



# **XVS1100(L) '99**

**5EL1-AE1**

## **SERVICE MANUAL**

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EB000000

**XVS1100 (L)  
SERVICE MANUAL**

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**First edition, October 1998**

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## NOTICE

This manual was produced by the Yamaha Motor Company 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, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha motorcycles has a basic understanding of the mechanical ideas and the procedures of motorcycle repair. Repairs attempted by anyone without this knowledge are likely to render the motorcycle unsafe and unfit for use.

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

### NOTE:

Designs and specifications are subject to change without notice.

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## 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!



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.

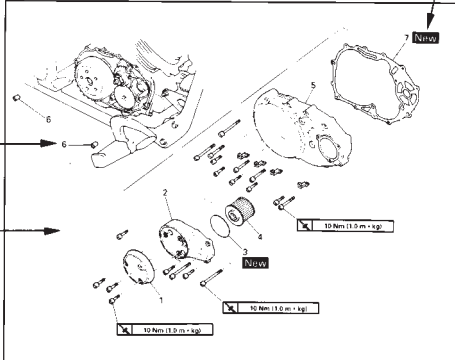
### EXPLODED DIAGRAMS

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.

② CLUTCH    ① ENG 

**CLUTCH CRANKCASE COVER (RIGHT)** 



⑤ → ④ → ⑦

| Order | Job name/Part name              | Qty | Remarks                                                                                                                                                                      |
|-------|---------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | Crankcase cover (right) removal |     | Remove the parts in the order below. Stand the motorcycle on a level surface.<br><b>WARNING</b><br>Securely support the motorcycle so there is no danger of it falling over. |
|       | Engine oil                      |     | Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.                                                                                                                              |
|       | Muffler assembly 1,2            |     | Refer to "ENGINE REMOVAL".                                                                                                                                                   |
| 1     | Brake pedal link                | 1   |                                                                                                                                                                              |
| 2     | Oil filter cover plate          | 1   |                                                                                                                                                                              |
| 3     | Oil filter cover                | 1   |                                                                                                                                                                              |
| 4     | O-ring                          | 1   | L=70 mm × 1, 65 mm × 1, 25 mm × 3                                                                                                                                            |
| 5     | Oil filter                      | 1   |                                                                                                                                                                              |
| 6     | Crankcase cover (right)         | 1   | L=65 mm × 1, 55 mm × 1, 45 mm × 4, 30 mm × 4                                                                                                                                 |

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CLUTCH    ENG 

**CLUTCH REMOVAL**

1. Straighten:  
• Lock washer tab

2. Loosen:  
• Nut (clutch boss) ①

**NOTE:**  
Loosen the nut (clutch boss) ① while holding the clutch boss ② with the clutch holding tool ③.

 Clutch holding tool: 98899-04086

**PRIMARY DRIVE GEAR REMOVAL**

1. Straighten:  
• Lock washer tab

2. Loosen:  
• Nut (primary drive gear) ①

**NOTE:**  
Place a copper plate ② between the teeth of the primary drive gear ③ and primary driven gear to lock them.

**CLUTCH INSPECTION**

1. Inspect:  
• Friction plates  
Wear/damage → Replace the friction plates as a set.

2. Measure:  
• Friction plate thickness  
Out of specification → Replace the friction plates as a set.  
Measure at four places.

 Thickness (friction plate): 2.9 ~ 3.1 mm <Wear limits> 2.6 mm

3. Inspect:  
• Clutch plate  
Damage → Replace the clutch plates as a set.

4. Measure:  
• Clutch plate warpage  
Out of specification → Replace the clutch plates as a set.  
Use a surface plate and a feeler gauge ①.

 Warp limit (clutch plate): Less than 0.2 mm

4-38

|                                                                                                      |                                                                                             |                                                                                       |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| ①<br>GEN<br>INFO    | ②<br>SPEC  |                                                                                       |
| ③<br>INSP<br>ADJ    | ④<br>ENG   |                                                                                       |
| ⑤<br>COOL           | ⑥<br>CARB  |                                                                                       |
| ⑦<br>CHAS           | ⑧<br>ELEC  |                                                                                       |
| ⑨<br>TRBL<br>SHTG  | ⑩         |                                                                                       |
| ⑪                 | ⑫        |                                                                                       |
| ⑬                 | ⑭        |                                                                                       |
| ⑮                 | ⑯        | ⑰  |
| ⑱                 | ⑲        | ⑳  |
| ㉑                 | ㉒        | ㉓  |
| ㉔                 | ㉕<br>New                                                                                    |                                                                                       |

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## ILLUSTRATED SYMBOLS

Illustrated symbols ① to ⑨ are printed on the top right of each page and indicate the subject of each chapter.

- ① General information
- ② Specifications
- ③ Periodic inspections and adjustments
- ④ Engine
- ⑤ Cooling system
- ⑥ Carburetion
- ⑦ Chassis
- ⑧ Electrical
- ⑨ Troubleshooting

Illustrated symbols ⑩ to ⑰ are used to identify the specifications appearing in the text.

- ⑩ Can be serviced with engine mounted
- ⑪ Filling fluid
- ⑫ Lubricant
- ⑬ Special tool
- ⑭ Torque
- ⑮ Wear limit, clearance
- ⑯ Engine speed
- ⑰  $\Omega$ , V, A

Illustrated symbols ⑱ to ㉓ in the exploded diagrams indicate the types of lubricants and lubrication points.

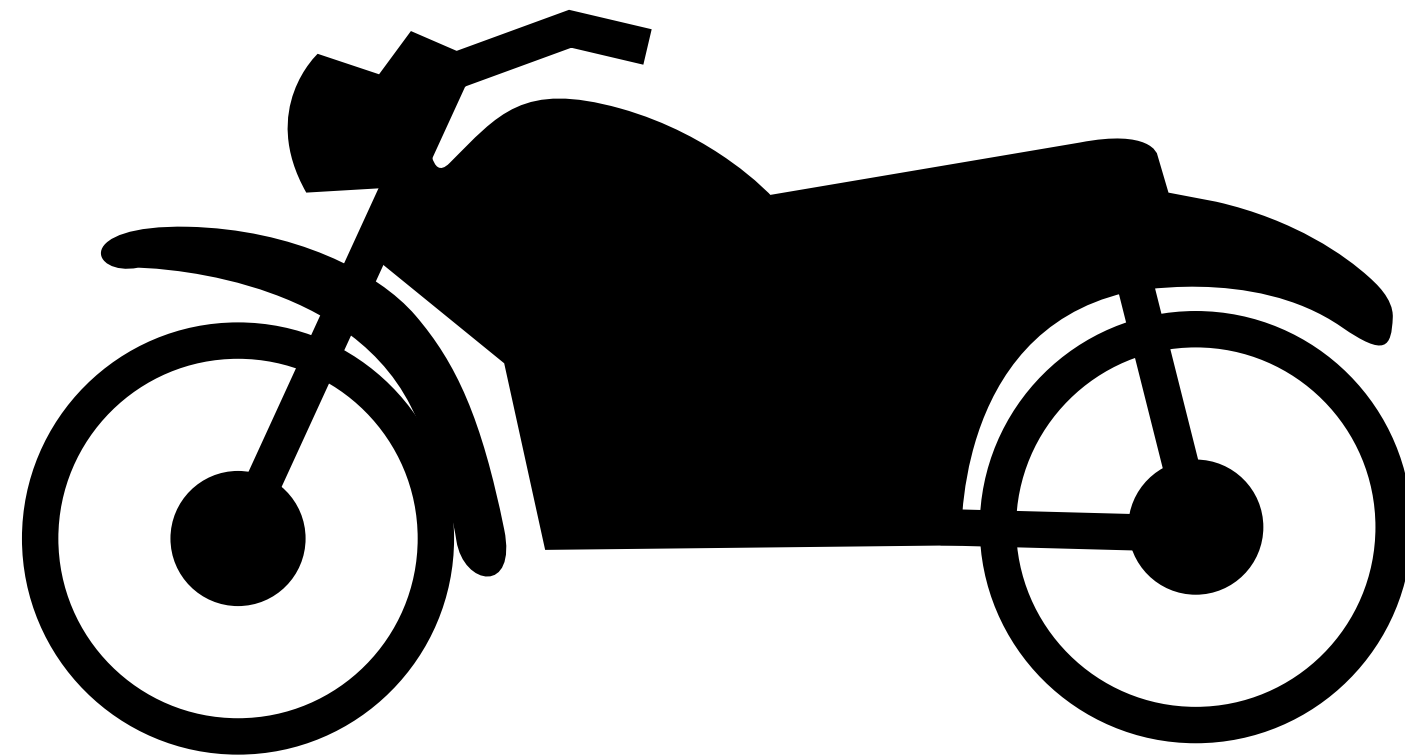
- ⑱ Apply engine oil
- ⑲ Apply gear oil
- ⑳ Apply molybdenum disulfide oil
- ㉑ Apply wheel bearing grease
- ㉒ Apply lightweight lithium-soap base grease
- ㉓ Apply molybdenum disulfide grease

Illustrated symbols ㉔ to ㉕ in the exploded diagrams indicate where to apply locking agent ㉔ and when to install new parts ㉕.

- ㉔ Apply locking agent (LOCTITE®)
- ㉕ Replace

# CHAPTER TITLES

|                                     |                                                                                       |
|-------------------------------------|---------------------------------------------------------------------------------------|
| GENERAL INFORMATION                 |    |
|                                     | GEN INFO <b>1</b>                                                                     |
| SPECIFICATIONS                      |    |
|                                     | SPEC <b>2</b>                                                                         |
| PERIODIC INSPECTION AND ADJUSTMENTS |    |
|                                     | INSP ADJ <b>3</b>                                                                     |
| ENGINE OVERHAUL                     |   |
|                                     | ENG <b>4</b>                                                                          |
| CARBURETION                         |  |
|                                     | CARB <b>5</b>                                                                         |
| CHASSIS                             |  |
|                                     | CHAS <b>6</b>                                                                         |
| ELECTRICAL                          |  |
|                                     | ELEC <b>7</b>                                                                         |
| TROUBLESHOOTING                     |  |
|                                     | TRBL SHTG <b>8</b>                                                                    |



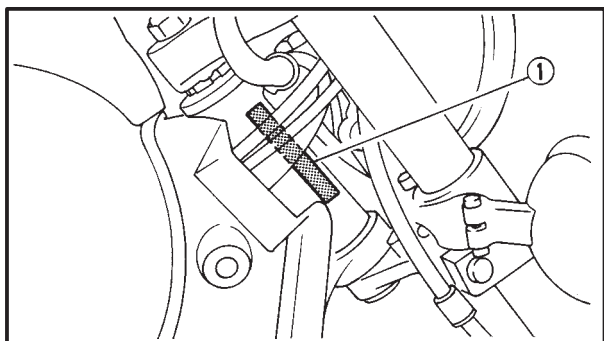
**GEN  
INFO**

**1**

CHAPTER 1.

GENERAL INFORMATION

|                                     |     |
|-------------------------------------|-----|
| <b>MOTORCYCLE IDENTIFICATION</b>    | 1-1 |
| VEHICLE IDENTIFICATION NUMBER       | 1-1 |
| MODEL LABEL                         | 1-1 |
| <b>IMPORTANT INFORMATION</b>        | 1-2 |
| PREPARATION FOR REMOVAL PROCEDURES  | 1-2 |
| REPLACEMENT PARTS                   | 1-2 |
| GASKETS, OIL SEALS AND O-RINGS      | 1-2 |
| LOCK WASHERS/PLATES AND COTTER PINS | 1-3 |
| BEARINGS AND OIL SEALS              | 1-3 |
| CIRCLIPS                            | 1-3 |
| <b>CHECKING OF CONNECTIONS</b>      | 1-4 |
| <b>SPECIAL TOOLS</b>                | 1-5 |



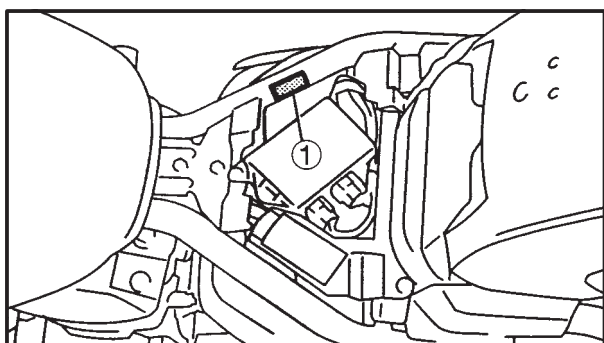
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### GENERAL INFORMATION MOTORCYCLE IDENTIFICATION

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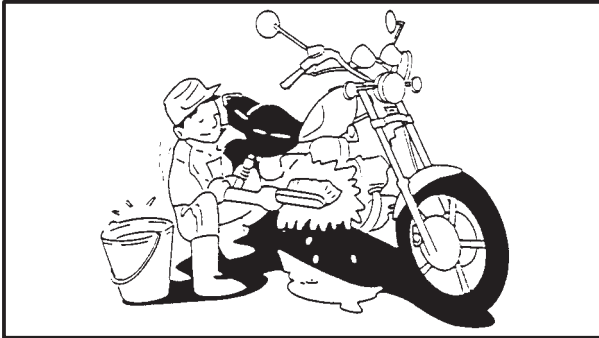
#### VEHICLE IDENTIFICATION NUMBER

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.



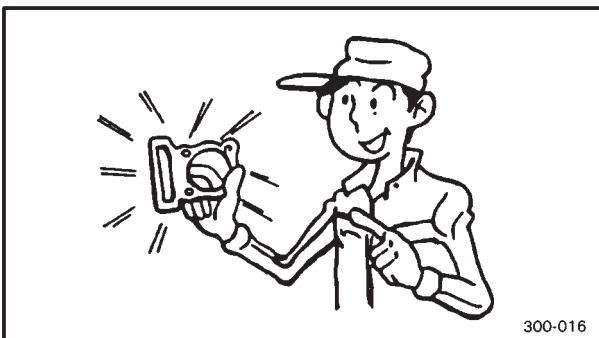
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## IMPORTANT INFORMATION PREPARATION FOR REMOVAL PROCEDURES

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.



300-008



300-016

EB101010

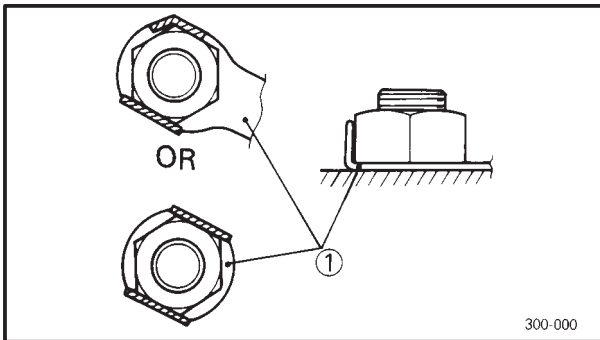
## REPLACEMENT PARTS

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.

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## 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.

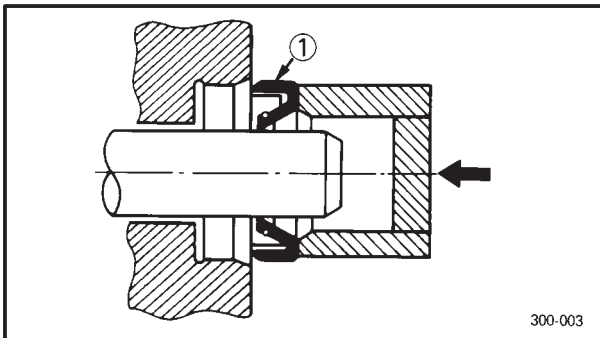


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### LOCK WASHERS/PLATES AND COTTER PINS

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



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### BEARINGS AND OIL SEALS

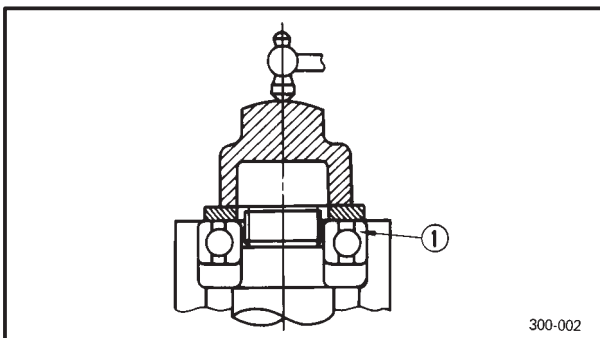
1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.

- ① Oil seal

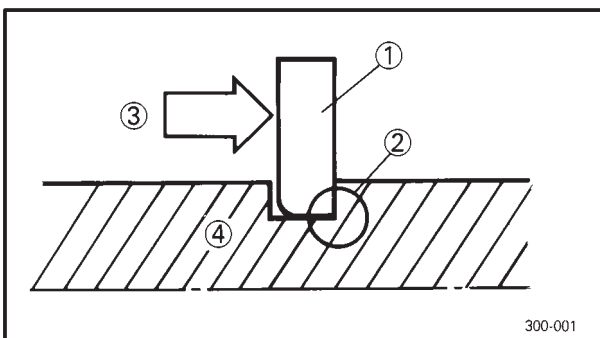
### CAUTION:

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

- ① Bearing



300-002



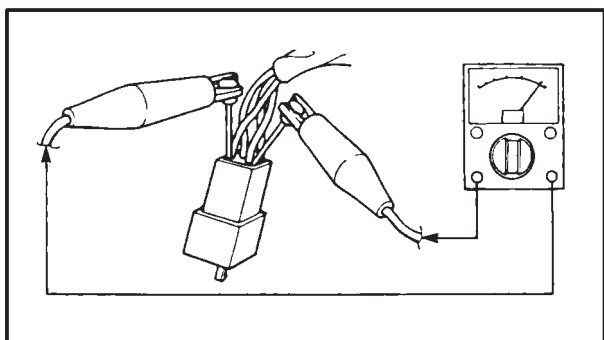
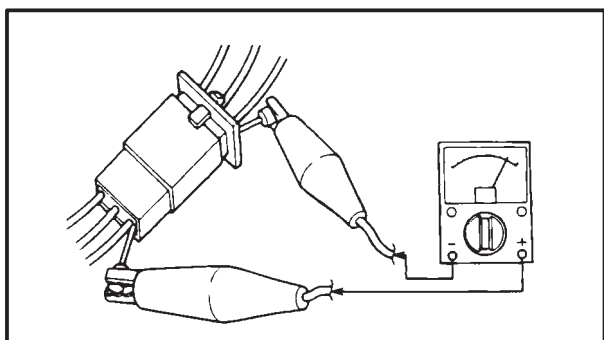
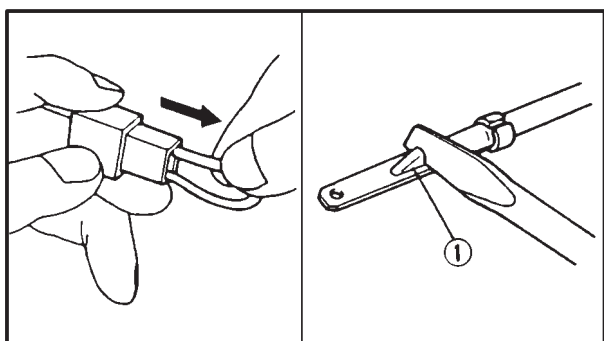
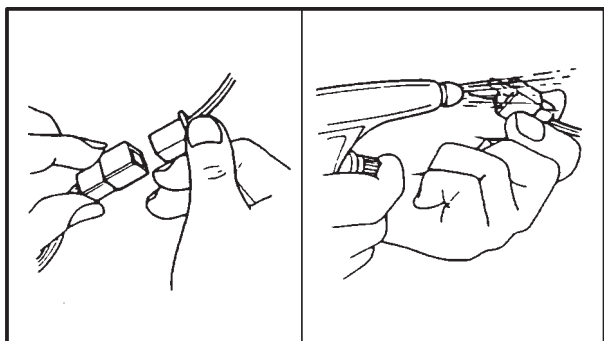
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### CIRCLIPS

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

- ④ Shaft



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### 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.

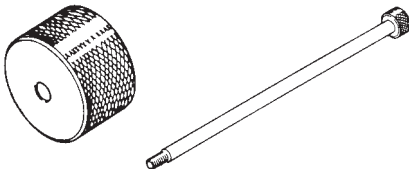
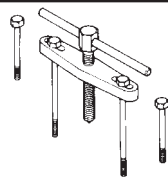
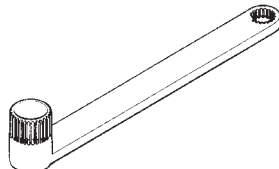
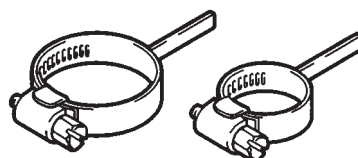
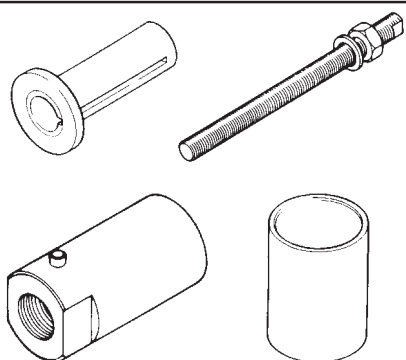
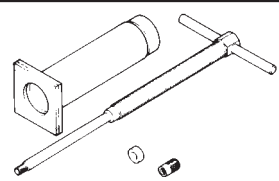
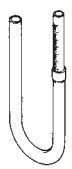


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## SPECIAL TOOLS

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.

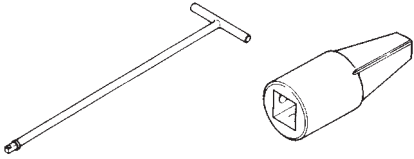
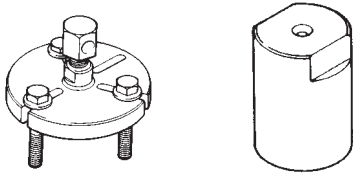
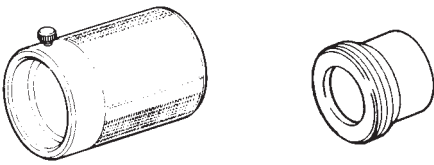
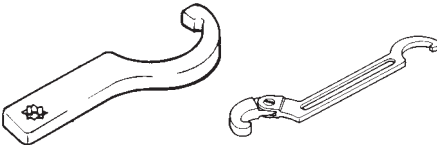
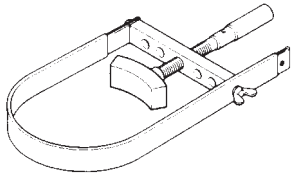
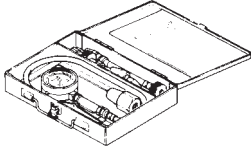
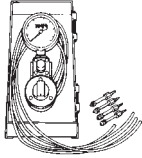
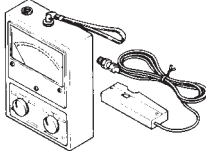
When placing an order, refer to the list provided below to avoid any mistakes.

| Tool No.                                                                                               | Tool name/How to use                                                                                               | Illustration                                                                          |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Weight<br>90890-01084<br>Bolt<br>90890-01085                                                           | Slide hammer bolt/weight<br><br>These tools are used to remove the rocker arm shaft.                               |    |
| 90890-01135                                                                                            | Crankcase separating tool<br><br>This tool is used to remove the crankshaft.                                       |    |
| 90890-01229                                                                                            | Coupling gear/Middle shaft tool<br><br>This tool is needed when removing or installing the final pinion shaft nut. |   |
| Final gear backlash band<br>90890-01230<br>Middle gear backlash band<br>90890-01231                    | Final gear backlash band<br><br>This tool is needed when measuring final gear /middle gear backlash.               |  |
| Installer pot<br>90890-01274<br>Bolt<br>90890-01275<br>Adaptor<br>90890-04130<br>Spacer<br>90890-04060 | Crankshaft installer pot/bolt/adaptor/spacer<br><br>These tools are used to install the crankshaft.                |  |
| 90890-01304                                                                                            | Piston pin puller<br><br>This tool is used to remove the piston pin.                                               |  |
| 90890-01312                                                                                            | Fuel level gauge<br><br>This gauge is used to measure the fuel level in the float chamber.                         |  |

## SPECIAL TOOLS

**GEN  
INFO**



| Tool No.                                                            | Tool name/How to use                                                                                                                 | Illustration                                                                          |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| T-handle<br>90890-01326<br>Holder<br>90890-01460                    | T-handle/damper rod holder<br><br>These tools are needed to loosen and tighten the damper rod holding bolt.                          |    |
| Puller<br>90890-01362<br>Adapter<br>90890-04131                     | Flywheel puller/adapter<br><br>These tools are needed to remove the rotor.                                                           |    |
| Weight<br>90890-01367<br>Adapter<br>90890-01381                     | Fork seal driver weight/adapter<br><br>These tools are needed when installing the slide metal, oil seal and dust seal into the fork. |     |
| Ring nut wrench<br>90890-01403<br>Exhaust nut wrench<br>90890-01268 | Ring nut wrench/exhaust and steering nut wrench<br><br>This tool is needed to loosen and tighten the steering stem ring nut.         |    |
| 90890-01701                                                         | Sheave holder<br><br>This tool is needed to hold the rotor when removing or installing the rotor bolt.                               |  |
| 90890-03081                                                         | Compression gauge set<br><br>These tools are needed to measure engine compression.                                                   |  |
| 90890-03094                                                         | Vacuum gauge<br><br>This gauge is needed for carburetor synchronization.                                                             |  |
| 90890-03112                                                         | Pocket tester<br><br>This instrument is needed for checking the electrical system.                                                   |  |
| 90890-03113                                                         | Engine tachometer<br><br>This tool is needed for observing engine r/min.                                                             |  |



| Tool No.                                                                       | Tool name/How to use                                                                                                                              | Illustration |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 90890-03141                                                                    | Timing light<br><br>This tool is necessary for checking ignition timing.                                                                          |              |
| 90890-04014                                                                    | Valve guide remover & installer<br><br>This tool is needed to remove and install the valve guide.                                                 |              |
| 90890-04019                                                                    | Valve spring compressor<br><br>This tool is needed to remove and install the valve assemblies.                                                    |              |
| Adapter<br>90890-01277<br>Shock puller<br>90890-01290<br>Weight<br>90890-01291 | Crankshaft installer bolt adapter/armature shock puller/weight<br><br>These tools are needed when removing the final pinion shaft.                |              |
| 90890-04137                                                                    | Bearing retainer wrench<br><br>This tool is needed when removing or installing the middle drive shaft assembly.                                   |              |
| Wrench<br>90890-04138<br>Holder<br>90890-04055                                 | Middle drive shaft nut wrench/Middle drive shaft holder<br><br>These tools are needed when removing or installing the middle drive shaft bearing. |              |
| 90890-04062                                                                    | Universal joint holder<br><br>This tool is needed when removing or installing the driven pinion gear nut.                                         |              |
| 90890-04077                                                                    | Bearing retainer wrench<br><br>This tool is needed when removing or installing the final drive pinion gear assembly.                              |              |
| 90890-04086                                                                    | Clutch holding tool<br><br>This tool is needed to hold the clutch when removing or installing the clutch boss nut.                                |              |

## SPECIAL TOOLS

GEN  
INFO



| Tool No.    | Tool name/How to use                                                                                                              | Illustration |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------|
| 90890-04090 | <p>Damper spring compressor</p> <p>This tool is needed when removing or installing the damper spring.</p>                         |              |
| 90890-06754 | <p>Dynamic spark tester<br/>Ignition checker</p> <p>This instrument is necessary for checking the ignition system components.</p> |              |
| 90890-85505 | <p>Yamaha bond No.1215</p> <p>This sealant (bond) is used on crankcase mating surfaces, etc.</p>                                  |              |



**SPEC**

**2**



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**CHAPTER 2.**  
**SPECIFICATIONS**

**GENERAL SPECIFICATIONS** ..... 2-1

**MAINTENANCE SPECIFICATIONS** ..... 2-4

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**LUBRICATION DIAGRAMS** ..... 2-23

**CABLE ROUTING** ..... 2-26



## SPECIFICATIONS

## GENERAL SPECIFICATIONS

| Item                                                                                                                                                                                                                                                                                                     | Standard                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model code:                                                                                                                                                                                                                                                                                              | XVS1100: 5EL1 (For Europe)<br>5EL2 (For D, A, FIN)<br>5EL3 (For Australia)                                                                                       |
| Dimensions:<br>Overall length<br>Overall width<br>Overall height<br>Seat height<br>Wheelbase<br>Minimum ground clearance<br>Minimum turning radius                                                                                                                                                       | 2,405 mm<br>895 mm<br>1,095 mm<br>690 mm<br>1,640 mm<br>145 mm<br>3,200 mm                                                                                       |
| Basic weight:<br>With oil and a full fuel tank                                                                                                                                                                                                                                                           | 274 kg (5EL2 : 275kg)                                                                                                                                            |
| Engine:<br>Engine type<br>Cylinder arrangement<br>Displacement<br>Bore × stroke<br>Compression ratio<br>Compression pressure (STD)<br>Starting system                                                                                                                                                    | Air cooled 4-stroke, SOHC<br>V-type 2-cylinder<br>1.063 L<br>95 × 75mm<br>8.3 : 1<br>1,000 kPa (10 kg/cm <sup>2</sup> , 10 bar) at 400 r/min<br>Electric starter |
| Lubrication system:                                                                                                                                                                                                                                                                                      | Wet sump                                                                                                                                                         |
| Oil type or grade:<br><div> <p>Engine oil Temp. °C</p> <p>The chart shows temperature ranges in °C for four oil grades: 10W/30 (approx. -15 to 25), 10W/40 (approx. -10 to 30), 20W/40 (approx. 0 to 35), and 20W/50 (approx. 5 to 40). Arrows indicate the recommended range for each grade.</p> </div> | API standard:<br>“SE” or higher grade<br>ACEA standard:<br>G4 or G5                                                                                              |
| Final gear oil:                                                                                                                                                                                                                                                                                          | SAE80API “GL-4” Hypoid Gear Oil                                                                                                                                  |
| Oil quantity:<br>Engine oil<br>Periodic oil change<br>With oil filter replacement<br>Total amount<br>Final gear case oil<br>Total amount                                                                                                                                                                 | <br><br>3.0 L<br>3.1 L<br>3.6 L<br><br>0.2 L                                                                                                                     |
| Air filter:                                                                                                                                                                                                                                                                                              | Dry type element                                                                                                                                                 |
| Fuel:<br>Type<br>Fuel tank capacity<br>Fuel reserve amount                                                                                                                                                                                                                                               | Regular unleaded gasoline<br>17 L<br>4.5 L                                                                                                                       |

## GENERAL SPECIFICATIONS

**SPEC**



| Item                            |           | Standard                                                                   |
|---------------------------------|-----------|----------------------------------------------------------------------------|
| Carburetor:                     |           |                                                                            |
| Type/quantity                   |           | BSR37/2                                                                    |
| Manufacturer                    |           | MIKUNI                                                                     |
| Spark plug:                     |           |                                                                            |
| Type                            |           | BPR7ES/W22EPR-U                                                            |
| Manufacturer                    |           | NGK/DENSO                                                                  |
| Spark plug gap                  |           | 0.7 ~ 0.8 mm                                                               |
| Clutch type:                    |           | Wet, multiple-disc                                                         |
| Transmission:                   |           |                                                                            |
| Primary reduction system        |           | Spur gear                                                                  |
| Primary reduction ratio         |           | 78/47 (1.660)                                                              |
| Secondary reduction system      |           | Shaft drive                                                                |
| Secondary reduction ratio       |           | 44/47 × 19/18 × 32/11 (2.875)                                              |
| Transmission type               |           | Constant mesh 5-speed                                                      |
| Operation                       |           | Left foot operation                                                        |
| Gear ratio                      | 1st       | 40/17 (2.353)                                                              |
|                                 | 2nd       | 40/24 (1.667)                                                              |
|                                 | 3rd       | 36/28 (1.286)                                                              |
|                                 | 4th       | 32/31 (1.032)                                                              |
|                                 | 5th       | 29/34 (0.853)                                                              |
| Chassis:                        |           |                                                                            |
| Frame type                      |           | Double cradle                                                              |
| Caster angle                    |           | 33°                                                                        |
| Trail                           |           | 136 mm                                                                     |
| Tire:                           |           |                                                                            |
| Type                            |           | With tube                                                                  |
| Size                            | front     | 110/90-18 61S                                                              |
|                                 | rear      | 170/80-15M/C 77S                                                           |
| Manufacturer                    | front     | BRIDGESTONE/DUNLOP                                                         |
|                                 | rear      | BRIDGESTONE/DUNLOP                                                         |
| Type                            | front     | EXEDRA L309/K555F                                                          |
|                                 | rear      | EXEDRA G546/K555                                                           |
| Maximum load-except motorcycle: |           | 201 kg (5EL2 : 200kg)                                                      |
| Tire pressure (cold tire):      |           |                                                                            |
| 0 ~ 90 kg (0 ~ 198 lb) load *   |           |                                                                            |
|                                 | front     | 200 kPa (2.00 kg/cm <sup>2</sup> )                                         |
|                                 | rear      | 225 kPa (2.25 kg/cm <sup>2</sup> )                                         |
| 90 kg (198 lb) ~ Maximum load * |           |                                                                            |
|                                 | front     | 225 kPa (2.25 kg/cm <sup>2</sup> )                                         |
|                                 | rear      | 250 kPa (2.50 kg/cm <sup>2</sup> )                                         |
|                                 |           | * Load is the total weight of the cargo, rider, passenger and accessories. |
| Brake:                          |           |                                                                            |
| Front brake                     | type      | Dual disc brake                                                            |
|                                 | operation | Right hand operation                                                       |
| Rear brake                      | type      | Single disc brake                                                          |
|                                 | operation | Right foot operation                                                       |

## GENERAL SPECIFICATIONS

**SPEC**



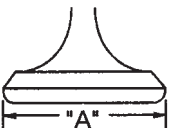
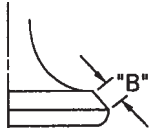
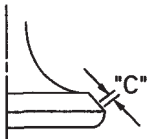
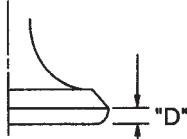
| Item                                                                                                                                                                                                                                                           | Standard                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Suspension:<br>Front suspension<br>Rear suspension                                                                                                                                                                                                             | Telescopic fork<br>Swingarm (link suspension)                                                                                                                                                        |
| Shock absorber:<br>Front shock absorber<br>Rear shock absorber                                                                                                                                                                                                 | Coil spring/Oil damper<br>Coil spring/Gas-oil damper                                                                                                                                                 |
| Wheel travel:<br>Front wheel travel<br>Rear wheel travel                                                                                                                                                                                                       | 140 mm<br>113 mm                                                                                                                                                                                     |
| Electrical:<br>Ignition system<br>Generator system<br>Battery type<br>Battery capacity                                                                                                                                                                         | T.C.I. (digital)<br>A.C. magneto<br>GT14B-4<br>12 V 12 AH                                                                                                                                            |
| Headlight type:                                                                                                                                                                                                                                                | Quartz bulb (halogen)                                                                                                                                                                                |
| Bulb wattage × quantity:<br>Headlight<br>Auxiliary light<br>Tail/brake light<br>Turn signal<br>Licence light<br>Meter light<br>Neutral indicator light<br>High beam indicator light<br>Turn indicator light<br>Oil level caution light<br>Engine warning light | 12 V 60 W/55 W × 1<br>12 V 4 W × 1<br>12 V 5 W/21 W × 1<br>12 V 21 W × 4<br>12 V 5 W × 1<br>14 V 1.4 W × 2<br>12 V 1.7 W × 1<br>12 V 1.7 W × 1<br>12 V 1.7 W × 1<br>12 V 1.7 W × 1<br>12 V 1.7 W × 1 |



# MAINTENANCE SPECIFICATIONS

**SPEC**

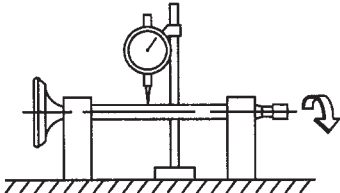
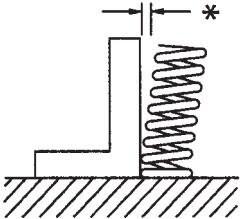
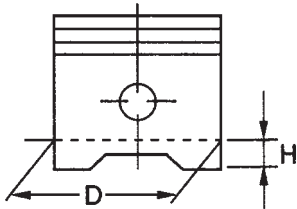


| Item                                                                                                                                                                                                                                                                                                                                       | Standard              |                  | Limit     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------|-----------|
| Timing chain:                                                                                                                                                                                                                                                                                                                              |                       |                  |           |
| Timing chain type/No. of links                                                                                                                                                                                                                                                                                                             | SILENT CHAIN/98L      |                  | ...       |
| Timing chain adjustment method                                                                                                                                                                                                                                                                                                             | Automatic             |                  | ...       |
| Rocker arm/rocker arm shaft:                                                                                                                                                                                                                                                                                                               |                       |                  |           |
| Bearing inside diameter                                                                                                                                                                                                                                                                                                                    | 14.000 mm ~ 14.018 mm |                  | 14.036 mm |
| Shaft outside diameter                                                                                                                                                                                                                                                                                                                     | 13.985 mm ~ 13.991 mm |                  | 13.95 mm  |
| Arm-to-shaft clearance                                                                                                                                                                                                                                                                                                                     | 0.009 mm ~ 0.033 mm   |                  | 0.086 mm  |
| Valve, valve seat, valve guide:                                                                                                                                                                                                                                                                                                            |                       |                  |           |
| Valve clearance (cold)                                                                                                                                                                                                                                                                                                                     | IN                    | 0.07 ~ 0.12 mm   | ...       |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 0.12 ~ 0.17 mm   | ...       |
| Valve dimensions:                                                                                                                                                                                                                                                                                                                          |                       |                  |           |
|     |                       |                  |           |
| Head Dia                                                                                                                                                                                                                                                                                                                                   |                       |                  |           |
| "A" head diameter                                                                                                                                                                                                                                                                                                                          | IN                    | 47.0 ~ 47.2 mm   | ...       |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 39.0 ~ 39.2 mm   | ...       |
| "B" face width                                                                                                                                                                                                                                                                                                                             | IN                    | 2.1 mm           | ...       |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 2.1 mm           | ...       |
| "C" seat width                                                                                                                                                                                                                                                                                                                             | IN                    | 1.2 ~ 1.4 mm     | 1.8 mm    |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 1.2 ~ 1.4 mm     | 1.8 mm    |
| "D" margin thickness                                                                                                                                                                                                                                                                                                                       | IN                    | 1.1 ~ 1.5 mm     | 0.8 mm    |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 1.1 ~ 1.5 mm     | 0.8 mm    |
| Stem outside diameter                                                                                                                                                                                                                                                                                                                      | IN                    | 7.975 ~ 7.990 mm | ...       |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 7.960 ~ 7.975 mm | ...       |
| Guide inside diameter                                                                                                                                                                                                                                                                                                                      | IN                    | 8.000 ~ 8.012 mm | ...       |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 8.000 ~ 8.012 mm | ...       |
| Stem-to-guide clearance                                                                                                                                                                                                                                                                                                                    | IN                    | 0.010 ~ 0.037 mm | 0.08 mm   |
|                                                                                                                                                                                                                                                                                                                                            | EX                    | 0.025 ~ 0.052 mm | 0.10 mm   |

# MAINTENANCE SPECIFICATIONS

**SPEC**

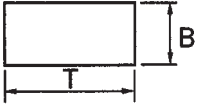
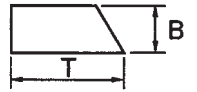
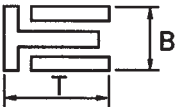
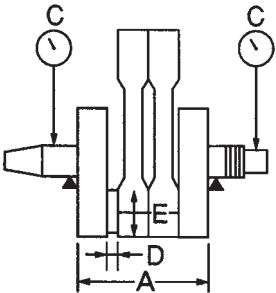


| Item                                                                                |          | Standard                               | Limit                    |
|-------------------------------------------------------------------------------------|----------|----------------------------------------|--------------------------|
| Stem runout limit                                                                   |          | ...                                    | 0.03 mm                  |
|    |          |                                        |                          |
| Valve seat width                                                                    | IN<br>EX | 1.2 ~ 1.4 mm<br>1.2 ~ 1.4 mm           | 2.0 mm<br>2.0 mm         |
| Valve spring:                                                                       |          |                                        |                          |
| Free length                                                                         | IN<br>EX | 44.6 mm<br>44.6 mm                     | 43.5 mm<br>43.5 mm       |
| Set length (valve closed)                                                           | IN<br>EX | 40 mm<br>40 mm                         | ...<br>...               |
| Compressed pressure (installed)                                                     | IN<br>EX | 160.7 N (16.4 kg)<br>160.7 N (16.4 kg) | ...<br>...               |
| Tilt limit *                                                                        | IN<br>EX | ...<br>...                             | 2.5°/1.9mm<br>2.5°/1.9mm |
|   |          |                                        |                          |
| Direction of winding (top view)                                                     | IN<br>EX | Clockwise<br>Clockwise                 | ...<br>...               |
| Piston:                                                                             |          |                                        |                          |
| Piston to cylinder clearance                                                        |          | 0.025 ~ 0.050 mm                       | 0.15 mm                  |
| Piston size "D"                                                                     |          | 94.960 ~ 94.975 mm                     | ...                      |
|  |          |                                        |                          |
| Measuring point "H"                                                                 |          | 5 mm                                   | ...                      |
| Piston off-set                                                                      |          | 0 mm                                   | ...                      |

# MAINTENANCE SPECIFICATIONS

SPEC



| Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Standard                                                                                                                                                                             | Limit                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Piston pin bore inside diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 22.004 ~ 22.015 mm                                                                                                                                                                   | ...                                                                                                                            |
| Piston pin outside diameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 21.991 ~ 22.000 mm                                                                                                                                                                   | ...                                                                                                                            |
| Piston rings:<br>Top ring: <br><br>Type<br>Dimensions (B × T)<br>End gap (installed)<br>Side clearance (installed)<br>2nd ring: <br><br>Type<br>Dimensions (B × T)<br>End gap (installed)<br>Side clearance<br><br><br>Oil ring: <br><br>Dimensions (B × T)<br>End gap (installed) | Plain<br>1.5 × 3.8 mm<br>0.3 ~ 0.5 mm<br>0.04 ~ 0.08 mm<br><br><br>Taper<br>1.2 × 3.8 mm<br>0.30 ~ 0.45 mm<br>0.03 ~ 0.07 mm<br><br><br><br><br><br><br>2.5 × 3.4 mm<br>0.2 ~ 0.7 mm | ...<br>...<br>0.8 mm<br>0.1 mm<br><br><br><br><br><br><br>...<br>...<br>0.8 mm<br>0.1 mm<br><br><br><br><br><br><br>...<br>... |
| Connecting rod:<br>Oil clearance<br>Color code (corresponding size)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.044 ~ 0.073 mm<br>①Blue ② Black ③ Brown ④ Green ⑤ Yellow                                                                                                                           | ...<br>...                                                                                                                     |
| Crankshaft: <br><br>Crank width "A"<br>Runout limit "C"<br>Big end side clearance "D"                                                                                                                                                                                                                                                                                                                                                                | 101.95 ~ 102.00 mm<br>...<br>0.320 ~ 0.474 mm                                                                                                                                        | ...<br>0.02 mm<br>...                                                                                                          |

# MAINTENANCE SPECIFICATIONS

**SPEC**



| Item                            | Standard                           | Limit   |
|---------------------------------|------------------------------------|---------|
| Clutch:                         |                                    |         |
| Friction plate thickness        | 2.9 ~ 3.1 mm                       | 2.8 mm  |
| Quantity                        | 8                                  | ...     |
| Clutch plate thickness          | 2.5 ~ 2.7 mm                       | 0.1 mm  |
| Quantity                        | 1                                  | ...     |
| Clutch plate thickness          | 1.9 ~ 2.1 mm                       | 0.1 mm  |
| Quantity                        | 7                                  | ...     |
| Clutch spring free length       | 7.2 mm                             | 6.5 mm  |
| Quantity                        | 1                                  | ...     |
| Clutch housing thrust clearance | 0.05 ~ 0.40 mm                     | ...     |
| Clutch housing radial clearance | 0.010 ~ 0.044 mm                   | ...     |
| Clutch release method           | Inner push, screw push             | ...     |
| Push rod bending limit          | ...                                | 0.5 mm  |
| Transmission:                   |                                    |         |
| Main axle deflection limit      | ...                                | 0.08 mm |
| Drive axle deflection limit     | ...                                | 0.08 mm |
| Shifter:                        |                                    |         |
| Shifter type                    | Guide bar                          | ...     |
| Carburetor:                     |                                    |         |
| I. D. mark                      | 5EL1 00                            | ...     |
| Main jet (M.J)                  | #1: #110, #2: #112.5               | ...     |
| Main air jet (M.A.J)            | #55                                | ...     |
| Jet needle (J.N)                | #1: 5DL39-53-3/5, #2: 5DL40-53-3/5 | ...     |
| Needle jet (N.J)                | P-0M                               | ...     |
| Pilot air jet (P.A.J.1)         | #63.8                              | ...     |
| (P.A.J.2)                       | #145                               | ...     |
| Pilot outlet (P.O)              | 1.0                                | ...     |
| Pilot jet (P.J)                 | #17.5                              | ...     |
| Bypass 1 (B.P.1)                | 0.8                                | ...     |
| Bypass 2 (B.P.2)                | 0.8                                | ...     |
| Bypass 3 (B.P.3)                | 0.8                                | ...     |
| Pilot screw (P.S)               | 3                                  | ...     |
| Valve seat size (V.S)           | 1.2                                | ...     |
| Starter jet (G.S.1)             | #42.5                              | ...     |
| Starter jet (G.S.2)             | 0.8                                | ...     |
| Throttle valve size (Th.V)      | #125                               | ...     |
| Fuel level (F.L)                | 4 ~ 5 mm                           | ...     |
| Engine idle speed               | 950 ~ 1,050 r/min                  | ...     |
| Intake vacuum                   | 34.7 ~ 37.3 kPa (260 ~ 280 mmHg)   | ...     |
| Engine oil temperature          | 75 ~ 85°C                          | ...     |
| Fuel pump:                      |                                    |         |
| Type                            | Electrical type                    | ...     |
| Model/manufacturer              | UC-Z6M/MITSUBISHI                  | ...     |
| Consumption amperage <max>      | 0.8 A                              | ...     |
| Output pressure                 | 12 kPa (0.12 kg/cm <sup>2</sup> )  | ...     |

## MAINTENANCE SPECIFICATIONS

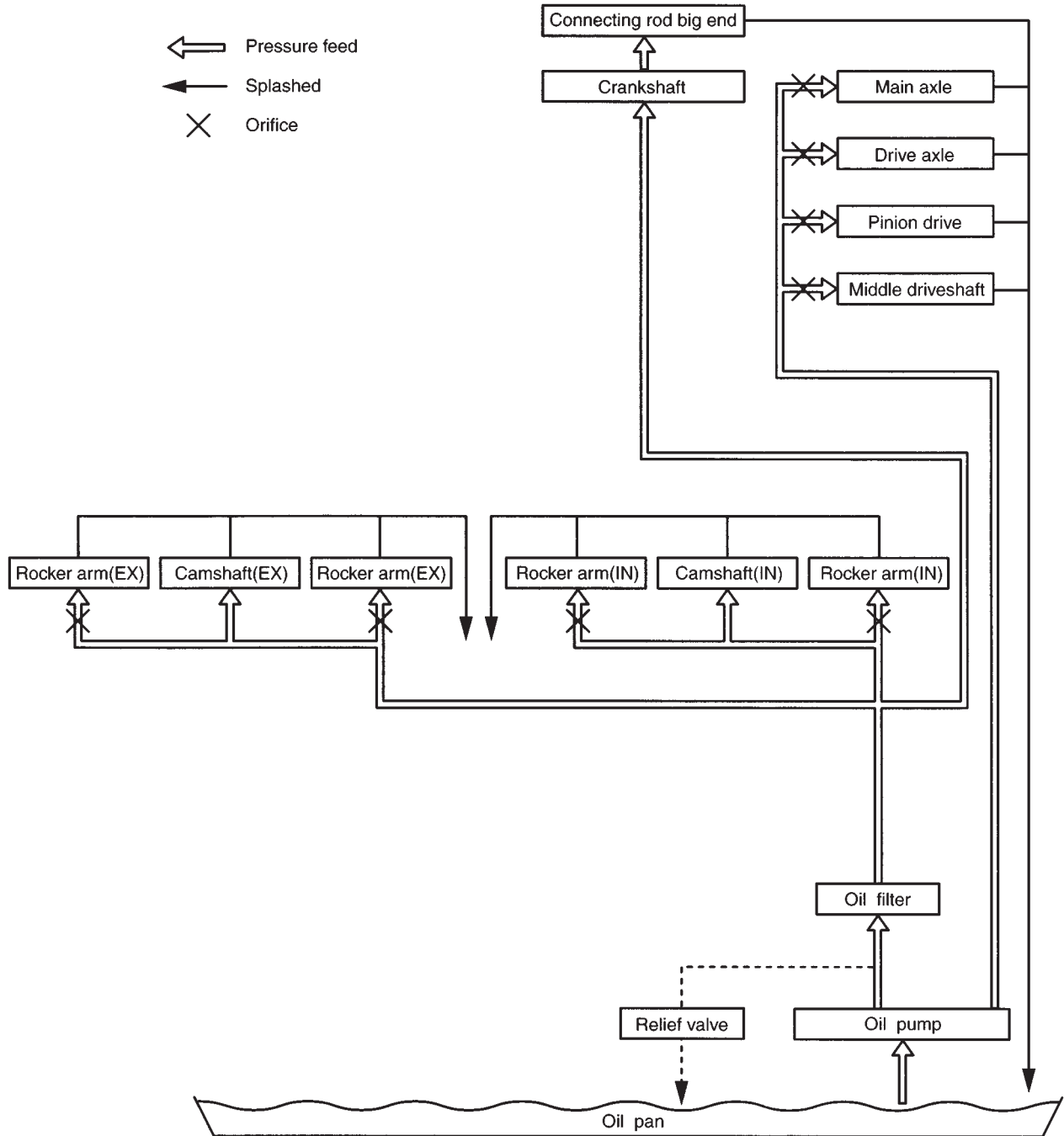
**SPEC**



| Item                            | Standard                                      | Limit   |
|---------------------------------|-----------------------------------------------|---------|
| Lubrication system:             |                                               |         |
| Oil filter type                 | Paper type                                    | ...     |
| Oil pump type                   | Trochoid type                                 | ...     |
| Tip clearance "A" or "B"        | 0.03 ~ 0.09 mm                                | 0.15 mm |
| Side clearance                  | 0.03 ~ 0.08 mm                                | 0.15 mm |
| Relief valve operating pressure | 450 ~ 550 kPa (4.5 ~ 5.5 kg/cm <sup>2</sup> ) | ...     |
| Shaft drive:                    |                                               |         |
| Middle gear backlash            | 0.1 ~ 0.2 mm                                  | ...     |
| Final gear backlash             | 0.1 ~ 0.2 mm                                  | ...     |

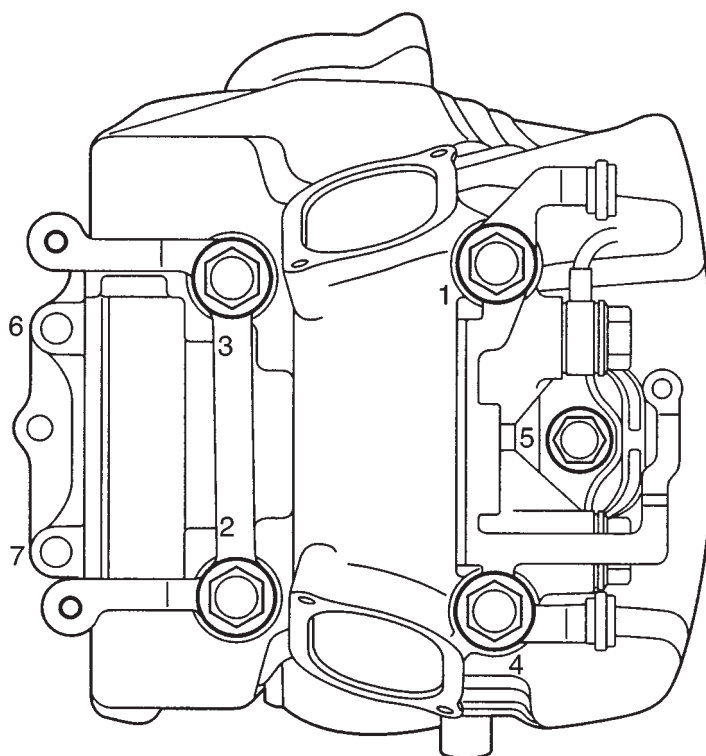


Lubrication chart:

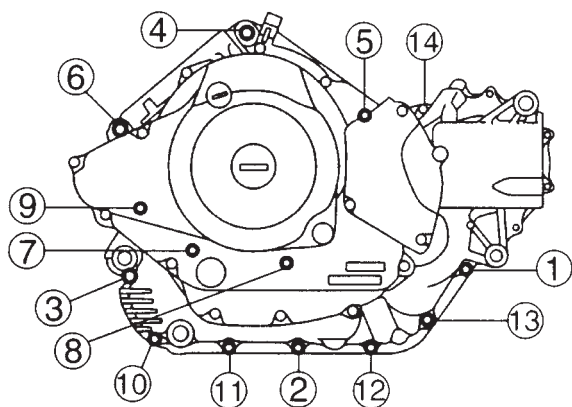




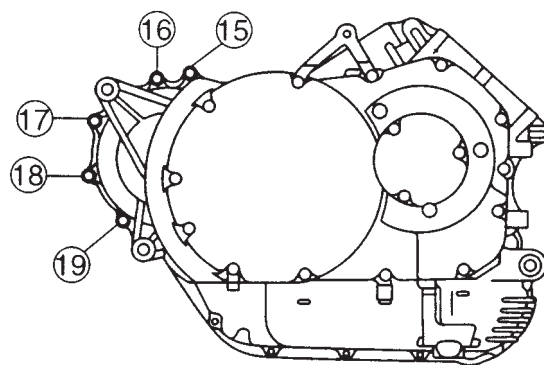
Cylinder head tightening sequence:



Crankcase tightening sequence:



Left crankcase



Right crankcase

# MAINTENANCE SPECIFICATIONS

**SPEC**



## Tightening torques

| Part to be tightened                        | Part name  | Thread size | Q'ty | Tightening torque |      | Remarks                                                                                                  |
|---------------------------------------------|------------|-------------|------|-------------------|------|----------------------------------------------------------------------------------------------------------|
|                                             |            |             |      | Nm                | m•kg |                                                                                                          |
| Cylinder head                               | Nut        | M12         | 8    | 50                | 5.0  | <br>Use lock washer   |
| Cylinder head                               | Nut        | M10         | 2    | 35                | 3.5  |                                                                                                          |
| Plate                                       | Bolt       | M8          | 2    | 20                | 2.0  |                                                                                                          |
| Cylinder head cover                         | Screw      | M6          | 4    | 4                 | 0.4  |                                                                                                          |
| Cylinder head (exhaust pipe)                | Stud bolt  | M8          | 4    | 12.5              | 1.25 |                                                                                                          |
| Rocker arm shaft                            | Union bolt | M16         | 2    | 37.5              | 3.75 |                                                                                                          |
| Camshaft sprocket cover                     | Bolt       | M6          | 4    | 10                | 1.0  |                                                                                                          |
| Tappet cover                                | Bolt       | M6          | 8    | 10                | 1.0  |                                                                                                          |
| Rocker arm shaft (oil passage)              | Bolt       | M16         | 4    | 38                | 3.8  |                                                                                                          |
| Stopper plate (camshaft)                    | Bolt       | M8          | 4    | 20                | 2.0  |                                                                                                          |
| Spark plug                                  | —          | M14         | 2    | 20                | 2.0  |                                                                                                          |
| Cylinder                                    | Bolt       | M6          | 2    | 10                | 1.0  |                                                                                                          |
| Lower cylinder head cover                   | Bolt       | M6          | 6    | 10                | 1.0  | <br>Use lock washer   |
| Upper cylinder head cover                   | Screw      | M6          | 8    | 5                 | 0.5  |                                                                                                          |
| Connecting rod                              | Nut        | M9          | 4    | 48                | 4.8  |                                                                                                          |
| Rotor                                       | Nut        | M16         | 1    | 175               | 17.5 |                                                                                                          |
| Valve adjusting locknut                     | Nut        | M8          | 4    | 27                | 2.7  |                                                                                                          |
| Camshaft sprocket                           | Bolt       | M10         | 2    | 55                | 5.5  |                                                                                                          |
| Timing chain tensioner                      | Bolt       | M6          | 4    | 10                | 1.0  |                                                                                                          |
| Timing chain tensioner cap                  | Bolt       | M6          | 2    | 8                 | 0.8  |                                                                                                          |
| Timing chain guide                          | Bolt       | M6          | 4    | 10                | 1.0  |                                                                                                          |
| Oil pump                                    | Bolt       | M6          | 3    | 10                | 1.0  |                                                                                                          |
| Oil strainer cover                          | Bolt       | M6          | 3    | 10                | 1.0  |                                                                                                          |
| Oil filter cover                            | Bolt       | M6          | 5    | 10                | 1.0  |                                                                                                          |
| Oil pump gear                               | Bolt       | M6          | 1    | 12                | 1.2  | <br>Use lock washer |
| Oil pump cap                                | Bolt       | M6          | 1    | 10                | 1.0  |                                                                                                          |
| Oil delivery pipe (cylinder head)           | Union bolt | M16         | 2    | 20                | 2.0  |                                                                                                          |
| Oil delivery pipe (crankcase)               | Union bolt | M10         | 1    | 20                | 2.0  |                                                                                                          |
| Drain bolt                                  | —          | M14         | 1    | 43                | 4.3  |                                                                                                          |
| Carburetor cover                            | Bolt       | M5          | 2    | 7                 | 0.7  |                                                                                                          |
| Air filter case stay                        | Bolt       | M6          | 2    | 10                | 1.0  |                                                                                                          |
| Air filter case assembly                    | Bolt       | M5          | 3    | 2                 | 0.2  |                                                                                                          |
| Exhaust pipe joint and cylinder head        | Nut        | M8          | 4    | 20                | 2.0  |                                                                                                          |
| Exhaust pipe joint and muffler assembly     | Bolt       | M8          | 2    | 20                | 2.0  |                                                                                                          |
| Muffler                                     | Bolt       | M10         | 2    | 25                | 2.5  |                                                                                                          |
| Crankcase (cylinder)                        | Stud bolt  | M12         | 8    | 24                | 2.4  | <br>Use lock washer |
| Crankcase (cylinder)                        | Stud bolt  | M10         | 2    | 20                | 2.0  |                                                                                                          |
| Crankcase                                   | Bolt       | M10         | 3    | 38.5              | 3.85 |                                                                                                          |
| Crankcase                                   | Bolt       | M6          | 10   | 10                | 1.0  |                                                                                                          |
| Bearing retainer (middle drive pinion gear) | Bolt       | M8          | 3    | 25                | 2.5  |                                                                                                          |
| Crankcase cover (left)                      | Bolt       | M6          | 13   | 10                | 1.0  |                                                                                                          |
| Crankcase cover (right)                     | Bolt       | M6          | 11   | 10                | 1.0  |                                                                                                          |
| Clamp                                       | Bolt       | M6          | 1    | 10                | 1.0  |                                                                                                          |
| One-way clutch                              | Bolt       | M6          | 8    | 12                | 1.2  |                                                                                                          |
| Primary drive gear                          | Nut        | M20         | 1    | 110               | 11.0 |                                                                                                          |

# MAINTENANCE SPECIFICATIONS

**SPEC**



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



## CHASSIS

| Item                    | Standard                   | Limit  |
|-------------------------|----------------------------|--------|
| Steering system:        |                            |        |
| Steering bearing type   | Angular bearing            | ...    |
| Front suspension:       |                            |        |
| Front fork travel       | 140 mm                     | ...    |
| Fork spring free length | 356.9 mm                   | 350 mm |
| Fitting length          | 319.4 mm                   | ...    |
| Collar length           | 183 mm                     | ...    |
| Spring rate (K1)        | 8.8 N/mm (0.9 kg/mm)       | ...    |
| (K2)                    | 12.7 N/mm (1.3 kg/mm)      | ...    |
| Stroke (K1)             | 0 ~ 77.5 mm                | ...    |
| (K2)                    | 77.5 ~ 140 mm              | ...    |
| Optional spring         | No                         | ...    |
| Oil capacity            | 0.464 L                    | ...    |
| Oil level               | 108 mm                     | ...    |
| Oil grade               | Fork oil 10W or equivalent | ...    |
| Rear suspension:        |                            |        |
| Shock absorber travel   | 113 mm                     | ...    |
| Spring free length      | 179.5 mm                   | ...    |
| Fitting length          | 163 mm                     | ...    |
| Spring rate (K1)        | 117.7 N/mm (12 kg/mm)      | ...    |
| Stroke (K1)             | 0 ~ 50 mm                  | ...    |
| Optional spring         | No                         | ...    |
| Swingarm:               |                            |        |
| Free play limit end     | ...                        | 0 mm   |
| Front wheel:            |                            |        |
| Type                    | Spoke wheel                | ...    |
| Rim size                | 18 × 2.15                  | ...    |
| Rim material            | Steel                      | ...    |
| Rim runout limit radial | ...                        | 1.0 mm |
| lateral                 | ...                        | 0.5 mm |
| Rear wheel:             |                            |        |
| Type                    | Spoke wheel                | ...    |
| Rim size                | 15M/C × MT4.50             | ...    |
| Rim material            | Steel                      | ...    |
| Rim runout limit radial | ...                        | 1.0 mm |
| lateral                 | ...                        | 0.5 mm |

|      |                                                                                     |
|------|-------------------------------------------------------------------------------------|
| SPEC |  |
|------|-------------------------------------------------------------------------------------|



# Tightening torques

| Part to be tightened                                  | Thread size | Tightening torque |      | Remarks  |
|-------------------------------------------------------|-------------|-------------------|------|----------|
|                                                       |             | Nm                | m•kg |          |
| Upper bracket and inner tube                          | M8          | 20                | 2.0  | See NOTE |
| Lower bracket and inner tube                          | M10         | 30                | 3.0  |          |
| Upper bracket and steering shaft                      | M22         | 110               | 11.0 |          |
| Ring nut (steering shaft)                             | —           | 18                | 1.8  |          |
| Handlebar holder (lower) and upper bracket            | M12         | 32                | 3.2  |          |
| Handlebar holder (lower) and handlebar holder (upper) | M8          | 28                | 2.8  |          |
| Master cylinder (front brake)                         | M6          | 10                | 1.0  |          |
| Union bolt (brake hose)                               | M10         | 30                | 3.0  |          |
| Brake hose holder and lower bracket                   | M6          | 10                | 1.0  |          |
| Brake hose joint and brake pipe                       | M10         | 19                | 1.9  |          |
| Brake hose joint and brake hose holder                | M6          | 10                | 1.0  |          |
| Front fender and outer tube                           | M8          | 10                | 1.0  |          |
| Headlight stay and lower bracket                      | M6          | 7                 | 0.7  |          |
| Headlight stay and headlight                          | M6          | 8                 | 0.8  |          |
| Front flasher light and lower bracket                 | M6          | 7                 | 0.7  |          |
| Engine mounting:                                      |             |                   |      |          |
| Frame and stay (front - upper)                        | M10         | 48                | 4.8  |          |
| Frame and stay (front - lower)                        | M10         | 48                | 4.8  |          |
| Stay and engine (front - upper)                       | M12         | 74                | 7.4  |          |
| Stay and engine (front - lower)                       | M10         | 48                | 4.8  |          |
| Frame and engine (rear - upper)                       | M10         | 48                | 4.8  |          |
| Frame and engine (rear - lower)                       | M10         | 48                | 4.8  |          |
| Down tube and frame                                   | M10         | 48                | 4.8  |          |
| Ignition coil and stay                                | M5          | 4                 | 0.4  |          |
| Muffler stay and frame                                | M8          | 30                | 3.0  |          |
| Rear shock absorber and relay arm                     | M10         | 48                | 4.8  |          |
| Rear shock absorber and frame                         | M10         | 40                | 4.0  |          |
| Pivot shaft and swingarm                              | M16         | 90                | 9.0  |          |
| Relay arm and frame                                   | M10         | 48                | 4.8  |          |
| Connecting arm and relay arm                          | M12         | 48                | 4.8  |          |
| Connecting arm and swingarm                           | M12         | 48                | 4.8  |          |
| Final gear case and swingarm                          | M10         | 90                | 9.0  |          |
| Swingarm end and holder                               | M8          | 23                | 2.3  |          |
| Fuel tank and fuel cock                               | M6          | 7                 | 0.7  |          |
| Fuel tank bracket and frame                           | M8          | 23                | 2.3  |          |
| Rider's seat                                          | M6          | 7                 | 0.7  |          |
| Passenger seat                                        | M6          | 7                 | 0.7  |          |
| Fuel tank and top cover                               | M5          | 4                 | 0.4  |          |
| Licence bracket and rear fender stay                  | M6          | 7                 | 0.7  |          |
| Rear fender and rear fender stay                      | M5          | 4                 | 0.4  |          |
| Rear fender and tail/brake light                      | M6          | 6                 | 0.6  |          |
| Rear fender stay and rear flasher light               | M12         | 7                 | 0.7  |          |
| Frame and rear fender                                 | M8          | 26                | 2.6  |          |
| Side cover (left)                                     | M6          | 7                 | 0.7  |          |
| Battery cover                                         | M6          | 7                 | 0.7  |          |
| Side cover (right)                                    | M6          | 7                 | 0.7  |          |
| Starter relay and leads                               | M6          | 7                 | 0.7  |          |

# MAINTENANCE SPECIFICATIONS

**SPEC**



| Part to be tightened                                   | Thread size | Tightening torque |      | Remarks                                                                               |
|--------------------------------------------------------|-------------|-------------------|------|---------------------------------------------------------------------------------------|
|                                                        |             | Nm                | m•kg |                                                                                       |
| Passenger footrest and frame                           | M8          | 26                | 2.6  |                                                                                       |
| Sidestand bracket and frame                            | M10         | 64                | 6.4  |                                                                                       |
| Sidestand and sidestand bracket                        | M10         | 56                | 5.6  |                                                                                       |
| Sidestand switch                                       | M5          | 4                 | 0.4  |                                                                                       |
| Brake pedal/footrest and frame                         | M6          | 7                 | 0.7  |                                                                                       |
| Rear brake master cylinder and master cylinder bracket | M8          | 23                | 2.3  |                                                                                       |
| Master cylinder bracket and down tube                  | M8          | 23                | 2.3  |                                                                                       |
| Footrest and frame                                     | M10         | 64                | 6.4  |                                                                                       |
| Front wheel axle                                       | M16         | 59                | 5.9  |                                                                                       |
| Front wheel axle pinch bolt                            | M8          | 20                | 2.0  |                                                                                       |
| Brake caliper                                          | M10         | 40                | 4.0  |                                                                                       |
| Brake disc and front wheel                             | M8          | 23                | 2.3  |    |
| Caliper bleed screw                                    | M7          | 6                 | 0.6  |                                                                                       |
| Rear wheel axle nut                                    | M16         | 107               | 10.7 |                                                                                       |
| Rear brake caliper and caliper bracket                 | M10         | 40                | 4.0  |                                                                                       |
| Caliper bracket and swingarm                           | M10         | 40                | 4.0  |                                                                                       |
| Brake hose union bolt                                  | M10         | 30                | 3.0  |                                                                                       |
| Caliper bleed screw                                    | M8          | 6                 | 0.6  |                                                                                       |
| Clutch hub and damper                                  | M10         | 62                | 6.2  |                                                                                       |
| Final gear case stud bolt                              | M10         | 18                | 1.8  |  |
| Final gear case stud bolt                              | M8          | 9                 | 0.9  |                                                                                       |
| Bearing housing (final gear case)                      | M8          | 23                | 2.3  |                                                                                       |
| Bearing housing (final gear case)                      | M10         | 40                | 4.0  |  |
| Drive pinion                                           | M14         | 130               | 13.0 |                                                                                       |
| Bearing retainer (final drive pinion gear)             | M65         | 115               | 11.5 | LH thread                                                                             |
| Oil filter bolt (final gear)                           | M14         | 23                | 2.3  |                                                                                       |
| Oil drain bolt (final gear)                            | M14         | 23                | 2.3  |                                                                                       |
| Housing cover                                          | M10         | 42                | 4.2  |                                                                                       |

## NOTE:

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



## ELECTRICAL

| Item                           | Standard                            | Limit |
|--------------------------------|-------------------------------------|-------|
| Voltage:                       | 12 V                                | ...   |
| Ignition system:               |                                     |       |
| Ignition timing (B.T.D.C.)     | 10° at 1,000 r/min                  | ...   |
| Advancer type                  | Digital type                        | ...   |
| T.C.I.:                        |                                     |       |
| Pickup coil resistance/color   | 189 ~ 231 Ω at 20°C/Gray – Black    | ...   |
| T.C.I. unit model/manufacturer | J4T101/MITSUBISHI                   | ...   |
| Ignition coil:                 |                                     |       |
| Model/manufacturer             | F6T507/MITSUBISHI                   | ...   |
| Primary winding resistance     | 3.57 ~ 4.83 Ω at 20°C               | ...   |
| Secondary winding resistance   | 10.7 ~ 14.5 kΩ at 20°C              | ...   |
| Spark plug cap:                |                                     |       |
| Type                           | Resin type                          | ...   |
| Resistance                     | 10 kΩ                               | ...   |
| Charging system:               |                                     |       |
| Type                           | A.C. magneto                        | ...   |
| Model/manufacturer             | F4T654/MITSUBISHI                   | ...   |
| Nominal output                 | 14 V 350 W at 5,000 r/min           | ...   |
| Stator coil resistance/color   | 0.36 ~ 0.44 Ω at 20°C/White – White | ...   |
| Voltage regulator:             |                                     |       |
| Type                           | Semi-conductor, short-circuit type  | ...   |
| Model/manufacturer             | SH650D-11/SHINDENGEN                | ...   |
| No load regulated voltage      | 14.1 ~ 14.9 V                       | ...   |
| Rectifier:                     |                                     |       |
| Model/manufacturer             | SH650D-11/SHINDENGEN                | ...   |
| Capacity                       | 18 A                                | ...   |
| Withstand voltage              | 200 V                               | ...   |
| Battery:                       |                                     |       |
| Specific gravity               | 1.320                               | ...   |
| Electric starter system:       |                                     |       |
| Type                           | Constant mesh type                  | ...   |
| Starter motor:                 |                                     |       |
| Model/manufacturer             | SM-13/MITSUBA                       | ...   |
| Output                         | 0.6 kW                              | ...   |
| Armature coil resistance       | 0.026 ~ 0.034 Ω at 20°C             | ...   |
| Brush overall length           | 12.5 mm                             | 5 mm  |
| Brush spring pressure          | 7.65 ~ 10.01 N (780 ~ 1021 g)       | ...   |
| Commutator diameter            | 28 mm                               | 27 mm |
| Mica undercut                  | 0.7 mm                              | ...   |
| Starter relay:                 |                                     |       |
| Model/manufacturer             | MS5F-421/JIDECO                     | ...   |
| Amperage rating                | 180 A                               | ...   |

# MAINTENANCE SPECIFICATIONS

**SPEC**



| Item                            | Standard             | Limit |
|---------------------------------|----------------------|-------|
| Horn:                           |                      |       |
| Type                            | Plane type           | ...   |
| Quantity                        | 1                    | ...   |
| Model/manufacturer              | YF-12/NIKKO          | ...   |
| Maximum amperage                | 3 A                  | ...   |
| Flasher relay:                  |                      |       |
| Type                            | Full transistor type | ...   |
| Model/manufacturer              | FE246BH/DENSO        | ...   |
| Self cancelling device          | No                   | ...   |
| Flasher frequency               | 75 ~ 95 cycle/min    | ...   |
| Wattage                         | 21 W × 2 + 3.4W      | ...   |
| Oil level gauge:                |                      |       |
| Model/manufacturer              | 5EL/DENSO            | ...   |
| Starting circuit cut-off relay  |                      |       |
| Model/manufacturer              | G8R-30Y-B/OMRON      | ...   |
| Fuel pump relay:                |                      |       |
| Model/manufacturer              | G8R-30Y-B/OMRON      | ...   |
| Circuit breaker:                |                      |       |
| Type                            | Fuse                 | ...   |
| Amperage for individual circuit |                      |       |
| MAIN                            | 30 A × 1             | ...   |
| HEAD LIGHT                      | 15 A × 1             | ...   |
| SIGNALS                         | 10 A × 1             | ...   |
| IGNITION                        | 10 A × 1             | ...   |
| BACK UP                         | 5 A × 1              | ...   |
| Carburetor heater               | 15 A × 1             | ...   |
| Reserve                         | 30 A × 1             | ...   |
| Reserve                         | 15 A × 1             | ...   |
| Reserve                         | 10 A × 1             | ...   |
| Reserve                         | 5 A × 1              | ...   |

# GENERAL TORQUE SPECIFICATIONS /CONVERSION TABLE

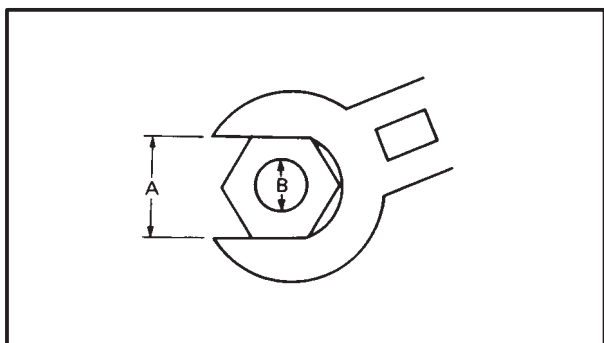
**SPEC**



EB202001

## GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. 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 fashion, in progressive stages, until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.



A: Distance between flats

B: Outside thread diameter

| A<br>(nut) | B<br>(Bolt) | General torque specifications |      |
|------------|-------------|-------------------------------|------|
|            |             | Nm                            | m•kg |
| 10 mm      | 6 mm        | 6                             | 0,6  |
| 12 mm      | 8 mm        | 15                            | 1,5  |
| 14 mm      | 10 mm       | 30                            | 3,0  |
| 17 mm      | 12 mm       | 55                            | 5,5  |
| 19 mm      | 14 mm       | 85                            | 8,5  |
| 22 mm      | 16 mm       | 130                           | 13,0 |

EAS00028

## 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.

| METRIC | MULTIPLIER | IMP       |
|--------|------------|-----------|
| ** mm  | x 0.03937  | = ** in   |
| 2 mm   | x 0.03937  | = 0.08 in |

## CONVERSION TABLE

| METRIC TO IMP       |                       |               |                           |
|---------------------|-----------------------|---------------|---------------------------|
|                     | Known                 | Multiplier    | Result                    |
| Torque              | m•kg                  | 7.233         | ft•lb                     |
|                     | m•kg                  | 86.794        | in•lb                     |
|                     | cm•kg                 | 0.0723        | ft•lb                     |
|                     | cm•kg                 | 0.8679        | in•lb                     |
| Weight              | kg                    | 2.205         | lb                        |
|                     | g                     | 0.03527       | oz                        |
| Distance            | km/hr                 | 0.6214        | mph                       |
|                     | km                    | 0.6214        | mi                        |
|                     | m                     | 3.281         | ft                        |
|                     | m                     | 1.094         | yd                        |
|                     | cm                    | 0.3937        | in                        |
|                     | mm                    | 0.03937       | in                        |
| Volume/<br>Capacity | cc (cm <sup>3</sup> ) | 0.03527       | oz (IMP liq.)             |
|                     | cc (cm <sup>3</sup> ) | 0.06102       | cu•in                     |
|                     | lt (liter)            | 0.8799        | qt (IMP liq.)             |
|                     | lt (liter)            | 0.2199        | gal (IMP liq.)            |
| Miscella-<br>neous  | kg/mm                 | 55.997        | lb/in                     |
|                     | kg/cm <sup>2</sup>    | 14.2234       | psi (lb/in <sup>2</sup> ) |
|                     | Centigrade            | 9/5 (°C) + 32 | Fahrenheit (°F)           |



EB203000

## LUBRICATION POINTS AND LUBRICANT TYPES

### ENGINE

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

## LUBRICATION POINTS AND LUBRICANT TYPES

SPEC



EB203010

### CHASSIS

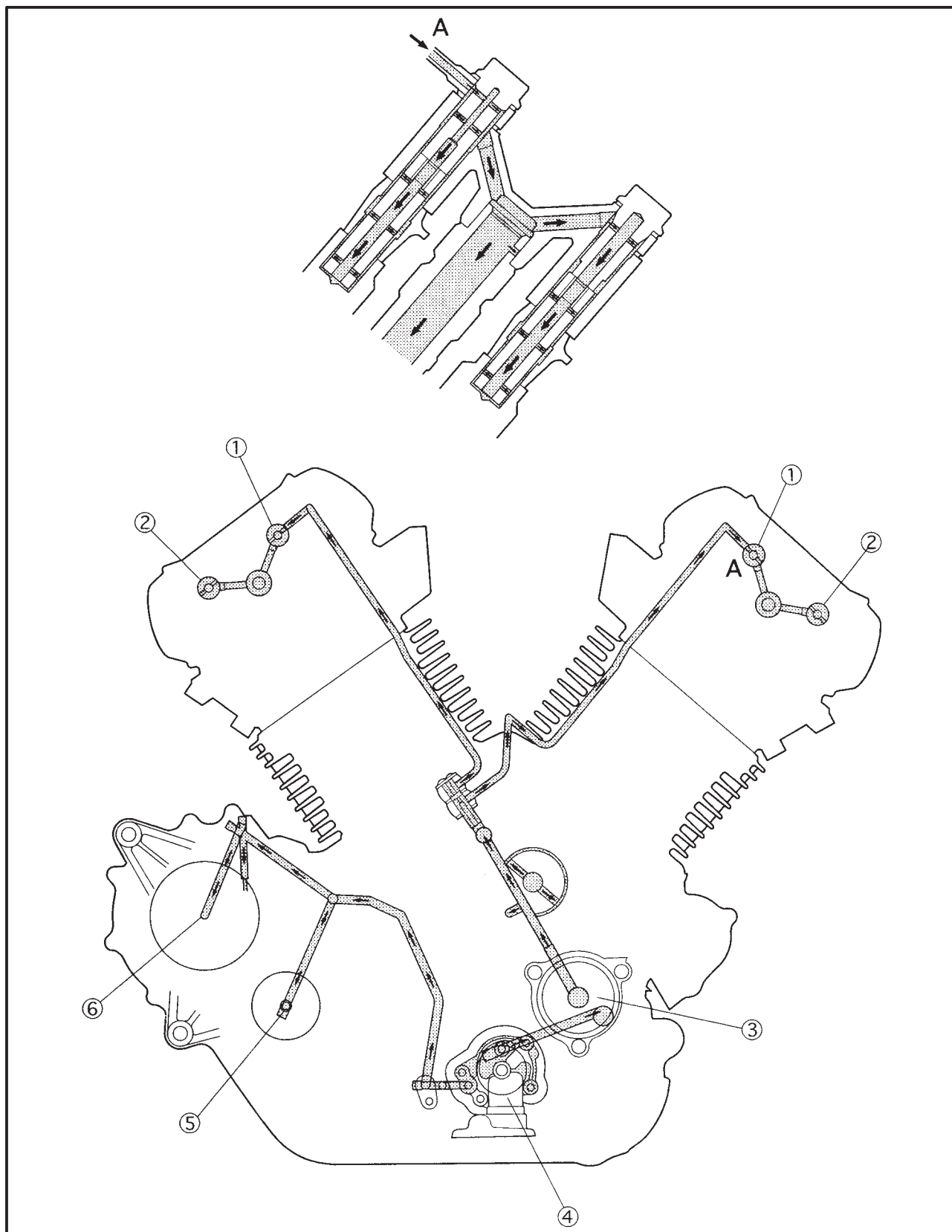
| Lubrication point                         | Symbol |
|-------------------------------------------|--------|
| Steering head pipe (upper/lower), bearing |        |
| Steering head pipe, bearing cover lip     |        |
| Steering head pipe, oil seal lip          |        |
| Front wheel oil seal lip (right/left)     |        |
| Rear wheel oil seal lip                   |        |
| Clutch hub fitting area                   |        |
| Rear brake pedal shaft                    |        |
| Shift pedal shaft                         |        |
| Sidestand bolt, sidestand sliding surface |        |
| Tube guide (throttle grip) inner surface  |        |
| Brake lever pivot bolt, contact surface   |        |
| Clutch lever pivot bolt, contact surface  |        |
| Rear shock absorber (lower) oil seal lip  |        |
| Swingarm pivot bearing inner surface      |        |
| Swingarm pivot oil seal lip               |        |
| Relay arm bearing, collar and oil seal    |        |
| Drive shaft spline                        |        |
| Drive shaft dust cover                    |        |



EB205000

## LUBRICATION DIAGRAMS

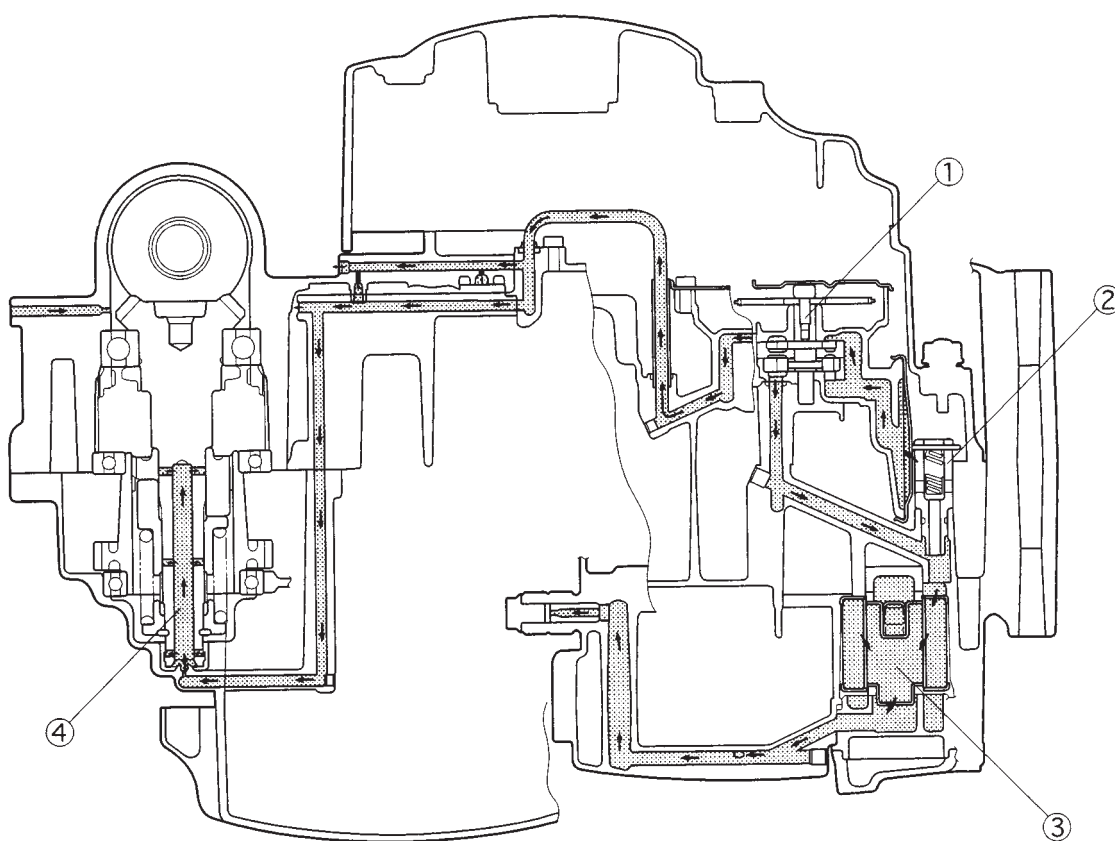
- ① Rocker arm shaft (intake)
- ② Rocker arm shaft (exhaust)
- ③ Oil filter
- ④ Oil pump
- ⑤ Drive axle
- ⑥ Middle drive shaft





- ① Oil pump
- ② Relief valve
- ③ Oil filter

- ④ Middle drive shaft

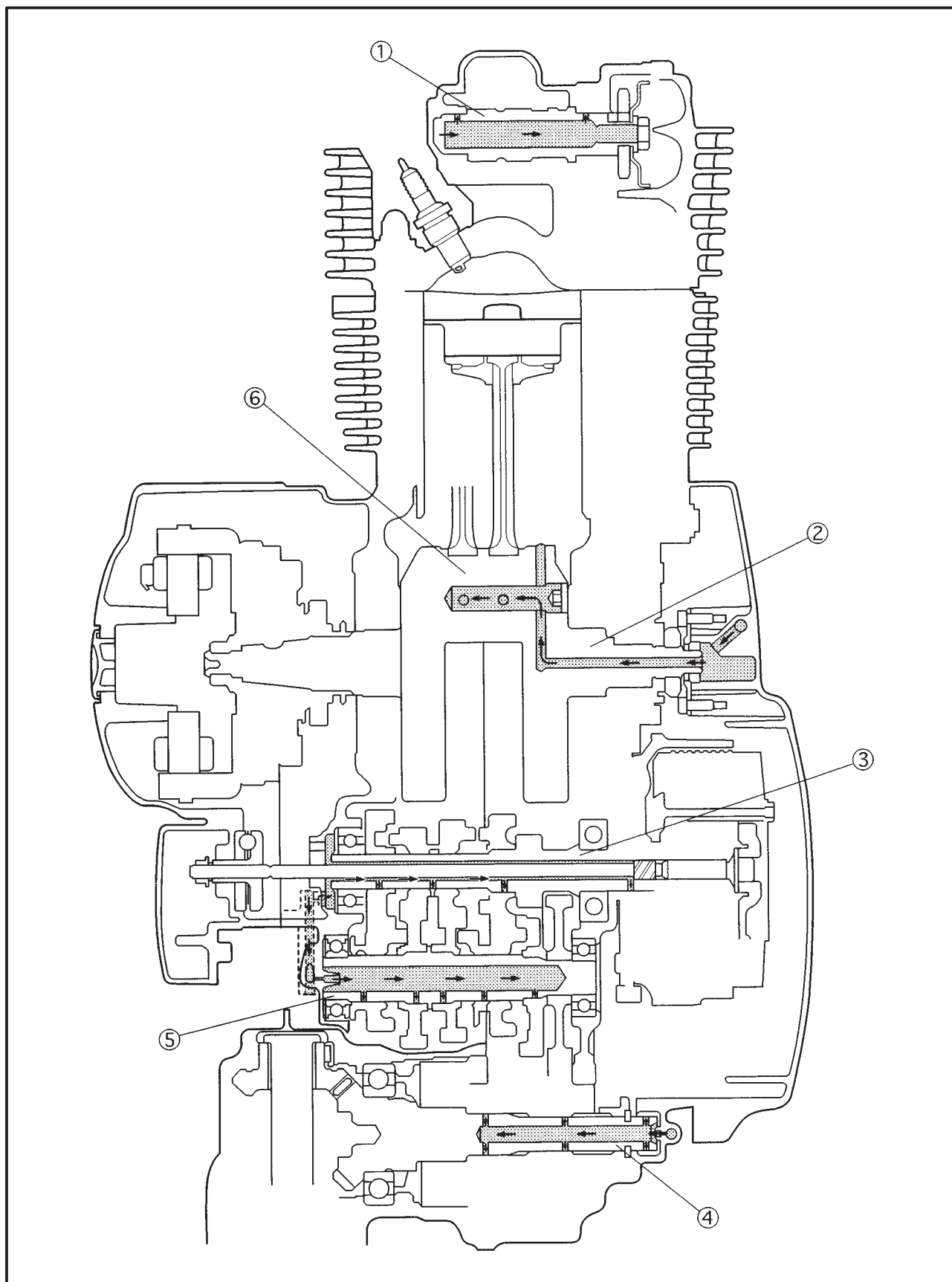


## LUBRICATION DIAGRAMS

SPEC



- ① Camshaft
- ② Crankshaft
- ③ Main axle
- ④ Middle drive shaft
- ⑤ Drive axle
- ⑥ Connecting rod big end

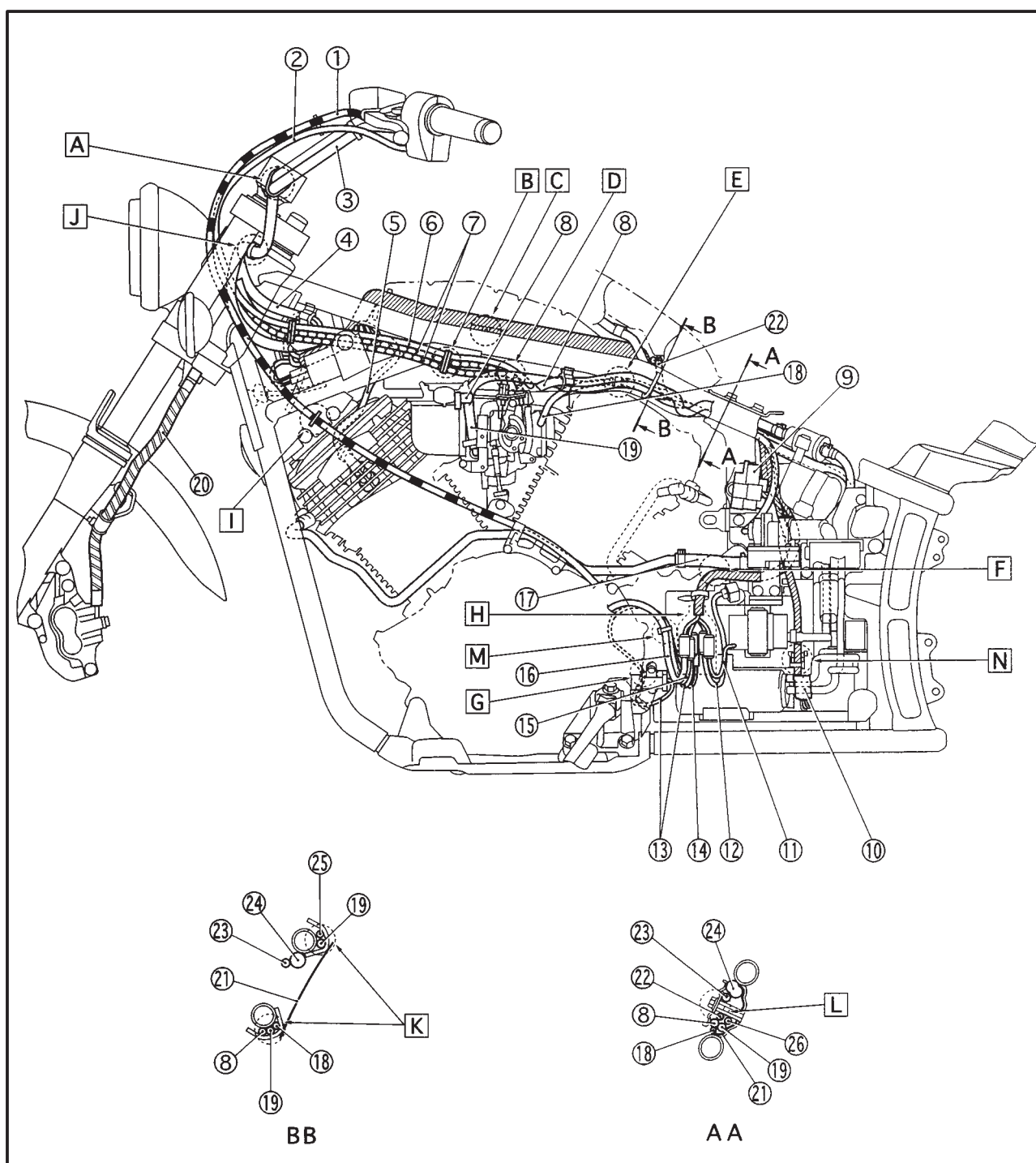




EB206000

## CABLE ROUTING

- |                                     |                                       |                                                                   |
|-------------------------------------|---------------------------------------|-------------------------------------------------------------------|
| ① Clutch cable                      | ⑩ Alarm connector                     | ⑲ Fuel hose (carburetor-fuel pump)                                |
| ② Starter cable                     | ⑪ Fuel pump lead                      | ⑳ Brake hose                                                      |
| ③ Handlebar switch lead (left)      | ⑫ Speed sensor lead                   | ㉑ Heat protector                                                  |
| ④ Handlebar switch lead (right)     | ⑬ Sidestand switch lead               | ㉒ Fuel breather hose (fuel tank-roll over valve) (for California) |
| ⑤ High tension code                 | ⑭ Neutral switch lead                 | ㉓ Speedometer lead                                                |
| ⑥ Starter cable                     | ⑮ Pickup coil lead                    | ㉔ Wireharness                                                     |
| ⑦ Throttle cable                    | ⑯ AC magneto lead                     | ㉕ Purge hose (carburetor-solenoid valve) (for California)         |
| ⑧ Fuel hose (fuel cock-fuel filter) | ⑰ Ventilation hose                    |                                                                   |
| ⑨ Fuse box                          | ⑱ Sensing hose (AIS-carburetor joint) |                                                                   |

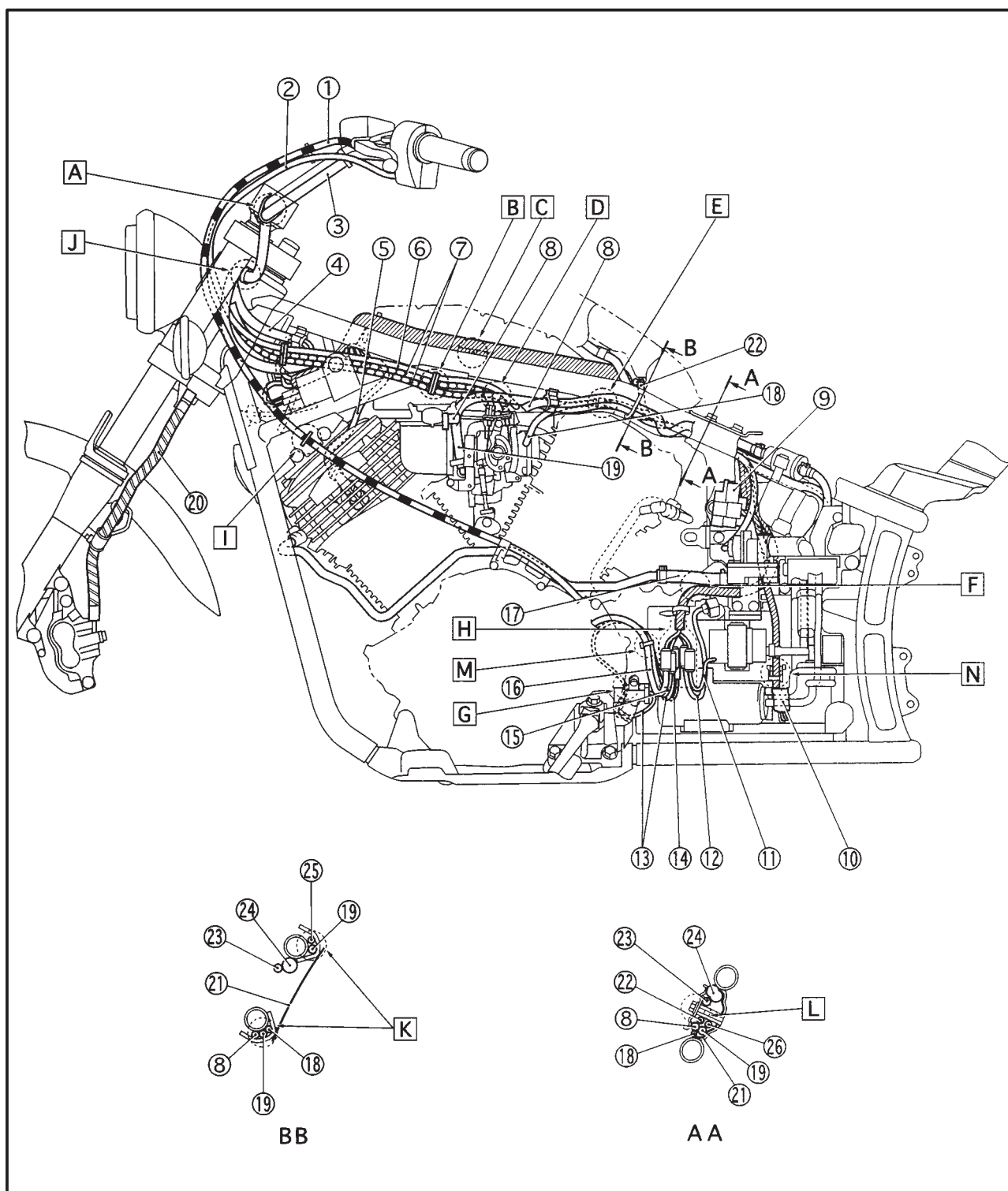


## CABLE ROUTING

SPEC

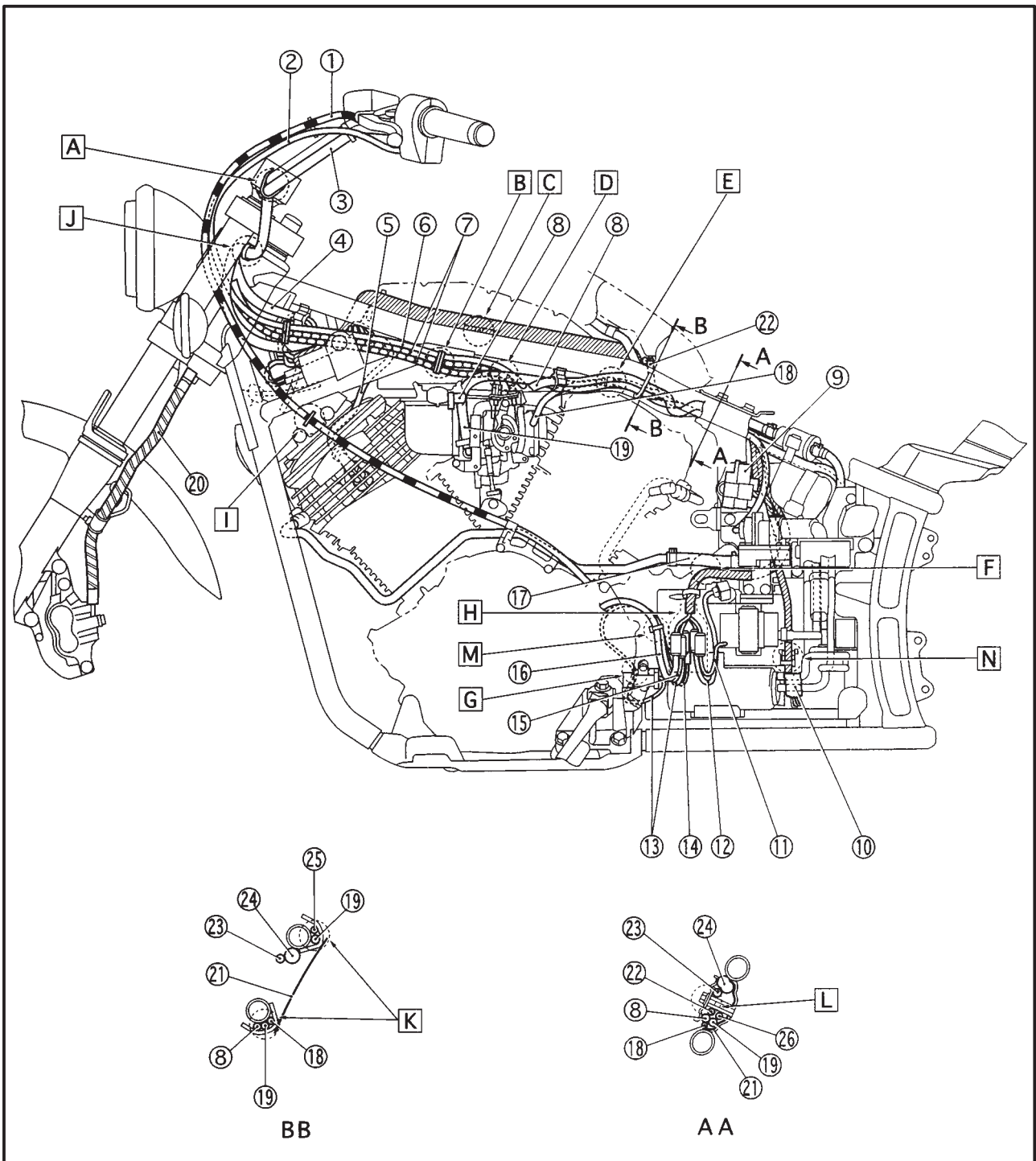


- ②⑥ Purge hose (carburetor-solenoid valve) (for California)
- A Fasten the handlebar switch leads (left and right) to the handlebar with plastic locking tie.
- B Position the throttle cable and starter cable as shown, and clamp them with holder.
- C Clamp the wire harness with the hook of frame side.
- D When installing the pipe of throttle cables, press it inside.
- E Connect the sensing hose (carburetor joint-AIS side) with a nozzle.
- F Push the wire harness inside of the tool box plate.
- G Route the sidestand lead inside of engine cover.
- H Position the all connectors inside of the connector cover.
- I Route the clutch cable through the cable guide.





- J** 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.
- K** Route the each hoses through the frame guide and do not pinch it.
- L** When installing the fitting plate, do not pinch the each hoses and wire harness.
- M** Fasten the AC magneto lead and sidestand switch lead with a plastic locking tie.
- N** Fasten the alarm lead with a plastic band on the lid.

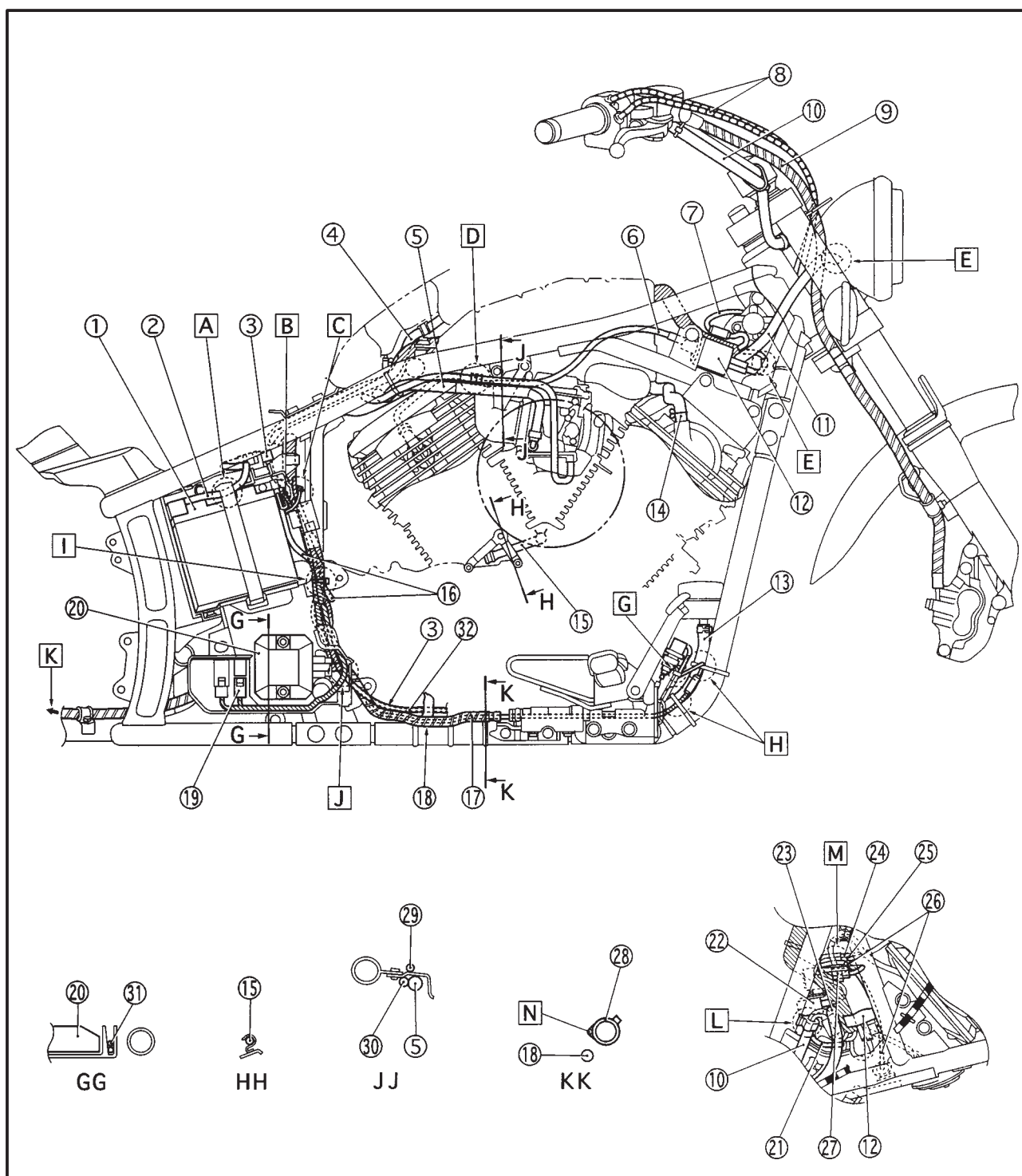


## CABLE ROUTING

SPEC



- |                                    |                                  |                                                            |
|------------------------------------|----------------------------------|------------------------------------------------------------|
| ① Battery                          | ⑫ Ignition coil                  | ②③ Handlebar switch lead (left)                            |
| ② Battery positive (+) lead        | ⑬ Master cylinder reservoir hose | ②④ Throttle position sensor lead                           |
| ③ Starter motor positive (+) lead  | ⑭ Breather hose                  | ②⑤ Carburetor heater lead                                  |
| ④ Speedometer lead                 | ⑮ Air filter drain hose          | ②⑥ Thermo switch lead                                      |
| ⑤ Fuel hose (carburetor-fuel pump) | ⑯ Battery negative (-) lead      | ②⑦ Starting circuit cutoff relay                           |
| ⑥ High tension code                | ⑰ Rear brake switch lead         | ②⑧ Down tube                                               |
| ⑦ Main switch lead                 | ⑱ Rear brake hose                | ②⑨ High tension code                                       |
| ⑧ Throttle cable                   | ⑲ Carburetor heater connector    | ③⑩ Purge hose (carburetor-solenoid valve) (for California) |
| ⑨ Brake hose                       | ⑲ Rectifier/regulator            | ③① Carburetor heater lead                                  |
| ⑩ Handlebar switch lead (right)    | ⑲ Main switch lead               | ③② Oil level switch lead                                   |
| ⑪ Headlight lead                   | ⑲ Flasher relay                  |                                                            |

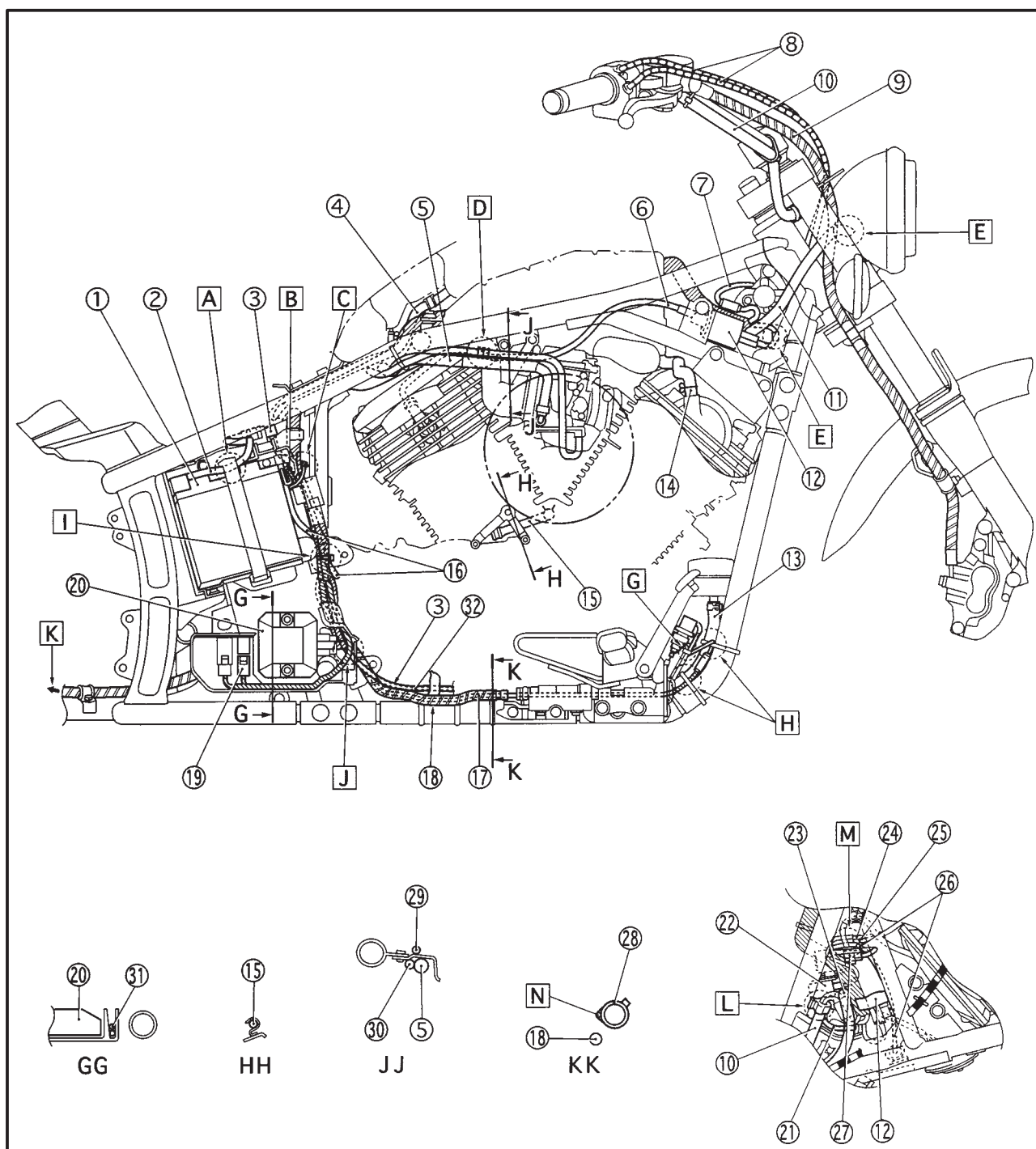


## CABLE ROUTING

SPEC



- [A] Clamp the battery positive (+) lead to the battery with battery band.
- [B] Connect the battery negative (-) lead connector and push it into the space between battery box and battery.
- [C] Route the rectifier/regulator lead, wire harness and starter motor positive (+) lead through the outside of frame bracket and fasten them to the frame with a plastic locking tie.
- [D] Connect the purge hose (carburetor side-solenoid valve side) with joint. (for California)
- [E] Route the front turn signal light lead and headlight lead through the rear of headlight body hole.
- [F] Connect the ignition coil lead at red tape to the right side.
- [G] Fasten the rear brake switch lead to the brake switch bracket with a plastic locking tie.
- [H] Fasten the rear brake switch lead and master cylinder reservoir hose to the down tube with a plastic locking tie.
- [I] Fasten the wire harness, starter motor positive (+) lead and battery negative (-) lead to the frame with a plastic locking tie.
- [J] Route the rectifier/regulator lead and carburetor heater lead through inside of battery box hole to outside it and connect them.

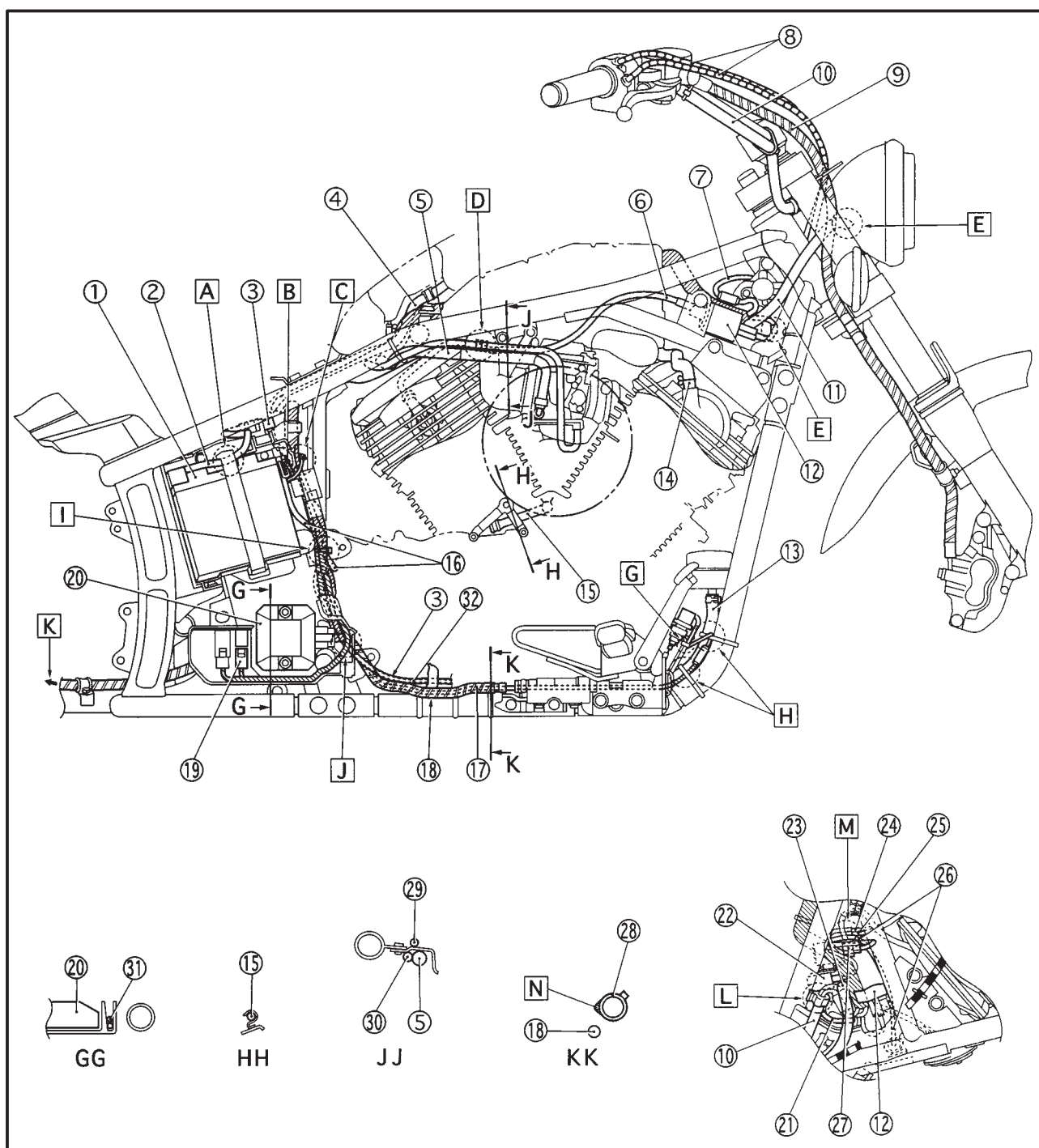


## CABLE ROUTING

SPEC



- [K] To rear brake caliper
- [L] Clamp the handlebar switch lead (right) and main switch lead to the frame with a holder.
- [M] Arrange the throttle position sensor connector, carburetor heater connector and thermo switch connector between the starting circuit cutoff relay and high tension code.
- [N] Fasten the rear brake switch to the down tube with a plastic locking tie.



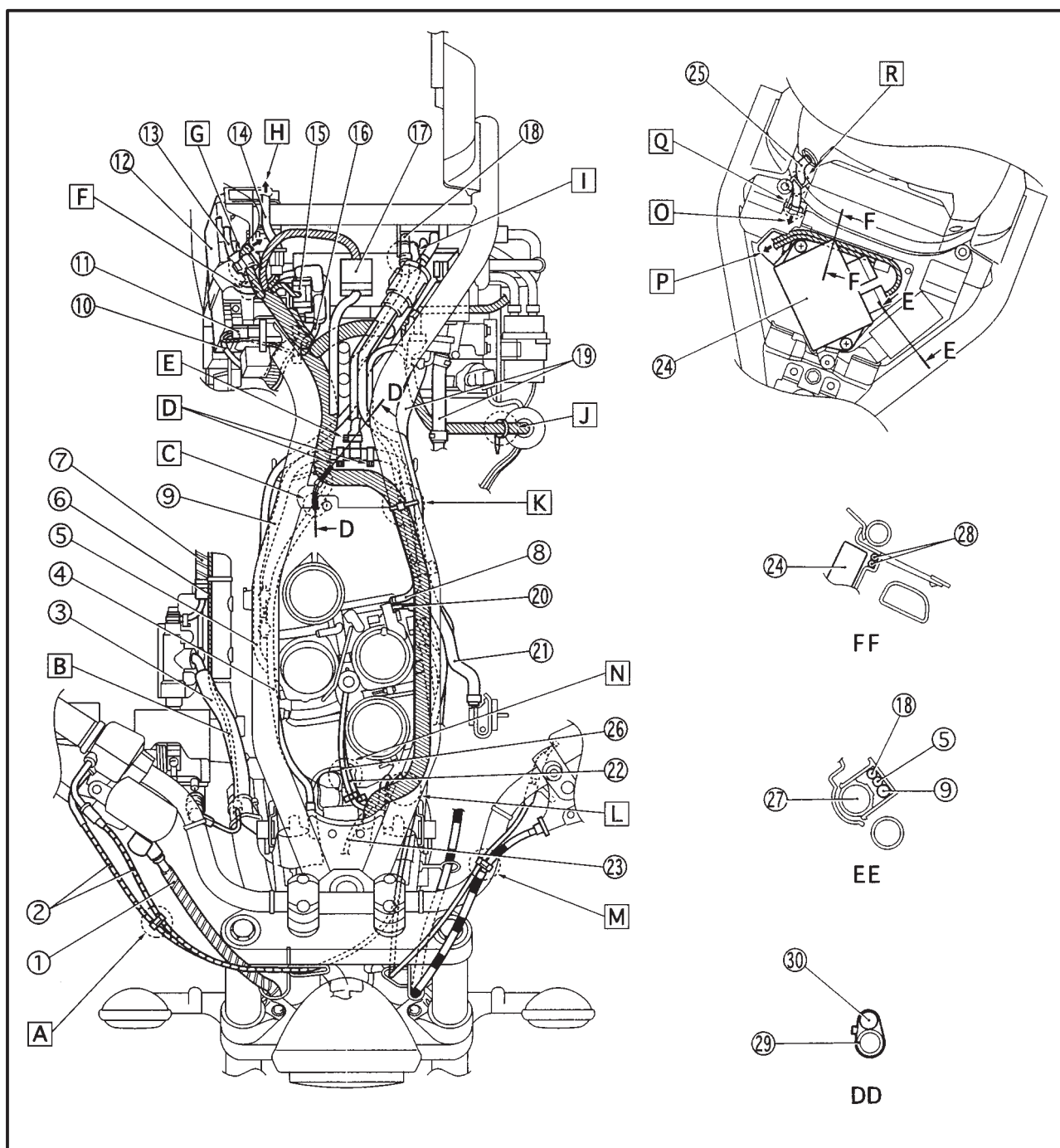
## CABLE ROUTING

SPEC



- |                                                           |                                                                        |                                     |
|-----------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------|
| ① Brake hose                                              | ⑪ Battery negative (-) lead connector                                  | ⑳ Starter cable                     |
| ② Throttle cable                                          | ⑫ Battery                                                              | ㉑ Fuel hose (fuel cock-fuel filter) |
| ③ Master cylinder reservoir hose                          | ⑬ Battery positive (+) lead                                            | ㉒ Carburetor heater lead            |
| ④ High tension code                                       | ⑭ Taillight lead                                                       | ㉓ Thermo switch lead                |
| ⑤ Purge hose (carburetor-solenoid valve) (for California) | ⑮ Starter relay                                                        | ㉔ Igniter unit                      |
| ⑥ Rear brake switch lead                                  | ⑯ Starter motor positive (+) lead                                      | ㉕ Taillight lead                    |
| ⑦ Brake hose                                              | ⑰ Speedometer lead connector                                           | ㉖ Throttle position sensor lead     |
| ⑧ Sensing hose (AIS-carburetor joint)                     | ⑱ Fuel tank breather hose (fuel tank-roll over valve) (for California) | ㉗ Fuel filter                       |
| ⑨ Fuel hose (carburetor-fuel pump)                        | ⑲ Ventilation hose                                                     | ㉘ Igniter unit lead                 |
| ⑩ Battery negative (-) lead                               |                                                                        | ㉙ Frame                             |
|                                                           |                                                                        | ㉚ Wire harness                      |

**A** Clamp the throttle cables with the holder.

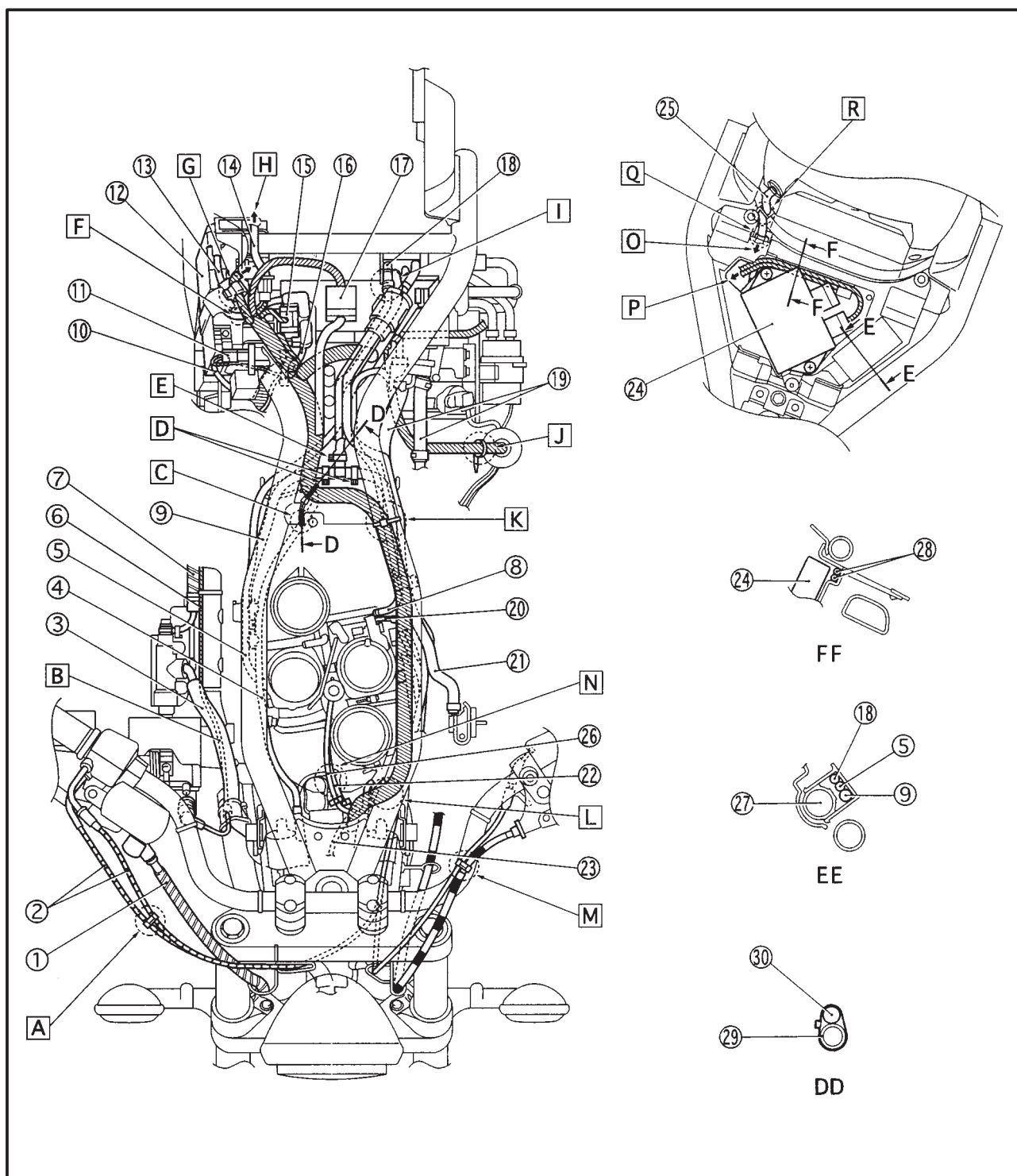


## CABLE ROUTING

SPEC



- [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] Route the fuel tank breather hose under the fuel filter and connect it (fuel tank side-roll over valve side) with a joint. Position the end of clip outside.
- [J] Fasten the wire harness with a band on the tool box plate.
- [K] Fasten the wire harness to the frame with a plastic locking tie. Position the locking tie front of the solder.

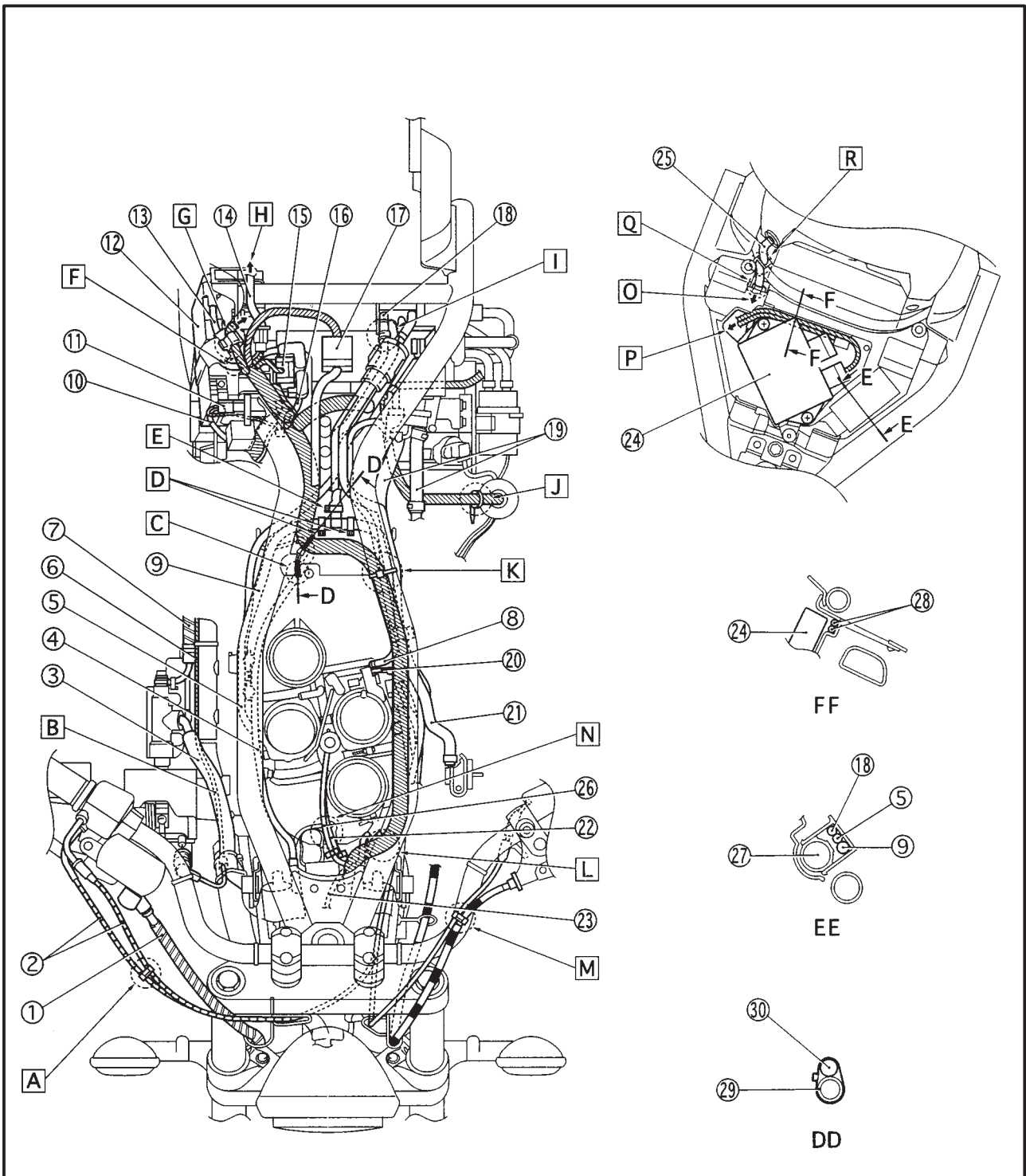


## CABLE ROUTING

SPEC



- L** Route wire harness outside of the guide on the frame.
- M** Clamp the clutch cable and starter cable with a holder. Position the end of holder down side.
- N** Route the throttle position sensor lead and carburetor heater lead left side of the tappet cover.
- O** To the wire harness.
- P** Route the igniter lead through the igniter plate hole to the wire harness.
- Q** Clamp the taillight lead with mud guard clamp.
- R** Clamp the taillight lead with a holder on the mud guard.



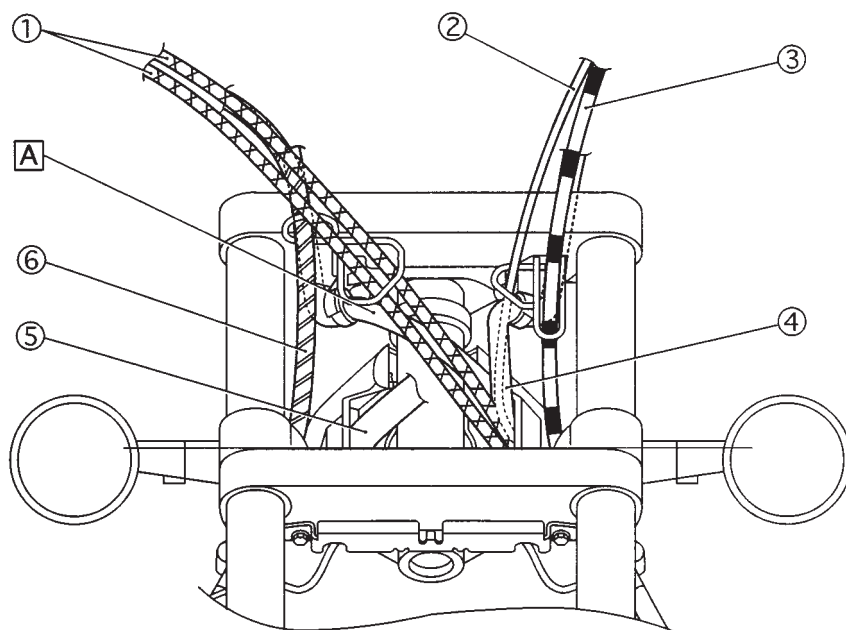
## CABLE ROUTING

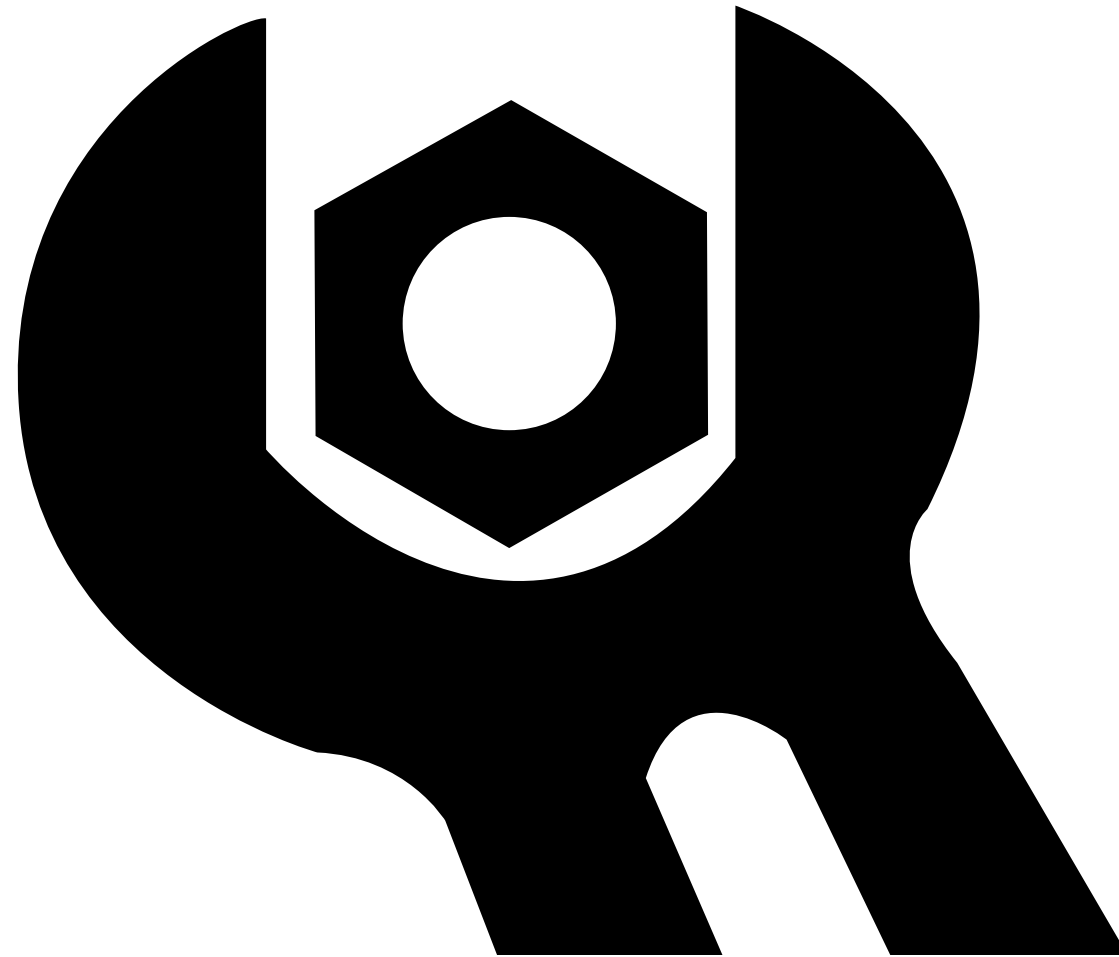
SPEC



- ① Throttle cable
- ② Starter cable
- ③ Clutch cable
- ④ Handlebar switch lead (left)
- ⑤ Headlight lead
- ⑥ Brake hose

- A** Route the handlebar switch lead (right) rear side of the throttle cable.





**INSP**

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**ADJ**

**3**

## CHAPTER 3

### PERIODIC INSPECTIONS AND ADJUSTMENTS

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EB300000

## PERIODIC INSPECTIONS AND ADJUSTMENTS

### INTRODUCTION

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. 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.

EB301000

### PERIODIC MAINTENANCE/LUBRICATION INTERVALS

| NO. | ITEM                      | CHECKS AND MAINTENANCE JOBS                                                                                                                                                                                                           | Initial<br>(1,000 km) | EVERY                                                    |                                                            |
|-----|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------|------------------------------------------------------------|
|     |                           |                                                                                                                                                                                                                                       |                       | 6,000 km<br>or<br>6 months<br>(whichever<br>comes first) | 12,000 km<br>or<br>12 months<br>(whichever<br>comes first) |
| 1   | * Fuel line (manual cock) | <ul style="list-style-type: none"> <li>Check fuel hoses for cracks or damage.</li> <li>Replace if necessary.</li> </ul>                                                                                                               |                       | √                                                        | √                                                          |
| 2   | * Fuel filter             | <ul style="list-style-type: none"> <li>Check condition.</li> <li>Replace if necessary.</li> </ul>                                                                                                                                     |                       |                                                          | √                                                          |
| 3   | Spark plugs               | <ul style="list-style-type: none"> <li>Check condition.</li> <li>Clean, regap or replace if necessary.</li> </ul>                                                                                                                     | √                     | √                                                        | √                                                          |
| 4   | * Valves (arm SOHC)       | <ul style="list-style-type: none"> <li>Check valve clearance.</li> <li>Adjust if necessary.</li> </ul>                                                                                                                                | √                     | √                                                        | √                                                          |
| 5   | Air filter                | <ul style="list-style-type: none"> <li>Clean or replace if necessary.</li> </ul>                                                                                                                                                      |                       | √                                                        | √                                                          |
| 6   | Clutch                    | <ul style="list-style-type: none"> <li>Check operation.</li> <li>Adjust or replace cable.</li> </ul>                                                                                                                                  | √                     | √                                                        | √                                                          |
| 7   | * Front brake (disc)      | <ul style="list-style-type: none"> <li>Check operation, fluid level and vehicle for fluid leakage. (See NOTE.)</li> <li>Correct accordingly.</li> <li>Repalce brake pads if necessary.</li> </ul>                                     | √                     | √                                                        | √                                                          |
| 8   | * Rear brake (disc)       | <ul style="list-style-type: none"> <li>Check operation, fluid level and vehicle for fluid leakage. (See NOTE.)</li> <li>Correct accordingly.</li> <li>Replace brake pads if necessary.</li> </ul>                                     | √                     | √                                                        | √                                                          |
| 9   | * Wheels (spoke)          | <ul style="list-style-type: none"> <li>Check balance, runout, spoke tightness and for damage.</li> <li>Tighten spokes and rebalance, replace if necessary.</li> </ul>                                                                 |                       | √                                                        | √                                                          |
| 10  | * Tires (EUR)             | <ul style="list-style-type: none"> <li>Check tread depth and for damage.</li> <li>Replace if necessary.</li> <li>Check air pressure.</li> <li>Correct if necessary.</li> </ul>                                                        |                       | √                                                        | √                                                          |
| 11  | * Wheel bearings          | <ul style="list-style-type: none"> <li>Check bearing for looseness or damage.</li> <li>Replace if necessary.</li> </ul>                                                                                                               |                       | √                                                        | √                                                          |
| 12  | * Swingarm (no nipple)    | <ul style="list-style-type: none"> <li>Check swingarm pivoting point for play.</li> <li>Correct if necessary.</li> <li>Lubricate with molybdenum disulfide grease every 24,000 km or 24 months (whichever comes first).</li> </ul>    |                       | √                                                        | √                                                          |
| 13  | * Steering bearings       | <ul style="list-style-type: none"> <li>Check bearing play and steering for roughness.</li> <li>Correct accordingly.</li> <li>Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).</li> </ul> |                       | √                                                        | √                                                          |
| 14  | * Chassis fasteners       | <ul style="list-style-type: none"> <li>Make sure that all nuts, bolts and screws are properly tightened.</li> <li>Tighten if necessary.</li> </ul>                                                                                    |                       | √                                                        | √                                                          |
| 15  | Sidestand                 | <ul style="list-style-type: none"> <li>Check operation.</li> <li>Lubricate and repair if necessary.</li> </ul>                                                                                                                        |                       | √                                                        | √                                                          |
| 16  | * Sidestand switch        | <ul style="list-style-type: none"> <li>Check operation.</li> <li>Replace if necessary.</li> </ul>                                                                                                                                     | √                     | √                                                        | √                                                          |

## PERIODIC MAINTENANCE/LUBRICATION INTERVALS

**INSP**  
**ADJ**



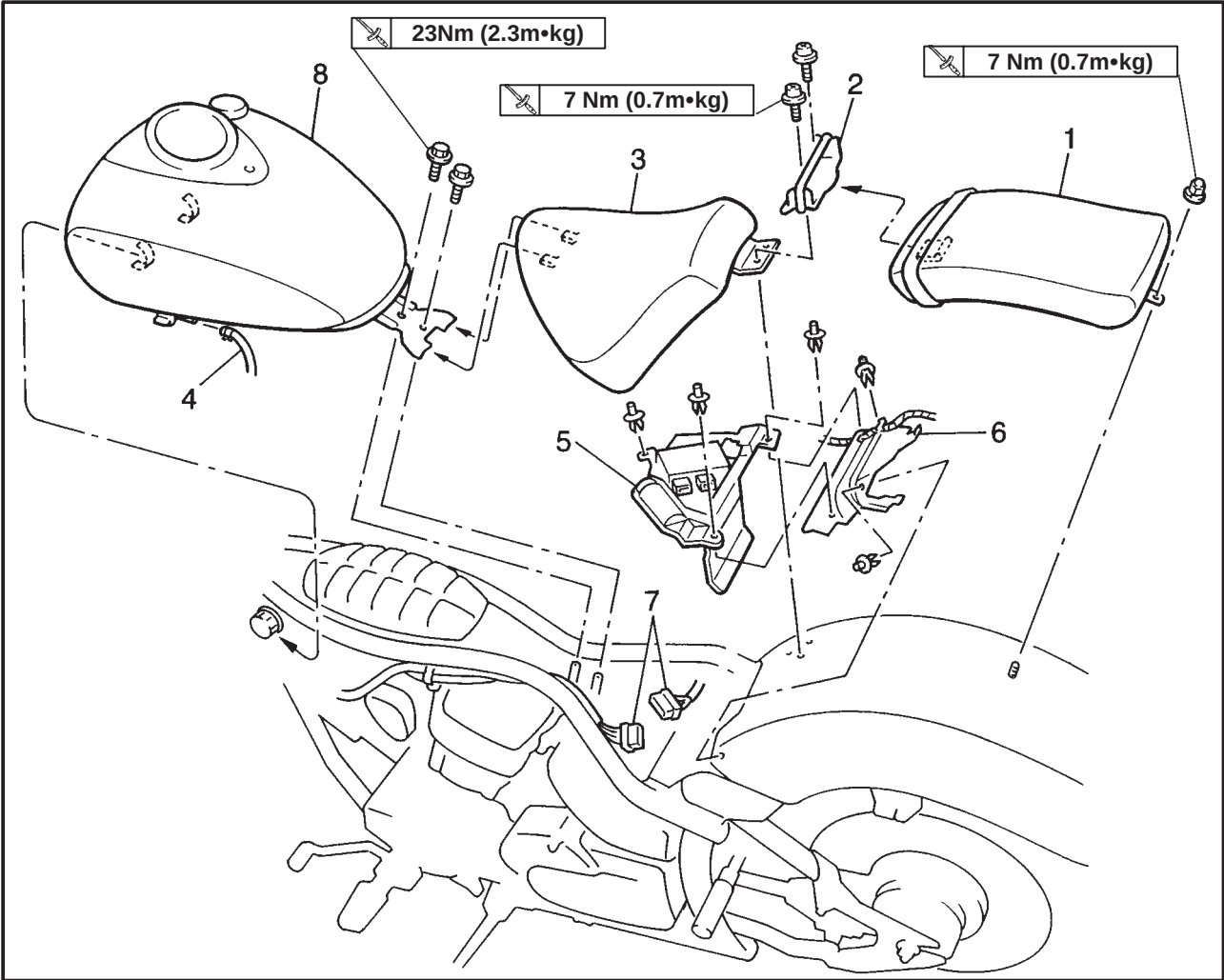
| NO. | ITEM                           | CHECKS AND MAINTENANCE JOBS                                                                                                                                                                                 | Initial<br>(1,000 km) | EVERY                                                    |                                                            |
|-----|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------|------------------------------------------------------------|
|     |                                |                                                                                                                                                                                                             |                       | 6,000 km<br>or<br>6 months<br>(whichever<br>comes first) | 12,000 km<br>or<br>12 months<br>(whichever<br>comes first) |
| 17  | * Front fork                   | <ul style="list-style-type: none"> <li>Check operation and for oil leakage.</li> <li>Correct accordingly.</li> </ul>                                                                                        |                       | √                                                        | √                                                          |
| 18  | * Rear shock absorber assembly | <ul style="list-style-type: none"> <li>Check operation and shock absorber for oil leakage.</li> <li>Replace shock absorber assembly if necessary.</li> </ul>                                                |                       | √                                                        | √                                                          |
| 19  | * Carburetors (multi)          | <ul style="list-style-type: none"> <li>Check engine idling speed, synchronization and start-er operation.</li> <li>Adjust if necessary.</li> </ul>                                                          | √                     | √                                                        | √                                                          |
| 20  | Engine oil                     | <ul style="list-style-type: none"> <li>Check oil level and vehicle for oil leakage.</li> <li>Correct if necessary.</li> <li>Change. (Warm engine before draining.)</li> </ul>                               | √                     | √                                                        | √                                                          |
| 21  | * Engine oil filter element    | <ul style="list-style-type: none"> <li>Replace.</li> </ul>                                                                                                                                                  | √                     |                                                          | √                                                          |
| 22  | Final gear oil                 | <ul style="list-style-type: none"> <li>Check oil level and vehicle for oil leakage.</li> <li>Change oil at initial 1,000 km and thereafter every 24,000 km or 24 months (whichever comes first).</li> </ul> | √                     | √                                                        | √                                                          |

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

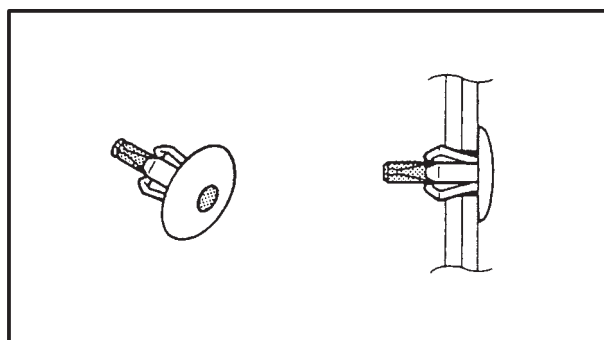
### NOTE:

- 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



| Order | Job name/Part name                 | Q'ty | Remarks                                                                                   |
|-------|------------------------------------|------|-------------------------------------------------------------------------------------------|
|       | <b>Fuel tank and seats removal</b> |      | Remove the parts in the order below.                                                      |
| 1     | Passenger seat                     | 1    | <b>NOTE:</b> _____<br>Set the fuel cock to "OFF" before dis-<br>connecting the fuel hose. |
| 2     | Seat bracket                       | 1    |                                                                                           |
| 3     | Rider's seat                       | 1    |                                                                                           |
| 4     | Fuel hose                          | 1    |                                                                                           |
| 5     | Ignitor plate                      | 1    | For installation, reverse the removal<br>procedure.                                       |
| 6     | Mud guard                          | 1    |                                                                                           |
| 7     | Meter lead couper                  | 1    |                                                                                           |
| 8     | Fuel tank assembly                 | 1    |                                                                                           |



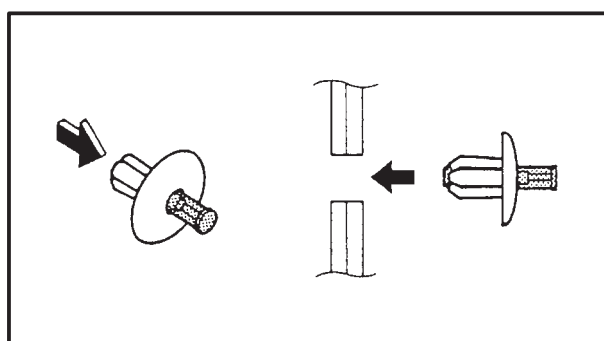
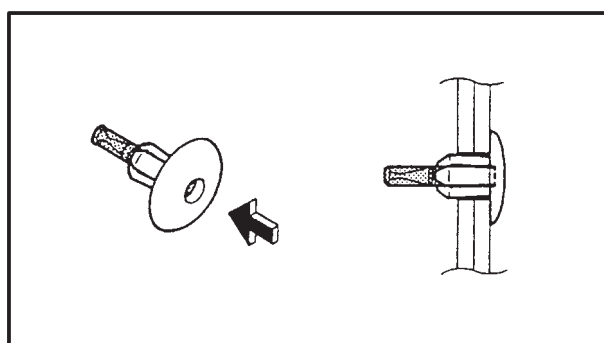
## REMOVAL

1. Remove:

- Ignitor plate

## NOTE:

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



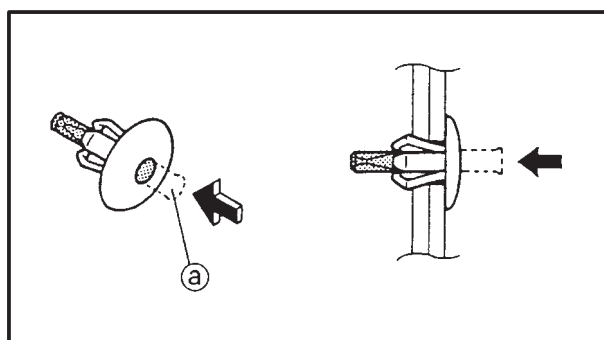
## INSTALLATION

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 ① in with a screwdriver. Make sure that the pin is flush with the fastener's head.





EAS00047

### 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

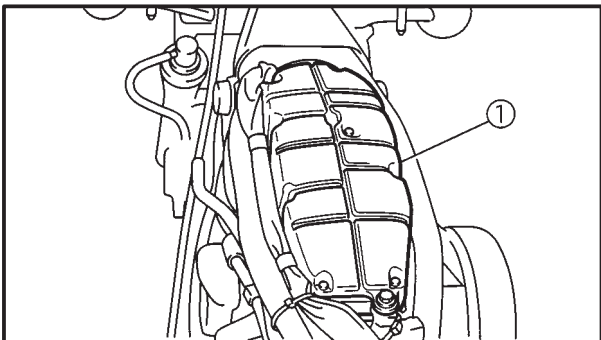
Refer to "FUEL TANK AND SEATS".

2. Disconnect:

- spark plug caps

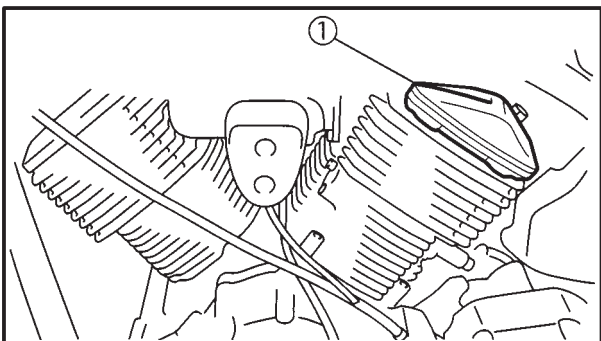
3. Remove:

- spark plugs



4. Remove:

- air intake box ①

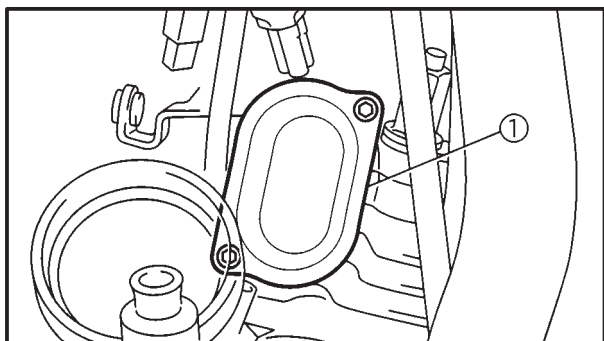


5. Remove:

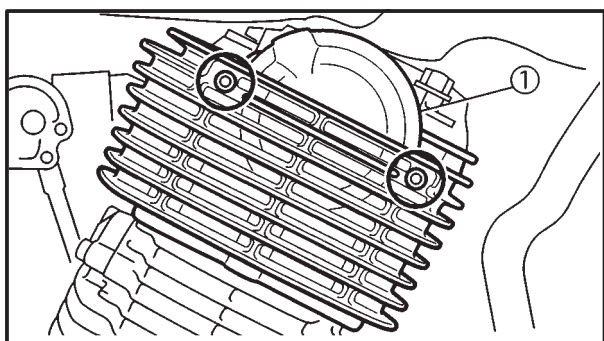
- cylinder head cover (rear cylinder) ①
- cylinder head cover (front cylinder)

## ADJUSTING THE VALVE CLEARANCE

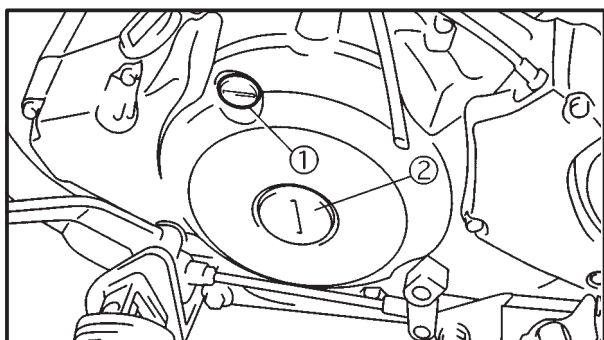
INSP  
ADJ



6. Remove:
- tappet covers ①



7. Remove:
- camshaft sprocket cover (rear cylinder) ①
  - camshaft sprocket cover (front cylinder)



8. Remove:
- timing plug ①
  - straight plug ②

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



**Valve clearance (cold):**

**Intake valve:**

**0.07 ~ 0.12 mm**

**Exhaust valve:**

**0.12 ~ 0.17 mm**









## ADJUSTING THE ENGINE IDLING SPEED/ ADJUSTING THE THROTTLE CABLE FREE PLAY

**INSP**  
**ADJ**



6. Adjust:
- throttle cable free play
- Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".



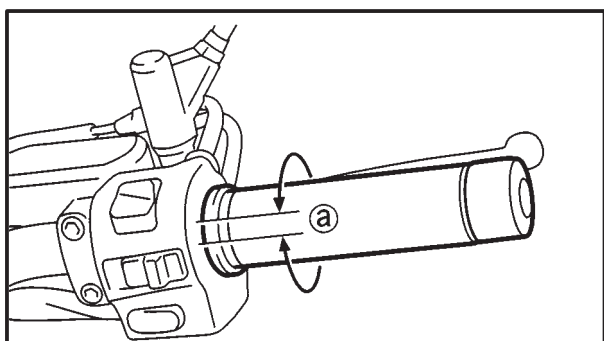
**Throttle cable free play (at the flange of the throttle grip)**  
4 ~ 6 mm

EAS00058

### 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 ①
- Out of specification → Adjust.



**Throttle cable free play (at the flange of the throttle grip)**  
4 ~ 6 mm

2. Remove:

- rider's seat
- fuel tank

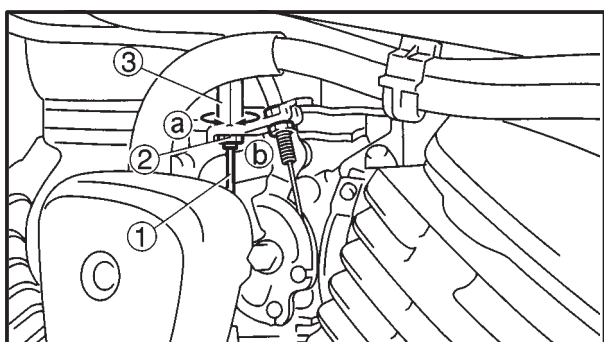
Refer to "FUEL TANK AND SEATS".

3. Adjust:

- throttle cable free play

#### NOTE:

When the motorcycle is accelerating, the accelerator cable ① is pulled.



#### Carburetor side

- Loosen the locknut ② on the accelerator cable.
- Turn the adjusting nut ③ in direction ① or ② until the specified throttle cable free play is obtained.

|             |                                        |
|-------------|----------------------------------------|
| Direction ① | Throttle cable free play is decreased. |
| Direction ② | Throttle cable free play is increased. |

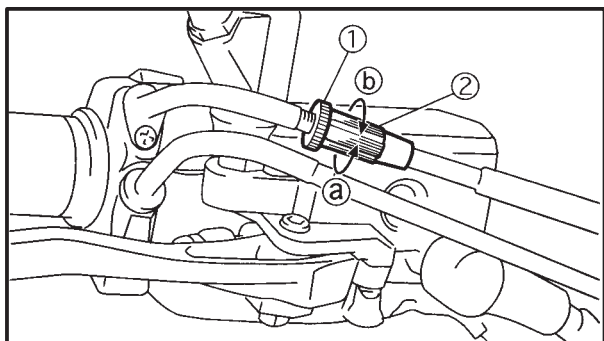
- c. Tighten the locknuts.

#### 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

INSP  
ADJ



### Handlebar side

- Loosen the locknut (1).
- Turn the adjusting nut (2) in direction (a) or (b) until the specified throttle cable free play is obtained.

|               |                                        |
|---------------|----------------------------------------|
| Direction (a) | Throttle cable free play is increased. |
| Direction (b) | Throttle cable free play is decreased. |

- Tighten the locknut.

### ⚠ 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.

EAS00059

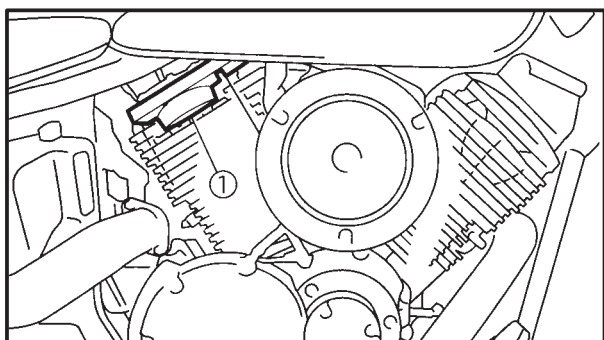
### CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

- Remove:
  - cylinder head covers (1)
- Disconnect:
  - spark plug cap
- Remove:
  - spark plug

### CAUTION:

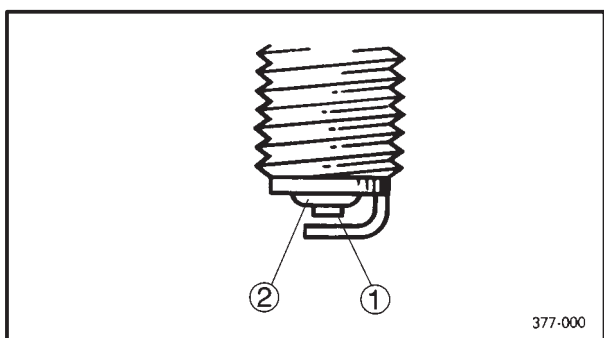
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.



- Check:
  - spark plug type  
Incorrect → Change.

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

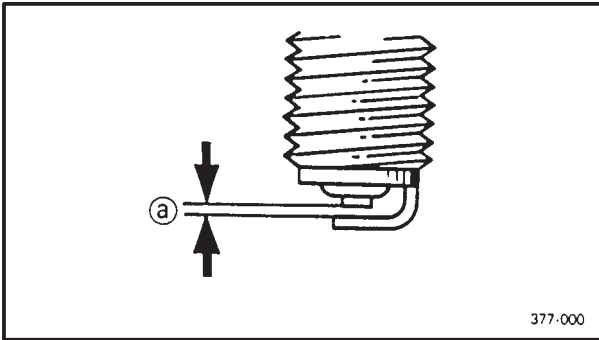
- Check:
  - electrode (1)  
Damage/wear → Replace the spark plug.
  - insulator (2)  
Abnormal color → Replace the spark plug.  
Normal color is a medium-to-light tan color.
- Clean:
  - spark plug  
(with a spark plug cleaner or wire brush)



377-000

## CHECKING THE SPARK PLUGS/ CHECKING THE IGNITION TIMING

**INSP  
ADJ**



7. Measure:

- spark plug gap (a)  
(with a wire gauge)  
Out of specification → Regap.



**Spark plug gap**  
**0.7 ~ 0.8 mm**

8. Install:

- spark plug **20 Nm (2.0 m•kg)**

**NOTE:** \_\_\_\_\_

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

9. Connect:

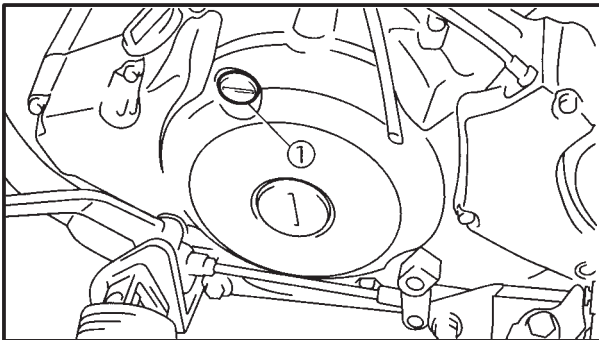
- spark plug cap

EAS00064

## CHECKING THE IGNITION TIMING

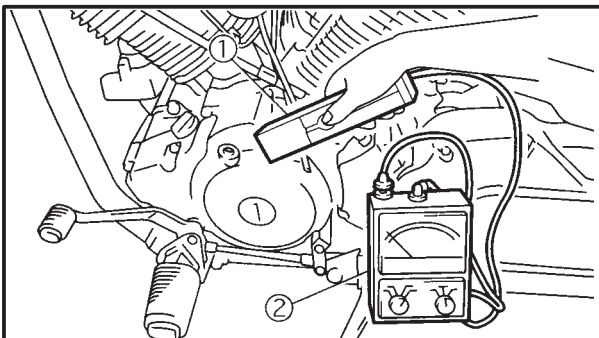
**NOTE:** \_\_\_\_\_

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:**  
**90890-03141**  
**Engine tachometer:**  
**90890-03113**





## MEASURING THE COMPRESSION PRESSURE/ CHECKING THE ENGINE OIL LEVEL

INSP  
ADJ



7. Install:
  - spark plug
8. Connect:
  - spark plug cap

 20 Nm (2.0 m•kg)

EAS00069

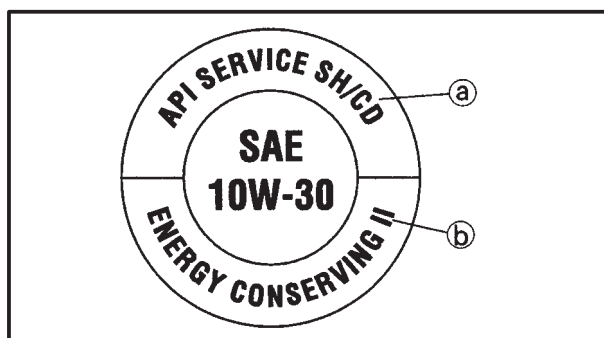
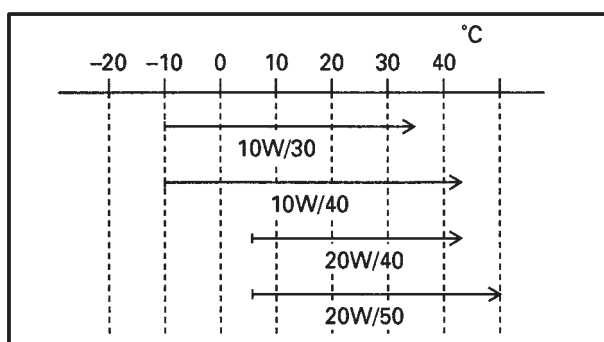
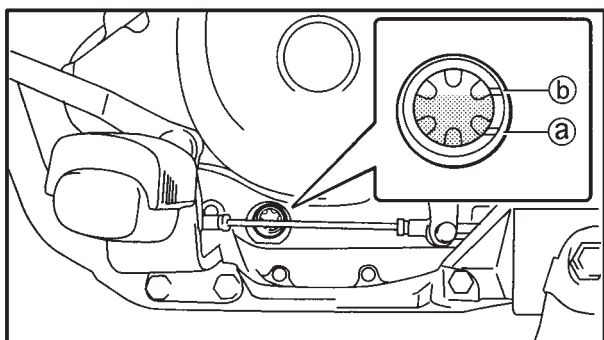
### CHECKING THE ENGINE OIL LEVEL

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 engine oil

Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.

API standard

SE or higher grade

ACEA standard

G4 or G5

#### CAUTION:

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

## CHECKING THE ENGINE OIL LEVEL/ CHANGING THE ENGINE OIL

INSP  
ADJ



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

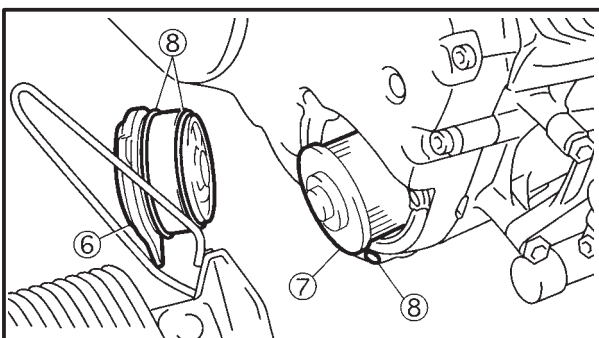
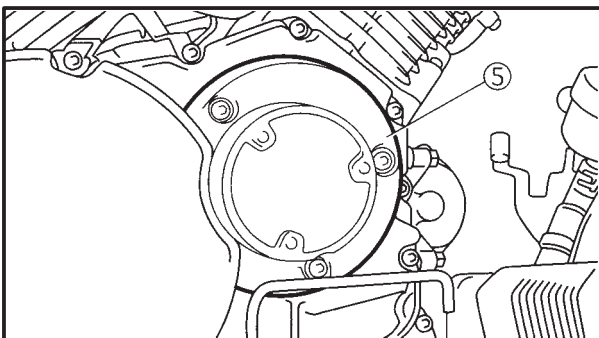
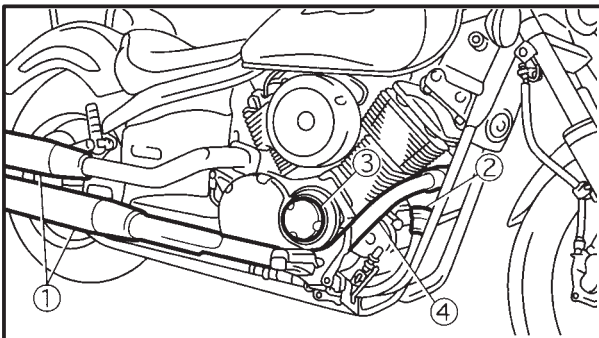
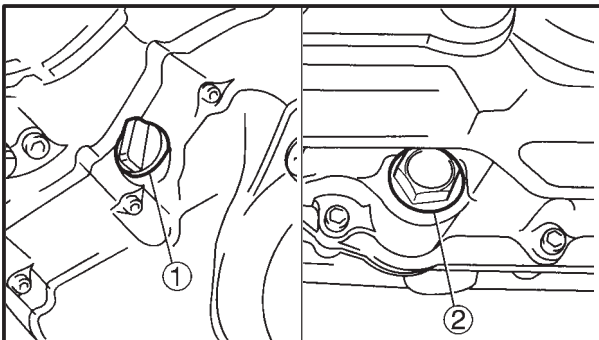
### NOTE:

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

EAS00075

### 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.



### ⚠ WARNING

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)**

- 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 **43 Nm (4.3 m•kg)**

8. Fill:
  - crankcase (with the specified amount of the recommended engine oil)

## CHANGING THE ENGINE OIL/ ADJUSTING THE CLUTCH CABLE FREE PLAY

**INSP**  
**ADJ**



### Quantity

Total amount

3.6 L

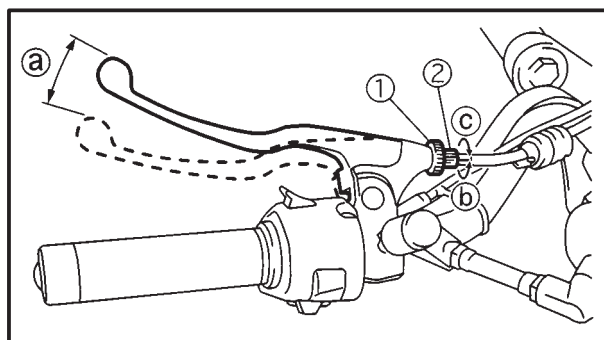
Without oil filter element  
replacement

3.0 L

With oil filter element  
replacement

3.1 L

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".



EAS00078

### ADJUSTING THE CLUTCH CABLE FREE PLAY

1. Check:
  - clutch cable free play **a**  
Out of specification → Adjust.



**Clutch cable free play (at the end  
of the clutch lever)**  
**5 ~ 10 mm**

2. Adjust:
  - clutch cable free play



#### Handlebar side

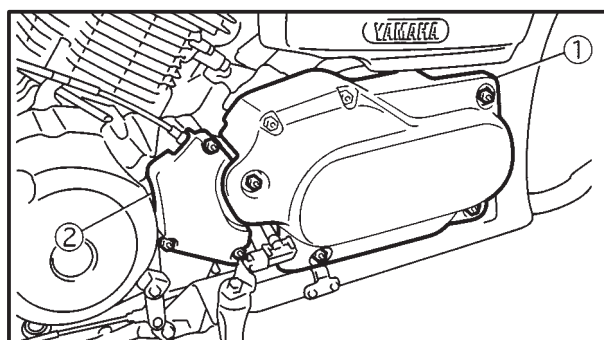
- a. Loosen the locknut **①**.
- b. Turn the adjusting screw **②** in direction **b** or **c** until the specified clutch cable free play is obtained.

|                    |                                      |
|--------------------|--------------------------------------|
| Direction <b>b</b> | Clutch cable free play is increased. |
| Direction <b>c</b> | Clutch cable free play is decreased. |

- c. Tighten the locknut.

#### NOTE:

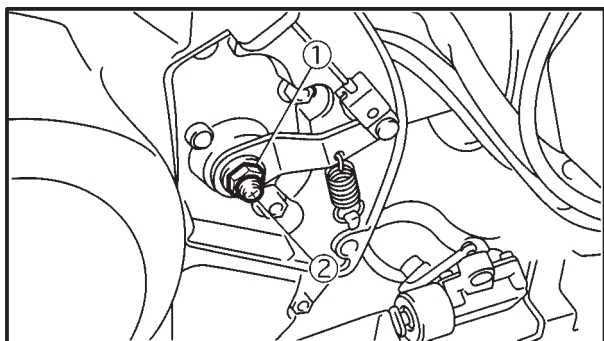
If the specified clutch cable free play cannot be obtained as described above, perform the mechanism adjustment procedure described below.



3. Remove:
  - left side cover **①**
  - clutch adjusting cover **②**

## ADJUSTING THE CLUTCH CABLE FREE PLAY/ CLEANING THE AIR FILTER ELEMENT

**INSP**  
**ADJ**



4. Adjust:
- clutch mechanism



### Engine side

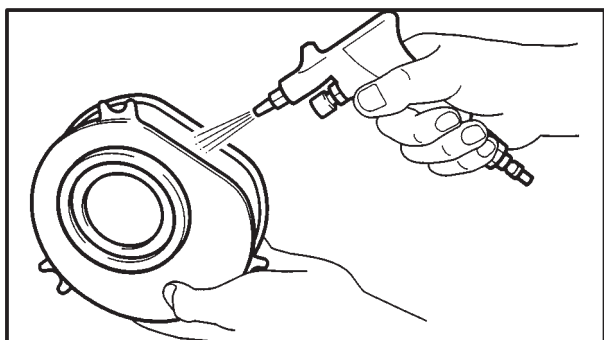
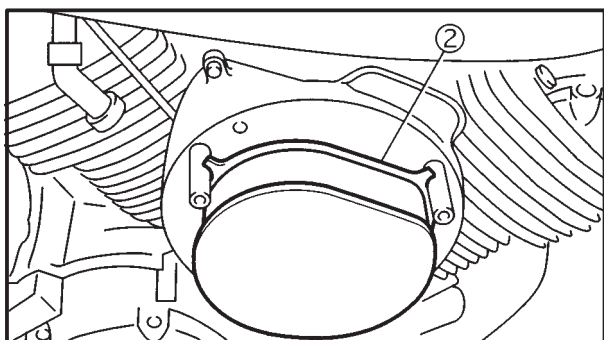
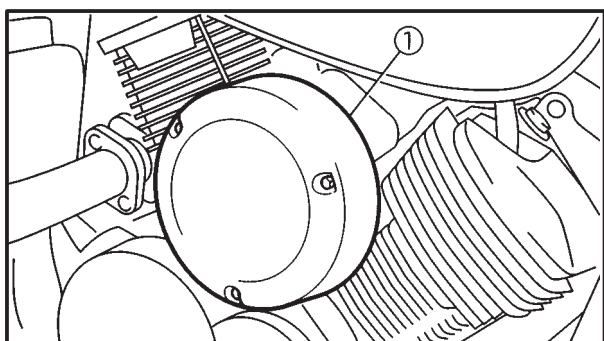
- Loosen the locknut (1).
- Turn in the adjusting screw (2) until it is lightly seated.
- Turn the adjusting screw out 1/4 of a turn.
- Tighten the locknut.
- Check the clutch cable free play again and adjust it if necessary.



EAS00086

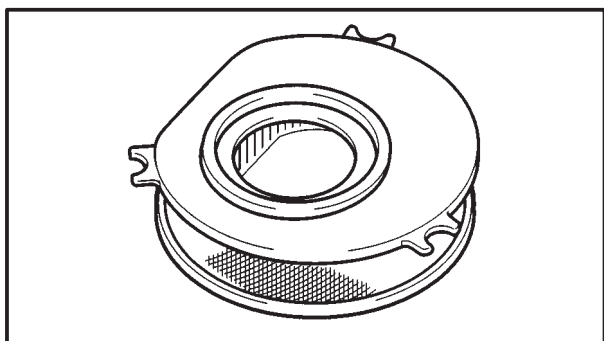
## CLEANING THE AIR FILTER ELEMENT

- Remove:
  - air filter case cover (1)
  - air filter element (2)



- Clean:
  - air filter element

Apply compressed air to the outer surface of the air filter element.



- Check:
  - air filter element

Damage → Replace.
- Install:
  - air filter element
  - air filter case cover

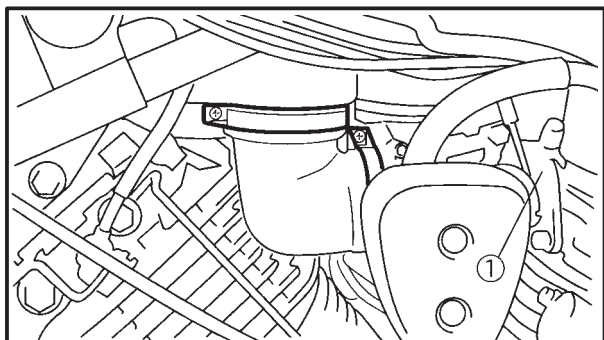


**CAUTION:**

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:**

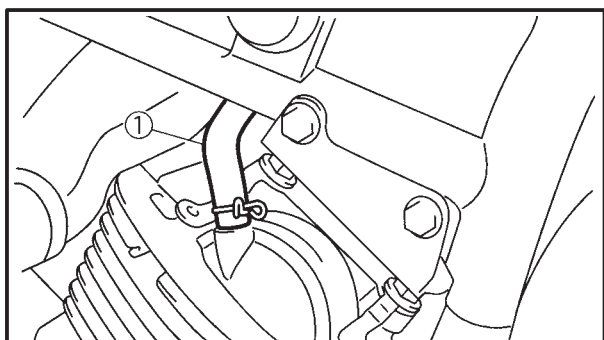
When installing the air filter element into the air filter case cover, be sure their sealing surfaces are aligned to prevent any air leaks.



EAS00094

**CHECKING THE CARBURETOR JOINT AND INTAKE MANIFOLD**

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



EAS00098

**CHECKING THE BREATHER HOSE**

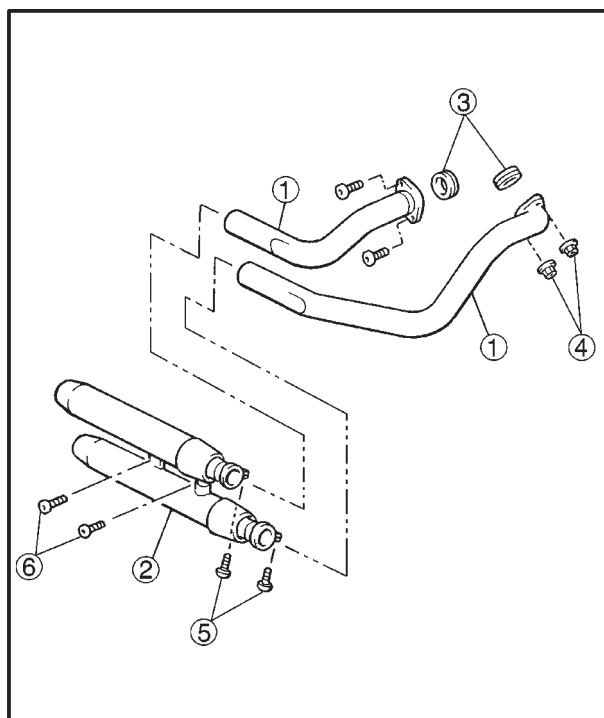
1. Remove:
  - cylinder head cover
2. Check:
  - cylinder head breather hose ①  
Cracks/damage → Replace.  
Loose connection → Connect properly.

**CAUTION:**

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

## CHECKING THE EXHAUST SYSTEM

INSP  
ADJ



EAS00100

### 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



Exhaust pipe nut ④

20 Nm (2.0 m•kg)

Exhaust pipe and muffler bolt ⑤

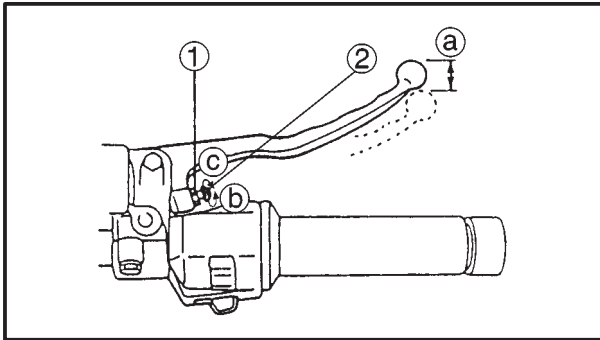
20 Nm (2.0 m•kg)

Muffler and muffler bracket bolt ⑥

25 Nm (2.5 m•kg)

## ADJUSTING THE FRONT BRAKE

INSP  
ADJ



EAS00108

### CHASSIS

#### ADJUSTING THE FRONT BRAKE

##### 1. Check:

- brake lever free play (a)  
Out of specification → Adjust.



**Brake lever free play (at the end of the brake lever)**  
**5 ~ 8 mm**

##### 2. Adjust:

- brake lever free play



- Loosen the locknut (1).
- Turn the adjusting bolt (2) in direction (b) or (c) until the specified brake lever free play is obtained.

**Direction (b) → Brake lever free play is increased.**

**Direction (c) → Brake lever free play is decreased.**

- 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.

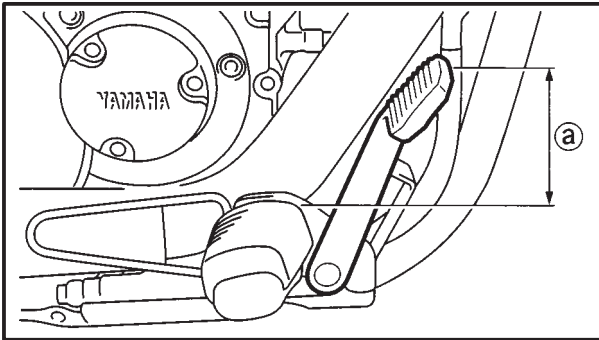
### **CAUTION:**

After adjusting the brake lever free play, make sure that there is no brake drag.



## ADJUSTING THE REAR BRAKE

INSP  
ADJ



EAS00110

### ADJUSTING THE REAR BRAKE

#### 1. Check:

- brake pedal position  
(distance ① from the top of the rider footrest to the top of the brake pedal)  
Out of specification → Adjust.



**Brake pedal position (below the top of the rider footrest)**  
**81.8 mm**

#### 2. Adjust:

- brake pedal position



- Loosen the locknut ①.
- Turn the adjusting bolt ② in direction ③ or ④ until the specified brake pedal position is obtained.

**Direction ③ → Brake pedal is raised.**

**Direction ④ → Brake pedal is lowered.**

### ⚠ WARNING

After adjusting the brake pedal position, check that the end of the adjusting bolt ② is visible through the hole ⑤.

- Tighten the locknut ① to specification.



**Locknut**  
**16 Nm (1.6 m•kg)**

### ⚠ 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.

### 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".

## CHECKING THE BRAKE FLUID LEVEL

INSP  
ADJ



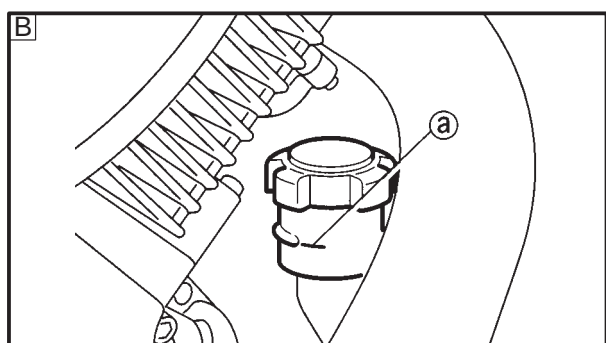
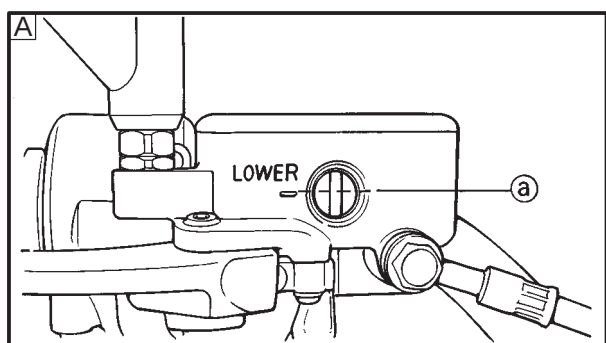
EAS00115

### 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.



**Recommended brake fluid  
DOT 4**

**A** Front brake

**B** Rear brake

#### **⚠ WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical 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.

#### NOTE:

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





EAS00134

## 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.

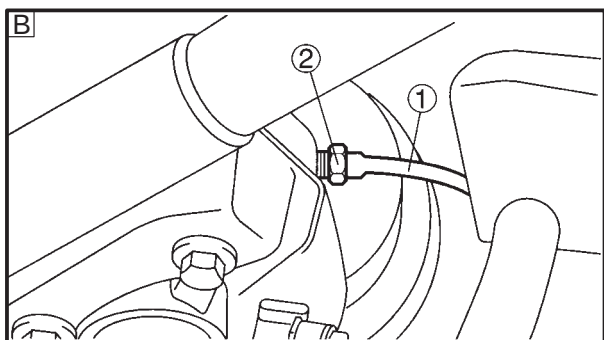
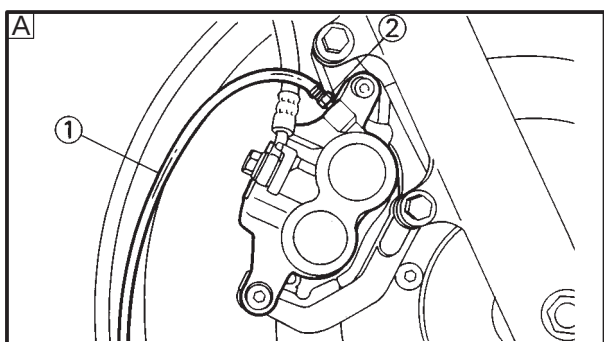
### NOTE:

- 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).
- [A] : Front      [B] : Rear
- 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.

**BLEEDING THE HYDRAULIC BRAKE SYSTEM/  
ADJUSTING THE SHIFT PEDAL**

|                     |                                                                                     |
|---------------------|-------------------------------------------------------------------------------------|
| <b>INSP<br/>ADJ</b> |  |
|---------------------|-------------------------------------------------------------------------------------|

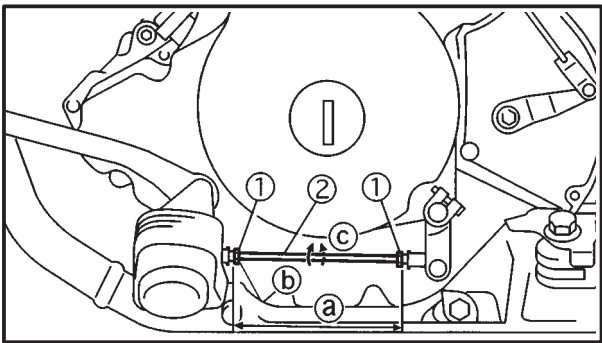
- h. Tighten the bleed screw and then release the brake lever or brake pedal.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- j. Tighten the bleed screw to specification.

|                                                                                   |                                        |
|-----------------------------------------------------------------------------------|----------------------------------------|
|  | <b>Bleed screw<br/>6 Nm (0.6 m•kg)</b> |
|-----------------------------------------------------------------------------------|----------------------------------------|

- 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.**



EAS00137

**ADJUSTING THE SHIFT PEDAL**

**NOTE:**

The shift pedal position is determined by the adjusting bolt length ①.

- 1. Measure:
  - adjusting the length ①Incorrect → Adjust.

|                                                                                     |                                           |
|-------------------------------------------------------------------------------------|-------------------------------------------|
|  | <b>Adjusting bolt length<br/>114.7 mm</b> |
|-------------------------------------------------------------------------------------|-------------------------------------------|

- 2. Adjust:
  - adjusting bolt length ①



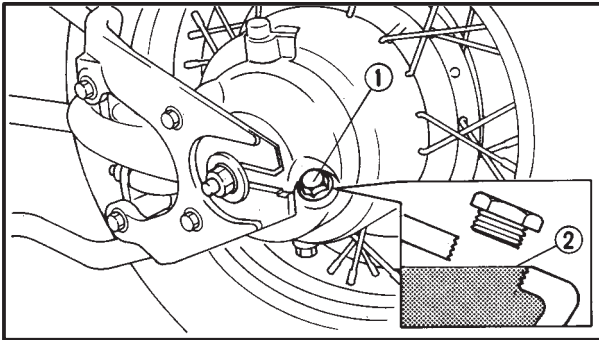
- a. Loosen both locknuts ①
- b. Turn the adjusting bolt ② in direction ⑥ or ⑦ to obtain the correct shift pedal position.

|                                              |
|----------------------------------------------|
| <b>Direction ⑥ → shift pedal is raised.</b>  |
| <b>Direction ⑦ → shift pedal is lowered.</b> |



## CHECKING THE FINAL DRIVE OIL LEVEL/ CHANGING THE FINAL DRIVE OIL

INSP  
ADJ



EAS00144

### 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 ①

3. Check:

- final drive oil level

The final drive oil level should be to the bottom brim ② 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”

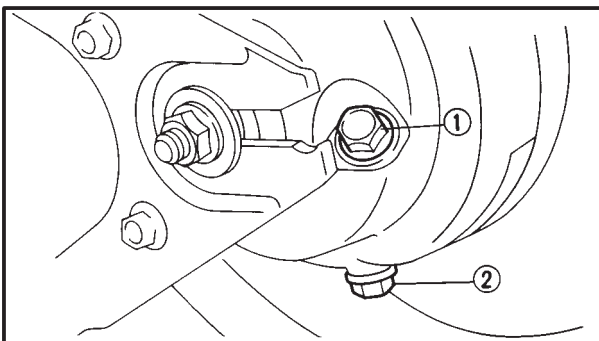
or

multi-purpose SAE 80W90  
hypoid gear oil

4. Install:

- final drive housing oil filler bolt

23 Nm (2.3 m•kg)



EAS00145

### CHANGING THE FINAL DRIVE OIL

1. Place a container under the final drive housing.

2. Remove:

- final drive housing oil filler bolt ①
- final drive housing oil drain bolt ②

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

23 Nm (2.3 m•kg)

5. Fill:

- final drive housing  
(with the specified amount of the recommended final drive oil)

## CHANGING THE FINAL DRIVE OIL/ CHECKING AND ADJUSTING THE STEERING HEAD

INSP  
ADJ



Quantity  
0.2 L

Refer to "CHECKING THE FINAL DRIVE OIL LEVEL".

EAS00146

### CHECKING AND ADJUSTING THE STEERING HEAD

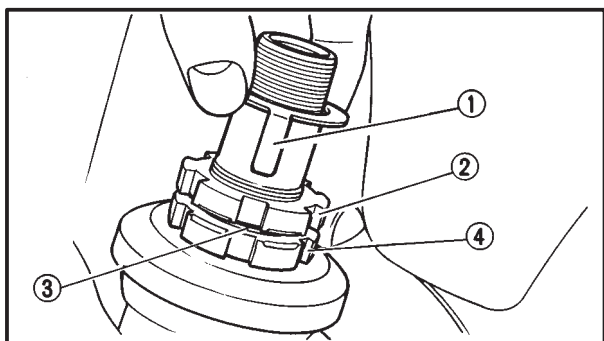
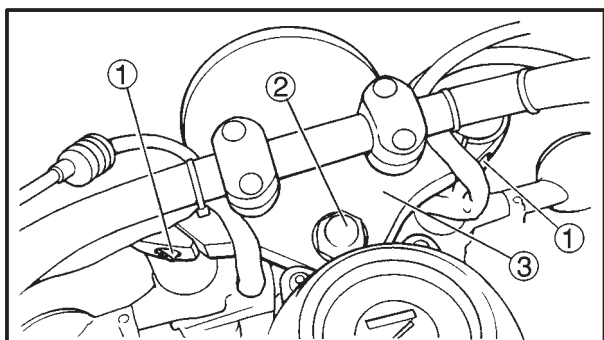
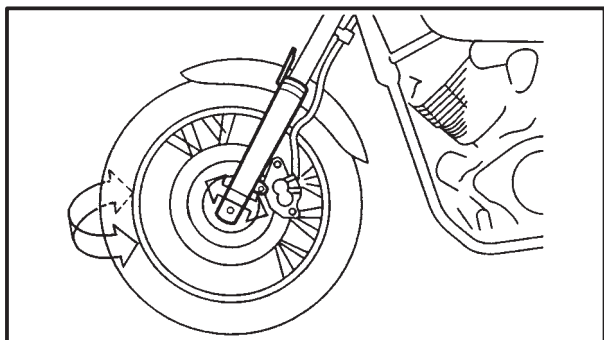
1. Stand the motorcycle on a level surface.

#### **⚠ 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. 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

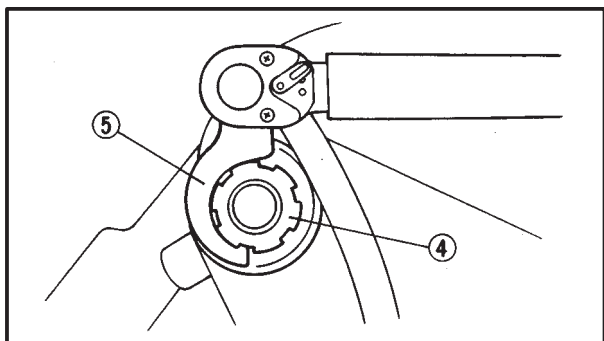
4. Adjust:

- steering head

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

## CHECKING AND ADJUSTING THE STEERING HEAD

**INSP  
ADJ**



- 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**  
**90890-01403**



**Lower ring nut (initial tightening torque)**  
**52 Nm (5.2 m•kg)**

- 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)**

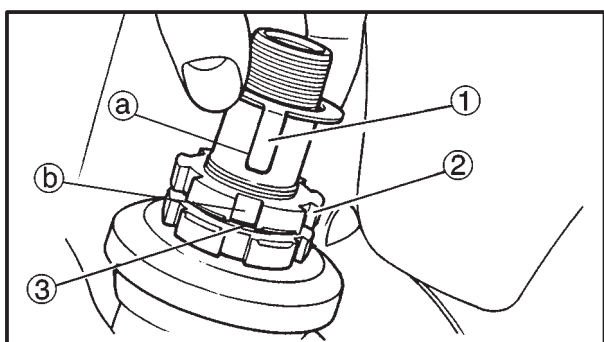
- d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and inspect the upper and lower bearings.

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 (a) sit correctly in the ring nut slots (b).

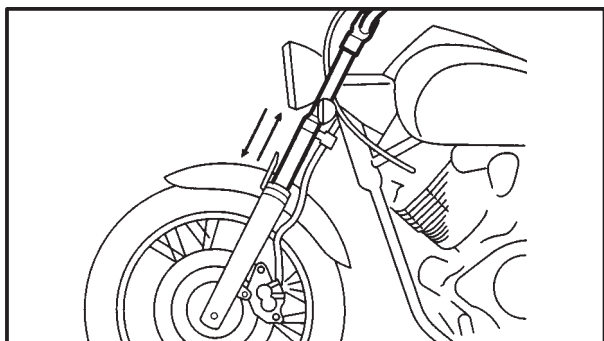


### 5. Install:

- upper bracket
- steering stem nut **110 Nm (11.0 m•kg)**
- upper bracket pinch bolt **20 Nm (2.0 m•kg)**

## CHECKING THE FRONT FORK/ ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

INSP  
ADJ



EAS00149

### 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.

EAS00159

### 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



## CHECKING THE TIRES

INSP  
ADJ



|                                             |                                     |                                     |
|---------------------------------------------|-------------------------------------|-------------------------------------|
| Basic weight: (with oil and full fuel tank) | 274 kg                              |                                     |
| Maximum load*:                              | 201 kg                              |                                     |
| Cold tire pressure:                         | Front                               | Rear                                |
| Up to 90 kg load*                           | 200 kPa (2.00 kgf/cm <sup>2</sup> ) | 225 kPa (2.25 kgf/cm <sup>2</sup> ) |
| 90 kg ~ maximum load*                       | 225 kPa (2.25 kgf/cm <sup>2</sup> ) | 250 kPa (2.50 kgf/cm <sup>2</sup> ) |
| High speed riding                           | 225 kPa (2.25 kgf/cm <sup>2</sup> ) | 250 kPa (2.50 kgf/cm <sup>2</sup> ) |

\*: total of cargo, rider, passenger and accessories

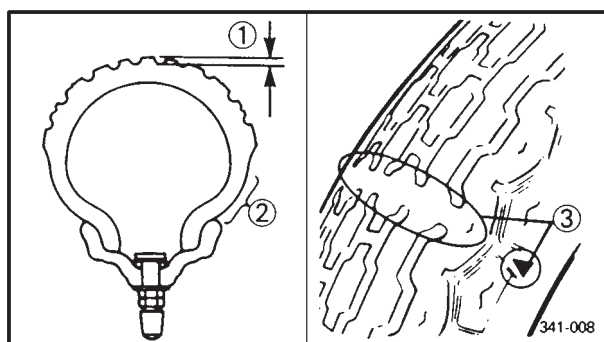
### **⚠ WARNING**

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.

|                                                                                     |                                                  |
|-------------------------------------------------------------------------------------|--------------------------------------------------|
|  | <b>Minimum tire tread depth</b><br><b>1.6 mm</b> |
|-------------------------------------------------------------------------------------|--------------------------------------------------|



- 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.



- 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.

|                |                       |
|----------------|-----------------------|
| Tube wheel     | Tubeless wheel        |
| Tube tire only | Tube or tubeless tire |

- 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:

| Manufacturer | Type          | Size        |
|--------------|---------------|-------------|
| BRIDGE-STONE | 110/90-18 61S | EXEDRA L309 |
| DUNLOP       | 110/90-18 61S | K555F       |

#### Rear tire:

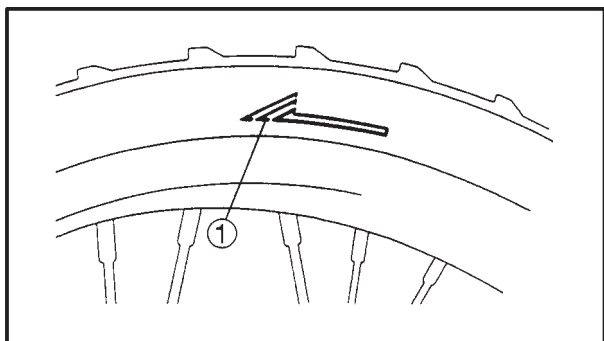
| Manufacturer | Type                 | Size           |
|--------------|----------------------|----------------|
| BRIDGE-STONE | 170/80-15<br>M/C 77S | EXEDRA<br>G546 |
| DUNLOP       | 170/80-15<br>M/C 77S | K555           |

#### WARNING

- New tires have a relatively low grip on the road surface until they have been slightly worn.  
Therefor, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

## CHECKING THE TIRES/ CHECKING AND TIGHTENING THE SPOKES

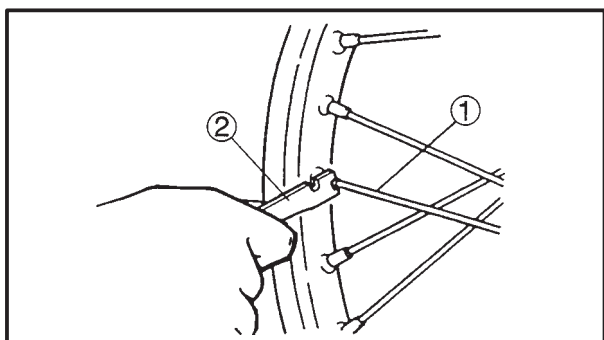
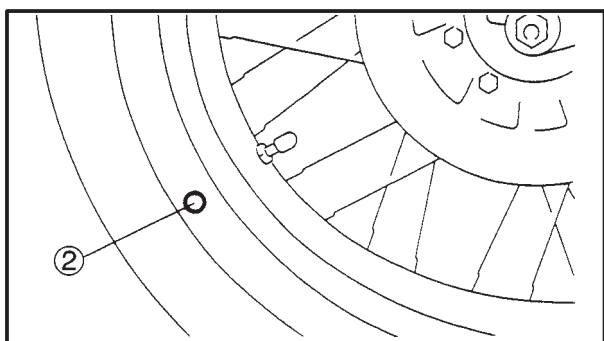
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### NOTE:

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.



EAS00169

### 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  **3 Nm (0.3 m•kg)**  
(with a spoke wrench (2))

### NOTE:

Be sure to tighten the spokes before and after break-in.



EAS00170

### CHECKING AND LUBRICATING THE CABLES

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

#### **WARNING**

**Damaged cable sheaths may causes 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**  
**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.

EAS00171

### LUBRICATING THE LEVERS AND PEDALS

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



**Recommended lubricant**  
**Engine oil**

EAS00172

### LUBRICATING THE SIDESTAND

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



**Recommended lubricant**  
**Engine oil**

EAS00174

### LUBRICATING THE REAR SUSPENSION

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



**Recommended lubricant**  
**Molybdenum disulfide grease**



EB305020

### ELECTRICAL SYSTEM

#### CHECKING AND CHARGING THE BATTERY

#### **WARNING**

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- Wear protective eye gear when handling or working near batteries.
- Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- DO NOT SMOKE when charging or handling batteries.
- KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.
- Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

First aid in case of bodily contact:

External

- SKIN – Wash with water.
- EYES – Flush with water for 15 minutes and get immediate medical attention.

Internal

Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

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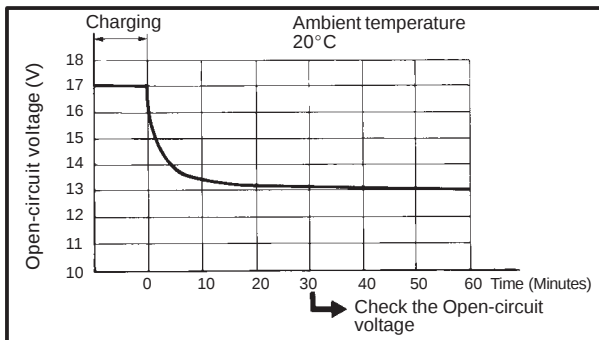
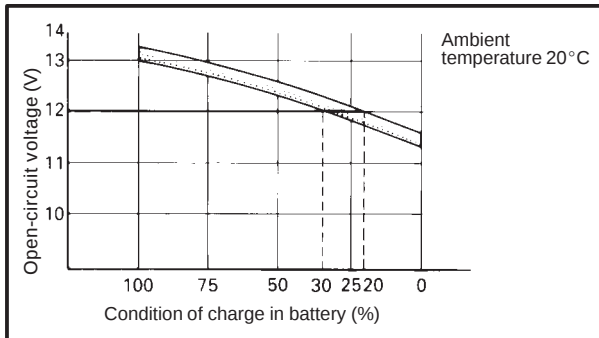
#### **CAUTION:**

- 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

INSP  
ADJ



### WARNING

Do not quick charge a battery.

### CAUTION:

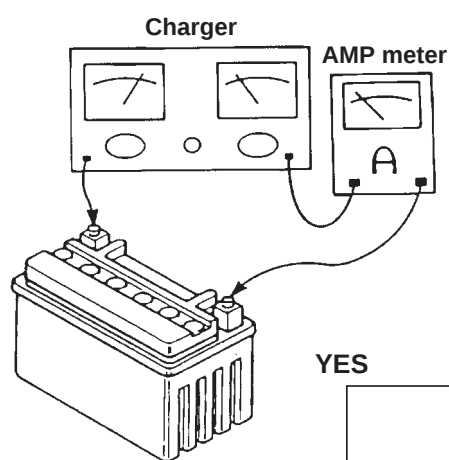
- Make sure that the battery breather hose and battery vent are free of obstructions.
- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger. They force a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is 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.

## CHECKING AND CHARGING THE BATTERY

INSP  
ADJ



### Charging method using a variable-current (voltage) type charger



Measure the open-circuit voltage prior to charging.

NOTE:

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

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

NOTE:

Set the charging voltage at 16 ~ 17 V. (If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.)

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

YES

NO

By turning the charging voltage adjust dial, set the charging voltage at 20 ~ 25 V.

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

YES

Monitor the amperage for 3 ~ 5 minutes to check if the standard charging current is reached.

NO

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

If the current does not exceed standard charging current after 5 minutes, replace the battery.

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 change in the amperage, readjust the voltage to obtain the standard charging current.

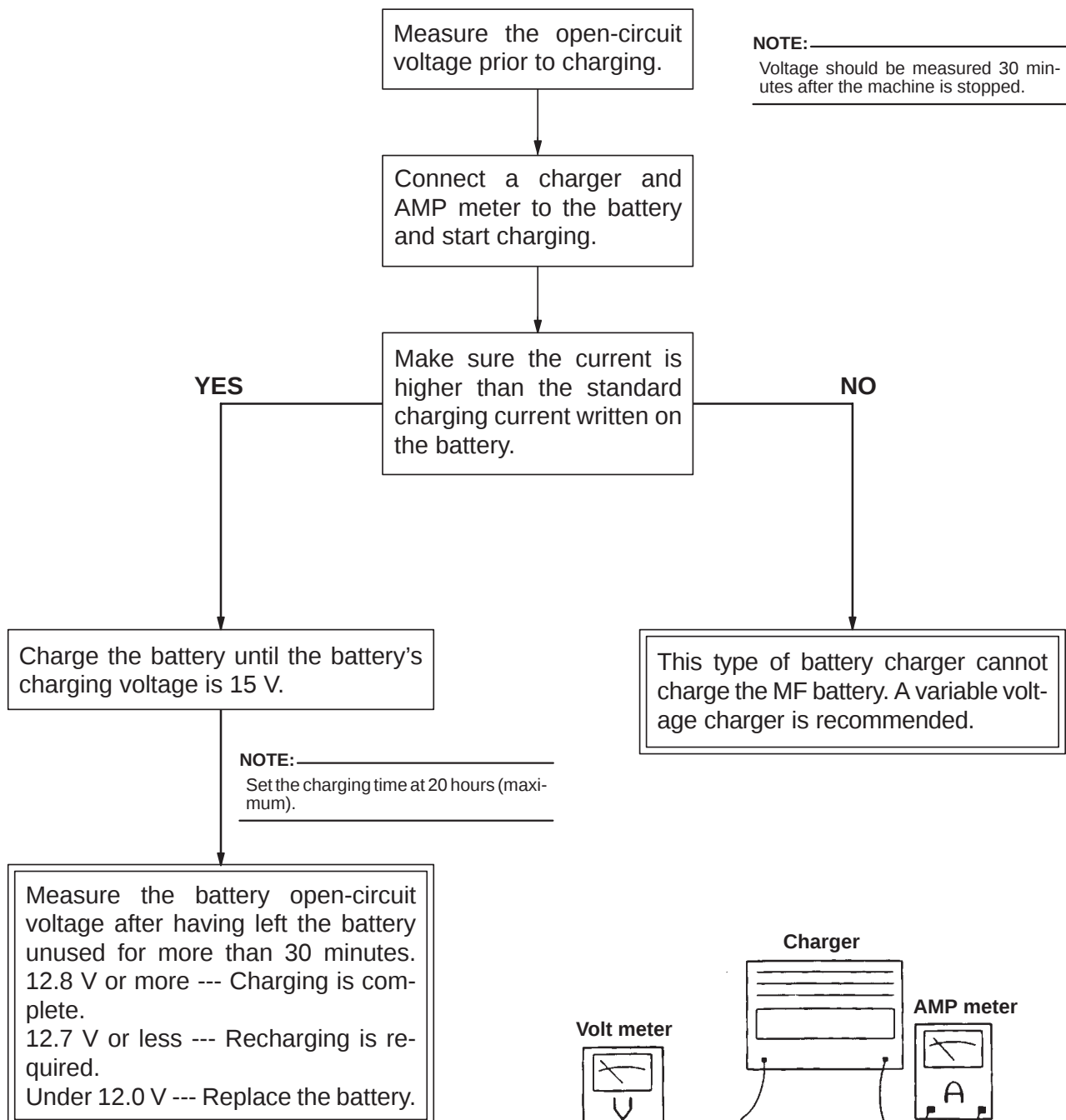
Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.  
12.8 V or more --- Charging is complete.  
12.7 V or less --- Recharging is required.  
Under 12.0 V --- Replace the battery.

## CHECKING AND CHARGING THE BATTERY

INSP  
ADJ



### Charging method using a constant-voltage type charger



### Charging method using a constant-current type charger

This type of battery charger cannot charge the MF battery.

## CHECKING AND CHARGING THE BATTERY

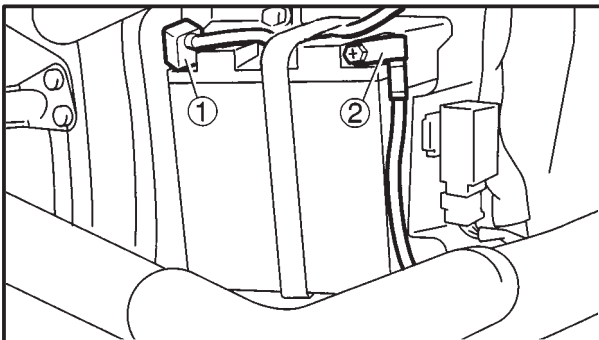
INSP  
ADJ



6. Check:
  - battery breather hose and battery vent  
Obstruction → Clean.  
Damage → Replace.
7. Install:
  - battery

### CAUTION:

- When inspecting the battery, make sure that the battery breather hose is properly attached and routed correctly. If the battery breather hose is positioned so as to allow electrolyte or hydrogen gas from the battery to contact the frame, the motorcycle and its finish may be damaged.
- Make sure that the battery breather hose is properly routed away from the drive chain and from below the swingarm.



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

### CAUTION:

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

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



**Recommended lubricant**  
**Dielectric grease**

11. Install:
  - battery cover

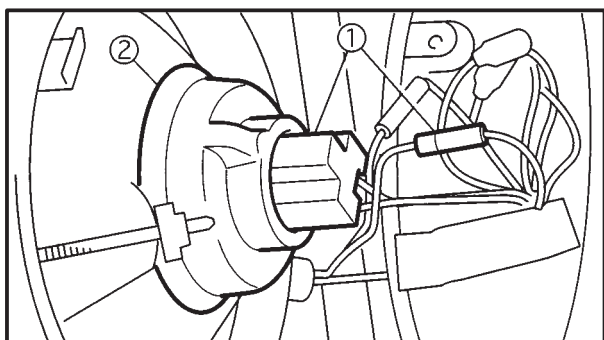




**⚠ WARNING**

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.

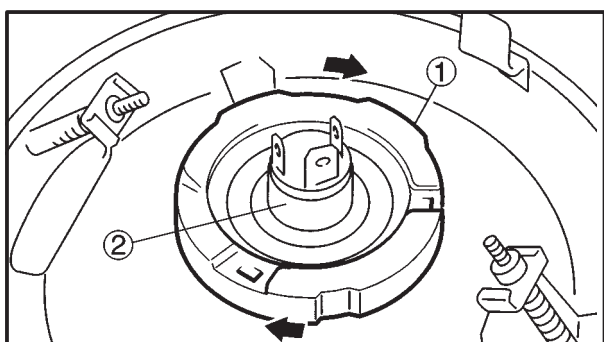
4. Install:
- tool box cover
  - ignitor plate
  - rider's seat



EAS00182

**REPLACING THE HEADLIGHT BULB**

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



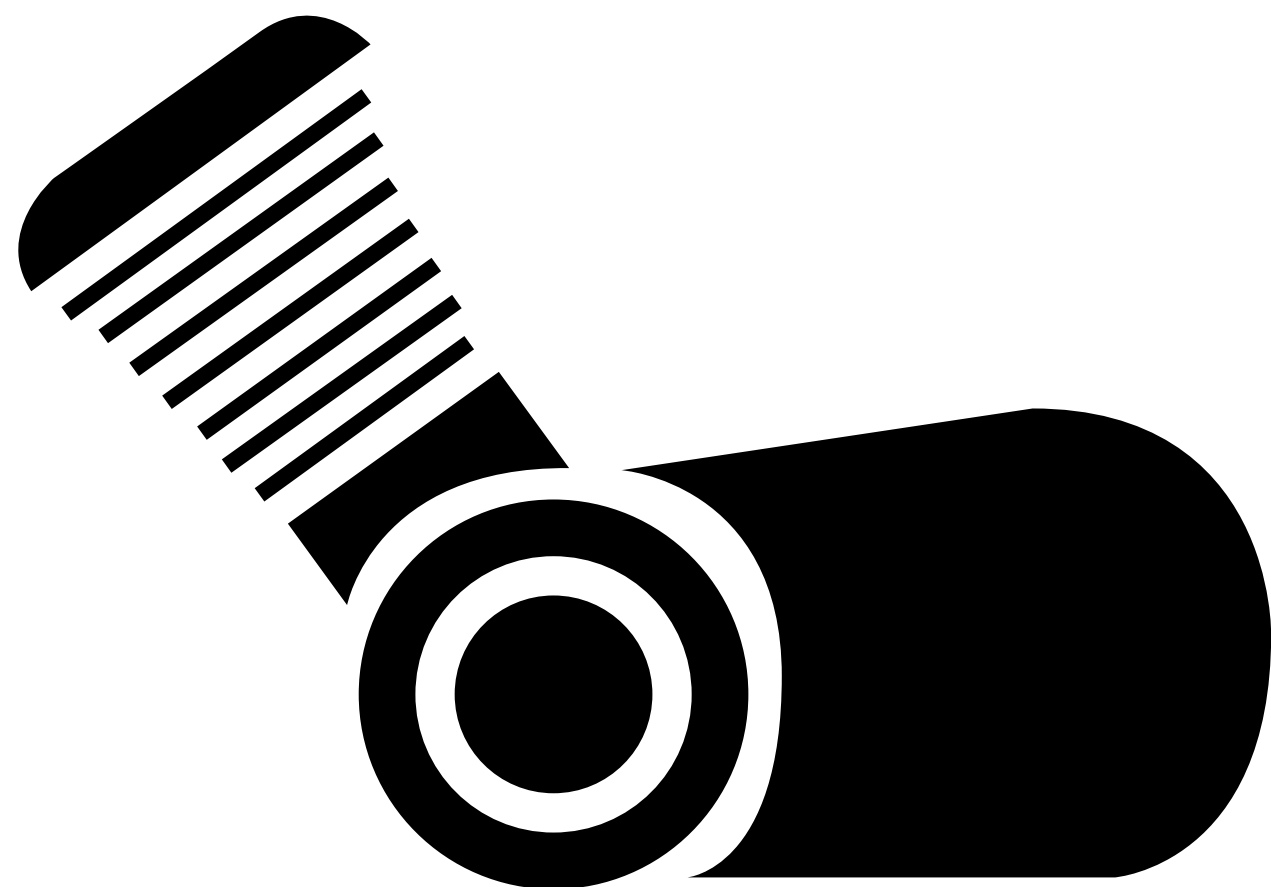
3. Remove:
- headlight bulb holder ①
4. Remove:
- headlight bulb ②

**⚠ 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.





**ENG**

**4**



## CHAPTER 4

### ENGINE

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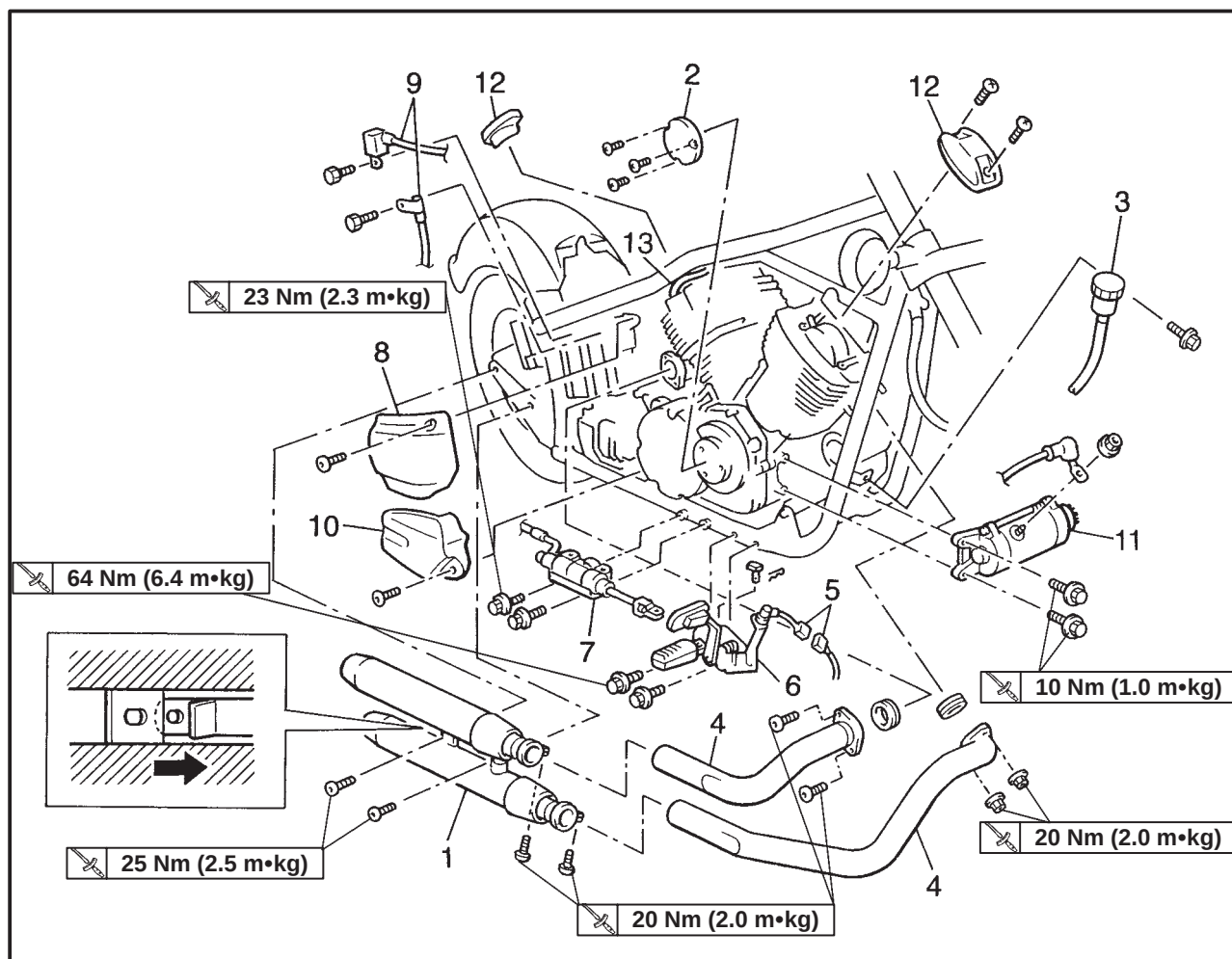
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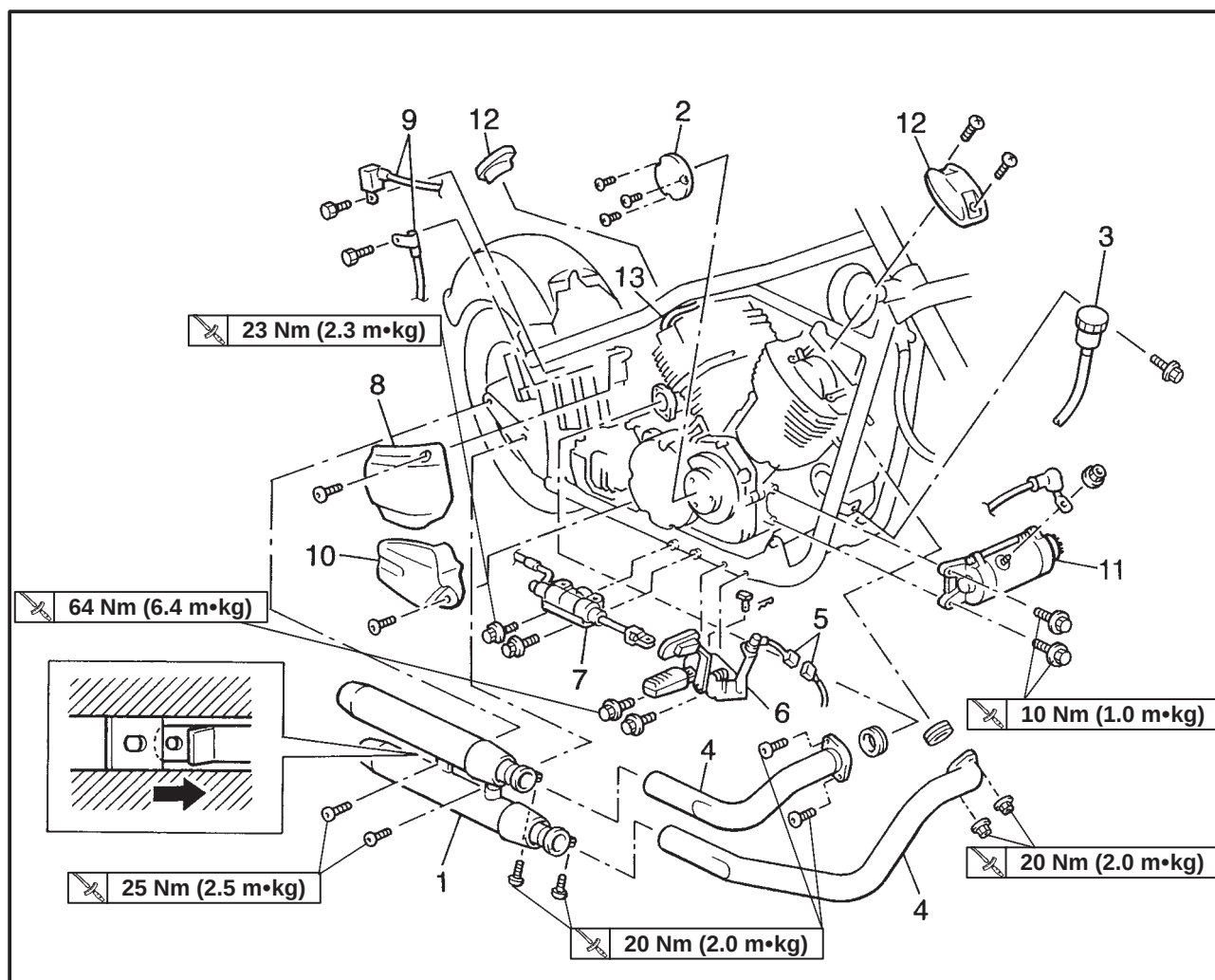
## ENGINE

## ENGINE REMOVAL

## MUFFLERS, BRAKE PEDAL AND SIDE COVER



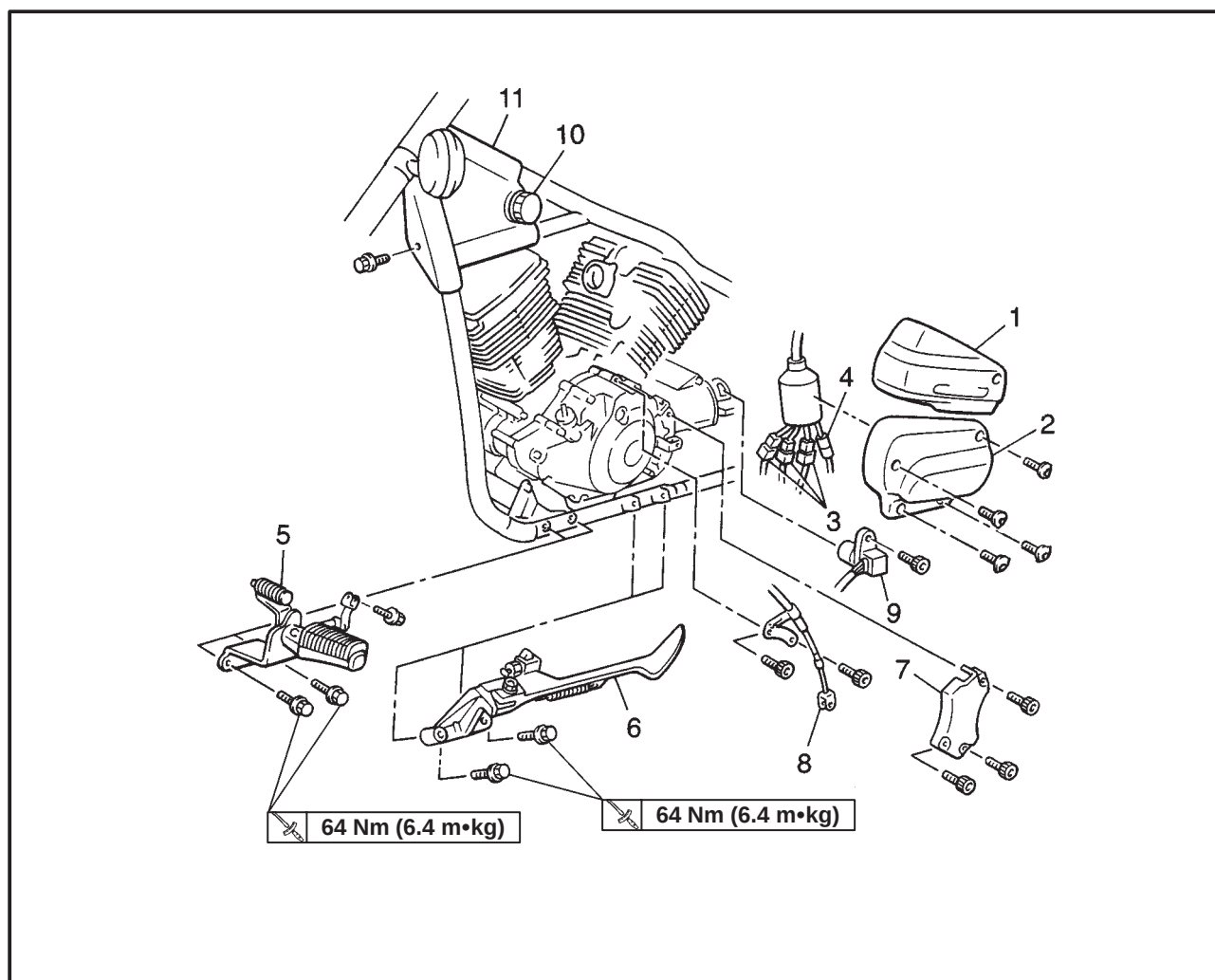
| Order | Job name/Part name                                      | Q'ty | Remarks                                                                          |
|-------|---------------------------------------------------------|------|----------------------------------------------------------------------------------|
|       | <b>Removing the muffler, brake pedal and side cover</b> |      | Remove the parts in the order listed.                                            |
|       |                                                         |      | Stand the motorcycle on a level surface.                                         |
|       |                                                         |      | <b>⚠ WARNING</b>                                                                 |
|       |                                                         |      | <b>Securely support the motorcycle so there is no danger of it falling over.</b> |
|       | Fuel tank                                               |      | Refer & "FUEL TANK AND SEATS" in Chapter 3.                                      |
|       | Air filter case assembly                                |      | Refer to "CARBURETOR" in Chapter 5.                                              |
|       | Carburetor assembly                                     |      |                                                                                  |
| 1     | Muffler assembly                                        | 1    |                                                                                  |
| 2     | Cover (emblem)                                          | 1    |                                                                                  |
| 3     | Reservoir tank                                          | 1    |                                                                                  |
| 4     | Exhaust pipes                                           | 2    |                                                                                  |
| 5     | Rear brake switch lead                                  | 1    | Disconnect                                                                       |
| 6     | Footrest/brake pedal                                    | 1/1  |                                                                                  |



| Order | Job name/Part name                 | Q'ty | Remarks                                                                                                     |
|-------|------------------------------------|------|-------------------------------------------------------------------------------------------------------------|
| 7     | Rear brake master cylinder/bracket | 1/1  | Disconnect<br><b>NOTE:</b> _____<br>First, disconnect the negative lead, then disconnect the positive lead. |
| 8     | Battery cover                      | 1    |                                                                                                             |
| 9     | Battery leads                      | 2    |                                                                                                             |
| 10    | Right side cover                   | 1    | Disconnect                                                                                                  |
| 11    | Starter motor                      | 1    |                                                                                                             |
| 12    | Cylinder head covers               | 4    |                                                                                                             |
| 13    | Spark plug caps                    | 4    | For installation, reverse the removal procedure                                                             |



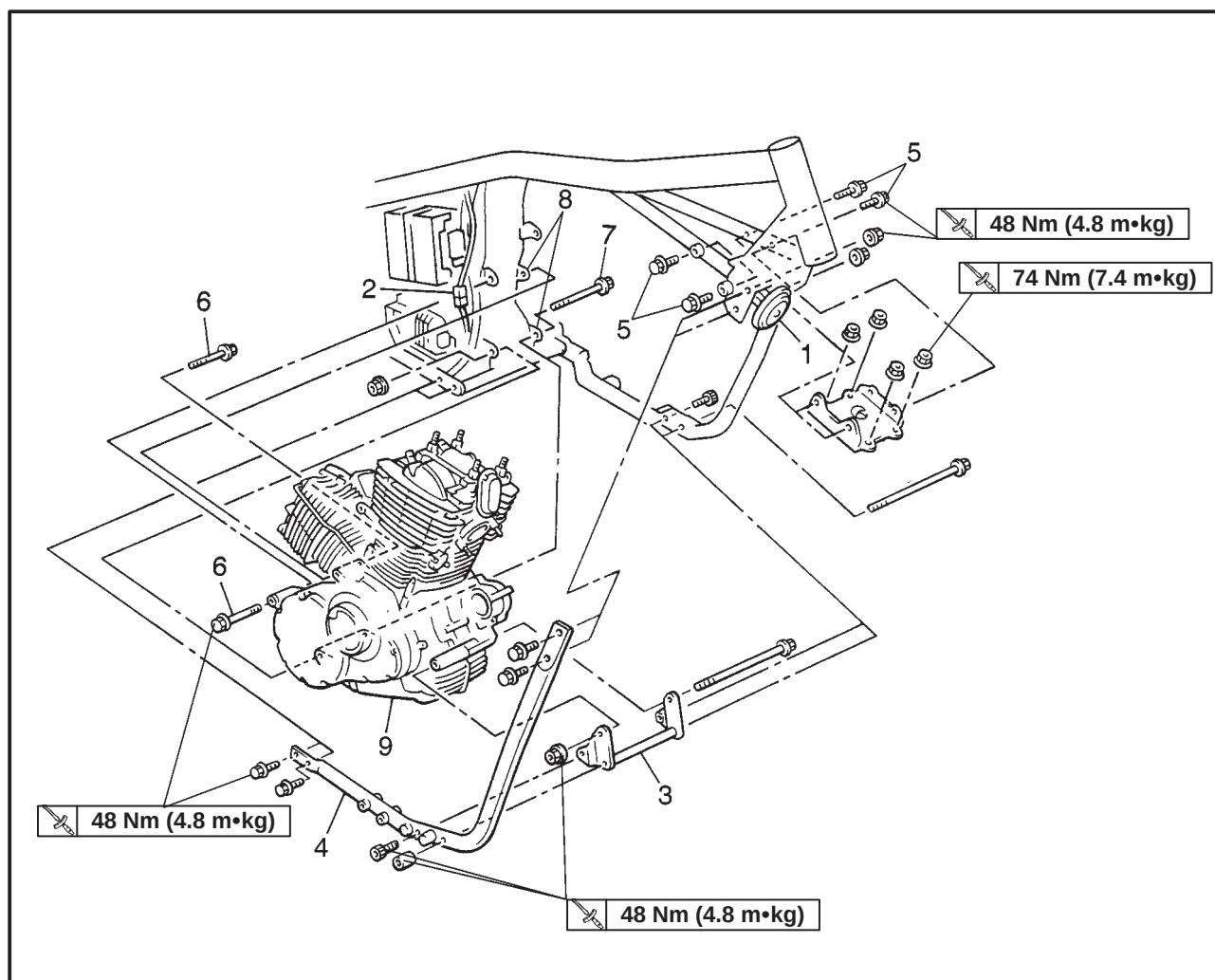
## LEADS, SHIFT PEDL AND CLUTCH CABLE



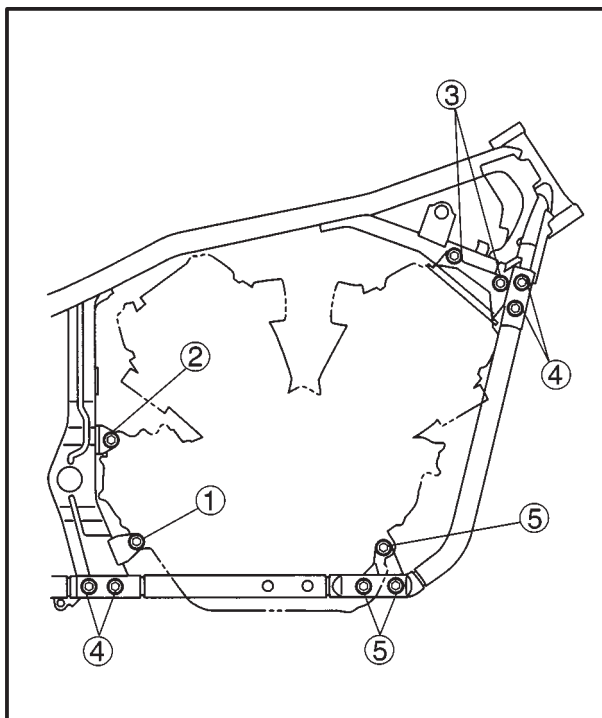
| Order | Job name/Part name                                                   | Q'ty  | Remarks                                          |
|-------|----------------------------------------------------------------------|-------|--------------------------------------------------|
|       | <b>Removing the leads, shift pedal and clutch cable</b>              |       | Remove the parts in the order listed.            |
| 1     | Tool box cover                                                       | 1     |                                                  |
| 2     | Left side cover                                                      | 1     |                                                  |
| 3     | AC magneto lead/pickup lead/side stand switch lead/speed sensor lead | 1/1/1 | Disconnect                                       |
| 4     | Neutral switch lead                                                  | 1     | Disconnect                                       |
| 5     | Footrest/shift pedal                                                 | 1/1   | Refer to "INSTALLING THE ENGINE".                |
| 6     | Sidestand                                                            | 1     |                                                  |
| 7     | Clutch adjusting cover                                               | 1     |                                                  |
| 8     | Clutch cable                                                         | 1     | Disconnect                                       |
| 9     | Speed sensor                                                         | 1     |                                                  |
| 10    | Fuel tank fitting knobs                                              | 2     |                                                  |
| 11    | Steering head side covers                                            | 2     |                                                  |
|       |                                                                      |       | For installation, reverse the removal procedure. |



## ENGINE MOUNTING BOLTS



| Order | Job name/Part name                  | Q'ty | Remarks                                                                                    |
|-------|-------------------------------------|------|--------------------------------------------------------------------------------------------|
|       | <b>Engine mounting bolt removal</b> |      |                                                                                            |
|       | Left crankcase cover                |      | Remove the parts in the order below.<br>Place a suitable stand under the frame and engine. |
|       | Tool box                            |      | Refer to "GENERATOR AND STARTER CLUTCH"                                                    |
| 1     | Horn                                | 1    | Refer to "REAR SHOCK ABSORBER AND SWINGARM" in Chapter 6.                                  |
| 2     | Engine ground lead connector        | 1    |                                                                                            |
| 3     | Engine stay (front-lower)           | 1    |                                                                                            |
| 4     | Down tube                           | 1    |                                                                                            |
| 5     | Engine bracket bolts                | 4    |                                                                                            |
| 6     | Engine mount bolts (rear upper)     | 2    |                                                                                            |
| 7     | Engine mount bolt (rear lower)      | 1    | Refer to "INSTALLING THE ENGINE".                                                          |
| 8     | Engine stays (rear upper/lower)     | 1/1  |                                                                                            |
| 9     | Engine assembly                     | 1    |                                                                                            |
|       |                                     |      | For installation, reverse the removal procedure.                                           |



EAS00192

**INSTALLING THE ENGINE**

1. Tighten the bolts in the following order.



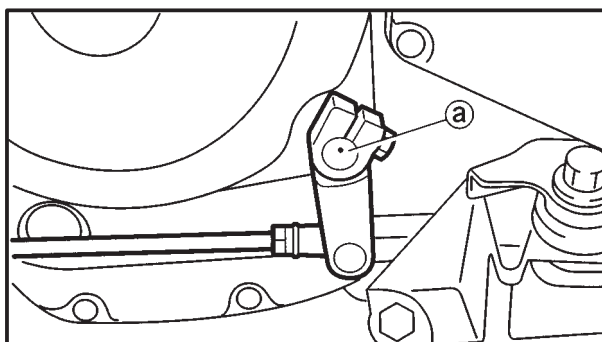
**Bolt ①:**  
48 Nm (4.8 m•kg)

**Bolt ②:**  
48 Nm (4.8 m•kg)

**Bolt ③:**  
48 Nm (4.8 m•kg)

**Bolt ④:**  
48 Nm (4.8 m•kg)

**Bolt ⑤:**  
48 Nm (4.8 m•kg)



2. Install:

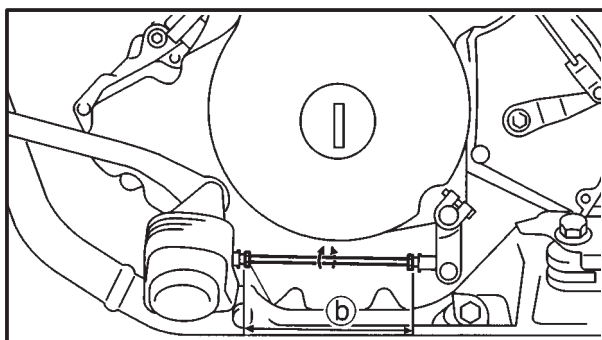
- shift arm ①

**NOTE:**

• Align the punch mark ① in the shift shaft with the slot in the shift arm.

• Adjust the adjusting bolt length ②.

Refer to "ADJUSTING THE SHIFT PEDAL" in chapter 3.



**Shift arm bolt**  
10Nm (1.0m•kg)

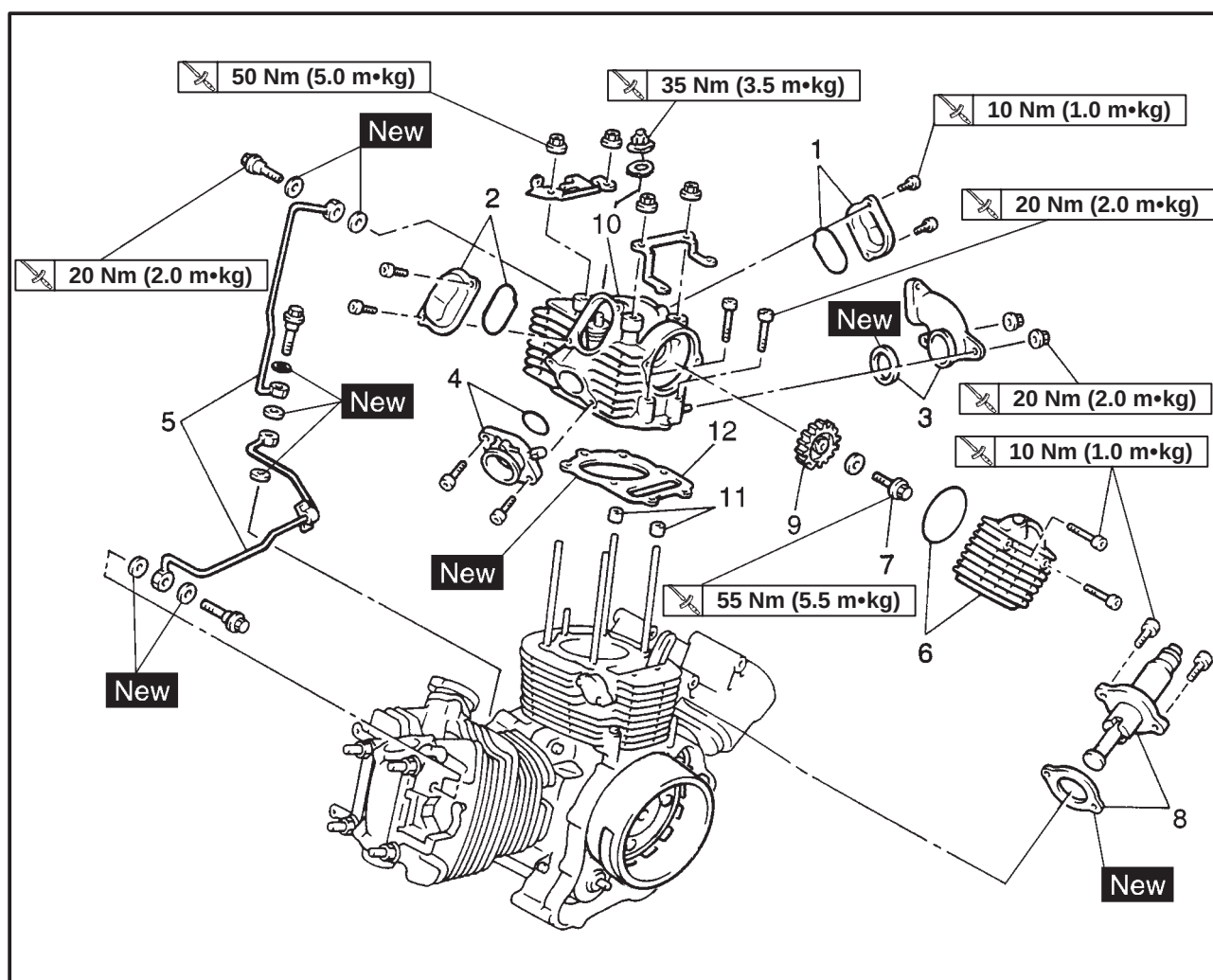


**Adjusting bolt length**  
114.7mm

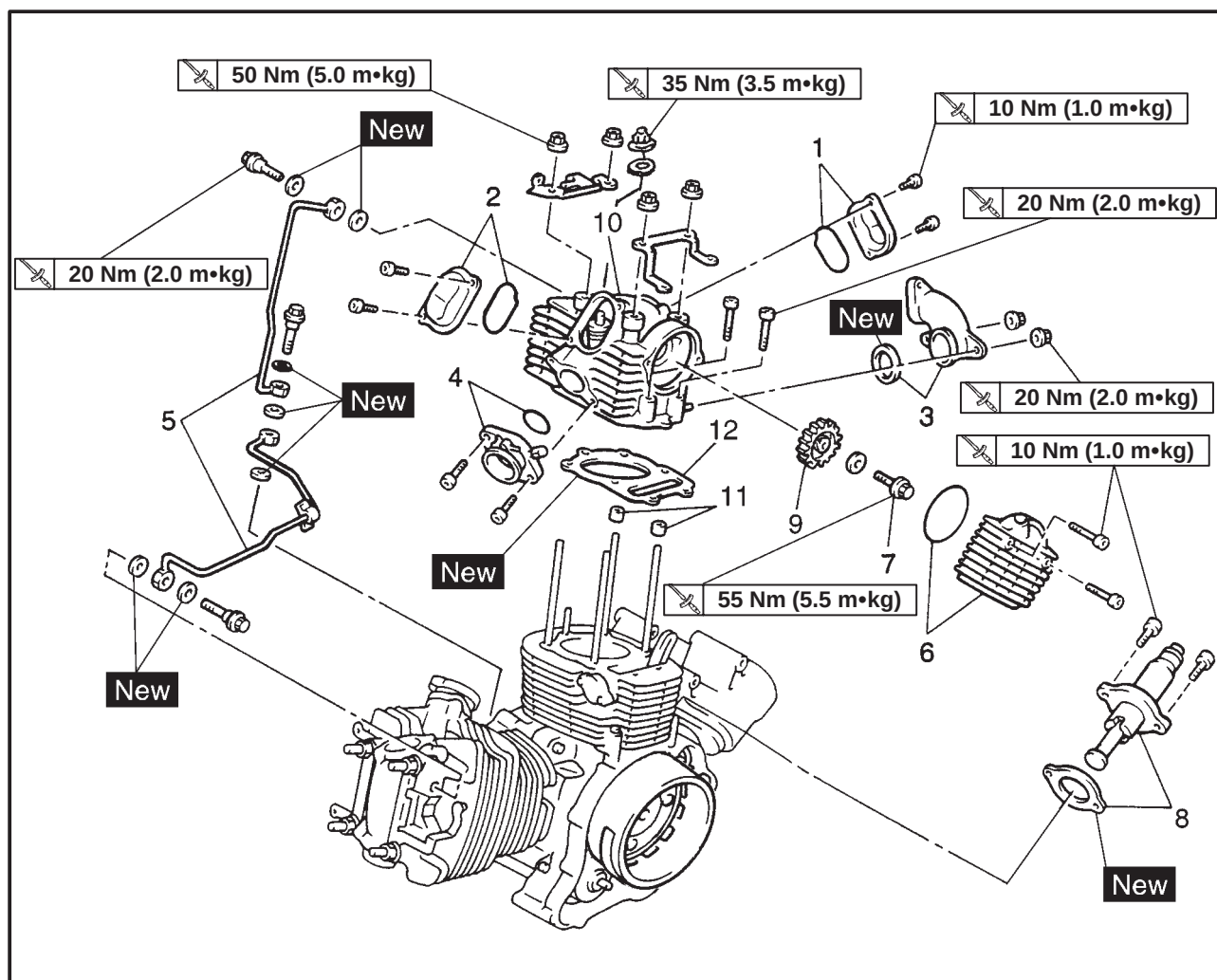


## CYLINDER HEADS

### REAR CYLINDER HEAD



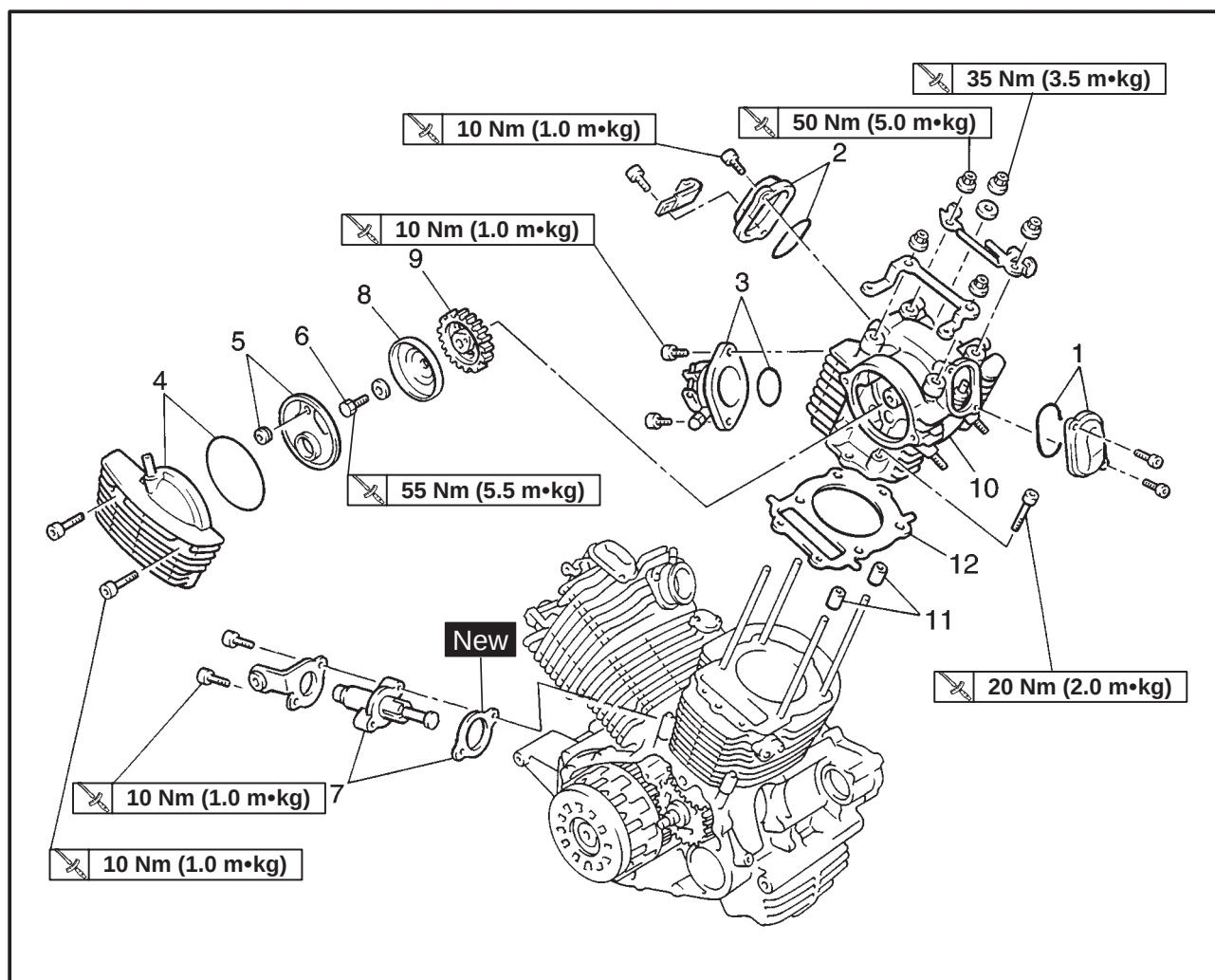
| Order | Job name/Part name             | Q'ty | Remarks                                   |
|-------|--------------------------------|------|-------------------------------------------|
|       | <b>Cylinder head removal</b>   |      |                                           |
|       | Engine assembly                |      | Remove the parts in the order listed.     |
|       | Left crankcase cover           |      | Refer to "ENGINE REMOVAL".                |
| 1     | Tappet cover (exhaust)/O-ring  | 1/1  | Refer to "INSTALLING THE CYLINDER HEADS". |
| 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  |                                           |
| 7     | Camshaft sprocket bolt         | 1    |                                           |



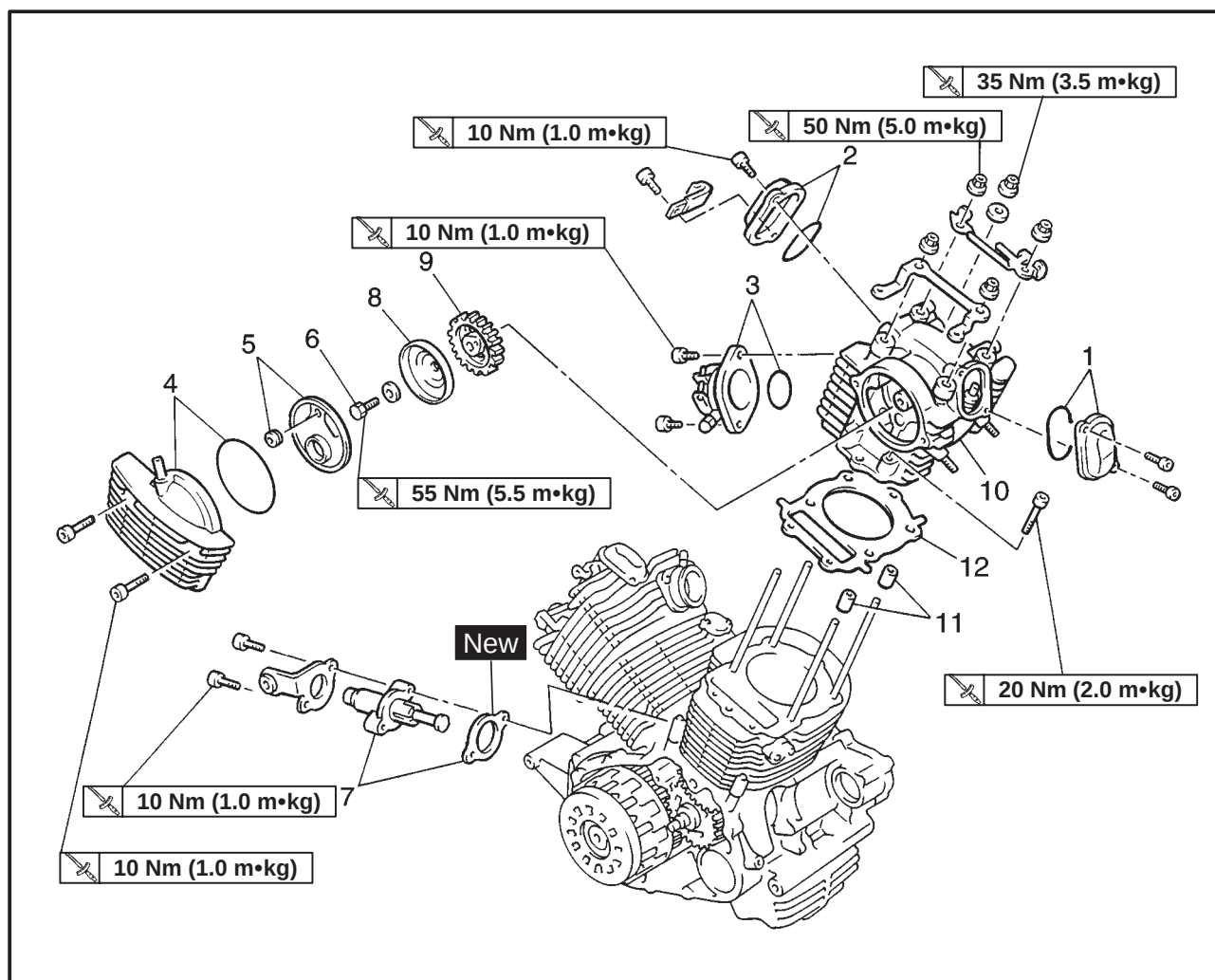
| Order | Job name/Part name            | Q'ty | Remarks                                            |
|-------|-------------------------------|------|----------------------------------------------------|
| 8     | Timing chain tensioner/gasket | 1/1  | Refer to "REMOVING/INSTALLING THE CYLINDER HEADS". |
| 9     | Camshaft sprocket             | 1    |                                                    |
| 10    | Cylinder head                 | 1    |                                                    |
| 11    | Dowel pins                    | 2    | Refer to "INSTALLING THE CYLINDER HEADS".          |
| 12    | Cylinder head gasket          | 1    |                                                    |
|       |                               |      | For installation, reverse the removal procedure.   |



## FRONT CYLINDER HEAD



| Order | Job name/Part name             | Q'ty | Remarks                                   |
|-------|--------------------------------|------|-------------------------------------------|
|       | <b>Cylinder head removal</b>   |      |                                           |
|       | Engine assembly                |      | Remove the parts in the order listed.     |
|       | Oil delivery pipes             |      | Refer to "ENGINE REMOVAL".                |
|       | Right crankcase cover          |      | Refer to "REAR CYLINDER HEAD".            |
|       |                                |      | Refer to "CLUTCH".                        |
| 1     | Tappet cover (exhaust)/O-ring  | 1/1  | Refer to "INSTALLING THE CYLINDER HEADS". |
| 2     | Tappet cover (intake)/O-ring   | 1/1  |                                           |
| 3     | Carburetor joint/O-ring        | 1/1  |                                           |
| 4     | Camshaft sprocket cover/O-ring | 1/1  |                                           |
| 5     | Baffle plate/O-ring            | 1/1  |                                           |
| 6     | Camshaft sprocket bolt         | 1    |                                           |



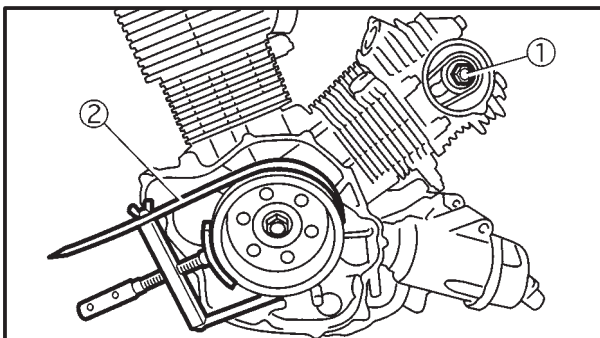
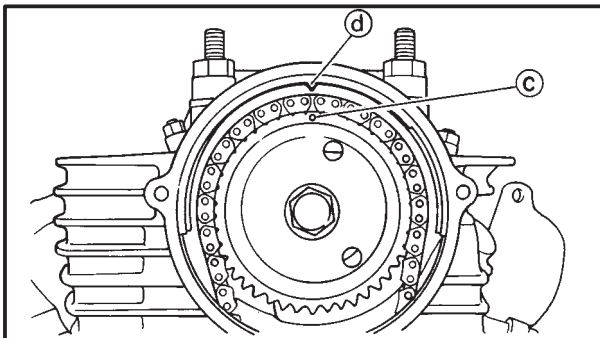
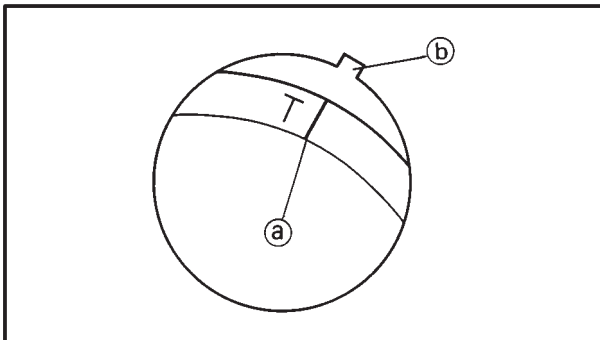
| Order | Job name/Part name            | Q'ty | Remarks                                                                                      |
|-------|-------------------------------|------|----------------------------------------------------------------------------------------------|
| 7     | Timing chain tensioner/gasket | 1/1  | Refer to "REMOVING/INSTALLING THE CYLINDER HEADS".                                           |
| 8     | Camshaft sprocket plate       | 1    |                                                                                              |
| 9     | Camshaft sprocket             | 1    |                                                                                              |
| 10    | Cylinder head                 | 1    | Refer to "INSTALLING THE CYLINDER HEADS".<br>For installation reverse the removal procedure. |
| 11    | Dowel pins                    | 2    |                                                                                              |
| 12    | Cylinder head gasket          | 1    |                                                                                              |



EAS00226

**REMOVING THE CYLINDER HEADS****Rear cylinder head****1. Remove:**

- camshaft sprocket cover
- tappet covers

**2. Align:**

- "T" mark (a) (with the stationary pointer (b))



- Temporarily install the left crankcase cover without the pickup coil and stator coil.
- Turn the crankshaft clockwise.
- 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.
- Check that the rear piston is at TDC in the compression stroke.
- 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.
- 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. Loosen:**

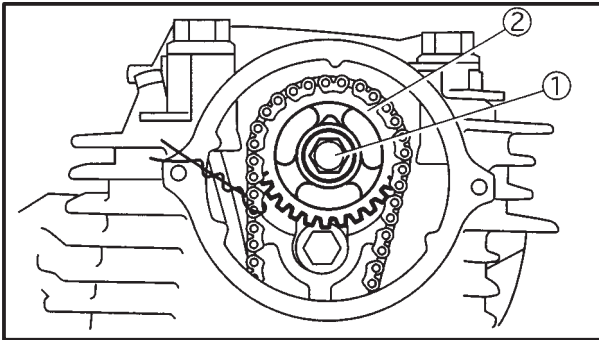
- bolt (camshaft sprocket) (1)

**NOTE:**

Use the sheave holder (2) to hold the rotor.



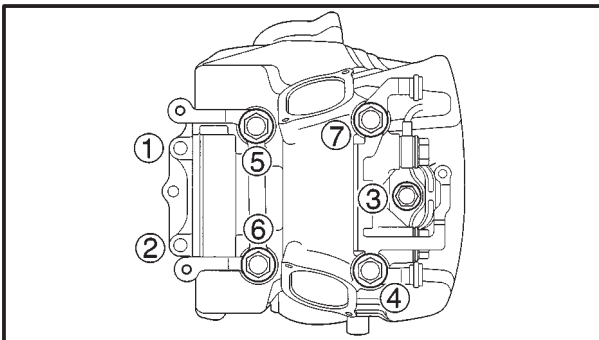
**Sheave holder:**  
**90890-01701**



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

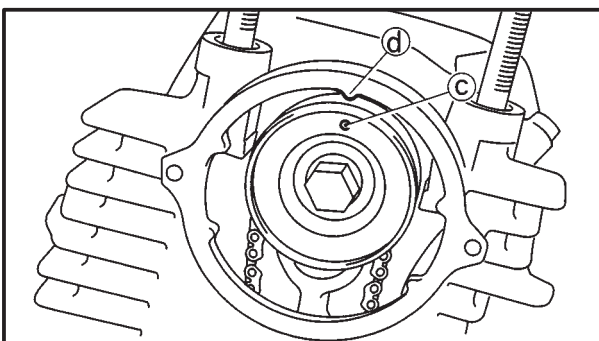
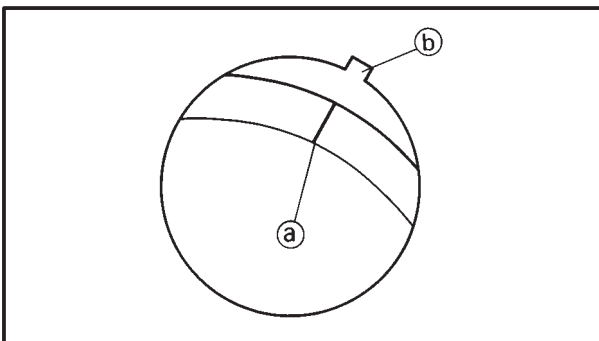
**NOTE:**

- 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)

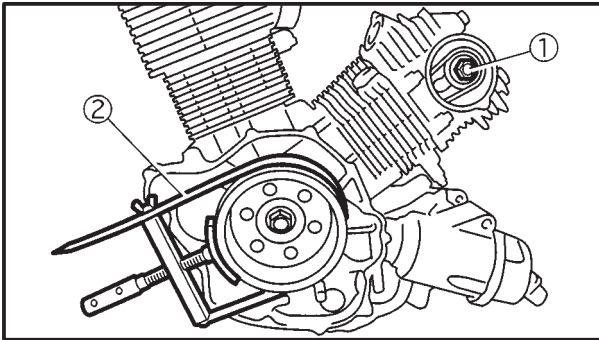
**Removal steps:**

- Turn the crankshaft clockwise 290°.
- Align the "I" mark (a) with the stationary pointer (b) 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 (c) on the camshaft sprocket should be aligned with the stationary pointer (d) on the cylinder head.
- The front piston is at TDC on the compression stroke when there is clearance at both of the rocker arms.









- d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.



**Cap bolt**  
**8 Nm (0.8 m•kg)**



5. Install:

- bolt (camshaft sprocket) ①

**55 Nm (5.5 m•kg)**

**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:**  
**90890-01701**

6. Check:

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

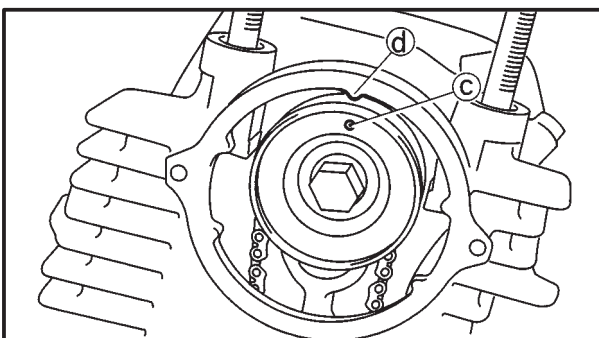
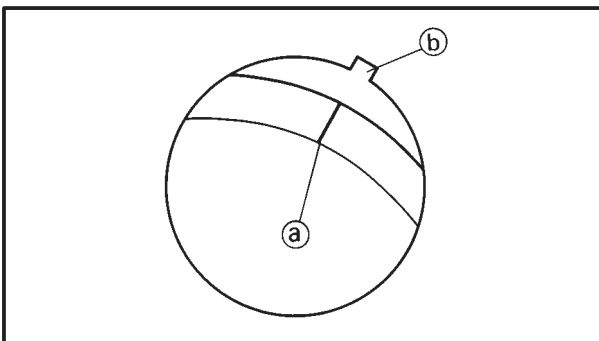
7. Measure:

- 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

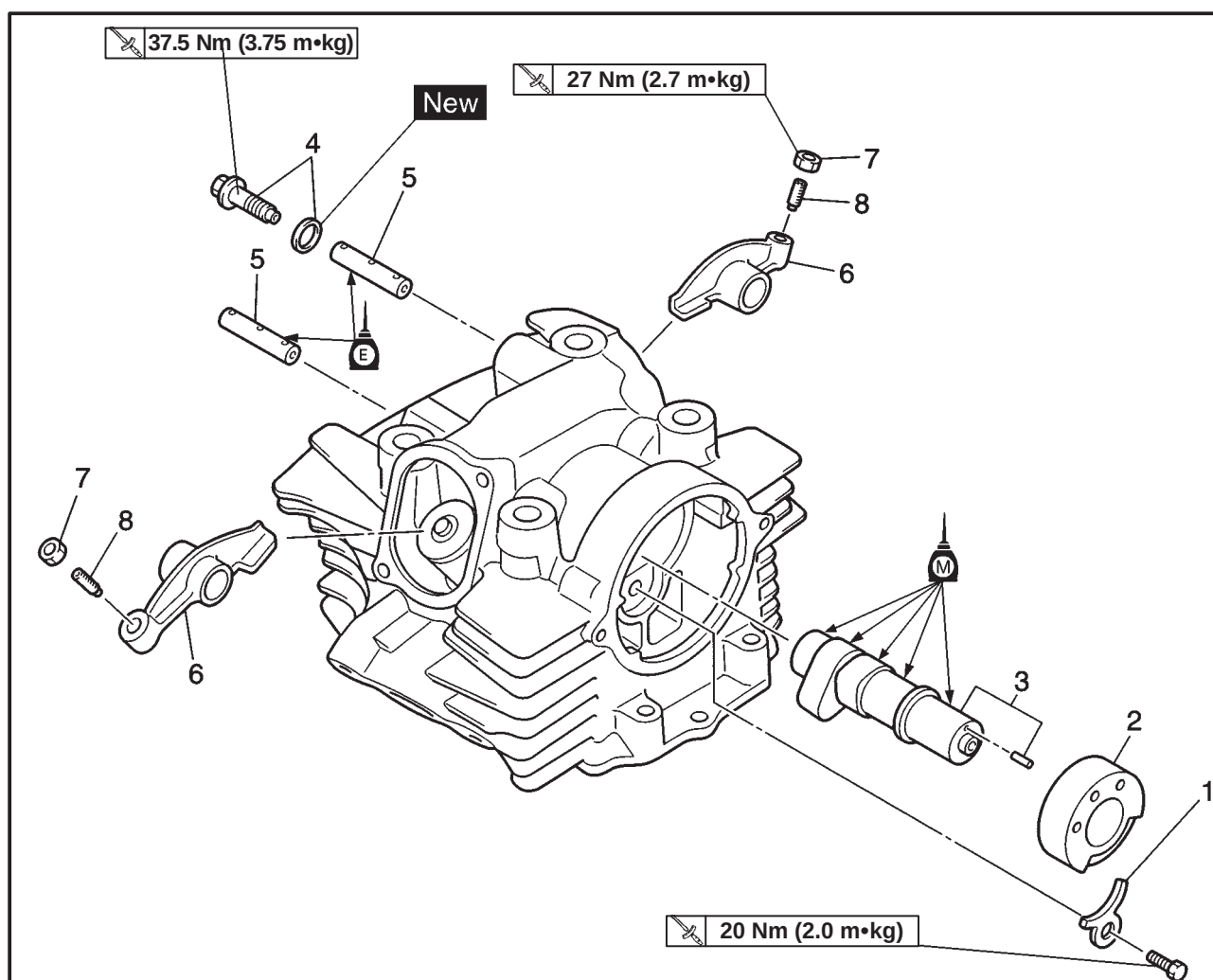


- Turn the crankshaft clockwise 290°.
- Align the "I" mark (a) with the stationary pointer (b) on the crankcase cover (left).
- Install the camshaft sprocket with the timing mark (c) facing out.
- Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
- Insert your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

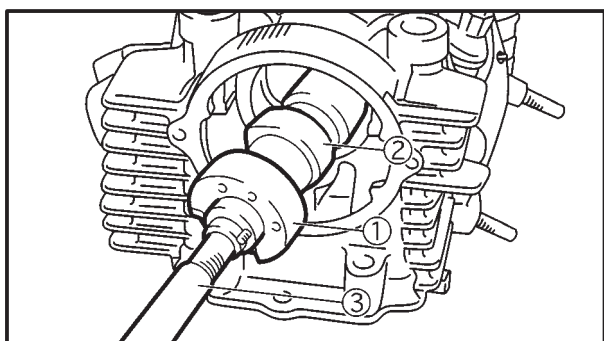
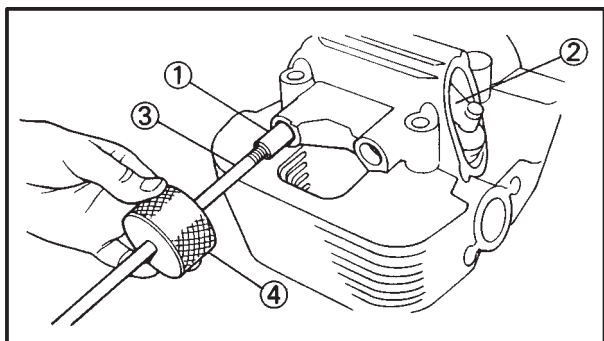




## ROCKER ARMS AND CAMSHAFT



| Order | Job name/Part name                          | Q'ty | Remarks                                                     |
|-------|---------------------------------------------|------|-------------------------------------------------------------|
|       | <b>Removing the rocker arm and camshaft</b> |      | Remove the parts in the order listed.                       |
|       | Cylinder heads                              |      | Refer to "CYLINDER HEAD".                                   |
| 1     | Stopper plate                               | 1    | Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT". |
| 2     | Camshaft bushing                            | 1    |                                                             |
| 3     | Camshaft/dowel pin                          | 1/1  |                                                             |
| 4     | Union bolt/gasket                           | 1/1  | Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT". |
| 5     | Rocker arm shafts                           | 2    |                                                             |
| 6     | Rocker arms                                 | 2    |                                                             |
| 7     | Locknuts                                    | 2    | For installation, reverse the removal procedure.            |
| 8     | Valve adjusters                             | 2    |                                                             |



EAS00202

## 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):**

**90890-01085**

**Weight:**

**90890-01084**

### 2. Remove:

- camshaft bushing ①
- camshaft ②

### NOTE:

Screw a 10 mm bolt ③ into the threaded end of the camshaft and pull out the camshaft.

EAS00205

## CHECKING THE CAMSHAFTS

### 1. Check:

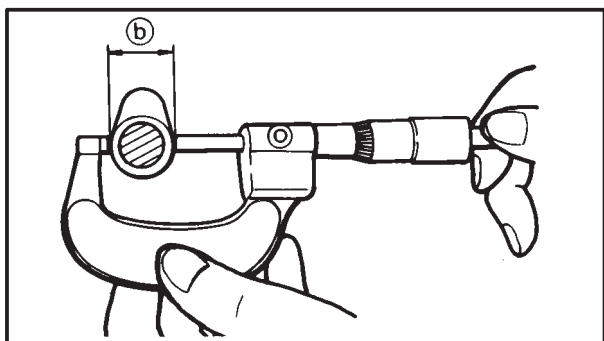
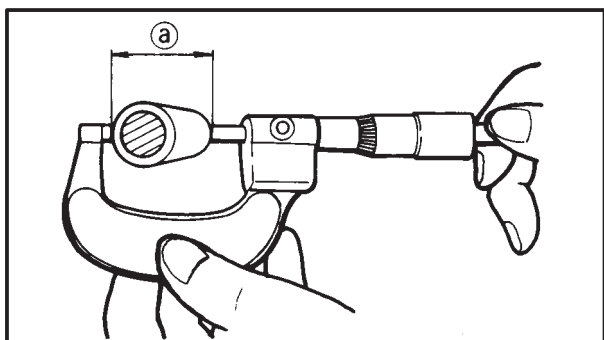
- camshaft bushings  
Damage/wear → Replace.

### 2. Check:

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

### 3. Measure:

- camshaft lobe dimensions ① and ②  
Out of specification → Replace the camshaft.



**Camshaft lobe dimension limit**

**Intake**

① 39.012 mm

② #1: 31.993 mm

#2: 32.027 mm

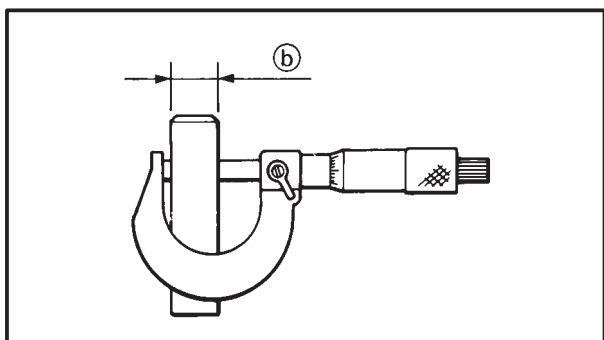
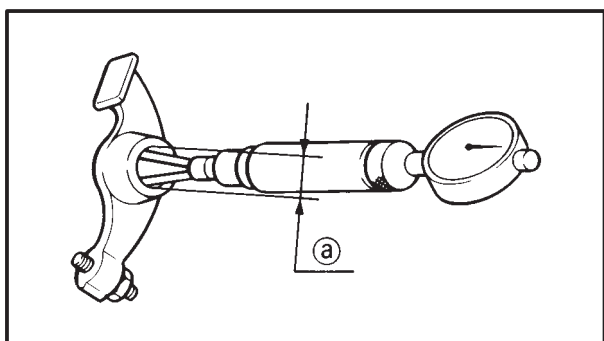
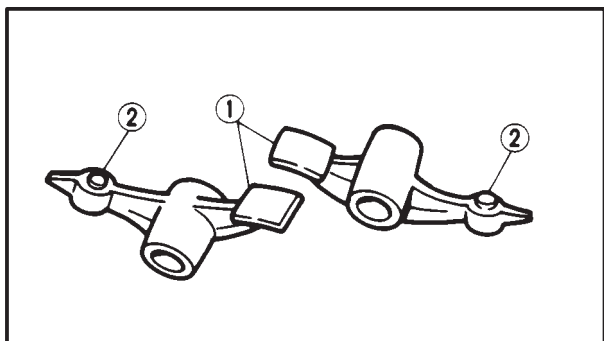
**Exhaust**

① 39.045 mm

② 32.100 mm

### 4. Check:

- camshaft oil passage  
Obstruction → Blow out with compressed air.



EB401410

## 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 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 ①  
Out of specification → Replace.



**Rocker arm inside diameter**  
**14.036 mm**

### 4. Measure:

- rocker arm shaft outside diameter ②  
Out of specification → Replace.



**Rocker arm shaft outside diameter**  
**13.95 mm**

### 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 → Replace the defective part(-s).



**Rocker-arm-to-rocker-arm-shaft clearance**

**0.009 ~ 0.033 mm**

**<Limit> : 0.086 mm**



EAS00220

### INSTALLING THE CAMSHAFT AND ROCKER ARMS

#### 1. Lubricate:

- camshaft



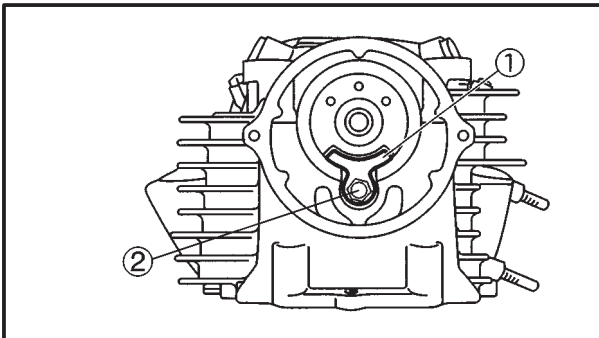
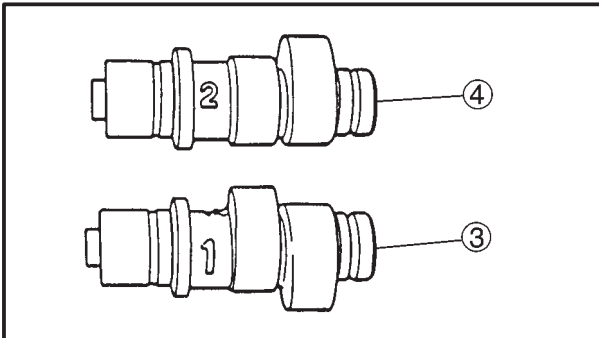
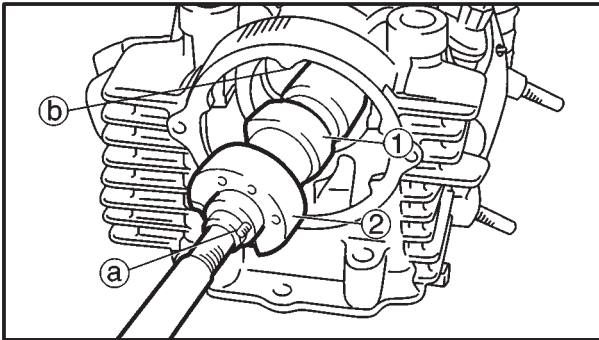
**Recommended lubricant**  
Camshaft/Bushing  
Molybdenum disulfide oil

#### 2. Install:

- camshaft ①
- camshaft bushing ②

#### NOTE:

- The dowel pin ① on the end of the camshaft must align with the timing mark ② 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)

#### 4. Lubricate:

- rocker arm shafts



**Recommended lubricant**  
Engine oil

## ROCKER ARMS AND CAMSHAFTS

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ENG



5. Install:

- rocker arms
- rocker arm shafts

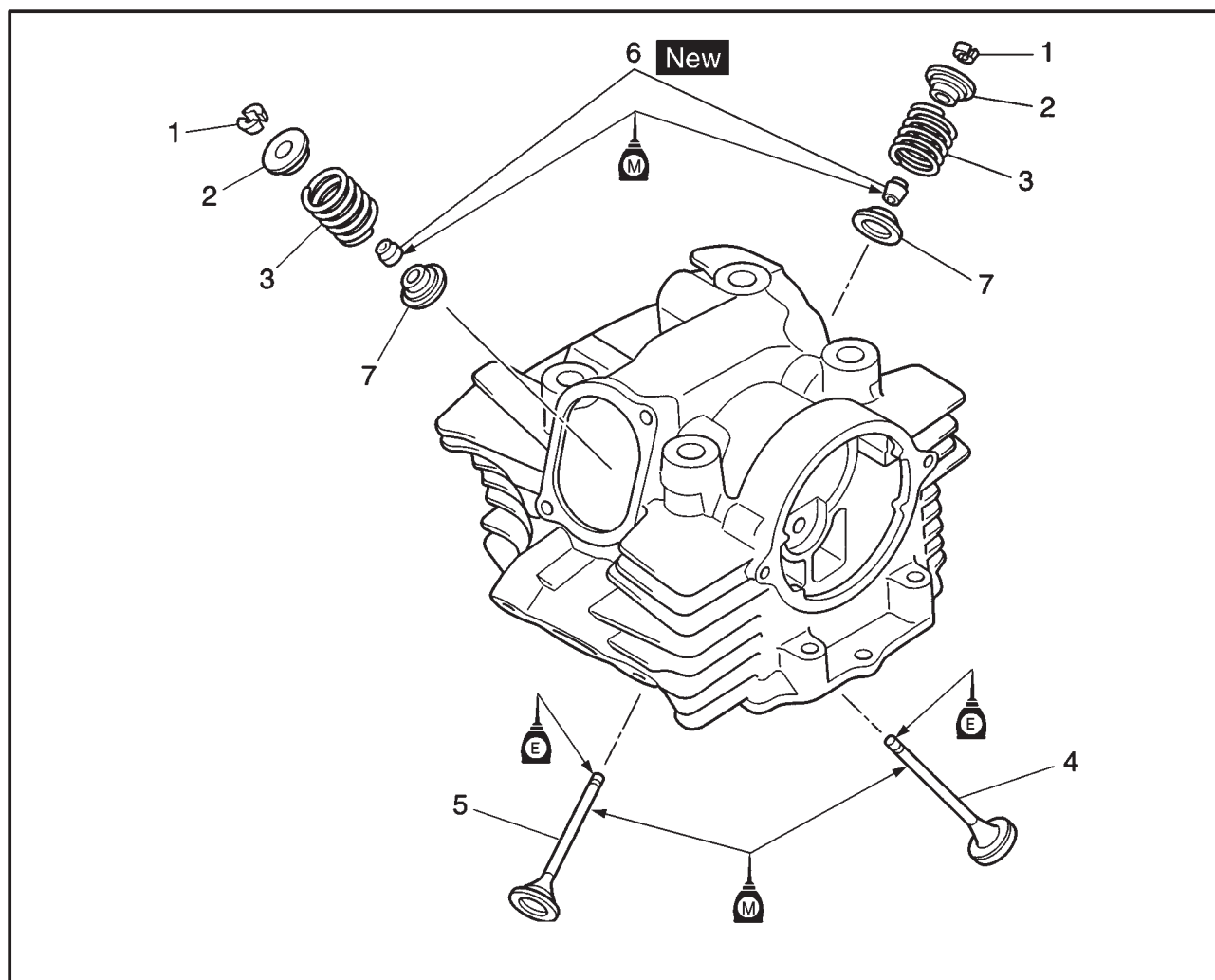
**NOTE:**

Make sure that the rocker arm shafts is completely pushed into the cylinder head.

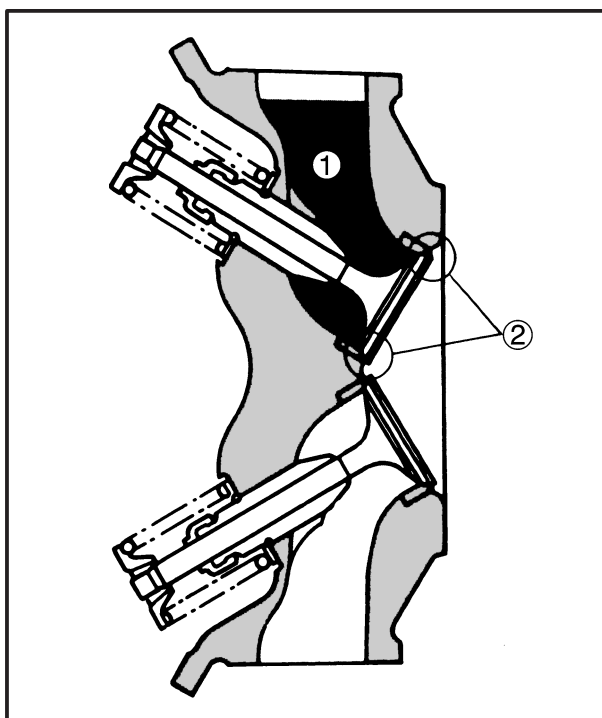
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## VALVES AND VALVE SPRINGS



| Order | Job name/Part name                            | Q'ty | Remarks                                          |
|-------|-----------------------------------------------|------|--------------------------------------------------|
|       | <b>Removing the valves and valve springs.</b> |      |                                                  |
|       | Cylinder heads                                |      | Remove the parts in the order listed.            |
|       | Rocker arms and camshafts                     |      | Refer to "CYLINDER HEADS".                       |
| 1     | Valve cotters                                 | 4    | Refer to "ROCKER ARMS AND CAMSHAFT".             |
| 2     | Valve spring retainers                        | 2    | Refer to "REMOVING/INSTALLING THE VALVES".       |
| 3     | Valve springs                                 | 2    |                                                  |
| 4     | Valve (intake)                                | 1    |                                                  |
| 5     | Valve (exhaust)                               | 1    | Refer to "INSTALLING THE VALVES".                |
| 6     | Valve stem seals                              | 2    |                                                  |
| 7     | Valve spring seats                            | 2    |                                                  |
|       |                                               |      | For installation, reverse the removal procedure. |



EAS00237

## 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.

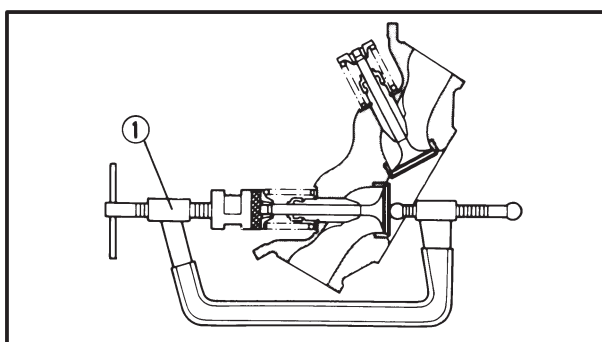
Refer to "CHECKING THE VALVE SEATS".



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:

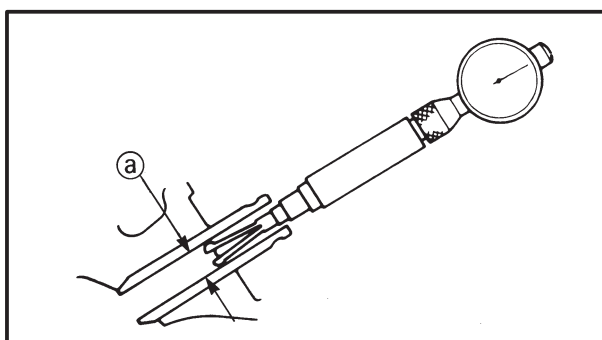
- valve cotters

### NOTE:

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



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



EAS00239

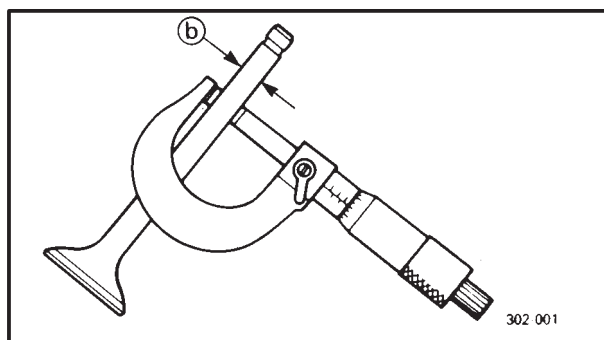
## CHECKING THE VALVES AND VALVE GUIDES

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 (a) –**  
**Valve stem diameter (b)**



Out of specification → Replace the valve guide.



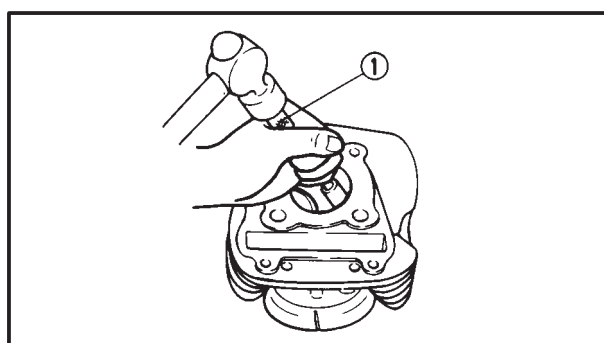
## Valve-stem-to-valve-guide clearance

Intake 0.010 ~ 0.037 mm

<Limit>: 0.08 mm

Exhaust 0.025 ~ 0.052 mm

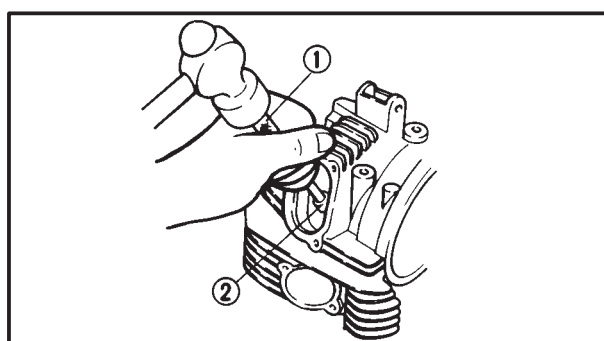
<Limit>: 0.10 mm



2. Replace.
  - valve guide

## NOTE:

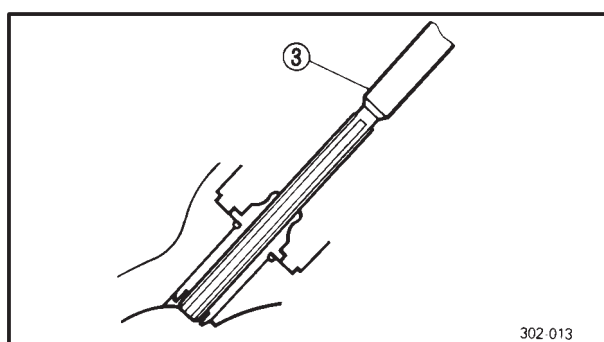
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100°C (212°F) in an oven.



- a. Remove the valve guide with a valve guide remover ①.
- b. Install the new valve guide with a valve guide installer ② and valve guide remover ①.
- c. 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.

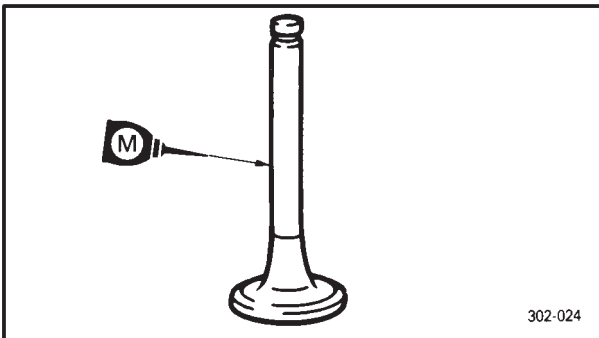
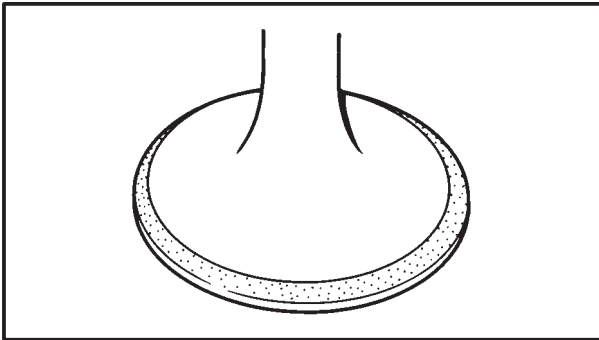


## Valve guide remover and installer (8 mm)

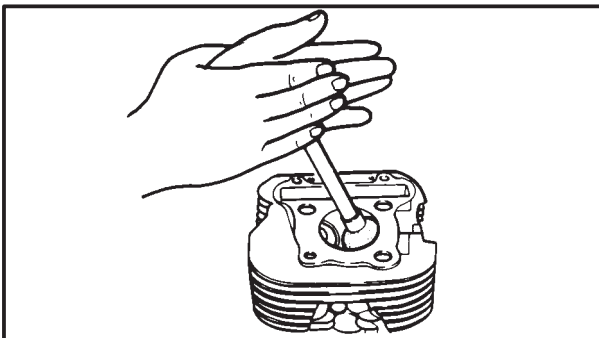
90890-04014

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.





302-024



4. Lap:
- valve face
  - valve seat

**NOTE:**

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



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

**CAUTION:**

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

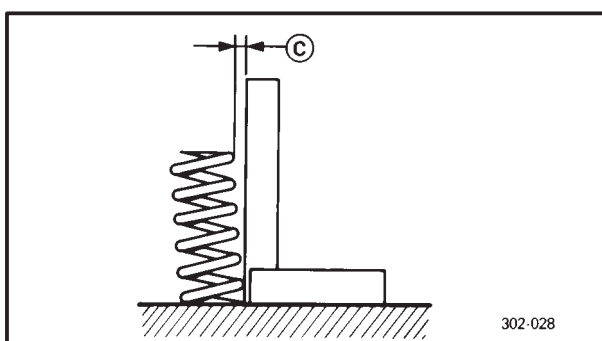
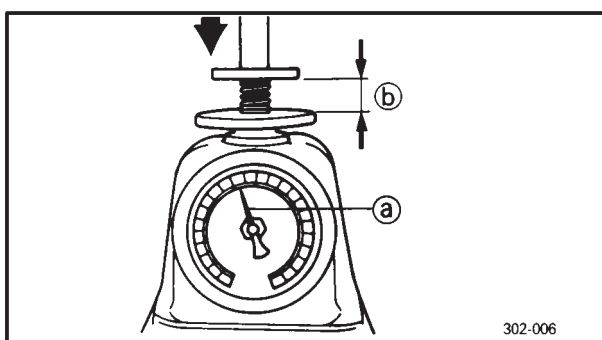
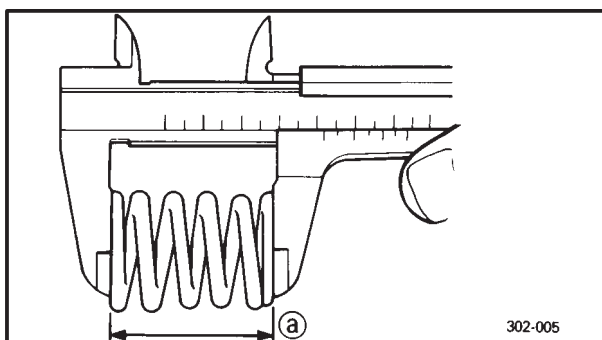
- b. Apply molybdenum disulfide oil onto the valve stem.  
c. Install the valve into the cylinder head.  
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

**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 (Dykem) 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.





EAS00241

## 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**

**<Limit>: 43.5 mm**

### 2. Measure:

- compressed spring force (a)

Out of specification → Replace the valve spring.

### (b) Installed length



**Compressed spring force**

**Intake and exhaust spring**

**160.7 N (16.4 kg) at 40 mm**

### 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**

EAS00245

## 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)



**Recommended lubricant**

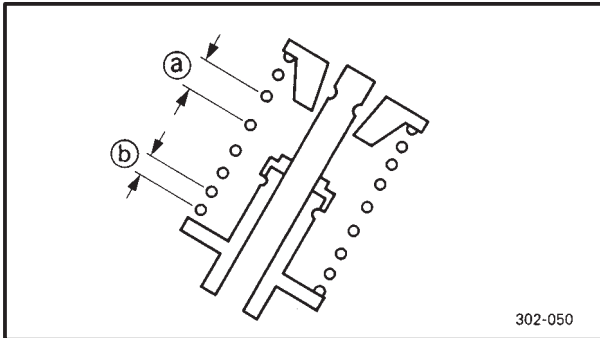
**Molybdenum disulfide oil**

### 3. Install:

- valve
- lower spring seat
- oil seal **New**
- valve spring
- upper spring seat  
(into the cylinder head)

## VALVE AND VALVE SPRINGS

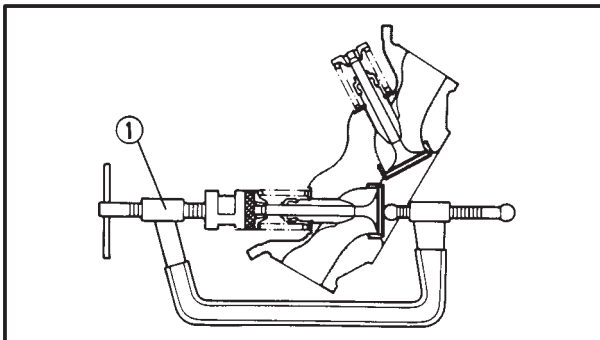
ENG



### NOTE:

Install the valve spring with the larger pitch (a) facing up.

(b) Smaller pitch



### 4. Install:

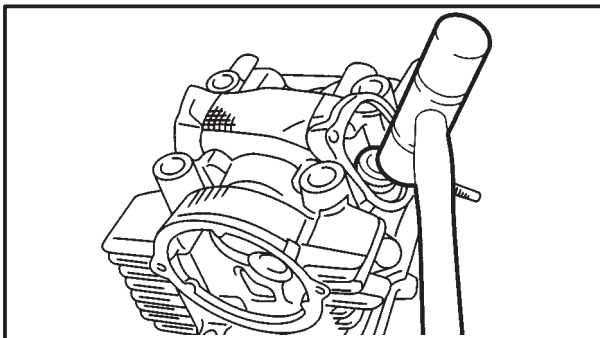
- valve cotters

### NOTE:

Install the valve cotters by compressing the valve spring with the valve spring compressor (1).



Valve spring compressor  
90890-04019



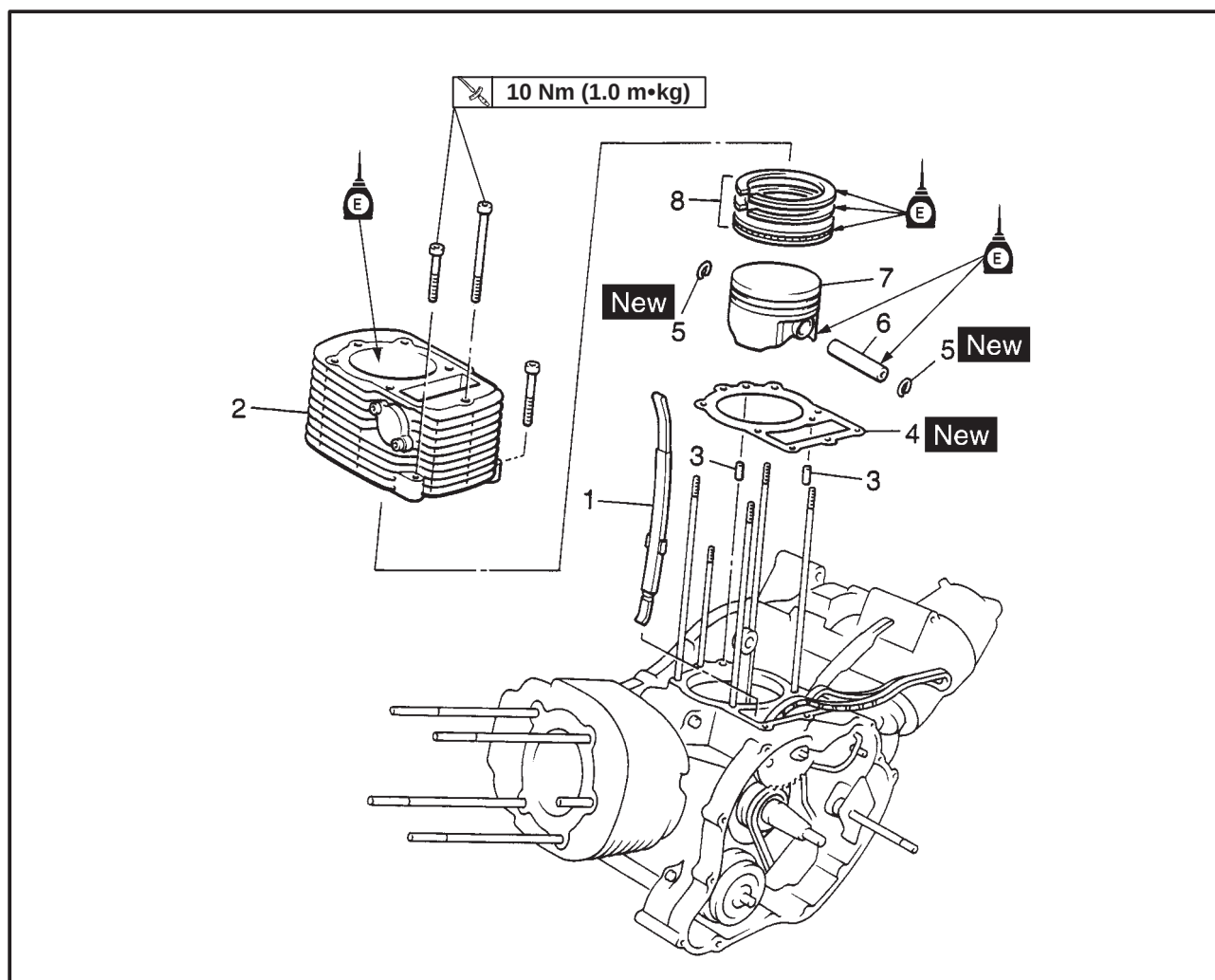
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

### CAUTION:

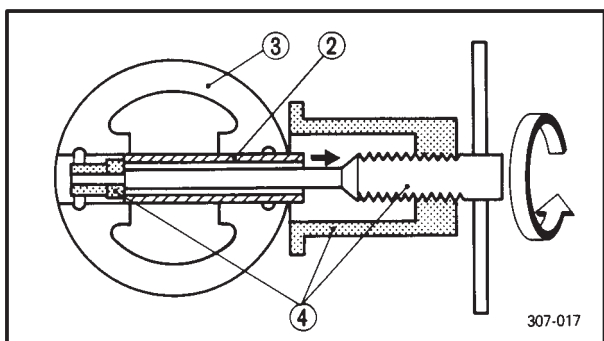
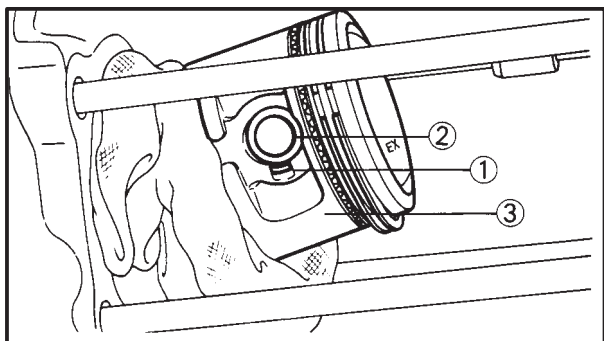
Hitting the valve tip with excessive force could damage the valve.



## CYLINDERS AND PISTONS



| Order | Job name/Part name                                                                | Q'ty | Remarks                                                                                                                      |
|-------|-----------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------|
| 1     | <b>Removing the cylinders and pistons</b><br>Cylinder heads<br>Timing chain guide | 1    | Remove the parts in the order listed.<br>Refer to "CYLINDER HEADS".<br>The "5EL" mark should face towards the cylinder head. |
| 2     | Cylinder                                                                          | 1    | Refer to "INSTALLING THE PISTONS AND CYLINDERS".                                                                             |
| 3     | Dowel pins                                                                        | 2    |                                                                                                                              |
| 4     | Cylinder gasket                                                                   | 1    |                                                                                                                              |
| 5     | Piston pin clips                                                                  | 2    | Refer to "REMOVING/INSTALLING THE CYLINDERS AND PISTONS".                                                                    |
| 6     | Piston pin                                                                        | 1    |                                                                                                                              |
| 7     | Piston                                                                            | 1    |                                                                                                                              |
| 8     | Piston ring set                                                                   | 1    | For installation, reverse the removal procedure.                                                                             |



EAS00254

**REMOVING THE PISTONS**

The following procedure applies to all of the pistons.

## 1. Remove:

- piston pin clip ①
- piston pin ②
- piston ③

**CAUTION:**

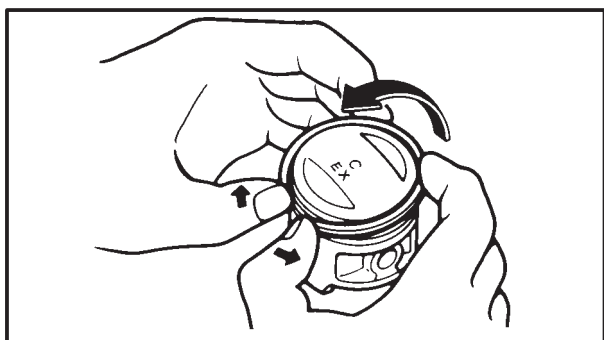
**Do not use a hammer to drive the piston pin out.**

**NOTE:**

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- 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 ④.



**Piston pin puller**  
**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.

EB404405

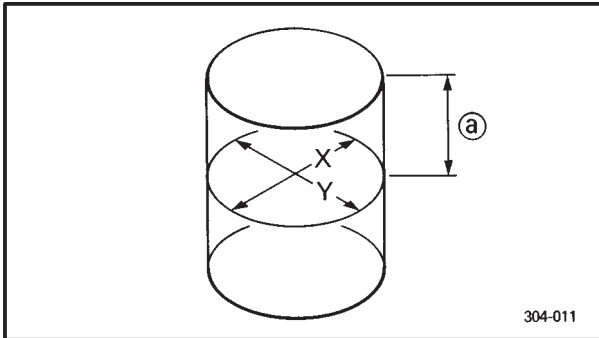
**CHECKING THE CYLINDERS AND PISTONS**

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

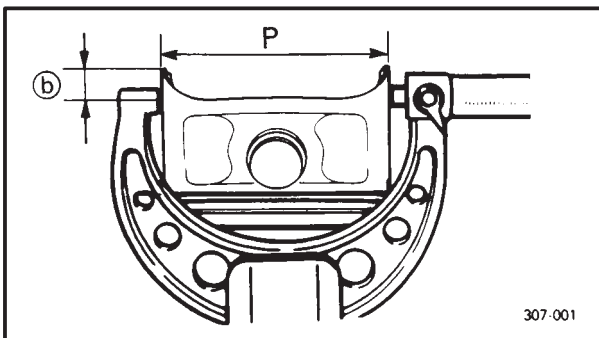


a. Measure cylinder bore "C" with the cylinder bore gauge.

① 40 mm 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.



|                       | Standard         | Wear limit |
|-----------------------|------------------|------------|
| Cylinder bore C:      | 95.00 ~ 95.01 mm | 95.1 mm    |
| $C = \frac{X + Y}{2}$ |                  |            |

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.

② 5 mm from the bottom edge of the piston.

|          | Piston size P      |
|----------|--------------------|
| Standard | 94.960 ~ 94.975 mm |

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

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

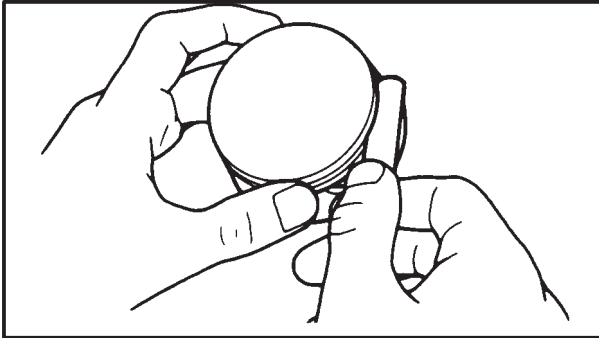
**Piston-to-cylinder clearance =**  
**Cylinder bore "C" –**  
**Piston skirt diameter "P"**



**Piston-to-cylinder clearance**  
**0.025 ~ 0.050 mm**  
**<Limit>: 0.15 mm**

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





EB404410

**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****Top ring**

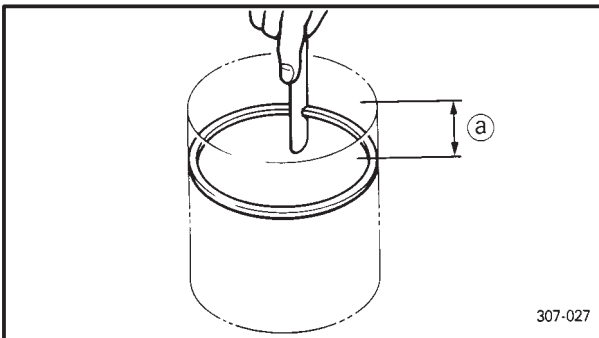
0.04 ~ 0.08 mm

&lt;Limit&gt;: 0.1 mm

**2nd ring**

0.03 ~ 0.07 mm

&lt;Limit&gt;: 0.1 mm

**2. Install:**

- piston ring  
(into the cylinder)

**NOTE:**

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

Ⓐ 40 mm from the top of the cylinder

**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****Top ring**

0.3 ~ 0.5 mm

&lt;Limit&gt;: 0.8 mm

**2nd ring**

0.3 ~ 0.45 mm

&lt;Limit&gt;: 0.8 mm

**Oil ring**

0.2 ~ 0.7 mm



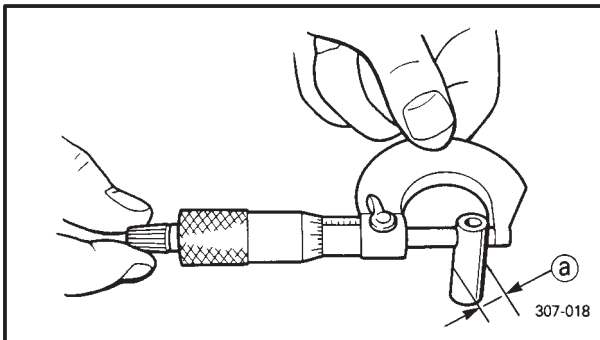
EAS00266

### 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.



**Piston pin outside diameter**  
**21.991 ~ 22.000 mm**

#### 3. Measure:

- piston pin bore inside diameter (b)  
Out of specification → Replace the piston



**Piston pin bore inside diameter**  
**22.004 ~ 22.015 mm**

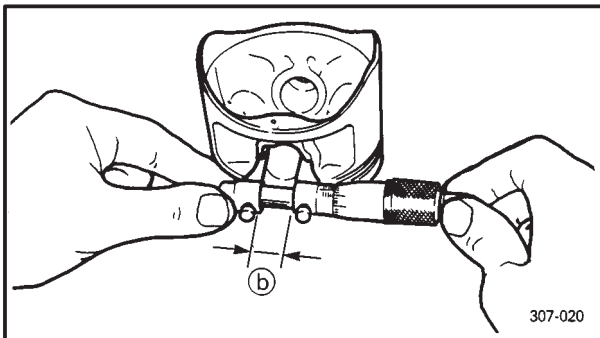
#### 4. Calculate:

- piston-pin-to-piston clearance  
Out of specification → Replace the piston pin.

**Piston-pin-to-piston clearance =**  
**Piston pin bore size (b) –**  
**Piston pin outside diameter (a)**



**Piston-pin-to-piston clearance**  
**0.004 ~ 0.024 mm**



EB404701

### INSTALLING THE PISTONS AND CYLINDERS

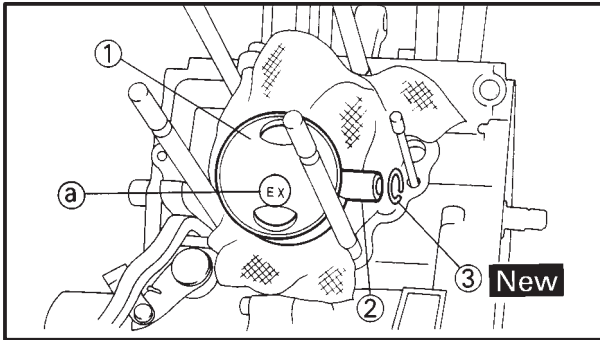
The following procedure applies to all of the pistons and cylinders.

#### 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.

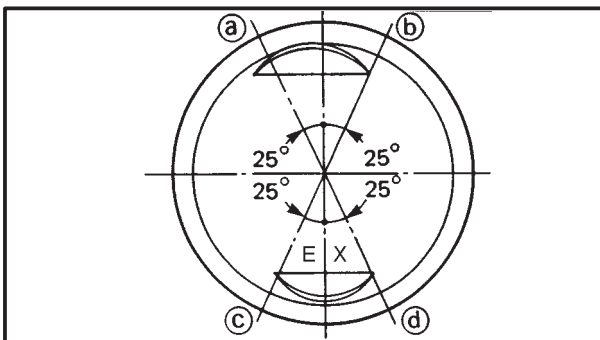


2. Install:
  - piston ①
  - piston pin ②
  - piston pin clip (New) ③

### NOTE:

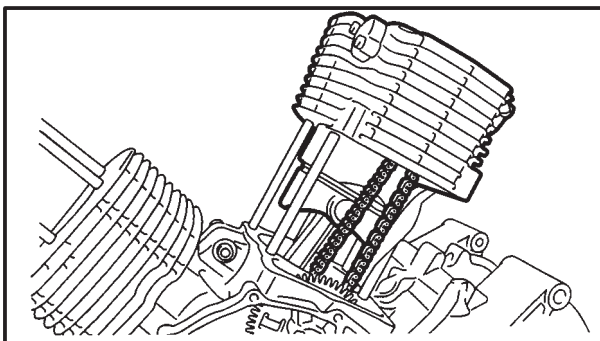
- Apply engine oil onto the piston pin.
- Make sure that the "EX" mark ① on the piston faces towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.

3. Install:
  - gasket (New)
  - dowel pins
4. Lubricate:
  - piston
  - piston rings
  - cylinder
  - (with the recommended lubricant)



**Recommended lubricant**  
**Engine oil**

5. Offset:
    - piston ring end gaps
- ① Top ring  
② Lower oil ring rail  
③ Upper oil ring rail  
④ 2nd ring



6. Install:
  - cylinder

### NOTE:

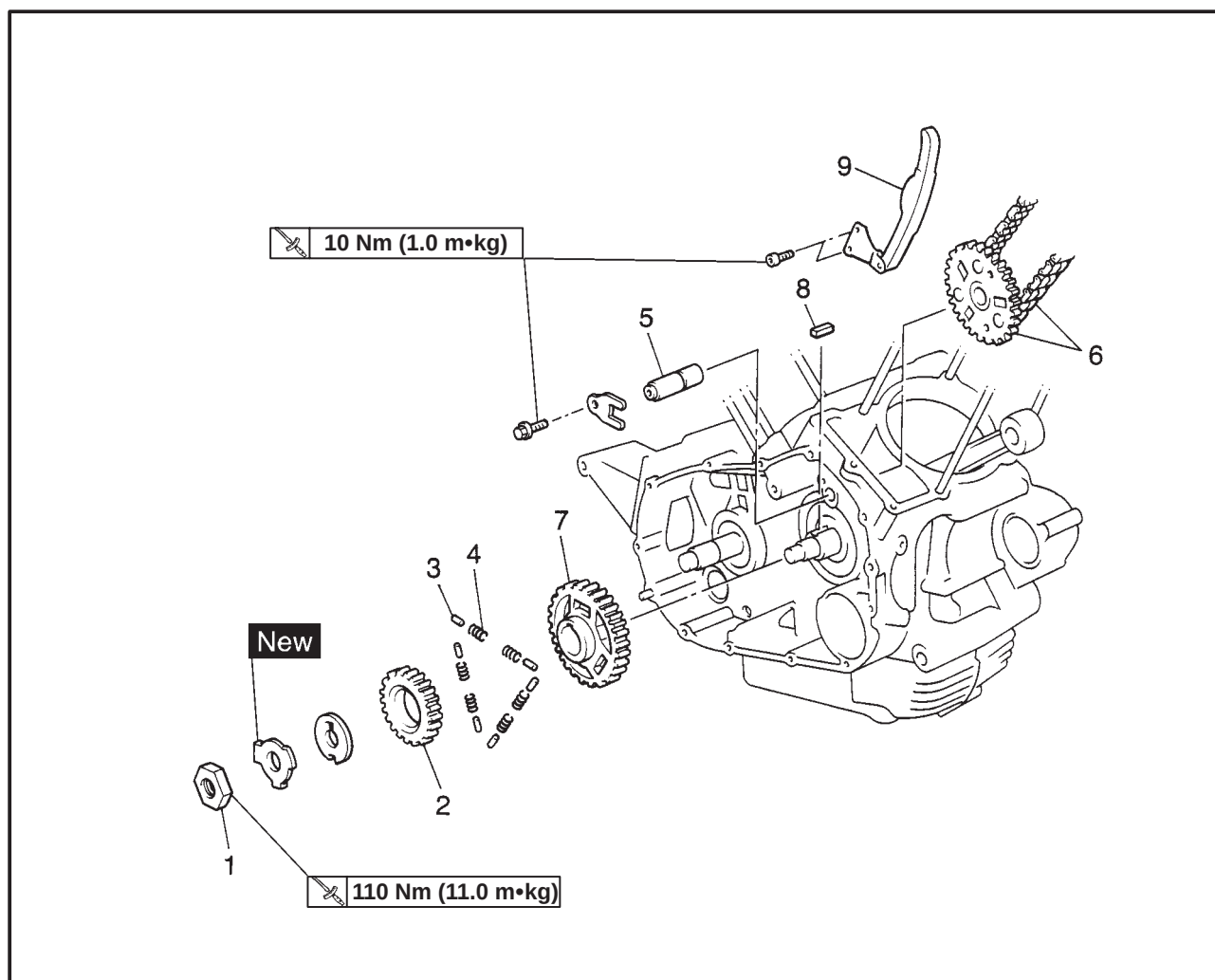
- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.



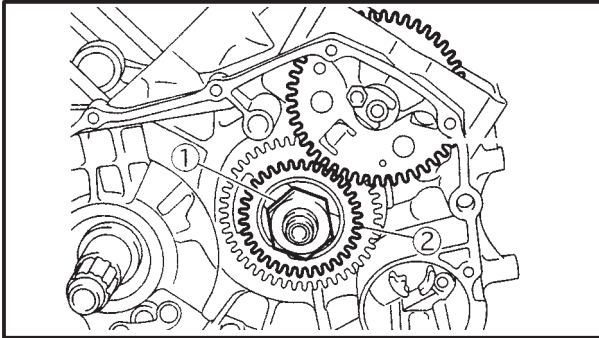
**Cylinder bolt**  
**10 Nm (1.0 m•kg)**



## TIMING GEARS



| Order | Job name/Part name                                | Q'ty | Remarks                                                |
|-------|---------------------------------------------------|------|--------------------------------------------------------|
|       | <b>Removing the timing gears</b>                  |      |                                                        |
|       | Cylinder heads                                    |      | Remove the parts in the order listed.                  |
|       | Cylinders                                         |      | Refer to "CYLINDER HEAD".                              |
|       | Clutch assembly                                   |      | Refer to "CYLINDERS AND PISTONS".                      |
|       |                                                   |      | Refer to "CLUTCH".                                     |
| 1     | Primary drive gear nut                            | 1    | Refer to "REMOVING/INSTALLING THE TIMING DRIVE GEARS". |
| 2     | Timing drive gear                                 | 1    |                                                        |
| 3     | Dowel pins                                        | 6    |                                                        |
| 4     | Springs                                           | 6    | Refer to "INSTALLING THE TIMING DRIVE GEARS".          |
| 5     | Timing chain drive gear shaft                     | 1    |                                                        |
| 6     | Timing chain drive gear sprocket/<br>Timing chain | 1/1  |                                                        |
| 7     | Primary drive gear                                | 1    | Refer to "INSTALLING THE TIMING DRIVE GEARS".          |
| 8     | Straight key                                      | 1    |                                                        |
| 9     | Timing chain guide                                | 1    |                                                        |
|       |                                                   |      | For installation, reverse the removal procedure.       |

**REMOVING THE TIMING DRIVE GEAR****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.

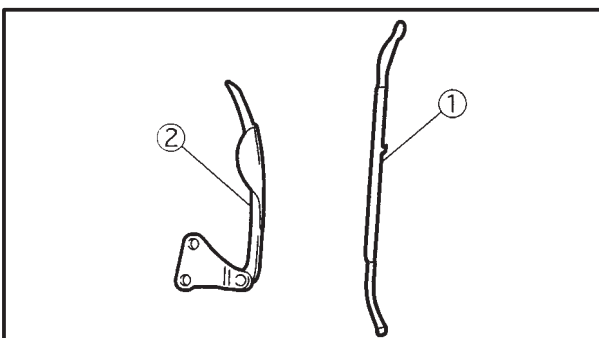
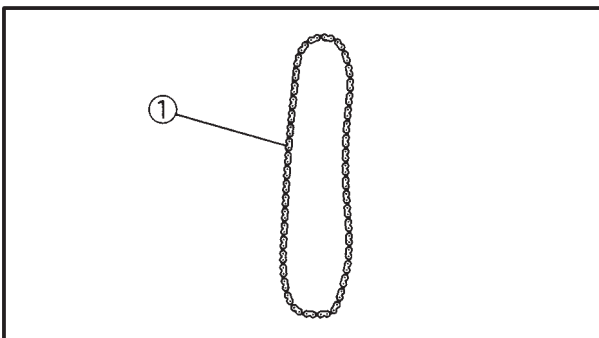
1. Remove:
  - rotor assembly
  - dowel pins
  - springs
  - timing drive gear
 Refer to "GENERATOR AND STARTER CLUTCH".

EB401422

**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/stiffness → 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).





EAS00292

**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.

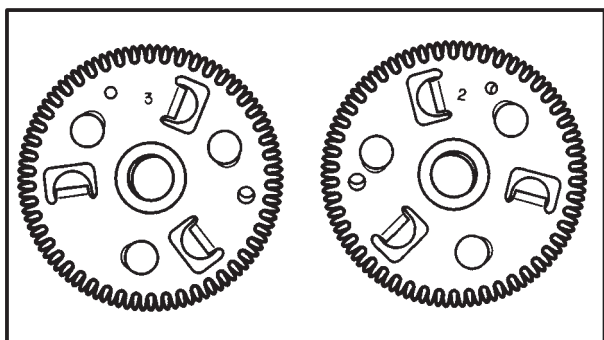
**INSTALLING THE TIMING DRIVE GEARS**

## 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.

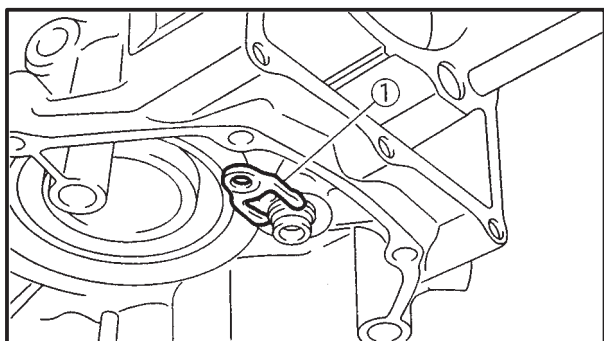


## 2. Install:

- 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.

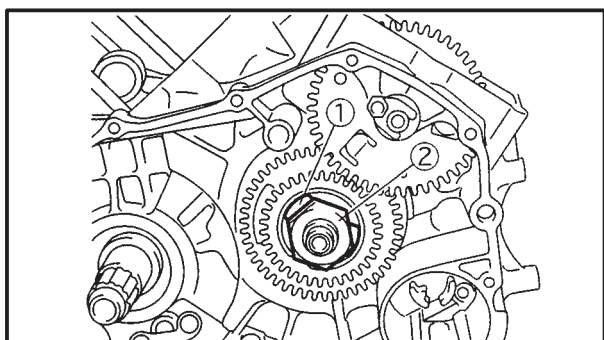
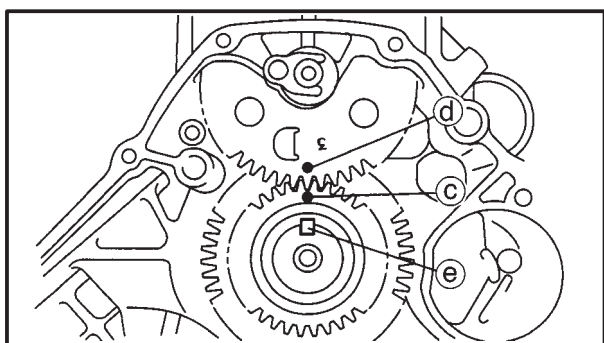
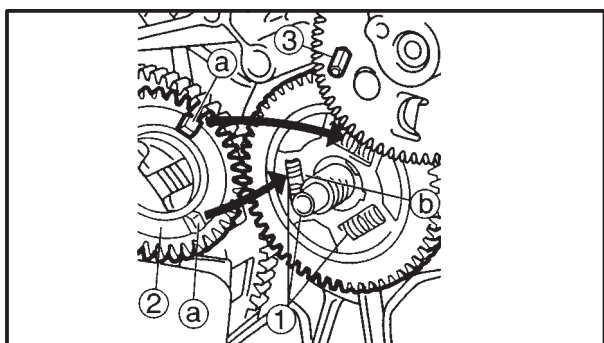


## 3. Install:

- stopper plate ①
- stopper plate bolt  10 Nm (1.0 m•kg)

**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:

(Front cylinder)

- 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

**110 Nm (11.0 m•kg)**
**NOTE:**

While holding the generator rotor 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.

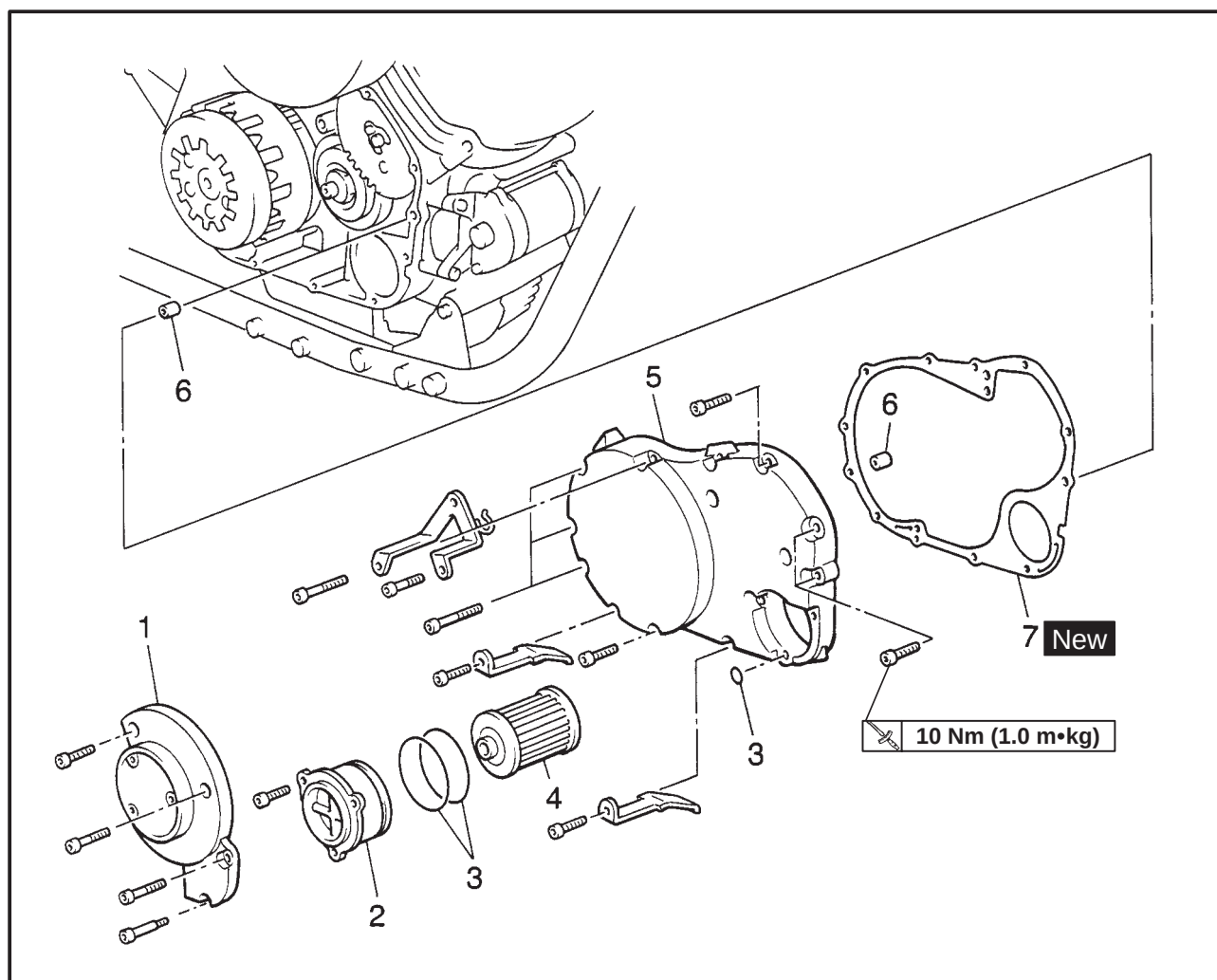
## 1. Install:

- springs
  - dowel pins
  - timing drive gear
  - rotor assembly
- Refer to "GENERATOR AND STARTER CLUTCH".

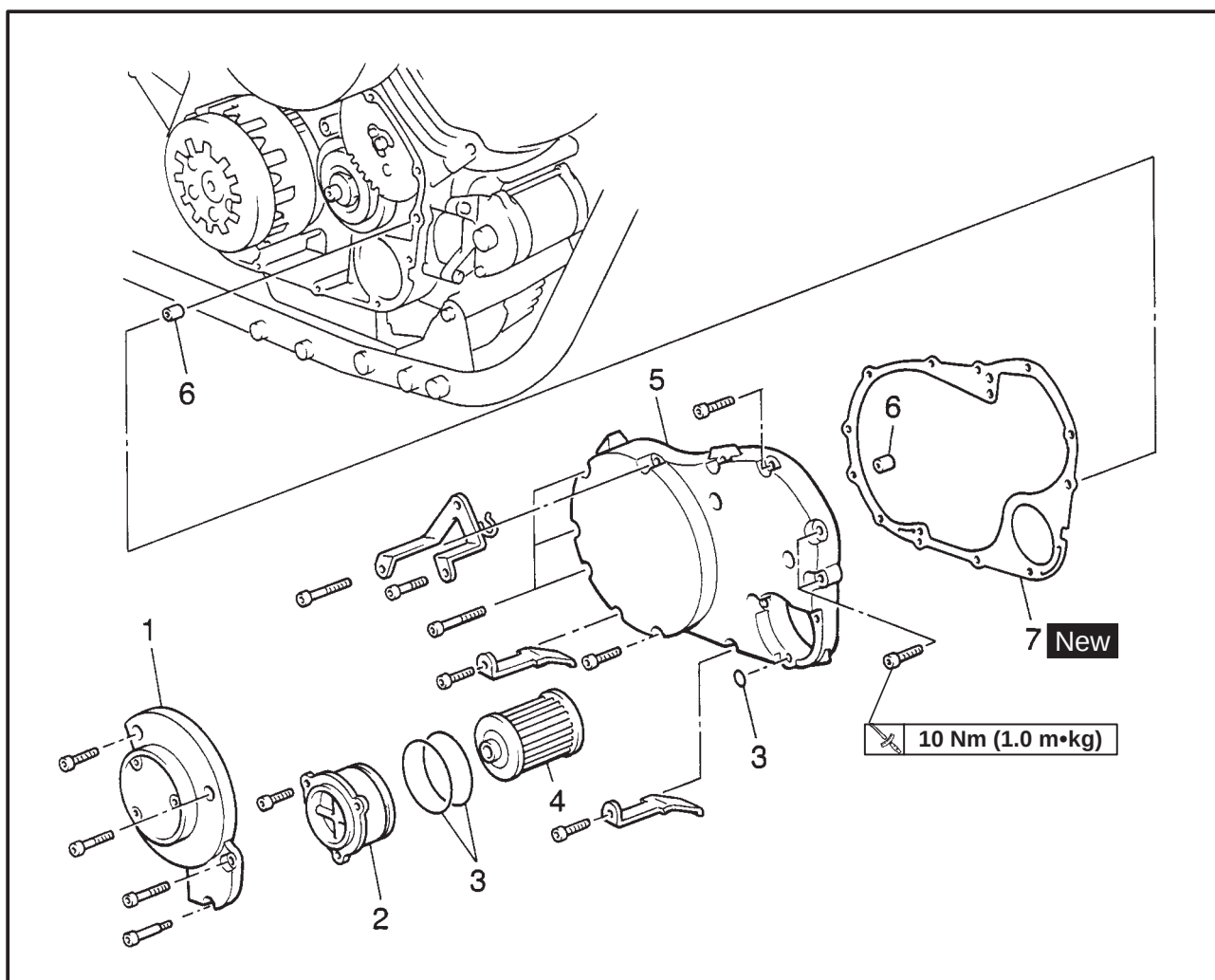


## CLUTCH

### RIGHT CRANKCASE COVER



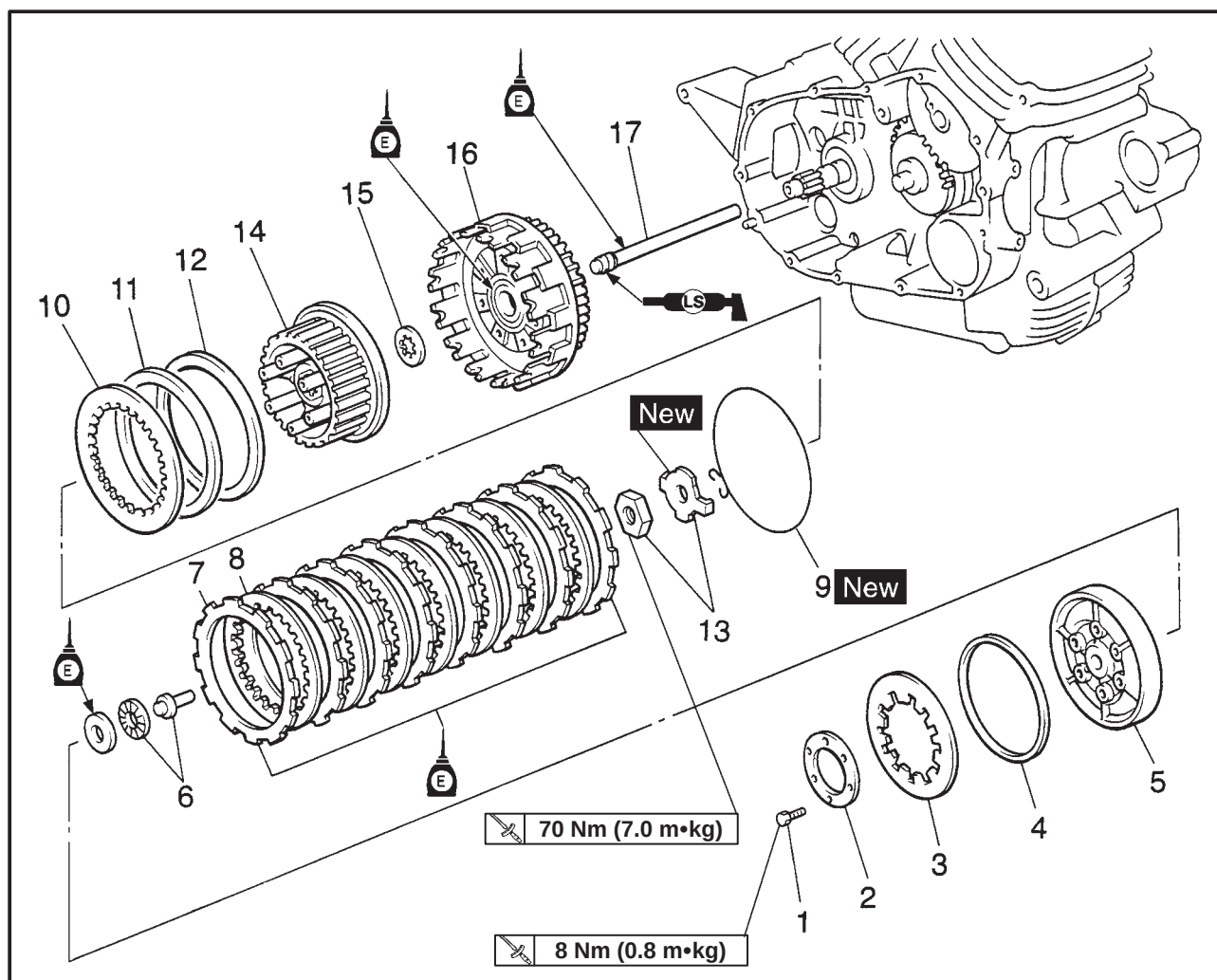
| Order | Job name/Part name                     | Q'ty | Remarks                                                                           |
|-------|----------------------------------------|------|-----------------------------------------------------------------------------------|
|       | <b>Removing the right clutch cover</b> |      | Remove the parts in the order listed.<br>Stand the motorcycle on a level surface. |
|       |                                        |      | <b>⚠ WARNING</b>                                                                  |
|       |                                        |      | <b>Securely support the motorcycle so there is no danger of it falling over.</b>  |
|       | Engine oil                             |      | Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.                                   |
|       | Muffler assembly                       |      | Refer to "ENGINE REMOVAL".                                                        |
|       | Exhaust pipes                          |      |                                                                                   |
|       | Brake pedal/Footrest                   |      |                                                                                   |
|       | Rear brake master cylinder/bracket     |      |                                                                                   |
| 1     | Oil filter cover plate                 | 1    |                                                                                   |
| 2     | Oil filter cover                       | 1    |                                                                                   |
| 3     | O-rings                                | 3    |                                                                                   |
| 4     | Oil filter                             | 1    |                                                                                   |
| 5     | Right crankcase cover                  | 1    |                                                                                   |



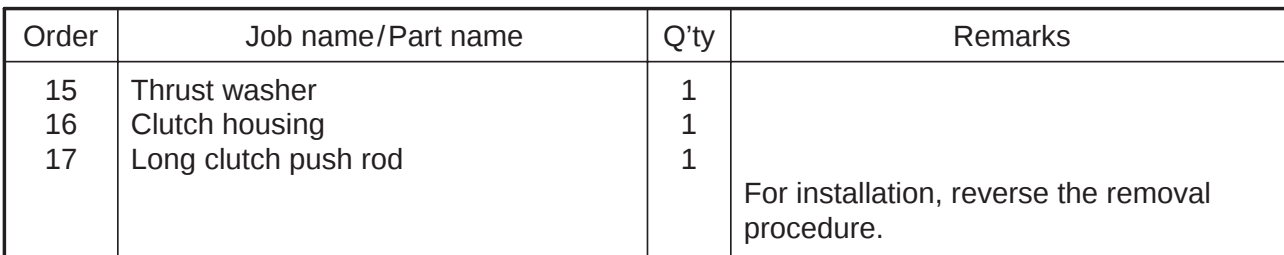
| Order | Job name/Part name     | Q'ty | Remarks                                          |
|-------|------------------------|------|--------------------------------------------------|
| 6     | Dowel pins             | 2    | For installation, reverse the removal procedure. |
| 7     | Crankcase cover gasket | 1    |                                                  |

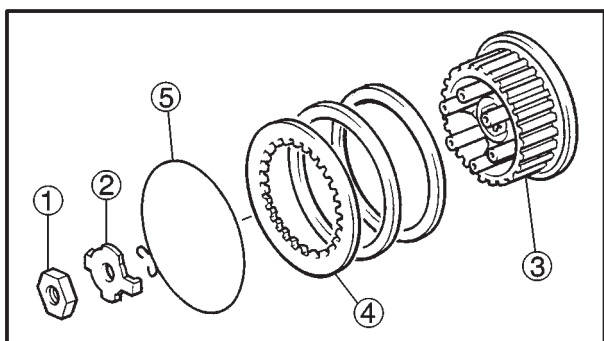
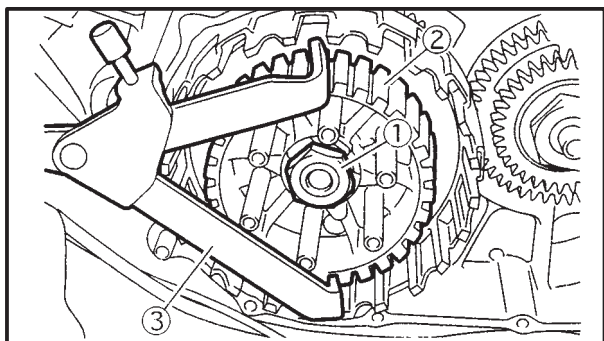


## CLUTCH ASSEMBLY



| Order | Job name/Part name            | Q'ty | Remarks                                    |
|-------|-------------------------------|------|--------------------------------------------|
|       | <b>Removing the clutch</b>    |      |                                            |
| 1     | Clutch spring bolts           | 6    | Remove the parts in the order listed.      |
| 2     | Clutch spring plate           | 1    |                                            |
| 3     | Clutch spring                 | 1    |                                            |
| 4     | Clutch spring seat            | 1    |                                            |
| 5     | Clutch pressure plate         | 1    |                                            |
| 6     | Bearing/shaft clutch push rod | 1/1  | Refer to "INSTALLING THE CLUTCH".          |
| 7     | Friction plates               | 6    |                                            |
| 8     | Clutch plates                 | 5    |                                            |
| 9     | Wire circlip                  | 1    |                                            |
| 10    | Clutch plate                  | 1    |                                            |
| 11    | Damper                        | 1    | Refer to "REMOVING/INSTALLING THE CLUTCH." |
| 12    | Clutch damper plate           | 1    |                                            |
| 13    | Nut/lock washer               | 1/1  |                                            |
| 14    | Clutch boss                   | 1    |                                            |





EAS00278

**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.

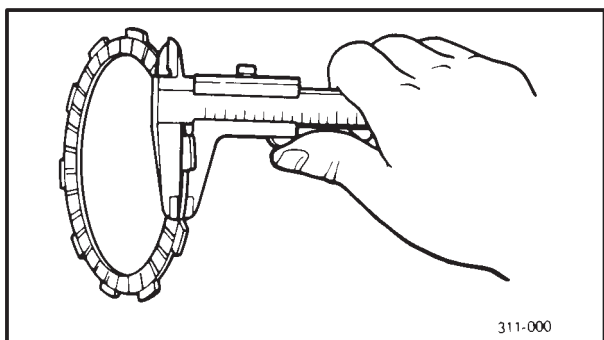


**Clutch holding tool**  
90890-04086

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.



EAS00281

**CHECKING THE FRICTION PLATES**

The following procedure applies to all of the friction plates.

1. Check:
  - friction plate

Damage/wear → Replace the friction plates as a set.
2. Measure:
  - friction plate thickness

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  
<Limit>: 2.8 mm

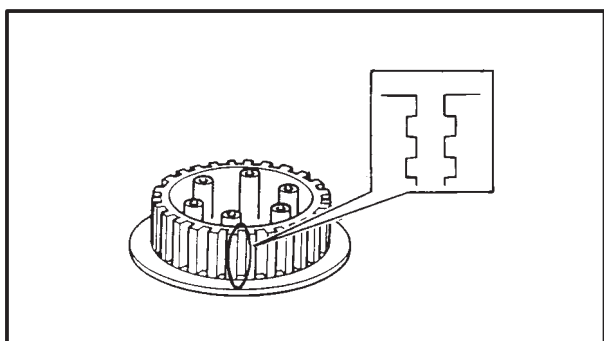


EAS00286

**CHECKING THE PRESSURE PLATE**

## 1. Check:

- pressure plate  
Cracks/damage → Replace.
- bearing  
Damage/wear → Replace.



EAS00285

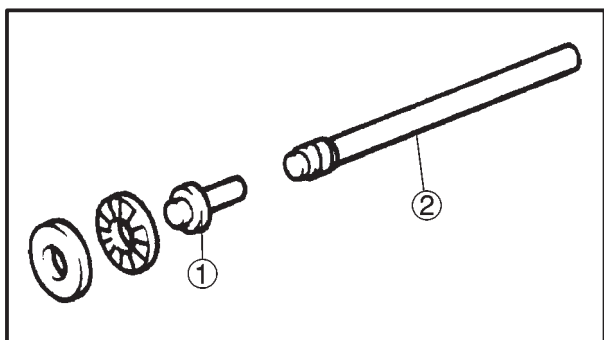
**CHECKING THE CLUTCH BOSS**

## 1. Check:

- clutch boss splines  
Damage/pitting/wear → Replace the clutch boss.

**NOTE:**

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



EAS00288

**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**



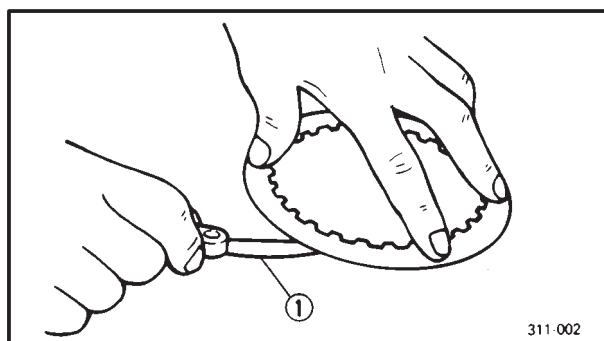
EAS00281

**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.



311-002

## 2. Measure:

- clutch plate warpage  
(with a surface plate and thickness gauge ①)  
Out of specification → Replace the clutch plates as a set.



**Clutch plate warpage limit**  
**Less than 0.1 mm**

EAS00283

**CHECKING THE CLUTCH SPRING AND CLUTCH SPRING SEAT PLATE**

## 1. Check:

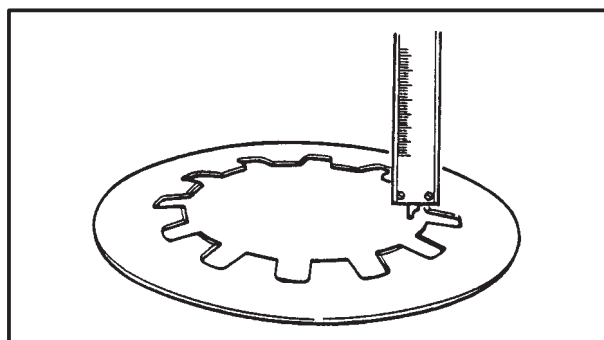
- clutch spring plate  
Damage → Replace.

## 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**  
**<Limit>: 6.5 mm**

EAS00284

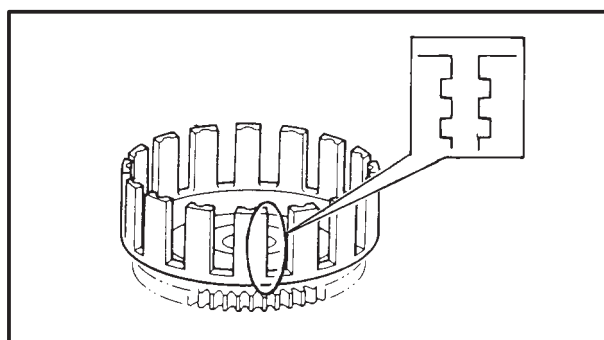
**CHECKING THE CLUTCH HOUSING**

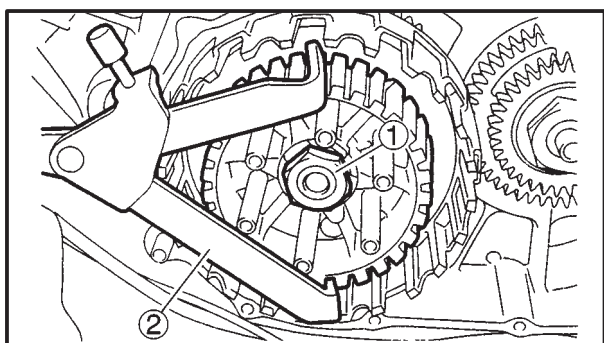
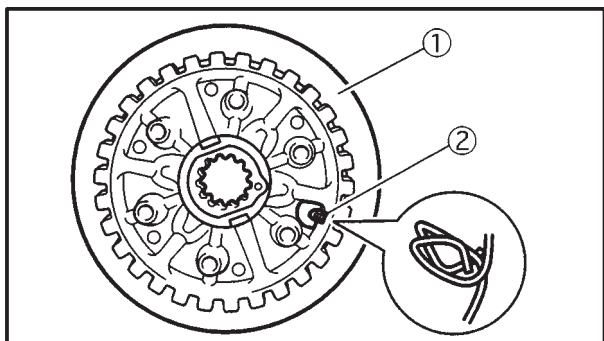
## 1. Check:

- 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.





EAS00295

**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

**70 Nm (7.0 m•kg)**
**NOTE:**

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



**Clutch holding tool**  
**90890-04086**

**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:**

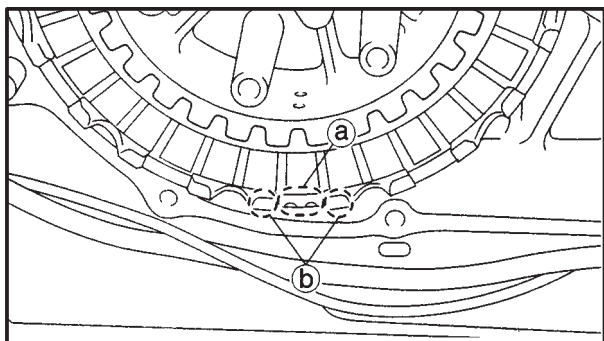
- friction plates
- clutch plates
- (with the recommended lubricant)



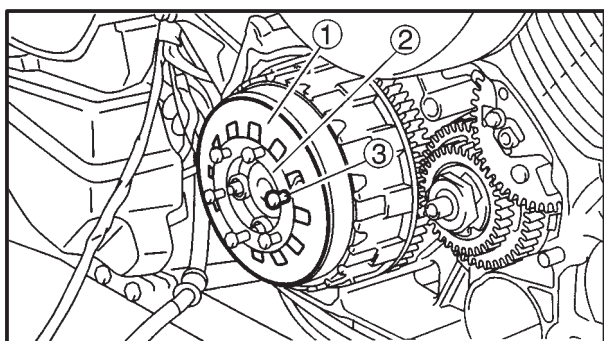
**Recommended lubricant**  
**Engine oil**

**6. Install:**

- friction plates
- clutch plates
- long clutch push rod
- short clutch push rod
- bearing
- washer

**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:**

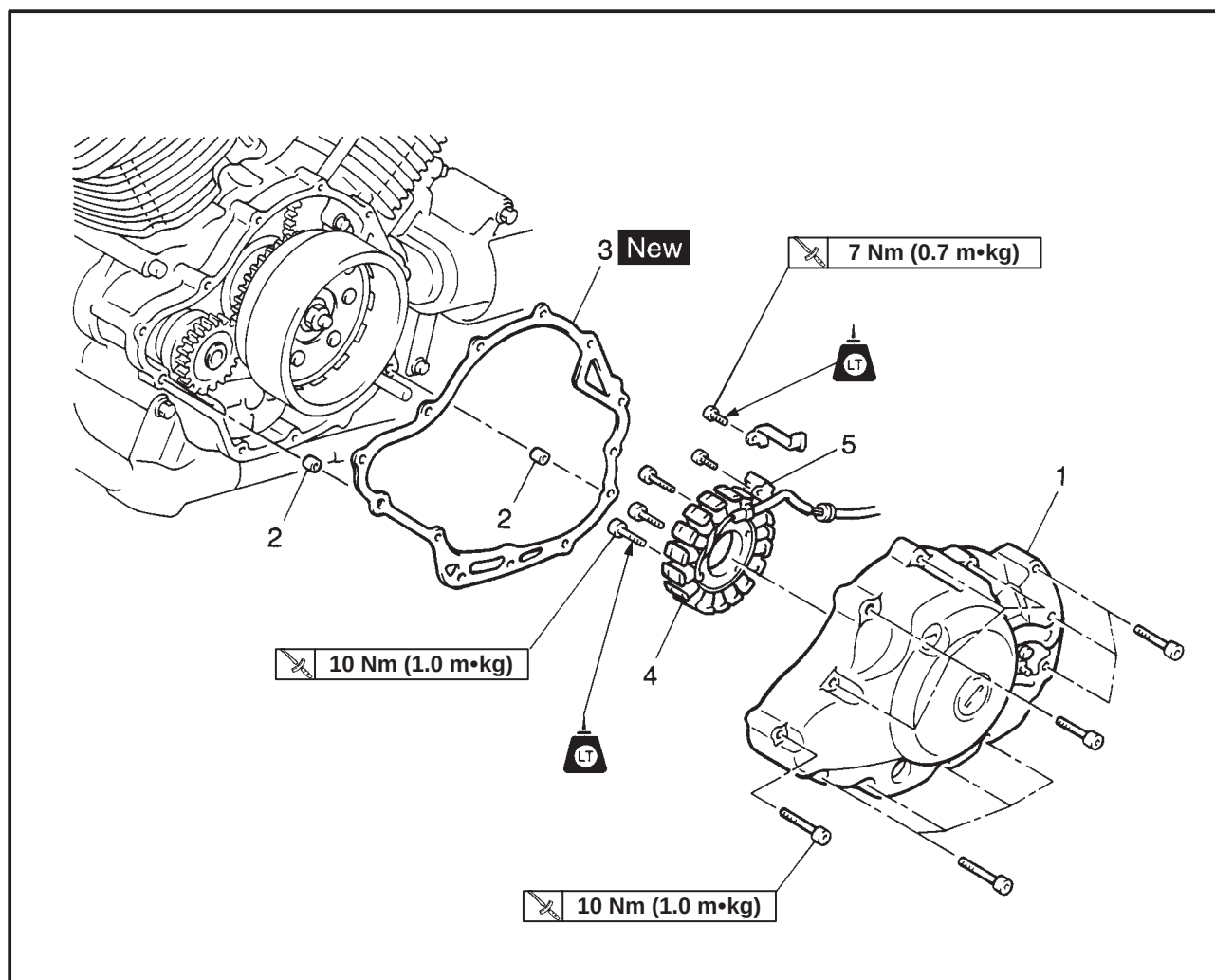
Tighten the clutch spring bolts in stages and in a crisscross pattern.



**Clutch spring bolt**  
**8 Nm (0.8 m•kg)**



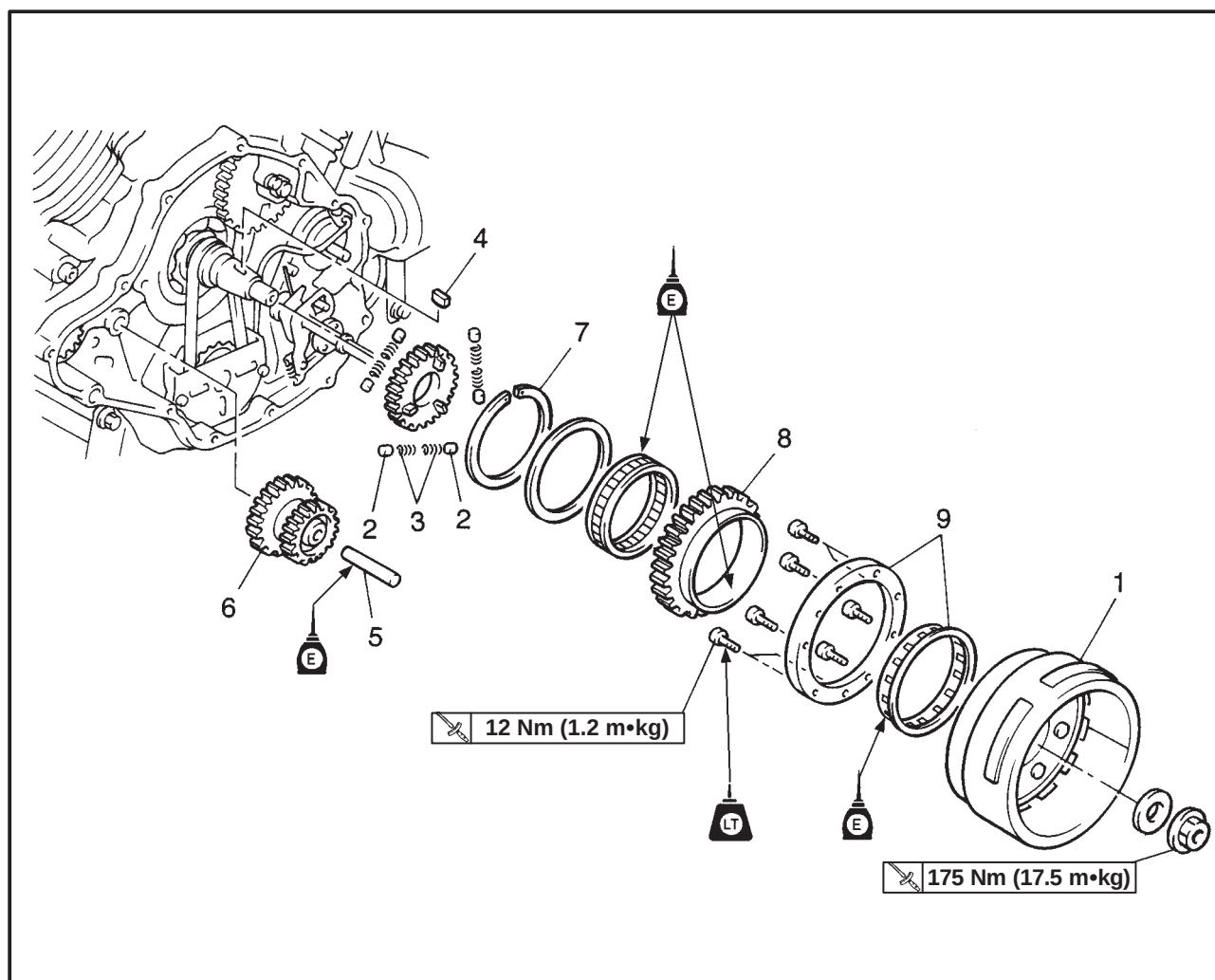
## GENERATOR AND STARTER CLUTCH STATOR COIL AND PICKUP COIL



| Order | Job name/Part name                                    | Q'ty | Remarks                                                                                    |
|-------|-------------------------------------------------------|------|--------------------------------------------------------------------------------------------|
|       | <b>Removing the starter coil</b>                      |      |                                                                                            |
|       | Engine oil                                            |      | Remove the parts in the order listed<br>Refer to "ENGINE OIL REPLACEMENT"<br>in CHAPTER 3. |
|       | Left side cover                                       |      |                                                                                            |
|       | AC magneto lead/pickup lead/<br>sidestand switch lead |      |                                                                                            |
|       | Footrest/shift pedal                                  |      |                                                                                            |
|       | Sidestand                                             |      |                                                                                            |
|       | Clutch adjusting cover/clutch cable                   |      | Refer to "ENGINE REMOVAL".                                                                 |
| 1     | Left crankcase cover                                  | 1    |                                                                                            |
| 2     | Dowel pins                                            | 2    |                                                                                            |
| 3     | Gasket                                                | 1    |                                                                                            |
| 4     | Stator coil                                           | 1    |                                                                                            |
| 5     | Pickup coil                                           | 1    |                                                                                            |
|       |                                                       |      | For installation, reverse the removal<br>procedure.                                        |



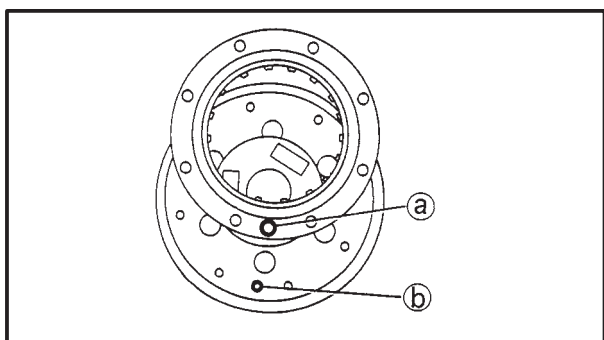
## GENERATOR AND STARTER CLUTCH



| Order | Job name/Part name                                | Q'ty | Remarks                                                                                  |
|-------|---------------------------------------------------|------|------------------------------------------------------------------------------------------|
|       | <b>Removing the generator and starter clutch.</b> |      | Remove the parts in the order listed                                                     |
| 1     | Rotor                                             | 1    | Refer to "REMOVING/INSTALLING THE GENERATOR."                                            |
| 2     | Dowel pins                                        | 6    |                                                                                          |
| 3     | Springs                                           | 6    |                                                                                          |
| 4     | Woodruff key                                      | 1    |                                                                                          |
| 5     | Shaft                                             | 1    | Refer to "INSTALLING THE GENERATOR."<br>For installation, reverse the removal procedure. |
| 6     | Starter idler gear                                | 1    |                                                                                          |
| 7     | Circlip                                           | 1    |                                                                                          |
| 8     | Starter clutch drive gear                         | 1    |                                                                                          |
| 9     | Starter clutch assembly                           | 1    |                                                                                          |







## INSTALLING THE GENERATOR

### 1. Install:

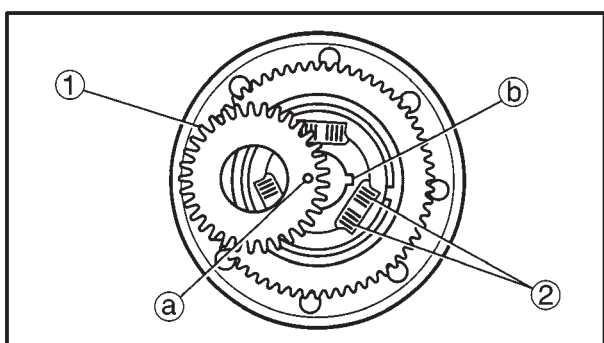
- starter clutch assembly

### NOTE:

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



**Starter clutch bolt:**  
**12 Nm (1.2 m•kg)**  
**LOCTITE®**

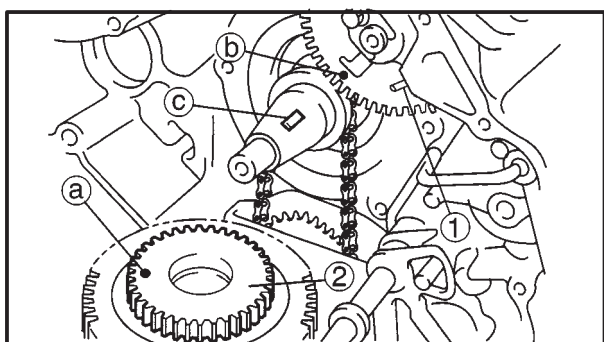
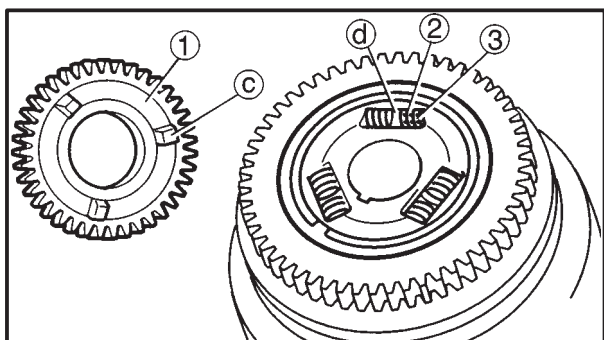


### 2. Install:

- 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).

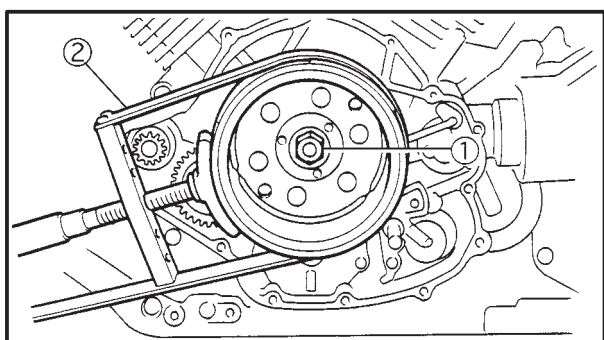


### 3. Install:

- 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)

**175 Nm (17.5 m•kg)**

### NOTE:

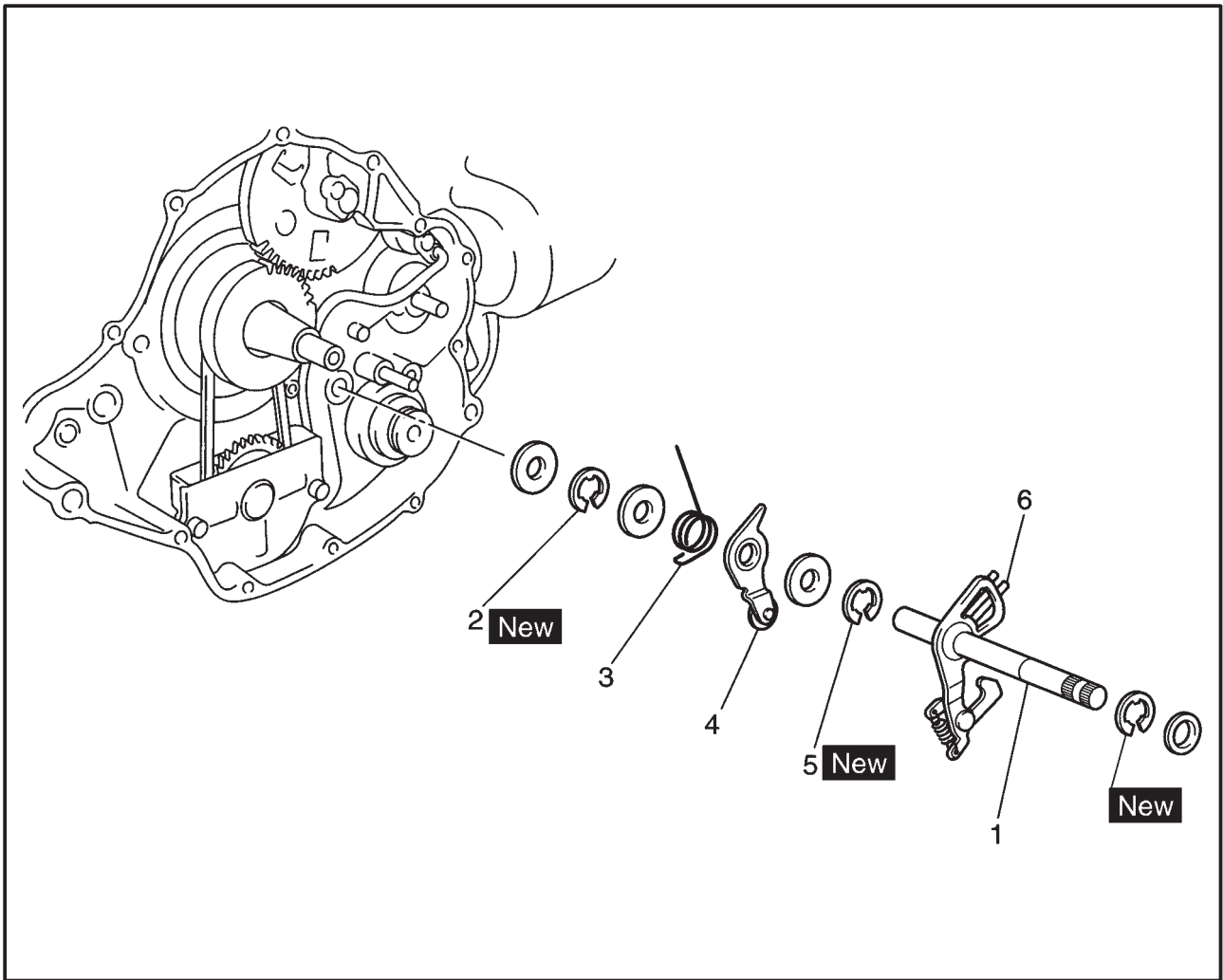
Tighten the rotor nut (1) while holding the mag-neto rotor with a sheave holder (2).



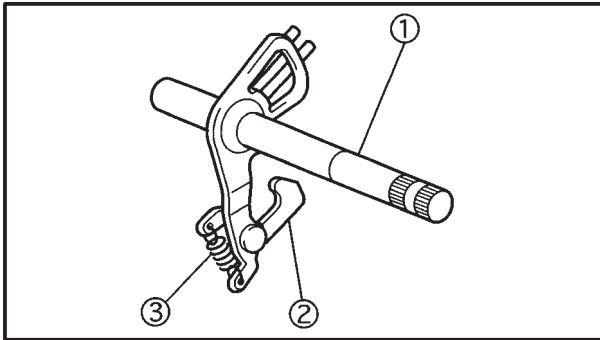
**Sheave holder:**  
**90890-01701**



SHIFT SHAFT



| Order | Job name/Part name                                 | Q'ty | Remarks                                          |
|-------|----------------------------------------------------|------|--------------------------------------------------|
|       | <b>Removing the shift shaft and stopper lever.</b> |      | Remove the parts in the order listed.            |
|       | Engine oil                                         |      | Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.  |
|       | Left crankcase cover                               |      | Refer to "GENERATOR AND STARTER CLUTCH".         |
| 1     | Rotor assembly                                     | 1    |                                                  |
| 2     | Shift shaft                                        | 1    |                                                  |
| 3     | Circlip                                            | 1    |                                                  |
| 4     | Torsion spring (stopper lever)                     | 1    | Refer to "INSTALLING THE SHIFT SHAFT".           |
| 5     | Stopper lever                                      | 1    |                                                  |
| 6     | Circlip                                            | 1    |                                                  |
|       | Torsion spring (shift shaft)                       | 1    | For installation, reverse the removal procedure. |

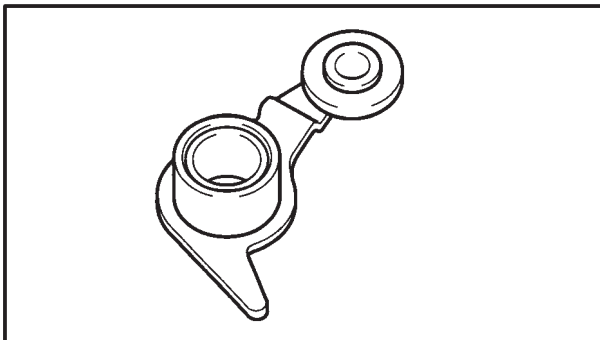


EAS00328

### CHECKING THE SHIFT SHAFT

#### 1. Check:

- shift shaft ①  
Bends/damage/wear → Replace.
- shift lever ②  
Bends/damage/wear → Replace.
- shift lever spring ③  
Damage/wear → Replace.

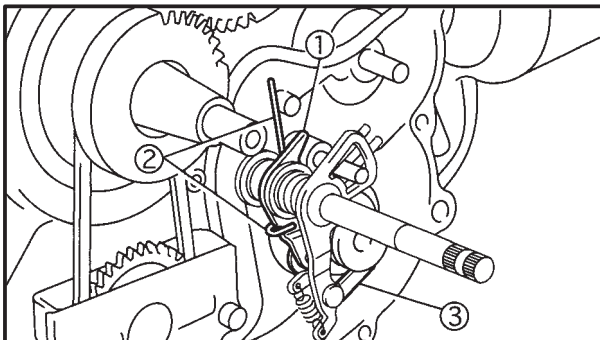


EB408410

### CHECKING THE STOPPER LEVER

#### 1. Check:

- stopper lever  
Bends/damage → Replace.
- roller turns roughly → Replace the stopper lever.



EAS00331

### INSTALLING THE SHIFT SHAFT

#### 1. Install:

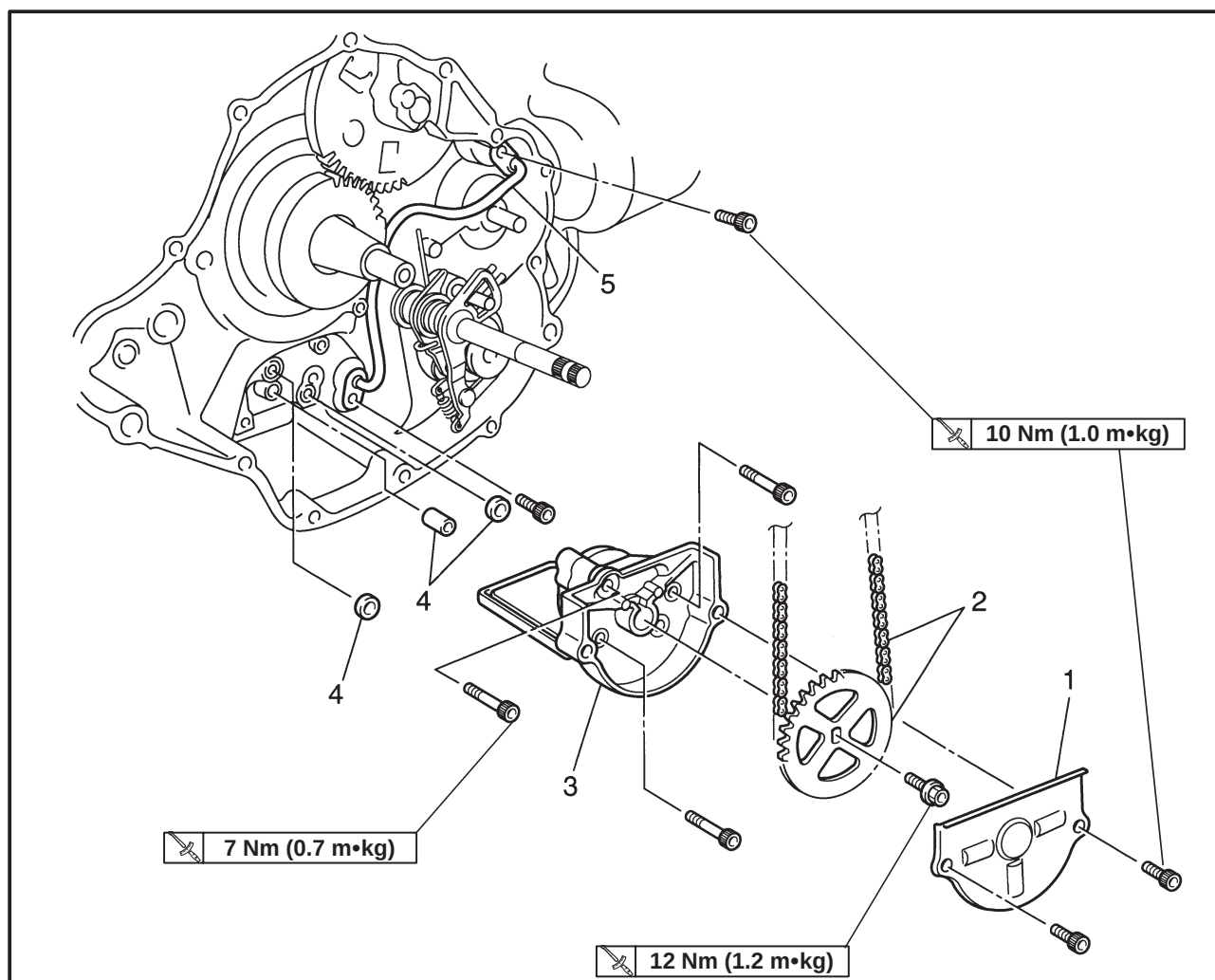
- stopper lever ①
- stopper lever spring ②
- shift shaft lever ③

#### NOTE:

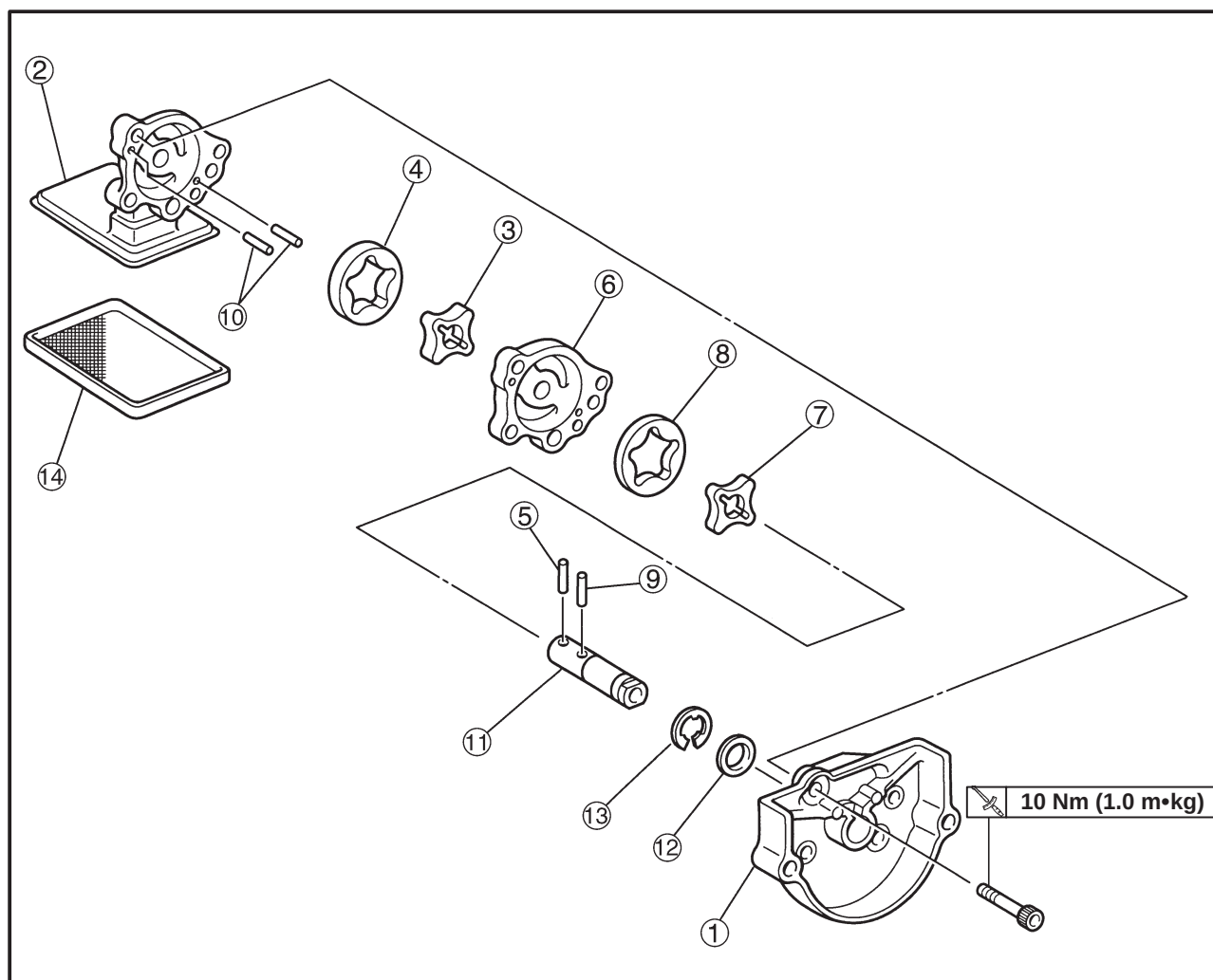
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.



## OIL PUMP



| Order | Job name/Part name                          | Q'ty | Remarks                                                                                           |
|-------|---------------------------------------------|------|---------------------------------------------------------------------------------------------------|
|       | <b>Removing the oil pump</b>                |      |                                                                                                   |
|       | Rotor assembly                              |      | Remove the parts in the order listed. Refer to "GENERATOR AND STARTER CLUTCH". Refer to "CLUTCH". |
| 1     | Crankcase cover (right)                     | 1    |                                                                                                   |
| 2     | Driven gear cover                           | 1/1  |                                                                                                   |
| 3     | Driven gear (oil pump)/Oil pump drive chain | 1    |                                                                                                   |
| 4     | Oil pump assembly                           | 2/1  |                                                                                                   |
| 5     | O-rings/dowel pin                           | 1    |                                                                                                   |
|       | Oil delivery pipe                           |      | For installation, reverse the removal procedure.                                                  |



| Order | Job name/Part name                | Q'ty | Remarks                                          |
|-------|-----------------------------------|------|--------------------------------------------------|
|       | <b>Disassembling the oil pump</b> |      | Disassembly the parts in the order listed.       |
| ①     | Oil pump cover                    | 1    | Refer to "ASSEMBLING THE OIL PUMP".              |
| ②     | Oil pump body                     | 1    |                                                  |
| ③     | Oil pump rotor (inner)            | 1    |                                                  |
| ④     | Oil pump rotor (outer)            | 1    |                                                  |
| ⑤     | Pin                               | 1    |                                                  |
| ⑥     | Oil pump body                     | 1    | Refer to "ASSEMBLING THE OIL PUMP".              |
| ⑦     | Oil pump rotor (inner)            | 1    |                                                  |
| ⑧     | Oil pump rotor (outer)            | 1    |                                                  |
| ⑨     | Pin                               | 1    |                                                  |
| ⑩     | Dowel pins                        | 2    |                                                  |
| ⑪     | Oil pump shaft                    | 1    |                                                  |
| ⑫     | Washer                            | 1    |                                                  |
| ⑬     | Circlip                           | 1    |                                                  |
| ⑭     | Oil strainer                      | 1    |                                                  |
|       |                                   |      | For assembly, reverse the disassembly procedure. |



EAS00364

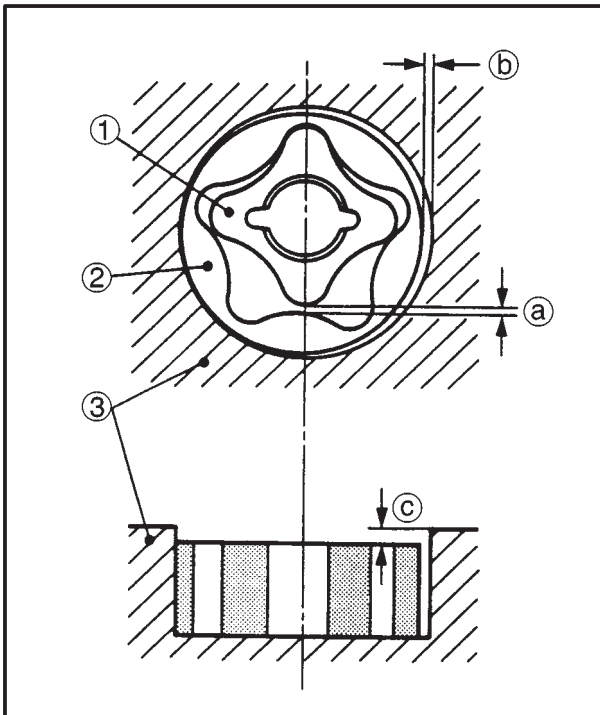
**CHECKING THE OIL PUMP**

## 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.

**Inner-rotor-to-outer-rotor-tip clearance**

0.03 ~ 0.09 mm

&lt;Limit&gt;: 0.15 mm

**Outer-rotor-to-oil-pump-body-side clearance**

0.03 ~ 0.08 mm

&lt;Limit&gt;: 0.15 mm

**Oil-pump-body-to-inner-rotor and outer-rotor clearance**

0.03 ~ 0.08 mm

&lt;Limit&gt;: 0.15 mm

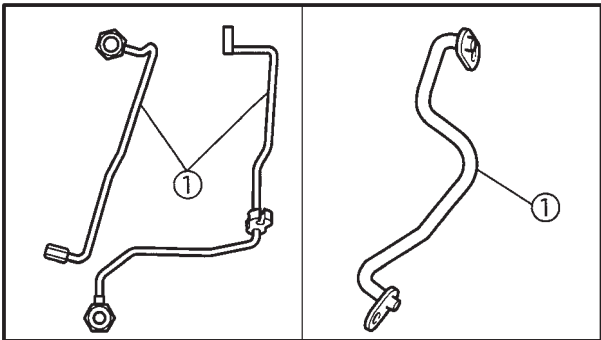
EAS00367

**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.

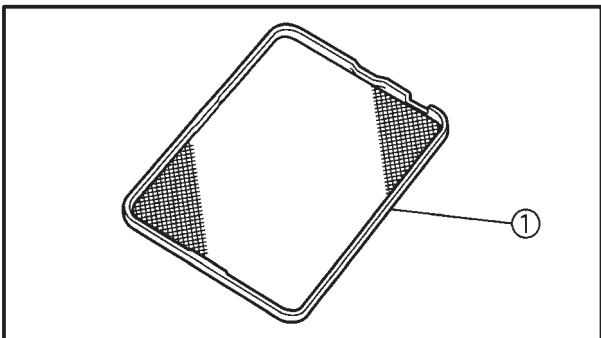


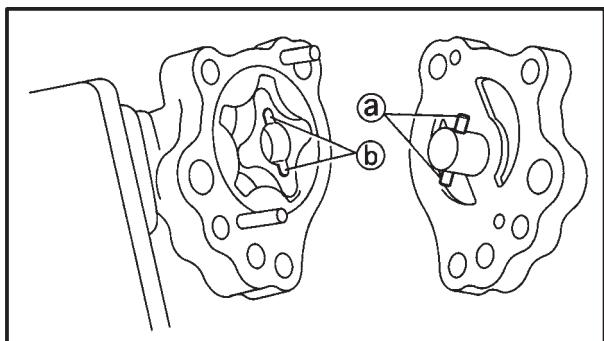
EAS00368

**CHECKING THE OIL STRAINER**

## 1. Check:

- oil strainer (1)
- Damage → Replace.  
Contaminants → Clean with engine oil.





EAS00376

**ASSEMBLING THE OIL PUMP****1. Assemble:**

- oil pump

 **10 Nm (1.0 m•kg)****CAUTION:** \_\_\_\_\_

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

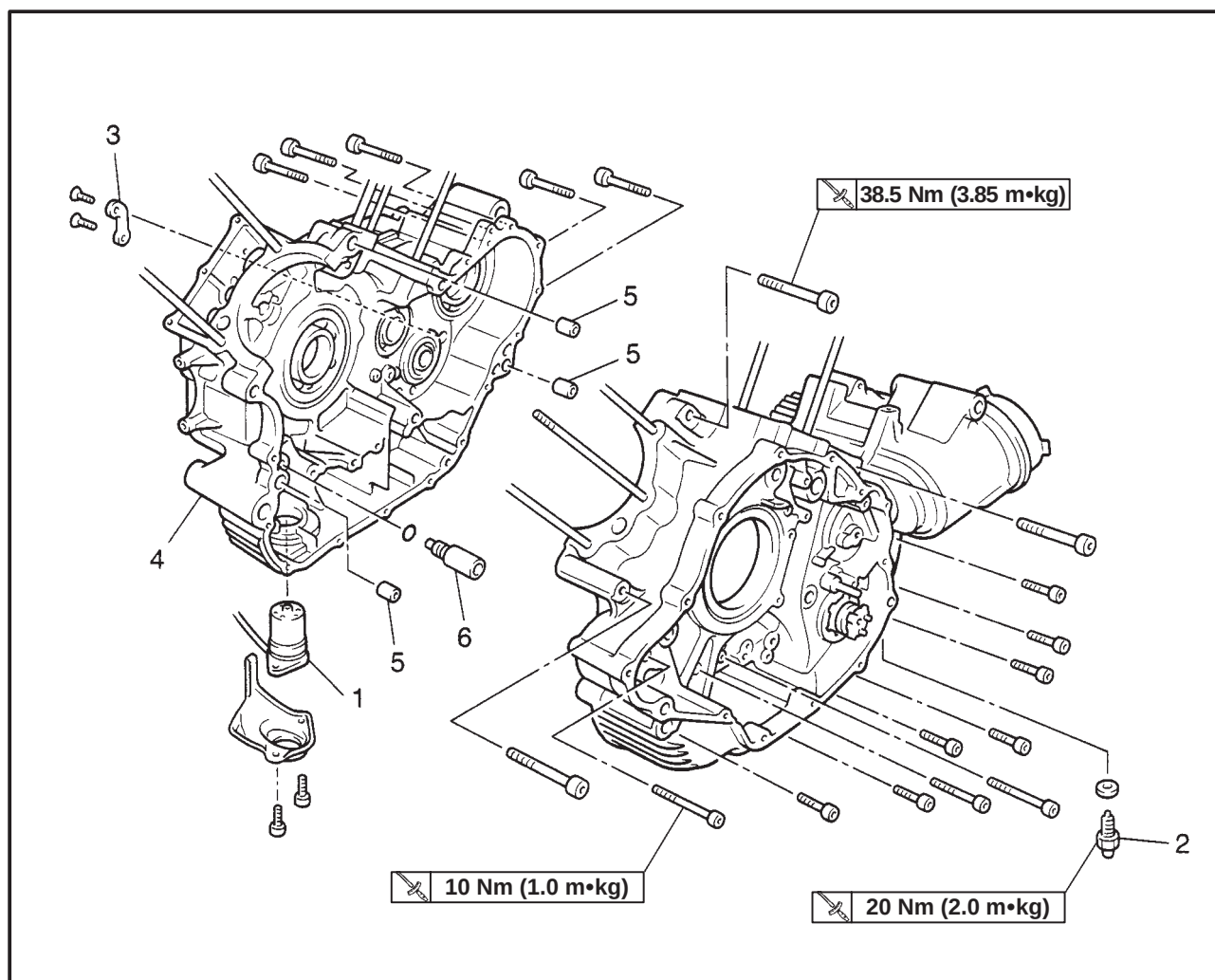
**NOTE:** \_\_\_\_\_

Align the pin (a) with the slots (b) on the inner rotor.



## CRANKSHAFT AND CONNECTING RODS

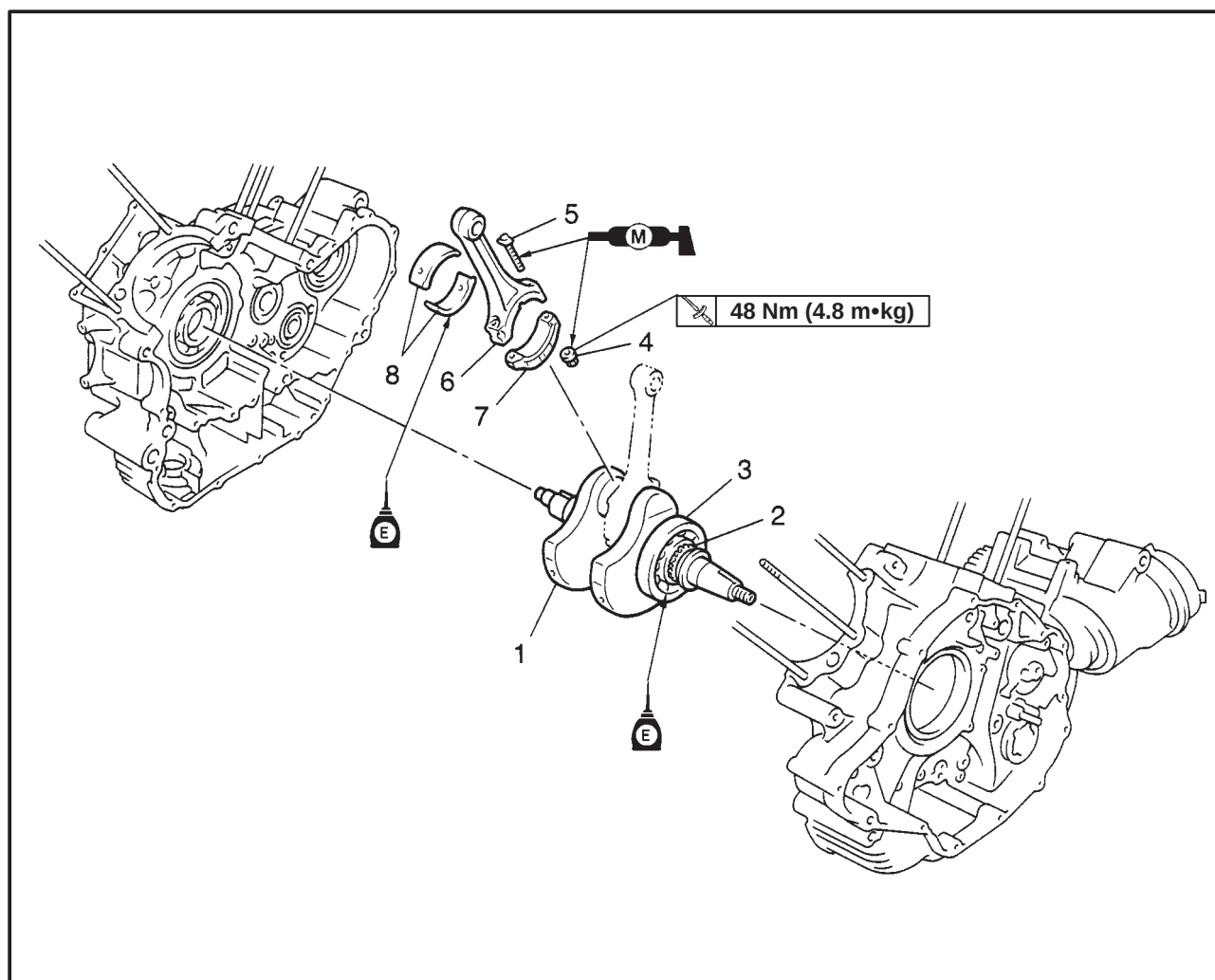
### CRANKCASE



| Order | Job name/Part name                      | Q'ty | Remarks                                            |
|-------|-----------------------------------------|------|----------------------------------------------------|
|       | <b>Removing the crankshaft assembly</b> |      |                                                    |
|       | Engine assembly                         |      | Remove the parts in the order listed.              |
|       | Cylinder head                           |      | Refer to "ENGINE REMOVAL".                         |
|       | Cylinder and piston                     |      | Refer to "CYLINDER HEADS".                         |
|       | Clutch assembly                         |      | Refer to "CYLINDERS AND PISTONS".                  |
|       | AC magneto and starter clutch           |      | Refer to "CLUTCH".                                 |
|       | Shift shaft                             |      | Refer to "GENERATOR AND STARTER CLUTCH".           |
|       | Oil pump assembly                       |      | Refer to "SHIFT SHAFT".                            |
| 1     | Oil level gauge                         | 1    | Refer to "OIL PUMP".                               |
| 2     | Neutral switch                          | 1    |                                                    |
| 3     | Shift shaft stopper plate               | 1    | Refer to "ASSEMBLING THE CRANKCASE".               |
| 4     | Crankcase (right)                       | 1    | Refer to "DISASSEMBLING/ASSEMBLING THE CRANKCASE". |
| 5     | Dowel pins                              | 3    |                                                    |
| 6     | Relief valve                            | 1    | For installation, reverse the removal procedure.   |



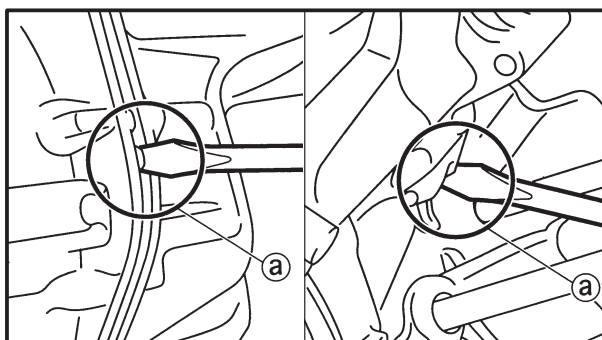
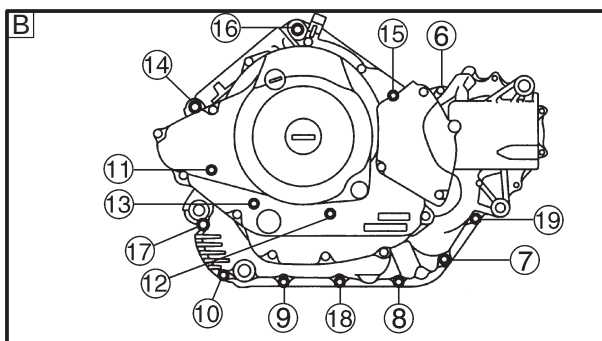
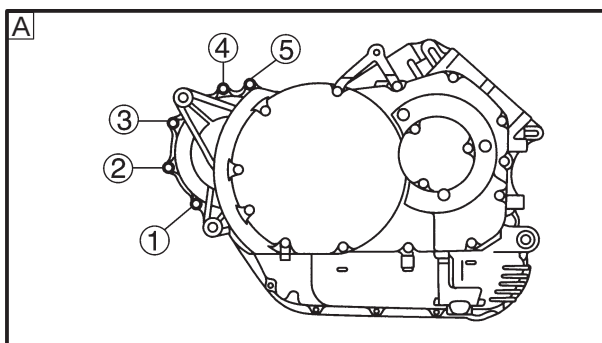
## CRANKSHAFT AND CONNECTING RODS



| Order | Job name/Part name                                | Q'ty | Remarks                                                                                                                |
|-------|---------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the crankshaft and connecting rod</b> |      |                                                                                                                        |
| 1     | Crankshaft assembly                               | 1    | Remove the parts in the order listed.                                                                                  |
| 2     | Oil pump drive sprocket                           | 1    | Refer to "REMOVING/INSTALLING THE CRANKSHAFT".                                                                         |
| 3     | Bearing                                           | 1    |                                                                                                                        |
| 4     | Nuts (connecting rod caps)                        | 4    | Refer to "INSTALLING THE CRANKSHAFT".                                                                                  |
| 5     | Connecting rod bolts                              | 4    |                                                                                                                        |
| 6     | Connecting rods                                   | 2    | Refer to "REMOVING THE CONNECTING RODS/INSTALLING THE CRANKSHAFT".<br>For installation, reverse the removal procedure. |
| 7     | Connecting rod caps                               | 2    |                                                                                                                        |
| 8     | Plain bearings                                    | 4    |                                                                                                                        |

## CRANKSHAFT AND CONNECTING RODS

ENG



EAS00386

### 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

**B** Left crankcase

#### 2. Remove:

- right crankcase

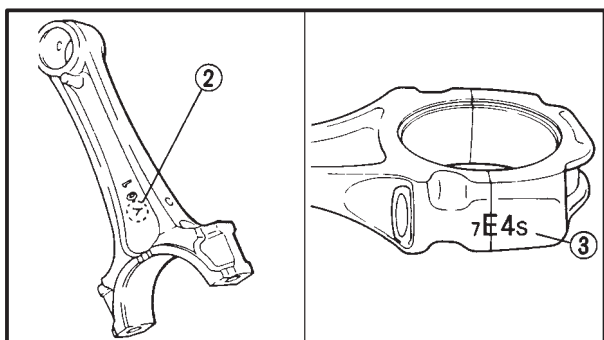
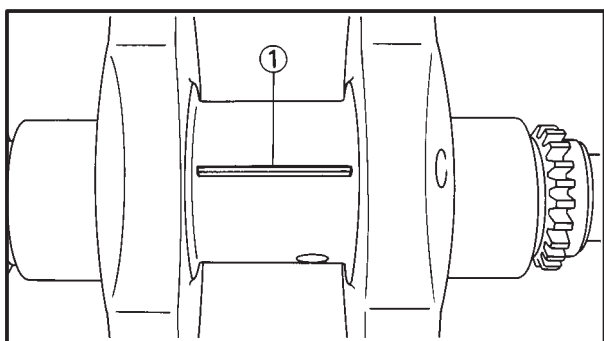
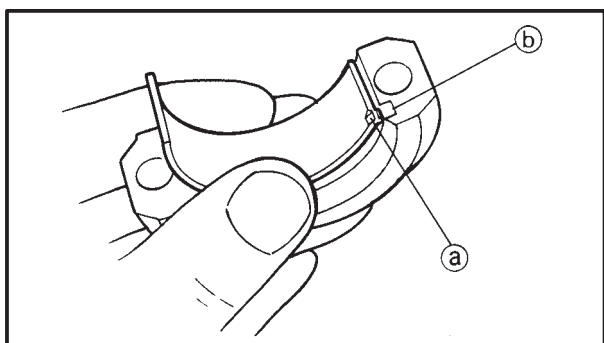
#### NOTE:

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

### 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.





## 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.

- Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
- Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

## NOTE:

Align the projections (a) on the big end bearings with the notches (b) in the connecting rod and connecting rod cap.

- Put a piece of Plastigauge® (1) on the crankshaft pin.
- 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 (2) on the connecting rod faces towards the left side of the crankshaft.
- Make sure that the characters (3) on both the connecting rod and connecting rod cap are aligned.

- 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 4.3 and 4.8 m•kg. Once you reach 4.3 m•kg, DO NOT STOP TIGHTENING until the specified torque is reached.

If the tightening is interrupted between 4.3 and 4.8 m•kg, loosen the connecting rod nut to less than 4.3 m•kg and start again.



Refer to "REMOVING THE CONNECTING RODS".

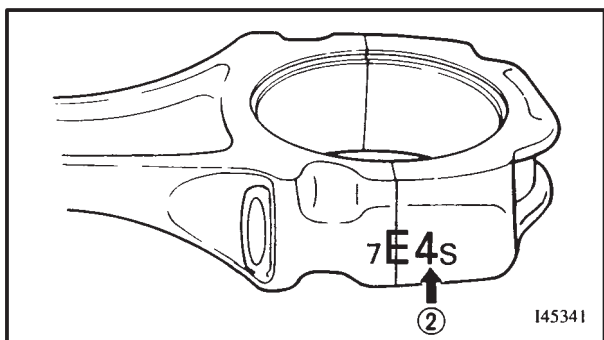
If the clearance is out of specification, select replacement big end bearings.

- “ $P_1, P_2$ ” refer to the bearings shown in the crankshaft illustration.

**“P<sub>1</sub>” (connecting rod) – “P<sub>1</sub>” (crankshaft web) = 4 – 1 = 3 (brown)**

| BEARING COLOR CODE |        |
|--------------------|--------|
| 1                  | blue   |
| 2                  | black  |
| 3                  | brown  |
| 4                  | green  |
| 5                  | yellow |

| BEARING COLOR CODE |       |
|--------------------|-------|
| 1                  | black |
| 2                  |       |
| 3                  | brown |
| 4                  | green |
| 5                  |       |





EB412440

## 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.

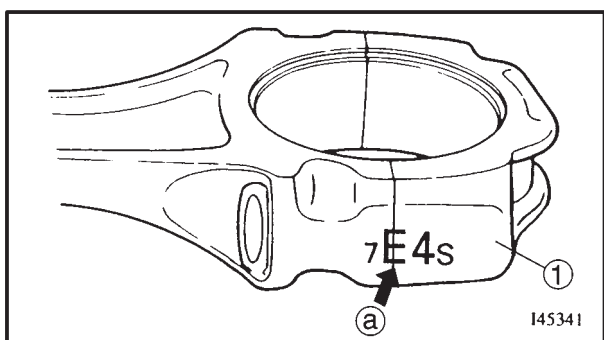
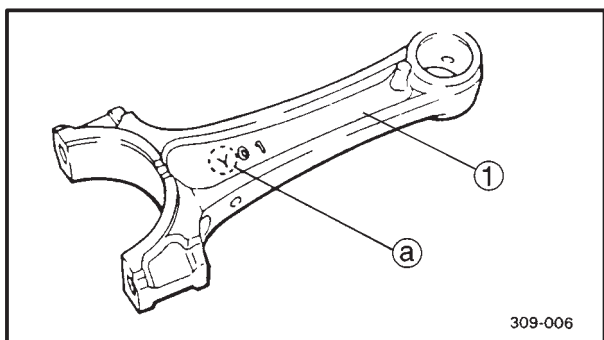
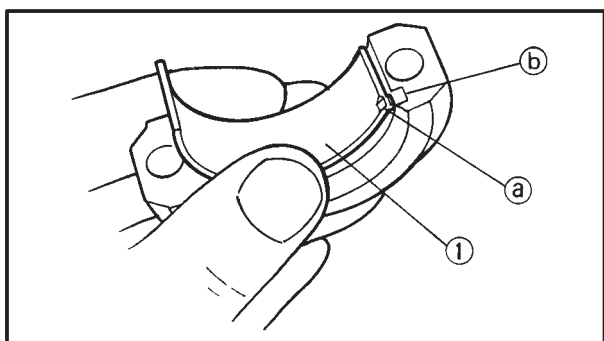
## INSTALLING THE CRANKSHAFT

### 3. Install:

- connecting rod bearings ①

#### NOTE:

- Align the projection ① of the bearings with the notches ② in the connecting rod cap.
- Install each bearing in its original place.



### 4. Install:

- connecting rods ①

#### NOTE:

- The stamped "Y" mark ① on the connecting rods should face towards the left side of the crankcase.
- Install each connecting rod in its original place.

### 5. Install:

- connecting rod cap ①

#### NOTE:

Be sure that the characters ① on the side of the cap and connecting rod are aligned.

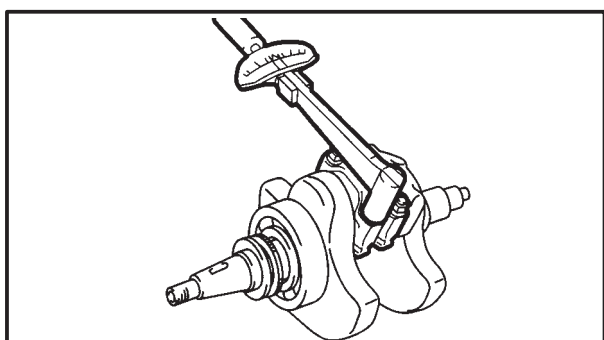
### 6. Tighten:

- nuts (connecting rod cap)

48 Nm (4.8 m•kg)

#### NOTE:

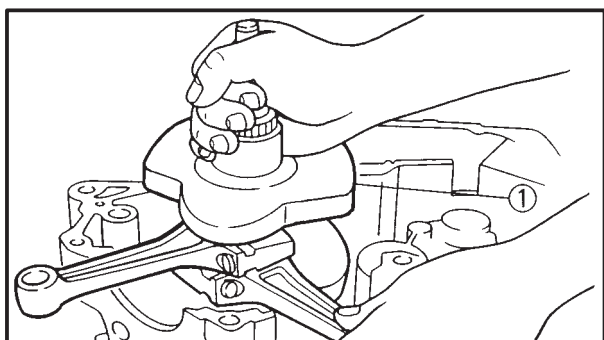
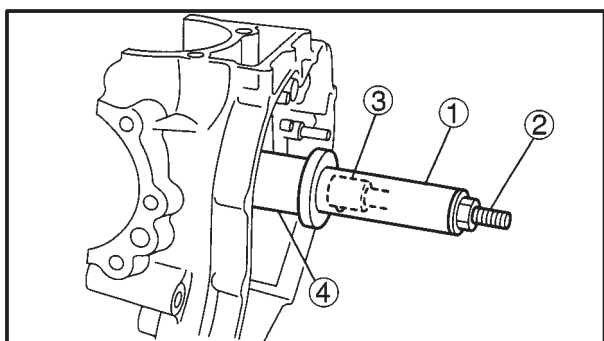
Apply molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.





## 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 4.3 and 4.8 m•kg. Once you reach 4.3 m•kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 4.3 and 4.8 m•kg, loosen the nut to less than 4.3 m•kg and start again.



## 7. Install:

- crankshaft installing tool

## NOTE:

Attach the spacer to the bearing inner race.



**Crankshaft installer pot ①**

90890-01274

**Crankshaft installer bolt ②**

90890-01275

**Adapter ③**

90890-04130

**Spacer ④**

90890-04060

## 8. 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)

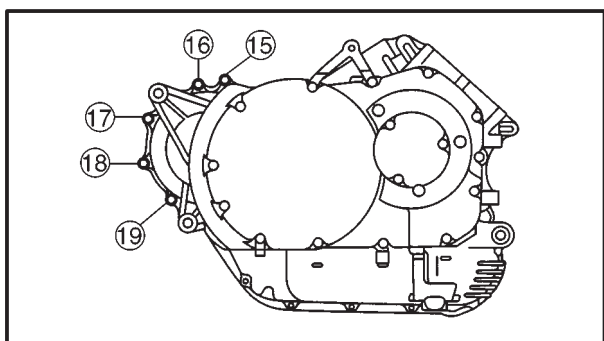
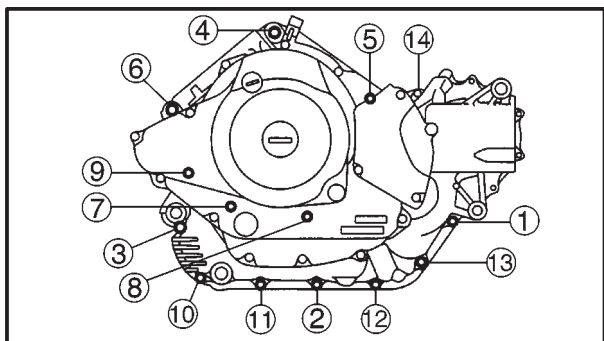


**Yamaha Bond No. 1215:**

90890-85505

## CRANKSHAFT AND CONNECTING RODS

ENG



### 2. Tighten:

- crankcase bolts  
(follow the proper tightening sequence)

#### NOTE:

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

④ ~ ⑥ (M10) 38.5Nm (3.85 m•kg)

① ~ ③, ⑦ ~ ⑱ (M6)

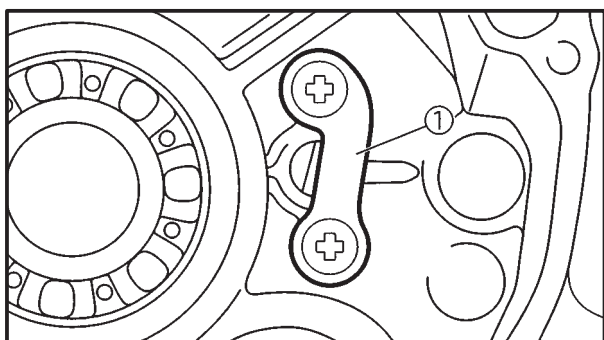
10 Nm (1.0 m•kg)

#### NOTE:

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

|                                      |                     |
|--------------------------------------|---------------------|
| M6 × 30 mm                           | ① ~ ③, ⑩ ~ ⑭, ⑰ ~ ⑱ |
| M6 × 30 mm<br>(Chromium plated bolt) | ⑮, ⑯                |
| M6 × 55 mm                           | ⑧                   |
| M6 × 80 mm                           | ⑦, ⑨                |
| M10 × 60 mm                          | ⑤                   |
| M10 × 70 mm                          | ④                   |
| M10 × 100 mm                         | ⑥                   |

⑱: with engine ground lead



### 3. Install:

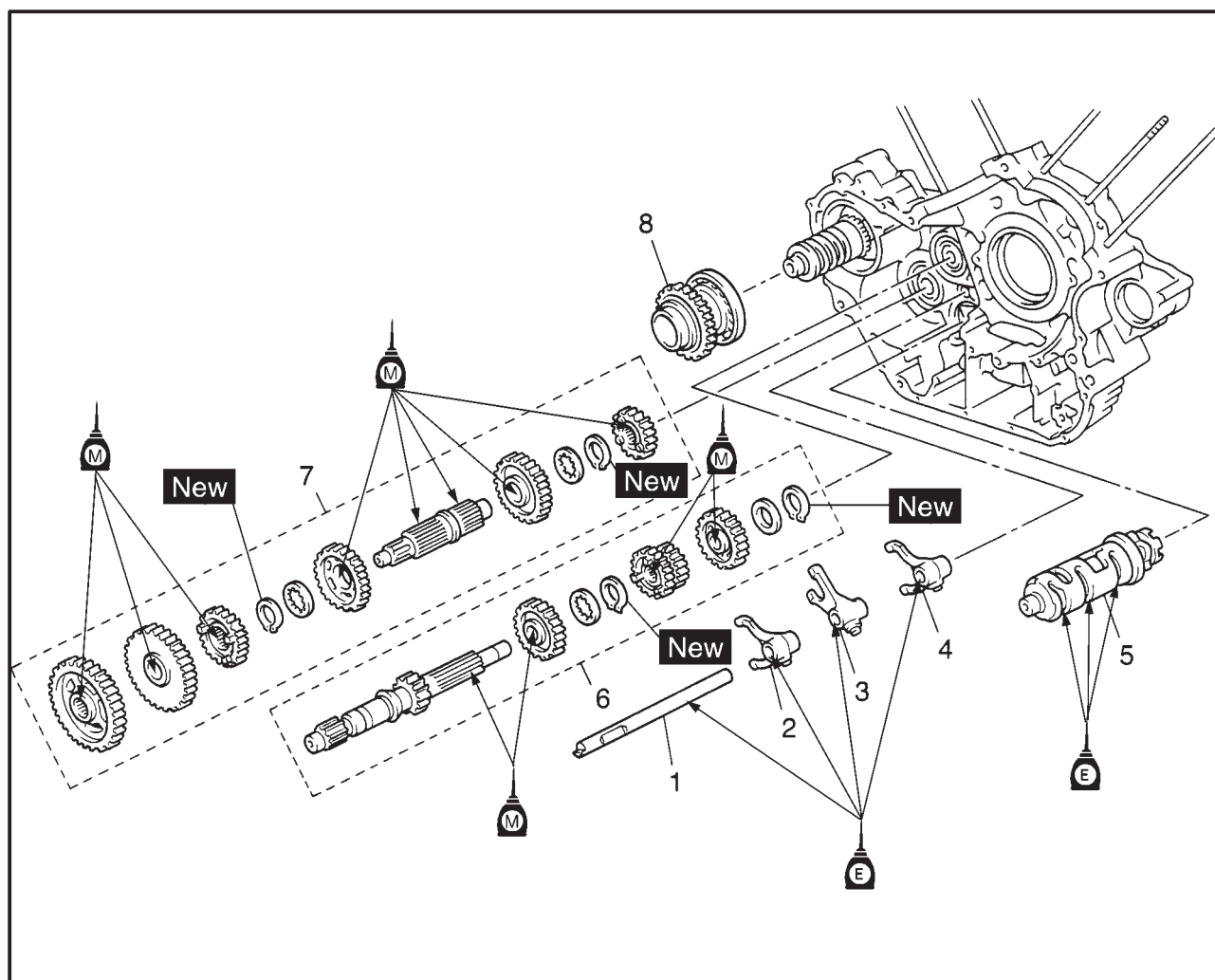
- shift shaft stopper plate ①

#### NOTE:

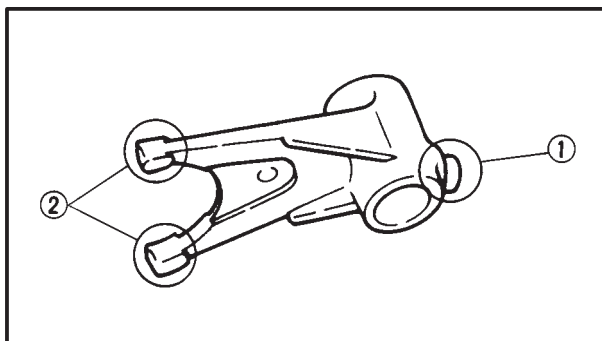
Install the shift shaft stopper plate as shown.



## TRANSMISSION



| Order | Job name/Part name          | Q'ty | Remarks                                                         |
|-------|-----------------------------|------|-----------------------------------------------------------------|
|       | <b>Transmission removal</b> |      |                                                                 |
|       | Crankcase separation        |      | Remove the parts in the order listed.<br>Refer to "CRANKSHAFT". |
| 1     | Guide bar                   | 1    | Refer to "INSTALLING THE<br>TRANSMISSION".                      |
| 2     | Shift fork 1 "R"            | 1    |                                                                 |
| 3     | Shift fork 2 "C"            | 1    |                                                                 |
| 4     | Shift fork 3 "L"            | 1    |                                                                 |
| 5     | Shift drum                  | 1    |                                                                 |
| 6     | Main axle assembly          | 1    | For installation, reverse the removal<br>procedure.             |
| 7     | Drive axle assembly         | 1    |                                                                 |
| 8     | Middle driven gear          | 1    |                                                                 |



EAS00421

**CHECKING THE SHIFT FORKS**

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

## 1. Check:

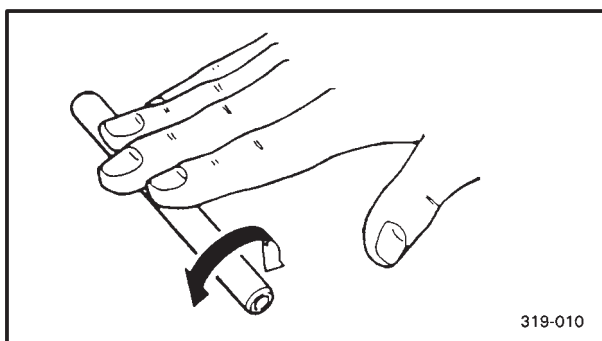
- shift fork cam follower ①
- shift fork pawl ②  
Bends/damage/scoring/wear → Replace the shift fork.

## 2. Check:

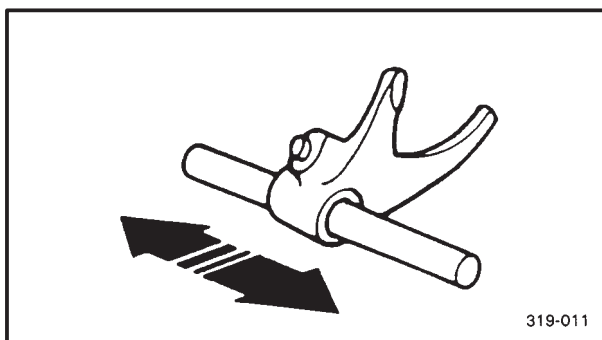
- shift fork guide bar  
Roll the shift fork guide bar on a flat surface.  
Bends → Replace.

**⚠ WARNING**

**Do not attempt to straighten a bent shift fork guide bar.**



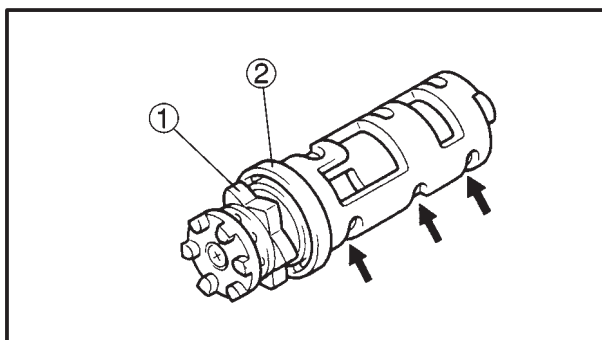
319-010



319-011

## 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.

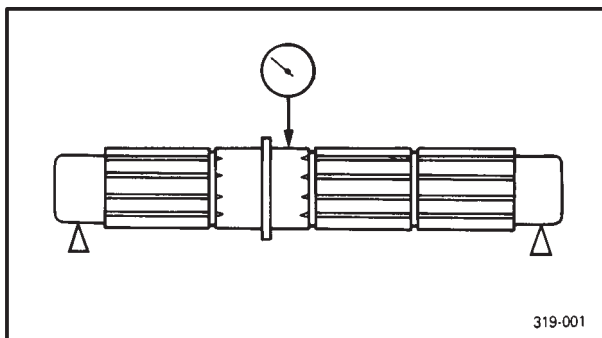


EAS00422

**CHECKING THE SHIFT DRUM ASSEMBLY**

## 1. Check:

- shift drum grooves  
Damage/scratches/wear → Replace the shift drum.
- shift drum segment ①  
Damage/wear → Replace.
- shift drum bearing ②  
Damage/pitting → Replace.



EAS00424

**CHECKING THE TRANSMISSION**

## 1. Measure:

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



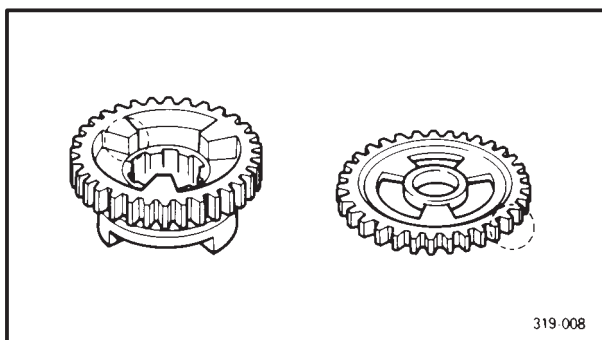
**Main axle runout limit**  
**0.08 mm**

## 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**



## 3. Check:

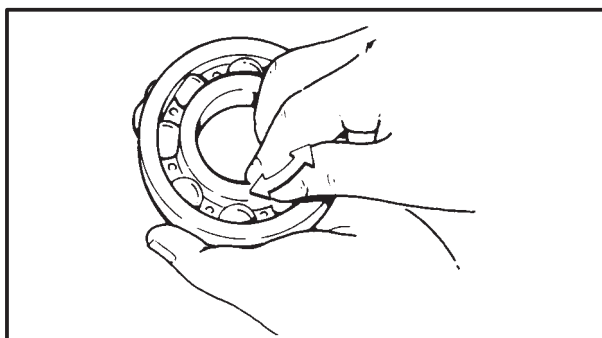
- transmission gears  
Blue discoloration/pitting/wear → Replace the defective gear(-s).
- transmission gear dogs  
Cracks/damage/rounded edges → Replace the defective gear(-s).

## 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.



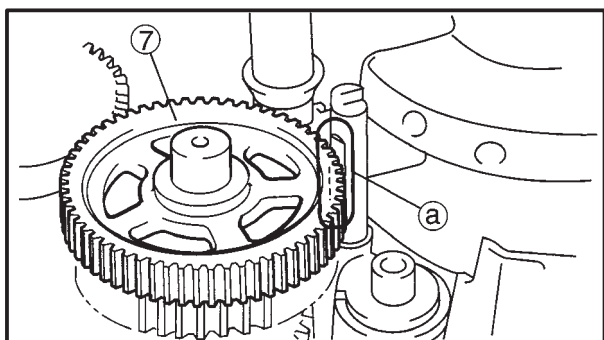
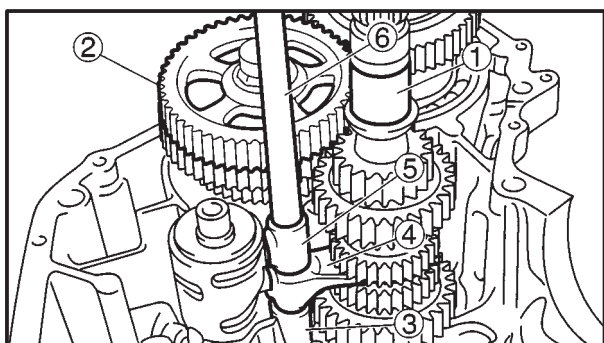
EAS00430

**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 (a) on the guide bar with the middle drive gear.

**⚠ WARNING**

Always use new circlips.

**3. Check:**

- transmission  
Rough movement → Repair.

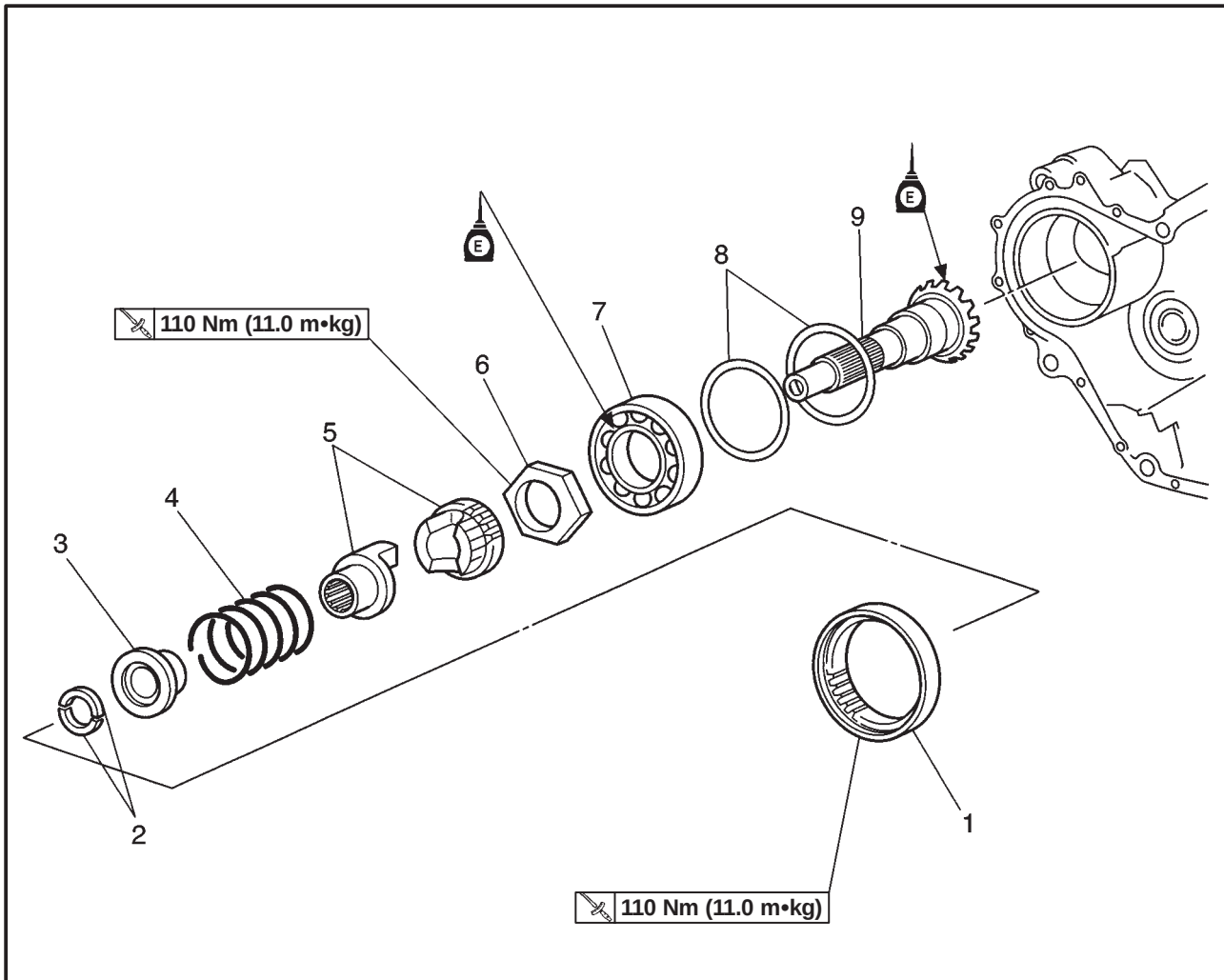
**NOTE:**

Oil each gear, shaft, and bearing thoroughly.



## MIDDLE GEAR

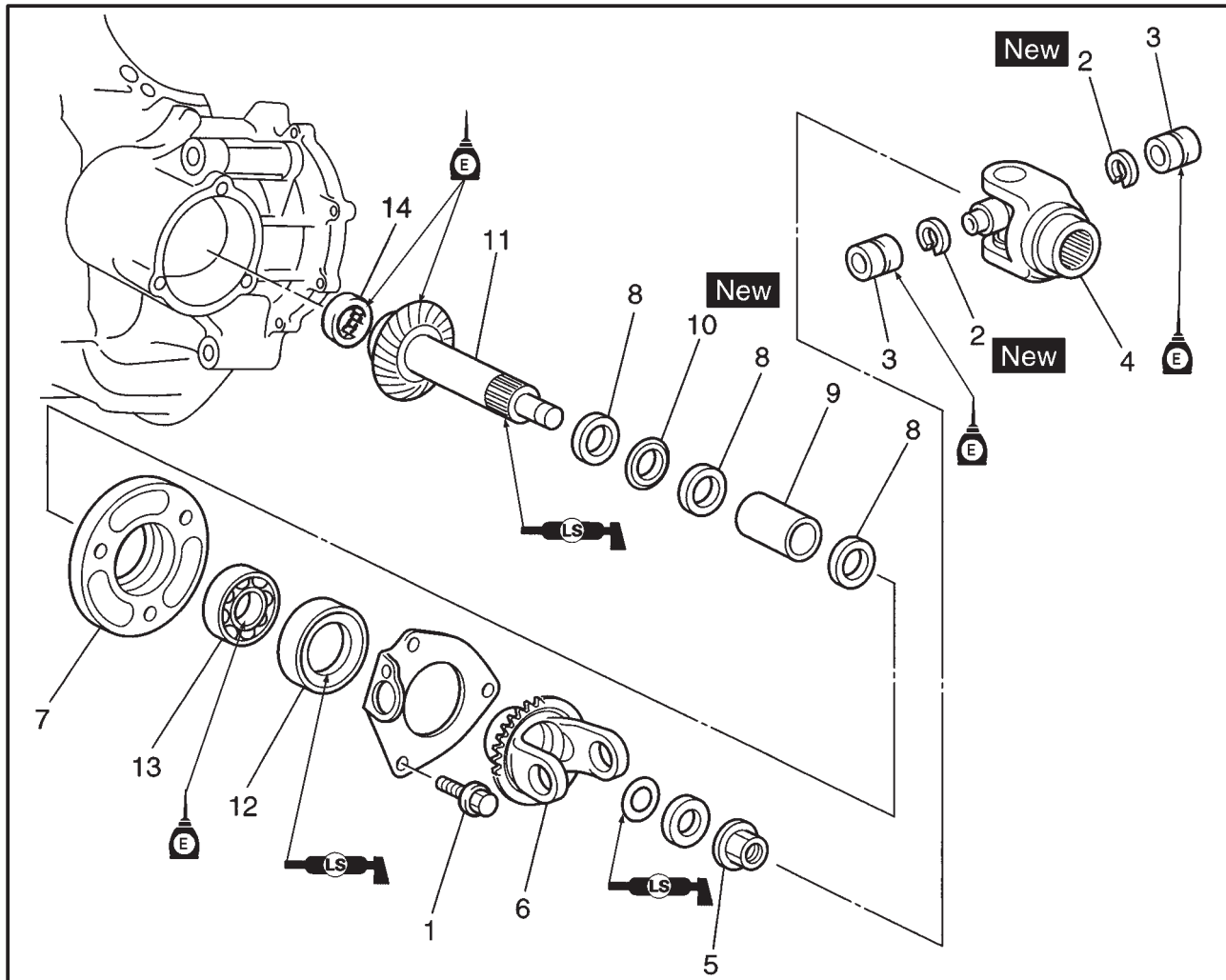
### MIDDLE DRIVE PINION GEAR



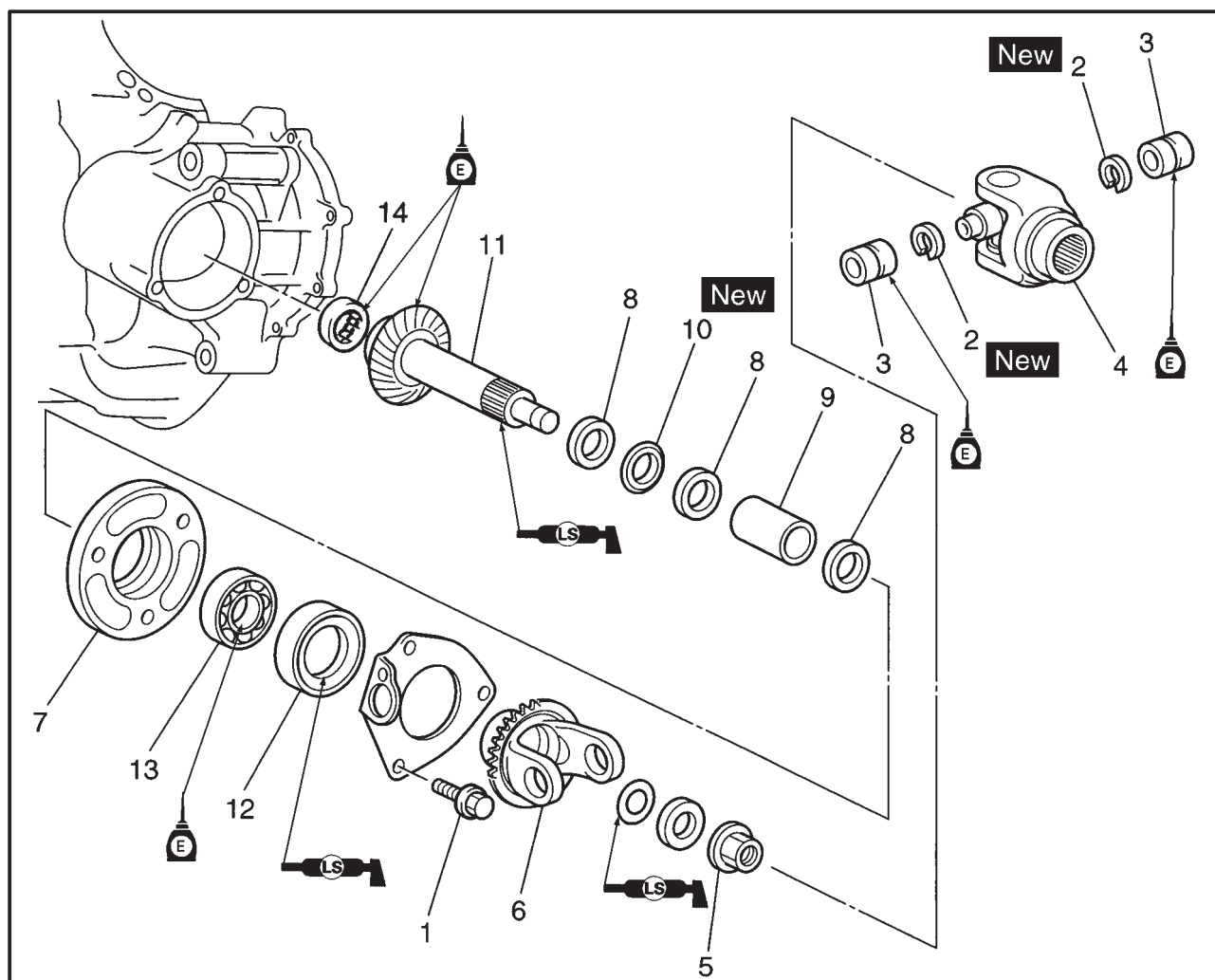
| Order | Job name/Part name                           | Q'ty | Remarks                                                                                                             |
|-------|----------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the middle drive pinion gear</b> |      |                                                                                                                     |
|       | Sepalate the crankcase                       |      |                                                                                                                     |
| 1     | Bearing retainer                             | 1    | Remove the parts in the order listed.                                                                               |
| 2     | Spring retainers                             | 2    | Refer to "CRANKSHAFT AND CONNECTING ROD."                                                                           |
| 3     | Spring seat                                  | 1    | Refer to "REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH". |
| 4     | Damper spring                                | 1    |                                                                                                                     |
| 5     | Damper cams                                  | 2    | Refer to "DISASSEMBLING/ ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY".                                               |
| 6     | Nut                                          | 1    |                                                                                                                     |
| 7     | Bearing                                      | 1    |                                                                                                                     |
| 8     | Shim(s)                                      | 1    |                                                                                                                     |
| 9     | Middle drive pinion shaft                    | 1    | For installation, reverse the removal procedure.                                                                    |



## MIDDLE DRIVEN PINION GEAR

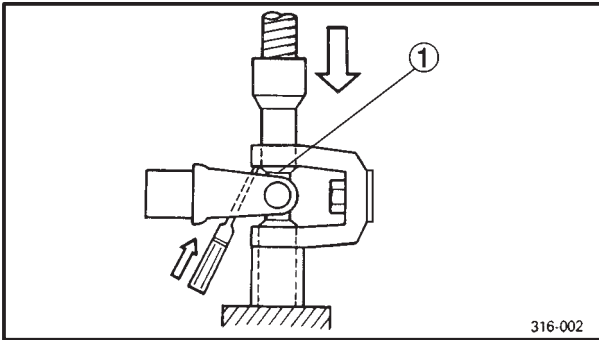


| Order | Job name/Part name                             | Q'ty | Remarks                                                                                                                                                                                            |
|-------|------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the middle driven pinion gear.</b> |      | Remove the parts in the order listed.                                                                                                                                                              |
| 1     | Bolts                                          | 3    | Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALLING THE UNIVERSAL JOINT".                                                                                                               |
| 2     | Circlips                                       | 2    |                                                                                                                                                                                                    |
| 3     | Bearings                                       | 2    |                                                                                                                                                                                                    |
| 4     | Driven yoke                                    | 1    |                                                                                                                                                                                                    |
| 5     | Nut                                            | 1    |                                                                                                                                                                                                    |
| 6     | Drive yoke                                     | 1    | Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".<br>Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH". |
| 7     | Bearing housing/O-ring                         | 1/1  |                                                                                                                                                                                                    |
| 8     | Washers                                        | 3    |                                                                                                                                                                                                    |
| 9     | Collar                                         | 1    |                                                                                                                                                                                                    |



| Order | Job name/Part name  | Q'ty | Remarks                                                                    |
|-------|---------------------|------|----------------------------------------------------------------------------|
| 10    | Collapsible collar  | 1    | Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH". |
| 11    | Middle driven shaft | 1    |                                                                            |
| 12    | Oil seal            | 1    | Refer to "ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY".                    |
| 13    | Bearing             | 1    |                                                                            |
| 14    | Bearing             |      |                                                                            |
|       |                     |      | For installation, reverse the removal procedure.                           |





## 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.

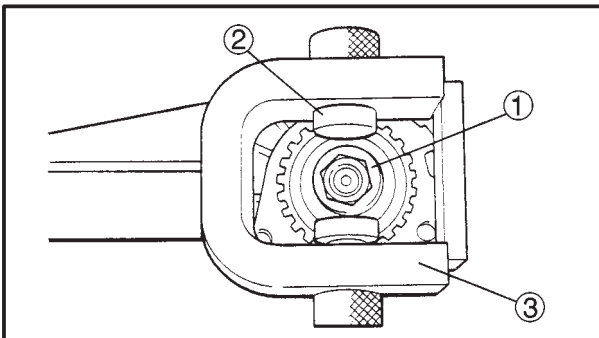
- d. Repeat the above steps to remove the opposite side's bearing.
- e. Separate the universal joint yokes.



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.



**Universal joint holder**  
90890-04062

EAS00438

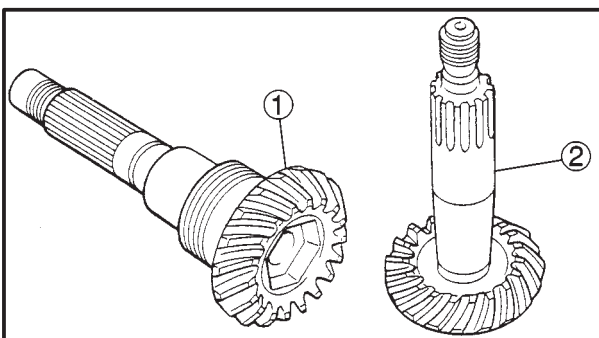
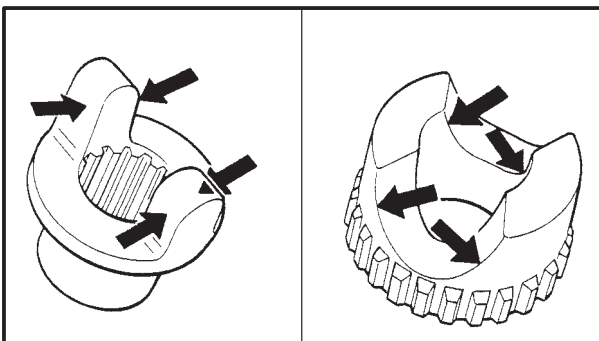
## CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Check:
  - damper cam surface  
Scratches/wear → Replace the damper cam.
2. Check:
  - spring  
Cracks/damage → Replace.

EAS00439

## 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:

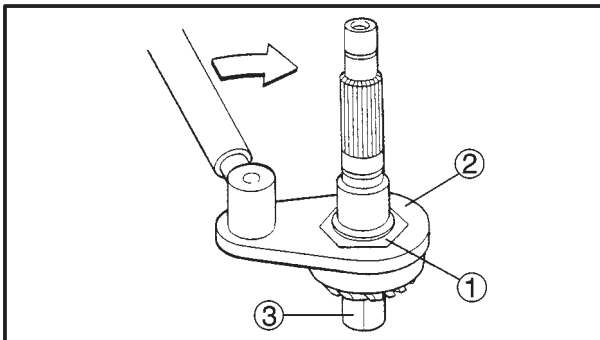
- O-ring
- oil seal

Damage → Replace the defective part(-s).

4. Check:

- universal joint movement

Rough movement → Replace the universal joint.



EAS00441

**ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY**

1. Tighten:

- middle drive shaft nut (1)

**110 Nm (11.0 m•kg)**

**NOTE:**

- Set the torque wrench at a right angle to the middle drive shaft nut wrench (2).
- Lock the threads on the middle drive shaft nut by staking them with a center punch.

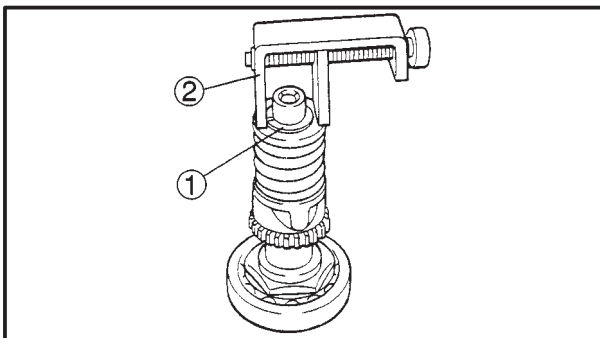


**Middle drive shaft nut wrench (2)**

**90890-04138**

**Middle drive shaft holder (3)**

**90890-04055**



2. Install:

- spring retainers (1)

**NOTE:**

While compress the spring with the damper spring compressor (2), and then install the spring retainers.



**Damper spring compressor**

**90890-04090**

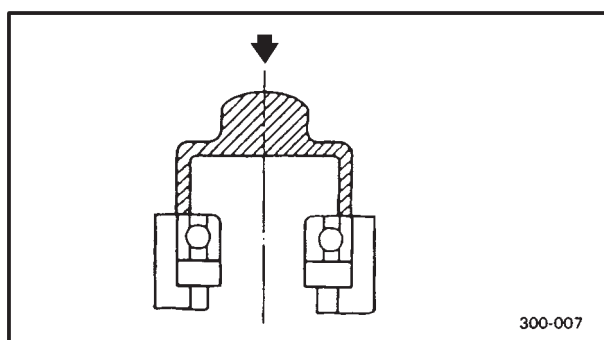


## ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

### 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:

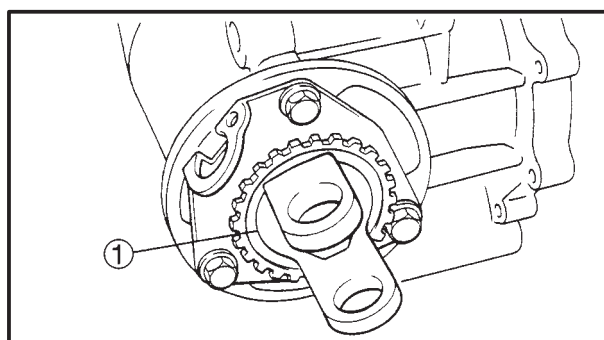
Finger tighten the middle driven shaft nut.

## 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 ①

25 Nm (2.5 m•kg)





**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.



## INSTALLING THE UNIVERSAL JOINT

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

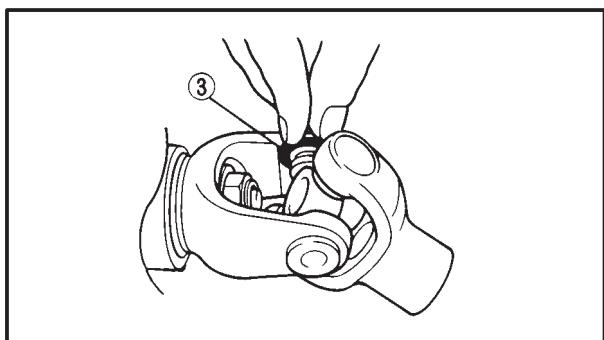
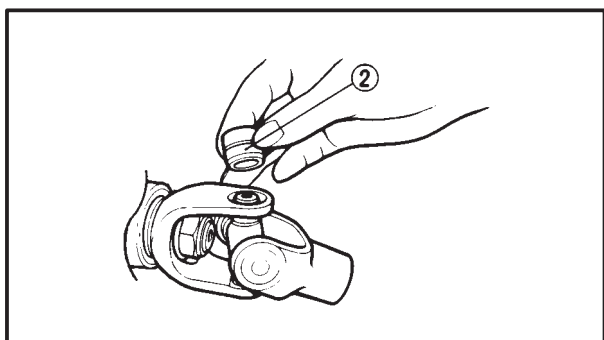
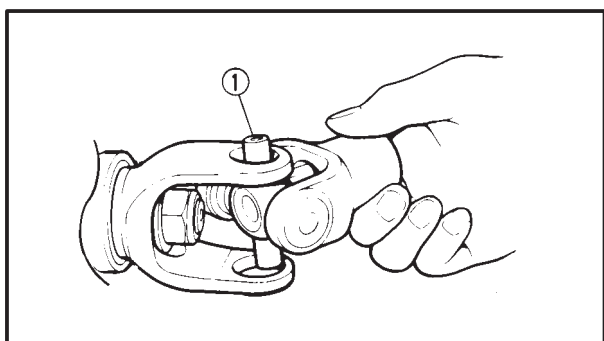
**CAUTION:**

**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.





EAS00452

**ALIGNING THE MIDDLE GEAR****NOTE:**

Aligning the middle gear is necessary when any of the following parts are replaced:

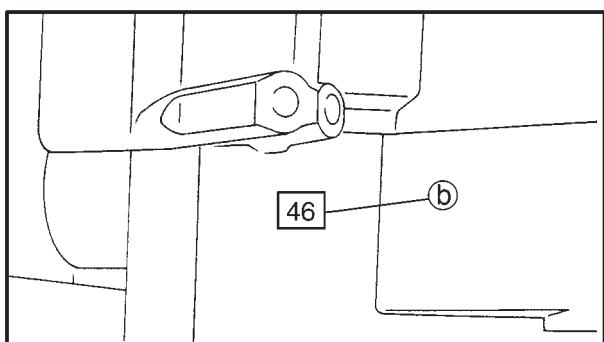
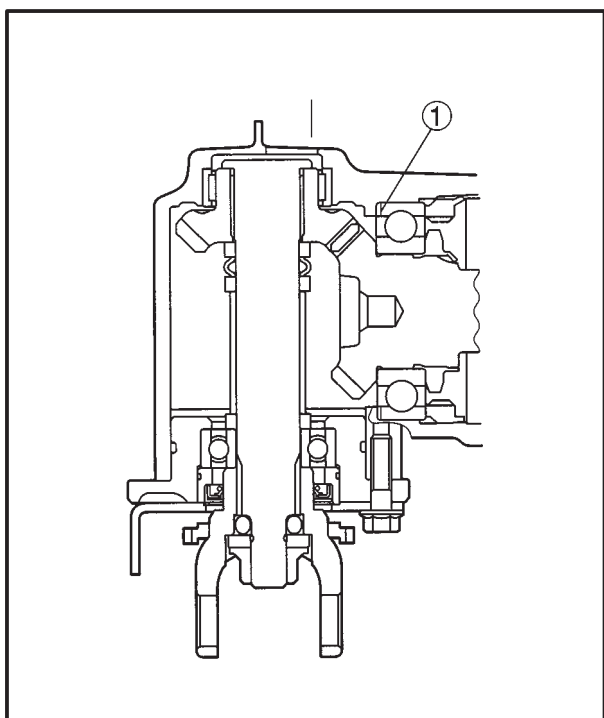
- Crankcase
- Middle drive shaft

## 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.



- 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.
- To find middle drive gear shim thickness "A", use the following formula.

**Middle drive gear shim thickness**

$$\text{"A"} = \text{(a)} - \text{(c)}$$

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 GEAR

ENG

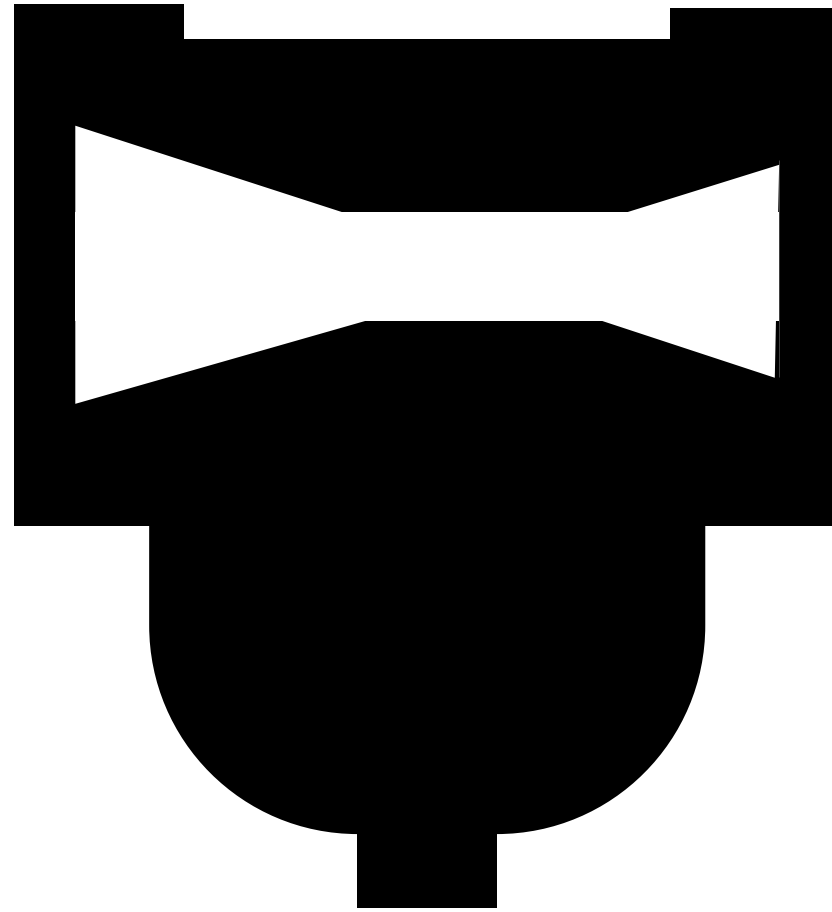


| Hundredths  | Rounded value |
|-------------|---------------|
| 0, 1, 2     | 0             |
| 3, 4, 5, 6, | 5             |
| 7, 8, 9     | 10            |

Shims are supplied in the following thickness.

|                                                                                   |                                |
|-----------------------------------------------------------------------------------|--------------------------------|
|  | Middle drive pinion gear shim: |
| Thickness (mm)                                                                    | 0.10, 0.15, 0.20               |





**CARB**

**5**

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## CHAPTER 5

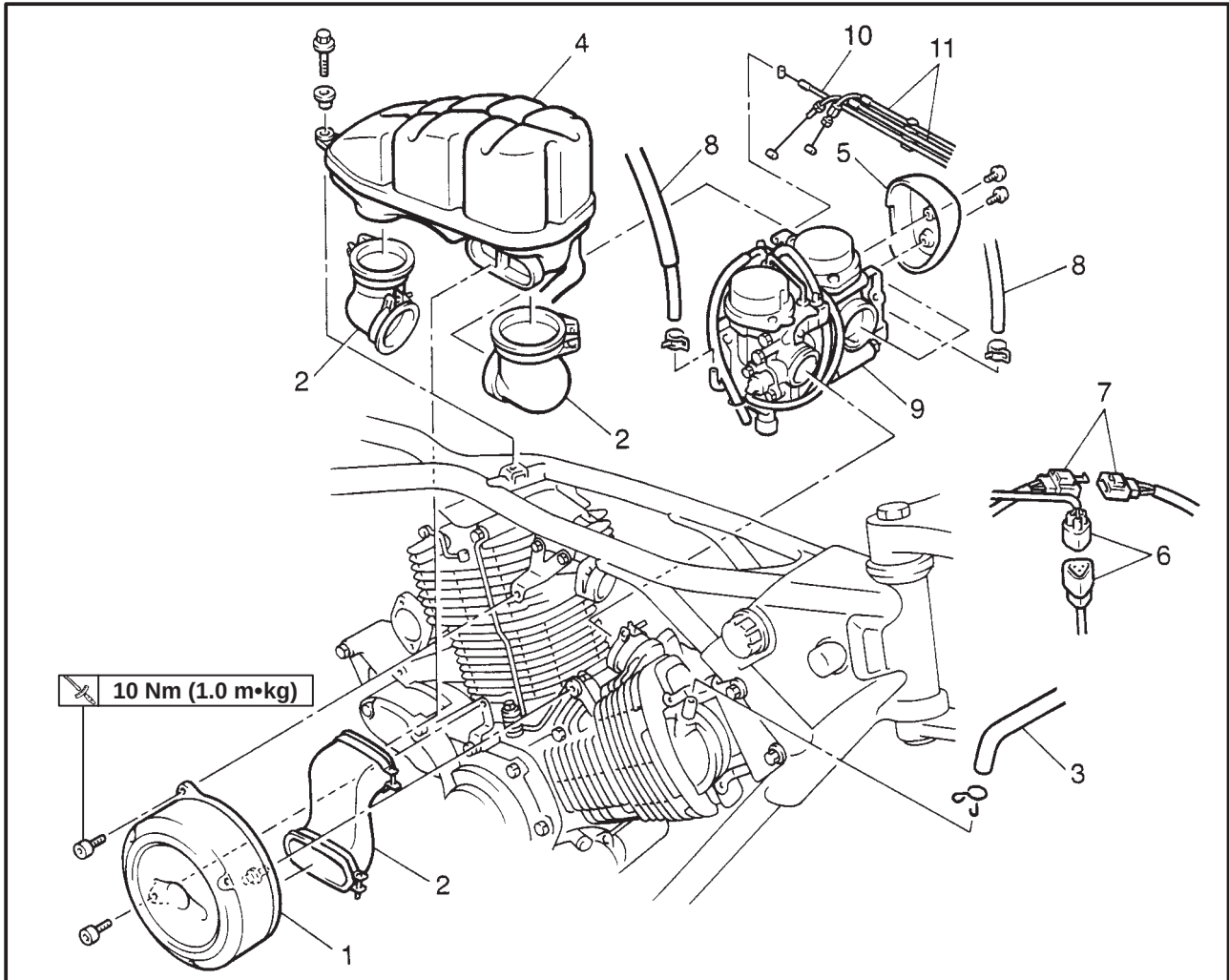
### CARBURETION

|                                                              |      |
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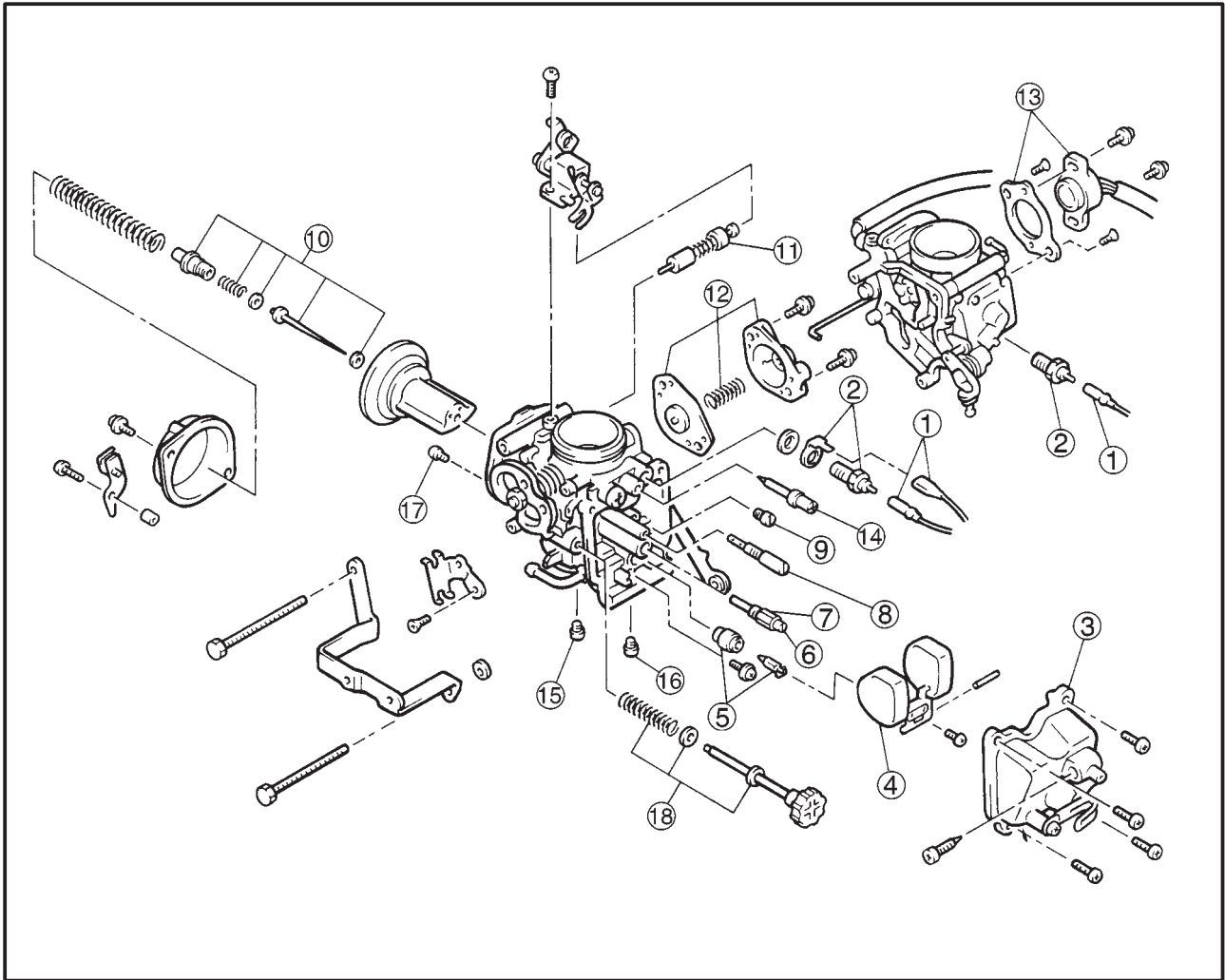


## CARBURETION

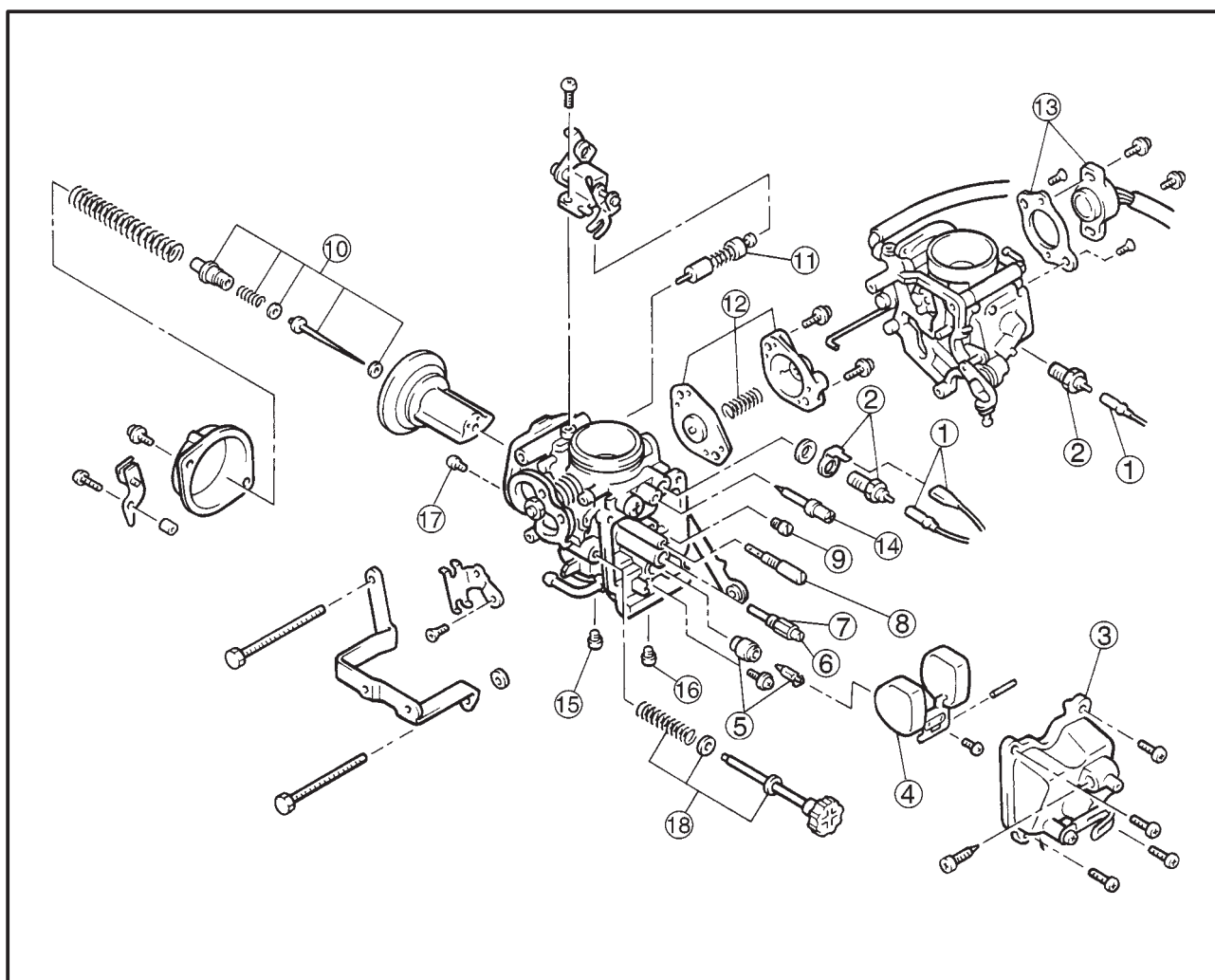
### CARBURETOR



| Order | Job name/Part name              | Q'ty | Remarks                                                                               |
|-------|---------------------------------|------|---------------------------------------------------------------------------------------|
|       | <b>Removing the carburetors</b> |      |                                                                                       |
|       | Fuel tank                       |      | Remove the parts in the order listed. Refer to "FUEL TANK AND SEATS" in CHAPTER 3.    |
| 1     | Air filter case assembly        | 1    |                                                                                       |
| 2     | Air ducts                       | 3    |                                                                                       |
| 3     | Cylinder head breather hose     | 1    | Disconnect                                                                            |
| 4     | Air chamber                     | 1    |                                                                                       |
| 5     | Cover                           | 1    |                                                                                       |
| 6     | Throttle position sensor lead   | 1    | Disconnect                                                                            |
| 7     | Carburetor heater lead          | 1    | Disconnect                                                                            |
| 8     | Fuel hoses                      | 2    | Disconnect                                                                            |
| 9     | Carburetor assembly             | 1    |                                                                                       |
| 10    | Starter cable                   | 1    | <b>NOTE:</b> _____                                                                    |
| 11    | Throttle cables                 | 2    | After removing the carburetor assembly, remove the starter cable and throttle cables. |
|       |                                 |      | For installation, reverse the removal procedure.                                      |

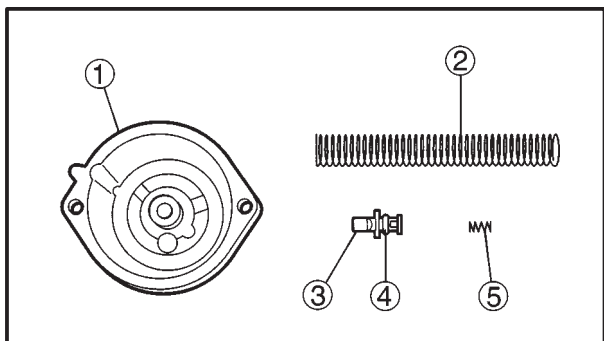


| Order | Job name/Part name                   | Q'ty | Remarks                                                                        |
|-------|--------------------------------------|------|--------------------------------------------------------------------------------|
|       | <b>Disassembling the carburetor.</b> |      | Disassemble the parts in the order listed.                                     |
| ①     | Carburetor heater leads              | 2    | 12V 30W<br><br><br><br><br><br><br><br><br><br>Refer to "CARBURETOR ASSEMBLY". |
| ②     | Carburetor heaters                   | 2    |                                                                                |
| ③     | Float chamber/gasket                 | 1    |                                                                                |
| ④     | Float                                | 1    |                                                                                |
| ⑤     | Needle valve set                     | 1    |                                                                                |
| ⑥     | Main jet                             | 1    |                                                                                |
| ⑦     | Jet holder                           | 1    |                                                                                |
| ⑧     | Pilot jet                            | 1    |                                                                                |
| ⑨     | Starter jet                          | 1    |                                                                                |
| ⑩     | Jet needle set                       | 1    |                                                                                |
| ⑪     | Starter plunger set                  | 1    |                                                                                |

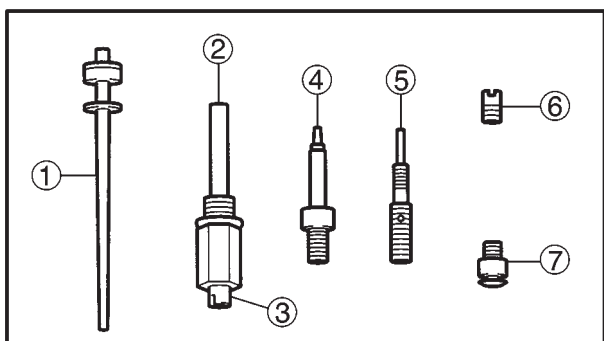


| Order | Job name/Part name       | Q'ty | Remarks                                                               |
|-------|--------------------------|------|-----------------------------------------------------------------------|
| ⑫     | Diaphragm set            | 1    | Refer to "ASSEMBLING THE CARBURETORS".                                |
| ⑬     | Throttle position sensor | 1    | Refer to "CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)". |
| ⑭     | Pilot screw              | 1    |                                                                       |
| ⑮     | Main air jet             | 1    |                                                                       |
| ⑯     | Pilot air jet 1          | 1    |                                                                       |
| ⑰     | Pilot air jet 2          | 1    |                                                                       |
| ⑱     | Throttle stop screw set  | 1    |                                                                       |
|       |                          |      | For assembly, reverse the disassembly procedure.                      |

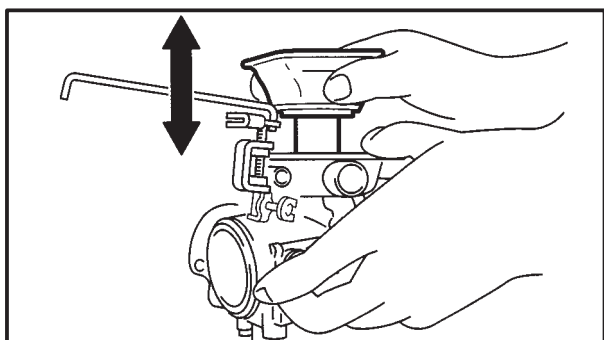




8. Check:
- vacuum chamber cover ①
  - piston valve spring ②
  - plastic cap ③
  - O-ring ④
  - spring ⑤
- Cracks/damage → Replace.



9. Check:
- jet needle ①
  - needle jet ②
  - main jet ③
  - pilot screw ④
  - pilot jet ⑤
  - main air jet ⑥
  - starter jet ⑦
- 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.



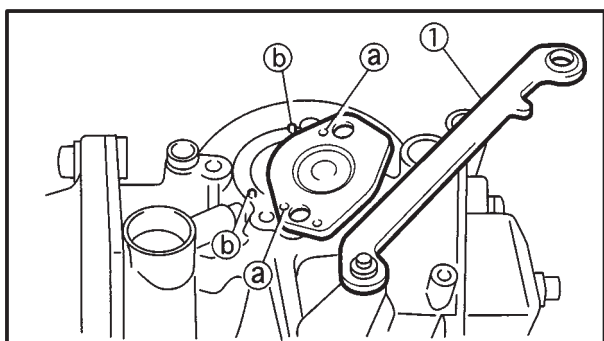
EB600042

## 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 (a) on the coasting enricher diaphragm with the projections (b) 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.

EB600051

## INSTALLING THE CARBURETORS

#### 1. Adjust:

- carburetor synchronization  
Refer to "SYNCHRONIZING THE CARBURETORS" in chapter 3.

#### 2. Adjust:

- engine idling speed



**Engine idling speed**  
950 ~ 1,050 r/min

Refer to "ADJUSTING THE ENGINE IDLING SPEED" in chapter 3.

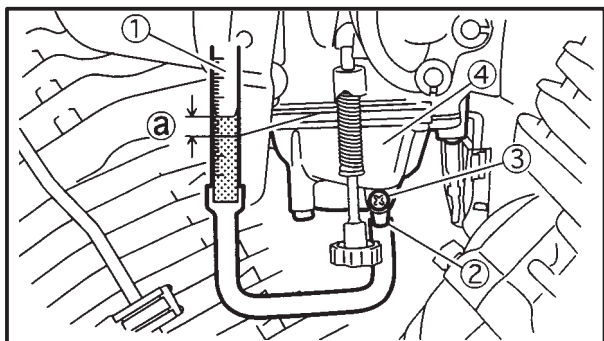
#### 3. Adjust:

- throttle cable free play



**Throttle cable free play**  
(at the flange of the throttle grip)  
4 ~ 6 mm

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.



EB600063

### MEASURING AND ADJUSTING THE FUEL LEVEL

#### 1. Measure:

- fuel level ①

Out of specification → Adjust.



**Fuel level (above the line on the float chamber)**  
4 ~ 5 mm



- 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**  
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 ①.

#### NOTE:

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

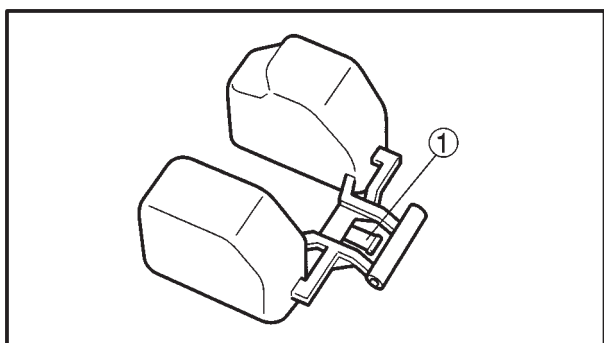


#### 2. Adjust:

- fuel level



- 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.







Remove the pocket tester leads and connect the throttle position sensor coupler.





EB601000

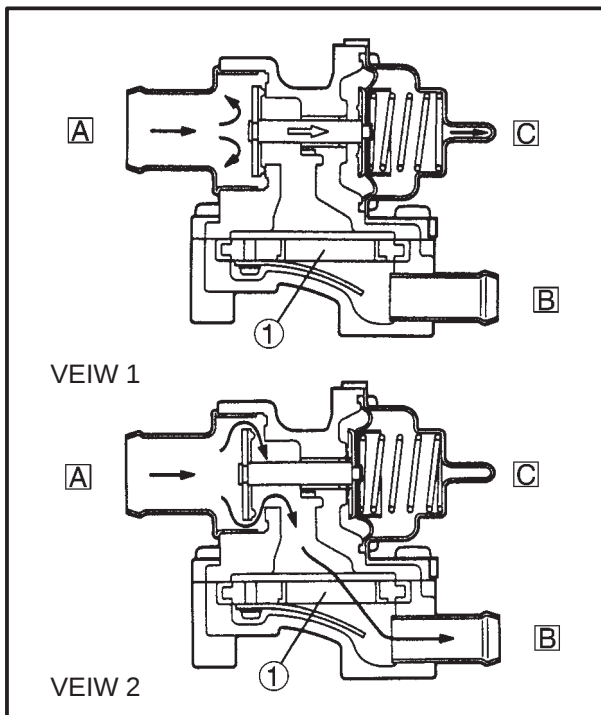
## AIR INDUCTION SYSTEM (AIS)

### 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° to 700°C.



### 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.

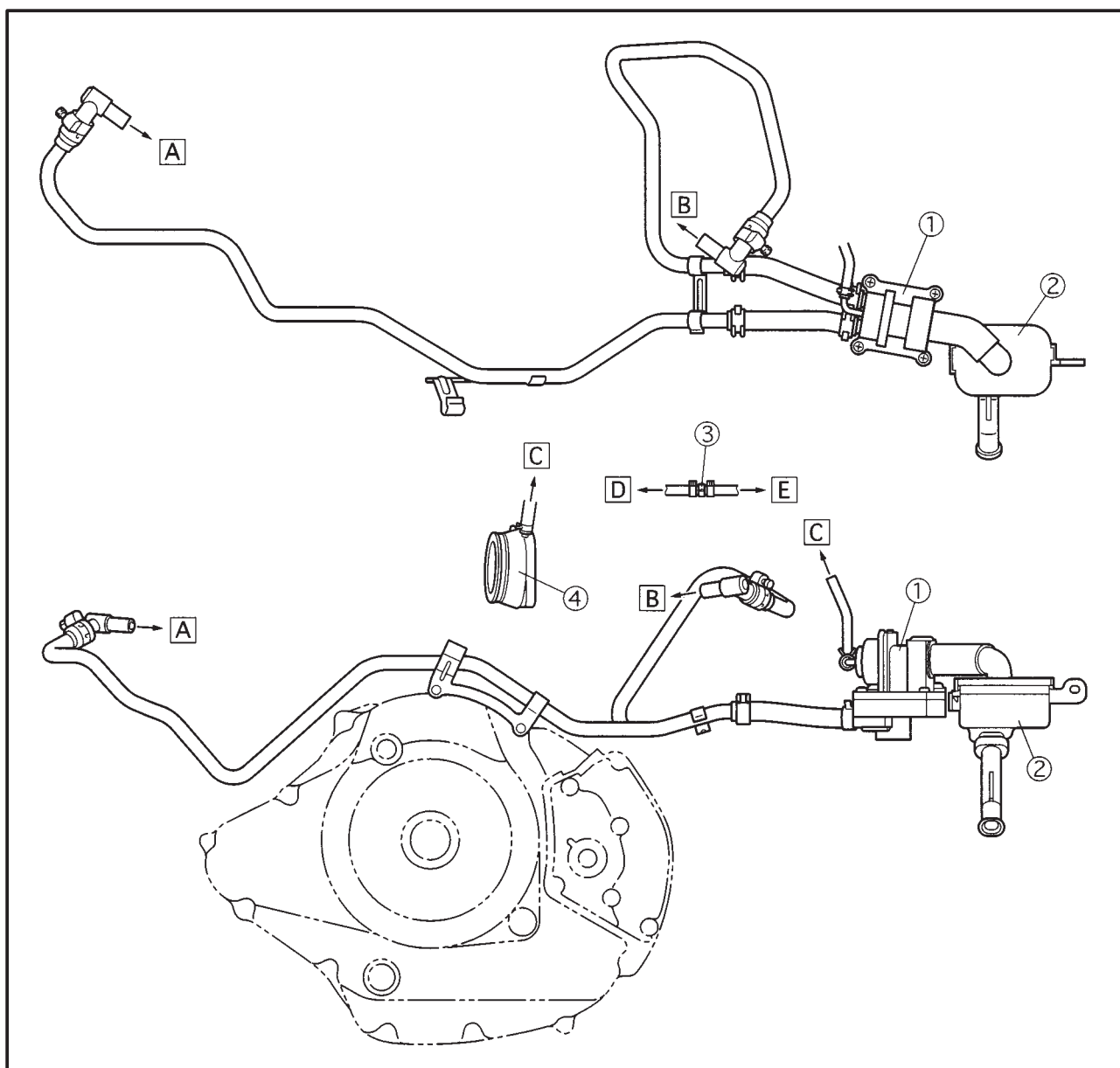
#### VIEW 1. (NO FLOW)

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



- ① Reed valve
- ② Air filter
- ③ Orifice
- ④ Carburetor joint (near cylinder)
- A To the front cylinder head
- B To the rear cylinder head
- C To the orifice
- D To the carburetor joint (rear cylinder)
- E To the AIS valve

### AIR INDUCTION SYSTEM INSPECTION

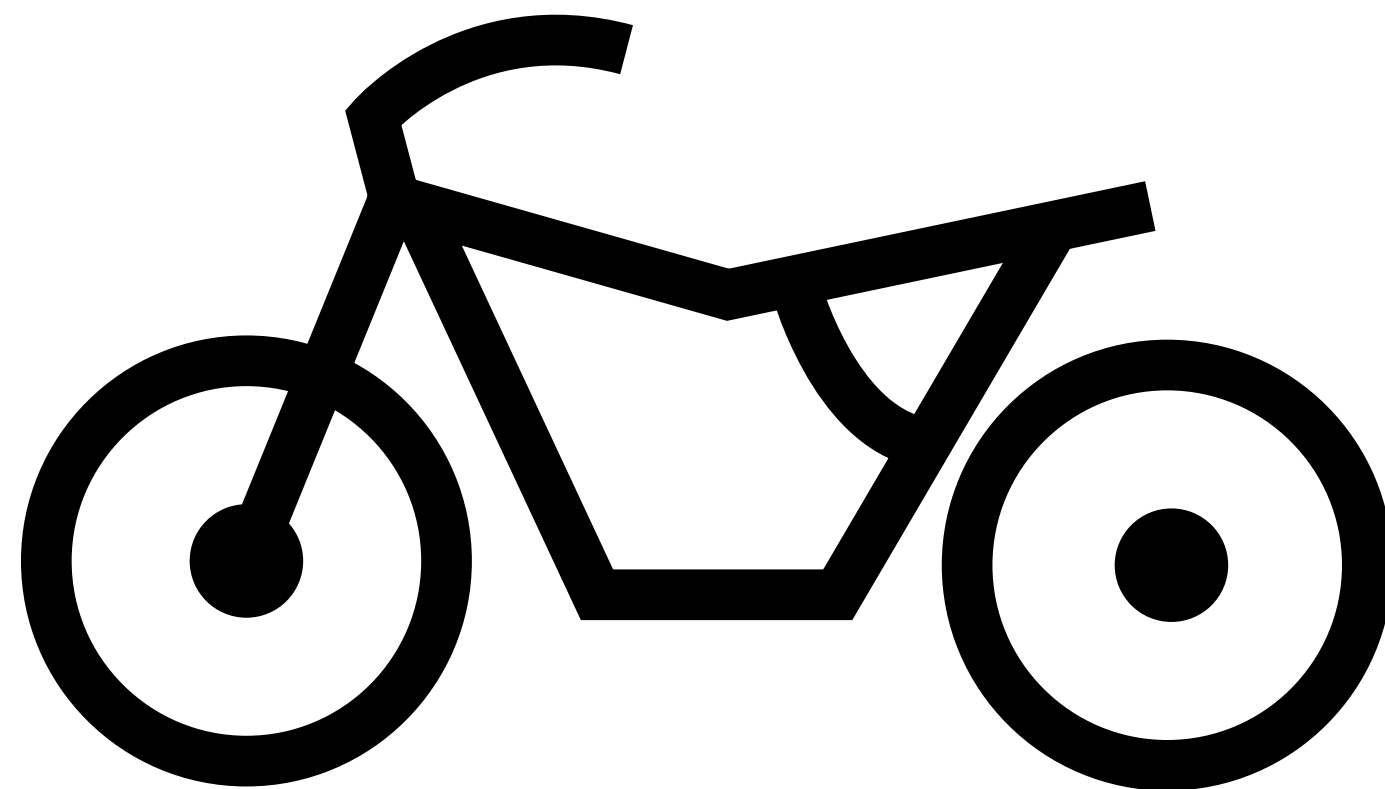
#### 1. Inspect:

- 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.





**CHAS**

**6**



## CHAPTER 6

### CHASSIS

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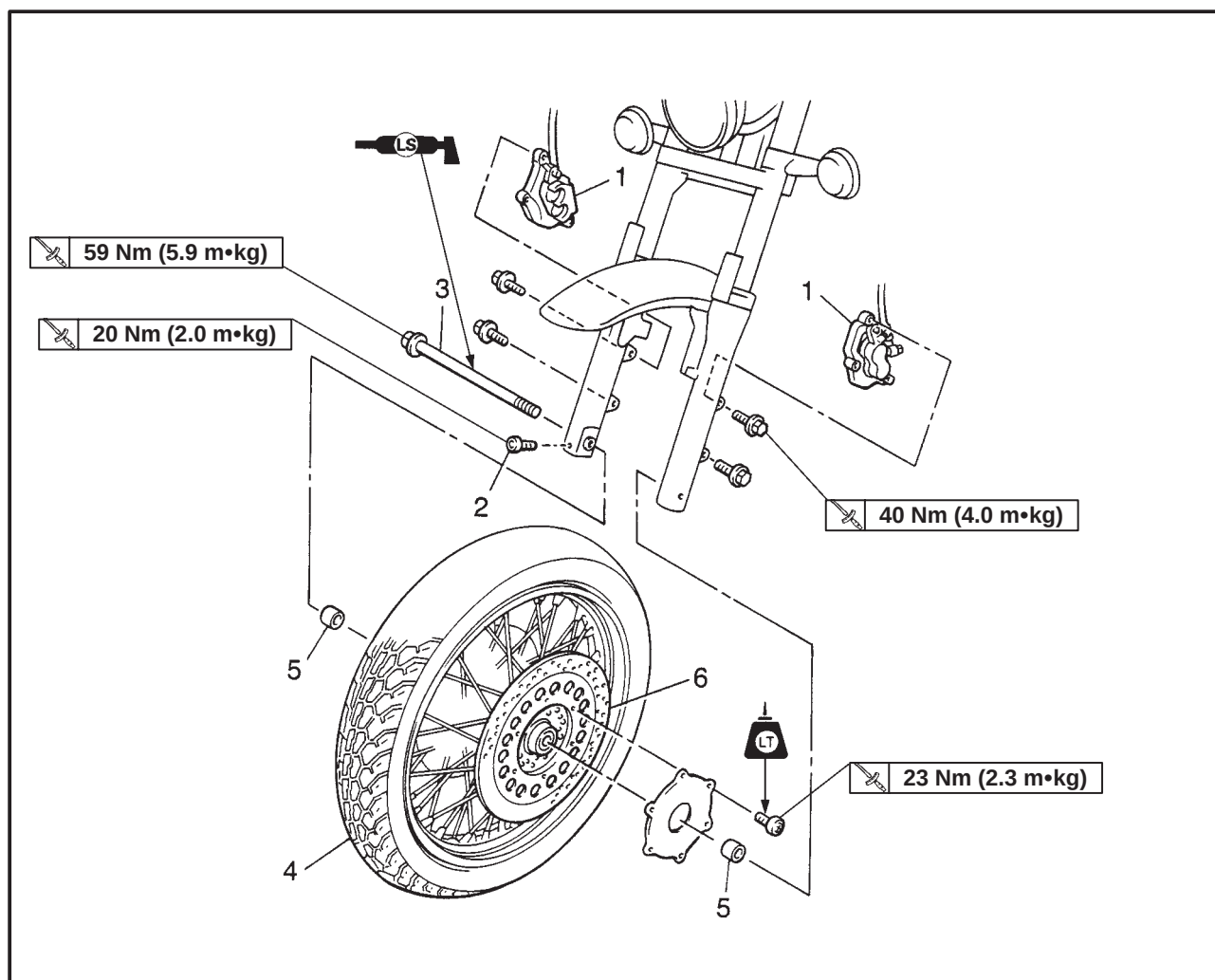


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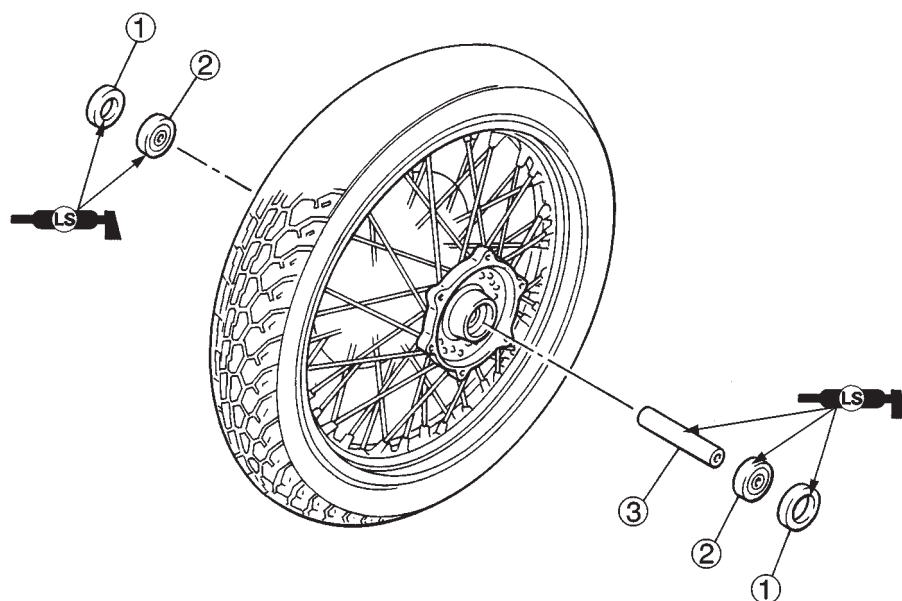
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## CHASSIS

## FRONT WHEEL AND BRAKE DISCS



| Order | Job name/Part name                              | Q'ty | Remarks                                                                                    |
|-------|-------------------------------------------------|------|--------------------------------------------------------------------------------------------|
|       | <b>Removing the front wheel and brake discs</b> |      | Remove the parts in the order listed. Stand the motorcycle on a level surface.             |
|       |                                                 |      | <b>⚠ WARNING</b> Securely support the motorcycle so there is no danger of it falling over. |
| 1     | Brake calipers                                  | 2    | Refer to "REMOVING/INSTALLING THE FRONT WHEEL".                                            |
| 2     | Front wheel axle pinch bolt                     | 1    |                                                                                            |
| 3     | Front wheel axle                                | 1    |                                                                                            |
| 4     | Front wheel assembly                            | 1    |                                                                                            |
| 5     | Collars                                         | 2    | Refer to "INSTALLING THE FRONT WHEEL".                                                     |
| 6     | Brake discs                                     | 2    |                                                                                            |
|       |                                                 |      | For installation, reverse the removal procedure.                                           |



| Order | Job name/Part name                   | Q'ty | Remarks                                          |
|-------|--------------------------------------|------|--------------------------------------------------|
| ①     | <b>Disassembling the front wheel</b> |      | Disassemble the parts in the order listed.       |
| ②     | Oil seals                            | 2    |                                                  |
| ③     | Bearings                             | 2    |                                                  |
|       | Collar                               | 1    |                                                  |
|       |                                      |      | For assembly, reverse the disassembly procedure. |

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## REMOVING THE FRONT WHEEL

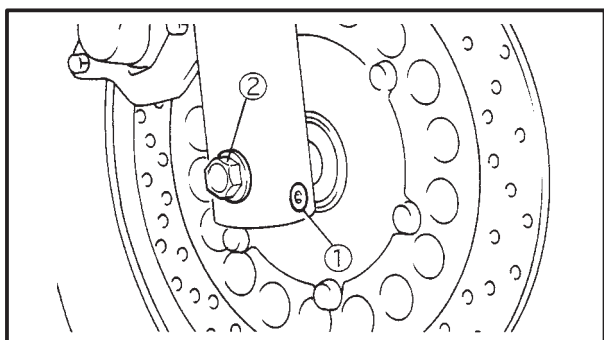
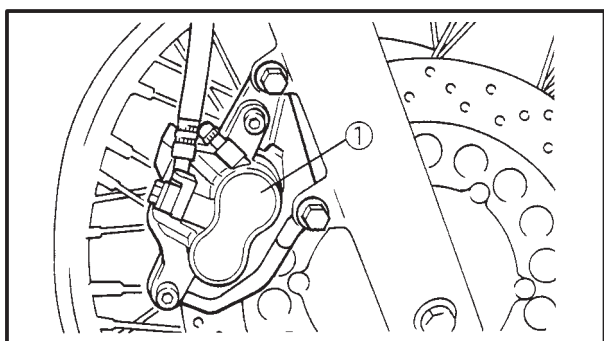
1. Stand the motorcycle on a level surface.

### **⚠ 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:

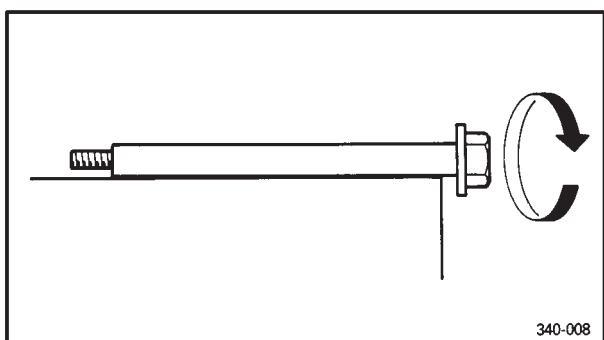
- pinch bolt (front wheel axle) ①
- front wheel axle ②

4. Elevate:

- front wheel

### NOTE:

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



340-008

EAS00526

## 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.

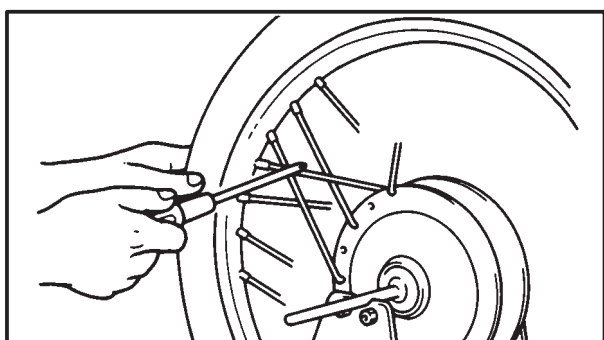
3. Check:

- 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.

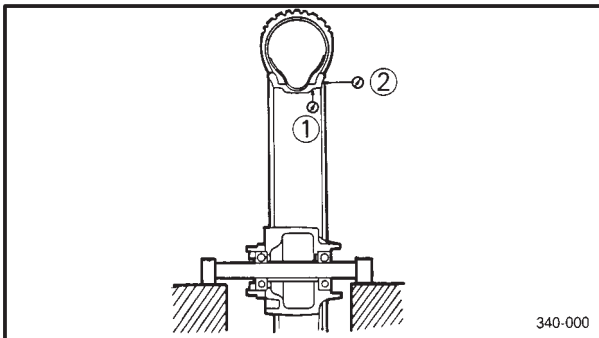
4. Tighten:

- spokes

3 Nm (0.3m•kg)

**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**  
**Front wheel lateral runout limit**  
**0.5 mm**

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 should be traveled at normal speed before any highspeed riding is done.

7. Check

- wheel bearings

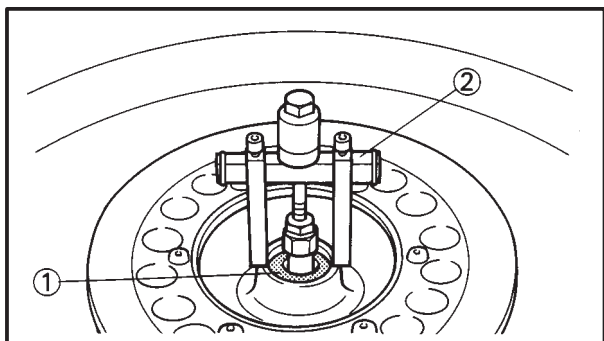
Front wheel turns roughly or is loose → Replace the wheel bearings.

- oil seals

Damage/wear → Replace.

8. Replace:

- wheel bearings (New)
- oil seals (New)



- 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.

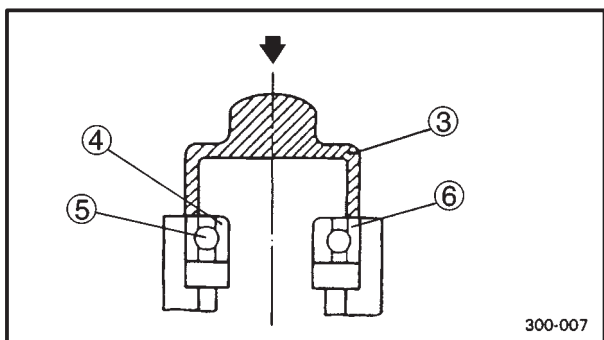
- c. Remove the wheel bearings with a general bearing puller ②.
- d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

**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.



300-007

EAS00531

## CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

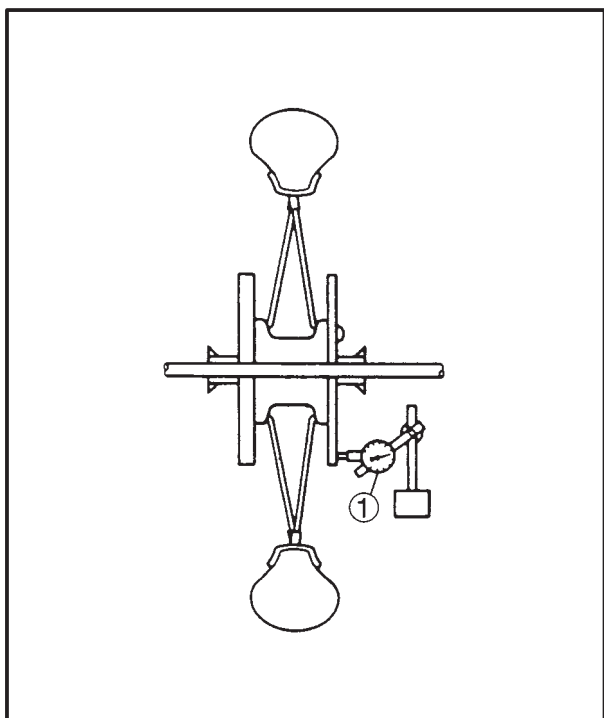
1. Check:
  - brake disc
  - Damage/galling → Replace.
2. Measure:
  - brake disc deflection ①
  - Out of specification → Correct the brake disc deflection or replace the brake disc.



**Brake disc deflection limit (maximum)**

Front: 0.15 mm

Rear: 0.15 mm



- 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.





EAS00544

## INSTALLING THE FRONT WHEEL

The following procedure applies to both brake discs.

1. Lubricate:
  - wheel axle
  - oil seallips

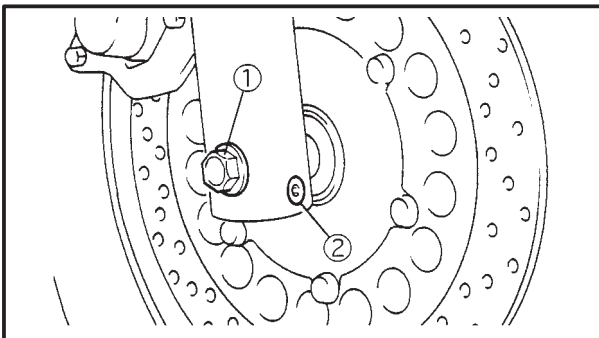
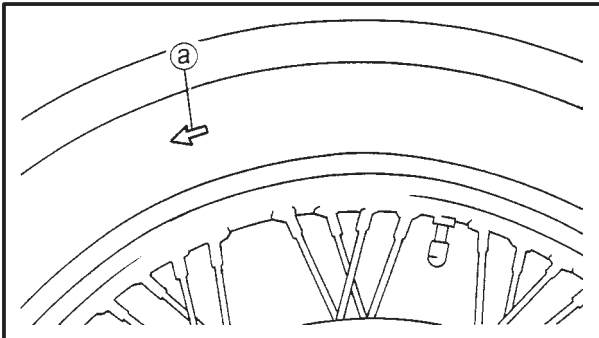


**Recommended lubricant**  
**Lithium soap base grease**

2. Install:
  - front wheel assembly

### NOTE:

The arrow mark (a) on the tire must point in the direction of the wheel.



3. Tighten:

- wheel axle ①
- wheel axle pinch bolt ②

59 Nm (5.9 m•kg)

20 Nm (2.0 m•kg)

### 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

40 Nm (4.0 m•kg)



### WARNING

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



EAS00549

## ADJUSTING THE FRONT WHEEL STATIC BALANCE

### NOTE:

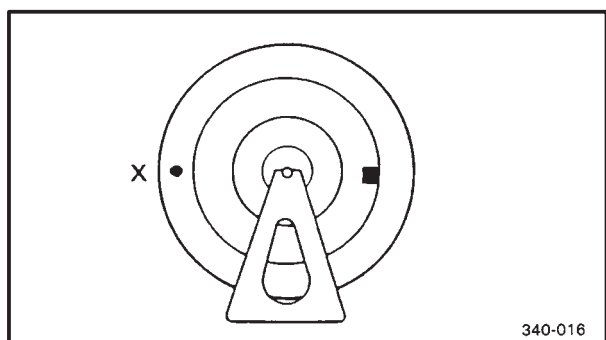
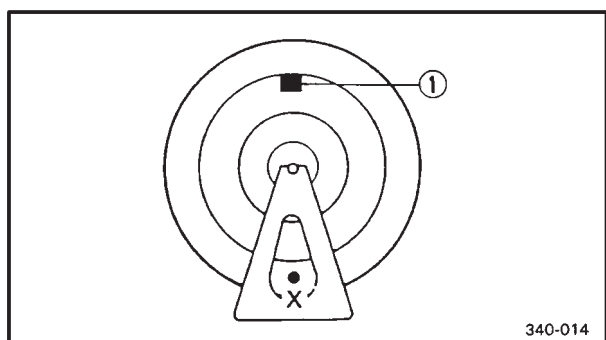
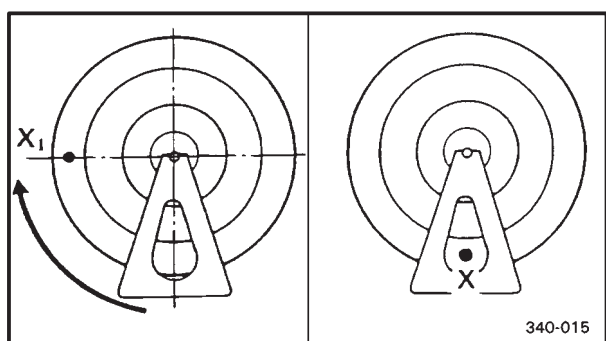
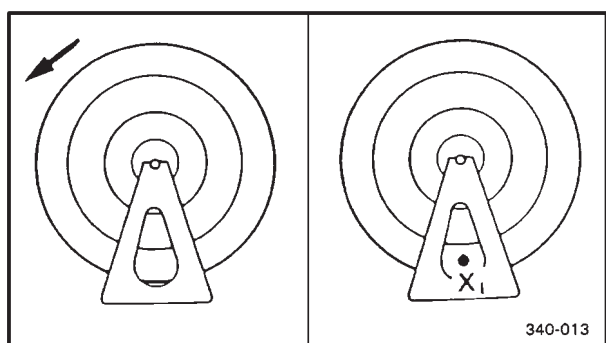
- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake discs installed.

### 1. Remove:

- balancing weight (-s)

### NOTE:

Place the front wheel on a suitable balancing stand.



### 2. Find:

- front wheel's heavy spot

- Spin the front wheel.
- When the front wheel stops, put an "X<sub>1</sub>" mark at the bottom of the wheel.
- Turn the front wheel 90° so that the "X<sub>1</sub>" mark is positioned as shown.
- Release the front wheel.
- When the wheel stops, put an "X<sub>2</sub>" mark at the bottom of the wheel.
- Repeat steps (b) through (d) several times until all the marks come to rest at the same spot.
- The spot where all the marks come to rest is the front wheel's heavy spot "X".

### 3. Adjust:

- front wheel static balance

- Install a balancing weight ① onto the rim exactly opposite the heavy spot "X".

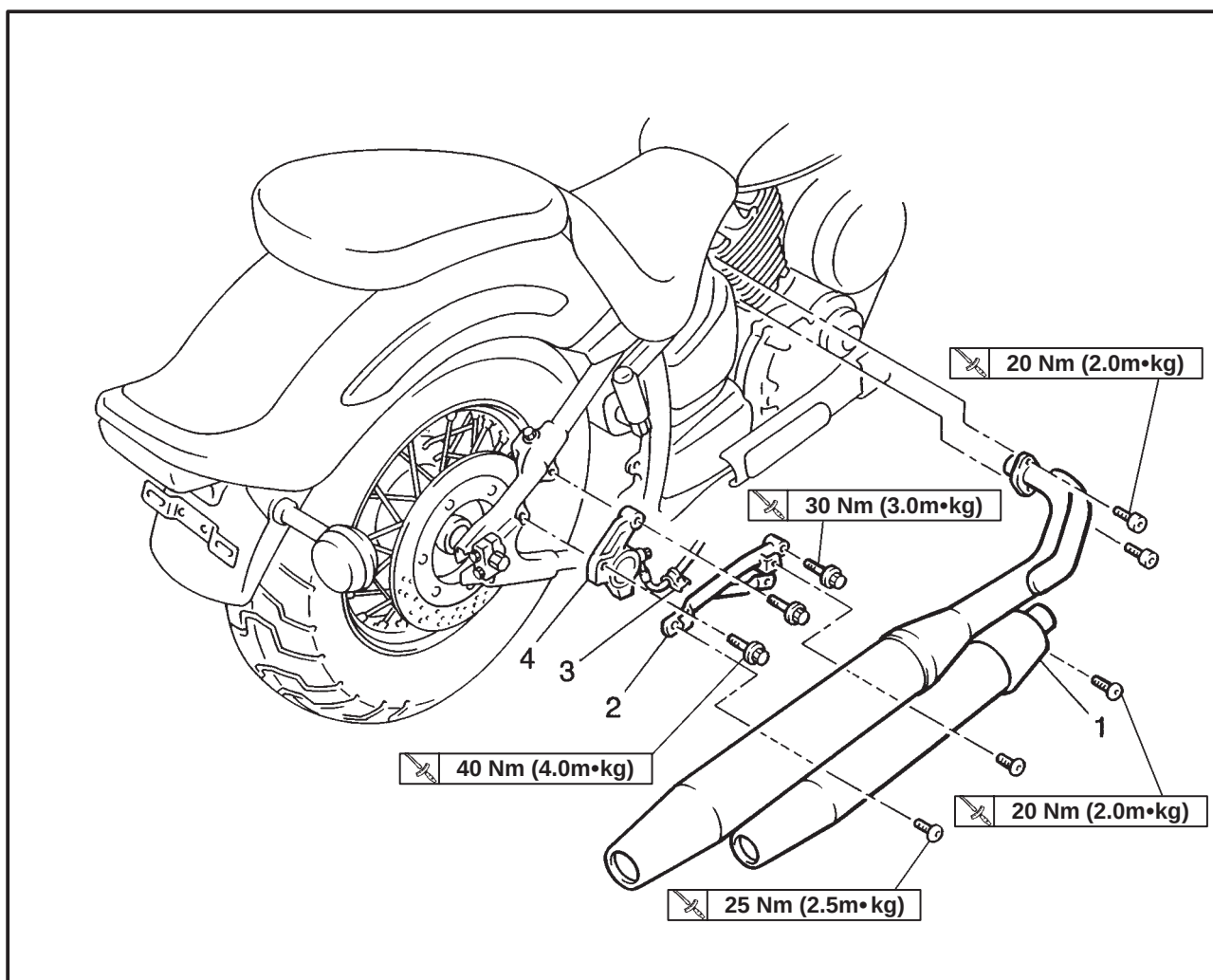
### NOTE:

Start with the lightest weight.

- Turn the front wheel 90° so that the heavy spot is positioned as shown.
- If the heavy spot does not stay in that position, install a heavier weight.
- Repeat steps (b) and (c) until the front wheel is balanced.

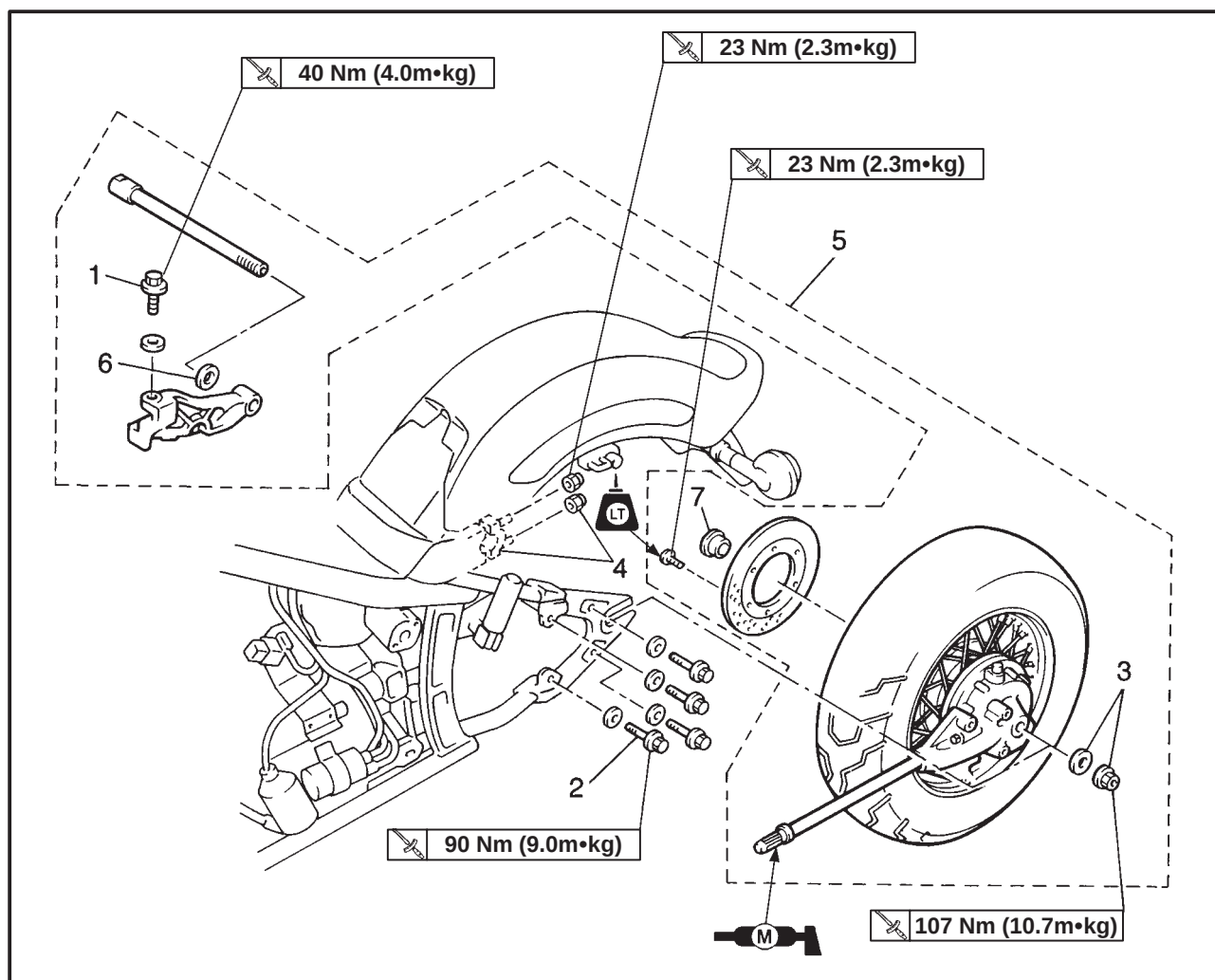


## REAR WHEEL AND BRAKE DISC MUFFLER AND BRAKE CALIPER

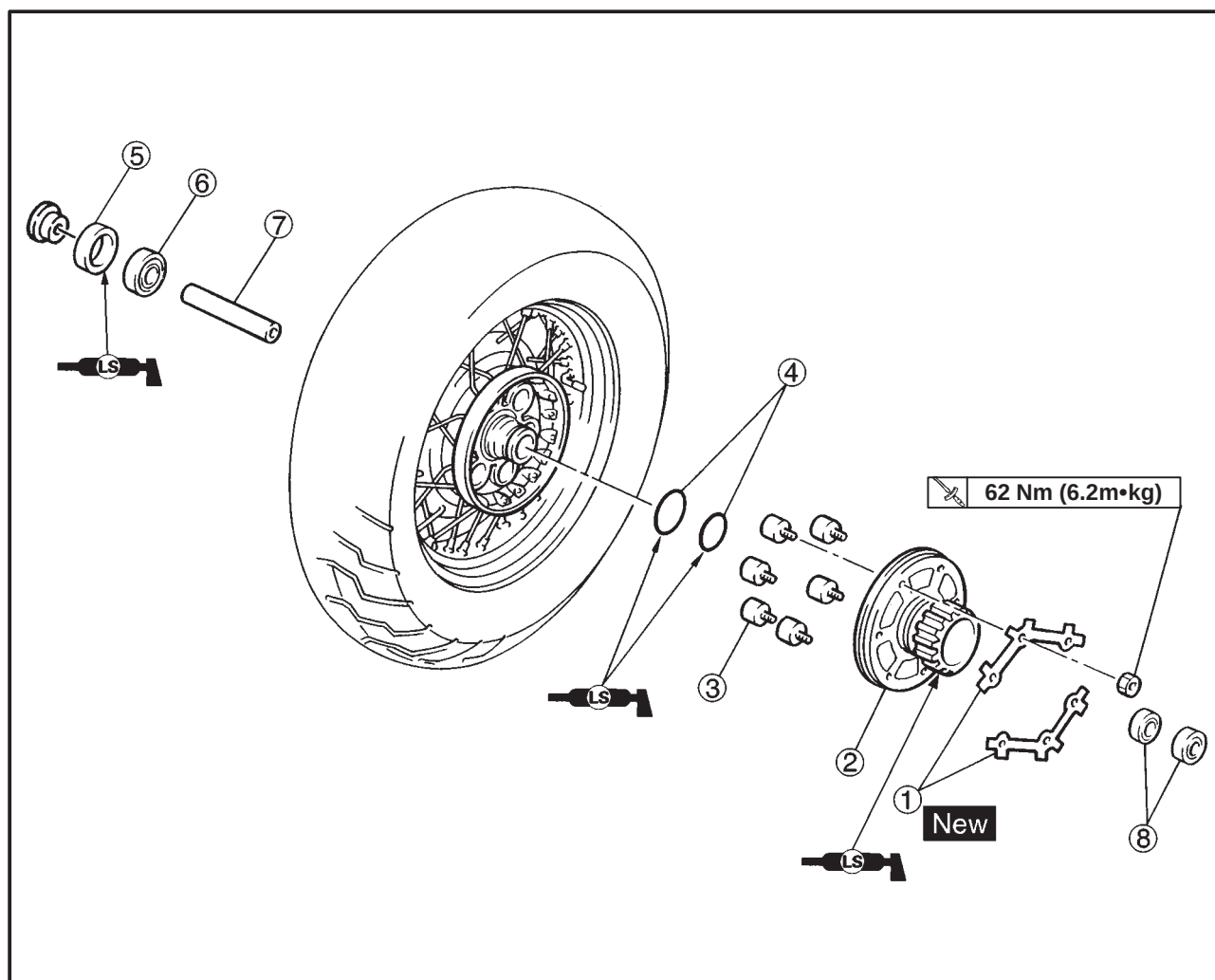


| Order | Job name/Part name                            | Q'ty | Remarks                                                                              |
|-------|-----------------------------------------------|------|--------------------------------------------------------------------------------------|
|       | <b>Removing the muffler and brake caliper</b> |      | Remove the parts in the order listed.                                                |
| 1     | Muffler                                       | 1    |                                                                                      |
| 2     | Muffler stay                                  | 1    |                                                                                      |
| 3     | Brake hose holder                             | 1    |                                                                                      |
| 4     | Brake caliper                                 | 1    | Refer to "REMOVING THE REAR WHEEL". For installation, reverse the removal procedure. |

## REAR WHEEL



| Order | Job name/Part name             | Q'ty | Remarks                                                                          |
|-------|--------------------------------|------|----------------------------------------------------------------------------------|
|       | <b>Removing the rear wheel</b> |      | Remove the parts in the order listed.                                            |
|       |                                |      | <b>⚠ WARNING</b>                                                                 |
|       |                                |      | <b>Securely support the motorcycle so there is no danger of it falling over.</b> |
|       | Final gear oil                 |      | Drain                                                                            |
|       | Fuel tank and seats            |      | Refer to "FINAL GEAR OIL REPLACEMENT" in CHAPTER 3.                              |
|       | Rear fender assembly           |      | Refer to "FUEL TANK AND SEATS" in CHAPTER 3.                                     |
| 1     | Brake caliper bracket bolt     | 1    | Loosen                                                                           |
| 2     | Bolts                          | 4    |                                                                                  |
| 3     | Rear axle nut/washer           | 1/1  |                                                                                  |
| 4     | Rear axle end nuts/axle holder | 2/1  | Refer to "REMOVING/INSTALLING THE REAR WHEEL".                                   |
| 5     | Rear wheel assembly            | 1    |                                                                                  |
| 6     | Washer                         | 1    |                                                                                  |
| 7     | Collar                         | 1    |                                                                                  |
|       |                                |      | For installation, reverse the removal procedure.                                 |



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



EAS00562

### REMOVING THE REAR WHEEL

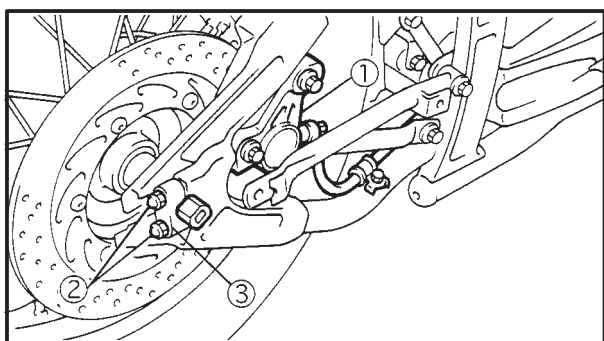
1. Stand the motorcycle on a level surface.

#### **⚠ 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 ①
  - 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 ②
6. Remove:
  - rear axle holder ③
7. Remove:
  - rear wheel

EAS00566

### 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" and "CHECKING THE WHEELS" 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".





- f. Tighten the rear axle holder with specified torque.



**Rear axle end nut**  
**23 Nm (2.3 m•kg)**

- g. Tighten the rear brake caliper bracket bolt with specified tightening torque.



**Brake caliper bracket bolt**  
**40 Nm (4.0 m•kg)**

- 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)**



EAS00575

## ADJUSTING THE REAR WHEEL STATIC BALANCE

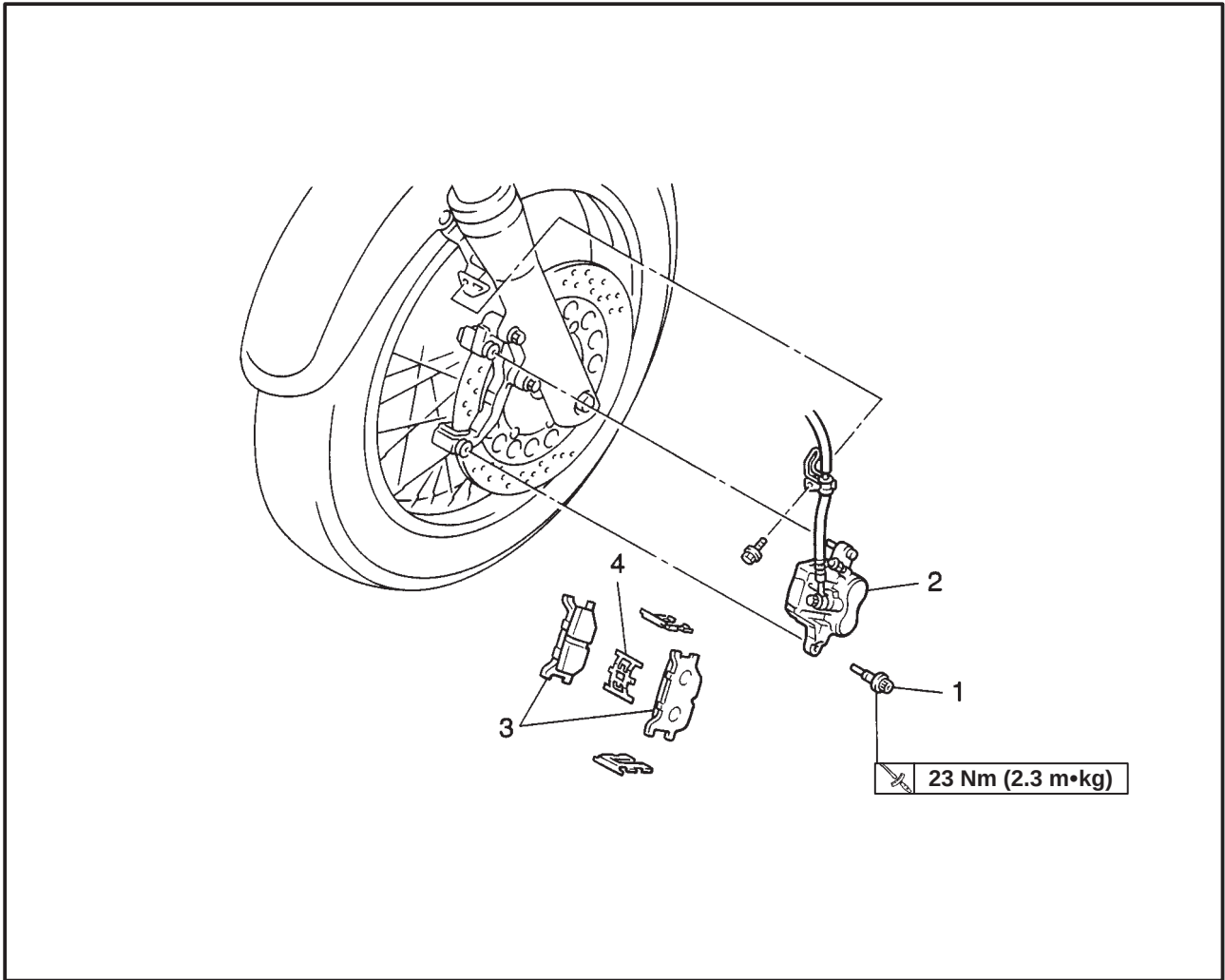
### NOTE:

- 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 DISCS".

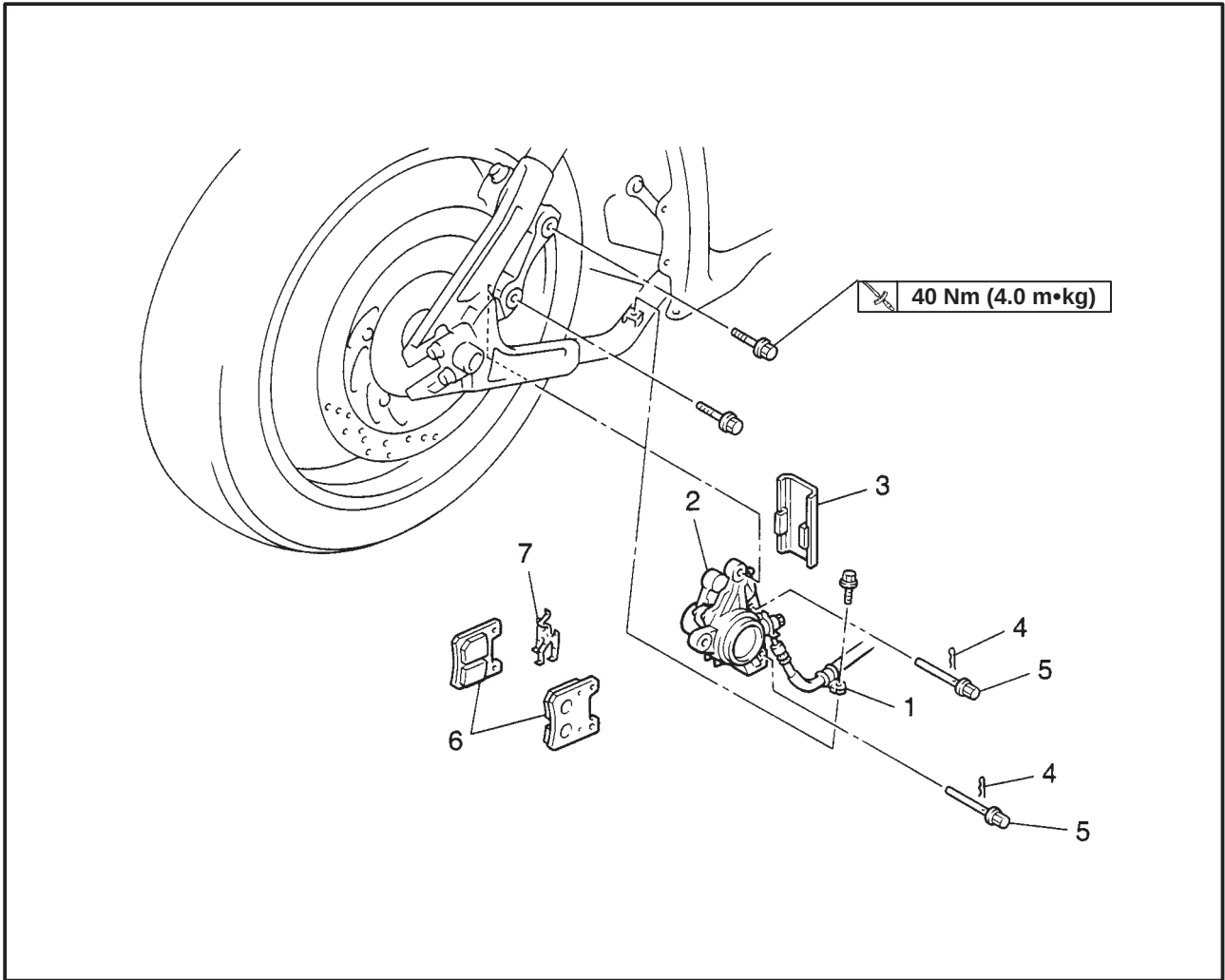
FRONT AND REAR BRAKES  
FRONT BRAKE PADS



| Order | Job name/Part name                   | Q'ty | Remarks                                                                                                                                         |
|-------|--------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the front brake pads</b> |      |                                                                                                                                                 |
| 1     | Retaining bolt                       | 1    | Remove the parts in the order listed.<br><br>Refer to "REPLACING THE FRONT BRAKE PADS".<br><br>For installation, reverse the removal procedure. |
| 2     | Brake caliper                        | 1    |                                                                                                                                                 |
| 3     | Brake pads                           | 2    |                                                                                                                                                 |
| 4     | Pad spring                           | 1    |                                                                                                                                                 |

EAS00578

REAR BRAKE PADS



| Order | Job name/Part name                  | Q'ty | Remarks                                                                        |
|-------|-------------------------------------|------|--------------------------------------------------------------------------------|
|       | <b>Removing the rear brake pads</b> |      |                                                                                |
|       | Muffler                             |      | Remove the parts in the order listed.<br>Refer to "REAR WHEEL AND BRAKE DISC". |
|       | Muffler stay                        |      |                                                                                |
| 1     | Brake hose holder                   | 1    | Refer to "REPLACING THE REAR BRAKE PADS".                                      |
| 2     | Caliper                             | 1    |                                                                                |
| 3     | Cover                               | 1    |                                                                                |
| 4     | Clips                               | 2    |                                                                                |
| 5     | Pad pins                            | 2    |                                                                                |
| 7     | Pad spring                          | 1    |                                                                                |
| 6     | Brake pads                          | 2    | For installation, reverse the removal procedure.                               |



EAS00579

### 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.

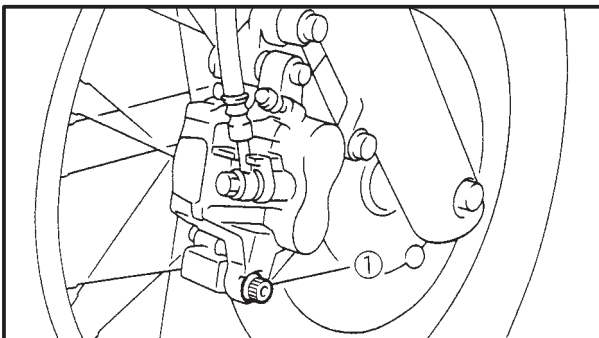
EAS00582

### REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

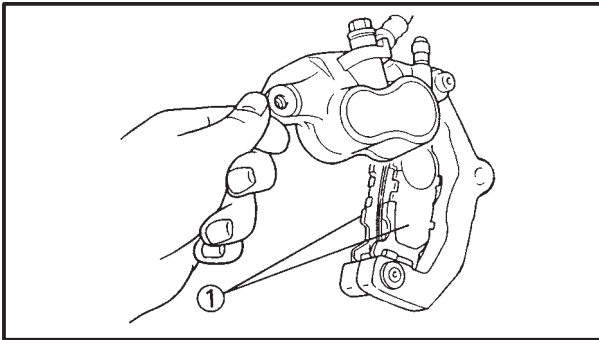
#### NOTE:

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

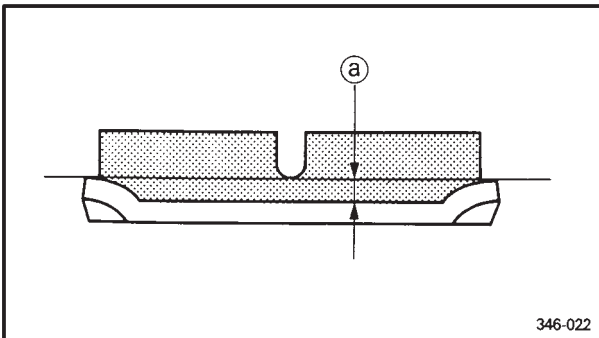


#### 1. Remove:

- brake hose holder
- retaining bolt 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.

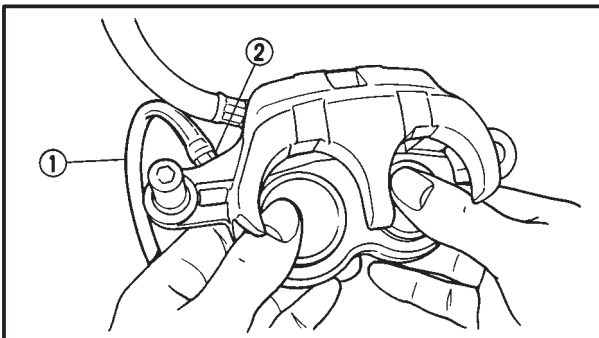


**Brake pad wear limit**  
**0.8 mm**

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.



- 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.



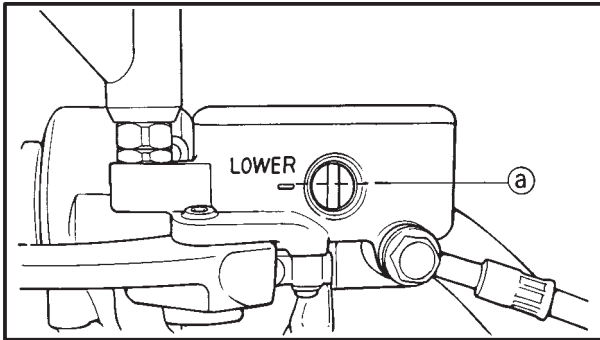
**Bleed screw**  
**6 Nm (0.6 m•kg)**

- d. Install new brake pad shims onto the new brake pads.
- e. Install new brake pads and a new brake pad spring.

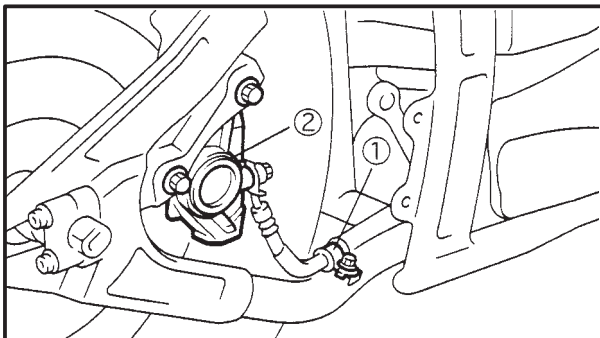
5. Install:
  - brake caliper
  - retaining bolt



**23 Nm (2.3 m•kg)**



6. 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.
7. Check:
  - brake lever operation  
Soft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



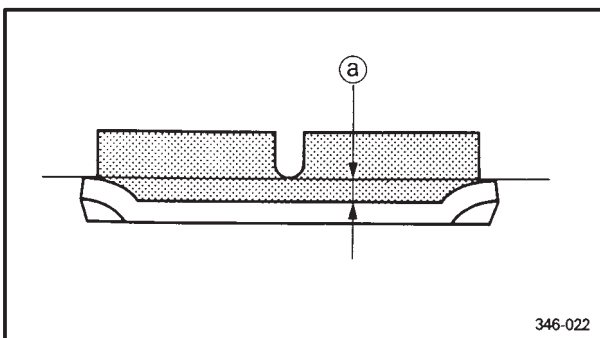
EAS00583

## 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 (a)  
Out of specification → Replace the brake pads as a set.



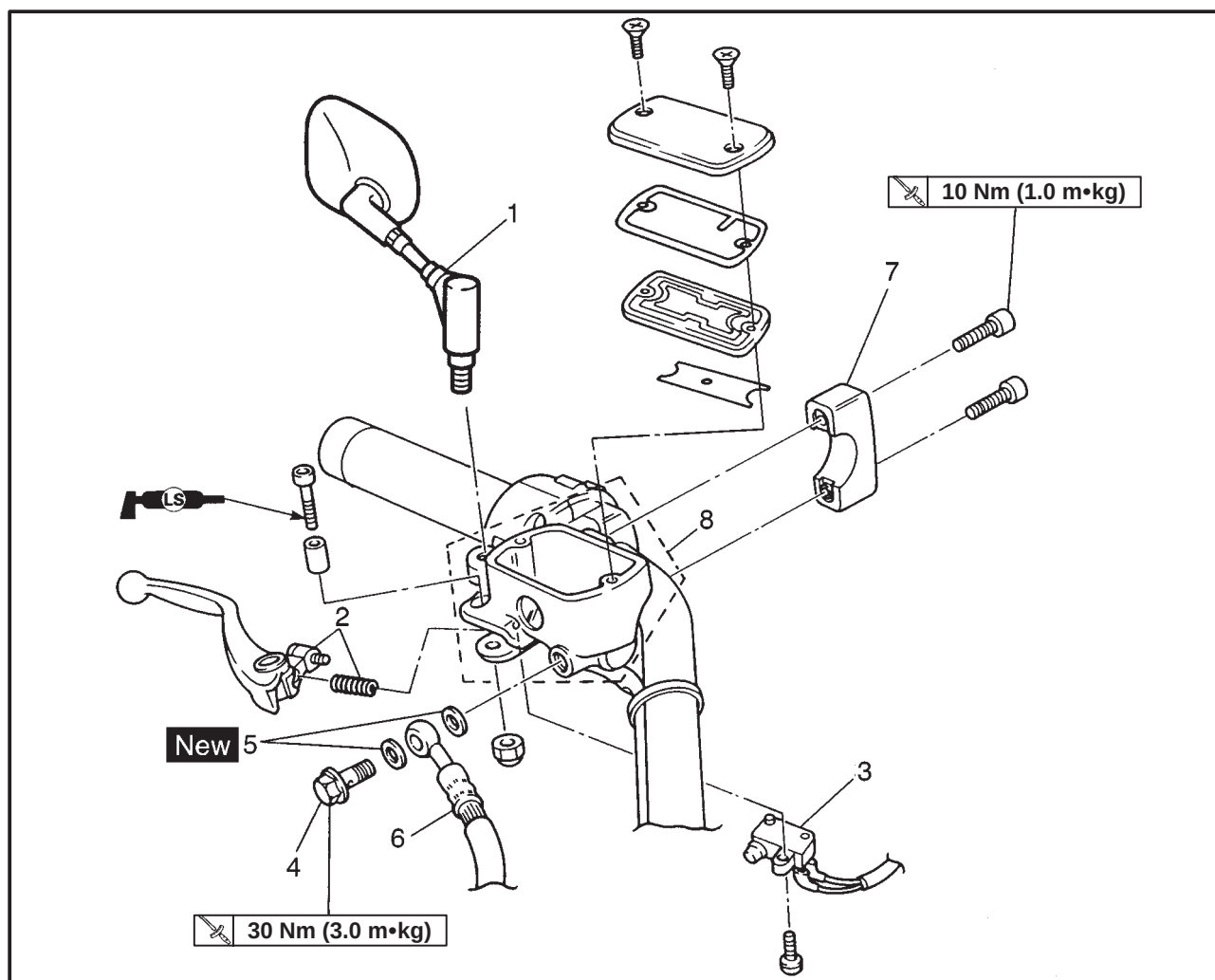
346-022



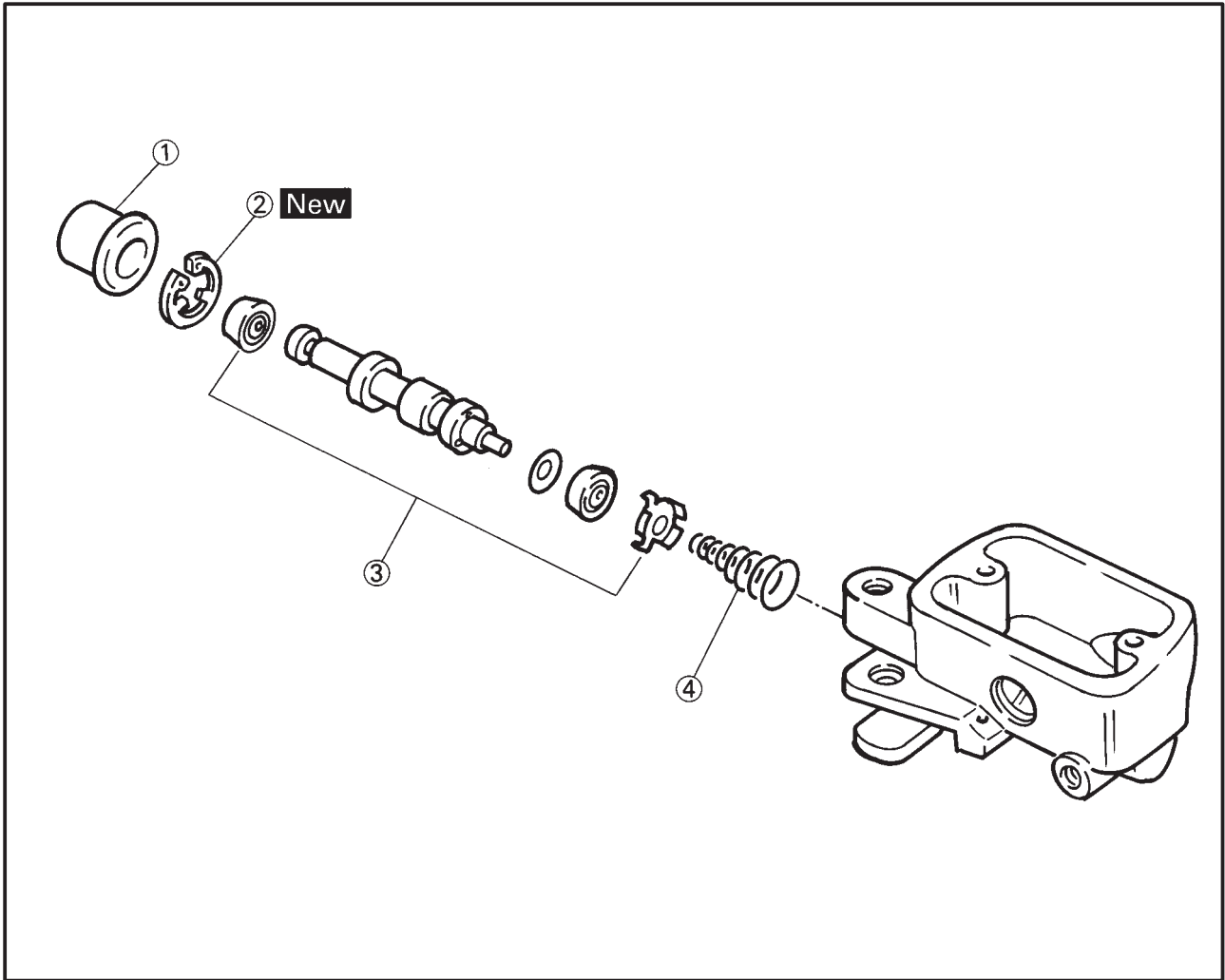
**Brake pad wear limit**  
**0.5 mm**



## FRONT BRAKE MASTER CYLINDER



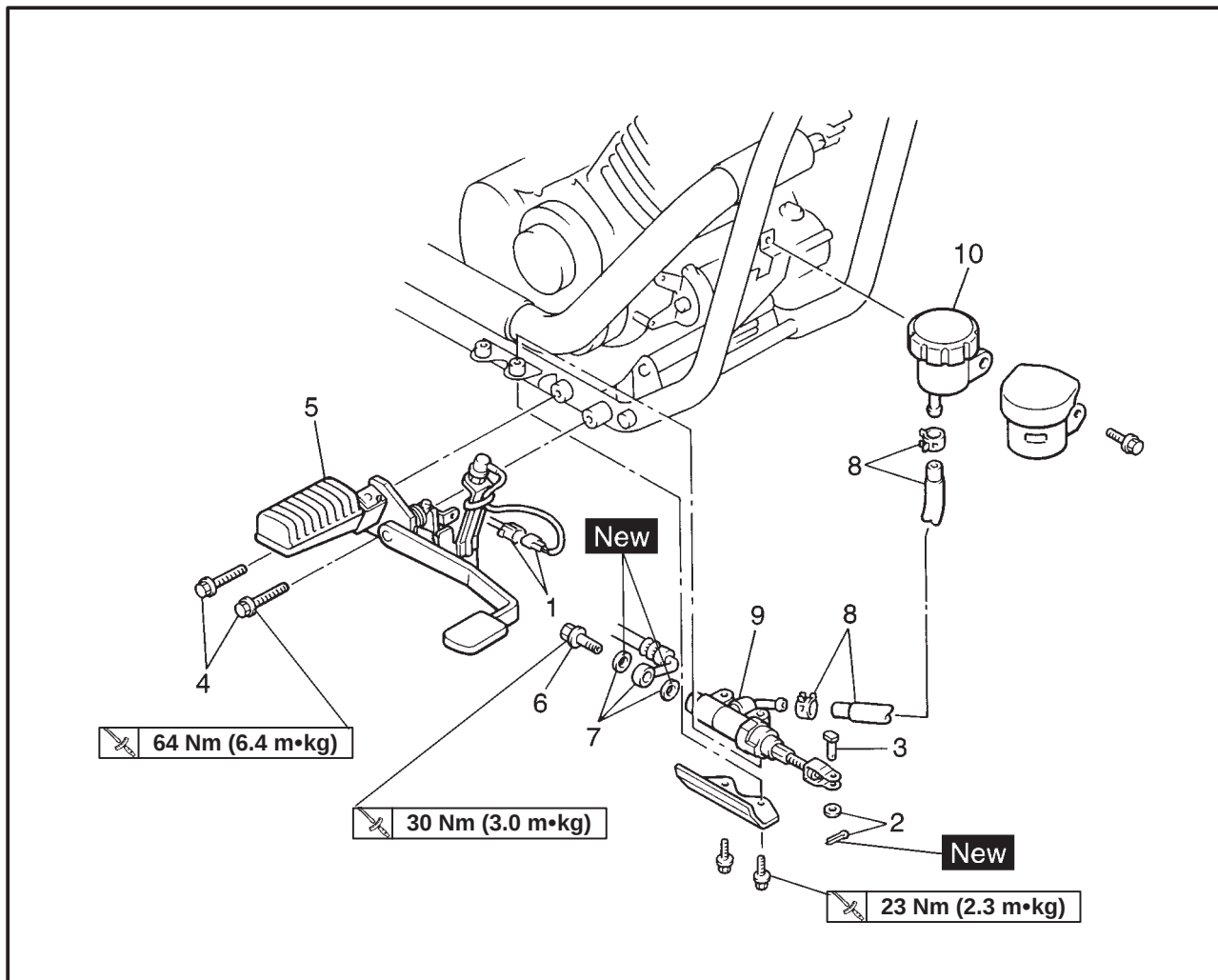
| Order | Job name/Part name                               | Q'ty | Remarks                                                         |
|-------|--------------------------------------------------|------|-----------------------------------------------------------------|
|       | <b>Removing the front brake master cylinder.</b> |      | Remove the parts in the order listed.                           |
|       | Brake fluid                                      |      | Drain                                                           |
| 1     | Rear view mirror (right)                         | 1    |                                                                 |
| 2     | Brake lever/compression spring                   | 1/1  |                                                                 |
| 3     | Front brake switch                               | 1    |                                                                 |
| 4     | Union bolt                                       | 1    |                                                                 |
| 5     | Copper washers                                   | 2    | Refer to "REMOVING/INSTALLING THE FRONT BRAKE MASTER CYLINDER". |
| 6     | Brake hose                                       | 1    |                                                                 |
| 7     | Master cylinder bracket                          | 1    | Refer to "INSTALLING THE FRONT BRAKE MASTER CYLINDER".          |
| 8     | Master cylinder                                  | 1    |                                                                 |
|       |                                                  |      | For installation, reverse the removal procedure.                |



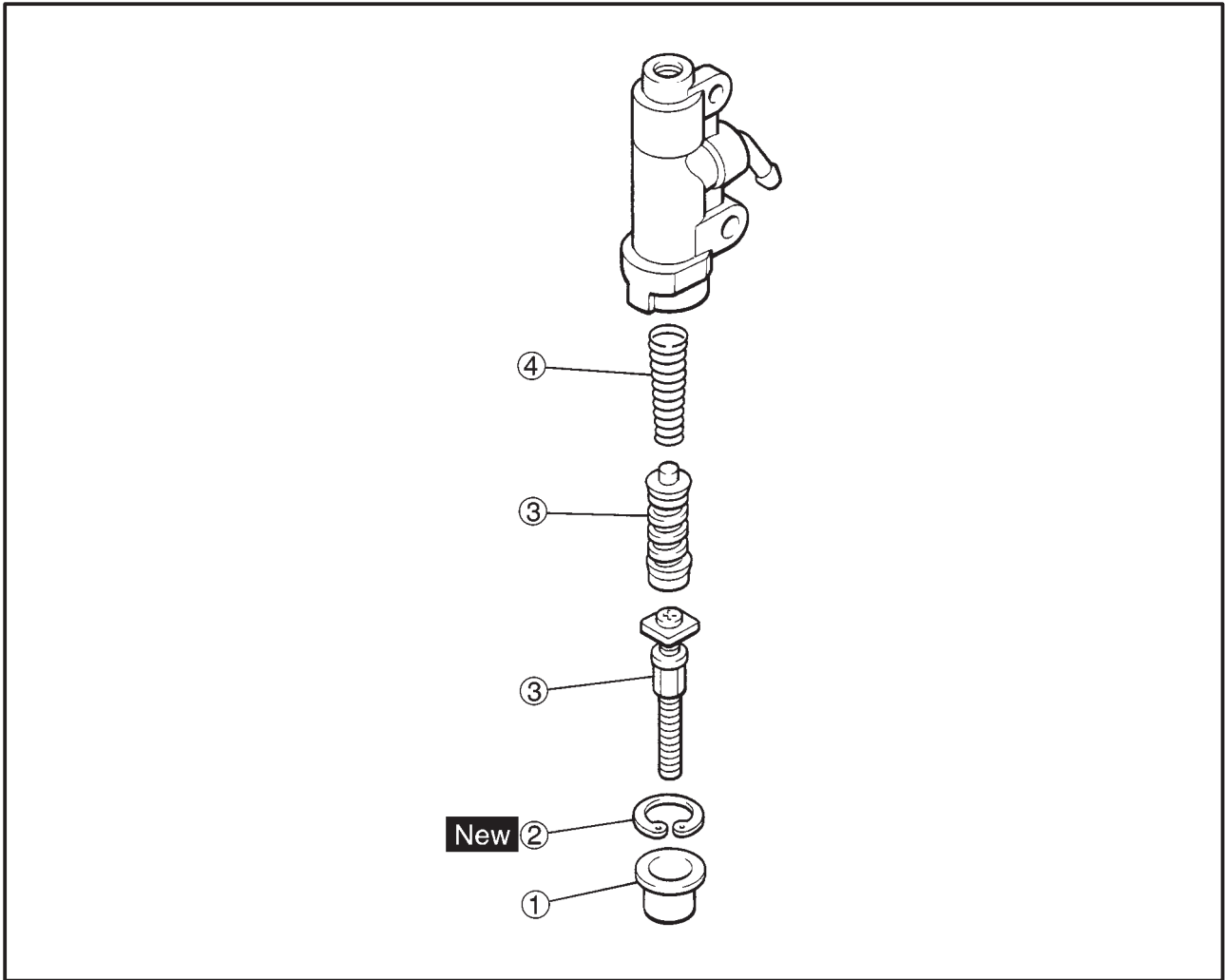
| Order | Job name/Part name                                   | Q'ty | Remarks                                          |
|-------|------------------------------------------------------|------|--------------------------------------------------|
|       | <b>Disassembling the front brake master cylinder</b> |      | Remove the parts in the order listed.            |
| ①     | Dust boot                                            | 1    |                                                  |
| ②     | Circlip                                              | 1    |                                                  |
| ③     | Master cylinder cup                                  | 1    |                                                  |
| ④     | Spring                                               | 1    |                                                  |
|       |                                                      |      | For assembly, reverse the disassembly procedure. |

EAS00586

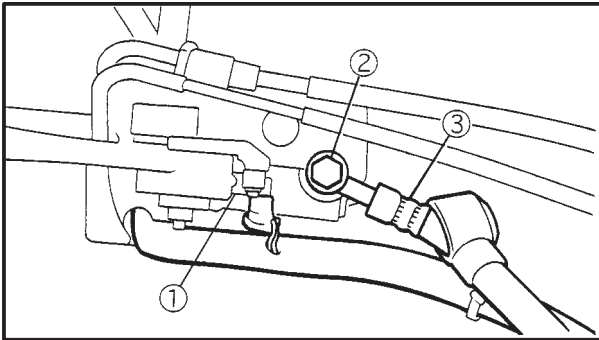
## REAR BRAKE MASTER CYLINDER



| Order | Job name/Part name                             | Q'ty | Remarks                                                        |
|-------|------------------------------------------------|------|----------------------------------------------------------------|
|       | <b>Removing the rear brake master cylinder</b> |      | Remove the parts in the order listed.                          |
|       | Brake fluid                                    |      | Drain                                                          |
| 1     | Brake switch connector                         | 1    | Disconnect                                                     |
| 2     | Cotter pin/washer                              | 1/1  |                                                                |
| 3     | Pin                                            | 1    |                                                                |
| 4     | Bolts                                          | 2    |                                                                |
| 5     | Brake pedal assembly                           | 1    |                                                                |
| 6     | Union bolt                                     | 1    |                                                                |
| 7     | Copper washers/brake hose                      | 2/1  | Refer to "REMOVING/INSTALLING THE REAR BRAKE MASTER CYLINDER". |
| 8     | Clips/reservoir hose                           | 2/1  |                                                                |
| 9     | Master cylinder assembly                       | 1    |                                                                |
| 10    | Reservoir tank                                 | 1    | For installation, reverse removal procedure.                   |



| Order | Job name/Part name                                  | Q'ty | Remarks                                          |
|-------|-----------------------------------------------------|------|--------------------------------------------------|
|       | <b>Disassembling the rear brake master cylinder</b> |      | Disassembly the parts in the order listed.       |
| ①     | Master cylinder boot                                | 1    |                                                  |
| ②     | Circlip                                             | 1    |                                                  |
| ③     | Master cylinder cup                                 | 1    |                                                  |
| ④     | Spring                                              | 1    |                                                  |
|       |                                                     |      | For assembly, reverse the disassembly procedure. |



EAS00588

## 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.

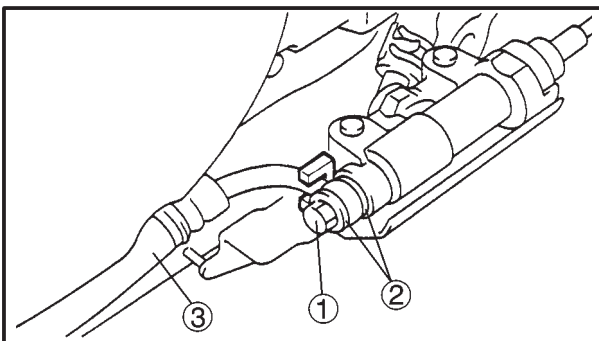
3. Remove:
  - master cylinder bracket
  - master cylinder

EAS00589

## REMOVING THE REAR BRAKE MASTER CYLINDER

### NOTE:

Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

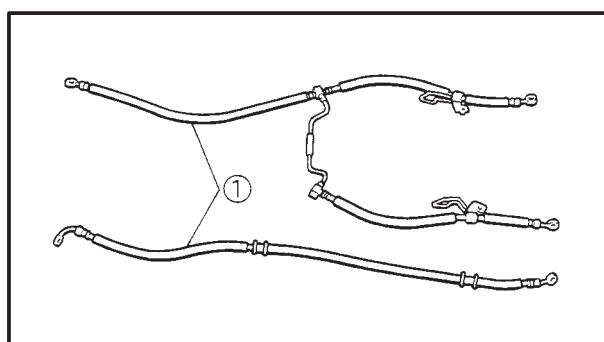
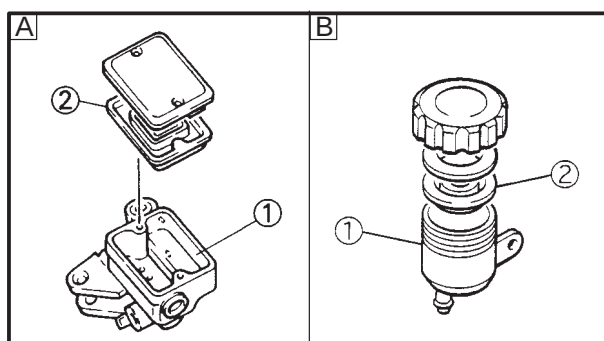
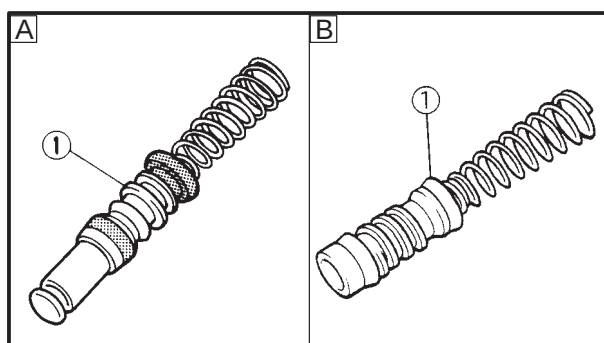
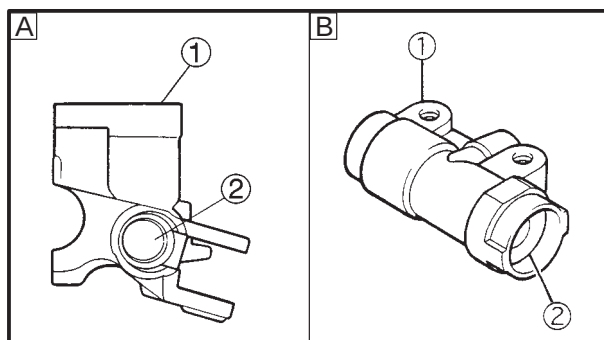


1. Remove:
  - brake switch connector
  - cotter pin/washer
  - pin
  - bolt/brake pedal assembly
2. Remove:
  - union bolt ①
  - copper washers ②
  - brake hose ③

### 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



EAS00592

## CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

The following procedure applies to the 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.

☐ A Front

☐ B Rear

### 2. Check:

- brake master cylinder kit ①  
Damage/scratches/wear → Replace.

☐ A Front

☐ B Rear

### 3. Check:

- brake fluid reservoir ①  
Cracks/damage → Replace.
- brake fluid reservoir diaphragm ②  
Cracks/damage → Replace.

☐ A Front

☐ B Rear

### 4. Check:

- brake hoses ①  
Cracks/damage/wear → Replace.

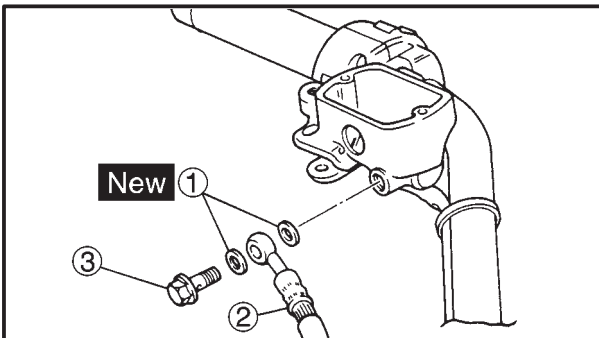
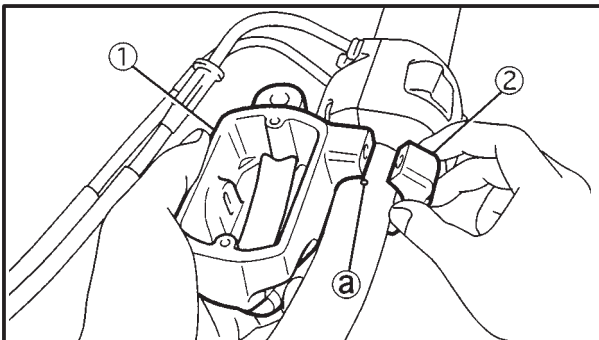


EAS00598

## 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.



**Recommended brake fluid**  
**DOT 4**

### 1. Install:

- brake master cylinder (1)
- brake master cylinder bracket (2)

**10 Nm (1.0 m•kg)**

### 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 (a) on the handlebar.
- First, tighten the upper bolt, then the lower bolt.

### 2. Install:

- copper washers (New) (1)
- brake hose (2)
- union bolt (3)

**30 Nm (3.0 m•kg)**

### ⚠ WARNING

**Proper brake hose routing is essential to insure 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)



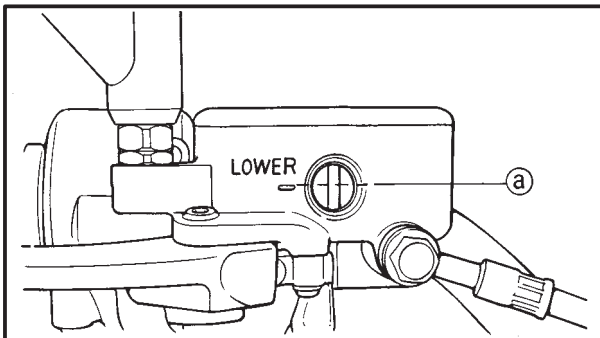
**Recommended brake fluid**  
**DOT 4**

**⚠ 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.

EAS00610

## INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
  - copper washers (New)
  - brake hose



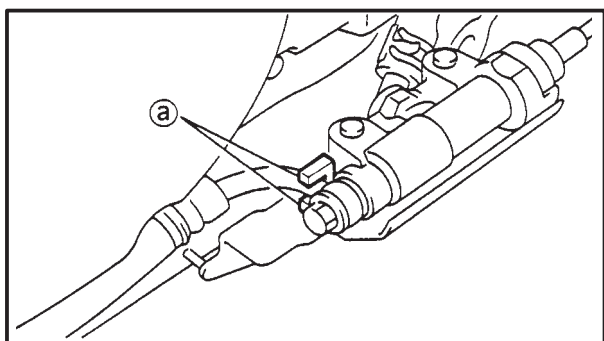
**Union bolt**  
30 Nm (3.0 m•kg)

### **⚠ WARNING**

Proper brake hose routing is essential to insure 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 (a) as shown.



2. Fill:
  - brake fluid reservoir  
(to the maximum level mark)



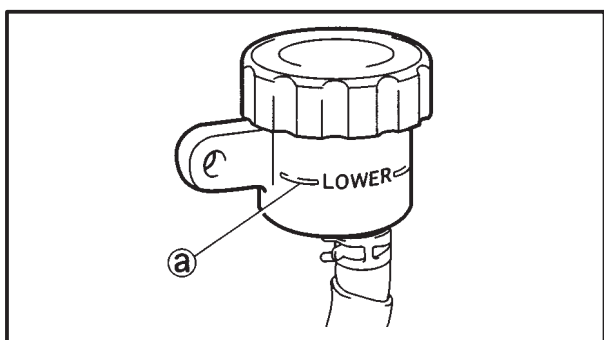
**Recommended brake fluid**  
DOT 4

### **⚠ WARNING**

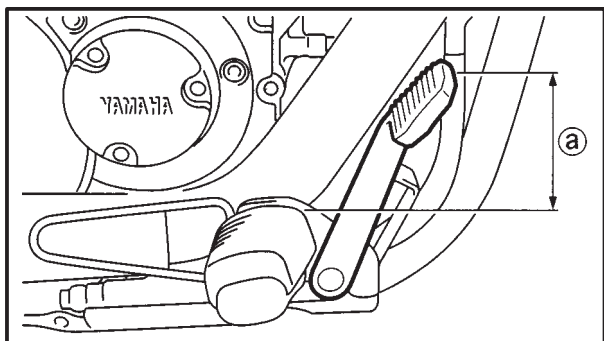
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake 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.



3. Bleed:
  - brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
4. Check:
  - brake fluid level  
Below the minimum level mark (a) → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.



5. Adjust:

- brake pedal position ①

Refer to “ADJUSTING THE REAR BRAKE” in chapter 3.



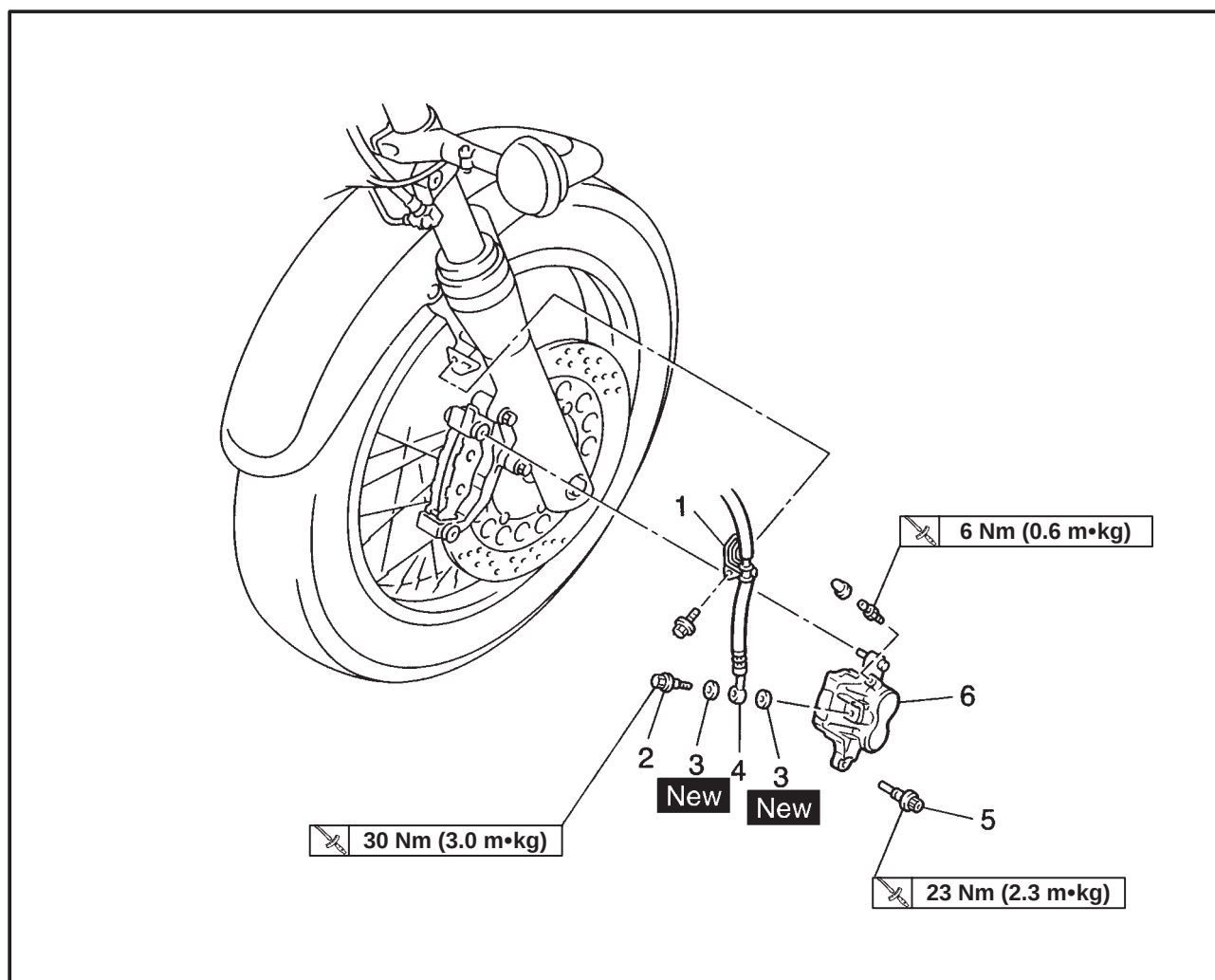
**Brake pedal position (below the top of the rider footrest)**  
**81.8 mm**

6. Adjust:

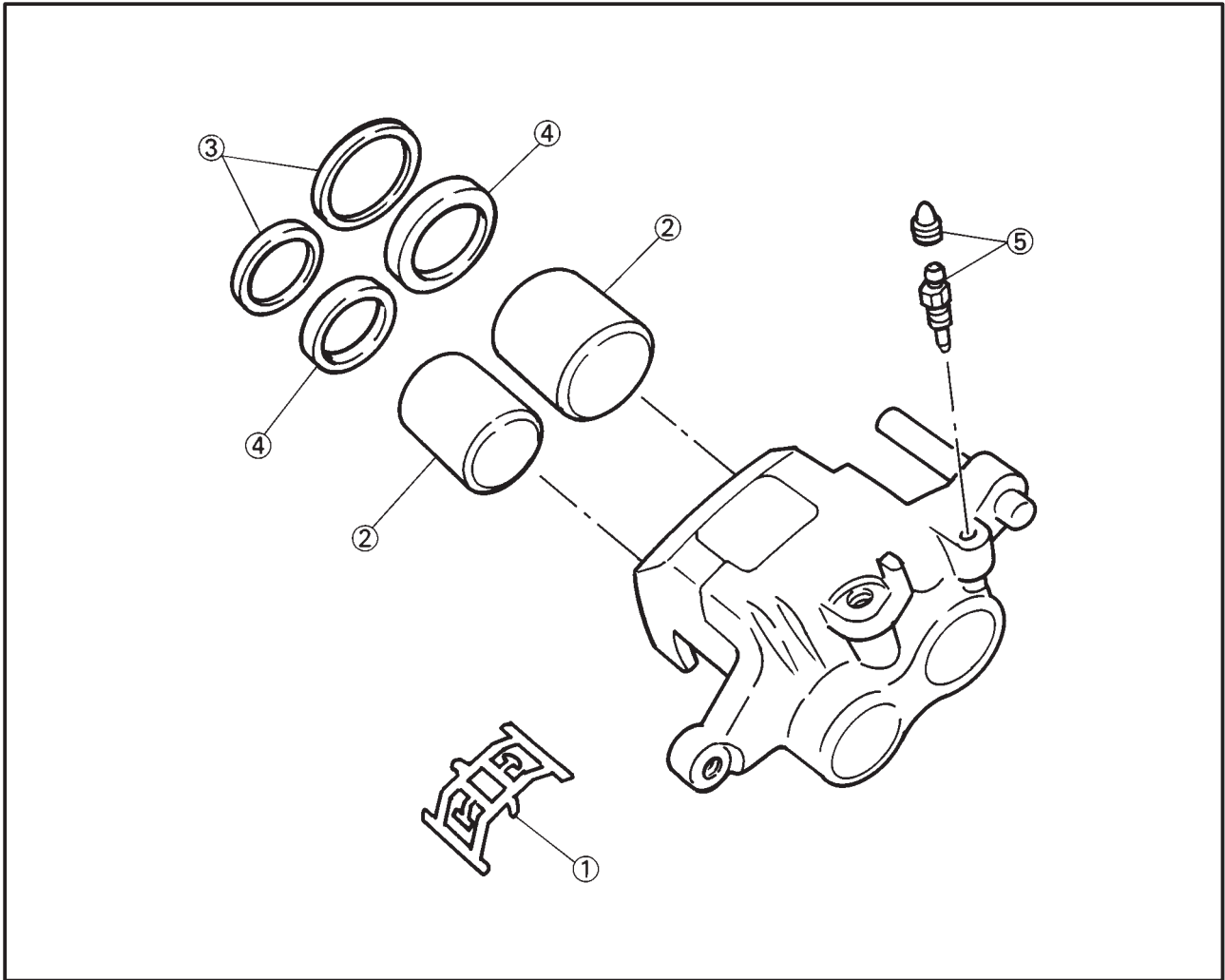
- rear brake light operation timing

Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” in chapter 3.

## FRONT BRAKE CALIPERS



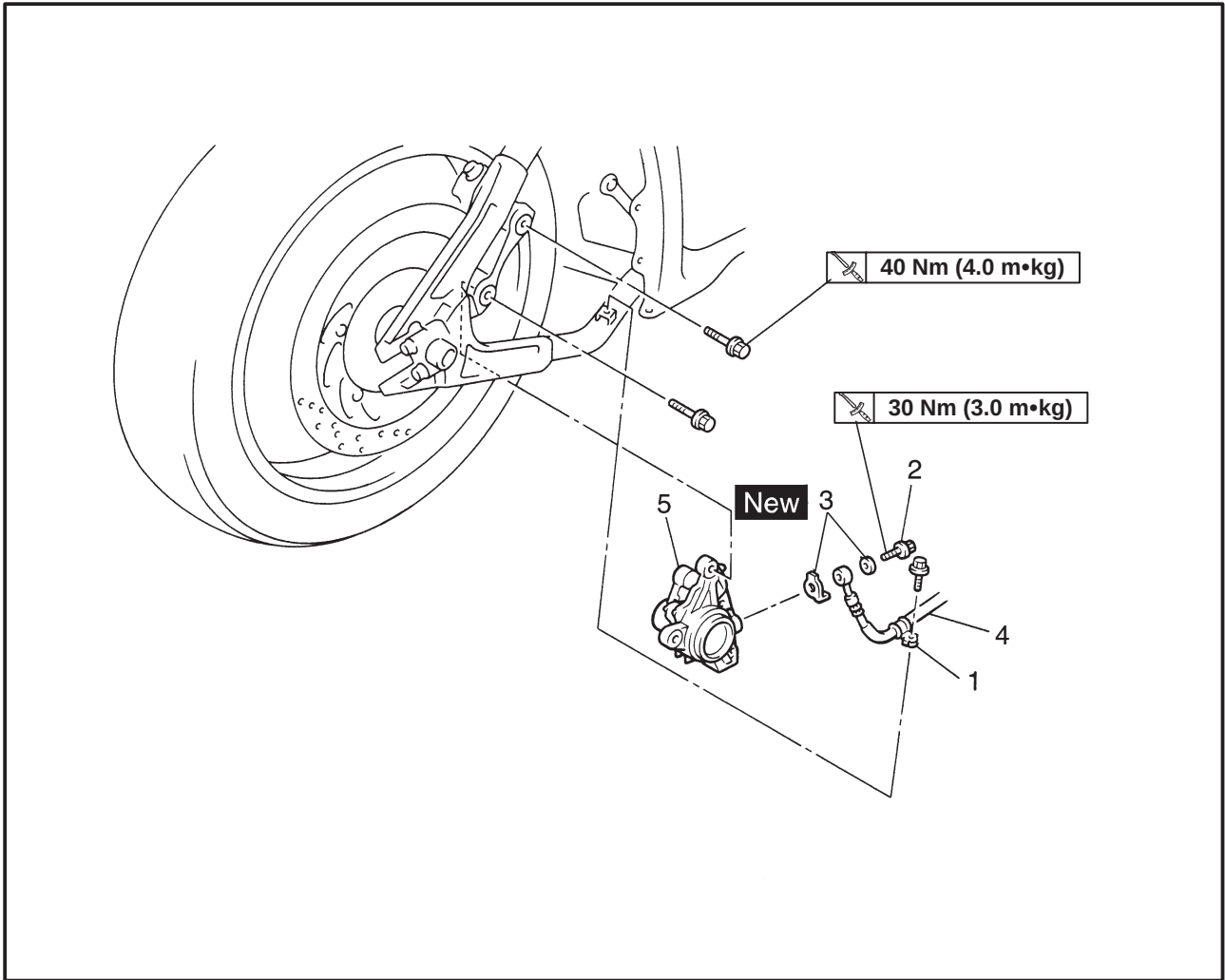
| Order | Job name/Part name                       | Q'ty | Remarks                                                  |
|-------|------------------------------------------|------|----------------------------------------------------------|
|       | <b>Removing the front brake calipers</b> |      |                                                          |
|       | Brake fluid                              |      | Remove the parts in the order listed.                    |
| 1     | Brake hose holder                        | 1    | Drain                                                    |
| 2     | Union bolt                               | 1    | Refer to "REMOVING/INSTALLING THE FRONT BRAKE CALIPERS". |
| 3     | Copper washers                           | 2    |                                                          |
| 4     | Brake hose                               | 1    |                                                          |
| 5     | Retaining bolt                           | 1    |                                                          |
| 6     | Brake caliper assembly                   | 1    | For installation, reverse the removal procedure.         |



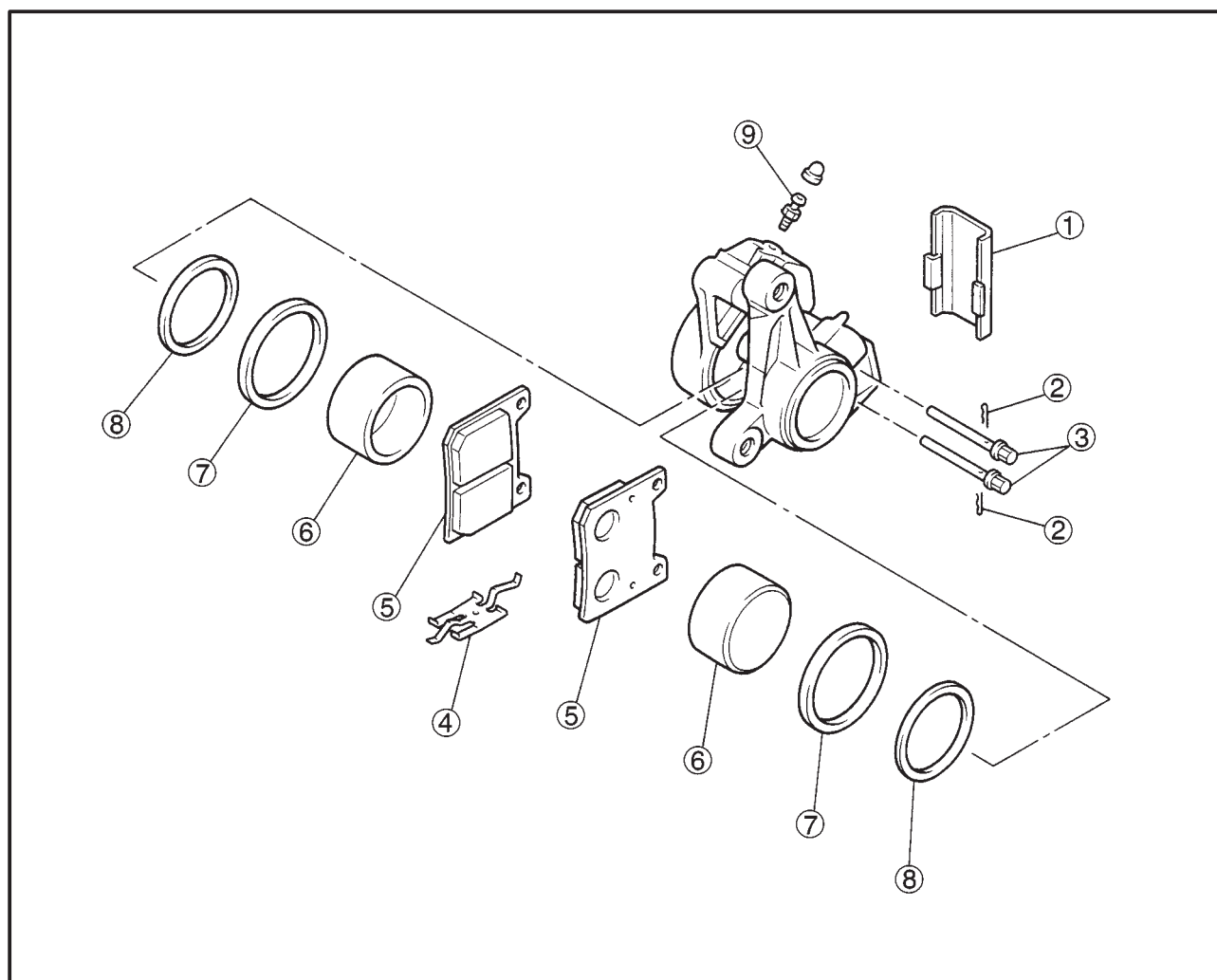
| Order | Job name/Part name                            | Q'ty | Remarks                                          |
|-------|-----------------------------------------------|------|--------------------------------------------------|
|       | <b>Disassembling the front brake calipers</b> |      | Remove the parts in the order listed.            |
| ①     | Pad spring                                    | 1    | Refer to "REMOVING THE FRONT BRAKE CALIPERS".    |
| ②     | Brake caliper pistons                         | 2    |                                                  |
| ③     | Dust seals                                    | 2    |                                                  |
| ④     | Caliper piston seals                          | 2    |                                                  |
| ⑤     | Bleed screw                                   | 1    | For assembly, reverse the disassembly procedure. |

ESA00616

REAR BRAKE CALIPER



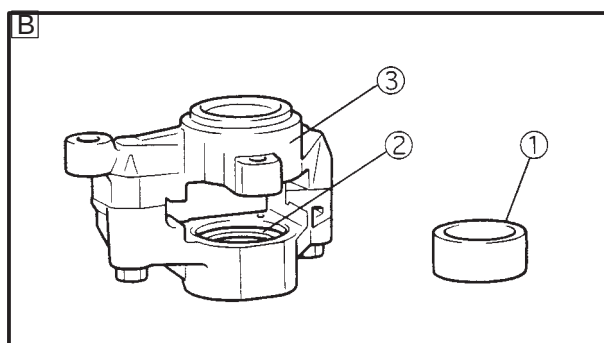
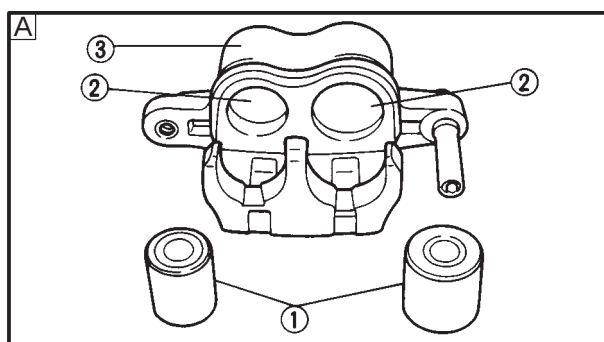
| Order | Job name/Part name                     | Q'ty | Remarks                                                |
|-------|----------------------------------------|------|--------------------------------------------------------|
|       | <b>Removing the rear brake caliper</b> |      | Remove the parts in the order listed.                  |
|       | Muffler                                |      | Refer to "REAR WHEEL AND BRAKE DISC".                  |
|       | Muffler stay                           |      | Disc                                                   |
|       | Brake fluid                            |      | Drain                                                  |
| 1     | Brake hose holder                      | 1    |                                                        |
| 2     | Union bolt                             | 1    |                                                        |
| 3     | Copper washers                         | 2    | Refer to "REMOVING/INSTALLING THE REAR BRAKE CALIPER". |
| 4     | Brake hose                             | 1    |                                                        |
| 5     | Caliper ass'y                          | 1    |                                                        |
|       |                                        |      | For installation, reverse the removal procedure.       |



| Order | Job name/Part name                          | Q'ty | Remarks                                          |
|-------|---------------------------------------------|------|--------------------------------------------------|
|       | <b>Disassembling the rear brake caliper</b> |      | Disassembly the parts in the order listed.       |
| ①     | Cover                                       | 1    | Refer to "DISASSEMBLING THE REAR BRAKE CALIPER". |
| ②     | Clips                                       | 2    |                                                  |
| ③     | Pad pins                                    | 2    |                                                  |
| ④     | Pad spring                                  | 1    |                                                  |
| ⑤     | Brake pads                                  | 2    |                                                  |
| ⑥     | Caliper pistons                             | 2    |                                                  |
| ⑦     | Dust seals                                  | 2    |                                                  |
| ⑧     | Piston seals                                | 2    |                                                  |
| ⑨     | Bleed screw                                 | 1    | For assembly, reverse the disassembly procedure. |







## 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.

EAS00638

## INSTALLING THE FRONT BRAKE CALIPERS

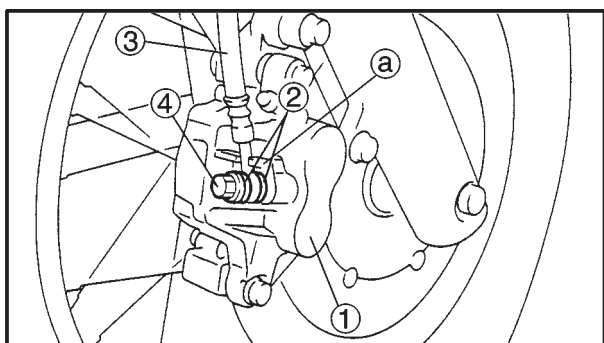
The following procedure applies to both of the brake calipers.

## ⚠ 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 Nm (3.0 m•kg)

## WARNING

Proper brake hose routing is essential to insure 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 ① on the brake caliper.

## 2. Install:

- brake caliper retaining bolt

23 Nm (2.3 m•kg)

- 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

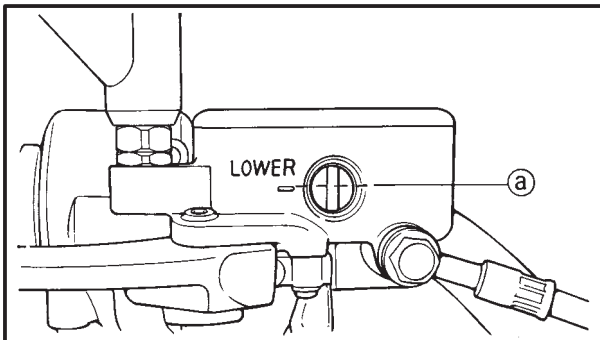
## WARNING

- 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 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.

EAS00642

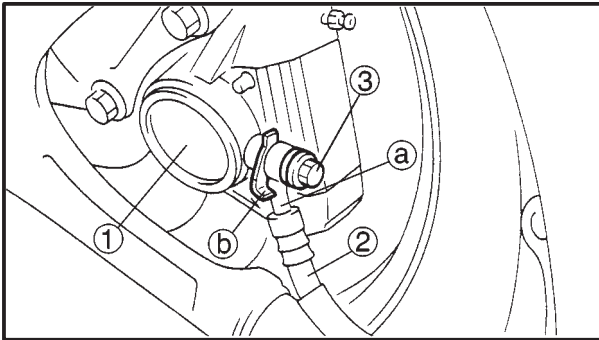
## INSTALLING THE REAR BRAKE CALIPER

### ⚠ 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)

## **⚠ WARNING**

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

## **CAUTION:**

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ① touches the projection ② on the copper washer.

## 2. Install:

- brake caliper
- brake hose holder

40 Nm (4.0 m•kg)

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:

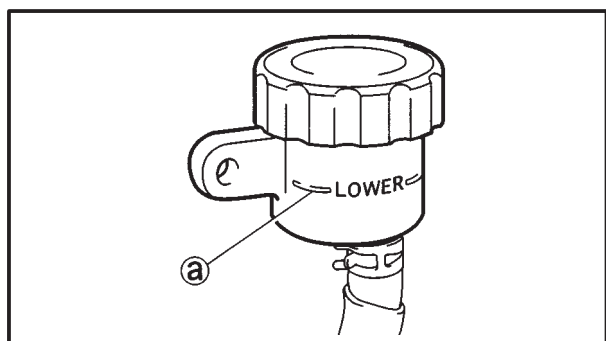
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

### 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:

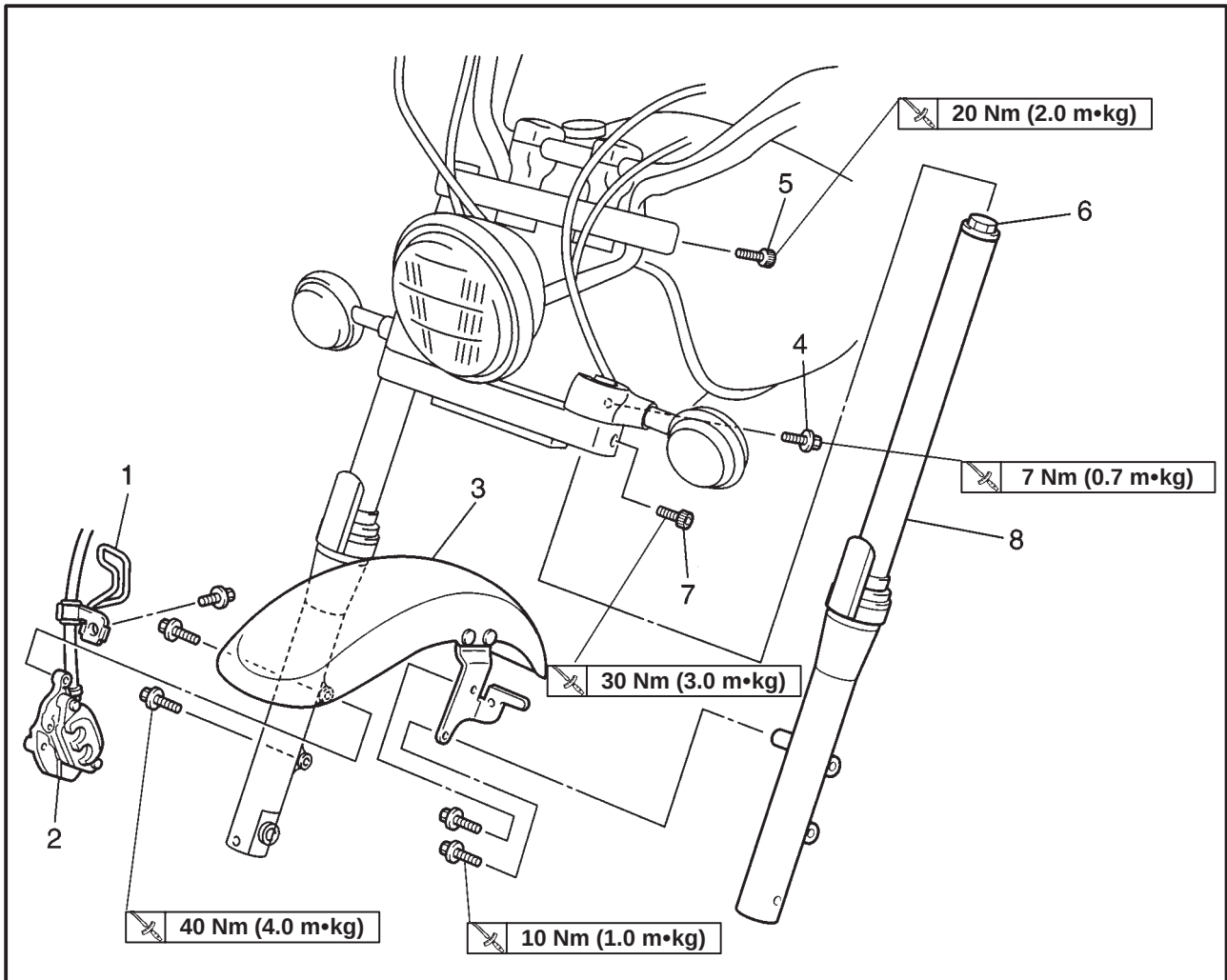
- brake pedal operation

Soft or spongy feeling → bleed the brake system.

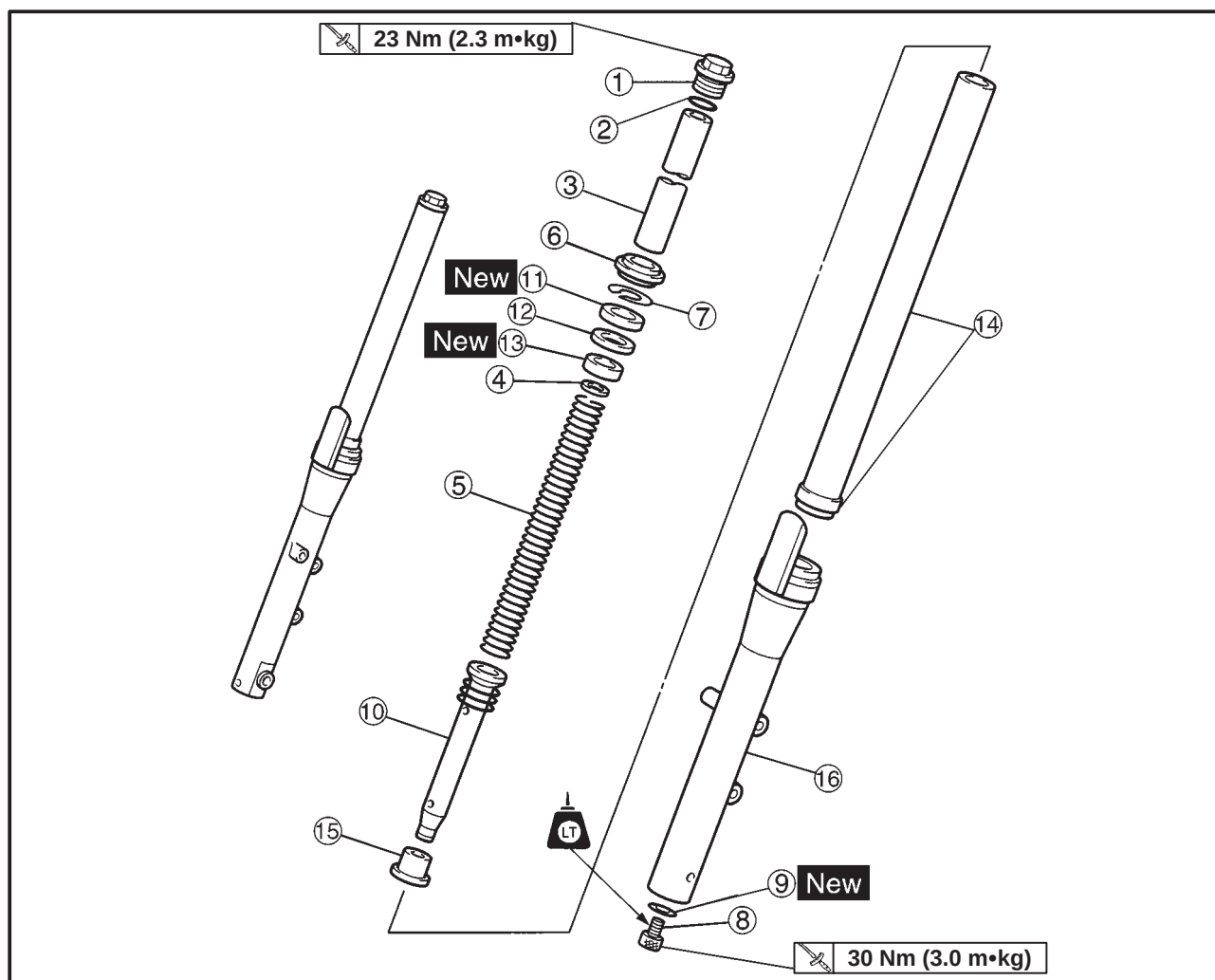
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



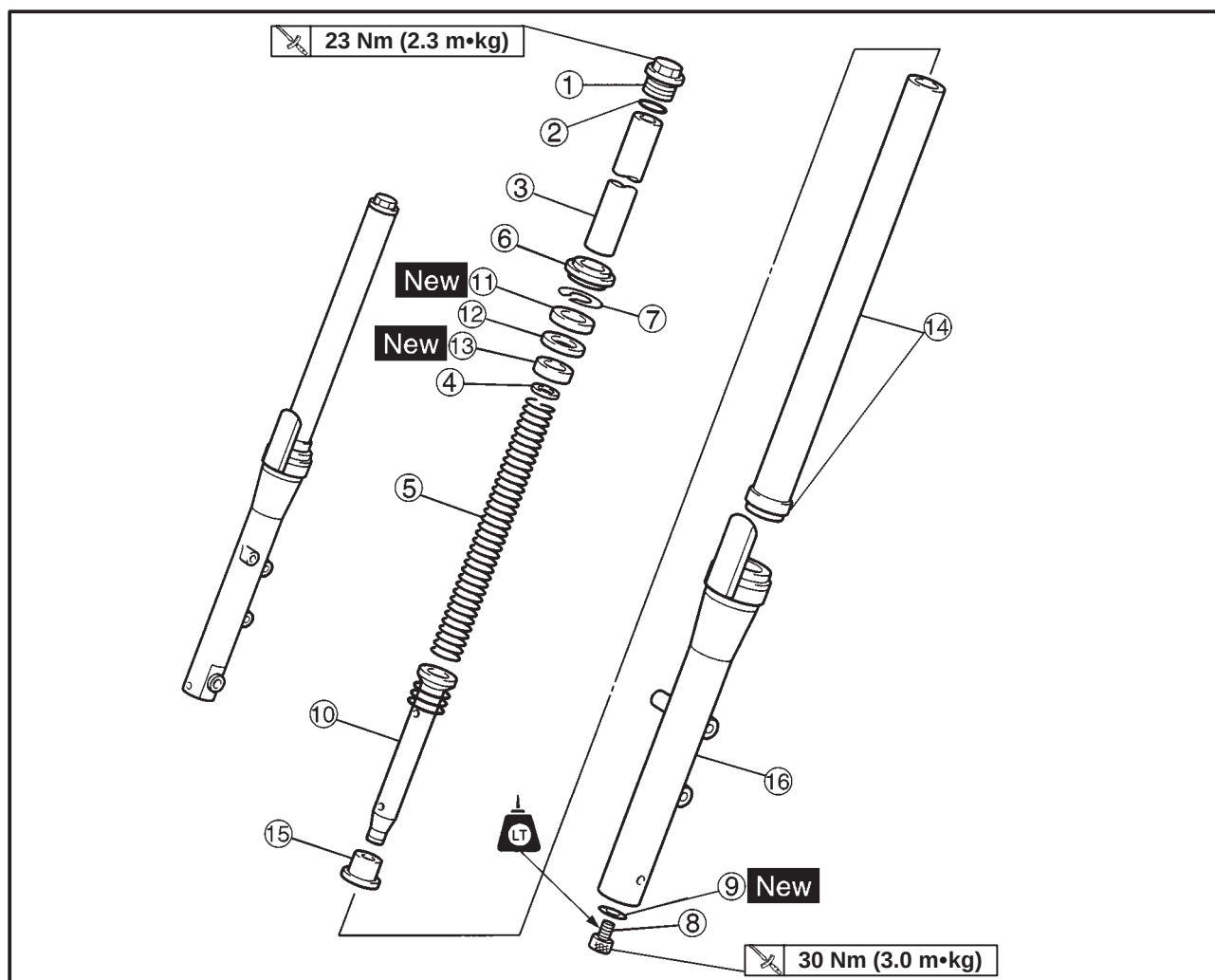
## FRONT FORK



| Order | Job name/Part name             | Q'ty | Remarks                                                                       |
|-------|--------------------------------|------|-------------------------------------------------------------------------------|
|       | <b>Removing the front fork</b> |      |                                                                               |
|       | Front wheel                    |      | Remove the parts in the order listed. Refer to "FRONT WHEEL AND BRAKE DISCS". |
| 1     | Brake hose holders             | 2    | Refer to "REMOVING/INSTALLING THE FRONT FORK LEGS".                           |
| 2     | Brake caliper assembly         | 2    |                                                                               |
| 3     | Front fender                   | 1    |                                                                               |
| 4     | Turn signal light bolts        | 2    |                                                                               |
| 5     | Upper bracket bolts            | 2    |                                                                               |
| 6     | Cap bolts                      | 2    |                                                                               |
| 7     | Lower bracket bolts            | 2    |                                                                               |
| 8     | Front fork legs                | 2    | For installation, reverse the removal procedure.                              |



| Order | Job name/Part name                  | Q'ty | Remarks                                                                                                    |
|-------|-------------------------------------|------|------------------------------------------------------------------------------------------------------------|
|       | <b>Disassembling the front fork</b> |      |                                                                                                            |
| ①     | Cap bolt                            | 1    | Disassemble the parts in the order listed.<br><br>Refer to "DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS". |
| ②     | O-ring                              | 1    |                                                                                                            |
| ③     | Spacer                              | 1    |                                                                                                            |
| ④     | Spring seat                         | 1    |                                                                                                            |
| ⑤     | Fork spring                         | 1    |                                                                                                            |
| ⑥     | Dust seal                           | 1    |                                                                                                            |
| ⑦     | Oil seal clip                       | 1    |                                                                                                            |
| ⑧     | Damper rod bolt                     | 1    |                                                                                                            |
| ⑨     | Copper washer                       | 1    |                                                                                                            |
| ⑩     | Damper rod/rebound spring           | 1/1  |                                                                                                            |
| ⑪     | Oil seal                            | 1    |                                                                                                            |



| Order | Job name/Part name            | Q'ty | Remarks                                                  |
|-------|-------------------------------|------|----------------------------------------------------------|
| ⑫     | Seal spacer                   | 1    | Refer to "DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS". |
| ⑬     | Outer tube bushing            | 1    |                                                          |
| ⑭     | Inner tube/inner tube bushing | 1/1  |                                                          |
| ⑮     | Oil lock piece                | 1    |                                                          |
| ⑯     | Outer tube                    | 1    |                                                          |
|       |                               |      | For assembly, reverse the disassembly procedure.         |



EAS00649

### REMOVING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

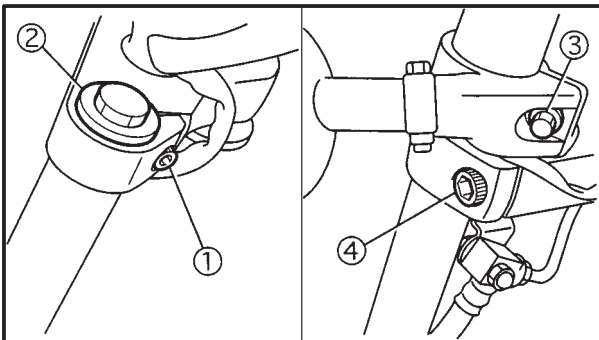
1. Stand the motorcycle on a level surface.

#### **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 (1)
- cap bolt (2)
- turn signal light bolt (3)
- lower bracket pinch bolt (4)

#### **WARNING**

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

3. Remove:

- front fork leg

EAS00653

### DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Remove:

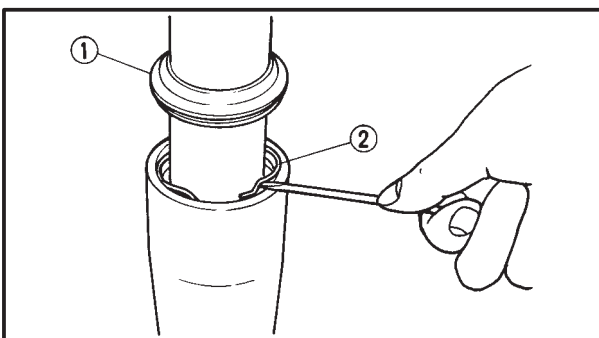
- cap bolt
- O-ring
- spacer
- spring seat
- fork spring

2. Drain

- fork oil

3. Remove:

- dust seal (1)
- oil seal clip (2)  
(with a flat-head screwdriver)



#### **CAUTION:**

Do not scratch the inner tube.



### NOTE:

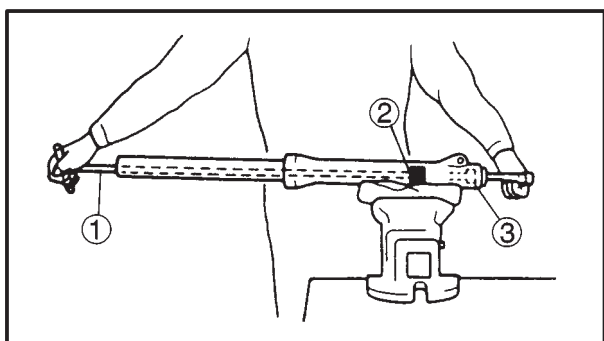
- Do not remove the front fork leg protector from the outer tube.
- If the front fork leg protector must be removed, always install a new one.

### 4. Remove:

- damper rod bolt
- copper washer

### NOTE:

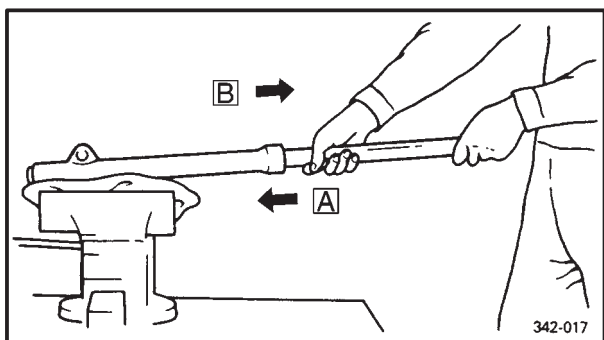
While holding the damper rod with the T-handle ① and damper rod holder ②, loosen the damper rod bolt ③.



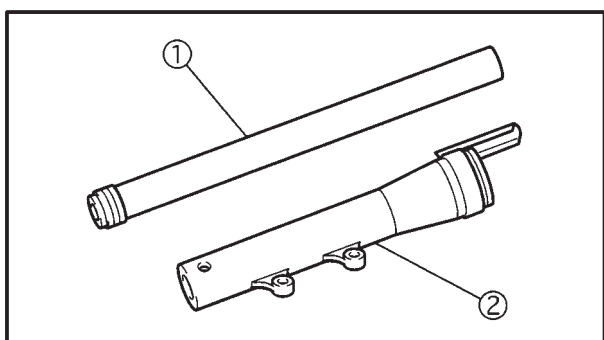
**T-handle**  
90890-01326  
**Damper rod holder**  
90890-01460

### 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.



EAS00657

### 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

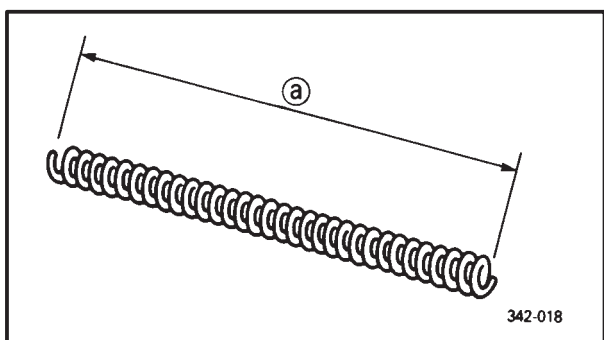
**Do not attempt to straighten a bent inner tube as this may dangerously weaken it.**

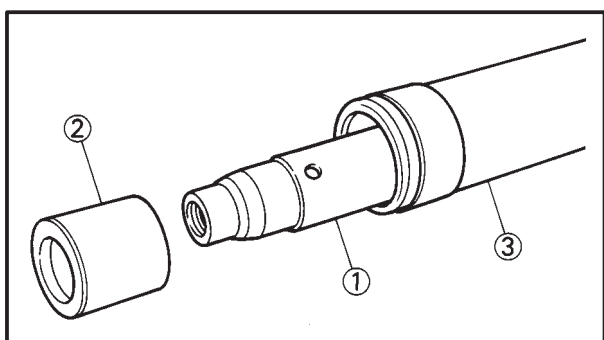
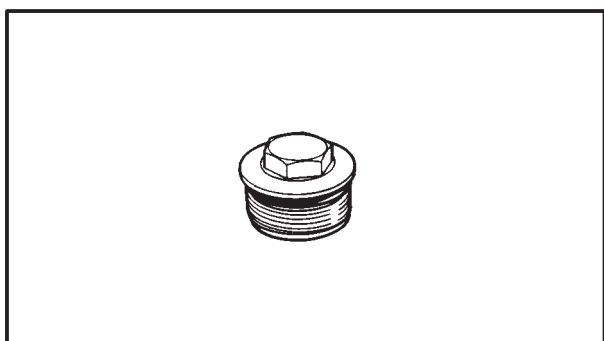
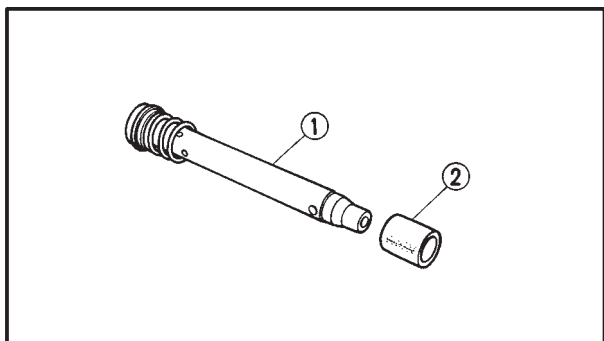
### 2. Measure:

- spring free length @
- Over the specified limit → Replace.



**Spring free length limit**  
350 mm





### 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.

EAS00659

### ASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

### ⚠ 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

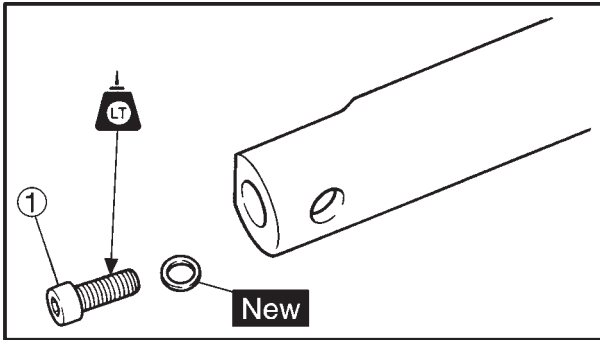
Always use new copper washers.

### 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.

## FRONT FORK

CHAS



### 2. Lubricate:

- inner tube's outer surface



**Recommended lubricant**  
Yamaha fork and shock oil  
10 W or equivalent

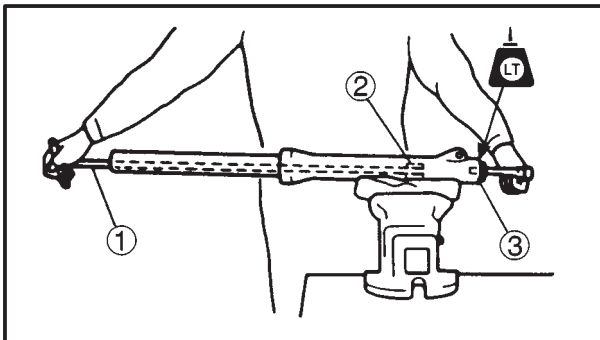
### 3. Tighten:

- damper rod bolt (1)

30 Nm (3.0 m•kg)

### NOTE:

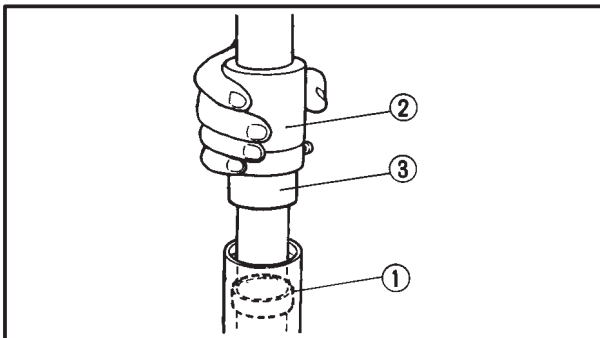
While holding the damper rod with the T-handle (1) and damper rod holder (2), tighten the damper rod bolt (3).



**T-handle**  
90890-01326  
**Damper rod holder**  
90890-01460

### 4. Install:

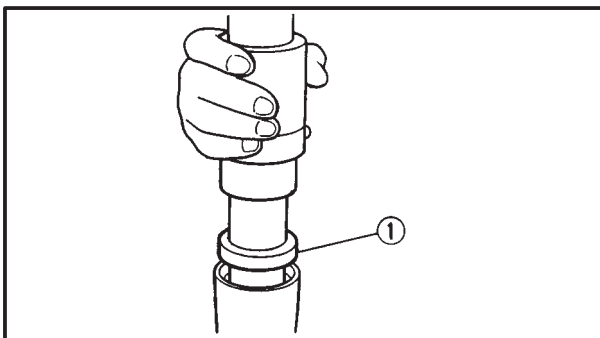
- outer tube bushing (1)
- seal spacer (with the fork seal driver weight (2) and adapter (3))



**Fork seal driver weight**  
90890-01367  
**Adapter**  
90890-01381

### 5. Install:

- oil seal (1) (with the fork seal driver weight and adapter)

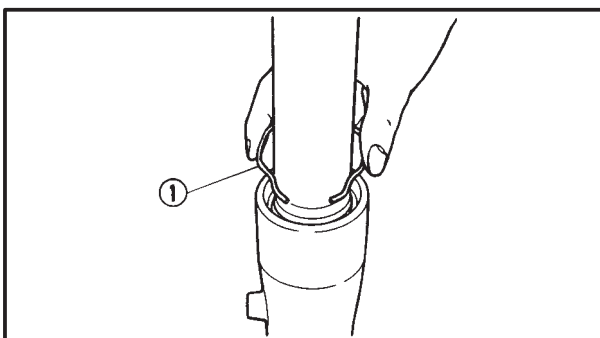


### CAUTION:

**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.

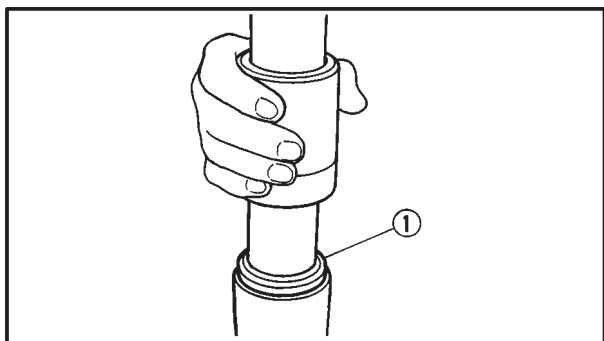


### 6. Install:

- 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)



**Quantity (each front fork leg)**  
**0.464 L**

**Recommended oil**  
**Yamaha fork and shock oil 10W**  
**or equivalent**

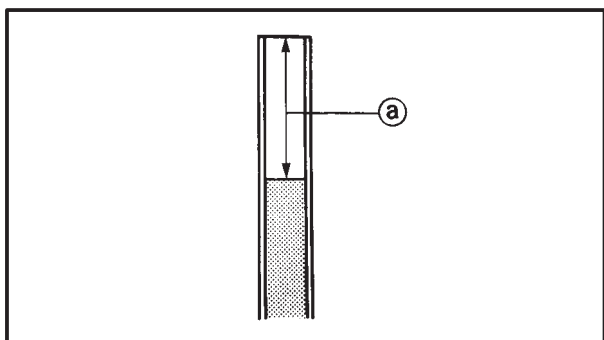
### CAUTION:

- 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 (a)  
Out of specification → Correct.



**Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)**  
**108 mm**

### 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 up-word.
- Before installing the cap bolt, apply grease to the O-ring.
- Temporarily tighten the cap bolt.

EAS00662

### INSTALLING THE FRONT FORK LEGS

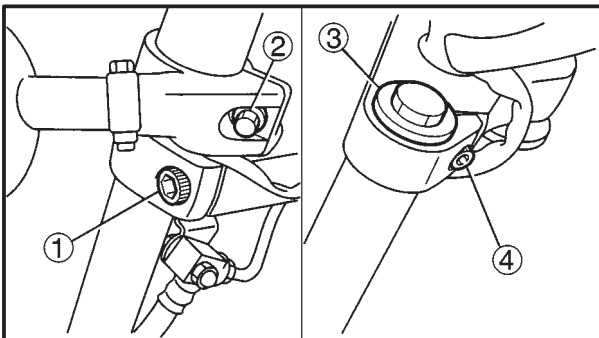
The following procedure applies to both of the front fork legs.

#### 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 Nm (3.0 m•kg)

- front turn signal light bolt ②

7 Nm (0.7 m•kg)

- cap bolt ③

23 Nm (2.3 m•kg)

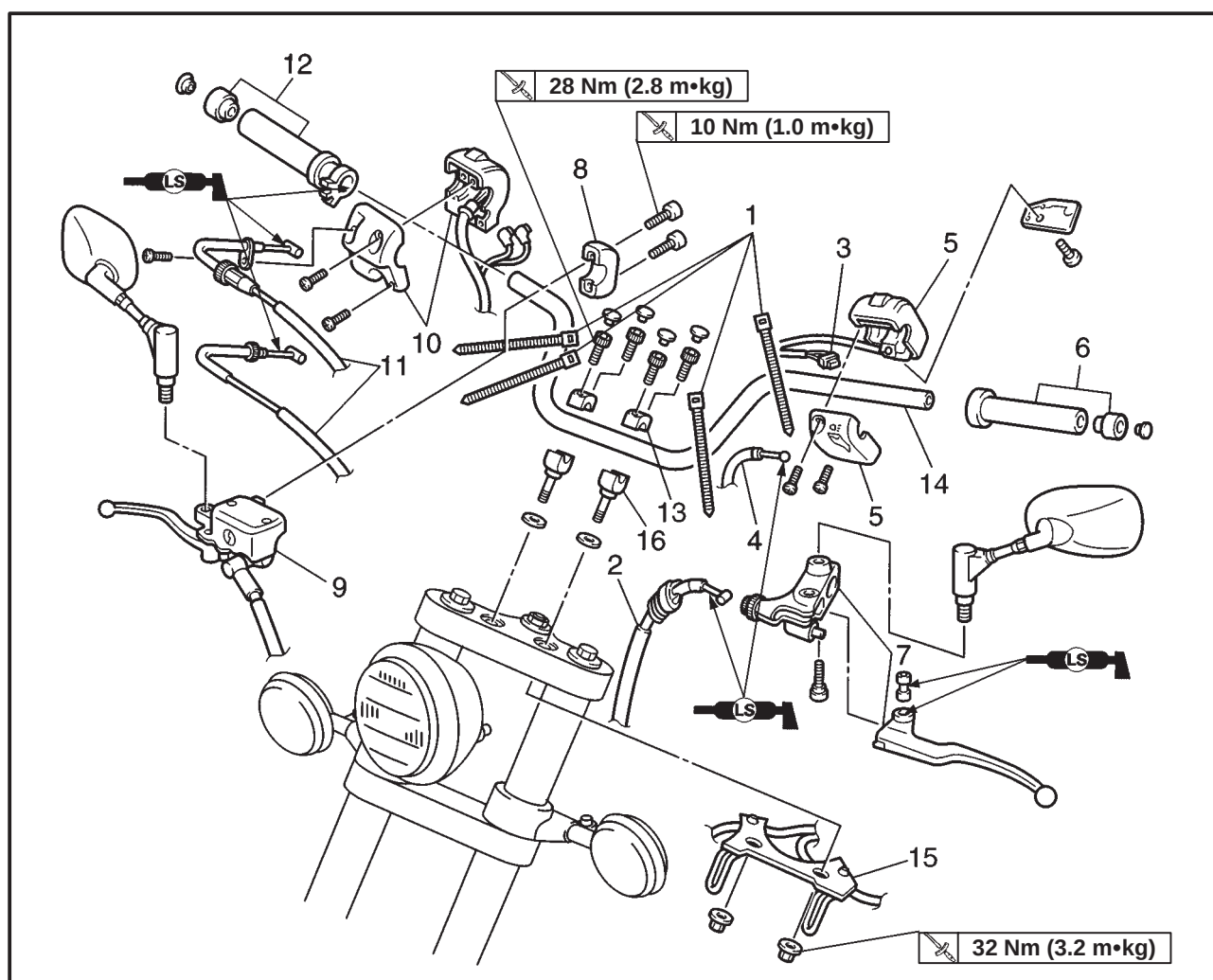
- upper bracket pinch bolt ④

20 Nm (2.0m •kg)

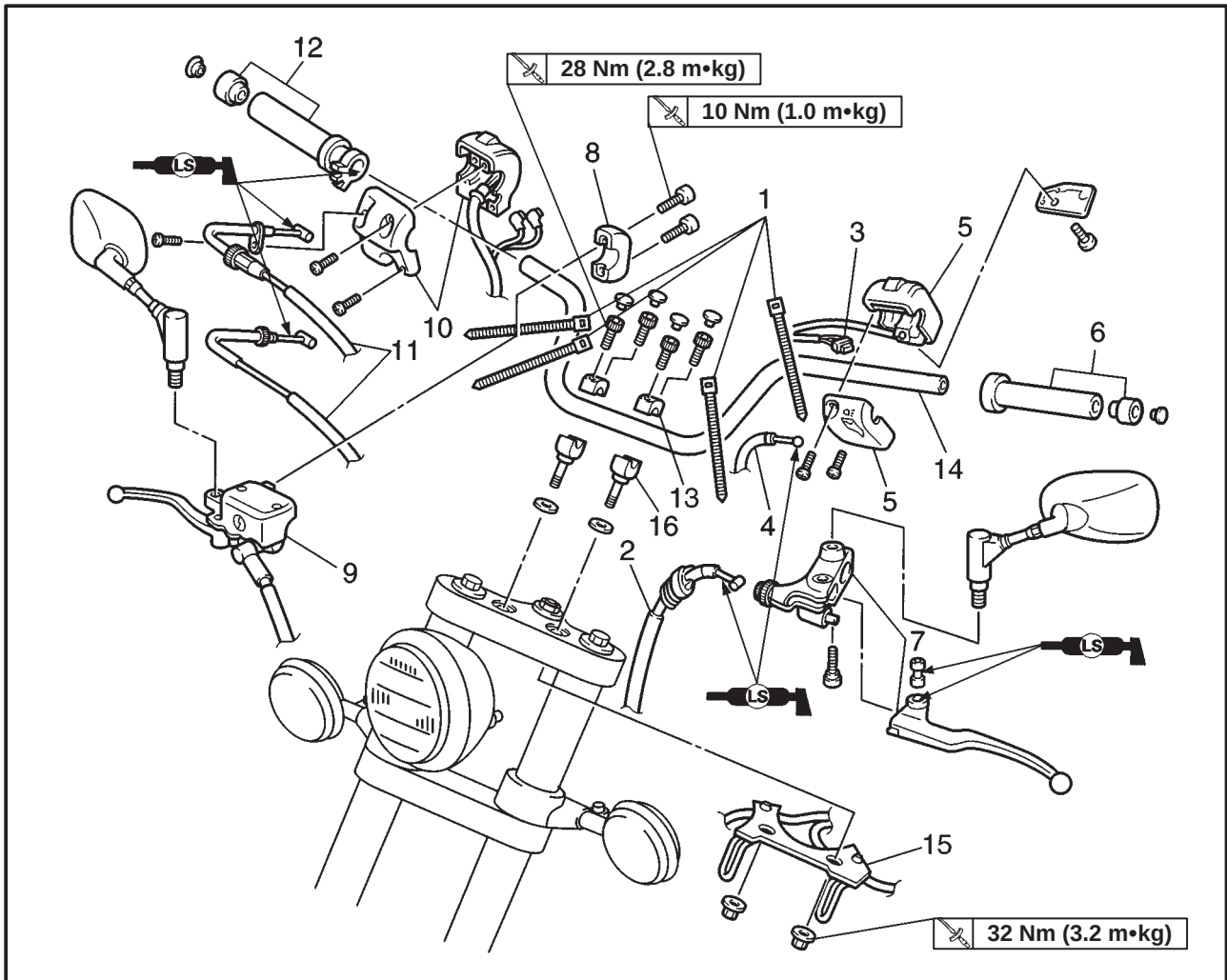
### ⚠ WARNING

Make sure that the brake hoses are routed properly.

## HANDLEBAR



| Order | Job name/Part name            | Q'ty | Remarks                                                                                                                                                                                 |
|-------|-------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the handlebar</b> |      | Remove the parts in the order listed.<br>Stand the motorcycle on a level surface.<br><b>⚠ WARNING</b><br>Securely support the motorcycle so that there is no danger of it falling over. |
| 1     | Plastic locking ties          | 4    |                                                                                                                                                                                         |
| 2     | Clutch cable                  | 1    |                                                                                                                                                                                         |
| 3     | Clutch switch lead            | 1    |                                                                                                                                                                                         |
| 4     | Starter cable                 | 1    |                                                                                                                                                                                         |
| 5     | Handlebar switch (left)       | 1    | Refer to "INSTALLING THE HANDLEBAR".                                                                                                                                                    |
| 6     | Grip (left)                   | 1    | Refer to "REMOVING THE HANDLEBAR".                                                                                                                                                      |
| 7     | Clutch lever assembly         | 1    |                                                                                                                                                                                         |
| 8     | Master cylinder bracket       | 1    |                                                                                                                                                                                         |
| 9     | Master cylinder assembly      | 1    | Refer to "INSTALLING THE HANDLEBAR".                                                                                                                                                    |
| 10    | Handlebar switch (right)      | 1    |                                                                                                                                                                                         |
| 11    | Throttle cables               | 2    |                                                                                                                                                                                         |



| Order | Job name/Part name        | Q'ty | Remarks                                          |
|-------|---------------------------|------|--------------------------------------------------|
| 12    | Throttle grip assembly    | 1    | Refer to "INSTALLING THE HANDLEBAR".             |
| 13    | Handlebar holders (upper) | 2    |                                                  |
| 14    | Handlebar                 | 1    |                                                  |
| 15    | Cable guide               | 1    |                                                  |
| 16    | Handlebar holders (lower) | 2    |                                                  |
|       |                           |      | For installation, reverse the removal procedure. |



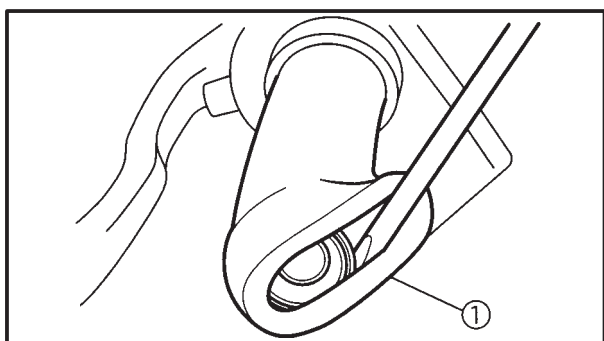
EAS00666

**REMOVING 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.

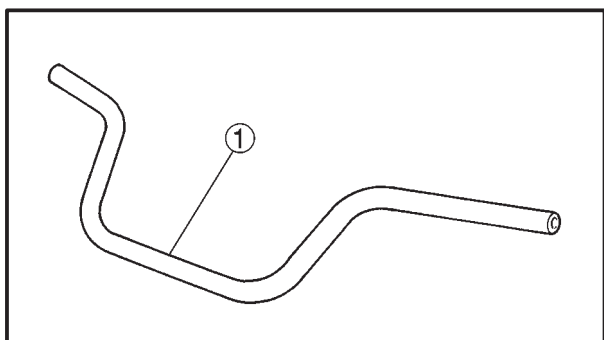


2. Remove:

- handlebar grip (left) ①

**NOTE:**

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



EAS00668

**CHECKING 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. Check:

- handlebar ①  
Bends/cracks/damage → Replace.

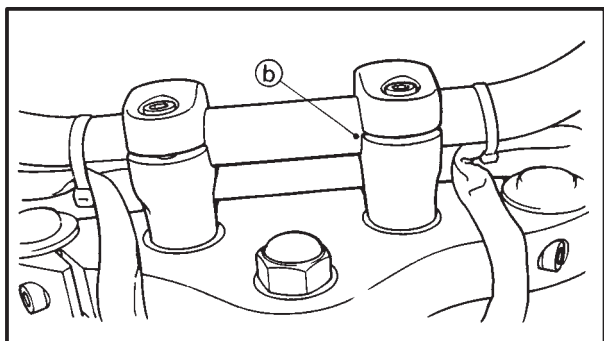
**⚠ WARNING**

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

3. Install:

- handlebar grip

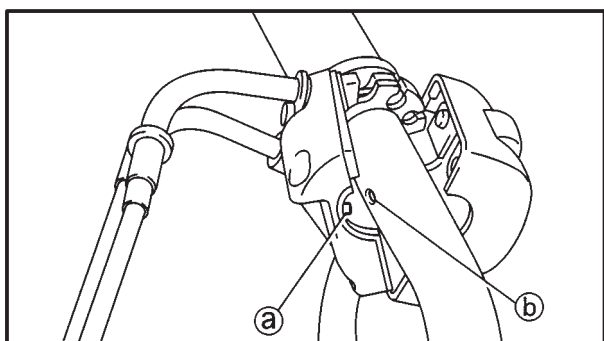




- Align the match marks (b) on the handlebar with the upper surface of the lower handlebar holders.

### 3. Install:

- throttle grip
- throttle cable

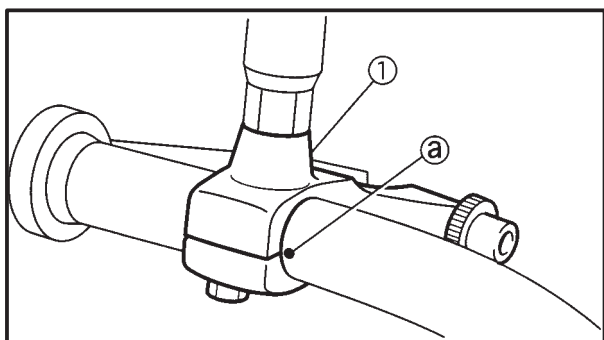


### ⚠ WARNING

Make sure that the pin (a) on the throttle cable housing is aligned with the hole (b) in the handlebar.

### 4. Install:

- master cylinder
- Refer to "FRONT AND REAR BRAKES".

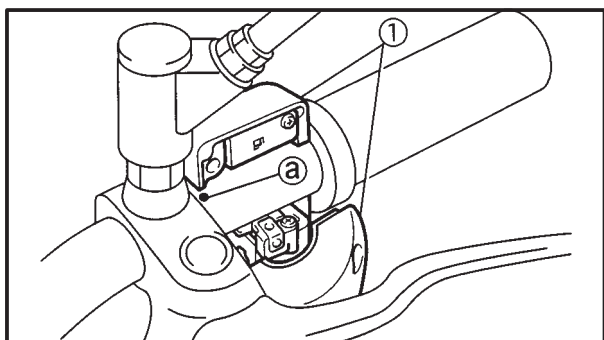


### 5. Install:

- clutch lever holder (1)

### NOTE:

Align the slit in the clutch lever holder with the punch mark (a) in the handlebar.



### 6. Install:

- left handlebar switch (1)

### NOTE:

Align the matching surface on the handlebar switches with the punch mark (a) 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 ~ 10 mm**

10. Adjust:

- throttle cable free play

Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in chapter 3.

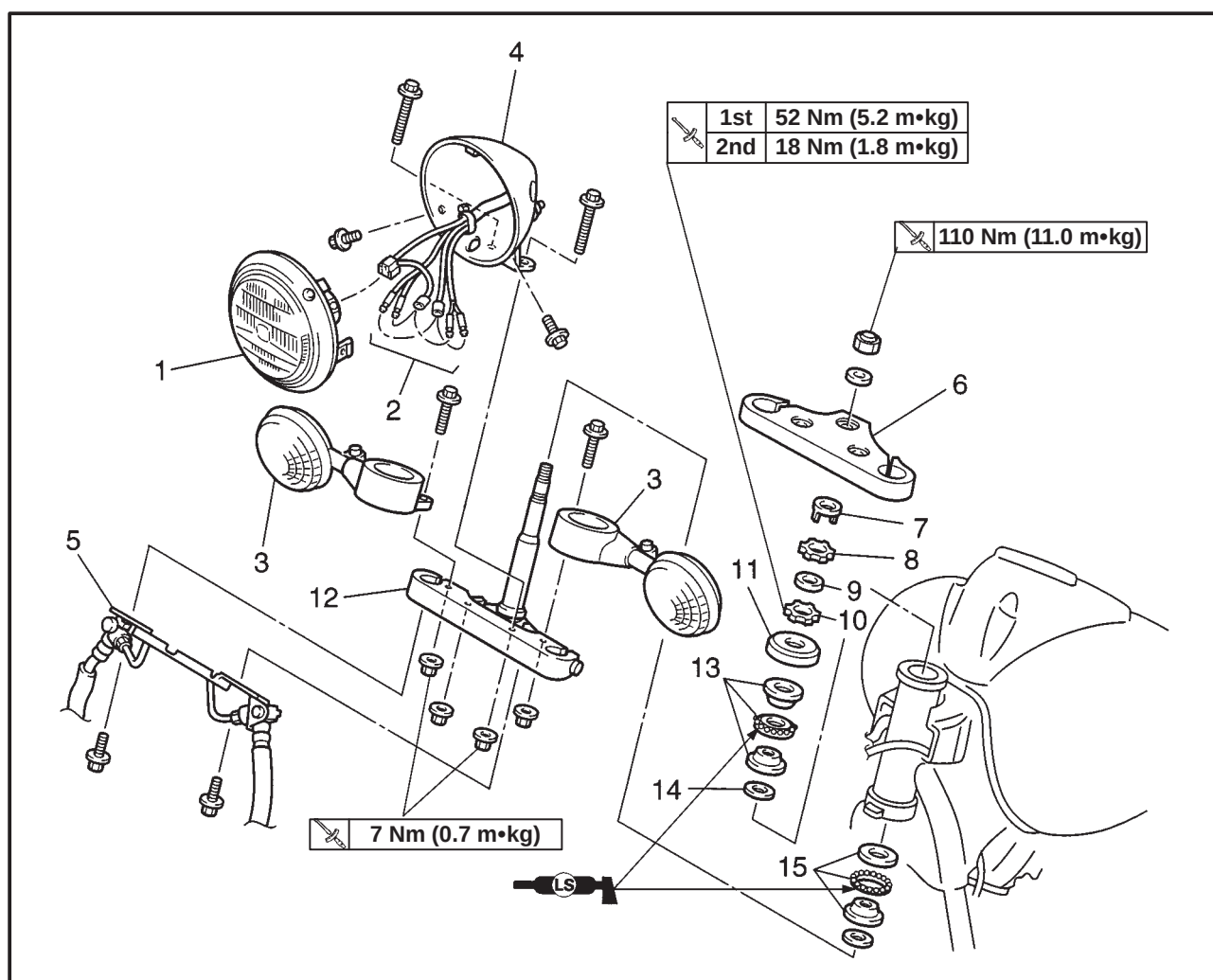


**Throttle cable free play (at the flange of the throttle grip)**

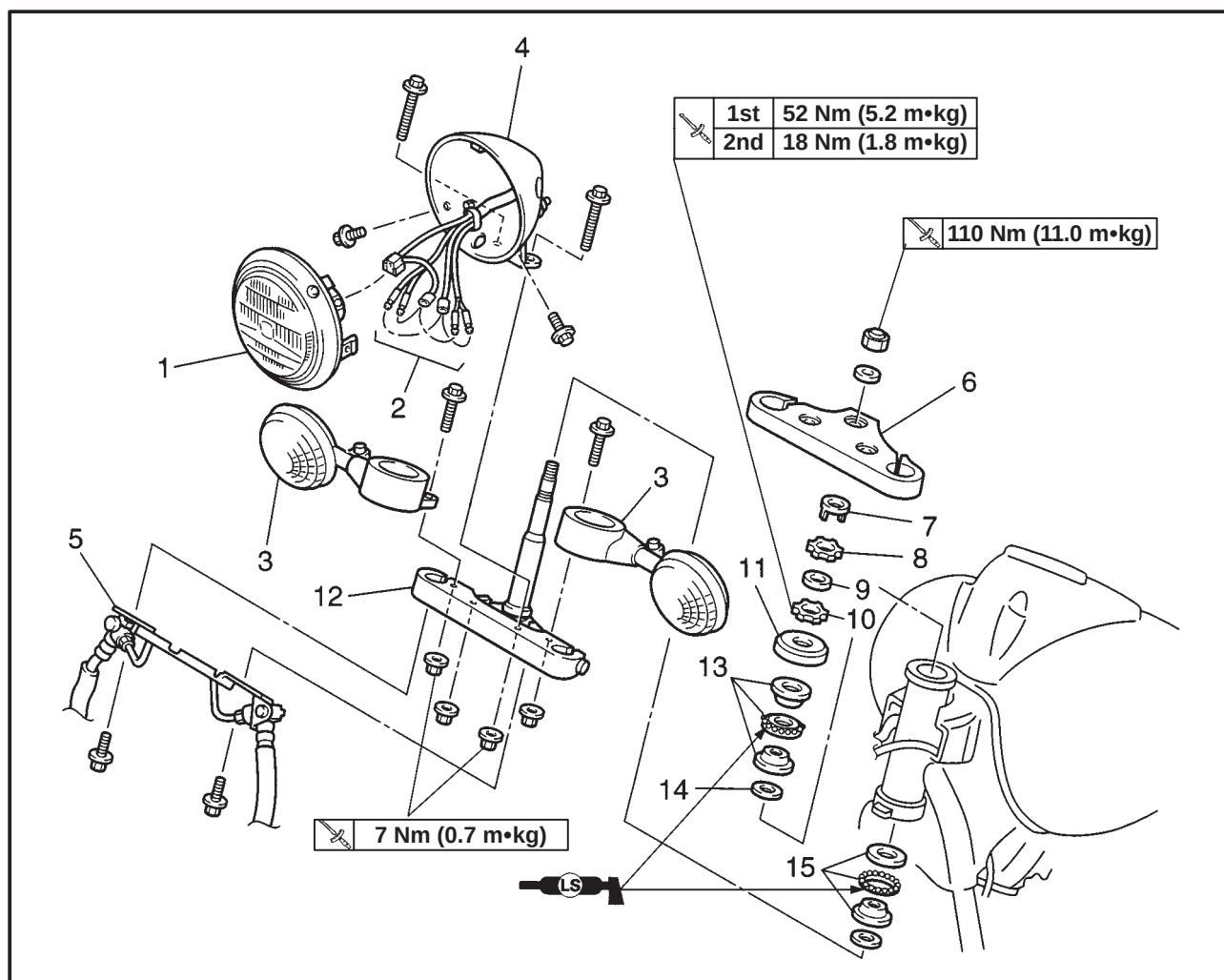
**4 ~ 6 mm**



## STEERING HEAD



| Order | Job name/Part name                   | Q'ty | Remarks                                                                               |
|-------|--------------------------------------|------|---------------------------------------------------------------------------------------|
|       | <b>Removing the lower bracket</b>    |      | Remove the parts in the order listed.<br>Stand the motorcycle on a level surface.     |
|       |                                      |      | <b>⚠ WARNING</b>                                                                      |
|       |                                      |      | <b>Securely support the motorcycle so that there is no danger of it falling over.</b> |
|       | Front fork legs                      |      | Refer to "FRONT FORK".                                                                |
|       | Handlebar                            |      | Refer to "HANDLEBAR".                                                                 |
| 1     | Headlight lens unit                  | 1    |                                                                                       |
| 2     | Leads (in the headlight body)        | —    | Disconnect                                                                            |
| 3     | Front turn signal light (left/right) | 1/1  |                                                                                       |
| 4     | Headlight body                       | 1    |                                                                                       |
| 5     | Brake hose joint holder              | 1    |                                                                                       |
| 6     | Upper bracket                        | 1    |                                                                                       |
| 7     | Lock washer                          | 1    |                                                                                       |
| 8     | Upper ring nut                       | 1    |                                                                                       |



| Order | Job name/Part name | Q'ty | Remarks                                                             |
|-------|--------------------|------|---------------------------------------------------------------------|
| 9     | Rubber washer      | 1    | Refer to "REMOVING THE LOWER BRACKET/INSTALLING THE STEERING HEAD". |
| 10    | Lower ring nut     | 1    |                                                                     |
| 11    | Bearing cover      | 1    |                                                                     |
| 12    | Lower bracket      | 1    |                                                                     |
| 13    | Bearing (upper)    | 1    |                                                                     |
| 14    | Rubber seal        | 1    |                                                                     |
| 15    | Bearing (lower)    | 1    | For installaiton, reverse the removal procedure.                    |



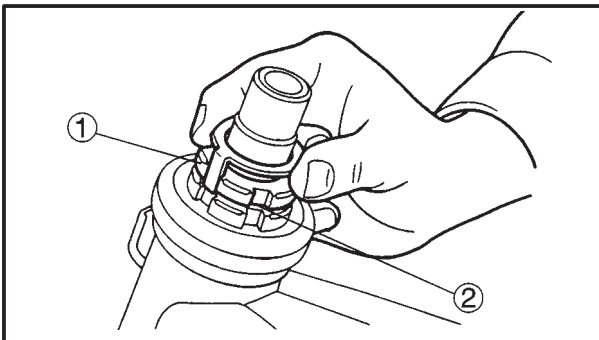
EAS00677

### 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

90890-01268

Ring nut wrench

90890-01403

#### **⚠ WARNING**

Securely support the lower bracket so that there is no danger of it falling.

EAS00681

### CHECKING THE STEERING HEAD

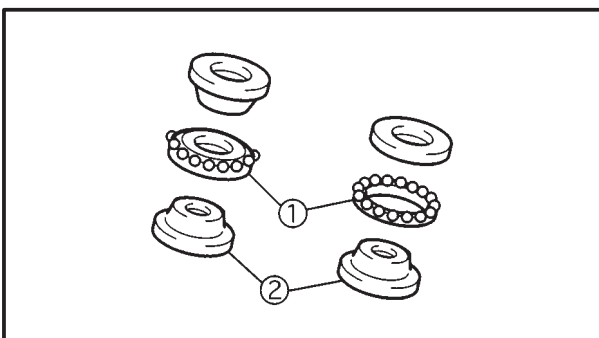
1. Wash:

- bearings
- bearing races



Recommended cleaning solvent

Kerosine



2. Check

- bearings ①
  - bearing races ②
- Damage/pitting → Replace.

3. Replace:

- bearings
- bearing races



## STEERING HEAD

---

**CHAS**



**NOTE:** \_\_\_\_\_

Temporarily tighten the steering stem nut.

---

4. Install:

- front fork legs

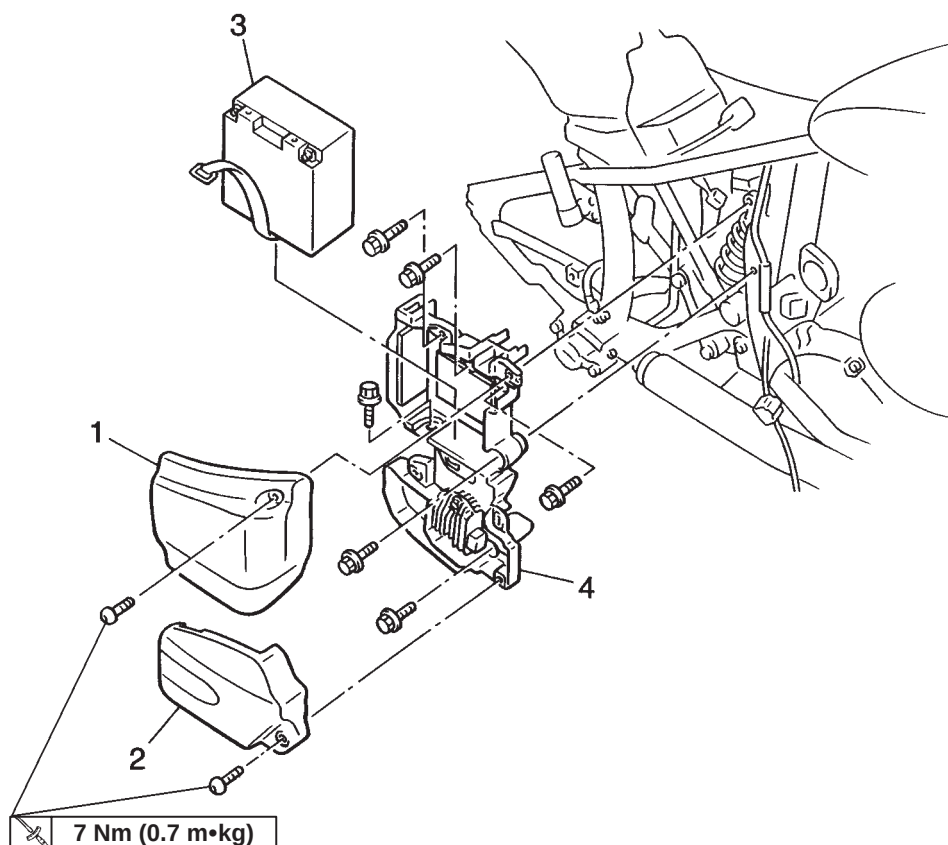
Refer to "FRONT FORK"

**NOTE:** \_\_\_\_\_

Temporarily tighten the upper and lower bracket pinch bolts.

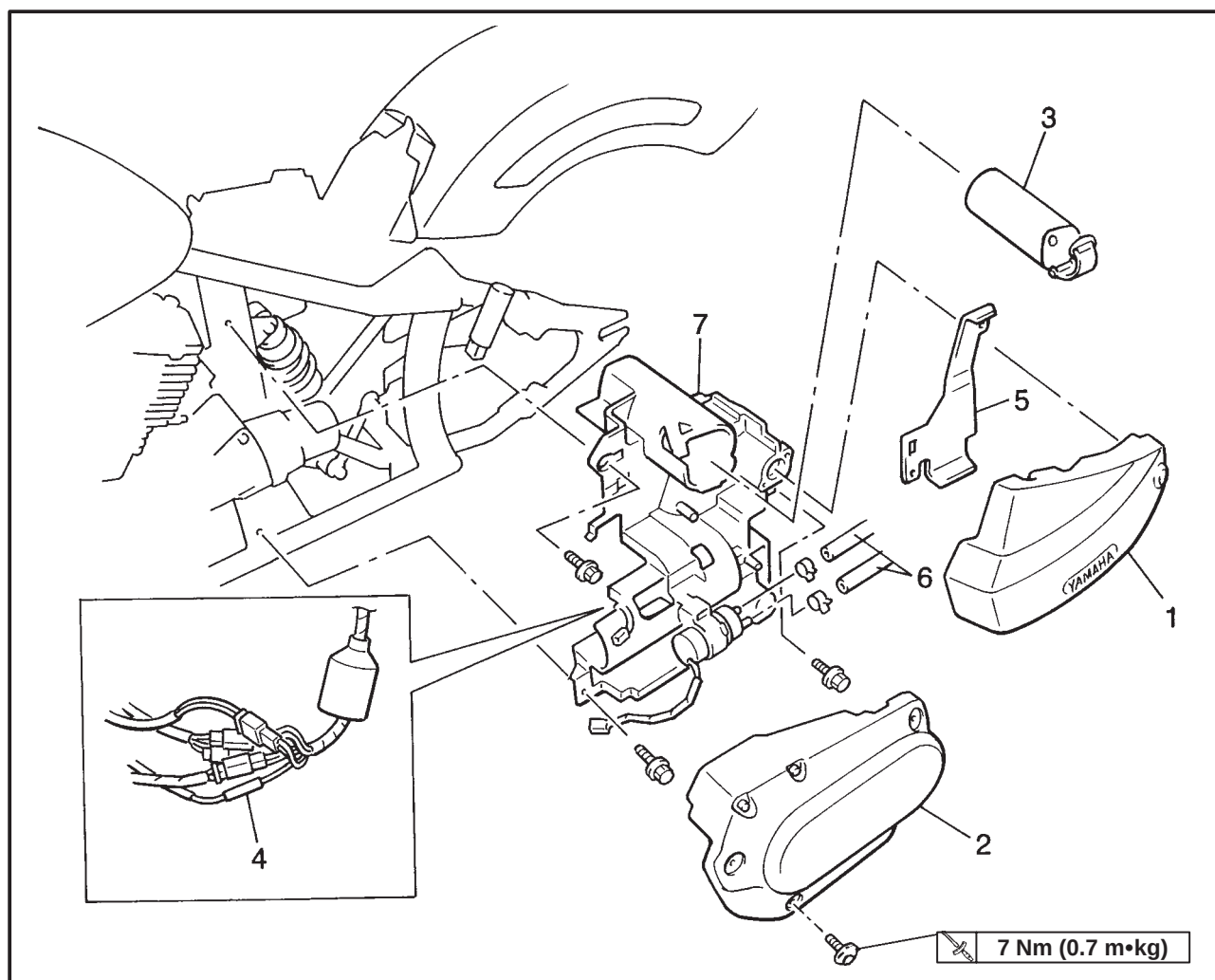
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## REAR SHOCK ABSORBER AND SWINGARM RIGHT SIDE COVER AND BATTERY BOX



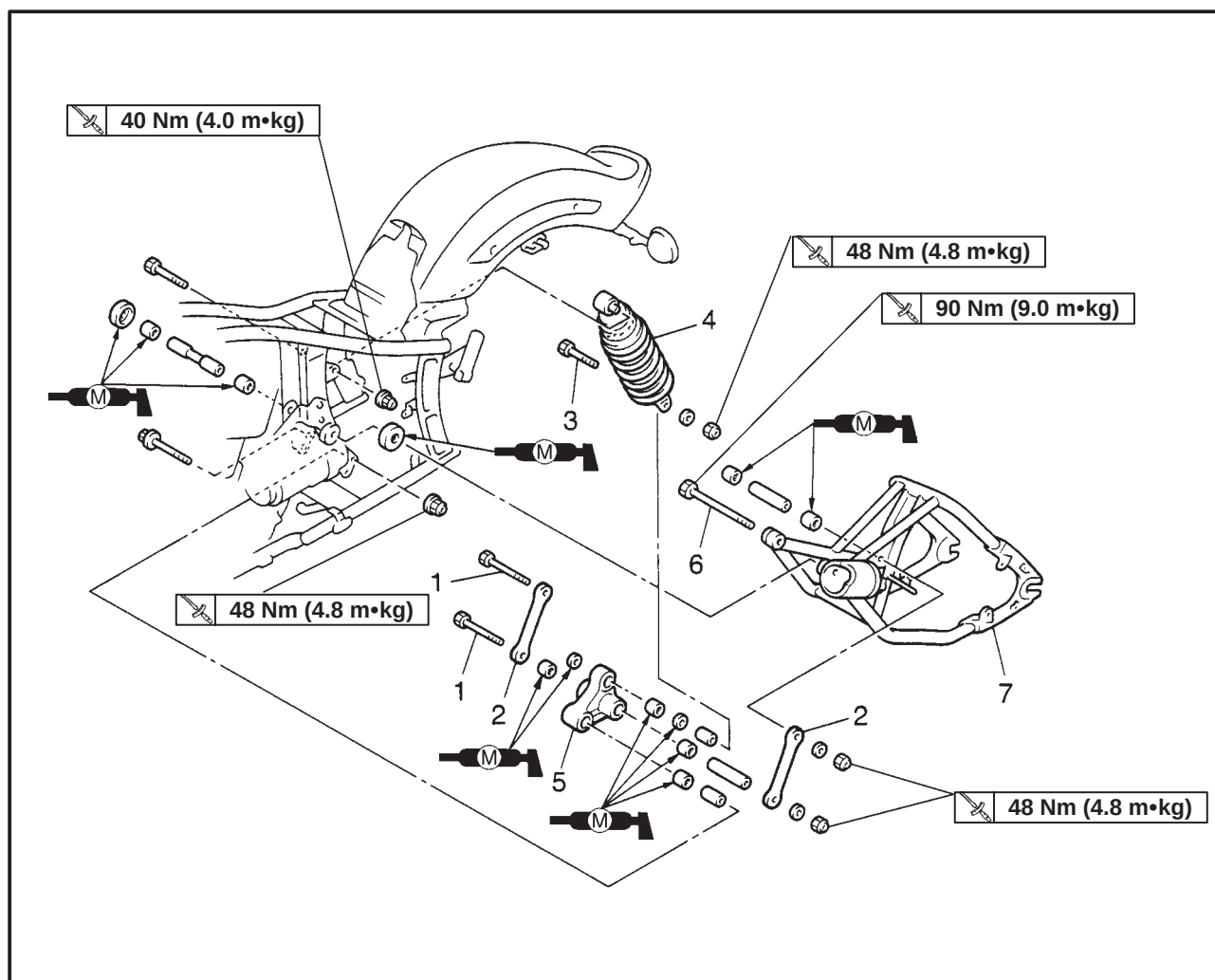
| Order | Job name/Part name                                    | Q'ty | Remarks                                                                                                                     |
|-------|-------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the right side cover and battery box.</b> |      |                                                                                                                             |
|       | Seats                                                 |      | Remove the parts in the order listed. Stand the motorcycle on a level surface. Refer to "FUEL TANK AND SEATS" in CHAPTER 3. |
|       | Muffler assembly                                      |      | Refer to "REAR WHEEL AND BRAKE DISC".                                                                                       |
| 1     | Battery cover                                         | 1    |                                                                                                                             |
| 2     | Right side cover                                      | 1    |                                                                                                                             |
| 3     | Battery                                               | 1    | Refer to "REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY".                                                            |
| 4     | Battery box                                           | 1    | For installation, reverse the removal procedure.                                                                            |

## LEFT SIDE COVER AND TOOL BOX



| Order | Job name/Part name                               | Q'ty | Remarks                                          |
|-------|--------------------------------------------------|------|--------------------------------------------------|
|       | <b>Removing the left side cover and tool box</b> |      | Remove the parts in order listed.                |
| 1     | Tool box cover                                   | 1    |                                                  |
| 2     | Left side cover                                  | 1    |                                                  |
| 3     | Owner's tool kit                                 | 1    |                                                  |
| 4     | Connector's                                      | —    | Disconnect                                       |
| 5     | Fuel hose holder                                 | 1    |                                                  |
| 6     | Fuel hoses                                       | 2    | Disconnect                                       |
| 7     | Tool box                                         | 1    |                                                  |
|       |                                                  |      | For installation, reverse the removal procedure. |

## REAR SHOCK ABSORBER AND SWINGARM



| Order | Job name/Part name                                   | Q'ty | Remarks                                                          |
|-------|------------------------------------------------------|------|------------------------------------------------------------------|
|       | <b>Removing the rear shock absorber and swingarm</b> |      | Remove the parts in order listed.                                |
|       | Rear wheel                                           |      | Refer to "REAR WHEEL AND BRAKE DISC".                            |
| 1     | Connecting arm bolts                                 | 2    | Refer to "REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY". |
| 2     | Connecting arms                                      | 2    |                                                                  |
| 3     | Rear shock absorber lower bolt                       | 1    | Refer to "REMOVING/INSTALLING THE SWINGARM".                     |
| 4     | Rear shock absorber                                  | 1    |                                                                  |
| 5     | Relay arm                                            | 1    | For installation, reverse the removal procedure.                 |
| 6     | Pivot shaft                                          | 1    |                                                                  |
| 7     | Swingarm                                             | 1    |                                                                  |





EAS00694

### REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

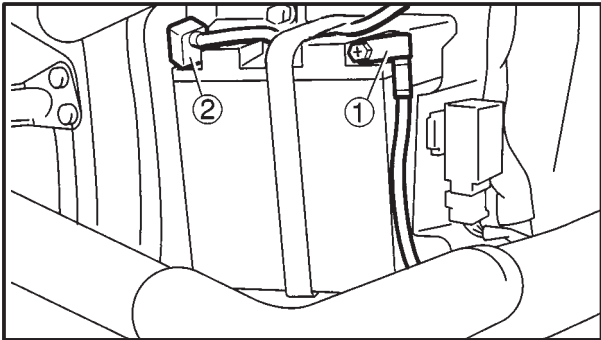
1. Stand the motorcycle on a level surface.

#### **⚠ 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.

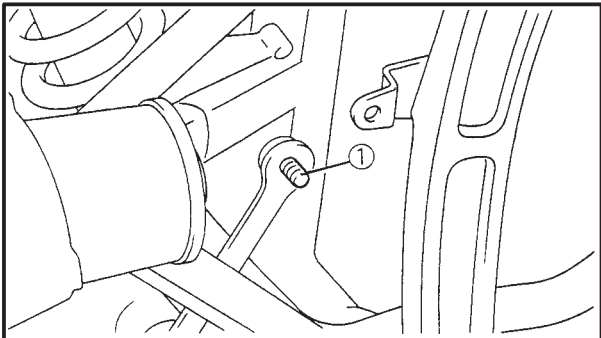


2. Disconnect:

- 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



EAS00702

## REMOVING THE SWINGARM

1. Stand the motorcycle on a level surface.

### **WARNING**

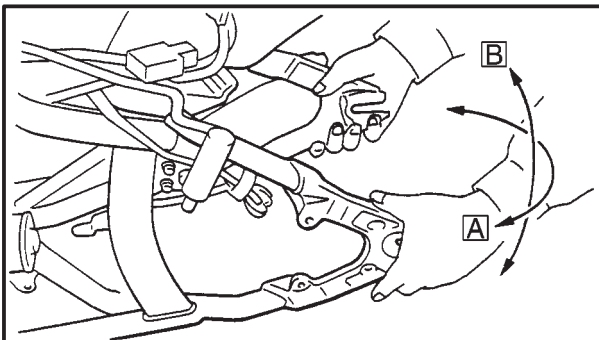
Securely support the motorcycle so that there is no danger of it falling over.

### **NOTE:**

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

2. Remove:

- rear shock absorber



3. Check:

- swingarm side play
- swingarm vertical movement

- a. Check the tightening torque of the swingarm pivot bolts and locknut.



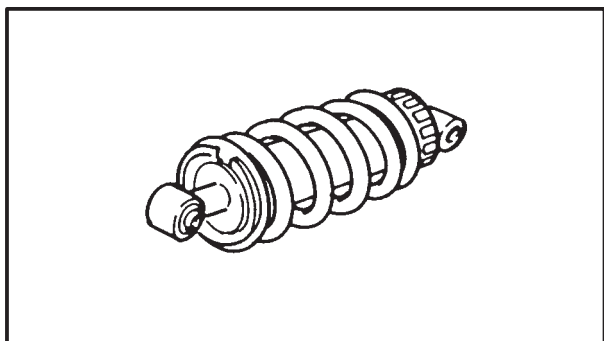
**Locknut**  
**90 Nm (9.0 m•kg)**

- 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**

- 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.

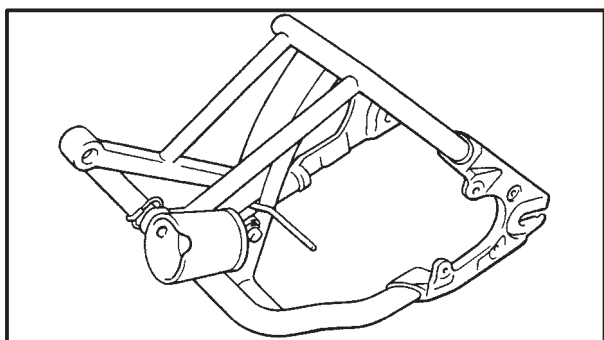


EAS00696

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY 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.



EAS00708

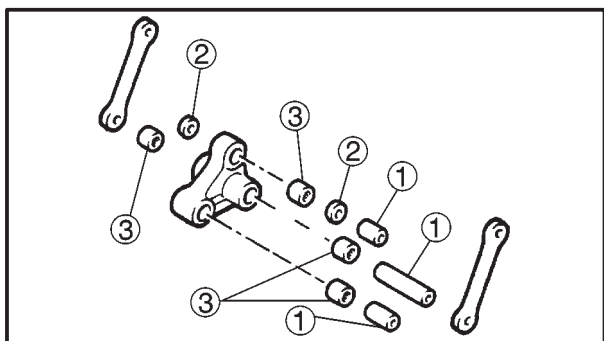
## CHECKING THE SWINGARM

### 1. Check:

- swingarm  
Bends/cracks/damage → Replace.

### 2. Check:

- pivot shaft  
Damage/wear → Replace.



### 3. Check:

- collars ①
- oil seals ②
- bearings ③  
Damage/wear → Replace.

EAS00698

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
  - swingarm  
Refer to "INSTALLING THE SWINGARM".
2. Lubricate:
  - spacers
  - bearings

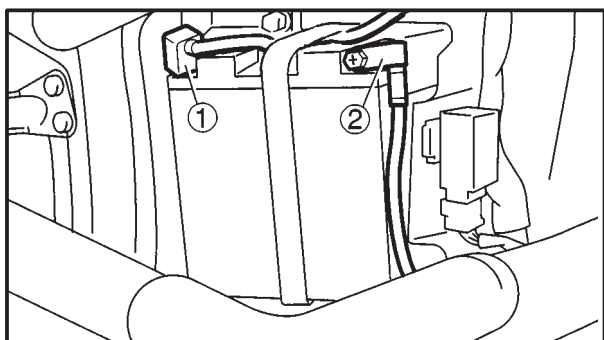


**Recommended lubricant**  
**Molybdenum disulfide grease**

3. Install:
  - rear shock absorber assembly



**Rear shock absorber assembly upper nut**  
**40 Nm (4.0 m•kg)**  
**Rear shock absorber assembly lower nut**  
**48 Nm (4.8 m•kg)**  
**Relay-arm-to-frame-nut**  
**48 Nm (4.8 m•kg)**



### NOTE:

- When installing the rear shock absorber assembly, lift up the swingarm.
- Install the connecting arm front bolt from the right.

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

### CAUTION:

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

EAS00712

## INSTALLING THE SWINGARM

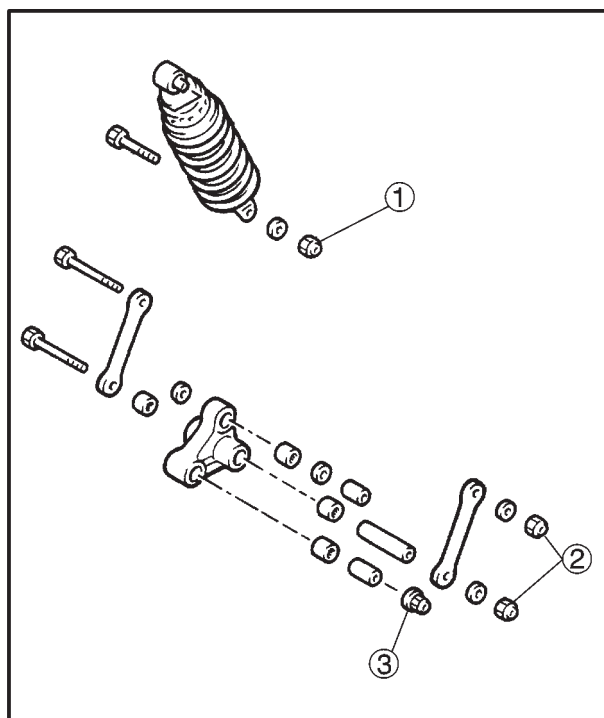
1. Lubricate:
  - bearings
  - spacers
  - oil seals



**Recommended lubricant**  
**Molybdenum disulfide grease**

## REAR SHOCK ABSORBER AND SWINGARM

CHAS



2. Install:
- relay arm
  - left connecting arm
  - right connecting arm



### Rear-shock-absorber-assembly lower nut ①

48 Nm (4.8 m•kg)

### Connecting arm nuts ②

48 Nm (4.8 m•kg)

### Relay-arm-to-frame-nut ③

48 Nm (4.8 m•kg)

3. Install:
- rear shock absorber  
Refer to "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY".
4. Install:
- rear wheel  
Refer to "REAR WHEEL AND BRAKE DISC".



## SHAFT DRIVE

EAS00715

### TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

| A  | Symptoms                                                                                                                                                                     | B                                                                                                                                                                                                                  | Possible causes |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1. | A pronounced hesitation or jerky movement during acceleration, deceleration, or sustained speeds. (not to be confused with engine surging or transmissionrelated movements.) | A. Bearing damage<br>B. Improper gear lash<br>C.Damaged gear teeth<br>D.Broken drive shaft<br>E. Broken gear teeth<br>F. Seizure due to lack of lubrication<br>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                                                                                    |                                                                                                                                                                                                                    |                 |

#### NOTE:

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.



**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.

** 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

** 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.**

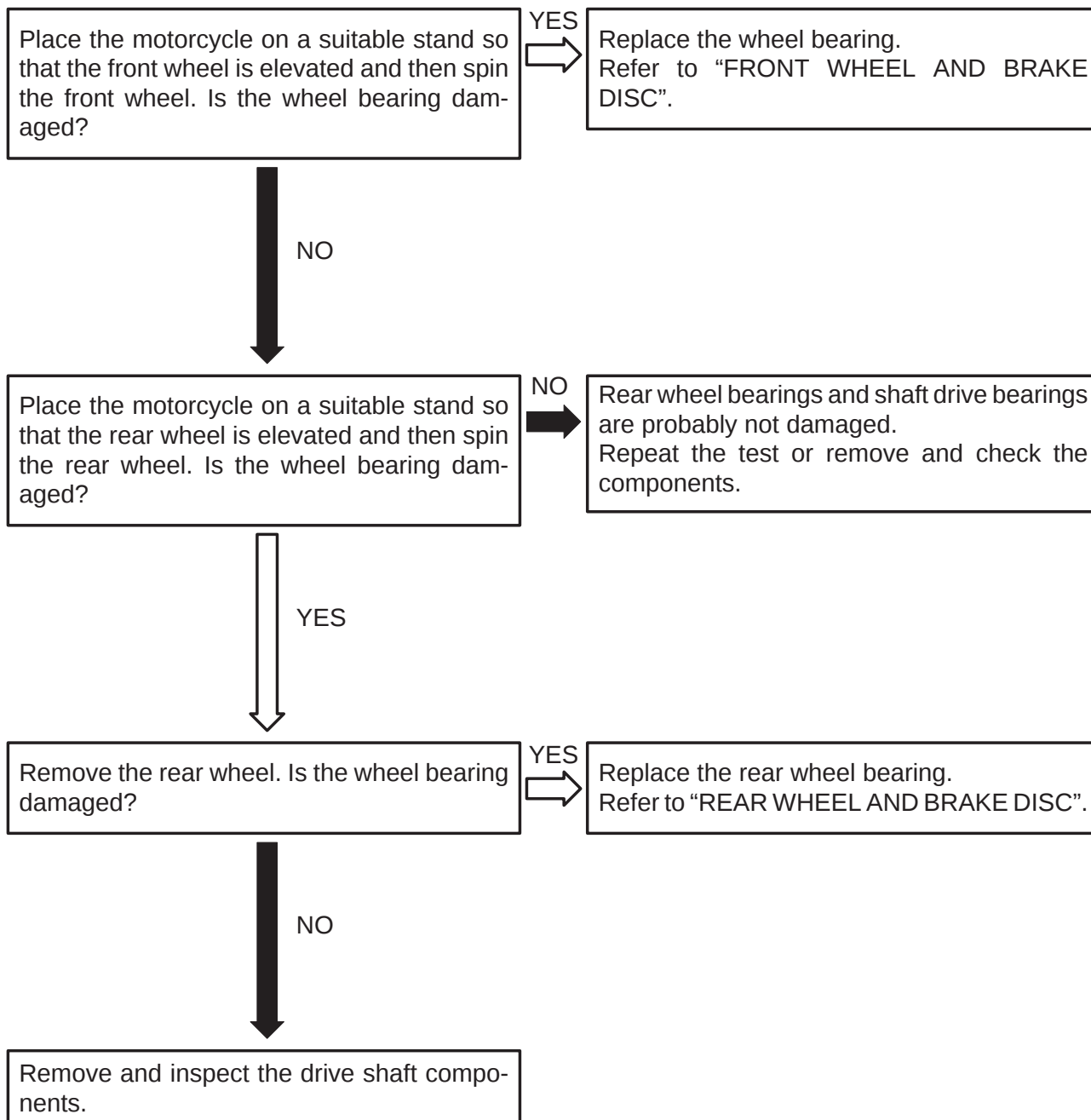




EAS00716

**Troubleshooting chart**

When causes A and B shown in the chart at the beginning of the “TROUBLESHOOTING” section exist, check the following points:



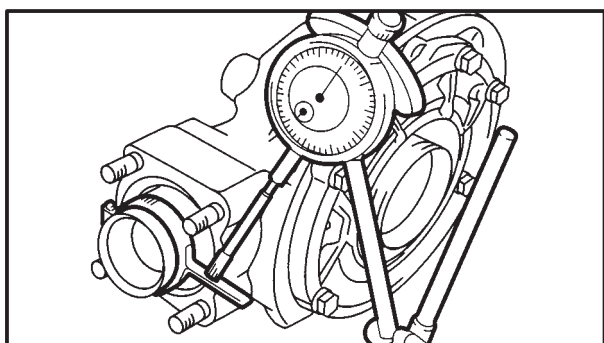




EAS00719

**MEASURING THE RING GEAR BACKLASH**

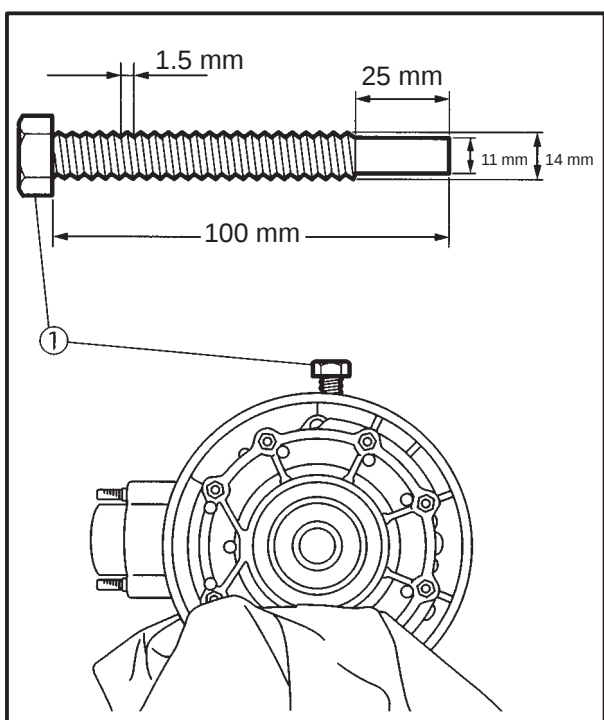
1. Secure the final drive assembly in a vise.
2. Remove:
  - final drive oil drain bolt
3. Drain:
  - final drive oil  
(from the final drive assembly)



4. Measure:
  - ring gear backlash  
Out of specification → Adjust.



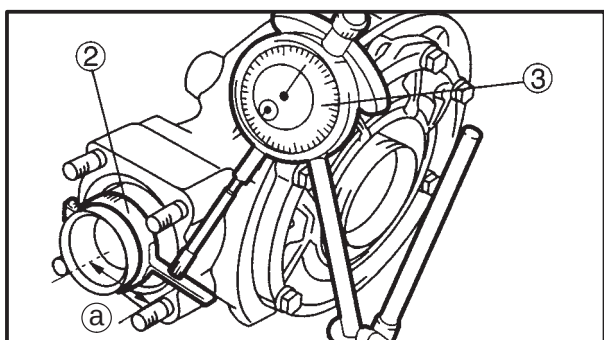
**Ring gear backlash**  
**0.1 ~ 0.2 mm**



- 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

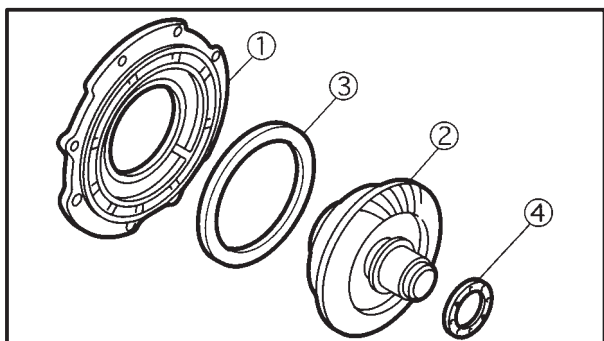
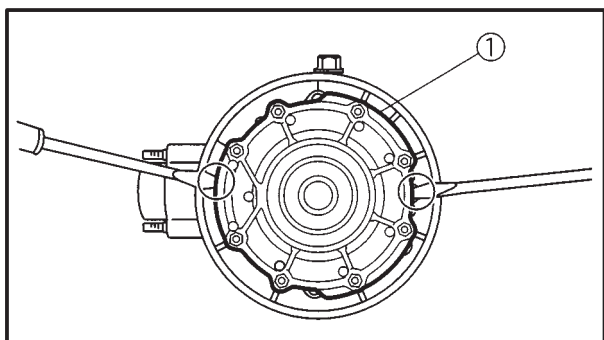
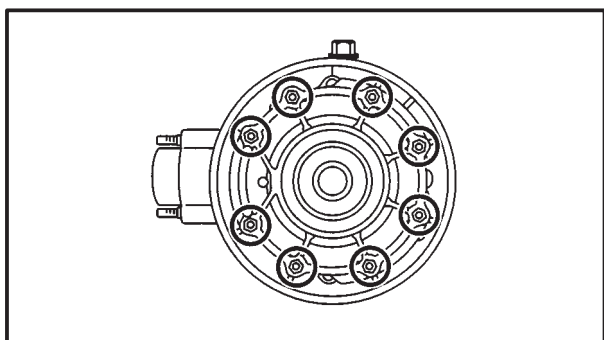


**Final gear backlash band**  
**90890-01230**

- a. Dial-gauge-plunger contact point: 54.5 mm
- 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.



FAS00720

## 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.

|              |                                  |
|--------------|----------------------------------|
| Thinner shim | Ring gear backlash is increased. |
| Thicker shim | Ring gear backlash is decreased. |

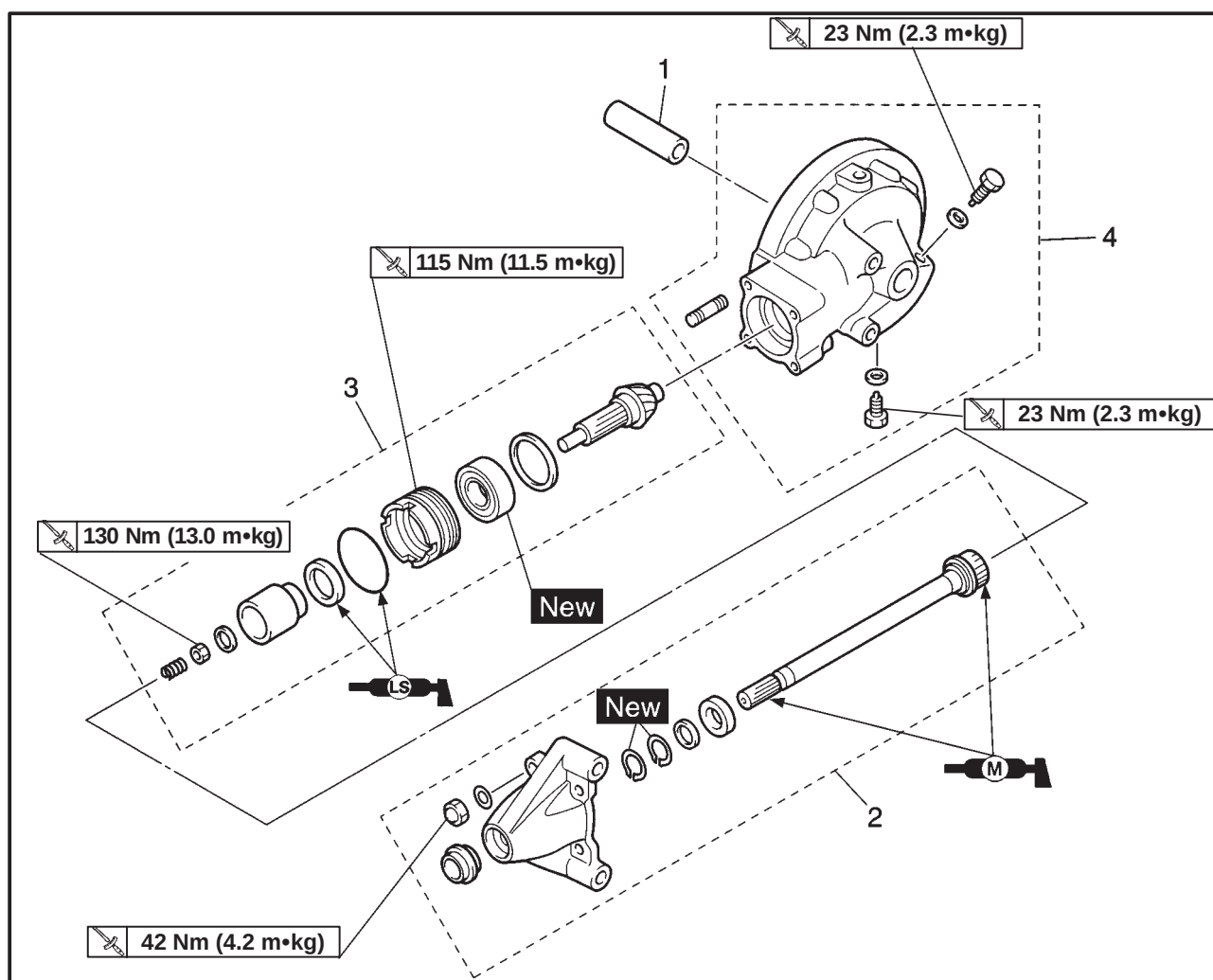


- b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
- c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

**Rig gear shims****Thickness (mm)****0.25, 0.30, 0.40****Thrust washers****Thickness (mm)****1.2, 1.4, 1.6, 1.8, 2.0**



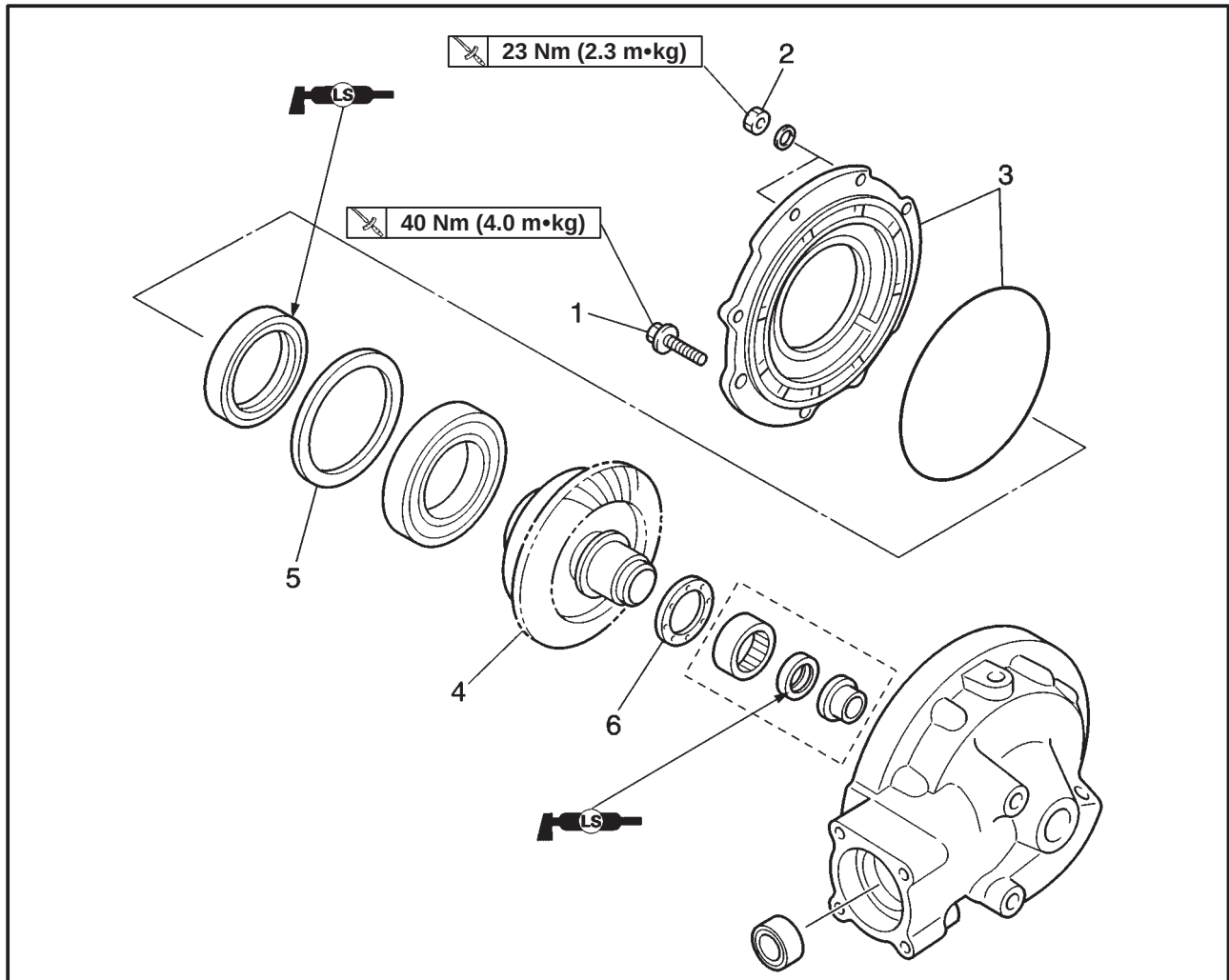
## FINAL DRIVE ASSEMBLY AND DRIVE SHAFT



| Order | Job name/Part name                                        | Q'ty | Remarks                                                                                                    |
|-------|-----------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------|
|       | <b>Removing the final drive assembly and drive shaft.</b> |      | Remove the parts in the order listed.<br>Stand the motorcycle on a level surface.                          |
|       |                                                           |      | <b>⚠ WARNING</b> _____<br><b>Securely support the motorcycle so there is no danger of it falling over.</b> |
|       | Rear wheel assembly                                       |      | Refer to "REAR WHEEL AND BRAKE DISC".                                                                      |
| 1     | Collar                                                    | 1    |                                                                                                            |
| 2     | Drive shaft assembly                                      | 1    |                                                                                                            |
| 3     | Final drive pinion gear assembly                          | 1    | Refer to "DISASSEMBLING THE FINAL DRIVE ASSEMBLY/ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR".      |
| 4     | Final gear assembly                                       | 1    | For installation, reverse the removal procedure.                                                           |



## FINAL GEAR



| Order | Job name/Part name                   | Q'ty | Remarks                                                                                                                                       |
|-------|--------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | <b>Disassembling the final gear.</b> | 2    | Disassemble the parts in the order listed.                                                                                                    |
| 2     | Bolts (bearing housing)              | 6    | <b>NOTE:</b> 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. |
|       | Nuts (bearing housing)               |      |                                                                                                                                               |
| 3     | Bearing housing/O-ring               | 1/1  |                                                                                                                                               |
| 4     | Ring gear                            | 1    |                                                                                                                                               |
| 5     | Shim (s)                             | 1    |                                                                                                                                               |
| 6     | Thrust washer                        | 1    | For assembly, reverse the disassembly procedure.                                                                                              |



EAS00724

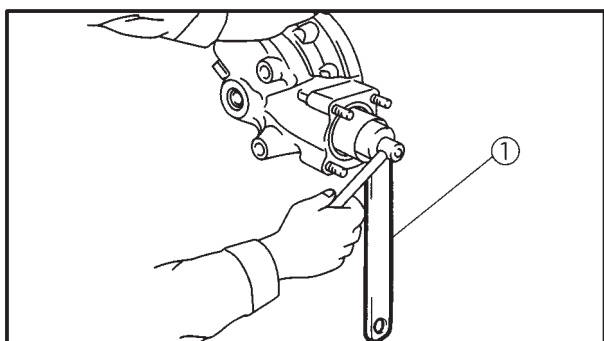
## DISASSEMBLING THE FINAL DRIVE ASSEMBLY

### 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))



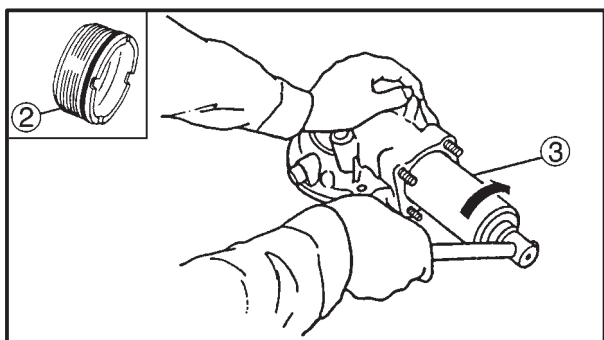
**Coupling gear/middle shaft tool**  
90890-01229

### 3. Remove:

- bearing retainer (2)  
(with the special tool (3))

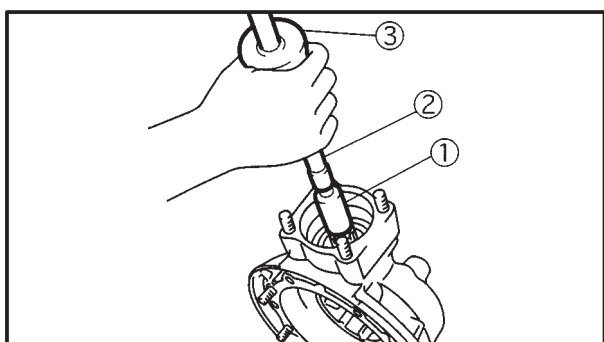


**Bearing retainer wrench**  
90890-04077



### 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)**  
90890-01277

**Armature shock puller (2)**  
90890-01290

**Weight (3)**  
90890-01291

### ⚠ WARNING

Always use new bearings.

### CAUTION:

The final drive pinion gear should only be removed if ring gear replacement is necessary.





**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":

$$\begin{aligned} A &= (84 + 1/100) - (83.50) \\ &= (84 + 0.01) - (83.50) \\ &= 84.01 - 83.50 \\ &= 0.51 \end{aligned}$$

Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thicknesses.

**Final drive pinion gear shim****Thickness (mm)****0.30, 0.40, 0.50**

Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

| Hundredths    | Rounded value |
|---------------|---------------|
| 0, 1, 2, 3, 4 | 0             |
| 5, 6, 7, 8, 9 | 10            |

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:

**Ring gear shim thickness**

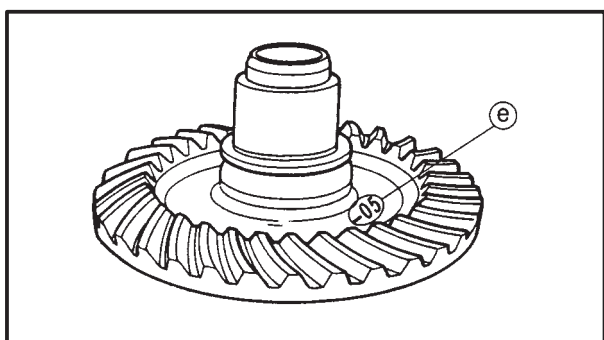
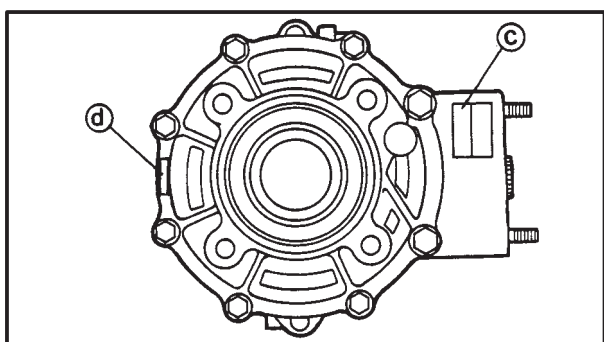
$$B = \textcircled{c} + \textcircled{d} - [(35.40 + \textcircled{e}/100) + \textcircled{f}]$$

**Where:**

Ⓒ = a numeral on the final drive housing.

Ⓓ = a numeral usually on the outside of the ring gear bearing housing.

Ⓔ = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to "35.40".





Ⓣ = the ring gear bearing thickness constant



**Ring gear bearing thickness“f”**  
**13.00 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:

$$\begin{aligned} B &= 45.51 + 3.35 - [(35.40 - 5/100) + 13] \\ &= 45.51 + 3.35 - [(35.40 - 0.05) + 13] \\ &= 48.86 - [35.35 + 13] \\ &= 48.86 - 48.35 \\ &= 0.51 \end{aligned}$$

Therefore, the calculated ring gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thickness.



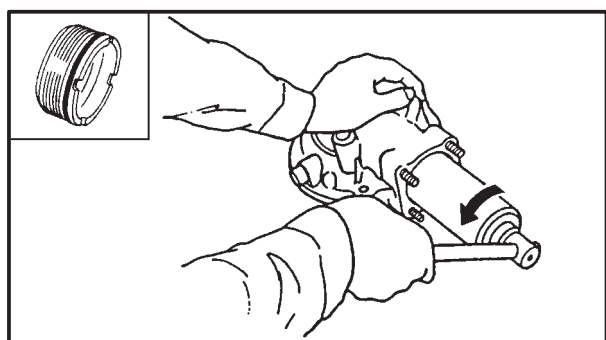
### Ring gear shim

|                |                  |
|----------------|------------------|
| Thickness (mm) | 0.30, 0.40, 0.50 |
|----------------|------------------|

Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

| Hundredths    | Rounded value |
|---------------|---------------|
| 0, 1, 2, 3, 4 | 0             |
| 5, 6, 7, 8, 9 | 10            |

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

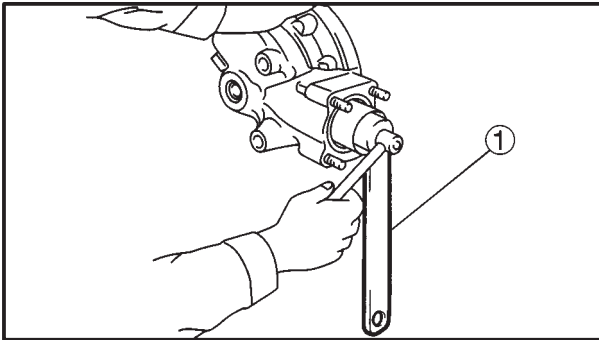


115Nm (11.5 m•kg)

(with the bearing retainer wrench)

**CAUTION:**

**The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counterclockwise.**



**Bearing retainer wrench**  
90890-04077

3. Install:

- gear coupling
- self-locking nut

(with the special tool ①)

**130 Nm (13.0 m•kg)**



**Coupling gear/middle shaft tool**  
90890-01229

**CAUTION:**

Apply **LOCTITE®** to the self-locking nut.

4. Install:

- ring gear bearing housing  
(along with the ring gear, but without the thrust washer)

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



- Remove the ring gear bearing housing (along with the ring gear).
- Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
- 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)**

**Ring gear bearing housing nut (M8)**

**23 Nm (2.3 m•kg)**

**NOTE:**

Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrust-washer clearance with Plastigauge®.

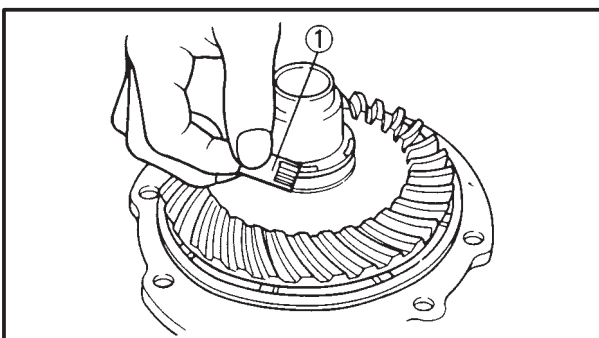
- Remove the ring gear bearing housing.
- Measure the width of the flattened Plastigauge® ①.



**Ring-gear-to-thrust-washer clearance**

**0.2 mm**

- If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).



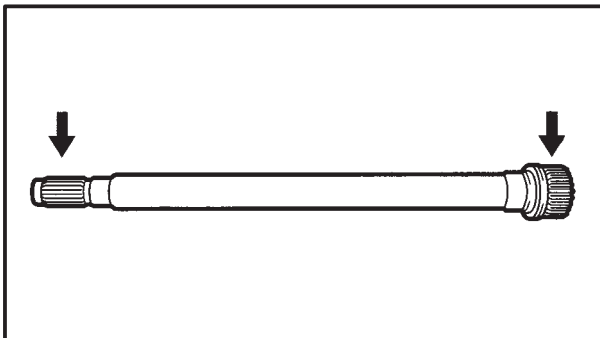


- g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
- h. Select the suitable thrust washer from the following chart.

| Thrust washer  |                         |
|----------------|-------------------------|
| Thickness (mm) | 1.2, 1.4, 1.6, 1.8, 2.0 |

- 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                               |



EAS00727

#### CHECKING THE DRIVE SHAFT

- Check:
  - drive shaft splines
 Damage/wear → Replace the drive shaft.

EAS00728

#### INSTALLING THE DRIVE SHAFT

- Lubricate:
  - drive shaft splines

| Recommended lubricant       |
|-----------------------------|
| Molybdenum disulfide grease |

- Apply:
  - sealant  
(onto both final drive housing mating surfaces)

| Yamaha bond No. 1215 |
|----------------------|
| 90890-85505          |

- Install:
  - drive shaft  
(to the final drive pinion gear)

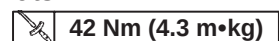
## SHAFT DRIVE

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### 4. Tighten:

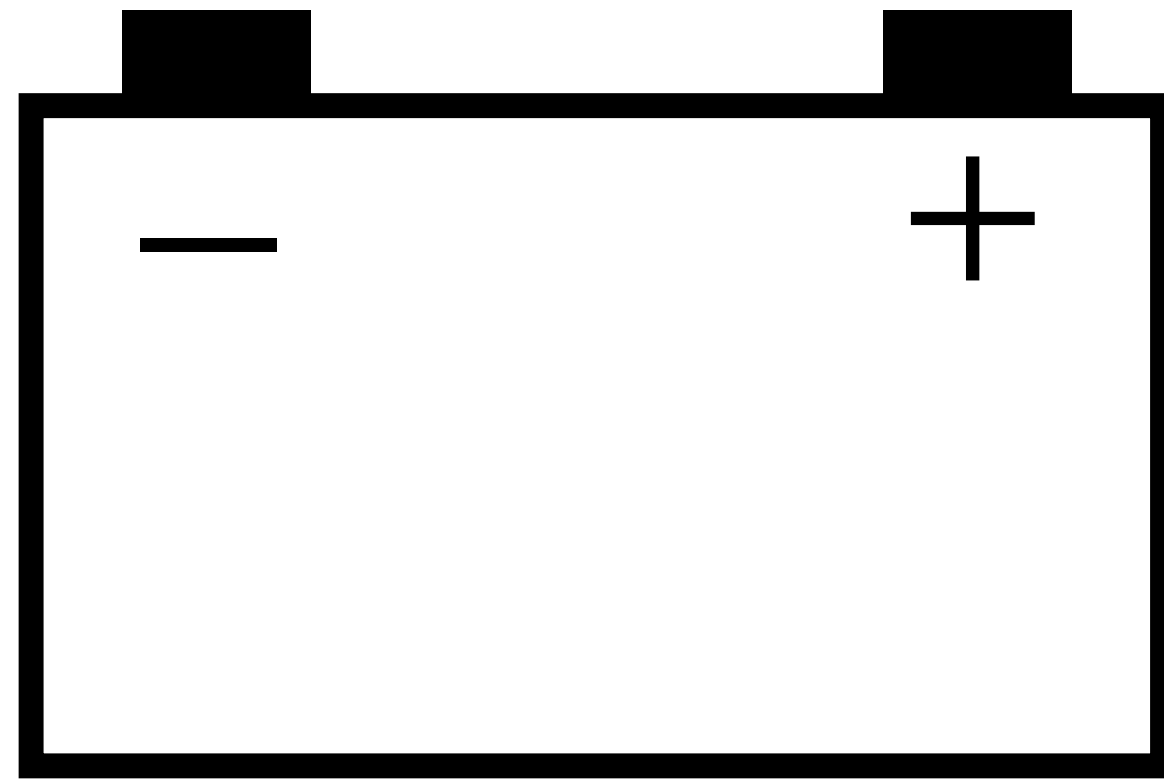
- final bearing housing nuts



### 5. Install:

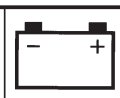
- rear wheel assembly

Refer to "REAR WHEEL AND BRAKE DISC".



**ELEC**

**7**



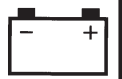
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## CHAPTER 7 ELECTRICAL

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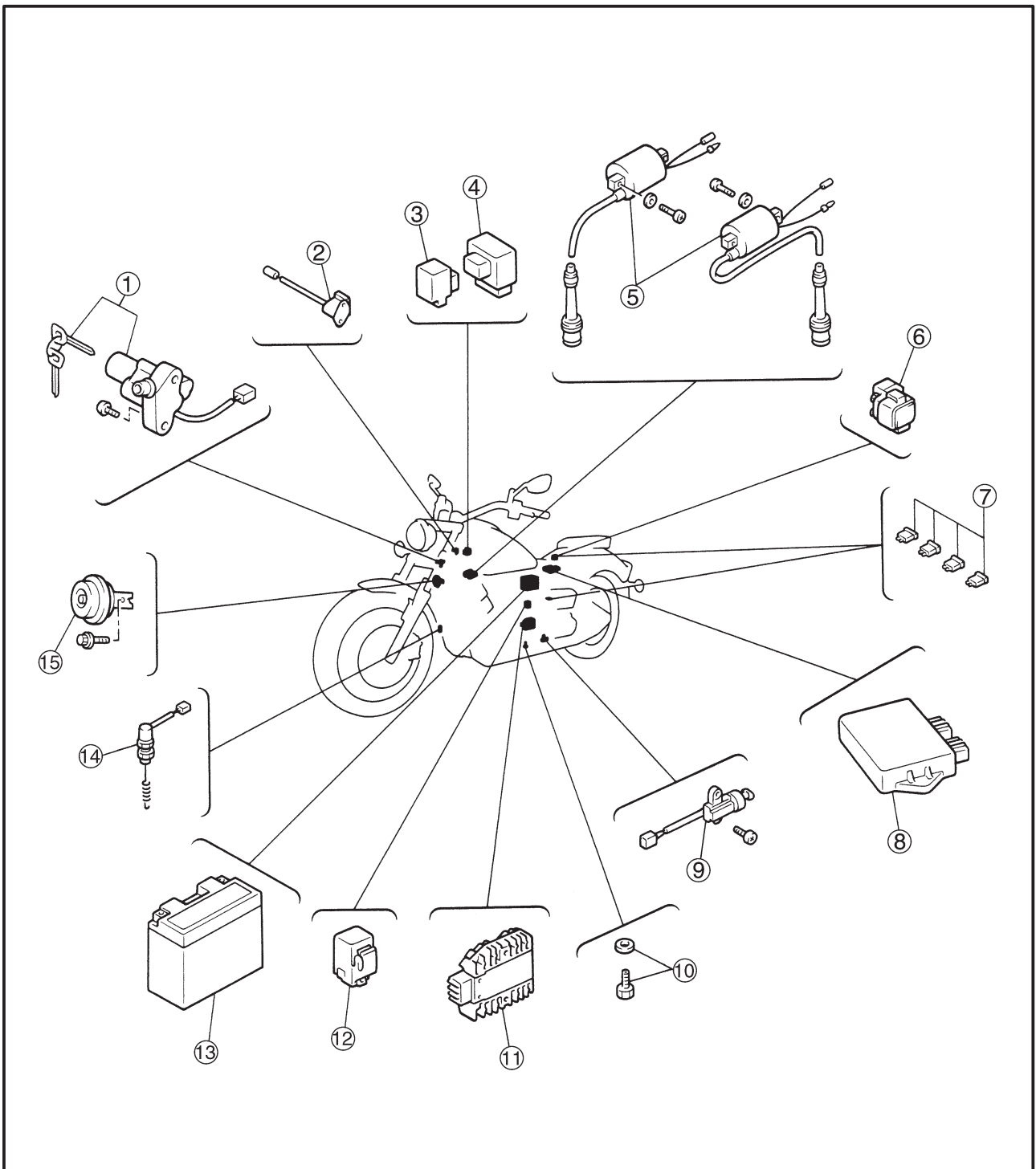


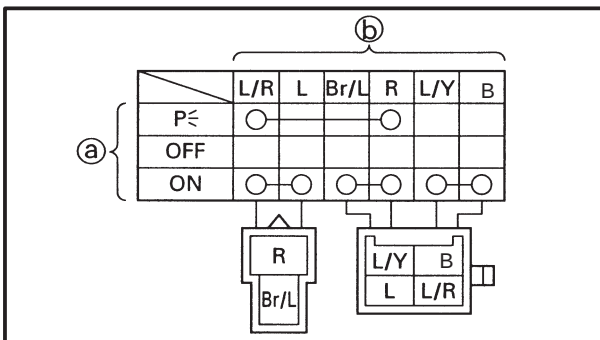
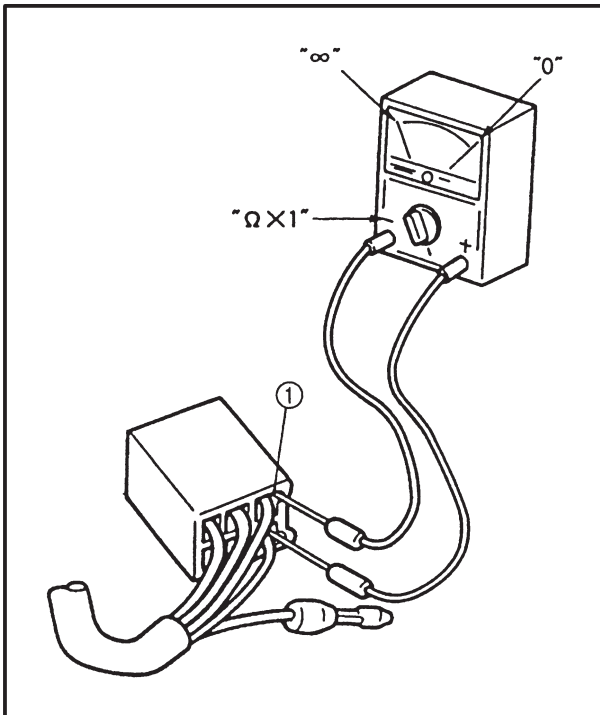
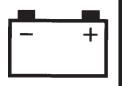
EB800000

## ELECTRICAL

## ELECTRICAL COMPONENTS

- |                                  |                       |
|----------------------------------|-----------------------|
| ① Main switch                    | ⑨ Side stand switch   |
| ② Thermo switch                  | ⑩ Neutral switch      |
| ③ Flasher relay                  | ⑪ Rectifier/regulator |
| ④ Starting circuit cut off relay | ⑫ Oil lamp relay      |
| ⑤ Ignition coil                  | ⑬ Battery             |
| ⑥ Starter relay                  | ⑭ Rear brake switch   |
| ⑦ Fuse                           | ⑮ Horn                |
| ⑧ Igniter unit                   |                       |





EAS0010

## 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  
90890-03112

#### NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " 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 ① are shown in the far left column and the switch lead colors ② 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 "P<".

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".



EAS00731

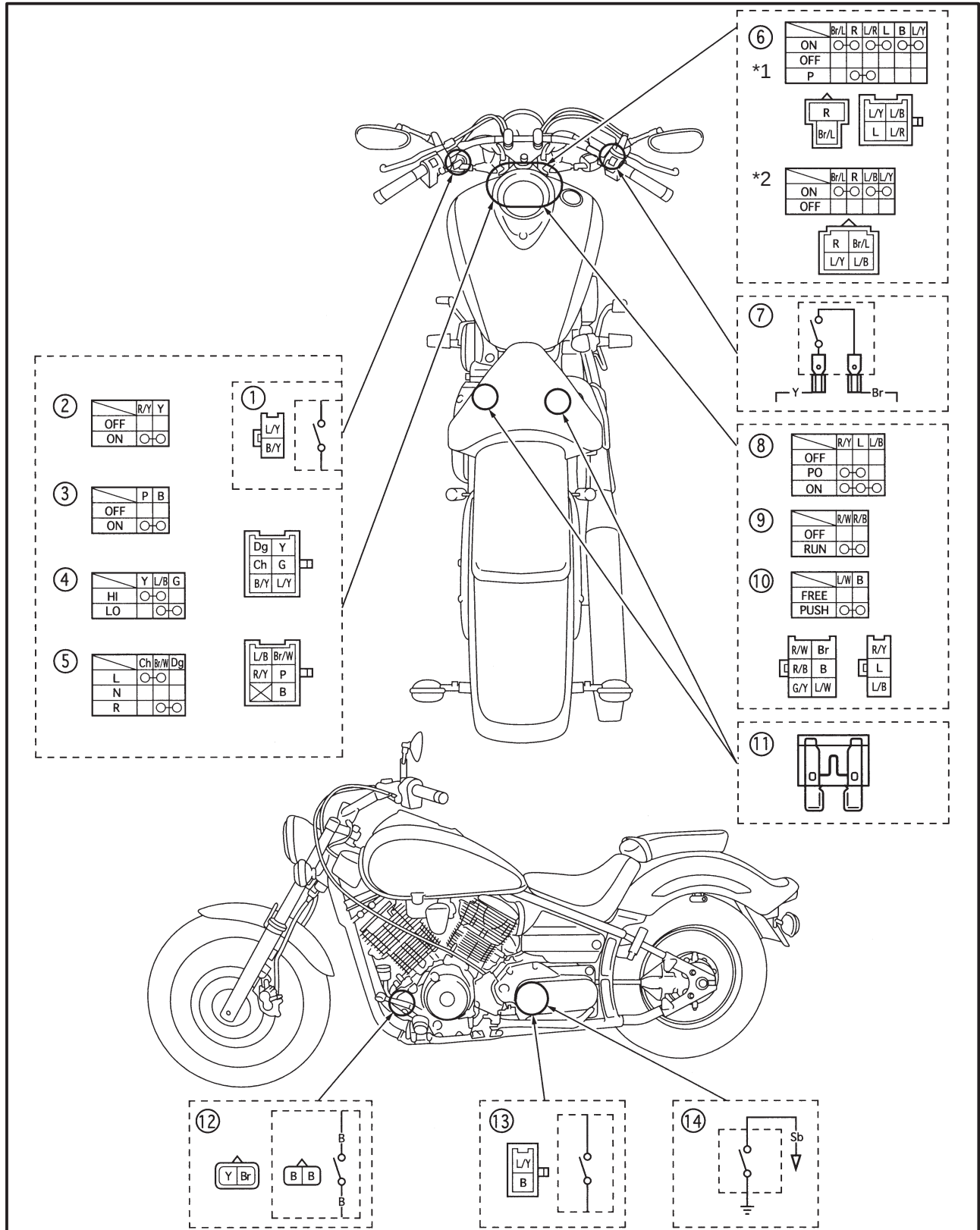
## CHECKING THE SWITCHES

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.



## CECKING THE SWITCHES

ELEC



- |                              |                      |
|------------------------------|----------------------|
| ① Clutch switch              | ⑨ Engine stop switch |
| ② Pass switch                | ⑩ Start switch       |
| ③ Horn switch                | ⑪ Fuse               |
| ④ Dimmer switch              | ⑫ Rear brake switch  |
| ⑤ Turn switch                | ⑬ Sidestand switch   |
| ⑥ Main switch                | ⑭ Neutral switch     |
| ⑦ Front brake switch         | *1: for Europe       |
| ⑧ Lights switch (for Europe) | *2: for AUS          |



EAS00732

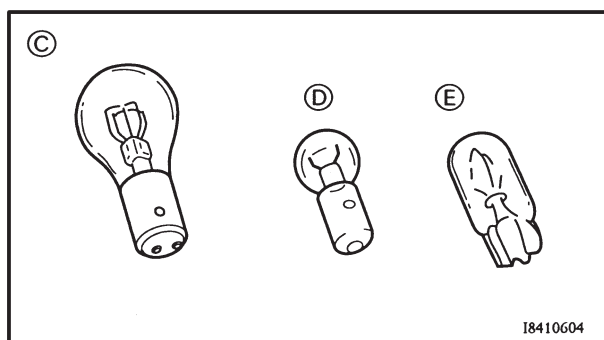
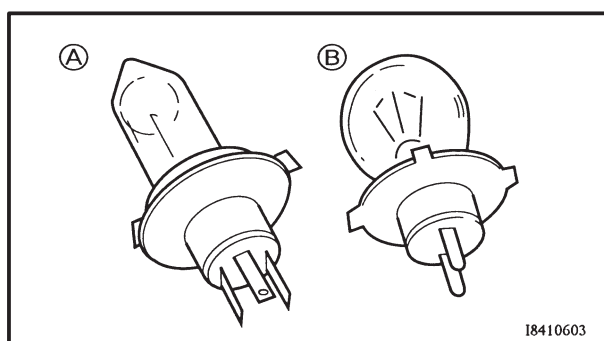
## CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/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 ① and ② 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 ③ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs ④ and ⑤ are used for meter and indicator lights and can be removed from their respective socket by turn ④ and pulling ⑤ them out.

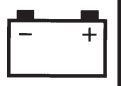
## CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:
  - bulb

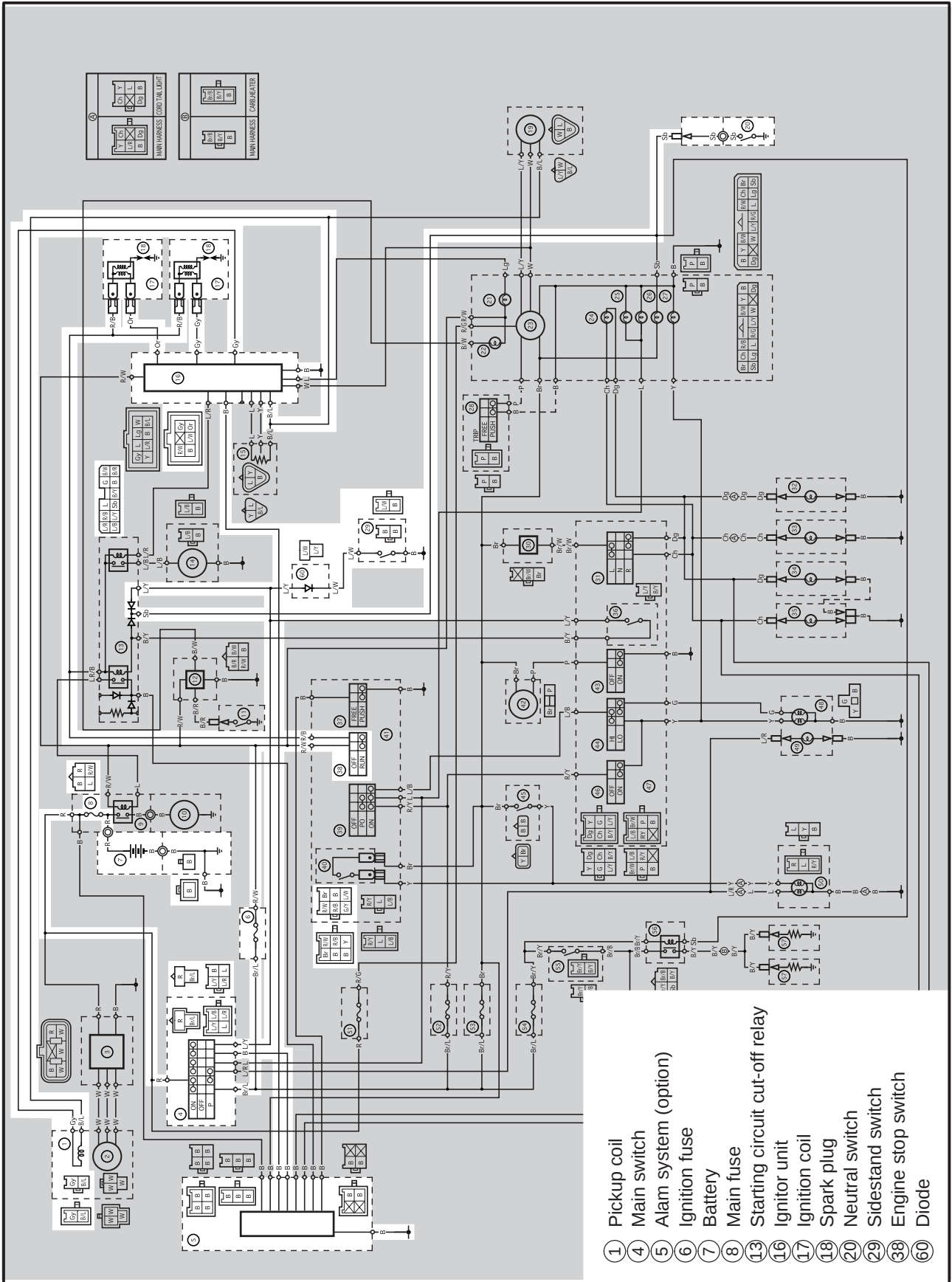






EB802000

## IGNITION SYSTEM CIRCUIT DIAGRAM





EAS00737

### 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).



**Ignition checker**  
**90890-06754**  
**Pocket tester**  
**90890-03112**

EAS00738

#### 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).

EAS00739

#### 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**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00741

#### 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**

- 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.

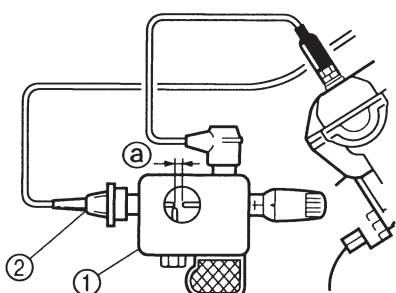


EAS00743

### 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 ① as shown.
- ② Spark plug cap
- Set the main switch to "ON".
- Measure the ignition spark gap (a).
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



18110202



**Min. ignition spark gap**  
**6 mm**

- Is there a spark and is the spark gap within specification ?

NO

YES

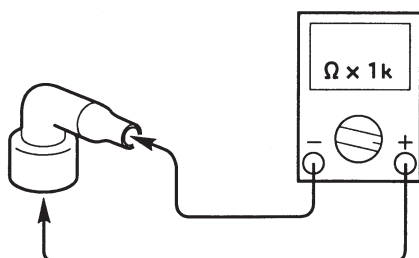
The ignition system is OK.

EAS00745

### 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 ( $\Omega \times 1k$ ) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



18040101



**Spark plug cap resistance**  
**10 k $\Omega$  at 20 °C**

- Is the spark plug cap OK?

YES

NO

Replace the spark plug cap.

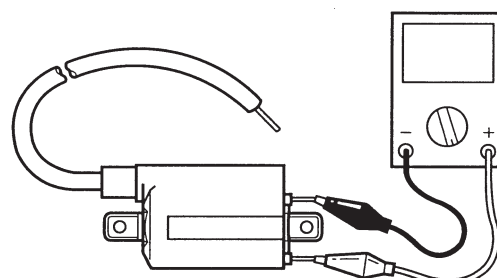
EAS00747

### 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 ( $\Omega \times 1$ ) to the ignition coil as shown.

**Tester positive probe → red/black**  
**Tester negative probe → orange (gray)**



18110104

- Measure the primary coil resistance.



**Primary coil resistance**  
**3.57 ~ 4.83  $\Omega$  at 20 °C**

- Connect the pocket tester ( $\Omega \times 1k$ ) 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**

## IGNITION SYSTEM

**ELEC**



373-021

**Secondary coil resistance**  
10.7 ~ 14.5 kΩ 20 °C

- Is the ignition coil OK?

YES

NO

Replace the ignition coil.

EAS00748

**7. Pickup coil resistance**

- Disconnect the pickup coil coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 100$ ) to the pickup coil terminal.

**Tester positive probe → gray ①**  
**Tester negative probe → black/blue ②**

① Gy  
② B/L

- Measure the pickup coil resistance.

**Pickup coil resistance**  
189 ~ 231 Ω at 20 °C  
(between gray and black/blue)

- Is the pickup coil OK?

YES

NO

Replace the pickup coil.

EAS00749

### 8. Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES

NO

Replace the main switch.

EAS00750

### 9. 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.

EAS00751

### 10. Neutral switch

- Check the neutral switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?

YES

NO

Replace the neutral switch.

EAS00752

### 11. Sidestand switch

- Check the sidestand switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the sidestand switch OK?

YES

NO

Replace the side-stand switch.



12. Diode

- Remove the diode from the wire harness.
- Check for continuity as follows:

|                                 |               |
|---------------------------------|---------------|
| Tester (+) lead → Blue/White ①  | Continuity    |
| Tester (-) lead → Blue/Yellow ② |               |
| Tester (+) lead → Blue/Yellow ② | No Continuity |
| Tester (-) lead → Blue/White ①  |               |

**NOTE:** \_\_\_\_\_  
When you switch the “-” and “+” leads of the digital pocket tester the readings in the above chart will be reversed.

Is the diode OK?



YES



NO

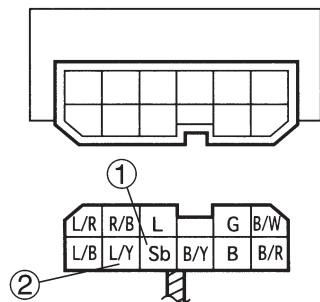
Replace the diode.

### 13. Starting circuit cut-off relay (diode)

- Remove the relay unit from the wire harness.
- Check for continuity as follows:  
Sky blue – Blue/Yellow ②

|                                 |               |
|---------------------------------|---------------|
| Tester (+) lead → SKY blue ①    | Continuity    |
| Tester (-) lead → Blue/Yellow ② |               |
| Tester (+) lead → Blue/Yellow ② | No Continuity |
| Tester (-) lead → Sky blue ①    |               |

**NOTE:** \_\_\_\_\_  
When you switch the “-” and “+” leads of the digital pocket tester the readings in the above chart will be reversed.



- Is the starting circuit cut-off relay (diode) OK?



YES



NO

Replace the starting circuit cut-off relay.

EAS00754

### 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

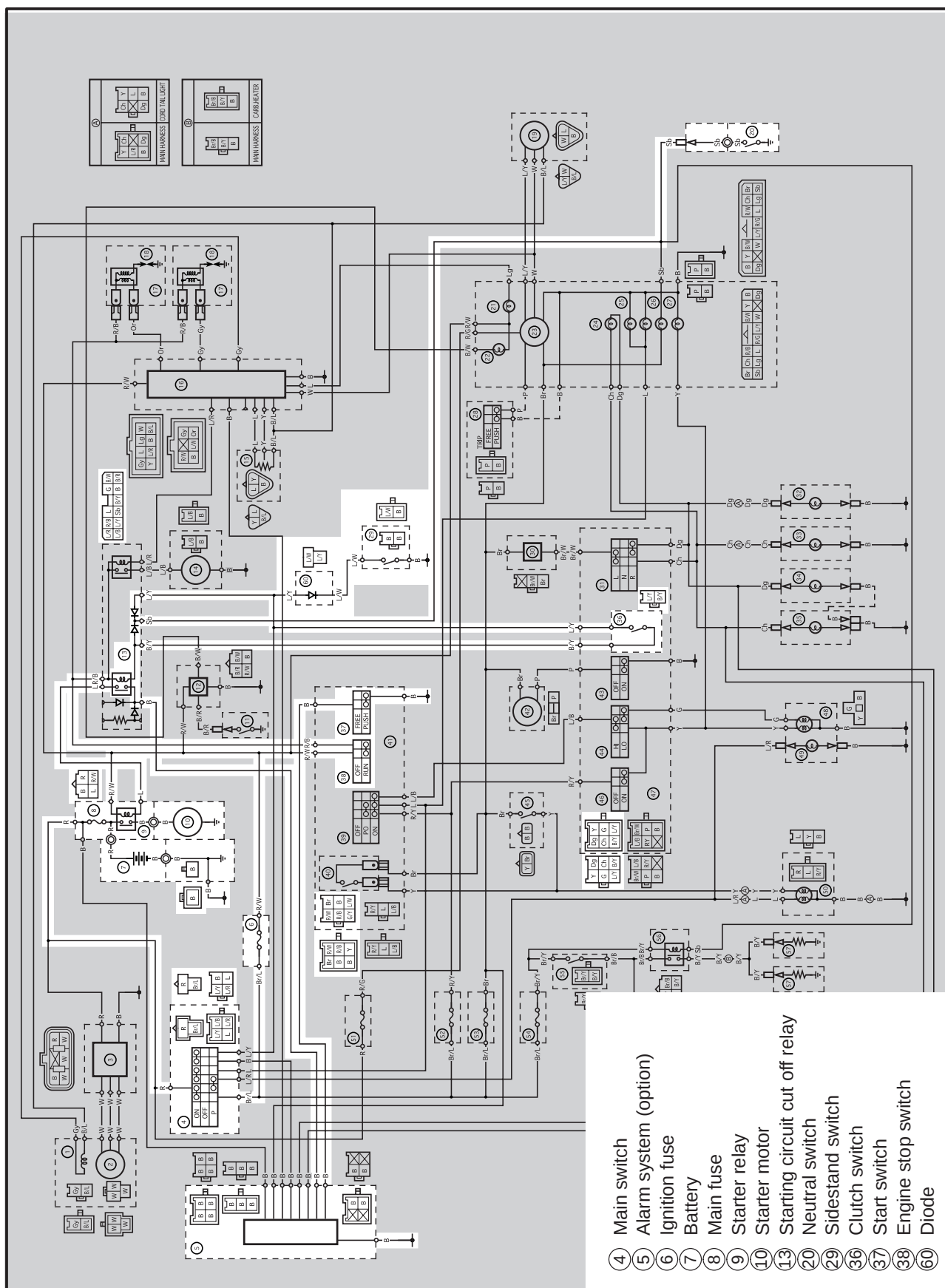
Properly connect or repair the ignition system's wiring.

Replace the ignitor unit.



EB803000

# ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM





EB803010

**STARTING CIRCUIT OPERATION**

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**

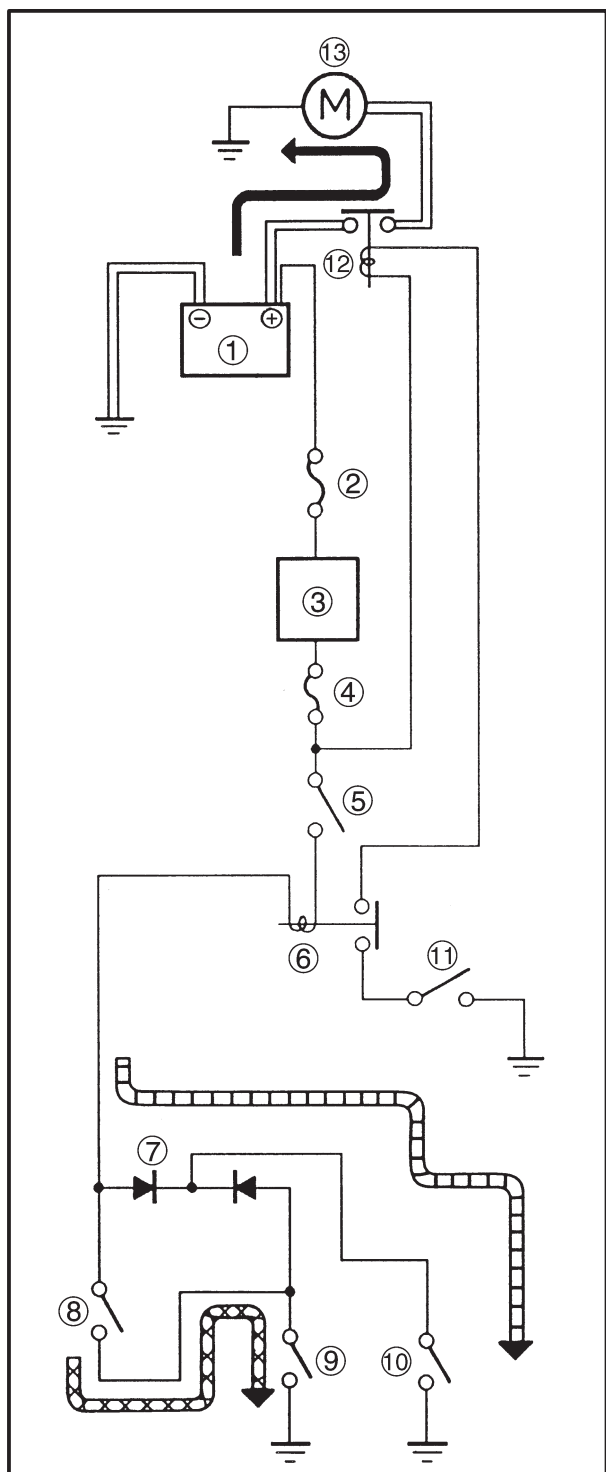
The clutch lever is pulled to the handlebar (the clutch switch is closed) and the side-stand is up (the sidestand switch is closed).

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.

← WHEN THE TRANSMISSION IS IN NEUTRAL

← WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN



- ① Battery
- ② Main fuse
- ③ Main switch
- ④ Ignition fuse
- ⑤ Engine stop switch
- ⑥ Starting circuit cut-off relay
- ⑦ Diode
- ⑧ Clutch switch
- ⑨ Sidestand switch
- ⑩ Neutral switch
- ⑪ Start switch
- ⑫ Starter relay
- ⑬ Starter motor



EAS00757

## 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**  
**90890-03112**

EAS00738

## 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).**

EAS00739

## 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**

- Is the battery OK?

YES

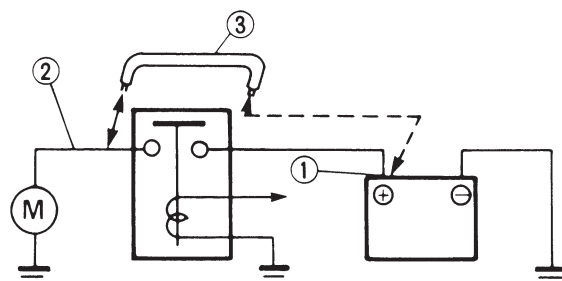
NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00758

## 3. Starter motor

- Connect the battery positive terminal ① and starter motor lead ② with a jumper lead ③.

**⚠ WARNING**

- A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.

- Does the starter motor turn?

YES

NO

**Repair or replace the starter motor.**



EAS00759

## 4. Starting circuit cutoff relay

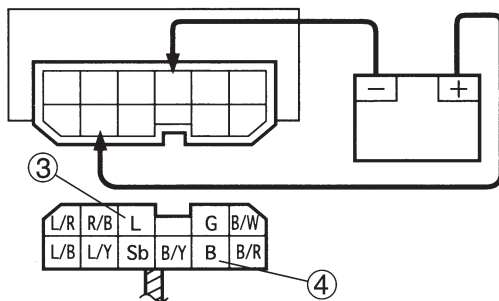
- Disconnect the relay unit from the coupler.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12V) to the relay unit terminals as shown.

Battery positive terminal → red/black ①

Battery negative terminal → black/yellow ②

Tester positive probe → blue ③

Tester negative probe → black ④



- Does the starting circuit cutoff relay have continuity between black and blue/white?



YES



NO

Replace the relay unit.

EAS00760

## 5. Starting circuit cutoff relay (Diode)

- Disconnect the starting circuit cutoff relay from the coupler.
- Connect the pocket tester ( $\Omega \times 1$ ) 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

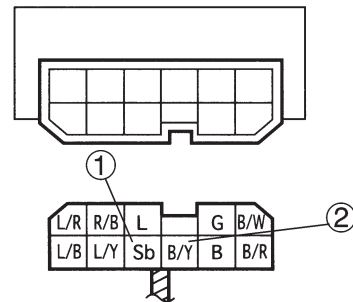
Tester negative probe → black/yellow ②

Continuity

Tester positive probe → black/yellow ②

Tester negative probe → sky blue ①

No continuity

**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?



YES



NO

Replace the relay unit.



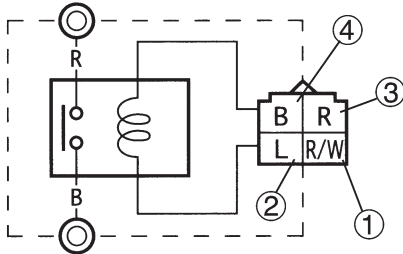
EAS00761

## 6. Starter relay

- Disconnect the starter relay from the coupler.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the starter relay coupler as shown.

**Battery positive terminal** → red/white ①  
**Battery negative terminal** → blue ②

**Tester positive probe** → red ③  
**Tester negative probe** → black ④



- Does the starter relay have continuity between red and black?

↓ YES

↓ NO

Replace the starter relay.

EAS00749

## 7. Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

↓ YES

↓ NO

Replace the main switch.

EAS00750

## 8. 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.

EAS00751

## 9. Neutral switch

- Check the neutral switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?

↓ YES

↓ NO

Replace the neutral switch.

EAS00752

## 10. Sidestand switch

- Check the sidestand switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the sidestand switch OK?

↓ YES

↓ NO

Replace the sidestand switch.

EAS00763

## 11. Clutch switch

- Check the clutch switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the clutch switch OK?

↓ YES

↓ NO

Replace the clutch switch.



EAS00764

|                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. Start switch                                                                                                                                             |
| <ul style="list-style-type: none"><li>• Check the start switch for continuity. Refer to "CHECKING THE SWITCHES".</li><li>• Is the start switch OK?</li></ul> |

↓ YES

↓ NO

Replace the right handlebar switch.

|                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------|
| 13. Diode                                                                                                                                |
| <ul style="list-style-type: none"><li>• Check the diode for continuity. Refer to "IGNITION SYSTEM".</li><li>• Is the diode OK?</li></ul> |

↓ YES

↓ NO

Replace the diode.

EAS00766

|                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14. Wiring                                                                                                                                                                                                 |
| <ul style="list-style-type: none"><li>• Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM".</li><li>• Is the starting system's wiring properly connected and without defects?</li></ul> |

↓ NO

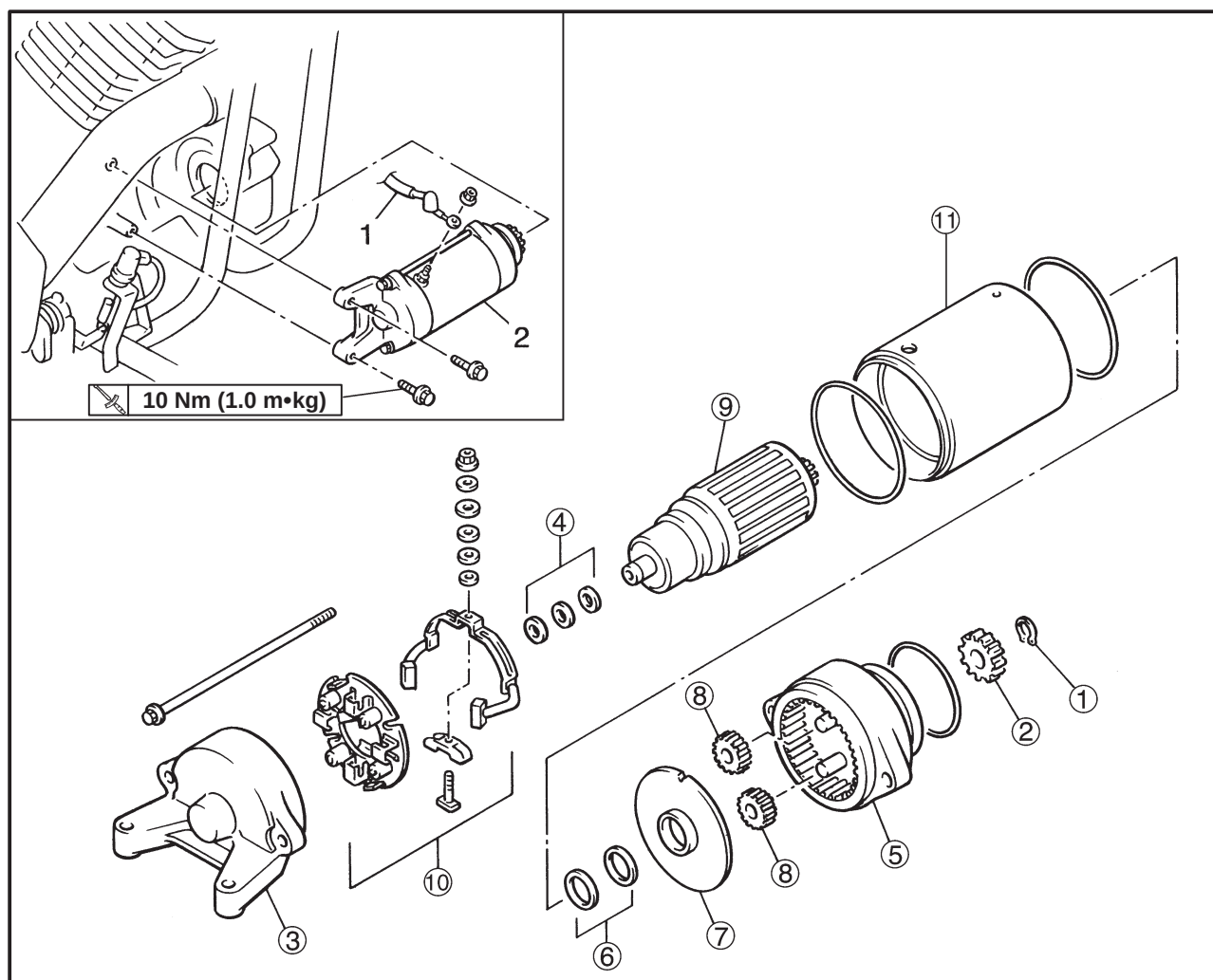
↓ YES

Properly connect or repair the starting system's wiring.

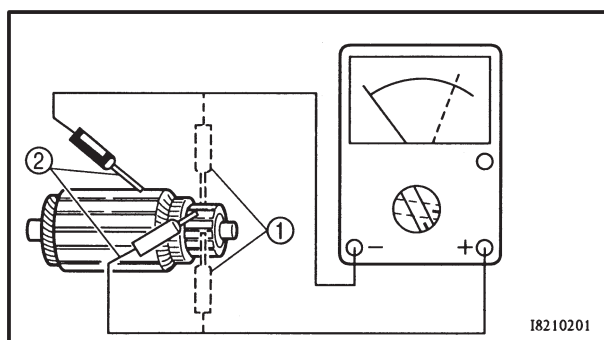
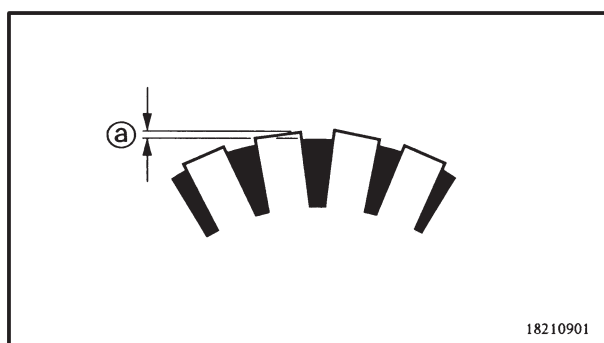
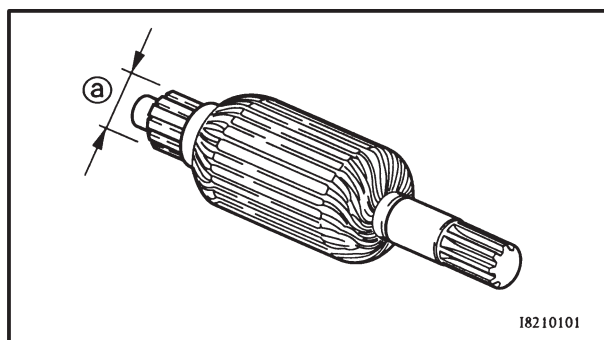
The starting system circuit is OK.



## STARTER MOTOR



| Order | Job name/Part name                     | Q'ty | Remarks                                          |
|-------|----------------------------------------|------|--------------------------------------------------|
| 1     | <b>Removing the starter motor</b>      |      | Remove the parts in the order listed.            |
| 2     | Starter motor lead                     | 1    |                                                  |
|       | Starter motor assembly                 | 1    | For installation, reverse the removal procedure. |
| ①     | <b>Disassembling the starter motor</b> |      | Disassembly the parts in the order listed.       |
| ②     | Circlip                                | 1    |                                                  |
| ③     | Starter motor drive gear               | 1    |                                                  |
| ④     | Starter motor rear cover               | 1    | Refer to "Assembling the starter motor."         |
| ⑤     | Washer set                             | 1    |                                                  |
| ⑥     | Starter motor front cover              | 1    | Refer to "Assembling the starter motor."         |
| ⑦     | Washer set                             | 1    |                                                  |
| ⑧     | End bracket                            | 1    | Refer to "Assembling the starter motor."         |
| ⑨     | Planetary gears                        | 2    |                                                  |
| ⑩     | Armature assembly                      | 1    |                                                  |
| ⑪     | Brush holder/brush                     | 1/1  | Refer to "Assembling the starter motor."         |
|       | Starter motor yoke                     | 1    | For assembly, reverse the disassembly procedure  |



FAS00769

## Checking the starter motor

1. Check:
  - commutator  
Dirt → Clean with 600 grit sandpaper.
2. Measure:
  - commutator diameter (a)  
Out of specification → Replace the starter motor.



**Min. commutator diameter**  
**27 mm**

- ### 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**

**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**  
**90890-03112**

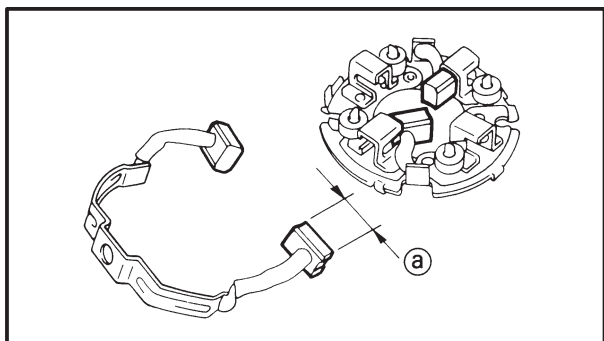


**Armature assembly**  
**Armature coil resistance ①**  
 0.026 ~ 0.034 Ω at 20 °C  
**Insulation resistance ②**  
 Above 1 MΩ at 20 °C

- b. If any resistance is out of specification, replace the starter motor.

## ELECTRIC STARTING SYSTEM

**ELEC**



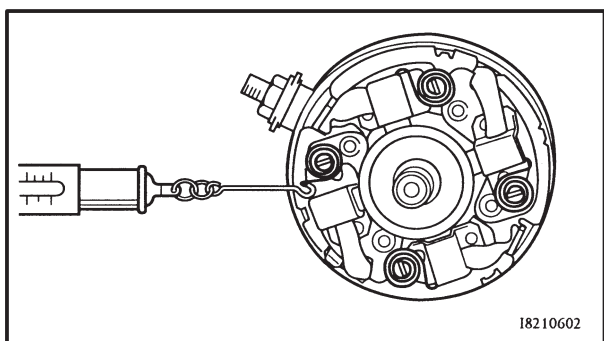
5. Measure:

- brush length ①

Out of specification → Replace the brushes as a set.



**Min. brush length**  
**5 mm**



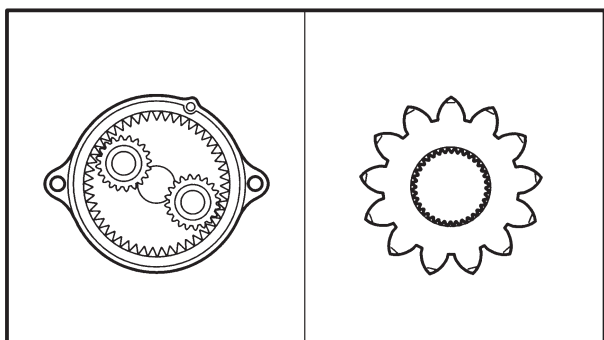
6. Measure:

- brush spring force

Out of specification → Replace the brush springs as a set.



**Brush spring force**  
**7.65 ~ 10.01 N (780 ~ 1.020 g)**



7. Check:

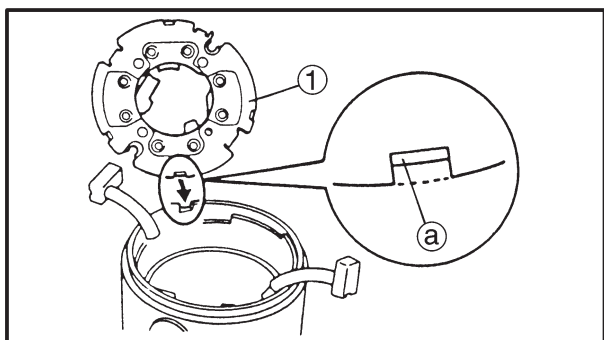
- gear teeth

Damage/wear → Replace the gear.

8. Check:

- oil seal

Damage/wear → Replace the defective part(-s).



EAS00772

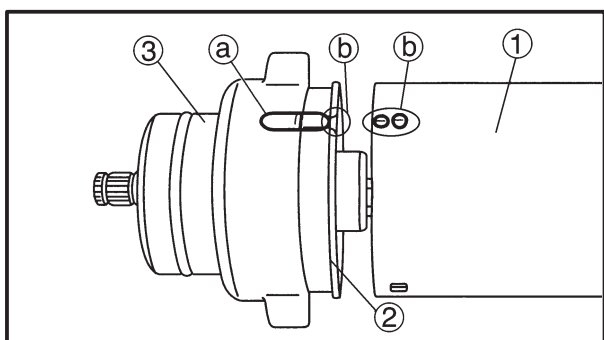
### Assembling the starter motor

1. Install:

- brush holder ①

**NOTE:**

Align the tab ① on the brush holder with the slot in the starter motor rear cover.



2. Install:

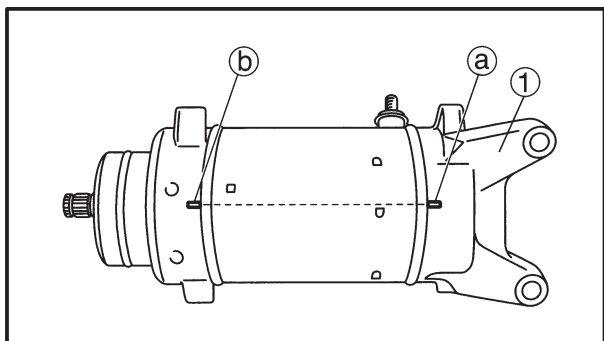
- starter motor yoke ①
- end bracket ②
- starter motor front cover ③

**NOTE:**

Align the projection ① on the front cover with the slot ② on the end cover and starter motor yoke.

## ELECTRIC STARTING SYSTEM

**ELEC**



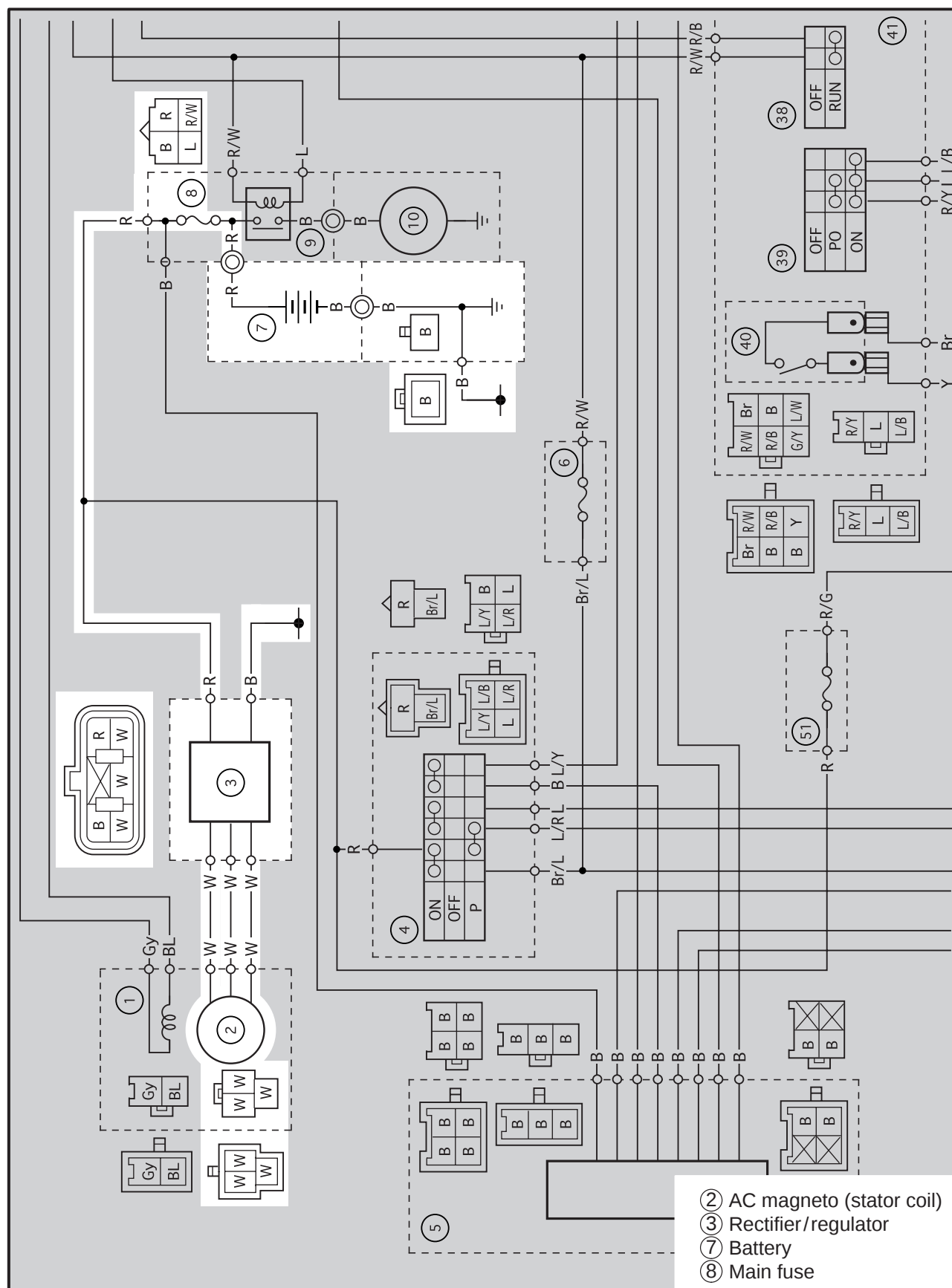
3. Install:

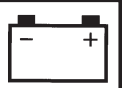
- Starter motor rear cover ①

**NOTE:**

Align the match marks ① on the rear cover with the match marks ② on the front cover.

## CHARGING SYSTEM CIRCUIT DIAGRAM





EAS00774

## 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****90890-03113****Pocket tester****90890-03112**

EAS00738

## 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.**

EAS00739

## 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**

- Is the battery OK

YES

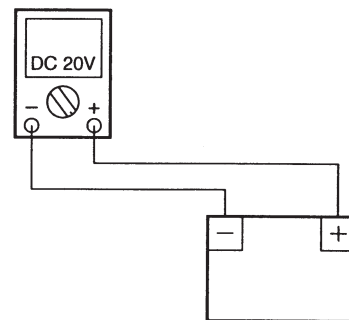
NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00775

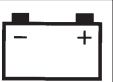
## 3. Charging voltage

- 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.

EAS00776

**4. Stator coil assembly resistances**

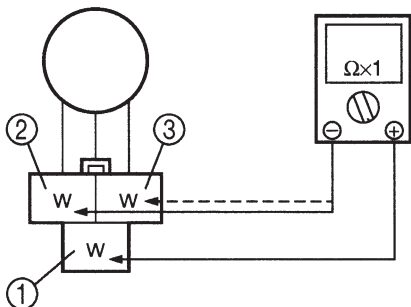
- Remove the generator cover.
- Connect the pocket tester ( $\Omega \times 1$ ) to the stator coil assembly coupler as shown.

**Tester positive probe** → **White** ①

**Tester negative probe** → **white** ②

**Tester positive probe** → **white** ①

**Tester negative probe** → **white** ③



- Measure the stator coil assembly resistances.



**Stator coil resistance**

**0.36 ~ 0.44  $\Omega$  at 20°C**

- Is the stator coil assembly OK?



YES



NO

Replace the stator coil assembly.

EAS00779

**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?



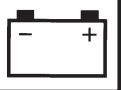
NO



YES

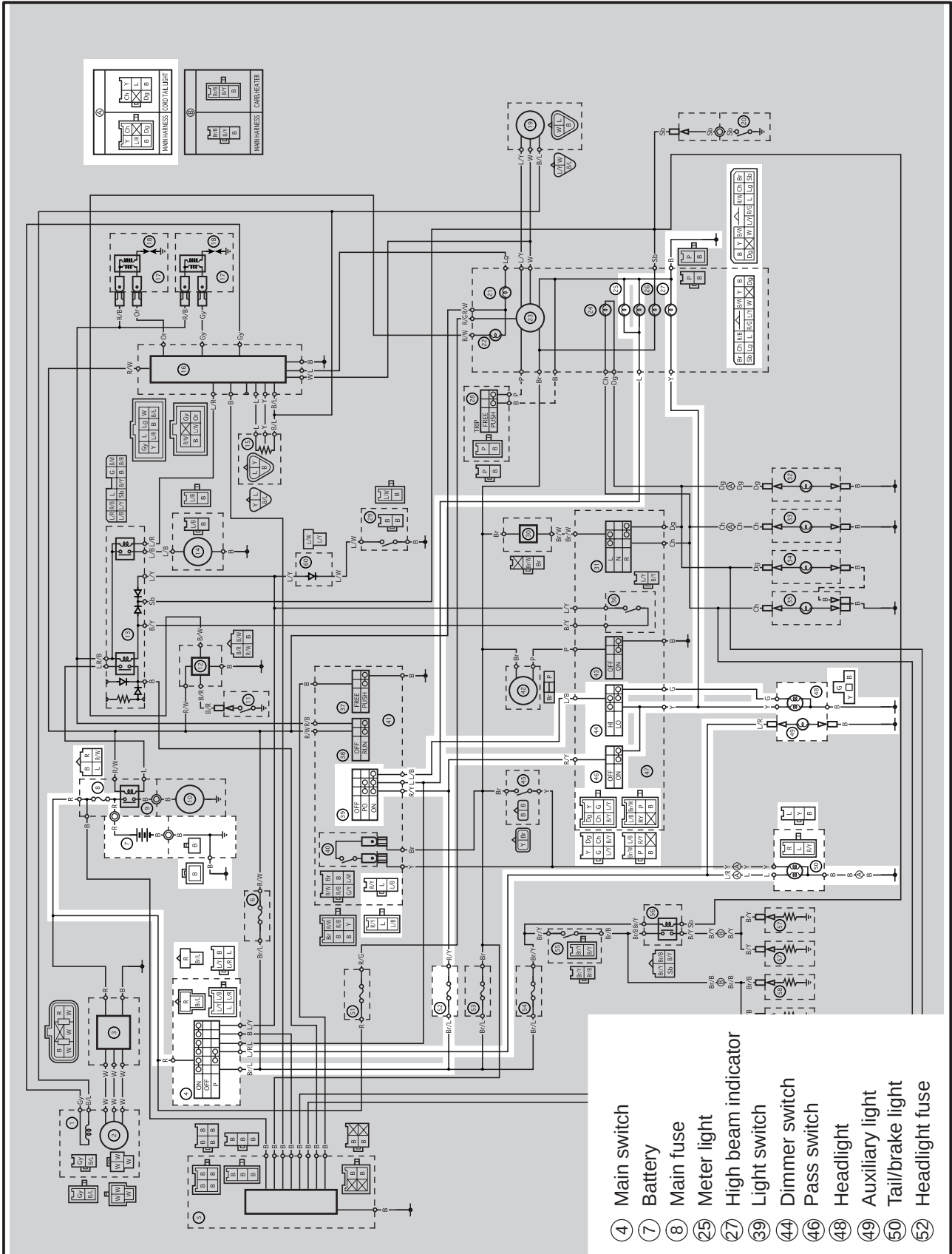
Properly connect or repair the charging system's wiring.

Replace the rectifier/regulator.



EB805000

## LIGHTING SYSTEM CIRCUIT DIAGRAM



## LIGHTING SYSTEM

**ELEC**



EAS00781

### TROUBLESHOOTING

**Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light (for Europe) or meter light.**

Check:

1. main and headlight fuses
2. battery
3. main switch
4. lights switch (for Europe)
5. dimmer switch
6. pass switch
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) steering head side covers
  - 5) headlight lens unit
  - 6) tool box cover
- Troubleshoot with the following special tool(-s).



**Pocket tester**  
**90890-03112**

EAS00738

#### 1. Main, and headlight fuses

- Check the main, and headlight fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, and headlight fuses OK?

↓ YES

↓ NO

Replace the fuse(-s).

EAS00739

#### 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**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

#### 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.

EAS00783

#### 4. Lights switch (for Europe)

- Check the lights switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the lights switch OK?

↓ YES

↓ NO

The lights switch is faulty. Replace the right handlebar switch.



EAS00784

### 5. Dimmer switch

- Check the dimmer switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the dimmer switch OK?



The dimmer switch is faulty. Replace the left handlebar switch.

EAS00786

### 6. Pass switch

- Check the pass switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the pass switch OK?



The pass switch is faulty. Replace the left handlebar switch.

EAS00787

### 7. Wiring

- Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system's wiring properly connected and without defects?



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.

EAS00788

## CHECKING THE LIGHTING SYSTEM

1. The headlight and the high beam indicator light fail to come on.

### 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?



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

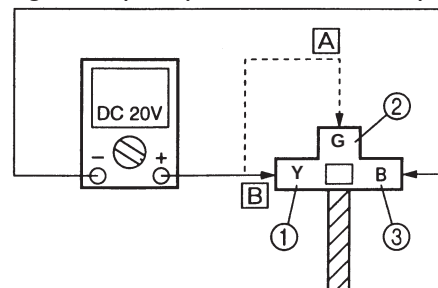
Tester negative probe → black ③

### High beam indicator light

Tester positive probe → yellow ④

Tester negative probe → black ⑤

### Headlight coupler (wire harness side)





**B**

- 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 (12V) of yellow ④ on the meter assembly coupler.
- Is the voltage within specification?

YES

This circuit is OK.

NO

The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

EAS00789

### 2. A meter light fails to come on.

#### 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?

YES

NO

Replace the meter light bulb, socket or both.

#### 2. Voltage

- Connect the pocket tester (20 V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → blue ①  
Tester negative probe → black ②

- Set the main switch to “ON”.
- Set the light switch to “☹” or “☹”.
- Measure the voltage (12 V) of blue ① on the meter assembly coupler (wire harness side).
- Is the voltage within specification?

YES

This circuit is OK.

NO

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EAS00790

### 3. A tail/brake light fails to come on.

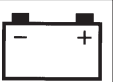
#### 1. Tail/brake light bulb and socket

- 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?

YES

NO

Replace the tail/brake lightbulb, socket or both.



2. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.

Tester positive probe → blue ①

Tester negative probe → black ②

- Set the main switch to “ON”
- Set the light switch to “ $\exists \text{D} \text{D} \exists$ ” or “ $\odot$ ”.
- Measure the voltage (12 V) of blue/red ① on 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.

2. Voltage

- Connect the pocket tester (DC 20 V) to the auxiliary light couplers (wire harness side) as shown.

Tester positive probe → blue/red ①

Tester negative probe → black ②

- Set the main switch to “ON”
- Set the light switch to “ $\exists \text{D} \text{D} \exists$ ” or “ $\odot$ ”.
- Measure the voltage (12 V) of blue/red ① on the auxiliary light couplers (wire harness side).
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from the main switch to the auxiliary light connectors is faulty and must be repaired.

EB05413

4. The auxiliary light fails to come on. (for Europe)

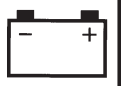
1. Auxiliary light bulb and socket

- Check the auxiliary light bulb and socket for continuity.  
Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the auxiliary light bulb and socket OK?

YES

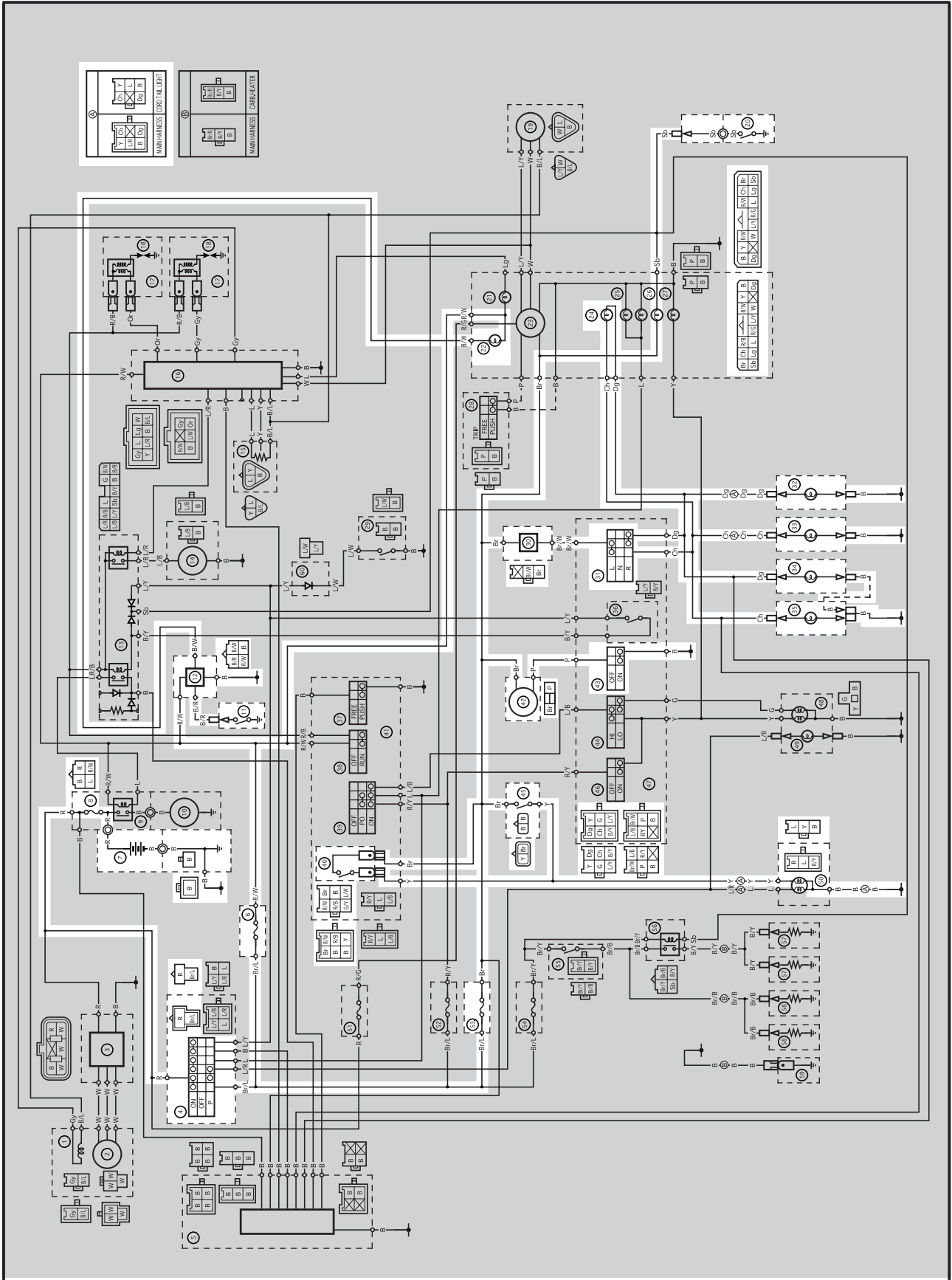
NO

Replace the auxiliary light bulb, socket or both.



EB806000

# SIGNAL SYSTEM CIRCUIT DIAGRAM





- ④ Main switch
- ⑥ Ignition fuse
- ⑦ Battery
- ⑧ Main fuse
- ⑪ Oil level gauge
- ⑫ Oil lamp relay
- ⑳ Neutral switch
- ㉒ Oil warning light
- ㉔ Turn signal indicator light
- ㉖ Neutral indicator light
- ㉚ Flasher relay
- ㉛ Turn signal switch
- ㉜ Rear turn signal light (R)
- ㉝ Rear turn signal light (L)
- ㉞ Front turn signal light (R)
- ㉟ Front turn signal light (L)
- ㊱ Front brake switch
- ㊲ Horn
- ㊳ Horn switch
- ㊴ Rear brake switch
- ㊵ Tail/brake light
- ㊶ Signal fuse

## SIGNALING SYSTEM

**ELEC**



EB806010

### 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**  
**90890-03112**

EAS00738

#### 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).

EAS00739

#### 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**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

#### 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.

EAS00795

#### 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.



EAS00796

### 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?

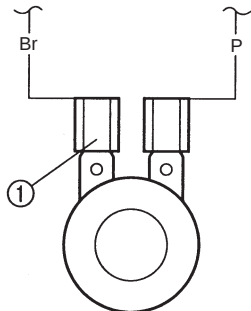


Replace the left handlebar switch.

##### 2. Voltage

- Connect the pocket tester (DC 20 V) to the horn connector at the horn terminal as shown.

**Tester positive probe → brown ①**  
**Tester negative probe → ground**



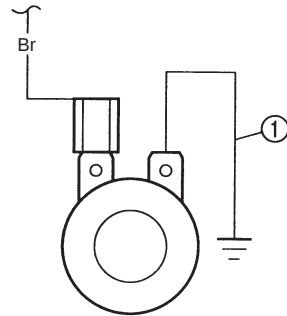
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown at the horn terminal.
- Is the voltage within specification?



The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

##### 3. Horn

- Disconnect the black connector at the horn terminal.
- Connect a jumper lead ① to the horn terminal and ground the jumper lead.
- Set the main switch to "ON".
- Does the horn sound?

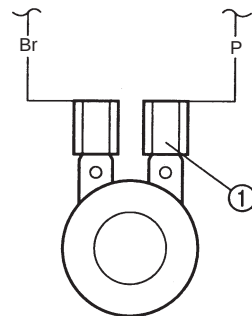


The horn is OK.

##### 4. Voltage

- Connect the pocket tester (DC 20 V) to the horn connector at the black terminal as shown.

**Tester positive probe → black ①**  
**Tester negative probe → ground**



- Set the main switch to "ON".
- Measure the voltage (12 V) of black ① at the horn terminal.
- Is the voltage within specification?



Repair or replace the horn.

Replace the horn.



EAS00797

### 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 lightbulb, socket or both.

- 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.

#### 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.

EAS00799

### 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

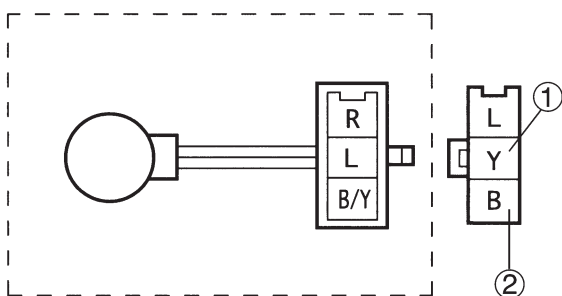
Replace the turn signal light bulb, socket or both.

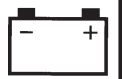
#### 3. Voltage

- 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





### 2. Turn signal switch

- Check the turn signal for continuity. Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?



YES



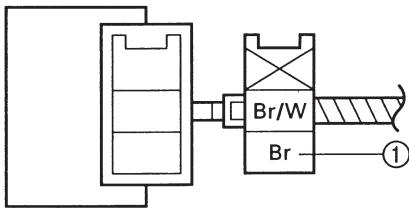
NO

Replace the left handlebar switch.

### 3. 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**



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① at the flasher relay coupler (wire harness side).
- Is the voltage within specification?



YES



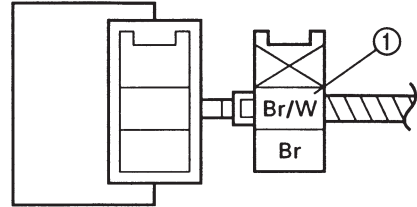
NO

The wiring circuit from the main switch to the flasher relay coupler (flasher relay side) is faulty and must be repaired.

### 4. Voltage

- Connect the tester (DC 20 V) to the flasher relay coupler (wire harness side) as shown.

**Tester positive probe → brown/white ①**  
**Tester negative probe → ground**



- 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?



YES



NO

The flasher relay is faulty and must be replaced.

### 5. 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

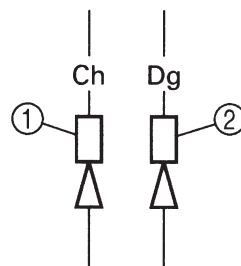
#### Left turn signal light

**Tester positive probe → chocolate ①**  
**Tester negative probe → ground**

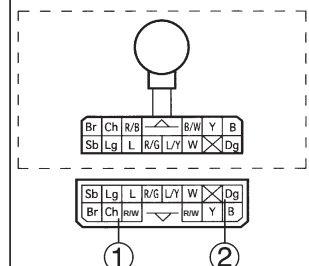
#### Right turn signal light

**Tester positive probe → daek green ②**  
**Tester negative probe → ground**

A



B





- Set the main switch to "ON".
- Set the turn signal switch to "←" or "→".
- Measure the voltage (12 V) of chocolate ① or dark green ② at the turn signal light connector (wire harness side).
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from the turn signal switch to the turn signal light connector is faulty and must be repaired.

EAS00800

### 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

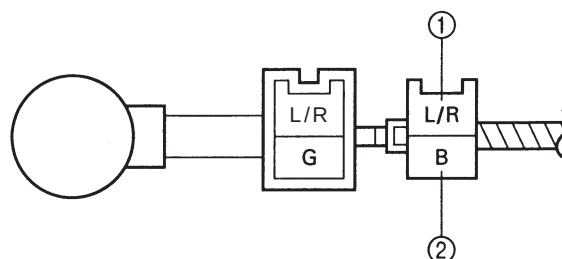
Replace the neutral switch.

### 3. Voltage

- Connect the pocket tester (DC 20V) to the meter assembly coupler (wire harness side) as shown.

Tester positive probe → brown ①

Tester negative probe → sky blue ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and sky blue ② at the meter assembly coupler.
- Is the voltage with specification?

YES

NO

This circuit is OK.

The wiring circuit from the main switch to the meter light bulb coupler is faulty and must be repaired.

EAS00802

### 5. The oil level warning light fails to come on.

#### 1. Oil level warning light bulb and socket

- Check the oil level warning light bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the oil level warning 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?



YES



NO

Replace the oil level switch.

## 3. Oil lamp relay

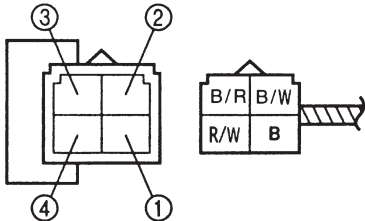
- Disconnect the oil lamp relay from the coupler.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the oil lamp relay terminals as shown.

**Battery positive terminal** → red/white ①

**Battery negative terminal** → black/red ②

**Tester positive probe** → black/white ③

**Tester negative probe** → black ④



- Does the oil lamp relay have continuity between red/blue and black?



YES



NO

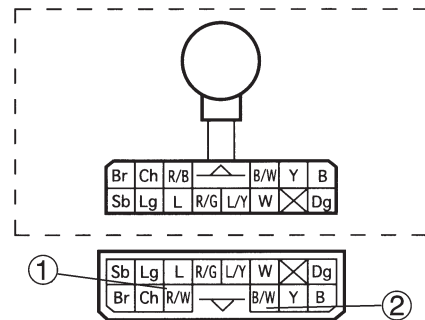
Replace the oil lamp relay.

## 4. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler (wire harness side) as shown.

**Tester positive probe** → red/white ①

**Tester negative probe** → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/red at the meter assembly coupler.
- Is the voltage within specification?



YES



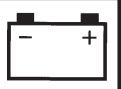
NO

This circuit is OK.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

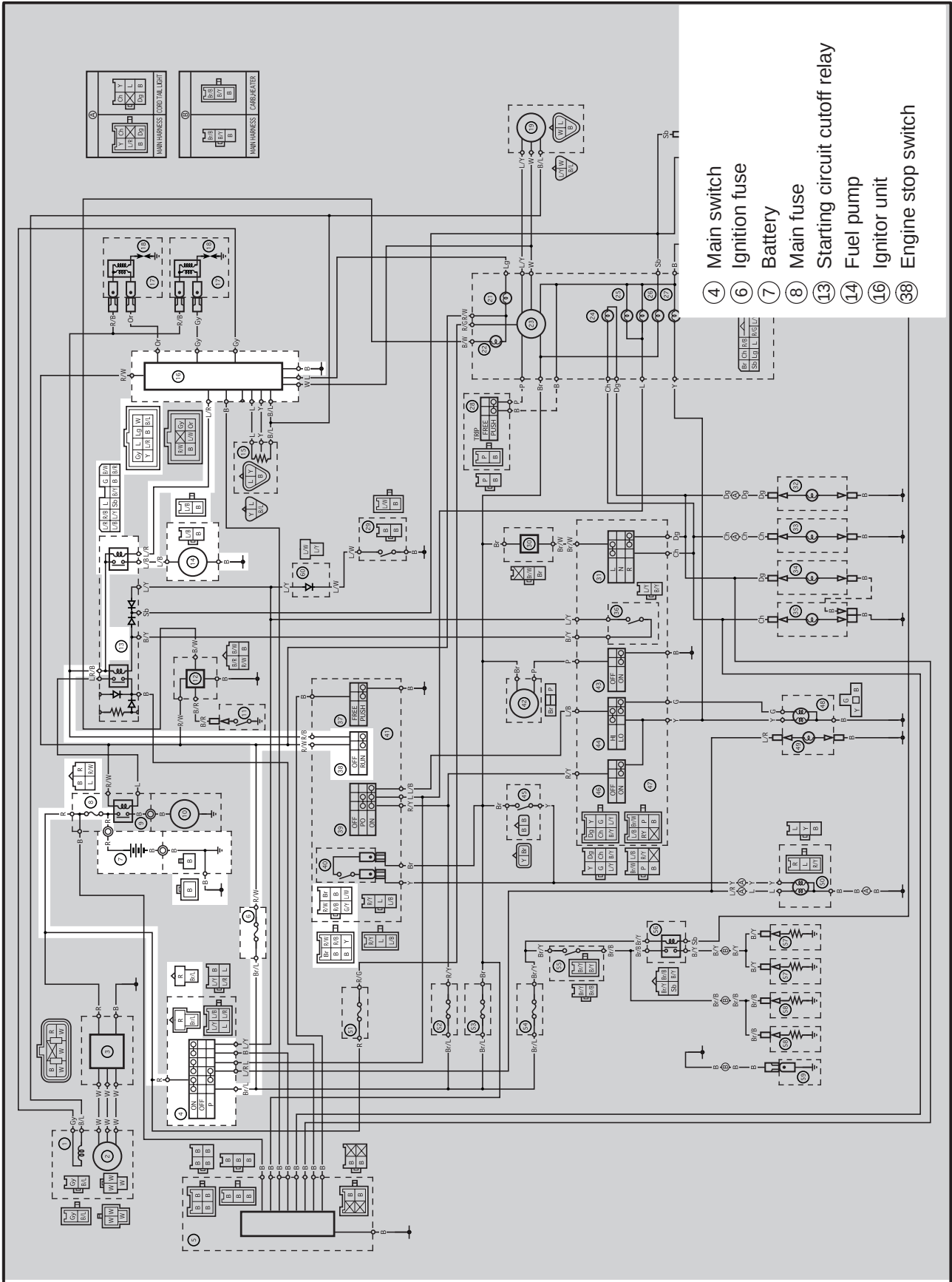
# FUEL PUMP SYSTEM

ELEC



EB808000

## FUEL PUMP SYSTEM CIRCUIT DIAGRAM





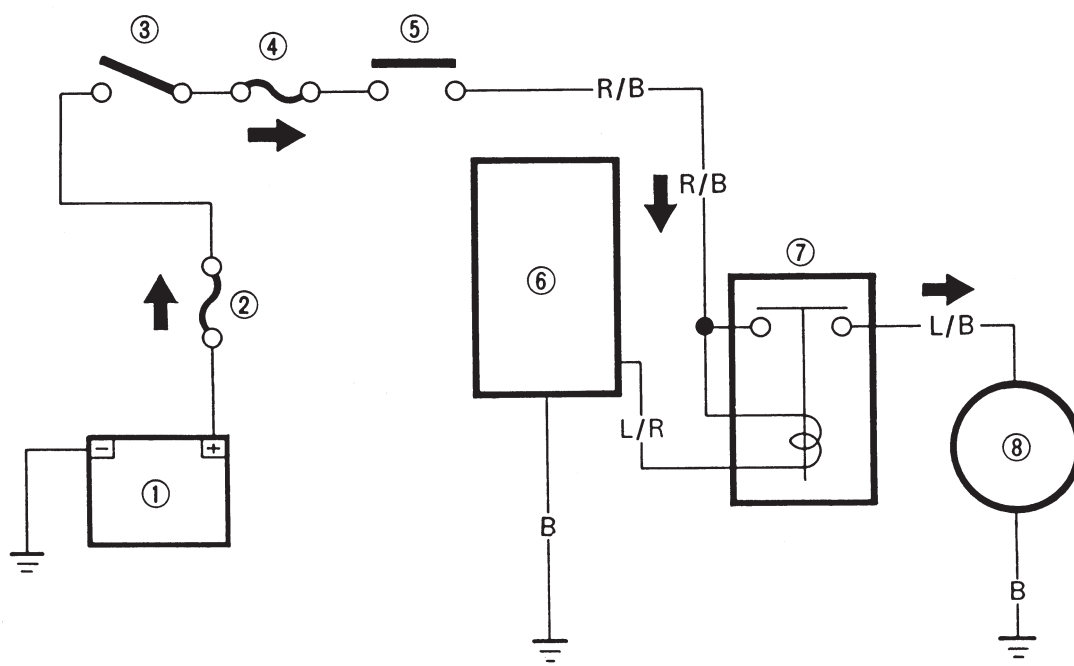
EB808010

### 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





EAS00781

### TROUBLESHOOTING

**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).



**Pocket tester**  
**90890-03112**

EAS00738

#### 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).

EAS00739

#### 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**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

#### 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.

EAS00750

#### 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.



EB803023

### 5. Starting circuit cutoff relay (fuel pump relay)

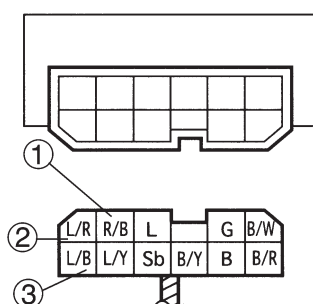
- Remove the relay unit from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay unit terminals.

**Battery (+) terminal** → **Red/Black terminal** ①

**Battery (-) terminal** → **Blue/Red terminal** ②

**Tester (+) lead** → **Red/Black terminal** ①

**Tester (-) lead** → **Blue/Black terminal** ③



- Does the fuel pump relay have continuity between red/black and blue/black?

YES

NO

Replace the starting circuit cutoff relay.

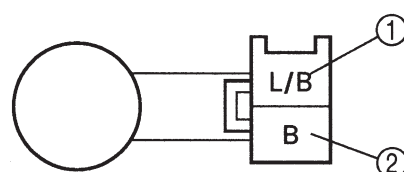
EB808021

### 6. Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel pump coupler terminals.

**Tester (+) lead** → **Blue/Black terminal** ①

**Tester (-) lead** → **Black terminal** ②



- Measure the fuel pump resistance.



**Fuel pump resistance:**  
**1.6 ~ 2.2  $\Omega$  at 20°C (68°F)**

- Is the fuel pump OK?

YES

NO

Replace the fuel pump.

### 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

YES

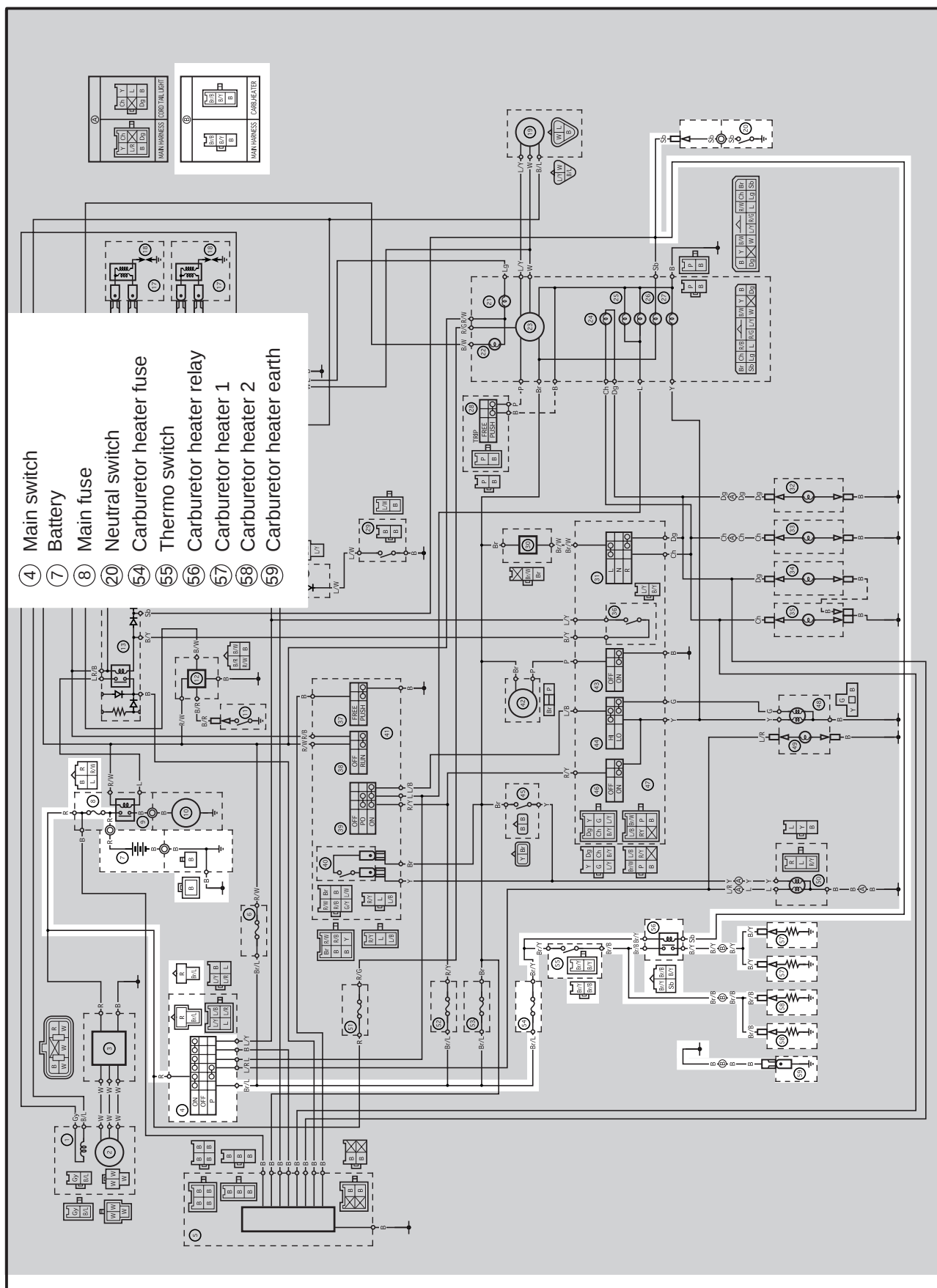
Properly connect or repair the fuel pump system's wiring.

Replace the ignitor unit.





## CARBURETOR HEATER SYSTEM CIRCUIT DIAGRAM



# CARBURETOR HEATER SYSTEM

**ELEC**



EAS00781

## 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**  
**90890-03112**

EAS00738

### 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).

EAS00739

### 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**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EAS00749

### 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.

EAS00751

### 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.

# CARBURETOR HEATER SYSTEM

ELEC



## 5. Carburetor heater relay

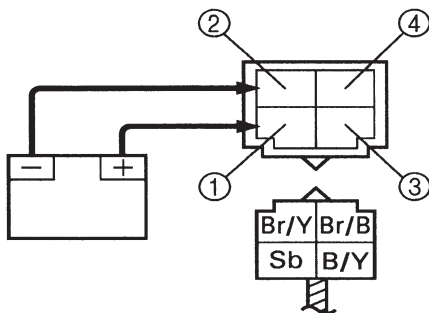
- Remove the carburetor heater relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the carburetor heater relay terminals.

**Battery (+) terminal** → **Brown/Yellow terminal** ①

**Battery (-) terminal** → **Sky blue terminal** ②

**Tester (+) lead** → **Brown/Black terminal** ③

**Tester (-) lead** → **Black/Yellow terminal** ④



- Does the carburetor heater relay have continuity between brown/black and black/yellow?

YES

NO

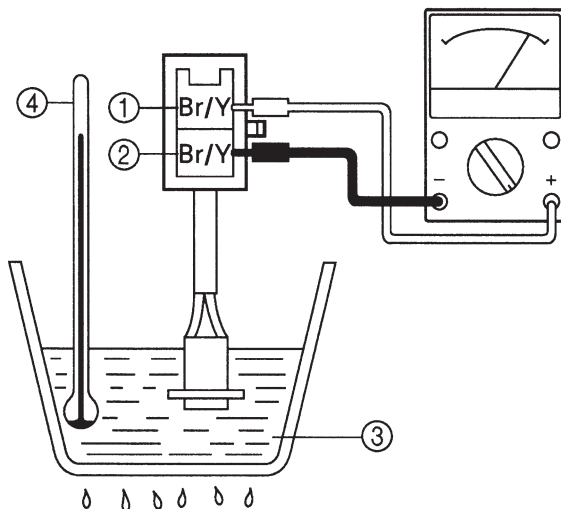
Replace the carburetor heater relay.

## 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 terminal** ①

**Tester (-) lead** → **Black/Yellow terminal** ②



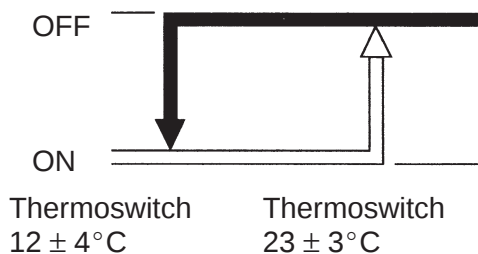
- Immerse the thermo switch in the water ③.
- Check the thermo switch for continuity. Note the temperatures while heating the water with the temperature gauge ④.

| Test step | Water temperature                    | Good condition |
|-----------|--------------------------------------|----------------|
| 1         | Less than $23 \pm 3^{\circ}\text{C}$ | ○              |
| 2         | More than $23 \pm 3^{\circ}\text{C}$ | ×              |
| 3         | More than $12 \pm 4^{\circ}\text{C}$ | ×              |
| 4         | Less than $12 \pm 4^{\circ}\text{C}$ | ○              |

**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.

## CARBURETOR HEATER SYSTEM

ELEC

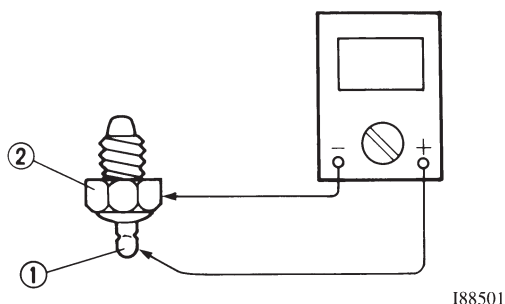


### 7. Carburetor heater

- 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.



**Carburetor heater resistance:**  
**12 V 30 W : 6 ~ 10  $\Omega$  at 20°C**

- Is the carburetor heater OK?



YES



NO

Replace the carburetor heater.

EAS00766

### 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?



NO



YES

Properly connect or repair the carburetor heater system's wiring.

The carburetor heater system circuit is OK.



## SELF-DIAGNOSIS

The XVS1100 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:

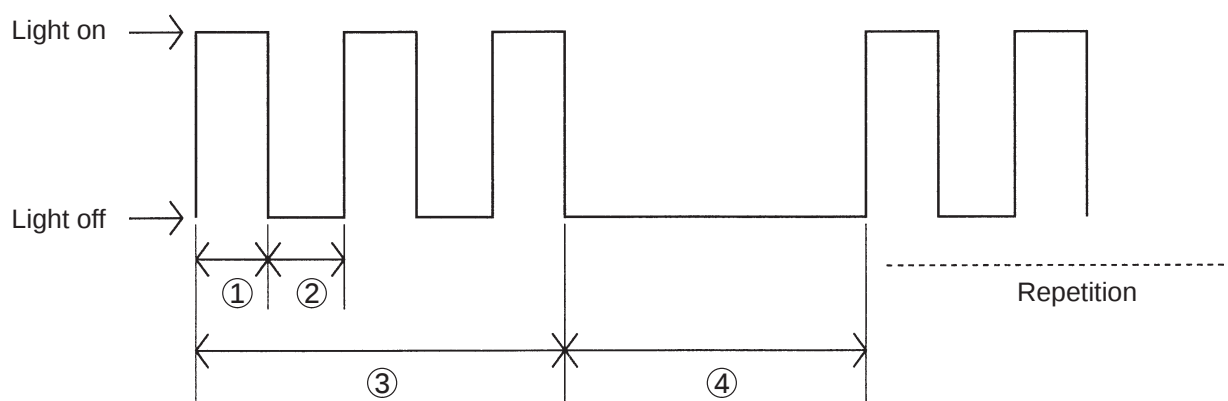
The XVS1100 features a self-diagnosing system.

In the XVS1100, 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.)

| Item                           | Condition                               | Response                                                                                                                                                                                                                    | Display condition code     |                        |
|--------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------|
|                                |                                         |                                                                                                                                                                                                                             | When engine is stationary  | When engine is running |
| Throttle position sensor (TPS) | Disconnected<br>Short-circuit<br>Locked | <ul style="list-style-type: none"> <li>Enables the motorcycle to run so that the ignition timing is fixed when the throttle is fully opened.</li> <li>Displays the condition code on the engine indicator light.</li> </ul> | Blinks in<br>Fault code: 3 | Light on               |
| Speed sensor                   | Disconnected<br>short-circuit           | <ul style="list-style-type: none"> <li>Displays the condition code on the engine indicator light.</li> </ul>                                                                                                                | Blinks in<br>Fault code: 4 | Light on               |

### 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





EAS00835

### TROUBLESHOOTING

**The engine warning light starts to display the self-diagnosis sequence.**

Check:

1. throttle position sensor
2. speed sensor

#### NOTE:

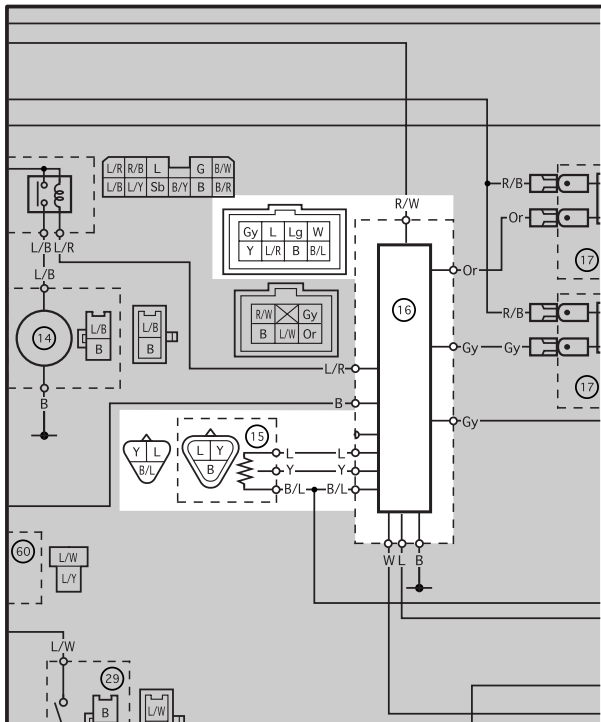
- Before troubleshooting, remove the following part(-s):
  - 1) rider seat
  - 2) fuel tank
  - 3) air filter case
  - 4) left side cover
- Troubleshoot with the following special tool(-s).



**Pocket tester**  
**90890-03112**

EAS00836

### 1. Throttle position sensor CIRCUIT DIAGRAM



- ① Throttle position sensor  
② Ignitor unit

### 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.

EB812401

### 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

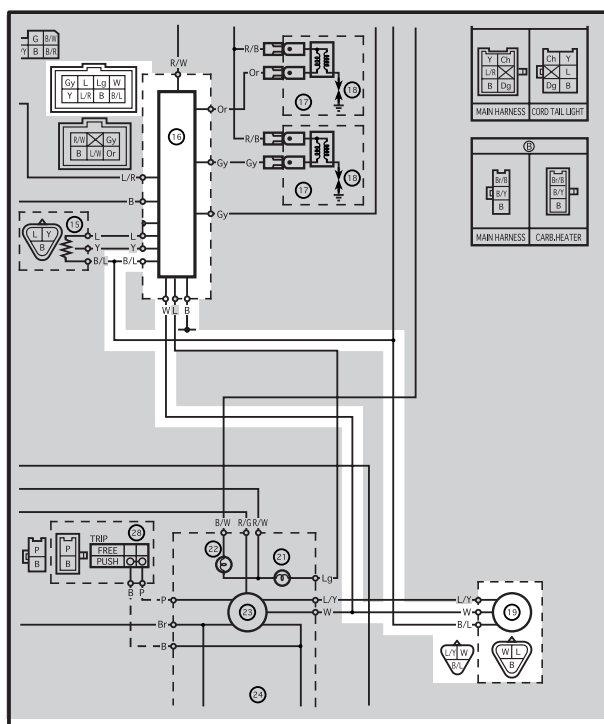
Replace the ignitor unit.

Replace the throttle position sensor.



## 2. Speed sensor

### CIRCUIT DIAGRAM



- ①⑥ Ignitor unit
- ①⑨ Speed sensor

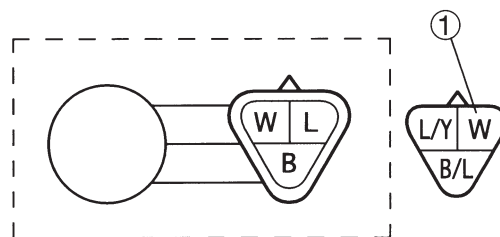
## 1. Wire harness

- Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".
- Is the wire harness OK?

↓ YES

↓ NO

Repair or replace the wire harness.



- Set the main switch to “ON”.
- Turn the rear wheel slowly.
- Check the tester voltage (0V - 5V - 0V).
- Is the speed sensor OK?

↓ YES

↓ NO

Replace the ignitor unit.

Replace the speed sensor.

## 2. Speed sensor

- Place the motorcycle on a suitable stand so that the rear wheel is elevated.
- Connect the pocket tester (DC 20V) to the speed sensor connector.

**Tester (+) lead → White ① terminal**

**Tester (-) lead → Body earth**

?

TRBL  
SHTG

8

## CHAPTER 8. TROUBLESHOOTING

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## TROUBLESHOOTING

### 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

#### Full-transistor system

- Faulty ignitor unit
- Faulty pickup coil

#### 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

EB901000

**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

EB902000

**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

EB903000

## **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

##### **Transmission**

- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

#### **JUMPS-OUT-OF GEAR**

##### **Shift shaft**

- Improperly adjusted shift lever position
- Improperly returned stopper lever

##### **Shift fork**

- Worn shift fork

##### **Shift cam**

- Improper thrust play
- Worn shift cam groove

##### **Transmission**

- Worn gear dog

EB904000

## **CLUTCH SLIPPING/Dragging**

### **CLUTCH SLIPPING**

##### **Clutch**

- Improperly adjusted clutch cable
- Loose clutch spring
- Fatigued clutch spring
- Worn friction plate/clutch plate
- Incorrectly assembled clutch

##### **Engine oil**

- Improper oil level
- Improper viscosity (low)
- Deterioration

### **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

##### **Engine oil**

- Improper oil level
- Improper viscosity (high)
- Deterioration

## OVERHEATING/FAULTY BRAKE/FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

TRBL  
SHTG



EB905000

### OVERHEATING

#### 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

EB906001

### 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

EB907000

### 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/ FAULTY LIGHTING AND SIGNAL SYSTEMS



EB908000

### UNSTABLE HANDLING

#### UNSTABLE HANDLING

##### Handlebar

- Improperly installed or bent

##### Steering

- Improperly installed handlebar crown
- 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

##### Front fork

- Uneven oil levels on both sides
- Uneven spring tension (uneven damping force adjuster position)
- Broken spring
- Twisted front fork

##### Wheel

- Incorrect wheel balance
- Deformed cast wheel
- Damaged bearing
- Bent or loose wheel axle
- Excessive wheel runout
- Loosed spoke

##### Frame

- Bent
- Damaged steering head tube
- Improperly installed bearing race

EB909000

### 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 or lights 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 SLOWLY

- Faulty flasher relay
- Faulty main and/or turn switch
- Improper bulb

#### BULB BURNT OUT

- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or lights switch
- Bulb life expired

#### FLASHER REMAINS LIT

- Faulty flasher relay
- Burnt-out bulb

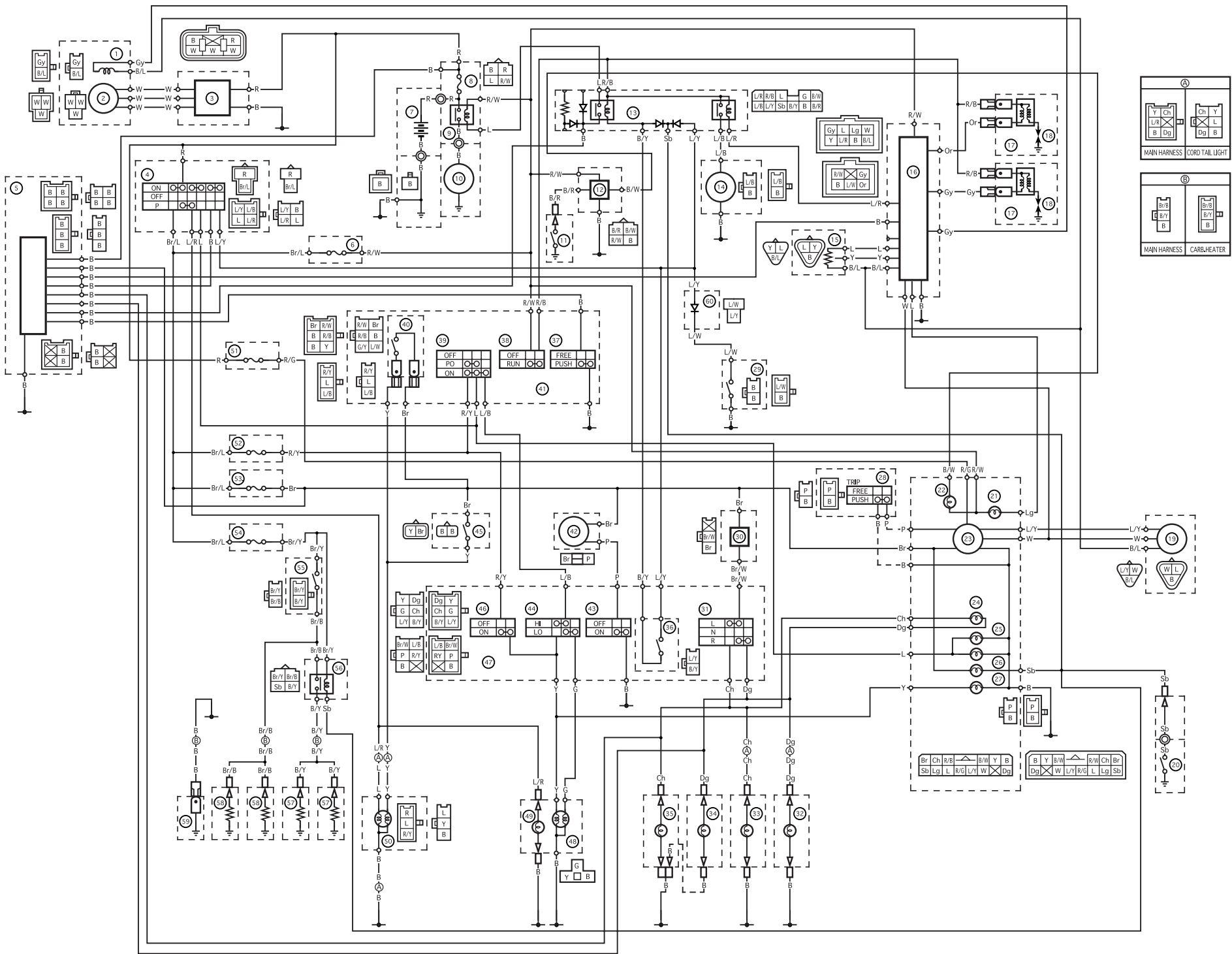
#### FLASHER BLINKS QUICKLY

- Improper bulb
- Faulty flasher relay
- Burnt-out bulb

#### HORN DOES NOT SOUND

- Faulty battery
- Faulty fuse
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wire harness

XVS1100 WIRING DIAGRAM (for Europe)

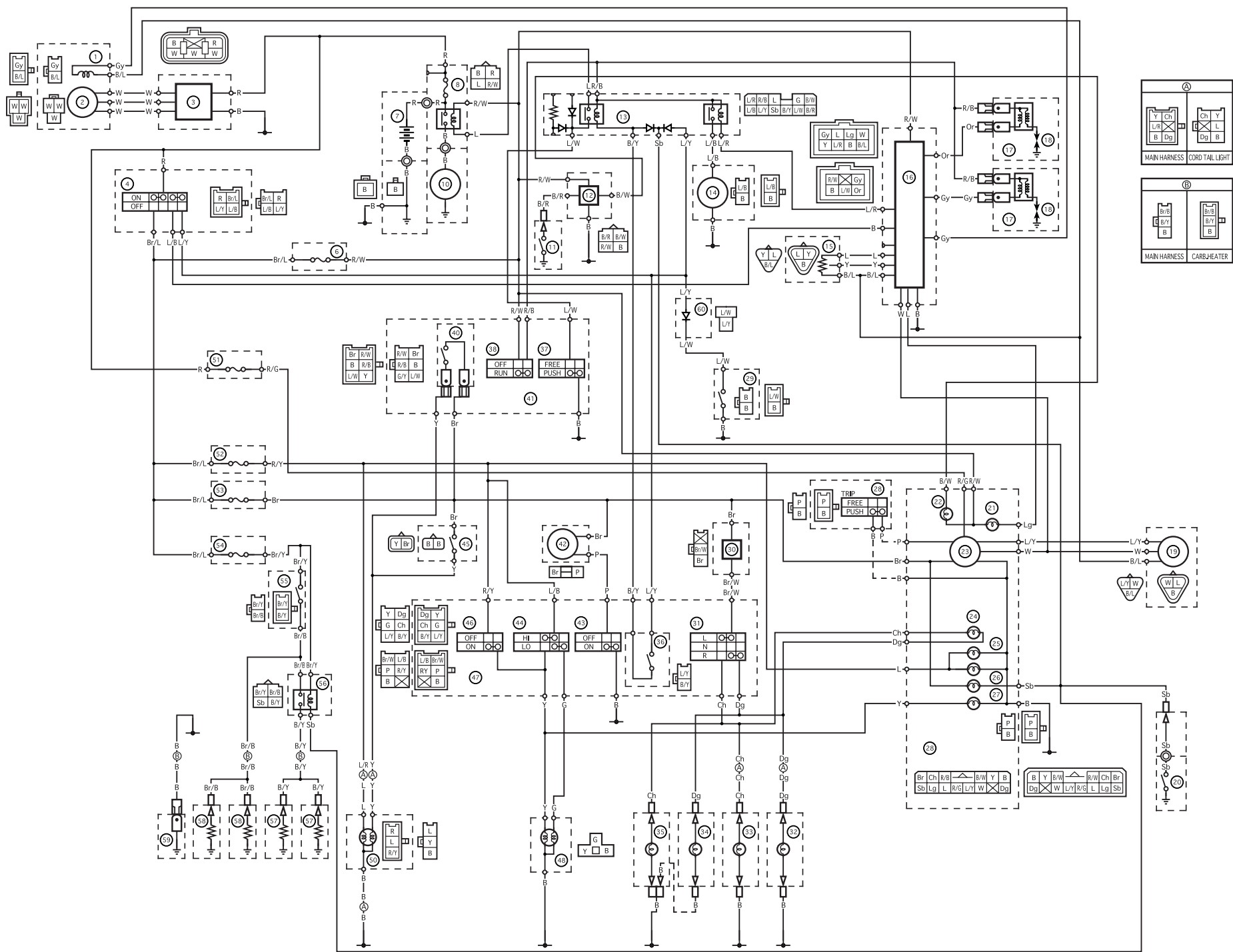


- ① Pickup coil
- ② A.C. magneto
- ③ Rectifier/regulator
- ④ Main switch
- ⑤ Alarm system (Option)
- ⑥ Ignition fuse
- ⑦ Battery
- ⑧ Main fuse
- ⑨ Starter relay
- ⑩ Starter motor
- ⑪ Oil level gauge
- ⑫ Oil lamp relay
- ⑬ Starting circuit cut-off relay
- ⑭ Fuel pump
- ⑮ Throttle position sensor
- ⑯ Igniter unit
- ⑰ Ignition coil
- ⑱ Spark plug
- ⑲ Speed sensor
- ⑳ Neutral switch
- ㉑ Engine warning light
- ㉒ Oil warning light
- ㉓ Speedometer
- ㉔ Turn signal indicator light
- ㉕ Meter light
- ㉖ Neutral indicator light
- ㉗ High beam indicator light
- ㉘ Trip switch
- ㉙ Sidestand switch
- ㉚ Flasher relay
- ㉛ Turn signal switch
- ㉜ Rear turn signal light (right)
- ㉝ Rear turn signal light (left)
- ㉞ Front turn signal light (right)
- ㉟ Front turn signal light (left)
- ㊱ Clutch switch
- ㊲ Start switch
- ㊳ Engine stop switch
- ㊴ Light switch
- ㊵ Front brake switch
- ㊶ Right handlebar switch
- ㊷ Horn
- ㊸ Horn switch
- ㊹ Dimmer switch
- ㊺ Rear brake switch
- ㊻ Pass switch
- ㊼ Left handlebar switch
- ㊽ Headlight
- ㊾ Auxiliary light
- ㊿ Tail/brake light
- 1 Backup fuse
- 2 Headlight fuse
- 3 Signal fuse
- 4 Carburetor heater fuse
- 5 Thermo switch
- 6 Carburetor heater relay
- 7 Carburetor heater 1
- 8 Carburetor heater 2
- 9 Carburetor heater earth
- 0 Diode

COLOR CODE

|                   |                     |                     |                      |                     |
|-------------------|---------------------|---------------------|----------------------|---------------------|
| B . . . . Black   | L . . . . Blue      | W . . . . White     | Br/L .. Brown/Blue   | L/Y ... Blue/Yellow |
| Br .... Brown     | Lg .... Light green | Y . . . . Yellow    | Br/W . Brown/White   | R/B... Red/Black    |
| Ch ... Chocolate  | O .... Orange       | B/L ... Black/Blue  | Br/Y .. Brown/Yellow | R/G .. Red/Green    |
| Dg ... Dark green | P . . . . Pink      | B/W .. Black/White  | L/B ... Blue/Black   | R/W .. Red/White    |
| G .... Green      | R . . . . Red       | B/Y... Black/Yellow | L/R... Blue/Red      | R/Y... Red/ Yellow  |
| Gy ... Gray       | Sb .... Sky blue    | Br/B .. Brown/Black | L/W .. Blue/White    |                     |

XVS1100L WIRING DIAGRAM (for AUS)



- ① Pickup coil
- ② A.C. magneto
- ③ Rectifier/regulator
- ④ Main switch
- ⑥ Ignition fuse
- ⑦ Battery
- ⑧ Main fuse
- ⑨ Starter relay
- ⑩ Starter motor
- ⑪ Oil level gauge
- ⑫ Oil lamp relay
- ⑬ Starting circuit cut-off relay
- ⑭ Fuel pump
- ⑮ Throttle position sensor
- ⑯ Igniter unit
- ⑰ Ignition coil
- ⑱ Spark plug
- ⑲ Speed sensor
- ⑳ Neutral switch
- ㉑ Engine warning light
- ㉒ Oil warning light
- ㉓ Speedometer
- ㉔ Turn signal indicator light
- ㉕ Meter light
- ㉖ Neutral indicator light
- ㉗ High beam indicator light
- ㉘ Trip switch
- ㉙ Sidestand switch
- ㉚ Flasher relay
- ㉛ Turn signal switch
- ㉜ Rear turn signal light (right)
- ㉝ Rear turn signal light (left)
- ㉞ Front turn signal light (right)
- ㉟ Front turn signal light (left)
- ㊱ Clutch switch
- ㊲ Start switch
- ㊳ Engine stop switch
- ㊴ Front brake switch
- ㊵ Right handlebar switch
- ㊶ Horn
- ㊷ Horn switch
- ㊸ Dimmer switch
- ㊹ Rear brake switch
- ㊺ Pass switch
- ㊻ Left handlebar switch
- ㊼ Headlight
- ㊽ Tail/brake light
- ㊾ Backup fuse
- ㊿ Headlight fuse
- 1 Signal fuse
- 2 Carburetor heater fuse
- 3 Thermo switch
- 4 Carburetor heater relay
- 5 Carburetor heater 1
- 6 Carburetor heater 2
- 7 Carburetor heater earth
- 8 Diode

COLOR CODE

|                   |                       |                     |                      |                     |
|-------------------|-----------------------|---------------------|----------------------|---------------------|
| B . . . . . Black | L . . . . . Blue      | W . . . . . White   | Br/L .. Brown/Blue   | L/Y ... Blue/Yellow |
| Br .... Brown     | Lg .... Light green   | Y . . . . . Yellow  | Br/W . Brown/White   | R/B... Red/Black    |
| Ch ... Chocolate  | O .... Orange         | B/L ... Black/Blue  | Br/Y .. Brown/Yellow | R/G .. Red/Green    |
| Dg ... Dark green | P . . . . . Pink      | B/W .. Black/White  | L/B ... Blue/Black   | R/W .. Red/White    |
| G .... Green      | R . . . . . Red       | B/Y... Black/Yellow | L/R ... Blue/Red     | R/Y... Red/Yellow   |
| Gy ... Gray       | Sb . . . . . Sky blue | Br/B .. Brown/Black | L/W .. Blue/White    |                     |



- 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 ignitar 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.

