



**YAMAHA**

**2002**

**TDM900(P)**

**5PS1-AE1**

**SERVICE MANUAL**



EAS00000

**TDM900 (P) 2002  
SERVICE MANUAL  
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## NOTICE

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

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

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**NOTE:**

Designs and specifications are subject to change without notice.

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## IMPORTANT MANUAL INFORMATION

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



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



Failure to follow **WARNING** instructions could result in severe injury or death to the motorcycle operator, a bystander or a person checking 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

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

- ① The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter. Refer to "SYMBOLS".
- ② Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 ("PERIODIC CHECKS AND ADJUSTMENTS"), where the sub-section title(s) appears.
- ③ Sub-section titles appear in smaller print than the section title.
- ④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.
- ⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.
- ⑥ Symbols indicate parts to be lubricated or replaced. Refer to "SYMBOLS".
- ⑦ A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- ⑧ Jobs requiring more information (such as special tools and technical data) are described sequentially.

②      ①

CLUTCH    ENG

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EAS00074

**CLUTCH**

④ →

⑤ →

⑥ →

⑦ →

Order	Job/Part	Qty	Remarks
<b>Removing the clutch</b>			
1	Clutch spring	6	Remove the parts in the order listed.
2	Pressure plate	1	
3	Pull rod	1	
4	Friction plate 1	2	
5	Clutch plate	8	
6	Friction plate 2	7	
7	Nut	1	
8	Lock washer	1	
9	Clutch boss	1	
10	Thrust plate	1	
11	Bearing	1	
12	Spacer	1	
13	Clutch housing	1	

5-42

CLUTCH    ENG

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EAS00075

**REMOVING THE CLUTCH**

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

**NOTE:**  
While holding the clutch boss ③ with the universal clutch holder ④, loosen the clutch boss nut.

**Universal clutch holder**  
90890-04086

3. Remove:
  - lock washer ②
  - Clutch boss ③

4. Remove:
  - spacer ①
  - bearing ②

**NOTE:**  
Insert two 6-mm bolts ③ into the spacer and then remove the spacer by pulling on the bolts.

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EAS00076

**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  
<Limits> 2.8 mm

311-000

5-44

① GEN INFO 	② SPEC 	
③ CHK ADJ 	④ CHAS 	
⑤ ENG 	⑥ COOL 	
⑦ FI 	⑧ ELEC 	
⑨ TRBL SHTG ?	⑩ 	
⑪ 	⑫ 	
⑬ 	⑭ 	
⑮ 	⑯ 	⑰ 
⑱ 	⑲ 	⑳ 
㉑ 	㉒ 	㉓ 
㉔ 	㉕ <b>New</b>	

## SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑨ indicate the subject of each chapter.

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

Symbols ⑩ to ⑰ indicate the following.

- ⑩ Serviceable with engine mounted
- ⑪ Filling fluid
- ⑫ Lubricant
- ⑬ Special tool
- ⑭ Tightening torque
- ⑮ Wear limit, clearance
- ⑯ Engine speed
- ⑰ Electrical data










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

- ⑱ Engine oil
- ⑲ Gear oil
- ⑳ Molybdenum-disulfide oil
- ㉑ Wheel-bearing grease
- ㉒ Lithium-soap-based grease
- ㉓ Molybdenum-disulfide grease

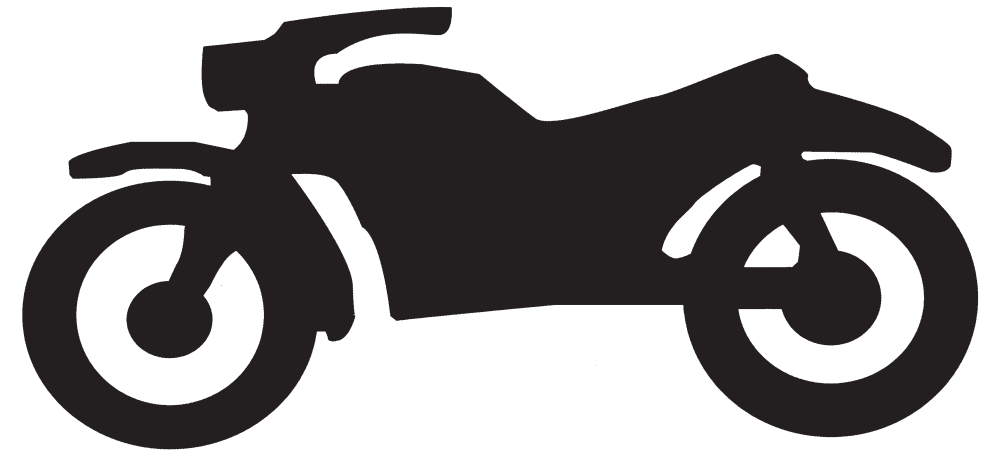
Symbols ㉔ to ㉕ in the exploded diagrams indicate the following.

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

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**GEN  
INFO**

**1**

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## CHAPTER 1 GENERAL INFORMATION

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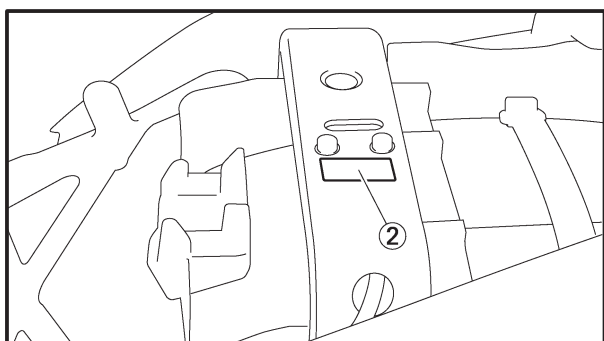
EAS00014

## **GENERAL INFORMATION MOTORCYCLE IDENTIFICATION**

EAS00017

### **VEHICLE IDENTIFICATION NUMBER**

The vehicle identification number ① is stamped into the right side of the steering head pipe.



EAS00018

### **MODEL LABEL**

The model label ② is affixed to the frame. This information will be needed to order spare parts.

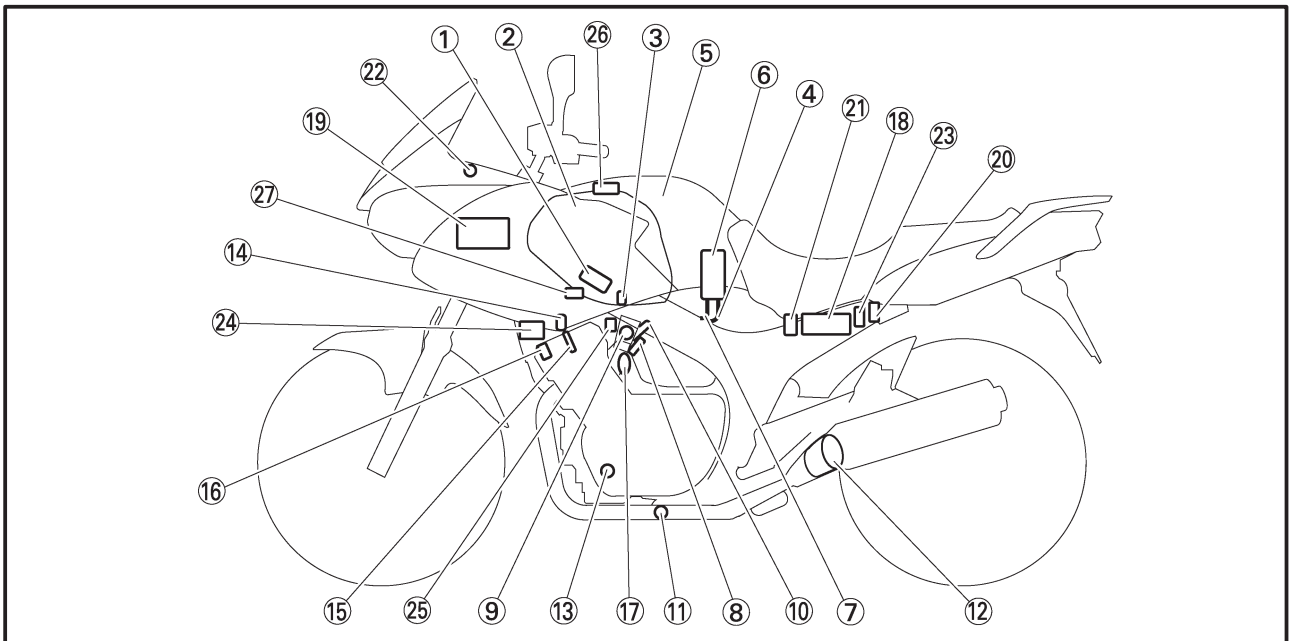
**FEATURES  
OUTLINE**

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

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

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

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions. Furthermore, the air induction system (AI system) has been placed under computer control together with the FI system in order to realize cleaner exhaust gases.

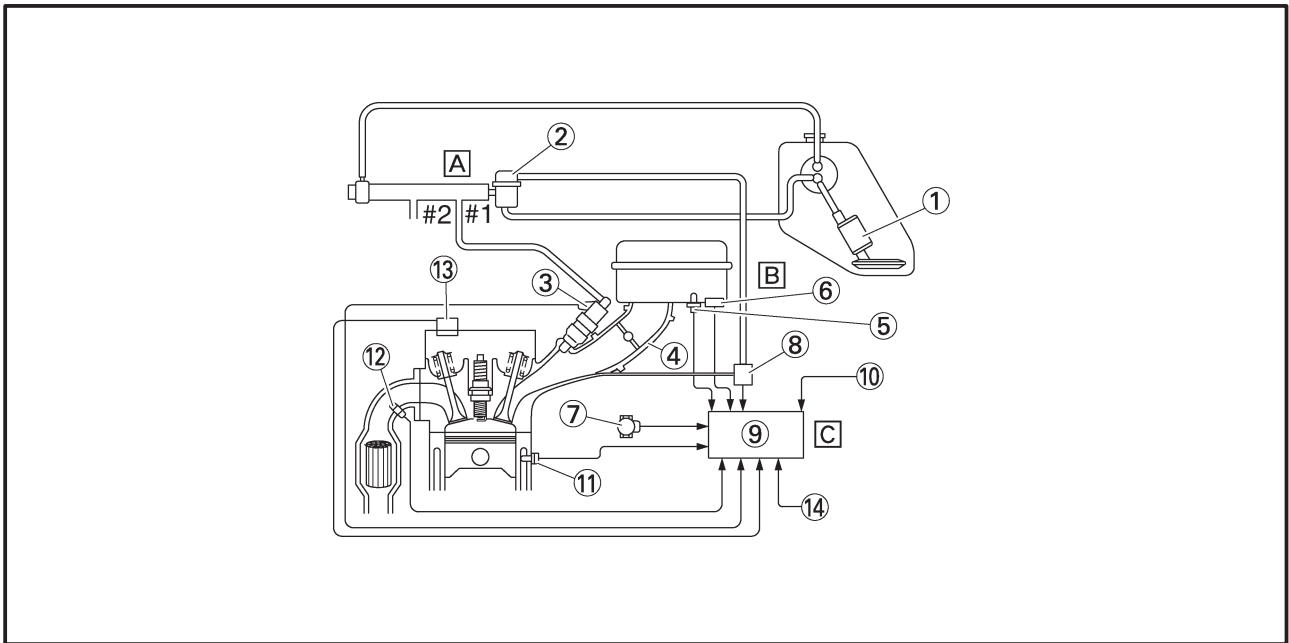


- |                                 |                                  |                                |                              |
|---------------------------------|----------------------------------|--------------------------------|------------------------------|
| ① Ignition coil                 | ⑩ Fuel injector                  | ⑲ ECU                          | ⑳ Adjustable air intake duct |
| ② Air filter case               | ⑪ O <sub>2</sub> sensor          | ⑳ Atmospheric pressure sensor  | ㉑ Intake solenoid            |
| ③ Intake air temperature sensor | ⑫ Catalytic converter            | ㉒ Fuel injection system relay  |                              |
| ④ Fuel delivery hose            | ⑬ Crankshaft position sensor     | ㉓ Engine trouble warning light |                              |
| ⑤ Fuel tank                     | ⑭ Coolant temperature sensor     | ㉔ Lean angle cut-off switch    |                              |
| ⑥ Fuel pump                     | ⑮ Spark plug                     | ㉕ Air cut-off valve            |                              |
| ⑦ Fuel return hose              | ⑯ Cylinder identification sensor | ㉖ Fast idle plunger            |                              |
| ⑧ Intake air pressure sensor    | ⑰ Pressure regulator             |                                |                              |
| ⑨ Throttle position sensor      | ⑱ Battery                        |                                |                              |

**FI SYSTEM**

The fuel pump delivers fuel to the injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the injector at only 294 kPa (2.94 kg/cm<sup>2</sup>, 2.94 bar) higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU energizes the injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, atmospheric pressure sensor, intake temperature sensor, coolant temperature sensor, and O<sub>2</sub> sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor and the cylinder identification sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



- |                                 |                               |                                  |                         |
|---------------------------------|-------------------------------|----------------------------------|-------------------------|
| ① Fuel pump                     | ⑦ Throttle position sensor    | ⑪ Coolant temperature sensor     | <b>A</b> Fuel system    |
| ② Pressure regulator            | ⑧ Intake air pressure sensor  | ⑫ O <sub>2</sub> sensor          | <b>B</b> Air system     |
| ③ Fuel injector                 | ⑨ ECU                         | ⑬ Cylinder identification sensor | <b>C</b> Control system |
| ④ Throttle body                 | ⑩ Atmospheric pressure sensor | ⑭ Crankshaft position sensor     |                         |
| ⑤ Intake air temperature sensor |                               |                                  |                         |
| ⑥ Intake solenoid               |                               |                                  |                         |

**Fuel control block**

The fuel control block consists of the following main components:

	Component	Function
Control block	ECU	Total FI system control
	Throttle body	Air volume control
	Pressure regulator	Fuel pressure detection
Sensor block	Intake air pressure sensor	Intake air pressure detection
	Atmospheric pressure sensor	Atmospheric pressure detection
	Coolant temperature sensor	Coolant temperature detection
	Intake air temperature sensor	Intake air temperature detection
	Throttle position sensor	Throttle angle detection
	O <sub>2</sub> sensor	Gas emission O <sub>2</sub> concentration detection
	Cylinder identification sensor	Reference position detection
	Crankshaft position sensor	Crankshaft position detection and engine PRM detection
Speed sensor	Speed detection	
Actuator block	Injector	Fuel injection
	Fuel pump	Fuel feed
	Air induction system, air cut valve	Induction of secondary air
	Intake solenoid	Air volume control

**ECU (Electronic Control Unit)**

The main functions of the ECU are ignition control, fuel control, self-diagnosis, and load control.

• ECU's internal construction and functions

The main components and functions of the ECU can be broadly divided into the following four items:

A. Power supply circuit

The power supply circuit obtains power from the battery (12 V) to supply the power (5 V) that is required for operating the ECU.

B. Input interface circuits

The input interface circuits convert the signals output by all the sensors into digital signals, which can be processed by the CPU, and input them into the CPU.

C. CPU (Central Processing Unit)

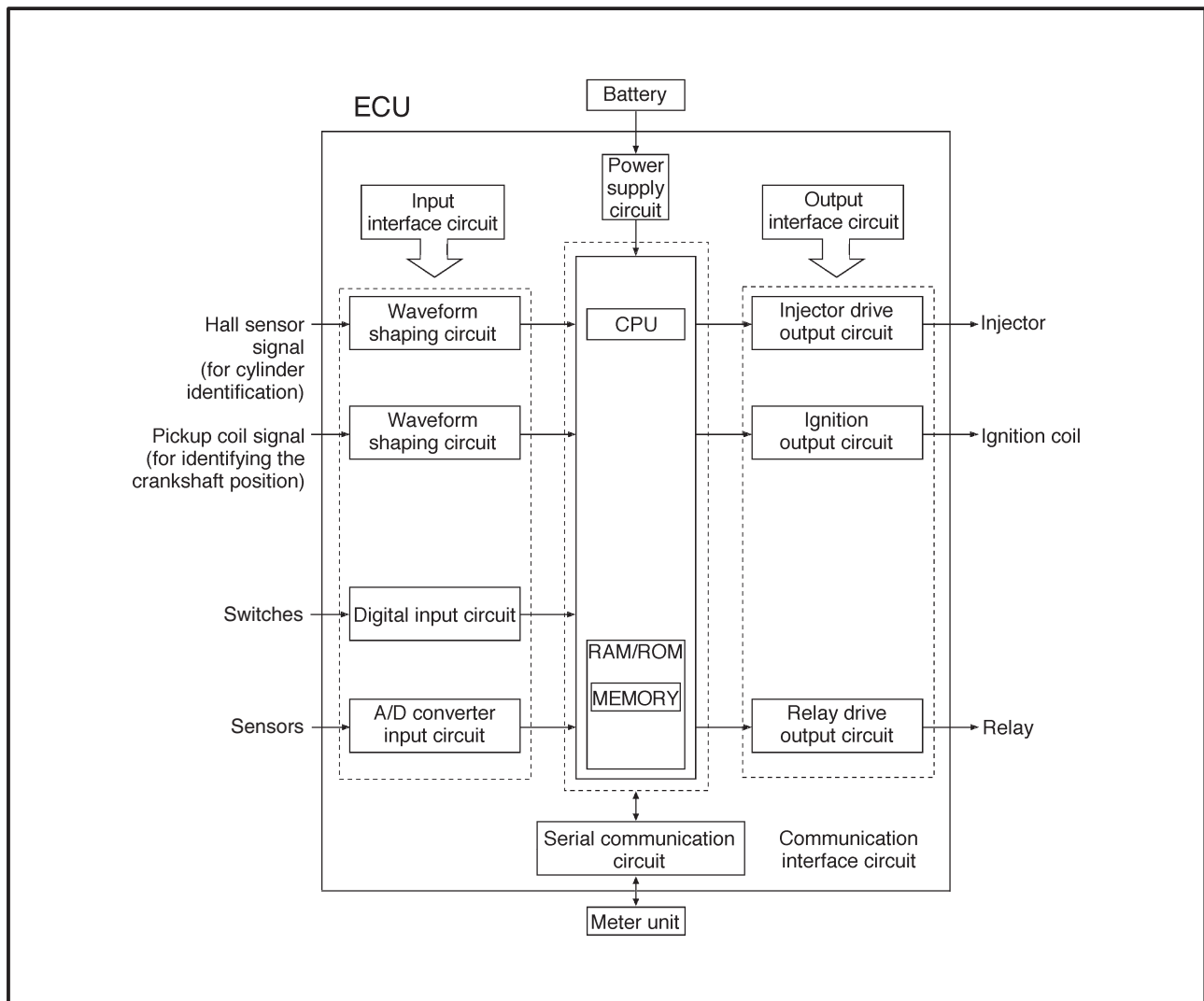
The CPU determines the condition of the sensors in accordance with the level of the signal that is output by the respective sensor. Then, the signals are temporarily stored on the RAM in the CPU. Based on those stored signals and the basic processing program on the ROM, the CPU calculates the fuel injection duration, injection timing, and ignition timing, and then sends control commands to the respective output interface circuits.

D. Output interface circuits

The output interface circuits convert the control signals output by the CPU into actuating signals for the respective actuators in order to actuate them. They also output commands to the relay output circuits as needed.

E. Interface circuit for communication

Communicates with the meter.





- Ignition control

The ignition control function of the ECU controls the ignition timing and the duration of ignition energizing. The ignition timing control uses the signals from the throttle position sensor (to detect the angle of the throttle), and the crankshaft position sensor and speed sensor (to detect the speed of the engine). This control establishes an ignition timing that suits the operating condition of the engine through compensations made to the basic ignition timing control map. The ignition energizing duration control establishes the energizing duration to suit the operating conditions by calculating the energizing duration in accordance with the signal received from the crankshaft position sensor and the battery voltage.

- Fuel control

The fuel control function of the ECU controls the injection timing and injection duration. The injection timing control controls the injection timing during the starting of the engine and the injection timing during the normal operation of the engine, based on the signals received from the crankshaft position sensor and the cylinder identification sensor. The injection duration control determines the duration of injection based on the signals received from the atmospheric pressure sensors, temperature sensors, and the position sensors, to which compensations are made to suit various conditions such as the weather, atmospheric pressure, starting, acceleration, and deceleration.

- Load control

The ECU effects load control in the following manner:

1. Stopping the fuel pump and injectors when the motorcycle overturns

The ECU turns OFF the fuel injection system relay when the lean angle cut-off switch is tripped.

2. Operating the headlight illumination relay

On the model for Europe, the ECU causes the headlight relay 2 to output a constant ON signal, provided that the main switch is ON. On the model for Australia, the ECU controls the headlight relay 2 in accordance with the engine speed as required by the daytime illumination specification.

3. Operating the radiator fan motor in accordance with the coolant temperature

The ECU controls the radiator fan motor relay ON/OFF in accordance with the coolant temperature.

4. Operating the AI system solenoid valve

The ECU controls the energizing of the solenoid valve in accordance with the driving conditions.

5. Operating the intake solenoid valve

The ECU controls the energizing of the solenoid valve in accordance with the driving conditions.

- Self-diagnosis function

The ECU is equipped with a self-diagnosis function to ensure that the engine control system is operating normally. The ECU mode functions include a diagnosis mode in addition to the normal mode.

Normal mode

- To check for any blown bulbs, this mode illuminates a warning light while the main switch is turned ON, and while the starter switch is being pressed.

- If the starting disable warning is activated, this mode alerts the rider by blinking the warning light while the start switch is being pressed.

- If a malfunction occurs in the system, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the malfunction by illuminating a warning light. After the engine is stopped, this mode displays a fault code on the clock LCD.

Diagnosis mode

- In this mode, a diagnostic code is input into the ECU through the operation of the operating switch on the meter, and the ECU displays the values output by the sensors or actuates the actuators in accordance with the diagnostic code. Whether the system is operating normally can be checked by observing the illumination of the warning light, the values displayed on the meter, or the actuating state of the actuators.

**Fuel pump**

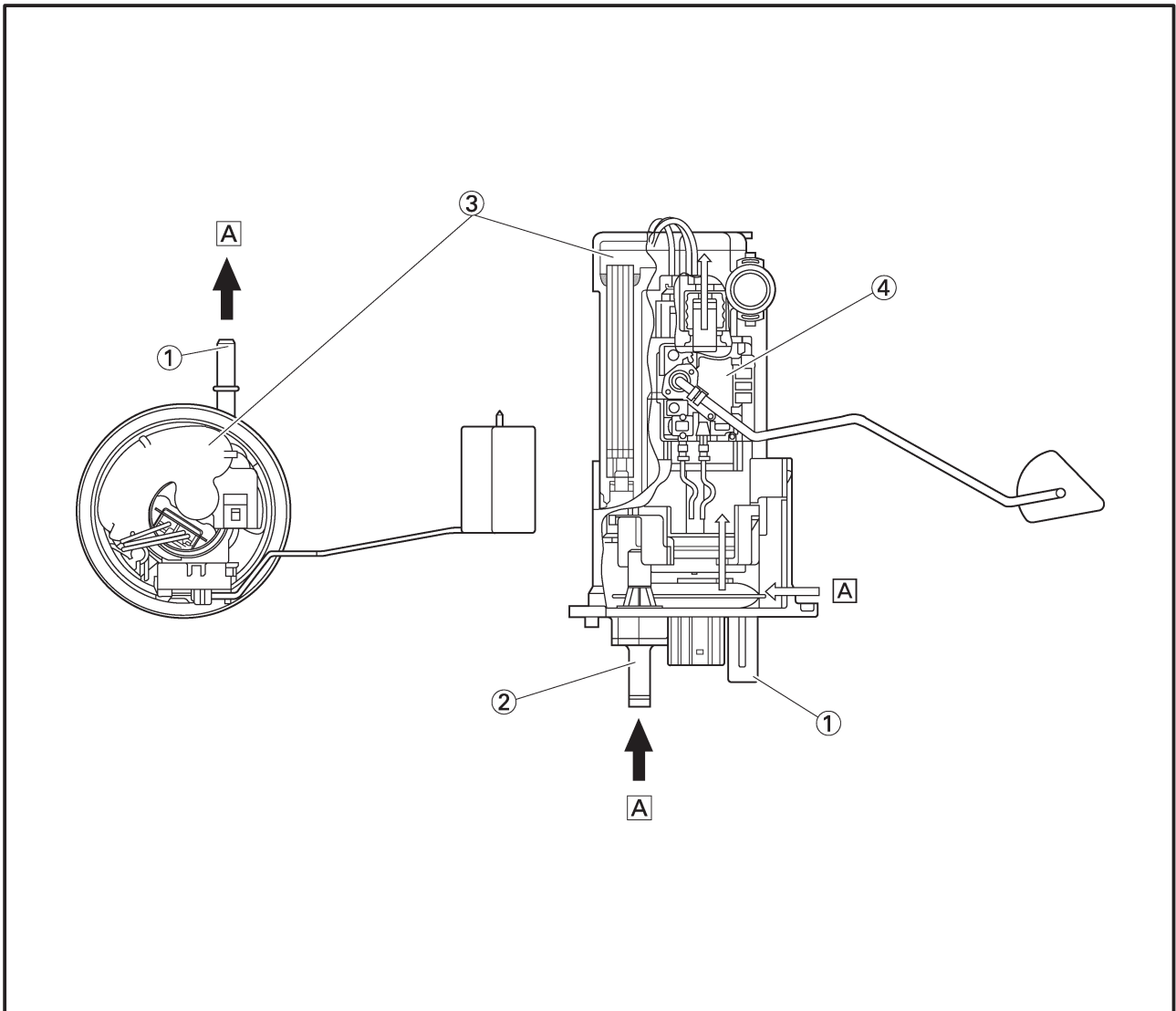
The fuel pump, which is mounted in the fuel tank, draws the fuel directly from the tank and pumps it to the injector.

A filter that is provided in the fuel pump prevents any debris in the fuel tank from entering the fuel system downstream of the pump.

The pump consists of a pump unit, electric motor, filter, and valves.

The pump unit is a Wesco type rotary pump that is connected to the motor shaft.

A relief valve is provided to prevent the fuel pressure from rising abnormally if the fuel hose becomes clogged. This valve opens when the fuel pressure at the discharge outlet reaches between 441 and 637 kPa, and returns the fuel to the fuel tank.



- ① Fuel feed nozzle
- ② Fuel return nozzle
- ③ Fuel filter
- ④ Sender unit
- Ⓐ Fuel

**Pressure regulator**

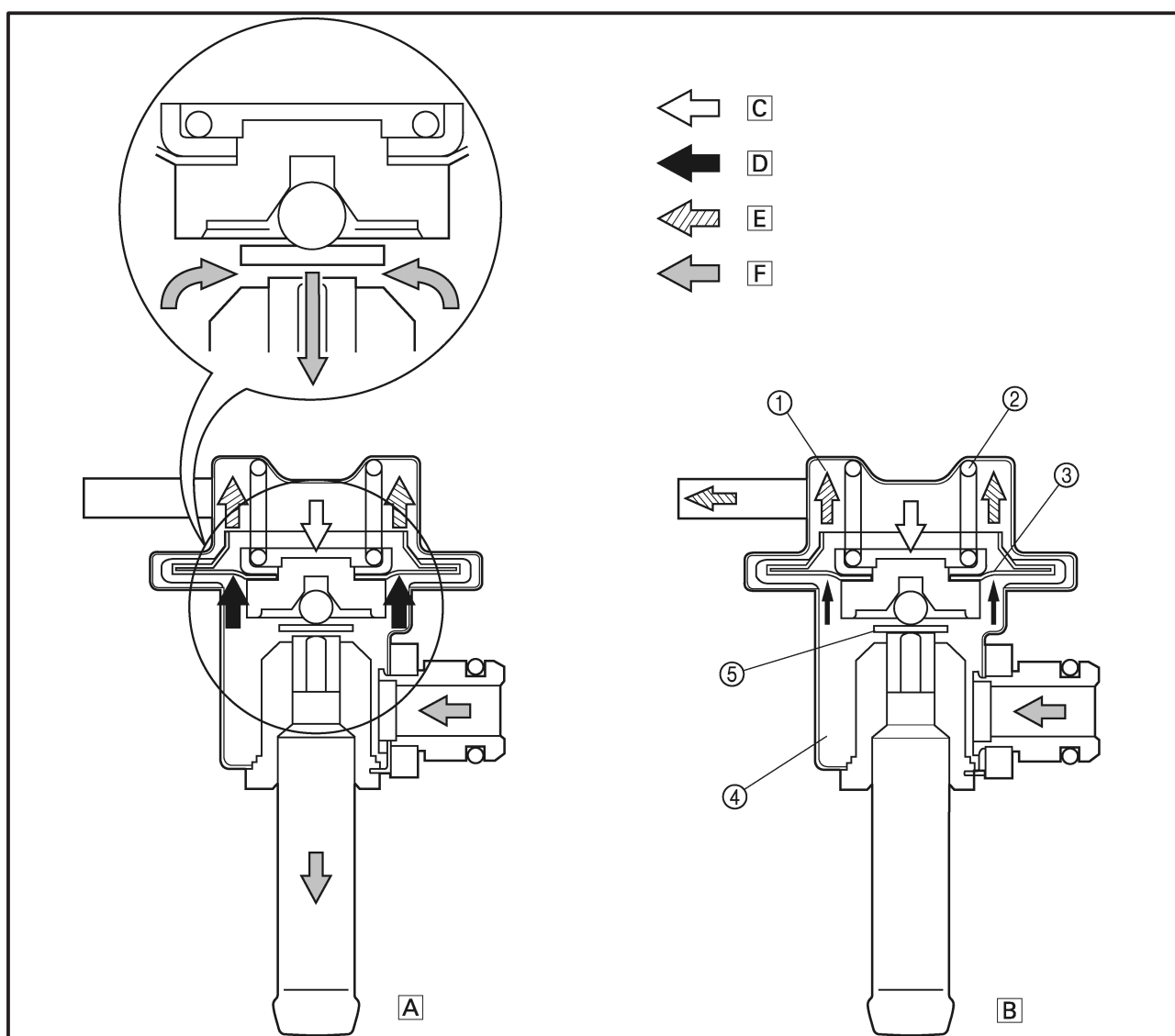
It regulates the fuel pressure that is applied to the injectors that are provided in the cylinders in order to maintain a constant pressure difference with the pressure in the intake manifold.

The fuel that is delivered by the fuel pump fills the fuel chamber through the fuel inlet of the regulator and exerts pressure on the diaphragm in the direction for opening the valve.

A spring that is provided in the spring chamber exerts pressure on the diaphragm in the direction for closing the valve, in contrast to the pressure of the fuel. Thus, the valve cannot open unless the fuel pressure overcomes the spring force.

An intake vacuum is applied to the spring chamber via a pipe. When the pressure of the fuel exceeds the sum of the intake vacuum and the spring force, the valve that is integrated with the diaphragm opens, allowing the fuel to return from the fuel outlet to the fuel tank, via the fuel return hose.

As a result, because the intake vacuum fluctuates in accordance with the changes in the operating conditions in contrast to the constant volume of fuel supplied by the pump, the valve opening/closing pressure also changes to regulate the return fuel volume. Thus, the difference between the fuel pressure and the intake manifold pressure remains constant at a prescribed pressure.



- ① Spring chamber
- ② Spring
- ③ Diaphragm

- ④ Fuel chamber
- ⑤ Valve

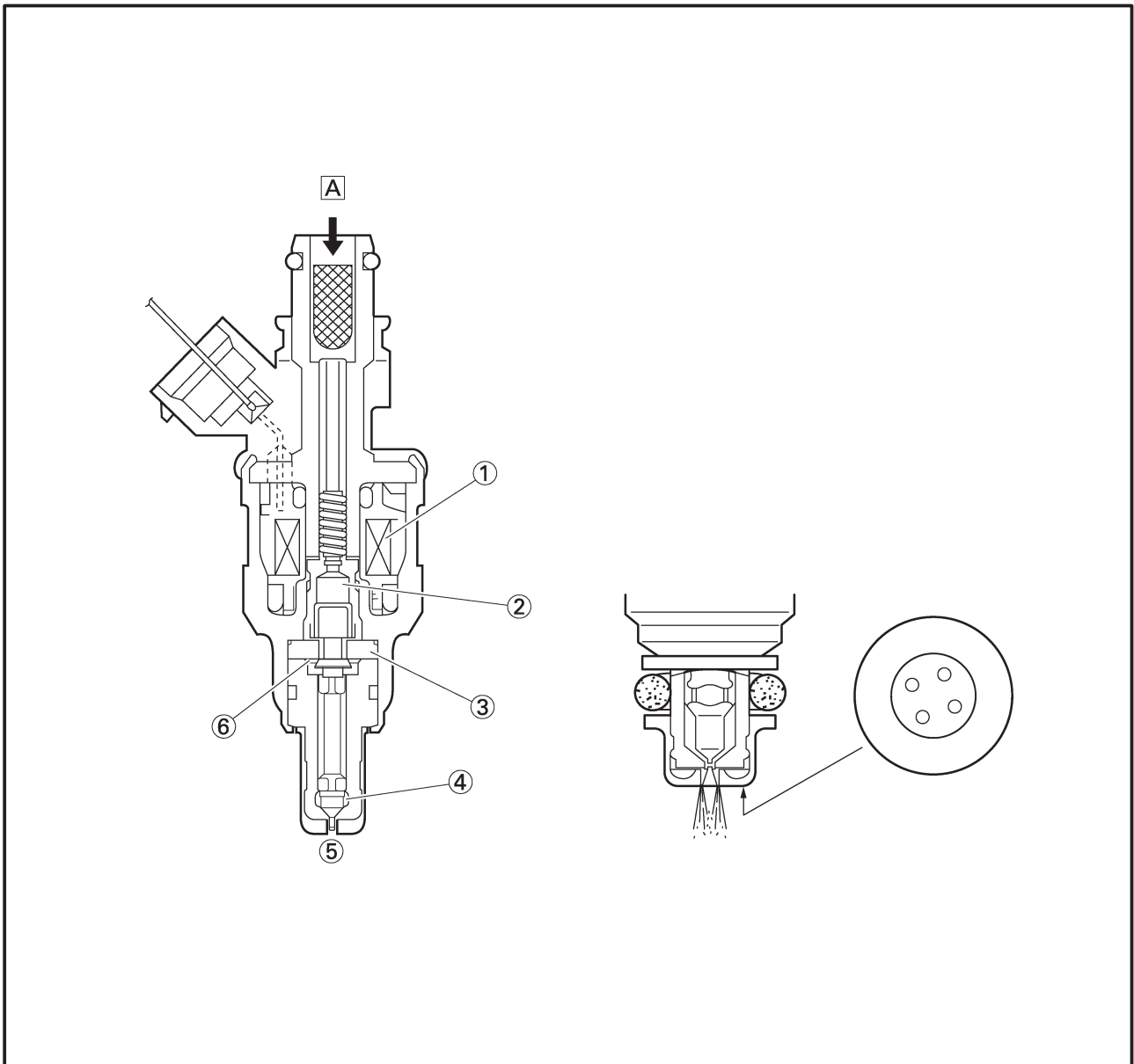
- [A] Open
- [B] Close
- [C] Spring pressure

- [D] Fuel pressure
- [E] Vacuum pressure
- [F] Fuel

**Fuel injector**

Upon receiving injection signals from the ECU, the fuel injector injects fuel. In the normal state, the core is pressed downward by the force of the spring, as illustrated. The needle that is integrated with the bottom of the core keeps the fuel passage closed.

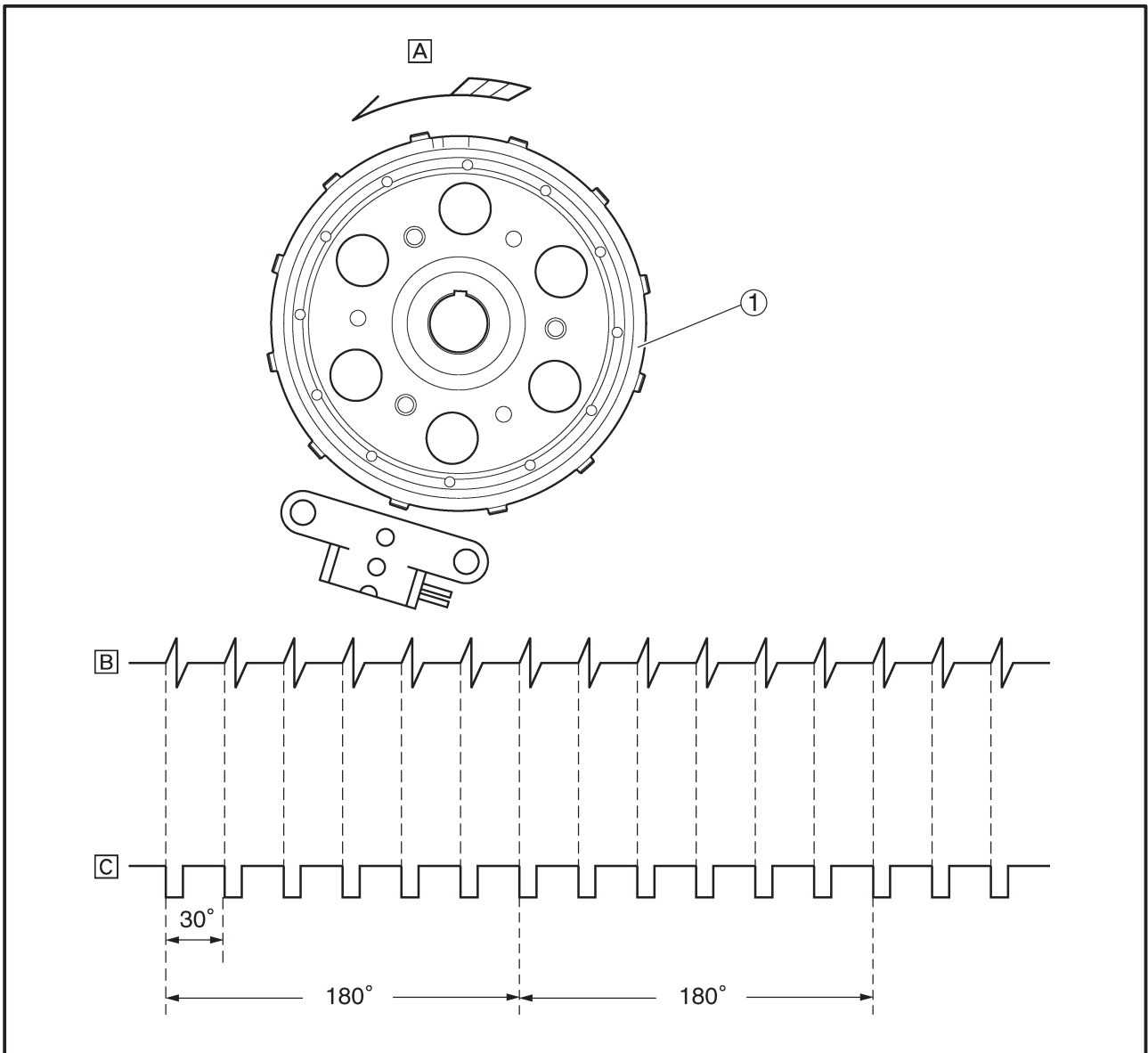
When the current flows to the coil in accordance with the signal from the ECU, the core is drawn upward, allowing the flange that is integrated with the needle to move to the spacer. Since the distance of the movement of the needle is thus kept constant, the opening area of the fuel passage also becomes constant. Because the pressure difference of the fuel to the intake manifold pressure is kept constant by the pressure regulator, the fuel volume varies in proportion to the length of time the coil is energized. The injector that has been recently adopted has a four-hole type injection orifice that enhances the atomization of fuel and improves combustion efficiency.



- ① Coil
- ② Core
- ③ Spacer
- ④ Needle
- ⑤ Inject
- ⑥ Flange
- Ⓐ Fuel

**Crankshaft position sensor**

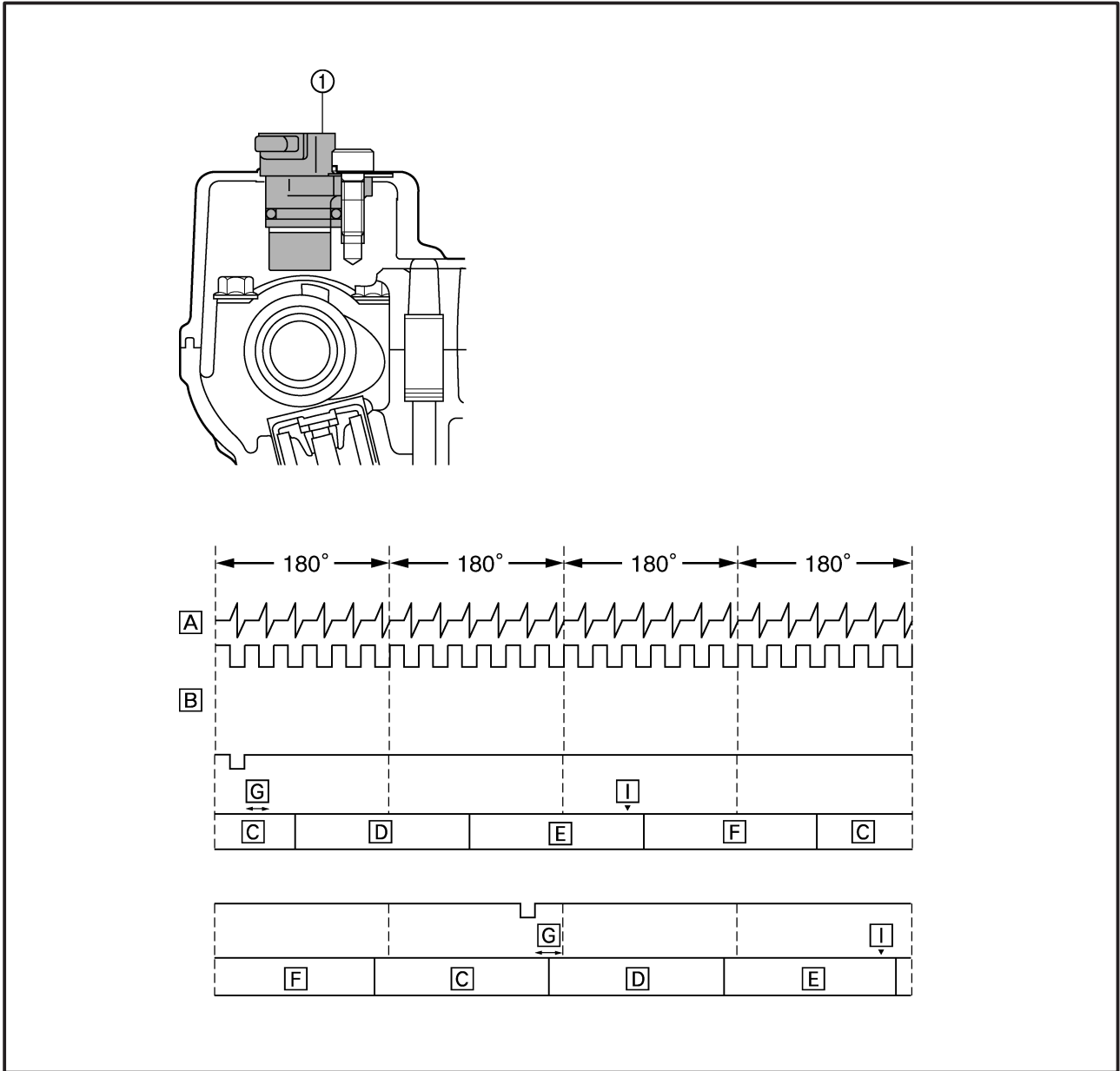
The crankshaft position sensor uses the signals of the pickup coil that is mounted on the right side of the crankshaft. When the rotation of the pickup rotor that is attached to the crankshaft causes the projections on the rotor to pass by the pickup coil, an electromotive force is generated in the coil. The voltage of this force is then input into the ECU, which calculates the position of the crankshaft and the speed of the engine. The ignition timing is then determined in accordance with the calculated data, in order to determine the corresponding injection timing. Based on the changes in the time intervals of the signals generated by the pickup coil, the ECU calculates the ignition timing advance to suit the operating conditions. The injection timing is also advanced in accordance with the ignition timing in order to supply fuel to the engine at an optimal timing.



- ① Pickup rotor
- A Direction of rotation
- B Pickup signal
- C Trigger pole

**Cylinder identification sensor**

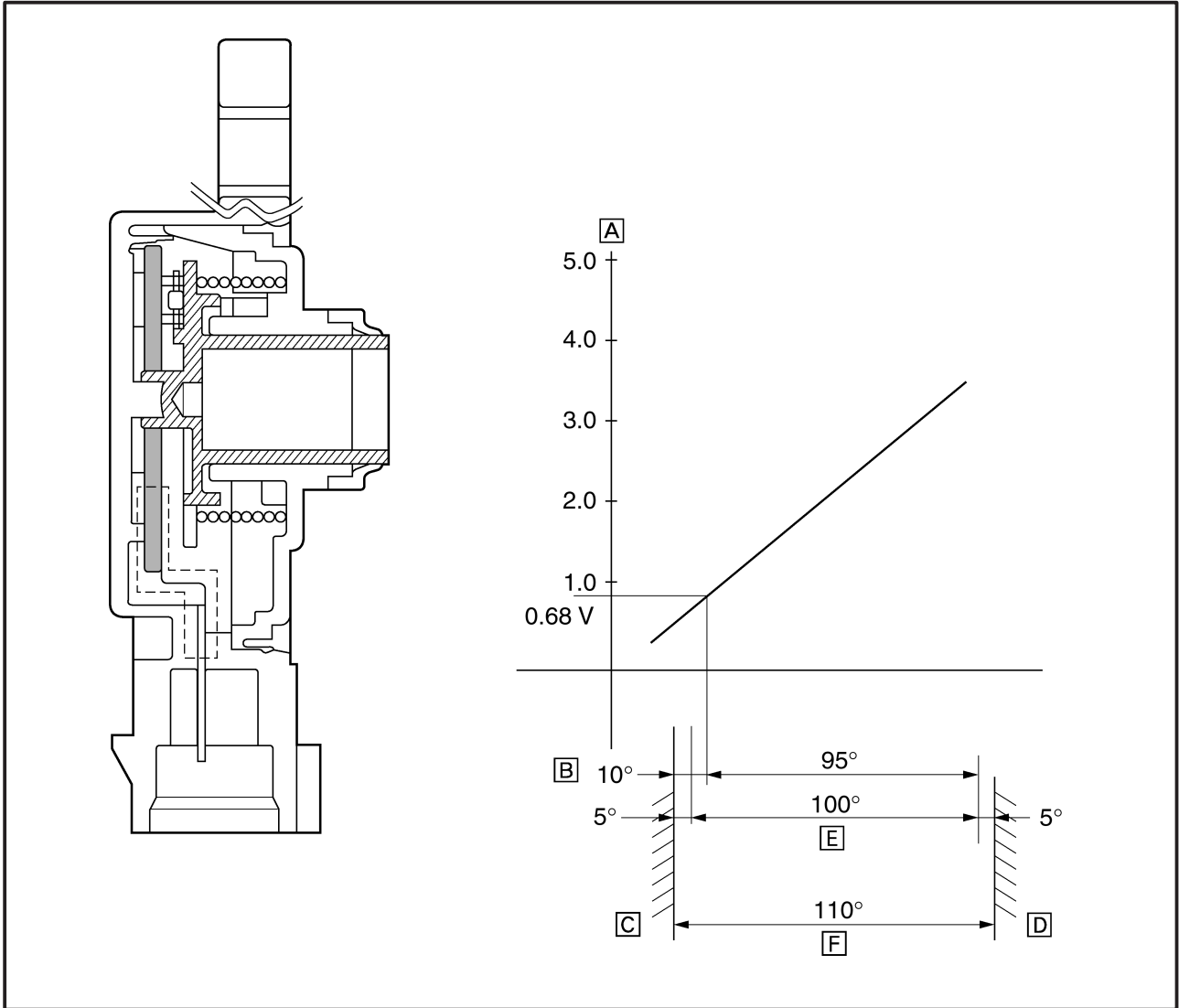
The cylinder identification sensor is mounted on the exhaust head cover of the #1 cylinder. When the exhaust cam of the #1 cylinder rotates and the projection of the cam plate passes by the sensor, the sensor generates a signal and sends it to the ECU. Based on this signal and the signal from the crankshaft position sensor, the ECU then actuates the injector of the cylinder that is currently in order to supply fuel.



- ① Cylinder identification sensor
- A Crankshaft position sensor signal
- B Cylinder identification sensor signal
- C Exhaust
- D Intake
- E Compression
- F Combustion
- G Injection
- H Ignition

**Throttle position sensor**

The throttle position sensor measures the intake air volume by detecting the position of the throttle valve. It detects the mechanical angle of the throttle valve through the positional relationship between the moving contact that moves in unison with the throttle shaft and the resistor board. In actual operation, the ECU supplies 5 V power to both ends of the resistor board and the voltage that is output by the throttle position sensor is used to determine the angle of the throttle valve.



- A** Output voltage
- B** Idling output position
- C** Mechanical stopper
- D** Mechanical stopper
- E** Effective electrical angle
- F** Sensor operating angle

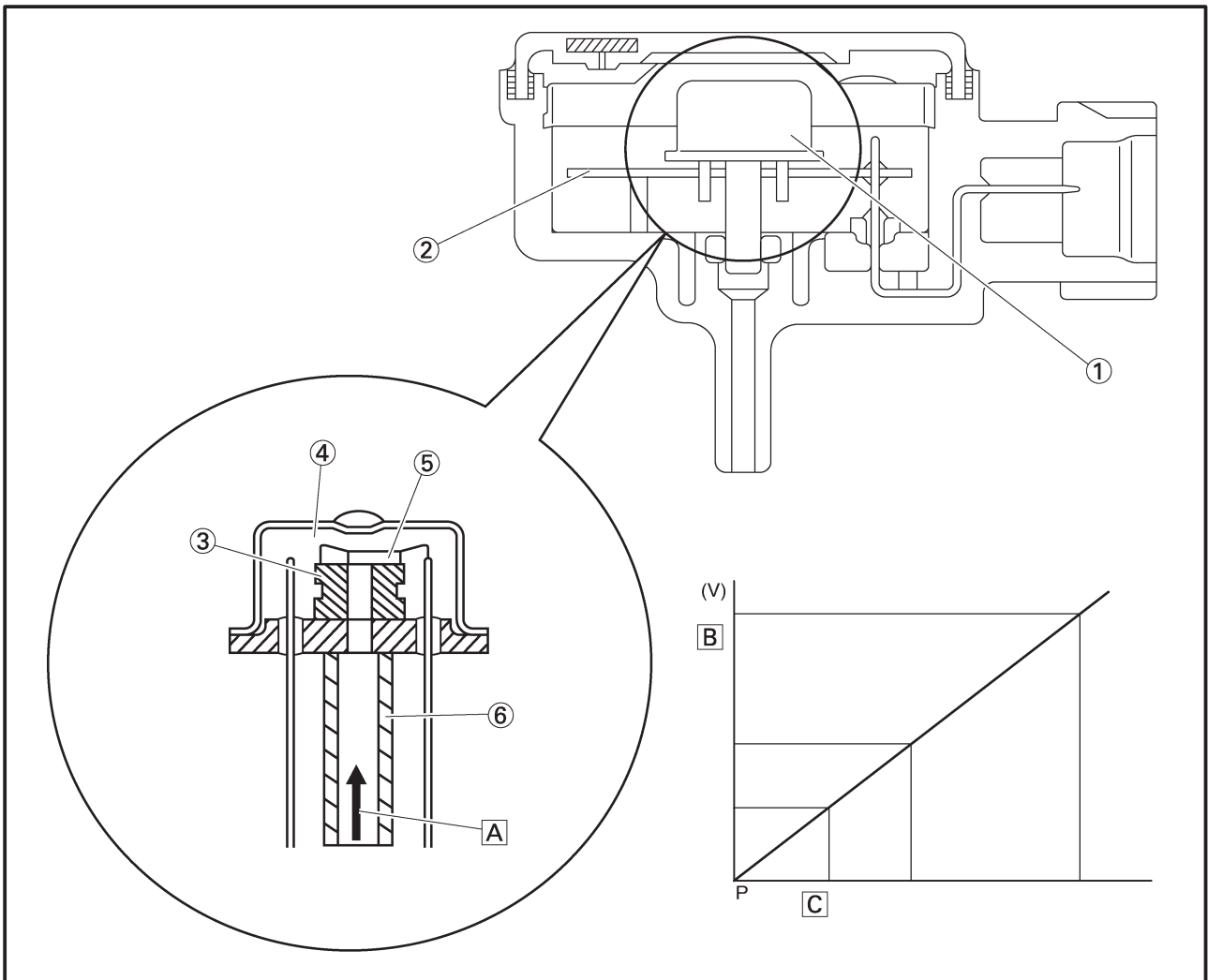
**Intake air pressure sensor and atmospheric pressure sensor**

• Intake air pressure sensor

The intake air pressure sensor is used for measuring the intake air volume. The intake air volume of every intake stroke is proportionate to the intake air pressure. Therefore, the intake air volume can be measured by measuring the intake air pressure. The intake air pressure sensor converts the measured intake air pressure into electrical signals and sends those signals to the ECU. When the intake air pressure is introduced into the sensor unit, which contains a vacuum chamber on one side of the silicon diaphragm, the silicon chip that is mounted on the silicon diaphragm converts the intake air pressure into electrical signals. Then, an integrated circuit (IC) amplifies and adjusts the signals and makes temperature compensations, in order to generate electrical signals that are proportionate to the pressure.

• Atmospheric pressure sensor

The atmospheric pressure sensor is used for making compensations to the changes in the air density caused by the changes in the atmospheric pressure (particularly at high altitudes). The operating principle and function of the atmospheric pressure sensor are the same as those of the aforementioned intake air pressure sensor.



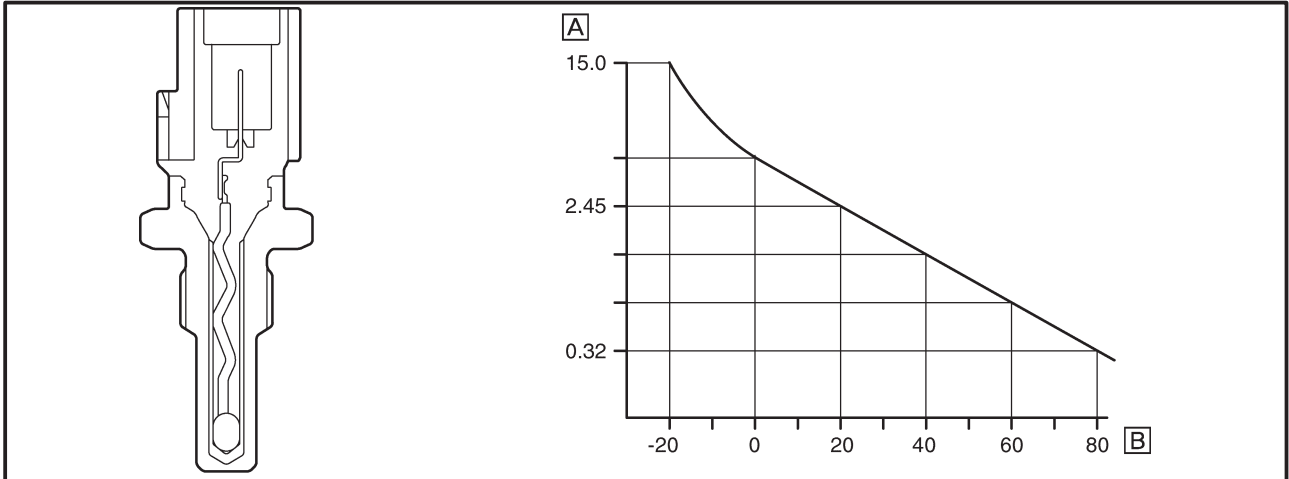
- ① Sensor unit
- ② Hybrid IC
- ③ Silicon diaphragm

- ④ Vacuum chamber
- ⑤ Silicon chip
- ⑥ Pressure induction pipe

- Ⓐ Atmospheric pressure, intake air pressure
- Ⓑ Output voltage
- Ⓒ Input pressure

**Coolant temperature sensor**

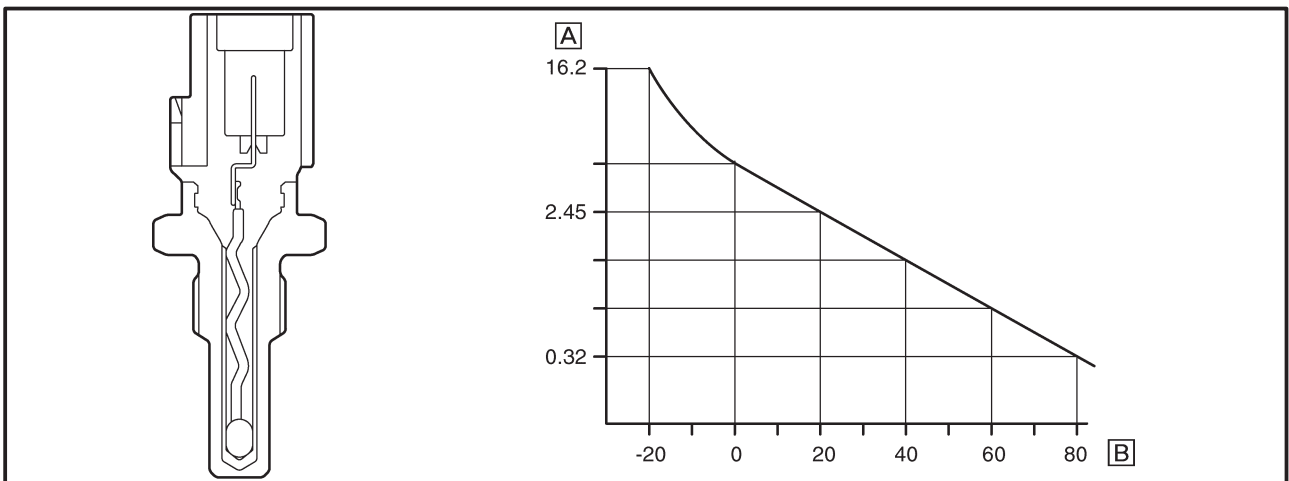
The signals from the coolant temperature sensor are used primarily for making fuel volume compensations during starting and warm-up. The coolant temperature sensor converts the temperature of the coolant into electrical signals and sends them to the ECU.



- A** Resistance kΩ
- B** Temperature °C

**Intake air temperature sensor**

The intake temperature sensor corrects the deviation of the air-fuel mixture that is associated with the changes in the intake air density, which are created by the changes in the intake air temperature that occur due to atmospheric temperatures. This sensor uses a semi-conductor thermistor that has a large resistance at low temperatures and a small resistance at high temperatures. The thermistor converts the temperature-dependent changes in resistance into electrical resistance values, which are then input into the ECU.

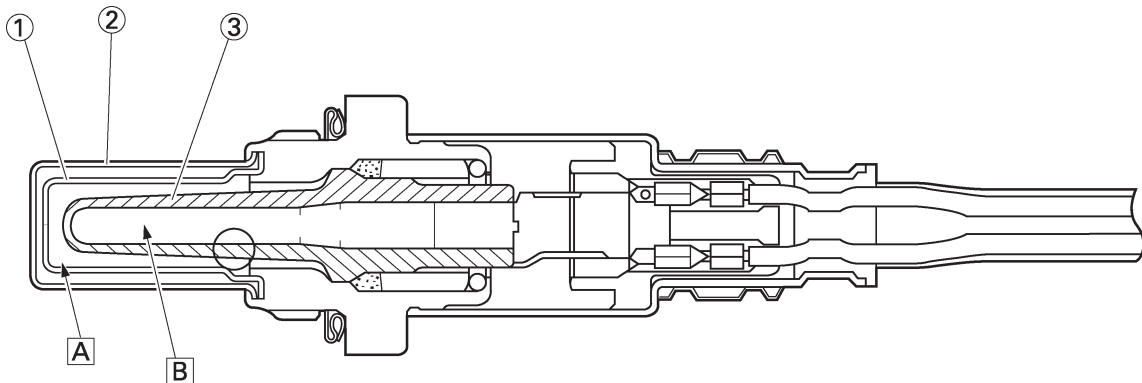


- A** Resistance kΩ
- B** Temperature °C



### O<sub>2</sub> sensor

The O<sub>2</sub> sensor has been adopted to enable the catalyst to function at a high degree of efficiency by maintaining the air-fuel mixture near the stoichiometric ratio (14.7 : 1). This sensor, which is a zirconia type, utilizes the oxygen ion conductivity of the solid electrolyte for detecting the oxygen concentration levels. In actual operation, a zirconia tube made of solid electrolyte is exposed in the exhaust gas, so that the exterior of the zirconia tube is in contact with the exhaust gas and the interior is in contact with the atmosphere whose oxygen concentration level is known. When a difference in the oxygen concentration level is created between the outside and the inside of the zirconia tube, the oxygen ion passes through the zirconia element and generates an electromotive force. The electromotive force increases when the oxygen concentration level is low (rich air-fuel ratio) and the electromotive force decreases when the oxygen concentration level is high (lean air-fuel ratio). As electromotive force is generated in accordance with the concentration of the exhaust gas, the resultant voltage is input into the ECU in order to correct the duration of the injection of fuel.

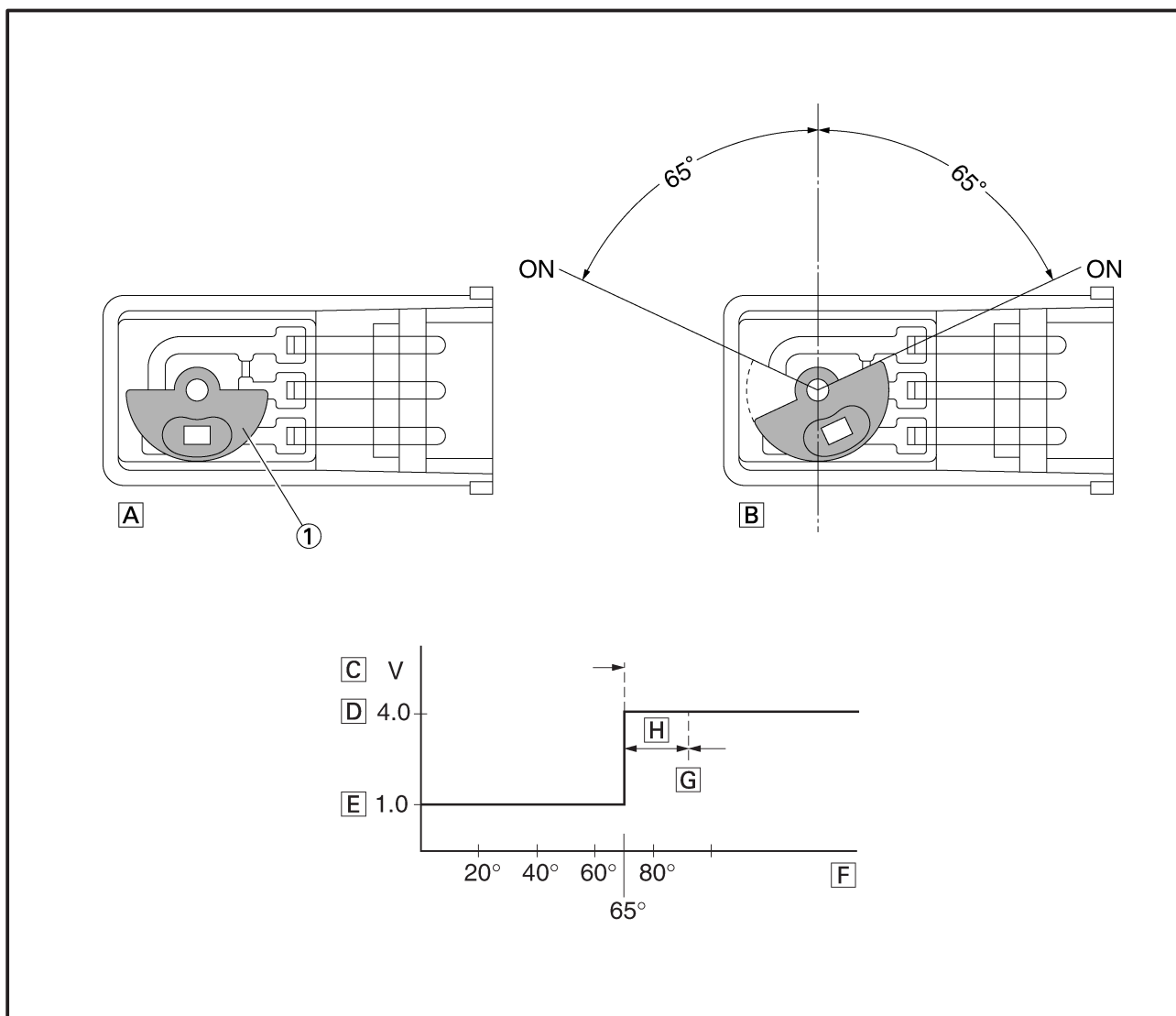


- ① Inner cover
- ② Outer cover
- ③ Zirconia tube

- A Exhaust gas
- B Atmosphere

### Lean angle cut-off switch

The lean angle cut-off switch stops the supply of fuel to the engine in case the motorcycle overturns. When the motorcycle is in the normal state, the cut-off switch outputs a constant voltage of approximately 1.0 V (low level). When the motorcycle tilts, the float in the switch tilts in proportion to the tilt of the motorcycle. However, the voltage output to the ECU remains unchanged at the low level. When the tilt of the motorcycle exceeds 70 degrees (according to the tilt of the float), the signal from the sensor increases to approximately 4.0 V (high level). When the ECU receives the high-level voltage, it determines that the motorcycle has overturned, and stops the delivery of fuel to the engine by turning OFF the fuel injection system relay that powers the fuel pump and the injectors. Once the cut-off switch is tripped, the ECU maintains this state; therefore, even if the motorcycle has recovered its upright position, this state will not be canceled unless the main switch is turned OFF, and then turned back ON.



① Float

- A** Normal
- B** Tilts
- C** Output voltage
- D** High level
- E** Low level
- F** Cut-off switch tilt angle
- G** Fuel injection system relay OFF
- H** Lag time

**THREE-WAY CATALYTIC CONVERTER SYSTEM**

**System outline**

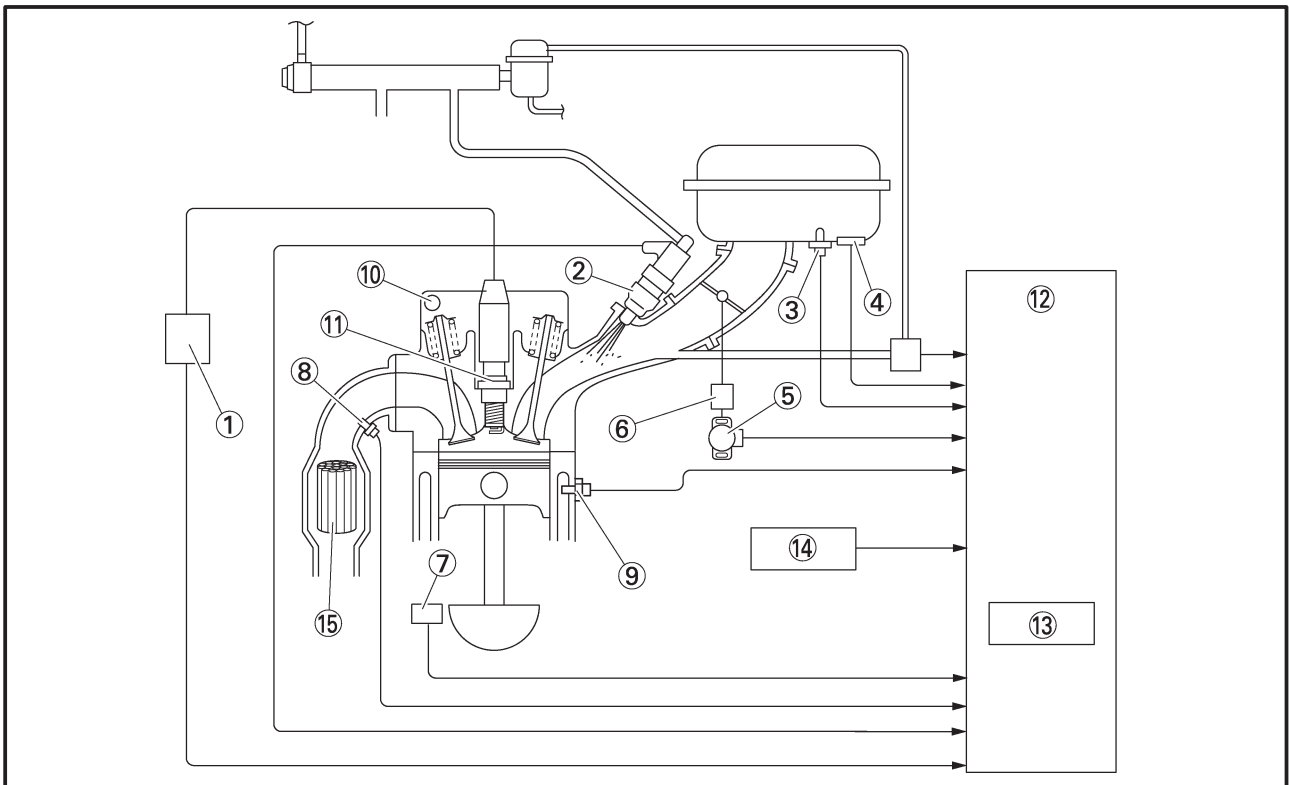
This is a highly efficient exhaust gas cleaning system that effects air-fuel control through a joint effort by the FI system, O<sub>2</sub> sensor, and the three-way catalytic converter system. By effecting comprehensive control of the air-fuel ratio in this manner, this system reduces the CO, HC, and NOx in the exhaust gases.

The FI system controls the mixture to an optimal air-fuel ratio (basic air-fuel ratio) that matches the operating condition of the engine in order to realize an ideal combustion.

Furthermore, an O<sub>2</sub> sensor that detects the concentration of oxygen that remains in the exhaust gas is provided in the exhaust pipe for the purpose of maximizing the performance of the three-way catalytic converter and to clean the exhaust gas at a high degree of efficiency. Based on this data, the ECU applies more precise compensation to the basic air-fuel ratio, in order to maintain the mixture in the vicinity of the stoichiometric air-fuel ratio of 14.7 : 1.

Through the joint effort of these control systems, the exhaust gas is cleaned in a highly efficient manner without sacrificing engine performance.

**Three-way catalytic converter system diagram**



- |                                 |                              |                                  |                               |
|---------------------------------|------------------------------|----------------------------------|-------------------------------|
| ① Ignition coil                 | ⑥ Intake air pressure sensor | ⑩ Cylinder identification sensor | ⑬ Igniter                     |
| ② Injector                      | ⑦ Crankshaft position sensor | ⑪ Spark plug                     | ⑭ Atmospheric pressure sensor |
| ③ Intake air temperature sensor | ⑧ O <sub>2</sub> sensor      | ⑫ ECU                            | ⑮ Catalytic converter         |
| ④ Intake solenoid               | ⑨ Coolant temperature sensor |                                  |                               |
| ⑤ Throttle position sensor      |                              |                                  |                               |

**Functions of components**

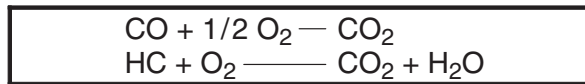
**Catalyst**

Because the conditions in which NOx is generated are directly opposed to those of CO and HC, there is a limit to the extent to which the concentration levels of these harmful elements can be reduced in the combustion stage. Hence, the function of the catalyst is to clean the exhaust gas at a high degree of efficiency by removing CO, HC, and NOx in the exhaust stage.

This model has adopted a monolith type metallic catalyst with a honeycomb construction, which achieves a low exhaust resistance through the large surface area of the catalyst body (with a high level of cleaning efficiency).

Catalytic substances consisting of precious metals such as platinum and rhodium are adhered to the wall surface of these honeycomb cells, which are enclosed in the exhaust pipe. As the exhaust gas comes in contact with these catalytic substances, the chemical reactions of oxidation and reduction advance in order to clean the exhaust gas.

- The CO and HC oxidize with the oxidation function of platinum, and are converted into harmless carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O), resulting in cleaner exhaust gases.

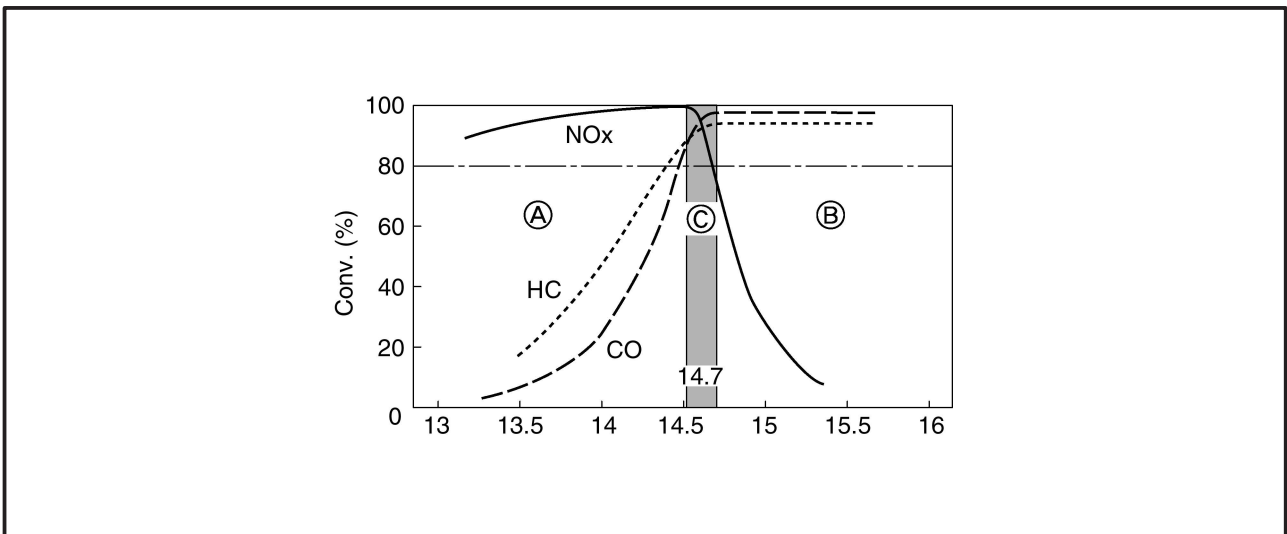


- The NOx is reduced by the reduction function of rhodium, which converts NOx into harmless nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>), resulting in cleaner exhaust gases.



To clean the exhaust gases at a high rate of efficiency through the maximization of these catalytic capacities, it is necessary to maintain and control the mixture in the vicinity of the stoichiometric air/fuel ratio of (14.7 : 1) at all times. As a means of maintaining the stoichiometric ratio, this system has adopted an O<sub>2</sub> feedback compensation method that uses an O<sub>2</sub> sensor.

Large amounts of both CO and HC are generated when the mixture is rich (as indicated by insufficient O<sub>2</sub> region (A)). Conversely, large amounts of NOx are generated when the mixture is lean (as indicated by excessive O<sub>2</sub> region (B)). Under these conflicting characteristics, the system maintains the mixture within an extremely narrow range (C) of stoichiometric ratio (14.7 : 1). As a result, the function of the catalyst is maximized, making it possible to clean the exhaust gases at a high degree of efficiency.





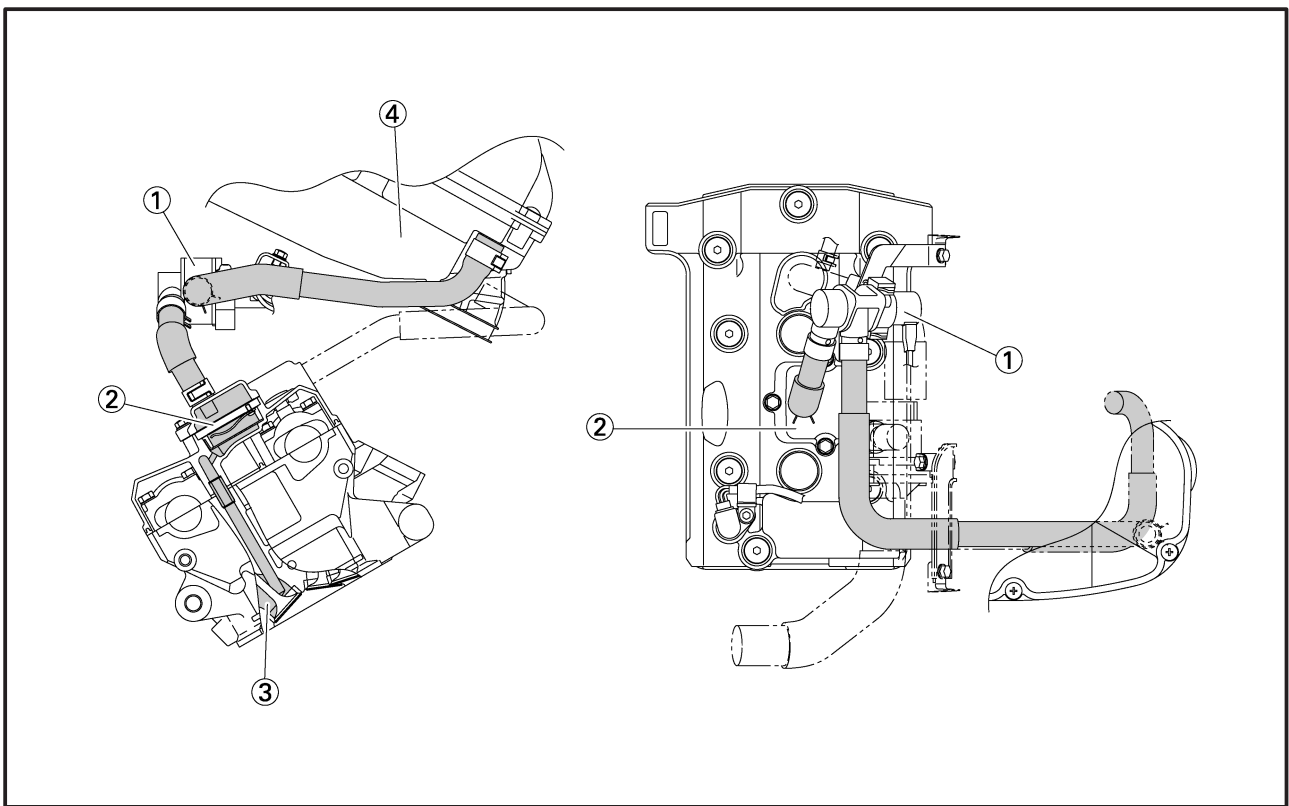
### AIR INDUCTION SYSTEM

The air induction system (AI system) introduces fresh air into the exhaust port in order to burn the unburned gas (which is present in the exhaust gas) in the exhaust pipe. The burning of the unburned gases in this manner enhances the efficiency of the catalyst and results in cleaner exhaust gases.

The AI system takes a portion of the air from the air cleaner, sends it to the reed valve via the air cut-off valve, and introduces it directly into the exhaust port through the reed valve.

The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut off the flow when the motorcycle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.

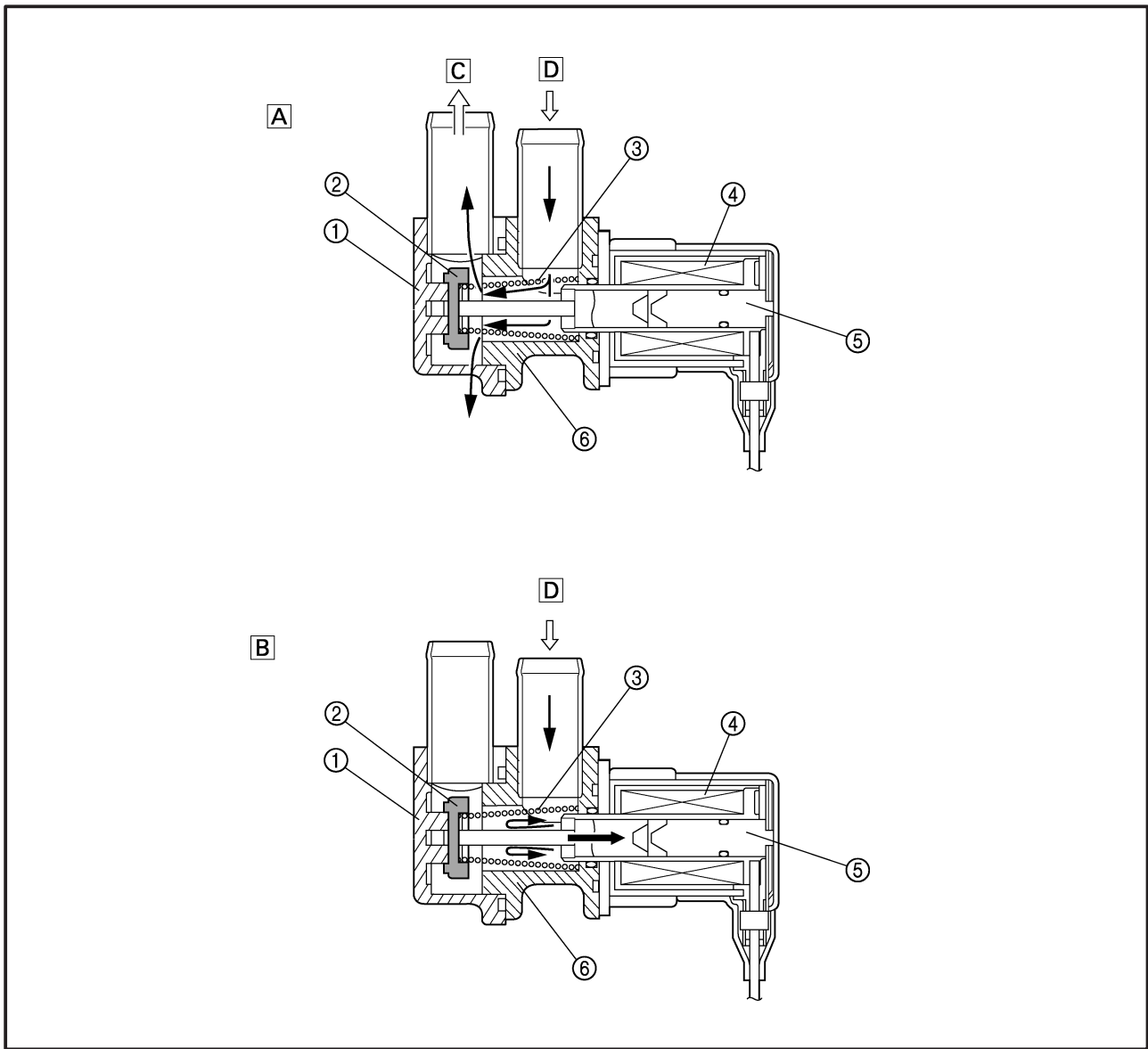
The reed valve is provided on the cylinder head cover above the cylinders, and sends air to the exhaust pipe through the inside of the cylinder head.



- ① Air cut-off valve
- ② Reed valve
- ③ Exhaust port
- ④ Air filter case

**Air cut-off valve**

The air cut-off valve consists of a plunger that is mounted inside the core of a solenoid coil, and a valve at the end of the plunger for opening and closing the air passage. Due to the force of a spring, the valve is in constant contact with valve block A, and thus keeps the air passage open. As a result, the air from the air cleaner passes through the air passage and flows into the reed valves of the cylinders. When the current flows to the solenoid coil in accordance with a signal from the ECU, the plunger in the core becomes attracted towards the coil. When this attraction force overcomes the pressure of the spring, the valve is pulled in along with the plunger, comes in contact with valve block B, and closes the air passage. The ECU controls the operation of the air cut-off valve so that it operates in an optimal condition to suit the driving conditions.



① Valve block A  
② Valve

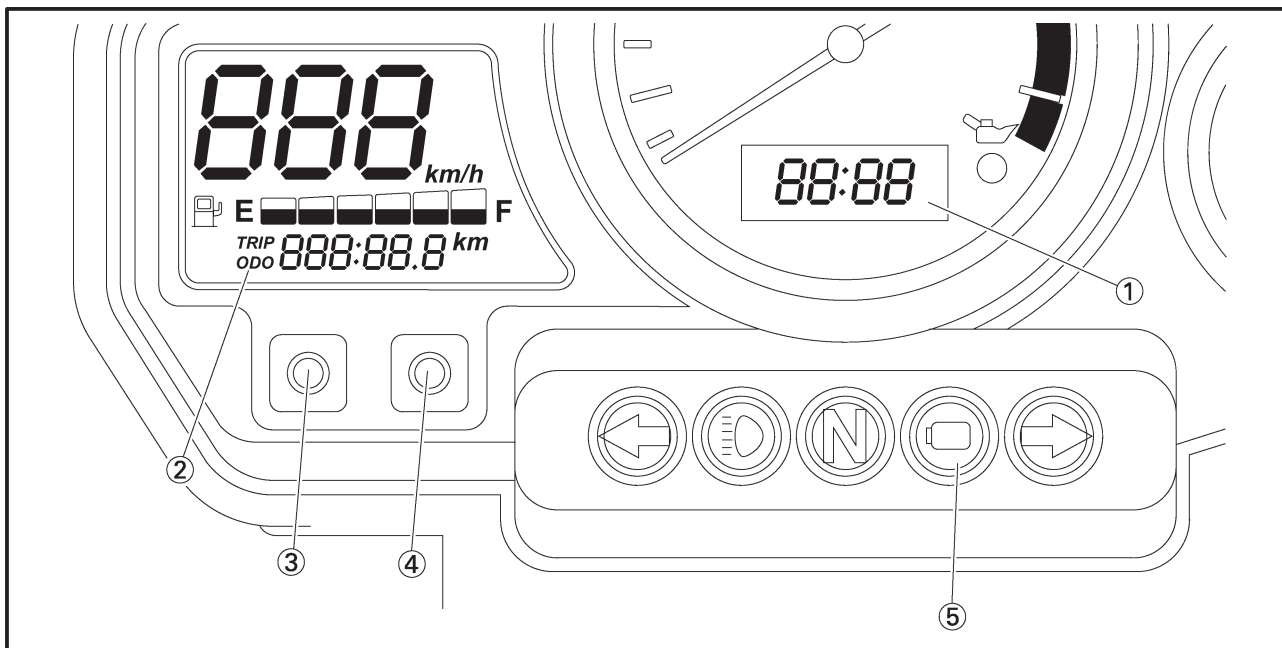
③ Spring  
④ Coil

⑤ Core  
⑥ Valve block B

A Open  
B Close  
C To reed valve  
D From air cleaner



INSTRUMENT PANEL



- ① Clock
- ② TRIP/ODO meter
- ③ SELECT button
- ④ RESET button
- ⑤ Engine trouble warning light

Function indication

The indications of the self-diagnosis function can be checked and inspection operations can be performed through the use of the multi-function meter on the instrument panel.

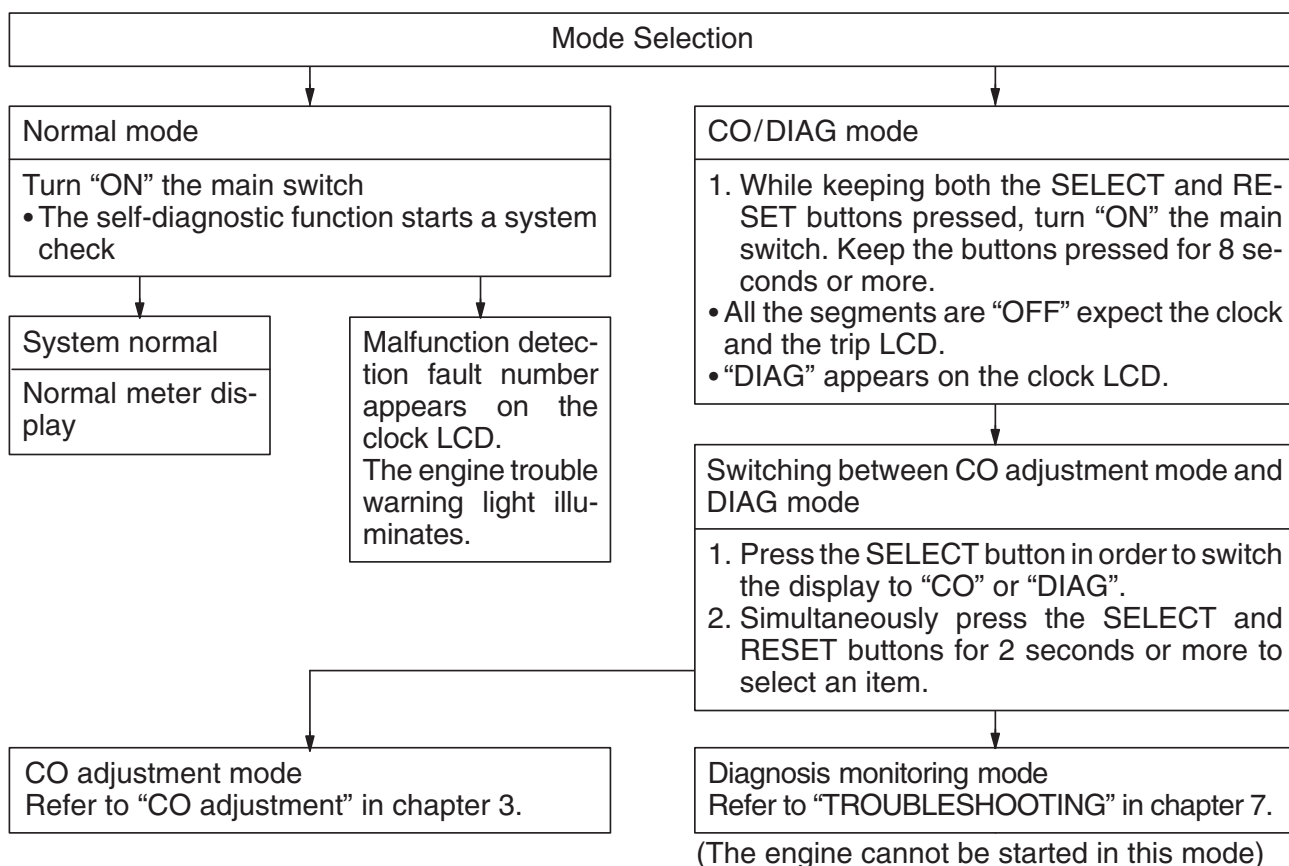
Based on the signals received from the sensors, the ECU inputs the signals into the multi-function meter. Then, the conditions of the sensors appear on the clock and trip/odometer display of the multi-function meter.

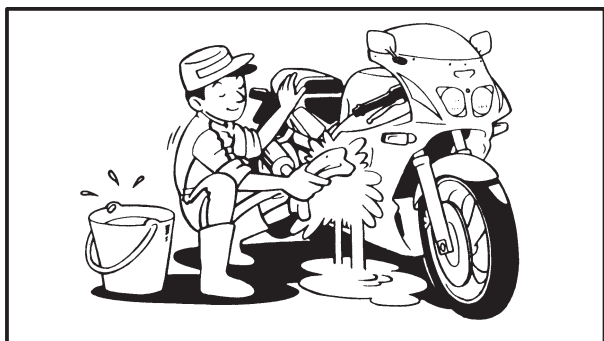
<p>NORMAL MODE</p>	<ul style="list-style-type: none"> <li>① Speed meter</li> <li>② Fuel meter (The symbol “” blinks when the gasoline is almost empty)</li> <li>③ Trip/odometer display</li> <li>④ Clock display</li> </ul>
<p>CO ADJUSTMENT/DIAGNOSTIC MONITORING SELECTION MODE</p>	<ul style="list-style-type: none"> <li>① Temporary selection display for CO/DIAG.</li> </ul> <p>CO: TRIP  ODO </p> <p>DIAG: TRIP  ODO </p>



<p><b>CO ADJUSTMENT MODE</b></p>	<p>① Cylinder identification For #1      For #2 </p> <p>② CO data Example:  lean                      rich -128 ← 0 → 128</p>
<p><b>DIAGNOSTIC MONITORING MODE</b></p>	<p>① Diagnostic monitoring code Example: code "01" </p> <p>② Monitoring data</p>
<p><b>WHEN THE COMMUNICATION ERROR OCCURRED BETWEEN ECU AND METER:</b></p>	<p>① Error code Example: When the error code is "Er-1" </p> <p>For details of error codes, refer to "FAIL-SAFE ACTION TABLE" in chapter 7.</p>

**CO adjustment and diagnostic monitoring mode**

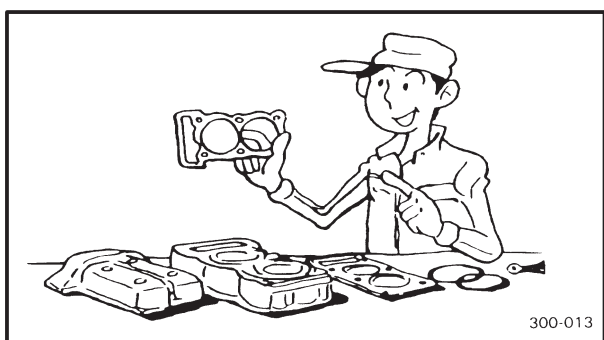




EAS00020

## IMPORTANT INFORMATION PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.
2. Use only the proper tools and cleaning equipment.  
Refer to the "SPECIAL TOOLS".
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.



EAS00021

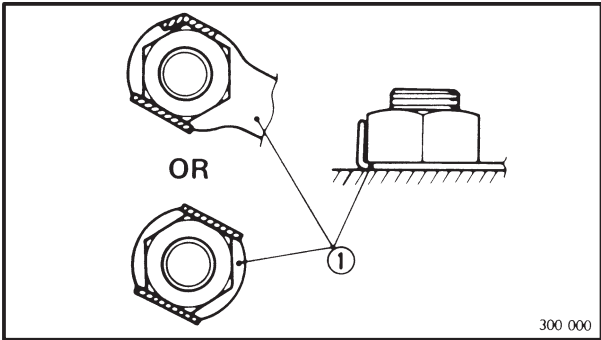
## REPLACEMENT PARTS

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

EAS00022

## GASKETS, OIL SEALS AND O-RINGS

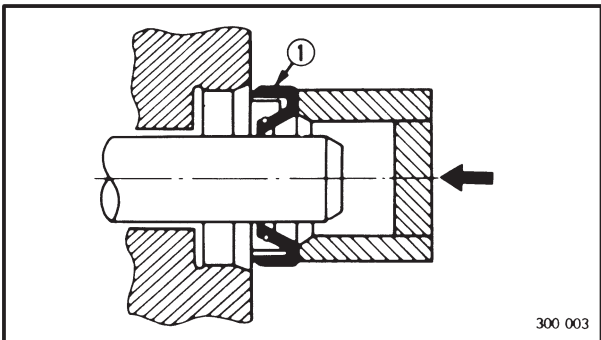
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



EAS00023

**LOCK WASHERS/PLATES AND COTTER PINS**

After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



EAS00024

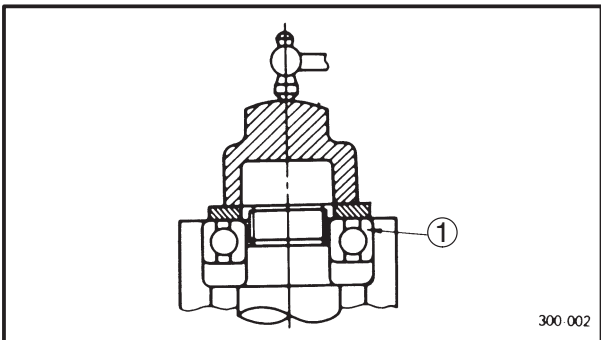
**BEARINGS AND OIL SEALS**

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

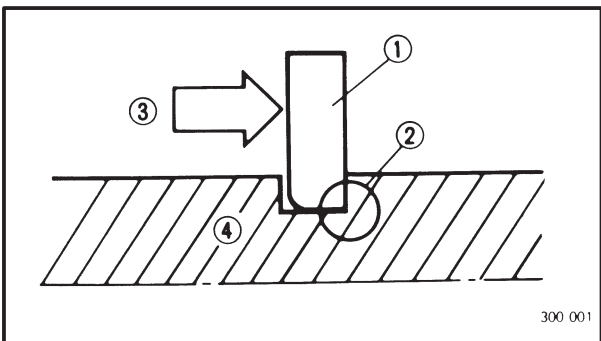
① Oil seal

**CAUTION:**

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



① Bearing



EAS00025

**CIRCLIPS**

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

④ Shaft

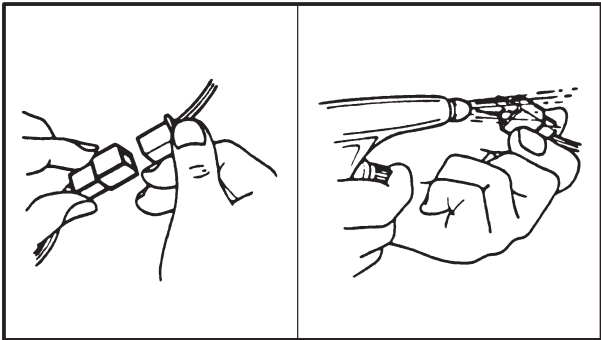
EAS00026

**CHECKING THE CONNECTIONS**

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

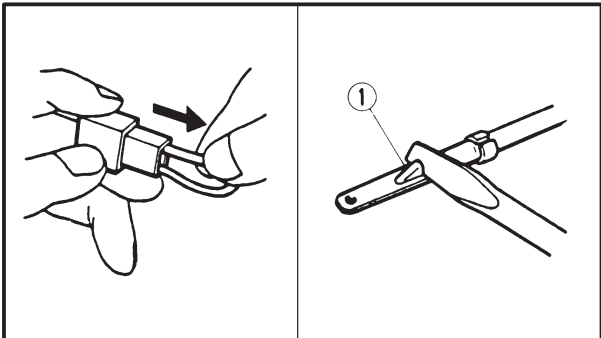
1. Disconnect:

- lead
- coupler
- connector



2. Check:

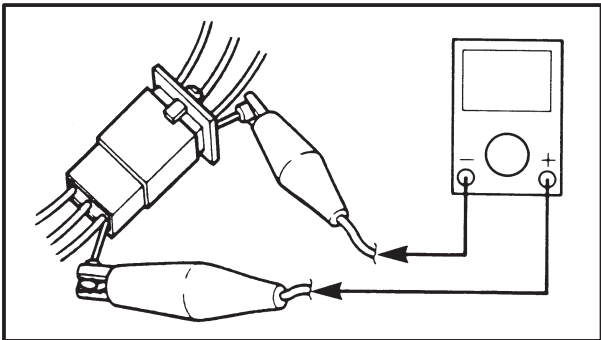
- lead
  - coupler
  - connector
- Moisture → Dry with an air blower.  
Rust/stains → Connect and disconnect several times.



3. Check:

- all connections
- Loose connection → Connect properly.

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



4. Connect:

- lead
- coupler
- connector

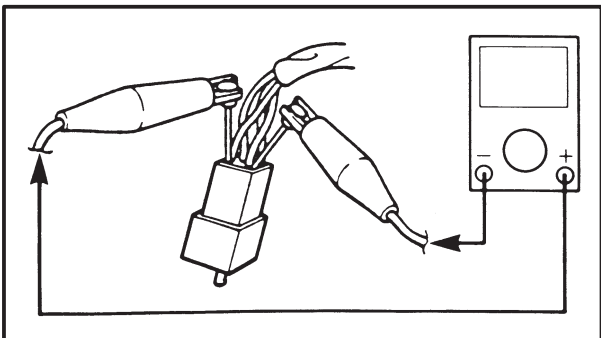
**NOTE:** \_\_\_\_\_  
Make sure all connections are tight.  
\_\_\_\_\_

5. Check:

- continuity  
(with the pocket tester)

	<b>Pocket tester</b> 90890-03112
---	-------------------------------------

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

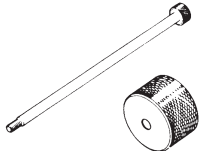
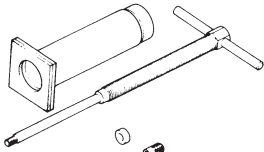
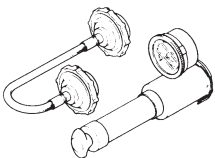
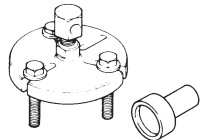
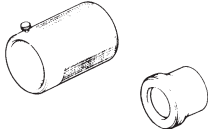
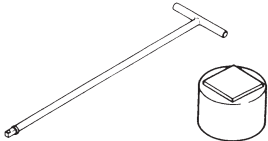
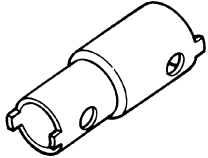
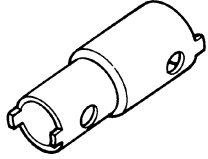




EAS00027

## SPECIAL TOOLS

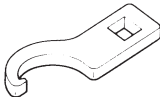
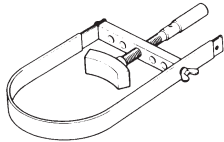
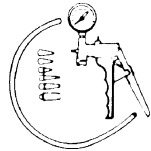
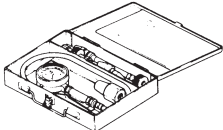
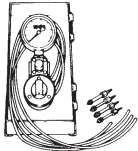
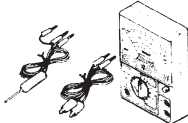
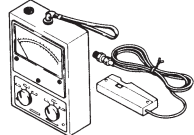
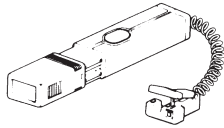
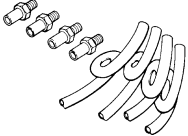
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

Tool No.	Tool name/How to use	Illustration
90890-01083 90890-01084	Slide hammer bolt Weight  These tools are used to remove the main axle assembly cover.	
90890-01304	Piston pin puller  This tool is used to remove the piston pin.	
90890-01325 90890-01352	Radiator cap tester Radiator cap tester adapter  This tester is needed for checking the cooling system.	
90890-01362 90890-01382	Flywheel puller Crankshaft protector  These tools are used to remove the A.C. magneto.	
90890-01367 90890-01374	Fork seal driver weight Fork seal driver attachment (43 mm)  These tools are used when installing the fork seal.	
90890-01326 90890-01375	T-handle Damper rod holder (29 mm) These tools are used to loosen and tighten the front fork damper rod holding bolt.	
90890-01455	Pivot shaft wrench  This tool is needed to loosen or tighten the spacer bolt.	
90890-01471	Pivot shaft wrench  This tool is needed to loosen or tighten the spacer bolt.	

## SPECIAL TOOLS

**GEN  
INFO**


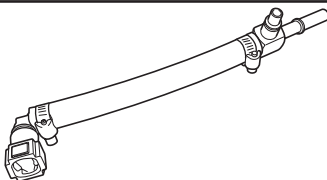

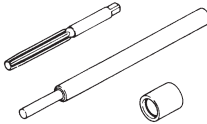
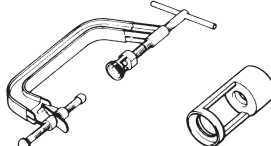
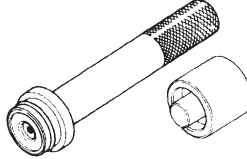
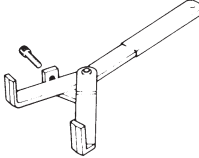
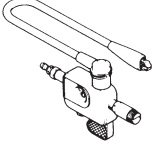
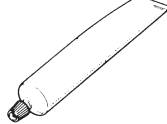


Tool No.	Tool name/How to use	Illustration
90890-01403	<p>Steering nut wrench</p> <p>This tool is used to loosen and tighten the steering ring nut.</p>	
90890-01701	<p>Sheave holder</p> <p>This tool is used to hold the rotor when loosening and tightening the rotor bolt.</p>	
90890-06756	<p>Vacuum/pressure pump gauge set</p> <p>This tool used to measure the vacuum pressure.</p>	
90890-03081 90890-04136	<p>Compression gauge Compression gauge adapter</p> <p>This gauge and adapter are used to measure the engine compression.</p>	
90890-03094	<p>Vacuum gauge</p> <p>This gauge is needed for carburetor synchronization.</p>	
90890-03132	<p>Pocket tester</p> <p>This instrument is invaluable for checking the electrical system.</p>	
90890-03113	<p>Engine tachometer</p> <p>This tool is needed for detecting engine rpm.</p>	
90890-03141	<p>Timing light</p> <p>This tool is necessary for checking ignition timing.</p>	
90890-03134	<p>Exhaust attachment</p> <p>This tool is needed for checking the CO.</p>	

## SPECIAL TOOLS

**GEN  
INFO**



Tool No.	Tool name/How to use	Illustration
90890-03153	<p>Pressure gauge</p> <p>This tool is needed to measure fuel pressure.</p>	
90890-03176	<p>Fuel pressure adapter</p> <p>This tool is needed to measure fuel pressure.</p>	
90890-04101	<p>Valve lapper</p> <p>This tool is needed to remove and install the valve lifter.</p>	
90890-04016	<p>Valve guide remover, installer and reamer (5.5 mm)</p> <p>This tool is needed to remove and install the valve lifter.</p>	
90890-04019 90890-04108	<p>Valve spring compressor Valve spring compressor attachment</p> <p>These tools are needed to remove and install the valve assemblies.</p>	
90890-04058 90890-04078	<p>Middle driven shaft bearing driver Mechanical seal installer</p> <p>These tools are needed to install the water pump seal.</p>	
90890-04086	<p>Universal clutch holder</p> <p>This tool is used to hold the clutch when removing or installing the clutch boss nut.</p>	
90890-06754	<p>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>	



**S P E E C**

**2**

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## **CHAPTER 2 SPECIFICATIONS**

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**SPEC**





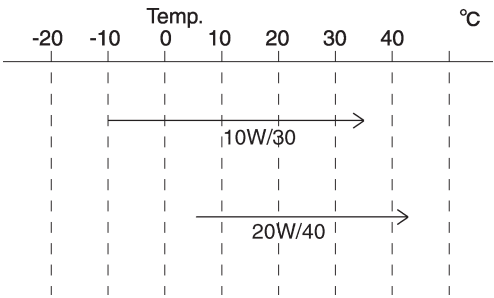
## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Standard	Limit
<b>Model code</b>	5PS1 (for EUR) 5PS2 (for OCE)	... ...
<b>Dimensions</b>		
Overall length	2,180 mm	...
Overall width	800 mm	...
Overall height	1,290 mm	...
Seat height	825 mm	...
Wheelbase	1,485 mm	...
Minimum ground clearance	160 mm	...
Minimum turning radius	2,900 mm	...
<b>Weight</b>		
Wet (with oil and a full fuel tank)	221 kg	...
Dry (without oil and fuel)	190 kg	...
Maximum load (total of cargo, rider, passenger, and accessories)	203 kg	...

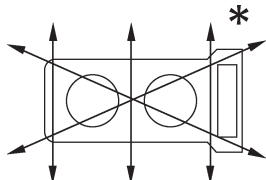


## ENGINE SPECIFICATIONS

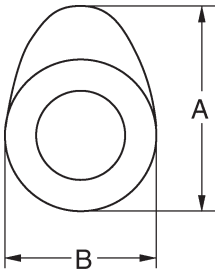
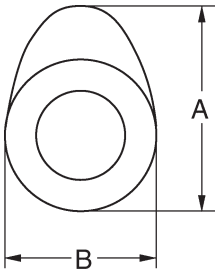
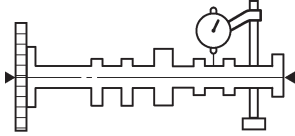
Item	Standard	Limit
<b>Engine</b> Engine type Displacement Cylinder arrangement Bore × stroke Compression ratio Engine idling speed Vacuum pressure at engine idling speed Standard compression pressure (at sea level)	Liquid-cooled, 4-stroke, DOHC 897 cm <sup>3</sup> Forward-inclined parallel 2-cylinder 92.0 × 67.5 mm 10.4 : 1 1,100 ~ 1,200 r/min 33 ~ 36 kPa 1,500 kPa (15 kg/cm <sup>2</sup> , 15 bar) at 400 r/min	... ... ... ... ... ... ... ...
<b>Fuel</b> Recommended fuel Fuel tank capacity Total (including reserve) Reserve only	Regular unleaded gasoline (EUR) Unleaded gasoline only (OCE) 20 L 3.5 L	... ... ... ...
<b>Engine oil</b> Lubrication system Recommended oil  Quantity Total amount Without oil filter cartridge replacement With oil filter cartridge replacement Relief valve opening pressure	Dry sump SAE 20W40SE or SAE 10W30SE 4.7 L 3.8 L 3.9 L 350 ~ 450 kPa (3.50 ~ 4.50 kg/cm <sup>2</sup> , 3.50 ~ 4.50 bar)	... ... ... ... ... ... ...

## ENGINE SPECIFICATIONS

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Item	Standard	Limit
<b>Oil filter</b> Oil filter type Bypass valve opening pressure	Paper 40.0 ~ 80.0 kPa (0.40 ~ 0.80 kg/cm <sup>2</sup> , 0.40 ~ 0.80 bar)	... ...
<b>Oil pump</b> Oil pump type Inner-rotor-to-outer-rotor-tip clearance Outer-rotor-to-oil-pump-housing clearance Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance	Trochoid 0.00 ~ 0.12 mm 0.03 ~ 0.08 mm 0.06 ~ 0.11 mm	... 0.20 mm 0.15 mm 0.18 mm
<b>Cooling system</b> Radiator capacity Radiator cap opening pressure  Valve relief pressure  Radiator core Width Height Depth Coolant reservoir Capacity <From low to full level> Water pump Water pump type Reduction ratio Max. impeller shaft tilt	1.7 L 95.0 ~ 125.0 kPa (0.95 ~ 1.25 kg/cm <sup>2</sup> , 0.95 ~ 1.25 bar)  343 ~ 441 kPa (3.5 ~ 4.5 kg/cm <sup>2</sup> , 3.5 ~ 4.5 bar)  300 mm 161.4 mm 27 mm  0.25 L 0.1 L  Single-suction centrifugal pump 44/44 × 38/27 (1.407) ...	... ...  ... ... ...  ... ... ...  ... ... 0.15 mm
<b>Starting system type</b>	Electric starter	...
<b>Spark plugs</b> Model (manufacturer) × quantity  Spark plug gap	DPR8EA-9 (NGK)/ X24EPR-U9 (DENSO) × 2  0.8 ~ 0.9 mm	...  ...
<b>Cylinder head</b> Volume Max. warpage  	32.2 ~ 33.0 cm <sup>3</sup> ...	... 0.10 mm

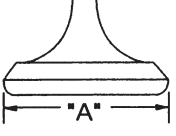
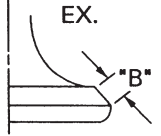
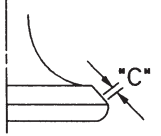
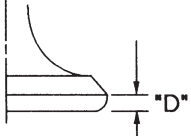
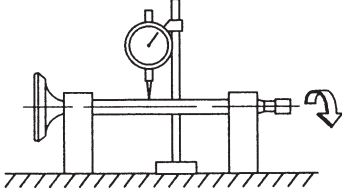


Item	Standard	Limit
<p><b>Camshafts</b>                      Drive system                      Camshaft cap inside diameter                      Camshaft journal diameter                      Camshaft-journal-to-camshaft-cap clearance                      Intake camshaft lobe dimensions</p>	<p>Chain drive (right)                      25.000 ~ 25.021 mm                      24.967 ~ 24.980 mm                      0.020 ~ 0.054 mm</p>	<p>•••                      •••                      •••                      0.08 mm</p>
<p></p>		
<p>Measurement A                      Measurement B</p>	<p>35.70 ~ 35.80 mm                      27.95 ~ 28.05 mm</p>	<p>35.60 mm                      27.85 mm</p>
<p>Exhaust camshaft lobe dimensions</p>		
<p></p>		
<p>Measurement A                      Measurement B</p>	<p>35.70 ~ 35.80 mm                      27.95 ~ 28.05 mm</p>	<p>35.60 mm                      27.85 mm</p>
<p>Max. camshaft runout</p>	<p>•••</p>	<p>0.03 mm</p>
<p></p>		

# ENGINE SPECIFICATIONS

**SPEC**

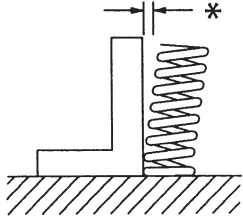



Item	Standard	Limit
<b>Timing chain</b>		
Model/number of links	82RH2015/138	...
Tensioning system	Automatic	...
<b>Valve, valve seats, valve guides</b>		
Valve clearance (cold)		
Intake	0.15 ~ 0.20 mm	...
Exhaust	0.23 ~ 0.28 mm	...
Valve dimensions		
		
		
Head Diameter	Face Width	Seat Width
Margin Thickness		
Valve head diameter A		
Intake	25.9 ~ 26.1 mm	...
Exhaust	27.9 ~ 28.1 mm	...
Valve face width B		
Intake	2.1 ~ 2.5 mm	...
Exhaust	2.1 ~ 2.5 mm	...
Valve seat width C		
Intake	0.9 ~ 1.1 mm	1.6 mm
Exhaust	0.9 ~ 1.1 mm	1.6 mm
Valve margin thickness D		
Intake	0.8 ~ 1.2 mm	...
Exhaust	0.8 ~ 1.2 mm	...
Valve stem diameter		
Intake	5.475 ~ 5.490 mm	5.445 mm
Exhaust	5.460 ~ 5.475 mm	5.430 mm
Valve guide inside diameter		
Intake	5.500 ~ 5.512 mm	5.55 mm
Exhaust	5.500 ~ 5.512 mm	5.55 mm
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm	0.08 mm
Exhaust	0.025 ~ 0.052 mm	0.1 mm
Valve stem runout	...	0.01 mm
		
Valve seat width		
Intake	0.9 ~ 1.1 mm	1.6 mm
Exhaust	0.9 ~ 1.1 mm	1.6 mm

# ENGINE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Valve springs</b>		
Free length		
Intake	37.3 mm	35.4 mm
Exhaust	37.3 mm	35.4 mm
Installed length (valve closed)		
Intake	30.4 mm	...
Exhaust	30.4 mm	...
Compressed spring force (installed)		
Intake	98.1 ~ 113.8 N (10.0 ~ 11.6 kgf)	...
Exhaust	98.1 ~ 113.8 N (10.0 ~ 11.6 kgf)	...
Spring tilt		
		
Intake	...	2.5°/1.7 mm
Exhaust	...	2.5°/1.7 mm
Winding direction (top view)		
Intake	Clockwise	...
Exhaust	Clockwise	...
		

# ENGINE SPECIFICATIONS

**SPEC**

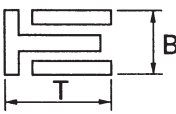
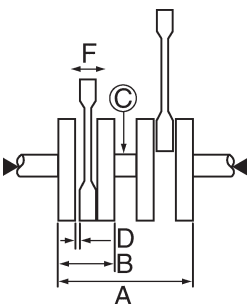


Item	Standard	Limit
<b>Cylinders</b>		
Cylinder arrangement	Forward inclined parallel 2-cylinder	•••
Bore × stroke	92.0 × 67.5 mm	•••
Compression ratio	10.4 : 1	•••
Bore	92.00 ~ 92.01	•••
Max. taper	•••	0.05 mm
Max. out-of-round	•••	0.05 mm
<b>Pistons</b>		
Piston-to-cylinder clearance	0.025 ~ 0.050 mm	0.11 mm
Diameter D	91.960 ~ 91.975 mm	•••
Height H	10 mm	•••
Piston pin bore (in the piston)		
Diameter	21.004 ~ 21.015 mm	21.045 mm
Offset	1 mm	•••
Offset direction	Intake side	•••
Piston pins		
Outside diameter	20.991 ~ 21.000 mm	20.971 mm
Piston-pin-to-piston-pin-bore clearance	0.004 ~ 0.024 mm	0.074 mm
Piston rings		
Top ring		
Ring type	Barrel	•••
Dimensions (B × T)	1.2 × 3.5 mm	•••
End gap (installed)	0.20 ~ 0.35 mm	0.6 mm
Ring side clearance	0.03 ~ 0.07 mm	0.12 mm
2nd ring		
Ring type	Taper	•••
Dimensions (B × T)	1.0 × 3.35 mm	•••
End gap (installed)	0.40 ~ 0.55 mm	0.9 mm
Ring side clearance	0.02 ~ 0.06 mm	0.12 mm

# ENGINE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<p>Oil ring</p>  <p>Dimensions (B × T)</p> <p>End gap (installed)</p> <p>Ring side clearance</p>	<p>1.9 × 2.5 mm</p> <p>0.20 ~ 0.50 mm</p> <p>0.04 ~ 0.14 mm</p>	<p>•••</p> <p>•••</p> <p>•••</p>
<p><b>Connecting rods</b></p> <p>Crankshaft-pin-to-big-end-bearing clearance</p> <p>Bearing color code</p> <p>Small end inside diameter</p>	<p>0.036 ~ 0.060 mm</p> <p>1 = Blue 2 = Black 3 = Brown 4 = Green</p> <p>21.005 ~ 21.018 mm</p>	<p>0.09 mm</p> <p>•••</p> <p>•••</p>
<p><b>Crankshaft</b></p>  <p>Width A</p> <p>Width B</p> <p>Max. runout C</p> <p>Big end side clearance D</p> <p>Crankshaft-journal-to-crankshaft-journal-bearing clearance</p> <p>Bearing color code</p> <p>Position of thrust bearing</p>	<p>60.75 ~ 61.25 mm</p> <p>150.1 ~ 150.9 mm</p> <p>•••</p> <p>0.110 ~ 0.262 mm</p> <p>0.020 ~ 0.038 mm</p> <p>1 = Blue 2 = Black 3 = Brown 4 = Green 5 = Yellow 6 = Pink 7 = Red</p> <p>#2 JOURNAL</p>	<p>•••</p> <p>•••</p> <p>0.02 mm</p> <p>0.50 mm</p> <p>0.10 mm</p> <p>•••</p> <p>•••</p>
<p><b>Balancer</b></p> <p>Balancer drive method</p>	<p>Gear</p>	<p>•••</p>
<p><b>Clutch</b></p> <p>Clutch type</p> <p>Clutch release method</p> <p>Operation</p> <p>Clutch cable free play (at the end of the clutch lever)</p> <p>Friction plates</p> <p>Thickness</p> <p>Plate quantity</p>	<p>Wet, multiple disc</p> <p>Outer pull, cam pull</p> <p>Left-hand operation</p> <p>10 ~ 15 mm</p> <p>2.9 ~ 3.1 mm</p> <p>9</p>	<p>•••</p> <p>•••</p> <p>•••</p> <p>•••</p> <p>2.8 mm</p> <p>•••</p>

## ENGINE SPECIFICATIONS

**SPEC**


Item	Standard	Limit
Clutch plates		
Thickness	1.9 ~ 2.1 mm	•••
Plate quantity	8	•••
Max. warpage	•••	0.1 mm
Clutch spring		
Free length	50 mm	47.5 mm
Spring quantity	6	•••
<b>Transmission</b>		
Transmission type	Constant mesh, 6-speed	•••
Primary reduction system	Spur gear	•••
Primary reduction ratio	67/39 (1.718)	•••
Secondary reduction system	Chain drive	•••
Secondary reduction ratio	42/16 (2.625)	•••
Operation	Left-foot operation	•••
Gear ratios		
1st gear	33/12 (2.750)	•••
2nd gear	37/19 (1.947)	•••
3rd gear	34/22 (1.545)	•••
4th gear	31/25 (1.240)	•••
5th gear	26/25 (1.040)	•••
6th gear	24/26 (0.923)	•••
Max. main axle runout	•••	0.08 mm
Max. drive axle runout	•••	0.08 mm
<b>Shifting mechanism</b>		
Shift mechanism type	Shift drum and guide bar	•••
Max. shift fork guide bar bending	•••	0.1 mm
<b>Air filter type</b>	Wet element	•••
<b>Fuel pump</b>		
Pump type	Electrical	•••
Model (manufacturer)	5PS (DENSO)	•••
Output pressure	294 kPa (2.94 kg/cm <sup>2</sup> , 2.94 bar)	•••

## ENGINE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Throttle bodies</b>		
Model (manufacturer) × quantity	38EIS (MIKUNI) × 2	...
Intake vacuum pressure	33 ~ 36 kPa	...
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm	...
ID mark	5PS1 00	...
Throttle valve size	#50	...



## CHASSIS SPECIFICATIONS

Item	Standard	Limit
<b>Frame</b>		
Frame type	Diamond	•••
Caster angle	25.5°	•••
Trail	114 mm	•••
<b>Front wheel</b>		
Wheel type	Cast wheel	•••
Rim		
Size	18M/C × MT3.50	•••
Material	Aluminum	•••
Wheel travel	150 mm	•••
Wheel runout		
Max. radial wheel runout	•••	1 mm
Max. lateral wheel runout	•••	0.5 mm
<b>Rear wheel</b>		
Wheel type	Cast wheel	•••
Rim		
Size	17M/C × MT5.00	•••
Material	Aluminum	•••
Wheel travel	133 mm	•••
Wheel runout		
Max. radial wheel runout	•••	1 mm
Max. lateral wheel runout	•••	0.5 mm
<b>Front tire</b>		
Tire type	Tubeless	•••
Size	120/70ZR 18M/C (59W)	•••
Model (manufacturer)	MEZ4J FRONT (METZELER)/ D220FSTJ (DUNLOP)	•••
Tire pressure (cold)		
0 ~ 90 kg	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	•••
90 ~ 208 kg	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	•••
High-speed riding	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	•••
Min. tire tread depth	•••	1.6 mm

## CHASSIS SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Rear tire</b>		
Tire type	Tubeless	•••
Size	160/60ZR17M/C (69W)	•••
Model (manufacturer)	MEZ4J (METZELER)/ D220STJ (DUNLOP)	•••
Tire pressure (cold)		
0 ~ 90 kg	250 kpa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	•••
90 ~ 208 kg	290 kPa (2.9 kgf/cm <sup>2</sup> , 2.9 bar)	•••
High-speed riding	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	•••
Min. tire tread depth	•••	1.6 mm
<b>Front brakes</b>		
Brake type	Dual-disc brake	•••
Operation	Right-hand operation	•••
Recommended fluid	DOT 4	•••
Brake discs		
Diameter × thickness	298 × 5 mm	•••
Min. thickness	•••	4.5 mm
Max. deflection	•••	0.1 mm
Brake pad lining thickness	5.5 mm	0.5 mm
Master cylinder inside diameter	14 mm	•••
Caliper cylinder inside diameter	30.2 mm and 27 mm	•••
<b>Rear brake</b>		
Brake type	Single-disc brake	•••
Operation	Right-foot operation	•••
Brake pedal position (below the top of the rider footrest)	32 mm	•••
Recommended fluid	DOT 4	•••
Brake discs		
Diameter × thickness	245 × 5mm	•••
Min. thickness	•••	4.5 mm
Max. deflection	•••	0.1 mm
Brake pad lining thickness	5.8 mm	0.8 mm
Master cylinder inside diameter	14 mm	•••
Caliper cylinder inside diameter	41.3 mm	•••

## CHASSIS SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Front suspension</b>		
Suspension type	Telescopic fork	•••
Front fork type	Coil spring/oil damper	•••
Front fork travel	150 mm	•••
Spring		
Free length	314 mm	308 mm
Spacer length	150 mm	•••
Installed length	306 mm	•••
Spring rate (K1)	6.86 N/mm (0.686 kgf/mm)	•••
Spring rate (K2)	9.32 N/mm (0.932 kgf/mm)	•••
Spring stroke (K1)	0 ~ 80 mm	•••
Spring stroke (K2)	80 ~ 150 mm	•••
Optional spring available	No	•••
Fork oil		•••
Recommended oil	Yamaha fork oil 10 WT or equivalent	•••
Quantity (each front fork leg)	507 cm <sup>3</sup>	•••
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	133 mm	•••
Inner tube outer diameter	43 mm	•••
Inner tube bend	•••	0.2 mm
Spring preload adjusting positions		
Minimum	8	•••
Standard	7	•••
Maximum	1	•••
Rebound damping adjusting positions		
Minimum	1	•••
Standard	2	•••
Maximum	4	•••
<b>Steering</b>		
Steering bearing type	Angular	•••
Lock to lock angle (left)	35°	•••
Lock to lock angle (right)	35°	•••

## CHASSIS SPECIFICATIONS

**SPEC**


Item	Standard	Limit
<b>Rear suspension</b>		
Suspension type	Swingarm (link suspension)	•••
Rear shock absorber assembly type	Coil spring/gas-oil damper	•••
Rear shock absorber assembly travel	61.5 mm	•••
Spring		
Free length	180 mm	176.4 mm
Installed length	170 mm	•••
Spring rate (K1)	127.5 mm (12.75 kgf/mm)	•••
Spring stroke (K1)	0 ~ 61.5 mm	•••
Optional spring available	No	•••
Standard spring preload gas/air pressure	1,200 kPa (12.0 kg/cm <sup>2</sup> , 12.0 bar)	•••
Spring preload adjusting positions		
Minimum	1	•••
Standard	5	•••
Maximum	9	•••
Rebound damping adjusting positions		
Minimum*	20	•••
Standard*	12	•••
Maximum*	3	•••
*from the fully turned-in position		
Compression damping adjusting positions		
Minimum*	12	•••
Standard*	11	•••
Maximum*	1	•••
*from the fully turned-in position		
<b>Swingarm</b>		
Free play (at the end of the swingarm)		
Radial	•••	1 mm
Axial	•••	1.2 mm
<b>Drive chain:</b>		
Type (manufacturer)	DID525HV KAI (DAIDO)	•••
Link quantity	118	•••
Drive chain slack	50 ~ 60 mm	•••
Maximum ten-link section	•••	150.1 mm



## ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
<b>System voltage</b>	12 V	...
<b>Ignition system</b>		
Ignition system type	Transistorized coil ignition (digital)	...
Ignition timing	10° BTDC at 1,150 r/min	...
Advancer type	Electric	...
Pickup coil resistance/color	420.8 ~ 569.3 Ω/Gy-B	...
Transistorized coil ignition unit model (manufacturer)	F8T911 (MITSUBISHI)	...
<b>Ignition coils</b>		
Model (manufacturer)	JO226 (DENSO)	...
Minimum ignition spark gap	6 mm	...
Primary coil resistance	3.4 ~ 4.6 Ω	...
Secondary coil resistance	10.4 ~ 15.6 kΩ	...
<b>Spark plug caps</b>		
Material	Resin	...
Resistance	10 kΩ	...
<b>Charging system</b>		
System type	A.C. magneto	...
Model (manufacturer)	LNZ86 (DENSO)	...
Nominal output	14 V/31.5 A at 5,000 r/min	...
Stator coil resistance/color	0.18 ~ 0.28 Ω/W-W	...
<b>Rectifier/regulator</b>		
Regulator type	Semiconductor, short circuit	...
Model (manufacturer)	FH001 (SHINDENGEN)	...
No-load regulated voltage	14.1 ~ 14.9 V	...
Rectifier capacity	35 A	...
Withstand voltage	200 V	...
<b>Battery</b>		
Battery type (manufacturer)	GT12B-4 (GS)	...
Battery voltage/capacity	12 V/10 AH	...
Specific gravity	1.320	...
Ten hour rate amperage	1.0 A	...
<b>Headlight type</b>	Halogen bulb	...
<b>Indicator light (voltage/wattage × quantity)</b>		
Neutral indicator light	14 V 1.2 W × 1	...
Turn signal indicator light	14 V 1.2 W × 2	...
Oil level warning light	LED × 1	...
High beam indicator light	14 V 1.4 W × 1	...
Engine trouble warning light	14 V 1.4 W × 1	...

## ELECTRICAL SPECIFICATIONS

**SPEC**


Item	Standard	Limit
<b>Bulbs (voltage/wattage × quantity)</b>		
Headlight	12 V 55 W × 2	...
Auxiliary light	12 V 5 W × 1	...
Tail/brake light	12 V 5 W/21 W × 1	...
Turn signal light	12 V 10 W × 4	...
Meter light	14 V 2 W × 2	...
<b>Electric starting system</b>		
System type	Constant mesh	...
Starter motor		
Model (manufacturer)	SM-13 (MITSUBA)	...
Power output	0.8 kW	...
Armature coil resistance	0.03 ~ 0.04 Ω	...
Brushes		
Overall length	10 mm	5 mm
Spring force	8.82 N (8.82 g)	...
Commutator diameter	28 mm	27 mm
Mica undercut	0.7 mm	...
<b>Starter relay</b>		
Model (manufacturer)	MS5F-621 (JIDECO)	...
Amperage	180 A	...
Coil resistance	4.18 ~ 4.62 Ω	...
<b>Horn</b>		
Horn type	Plane	...
Model (manufacturer) × quantity	YF-12 (NIKKO) × 1	...
Max. amperage	3 A	...
Performance	105 ~ 113 db/2 m	...
Coil resistance	1.15 ~ 1.25 Ω	...
<b>Turn signal relay</b>		
Relay type	Full-transistor	...
Model (manufacturer)	FE218BH (DENSO)	...
Self-cancelling device built-in	No	...
Turn signal blinking frequency	75 ~ 95 cycles/min.	...
Wattage	10 W × 2 + 3.4 W	...
<b>Oil level switch</b>		
Model (manufacturer)	5PS (DENSO)	...
<b>Fuel sender</b>		
Model (manufacturer)	5PS (DENSO)	...
Resistance	20 ~ 140 Ω at 25°C	...
<b>Starting circuit cut-off relay</b>		
Model (manufacturer)	G8R-30Y-P (OMRON)	...
Coil resistance	180 Ω	...
<b>Throttle position sensor</b>		
Model (manufacturer)	4HD (MIKUNI)	...
Resistance	4 ~ 6 kΩ	...

## ELECTRICAL SPECIFICATIONS



Item	Standard	Limit
<b>Fuses (amperage × quantity)</b>		
Main fuse	40 A × 1	...
Fuel injection system fuse	15 A × 1	...
Headlight fuse	15 A × 1	...
Signaling system fuse	7.5 A × 1 (EUR)	...
	10A × 1 (OCE)	...
Ignition fuse	10 A × 1	...
Radiator fan motor fuse	20 A × 1	...
Hazard light fuse	10 A × 1	...
Parking light fuse	5 A × 1	...
Backup fuse	5 A × 1	...
Reserve fuse	20 A × 1	...
	15 A × 1	...
	10 A × 1	...
	7.5 A × 1 (EUR)	...
	5 A × 1	...

# CONVERSION TABLE/ GENERAL TIGHTENING TORQUE SPECIFICATIONS

**SPEC**



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	=	IMPERIAL
** mm	×	0.03937	=	** in
2 mm	×	0.03937	=	0.08 in

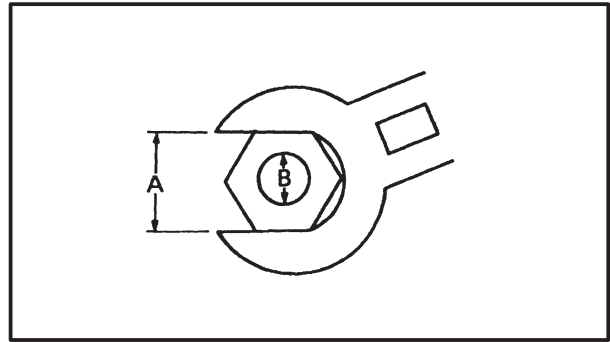
## CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Tightening 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
Speed	km/hr	0.6214	mph
Distance	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
Volume/ 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.)
Misc.	kg/mm	55.997	lb/in
	kg/cm <sup>2</sup>	14.2234	psi (lb/in <sup>2</sup> )
	Centigrade (°C)	9/5+32	Fahrenheit (°F)

EAS00029

## GENERAL TIGHTENING TORQUE SPECIFICATIONS

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



A: Width across flats

B: Thread diameter

A (nut)	B (bolt)	General tightening torques	
		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

## TIGHTENING TORQUES

**SPEC**



### TIGHTENING TORQUES ENGINE TIGHTENING TORQUES

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m•kg	
Cylinder head stud bolt (exhaust pipe)	Bolt	M8	4	15	1.5	
Camshaft cap	Bolt	M8	16	10	1.0	
Cylinder head bolt	Bolt	M6	2	10	1.0	
Cylinder head nut	Nut	M10	6	18	1.8	
(initial)				18*1	1.8*1	
(2nd)				150°*2		
(final)						
Cylinder head cover	Bolt	M6	8	10	1.0	
Oil gallery bolt	Bolt	M6	1	10	1.0	
Spark plug	–	M12	2	18	1.8	
Cylinder head cover breather plate	Screw	M5	3	4	0.4	
Cylinder identification sensor	Bolt	M6	1	10	1.0	
Connecting rod	Nut	M9	4	62	6.2	
Generator rotor	Bolt	M12	1	130	13	
Camshaft sprocket	Bolt	M7	4	24	2.4	
Timing chain tensioner cap	Bolt	M6	1	7	0.7	
Radiator cover	Bolt	M6	2	5	0.5	
Radiator cap stopper	Bolt	M5	1	5	0.5	
Radiator	Bolt	M6	4	7	0.7	
Oil pipe 1	Bolt	M6	2	10	1.0	
Oil delivery pipe 1	Bolt	M10	2	21	2.1	
Oil pump	Screw	M6	6	6	0.6	
Oil baffle plate	Bolt	M6	2	10	1.0	
Engine oil drain bolt	Bolt	M14	1	35	3.5	
Oil strainer	Bolt	M6	4	10	1.0	
Relief valve stay	Bolt	M6	1	10	1.0	
Oil filter element drain bolt	Bolt	M10	1	30	3.0	
Air filter case	Bolt	M6	1	7	0.7	
Surge tank	Screw	M5	1	4	0.4	
Solenoid valve	Screw	M5	1	4	0.4	
Exhaust check bolt	Bolt	M6	2	10	1.0	
Exhaust pipe	Nut	M8	4	20	2.0	
Exhaust pipe	Bolt	M8	1	24	2.4	
Muffler joint	Bolt	M8	2	20	2.0	
Muffler	Bolt	M8	2	20	2.0	
O <sub>2</sub> sensor protector	Bolt	M6	2	10	1.0	
Crankcase	Bolt	M10	6	10	1.0	
(initial)				20*1	2.0*1	
(2nd)				55°*2		
(final)						
Crankcase	Bolt	M6	12	12	1.2	
Crankcase	Bolt	M8	10	24	2.4	
Balancer shaft	Screw	M6	2	12	1.2	
Balancer holder	Bolt	M6	4	10	1.0	
Clutch cover plate	Screw	M5	3	4	0.4	
Crankcase upper cover	Bolt	M6	11	10	1.0	

## TIGHTENING TORQUES

**SPEC**



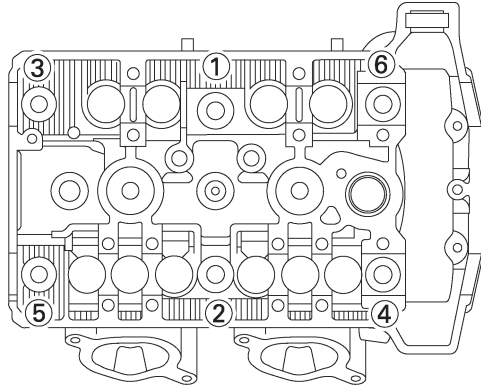
Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m•kg	
Drive chain slider	Bolt	M6	2	10	1.0	
Engine bracket	Bolt	M8	2	24	2.4	
Starter clutch	Bolt	M6	3	10	1.0	
Clutch spring	Screw	M6	6	8	0.8	
Clutch boss	Nut	M20	1	70	7.0	Use a lock washer
Bearing housing	Screw	M6	3	12	1.2	Stake
Drive sprocket	Nut	M22	1	85	8.5	Use a lock washer
Speed sensor rotor	Nut	M10	1	20	2.0	
Sift drum	Screw	M5	1	4	0.4	
Stopper lever	Bolt	M6	1	10	1.0	
Shift fork guide stopper	Bolt	M6	2	12	1.2	
Shift arm	Bolt	M6	1	12	1.2	Left-hand threads
Shift rod lock nut	Nut	M6	1	8	0.8	
Shift rod lock nut	Nut	M6	1	8	0.8	Left-hand threads
Shift rod joint	Bolt	M6	1	10	1.0	
Shift pedal	Bolt	M8	1	22	2.2	
Stopper	Screw	M8	1	22	2.2	
Stator coil	Bolt	M6	3	10	1.0	
Crankshaft position sensor	Bolt	M5	2	4	0.4	
Neutral switch	Screw	M6	2	4	0.4	
Starter motor	Bolt	M6	2	10	1.0	
Thermo unit	–	M12	1	18	1.8	
Intake air temperature sensor	–	M12	1	18	1.8	
O <sub>2</sub> sensor	–	M18	1	45	4.5	
Oil filter element cover bolt	Bolt	M6	6	10	1.0	
Clutch cover	Bolt	M6	9	10	1.0	

**NOTE:**

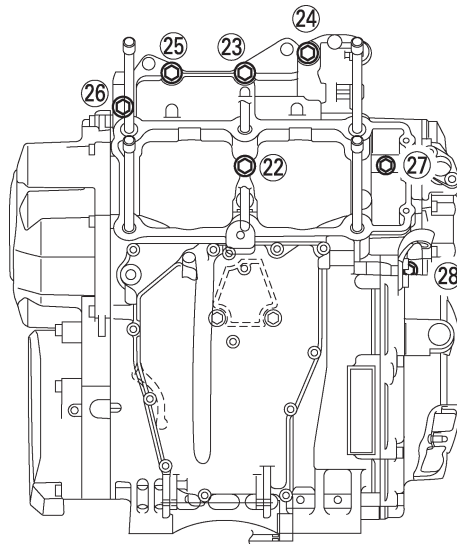
- \*1. Retighten the bolt (nut) to the specified torque with a torque wrench.
- \*2. Tighten the bolt (nut) again to the specified angle using an angle torque gauge.
- \*3. Apply anti-seize lubricant (high temperature grade).



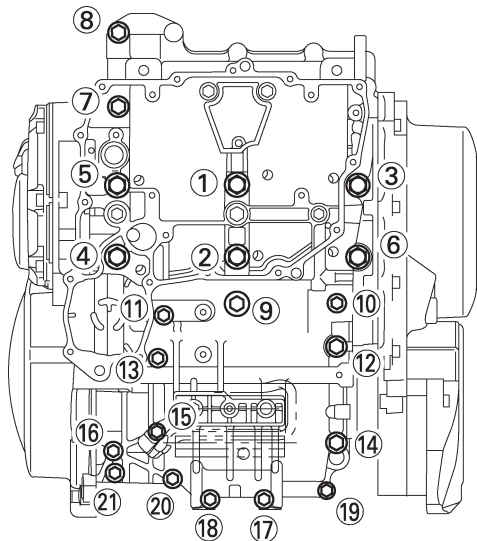
Cylinder head tightening sequence:



Crankcase tightening sequence:  
Upper crankcase



Lower crankcase



## TIGHTENING TORQUES

**SPEC**





### CHASSIS TIGHTENING TORQUES

Part to be tightened	Thread size	Tightening torque		Remarks
		Nm	m•kg	
Upper bracket pinch bolt	M8	26	2.6	See NOTE
Steering stem nut	M28	113	11.3	
Lower ring nut	M30	15	1.5	
Lower bracket pinch bolt	M8	28	2.8	
Horn bracket and lower bracket	M6	10	1.0	
Brake hose union bolt	M10	30	3.0	
Front cowling stay and frame	M8	30	3.0	
Grip end	M16	26	2.6	
Front brake master cylinder bracket	M6	10	1.0	
Handlebar upper holder	M8	23	2.3	
Upper bracket and wire guide	M6	7	0.7	
Throttle cable adjusting nut	M6	4	0.4	
ECU and plate	M6	7	0.7	
Front fender and outer tube	M6	6	0.6	
Engine mounting:				
Front mounting bolt (left and right)	M12	55	5.5	
Rear upper mounting bolt and nut	M10	45	4.5	
Rear lower mounting bolt and nut	M10	45	4.5	
Pinch bolt	M8	26	2.6	
Engine and engine bracket	M8	30	3.0	
Adjusting bolt	M16	7	0.7	
Frame and rear frame	M10	41	4.1	
Pivot shaft and nut	M18	95	9.5	
Swingarm and connecting arm	M12	49	4.9	
Relay arm and connecting arm	M12	49	4.9	
Relay arm and rear shockabsorber	M10	40	4.0	
Relay arm and frame	M10	40	4.0	
Rear shock absorber and upper bracket	M10	44	4.4	
Upper bracket and frame	M14	52	5.2	
Chain case and swingarm	M6	7	0.7	
Chain protector and swingarm	M6	7	0.7	
Brake hose holder and swingarm	M6	7	0.7	
Pivot shaft adjusting bolt	M25	5	0.5	
Frame and fuel tank rear	M6	7	0.7	
Frame and fuel tank front	M8	16	1.6	
Grab bar	M8	23	2.3	
Sidestand and sidestand bracket	M8	23	2.3	
Sidestand bracket and frame	M8	26	2.6	

## TIGHTENING TORQUES

**SPEC**



Part to be tightened	Thread size	Tightening torque		Remarks
		Nm	m•kg	
Footrest bracket and frame	M8	30	3.0	
Rear brake master cylinder and bracket	M8	23	2.3	
Rear footrest and footrest bracket	M6	8	0.8	
Front wheel axle	M18	72	7.2	
Rear wheel axle and nut	M24	150	15.0	
Front brake caliper	M10	40	4.0	
Rear brake caliper and caliper bracket	M10	27	2.7	
Front brake disc and wheel	M6	18	1.8	
Rear brake disc and wheel	M8	20	2.0	
Rear wheel sprocket and hub	M10	69	6.9	
Bleed screw	M8	6	0.6	
Front wheel axle pinch bolt	M8	20	2.0	
Rear brake caliper bracket and swing arm	M10	40	4.0	

**NOTE:**

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

## LUBRICATION POINTS AND LUBRICANT TYPES

**SPEC**





















### LUBRICATION POINTS AND LUBRICANT TYPES ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearings	
Crankshaft pins	
Piston surfaces	
Piston pins	
Connecting rod bolts and nuts	
Crankshaft journals	
Camshaft lobes	
Camshaft journals	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Water pump impeller shaft	
Oil pump rotors (inner and outer)	
Oil pump housing	
Oil strainer	
Pull rod and clutch cover	
Shift shaft left side and crankcase	
Starter clutch idle gear inner surface	
Starter clutch assembly	
Primary driven gear	
Transmission gears (wheel and pinion)	
Main axle and drive axle	
Shift drum	
Shift forks and shift fork guide bars	
Shift shaft right side and crankcase	
Shift pedal bolt	
Cylinder head cover mating surface	Yamaha bond No. 1215
Cylinder head cover	Yamaha bond No. 1215
Crankcase mating surface	Yamaha bond No. 1215
Speed sensor gromet	Yamaha bond No. 1215
O <sub>2</sub> sensor protector	Anti-seize lubricant (high temperature grade)

## LUBRICATION POINTS AND LUBRICANT TYPES



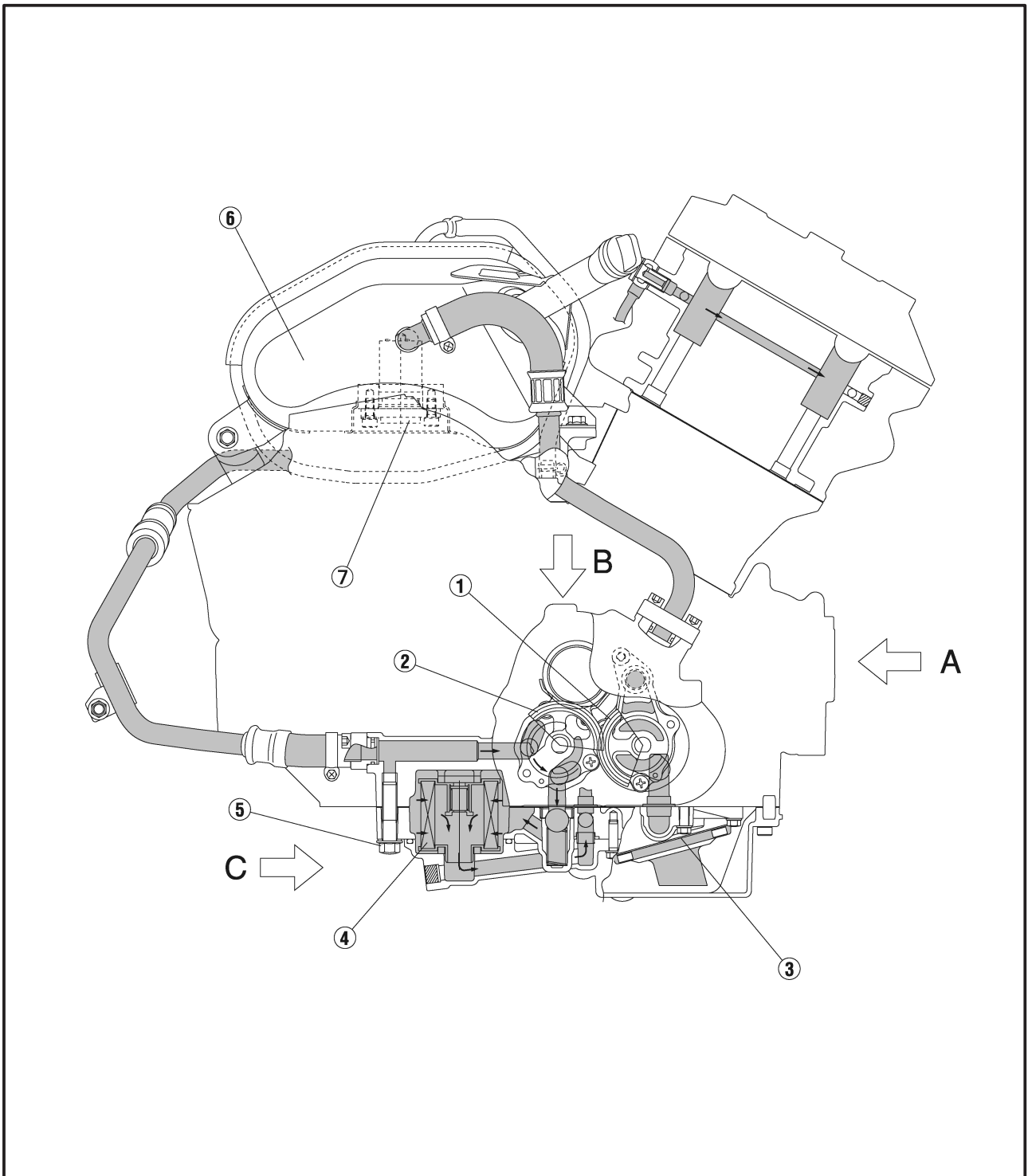
### CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	
Front wheel oil seal (right and left)	
Rear wheel oil seal	
Rear wheel drive hub oil seal	
Rear wheel drive hub mating surface	
Rear brake pedal pivot	
Rear footrest pivoting point	
Sidestand pivoting point and metal-to-metal moving parts	
Throttle grip inner surface	
Clutch lever pivot bolt and clutch cable end	
Hooks	
Engine mounting bolts and nuts (rear upper and lower)	
Brake lever pivot bolt and contact surface	
Rear shock absorber assembly mounting bolts	
Pivot shaft	
Connecting arm bearing	
Spacer (relay arm and connecting arm)	
Oil seal (relay arm and connecting arm)	



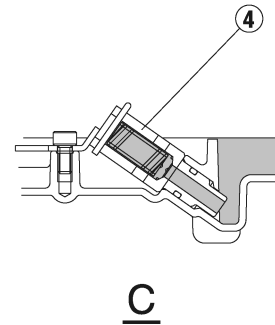
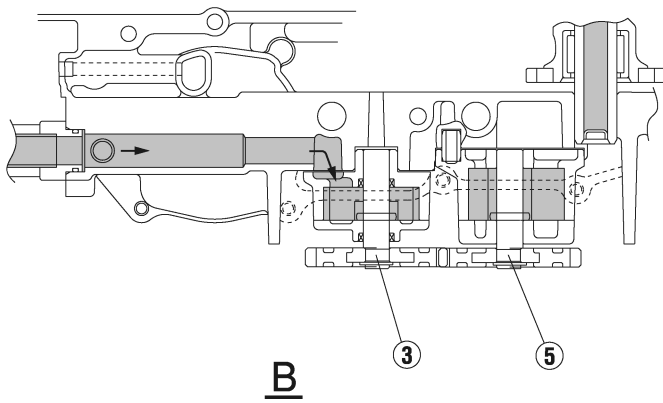
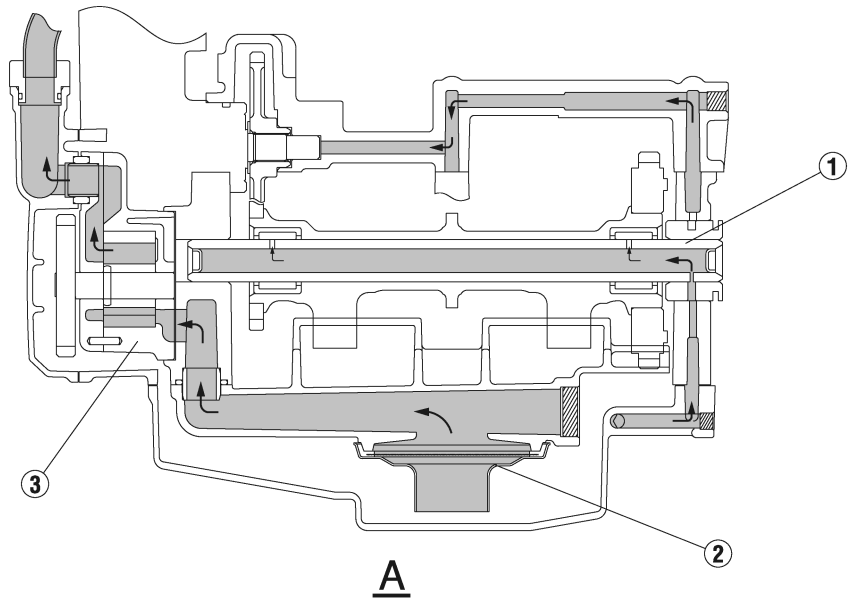
**OIL FLOW DIAGRAMS**

- ① Scavenge pump
- ② Feed pump
- ③ Oil strainer
- ④ Oil filter element
- ⑤ Oil drain bolt (oil tank)
- ⑥ Oil tank
- ⑦ Oil level switch



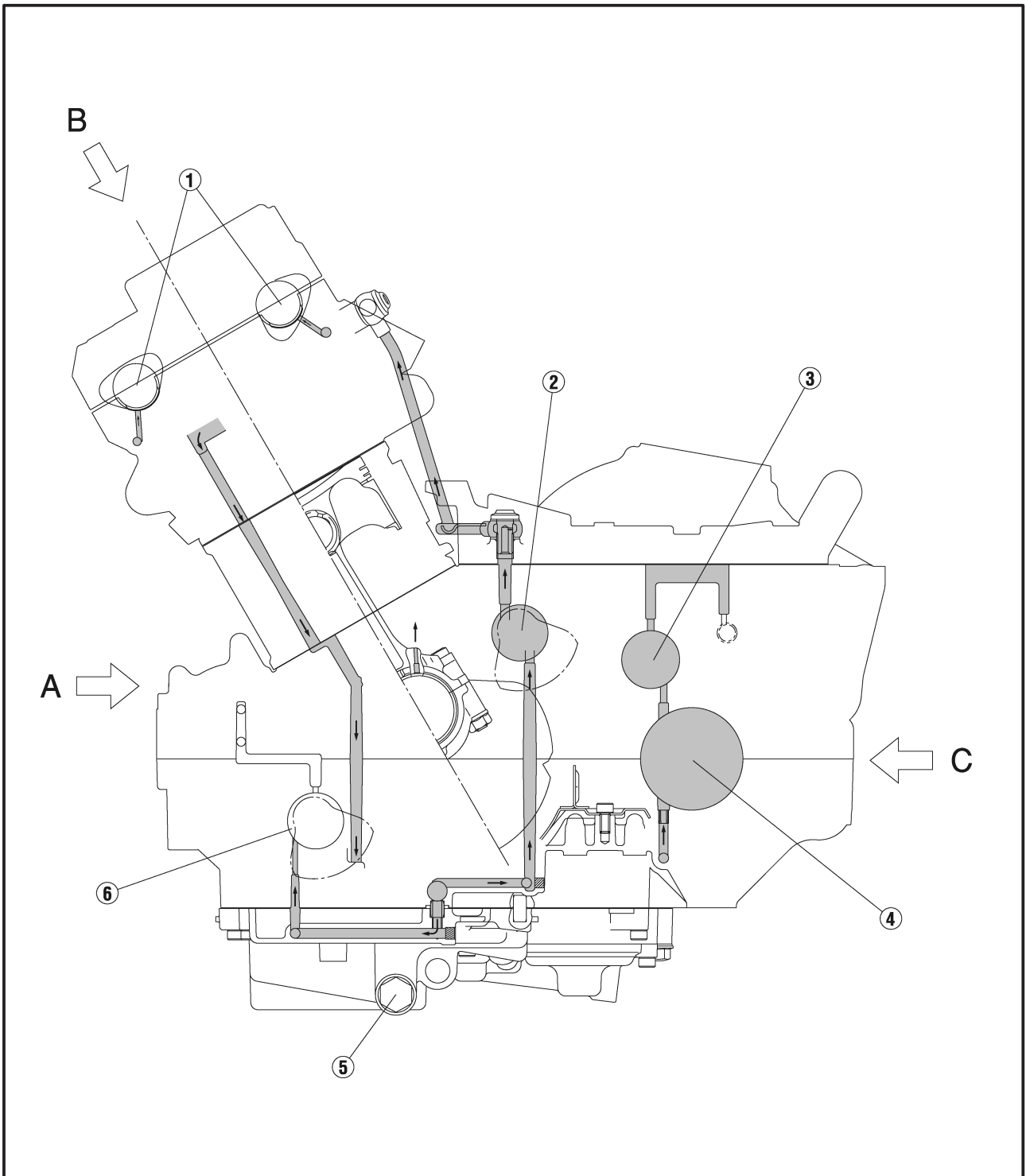


- ① Front balancer shaft
- ② Oil strainer
- ③ Feed pump
- ④ Relief valve
- ⑤ Scavenge pump



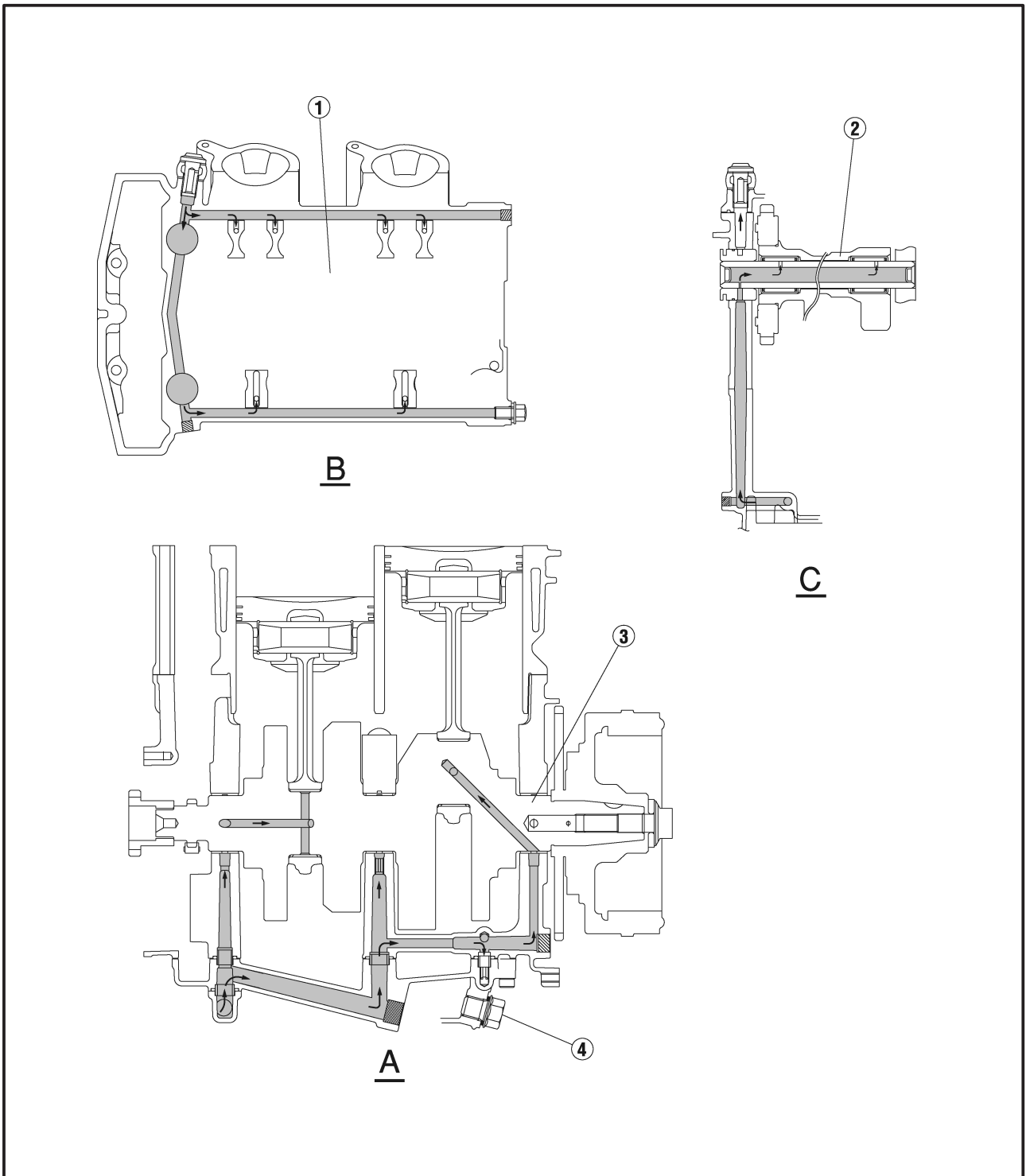


- ① Cam shaft
- ② Rear balancer shaft
- ③ Main axle
- ④ Drive axle
- ⑤ Oil drain bolt (engine)
- ⑥ Front balancer shaft

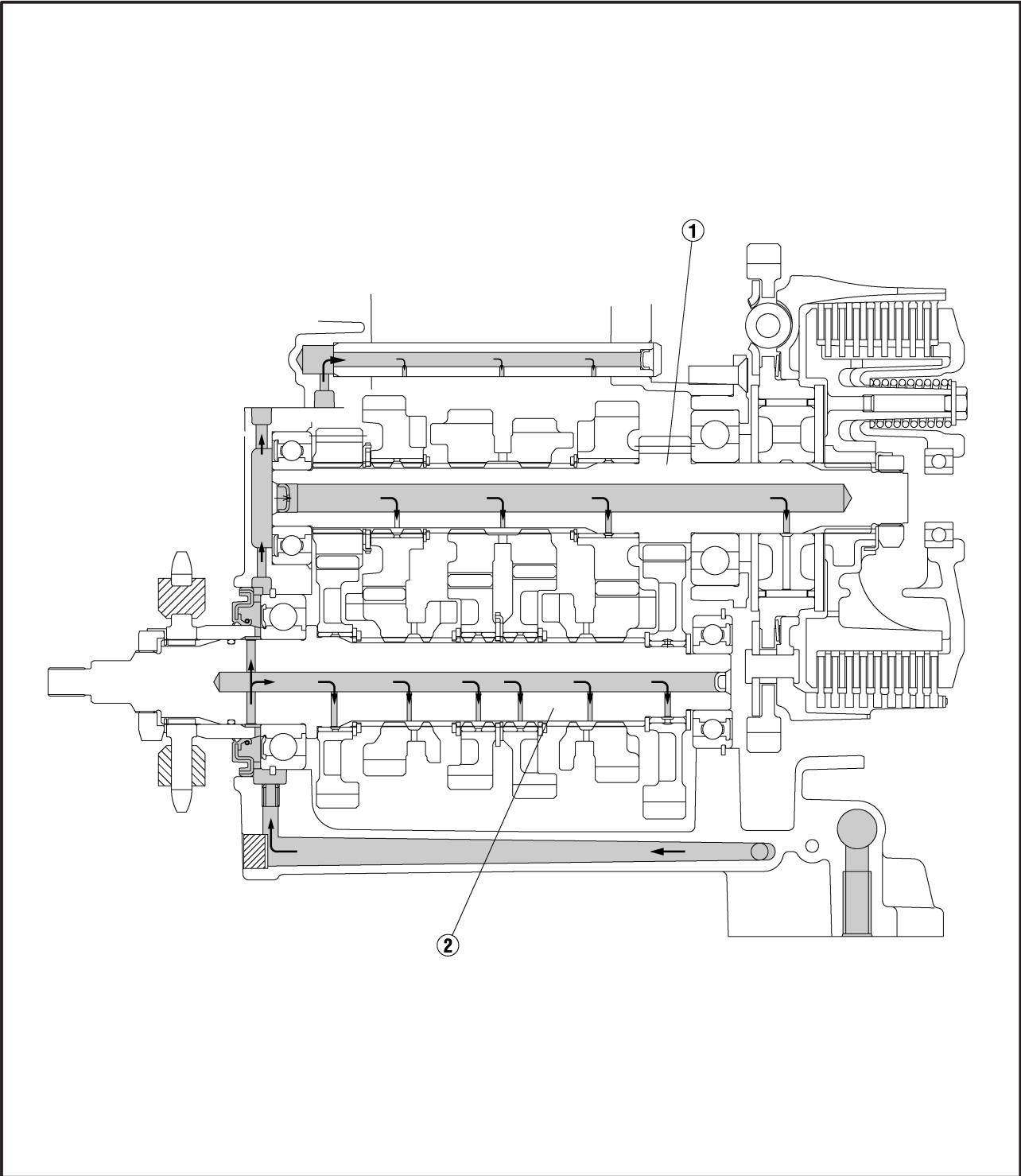




- ① Cylinder head
- ② Rear balancer shaft
- ③ Crankshaft
- ④ Oil drain bolt (engine)

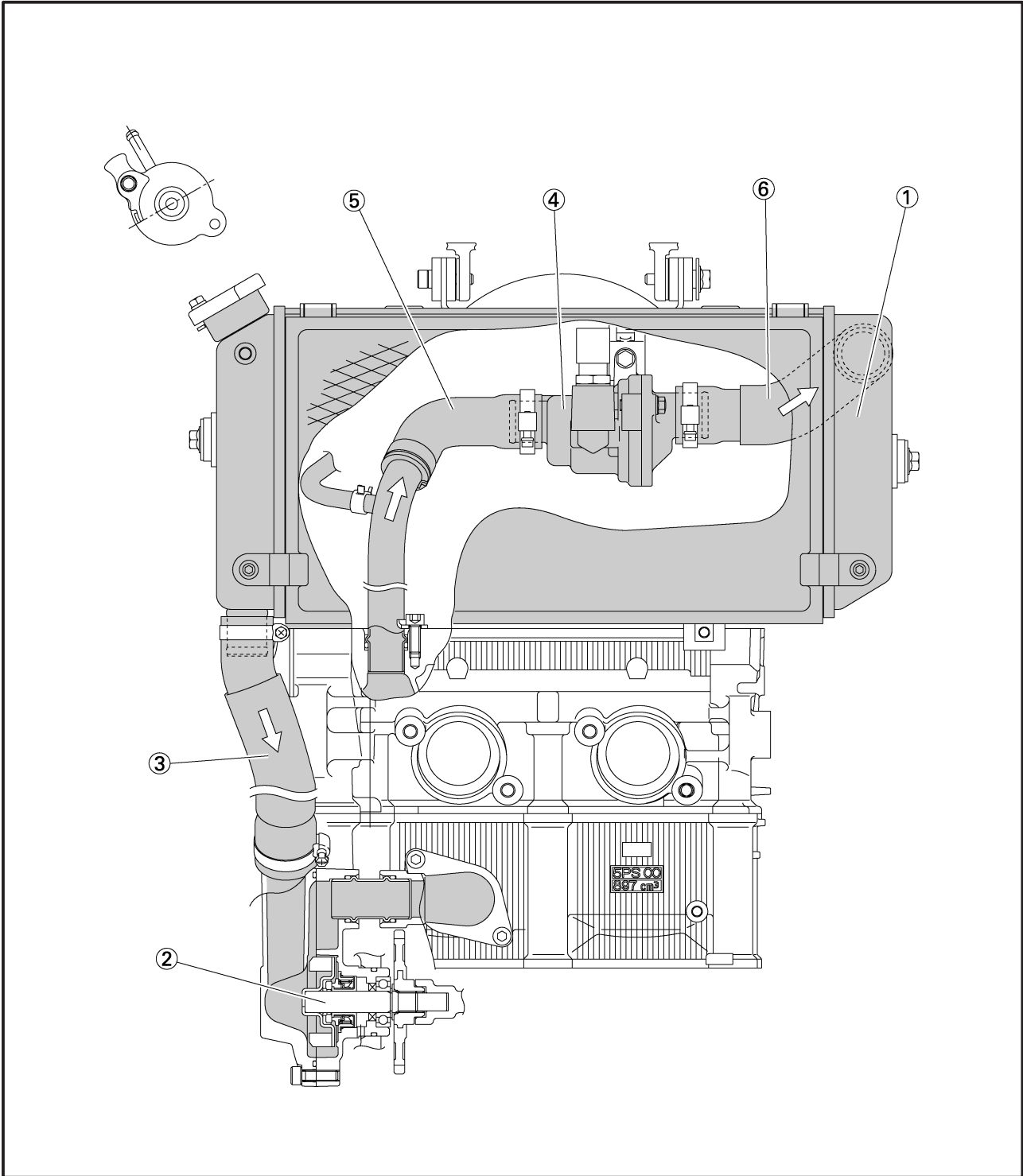


- ① Main axle
- ② Drive axle



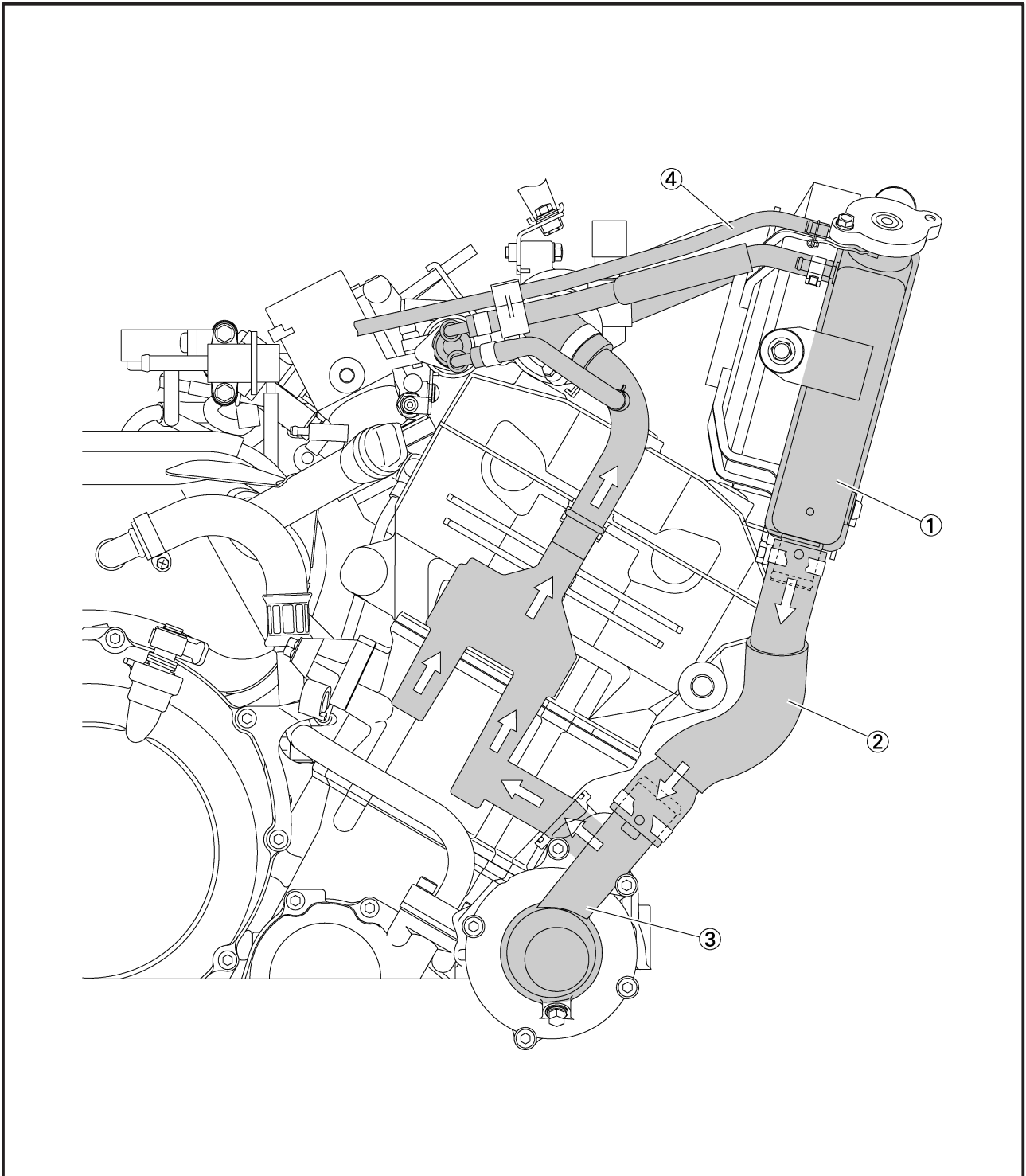
COOLING SYSTEM DIAGRAMS

- ① Radiator
- ② Water pump
- ③ Radiator outlet hose
- ④ Thermostat assembly
- ⑤ Thermostat inlet hose
- ⑥ Radiator inlet hose

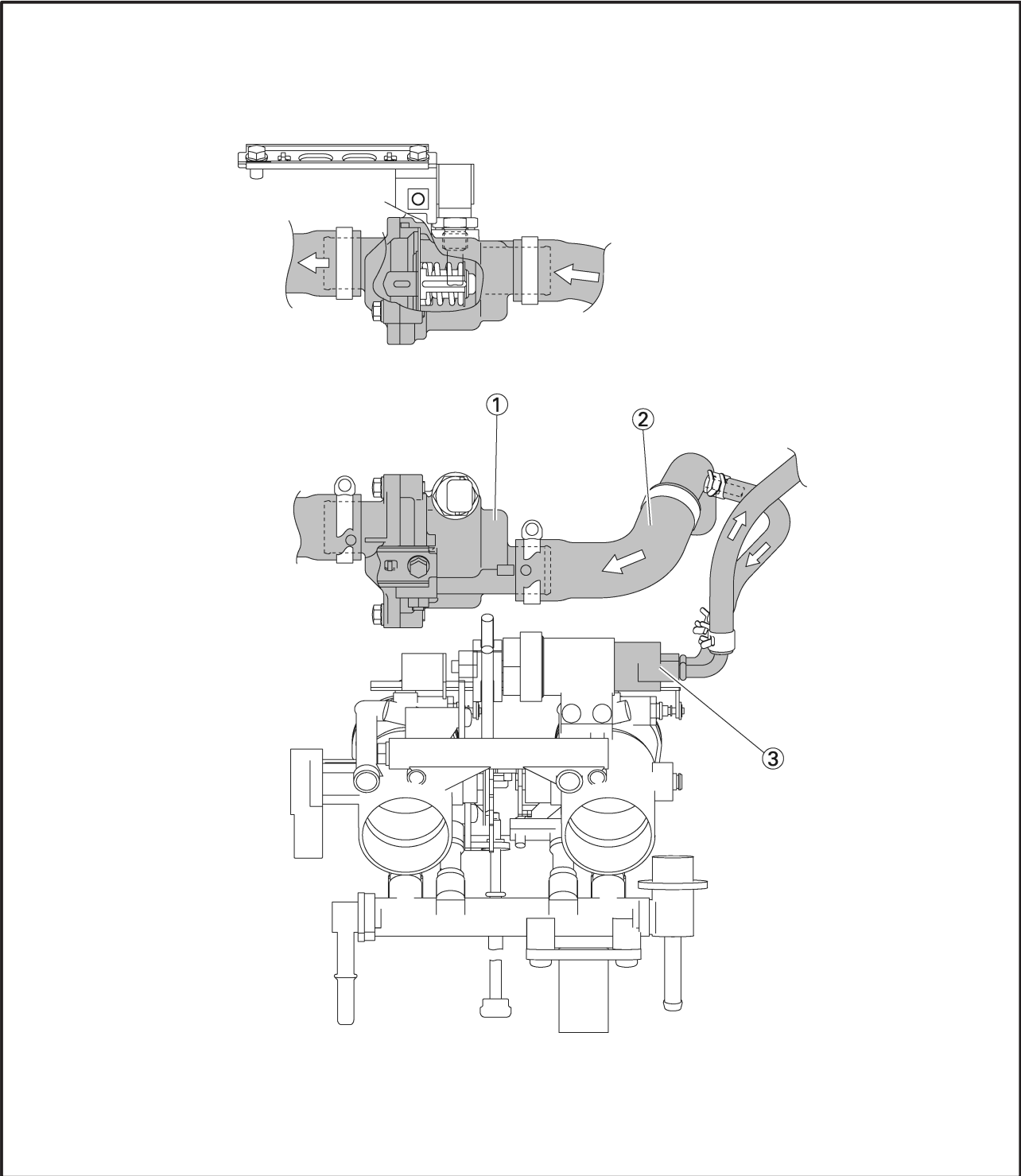




- ① Radiator
- ② Radiator outlet hose
- ③ Water pump
- ④ Coolant reservoir tank hose

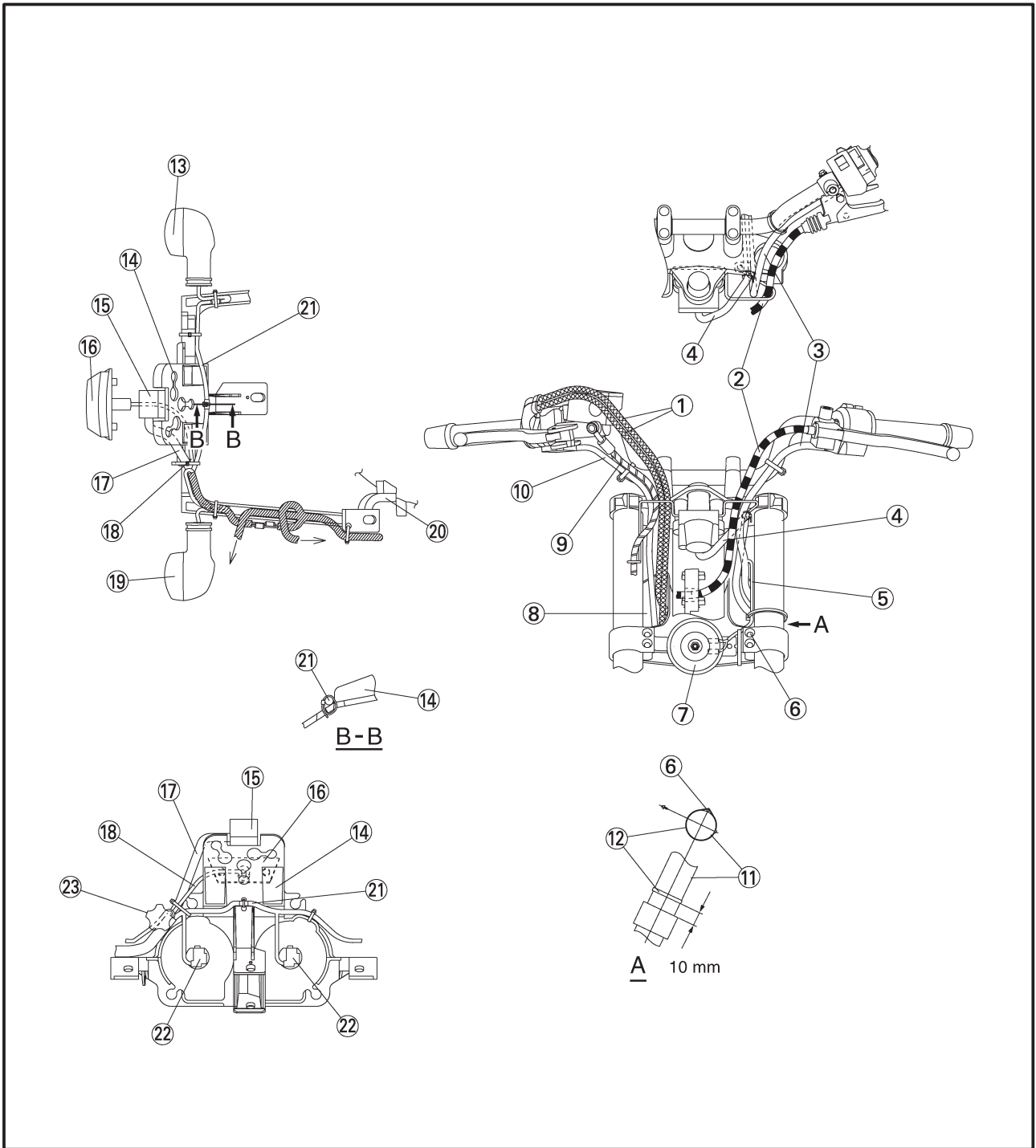


- ① Thermostat assembly
- ② Thermostat inlet hose
- ③ Liner control valve



CABLE ROUTING

- ① Throttle cables
- ② Clutch cable
- ③ Handlebar switch lead (left)
- ④ Main switch lead
- ⑤ Cover 7
- ⑥ Horn lead
- ⑦ Horn
- ⑧ Cover 8
- ⑨ Front brake hose
- ⑩ Handlebar switch lead (right)
- ⑪ Front fork
- ⑫ Clamp
- ⑬ Front turn signal light (right)
- ⑭ Stay 1
- ⑮ Meter assembly
- ⑯ Auxiliary light
- ⑰ Meter lead
- ⑱ Auxiliary light lead
- ⑲ Front turn signal light (left)
- ⑳ Stay 3
- ㉑ Headlight sub wire harness
- ㉒ Headlight coupler
- ㉓ Headlight adjusting knob

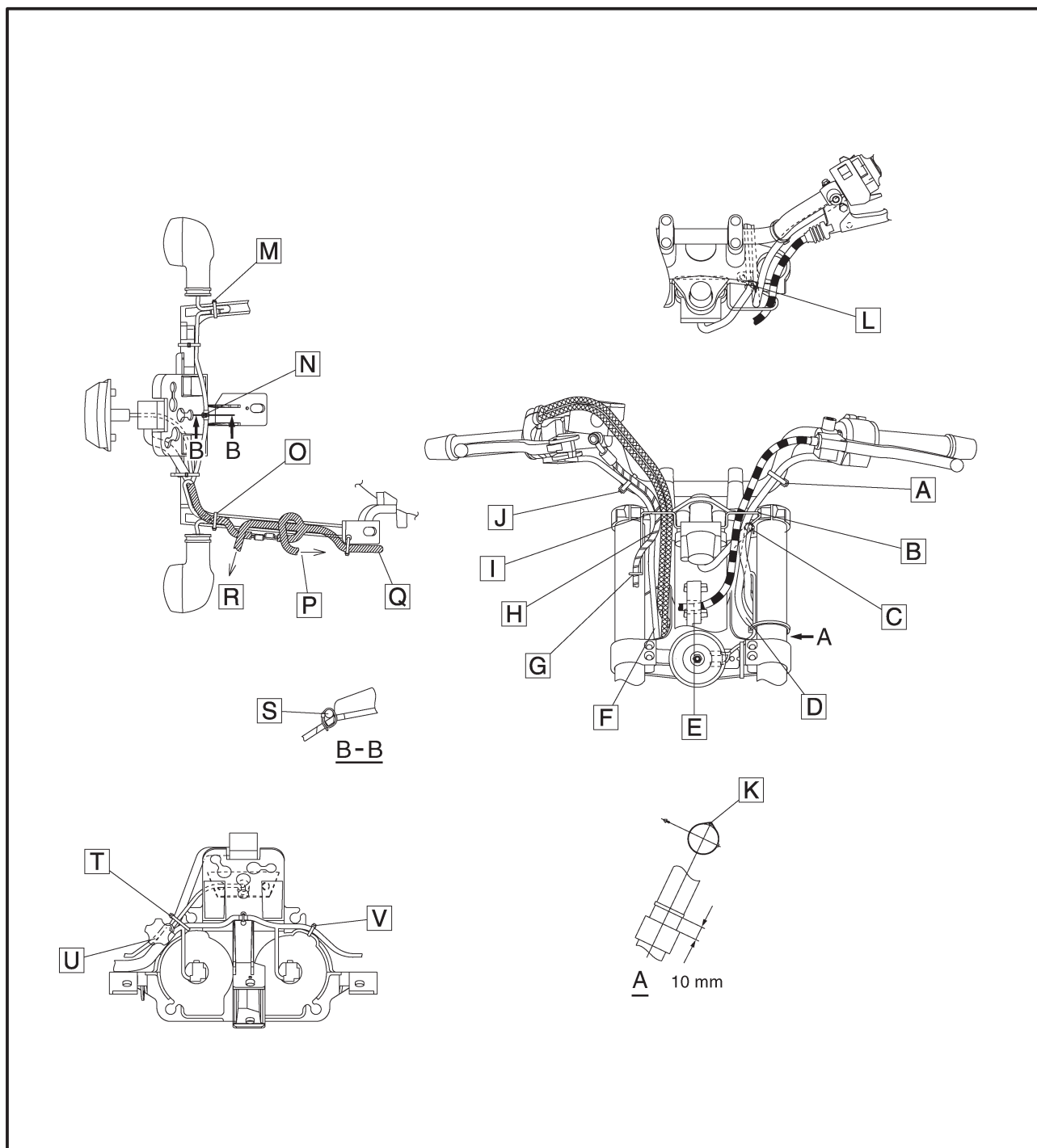


## CABLE ROUTING

SPEC



- A** Fasten the handlebar switch lead (left) to the handlebar with a band.
- B** Through the handlebar switch lead (left) and clutch cable to the wire guide on the upper bracket.
- C** Fasten the main switch lead to the wire guide with a clamp. There should be no slack between main switch and wire guide. Cut the clamp tip with 3 to 8 mm left.
- D** Route the main switch lead through the cover 7 so that it route beneath the handlebar switch lead (left).
- E** Route the clutch cable through the hole in front of the head pipe on the frame.
- F** Route the handlebar switch lead (right) and throttle cable (2 cables) through the cover 8.
- G** Route the brake hose through the guide.
- H** Always route the cables so that the brake hose passes by the outside of the throttle cables.
- I** Route the handlebar switch lead, brake hose and throttle cable (2 cables) through the wire guide of the upper bracket.
- J** Fasten the handlebar switch lead (right) to the handlebar with a band.
- K** Fasten the horn lead to the front fork (left side) with a clamp as shown in the drawing. Cut the clamp tip with 3 to 8 mm left.

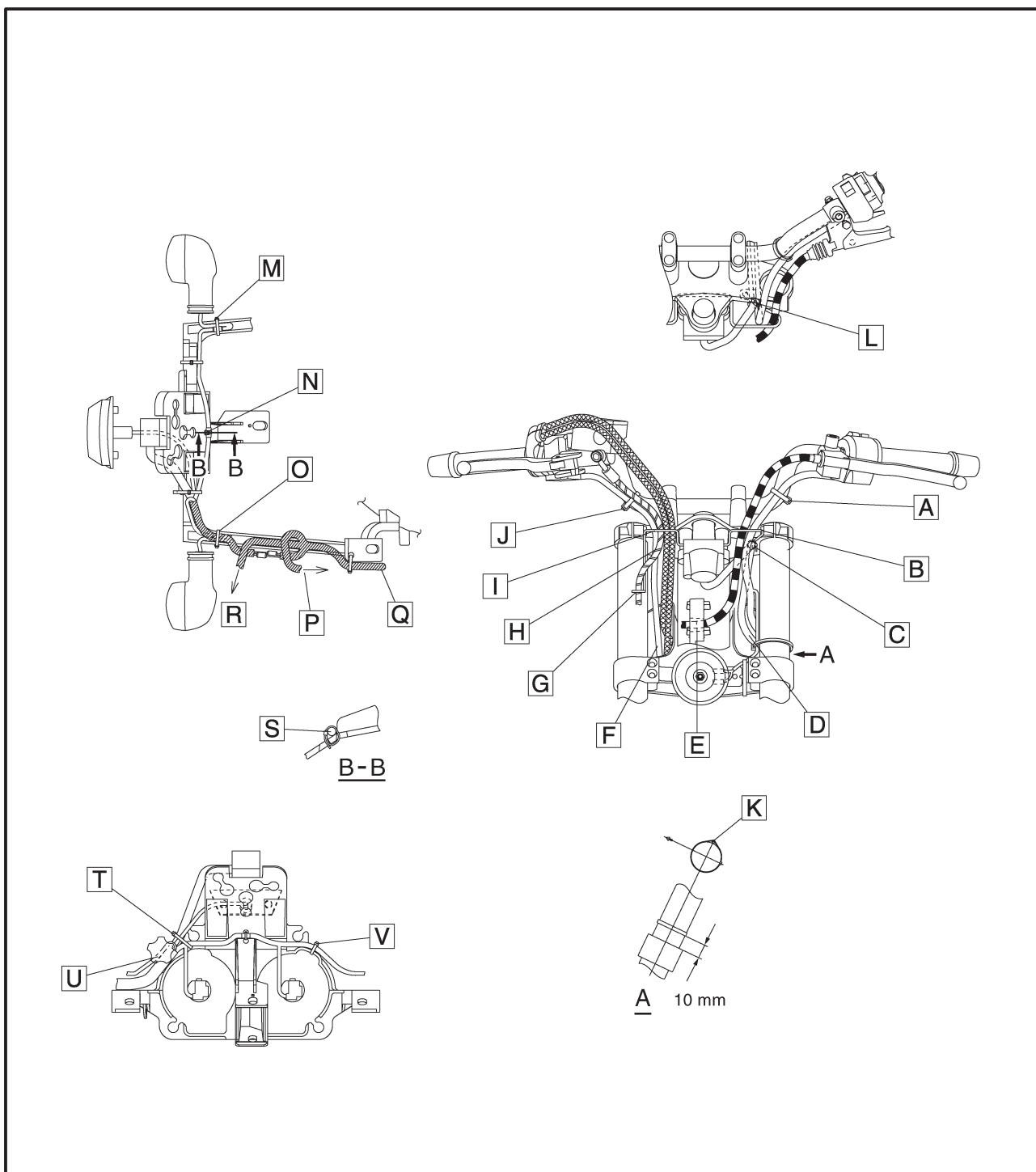


## CABLE ROUTING

SPEC



- L** Fasten the main switch lead with a clamp so that it faces the front side of the vehicle.
- M** Fasten the turn signal lead (right) together with the coupler to the stay 1.
- N** Clamp the headlight sub wire harness aligned with the white tape.
- O** Fasten the wire harness and turn signal lead (left) together with the coupler to the stay.
- Route the left turn signal lead under the wire harness.
- P** To the starting circuit cut-off relay
- Q** Route the wire harness so that it passes by the outside of bolt.
- R** To the ECU
- S** Fasten the headlight sub wire harness with the clamp that is passed through the center hole of stay 1.
- T** Clamp the meter lead, auxiliary light and headlight sub wire harness to the stay.
- U** Route each lead through the inside of the headlight adjusting knob.
- V** Clamp the headlight sub wire harness to the stay 1.

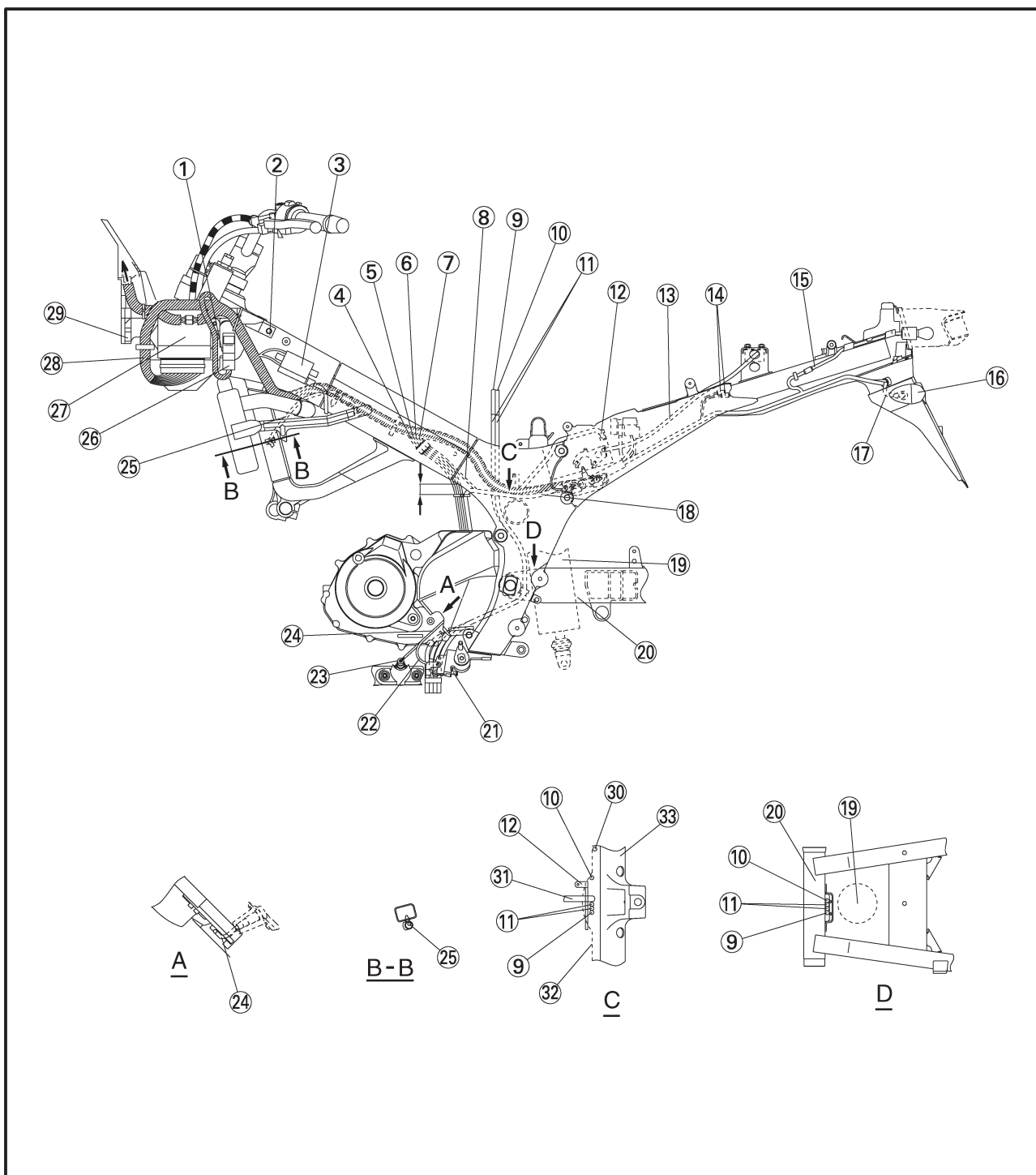


# CABLE ROUTING

**SPEC**



- |                                     |                                 |                                  |
|-------------------------------------|---------------------------------|----------------------------------|
| ① Plate                             | ⑫ Battery negative lead         | ⑳ O <sub>2</sub> sensor          |
| ② Stay 3                            | ⑬ Seat lock cable               | ㉑ O <sub>2</sub> sensor lead     |
| ③ Ignition coil                     | ⑭ Alarm coupler                 | ㉒ Cylinder identification sensor |
| ④ Neutral switch lead               | ⑮ Tail/brake light lead         | ㉓ Headlight relay (for OCE)      |
| ⑤ O <sub>2</sub> sensor lead        | ⑯ Rear turn signal light (left) | ㉔ ECU                            |
| ⑥ Speed sensor lead                 | ⑰ Rear turn signal light lead   | ㉕ ECU lead                       |
| ⑦ Sidestand switch lead             | ⑱ Rectifier/regulator lead      | ㉖ Stay 1                         |
| ⑧ Crankshaft position sensor lead   | ㉒ Rear suspension               | ㉗ Starter relay lead             |
| ⑨ Air filter case drain hose        | ㉓ Swingarm                      | ㉘ Oil pipe                       |
| ⑩ Coolant reservoir tank drain hose | ㉔ Sidestand switch              | ㉙ Engine                         |
| ⑪ Fuel drain hose                   | ㉕ Sidestand switch lead         | ㉚ Frame                          |

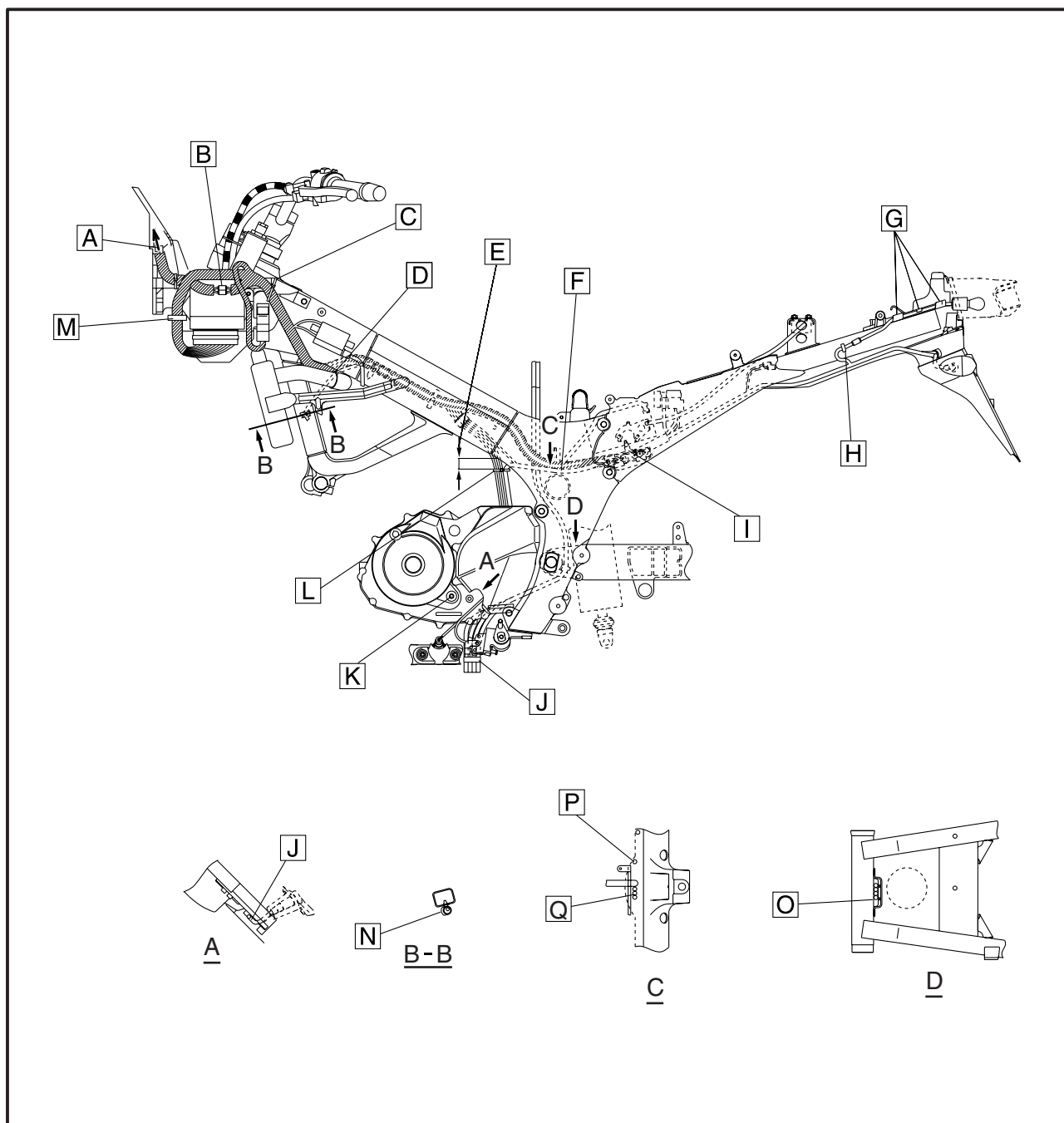


## CABLE ROUTING

SPEC



- A** To the headlight
- B** Connect the headlight sub-wire harness in front of ECU and make it not to route inside or above the ECU lead.
- C** Fasten the wire harness to the stay 1 with a clamp. The knot should be faced to the outside of the vehicle as shown in the drawing.
- D** Lay on the cylinder identification sensor lead above the radiator pipe (left side).
- E** Less than 20 mm
- F** Pass the rectifier/regulator lead above the frame cross tube.
- G** Route the tail/brake light lead through the guides (3 places) of the tail/brake light bracket.
- H** Fasten the tail/brake light lead to the outside of the frame with a clamp. Connect the tail/brake light lead coupler between rear cover and frame, positioning without routing above the frame.
- I** Fasten the rectifier/regulator lead with the clamp installed with the rear fender. The knot of the clamp should face the inner side of the vehicle.
- J** Route the fuel drain hose (2 hoses), air filter case drain hose, and coolant reservoir tank drain hose through the clamp. For the fuel drain hose, the white paint mark should be under the clamp. The position is regardless of ranks. Make the end clearances of coolant reservoir tank drain hose and air filter case drain hose from the clamp even with that of fuel drain hose.

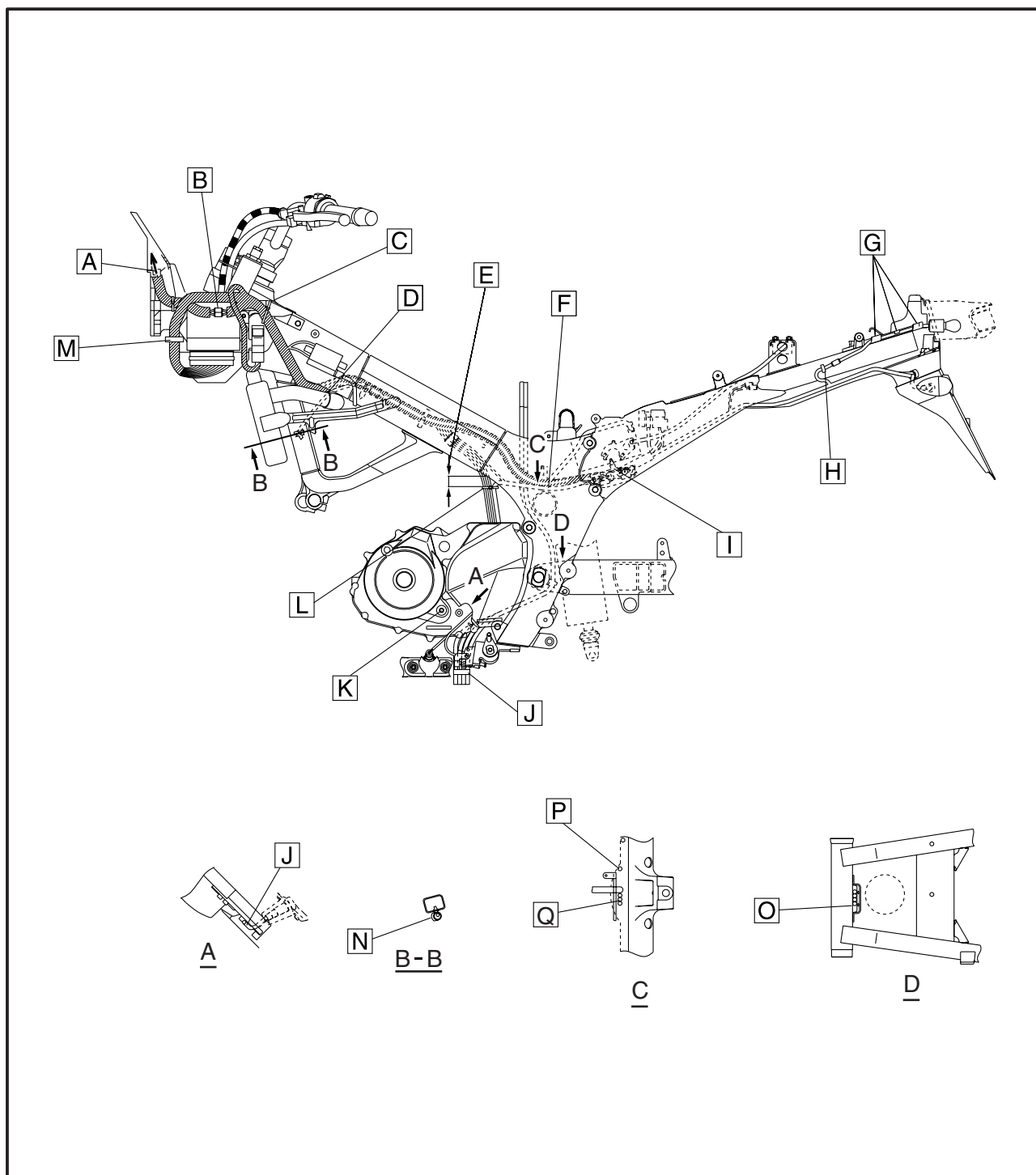


## CABLE ROUTING

SPEC



- K** The O<sub>2</sub> sensor lead should not stick out from the boss seat face to the outside of the vehicle.
- L** Bind the neutral switch, O<sub>2</sub> sensor, speed sensor, sidestand switch and rectifier/regulator leads with the clamp. Cut the tip with 3 to 8 mm left and make it face to the outside of the vehicle.
- M** Fasten the ECU lead with the clamp installed to the plate front side hole. Install the clamp to the outside of plate.
- N** Fasten the cylinder identification sensor lead to the inner side of the frame with a clamp.
- O** Route the fuel drain hose (2 hoses), air filter case drain hose and radiator reservoir tank drain hose through the guide located behind the swingarm head pipe. Do not make hoses to cross in the area between C and D.
- P** Pass the radiator reservoir tank drain hose right side of the battery negative lead.
- Q** Pass the fuel drain hose and air filter case drain hose behind the battery negative lead.

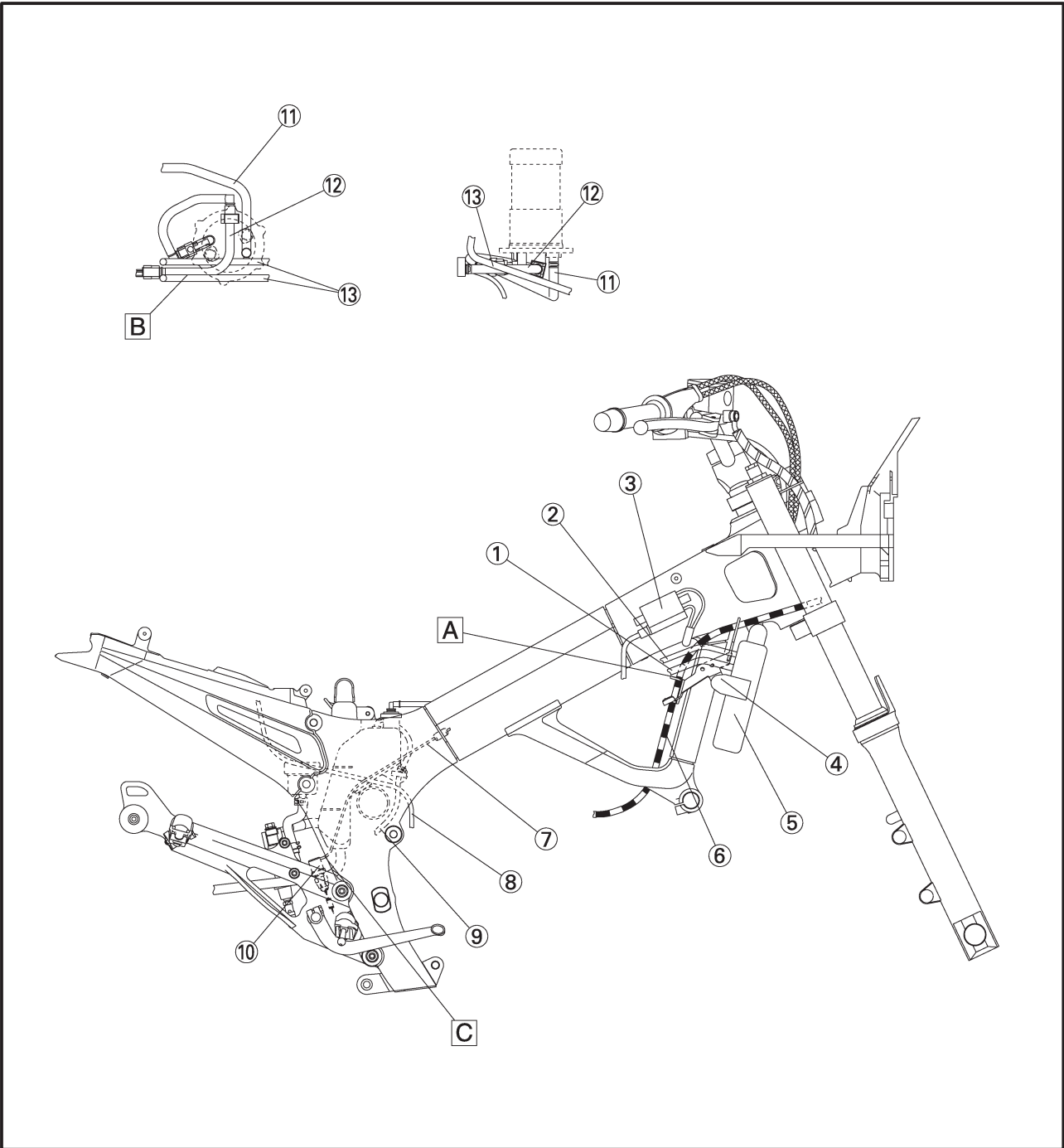


# CABLE ROUTING



- ① Hose 2
- ② Hose
- ③ Ignition coil
- ④ Stay 2
- ⑤ Radiator
- ⑥ Clutch cable
- ⑦ Rear brake light switch lead
- ⑧ Starter relay lead
- ⑨ Coolant reservoir tank drain hose
- ⑩ Rear brake light switch
- ⑪ Fuel return hose
- ⑫ Fuel hose
- ⑬ Fuel drain hose

- A** Route the clutch cable through the guide of stay 2.
- B** Pass the fuel hose between the fuel drain hoses.
- C** Direct the take out port of rear brake light switch lead to the front.

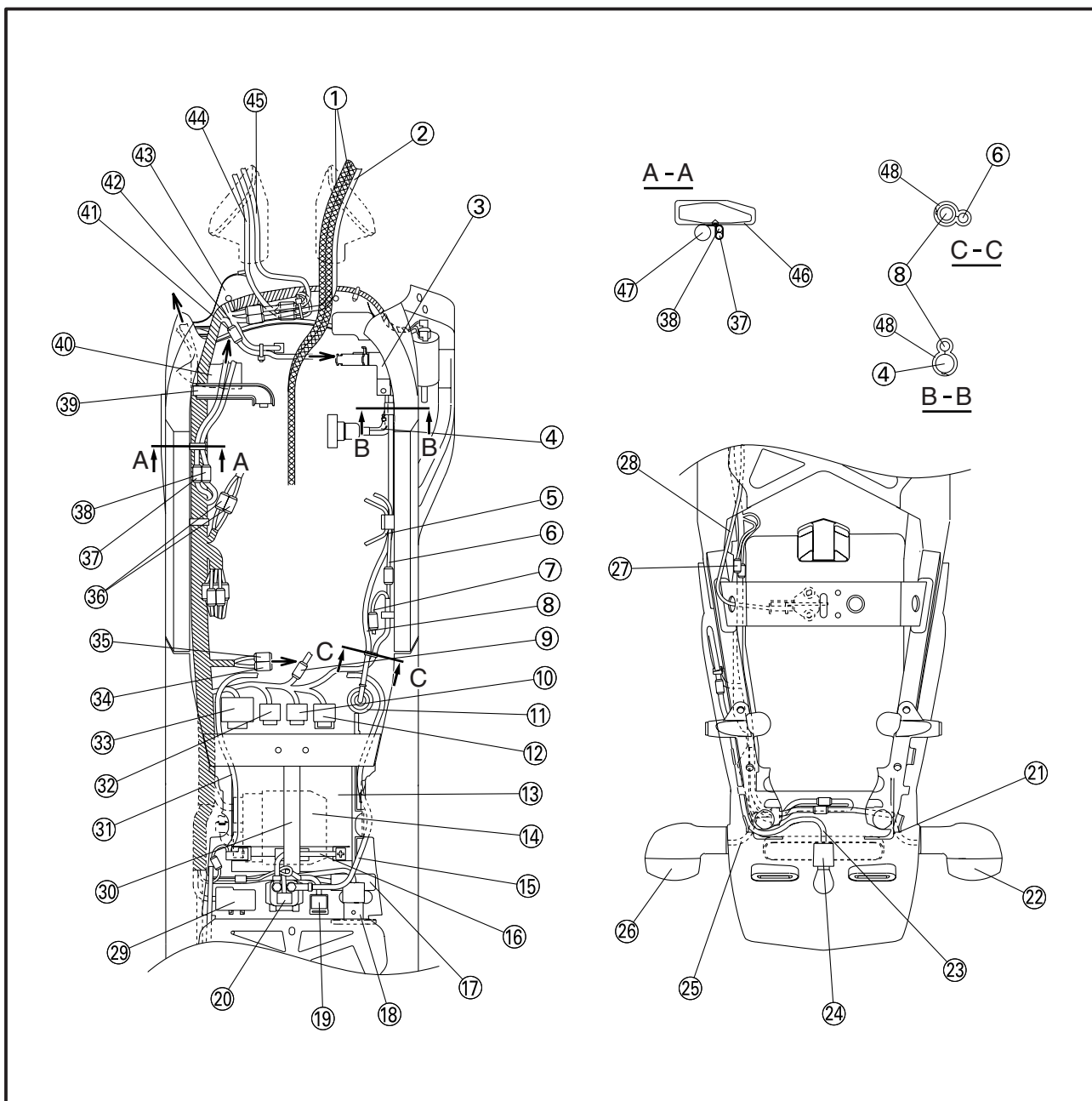


# CABLE ROUTING

**SPEC**



- |                                      |                                       |  |
|--------------------------------------|---------------------------------------|--|
| ① Throttle cables                    | ⑱ Atmospheric pressure sensor         | ③⑤ Fuel pump lead 1                    |
| ② Handlebar switch lead (right)      | ⑲ Main fuse                           | ③⑥ Sub wire harness (throttle body)    |
| ③ Stay                               | ⑳ Starter relay                       | ③⑦ Radiator fan motor lead             |
| ④ Thermo wax hose                    | ㉑ Rear turn signal light lead (right) | ③⑧ Cylinder identification sensor lead |
| ⑤ Intake air vacuum hose             | ㉒ Rear turn signal light (right)      | ③⑨ Bracket 1                           |
| ⑥ Sub-wire harness (air filter case) | ㉓ Tail/brake light lead               | ④⑩ Hose 1                              |
| ⑦ Rear brake light switch lead       | ㉔ Tail/brake light                    | ④⑪ AI system lead                      |
| ⑧ Coolant reservoir tank hose        | ㉕ Rear turn signal light lead (left)  | ④⑫ Coolant temperature sensor lead     |
| ⑨ Oil level switch lead              | ㉖ Rear turn signal light (left)       | ④⑬ Cover 2                             |
| ⑩ Fuel injection system relay        | ㉗ Alarm coupler                       | ④⑭ Main switch lead                    |
| ⑪ Coolant reservoir tank             | ㉘ Seat lock cable                     | ④⑮ Handlebar switch lead (left)        |
| ⑫ Turn signal relay                  | ㉙ Fuse box                            | ④⑯ Frame                               |
| ⑬ Battery                            | ⑳ Battery band                        | ④⑰ Wire harness                        |
| ⑭ Rectifier/regulator                | ㉑ Battery negative lead               | ④⑱ Clamp                               |
| ⑮ Starter motor lead                 | ㉒ Radiator fan relay                  |  |
| ⑯ Battery positive lead              | ㉓ Starting circuit cut-off relay      |  |
| ⑰ Lean angle cut-off switch          | ㉔ Fuel pump lead 2                    |  |

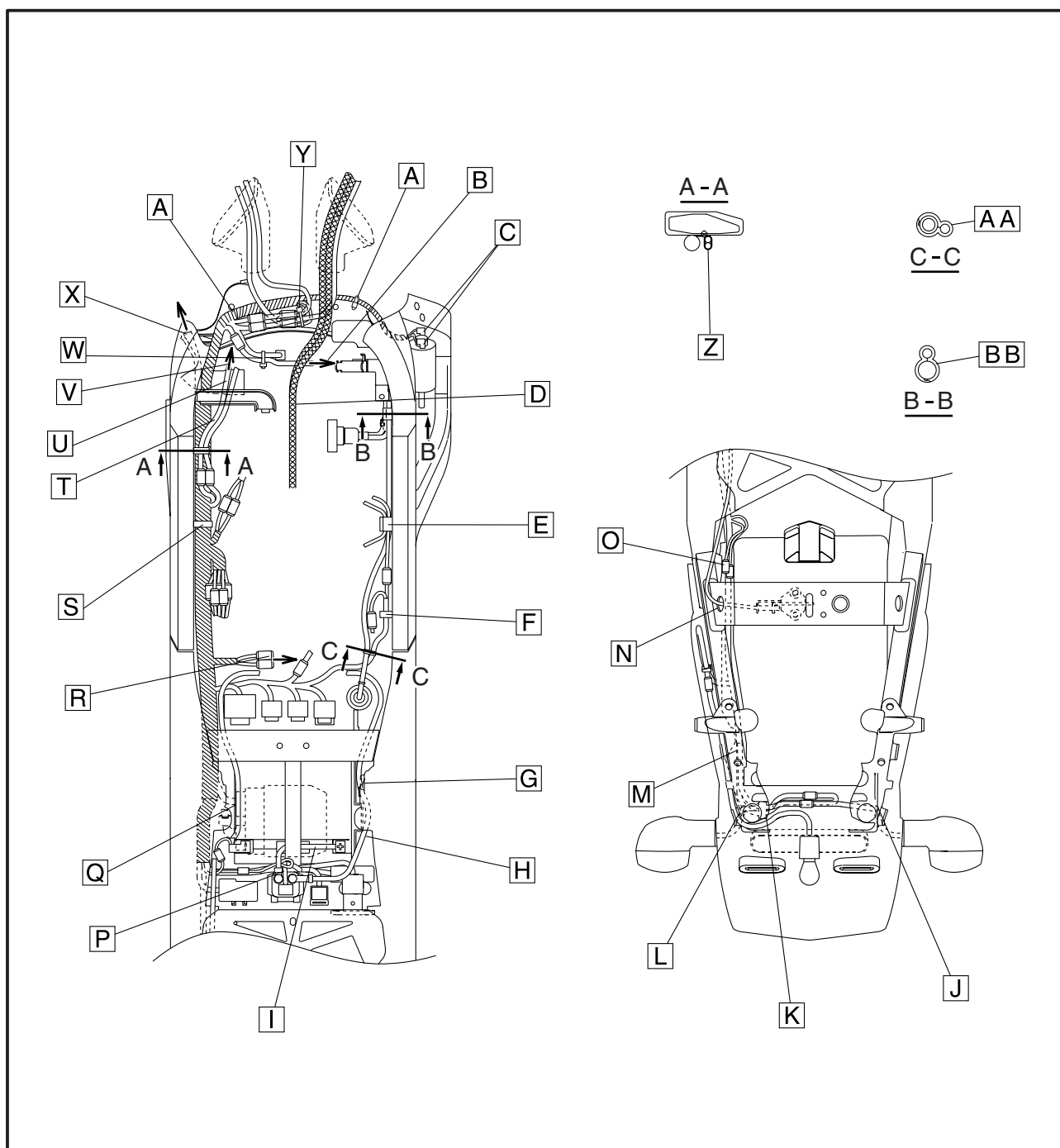


## CABLE ROUTING

SPEC



- A** For the wire harness routing, use clamps to fasten the wire harness to the outer hole of the cover 2.
- B** To the AI system
- C** Plug in the ignition coil lead terminals as shown in the drawing (both left and right).
- D** For the throttle cable, the upper side should be the return side and the lower side should be the pull side.
- E** Fasten the coolant reservoir tank hose, sub wire harness (air filter case), air intake vacuum hose to the inner side of frame with a clamp. Attach the clamp with its knot upward.
- F** Fasten the sub wire harness (air filter case) to the inner side of frame with a clamp.
- G** Route the starter motor lead under the rear frame attaching boss section.
- H** Route the starter motor lead by the right side of the battery and coolant reservoir tank.
- I** Pass the battery positive lead under the battery band.
- J** Pass the rear turn signal light lead (right) by the right side hole of fender.
- K** Route the rear turn signal light leads (right and left) through the clamp installed with the rear fender. Adjust the length of rear turn signal lead (left) by folding and then bundle it.

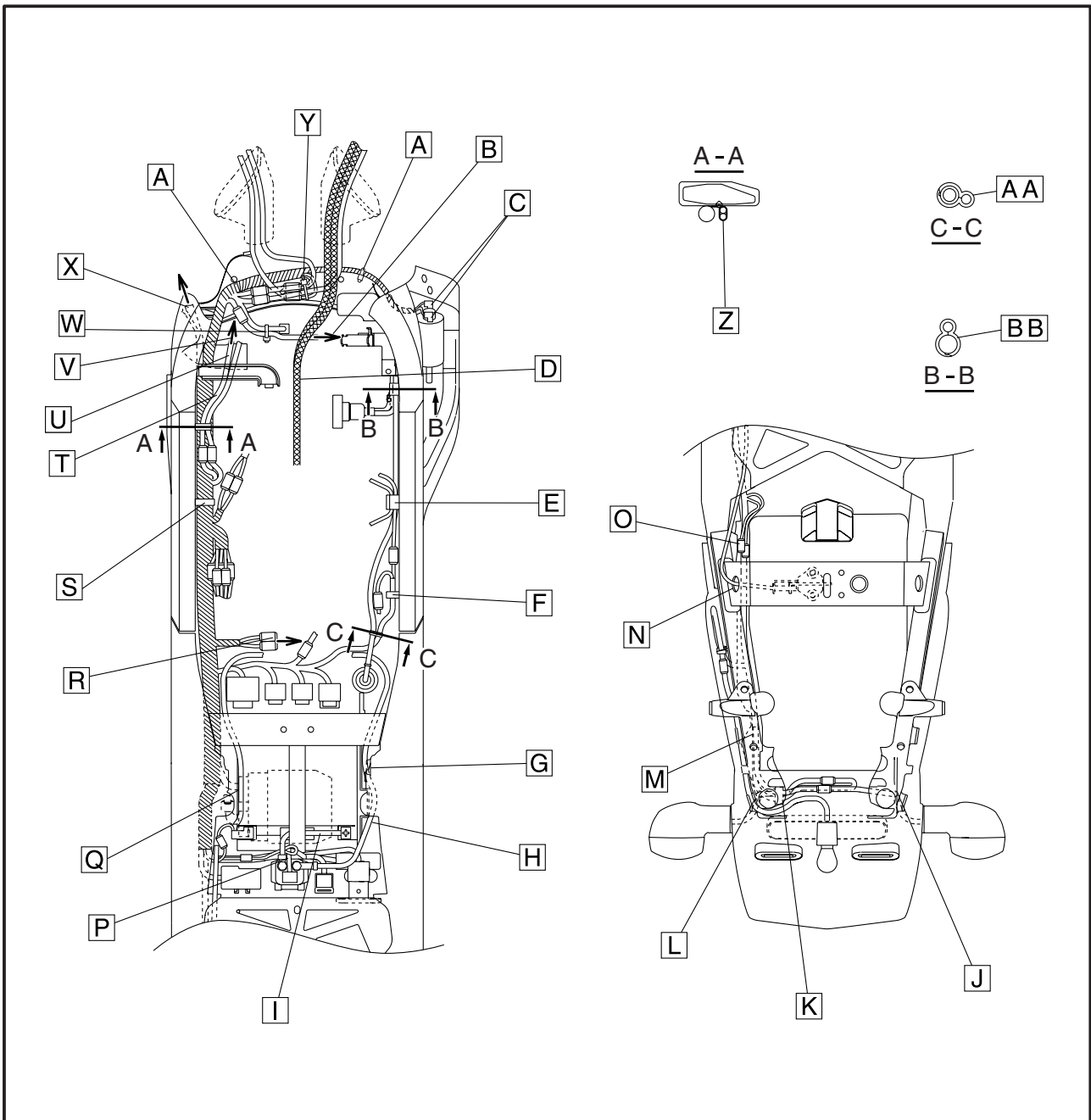


## CABLE ROUTING

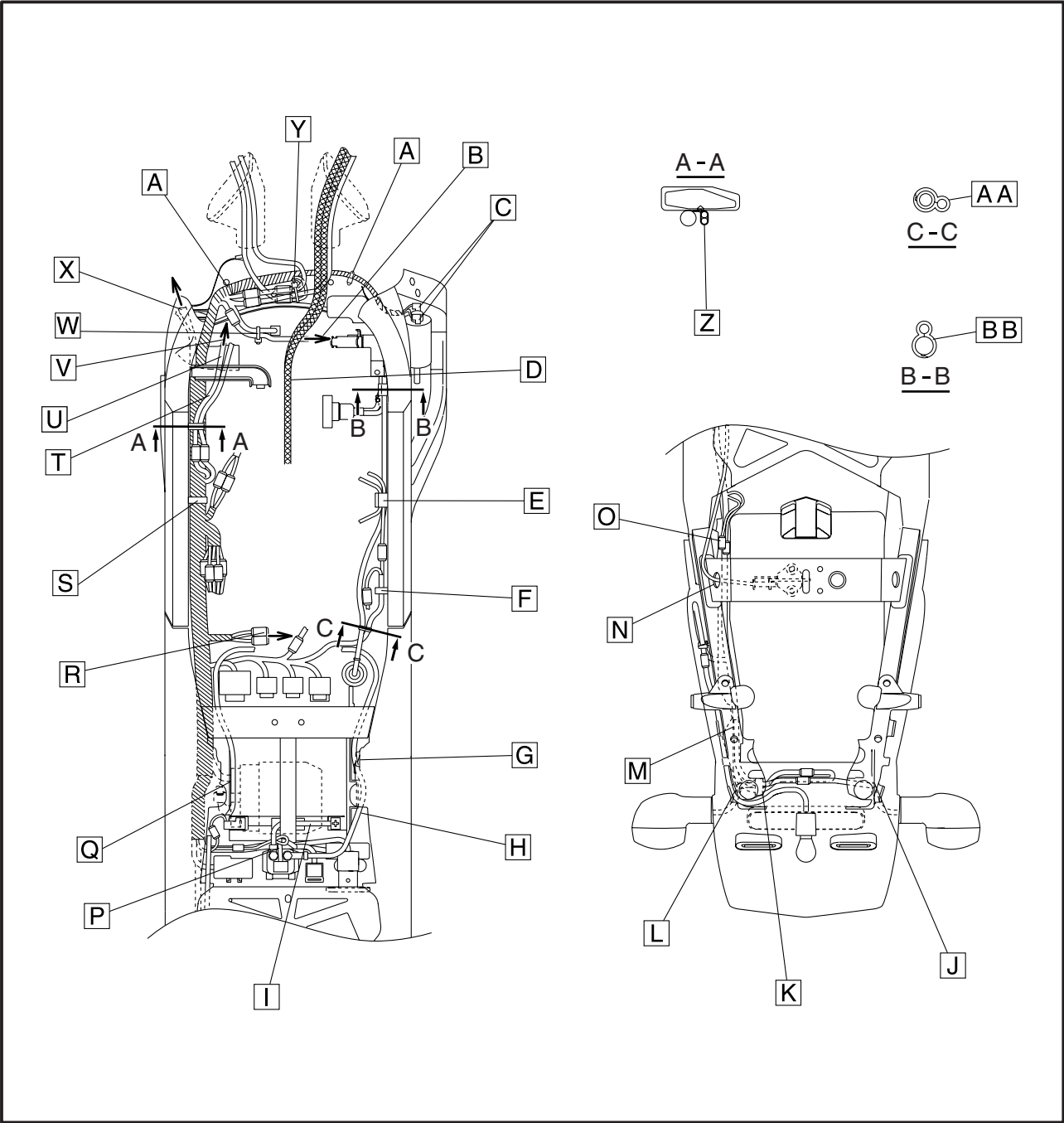
SPEC



- L** Route the rear turn signal lead (left) through the left side hole of fender.
- M** Route the rear turn signal light leads (right and left) between the ribs of rear fender.
- N** Route the seat lock cable through the hole section of the seat bracket of rear frame. Either direction of the seat lock cable is acceptable.
- O** House the alarm coupler between the ribs of rear fender.
- P** Wire the battery positive lead together with the starter relay lead as shown in the illustration.
- Q** Pass the battery negative lead above the battery.
- R** To the fuel pump
- S** Fasten the wire harness to the inner side of frame with the clamp.
- T** Pass the wire harness, cylinder identification sensor and radiator fan motor leads under the bracket 1.
- U** Pass the wire harness, cylinder identification sensor and radiator fan motor leads above the hose 1.
- V** To the radiator fan motor
- W** Bundle the coolant temperature sensor and AI system leads with a clamp. Cut the clamp tip with 3 to 8 mm left.
- X** To the headlight
- Y** Bind the wire harness (Main switch lead), right handle bar switch lead and left handle bar switch lead with the clamp. Point the tip of the clamp to the front and place it between the cover and the harness. Position the clamp at the closer point than the coupler to the right side of the vehicle body as shown in the illustration.



- Z** Fasten the cylinder identification sensor and radiator fan motor lead to the frame with a clamp. Position the clamp tip to face downward.
- AA** Route the wire harness through the smaller diameter and the radiator reservoir tank drain hose through the larger diameter and clamp them.
- BB** Place the radiator reservoir tank hose up and the thermo wax hose down and then clamp them. Attach the clamp with its open section downward.





**CHK**

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**3**




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## CHAPTER 3 PERIODIC CHECKS AND ADJUSTMENTS

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## PERIODIC CHECKS AND ADJUSTMENTS

### INTRODUCTION

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

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### PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

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

- **The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.**
- From 50,000 km, repeat the maintenance intervals starting from 10,000 km.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (× 1,000 km)					ANNUAL CHECK
			1	10	20	30	40	
1	* Fuel line (See page 3-36)	• Check fuel hoses for cracks or damage.		√	√	√	√	√
2	Spark plugs (See page 3-27)	• Check condition. • Clean and regap.		√		√		
		• Replace.			√		√	
3	* Valves (See page 3-10)	• Check valve clearance. • Adjust.	Every 40,000 km					
4	Air filter element (See page 3-35)	• Replace.					√	
5	Clutch (See page 3-34)	• Check operation. • Adjust.	√	√	√	√	√	
6	* Front brake (See page 3-45)	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
		• Replace brake pads.	Whenever worn to the limit					
7	* Rear brake (See page 3-45)	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
		• Replace brake pads.	Whenever worn to the limit					
8	* Brake hoses (See page 3-47)	• Check for cracks or damage.		√	√	√	√	√
		• Replace.	Every 4 years					
9	* Wheels (See page 3-61)	• Check runout and for damage.		√	√	√	√	
10	* Tires (See page 3-59)	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√
11	* Wheel bearings (See page 4-3)	• Check bearing for looseness or damage.		√	√	√	√	
12	* Swingarm (See page 4-72)	• Check operation and for excessive play.		√	√	√	√	
		• Lubricate with lithium-soap-based grease.	Every 50,000 km					
13	Drive chain (See page 3-50)	• Check chain slack. • Make sure that the rear wheel is properly aligned. • Clean and lubricate.	Every 1,000 km and after washing the motorcycle or riding in the rain					
14	* Steering bearings (See page 3-52)	• Check bearing play and steering for roughness.	√	√	√	√	√	
		• Lubricate with lithium-soap-based grease.	Every 20,000 km					

# INTRODUCTION/PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

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NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (× 1,000 km)					ANNUAL CHECK
			1	10	20	30	40	
15	* Chassis fasteners (See page 2-22)	• Make sure that all nuts, bolts and screws are properly tightened.		√	√	√	√	√
16	Sidestand (See page 3-62)	• Check operation. • Lubricate.		√	√	√	√	√
17	* Sidestand switch (See page 8-4)	• Check operation.	√	√	√	√	√	√
18	* Front fork (See page 3-55)	• Check operation and for oil leakage.		√	√	√	√	
19	* Shock absorber assembly (See page 3-57)	• Check operation and shock absorber for oil leakage.		√	√	√	√	
20	* Rear suspension relay arm and connecting arm pivoting points (See page 3-62)	• Check operation.		√	√	√	√	
		• Lubricate with lithium-soap-based grease.			√		√	
21	* Electronic fuel injection (See page 3-15)	• Adjust engine idling speed and synchronization	√	√	√	√	√	√
22	Engine oil (See page 3-30)	• Change. • Check oil level and vehicle for oil leakage.	√	√	√	√	√	√
23	Engine oil filter element (See page 3-32)	• Replace.	√		√		√	
24	* Cooling system (See page 3-38)	• Check coolant level and vehicle for coolant leakage.		√	√	√	√	√
		• Change.	Every 3 years					
25	* Front and rear brake switches (See page 3-47)	• Check operation.	√	√	√	√	√	√
26	Moving parts and cables (See page 3-62)	• Lubricate.		√	√	√	√	√
27	* Air induction system (See page 7-39)	• Check the air cut-off valve, read valve, and hose for damage. • Replace the entire air induction system if necessary.		√	√	√	√	√
28	* Throttle grip housing and cable (See page 3-25)	• Check operation and free play. • Adjust the throttle cable free play if necessary. • Lubricate the throttle grip housing and cable.		√	√	√	√	√
29	* Muffler and exhaust pipe. (See page 3-37)	• Check the screw clamp for looseness.	√	√	√	√	√	√
30	* Lights, signals and switches (See page 3-71)	• Check operation. • Adjust headlight beam.	√	√	√	√	√	√

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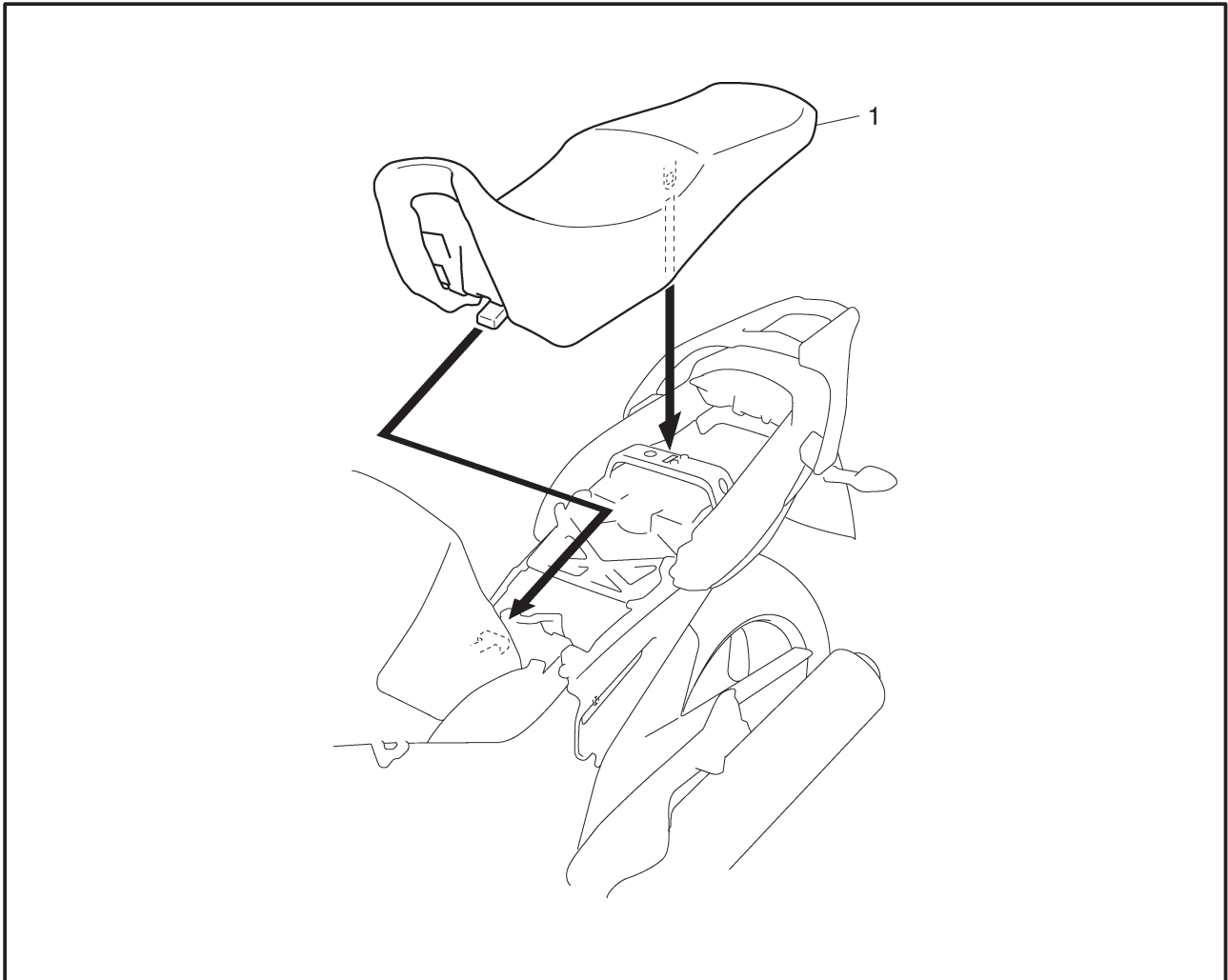
**NOTE:**

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



EAS00038

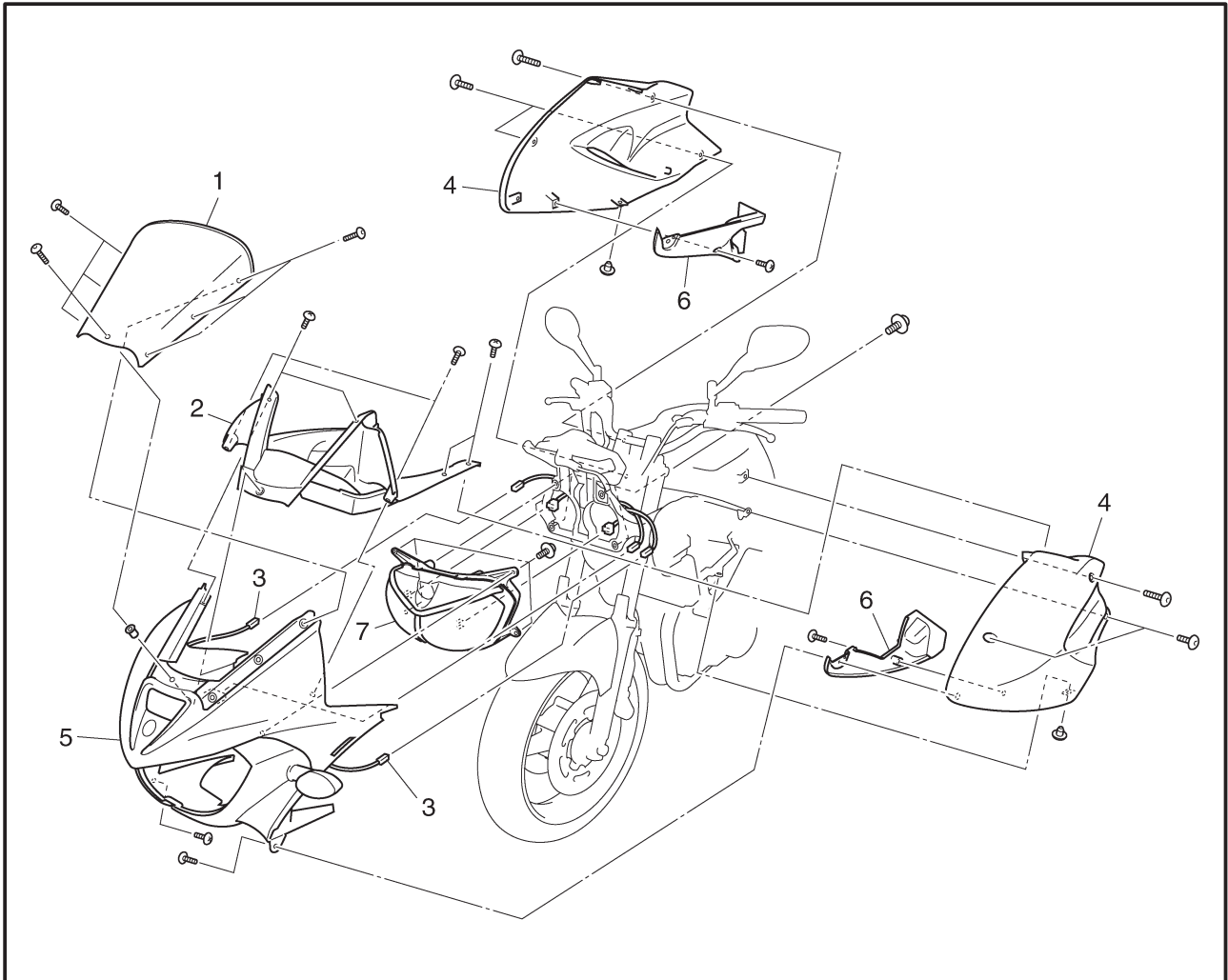
## SEAT



Order	Job/Part	Q'ty	Remarks
1	<b>Removing the seat</b> Seat	1	Remove the parts in the order listed.  For installation, reverse the removal procedure.



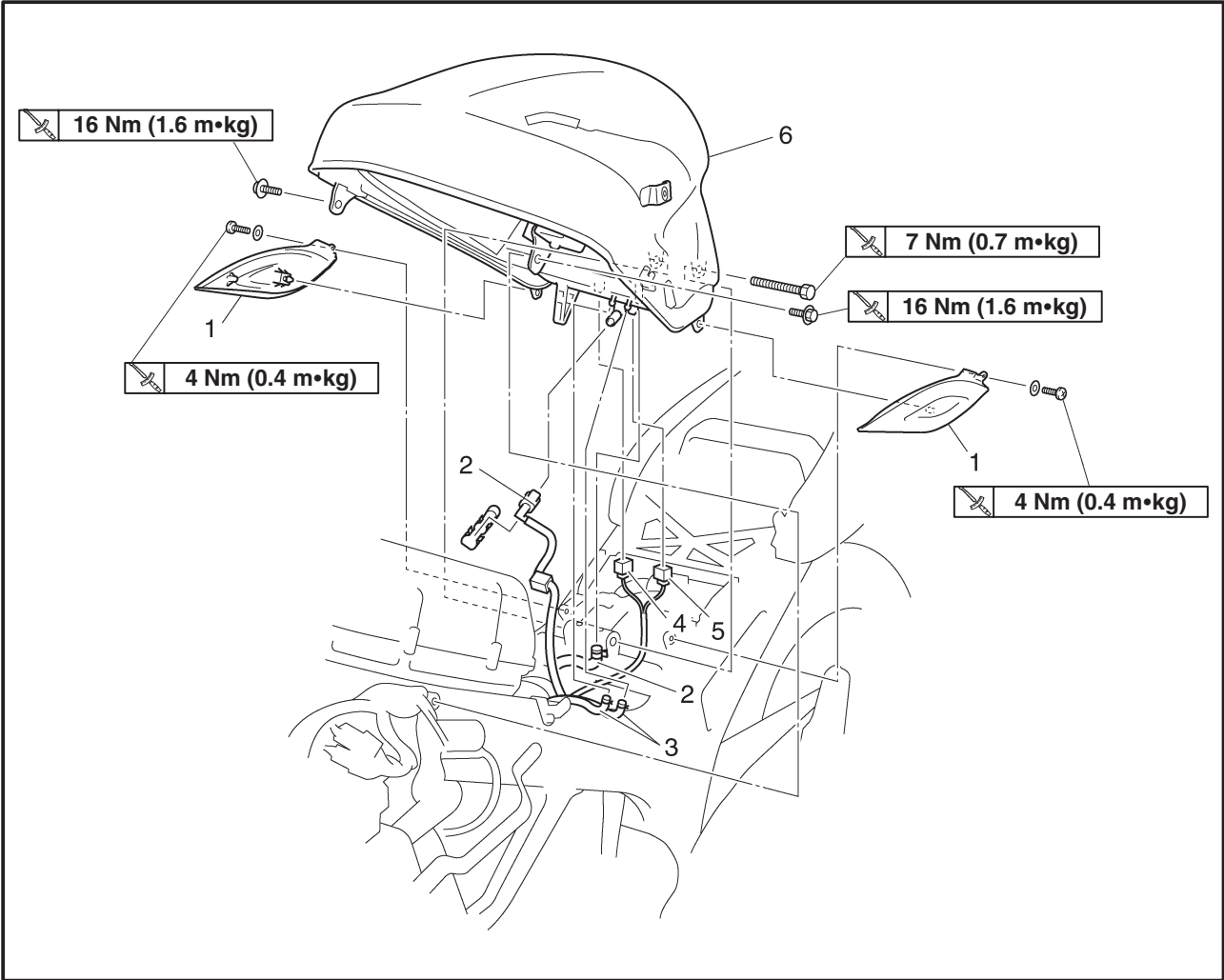
FRONT COWLINGS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front cowlings</b>		Remove the parts in the order listed.
1	Windshield	1	
2	Inner panel	1	
3	Turn signal light connector	2	Disconnect.
4	Side cowling (left and right)	2	
5	Front cowling	1	
6	Air intake grille	2	
7	Headlight assembly	1	
			For installation, reverse the removal procedure.

EAS00040

FUEL TANK



Order	Job/Part	Q'ty	Remarks
	<b>Removing the fuel tank</b>		
	Seat		Remove the parts in the order listed.
	Side cowling		Refer to "SEAT".
	Side cover		Refer to "FRONT COWLINGS".
1	Side cover	2	
2	Fuel hose	2	
3	Fuel tank breather hose	2	Disconnect.
4	Fuel pump coupler	1	
5	Fuel sender coupler	1	
6	Fuel tank	1	
			For installation, reverse the removal procedure.



---

**REMOVING THE FUEL TANK**

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
  - fuel return hose
  - fuel hose

**CAUTION:** \_\_\_\_\_

Although the fuel has been removed from the fuel tank be careful when removing the fuel hoses, since there may be fuel remaining in it.

---

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

Before removing the hoses, place a few rags in the area under where it will be removed.

---

3. Remove:
  - fuel tank

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

Do not set the fuel tank down so that the installation surface of the fuel pump is directly under the tank. Be sure to lean the fuel tank in an upright position.

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**REMOVING THE FUEL PUMP**

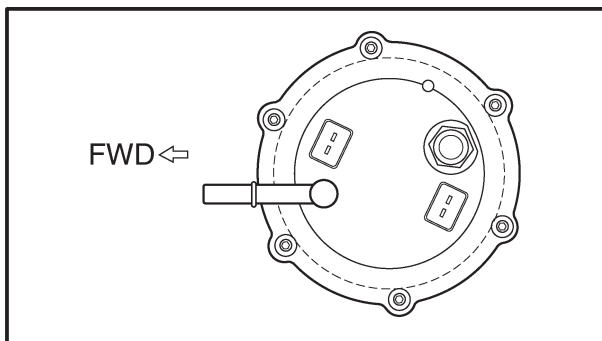
1. Remove:
  - fuel pump

**CAUTION:** \_\_\_\_\_

- Do not drop the fuel pump or give it a strong shock.
  - Do not touch the base section of the fuel sender.
-

## INSTALLING THE FUEL PUMP/ INSTALLING THE FUEL HOSE


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### INSTALLING THE FUEL PUMP

1. Install:

- fuel pump

 4 Nm (0.4 m•kg)

#### NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Tighten the fuel pump bolts in stages in a criss-cross pattern and to the specified torque.

### INSTALLING THE FUEL HOSE

1. Install:

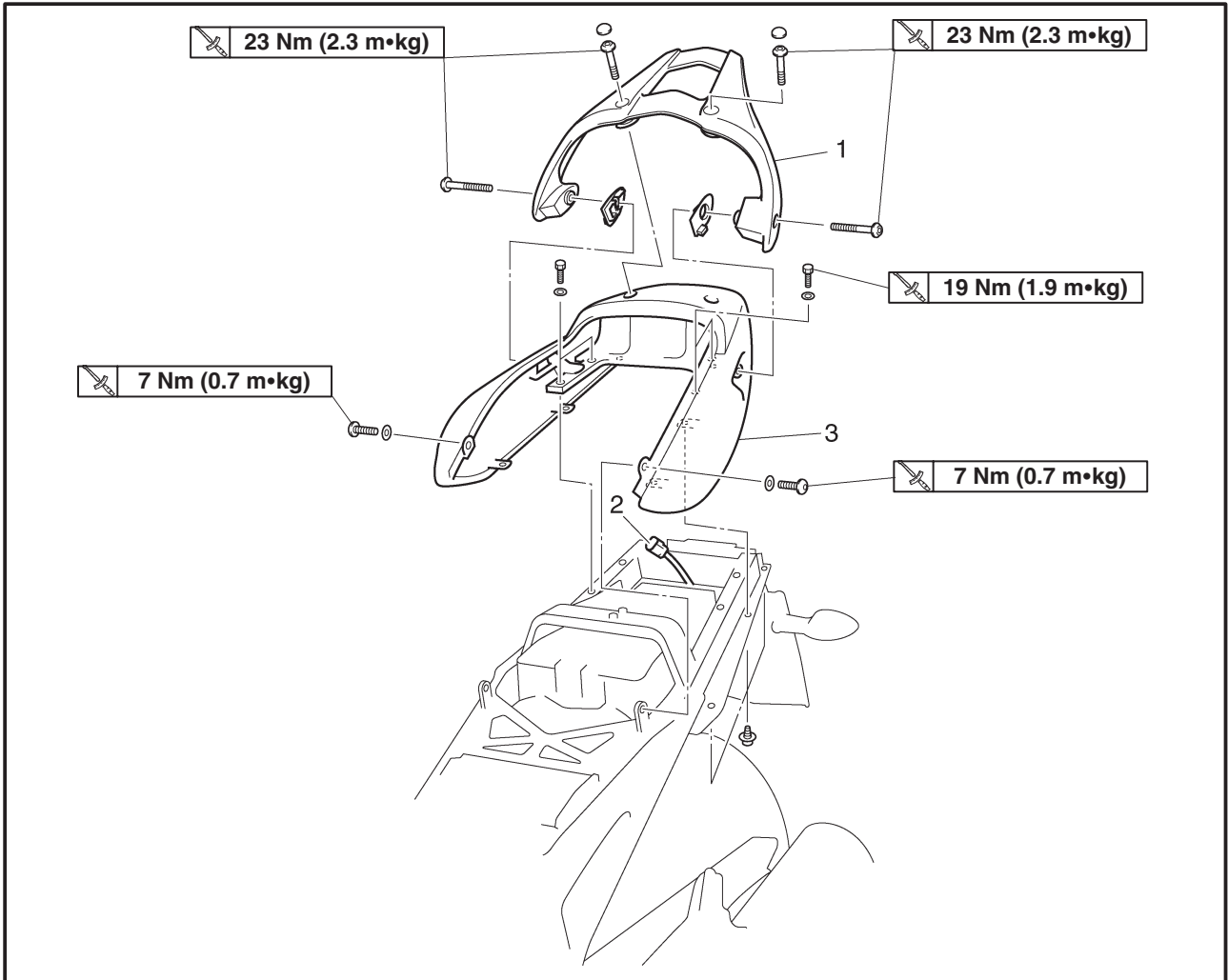
- fuel hose
- fuel hose holders

#### CAUTION:

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holders are in the correct position, otherwise the fuel hose will not be properly installed.

EAS00042

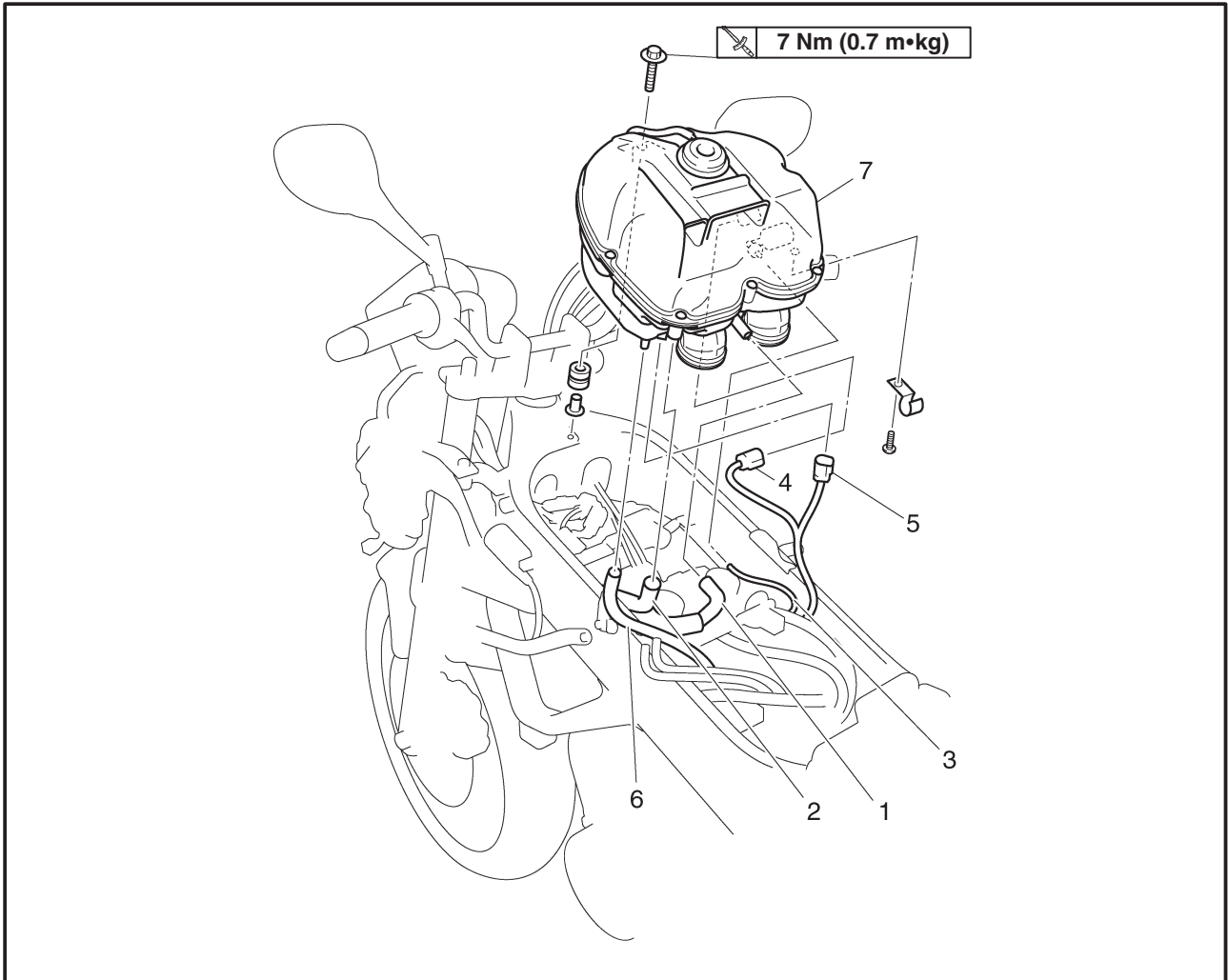
REAR COWLING



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear cowling</b>		
	<b>Seat</b>		Remove the parts in the order listed. Refer to "SEAT".
1	Grab bar	1	
2	Tail/brake light coupler	1	Disconnect.
3	Rear cowling	1	For installation, reverse the removal procedure.

EAS00043

**AIR FILTER CASE**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the air filter case</b>		Remove the parts in the order listed.
	Side cowlings		
	Seat		Refer to "SEAT".
	Fuel tank		Refer to "FUEL TANK".
1	Cylinder head breather hose	1	Disconnect.
2	Air system hose	1	
3	Solenoid valve hose	1	
4	Solenoid valve coupler	1	
5	Atmospheric temperature sensor coupler	1	
6	Drain hose	1	
7	Air filter case	1	For installation, reverse the removal procedure.



EAS00045

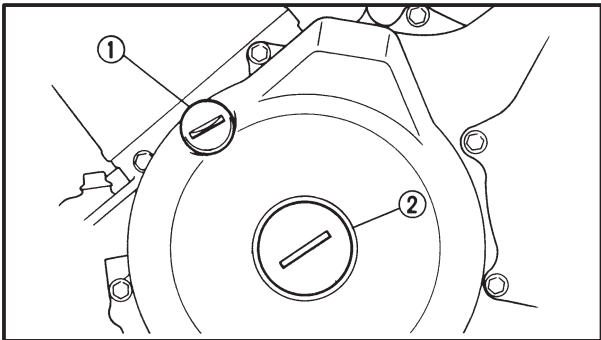
## ENGINE ADJUSTING THE VALVE CLEARANCE

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:
  - seat  
Refer to "SEAT".
  - side cowlings  
Refer to "FRONT COWLINGS".
  - fuel tank  
Refer to "FUEL TANK".
  - air filter case  
Refer to "AIR FILTER CASE".
2. Remove:
  - air cut-off valve  
Refer to "AIR CUT-OFF VALVE AND REED VALVE" in chapter 7.
3. Drain:
  - coolant  
Refer to "CHANGING THE COOLANT".
4. Remove:
  - radiator  
Refer to "RADIATOR" in chapter 6.
  - thermostat assembly  
Refer to "RADIATOR" in chapter 6.
5. Remove:
  - cylinder head cover  
Refer to "CYLINDER HEAD COVER" in chapter 5.
  - timing plug ①
  - straight plug ②
6. Measure:
  - valve clearance  
Out of specification → Adjust.



**Valve clearance (cold)**

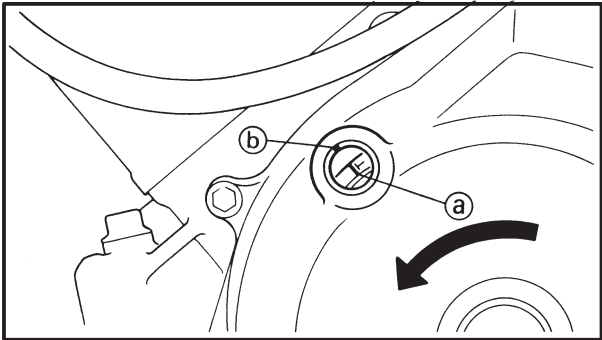
**Intake valve**

**0.15 ~ 0.20 mm**

**Exhaust valve**

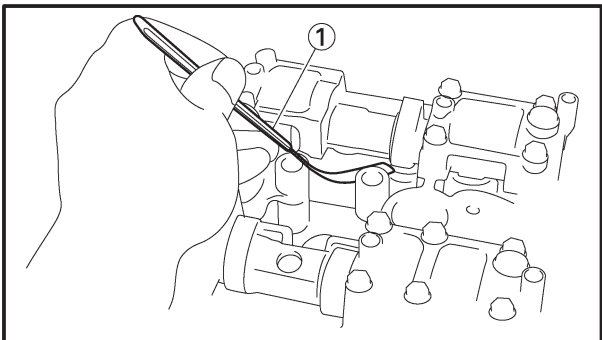
**0.23 ~ 0.28 mm**

# ADJUSTING THE VALVE CLEARANCE

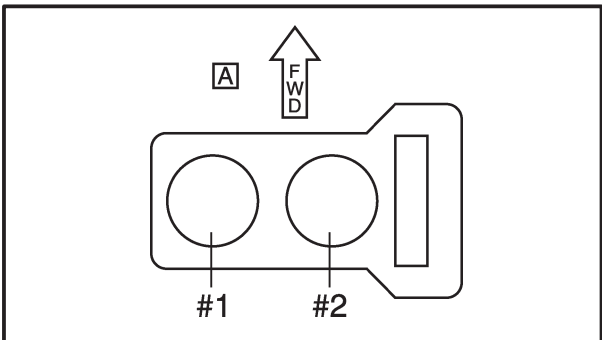


- a. Turn the crankshaft counterclockwise.
- b. When piston #1 is at TDC on the compression stroke, align the TDC mark (a) on the generator rotor with the mark (b) on the crankcase cover.

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



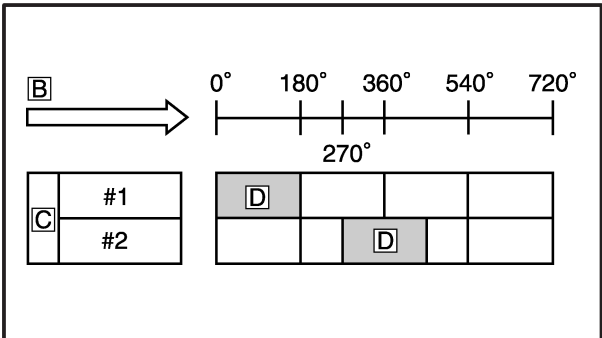
- c. Measure the valve clearance with a thickness gauge (1).
- NOTE:** \_\_\_\_\_
- If the valve clearance is incorrect, record the measured reading.
  - Measure the valve clearance in the following sequence.



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

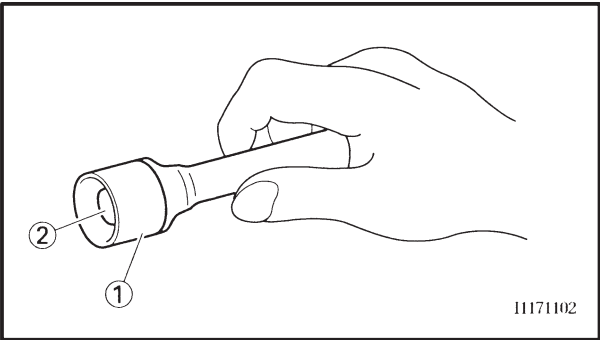
- A Front
- d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.
- B Degrees that the crankshaft is turned counterclockwise
- C Cylinder
- D Combustion cycle

<b>Cylinder #2</b>	<b>270°</b>
--------------------	-------------



- 7. Remove:
    - intake camshaft
    - exhaust camshaft
- NOTE:** \_\_\_\_\_
- Refer to “CAMSHAFT” in chapter 5.
  - When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

### ADJUSTING THE VALVE CLEARANCE

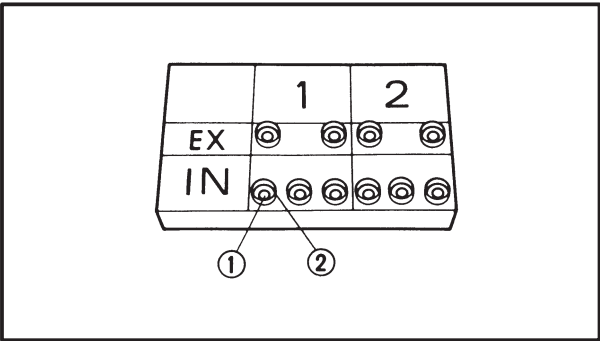


8. Adjust:
- valve clearance

- 
- a. Remove the valve lifter (1) and the valve pad (2) with a valve lapper (3).

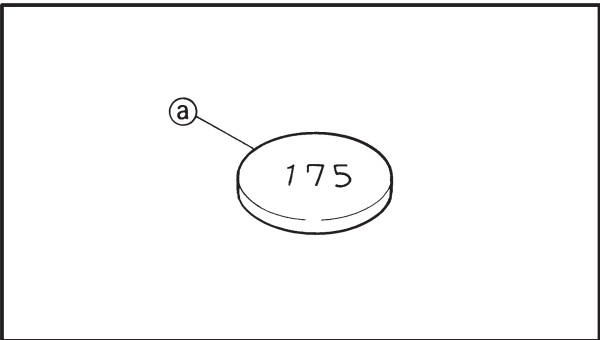
	<b>Valve lapper</b> 90890-04101
--	------------------------------------

- NOTE:**
- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
  - Make a note of the position of each valve lifter (1) and valve pad (2) so that they can be installed in the correct place.



- b. Select the proper valve pad from the following table.

Valve pad thickness range		Available valve pads
Nos.	1.20 ~ 2.40	25 thicknesses in 0.05 mm increments
120 ~ 240		



- NOTE:**
- The thickness (a) of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.
  - Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.

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

Last digit	Rounded value
0 or 2	0
5	5
8	10



**EXAMPLE:**

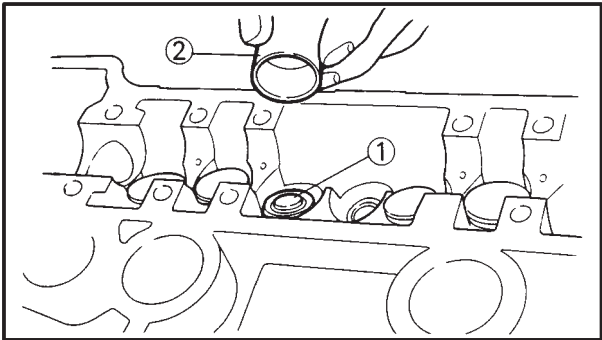
Original valve pad number = 148 (thickness = 1.48 mm (0.058 in))

Rounded value = 150

d. Locate the rounded number of the original valve pad and the measured valve clearance in the valve pad selection table. The point where the column and row intersect is the new valve pad number.

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

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



e. Install the new valve pad ① and the valve lifter ②.

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

- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with molybdenum disulfide oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.

f. Install the exhaust and intake camshafts, timing chain and camshaft caps.

	<p><b>Camshaft cap bolt</b> 10 Nm (1.0 m•kg)</p>
--	--

# ADJUSTING THE VALVE CLEARANCE



## INTAKE

MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.05 ~ 0.09			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.10 ~ 0.14		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.15 ~ 0.20	STANDARD CLEARANCE																								
0.21 ~ 0.25	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.26 ~ 0.30	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.31 ~ 0.35	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.36 ~ 0.40	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.41 ~ 0.45	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.46 ~ 0.50	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.51 ~ 0.55	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.56 ~ 0.60	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.61 ~ 0.65	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.66 ~ 0.70	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.71 ~ 0.75	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.76 ~ 0.80	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.81 ~ 0.85	185	190	195	200	205	210	215	220	225	230	235	240													
0.86 ~ 0.90	190	195	200	205	210	215	220	225	230	235	240														
0.91 ~ 0.95	195	200	205	210	215	220	225	230	235	240															
0.96 ~ 1.00	200	205	210	215	220	225	230	235	240																
1.01 ~ 1.05	205	210	215	220	225	230	235	240																	
1.06 ~ 1.10	210	215	220	225	230	235	240																		
1.11 ~ 1.15	215	220	225	230	235	240																			
1.16 ~ 1.20	220	225	230	235	240																				
1.21 ~ 1.25	225	230	235	240																					
1.26 ~ 1.30	230	235	240																						
1.31 ~ 1.35	235	240																							
1.36 ~ 1.40	240																								

**VALVE CLEARANCE (cold):**  
 0.15 ~ 0.20 mm  
 Example: Installed is 175  
 Measured clearance is 0.27 mm  
 Replace 175 pad with 185 pad  
 Pad number: (example)  
 Pad No. 175 = 1.75 mm  
 Pad No. 185 = 1.85 mm

## EXHAUST

MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.02						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.03 ~ 0.07					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.08 ~ 0.12				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.13 ~ 0.17			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.18 ~ 0.22		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.23 ~ 0.28	STANDARD CLEARANCE																								
0.29 ~ 0.33	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.34 ~ 0.38	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.39 ~ 0.43	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.44 ~ 0.48	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.49 ~ 0.53	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.54 ~ 0.58	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.59 ~ 0.63	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.64 ~ 0.68	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.69 ~ 0.73	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.74 ~ 0.78	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.79 ~ 0.83	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.84 ~ 0.88	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.89 ~ 0.93	185	190	195	200	205	210	215	220	225	230	235	240													
0.94 ~ 0.98	190	195	200	205	210	215	220	225	230	235	240														
0.99 ~ 1.03	195	200	205	210	215	220	225	230	235	240															
1.04 ~ 1.08	200	205	210	215	220	225	230	235	240																
1.09 ~ 1.13	205	210	215	220	225	230	235	240																	
1.14 ~ 1.18	210	215	220	225	230	235	240																		
1.19 ~ 1.23	215	220	225	230	235	240																			
1.24 ~ 1.28	220	225	230	235	240																				
1.29 ~ 1.33	225	230	235	240																					
1.34 ~ 1.38	230	235	240																						
1.39 ~ 1.43	235	240																							
1.44 ~ 1.48	240																								

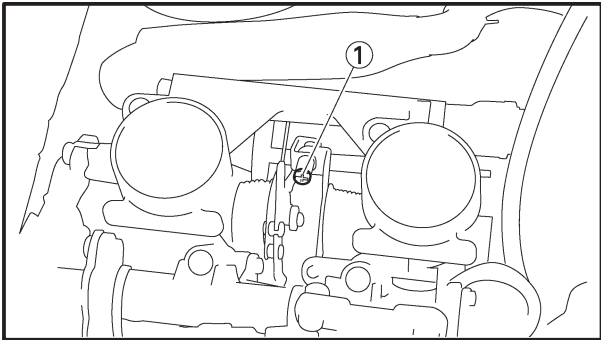
**VALVE CLEARANCE (cold):**  
 0.23 ~ 0.28 mm  
 Example: Installed is 175  
 Measured clearance is 0.35 mm  
 Replace 175 pad with 185 pad  
 Pad number: (example)  
 Pad No. 175 = 1.75 mm  
 Pad No. 185 = 1.85 mm





## SYNCHRONIZING THE THROTTLE BODIES

**CHK**  
**ADJ**



### CAUTION:

Do not use the throttle valve adjusting screws ① to adjust the throttle body synchronization.



**Carburetor angle driver**  
**90890-03158**



**Vacuum pressure at engine idling speed**  
**33.0 ~ 36.0 kPa**  
**(248 ~ 270 mm Hg)**

### NOTE:

The difference in vacuum pressure between two throttle bodies should not exceed 1.33 kPa (10 mm Hg).

#### 9. Measure:

- engine idling speed  
Out of specification → Adjust.  
Make sure that the vacuum pressure is within specification.

#### 10. Stop the engine and remove the measuring equipment.

#### 11. Adjust:

- throttle cable free play  
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.



**Throttle cable free play**  
**(at the flange of the throttle grip)**  
**3 ~ 5 mm**

#### 12. Remove:

- engine tachometer
- vacuum gauge

#### 13. Remove:

- fuel tank  
Refer to “FUEL TANK”.

#### 14. Install:

- fuel tank  
Refer to “FUEL TANK”.
- rider seat  
Refer to “SEATS AND FUEL TANK”.

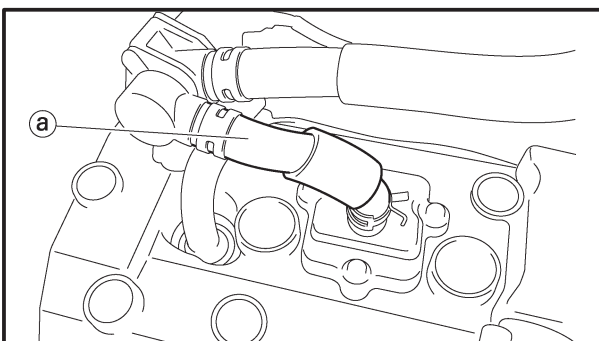
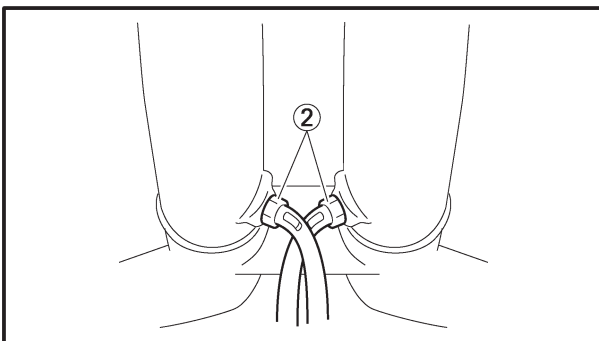
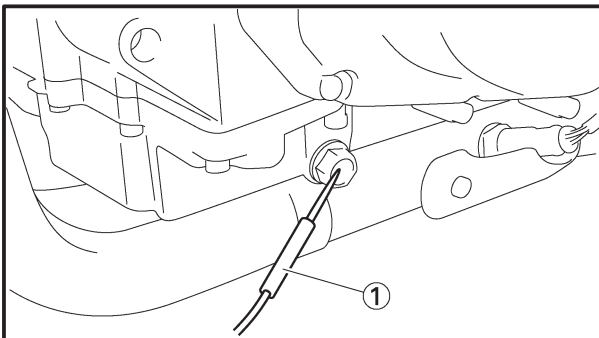
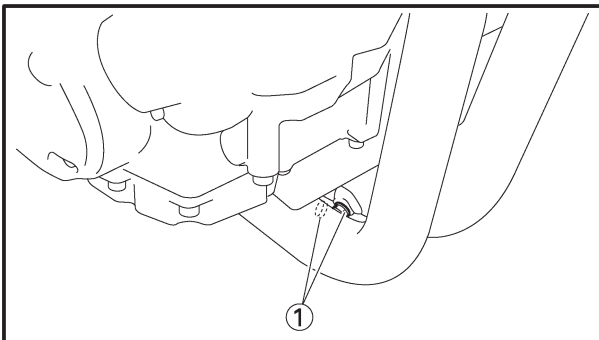
## CHECKING AND ADJUSTING THE EXHAUST GAS AT IDLE

(Measuring the exhaust gas at idle [when the air induction system does not operate])

1. Stand the motorcycle on a level surface.

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

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



2. Remove:

- rider seat  
Refer to "SEAT".
- fuel tank  
Refer to "FUEL TANK".
- air filter case  
Refer to "AIR FILTER CASE".
- exhaust pipe bolts ①

3. Install:

- pocket tester ①  
(onto the engine oil drain bolt)
- engine tachometer  
(onto the spark plug lead of cylinder #1)
- exhaust attachment ②  
(onto the exhaust pipe)



**Pocket tester**  
90890-03132  
**Engine tachometer**  
90890-03113  
**Exhaust attachment**  
90890-03134

4. Stop air induction system operation.

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

Crimp the hose ③ running from the lead valve to the air cut-off valve to prevent the air cut-off valve from operating.

Make sure not to damage the hose while crimping it.

## CHECKING AND ADJUSTING THE EXHAUST GAS AT IDLE

CHK  
ADJ



5. Install:
  - air filter case  
Refer to “AIR FILTER CASE”.
  - fuel tank  
Refer to “FUEL TANK”.
6. Start the engine and warm it up until the specified oil temperature is reached.

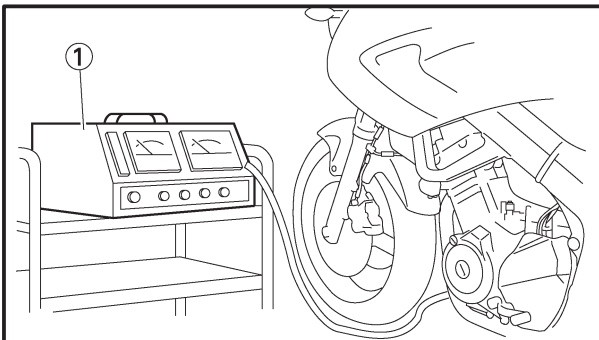


**Oil temperature**  
60 ~ 80°C

7. Measure:
  - engine idling speed  
Out of specification → Adjust.  
Refer to “ADJUSTING THE ENGINE IDLING SPEED”.



**Engine idling speed**  
1,100 ~ 1,200 r/min



8. Install:
  - CO/HC tester ①  
(onto the exhaust attachment)
9. Measure:
  - carbon monoxide density  
Out of specification → Adjust.  
Within specification → Measure the exhaust gas when induction system is operating.



**Carbon monoxide density (when air induction system is not operating)**  
3.0 ~ 4.0%



## ADJUSTING THE EXHAUST GAS VOLUME

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

Be sure to set the carbon monoxide density to standard, and then adjust the exhaust gas.



### Setting steps

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

If the battery is not fully charged errors one to four will be indicated on the display.

- a. "CO" and "DIAG" modes
  - Push the "SELECT" button and the "RESET" button together, and then set the main switch to "ON".

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

Be sure to push the buttons for more than eight seconds after setting the main switch to "ON".

- All segments, except the clock and "TRIP", will start flashing.
- "DIAG" will be indicated on the display.
- b. To switch to the "CO" adjusting mode
  - 1) Push the "SELECT" button to switch the display between the "CO" adjusting mode and the "DIAG" mode.
  - 2) Push the "SELECT" button and "RESET" button together for more than two seconds to set the desired mode.
- c. To select the cylinder to be adjusted
  - Push the "SELECT" button or the "RESET" button to select the cylinder.

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

The number of the cylinder to be adjusted will be indicated on the display.

- Push the "RESET" button to scroll down the cylinder numbers.
- Push the "SELECT" button to scroll up the cylinder numbers.
- Push the "SELECT" button and the "RESET" button together for more than two seconds to set the cylinder.
- d. To adjust the carbon monoxide exhaust gas volume
  - After selecting the cylinder, adjust the exhaust gas volume by pushing the "SELECT" button or the "RESET" button.

## ADJUSTING THE EXHAUST GAS VOLUME



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

The exhaust gas volume will be indicated on the display.

- 
- Push the “RESET” button to increase the volume.
  - Push the “SELECT” button to decrease the volume.
  - Release the button to set the volume.
  - Push the “SELECT” button and the “RESET” button together to return to the selected cylinder.
- e. To deactivate the mode set the main switch “OFF”.





## CHECKING THE EXHAUST GAS AT IDLE

(Measuring the exhaust gas at idle [when air induction system is operating])

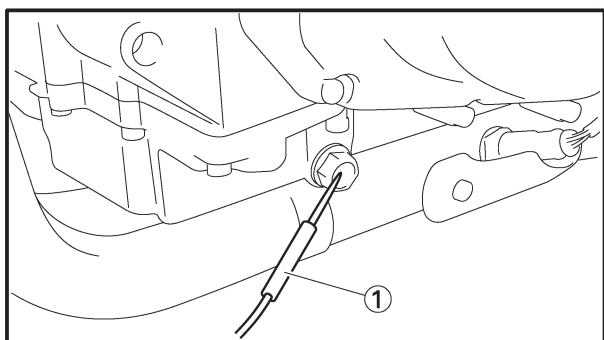
1. Stand the motorcycle on a level surface.

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

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

2. Remove:

- rider seat  
Refer to "SEAT".
- fuel tank  
Refer to "FUEL TANK".



3. Install:

- pocket tester ①  
(onto the engine oil drain bolt)
- engine tachometer  
(onto the spark plug lead of cylinder #1)



**Pocket tester**  
**90890-03132**  
**Engine tachometer**  
**90890-03113**

4. Install:

- fuel tank  
Refer to "FUEL TANK".

5. Start the engine and warm it up until the specified oil temperature is reached.



**Oil temperature**  
**60 ~ 80°C**

6. Measure:

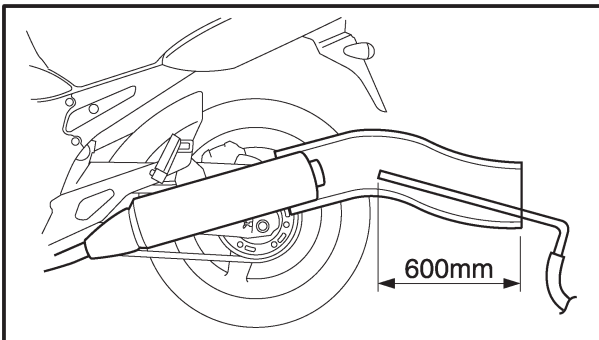
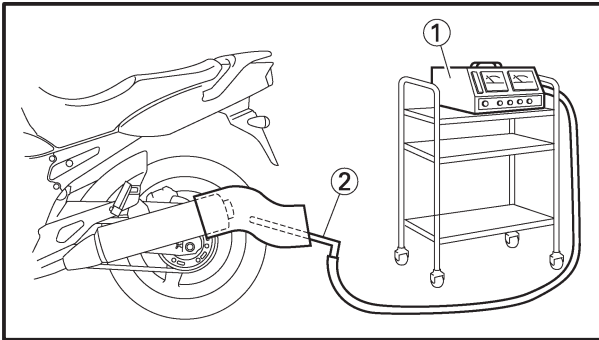
- engine idling speed  
Out of specification → Adjust.  
Refer to "ADJUSTING THE ENGINE IDLING SPEED".



**Engine idling speed**  
**1,100 ~ 1,200 r/min**

## CHECKING THE EXHAUST GAS AT IDLE

CHK  
ADJ



### 7. Install:

- carbon monoxide and hydrocarbon tester ①
- sampling probe ②

### NOTE:

- Since it is necessary to insert the sampling probe 600 mm into the exhaust pipe, be sure to use a heat-resistant rubber tube as shown in the illustration.
- Be sure to set the heat-resistant rubber tube so that exhaust gas does not leak out.
- Before using the carbon monoxide and hydrocarbon tester, be sure to read the user's manual.

### 8. Measure:

- carbon monoxide density
- hydrocarbon density



**Carbon monoxide density (when  
air induction system is operating)  
Below 1%  
(Reference value)**

Out of specification → Check air induction system.

Refer to "AIR INDUCTION SYSTEM" in chapter 7.

# ADJUSTING THE ENGINE IDLING SPEED



EAS00052

## ADJUSTING THE ENGINE IDLING SPEED

### NOTE:

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

1. Start the engine and let it warm up for several minutes.
2. Attach:
  - engine tachometer  
(onto the spark plug lead of cylinder #1)

	<b>Engine tachometer</b> <b>90890-03113</b>
---	--

3. Measure:
  - engine idling speed  
Out of specification → Adjust.

	<b>Engine idling speed</b> <b>1,100 ~ 1,200 r/min</b>
---	--

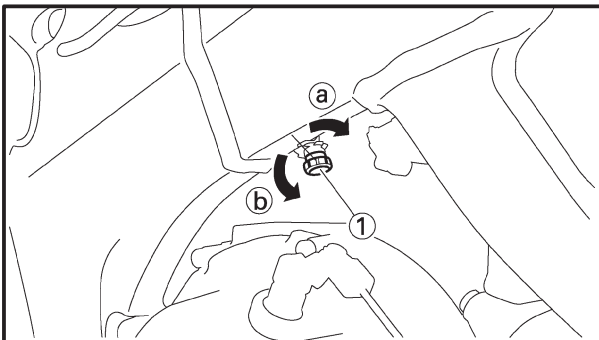
4. Adjust:
  - engine idling speed

a. Turn the throttle stop screw ① in direction ② or ③ until the specified engine idling speed is obtained.

<b>Direction ②</b>	<b>Engine idling speed is increased.</b>
<b>Direction ③</b>	<b>Engine idling speed is decreased.</b>

5. Adjust:
  - throttle cable free play  
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.

	<b>Throttle cable free play (at the flange of the throttle grip)</b> <b>3 ~ 5 mm</b>
---	---



## ADJUSTING THE THROTTLE CABLE FREE PLAY

CHK  
ADJ

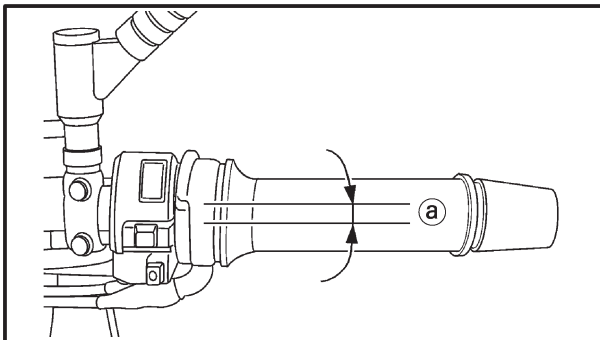


EAS00055

### ADJUSTING THE THROTTLE CABLE FREE PLAY

#### NOTE:

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



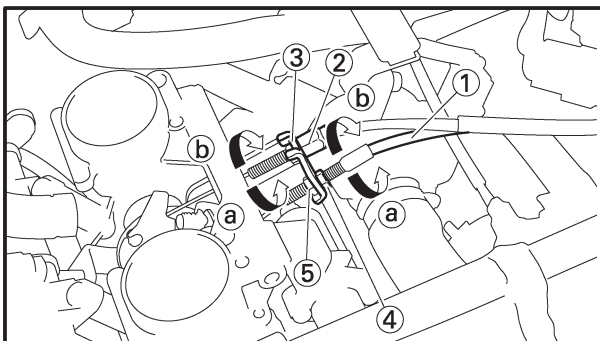
**Throttle cable free play  
(at the flange of the throttle grip)**  
3 ~ 5 mm

#### 1. Check:

- throttle cable free play (a)  
Out of specification → Adjust.

#### 2. Remove:

- fuel tank  
Refer to "FUEL TANK".
- air filter case  
Refer to "AIR FILTER CASE".



#### 3. Adjust:

- throttle cable free play

#### NOTE:

When the throttle is opened, the accelerator cable ① is pulled.

#### Carburetor side

- Loosen the locknut ② on the decelerator cable.
- Turn the adjusting nut ③ in direction (a) or (b) to take up any slack on the decelerator cable.
- Loosen the locknut ④ on the accelerator cable.
- Turn the adjusting nut ⑤ in direction (a) or (b) until the specified throttle cable free play is obtained.

## ADJUSTING THE THROTTLE CABLE FREE PLAY

CHK  
ADJ

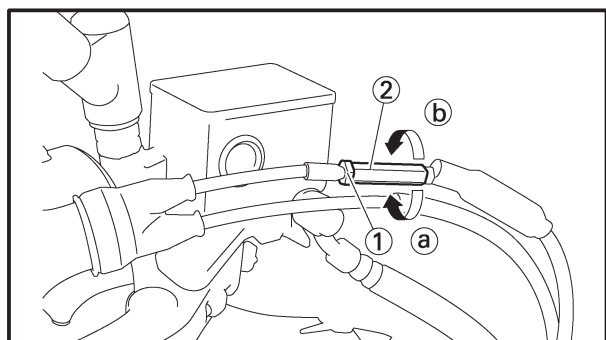


Direction (a)	Throttle cable free play is increased.
Direction (b)	Throttle cable free play is decreased.

e. 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.



**Handlebar side**

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

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

c. Tighten the locknut.

**⚠ WARNING** \_\_\_\_\_

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

4. Install:

- air filter case  
Refer to "AIR FILTER CASE".
- fuel tank  
Refer to "FUEL TANK".

EAS00059

## CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

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

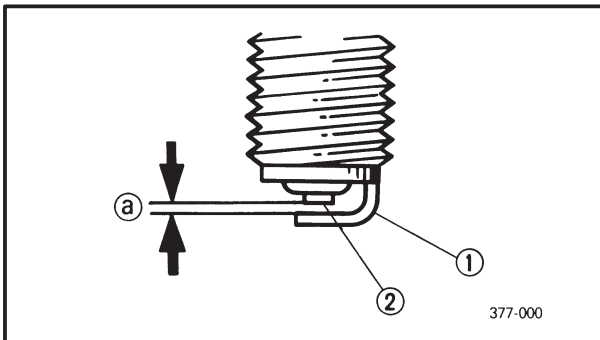
### CAUTION:

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

3. Check:
  - spark plug type  
Incorrect → Replace.



**Spark plug type (manufacturer)**  
**DPR8EA-9 (NGK)**  
**X24EPR-U9 (DENSO)**




4. Check:
  - electrode ①  
Damage/wear → Replace the spark plug.
  - insulator ②  
Abnormal color → Replace the spark plug.  
Normal color is medium-to-light tan.
5. Clean:
  - spark plug  
(with a spark plug cleaner or wire brush)
6. Measure:
  - spark plug gap ③  
(with a wire Thickness gauge)  
Out of specification → Regap.



**Spark plug gap**  
**0.8 ~ 0.9 mm**

7. Install:
  - spark plug

 **18 Nm (1.8 m•kg)**

### NOTE:

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

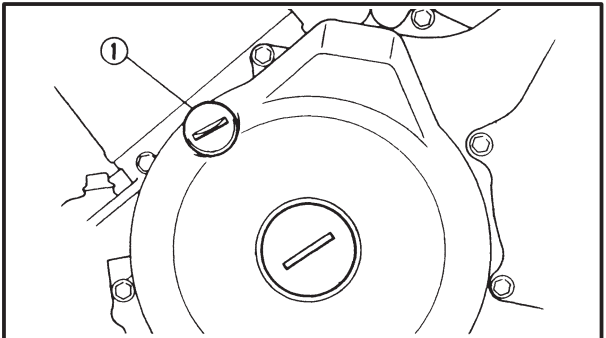
EAS00064

## CHECKING THE IGNITION TIMING

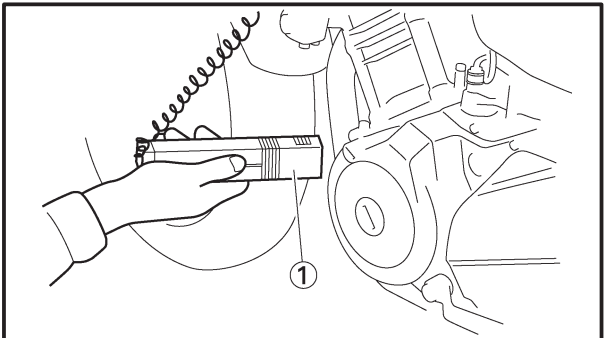
**NOTE:** \_\_\_\_\_

Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure all connections are tight and free of corrosion.

---



- 1. Remove:
  - timing plug ①



- 2. Connect:
  - timing light ①
  - engine tachometer (onto the spark plug lead of cylinder #1)

	<b>Timing light</b> 90890-03141
	<b>Engine tachometer</b> 90890-03113

- 3. Check:
  - ignition timing



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

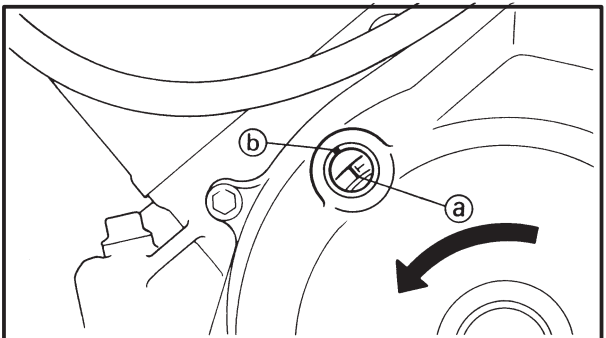
	<b>Engine idling speed</b> 1,100 ~ 1,200 r/min
---	---

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

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

The ignition timing is not adjustable.

---



- 4. Install:
  - timing plug



EAS00065

## MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

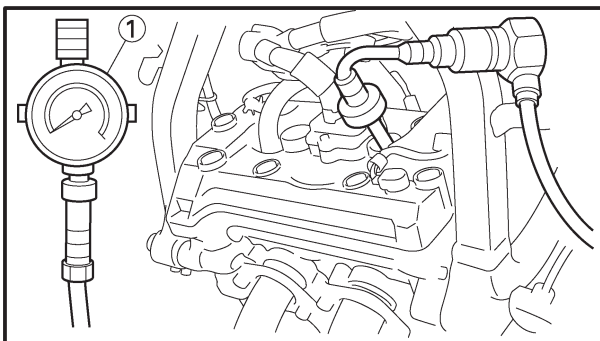
### NOTE:

Insufficient compression pressure will result in a loss of performance.

1. Measure:
  - valve clearance  
Out of specification → Adjust.  
Refer to “ADJUSTING THE VALVE CLEARANCE”.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Disconnect:
  - spark plug cap
4. Remove:
  - spark plug

### CAUTION:

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



5. Install:
  - compression gauge ①



**Compression gauge**  
90890-03081  
**Compression gauge adapter**  
90890-04136

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



**Compression pressure**  
**(at sea level)**  
**Minimum**  
1,305 kPa (13.05 kg/cm<sup>2</sup>,  
13.05 bar)  
**Standard**  
1,500 kPa (15 kg/cm<sup>2</sup>, 15 bar)  
**Maximum**  
1,680 kPa (16.80 kg/cm<sup>2</sup>,  
16.80 bar)

# MEASURING THE COMPRESSION PRESSURE/ CHECKING THE ENGINE OIL LEVEL



- a. Set the main switch to "ON".
- b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

## **WARNING**

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

## **NOTE:**

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm<sup>2</sup>, 1 bar).

- c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.  
Carbon deposits → Eliminate.
- d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.  
Refer to the following table.

<b>Compression pressure (with oil applied into the cylinder)</b>	
<b>Reading</b>	<b>Diagnosis</b>
<b>Higher than without oil</b>	<b>Piston ring(s) wear or damage → Repair.</b>
<b>Same as without oil</b>	<b>Piston, valves, cylinder head gasket or piston possibly defective → Repair.</b>



- 7. Install:
  - spark plug **18 Nm (1.8 m•kg)**

## EAS00069 **CHECKING THE ENGINE OIL LEVEL**

- 1. Stand the motorcycle on a level surface.

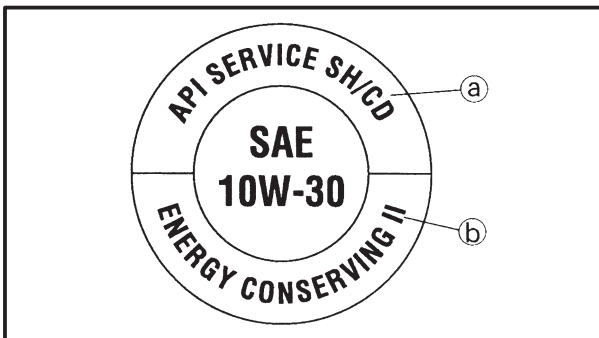
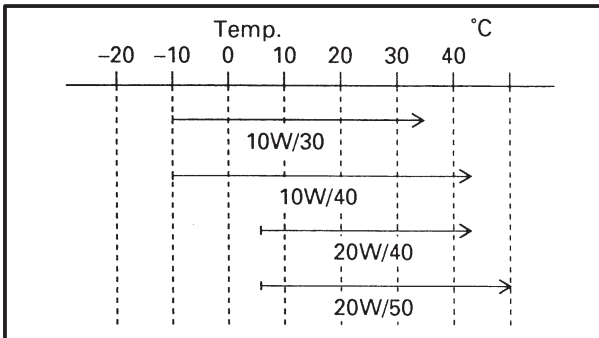
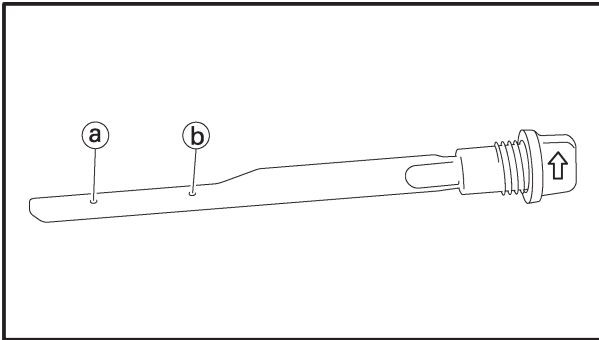
## **NOTE:**

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

- 2. Start the engine, warm it up for 15 minutes, and then turn it off.

## CHECKING THE ENGINE OIL LEVEL

CHK  
ADJ



### 3. Check:

- engine oil level

Wipe the dipstick clean, insert it into the oil filler hole (without screw it in and direct the arrow mark on the cap upward.), and then remove it to check the oil level.

The engine oil level should be between the minimum level mark (a) and maximum level mark (b).

Below the minimum level mark → Add the recommended engine oil to the proper level.



### Recommended 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.

### NOTE:

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

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

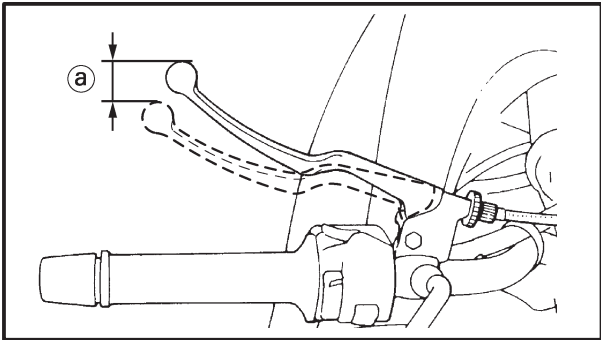
### NOTE:

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





# ADJUSTING THE CLUTCH CABLE FREE PLAY

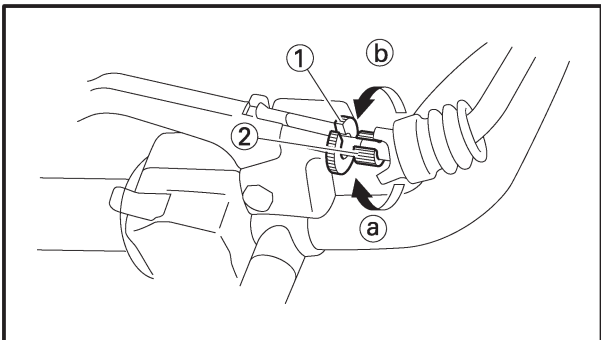


EAS00078

## ADJUSTING THE CLUTCH CABLE FREE PLAY

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

	<b>Clutch cable free play (at the end of the clutch lever)</b> 10 ~ 15 mm
--	--



2. Adjust:
  - clutch cable free play



### Handlebar side

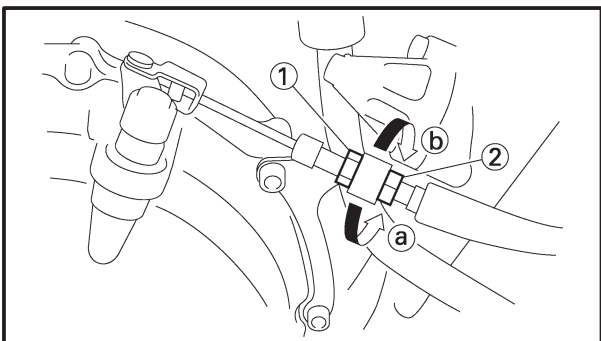
- a. Loosen the locknut (1).
- b. Turn the adjusting bolt (2) in direction (a) or (b) until the specified clutch cable free play is obtained.

Direction (a)	Clutch cable free play is increased.
Direction (b)	Clutch cable free play is decreased.

- c. Tighten the locknut.

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

If the specified clutch cable free play cannot be obtained on the handlebar side of the cable, use the adjusting nut on the engine side.



### Engine side

- a. Loosen the locknuts (1).
- b. Turn the adjusting bolt (2) in direction (a) or (b) until the specified clutch cable free play is obtained.

Direction (a)	Clutch cable free play is increased.
Direction (b)	Clutch cable free play is decreased.

- c. Tighten the locknuts.

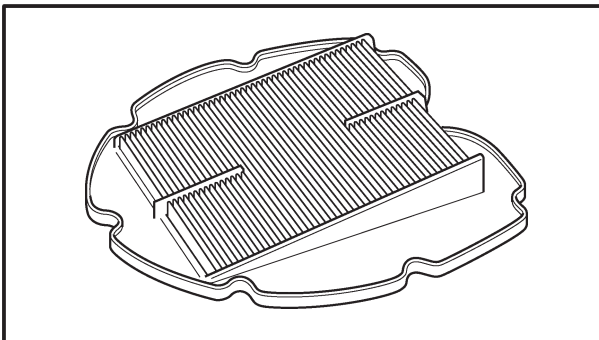




EAS00086

### CHECKING THE AIR FILTER ELEMENT

1. Remove:
  - fuel tank  
Refer to “FUEL TANK”.



2. Remove:
  - air filter case cover
  - air filter element
3. Check:
  - air filter element  
Damage → Replace.

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

Replace the air filter element at periodic intervals of 40,000 km travel.

The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

4. Install:
  - air filter element
  - air filter case cover

**CAUTION:** \_\_\_\_\_

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

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

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

5. Install:
  - fuel tank.

## CHECKING THE FUEL AND VACUUM HOSES/ CHECKING THE CRANKCASE BREATHER HOSE

CHK  
ADJ

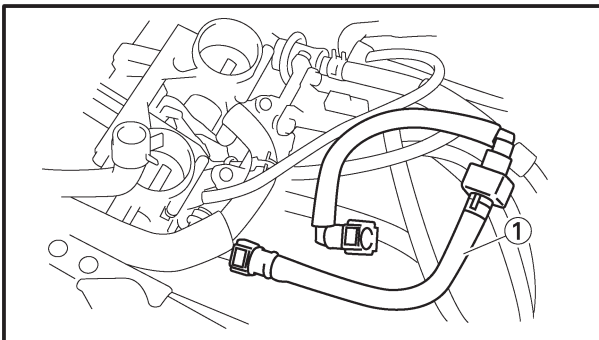


EAS00096

### CHECKING THE FUEL AND VACUUM HOSES

The following procedure applies to all of the fuel and vacuum hoses.

1. Remove:
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.

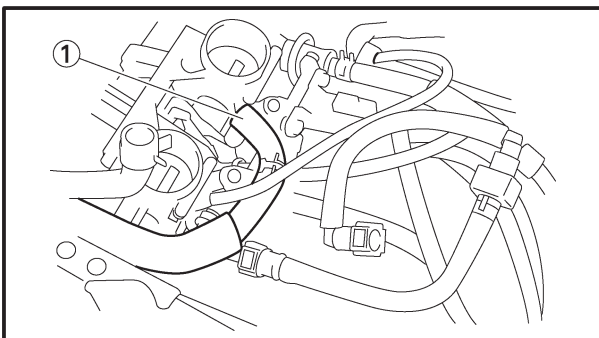


2. Check:
  - fuel hose ①  
Cracks/damage → Replace.  
Loose connection → Connect properly.
3. Install:
  - fuel tank
  - air filter case

EAS00098

### CHECKING THE CRANKCASE BREATHER HOSE

1. Remove:
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.



2. Check:
  - crankcase breather hose ①  
Cracks/damage → Replace.  
Loose connection → Connect properly.

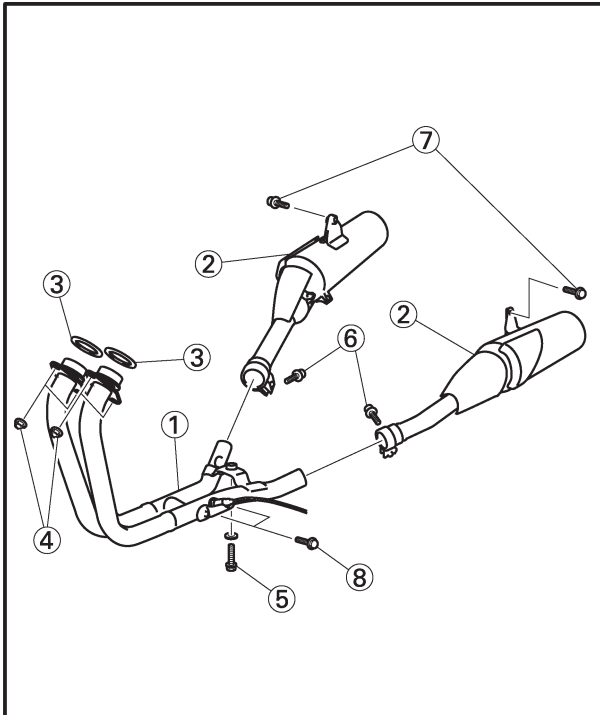
#### CAUTION:

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

3. Install:
  - air filter case
  - fuel tank

## CHECKING THE EXHAUST SYSTEM

CHK  
ADJ



EAS00100

### CHECKING THE EXHAUST SYSTEM

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

1. Check:

- exhaust pipe ①
- muffler ②  
Cracks/damage → Replace.
- gasket ③  
Exhaust gas leaks → Replace.

2. Check:

- tightening torque



Exhaust pipe nut ④

20 Nm (2.0 m•kg)

Exhaust pipe bolt ⑤

24 Nm (2.4 m•kg)

Exhaust pipe and muffler bolt ⑥

20 Nm (2.0 m•kg)

Muffler and muffler bracket bolt ⑦

24 Nm (2.4 m•kg)

O<sub>2</sub> sensor protector bolt ⑧

10 Nm (1.0 m•kg)



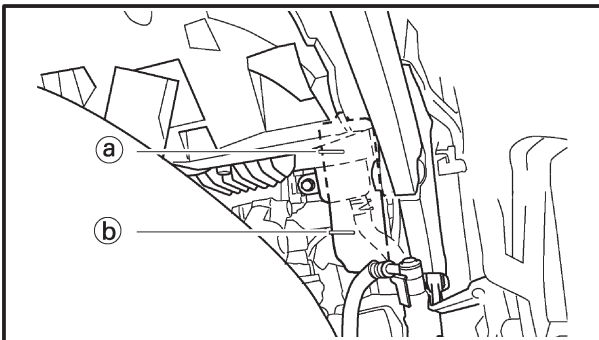
EAS00102

### CHECKING THE COOLANT LEVEL

1. Stand the motorcycle on a level surface.

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

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



2. Remove:

- seat  
Refer to "SEAT".

3. Check:

- coolant level  
The coolant level should be between the maximum level mark (a) and minimum level mark (b).  
Below the minimum level mark → Add the recommended coolant to the proper level.

**CAUTION:** \_\_\_\_\_

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**

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

5. Check:

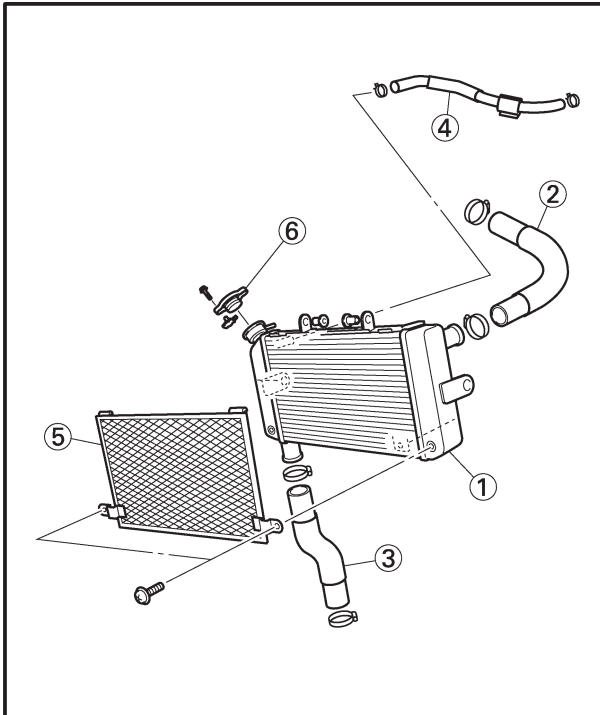
- coolant level

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

Before checking the coolant level, wait a few minutes until it settles.

6. Install:

- seat



EAS00104

### CHECKING THE COOLING SYSTEM

1. Remove:

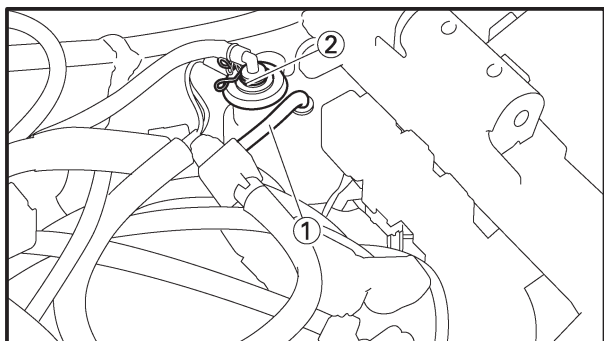
- fuel tank  
Refer to "FUEL TANK".
- air filter case  
Refer to "AIR FILTER CASE".

2. Check:

- radiator ①  
Cracks/damage → Replace.  
Refer to "COOLING SYSTEM" in chapter 6.
- radiator inlet hose ②
- radiator outlet hose ③
- radiator reservoir tank hose ④
- radiator cover ⑤

3. Install:

- fuel tank
- air filter case



EAS00105

## CHANGING THE COOLANT

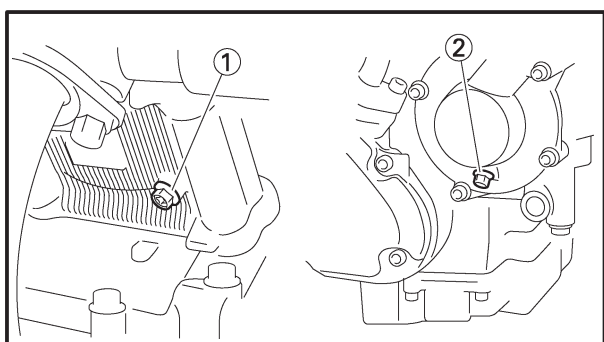
1. Remove:
  - seat  
Refer to "SEAT".
2. Disconnect:
  - coolant reservoir hose ①
3. Drain:
  - coolant  
(from the coolant reservoir tank)
4. Remove:
  - coolant reservoir tank cap ②

### **⚠ WARNING**

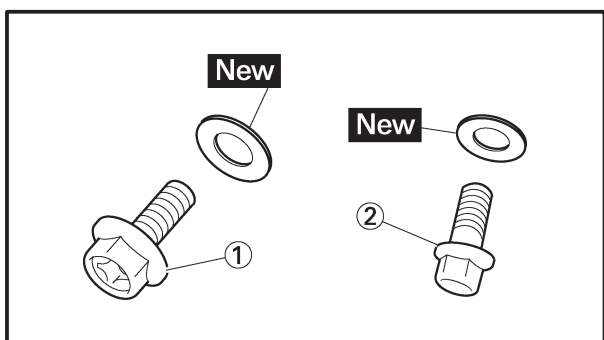
**A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:**

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

The following procedure applies to all of the coolant drain bolts and copper washers.




5. Remove:
  - coolant drain bolt (engine) ①  
(along with the copper washer)
  - coolant drain bolt (water pump) ②  
(along with the copper washer)
6. Drain:
  - coolant  
(from the engine and radiator)



7. Install:
  - coolant drain bolt (engine) ①  
(with new copper washer)  
**10 Nm (1.0 m•kg)**
  - coolant drain bolt (water pump) ②  
(with new copper washer)  
**10 Nm (1.0 m•kg)**



8. Connect:
  - coolant reservoir hose
9. Fill:
  - cooling system  
(with the specified amount of the recommended coolant)

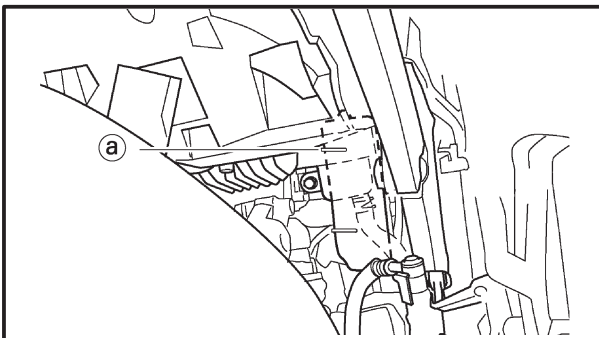
	<p><b>Recommended antifreeze</b>                  High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines</p> <p><b>Mixing ratio</b>                  1:1 (antifreeze:water)</p> <p><b>Quantity</b></p> <p><b>Total amount</b>                  1.7 L</p> <p><b>Coolant reservoir capacity</b>                  0.25 L</p> <p><b>From minimum to maximum level mark</b>                  0.1 L</p>
---	---

### Handling notes for coolant

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

### **WARNING**

- If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.
- If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
- If coolant is swallowed, induce vomiting and get immediate medical attention.
- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant comes into contact with painted surfaces, immediately wash them with water.
- Do not mix different types of antifreeze.



10. Install:
  - radiator cap
11. Fill:
  - coolant reservoir tank  
(with the recommended coolant to the maximum level mark (a))

## CHANGING THE COOLANT

---

CHK  
ADJ



12. Install:
  - coolant reservoir cap
13. Start the engine, warm it up for several minutes, and then stop it.
14. Check:
  - coolant levelRefer to “CHECKING THE COOLANT LEVEL”.

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

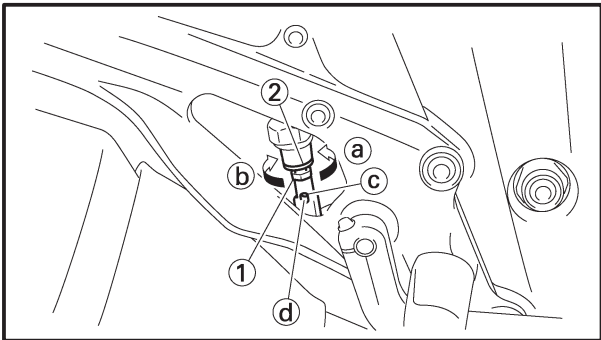
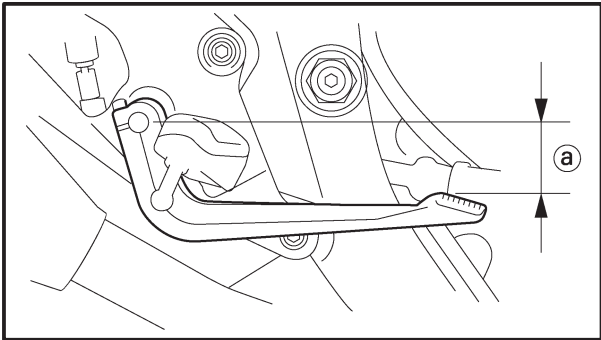
Before checking the coolant level, wait a few minutes until the coolant has settled.

---

15. Install:
  - seat



## ADJUSTING THE REAR BRAKE



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.

	<b>Brake pedal position (below the top of the rider footrest) 32 mm</b>
--	---

2. Adjust:
  - brake pedal position



- a. Loosen the locknut ①.
- b. 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 ⑤ is visible through the hole ⑥.

- c. Tighten the locknut ① to specification.

	<b>Locknut 10 Nm (1.0 m•kg)</b>
--	-------------------------------------

#### **⚠ 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, check and, if necessary, bleed the brake system.

#### **CAUTION:**

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



## ADJUSTING THE REAR BRAKE/ CHECKING THE BRAKE FLUID LEVEL

CHK  
ADJ



- Adjust:
  - rear brake light switchRefer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH”.

EAS00115

### CHECKING THE BRAKE FLUID LEVEL

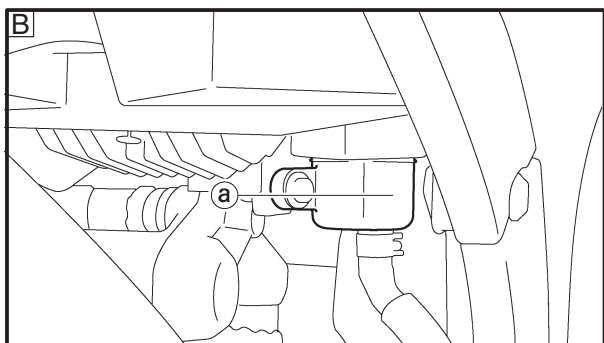
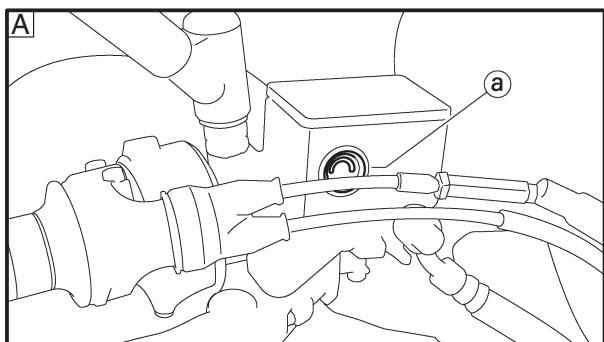
- Stand the motorcycle on a level surface.

#### NOTE:

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

- 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 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.

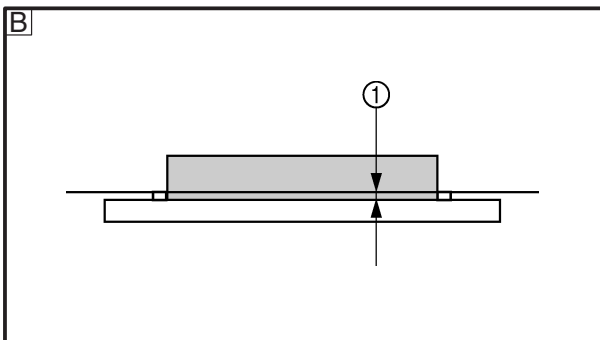
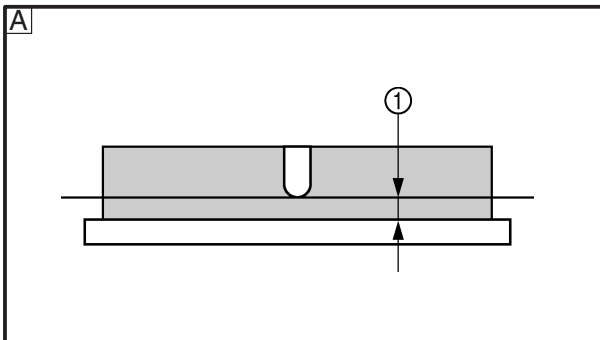
## CHECKING THE BRAKE FLUID LEVEL/ CHECKING THE FRONT AND REAR BRAKE PADS

CHK  
ADJ



### NOTE:

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



EAS00122

### CHECKING THE FRONT AND REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.

2. Check:

- front brake pad
- rear brake pad

Wear indicator groove ① almost disappeared → Replace the brake pads as a set. Refer to “REPLACING THE FRONT BRAKE PADS” and “REPLACING THE REAR BRAKE PADS” in chapter 4.

**A** Front brake

**B** Rear brake

## ADJUSTING THE REAR BRAKE LIGHT SWITCH/ CHECKING THE FRONT AND REAR BRAKE HOSES

CHK  
ADJ



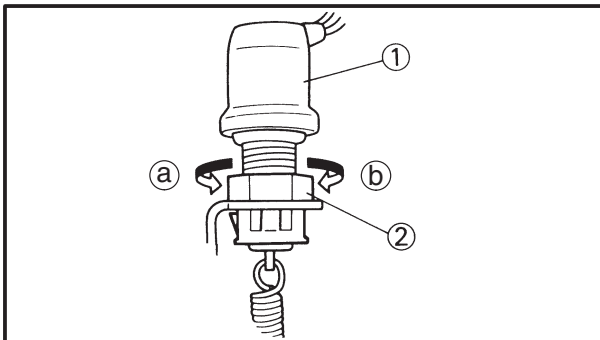
EAS00128

### ADJUSTING THE REAR BRAKE LIGHT SWITCH

#### NOTE:

The rear brake light switch is operated by movement of the brake pedal.

The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.



#### 1. Check:

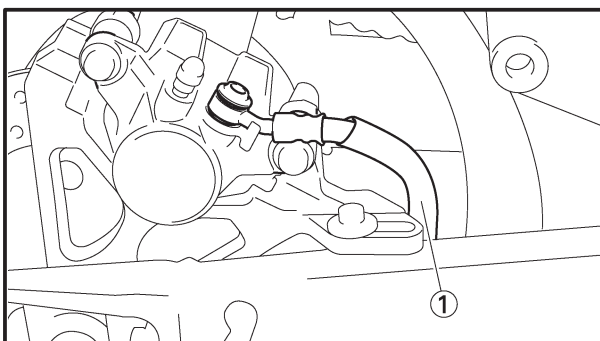
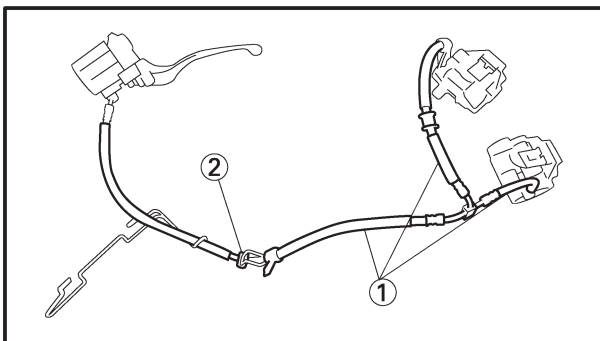
- rear brake light operation timing  
Incorrect → Adjust.

#### 2. Adjust:

- rear brake light operation timing

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

Direction (a)	Brake light comes on sooner.
Direction (b)	Brake light comes on later.



EAS00131

### CHECKING THE FRONT AND REAR BRAKE HOSES

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

#### 1. Check:

- brake hoses (1)

Cracks/damage/wear → Replace.

Activate the brake lever or pedal several time.

Brake fluid leakage → Replace the damaged hose.

Refer to "FRONT AND REAR BRAKES" in chapter 4.

#### 2. Check:

- brake hose clamp (2)

Loose → Tighten the clamp bolt.

- Hold the motorcycle upright and apply the brake several times.

EAS00134

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

### **⚠ WARNING**

Bleed the hydraulic brake system whenever:

- the system is disassembled.
- a brake hose is loosened, disconnected or replaced.
- the brake fluid level is very low.
- brake operation is faulty.

### NOTE:

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

1. Bleed:
  - hydraulic brake system



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

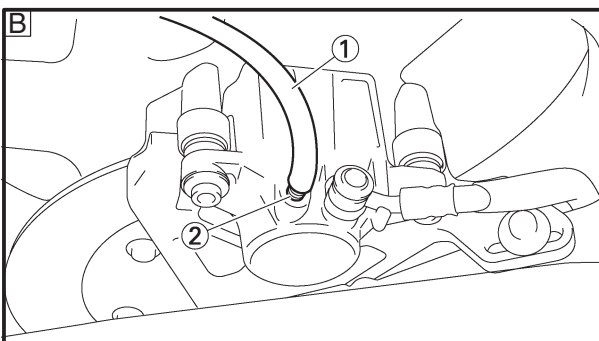
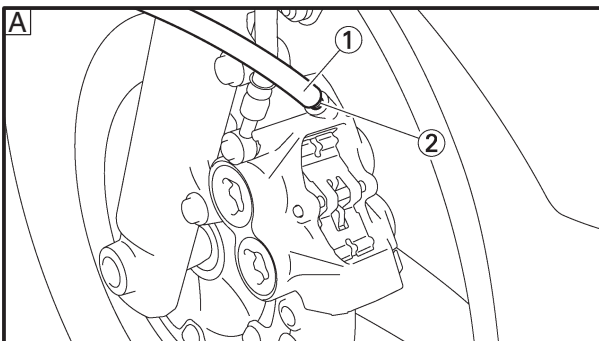
**A** Front

**B** Rear

- d. Place the other end of the hose into a container.
- e. Slowly apply the brake several times.
- f. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
- g. Loosen the bleed screw.

### NOTE:

Loosening the bleed screw will release the pressure and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.



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

CHK  
ADJ



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

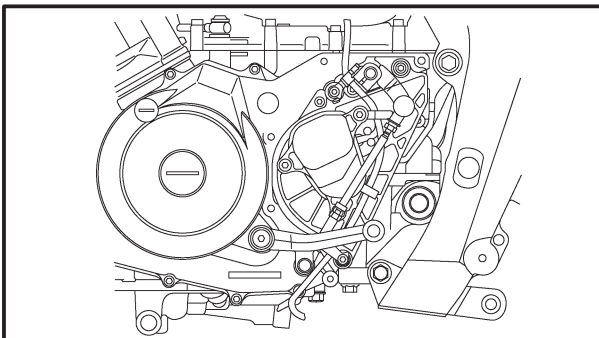


**Bleed screw**  
**6 Nm (0.6 m•kg)**

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

### ⚠ WARNING

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



EAS00137

### ADJUSTING THE SHIFT PEDAL

#### NOTE:

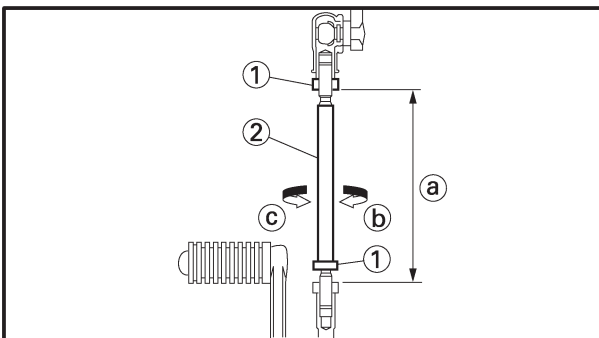
The shift pedal position is determined by the installed shift rod length (a).

1. Measure:
  - installed shift rod length (a)
 Incorrect → Adjust.



**Installed shift rod length**  
**94 mm**

2. Adjust:
  - installed shift rod length (a)
  - a. Loosen both locknuts (1).
  - b. Turn the shift rod (2) in direction (b) or (c) to obtain the correct shift pedal position.



Direction (b)	Installed shift rod length increases.
Direction (c)	Installed shift rod length decreases.

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



EAS00140

## ADJUSTING THE DRIVE CHAIN SLACK

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

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

**CAUTION:** \_\_\_\_\_

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

1. Stand the motorcycle on a level surface.

**⚠ WARNING** \_\_\_\_\_

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

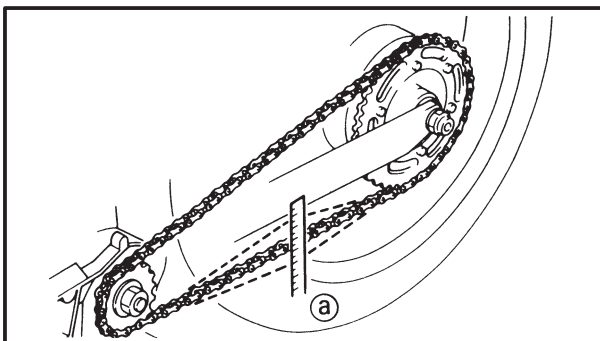
**NOTE:** \_\_\_\_\_

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

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

3. Check:

- drive chain slack (a)  
Out of specification → Adjust.



	<b>Drive chain slack</b> 50 ~ 60 mm
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EAS00146

### CHECKING AND ADJUSTING THE STEERING HEAD

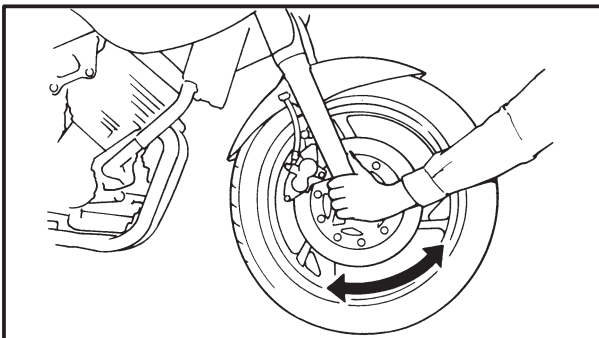
1. Stand the motorcycle on a level surface.

#### **⚠ 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.

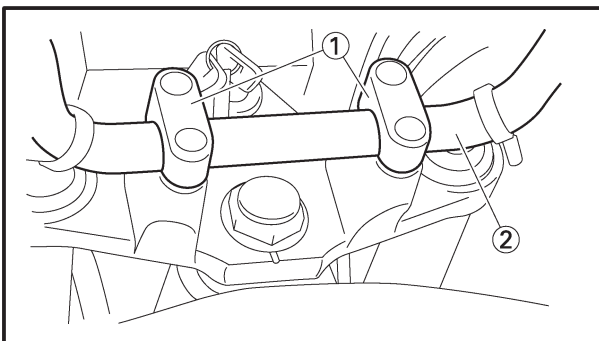


2. Check:

- steering head

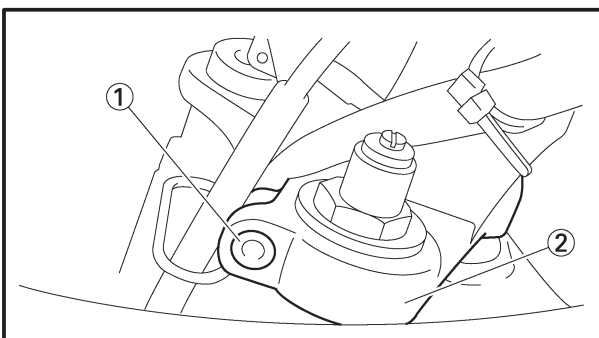
Grasp the bottom of the front fork legs and gently rock the front fork.

Binding/looseness → Adjust the steering head.



3. Remove:

- handlebar holder ①
- handlebar ②



4. Loosen:

- upper bracket pinch bolts ①

5. Remove:

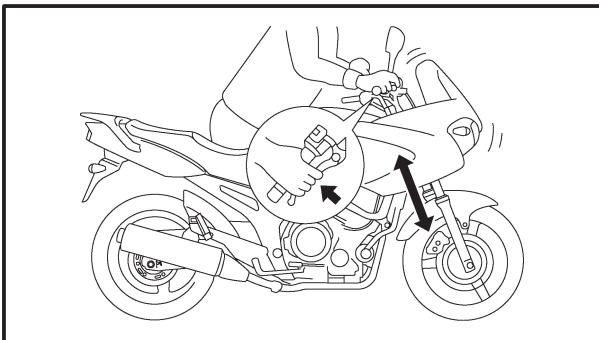
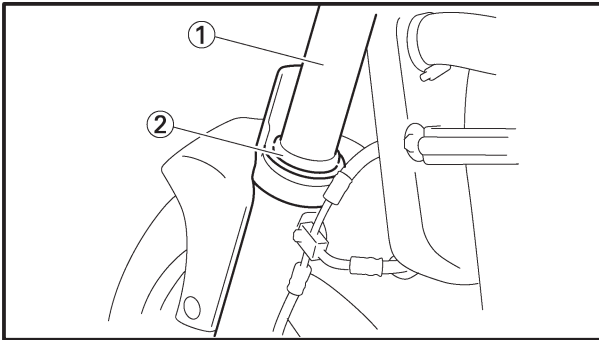
- steering stem nut
- upper bracket ②





## CHECKING THE FRONT FORK/ ADJUSTING THE FRONT FORK LEGS

CHK  
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 ①  
Damage/scratches → Replace.
- oil seal ②  
Oil leakage → Replace.

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

4. Check:

- front fork operation  
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.  
Rough movement → Repair.  
Refer to "FRONT FORK" in chapter 4.

EAS00154

### ADJUSTING THE FRONT FORK LEGS

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

#### **⚠ WARNING**

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

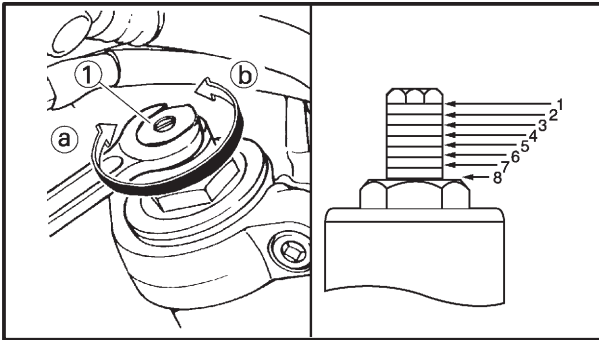
#### Spring preload

#### **CAUTION:**

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

## ADJUSTING THE FRONT FORK LEGS

CHK  
ADJ



1. Adjust:
  - spring preload
- a. Turn the adjusting bolt (1) in direction (a) or (b).

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

### Adjusting positions

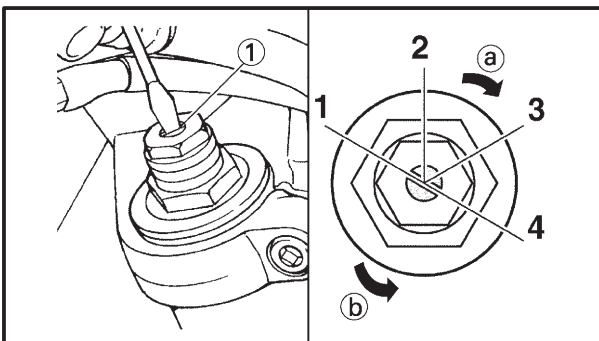
Minimum: 8  
Standard: 7  
Maximum: 1

### Rebound damping

#### CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
  - rebound damping
- a. Turn the adjusting screw (1) in direction (a) or (b).



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

### Adjusting positions

Minimum: 1  
Standard: 2  
Maximum: 4



EAS00158

**ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY**

**⚠ WARNING**

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

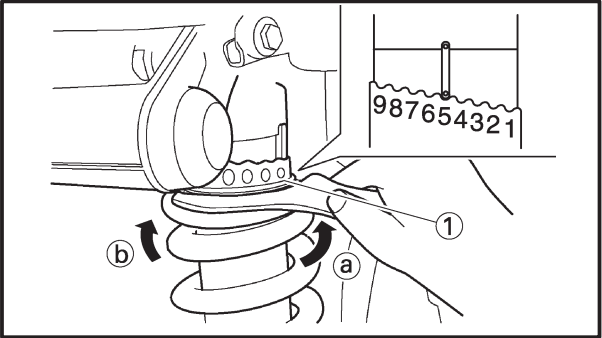
**Spring preload**

**CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
  - spring preload

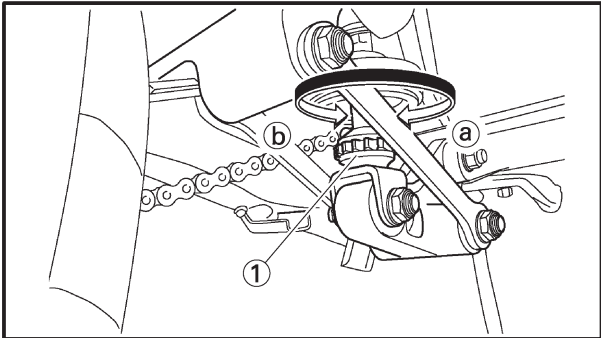
- a. Turn the adjusting ring ① in direction ① or ②.
- b. Align the desired position on the adjusting ring with the stopper ③.



<b>Direction ①</b>	<b>Spring preload is increased (suspension is harder).</b>
<b>Direction ②</b>	<b>Spring preload is decreased (suspension is softer).</b>

<b>Adjusting positions</b>
<b>Minimum: 1</b>
<b>Standard: 5</b>
<b>Maximum: 9</b>

# ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY



## Rebound damping

**CAUTION:** \_\_\_\_\_

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
  - rebound damping



- Turn the adjusting knob (1) in direction (a) or (b).

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

**Adjusting positions**  
 Minimum: 20 clicks out\*  
 Standard: 12 clicks out\*  
 Maximum: 3 clicks out\*  
 \* from the fully turned-in position



## Compression damping

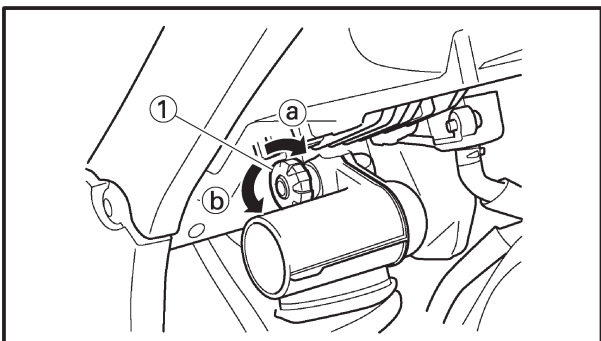
**CAUTION:** \_\_\_\_\_

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
  - compression damping



- Turn the adjusting screw (1) in direction (a) or (b).



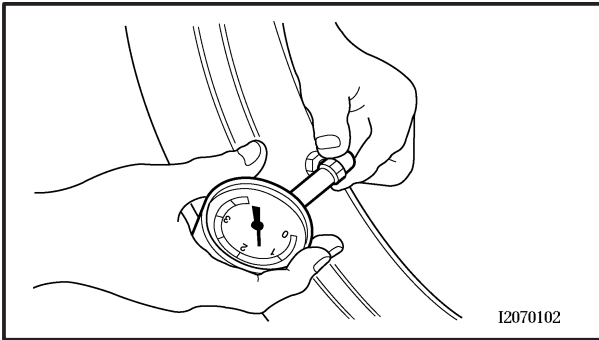
Direction (a)	Compression damping is increased (suspension is harder).
Direction (b)	Compression damping is decreased (suspension is softer).

**Adjusting positions**  
 Minimum: 12 clicks out\*  
 Standard: 11 clicks out\*  
 Maximum: 1 clicks out\*  
 \* from the fully turned-in position



## CHECKING THE TIRES

CHK  
ADJ



EAS00166

### CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Check:
  - tire pressure
  - Out of specification → Regulate.

#### **⚠ WARNING**

- The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
- The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
- Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.

**NEVER OVERLOAD THE MOTORCYCLE.**

Basic weight (with oil and a full fuel tank)	221 kg	
Maximum load*	371 kg	
Cold tire pressure	Front	Rear
Up to 90 kg load*	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)
90 kg ~ maximum load*	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	290 kPa (2.9 kgf/cm <sup>2</sup> , 2.9 bar)
High-speed riding	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)	250 kPa (2.5 kgf/cm <sup>2</sup> , 2.5 bar)

\* Total weight of rider, passenger, cargo and accessories

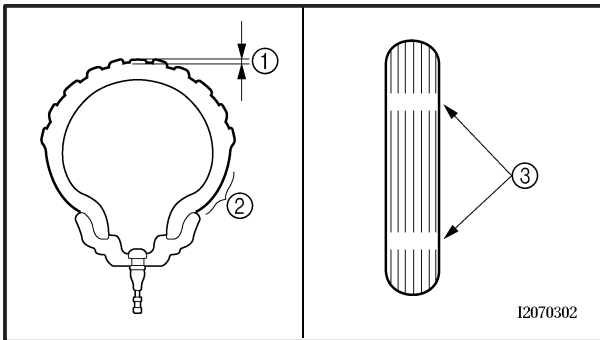
#### **⚠ WARNING**

**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.

## CHECKING THE TIRES

CHK  
ADJ

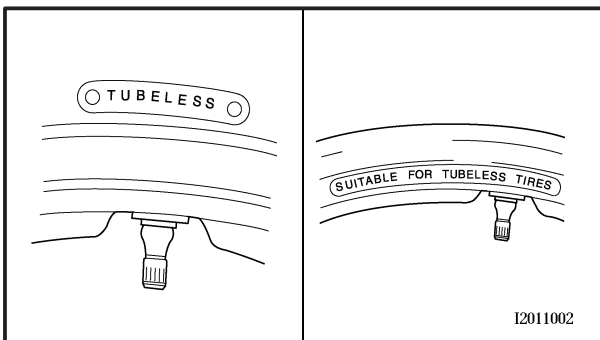


Minimum tire tread depth  
1.6 mm

- ① Tire tread depth
- ② Sidewall
- ③ Wear indicator

### ⚠ WARNING

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



- A Tire
- B Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

### ⚠ WARNING

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

## CHECKING THE TIRES/ CHECKING THE WHEELS

CHK  
ADJ



### Front tire

Manufacturer	Size	Model
DUNLOP	120/70ZR18 M/C (59W)	D220FSTJ
METZELER	120/70ZR18 M/C (59W)	MEZ4J Front
BRIDGE- STONE	120/70ZR18 M/C (59W)	BT020F
PIRELLI	120/70ZR18 M/C (59W)	MTR23 DRAGON GTS Front

### Rear tire

Manufacturer	Size	Model
DUNLOP	160/60ZR17 M/C (69W)	D220STJ
METZELER	160/60ZR17 M/C (69W)	MEZ4J
BRIDGE- STONE	160/60ZR17 M/C (69W)	BT020R
PIRELLI	160/60ZR17 M/C (69W)	MTR24 DRAGON GTS

EAS00168

### CHECKING THE WHEELS

The following procedure applies to both of the wheels.

1. Check:

- wheel

Damage/out-of-round → Replace.

Refer to “CHECKING THE FRONT WHEEL”  
in chapter 4.

### **WARNING**

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

### **NOTE:**

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



EAS00170

### CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the inner and outer cables.

#### **WARNING**

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

1. Check:
  - outer cable  
Damage → Replace.
2. Check:
  - cable operation  
Rough movement → Lubricate.



**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 lubricating device.

EAS00171

### LUBRICATING THE LEVERS AND PEDALS

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



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

EAS00172

### LUBRICATING THE SIDESTAND

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



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

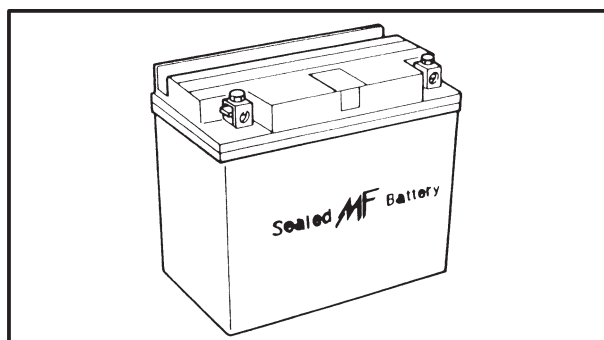
EAS00174

### LUBRICATING THE REAR SUSPENSION

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



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



EAS00178

### 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.

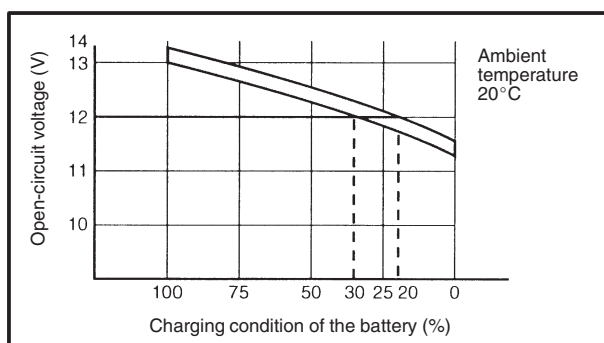
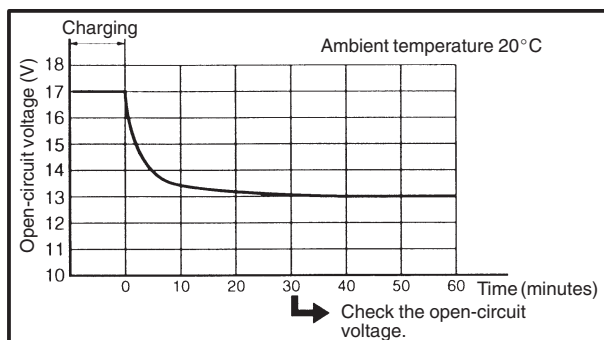
#### **CAUTION:**

- This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.



## CHECKING AND CHARGING THE BATTERY

CHK  
ADJ



### 5. Charge:

- battery (refer to the appropriate charging method illustration)

### ⚠ WARNING

Do not quick charge a battery.

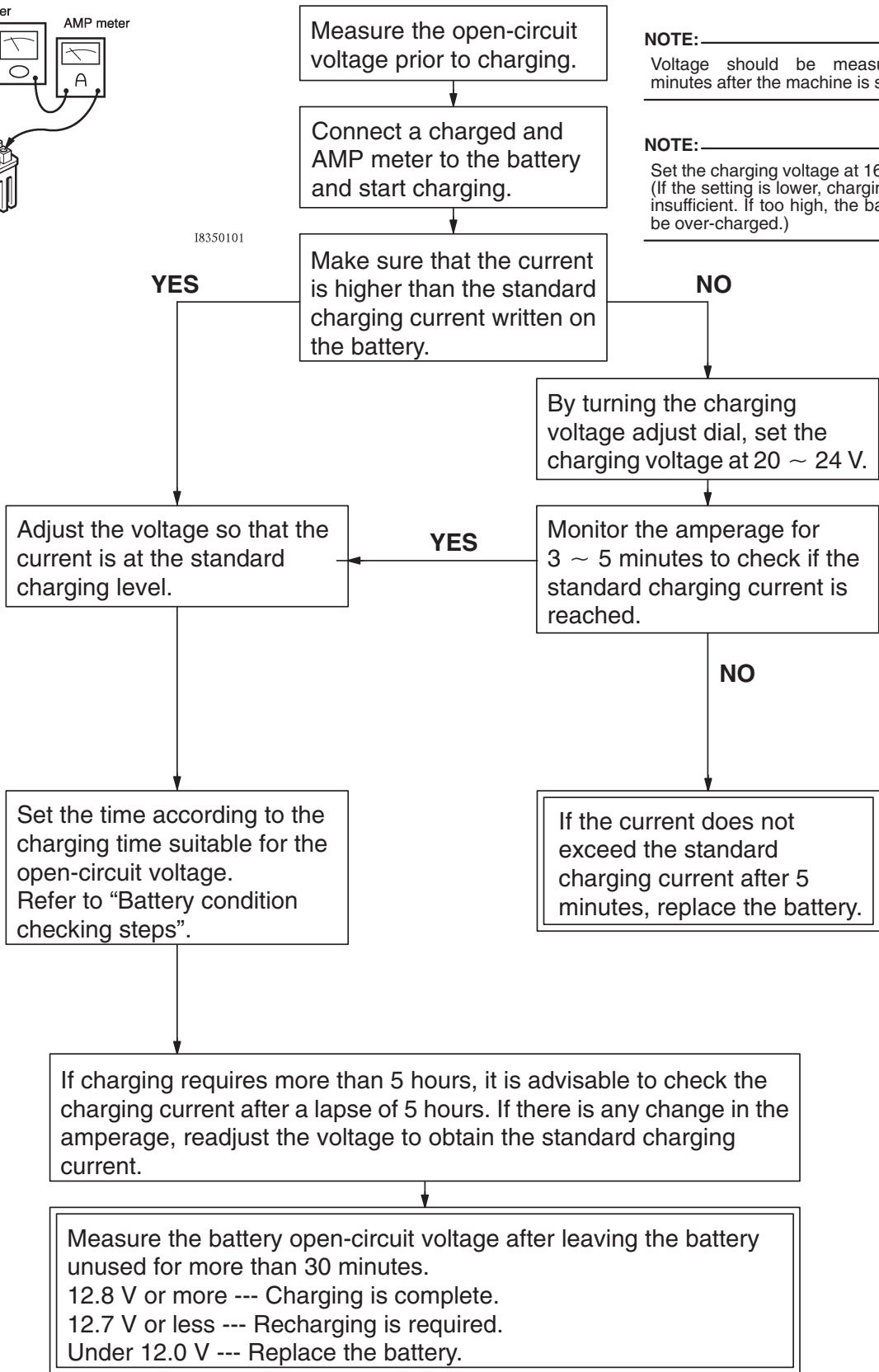
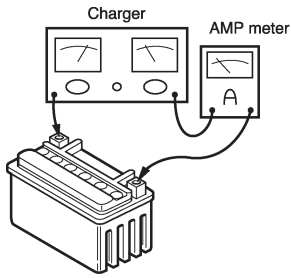
### CAUTION:

- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative battery lead from the battery terminal.)
- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

# CHECKING AND CHARGING THE BATTERY



## Charging method using a variable voltage charger



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

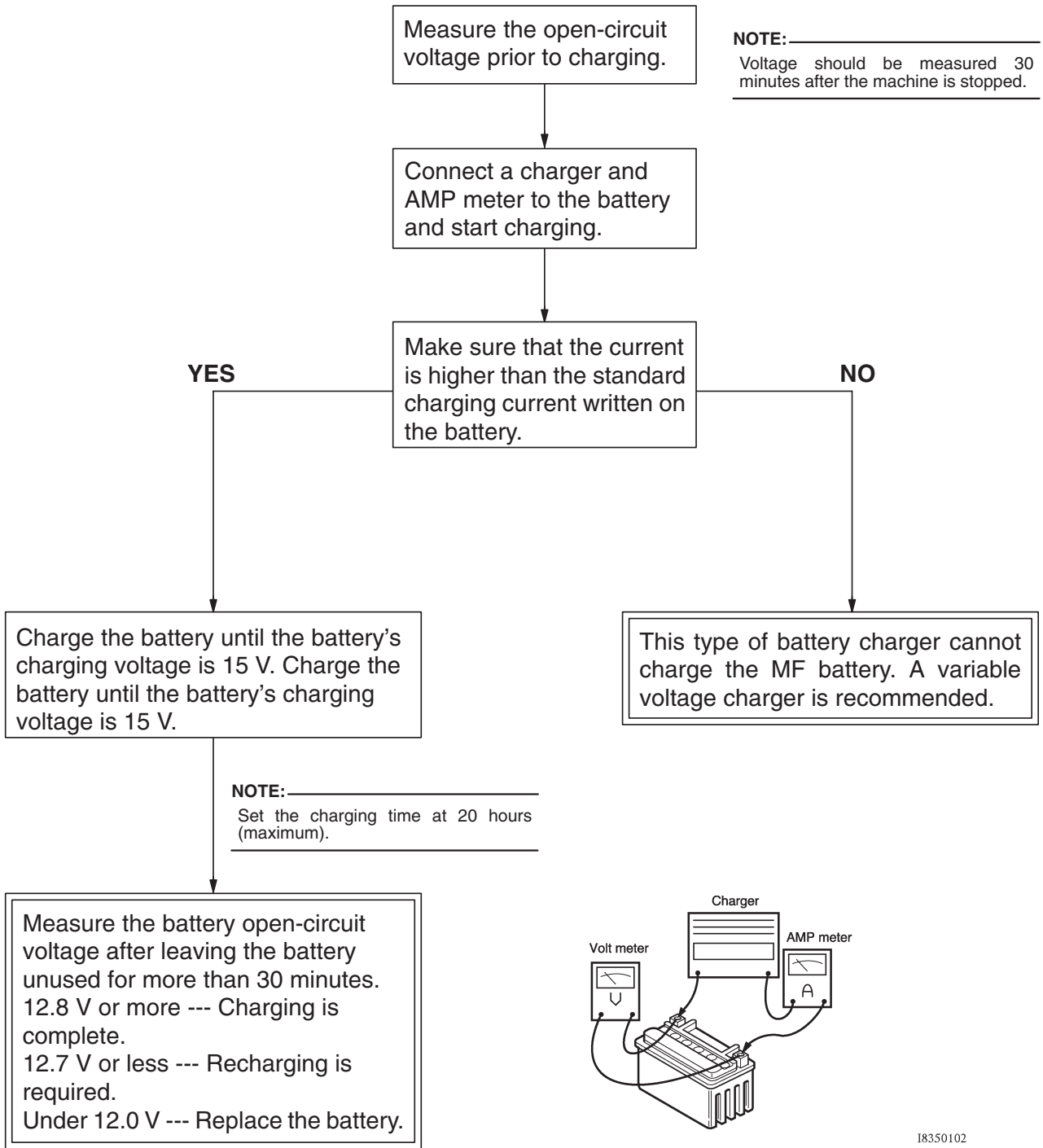
**NOTE:** \_\_\_\_\_  
Set the charging voltage at 16 ~ 17 V. (If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.)

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# CHECKING AND CHARGING THE BATTERY



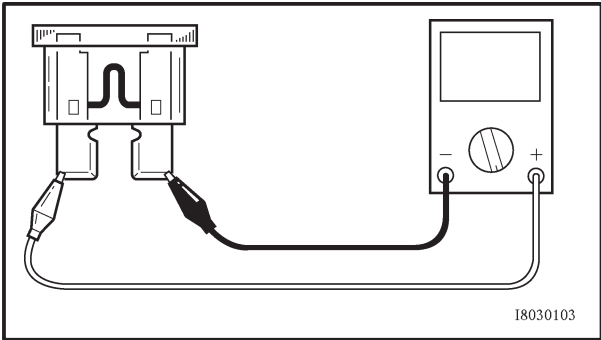
## Charging method using a constant voltage charger



18350102



## CHECKING THE FUSES



	<b>Pocket tester</b> 90890-03132
---	-------------------------------------

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



3. Replace:

- blown fuse



- a. Set the main switch to “OFF”.
- b. Install a new fuse of the correct amperage rating.
- c. Set on the switches to verify if the electrical circuit is operational.
- d. If the fuse immediately blows again, check the electrical circuit.



Fuses	Amperage rating	Q'ty
Main	40A	1
Fuel injection system	15A	1
Headlight	15A	1
Signaling system	7.5A (EUR) 10A (OCE)	1
Ignition	10A	1
Radiator fan motor	20A	1
Hazard light	10A	1
Parking light	5A	1
Backup	5A	1
Reserve	20, 15, 10, 7.5 (EUR), 5A	1

### **WARNING**

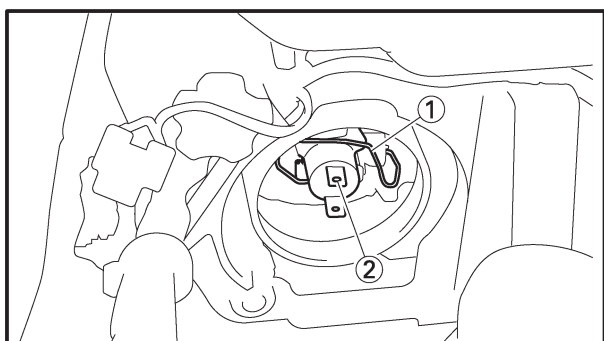
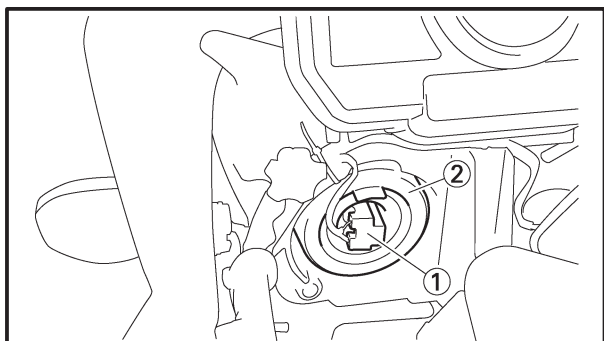
Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

4. Install:

- seat

## REPLACING THE HEADLIGHT BULBS

CHK  
ADJ



EAS00183

### REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

1. Disconnect:
  - headlight coupler ①
2. Remove:
  - headlight bulb holder cover ②
3. Remove:
  - headlight bulb holder ①
4. Remove:
  - headlight bulb ②

#### **⚠ WARNING**

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

5. Install:
  - headlight bulb **New**  
Secure the new headlight bulb with the headlight bulb holder.

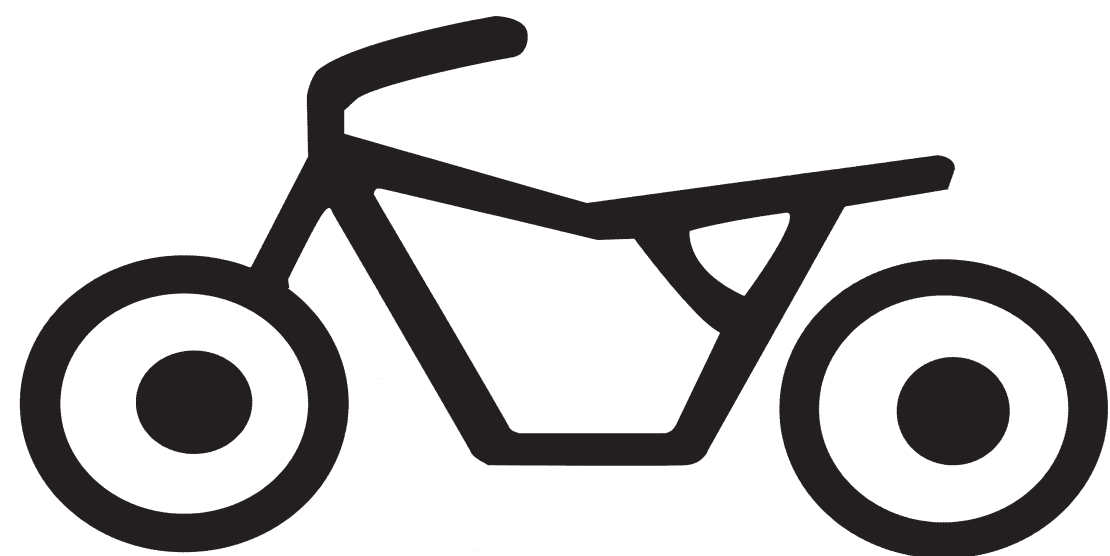
#### **CAUTION:**

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Install:
  - headlight bulb holder
7. Install:
  - headlight bulb holder cover
8. Connect:
  - headlight coupler







**CHAS**

**4**

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## CHAPTER 4 CHASSIS

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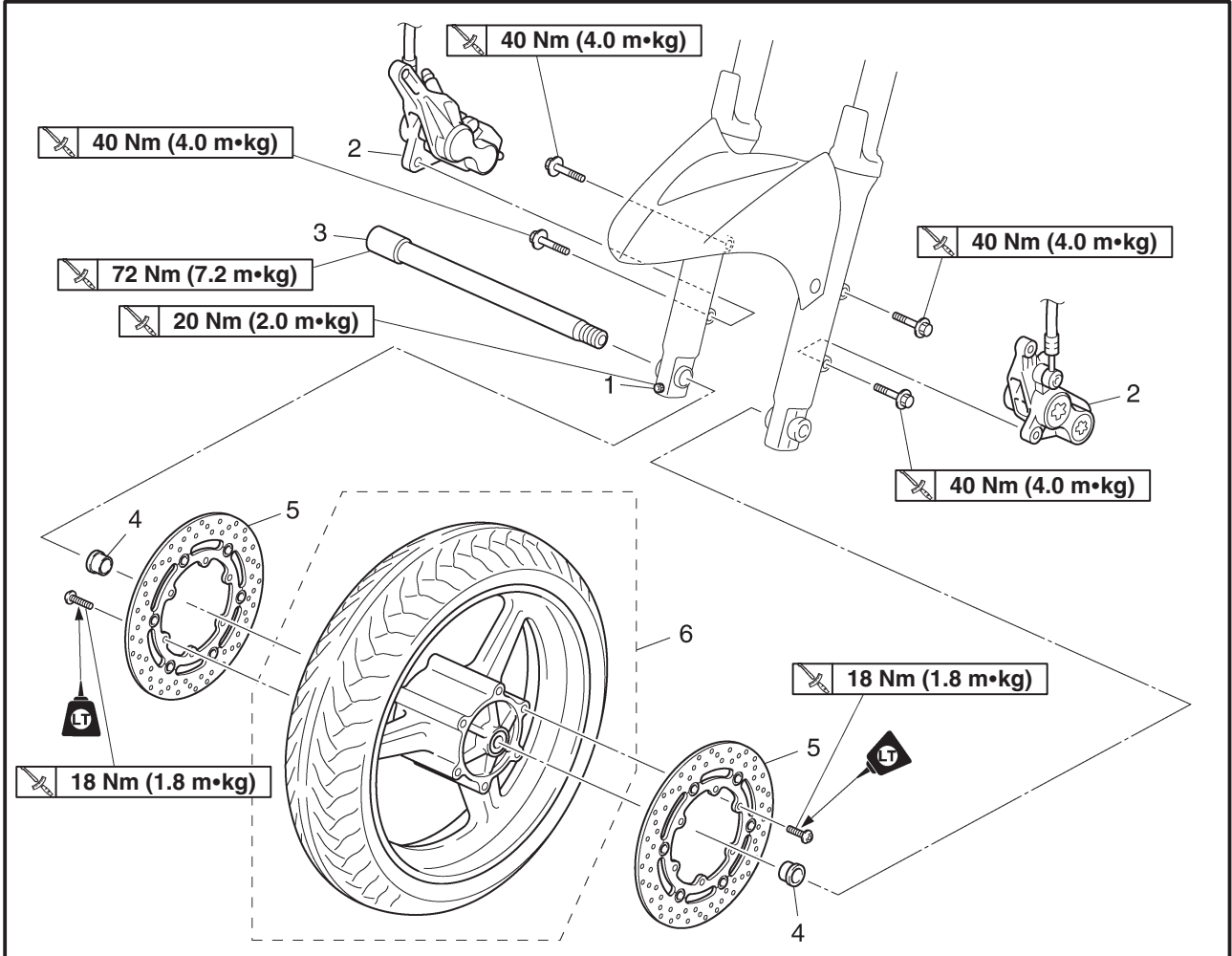
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EAS00514

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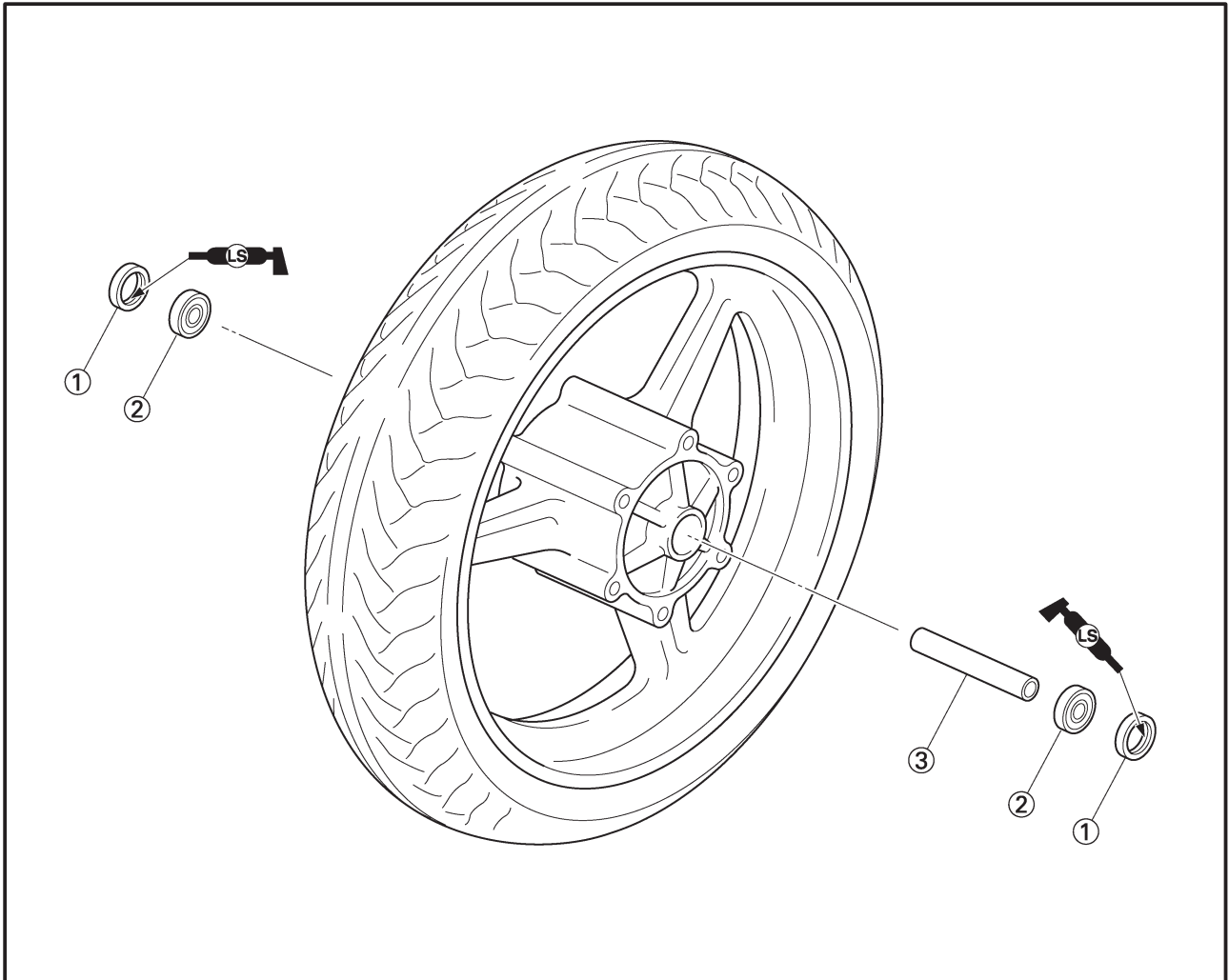
FRONT WHEEL AND BRAKE DISCS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front wheel and brake discs</b>		Remove the parts in the order listed.
			<b>NOTE:</b> _____ Place the motorcycle on a suitable stand so that the front wheel is elevated.
1	Wheel axle pinch bolt	1	Loosen.
2	Brake caliper	2	
3	Front wheel axle	1	
4	Collar	2	
5	Brake disc	2	
6	Front wheel	1	
			For installation, reverse the removal procedure.

EAS00518

FRONT WHEEL



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front wheel</b>		Disassembly the parts in the order listed.
①	Oil seal	2	
②	Bearing	2	
③	Collar	1	
			For assembly, reverse the disassembly procedure.



EAS00521

### 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:

- left brake caliper
- right brake caliper

#### **NOTE:**

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

3. Loosen:

- wheel axle pinch bolt
- front wheel axle

4. Elevate:

- front wheel

#### **NOTE:**

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

5. Remove:

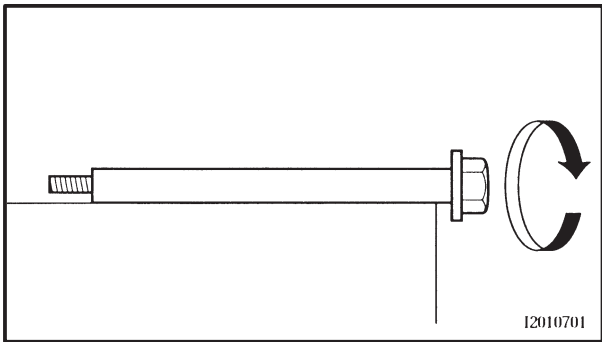
- front wheel axle

6. Remove:

- front wheel

7. Remove:

- collars



EAS00525

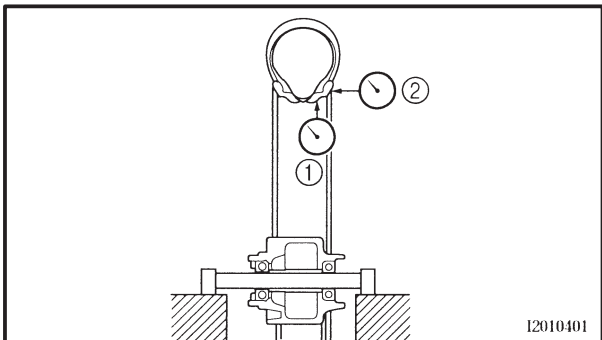
## CHECKING THE FRONT WHEEL

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  
Refer to “CHECKING THE TIRES” in chapter 3.
  - front wheel  
Damage/wear → Replace.

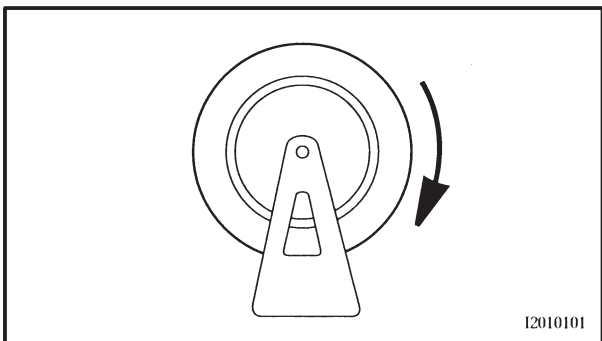


3. Measure:
  - radial wheel runout ①
  - lateral wheel runout ②

Over the specified limits → Replace.



**Radial wheel runout limit  
1 mm  
Lateral wheel runout limit  
0.5 mm**



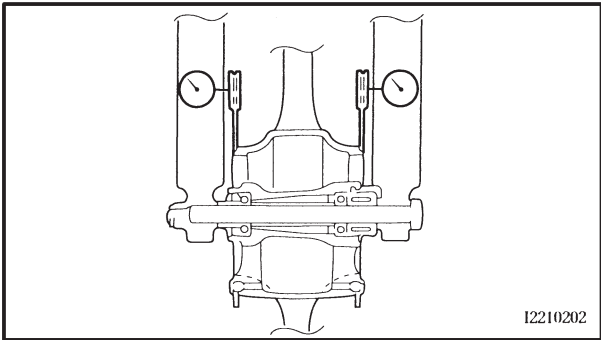
4. Check:
  - wheel bearings  
Front wheel turns roughly or is loose  
→ Replace the wheel bearings.  
Refer to “DISASSEMBLING THE FRONT WHEEL” and “ASSEMBLING THE FRONT WHEEL”.

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  
Out of specification → Correct the brake disc deflection or replace the brake disc.

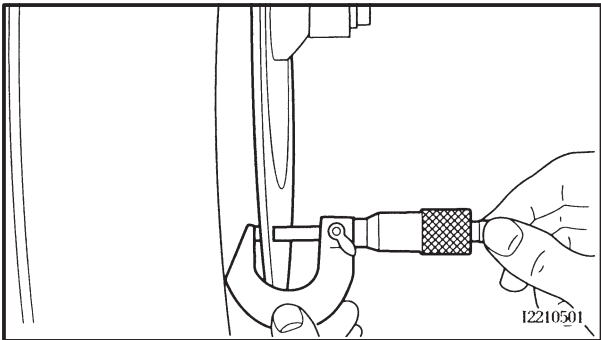


### Brake disc deflection limit (maximum)

Front: 0.1 mm  
Rear: 0.1 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.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 2 ~ 3 mm below the edge of the brake disc.

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



### Brake disc thickness limit (minimum)

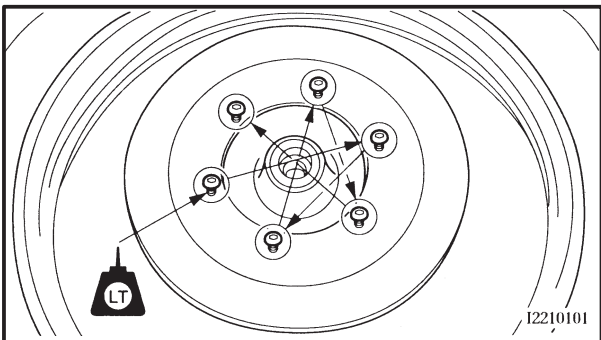
Front: 4.5 mm  
Rear: 4.5 mm

4. Adjust:
  - brake disc deflection

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

### NOTE:

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



### Brake disc bolt

Front  
18 Nm (1.8 m•kg) LOCTITE®  
Rear  
20 Nm (2.0 m•kg) LOCTITE®



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



EAS00549

**ADJUSTING THE FRONT WHEEL STATIC BALANCE**

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

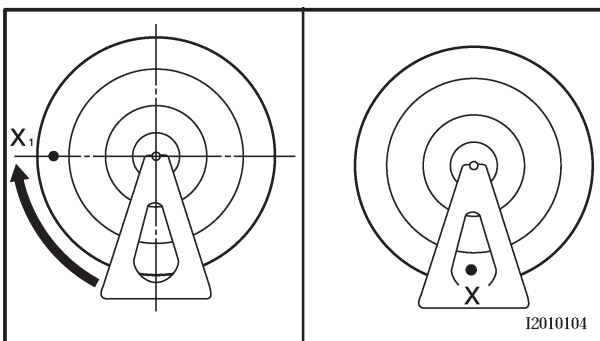
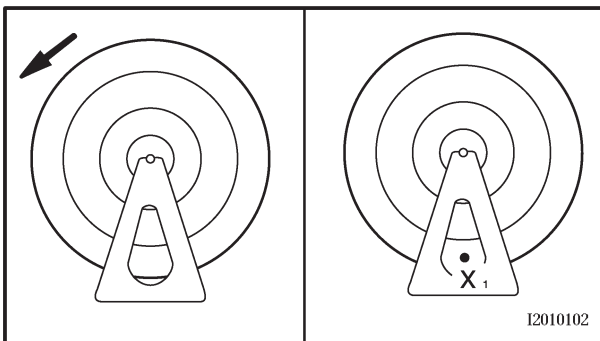
- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake discs installed.



- 1. Remove:
  - balancing weight(s)
- 2. Find:
  - front wheel’s heavy spot

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

Place the front wheel on a suitable balancing stand.



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





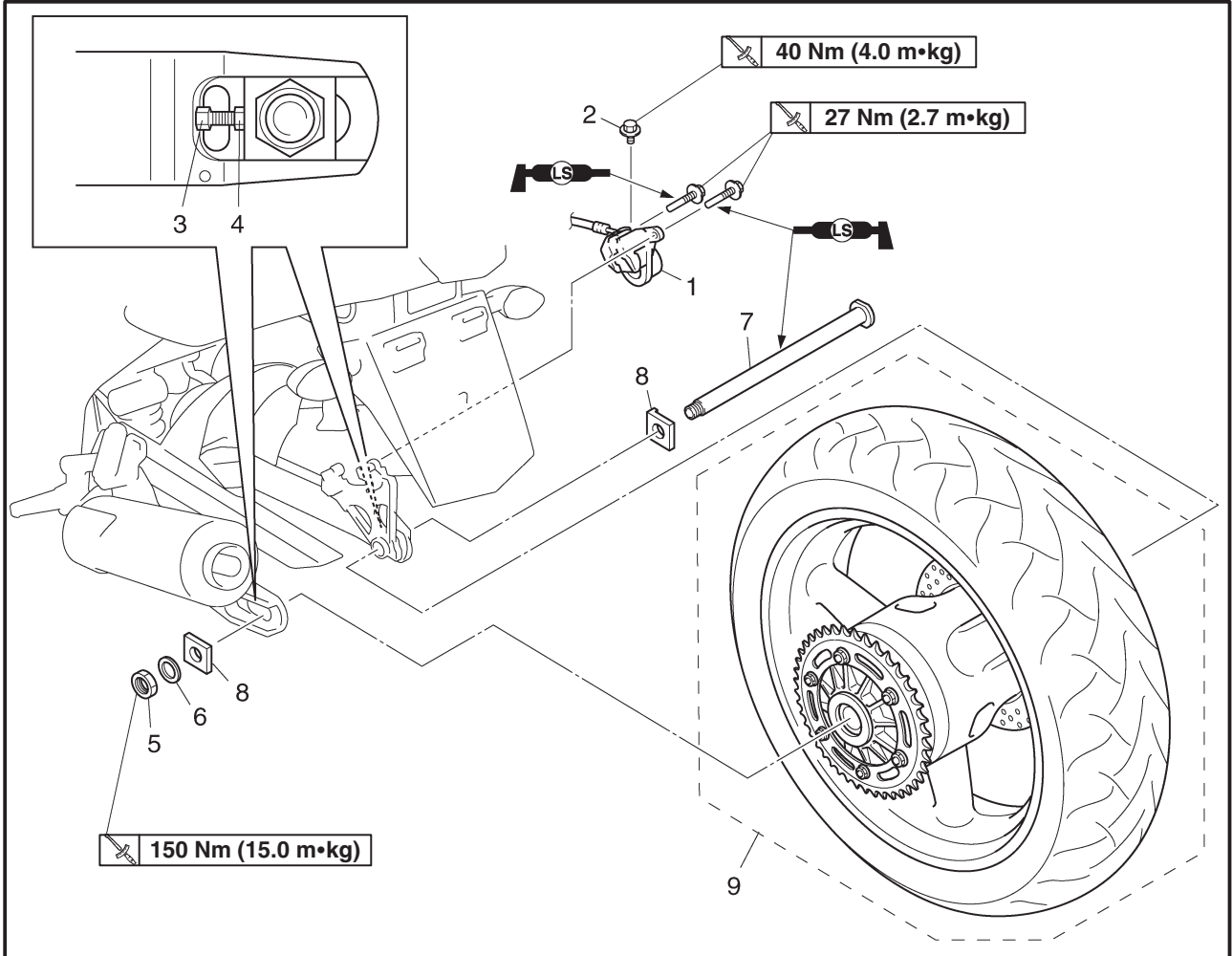


# REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET



EAS00550

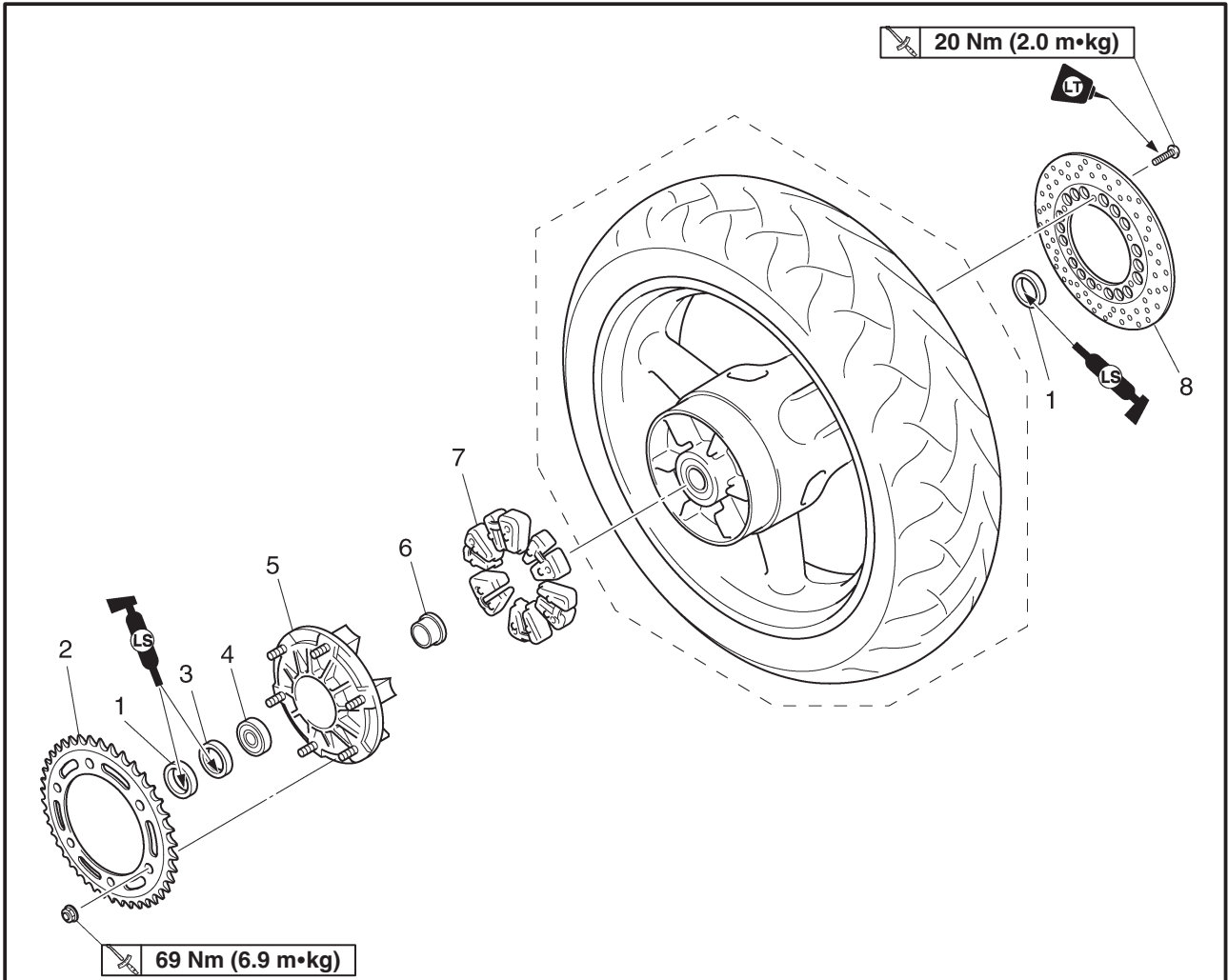
## REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET REAR WHEEL



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear wheel</b>		Remove the parts in the order listed. <b>NOTE:</b> _____ Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake caliper bracket	1	
2	Brake caliper bracket bolt	1	Loosen.
3	Lock nut	2	Loosen.
4	Adjusting bolt	2	Loosen.
5	Wheel axle nut	1	
6	Washer	1	
7	Rear wheel axle	1	
8	Adjusting block	2	
9	Rear wheel	1	
			For installation, reverse the removal procedure.

# REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET

CHAS

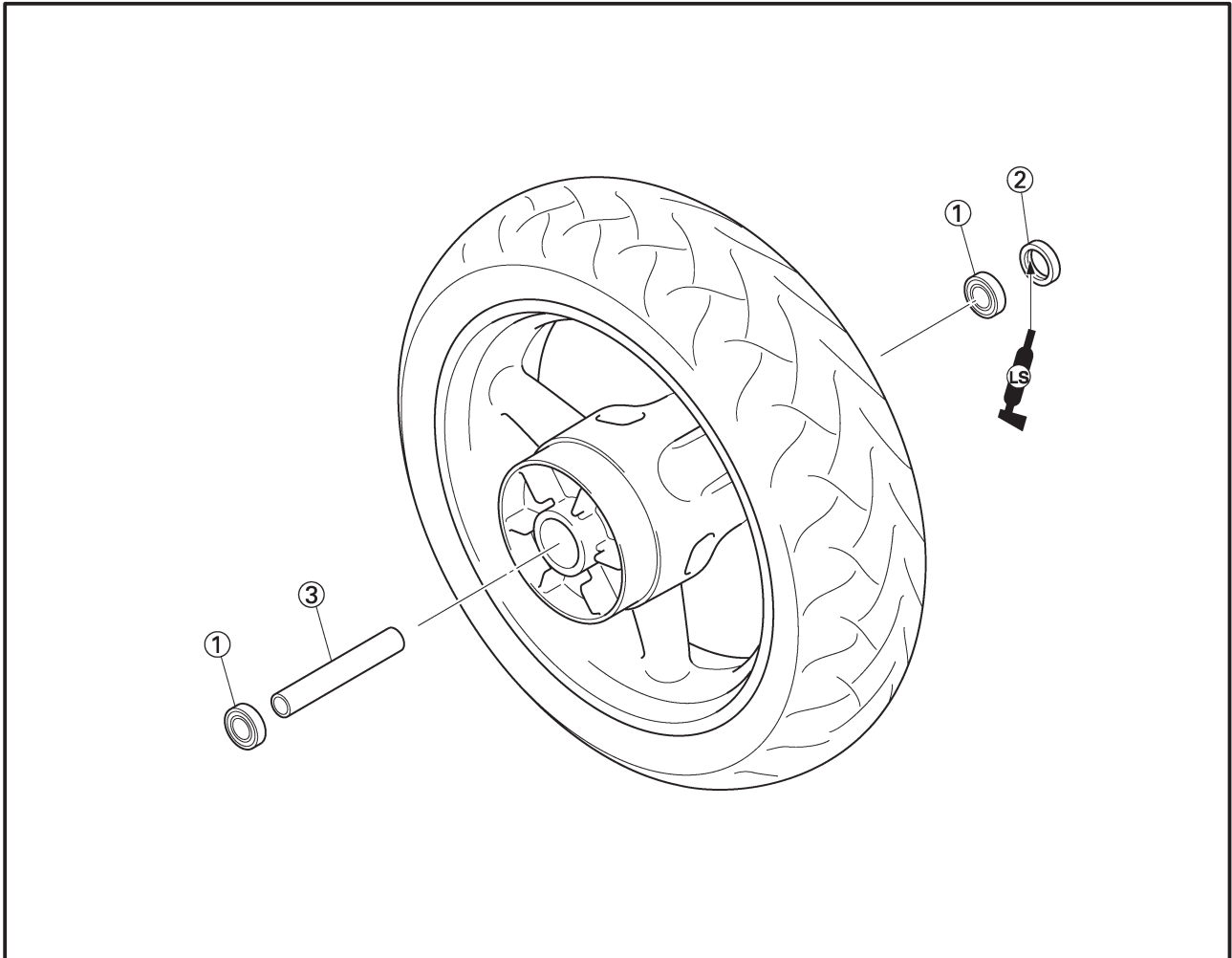


Order	Job/Part	Q'ty	Remarks
	<b>Removing the brake disc and rear wheel sprocket</b>		
1	Collar	2	
2	Rear wheel sprocket	1	
3	Oil seal	1	
4	Bearing	1	
5	Rear wheel drive hub	1	
6	Collar	1	
7	Damper	6	
8	Rear brake disc	1	
			For installation, reverse the disassembly procedure.

# REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET



EAS00560



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear wheel</b>		Disassembly the parts in the order listed.
①	Bearing	2	
②	Oil seal	1	
③	Spacer	1	
			For installation, reverse the disassembly procedure.

## REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET

CHAS



EAS00561

### REMOVING THE REAR WHEEL

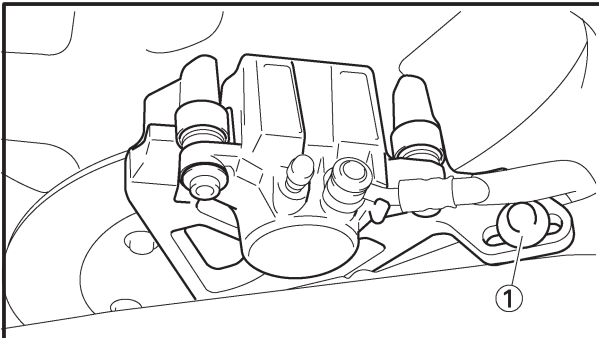
1. Stand the motorcycle on a level surface.

#### **⚠ 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.

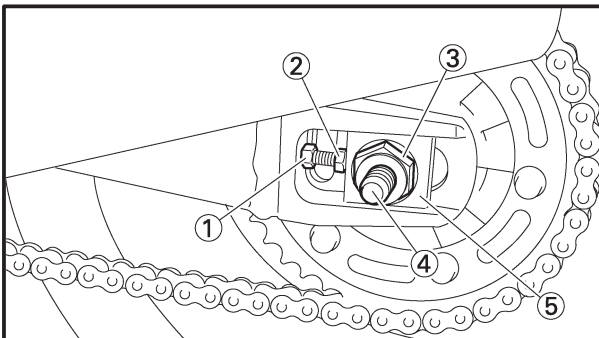


2. Remove:

- brake caliper bracket bolt (1)

#### **NOTE:**

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



3. Loosen:

- locknut (1) (left and right)
- adjusting bolt (2) (left and right)

4. Remove:

- wheel axle nut (3)
- wheel axle (4)
- adjusting block (5) (left and right)
- rear wheel

#### **NOTE:**

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

5. Remove:

- left collar
- rear wheel drive hub
- rear wheel drive hub damper

EAS00565

### CHECKING THE REAR WHEEL

1. Check:

- wheel axle
- rear wheel
- wheel bearings

Refer to "CHECKING THE FRONT WHEEL".



# REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET



EAS00572

## INSTALLING THE REAR WHEEL

1. Lubricate:
  - wheel axle
  - wheel bearings
  - oil seal lips

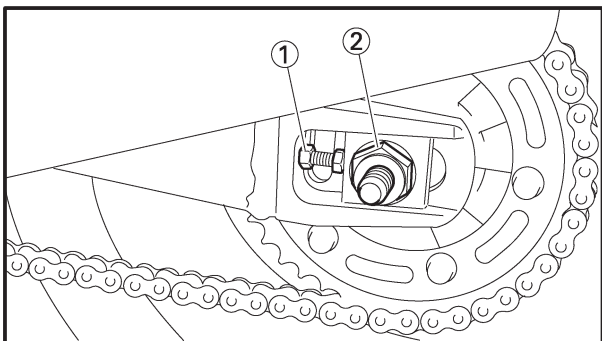
	<b>Recommended lubricant</b> <b>Lithium-soap-based grease</b>
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2. Install:
  - rear wheel drive hub damper
  - rear wheel drive hub
  - left collar
3. Install:
  - rear wheel
  - adjusting block (left and right)
  - wheel axle
  - wheel axle nut

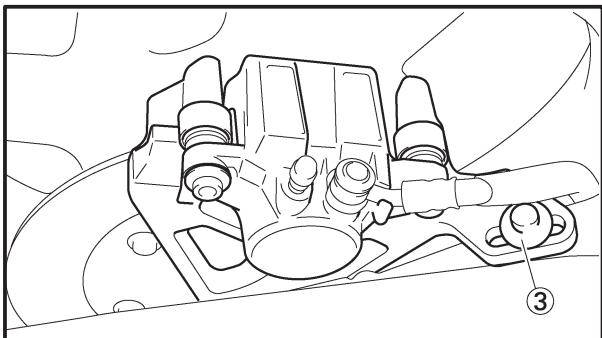
4. Adjust:
  - drive chain slack

	<b>Drive chain slack</b> <b>50 ~ 60 mm</b>
---	---

Refer to “ADJUSTING THE DRIVE CHAIN SLACK” in chapter 3.



5. Tighten:
  - locknut (left and right) ①
  - wheel axle nut ②  **150 Nm (15.0 m•kg)**
  - brake caliper bracket bolt ③  **40 Nm (4.0 m•kg)**



## REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET

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EAS00575

### ADJUSTING THE REAR WHEEL STATIC BALANCE

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

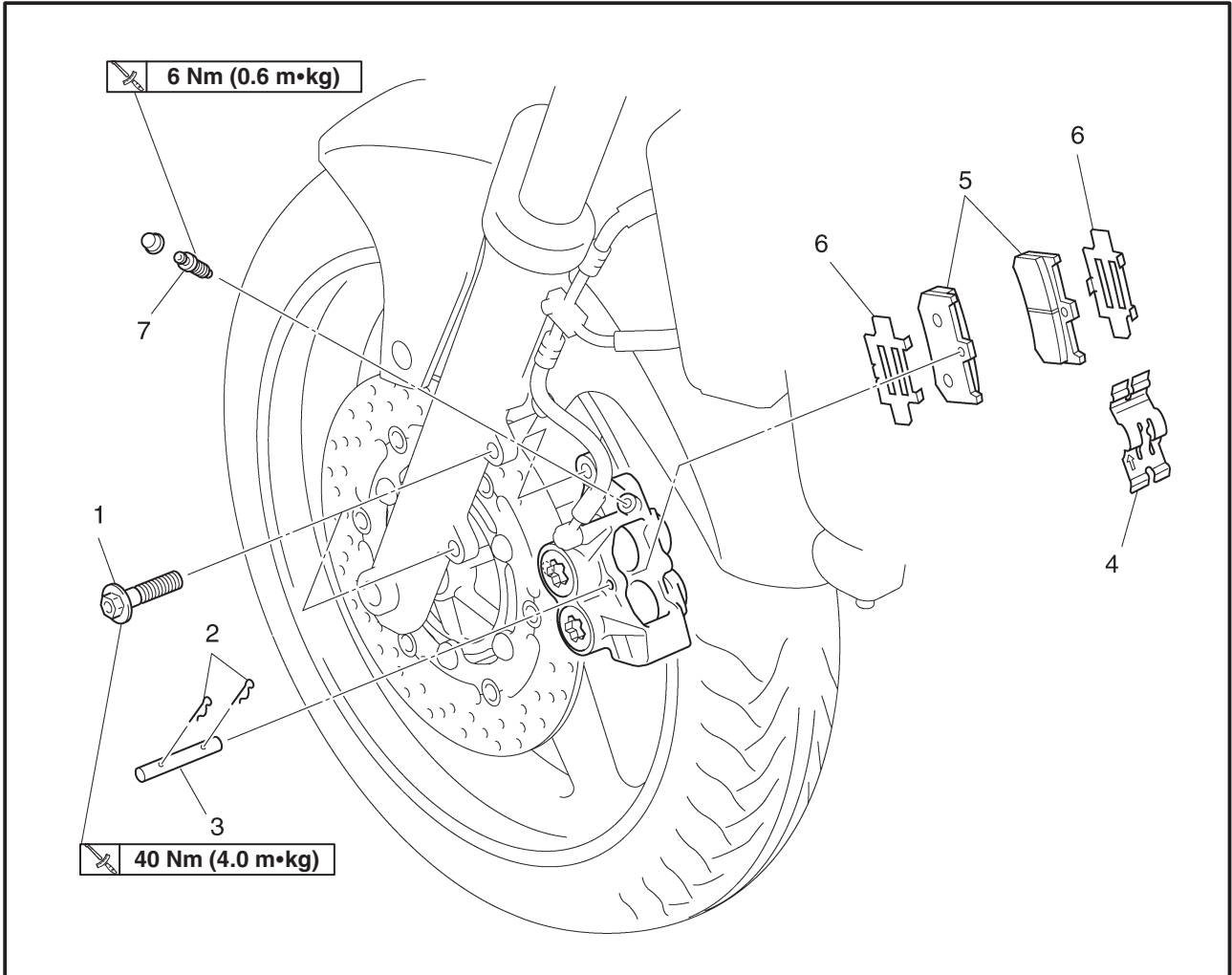
- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
  - Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.
- 

1. Adjust:

- rear wheel static balance  
Refer to "ADJUSTING THE FRONT WHEEL  
STATIC BALANCE".

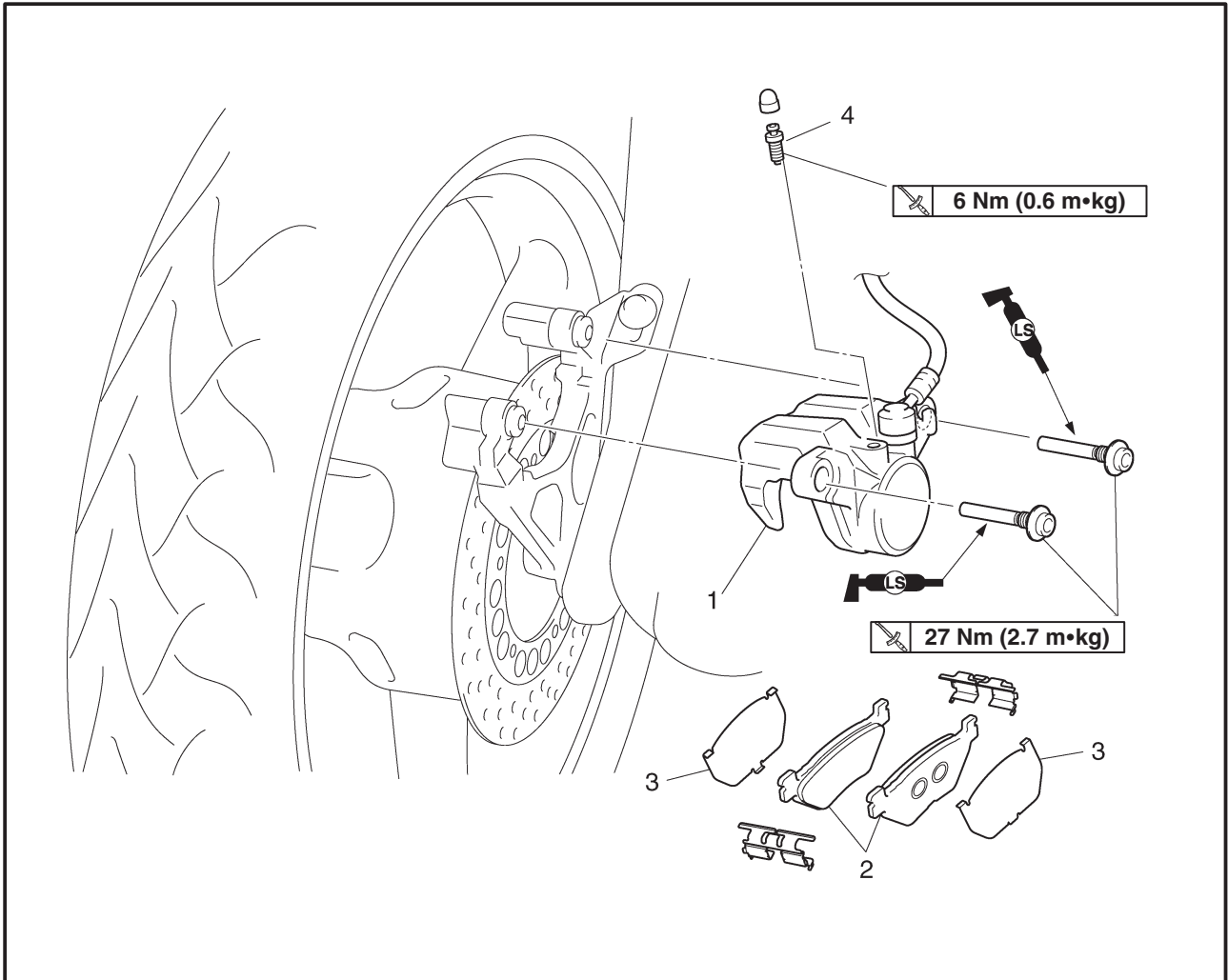
EAS00577

**FRONT AND REAR BRAKES**  
**FRONT BRAKE PADS**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake pads</b>		Remove the parts in the order listed.
1	Brake caliper bolt	2	
2	Brake pad clip	2	
3	Brake pad pin	1	
4	Brake pad spring	1	
5	Brake pad	2	
6	Brake pad shim	2	
7	Bleed screw	1	
			For installation, reverse the removal procedure.

REAR BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake pads.</b>		Remove the parts in the order listed.
1	Rear brake caliper	1	
2	Brake pad	2	
3	Brake pad shim	2	
4	Bleed screw	1	
			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 brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

**FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**

- Flush with water for 15 minutes and get immediate medical attention.

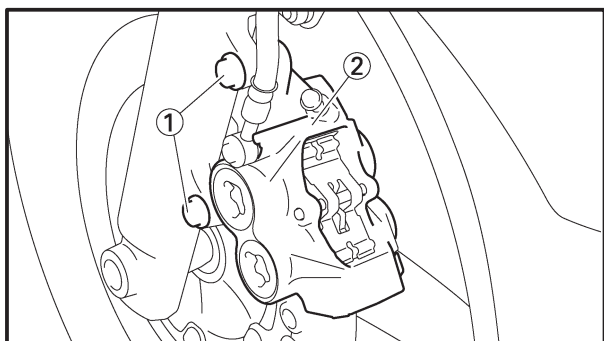
EAS00582

**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.

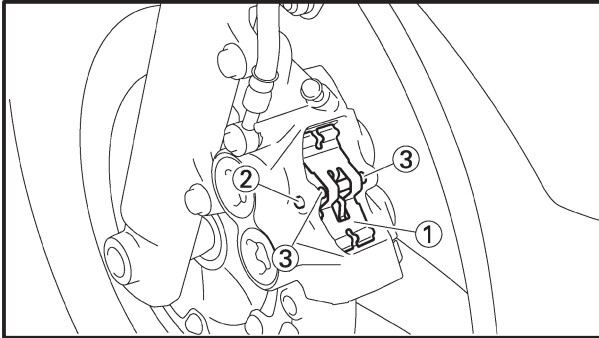


1. Remove:
  - brake caliper bolts ①
  - brake caliper ②




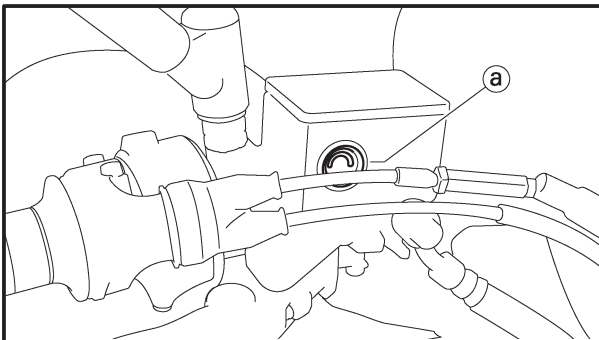
## FRONT AND REAR BRAKES

CHAS



5. Install:
- brake pad spring ①
  - brake pad pin ②
  - brake pad clips ③
  - brake caliper

 40 Nm (4.0 m•kg)



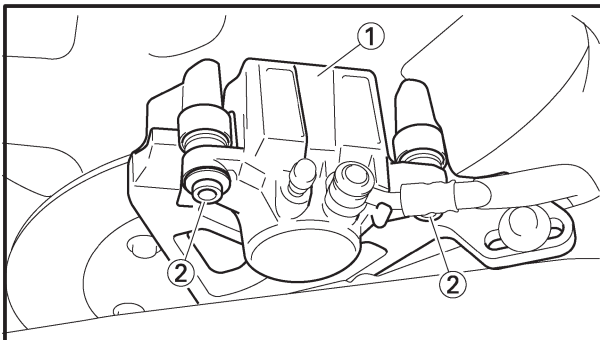
6. Check:
- brake fluid level  
Below the minimum level mark (a) → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

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

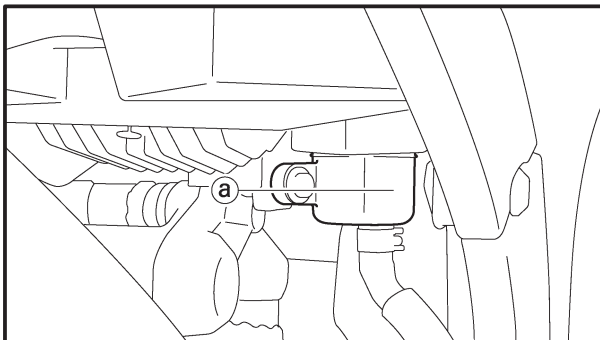


- d. Install a new brake pad shim onto each new brake pad.
- 5. Lubricate:
  - brake caliper bolt

	<p style="margin: 0;"><b>Recommended lubricant</b></p> <p style="margin: 0;"><b>Lithium-sope-based grease</b></p>
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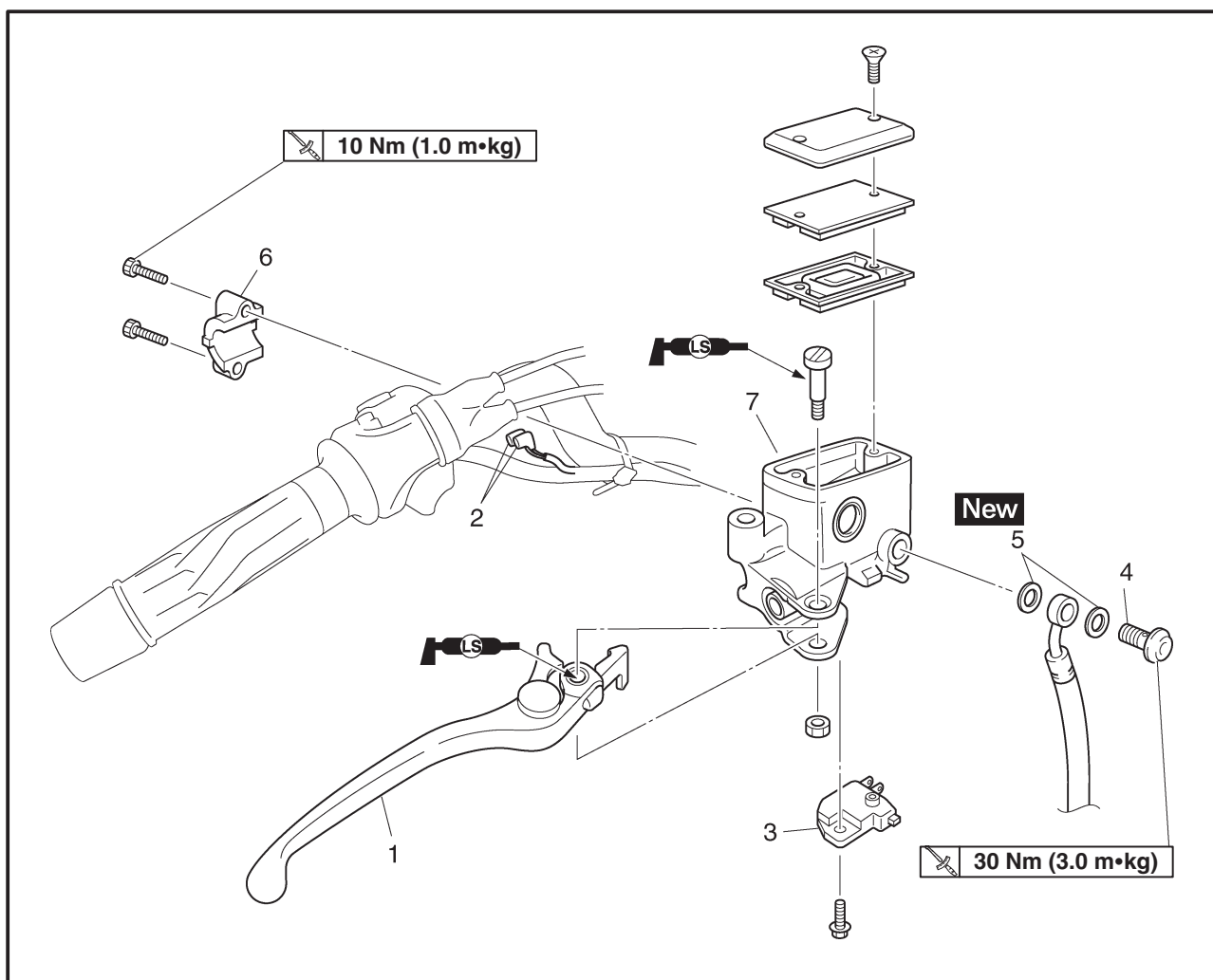
- 6. Install:
  - brake caliper ①
  - brake caliper bolts ② 27 Nm (2.7 m•kg)



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

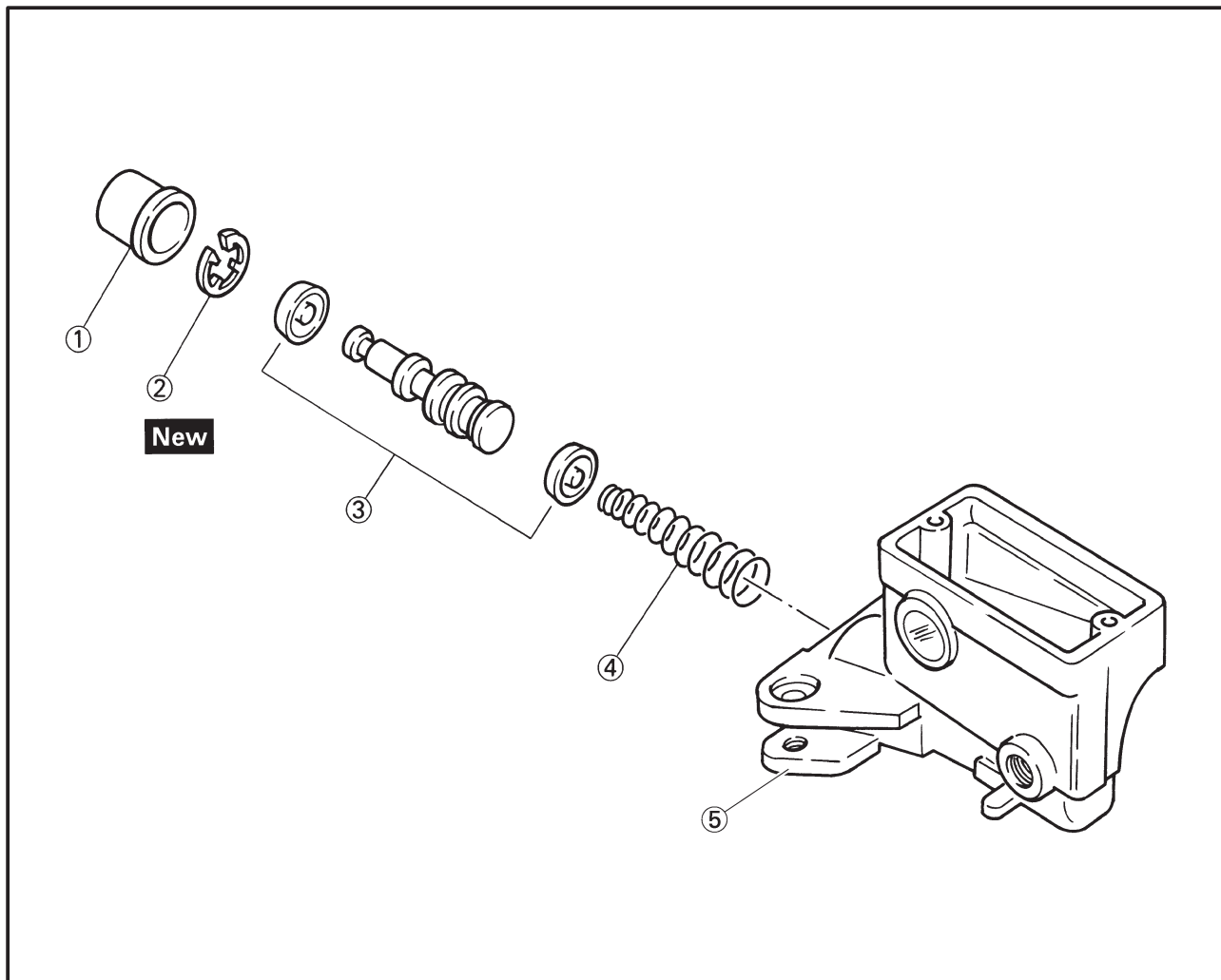
EAS00584

## FRONT BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake master cylinder</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake lever	1	
2	Front brake light switch lead coupler	1	Disconnect.
3	Front brake switch	1	
4	Union bolt	1	
5	Copper washer	2	
6	Master cylinder bracket	1	
7	Master cylinder assembly	1	
			For installation, reverse the removal procedure.

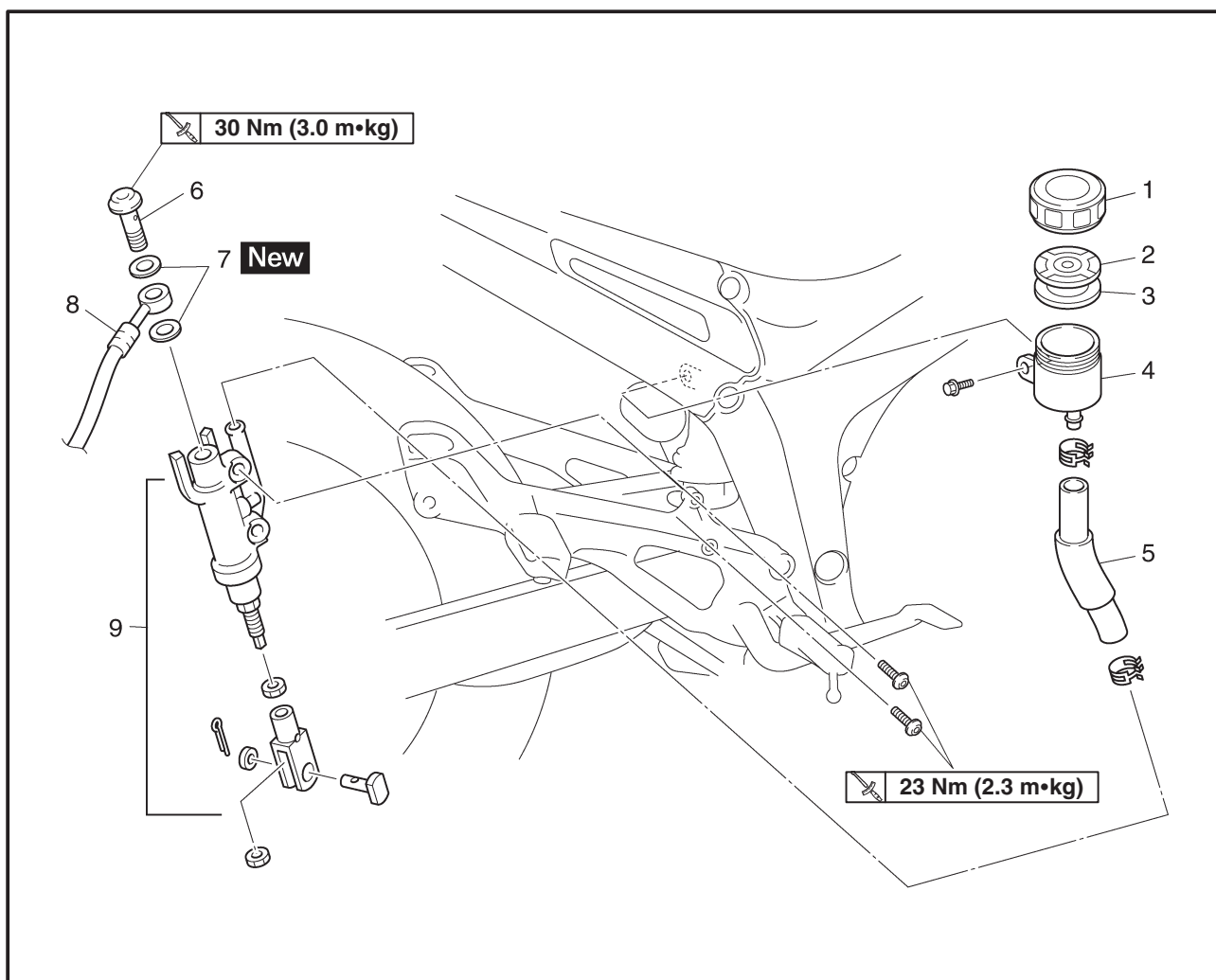
EAS00585



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front brake master cylinder</b>		Disassembly the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Master cylinder kit	1	
④	Spring	1	
⑤	Master cylinder body	1	
			For assembly, reverse the disassembly procedure.

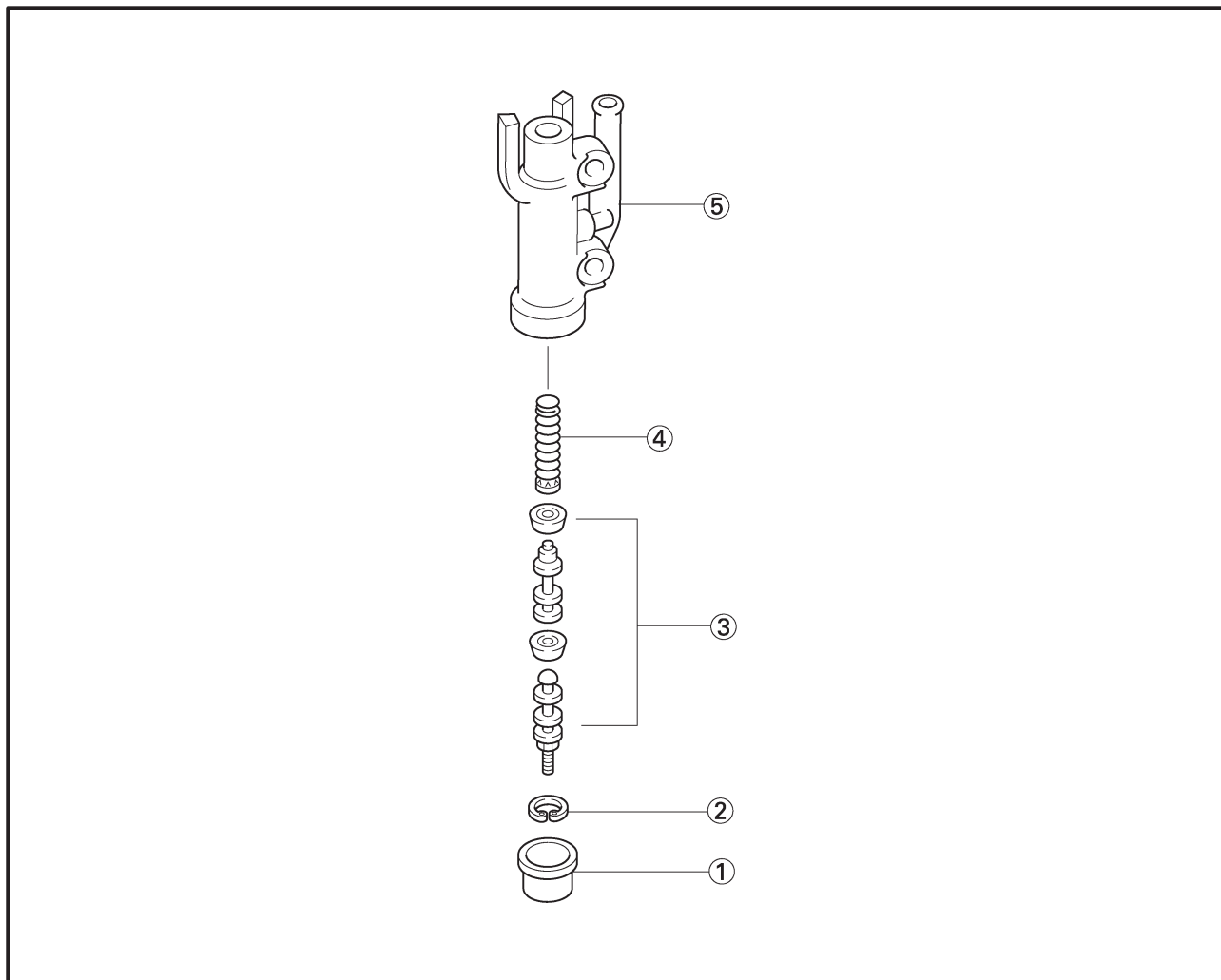
EAS00586

REAR BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake master cylinder</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Rear brake fluid reservoir diaphragm holder	1	
3	Rear brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Brake fluid reservoir hose	1	
6	Union bolt	1	
7	Copper washer	2	
8	Brake hose	1	
9	Master cylinder assembly	1	
			For installation, reverse the removal procedure.

EAS00587



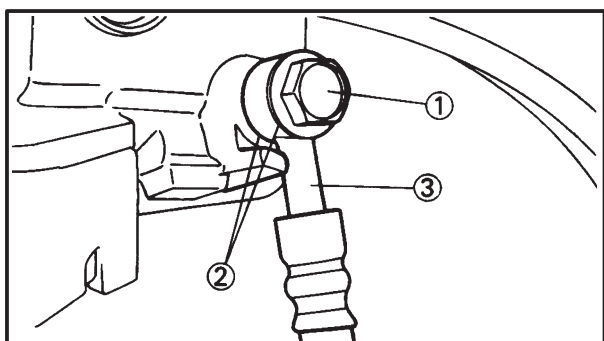
Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear brake master cylinder</b>		Disassemble the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Master cylinder kit	1	
④	Spring	1	
⑤	Master cylinder body	1	
			For assembly, reverse the disassembly procedure.

EAS00588

## DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

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

Before disassembling the front brake master cylinder, drain the brake fluid from the entire brake system.

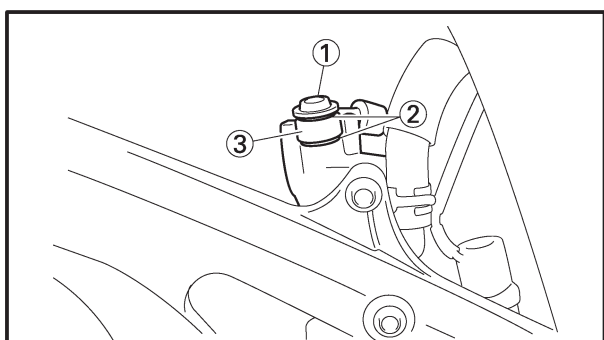


1. Disconnect:
  - brake switch coupler (from the brake switch)
2. Remove:
  - union bolt ①
  - copper washers ②
  - brake hose ③

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

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

3. Remove;
  - front brake lever
  - front brake master cylinder bracket
  - front brake master cylinder assembly
4. Remove:
  - circlip (into the front brake master cylinder)
  - master cylinder kit



EAS00589

## DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

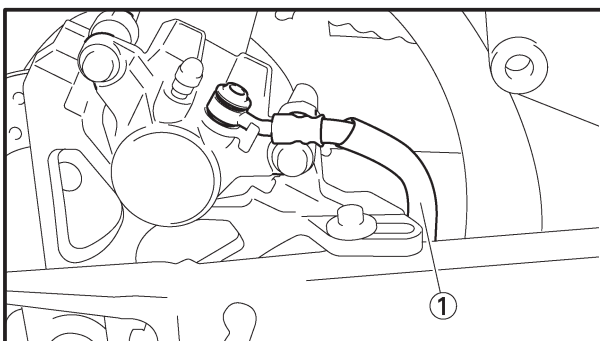
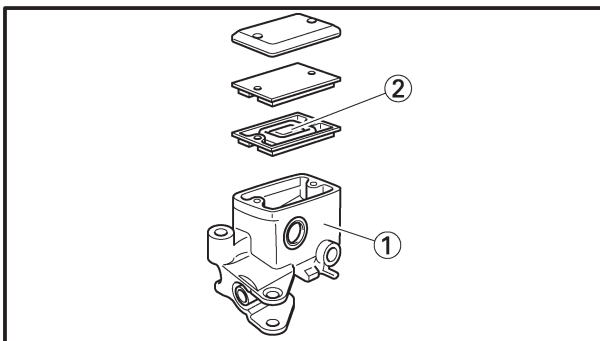
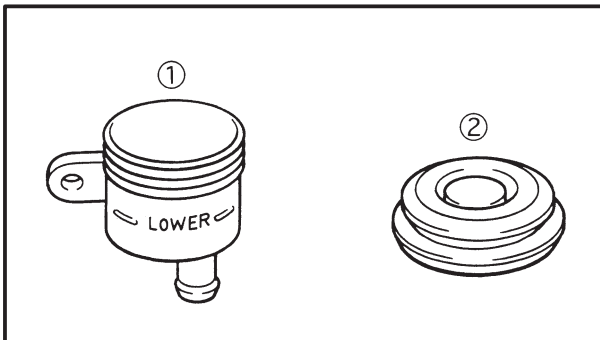
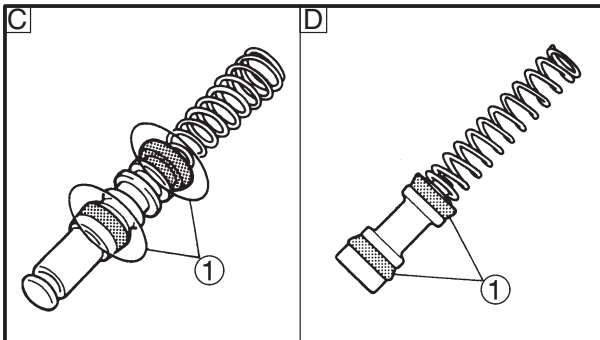
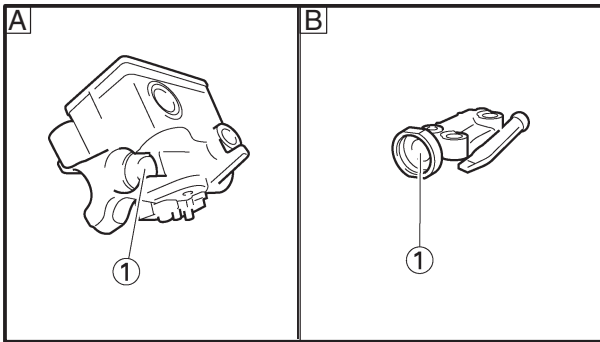
1. Remove:

- union bolt ①
- copper washers ②
- brake hose ③

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

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

2. Disconnect:
  - brake fluid reservoir hose
3. Remove:
  - pin (from the brake pedal link)
4. Remove:
  - rear brake master cylinder assembly
5. Remove:
  - circlip (into the rear brake master cylinder)
  - master cylinder kit



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 (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.

**C** Front

**D** Rear

### 3. Check:

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

### 4. Check:

- front brake master cylinder reservoir ①  
Cracks/damage → Replace.
- front brake master cylinder reservoir diaphragm ②  
Damage/wear → Replace.

### 5. Check:

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



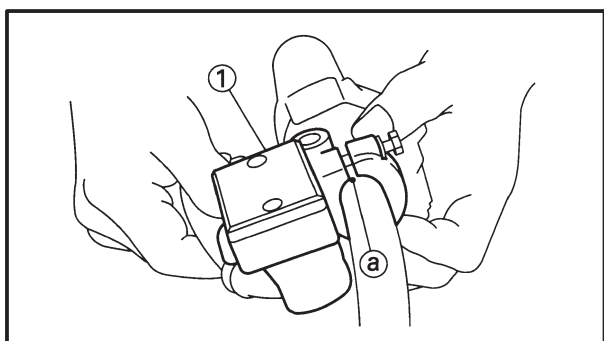
EAS00598

## ASSEMBLING AND 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:
  - master cylinder kit
  - circlip **New**
  - brake master cylinder (1)
  - brake master cylinder holder bolts

10 Nm (1.0 m•kg)

### ⚠ WARNING

- Install the brake master cylinder holder with the “UP” mark facing up.
- Align the end of the brake master cylinder holder with the punch mark (a) on the handlebar.
- First, tighten the upper bolt, then the lower bolt.

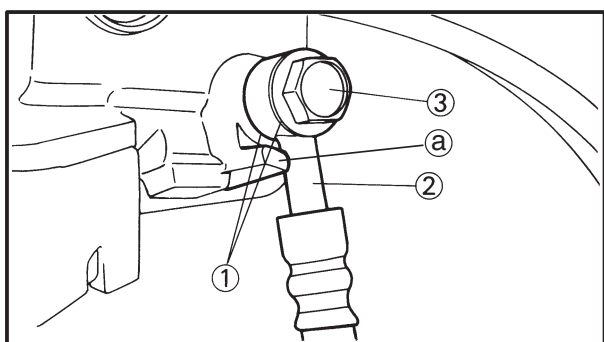
2. Install:

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

30 Nm (3.0 m•kg)

### CAUTION:

When installing the brake hose onto the brake master cylinder, make sure that the brake pipe touches the projection (a) on the brake master cylinder.



### ⚠ 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 right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



3. Install:
  - front brake lever
4. Connect:
  - brake switch coupler (to the brake switch)
5. Fill:
  - brake master cylinder reservoir  
(with the specified amount of the recommended brake fluid)



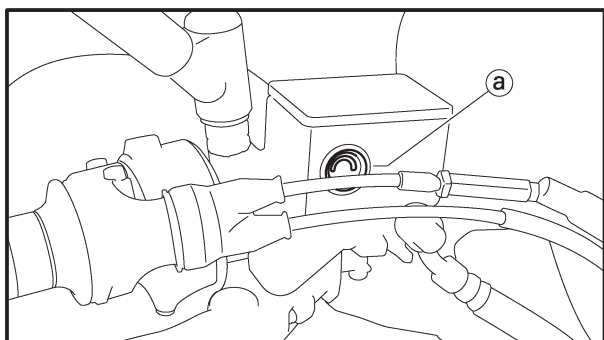
**Recommended brake fluid  
DOT 4**

### **⚠ 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 brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

### **CAUTION:**

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




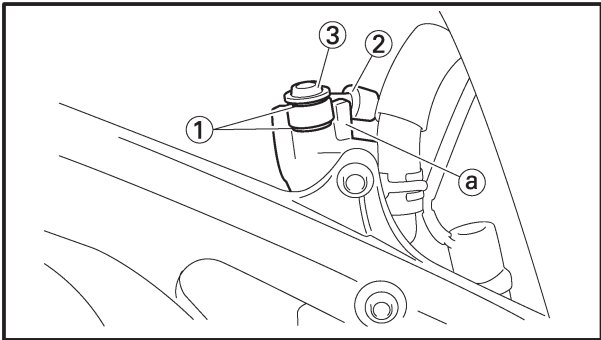
6. Bleed:
  - brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
7. Check:
  - brake fluid level  
Below the minimum level mark (a) → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
8. Check:
  - brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

EAS00608

**ASSEMBLING THE REAR BRAKE MASTER CYLINDER**

1. Install:
  - master cylinder kit
  - circlip **New**
2. Install:
  - rear brake master cylinder assembly
3. Install:
  - pin (to the brake pedal link)
4. Connect:
  - brake fluid reservoir hose
5. Install:
  - copper washers ① **New**
  - brake hoses 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 master cylinder, make sure the brake pipe touches the projection ① as shown.

2. Fill:
  - brake fluid reservoir

	<b>Recommended brake fluid DOT 4</b>
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**⚠ WARNING**

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

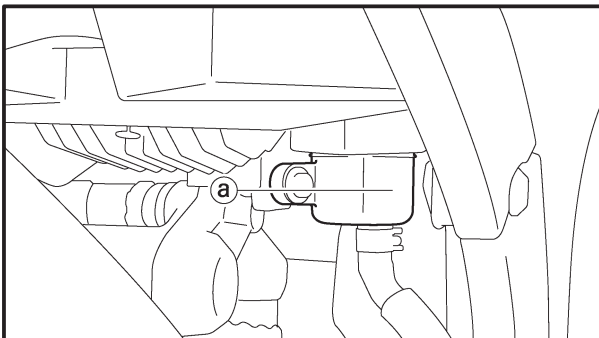
**CAUTION:**

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

## 3. Bleed:

- brake system

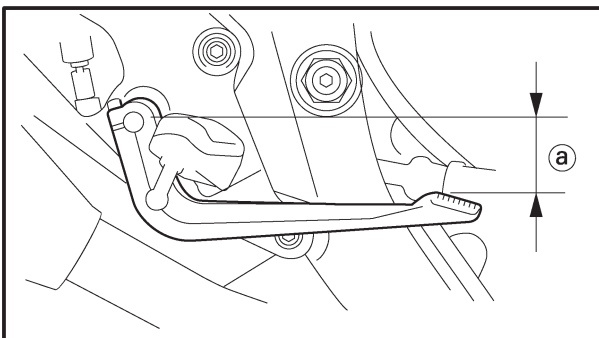
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.



## 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 (a)

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



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

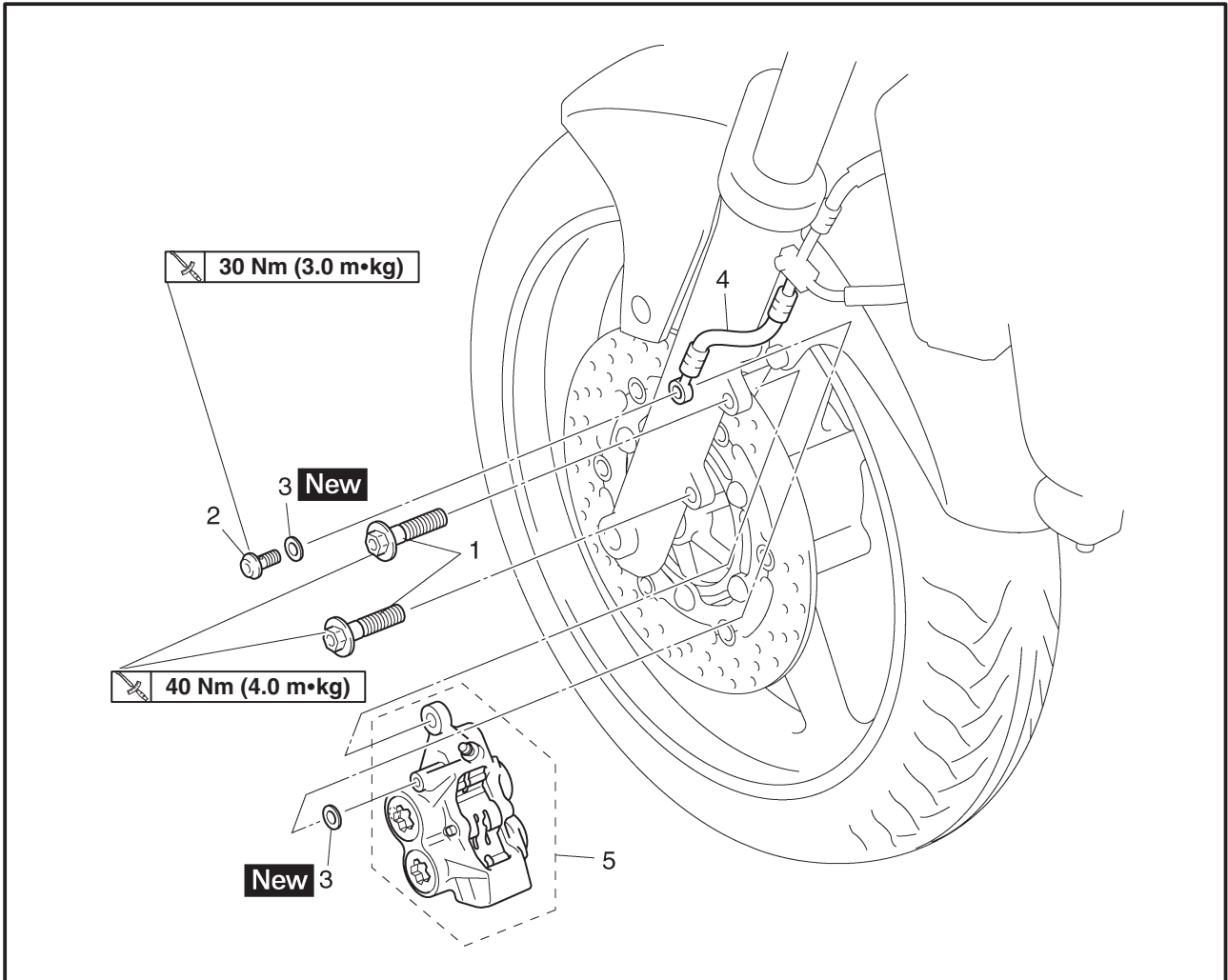
## 6. Adjust:

- rear brake light operation timing

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

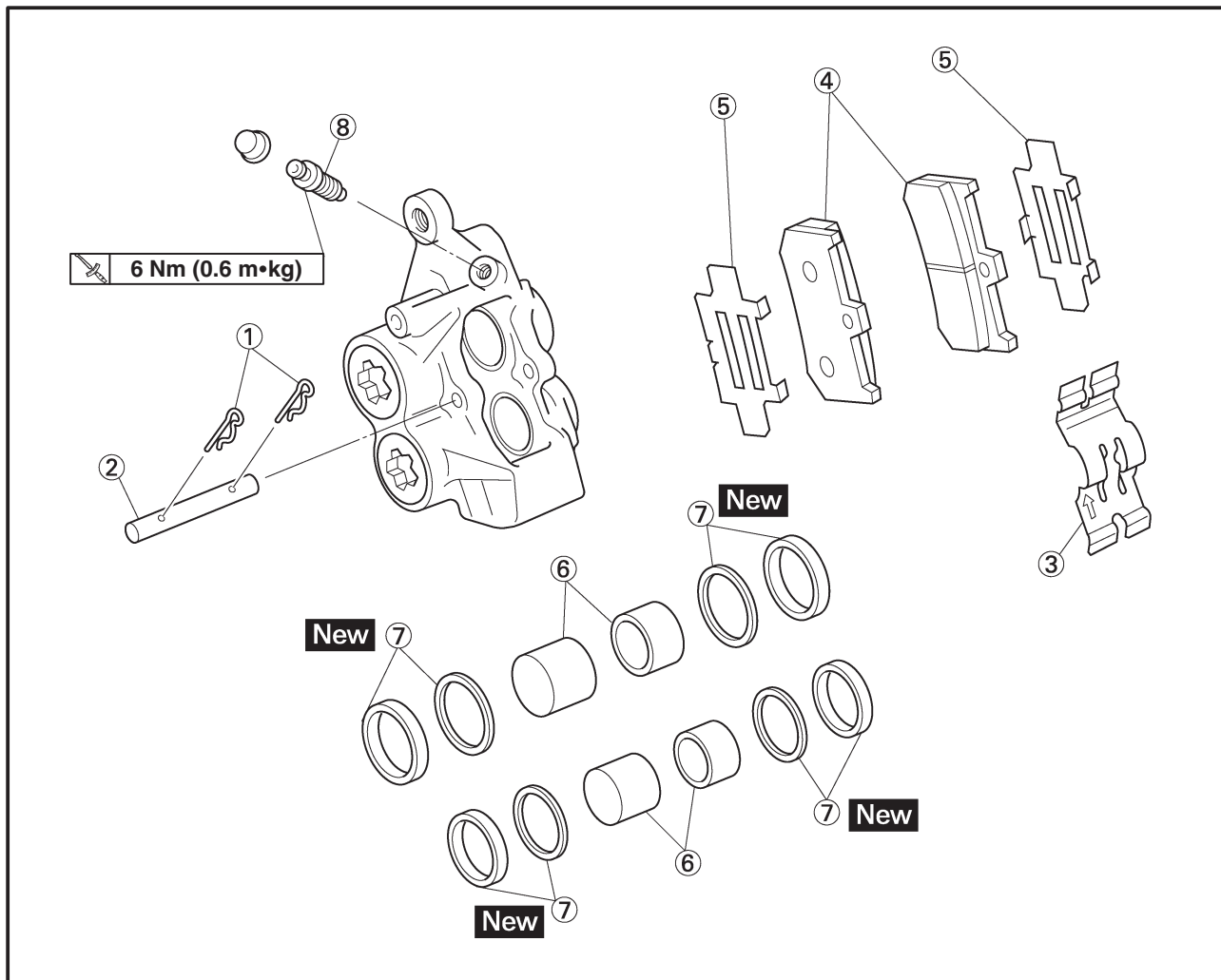
EAS00613

FRONT BRAKE CALIPERS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake calipers</b>		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers. Drain.
1	Brake fluid	2	
2	Front brake caliper bolt	1	
3	Union bolt	2	
4	Copper washer	1	
5	Brake hose	1	
	Brake caliper	1	For installation, reverse the removal procedure.

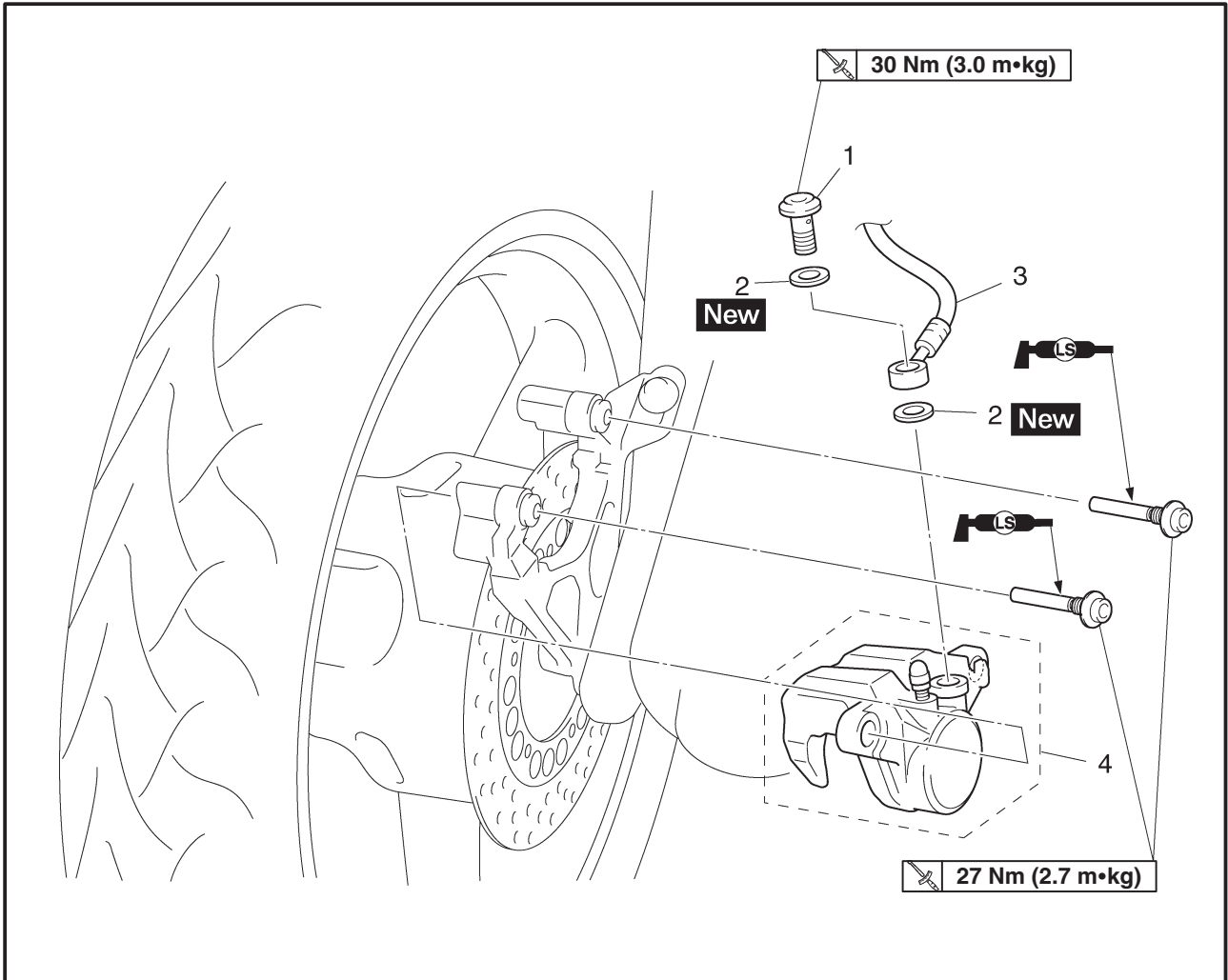
EAS00615



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front brake calipers</b>		Disassemble the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad clip	2	
②	Brake pad pin	1	
③	Brake pad spring	1	
④	Brake pad	2	
⑤	Shim	2	
⑥	Brake caliper piston	4	
⑦	Brake caliper piston seal kit	4	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

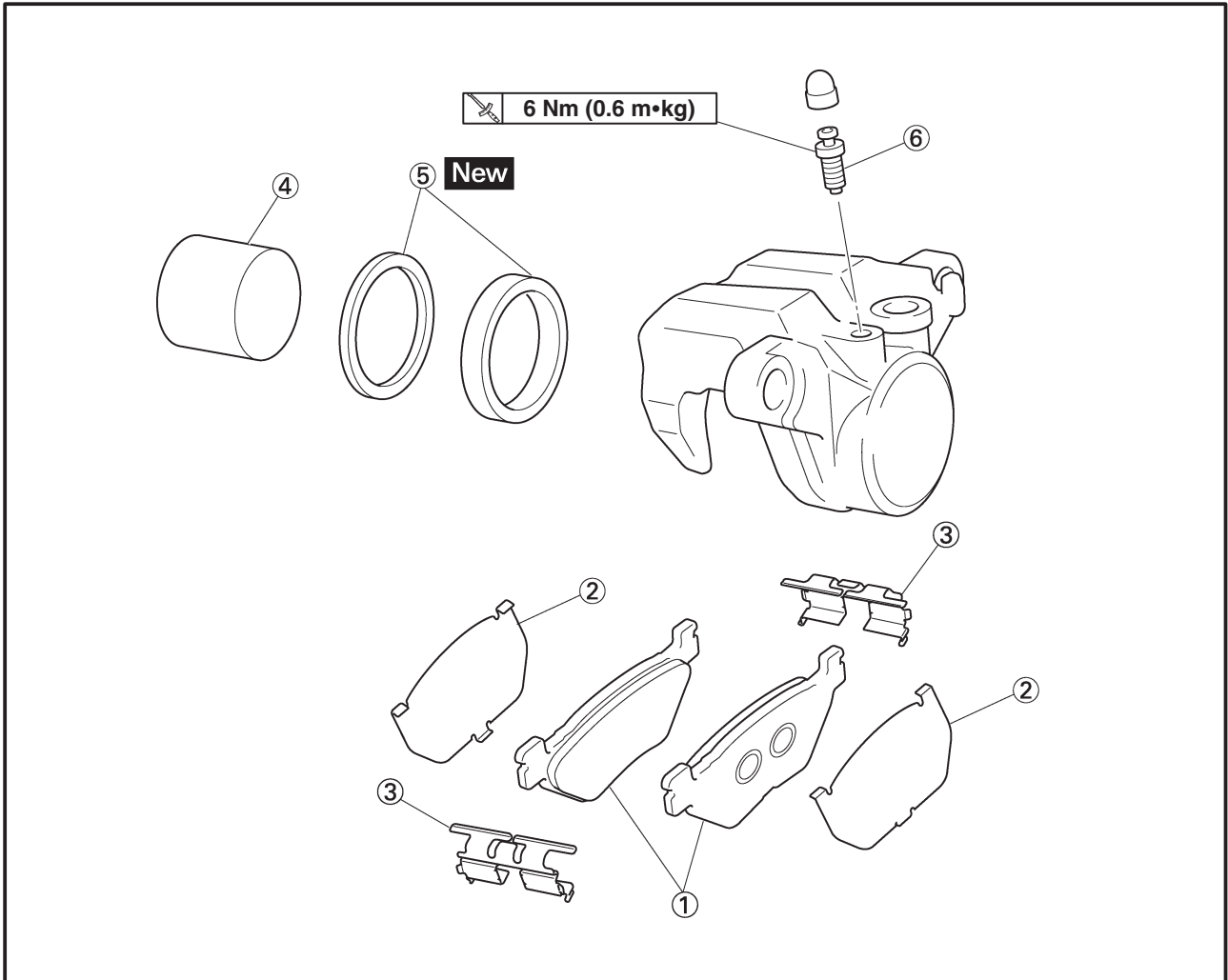
EAS00616

REAR BRAKE CALIPER



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake caliper</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper	1	
			For installation, reverse the removal procedure.

EAS00617



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear brake caliper</b>		Disassemble the parts in the order listed.
①	Brake pad	2	
②	Shim	2	
③	Brake pad spring	2	
④	Brake caliper piston	1	
⑤	Brake caliper piston seal kit	1	
⑥	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

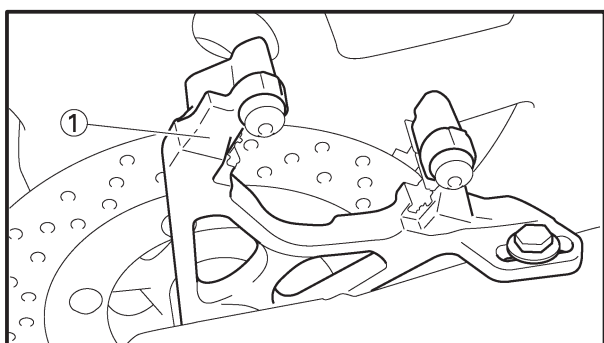
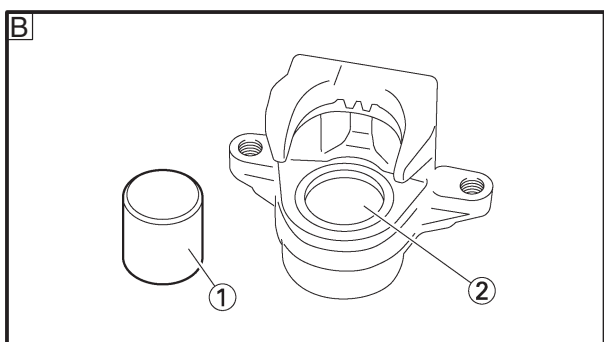
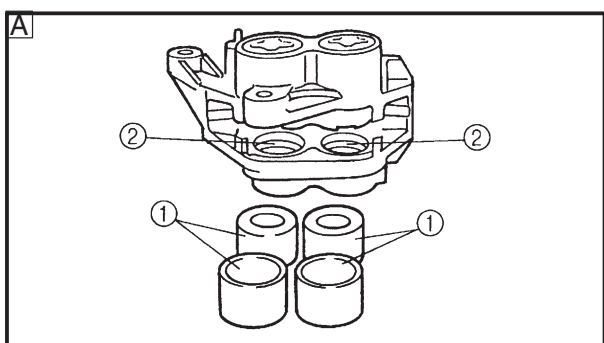




EAS00633

## CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled



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

### **⚠ WARNING**

**Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

- A** Front
- B** Rear

2. Check:
  - rear brake caliper brackets ①  
Cracks/damage → Replace.

EAS00638

**ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

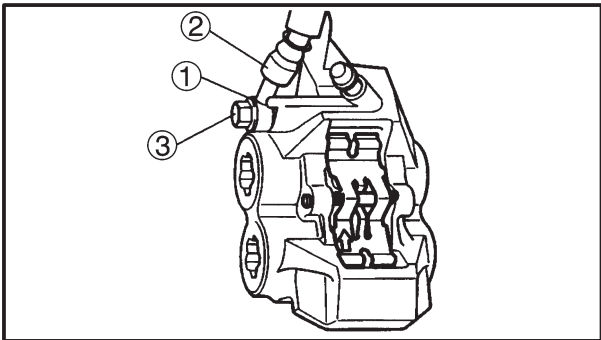
**⚠ WARNING**



- 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.

	<b>Recommended brake fluid DOT 4</b>
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1. Install:
  - brake caliper seals **New**
  - brake caliper pistons
2. Install:
  - brake pad shims
  - brake pads
  - brake pad spring
  - brake pad pin
  - brake pad clips

Refer to “REPLACING THE BRAKE PADS”.



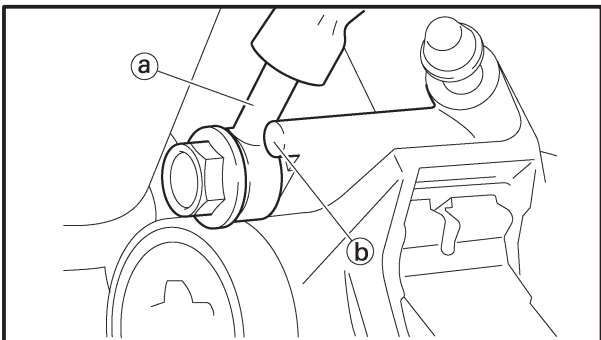
3. Install:
  - brake caliper (temporarily)
  - brake caliper bolt  **40 Nm (4.0 m•kg)**
  - copper washers ① **New**
  - brake hose ②
  - union bolt ③  **30 Nm (3.0 m•kg)**

**⚠ 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, make sure the brake pipe ① touches the projection ② on the brake caliper.





## 4. Fill:

- brake master cylinder reservoir  
(with the specified amount of the recommended brake fluid)



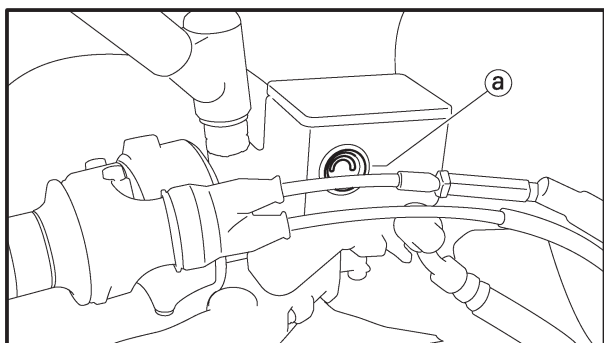
**Recommended brake fluid  
DOT 4**

**⚠ 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 brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

**CAUTION:**

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



## 5. Bleed:

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

## 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.



EAS00642


### ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER


#### **⚠ WARNING**

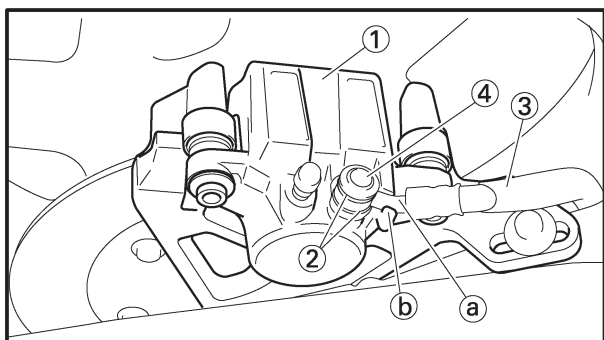
- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston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



Recommended brake fluid  
DOT 4

1. Install:
  - brake caliper seals **New**
  - brake caliper piston
2. Install:
  - brake pads
  - brake pad springs
  - brake caliper bolt  27 Nm (2.7 m•kg)

Refer to “REPLACING THE BRAKE PADS”.
3. Install:
  - brake caliper ① (temporarily)
  - copper washers ② **New**
  - 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 the brake pipe ① touches the projection ② on the brake caliper.



## 5. Fill:

- brake fluid reservoir  
(with the specified amount of the recommended brake fluid)



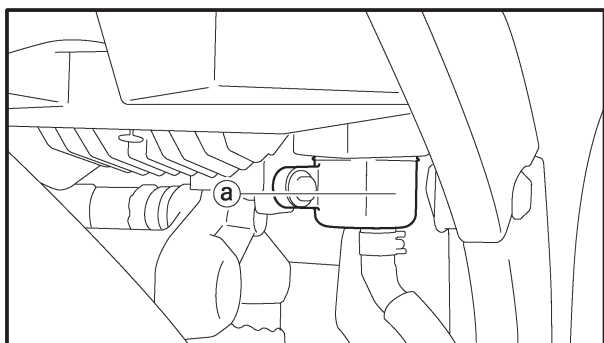
**Recommended brake fluid**  
**DOT 4**

**⚠ 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.



## 6. Bleed:

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

## 7. Check:

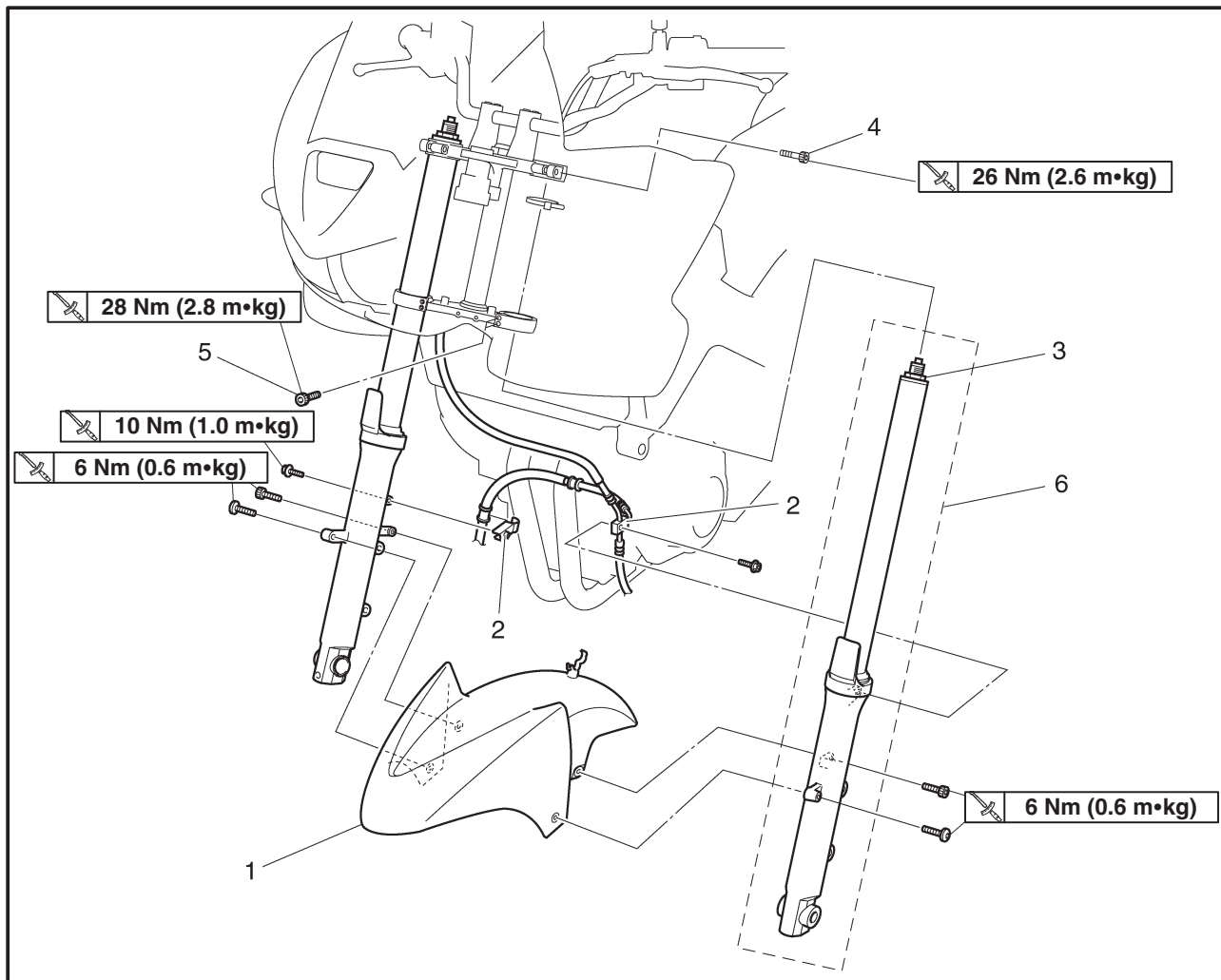
- brake fluid level  
Below the minimum level mark (a) → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

## 8. Check:

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

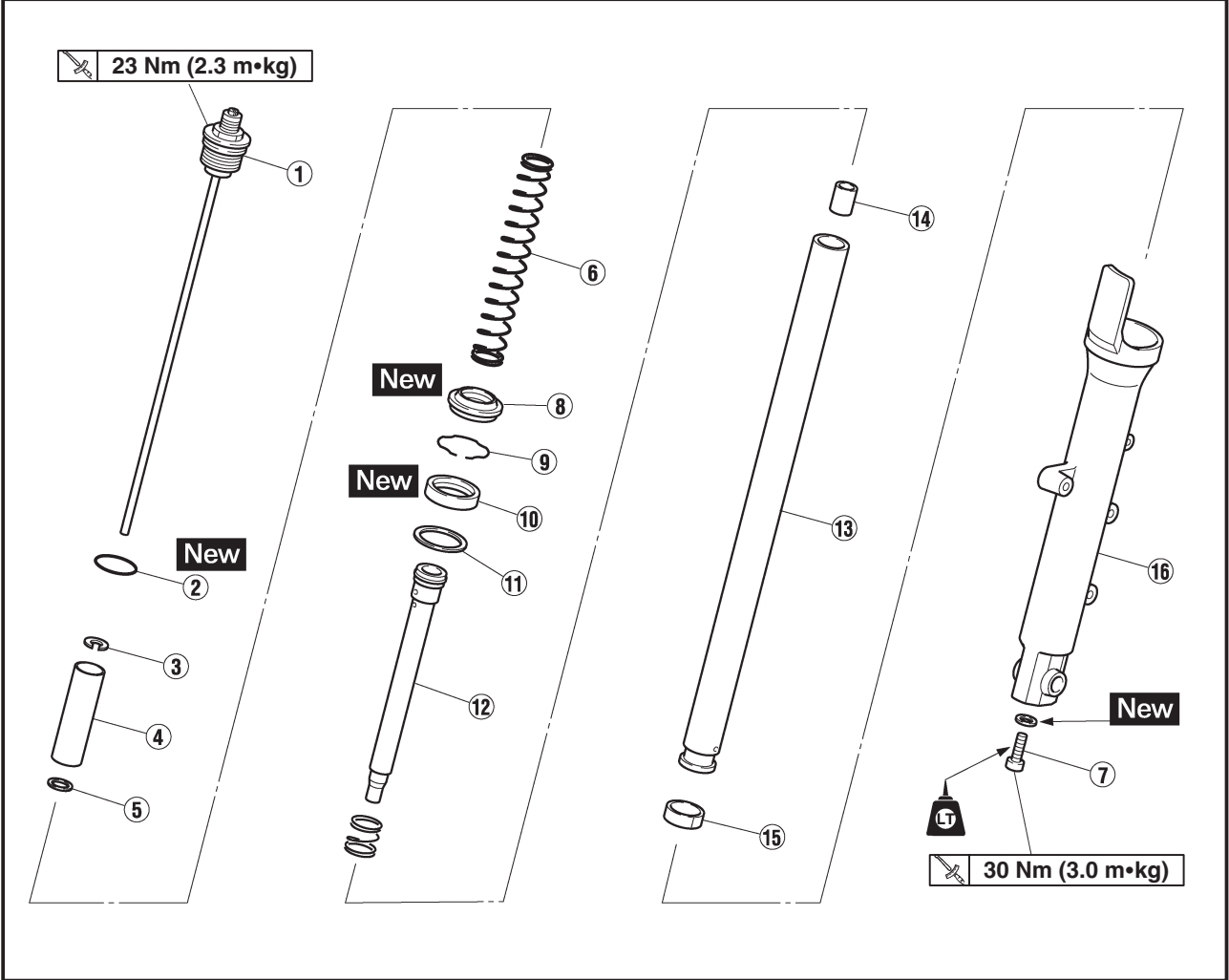
EAS00647

FRONT FORK

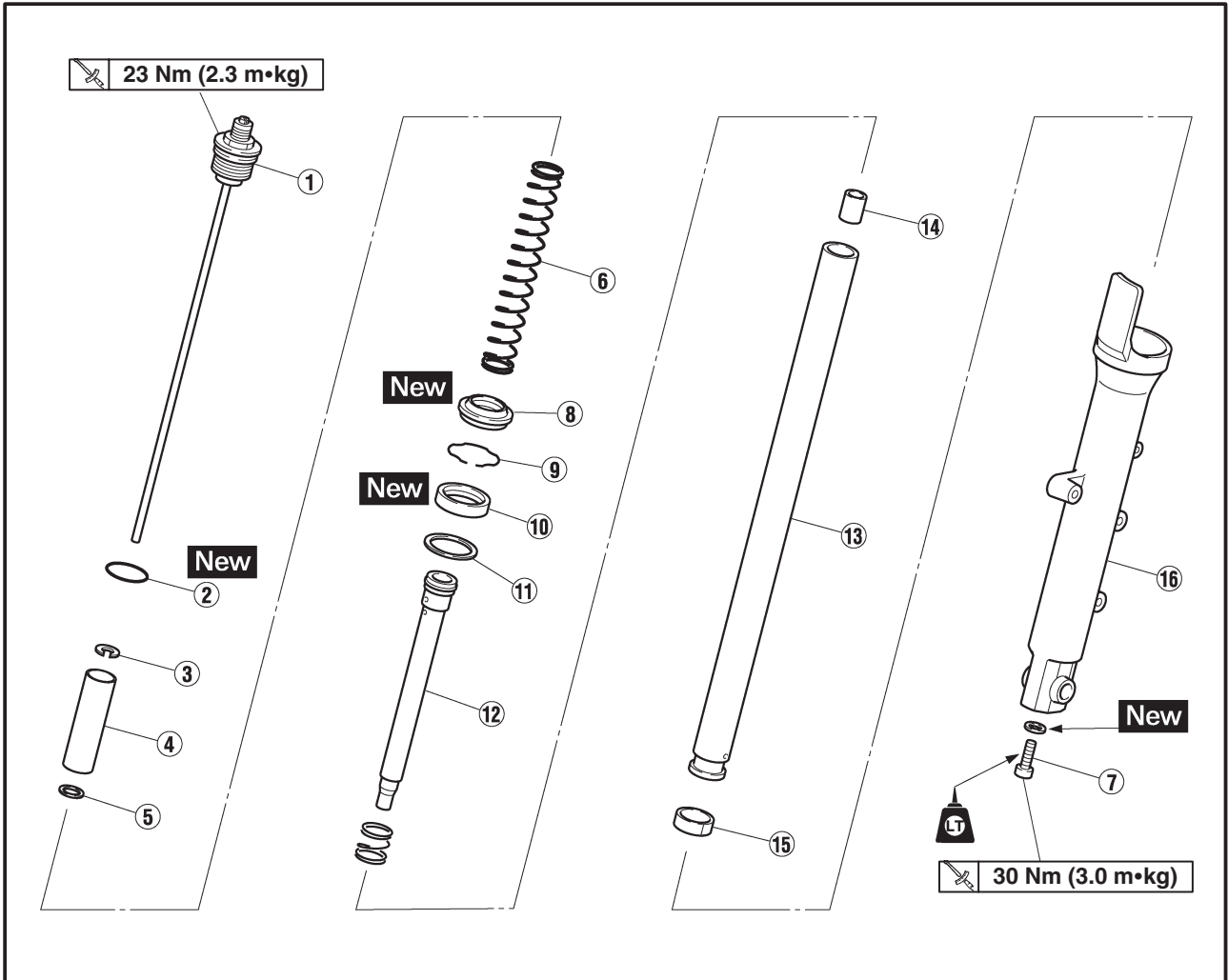


Order	Job/Part	Q'ty	Remarks
	<b>Removing the front fork legs</b>		
	Front wheel		Remove the parts in the order listed. Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front brake caliper		Refer to "FRONT AND REAR BRAKE".
1	Front fender	1	Loosen.
2	Brake hose holder	2	
3	Cap bolt	1	
4	Upper bracket pinch bolt	2	
5	Lower bracket pinch bolt	2	
6	Front fork	1	For installation, reverse the removal procedure.

EAS00648



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front fork legs</b>		Disassembly the parts in the order listed.
①	Cap bolt	1	
②	O-ring	1	
③	Washer	1	
④	Spacer	1	
⑤	Washer	1	
⑥	Fork spring	1	
⑦	Damper rod bolt	1	
⑧	Dust seal	1	
⑨	Oil seal clip	1	
⑩	Oil seal	1	
⑪	Washer	1	
⑫	Damper rod	1	
⑬	Inner tube	1	



Order	Job/Part	Q'ty	Remarks
⑭	Oil lock piece	1	For assembly, reverse the disassembly procedure.
⑮	Outer tube bushing	1	
⑯	Outer tube	1	



EAS00651

**REMOVING THE FRONT FORK LEGS**

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

1. Stand the motorcycle on a level surface.

**⚠ WARNING**

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

**NOTE:**

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

2. Remove:

- front brake caliper  
Refer to “FRONT AND REAR BRAKE”.

- front wheel  
Refer to “FRONT WHEEL AND BRAKE DISCS”

3. Remove:

- front fender

4. Loosen:

- upper bracket pinch bolt ①

5. Loosen:

- cap bolt ②

6. Loosen:

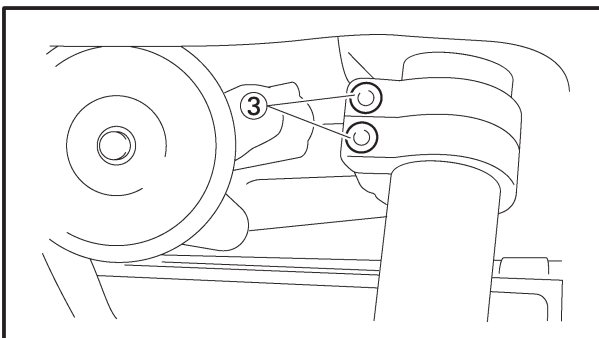
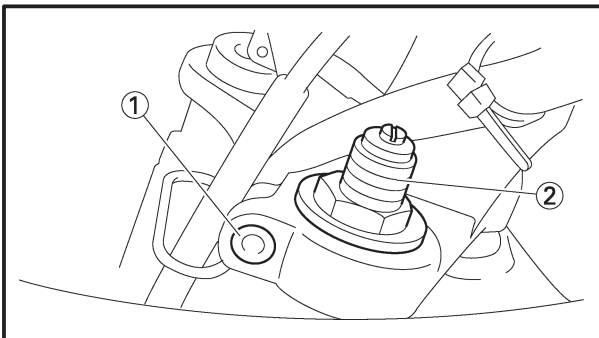
- lower bracket pinch bolts ③

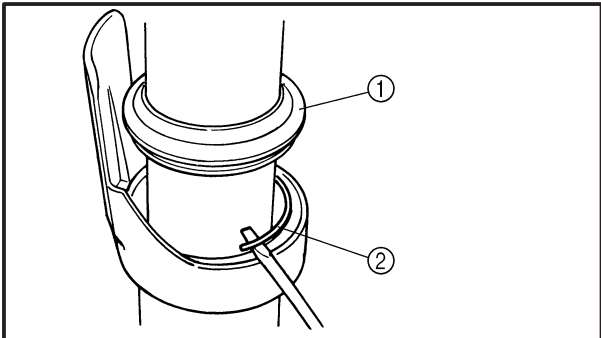
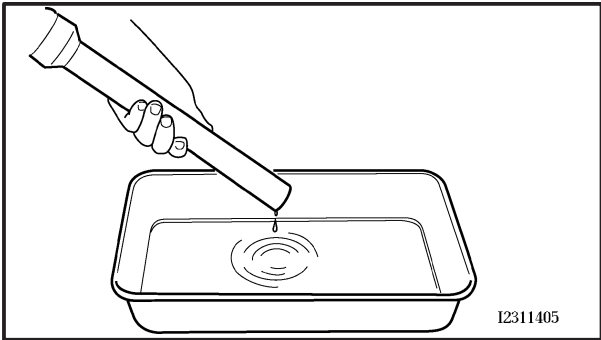
**⚠ WARNING**

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

7. Remove:

- front fork leg





EAS00655

## DISASSEMBLING THE FRONT FORK LEGS

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

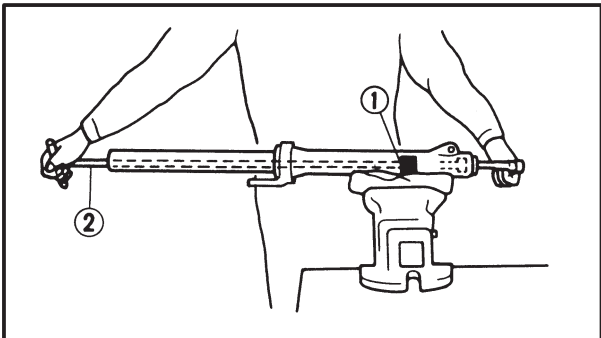
1. Remove:
  - cap bolt
  - washers
  - spacer
  - spring
2. Drain:
  - fork oil
3. Remove:
  - dust seal ①
  - oil seal clip ②  
(with a flat-head screwdriver)

### CAUTION:

Do not scratch the inner tube.

### NOTE:

- Do not remove the 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 assembly bolt
  - copper washer

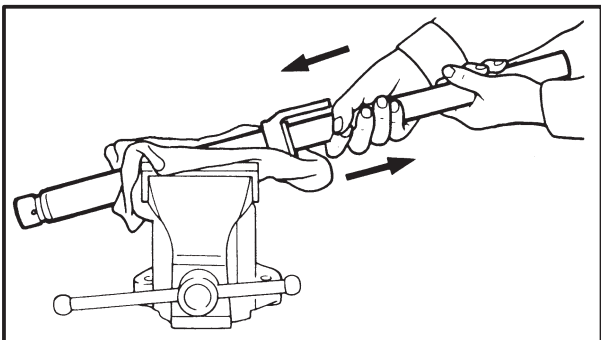
### NOTE:

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



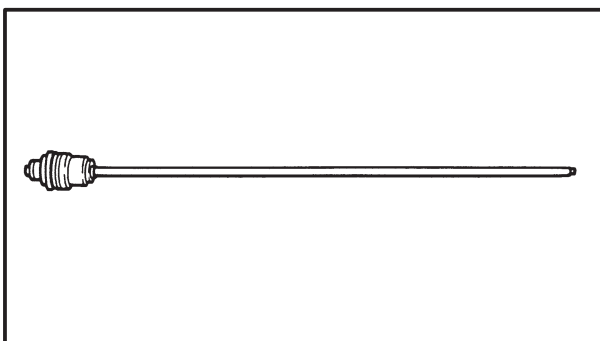
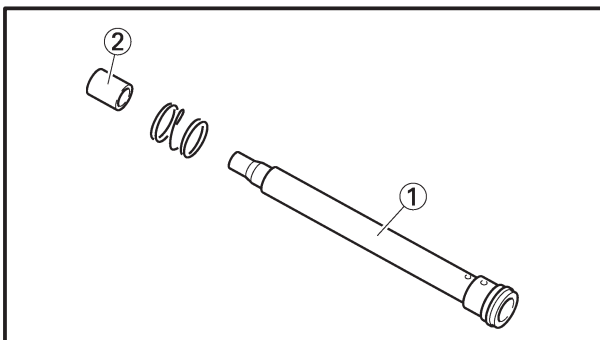
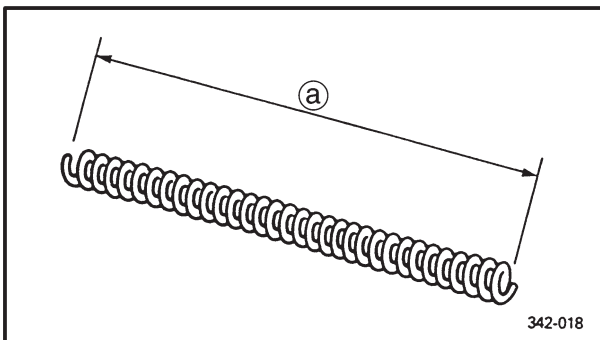
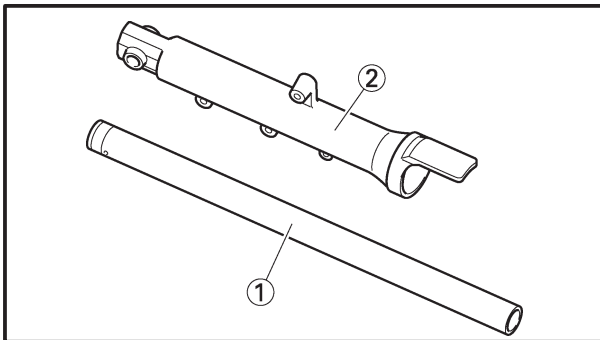
**Damper rod holder (29 mm)**  
90890-01375

**T-handle**  
90890-01326



5. Remove:
  - inner tube

- a. Hold the front fork leg horizontally.
- b. Slowly push the inner tube into the outer tube and just before it bottoms out, pull the inner tube back quickly.
- c. 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 ①

Out of specification → Replace.



**Spring free length**

**314 mm**

**<Limit> : 308 mm**

## 3. Check:

- damper rod ①

Damage/wear → Replace.

Obstruction → Blow out all of the oil passages with compressed air.

- oil flow stopper ②

Damage → Replace.

**CAUTION:**

- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**

- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

## 4. Check:

- cap bolt

Damage/wear → Replace.



EAS00661

**ASSEMBLING THE FRONT FORK LEGS**

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

**⚠ WARNING**

- Make sure the oil levels in both front fork legs are equal.
- Uneven oil levels can result in poor handling and a loss of stability.

**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 all of the components are clean.

## 1. Install:

- damper rod

**⚠ WARNING**

Always use new copper washers.

**CAUTION:**

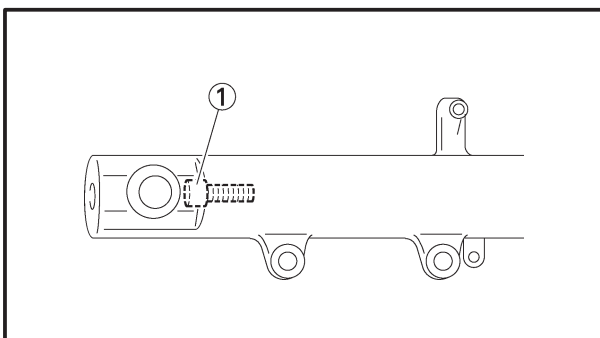
Allow the damper rod to slide slowly down the inner tube until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

## 2. Lubricate:

- inner tube's outer surface



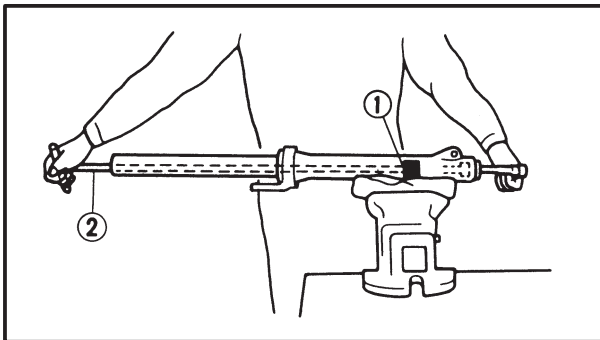
**Recommended lubricant**  
Yamaha fork and shock oil 5W  
or equivalent



## 3. Tighten:

- damper rod assembly bolt ①

**30 Nm (3.0 m•kg)** **LOCTITE®**

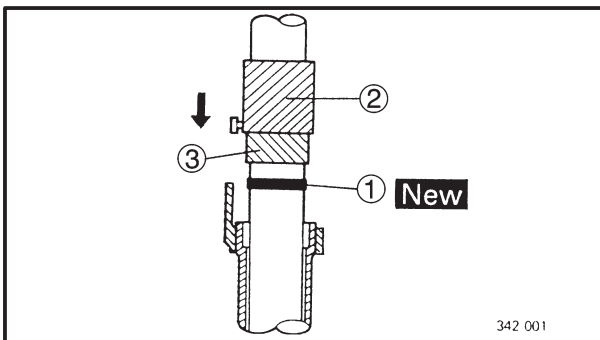


**NOTE:**

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



**Damper rod holder (29 mm)**  
90890-01375  
**T-handle**  
90890-01326

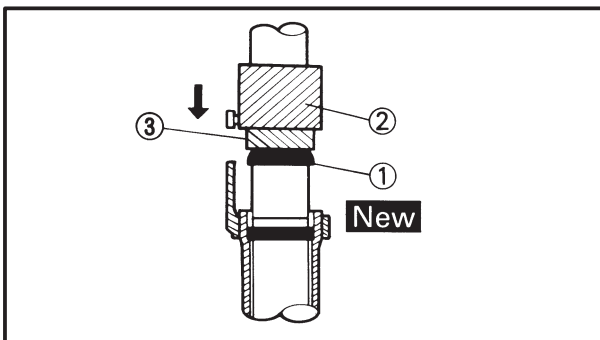


4. Install:

- outer tube bushing ① **New**  
(with the fork seal driver weight ② and fork seal driver attachment ③)



**Fork seal driver weight**  
90890-01367  
**Fork seal driver attachment**  
90890-01374

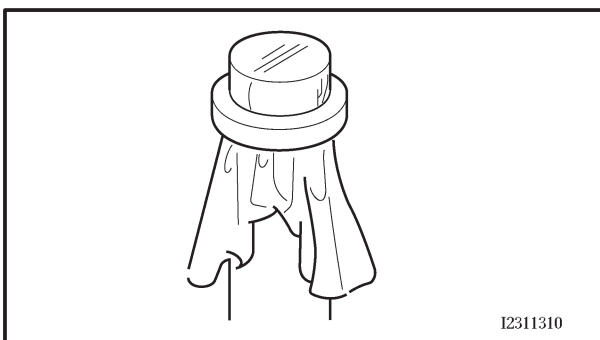


5. Install:

- washer
- oil seal ① **New**  
(with the fork seal driver weight and fork seal driver attachment)

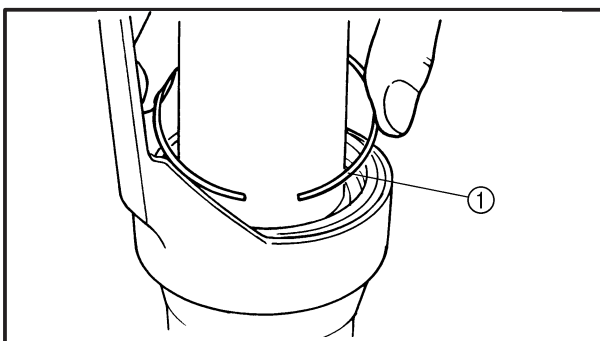
**CAUTION:**

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



**NOTE:**

- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag ② to protect the oil seal during installation.

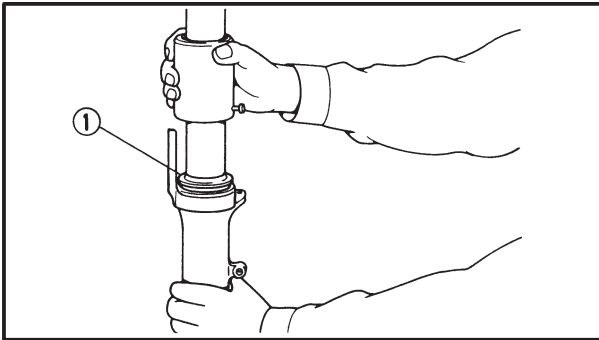


6. Install:

- oil seal clip ①

**NOTE:**

Adjust the oil seal clip so that it fits into the outer tube's 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)

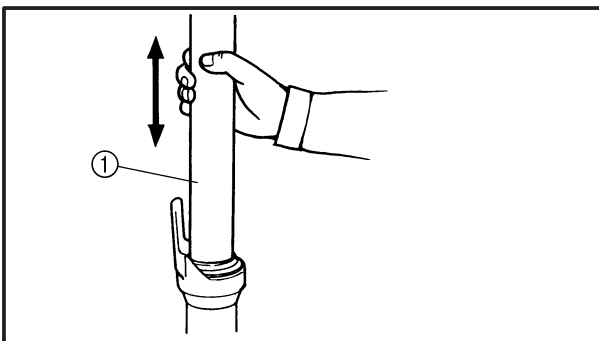


Quantity (each front fork leg)  
0.507 L

Recommended oil  
Yamaha fork and shock oil 10W  
or equivalent

### CAUTION:

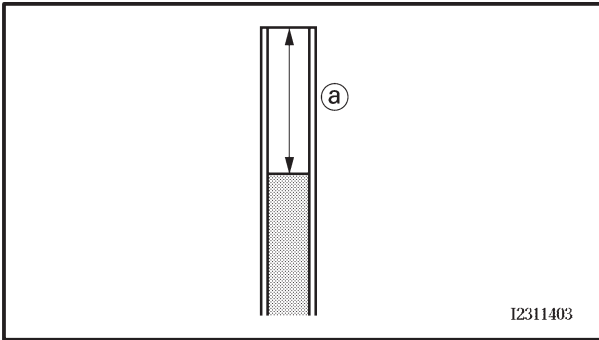
- Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.
- When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.



9. Slowly stroke the inner tube ① up and down.
10. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

### NOTE:

Be sure to bleed the front fork leg of any residual air.

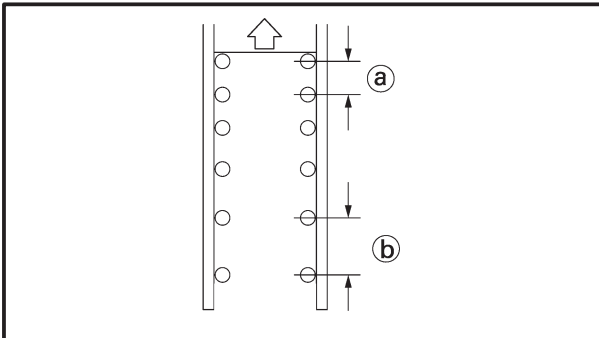


11. Measure:

- 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)**  
**133 mm**

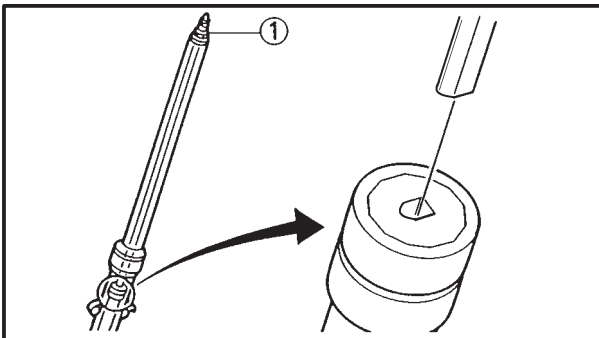


12. Install:

- spring
- spring seat
- spacer
- washer
- cap bolt (1)

**NOTE:**

- Install the spring with the smaller pitch (a) facing up.
- Before installing the cap bolt, apply grease onto the O-ring.
- Align the end of the cap bolt rod with the hole in the damper rod, then install the cap bolt rod and temporarily install the cap bolt.
- Temporarily tighten the cap bolt.



(b) larger pitch



EAS00662

**INSTALLING THE FRONT FORK LEGS**

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

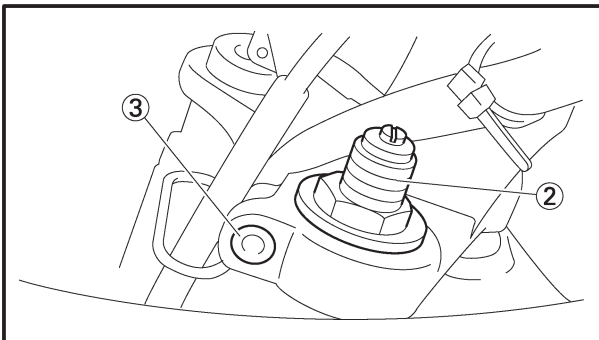
## 1. Install:

- front fork leg

Temporarily tighten the upper and lower bracket pinch bolts.

**NOTE:**

Make sure the inner fork tube is flush with the top of the handlebar holder.



## 2. Tighten:

- lower bracket pinch bolts (1)

	<b>28 Nm (2.8 m•kg)</b>
--	-------------------------

- cap bolt (2)

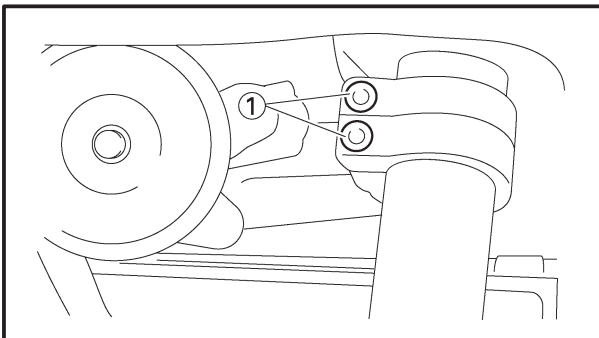
	<b>23 Nm (2.3 m•kg)</b>
--	-------------------------

- upper bracket pinch bolt (3)

	<b>26 Nm (2.6 m•kg)</b>
--	-------------------------

**⚠ WARNING**

Make sure the brake hoses are routed properly.



## 3. Install:

- front fender

## 4. Install:

- front wheel

Refer to “FRONT WHEEL AND BRAKE DISCS”.

- front brake caliper

	<b>40 Nm (4.0 m•kg)</b>
--	-------------------------

Refer to “FRONT AND REAR BRAKE”.

## 5. Adjust:

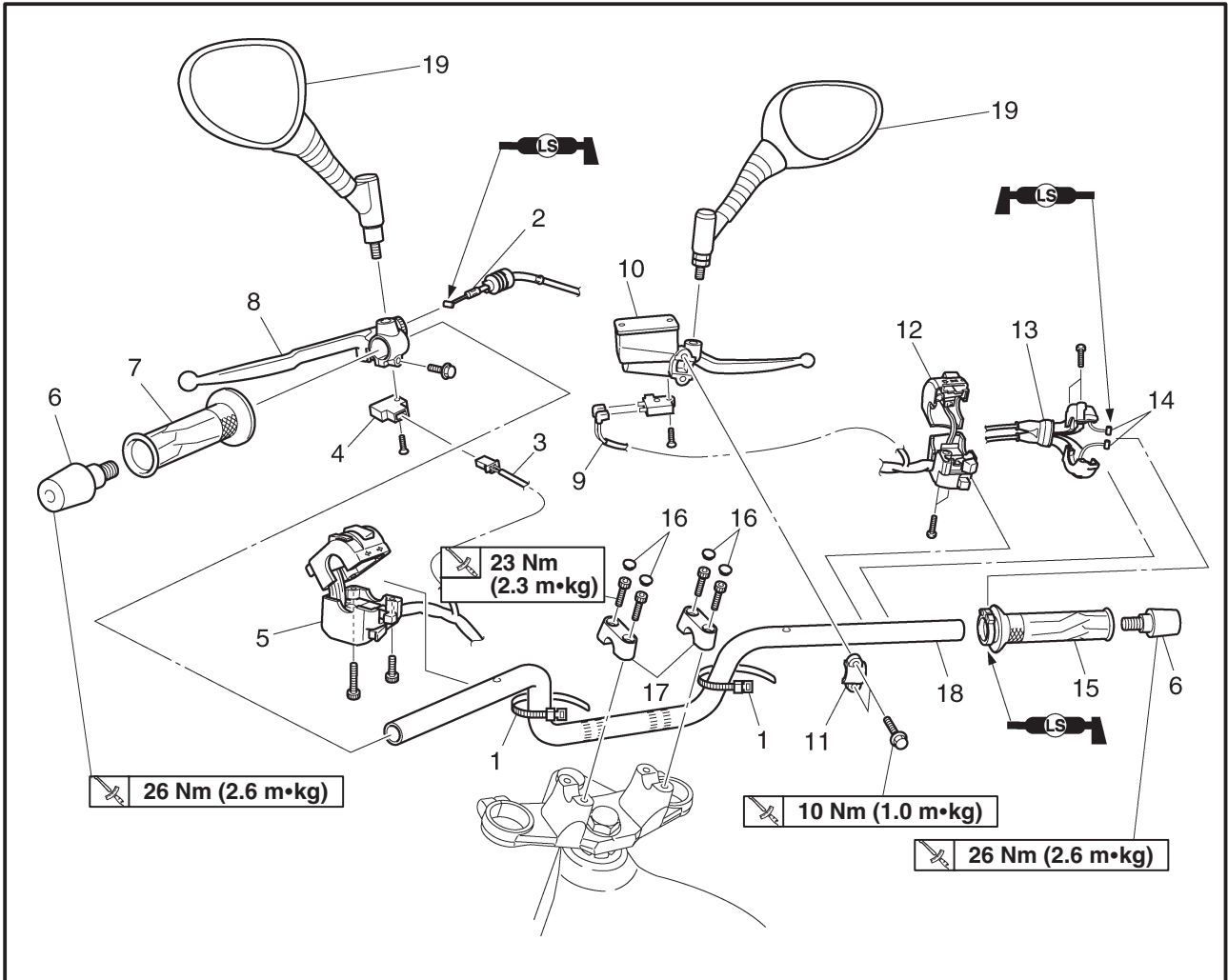
- spring preload

- rebound damping

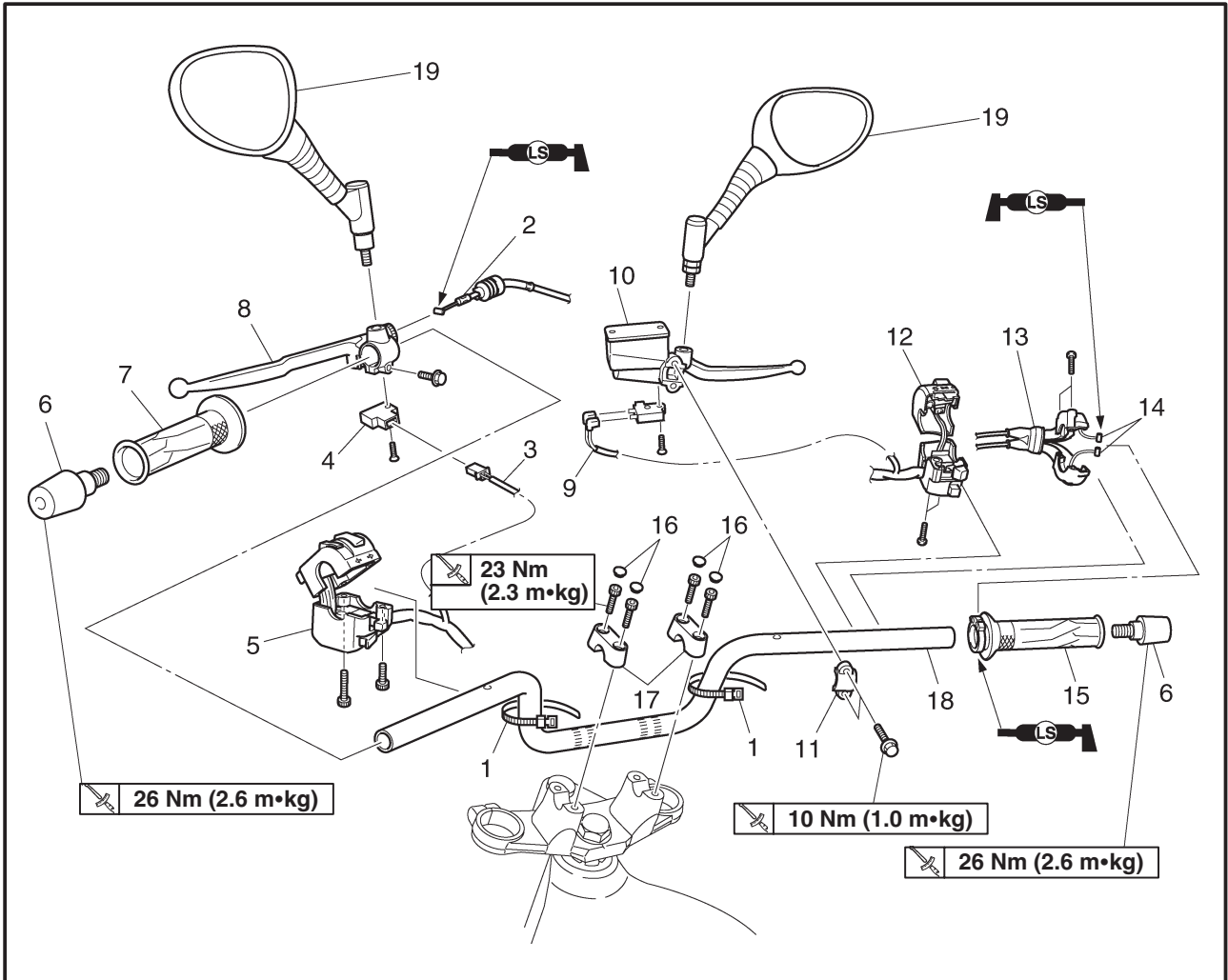
- Refer to “ADJUSTING THE FRONT FORK LEGS” in chapter 3.

EAS00664

**HANDLEBAR**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the handlebar</b>		Remove the parts in the order listed.
1	Band	2	
2	Clutch cable	1	
3	Clutch switch lead coupler	1	Disconnect.
4	Clutch switch	1	
5	Left handlebar switch	1	
6	Grip end	2	
7	Handlebar grip (left)	1	
8	Clutch lever assembly	1	
9	Front brake light switch lead coupler	1	Disconnect.
10	Master cylinder assembly	1	
11	Master cylinder bracket	1	
12	Right handlebar switch	1	
13	Throttle cable housing	1	
14	Throttle cable	2	
15	Throttle grip	1	
16	Plug	4	



Order	Job/Part	Q'ty	Remarks
17	Upper handlebar holder	2	For installation, reverse the removal procedure.
18	Handlebar	1	
19	Rear view mirror	2	



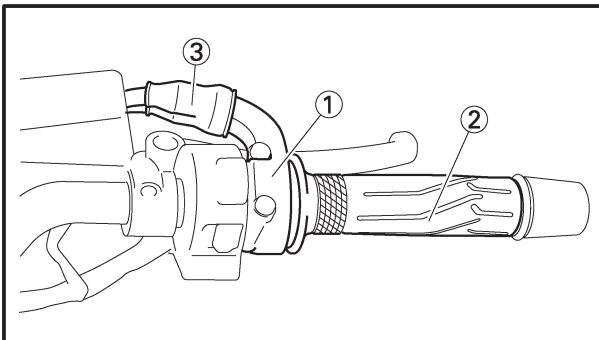
EAS00666

**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:

- throttle cable housing (1)
- throttle grip (2)

**NOTE:**

While removing the throttle cable housing, pull back the rubber cover (3).

3. Remove:

- handlebar switch (left and right)

4. Remove:

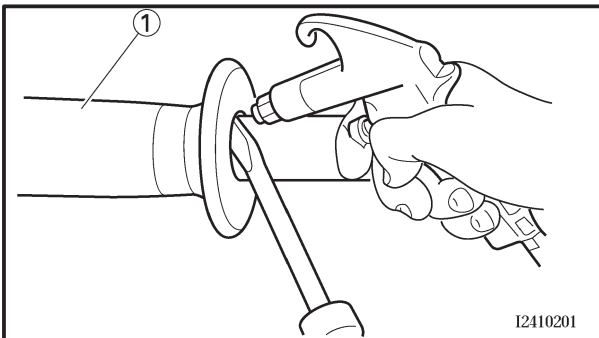
- upper handlebar holder

5. Remove:

- handlebar grip (1)

**NOTE:**

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



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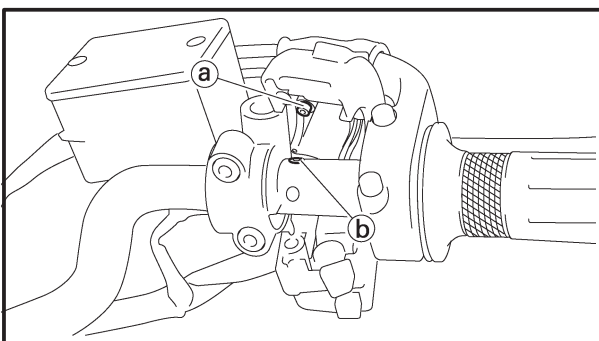
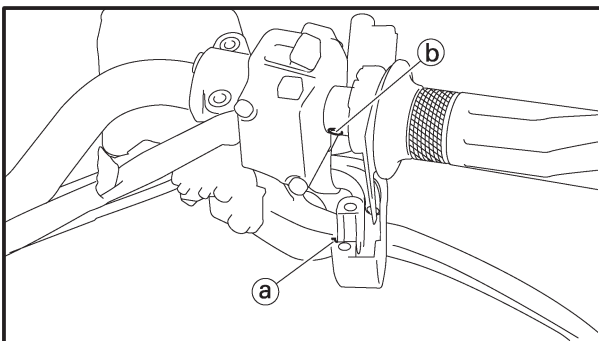
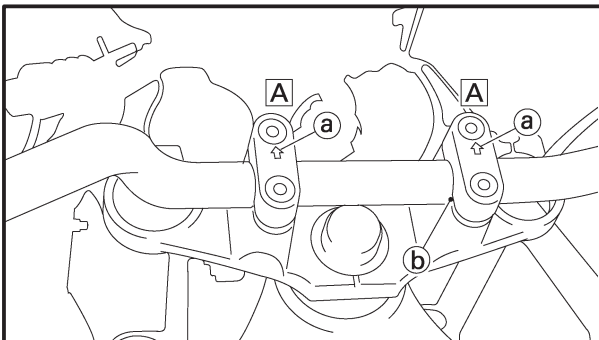
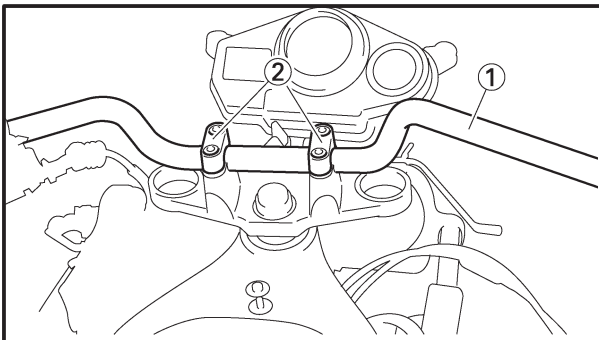
EAS00670

**INSTALLING THE HANDLEBAR**

1. Stand the motorcycle on a level surface.

**⚠ WARNING**

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



2. Install:

- handlebar ①
- upper handlebar holders ②

23 Nm (2.3 m•kg)

**CAUTION:**

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

**NOTE:**

- The upper handlebar holders should be installed with the arrow marks ① facing forward **A**.
- Align the match marks ② on the handlebar with the upper surface of the lower handlebar holders.

3. Install:

- throttle grip
- throttle cable housing
- throttle cable

**NOTE:**

Align the projection ① on the throttle cable housing with the hole ② in the handlebar.

4. Install:

- left handlebar switch
- right handlebar switch

**NOTE:**

Align the projections ① on the handlebar switches with the hole ② in the handlebar.



5. Install:
  - clutch cable
6. Connect:
  - clutch switch coupler

**NOTE:**

Lubricate the end of the clutch cable with a thin coat of lithium-soap-based grease.

7. Adjust:
  - clutch cable free playRefer to “ADJUSTING THE CLUTCH CABLE FREE PLAY” in chapter 3.



**Clutch cable free play (at the end of the clutch lever)**

**10 ~ 15 mm**

8. Adjust:
  - throttle cable free playRefer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in chapter 3.

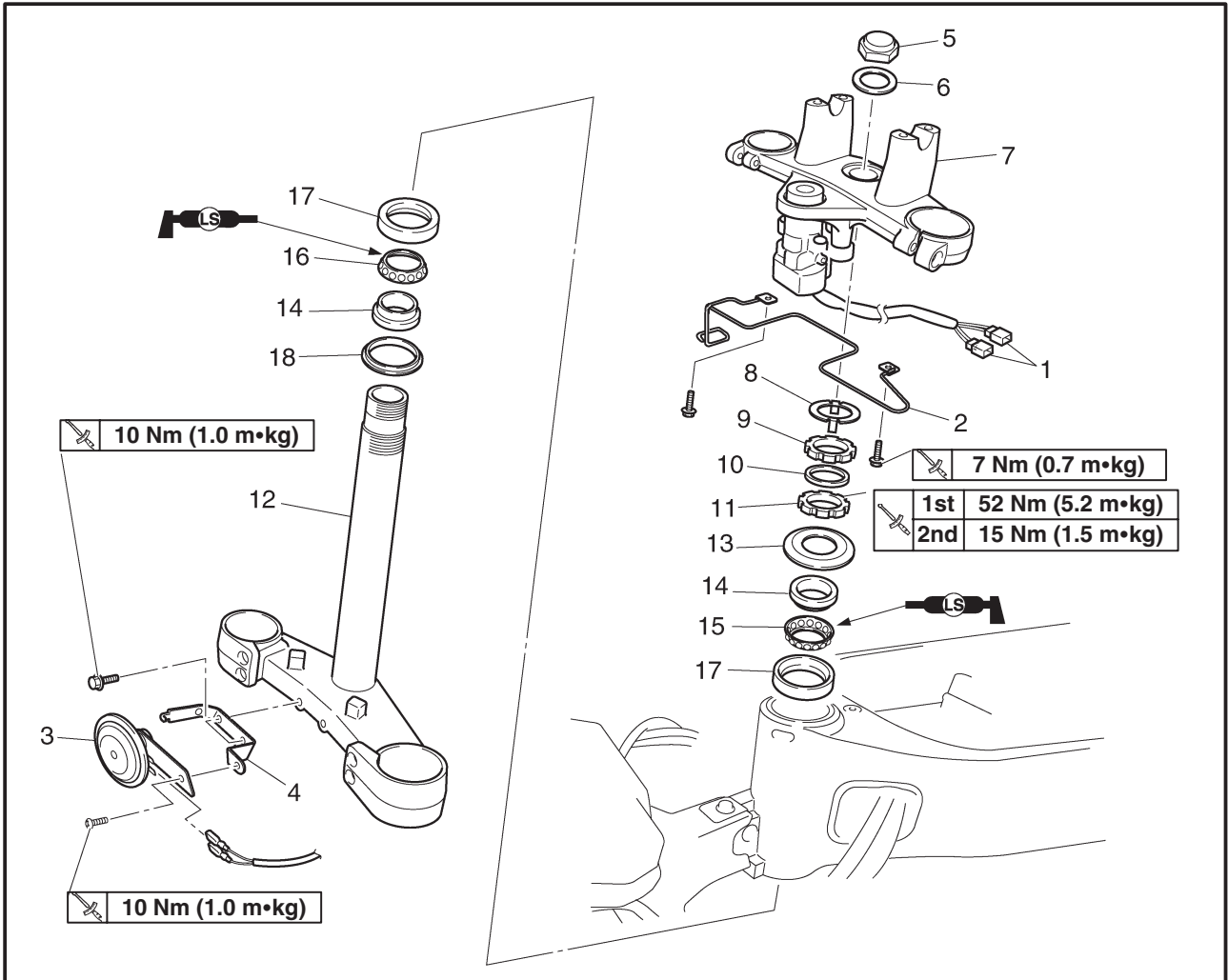


**Throttle cable free play (at the flange of the throttle grip)**

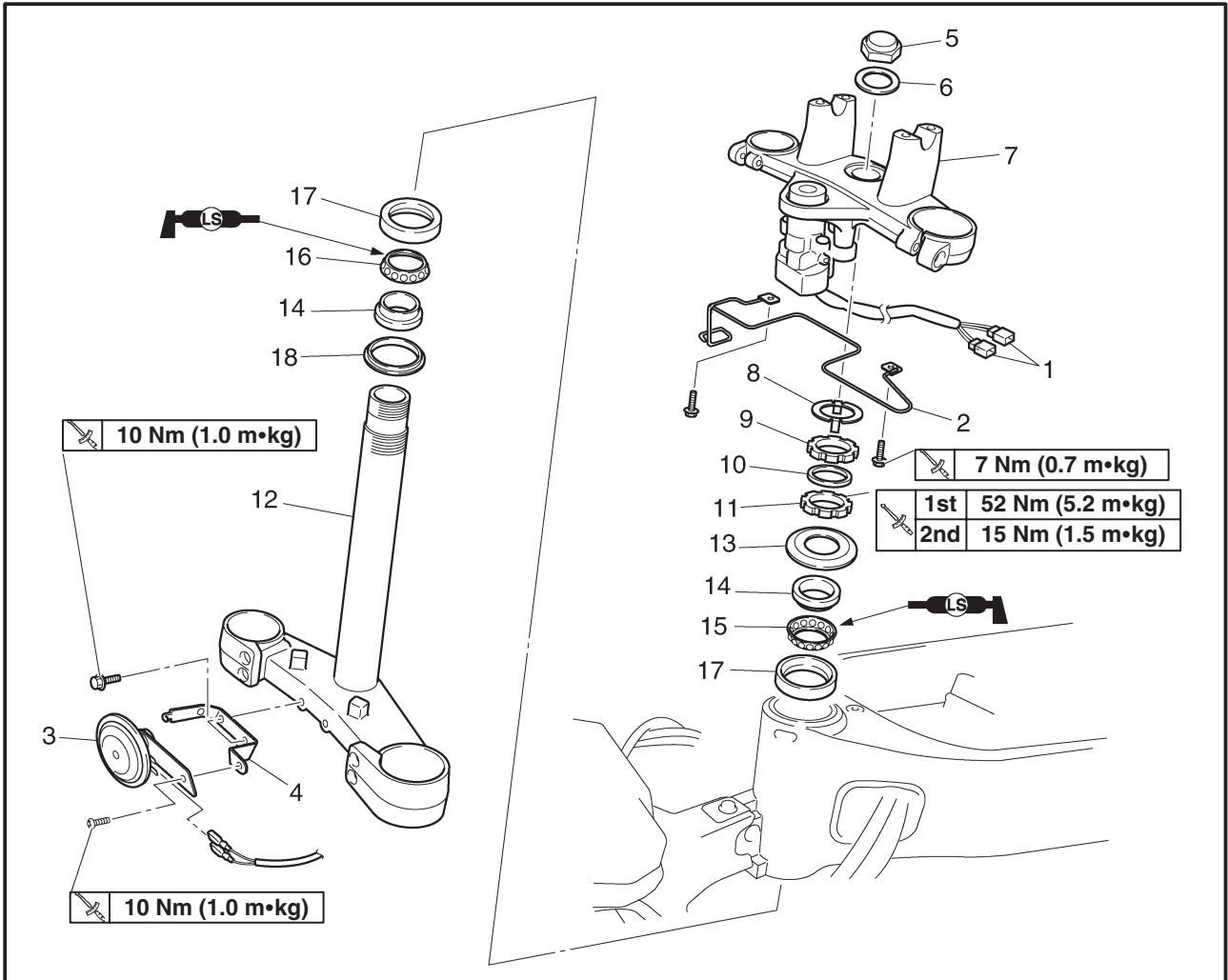
**3 ~ 5 mm**

EAS00676

STEERING HEAD



Order	Job/Part	Q'ty	Remarks
	<b>Removing the lower bracket</b>		
	Front wheel		Remove the parts in the order listed. Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front fork legs		Refer to "FRONT FORK".
	Handlebar		Refer to "HANDLEBAR".
1	Main switch lead coupler	1	Disconnect.
2	Cable guide	1	
3	Horn	1	
4	Brake hose bracket	1	
5	Steering stem nut	1	
6	Washer	1	
7	Upper bracket	1	
8	Lock washer	1	
9	Upper ling nut	1	



Order	Job/Part	Q'ty	Remarks
10	Rubber washer	1	
11	Lower ring nut	1	
12	Lower bracket	1	
13	Bearing cover	1	
14	Bearing inner race	1	
15	Upper bearing	1	
16	Lower bearing	1	
17	Bearing outer race	1	
18	Dust seal	1	
			For installation, reverse the removal procedure.



EAS00679

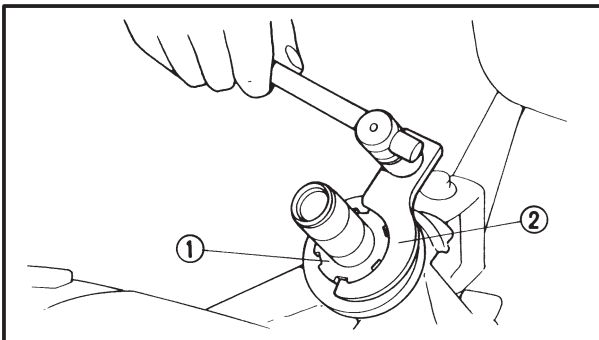
**REMOVING THE LOWER BRACKET**

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
  - steering stem nut
3. Remove:
  - upper ring nut
  - lower ring nut ① (with the special tool ②)



**Steering nut wrench**  
90890-01403

**⚠ WARNING**

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





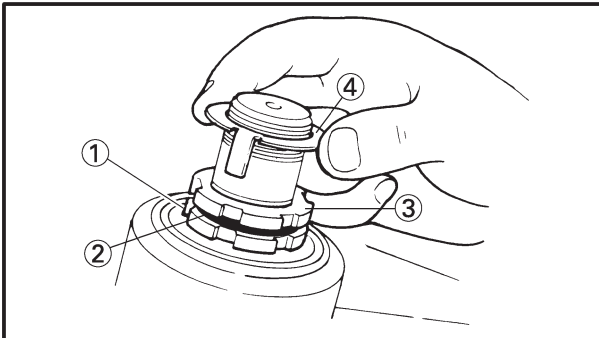
EAS00683

## INSTALLING THE STEERING HEAD

1. Lubricate:
  - upper bearing
  - lower bearing
  - bearing races



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



2. Install:
  - lower ring nut ①
  - rubber washer ②
  - upper ring nut ③
  - lock washer ④

Refer to “CHECKING THE STEERING HEAD” in chapter 3.
3. Install:
  - upper bracket
  - steering stem nut

**NOTE:** \_\_\_\_\_  
Temporarily tighten the steering stem nut.

4. Install:
  - front fork legs

Refer to “INSTALLING THE FRONT FORK LEGS”.

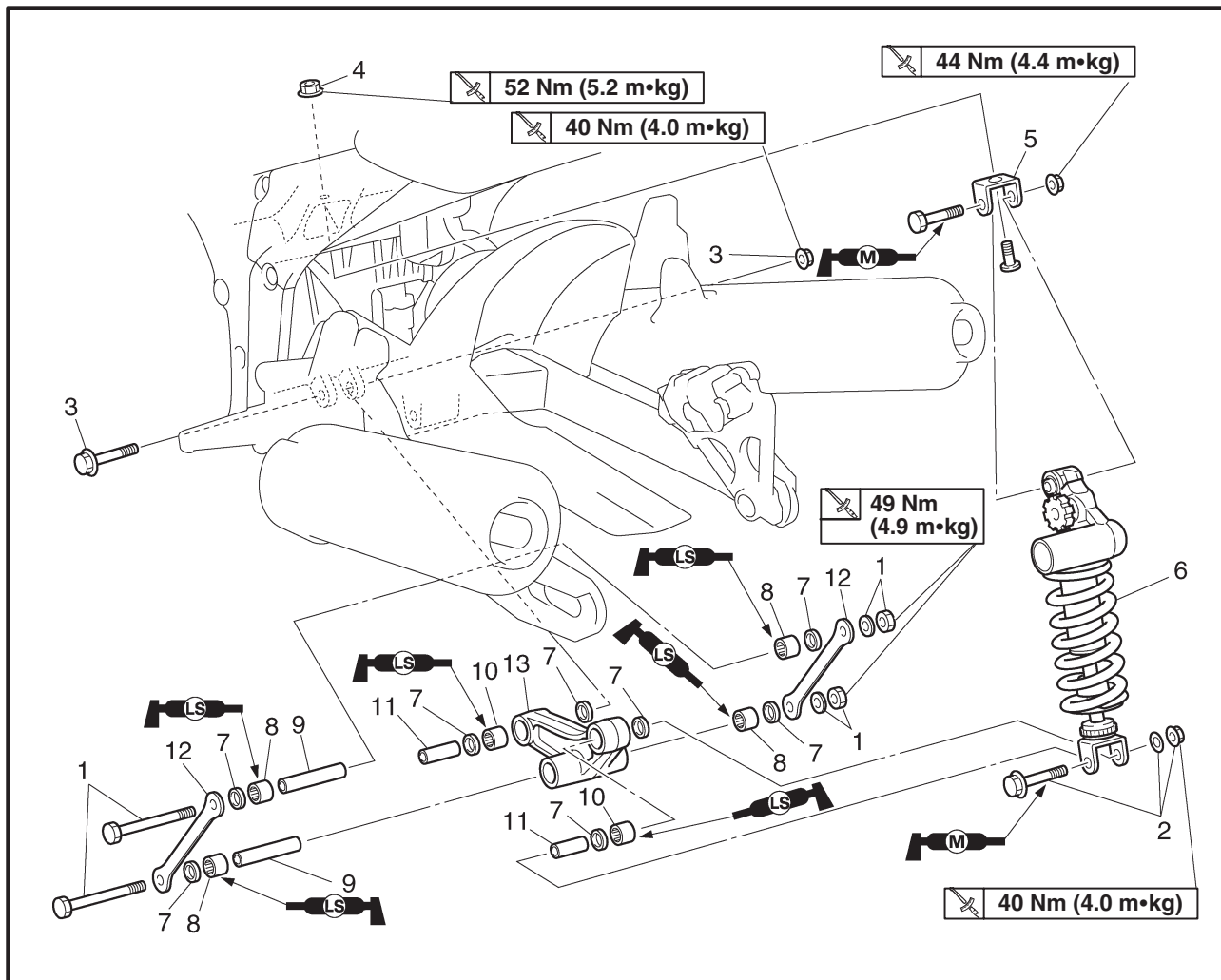
**NOTE:** \_\_\_\_\_  
Temporarily tighten the upper and lower bracket pinch bolts.

# REAR SHOCK ABSORBER ASSEMBLY



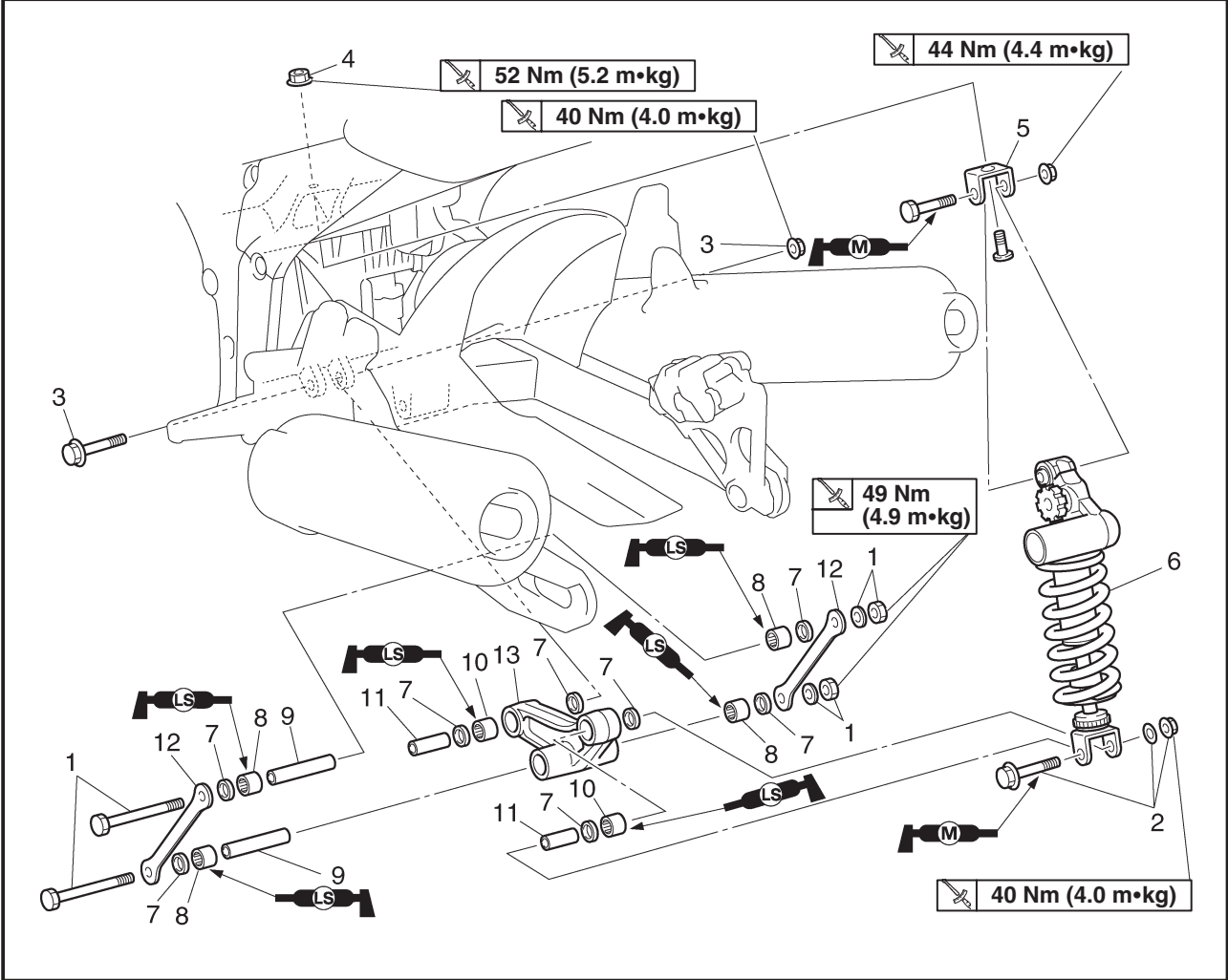
EAS00685

## REAR SHOCK ABSORBER ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear shock absorber assembly</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT" in chapter 3.
1	Nut/washer/bolt	2/2/2	
2	Nut/washer/bolt	1/1/1	
3	Nut/bolt	1/1	
4	Nut	1	
5	Rear shock absorber upper bracket	1	
6	Rear shock absorber	1	
7	Oil seal	8	
8	Bearing	4	
9	Collar	2	
10	Bearing	2	

# REAR SHOCK ABSORBER ASSEMBLY



Order	Job/Part	Q'ty	Remarks
11	Collar	2	For installation, reverse the removal procedure.
12	Connecting arm	2	
13	Relay arm	1	



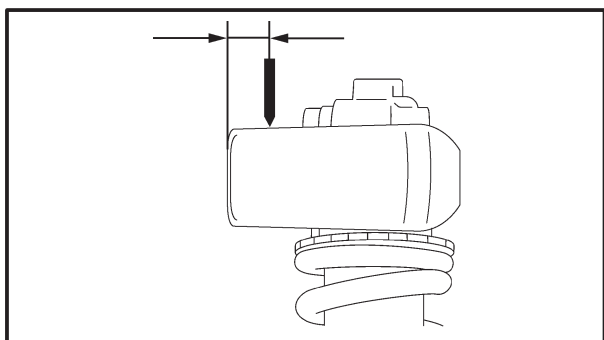
EAS00687

## HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

### **⚠ WARNING**

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

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



EAS00689

## DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

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

### **⚠ WARNING**

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

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:

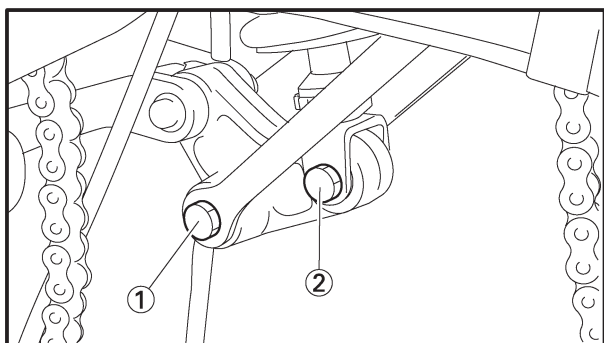
- battery leads (from the battery terminals)

### **CAUTION:**

First, disconnect the negative battery lead, then the positive battery lead.

3. Remove:

- battery

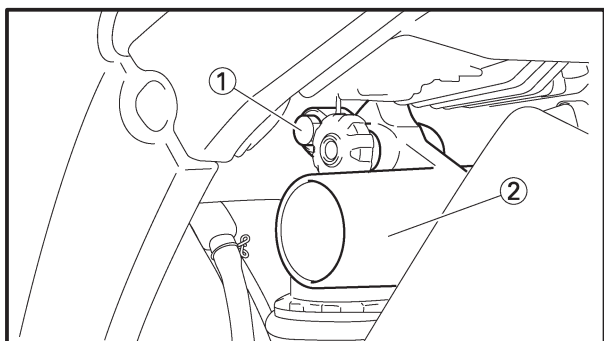


4. Remove:

- connecting arm bolt ①
- rear shock absorber assembly lower bolt ②

### **NOTE:**

While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.

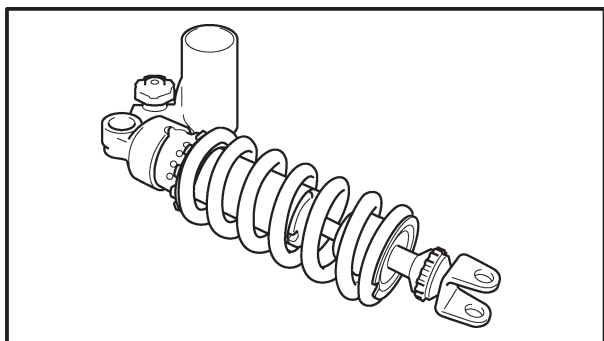


5. Remove:

- rear shock absorber assembly upper bolt ①
- rear shock absorber assembly ②

### **NOTE:**

Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm and relay arm.



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.

EAS00698

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
  - spacers
  - bearings

	<b>Recommended lubricant</b> <b>Molybdenum disulfide grease</b>
--	--

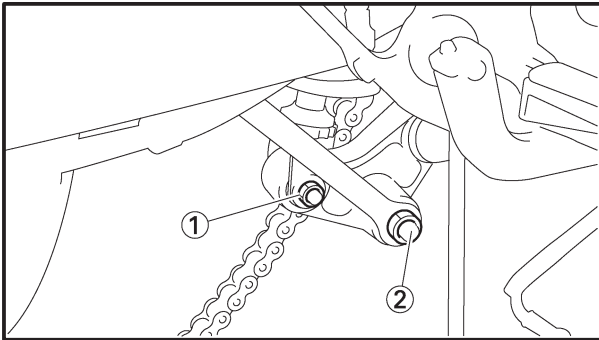
2. Install:
  - rear shock absorber upper bracket
  - rear shock absorber assembly

**44 Nm (4.4 m•kg)**

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


## REAR SHOCK ABSORBER ASSEMBLY

CHAS




### 3. Tighten:


- rear shock absorber assembly upper nut

 40 Nm (4.0 m•kg)


- rear shock absorber assembly lower nut ①

 40 Nm (4.0 m•kg)

- connecting arm nut ②

 40 Nm (4.0 m•kg)

- rear shock absorber upper bracket nut

 52 Nm (5.2 m•kg)

### 4. Connect:

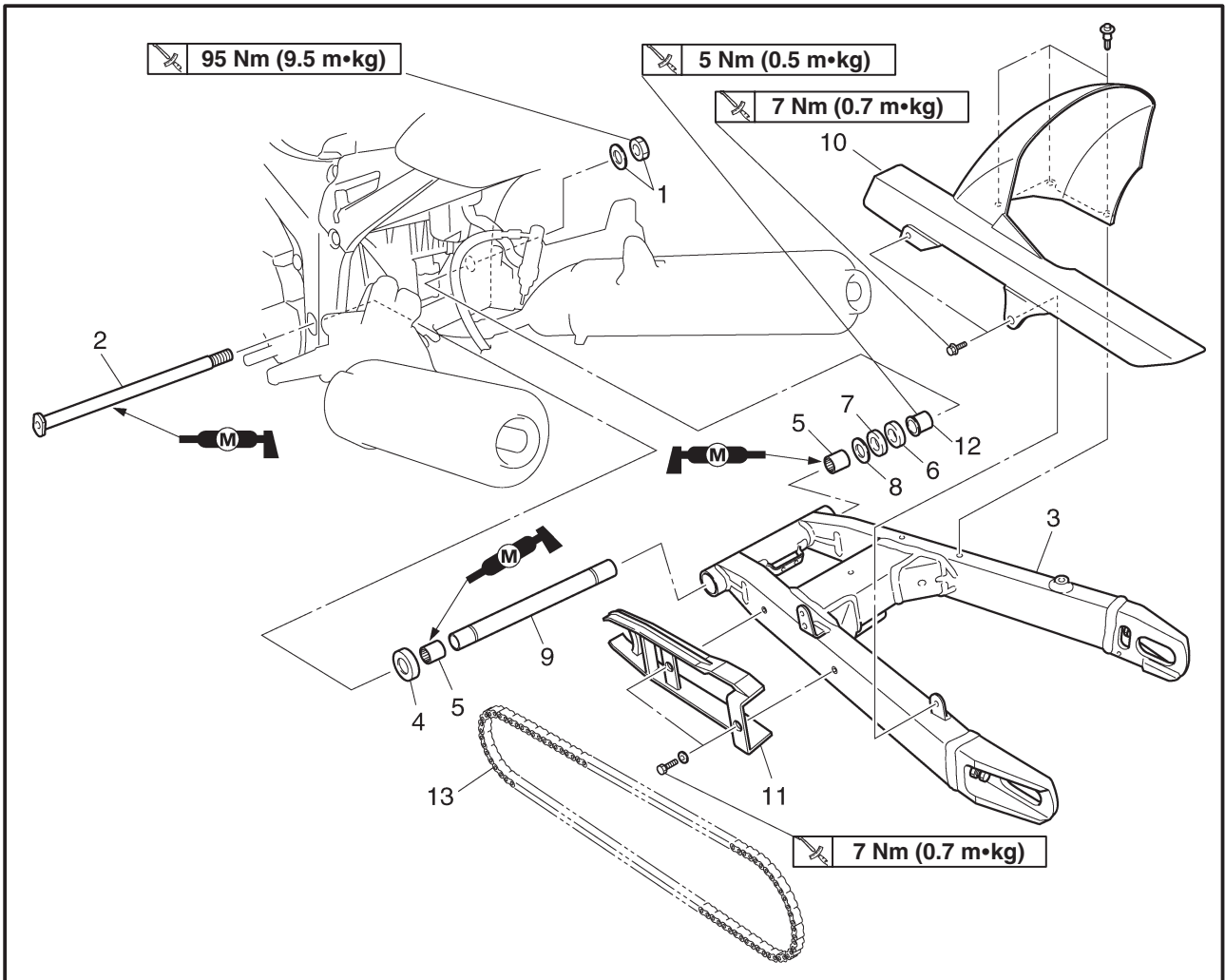
- battery leads  
(to the battery terminals)

### CAUTION:

First, connect the positive battery lead, then the negative battery lead.

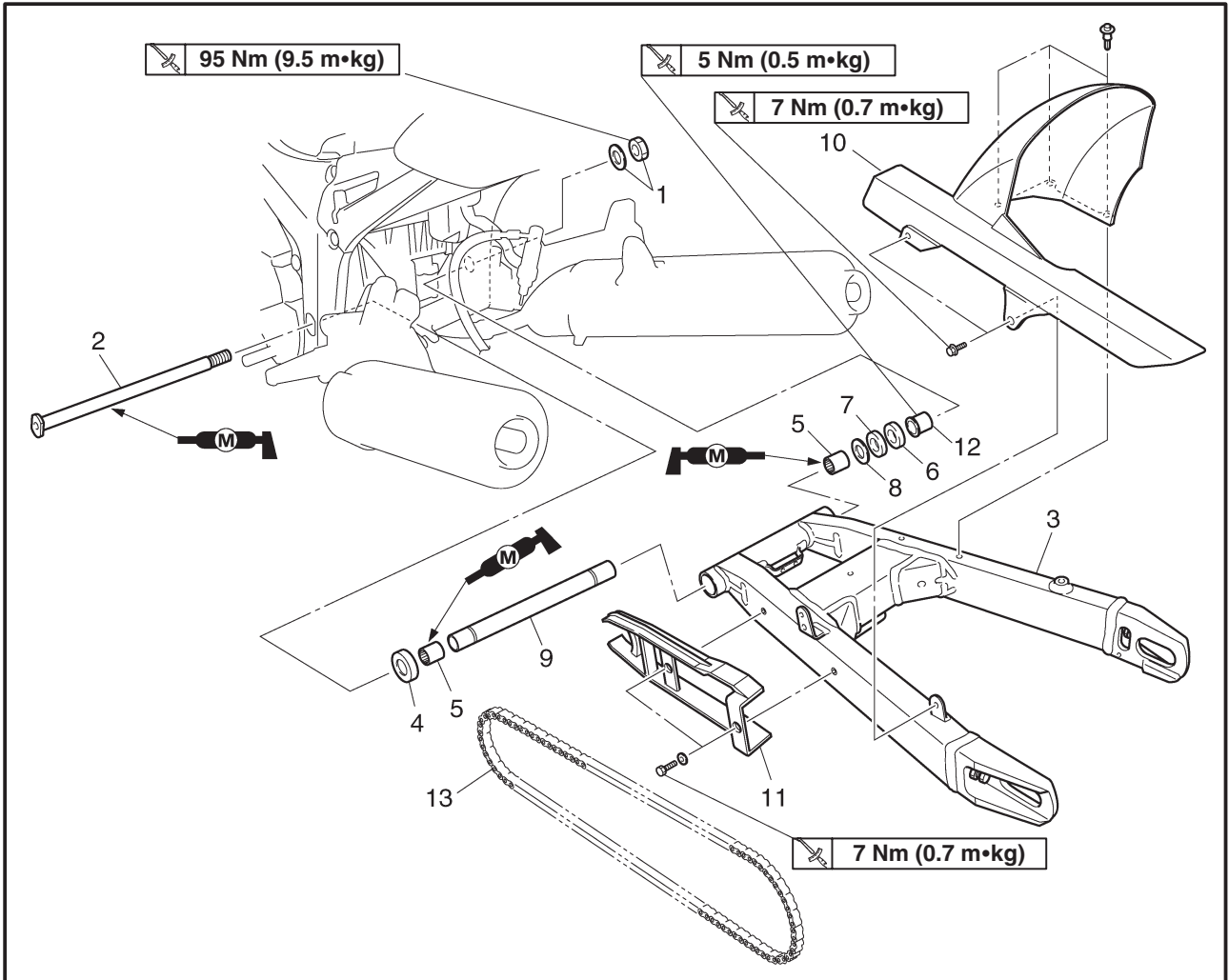
EAS00700

SWINGARM AND DRIVE CHAIN



Order	Job/Part	Q'ty	Remarks
	<b>Removing the swingarm and drive chain</b>		Remove the parts in the order listed.
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET".
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY".
1	Pivot shaft nut/washer	1/1	
2	Pivot shaft	1	
3	Swingarm	1	
4	Dust cover	1	

# SWINGARM AND DRIVE CHAIN



Order	Job/Part	Q'ty	Remarks
5	Bearing	2	
6	Collar	1	
7	Oil seal	1	
8	Washer	1	
9	Spacer	1	
10	Rear fender	1	
11	Chain protector	1	
12	Pivot shaft adjusting bolt	1	
13	Drive chain	1	
			For installation, reverse the removal procedure.





EAS00706

## REMOVING THE DRIVE CHAIN

1. Stand the motorcycle on a level surface.

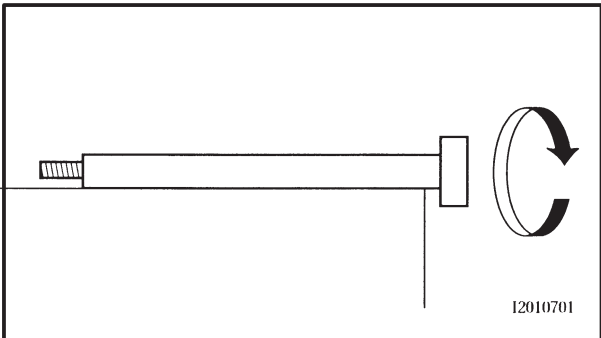
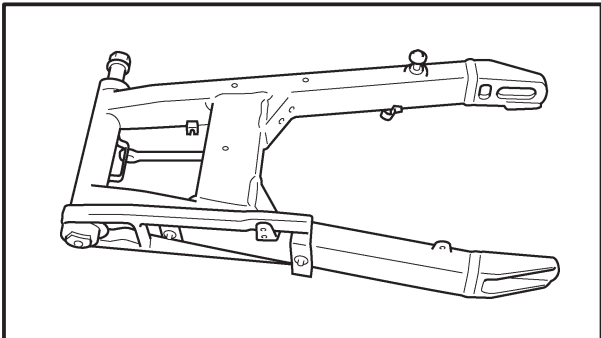
### **⚠ WARNING**

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:
  - swingarm
3. Remove:
  - drive chain



EAS00707

## CHECKING THE SWINGARM

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

2. Check:
  - pivot shaft
    - Roll the pivot shaft on a flat surface.
    - Bends → Replace.

### **⚠ WARNING**

Do not attempt to straighten a bent pivot shaft.

3. Wash:
  - pivot shaft
  - dust covers
  - spacer
  - washers
  - bearings

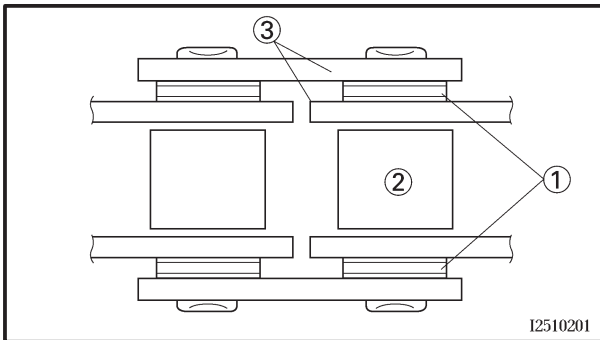
	<b>Recommended cleaning solvent</b> Kerosene
--	---





## SWINGARM AND DRIVE CHAIN

CHAS



I2510201

### 4. Check:

- O-rings ①  
Damage → Replace the drive chain, drive sprocket and rear wheel sprocket as a set.
- drive chain rollers ②  
Damage/wear → Replace the drive chain, drive sprocket and rear wheel sprocket as a set.
- drive chain side plates ③  
Damage/wear → Replace the drive chain, drive sprocket and rear wheel sprocket as a set.  
Cracks → Replace the drive chain, drive sprocket and rear wheel sprocket as a set and make sure the battery breather hose is properly routed away from the drive chain and below the swingarm.

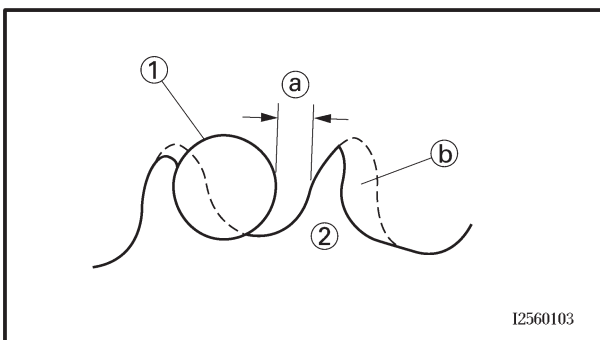
### 5. Lubricate:

- drive chain



### Recommended lubricant

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



I2560103

### 6. Check:

- drive sprocket
  - rear wheel sprocket  
More than 1/4 tooth ① wear → Replace the drive chain sprockets as a set.  
Bent teeth → Replace the drive chain sprockets as a set.
- ① Correct  
② Drive chain roller  
③ Drive chain sprocket



EAS00711

## INSTALLING THE SWINGARM

- Lubricate:
  - bearings
  - spacers
  - dust covers
  - pivot shaft



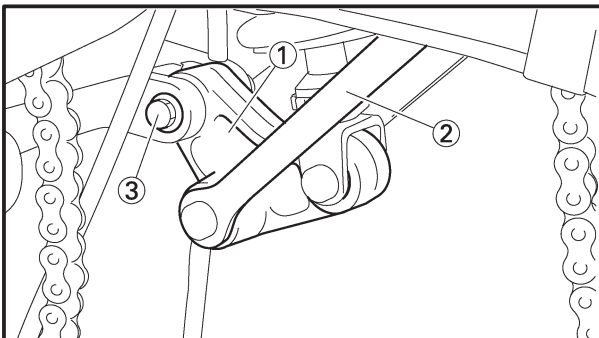
**Recommended lubricant**  
Molybdenum disulfide grease

- Lubricate:
  - drive chain



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

- Install:
  - drive chain (to the swingarm)
- Install:
  - swingarm (to the frame)

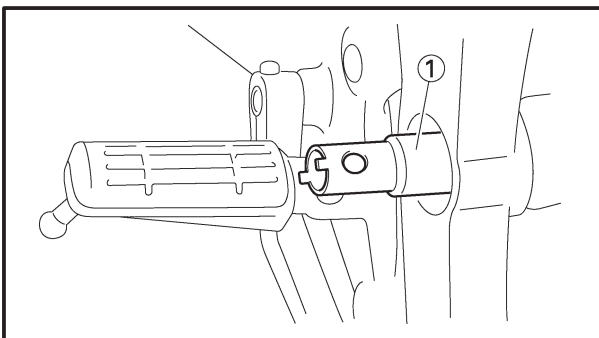


- Install:
  - relay arm ①
  - connecting arms ②

	<b>40 Nm (4.0 m•kg)</b>
	<b>49 Nm (4.9 m•kg)</b>

**NOTE:**

Install the connecting arm front bolt ③ from the left.



- Install:
  - pivot shaft adjusting bolt
  - swingarm
  - pivot shaft
  - washer
  - pivot shaft nut

	<b>95 Nm (9.5 m•kg)</b>
--	-------------------------

**NOTE:**

Use the pivot shaft wrench ① to tighten the pivot adjust bolt to finger tightness.



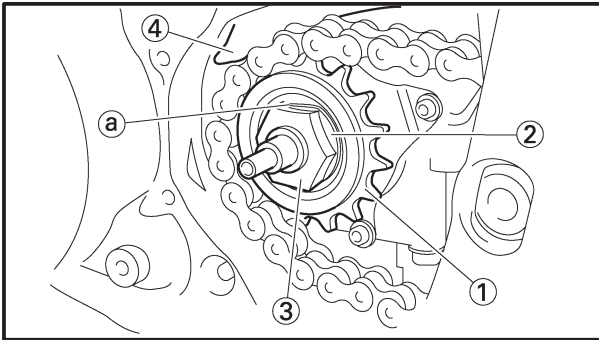
**Pivot shaft wrench**  
90890-01455

- Install:
  - rear shock absorber assembly
  - rear wheel

Refer to “INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY” and “INSTALLING THE REAR WHEEL”.

## SWINGARM AND DRIVE CHAIN

CHAS



8. Install:

- drive sprocket ①
- washer ② **New**
- drive sprocket nut ③
- drive chain guide ④

**85 Nm (8.5 m•kg)**

**NOTE:**

While applying the rear brake, tighten the drive sprocket nut.

9. Bend the lock washer tab ① along a flat side of the nut.

10. Adjust:

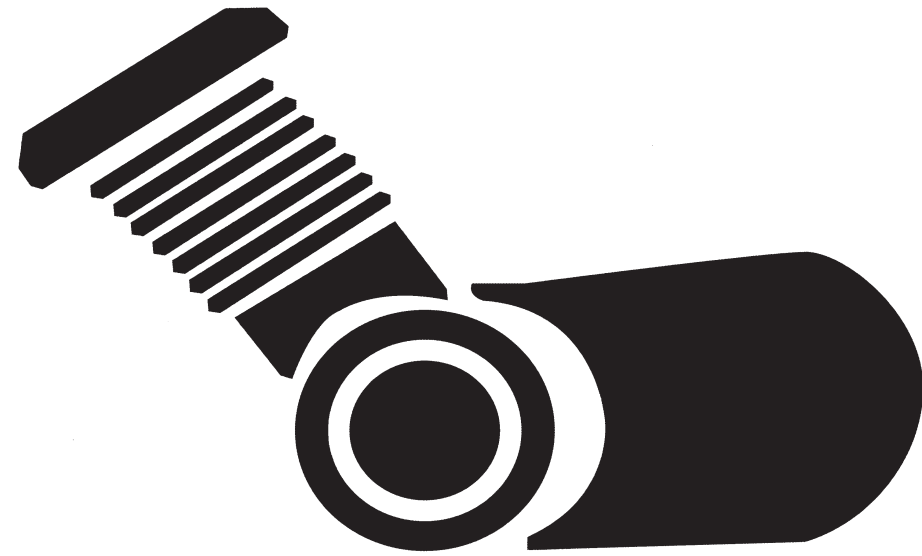
- drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” in chapter 3.



**Drive chain slack**  
50 ~ 60 mm

**CAUTION:**

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



**ENG**

**5**



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## CHAPTER 5 ENGINE

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ENG



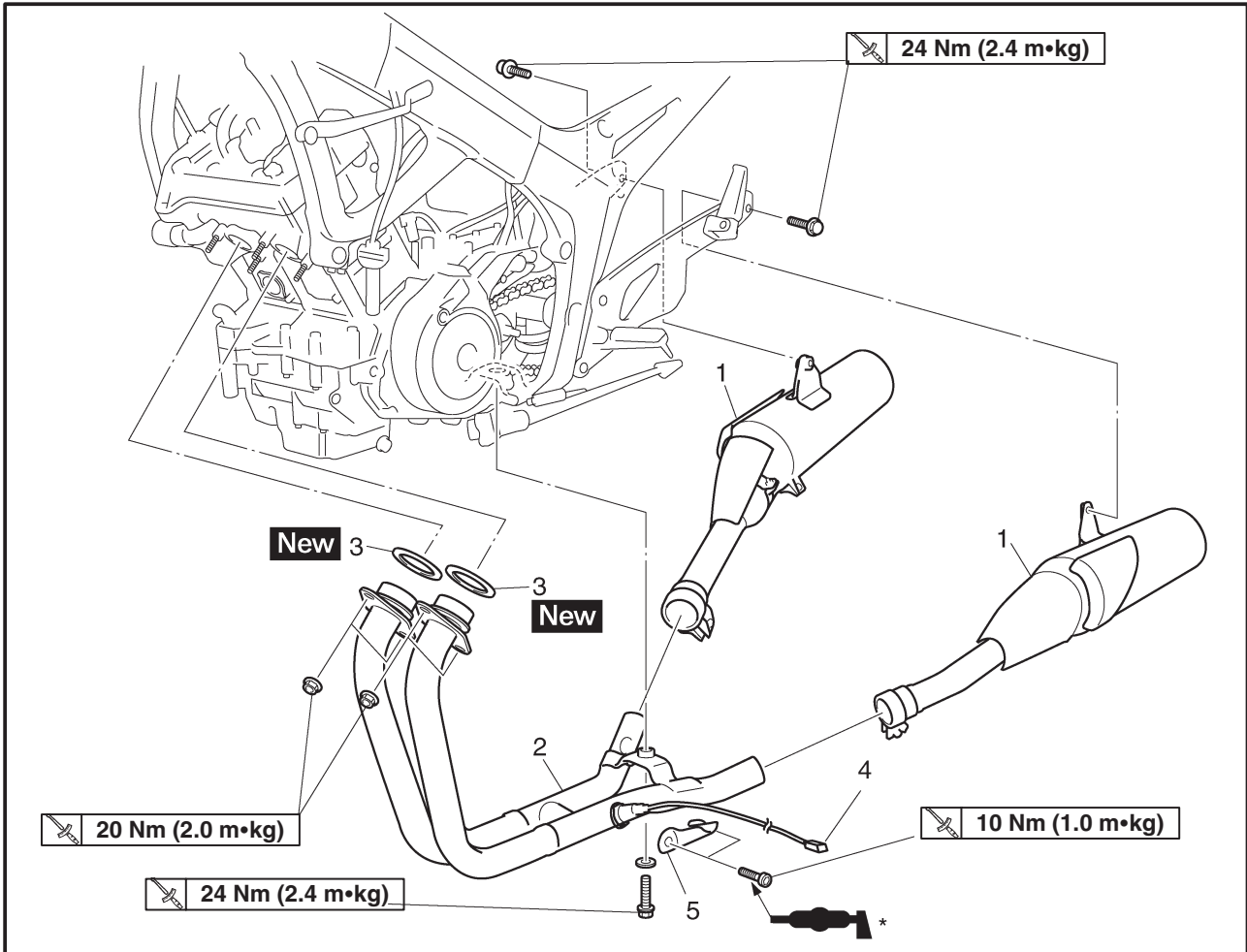


EAS00188

# ENGINE

## ENGINE EXHAUST PIPES

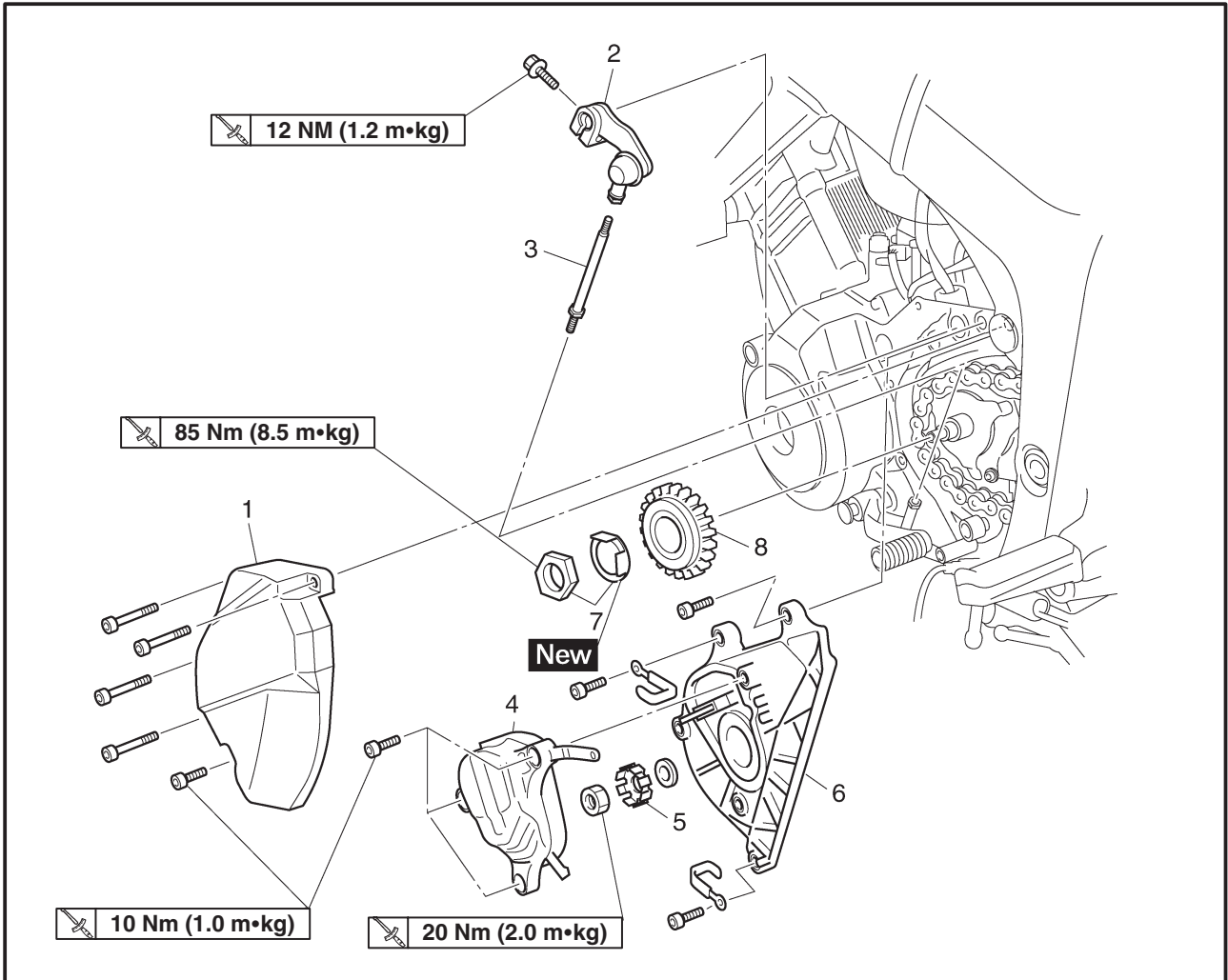
\* Anti-seize lubricant (high-temperature grade)



Order	Job/Part	Q'ty	Remarks
	<b>Removing the exhaust pipes</b>		Remove the parts in the order listed. <b>CAUTION:</b> _____ <b>First, disconnect the negative battery lead, and then the positive battery lead. For connecting, reverse the disconnection procedure.</b>
1	Muffler	1	
2	Exhaust pipe	1	
3	Gasket	2	
4	O <sub>2</sub> sensor coupler	1	Disconnect.
5	O <sub>2</sub> sensor protector	1	For installation, reverse the removal procedure.



DRIVE SPROCKET

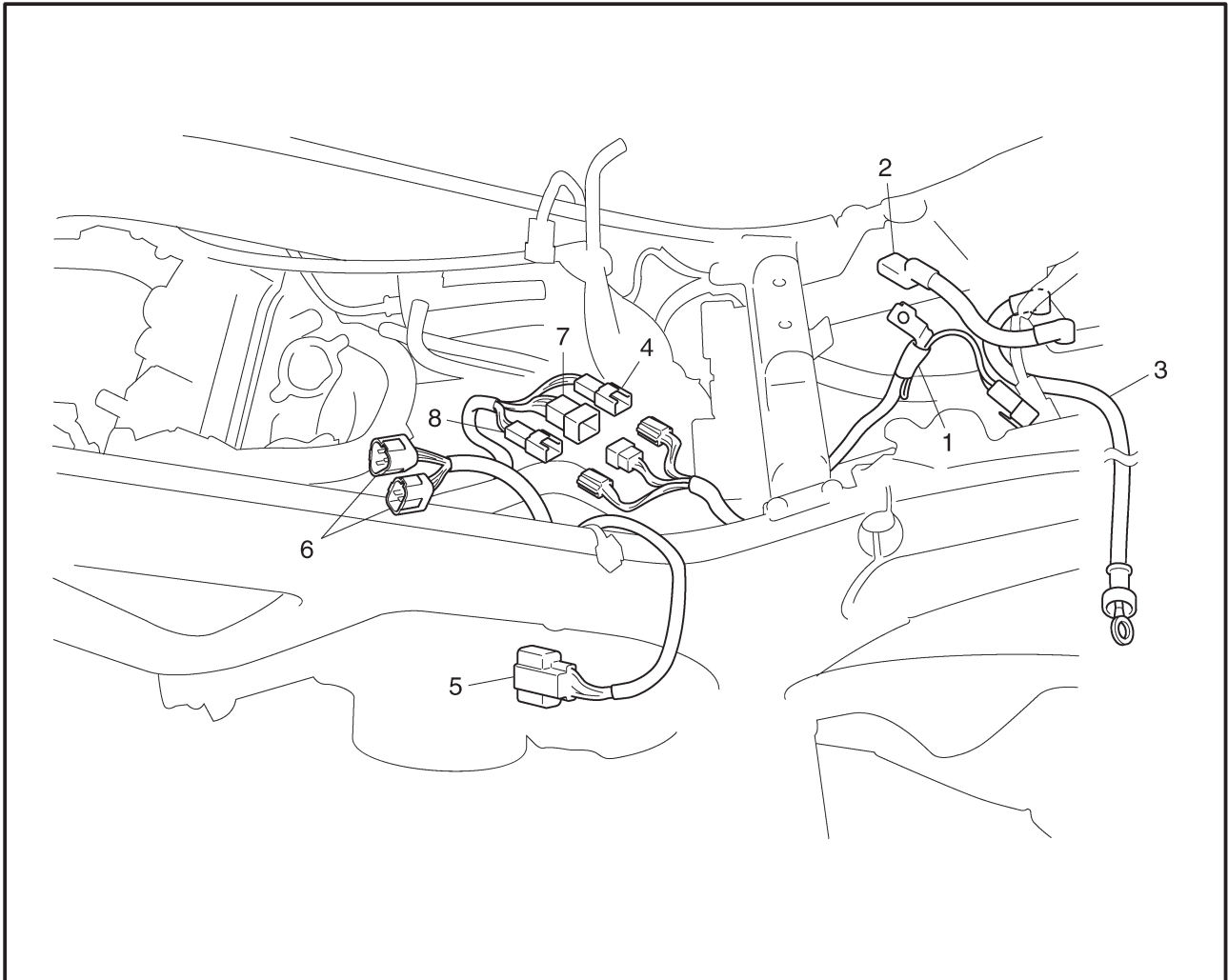


Order	Job/Part	Q'ty	Remarks
	<b>Removing the drive sprocket</b>		
1	Drive sprocket cover	1	Remove the parts in the order listed.
2	Shift arm	1	
3	Shift rod	1	
4	Cover 1	1	
5	Speed sensor rotor	1	
6	Cover 2	1	
7	Nut/lock washer	1/1	
8	Drive sprocket	1	
			For installation, reverse the removal procedure.

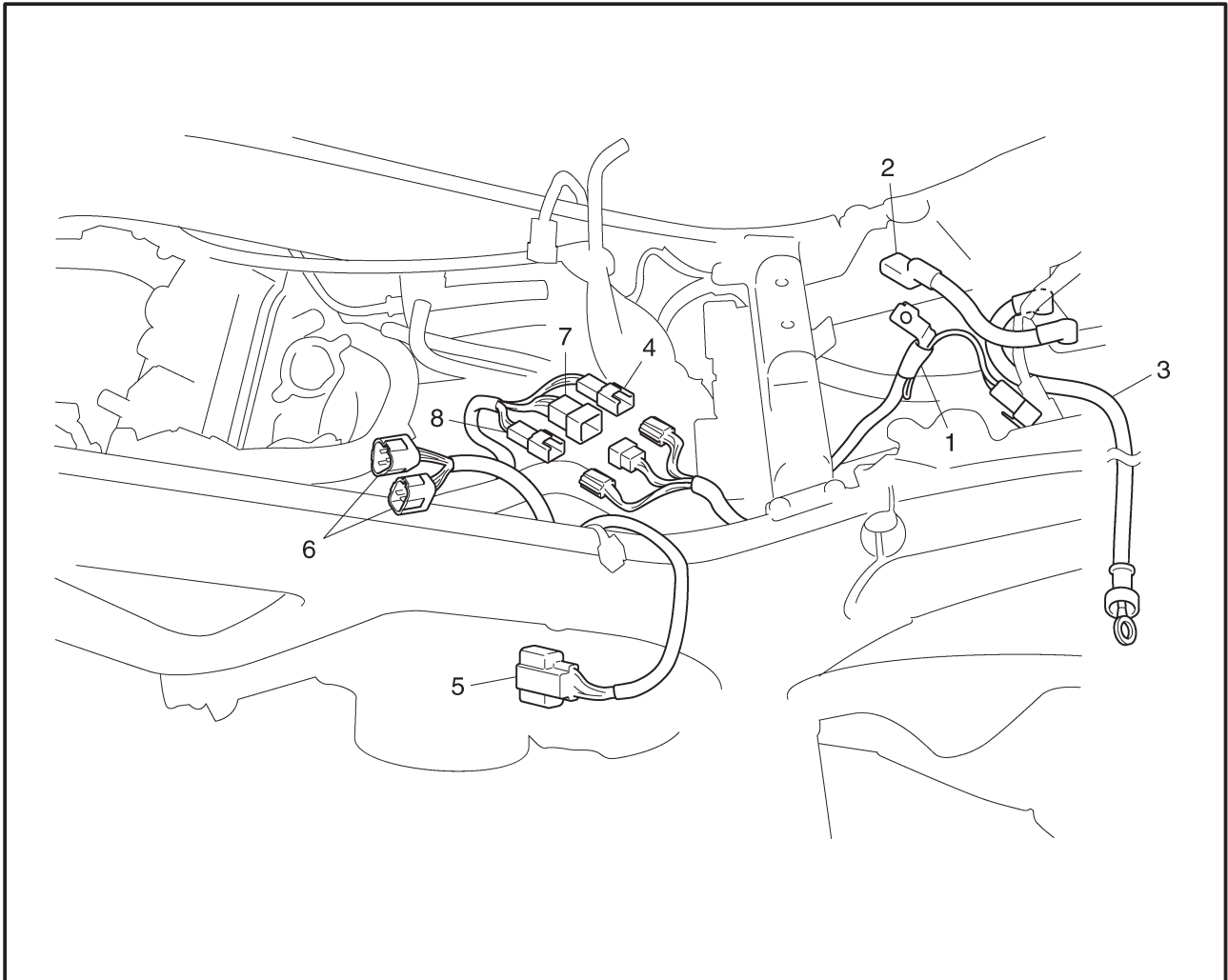


EAS00190

**LEADS AND HOSES**



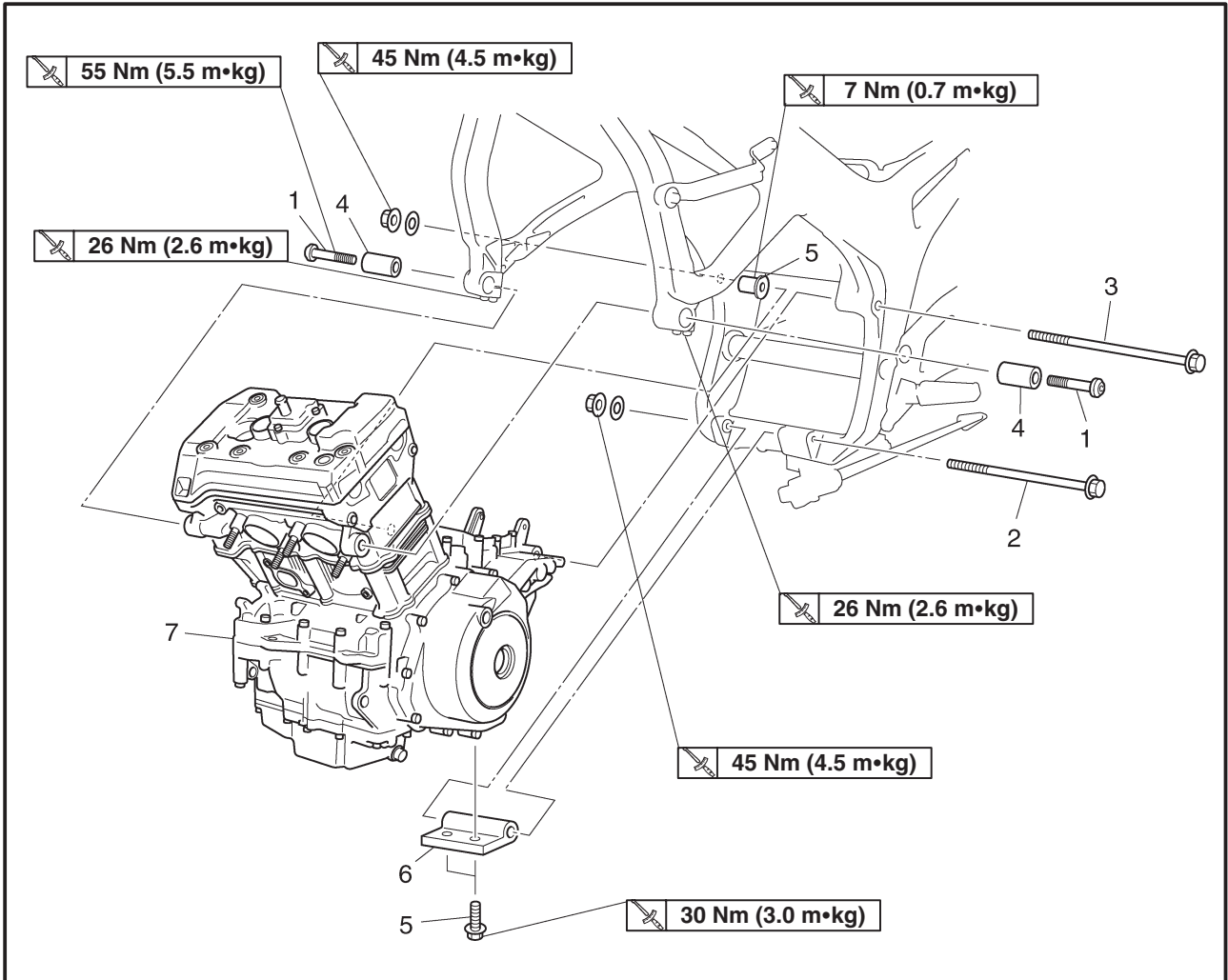
Order	Job/Part	Q'ty	Remarks
	<b>Removing the leads and hoses</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT", "FUEL TANK", "AIR FILTER CASE" in chapter 3.  Refer to "FUEL INJECTION SYSTEM" in chapter 7. Refer to "RADIATOR" in chapter 6.
	Side cover		
	Side cowlings		
	Fuel tank		
	Air filter case		
	Throttle body		
1	Radiator	1	
2	Battery negative lead	1	
	Battery positive lead	1	<b>CAUTION:</b> _____ <b>First, disconnect the negative battery lead, and then the positive battery lead. For connecting, reverse the disconnection procedure.</b>
3	Starter motor lead	1	Disconnect.



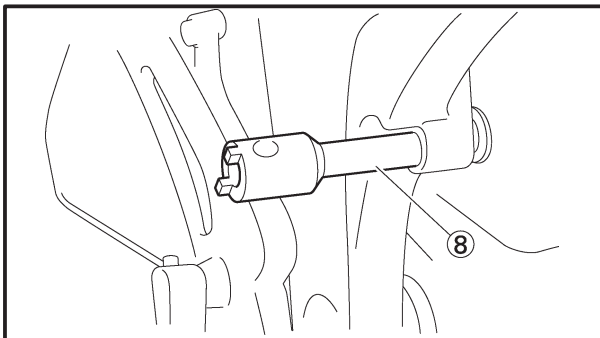
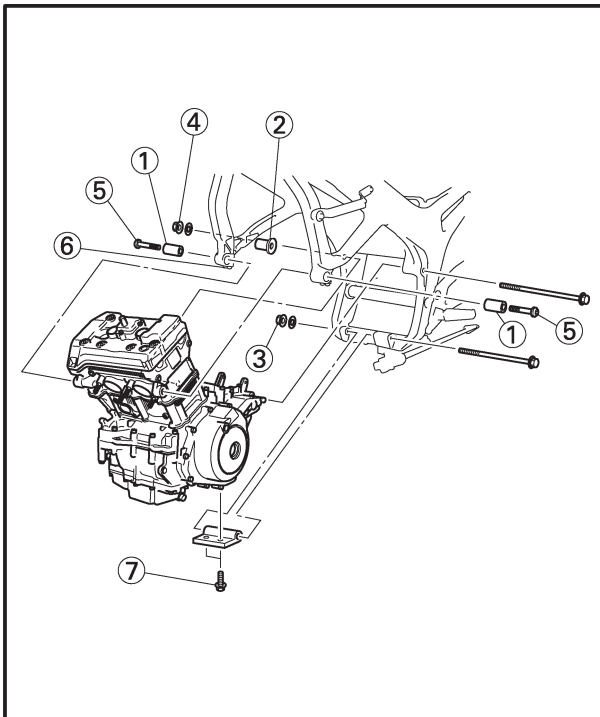
Order	Job/Part	Q'ty	Remarks
4	Neutral switch lead coupler	1	Disconnect.
5	Generator lead coupler	1	Disconnect.
6	Throttle body sub-wire harness coupler	2	Disconnect.
7	Speed sensor lead	1	Disconnect.
			For installation, reverse the removal procedure.

EAS00191

ENGINE



Order	Job/Part	Q'ty	Remarks
	<b>Removing the engine</b>		Remove the parts in the order listed. <b>NOTE:</b> _____ Place a suitable stand under the frame and engine.
	Starter motor		Refer to "STARTER MOTOR" in chapter 8.
1	Engine mounting bolt (front)	2	
2	Engine mounting bolt (rear lower)	1	
3	Engine mounting bolt (rear upper)	1	
4	Collar	2	
5	Adjusting bolt	2	
6	Engine bracket	1	
7	Engine	1	Refer to "INSTALLING THE ENGINE". For installation, reverse the removal procedure.



EAS00192







**INSTALLING THE ENGINE****1. Install:**

- collars ①
- adjusting bolt ②
- engine mounting nut (rear lower) ③
- engine mounting nut (rear upper) ④
- engine mounting bolts (front) ⑤
- pinch bolts ⑥
- engine bracket bolts ⑦

**NOTE:**

- Lubricate the rear mounting bolt threads with lithium soap base grease.
- Do not fully tighten the bolts.

**2. Tighten:**

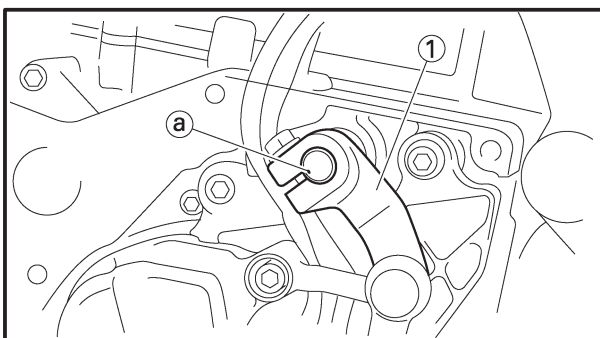
- adjusting bolt ②  **7 Nm (0.7 m•kg)**
- engine mounting nut (rear upper) ④  **45 Nm (4.5 m•kg)**
- engine mounting nut (rear lower) ③  **45 Nm (4.5 m•kg)**
- engine mounting bolts (front) ⑤  **55 Nm (5.5 m•kg)**
- pinch bolts ⑥  **26 Nm (2.6 m•kg)**
- engine bracket bolts ⑦  **30 Nm (3.0 m•kg)**

**NOTE:**

- Tighten the adjusting bolt ② to specification with a pivot shaft wrench ⑧.



**Pivot shaft wrench**  
90890-01471

**3. Install:**

- shift arm ①  **10 Nm (1.0 m•kg)**

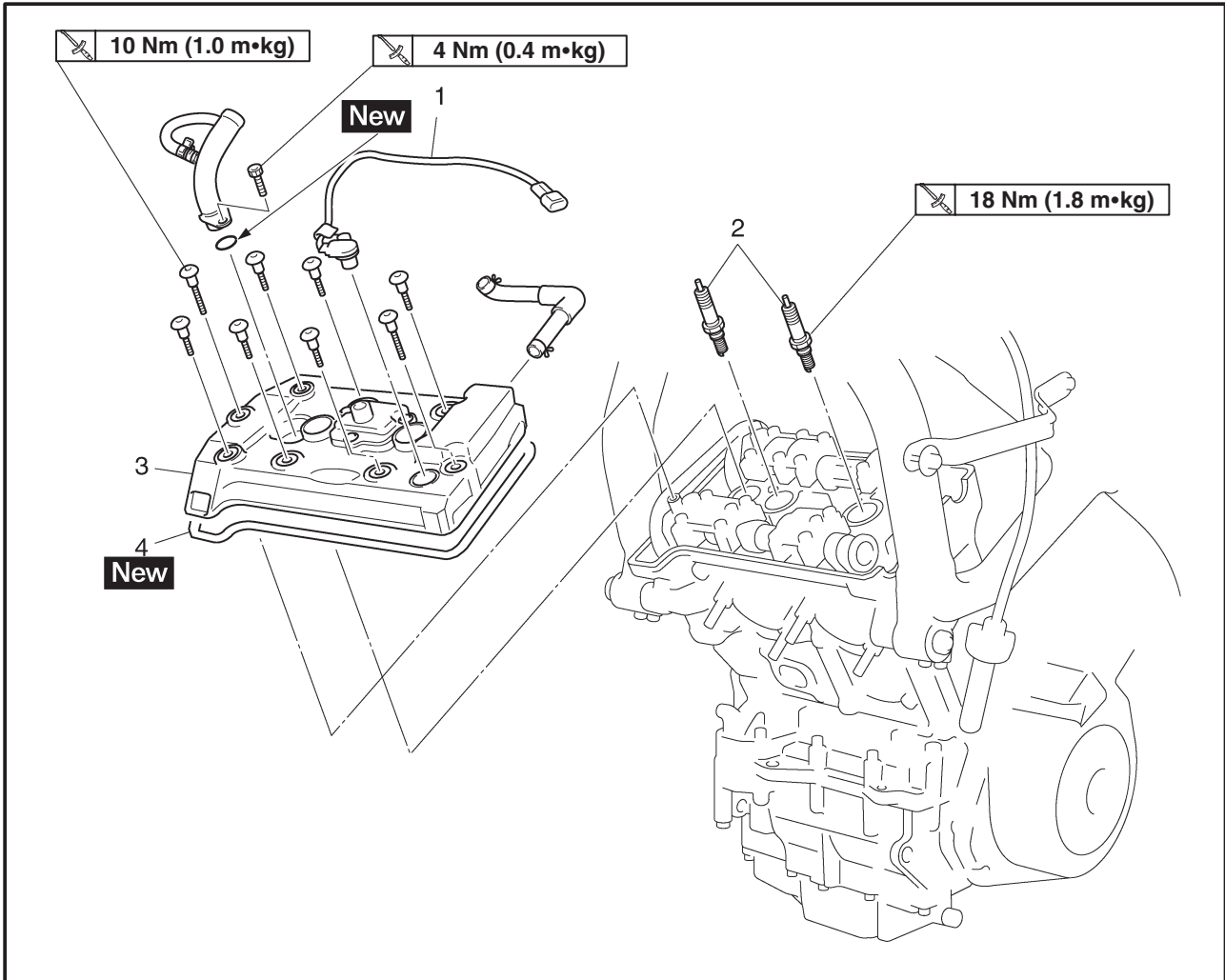
**NOTE:**

- Align the punch mark (a) in the shift shaft with the slot in the shift arm.



EAS00194

**CAMSHAFT  
CYLINDER HEAD COVER**

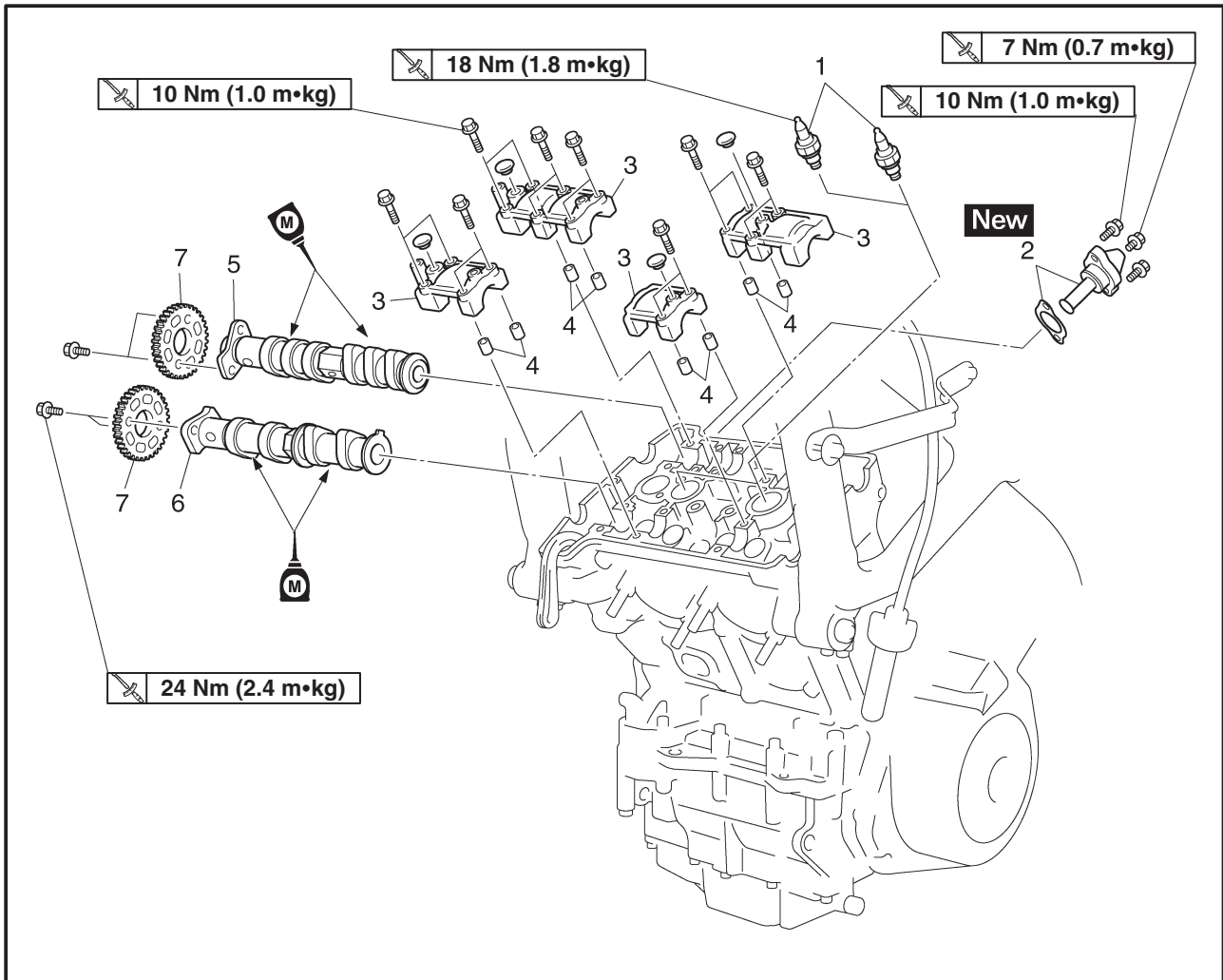


Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinder head cover</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT" in chapter 3.
	Side cowlings		Refer to "FRONT COWLINGS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	AI system		Refer to "AIR INDUCTION SYSTEM" in chapter 7.
	Radiator		Refer to "RADIATOR" in chapter 6.
	Thermostat assembly		
1	Cylinder identification sensor	1	
2	Spark plug	2	
3	Cylinder head cover	1	
4	Cylinder head gasket	1	
			For installation, reverse the removal procedure.



EAS00196

CAMSHAFTS

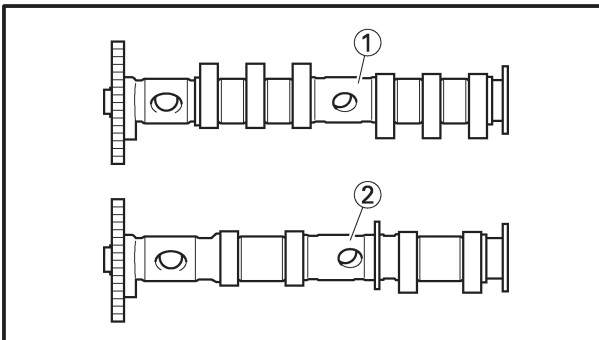


Order	Job/Part	Q'ty	Remarks
	<b>Removing the camshafts</b>		Remove the parts in the order listed.
1	Spark plug	2	
2	Timing chain tensioner/Gasket	1/1	
3	Camshaft cap	4	
4	Dowel pin	8	
5	Intake camshaft	1	
6	Exhaust camshaft	1	
7	Camshaft sprocket	2	
			For installation, reverse the removal procedure.



**CAUTION:**

To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

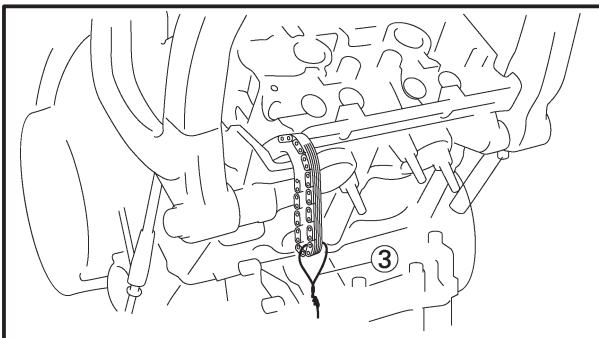


## 7. Remove:

- intake camshaft ①
- exhaust camshaft ②
- timing chain guide (exhaust side)

**NOTE:**

To prevent the timing chain from falling into the crankcase, fasten it with a wire ③.



## 8. Remove:

- camshaft sprocket

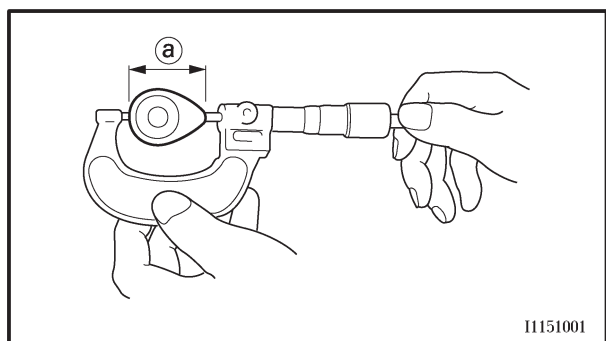


EAS00204

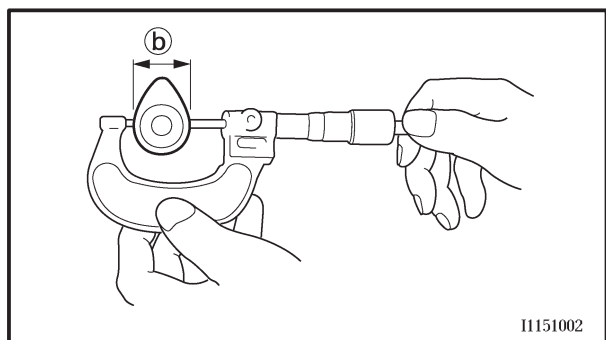
**CHECKING THE CAMSHAFTS**

## 1. Check:

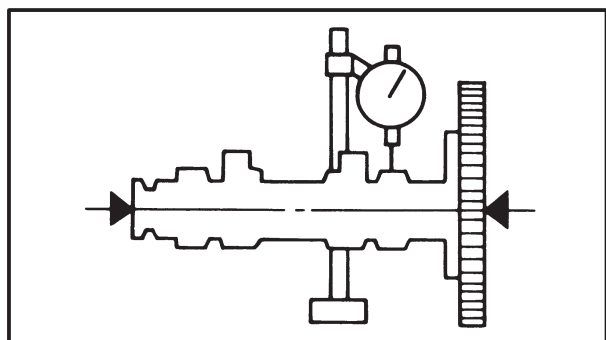
- camshaft lobes  
Blue discoloration/pitting/scratches → Replace the camshaft.



I1151001



I1151002



## 2. Measure:

- camshaft lobe dimensions (a) and (b)  
Out of specification → Replace the camshaft.

**Camshaft lobe dimension limit****Intake camshaft**

① 35.60 mm

② 27.85 mm

**Exhaust camshaft**

① 35.60 mm

② 27.85 mm

## 3. Measure:

- camshaft runout  
Out of specification → Replace.

**Camshaft runout limit****0.03 mm**

## 4. Measure:

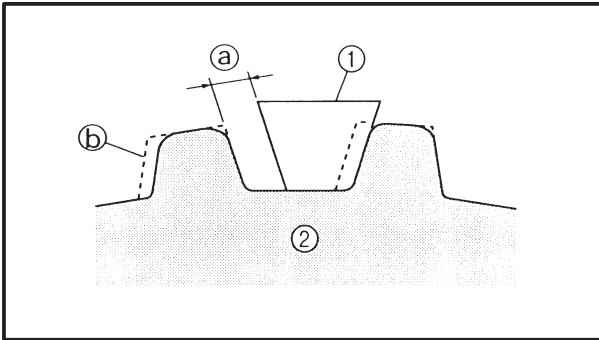
- camshaft-journal-to-camshaft-cap clearance  
Out of specification → Measure the camshaft journal diameter.

**Camshaft-journal-to-camshaft-cap clearance**

0.020 ~ 0.054 mm

&lt;Limit&gt;: 0.08 mm





EAS00208

### CHECKING CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

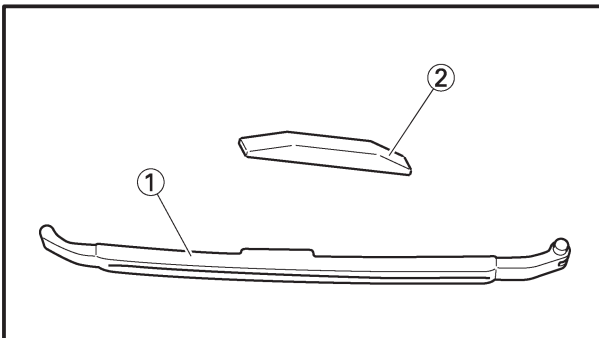
The following procedure applies to all of the camshaft sprockets and timing chain guides.

#### 1. Check:

- camshaft sprocket

More than 1/4 tooth wear (a) → Replace the camshaft sprockets and the timing chain as a set.

- (a) 1/4 tooth
- (b) Correct
- (1) Timing chain roller
- (2) Camshaft sprocket



#### 2. Check:

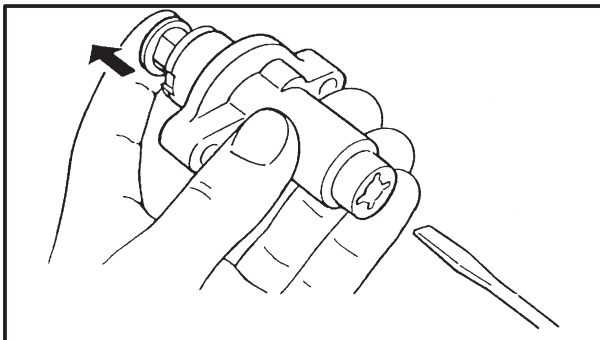
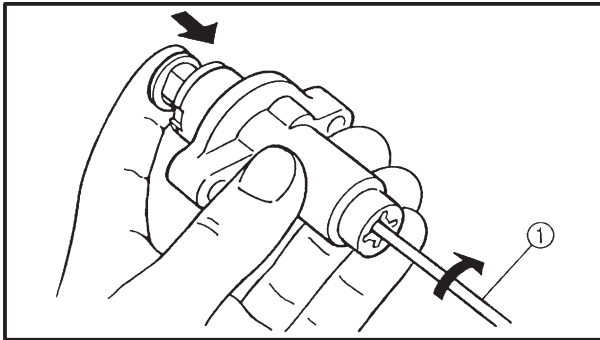
- timing chain guide (1) (exhaust side)
- timing chain guide (2) (top side)

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



EAS00210

**CHECKING THE TIMING CHAIN TENSIONER**



**1. Check:**

- timing chain tensioner  
Cracks/damage → Replace.

**2. Check:**

- one-way cam operation  
Rough movement → Replace the timing chain tensioner assembly.



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

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

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

\_\_\_\_\_

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

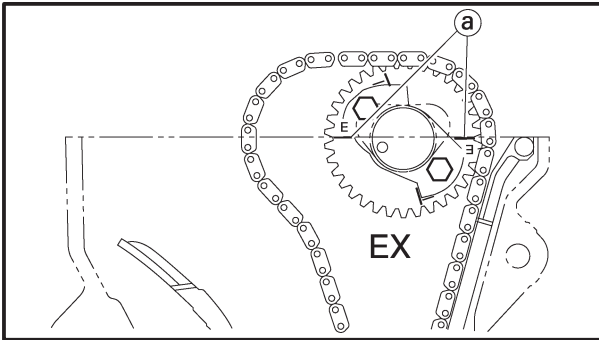
- c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



**3. Check:**

- cap bolt
  - copper washer
  - gasket
- Damage/wear → Replace the defective part(s).





5. Install:
- timing chain guide (exhaust side)

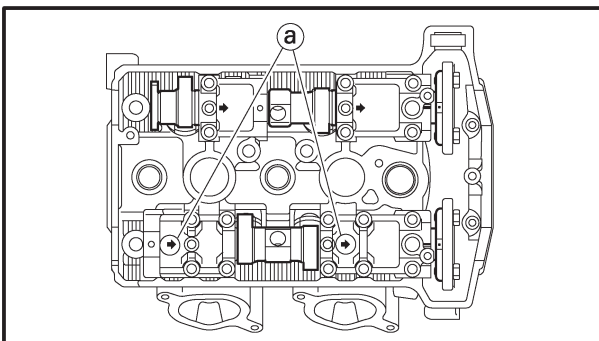
**NOTE:**

- When installing the timing chain guide, be sure to keep the timing chain as tight as possible on the exhaust side.
- Make sure the match marks (a) are parallel with the edge of the cylinder head.

6. Install:
- intake camshaft  
(with the camshaft sprocket temporarily tightened)

**NOTE:**

- Make sure the punch mark on the camshaft face up.
- When installing the intake camshaft, be sure to keep the timing chain as tight as possible between the exhaust camshaft sprocket and intake camshaft sprocket.

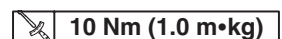


7. Install:
- dowel pins
  - intake camshaft caps

**NOTE:**

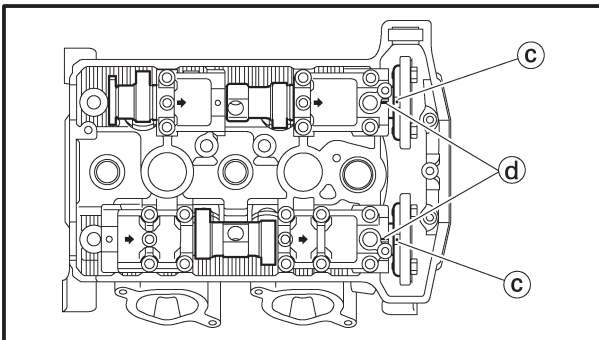
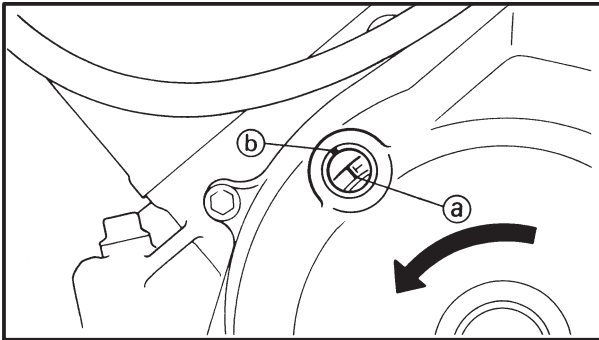
- Make sure each camshaft cap is installed in its original place.
- Make sure the arrow mark (a) on each camshaft cap points towards the right side of the engine.

8. Install:
- camshaft cap bolts

**NOTE:**

Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.





## 10. Turn:

- crankshaft  
(several full turns counterclockwise)

## 11. Check:

- “T” mark **(a)**

Make sure the “T” mark on the generator rotor is aligned with the stationary pointer **(b)** on the generator rotor cover.

- camshaft punch mark **(c)**


Make sure the punch marks on the camshafts are aligned with the embossed marks **(d)** on the camshaft cap.

Out of alignment → Adjust.

Refer to the installation steps above.

## 12. Tighten:

- camshaft sprocket bolts **(1)**

 24 Nm (2.4 m•kg)

**CAUTION:**

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

## 13. Measure:

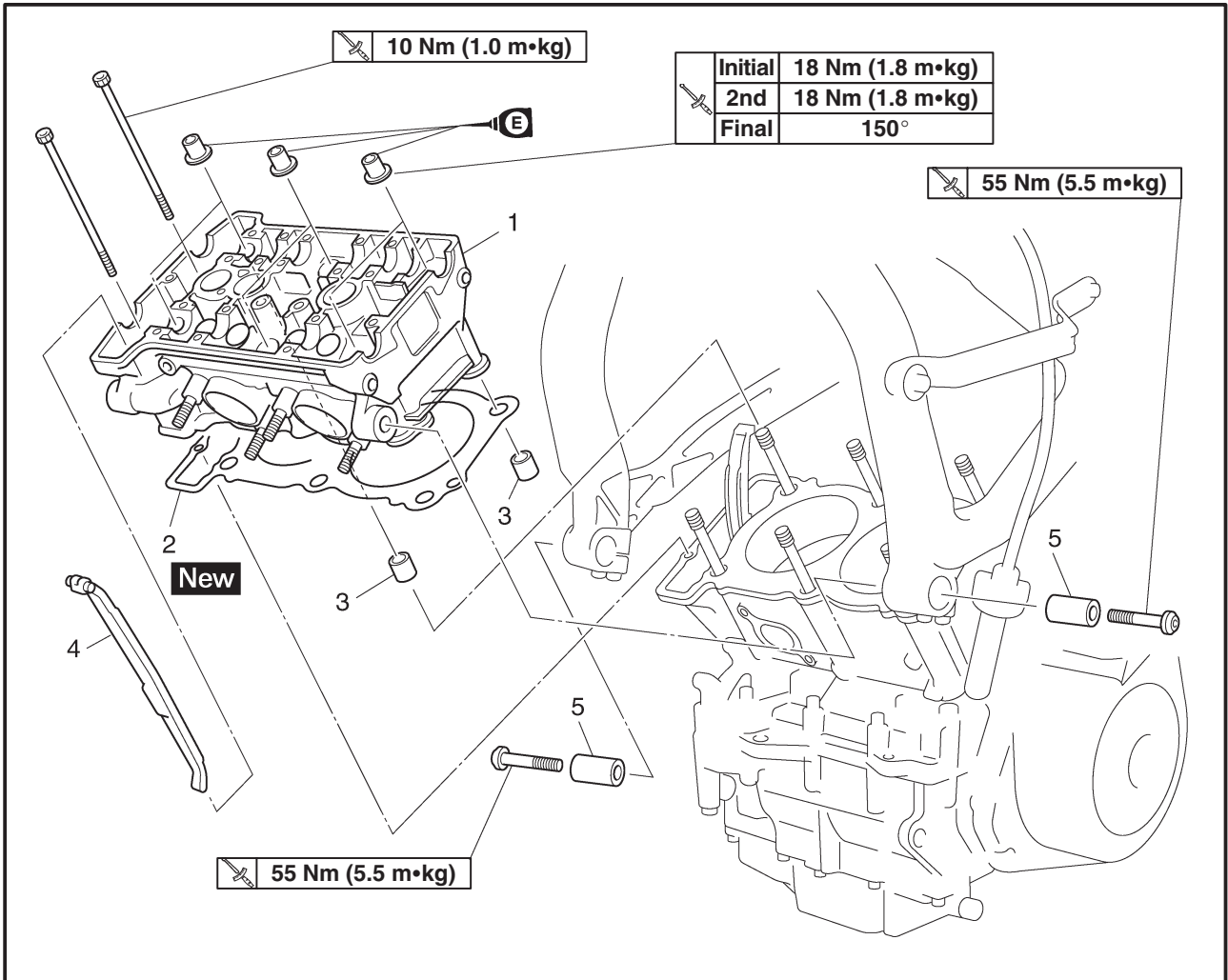
- valve clearance

Out of specification → Adjust.

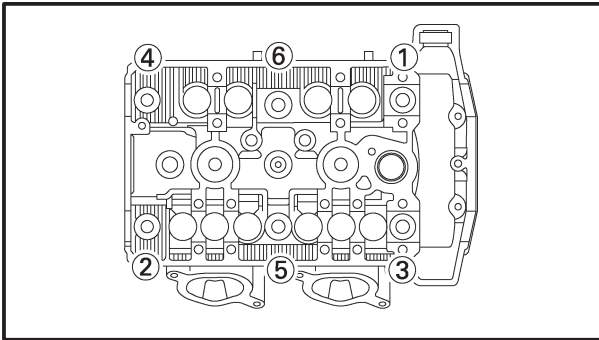
Refer to “ADJUSTING THE VALVE CLEARANCE” in chapter 3.

EAS00221

CYLINDER HEAD



Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinder head</b>		Remove the parts in the order listed.
	Exhaust pipe, Muffler		Refer to "EXHAUST PIPES" and "DRIVE SPROCKET".
	Camshaft		Refer to "CAMSHAFT".
	Throttle body		Refer to "THROTTLE BODY" in chapter 7.
1	Cylinder head	1	
2	Head gasket	1	
3	Dowel pin	2	
4	Timing chain guide (exhaust side)	1	
5	Collar	2	
			For installation, reverse the removal procedure.



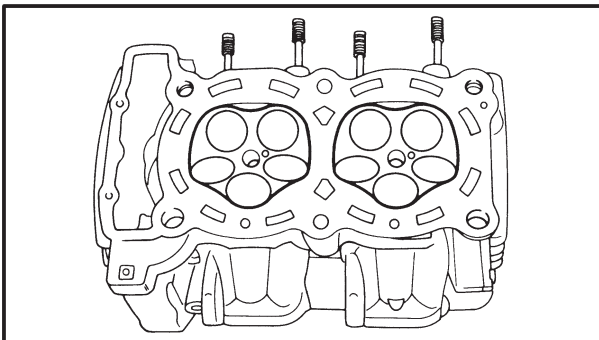
EAS00223

**REMOVING THE CYLINDER HEAD**

1. Remove:
  - cylinder head bolts
  - cylinder head nuts

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

- Loosen the nuts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.



EAS00229

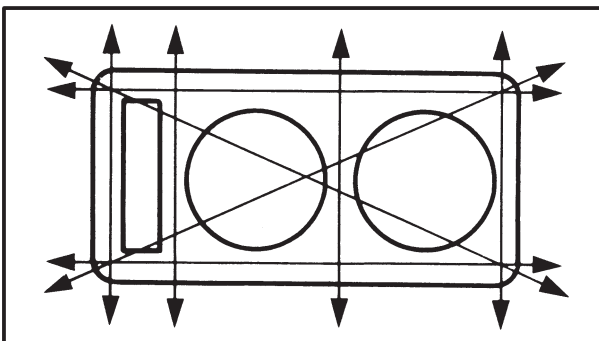
**CHECKING THE CYLINDER HEAD**

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

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

Do not use a sharp instrument to avoid damaging or scratching:

- spark plug bore threads
  - valve seats
2. Check:
    - cylinder head  
Damage/scratches → Replace.
    - cylinder head water jacket  
Mineral deposits/rust → Eliminate.
  3. Measure:
    - cylinder head warpage  
Out of specification → Resurface the cylinder head.

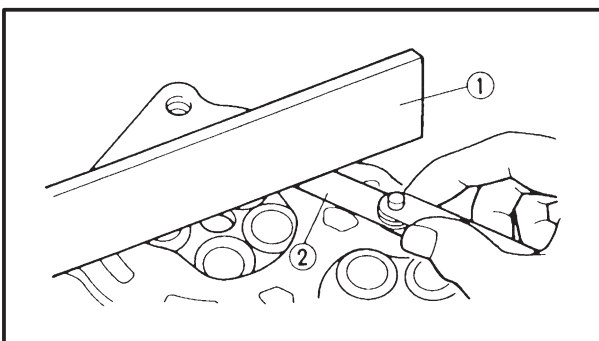


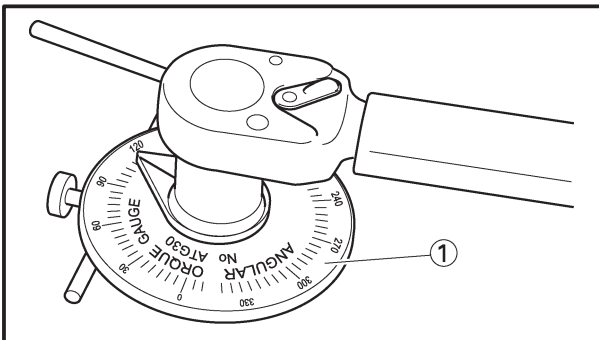
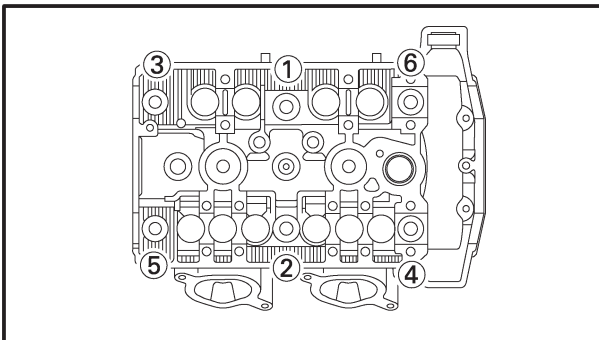
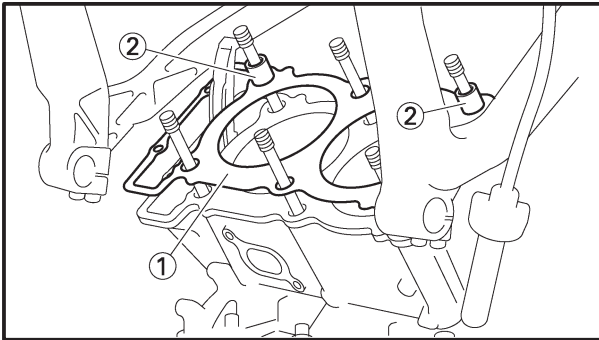
**Maximum cylinder head warpage  
Less than 0.10 mm**

- a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
- b. Measure the warpage.
- c. If the limit is exceeded, resurface the cylinder head as follows.
- d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

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

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






EAS00233

**INSTALLING THE CYLINDER HEAD**

1. Install:
  - gasket **New** ①
  - dowel pins ②
2. Install:
  - cylinder head

**NOTE:** \_\_\_\_\_  
 Pass the timing chain through the timing chain cavity.

3. Tighten:
  - cylinder head nuts ① ~ ⑥

Initial	 <b>18 Nm (1.8 m•kg)</b>
2nd	 <b>18 Nm (1.8 m•kg)</b>
Final	 <b>150°</b>

**NOTE:** \_\_\_\_\_  
 • Lubricate the cylinder head nuts and bolts with engine oil.

- NOTE:** \_\_\_\_\_
- First, tighten the nuts ① ~ ⑥ to 18 Nm (1.8 m•kg) with a torque wrench.
  - Loosen the nuts one by one following the tightening order and then tighten them to 18 Nm (1.8 m•kg) again.
  - Retighten the nuts to 150° with angle torque gauge.

**CAUTION:** \_\_\_\_\_

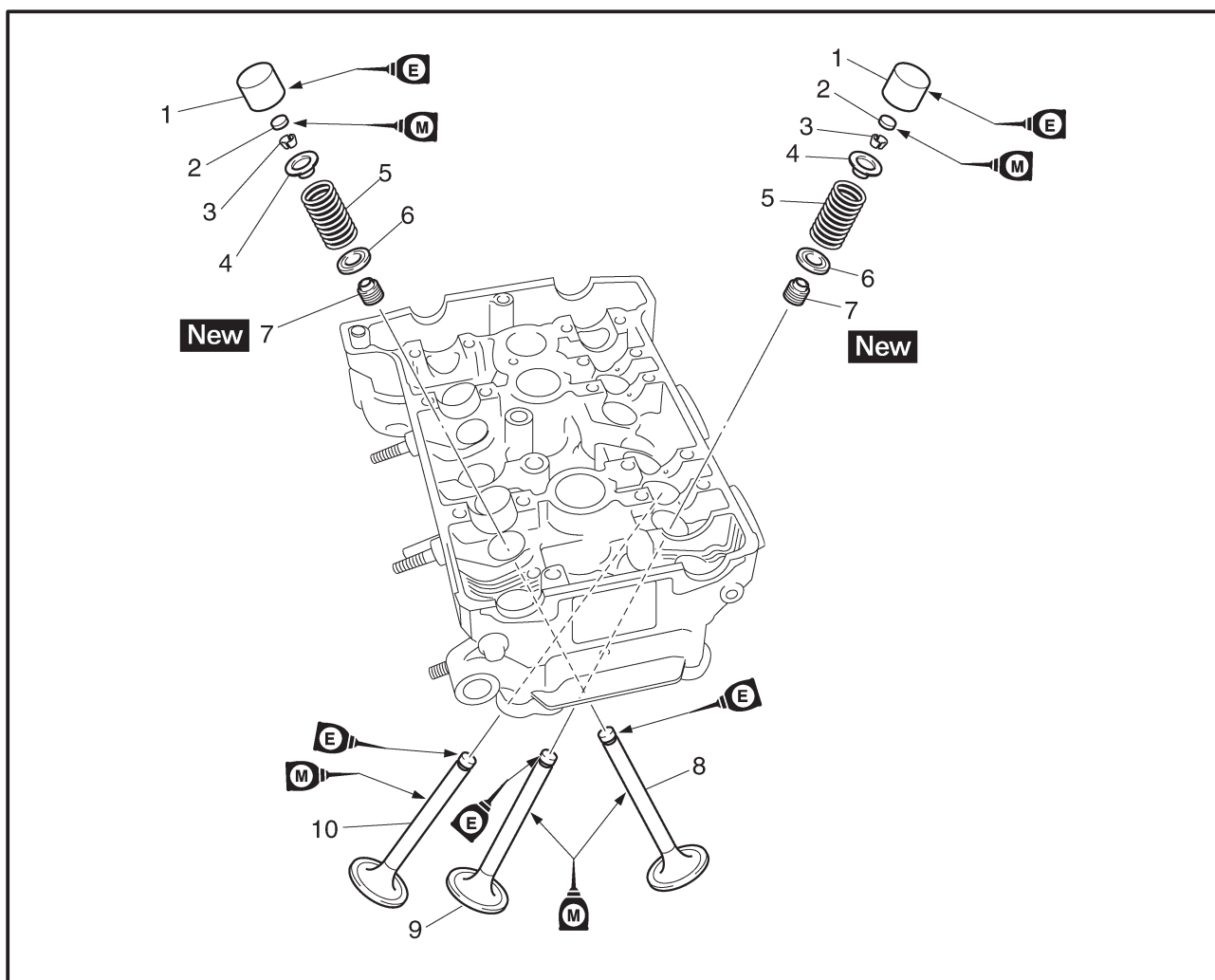
- Use an angle torque gauge ① and tighten at the correct angle.
  - If an angle torque gauge is not available, do not tighten at an angle because accurate tightening cannot be expected.
- Tightening in this case should be controlled by torque and final tightening should be to 40 Nm (4.0 m•kg).

4. Install:
  - exhaust camshaft
  - intake camshaft
 Refer to “INSTALLING THE CAMSHAFTS”.



EAS00236

## VALVES AND VALVE SPRINGS



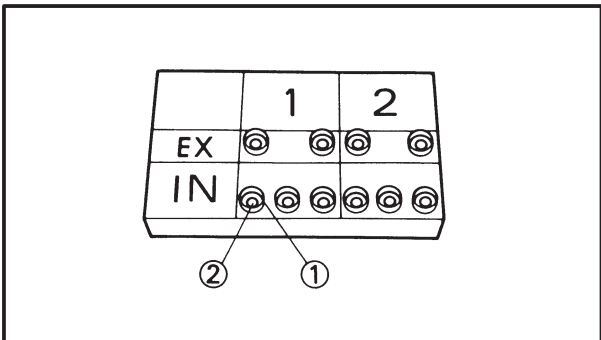
Order	Job/Part	Q'ty	Remarks
	<b>Removing the valves and valve springs</b>		Remove the parts in the order listed.
1	Valve lifter	10	
2	Valve pad	10	
3	Valve cotter	20	
4	Upper valve spring seat	10	
5	Valve spring	10	
6	Valve spring seat	10	
7	Valve stem seal	10	
8	Exhaust valve	4	
9	Intake valve (center)	2	
10	Intake valve (left and right)	4	
			For installation, reverse the removal procedure.

EAS00237

**REMOVING THE VALVES**

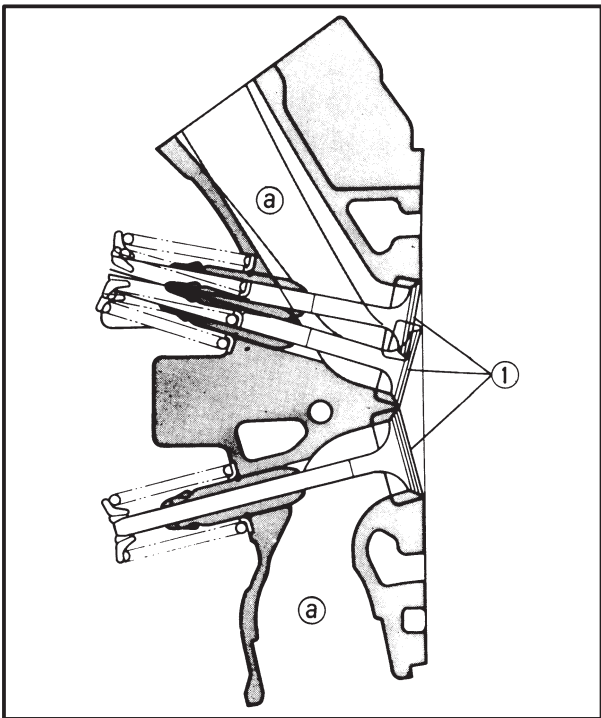
The following procedure applies to all of the valves and related components.

**NOTE:** \_\_\_\_\_  
 Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.



1. Remove:
- valve lifter ①
  - valve pad ②

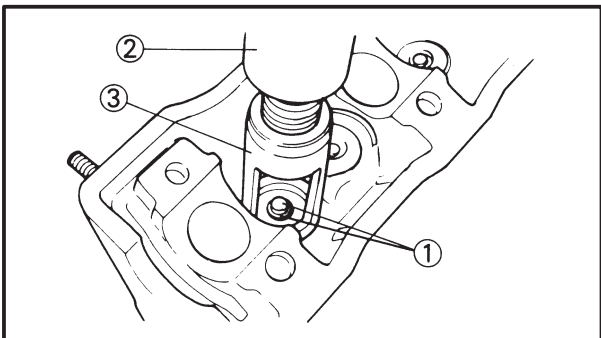
**NOTE:** \_\_\_\_\_  
 Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



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

- a. Pour a clean solvent ① into the intake and exhaust ports.  
 b. Check that the valves properly seal.

**NOTE:** \_\_\_\_\_  
 There should be no leakage at the valve seat ①.

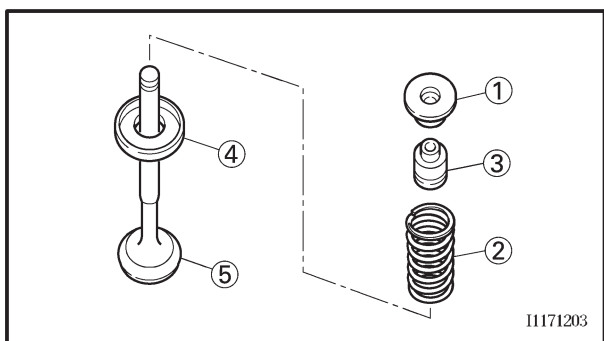


3. Remove:
- valve coters ①

**NOTE:** \_\_\_\_\_  
 Remove the valve coters by compressing the valve spring with the valve spring compressor ② and the valve spring compressor attachment ③.



**Valve spring compressor**  
90890-04019  
**Valve spring compressor attachment**  
90890-04108

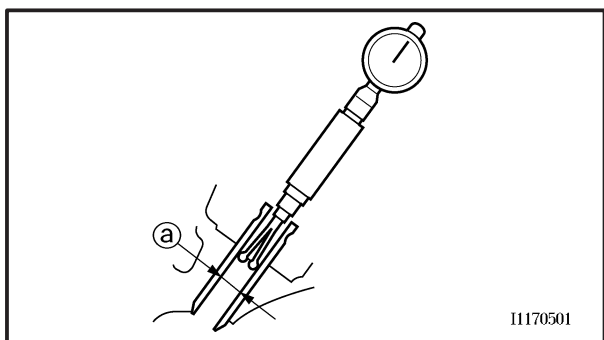


4. Remove:

- upper valve spring seat ①
- valve spring ②
- valve stem seal ③
- lower valve spring seat ④
- valve ⑤

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

Identify the position of each part very carefully so that it can be reinstalled in its original place.



EAS00239

## CHECKING THE VALVES AND VALVE GUIDES

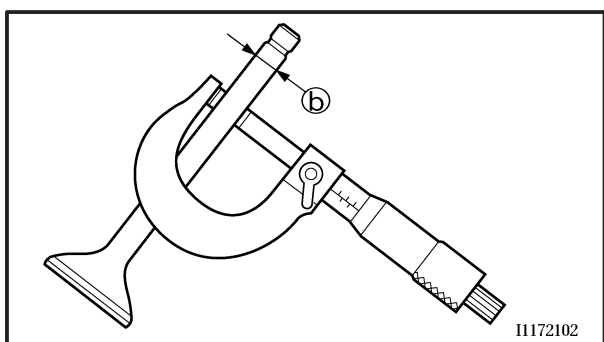
The following procedure applies to all of the valves and valve guides.

1. Measure:

- valve-stem-to-valve-guide clearance

**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>: 0.1 mm

2. Replace:

- valve guide

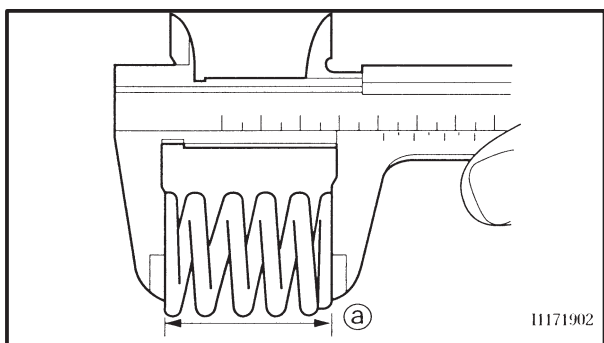
**NOTE:** \_\_\_\_\_

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









11171902

EAS00241

## CHECKING THE VALVE SPRINGS

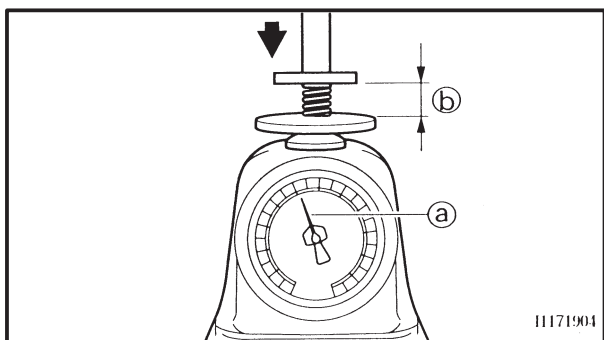
The following procedure applies to all of the valve springs.

### 1. Measure:

- valve spring free length (a)  
Out of specification → Replace the valve spring.



**Valve spring free length**  
Intake and exhaust valve spring  
37.3 mm  
<Limit>:35.4 mm



11171904

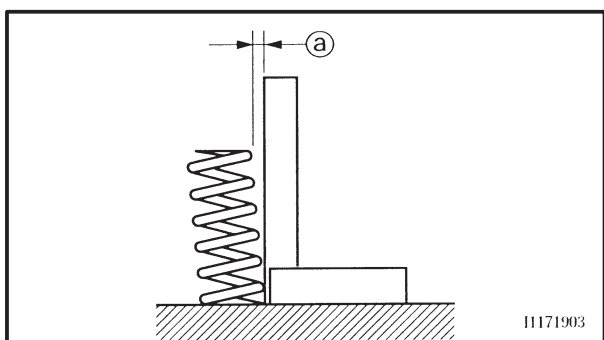
### 2. Measure:

- compressed valve spring force (a)  
Out of specification → Replace the valve spring.

(b) Installed length



**Compressed valve spring force (installed)**  
Intake and exhaust valve spring  
98.1 ~ 113.8 N  
(10.0 ~ 11.6 kgf) at 30.4 mm



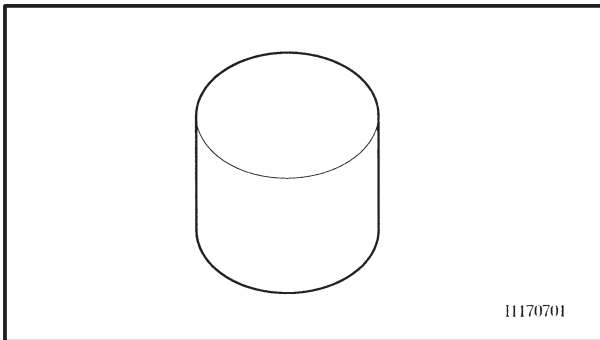
11171903

### 3. Measure:

- valve spring tilt (a)  
Out of specification → Replace the valve spring.



**Spring tilt limit**  
Intake and exhaust valve spring  
2.5° / 1.7 mm



EAS00242

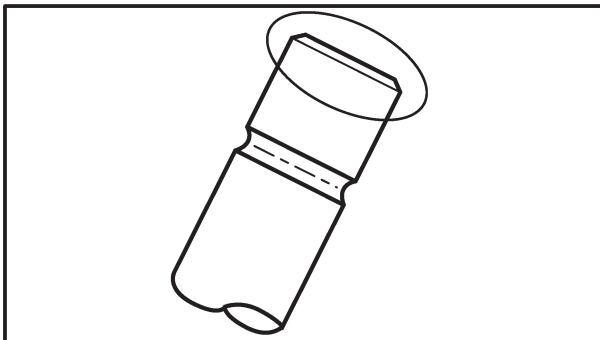
## CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

1. Check:

- valve lifter

Damage/scratches → Replace the valve lifters and cylinder head.



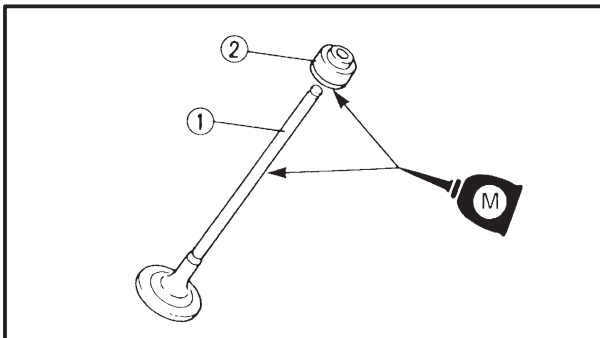
EAS00247

## INSTALLING THE VALVES

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

1. Deburr:

- valve stem end  
(with an oil stone)

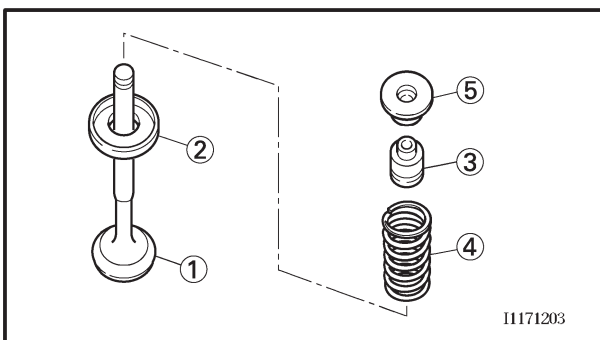


2. Lubricate:

- valve stem ①
- valve stem seal ②  
(with the recommended lubricant)

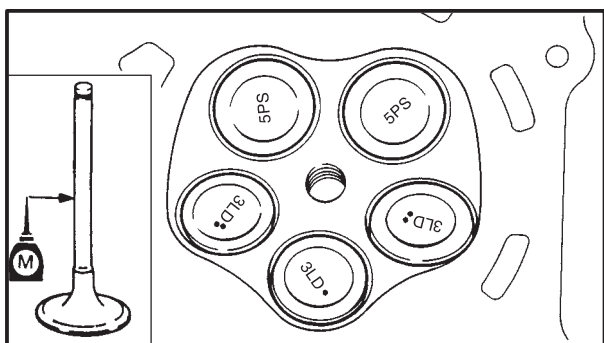


**Recommended lubricant**  
**Molybdenum disulfide oil**



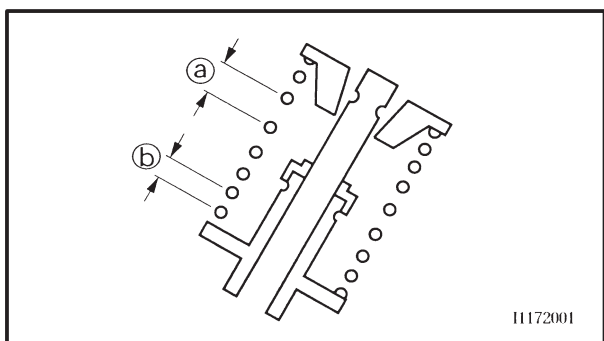
3. Install:

- valve ①
- lower spring seat ②
- valve stem seal ③
- valve spring ④
- upper spring seat ⑤  
(into the cylinder head)

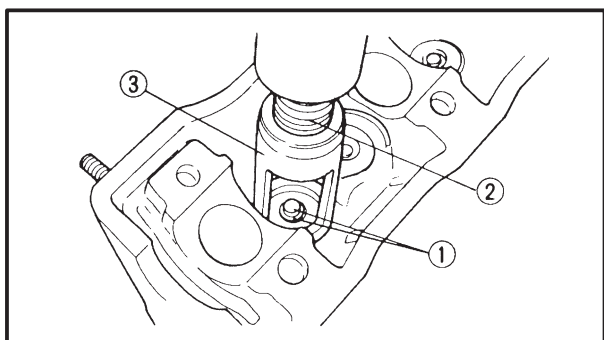


**NOTE:**

- Make sure each valve is installed in its original place. Refer to the following embossed marks.  
Right and left intake valve(s): "3LD."  
Middle intake valve(s): "3LD."  
Exhaust valve(s): "5PS:"
- Install the valve spring with the larger pitch (a) facing up.



(b) Smaller pitch



4. Install:

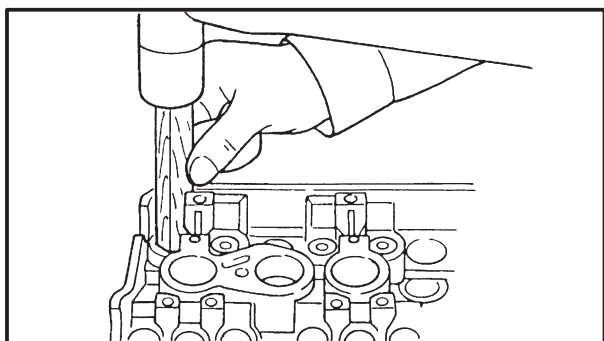
- valve cotters (1)

**NOTE:**

Install the valve cotters by compressing the valve spring with the valve spring compressor (2) and the valve spring compressor attachment (3).



**Valve spring compressor**  
90890-04019  
**Valve spring compressor attachment**  
90890-04108



5. To secure the valve cotters (1) onto the valve stem, lightly tap the valve tip with a soft-face hammer.

**CAUTION:**

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



6. Lubricate:
- valve pad



**Recommended lubricant**  
**Molybdenum disulfide oil**

- valve lifter  
(with the recommended lubricant)



**Recommended lubricant**  
**Engien oil**

7. Install:
- valve pad
  - valve lifter

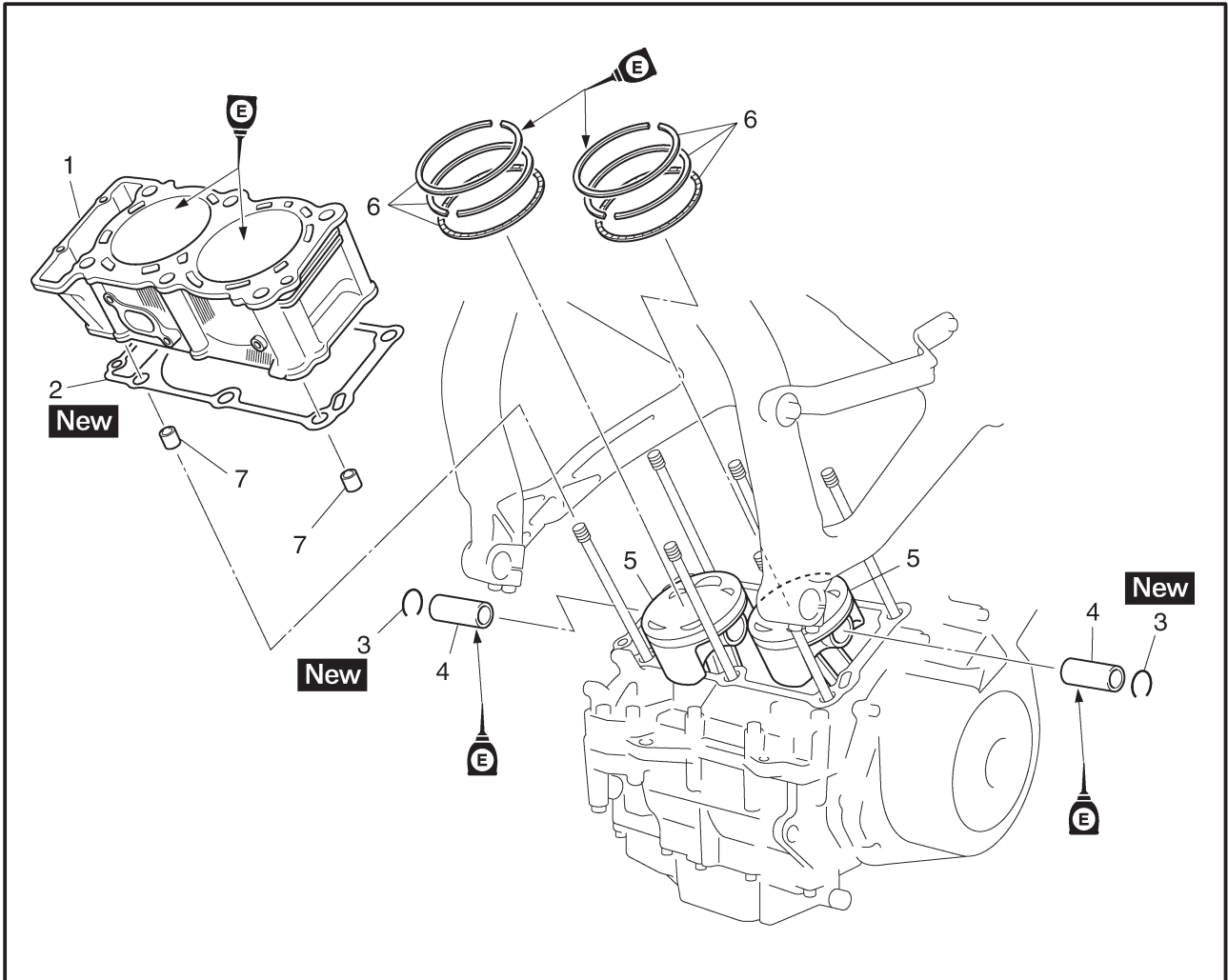
**NOTE:** \_\_\_\_\_

- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

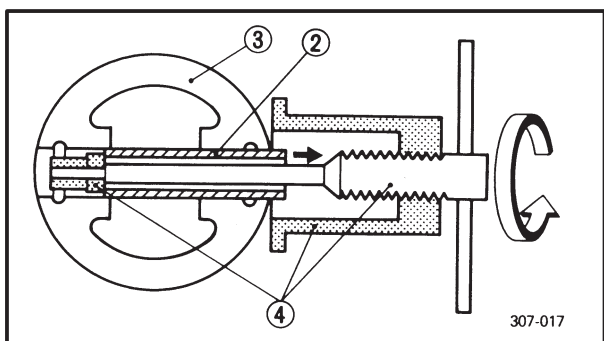
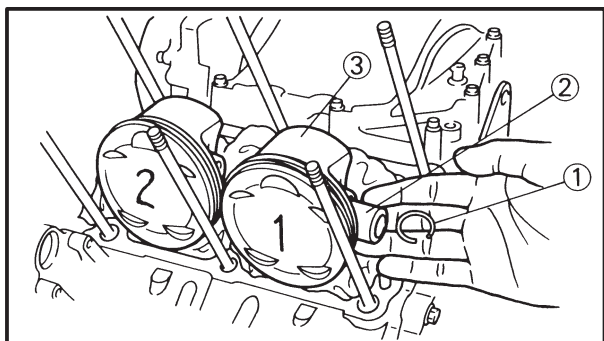


EAS00252

CYLINDER AND PISTONS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinder and pistons</b>		Remove the parts in the order listed. Refer to "CYLINDER HEAD".
1	Cylinder head	1	
2	Cylinder	1	
3	Circlip	4	
4	Piston pin	2	
5	piston	2	
6	Piston ring set	2	
7	Dowel pin	2	
			For installation, reverse the removal procedure.



EAS00254

### REMOVING THE CYLINDER AND PISTONS

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

1. Remove:
  - piston pin clip ①
  - piston pin ②
  - piston ③

#### CAUTION:

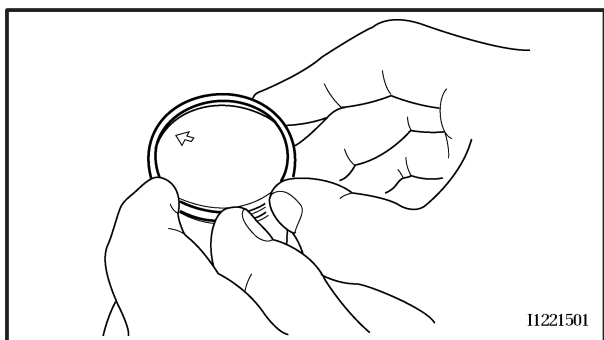
Do not use a hammer to drive the piston pin out.

#### 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 ②, 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 set ④.



**Piston pin puller set**  
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.



EA262

## CHECKING THE CYLINDER AND PISTONS

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

1. Check:

- piston wall
- cylinder wall

Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:

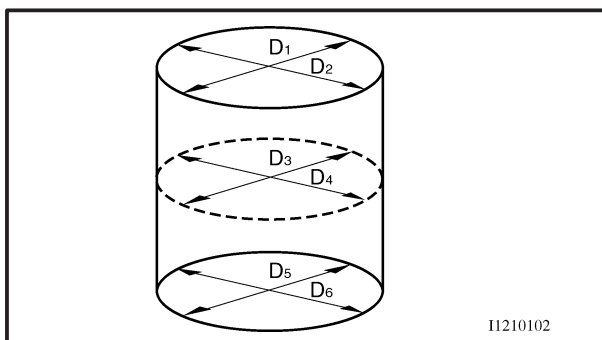
- piston-to-cylinder clearance



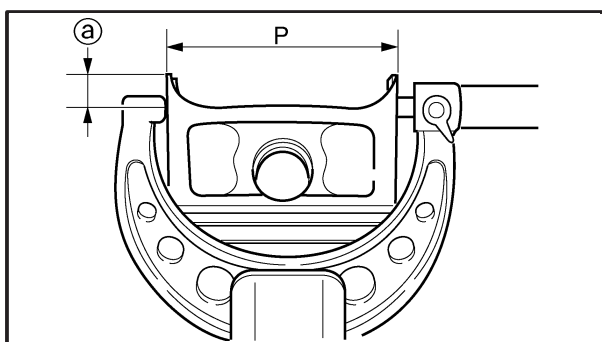
- a. Measure cylinder bore “C” with the cylinder bore gauge.

**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.



11210102



Cylinder bore “C”	92.00 ~ 92.01 mm
Taper limit “T”	0.05 mm
Out of round “R”	0.05 mm

“C” = maximum of D <sub>1</sub> ~ D <sub>6</sub>
“T” = maximum of D <sub>1</sub> or D <sub>2</sub> – maximum of D <sub>5</sub> or D <sub>6</sub>
“R” = maximum of D <sub>1</sub> , D <sub>3</sub> or D <sub>5</sub> – minimum of D <sub>2</sub> , D <sub>4</sub> or D <sub>6</sub>

- b. If out of specification, replace the cylinder, and the piston and piston rings as a set.  
 c. Measure piston skirt diameter “P” with the micrometer.

Ⓐ 5 mm from the bottom edge of the piston

	Piston size “P”
Standard	91.960 ~ 91.975 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”
--

## CYLINDER AND PISTONS

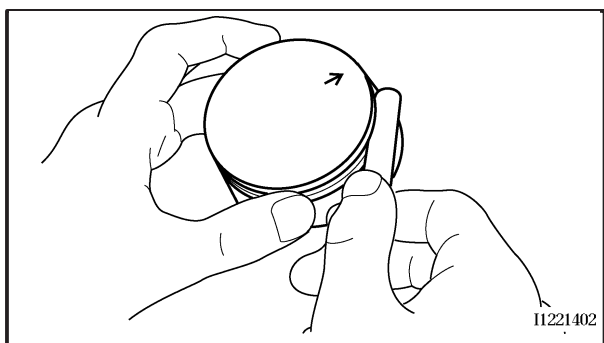
ENG



**Piston-to-cylinder clearance**  
**0.025 ~ 0.050 mm**  
**<Limit>: 0.11 mm**

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





EAS00264

**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**

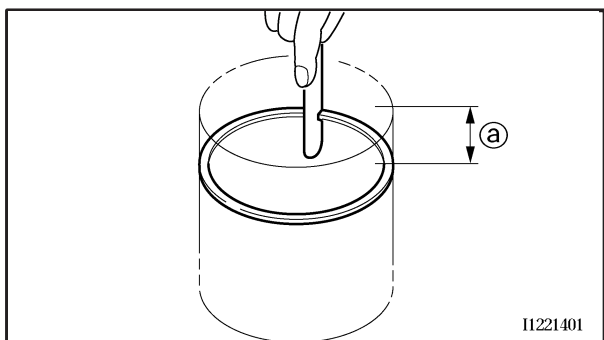
0.03 ~ 0.07 mm

&lt;Limit&gt;: 0.12 mm

**2nd ring**

0.02 ~ 0.06 mm

&lt;Limit&gt;: 0.12 mm



## 2. Install:

- piston ring  
(into the cylinder)

**NOTE:**

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

① 5 mm

## 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**

0.02 ~ 0.35 mm

&lt;Limit&gt;: 0.6 mm

**2nd ring**

0.40 ~ 0.55 mm

&lt;Limit&gt;: 0.9 mm

**Oil ring**

0.20 ~ 0.50 mm



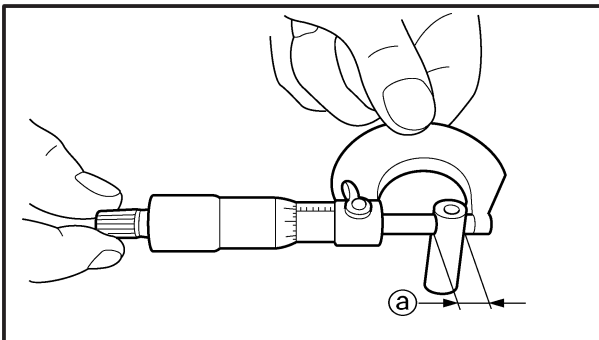
EAS00266

**CHECKING THE PISTON PINS**

The following procedure applies to all of the piston pins.

## 1. Check:

- piston pin  
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

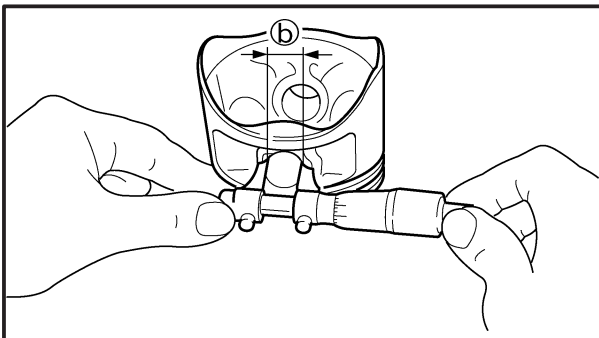


## 2. Measure:

- piston pin outside diameter (a)  
Out of specification → Replace the piston pin.



**Piston pin outside diameter**  
20.991 ~ 21.000 mm  
<Limit>: 20.971 mm



## 3. Measure:

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



**Piston pin bore diameter  
(in the piston)**  
21.004 ~ 21.015 mm  
<Limit>: 21.045 mm

## 4. Calculate:

- piston-pin-to-piston-pin-bore clearance  
Out of specification → Replace the piston pin and piston as a set.

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



**Piston-pin-to-piston clearance**  
0.004 ~ 0.024 mm  
<Limit>: 0.074 mm



EAS00272

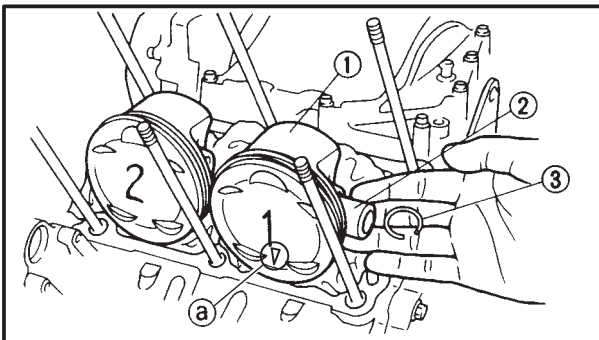
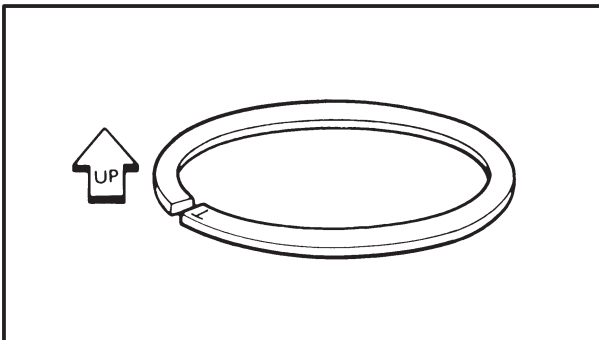
**INSTALLING THE PISTONS AND CYLINDER**

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

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

**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 the "arrow" mark (a) 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 piston pin clip from falling into the crankcase.
- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #2).

3. Install:

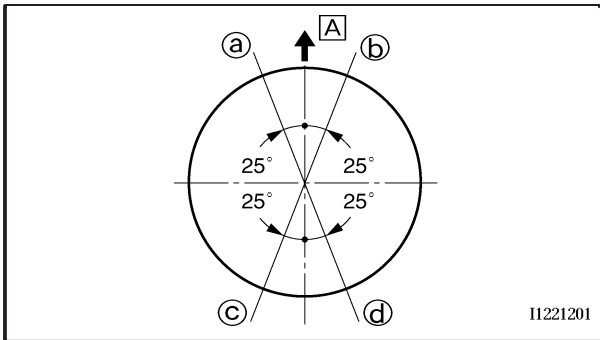
- gasket **New**
- dowel pins

4. Lubricate:

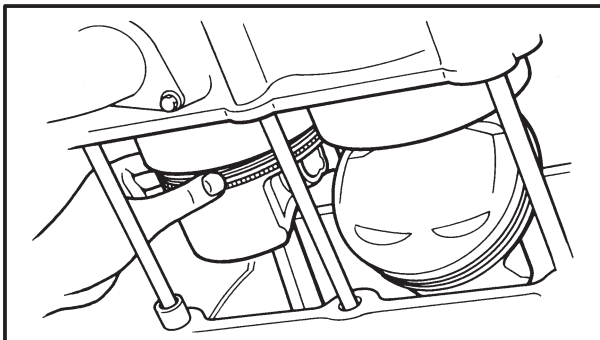
- piston
- piston rings
- cylinder  
(with the recommended lubricant)



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



5. Offset:
- piston ring end gaps
  - Ⓐ Top ring
  - Ⓑ Lower oil ring rail
  - Ⓒ Upper oil ring rail
  - Ⓓ 2nd ring
  - Ⓐ Intake side



6. Install:
- cylinder

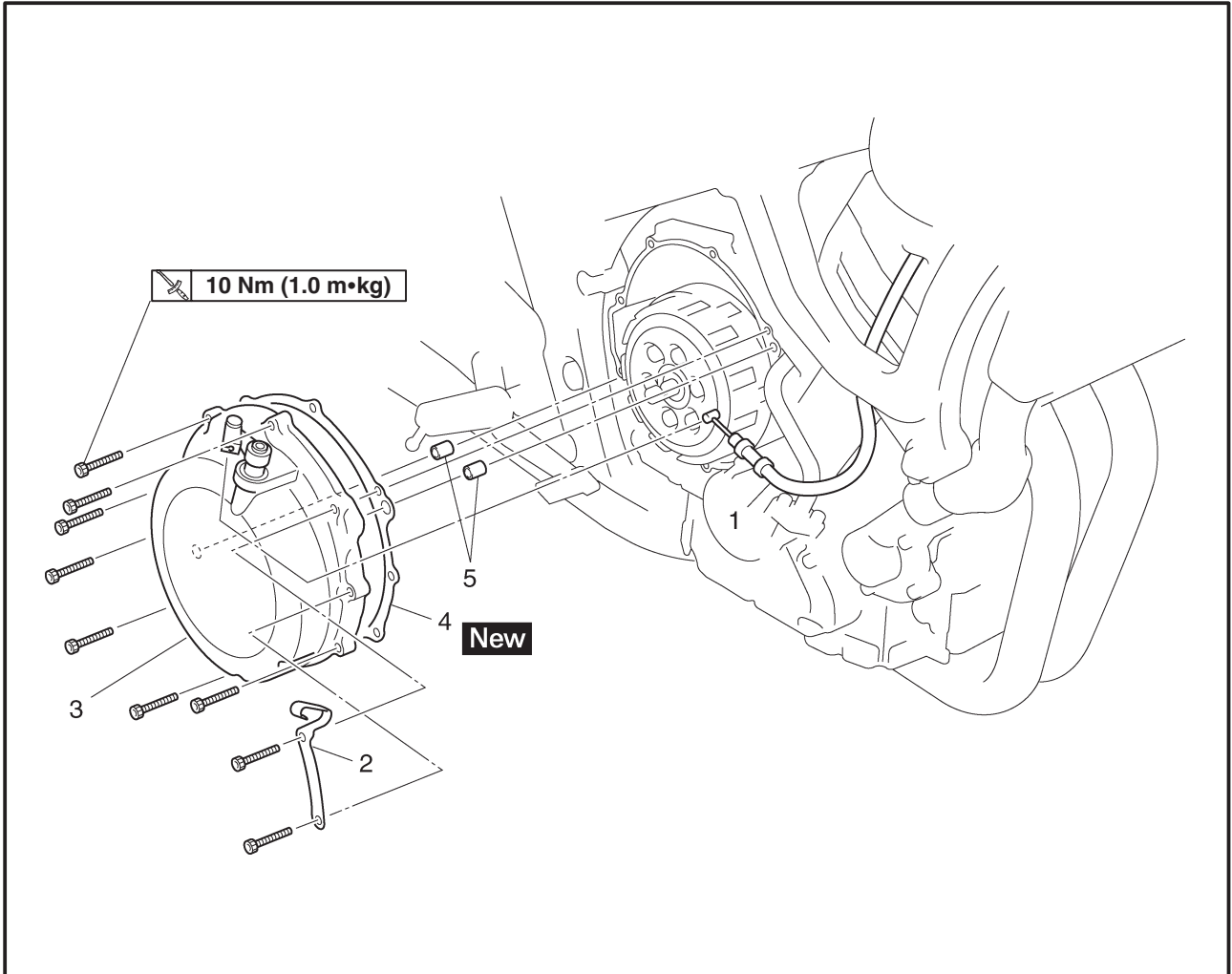
**NOTE:** \_\_\_\_\_

- 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.
- \_\_\_\_\_



EAS00273

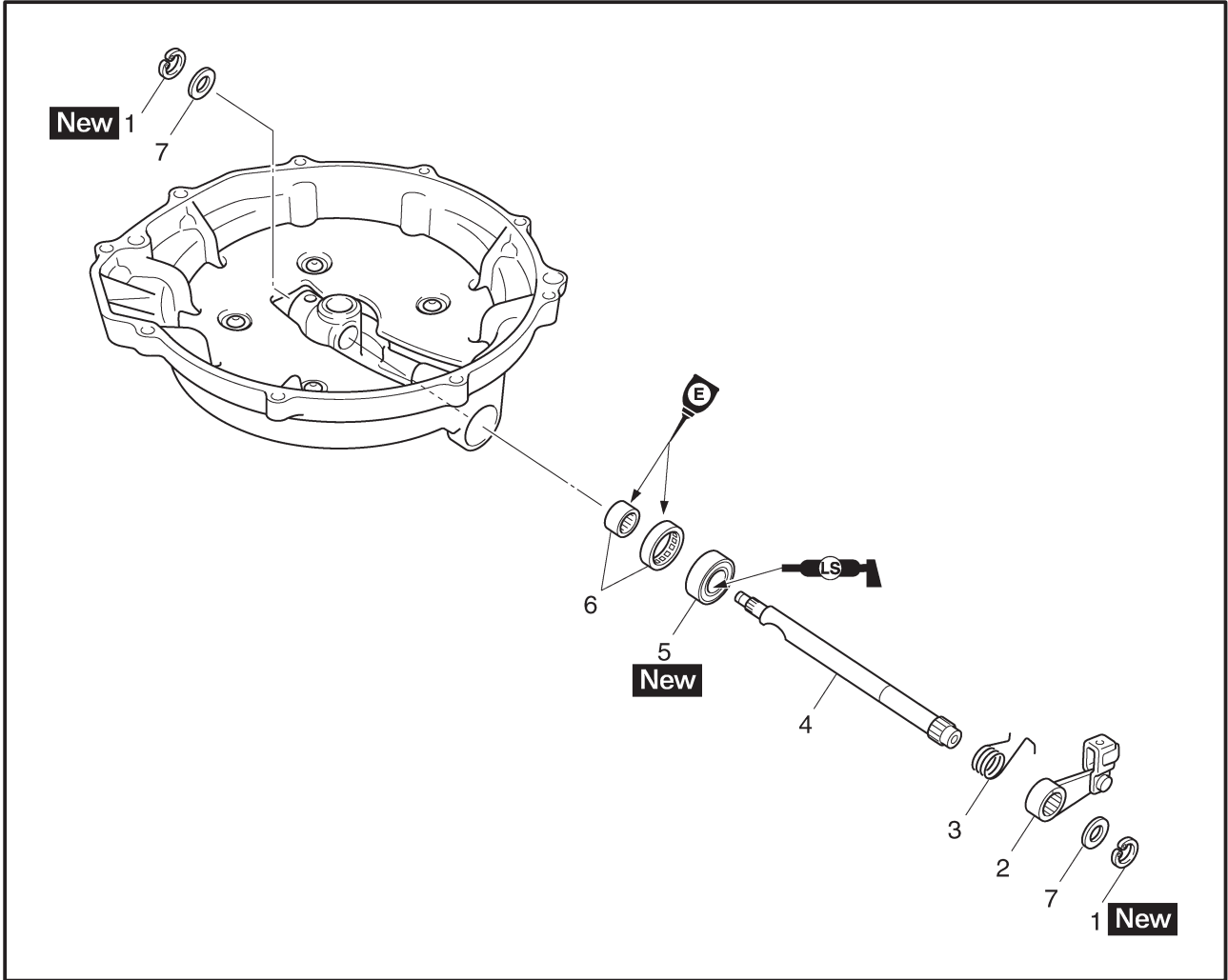
**CLUTCH  
CLUTCH COVER**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the clutch cover</b> Engine oil		Remove the parts in the order listed. Drain Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	<b>NOTE:</b> _____ Loosen the bolts in a crisscross pattern.
2	Clutch cable stay	1	
3	Clutch cover	1	
4	Gasket	1	For installation, reverse the removal procedure.
5	Dowel pin	2	

EB405010

**PULL LEVER SHAFT**

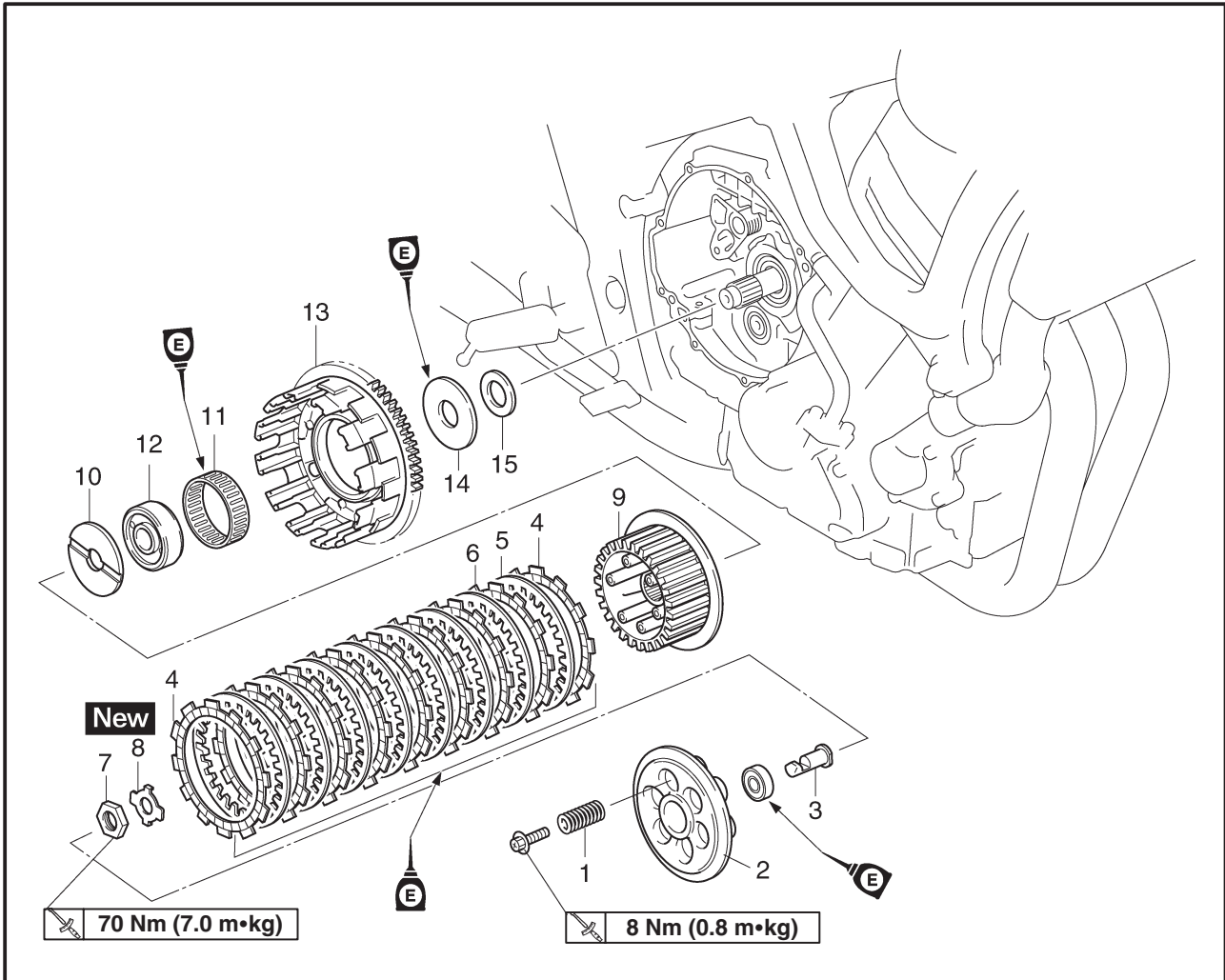


Order	Job/Part	Q'ty	Remarks
	<b>Removing the pull lever shaft</b>		Remove the parts in the order listed.
1	Circlip	2	
2	Pull lever	1	
3	Pull lever spring	1	
4	Pull lever shaft	1	
5	Oil seal	1	
6	Bearing	2	
7	Washer	2	
			For installation, reverse the removal procedure.

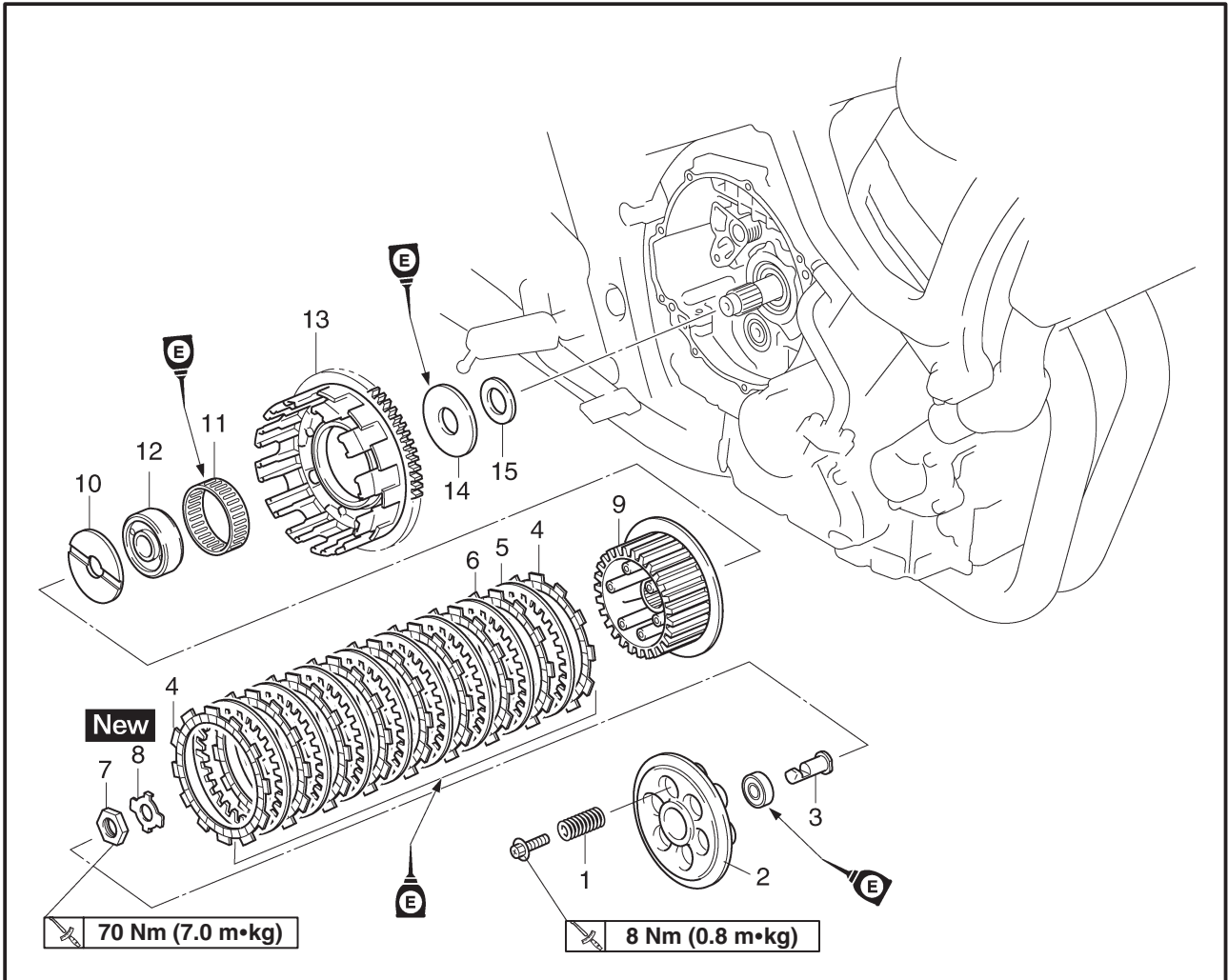


EAS00274

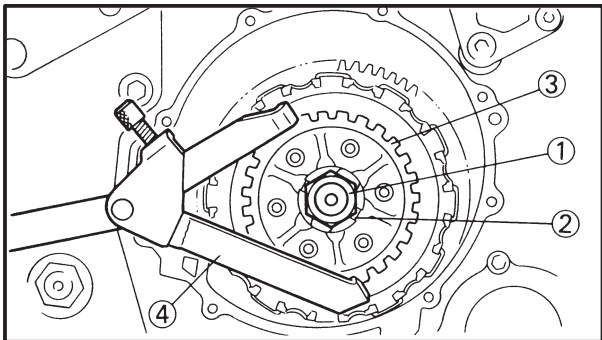
CLUTCH



Order	Job/Part	Q'ty	Remarks
	<b>Removing the clutch</b>		Remove the parts in the order listed.
1	Clutch spring	6	
2	Pressure plate	1	
3	Pull rod	1	
4	Friction plate 1	2	
5	Clutch plate	8	
6	Friction plate 2	7	
7	Nut	1	
8	Lock washer	1	
9	Clutch boss	1	
10	Thrust plate	1	
11	Bearing	1	
12	Spacer	1	
13	Clutch housing	1	



Order	Job/Part	Q'ty	Remarks
14	Thrust plate 1	1	For installation, reverse the removal procedure.
15	Thrust plate 2	1	



EAS00275

**REMOVING THE CLUTCH**

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

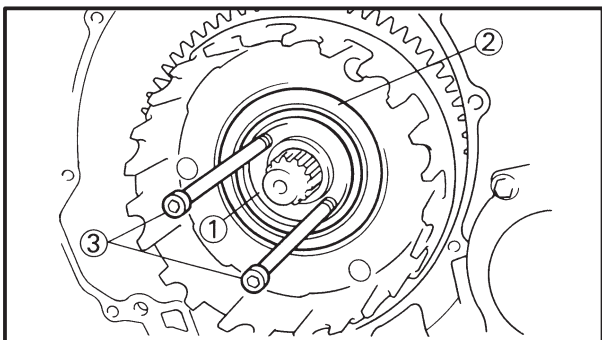
**NOTE:** \_\_\_\_\_

While holding the clutch boss ③ with the universal clutch holder ④, loosen the clutch boss nut.



**Universal clutch holder**  
90890-04086

3. Remove:
  - lock washer ②
  - Clutch boss ③



4. Remove:
  - spacer ①
  - bearing ②

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

Insert two 6-mm bolts ③ into the spacer and then remove the spacer by pulling on the bolts.

EAS00280

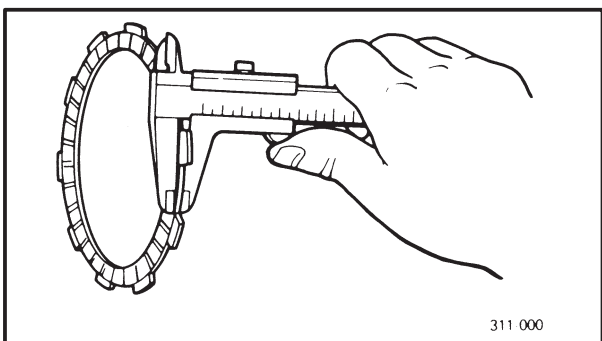
**CHECKING THE FRICTION PLATES**

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

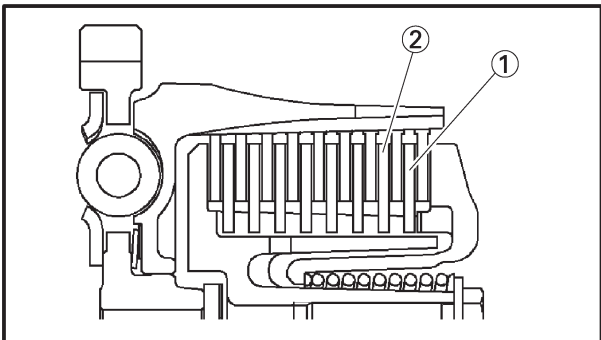
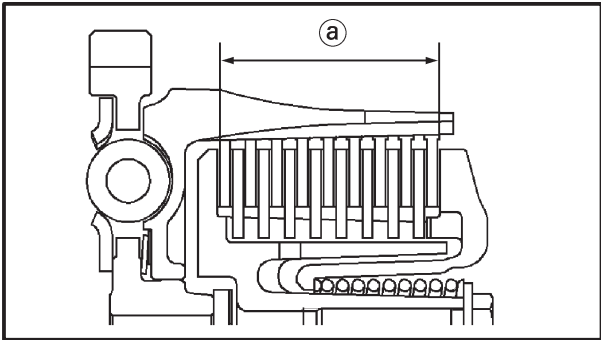
Measure the friction plate at four places.



311 000



**Friction plate thickness**  
2.9 ~ 3.1 mm  
<Limit>: 2.8 mm



3. Measure:

- assembly width (a)  
Out of specification → Adjust.



**Assembly width**  
42.5 ~ 43.7 mm



- Assembly width adjusted by clutch plate ① and ②.
- Select the clutch plate from the following table.

**Clutch plate ①**

Part No.	Thickness	
168-16325-00	1.6 mm	
3J2-16324-00	2.0 mm	STD
168-16324-00	2.3 mm	

**Clutch plate ②**

Part No.	Thickness	
3J2-16324-00	2.0 mm	STD
168-16324-00	2.3 mm	

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

When adjusting the clutch assembly width [by replacing the clutch plate (s)], be sure to replace the clutch plate ① first. After replacing the clutch plate ①, if specifications cannot be met, replace the clutch plate ②.





EAS00281

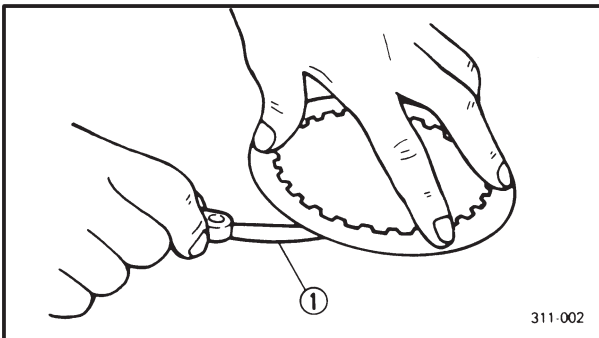
**CHECKING THE CLUTCH PLATES**

The following procedure applies to all of the clutch plates.

## 1. Check:

- clutch plate

Damage → Replace the clutch plates as a set.



## 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

EAS00282

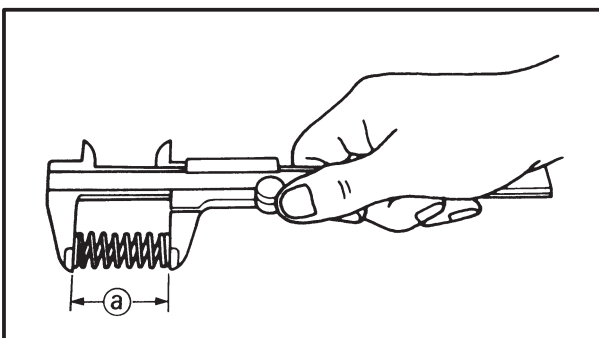
**CHECKING THE CLUTCH SPRINGS**

The following procedure applies to all of the clutch springs.

## 1. Check:

- clutch spring

Damage → Replace the clutch springs as a set.



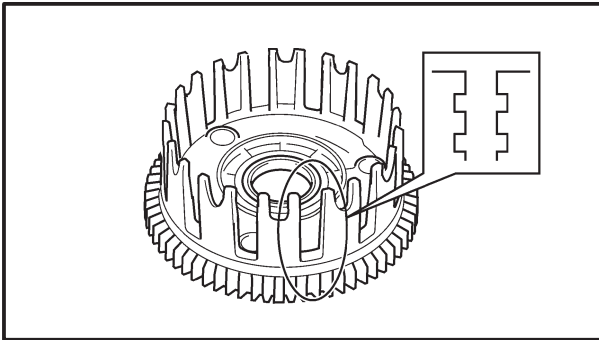
## 2. Measure:

- clutch spring free length ②

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



**Clutch spring free length**  
50 mm  
<Limit>: 47.5 mm



EAS00284

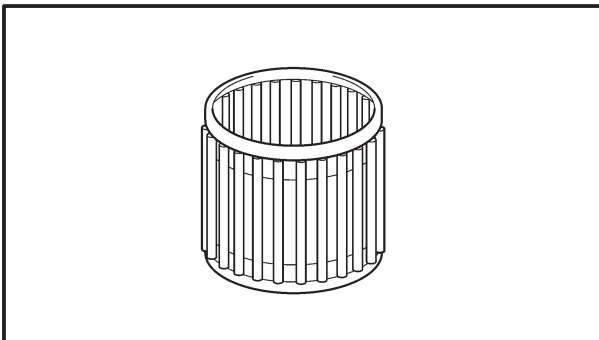
**CHECKING THE CLUTCH HOUSING**

## 1. Check:

- clutch housing dogs  
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

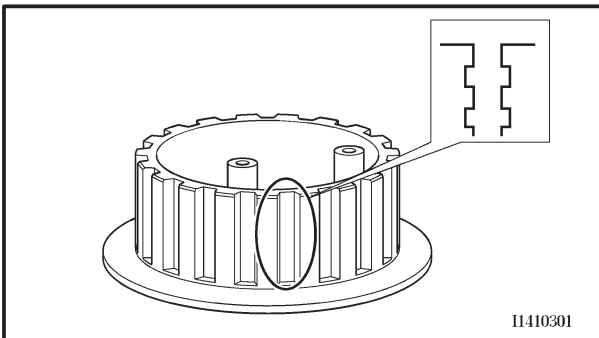
**NOTE:** \_\_\_\_\_

Pitting on the clutch housing dogs will cause erratic clutch operation.



## 2. Check:

- bearing  
Damage/wear → Replace the bearing and clutch housing.



EAS00285

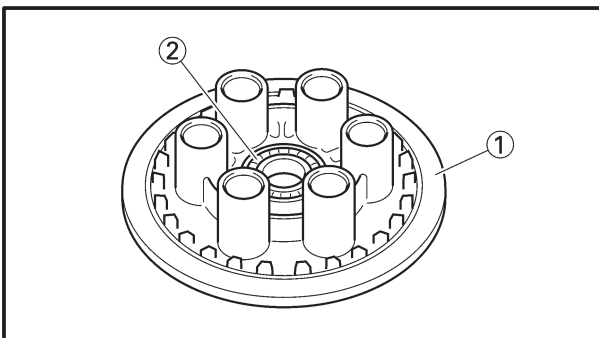
**CHECKING THE CLUTCH BOSS**

## 1. Check:

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

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

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

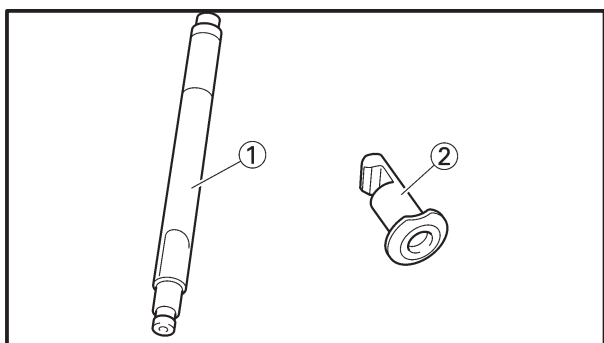


EAS00286

**CHECKING THE PRESSURE PLATE**

## 1. Check:

- pressure plate ①  
Cracks/damage → Replace.
- bearing ②  
Damage/wear → Replace.



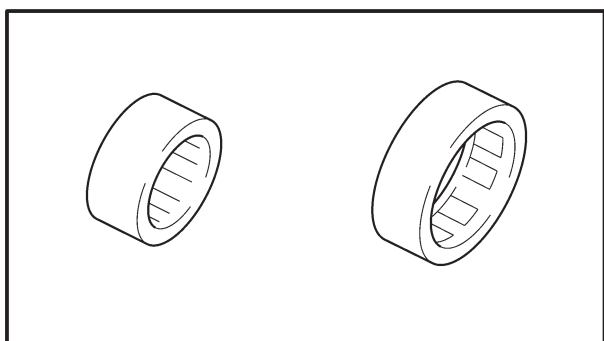
EAS00287

**CHECKING THE PULL LEVER SHAFT AND PULL ROD**

## 1. Check:

- pull lever shaft ①
- pull rod ②

Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.



## 2. Check:

- pull rod bearing

Damage/wear → Replace.

EAS00292

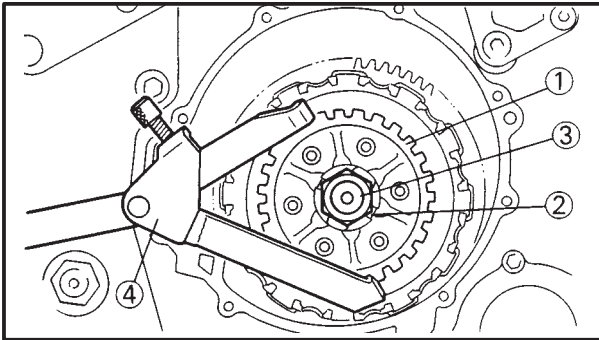
**CHECKING THE PRIMARY DRIVE**

## 1. Check:

- primary drive 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.



EAS00299


**INSTALLING THE CLUTCH**

## 1. Install:

- clutch boss ①
- lock washer **New** ②
- clutch boss nut ③

## 2. Tighten:

- clutch boss nut

 **70 Nm (7.0 m•kg)**
**NOTE:**

While holding the clutch boss with the universal clutch holder ④, tighten the clutch boss nut.



**Universal clutch holder**  
90890-04086

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

## 4. Lubricate:

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



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

## 5. Install:

- friction plates
- clutch plates

**NOTE:**

First, install a friction plate and then alternate between a clutch plate and a friction plate.

## 6. Measure:

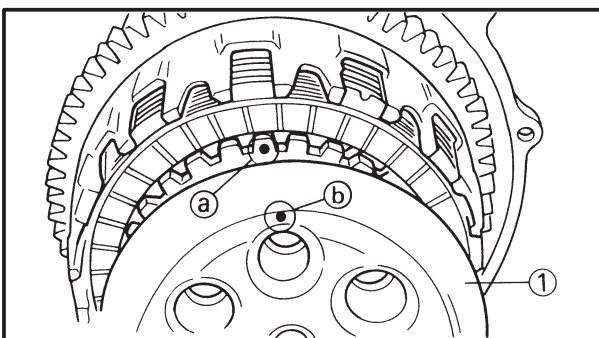
- assembly width  
Out of specification → Adjust.  
Refer to “CHECKING THE FRICTION PLATE”.

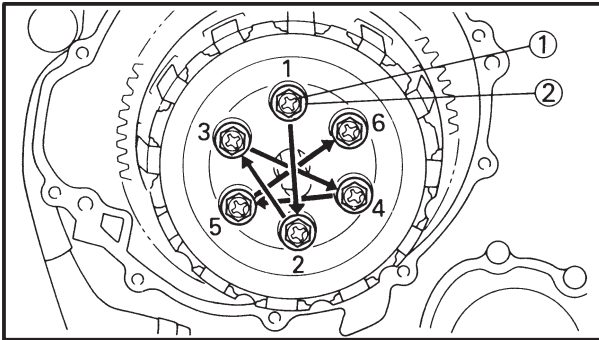
## 7. Install:

- pressure plate ①


**NOTE:**

Align the punch mark (b) in the pressure plate with the punch mark (a) in the clutch boss.



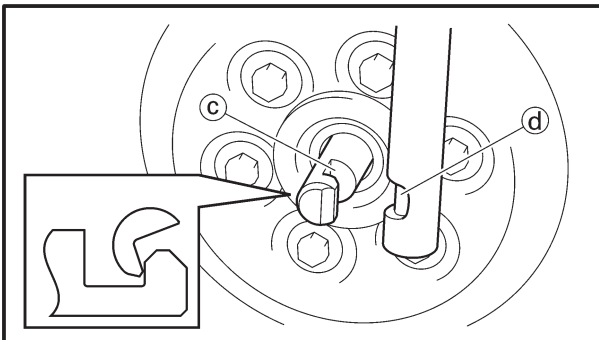


8. Install:
- clutch springs
  - clutch spring bolts

 **8 Nm (0.8 m•kg)**


**NOTE:**

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



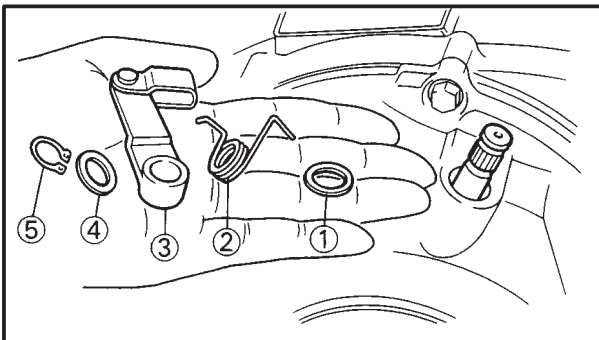
9. Install:

- dowel pins
- gasket **New**
- clutch cover

 **10 Nm (1.0 m•kg)**

**NOTE:**

- When installing the clutch cover, push the pull lever and check that the punch mark (a) on the pull lever aligns with the mark (b) on the clutch cover. Make sure that the pull rod groove (c) and pull lever shaft groove (d) are engaged.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

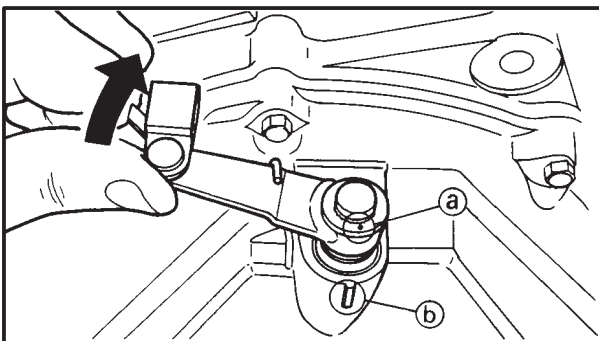


10. Install:

- washer ①
- pull lever spring ②
- pull lever ③
- washer ④
- circlip **New** ⑤

**NOTE:**

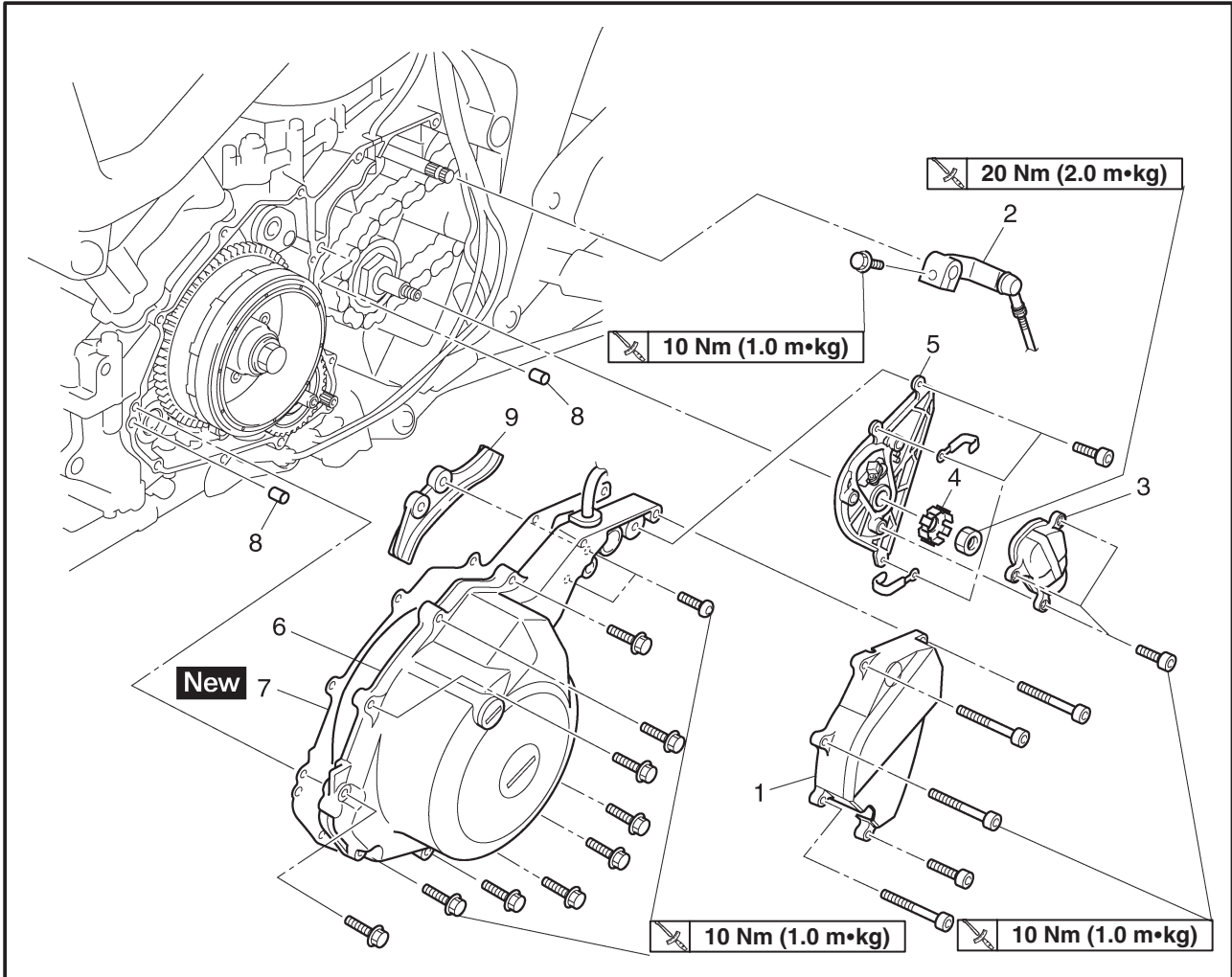
Align the punch mark (a) in the pull lever shaft with the mark (b) on the clutch cover.





EAS00326

**SHIFT SHAFT  
GENERATOR ROTOR COVER**



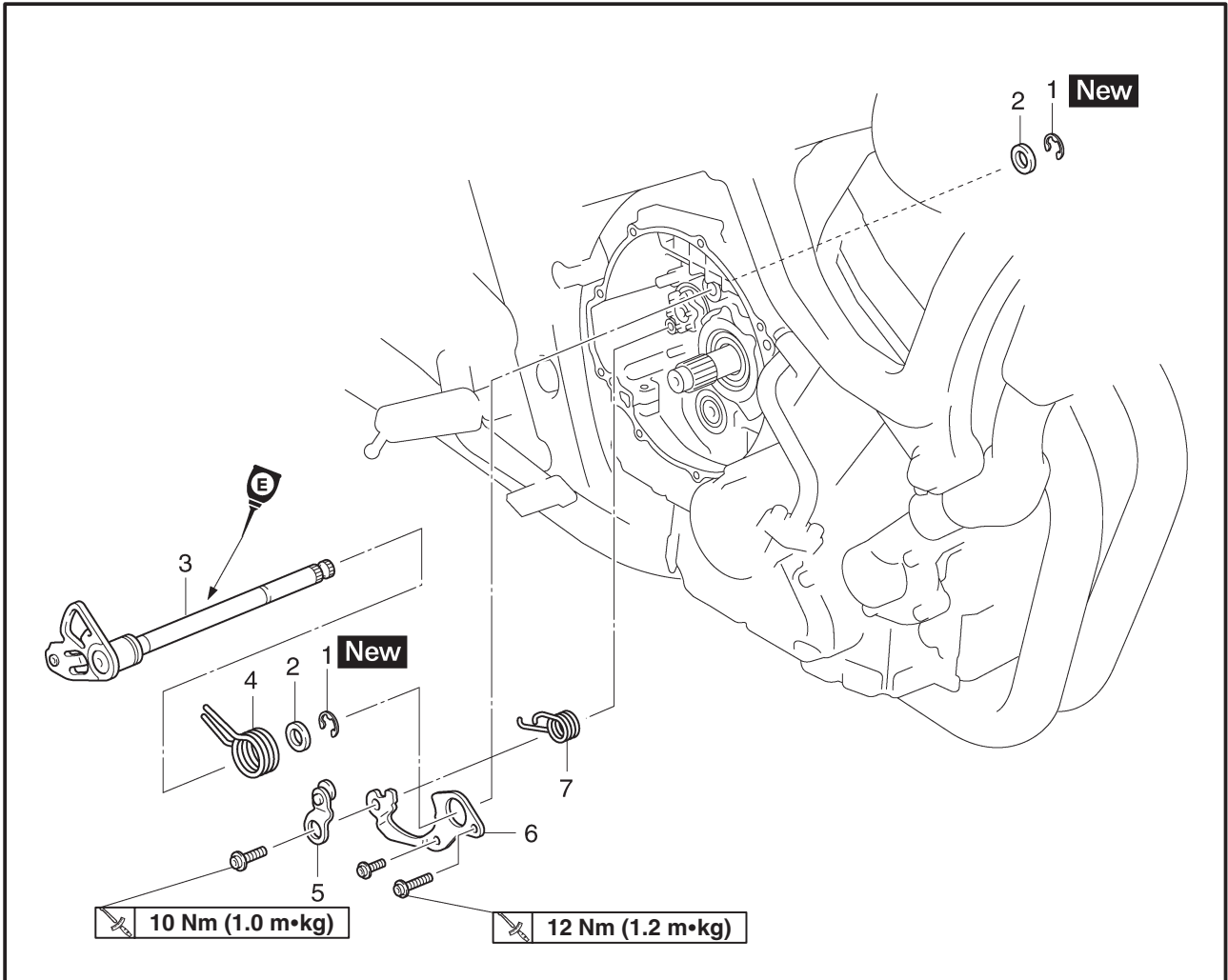
Order	Job/Part	Q'ty	Remarks
	<b>Removing the generator rotor cover</b>		Remove the parts in the order listed.
1	Drive sprocket cover	1	
2	Shift arm	1	
3	Cover 1	1	
4	Speed sensor rotor	1	
5	Cover 2	1	
6	Generator rotor cover	1	
7	Gasket	1	<b>NOTE:</b> _____ Loosen the bolts in stages and in a crisscross pattern.
8	Dowel pin	2	
9	Drive chain slider	1	For installation, reverse the removal procedure.



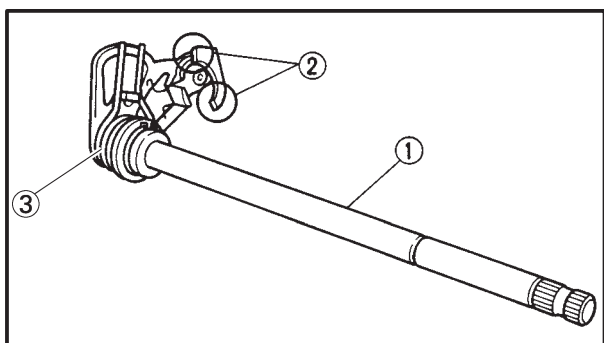
EAS00327



SHIFT SHAFT AND STOPPER LEVER



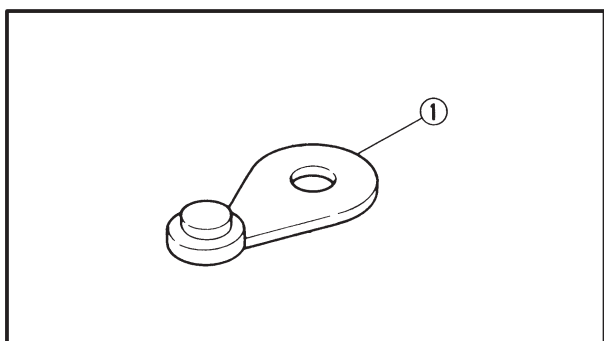
Order	Job/Part	Q'ty	Remarks
	<b>Removing the shift shaft and stopper lever</b>		Remove the parts in the order listed.
	Clutch		Refer to "CLUTCH".
	Shift arm		Refer to "GENERATOR ROTOR COVER".
1	Circlip	2	
2	Washer	2	
3	Shift shaft	1	
4	Shift shaft spring	1	
5	Stopper lever	1	
6	Bearing retainer	1	
7	Stopper lever spring	1	
			For installation, reverse the removal procedure.



EAS00328

## CHECKING THE SHIFT SHAFT

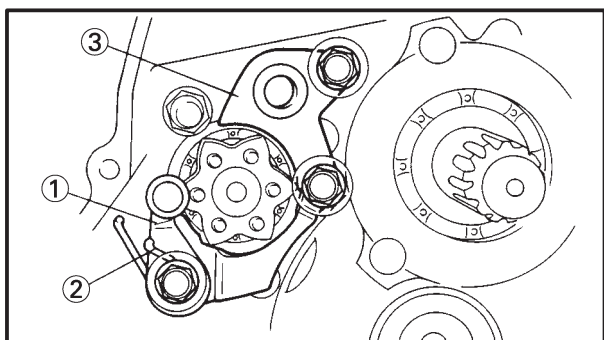
1. Check:
  - shift shaft ①
  - shift shaft pawl ②  
Bends/damage/wear → Replace.
  - shift lever spring ③  
Damage/wear → Replace.



EAS00330

## CHECKING THE STOPPER LEVER

1. Check:
  - stopper lever ①  
Bends/damage → Replace.  
Roller turns roughly → Replace the stopper lever.



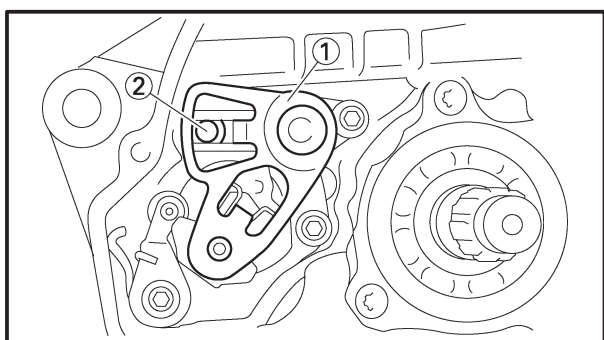
EAS00331

## INSTALLING THE SHIFT SHAFT

1. Install:
  - stopper lever ①
  - stopper lever spring ②
  - retainer 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.



2. Install:
  - washer
  - shift shaft ①

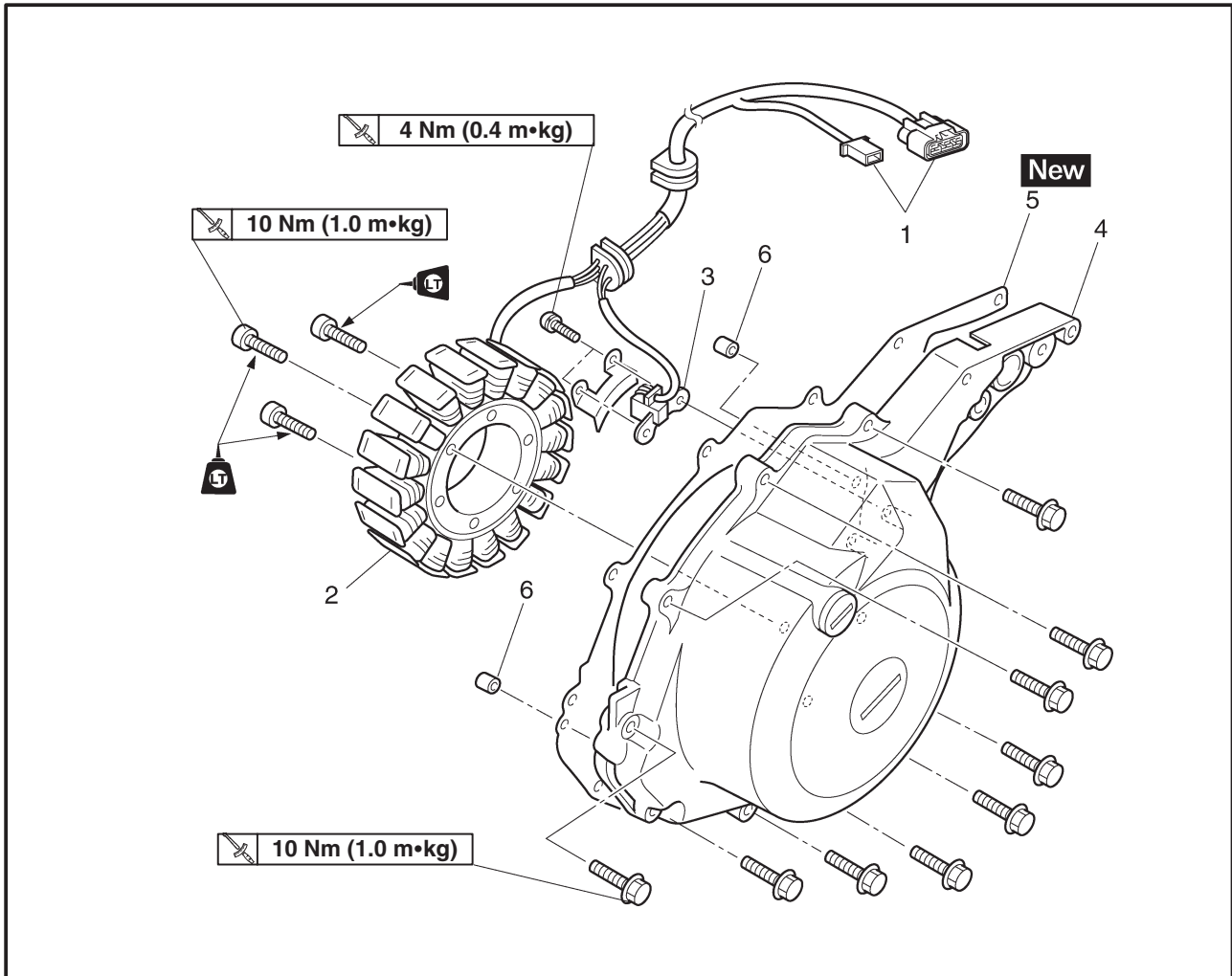
**NOTE:** \_\_\_\_\_

- Lubricate the oil seal lips with lithium-soap-based grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper ②.



EAS00341

## STARTER CLUTCH AND GENERATOR STATOR COIL ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	<b>Removing the stator coil assembly</b>		Remove the parts in the order listed.
	Engine oil		Drain
	Generator rotor cover		Refer to "GENERATOR ROTOR COVER".
1	Stator coil coupler/Pickup coil coupler	1	Disconnect.
2	Stator coil	1	
3	Pickup coil	1	
4	Generator cover	1	
5	Gasket	1	
6	Dowel pin	2	
			For installation, reverse the removal procedure.

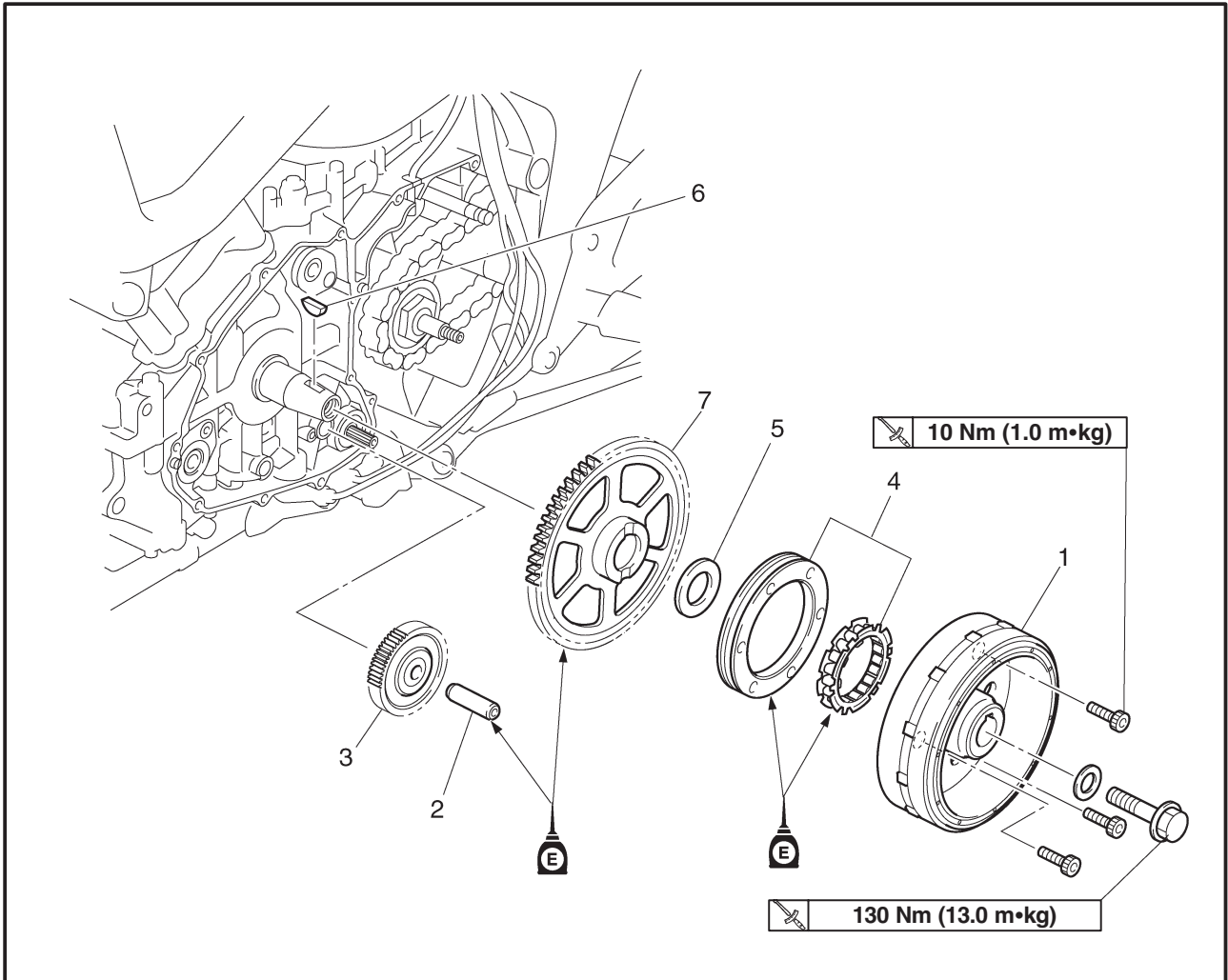
# STARTER CLUTCH AND GENERATOR



EAS00343



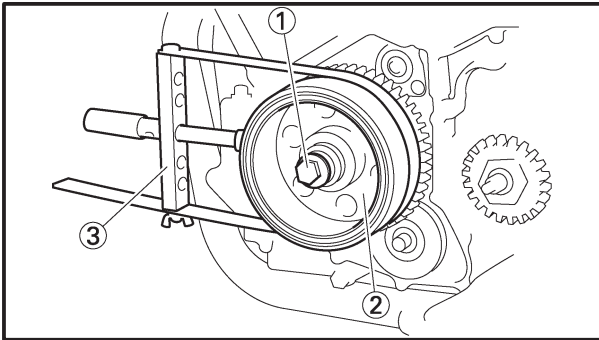
## STARTER CLUTCH AND GENERATOR ROTOR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the starter clutch and generator rotor</b>		Remove the parts in the order listed.
1	Generator rotor	1	
2	Idle gear shaft	1	
3	Starter motor idle gear	1	
4	Starter clutch	1	
5	Washer	1	
6	Woodruff key	1	
7	Starter clutch gear	1	
			For installation, reverse the removal procedure.

## STARTER CLUTCH AND GENERATOR

ENG



EAS00347

### REMOVING THE GENERATOR

1. Remove:

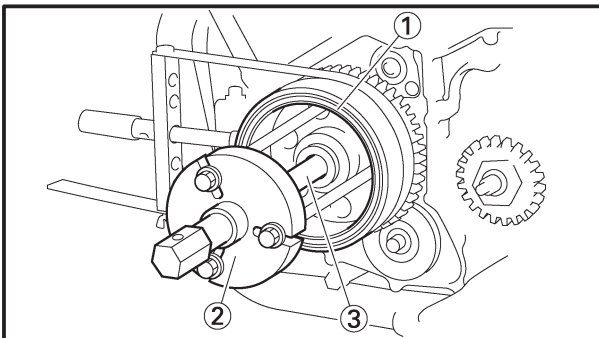
- generator rotor bolt ①
- washer

#### NOTE:

- While holding the generator rotor ② with the sheave holder ③, loosen the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



**Sheave holder**  
90890-01701



2. Remove:

- generator rotor ①  
(with the flywheel puller ② and flywheel puller attachment ③)
- woodruff key

#### CAUTION:

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set's center bolt and the crankshaft.

#### NOTE:

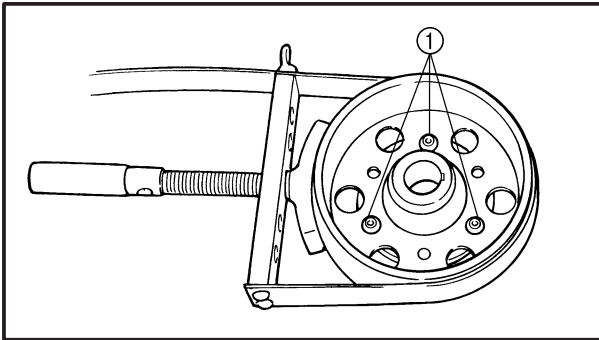
Make sure the flywheel puller is centered over the generator rotor.



**Flywheel puller**  
90890-01362  
**Flywheel puller attachment**  
90890-01382

## STARTER CLUTCH AND GENERATOR

ENG



### REMOVING THE STARTER CLUTCH

1. Remove:

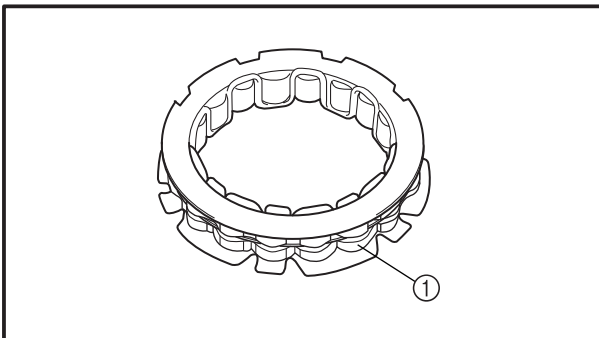
- starter clutch bolt ①

#### NOTE:

- While holding the generator rotor with the sheave holder, remove the starter clutch bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



**Sheave holder**  
90890-01701

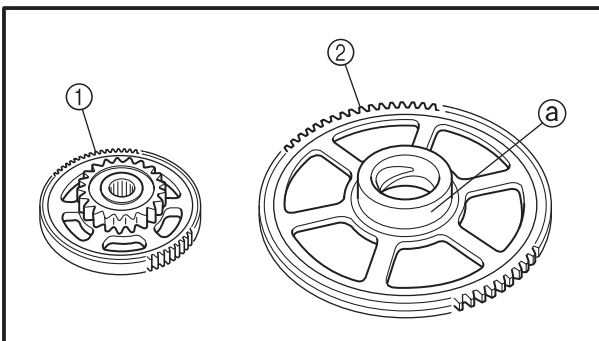


EAS00351

### CHECKING THE STARTER CLUTCH

1. Check:

- starter clutch rollers ①  
Damage/wear → Replace.



2. Check:

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

3. Check:

- starter clutch gear's contacting surfaces @  
Damage/pitting/wear → Replace the starter clutch gear.

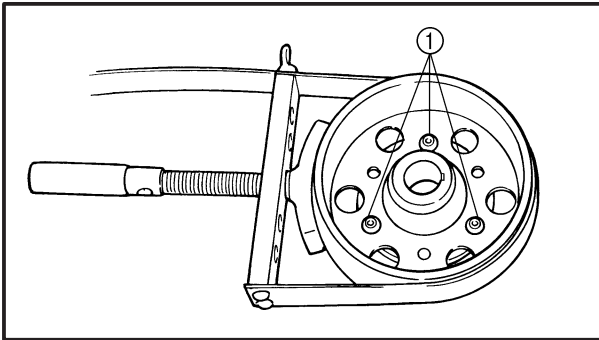
4. Check:

- starter clutch operation



## STARTER CLUTCH AND GENERATOR

ENG




EAS00352

### INSTALLING THE STARTER CLUTCH

1. Install:

- starter clutch

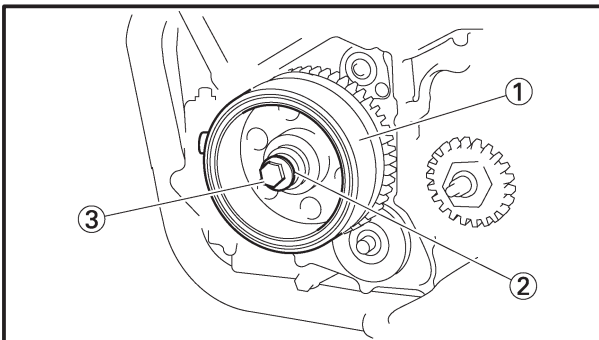
 10 Nm (1.0 m•kg)

**NOTE:**

- While holding the generator rotor ① with the sheave holder, tighten the starter clutch bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



**Sheave holder**  
90890-01701



EAS00354

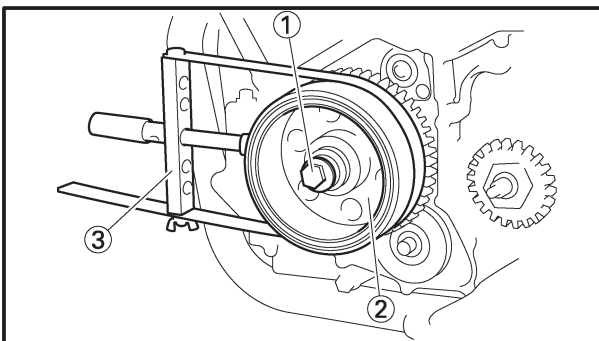
### INSTALLING THE GENERATOR

1. Install:

- woodruff key
- generator rotor ①
- washer ②
- generator rotor bolt ③

**NOTE:**

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.



2. Tighten:

- generator rotor bolt ①  130 Nm (13.0 m•kg)

**NOTE:**

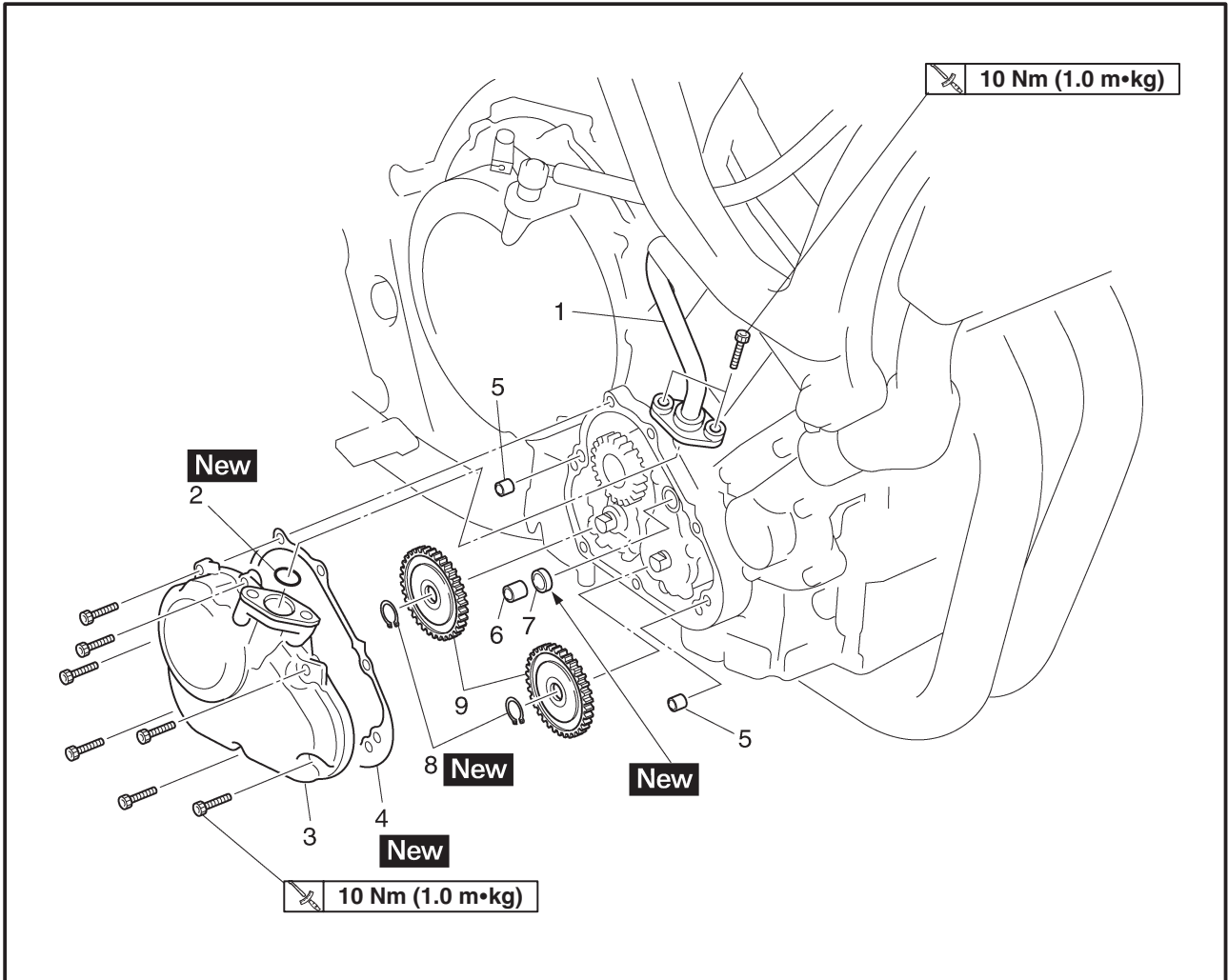
- While holding the generator rotor ② with the sheave holder ③, tighten the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



**Sheave holder**  
90890-01701

EAS00357

**OIL PAN AND OIL PUMP**  
**OIL PUMP COVER AND OIL PUMP DRIVEN GEAR**



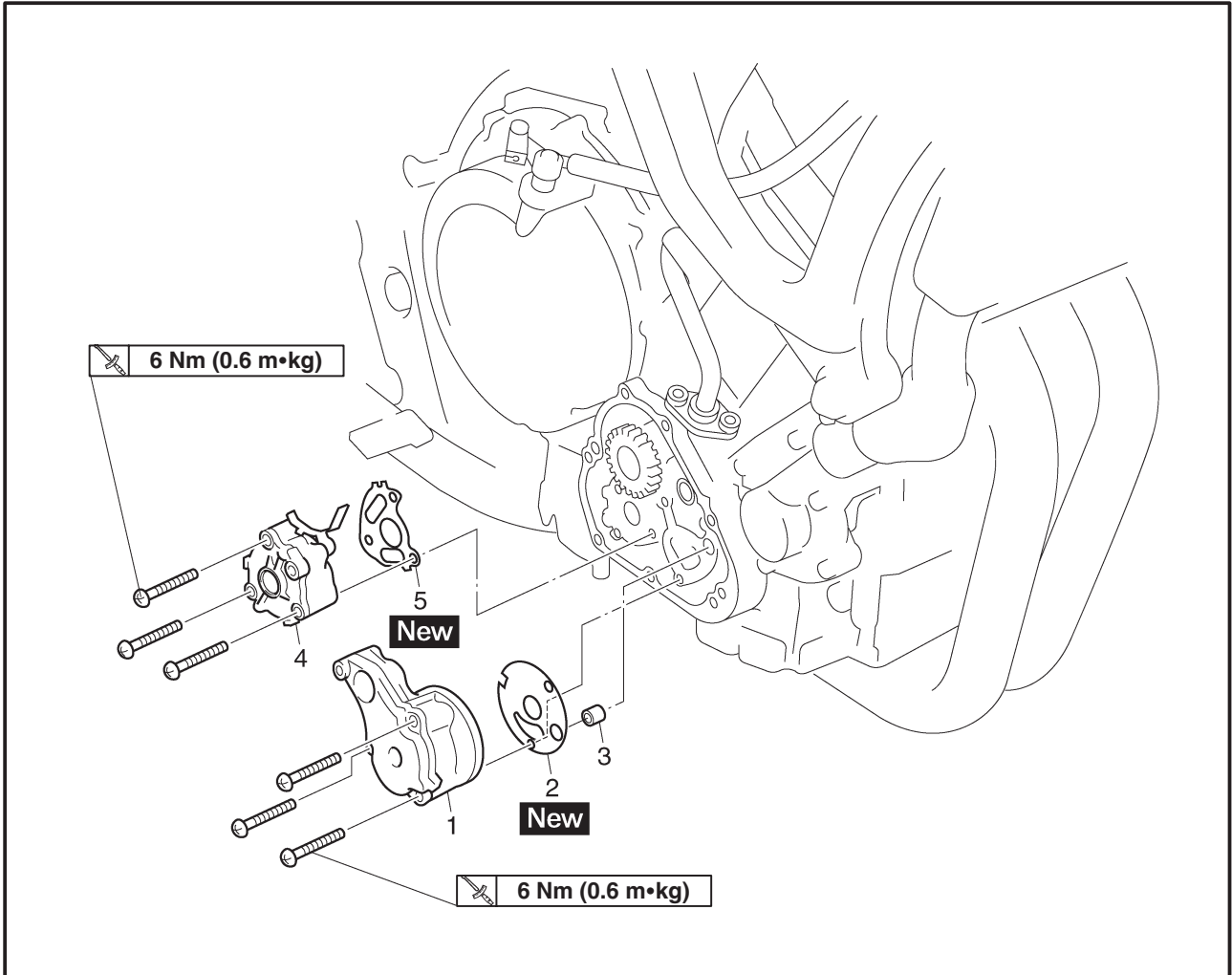
Order	Job/Part	Q'ty	Remarks
	<b>Removing the oil pump cover and oil pump driven gear</b> <b>Engine oil</b>		Remove the parts in the order listed.  Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Oil pipe	1	
2	O-ring	1	
3	Oil pump cover	1	
4	Gascket	1	
5	Dowel pin	2	
6	Collar	1	
7	Gascket	1	
8	Circlip	2	
9	Oil pump driver gear	2	
			For installation, reverse the removal procedure.



EAS00359



OIL PUMP



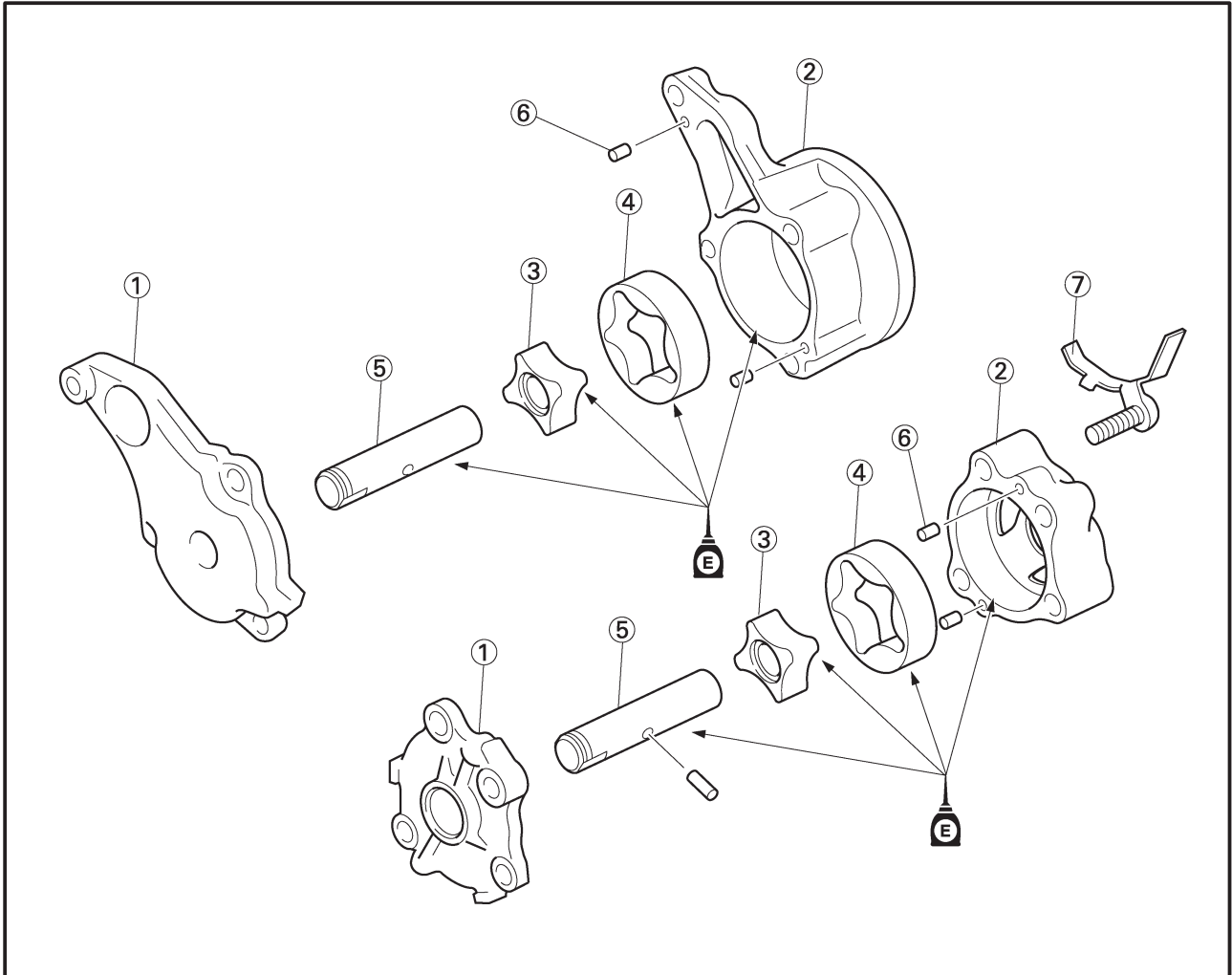
Order	Job/Part	Q'ty	Remarks
	<b>Removing the oil pump</b>		Remove the parts in the order listed.
1	Scavenge pump	1	
2	Gasket	1	
3	Dowel pin	1	
4	Feed pump	1	
5	Gasket	1	
			For installation, reverse the removal procedure.

# OIL PAN AND OIL PUMP

ENG



EAS00360



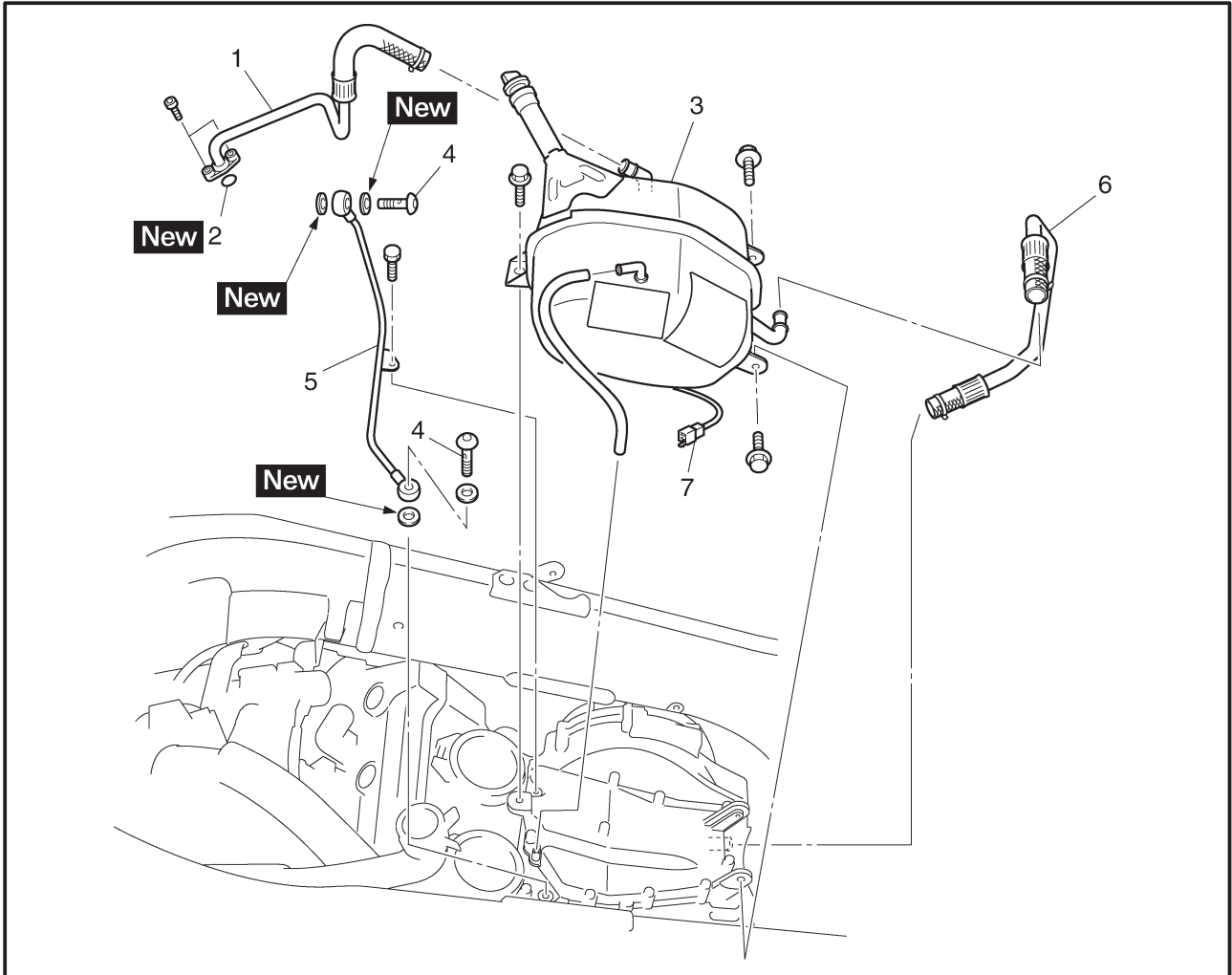
Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the oil pump</b>		Remove the parts in the order listed.
①	Oil pump cover	2	
②	Oil pump housing	2	
③	Inner rotor	2	
④	Outer rotor	2	
⑤	Rotor shaft	2	
⑥	Dowel pin	4	
⑦	Stay	1	
			For assembly, reverse the disassembly procedure.



EAS00358



OIL HOSE AND OIL TANK

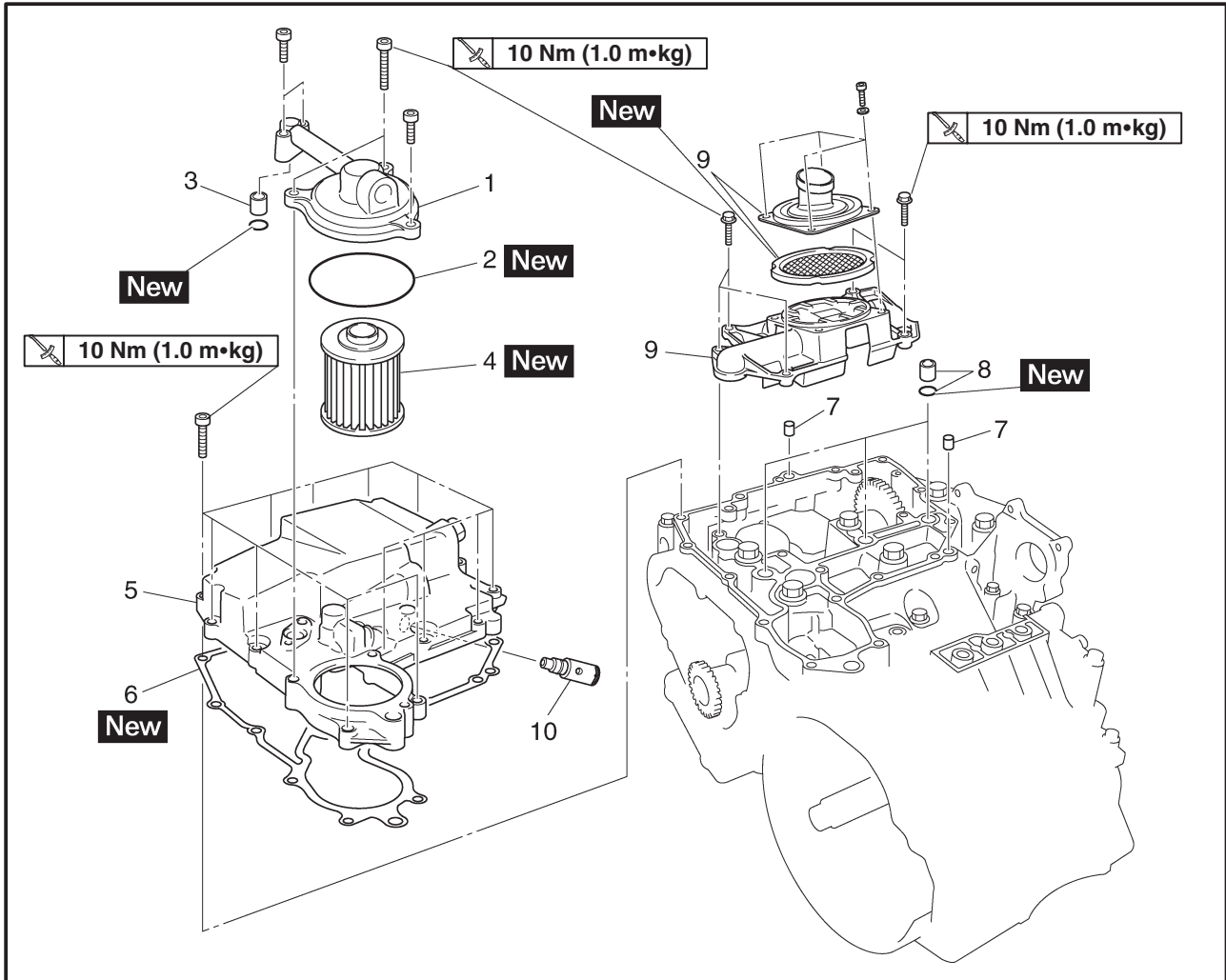


Order	Job/Part	Q'ty	Remarks
	<b>Removing the oil hose and oil tank</b>		Remove the parts in the order listed.
1	Oil hose 1	1	
2	O-ring	1	
3	Oil tank	1	
4	Union bolt	2	
5	Oil pipe	1	
6	Oil hose 2	1	
7	Oil level switch coupler	1	Disconnect. For installation, reverse the removal procedure.

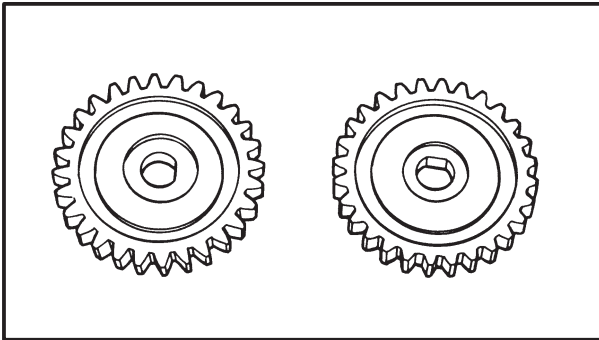


EAS00356

OIL PAN



Order	Job/Part	Q'ty	Remarks
	<b>Removing the oil pan</b>		
	Engine oil		Remove the parts in the order listed.
	Oil hose		Drain.
			Refer to "OIL HOSE".
1	Oil filter cover	1	
2	O-ring	1	
3	Collar	1	
4	Oil filter	1	<b>NOTE:</b> _____
			Install the oil filter with the projection towards the oil filter cover.
5	Oil pan	1	
6	Gasket	1	
7	Dowel pin	2	
8	O-ring/collar	1/1	
9	Oil strainer (cover/filter/bracket)	1/1/1	
10	Relief valve	1	
			For installation, reverse the removal procedure.

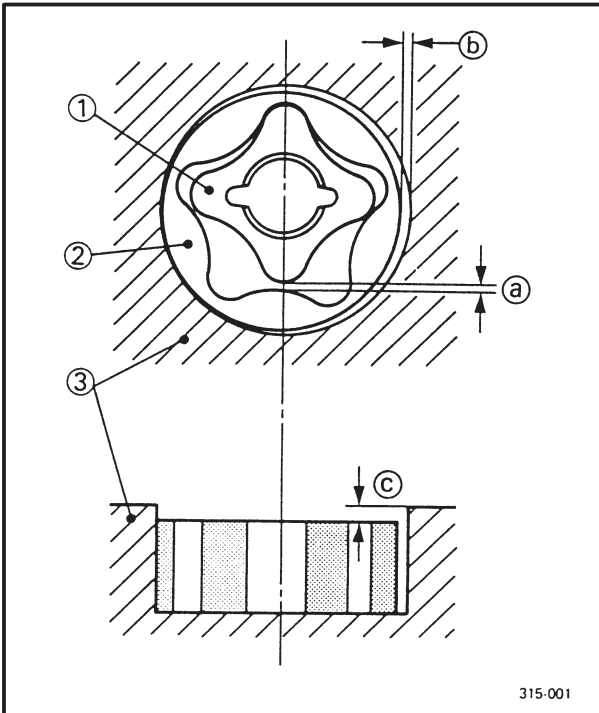


EAS00364

## CHECKING THE OIL PUMP

### 1. Check:

- oil pump driven gear ①
  - oil pump housing ②
  - oil pump housing cover ③
- Cracks/damage/wear → Replace the defective part(s).



### 2. Measure:

- inner-rotor-to-outer-rotor-tip clearance ①
- outer-rotor-to-oil-pump-housing clearance ②
- oil-pump-housing-to-inner-rotor-and-outer-rotor clearance ③

Out of specification → Replace the oil pump.

- ① Inner rotor
- ② Outer rotor
- ③ Oil pump housing



### Inner-rotor-to-outer-rotor-tip clearance

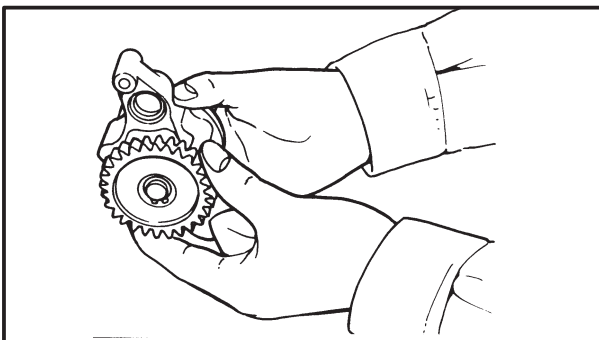
0.00 ~ 0.12 mm

### Outer-rotor-to-oil-pump-housing clearance

0.03 ~ 0.08 mm

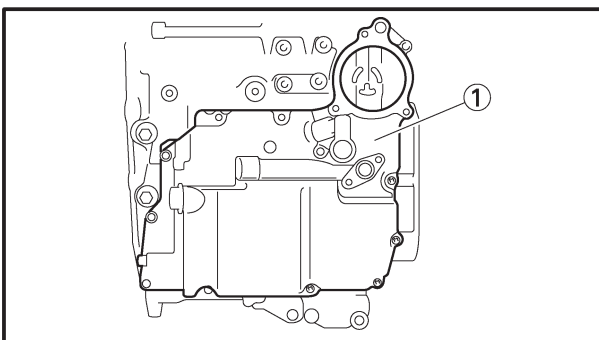
### Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance

0.03 ~ 0.08 mm



### 3. Check:

- oil pump operation
- Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS00362

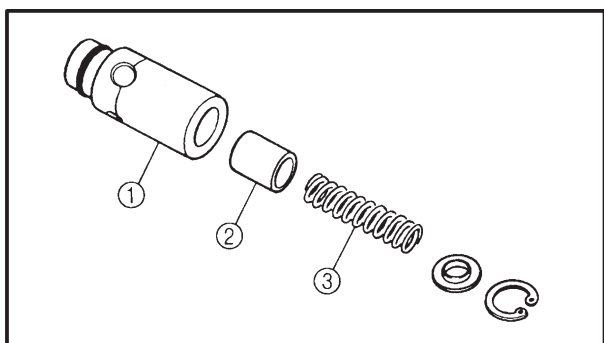
## REMOVING THE OIL PAN

### 1. Remove:

- oil pan ①
- gasket
- dowel pins

### NOTE:

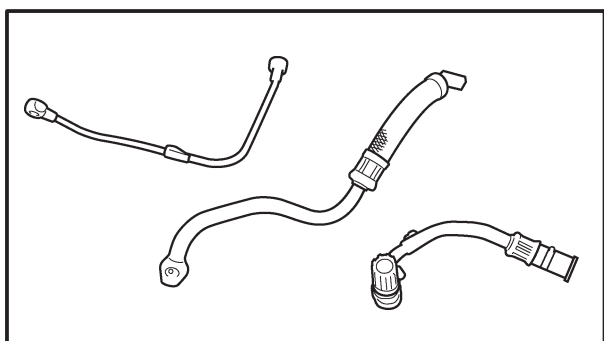
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



EAS00365

**CHECKING THE RELIEF VALVE**

1. Check:
  - relief valve body ①
  - relief valve ②
  - spring ③

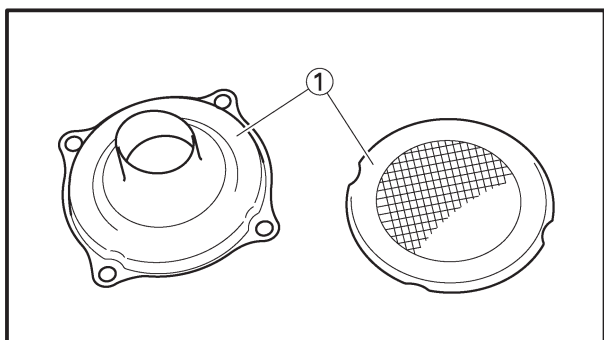


EAS00367

**CHECKING THE OIL DELIVERY PIPES**

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

1. Check:
  - oil delivery pipes  
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 solvent.

EAS00373

**CHECKING THE OIL NOZZLES**

The following procedure applies to all of the oil nozzles.

1. Check:
  - oil nozzle
  - check ball  
Damage/wear → Replace the oil nozzle.
  - O-ring  
Damage/wear → Replace.
  - oil nozzle passage  
Obstruction → Blow out with compressed air.



EAS00375

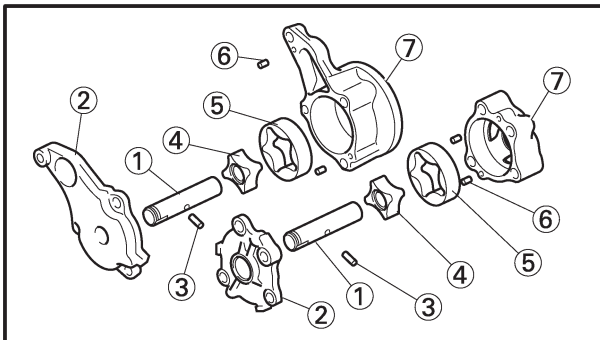
## ASSEMBLING THE OIL PUMP

### 1. Lubricate:

- inner rotor
- outer rotor
- oil pump shaft  
(with the recommended lubricant)



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



### 2. Install:

- oil pump shaft ①  
(to the oil pump cover ②)
- pin ③
- inner rotor ④
- outer rotor ⑤
- pin ⑥
- oil pump housing ⑦

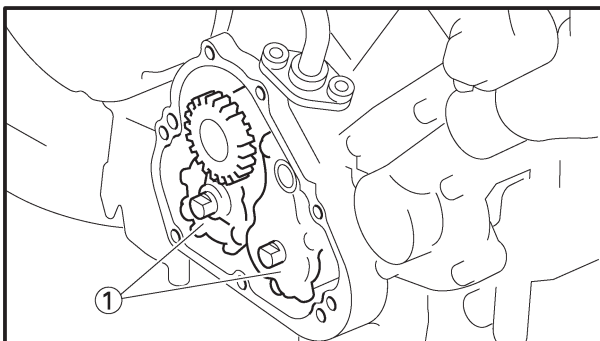
**6 Nm (0.6 m•kg)**

### NOTE:

When installing the inner rotor, align the pin ③ in the oil pump shaft with the groove in the inner rotor ④.

### 3. Check:

- oil pump operation  
Refer to "CHECKING THE OIL PUMP".



EAS00376

## INSTALLING THE OIL PUMP

### 1. Install:

- oil pump ①

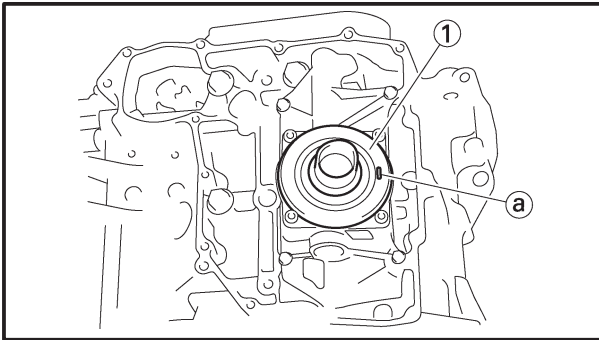
**6 Nm (0.6 m•kg)**

### CAUTION:

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

### 2. Install:

- oil pump driven gear




EAS00378

## INSTALLING THE OIL STRAINER

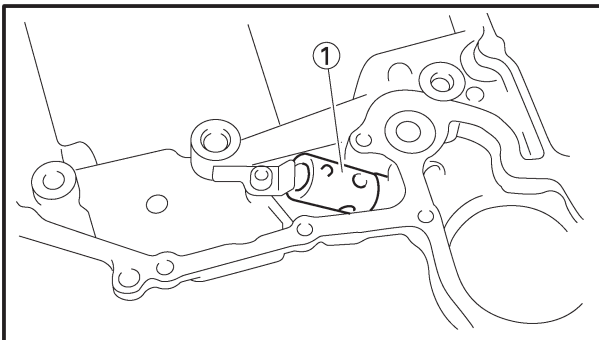
1. Install:

- collar
- O-ring
- oil strainer ①

 10 Nm (1.0 m•kg)

### NOTE:

The mark (a) on the oil strainer housing must point towards the front of the engine.

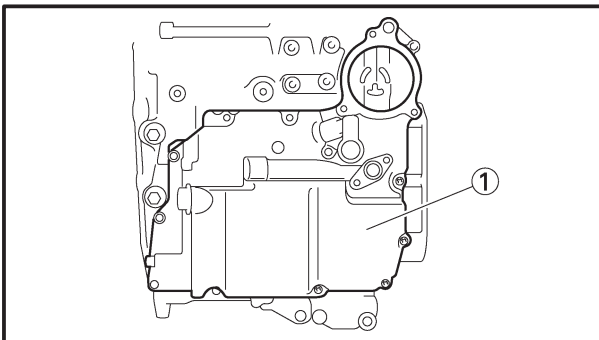


EAS00380

## INSTALLING THE OIL PAN


1. Install:


- relief valve ①



2. Install:

- dowel pins
- gasket **New**
- oil pan ①
- engine oil drain bolt

 10 Nm (1.0 m•kg)

 30 Nm (3.0 m•kg)

### **⚠ WARNING**

Always use new copper washers.

### NOTE:

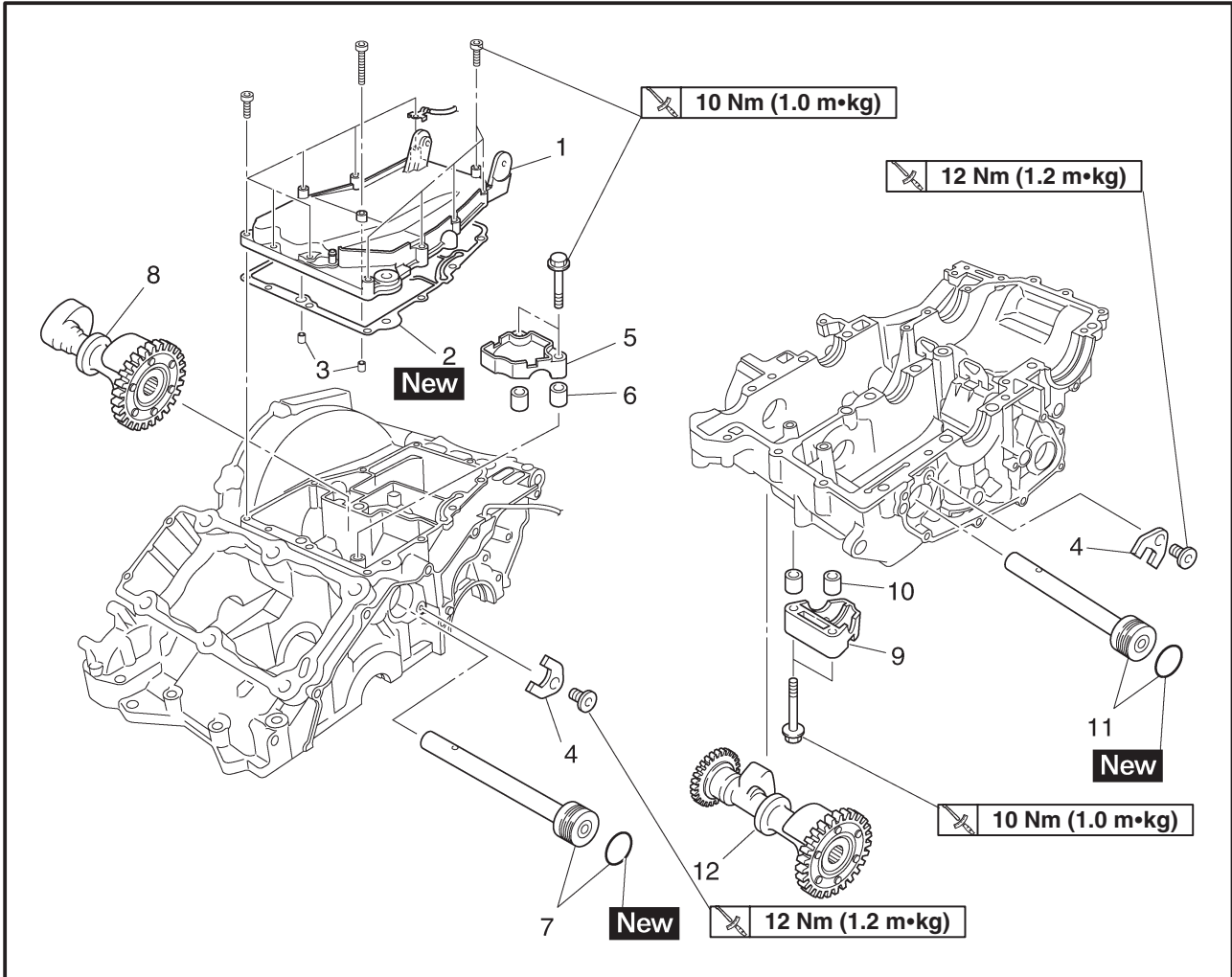
Tighten the oil pan bolts in stages and in a criss-cross pattern.

3. Install:

- oil tank

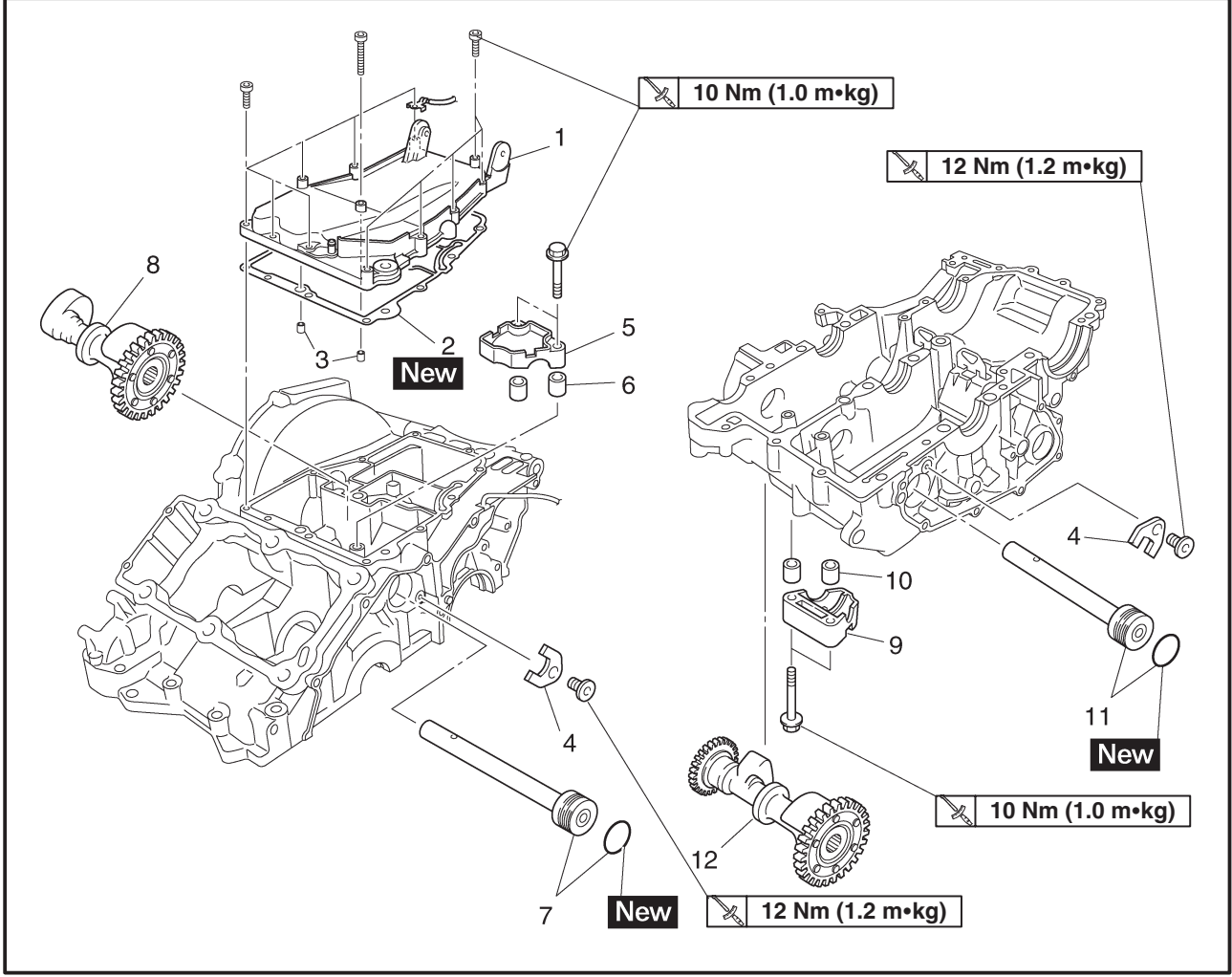


**CRANKSHAFT  
BALANCER SHAFT**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the balancer shaft</b>		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Oil tank		Refer to "OIL TANK".
	Oil pan		Refer to "OIL PAN".
1	Crankcase upper cover	1	
2	Gasket	1	
3	Dowel pin	2	
4	Balancer shaft retainer	2	
5	Rear balancer holder	1	
6	Dowel pin	2	
7	Rear balancer shaft/O-ring	1/1	

# CRANKSHAFT

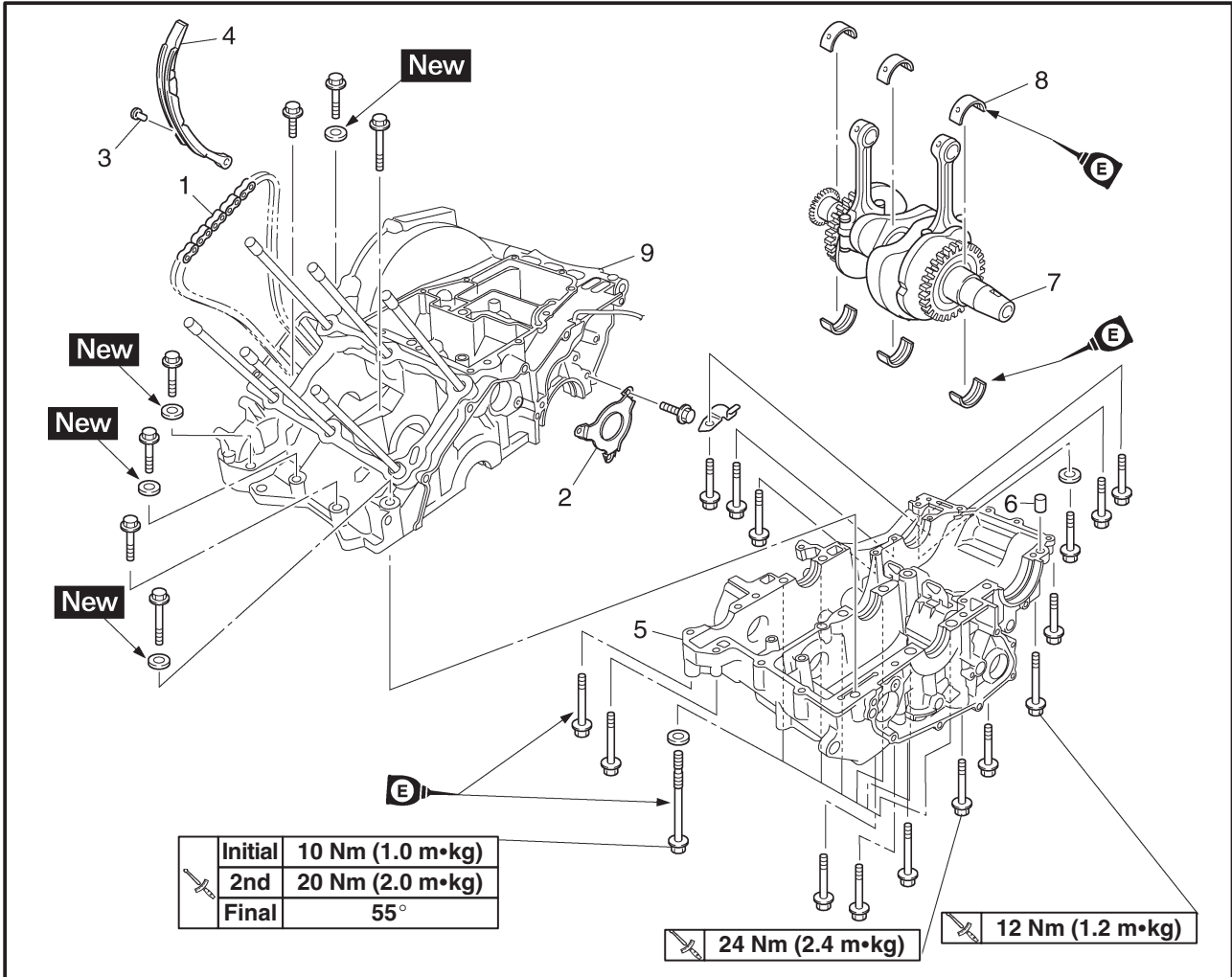


Order	Job/Part	Q'ty	Remarks
8	Rear balancer weight	1	For installation, reverse the removal procedure.
9	Front balancer holder	1	
10	Dowel pin	2	
11	Front balancer shaft/O-ring	1/1	
12	Front balancer weight	1	
	Water pump drive gear		



EAS00381

CRANKSHAFT ASSEMBLY

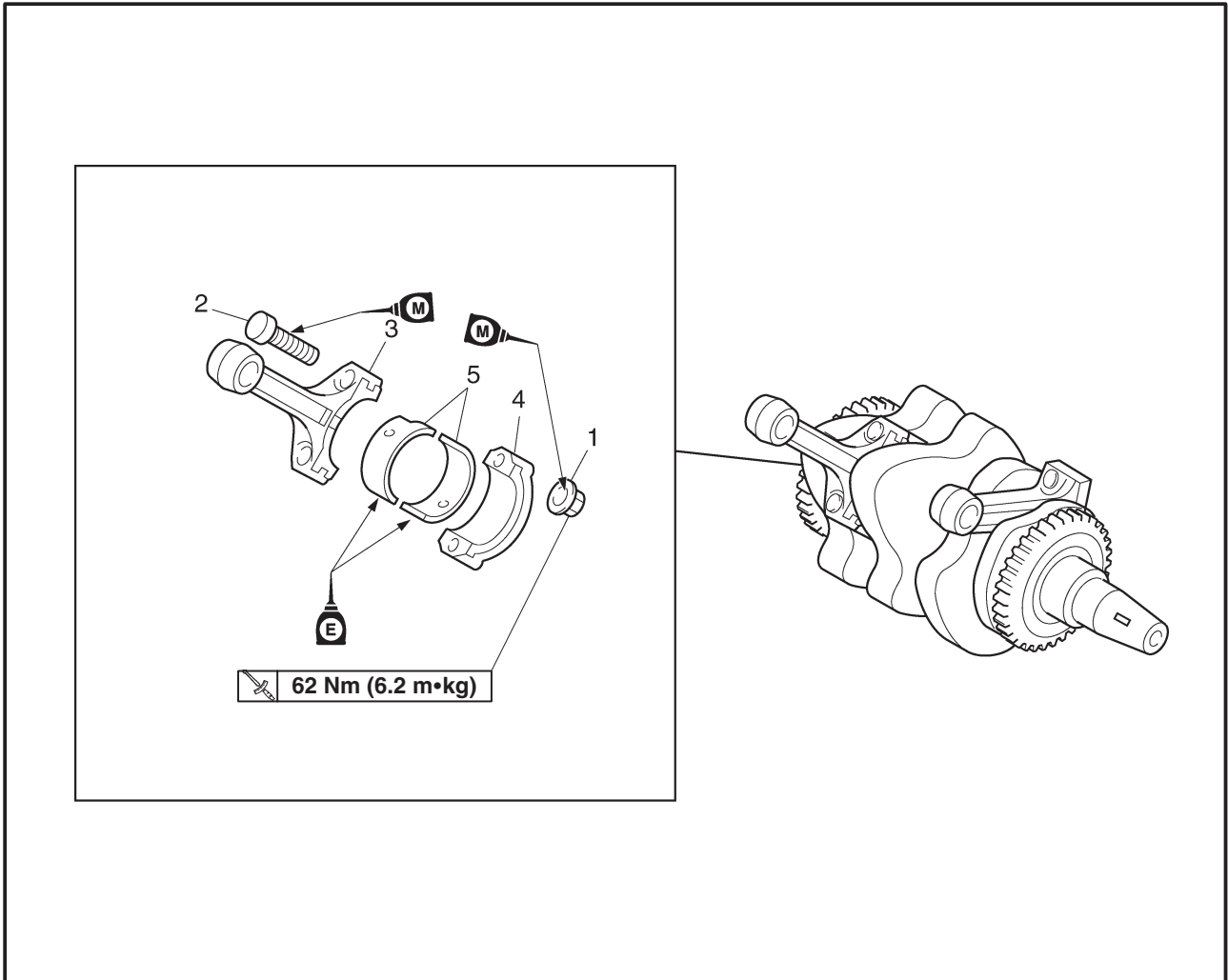


Order	Job/Part	Q'ty	Remarks
	<b>Removing the crankshaft assembly</b>		Remove the parts in the order listed. Refer to "BALANCER". Refer to "WATER PUMP" in chapter 6.  For installation, reverse the removal procedure.
	Balancer weight		
	Water pump		
1	Timing chain	1	
2	Cover plate	1	
3	Pin	1	
4	Timing chain guide (intake)	1	
5	Lower crankcase	1	
6	Dowel pin	1	
7	Crankshaft assembly	1	
8	Main journal bearing	6	
9	Upper crankcase	1	

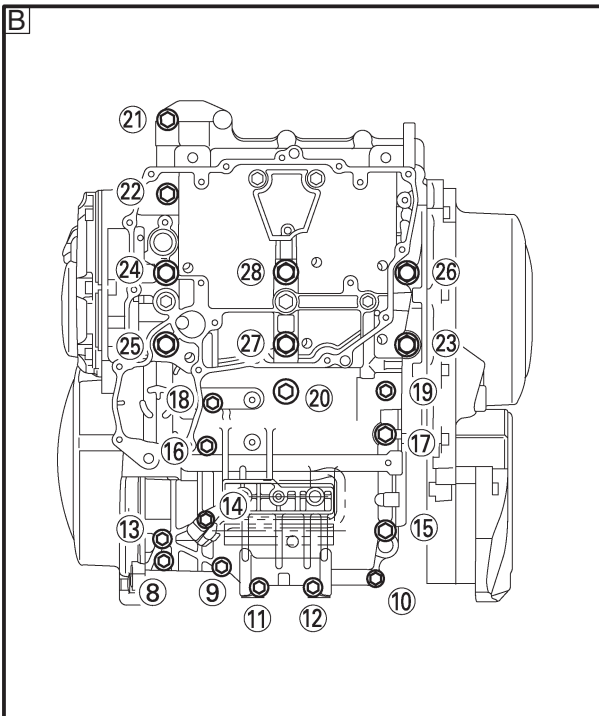
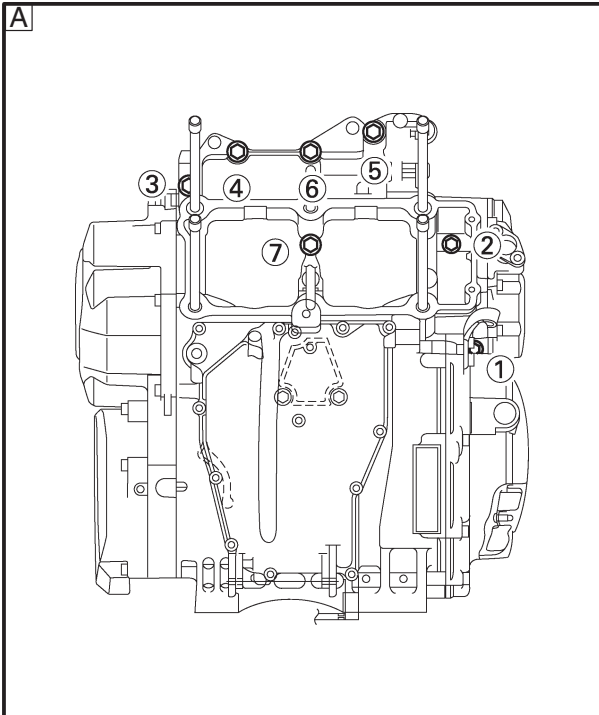


EAS00382

CONNECTING ROD



Order	Job/Part	Q'ty	Remarks
	<b>Removing the connecting rod</b>		
1	Nut	4	Remove the parts in the order listed.  For installation, reverse the removal procedure.
2	Connecting rod bolt	4	
3	Connecting rod	2	
4	Connecting rod cap	2	
5	Connecting rod bearing	4	



EAS00384

## DISASSEMBLING THE CRANKCASE

1. Remove:
  - cover plate
  - timing chain guide (intake)
2. 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).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

**A** Upper crankcase

**B** Lower crankcase

3. Place the engine upside down.

4. Remove:
  - lower crankcase

### CAUTION:

**Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.**

M6 × 70 mm bolts ①, ②, ⑧ ~ ⑭, ⑰, ⑱

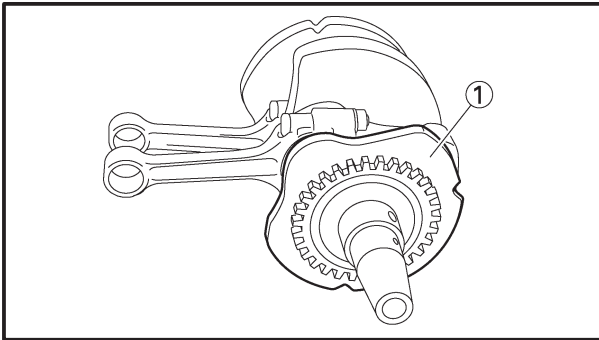
M8 × 75 mm bolts ③ ~ ⑦, ⑮, ⑲, ⑳ ~ ㉒

M10 × 135 mm bolts ㉓ ~ ㉘

5. Remove:
  - dowel pins
6. Remove:
  - crankshaft journal lower bearing (from the lower crankcase)

### NOTE:

Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.



EAS00387

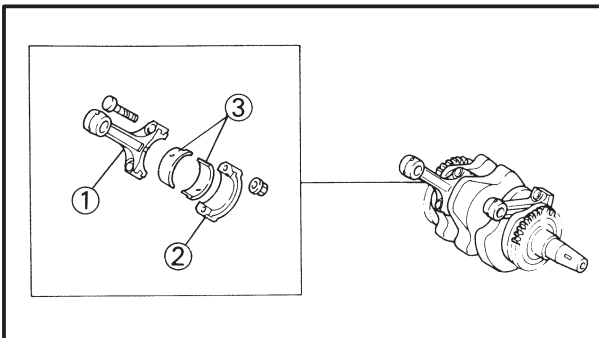
## REMOVING THE CRANKSHAFT ASSEMBLY

1. Remove:

- crankshaft assembly ①
- crankshaft journal upper bearings (from the upper crankcase)

### NOTE:

Identify the position of each crankshaft journal upper bearing so that it can be reinstalled in its original place.



EAS00391

## REMOVING THE CONNECTING RODS

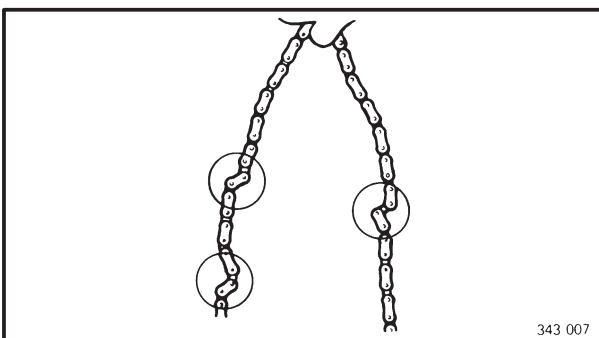
The following procedure applies to all of the connecting rods.

1. Remove:

- connecting rods ①
- connecting rod caps ②
- big end bearings ③

### NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



343 007

## CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE

1. Check:

- timing chain  
Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.

2. Check:

- timing chain guide (intake side)  
Damage/wear → Replace the timing chain guide. (intake side)




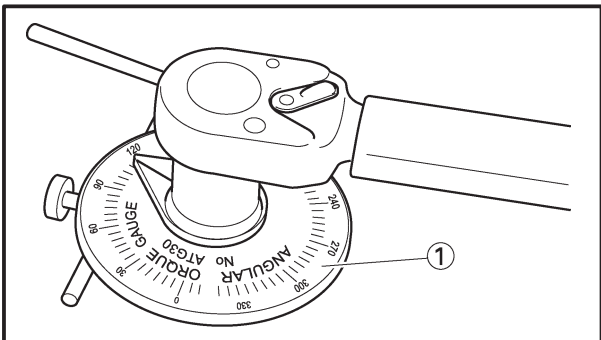
**NOTE:** \_\_\_\_\_  
Do not put the Plastigauge<sup>®</sup> over the oil hole in the crankshaft journal.

e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

**NOTE:** \_\_\_\_\_  
• Align the projections of the crankshaft journal lower bearings with the notches in the lower crankcase.  
• Do not move the crankshaft until the clearance measurement has been completed.

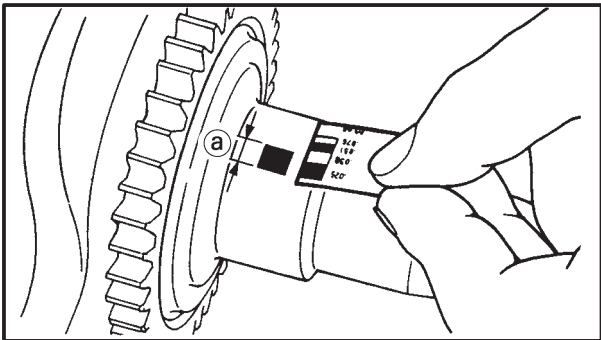
f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

	<b>Crankcase bolt</b>
	<b>Initial 10 Nm (1.0 m•kg)</b>
	<b>2nd 20 Nm (2.0 m•kg)</b>
	<b>Final 55°</b>



**CAUTION:** \_\_\_\_\_

• Use an angle torque gauge ① and tighten at the correct angle.  
• If an angle torque gauge is not available, do not tighten at an angle because accurate tightening cannot be expected.  
Tightening in this case should be controlled by torque and final tightening should be to 41 Nm (4.1 m•kg).

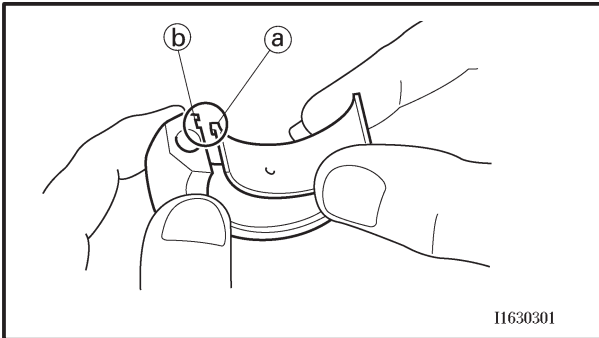


**NOTE:** \_\_\_\_\_  
Lubricate the crankcase bolt threads with engine oil.

g. Remove the lower crankcase and the crankshaft journal lower bearings.  
h. Measure the compressed Plastigauge<sup>®</sup> width ② on each crankshaft journal. If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.



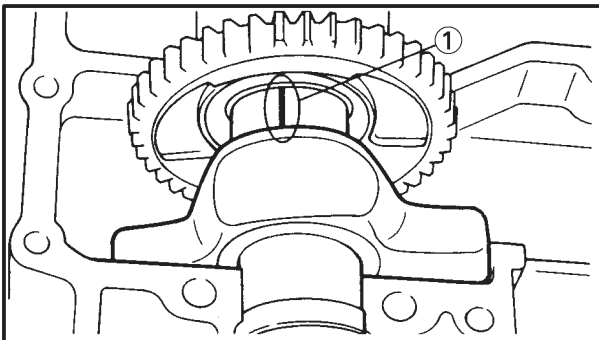




- a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rods halves.
- b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

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

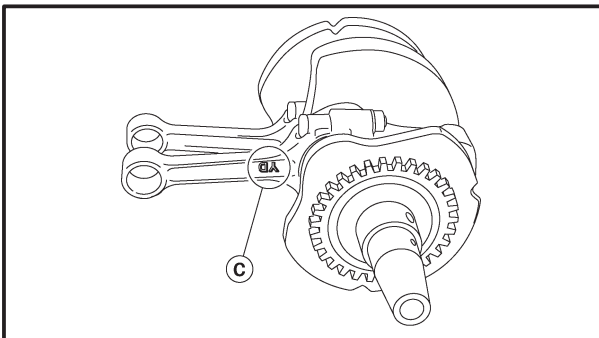
Align the projections (a) on the big end bearings with the notches (b) in the connecting rod and connecting rod cap.



- c. Put a piece of Plastigauge® ① on the crankshaft pin.
- d. Assemble the connecting rod halves.

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

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with molybdenum disulfide grease.
- Make sure the “Y” mark (C) on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters on both the connecting rod and connecting rod cap are aligned.



- e. Tighten the connecting rod nuts.

**CAUTION:** \_\_\_\_\_

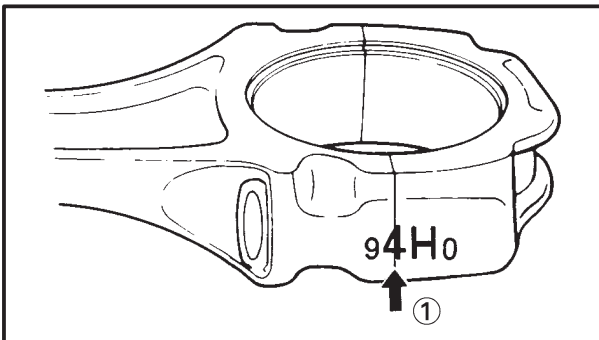
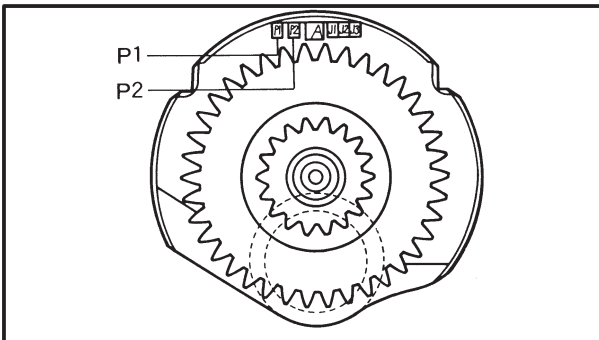
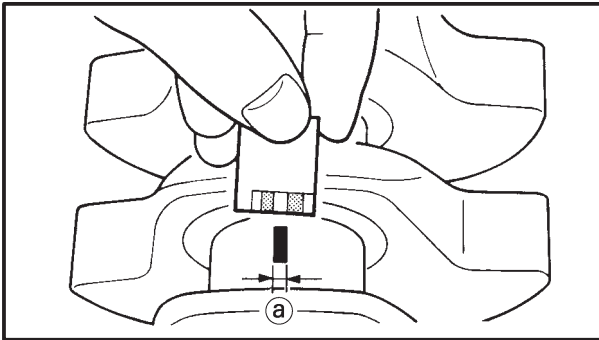
- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 52 and 62 Nm (5.2 and 6.2 m•kg). Once you reach 52 Nm (5.2 m•kg), DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 52 and 62 Nm (5.2 and 6.2 m•kg), loosen the connecting rod nut to less than 52 Nm (5.2 m•kg) and start again.**

Refer to “INSTALLING THE CONNECTING RODS”.



**Connecting rod nut  
62 Nm (6.2 m•kg)**

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



g. Measure the compressed Plastigauge® width (a) on the crankshaft pin.  
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

6. Select:
- big end bearings (P1 ~ P2)

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

- The numbers **A** stamped into the crankshaft web and the numbers **①** on the connecting rods are used to determine the replacement big end bearing sizes.
- “P1” ~ “P2” refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod “P1” and the crankshaft web “P1” numbers are “4” and “1” respectively, then the bearing size for “P1” is:

<p>“P1” (connecting rod) – “P1” (crankshaft) = 4 – 1 = 3 (brown)</p>
--

BIG END BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green

EAS00399

**CHECKING THE CRANKCASE**

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
  - crankcase  
Cracks/damage → Replace.
  - oil delivery passages  
Obstruction → Blow out with compressed air.

EAS00401

**CHECKING THE BEARINGS**

1. Check:
  - bearings  
Clean and lubricate the bearings, then rotate the inner race with your finger.  
Rough movement → Replace.



EAS00402

## CHECKING THE CIRCLIPS AND WASHERS

### 1. Check:

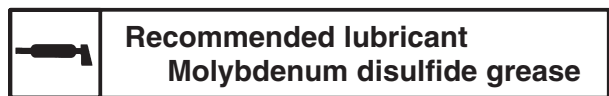
- circlips  
Bends/damage/looseness → Replace.
- washers  
Bends/damage → Replace.

EAS00404

## INSTALLING THE CONNECTING RODS

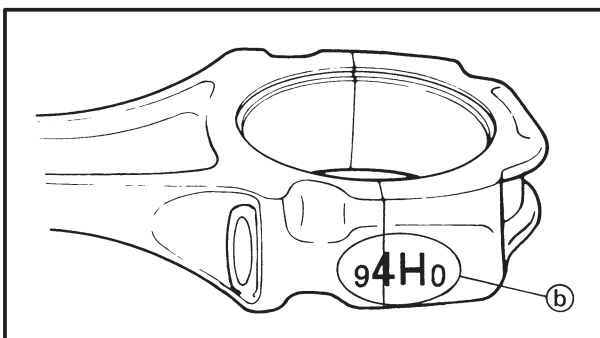
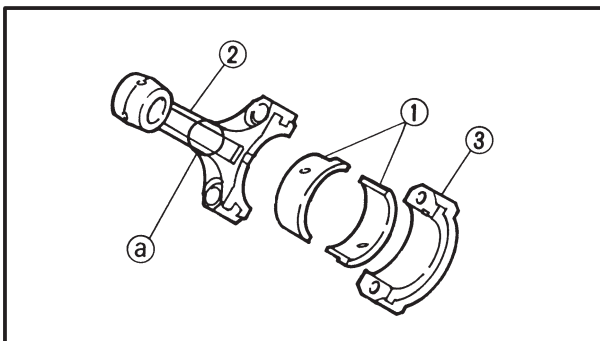
### 1. Lubricate:

- bolt threads
- nut seats  
(with the recommended lubricant)



### 2. Lubricate:

- crankshaft pins
- big end bearings
- connecting rod inner surface  
(with the recommended lubricant)



### 3. Install:

- big end bearings ①
- connecting rods ②
- connecting rod caps ③  
(onto the crankshaft pins)

### NOTE:

- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the “Y” marks (a) on the connecting rods face towards the left side of the crankshaft.
- Make sure the characters (b) on both the connecting rod and connecting rod cap are aligned.



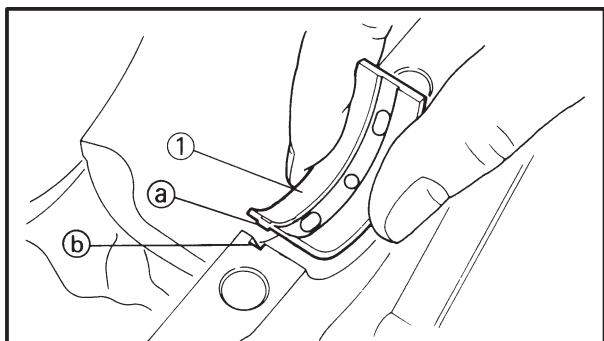
- 
4. Align:
    - bolt heads  
(with the connecting rod caps)
  5. Tighten:
    - connecting rod nuts



**Connecting rod nuts**  
**62 Nm (6.2 m•kg)**

**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 52 and 62 Nm (5.2 and 6.2 m•kg). Once you reach 52 Nm (5.2 m•kg) **DO NOT STOP TIGHTENING** until the specified torque is reached. If the tightening is interrupted between 52 and 62 Nm (5.2 and 6.2 m•kg), loosen the connecting rod nut to less than 52 Nm (5.2 m•kg) and start again.
-



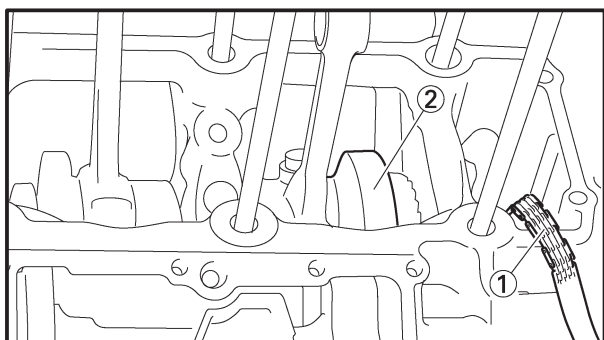
EAS00407

**INSTALLING THE CRANKSHAFT****1. Install:**

- crankshaft journal upper bearings (into the upper crankcase)

**NOTE:**

- Align the projections (a) on the crankshaft journal upper bearings (1) with the notches (b) in the upper crankcase.
- Be sure to install each crankshaft journal upper bearing in its original place.

**2. Install:**

- timing chain (1) (onto the crankshaft sprocket)
- crankshaft assembly (2)

**NOTE:**

- Pass the timing chain through the timing chain cavity.
- To prevent the timing chain from falling into the crankcase, fasten it with a wire.



EAS00415

## ASSEMBLING THE CRANKCASE

### 1. Lubricate:

- crankshaft journal bearings  
(with the recommended lubricant)



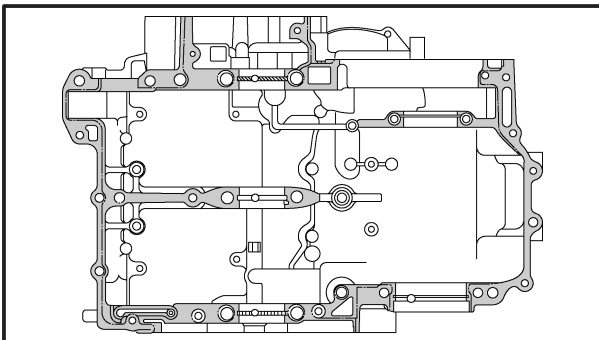
**Recommended lubricant**  
**Engine oil**

### 2. Apply:

- sealant  
(onto the crankcase mating surfaces)

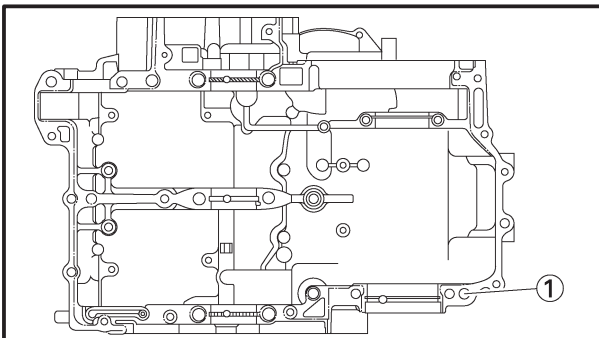


**Yamaha bond No. 1215**  
**90890-85505**



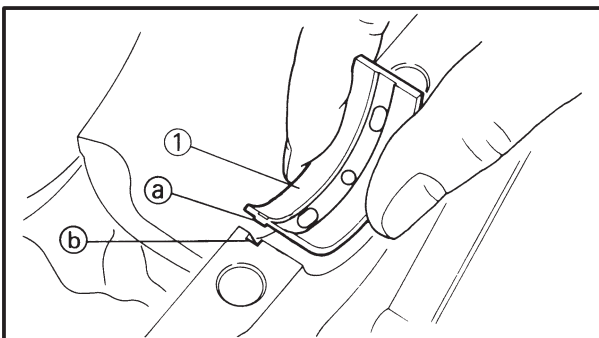
### NOTE:

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.



### 3. Install:

- dowel pin ①
- oil jet nozzle

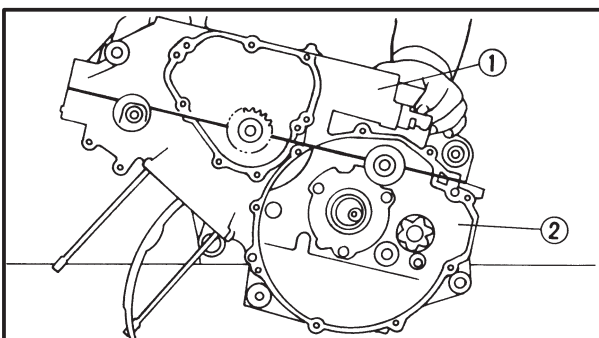


### 4. Install:

- crankshaft journal lower bearings  
(into the lower crankcase)

### NOTE:

- Align the projections (a) on the crankshaft journal lower bearings ① with the notches (b) in the lower crankcase.
- Install each crankshaft journal lower bearing in its original place.

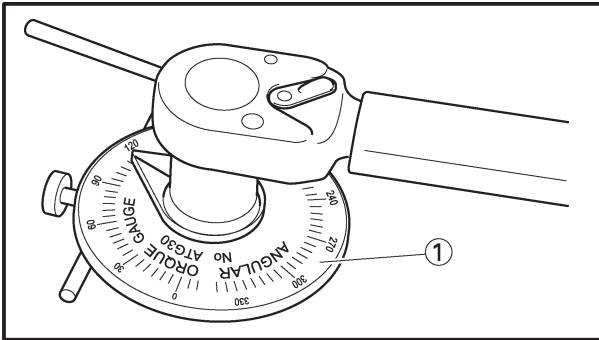


### 5. Install:

- lower crankcase ①  
(onto the upper crankcase ②)

# CRANKSHAFT

ENG



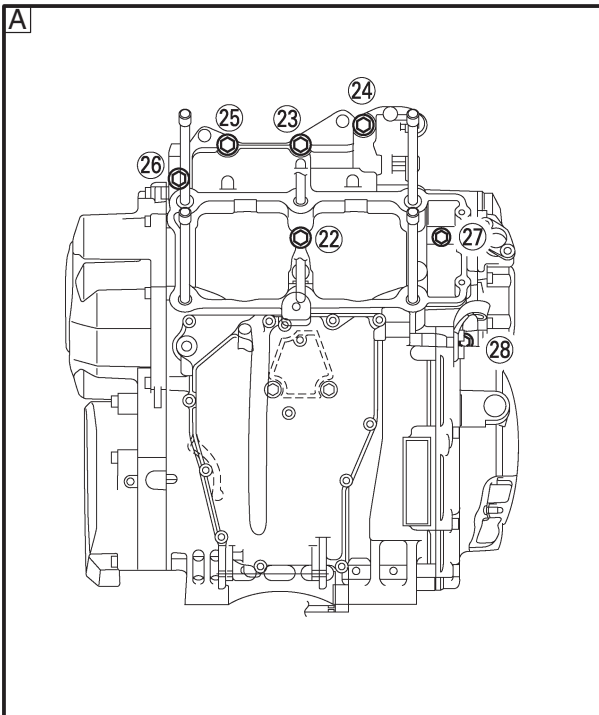
6. Install:

- crankcase bolts (M10)

initial	10 Nm (1.0 m•kg)
2nd	20 Nm (2.0 m•kg)
final	55°

## CAUTION:

- Use an angle torque gauge (1) and tighten at the correct angle.
- If an angle torque gauge is not available, do not tighten at an angle because accurate tightening cannot be expected. Tightening in this case should be controlled by torque and final tightening should be to 41 Nm (4.1 m•kg).



- crankcase bolts (M6)

12 Nm (1.2 m•kg)
------------------

- crankcase bolts (M8)

24 Nm (2.4 m•kg)
------------------

## NOTE:

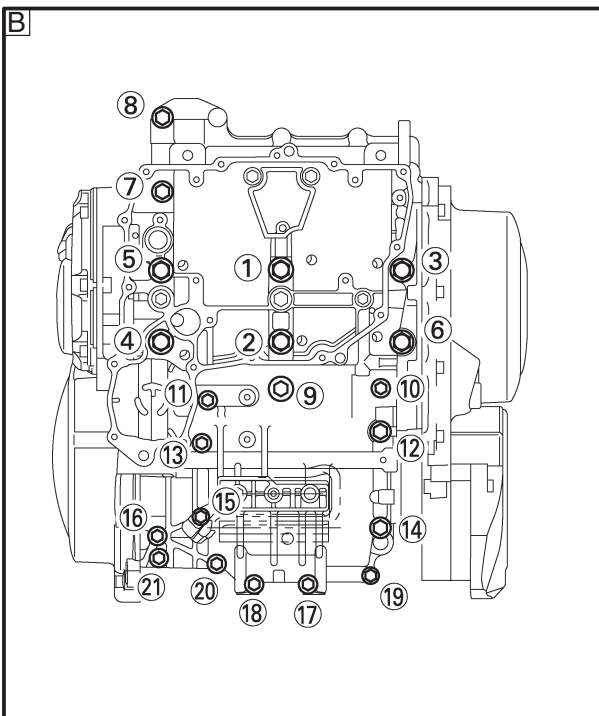
- Lubricate the bolt threads (1 ~ 28) with engine oil.
- Tighten the bolts in the tightening sequence cast on the crankcase.
- Install a copper washer on bolts (16) (22) (24) (26).

A Upper crankcase

B Lower crankcase

7. Install:

- timing chain guide (intake)
- cover plate





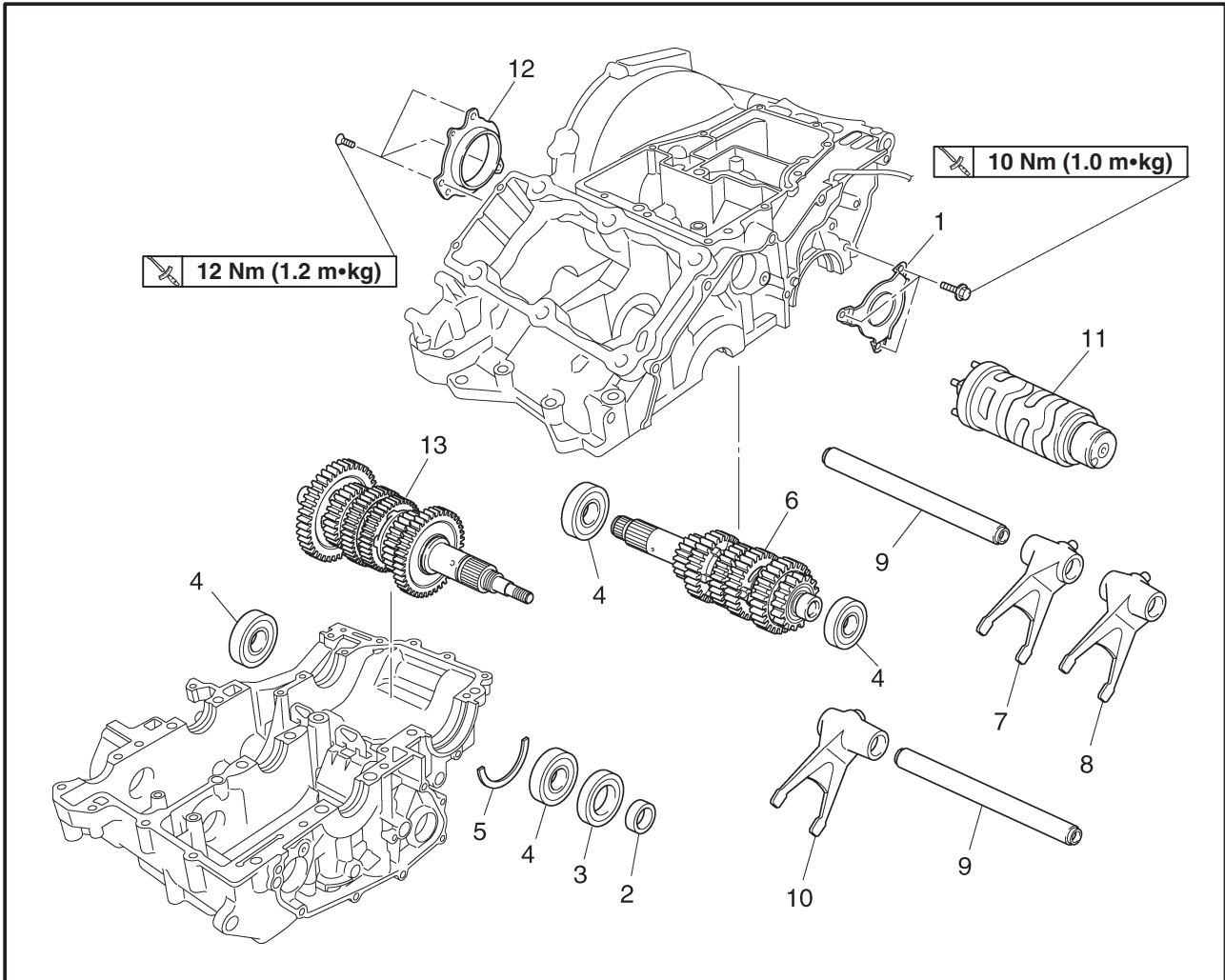




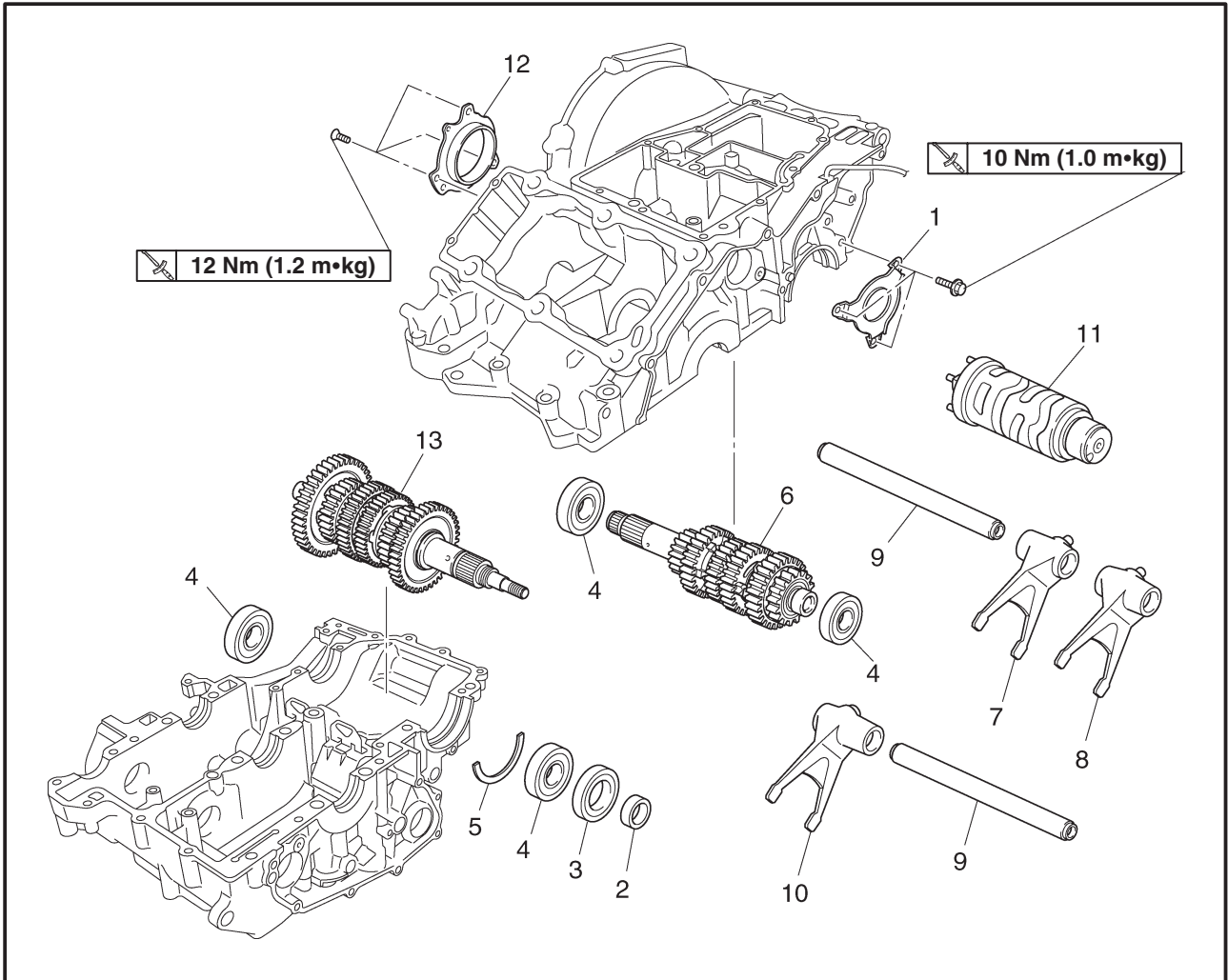
EAS00419

**TRANSMISSION**

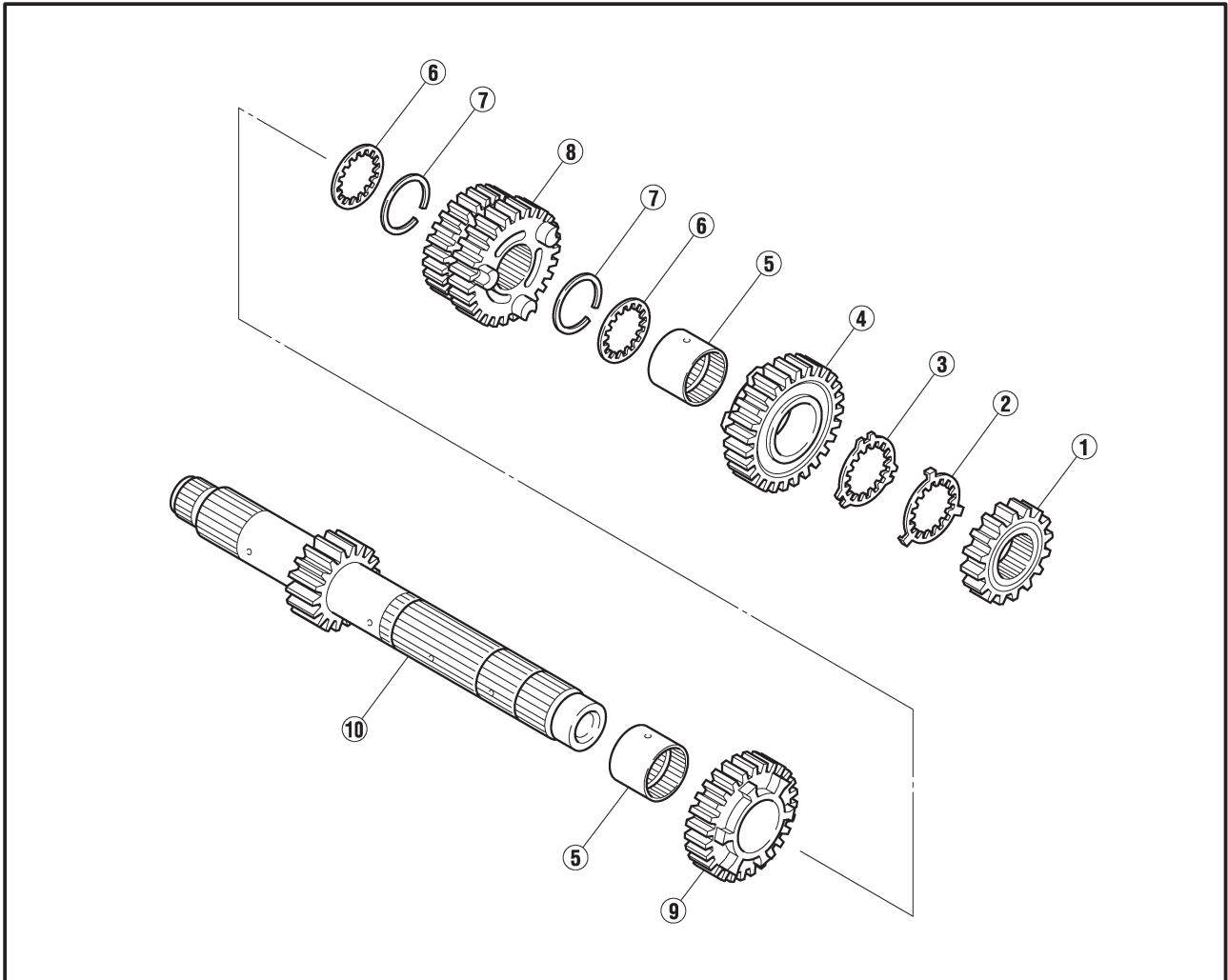
**TRANSMISSION, SHIFT DRUM ASSEMBLY, AND SHIFT FORKS**



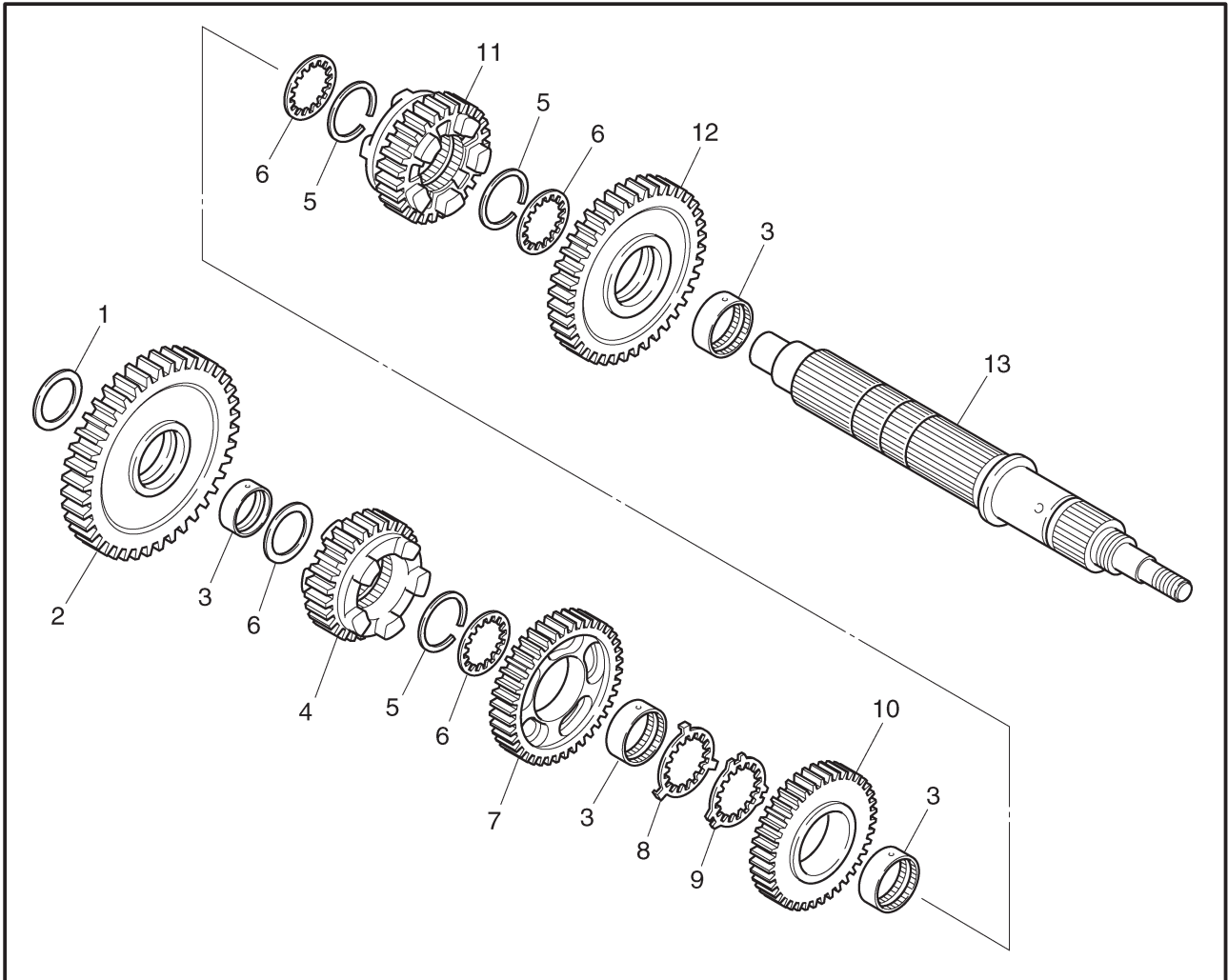
Order	Job/Part	Q'ty	Remarks
	<b>Removing the transmission, shift drum assembly, and shift forks</b>		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
1	Cover plate	1	
2	Collar	1	
3	Oil seal	1	
4	Bearing	4	
5	Circlip	1	
6	Main axle assembly	1	
7	Shift fork "R"	1	
8	Shift fork "L"	1	
9	Shift fork guide bar	2	
10	Shift fork "C"	1	



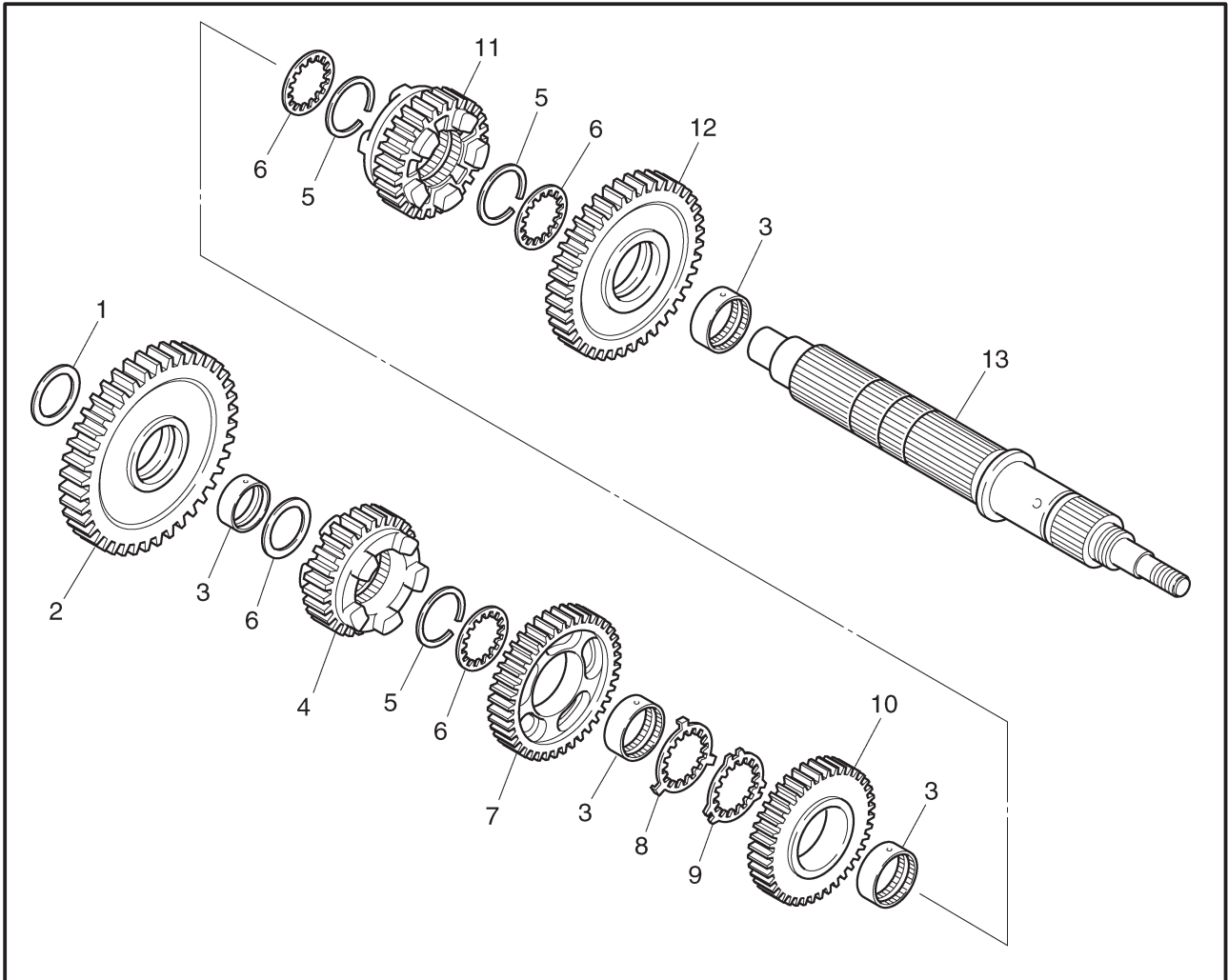
Order	Job/Part	Q'ty	Remarks
11	Shift drum	1	For installation, reverse the removal procedure.
12	Bearing housing	1	
13	Drive axle assembly	1	



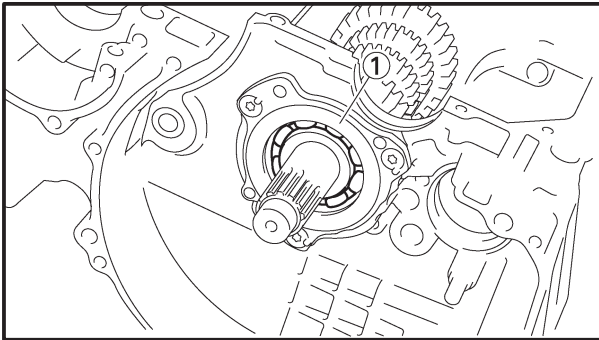
Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the main axle assembly.</b>		Disassemble the parts in the order listed.
①	2nd pinion gear	1	
②	Lock washer	1	
③	Lock washer retainer	1	
④	6th pinion gear	1	
⑤	Collar	2	
⑥	Washer	2	
⑦	Circlip	2	
⑧	3rd/4th pinion gear	1	
⑨	5th pinion gear	1	
⑩	Main axle	1	
			For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the drive axle assembly.</b>		Disassemble the parts in the order listed.
①	Washer	1	
②	1st wheel gear	1	
③	Collar	4	
④	5th wheel gear	1	
⑤	Circlip	3	
⑥	Washer	4	
⑦	3rd wheel gear	1	
⑧	Lock washer	1	
⑨	Lock washer retainer	1	
⑩	4th wheel gear	1	



Order	Job/Part	Q'ty	Remarks
⑪	6th wheel gear	1	For assembly, reverse the disassembly procedure.
⑫	2nd wheel gear	1	
⑬	Drive axle	1	



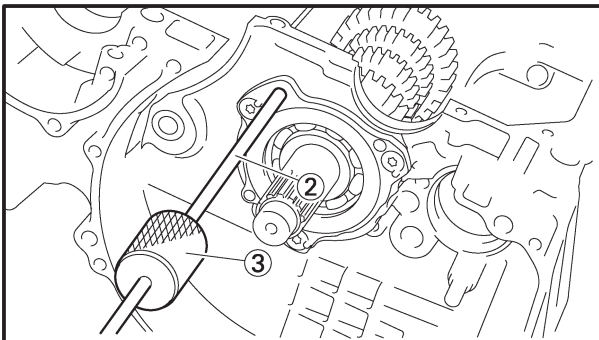
EAS00420

## REMOVING THE TRANSMISSION

- Remove:
  - drive axle assembly
  - bearing housing ① (with the Torx® wrench)

### NOTE:

Remove the bearing housing with the slide hammer bolt ② and weight ③.



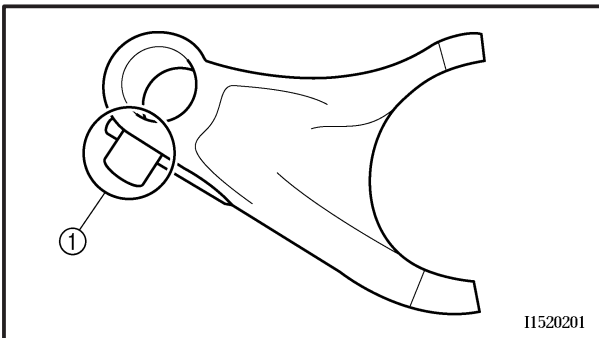
**Slide hammer bolt**

**90890-01083**

**Weight**

**90890-01084**

- Remove:
  - main axle assembly (from the clutch side)



I1520201

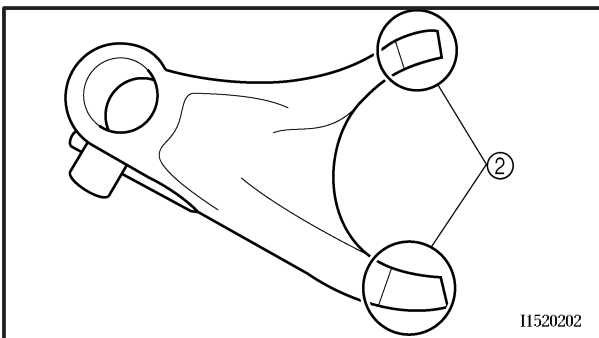
EAS00421

## CHECKING THE SHIFT FORKS

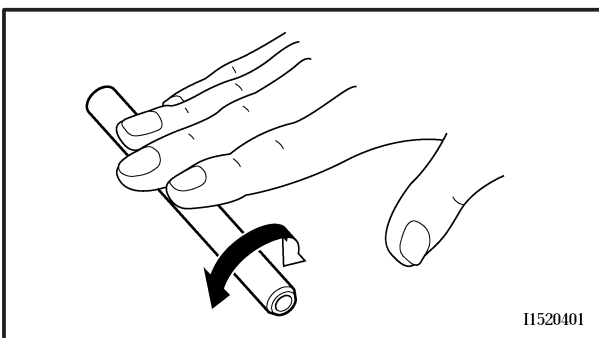
The following procedure applies to all of the shift forks.

- Check:
  - shift fork cam follower ①
  - shift fork pawl ②

Bends/damage/scoring/wear → Replace the shift fork.



I1520202



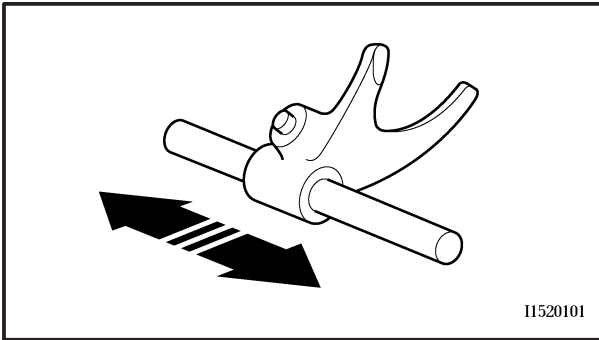
I1520401

- Check:
  - shift fork guide bar

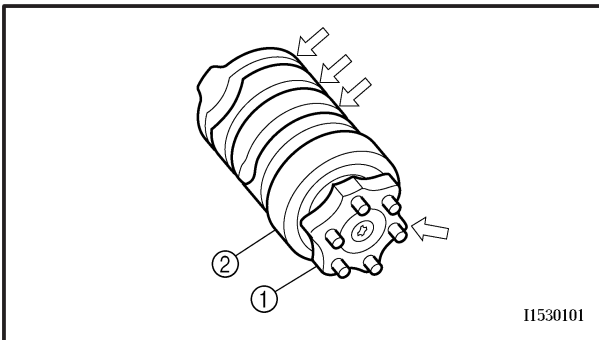
Roll the shift fork guide bar on a flat surface.  
Bends → Replace.

### ⚠ WARNING

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



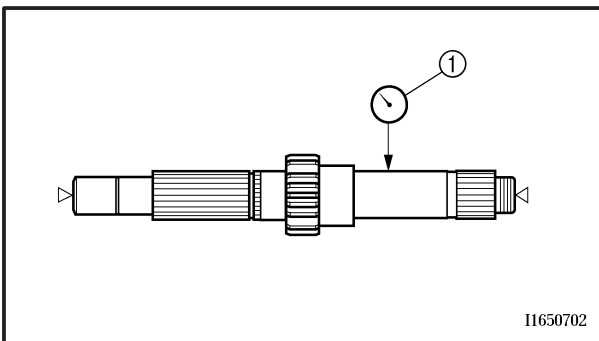
3. Check:
- shift fork movement  
(along the shift fork guide bar)  
Rough movement → Replace the shift forks and shift fork guide bar as a set.



EAS00422

**CHECKING THE SHIFT DRUM ASSEMBLY**

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



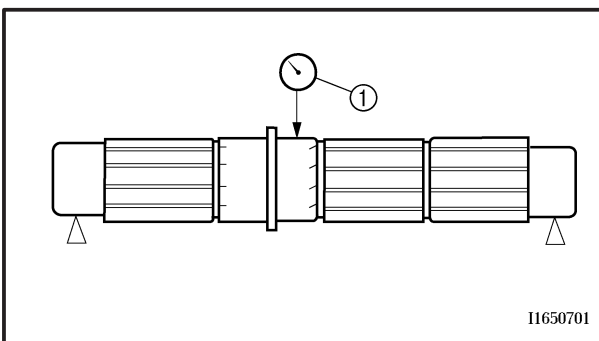
EAS00425

**CHECKING THE TRANSMISSION**

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



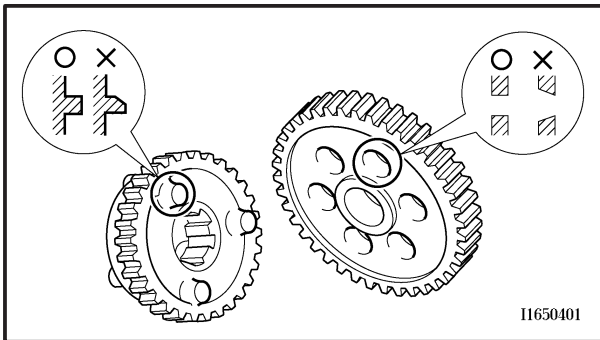
**Main axle runout limit**  
**0.08 mm**



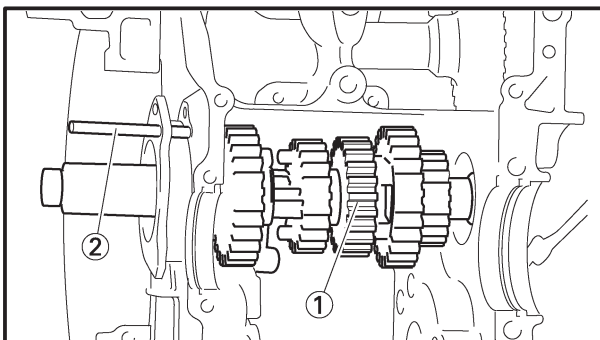
2. Measure:
- drive axle runout  
(with a centering device and dial gauge ①)  
Out of specification → Replace the drive axle.



**Drive axle runout limit**  
**0.08 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 engagement  
(each pinion gear to its respective wheel gear)  
Incorrect → Reassemble the transmission axle assemblies.
5. Check:
  - transmission gear movement  
Rough movement → Replace the defective part(s).
6. Check:
  - circlips  
Bends/damage/looseness → Replace.



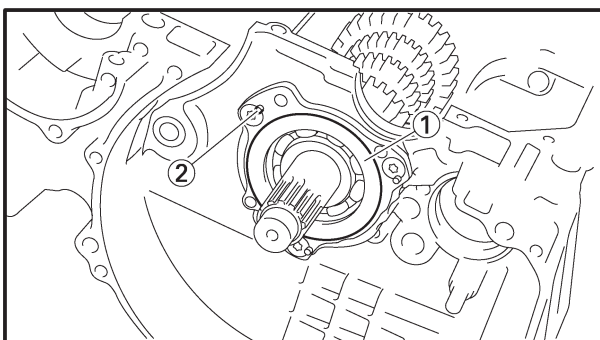
EAS00429

### INSTALLING THE TRANSMISSION

1. Install:
  - main axle assembly ①

#### NOTE:

When installing the main axle assembly, use a pin ② to align the bearing housing bolt hole with the corresponding hole in the lower crankcase.

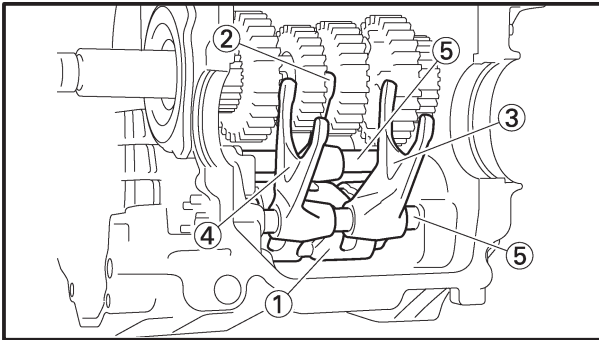


2. Install:
  - bearing housing ①

12 Nm (1.2 m•kg)

#### NOTE:

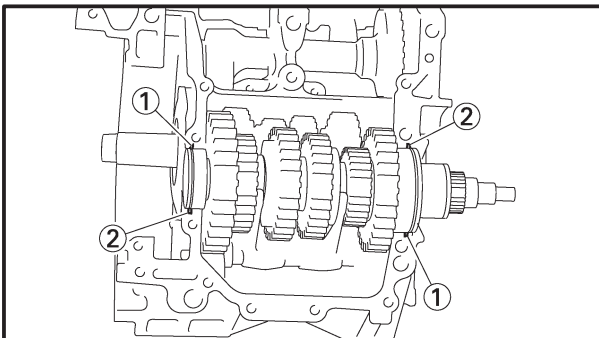
After tightening the bearing housing bolts, stake the outer edge of each bolt head with a center punch ② to prevent them from loosening.



3. Install:
- shift drum assembly ①
  - shift fork "C" ②
  - shift fork "L" ③
  - shift fork "R" ④
  - shift fork guide bars ⑤

**NOTE:**

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C", "L".
- Install the shift fork guide bars with the tapered end facing towards the clutch.



4. Install:
- drive axle assembly

**NOTE:**

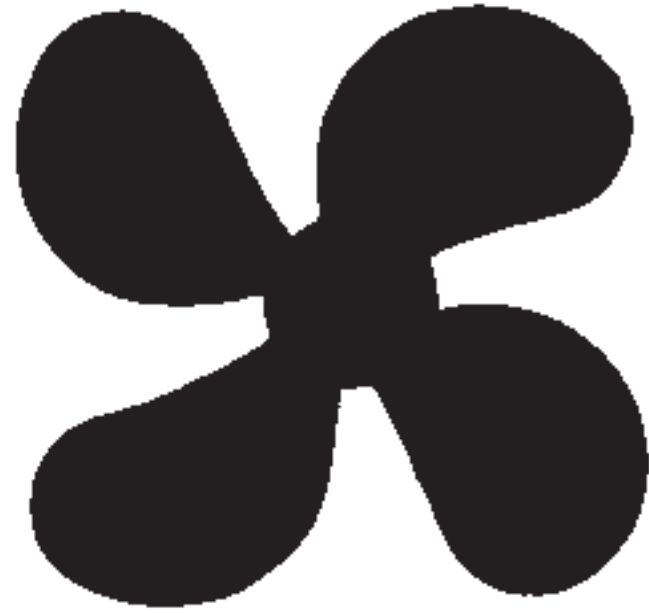
- The drive axle bearing pin must face towards the front of the crankcase.
- Make sure the drive axle bearing circlips ① are inserted into the grooves ② in the upper crankcase.

5. Check:
- transmission  
Rough movement → Repair.

**NOTE:**

Oil each gear, shaft, and bearing thoroughly.





COOL

6



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## CHAPTER 6 COOLING SYSTEM

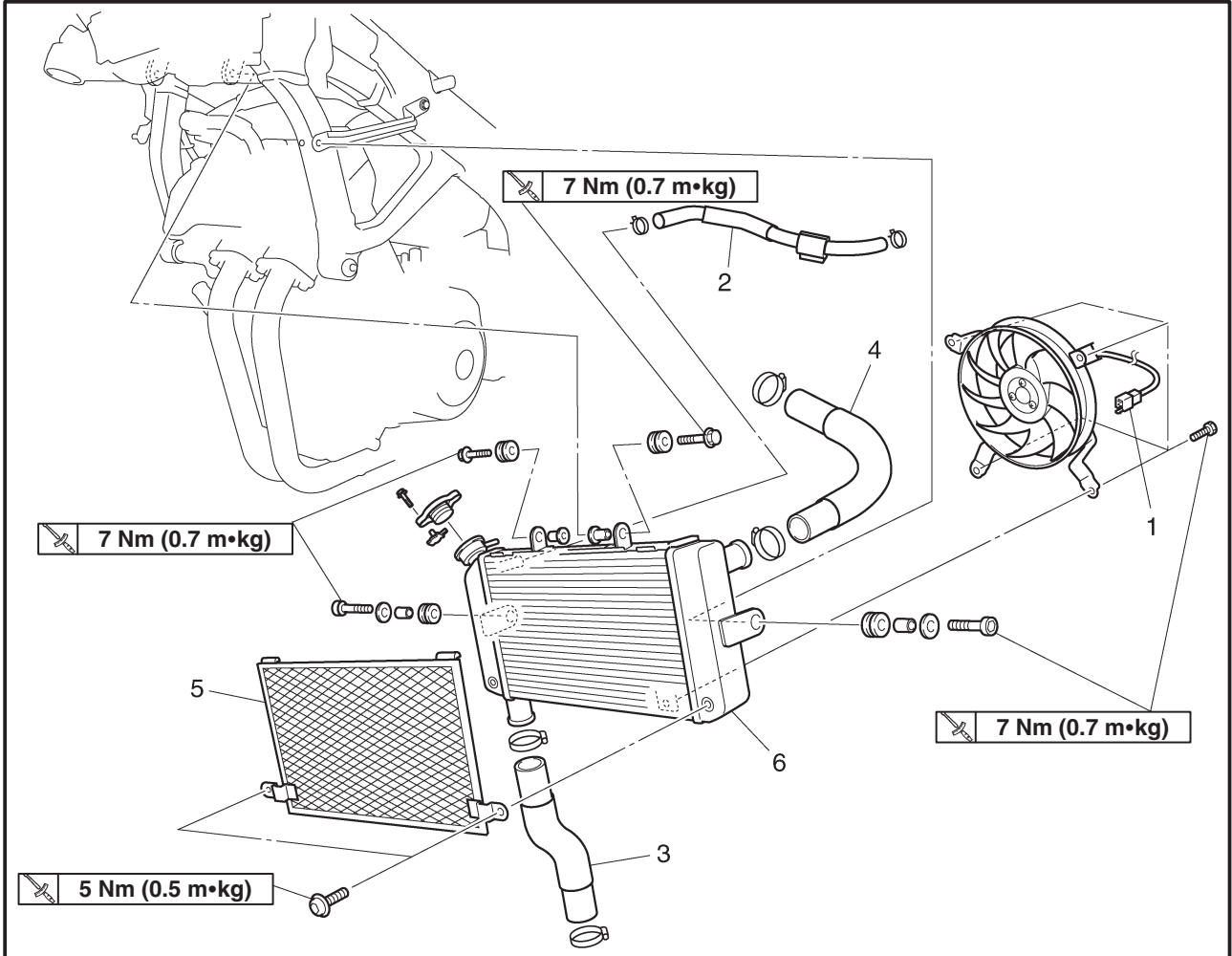
<b>RADIATOR</b> .....	6-1
CHECKING THE RADIATOR .....	6-2
INSTALLING THE RADIATOR .....	6-3
<b>THERMOSTAT</b> .....	6-4
THERMOSTAT ASSEMBLY .....	6-4
CHECKING THE THERMOSTAT .....	6-6
ASSEMBLING THE THERMOSTAT ASSEMBLY .....	6-7
INSTALLING THE THERMOSTAT ASSEMBLY .....	6-7
<b>WATER PUMP</b> .....	6-8
DISASSEMBLING THE WATER PUMP .....	6-10
CHECKING THE WATER PUMP .....	6-10
ASSEMBLING THE WATER PUMP .....	6-11
INSTALLING THE WATER PUMP .....	6-12



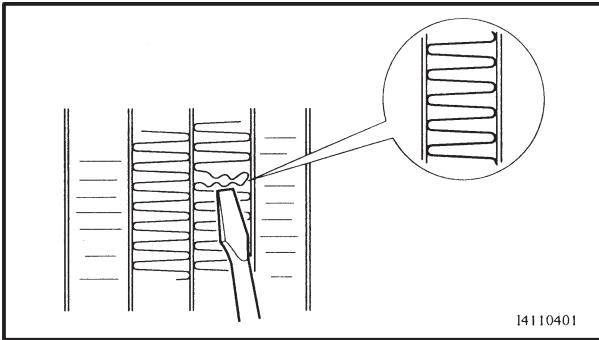
EAS00454

COOLING SYSTEM

RADIATOR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the radiator</b>		Remove the parts in the order listed.
	Side cowlings		Refer to "FRONT COWLING".
	Coolant		Drain.
	Fuel tank		Refer to "CHANGING THE COOLANT" in chapter 3.
	Air filter case		Refer to "FUEL TANK" in chapter 3.
			Refer to "AIR FILTER CASE" in chapter 3.
1	Radiator fan coupler	1	Disconnect.
2	Coolant reservoir hose	1	
3	Radiator outlet hose	1	
4	Radiator inlet hose	1	
5	Radiator cover	1	
6	Radiator	1	
			For installation, reverse the removal procedure.



I4110401

EAS00455

### CHECKING THE RADIATOR

1. Check:

- radiator fins

Obstruction → Clean.

Apply compressed air to the rear of the radiator.

Damage → Repair or replace.

**NOTE:**

Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:

- radiator hoses

- radiator pipes

Cracks/damage → Replace.

3. Measure:

- radiator cap opening pressure

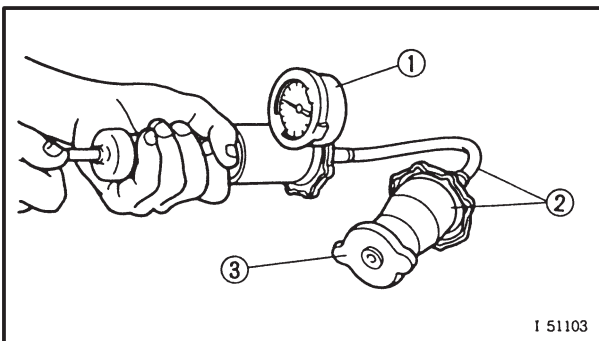
Below the specified pressure → Replace the radiator cap.



**Radiator cap opening pressure**

95 ~ 125 kPa

(0.95 ~ 1.25 kg/cm<sup>2</sup>)



I 51103

- a. Install the radiator cap tester ① and radiator cap tester adapter ② to the radiator cap ③.



**Radiator cap tester**

90890-01325

**Radiator cap tester adapter**

90890-01352

- b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

4. Check:

- radiator fan

Damage → Replace.

Malfunction → Check and repair.

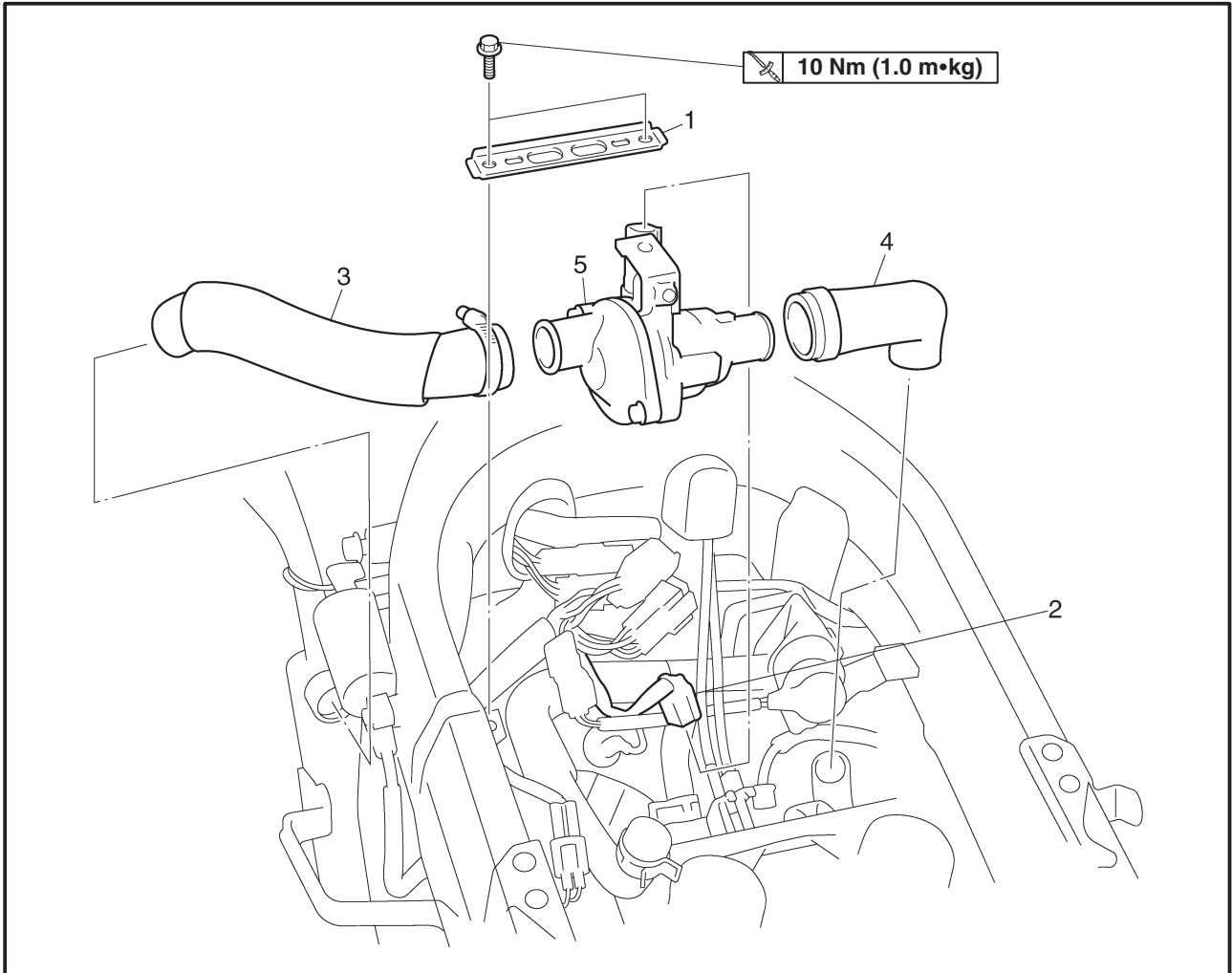
Refer to "COOLING SYSTEM" in chapter 8.





EAS00460

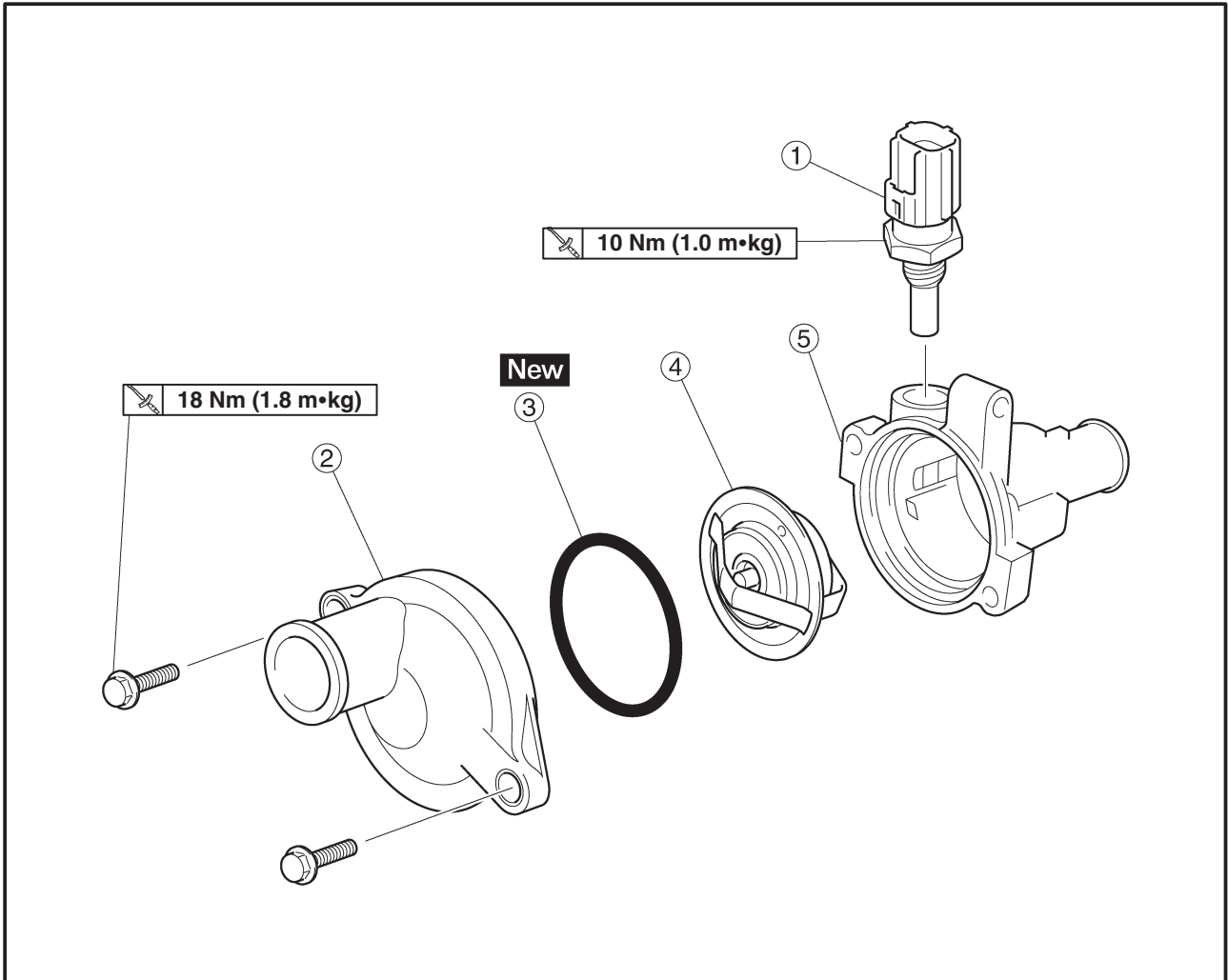
**THERMOSTAT  
THERMOSTAT ASSEMBLY**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the thermostat assembly</b>		Remove the parts in the order listed.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Coolant		Drain.
1	Bracket	1	Disconnect.
2	Thermo unit lead coupler	1	
3	Thermostat inlet hose	1	
4	Thermostat outlet hose	1	
5	Thermostat assembly	1	
			For installation, reverse the removal procedure.

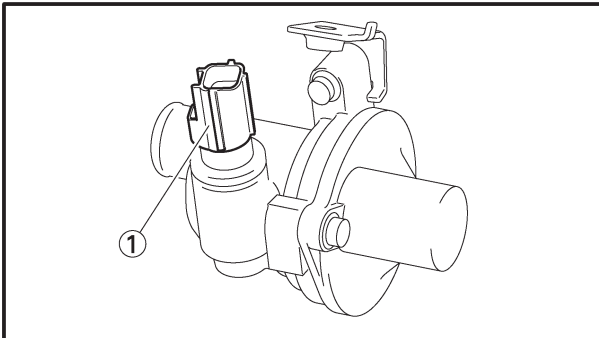
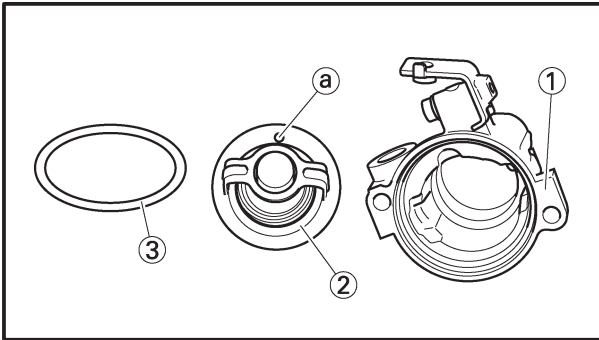


EAS00461



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the thermostat assembly</b>		Disassembly the parts in the order listed.
①	Thermo unit	1	
②	Thermostat cover	1	
③	O-ring	1	
④	Thermostat	1	
⑤	Thermostat housing	1	
			For assembly, reverse the disassembly procedure.





EAS00464

### ASSEMBLING THE THERMOSTAT ASSEMBLY

#### 1. Install:

- thermostat housing ①
- thermostat ②
- O-ring **New** ③
- thermostat housing cover

#### NOTE:

Install the thermostat with its breather hole (a) facing up.

#### 2. Install:

- thermo unit ①

18 Nm (18 m•kg)

#### CAUTION:

Use extreme care when handling the thermo unit. Replace any part that was dropped or subjected to a strong impact.

EAS00467

### INSTALLING THE THERMOSTAT ASSEMBLY

#### 1. Install:

- thermostat assembly
- bracket

#### 2. Fill:

- cooling system  
(with the specified amount of the recommended coolant)  
Refer to "CHANGING THE COOLANT" in chapter 3.

#### 3. Check:

- cooling system  
Leaks → Repair or replace any faulty part.

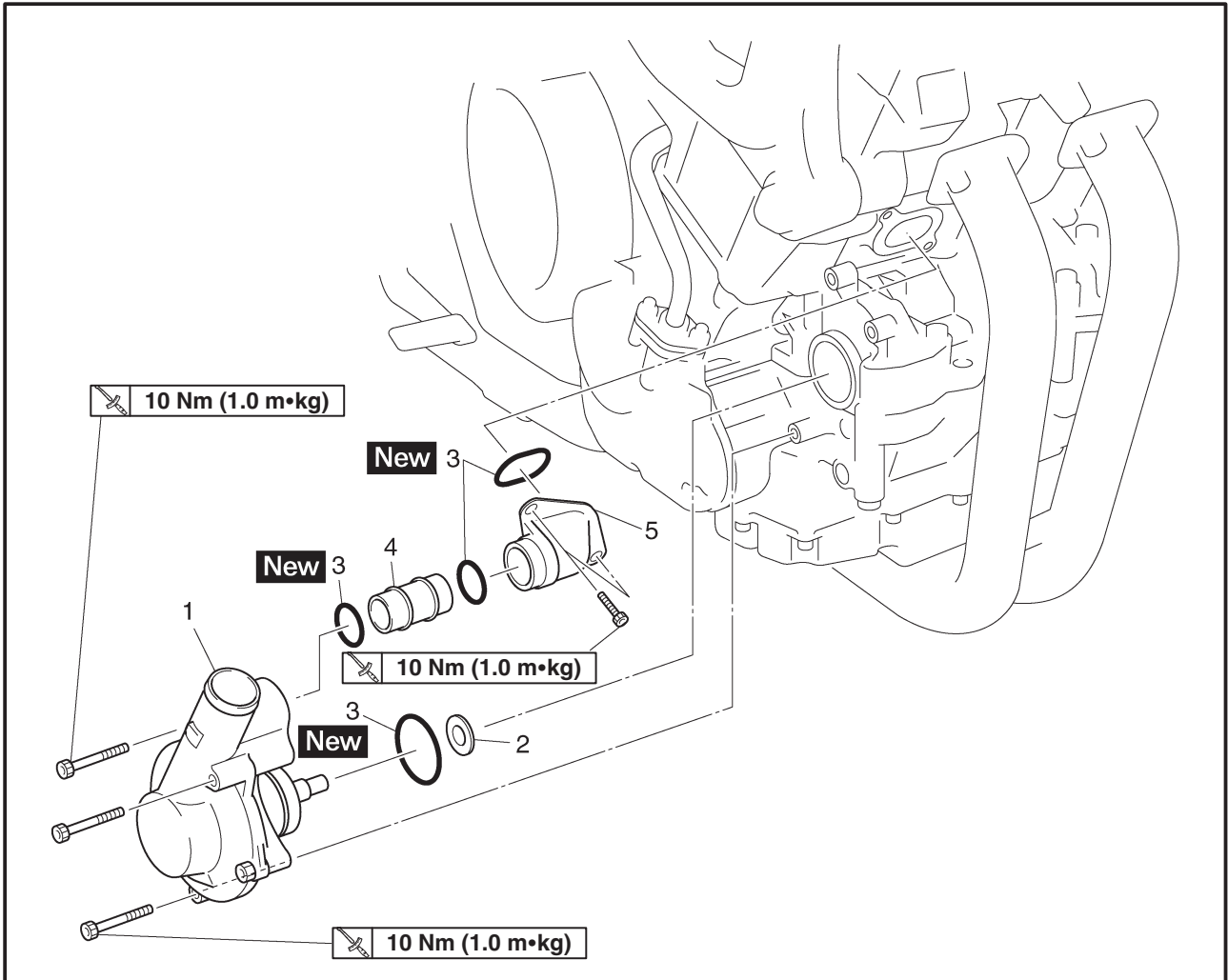
#### 4. Measure:

- radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.  
Refer to "CHECKING THE RADIATOR".



EAS00468

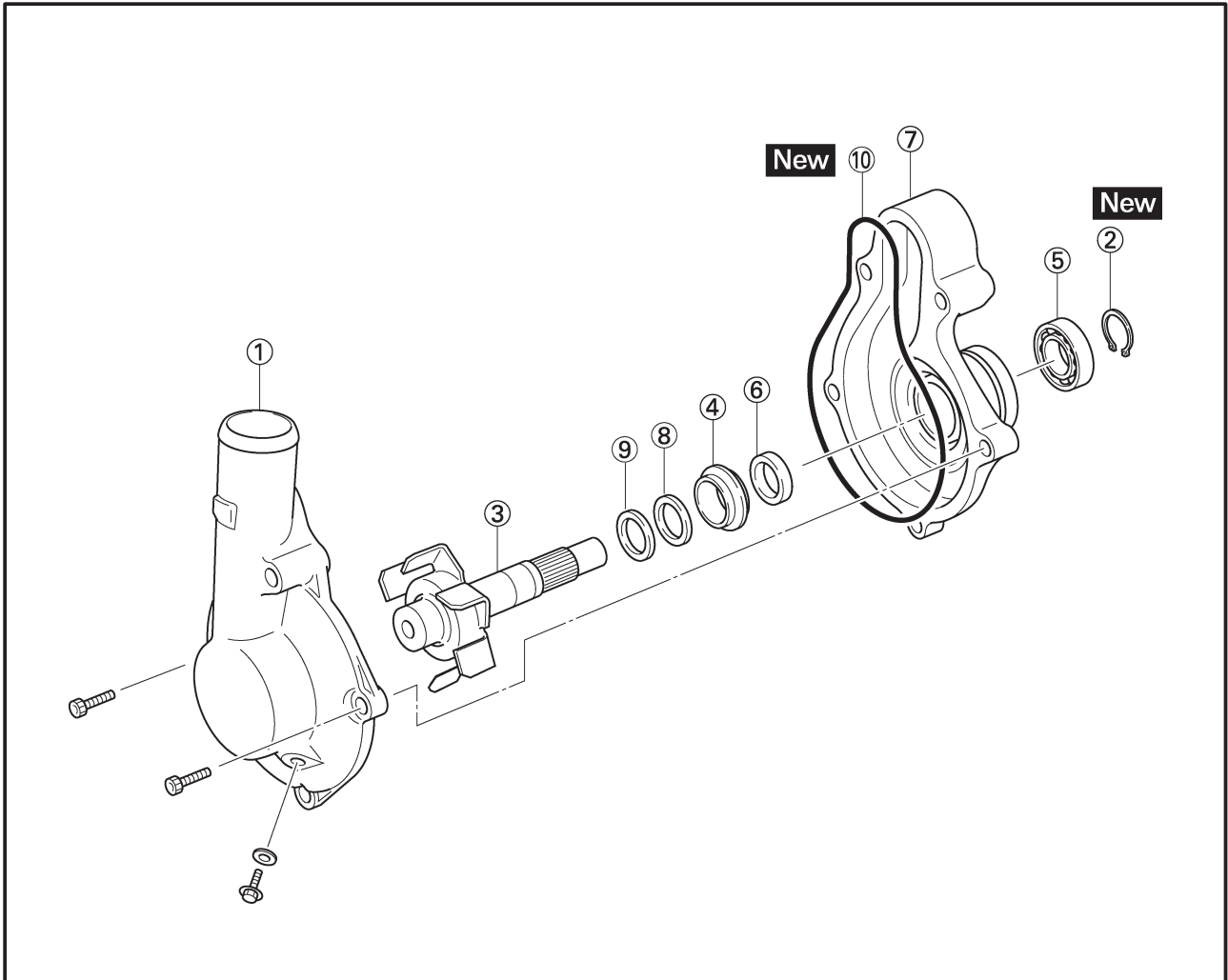
WATER PUMP



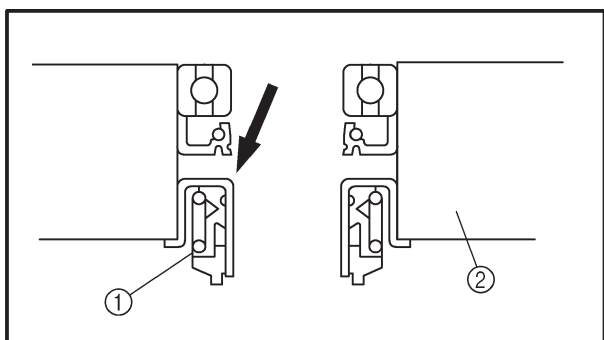
Order	Job/Part	Q'ty	Remarks
	<b>Removing the water pump</b>		Remove the parts in the order listed. It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil. Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Coolant		
1	Water pump assembly	1	
2	Washer	1	
3	O-ring	4	
4	Pipe	1	
5	Housing	1	
			For installation, reverse the removal procedure.



EAS00469



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the water pump</b>		Disassembly the parts in the order listed.
①	Water pump cover	1	
②	Circlip	1	
③	Impeller	1	
④	Water pump seal	1	
⑤	Bearing	1	
⑥	Oil seal	1	
⑦	Water pump housing	1	
⑧	Rubber damper holder	1	
⑨	Rubber damper	1	
⑩	O-ring	1	
			For assembly, reverse the disassembly procedure.



EAS00470

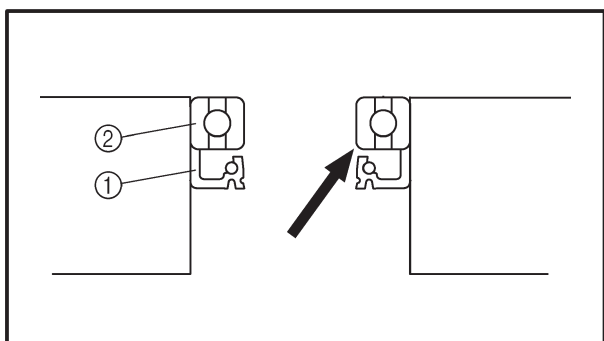
## DISASSEMBLING THE WATER PUMP

1. Remove:
  - impeller
  - water pump seal ①

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

Remove the water pump seal from the inside of the water pump housing.

\_\_\_\_\_

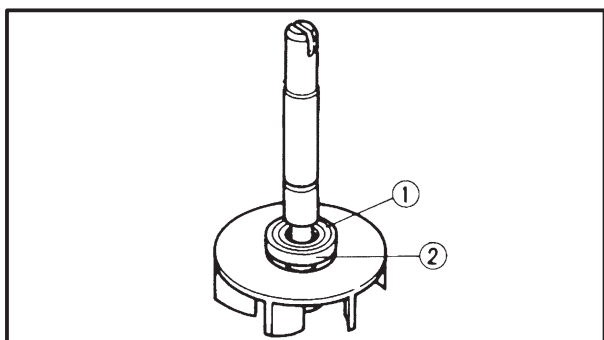


- ② Water pump housing
2. Remove:
    - bearing ①
    - oil seal ②

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

Remove the bearing and oil seal from the inside of the water pump housing.

\_\_\_\_\_

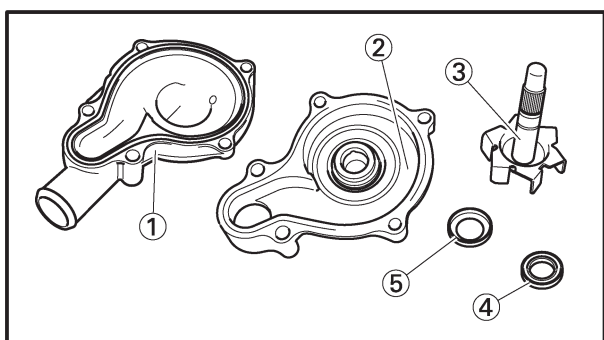


- ③ Water pump housing
3. Remove:
    - rubber damper holder ①
    - rubber damper ②  
(from the impeller, with a thin, flat-head screwdriver)

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

Do not scratch the impeller shaft.

\_\_\_\_\_



EAS00473

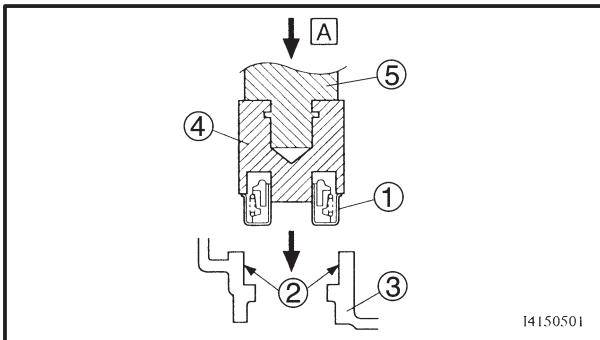
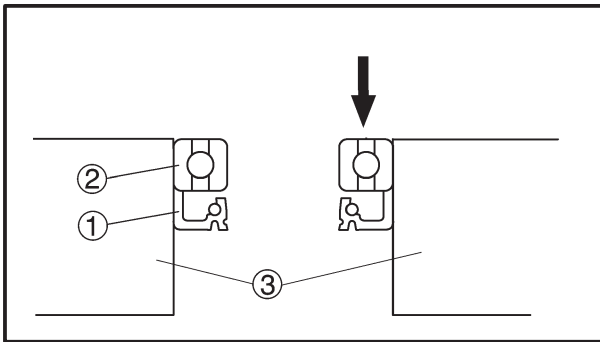
## CHECKING THE WATER PUMP

1. Check:
  - water pump cover ①
  - water pump housing ②
  - impeller ③
  - rubber damper ④
  - rubber damper holder ⑤
  - water pump seal
  - oil seal

Cracks/damage/wear → Replace.
2. Check:
  - bearing

Rough movement → Replace.
3. Check:
  - water pump outlet pipe
  - radiator outlet hose

Cracks/damage/wear → Replace.



I4150501

EAS00475

**ASSEMBLING THE WATER PUMP**

1. Install:
- oil seal **New** ①
  - (into the water pump housing ③)
  - bearing ②

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

- Before installing the oil seal, apply tap water or coolant onto its out surface.
- Install the oil seal with a socket that matches its outside diameter.

2. Install:
- water pump seal **New** ①

**CAUTION:** \_\_\_\_\_

**Never lubricate the water pump seal surface with oil or grease.**

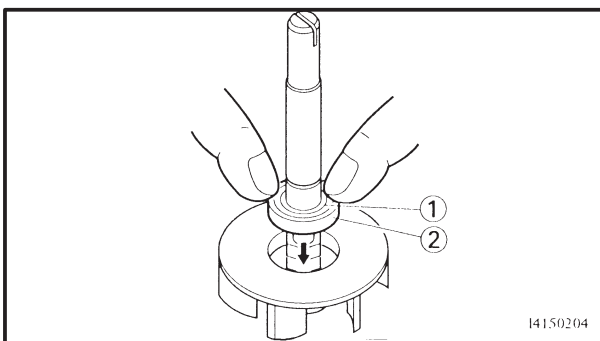
**NOTE:** \_\_\_\_\_

- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 ② to the water pump housing ③.



**Mechanical seal installer** ④  
 90890-04078  
**Middle driven shaft bearing driver** ⑤  
 90890-04058  
 Yamaha bond No.1215  
 90890-85505

**A** Push down.



I4150204

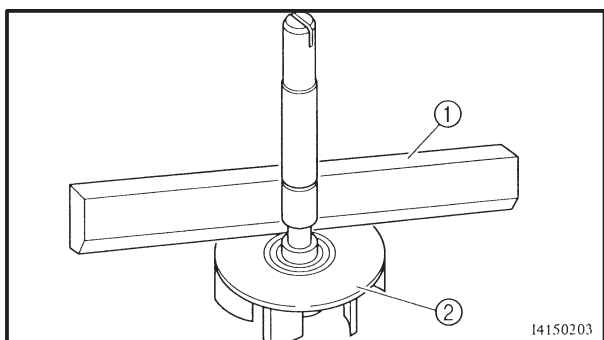
3. Install:
- rubber damper **New** ①
  - rubber damper holder **New** ②

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

Before installing the rubber damper, apply tap water or coolant onto its outer surface.

## WATER PUMP

COOL



4. Measure:
- impeller shaft tilt
- Out of specification → Repeat steps (3) and (4).

### CAUTION:

Make sure the rubber damper and rubber damper holder are flush with the impeller.



Impeller shaft tilt limit  
0.15 mm

- ① Straightedge  
② Impeller

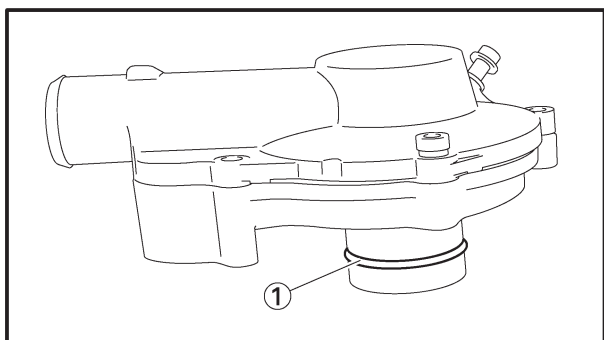
5. Install:
- impeller
  - circlip **New**

### NOTE:

After installation, check that the impeller shaft rotates smoothly.

6. Install:
- water pump cover

10 Nm (1.0 m•kg)



EAS00477

## INSTALLING THE WATER PUMP

1. Install:
- O-ring **New** ①

### NOTE:

Lubricate the O-ring with a thin coat of lithium-soap-based grease.

2. Install:
- water pump assembly

10 Nm (1.0 m•kg)



**FI**

**7**



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## CHAPTER 7

### FUEL INJECTION SYSTEM

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FI

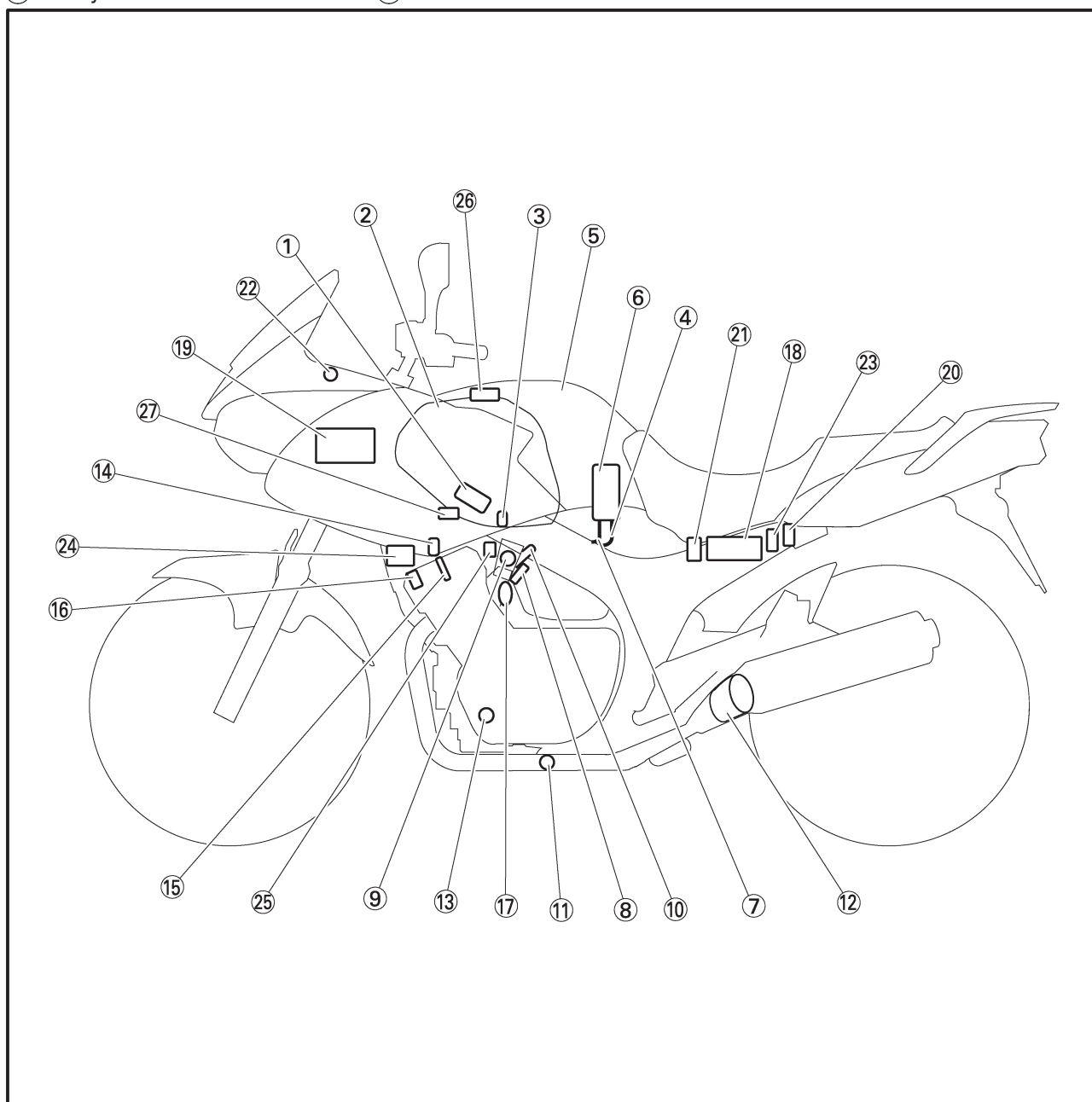




## FUEL INJECTION SYSTEM

### FUEL INJECTION SYSTEM

- |                              |                                  |                              |
|------------------------------|----------------------------------|------------------------------|
| ① Ignition coil              | ⑬ Crankshaft position sensor     | ⑳ Fast idle plunger          |
| ② Air filter case            | ⑭ Coolant temperature sensor     | ㉑ Adjustable air intake duct |
| ③ Intake temperature sensor  | ⑮ Spark plug                     | ㉒ Intake Solenoid            |
| ④ Fuel delivery hose         | ⑯ Cylinder identification sensor |                              |
| ⑤ Fuel tank                  | ⑰ Pressure regulator             |                              |
| ⑥ Fuel pump                  | ⑱ Battery                        |                              |
| ⑦ Fuel return hose           | ㉓ ECU                            |                              |
| ⑧ Intake air pressure sensor | ㉔ Atmospheric pressure sensor    |                              |
| ⑨ Throttle position sensor   | ㉕ Fuel injection system relay    |                              |
| ⑩ Fuel injector              | ㉖ Engine trouble warning light   |                              |
| ⑪ O <sub>2</sub> sensor      | ㉗ Lean angle cut-off switch      |                              |
| ⑫ Catalytic converter        | ㉘ Air cut-off valve              |                              |



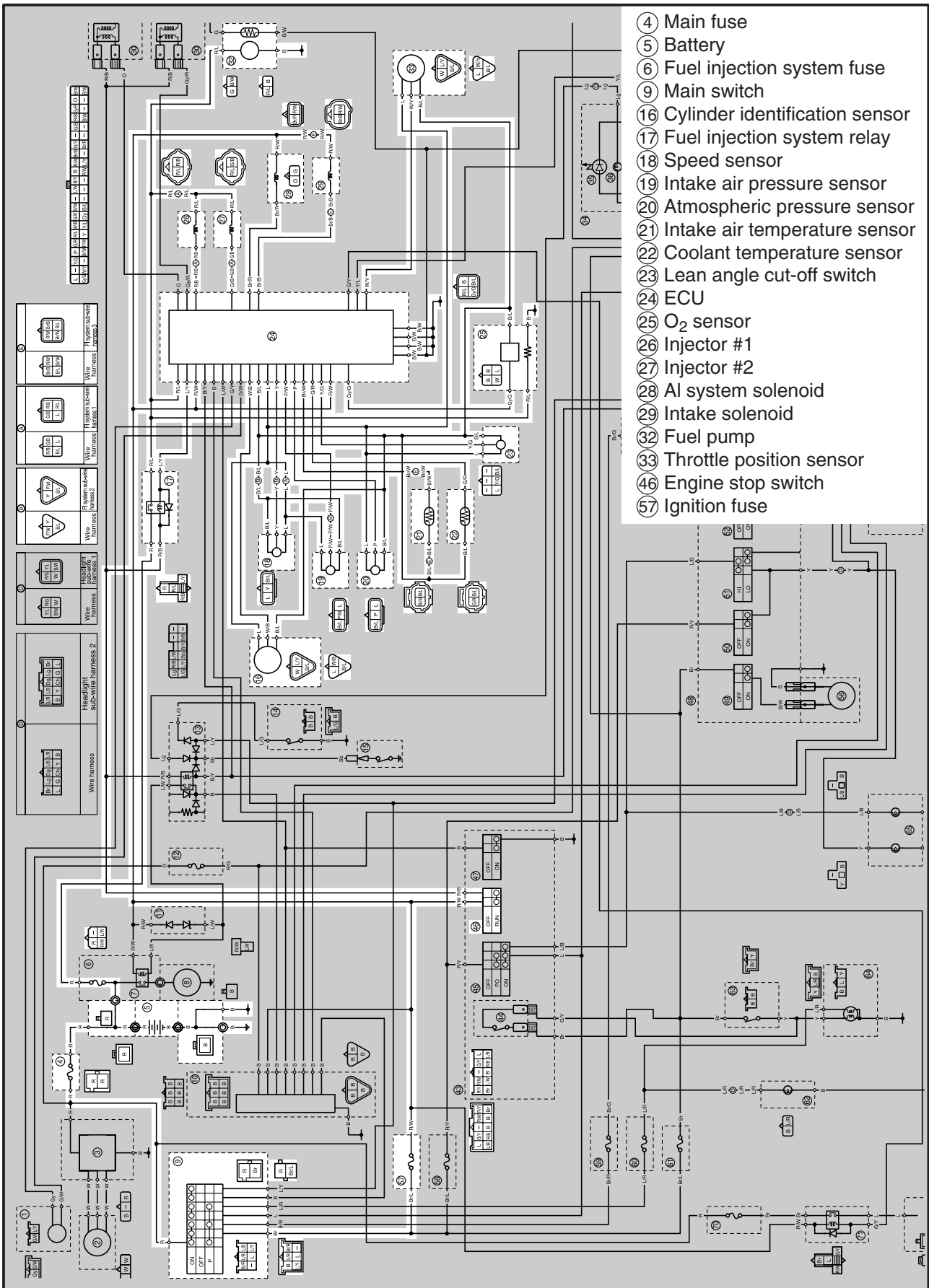
# FUEL INJECTION SYSTEM

FI



EAS00814

## CIRCUIT DIAGRAM



- ④ Main fuse
- ⑤ Battery
- ⑥ Fuel injection system fuse
- ⑨ Main switch
- ⑯ Cylinder identification sensor
- ⑰ Fuel injection system relay
- ⑱ Speed sensor
- ⑲ Intake air pressure sensor
- ⑳ Atmospheric pressure sensor
- ㉑ Intake air temperature sensor
- ㉒ Coolant temperature sensor
- ㉓ Lean angle cut-off switch
- ㉔ ECU
- ㉕ O<sub>2</sub> sensor
- ㉖ Injector #1
- ㉗ Injector #2
- ㉘ AI system solenoid
- ㉙ Intake solenoid
- ㉚ Fuel pump
- ㉛ Throttle position sensor
- ㉜ Engine stop switch
- ㉝ Ignition fuse



## ECU'S SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the engine control system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the ECU memory in the form of a fault code.

- To inform the rider that the fuel injection stop function is active, the engine trouble warning light blinks while the start switch is being pressed to start the engine.
- If a malfunction in the system is detected by the self-diagnostic function, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating an engine trouble warning light.
- After the engine has been stopped, digital numbers representing the self-diagnostic fault codes appear on the clock LCD. Once a self-diagnostic fault code has been displayed, it remains stored in the ECU memory until a deletion operation is performed.

## Engine trouble warning light indication and FI system operating conditions

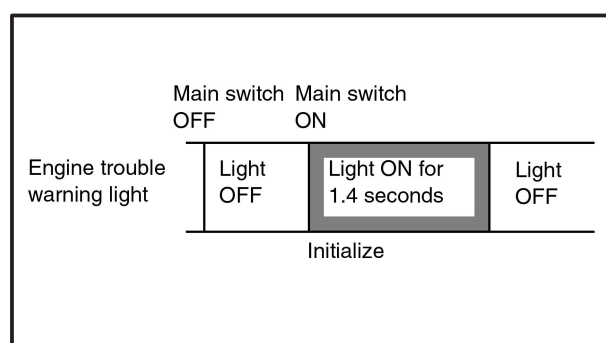
Warning light indication	ECU's operating condition	FI operating condition	Starting and driving
Blinking*	Warning control when unable to start engine	Operation stopped	Unable
Continuous ON	Detecting malfunction	Gives driving instructions with substitute characteristics in accordance with the description of the malfunction.	Able/Unable depending on self-diagnostic fault code

\* This control is effected when any one of the conditions listed below is present and the starter switch is turned ON:

- |  |   |
|--|---|
| 11: Cylinder identification sensor                 | 30: Lean angle cut-off switch (latch up detected)     |
| 12: Crankshaft position sensor                     | 41: Lean angle cut-off switch (open or short circuit) |
| 19: Sidestand switch (open circuit in wire to ECU) | 50: ECU internal malfunction (memory check error)     |

## Function to check for blown engine trouble warning light bulb

The engine trouble warning light illuminates for 1.4 seconds after the main switch has been turned "ON" and while the starter switch is being pressed. If the warning light does not illuminate under these conditions, a problem may have possibly occurred, such as a blown warning light bulb.





## SUBSTITUTE CHARACTERISTICS OPERATION CONTROL (FAIL-SAFE ACTION)

If the ECU detects an abnormal signal from a sensor while the motorcycle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with substitute characteristic operation instructions that are appropriate for the type of the malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for every sensor, in order to provide the engine with substitute characteristics operation instructions that enable the engine to continue to operate (or to stop its operation, depending on circumstances).

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

## FAIL-SAFE ACTIONS TABLE

### Self-Diagnostic Function

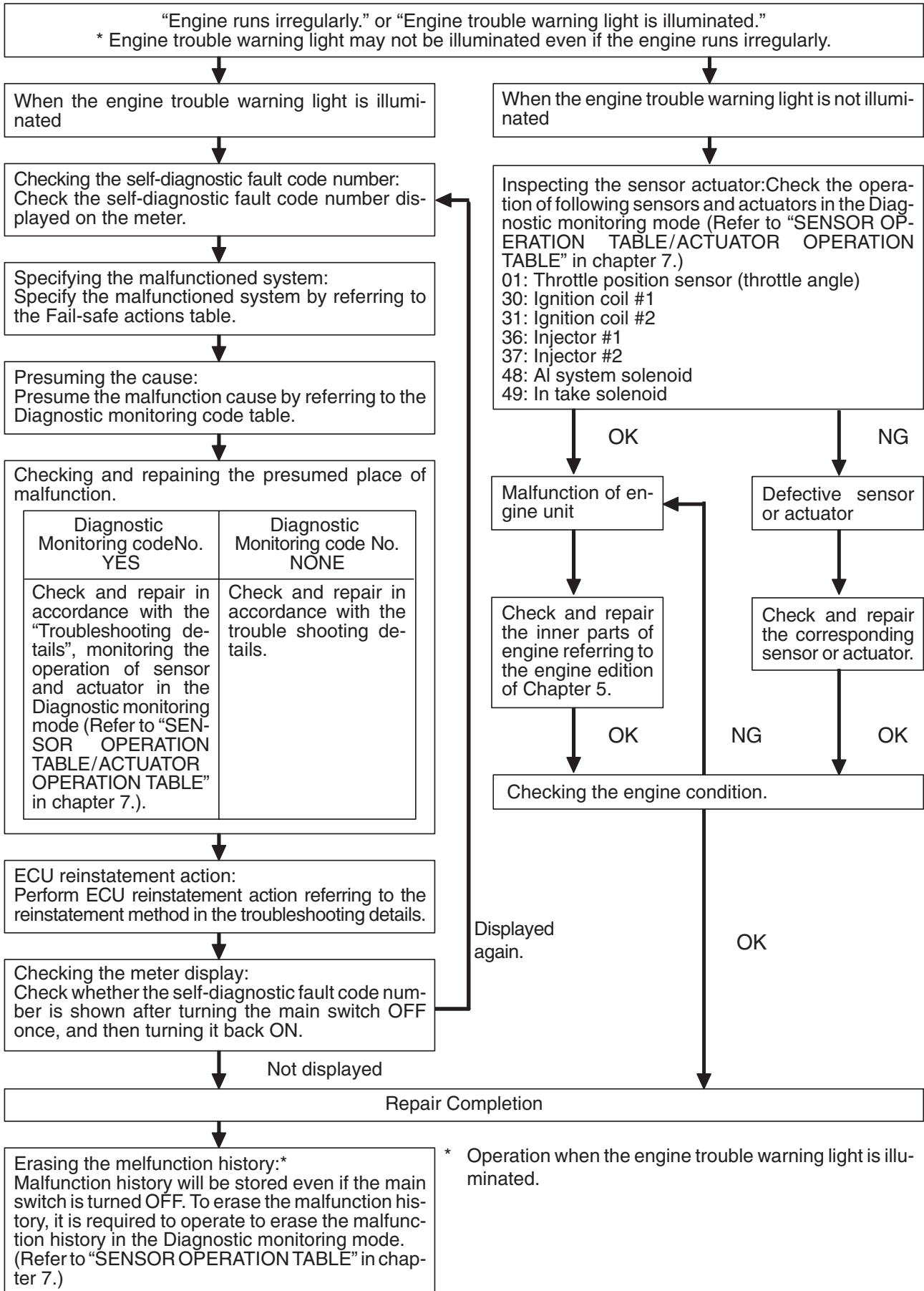
Fault code No.	Item	Symptom	Fail-safe action	Able / unable to start	Able / unable to drive
11	Cylinder identification sensor	No normal signals are received from the cylinder identification sensor.	Continues to operate the engine based on the of the cylinder identification that existed up to that point.	Unable	Able
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	• Stops the engine (by stopping the injection and ignition).	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor - open or short circuit detected.	• Fixes the intake air pressure to 760 mmHg.	Able	Able
14	Intake air pressure sensor (pipe system)	Faulty intake air pressure sensor pipe system a hose is detached, causing the constant application of atmospheric pressure to the sensor, or, the hose is clogged.	• Fixes the intake air pressure to 760 mmHg.	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor - open or short circuit detected.	• Fixes the throttle position sensor to fully open.	Able	Able
19	Sidestand switch (open circuit wire to ECU)	Open circuit is detected in the input line from the sidestand switch to the ECU.	– (No start)	Unable	Unable
20	Intake temperature Atmospheric pressure	Defective values are detected due to the internal malfunction	• Fixes the intake air pressure and atmospheric pressure to 760 mmHg.	Able	Able
21	Coolant temperature sensor	Coolant temperature sensor - open or short circuit detected.	• Fixes the coolant temperature to 60°C.	Able	Able
22	Intake temperature sensor	Intake temperature sensor - open or short circuit detected.	• Fixes the intake temperature to 20°C.	Able	Able
23	Atmospheric pressure sensor	Atmospheric pressure sensor - open or short circuit detected.	• Fixes the atmospheric pressure to 760 mmHg.	Able	Able
24	O <sub>2</sub> sensor (inactive)	No normal signals are received from the O <sub>2</sub> sensor.	–	Able	Able
30	Lean angle cut-off switch (latch up detected)	The motorcycle has overturned.	• Turns OFF the fuel injection system relay of the fuel system.	Unable	Unable
33	Faulty ignition	Open circuit detected in the primary wire of the ignition coil (#1).	• Fuel is cut off only to the cylinder in which a malfunction is detected.	Able (depending on the number of faulty)	Able (depending on the number of faulty)
34		Open circuit detected in the primary wire of the ignition coil (#2).			
41	Lean angle cut-off switch (open or short circuit)	Lean angle cut-off switch - open or short circuit detected.	• Turns OFF the fuel injection system relay of the fuel system.	Unable	Unable
42	Speed sensor, neutral switch	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	• Fixes the gear to the top gear.	Able	Able
43	Fuel system voltage (monitor voltage)	The ECU is unable to monitor the battery voltage (an open circuit in the line to the ECU).	• Fixes the battery voltage to 12 V.	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	An error is detected while reading or writing on EEPROM (CO adjustment value).	–	Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	–	Unable	Unable

## Communication error with the meter

Er-1	ECU internal malfunction (output signal error)	No signals are received from the ECU.	–	Unable	Unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	–	Unable	Unable
Er-3	ECU internal malfunction (output signal error)	Data from the ECU cannot be received correctly.	–	Unable	Unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	–	Unable	Unable



## TROUBLE SHOOTING CHART

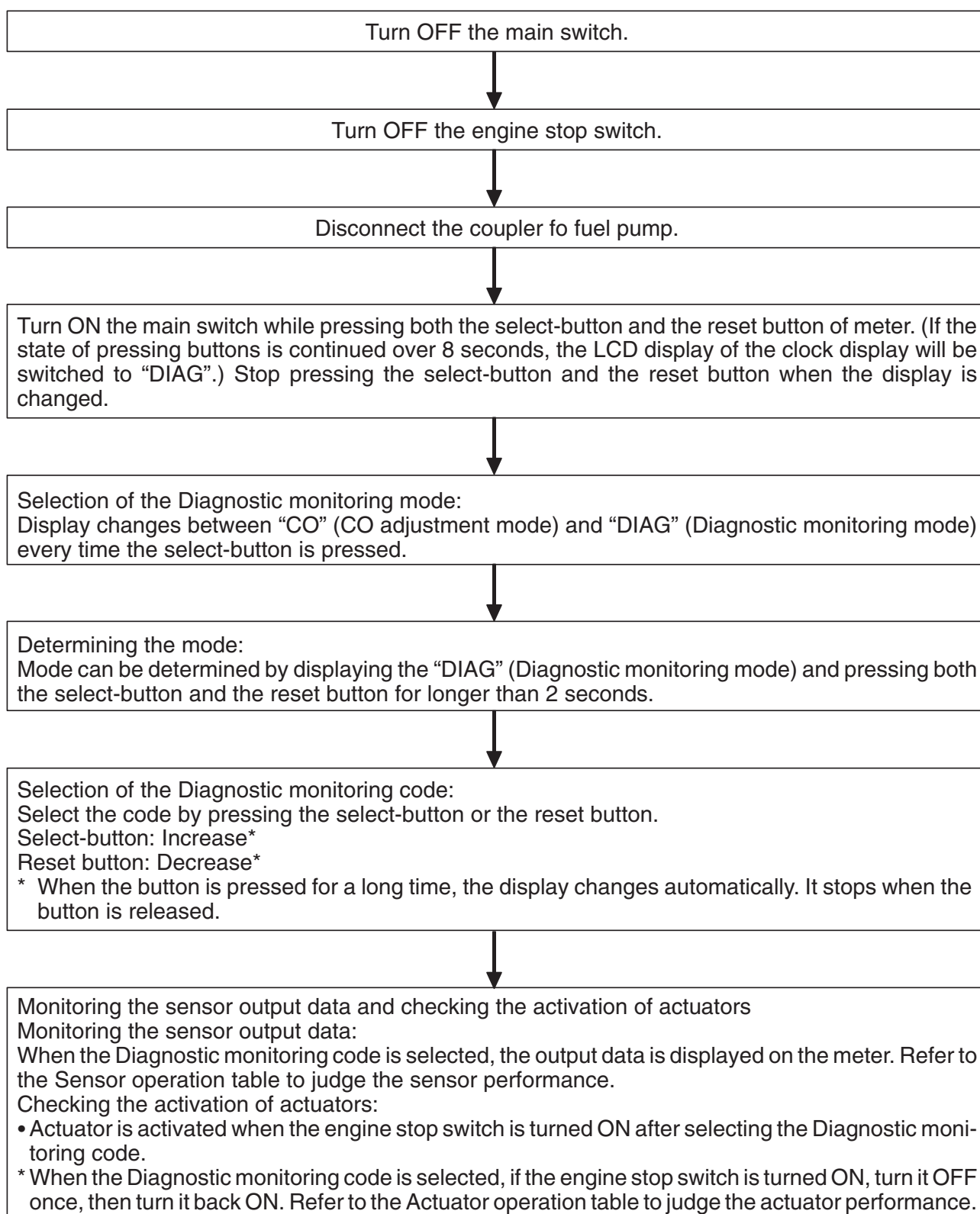




## DIAGNOSTIC MONITORING MODE

It is possible to monitor the sensor output data or check the activation of actuators without connecting the measurement equipment by simply switching the meter indication from the Normal mode to the Diagnostic monitoring mode.

Switching the mode to the Diagnostic monitoring mode



## FUEL INJECTION SYSTEM

**FI**

**Diagnostic monitoring code table**

Fault Code No.	Symptom	Probable cause of malfunction	Diagnostic monitoring code No.
11	No normal signals are received from the cylinder identification sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring sub lead.</li> <li>• Open or short circuit in wiring harness.</li> <li>• Defective cylinder identification sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
12	No normal signals are received from the crankshaft position sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective crankshaft position sensor.</li> <li>• Malfunction in pickup rotor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
13	Intake air pressure sensor-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring sub lead.</li> <li>• Open or short circuit in wiring harness.</li> <li>• Defective intake air pressure sensor.</li> <li>• Malfunction in ECU.</li> </ul>	03
14	Faulty intake air pressure sensor pipe system; • detached hose • clogged hose	<ul style="list-style-type: none"> <li>• Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>• Malfunction of the intake air pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	03
15	Throttle position sensor-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring sub lead.</li> <li>• Open or short circuit in wiring harness.</li> <li>• Defective throttle position sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed throttle position sensor.</li> </ul>	01
19	Open circuit in the input line from the sidestand switch to the ECU is detected when the start switch is pressed.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Malfunction in ECU.</li> </ul>	20
20	Defective values are detected due to the internal malfunction of the intake air temperature sensor or the atmospheric pressure sensor.	<ul style="list-style-type: none"> <li>• Malfunction of the intake air pressure sensor or atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Open or short circuit in wiring harness.</li> <li>• Open or short circuit in wiring sub lead.</li> <li>• Malfunction in ECU.</li> </ul>	—
21	Coolant temperature sensor-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective coolant temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	06
22	Intake temperature sensor-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective intake temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	05
23	Atmospheric pressure sensor-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective atmospheric pressure sensor.</li> <li>• Improperly installed sensor.</li> <li>• Malfunction in ECU.</li> </ul>	02
24	No normal signals are received from the O <sub>2</sub> sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective O<sub>2</sub> sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
30	The motorcycle has overturned.	<ul style="list-style-type: none"> <li>• Overturned.</li> <li>• Malfunction in ECU.</li> </ul>	08

## FUEL INJECTION SYSTEM

**FI**


Fault Code No.	Symptom	Probable cause of malfunction	Diagnostic monitoring code No.
33	Open circuit is detected in the primary wire of the ignition coil (#1).	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> <li>• Malfunction in a component of ignition cutoff circuit system.</li> </ul>	30
34	Open circuit is detected in the primary wire of the ignition coil (#2).	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> <li>• Malfunction in a component of ignition cutoff circuit system.</li> </ul>	31
41	Lean angle cut-off switch-open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective lean angle cut-off switch.</li> <li>• Malfunction in ECU.</li> </ul>	08
42	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective speed sensor.</li> <li>• Malfunction in vehicle speed sensor detected unit.</li> <li>• Defective neutral switch.</li> <li>• Malfunction in the engine side of the neutral switch.</li> <li>• Malfunction in ECU.</li> </ul>	07 21
43	The ECU is unable to monitor the battery voltage (an open circuit in the monitor line to the ECU).	<ul style="list-style-type: none"> <li>• Open circuit in wiring harness.</li> <li>• Malfunction in ECU.</li> </ul>	—
44	An error is detected while reading or writing on EEPROM.	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory).</li> </ul>	60
50	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)</li> </ul>	—

Er-1	No signals are received from the ECU.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in meter unit.</li> <li>• Malfunction in ECU.</li> </ul>	—
Er-2	No signals are received from the ECU within the specified duration.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in meter unit.</li> <li>• Malfunction in ECU.</li> </ul>	—
Er-3	Data from the ECU cannot be received correctly.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in meter unit.</li> <li>• Malfunction in ECU.</li> </ul>	—
Er-4	Non-registered data has been received from the meter.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in meter unit.</li> <li>• Malfunction in ECU.</li> </ul>	—

## FUEL INJECTION SYSTEM

**FI**

**Sensor operation table**

Diagnostic monitoring code No.	Item	Meter display	Checking method
01	Throttle angle Fully closed position	15-17	<ul style="list-style-type: none"> <li>• Check with throttle fully closed.</li> <li>• Check with throttle fully open.</li> </ul>
	Fully opened position	97-100	
02	Atmospheric pressure	—	Compare the actually measured atmospheric pressure with the meter display value. (*1)
03	Pressure difference (atmospheric pressure- intake air pressure)	—	Turn On the engine stop switch, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)
05	Intake temperature	—	Compare the actually measured intake air temperature with the meter display value. (*2)
06	Coolant temperature	—	Compare the actually measured coolant temperature with the meter display value.
07	Vehicle speed pulse	0-999	Check that the number changes (integrating) when the rear wheels are rotated.
08	Lean angle cut-off switch Upright overturned	0.4-1.4 3.8-4.2	Remove the lean angle cut-off switch and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
20	Sidestand switch Stand retracted Stand extended	ON OFF	Turn ON/OFF the Sidestand switch.
21	Neutral switch Neutral In gear	ON OFF	Perform the shift operation of transmission.
60	E2PROM fault code display No fault Fault detected	00 01 or 02 (Fault detection cylinder) (If both cylinders are defective, the display alternates every two seconds.)	—
61	Malfunction history code display No history History exists	00 11-50 (Fault detection code) (If code numbers more than one are detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
62	Malfunction history code erasure No history History exists	00 00-21 (Memory numbers of the fault detection)	— To erase the history, turn ON the engine stop switch.
70	Control number	00-255	—

\*1 If it is not possible to check it with an atmospheric pressure gauge, judge it by using 760 mmHg as the standard.

\*2 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

## FUEL INJECTION SYSTEM

FI



### Actuator operation table

Diagnostic monitoring code No.	Item	Actuation	Checking method
30	Ignition coil #1	Actuates the ignition coils #1 for five times every second. Illuminates the engine trouble warning light	Check the spark five times. • Connect an ignition checker.
31	Ignition coil #2	Actuates the ignition coils #2 for five times every second. Illuminates the engine trouble warning light.	Check the spark five times. • Connect an ignition checker.
36	Injector #1	Actuates the injector #1 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #1 five times.
37	Injector #2	Actuates the injector #2 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #2 five times.
48	AI system solenoid	Actuates the AI system solenoid for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the AI system solenoid five times.
49	Intake solenoid	Actuates the intake solenoid for five times every second. Illuminates the engine trouble warning light. * Actuators may operate once or twice immediately after the engine stopped or cranking was performed.	Check the operating sound of the intake solenoid five times.
50	Fuel injection system relay	Actuates the fuel injection system relay for five times every second. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel injection system relay five times.
51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles every five-second. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the Radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay for five times every five-second. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.

\* If the engine stop switch is ON, turn it OFF once, and then turn it back ON.



## TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Carry out check and maintenance on items or components that could be a cause of malfunction in accordance with the order.

When the check and maintenance of malfunctioned part is completed, restore the meter display according to the "Restore method".

Fault code No.:

Fault code number displayed on the meter when the engine failed to work normally. (Refer to "DIAGNOSTIC MONITORING MODE".)

Diagnostic monitoring code No.:

Code number to be used when the diagnostic monitoring mode is operated. (Refer to "DIAGNOSTIC MONITORING MODE".)

<b>Fault code No.</b>	<b>11</b>	<b>symptom</b>	<b>A.</b> No normal signals are received from the cylinder identification sensor. <b>B.</b> Malfunction of electric starting system	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>A-1</b>	Installed state of cylinder identification sensor	Check the installed area for looseness or pinching.		Reinstated by starting the engine and operating it at idle.
<b>A-2</b>	Connected state of connector Cylinder identification sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
<b>A-3</b>	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. Between main wiring harness and sub lead Blue - Yellow White/Black - White Black/Blue - Black/Blue		
<b>A-4</b>	Defective cylinder identification sensor	Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		
<b>B-1</b>	Connected state of connector Alarm short circuit coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
<b>B-2</b>	Defective starter relay or starter motor	Replace if defective Refer to "ELECTRIC STARTING SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>12</b>	<b>Symptom</b>	No normal signals are received from the crankshaft position sensor.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Installed state of crankshaft position sensor	Check the installed area for looseness or pinching.		Reinstated by cranking the engine.
2	Connected state of connector Crankshaft position sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit between the main wiring harnesses. Gray - Blue/Yellow Green/White - Green/White		
4	Defective crankshaft position sensor.	Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

<b>Fault code No.</b>	<b>13</b>	<b>Symptom</b>	Intake air pressure sensor-open or short circuit defected.	
<b>Diagnostic monitoring code No.</b>		<b>03</b>	Intake air pressure sensor	
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated by cranking the engine.
2	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue <b>Sub lead</b> Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue		
3	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>14</b>	<b>Symptom</b>	Intake air pressure sensor-pipe system malfunction (clogged or detached hose).	
<b>Diagnostic monitoring code No.</b>		<b>03</b>	Intake air pressure sensor	
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>1</b>	Intake air pressure sensor hose detached, clogged, kinked, or pinched. Intake air pressure sensor malfunction at intermediate electrical potential. Atmospheric pressure sensor malfunction at Intermediate electrical potential.	Repair or replace the sensor hose.  Check and repair the connection.  Replace it if there is a malfunction.		Reinstated by starting the engine and operating it at idle.
<b>2</b>	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
<b>3</b>	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>15</b>	<b>Symptom</b>	Throttle position sensor-open or short circuit defected.	
<b>Diagnostic monitoring code No.</b>		<b>01</b>	Throttle position sensor	
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>1</b>	Installed state of throttle position sensor.	Check the installed area for looseness or pinching. Check that it is installed in the specified position.		Reinstated by turning the main switch ON.
<b>2</b>	Connected state of connector Throttle position sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.		
<b>3</b>	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Black/Blue - Black/Blue Yellow - Yellow Blue - Blue <b>Sub lead</b> Black/Blue - Black/Blue Yellow - Yellow Blue - Blue		
<b>4</b>	Throttle position sensor lead wire open circuit output voltage check.	Check for open circuit and replace the throttle position sensor. Black/Blue - Yellow		
		Open circuit item	Output voltage	
		Ground wire open circuit	5 V	
		Output wire open circuit	0 V	
		Power supply wire open circuit	0 V	
<b>5</b>	Defective throttle position sensor.	Execute the diagnostic monitoring mode. (Code No. 01) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>19</b>	<b>Symptom</b>	Open circuit is detected in the input line from the sidestand switch to the ECU.	
<b>Diagnostic monitoring code No.</b>	<b>20</b>	Sidestand switch		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>1</b>	Connected state of connector Main wiring harness ECU coupler (No. 43 pin, black) Alarm coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		If the transmission is in gear, it is reinstated by refracing the sidestand.  If the transmission is in neutral, it is reinstated by reconnecting the wiring.
<b>2</b>	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  Between <b>ECU</b> and sidestand switch		
<b>3</b>	Defective sidestand switch	Execute the diagnostic monitoring mode. (Code No. 20) Replace if defective. Refer to "CHECKING THE SWITCHES" in chapter 8.		

## FUEL INJECTION SYSTEM

FI



<b>Fault code No.</b>	<b>20</b>	<b>Symptom</b>	<b>A.</b> Intake air pressure sensor-open or short circuit detected. <b>B.</b> Defective values are detected due to the internal malfunction of the intake air pressure sensor or the Atmospheric pressure sensor.		
<b>Diagnostic monitoring code No.</b>		<b>A</b>	<b>03</b>	Intake air pressure sensor	
		<b>B</b>	<b>02</b> <b>03</b>	Atmospheric pressure sensor Intake air pressure sensor	
<b>Order</b>	<b>Item/components</b>		<b>Check or maintenance job</b>		<b>Restore method</b>
<b>A-1</b>	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler		Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated by cranking the engine.
<b>A-2</b>	Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Black/Blue - Black/Blue Pink/White - Pink . White Blue - Blue  <b>Sub lead</b> Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue		
<b>A-3</b>	Defective intake air pressure sensor		Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		
<b>B-1</b>	Defective atmospheric pressure sensor.		Execute the diagnostic monitoring mode. (Code No. 02) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		Reinstated by turning the main switch ON.
<b>B-2</b>	Defective intake air pressure sensor		Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		Reinstated by cranking the engine.

## FUEL INJECTION SYSTEM

FI



<b>Fault code No.</b>	<b>21</b>	<b>Symptom</b>	Open or short circuit is detected from the coolant temperature sensor.	
<b>Diagnostic monitoring code No.</b>		<b>06</b>	Coolant temperature sensor	
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Installed state of coolant temperature sensor	Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2	Connected state of connector Coolant temperature sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.		
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b> Black/Blue - Black/Blue Green - Red		
4	Defective coolant temperature sensor.	Execute the diagnostic monitoring mode. (Code No. 06) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

<b>Fault code No.</b>	<b>22</b>	<b>Symptom</b>	Open or short circuit detected from the intake air temperature sensor.	
<b>Diagnostic monitoring code No.</b>		<b>05</b>	Intake air temperature sensor	
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Installed state of intake air temperature sensor	Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2	Connected state of connector Intake temperature sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b> Black/Blue - Black/Blue Brown/White - Brown/White		
4	Defective intake air temperature sensor.	Execute the diagnostic monitoring mode. (Code No. 05) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>23</b>	<b>Symptom</b>	Open or short circuit detected from the atmospheric pressure sensor.	
<b>Diagnostic monitoring code No.</b>	<b>02</b>	Atmospheric pressure sensor		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Installed state of atmospheric pressure sensor	Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2	Connected state of connector Atmospheric pressure sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b> Blue - Blue Black/Blue - Black/Blue Pink - Pink		
4	Defective atmospheric pressure sensor.	Execute the diagnostic monitoring mode. (Code No. 02) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.		

<b>Fault code No.</b>	<b>24</b>	<b>Symptom</b>	No normal signal is received from the O <sub>2</sub> sensor.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Installed state of O <sub>2</sub> sensor	Check the installed area for looseness or pinching.		As the returning method, start and warm up the engine until the coolant temperature rises over 60°C. Then, maintain the engine speed at 2000 rpm to 3000 rpm until the warning light goes off. When the warning light goes off, the reset operation is finished.
2	Connected state of connector O <sub>2</sub> sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b> Black/Blue - White Gray/Green - Blue		
4	Check fuel pressure	Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION".		
5	Defective O <sub>2</sub> sensor.	Replace if defective.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>30</b>	<b>Symptom</b>	The motorcycle has overturned.	
<b>Diagnostic monitoring code No.</b>	<b>08</b>	Lean angle cut-off switch		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	The motorcycle has overturned.	Raise the motorcycle upright.		Reinstated by turning the main switch ON (however, the engine cannot be restarted unless the main switch is first turned OFF).
2	Installed state of the lean angle cut-off switch	Check the installed area for looseness or pinching.		
3	Connected state of connector Lean angle cut-off switch coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		
4	Defective lean angle cut-off switch	Execute the diagnostic monitoring mode. (Code No. 08) Replace if defective.		

<b>Fault code No.</b>	<b>33</b>	<b>Symptom</b>	Malfunction detected in the primary wire of the ignition coil (#1).	
<b>Diagnostic monitoring code No.</b>	<b>30</b>	Ignition coil (#1)		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Ignition coil primary side coupler (Orange) Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated by starting the engine and operating it at idle.
2	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b> Orange - Orange Red/Black - Red/Black		
3	Defective ignition coil	Execute the diagnostic monitoring mode. (Code No. 30) Test the primary and secondary coils for continuity. Replace if defective. Refer to "IGNITION SYSTEM" in chapter 8.		

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>34</b>	<b>Symptom</b>	Malfunction detected in the primary wire of the ignition coil (#2).	
<b>Diagnostic monitoring code No.</b>	<b>31</b>	Ignition coil (#2)		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>1</b>	Connected state of connector Ignition coil primary side coupler (Gray/Red) Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated by starting the engine and operating it at idle.
<b>2</b>	Open or short circuit in lead wire.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b>  Gray/Red - Gray/Red Red/Black - Red/Black		
<b>3</b>	Defective ignition coil	Execute the diagnostic monitoring mode. (Code No. 31) Test the primary and secondary coils for continuity. Replace if defective. Refer to "IGNITION SYSTEM" in chapter 8.		

<b>Fault code No.</b>	<b>41</b>	<b>Symptom</b>	Open or short circuit detected in the lean angle cut-off switch.	
<b>Diagnostic monitoring code No.</b>	<b>08</b>	Lean angle cut-off switch		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
<b>1</b>	Connected state of connector Lean angle cut-off switch coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated immediately when it becomes normal.
<b>2</b>	Open or short circuit in lead wire.	Repair or replace if there is an open or short circuit.  <b>Main wiring harness</b>  Black/Blue - Black/Blue Yellow/Green - Yellow/Green Red/White - Red/White		
<b>3</b>	Defective lean angle cut off switch	Execute the diagnostic monitoring mode. (Code No. 08) Replace if defective.		

## FUEL INJECTION SYSTEM

**FI**



Fault code No.	<b>42</b>	Symptom	<b>A.</b> No normal signal are received from the speed sensor. <b>B.</b> Open or short circuit is detected in the neutral switch.	
<b>Diagnostic monitoring code No.</b>	<b>A</b>	<b>07</b>	Speed sensor	
	<b>B</b>	<b>21</b>	Neutral switch	
Order	Item/components		Check or maintenance job	Restore method
<b>A-1</b>	Connected state of connector Speed sensor coupler Main wiring harness ECU coupler		Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at a 20 to 30 km/h.
<b>A-2</b>	Open or short circuit in lead wire.		Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Blue - Blue White/Yellow - White Black/Blue - Black/Blue	
<b>A-3</b>	Gear for detecting vehicle speed has broken.		Replace if defective. Refer to "TRANSMISSION" in chapter 5.	
<b>A-4</b>	Defective speed sensor		Execute the diagnostic monitoring mode. (Code No. 07) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	
<b>B-1</b>	Connected state of connector Neutral switch coupler Main wiring harness ECU coupler		Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at a 20 to 30 km/h.
<b>B-2</b>	Open or short circuit in lead wire.		Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Sky blue/Sky blue	
<b>B-3</b>	Faulty shift drum (neutral detection area)		Replace if defective. Refer to "TRANSMISSION" in chapter 5.	
<b>B-4</b>	Defective neutral switch		Execute the diagnostic monitoring mode. (Code No. 21) Replace if defective. Refer to "CHECKING THE SWITCHES" in chapter 8.	

## FUEL INJECTION SYSTEM

**FI**



<b>Fault code No.</b>	<b>43</b>	<b>Symptom</b>	The ECU is unable to monitor the battery voltage.	
<b>Diagnostic monitoring code No.</b>	50	Fuel injection system relay		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Fuel injection system relay coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.		Reinstated by starting the engine and operating it at idle.
2	Defective main relay	Replace if defective.		
3	Open or short circuit in the wiring harness.	Repair or replace if there is an open or short circuit. <b>Main wiring harness</b> Red - Red Red/Black - Red/Black Red/Blue - Red/Blue Blue/Yellow - Blue/Yellow		
4	Malfunction or open circuit in fuel injection system relay	Execute the diagnostic monitoring mode. (Code No. 50) Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8. If there is no malfunction with the fuel injection system relay, replace the ECU.		

<b>Fault code No.</b>	<b>44</b>	<b>Symptom</b>	Error is detected while reading or writing on EEPROM (CO adjustment value).	
<b>Diagnostic monitoring code No.</b>	60	EEPROM improper cylinder indication		
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Malfunction in ECU	Execute the diagnostic monitoring mode. (Code No. 60) *Check the faulty cylinder. (If there are multiple cylinders, the number of the faulty cylinders appear alternately at 2-second intervals.) *Readjust the CO of the displayed cylinder. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" in chapter 3. Replace ECU if defective.		Reinstated by turning the main switch ON

<b>Fault code No.</b>	<b>50</b>	<b>Symptom</b>	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Malfunction in ECU	Replace ECU.		Reinstated by turning the main switch ON

## FUEL INJECTION SYSTEM

**FI**


<b>Fault code No.</b>	<b>Er-1</b>	<b>Symptom</b>	No signals are received from the ECU.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.		
3	Malfunction in ECU	Replace the ECU.		

<b>Fault code No.</b>	<b>Er-2</b>	<b>Symptom</b>	No signals are received from the ECU within the specified duration.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.		
3	Malfunction in ECU	Replace the ECU.		

<b>Fault code No.</b>	<b>Er-3</b>	<b>Symptom</b>	Data from the ECU cannot be received correctly.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.		
3	Malfunction in ECU	Replace the ECU.		

## FUEL INJECTION SYSTEM

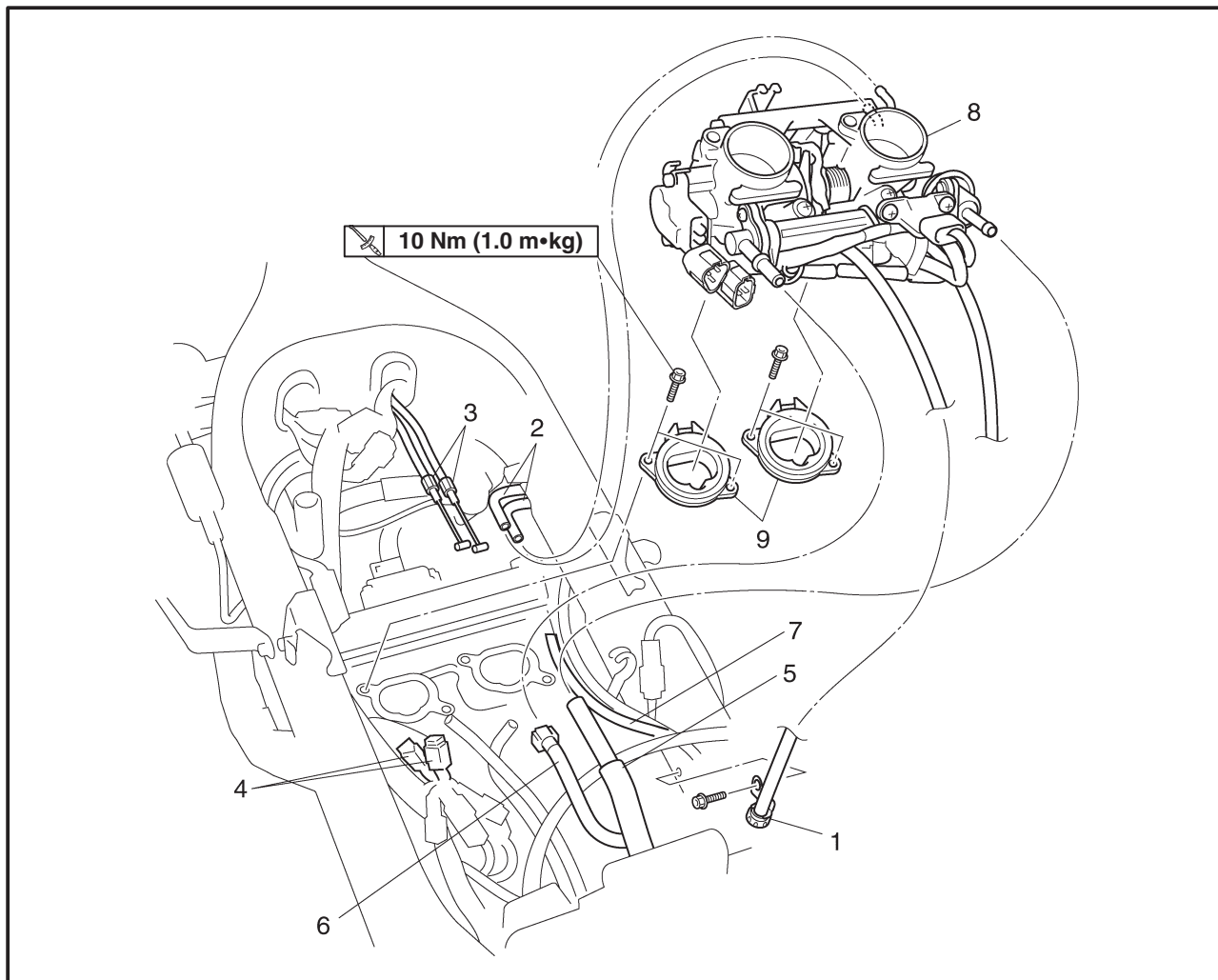
**FI**



<b>Fault code No.</b>	<b>Er-4</b>	<b>Symptom</b>	Non-registered data has been received from the meter.	
<b>Diagnostic monitoring code No.</b>				
<b>Order</b>	<b>Item/components</b>	<b>Check or maintenance job</b>		<b>Restore method</b>
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler.  If there is a malfunction, repair it and connect it securely.		Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.		
3	Malfunction in ECU	Replace the ECU.		



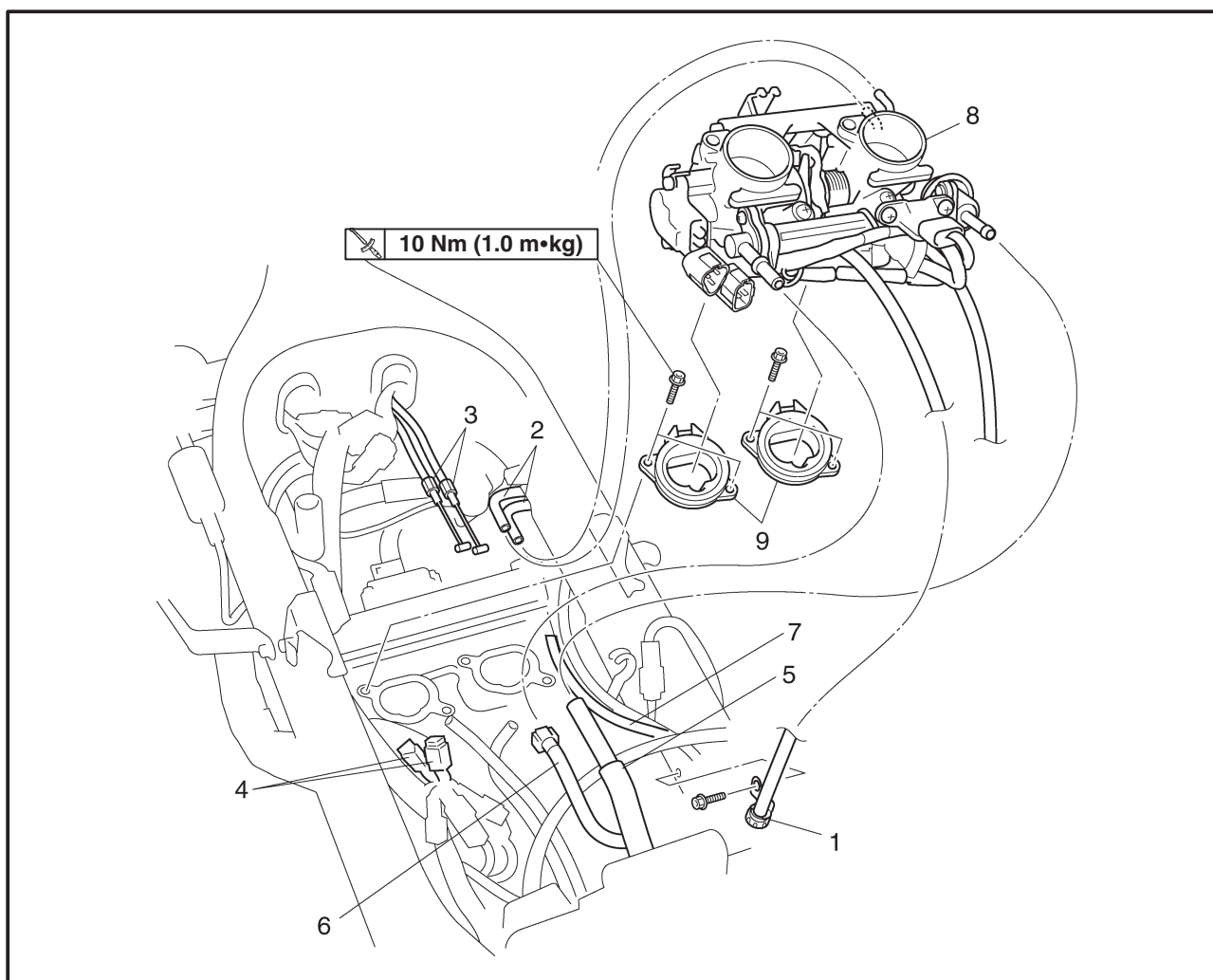
## THROTTLE BODY ASSEMBLY



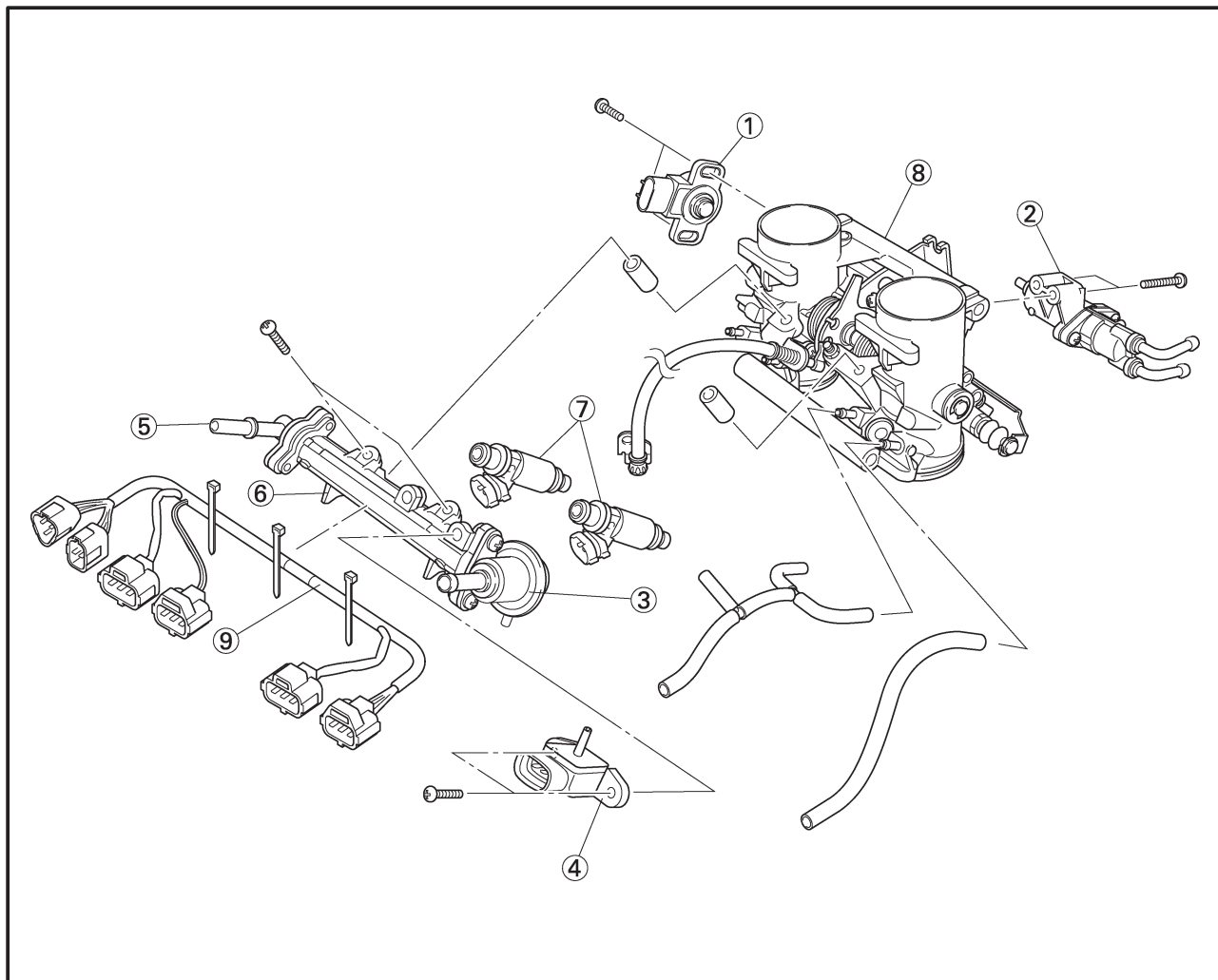
Order	Job/Part	Q'ty	Remarks
	<b>Removing the throttle body assembly</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT", "FUEL TANK", "AIR FILTER CASE" in chapter 3.
	Fuel tank		
	Air filter case		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Coolant		
1	Throttle stop screw	1	
2	Fast idle plunger hose	2	Disconnect.
3	Throttle cable	2	Disconnect.
4	Throttle body sub-wire harness coupler	2	Disconnect.
5	Fuel return hose	1	Disconnect.

# FUEL INJECTION SYSTEM

FI



Order	Job/Part	Q'ty	Remarks
6	Fuel hose	1	Disconnect.
7	Vacuum hose	1	Disconnect.
8	Throttle body assembly	1	
9	Throttle body joint	2	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the throttle body</b>		Disassemble the parts in the order listed.
①	Throttle position sensor	1	
②	Fast idle plunger	1	
③	Pressur regulator	1	
④	Intake air pressure sensor	1	
⑤	Fuel injection pipe	1	
⑥	Fuel distributor	1	
⑦	Injector	2	
⑧	Throttle body	1	
⑨	Sub-wire harness		
			<b>CAUTION</b> _____ The throttle bodies should not be disassembled unnecessarily. _____
			For assembly, reverse the removal procedure.



**CAUTION:**  
The throttle bodies should not be disassembled unnecessarily.

**CHECKING THE INJECTOR**

- 1. Check:
• injector
Damage -> Replace.

**CHECKING THE THROTTLE BODY**

- 1. Check:
• throttle body
Cracks/damage -> Replace the throttle bodies.
2. Check:
• fuel passages
Obstruction -> Clean.

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

**CHECKING THE PRESSURE REGULATOR**

- 1. Check:
• pressure regulator
Damage -> Replace.

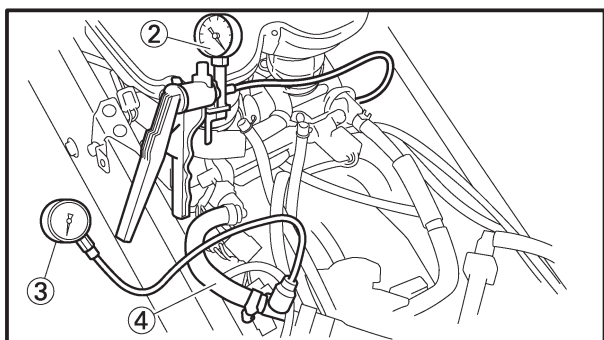
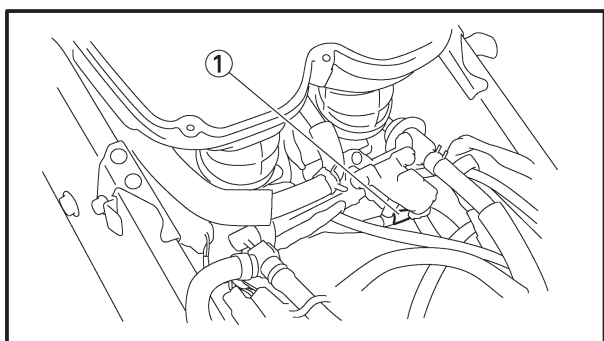


## CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:
  - pressure regulator operation



- a. Remove the fuel tank.  
Refer to "FUEL TANK" in chapter 3.
- b. Disconnect the vacuum hose ① from the pressure regulator.
- c. Connect the vacuum/pressure pump gauge set ② onto the vacuum hose from the pressure regulator.
- d. Connect the fuel pressure gauge ③ and adapter ④ onto the fuel hose.



	<b>Vacuum/pressure pump gauge set</b> 90890-06756 <b>Pressure gauge</b> 90890-03153 <b>Adapter</b> 90890-03176
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- e. Install the fuel tank.  
Refer to "FUEL TANK" in chapter 3.
- f. Start the engine.
- g. Measure the fuel pressure.

	<b>Fuel pressure</b> 294 kPa (2.94 kgf/cm <sup>2</sup> , 2.94 bar)
--	---

- h. Use the vacuum pressure pump gauge set to adjust the fuel pressure in relation to the vacuum pressure as described below.

**NOTE:** \_\_\_\_\_  
 The vacuum pressure should not exceed 100 kPa (1 mmHg).

Increase the vacuum pressure → Fuel pressure is decreased
Decrease the vacuum pressure → Fuel pressure is increased

Faulty → Replace the pressure regulator.



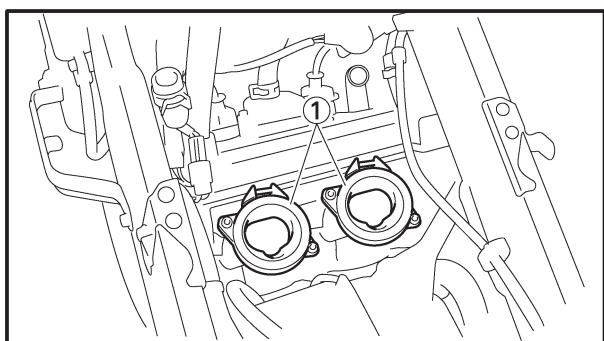


EAS00095

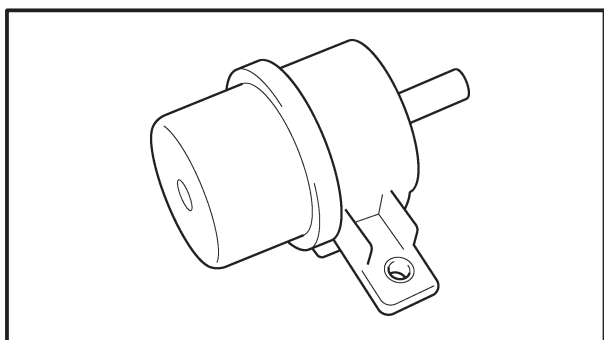
## CHECKING THE THROTTLE BODY JOINTS

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

1. Remove:
  - fuel tank  
Refer to “FUEL TANK” in chapter 3.
  - air filter case  
Refer to “AIR FILTER CASE” in chapter 3.

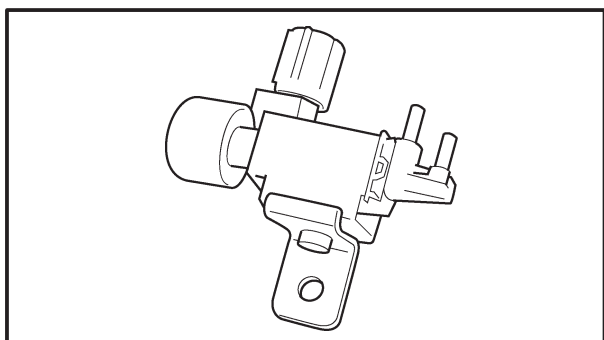


2. Check:
  - throttle body joint ①  
Cracks/damage → Replace.
3. Install:
  - air filter case
  - fuel tank



## CHECKING THE SURGE TANK

1. Remove:
  - fuel tank
  - air filter case
2. Check:
  - surge tank  
Cracks/damage → Replace.



## CHECKING THE ACTUATOR

1. Check:
  - actuator  
Cracks/damage → Replace.

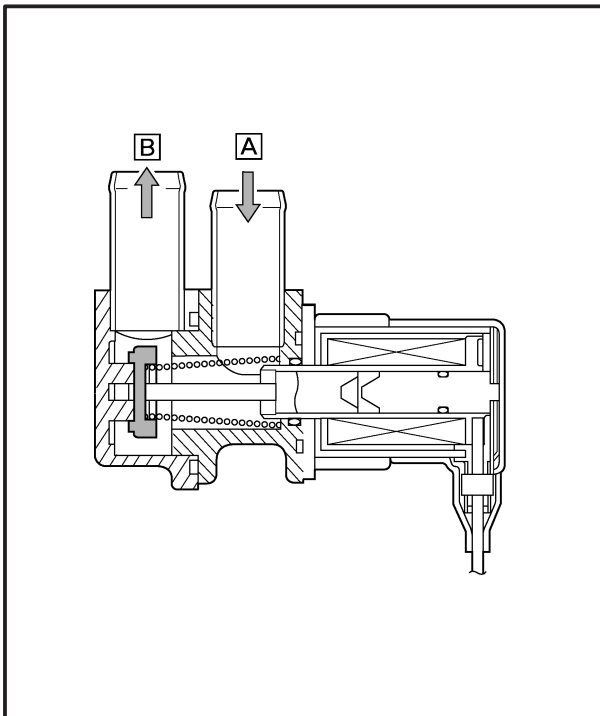


EAS00507

## AIR INDUCTION SYSTEM AIR INJECTION

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C.



EAS00508

## AIR CUT-OFF VALVE

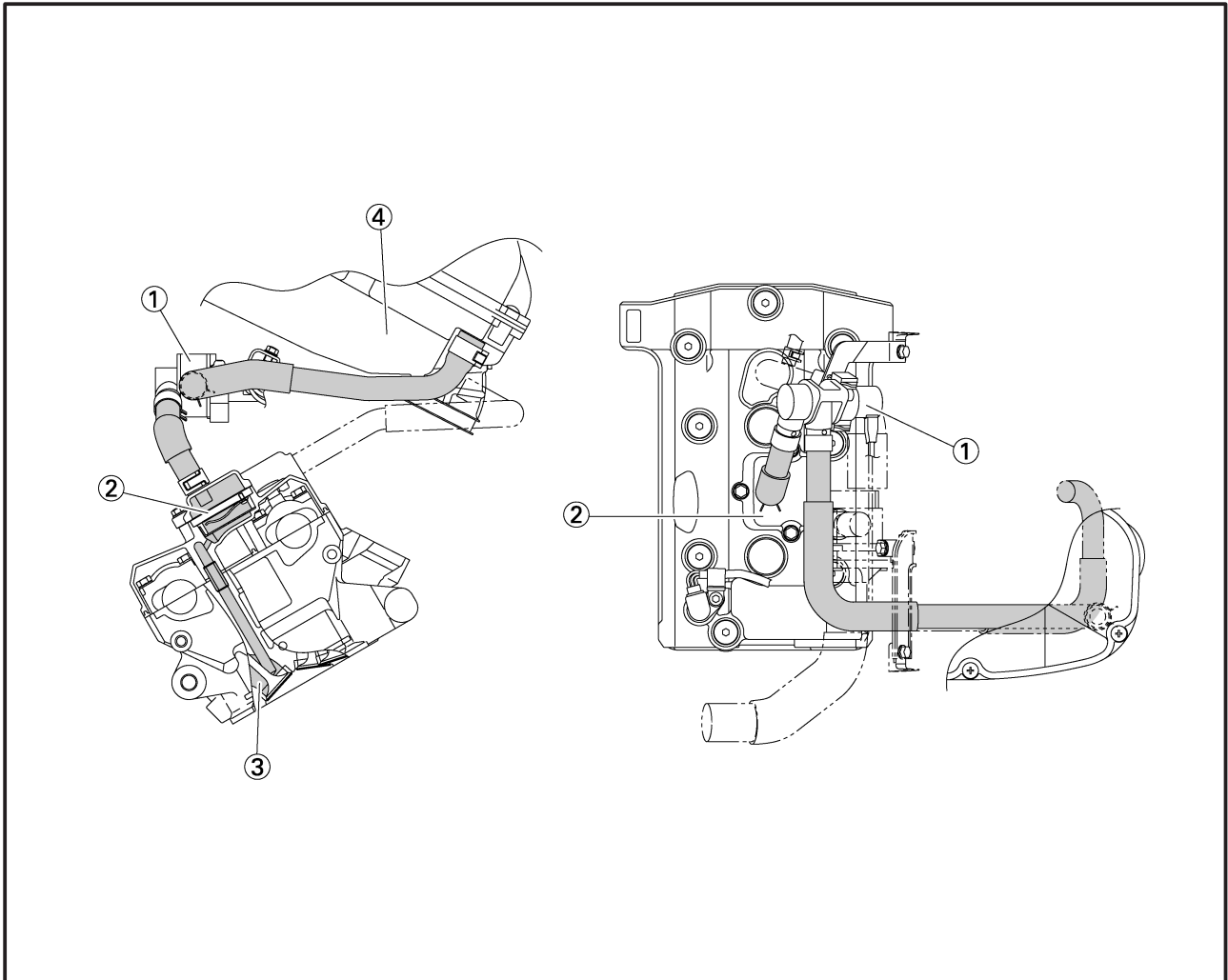
The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the motorcycle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.

- A** From the air filter case
- B** To the reed valve



EAS00509

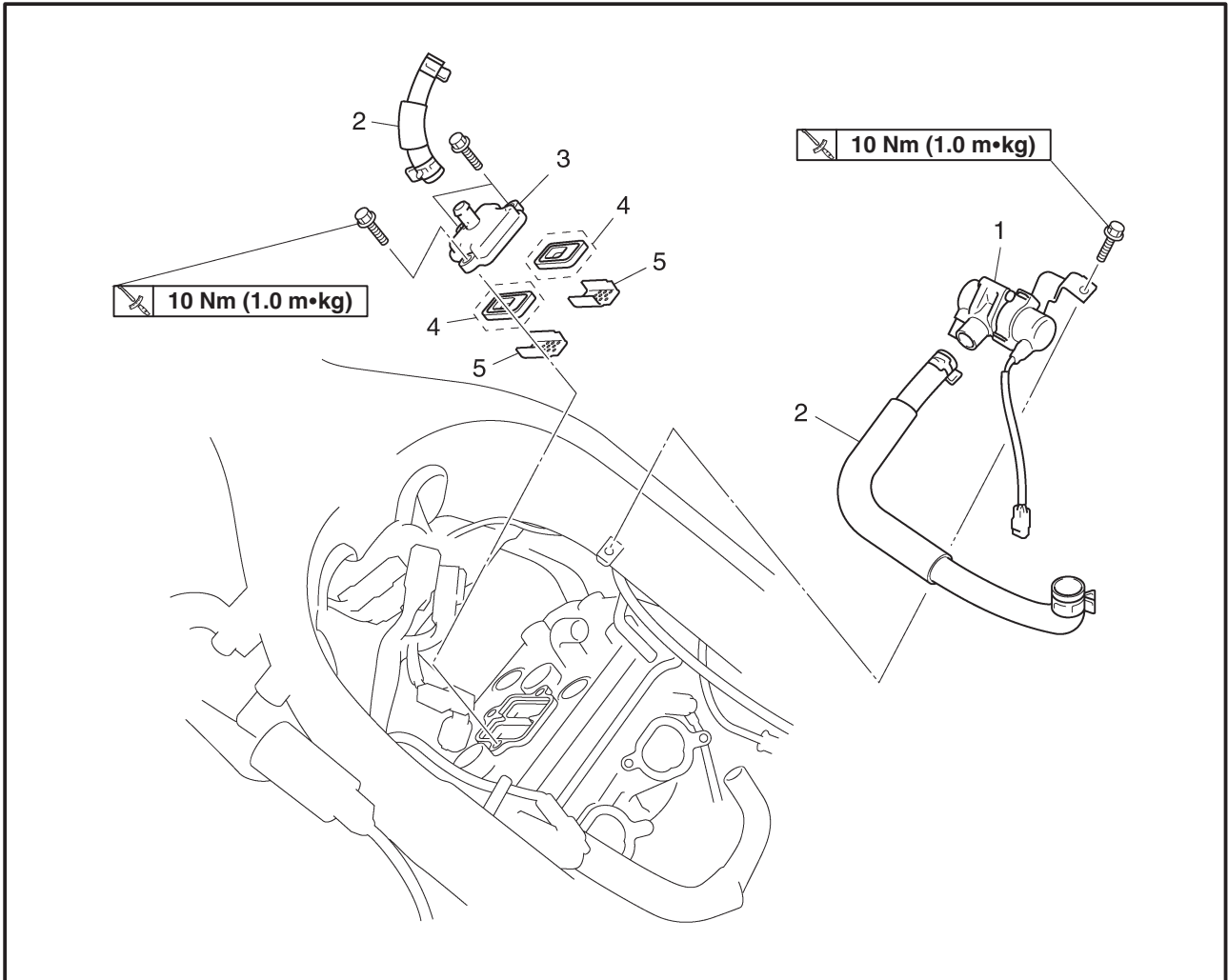
## AIR INDUCTION SYSTEM DIAGRAMS



- ① Air cut-off valve
- ② Reed valve
- ③ Exhaust port
- ④ Air filter case



AIR CUT-OFF VALVE AND REED VALVE



Order	Job/Part	Q'ty	Remarks
	<b>Removing the air cut-off valve and reed valve</b>		Remove the parts in teh order listed.
	Seat		Refer to "SEAT, FUEL TANK, AIR FILTER CASE" in chapter 3.
	Fuel tank		
	Air filter case		
1	Air cut-off valve	1	
2	Hose	2	
3	Reed valve cover	1	
4	Reed valve assembly	2	
5	Plate	2	
			For installation, reverse the removal procedure.



EAS00510

### CHECKING THE AIR INDUCTION SYSTEM

1. Check:

- hoses

Loose connection → Connect properly.

Cracks/damage → Replace.

- pipes

Cracks/damage → Replace.

2. Check:

- steel reed

- steel reed stopper

- reed valve seat

Cracks/damage → Replace the reed valve.

3. Check:

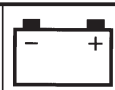
- air cut-off valve

Cracks/damage → Replace.



**ELEEC**

**8**



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## CHAPTER 8 ELECTRICAL

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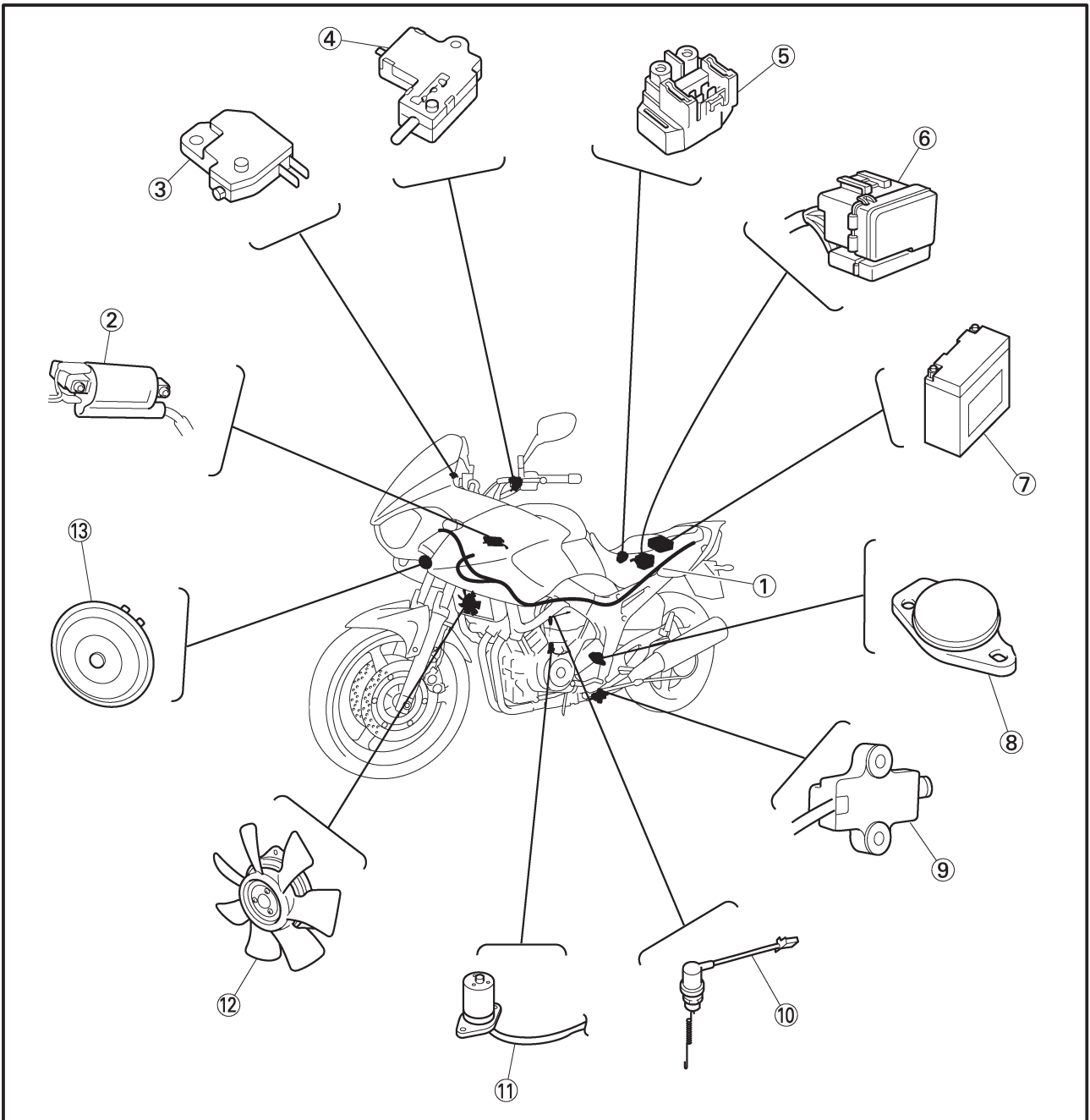
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EAS00729

# ELECTRICAL

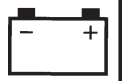
## ELECTRICAL COMPONENTS

- ① Wire harness
- ② Ignition coil
- ③ Front brake light switch
- ④ Clutch switch
- ⑤ Starter relay
- ⑥ Fuse box
- ⑦ Battery
- ⑧ Neutral switch
- ⑨ Sidestand switch
- ⑩ Rear brake light switch
- ⑪ Oil level switch
- ⑫ Radiator fan motor
- ⑬ Horn

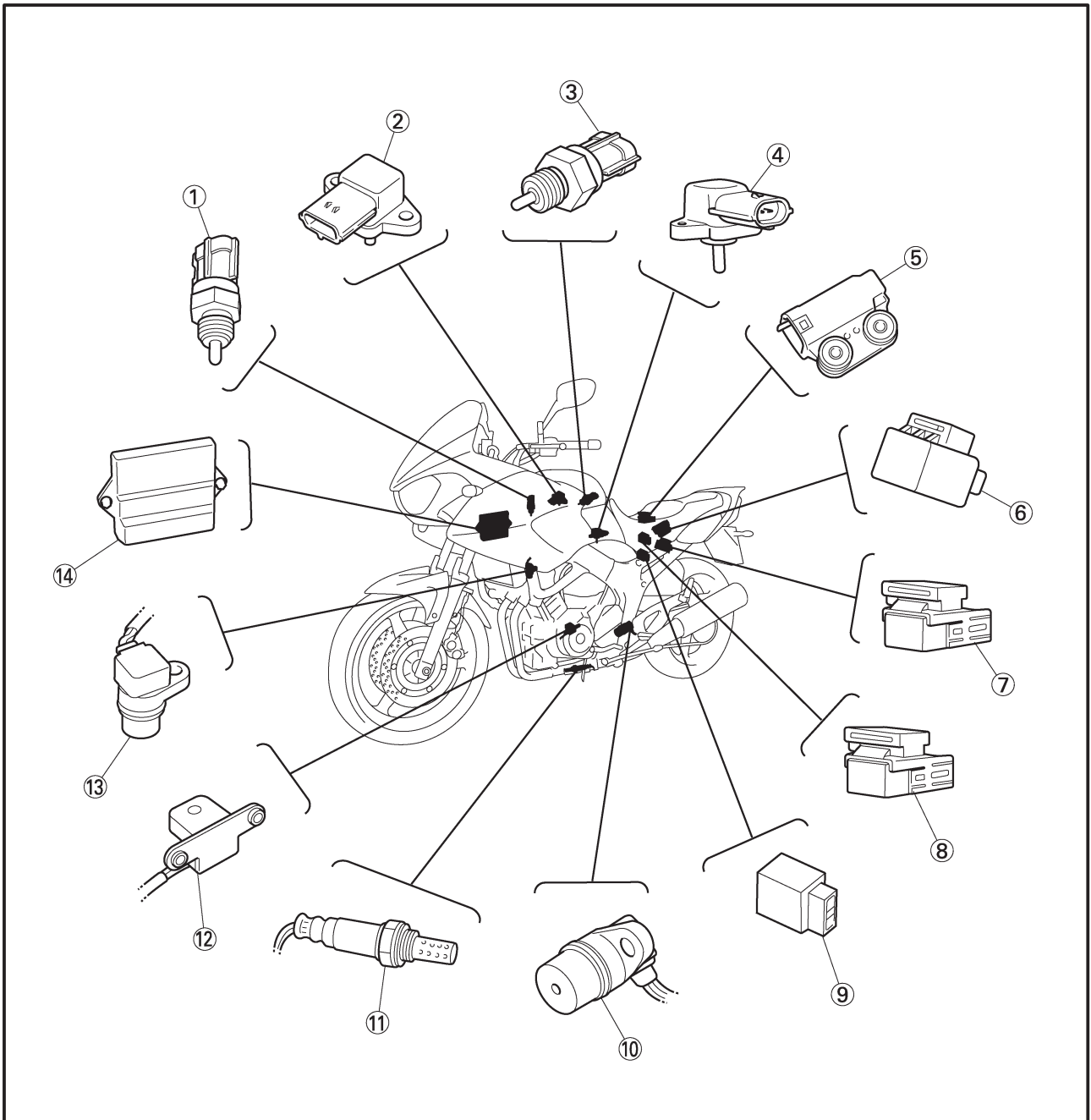


## ELECTRICAL COMPONENTS

ELEC

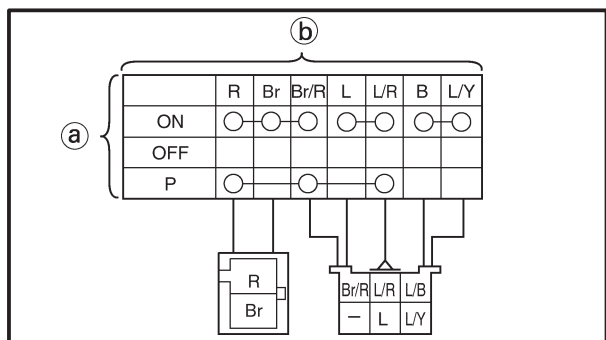
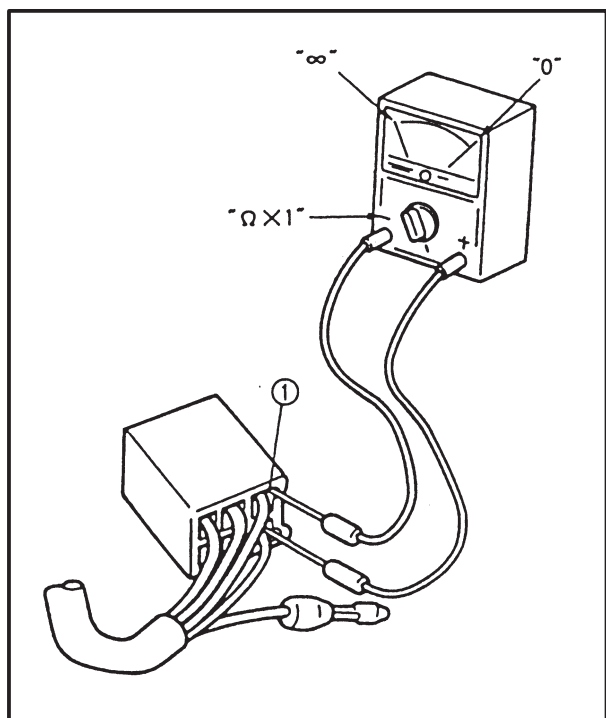


- ① Coolant temperature sensor
- ② Atmospheric pressure sensor
- ③ Intake air temperature sensor
- ④ Intake air pressure sensor
- ⑤ Lean angle cut-off switch
- ⑥ Turn signal relay
- ⑦ Fuel injection system relay
- ⑧ Radiator fan motor relay
- ⑨ Starting circuit cut-off relay
- ⑩ Speed sensor
- ⑪ O<sub>2</sub> sensor
- ⑫ Crankshaft position sensor
- ⑬ Cylinder identification sensor
- ⑭ ECU



## CHECKING SWITCH CONTINUITY

ELEC



EAS00730

### 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 (a). Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Pocket tester  
90890-03132

#### 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 (a) are shown in the far left column and the switch lead colors (b) are shown in the top row in the switch illustration.

#### NOTE:

“○—○” indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

**The example illustration on the left shows that:**

There is continuity between black and black/white when the switch is set to “OFF”. There is continuity between red and brown when the switch is set to “ON”.



EAS00731

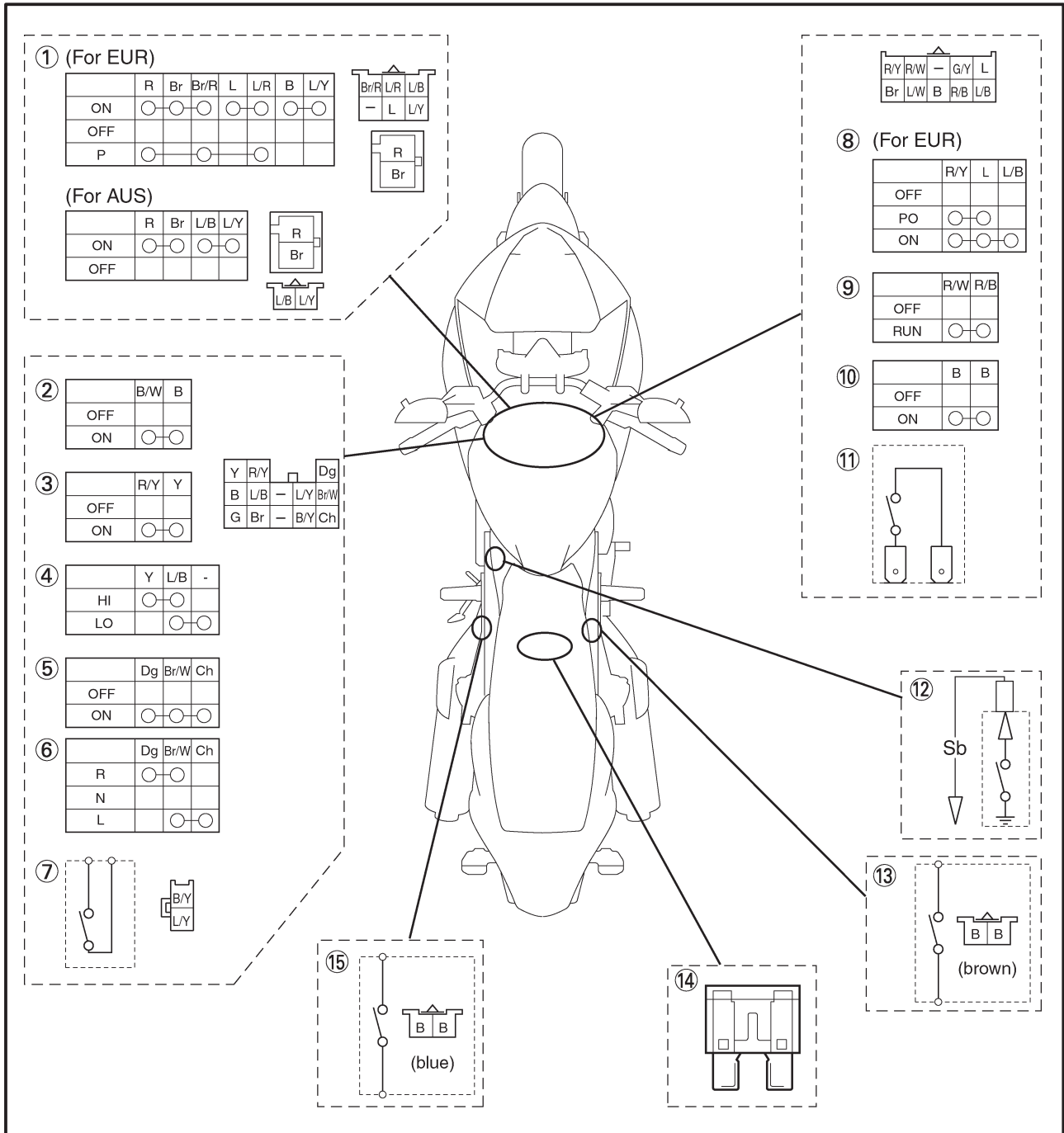
## CHECKING THE SWITCHES

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.

Improperly connected → Properly connect.

Incorrect continuity reading → Replace the switch.



- ① Main switch
- ② Horn switch
- ③ Pass switch
- ④ Dimmer switch
- ⑤ Hazard switch
- ⑥ Turn signal switch

- ⑦ Clutch switch
- ⑧ Light switch
- ⑨ Engine stop switch
- ⑩ Start switch
- ⑪ Front brake light switch
- ⑫ Neutral switch

- ⑬ Rear brake light switch
- ⑭ Fuses
- ⑮ Sidestand switch



EAS00732

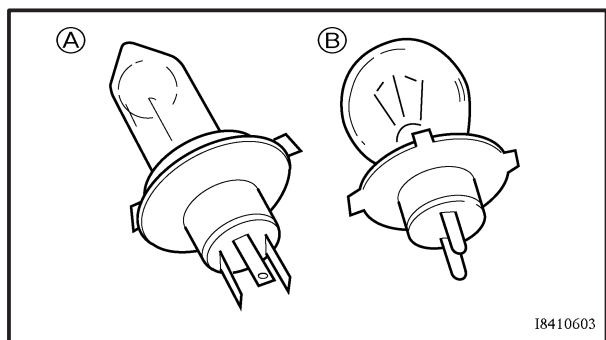
## CHECKING THE BULBS AND BULB SOCKETS

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

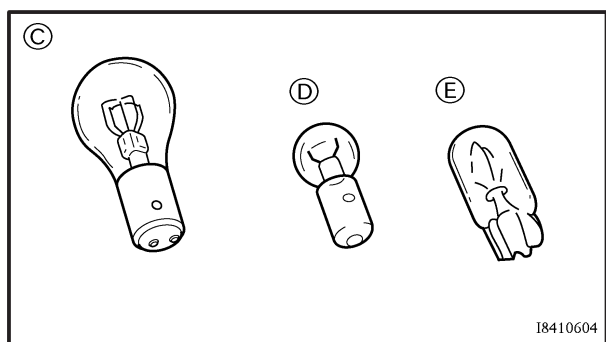
Damage/wear → Repair or replace the bulb, bulb socket or both.

Improperly connected → Properly connect.

No continuity → Repair or replace the bulb, bulb socket or both.



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### TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs **(A)** and **(B)** are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs **(C)** is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs **(C)** and **(E)** are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

### CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:
  - bulb





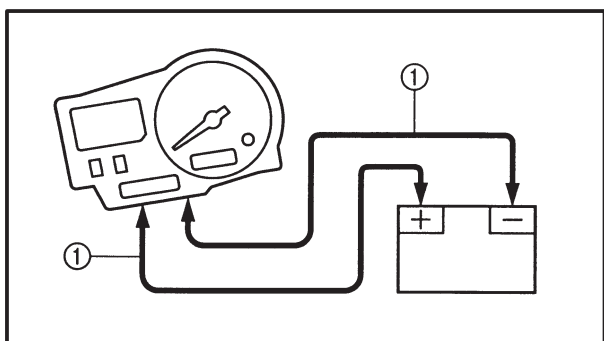
## CHECKING THE LEDs

The following procedures applies to all of the LEDs.

1. Check:
  - LED (for proper operation)  
Improper operation → Replace.



- a. Disconnect the meter assembly coupler (meter assembly side).
- b. Connect two jumper leads ① from the battery terminals to the respective coupler terminal as shown.



### **⚠ WARNING**

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

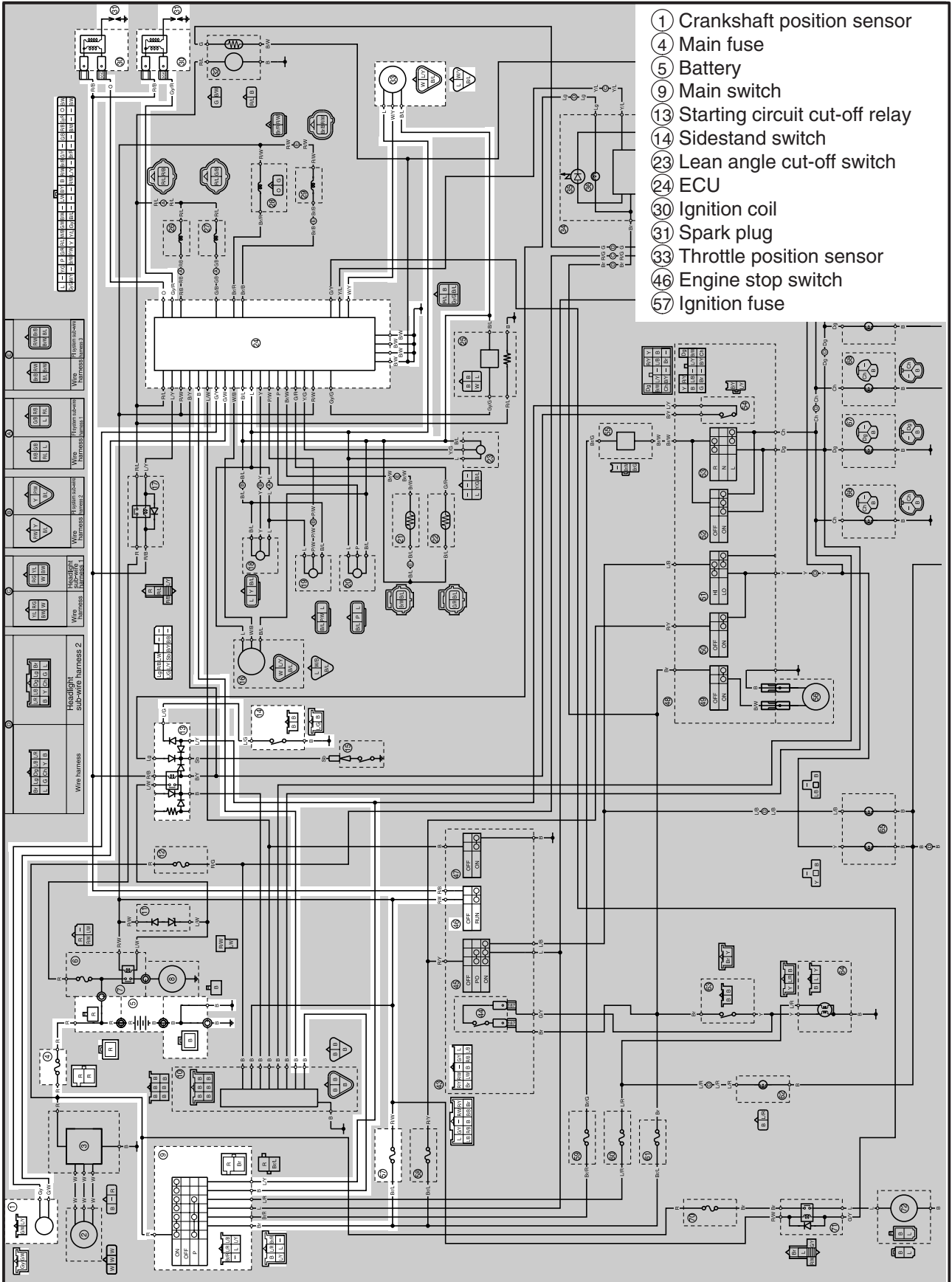
- c. When the jumper leads are connected to the terminals the respective LED should illuminate.  
Does not light → Replace the meter assembly.



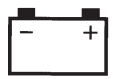


EAS00735

**IGNITION SYSTEM  
CIRCUIT DIAGRAM**



- ① Crankshaft position sensor
- ④ Main fuse
- ⑤ Battery
- ⑨ Main switch
- ⑬ Starting circuit cut-off relay
- ⑭ Sidestand switch
- ⑲ Lean angle cut-off switch
- ⑳ ECU
- ㉓ Ignition coil
- ㉔ Spark plug
- ㉖ Throttle position sensor
- ㉗ Engine stop switch
- ㉘ Ignition fuse



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. Main switch
8. Engine stop switch
9. Sidestand switch
10. Crankshaft position resistance
11. Starting circuit cut-off relay
12. Wiring connections  
(of the entire ignition system)

#### NOTE:

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



**Ignition checker**  
90890-06754  
**Pocket tester**  
90890-03132

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.



**Minimum 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**  
**DPR8EA-9 (NGK)**  
**X24EPR-U9 (DENSO)**  
**Spark plug gap**  
**0.8 ~ 0.9 mm**

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

↓ YES

↓ NO

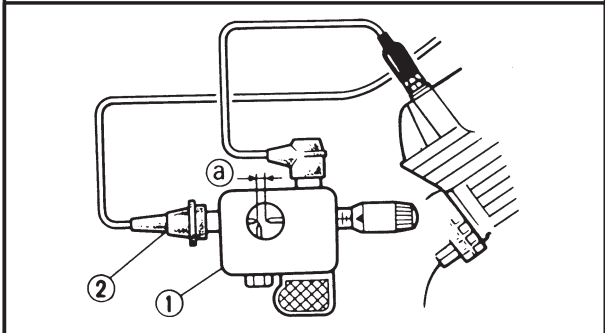
Re-gap or replace the spark plug.

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 ③.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



 **Minimum ignition spark gap**  
**6 mm**

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



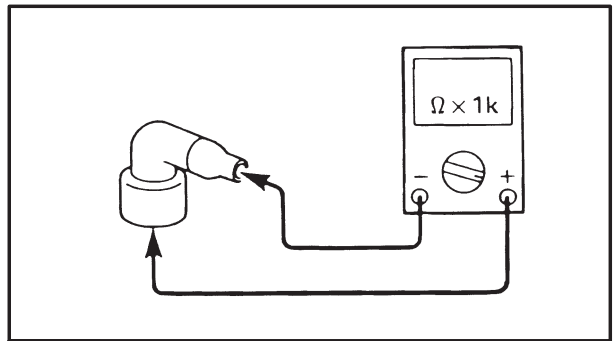
The ignition system is OK.

EAS00745

**5. Spark plug cap resistance**

The following procedure applies to all of the spark plug caps.

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ("Ω × 1k") to the spark plug cap as shown.
- Measure the spark plug cap resistance.



 **Spark plug cap resistance**  
**10 kΩ at 20°C**

• Is the spark plug cap OK?



Replace the spark plug cap.

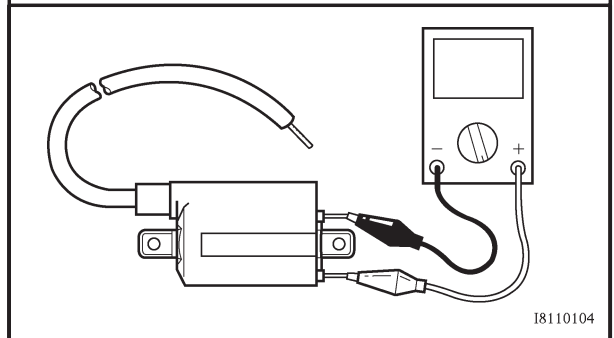
EAS00747

**6. Ignition coil resistance**

The following procedure applies to all of the ignition coils.

- Disconnect the ignition coil leads from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

**Positive tester probe → red/black**  
**Negative tester probe → orange (gray)**



• Measure the primary coil resistance.

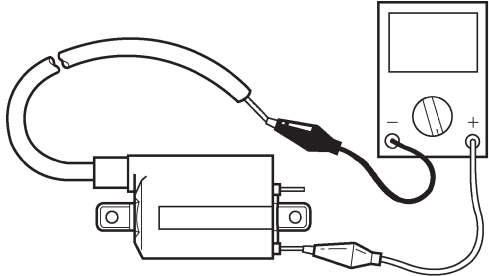
 **Primary coil resistance**  
**3.4 ~ 4.6 Ω at 20°C**

• Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

# IGNITION SYSTEM


**ELEC** 

**Negative tester probe** → spark plug lead ①  
**Positive tester probe** → spark plug lead ②



18110104

- Measure the secondary coil resistance.

 **Secondary coil resistance**  
10.4 ~ 15.6 kΩ at 20°C

- Is the ignition coil OK?

↓ YES      ↓ NO

Replace the ignition coil.

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.

EAS00752

**9. 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.

EAS00749

**7. Main switch**

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

↓ YES      ↓ NO

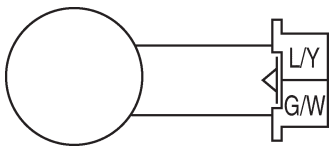
Replace the main switch.

EAS00748

10. Crankshaft position sensor resistance

- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.

**Positive tester probe** → green/white ①  
**Negative tester probe** → blue/yellow ②



- Measure the crankshaft position sensor resistance.



**Crankshaft position sensor resistance**  
 192 ~ 288 $\Omega$  at 20°C  
 (between green/white and blue/yellow)

- Is the crankshaft position sensor OK?

↓ YES

↓ NO

Replace the pickup coil.

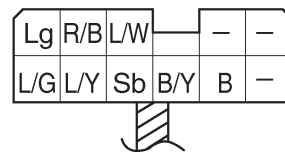
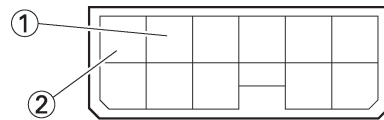
EAS00753

11. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the starting circuit cut-off relay coupler as shown.
- Check the starting circuit cut-off relay for continuity.

**Positive tester probe** → blue/green ②  
**Negative tester probe** → blue/yellow ①  
**Continuity**

**Positive tester probe** → blue/yellow ①  
**Negative tester probe** → blue/green ②  
**No continuity**



**NOTE:** When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

↓ YES

↓ NO

Replace the starting circuit cut-off relay.

EAS00754

12. Wiring

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

↓ YES

↓ NO

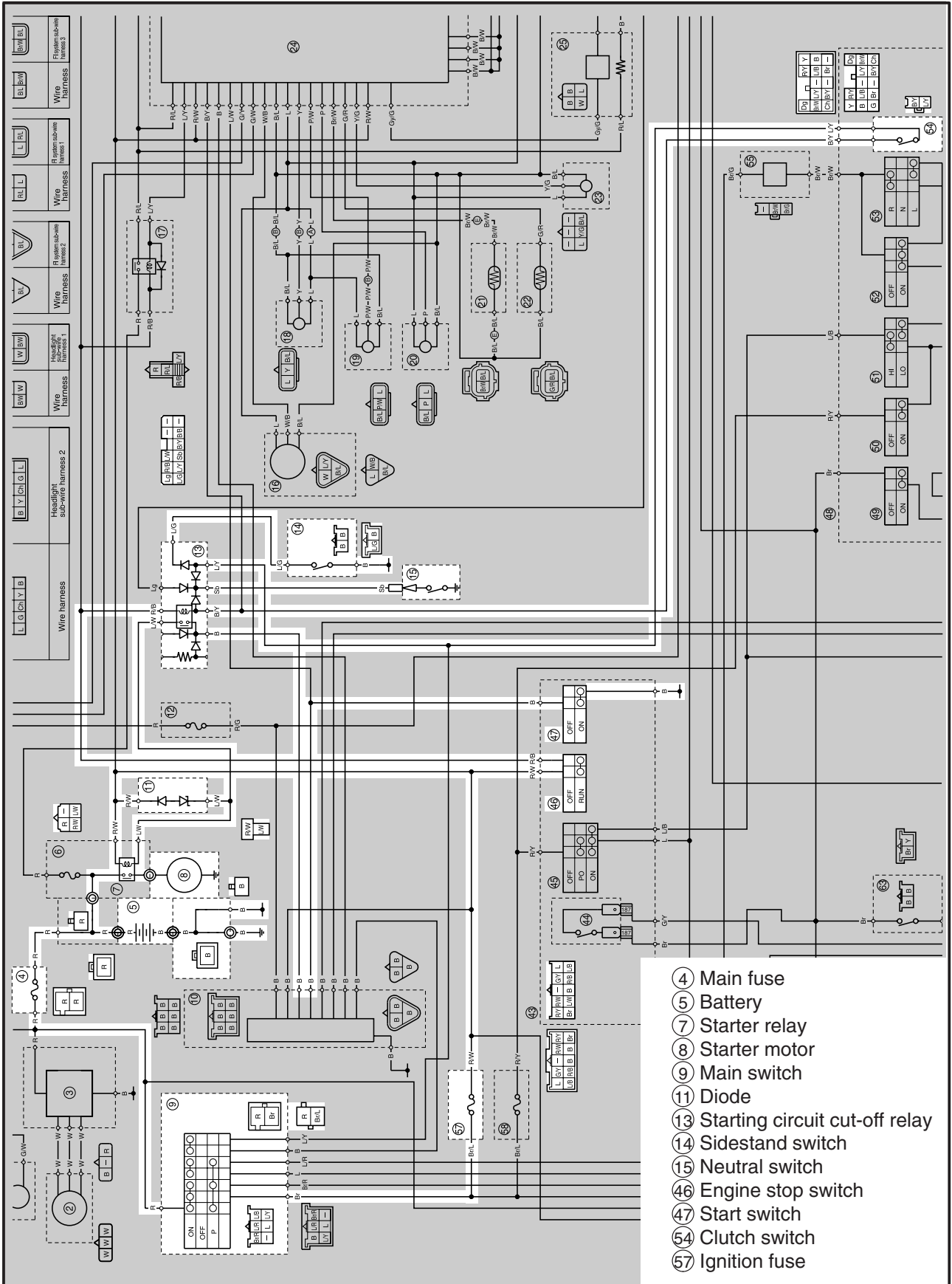
Replace the ignitor unit.

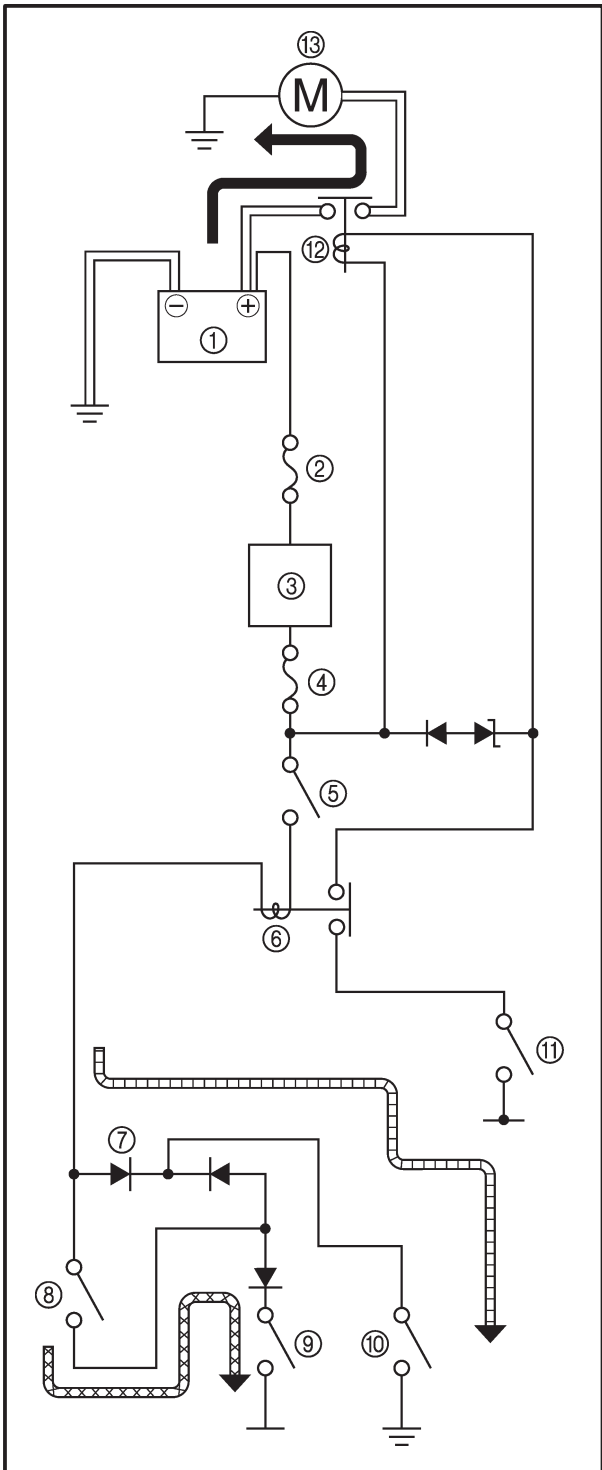
Properly connect or repair the ignition system's wiring.



EAS00755

## ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM





EAS00756

**STARTING CIRCUIT CUT-OFF SYSTEM OPERATION**

If the engine stop switch is set to “ ” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the starter switch.

◀ WHEN THE TRANSMISSION IS IN NEUTRAL

◀ WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

- ① Battery
- ② Main fuse
- ③ Main switch
- ④ Ignition fuse
- ⑤ Engine stop switch
- ⑥ Starting circuit cut-off relay
- ⑦ Diode (starting circuit cut-off relay)
- 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 cut-off relay
5. Diode
6. starter relay
7. main switch
8. engine stop switch
9. neutral switch
10. sidestand switch
11. clutch switch
12. start switch
13. wiring connections  
(of the entire starting system)

#### NOTE:

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



**Pocket tester**  
90890-03132

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.



**Minimum open-circuit voltage**  
**12.8 V or more at 20°C**

- Is the battery OK?

↓ YES

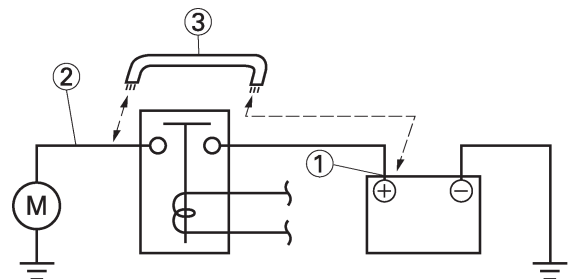
↓ NO

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

EAS00758

#### 3. Starter motor

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



18210801

#### ⚠ WARNING

- A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.

- Does the starter motor turn?

↓ YES

↓ NO

Repair or replace the starter motor.



EAS00759

**4. Starting circuit cut-off relay**

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the starting circuit cut-off relay terminals as shown.

**Battery positive terminal** → red/black ①  
**Battery negative terminal** → black/yellow ②

**Tester positive probe** → blue/white ③  
**Tester negative probe** → black ④

Lg	R/B	LW	-	-
L/G	L/Y	Sb	B/Y	B

• Does the starting circuit cut-off relay have continuity between blue/white and black?

↓ YES

↓ NO

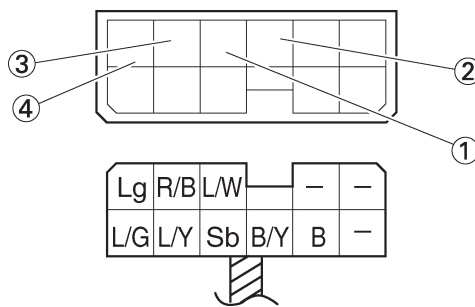
Replace the starting circuit cut-off relay.

EAS00760

**5. Starting circuit cut-off relay (diode)**

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the starting circuit cut-off relay terminals as shown.
- Measure the starting circuit cut-off relay for continuity as follows.

<p><b>Tester positive probe</b> → sky blue ①  <b>Tester negative probe</b> → black/yellow ②</p>	<b>Continuity</b>
<p><b>Tester positive probe</b> → sky blue ①  <b>Tester negative probe</b> → blue/yellow ③</p>	
<p><b>Tester positive probe</b> → blue/green ④  <b>Tester negative probe</b> → blue/yellow ③</p>	
<p><b>Tester positive probe</b> → black/yellow ②  <b>Tester negative probe</b> → sky blue ①</p>	<b>No continuity</b>
<p><b>Tester positive probe</b> → blue/yellow ③  <b>Tester negative probe</b> → sky blue ①</p>	
<p><b>Tester positive probe</b> → blue/yellow ③  <b>Tester negative probe</b> → blue/green ④</p>	



**NOTE:** \_\_\_\_\_  
 When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

• Are the testing readings correct?

↓ YES

↓ NO

Replace the starting circuit cut-off relay.



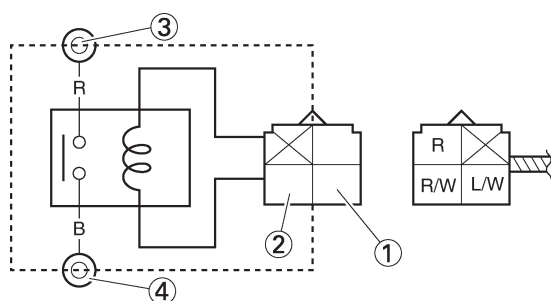
EAS00761

### 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 terminals as shown.

**Battery positive terminal** → red/white ①  
**Battery negative terminal** → blue/white 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 side-stand switch.

EAS00763

### 11. Clutch switch

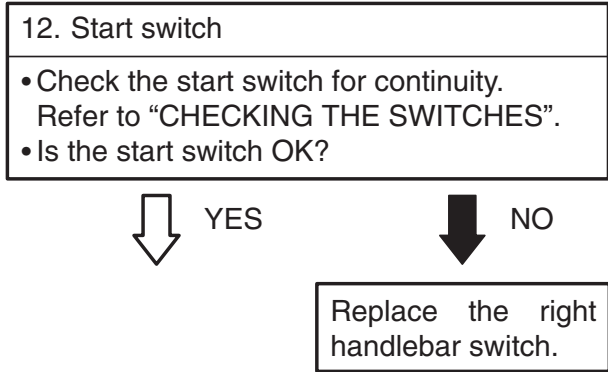
- Check the clutch switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the clutch switch OK?

↓ YES      ↓ NO

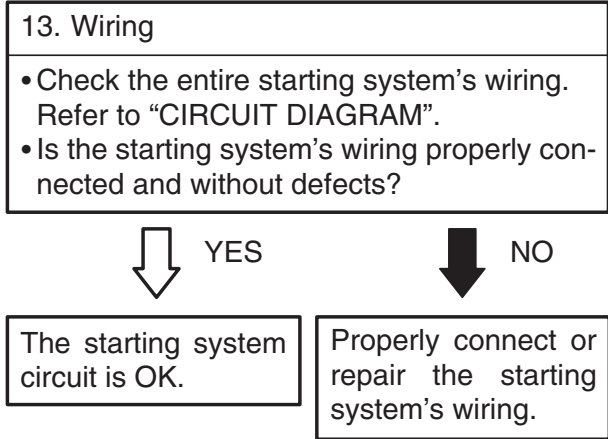
Replace the clutch switch.



EAS00764

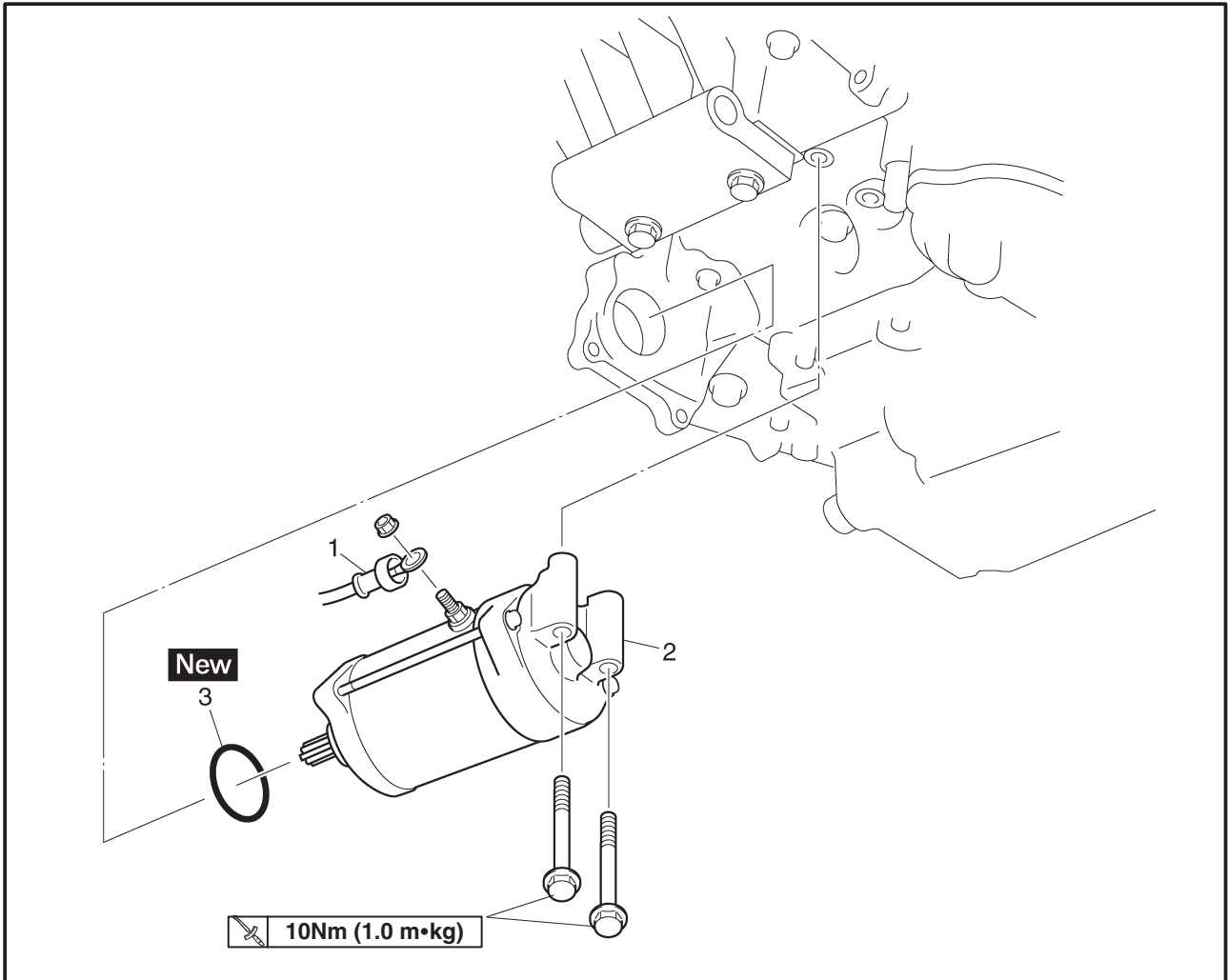


EAS00766



EAS00767

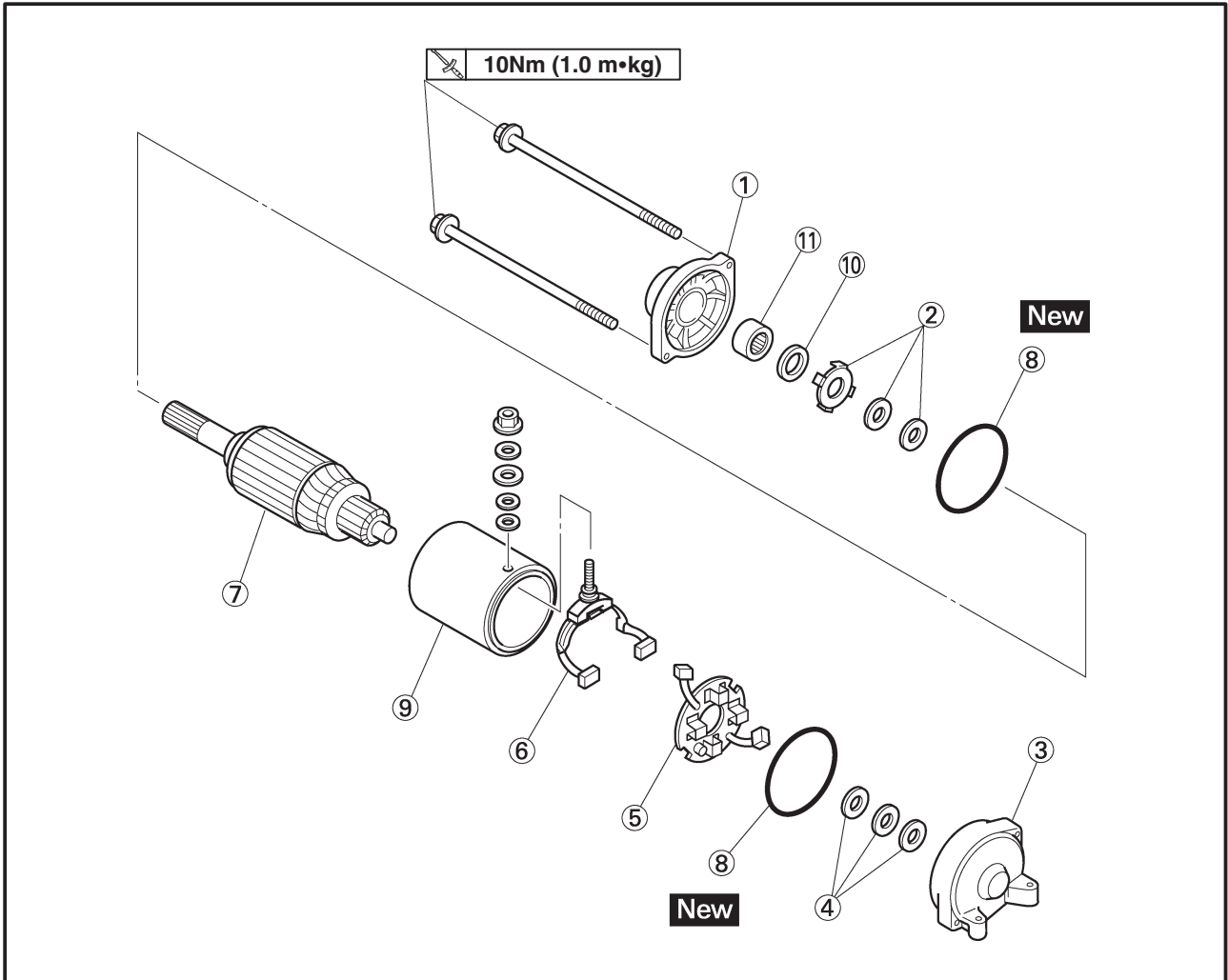
STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the starter motor</b>		Remove the parts in the order listed.
1	Exhaust pipe	1	Disconnect.
2	Starter motor lead	1	
3	Starter motor	1	
	O-ring	1	For installation, reverse the removal procedure.



EAS00768



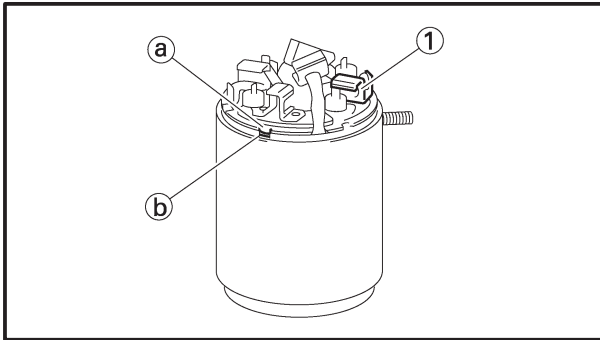
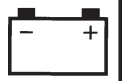
Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the starter motor</b>		Disassemble the parts in the order listed.
①	Front bracket	1	
②	Washer kit	1	
③	Rear bracket	1	
④	Washer kit	1	
⑤	Brush holder	1	
⑥	Brush	2	
⑦	Armature coil	1	
⑧	O-ring	2	
⑨	Starter motor yoke	1	
⑩	Seal	1	
⑪	Bearing	1	
			For assembly, reverse the disassembly procedure.





## STARTER MOTOR

ELEC



EAS00772

### ASSEMBLING THE STARTER MOTOR

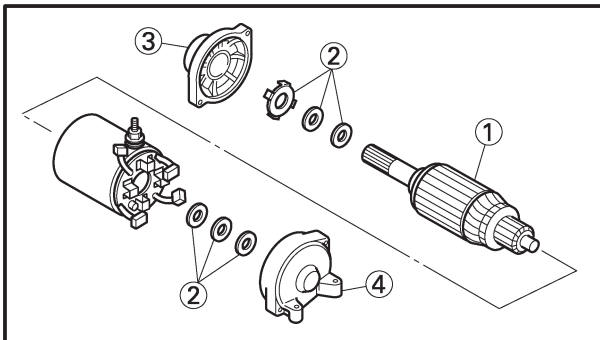
1. Install:

- brush holder ①

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

Align the tab ① on the brush holder with the slot ② in the starter motor yoke.

\_\_\_\_\_



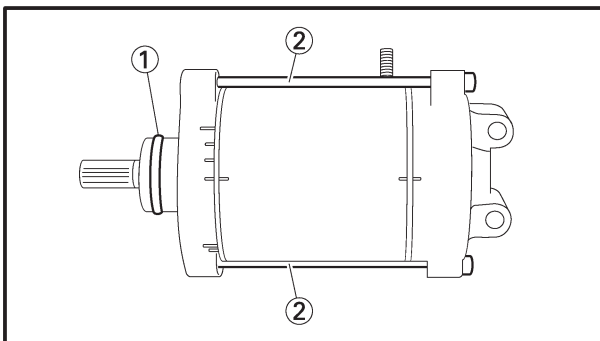
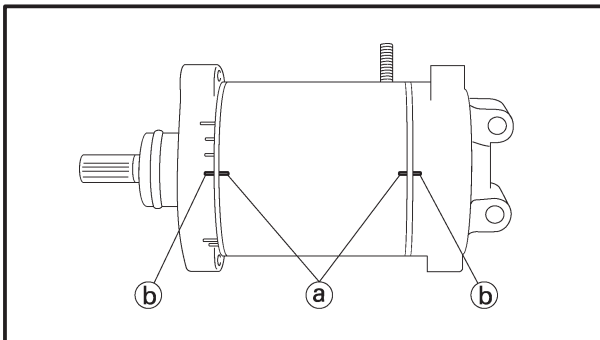
2. Install:

- armature coil ①
- washers ②
- starter motor front cover ③
- starter motor rear cover ④

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

Align the match marks ① on the starter motor yoke with the match marks ② on the front and starter motor rear covers.

\_\_\_\_\_



3. Install:

- O-rings **New** ①
- Starter motor bolts ②

10 Nm (1.0 m•kg)



# CHARGING SYSTEM



EAS00774

## TROUBLESHOOTING

**The battery is not being charged.**

Check:

1. main fuse
2. battery
3. charging voltage
4. stator assembly resistance
5. wiring connections  
(of the entire charging system)

### NOTE:

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



**Engine tachometer**  
90890-03113  
**Pocket tester**  
90890-03132

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.

### 2. Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



**Minimum open-circuit voltage**  
12.8 V or more at 20°C

- Is the battery OK?

↓ YES

↓ NO

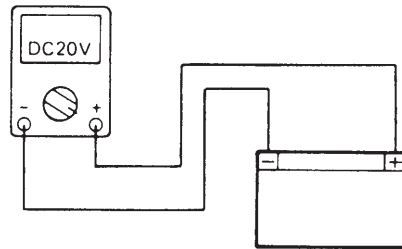
- Clean the battery terminals.
- Recharge or replace the battery.

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.

**Positive tester probe** → positive battery terminal  
**Negative tester probe** → negative battery 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 the battery is fully charged.

- Is the charging voltage within specification?

↓ NO

↓ YES

The charging circuit is OK.



EAS00776

**4. Stator coil resistance**

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

**Positive tester probe** → white ①  
**Negative tester probe** → white ②

**Positive tester probe** → white ①  
**Negative tester probe** → white ③

- Measure the stator coil resistances.

**Stator coil resistance**  
 0.18 ~ 0.28  $\Omega$  at 20°C

- Is the stator coil 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?

↓ YES

↓ NO

Replace the rectifier/regulator.

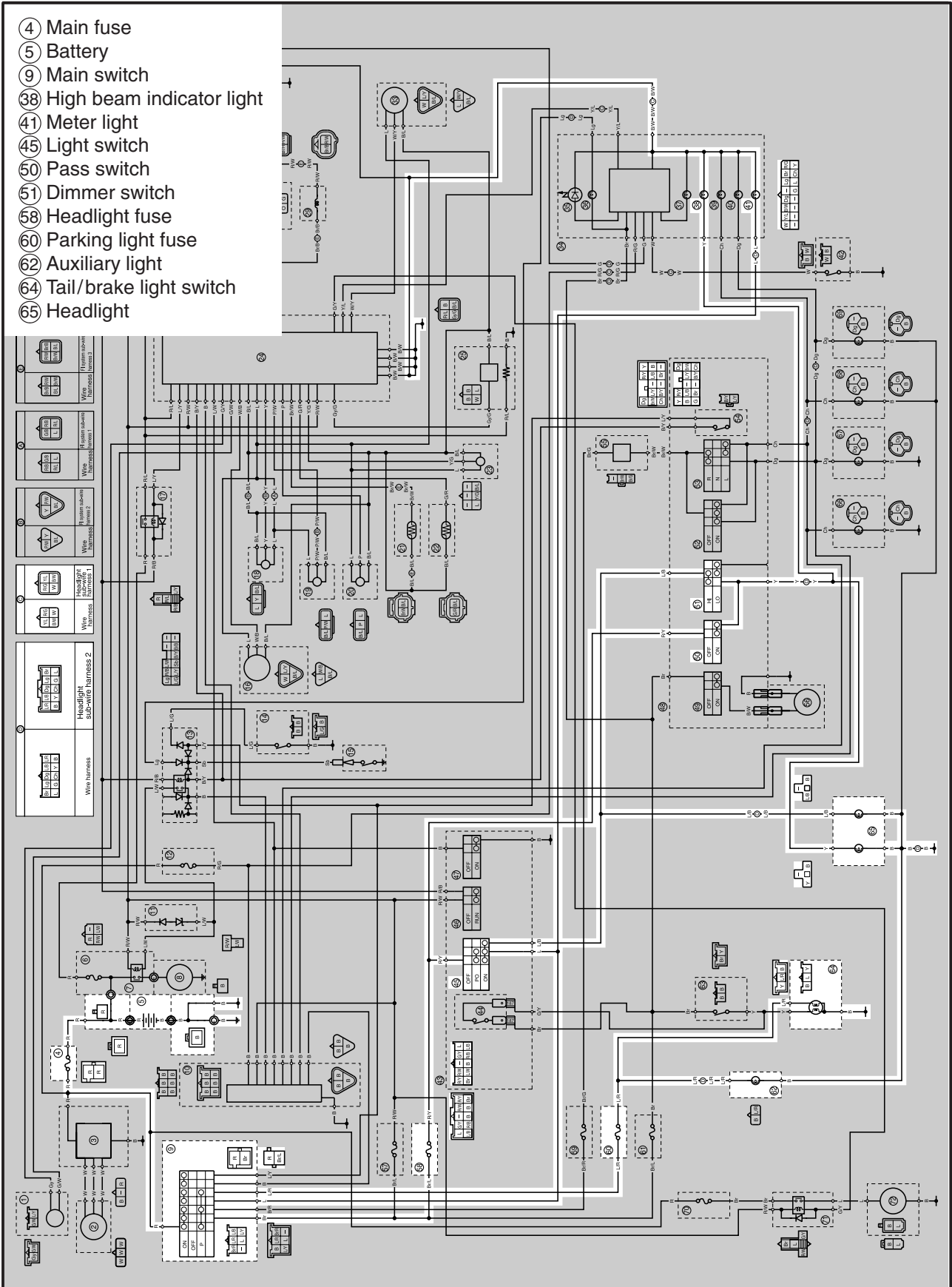
Properly connect or repair the charging system's wiring.



EAS00780

**LIGHTING SYSTEM  
CIRCUIT DIAGRAM**

- ④ Main fuse
- ⑤ Battery
- ⑨ Main switch
- ③⑧ High beam indicator light
- ④① Meter light
- ④⑤ Light switch
- ⑤⑩ Pass switch
- ⑤① Dimmer switch
- ⑤⑧ Headlight fuse
- ⑥⑩ Parking light fuse
- ⑥② Auxiliary light
- ⑥④ Tail/brake light switch
- ⑥⑤ Headlight





EAS00781

**TROUBLESHOOTING**

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

Check:

1. main, parking light, and headlight fuses
2. battery
3. main switch
4. light switch
5. dimmer switch
6. pass switch
7. wiring connections  
(of the entire lighting system)

**NOTE:**

- Before troubleshooting, remove the following part(s):
  1. fuel tank
  2. front cowling
  3. rear cowling
- Troubleshoot with the following special tool(s).

	<b>Pocket tester</b> 90890-03132
--	-------------------------------------

EAS00738

<p>1. Main, parking lighting and headlight fuses</p> <ul style="list-style-type: none"> <li>• Check the main, parking lighting and headlight fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.</li> <li>• Are the main, parking lighting and headlight fuses OK?</li> </ul>
---



Replace the fuse(s).

EAS00739

2. Battery
<ul style="list-style-type: none"> <li>• Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.</li> </ul>

	<p><b>Minimum open-circuit voltage</b> <b>12.8 V or more at 20° C</b></p>
--	---

• Is the battery OK?



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

EAS00749

3. Main switch
<ul style="list-style-type: none"> <li>• Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.</li> <li>• Is the main switch OK?</li> </ul>



Replace the main switch.

EAS00783

4. Light switch
<ul style="list-style-type: none"> <li>• Check the light switch for continuity. Refer to “CHECKING THE SWITCHES”.</li> <li>• Is the light switch OK?</li> </ul>



The light 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?

↓ YES

↓ NO

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?

↓ YES

↓ NO

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?

↓ YES

↓ NO

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?



↓ YES

↓ NO

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 coupler (wire harness side)

**Headlight**

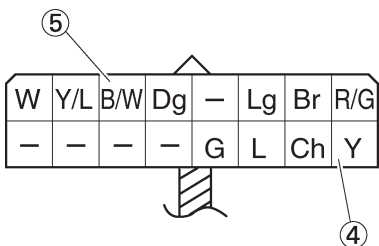
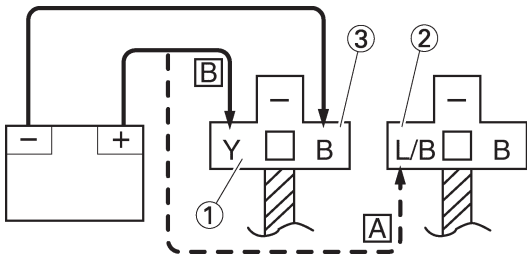
Positive tester probe → yellow ① or blue/black ②

Negative tester probe → black ③




**High beam indicator light**

Positive tester probe → yellow ④

Negative tester probe → black/white ⑤



Meter assembly coupler (wire harness side)

- Set the main switch to “ON”.
- Set the light switch to “ ”.
- Set the dimmer switch to “ ” or “ ”.
- Measure the voltage (DC 12 V) of yellow ④ on the meter assembly coupler (wire harness side).
- Is the voltage within specification?

↓ YES

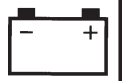
↓ NO

This circuit is OK.

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

# LIGHTING SYSTEM

**ELEC**



EAS00789

2. The 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.

EAS00790

3. The tail/brake light fails to come on.

1. Tail/brake light bulb and socket

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

↓ YES

↓ NO

Replace the tail/brake light bulb, socket or both.

2. Voltage

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

**Positive tester probe → blue ①**  
**Negative tester probe → black/white ②**

- Set the main switch to “ON”.
- Set the light switch to “ $\exists D \Delta \exists$ ” or “ $\odot$ ”.
- Measure the voltage (DC 12 V) of blue ① on the meter assembly coupler (wire harness side).
- 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.

2. Voltage

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

**Positive tester probe → blue/red ①**  
**Negative tester probe → black ②**

- Set the main switch to “ON”.
- Set the light switch to “ $\exists D \Delta \exists$ ” or “ $\odot$ ”.
- Measure the voltage (DC 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.

wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

EAS00791

4. The auxiliary light fails to come on.

1. Auxiliary light bulb and socket

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

↓ YES

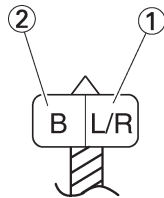
↓ NO

Replace the auxiliary light bulb, socket or both.

2. Voltage

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

**Positive tester probe** → blue/red ①  
**Negative tester probe** → black ②



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

↓ YES

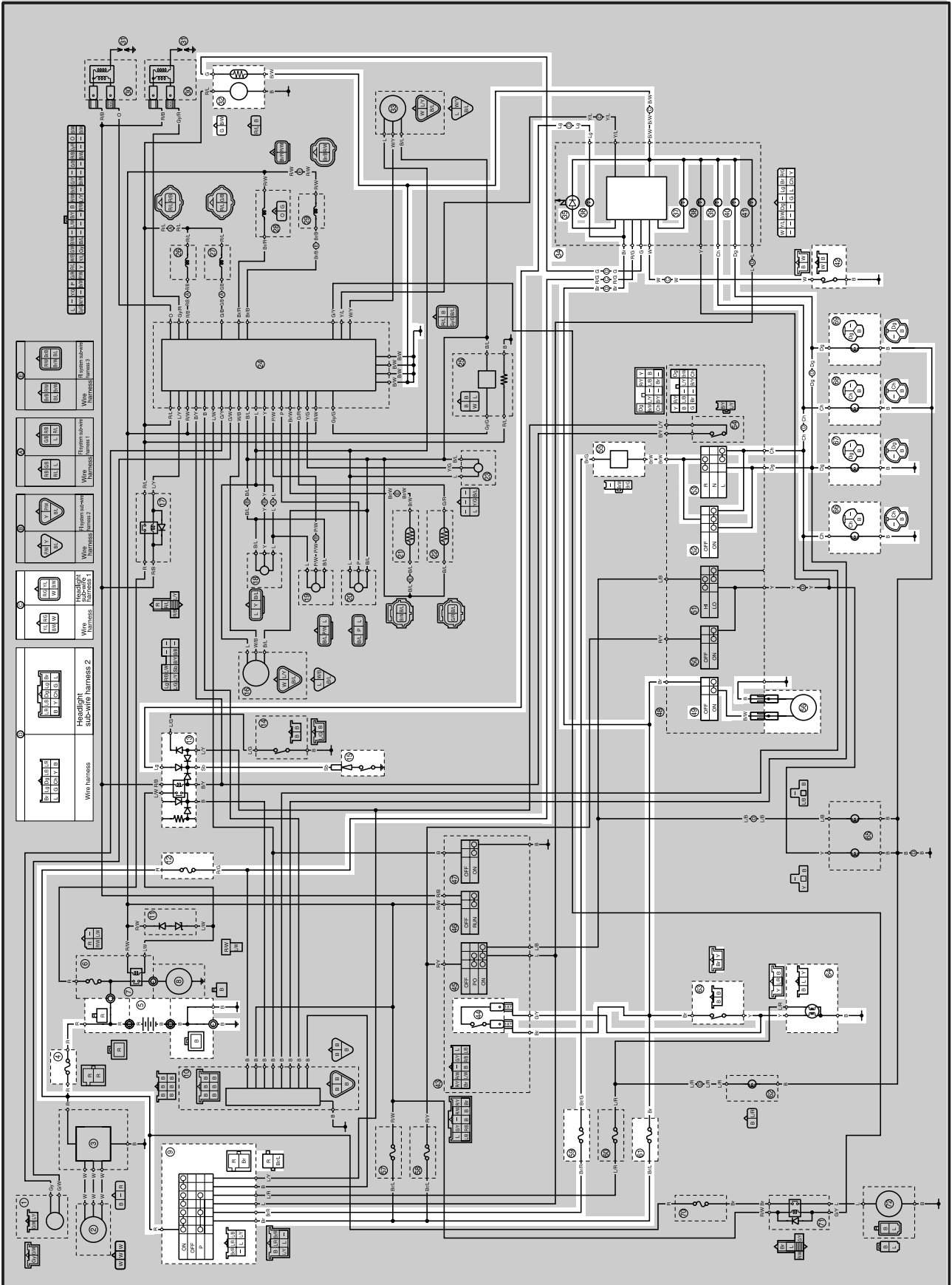
↓ NO

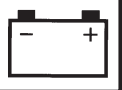
This circuit is OK.

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

EAS00780

**SIGNALING SYSTEM  
CIRCUIT DIAGRAM**





EAS00793

- ④ Main fuse
- ⑤ Battery
- ⑨ Main switch
- ⑫ Buck up fuse
- ⑬ Starting circuit cut-off relay
- ⑮ Neutral switch
- ⑳ Fuel pump
- ㉓ Oil level warning light
- ㉔ Neutral indicator light
- ㉕ Engine trouble warning light
- ㉖ Left turn signal indicator light
- ㉗ Right turn signal indicator light
- ㉘ Oil level switch
- ㉙ Front brake light switch
- ㉚ Horn switch
- ㉛ Hazard switch
- ㉜ Turn signal switch
- ㉝ Turn signal relay
- ㉞ Horn
- ㉟ Hazard light fuse
- ㊱ Signaling system fuse
- ㊲ Rear brake light switch
- ㊳ Tail/brake light switch
- ㊴ Rear turn signal light (left)
- ㊵ Rear turn signal light (right)
- ㊶ Front turn signal light (left)
- ㊷ Front turn signal light (right)



EAS00794

### 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, signaling, hazard light and back up fuses
2. battery
3. main switch
4. wiring connections  
(of the entire signaling system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
  1. fuel tank
  2. front cowling
  3. air filter case
- Troubleshoot with the following special tool(s).



**Pocket tester**  
**90890-03132**

EAS00738

1. Main, signaling system, hazard lighting, windshield motor and backup fuses

- Check the main, signaling system, hazard lighting, windshield motor and backup fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signaling system, hazard lighting, windshield motor and backup 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.



**Minimum 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 signal 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 SIGNAL 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?

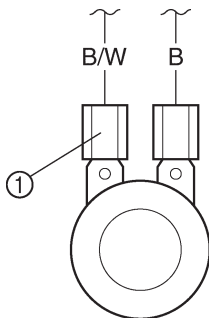


Replace the left handlebar switch.

2. Voltage

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

**Positive tester probe** → black/white ①  
**Negative tester probe** → ground



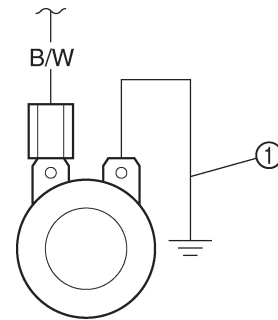
- Set the main switch to “ON”.
- Push the horn switch.
- Measure the voltage (DC 12 V) of black/white at the horn terminal.
- Is the voltage within specification?



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”.
- Push the horn switch.
- Does the horn sound?



The horn is OK.

Replace the horn.

EAS00797

2. The tail/brake light fails to come on.

1. Tail/brake light bulb and socket

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

↓ YES

↓ NO

Replace the tail/brake light bulb, socket or both.

2. Brake light switches

- Check the brake light switches for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the brake light switch OK?

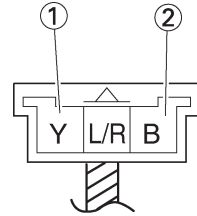
↓ YES

↓ NO

Replace the brake light switch.

3. Voltage

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



**Positive tester probe → yellow ①**  
**Negative tester probe → black ②**

- Set the main switch to “ON”.
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (DC 12 V) of yellow 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.

# SIGNALING SYSTEM



EAS00799

3. The turn signal light, turn signal indicator light or both fail to blink.

**1. Turn signal indicator 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?



Replace the turn signal light bulb, socket or both.

**2. Turn signal switch**

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

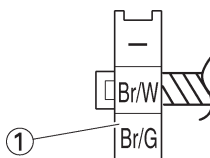


Replace the left handlebar switch.

**3. Voltage**

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

**Positive tester probe → brown/green ①**  
**Negative tester probe → ground**



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) on brown/green ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

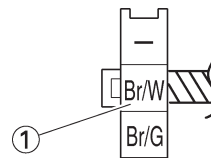


The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

**4. Voltage**

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

**Positive tester probe → brown/white ①**  
**Negative tester probe → ground**



- Set the main switch to "ON".
- Set the turn signal switch to "←" or "→".
- Measure the voltage (DC 12 V) on brown/white ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?



The turn signal relay is faulty and must be replaced.

**5. Voltage**

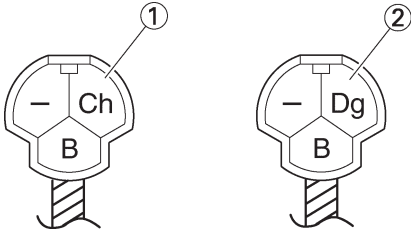
- Connect the pocket tester (DC 20 V) to the turn signal light coupler or meter assembly coupler (wire harness side) as shown.

**A** Turn signal light  
**B** Turn signal indicator light

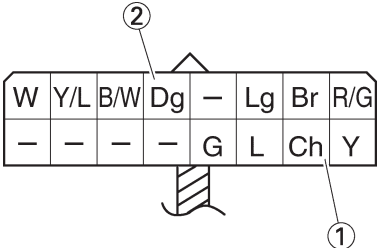
**Left turn signal light**  
**Positive tester probe** → chocolate ①  
**Negative tester probe** → ground

**Right turn signal light**  
**Positive tester probe** → dark green ②  
**Negative tester probe** → ground

**A**



**B**



- Set the main switch to "ON".
- Set the turn signal switch to " ← " or " → ".
- Measure the voltage (DC 12 V) of the chocolate ① or dark green ② at the turn signal light coupler (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 coupler (meter assembly coupler) 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

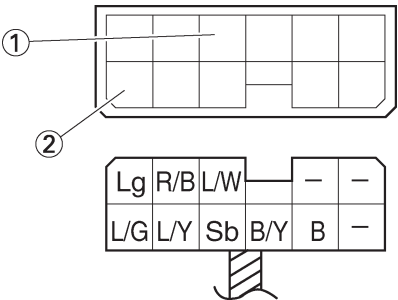
Replace the neutral switch.

EAS00753

**3. Starting circuit cut-off relay**

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the starting circuit cut-off relay terminals as shown.
- Check the starting circuit cut-off relay for continuity.

<p><b>Tester positive probe</b> → sky blue ①</p> <p><b>Tester negative probe</b> → light green ②</p>	<b>Continuity</b>
<p><b>Tester positive probe</b> → light green ②</p> <p><b>Tester negative probe</b> → sky blue ①</p>	<b>No continuity</b>



**NOTE:** \_\_\_\_\_  
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

\_\_\_\_\_

• Are the tester readings correct?

↓ YES

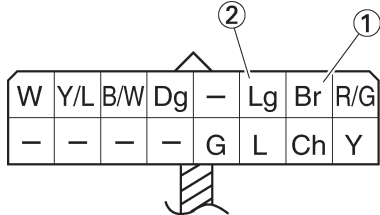
↓ NO

Replace the starting circuit cut-off relay.

**4. Voltage**

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

**Positive tester probe** → brown ①  
**Negative tester probe** → light green ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V).
- 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.

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 LEDs"
- Are the oil level warning light bulb and socket OK?

↓ YES

↓ NO

Replace the oil level warning light bulb, socket or both.

**2. Engine oil level switch**

- Drain the engine oil and remove the engine oil level switch from the oil tank.
- Check the engine oil level switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine oil level switch OK?

↓ YES

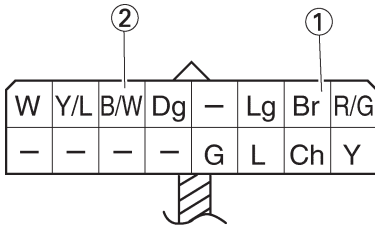
↓ NO

Replace the engine oil level switch.

**3. Voltage**

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

**Positive tester probe → brown ①**  
**Negative tester probe → black/white ②**



- Set the main switch to “ON”.
- Measure the voltage (DC 12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

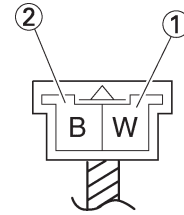
↓ NO

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

**4. Voltage**

- Connect the pocket tester (DC 20 V) to the engine oil level switch coupler as shown.

**Tester positive probe → white ①**  
**Tester negative probe → black ②**



- Set the main switch to “ON”.
- Measure the voltage (5 V) of white ① and black ② at the oil level switch coupler.
- Is the voltage within specification?

↓ YES

↓ NO

This circuit is OK.

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



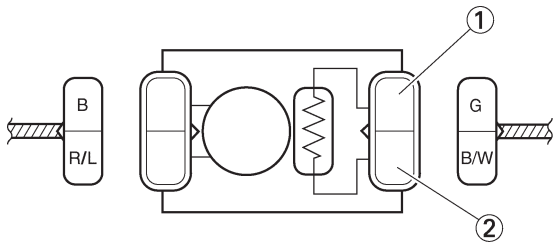
EAS00803

6. The fuel level gauge fails to operate.

1. Fuel sender

- Drain the fuel from the fuel tank and remove the fuel pump assembly from the fuel tank.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel sender as shown.

**Positive tester probe** → green ①  
**Negative tester probe** → black/white ②



- Measure the fuel sender resistances.

**NOTE:** \_\_\_\_\_  
 Measure the resistances when the float arm is in contact with the full position and empty position of the stopper.



**Fuel sender resistance**  
**Full position of the float**  
 19 ~ 21  $\Omega$  at 20°C  
**Empty position of the float**  
 139 ~ 141  $\Omega$  at 20°C

- Is the fuel sender OK?

↓ YES

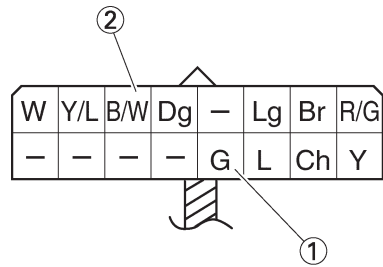
↓ NO

Replace the fuel pump.

2. Voltage

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

**Positive tester probe** → green ①  
**Negative tester probe** → black/white ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of green ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

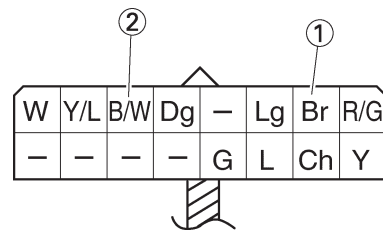
↓ NO

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

3. Voltage

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

**Tester positive probe** → brown ①  
**Tester negative probe** → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

↓ NO

This circuit is OK.

Replace the meter assembly.

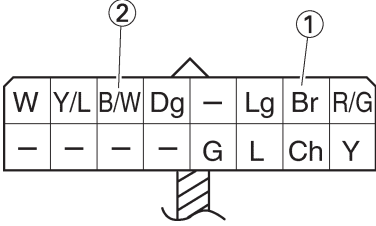
EAS00805

7. The clock fails to operate.

1. Voltage

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

**Positive tester probe** → brown ①  
**Negative tester probe** → black/white ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

↓ YES

↓ NO

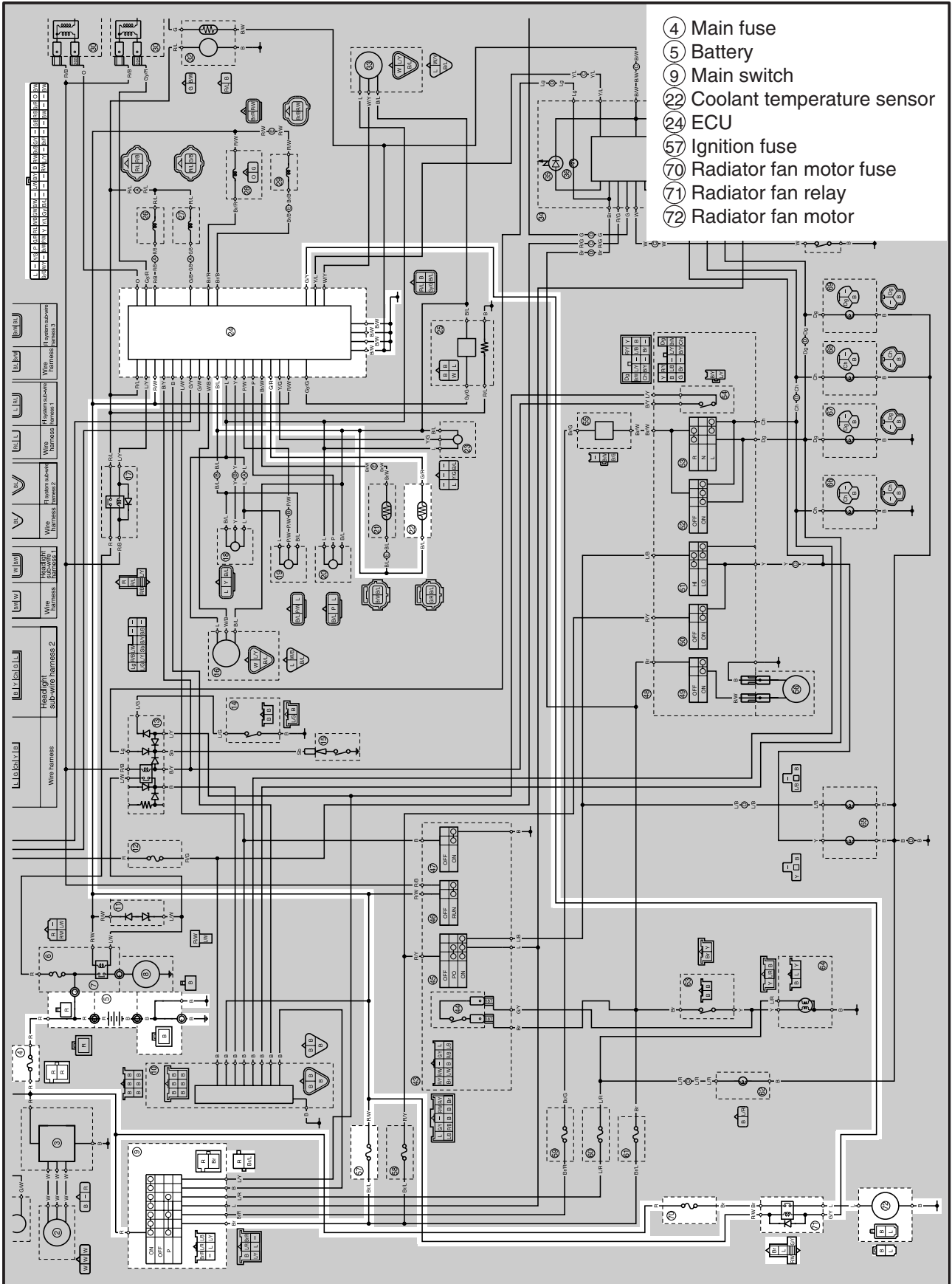
Replace the meter assembly.

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



EAS00807

**COOLING SYSTEM  
CIRCUIT DIAGRAM**



- ④ Main fuse
- ⑤ Battery
- ⑨ Main switch
- ②② Coolant temperature sensor
- ②④ ECU
- ⑤⑦ Ignition fuse
- ⑦⑦ Radiator fan motor fuse
- ⑦① Radiator fan relay
- ⑦② Radiator fan motor



EAS00808

**TROUBLESHOOTING**


**The radiator fan motor fails to turn.  
The water temperature gauge needle fails to move when the engine is warm.**

Check:

1. main, turn signal, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. radiator fan motor relay
6. coolant temperature sensor
7. wiring connections  
(the entire cooling system)

**NOTE:**

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

	<b>Pocket tester</b> <b>90890-03132</b>
---	--


EAS00738

<p>1. Main, ignition, and radiator fan motor fuses</p> <ul style="list-style-type: none"> <li>• Check the main, ignition, and radiator fan motor fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.</li> <li>• Are the main, ignition, and radiator fan motor fuses OK?</li> </ul>
---



Replace the fuse(s).

EAS00739

2. Battery	
<ul style="list-style-type: none"> <li>• Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.</li> </ul>	
	<b>Minimum open-circuit voltage</b> <b>12.8 V or more at 20°C</b>
<ul style="list-style-type: none"> <li>• Is the battery OK?</li> </ul>	



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

EAS00749

3. Main switch	
<ul style="list-style-type: none"> <li>• Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.</li> <li>• Is the main switch OK?</li> </ul>	



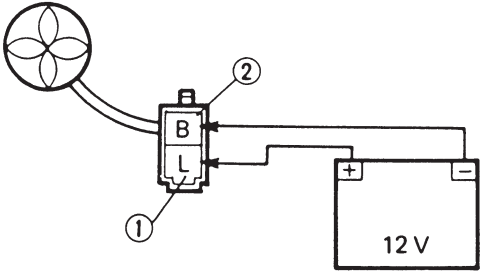
Replace the main switch.

EAS00809

**4. Radiator fan motor**

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (DC 12 V) as shown.

**Positive battery lead → blue ①**  
**Negative battery lead → black ②**



• Does the radiator fan motor turn?

↓ YES                      ↓ NO

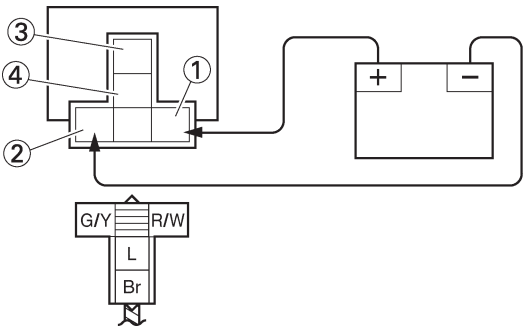
The radiator fan motor is faulty and must be replaced.

**5. Radiator fan motor relay**

- Disconnect the radiator fan motor relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the radiator fan motor terminal as shown.
- Check the radiator fan motor of continuity.

**Battery positive terminal → red/white ①**  
**Battery negative terminal → green/yellow ②**

**Tester positive probe → brown ③**  
**Tester negative probe → blue ④**



• Does the radiator fan motor relay have continuity between brown and blue?

↓ YES                      ↓ NO

Replace the radiator fan motor relay.

**6. Coolant temperature sensor**

- Remove the coolant temperature sensor from the thermostat assembly.
- Connect the pocket tester ( $\Omega \times 1$ ) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.


**NOTE:**  
 Make sure that the coolant temperature sensor terminals do not get wet.

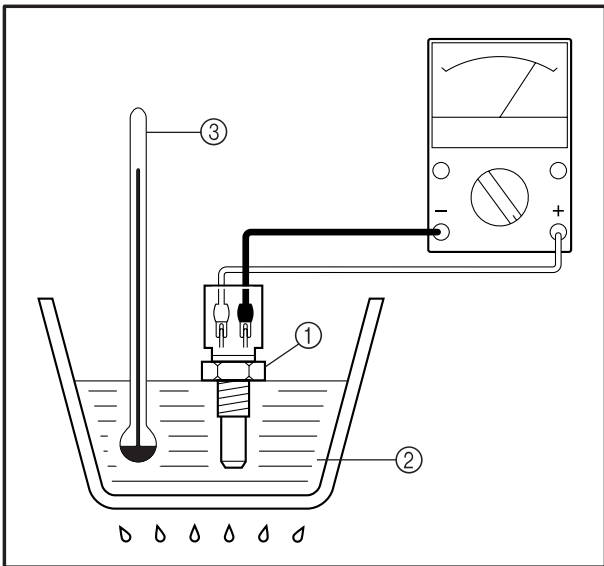
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool down to the specified temperature.
- Check the thermo switch for continuity at the temperatures indicated below.

Test step	Coolant temperature	Resistance
1	20°C	2.32 ~ 2.59 kΩ
2	80°C	0.31 ~ 0.33 kΩ
3	110°C	0.14 ~ 0.15 kΩ

**⚠ WARNING**

- Handle the thermo switch with special care.
- Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.

 **Coolant temperature sensor**  
 20 Nm (2.0 m•kg)  
 Three bond sealock®10



• Does the coolant temperature sensor operate properly as described above?

↓ YES

↓ NO

Replace the coolant temperature sensor.

EAS00813

**7. Wiring**

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

↓ YES

↓ NO

This circuit is OK.

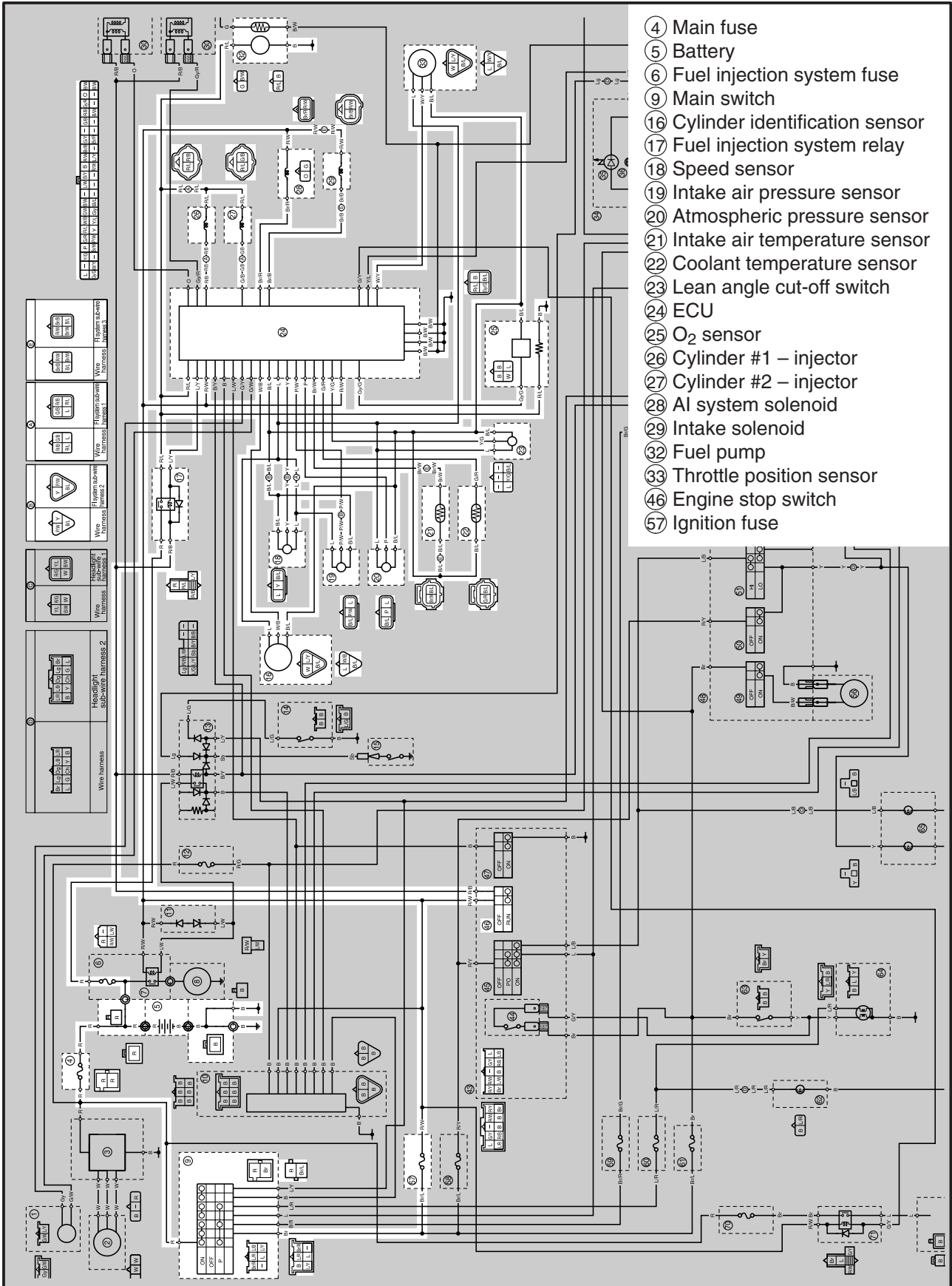
Properly connect or repair the cooling system's wiring.

# FUEL INJECTION SYSTEM



EAS00814

## FUEL INJECTION SYSTEM CIRCUIT DIAGRAM



- ④ Main fuse
- ⑤ Battery
- ⑥ Fuel injection system fuse
- ⑨ Main switch
- ⑯ Cylinder identification sensor
- ⑰ Fuel injection system relay
- ⑱ Speed sensor
- ⑲ Intake air pressure sensor
- ⑳ Atmospheric pressure sensor
- ㉑ Intake air temperature sensor
- ㉒ Coolant temperature sensor
- ㉓ Lean angle cut-off switch
- ㉔ ECU
- ㉕ O<sub>2</sub> sensor
- ㉖ Cylinder #1 – injector
- ㉗ Cylinder #2 – injector
- ㉘ AI system solenoid
- ㉙ Intake solenoid
- ㉚ Fuel pump
- ㉛ Throttle position sensor
- ㉜ Engine stop switch
- ㉝ Ignition fuse



EAS00816

### TROUBLESHOOTING

#### If the fuel injection system fails to operate.

Check:

1. main fuel injection system and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. fuel injection system relay
6. fuel pump resistance
7. crankshaft position sensor
8. cylinder identification sensor
9. speed sensor
10. coolant temperature sensor
11. intake air temperature sensor
12. intake air pressure sensor
13. atmospheric pressure sensor
14. AI system solenoid
15. Intake solenoid
16. wiring connections (the entire fuel system)

#### NOTE:

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



**Pocket tester**  
90890-03132

EAS00738

1. Main, fuel injection system and ignition fuses

- Check the main, fuel injection system and ignition fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, fuel injection system 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.



**Minimum 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.



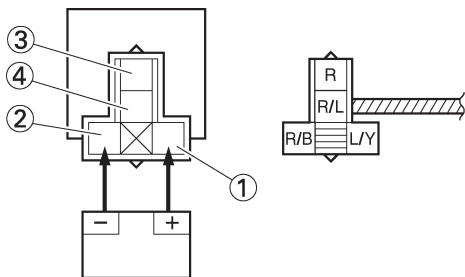
EAS00759

## 5. Fuel injection system relay

- Disconnect the fuel injection system relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the fuel injection system relay terminals as shown.

**Battery positive terminal** → red/black ①  
**Battery negative terminal** → blue/yellow ②

**Tester positive probe** → red ③  
**Tester negative probe** → red/blue ④



- Does the fuel injection system relay have continuity between blue/white and black?

↓ YES

↓ NO

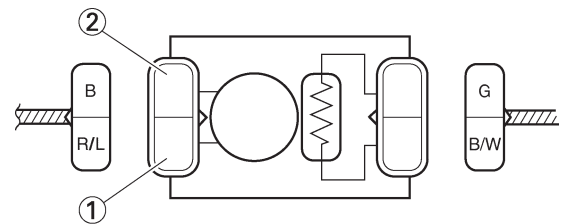
Replace the fuel injection system relay.

EAS00617

## 6. Fuel pump resistance

- Disconnect the fuel pump coupler from the fuel pump.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel pump coupler as shown.

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



- Measure the fuel pump resistance.



**Fuel pump resistance**  
**0.2 ~ 3.0  $\Omega$  at 20°C**

- Is the fuel pump OK?

↓ YES

↓ NO

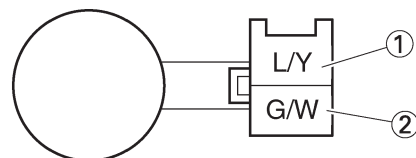
Replace the fuel pump.

EAS00748

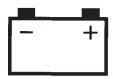
## 7. Crankshaft position sensor resistance


- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.

**Tester positive probe** → blue/yellow ①  
**Tester negative probe** → green/white ②



- Measure the crankshaft position sensor resistance.



 **Crankshaft position sensor resistance**  
 420 ~ 569 Ω at 20°C  
 (between gray and black)

• Is the crankshaft position sensor OK?

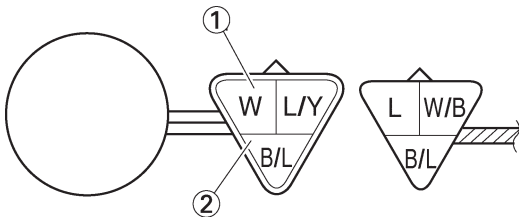
↓ YES                      ↓ NO

Replace the crankshaft position sensor.


8. Cylinder identification sensor output voltage

• Connect the pocket tester (DC 20 V) to the cylinder identification sensor coupler terminal as shown.

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



- Set the main switch to "ON".
- Measure the cylinder identification sensor output voltage.

 **Cylinder identification sensor output voltage**  
 When sensor is on  
 DC 4.8 V or more  
 When sensor is off  
 DC 0.6 V or less

• Is the cylinder identification sensor OK?

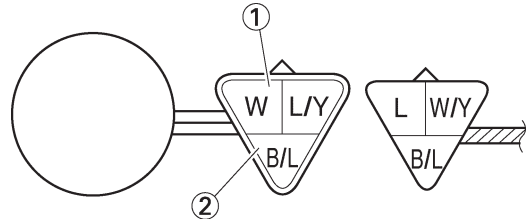
↓ YES                      ↓ NO

Replace the cylinder identification sensor.


9. Speed sensor output voltage

- Measure the speed sensor output voltage.
- Connect the pocket tester (DC 20 V) to the speed sensor coupler terminal as shown.

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



- Measure the speed sensor output voltage.

 **Speed sensor output voltage**  
 When sensor is on  
 DC 4.8 V or more  
 When sensor is off  
 DC 0.6 V or less

• Is the speed sensor OK?

↓ YES                      ↓ NO

Replace the speed sensor.

EAS00811

10. Coolant temperature sensor


- Remove the coolant temperature sensor from the thermostat assembly.
- Connect the pocket tester ( $\Omega \times 1$ ) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

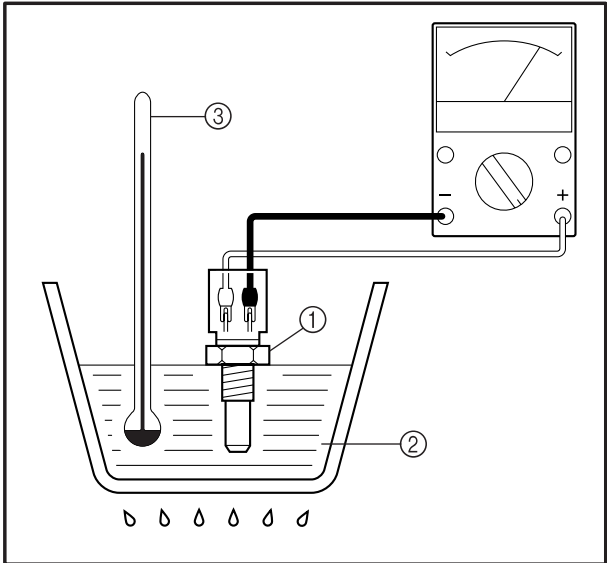
**NOTE:**  
Make sure that the coolant temperature sensor terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool down to the specified temperature.
- Check the coolant temperature sensor for continuity at the temperatures indicated below.

Test step	Coolant temperature	Resistance
1	20°C	2.32 ~ 2.59 kΩ
2	80°C	0.31 ~ 0.33 kΩ
3	110°C	0.14 ~ 0.15 kΩ

**⚠ WARNING**  
 • Handle the coolant temperature sensor with special care.  
 • Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.

 Coolant temperature sensor  
 20 Nm (2.0 m•kg)  
 Three bond sealock® 10

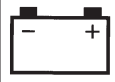


• Does the coolant temperature sensor operate properly as described above?

↓ YES

↓ NO

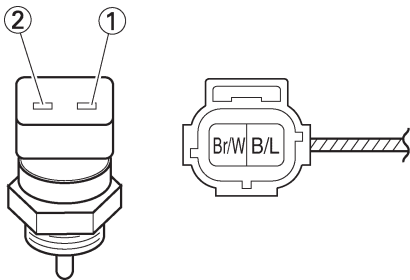
Replace the coolant temperature sensor.



### 11. Intake air temperature sensor resistance

- Remove the intake air temperature sensor from the air filter case.
- Connect the pocket tester ( $\Omega \times 100$ ) to the intake air temperature sensor terminal as shown.

Tester positive probe → brown/white ①  
 Tester negative probe → black/blue ②



- Measure the intake air temperature sensor resistance.



**Intake air temperature sensor resistance**  
 450 ~ 550  $\Omega$  at 20°C

### ⚠ WARNING

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.



**Intake air temperature sensor**  
 18 Nm (1.8 m•kg)

- Is the intake air temperature sensor OK?

↓ YES

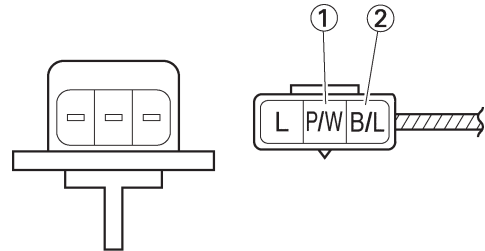
↓ NO

Replace the intake air temperature sensor.

### 12. Intake air pressure sensor output voltage

- Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler terminal as shown.

Tester positive probe → pink/white ①  
 Tester negative probe → black/blue ②



- Set the main switch to "ON".
- Measure the intake air pressure sensor output voltage.



**Intake air pressure sensor output voltage**  
 3.75 ~ 4.25 V

- Is the intake air pressure sensor OK?

↓ YES

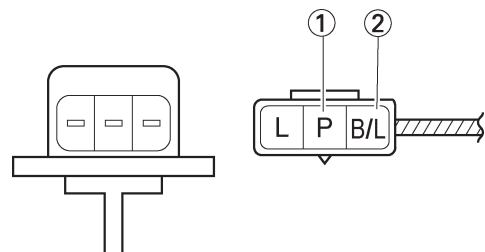
↓ NO

Replace the intake air pressure sensor.

### 13. Atmospheric pressure sensor output voltage

- Connect the pocket tester (DC 20 V) to the atmospheric pressure sensor coupler terminal as shown.

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





- Set the main switch to “ON”.
- Measure the atmospheric pressure sensor output voltage.



**Atmospheric pressure sensor output voltage**  
3.75 ~ 4.25 DCV

• Is the atmospheric pressure sensor OK?

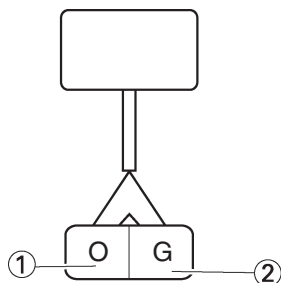


Replace the atmospheric pressure sensor.

### 14. AI system solenoid

- Remove the AI system solenoid coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the AI system solenoid terminal as shown.

**Tester positive probe** → orange ①  
**Tester negative probe** → green ②



• Measure the AI system solenoid resistance.



**AI system solenoid resistance**  
19 ~ 25  $\Omega$  at 20°C

• Is the AI system solenoid OK?

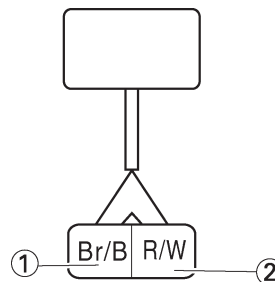


Replace the AI system solenoid.

### 15. Intake solenoid

- Remove the intake solenoid coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the AI system solenoid terminal as shown.

**Tester positive probe** → brown/black ①  
**Tester negative probe** → red/white ②



• Measure the intake solenoid resistance.



**Intake solenoid resistance**  
42 ~ 48  $\Omega$  at 20°C

• Is the intake solenoid OK?



Replace the intake solenoid.

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### 16. Wiring

- Check the entire fuel injection system's wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the fuel injection system's wiring properly connected and without defects?



Replace the ECU.

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

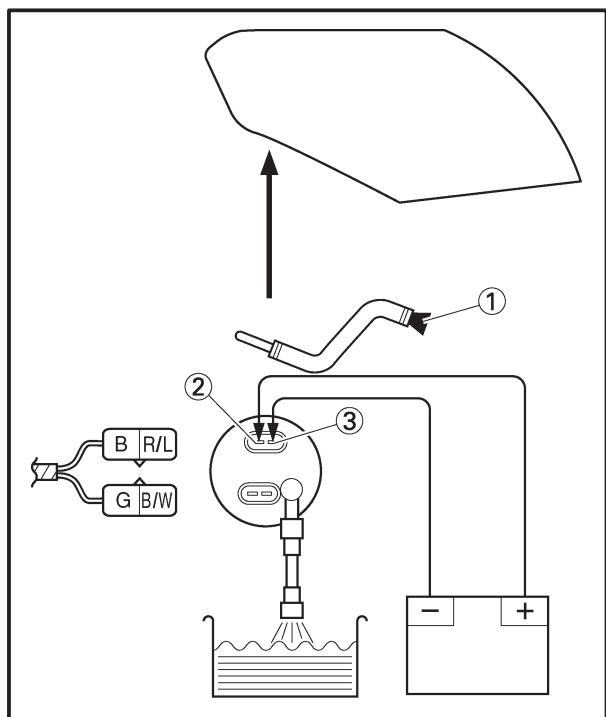
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## CHECKING THE FUEL PUMP

### **⚠ WARNING**

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:

- Stop the engine before refueling.
- Do not smoke, and keep away from open flames, sparks, or any other source of fire.
- If you do accidentally spill gasoline, wipe it up immediately with dry rags.
- If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure the engine is completely cool before performing the following test.



### 1. Check:

- Fuel pump operation




- a. Insert the plug ① to fuel return hose end.
- b. Fill the fuel tank.
- c. Put the end of the fuel hose into an open container.
- d. Connect the battery (DC 12 V) to the fuel pump coupler as shown.

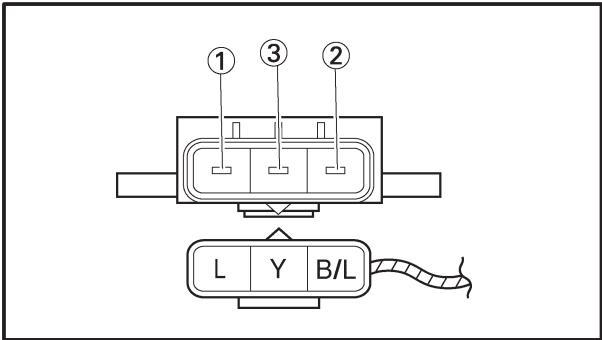
**Positive battery lead → red/blue ②**  
**Negative battery lead → black ③**

- e. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.





 **Throttle position sensor resistance**  
 (520 ~ 900 Ω) ~ (4.0 ~ 6.0 kΩ)  
 at 20°C  
 (yellow – black/blue)




2. Check:
- throttle position sensor angle



- Connect the throttle position sensor coupler to the throttle position sensor.
- Connect the pocket tester (DC 20 V) to the throttle position sensor coupler.

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

- Measure the throttle position sensor output voltage.

 **Throttle position sensor output voltage**  
 4.95 ~ 5.05 V

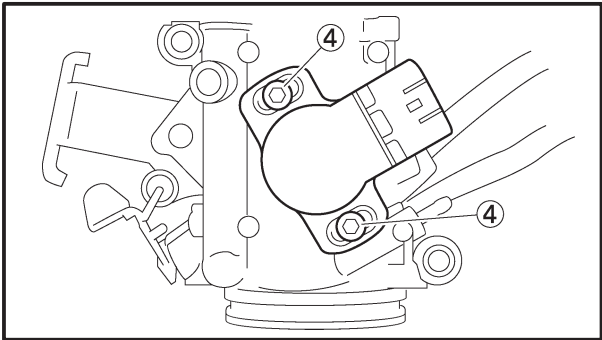
- Out of specification
- Check the throttle sensor coupler connection.
  - Check the entire fuel injection system's wiring.



3. Adjust:
- throttle position sensor angle



- Lift the throttle body assembly slightly out of the intake manifolds.
- Loosen the throttle position sensor screws ④.
- Connect the pocket tester (DC20 V) to the throttle position sensor coupler.



**Tester positive probe** → yellow terminal ③  
**Tester negative probe** → black/blue terminal ②

## FUEL INJECTION SYSTEM

**ELEC**



- d. Adjust the throttle position sensor angle so the measured output voltage is within the specified range.



**Throttle position sensor output voltage**

**0.53 ~ 0.83 V**

- e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws ④.





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**TROUBLESHOOTING****NOTE:**

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

**STARTING FAILURES****ENGINE****Cylinder(s) and cylinder head(s)**

- Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Damaged cylinder gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve

**Piston(s) and piston ring(s)**

- Improperly installed piston ring
- Damaged, worn or fatigued piston ring
- Seized piston ring
- Seized or damaged piston

**Air filter**

- Improperly installed air filter
- Clogged air filter element

**Crankcase and crankshaft**

- Improperly assembled crankcase
- Seized crankshaft

**FUEL SYSTEM****Fuel tank**

- Empty fuel tank
- Clogged fuel tank drain hose
- Deteriorated or contaminated fuel

**Fuel pump**

- Faulty fuel pump
- Faulty fuel pump relay

**Throttle body(-ies)**

- Deteriorated or contaminated fuel
- Sucked-in air

**ELECTRICAL SYSTEMS****Battery**

- Discharged battery
- Faulty battery

**Fuse(s)**

- Blown, damaged or incorrect fuse
- Improperly installed fuse

**Spark plug(s)**

- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

**Ignition coil(s)**

- Cracked or broken ignition coil body
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

**Ignition system**

- Faulty ECU
- Faulty pickup coil
- Broken generator rotor woodruff key

**Switches 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
- Improperly grounded circuit
- Loose connections

**Starting system**

- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cut-off relay
- Faulty starter clutch

## STARTING PROBLEMS/ INCORRECT ENGINE IDLING SPEED

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### INCORRECT ENGINE IDLING SPEED

#### ENGINE

##### Cylinder(s) and cylinder head(s)

- Incorrect valve clearance
- Damaged valve train components

##### Air filter

- Clogged air filter element

#### FUEL SYSTEM

##### Throttle body (-ies)

- Damaged or loose throttle body joint
- Improperly synchronized throttle bodies
- Improperly adjusted engine idling speed (throttle stop screw)
- Improper throttle cable free play
- Flooded throttle body
- Faulty air induction system

#### ELECTRICAL SYSTEMS

##### Battery

- Discharged battery
- Faulty battery

##### Spark plug(s)

- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

##### Ignition coil(s)

- Broken or shorted primary or secondary coils
- Faulty spark plug lead
- Cracked or broken ignition coil

##### Ignition system

- Faulty ignitor unit
- Faulty pickup coil
- Broken generator rotor woodruff key

## POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE/ FAULTY GEAR SHIFTING

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### POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURES".

#### ENGINE

##### Air filter

- Clogged air filter element

#### FUEL SYSTEM

##### Fuel pump

- Faulty fuel pump

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### FAULTY GEAR SHIFTING SHIFTING IS DIFFICULT

Refer to "CLUTCH DRAGS".

#### SHIFT PEDAL DOES NOT MOVE

##### Shift shaft

- Improperly adjusted shift rod
- Bent shift shaft.

##### Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

##### Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

#### JUMPS OUT OF GEAR

##### Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

##### Shift forks

- Worn shift fork

##### Shift drum

- Incorrect axial play
- Worn shift drum groove

##### Transmission

- Worn gear dog

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### FAULTY CLUTCH

#### CLUTCH SLIPS

##### Clutch

- Improperly assembled clutch
- Improperly assembled clutch master cylinder
- Improperly assembled clutch release cylinder
- Incorrect clutch fluid level
- Damaged clutch hose
- Loose or fatigued clutch spring
- Loose union bolt
- Worn friction plate
- Worn clutch plate
- Damaged clutch release cylinder

##### Engine oil

- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

#### CLUTCH DRAGS

##### Clutch

- Air in hydraulic clutch system
- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch push rod
- Damaged clutch boss
- Burnt primary driven gear bushing
- Damaged clutch release cylinder
- Match marks not aligned

##### Engine oil

- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

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### OVERHEATING

#### ENGINE

##### Clogged coolant passages

- Cylinder head(s) and piston(s)
- Heavy carbon buildup

##### Engine oil

- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

#### COOLING SYSTEM

##### Coolant

- Low coolant level

##### Radiator

- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin

##### Water pump

- Damaged or faulty water pump
- Thermostat
- Thermostat stays closed
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

#### FUEL SYSTEM

##### Throttle body(-ies)

- Faulty throttle body(-ies)
- Damaged or loose throttle body joint

##### Air filter

- Clogged air filter element

#### CHASSIS

##### Brake(s)

- Dragging brake

#### ELECTRICAL SYSTEMS

##### Spark plug(s)

- Incorrect spark plug gap
- Incorrect spark plug heat range

##### Ignition system

- Faulty ECU

## OVERCOOLING/POOR BRAKING PERFORMANCE/ FAULTY FRONT FORK LEGS

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### OVERCOOLING COOLING SYSTEM

#### Thermostat

- Thermostat stays open

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### POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

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### FAULTY FRONT FORK LEGS LEAKING OIL

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

### MALFUNCTION

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

## UNSTABLE HANDLING/ FAULTY LIGHTING OR SIGNALING SYSTEM

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### UNSTABLE HANDLING

#### Handlebar

- Bent or improperly installed handlebar

#### Steering head components

- Improperly installed upper bracket
- Improperly installed lower bracket (improperly tightened ring nut)
- Bent steering stem
- Damaged ball bearing or bearing race

#### Front fork leg(s)

- Uneven oil levels (both front fork legs)
- Unevenly tensioned fork spring (both front fork legs)
- Broken fork spring
- Bent or damaged inner tube
- Bent or damaged outer tube

#### Swingarm

- Worn bearing or bushing
- Bent or damaged swingarm

#### Rear shock absorber assembly(-ies)

- Faulty rear shock absorber spring
- Leaking oil or gas

#### Tire(s)

- Uneven tire pressures (front and rear)
- Incorrect tire pressure
- Uneven tire wear

#### Wheel(s)

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

#### Frame

- Bent frame
- Damaged steering head pipe
- Improperly installed bearing race

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### FAULTY LIGHTING OR SIGNALING SYSTEM

#### HEADLIGHT DOES NOT COME ON

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

#### HEADLIGHT BULB BURNT OUT

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

#### TAIL/BRAKE LIGHT DOES NOT COME ON

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

#### TAIL/BRAKE LIGHT BULB BURNT OUT

- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

#### TURN SIGNAL DOES NOT COME ON

- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

#### TURN SIGNAL BLINKS SLOWLY

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

#### TURN SIGNAL REMAINS LIT

- Faulty turn signal relay
- Burnt-out turn signal bulb

#### TURN SIGNAL BLINKS QUICKLY

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

#### HORN DOES NOT SOUND

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

## WIRING DIAGRAM (EUR)

- ① Crankshaft position sensor
- ② Generator
- ③ Rectifier/regulator
- ④ Main fuse
- ⑤ Battery
- ⑥ Fuel injection system fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Main switch
- ⑩ Alarm
- ⑪ Diode
- ⑫ Buck up fuse
- ⑬ Starting circuit cut-off relay
- ⑭ Sidestand switch
- ⑮ Neutral switch
- ⑯ Cylinder identification sensor
- ⑰ Fuel injection system relay
- ⑱ Throttle position sensor
- ⑲ Intake air pressure sensor
- ⑳ Atmospheric pressure sensor
- ㉑ Intake air temperature sensor
- ㉒ Coolant temperature sensor
- ㉓ Lean angle cut-off switch
- ㉔ ECU
- ㉕ O<sub>2</sub> sensor
- ㉖ Injector (#1)
- ㉗ Injector (#2)
- ㉘ AI system solenoid
- ㉙ Intake solenoid
- ㉚ Ignition coil
- ㉛ Spark plug
- ㉜ Fuel pump
- ㉝ Speed sensor
- ㉞ Meter assembly
- ㉟ Oil level warning light
- ㊱ Neutral indicator light
- ㊲ Engine trouble warning light
- ㊳ High beam indicator light
- ㊴ Left turn signal indicator light
- ㊵ Right turn signal indicator light
- ㊶ Meter light
- ㊷ Oil level switch
- ㊸ Right handlebar switch
- ㊹ Front brake light switch
- ㊺ Light switch
- ㊻ Engine stop switch
- ㊼ Start switch
- ㊽ Left handlebar switch
- ㊾ Horn switch
- ㊿ Pass switch
- 1 Dimmer switch
- 2 Hazard switch
- 3 Turn signal switch
- 4 Clutch switch
- 5 Turn signal relay
- 6 Horn
- 7 Ignition fuse
- 8 Headlight fuse
- 9 Hazard light fuse
- 0 Parking light fuse
- 1 Signaling system fuse

- 2 Auxiliary light
- 3 Rear brake light switch
- 4 Tail/brake light
- 5 Headlight
- 6 Rear turn signal light (left)
- 7 Rear turn signal light (right)
- 8 Front turn signal light (left)
- 9 Front turn signal light (right)
- 0 Radiator fan motor fuse
- 1 Radiator fan relay
- 2 Radiator fan motor

## COLOR CODE

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

## WIRING DIAGRAM (OCE)

- ① Crankshaft position sensor
- ② Generator
- ③ Rectifier/regulator
- ④ Main fuse
- ⑤ Battery
- ⑥ Fuel injection system fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Main switch
- ⑩ Diode
- ⑪ Buck up fuse
- ⑫ Starting circuit cut-off relay
- ⑬ Sidestand switch
- ⑭ Neutral switch
- ⑮ Cylinder identification sensor
- ⑯ Fuel injection system relay
- ⑰ Throttle position sensor
- ⑱ Intake air pressure sensor
- ⑲ Atmospheric pressure sensor
- ⑳ Intake air temperature sensor
- ㉑ Coolant temperature sensor
- ㉒ Lean angle cut-off switch
- ㉓ ECU
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- ㉕ Injector (#1)
- ㉖ Injector (#2)
- ㉗ AI system solenoid
- ㉘ Intake solenoid
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- ㉜ Speed sensor
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- ㊸ Front brake light switch
- ㊹ Engine stop switch
- ㊺ Start switch
- ㊻ Headlight relay
- ㊼ Left handlebar switch
- ㊽ Horn switch
- ㊾ Pass switch
- ㊿ Dimmer switch
- 1 Turn signal switch
- 2 Clutch switch
- 3 Turn signal relay
- 4 Horn
- 5 Ignition fuse
- 6 Headlight fuse
- 7 Signaling system fuse
- 8 Auxiliary light
- 9 Rear brake light switch
- 0 Tail/brake light
- 1 Headlight

- 2 Rear turn signal light (left)
- 3 Rear turn signal light (right)
- 4 Front turn signal light (left)
- 5 Front turn signal light (right)
- 6 Radiator fan motor fuse
- 7 Radiator fan relay
- 8 Radiator fan motor

## COLOR CODE

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

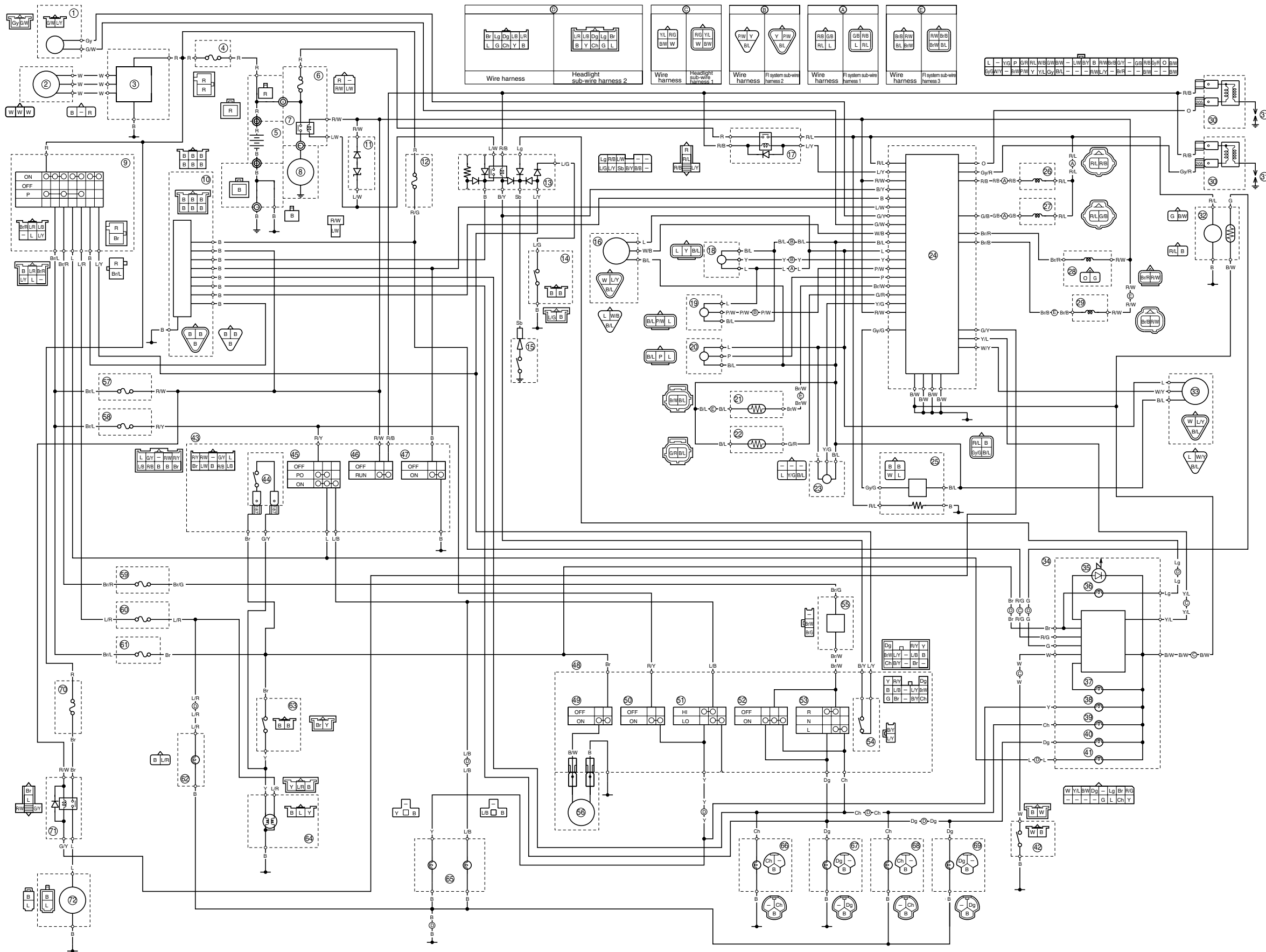




YAMAHA MOTOR CO., LTD.

2500 SHINGAI IWATA SHIZUOKA JAPAN

# TDM900 2002 WIRING DIAGRAM (EUR)



# TDM900P 2002 WIRING DIAGRAM (OCE)

