



**YAMAHA**

**XV1700P**

**XV1700PC**

**SERVICE MANUAL**

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**XV1700P/XV1700PC  
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.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

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

**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.



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

CLUTCH

①

ENG

EA00073

**CLUTCH**

**CLUTCH COVER**

CLUTCH

ENG

**REMOVING THE CLUTCH**

1. Remove:

- clutch cable holder ①
- clutch cover ②

**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.

2. Straighten the lock washer tab.

3. Loosen:

- clutch boss nut ③

**NOTE:**  
While holding the clutch boss ② with the universal clutch holder ④, loosen the clutch boss nut.

Universal clutch holder  
YM-91042

4. Remove:

- clutch boss nut ①
- lock washer ②
- clutch boss assembly ③

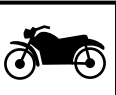





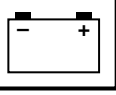


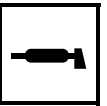

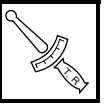


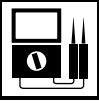







**NOTE:**  
There is a built-in damper between the clutch boss and the clutch plate. It is not necessary to remove the wire circlip ⑤ and disassemble the built-in damper unless there is serious clutch chattering.

Order	Job/Part	Q'ty	Remarks
	<b>Removing the clutch cover</b>		Remove the parts in the order listed.
	Left side cover		Refer to "SEAT AND SIDE COVERS" in chapter 3.
	Sub fuel tank		Refer to "SUB FUEL TANK" in chapter 3.
	Engine left side cover		Refer to "ROCKER ARMS, PUSH RODS AND VALVE LIFTERS".
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	Disconnect.
2	Pull lever	1	Refer to "INSTALLING THE CLUTCH".
3	Pull lever spring	1	
4	Crankshaft position sensor lead	1	Disconnect.

5 - 56

5 - 61



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

EAS00009

## SYMBOLS

The following symbols are not relevant to every vehicle. Symbols ① to ⑧ indicate the subject of each chapter.

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

Symbols ⑨ to ⑯ indicate the following.

- ⑨ Serviceable with engine mounted
- ⑩ Filling fluid
- ⑪ Lubricant
- ⑫ Special tool
- ⑬ Tightening torque
- ⑭ Wear limit, clearance
- ⑮ Engine speed
- ⑯ Electrical data








Symbols ⑰ to ㉒ in the exploded diagrams indicate the types of lubricants and lubrication points.

- ⑰ Engine oil
- ⑱ Gear oil
- ⑲ Molybdenum-disulfide oil
- ⑳ Wheel-bearing grease
- ㉑ Lithium-soap-based grease
- ㉒ Molybdenum-disulfide grease

Symbols ㉓ to ㉔ in the exploded diagrams indicate the following.

- ㉓ Apply locking agent (LOCTITE®)
- ㉔ Replace the part

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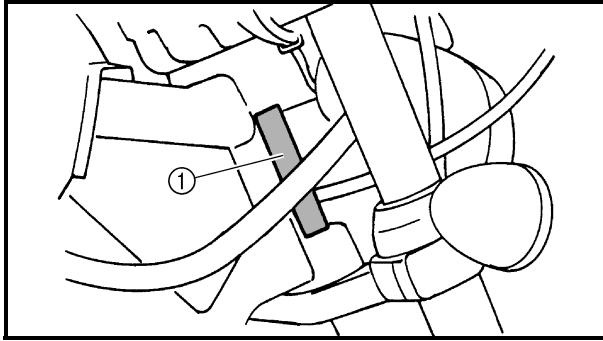
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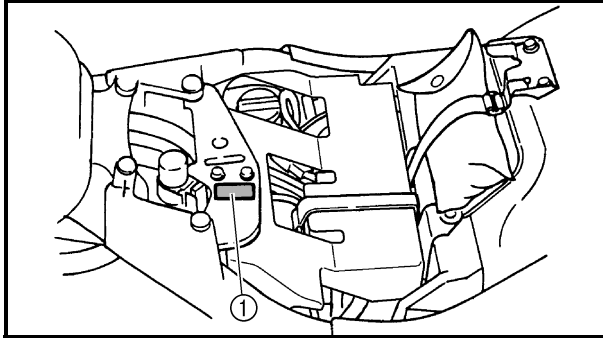
EAS00014

## 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 ① is affixed to the frame. This information will be needed to order spare parts.

## FEATURES

### OUTLINE

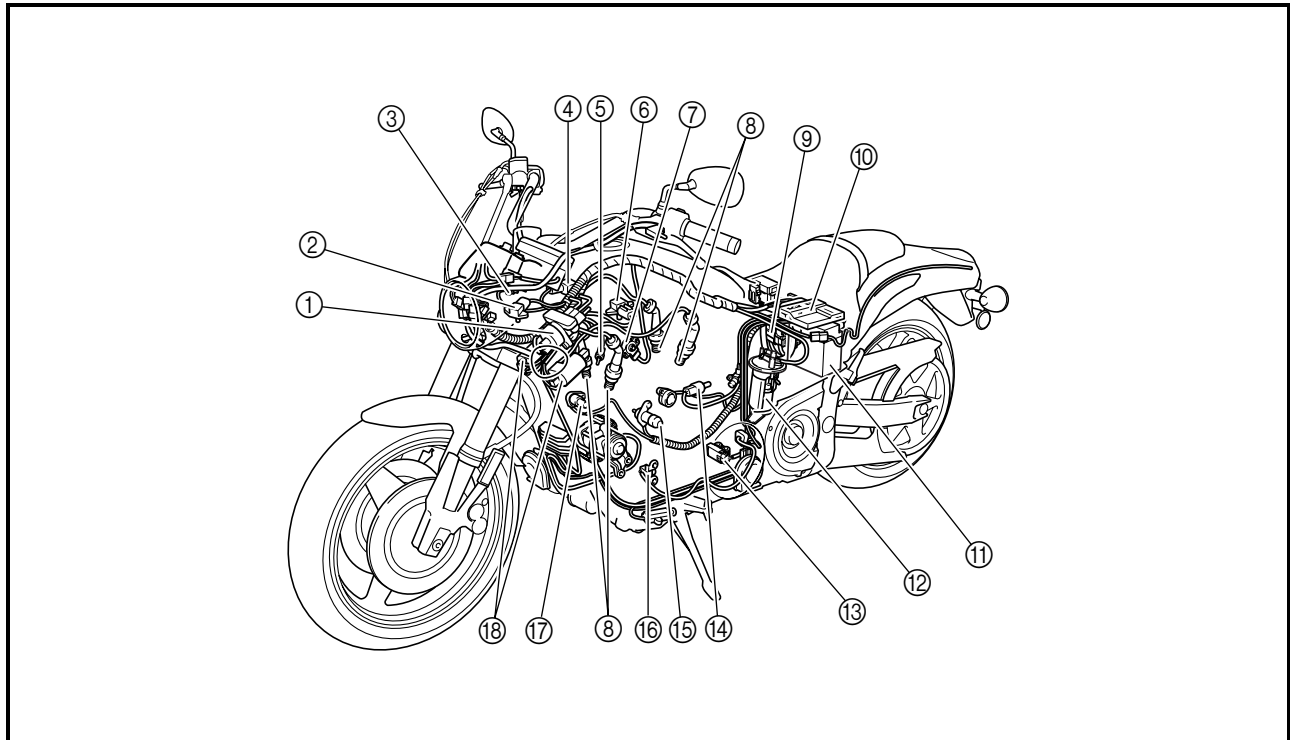
The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature.

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.

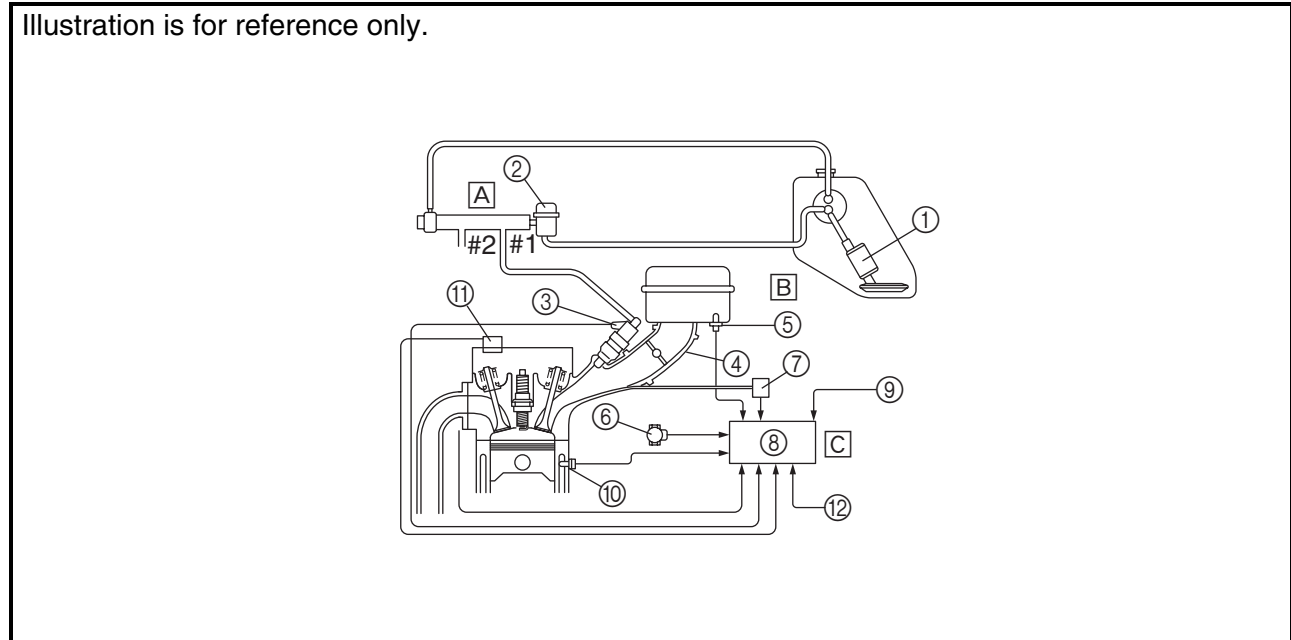


- |                                 |                            |                                  |
|---------------------------------|----------------------------|----------------------------------|
| ① Liner control valve           | ⑦ Throttle position sensor | ⑬ Lean angle cut-off switch      |
| ② Intake air pressure sensor 2  | ⑧ Spark plug               | ⑭ Oil temperature sensor         |
| ③ Intake air temperature sensor | ⑨ Relay unit               | ⑮ Decompression solenoid         |
| ④ Intake air pressure sensor 1  | ⑩ ECU                      | ⑯ Crankshaft position sensor     |
| ⑤ Engine temperature sensor     | ⑪ Battery                  | ⑰ Cylinder identification sensor |
| ⑥ Atmospheric pressure sensor   | ⑫ Fuel pump                | ⑱ Ignition coil                  |

**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 2.55 kg/cm<sup>2</sup> 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, engine temperature sensor, and oil temperature 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 Intake air pressure sensor     | Ⓐ Fuel system    |
| ② Pressure regulator        | ⑧ ECU                            | Ⓑ Air system     |
| ③ Fuel injector             | ⑨ Atmospheric pressure sensor    | Ⓒ Control system |
| ④ Throttle body             | ⑩ Engine temperature sensor      |                  |
| ⑤ Intake temperature sensor | ⑪ Cylinder identification sensor |                  |
| ⑥ Throttle position sensor  | ⑫ Crankshaft position sensor     |                  |



**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 adjustment
Sensor block	Intake air pressure sensor	Intake air pressure detection
	Atmospheric pressure sensor	Atmospheric pressure detection
	Engine temperature sensor	Engine temperature detection
	Intake temperature sensor	Intake temperature detection
	Throttle position sensor	Throttle angle detection
	Oil temperature sensor	Engine oil temperature detection
	Cylinder identification sensor	Reference position detection
	Crankshaft position sensor	Crankshaft position detection and engine RPM detection
	Speed sensor	Speed detection
Actuator block	Injector	Fuel injection
	Fuel pump	Fuel feed
	Air Induction system, air cut valve	Induction of secondary air
	Liner control valve	First idle control (see page 1-28)

An FI warning light is provided on meter panel.

**COMPONENTS**

**ECU (Electronic Control Unit)**

The ECU is mounted underneath the seat, above the battery box. 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 (more than 5 V) that is required for operating the ECU.

B. Input interface circuits

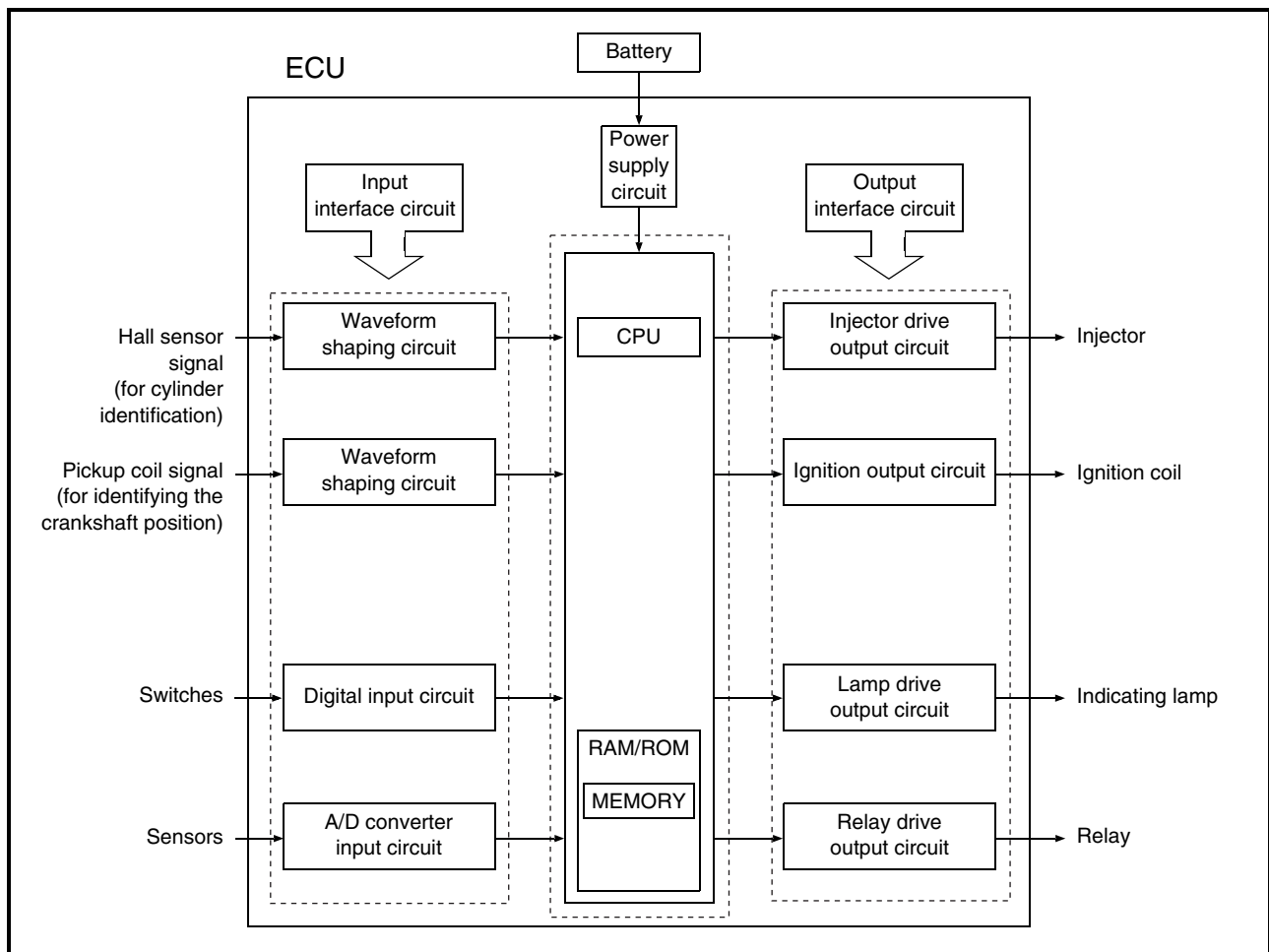
The input interface circuits convert the signals output by all the sensors into digital signals, which can be processed by the CPU, and input them into the CPU.

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 indicator and relay output circuits as needed.



- Ignition control

The ignition timing control uses the signals from the throttle position sensor (to detect the angle of the throttle), and the crankshaft position sensor (to detect the speed of the engine) and the speed sensor. 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

The ECU controls the headlight relay in accordance with the engine speed as required by the daytime illumination specification.

3. Operating the liner control valve

The ECU controls the liner control valve to increase the intake air volume for starting the engine under cold conditions.

4. Operating the automatic decompression solenoid valve

The ECU controls the operation of the automatic decompression solenoid valve when the engine is started.

- 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**

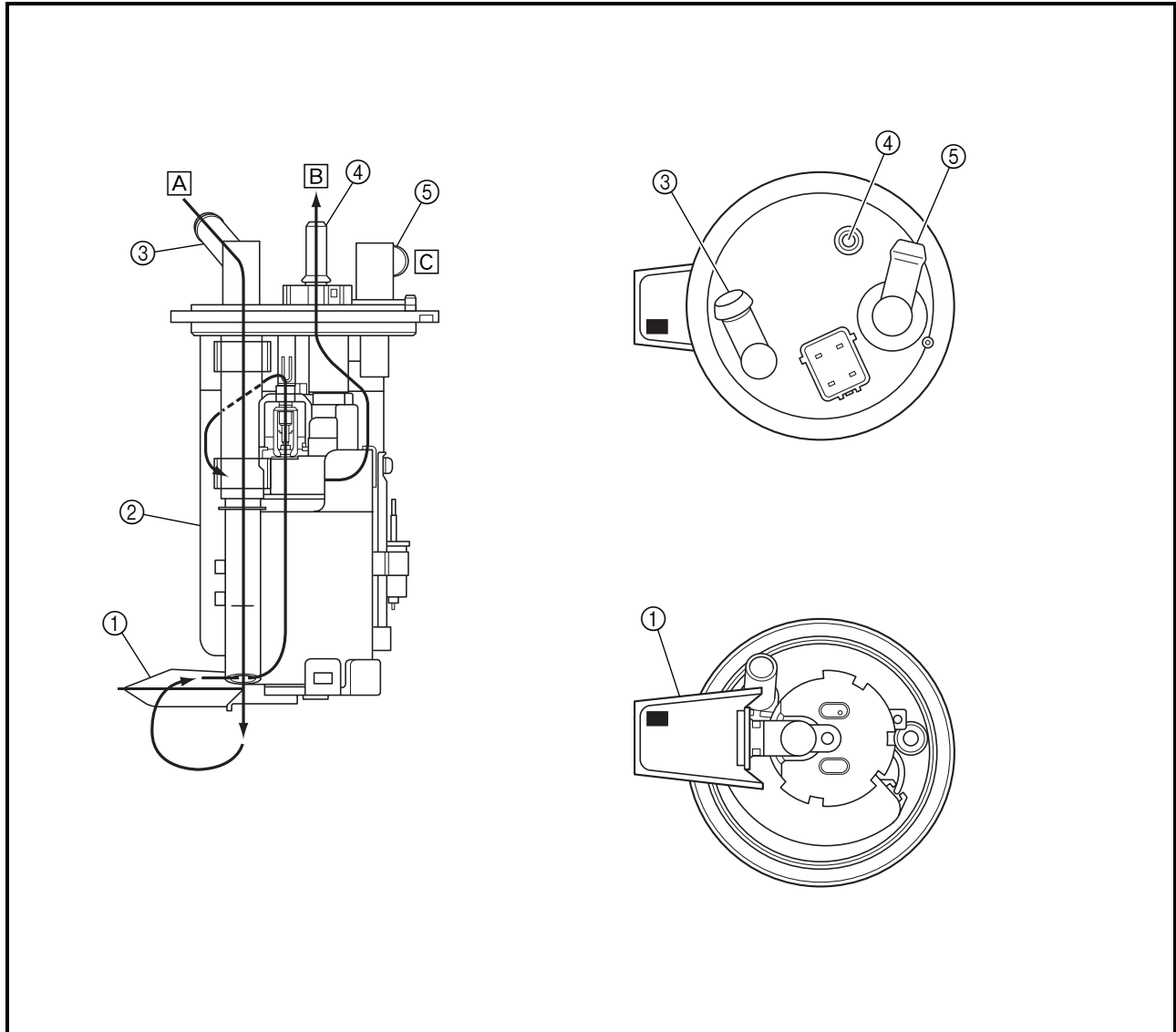
The fuel pump, which is mounted in the fuel tank, draws the fuel directly from the tank and pumps it to the injector.

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 440 and 640 kpa, and returns the fuel to the fuel tank.



- ① Fuel filter
- ② Fuel inlet strainer
- ③ Fuel inlet
- ④ Fuel outlet
- ⑤ Air vent pipe

- A From main fuel tank
- B To injectors
- C To main fuel tank

**Pressure regulator**

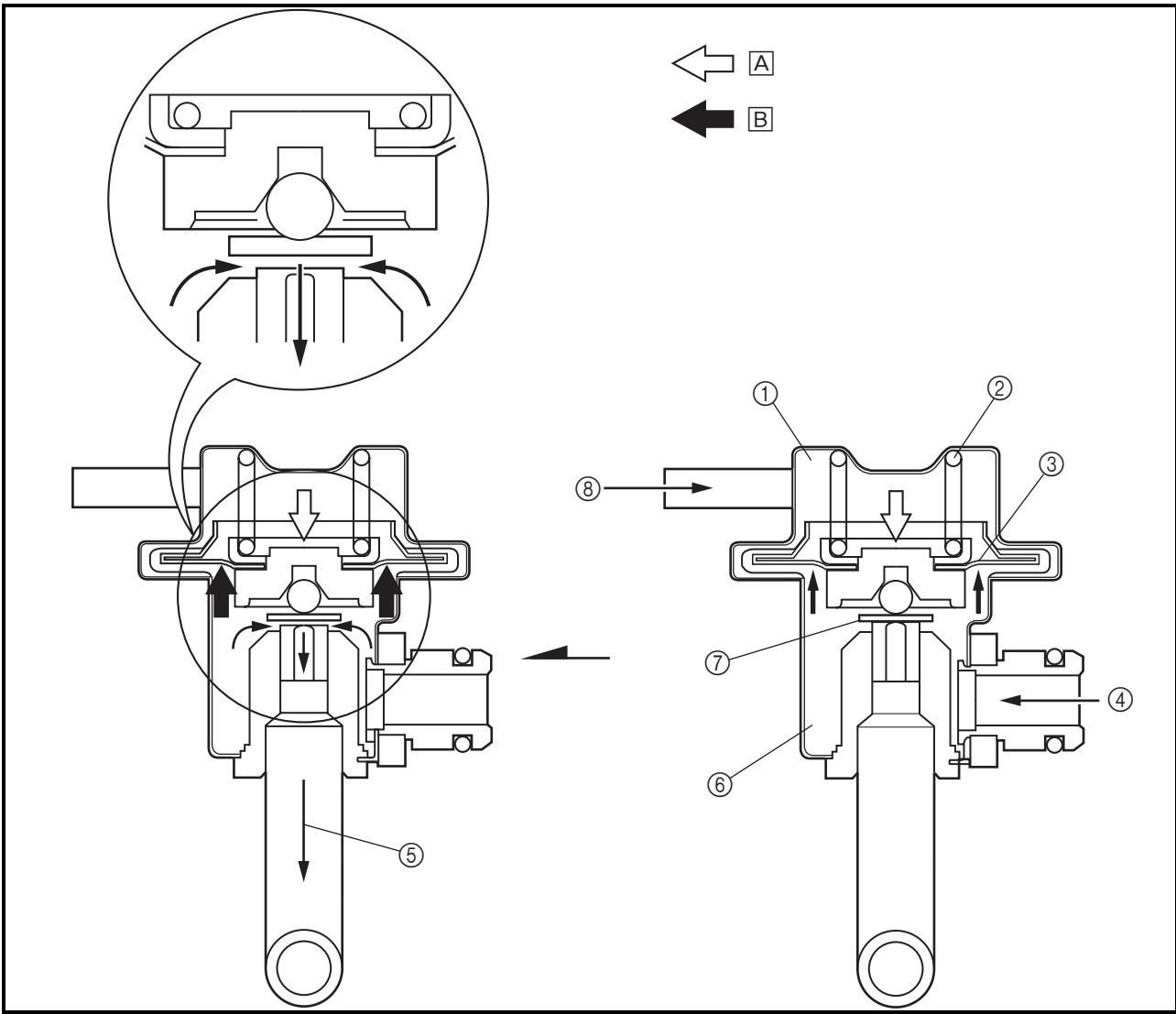
It regulates the fuel pressure that is applied to the injectors that supply fuel to the cylinders in order to maintain a constant pressure.

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.

By the atmospheric pressure applied to the spring chamber and when the fuel pressure exceeds the sum of the atmospheric pressure and spring force, the diaphragm opens the valve, allowing fuel to return to the fuel tank from the return hose.

Therefore, the fuel pressure applied to the injectors by the pressure regulator is controlled by the atmospheric pressure and the spring force to maintain the fuel pressure in accordance to the changes of the atmospheric pressure.



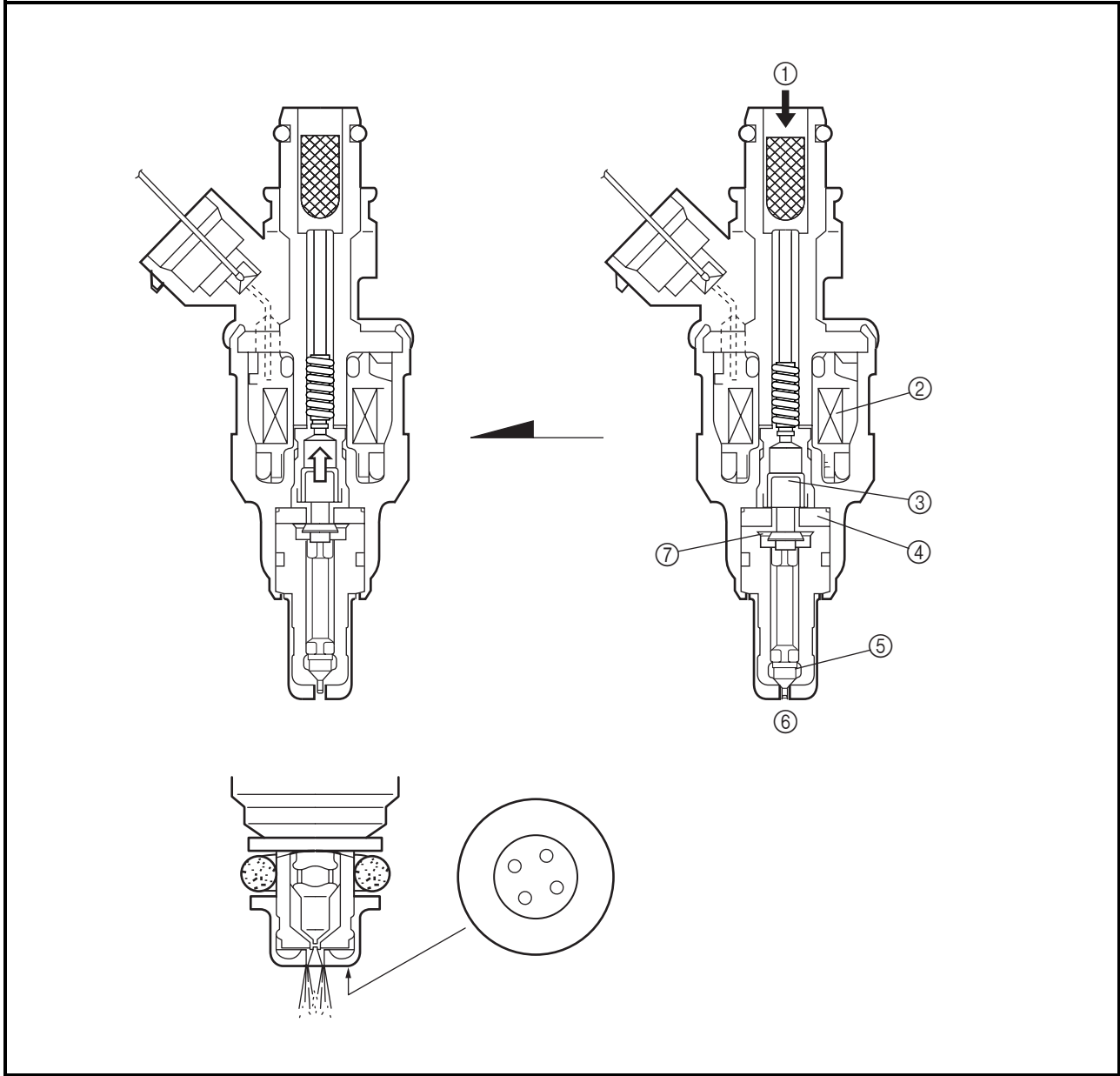
- ① Spring chamber
- ② Spring
- ③ Diaphragm
- ④ Fuel inlet
- ⑤ Fuel outlet
- ⑥ Fuel chamber
- ⑦ Valve
- ⑧ Atmospheric pressure sensor
- ▢ A Spring pressure
- ▢ B Fuel pressure



**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.

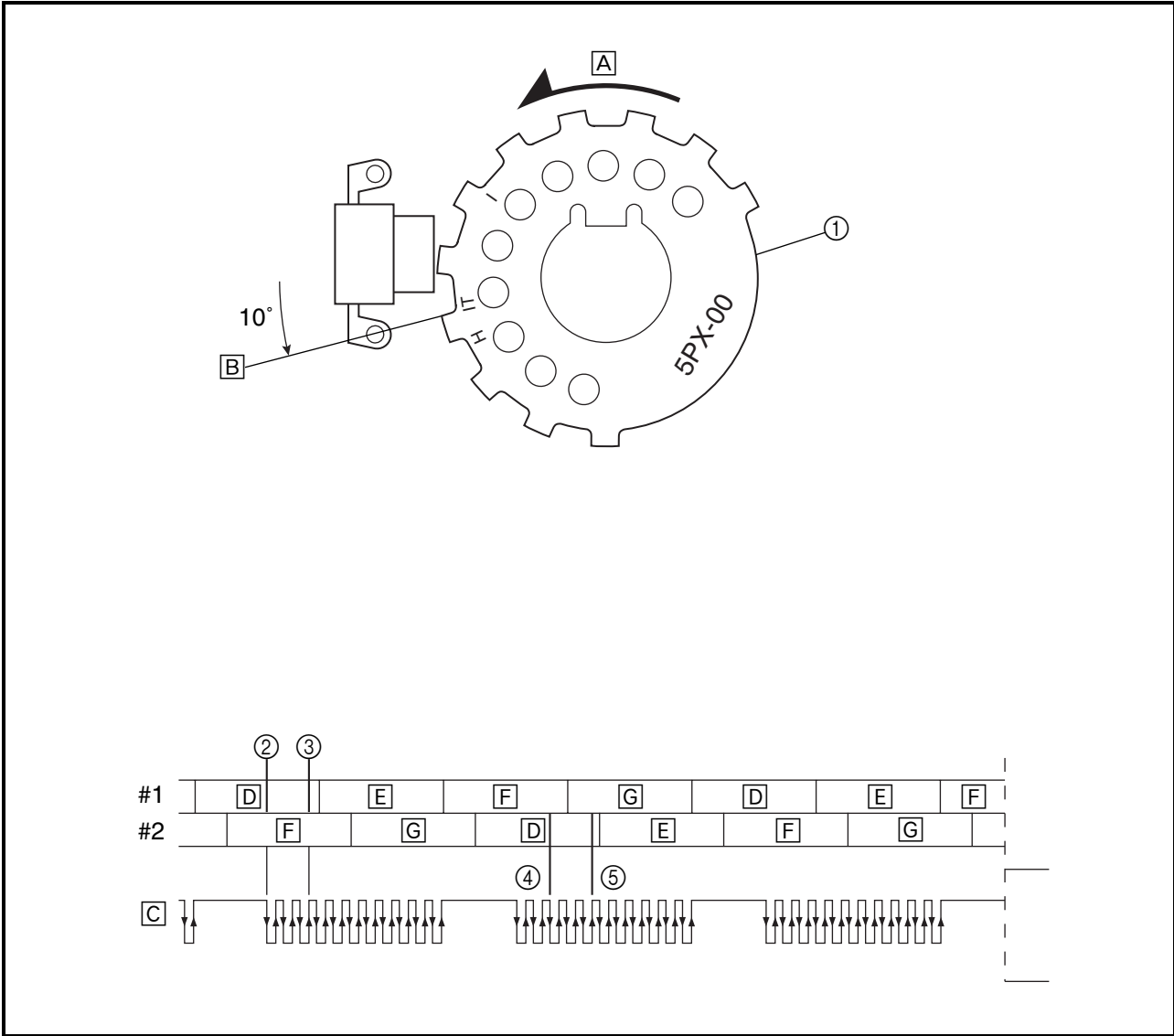


- ① Fuel
- ② Coil
- ③ Core
- ④ Spacer

- ⑤ Needle
- ⑥ Inject
- ⑦ Flange

**Crankshaft position sensor**

The crankshaft position sensor uses the signals of the crankshaft position sensor that is mounted on the left 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 crankshaft position sensor, 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 crankshaft position sensor, 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
- ② Identification of cylinder #1 (82° BTDC)
- ③ Ignition of cylinder #1 (10° BTDC)
- ④ Identification of cylinder #2
- ⑤ Ignition of cylinder #2
- Ⓐ Direction of rotation
- Ⓑ Compression stroke of cylinder #1 (10° BTDC)
- Ⓒ Crankshaft position sensor
- Ⓓ Compression
- Ⓔ Combustion
- Ⓕ Exhaust
- Ⓖ Intake

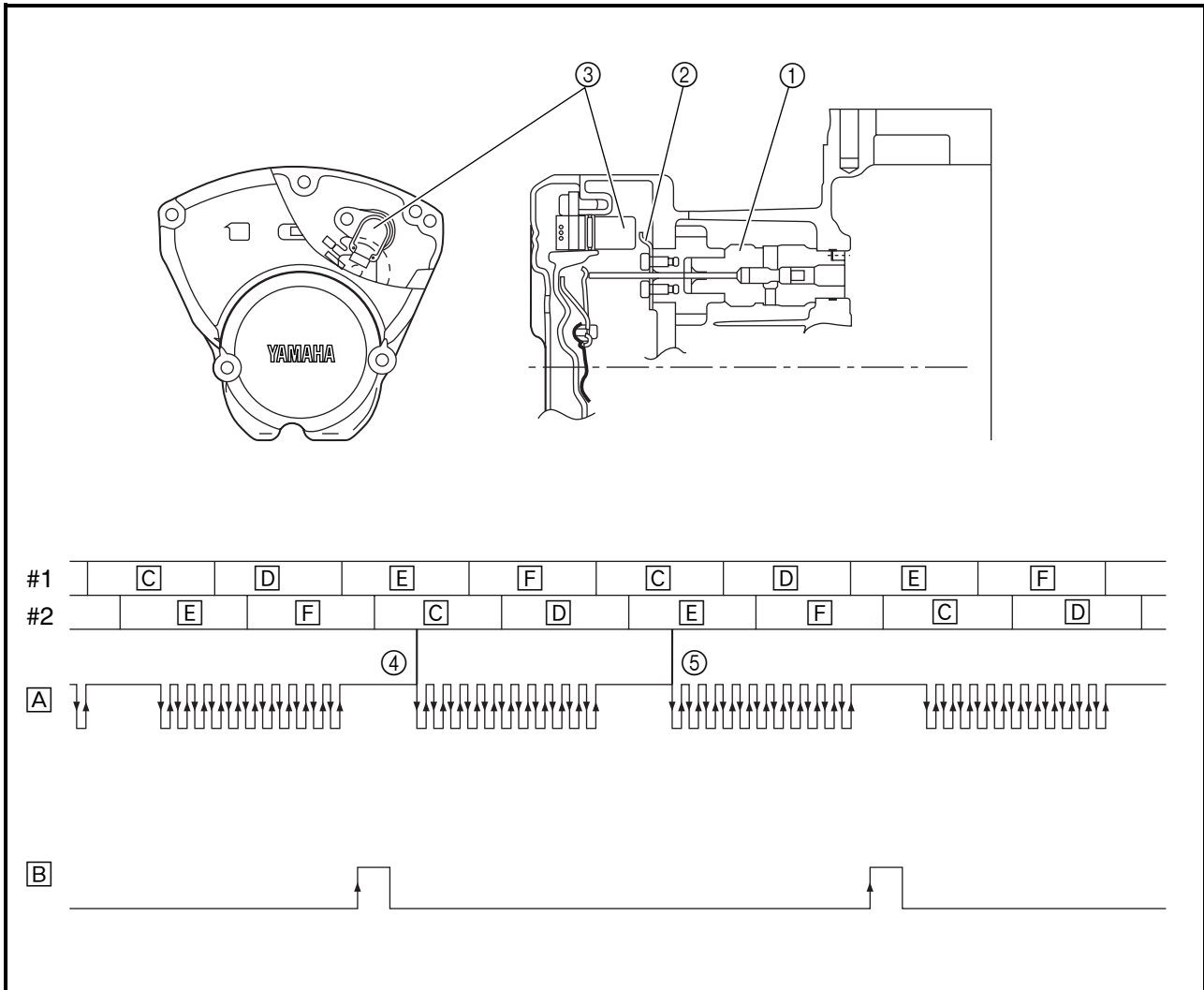


**Cylinder identification sensor**

The cylinder identification sensor is installed on the camshaft drive gear cover. When the cam of cylinder #1 rotates, the pickup rotor installed on the cam also rotates. When the pickup rotor passes by the sensor, trigger poles on the rotor generate a signal and send it to the ECU. Based on this signal and the signal from the crankshaft position sensor, the ECU then actuates the injectors to supply fuel.

**Cylinder identification**

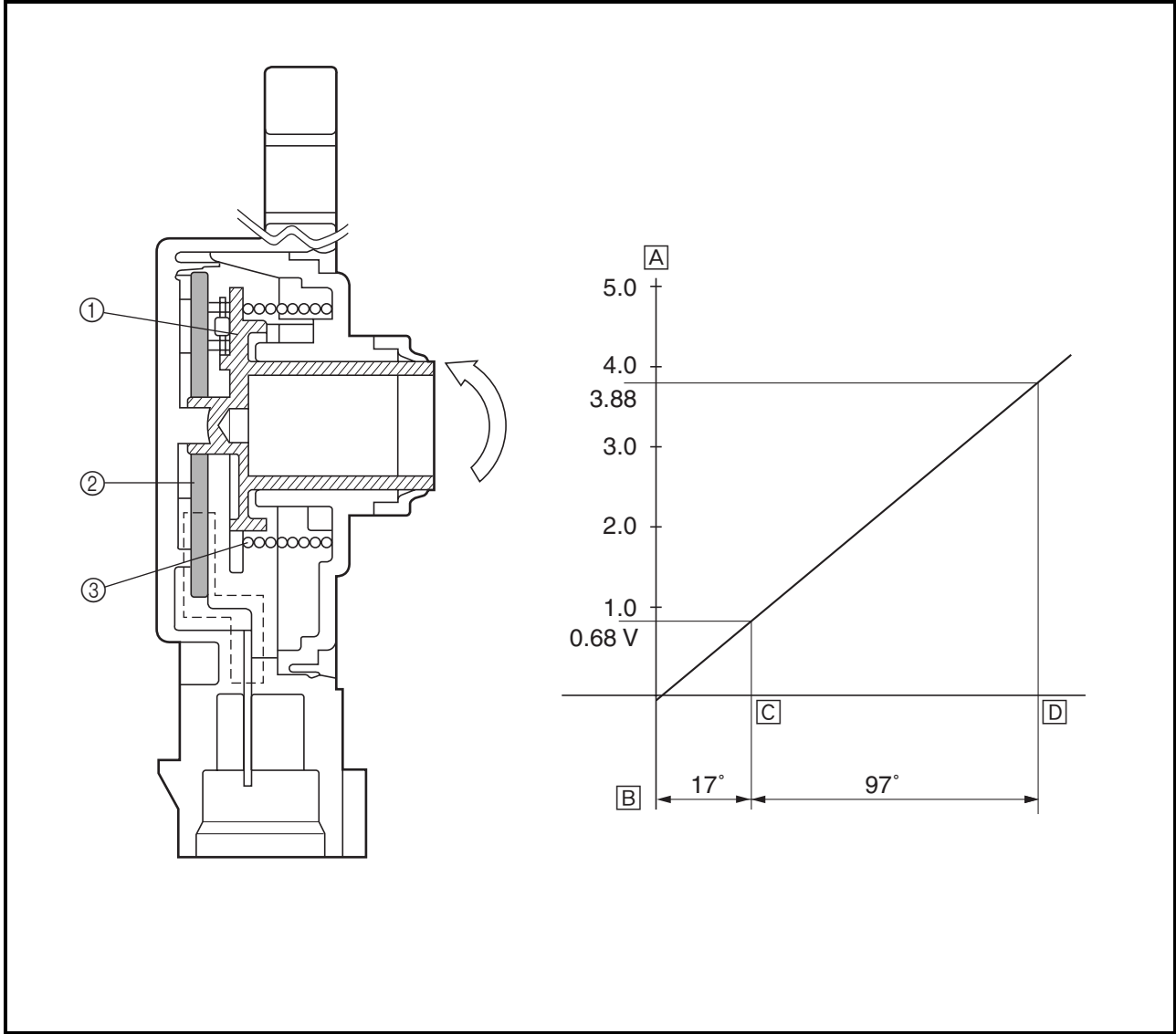
When the crank angle is 110 degrees or higher, no signals are transmitted from the crankshaft position sensor to the ECU. Once the crank angle is less than 110 degrees, the first signal that the ECU receives from the sensor identifies cylinder #1 at 82° BTDC. When the ECU receives a signal from the cylinder identification sensor, cylinder #1 is at 82° BTDC on the exhaust stroke. When the ECU does not receive a signal from the cylinder identification sensor, cylinder #1 is at 82° BTDC on the compression stroke.



- ① Front cylinder camshaft
- ② Front cylinder camshaft end cover
- ③ Cylinder identification sensor
- ④ Exhaust stroke of cylinder #1 (82° BTDC)
- ⑤ Compression stroke of cylinder #1 (82° BTDC)
- A Crankshaft position sensor signal
- B Cylinder identification sensor signal
- C Compression
- D Combustion
- E Exhaust
- F Intake

**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.



- ① Moving contact
- ② Resistor board
- ③ Spring

- Ⓐ Output voltage
- Ⓑ Idling output position
- Ⓒ Full close
- Ⓓ Full open

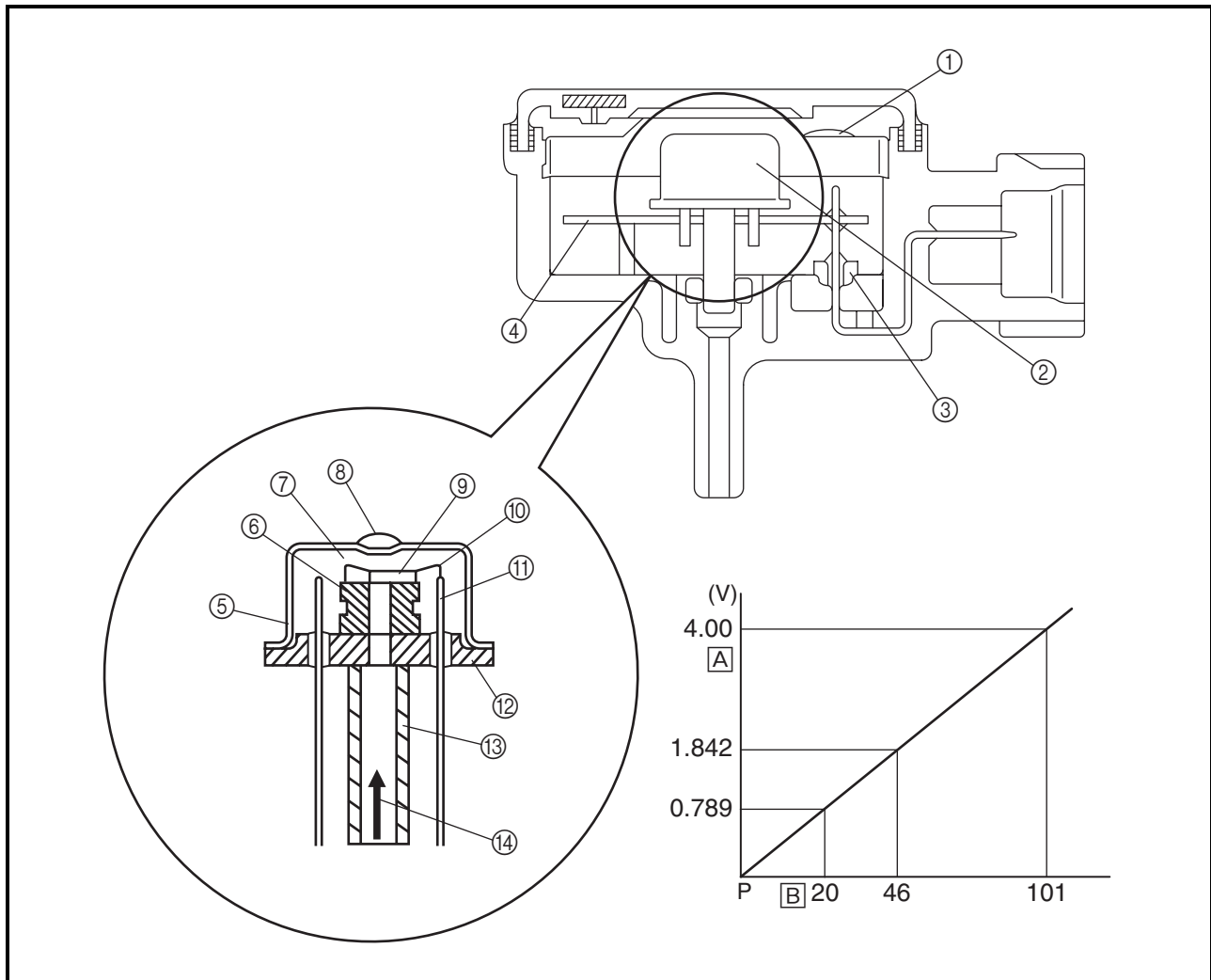
**Intake air pressure sensor and atmospheric pressure sensor**

• 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.

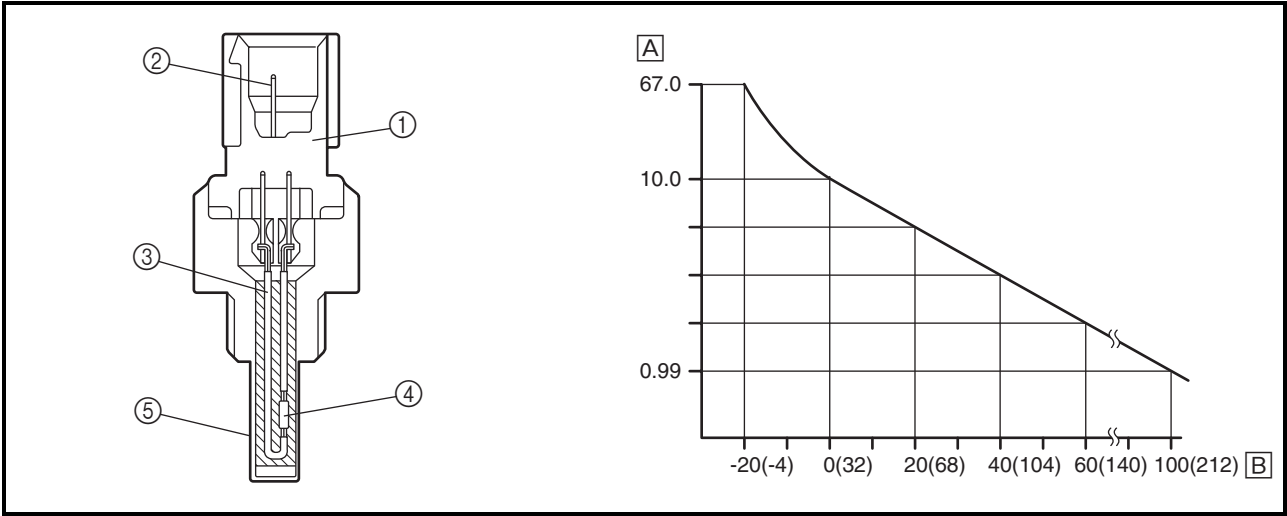


- |                     |                     |   |                  |
|---------------------|---------------------|---|------------------|
| ① EMI shield        | ⑥ Silicon diaphragm | ⑪ Lead pin                                  | Ⓐ Output voltage |
| ② Sensor unit       | ⑦ Vacuum chamber    | ⑫ Stem                                      | Ⓑ Input pressure |
| ③ Through condenser | ⑧ Solder            | ⑬ Pressure induction pipe                   |                  |
| ④ Hybrid IC         | ⑨ Silicon chip      | ⑭ Atmospheric pressure, intake air pressure |                  |
| ⑤ Cap               | ⑩ Gold wire         |   |                  |



**Engine temperature sensor**

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

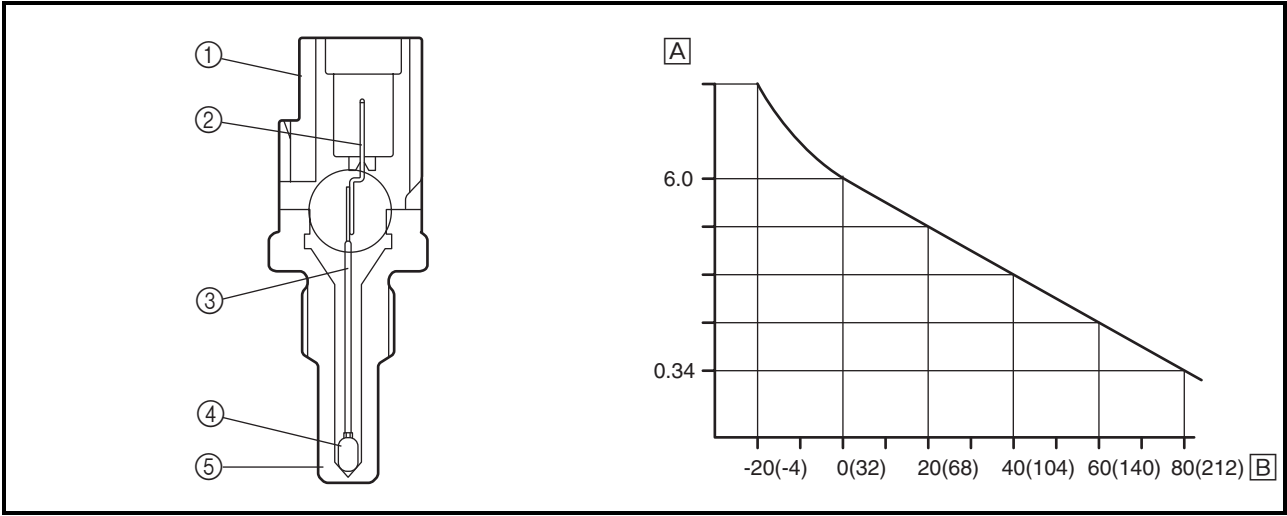


- ① Connector
- ② Terminal
- ③ Tube
- ④ Thermistor

- ⑤ Holder
- Ⓐ Resistance kΩ
- Ⓑ Temperature °C (°F)

**Intake 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.

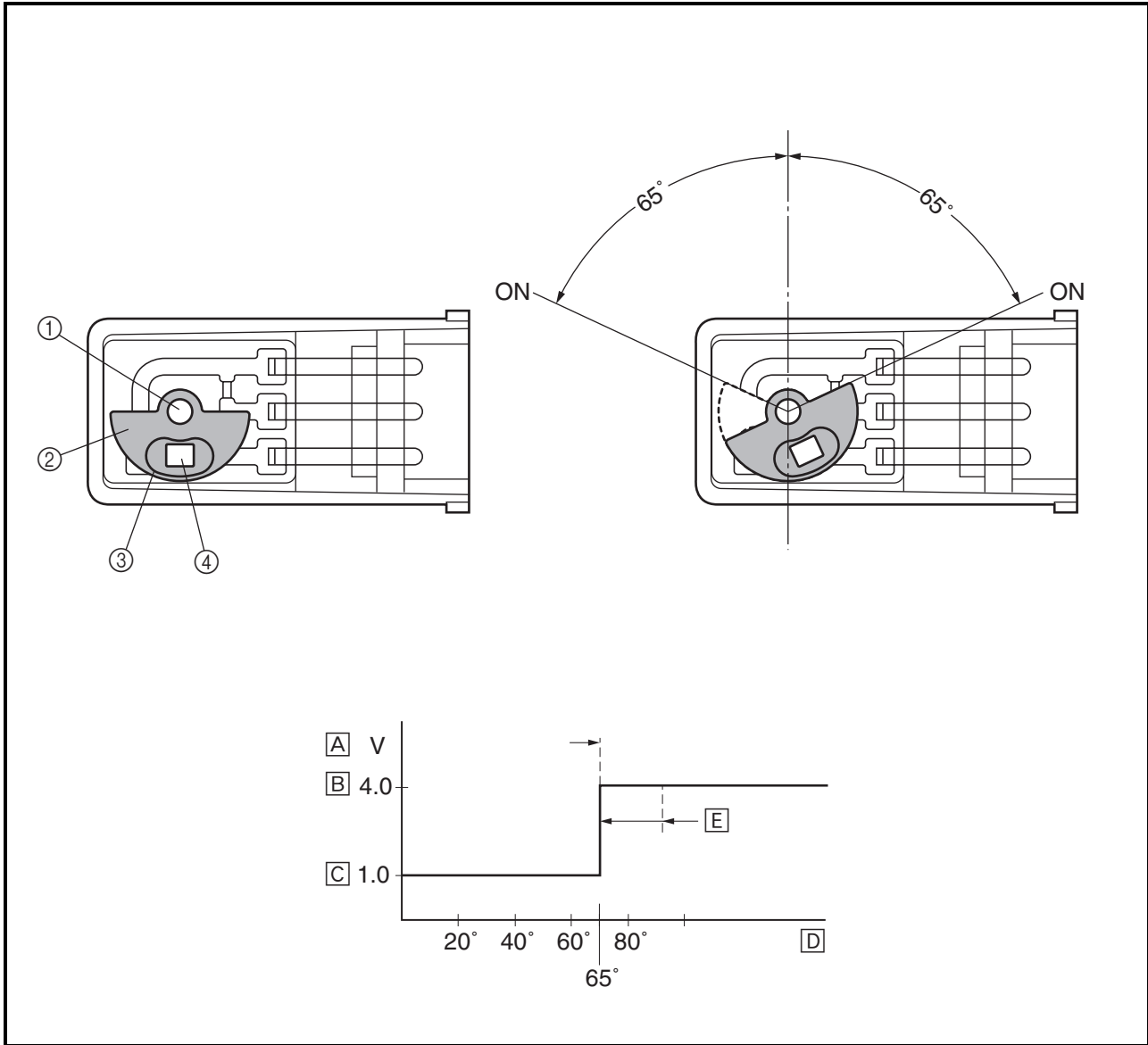


- ① Connector
- ② Terminal
- ③ Tube
- ④ Thermistor

- ⑤ Holder
- Ⓐ Resistance kΩ
- Ⓑ Temperature °C (°F)

**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 Shaft
- ② Float
- ③ Magneto
- ④ IC unit

- [A] Output voltage
- [B] High level
- [C] Low level
- [D] Cut-off switch tilt angle
- [E] Fuel injection system relay OFF

**FUEL INJECTION SYSTEM**

**Operation and control**

The fuel injection timing, injection duration, ignition timing, and the coil energizing duration are controlled by the ECU. To determine the basic injection timing, the ECU calculates the intake air volume through the signals from the intake air pressure sensor, throttle position sensor, cylinder identification sensor, and crankshaft position sensor.

Furthermore, the ECU calculates the final injection timing by adding the following compensations to the aforementioned basic injection duration: those obtained from the state of acceleration, as well as those based on the signals from various sensors such as the engine temperature, intake temperature, atmospheric. At the same time, the ECU assesses the crankshaft position through the signals from the cylinder identification sensor and the crankshaft position sensor. Then, when the ECU determines that it is time to inject fuel, it sends an injection command to the injectors. Furthermore, the ECU also controls the length of time the coil is energized by calculating the ignition timing and the coil energizing duration based on the signals from these sensors.

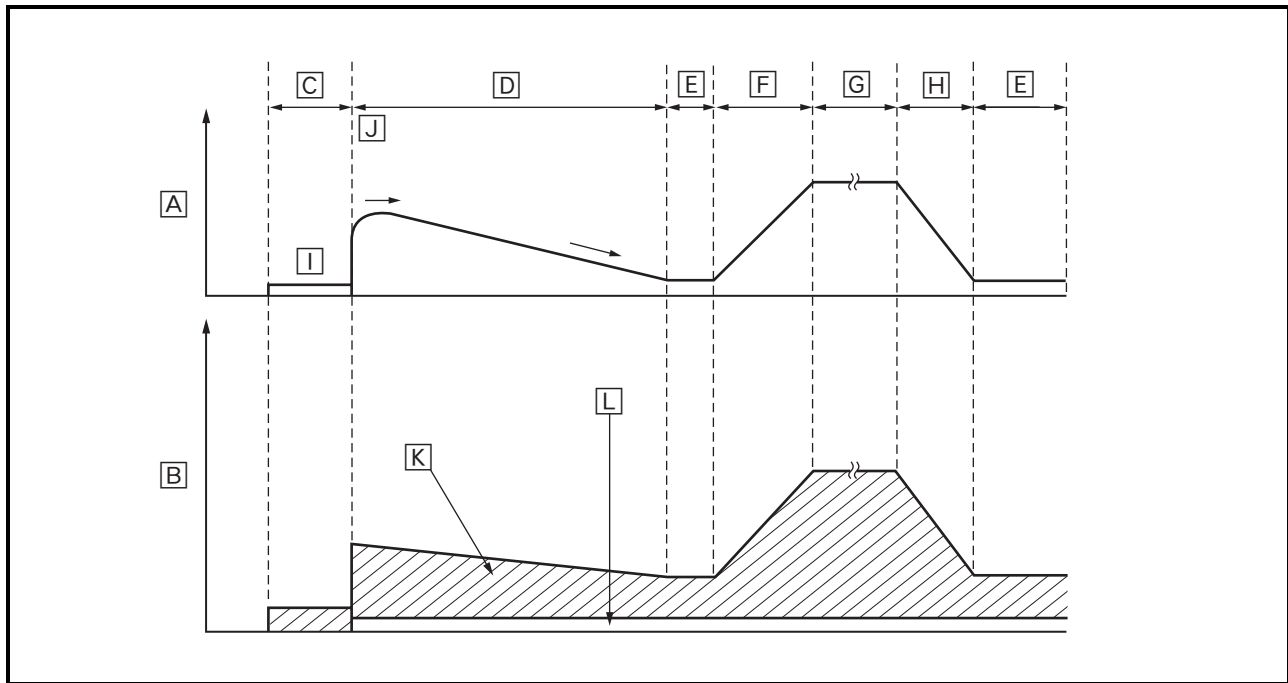
**Determining the basic injection duration**

The intake air volume determines the basic injection duration. In order to operate the engine in an optimal condition, it is necessary to supply fuel at an air-fuel ratio that corresponds appropriately to the volume of intake air that is constantly changing, and to ignite it an appropriate timing. The ECU controls the basic injection duration based on the intake air volume and engine speed data.

**Detection of intake air volume**

The intake air volume is detected primarily through the signals from the throttle position sensor and the intake air pressure sensor. The intake air volume is determined in accordance with the signals from the atmospheric pressure sensor, intake temperature sensor, and the engine speed data.

Composition of basic injection duration



- |                             |                       |  |
|-----------------------------|-----------------------|--|
| <b>A</b> RPM                | <b>E</b> Idle         | <b>I</b> Start                         |
| <b>B</b> Injection duration | <b>F</b> Acceleration | <b>J</b> After start                   |
| <b>C</b> Cranking           | <b>G</b> Constant     | <b>K</b> Basic injection duration      |
| <b>D</b> Warm-up            | <b>H</b> Deceleration | <b>L</b> Voltage compensation duration |

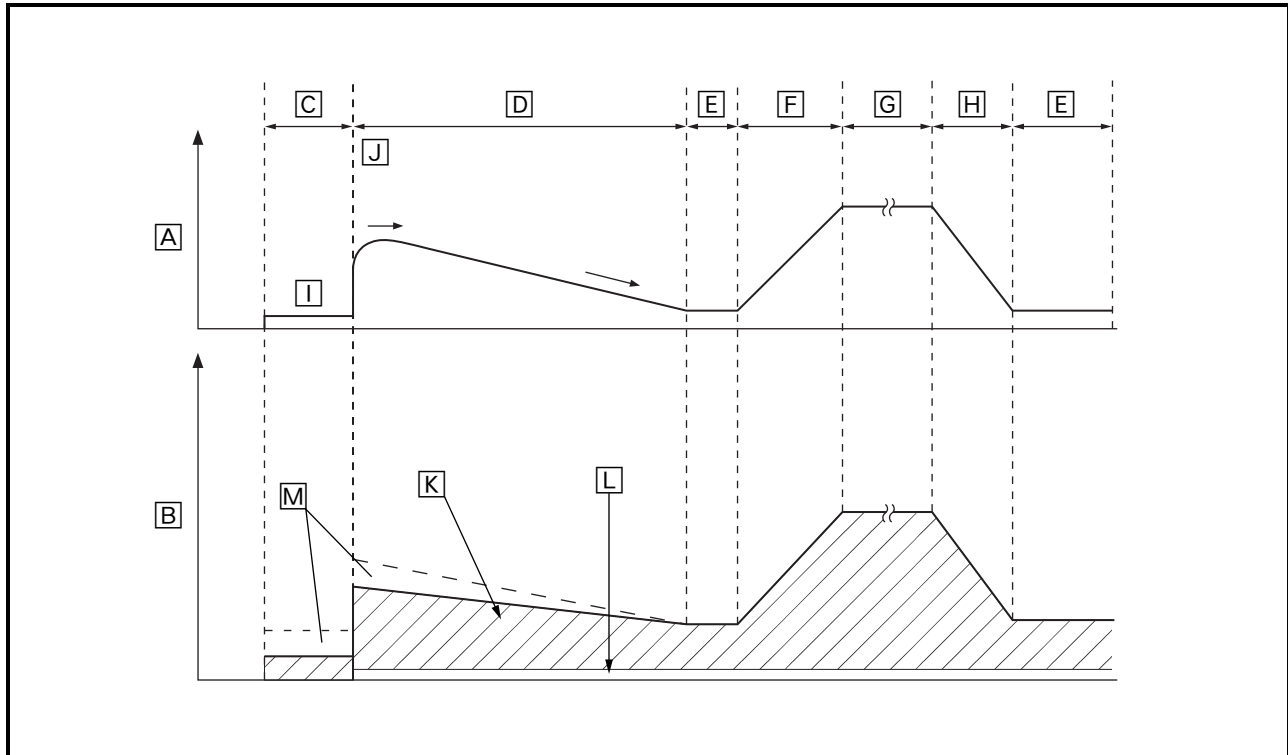
**Fuel injection duration during linear control valve operation**

The linear control valve supplies air to the intake manifold when starting or during engine warm up. The intake air volume determines the basic injection duration. As the intake air increases through the linear control valve, the intake air volume corrects the basic injection duration.

The correction volume changes according to the position of the valve at starting and when the valve position changes to accommodate the engine temperature and engine oil temperature as the intake air volume increases.

When the engine oil temperature reaches 80 °C (176 °F) or higher, the linear control valve fully closes to stop the air volume from increasing and control returns to basic injection control.

Composition of basic injection duration during linear control valve operation

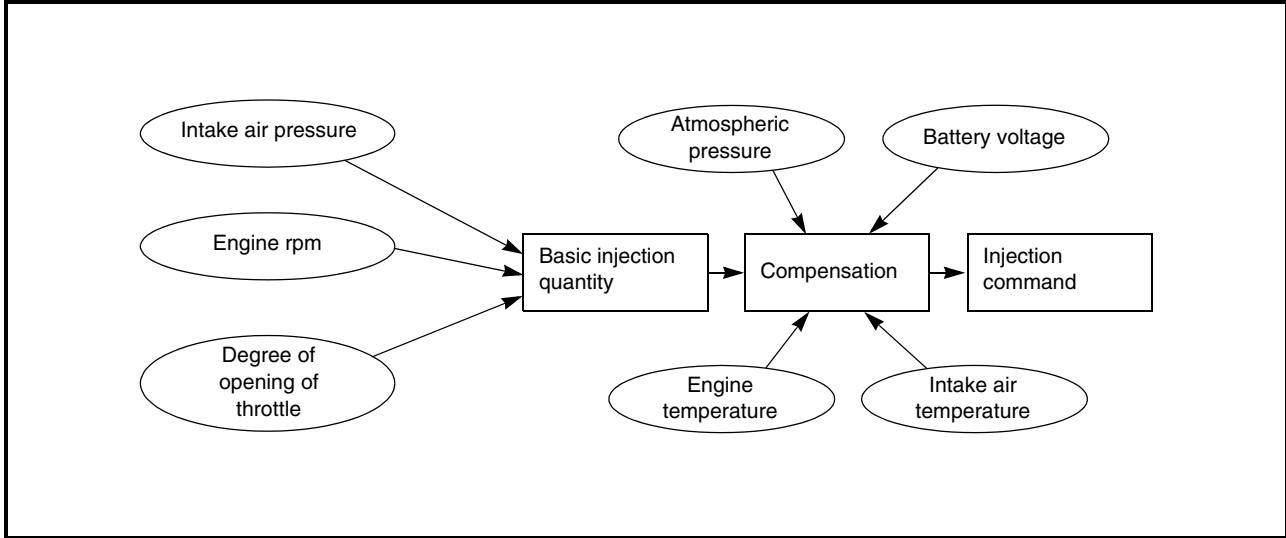


- [A] Engine speed (r/min)
- [B] Injection duration
- [C] Cranking
- [D] Warm up
- [E] Idling
- [F] Acceleration
- [G] Fixed

- [H] Deceleration
- [I] Starting
- [J] After starting
- [K] Basic injection duration
- [L] Voltage compensation duration
- [M] Correction volume

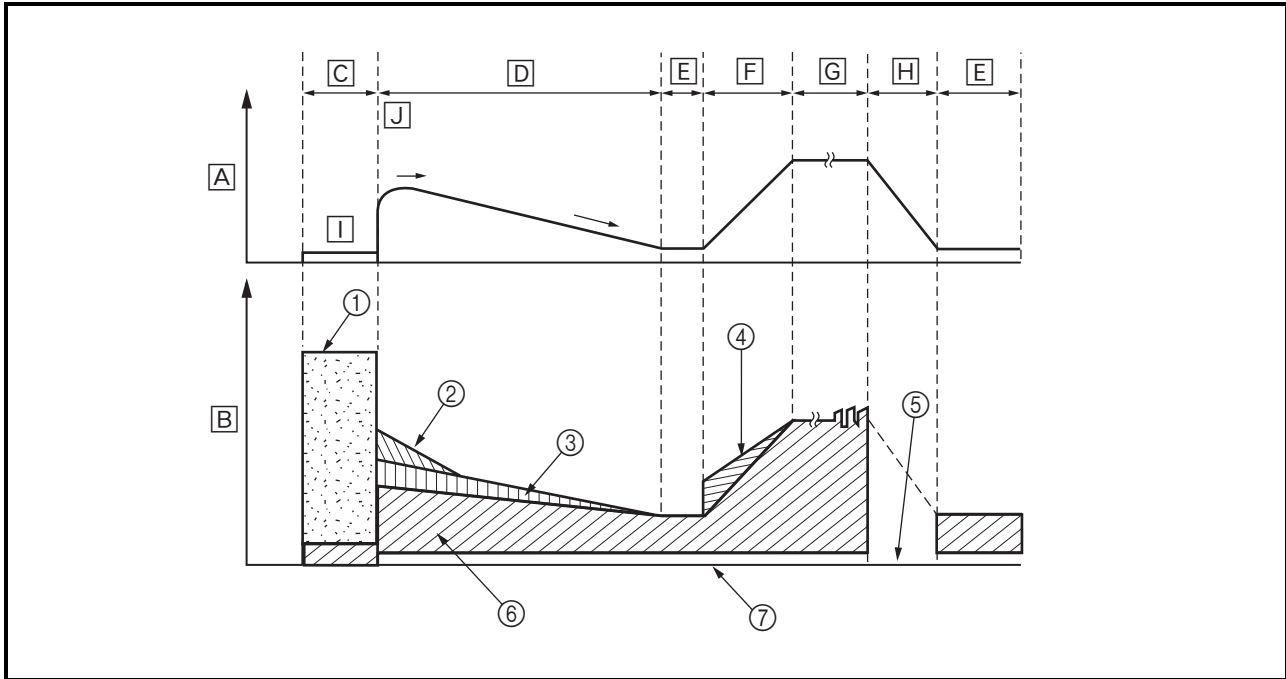
**Determining the final injection duration**

The intake air volume determines the basic injection duration. However, at a given intake air volume, the volume of fuel that is required varies by the engine operating conditions such as acceleration or deceleration, or by weather conditions. This system uses various sensors to precisely check these conditions, applies compensations to the basic injection duration, and determines the final injection duration based on the operating condition of the engine.



The fuel is cut off under conditions that do not require fuel, in order to stop the injection.

Composition of final injection duration



- ① Injection at start \*1
- ② After-start enrichment \*2
- ③ Warm-up enrichment \*3
- ④ Acceleration compensation \*5
- ⑤ Fuel cut-off Deceleration compensation \*5
- ⑥ Basic injection duration
- ⑦ Voltage compensation duration
- [A] RPM
- [B] Injection duration
- [C] Cranking
- [D] Warm-up
- [E] Idle
- [F] Acceleration
- [G] Constant
- [H] Deceleration
- [I] Start
- [J] After start



Reactive injection duration:

A lag is created between the time the ECU outputs a fuel injection signal to the injector and the time the injector actually opens. Therefore, the ECU calculates this lag in advance before sending the actuation signal to the injector. The battery voltage determines the reactive injection duration.

- High voltage → short reactive injection duration
- Low voltage → long reactive injection duration

LIST OF FUEL INJECTION COMPENSATIONS

Compensation item	Check item	Sensor used
Starting injection *1	Engine temperature	Engine temperature sensor
After-start injection:		
After-start enrichment *2	Engine temperature	Engine temperature sensor
Warm-up enrichment *3	Engine temperature	Engine temperature sensor
Intake temperature compensation *4	Intake temperature	Intake temperature sensor
Acceleration compensation/ deceleration compensation *5	Intake air pressure	Intake air pressure sensor
	Throttle position	Throttle position sensor
	Engine temperature	Engine temperature sensor

**Fuel control during normal driving**

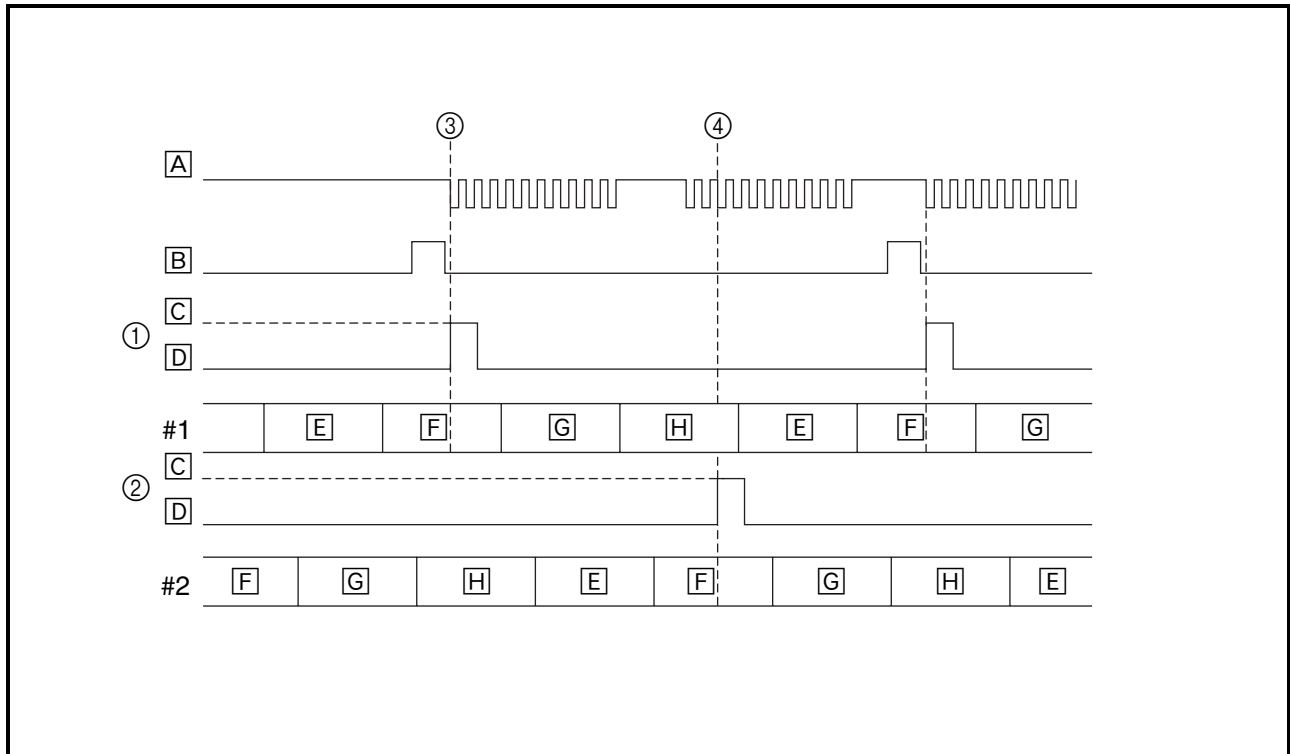
In synchronous injection during normal driving, fuel is injected on a cylinder-by-cylinder basis when all of the conditions below are met:

- ① Other than the stop mode
- ② Cylinder identification completed
- ③ Other than overrun

To determine the injection timing, the ECU calculates the injection timing through the use of the 3D control map provided in the ECU, which is based on the throttle position and the engine speed.

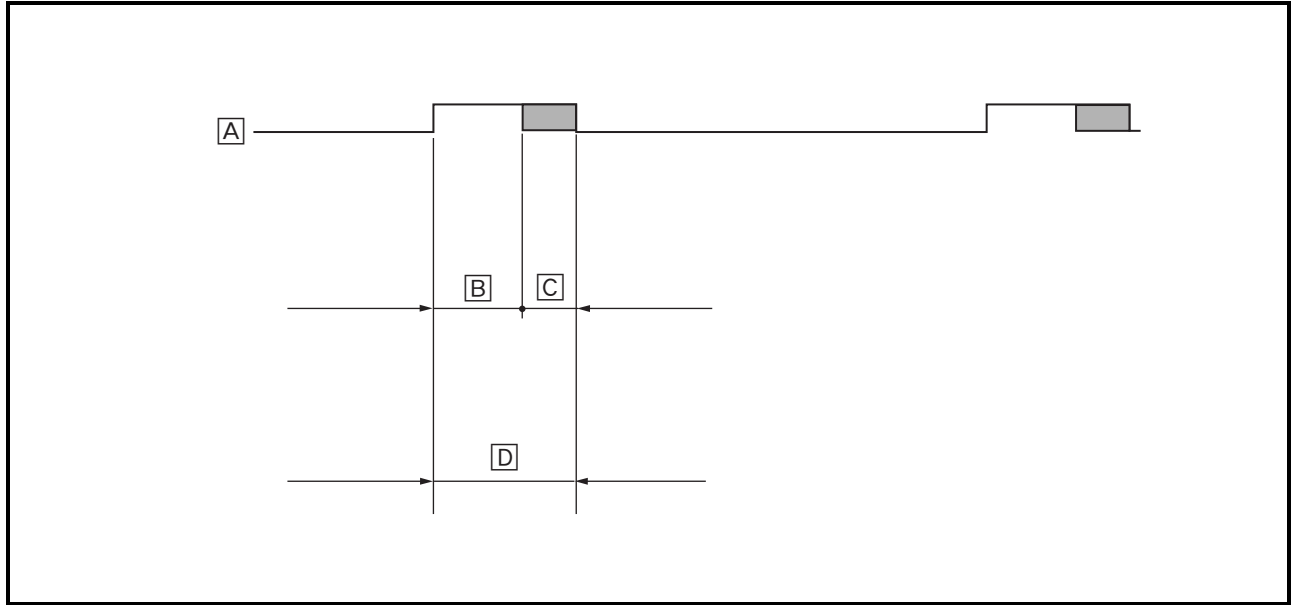
The injection duration is based on the basic injection duration (obtained through the throttle position, intake air pressure, and engine speed) to which injection duration compensation (based on the signals from various sensors such as the intake temperature sensor, atmospheric pressure sensor) is added to determine the final injection duration. As a result, fuel is supplied to the cylinders.

- Normal synchronous injection



- |                                 |                                    |               |
|---------------------------------|------------------------------------|---------------|
| ① Injector #1                   | A Crankshaft position sensor       | E Combustion  |
| ② Injector #2                   | B Crankshaft identification signal | F Exhaust     |
| ③ Identification of cylinder #1 | C Injection                        | G Intake      |
| ④ Identification of cylinder #2 | D Stop                             | H Compression |

- Fuel injection control during normal driving



- A** #1 cylinder fuel injection timing
- B** Basic injection duration
- C** Various types of fuel injection duration compensations
- D** Final injection duration (**B** + **C**)

**Fuel injection compensation control**

• Starting injection control

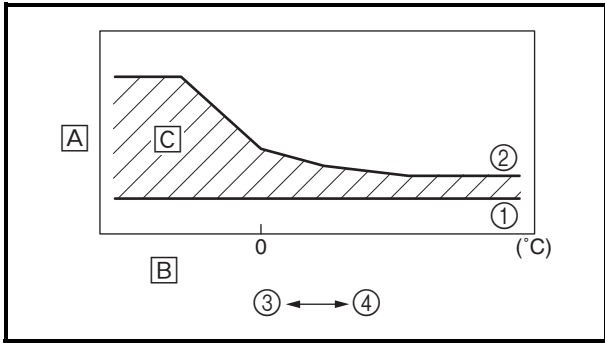
The engine temperature is used for determining the injection duration in order to ensure proper start ability. To suit the engine's operating conditions, the starting injection duration is determined by applying a starting compensation coefficient to the basic injection duration, which forms the basis of the injection duration.

**(Starting injection duration = basic injection duration × injection compensation coefficient)**

During starting, injection cylinder control is effected together with injection duration compensation. The injectors of all cylinders inject only once immediately after receiving a signal from the crankshaft position sensor during the cranking of the engine. This is called asynchronous injection, in contrast to the synchronous injection, which is a normal cylinder injection that is effected on a cylinder-by-cylinder basis.

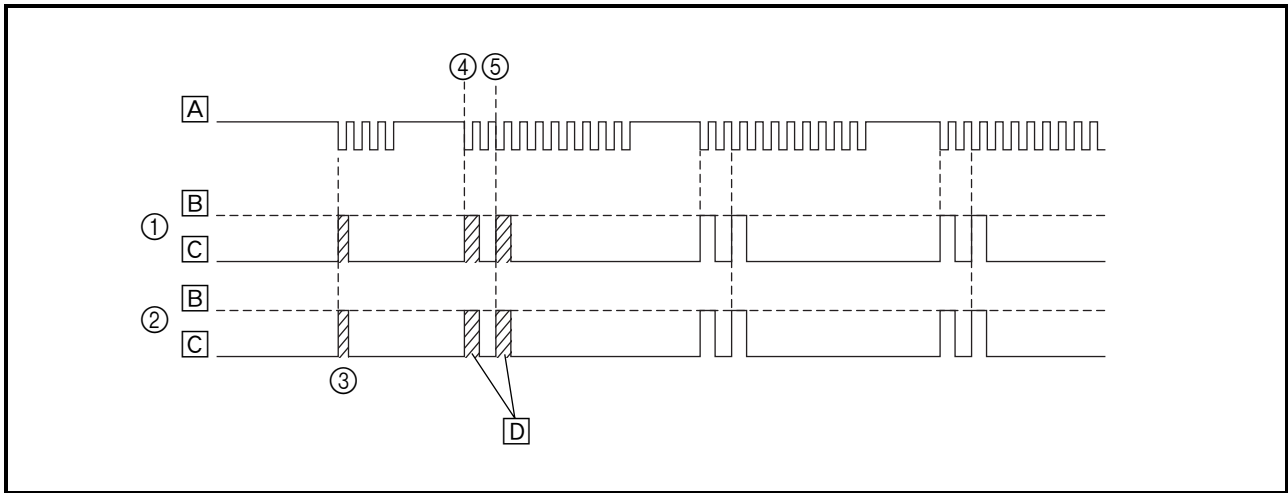
After the asynchronous injection is completed, and until the ECU receives signals from the cylinder identification sensor with the engine speed at 400 r/min or higher, the injectors are actuated in pairs in sync with the signals from the crankshaft position sensor: cylinder #1 and cylinder #2. Controlling both the injection duration and the injection cylinders in this manner enables a precise supply of fuel in accordance with the starting conditions of the engine.

• Starting injection duration



- ① Basic injection duration
- ② After-start compensation injection duration
- ③ Low
- ④ High
- A Injection duration
- B Engine temperature
- C Extended duration

• Starting cylinder control

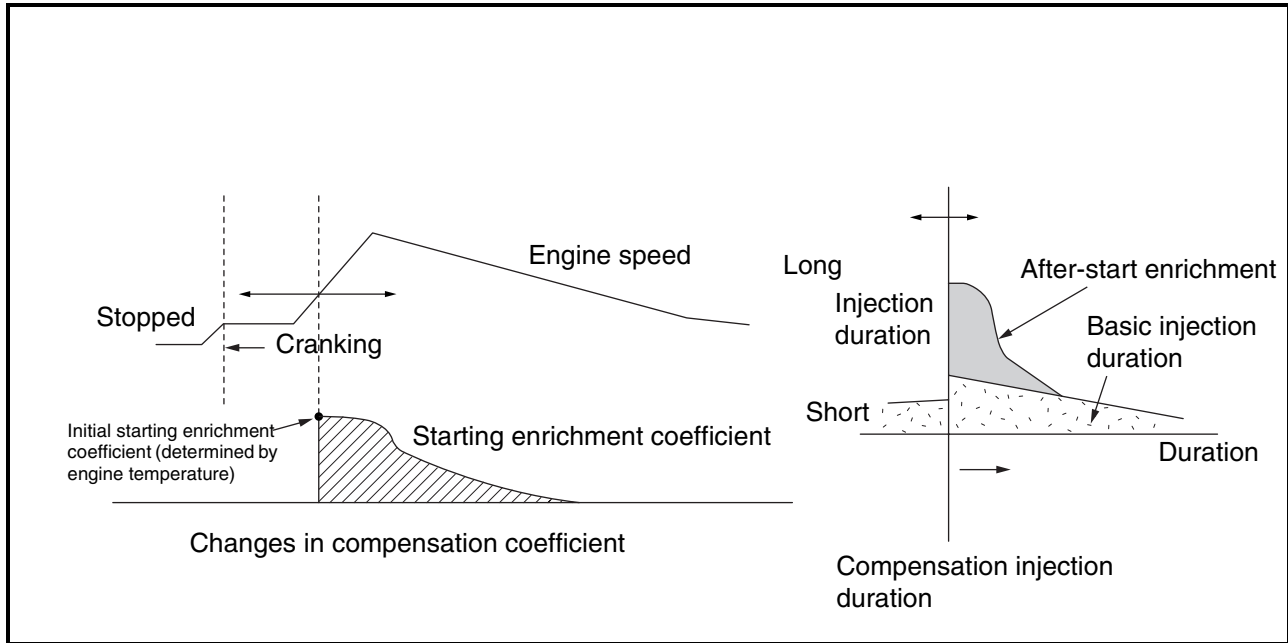


- ① Injector #1
- ② Injector #2
- ③ Starting asynchronous injection
- ④ Identification of cylinder #1
- ⑤ Identification of cylinder #2
- A Crankshaft position sensor
- B Injection
- C Stop
- D Synchronous injection

- After-start enrichment

After-start enrichment provides enrichment compensation during a prescribed duration following the starting (firing) of the engine. While the amount of fuel enrichment is determined by the after-start enrichment coefficient, the coefficient varies by the engine temperature. Although the engine temperature determines the initial starting enrichment coefficient, the coefficient subsequently changes in accordance with the damping factor. The enrichment ratio is the highest immediately after the engine is started, and diminishes gradually. The enrichment of fuel in this manner ensures a stable engine operation immediately after the engine is started.

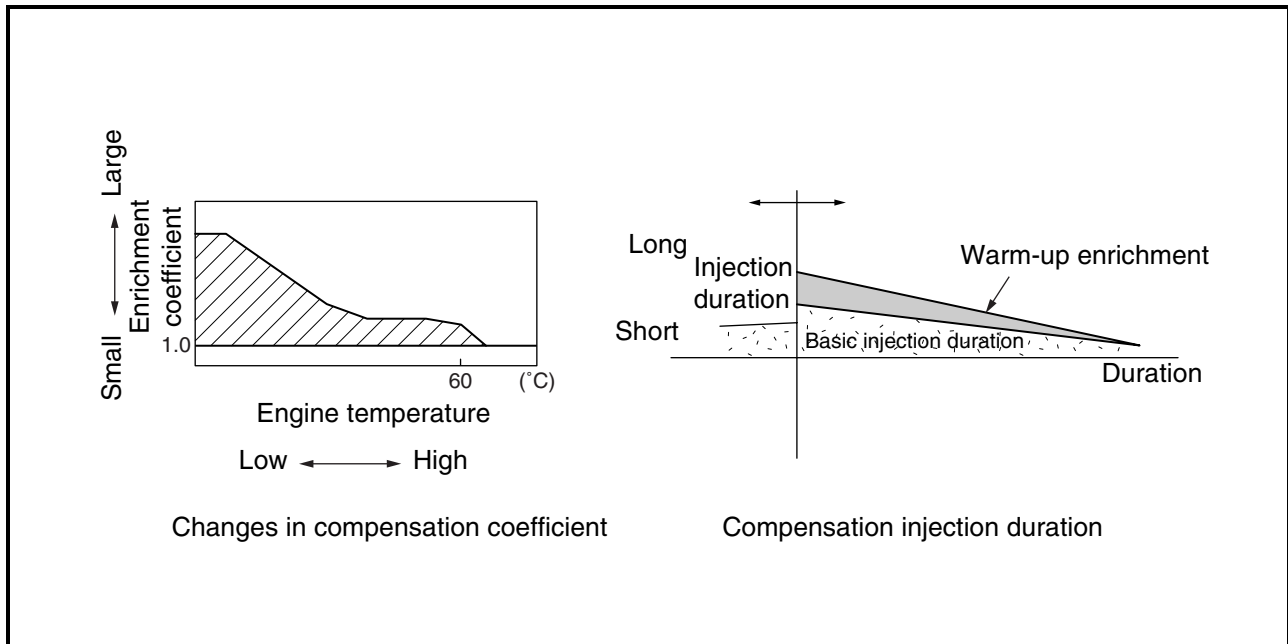
Changes in compensation coefficient and compensation injection duration



- Warm-up enrichment

When the engine temperature is low, a warm-up coefficient is applied in accordance with the signals from the engine temperature sensor in order to effect fuel enrichment. Because the engine temperature determines the coefficient, the coefficient changes with the fluctuations in the engine temperature. The coefficient increases with the decrease in the engine temperature, and decreases with the increase in the engine temperature. The ratio of fuel enrichment also changes with the changes in the coefficient.

Changes in compensation coefficient and compensation injection duration

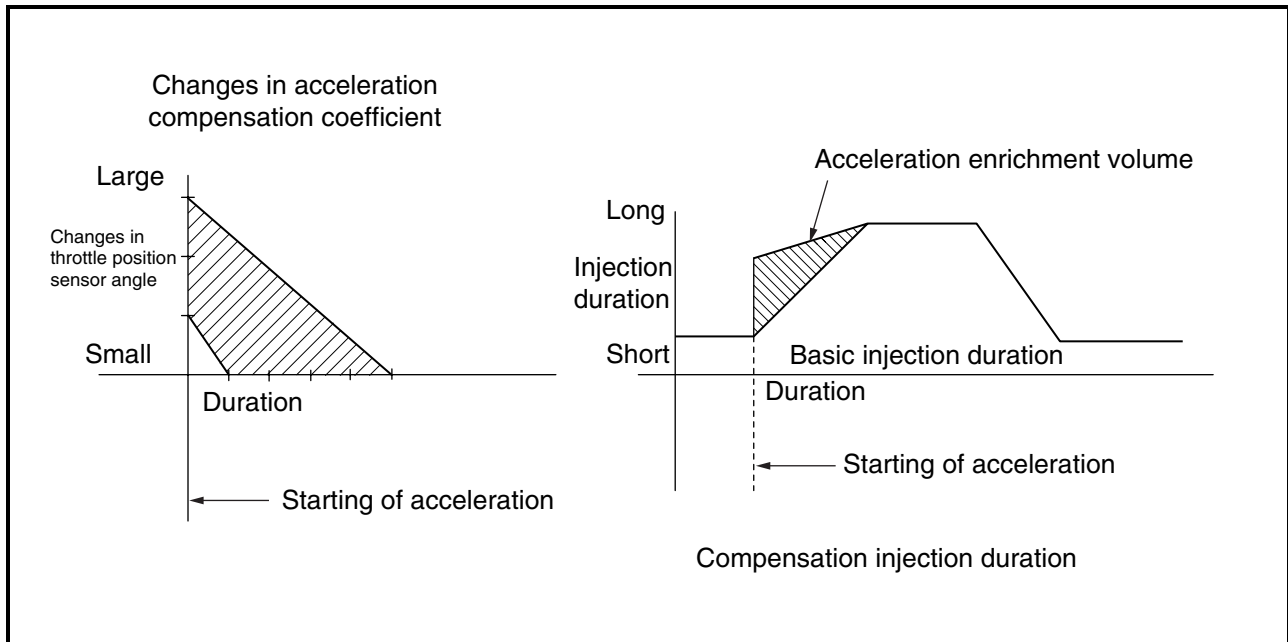


- Acceleration enrichment

Acceleration enrichment is provided in accordance with the signals from the throttle position sensor. As the rider operates the accelerator to accelerate the motorcycle from a constant speed, the throttle position sensor actuates in unison with the accelerator. The ECU interprets that acceleration has taken place through the throttle position sensor signal and executes acceleration enrichment. The enrichment volume is determined by the acceleration enrichment coefficient. The coefficient increases with the changes in the throttle position sensor, which also increases the actual enrichment volume. The enrichment volume is executed in accordance with the acceleration enrichment coefficient when the movement of the throttle position sensor has met the acceleration condition as defined by the ECU. Thereafter, the enrichment volume is regulated by the coefficient that changes in accordance with the damping rate.

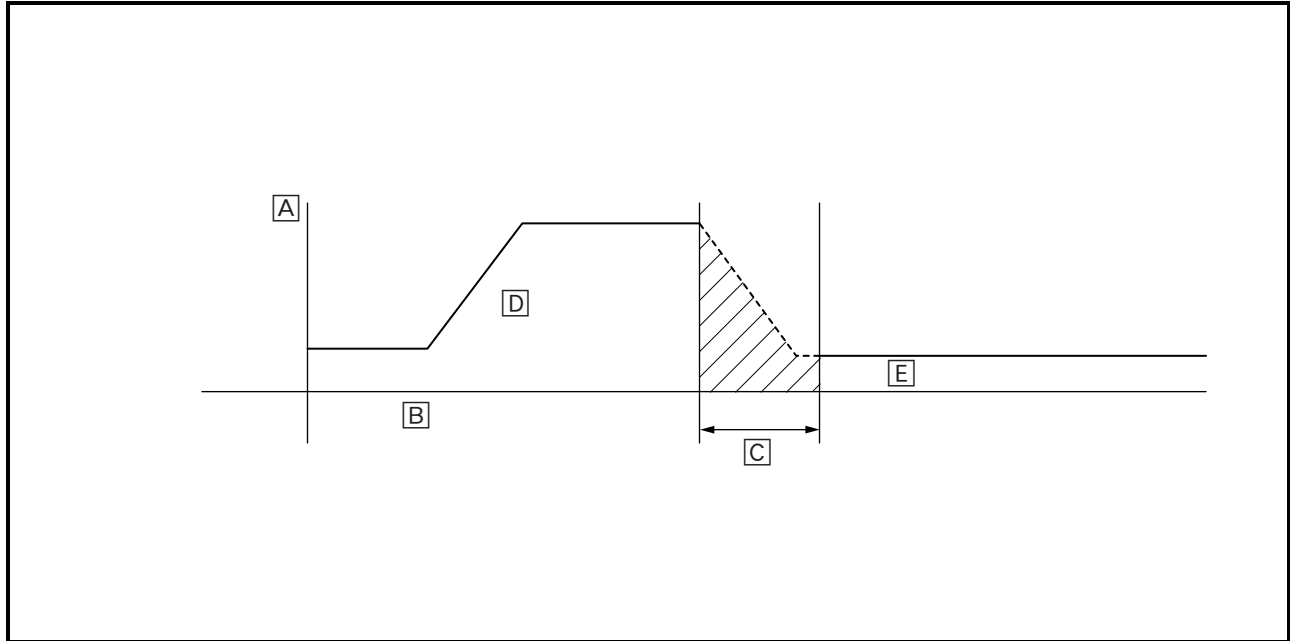
**(Acceleration injection duration = basic injection duration × acceleration compensation coefficient)**

Changes in compensation coefficient and compensation injection duration



- Deceleration control

Deceleration control is effected in accordance with the signals from the throttle position sensor. As the rider operates the accelerator to decelerate the motorcycle that is in motion, the throttle position sensor actuates in unison with the accelerator. When the engine speed is greater than a prescribed value with the throttle fully closed (thus applying engine braking), the ECU executes a deceleration fuel cut-off. The injection of fuel to all the cylinders is stopped when fuel cut-off control is executed, thus improving fuel economy.



- A** Engine speed
- B** Duration
- C** Fuel cut-off control (stopping fuel injection)
- D** Basic injection duration
- E** Basic injection duration

- Over-revolution control

The over-revolution control of the ECU operates the ignition control and fuel cut-off control when the engine speed becomes greater than the specified value. The over-revolution control first operates the ignition control to reduce the ignition of each cylinder to keep the engine speed from rising. If the engine speed increases after the ignition control is activated, the fuel cut-off control is activated. The fuel cut-off control is first activated in cylinder #1, then in cylinder #2 as the engine speed increases further.

In addition, specified engine speeds are set at each gear position, therefore, over-revolution control can be achieved more accurately.



## FIRST IDLE CONTROL SYSTEM

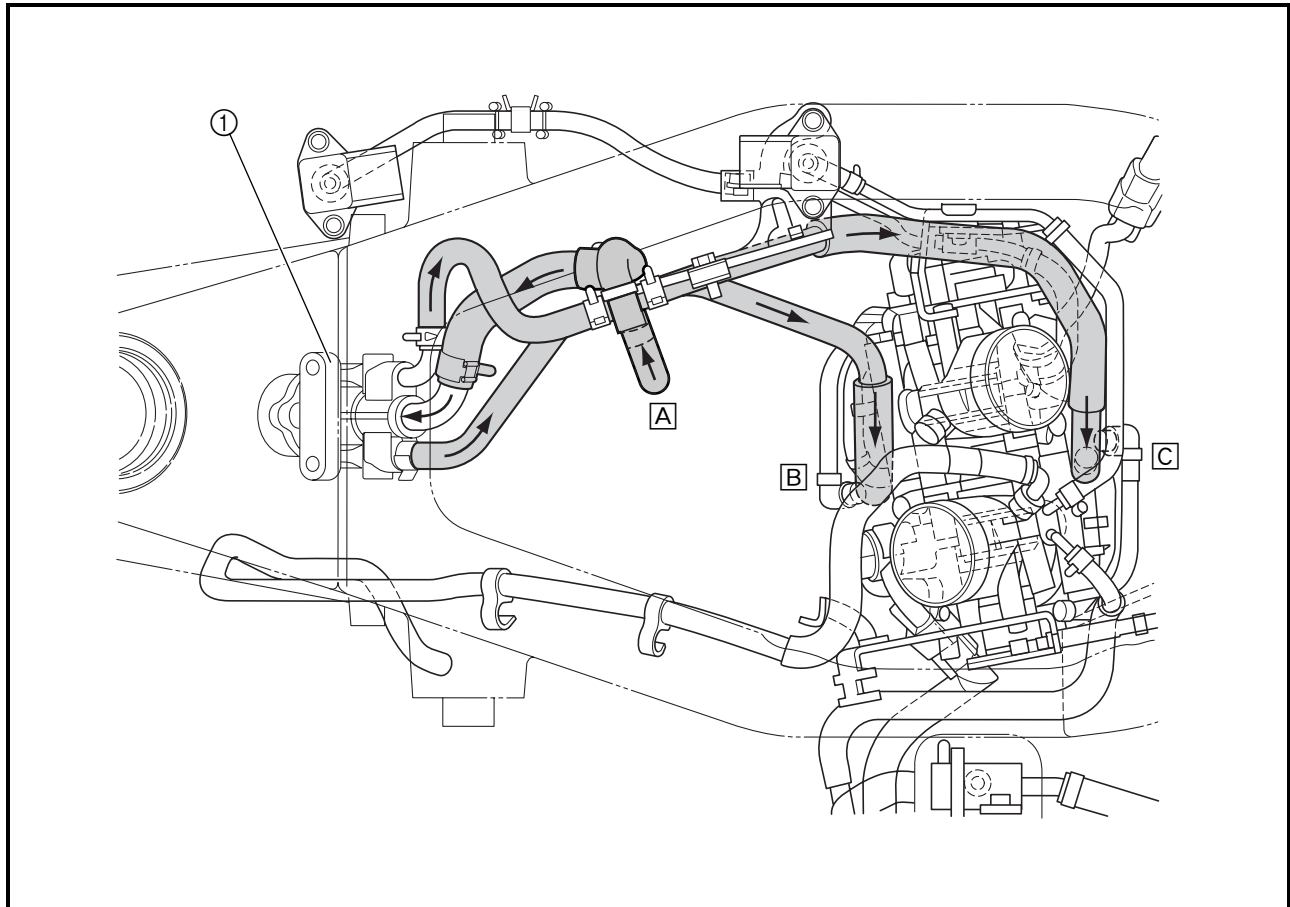
This system temporarily increases the fuel injection volume of the injectors when starting a cold engine and until the engine is warm. The system improves startability and stabilizes engine speed during engine warm up.

### Basic operation

The ECU receives a signal from the engine temperature sensor and determines the temperature of the engine with the collected data. Based on this data, the ECU regulates the linear control valve.

The linear control valve sends air from the silencer air filter case to the intake manifold to increase the intake air volume. When the engine is started and during engine warm up, the fuel injection volume is increased to compensate the increase in the air volume.

A signal from the ECU and the temperature of the engine immediately after starting, determine the air volume introduced by the linear control valve. When the engine is running, the engine oil temperature controls the linear control valve. If the temperature is low, the intake air volume increases. If the temperature is high, the intake air volume decreases. Furthermore, if the temperature reaches 80 °C or higher, the valve fully closes to stop the intake air volume from increasing.



- ① Liner control valve
- A From silencer air filter case
- B To intake manifold - cylinder #2
- C To intake manifold - cylinder #1

## COMPONENTS

### Linear control valve

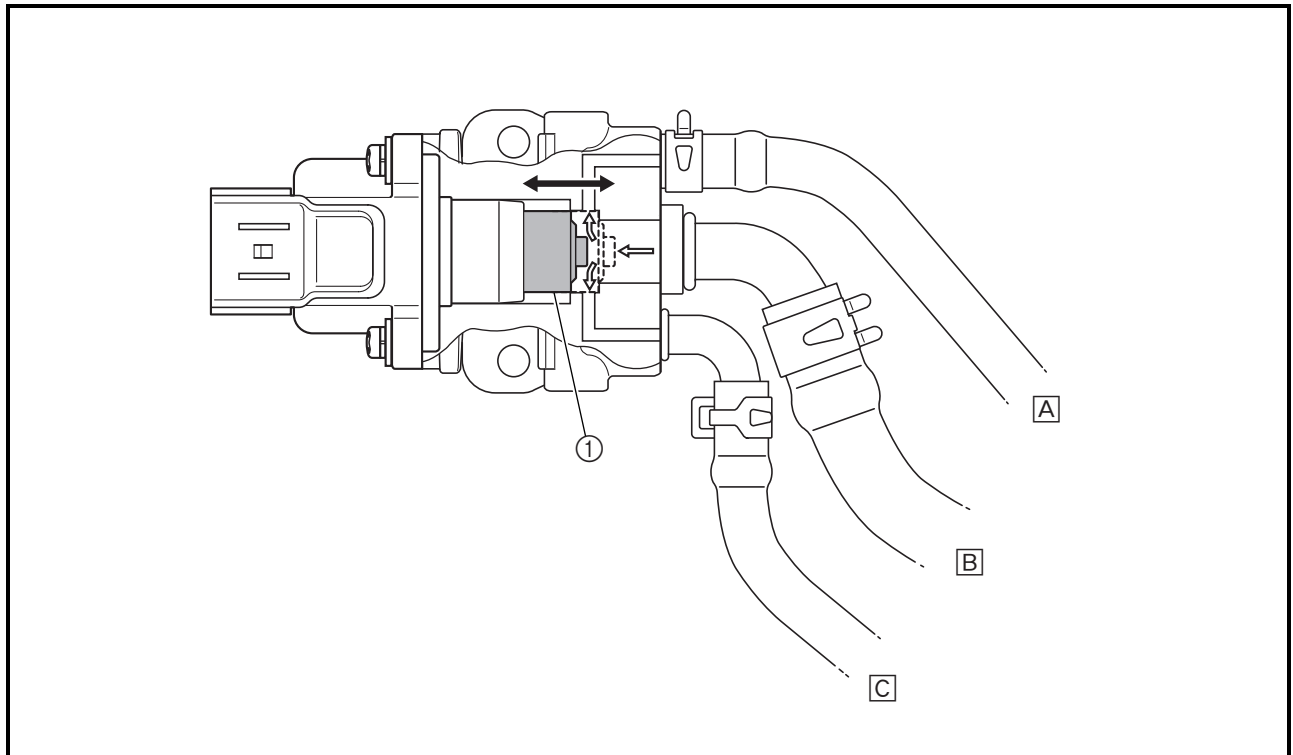
The linear control valve sends air from the silencer box to the intake manifold to increase the intake air volume.

The linear control valve consists of a stepper motor that operates the valve, a valve unit that is attached to the motor, and a main body that distributes the intake air. The stepper motor has been adopted to deduce malfunctions during operation and for high-precision control. The main body contains air passages, which are opened and closed by the motor, which operates the valve. In addition, a pipe to introduce air from the silencer air filter case and air pipes to distribute air to each cylinder are installed on the linear control valve.

The stepper motor used in the XV1700 rotates exactly 15 degrees per step (1 pulse input). With each step, the valve moves approximately 0.041 mm. The stepper motor is set to make a total of 146 steps, thus the total range of the valve, from fully closed to fully open, is approximately 6.08 mm.

The linear control valve is operated when the engine is started and adjusts its opening to accommodate the temperature of the engine. When the engine is started, the control data transfers from the engine temperature to the engine oil temperature and adjusts the valve opening to accommodate the engine oil temperature. When the engine oil temperature reaches 80 °C (176 °F) or higher, the valve fully closes to stop the intake air volume from increasing.

In addition, the linear control valve fully closes when the main switch is turned off, but maintains its current position if the engine is stopped with the engine stop switch or if the engine stalls. When the engine is restarted, control starts at the maintained position.



- ① Valve
- Ⓐ To intake manifold - cylinder #1
- Ⓑ From silencer air filter case
- Ⓒ To intake manifold - cylinder #2

**Instrument panel**

Function indication

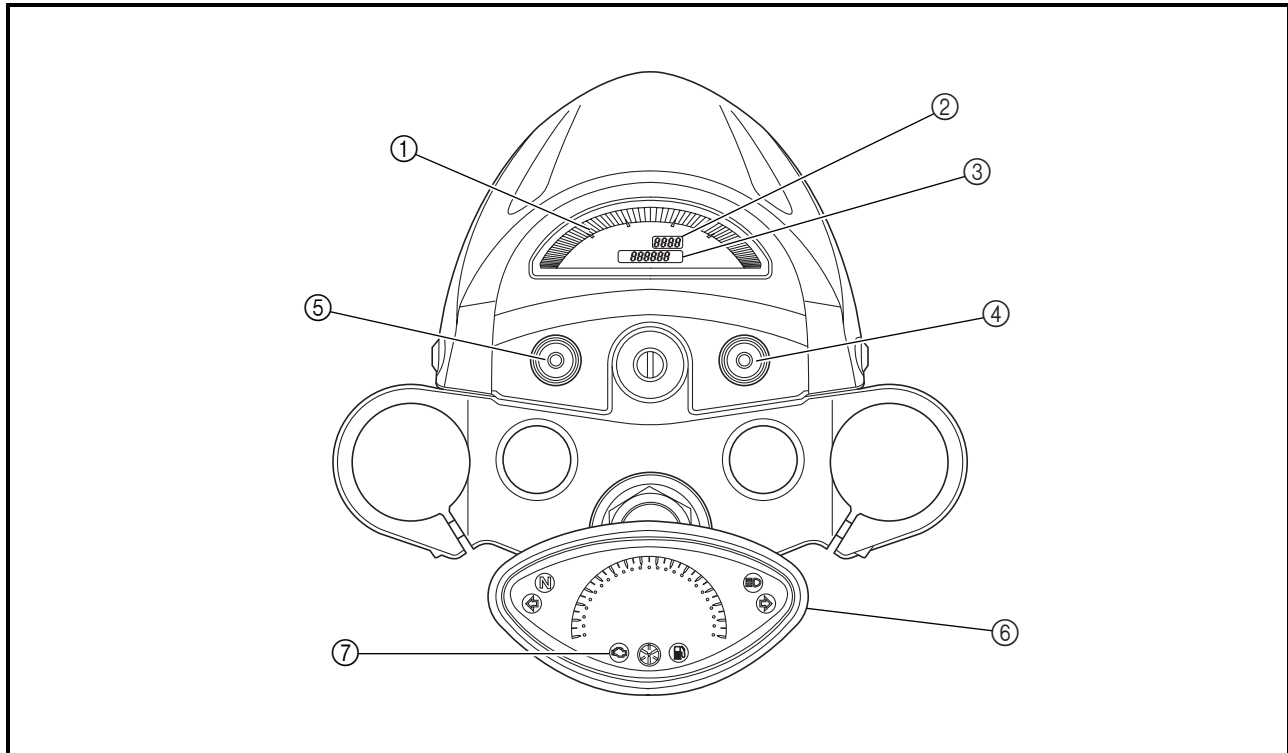
The indications of the self-diagnosis function can be checked and inspection operations can be performed through the use of the tachometer on the instrument panel.

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

1. ECU transmission data and meter display

Mode	ECU transmission data	Meter indication	Display description
Common to all modes	Vehicle speed	Tripmeter	4 digits including decimals
	Engine warning indicator lamp	Indicator lamp	ON/OFF
	Self-diagnostic fault code	Clock LCD	Shows trouble code in numbers
Normal mode	Engine temperature	Indicator lamp	Engine temperature
DIAG mode	Diagnostic code	Clock LCD	Shows diagnostic code in numbers
	Diagnosis sensor value	Trip LCD	Shows data for sensors

Note: If the exchange of data between the ECU and the meters is abnormal, the clock LCD shows error “Er-1~4”. The clock LCD reverts to showing the time after the error has been corrected.



- ① Tachometer
- ② Clock
- ③ Odometer/tripmeter/fuel reserve tripmeter
- ④ RESET button
- ⑤ SELECT button
- ⑥ Speedometer assembly
- ⑦ Engine trouble warning light



2. DIAG mode inspection and adjustment (multi-function meter)

Mode Selection (Make sure to disconnect the coupler from the fuel pump.)

**DIAG mode**

1. While keeping both the SELECT and RESET buttons pressed, turn "ON" the main switch. Keep the buttons pressed for 8 seconds or more.
  - \* All the segments are "OFF" except the clock and the trip LCD.
  - \* "DIAG" appears on the clock LCD.
2. Simultaneously press the SELECT and RESET buttons for 2 seconds or more to select an item.

**Normal mode**

Turn "ON" the main switch.

- \* The self-diagnostic function starts a system check.

System normal  
Normal meter display

**Malfunction detection**

A fault code number appears on the clock LCD.

The engine trouble warning light illuminates.

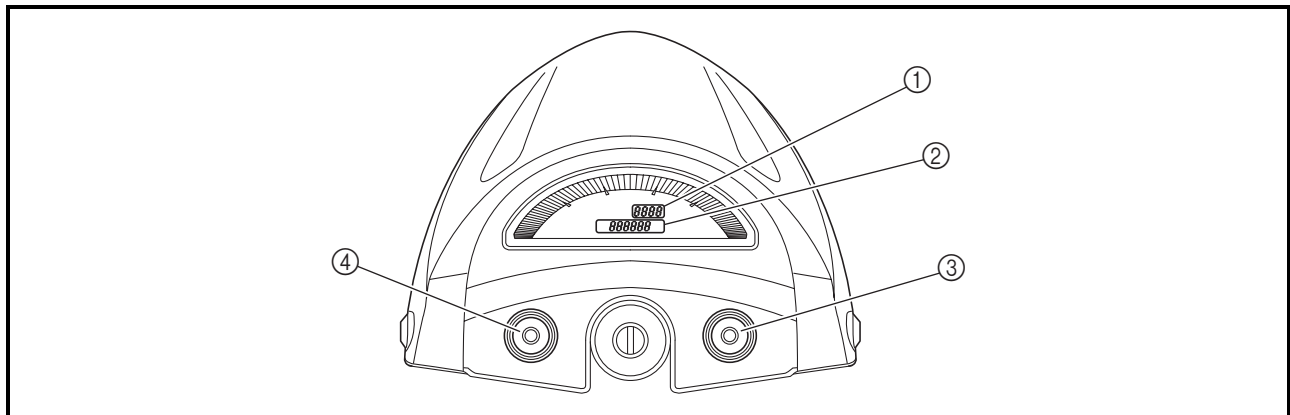
(The engine cannot be started in this mode.)

**Diagnosis mode**

Enables the verification of the operation of the actuator and various sensors.

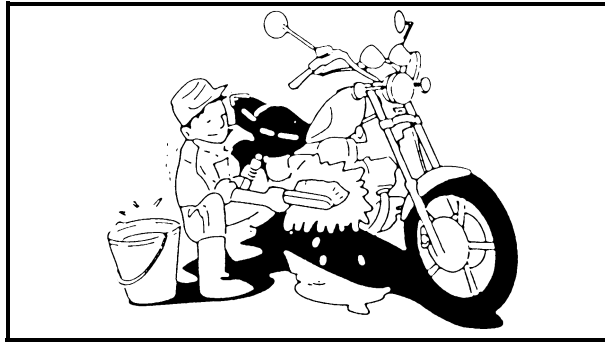
- \* Turn the engine stop switch to "OFF". (Turn it "ON" when the diagnostic code is 09 or 03.)

1. Press the SELECT and RESET buttons to select the Diagnosis mode.
  - \* RESET button = decrement
  - \* SELECT button = increment
  - \* A diagnostic code number appears on the clock LCD.
2. Checking the operation of the actuator
  - \* Turn "ON" the engine stop switch to start the operation.
3. Checking the operation of various sensors
  - \* The condition of the operation appears on the TRIP LCD.



- ① Clock
- ② Odometer/tripmeter/fuel reserve tripmeter

- ③ RESET button
- ④ SELECT button



EAS00020

**IMPORTANT INFORMATION  
PREPARATION FOR REMOVAL AND  
DISASSEMBLY**

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



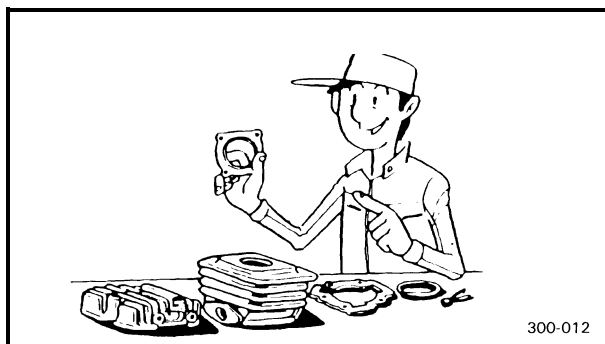
2. Use only the proper tools and cleaning equipment.

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**

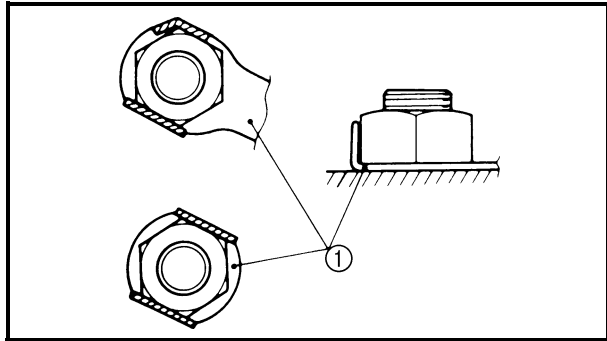
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

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.

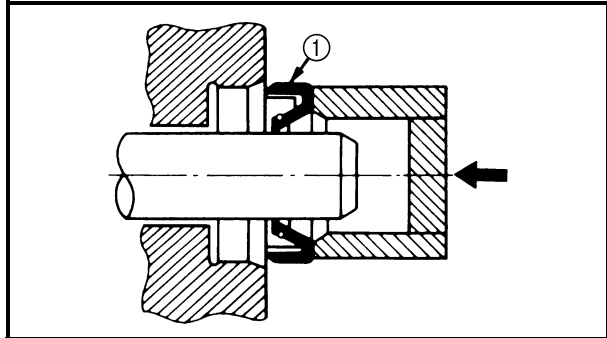
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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.

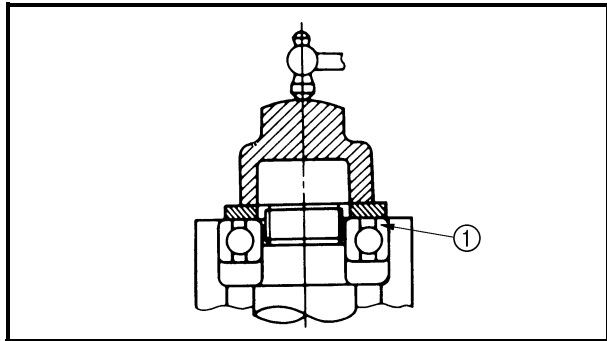


EAS00024

**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.

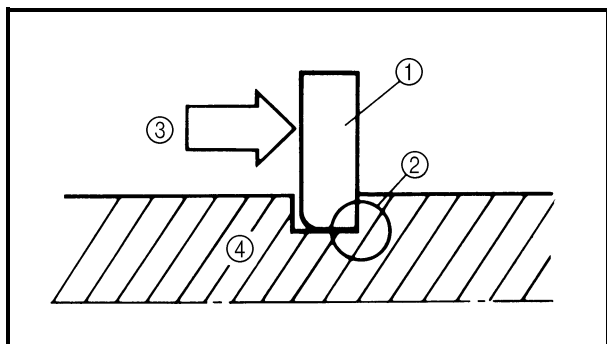
① Oil seal



**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

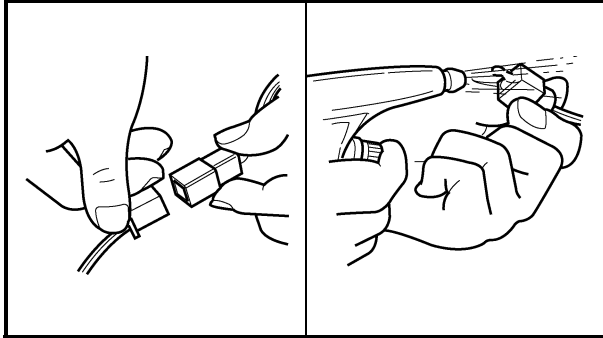
EAS00026

## CHECKING THE CONNECTIONS

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

1. Disconnect:

- lead
- coupler
- connector

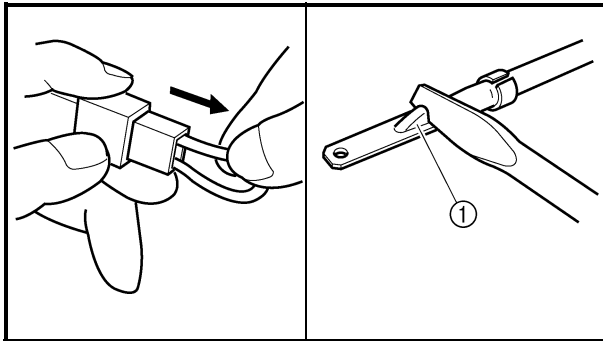


2. Check:

- lead
- coupler
- connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



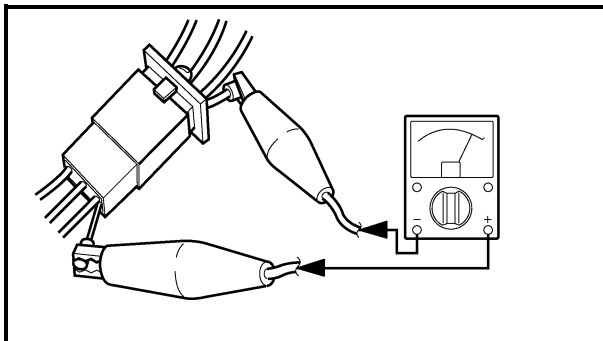
3. Check:

- all connections

Loose connection → Connect properly.

**NOTE:**

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

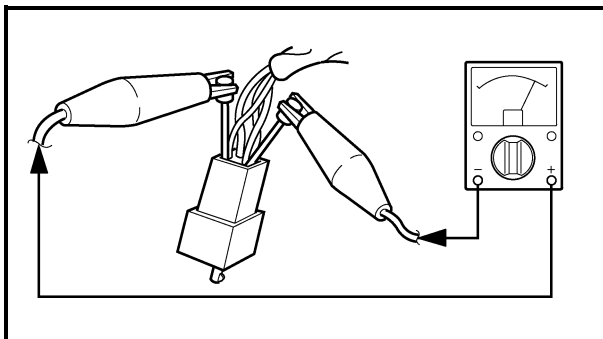


4. Connect:

- lead
- coupler
- connector

**NOTE:**

Make sure all connections are tight.



5. Check:

- continuity (with the pocket tester)



**Pocket tester  
YU-03112**

**NOTE:**

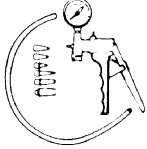
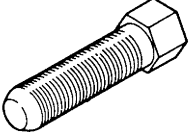
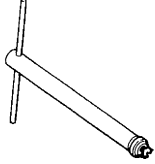
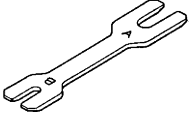
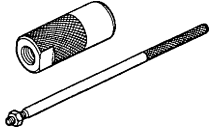
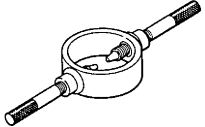
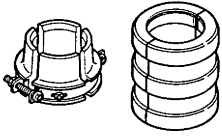
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

EAS00027

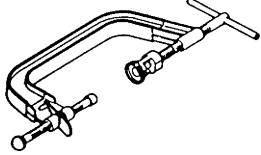
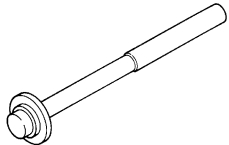
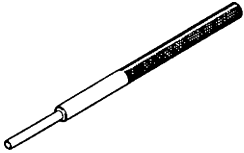
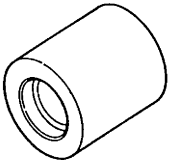
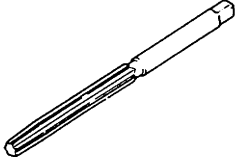
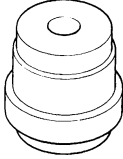
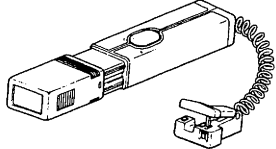

**SPECIAL TOOLS**

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.

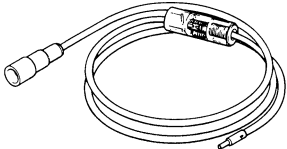
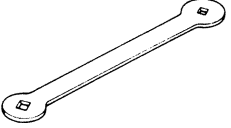
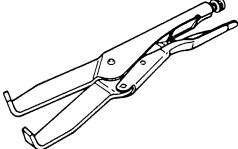
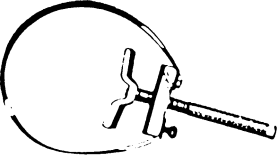
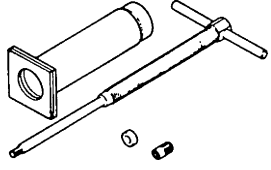
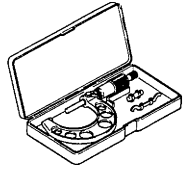
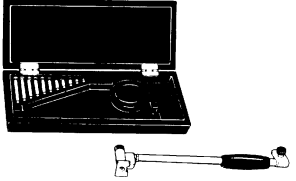
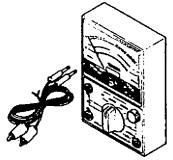
When placing an order, refer to the list provided below to avoid any mistakes.

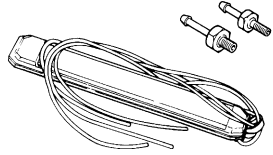
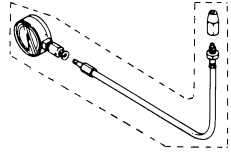
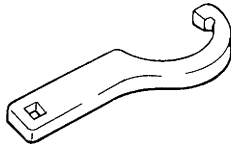
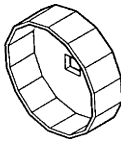

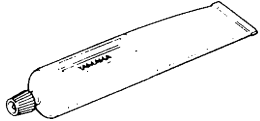
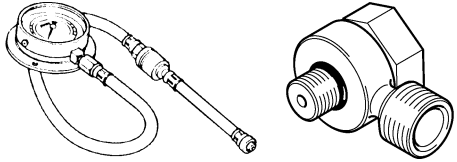
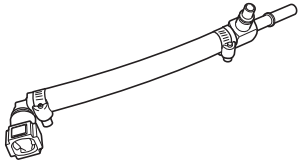
Tool No.	Tool name/Function	Illustration
YB-35956	<p>Mity vac</p> <p>This tool used to measure the vacuum pressure.</p>	
YM-01080-A	<p>Alternator rotor puller</p> <p>This tool is used to remove the generator rotor.</p>	
YM-01423	<p>Damper rod holder</p> <p>This tool is used to hold the damper rod assembly when loosening or tightening the damper rod assembly bolt.</p>	
YM-01434	<p>Rod holder</p> <p>This tool is used to support the damper adjusting rod.</p>	
<p>Rod puller YM-01437</p>	<p>Rod puller</p> <p>These tools are used to pull up the front fork damper rod.</p>	
YM-01441	<p>Fork spring compressor</p> <p>This tool is used to disassemble or assemble the front fork legs.</p>	
YM-01442	<p>Fork seal driver</p> <p>This tool is used to install the front fork's oil seal and dust seal.</p>	



Tool No.	Tool name/Function	Illustration
YM-04019	<p>Valve spring compressor set</p> <p>This tool is used to remove or install the valve assemblies.</p>	
YM-04058	<p>Bearing driver</p> <p>This tool is needed when installing the crankshaft journal bearing.</p>	
YM-04064-A	<p>Valve guide remover (ø6)</p> <p>This tool is used to remove or install the valve guides.</p>	
YM-04065-A	<p>Valve guide installer (ø6)</p> <p>This tool is used to install the valve guides.</p>	
YM-04066	<p>Valve guide reamer (ø6)</p> <p>This tool is used to re bore the new valve guides.</p>	
YM-28898	<p>Bearing remover and installer</p> <p>This tool is needed when removing or installing the crankshaft journal bearing.</p>	
YM-33277-A	<p>Timing light</p> <p>This tool is used to check the ignition timing.</p>	
YM-03170	<p>Belt tension gauge</p> <p>This tool is used to measure the drive belt slack.</p>	

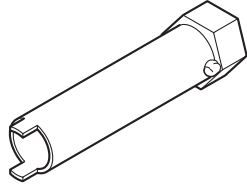


Tool No.	Tool name/Function	Illustration
YM-34487	<p>Dynamic spark tester</p> <p>This tool is used to check the ignition system components.</p>	
YM-8035	<p>Valve adjuster</p> <p>This tool is used to adjust the valve clearance.</p>	
YM-91042	<p>Universal clutch holder</p> <p>This tool is used to hold the clutch boss when removing or installing the clutch boss nut.</p>	
YS-01880-A	<p>Primary sheave holder</p> <p>This tool is used to hold the generator rotor when removing or installing the generator rotor bolt, generator shaft bolt or crankshaft position sensor rotor bolt.</p>	
YU-01304	<p>Piston pin puller</p> <p>This tool is used to remove the piston pins.</p>	
YU-03009	<p>Micrometer (75 ~ 100 mm)</p> <p>This tool is used to measure the piston skirt diameter.</p>	
YU-03017	<p>Cylinder bore gauge (50 ~ 100 mm)</p> <p>This tool is used to measure the cylinder bore.</p>	
YU-03112	<p>Pocket tester</p> <p>This tool is used to check the electrical system.</p>	

Tool No.	Tool name/Function	Illustration
YU-08030	<p>Carburetor synchronizer</p> <p>This gauge is needed for throttle bodies synchronization.</p>	
<p>Compression gauge YU-33223</p> <p>Compression gauge adapter YU-33223-3</p>	<p>Compression gauge set 14/18 mm</p> <p>Compression gauge adapter 12 mm</p> <p>These tools are used to measure engine compression.</p>	
YU-33975	<p>Spanner wrench</p> <p>This tool is used to loosen or tighten the steering stem ring nuts.</p>	
YU-38411	<p>Oil filter wrench</p> <p>This tool is needed to loosen or tighten the oil filter cartridge.</p>	
YU-8036-A	<p>Inductive tachometer</p> <p>This tool is used for check engine speed.</p>	
ACC-11001-05-01	<p>Quick Gasket®</p> <p>This sealant is used to seal two mating surfaces (e. g., crankcase mating surfaces).</p>	
<p>Gauge YU-03153</p> <p>Oil pressure adaptor E YM-03129</p>	<p>Pressure gauge</p> <p>Oil pressure adaptor E</p> <p>These tools are needed to measure engine oil pressure.</p>	
YM-03176	<p>Fuel pressure adapter</p> <p>This tool is needed to measure fuel pressure.</p>	

# SPECIAL TOOLS

<b>GEN INFO</b>	
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Tool No.	Tool name/Function	Illustration
YM-01485	Pivot shaft wrench  This tool is needed to loosen or tighten the spacer bolt.	



## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Item	Standard	Limit
<b>Model code</b>	5PX1 (USA) 5PX2 (California) 5PX3 (CDN)	---- ---- ----
<b>Dimensions</b>		
Overall length	2,385 mm (93.9 in)	----
Overall width	955 mm (37.6 in)	----
Overall height	1,120 mm (44.1 in)	----
Seat height	725 mm (28.5 in)	----
Wheelbase	1,665 mm (65.6 in)	----
Minimum ground clearance	155 mm (6.10 in)	----
Minimum turning radius	3,400 mm (133.9 in)	----
<b>Weight</b>		
Wet (with oil and a full fuel tank)	295 kg (650 lb)	----
Dry (without oil and fuel)	278 kg (613 lb)	----
Gross vehicle weight ratio (GVWR)	480 kg (1,058 lb)	----
Bias weight (dry) front	133 kg (293 lb)	----
Bias weight (dry) rear	145 kg (320 lb)	----
Maximum load (total of cargo, rider, passenger, and accessories)	185 kg (408 lb)	----



## ENGINE SPECIFICATIONS

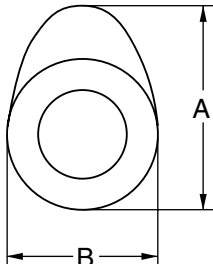
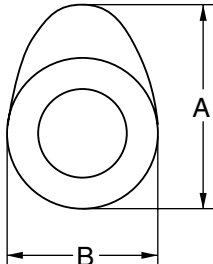
Item	Standard	Limit
<b>Engine</b>		
Engine type	Air-cooled, 4-stroke, OHV	----
Displacement	1,670 cm <sup>3</sup> (101.9 cu.in)	----
Cylinder arrangement	V-type 2-cylinder	----
Bore × stroke	97 × 113 mm (3.82 × 4.45 in)	----
Compression ratio	8.36 : 1	----
Engine idling speed	850 ~ 950 r/min	----
CO%	4.0 ~ 5.0 %	----
Vacuum pressure at engine idling speed	50 kPa (375 mm Hg, 14.8 in Hg)	----
Standard compression pressure (at sea level)	1,200 kPa (12.0 kg/cm <sup>2</sup> , 171 psi) at 200 r/min	----
Minimum compression pressure	1,000 kPa (10.0 kg/cm <sup>2</sup> , 145 psi)	----
Maximum compression pressure	1,400 kPa (14.0 kg/cm <sup>2</sup> , 203 psi)	----
Engine dry weight	108 kg (238 lb)	----
<b>Fuel</b>		
Recommended fuel	Unleaded fuel only (USA and California) Regular unleaded gasoline only (CDN)	----
Fuel tank capacity		
Total (including reserve)	15 L (13.2 Imp qt, 15.86 US qt)	----
Reserve only	3 L (2.64 Imp qt, 3.17 US qt)	----
<b>Engine oil</b>		
Lubrication system	Dry sump	----
Recommended oil	Yamalube 4 (20W40) or SAE 20W40 type SE motor oil (40 °F/5 °C or above) (Non-Friction modified)	----
Quantity		
Total amount	5.0 L (4.40 Imp qt, 5.29 US qt)	----
Engine	2.0 L (1.76 Imp qt, 2.11 US qt)	----
Oil tank	3.0 L (2.64 Imp qt, 3.17 US qt)	----
Without oil filter cartridge replacement	3.7 L (3.26 Imp qt, 3.91 US qt)	----
With oil filter cartridge replacement	4.1 L (3.61 Imp qt, 4.33 US qt)	----
Oil pressure (hot)	60 kPa (0.6 kg/cm <sup>2</sup> , 8.5 psi) at 900 r/min	----
Relief valve opening pressure	600 kPa (6.0 kg/cm <sup>2</sup> , 85 psi)	----
Oil temperature	70 ~ 90 °C (158 ~ 194 °F)	----

# ENGINE SPECIFICATIONS

**SPEC**

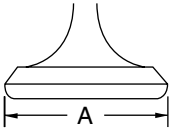
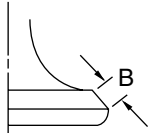
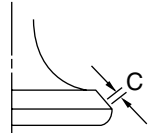
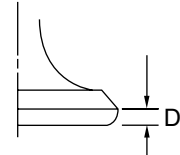

Item	Standard	Limit
<b>Transfer gear oil</b>		
Recommended oil	SAE 80 API "GL-4" hypoid gear oil	----
Total amount	0.49 L (0.43 Imp qt, 0.52 US qt)	----
Periodic oil replacement	0.4 L (0.35 Imp qt, 0.42 US qt)	----
<b>Oil filter</b>		
Oil filter type	Cartridge (paper)	----
Bypass valve opening pressure	80 ~ 120 kPa (0.8 ~ 1.2 kg/cm <sup>2</sup> , 11.3 ~ 17.1 psi)	----
<b>Engine oil pump</b>		
Oil pump type	Trochoid	----
Inner rotor to outer rotor tip clearance	0 ~ 0.12 mm (0 ~ 0.0047 in)	0.17 mm (0.0067 in)
Outer rotor to oil pump housing clearance (feed pump)	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)	0.13 mm (0.0051 in)
Outer rotor to oil pump housing clearance (scavenging pump)	0.06 ~ 0.11 mm (0.0024 ~ 0.0043 in)	0.16 mm (0.0063 in)
<b>Transfer oil pump</b>		
Oil pump type	Trochoid	----
Inner rotor to outer rotor tip clearance	0.07 ~ 0.12 mm (0.0028 ~ 0.0047 in)	0.17 mm (0.0067 in)
Outer rotor to oil pump housing clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)	0.16 mm (0.0063 in)
Bypass valve opening pressure	80 ~ 120 kPa (0.8 ~ 1.2 kg/cm <sup>2</sup> , 11.3 ~ 17.1 psi)	----
Relief valve opening pressure	600 kPa (6.0 kg/cm <sup>2</sup> , 85 psi)	----
Oil pressure (hot)	60 kPa (0.6 kg/cm <sup>2</sup> , 8.5 psi) at 900 r/min	----
<b>Starting system type</b>		
	Electric starter	----
<b>Electric fuel injection</b>		
Model	IMP-732	----
Manufacturer	NIPPON INJECTOR	----
Quantity	2	----
<b>Spark plugs</b>		
Model	DPR7EA-9/X22EPR-U9	----
Manufacturer	NGK/DENSO	----
Quantity	4	----
Spark plug gap	0.8 ~ 0.9 mm (0.0315 ~ 0.0354 in)	----
<b>Cylinder heads</b>		
Volume	98.6 ~ 103.6 cm <sup>3</sup> (6.02 ~ 6.32 cu.in)	----
Max. warpage	----	0.03 mm (0.0012 in)



Item	Standard	Limit
<b>Camshafts</b>		
Drive system	Gear drive	----
Crankcase hole inside diameter	25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in)	----
Camshaft cover hole inside diameter	28.000 ~ 28.021 mm (1.1024 ~ 1.1032 in)	----
Camshaft journal diameter (crankcase side)	24.937 ~ 24.950 mm (0.9818 ~ 0.9823 in)	----
Camshaft journal diameter (camshaft cover side)	27.967 ~ 27.980 mm (1.1011 ~ 1.1016 in)	----
Camshaft to crankcase clearance	0.050 ~ 0.084 mm (0.0020 ~ 0.0033 in)	----
Camshaft to camshaft cover clear- ance	0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)	----
Camshaft intake cam dimensions		
		
Measurement A	38.231 ~ 38.331 mm (1.5052 ~ 1.5091 in)	38.131 mm (1.5012 in)
Measurement B	32.013 ~ 32.113 mm (1.2604 ~ 1.2643 in)	31.913 mm (1.2564 in)
Camshaft exhaust cam dimensions		
		
Measurement A	38.232 ~ 38.332 mm (1.5052 ~ 1.5091 in)	38.132 mm (1.5013 in)
Measurement B	31.995 ~ 32.095 mm (1.2596 ~ 1.2636 in)	31.895 mm (1.2557 in)



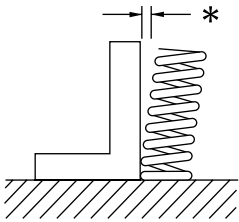



Item	Standard	Limit	
<b>Rocker arms, Rocker arm shafts</b>			
Rocker arm inside diameter	18.000 ~ 18.018 mm (0.7087 ~ 0.7094 in)	18.036 mm (0.7101 in)	
Rocker arm shaft outside diameter	17.976 ~ 17.991 mm (0.7077 ~ 0.7083 in)	14.970 mm (0.5894 in)	
Rocker arm to rocker arm shaft clearance	0.009 ~ 0.042 mm (0.0004 ~ 0.0017 in)	0.08 mm (0.003 in)	
Lift ratio (Y/X)	40.4/29.5 = 1.37	----	
<b>Valves, valve seats, valve guides</b>			
Valve clearance (cold)		----	
Intake	0 ~ 0.04 mm (0 ~ 0.0016 in)	----	
Exhaust	0 ~ 0.04 mm (0 ~ 0.0016 in)	----	
Valve dimensions			
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
Valve head diameter A			
Intake	33.9 ~ 34.1 mm (1.3346 ~ 1.3425 in)		----
Exhaust	27.9 ~ 28.1 mm (1.0984 ~ 1.1063 in)		----
Valve face width B			
Intake	1.3 ~ 2.3 mm (0.0512 ~ 0.0906 in)		----
Exhaust	1.2 ~ 2.4 mm (0.0472 ~ 0.0945 in)		----
Valve seat width C			
Intake	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)		2.0 mm (0.079 in)
Exhaust	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)		2.0 mm (0.079 in)
Valve margin thickness D			
Intake	0.7 ~ 1.3 mm (0.0276 ~ 0.0512 in)		0.4 mm (0.016 in)
Exhaust	0.7 ~ 1.3 mm (0.0276 ~ 0.0512 in)		0.4 mm (0.016 in)

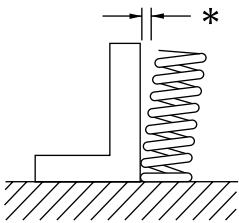
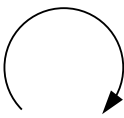


Item	Standard	Limit
Valve stem diameter		
Intake	5.975 ~ 5.990 mm (0.2352 ~ 0.2358 in)	5.945 mm (0.2341 in)
Exhaust	5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in)	5.920 mm (0.2331 in)
Valve guide inside diameter		
Intake	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.05 mm (0.2382 in)
Exhaust	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.05 mm (0.2382 in)
Valve stem-to-valve guide clearance		
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.1 mm (0.0039 in)
Valve stem runout	----	0.01 mm (0.0004 in)
Valve seat material		
Intake	PB 6	----
Exhaust	V557W	----
<b>Valve springs</b>		
Inner springs		
Free length		
Intake	38.26 mm (1.51 in)	36.26 mm (1.43 in)
Exhaust	38.26 mm (1.51 in)	36.26 mm (1.43 in)
Spring rate-intake (K1)	7.3 N/mm (41.68 lb/in)	----
Spring rate-intake (K2)	8.8 N/mm (50.25 lb/in)	----
Spring rate-exhaust (K1)	7.3 N/mm (41.68 lb/in)	----
Spring rate-exhaust (K2)	8.8 N/mm (50.25 lb/in)	----
Installed length (valve closed)		
Intake	29.0 mm (1.14 in)	----
Exhaust	29.0 mm (1.14 in)	----

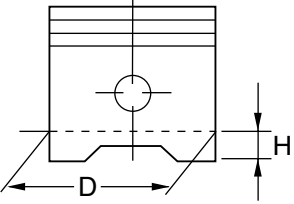
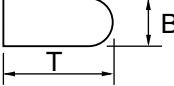


Item	Standard	Limit
Compressed spring force (installed)		
Intake	63 ~ 73 N (6.3 ~ 7.3 kg, 13.9 ~ 16.1 lb)	----
Exhaust	63 ~ 73 N (6.3 ~ 7.3 kg, 13.9 ~ 16.1 lb)	----
Spring tilt		
		
Intake	----	2.5°/2.4 mm
		(2.5°/0.094 in)
Exhaust	----	2.5°/2.4 mm
		(2.5°/0.094 in)
Winding direction (top view)		
Intake	Counterclockwise	----
Exhaust	Counterclockwise	----
		
Outer springs		
Free length		
Intake	43.25 mm (1.70 in)	41.26 mm
		(1.62 in)
Exhaust	43.25 mm (1.70 in)	41.26 mm
		(1.62 in)
Spring rate-intake (K1)	12.2 N/mm (69.66 lb/in)	----
Spring rate-intake (K2)	14.9 N/mm (85.08 lb/in)	----
Spring rate-exhaust (K1)	12.2 N/mm (69.66 lb/in)	----
Spring rate-exhaust (K2)	14.9 N/mm (85.08 lb/in)	----
Installed length (valve closed)		
Intake	31.0 mm (1.22 in)	----
Exhaust	31.0 mm (1.22 in)	----
Compressed spring force (installed)		
Intake	139 ~ 161 N	----
	(13.9 ~ 16.1 kg, 30.6 ~ 35.5 lb)	
Exhaust	139 ~ 161 N	----
	(13.9 ~ 16.1 kg, 30.6 ~ 35.5 lb)	

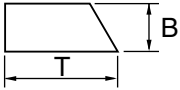
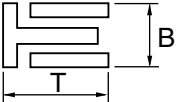
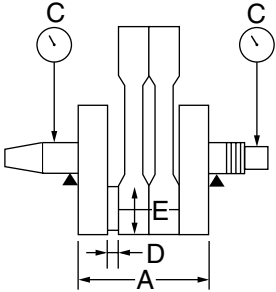


Item	Standard	Limit
<p>Spring tilt</p>  <p>Intake</p> <p>Exhaust</p> <p>Winding direction (top view)</p> <p>Intake</p> <p>Exhaust</p>	<p>----</p> <p>----</p> <p>Clockwise</p> <p>Clockwise</p> 	<p>2.5°/2.4 mm (2.5°/0.094 in)</p> <p>2.5°/2.4 mm (2.5°/0.094 in)</p> <p>----</p> <p>----</p>
<p><b>Valve lifters</b></p> <p>Valve lifter outside diameter</p> <p>Valve lifter case inside diameter</p> <p>Valve lifter-to-valve lifter case clearance</p>	<p>22.9680 ~ 22.9744 mm (0.9043 ~ 0.9045 in)</p> <p>23.000 ~ 23.021 mm (0.9055 ~ 0.9063 in)</p> <p>0.0256 ~ 0.0530 mm (0.0010 ~ 0.0021 in)</p>	<p>----</p> <p>----</p> <p>----</p>
<p><b>Valve push rods</b></p> <p>Valve push rod 1 length</p> <p>Valve push rod 2 length</p> <p>Valve push rod runout</p>	<p>288.5 mm (11.358 in)</p> <p>290.5 mm (11.437 in)</p> <p>0.3 mm (0.012 in)</p>	<p>----</p> <p>----</p> <p>----</p>
<p><b>Cylinders</b></p> <p>Material</p> <p>Sleeve type</p> <p>Bore</p> <p>Max. taper</p> <p>Max. out of round</p>	<p>Aluminum alloy</p> <p>Ceramic composite plated</p> <p>97.000 ~ 97.010 mm (3.8189 ~ 3.8193 in)</p> <p>----</p> <p>----</p>	<p>----</p> <p>----</p> <p>----</p> <p>0.05 mm (0.00197 in)</p> <p>0.05 mm (0.00197 in)</p>



Item	Standard	Limit
<b>Pistons</b>		
Piston-to-cylinder clearance	0.025 ~ 0.050 mm (0.001 ~ 0.002 in)	0.15 mm (0.006 in)
Diameter D	96.960 ~ 96.975 mm (3.8173 ~ 3.8179 in)	----
		
Height H	5 mm (0.20 in)	----
Piston pin bore (in the piston)		
Diameter	22.004 ~ 22.015 mm (0.8663 ~ 0.8667 in)	22.045 mm (0.8679 in)
Offset	1.0 mm (0.0394 in)	----
Piston pins		
Outside diameter	21.991 ~ 22.000 mm (0.8658 ~ 0.8661 in)	21.971 mm (0.8650 in)
Piston pin-to-piston pin bore clearance	0.004 ~ 0.024 mm (0.00016 ~ 0.00094 in)	0.074 mm (0.0029 in)
Piston rings		
Top ring		
		
Ring type	Barrel	----
Dimensions (B × T)	1.2 × 3.8 mm (0.047 × 0.150 in)	----
End gap (installed)	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.65 mm (0.026 in)
Ring side clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)	0.12 mm (0.0047 in)
Plating/coating	Chrome plated/parkerizing	----



Item	Standard	Limit
<p>2nd ring</p>  <p>Ring type Dimensions (B × T) End gap (installed) Ring side clearance Plating/coating</p> <p>Oil ring</p>  <p>Dimensions (B × T) End gap (installed) Plating/coating</p>	<p>Taper 1.2 × 3.8 mm (0.047 × 0.150 in) 0.30 ~ 0.45 mm (0.012 ~ 0.018 in) 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in) Parkerizing</p> <p>2.5 × 3.4 mm (0.098 × 0.134 in) 0.2 ~ 0.7 mm (0.008 ~ 0.028 in) Chrome plated/parkerizing</p>	<p>---- ---- 0.8 mm (0.031 in) 0.12 mm (0.0047 in) ---- ---- ----</p>
<p><b>Connecting rods</b> Crankshaft pin-to-big end bearing clearance Bearing color code Connecting rod length</p>	<p>0.037 ~ 0.074 mm (0.0015 ~ 0.0029 in) 1 = Blue, 2 = Black, 3 = Brown, 4 = Green, 5 = Yellow. 191.95 ~ 192.05 mm (7.557 ~ 7.561 in)</p>	<p>---- ---- ----</p>
<p><b>Crankshaft</b></p>  <p>Width A Max. runout C Big end side clearance D Big end radial clearance E Crankshaft journal-to-crankshaft-journal bearing clearance</p>	<p>132.8 ~ 133.2 mm (5.228 ~ 5.244 in) ---- 0.320 ~ 0.474 mm (0.0126 ~ 0.0187 in) 0.037 ~ 0.074 mm (0.0015 ~ 0.0029 in) 0.030 ~ 0.060 mm (0.0012 ~ 0.0024 in)</p>	<p>---- 0.04 mm (0.0016 in) ---- 0.09 mm (0.0035 in) 0.1 mm (0.0039 in)</p>



Item	Standard	Limit
<b>Clutch</b>		
Clutch type	Wet, multiple disc	----
Clutch release method	Outer pull, rack and pinion (pull rod type)	----
Clutch release method operation	Cable operation	----
Operation	Left-hand operation	----
Clutch cable free play (at the end of the clutch lever)	10 ~ 15 mm (0.39 ~ 0.59 in)	----
Friction plates		
Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	2.8 mm (0.110 in)
Plate quantity	9	----
Clutch plates		
Thickness	2.2 ~ 2.4 mm (0.087 ~ 0.094 in)	----
Plate quantity	8	----
Max. warpage	----	0.2 mm (0.008 in)
Clutch springs		
Free length	7 mm (0.276 in)	----
Spring quantity	1	----
Min. length	----	6.5 mm (0.256 in)
Clutch housing thrust clearance	0.10 ~ 0.37 mm (0.0039 ~ 0.0146 in)	----
Clutch housing radial clearance	0.017 ~ 0.053 mm (0.0007 ~ 0.0021 in)	----
Primary reduction gear backlash tolerance	A-A, B-B, C-C, D-D, E-E	----
Primary drive gear backlash Number	A, B, C, D, E, F	----
Primary driven gear backlash Number	A, B, C, D, E, F	----



Item	Standard	Limit
<b>Transmission</b>		
Transmission type	Constant mesh, 5-speed	----
Primary reduction system	Spur gear	----
Primary reduction ratio	72/47 (1.532)	----
Secondary reduction system	Belt drive	----
Secondary reduction ratio	35/32 × 70/32 (2.393)	----
Operation	Left-foot operation	----
Gear ratios		
1st gear	38/16 (2.375)	----
2nd gear	30/19 (1.579)	----
3rd gear	29/25 (1.160)	----
4th gear	29/31 (0.935)	----
5th gear	24/30 (0.800)	----
Max. main axle runout	----	0.08 mm (0.003 in)
Max. drive axle runout	----	0.08 mm (0.003 in)
<b>Shifting mechanism</b>		
Shift mechanism type	Guide bar	----
Max. shift fork guide bar bending	----	0.025 mm (0.001 in)
Shift fork thickness	6.26 ~ 6.39 mm (0.2465 ~ 0.2516 in)	----
<b>Air filter type</b>		
	Wet element	----
<b>Fuel pump</b>		
Pump type	Electrical	----
Model (manufacturer)	5PX (MITSUBISHI)	----
Output pressure	392 ~ 588 kPa (3.92 ~ 5.88 kg/cm <sup>2</sup> , 55.7 ~ 83.6 psi)	----
<b>Throttle bodies</b>		
Model (manufacturer) × quantity	AC40-B204 (MIKUNI) × 2	----
Throttle cable free play (at the flange of the throttle grip)	4 ~ 6 mm (0.16 ~ 0.24 in)	----
ID mark	XV1700PC 5PX1 00 (USA and CAN) XV1700PC 5PX2 10 (California)	----
Throttle valve size	#100	----




**CHASSIS SPECIFICATIONS**

Item	Standard	Limit
<b>Frame</b>		
Frame type	Double cradle	----
Caster angle	29.5°	----
Trail	130 mm (5.12 in)	----
<b>Front wheel</b>		
Wheel type	Cast wheel	----
Rim		
Size	18 M/C × MT 3.50 18 × MT 3.50	----
Material	Aluminum	----
Wheel travel	135 mm (5.31 in)	----
Wheel runout		
Max. radial wheel runout	----	1 mm (0.04 in)
Max. lateral wheel runout	----	0.5 mm (0.02 in)
<b>Rear wheel</b>		
Wheel type	Cast wheel	----
Rim		
Size	17 M/C × MT 6.00 17 × MT 6.00	----
Material	Aluminum	----
Wheel travel	110 mm (4.33 in)	----
Wheel runout		
Max. radial wheel runout	----	1 mm (0.04 in)
Max. lateral wheel runout	----	0.5 mm (0.02 in)
<b>Front tire</b>		
Tire type	Tubeless	----
Size	120/70 ZR 18 M/C (59 W) 120/70 ZR 18 (59 W)	----
Model (manufacturer)	D220FST (DUNLOP)/ BT020FG (BRIDGESTONE)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	----
90 kg (198 lb) ~ Maximum load*	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	----
High-speed riding	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	----
	* Load is the total weight of the cargo, rider, passenger and accessories.	
Min. tire tread depth	----	1.0 mm (0.04 in)

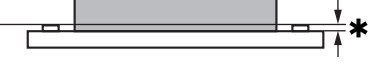
# CHASSIS SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Rear tire</b>		
Tire type	Tubeless	----
Size	200/50 ZR 17 M/C (75 W) 200/50 ZR 17 (75 W)	----
Model (manufacturer)	D220ST (DUNLOP)/ BT020R (BRIDGESTONE)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	----
90 kg (198 lb) ~ Maximum load*	290 kPa (2.9 kgf/cm <sup>2</sup> , 42 psi)	----
High-speed riding	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	----
	* Load is the total weight of the cargo, rider, passenger and accessories.	
Min. tire tread depth	----	1.0 mm (0.04 in)
<b>Front brakes</b>		
Brake type	Dual-disc brake	----
Operation	Right-hand operation	----
Brake lever free play (lever end)	2 ~ 5 mm (0.08 ~ 0.20 in)	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	298 × 5 mm (11.73 × 0.20 in)	----
Min. thickness	----	4.5 mm (0.18 in)
Max. deflection	----	0.1 mm (0.004 in)
Brake pad lining thickness	5.5 mm (0.22 in)	0.5 mm (0.02 in)
		
Master cylinder inside diameter	14 mm (0.55 in)	----
Caliper cylinder inside diameter	27 mm (1.06 in) and 30.2 mm (1.19 in)	----



Item	Standard	Limit
<b>Rear brake</b>		
Brake type	Single-disc brake	----
Operation	Right-foot operation	----
Brake pedal free play (P)	0 mm (0 in)	----
Brake pedal position (from the top of the rider footrest to the top of the brake pedal)	80 mm (3.2 in)	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	282 × 6 mm (11.10 × 0.24 in)	----
Min. thickness	----	5.5 mm (0.22 in)
Max. deflection	----	0.15 mm (0.006 in)
Brake pad lining thickness	5.8 mm (0.23 in)	0.8 mm (0.03 in)
		
Master cylinder inside diameter	12.7 mm (0.5 in)	----
Caliper cylinder inside diameter	41.3 mm (1.63 in)	----
<b>Steering</b>		
Steering bearing type	Taper roller bearings	----
Lock to Lock angle (left)	35°	----
Lock to Lock angle (right)	35°	----
<b>Front suspension</b>		
Suspension type	Telescopic fork	----
Front fork type	Coil spring/oil damper	----
Front fork travel	135 mm (5.31 in)	----
Spring		
Free length	296 mm (11.65 in)	291 mm (11.46 in)
Spring rate (K1)	6.4 N/mm (0.64 kg/mm, 36.54 lb/in)	----
Spring rate (K2)	7.8 N/mm (0.78 kg/mm, 44.54 lb/in)	----
Spring stroke (K1)	0 ~ 85 mm (0 ~ 3.35 in)	----
Spring stroke (K2)	85 ~ 135 mm (3.35 ~ 5.31 in)	----
Optional spring available	No	----
Fork oil		
Recommended oil	Suspension oil "01"	----
Quantity (each front fork leg)	476 cm <sup>3</sup> (16.8 Imp oz, 16.1 US oz)	----
Level (from the top of the outer tube and damper rod, with the outer tube fully compressed, and without the fork spring)	100 mm (3.94 in)	----
Inner tube outer diameter	41 mm (1.61 in)	----

# 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	50 mm (1.97 in)	----
Spring		
Free length	188 mm (7.4 in)	183 mm (7.2 in)
Installed length	172 mm (6.77 in)	----
Spring rate (K1)	137 N/mm (13.7 kg/mm, 782.27 lb/in)	----
Spring stroke (K1)	0 ~ 50 mm (0 ~ 1.97 in)	----
Optional spring available	No	----
Standard spring preload gas/air pressure	1,000 kPa (10 kg/cm <sup>2</sup> , 142 psi)	----
<b>Swingarm</b>		
Free play (at the end of the swingarm)		
Radial	----	1 mm (0.04 in)
Axial	----	1 mm (0.04 in)
<b>Drive belt</b>		
Model (manufacturer)	UBD-0568	----
Drive belt slack (on a sidestand)	6 ~ 8 mm (0.24 ~ 0.31 in)	----
Drive belt slack (on a suitable stand)	7 ~ 9 mm (0.28 ~ 0.35 in)	----



## 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 900 r/min	----
Advancer type	Electric	----
Crankshaft position sensor resistance/color	248 ~ 372 Ω/Gy-B	----
Transistorized coil ignition unit model (manufacturer)	F8T914 (MITSUBISHI)	----
<b>Ignition coils</b>		
Model (manufacturer)	J0447 (DENSO)	----
Minimum ignition spark gap	6 mm (0.24 in)	----
Primary coil resistance	1.31 ~ 1.79 Ω	----
Secondary coil resistance	12 ~ 18 kΩ	----
<b>Spark plug caps</b>		
Material	Resin	----
Resistance	10 kΩ	----
<b>Charging system</b>		
System type	AC magneto	----
Model (manufacturer)	F5PX/YAMAHA	----
Nominal output	14 V/31 A at 5,000 r/min	----
Stator coil resistance/color	0.12 ~ 0.20 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)	GT14B-4 (GS)	----
Battery voltage/capacity	12 V/12 AH	----
Specific gravity	1.320	----
Ten hour rate amperage	1.2 A	----
<b>Headlight type</b>	Halogen bulb	----
<b>Indicator light (voltage/wattage × quantity)</b>		
Meter light	LED × 13	----
Neutral indicator light	LED × 1	----
Turn signal indicator light	LED × 2	----
Fuel indicator light	LED × 1	----
High beam indicator light	LED × 1	----
Engine trouble warning light	LED × 1	----

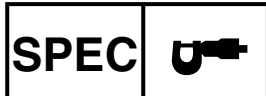


Item	Standard	Limit
<b>Bulbs (voltage/wattage × quantity)</b>		
Headlight	12 V 60 W/55 W × 1	----
Licence plate light	12 V 5 W × 2	----
Tail/brake light	LED	----
Front turn signal/position light	12 V 23 W/8 W × 2	----
Rear turn signal light	12 V 23 W × 2	----
Speedometer light	LED × 1	----
Tachometer light	LED × 1	----
<b>Electric starting system</b>		
System type	Constant mesh	----
Starter motor		
Model (manufacturer)	5PX (YAMAHA)	----
Power output	0.9 kW	----
Armature coil resistance	0.0081 ~ 0.0099 Ω	----
Brushes		
Overall length	9.8 mm (0.39 in)	5 mm (0.2 in)
Spring force	7.36 ~ 11.04 N (736 ~ 1,104 g)	----
Commutator diameter	28.5 mm (1.12 in)	27.5 mm (1.08 in)
Mica undercut	1.5 mm (0.06 in)	----
<b>Starter relay</b>		
Model (manufacturer)	MS5F-631 (JIDECO)	----
Amperage	180 A	----
Coil resistance	4.18 ~ 4.62 Ω	----
<b>Starting circuit cut-off relay</b>		
Model/manufacturer	G8R-30Y-S/OMRON	----
Coil resistance	162 ~ 198 Ω	----
<b>Horn</b>		
Horn type	Eddy	----
Model (manufacturer) × quantity	YP-12 (NIKKO) × 2	----
Max. amperage	2 A	----
Performance	95 ~ 115 db/2 m	----
Coil resistance	0.94 ~ 0.98 Ω	----
<b>Turn signal relay</b>		
Relay type	Semi-transistor	----
Model (manufacturer)	FB257H (DENSO)	----
Self-cancelling device built-in	Yes	----
Hazard flasher device	Yes	----
Turn signal blinking frequency	75 ~ 95 cycles/min.	----
Wattage	23 W × 2 + 3.4 W	----



Item	Standard	Limit
<b>Headlight relay</b>		
Model/manufacturer	ACM33211 M04/MATSUSHITA	----
Coil resistance	86.4 ~ 105.6 $\Omega$	----
<b>Fuel injection system relay</b>		
Model/manufacturer	G8R-30Y-S/OMRON	----
Coil resistance	162 ~ 198 $\Omega$	----
<b>Throttle position sensor</b>		
Resistance	4 ~ 6 k $\Omega$ /L-B	----
Output voltage (at idle)	0.605 ~ 0.755 V	----
<b>Circuit breaker</b>		
Circuit breaker type	Fuse	----
<b>Fuses (amperage <math>\times</math> quantity)</b>		
Main fuse	30 A $\times$ 1	----
Fuel injection system fuse	15 A $\times$ 1	----
Headlight fuse	15 A $\times$ 1	----
Signaling system fuse	10 A $\times$ 1	----
Ignition fuse	10 A $\times$ 1	----
ECU fuse	10 A $\times$ 1	----
Decompression solenoid fuse	15 A $\times$ 1	----
Backup fuse (odometer and clock)	7.5 A $\times$ 1	----
Reserve fuse	30 A, 15 A, 10 A, 7.5 A $\times$ 1	----
<b>Engine temperature sensor</b>		
Model/manufacturer	5PX/DENSO	----
Resistance	895.38 ~ 1,098.02 $\Omega$ at 100 $^{\circ}$ C (212 $^{\circ}$ F)	----

# CONVERSION TABLE/ GENERAL TIGHTENING TORQUE SPECIFICATIONS



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

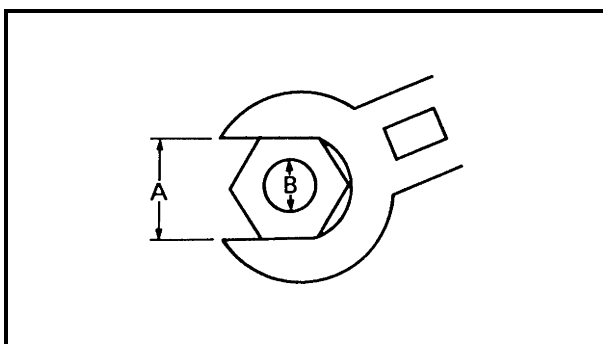
## CONVERSION TABLE

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)

EAS00030

## 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: Distance between flats

B: Outside thread diameter




A (nut)	B (bolt)	General tightening torques		
		Nm	m·kg	ft·lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94





## TIGHTENING TORQUES











### ENGINE TIGHTENING TORQUES

Item	Fastener	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Spark plug	—	M12	4	18	1.8	13	
Front cylinder head cover	Bolt	M6	14	10	1.0	7.2	
Rear cylinder head cover	Bolt	M6	14	10	1.0	7.2	
Front rocker arm base	Bolt	M8	2	24	2.4	17	
Front rocker arm base	Bolt	M6	4	10	1.0	7.2	
Rear rocker arm base	Bolt	M8	2	24	2.4	17	
Rear rocker arm base	Bolt	M6	4	10	1.0	7.2	
Cylinder head	Nut	M12	8	60	6.0	43	 
Cylinder head	Nut	M10	4	39	3.9	28	
Engine temperature sensor	—	M12	1	20	2.0	14	See NOTE *1.
Cylinder head (exhaust pipe)	Stud bolt	M8	4	15	1.5	11	
Camshaft driven gear	Nut	M14	1	52	5.2	37	
Camshaft driven gear	Bolt	M10	1	30	3.0	22	
Camshaft cover	Bolt	M6	6	10	1.0	7.2	
Decompression solenoid	Bolt	M4	2	7	0.7	5.1	
Camshaft sprocket cover 1	Bolt	M6	2	7	0.7	5.1	
Camshaft sprocket cover 1	Bolt	M6	1	10	1.0	7.2	
Camshaft sprocket cover 2	Bolt	M6	5	10	1.0	7.2	
Engine left side cover	Bolt	M6	6	10	1.0	7.2	
Rocker arm adjusting screw	Nut	M7	4	20	2.0	14	
Valve lifter case	Bolt	M6	4	10	1.0	7.2	
Engine oil checking bolt	Bolt	M5	3	4	0.4	2.9	
Front cylinder camshaft end cover	Bolt	M5	2	5	0.5	3.6	
Engine oil drain bolt (crankcase)	—	M14	1	43	4.3	31	
Engine oil drain bolt (oil tank)	—	M14	1	43	4.3	31	
Oil filter cartridge	—	M20	1	17	1.7	12	
Oil filter bolt	Union bolt	M20	1	70	7.0	50	
Oil filter bracket	Bolt	M6	4	10	1.0	7.2	
Oil delivery pipe	Bolt	M6	4	10	1.0	7.2	
Oil delivery pipe (cylinder head-to-crankcase)	Union bolt	M10	2	21	2.1	15	
Oil delivery pipe (cylinder head-to-crankcase)	Union bolt	M8	1	18	1.8	13	
Oil strainer	Bolt	M6	2	10	1.0	7.2	
Engine oil pump assembly	Bolt	M6	3	10	1.0	7.2	
Oil pump housing cover	Screw	M4	4	2	0.2	1.4	
Dipstick	—	M33	1	2	0.2	1.4	

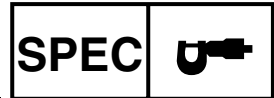
# TIGHTENING TORQUES



**SPEC**



Item	Fastener	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Intake manifold	Bolt	M6	4	10	1.0	7.2	
Throttle body joint	Screw	M4	2	4	0.4	2.9	
Pressure regulator	Bolt	M5	2	7	0.7	5.1	
Intake vacuum hose bracket	Bolt	M6	1	10	1.0	7.2	
Intake air pressure sensor bracket 2	Bolt	M6	1	10	1.0	7.2	
A.I.S. bracket	Bolt	M5	4	4	0.4	2.9	
Resonator	Screw	M5	2	2	0.2	1.4	
Air cut-off valve assembly	Bolt	M8	1	24	2.4	17	
Air cut-off valve assembly	Bolt	M6	2	10	1.0	7.2	
Air filter case	Bolt	M6	2	7	0.7	5.1	
Air filter case clamp	Screw	M4	1	3	0.3	2.2	
Front exhaust pipe	Nut	M8	2	20	2.0	14	
Rear exhaust pipe	Bolt	M8	2	24	2.4	17	
Rear exhaust pipe joint cover	Screw	M6	2	7	0.7	5.1	
Rear exhaust pipe joint	Nut	M8	2	20	2.0	14	
Muffler	Bolt	M10	1	53	5.3	38	
Muffler	Bolt	M8	2	20	2.0	14	
Muffler clamp	Bolt	M8	2	12	1.2	8.7	
Crankcase (cylinder head)	Stud bolt	M12	8	See NOTE *1.			
Crankcase (cylinder head)	Stud bolt	M10	4	See NOTE *2.			
Crankcase (transfer gear case)	Stud bolt	M8	1	See NOTE *3.			
Right crankcase	Bolt	M8	3	24	2.4	17	
Right crankcase	Bolt	M6	3	10	1.0	7.2	
Left crankcase	Bolt	M6	15	10	1.0	7.2	
Crankshaft position sensor	Screw	M6	2	7	0.7	5.1	
Crankshaft position sensor lead holder	Screw	M6	7	7	0.7	5.1	
Stator coil assembly	Screw	M6	3	7	0.7	5.1	
Stator coil assembly	Bolt	M6	1	10	1.0	7.2	
Starter clutch	Bolt	M8	6	24	2.4	17	
Generator cover	Bolt	M6	11	10	1.0	7.2	
Generator rotor	Bolt	M12	1	130	13.0	94	
Generator shaft	Bolt	M8	1	28	2.8	20	
Generator shaft end cover	Bolt	M6	2	10	1.0	7.2	
Crankshaft position sensor rotor	Bolt	M12	1	100	10.0	72	
Clutch cover	Bolt	M6	11	10	1.0	7.2	
Clutch boss	Nut	M20	1	85	8.5	61	Use a lock washer.
Clutch spring plate	Bolt	M6	6	8	0.8	5.8	
Pull lever	Bolt	M6	1	12	1.2	8.7	
Transfer gear oil drain bolt	—	M8	1	18	1.8	13	
Middle drive gear	Nut	M22	1	100	10.0	72	Use a lock washer.

# TIGHTENING TORQUES



Item	Fastener	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Cover	Bolt	M8	2	24	2.4	17	
Cover	Bolt	M6	5	10	1.0	7.2	
Oil tank left cover	Bolt	M6	16	10	1.0	7.2	
Oil tank left cover	Bolt	M6	3	10	1.0	7.2	
Oil strainer	Bolt	M6	1	10	1.0	7.2	
Transfer gear case	Bolt	M8	4	30	3.0	22	
Transfer gear case cover	Nut	M8	1	30	3.0	22	
Transfer gear oil checking bolt	Bolt	M6	1	8	0.8	5.8	
Transfer gear oil pump cover	Bolt	M6	2	10	1.0	7.2	
Transfer gear oil pump	Bolt	M6	3	10	1.0	7.2	
Drive sprocket case	Bolt	M10	3	50	5.0	36	
Drive sprocket case	Bolt	M10	5	50	5.0	36	
Drive sprocket	Nut	M22	1	100	10.0	72	Use a lock washer.
Drive sprocket cover	Bolt	M6	1	7	0.7	5.1	
Shift arm	Bolt	M6	1	12	1.2	8.7	
Shift rod locknut	Nut	M8	2	12	1.2	8.7	
Shift shaft spring stopper	Bolt	M8	1	22	2.2	16	
Shift drum assembly	Screw	M6	1	12	1.2	8.7	
Shift drum assembly plate	Screw	M5	1	4	0.4	2.9	
Stopper lever	Bolt	M6	1	10	1.0	7.2	
Neutral switch	Bolt	M6	2	4	0.4	2.9	
Speed sensor	Bolt	M6	1	10	1.0	7.2	
Intake air pressure sensor	Bolt	M5	2	5	0.5	3.6	
Intake air temperature sensor	—	M8	1	15	1.5	11	
Oil temperature sensor	—	M12	1	20	2.0	14	See NOTE *1.
Oil gallery bolt	Bolt	M8	3	20	2.0	14	
Oil gallery bolt	Bolt	M6	1	10	1.0	7.2	
Oil gallery bolt	Bolt	M5	3	9	0.9	6.5	

**NOTE:**

\*1: Do not tighten the engine temperature sensor and oil temperature sensor beyond the specified torques.

\*2: When installing the crankcase stud bolts (cylinder head), make sure that their installed length is 141.5 mm (5.57 in).

\*3: When installing the crankcase stud bolts (transfer gear case), make sure that their installed length is 69.3 mm (2.73 in).



## CHASSIS TIGHTENING TORQUES

Item	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Upper bracket and outer tube	M8	26	2.6	19	See NOTE.
Lower bracket and outer tube	M8	23	2.3	17	
Upper bracket and steering shaft	M28	115	11.5	85	
Handlebar holder (lower) and handlebar holder (upper)	M8	28	2.8	20	
Ring nut (steering shaft)	M30	4	0.4	2.9	
Brake hose joint and lower bracket	M6	7	0.7	5.1	
Brake master cylinder reservoir cap	M4	2	0.2	1.4	
Turn signal light bracket and lower bracket	M6	7	0.7	5.1	
Turn signal light bracket pinch bolt	—	7	0.7	5.1	
Headlight bracket and lower bracket	M8	23	2.3	17	
Headlight bracket and brake hose joint	M6	7	0.7	5.1	
Handlebar holder (lower)	M12	40	4.0	29	
Front brake master cylinder	M6	10	1.0	7.2	
Union bolt (brake hose)	M10	32	3.2	23	
Engine mounting:					
Spacer bolt	M18	18	1.8	13	
Upper mounting bolt (upper engine bracket and engine)	M10	48	4.8	35	
Upper engine bracket and frame	M10	48	4.8	35	
Lower front mounting nut (frame and engine)	M12	105	10.5	75	
Lower rear mounting nut (frame and engine)	M12	88	8.8	64	
Rear engine bracket and frame	M10	53	5.3	38	
Rear engine bracket and engine	M12	98	9.8	71	
Front engine bracket and frame	M10	48	4.8	35	
Front engine bracket and engine	M12	88	8.8	64	
Transfer gear case and transfer gear case bracket	M10	63	6.3	45	
Transfer gear case bracket and frame	M10	53	5.3	38	
Muffler bracket and frame	M10	53	5.3	38	
Muffler bracket and muffler	M8	20	2.0	14	
Ignition coil	M6	7	0.7	5.1	
Swingarm pivot shaft	M18	125	12.5	90	
Relay arm and swingarm	M12	59	5.9	43	
Relay arm and connecting rod	M12	59	5.9	43	
Relay arm and rear shock absorber	M10	40	4.0	29	
Rear shock absorber, connecting rod and frame	M12	59	5.9	43	
Upper drive belt cover and swingarm	M6	7	0.7	5.1	
Lower drive belt cover and swingarm	M6	7	0.7	5.1	

# TIGHTENING TORQUES

**SPEC**



Item	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Rear fender bracket and frame	M10	40	4.0	29	
Rear fender bracket and rear fender	M8	23	2.3	17	
Fuel tank and fuel filter	M6	7	0.7	5.1	
Fuel tank bracket and frame	M6	10	1.0	7.2	
Fuel tank and frame	M8	19	1.9	7.2	
Sub fuel tank and frame	M6	10	1.0	7.2	
Seat bracket and frame	M8	16	1.6	11	
Side cover and side cover bracket	M6	4	0.4	2.9	
Side cover bracket and frame	M6	13	1.3	9.4	
Side cover and seat bracket	M6	7	0.7	5.1	
Starter relay and battery positive lead	M6	7	0.7	5.1	
Starter relay and starter motor lead	M6	7	0.7	5.1	
Battery box and frame	M6	7	0.7	5.1	
Sidestand bracket and frame	M10	63	6.3	45	
Sidestand and bolt	M12	122	12.2	88	
Sidestand and nut	M12	88	8.8	64	
Footrest bracket and frame	M10	48	4.8	35	
Rear footrest and frame	M10	48	4.8	35	
Front brake master cylinder holder	M6	10	1.0	7.2	
Rear brake master cylinder and rear brake master cylinder bracket	M8	23	2.3	17	
Rear brake master cylinder cover and frame	M8	23	2.3	17	
Rear brake fluid reservoir	M6	7	0.7	5.1	
Union bolt (rear brake hose)	M10	30	3.0	22	
Brake rod and rear brake master cylinder	M8	16	1.6	11	
Front wheel axle	M18	72	7.2	52	
Front wheel axle pinch bolt	M8	23	2.3	17	
Rear wheel axle nut	M18	150	15.0	110	
Front brake caliper	M10	40	4.0	29	
Rear brake caliper	M10	27	2.7	19	
Brake disc and wheel	M6	18	1.8	13	
Caliper bleed screw (front)	M8	6	0.6	4.3	
Caliper bleed screw (rear)	M7	6	0.6	4.3	
Rear wheel sprocket and rear wheel drive hub	M12	95	9.5	68	
Rear brake caliper bracket and swingarm	M10	30	3.0	22	
Front fork guard and front fork	M8	16	1.6	11	
Front fork guard and front fork	M6	13	1.3	9.4	
Front fender and front fork leg	M8	16	1.6	11	
Cap bolt and outer tube	—	23	2.3	17	

## TIGHTENING TORQUES

**SPEC**

Item	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Damper rod assembly bolt	—	40	4.0	29	
Reflector bracket (front)	M6	8	0.8	5.8	
Footrest bracket and rear brake bracket	M8	16	1.6	11	
Footrest bracket and shift rod bracket	M8	16	1.6	11	
Rear brake bracket and brake pedal	M8	19	1.9	13	
Shift shaft and shift pedal	M6	12	1.2	8.7	
































**NOTE:**

1. First, tighten the ring nut approximately 52 Nm (5.2 m • kg, 37 ft • lb) by using the torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.

EAS00031




















## LUBRICATION POINTS AND LUBRICANT TYPES

### ENGINE

Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearings	
Connecting rod bolts and nuts	
Connecting rod small end and big end	
Crankshaft pins	
Crankshaft journals	
Piston surfaces	
Piston pins	
Camshaft cam lobes and camshaft journals	
Valve push rods	
Valve push rod end balls	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Valve lifters	
Rocker arms	
Rocker arm shafts	
Oil pump rotors (inner and outer) and oil pump housing	
Oil strainer	
Starter clutch idle gear inner surface	
Starter clutch idle gear shafts	
Starter clutch roller and starter clutch gears outer surface	
Crankshaft big end bearing (upper and lower)	
Clutch pull rod	
Pressure plate bearing	
Transmission gears (wheel and pinion)	
Shift drum	
Shift forks and shift fork guide bars	
Shift shaft	
Shift pedal	
Shift lever joint	
Crankcase mating surface	Sealant (Quick Gasket®)
Stator coil lead grommet	Sealant (Quick Gasket®)
Crankshaft position sensor lead grommet	Sealant (Quick Gasket®)

EAS00032

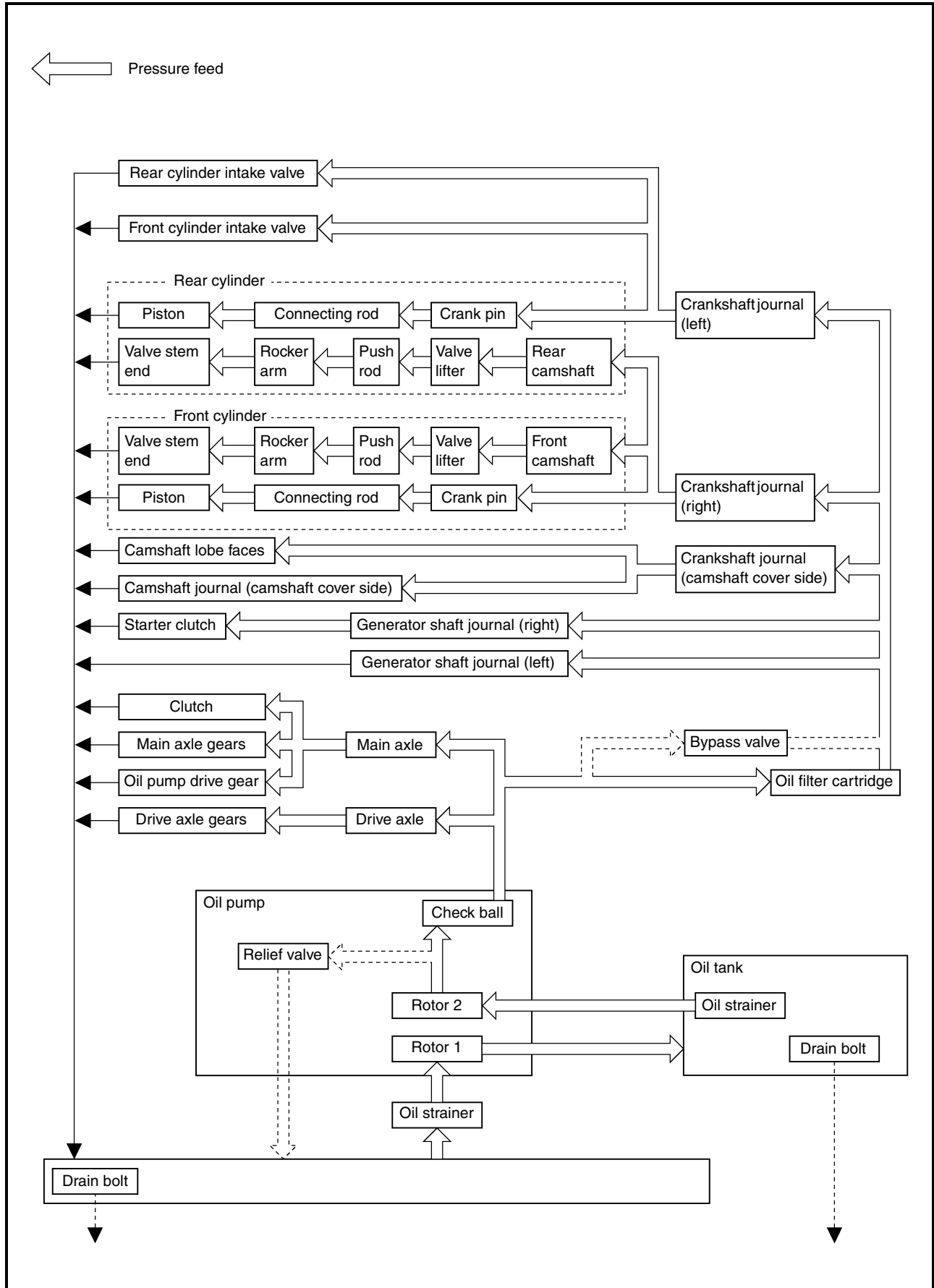
## CHASSIS

Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	
Steering bearing cover	
Steering head pipe lower oil seal	
Front wheel oil seal (right and left)	
Rear wheel oil seal	
Rear wheel drive hub mating surface	
Rear brake pedal shaft	
Shift pedal	
Rear footrest pivot	
Sidestand sliding surface	
Tube guide (throttle grip) inner surface	
Brake lever pivot bolt, contact surface	
Clutch lever pivot bolt, contact surface	
Swingarm pivot shaft	
Swingarm pivot bearing	
Swingarm pivot oil seal	
Relay arm bearing (inner)	
Rear shock absorber bearing (inner)	
Connecting rod bearing (inner)	



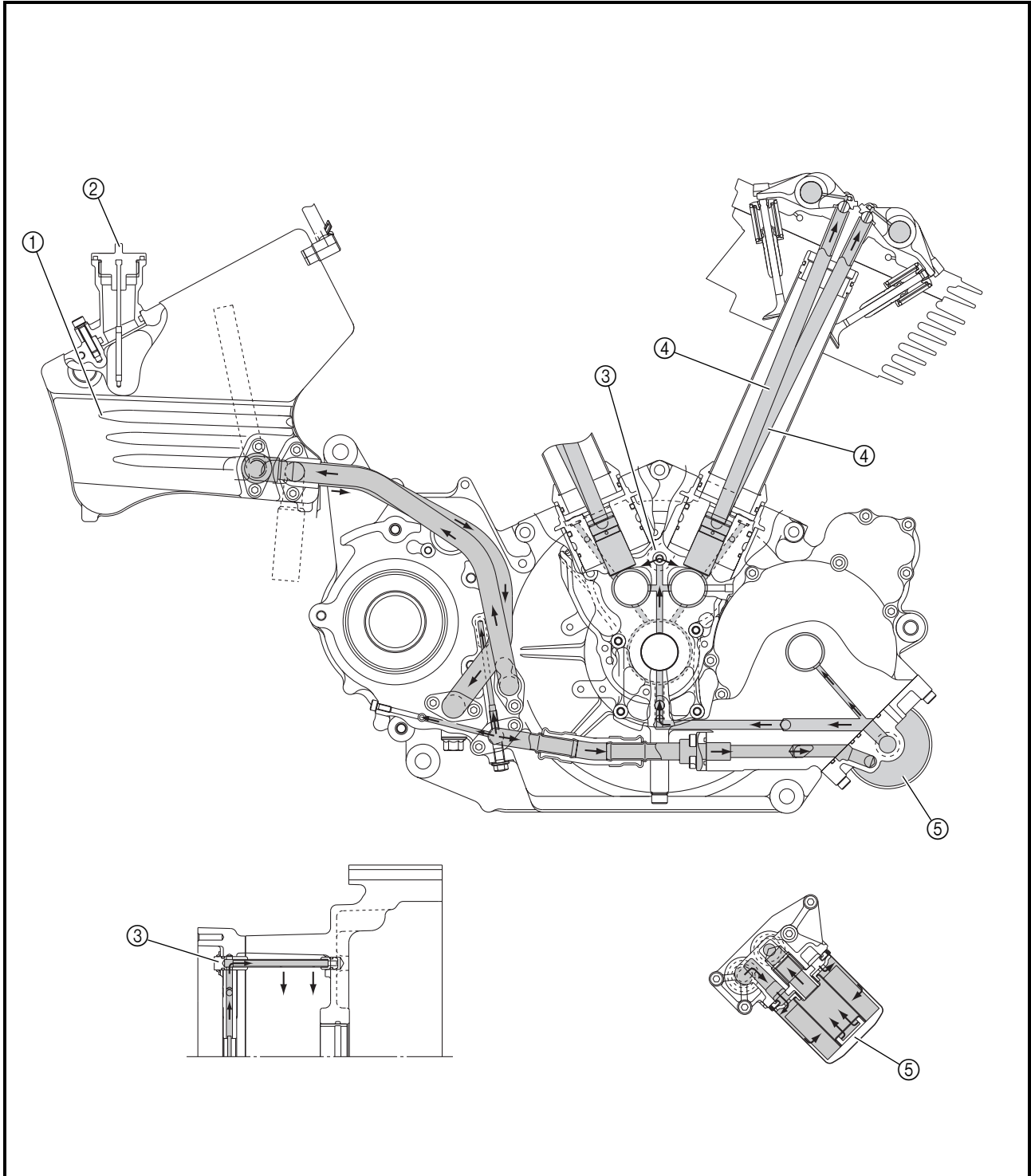


ENGINE OIL LUBRICATION CHART



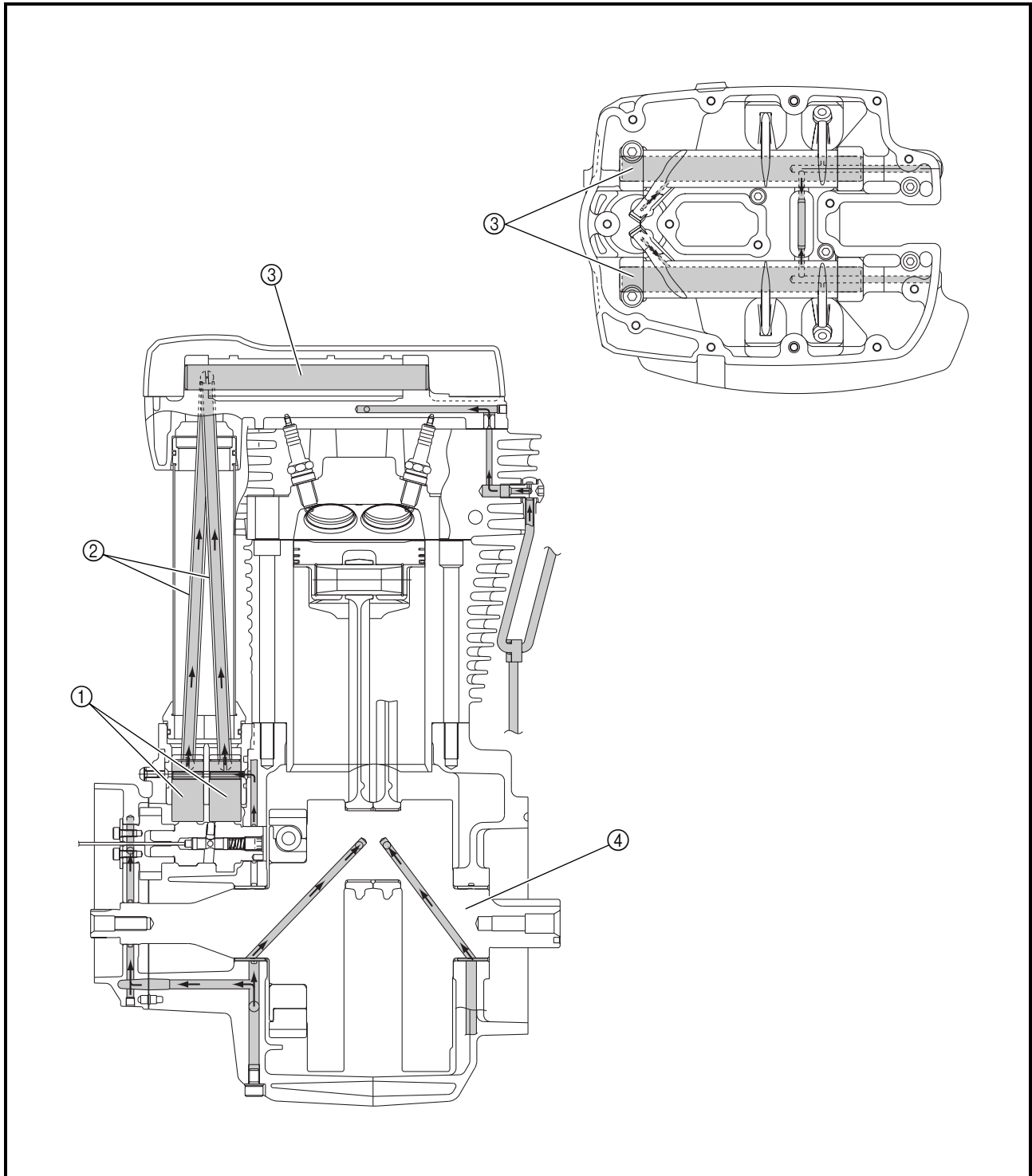
ENGINE OIL FLOW DIAGRAMS

- ① Oil tank
- ② Dipstick
- ③ Oil delivery pipe
- ④ Push rod
- ⑤ Oil filter cartridge



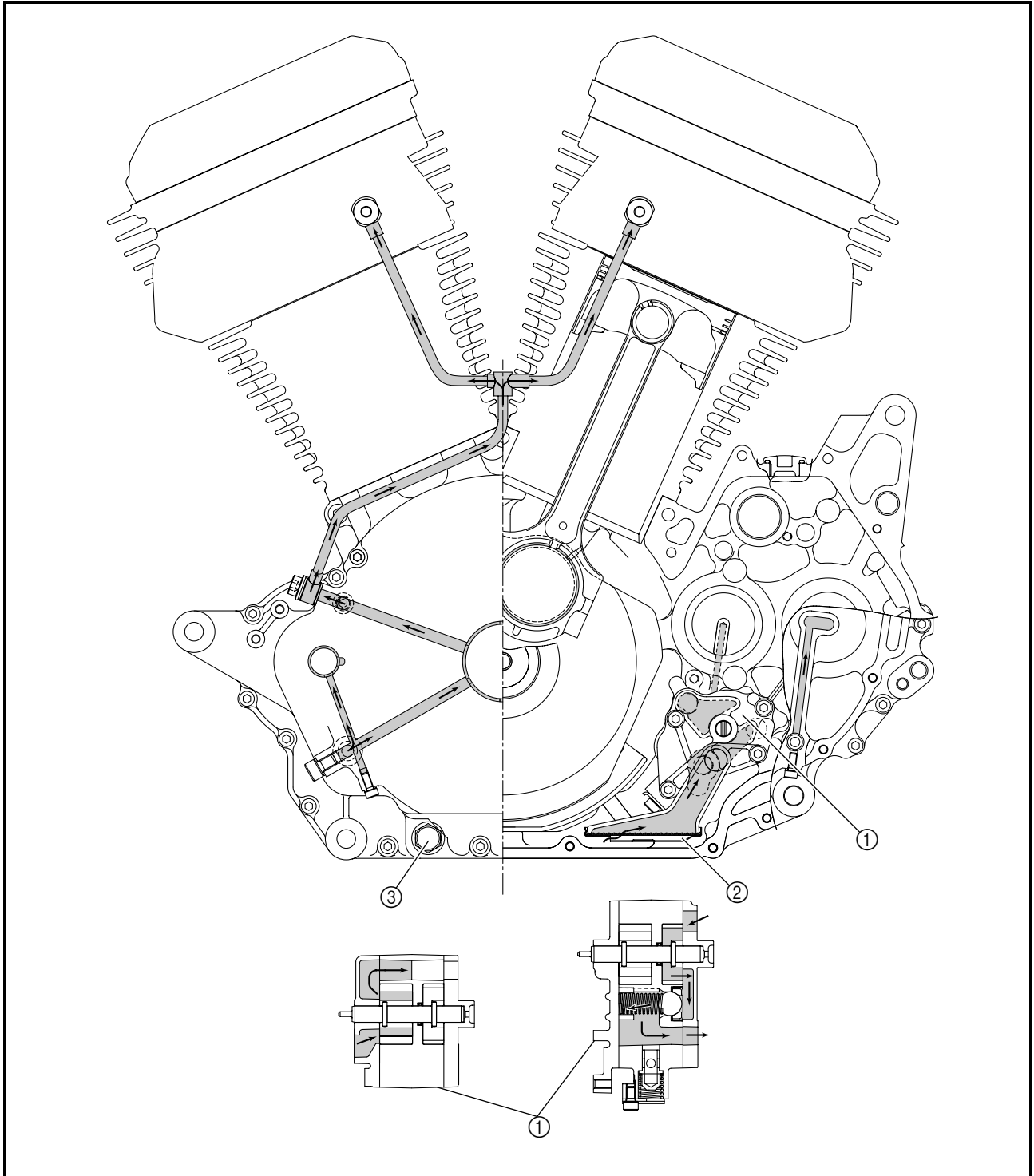


- ① Valve lifter
- ② Push rod
- ③ Rocker arm shaft
- ④ Crankshaft





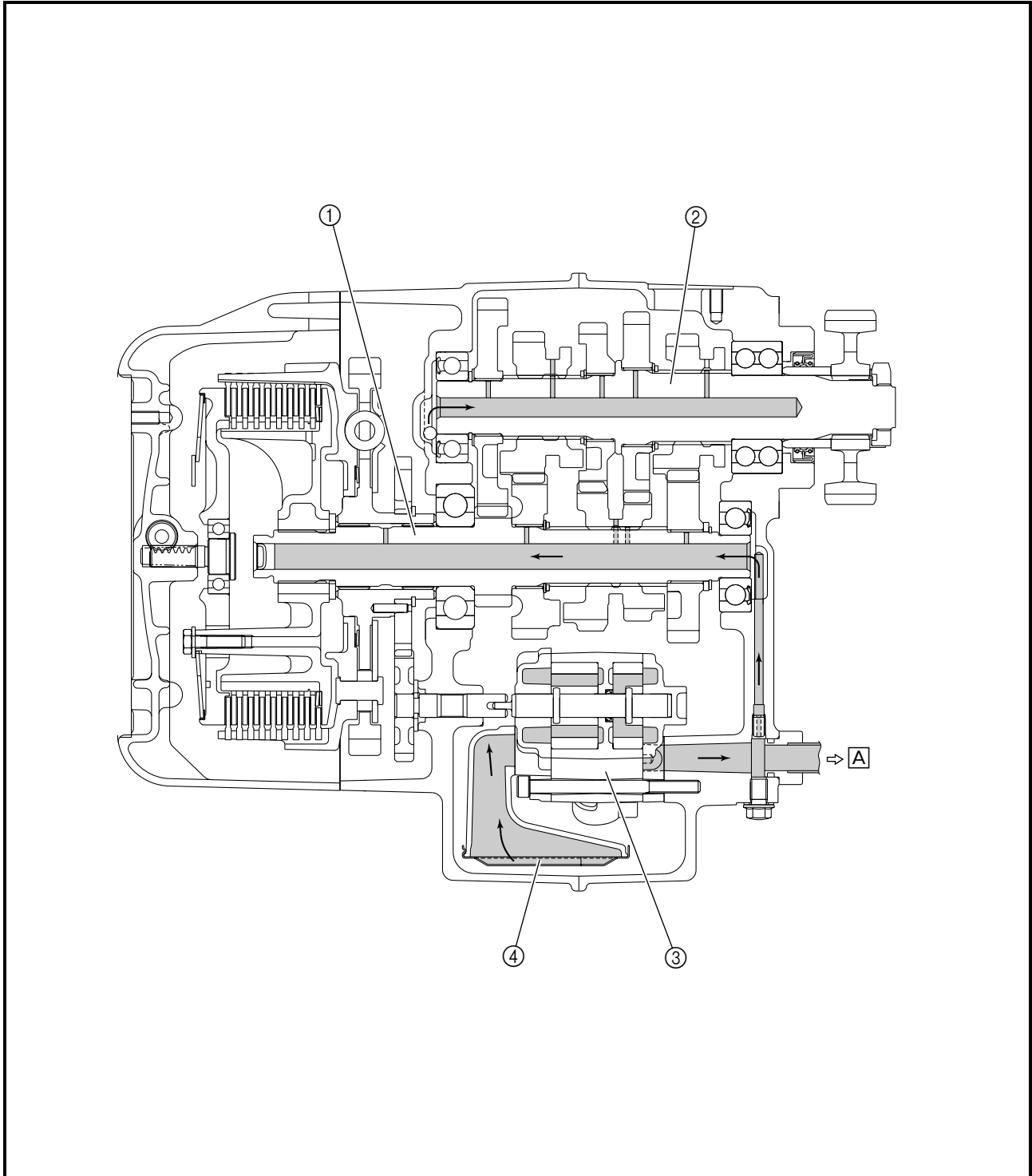
- ① Engine oil pump
- ② Oil strainer
- ③ Engine oil drain bolt (engine)





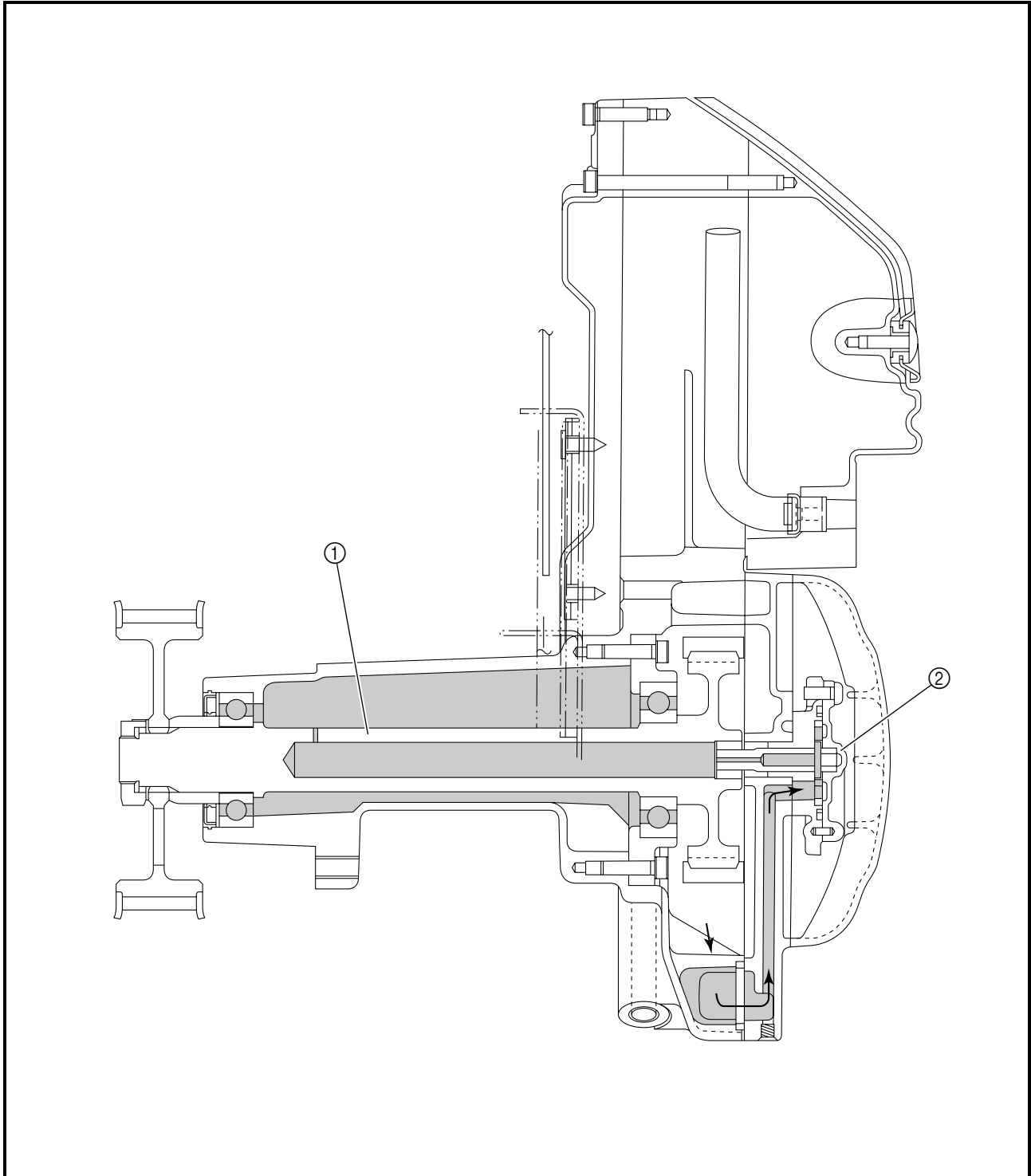
- ① Main axle
- ② Drive axle
- ③ Engine oil pump
- ④ Oil strainer

Ⓐ To oil filter cartridge

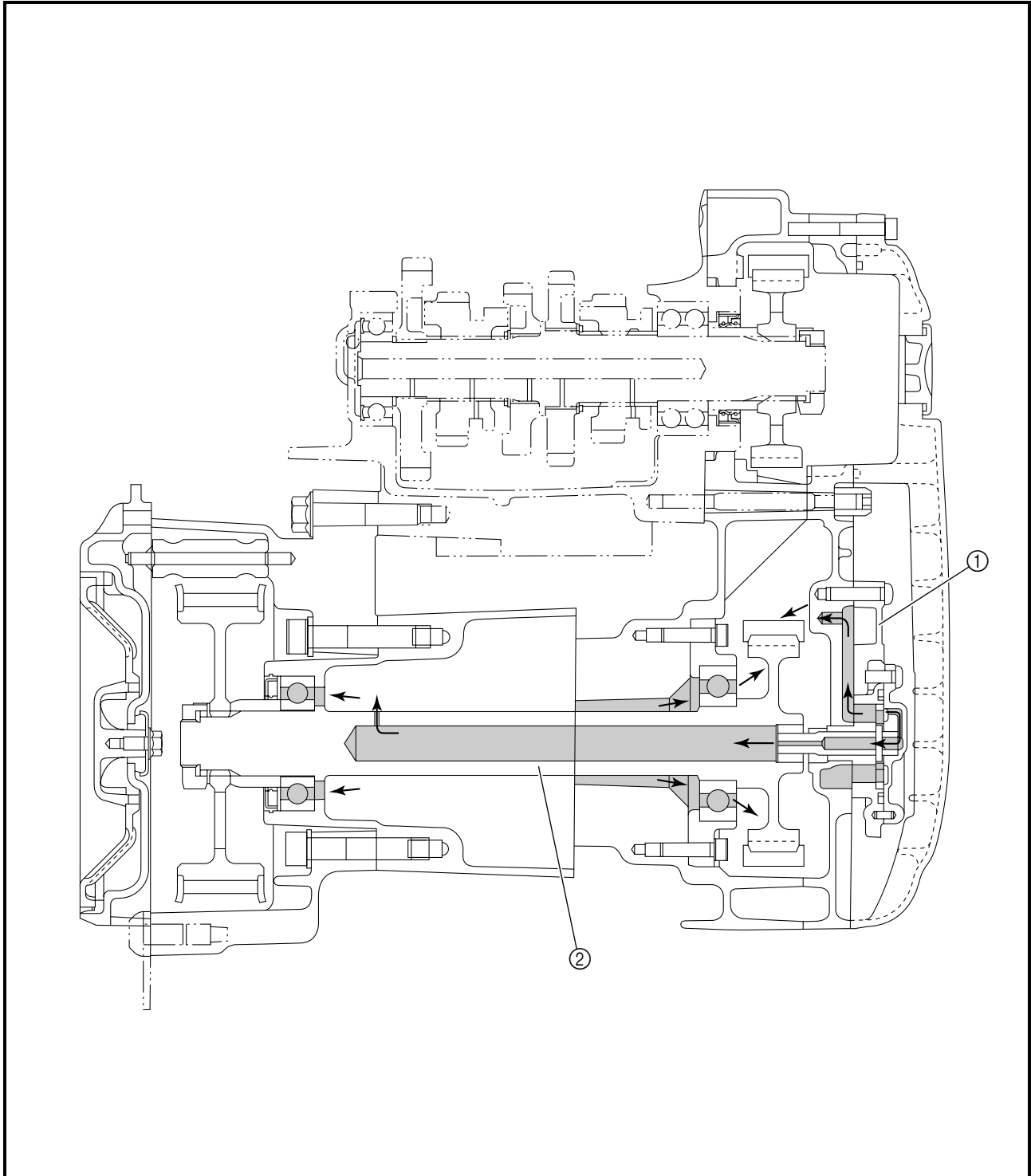


**TRANSFER GEAR OIL FLOW DIAGRAMS**

- ① Middle driven shaft
- ② Transfer gear oil pump



- ① Transfer gear oil pump
- ② Middle driven shaft



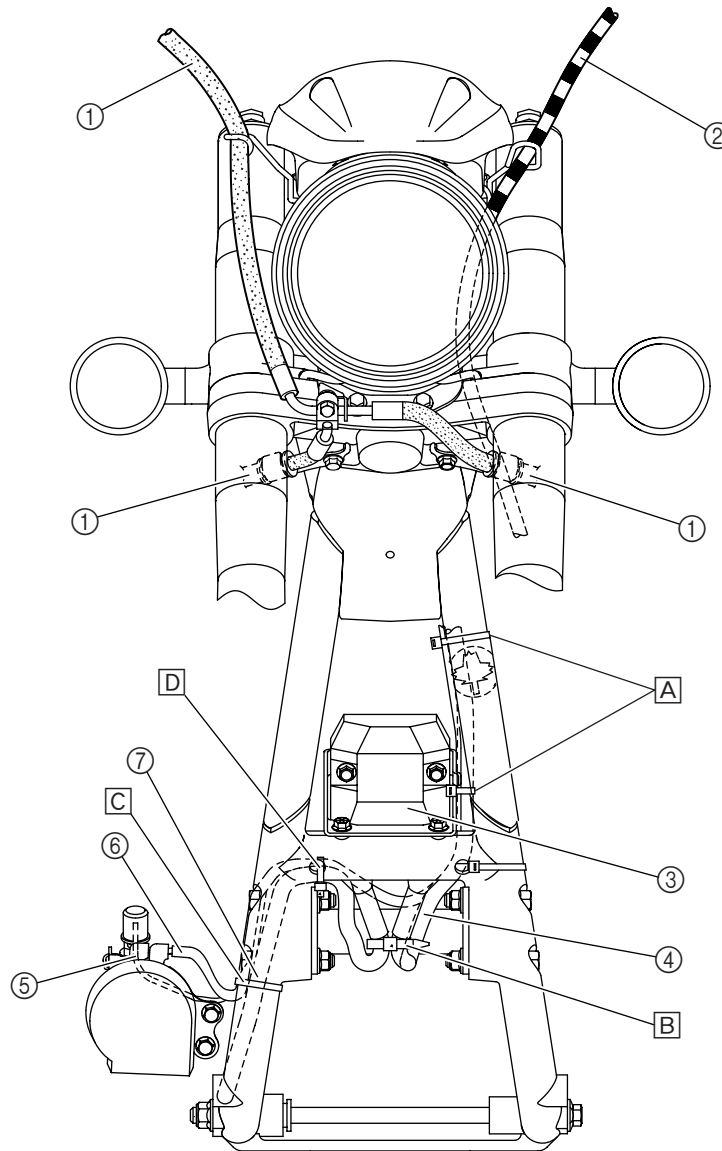


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**CABLE ROUTING**

- ① Brake hose
- ② Clutch cable
- ③ Rectifier/regulator
- ④ Rectifier/regulator lead
- ⑤ Rear brake light switch lead
- ⑥ Horn lead
- ⑦ Stator coil assembly lead

- A Fasten the rectifier/regulator lead, horn lead, and rear brake light switch lead with a plastic locking tie to the frame.
- B Fasten the stator coil assembly lead, rectifier/regulator lead, and the end of the boot with a plastic band.
- C Fasten the rear brake light switch lead, horn lead, and stator coil assembly lead with a plastic locking tie to the frame.
- D Fasten the stator coil assembly lead, horn lead, and rear brake light switch lead with a plastic locking tie to the frame.

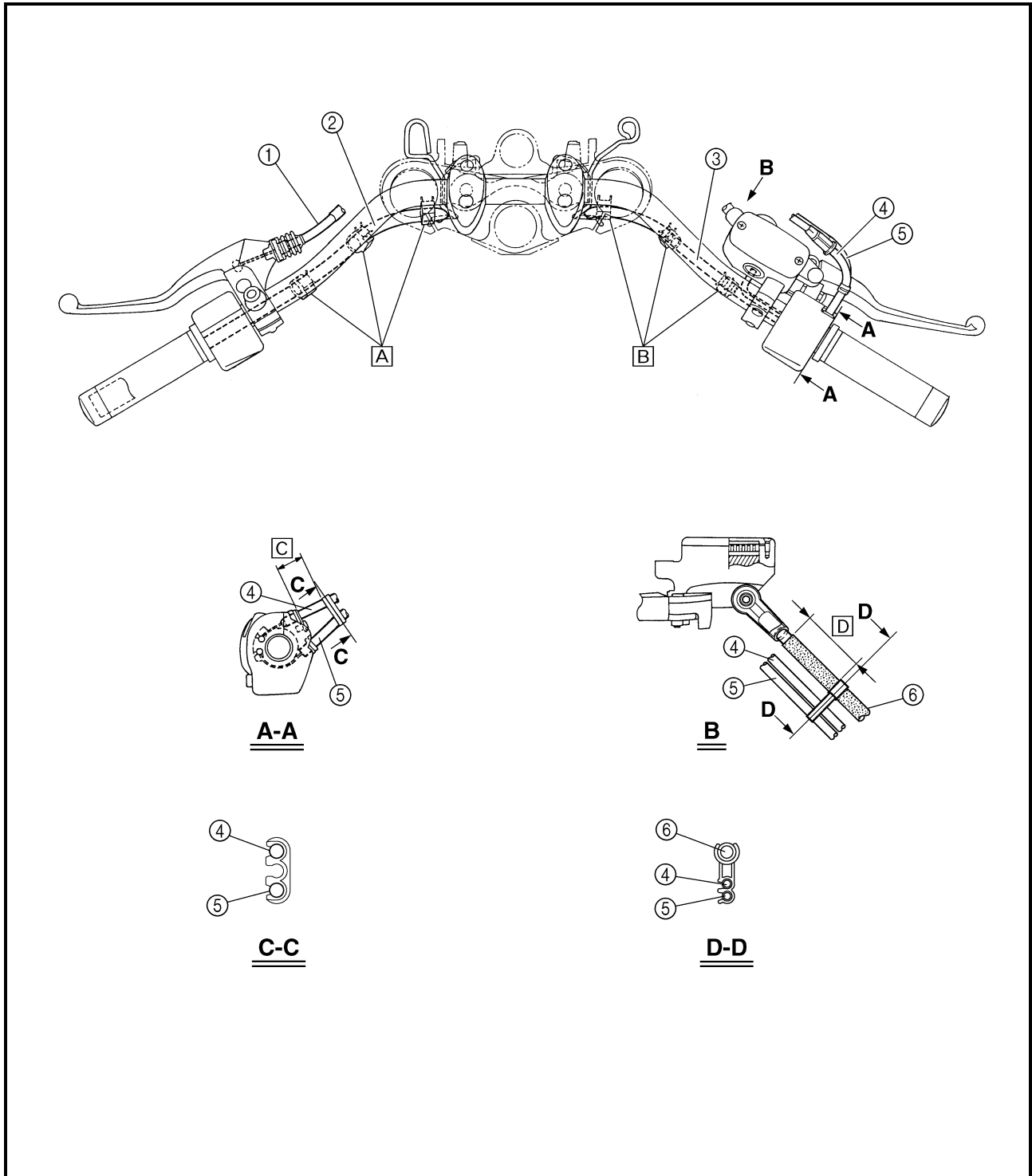






- ① Clutch cable
- ② Left handlebar switch lead
- ③ Right handlebar switch lead
- ④ Throttle cable 1
- ⑤ Throttle cable 2
- ⑥ Brake hose

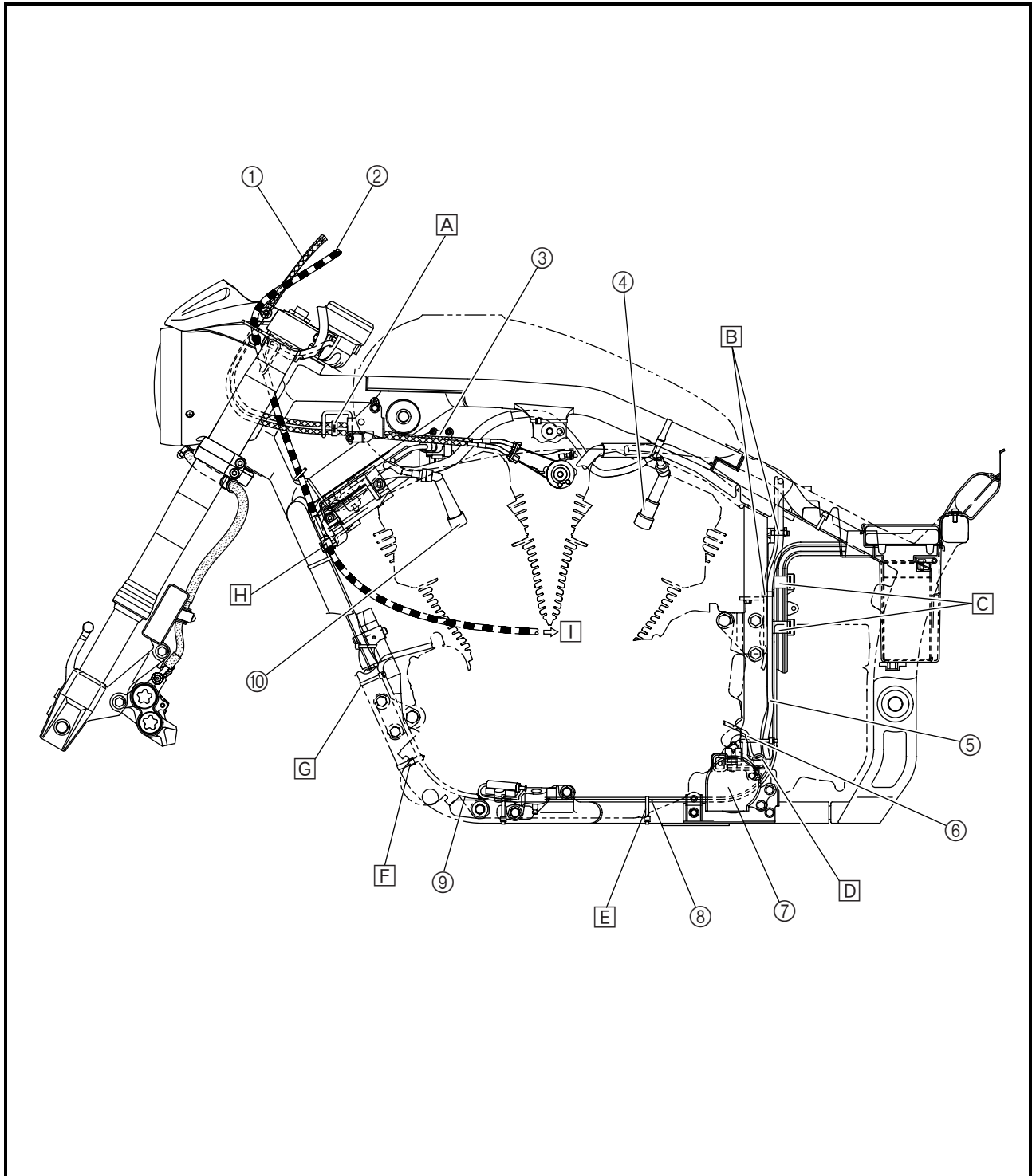
- A Fasten the left handlebar switch lead with a plastic holder.
- B Fasten the right handlebar switch lead with a plastic holder.
- C 20 ~ 30 mm (0.8 ~ 1.2 in)
- D 50 ~ 70 mm (2.0 ~ 2.8 in)





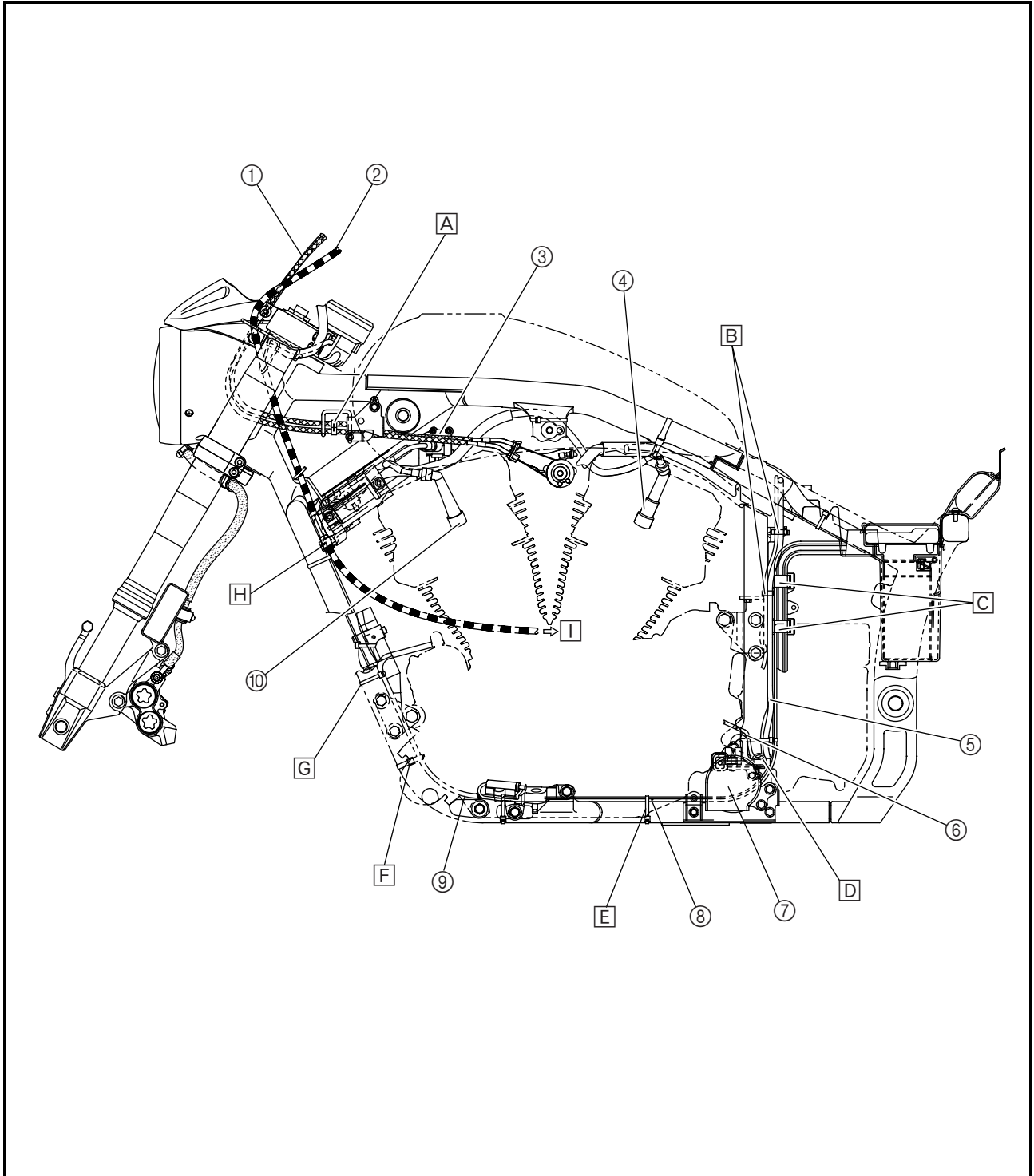
- ① Throttle cables
- ② Clutch cable
- ③ Atmospheric pressure sensor
- ④ Spark plug cap (ignition coil 1-L spark plug lead)
- ⑤ Horn lead
- ⑥ Crankshaft position sensor lead
- ⑦ Horn 2
- ⑧ Sidestand switch lead
- ⑨ Starter motor lead
- ⑩ Spark plug cap (ignition coil 2-L spark plug lead)

- A Pass throttle cable 1 and throttle cable 2 through the cable guide, and then fasten them with a plastic holder.
- B Fasten the engine stop switch lead, horn lead, and oil temperature sensor lead with a plastic locking tie.
- C Fasten the sidestand switch lead, starter motor lead, crankshaft position sensor lead, decompression solenoid lead, cylinder identification sensor lead, speed sensor lead, and neutral switch lead with a plastic locking tie.





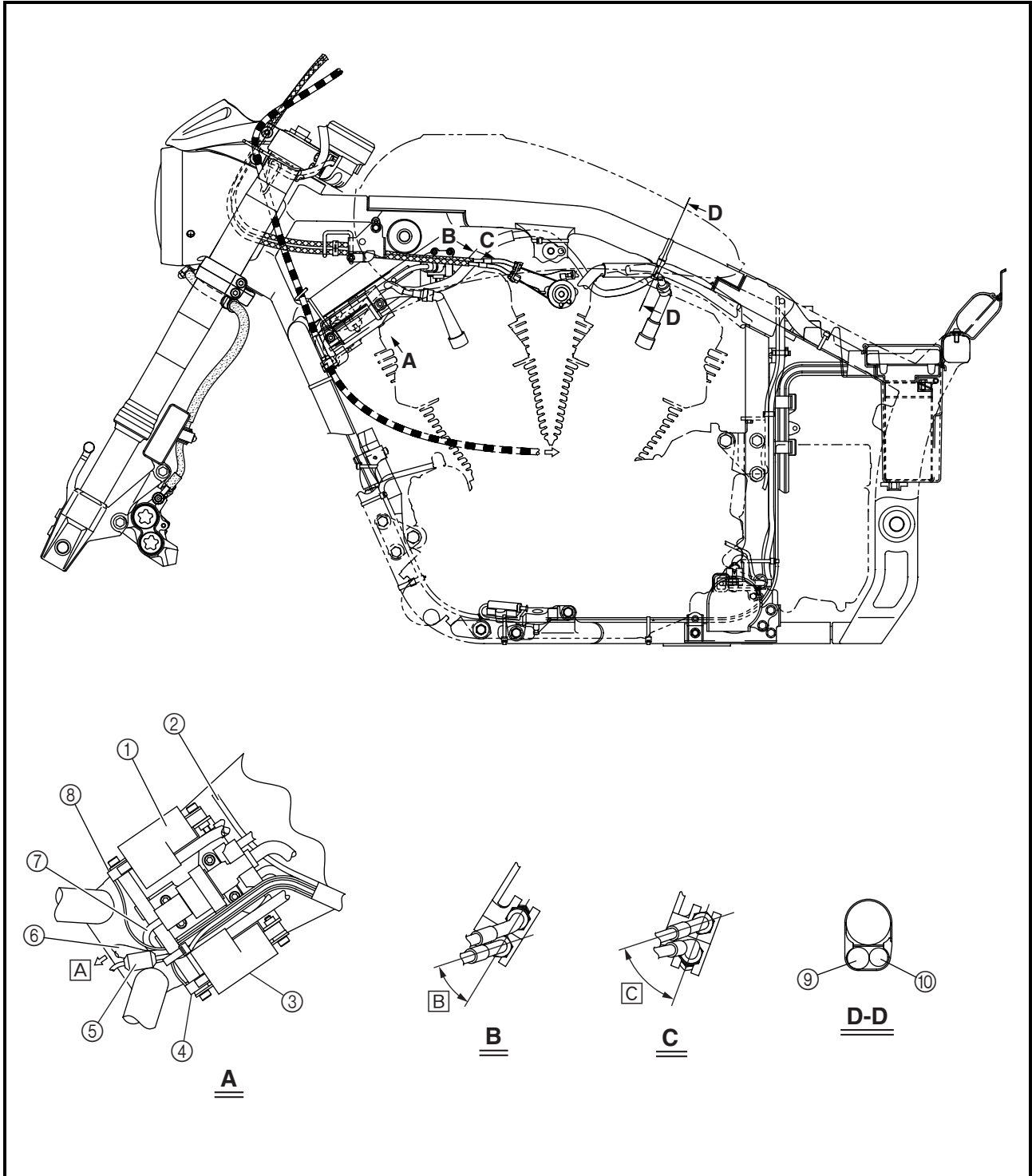
- D Fasten the engine stop switch lead, crankshaft position sensor lead, and horn lead with a plastic locking tie.
  - E Fasten the starter motor lead, and side stand switch lead with a plastic locking tie to the frame.
  - F Fasten the starter motor lead, fuel tank drain hose, and fuel tank/air filter breather hose with a plastic band to the frame.
- Be sure not to pinch the fuel tank drain hose or the fuel tank/air filter breather hose.
- G Fasten the starter motor lead with the plastic clamp.
  - H Clamp the clutch cable between the locknut and washer with a plastic clamp.
  - I To the engine.





- ① Ignition coil 1
- ② Atmospheric pressure sensor lead
- ③ Ignition coil 2
- ④ Ignition coil 2 lead
- ⑤ Rear brake light switch coupler
- ⑥ Rectifier/regulator lead and horn lead
- ⑦ Linear control valve lead
- ⑧ Ignition coil 1 lead
- ⑨ Fuel return hose
- ⑩ Fuel inlet hose

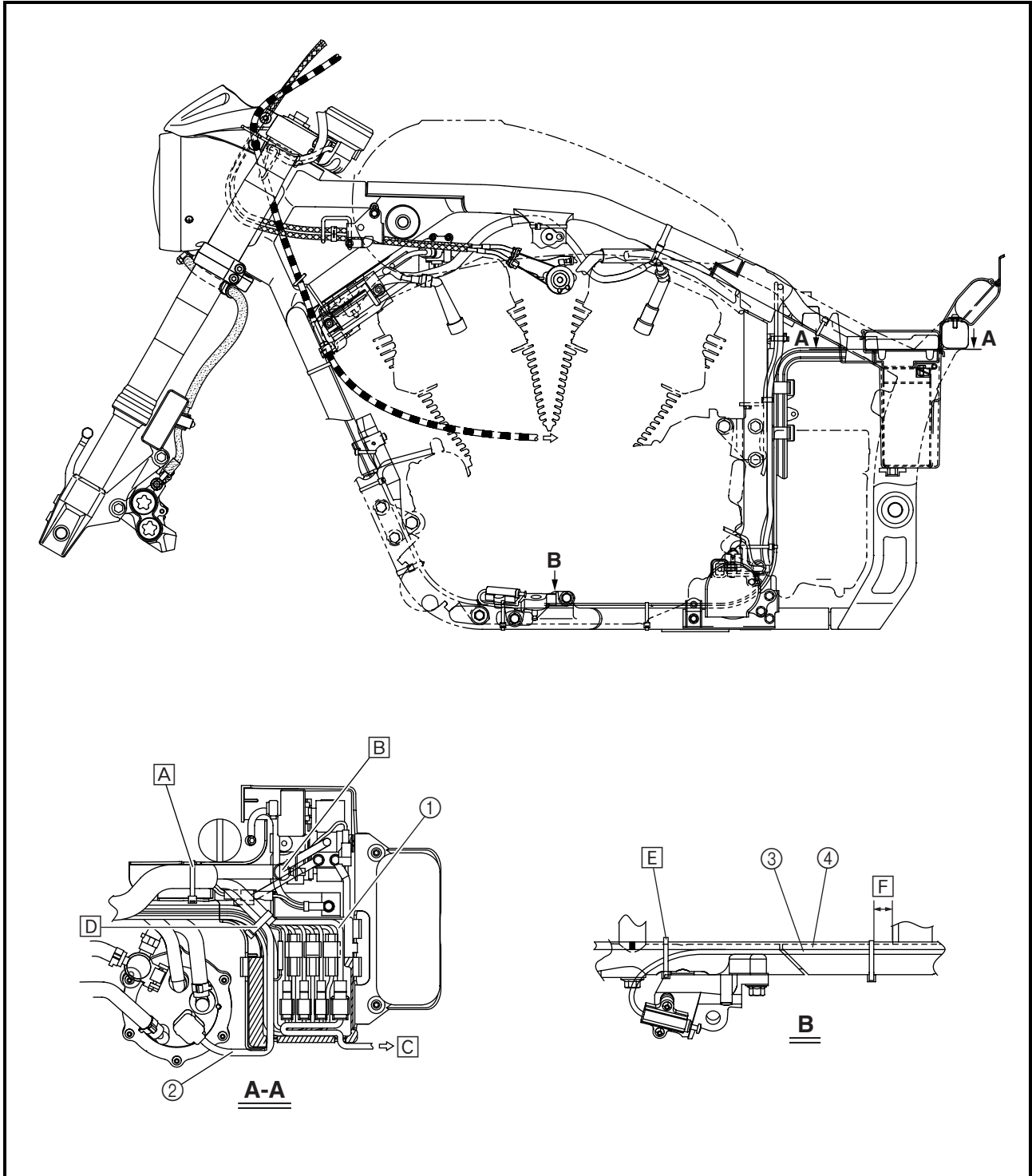
- A To the rectifier/regulator, horn 1 and rear brake light switch.
- B 30 ~ 50 degrees
- C 40 ~ 60 degrees





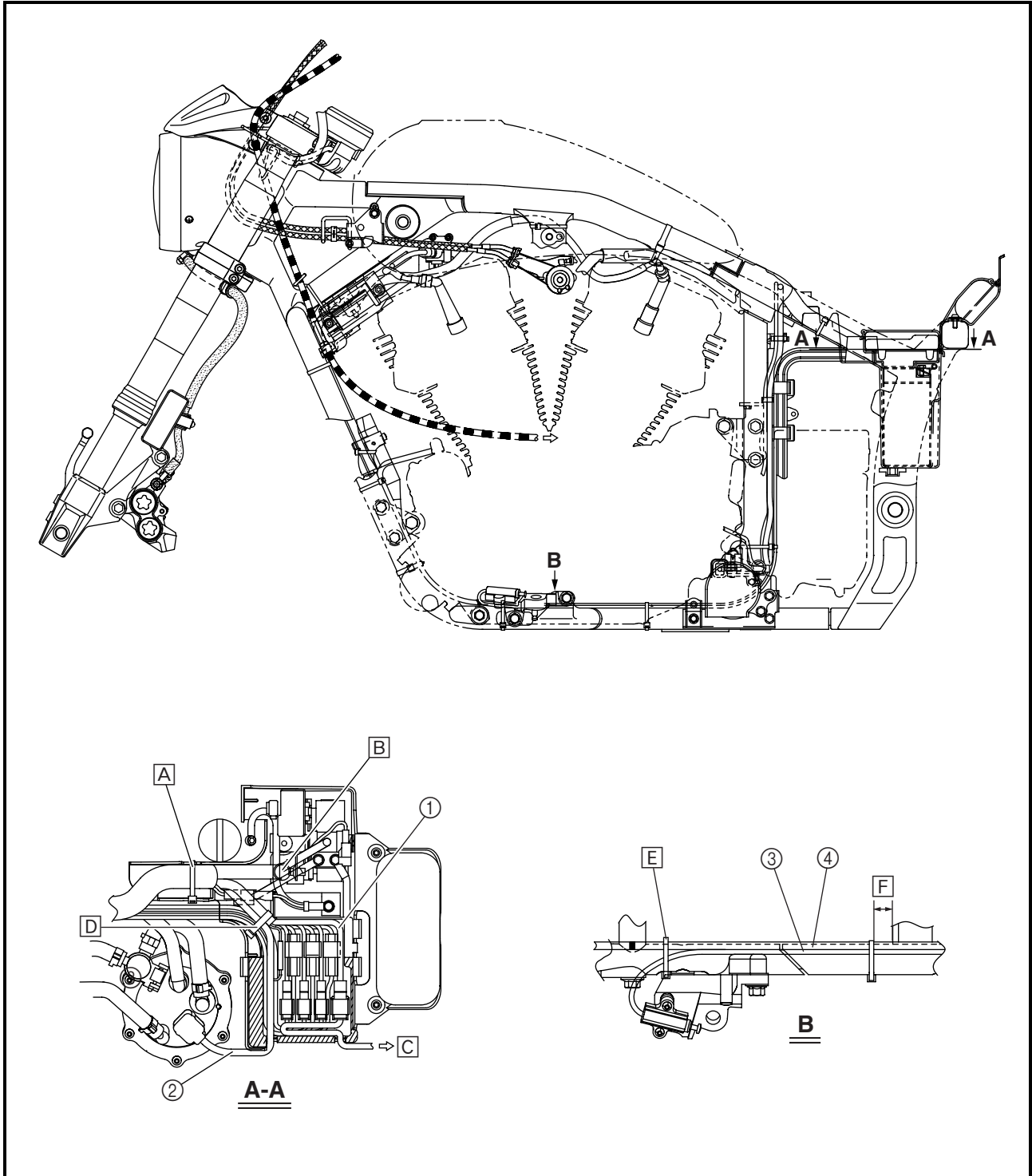
- ① Tail/brake light lead
- ② Fuel pump lead
- ③ Sidestand switch lead
- ④ Starter motor lead

- A Be sure to position the ECU leads and sensor leads toward the left side of the frame, and then fasten the wire harness protector with a plastic locking tie.
- B Route the negative battery lead on top of the other leads.
- C To the tail/brake light.





- D Fasten the decompression solenoid lead, speed sensor lead, cylinder identification sensor lead, sidestand switch lead, crankshaft position sensor lead, neutral switch lead, and fuel pump lead with a plastic band.
- E Position the gray mark on the starter motor lead at the center of the bolt. Fit the starter motor lead and sidestand switch lead into the groove in the frame, and then fasten them with a plastic locking tie.
- F 10 ~ 30 mm (0.4 ~ 1.2 in)





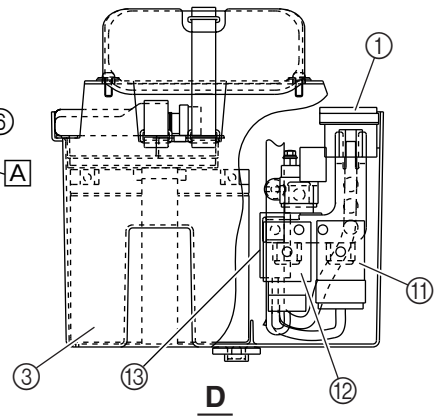
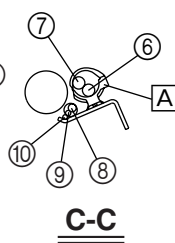
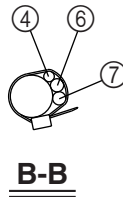
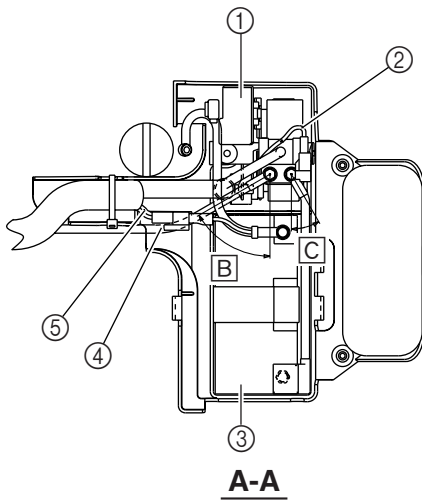
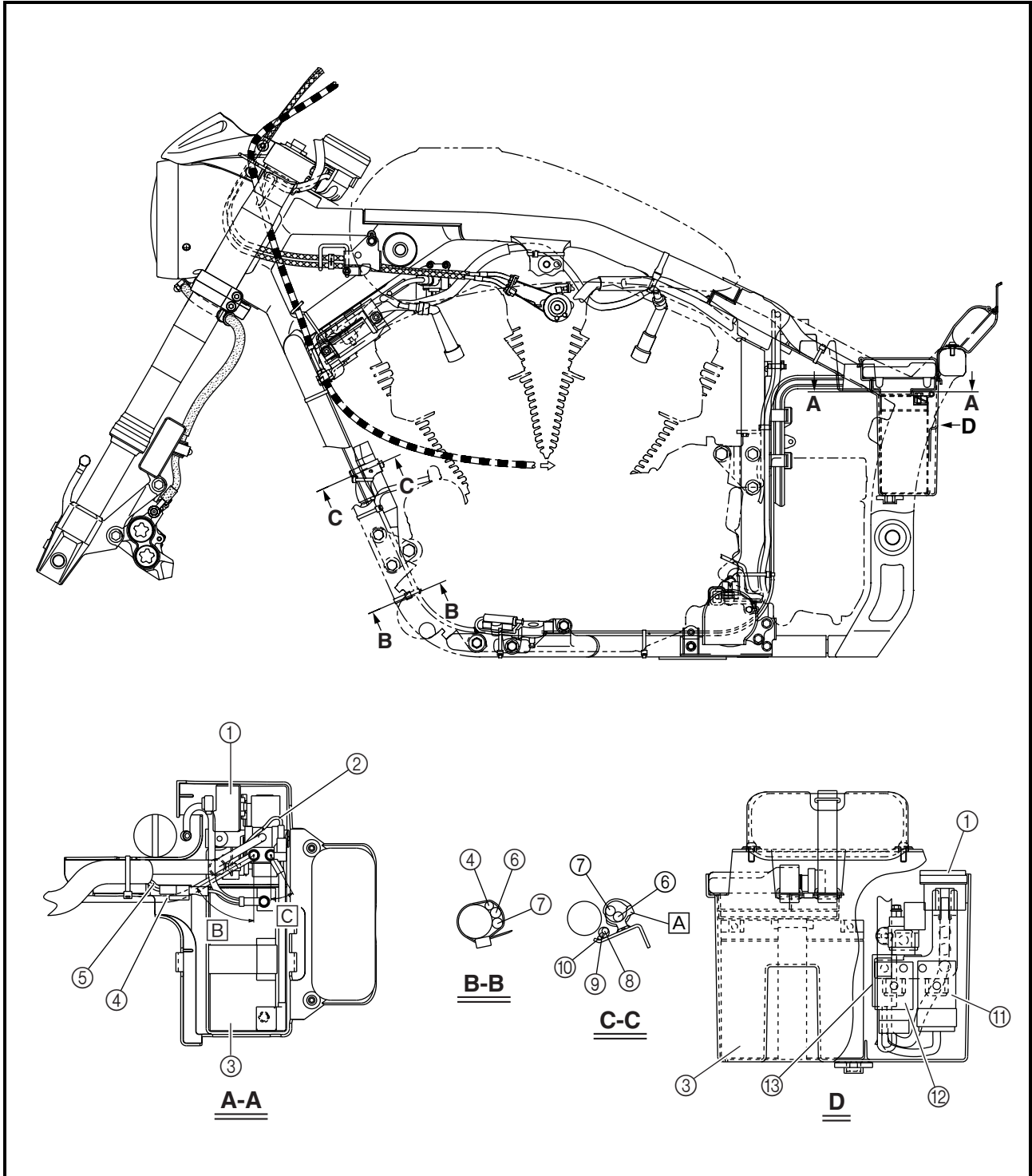
- ① Fuse box
- ② ECU lead
- ③ Battery
- ④ Starter motor lead
- ⑤ ECU ground lead
- ⑥ Fuel tank/air filter breather hose
- ⑦ Fuel tank/air filter drain hose
- ⑧ Regulator lead
- ⑨ Horn lead
- ⑩ Rear brake light switch lead

- ⑪ Cut-off relay
- ⑫ Turn signal relay
- ⑬ Headlight relay

**A** Clamp the fuel tank/air filter breather hose, and fuel tank/air filter drain hose with a plastic clamp.

**B** 45 ~ 60 degrees

**C** 15 ~ 30 degrees

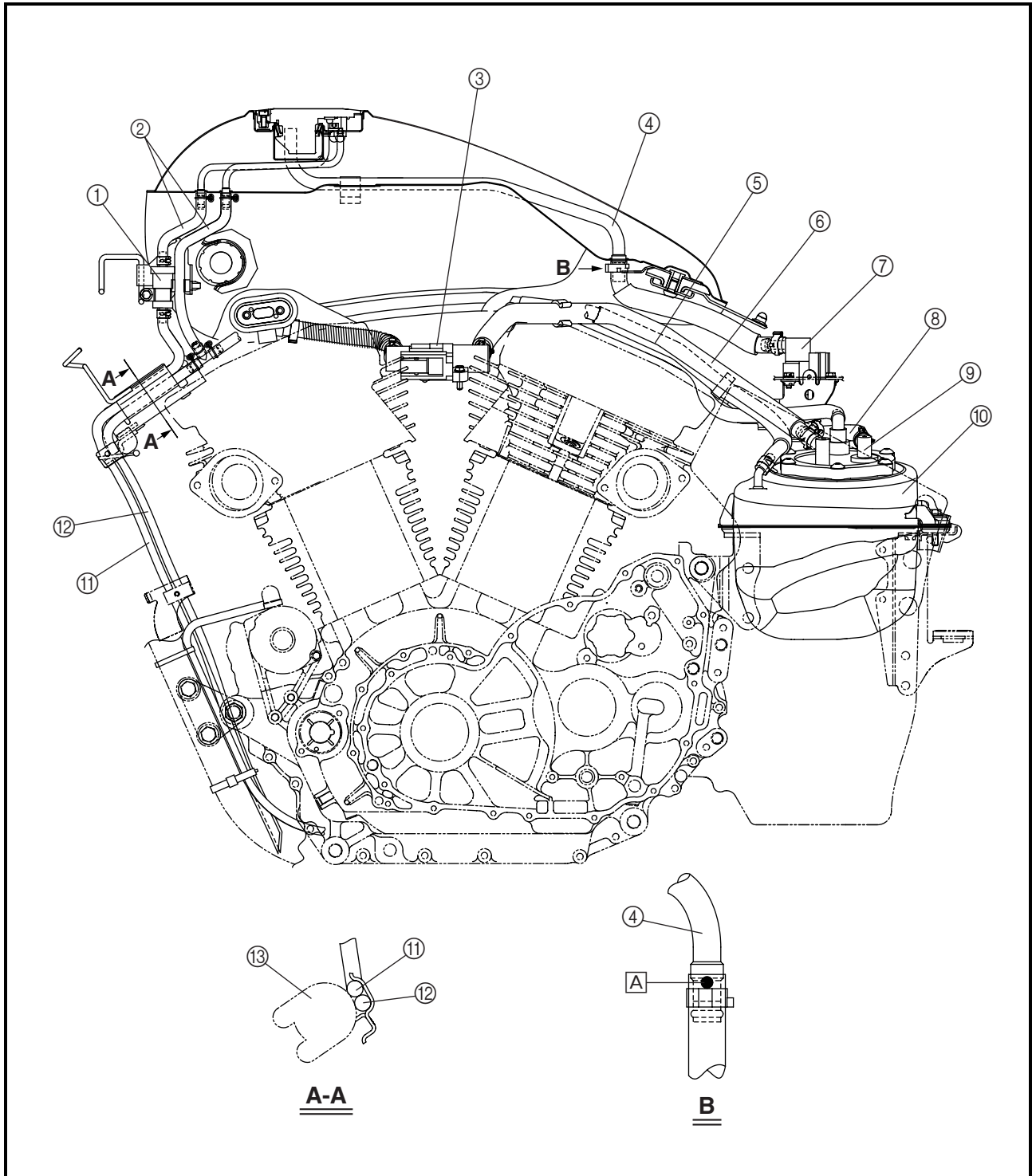




- ① Roll over valve
- ② Fuel tank breather hose
- ③ Fuel hose joint 1
- ④ Fuel hose
- ⑤ Fuel inlet hose
- ⑥ Fuel outlet hose
- ⑦ Fuel hose joint 2
- ⑧ Fuel hose
- ⑨ Fuel pump coupler
- ⑩ Sub fuel tank

- ⑪ Fuel tank drain hose
- ⑫ Fuel tank/air filter breather hose
- ⑬ Ignition coil 1

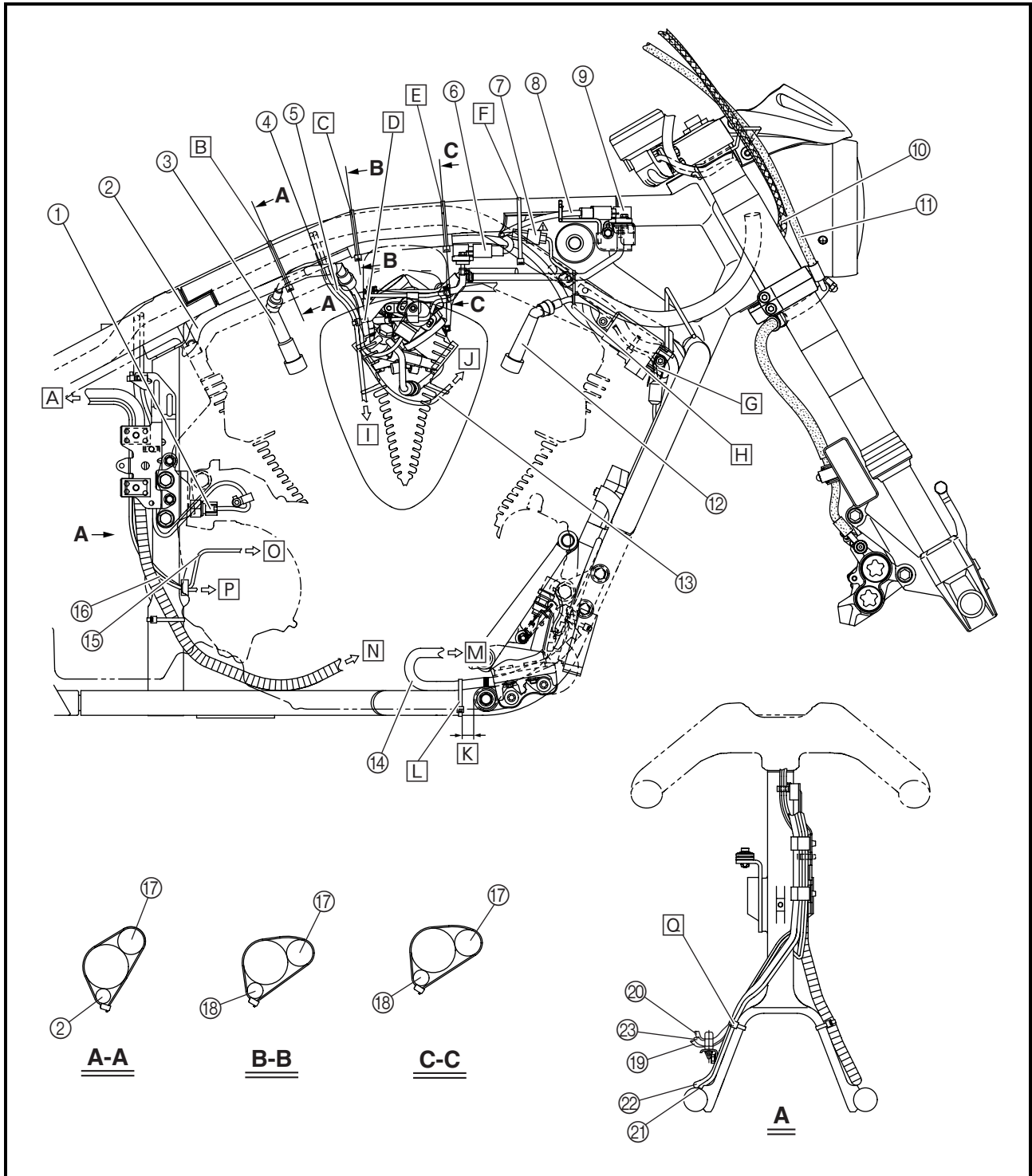
Ⓐ Make sure that the white paint mark is facing forward.







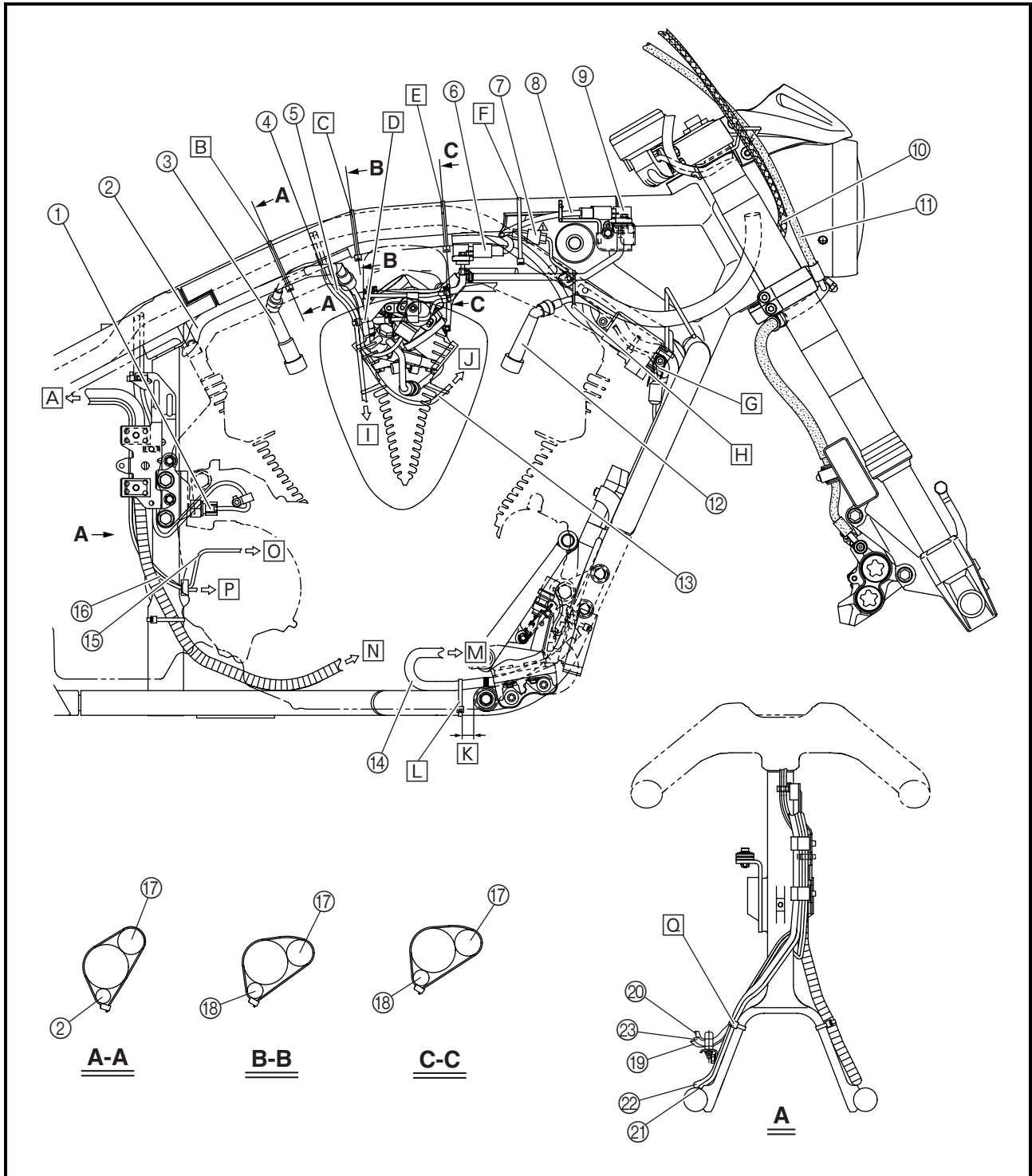
- |  |  |                                     |
|--|--|-------------------------------------|
| ① Oil temperature sensor                             | ⑨ Intake air pressure sensor 2                       | ⑱ Ignition coil 1-R spark plug lead |
| ② Fuel hose  | ⑩ Throttle cables                                    | ⑲ Lean angle cut-off switch lead    |
| ③ Spark plug cap (ignition coil 1-R spark plug lead) | ⑪ Brake hose   | ⑳ Crankshaft position sensor lead   |
| ④ Injector lead                                      | ⑫ Spark plug cap (ignition coil 2-R spark plug lead) | ㉑ Sidestand switch lead             |
| ⑤ Throttle position sensor lead                      | ⑬ Engine temperature sensor lead                     | ㉒ Starter motor lead                |
| ⑥ Intake air pressure sensor 1                       | ⑭ Stator coil lead                                   | ㉓ Horn 2 lead                       |
| ⑦ Intake air temperature sensor coupler              | ⑮ Neutral switch lead                                |                                     |
| ⑧ Intake air pressure sensor lead                    | ⑯ Speed sensor lead                                  |                                     |
|  | ⑰ Main wire harness                                  |                                     |





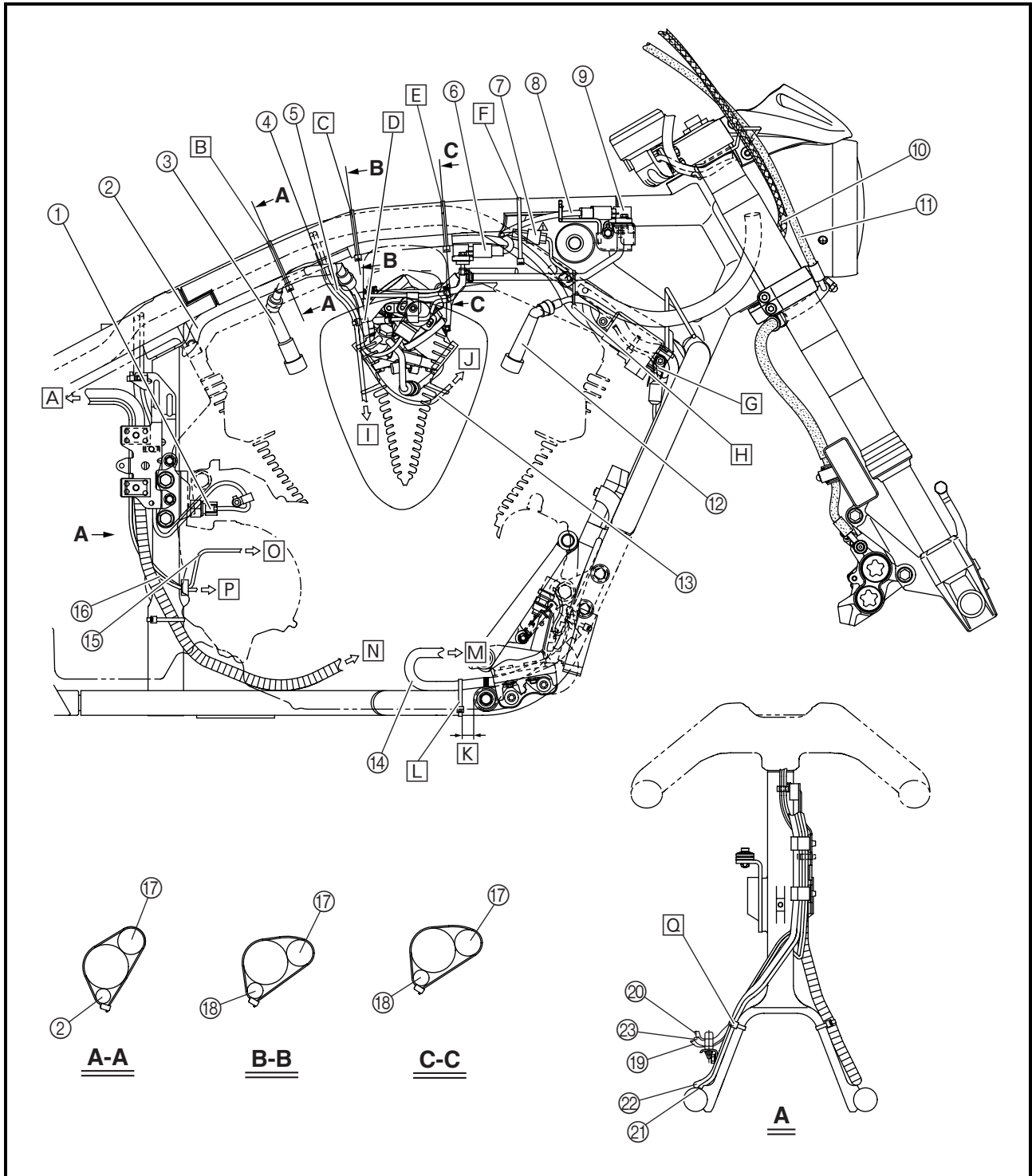
- A To the battery box.
- B Fasten the main wire harness, and fuel hose with a plastic locking tie to the frame.
- C Fasten the main wire harness, and spark plug lead #3 with a plastic locking tie to the frame.
- D Fasten the throttle position sensor lead, engine temperature sensor lead, and injector lead with a plastic locking tie to the fuel delivery pipe.
- E Fasten the main wire harness, and spark plug lead #3 with a plastic locking tie.

- F Fasten the main wire harness, intake air pressure sensor lead #2, ignition coil 1-R spark plug lead, and intake air temperature sensor coupler with a plastic locking tie.
- G Fasten the rear brake light switch lead, and ignition coil lead #2 with a plastic band.
- H Fasten the main wire harness, and intake vacuum hose with a plastic locking tie.





- I To the injector sub lead.
- J To the engine temperature sensor.
- K 10 ~ 30 mm (0.4 ~ 1.2 in)
- L Position the gray mark on the stator coil lead at the center of the bolt, and then fasten it with a plastic locking tie.
- M To the stator coil.
- N To the decompression solenoid, and cylinder identification sensor.
- O To the neutral switch.
- P To the speed sensor.
- Q Fasten the crankshaft position sensor lead, side-stand switch lead, lean angle cut-off switch lead, starter motor lead, and horn lead with a plastic locking tie.

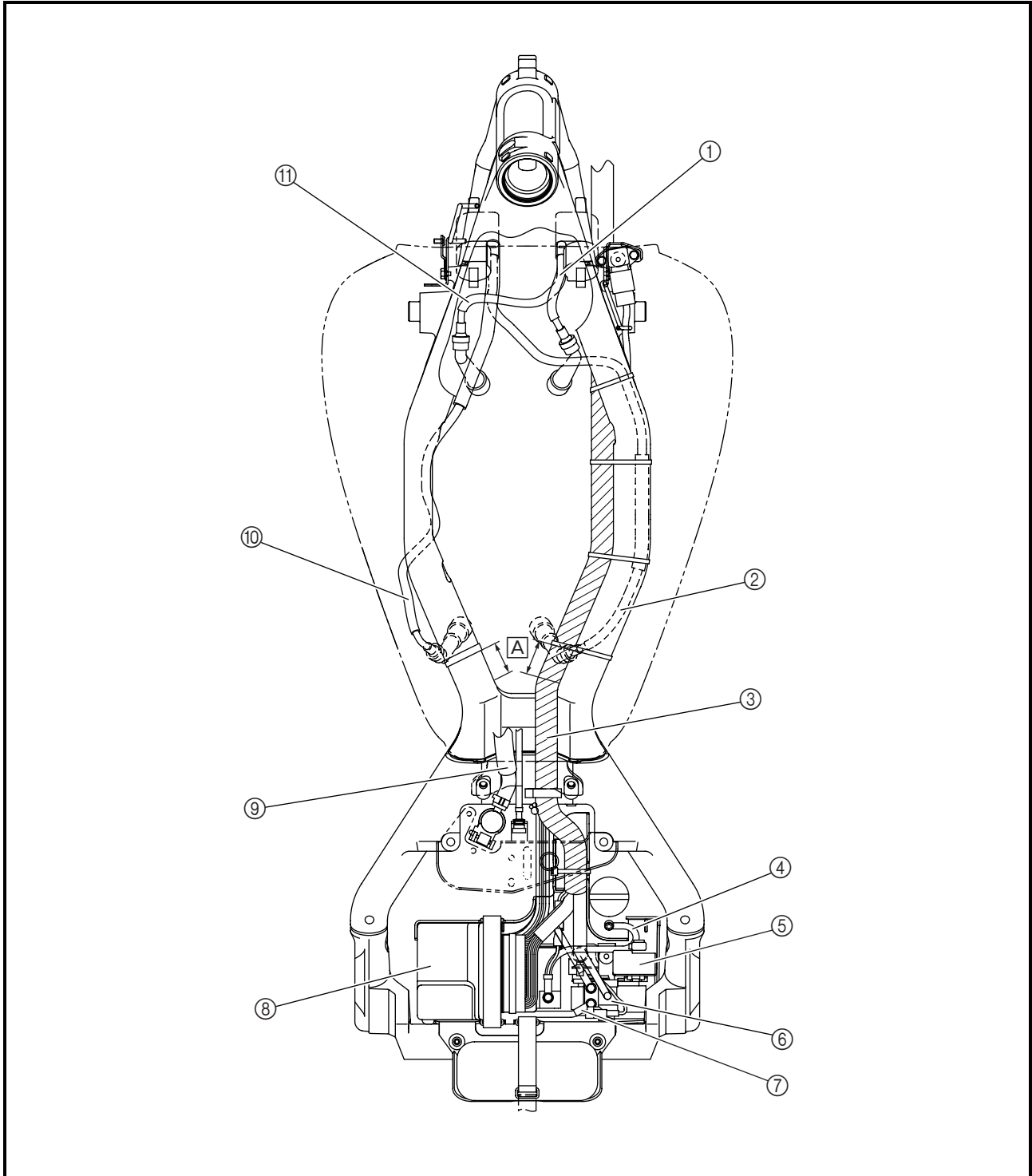




- ① Ignition coil 2-R spark plug lead
- ② Ignition coil 1-R spark plug lead
- ③ Main wire harness
- ④ Negative battery ground lead
- ⑤ Fuse box
- ⑥ Main fuse coupler
- ⑦ Positive battery lead

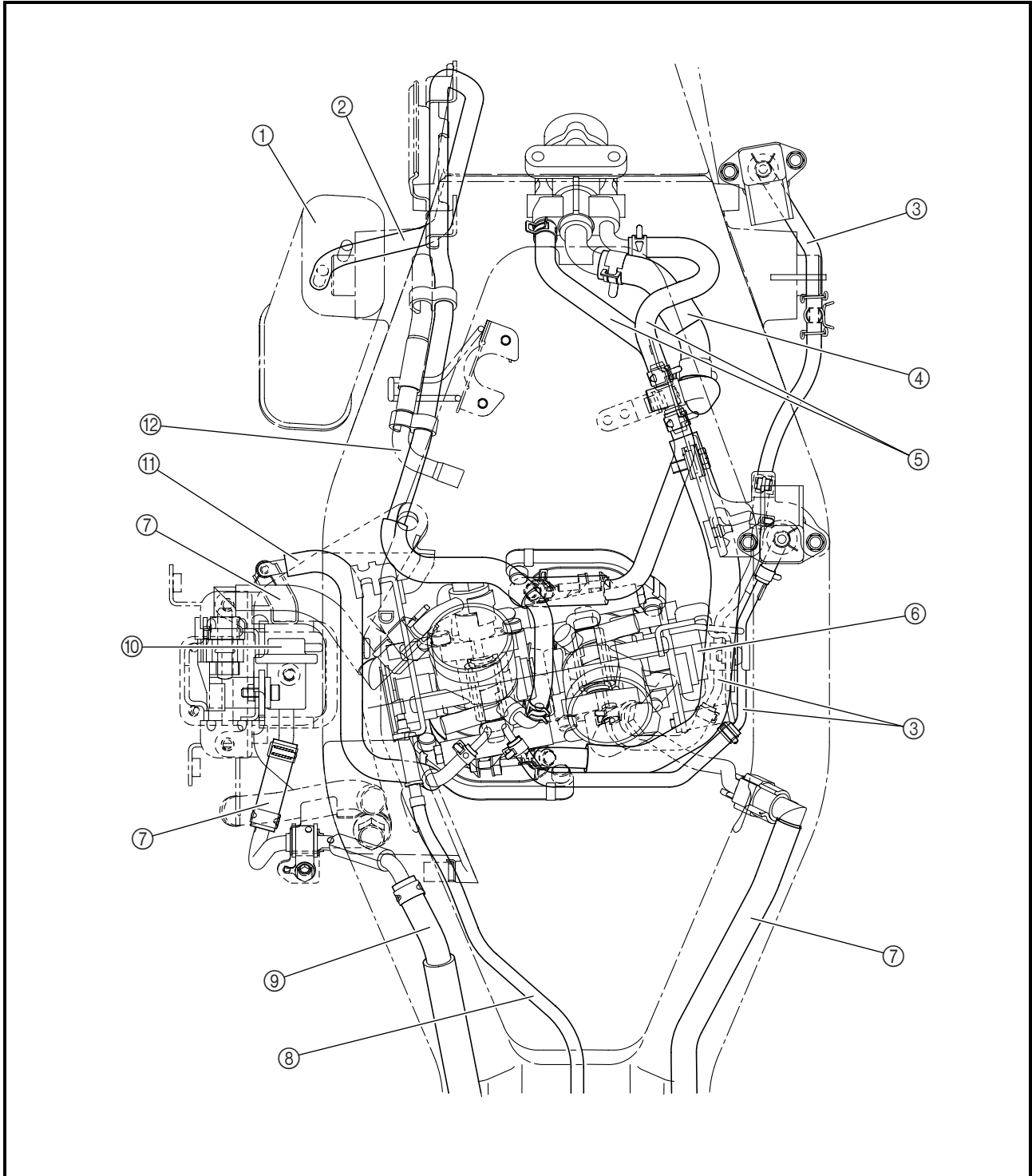
- ⑧ ECU
- ⑨ Fuel hose
- ⑩ Ignition coil 1-L spark plug lead
- ⑪ Ignition coil 2-L spark plug lead

Ⓐ 40 ~ 60 mm (1.6 ~ 2.4 in)





- ① Canister (California only)
- ② Canister purge hose (California only)
- ③ Intake vacuum hose
- ④ Liner control valve inlet hose
- ⑤ Liner control valve outlet hose
- ⑥ Throttle position sensor
- ⑦ Fuel hose
- ⑧ Throttle stop screw
- ⑨ Fuel inlet hose
- ⑩ Pressure regulator
- ⑪ A.I.S. vacuum hose
- ⑫ Silencer air filter case drain hose

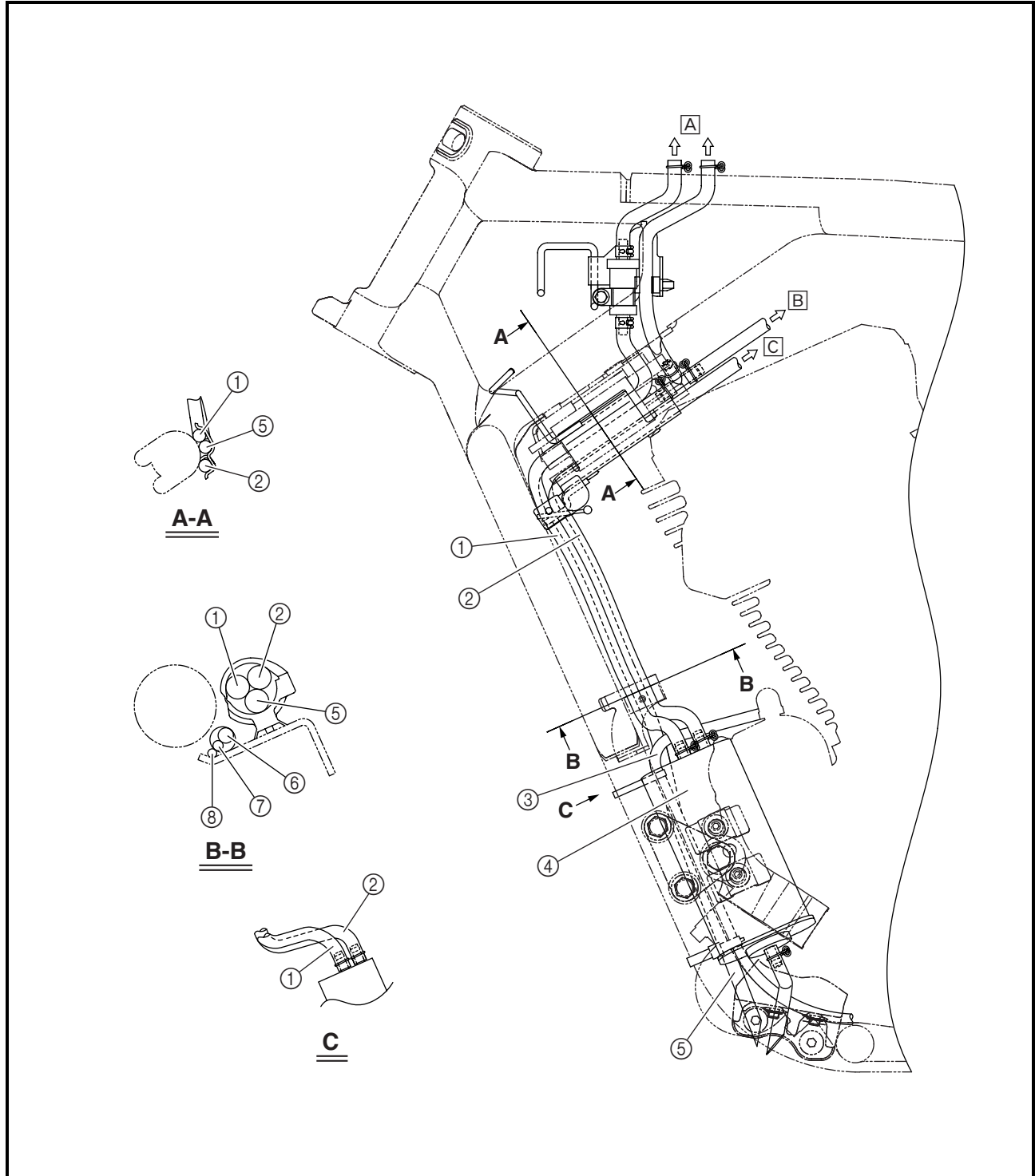




**Canister (California only)**

- ① Canister charge hose
- ② Canister purge hose
- ③ Starter motor lead
- ④ Canister
- ⑤ Fuel tank drain hose
- ⑥ Regulator lead
- ⑦ Horn lead
- ⑧ Rear brake light switch lead

- Ⓐ To the fuel tank.
- Ⓑ To the silencer air filter case.
- Ⓒ To the throttle bodies.



# INTRODUCTION/PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM



EAS00036

## PERIODIC CHECKS AND ADJUSTMENTS

### INTRODUCTION

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

### PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

No.	ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
			600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months
1	* Valve clearance (See page 3-11.)	<ul style="list-style-type: none"> <li>Check valve clearance when engine is cold.</li> <li>Adjust if necessary.</li> </ul>	Every 16,000 mi (25,000 km)					
2	* Spark plugs (See page 3-20.)	<ul style="list-style-type: none"> <li>Check condition.</li> <li>Adjust gap and clean.</li> <li>Replace at 8,000 mi (13,000 km) or 12 months and thereafter every 8,000 mi (13,000 km) or 12 months.</li> </ul>		√	Replace.	√	Replace.	√
3	* Crankcase ventilation system (See page 3-38.)	<ul style="list-style-type: none"> <li>Check ventilation hose for cracks or damage.</li> <li>Replace if necessary.</li> </ul>		√	√	√	√	√
4	* Fuel line (See page 3-37.)	<ul style="list-style-type: none"> <li>Check fuel hose for cracks or damage.</li> <li>Replace if necessary.</li> </ul>		√	√	√	√	√
5	* Exhaust system (See page 3-39.)	<ul style="list-style-type: none"> <li>Check for leakage.</li> <li>Retighten if necessary.</li> <li>Replace gasket(s) if necessary.</li> </ul>		√	√	√	√	√
6	* Electrical Fuel Injection System (See page 3-15.)	<ul style="list-style-type: none"> <li>Check and adjust engine idle speed and synchronization.</li> <li>Adjust cable free play.</li> </ul>	√	√	√	√	√	√
7	* Evaporative Emission control system (For California only)	<ul style="list-style-type: none"> <li>Check control system for damage.</li> <li>Replace if necessary.</li> </ul>				√		√

\* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

# GENERAL MAINTENANCE AND LUBRICATION CHART



## GENERAL MAINTENANCE AND LUBRICATION CHART

No.	ITEM	ROUTINE	TYPE	INITIAL	ODOMETER READINGS					
				600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months	
1	Engine oil (See page 3-27.)	• Change.	—	√	√	√	√	√	√	
2	* Engine oil filter cartridge	• Replace.	—	√		√		√		
3	* Air filter elements (See page 3-36.)	• Check condition and for damage. • Replace if necessary.	—		√	√	√	√	√	
4	* Front brake (See page 3-40.)	• Check operation and fluid leakage. (See NOTE page 3-3.) • Correct if necessary.	—	√	√	√	√	Replace brake fluid.	√	
5	* Rear brake (See page 3-41.)	• Check operation and fluid leakage. (See NOTE page 3-3.) • Correct if necessary.	—	√	√	√	√	Replace brake fluid.	√	
6	* Clutch (See page 3-35.)	• Check operation and free play. • Correct if necessary.	—	√	√	√	√	√	√	
7	* Transfer case oil (See page 3-32.)	• Check vehicle for leakage. • Replace every 16,000 mi (25,000 km) or 24 months.	SAE 80 API "GL-4" hypoid gear oil	Change.		Check.		Change.		
8	* Control cables (See page 3-58.)	• Apply chain lube thoroughly.	Yamaha chain and cable lube or engine oil 10W-30	√	√	√	√	√	√	
9	* Rear arm pivot bearing (See page 4-86.)	• Check bearing assembly for looseness. • Moderately repack every 16,000 mi (25,000 km) or 24 months.	Lithium-soap-based grease			√		Repack.		
10	Brake and clutch lever pivot shafts (See page 3-59.)	• Lubricate. • Apply grease lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√	
11	Brake pedal and shift pedal shafts (See page 3-59.)	• Lubricate. • Apply grease lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√	
12	* Sidestand pivot (See page 3-59.)	• Check operation and lubricate. • Apply grease lightly.	Lithium-soap-based grease (all-purpose grease)		√	√	√	√	√	
13	* Sidestand switch (See page 3-59.)	• Check and clean or replace if necessary.	—	√	√	√	√	√	√	
14	* Front fork (See page 3-52.)	• Check operation and for leakage.	—		√	√	√	√	√	
15	* Steering bearings (See page 3-50.)	• Check bearing assembly for looseness. • Moderately repack every 16,000 mi (25,000 km) or 24 months.	Lithium-soap-based grease (all-purpose grease)		√	√	√	Repack.	√	
16	* Wheel bearings (See page 4-4.)	• Check bearings for smooth rotation.	—		√	√	√	√	√	

3



# GENERAL MAINTENANCE AND LUBRICATION CHART



No.	ITEM	ROUTINE	TYPE	INITIAL	ODOMETER READINGS					
				600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	8,000 mi (13,000 km) or 12 months	12,000 mi (19,000 km) or 18 months	16,000 mi (25,000 km) or 24 months	20,000 mi (31,000 km) or 30 months	
17	* Rear suspension link pivots (See page 4-86.)	<ul style="list-style-type: none"> <li>Lubricate.</li> <li>Apply grease lightly.</li> </ul>	Lithium-soap-based grease						√	
18	* Drive belt (See page 3-47.)	<ul style="list-style-type: none"> <li>Check belt tension.</li> <li>Adjust if necessary.</li> </ul>	—	√	Every 2,500 mi (4,000 km)					

\* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

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

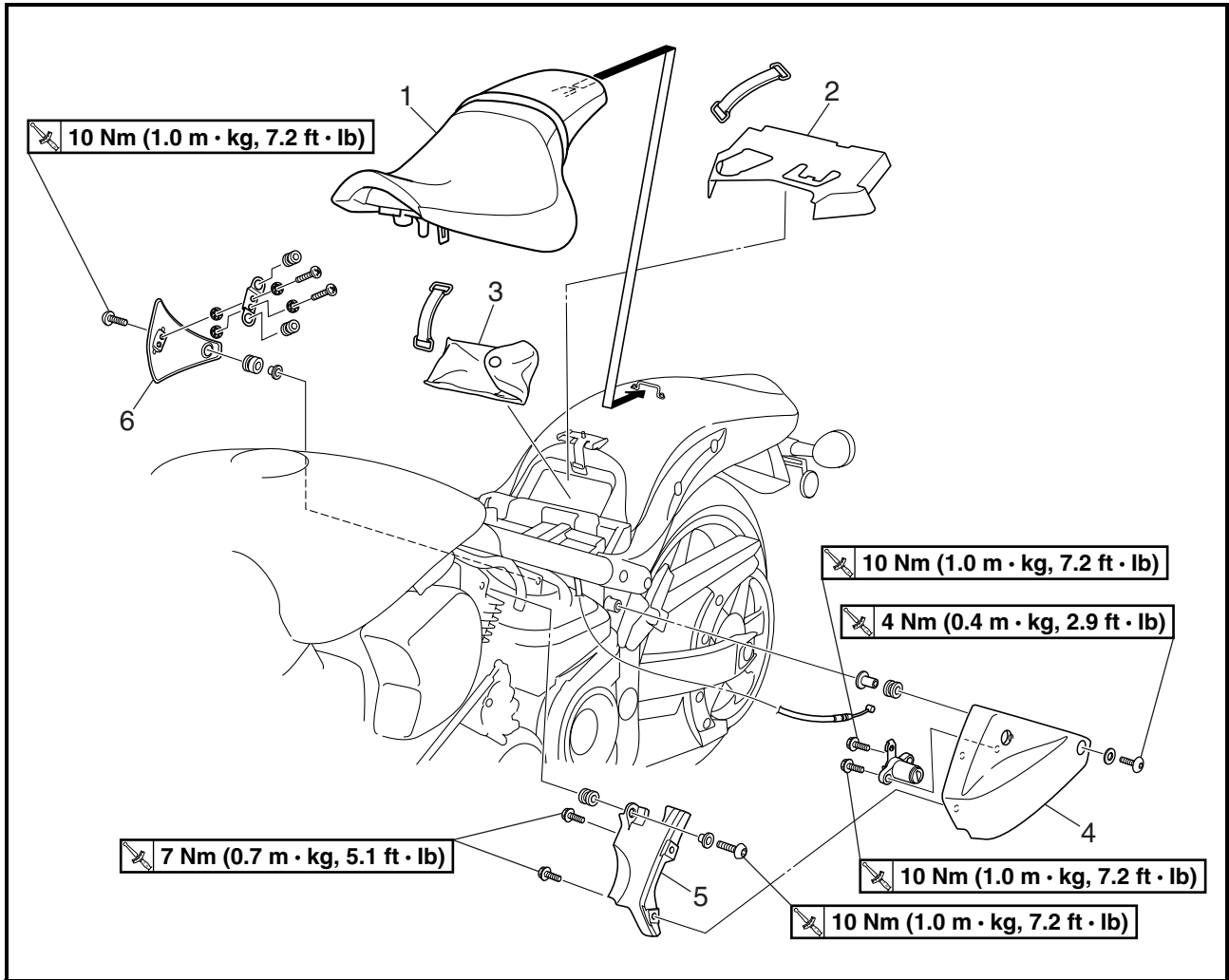
From 24,000 mi (37,000 km) or 36 months, repeat the maintenance intervals starting from 4,000 mi (7,000 km) or 6 months.

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

- Air filters
  - This model's air filters are equipped with disposable oil-coated paper elements, which must not be cleaned with compressed air to avoid damaging them.
  - The air filter elements need to be replaced more frequently when riding in unusually wet or dusty areas.
- Hydraulic brake service
  - After disassembling the brake master cylinders and calipers, always change the fluid. Regularly check the brake fluid levels and fill the reservoirs as required.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

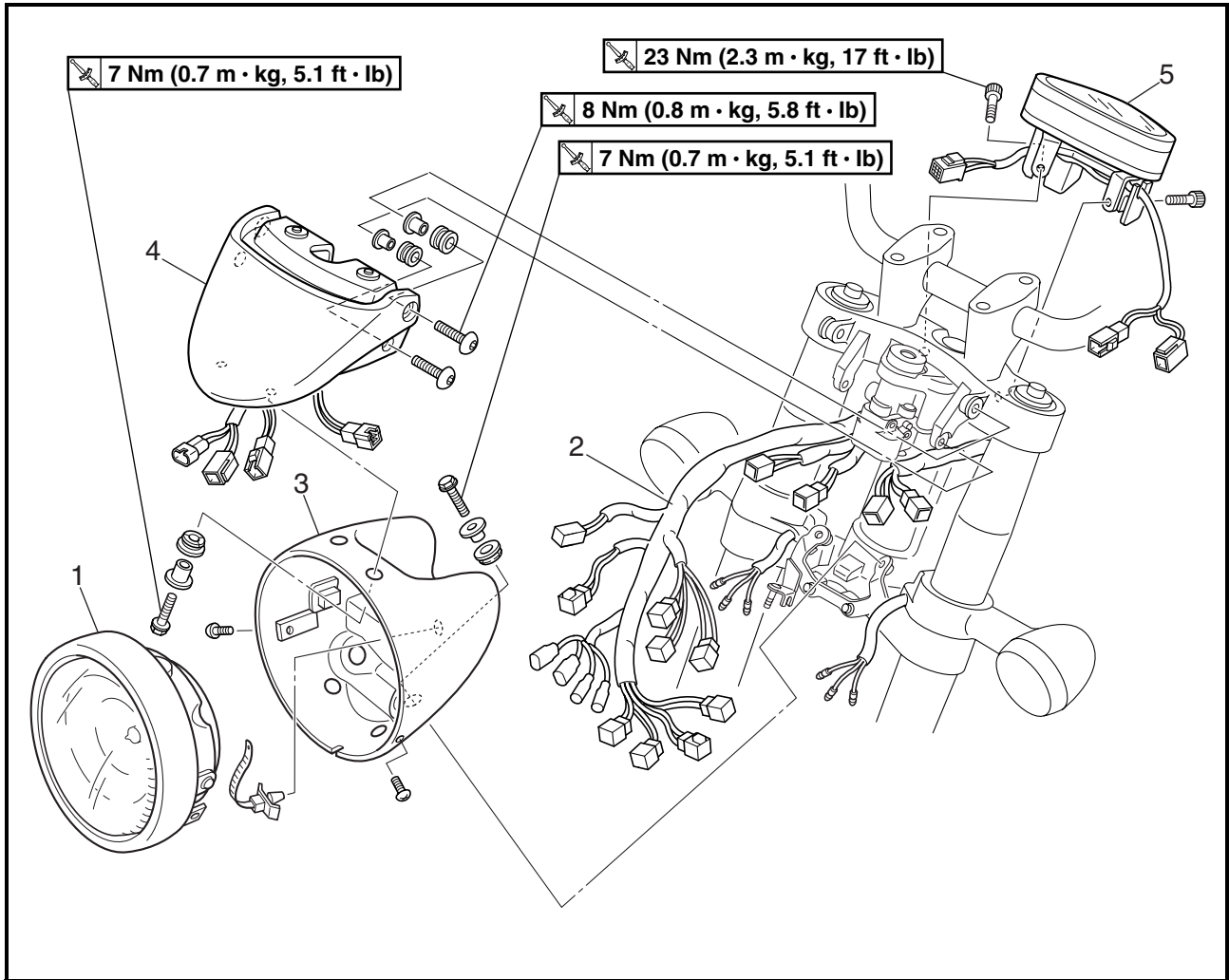
EAS00038

## SEAT AND SIDE COVERS



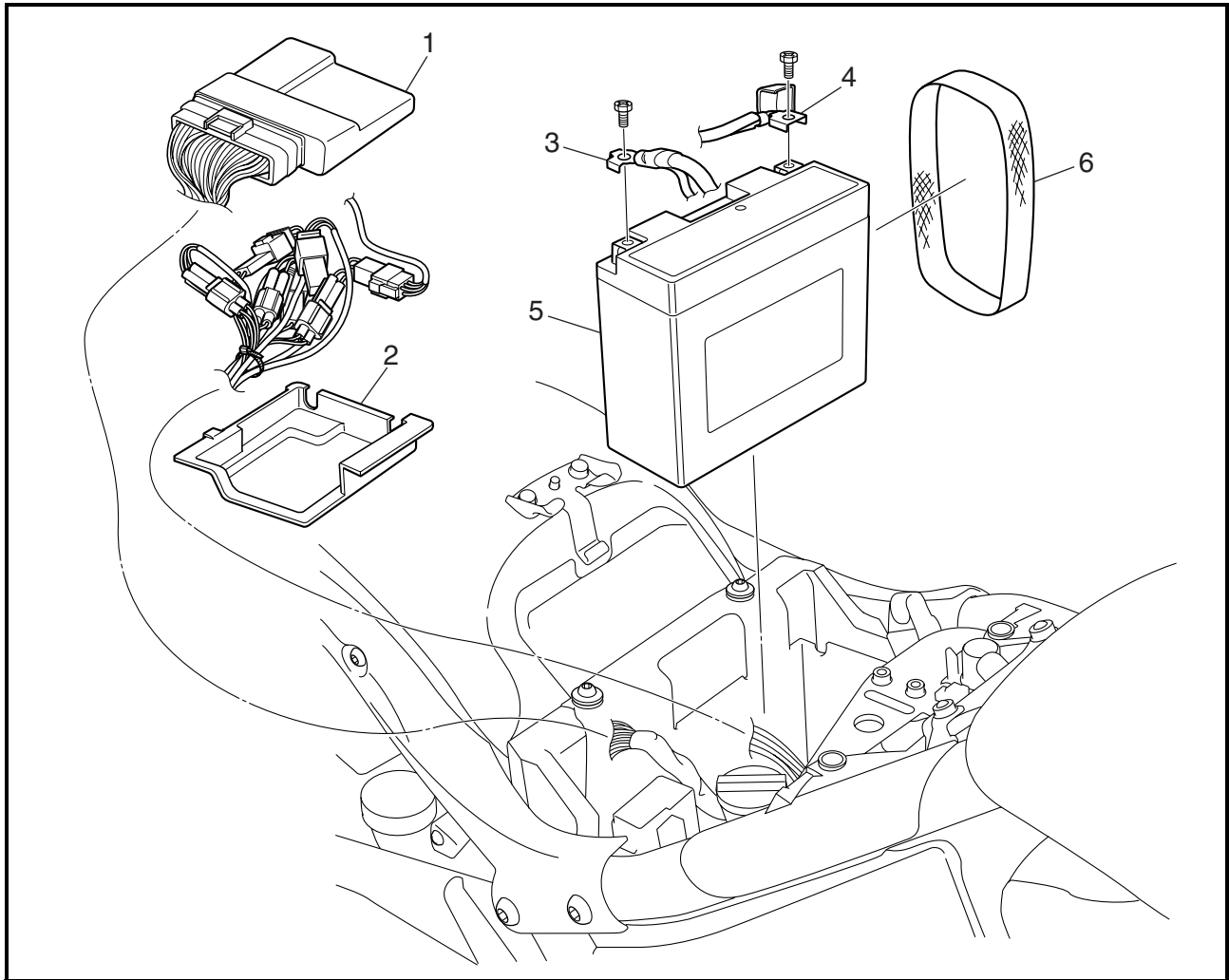
Order	Job/Part	Q'ty	Remarks
	<b>Removing the seat and side covers</b>		Remove the parts in the order listed.
1	Seat	1	
2	Cover	1	
3	Tool kit	1	
4	Left side cover 1	1	
5	Left side cover 2	1	
6	Right side cover	1	
			For installation, reverse the removal procedure.

## HEADLIGHT AND METER ASSEMBLIES



Order	Job/Part	Q'ty	Remarks
	<b>Removing the headlight and meter assemblies</b>		Remove the parts in the order listed.
1	Headlight lens unit	1	Disconnect.
2	Wire harness (in the headlight body)	1	
3	Headlight body	1	
4	Tachometer assembly	1	
5	Speedometer assembly	1	
			For installation, reverse the removal procedure.

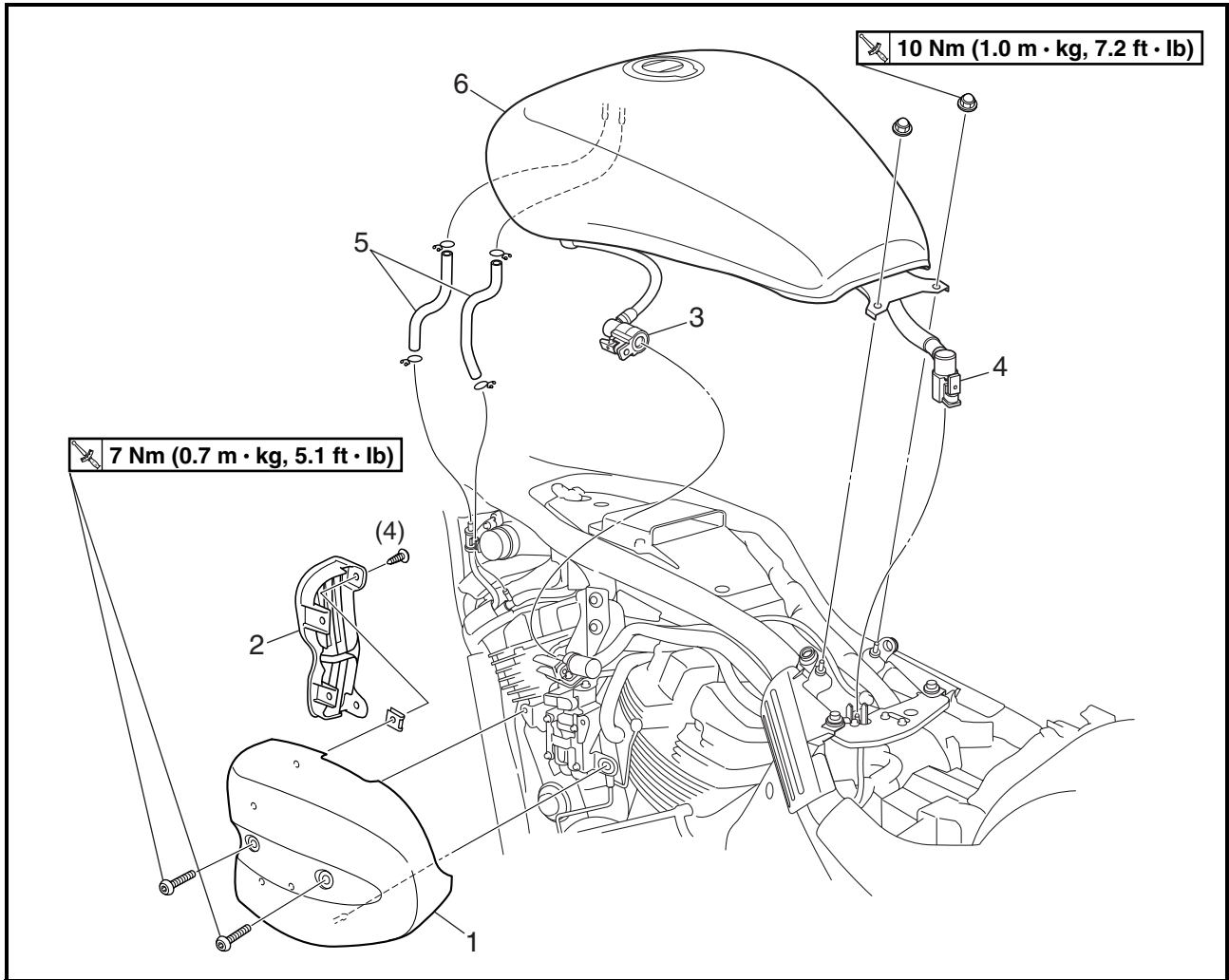
**BATTERY**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the battery</b>		Remove the parts in the order listed. Refer to "SEAT AND SIDE COVERS".
	Seat		
1	ECU	1	
2	Battery cover	1	
3	Negative battery lead	1	
4	Positive battery lead	1	
5	Battery	1	
6	Belt	1	
			For installation, reverse the removal procedure.



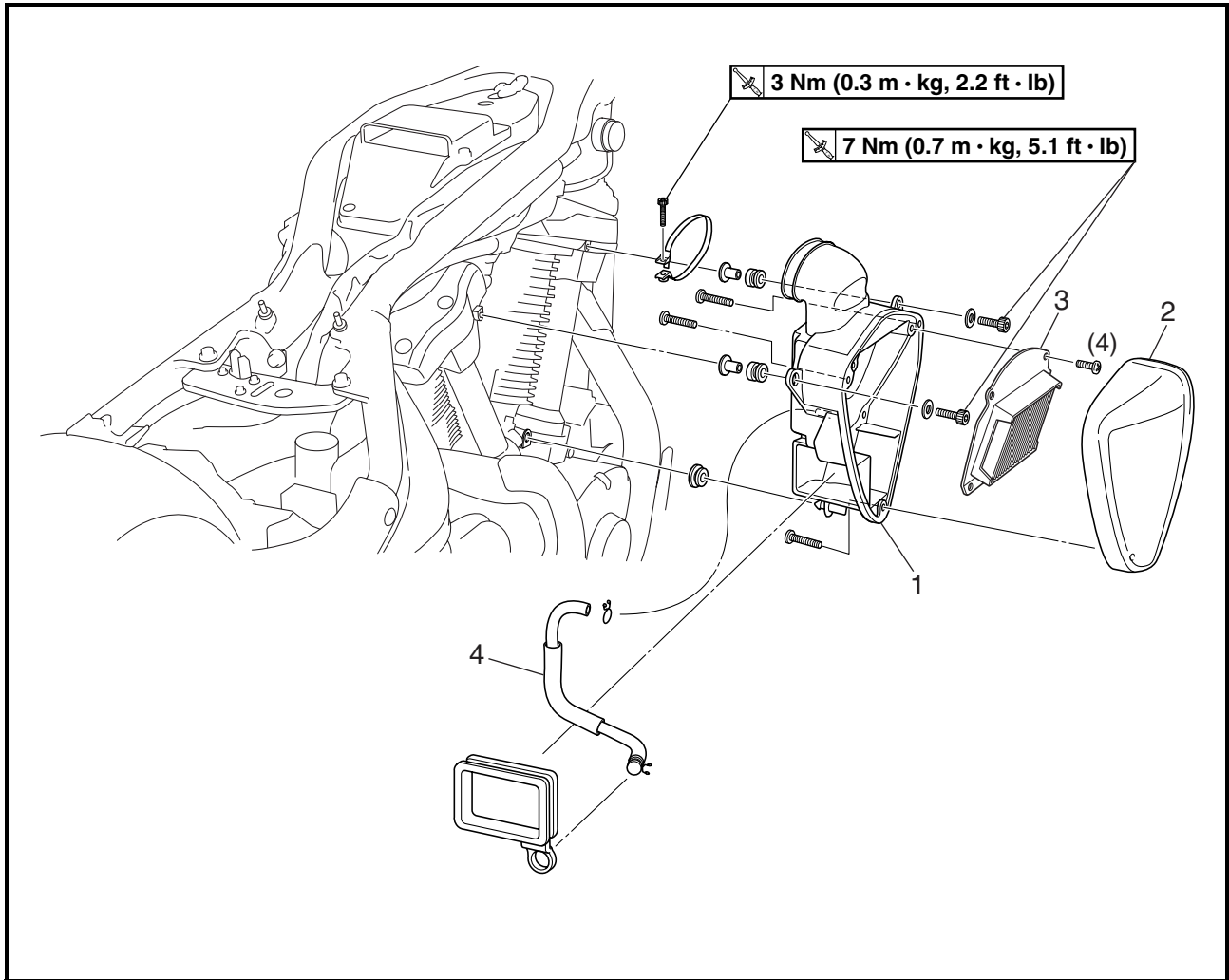
FUEL TANK



Order	Job/Part	Q'ty	Remarks
	<b>Removing the fuel tank</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT AND SIDE COVERS".
1	Air induction system cover	1	
2	Air duct	1	
3	Fuel hose joint 1	1	Disconnect.
4	Fuel hose joint 2	1	Disconnect.
5	Fuel tank breather hose	2	Disconnect.
6	Fuel tank	1	
			For installation, reverse the removal procedure.

EAS00043

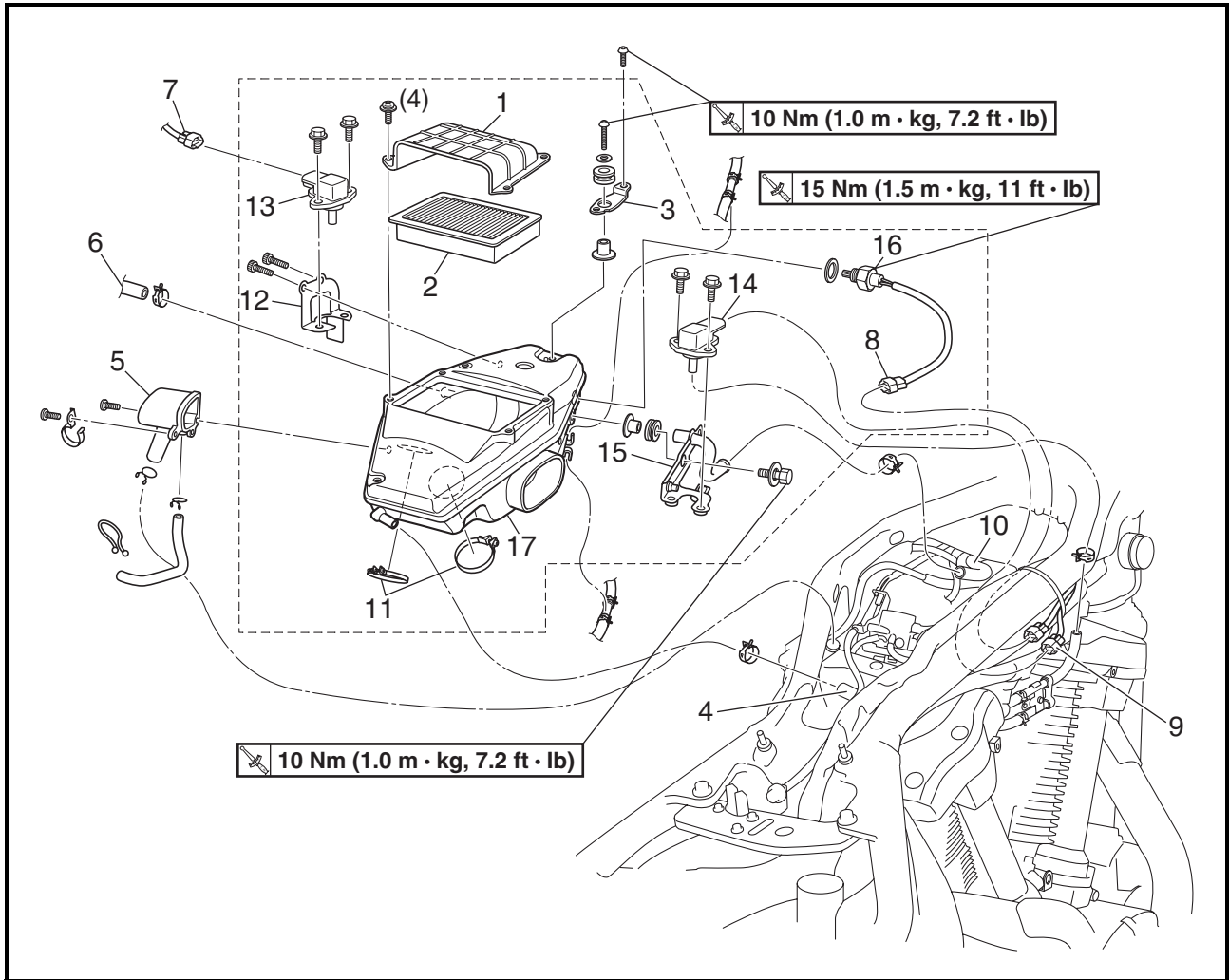
**AIR FILTER CASE**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the air filter case</b>		
	Fuel tank		Remove the parts in the order listed. Refer to "FUEL TANK".
1	Air filter case	1	
2	Air filter case cover	1	
3	Air filter element	1	
4	Air filter check hose	1	
			For installation, reverse the removal procedure.

EAS00043

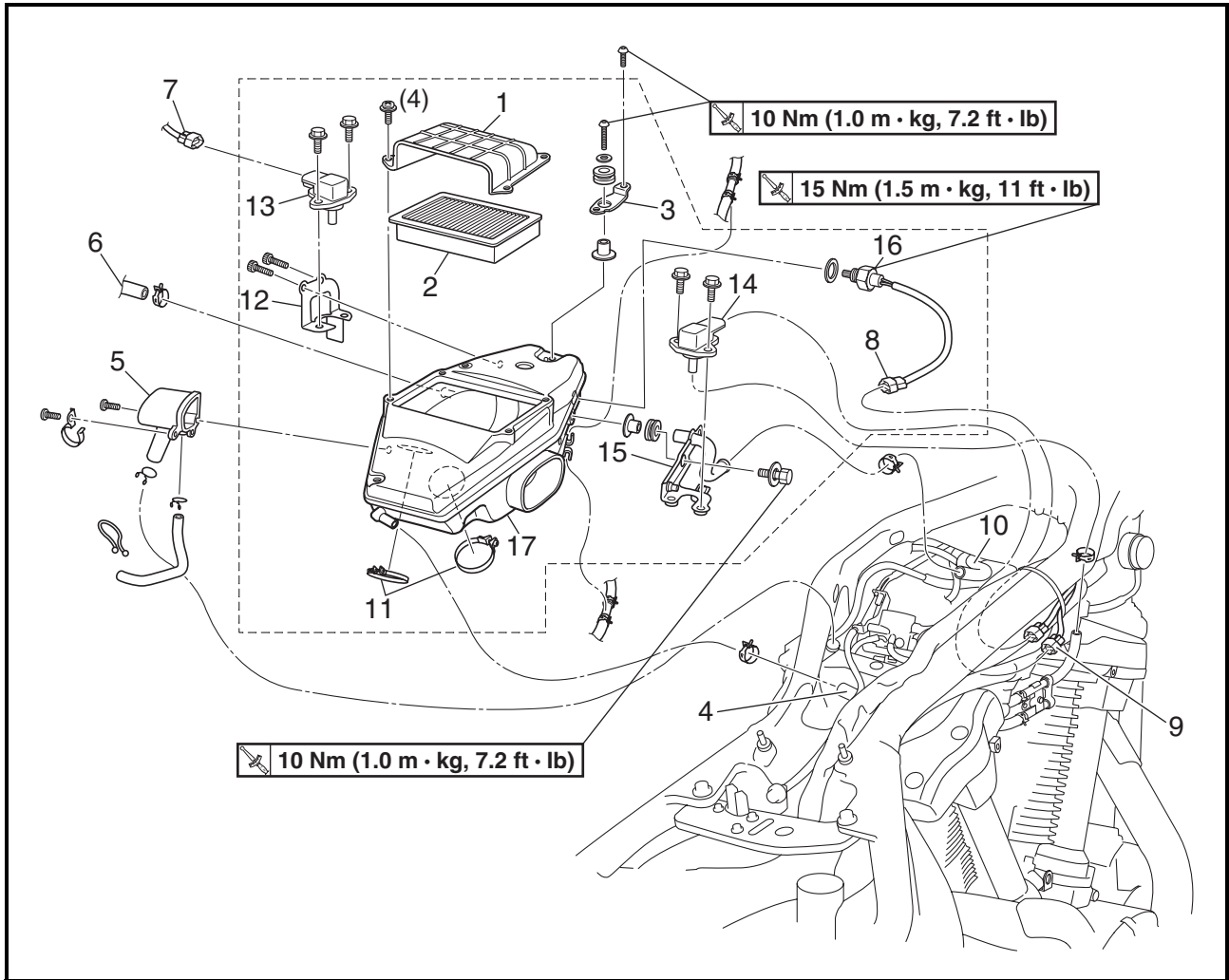
## SILENCER AIR FILTER CASE



Order	Job/Part	Q'ty	Remarks
	<b>Removing the silencer air filter case</b>		Remove the parts in the order listed. Refer to "AIR FILTER CASE".
	Air filter case		
1	Silencer air filter case cover	1	
2	Silencer air filter element	1	
3	Silencer air filter case bracket	1	
4	Cylinder head breather hose	1	Disconnect.
5	Resonator	1	
6	Silencer air filter case drain hose	1	
7	Atmospheric pressure sensor coupler	1	Disconnect.
8	Intake air temperature sensor coupler	1	Disconnect.

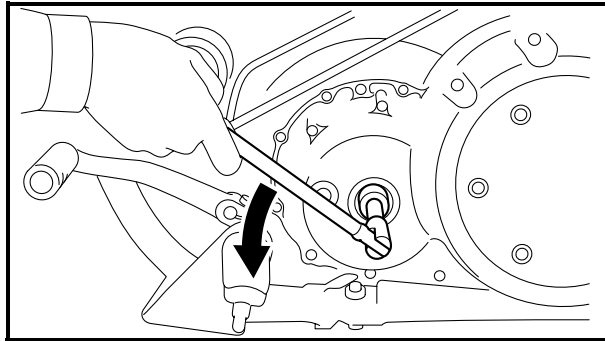
# SILENCER AIR FILTER CASE

**CHK  
ADJ**



Order	Job/Part	Q'ty	Remarks
9	Intake air pressure sensor 1 coupler	1	Disconnect.
10	Liner control valve inlet hose	1	Disconnect.
11	Clamp screw	2	Loosen.
12	Atmospheric pressure sensor bracket	1	
13	Atmospheric pressure sensor	1	
14	Intake air pressure sensor 1	1	
15	Intake air pressure sensor 1 bracket	1	
16	Intake air temperature sensor	1	
17	Silencer air filter case	1	
			For installation, reverse the removal procedure.





EAS00047

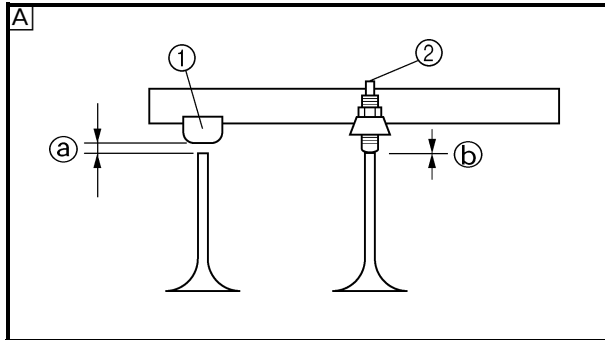
## ENGINE

### ADJUSTING THE VALVE CLEARANCE

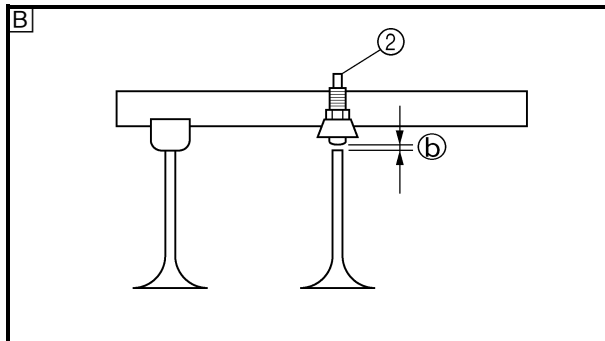
The following procedure applies to all of the valves.

#### NOTE:

- The valve clearance is automatically adjusted by the hydraulic valve lifter. However, there are times that the valve clearance is needed to be adjusted manually. If this is the case, adjust the clearance of the two maladjusted or worn valves, of a rocker arm, with the adjusting screw.



- A** If clearance is on the slip side ①, loosen the adjusting screw and bring the valve clearance ① within specification. Check if the valve clearance ② on the adjusting screw side is within specification.



- B** If clearance is on the adjusting screw ② side, tighten the adjusting screw and bring the valve clearance ② within specification.

- 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:

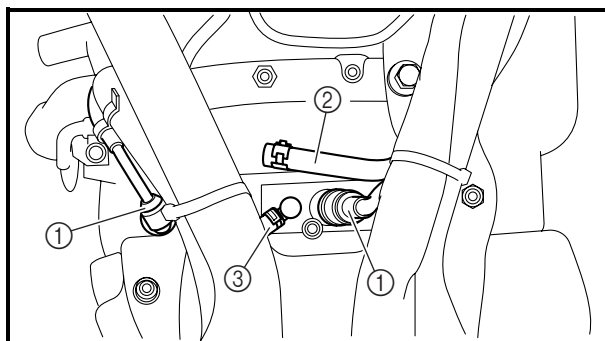
- seat  
Refer to "SEAT AND SIDE COVERS".
- fuel tank  
Refer to "FUEL TANK".
- air filter case  
Refer to "AIR FILTER CASE".
- silencer air filter case  
Refer to "SILENCER AIR FILTER CASE".

#### 2. Disconnect:

- spark plug caps ①
- cylinder head breather hose ②
- oil tank breather hose ③

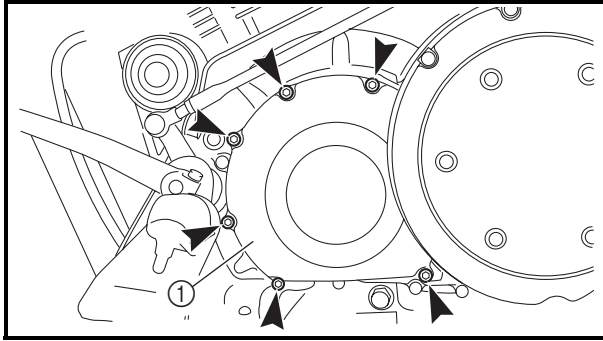
#### 3. Remove:

- spark plugs
- cylinder head covers (upper)
- gaskets
- dowel pins

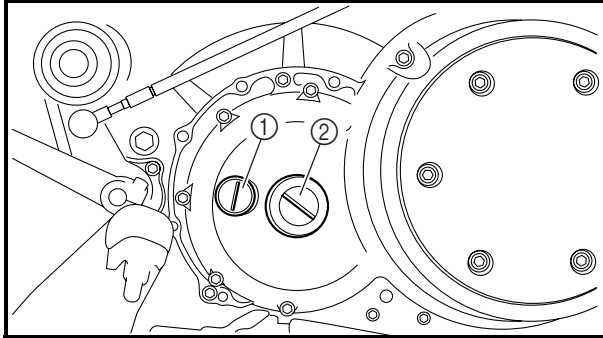


## ADJUSTING THE VALVE CLEARANCE

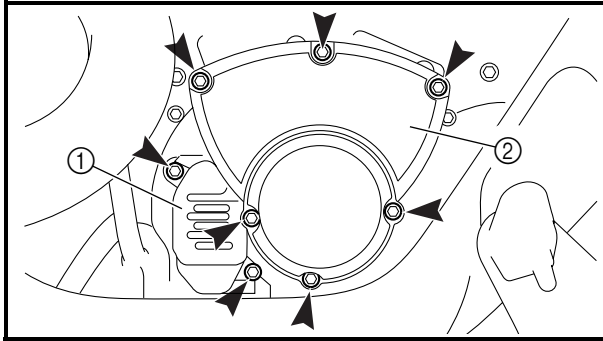
CHK  
ADJ



4. Remove:
- engine left side cover ①



5. Remove:
- timing mark accessing screw ①
  - crankshaft end cover ②



6. Remove:
- decompression solenoid cover ①
  - camshaft sprocket cover ②

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



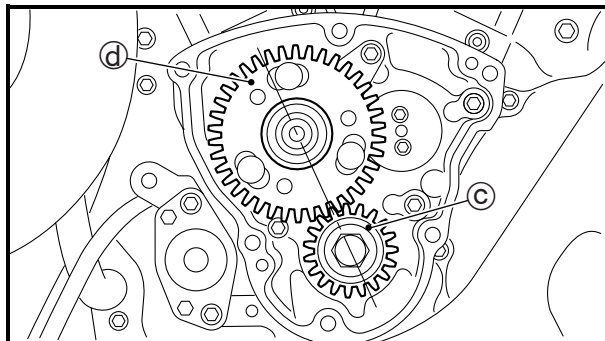
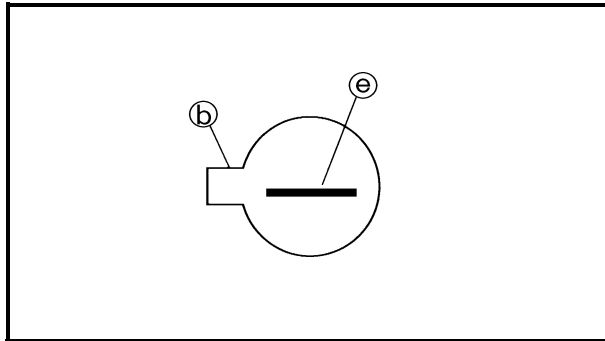
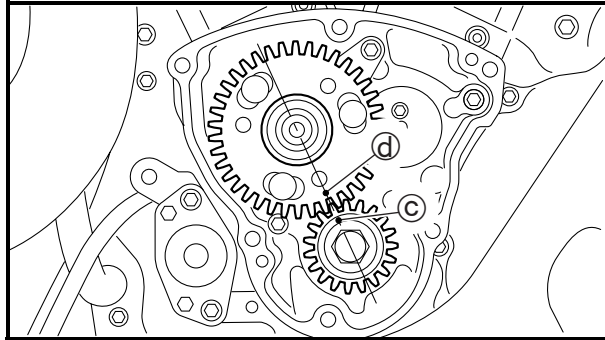
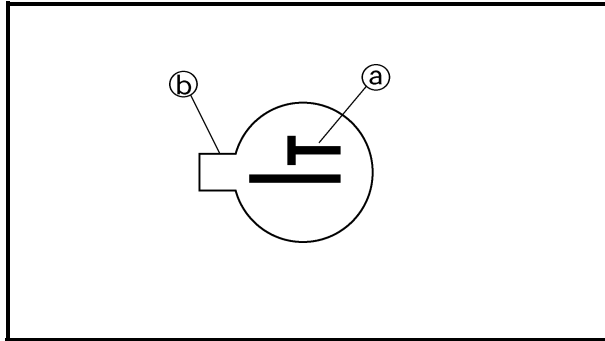
### Valve clearance (cold)

#### Intake valve

0 ~ 0.04 mm (0 ~ 0.0016 in)

#### Exhaust valve

0 ~ 0.04 mm (0 ~ 0.0016 in)



### Piston #1 TDC (rear cylinder)

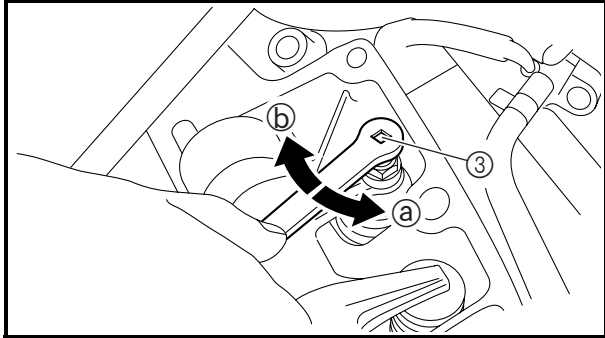
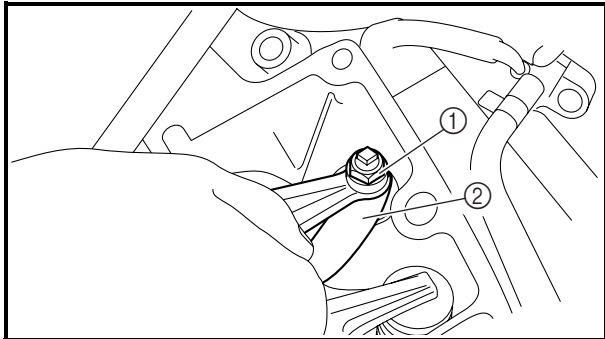
- a. Turn the crankshaft counterclockwise.
- b. When piston #1 is at TDC on the compression stroke, align the TDC mark (a) on the crankshaft position sensor rotor with the pointer (b) on the clutch/crankshaft position sensor rotor cover.
- c. Check the camshaft drive gear mark (c) position and camshaft driven gear mark (d) position as shown.  
If the marks are not aligned, turn the crankshaft counterclockwise 360 degrees and recheck step b.
- d. Measure the valve clearance with a thickness gauge.

### Piston #2 TDC (front cylinder)

- a. Turn the crankshaft counterclockwise from the piston #1 TDC by 408 degrees.
- b. When piston #2 is at TDC on the compression stroke, align the TDC mark (e) on the crankshaft position sensor rotor with the pointer (b) on the clutch/crankshaft position sensor rotor cover.
- c. Check the camshaft drive gear mark (c) position and camshaft driven gear mark (d) position as shown.
- d. Measure the valve clearance with a thickness gauge.



# ADJUSTING THE VALVE CLEARANCE



8. Adjust:
- valve clearance




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

	<b>Valve adjuster</b> <b>YM-08035</b>
---	--

	Adjusting screw side	Slip side
<b>Direction ①</b>	<b>Valve clearance is increased.</b>	<b>Valve clearance is decreased.</b>
<b>Direction ②</b>	<b>Valve clearance is decreased.</b>	<b>Valve clearance is increased.</b>

- Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.

	<b>Locknut</b> <b>20 Nm (2.0 m • kg, 14 ft • lb)</b>
---	---

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



9. Install:
- all moved parts

**NOTE:** \_\_\_\_\_  
For installation, reverse the removal procedure. Note the following points.

Refer to “ROCKER ARMS, PUSH RODS AND VALVE LIFTERS” in chapter 5.

EAS00051

## SYNCHRONIZING THE THROTTLE BODIES

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

Prior to synchronizing the throttle bodies, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

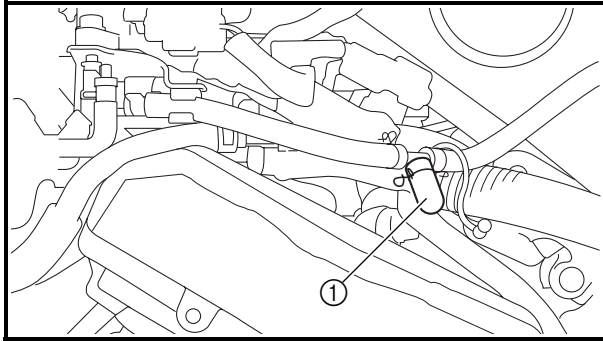
1. Stand the motorcycle on a level surface.

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

Place the motorcycle on a suitable stand.

2. Remove:

- seat  
Refer to "SEAT AND SIDE COVERS".
- fuel tank  
Refer to "FUEL TANK".
- air filter case  
Refer to "AIR FILTER CASE".

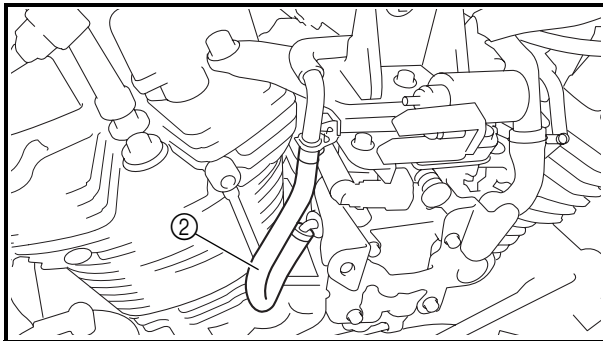


3. Remove:

- hose ①
- hose ②

4. Install:

- carburetor synchronizer
- inductive tachometer  
(onto the spark plug lead of cylinder #1)



**Carburetor synchronizer**  
**YU-08030**  
**Inductive tachometer**  
**YU-8036-A**

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

6. Check:

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



**Engine idling speed**  
**850 ~ 950 r/min**









**NOTE:** \_\_\_\_\_  
Apply locking agent (LOCKTITE®) to the threads of the locknut ②.

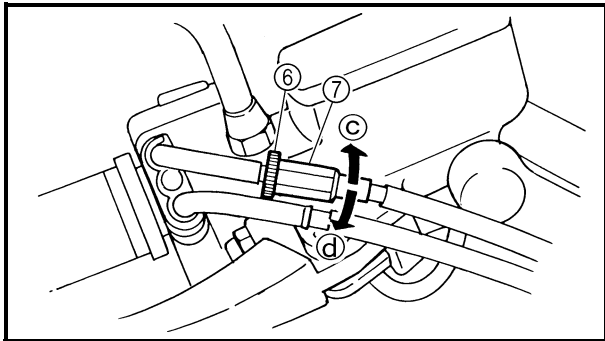
- e. Loosen the locknut ④ on the accelerator cable.
- f. Turn the adjusting nut ⑤ in direction ③ or ④ until the specified throttle cable free play is obtained.

Direction ③	Throttle cable free play is increased.
Direction ④	Throttle cable free play is decreased.

- g. Tighten the locknut ④.

**NOTE:** \_\_\_\_\_  
If the specified throttle cable free play cannot be obtained on the throttle body side of the cable, use the adjusting nut on the handlebar side.

- h. Install the fuel tank and seat.  
Refer to “FUEL TANK” and “SEAT AND SIDE COVERS”.



**Handlebar side**

- a. Loosen the locknut ⑥.
- b. Turn the adjusting nut ⑦ in direction ③ or ④ until the specified throttle cable free play is obtained.

Direction ③	Throttle cable free play is increased.
Direction ④	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 or left to ensure that this does not cause the engine idling speed to change.



EAS00059

## CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
  - seat  
Refer to “SEAT AND SIDE COVERS”.
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.
2. Disconnect:
  - spark plug cap

3. Remove:
  - spark plug

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

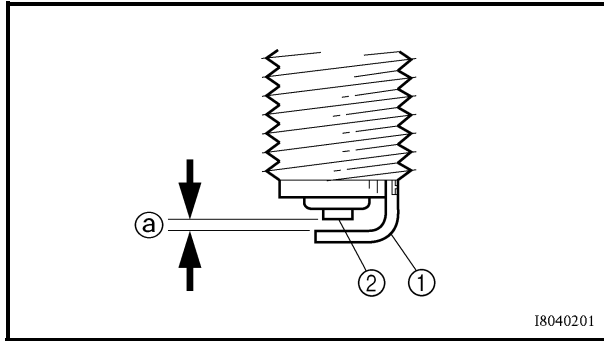
**Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.**

---


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




**Spark plug type (manufacturer)**  
DPR7EA-9 (NGK)  
X22EPR-U9 (DENSO)



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

	<b>Spark plug gap</b> 0.8 ~ 0.9 mm (0.0315 ~ 0.0354 in)
---	--

8. Install:
  - spark plug  **18 Nm (1.8 m • kg, 13 ft • lb)**

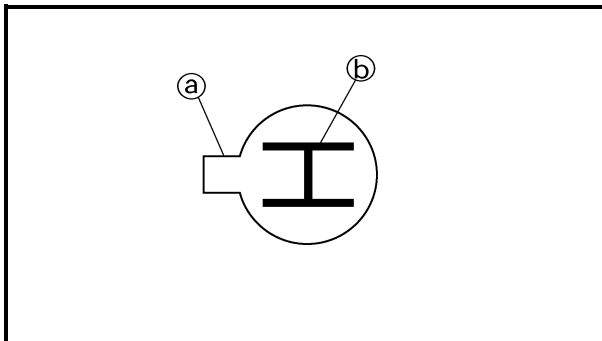
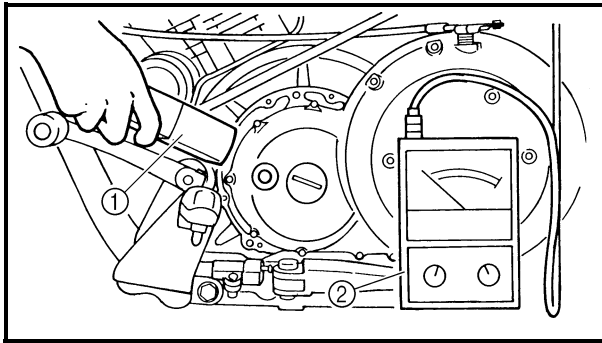
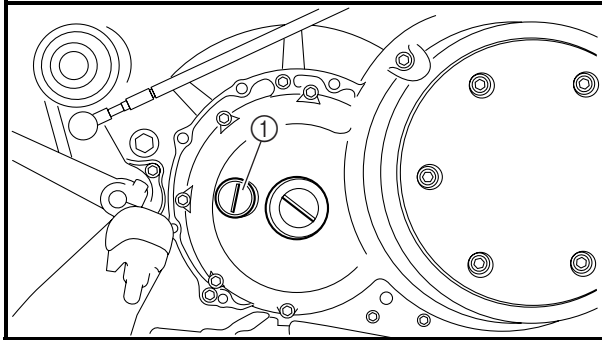
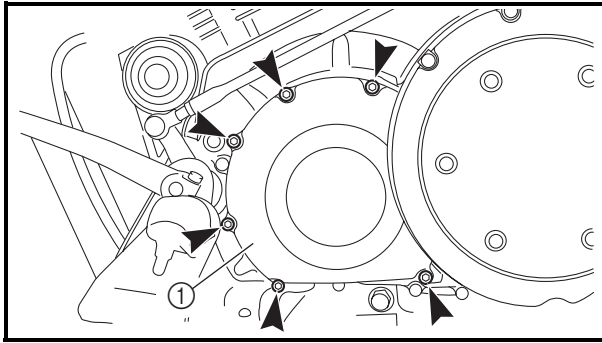
**NOTE:** \_\_\_\_\_  
 Before installing the spark plug, clean the spark plug and gasket surface.

---

9. Connect:
  - spark plug cap
10. Install:
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - fuel tank  
Refer to “FUEL TANK”.
  - seat  
Refer to “SEAT AND SIDE COVERS”.

# CHECKING THE IGNITION TIMING

CHK  
ADJ



EAS00061

## 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:
  - engine left side cover ①
2. Remove:
  - timing mark accessing screw ①

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



**Timing light**  
**YM-33277-A**  
**Inductive tachometer**  
**YU-8036-A**

4. Check:
  - ignition timing



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



**Engine idling speed**  
**850 ~ 950 r/min**

- b. Check that the mark ① is within the required firing range ② on the timing.  
Incorrect firing range → Check the ignition system.

### NOTE:

The ignition timing is not adjustable.



5. Install:
  - timing mark accessing screw
6. Install:
  - engine left side cover

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. Remove:
  - seat  
Refer to “SEAT AND SIDE COVERS”.
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.
4. Remove:
  - camshaft sprocket cover  
Refer to “ROCKER ARMS, PUSH RODS AND VALVE LIFTERS” in chapter 5.
  - decompression solenoid  
Refer to “CAMSHAFTS” in chapter 5.
5. Install:
  - camshaft sprocket cover  
Refer to “ROCKER ARMS, PUSH RODS AND VALVE LIFTERS” in chapter 5.
6. Disconnect:
  - spark plug cap



- c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
- d. Carbon deposits → Eliminate.
- e. 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.

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



- 10. Install:
  - spark plug  18 Nm (1.8 m • kg, 13 ft • lb)
- 11. Connect:
  - spark plug cap
- 12. Remove:
  - camshaft sprocket cover  
Refer to “ROCKER ARMS, PUSH RODS AND VALVE LIFTERS” in chapter 5.
- 13. Install:
  - decompression solenoid  
Refer to “CAMSHAFTS” in chapter 5.
  - camshaft sprocket cover  
Refer to “ROCKER ARMS, PUSH RODS AND VALVE LIFTERS” in chapter 5.
- 14. Install:
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - fuel tank  
Refer to “FUEL TANK”.
  - seat  
Refer to “SEAT AND SIDE COVERS”.

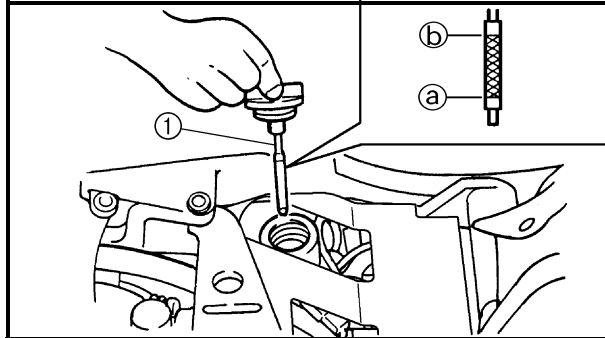
EAS00071

## 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 several minutes, and then turn it off.

3. Remove:

- seat  
Refer to "SEAT AND SIDE COVERS".

4. Remove:

- dipstick ①

5. Check:


- engine oil level

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

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

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

Do not screw the dipstick in when inspecting the oil level.

	<p><b>Recommended oil</b> Yamalube 4 (20W40) or SAE 20W40 type SE motor oil</p>
---	---

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

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives.
- Do not allow foreign materials to enter the crankcase.

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

- API Service "SE", "SF" and "SG" type or equivalent (e.g., "SF-SE", "SF-SE-CC", "SF-SE-SD").
- Before checking the engine oil level, wait a few minutes until the oil has settled.



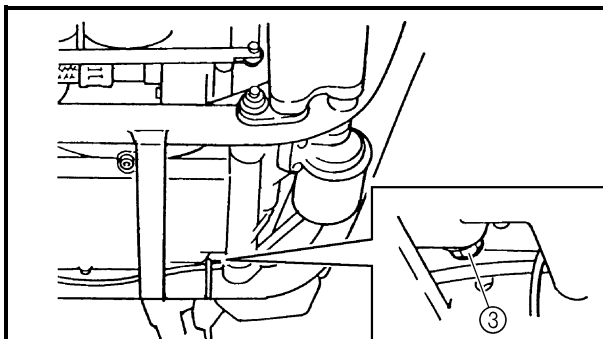
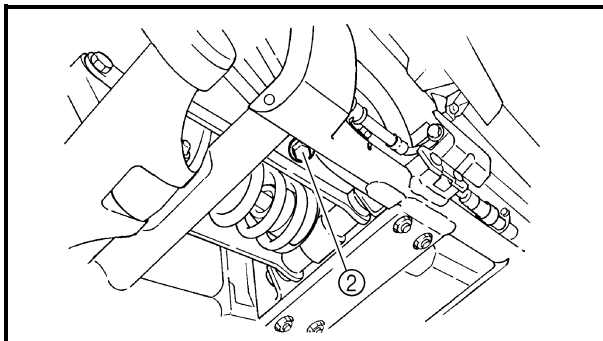
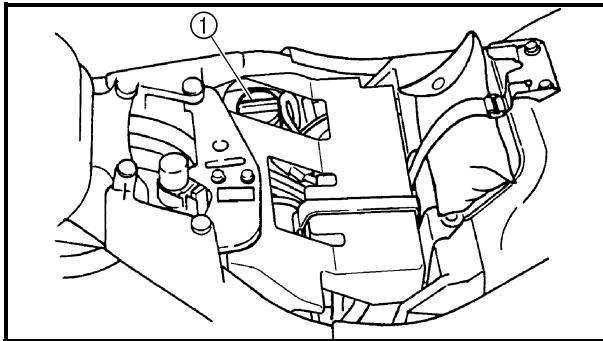
6. Install:
  - dipstick
7. Start the engine, warm it up for several minutes, and then turn it off.
8. Check the engine oil level again.

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

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

---

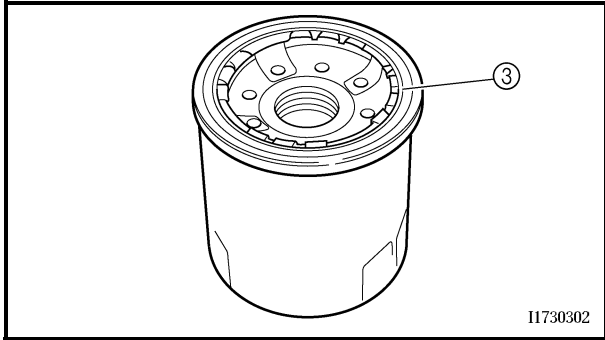
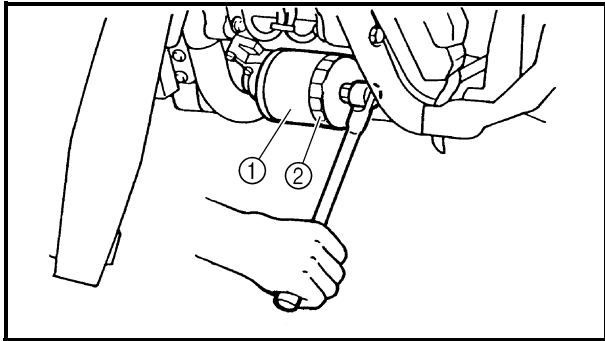
9. Install:
  - seatRefer to “SEAT AND SIDE COVERS”.



EAS00073

**CHANGING THE ENGINE OIL**

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
  - dipstick ①
  - engine oil drain bolt (oil tank) ②
  - engine oil drain bolt (engine) ③
4. Drain:
  - engine oil  
(completely from the oil tank and crank-case)



5. If the oil filter cartridge is also to be replaced, perform the following procedure.



a. Remove the oil filter cartridge ① with an oil filter wrench ②.

	<b>Oil filter wrench</b> <b>YU-38411</b>
--	---

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

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

**Make sure the O-ring ③ is positioned correctly in the groove of the oil filter cartridge.**

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

	<b>Oil filter cartridge</b> <b>17 Nm (1.7 m • kg, 12 ft • lb)</b>
--	--



6. Check:

- engine oil drain bolt gasket  
Damage → Replace.


7. Install:

- engine oil drain bolts  
(along with the gasket)

	<b>43 Nm (4.3 m • kg, 31 ft • lb)</b>
--	---------------------------------------

8. Fill:

- oil tank  
(with the specified amount of the recommended engine oil)

	<b>Quantity</b>
	<b>Total amount</b> 5.0 L (4.40 Imp qt, 5.29 US qt)
	<b>Without oil filter cartridge replacement</b> 3.7 L (3.26 Imp qt, 3.91 US qt)
	<b>With oil filter cartridge replacement</b> 4.1 L (3.61 Imp qt, 4.33 US qt)

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


- Pour the engine oil in several stages.
- First, pour in 2.5 L of oil and then start the engine and rev it 3 to 5 times. Stop the engine, and then pour in the remainder of the specified amount.

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

**When starting the engine make sure the dipstick is securely fitted into the oil tank.**

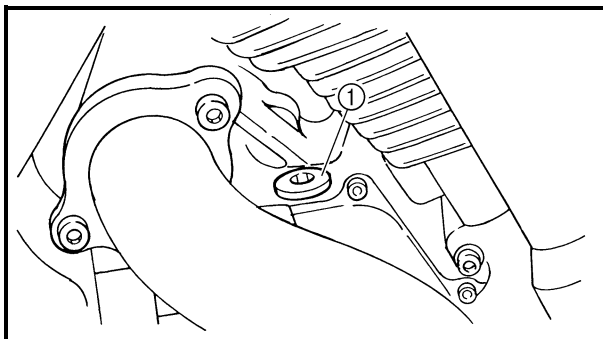
9. Fill: (when engine disassembly)

- crankcase and oil tank

	<b>Quantity</b>
	<b>Total amount</b> 5.0 L (4.40 Imp qt, 5.29 US qt)
	<b>Oil tank</b> 3.0 L (2.64 Imp qt, 3.17 US qt)
	<b>Crankcase</b> 2.0 L (1.76 Imp qt, 2.11 US qt)

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

After the engine has been disassembled, pour the specified amount of engine oil into the crankcase and the oil tank. When pouring engine oil into the crankcase, pour it into the hole of the removed bolt ①.







EAS00077

## MEASURING THE ENGINE OIL PRESSURE

### 1. Check:

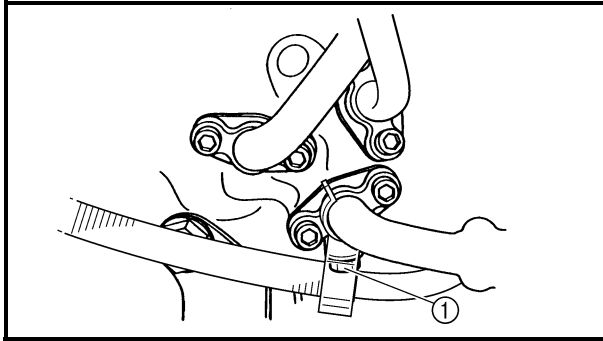
- engine oil level

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

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

### CAUTION:

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

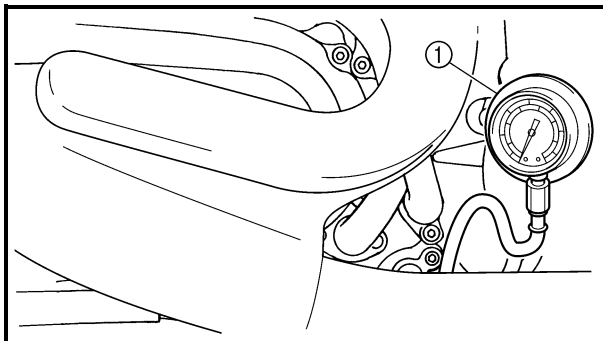


### 3. Remove:

- oil gallery bolt ①

### ⚠ WARNING

The engine, muffler and engine oil are extremely hot.




### 4. Install:

- oil pressure gauge ①
- oil pressure adaptor E




Pressure gauge  
YU-03153  
Oil pressure adaptor E  
YM-03129

5. Measure:
- engine oil pressure  
(at the following conditions)

	<b>Engine oil pressure</b>
	40 ~ 80 kPa
	(0.4 ~ 0.8 kg/cm <sup>2</sup> , 5.688 ~ 11.376 psi)
	<b>Engine speed</b>
	Approx. 900 r/min
<b>Engine oil temperature</b>	
70 ~ 90 °C (158 ~ 194 °F)	

Engine oil pressure	Possible causes
<b>Below specifica- tion</b>	<ul style="list-style-type: none"> <li>• Faulty oil pump</li> <li>• Clogged oil filter</li> <li>• Leaking oil pas- sage</li> <li>• Broken or dam- aged oil seal</li> </ul>
<b>Above specifica- tion</b>	<ul style="list-style-type: none"> <li>• Faulty oil filter</li> <li>• Oil viscosity too high</li> </ul>

6. Install:
- oil gallery bolt

 20 Nm (2.0 m • kg, 14 ft • lb)

## CHECKING THE TRANSFER GEAR OIL LEVEL

1. Stand the motorcycle on a level surface.

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

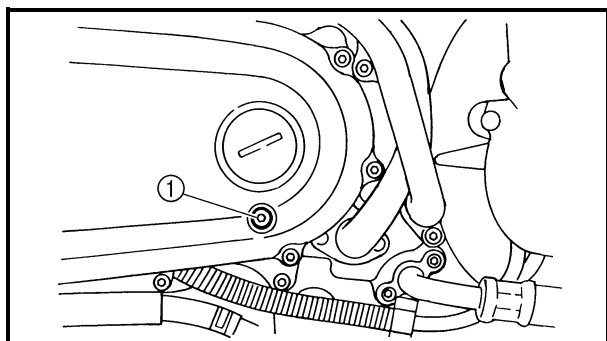
- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.

2. Remove:

- muffler
  - rear exhaust pipe
  - front exhaust pipe
- Refer to “ENGINE” in chapter 5.

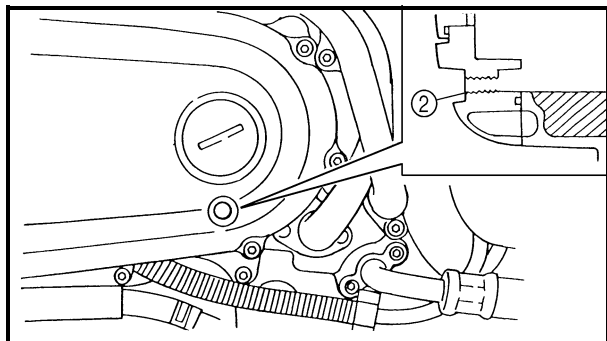
3. Remove:

- checking bolt ①



## CHECKING THE TRANSFER GEAR OIL LEVEL/ CHANGING THE TRANSFER GEAR OIL

CHK  
ADJ



### 4. Check:

- transfer gear oil level

The transfer gear oil level should be up to the brim ② of the hole.

Below the brim → Add the recommended transfer gear oil to the proper level.




**Recommended oil**  
**SAE80API “GL-4” Hypoid gear oil**

### CAUTION:

**Do not allow foreign materials to enter the transfer case.**

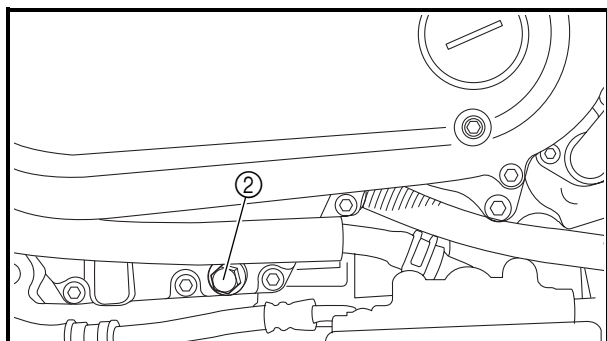
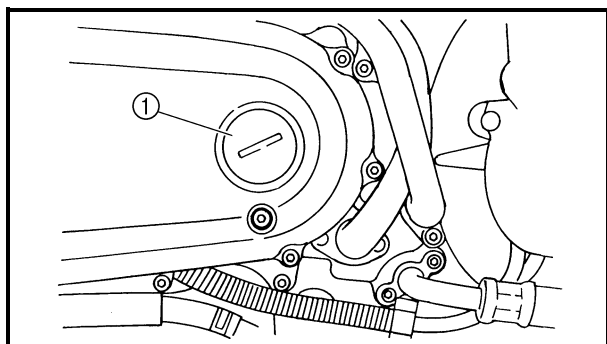
### 5. Install:

- checking bolt  **8 Nm (0.8 m • kg, 5.8 ft • lb)**

### 6. Install:

- front exhaust pipe
- rear exhaust pipe
- muffler

Refer to “ENGINE” in chapter 5.



## CHANGING THE TRANSFER GEAR OIL

### 1. Remove:

- muffler
- rear exhaust pipe
- front exhaust pipe

Refer to “ENGINE” in chapter 5.

### 2. Place a container under the transfer gear oil drain bolt.

### 3. Remove:

- straight plug ①
- transfer gear oil drain bolt ②


### 4. Drain:

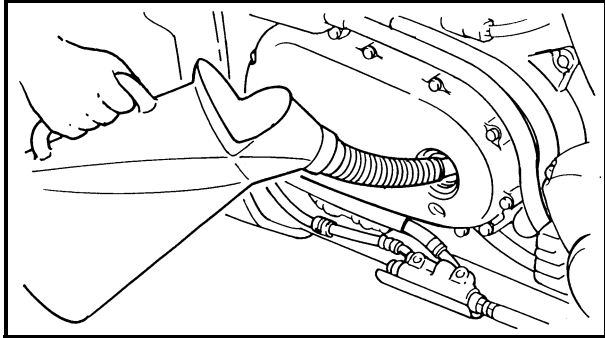
- transfer gear oil  
(completely from the transfer gear case)

### 5. Check:


- transfer gear oil drain bolt gasket  
Damage → Replace.

- 6. Install:
  - transfer gear oil drain bolt

 **18 Nm (1.8 m • kg, 13 ft • lb)**



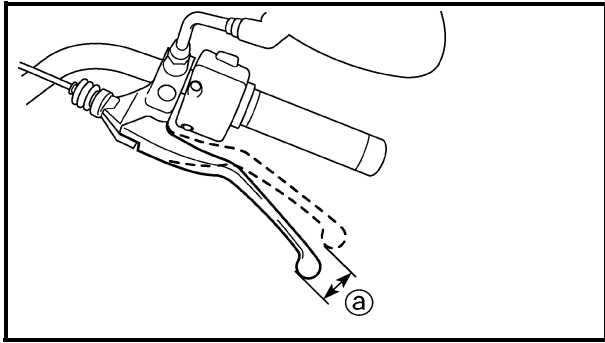
- 7. Fill:
  - transfer gear case  
(with the specified amount of the recommended transfer gear oil)

	<b>Quantity</b>
	<b>Total amount</b>
	<b>0.49 L (0.43 Imp qt, 0.52 US qt)</b>
	<b>Periodic oil replacement</b>
	<b>0.4 L (0.35 Imp qt, 0.42 US qt)</b>

- 8. Install:
  - straight plug
- 9. Check:
  - transfer gear oil level  
Refer to “CHECKING THE TRANSFER GEAR OIL LEVEL”.
- 10. Install:
  - front exhaust pipe
  - rear exhaust pipe
  - muffler  
Refer to “ENGINE” in chapter 5.



# ADJUSTING THE CLUTCH CABLE FREE PLAY

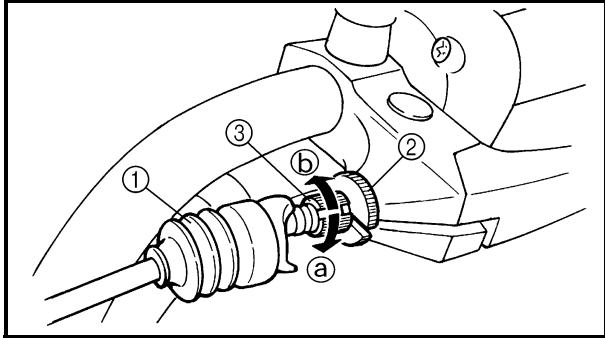


EAS00078

## 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 (0.39 ~ 0.59 in)
--	---



2. Adjust:
  - clutch cable free play



### Handlebar side

- a. Pull the boot **1** off.
- b. Loosen the locknut **2**.
- c. Turn the adjusting bolt **3** in direction **a** or **b** until the specified clutch cable free play is obtained.

<b>Direction a</b>	<b>Clutch cable free play is increased.</b>
<b>Direction b</b>	<b>Clutch cable free play is decreased.</b>

- d. Tighten the locknut.

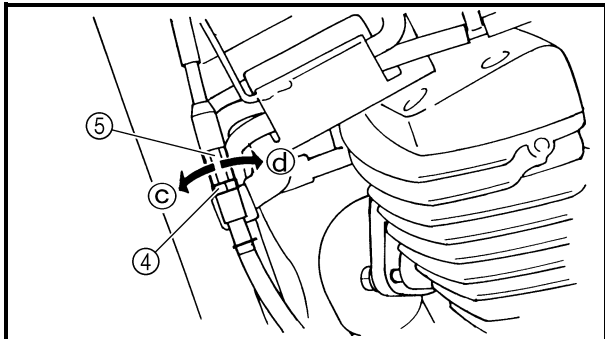
### NOTE:

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.

- e. Pull the boot **1** in.

### Engine side

- a. Loosen the locknut **4**.
- b. Turn the adjusting bolt **5** in direction **c** or **d** until the specified clutch cable free play is obtained.



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

- c. Tighten the locknut.

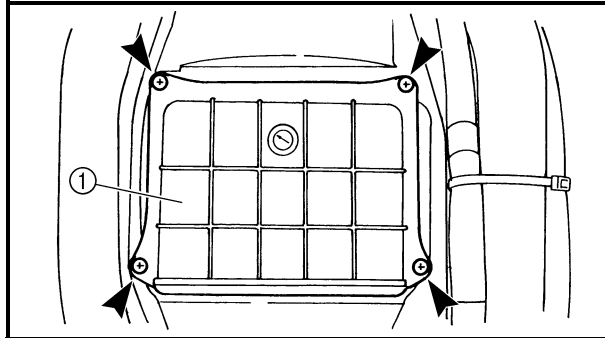


EAS00088

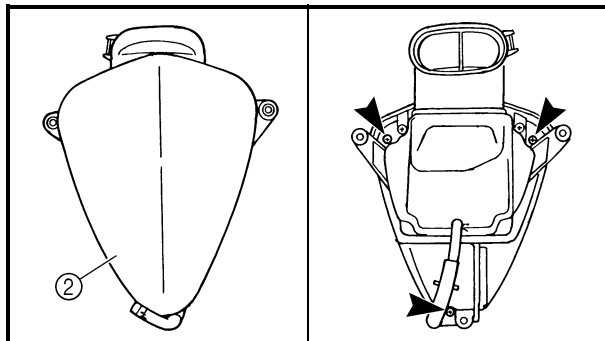
## CLEANING THE AIR FILTER ELEMENTS

The following procedure applies to both air filter elements.

1. Remove:
  - seat  
Refer to “SEAT AND SIDE COVERS”.
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.



2. Remove:
  - silencer air filter case cover ①
  - silencer air filter element  
Refer to “SILENCER AIR FILTER CASE”.
  - air filter case cover ②
  - air filter element  
Refer to “AIR FILTER CASE”.



3. Check:
  - air filter element  
Damage → Replace.
4. Install:
  - air filter element
  - air filter case cover  
Refer to “AIR FILTER CASE”.
  - silencer air filter element
  - silencer air filter case cover  
Refer to “SILENCER AIR FILTER CASE”.

### 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 throttle body tuning, leading to poor engine performance and possible overheating.**

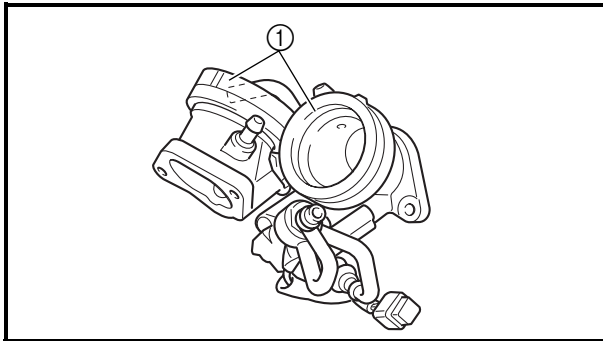
5. Install:
  - air filter case  
Refer to “AIR FILTER CASE”.
  - fuel tank  
Refer to “FUEL TANK”.
  - seat  
Refer to “SEAT AND SIDE COVERS”.

EAS00094

## CHECKING THE THROTTLE BODY JOINTS

The following procedure applies to all of the throttle body joint.

1. Remove:
  - seat  
Refer to "SEAT AND SIDE COVERS".
  - fuel tank  
Refer to "FUEL TANK".
  - air filter case  
Refer to "AIR FILTER CASE".
  - silencer air filter case  
Refer to "SILENCER AIR FILTER CASE".



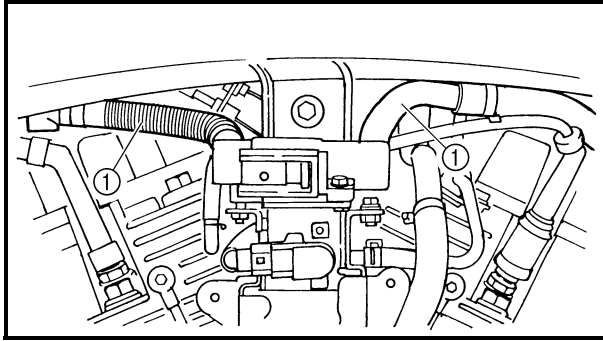
2. Check:
  - throttle body joint ①  
Cracks/damage → Replace.
3. Install:
  - silencer air filter case  
Refer to "SILENCER AIR FILTER CASE".
  - air filter case  
Refer to "AIR FILTER CASE".
  - fuel tank  
Refer to "FUEL TANK".
  - seat  
Refer to "SEAT AND SIDE COVERS".

EAS00096

## CHECKING THE FUEL HOSES

The following procedure applies to all of the fuel hoses.

1. Remove:
  - air induction system cover  
Refer to "FUEL TANK".

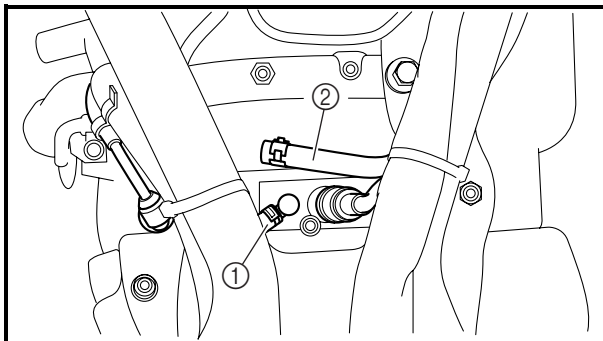


2. Check:
  - fuel hose ①  
Cracks/damage → Replace.  
Loose connection → Connect properly.
3. Install:
  - air induction system cover  
Refer to “FUEL TANK”.

EAS00098

**CHECKING THE CYLINDER HEAD  
BREATHER HOSE AND OIL TANK  
BREATHER HOSE**

1. Remove:
  - seat  
Refer to “SEAT AND SIDE COVERS”.
  - fuel tank  
Refer to “FUEL TANK”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.

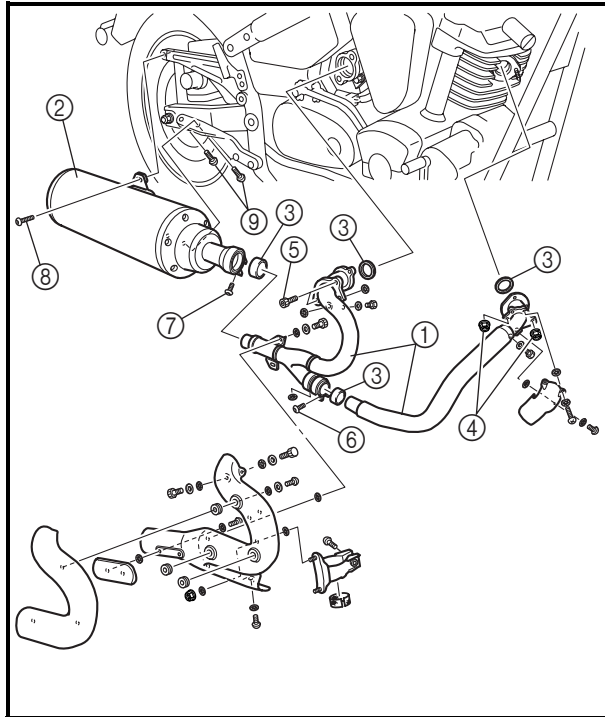


2. Check:
  - oil tank breather hose ①
  - cylinder head breather hose ②  
Cracks/damage → Replace.  
Loose connection → Connect properly.

**CAUTION:**

**Make sure the breather hoses are routed correctly.**

3. Install:
  - silencer air filter case  
Refer to “SILENCER AIR FILTER CASE”.
  - air filter case  
Refer to “AIR FILTER CASE”.
  - fuel tank  
Refer to “FUEL TANK”.
  - seat  
Refer to “SEAT AND SIDE COVERS”.



EAS00099

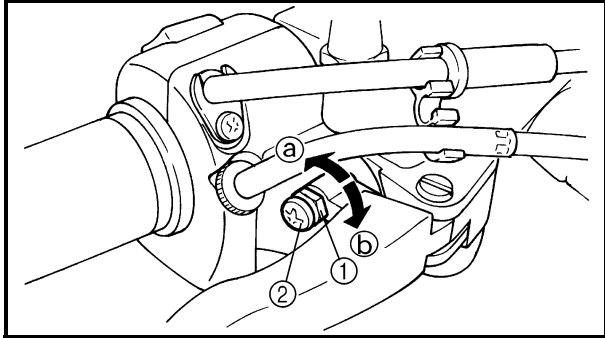
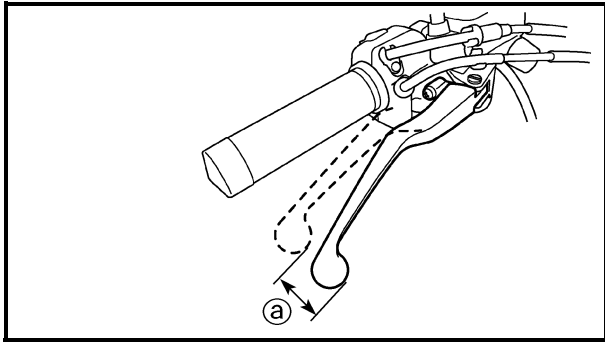
## CHECKING THE EXHAUST SYSTEM

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

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



- Front exhaust pipe nut ④**  
20 Nm (2.0 m • kg, 14 ft • lb)
- Rear exhaust pipe bolt ⑤**  
24 Nm (2.4 m • kg, 17 ft • lb)
- Front exhaust pipe and rear exhaust pipe bolt ⑥**  
12 Nm (1.2 m • kg, 8.7 ft • lb)
- Exhaust pipe and muffler bolt ⑦**  
12 Nm (1.2 m • kg, 8.7 ft • lb)
- Muffler and muffler bracket bolt ⑧**  
53 Nm (5.3 m • kg, 38 ft • lb)
- Muffler and muffler bracket bolts ⑨**  
20 Nm (2.0 m • kg, 14 ft • lb)



EAS00108

**CHASSIS**

**ADJUSTING THE FRONT BRAKE**

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



**Brake lever free play (at the end of the brake lever)**  
2 ~ 5 mm (0.08 ~ 0.20 in)

2. Adjust:
  - brake lever free play



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

Direction (a)	Brake lever free play is increased.
Direction (b)	Brake lever free play is decreased.

- c. Tighten the locknut.

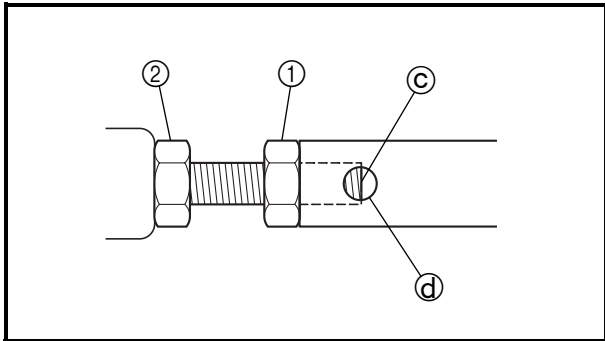
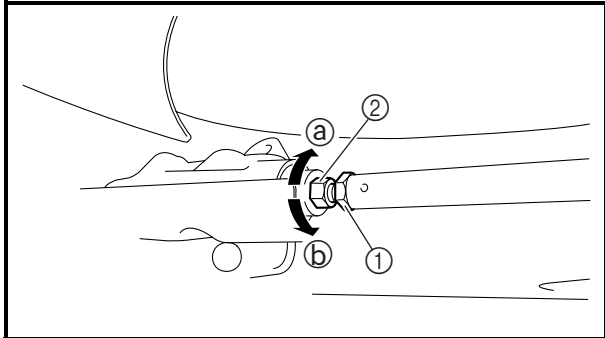
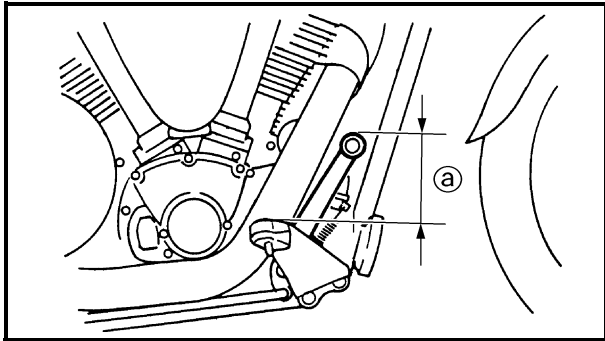
**⚠ WARNING**

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check and, if necessary, bleed the brake system.

**CAUTION:**

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





EAS00110

## ADJUSTING THE REAR BRAKE

### 1. Check:

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



**Brake pedal position (from the top of the rider footrest to the top of the brake pedal)**  
**80 mm (3.2 in)**

### 2. Adjust:

- brake pedal position



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

Direction ③	Brake pedal is raised.
Direction ④	Brake pedal is lowered.

### **⚠ WARNING**

After adjusting the brake pedal position, check that the end of the adjusting bolt ③ is visible through the hole ④.

- Tighten the locknut ① to specification.



**Locknut**  
**16 Nm (1.6 m • kg, 11 ft • lb)**

### **⚠ 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.



3. Adjust:

- rear brake light switch

Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH”.

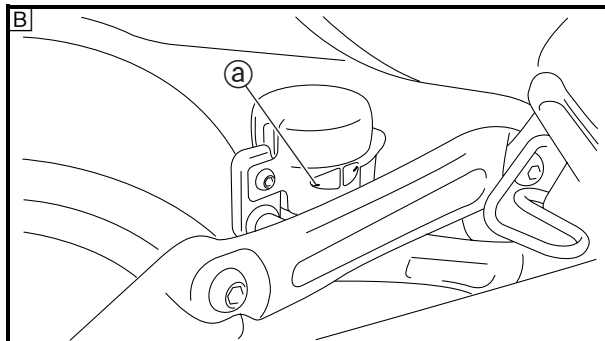
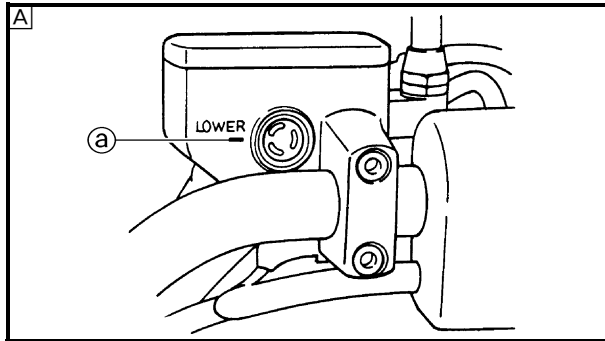
EAS00115

**CHECKING THE BRAKE FLUID LEVEL**

1. Stand the motorcycle on a level surface.

**NOTE:**

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



2. Check:

- brake fluid level

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

	<b>Recommended brake fluid DOT 4</b>
---	--

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 spilled brake fluid immediately.

**NOTE:**

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

EAS00120

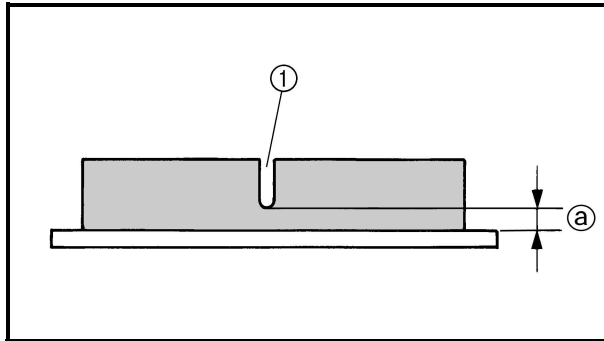
**CHECKING THE FRONT BRAKE PADS**

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:

- front brake pad

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



**Brake pad wear limit ②**  
**0.5 mm (0.02 in)**

EAS00118

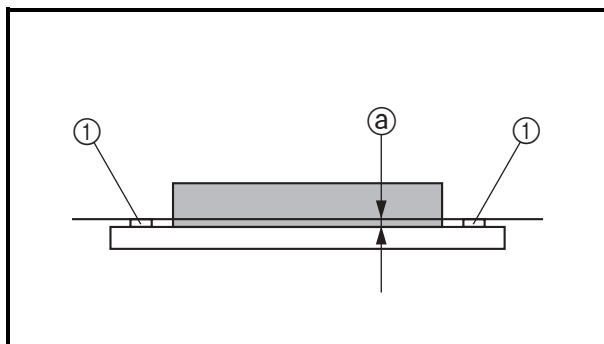
**CHECKING THE REAR BRAKE PADS**

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:

- rear brake pad

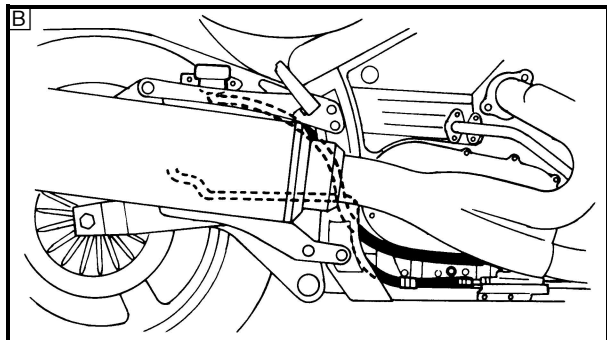
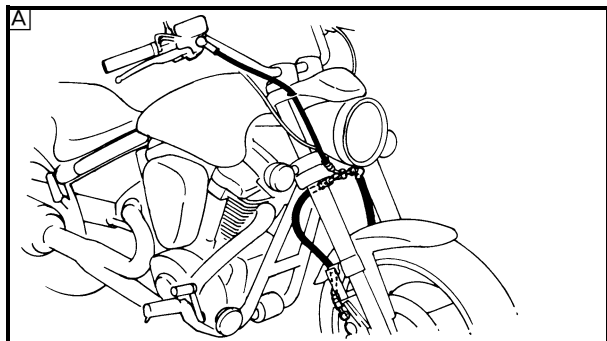
Wear indicators ① almost touch the brake disc → Replace the brake pads as a set. Refer to “REPLACING THE REAR BRAKE PADS” in chapter 4.



**Brake pad wear limit ②**  
**0.8 mm (0.03 in)**



# CHECKING THE FRONT AND REAR BRAKE HOSES/ BLEEDING THE HYDRAULIC BRAKE SYSTEM



## 4. Check:

- brake hose  
Brake fluid leakage → Replace the damaged hose.  
Refer to “FRONT AND REAR BRAKES” in chapter 4.

**A** Front

**B** Rear

EAS00134

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

### **⚠ WARNING**

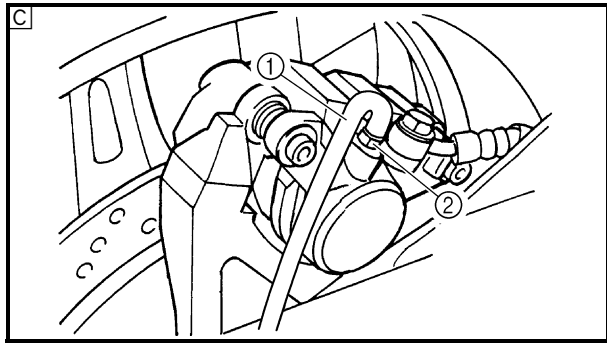
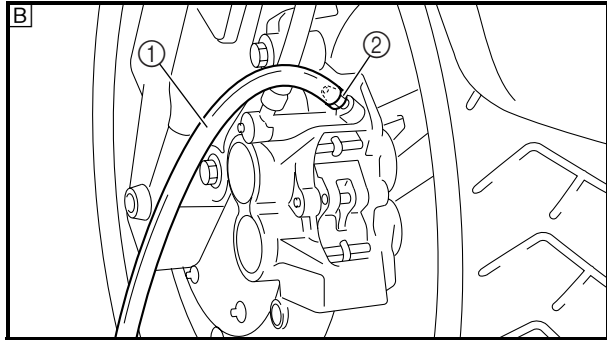
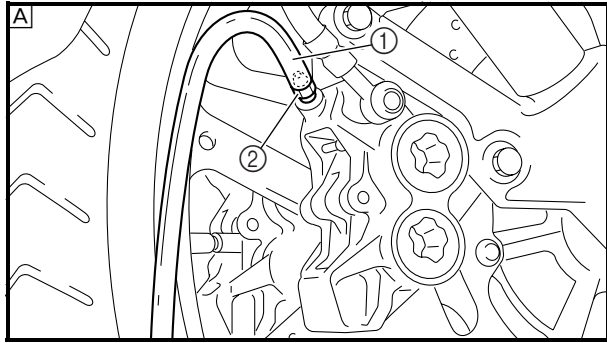
Bleed the hydraulic brake system whenever:

- 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.

# BLEEDING THE HYDRAULIC BRAKE SYSTEM



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.
- 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.

- ▲ Front (right)
- ▲ Front (left)
- ▲ Rear

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

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

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

	<b>Bleed screw</b> <b>6 Nm (0.6 m • kg, 4.3 ft • lb)</b>
---	---

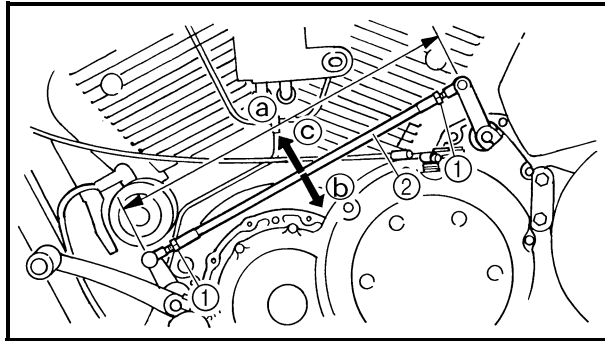
- k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to “CHECKING THE BRAKE FLUID LEVEL”.

**▲ WARNING** \_\_\_\_\_

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



# ADJUSTING THE SHIFT PEDAL/ ADJUSTING THE DRIVE BELT SLACK



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.

	<b>Installed shift rod length</b> <b>368 ~ 372 mm (14.49 ~ 14.65 in)</b>
--	---

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

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



EAS00138

## ADJUSTING THE DRIVE BELT SLACK

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

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

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

**A drive belt 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 belt slack within the specified limits.**

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

Measure the drive belt slack when the engine is cold, and when the drive belt is dry.

1. Stand the motorcycle on a level surface.

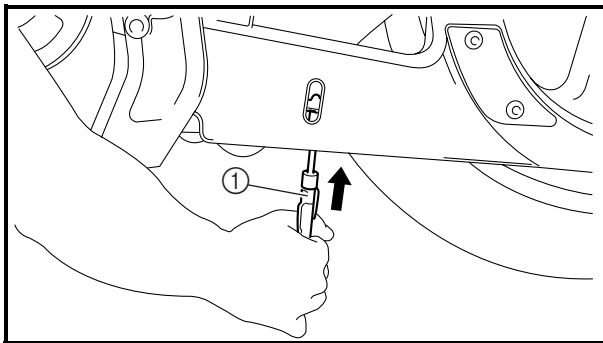
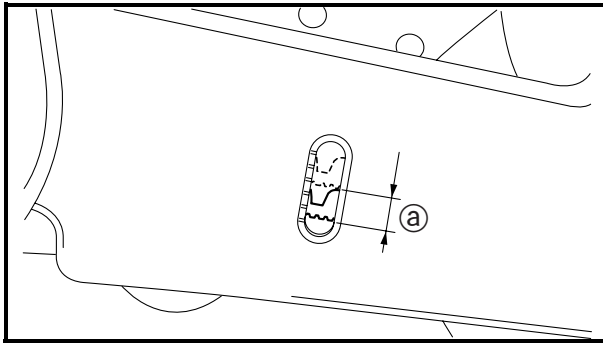
**⚠ WARNING**

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

**NOTE:**


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


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



3. Check:

- drive belt slack ①  
Out of specification → Adjust.

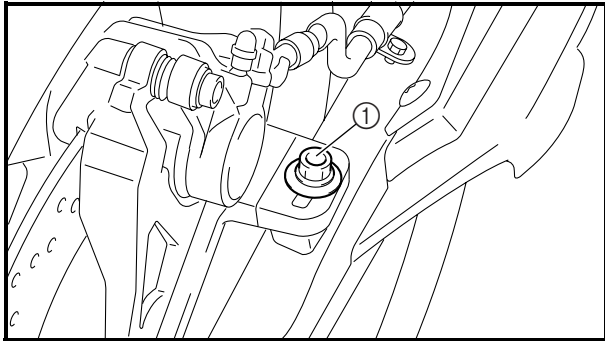
	<b>Drive belt slack</b>
	<b>On the sidestand</b> 6 ~ 8 mm at 4.5 kg (0.24 ~ 0.31 in at 10 lbs) <b>On a suitable stand</b> 7 ~ 9 mm at 4.5 kg (0.28 ~ 0.35 in at 10 lbs)

	<b>Belt tension gauge</b> YM-03170
---	---------------------------------------

**NOTE:**

- The level marks of the level window on the lower drive belt cover are in units of 5 mm (0.20 in). Use them as a standard for measuring the drive belt slack.
- Measure the drive belt slack when the drive belt has been pushed with 4.5 kg (10 lbs) of pressure using a belt tension gauge ①.

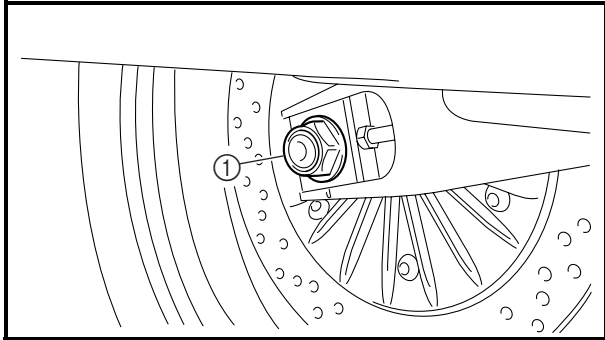
# ADJUSTING THE DRIVE BELT SLACK



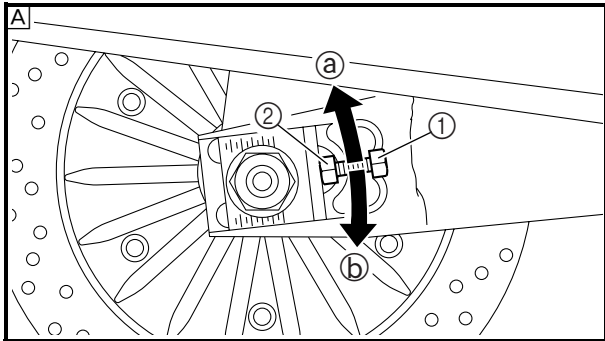
4. Adjust:
- drive belt slack



**NOTE:** \_\_\_\_\_  
Place the motorcycle on the suitable stand so that the rear wheel is elevated.

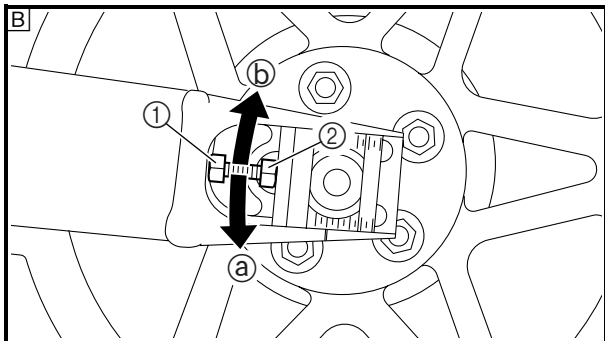


- a. Loosen the brake caliper bracket bolt ①.
- b. Loosen the wheel axle nut ①.




- c. Loosen both locknuts ①.
- A** Right  
**B** Left
- d. Turn both adjusting bolts ② in direction **a** or **b** until the specified drive belt slack is obtained.

<b>Direction a</b>	<b>Drive belt is tightened.</b>
<b>Direction b</b>	<b>Drive belt is loosened.</b>




**NOTE:** \_\_\_\_\_  
To maintain the proper wheel alignment, adjust both sides evenly.


- e. Tighten the locknuts to specification.

	<b>Locknut</b> <b>16 Nm (1.6 m • kg, 11 ft • lb)</b>
---	---

- f. Tighten the wheel axle nut to specification.

	<b>Wheel axle nut</b> <b>150 Nm (15.0 m • kg, 110 ft • lb)</b>
---	---

- g. Tighten the brake caliper bracket bolt to specification.

	<b>Brake caliper bracket bolt</b> <b>30 Nm (3.0 m • kg, 22 ft • lb)</b>
---	--



EAS00146

## CHECKING AND ADJUSTING THE STEERING HEAD

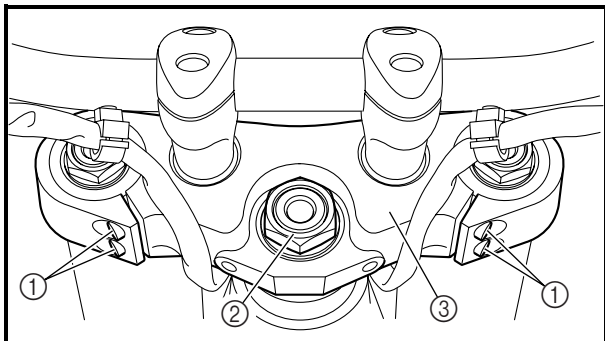
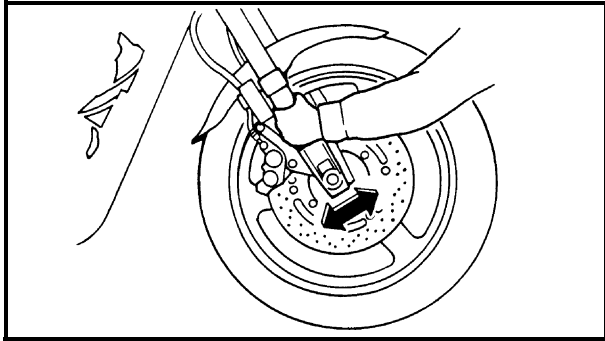
1. Stand the motorcycle on a level surface.

### **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:

- tachometer
- speedometer assembly

Refer to “HEADLIGHT AND METER ASSEMBLIES”.

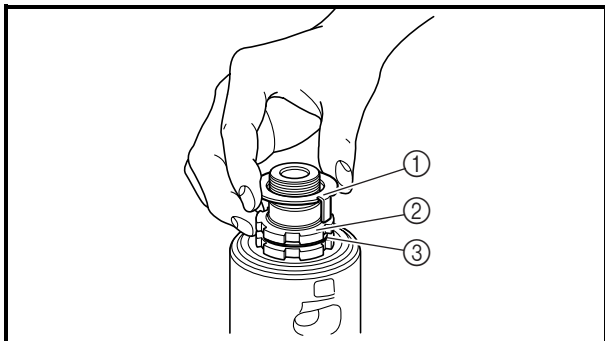
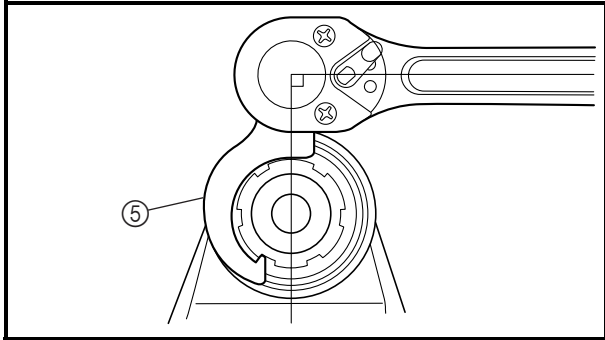
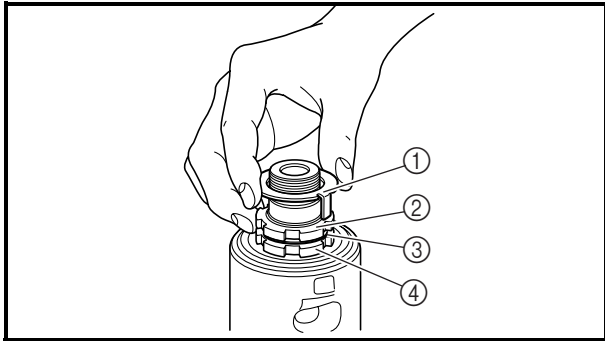
4. Loosen:

- upper bracket pinch bolts ①

5. Remove:

- steering stem nut ②
- washer
- upper bracket ③







6. Adjust:
- steering head



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

**NOTE:** \_\_\_\_\_  
Set the torque wrench at a right angle to the spanner wrench.


	<b>Spanner wrench</b> <b>YU-33975</b>
---	--

	<b>Lower ring nut (initial tightening torque)</b> <b>52 Nm (5.2 m • kg, 37 ft • lb)</b>
---	--

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

**⚠ WARNING** \_\_\_\_\_

**Do not overtighten the lower ring nut.**


	<b>Lower ring nut (final tightening torque)</b> <b>4 Nm (0.4 m • kg, 2.9 ft • lb)</b>
---	--

- Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings. Refer to “STEERING HEAD” in chapter 4.
- Install the rubber washer ③.
- Install the upper ring nut ②.
- Finger tighten the upper ring nut ②, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
- Install the lock washer ①.


**NOTE:** \_\_\_\_\_  
Make sure the lock washer tabs sit correctly in the ring nut slots.



7. Install:
  - upper bracket
  - washer
  - steering stem nut

 **115 Nm (11.5 m • kg, 85 ft • lb)**

8. Tighten:
  - upper bracket pinch bolt

 **26 Nm (2.6 m • kg, 19 ft • lb)**

9. Install:
  - speedometer
  - tachometerRefer to “HEADLIGHT AND METER ASSEMBLIES”.

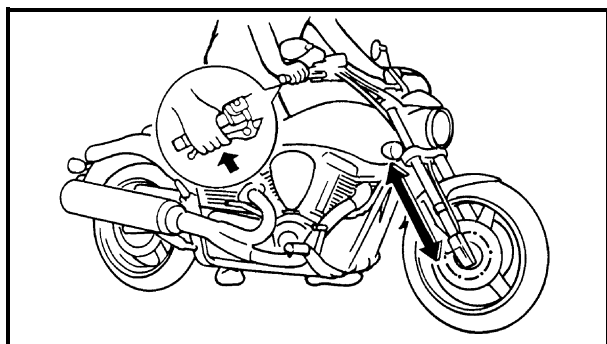
EAS00149

## CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

### **WARNING**

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



2. Check:
  - inner tube  
Damage/scratches → Replace.
  - oil seal  
Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.
4. Check:
  - 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.

EAS00152

**ADJUSTING THE FRONT FORK LEGS**

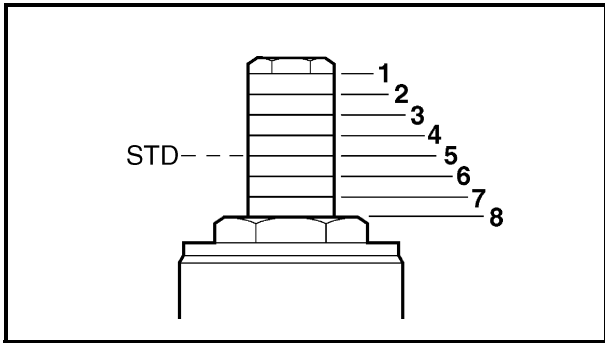
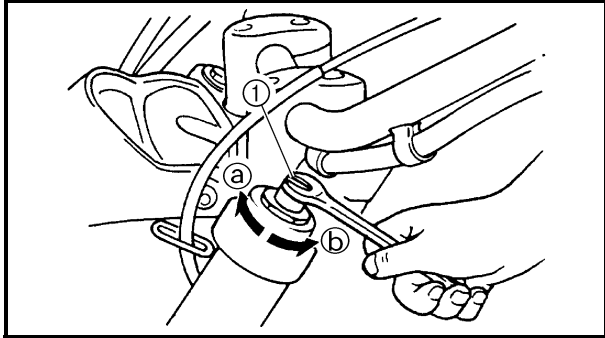
The following procedure applies to both of the front fork legs.

**⚠ 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.

**CAUTION:**

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



1. Adjust:
- spring preload



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

<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>

<p align="center"><b>Adjusting positions</b></p> <p align="center">Minimum: 8</p> <p align="center">Standard: 5</p> <p align="center">Maximum: 1</p>
--



EAS00156

## ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

### ⚠ WARNING

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

### Spring preload

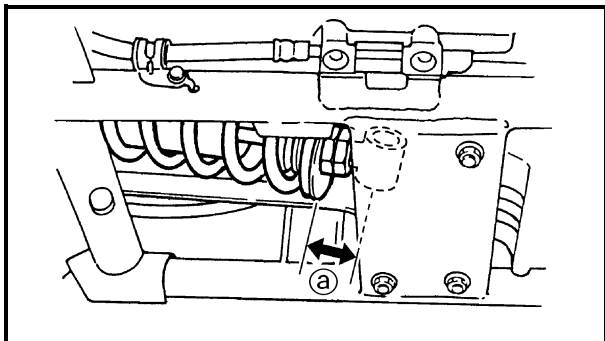
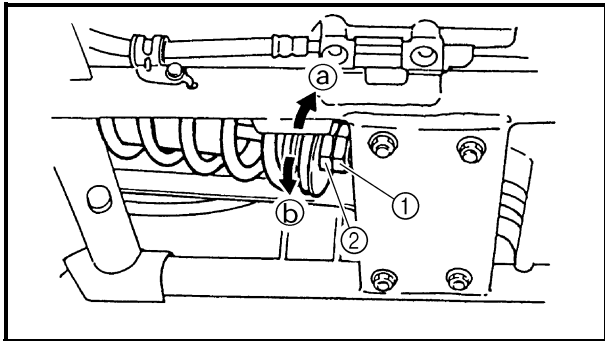
#### CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
  - spring preload

#### NOTE:

Adjust the spring preload with the special wrench.



- a. Loosen the locknut ①.
- b. Turn the spring preload adjusting nut ② in direction ① or ②.

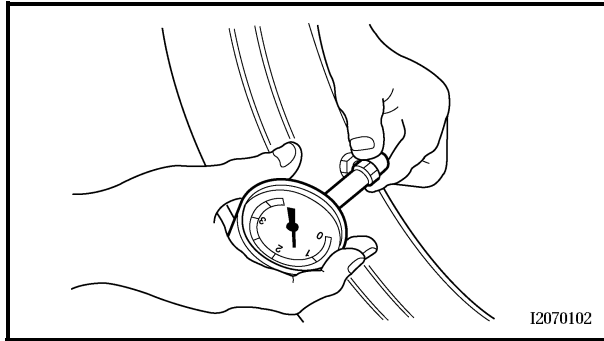
Direction ①	Spring preload is increased (suspension is harder).
Direction ②	Spring preload is decreased (suspension is softer).

Adjusting positions ① Minimum: 40.5 mm (1.59 in) Standard: 42.5 mm (1.67 in) Maximum: 51.5 mm (2.03 in)
--

#### CAUTION:

Never turn the spring preload adjusting nut beyond the maximum or minimum setting.





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.**

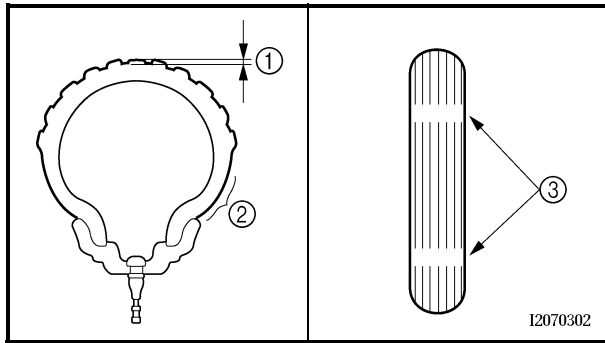
<b>Basic weight (with oil and a full fuel tank)</b>	<b>295 kg (650 lb)</b>	
<b>Maximum load*</b>	<b>185 kg (408 lb)</b>	
<b>Cold tire pressure</b>	<b>Front</b>	<b>Rear</b>
<b>Up to 90 kg load*</b>	<b>250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)</b>	<b>250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)</b>
<b>90 kg ~ maxi- mum load*</b>	<b>250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)</b>	<b>290 kPa (2.9 kgf/cm<sup>2</sup>, 42 psi)</b>
<b>High-speed riding</b>	<b>250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)</b>	<b>250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)</b>

\* 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.

# CHECKING THE TIRES



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

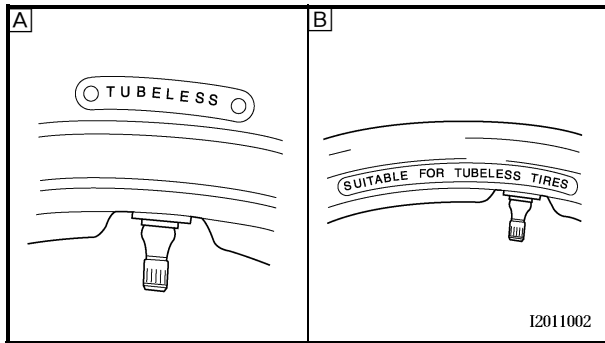
	<b>Minimum tire tread depth</b> <b>1.0 mm (0.04 in)</b>
--	--

- 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

- 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.

Front tire

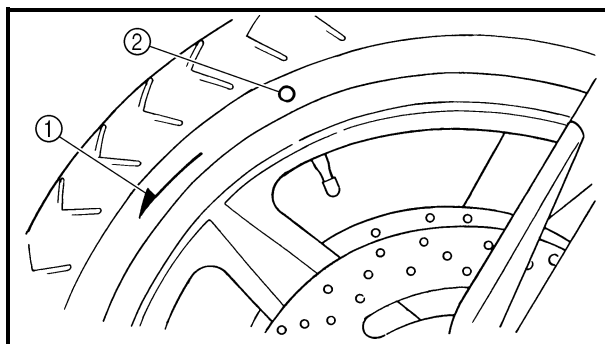
Manufacturer	Model	Size
BRIDGESTONE	BT020FG	120/70 ZR 18 M/C (59 W) 120/70 ZR 18 (59 W)
DUNLOP	D220FST	120/70 ZR 18 M/C (59 W) 120/70 ZR 18 (59 W)

Rear tire

Manufacturer	Model	Size
BRIDGESTONE	BT020R	200/50 ZR 17 M/C (75 W) 200/50 ZR 17 (75 W)
DUNLOP	D220ST	200/50 ZR 17 M/C (75 W) 200/50 ZR 17 (75 W)

**⚠ WARNING**

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



**NOTE:**

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

EAS00168

## CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

### **WARNING**

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

### **NOTE:**

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

EAS00170

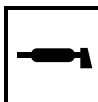
## CHECKING AND LUBRICATING THE CABLES

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.

	<b>Recommended lubricant</b> <b>Lithium-soap-based grease</b>
---	--

EAS00172

**LUBRICATING THE SIDESTAND**

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

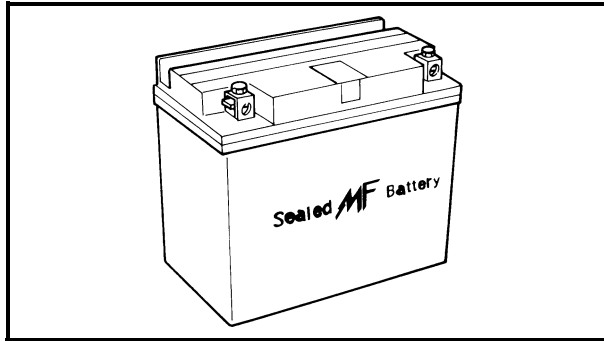
	<b>Recommended lubricant</b> <b>Lithium-soap-based grease</b>
---	--

EAS00174

**LUBRICATING THE REAR SUSPENSION**

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

	<b>Recommended lubricant</b> <b>Lithium-soap-based grease</b>
---	--



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.

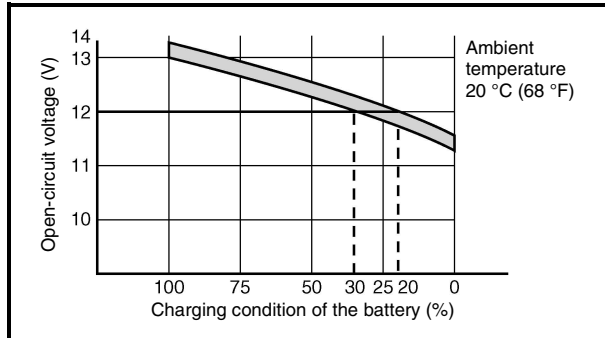
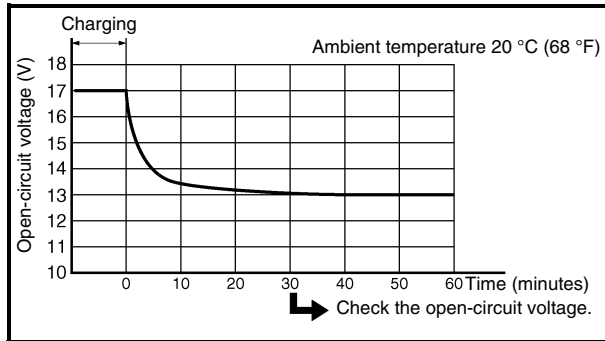
**INTERNAL**

- 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.





## 5. Charge:

- battery  
(refer to the appropriate charging method illustration)

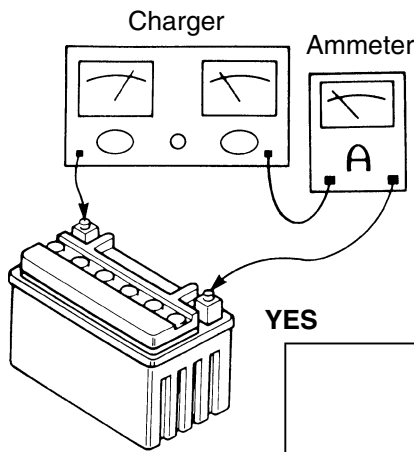
### ⚠ WARNING

**Do not quick charge a battery.**

### CAUTION:

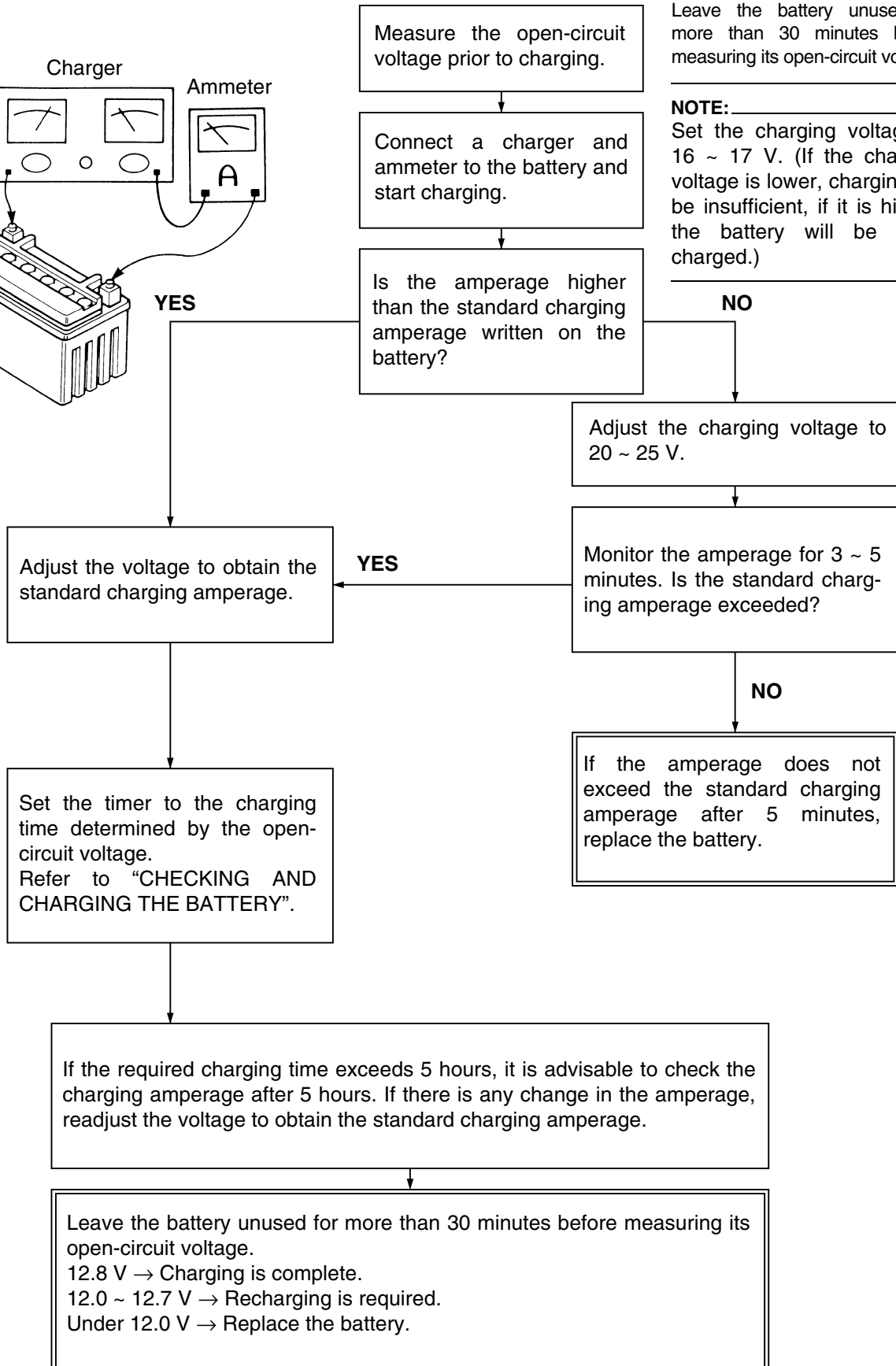
- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not 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.

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

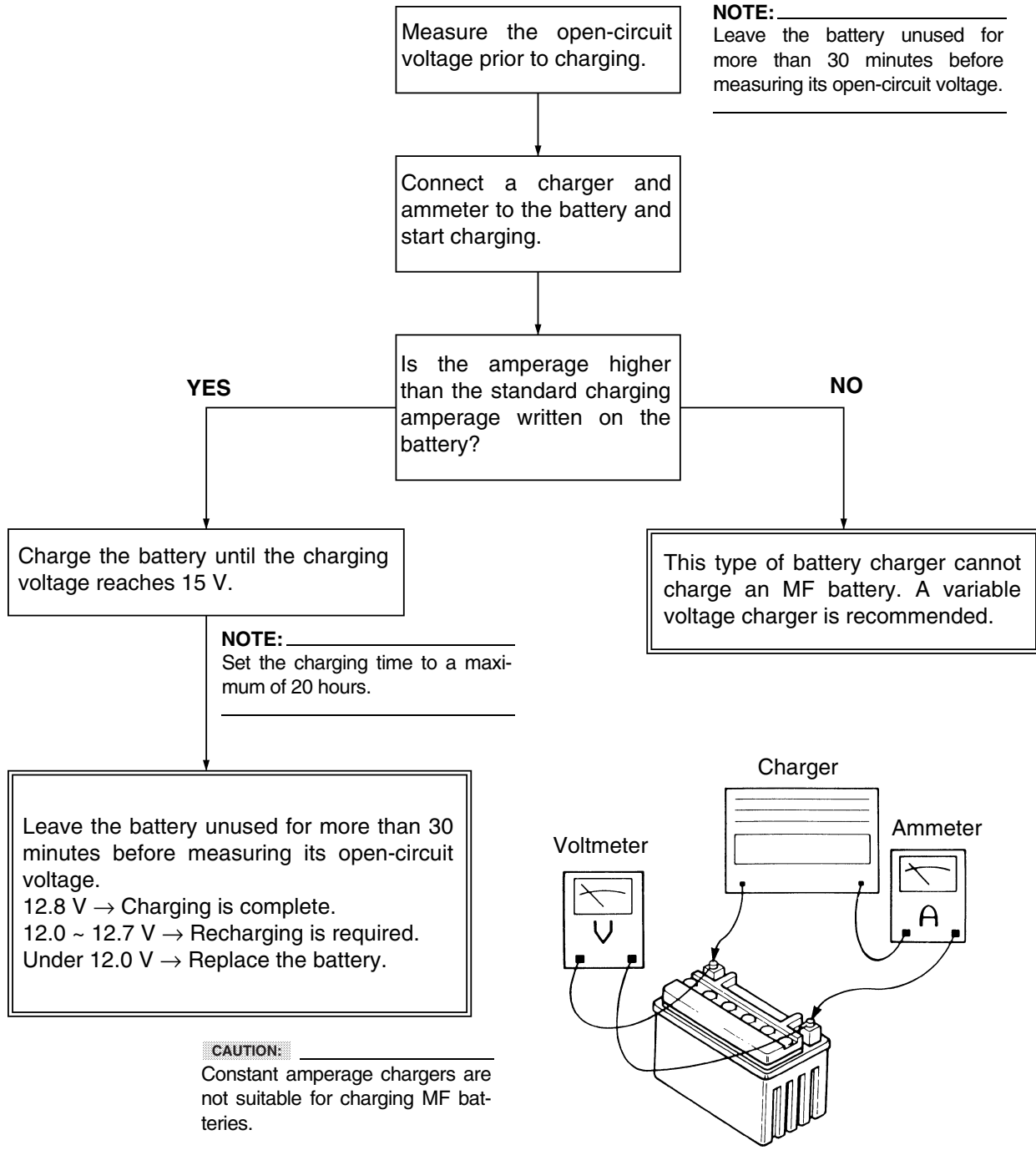


**NOTE:**  
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

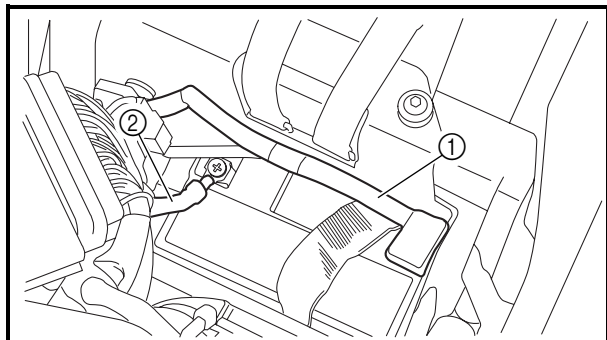
**NOTE:**  
Set the charging voltage to 16 ~ 17 V. (If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)



## Charging method using a constant voltage charger



6. Install:
  - batteryRefer to “BATTERY”.



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

**CAUTION:**

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

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

	<b>Recommended lubricant</b> <b>Dielectric grease</b>
---	--

10. Install:
  - seatRefer to “SEAT AND SIDE COVERS”.

EAS00181

## CHECKING THE FUSES

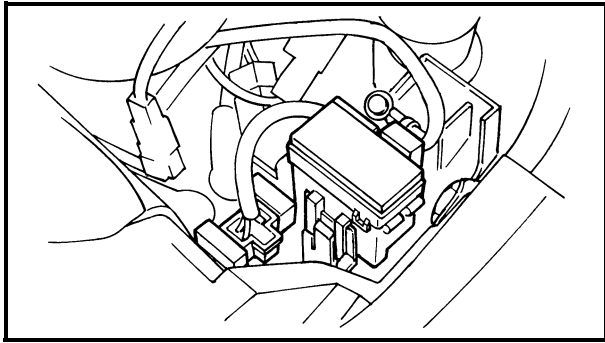
The following procedure applies to all of the fuses.

**CAUTION:**

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







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	30 A	1
Headlight	15 A	1
Signaling system	10 A	1
Ignition	10 A	1
Fuel injection system	15 A	1
ECU	10 A	1
Decompression solenoid	15 A	1
Backup (odometer and clock)	7.5 A	1
Reserve	30 A	1
Reserve	15 A	1
Reserve	10 A	1
Reserve	7.5 A	1

**⚠ WARNING**

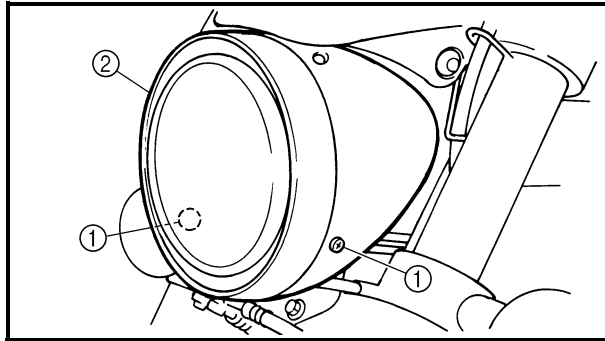
Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.



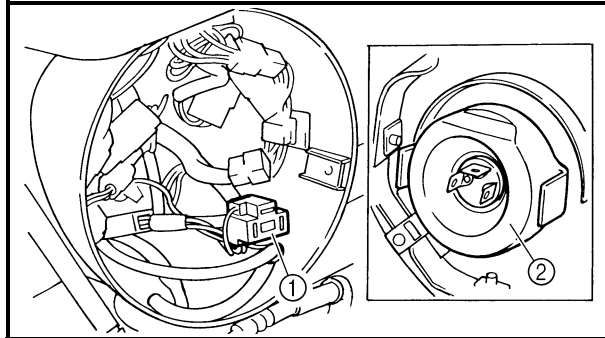
4. Install:
  - seat
 Refer to "SEAT AND SIDE COVERS".

EAS00182

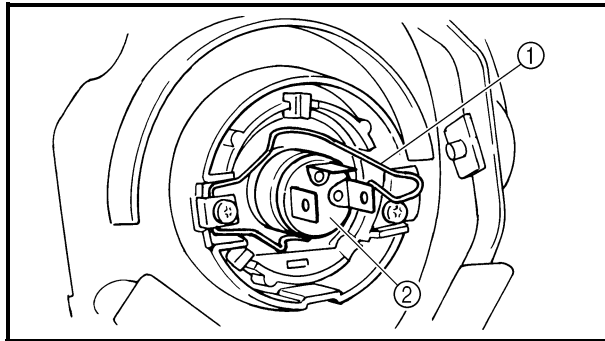
## REPLACING THE HEADLIGHT BULB



1. Remove:
  - screws ①
  - headlight lens unit ②



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



4. Detach:
  - headlight bulb holder ①
5. 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.

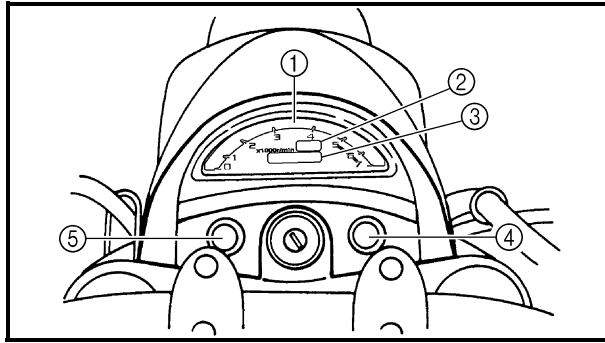
6. Install:
  - headlight bulb **New**

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.





## INSTRUMENT FUNCTIONS

### ODOMETER AND TRIPMETER

- ① Tachometer
- ② Clock
- ③ Odometer/trip meter/fuel reserve trip meter
- ④ “RESET” button
- ⑤ “SELECT” button

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

“ODO” → “TRIP 1” → “TRIP 2” → “ODO”

If the fuel level warning light comes on, the odometer display will automatically change to the fuel reserve tripmeter mode “TRIP F” and start counting the distance traveled from that point. In that case, pushing the “SELECT” button switches the display between the various tripmeter and odometer modes in the following order:

“TRIP F” → “TRIP 1” → “TRIP 2” → “ODO” → “TRIP F”

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



**ADJUSTING THE METER LIGHT**

- 1. Adjust:
  - meter light



- a. Turn the key to "OFF".
- b. Push and hold the "SELECT" button.
- c. Turn the key to "ON", and then after five seconds, release the "SELECT" button.
- d. Push the "RESET" button to select the desired brightness.
- e. Push the "SELECT" button to set the brightness level.
- f. Turn the key to "OFF"

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

When adjusting the meter lighting, the odometer display will indicate the brightness level.



EAS00187

**ADJUSTING THE CLOCK**

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

This digital clock constantly displays the time.



- 1. Adjust:
  - clock



- a. Push the "SELECT" button and "RESET" button together for at least two seconds.
- b. When the hour digits start flashing, push the "RESET" button to set the hours.
- c. Push the "SELECT" button, and the minute digits will start flashing.
- d. Push the "RESET" button to set the minutes.
- e. Push the "SELECT" button and then release it to start the clock.

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

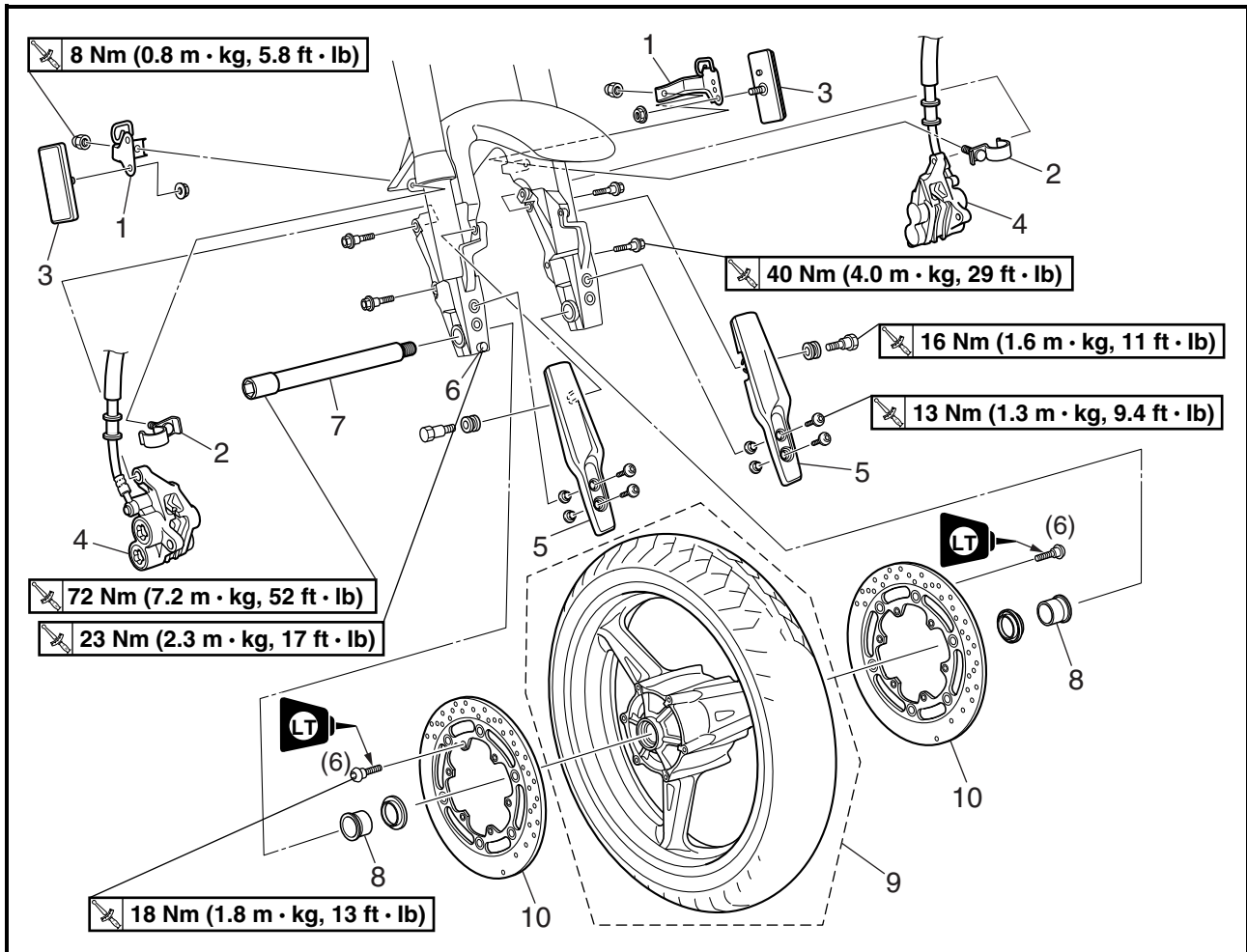
- After setting the clock, be sure to push the "SELECT" button before turning the key to "OFF", otherwise the clock will not be set.
- When setting the time (e.g., after reconnecting the battery), first set the clock to 1:00 AM, and then set it to the correct time.



EAS00514

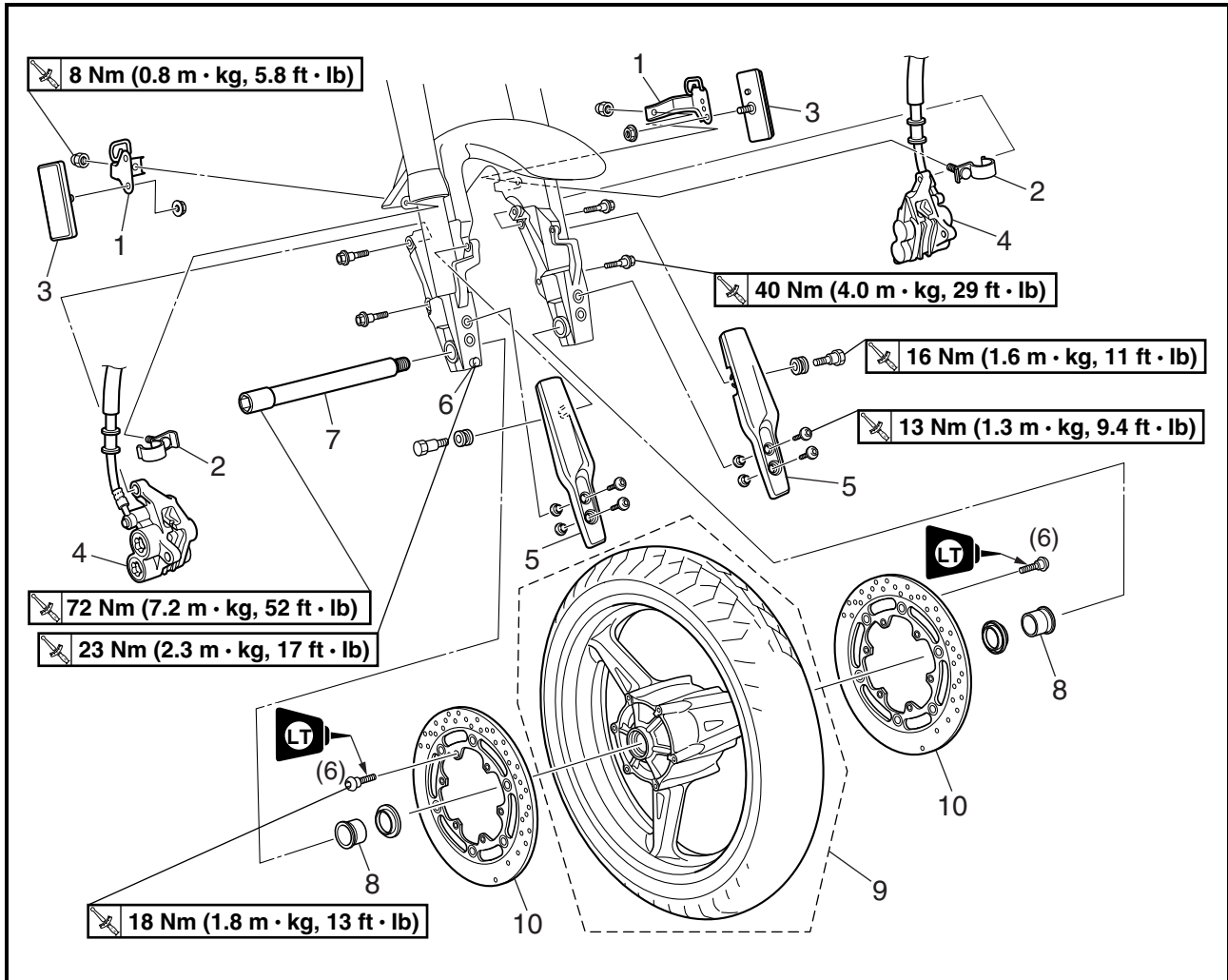
CHASSIS

FRONT WHEEL AND BRAKE DISCS

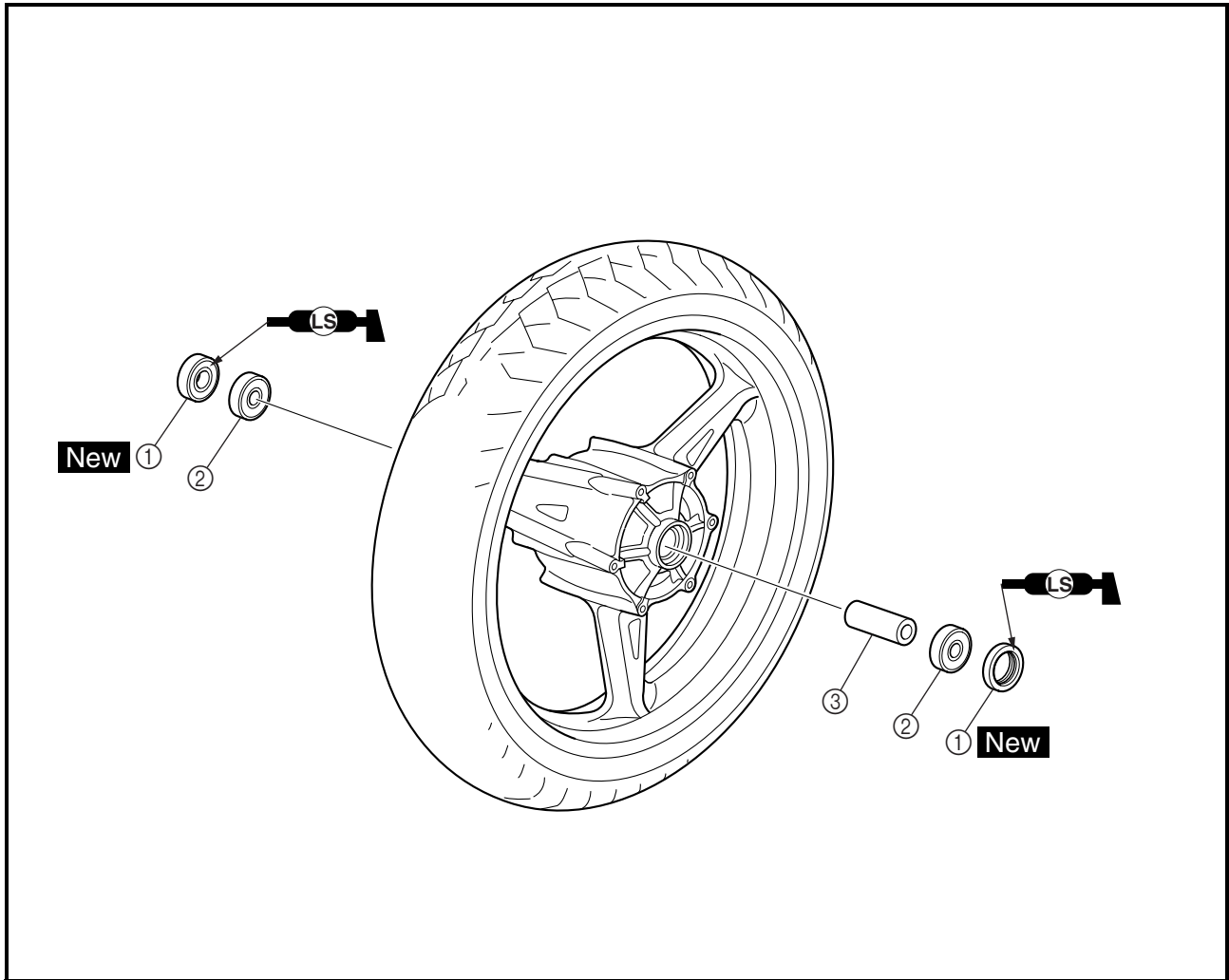


4

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	Reflector bracket (left and right)	2	Loosen. } Refer to "INSTALLING THE FRONT WHEEL".
2	Brake hose holder	2	
3	Reflector (left and right)	2	
4	Brake caliper (left and right)	2	
5	Front fork guard (left and right)	2	
6	Wheel axle pinch bolt	1	
7	Front wheel axle	1	



Order	Job/Part	Q'ty	Remarks
8	Collar (left and right)	2	Refer to "INSTALLING THE FRONT WHEEL".
9	Front wheel	1	
10	Brake disc (left and right)	2	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front wheel</b>		Remove the parts in the order listed.
①	Oil seal (left and right)	2	
②	Wheel bearing (left and right)	2	
③	Spacer	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:**

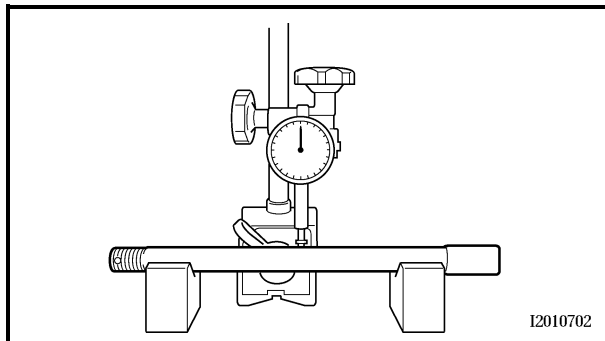
Do not apply the brake lever when removing the brake calipers.

3. Elevate:

- front wheel

**NOTE:**

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



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

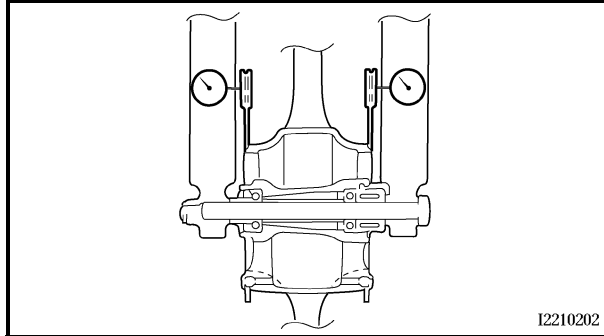



EAS00531

## 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.



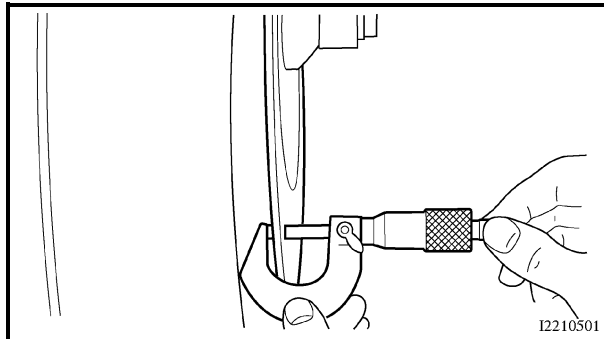


**Brake disc deflection limit (maximum)**


Front: 0.10 mm (0.004 in)

Rear: 0.15 mm (0.006 in)

- a. Place the motorcycle on a suitable stand so that the wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 1.5 mm (0.006 in) below the edge of the brake disc.



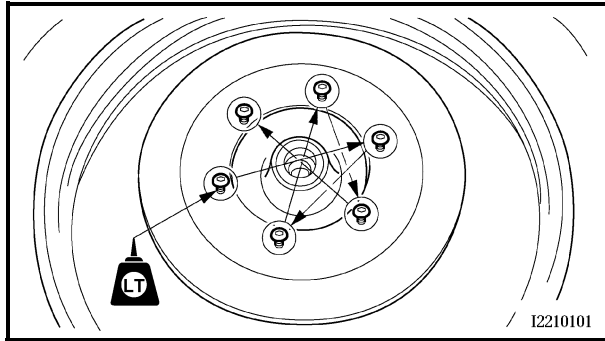
3. Measure:
  - brake disc thickness  
Measure the brake disc thickness at a few different locations.  
Out of specification → Replace.



**Brake disc thickness limit (minimum)**

Front: 4.5 mm (0.18 in)

Rear: 5.5 mm (0.22 in)



4. Adjust:
- brake disc deflection

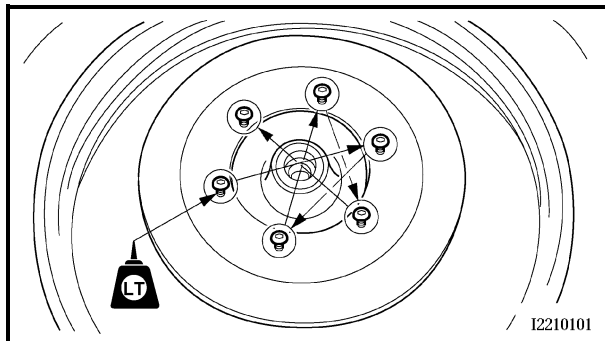


- Remove the brake disc.
- Rotate the brake disc by one bolt hole.
- Install the brake disc.

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

	<p><b>Brake disc bolt</b>  <b>18 Nm (1.8 m • kg, 13 ft • lb)</b>  <b>LOCTITE® 648</b></p>
--	---


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



EAS00544

**INSTALLING THE FRONT WHEEL**

The following procedure applies to both of the brake discs.

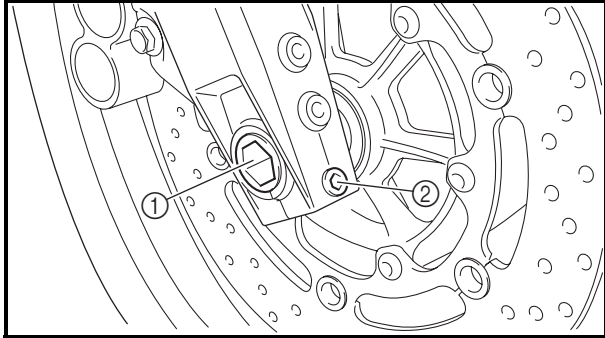
- Install:
  - brake discs  **18 Nm (1.8 m • kg, 13 ft • lb)**

**NOTE:** \_\_\_\_\_  
 • Apply locking agent (LOCTITE® 648) to the threads of the brake disc bolts.  
 • Tighten the brake disc bolts in stages and in a crisscross pattern.



2. Lubricate:
  - wheel axle
  - oil seal lips

	<b>Recommended lubricant</b> Lithium-soap-based grease
--	---



3. Install:
  - collars
  - front wheel
  - front wheel axle

4. Tighten:
  - front wheel axle ①

72 Nm (7.2 m • kg, 52 ft • lb)

- wheel axle pinch bolt ②

23 Nm (2.3 m • kg, 17 ft • lb)

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

5. Install:
  - spacer
  - front fork guard (left and right)
  - front fork guard bolts

13 Nm (1.3 m • kg, 9.4 ft • lb)

**NOTE:** \_\_\_\_\_  
 When installing the front fork guards, make sure that there is not dirt between the guard and the front fork.

6. Install:
  - brake calipers

40 Nm (4.0 m • kg, 29 ft • lb)

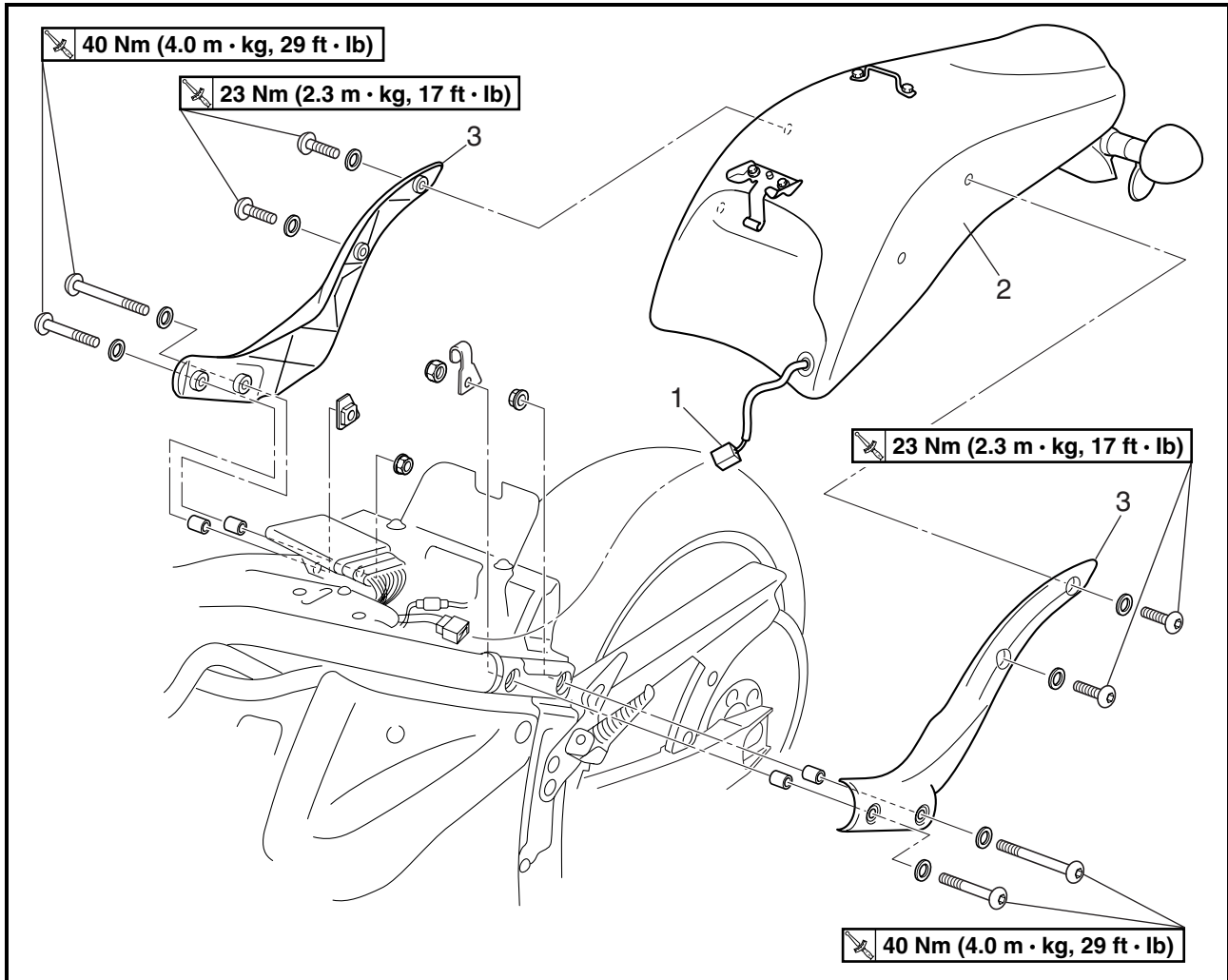
**WARNING** \_\_\_\_\_  
**Make sure the brake hose is routed properly.**





EAS00550

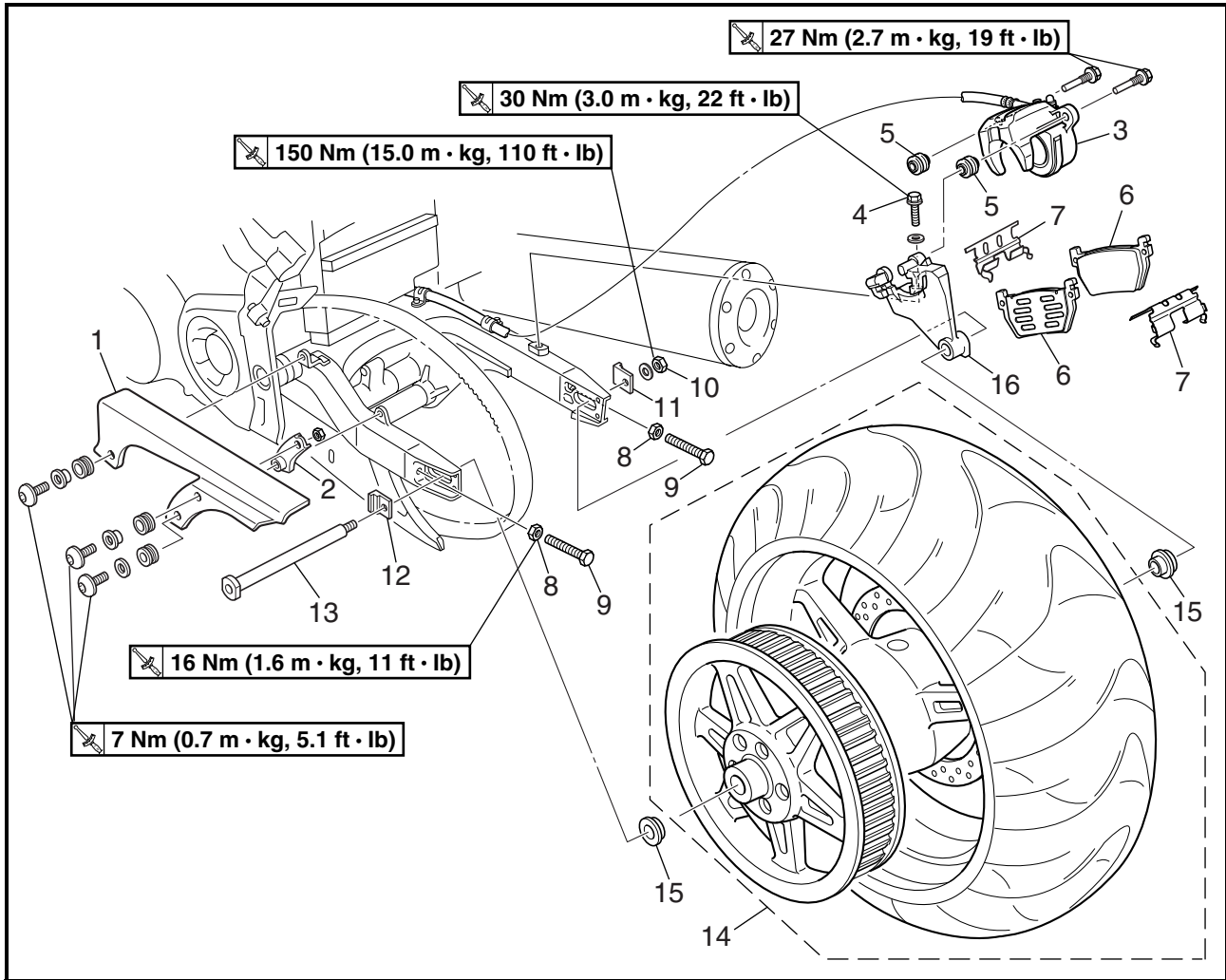
## REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear fender</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT AND SIDE COVERS" in chapter 3.
1	Tail sub-wire harness coupler	1	Disconnect. Refer to "INSTALLING THE REAR WHEEL".
2	Rear fender assembly	1	
3	Rear fender bracket (left and right)	2	
			For installation, reverse the removal procedure.

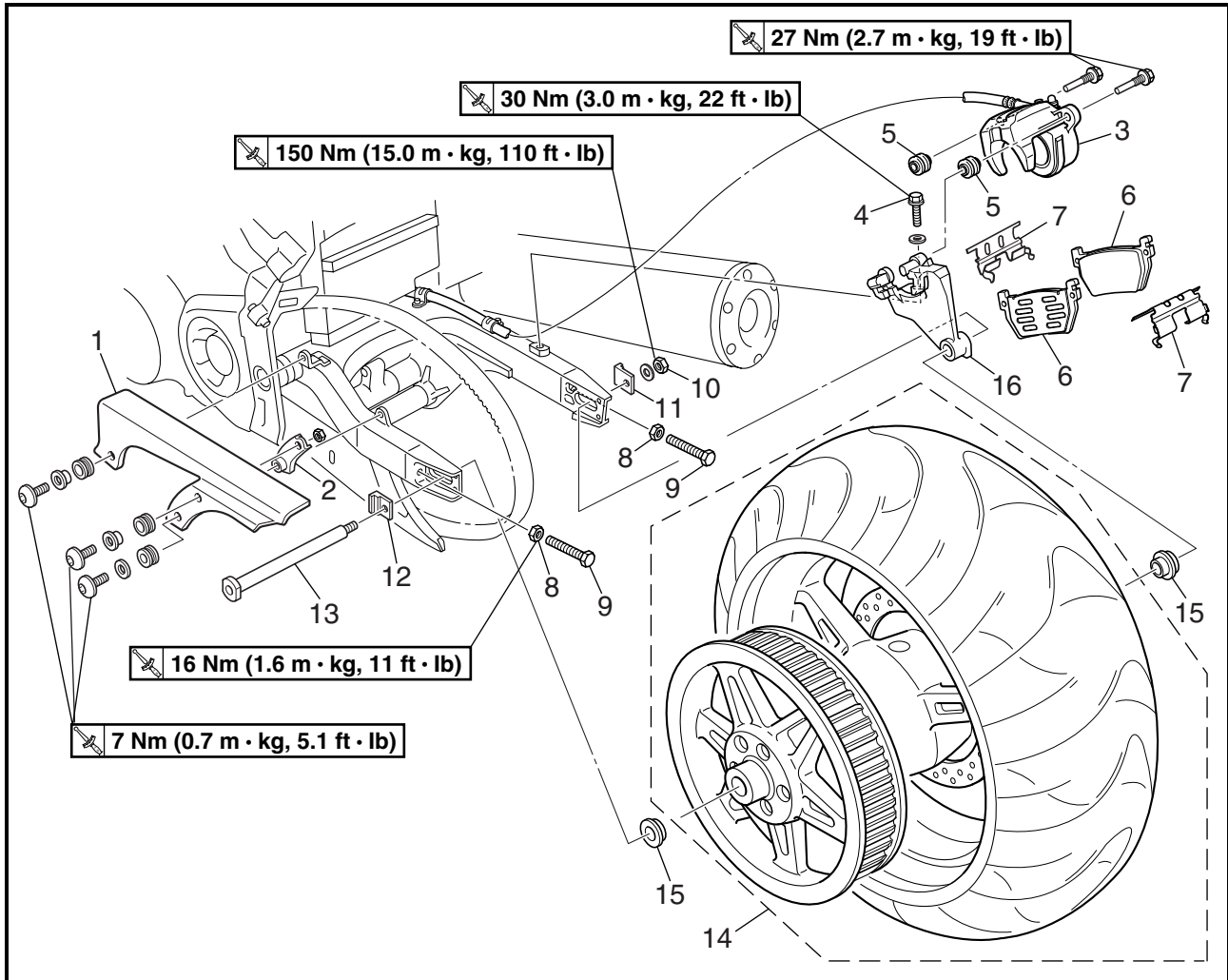


# REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY



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	Upper drive belt cover	1	Refer to "INSTALLING THE REAR WHEEL".
2	Upper drive belt cover plate	1	
3	Brake caliper	1	
4	Brake caliper bracket bolt	1	
5	Pin boot	2	
6	Brake pad/brake pad shim	2/2	
7	Brake pad spring	2	

# REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY

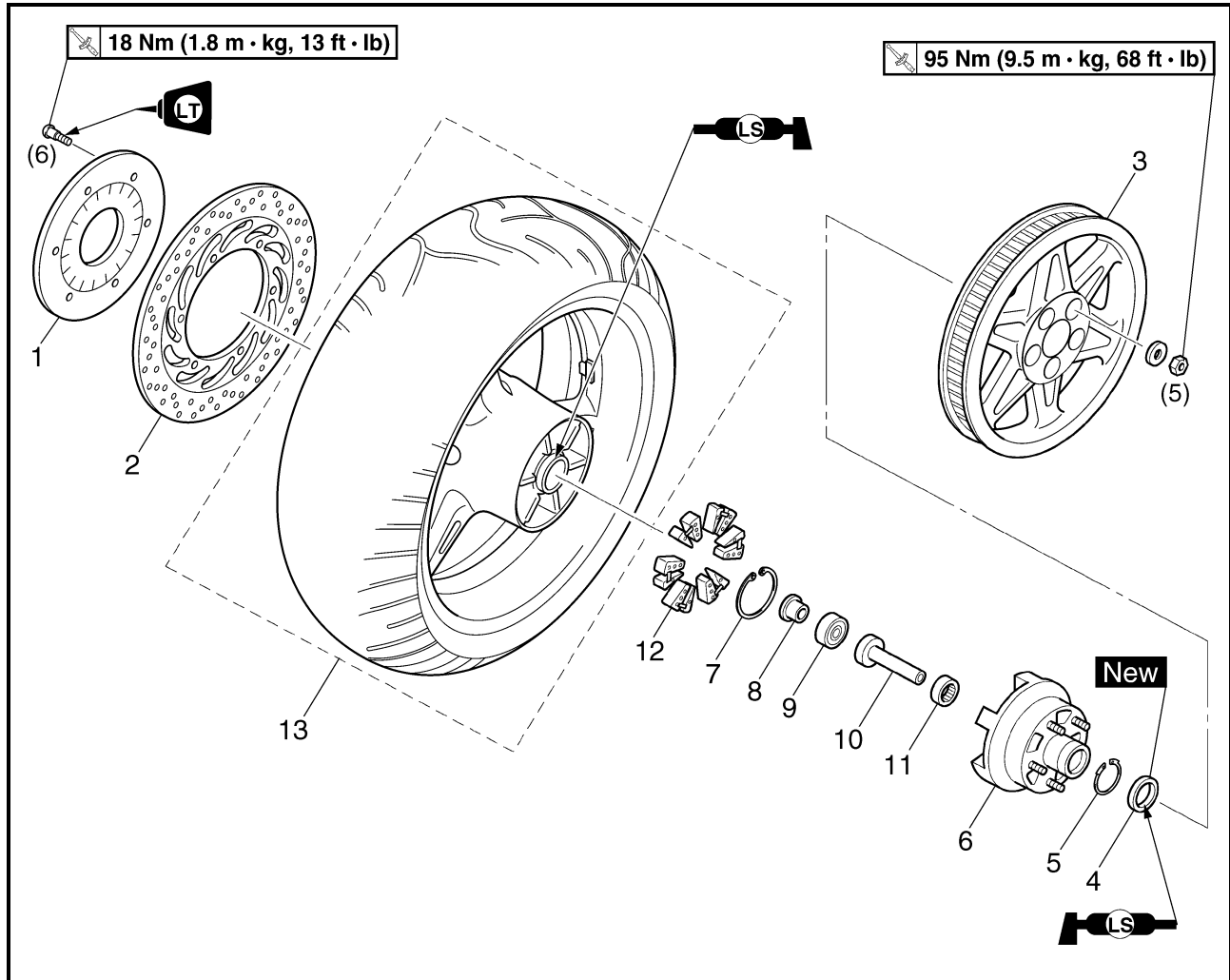


Order	Job/Part	Q'ty	Remarks
8	Locknut (left and right)	2	Loosen.
9	Adjusting bolt (left and right)	2	Loosen.
10	Wheel axle nut	1	
11	Right adjusting plate	1	Refer to "REMOVING THE REAR WHEEL" and "INSTALLING THE REAR WHEEL".
12	Left adjusting plate	1	
13	Rear wheel axle	1	
14	Rear wheel	1	
15	Collar (left and right)	2	
16	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

# REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY

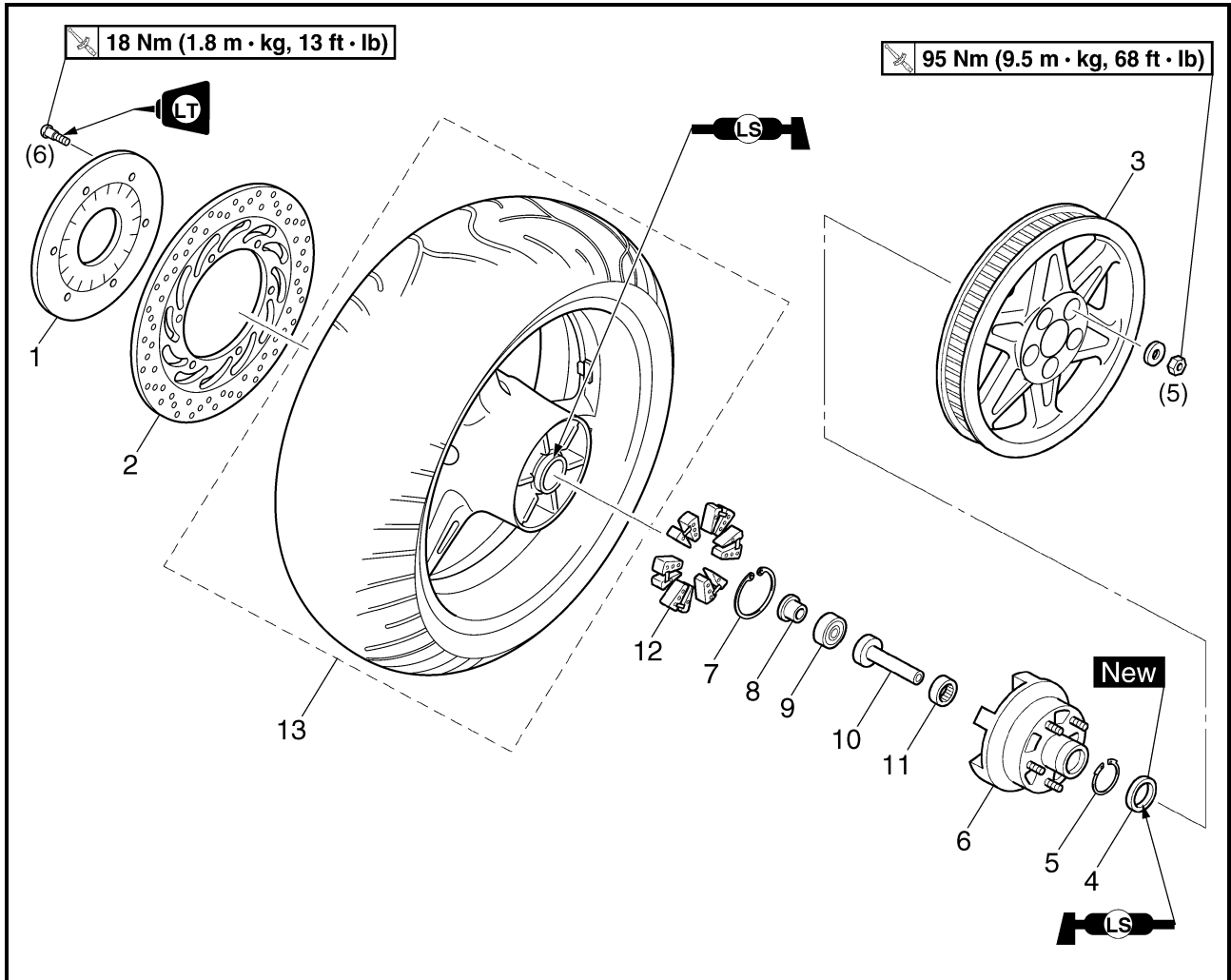


EAS00556



Order	Job/Part	Q'ty	Remarks
	<b>Removing the brake disc and rear wheel pulley</b>		Remove the parts in the order listed.
1	Brake disc cover	1	Refer to "INSTALLING THE REAR WHEEL".
2	Brake disc	1	
3	Rear wheel pulley	1	
4	Oil seal	1	
5	Circlip	1	
6	Rear wheel drive hub	1	
7	Circlip	1	

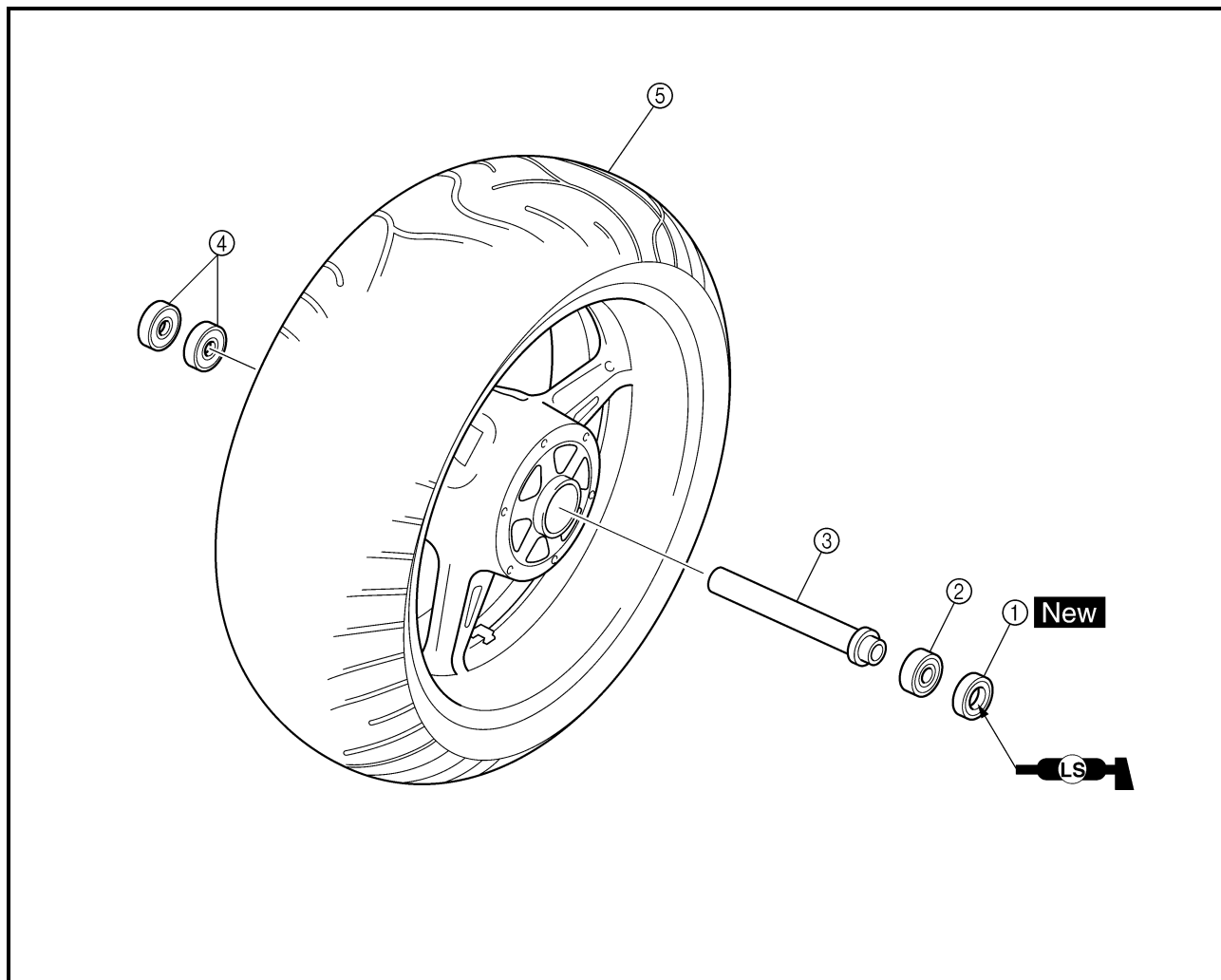
# REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY



Order	Job/Part	Q'ty	Remarks
8	Collar	1	
9	Bearing	1	
10	Collar	1	
11	Bearing	1	
12	Rear wheel drive hub damper	6	
13	Rear wheel	1	
			For installation, reverse the removal procedure.



EAS00560



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear wheel</b>		Remove the parts in the order listed.
①	Oil seal	1	Refer to "ASSEMBLING THE REAR WHEEL".
②	Bearing	1	
③	Spacer	1	
④	Bearing	2	
⑤	Rear wheel	1	
			For assembly, reverse the disassembly procedure.



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

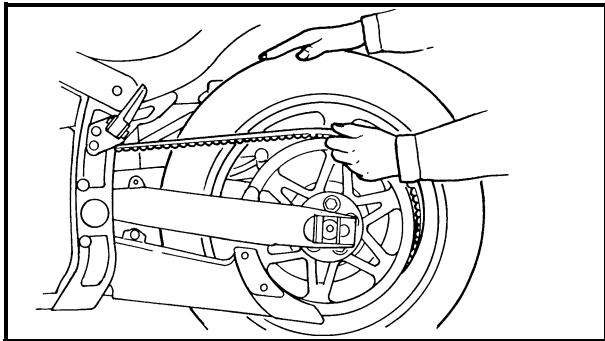
### **NOTE:**

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

3. Loosen:
  - locknuts
  - adjusting nuts
4. Remove:
  - wheel axle nut
  - wheel axle
  - rear wheel

### **NOTE:**

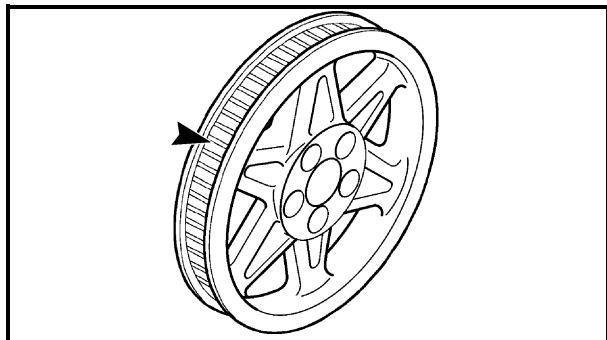
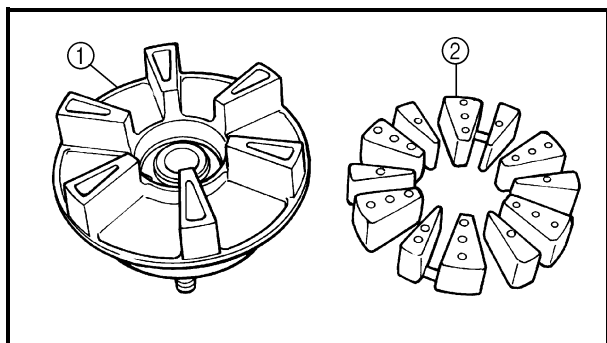
Push the rear wheel forward and remove the drive belt from the rear wheel pulley.



EAS00565

## CHECKING THE REAR WHEEL

1. Check:
  - wheel axle
  - rear wheel
  - wheel bearings
  - oil sealsRefer to “CHECKING THE FRONT WHEEL”.
2. Check:
  - tire
  - rear wheelDamage/wear → Replace.  
Refer to “CHECKING THE TIRES” and “CHECKING THE WHEELS” in chapter 3.
3. Measure:
  - radial wheel runout
  - lateral wheel runoutRefer to “FRONT WHEEL AND BRAKE DISCS”.



EAS00567

**CHECKING THE REAR WHEEL DRIVE HUB**

1. Check:
- rear wheel drive hub ①  
Cracks/damage → Replace.
  - rear wheel drive hub dampers ②  
Damage/wear → Replace.

EAS00568

**CHECKING AND REPLACING THE REAR  
WHEEL PULLEY**

1. Check:
- rear wheel pulley  
Surface plating has come → Replace the rear wheel pulley.  
Bent teeth → Replace the rear wheel pulley.
2. Replace:
- rear wheel pulley



- a. Remove the self-locking nuts and the rear wheel pulley.
- b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the pulley.
- c. Install the new rear wheel pulley.

	<b>Rear wheel pulley self-locking nut</b> 95 Nm (9.5 m • kg, 68 ft • lb)
--	---

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



**ASSEMBLING THE REAR WHEEL**

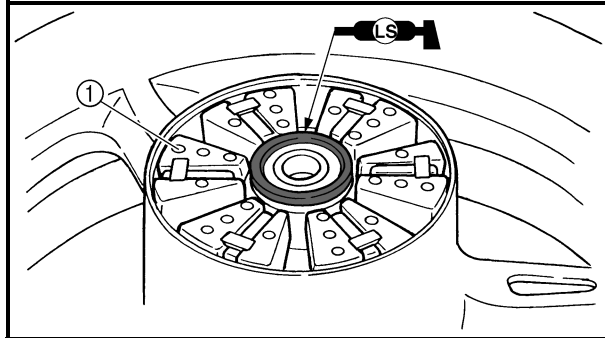
1. Install:
- bearings
  - spacer
  - bearing
  - oil seal **New**  
Refer to “FRONT WHEEL AND BRAKE DISCS”.

EAS00572

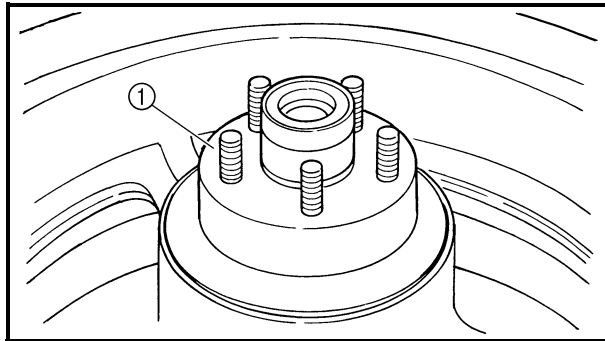
## INSTALLING THE REAR WHEEL

1. Lubricate:
  - oil seal lips

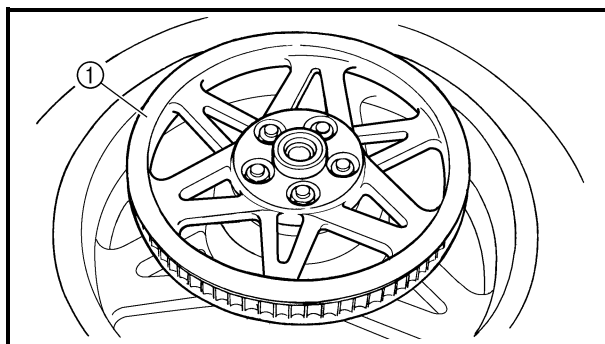
	<b>Recommended lubricant</b> Lithium-soap-based grease
---	---




2. Install:
  - rear wheel drive hub dampers ①



3. Install:
  - rear wheel drive hub assembly ①



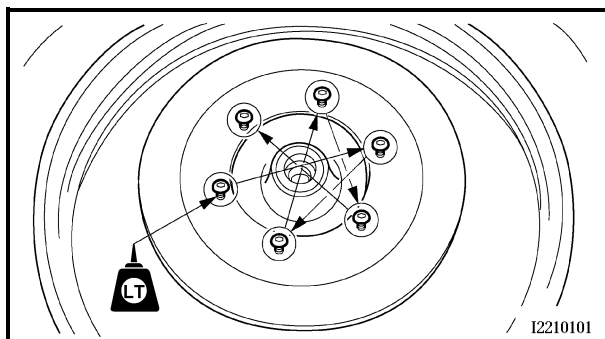
4. Install:
  - rear wheel pulley ①

 **95 Nm (9.5 m • kg, 68 ft • lb)**

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

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

Install the rear wheel pulley with its wider spokes situated on top of the rear wheel spokes.

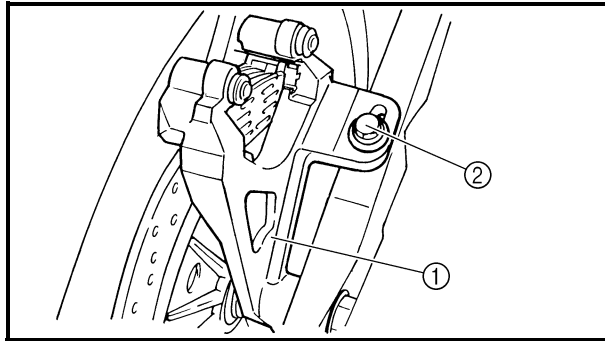


5. Install:
  - brake disc
  - brake disc cover

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

- Apply locking agent (LOCTITE® 648) to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.





6. Install:
- brake caliper bracket ①
  - washer
  - brake caliper bracket bolt ②

**NOTE:** \_\_\_\_\_  
Temporarily tighten the brake caliper bracket bolt.

---


7. Install:
- collars
  - rear wheel
  - adjusting plates
  - rear wheel axle
  - washer
  - wheel axle nut

**NOTE:** \_\_\_\_\_  
Temporarily tighten the wheel axle nut.


---

8. Adjust:
- drive belt slack
- Refer to “ADJUSTING THE DRIVE BELT SLACK” in chapter 3.

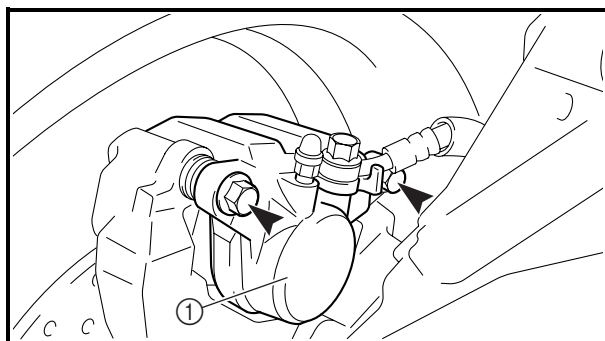
9. Tighten:
- wheel axle nut

 **150 Nm (15.0 m • kg, 110 ft • lb)**


- brake caliper bracket bolts

 **30 Nm (3.0 m • kg, 22 ft • lb)**

10. Install:
- brake pad springs
  - brake pad shims
  - brake pads
  - pin boots

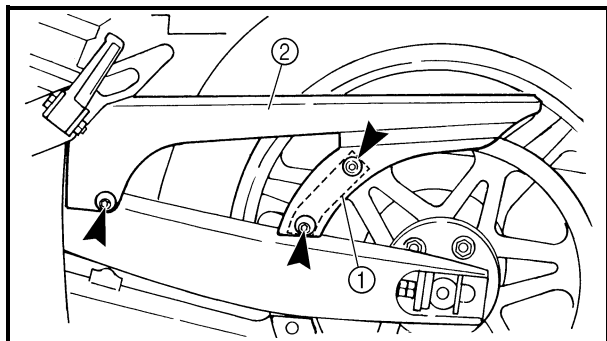


11. Install:
- brake caliper ①

 **27 Nm (2.7 m • kg, 19 ft • lb)**

# REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY

CHAS



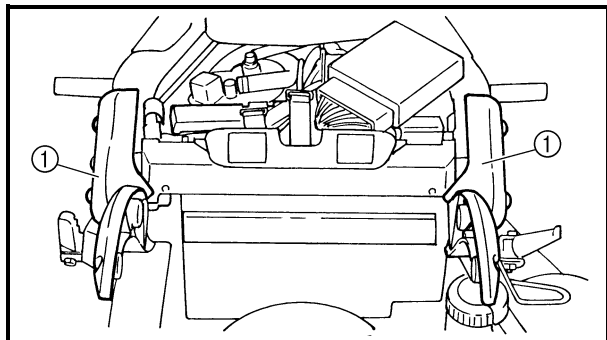
12.Install:

- upper drive belt cover plate ①

7 Nm (0.7 m • kg, 5.1 ft • lb)

- upper drive belt cover ②

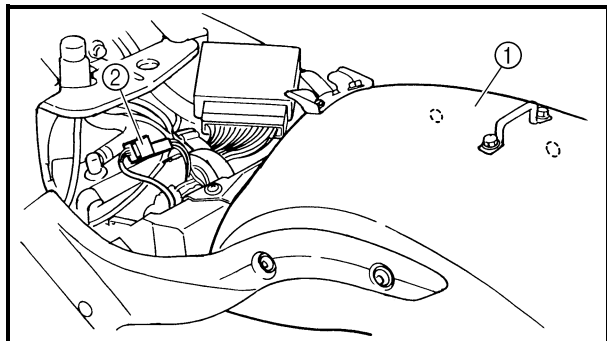
7 Nm (0.7 m • kg, 5.1 ft • lb)



13.Install:

- rear fender bracket ①

40 Nm (4.0 m • kg, 29 ft • lb)



14.Install:

- rear fender assembly ①

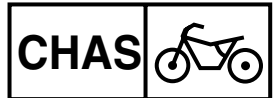
15.Connect:

- tail sub-wire harness coupler ②

16.Install:

- seat

Refer to “SEAT AND SIDE COVERS” in chapter 3.



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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.
- 

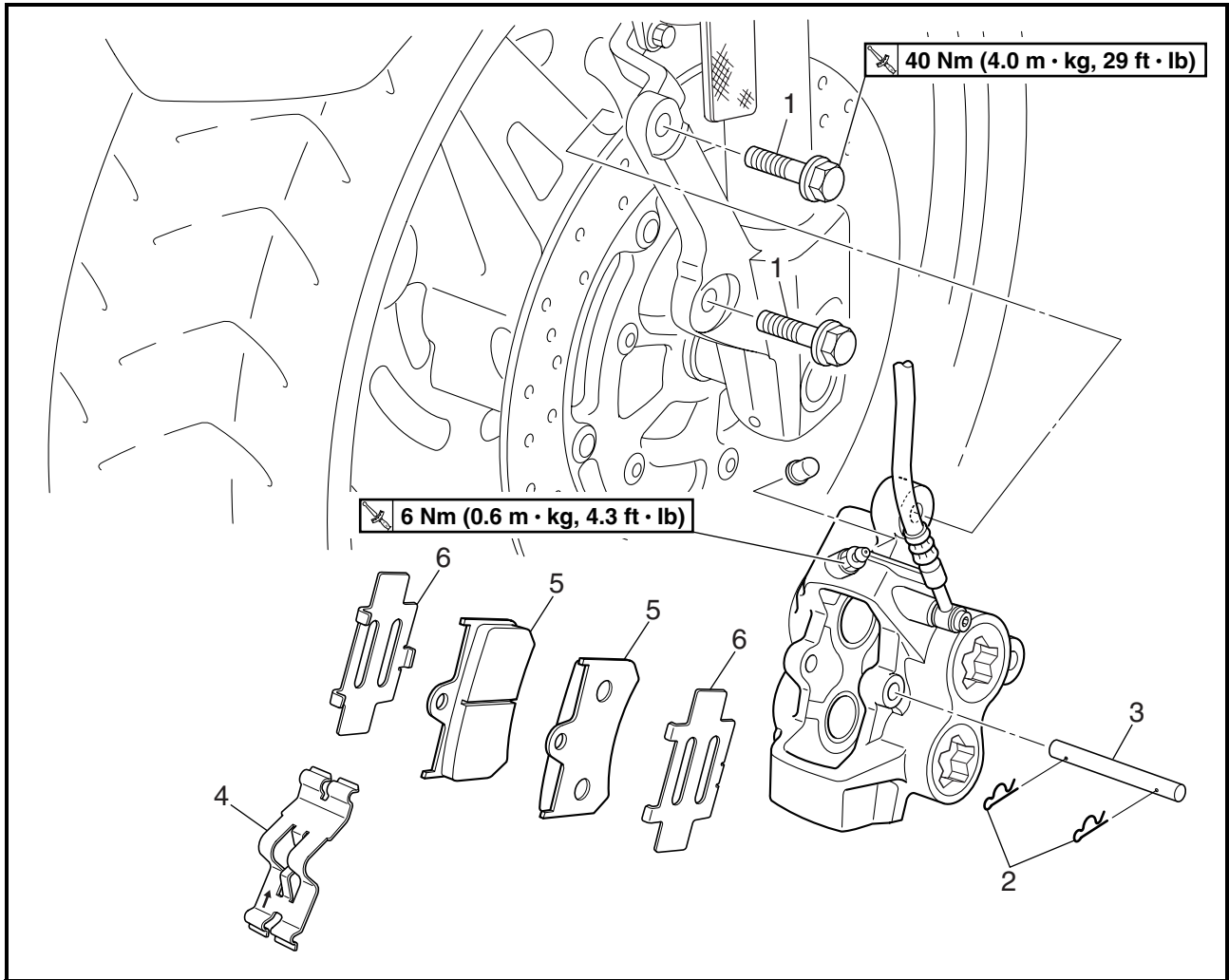
1. Adjust:

- rear wheel static balance  
Refer to "FRONT WHEEL AND BRAKE DISCS".

EAS00577

**FRONT AND REAR BRAKES**

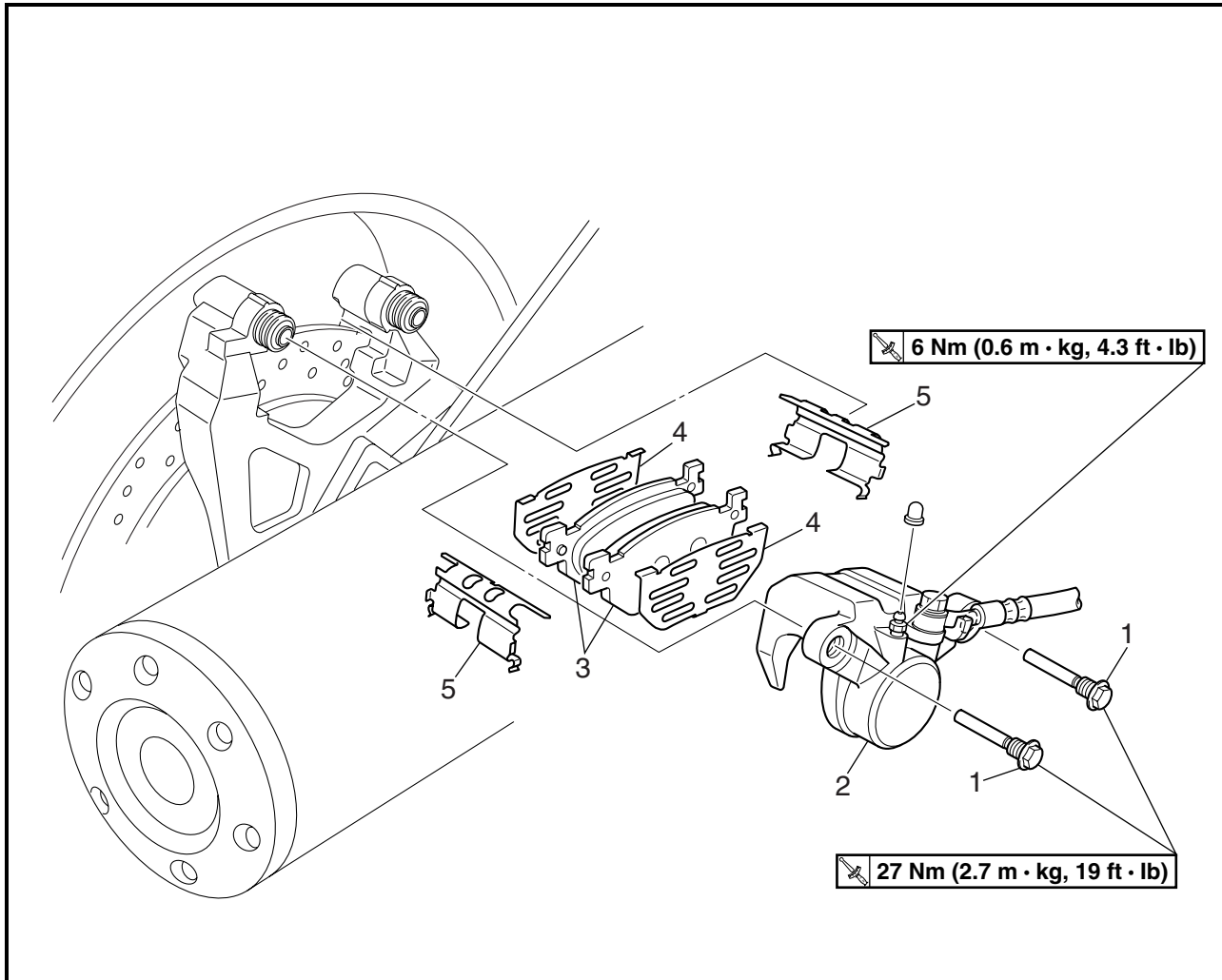
**FRONT BRAKE PADS**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake pads</b>		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
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	
			For installation, reverse the removal procedure.

EAS00578

REAR BRAKE PADS



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



EAS00579

**CAUTION:**

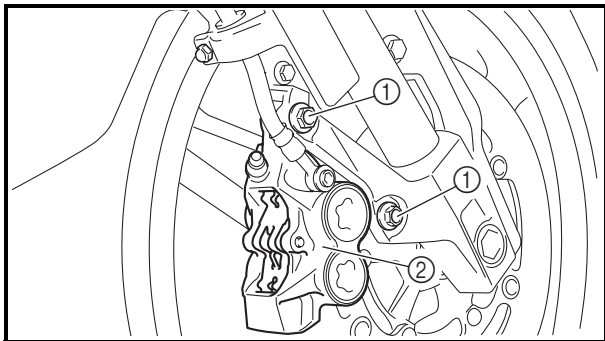
Disc brake components rarely require disassembly.

Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt 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.



EAS00580

**REPLACING THE FRONT BRAKE PADS**

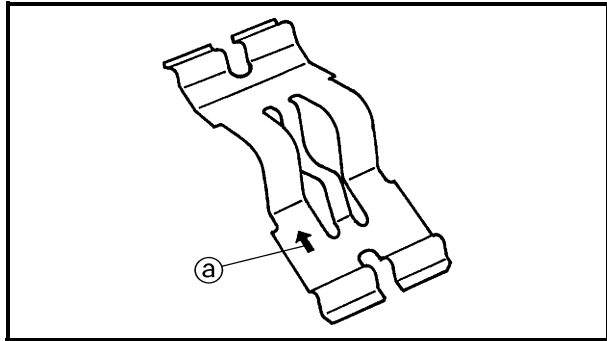
The following procedure applies to both brake calipers.

**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

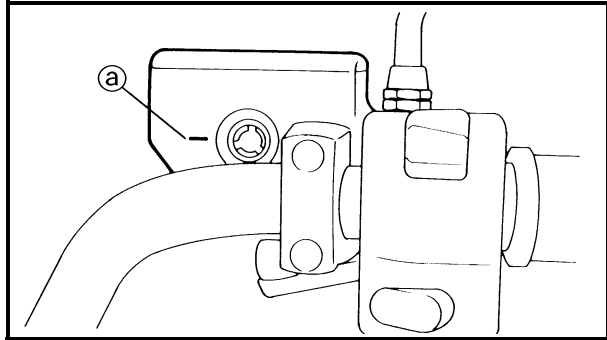




d. Install new brake pads and a new brake pad spring.

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

The arrow (a) on the brake pad spring must point in the direction of disc rotation.



6. Install:

- brake caliper
- brake caliper bolts

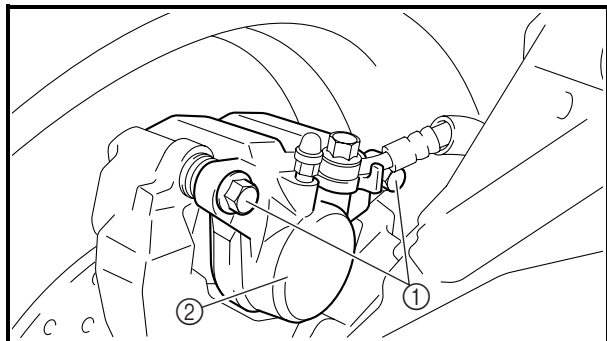
27 Nm (2.7 m • kg, 19 ft • lb)

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.



EAS00583

**REPLACING THE REAR BRAKE PADS**

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

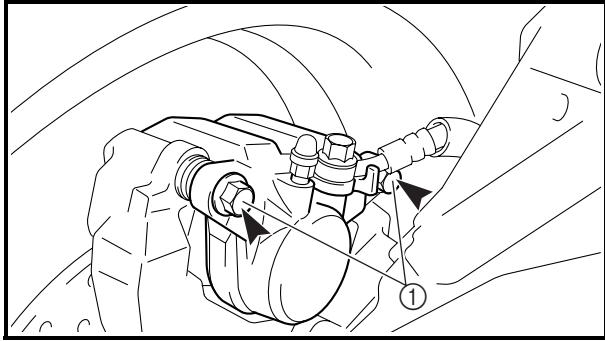
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:

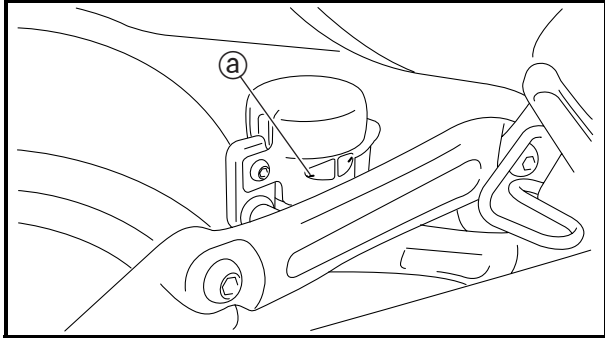
- brake caliper retaining bolts (1)
- brake caliper (2)







5. Install:
- brake caliper retaining bolt ①

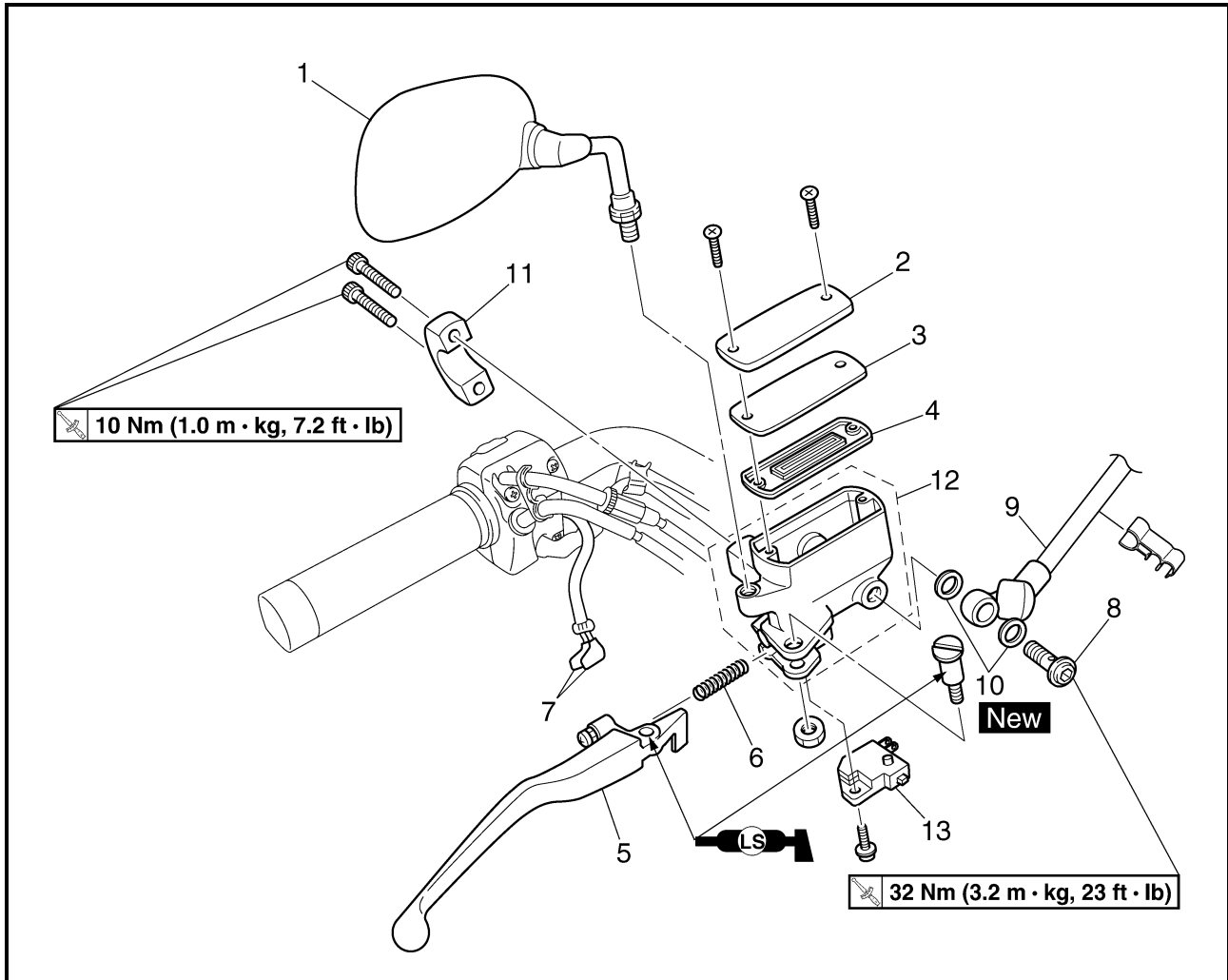


6. Check:
- brake fluid level  
Below the minimum level mark (a) → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
7. Check:
- brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE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

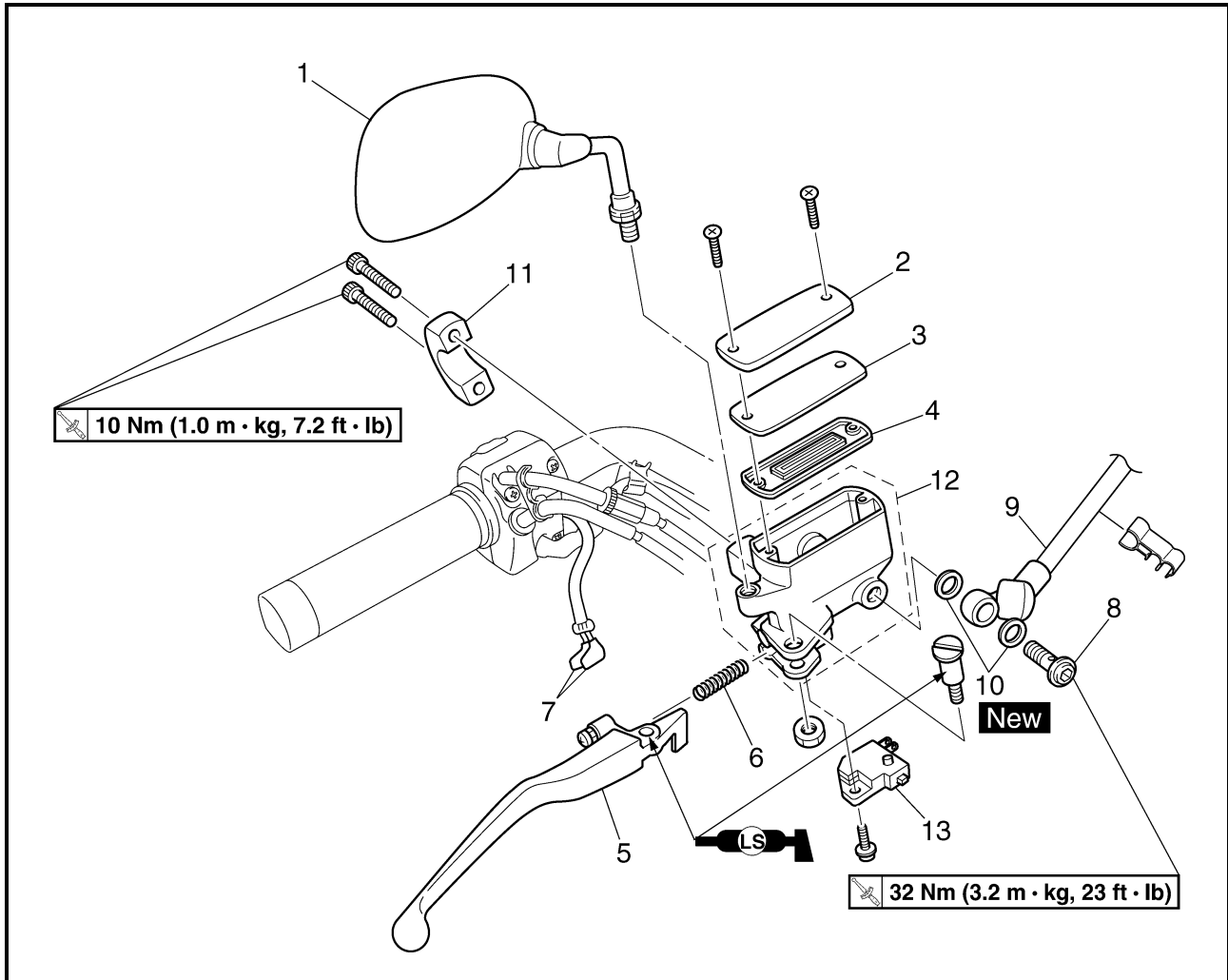


EAS00584

**FRONT BRAKE MASTER CYLINDER**



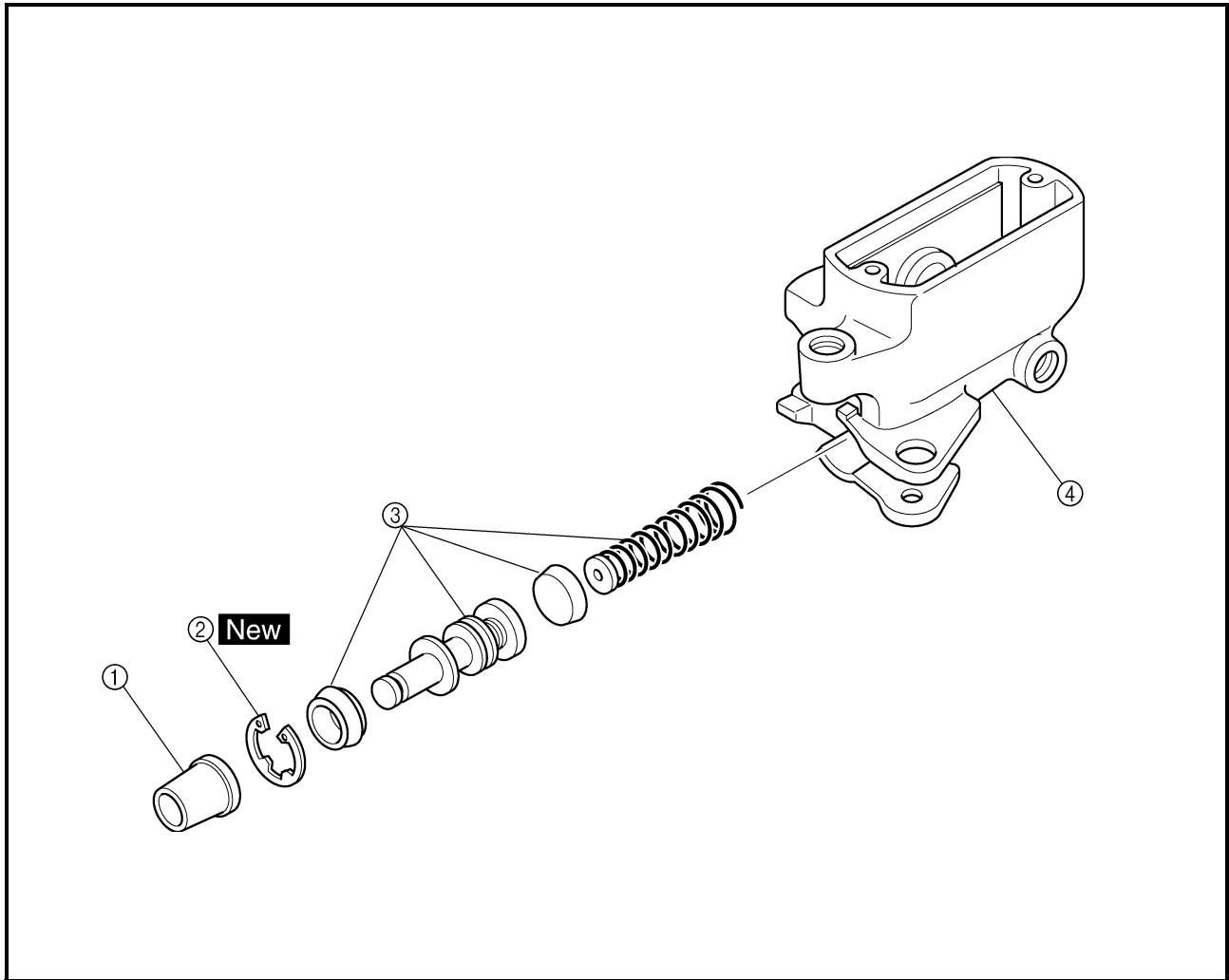
Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake master cylinder</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Rear view mirror (right)	1	
2	Brake master cylinder reservoir cap	1	
3	Brake master cylinder reservoir diaphragm holder	1	
4	Brake master cylinder reservoir diaphragm	1	
5	Brake lever	1	
6	Brake lever spring	1	



Order	Job/Part	Q'ty	Remarks
7	Front brake light switch connector	2	Disconnect. Refer to "REMOVING THE FRONT BRAKE MASTER CYLINDER" and "ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER".  For installation, reverse the removal procedure.
8	Union bolt	1	
9	Brake hose	1	
10	Copper washer	2	
11	Brake master cylinder holder	1	
12	Brake master cylinder	1	
13	Front brake light switch	1	



EAS00585

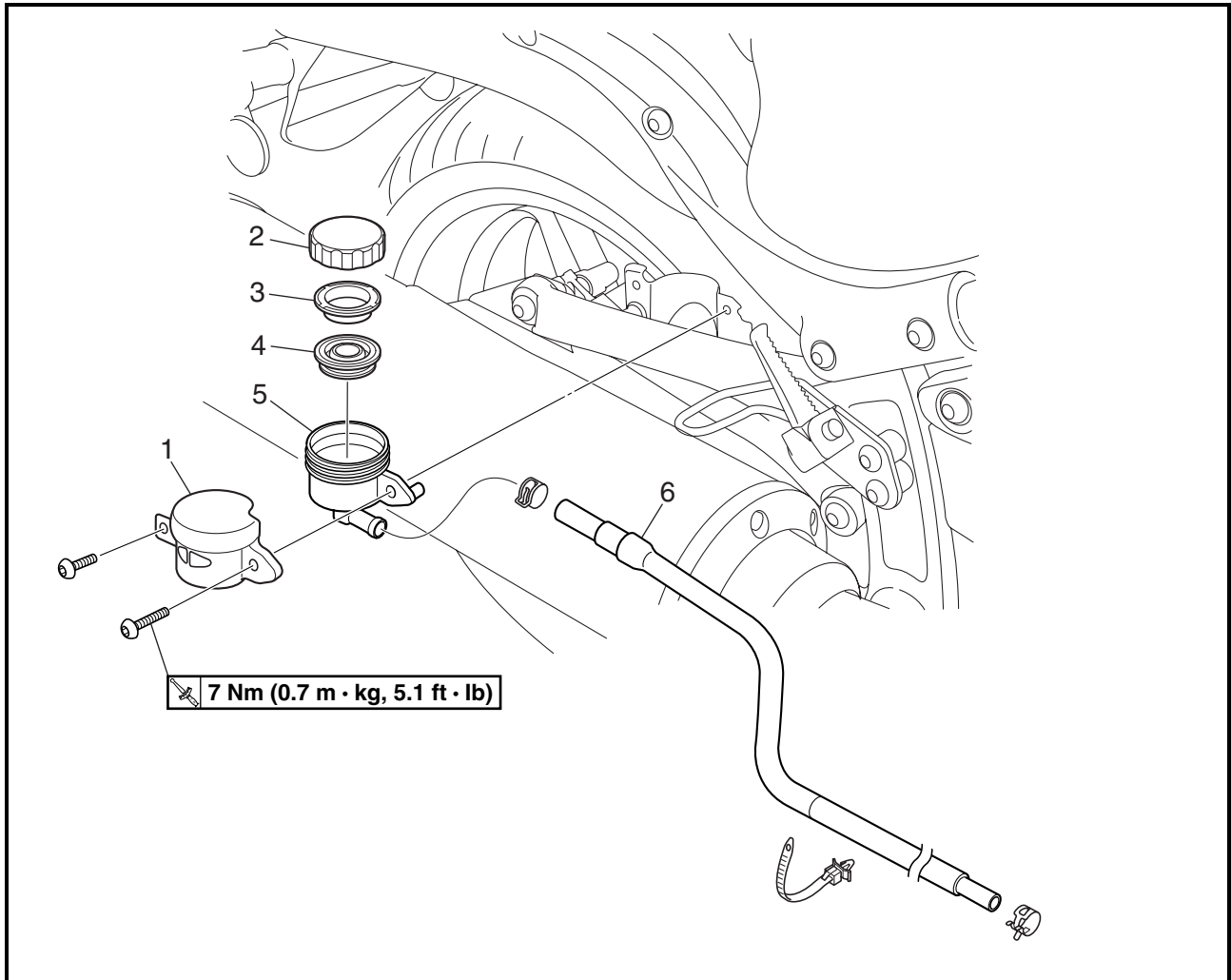


Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front brake master cylinder</b>		Remove the parts in the order listed.
①	Dust boot	1	Refer to "ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER".
②	Circlip	1	
③	Brake master cylinder kit	1	
④	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

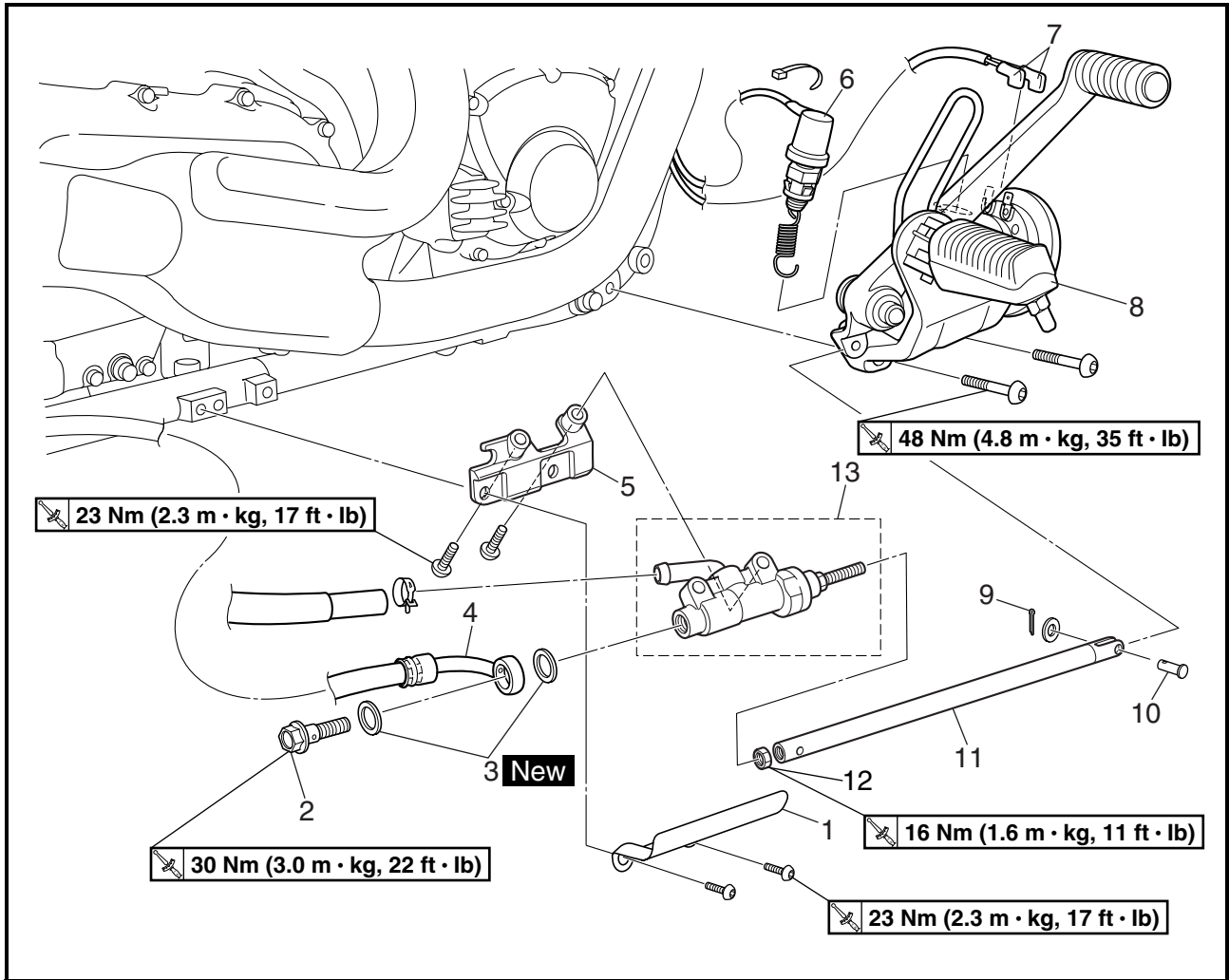


EAS00586

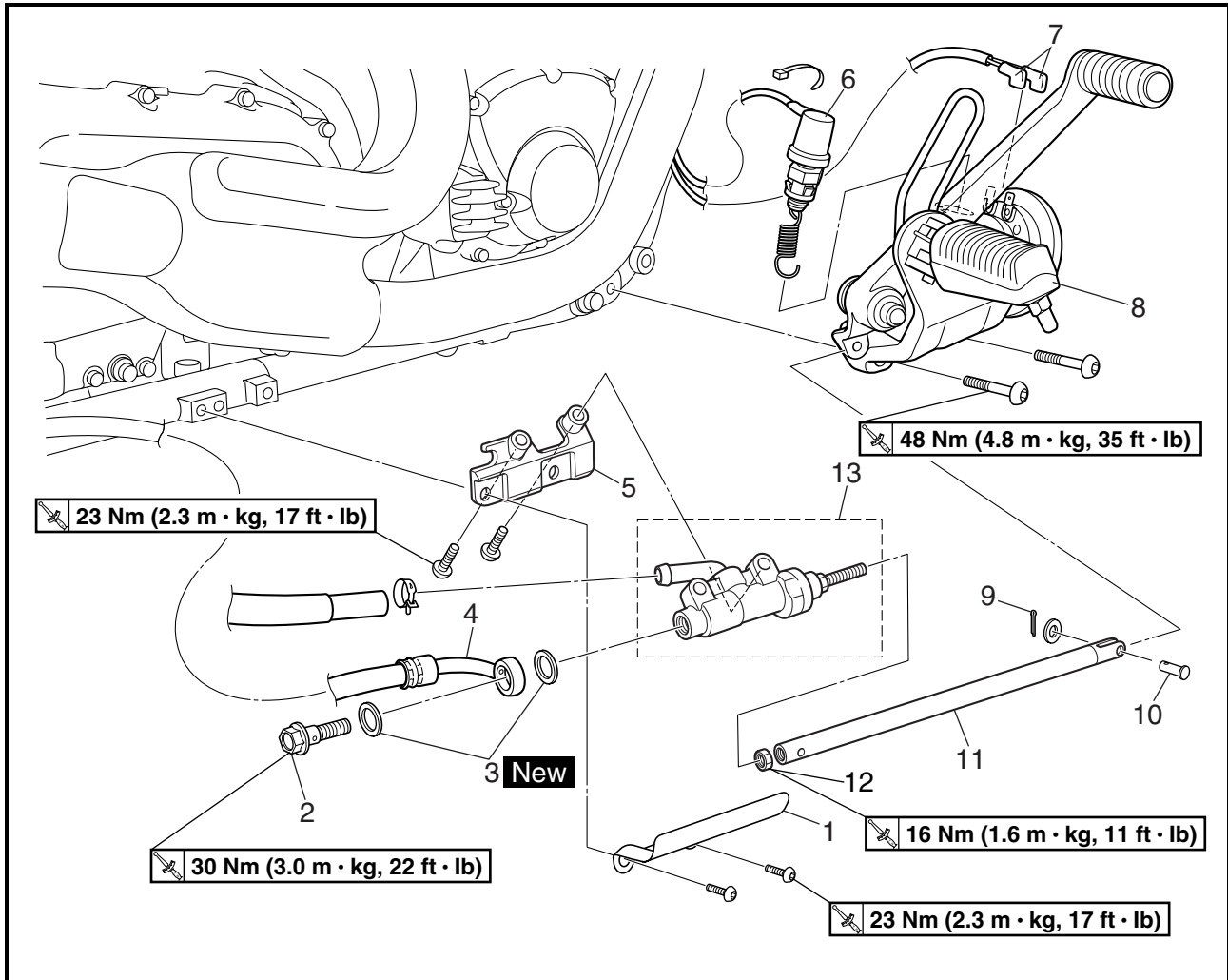
REAR BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	<b>Removing the brake fluid reservoir</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cover	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake master cylinder</b>		Remove the parts in the order listed.
1	Brake master cylinder cover	1	Refer to "REMOVING THE REAR BRAKE MASTER CYLINDER" and "ASSEMBLING AND INSTALLING THE REAR BRAKE MASTER CYLINDER".
2	Union bolt	1	
3	Copper washer	2	
4	Brake hose	1	
			Disconnect.
5	Brake master cylinder bracket	1	Disconnect.
6	Rear brake light switch	1	
7	Horn 1 connector	2	
8	Right footrest assembly (right)	1	

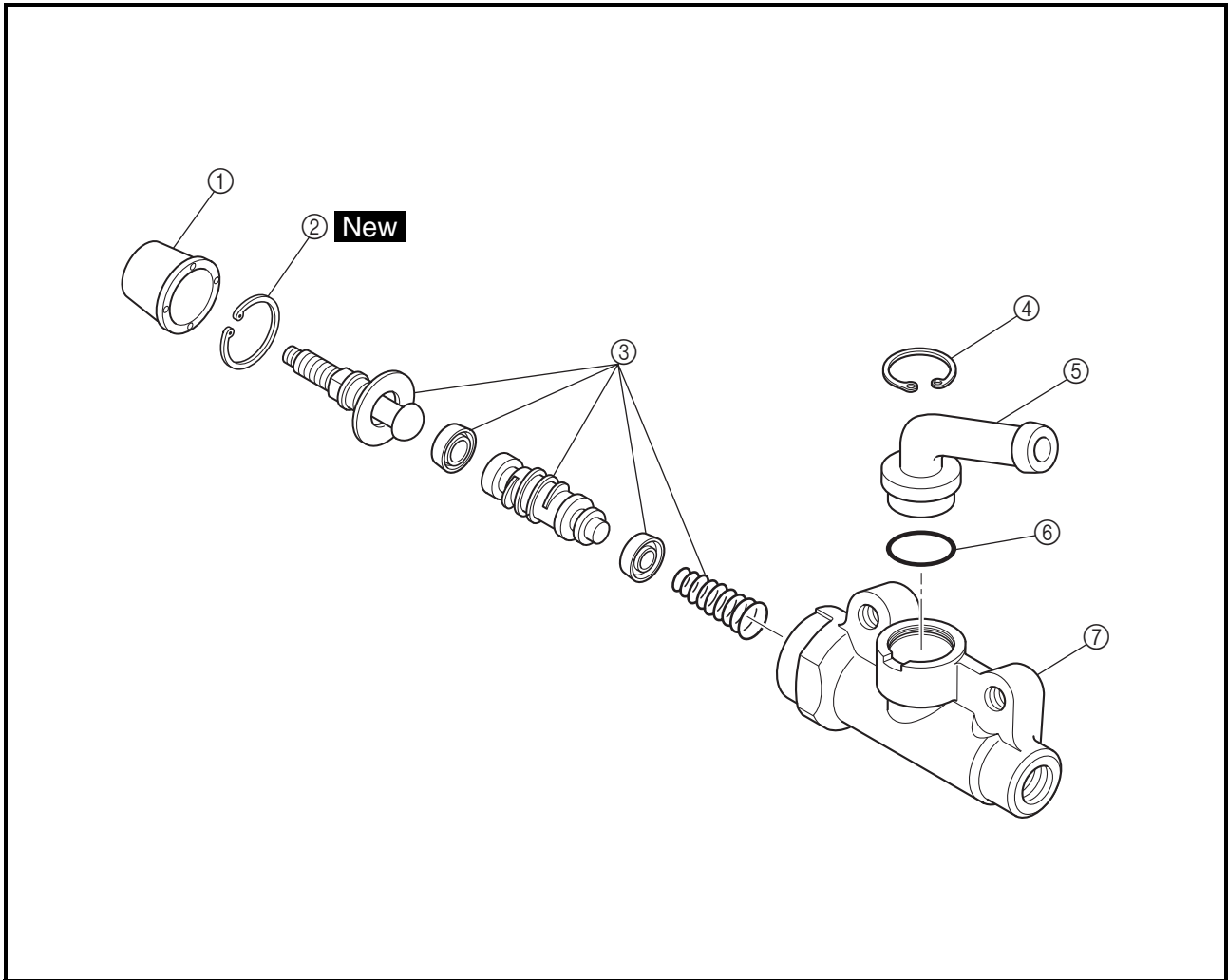


Order	Job/Part	Q'ty	Remarks
9	Cotter pin	1	For installation, reverse the removal procedure.
10	Pin	1	
11	Brake rod	1	
12	Locknut	1	
13	Brake master cylinder	1	





EAS00587



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear brake master cylinder</b>		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Brake master cylinder kit	1	
④	Circlip	1	
⑤	Brake hose joint	1	
⑥	O-ring	1	
⑦	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

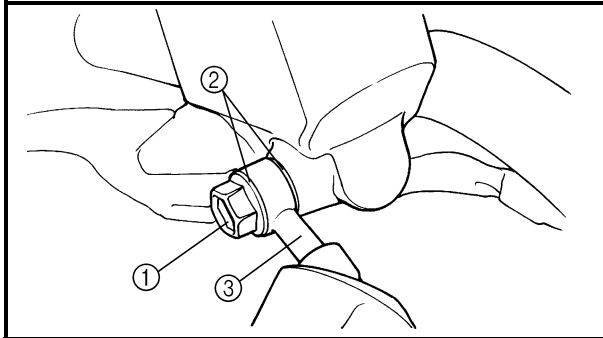


EAS00588

**REMOVING THE FRONT BRAKE MASTER CYLINDER**

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

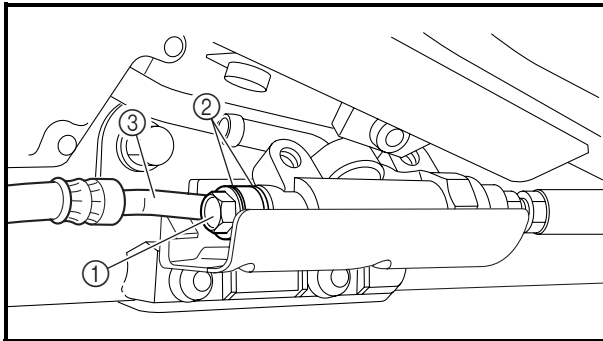
Before disassembling the front brake master cylinder, drain the brake fluid from the entire brake system.



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.



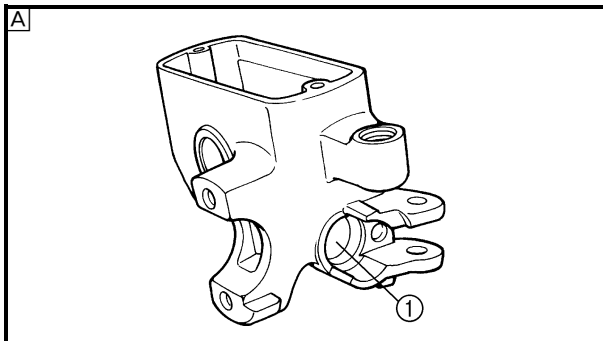
EAS00589

**REMOVING THE REAR BRAKE MASTER CYLINDER**

1. Remove:
  - union bolt ①
  - copper washers ②
  - brake hose ③

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

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



EAS00592

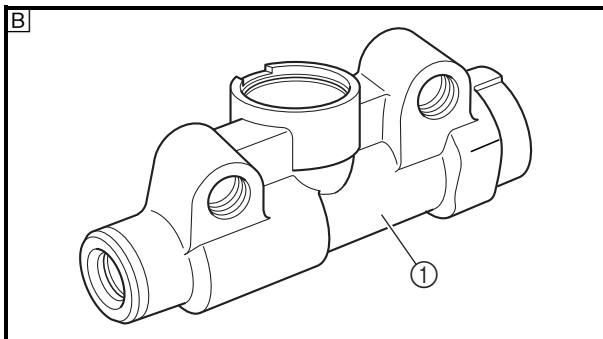
**CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS**

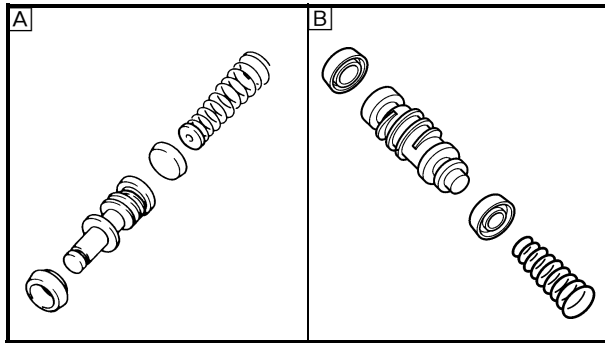
The following procedure applies to the both of the brake master cylinders.

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

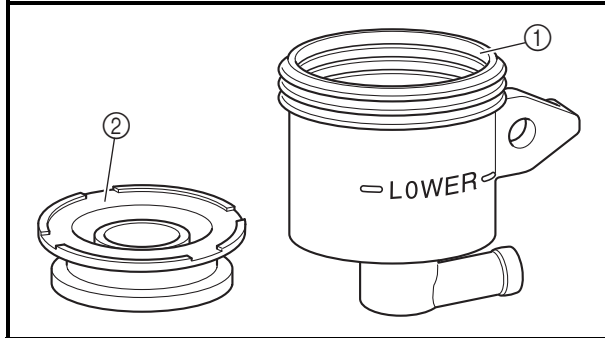
**B** Rear



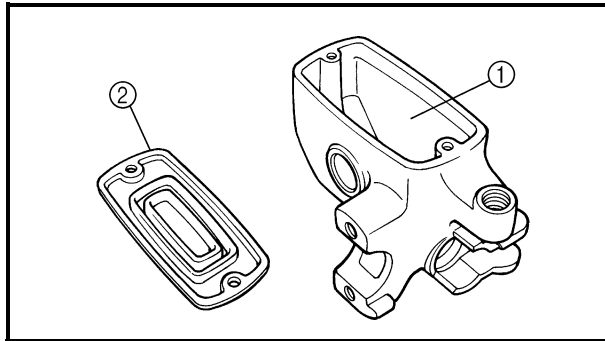


2. Check:
- brake master cylinder kit  
Damage/scratches/wear → Replace.

- Ⓐ Front
- Ⓑ 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  
Cracks/damage/wear → Replace.

EAS00598

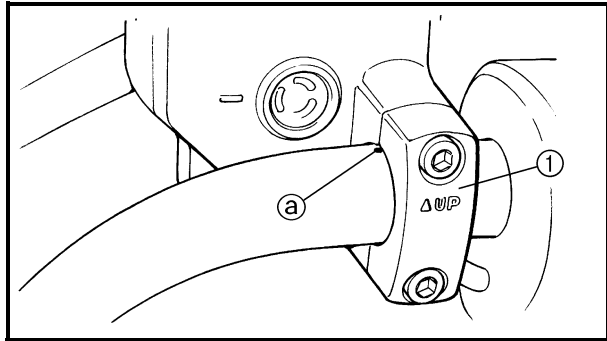
## ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

### ⚠ 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

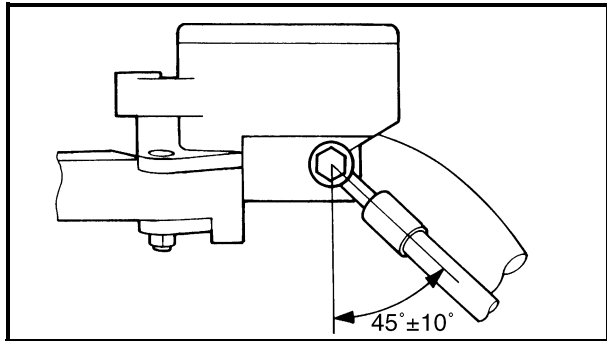


1. Install:
  - brake master cylinder
  - brake master cylinder holder ①

**10 Nm (1.0 m • kg, 7.2 ft • lb)**

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

- Install the brake master cylinder holder with the “UP” mark facing up.
- Align the end of the brake master cylinder holder with the punch mark ① on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



2. Install:

- copper washers **New**
- brake hose
- union bolt **32 Nm (3.2 m • kg, 23 ft • lb)**

**⚠ WARNING** \_\_\_\_\_

**Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING” in chapter 2.**

**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. Fill:

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

	<b>Recommended brake fluid DOT 4</b>
--	--

**⚠ WARNING**

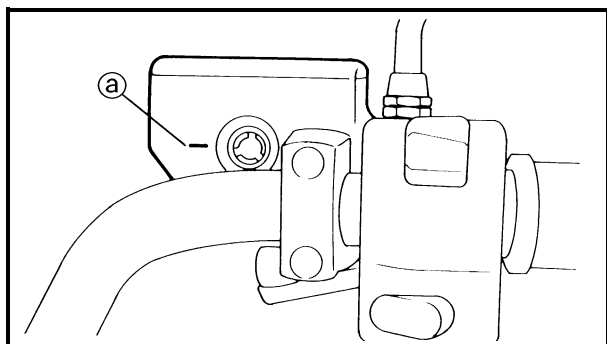
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

**CAUTION:**

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

## 4. Bleed:

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

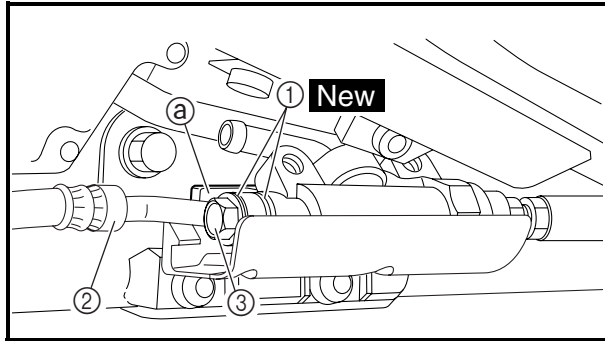


## 5. Check:

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

## 6. Check:

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



EAS00608

**ASSEMBLING AND INSTALLING THE REAR BRAKE MASTER CYLINDER**

1. Install:

- copper washers ① **New**
- brake hoses ②
- union bolt ③ 30 Nm (3.0 m • kg, 22 ft • lb)

**⚠ WARNING**

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING” in chapter 2.

**CAUTION:**

When installing the brake hose onto the brake master cylinder, make sure the brake pipe touches the projection ① onto brake master cylinder bracket, as shown.

2. Fill:

- brake fluid reservoir  
(to the maximum level mark)



**Recommended brake fluid  
DOT 4**

**⚠ WARNING**

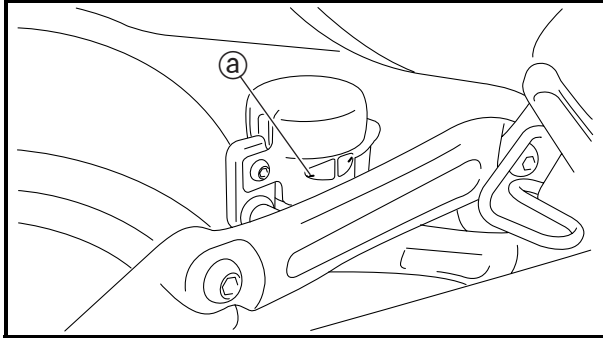
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

**CAUTION:**

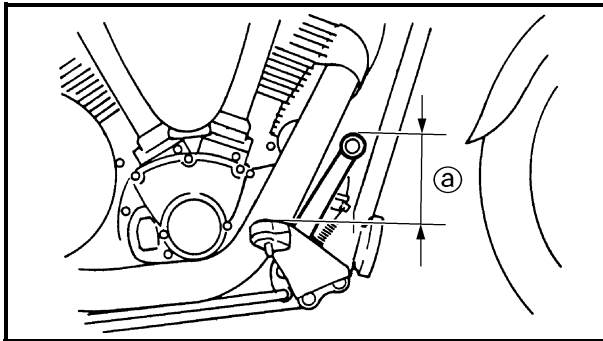
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.



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.

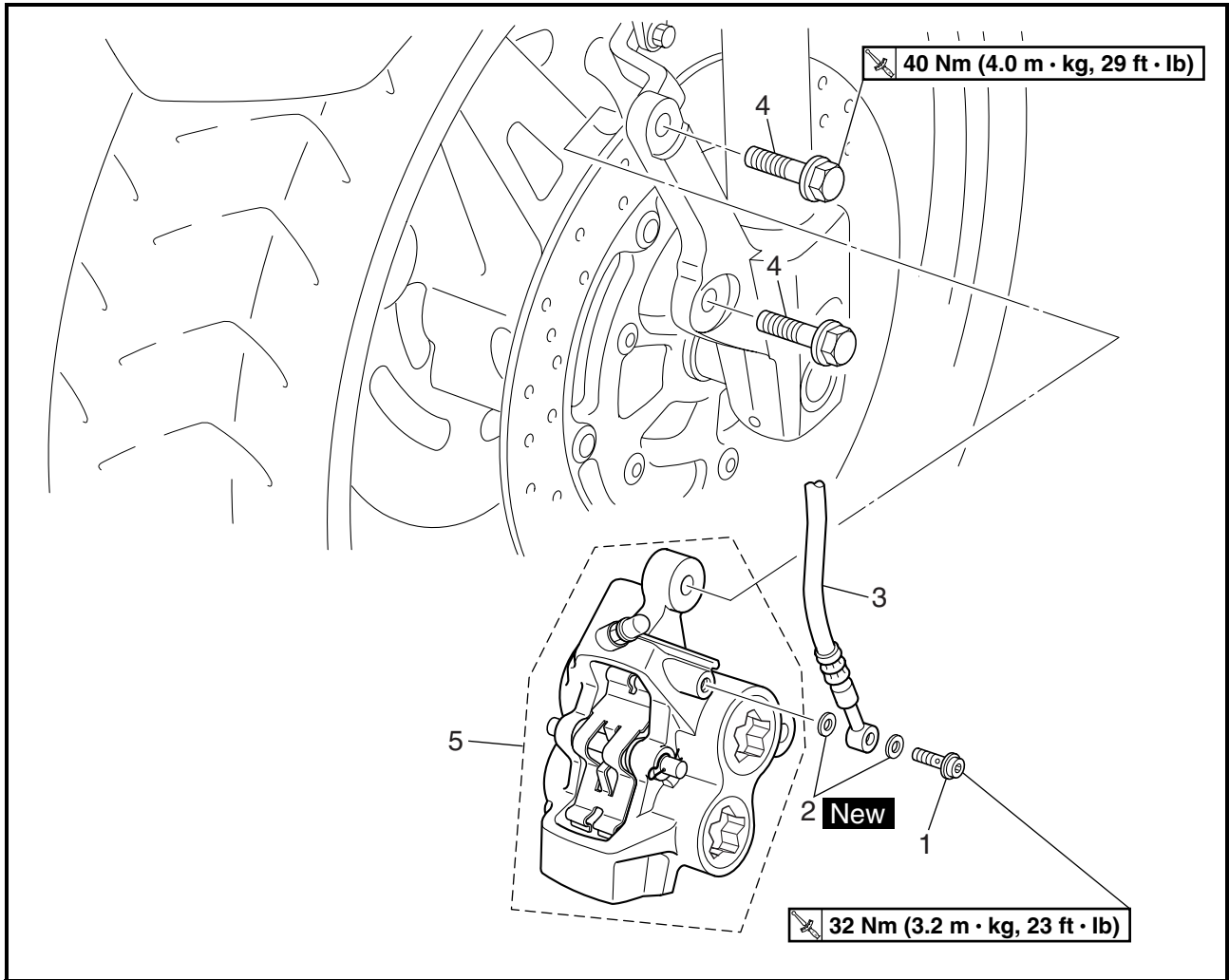


**Brake pedal position (from the top of the rider footrest to the top of the brake pedal)**  
**80 mm (3.2 in)**

6. Adjust:
  - rear brake light operation timing
 Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” in chapter 3.

EAS00613

**FRONT BRAKE CALIPERS**

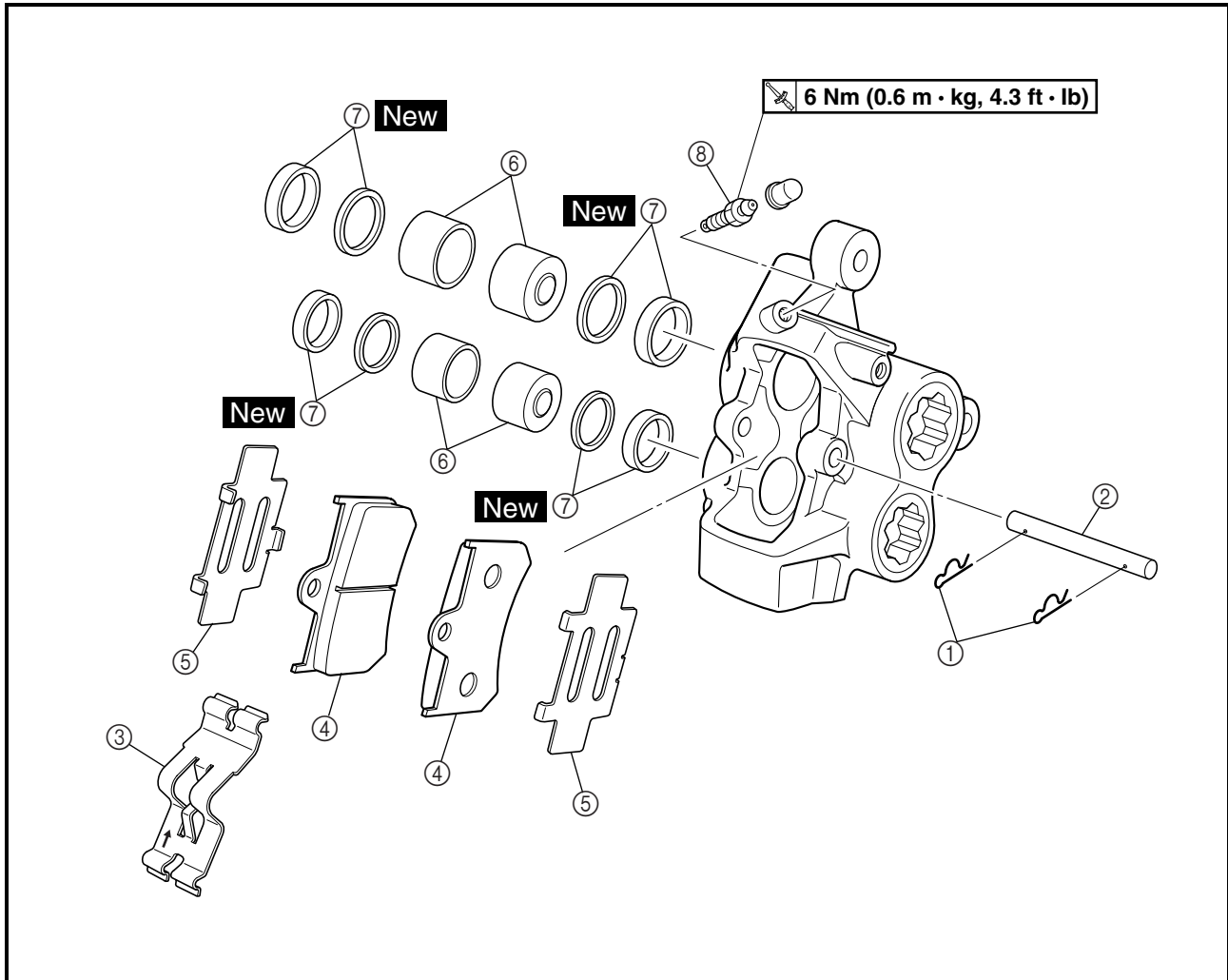


Order	Job/Part	Q'ty	Remarks
	<b>Removing the front brake calipers</b>		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers. Refer to "FRONT WHEEL AND BRAKE DISCS". Drain.
	Brake hose holder		
	Brake fluid		
1	Union bolt	1	Disconnect. Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS" and "ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS". For installation, reverse the removal procedure.
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper bolt	2	
5	Brake caliper	1	





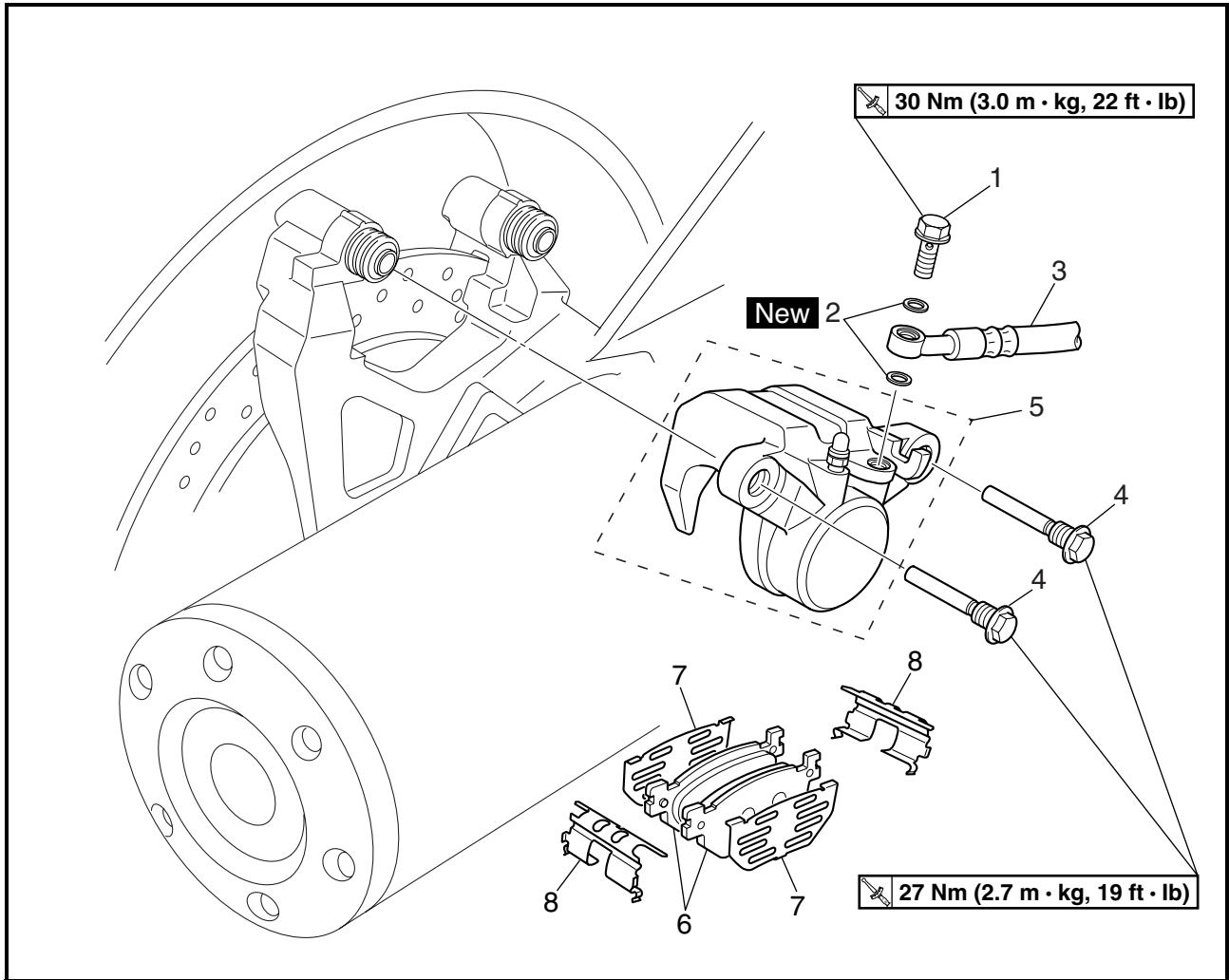
EAS00615



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front brake calipers</b>		Remove 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	Brake pad shim	2	
⑥	Brake caliper piston	4	Refer to "DISASSEMBLING THE FRONT BRAKE CALIPERS".
⑦	Brake caliper piston seal	8	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS00616

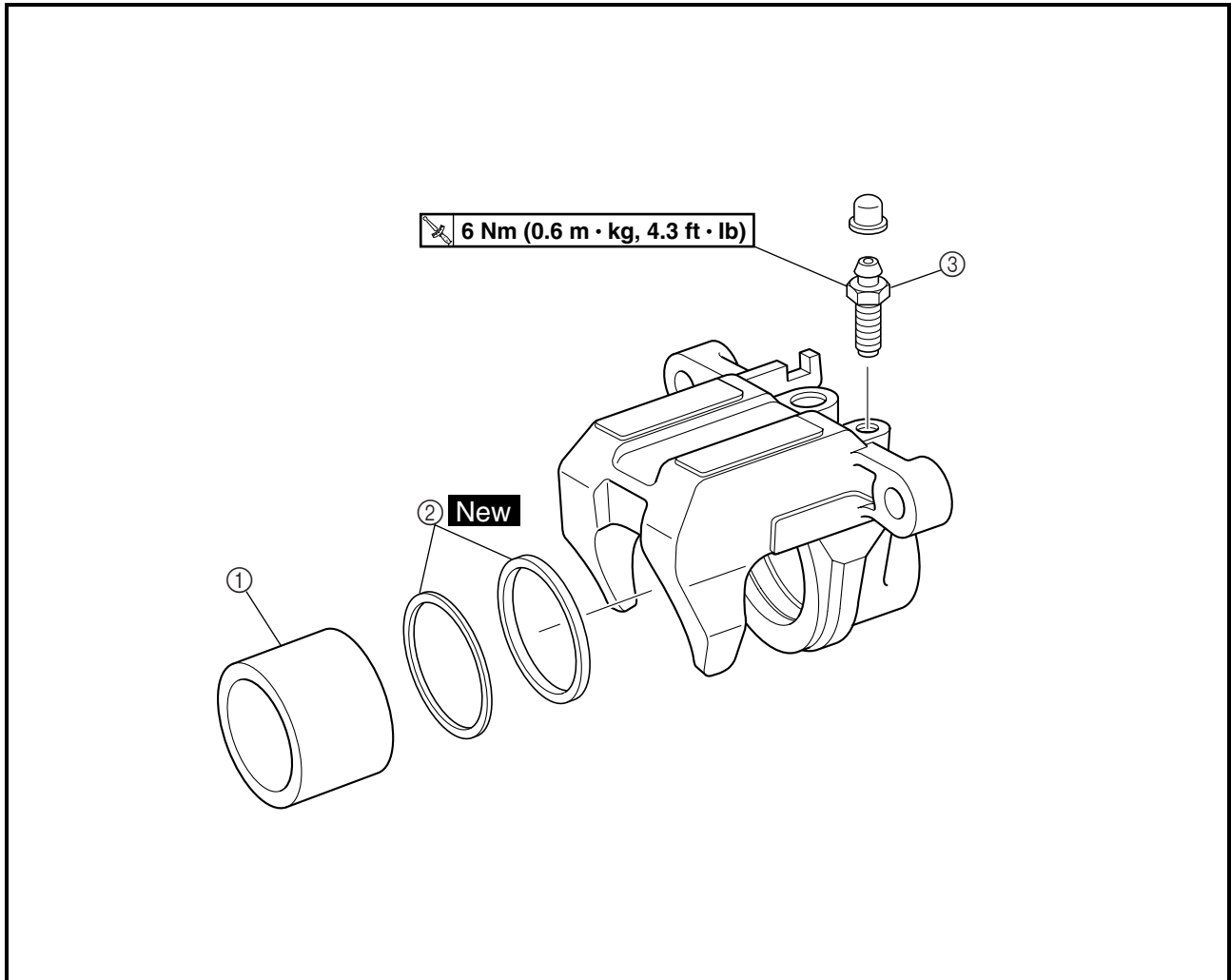
REAR BRAKE CALIPER



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake caliper</b>		Remove the parts in the order listed.
1	Union bolt	1	Disconnect. Refer to "DISASSEMBLING THE REAR BRAKE CALIPER" and "ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER".
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper retaining bolt	2	
5	Brake caliper	1	
6	Brake pad	2	
7	Brake pad shim	2	
8	Brake pad spring	2	
			For installation, reverse the removal procedure.



EAS00617



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the rear brake caliper</b>		Remove the parts in the order listed.
①	Brake caliper piston	1	Refer to "DISASSEMBLING THE REAR BRAKE CALIPER".
②	Brake caliper piston seal	2	
③	Bleed screw	1	
			For assembly, reverse the disassembly procedure.



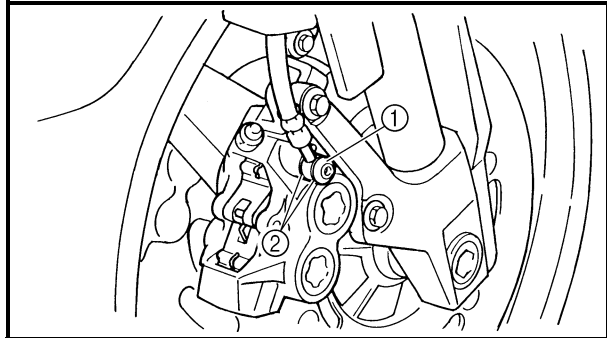
EAS00625

**DISASSEMBLING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

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

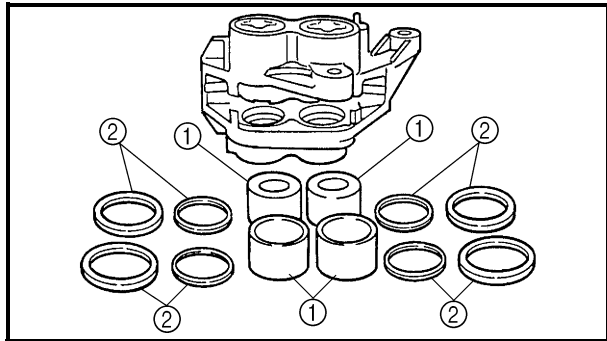
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
  - union bolt ①
  - copper washers ②
  - brake hose

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

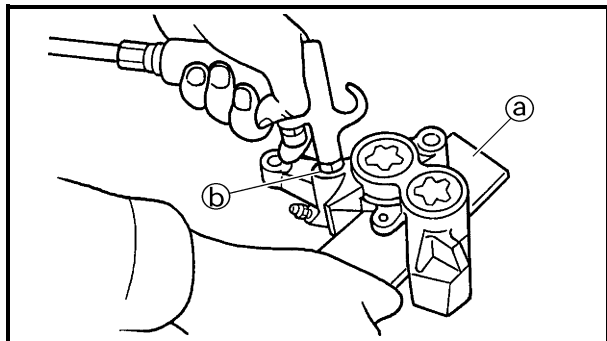
Put the end of the brake hose into a container and pump out the brake fluid carefully.



2. Remove:
  - brake caliper pistons ①
  - brake caliper piston seals ②



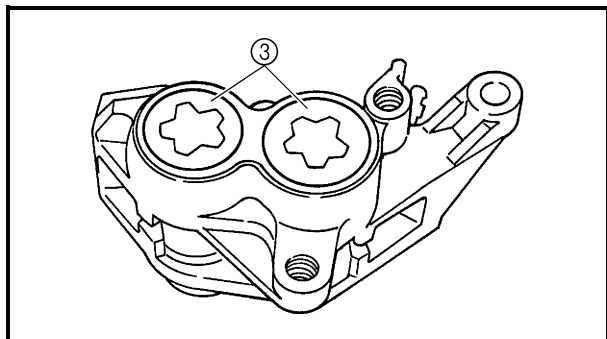
- a. Secure the right side brake caliper pistons with a piece of wood ③.
- b. Blow compressed air into the brake hose joint opening ④ to force out the left side pistons from the brake caliper.



**⚠ WARNING** \_\_\_\_\_

- Never try to pry out the brake caliper pistons.
- Do not loosen the bolts ③.

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

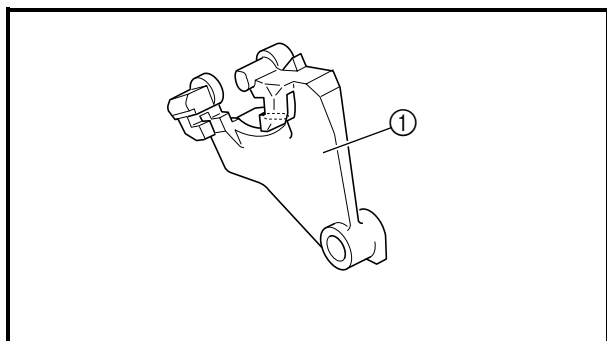
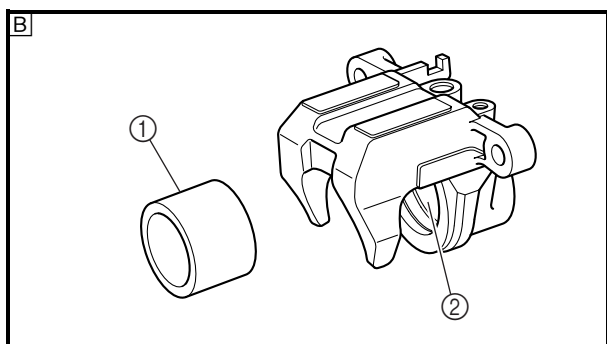
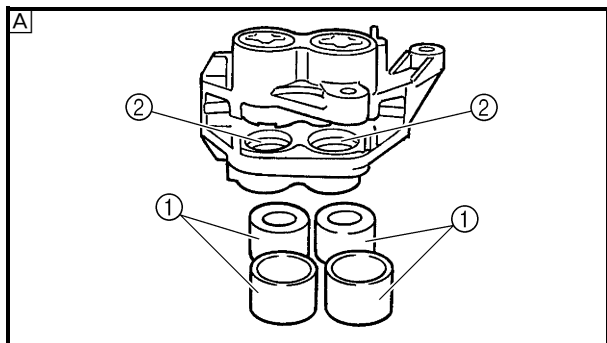




EAS00633

## 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.**

Ⓐ Front

Ⓑ Rear

### 2. Check:

- rear brake caliper bracket ①  
Cracks/damage → Replace.



EAS00638

### ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

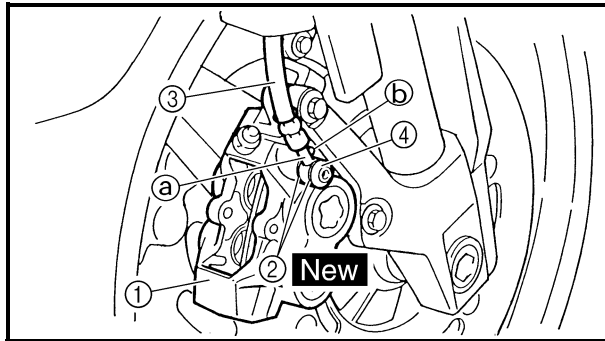
The following procedure applies to both of the brake calipers.

#### ⚠ 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.



Recommended brake fluid  
DOT 4



1. Install:

- brake caliper ① (temporarily)
- copper washers ② **New**
- brake hose ③
- union bolt ④  32 Nm (3.2 m • kg, 23 ft • lb)

#### ⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING” in chapter 2.

#### 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.

2. Remove:


- brake caliper



3. Install:
  - brake pads
  - brake pad spring
  - brake caliper bolt

 40 Nm (4.0 m • kg, 29 ft • lb)

- brake hose holder

 8 Nm (0.8 m • kg, 5.8 ft • lb)

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



**Recommended brake fluid  
DOT 4**

#### **⚠ WARNING**

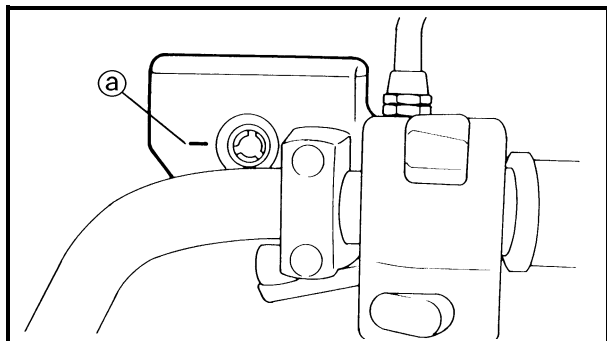
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

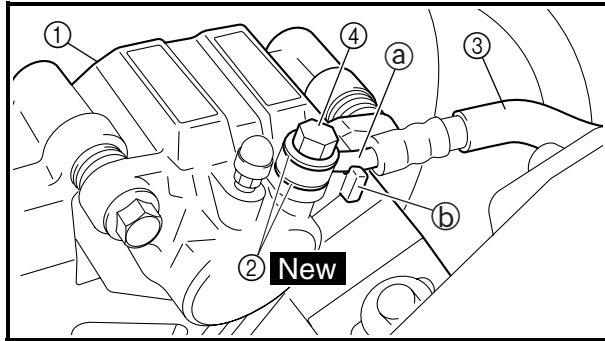
### ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER

#### **⚠ 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 ① (temporarily)
- copper washers ② **New**
- brake hose ③
- union bolt ④

30 Nm (3.0 m • kg, 22 ft • lb)

**⚠ WARNING**

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to “CABLE ROUTING” in chapter 2.

**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.

## 2. Remove:

- brake caliper

## 3. Install:

- brake pad springs
- brake pad
- brake caliper
- brake caliper retaining bolts

27 Nm (2.7 m • kg, 19 ft • lb)



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



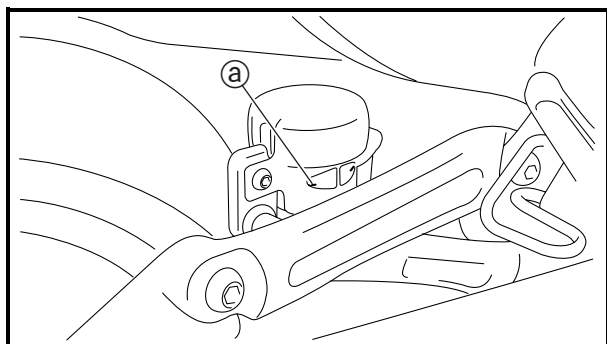
**Recommended brake fluid  
DOT 4**

#### **⚠ 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:**

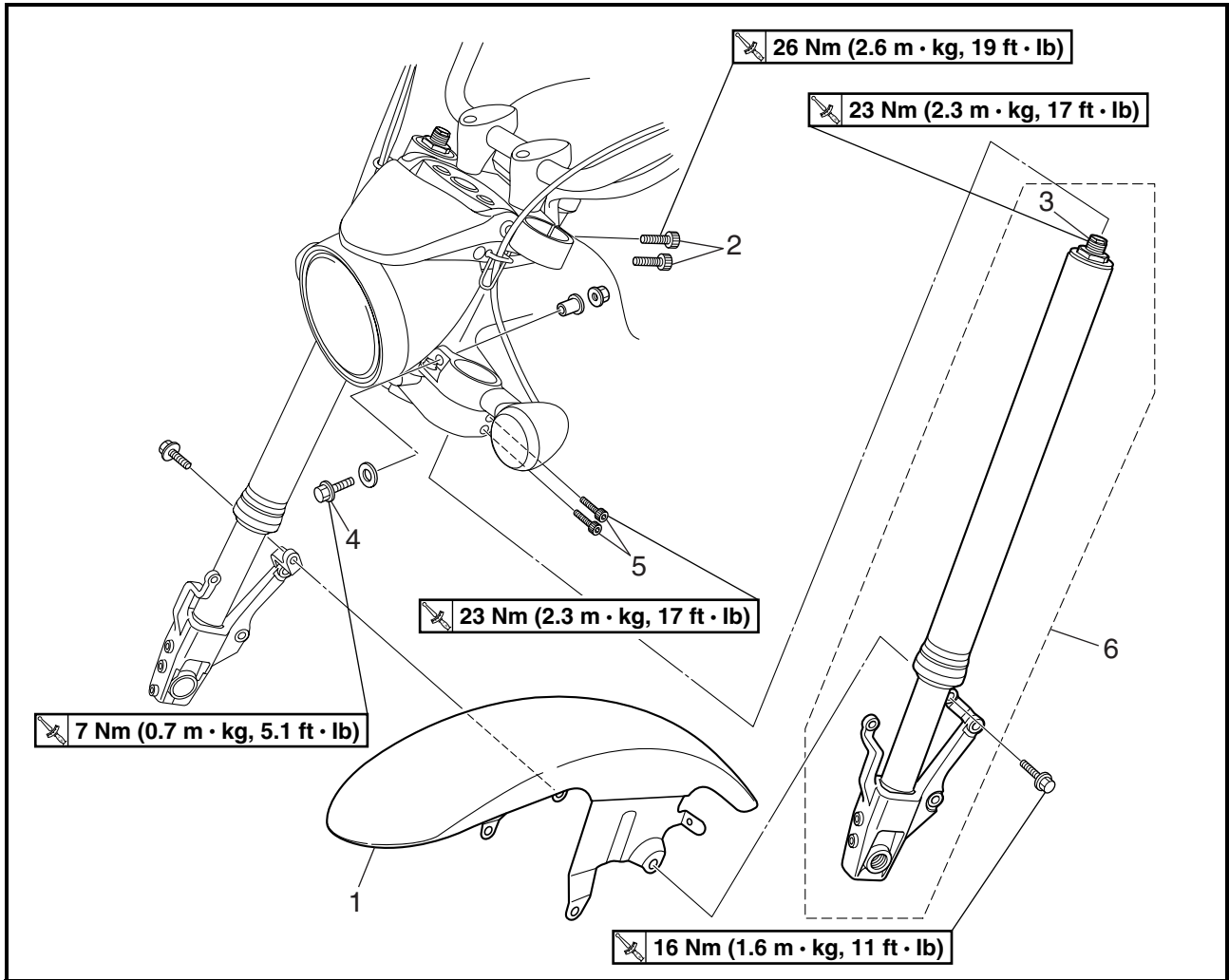
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**



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

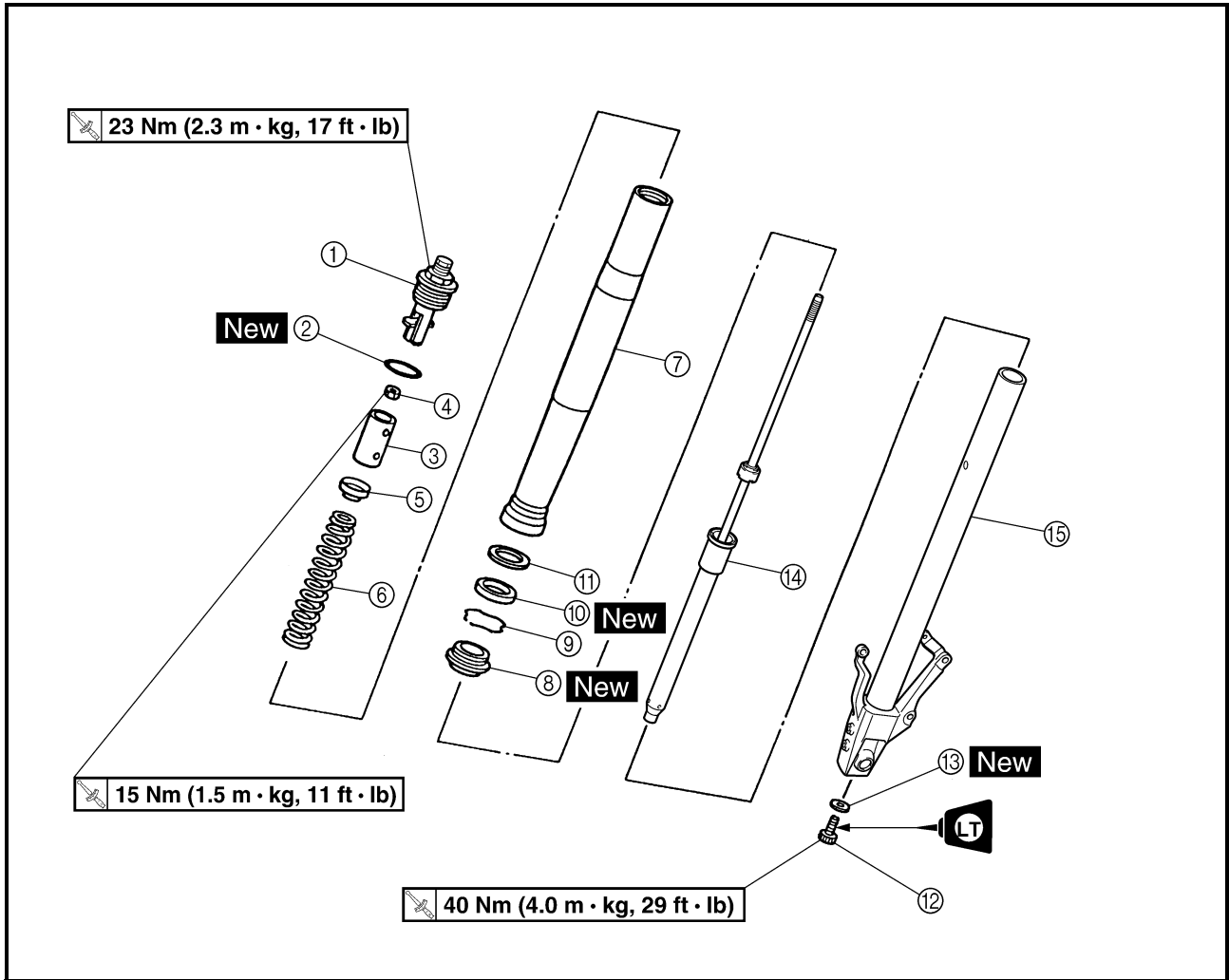
EAS00647

FRONT FORK

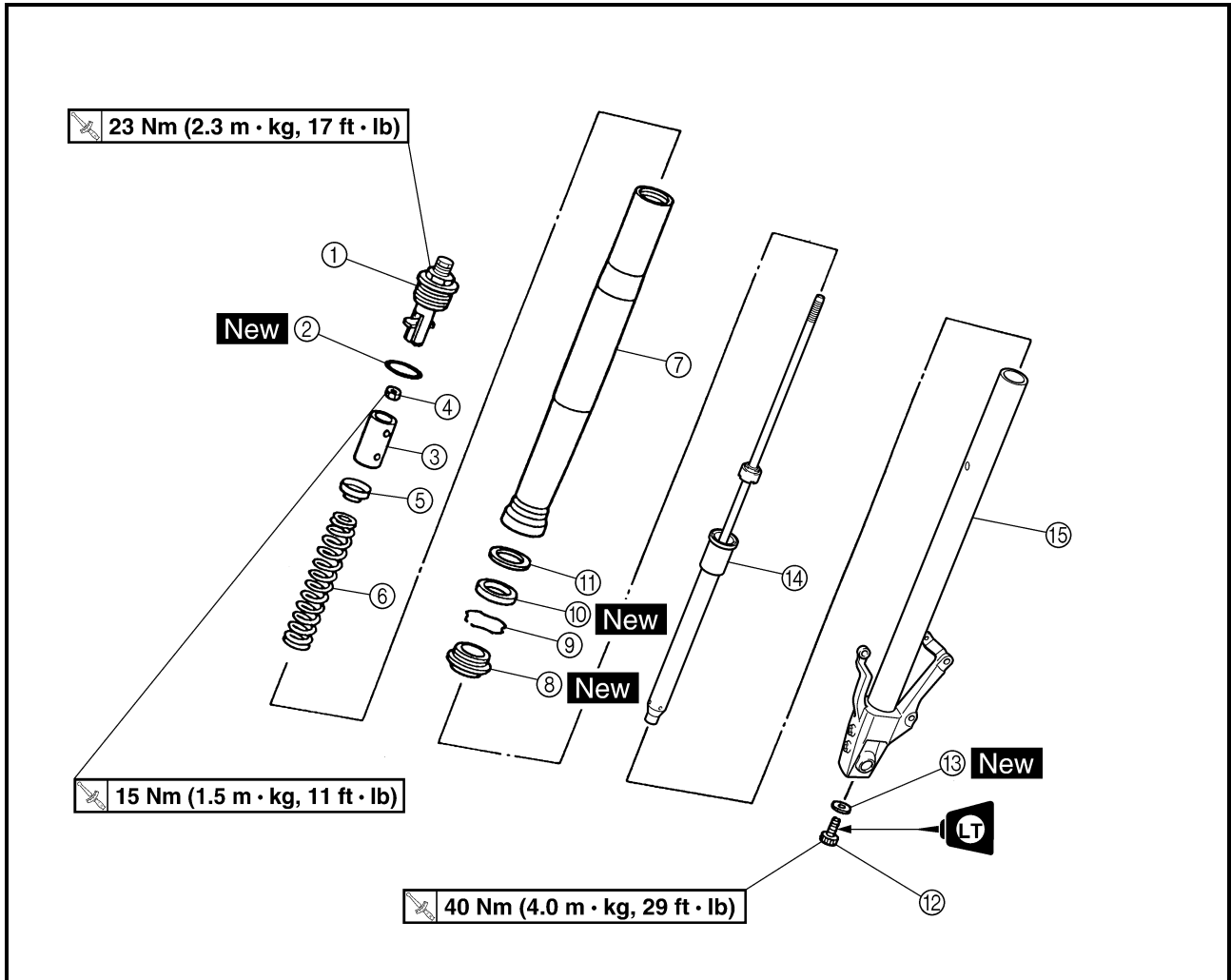


Order	Job/Part	Q'ty	Remarks
	<b>Removing the front fork legs</b>		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
1	Front fender	1	Loosen. } Refer to "REMOVING THE Loosen. } FRONT FORK LEGS" and Loosen. } "INSTALLING THE FRONT Loosen. } FORK LEGS".
2	Upper bracket pinch bolt	2	
3	Cap bolt	1	
4	Turn signal light bracket pinch bolt	1	
5	Lower bracket pinch bolt	2	
6	Front fork leg	1	
			For installation, reverse the removal procedure.

EAS00648



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the front fork legs</b>		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
①	Cap bolt	1	Refer to "DISASSEMBLING THE FRONT FORK LEGS" and "ASSEMBLING THE FRONT FORK LEGS".
②	O-ring	1	
③	Spacer	1	
④	Nut	1	
⑤	Spring seat	1	
⑥	Fork spring	1	
⑦	Outer tube	1	
⑧	Dust seal	1	



Order	Job/Part	Q'ty	Remarks
⑨	Oil seal clip	1	Refer to "DISASSEMBLING THE FRONT FORK LEGS" and "ASSEMBLING THE FRONT FORK LEGS".
⑩	Oil seal	1	
⑪	Washer	1	
⑫	Damper rod assembly bolt	1	
⑬	Copper washer	1	
⑭	Damper rod assembly	1	
⑮	Inner tube	1	For assembly, reverse the disassembly procedure.



EAS00649

**REMOVING THE FRONT FORK LEGS**

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

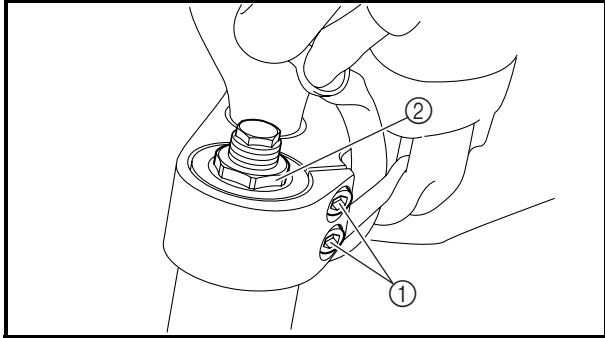
1. Stand the motorcycle on a level surface.

**⚠ WARNING**

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

**NOTE:**

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

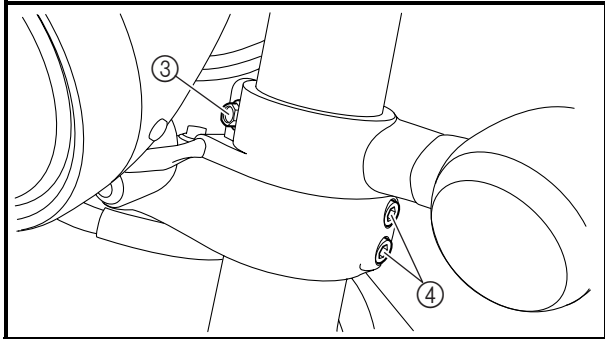


2. Loosen:

- upper bracket pinch bolts ①
- cap bolt ②
- turn signal light bracket pinch bolt ③
- lower bracket pinch bolts ④

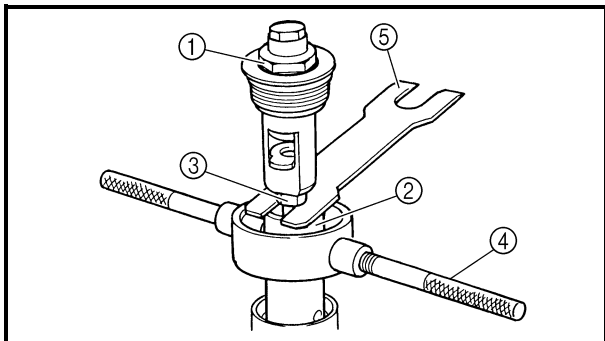
**⚠ WARNING**

**Before loosening the upper and lower bracket pinch bolts and turn signal light bracket pinch bolt, support the front fork leg.**



3. 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 ①  
(from the damper rod)
- spacer ②
- nut ③

- a. Press down on the spacer with the fork spring compressor ④.
- b. Install the rod holder ⑤ between the nut ③ and the spacer ②.



**Fork spring compressor  
YM-01441  
Rod holder  
YM-01434**



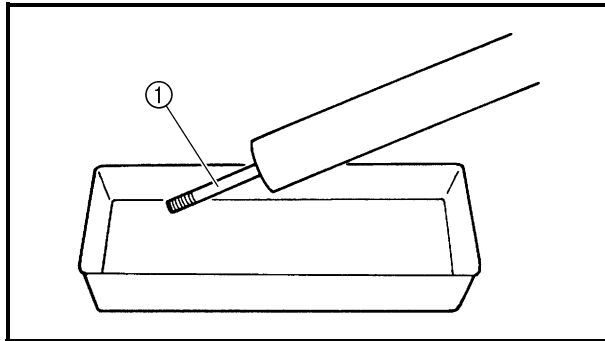
**NOTE:** \_\_\_\_\_  
Use the side of the rod holder that is marked "B".

- c. Loosen the nut.
- d. Remove the cap bolt.
- e. Remove the rod holder and fork spring compressor.

**⚠ WARNING** \_\_\_\_\_

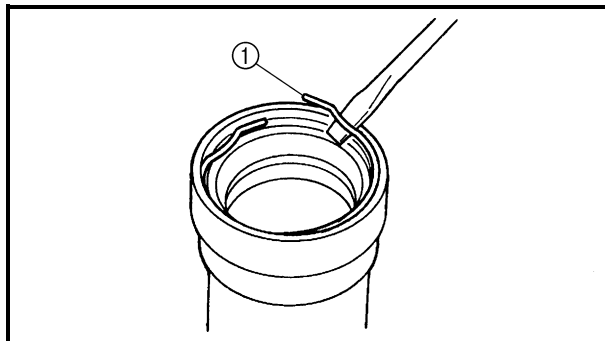
**The fork spring is compressed.**

- f. Remove the spacer and nut.



- 2. Drain:
  - fork oil

**NOTE:** \_\_\_\_\_  
Stroke the damper rod ① several times while draining the fork oil.

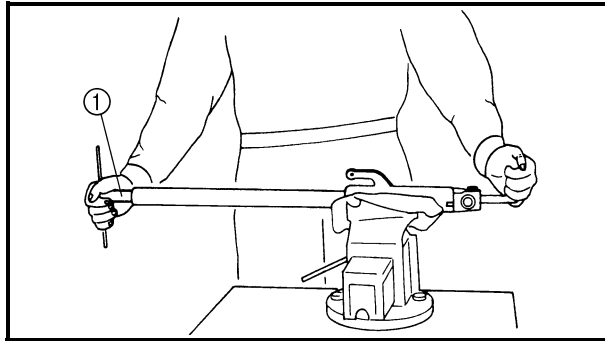


- 3. Remove:
  - dust seal
  - oil seal clip ①
  - oil seal
  - washer  
(with a flat-head screwdriver)

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

**Do not scratch the inner tube.**





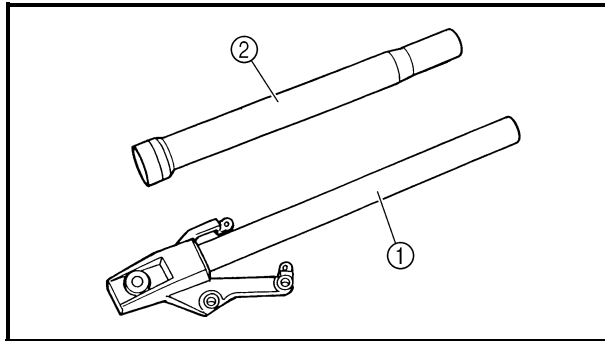
4. Remove:
- damper rod assembly bolt
  - copper washer

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

While holding the damper rod with the damper rod holder ①, loosen the damper rod assembly bolt.



**Damper rod holder**  
**YM-01423**



EAS00657

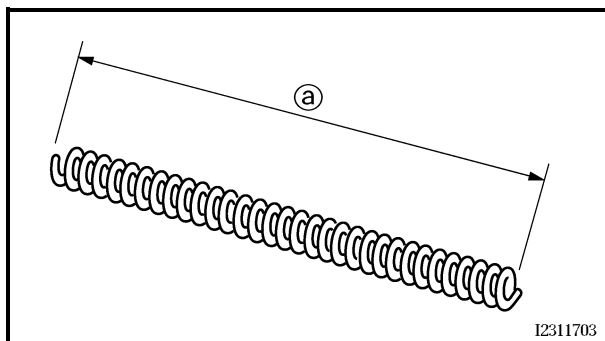
**CHECKING THE FRONT FORK LEGS**

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.**

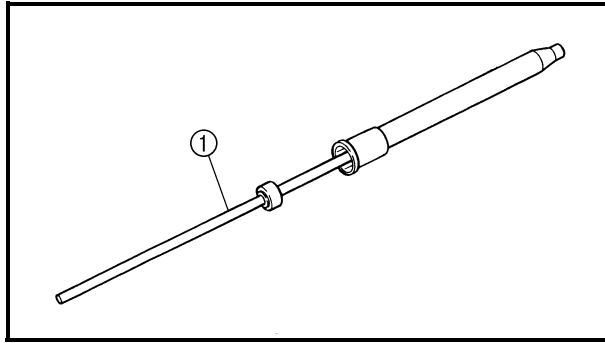


I2311703

2. Measure:
- spring free length ③
- Out of specification → Replace.



**Spring free length**  
**296 mm (11.65 in)**  
**<Limit>: 291 mm (11.46 in)**

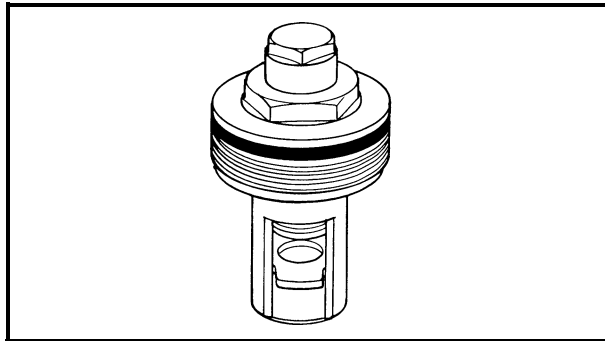


## 3. Check:

- damper rod ①  
Damage/wear → Replace.  
Obstruction → Blow out all of the oil passages with compressed air.

**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 O-ring  
Damage/wear → Replace.



EAS00660

**ASSEMBLING THE FRONT FORK LEGS**

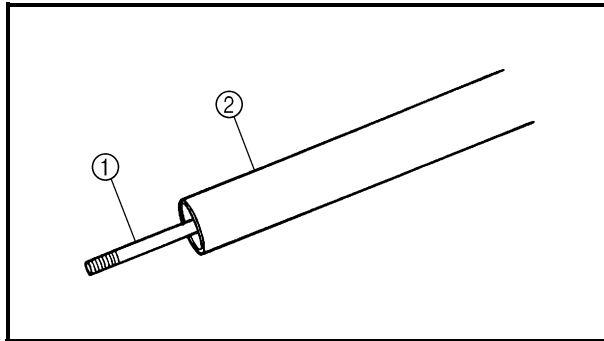
The following procedure applies to both of the front fork legs.

**⚠ 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:**

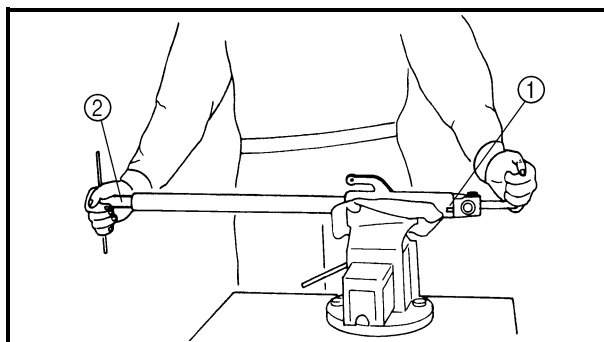
- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure all of the components are clean.




1. Install:
  - damper rod assembly ①

**CAUTION:**

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



2. Tighten:
  - damper rod assembly bolt ①

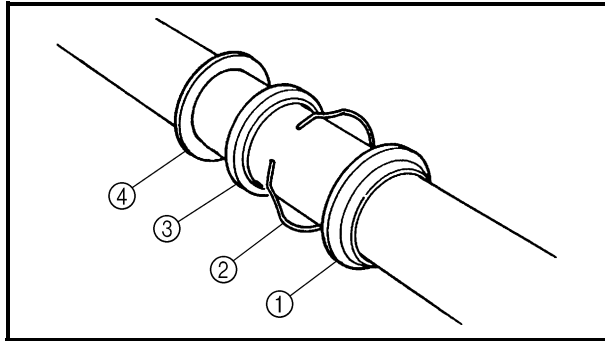
 **40 Nm (4.0 m • kg, 29 ft • lb)**

**NOTE:**

While holding the damper rod assembly with the damper rod holder ②, tighten the damper rod assembly bolt.



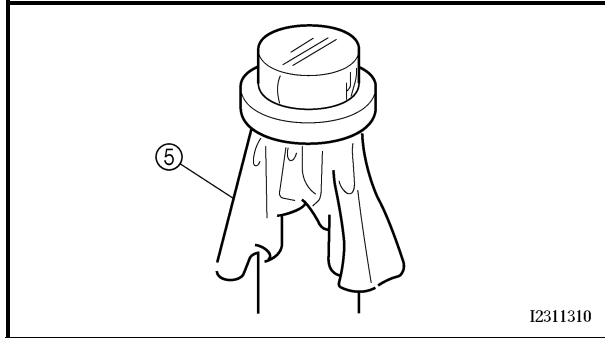
**Damper rod holder  
YM-01423**



3. Install:
- dust seal ①
  - oil seal clip ②
  - oil seal ③
  - washer ④

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

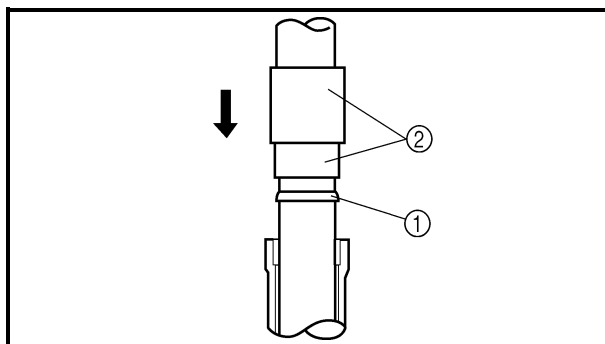
**Make sure the numbered side of the oil seal faces down.**



**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 ⑤ to protect the oil seal during installation.

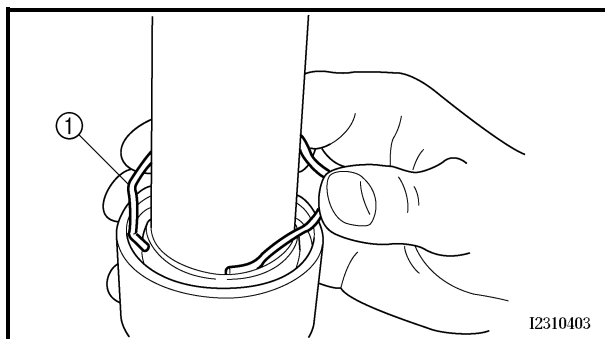
4. Install:
- outer tube  
(onto the inner tube)



5. Install:
- washer
  - oil seal ①  
(with the fork seal driver ②)



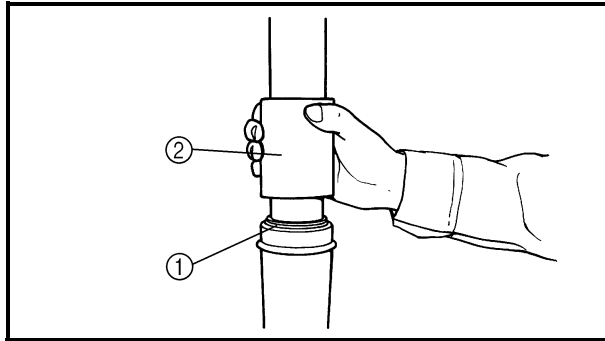
**Fork seal driver  
YM-01442**



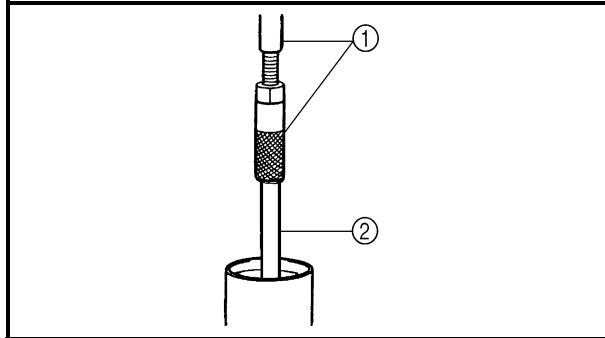
6. Install:
- oil seal clip ①

**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 ②)



8. Install:
- rod puller ①  
(onto the damper rod ②)



**Rod puller**  
**YM-01437**

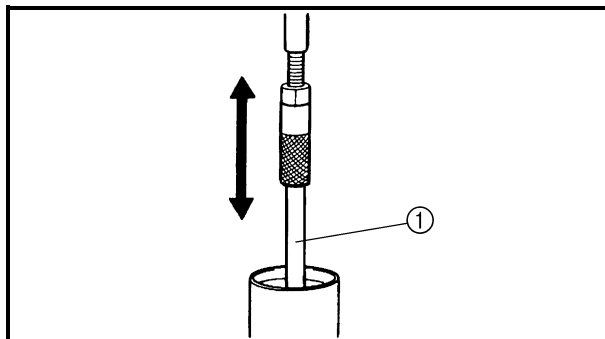
9. Fully compress the front fork leg.  
10. Fill:
- front fork leg  
(with the specified amount of the recommended fork oil)



**Quantity (each front fork leg)**  
**476 cm<sup>3</sup> (16.8 Imp qt, 16.1 US qt)**  
**Recommended oil**  
**Yamaha suspension oil "01"**

**CAUTION:**

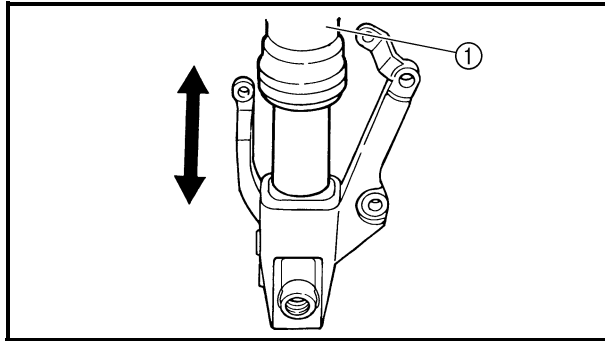
- Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.
- When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.



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

**NOTE:**

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



12. Slowly stroke the outer tube ① up and down to distribute the fork oil once more (1 stroke = about 150 mm (8.12 in)).

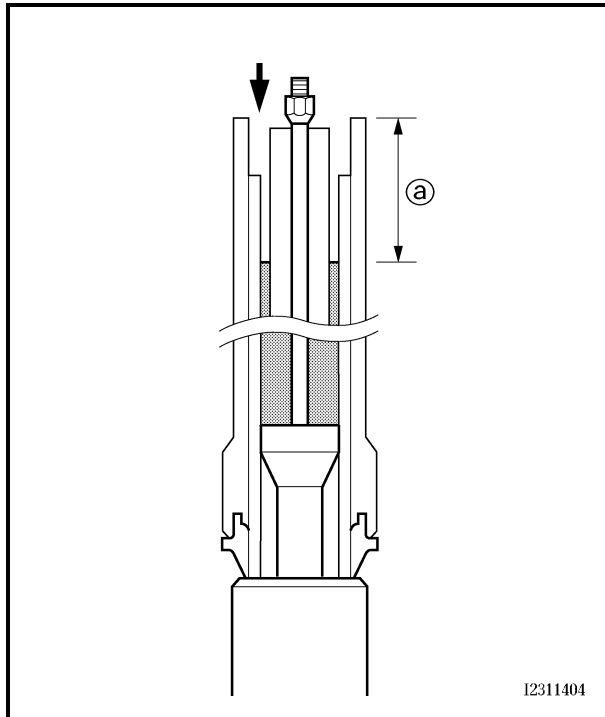
**NOTE:**

Be careful not to stroke the outer tube over 150 mm (8.12 in) as this will cause air to enter. If the outer tube is stroke more than 150 mm (8.12 in), repeat steps (11) and (12).

13. 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.



14. Measure:

- front fork leg oil level ②  
Out of specification → Correct.



**Front fork leg oil level (from the top of the outer tube and damper rod, with the outer tube fully compressed, and without the spring) 100 mm (3.94 in)**



k. Remove the rod holder and fork spring compressor.

**CAUTION:**

**The fork spring is compressed.  
Always use a new cap bolt O-ring.**

16. Install:
- cap bolt  
(onto the outer tube)

**NOTE:**  
Temporary tighten the cap bolt.

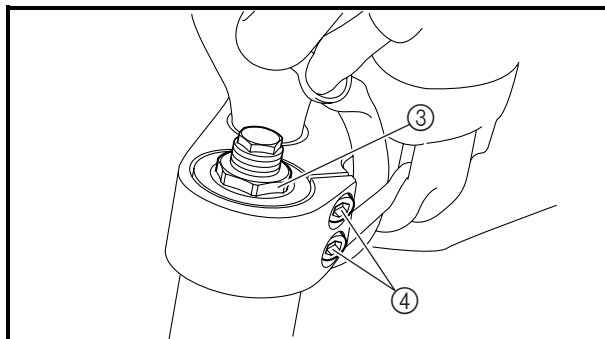
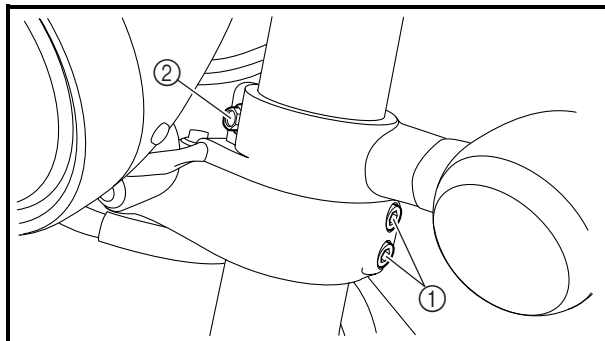
EAS00662

**INSTALLING THE FRONT FORK LEGS**

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

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

**NOTE:**  
Make sure the outer fork tube is flush with the top of the upper bracket.



2. Tighten:
- lower bracket pinch bolts ①  
**23 Nm (2.3 m • kg, 17 ft • lb)**
  - turn signal light bracket pinch bolt ②  
**7 Nm (0.7 m • kg, 5.1 ft • lb)**
  - cap bolt ③  
**23 Nm (2.3 m • kg, 17 ft • lb)**
  - upper bracket pinch bolts ④  
**26 Nm (2.6 m • kg, 19 ft • lb)**

**WARNING**

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





3. Adjust:

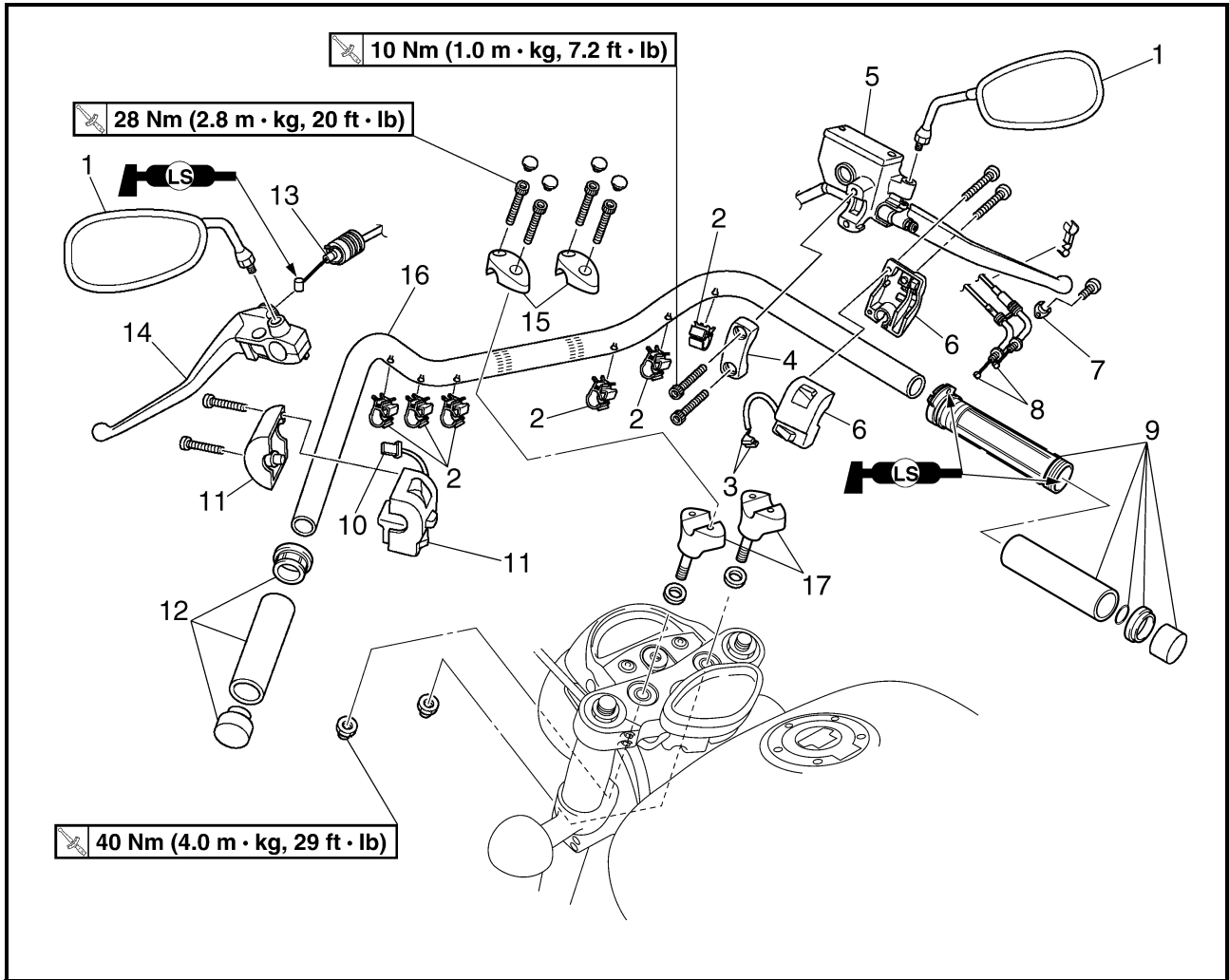
- spring preload

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

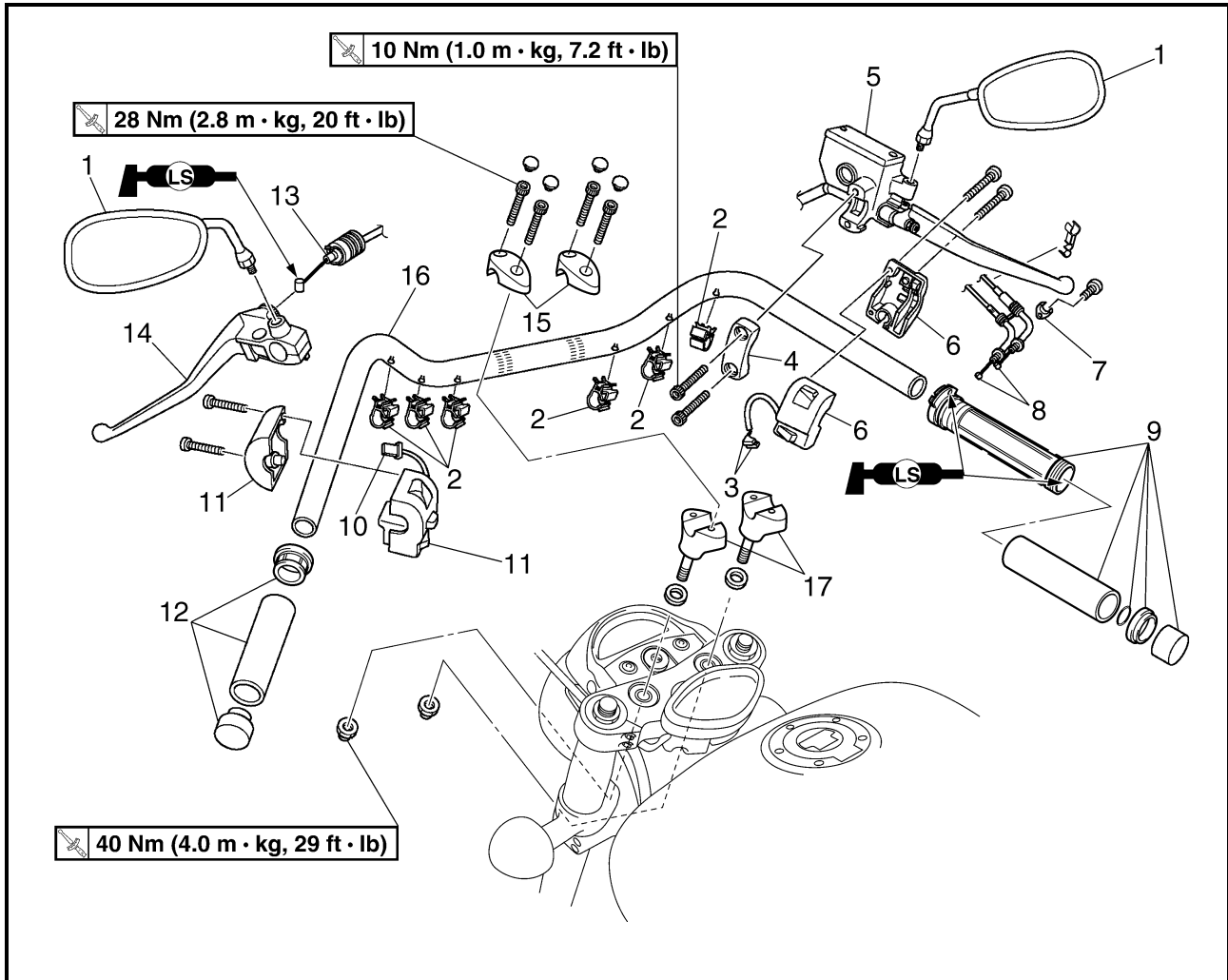


EAS00664

HANDLEBAR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the handlebar</b>		Remove the parts in the order listed.
1	Rear view mirror (left and right)	2	Disconnect.  Refer to "INSTALLING THE HANDLEBAR".  Disconnect.
2	Plastic clamp	6	
3	Front brake light switch connector	2	
4	Brake master cylinder holder	1	
5	Brake master cylinder	1	
6	Right handlebar switch	1	
7	Throttle cable holder	1	
8	Throttle cable	2	
9	Throttle grip	1	
10	Clutch switch coupler	1	



Order	Job/Part	Q'ty	Remarks
11	Left handlebar switch	1	Refer to "REMOVING THE HANDLEBAR". Refer to "INSTALLING THE HANDLEBAR".
12	Handlebar grip	1	
13	Clutch cable	1	
14	Clutch lever holder	1	
15	Upper handlebar holder	2	
16	Handlebar	1	
17	Lower handlebar holder	2	
			For installation, reverse the removal procedure.



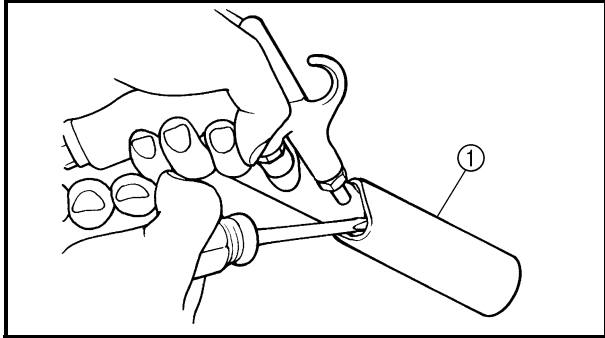
EAS00666

**REMOVING THE HANDLEBAR**

1. Stand the motorcycle on a level surface.

**⚠ WARNING**

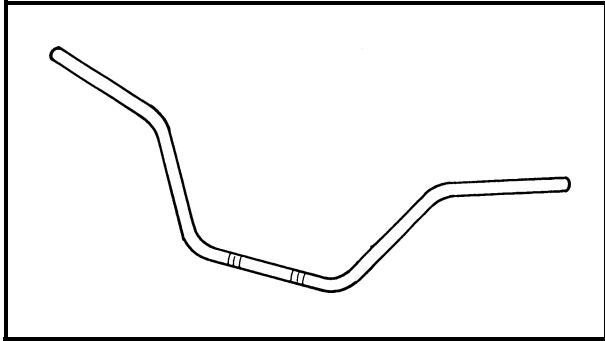
**Securely support the motorcycle so that there is no danger of it falling over.**



2. Remove:
  - handlebar grip ①

**NOTE:**

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



EAS00668

**CHECKING THE HANDLEBAR**

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

**⚠ WARNING**

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

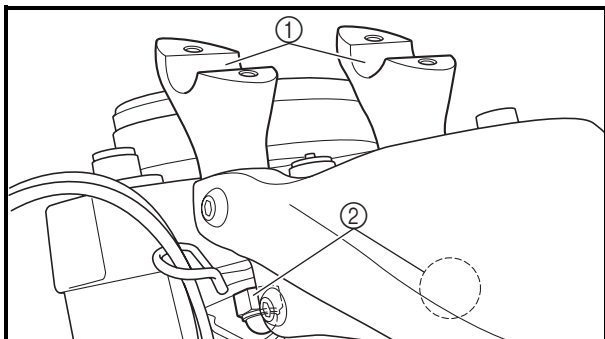
EAS00670

**INSTALLING THE HANDLEBAR**

1. Stand the motorcycle on a level surface.

**⚠ WARNING**

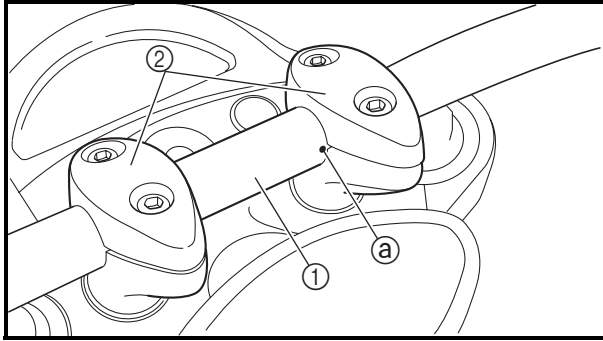
**Securely support the motorcycle so that there is no danger of it falling over.**



2. Install:
  - washers
  - lower handlebar holders ①

**NOTE:**

Temporarily tighten the nuts ②.



## 3. Install:

- handlebar ①
- upper handlebar holders ②

28 Nm (2.8 m • kg, 20 ft • lb)

**CAUTION:**

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

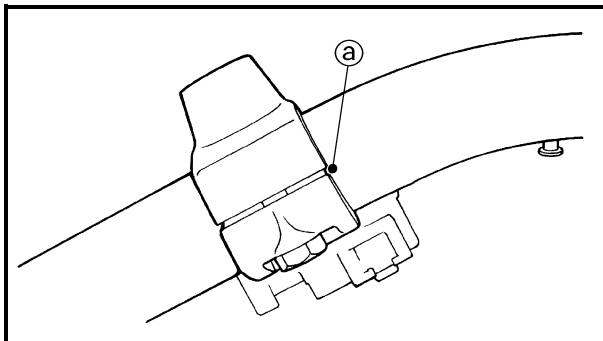
**NOTE:**

Align the match marks ② on the handlebar with the upper surface of the lower handlebar holder.

## 4. Tighten:

- lower handlebar holder nuts

40 Nm (4.0 m • kg, 29 ft • lb)



## 5. Install:

- clutch lever holder

**NOTE:**

Align the slit of clutch lever holder with the punch mark ② on the handlebar.

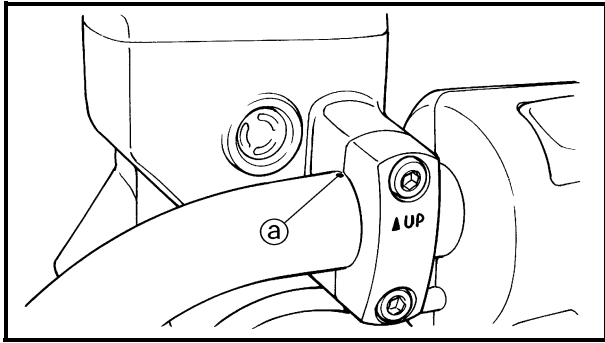
## 6. Install:

- clutch cable

**NOTE:**

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





## 13.Install:

- brake master cylinder
- brake master cylinder holder

10 Nm (1.0 m • kg, 7.2 ft • lb)

**NOTE:**

- Install the brake master cylinder holder with the “UP” mark facing up.
- Align the end of the brake master cylinder holder with the punch mark ① in the handlebar.
- First, tighten the upper bolt, then the lower bolt.

## 14.Connect:

- front brake light switch connectors

## 15.Install:

- plastic clamps

**NOTE:**

Refer to “CABLE ROUTING” in chapter 2.

## 16.Adjust:

- clutch cable free play

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



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

10 ~ 15 mm (0.39 ~ 0.59 in)

## 17.Adjust:

- throttle cable free play

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



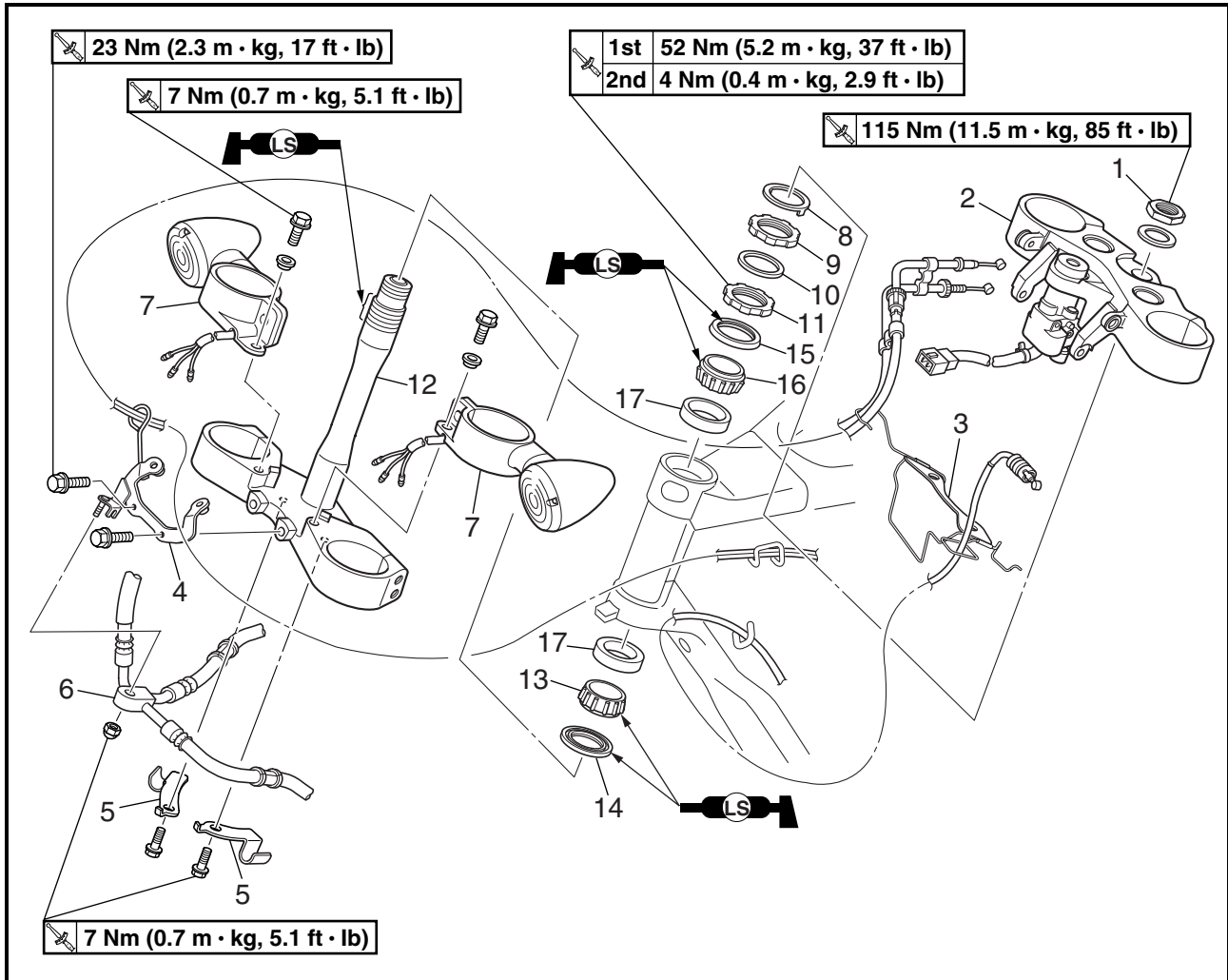
**Throttle cable free play (at the flange of the throttle grip)**

4 ~ 6 mm (0.16 ~ 0.24 in)



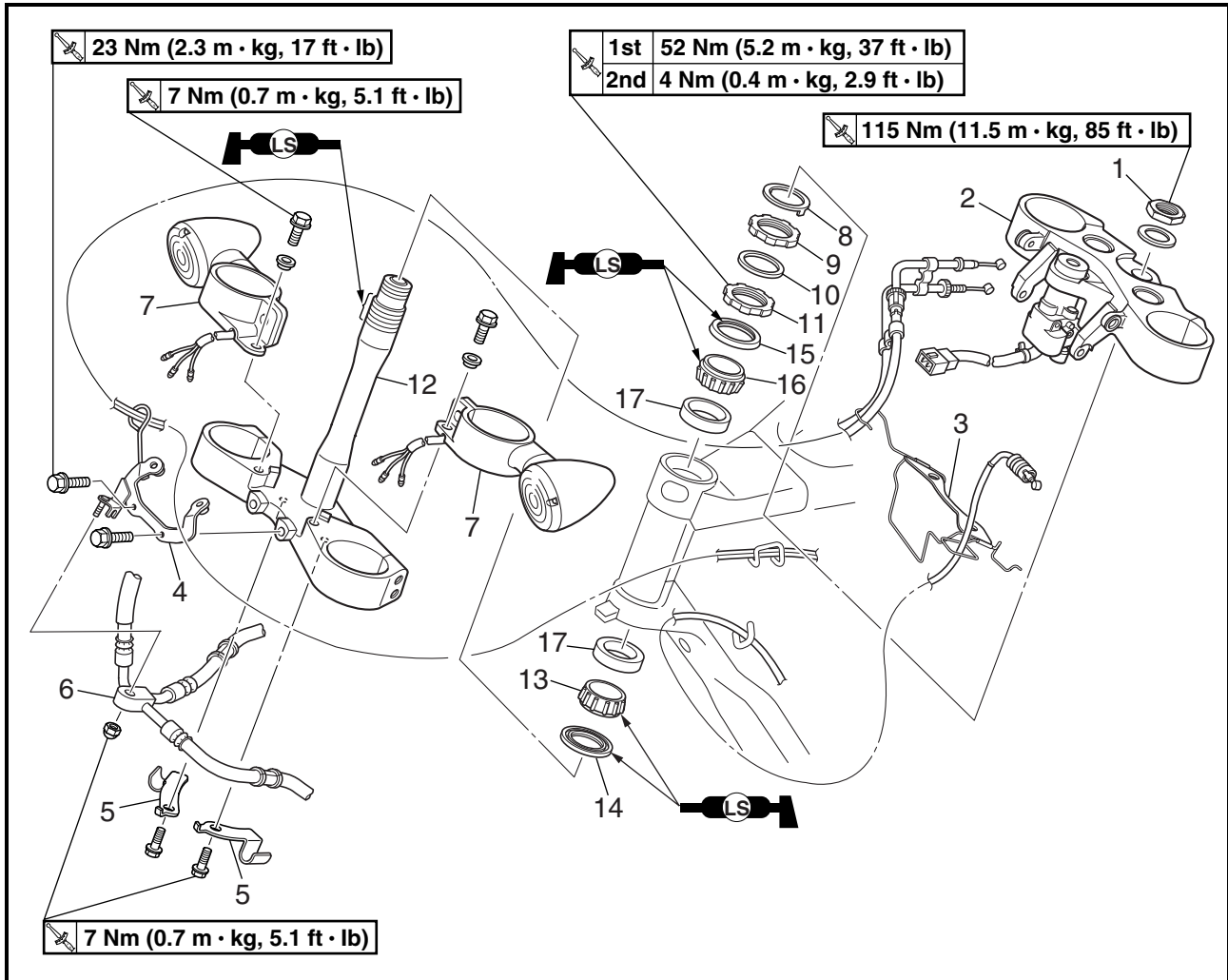
EAS00676

STEERING HEAD

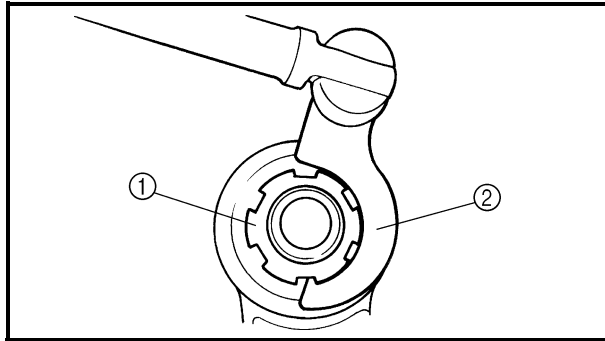


Order	Job/Part	Q'ty	Remarks
	<b>Removing the lower bracket</b>		Remove the parts in the order listed.
	Handlebar/handlebar holders		Refer to "HANDLEBAR".
	Meter assemblies		Refer to "HEADLIGHT AND METER ASSEMBLIES" in chapter 3.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front fork legs		Refer to "FRONT FORK".
1	Steering stem nut	1	Refer to "INSTALLING THE STEERING HEAD".
2	Upper bracket	1	
3	Cable guide	1	
4	Headlight bracket	1	
5	Brake hose bracket	2	
6	Brake hose joint	1	
7	Turn signal light bracket assembly	2	





Order	Job/Part	Q'ty	Remarks
8	Lock washer	1	Refer to "REMOVING THE LOWER BRACKET". Refer to "INSTALLING THE STEERING HEAD". For installation, reverse the removal procedure.
9	Upper ring nut	1	
10	Rubber washer	1	
11	Lower ring nut	1	
12	Lower bracket	1	
13	Lower bearing	1	
14	Lower bearing cover	1	
15	Upper bearing cover	1	
16	Upper bearing	1	
17	Bearing outer race	1	



EAS00677

**REMOVING THE LOWER BRACKET**

1. Stand the motorcycle on a level surface.

**⚠ WARNING**

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

2. Remove:

- ring nut ①  
(with the spanner wrench ②)



**Spanner wrench  
YU-33975**

**⚠ WARNING**

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

EAS00681

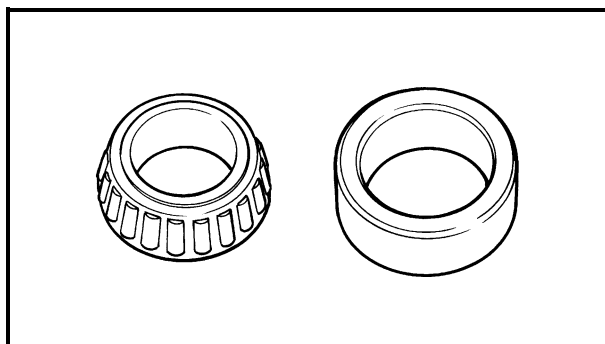
**CHECKING THE STEERING HEAD**

1. Wash:

- bearings
- bearing races

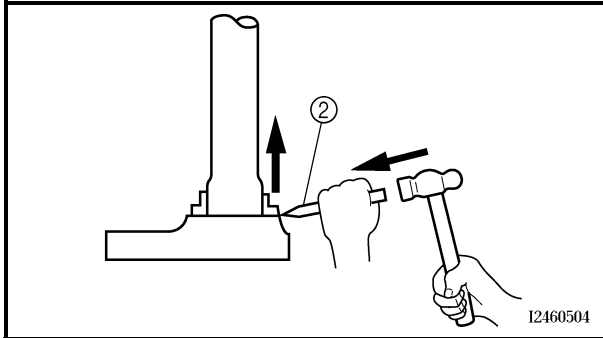
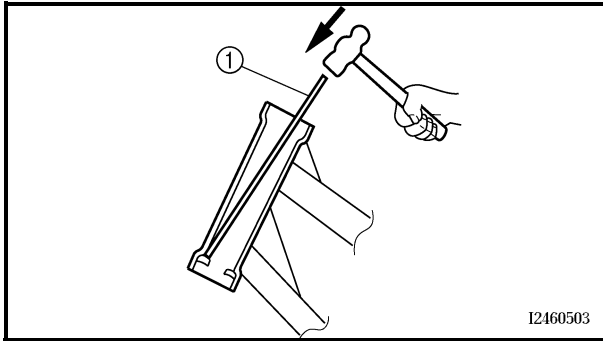


**Recommended cleaning solvent  
Kerosene**



2. Check:

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



- 3. Replace:
  - bearings
  - bearing races

- 
- a. Remove the bearing races from the steering head pipe with a long rod (1) and hammer.
  - b. Remove the bearing race from the lower bracket with a floor chisel (2) and hammer.
  - c. Install a new rubber seal and new bearing races.

**CAUTION:**

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

**NOTE:**

- Always replace the bearings and bearing races as a set.
- Whenever the steering head is disassembled, replace the rubber seal.

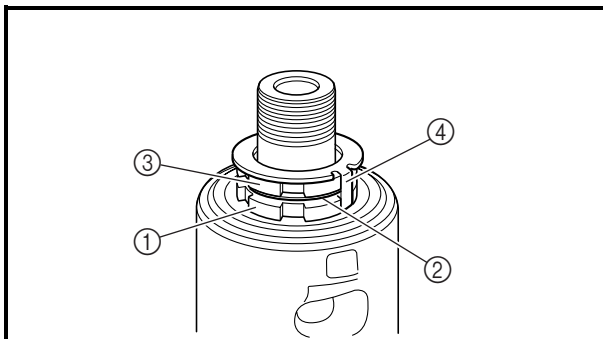
- 
4. Check:
- upper bracket
  - lower bracket (along with the steering stem)
- Bends/cracks/damage → Replace.

EAS00683

**INSTALLING THE STEERING HEAD**

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

	<b>Recommended lubricant</b> Lithium-soap-based grease
---	---



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

Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” in chapter 3.



3. Install:
  - upper bracket
  - steering stem nut

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


---

4. Install:
  - front fork legsRefer to “FRONT FORK”.

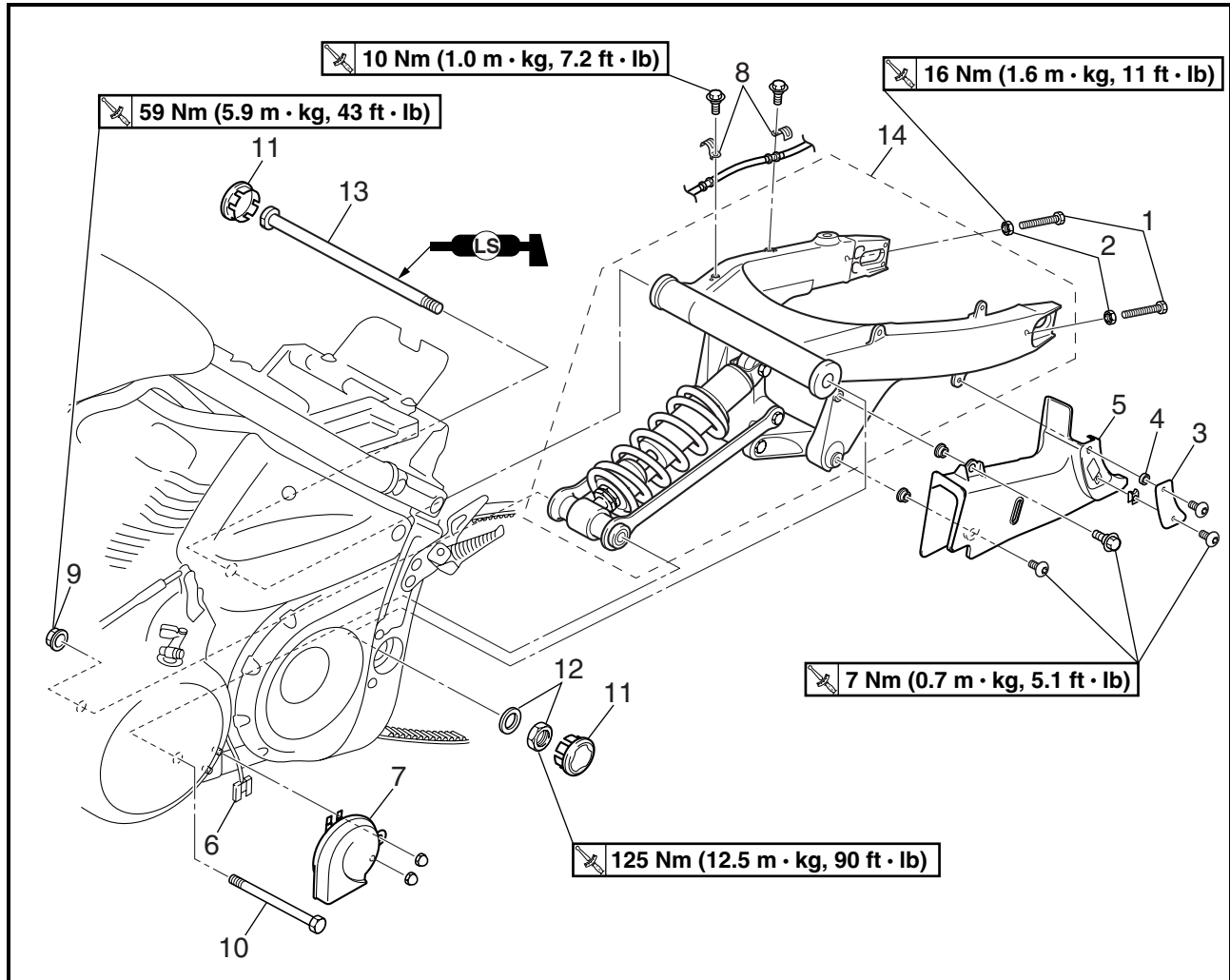
**NOTE:** \_\_\_\_\_  
Temporarily tighten the lower bracket pinch bolts.

---

5. Tighten:
  - steering stem nut

 **115 Nm (11.5 m • kg, 85 ft • lb)**

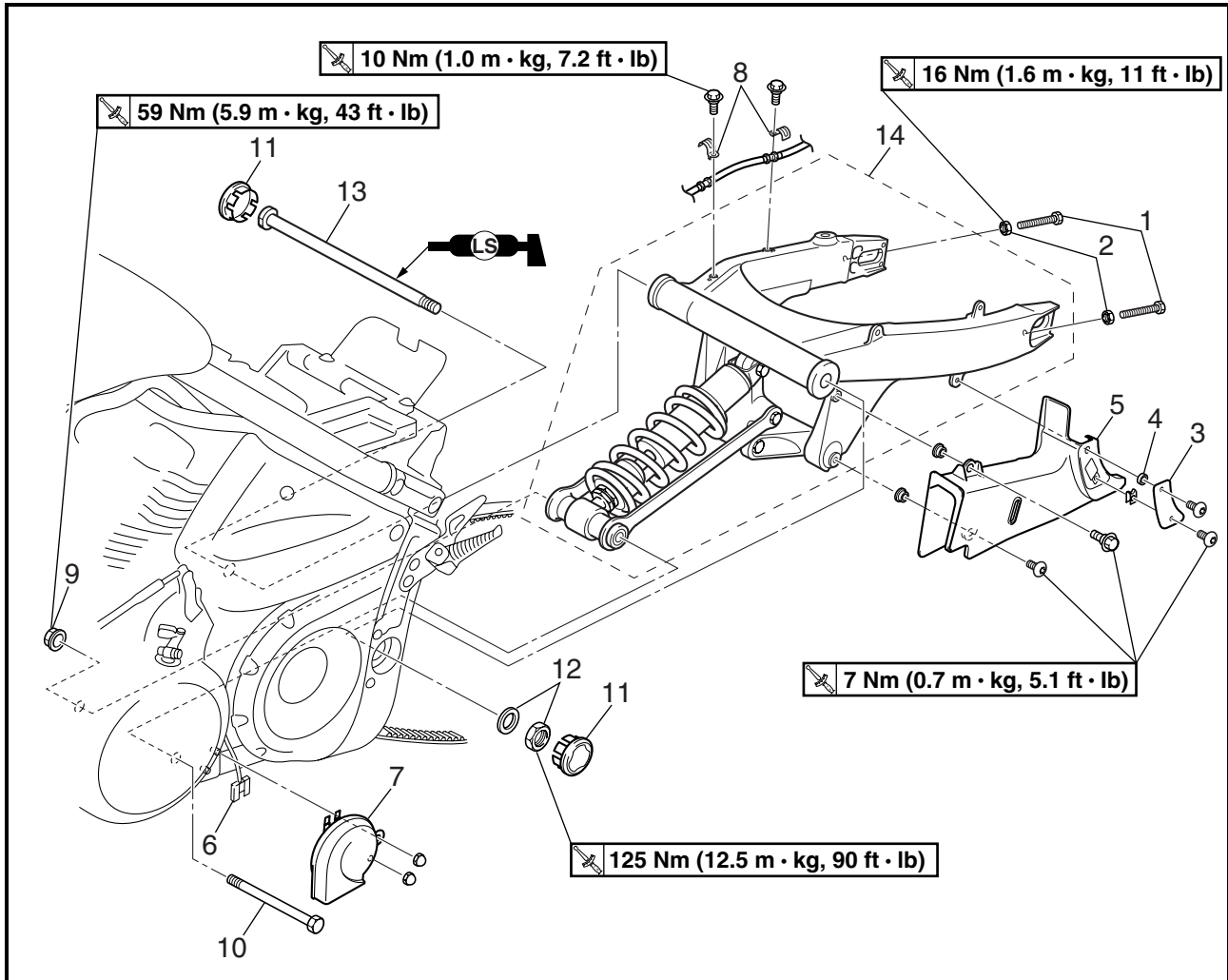
REAR SHOCK ABSORBER AND SWINGARM



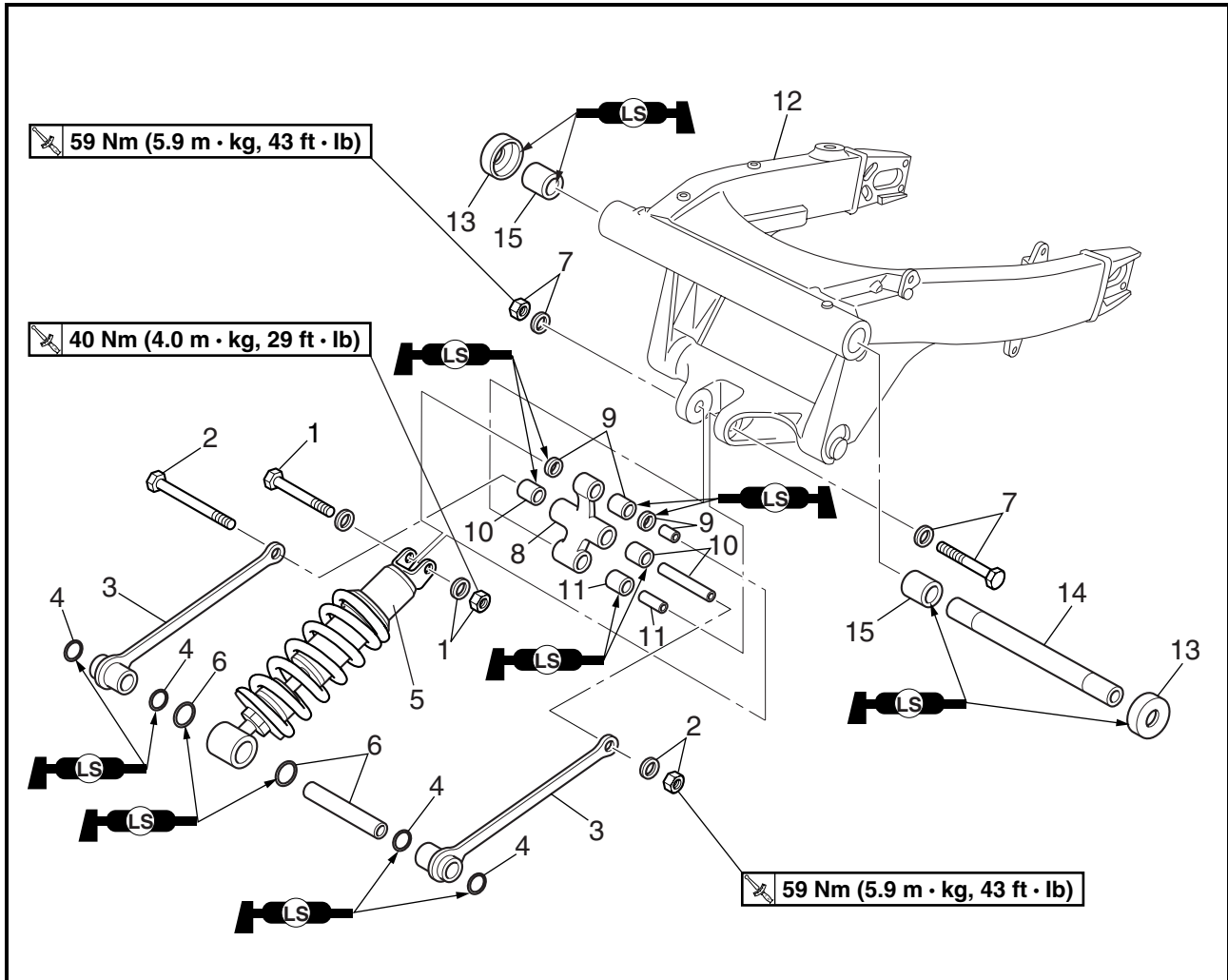
Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear shock absorber and swingarm</b>		Remove the parts in the order listed.
	Rear brake master cylinder bracket		Refer to "FRONT AND REAR BRAKES".
	Rear exhaust pipe		Refer to "ENGINE" in chapter 5.
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY".
1	Adjusting bolt	2	
2	Locknut	2	
3	Lower drive belt cover plate	1	
4	Spacer	1	
5	Lower drive belt cover	1	
6	Horn 2 coupler	1	Disconnect.
7	Horn 2	1	

# REAR SHOCK ABSORBER AND SWINGARM

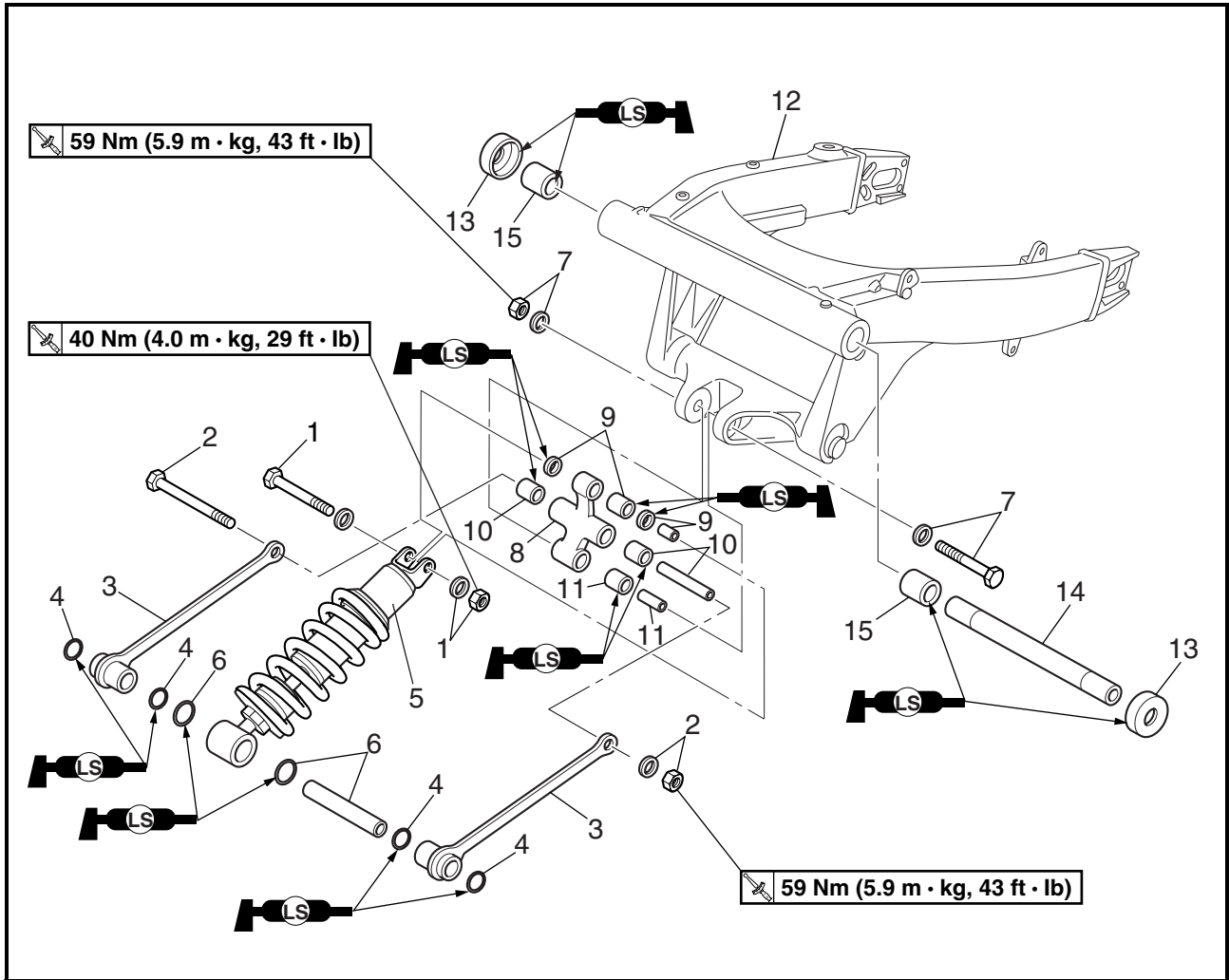
**CHAS**



Order	Job/Part	Q'ty	Remarks
8	Brake hose holder	2	Refer to "REMOVING THE REAR SHOCK ABSORBER AND SWINGARM" and "INSTALLING THE REAR SHOCK ABSORBER AND SWINGARM".
9	Self-locking nut	1	
10	Bolt (shock absorber-connecting arm-frame)	1	
11	Cover (left and right)	2	
12	Pivot shaft nut/washer	1/1	
13	Pivot shaft	1	
14	Rear shock absorber and swingarm assembly	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear shock absorber and swingarm</b>		Remove the parts in the order listed.
1	Self-locking nut/washer/bolt	1/1/1	Bolt $l = 100$ mm (3.94 in)
2	Self-locking nut/washer/bolt	1/1/1	Bolt $l = 124$ mm (4.88 in)
3	Connecting arm	2	
4	O-ring	4	
5	Rear shock absorber	1	
6	Spacer/O-ring	1/2	
7	Self-locking nut/washer/bolt	1/2/1	Bolt $l = 77$ mm (3.03 in)
8	Relay arm	1	
9	Spacer/oil seal/bearing	1/2/1	Refer to "INSTALLING THE REAR SHOCK ABSORBER AND SWINGARM".
10	Spacer/bearing	1/2	
11	Spacer/bearing	1/1	



Order	Job/Part	Q'ty	Remarks
12	Swingarm	1	For installation, reverse the removal procedure.
13	Dust cover	2	
14	Spacer	1	
15	Bearing	2	





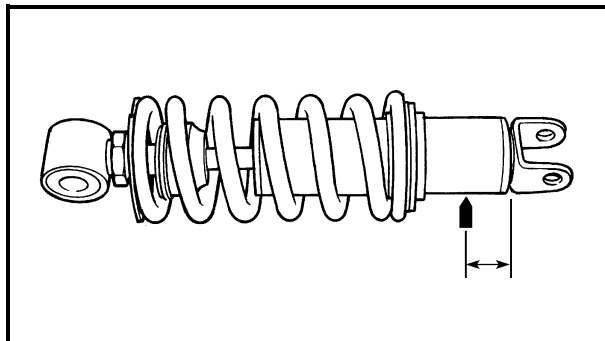
EAS00686

## HANDLING THE REAR SHOCK ABSORBER

### **⚠ WARNING**

This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, 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.

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber 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 in any way. Rear shock absorber damage will result in poor damping performance.



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.



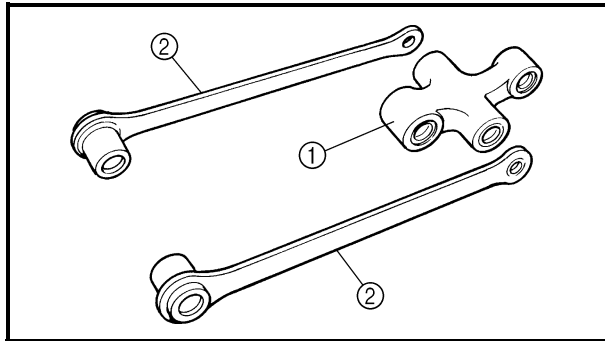


EAS00696

## CHECKING THE REAR SHOCK ABSORBER

### 1. Check:

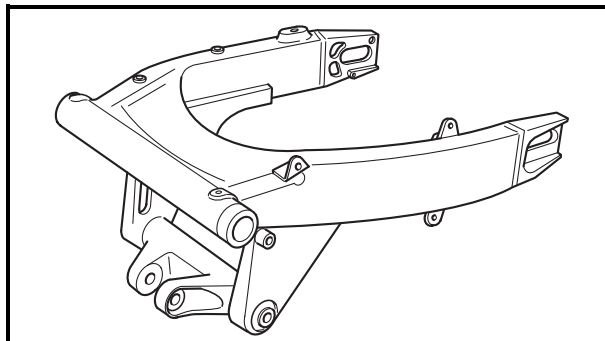
- rear shock absorber rod  
Bends/damage → Replace the rear shock absorber assembly.
- rear shock absorber  
Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- spring  
Damage/wear → Replace the rear shock absorber assembly.
- gas cylinder  
Damage/gas leaks → Replace.
- bushings  
Damage/wear → Replace.
- O-ring  
Damage/wear → Replace.
- bolts  
Bends/damage/wear → Replace.



## CHECKING THE RELAY ARM AND CONNECTING ARM

### 1. Check:

- relay arm ①
- connecting arms ②  
Damage/wear → Replace.
- bearings
- oil seals  
Damage/pitting → Replace.
- spacers  
Damage/scratches → Replace.



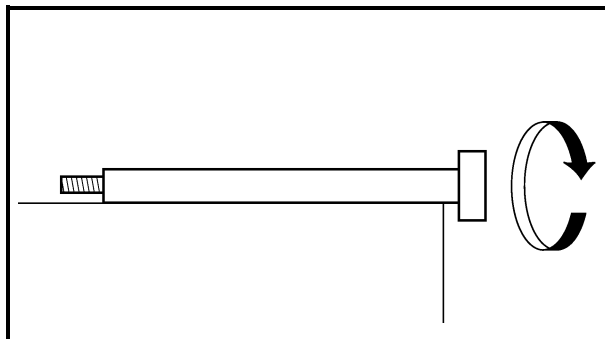
## CHECKING THE SWINGARM

### 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
  - bearings

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

4. Check:
- dust covers
  - spacer
  - oil seals
  - Damage/wear → Replace.
  - bearings
  - Damage/pitting → Replace.

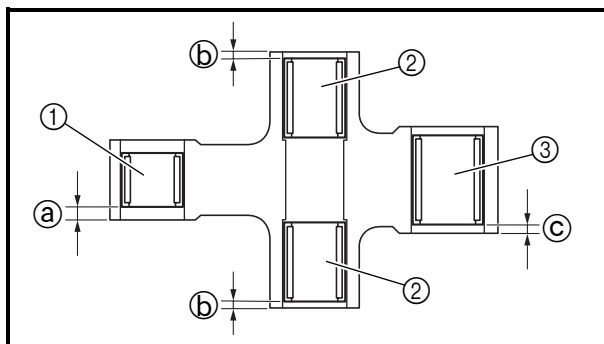
EAS00711


## INSTALLING THE REAR SHOCK ABSORBER AND SWINGARM

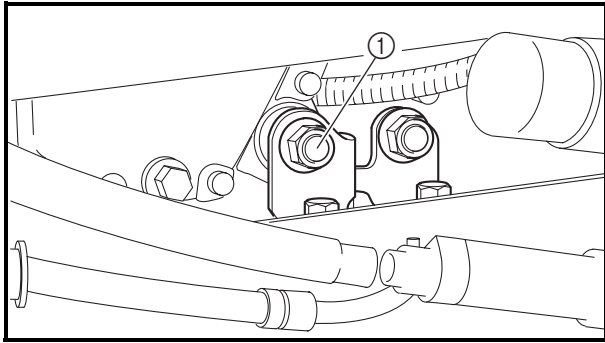
1. Lubricate:
- bearings
  - spacers
  - dust covers
  - O-rings
  - pivot shaft

	<b>Recommended lubricant</b> <b>Lithium-soap-based grease</b>
---	--

2. Install:
- bearings ①, ②, ③  
(to relay arm)



	<b>Installed depth ①</b> <b>4.5 mm (0.18 in)</b> <b>Installed depth ②</b> <b>1.0 mm (0.04 in)</b> <b>Installed depth ③</b> <b>2.0 mm (0.08 in)</b>
---	---



### 3. Install:

- bolt (shock absorber-connecting arm-frame) ①

### **NOTE:**

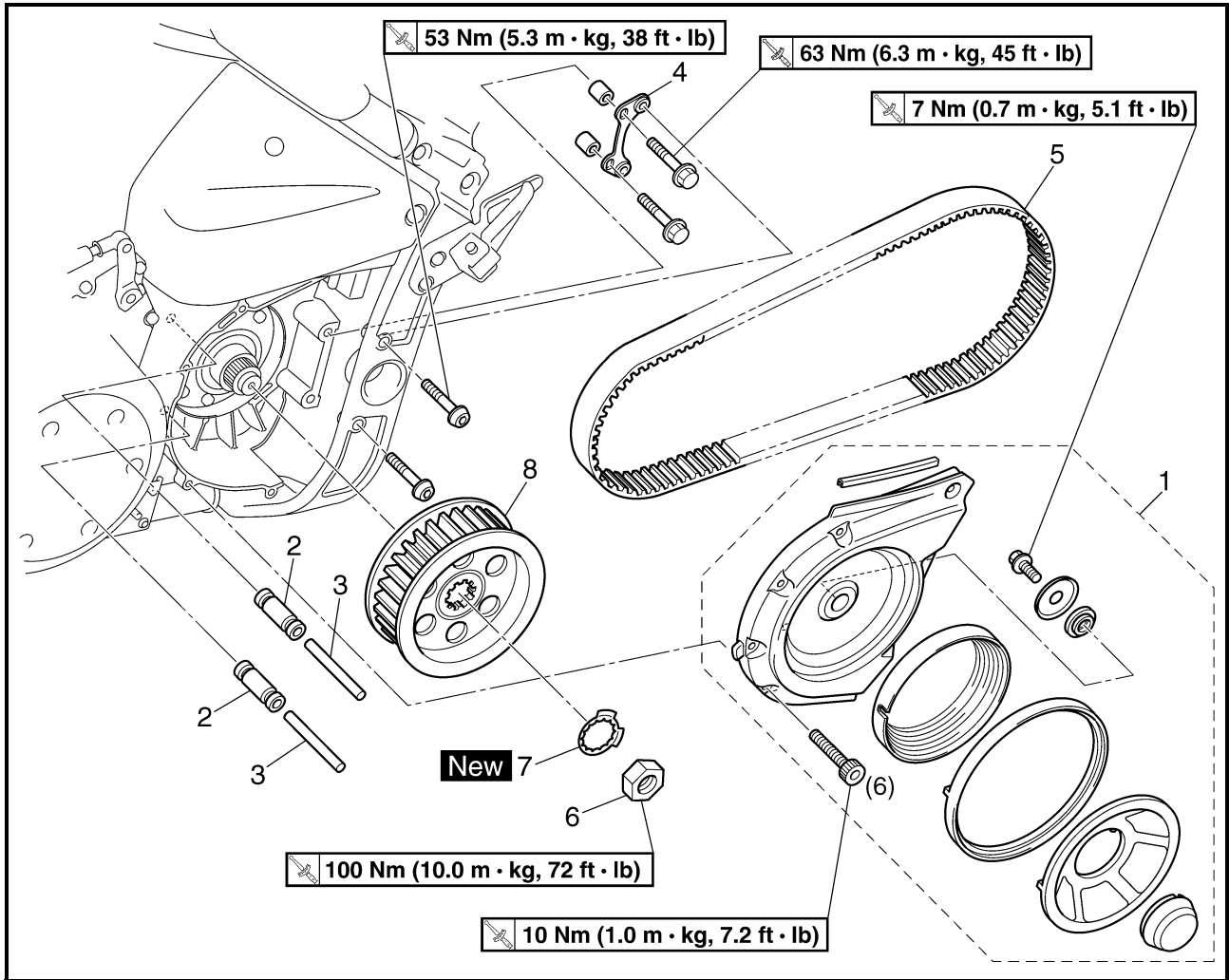
When installing the bolt (shock absorber-connecting arm-frame), hold the swingarm so that it does not drop down.

### 4. Adjust:

- drive belt slack

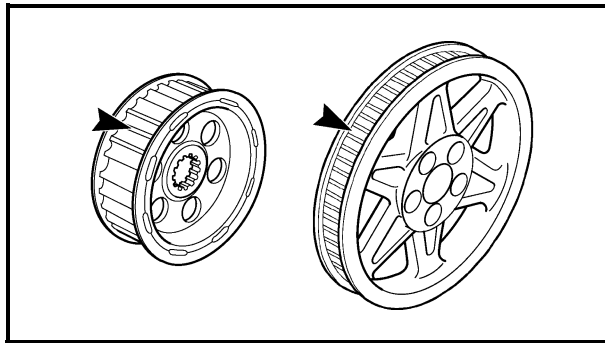
Refer to “ADJUSTING THE DRIVE BELT SLACK” in chapter 3.

DRIVE BELT AND DRIVE SPROCKET



Order	Job/Part	Q'ty	Remarks
	<b>Removing the drive belt and drive sprocket</b>		Remove the parts in the order listed.
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY".
	Rear shock absorber and swingarm assembly		Refer to "REAR SHOCK ABSORBER AND SWINGARM".
1	Drive sprocket cover	1	
2	Slider	2	
3	Dowel pin	2	
4	Transfer gear case bracket	1	
5	Drive belt	1	
6	Drive sprocket nut	1	
7	Lock washer	1	
8	Drive sprocket	1	
			For installation, reverse the removal procedure.

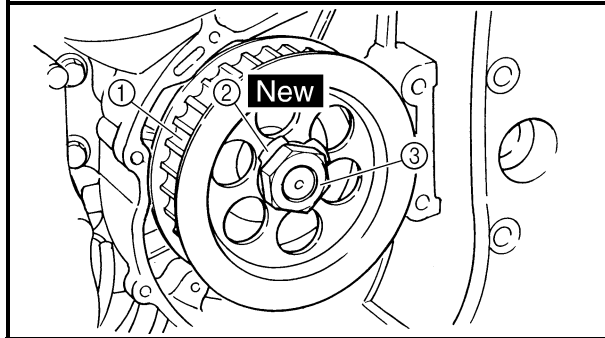




3. Check:

- drive sprocket
- rear wheel pulley

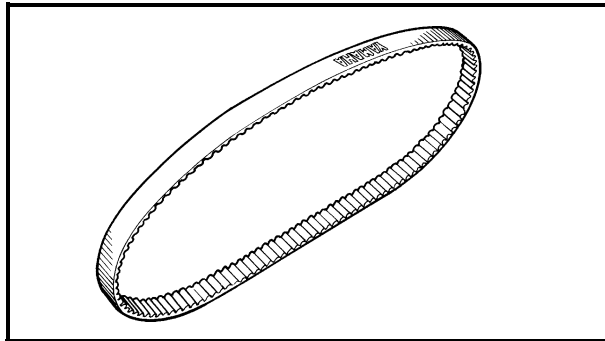
Bent teeth → Replace the drive belt and pulleys as a set.



## INSTALLING THE DRIVE BELT AND DRIVE SPROCKET

1. Install:

- drive sprocket ①
- lock washer ② **New**
- drive sprocket nut ③



2. Install:

- drive belt

**CAUTION:**

Install the drive belt facing the same way it was removed.

Do not twist the drive belt when installing it.

3. Install:

- rear shock absorber and swingarm assembly

Refer to “REAR SHOCK ABSORBER AND SWINGARM”.

- rear wheel

Refer to “REAR WHEEL, BRAKE DISC, AND REAR WHEEL PULLEY”.

4. Tighten:

- drive sprocket nut

100 Nm (10.0 m • kg, 72 ft • lb)

**NOTE:**

When tightening the drive sprocket nut, press down on the brake pedal so the drive sprocket does not move.

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

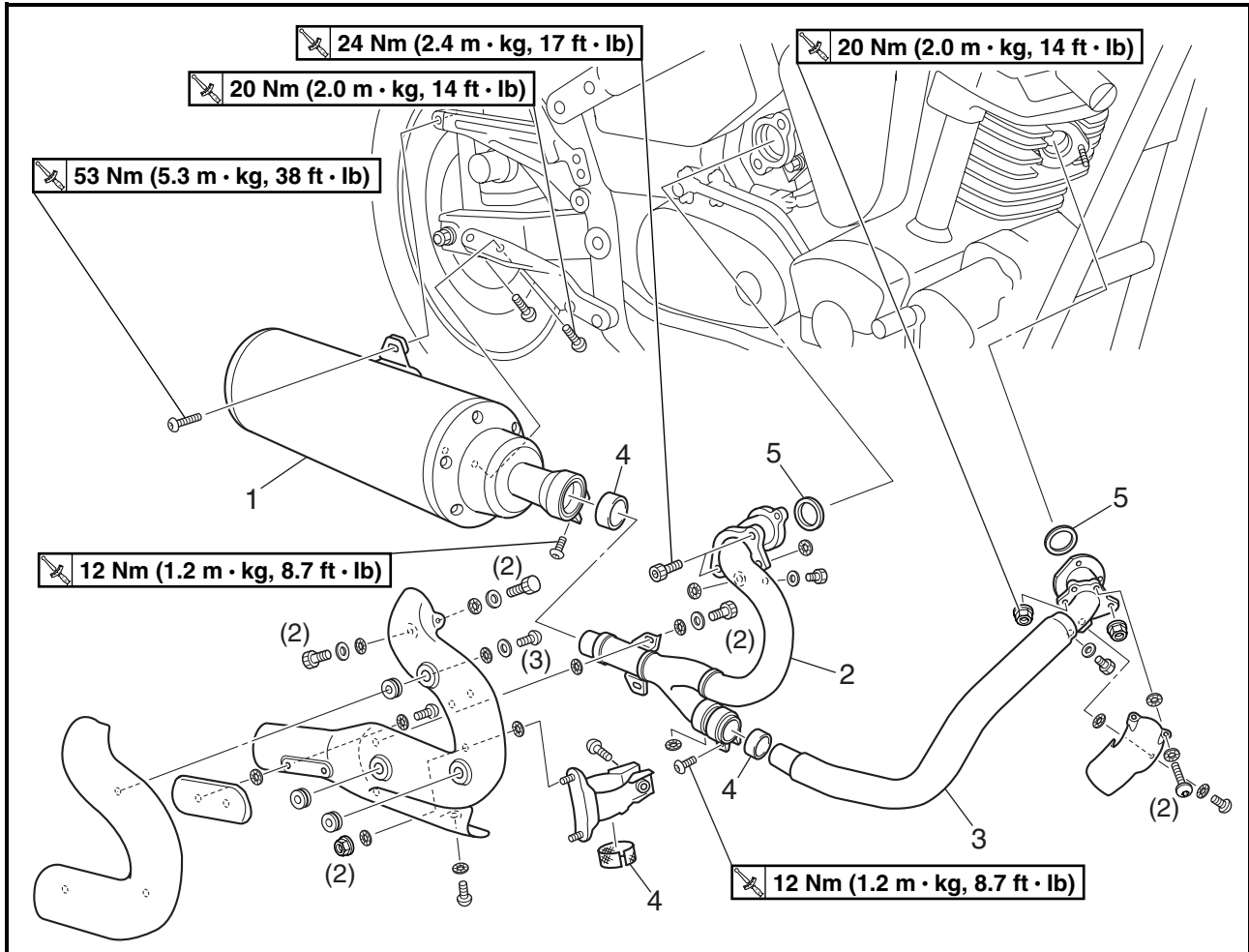




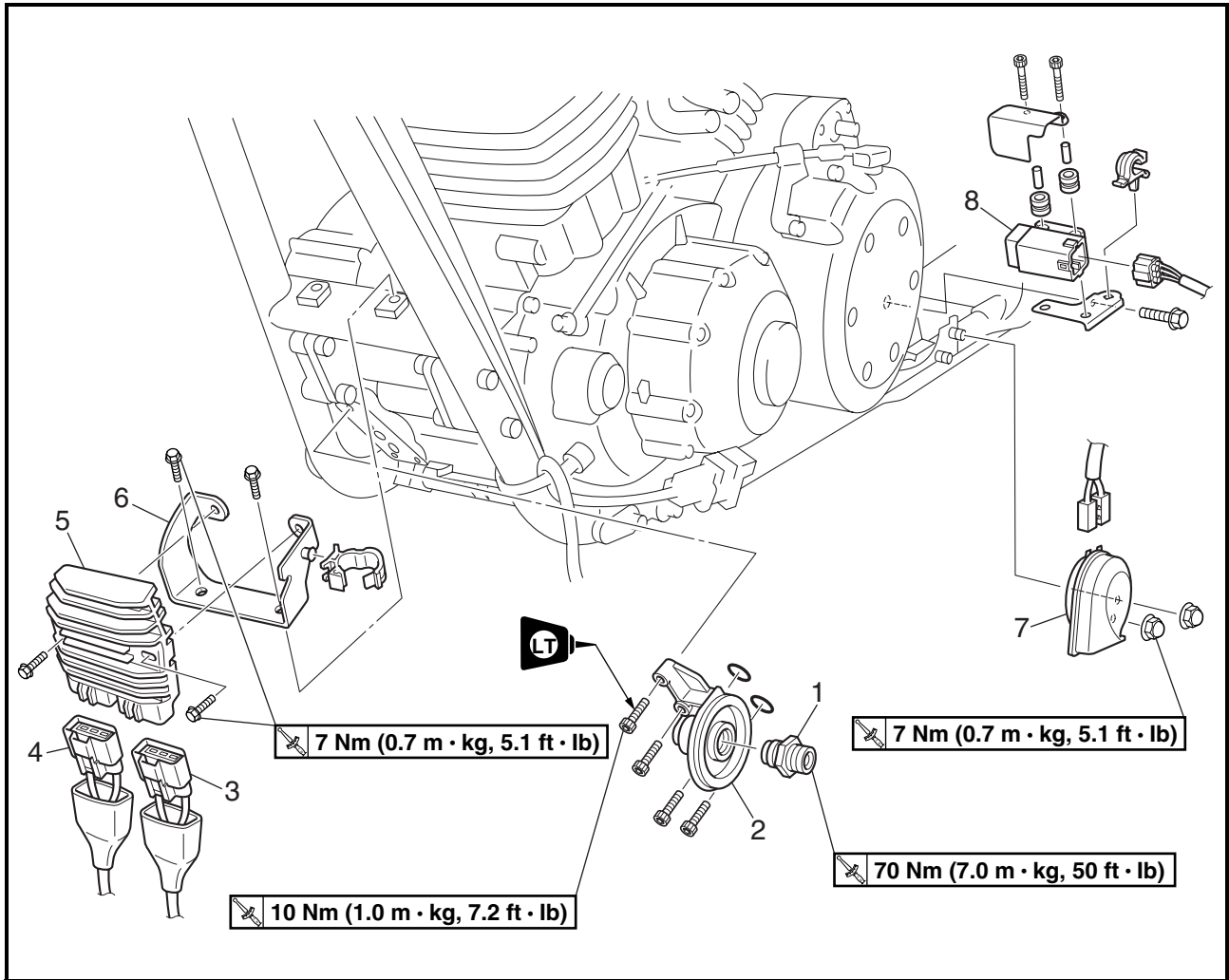
EAS00188

# ENGINE

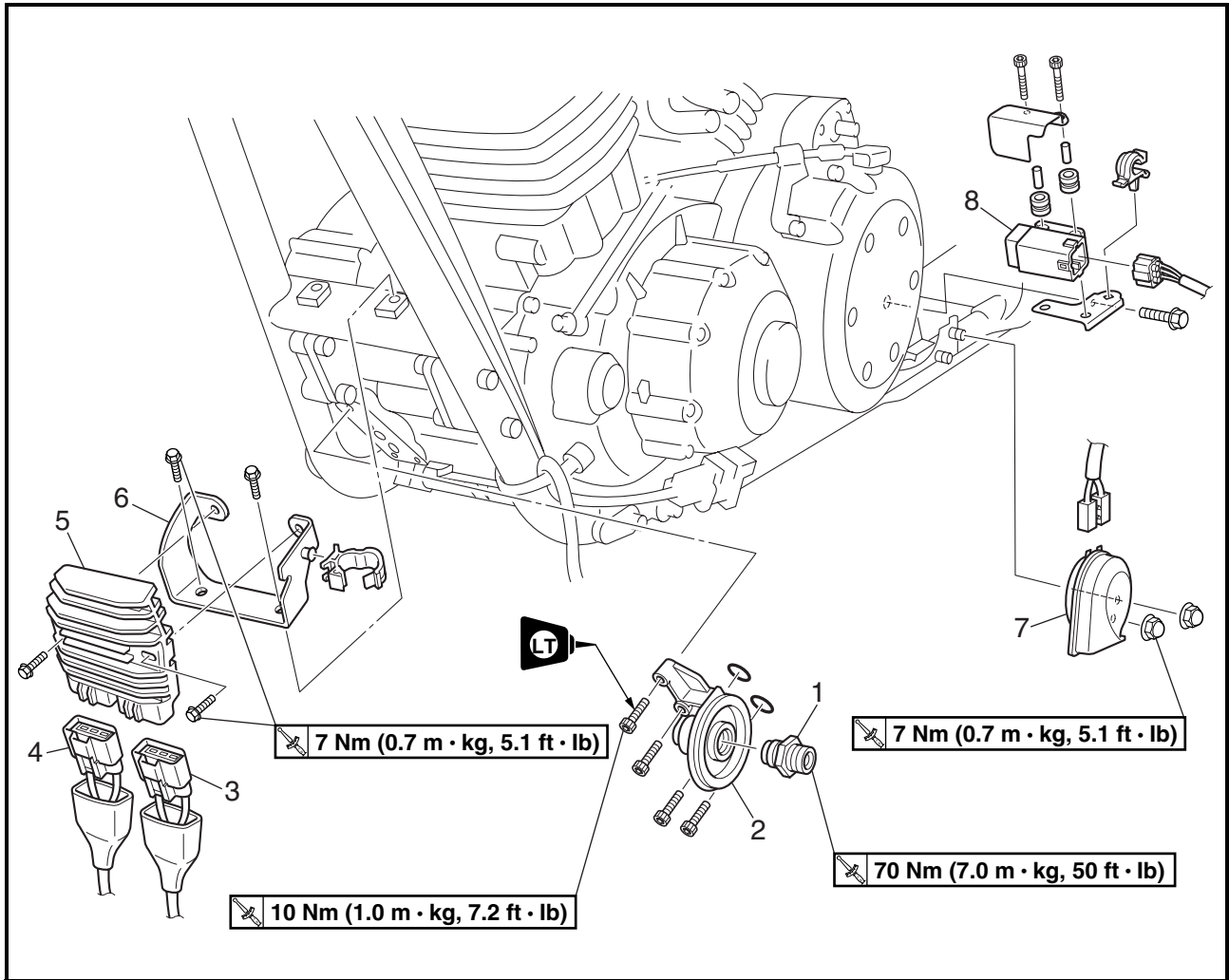
## ENGINE



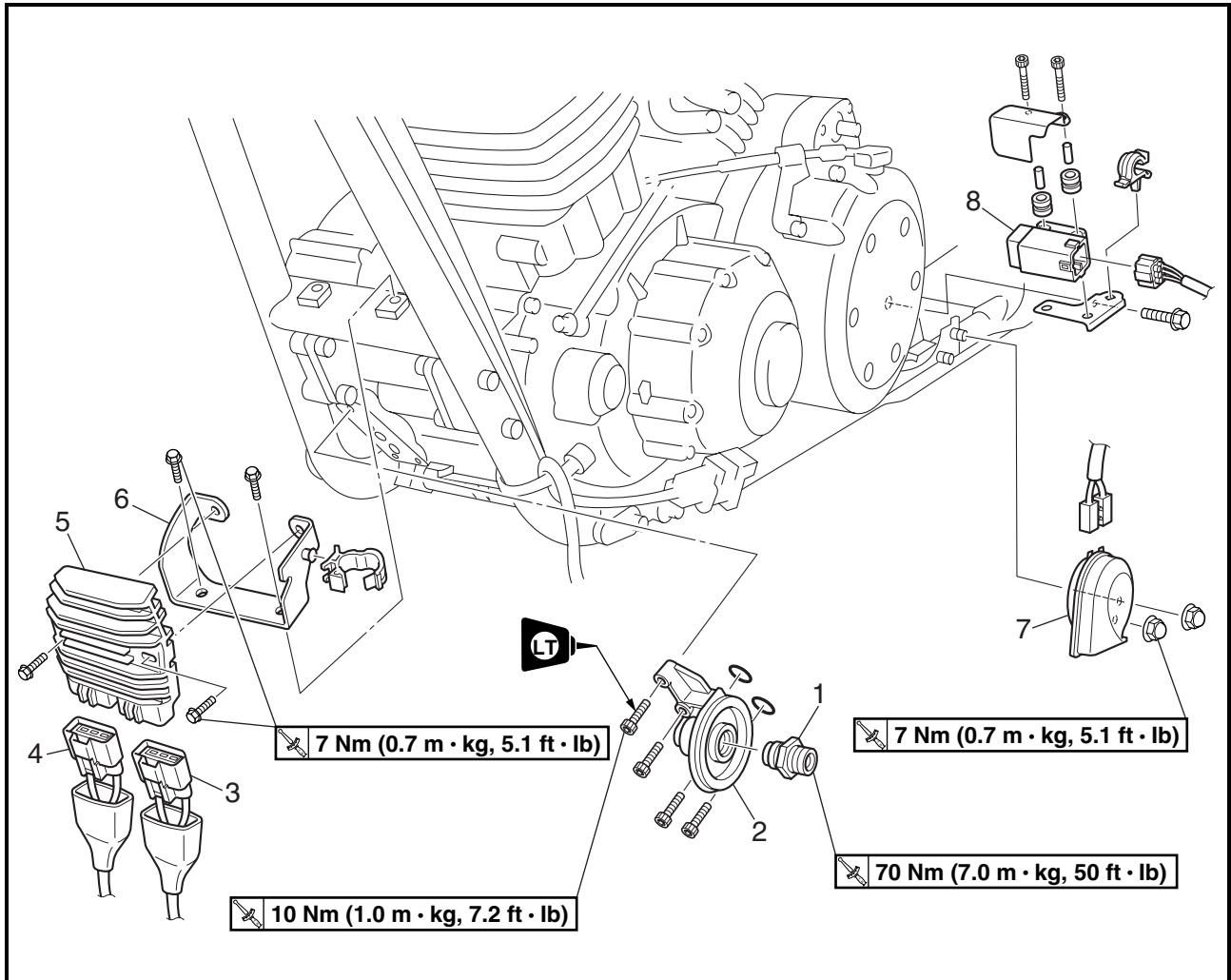
Order	Job/Part	Q'ty	Remarks
	<b>Removing the muffler and exhaust pipes</b>		Remove the parts in the order listed.
1	Muffler	1	
2	Rear exhaust pipe	1	
3	Front exhaust pipe	1	
4	Gasket	2	
5	Gasket	2	
			For installation, reverse the removal procedure.



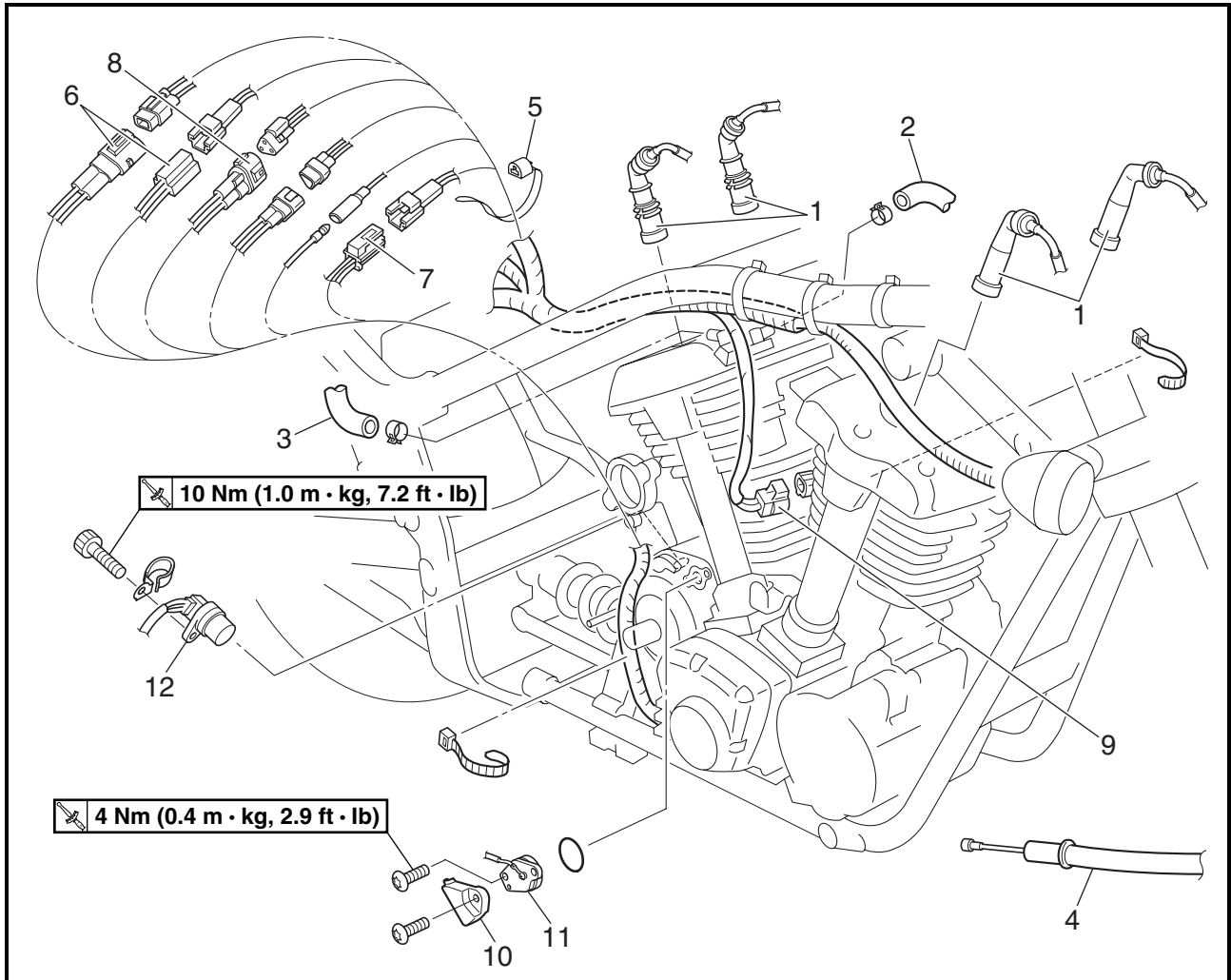
Order	Job/Part	Q'ty	Remarks
	<b>Removing the oil filter bracket and horn</b>		Remove the parts in the order listed.
	Seat/side covers		Refer to "SEAT AND SIDE COVERS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Silencer air filter case		Refer to "SILENCER AIR FILTER CASE" in chapter 3.
	Throttle bodies/intake manifold		Refer to "FUEL INJECTION SYSTEM" in chapter 6.
	Air induction system parts		Refer to "AIR INDUCTION SYSTEM" in chapter 6.
	Starter motor		Refer to "STARTER MOTOR" in chapter 7.



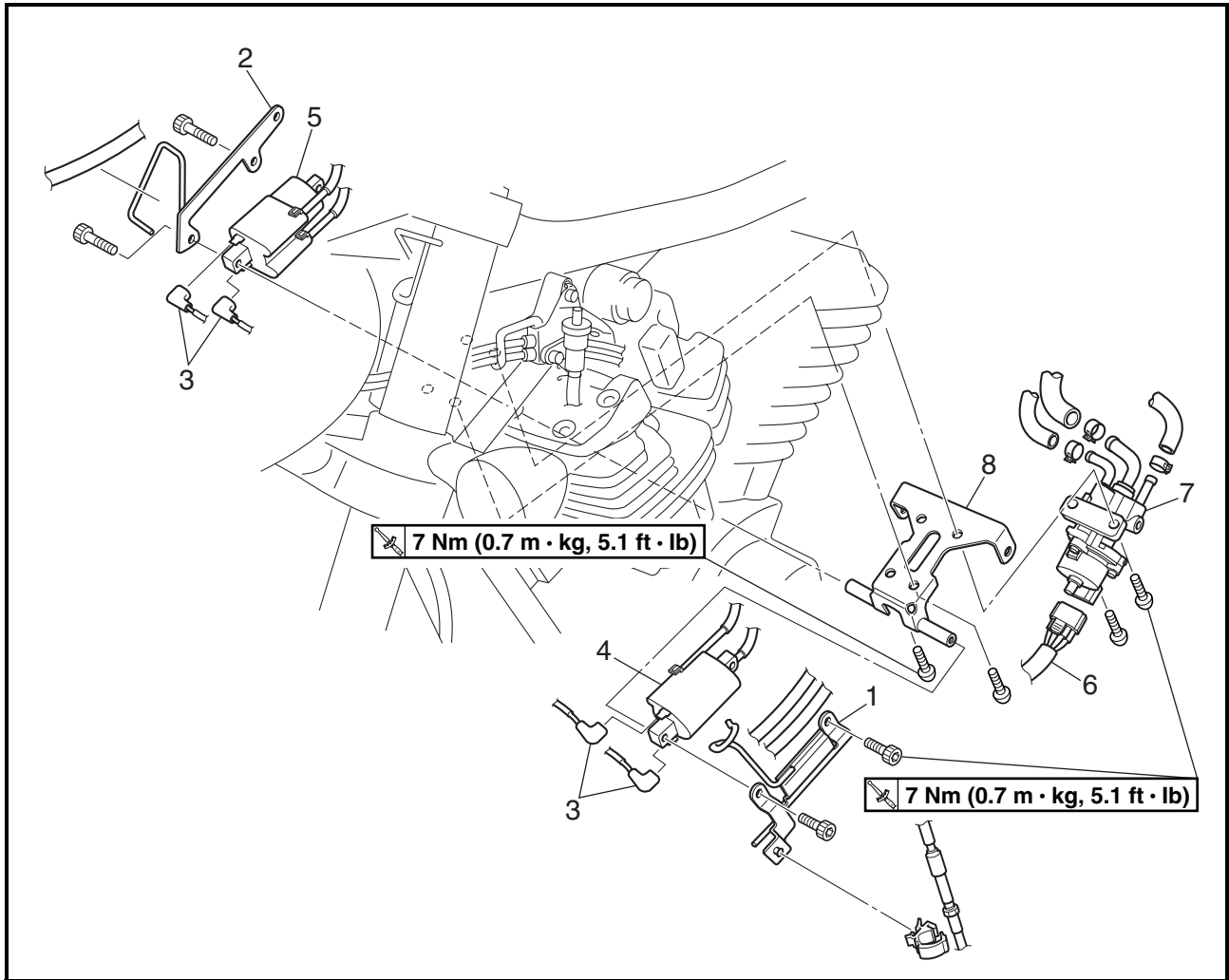
Order	Job/Part	Q'ty	Remarks
	Engine oil/oil filter cartridge		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Sub fuel tank		Refer to "SUB FUEL TANK".
	Transfer gear oil		Drain. Refer to "CHANGING THE TRANSFER GEAR OIL" in chapter 3.
	Transfer gear case		Refer to "TRANSFER GEAR CASE".
	Rider footrest (left)		Refer to "ROCKER ARMS, PUSH RODS AND VALVE LIFTERS".
	Rider footrest (right)/oil delivery pipe		Refer to "GENERATOR AND STARTER CLUTCH".
1	Oil filter bolt	1	
2	Oil filter bracket	1	



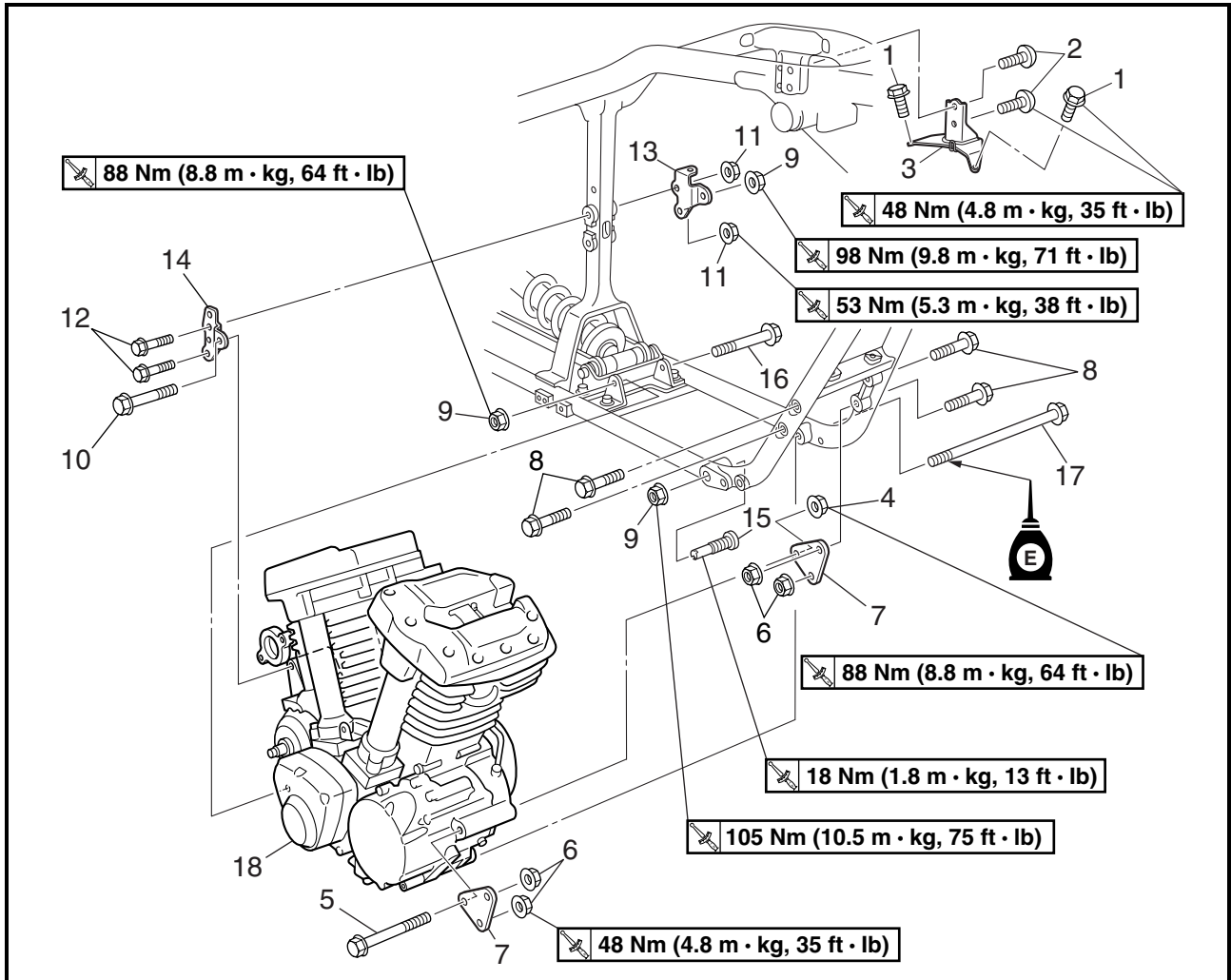
Order	Job/Part	Q'ty	Remarks
3	Rectifier/regulator coupler	1	Disconnect.
4	Stator coil assembly coupler	1	Disconnect.
5	Rectifier/regulator	1	
6	Rectifier/regulator bracket	1	
7	Horn 2	1	
8	Lean angle cut-off switch	1	
			For installation, reverse the removal procedure.



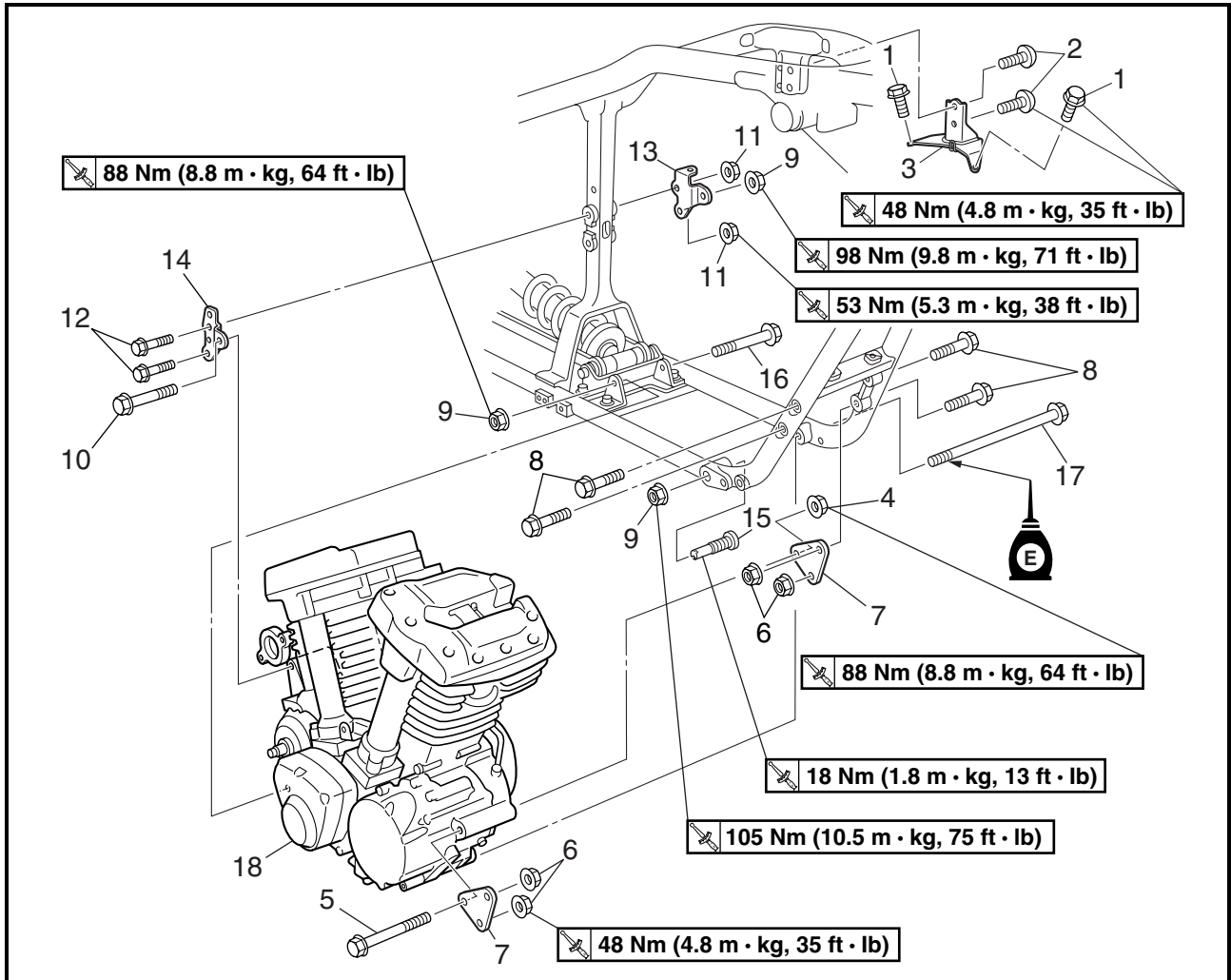
Order	Job/Part	Q'ty	Remarks
	<b>Disconnecting the leads and hoses</b>		Disconnect the parts in the order listed.
1	Spark plug caps	4	
2	Cylinder head breather hose	1	
3	Oil tank breather hose	1	
4	Clutch cable	1	
5	Plastic clamp	1	
6	Decompression solenoid coupler	2	
7	Crankshaft position sensor coupler	1	
8	Cylinder identification coupler	1	
9	Engine temperature sensor coupler	1	
10	Neutral switch cover	1	
11	Neutral switch	1	
12	Speed sensor	1	
			For connecting, reverse the disconnection procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Removing the ignition coil and linear control valve</b>		Remove the parts in the order listed.
1	Hose bracket	1	
2	Wire harness bracket	1	
3	Ignition coil connector	4	Disconnect.
4	Ignition coil 1	1	
5	Ignition coil 2	1	
6	Linear control valve coupler	1	Disconnect.
7	Linear control valve	1	
8	Linear control valve bracket	1	
			For installation, reverse the removal procedure.

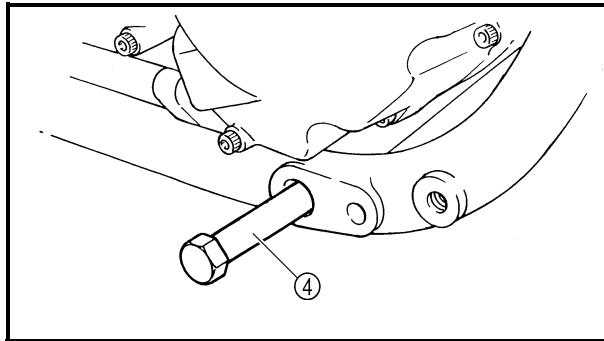
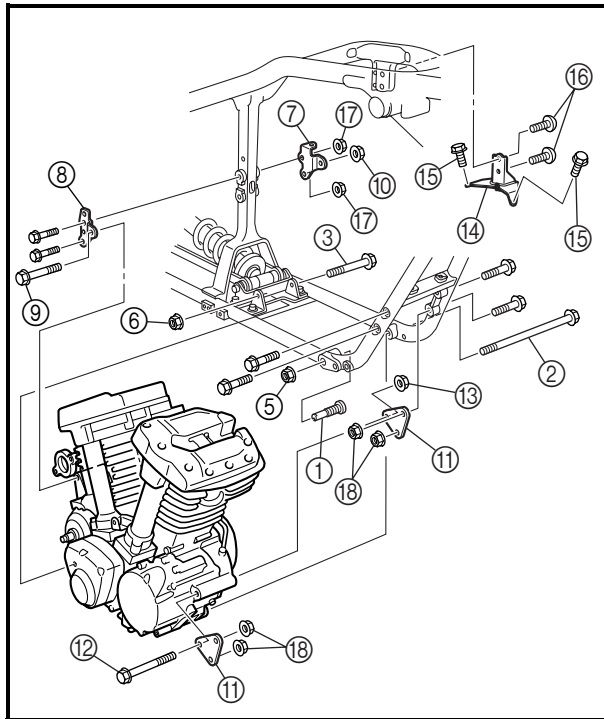


Order	Job/Part	Q'ty	Remarks
	<b>Removing the engine</b>		Remove the parts in the order listed.
			<b>NOTE:</b> _____ Place a suitable stand under the frame and engine.
1	Upper mounting bolt	2	Refer to "INSTALLING THE ENGINE".
2	Upper mounting bracket bolt	2	
3	Upper mounting	1	
4	Self-locking nut	1	
5	Front mounting bolt	1	
6	Front engine bracket self-locking nut	4	
7	Front engine bracket	2	
8	Front engine bracket bolt	4	
9	Self-locking nut	3	
10	Upper rear mounting bolt	1	



Order	Job/Part	Q'ty	Remarks
11	Rear engine bracket nut	2	Loosen. Refer to "INSTALLING THE ENGINE".  For installation, reverse the removal procedure.
12	Rear engine bracket bolt	2	
13	Rear engine bracket (left)	1	
14	Rear engine bracket (right)	1	
15	Spacer bolt	1	
16	Lower rear mounting bolt	1	
17	Lower front mounting bolt	1	
18	Engine	1	





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**INSTALLING THE ENGINE**

1. Install:
  - spacer bolt ①
  - lower front mounting bolt ②
  - lower rear mounting bolt ③
2. Tighten:
  - spacer bolt ①

**18 Nm (1.8 m • kg, 13 ft • lb)**

**NOTE:**

- Tighten the spacer bolt ① to specification with a pivot shaft wrench ④.
- When tightened, the spacer bolt ① should be flat against the engine surface.



**Pivot shaft wrench  
YM-01485**

3. Install:
  - self-locking nut ⑤, ⑥
  - rear engine bracket (left) ⑦
  - rear engine bracket (right) ⑧
  - upper rear mounting bolt ⑨
  - self-locking nut ⑩
  - front engine bracket ⑪
  - front mounting bolt ⑫
  - self-locking nut ⑬
  - upper engine bracket ⑭
  - upper mounting bolts ⑮

**NOTE:**

Do not fully tighten the bolts and nuts.

4. Tighten:
  - upper mounting bolts ⑮

**48 Nm (4.8 m • kg, 35 ft • lb)**

  - upper engine bracket bolts ⑯

**48 Nm (4.8 m • kg, 35 ft • lb)**
5. Tighten:
  - self-locking nut ⑤

**105 Nm (10.5 m • kg, 75 ft • lb)**

  - self-locking nut ⑥

**88 Nm (8.8 m • kg, 64 ft • lb)**

  - nuts ⑰

**53 Nm (5.3 m • kg, 38 ft • lb)**

  - self-locking nut ⑩

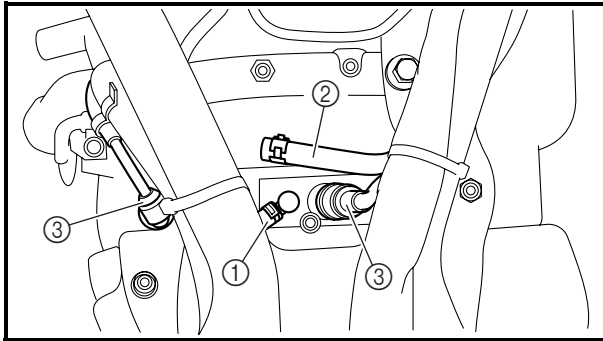
**98 Nm (9.8 m • kg, 71 ft • lb)**

  - self-lock nuts ⑱

**48 Nm (4.8 m • kg, 35 ft • lb)**

  - self-locking nut ⑬

**88 Nm (8.8 m • kg, 64 ft • lb)**

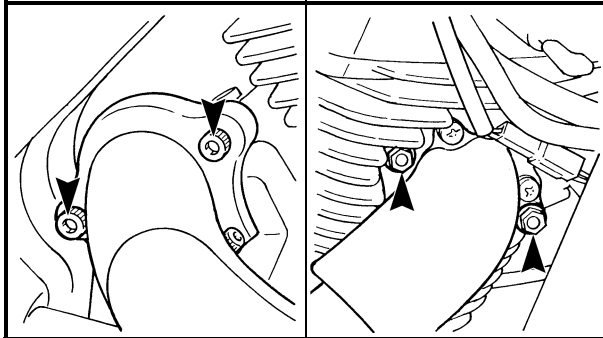


## 6. Connect:

- oil tank breather hose ①
- cylinder head breather hose ②
- spark plug caps ③

**NOTE:**

Refer to "CABLE ROUTING" in chapter 2.

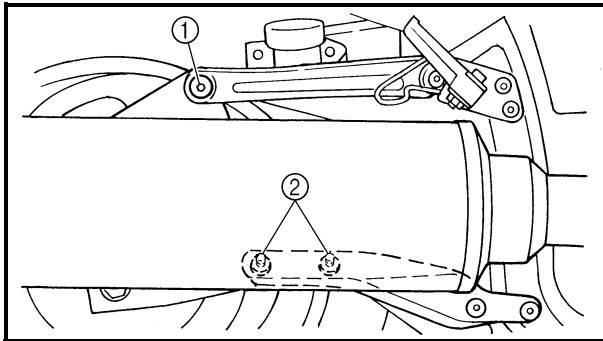
**INSTALLING THE MUFFLER AND EXHAUST PIPES**

## 1. Install:

- gaskets
- exhaust pipes

**NOTE:**

Finger tighten the exhaust pipe nuts and bolts.

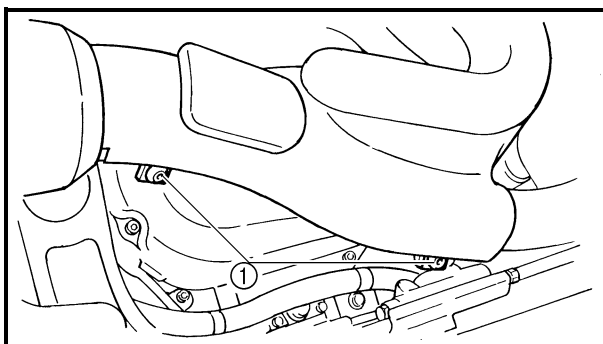


## 2. Install:

- muffler
- bolt ①
- bolts ②

	<b>53 Nm (5.3 m • kg, 38 ft • lb)</b>
--	---------------------------------------

	<b>20 Nm (2.0 m • kg, 14 ft • lb)</b>
--	---------------------------------------



## 3. Tighten:

- exhaust pipe nuts

	<b>20 Nm (2.0 m • kg, 14 ft • lb)</b>
--	---------------------------------------

- exhaust pipe bolts

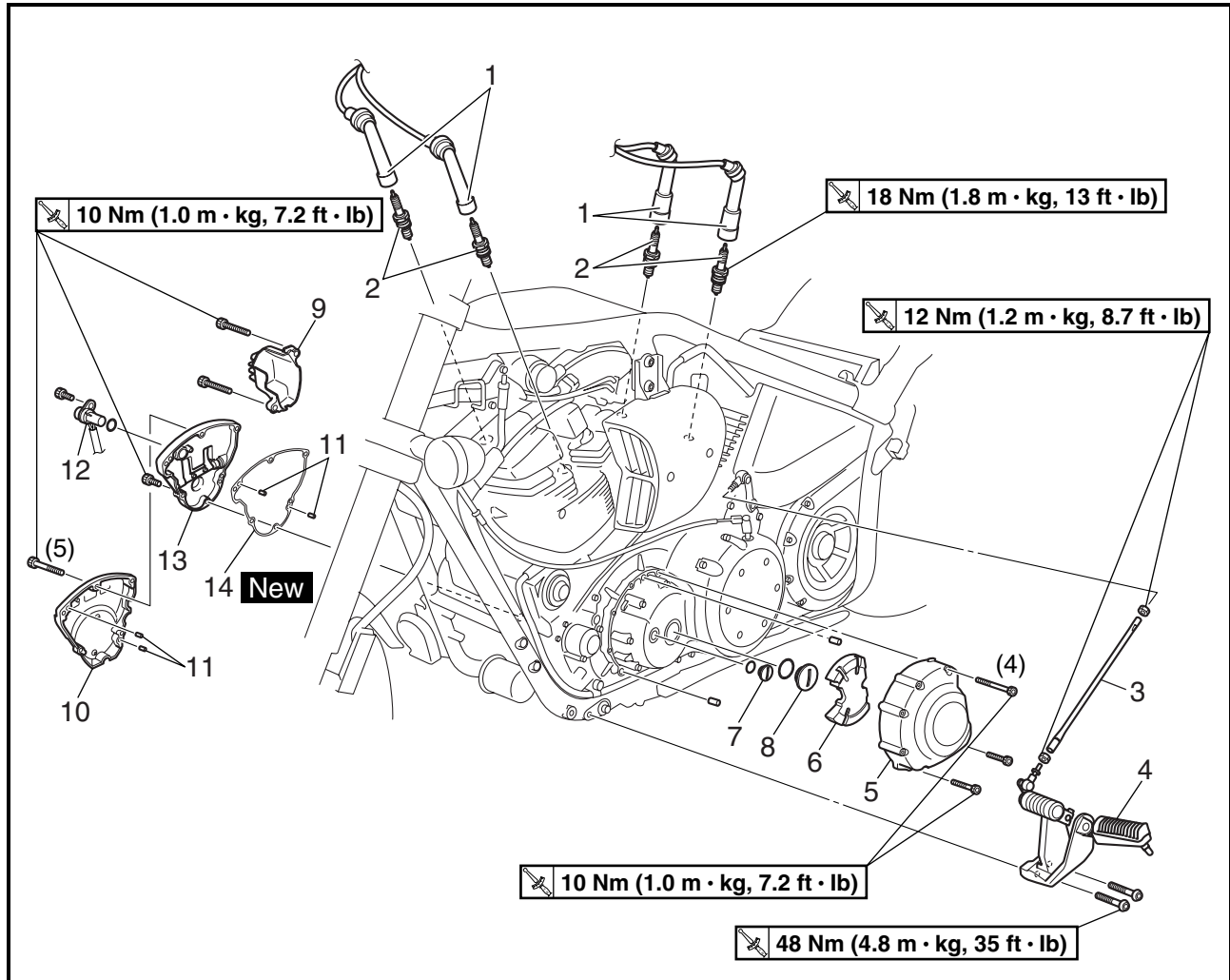
	<b>24 Nm (2.4 m • kg, 17 ft • lb)</b>
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- clamp bolts ①

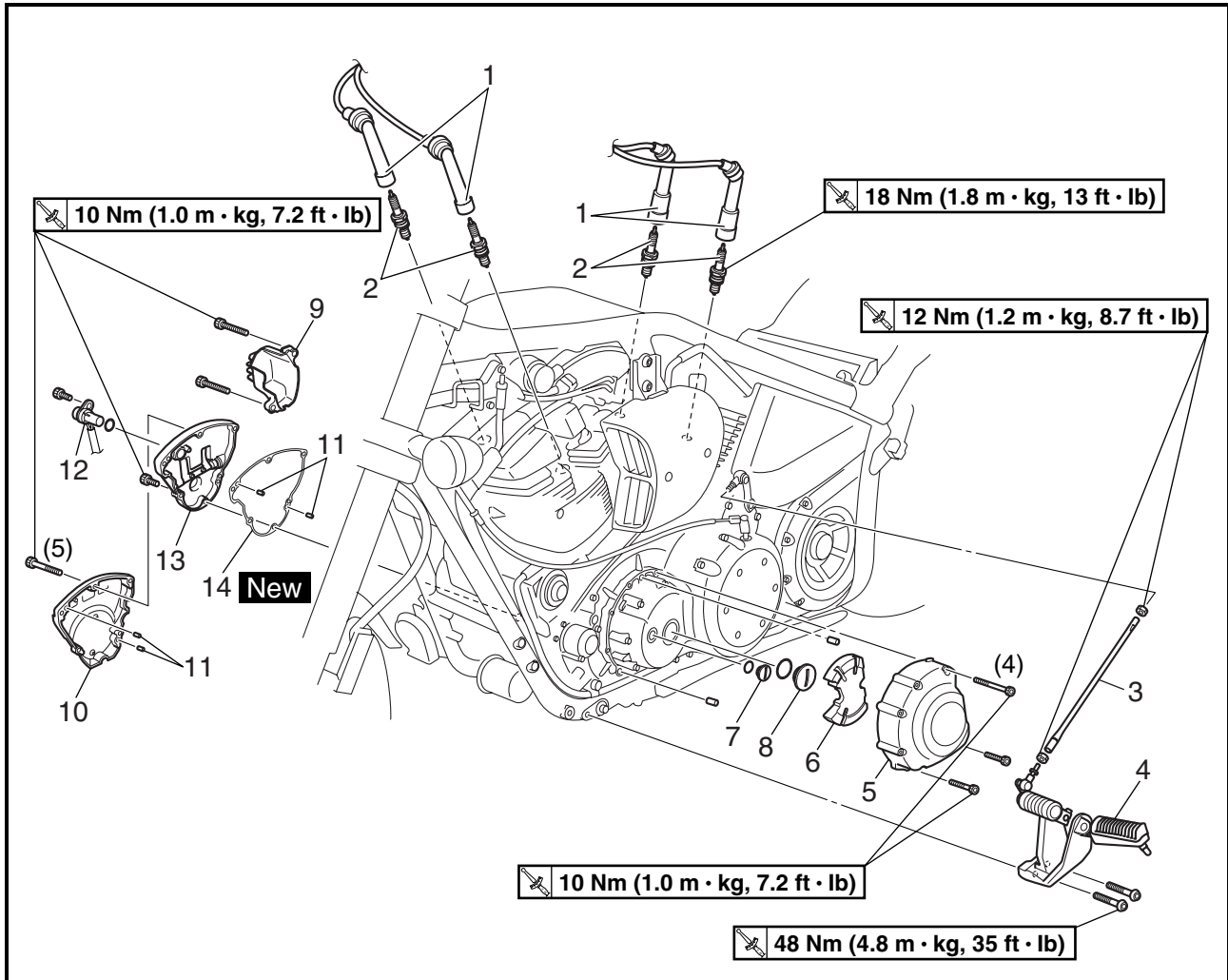
	<b>12 Nm (1.2 m • kg, 8.7 ft • lb)</b>
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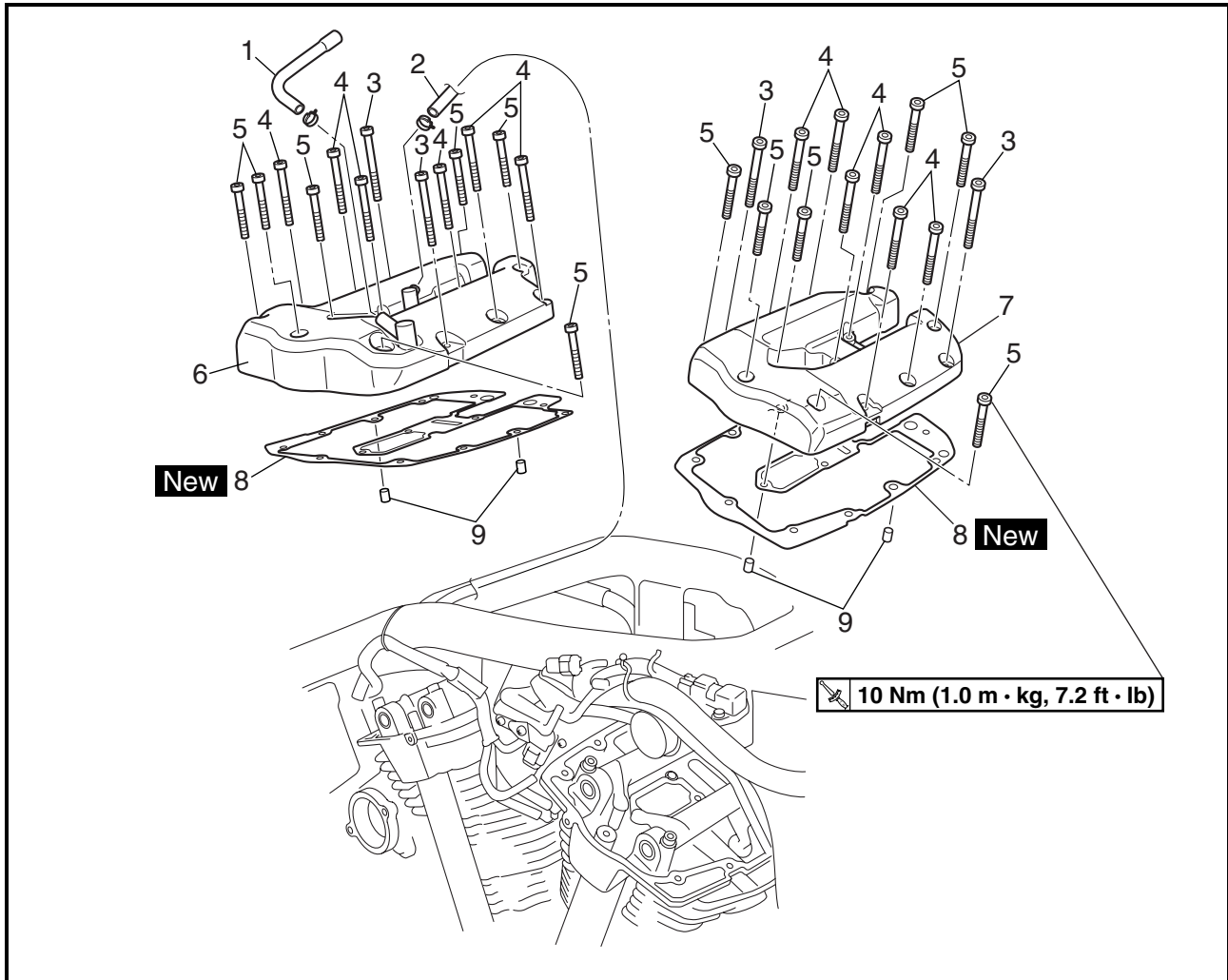
## ROCKER ARMS, PUSH RODS AND VALVE LIFTERS



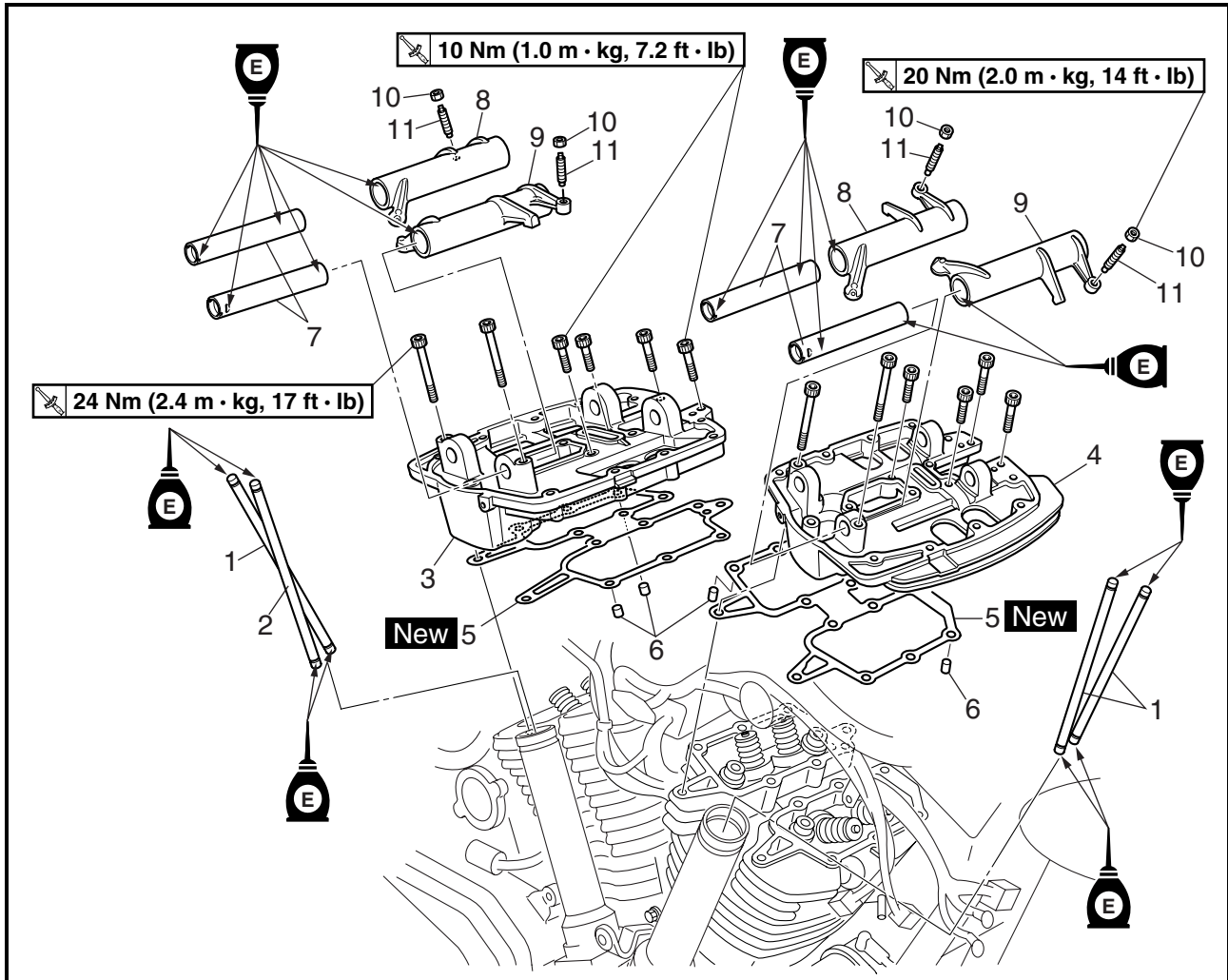
Order	Job/Part	Q'ty	Remarks
	<b>Removing the engine left side cover and camshaft sprocket cover</b> Seat/fuel tank/silencer air filter case  Muffler/exhaust pipes Engine oil		Remove the parts in the order listed.  Refer to "SEAT AND SIDE COVERS", "FUEL TANK" and "SILENCER AIR FILTER CASE" in chapter 3. Refer to "ENGINE". Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Spark plug cap	2/2	Disconnect.
2	Spark plug	4	Refer to "INSTALLING THE CAMSHAFT SPROCKET COVER AND ENGINE LEFT SIDE COVER".
3	Shift rod	1	
4	Rider footrest assembly (left)	1	
5	Canister	1	



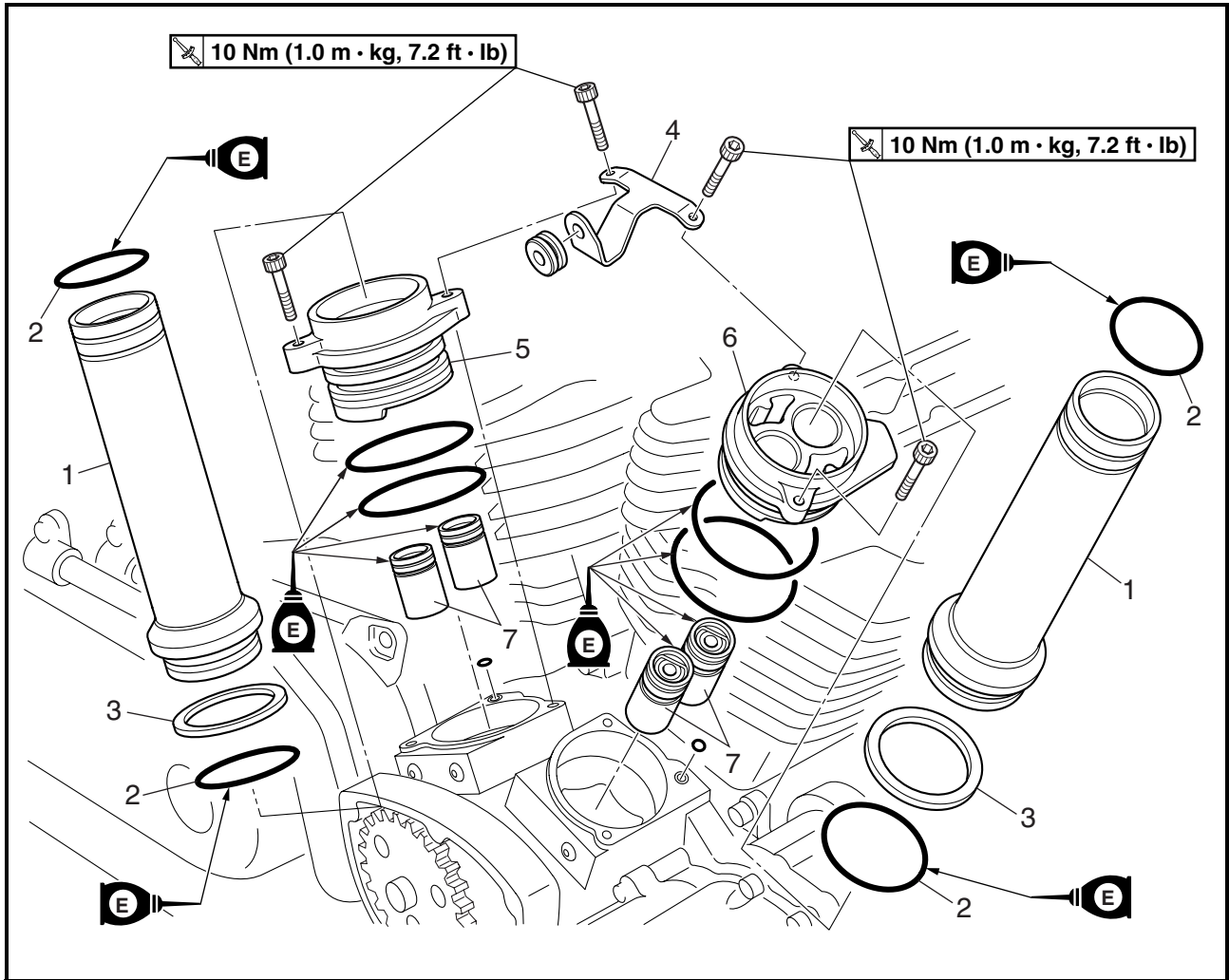
Order	Job/Part	Q'ty	Remarks
6	Engine left side cover	1	Refer to "INSTALLING THE CAMSHAFT SPROCKET COVER AND ENGINE LEFT SIDE COVER".
7	Rubber damper	1	
8	Timing mark accessing screw	1	
9	Crankshaft end cover	1	
10	Decompression solenoid cover	1	
11	Camshaft sprocket cover 1	1	For installation, reverse the removal procedure
12	Dowel pin	2	
13	Cylinder identification sensor	1	
14	Camshaft sprocket cover 2	1	
15	Camshaft sprocket cover gasket	1	



Order	Job/Part	Q'ty	Remarks
	<b>Removing cylinder head covers</b>		Remove the parts in the order listed. Refer to "ENGINE".
	Ignition coil/rectifier/regulator/ liner control valve		
1	Cylinder head breather hose	1	
2	Oil tank breather hose	1	
3	Bolt	4	$\ell = 60 \text{ mm (2.36 in)}$
4	Bolt	12	$\ell = 50 \text{ mm (1.97 in)}$
5	Bolt	12	$\ell = 40 \text{ mm (1.57 in)}$
6	Rear cylinder head cover	1	
7	Front cylinder head cover	1	Refer to "INSTALLING THE CYLINDER HEAD COVERS".
8	Cylinder head cover gasket	2	
9	Dowel pin	4	
			For installation, reverse the removal procedure

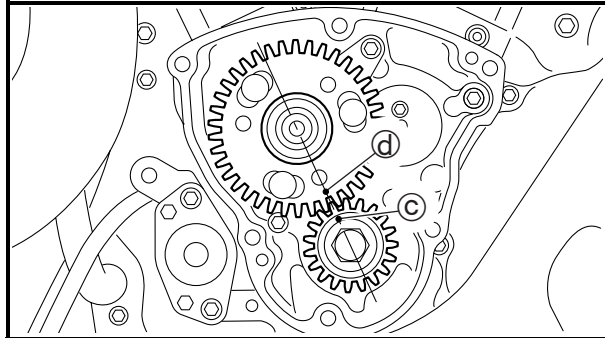
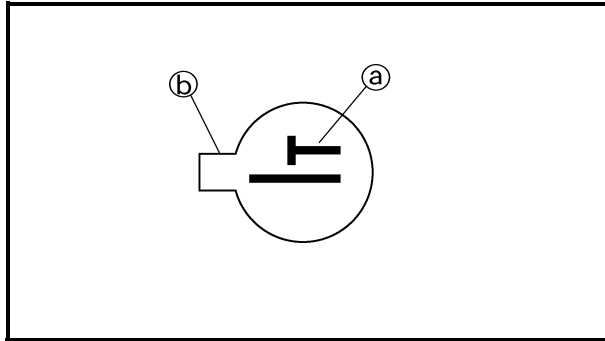


Order	Job/Part	Q'ty	Remarks
	<b>Removing the push rods and rocker arms</b>		Remove the parts in the order listed.
1	Push rod 1	3	$\ell = 288.5 \text{ mm (11.358 in)}$ blue painting
2	Push rod 2	1	$\ell = 290.5 \text{ mm (11.437 in)}$ yellow painting
3	Rear rocker arm base	1	
4	Front rocker arm base	1	
5	Rocker arm base gasket	2	
6	Dowel pin	4	Refer to "REMOVING THE ROCKER ARMS, PUSH RODS AND VALVE LIFTERS" and "INSTALLING THE ROCKER ARMS AND PUSH RODS".
7	Rocker arm shaft	4	
8	Rocker arm 1	2	
9	Rocker arm 2	2	
10	Locknut	2	
11	Adjusting screw	2	
			For installation, reverse the removal procedure

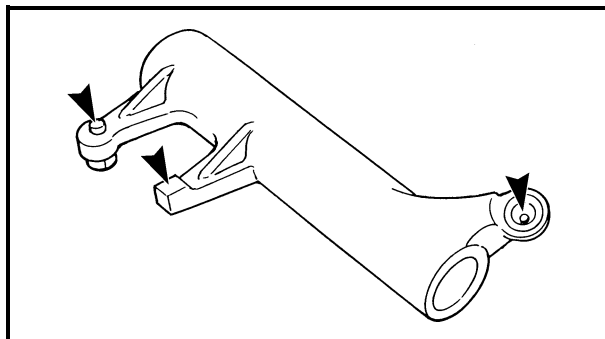
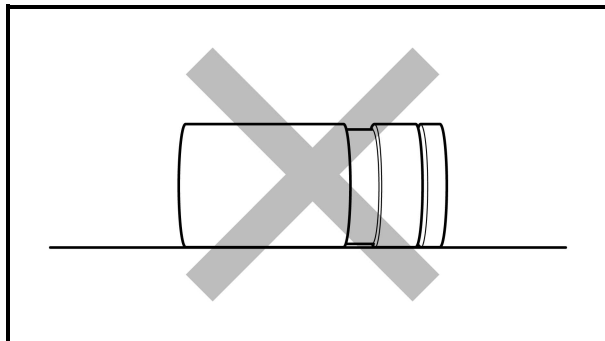


Order	Job/Part	Q'ty	Remarks
	<b>Removing the valve lifters</b>		Remove the parts in the order listed.
1	Push rod cover	2	
2	O-ring	4	
3	Seal	2	
4	Air filter bracket	1	
5	Rear valve lifter case	1	
6	Front valve lifter case	1	
7	Valve lifter	4	Refer to "REMOVING THE ROCKER ARMS, PUSH RODS AND VALVE LIFTERS" and "INSTALLING THE VALVE LIFTERS". For installation, reverse the removal procedure





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## REMOVING THE ROCKER ARMS, PUSH RODS AND VALVE LIFTERS

- Align:
  - TDC mark (a) on the crankshaft position sensor rotor (with the pointer (b) on the clutch/crankshaft position sensor rotor cover)



- Turn the crankshaft clockwise.
- When piston #1 is at TDC on the compression stroke, align the TDC mark (a) on the crankshaft position sensor rotor with the pointer (b) on the clutch/crankshaft position sensor rotor cover.
- Check the camshaft drive gear mark (c) position and camshaft driven gear mark (d) position as shown. If the marks are not aligned, turn the crankshaft counterclockwise 360 degrees and recheck step b.



- Remove:
  - rocker arm bases (with the rocker arms)
- Remove:
  - valve lifters

**NOTE:** \_\_\_\_\_  
 Make a note of the position of each valve lifter so that they can be installed in the correct place.

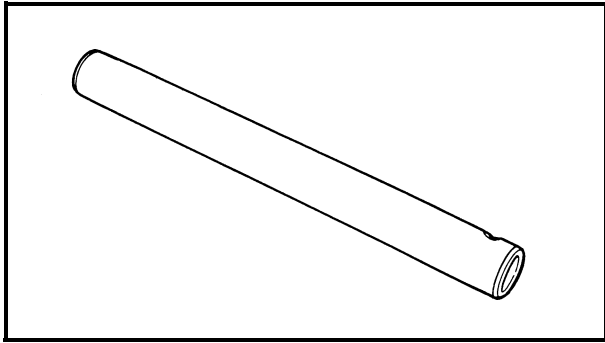
**CAUTION:** \_\_\_\_\_  
 Do not lay the removed valve lifter on its side.

## CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

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

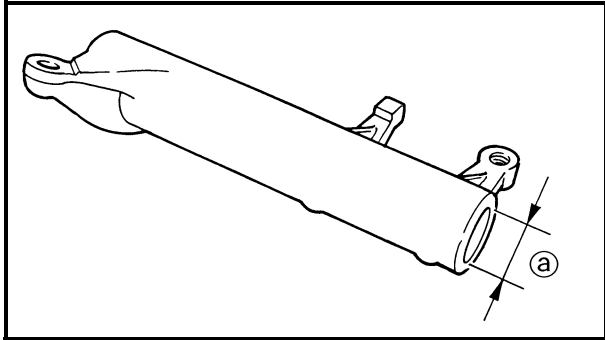
- Check:
  - rocker arm  
 Damage/wear → Replace.





2. Check:

- rocker arm shaft  
Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.

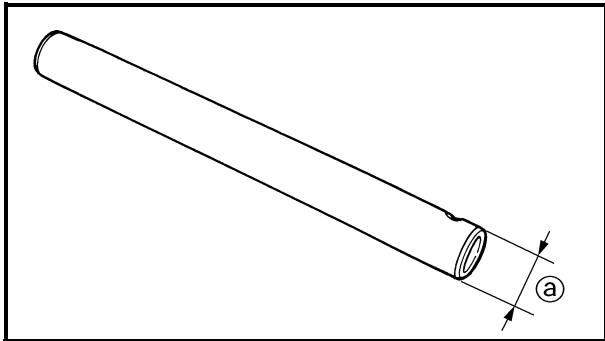


3. Measure:

- rocker arm inside diameter (a)  
Out of specification → Replace.



**Rocker arm inside diameter**  
18.000 ~ 18.018 mm  
(0.7087 ~ 0.7094 in)



4. Measure:

- rocker arm shaft outside diameter (a)  
Out of specification → Replace.



**Rocker arm shaft outside diameter**  
17.976 ~ 17.991 mm  
(0.7077 ~ 0.7083 in)

5. Calculate:

- rocker arm to rocker arm shaft clearance

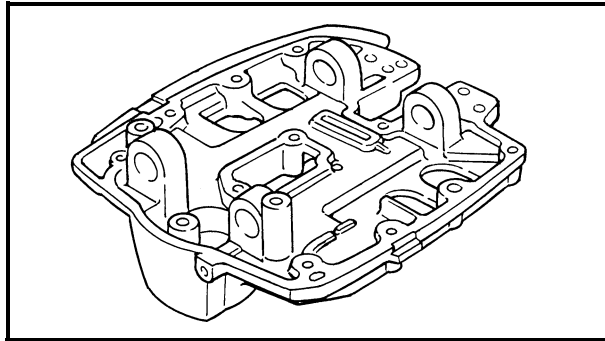
**NOTE:**

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

Above 0.08 mm (0.003 in) → Replace the defective part(s).

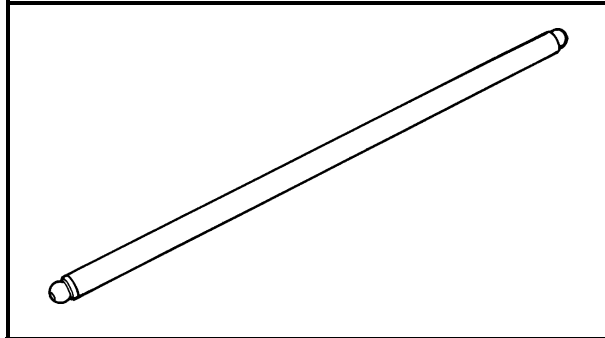


**Rocker arm to rocker arm shaft clearance**  
0.009 ~ 0.042 mm  
(0.0004 ~ 0.0017 in)



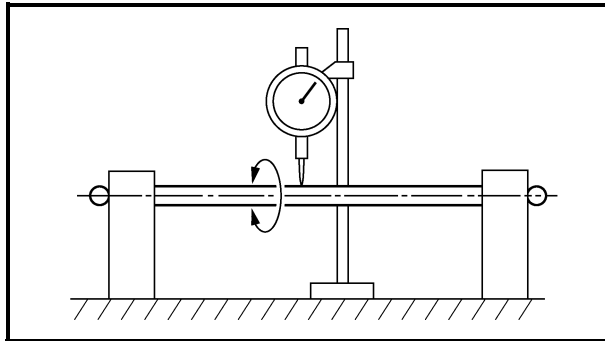
## CHECKING THE ROCKER ARM BASES

1. Check:
  - rocker arm base  
Cracks/damage → Replace.



## CHECKING THE PUSH RODS

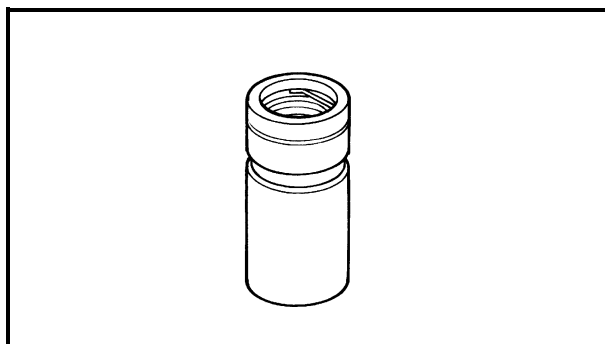
1. Check:
  - push rod
  - push rod end  
Bends/damage → Replace.



2. Measure:
  - push rod runout  
Out of specification → Replace.

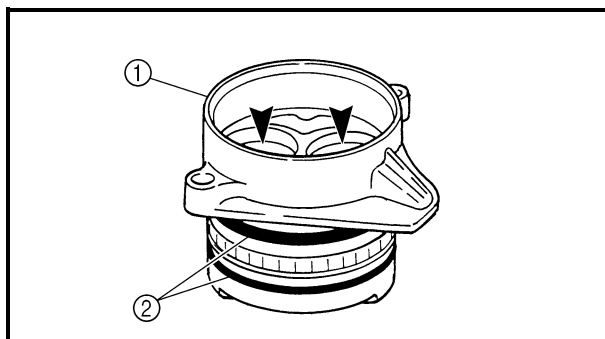


**Push rod runout**  
**0.3 mm (0.012 in)**

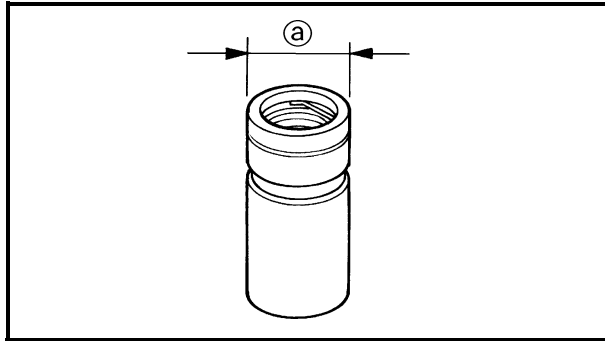


## CHECKING THE VALVE LIFTERS AND VALVE LIFTER CASES

1. Check:
  - valve lifter  
Blue discoloration/excessive wear/pitting/scratches → Replace and check the lubrication system.



2. Check:
  - valve lifter case ①  
Damage/wear → Replace the valve lifter case.
  - O-ring ②  
Damage/wear → Replace the O-ring.

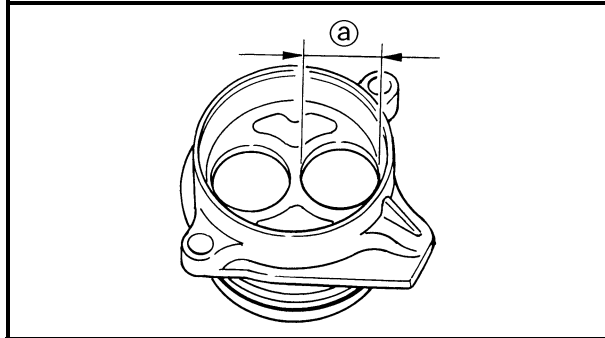


3. Measure:

- valve lifter outside diameter (a)  
Out of specification → Replace.



**Valve lifter outside diameter**  
22.9680 ~ 22.9744 mm  
(0.9043 ~ 0.9045 in)



4. Measure:

- valve lifter case inside diameter (a)  
Out of specification → Replace.



**Valve lifter case inside diameter**  
23.000 ~ 23.021 mm  
(0.9055 ~ 0.9063 in)

5. Calculate:

- valve lifter-to-valve lifter case clearance

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

Calculate the clearance by subtracting the valve lifter case outside diameter.

Above 0.072 mm (0.0028 in) → Replace the defective part(s).

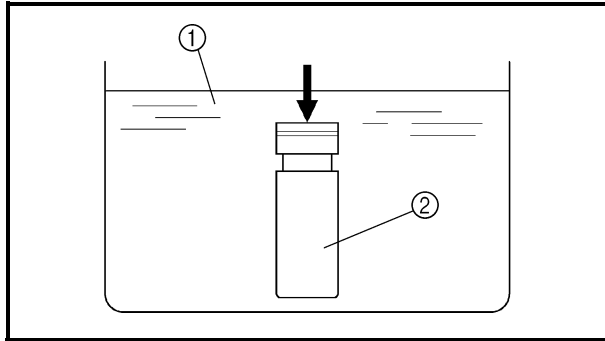


**Valve lifter-to-valve lifter case clearance**  
0.0256 ~ 0.0530 mm  
(0.0010 ~ 0.0021 in)

## BLEEDING A VALVE LIFTER

A valve lifter must be bled in the following cases.

- When installing a new valve lifter
- When the valve lifter leaks oil



1. Bleed:
  - valve lifter



- a. Fill a container with kerosene and place the valve lifter into the container as shown. Pump the plunger side of the valve lifter with a press a number of times to let in kerosene.

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

- Do not pump the valve lifter excessively.
- Kerosene is highly flammable.

- ① Kerosene
- ② Valve lifter
- b. Install the valve lifter into the engine.

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

**Be sure to install the valve lifter in its appropriate position.**

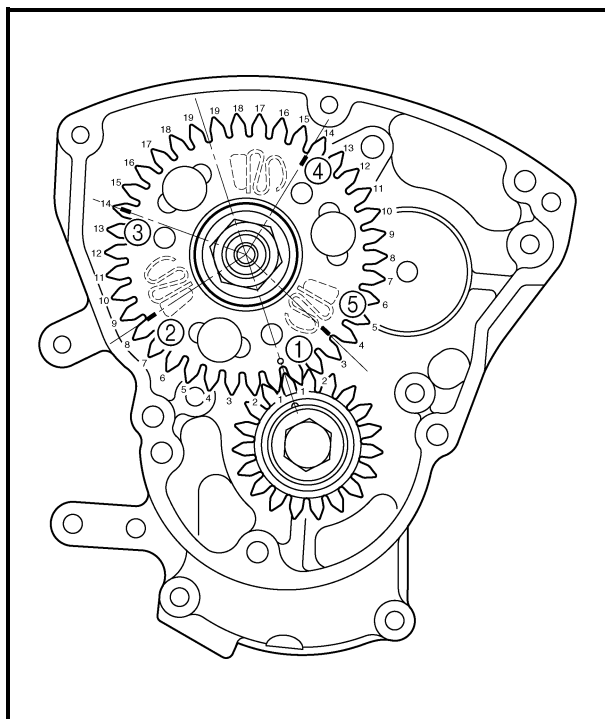
- c. Start the engine and warm it up.
- d. Stop the engine.
- e. Remove the camshaft sprocket cover.
- f. Rotate the camshaft until the punch mark ① on the camshaft driven gear aligns with the punch mark on the camshaft drive gear as shown. This is the condition in which piston #1 is at top dead center (TDC).

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

The crankshaft can be rotated smoothly when the spark plugs are removed.

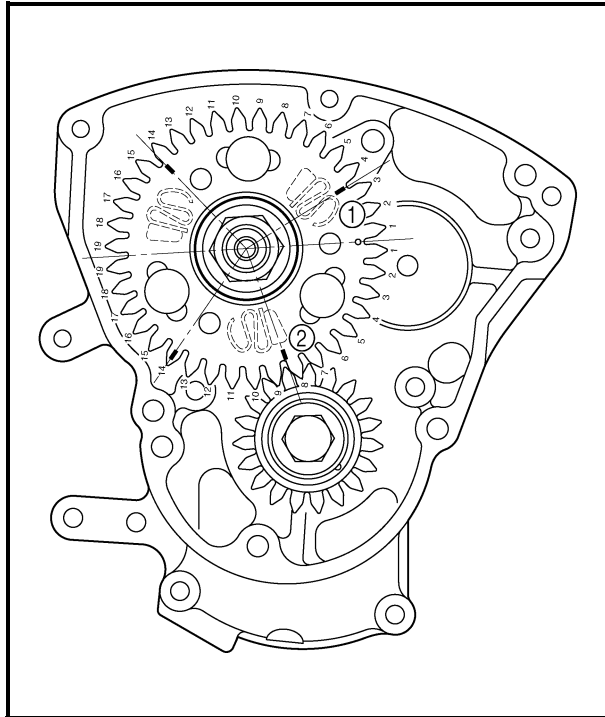
**⚠ WARNING** \_\_\_\_\_

**Be careful since the engine is hot.**



- g. With piston #1 at TDC, count the indicated number of gear teeth and place marks ② through ⑤ on the camshaft driven gear as shown. When these marks align between the centers of the camshaft drive and driven gears, the corresponding valve lifter is at its highest point.

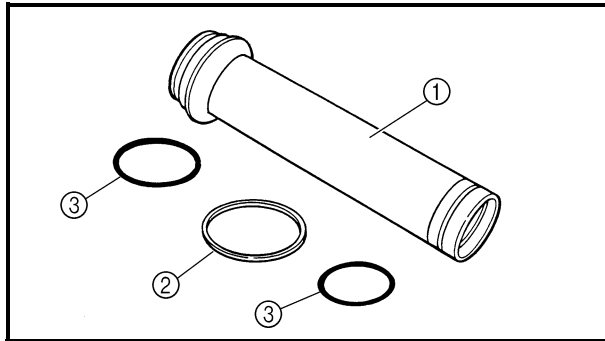
- ① Piston #1 TDC punch mark
- ② Cylinder #2 intake valve at its highest point
- ③ Cylinder #1 exhaust valve at its highest point
- ④ Cylinder #1 intake valve at its highest point
- ⑤ Cylinder #2 exhaust valve at its highest point



h. Rotate the crankshaft unit the mark (on the camshaft driven gear) for the valve lifter to be bled aligns with the camshaft drive gear as shown.

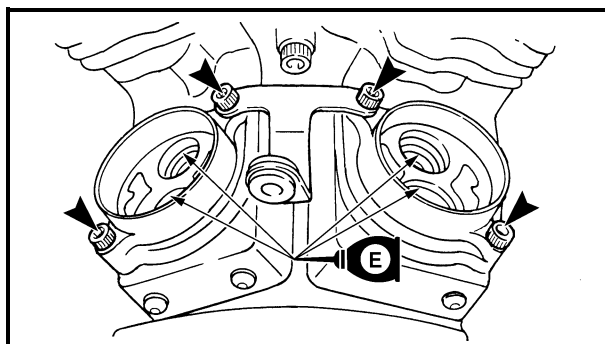
Example: For bleeding the cylinder #2 intake valve lifter, align mark ② as shown.

- ① Piston #1 TDC punch mark
- ② Cylinder #2 intake valve at its highest point
- i. Leave the camshaft drive and driven gears aligned for five minutes to allow the valve lifter to bleed.
- j. If necessary, repeat steps “h” and “i” to bleed other valve lifters.



## CHECKING THE PUSH ROD COVER

1. Check:
  - push rod cover ①  
Cranks/damage → Replace.
  - seal ②
  - O-ring ③  
Damage/wear → Replace the oil seal and O-ring as a set.

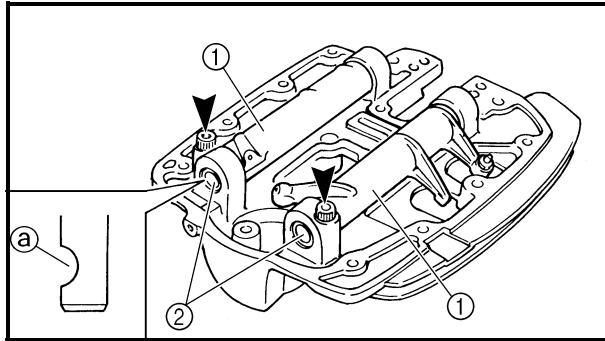


## INSTALLING THE VALVE LIFTERS

1. Install:
  - valve lifter cases (front and rear)
  - valve lifters
  - air filter bracket

### NOTE:

- Install the valve lifter in the correct place.
- After installing the valve lifters, fill the tops of them with engine oil.



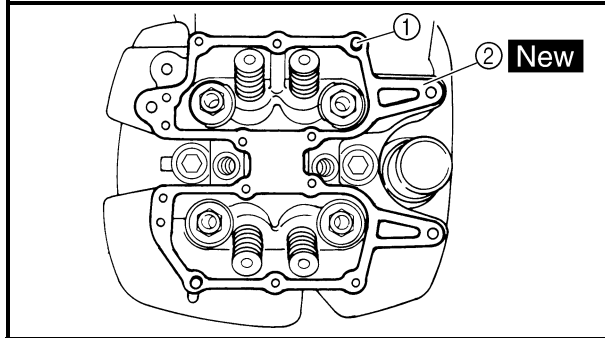
## INSTALLING THE ROCKER ARMS AND PUSH RODS

The following procedure applies to both cylinders.

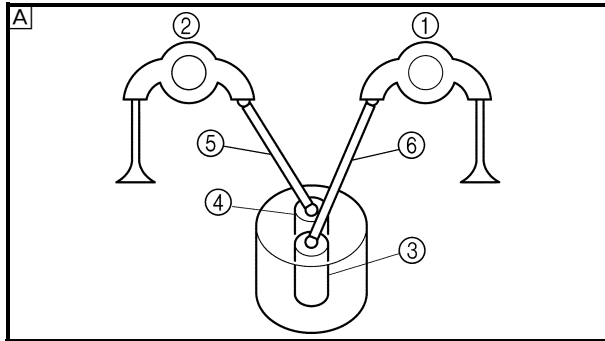
1. Install:
  - rocker arms ①
  - rocker arm shafts ② (onto rocker arm base)

**NOTE:**

The thread hole ③ of the rocker arm shaft must face to the outside.



2. Install:
  - dowel pins ①
  - rocker arm gasket ② **New**



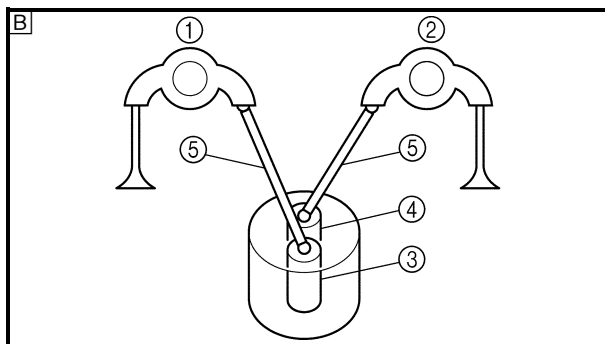
3. Install:
  - rocker arm bass (with rocker arms)
  - push rods



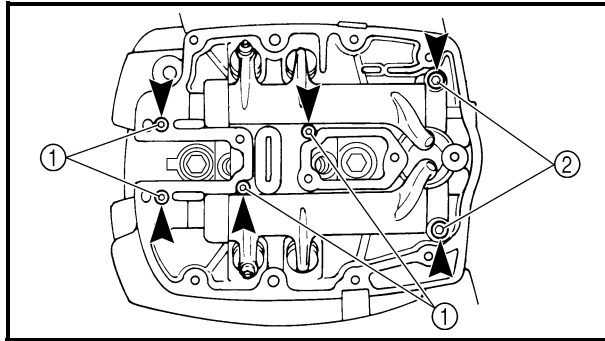
- a. Put the rocker arm base on the cylinder head.
- b. Install the push rods.

**NOTE:**

- Be sure to correctly install the push rods between the rocker arms and valve lifters as shown. The illustration is viewed from the right side of the motorcycle.



- Ⓐ Rear cylinder
- Ⓑ Front cylinder
- ① Intake side rocker arm
- ② Exhaust side rocker arm
- ③ Intake valve lifter
- ④ Exhaust valve lifter
- ⑤ Push rod 2  $\ell = 288.5$  mm (11.358 in) blue painting
- ⑥ Push rod 1  $\ell = 290.5$  mm (11.437 in) yellow painting
- The lengths of push rod 1 and push rod 2 are different. Therefore, be sure to install them in the proper position.
- Lubricate the push rod end balls with engine oil.

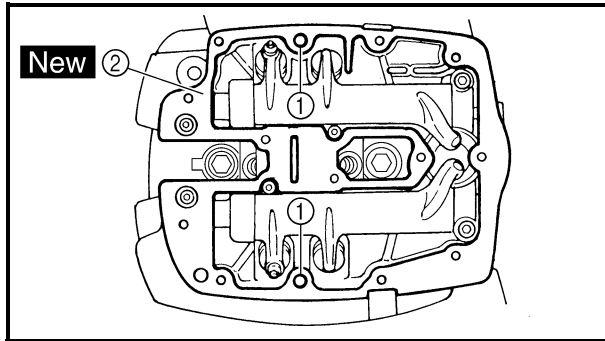


c. Install the rocker arm base bolts.

**NOTE:**

Tighten the rocker arm base bolts in stages and in a crisscross pattern.

	<b>Rocker arm base bolt ①</b>
	<b>10 Nm (1.0 m • kg, 7.2 ft • lb)</b>
	<b>Rocker arm base bolt ②</b>
	<b>24 Nm (2.4 m • kg, 17 ft • lb)</b>



## INSTALLING THE CYLINDER HEAD COVERS

The following procedure applies to both cylinders.

1. Install:

- dowel pins ①
- cylinder head cover gasket ② **New**

2. Install:

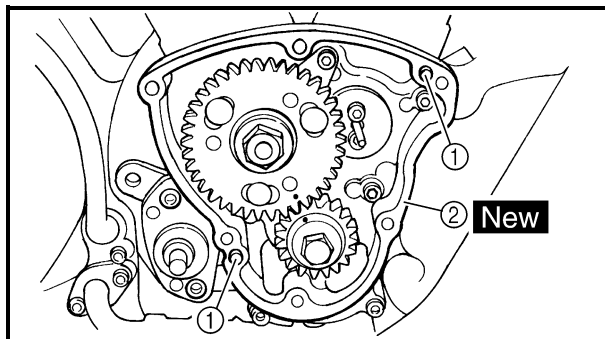
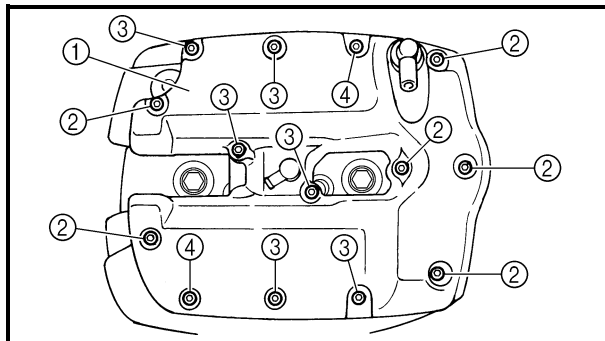
- cylinder head cover ①

**10 Nm (1.0 m • kg, 7.2 ft • lb)**

Bolts ②:  $\ell = 40 \text{ mm (1.57 in)}$

Bolts ③:  $\ell = 50 \text{ mm (1.97 in)}$

Bolts ④:  $\ell = 60 \text{ mm (2.36 in)}$



## INSTALLING THE CAMSHAFT SPROCKET COVER AND ENGINE LEFT SIDE COVER

1. Install:

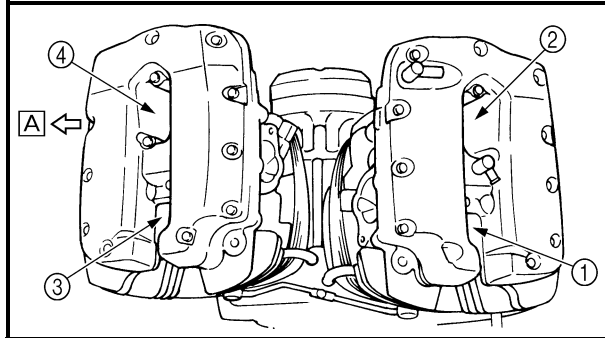
- dowel pins ①
- camshaft sprocket cover gasket ② **New**



2. Install:
  - canister (for California only)

**NOTE:** \_\_\_\_\_  
Refer to “CABLE ROUTING” in chapter 2.

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3. Install:
  - spark plugs
4. Connect:
  - spark plug caps

**NOTE:** \_\_\_\_\_  
Refer to “CABLE ROUTING” in chapter 2.

---

- A** Forward
- ① Ignition coil 1 - L spark plug lead
  - ② Ignition coil 1 - R spark plug lead
  - ③ Ignition coil 2 - L spark plug lead
  - ④ Ignition coil 2 - R spark plug lead

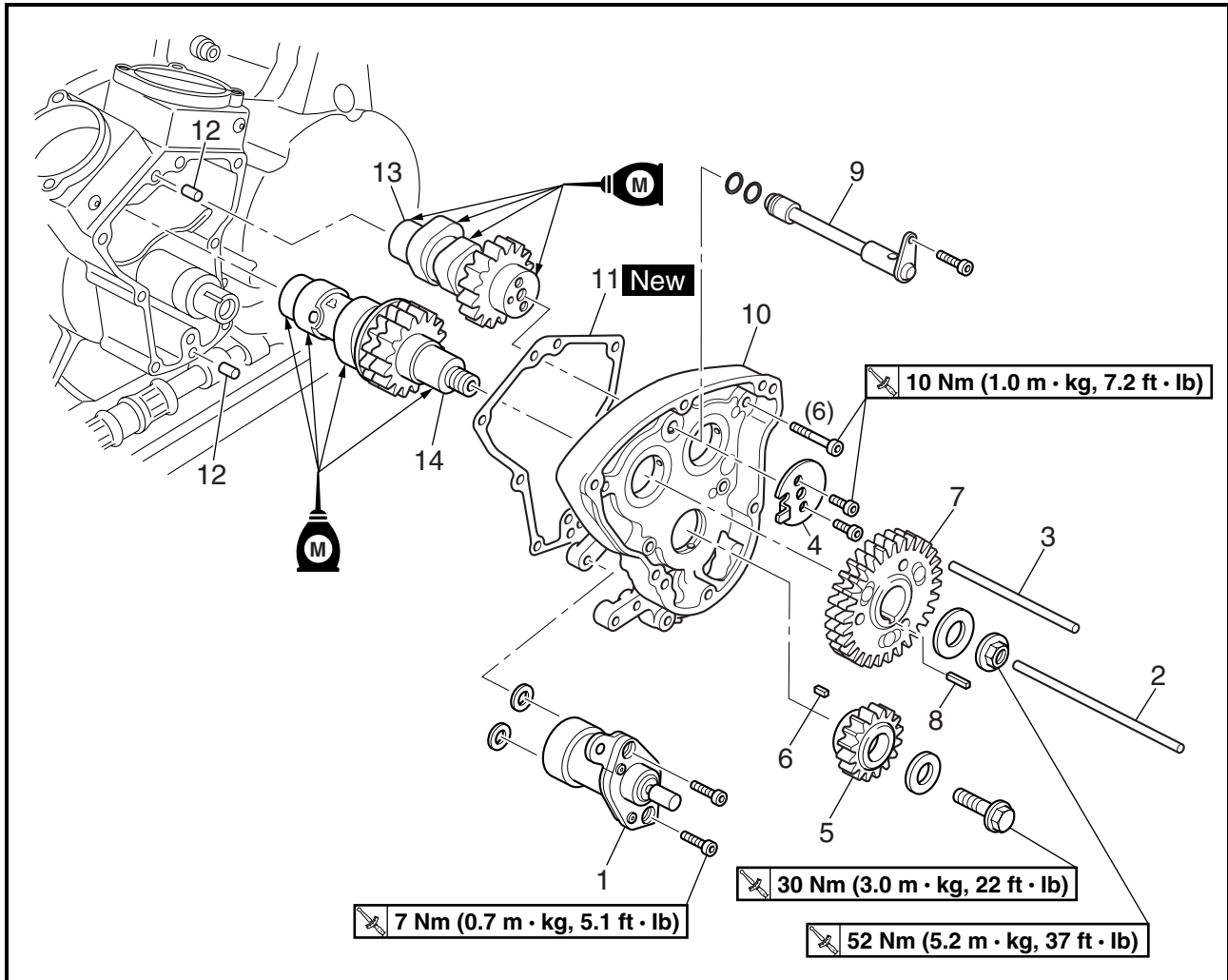
5. Adjust:
  - installed shift rod lengthRefer to “ADJUSTING THE SHIFT PEDAL” in chapter 3.



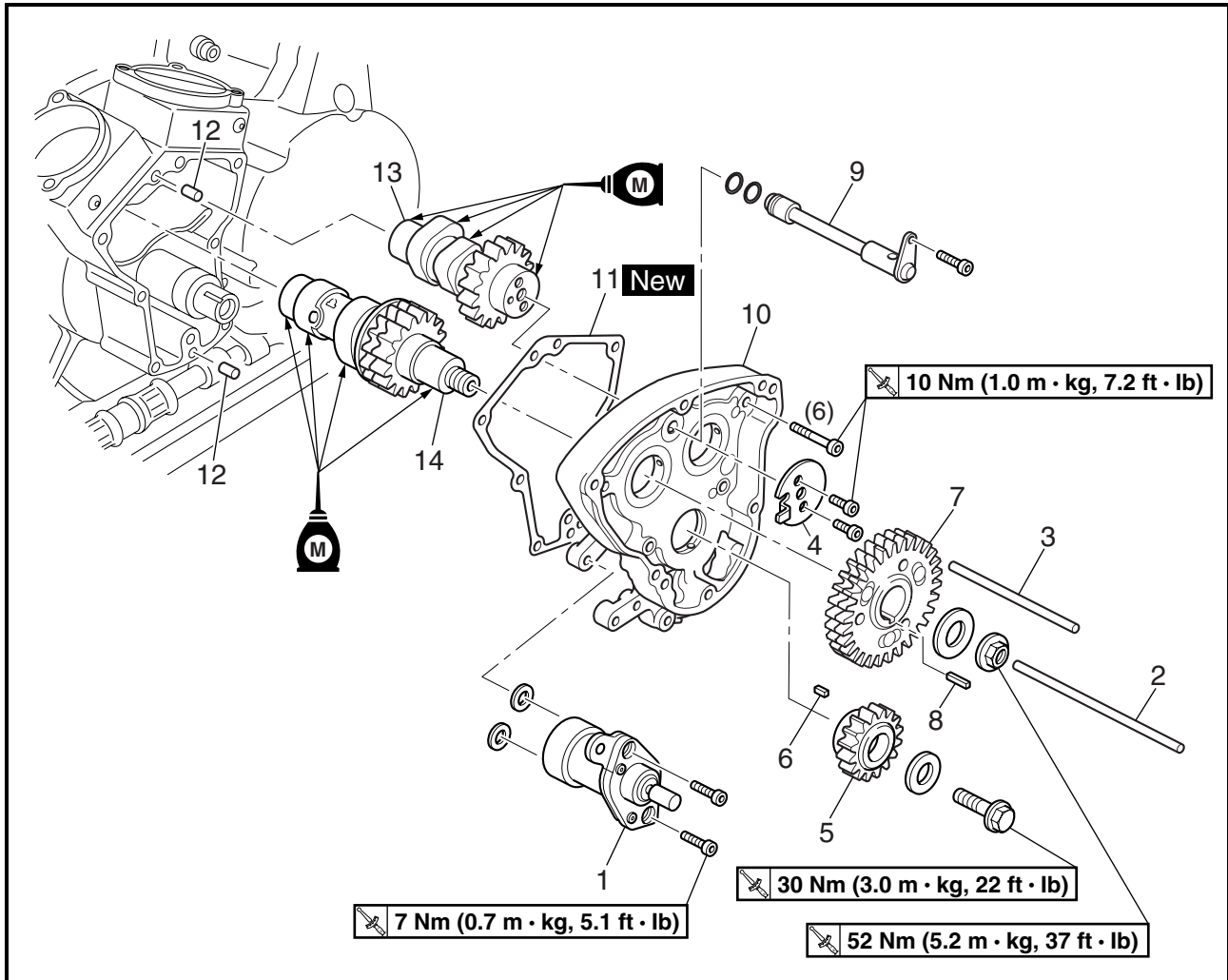


EAS00196

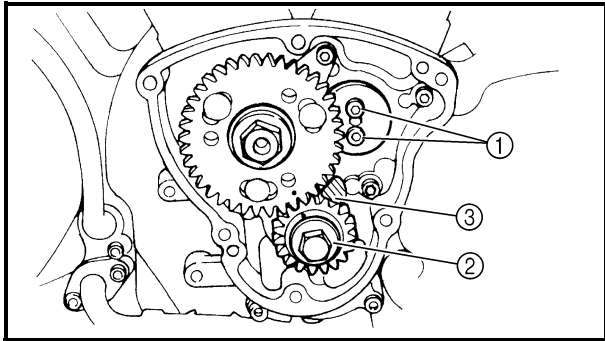
CAMSHAFTS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the camshafts</b>		
	Valve lifters		Remove the parts in the order listed. Refer to "ROCKER ARMS, PUSH RODS AND VALVE LIFTERS".
1	Decompression solenoid	1	
2	Long decompression push rod	1	92 mm (3.6 in)
3	Short decompression push rod	1	78 mm (3.1 in)
4	Front cylinder camshaft end cover	1	Refer to "REMOVING THE CAM-SHAFTS" and "INSTALLING THE CAM-SHAFTS".
5	Camshaft drive gear	1	
6	Straight key	1	



Order	Job/Part	Q'ty	Remarks
7	Camshaft driven gear	1	Refer to "REMOVING THE CAMSHAFTS" and "INSTALLING THE CAMSHAFTS".
8	Straight key	1	
9	Oil delivery pipe	1	
10	Camshaft cover	1	
11	Camshaft cover gasket	1	
12	Dowel pin	2	
13	Front cylinder camshaft	1	
14	Rear cylinder camshaft	1	
			For installation, reverse the removal procedure.



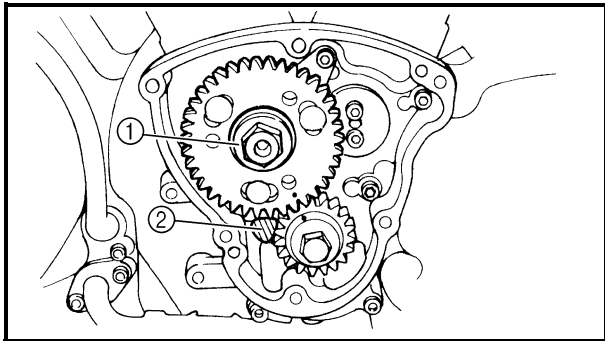
## REMOVING THE CAMSHAFTS

### 1. Loosen:

- front cylinder camshaft end cover bolts ①
- camshaft drive gear bolt ②

### NOTE:

- Place a folded copper washer ③ between the teeth of the camshaft drive gear and camshaft driven gear in order to lock them.
- Do not damage the teeth of the camshaft drive and camshaft driven gears.

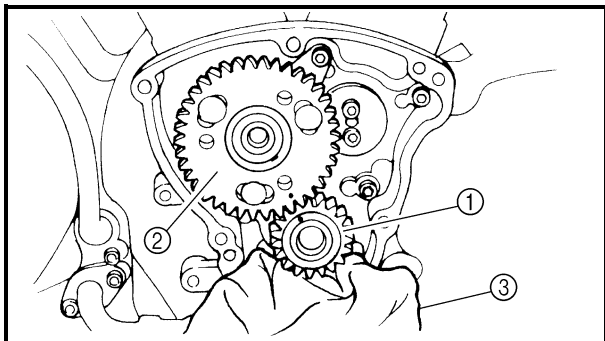


### 2. Loosen:

- camshaft driven gear nut ①

### NOTE:

- Place a folded copper washer ② between the teeth of the camshaft drive gear and camshaft driven gear in order to lock them.
- Do not damage the teeth of the camshaft drive and camshaft driven gears.

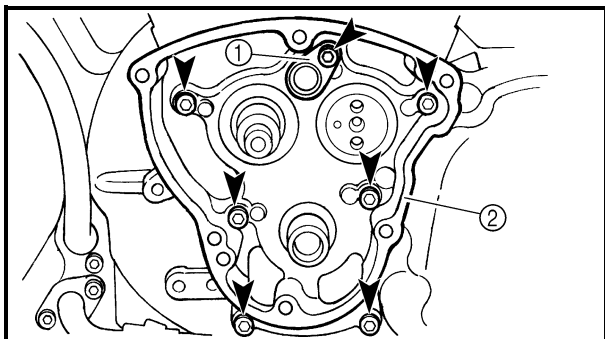


### 3. Remove:

- front cylinder camshaft end cover
- camshaft drive gear ①
- camshaft driven gear ②
- straight keys

### NOTE:

Cover the crankcase hole with a clean rag ③ to prevent the straight keys from falling into the crankcase.



### 4. Remove:

- oil delivery pipe ①
- camshaft cover ②  
(along with the camshafts)

### 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.



EAS00204

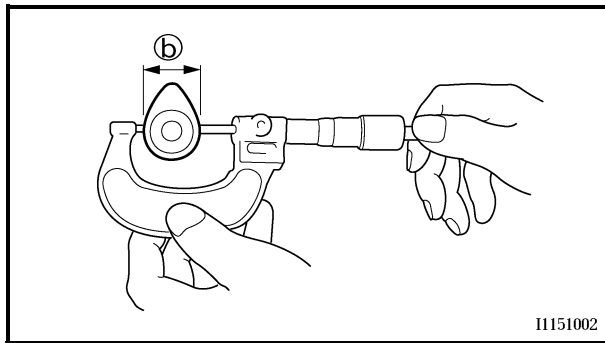
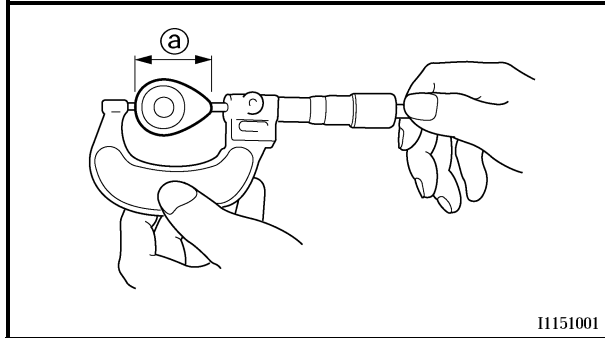
**CHECKING THE CAMSHAFTS**

## 1. Check:

- cam

Blue discoloration/pitting/scratches →

Replace the camshaft.



## 2. Measure:

- cam dimensions ① and ②

Out of specification → Replace the camshaft.

**Camshaft lobe dimension limit  
Intake camshaft**

① 38.231 ~ 38.331 mm

(1.5052 ~ 1.5091 in)

② 32.013 ~ 32.113 mm

(1.2604 ~ 1.2643 in)

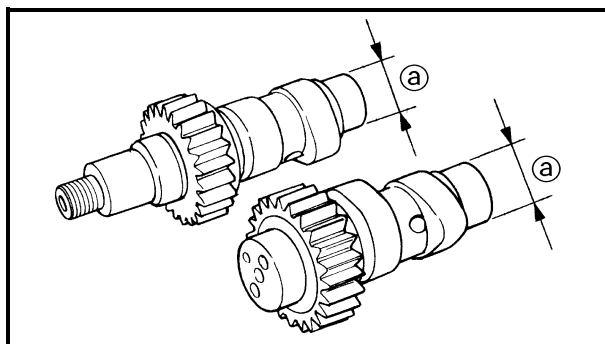
**Exhaust camshaft**

① 38.232 ~ 38.332 mm

(1.5052 ~ 1.5091 in)

② 31.995 ~ 32.095 mm

(1.2596 ~ 1.2636 in)



## 3. Measure:

- camshaft journal diameter (crankcase side)

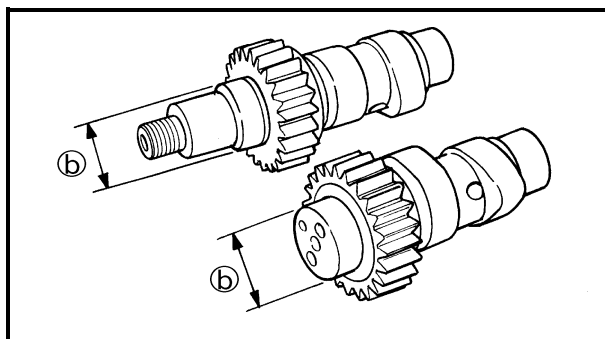
①

Out of specification → Replace the camshaft.

**Camshaft journal diameter  
(crankcase side)**

24.937 ~ 24.950 mm

(0.9818 ~ 0.9823 in)



## 4. Measure:

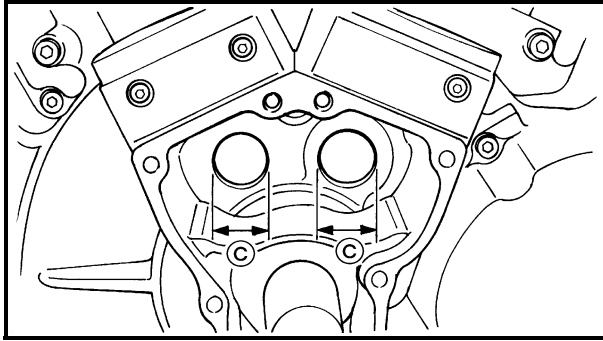
- camshaft journal diameter (camshaft cover side) ②

Out of specification → Replace the camshaft.

**Camshaft journal diameter  
(camshaft cover side)**

27.967 ~ 27.980 mm

(1.1011 ~ 1.1016 in)

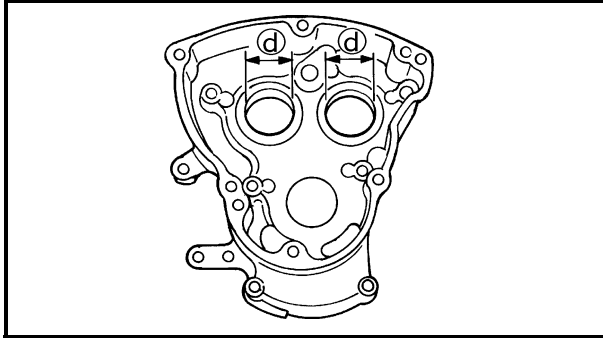


5. Measure:

- crankcase hole inside diameter ©  
Out of specification → Replace the crankcase.



**Crankcase hole inside diameter**  
25.000 ~ 25.021 mm  
(0.9843 ~ 0.9851 in)



6. Measure:

- camshaft cover hole inside diameter Ⓓ  
Out of specification → Replace the camshaft cover.



**Camshaft cover hole inside diameter**  
28.000 ~ 28.021 mm  
(1.1024 ~ 1.1032 in)

7. Calculate:

- camshaft-to-crankcase clearance  
Out of specification → Replace the defective part(s).

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

Calculate the clearance by subtracting the crankcase side camshaft journal diameter (crankcase side) from the crankcase hole inside diameter.



**Camshaft to crankcase clearance**  
0.050 ~ 0.084 mm  
(0.0020 ~ 0.0033 in)

8. Calculate:

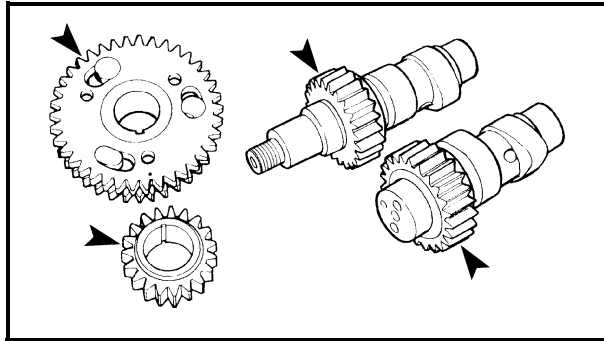
- camshaft to camshaft cover clearance  
Out of specification → Replace the defective part(s).

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

Calculate the clearance by subtracting the camshaft journal diameter (camshaft cover side) from the camshaft cover hole inside diameter.



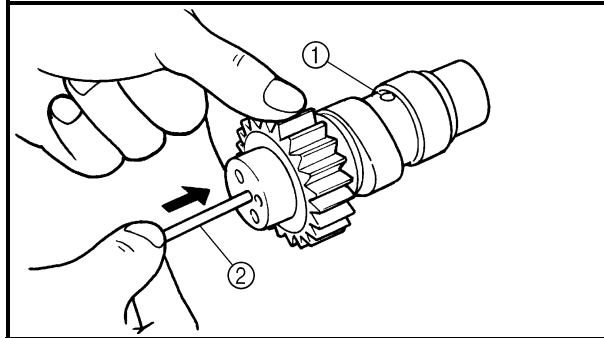
**Camshaft to camshaft cover clearance**  
0.020 ~ 0.054 mm  
(0.0008 ~ 0.0021 in)



## 9. Check:

- camshaft drive gears
- camshaft driven gears

Chips/pitting/roughness/wear → Replace the defective part(s).

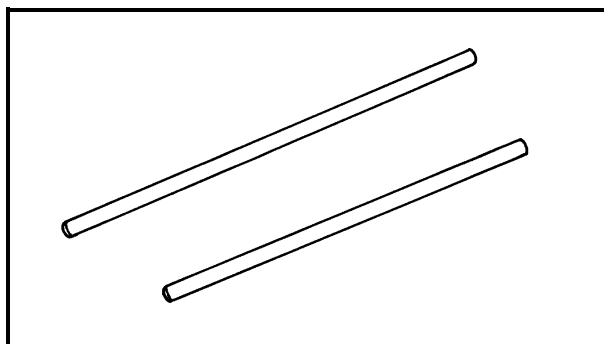
**CHECKING THE DECOMPRESSION SYSTEM**

## 1. Check:

- decompression system

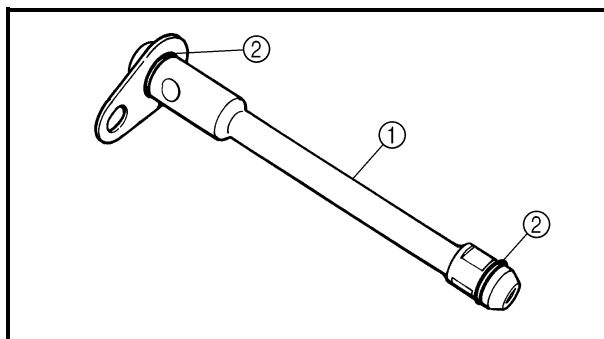
**NOTE:**

- Check the decompression system while the decompression push rod is installed in the camshaft.
- Check that the decompression pin ① projects from the camshaft.
- Check that the decompression push rod ② moves smoothly.



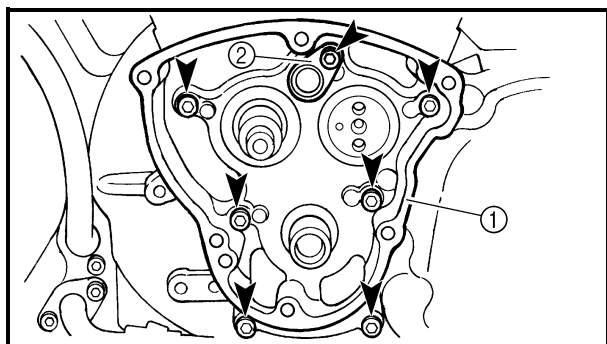
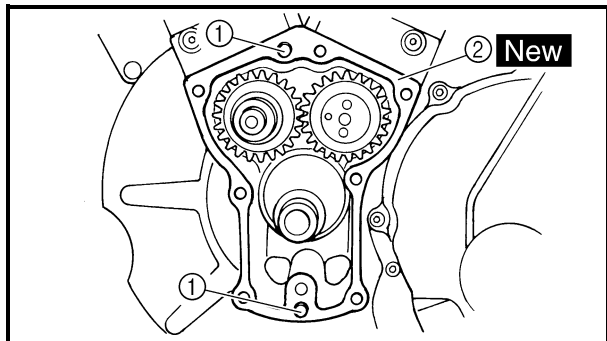
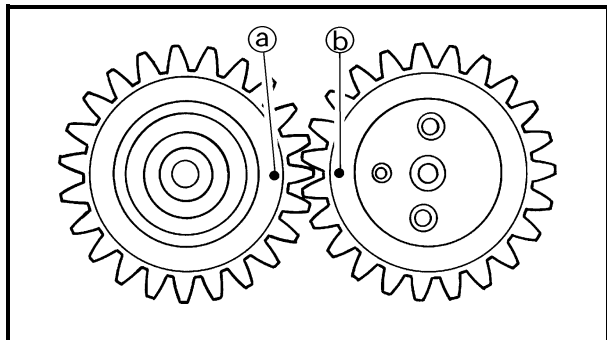
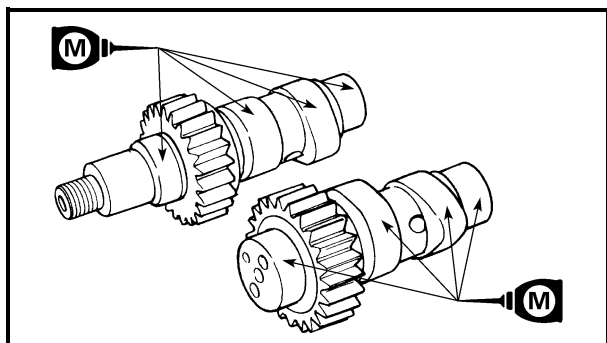
## 2. Check:

- decompression push rods
- Bends/damage → Replace.

**CHECKING THE OIL DELIVERY PIPE**

## 1. Check:

- oil delivery pipe ①
- Damage → Replace.  
Obstruction → Wash and blow out with compressed air.
- O-rings ②
- Damage/wear → Replace.



## INSTALLING THE CAMSHAFTS

1. Install:
  - camshafts  
(to the camshaft cover)
  - front cylinder camshaft end cover

### NOTE:

- Lubricate molybdenum disulfide oil onto the camshaft journals and lobes.
- Align the punch mark (a) on the rear cylinder camshaft with the punch mark (b) on the front cylinder camshaft.

2. Install:

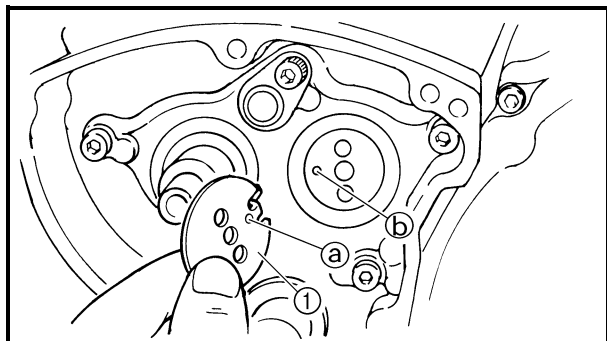
- dowel pins (1)
- camshaft cover gasket (2) **New**

3. Install:

- camshaft cover (1)  
(along with the camshafts)
- oil delivery pipe (2)

### NOTE:

Tighten the camshaft cover bolts in stages and in a crisscross pattern.

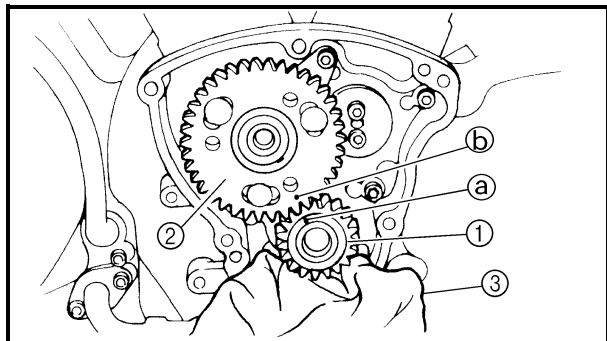
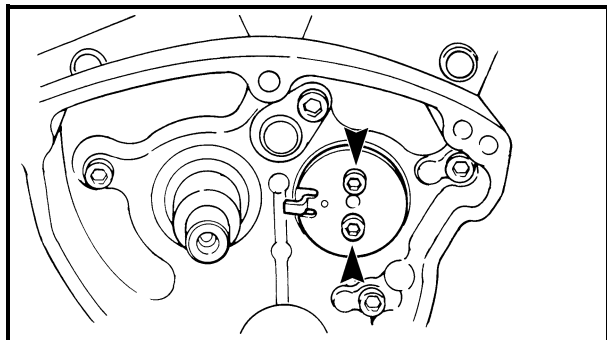


## 4. Install:

- front cylinder camshaft end cover ①

**NOTE:**

- Align the projection (a) on the front cylinder camshaft end cover with the hole (b) on the front cylinder camshaft.
- Finger tighten the place bolts.

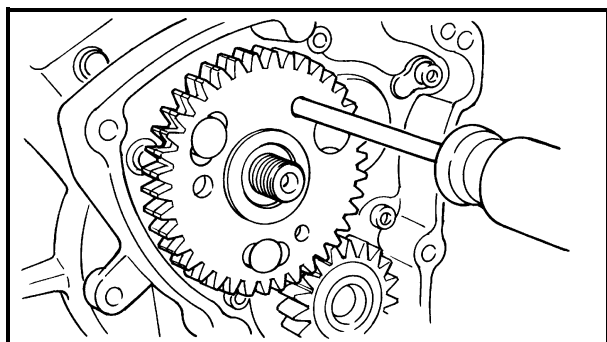


## 5. Install:

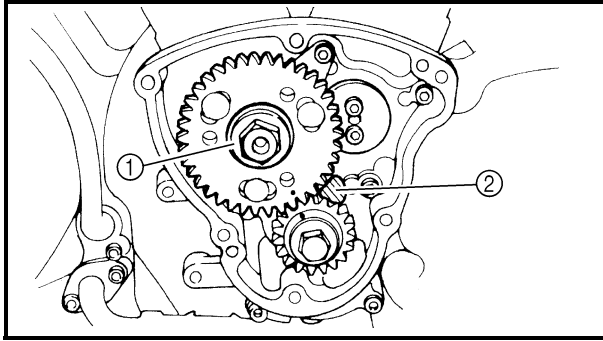
- straight keys
- camshaft drive gear ①
- camshaft driven gear ②

**NOTE:**

- Cover the crankcase hole with a clean rag (3) to prevent the straight keys from falling into the crankcase.
- Align the punch mark (a) on the camshaft drive gear (1) with the punch mark (b) on the camshaft driven gear (2).
- Insert a cross-headed screwdriver into one of the holes in the outer camshaft driven gear and rotate the gear until the teeth of both driven gears are aligned. The teeth of both camshaft driven gears must be aligned for installation.








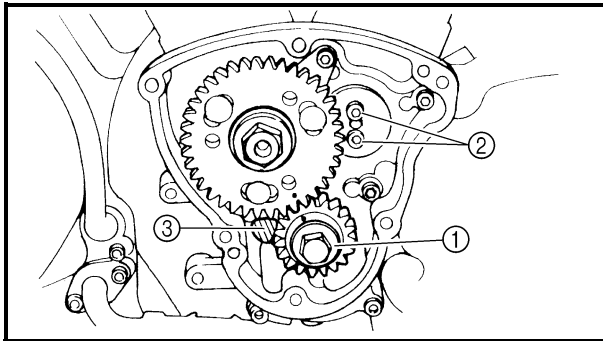
## 6. Tighten:

- camshaft driven gear nut ①

 52 Nm (5.2 m • kg, 37 ft • lb)


**NOTE:**

- Place a folded copper washer ② between the teeth of the camshaft drive gear and camshaft driven gear in order to lock them.
- Do not damage the teeth of the camshaft drive and camshaft driven gear.
- After tightening the camshaft driven gear nut, remove the copper washer to clean the teeth of the camshaft drive gear and camshaft driven gear.




## 7. Tighten:

- camshaft drive gear bolt ①

 30 Nm (3.0 m • kg, 22 ft • lb)

- front cylinder camshaft end cover bolts ②

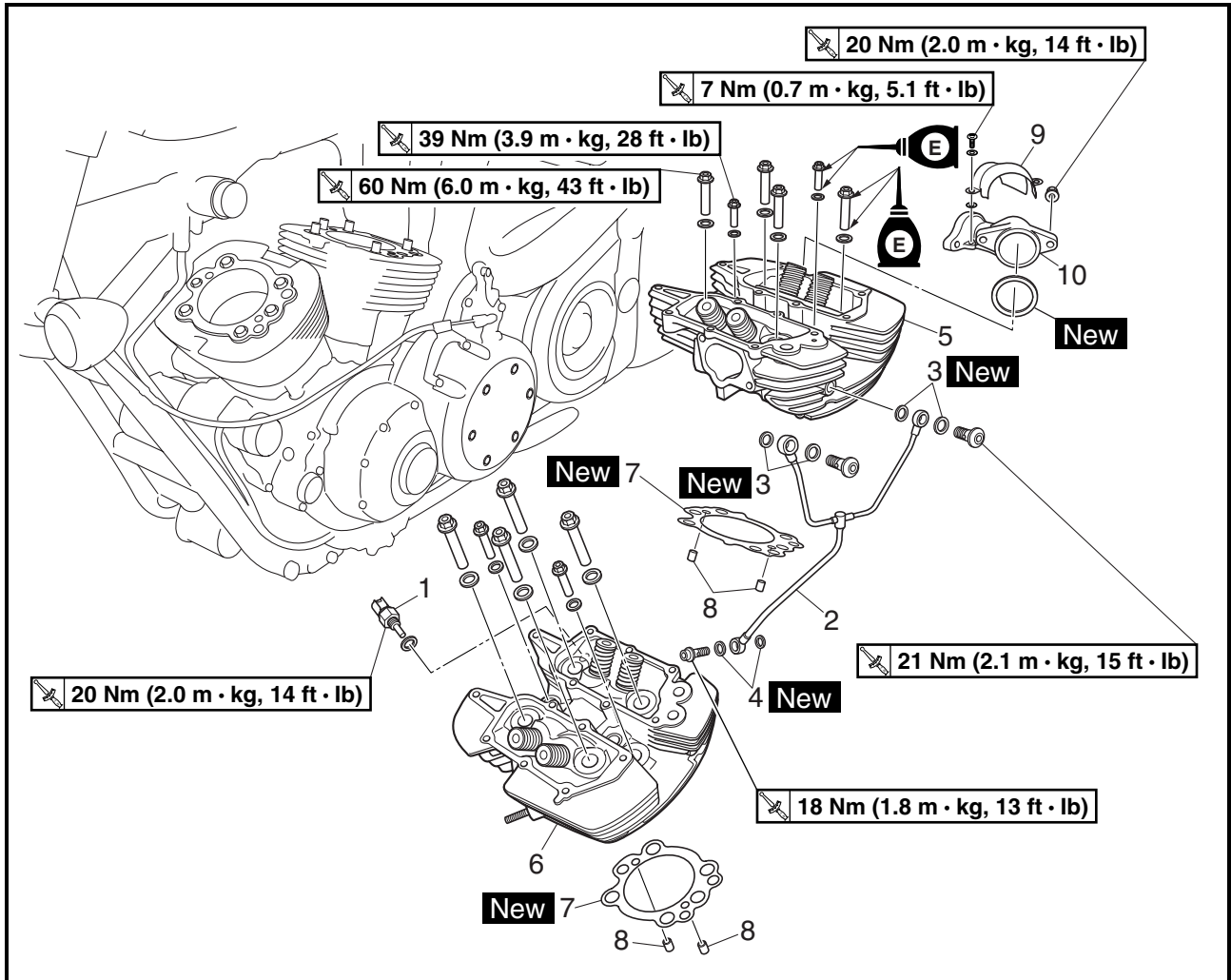
 10 Nm (1.0 m • kg, 7.2 ft • lb)

**NOTE:**

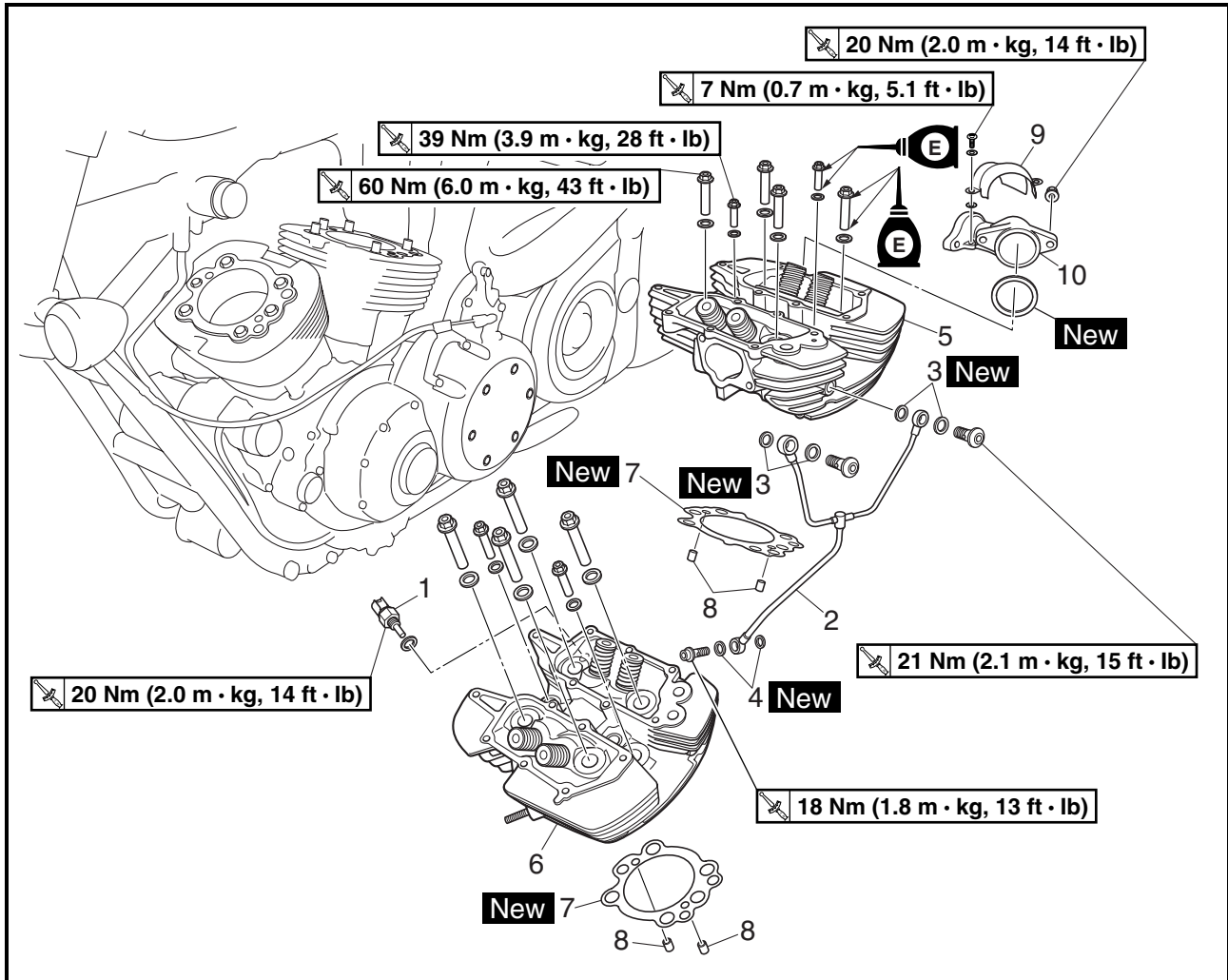
- Place a folded copper washer ③ between the teeth of the camshaft drive gear and camshaft driven gear in order to lock them.
- Do not damage the teeth of the camshaft drive and camshaft driven gear.
- After tightening the camshaft drive gear bolt, remove the copper washer to clean the teeth of the camshaft drive gear and camshaft driven gear.

EAS00221

CYLINDER HEADS

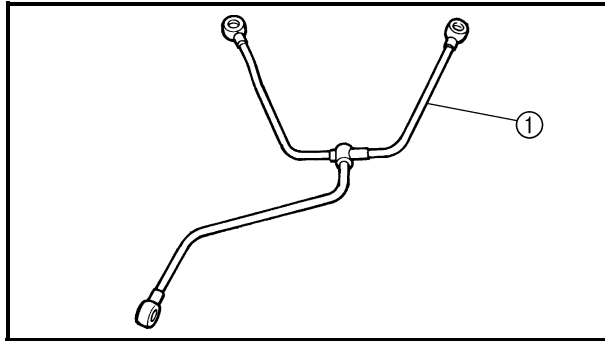


Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinder heads</b>		Remove the parts in the order listed.
	Throttle bodies/intake manifolds		Refer to "THROTTLE BODIES" in chapter 6.
	Air cut-off valve assembly		Refer to "AIR CUT-OFF VALVE ASSEMBLY AND AIR INDUCTION SYSTEM HOSES" in chapter 6.
	Rocker arms/cylinder head covers		Refer to "ROCKER ARMS, PUSH RODS AND VALVE LIFTERS".
1	Engine temperature sensor	1	
2	Oil delivery pipe	1	Refer to "INSTALLING THE CYLINDER HEAD".
3	Copper washer	4	
4	Copper washer	2	



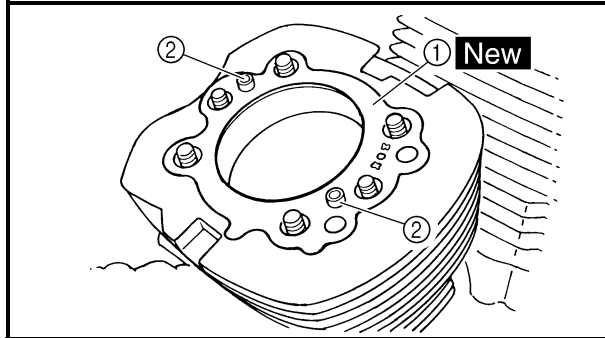
Order	Job/Part	Q'ty	Remarks
5	Rear cylinder head	1	Refer to "REMOVING THE CYLINDER HEADS".
6	Front cylinder head	1	
7	Cylinder head gasket	2	
8	Dowel pin	4	
9	Rear exhaust pipe joint cover	1	
10	Rear exhaust pipe joint	1	
			Refer to "INSTALLING THE CYLINDER HEAD".
			For installation, reverse the removal procedure.





**CHECKING THE OIL DELIVERY PIPE**

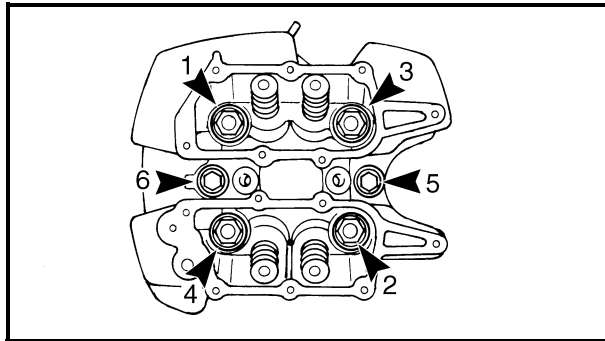
1. Check:
  - oil delivery pipe ①  
Damage → Replace.  
Obstruction → Wash and blow out with compressed air.



EAS00232

**INSTALLING THE CYLINDER HEAD**

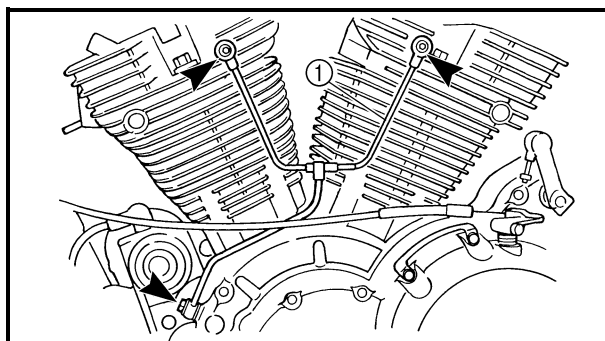
1. Install:
  - cylinder head gasket ① **New**
  - dowel pins ②
2. Install:
  - cylinder heads
  - washers



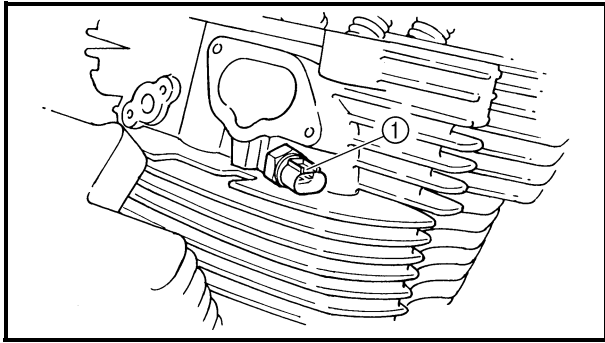
3. Tighten:
  - cylinder head nuts (M12: 1 ~ 4)  
**60 Nm (6.0 m • kg, 43 ft • lb)**
  - cylinder head nuts (M10: 5 ~ 6)  
**39 Nm (3.9 m • kg, 28 ft • lb)**

**NOTE:**


- Lubricate the cylinder head nuts with engine oil.
- Tighten the cylinder head nuts in the proper tightening sequence as shown and torque them in two stages.



5. Install:
  - copper washers **New**
  - oil delivery pipe ①
  - oil delivery pipe bolts (M10)  
**21 Nm (2.1 m • kg, 15 ft • lb)**
  - oil delivery pipe bolts (M8)  
**18 Nm (1.8 m • kg, 13 ft • lb)**



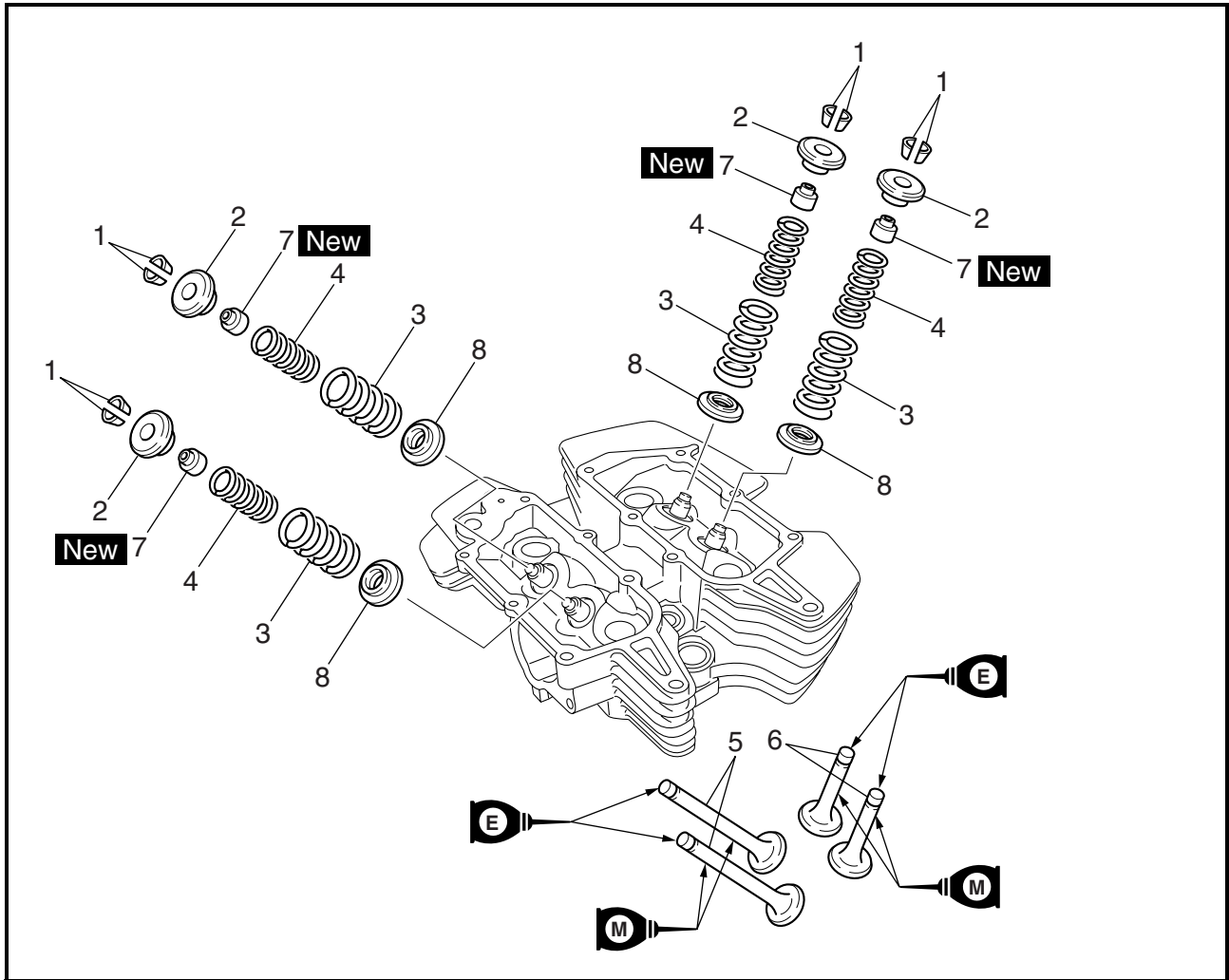
6. Install:
- washer
  - engine temperature sensor ①

 **20 Nm (2.0 m • kg, 14 ft • lb)**



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.
			The following procedure applies to both cylinders.
			Refer to "CYLINDER HEADS".
1	Cylinder head	8	
	Valve cotter	4	
2	Upper spring seat	4	
3	Outer valve spring	4	
4	Inner valve spring	4	Refer to "REMOVING THE VALVES" and "INSTALLING THE VALVES".
5	Intake valve	2	
6	Exhaust valve	2	
7	Valve stem seal	4	
8	Lower spring seat	4	
			For installation, reverse the removal procedure.



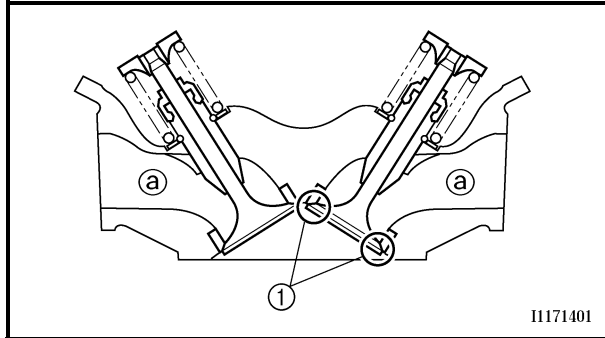
EAS00238

## 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. Check:

- valve sealing (for leakage)

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

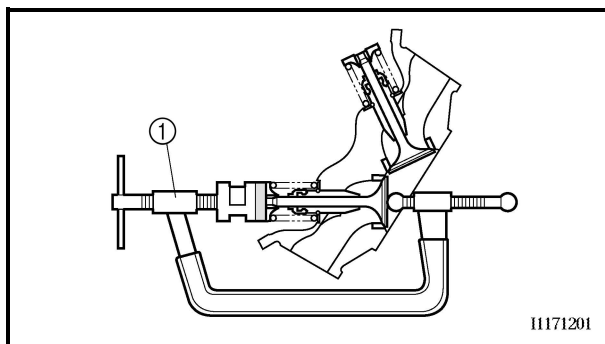


a. Pour a clean solvent ① into the intake and exhaust ports.

b. Check that the valves properly seal.

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

There should be no leakage at the valve seat ①.



2. Remove:

- valve cotters

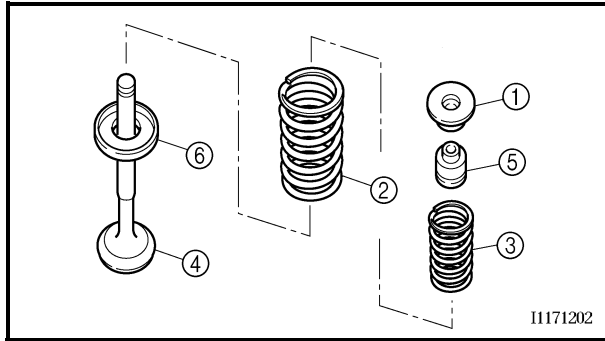
**NOTE:** \_\_\_\_\_

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



**Valve spring compressor set  
YM-04019**



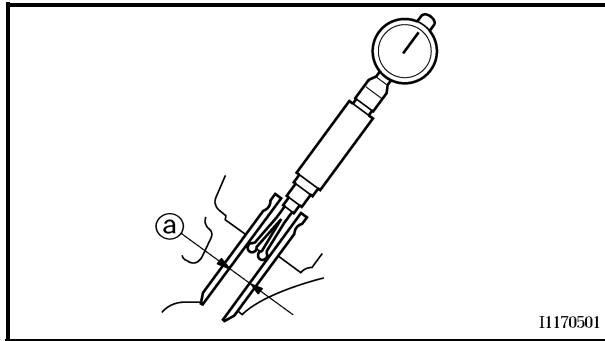


3. Remove:

- upper spring seat ①
- outer valve spring ②
- inner valve spring ③
- valve ④
- valve stem seal ⑤
- lower spring seat ⑥

**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**

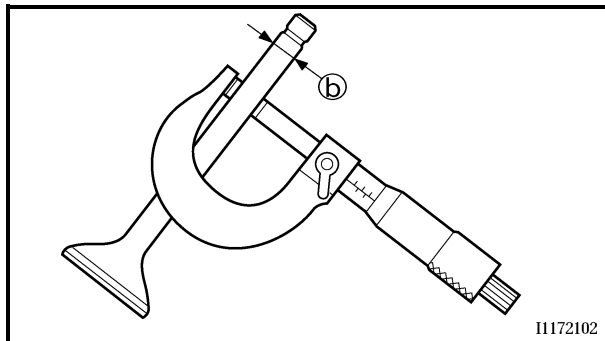
The following procedure applies to all of the valves and valve guides.

1. Measure:

- valve-stem-to-valve-guide clearance

$$\text{Valve-stem-to-valve-guide clearance} = \text{Valve guide inside diameter (a)} - \text{Valve stem diameter (b)}$$

Out of specification → Replace the valve guide.



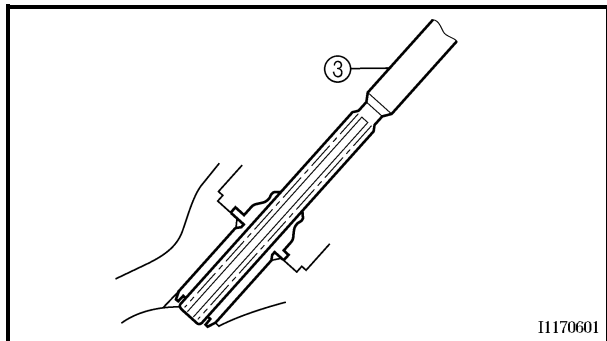
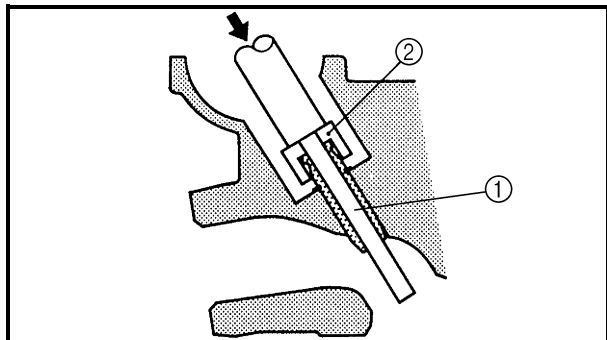
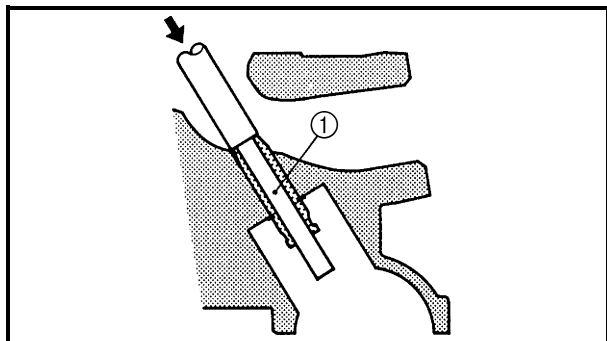
**Valve-stem-to-valve-guide clearance**

**Intake**

0.010 ~ 0.037 mm  
(0.0004 ~ 0.0015 in)  
<Limit>: 0.08 mm (0.0031 in)

**Exhaust**

0.025 ~ 0.052 mm  
(0.0010 ~ 0.0020 in)  
<Limit>: 0.1 mm (0.0039 in)



11170601

2. Replace:
- valve guide

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

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



- Remove the valve guide with the valve guide remover ①.
- Install the new valve guide with the valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide with the valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

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

After replacing the valve guide, reface the valve seat.



Valve guide remover (ø6)

YM-04064-A

Valve guide installer (ø6)

YM-04065-A

Valve guide reamer (ø6)

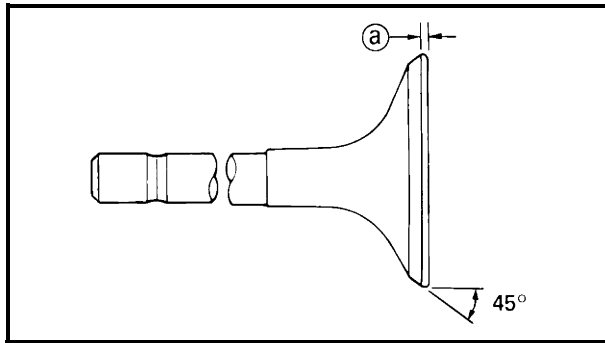
YM-04066



3. Eliminate:
- carbon deposits  
(from the valve face and valve seat)

4. Check:
- valve face  
Pitting/wear → Grind the valve face.

- valve stem end  
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

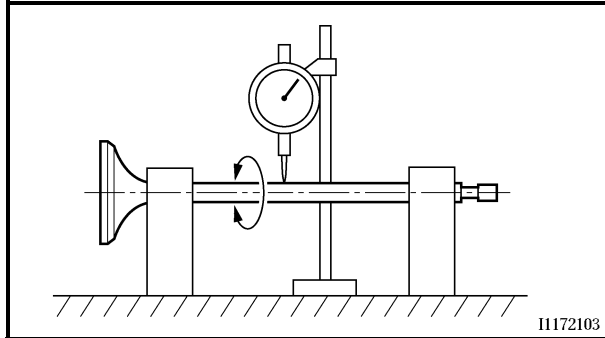


5. Measure:

- valve margin thickness @
- Out of specification → Replace the valve.



**Valve margin thickness**  
0.7 ~ 1.3 mm (0.0276 ~ 0.0512 in)



6. Measure:

- valve stem runout
- Out of specification → Replace the valve.

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

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.



**Valve stem runout**  
0.01 mm (0.0004 in)

EAS00240

## CHECKING THE VALVE SEATS

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

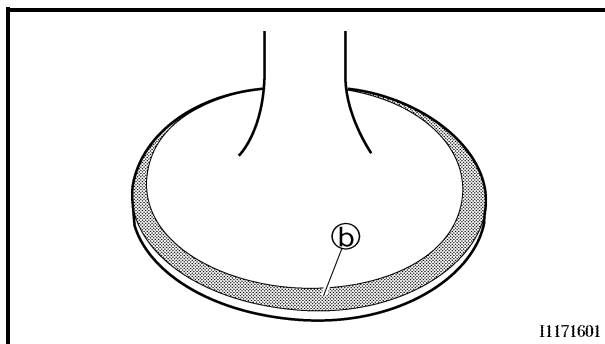
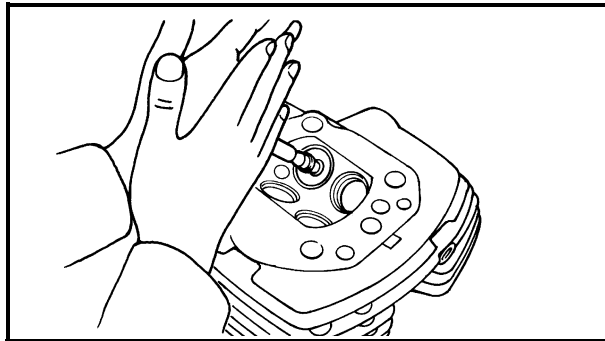
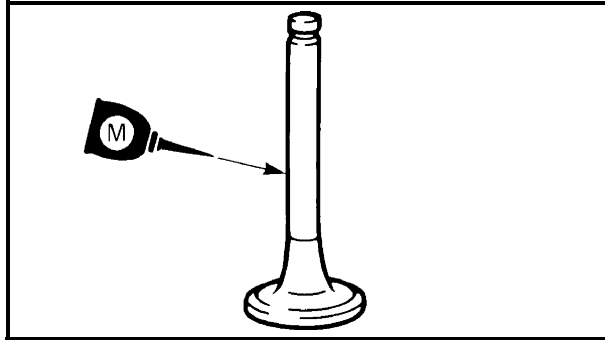
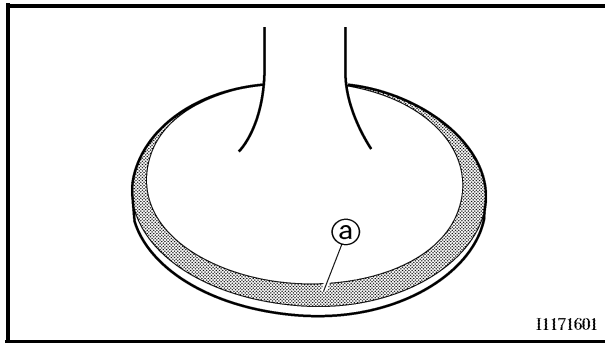
1. Eliminate:

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

2. Check:

- valve seat  
Pitting/wear → Replace the cylinder head.





4. Lap:
- valve face
  - valve seat

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

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



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

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

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

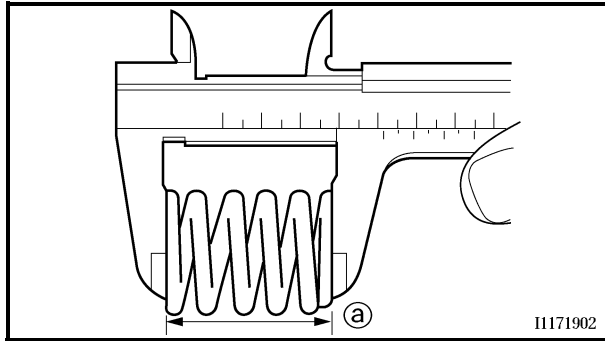
- b. Apply molybdenum disulfide oil onto the valve stem.  
 c. Install the valve into the cylinder head.  
 d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

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

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- e. Apply a fine lapping compound to the valve face and repeat the above steps.  
 f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.  
 g. Apply Mechanic's blueing dye (Dykem) (b) onto the valve face.  
 h. Install the valve into the cylinder head.  
 i. Press the valve through the valve guide and onto the valve seat to make a clear impression.  
 j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.





EAS00241

## CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:

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



### Valve spring free length

#### Intake valve spring

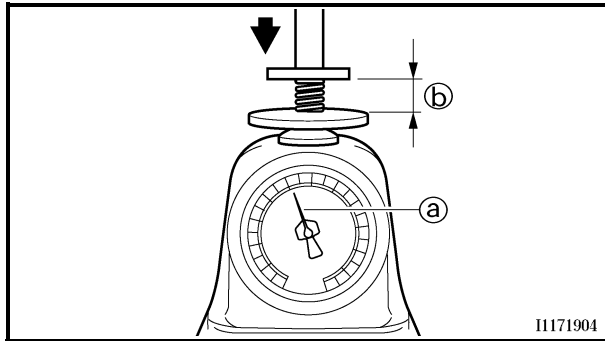
38.26 mm (1.51 in)

<Limit>: 36.26 mm (1.43 in)

#### Exhaust valve spring

38.26 mm (1.51 in)

<Limit>: 36.26 mm (1.43 in)



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 inner valve spring

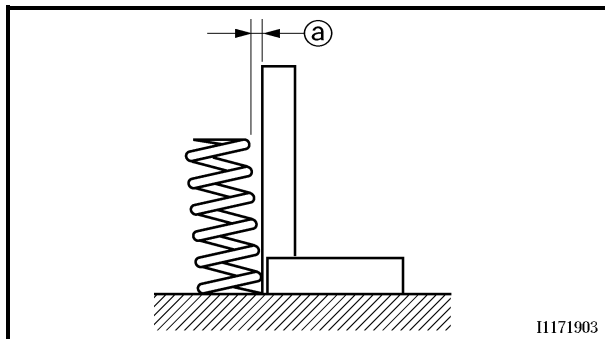
6.3 ~ 7.3 kg at 29.0 mm

(13.9 ~ 16.1 lb at 1.14 in)

#### Intake and exhaust outer valve spring

13.9 ~ 16.1 kg at 31.0 mm

(30.6 ~ 35.5 lb at 1.22 in)



3. Measure:

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



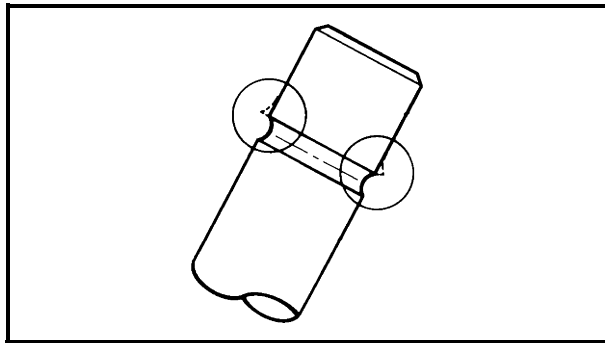
### Spring tilt limit

#### Intake and exhaust inner valve spring

2.4 mm (0.094 in)

#### Intake and exhaust outer valve spring

2.4 mm (0.094 in)

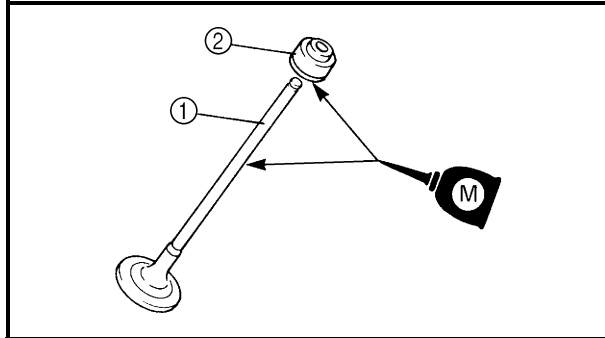


EAS00246


## INSTALLING THE VALVES

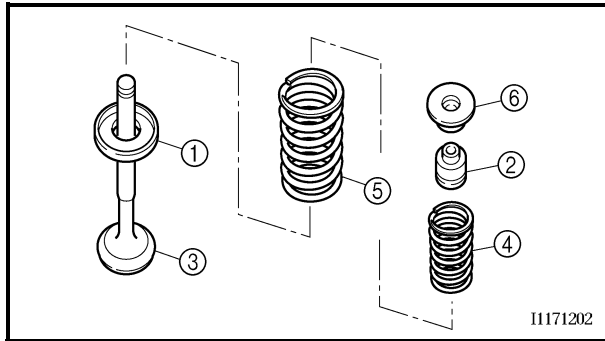
The following procedure applies to all of the valves and related components.

1. Deburr:
  - valve stem end  
(with an oil stone)



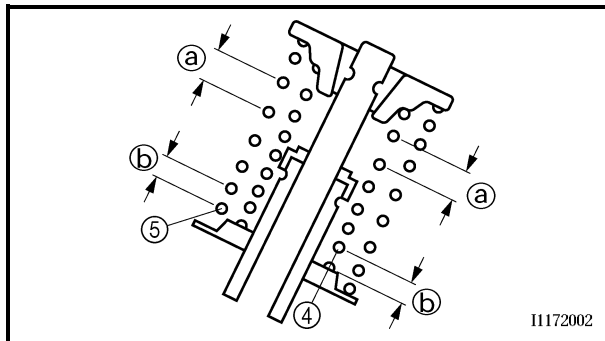
2. Lubricate:
  - valve stem ①
  - oil seal ②  
(with the recommended lubricant)

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

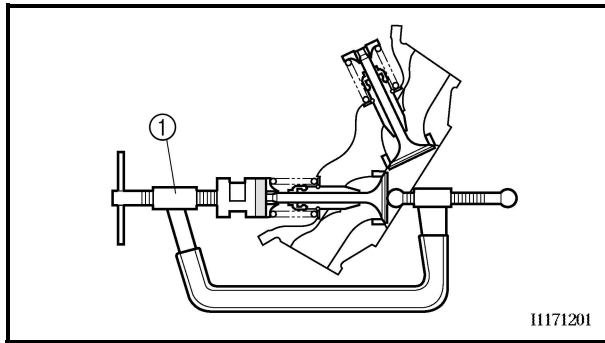


3. Install:
  - lower spring seat ①
  - valve stem seal ②
  - valve ③
  - inner valve spring ④
  - outer valve spring ⑤
  - upper spring seat ⑥  
(into the cylinder head)

**NOTE:** \_\_\_\_\_  
 Install the valve springs with the larger pitch ① facing up.



② Smaller pitch

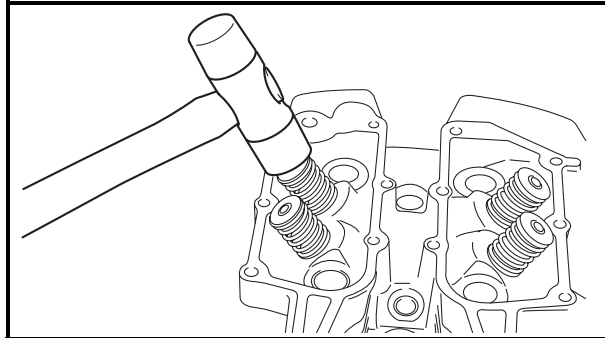


4. Install:
- valve cotters ①

**NOTE:** \_\_\_\_\_  
Install the valve cotters by compressing the valve springs with the valve spring compressor set ①.



**Valve spring compressor set  
YM-04019**



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

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

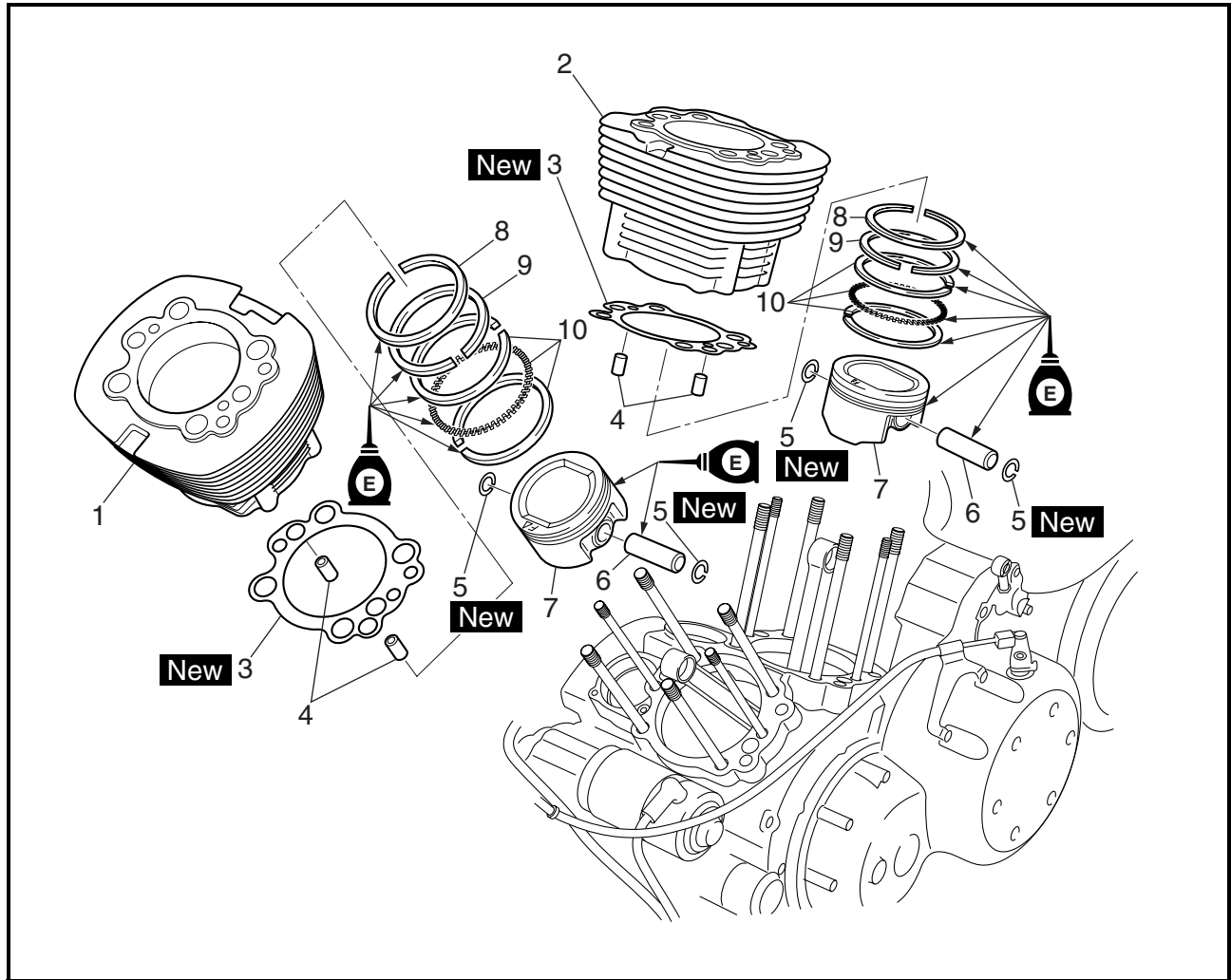
**Hitting the valve tip with excessive force could damage the valve.**

6. Install:
- cylinder head
- Refer to "CYLINDER HEADS".

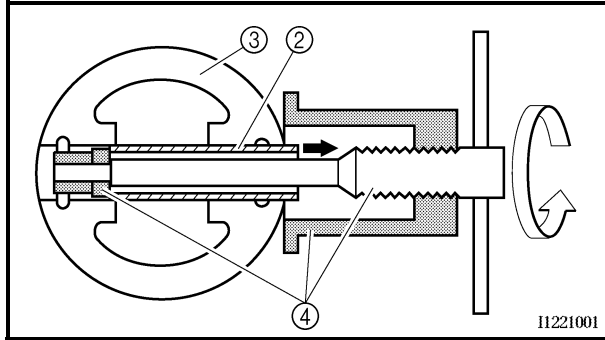
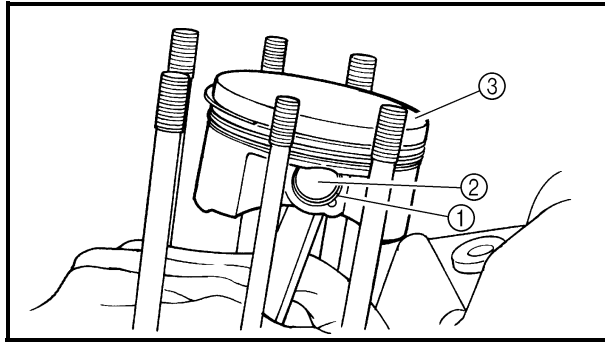


EAS00252

CYLINDERS AND PISTONS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinders and pistons</b>		Remove the parts in the order listed. Refer to "CYLINDER HEADS".
1	Front cylinder	1	Refer to "INSTALLING THE PISTONS AND CYLINDERS". Refer to "REMOVING THE CYLINDERS AND PISTONS".
2	Rear cylinder	1	
3	Cylinder gasket	2	
4	Dowel pin	4	
5	Piston pin clip	4	
6	Piston pin	2	
7	Piston	2	
8	Top ring	2	
9	2nd ring	2	
10	Oil ring	2	
			For installation, reverse the removal procedure.



EAS00254

## REMOVING THE CYLINDERS AND PISTONS

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

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

### CAUTION:

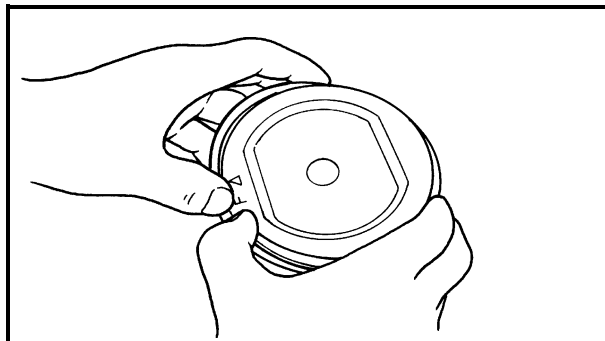
**Do not use a hammer to drive the piston pin out.**

### NOTE:

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.



**Piston pin puller**  
**YU-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.



EAS00258

**CHECKING THE CYLINDERS 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 the piston and piston rings as a set.

2. Measure:

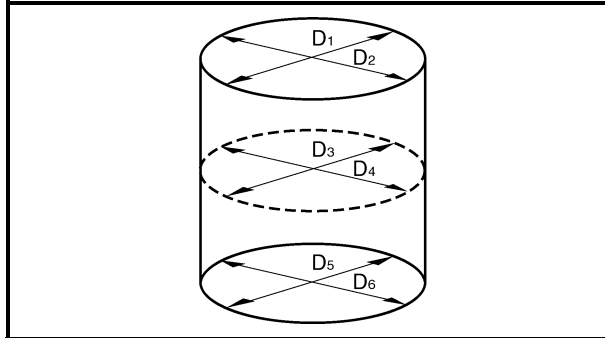
- piston-to-cylinder clearance



- 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.



**Cylinder bore gauge**  
(50 ~ 100 mm)  
YU-03017

<b>Cylinder bore “C”</b>	<b>97.000 ~ 97.010 mm</b> <b>(3.8189 ~ 3.8193 in)</b>
<b>Taper limit “T”</b>	<b>0.05 mm (0.0016 in)</b>
<b>Out of round “R”</b>	<b>0.05 mm (0.0016 in)</b>

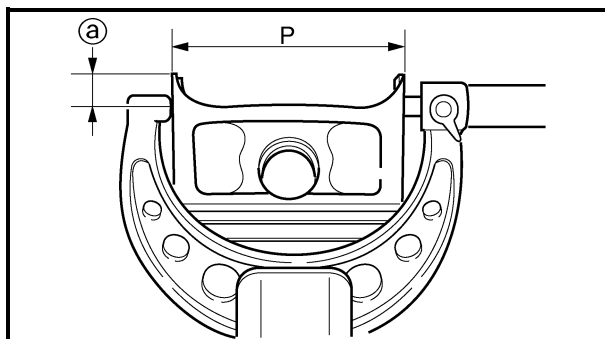
“C” = maximum of  $D_1 \sim D_6$

“T” = maximum of  $D_1$  or  $D_2$  - maximum of  $D_5$  or  $D_6$

“R” = maximum of  $D_1, D_3$  or  $D_5$  - minimum of  $D_2, D_4$  or  $D_6$

- 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.




**Micrometer (75 ~ 100 mm)**  
YU-03009

- Ⓐ 5 mm (0.20 in) from the bottom edge of the piston

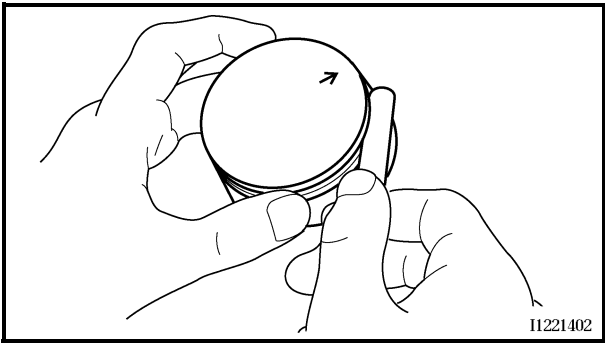
	<b>Piston size "P"</b>
<b>Standard</b>	<b>96.960 ~ 96.975 mm (3.8173 ~ 3.8179 in)</b>

- 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.

<p><b>Piston-to-cylinder clearance =</b>  <b>Cylinder bore "C" -</b>  <b>Piston skirt diameter "P"</b></p>
--

	<p><b>Piston-to-cylinder clearance</b>  <b>0.025 ~ 0.050 mm</b>  <b>(0.001 ~ 0.002 in)</b>  <b>&lt;Limit&gt;: 0.15 mm (0.006 in)</b></p>
	<p> </p>


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

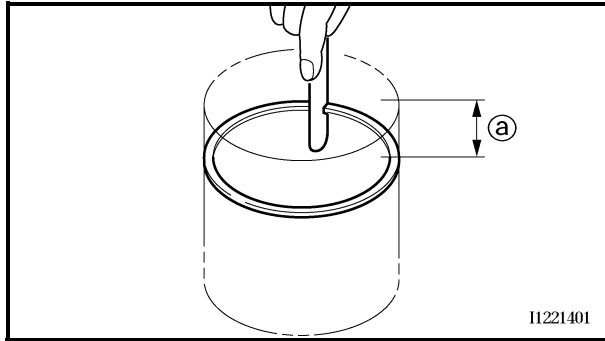


EAS00263  
**CHECKING THE PISTON RINGS**

- 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.

	<p><b>Piston ring side clearance</b></p>
	<p><b>Top ring</b>  <b>0.03 ~ 0.08 mm</b>  <b>(0.0012 ~ 0.0031 in)</b>  <b>&lt;Limit&gt;: 0.12 mm (0.0047 in)</b></p> <p><b>2nd ring</b>  <b>0.03 ~ 0.07 mm</b>  <b>(0.0012 ~ 0.0028 in)</b>  <b>&lt;Limit&gt;: 0.12 mm (0.0047 in)</b></p>



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

**NOTE:** \_\_\_\_\_  
Level the piston ring into the cylinder with the piston crown.

① 10 mm (0.39 in)

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

0.30 ~ 0.45 mm  
(0.012 ~ 0.018 in)  
<Limit>: 0.65 mm (0.026 in)

#### 2nd ring

0.30 ~ 0.45 mm  
(0.012 ~ 0.018 in)  
<Limit>: 0.80 mm (0.031 in)

#### Oil ring

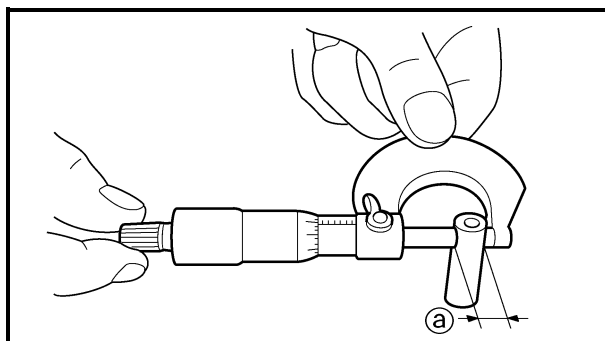
0.2 ~ 0.7 mm  
(0.008 ~ 0.028 in)

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.

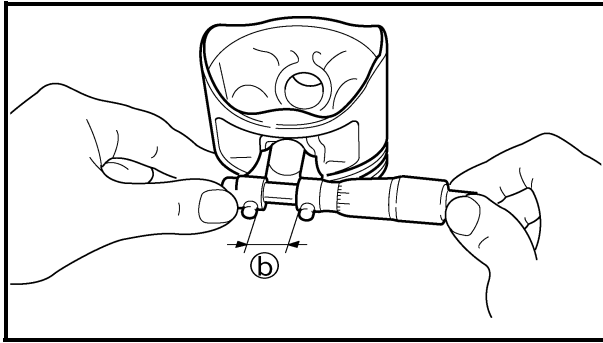


2. Measure:
  - piston pin outside diameter ①  
Out of specification → Replace the piston pin.



### Piston pin outside diameter

21.991 ~ 22.000 mm  
(0.8658 ~ 0.8661 in)  
<Limit>: 21.971 mm (0.8650 in)



### 3. Measure:

- piston pin bore diameter (in the piston)  $\textcircled{b}$   
Out of specification → Replace the piston pin.



#### Piston pin bore diameter (in the piston)

22.004 ~ 22.015 mm

(0.8663 ~ 0.8667 in)

<Limit>: 22.045 mm (0.8679 in)

### 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 (in the piston)

$\textcircled{b}$  - Piston pin outside diameter  $\textcircled{a}$

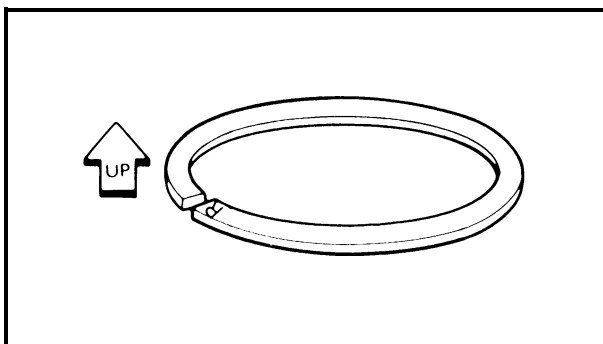


#### Piston-pin-to-piston pin bore clearance

0.004 ~ 0.024 mm

(0.00016 ~ 0.00094 in)

<Limit>: 0.074 mm (0.0029 in)



EAS00268

## INSTALLING THE PISTONS AND CYLINDERS

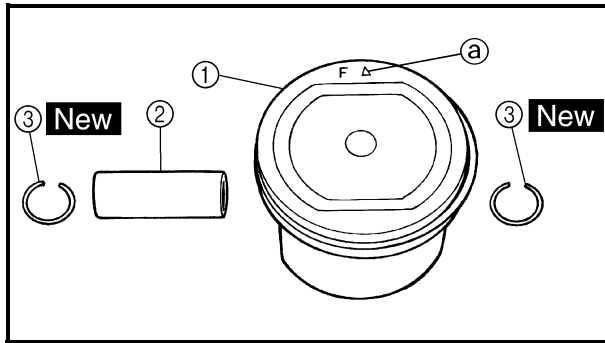
The following procedure applies to all of the pistons and cylinders.

### 1. Install:

- top ring
- 2nd ring
- oil ring

### NOTE:

Be sure to install the piston rings so that the manufacturer's marks or numbers face up.

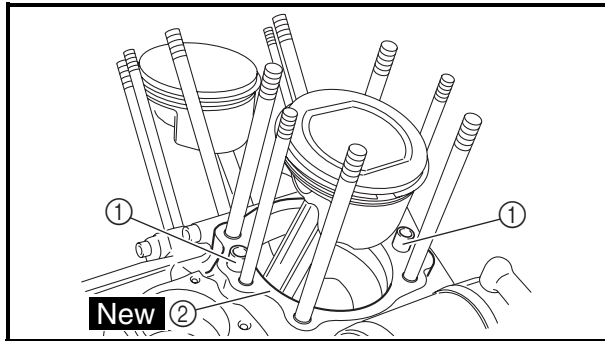


### 2. Install:

- piston ①
- piston pin ②
- piston pin clips ③ **New**

### NOTE:

- Apply engine oil onto the piston pin.
- Make sure the “arrow” mark (a) on the piston faces towards the front of the motorcycle.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.

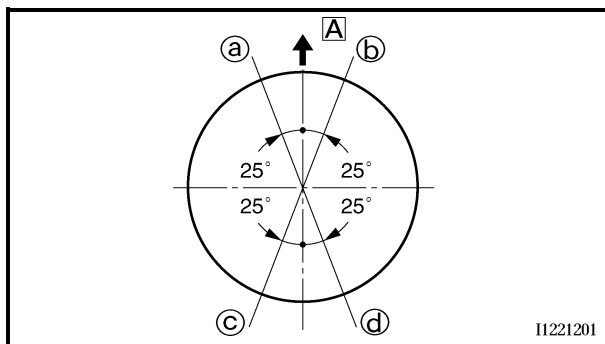


### 3. Install:

- dowel pins ①
- cylinder gasket ② **New**

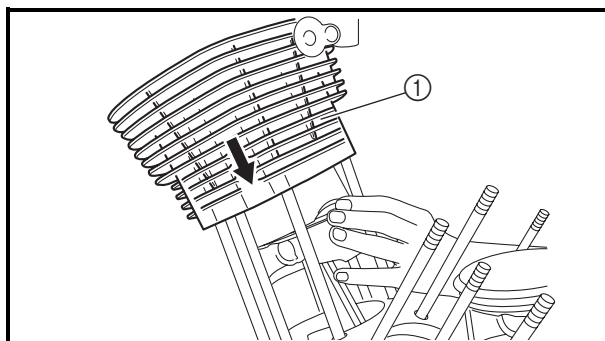
### 4. Lubricate:

- piston
- piston rings
- cylinder  
(with the recommended lubricant)



### 5. Offset:

- piston ring end gaps
- (a) Top ring  
 (b) Lower oil ring rail  
 (c) Upper oil ring rail  
 (d) 2nd ring  
 (A) Forward



### 6. Install:

- cylinder ①

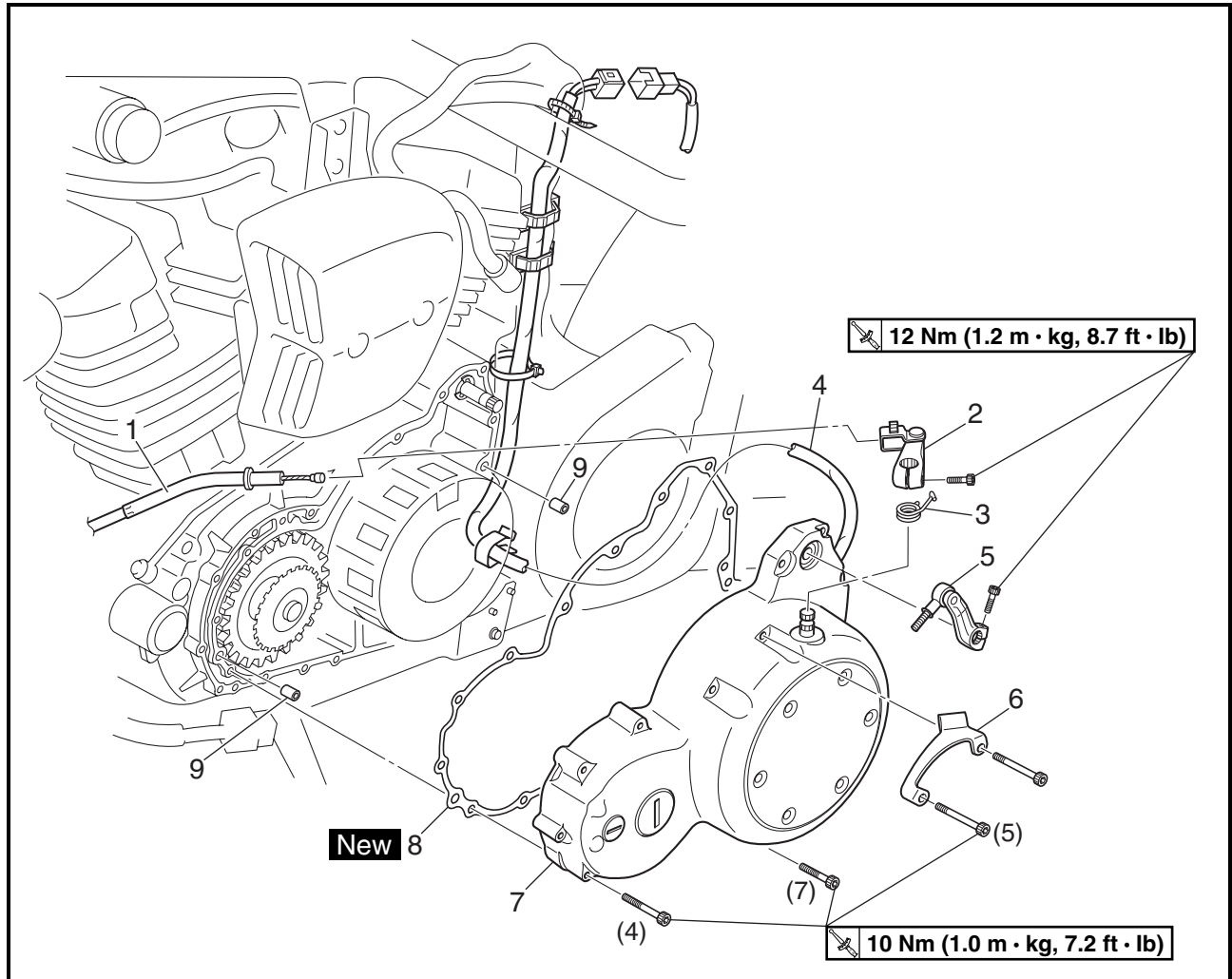
### NOTE:

While compressing the piston rings with one hand, install the cylinder with the other hand.



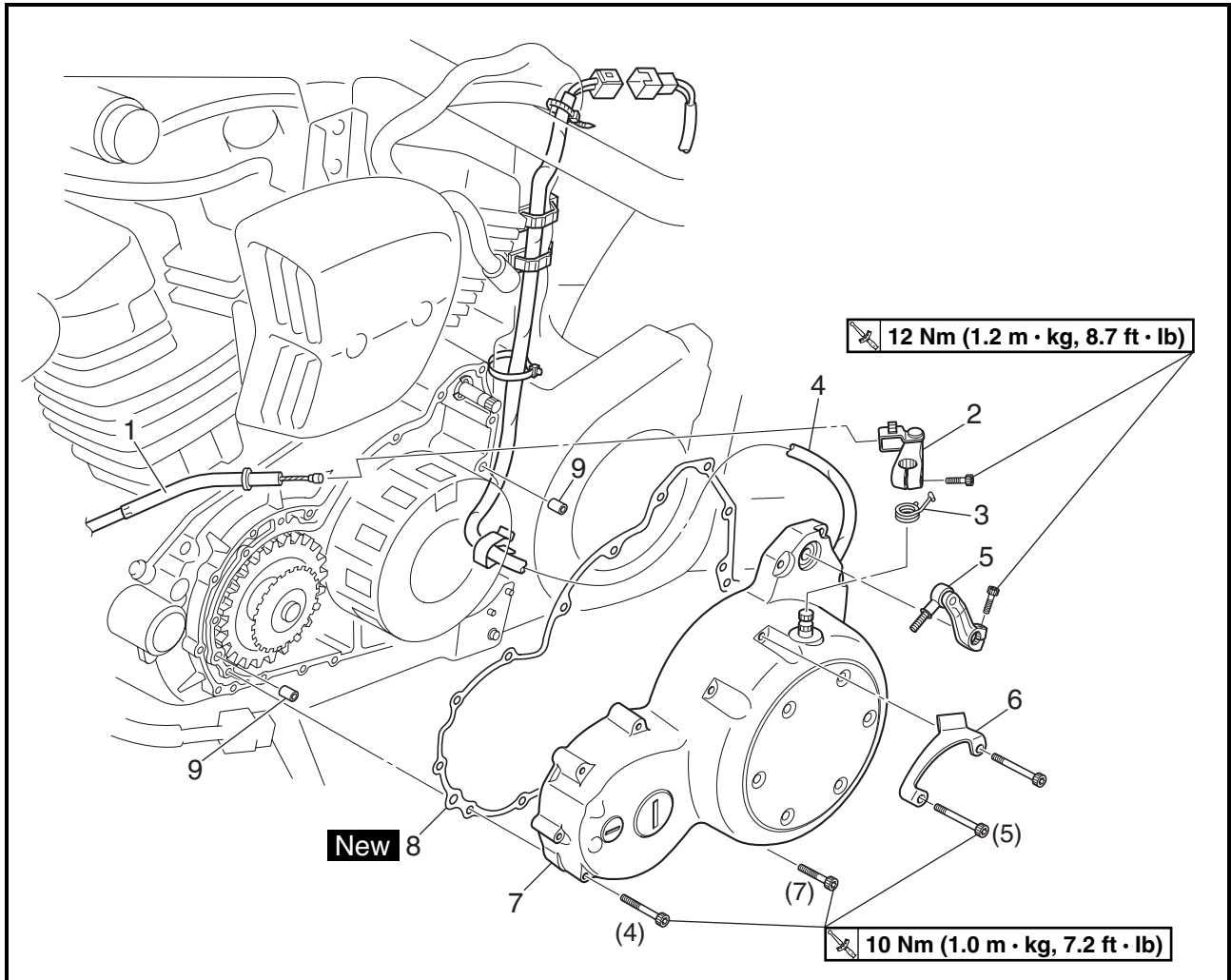
EAS00273

**CLUTCH**  
**CLUTCH COVER**

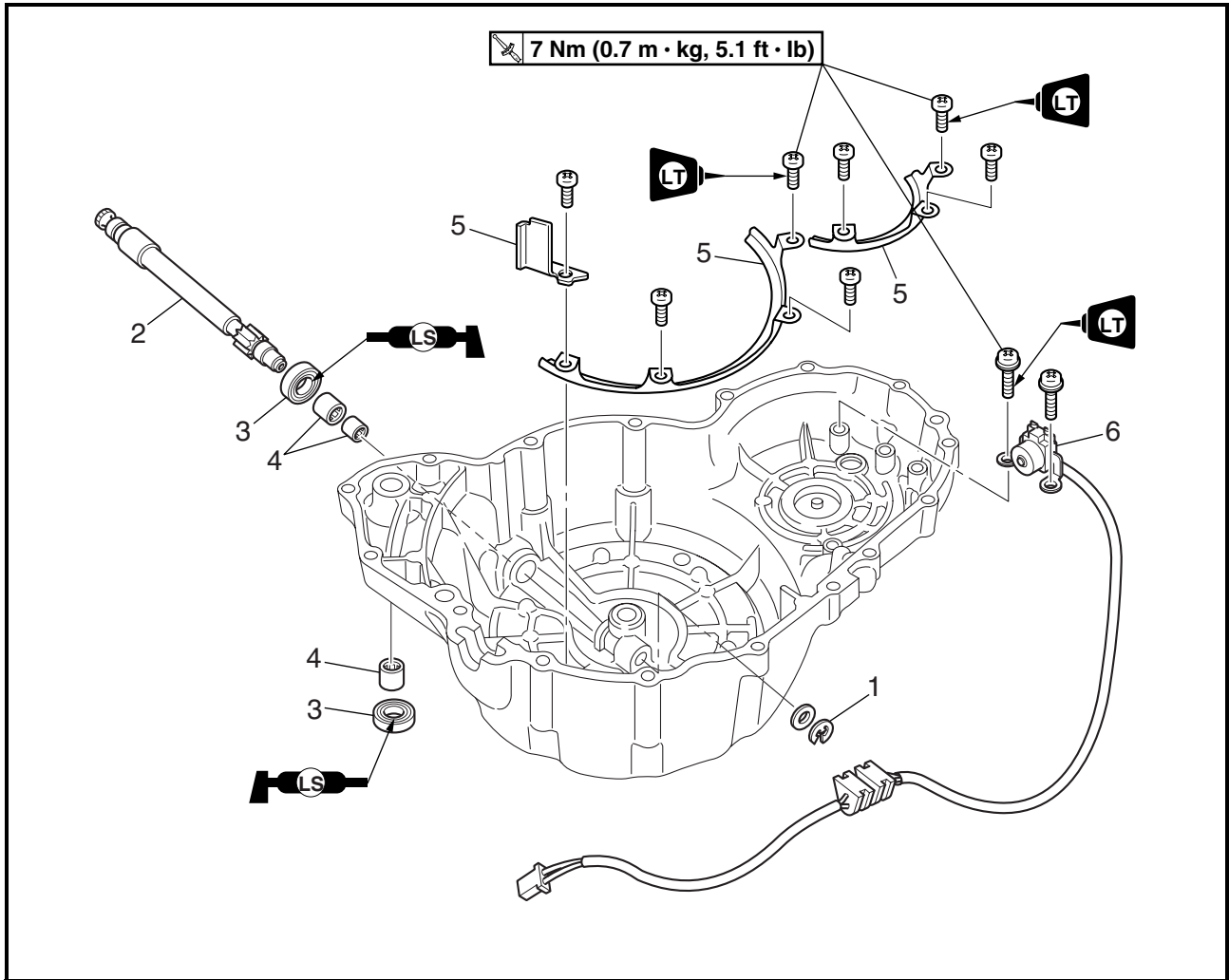


Order	Job/Part	Q'ty	Remarks
	<b>Removing the clutch cover</b>		Remove the parts in the order listed.
	Left side cover		Refer to "SEAT AND SIDE COVERS" in chapter 3.
	Sub fuel tank		Refer to "SUB FUEL TANK".
	Engine left side cover		Refer to "ROCKER ARMS, PUSH RODS AND VALVE LIFTERS".
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	Disconnect.
2	Pull lever	1	Refer to "INSTALLING THE CLUTCH".
3	Pull lever spring	1	
4	Crankshaft position sensor lead	1	





Order	Job/Part	Q'ty	Remarks
5	Shift arm	1	Refer to "REMOVING THE CLUTCH". Refer to "INSTALLING THE CLUTCH".  For installation, reverse the removal procedure.
6	Clutch cable holder	1	
7	Clutch cover	1	
8	Clutch cover gasket	1	
9	Dowel pin	1	

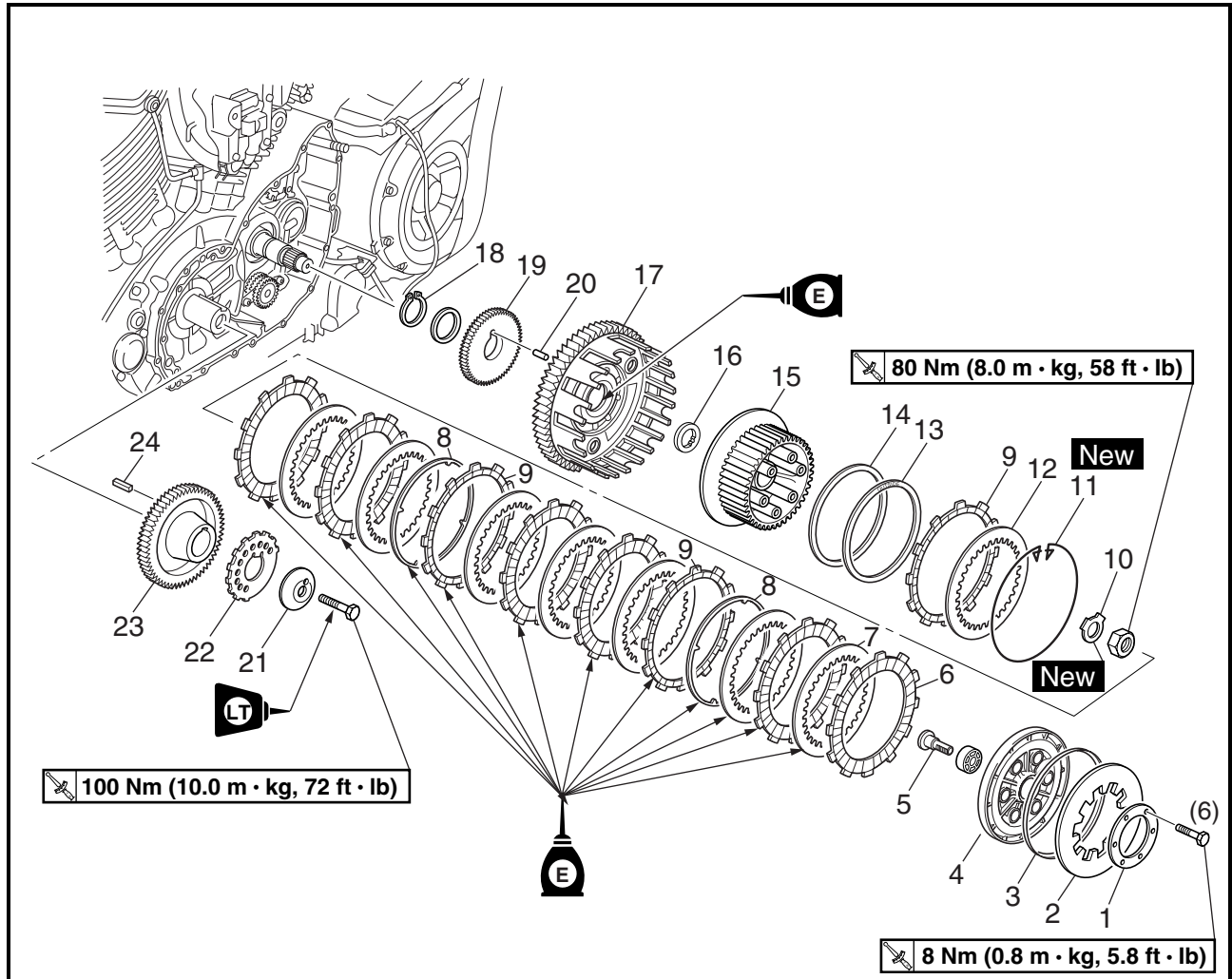


Order	Job/Part	Q'ty	Remarks
	<b>Removing the pull lever shaft and crankshaft position sensor</b>		Remove the parts in the order listed.
	Pull lever	1	
	Pull lever spring	1	
1	Circlip	1	
2	Pull lever shaft	1	
3	Oil seal	2	
4	Bearing	3	
5	Crankshaft position sensor lead holder	3	Refer to "INSTALLING THE CRANKSHAFT POSITION SENSOR AND PULL LEVER SHAFT".
6	Crankshaft position sensor	1	For installation, reverse the removal procedure.

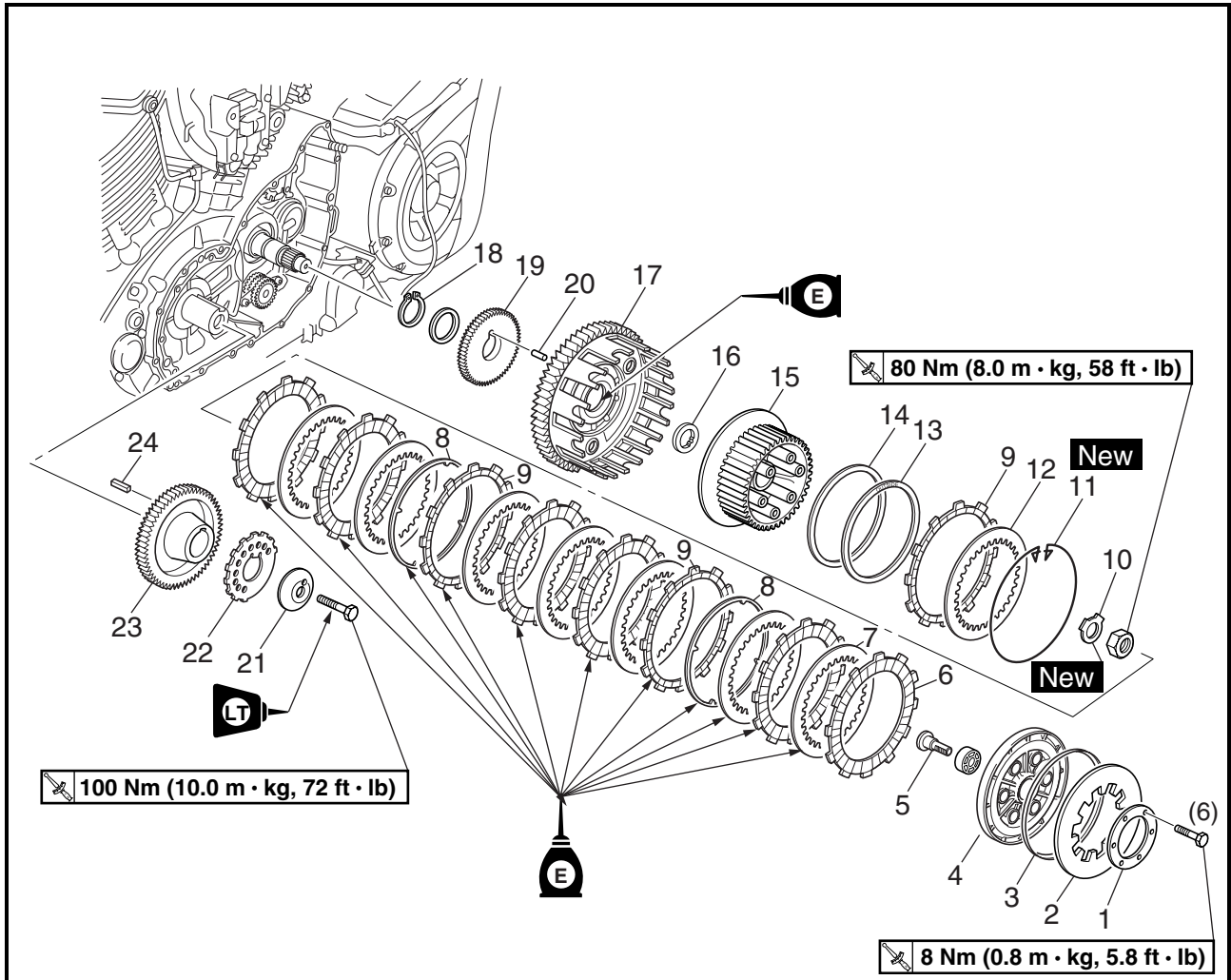


EAS00274

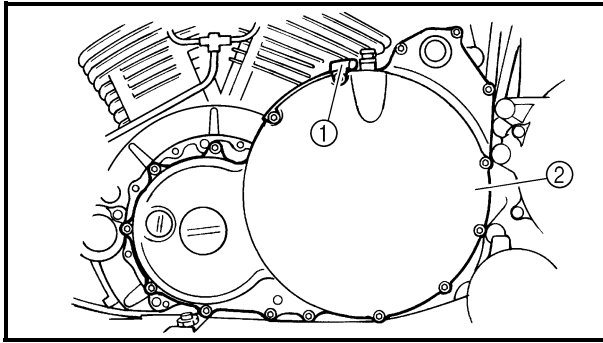
CLUTCH



Order	Job/Part	Q'ty	Remarks
	<b>Removing the clutch</b>		
	Generator cover		Remove the parts in the order listed. Refer to "GENERATOR AND STARTER CLUTCH".
1	Clutch spring plate retainer	1	Refer to "INSTALLING THE CLUTCH". Black painting Refer to "REMOVING THE CLUTCH".
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Pull rod	1	
6	Friction plate 2	6	
7	Clutch plate	7	
8	Cushion spring	2	
9	Friction plate 1	3	
10	Lock washer	1	
11	Wire circlip	1	
12	Clutch plate	1	



Order	Job/Part	Q'ty	Remarks
13	Clutch damper spring	1	Refer to "REMOVING THE CLUTCH".  Refer to "INSTALLING THE CLUTCH".  Refer to "REMOVING THE PRIMARY DRIVE GEAR".  For installation, reverse the removal procedure.
14	Clutch damper spring seat	1	
15	Clutch boss	1	
16	Thrust washer	1	
17	Clutch housing	1	
18	Circlip	1	
19	Oil pump drive gear	1	
20	Dowel pin	1	
21	Spacer	1	
22	Crankshaft position sensor rotor	1	
23	Primary drive gear	1	
24	Straight key	1	



EAS00277

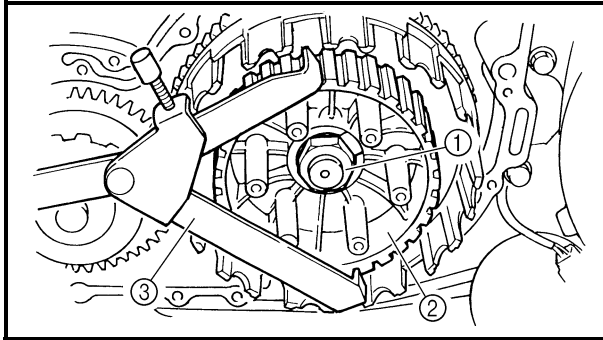
**REMOVING THE CLUTCH**

## 1. Remove:

- clutch cable holder ①
- clutch cover ②

**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.



## 2. Straighten the lock washer tab.

## 3. Loosen:

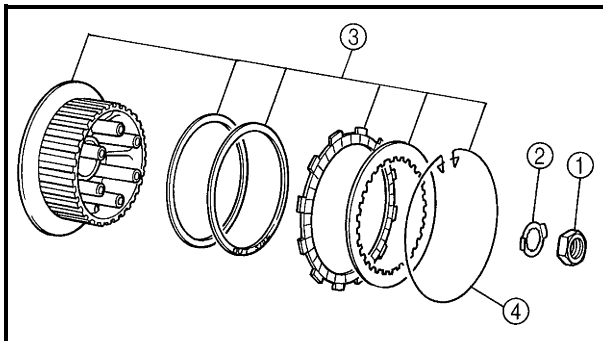
- clutch boss nut ①

**NOTE:**

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



**Universal clutch holder**  
YM-91042

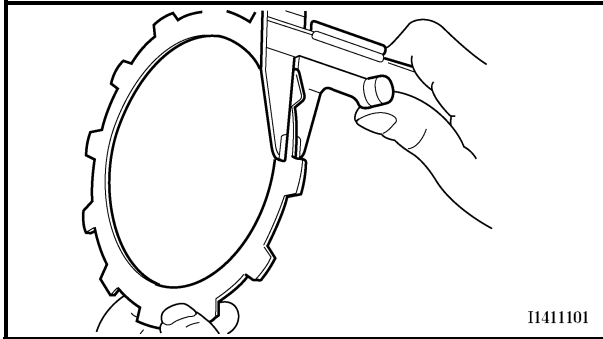
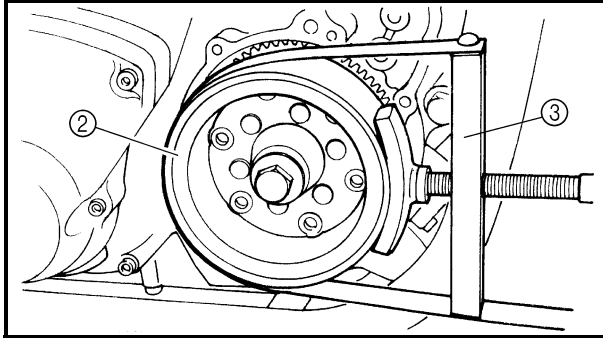
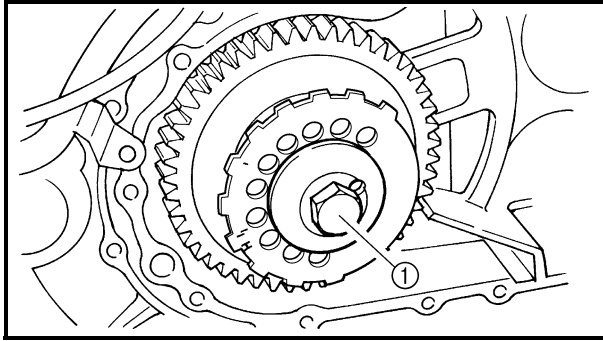


## 4. Remove:

- clutch boss nut ①
- lock washer ②
- clutch boss assembly ③

**NOTE:**

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



EAS00279

**REMOVING THE PRIMARY DRIVE GEAR**

1. Remove:

- crankshaft position sensor rotor bolt ①

**NOTE:**

While holding the generator rotor ② with the sheave holder ③, loosen the crankshaft position sensor rotor bolt.



**Primary sheave holder**  
**YS-01880-A**

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.



**Friction plate thickness**  
**2.9 ~ 3.1 mm (0.114 ~ 0.122 in)**

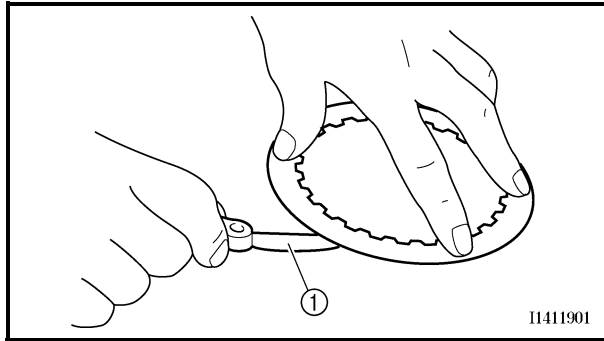
EAS00281

**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.

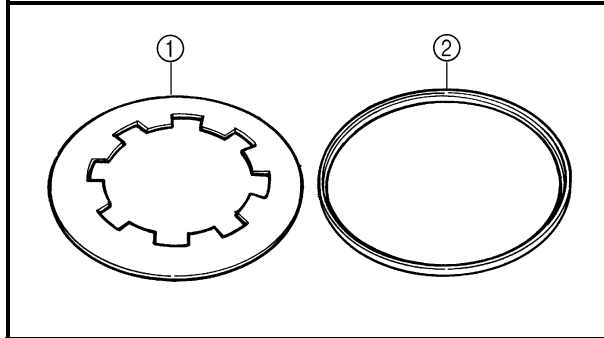


## 2. Measure:

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



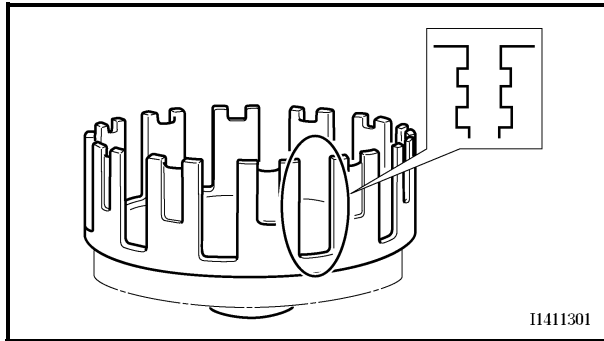
**Clutch plate warpage limit  
0.2 mm (0.008 in)**



EAS00283

**CHECKING THE CLUTCH PLATE SPRING**

1. Check:
  - clutch plate spring ①  
Damage → Replace.
2. Check:
  - clutch plate spring seat ②  
Damage → Replace.



EAS00284

**CHECKING THE CLUTCH HOUSING**

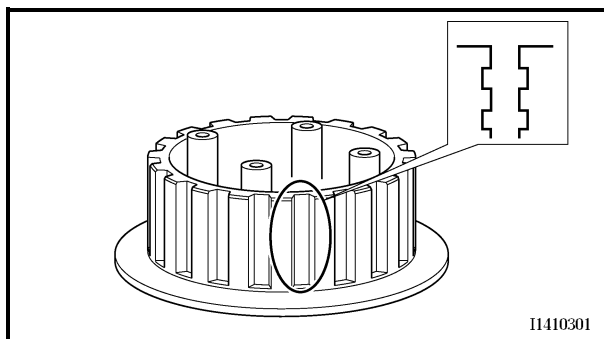
1. Check:
  - clutch housing dogs  
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

**NOTE:**

Pitting on the clutch housing dogs will cause erratic clutch operation.

## 2. Check:

- bearing  
Damage/wear → Replace the bearing and clutch housing.



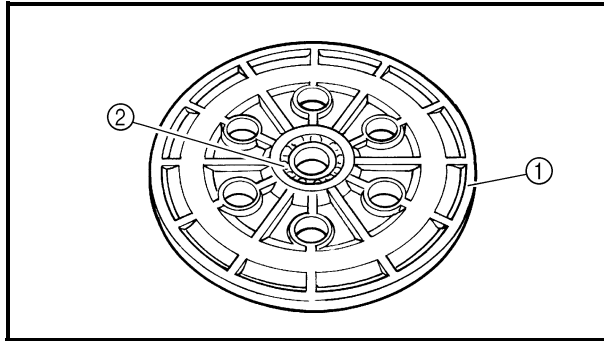
EAS00285

**CHECKING THE CLUTCH BOSS**

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

**NOTE:**

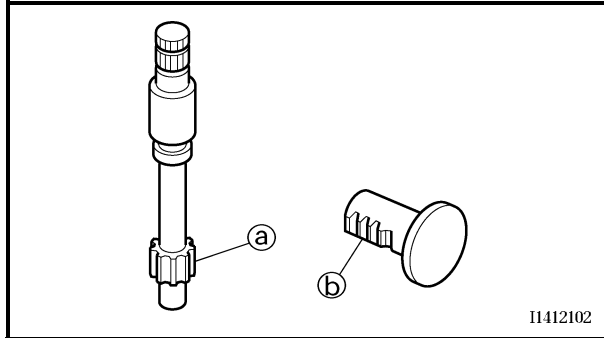
Pitting on the clutch boss splines will cause erratic clutch operation.



EAS00286

**CHECKING THE PRESSURE PLATE**

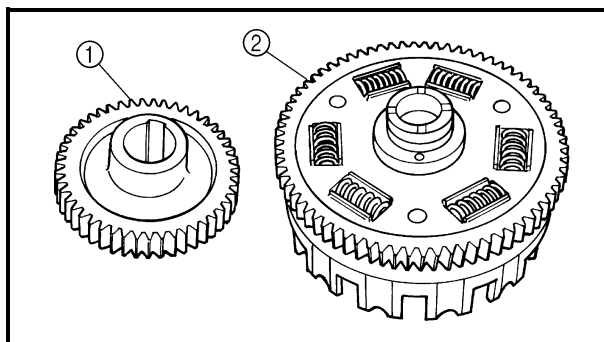
1. Check:
  - pressure plate ①  
Cracks/damage → Replace.
  - bearing ②  
Damage/wear → Replace.



EAS00287

**CHECKING THE PULL LEVER SHAFT AND PULL ROD**

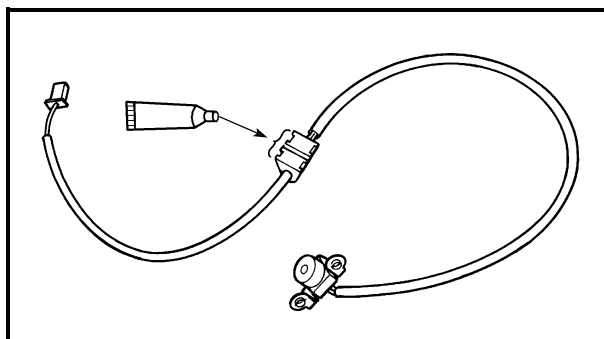
1. Check:
  - pull lever shaft pinion gear teeth ①
  - pull rod teeth ②  
Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.
2. Check:
  - pull rod bearing  
Damage/wear → Replace.



EAS00292

**CHECKING THE PRIMARY DRIVE**

1. Check:
  - primary drive gear ①
  - primary driven gear ②  
Damage/wear → Replace the primary drive gear and clutch housing as a set.  
Excessive noise during operation → Replace the primary drive gear and clutch housing as a set.

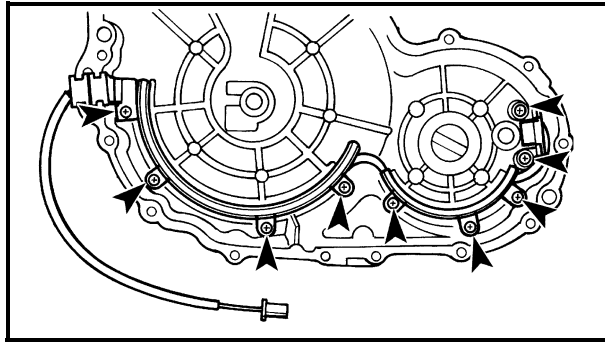
**INSTALLING THE CRANKSHAFT POSITION SENSOR AND PULL LEVER SHAFT**

1. Apply:
  - sealant  
(onto the crankshaft position sensor lead grommet)



**Quick Gasket®**  
ACC-11001-05-01





2. Install:

- crankshaft position sensor

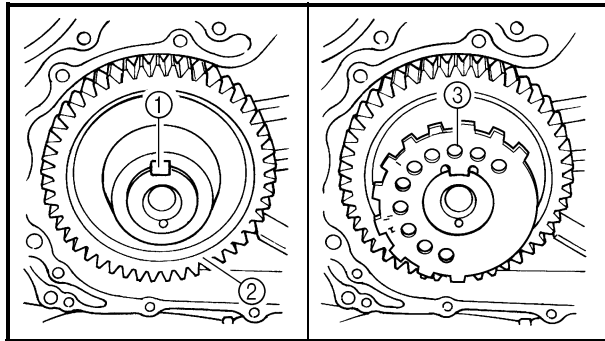
7 Nm (0.7 m • kg, 5.1 ft • lb)

- crankshaft position sensor lead holder

7 Nm (0.7 m • kg, 5.1 ft • lb)

**NOTE:**

Apply locking agent (LOCTITE®) to the threads of the crankshaft position sensor bolts and crankshaft position sensor lead holder bolts.



EAS00303

**INSTALLING THE PRIMARY DRIVE GEAR**

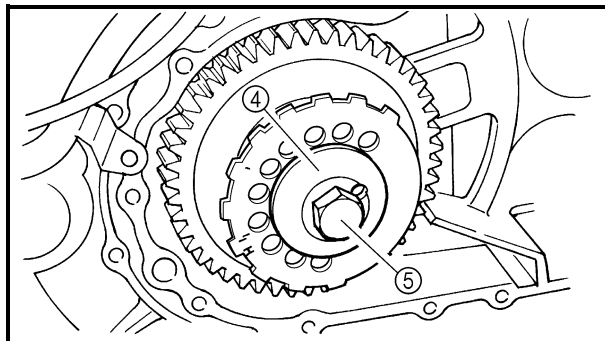
1. Install:

- straight key ①
- primary drive gear ②
- crankshaft position sensor rotor ③
- spacer ④
- crankshaft position sensor rotor bolt ⑤

100 Nm (10.0 m • kg, 72 ft • lb)

**CAUTION:**

The timing marks on the crankshaft position sensor rotor must face outside.



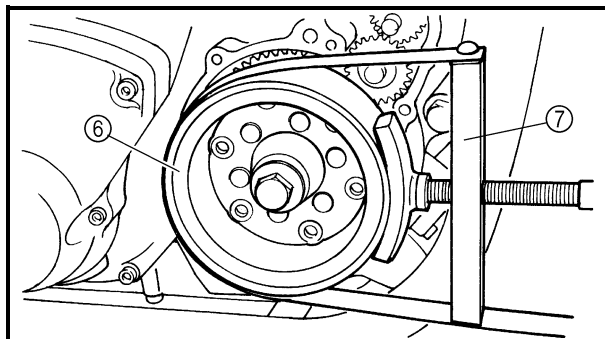
**NOTE:**

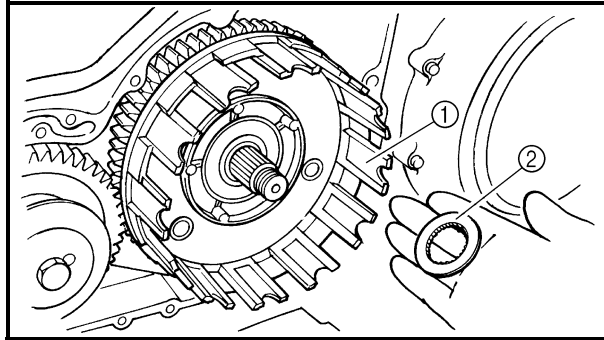
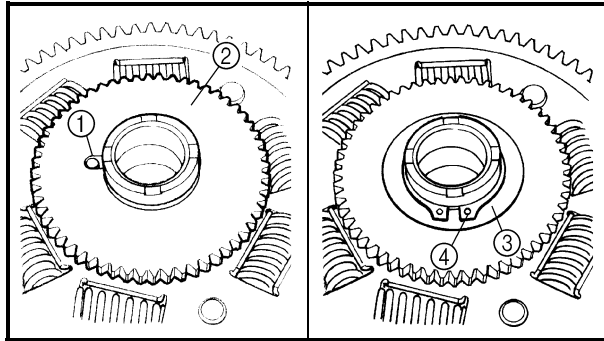
While holding the generator rotor ⑥ with the primary sheave holder ⑦, tighten the crankshaft position sensor rotor bolt.



**Primary sheave holder  
YS-01880-A**

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





EAS00293

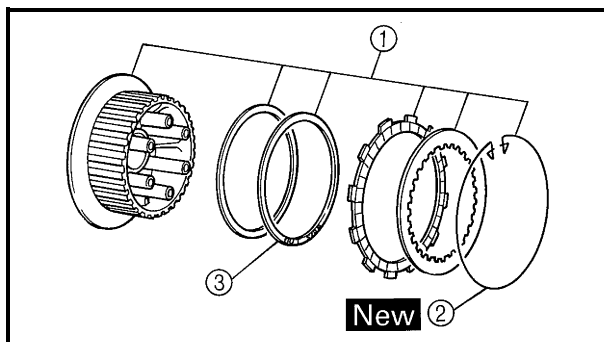
**INSTALLING THE CLUTCH**

1. Install:
  - dowel pin ①
  - oil pump drive gear ②
  - plate ③
  - circlip ④

2. Install:
  - clutch housing ①
  - thrust washer ②

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

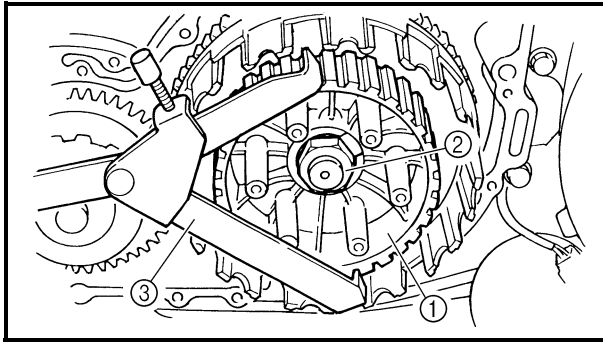
- Lubricate the clutch housing bearings with engine oil.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- Make sure that the oil pump drive gear teeth and oil pump driven gear teeth mesh correctly.



3. Install:
  - clutch boss assembly ①

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

- If the wire circlip ② has been removed, carefully install a new one.
- Install the clutch damper spring ③ with the "OUTSIDE" mark facing out.



## 4. Install:

- clutch boss ①
- lock washer **New**
- clutch boss nut ②

**80 Nm (8.0 m • kg, 58 ft • lb)**

**NOTE:**

While holding the clutch boss with the universal clutch holder ③, tighten the clutch boss nut.



**Universal clutch holder  
YM-91042**

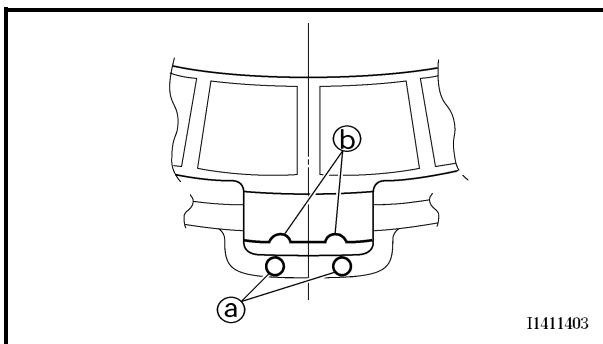
5. Bend the lock washer tab along a flat side of the nut.

## 6. Lubricate:

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



**Recommended lubricant  
Engine oil**



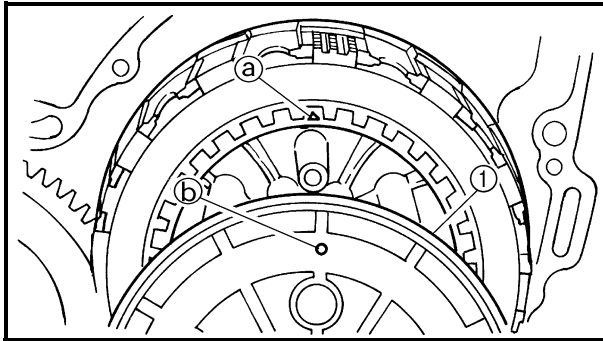
11411403

## 7. Install:

- friction plates
- clutch plates
- cushion springs

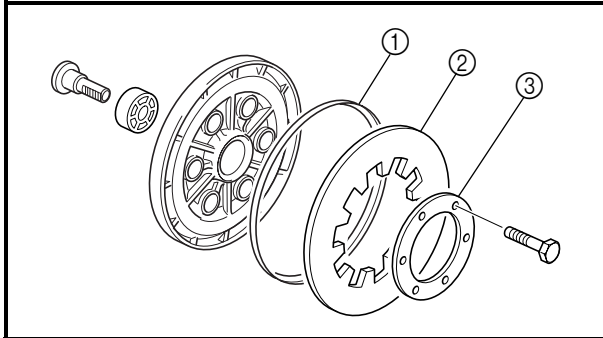
**NOTE:**

- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Apply molybdenum disulfide grease onto the bearing and pull rod teeth.
- Align the two embossed mark ① on the clutch housing with the two semicircular slots ② in the friction plates.



8. Install:
- pressure plate ①

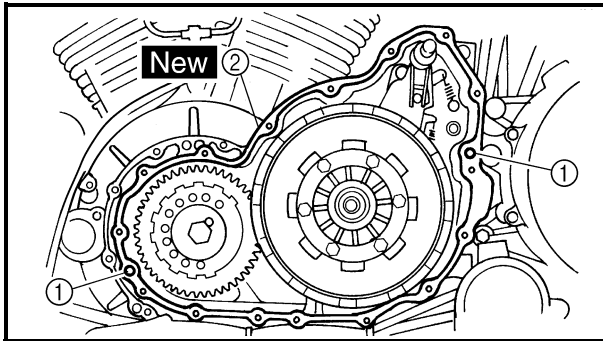
**NOTE:** \_\_\_\_\_  
Align the punch mark (a) in the pressure plate with the punch mark (b) in the clutch boss.



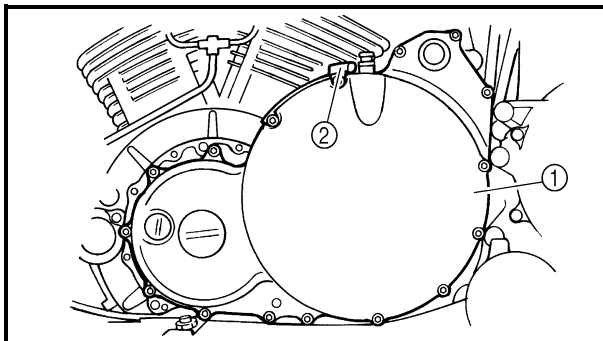
9. Install:
- clutch spring plate seat ①
  - clutch spring plate ②
  - clutch spring plate retainer ③

**8 Nm (0.8 m • kg, 5.8 ft • lb)**

**NOTE:** \_\_\_\_\_  
Tighten the clutch spring plate retainer bolts in stages and in a crisscross pattern.



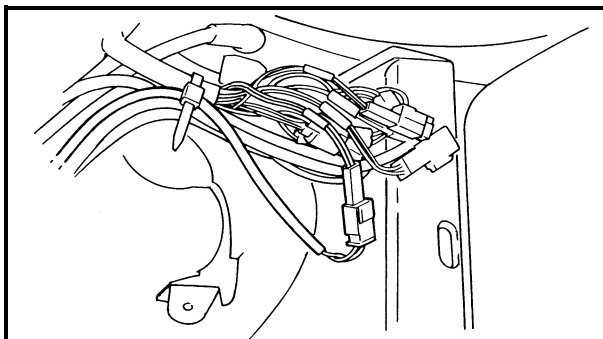
10. Install:
- dowel pins ①
  - clutch cover gasket ② **New**



11. Install:
- clutch cover ①
  - clutch cable holder ②

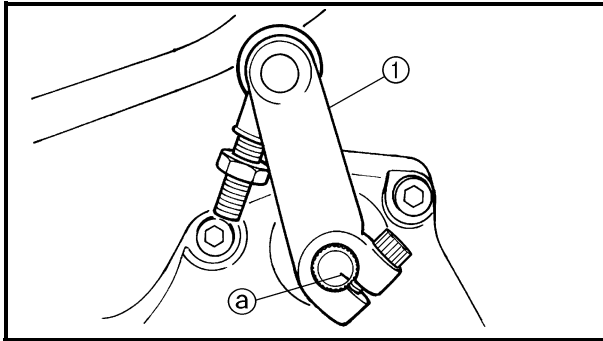
**10 Nm (1.0 m • kg, 7.2 ft • lb)**

**NOTE:** \_\_\_\_\_  
Tighten the clutch cover bolts in stages and in a crisscross pattern.




12. Connect:
- crankshaft position sensor coupler

**NOTE:** \_\_\_\_\_  
Refer to "CABLE ROUTING" in chapter 2.



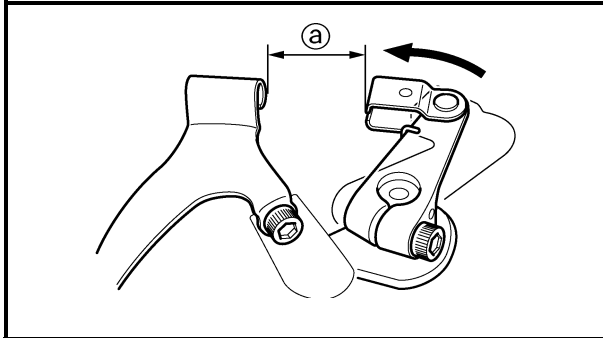
13.Install:

- shift arm ①

 12 Nm (1.2 m • kg, 8.7 ft • lb)


**NOTE:**

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



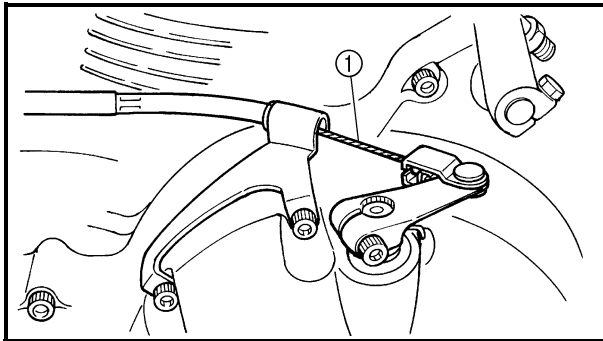
14.Install:

- pull lever spring
- pull lever

 12 Nm (1.2 m • kg, 8.7 ft • lb)

**NOTE:**

If there is no free play in the clutch, install the pull lever to the pull lever shaft in order to get the distance (a) between the pull lever and clutch cable holder to 31.3 mm (1.23 in).



15.Connect:

- clutch cable ①

16.Adjust:

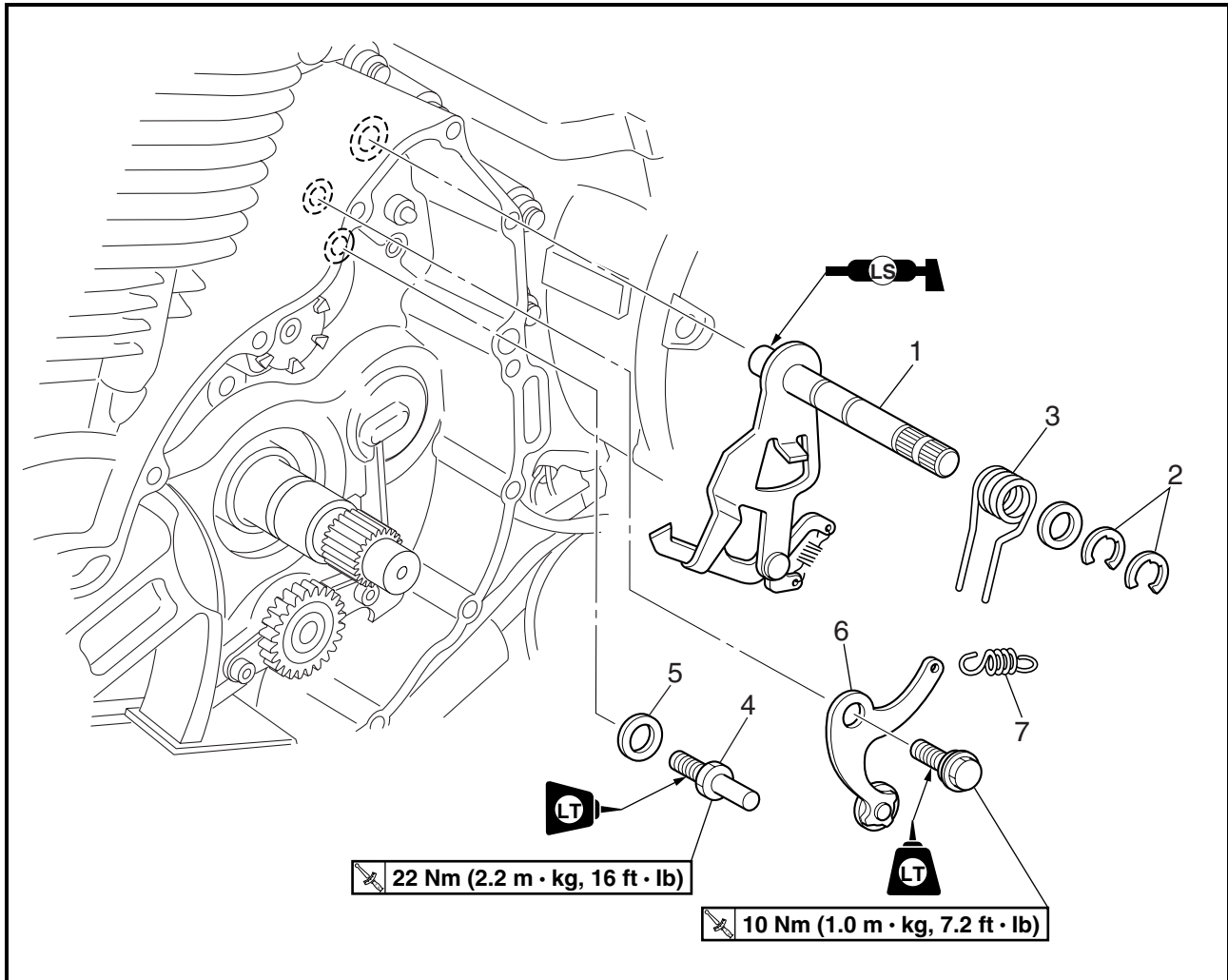
- clutch cable free play

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

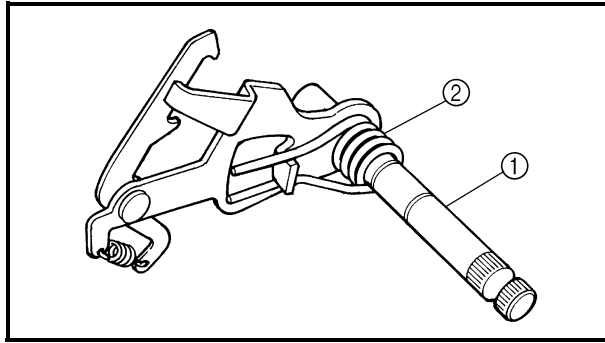


EAS00327

## SHIFT SHAFT AND STOPPER LEVER



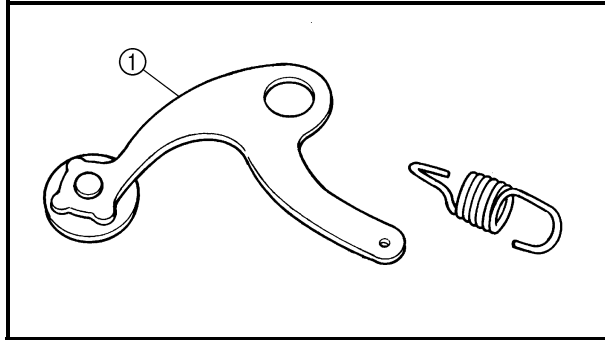
Order	Job/Part	Q'ty	Remarks
	<b>Removing the shift shaft and stopper lever</b>		Remove the parts in the order listed.
	Engine oil		Drain.
	Clutch housing		Refer to "CLUTCH".
1	Shift shaft	1	
2	Circlip	2	
3	Shift shaft spring	1	
4	Shift shaft spring stopper	1	Refer to "INSTALLING THE STOPPER LEVER AND SHIFT SHAFT".
5	Washer	1	
6	Stopper lever	1	
7	Stopper lever spring	1	
			For installation, reverse the removal procedure.



EAS00328

## CHECKING THE SHIFT SHAFT

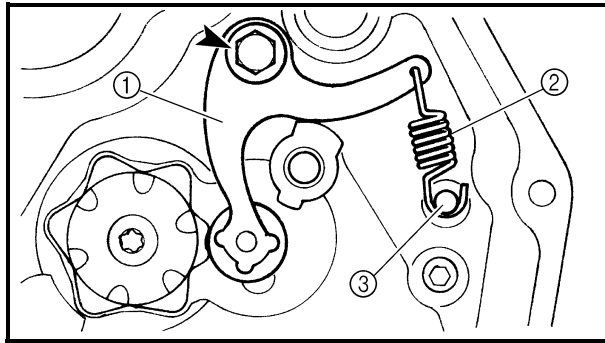
- Check:
  - shift shaft ①
  - shift lever spring ②
 Damage/wear → Replace.



EAS00330

## CHECKING THE STOPPER LEVER

- Check:
  - stopper lever ①
 Bends/damage → Replace.  
 Roller turns roughly → Replace the stopper lever.



EAS00331

## INSTALLING THE STOPPER LEVER AND SHIFT SHAFT

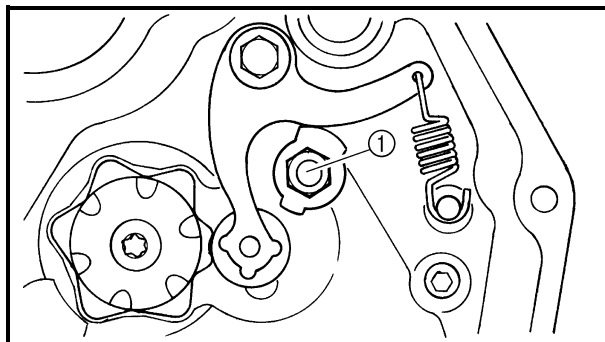
- Install:
  - stopper lever ①

10 Nm (1.0 m • kg, 7.2 ft • lb)

  - stopper lever spring ②

### NOTE:

- Apply locking agent (LOCTITE®) to the threads of stopper lever bolt.
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss ③.
- Mesh the stopper lever with the shift drum segment assembly.

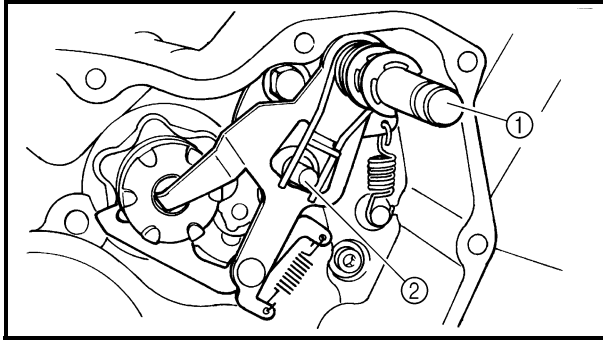


- Install:
  - washer
  - shift shaft spring stopper ①

22 Nm (2.2 m • kg, 16 ft • lb)

### NOTE:

- Apply locking agent (LOCTITE®) to the threads of shift shaft spring stopper.



3. Install:

- shift shaft spring
- circlips
- shift shaft ①

**NOTE:**

Install the end of the shift shaft spring onto the shift shaft spring stopper ②.



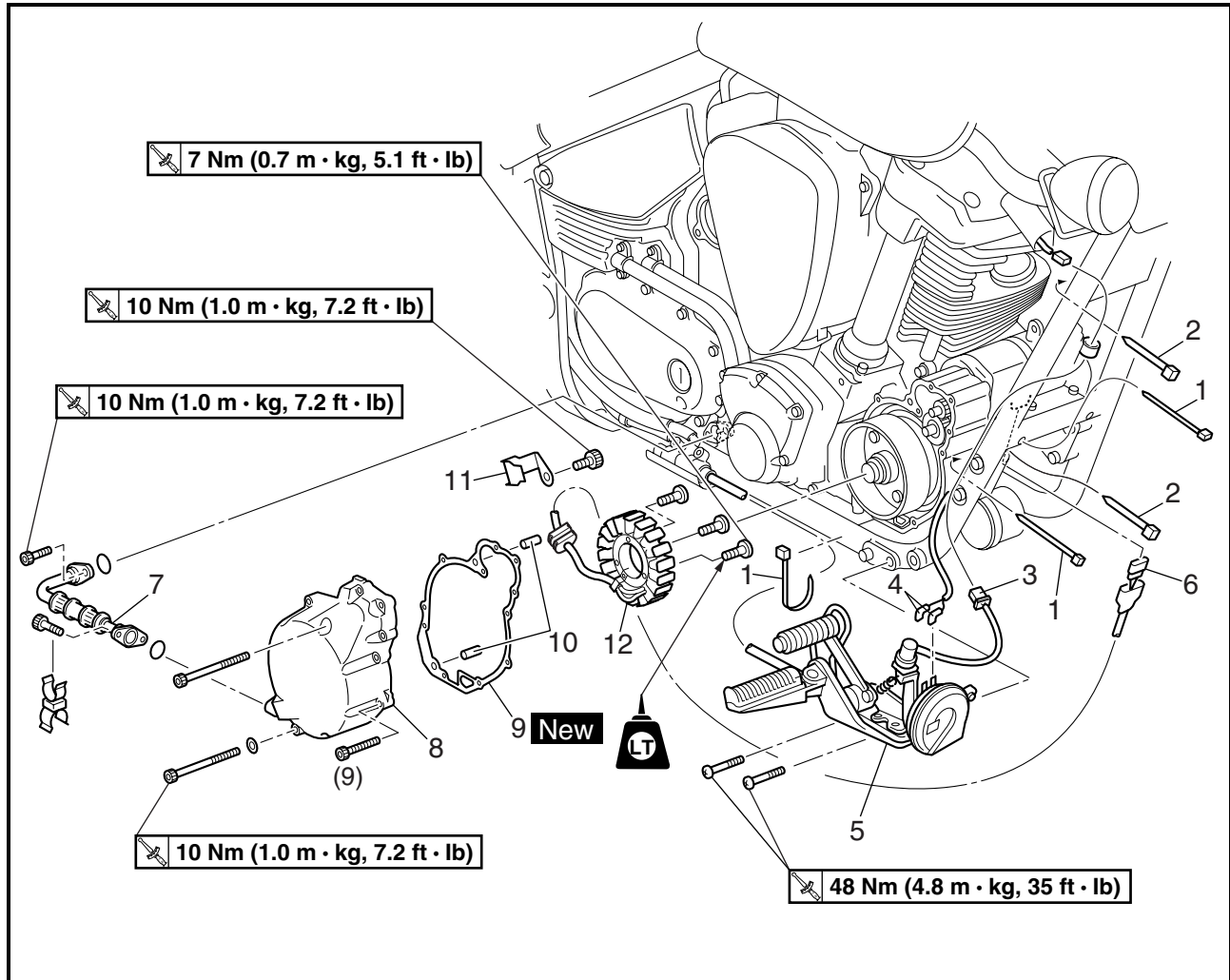


EAS00341

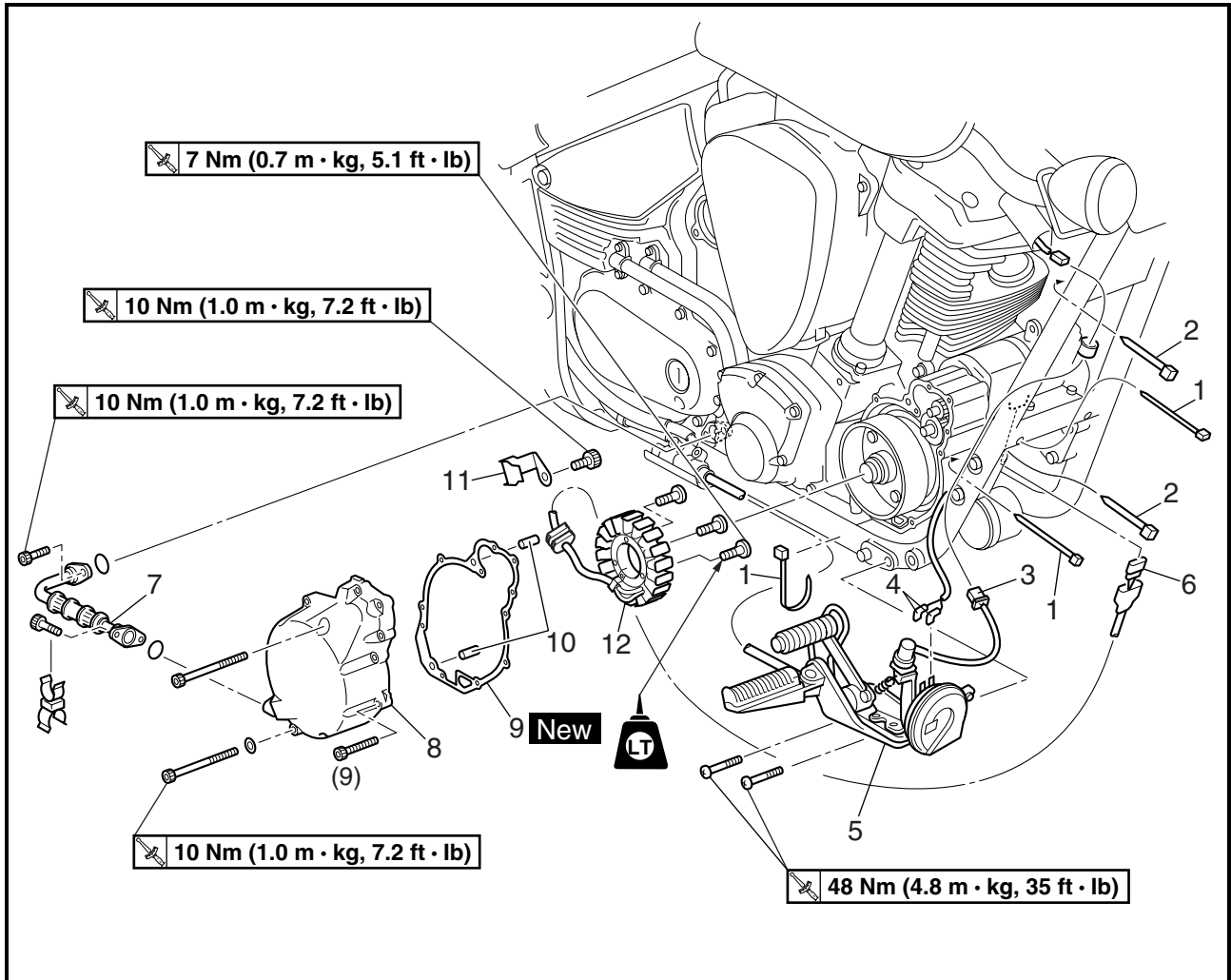
## GENERATOR AND STARTER CLUTCH



### STATOR COIL ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	<b>Removing the stator coil assembly</b>		Remove the parts in the order listed.
	Muffler/exhaust pipes		Refer to "ENGINE".
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Plastic locking tie	3	
2	Plastic band	2	
3	Rear brake light switch coupler	1	Disconnect.
4	Horn 1 connectors	2	
5	Rider footrest assembly (right)	1	
6	Stator coil assembly coupler	1	Disconnect.
7	Oil delivery pipe	1	

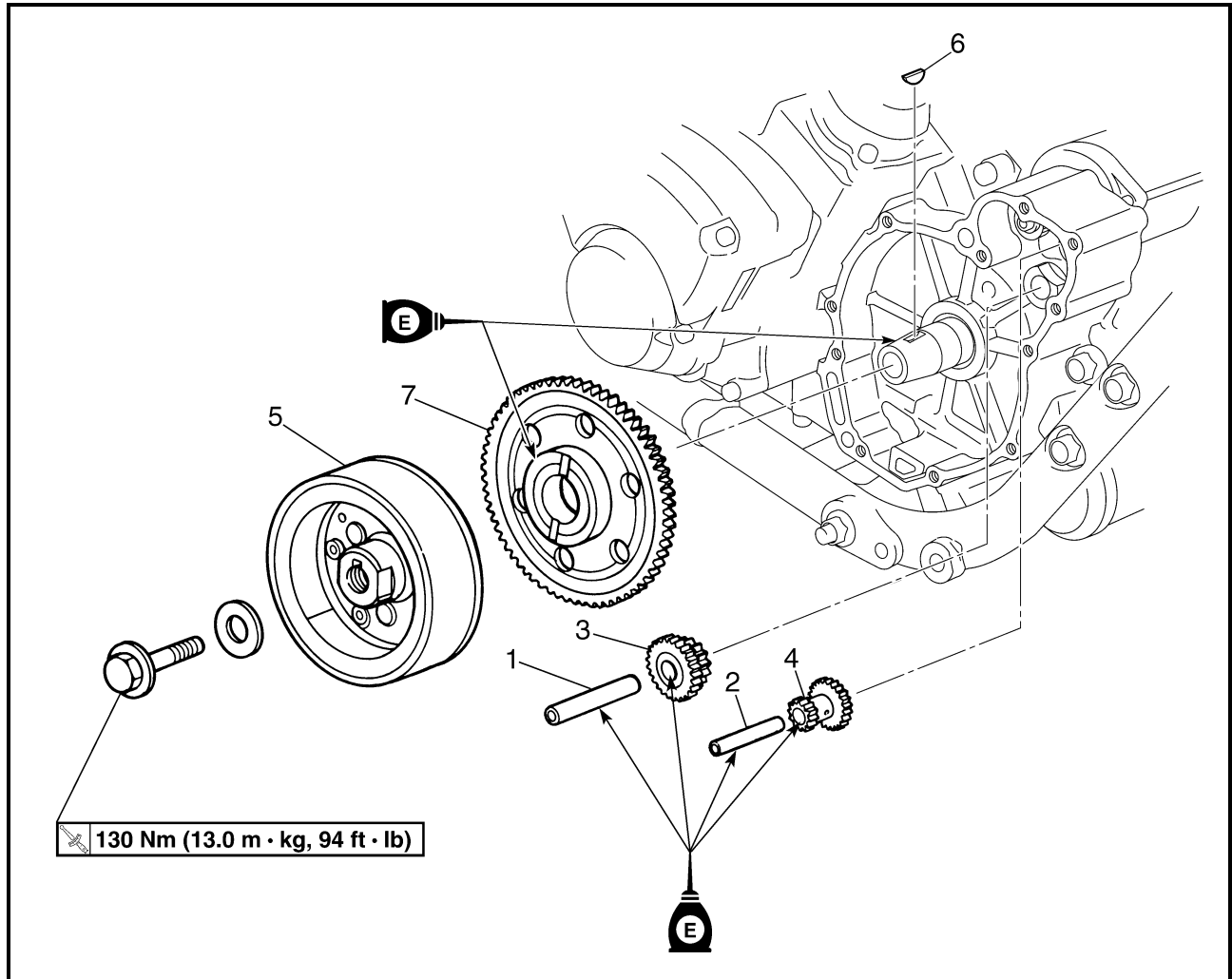


Order	Job/Part	Q'ty	Remarks
8	Generator cover	1	For installation, reverse the removal procedure.
9	Generator cover gasket	1	
10	Dowel pin	2	
11	Stator coil assembly lead holder	1	
12	Stator coil assembly	1	

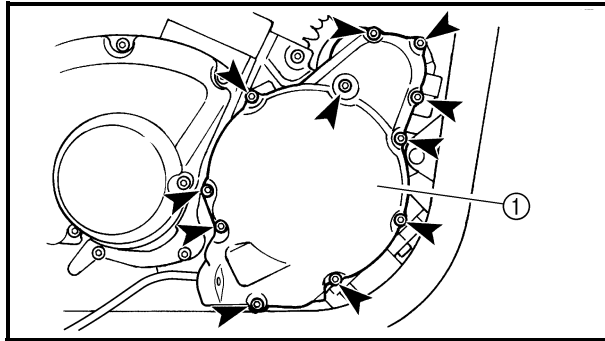


EAS00343

## GENERATOR AND STARTER CLUTCH



Order	Job/Part	Q'ty	Remarks
	<b>Removing the generator rotor</b>		Remove the parts in the order listed.
1	Starter clutch idle gear shaft #2	1	
2	Starter clutch idle gear shaft #1	1	
3	Starter clutch idle gear #2	1	
4	Starter clutch idle gear #1	1	
5	Generator rotor	1	
6	Woodruff key	1	
7	Starter clutch gear	1	
			For installation, reverse the removal procedure.



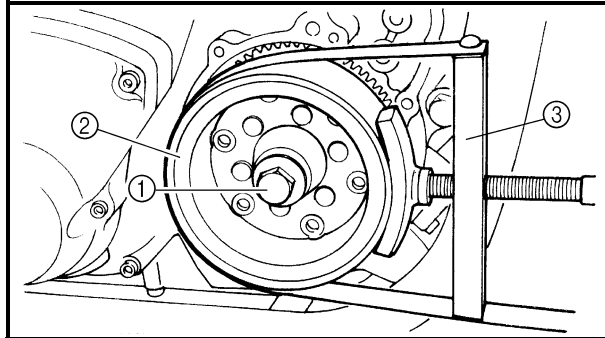
EAS00347

## REMOVING THE GENERATOR

1. Remove:
  - generator cover ①

**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.



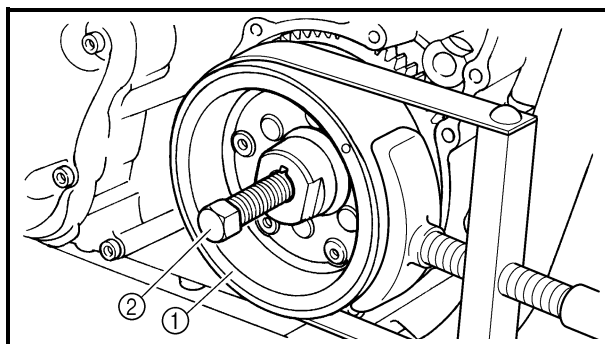
2. Remove:
  - generator rotor bolt ①
  - washer

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

While holding the generator rotor ② with the primary sheave holder ③, loosen the generator rotor bolt.



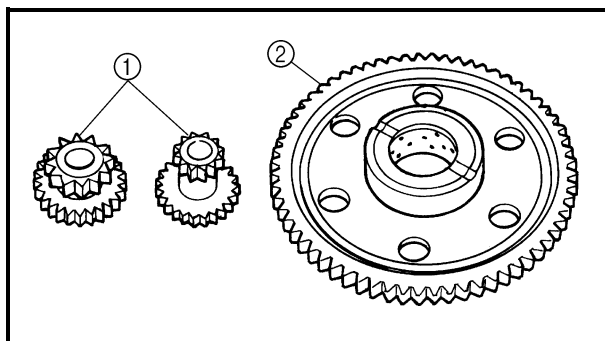
**Primary sheave holder  
YS-01880-A**



3. Remove:
  - generator rotor ①  
(with the alternator rotor puller ②)



**Alternator rotor puller  
YM-01080-A**

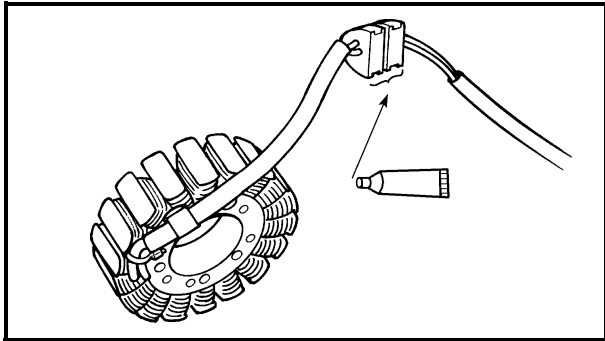


EAS00348

## CHECKING THE STARTER CLUTCH

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

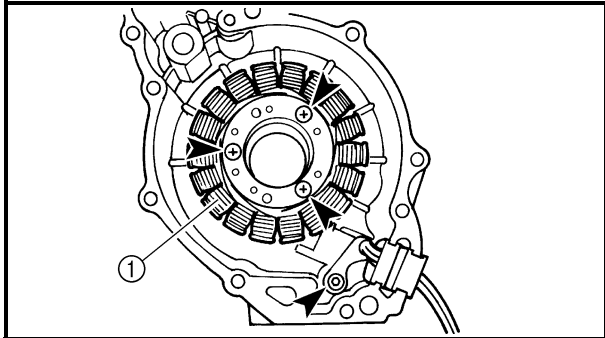




3. Apply:
- sealant  
(onto the stator coil assembly lead grommet)



**Quick Gasket®**  
**ACC-11001-05-01**

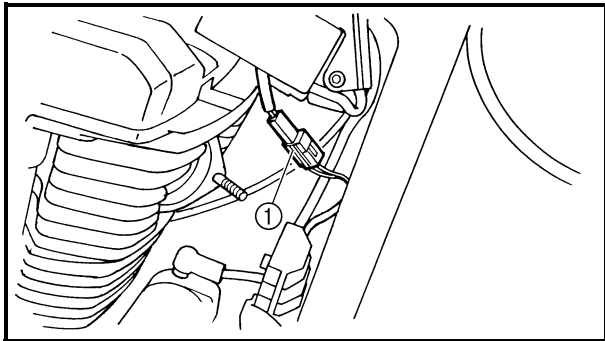


4. Install:
- stator coil assembly ①
  - stator coil assembly lead holder

**7 Nm (0.7 m • kg, 5.2 ft • lb)**

**10 Nm (1.0 m • kg, 7.2 ft • lb)**

**NOTE:** \_\_\_\_\_  
Apply locking agent (LOCTITE®) to the threads of the stator coil assembly bolts.

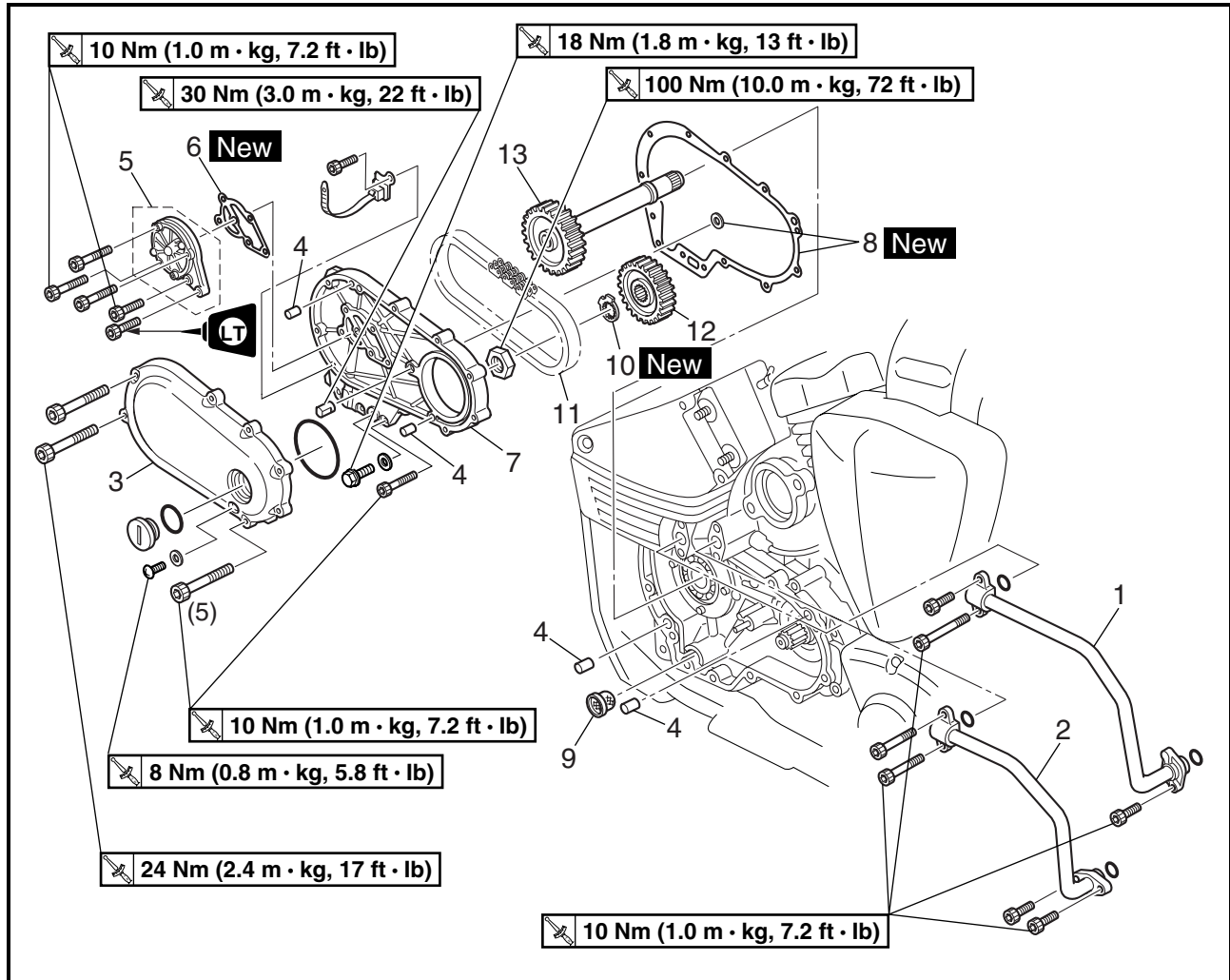


5. Connect:
- stator coil assembly coupler
  - horn 1 connectors
  - rear brake light switch coupler ①

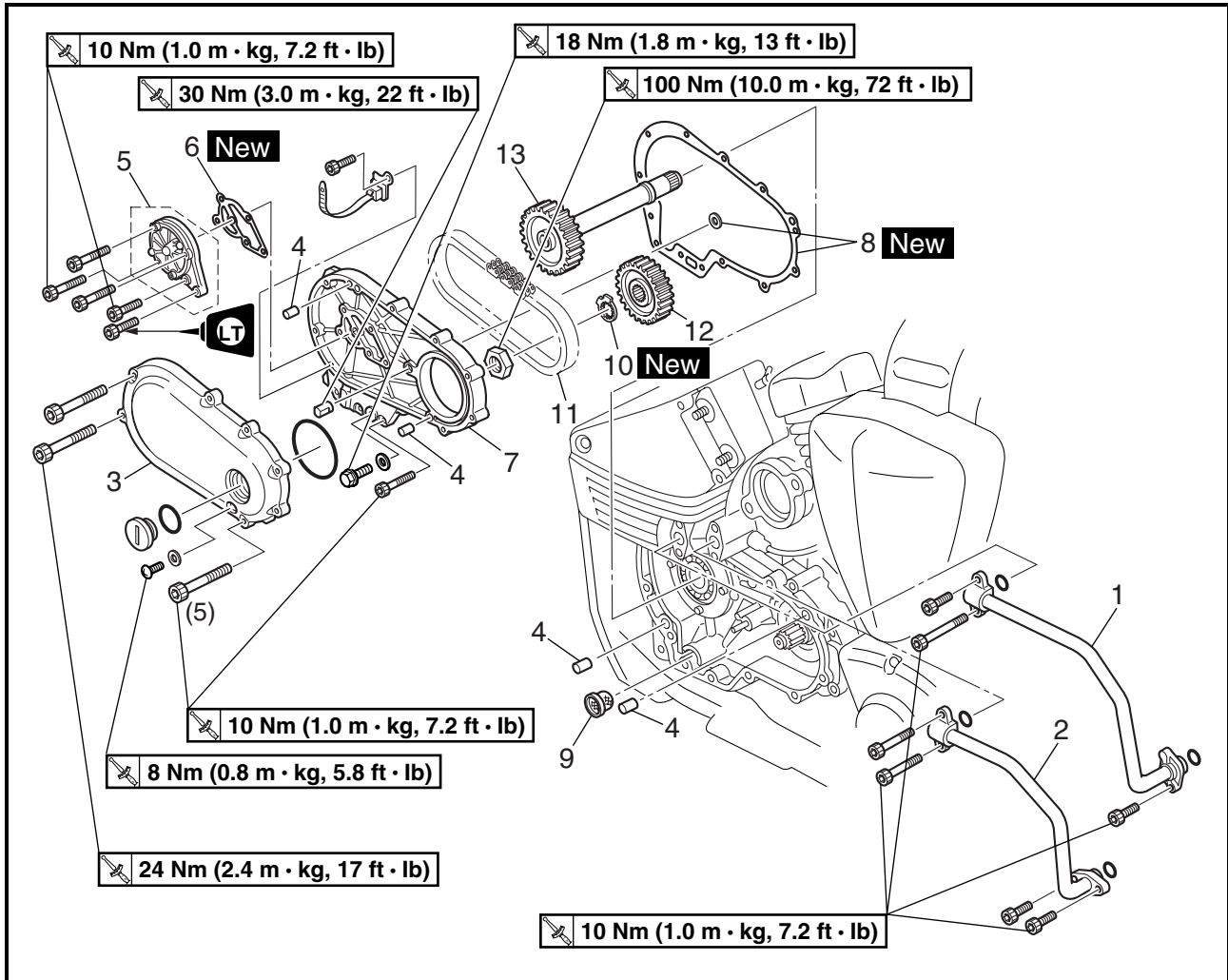
**NOTE:** \_\_\_\_\_  
Refer to "CABLE ROUTING" in chapter 2.



TRANSFER GEAR CASE

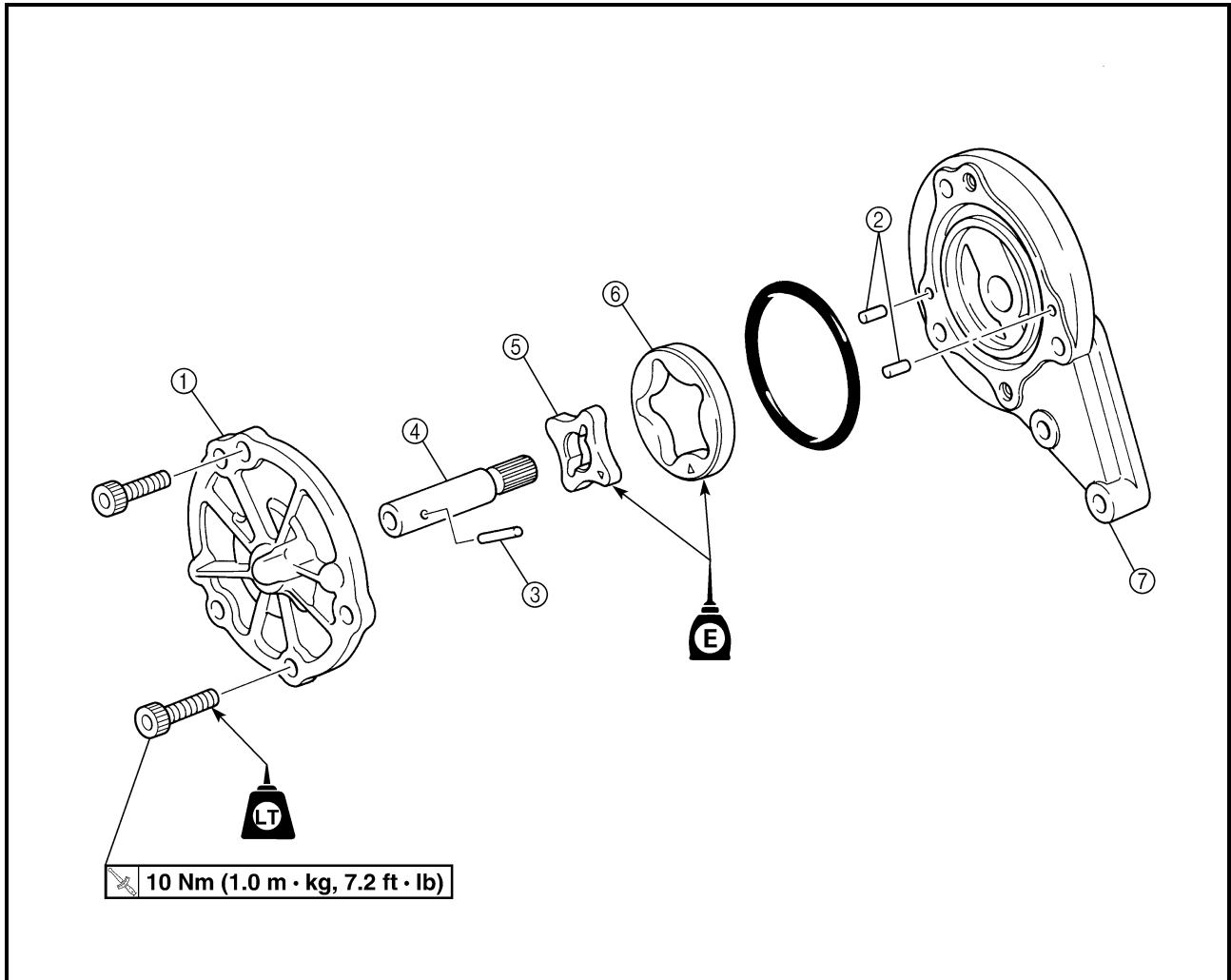


Order	Job/Part	Q'ty	Remarks
	<b>Removing the transfer gear case cover</b>		Remove the parts in the order listed.
	Muffler/exhaust pipes		Refer to "ENGINE".
	Engine oil		Drain.
	Transfer gear oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Drive sprocket		Drain.
			Refer to "CHANGING THE TRANSFER GEAR OIL" in chapter 3.
			Refer to "DRIVE BELT AND DRIVE SPROCKET" in chapter 4.
1	Oil pipe #1	1	
2	Oil pipe #2	1	
3	Cover	1	



Order	Job/Part	Q'ty	Remarks
4	Dowel pin	4	
5	Transfer gear oil pump	1	
6	Transfer gear oil pump gasket	1	
7	Transfer gear case cover	1	
8	Transfer gear case cover gasket	1	
9	Oil strainer	1	
10	Lock washer	1	
11	Primary chain	1	
12	Middle drive gear	1	
13	Middle driven shaft	1	
			For installation, reverse the removal procedure.

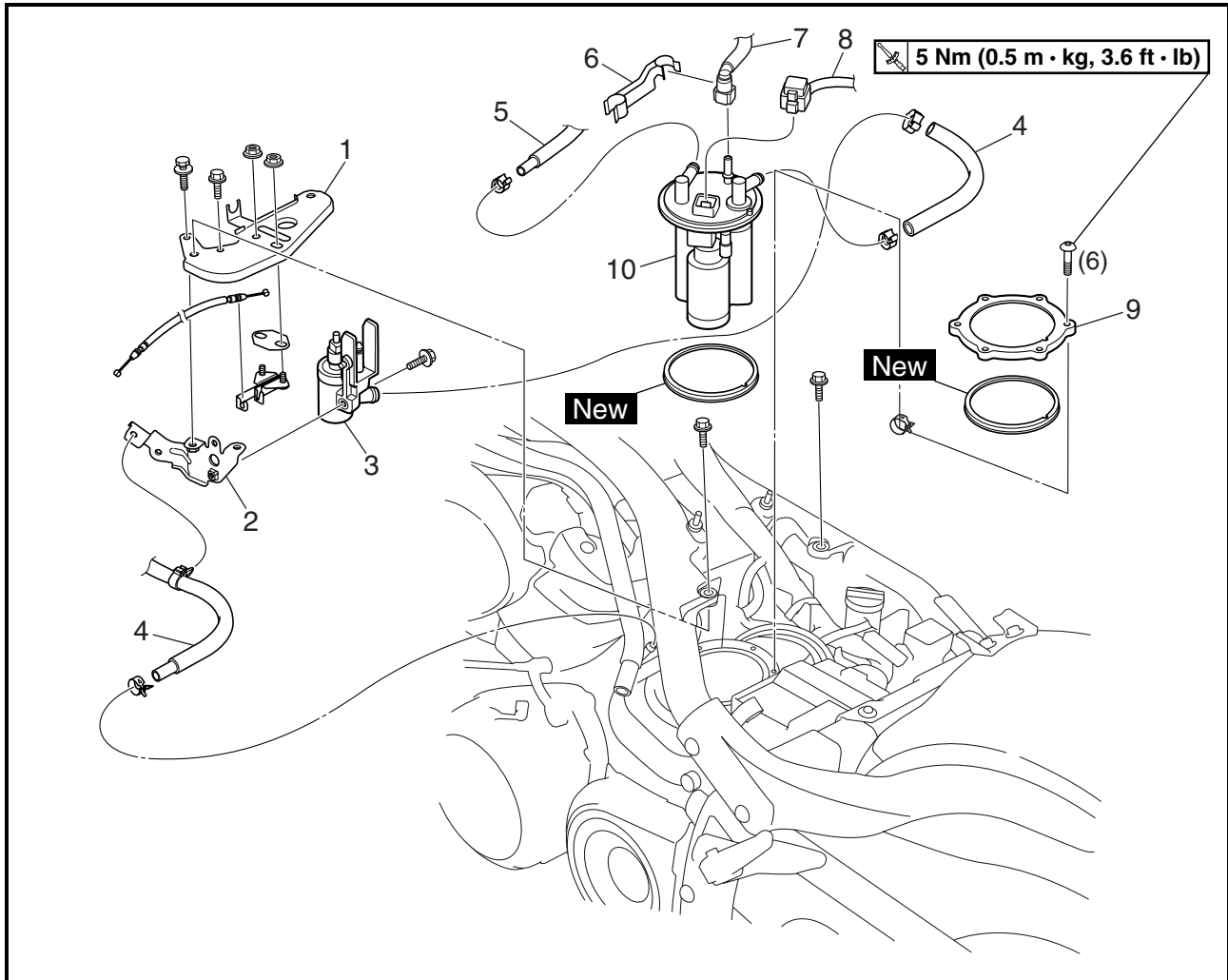




Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the transfer gear case oil pump</b>		Remove the parts in the order listed.
①	Oil pump cover	1	
②	Pin	2	
③	Pin	1	
④	Oil pump shaft	1	
⑤	Oil pump inner rotor	1	
⑥	Oil pump outer rotor	1	
⑦	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.



## FUEL PUMP



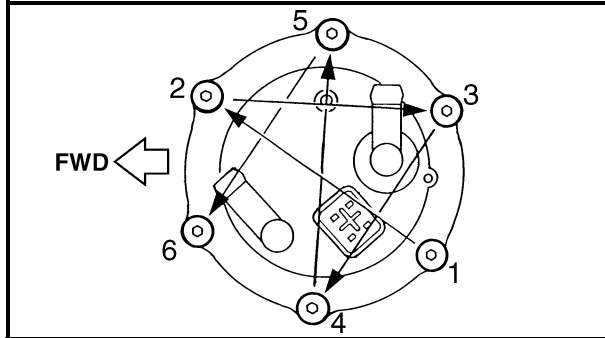
Order	Job/Part	Q'ty	Remarks
	<b>Removing the fuel pump</b>		Remove the parts in the order listed.
	Seat/cover		Refer to "SEAT AND SIDE COVERS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
1	Throttle stop screw bracket	1	
2	Fuel hose joint bracket	1	
3	Fuel hose joint	1	
4	Fuel hose	2	
5	Fuel inlet hose	1	
6	Hose holder	1	
7	Fuel outlet hose	1	
8	Fuel pump coupler	1	Disconnect.
9	Fuel pump cover	1	
10	Fuel pump	1	
			For installation, reverse the removal procedure.

**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.

**INSTALL THE FUEL PUMP**

1. Install:
  - fuel pump

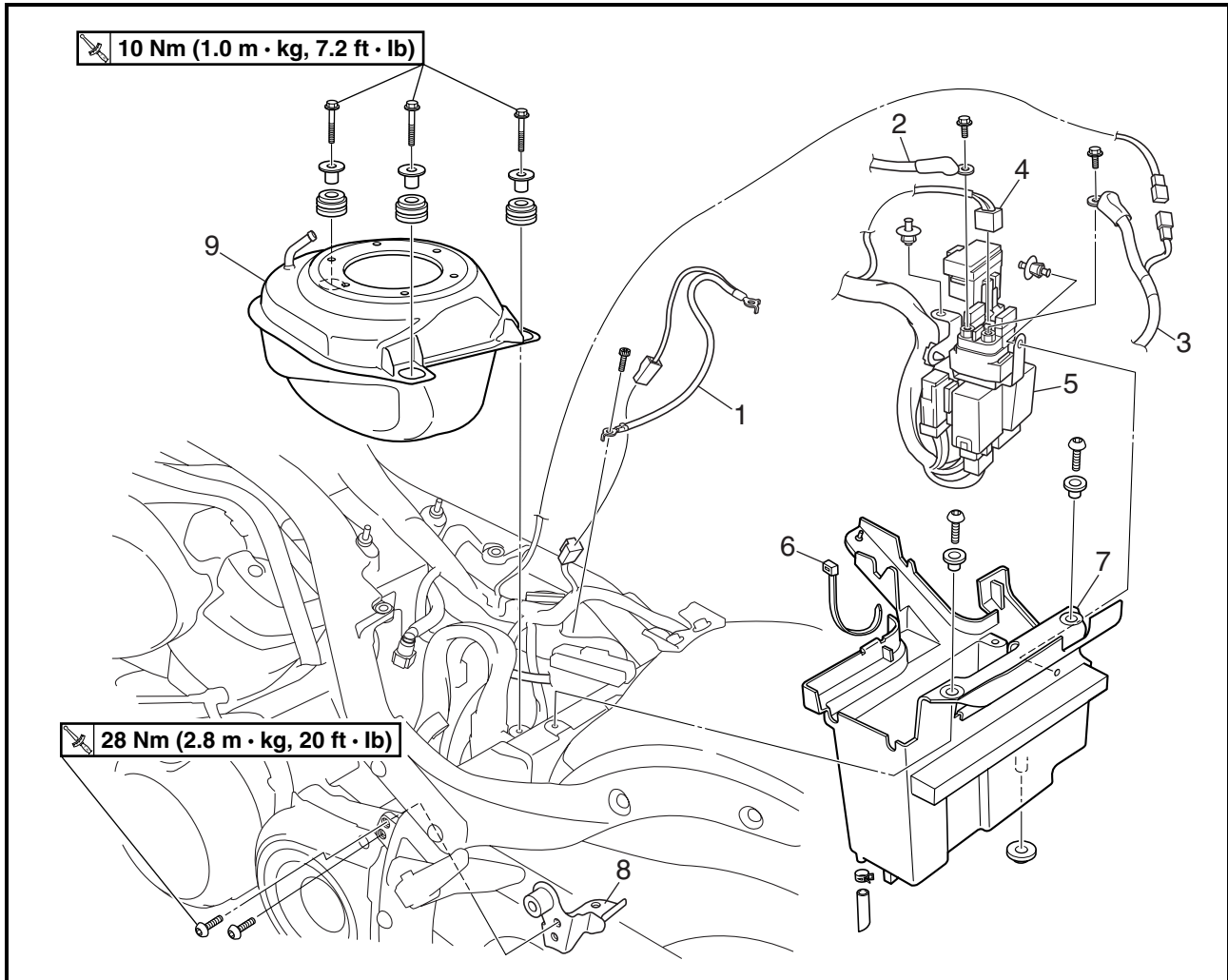
 5 Nm (0.5 m • kg, 3.6 ft • lb)

**NOTE:**

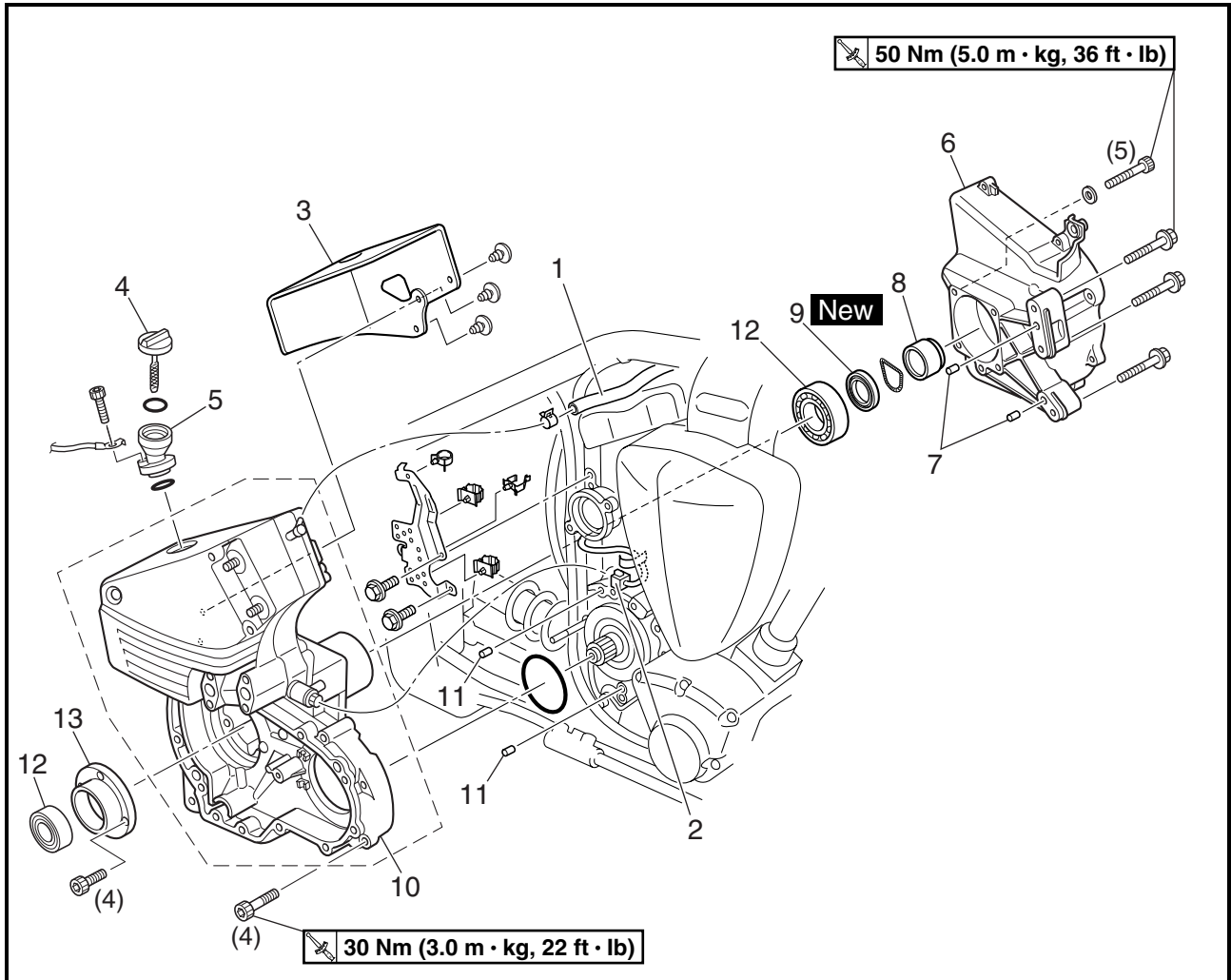
- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



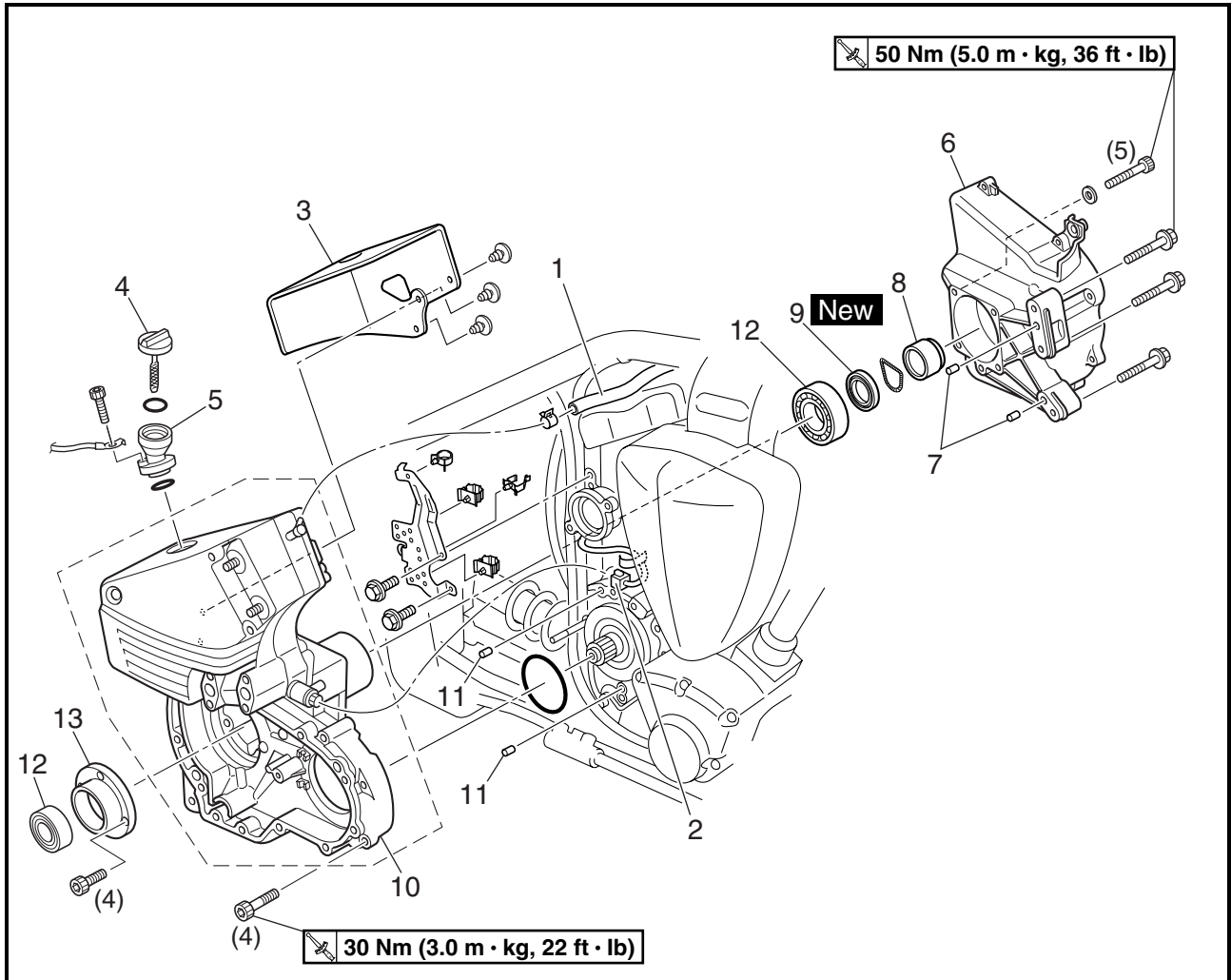
SUB FUEL TANK



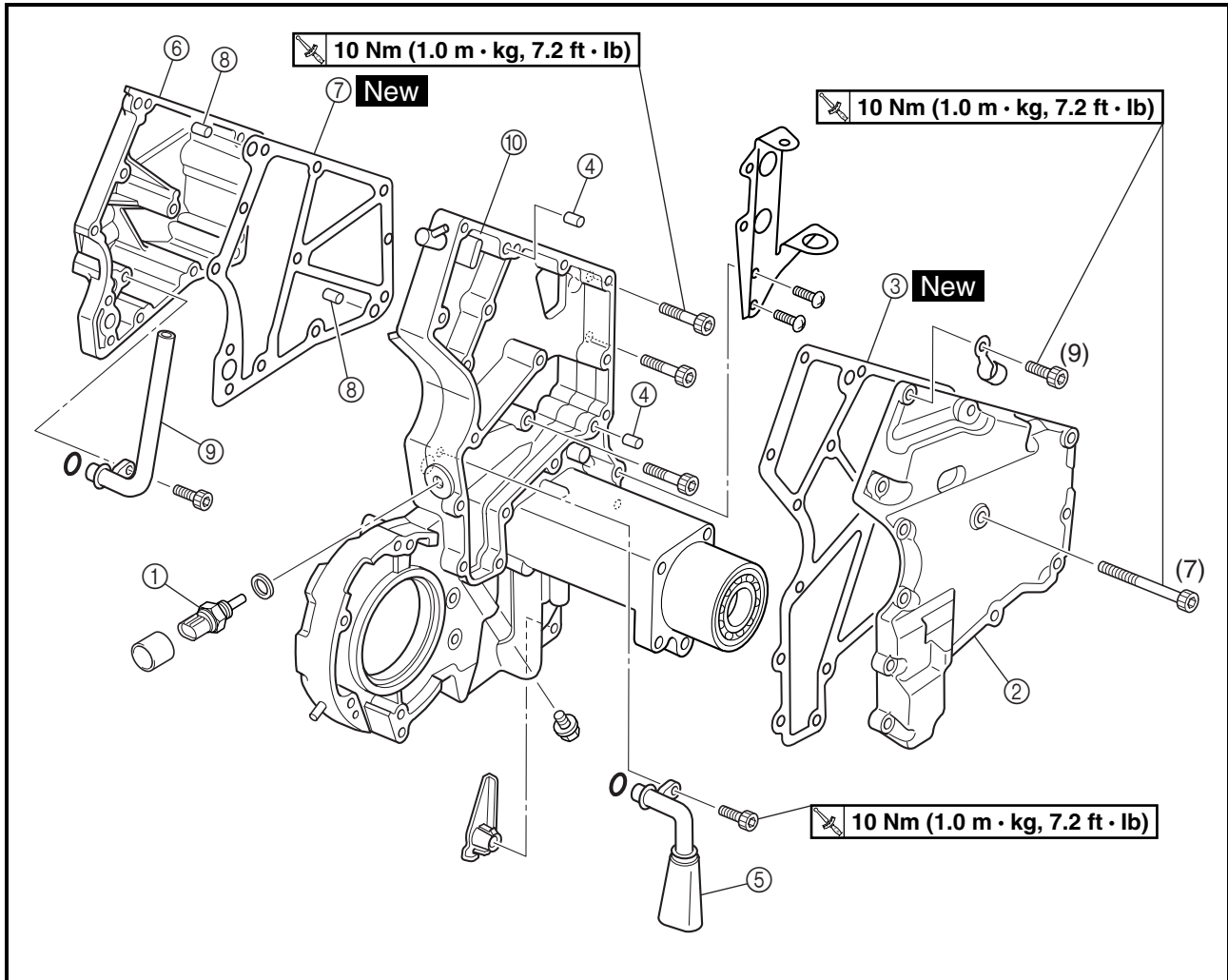
Order	Job/Part	Q'ty	Remarks
	<b>Removing the sub fuel tank</b>		Remove the parts in the order listed.
	Fuel pump		Refer to "FUEL PUMP".
	Battery		Refer to "BATTERY" in chapter 3.
1	Battery negative lead	1	
2	Starter motor lead	1	
3	Battery positive lead	1	Disconnect.
4	Starter relay coupler	1	Disconnect.
5	Relay assembly	1	
6	Plastic locking tie	1	
7	Battery box	1	
8	Sub fuel tank bracket	1	
9	Sub fuel tank	1	
			For installation, reverse the removal procedure.



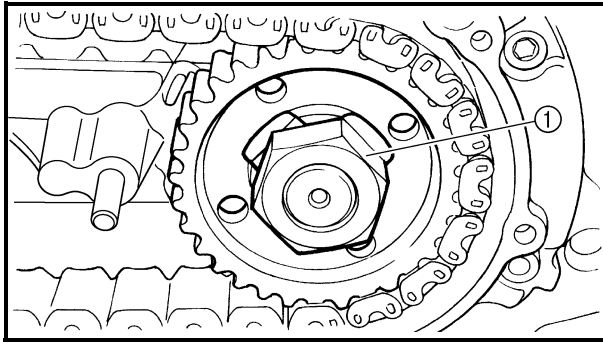
Order	Job/Part	Q'ty	Remarks
	<b>Removing the transfer gear case</b>		
	Seat/right side cover		Remove the parts in the order listed. Refer to "SEAT AND SIDE COVERS" in chapter 3.
1	Oil tank breather hose	1	
2	Oil temperature sensor coupler	1	Disconnect.
3	Oil tank cover	1	
4	Dipstick	1	
5	Dipstick joint	1	
6	Drive sprocket case	1	
7	Dowel pin	2	
8	Spacer	1	



Order	Job/Part	Q'ty	Remarks
9	Oil seal	1	For installation, reverse the removal procedure.
10	Transfer gear case	1	
11	Dowel pin	2	
12	Bearing	2	
13	Bearing housing	1	



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the oil tank</b>		Remove the parts in the order listed.
①	Oil temperature sensor	1	
②	Oil tank left cover	1	
③	Oil tank left cover gasket	1	
④	Dowel pin	2	
⑤	Oil strainer	1	
⑥	Oil tank right cover	1	
⑦	Oil tank right cover gasket	1	
⑧	Dowel pin	2	
⑨	Oil pipe	1	
⑩	Oil tank	1	
			For assembly, reverse the disassembly procedure.



### REMOVING THE MIDDLE DRIVEN SHAFT

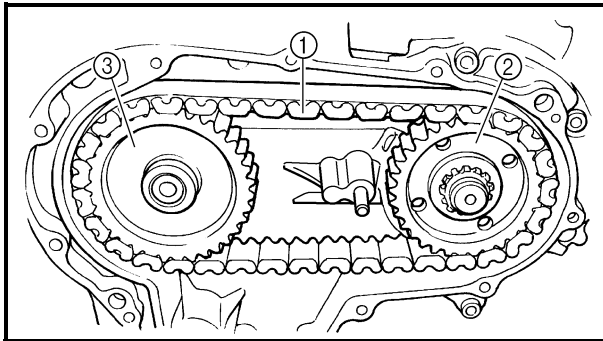
#### NOTE:

Loosen the middle drive gear nut before remove the drive sprocket.

1. Straighten the lock washer tab.
2. Loosen:
  - middle drive gear nut ①

#### NOTE:

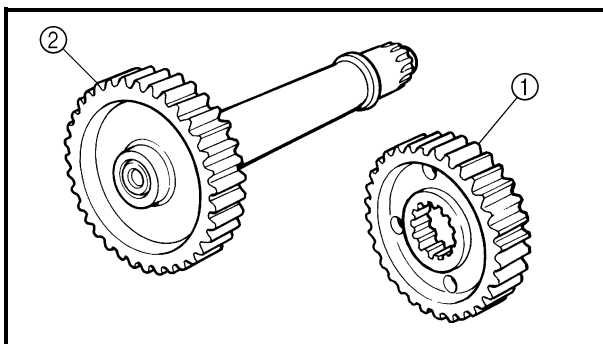
When loosening the middle drive gear nut, press down on the brake pedal so the middle drive gear does not move.



3. Remove:
  - primary chain ①
  - middle drive gear ②
  - middle driven shaft ③

#### NOTE:

Remove the primary chain, middle drive gear and middle driven shaft at the same time.



### CHECKING THE MIDDLE DRIVE

#### 1. Check:

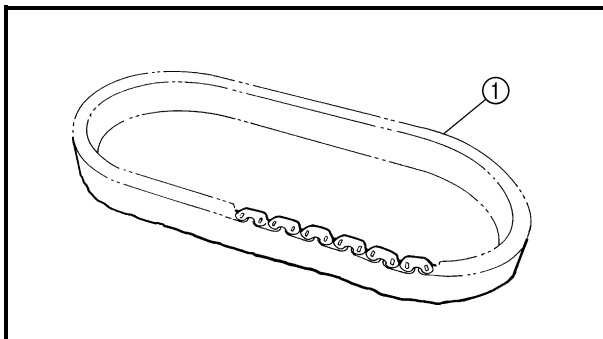
- middle drive gear ①
- middle driven gear ②

Damage/wear → Replace the middle drive gear, middle driven shaft and primary chain as a set.

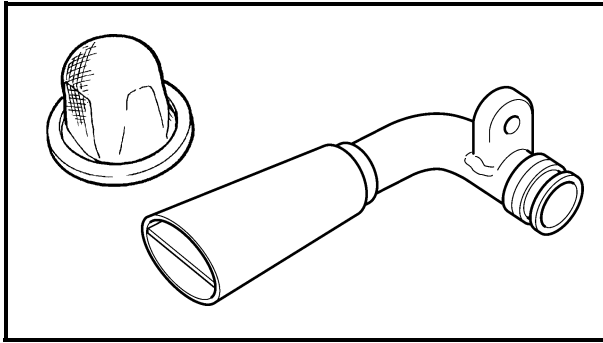
#### 2. Check:

- primary chain ①

Damage/stiffness → Replace the primary chain, middle drive gear and middle driven shaft as a set.

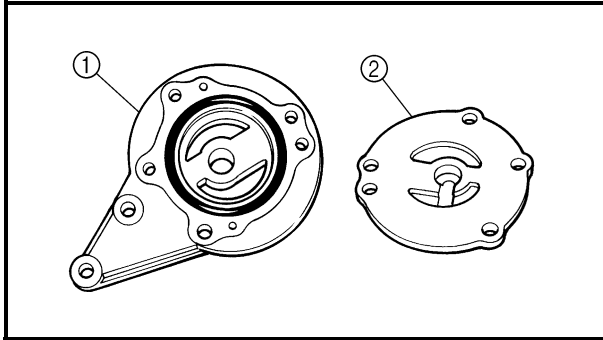






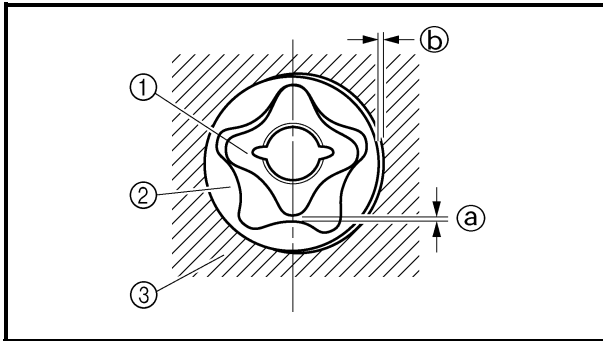
## CHECKING THE OIL STRAINER

1. Check:
  - oil strainer  
Damage → Replace.  
Contaminants → Clean with engine oil.



## CHECKING THE OIL PUMP

1. Check:
  - oil pump housing ①
  - oil pump cover ②
 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
 Out of specification → Replace the oil pump.

- ① Inner rotor
- ② Outer rotor
- ③ Oil pump housing

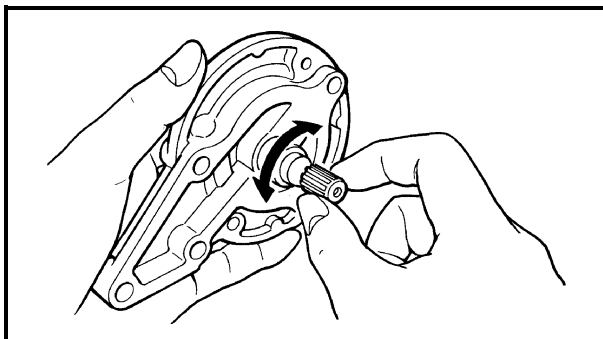


**Inner rotor-to-outer rotor tip clearance**

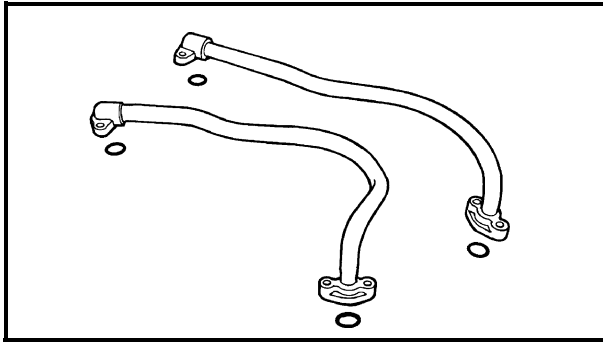
**0.07 ~ 0.12 mm**  
**(0.0028 ~ 0.0047 in)**

**Outer rotor-to-oil pump housing clearance**

**0.03 ~ 0.08 mm**  
**(0.0012 ~ 0.0031 in)**



3. Check:
  - oil pump operation  
Unsmooth → Repair or replace the defective part(-s).



### CHECKING THE OIL PIPE

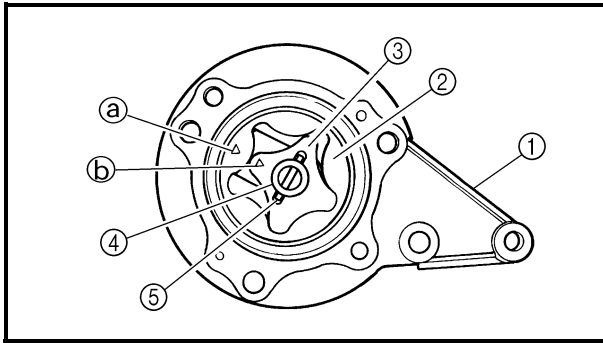
1. Check:
  - oil pipe
 Damage → Replace.

EAS00375

### ASSEMBLING THE OIL PUMP

1. Lubricate:
  - inner rotor
  - outer rotor
  - oil pump shaft  
(with the recommended lubricant)

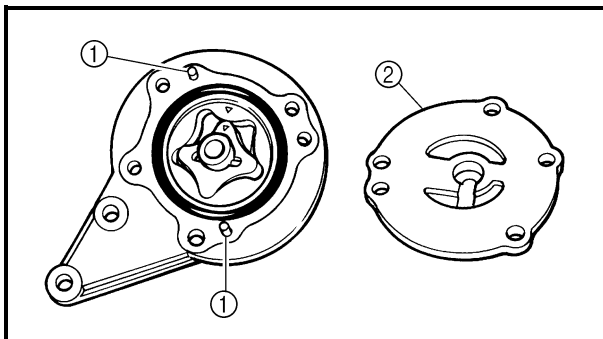
	<b>Recommended lubricant Engine oil</b>
---	---




2. Install:
  - oil pump housing ①
  - oil pump outer rotor ②
  - oil pump inner rotor ③
  - oil pump shaft ④
  - pin ⑤

#### NOTE:

- When installing the oil pump shaft, align the pin in the oil pump shaft with the groove in the oil pump inner rotor.
- Align the arrow ① on the pump outer rotor with the arrow ② on the oil pump inner rotor.



3. Install:
  - pins ①
  - oil pump cover ②

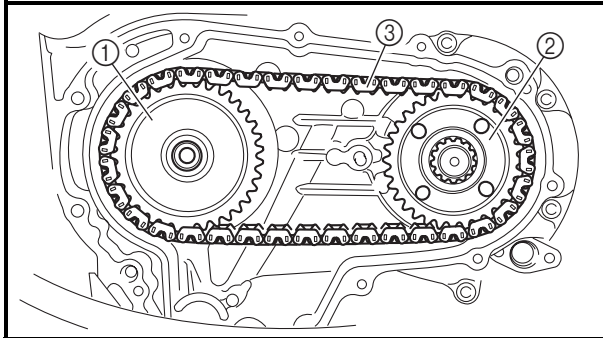
 **10 Nm (1.0 m • kg, 7.2 ft • lb)**

#### NOTE:

- Apply locking agent (LOCTITE®) to the threads of the oil pump cover screws.



4. Check:
  - oil pump operation
 Refer to “CHECKING THE OIL PUMP”.

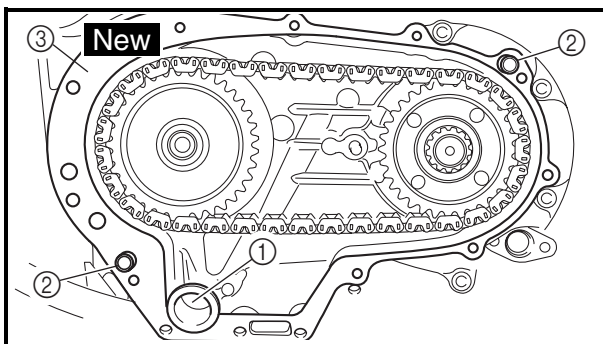
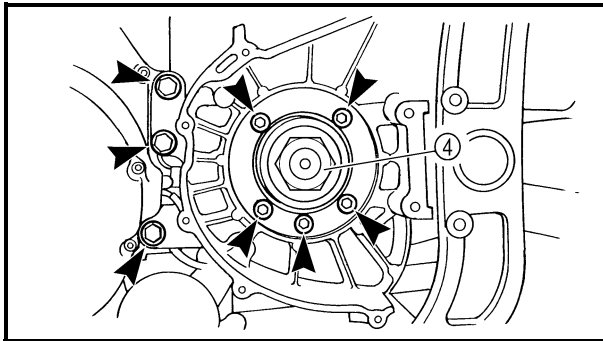


### INSTALLING THE TRANSFER GEAR CASE

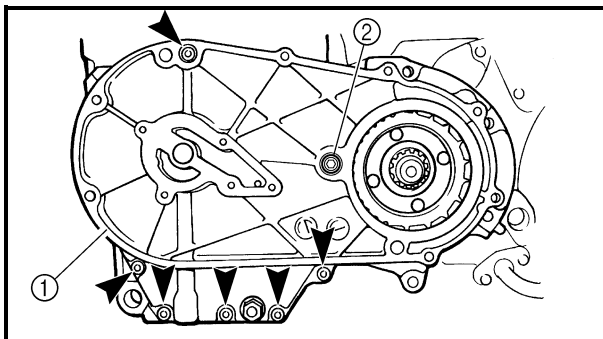
1. Install:
  - middle driven shaft ①
  - middle drive gear ②
  - primary chain ③  
(into the transfer gear case)
  - drive sprocket nut ④

#### NOTE:

- Install the middle driven shaft, middle drive gear and primary chain at the same time.
- Align the splines on the middle gear with the splines on the drive axle.
- Temporarily install the drive sprocket nut onto the middle driven shaft.



2. Install:
  - oil strainer ①
  - dowel pins ②
  - transfer gear case cover gasket ③ **New**

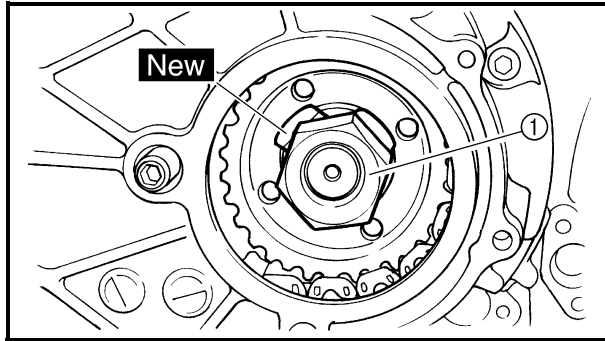


3. Install:
  - transfer gear case cover ①

- nut ②

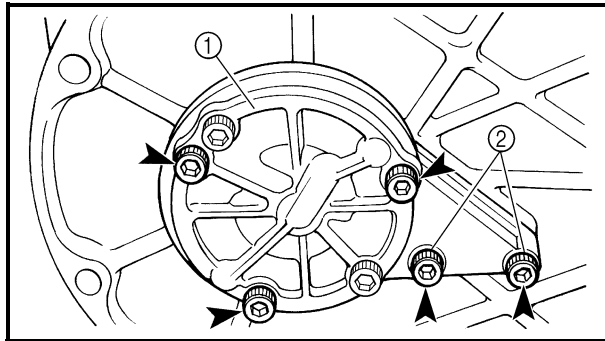
10 Nm (1.0 m • kg, 7.2 ft • lb)

30 Nm (3.0 m • kg, 22 ft • lb)



4. Install:
    - lock washer **New**
    - middle drive gear nut ①
- 100 Nm (10.0 m • kg, 72 ft • lb)**
5. Bend the lock washer tab along a flat side of the nut.

6. Remove:
  - drive sprocket nut

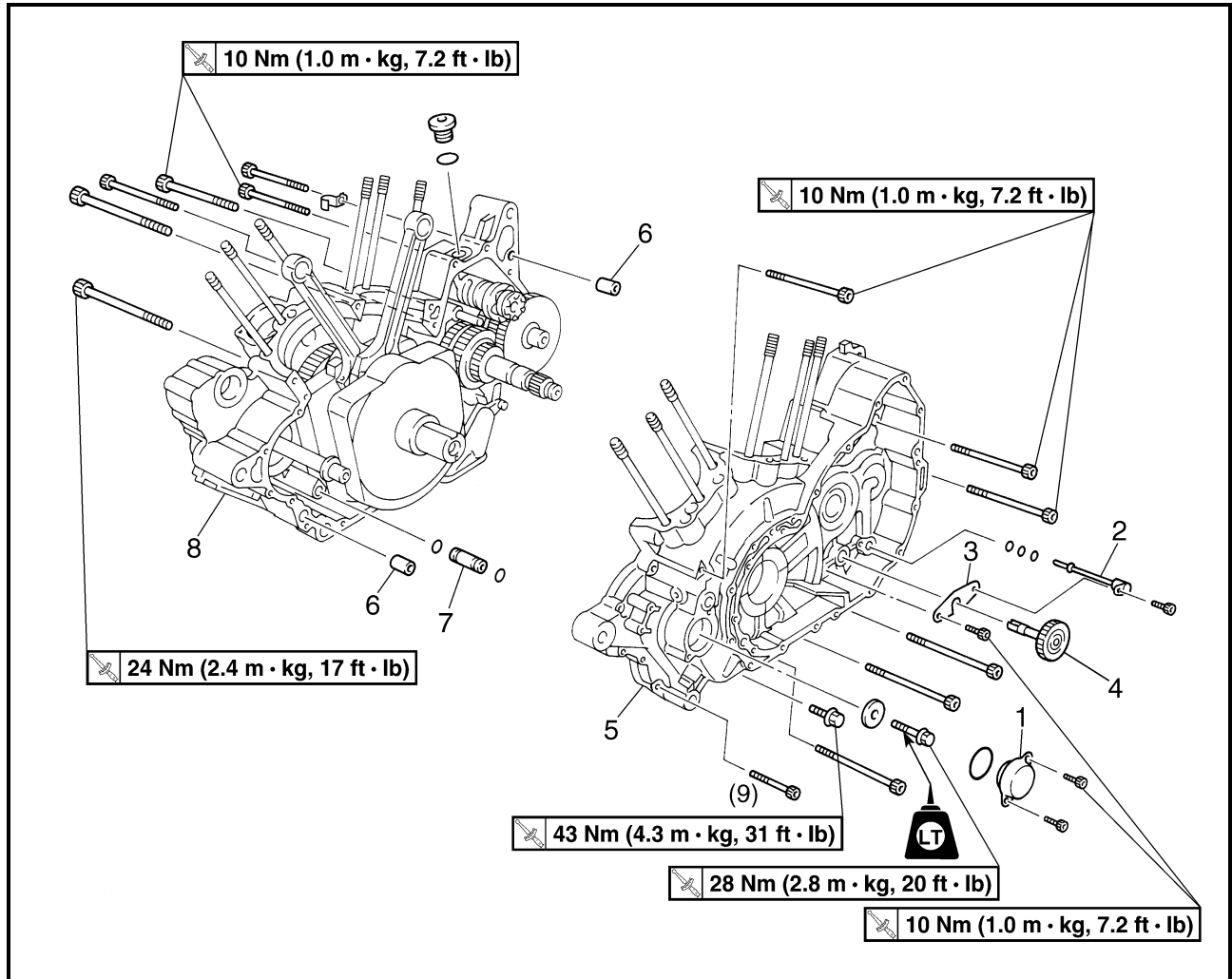


7. Install:
    - transfer gear oil pump gasket **New**
    - transfer gear oil pump ①
- 10 Nm (1.0 m • kg, 7.2 ft • lb)**

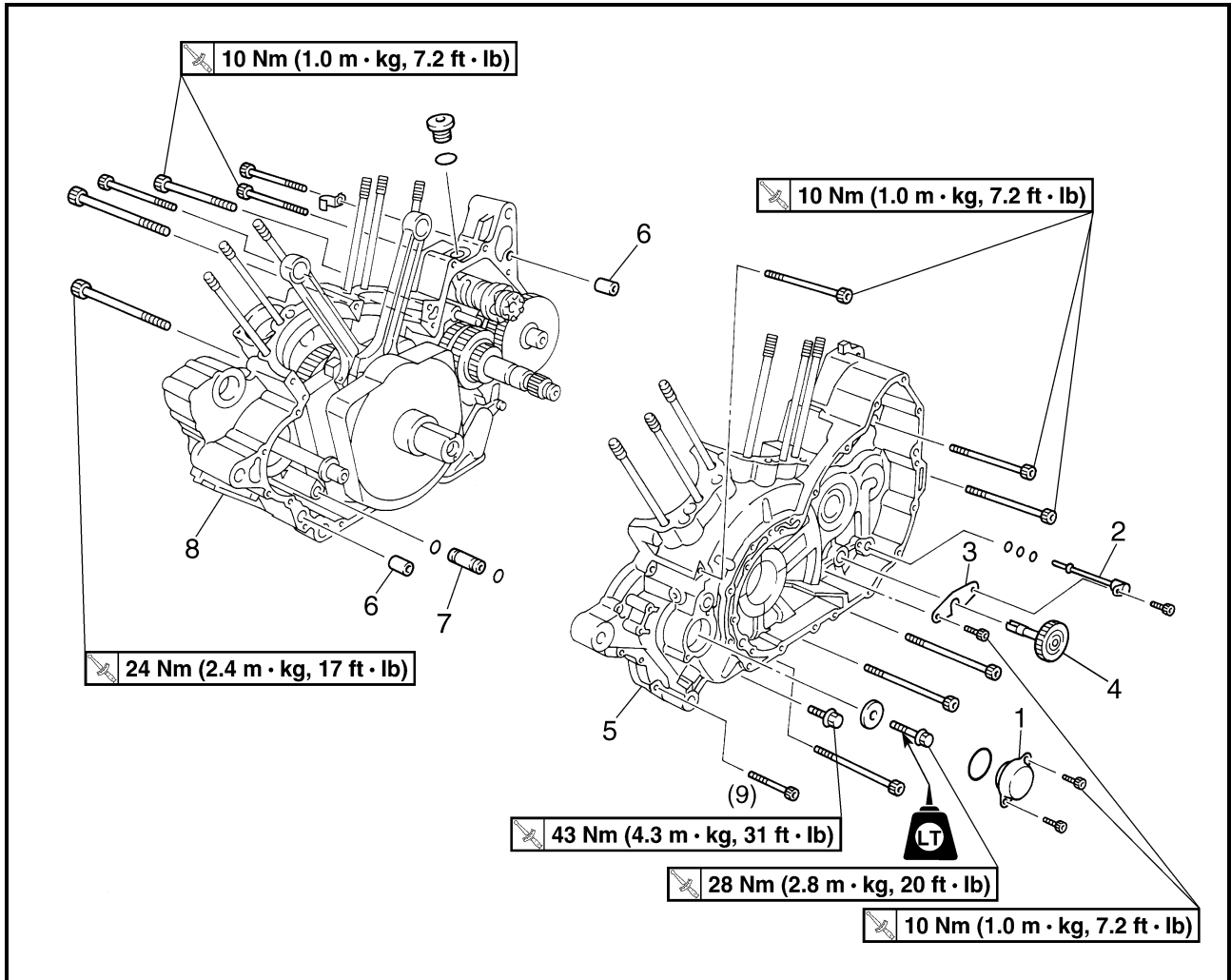
**NOTE:** \_\_\_\_\_  
 Apply locking agent (LOCTITE®) only to the threads of the transfer gear oil pump bolts (M6 × 25 mm) bolts ②.  
 \_\_\_\_\_



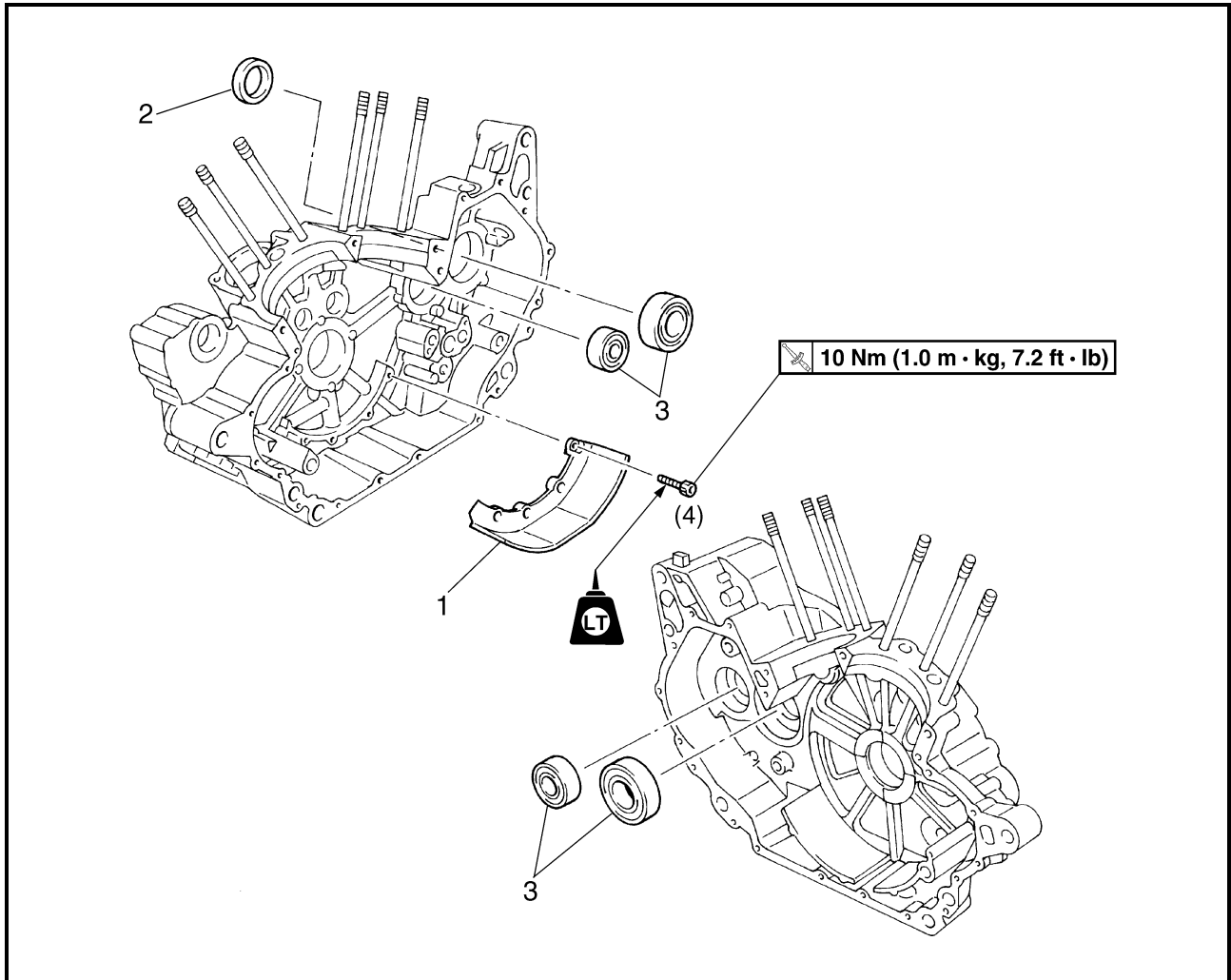
CRANKCASE



Order	Job/Part	Q'ty	Remarks
	<b>Separating the crankcase</b>		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Camshafts		Refer to "CAMSHAFTS".
	Pistons		Refer to "CYLINDERS AND PISTONS".
	Shift shaft		Refer to "SHIFT SHAFT AND STOPPER LEVER".
	Generator rotor		Refer to "GENERATOR AND STARTER CLUTCH".
1	Generator shaft end cover	1	
2	Oil delivery pipe	1	
3	Engine oil pump driven gear stopper	1	



Order	Job/Part	Q'ty	Remarks
4	Engine oil pump driven gear	1	For installation, reverse the removal procedure.
5	Left crankcase	1	
6	Dowel	2	
7	Joint pipe	1	
8	Right crankcase	1	



Order	Job/Part	Q'ty	Remarks
	<b>Removing the baffle plate and bearings</b>		Remove the parts in the order listed.
	Crankshaft		Refer to "CRANKSHAFT AND CONNECTING RODS".
	Transmission		Refer to "TRANSMISSION".
1	Baffle plate	1	
2	Oil seal	1	
3	Bearing	4	
			For installation, reverse the removal procedure.



EAS00386

## DISASSEMBLING THE CRANKCASE

### NOTE:

Loosen the generator shaft bolt before removing the generator rotor.

### 1. Remove:

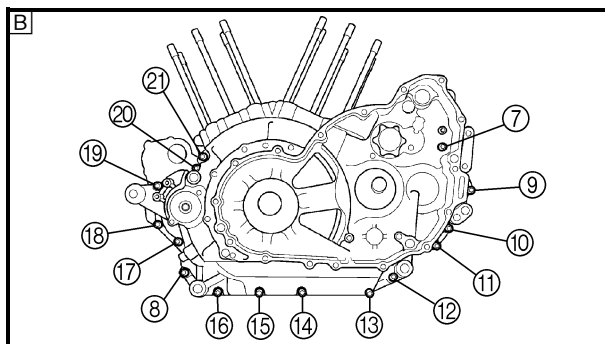
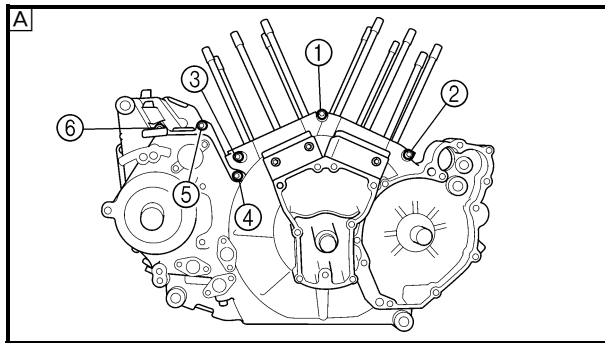
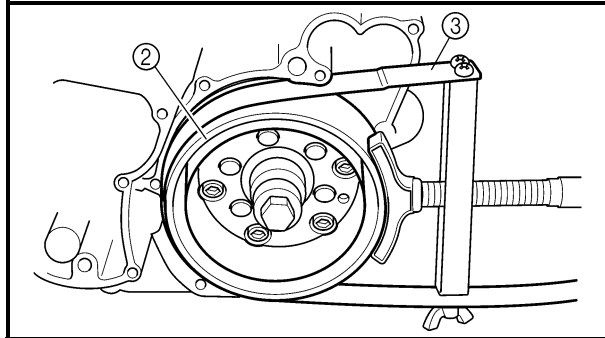
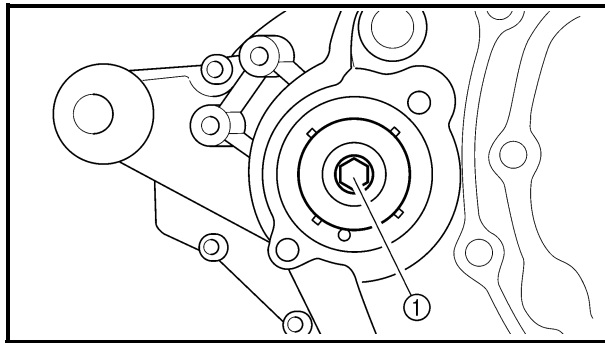
- generator shaft bolt ①

### NOTE:

While holding the generator rotor ② with the primary sheave holder ③, loosen the generator shaft bolt.



**Primary sheave holder  
YS-01880-A**



### 2. Remove:

- crankcase bolts
- holder

### 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.

Ⓐ Right crankcase

Ⓑ Left crankcase

M8 × 100 mm bolts: ①, ②

M8 × 80 mm bolt: ③

M6 × 105 mm bolt: ⑳

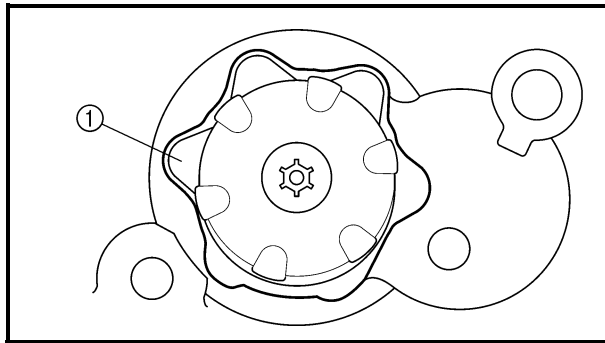
M6 × 85 mm bolts: ⑨, ⑬

M6 × 75 mm bolts: ⑭, ⑮

M6 × 60 mm bolts: ④ ~ ⑦

M6 × 40 mm bolts: ⑧, ⑩ ~ ⑫, ⑯ ~ ㉑

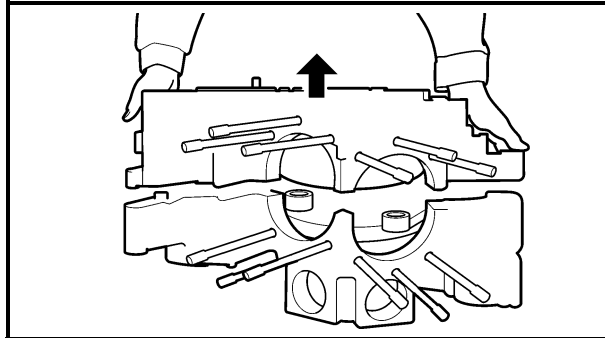




3. Turn:
- shift drum segment

**NOTE:**

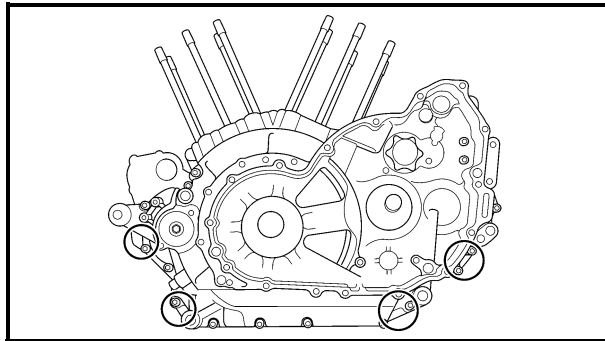
Turn the shift drum segment ① to the position shown in the illustration. In this position, the shift drum segment's teeth will not contact the crankcase during crankcase separation.



4. Remove:
- right crankcase

**CAUTION:**

- **First check that the shift drum segment's teeth then remove the right crankcase.**
- **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.**



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 AND OIL SEALS

### 1. Check:

- bearings

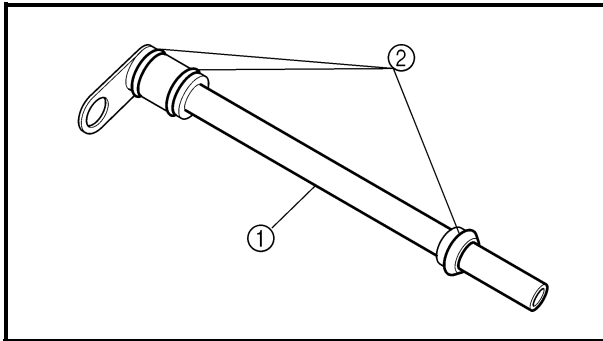
Clean and lubricate the bearings, then rotate the inner race with your finger.

Rough movement → Replace.

### 2. Check:

- oil seals

Damage/wear → Replace.



## CHECKING THE OIL DELIVERY PIPE

### 1. Check:

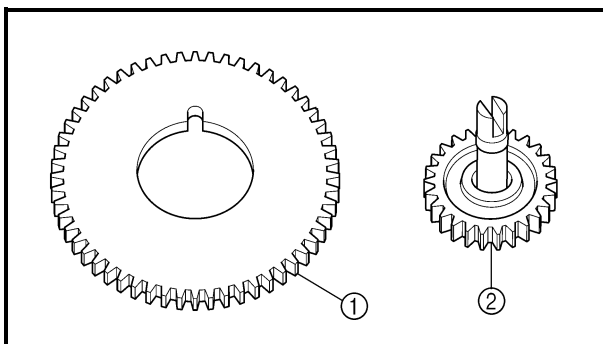
- oil delivery pipe ①

Damage → Replace.

Obstruction → Wash and blow out with compressed air.

- O-rings ②

Damage/wear → Replace.



## CHECKING THE ENGINE OIL PUMP DRIVE

### 1. Check:

- oil pump drive gear ①

- oil pump driven gear ②

Chips/pitting/roughness/wear → Replace the defective part(s).



EAS00416

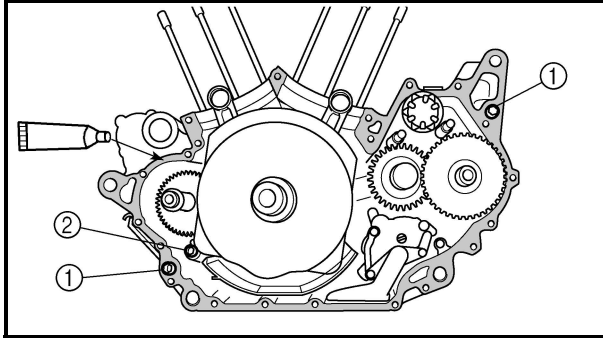
**ASSEMBLING THE CRANKCASE**

1. Apply:
  - sealant  
(onto the crankcase mating surfaces)

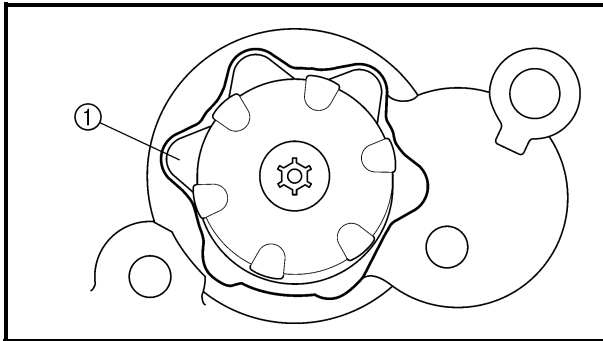


**Quick Gasket®**  
**ACC-11001-05-01**

**NOTE:** \_\_\_\_\_  
Do not allow any sealant to come into contact with the oil gallery.



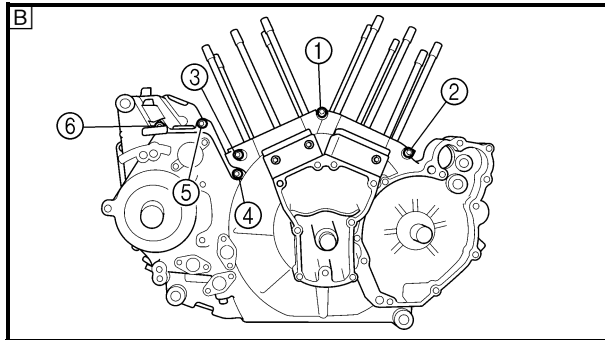
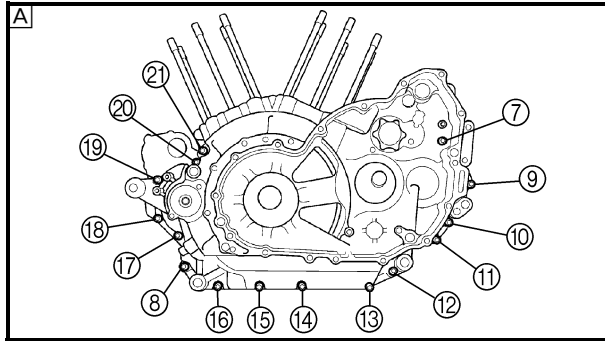
2. Install:
  - dowel pins ①
  - joint pipe ②



3. Install:
  - left crankcase  
(onto the right crankcase)

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

- Turn the shift drum segment ① to the position shown in the illustration. In this position, the shift drum segment's teeth will not contact the crankcase during crankcase installation.
- Tap lightly on the left crankcase with a soft-face hammer.



4. Install:
- holder
  - crankcase bolts

**NOTE:**

- Lubricate the bolt threads with engine oil.
- Tighten each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
- Tighten the bolts in numerical order (refer to the numbers in the illustration).

**A** Left crankcase

**B** Right crankcase

M8 × 100 mm bolts: ①, ②

M8 × 80 mm bolt: ③

M6 × 105 mm bolt: ②

M6 × 85 mm bolts: ⑨, ⑬

M6 × 75 mm bolts: ⑭, ⑮

M6 × 60 mm bolts: ④ ~ ⑦

M6 × 40 mm bolts: ⑧, ⑩ ~ ⑫, ⑯ ~ ⑳




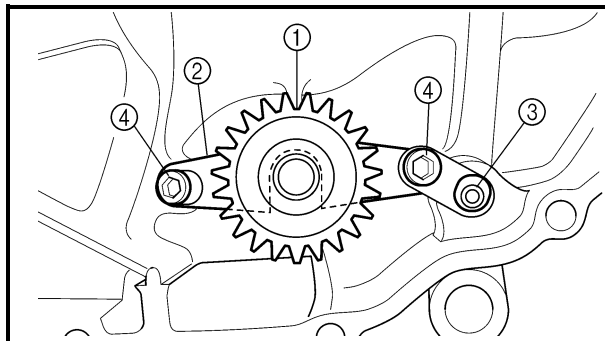
**Bolt ① ~ ③**

**24 Nm (2.4 m • kg, 17 ft • lb)**

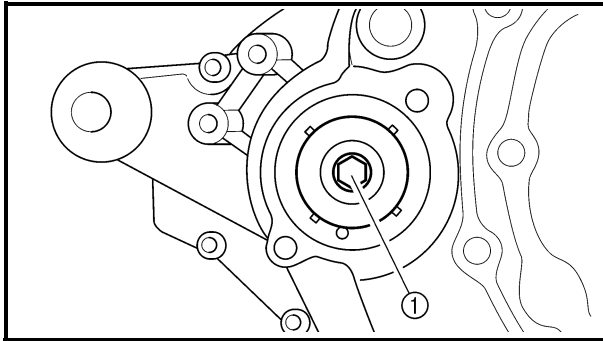
**Bolt ④ ~ ⑳**

**10 Nm (1.0 m • kg, 7.2 ft • lb)**

5. Apply:
- engine oil  
(onto the crankshaft pins bearings and oil delivery holes)
6. Check:
- crankshaft and transmission operation  
Rough movement → Repair.
7. Install:
- engine oil pump driven gear ①
  - engine oil pump driven gear stopper ②
  - oil delivery pipe ③
  - bolts ④  **10 Nm (1.0 m • kg, 7.2 ft • lb)**




8. Install:
- generator rotor  
Refer to “GENERATOR AND STARTER CLUTCH”.



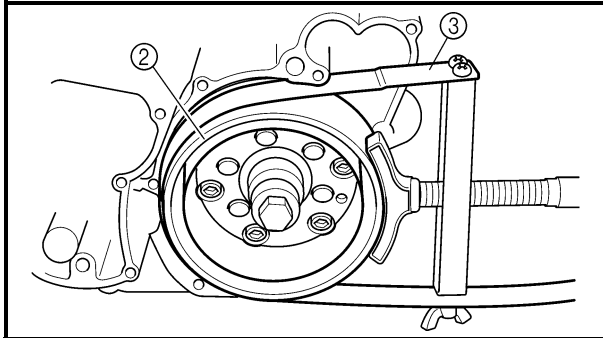
9. Install:

- washer
- generator shaft bolt ①

 28 Nm (2.8 m • kg, 20 ft • lb)

**NOTE:**

- Apply locking agent (LOCTITE®) to the threads of the generator shaft bolt.
- While holding the generator rotor ② with the primary sheave holder ③, tighten the generator shaft bolt.

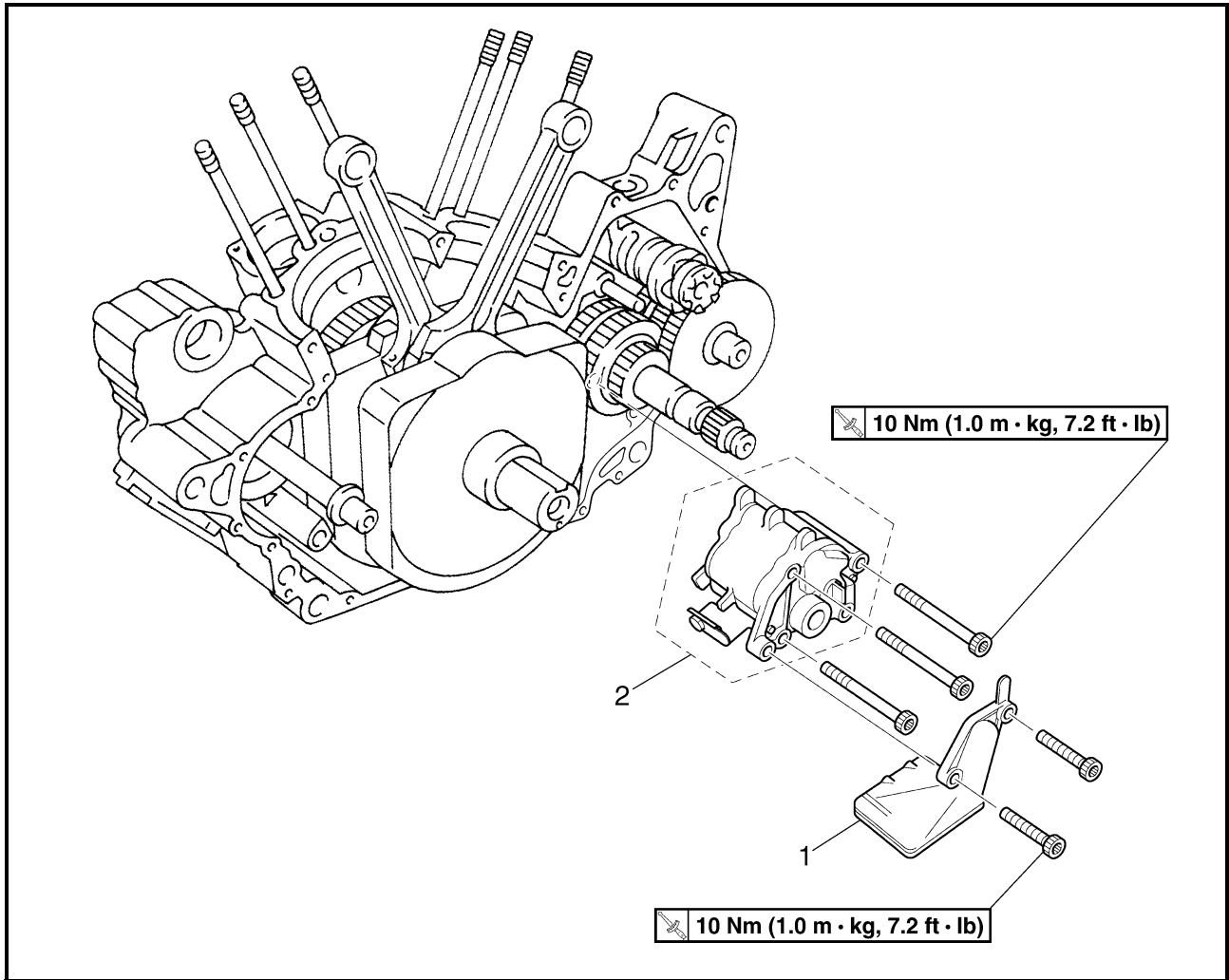


**Primary sheave holder  
YS-01880-A**

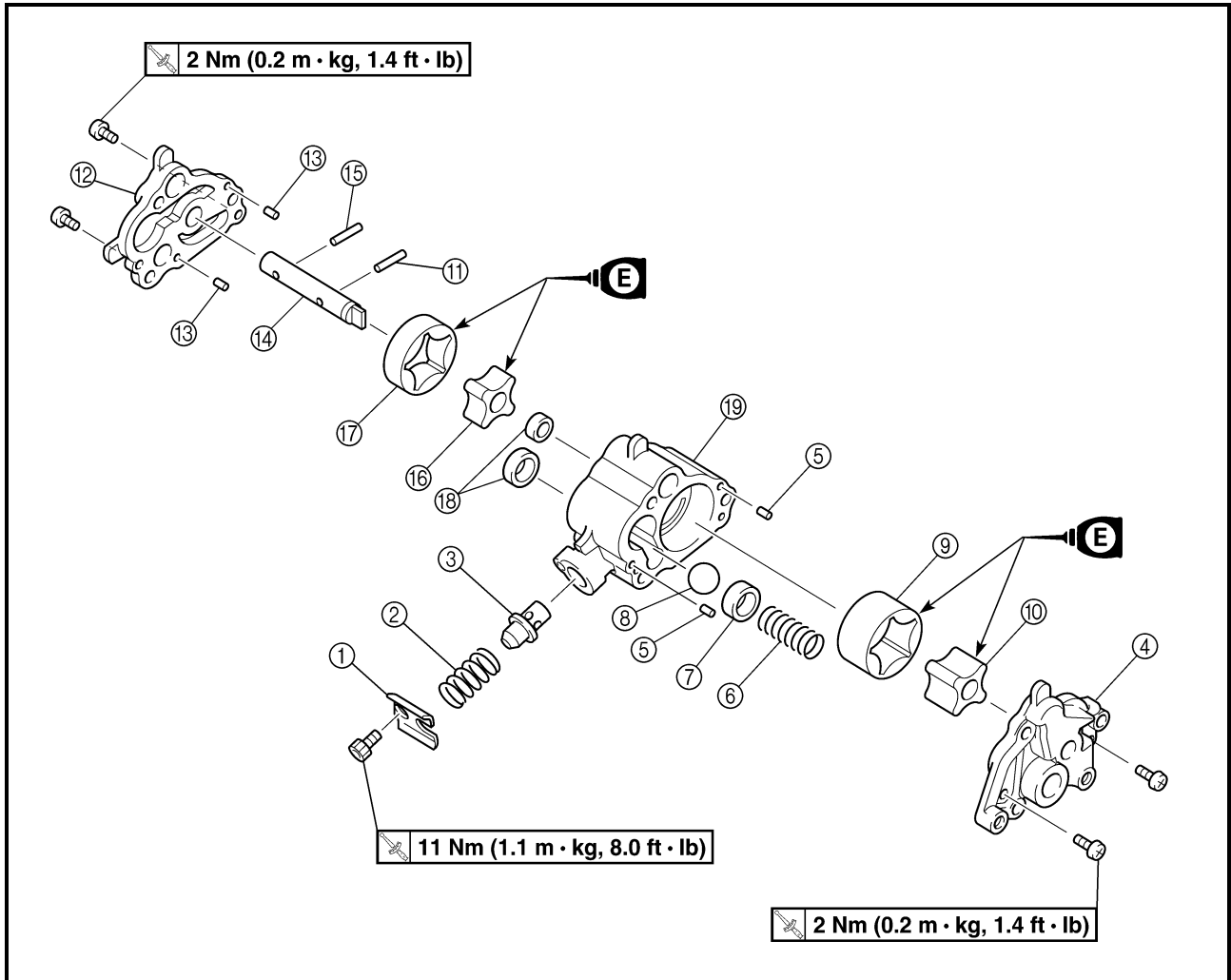


EAS00356

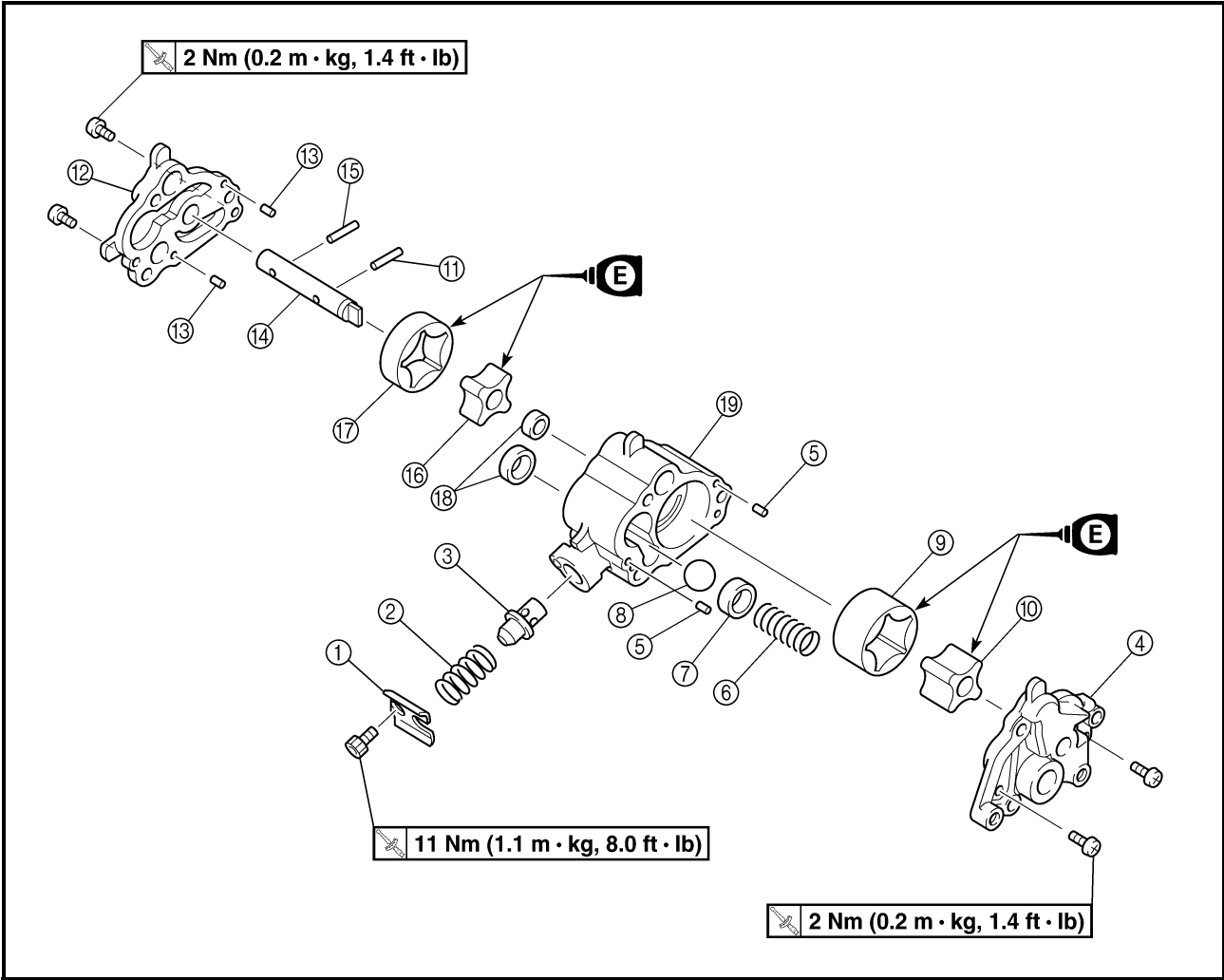
ENGINE OIL PUMP



Order	Job/Part	Q'ty	Remarks
	<b>Removing the engine oil pump</b>		
	Crankcase		Remove the parts in the order listed. Separate. Refer to "CRANKCASE"
1	Oil strainer	1	
2	Engine oil pump assembly	1	
			For installation, reverse the removal procedure.

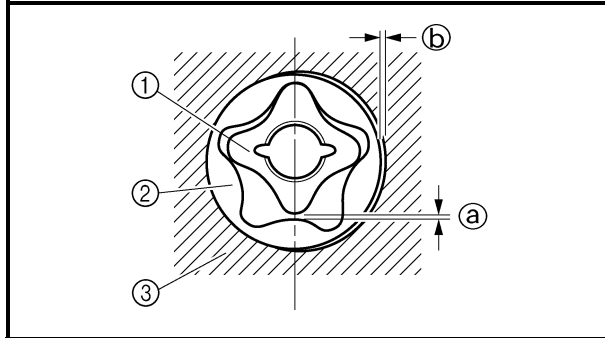
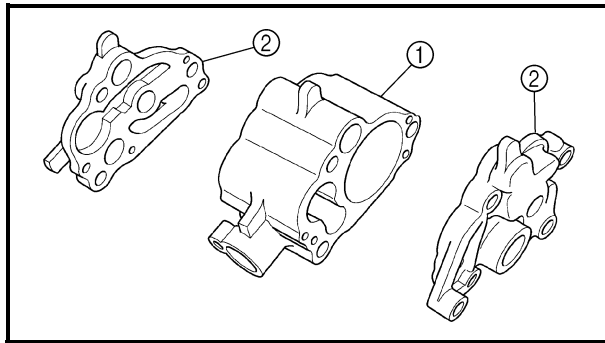


Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the engine oil pump</b>		Remove the parts in the order listed.
①	Spring retainer	1	
②	Spring	1	
③	Relief valve	1	
④	Oil pump housing cover 1	1	
⑤	Pin	2	
⑥	Spring	1	
⑦	Collar	1	
⑧	Ball	1	
⑨	Oil pump outer rotor 1	1	
⑩	Oil pump inner rotor 1	1	
⑪	Pin	1	



Order	Job/Part	Q'ty	Remarks
⑫	Oil pump housing cover 2	1	For assembly, reverse the disassembly procedure.
⑬	Pin	2	
⑭	Oil pump shaft	1	
⑮	Pin	1	
⑯	Oil pump inner rotor 2	1	
⑰	Oil pump outer rotor 2	1	
⑱	Oil seal	2	
⑲	Oil pump housing	1	





EAS00363

**CHECKING THE OIL PUMP**

1. Check:

- oil pump housing ①
- oil pump housing covers ②

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

Out of specification → Replace the oil pump.

- ① Inner rotor
- ② Outer rotor
- ③ Oil pump housing



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

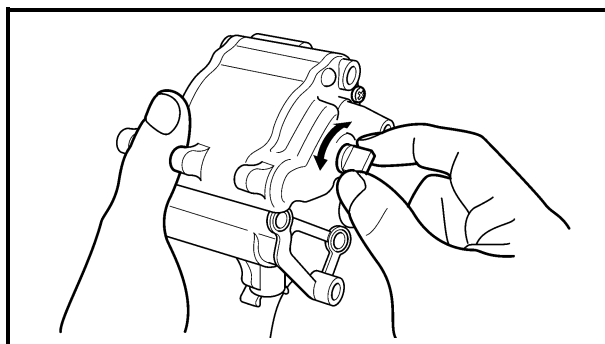
0 ~ 0.12 mm (0 ~ 0.0047 in)

**Outer-rotor-to-oil-pump-housing clearance (feed pump)**

0.03 ~ 0.08 mm  
(0.0012 ~ 0.0031 in)

**Outer-rotor-to-oil-pump-housing clearance (scavenging pump)**

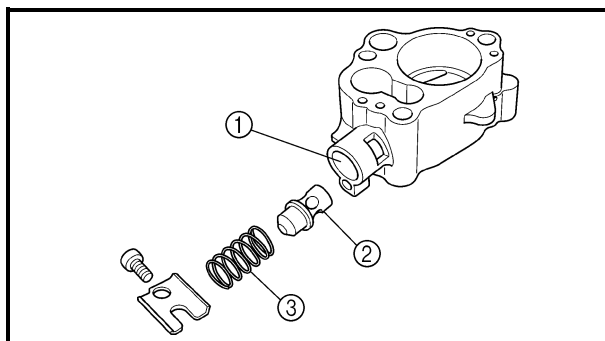
0.06 ~ 0.11 mm  
(0.0024 ~ 0.0043 in)



3. Check:

- oil pump operation

Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



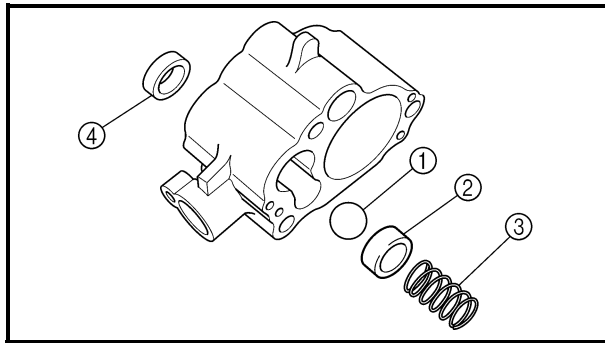
EAS00365

**CHECKING THE RELIEF VALVE**

1. Check:

- relief valve body ①
- relief valve ②
- spring ③

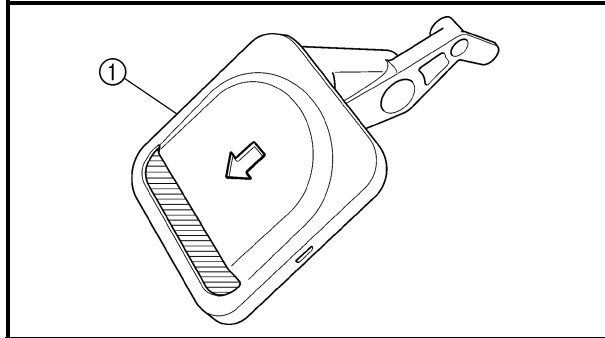
Damage/wear → Replace the defective part(s).



2. Check:

- ball ①
- collar ②
- spring ③
- oil seal ④

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



EAS00368

## CHECKING THE OIL STRAINER

1. Check:

- oil strainer ①

Damage → Replace.

Contaminants → Clean with solvent.

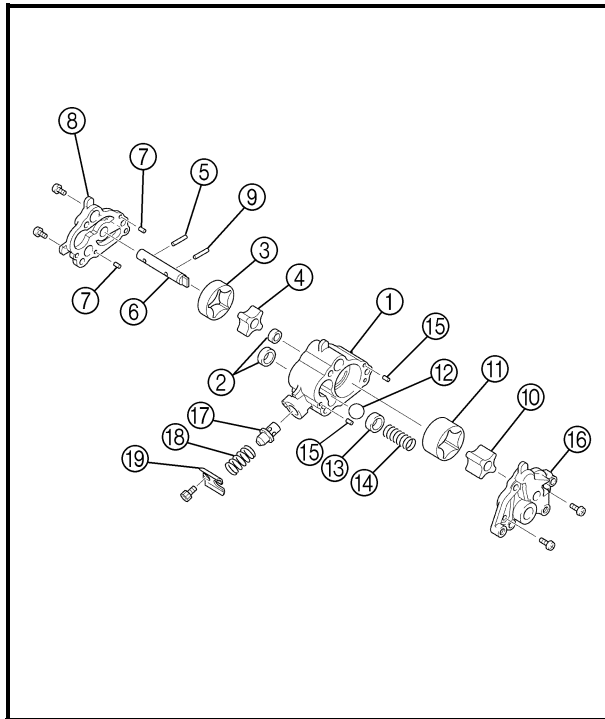
EAS00375

## ASSEMBLING THE OIL PUMP

1. Lubricate:

- inner rotor
- outer rotor
- oil pump shaft  
(with the recommended lubricant)

	<b>Recommended lubricant</b> <b>Engine oil</b>
---	---



2. Install:
- oil pump housing ①
  - oil seals ②
  - oil pump outer rotor 2 ③
  - oil pump inner rotor 2 ④
  - pin ⑤
  - oil pump shaft ⑥
  - pins ⑦
  - oil pump housing cover 2 ⑧

2 Nm (0.2 m • kg, 1.4 ft • lb)

- pin ⑨
- oil pump inner rotor 1 ⑩
- oil pump outer rotor 1 ⑪
- ball ⑫
- collar ⑬
- spring ⑭
- pins ⑮
- oil pump housing cover 1 ⑯

2 Nm (0.2 m • kg, 1.4 ft • lb)

- relief valve ⑰
- spring ⑱
- spring retainer ⑲

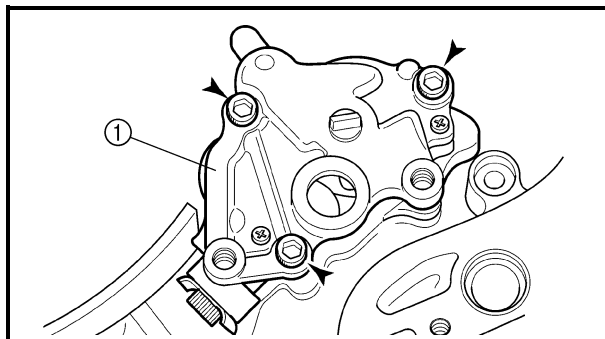
11 Nm (1.1 m • kg, 8.0 ft • lb)

**NOTE:**

When installing the inner rotor, align the pin in the oil pump shaft with the groove in the inner rotor.

3. Check:

- oil pump operation  
Refer to “CHECKING THE OIL PUMP”.



EAS00376

**INSTALLING THE OIL PUMP**

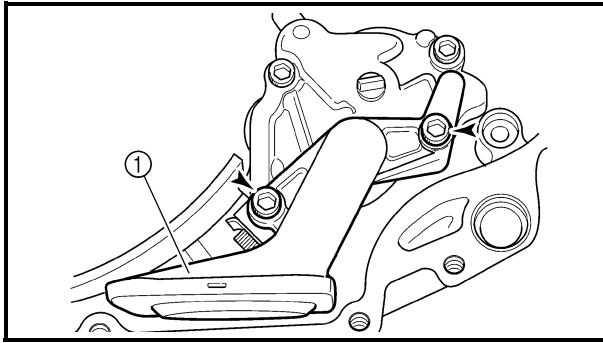
1. Install:

- oil pump ①

10 Nm (1.0 m • kg, 7.2 ft • lb)

**CAUTION:**

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




EAS00378

**INSTALLING THE OIL STRAINER**

1. Install:

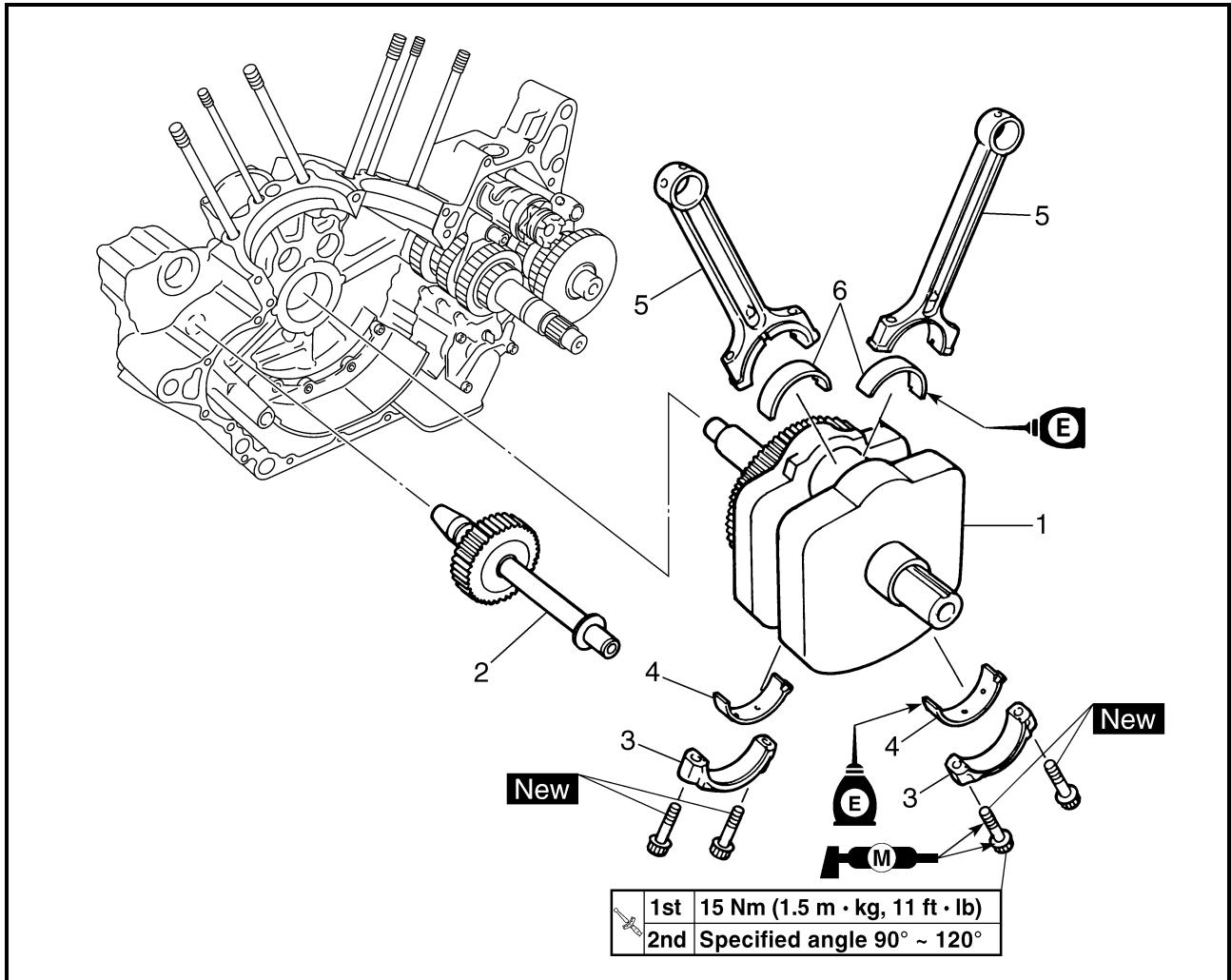
- oil strainer ①

 **10 Nm (1.0 m • kg, 7.2 ft • lb)****NOTE:**

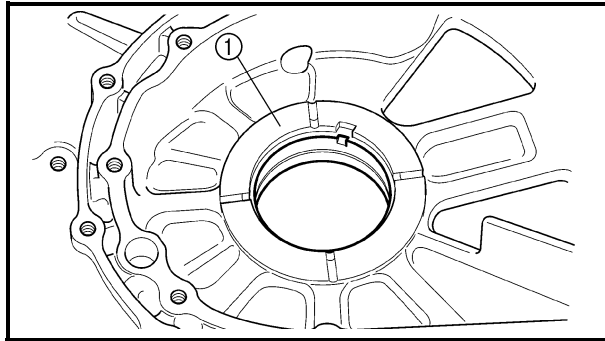
The arrow mark on the oil strainer cover must point towards the rear of the engine.



CRANKSHAFT AND CONNECTING RODS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the crankshaft and connecting rods</b>		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Crankshaft	1	
2	Generator shaft	1	
3	Connecting rod cap	2	
4	Big end lower bearing	2	
5	Connecting rod	2	
6	Big end upper bearing	2	
			For installation, reverse the removal procedure.



EAS00385

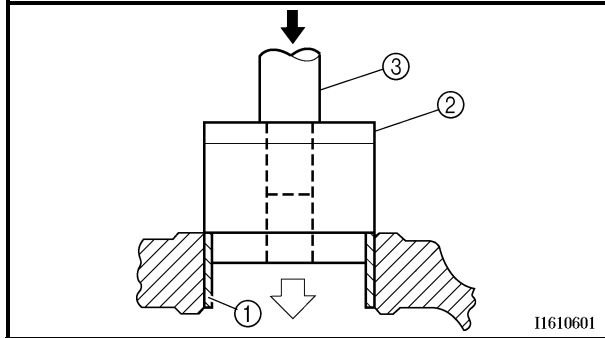
## REMOVING THE CRANKSHAFT

1. Remove:

- crankshaft journal bearing ①

### NOTE:

- Remove the crankshaft journal bearing with the bearing remover and installer ② and bearing driver ③.

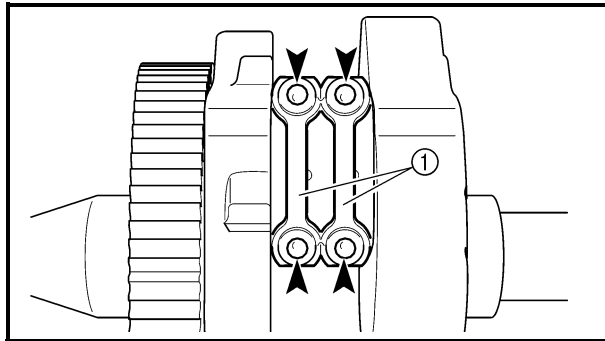


**Bearing remover and installer**

**YM-28898**

**Bearing driver**

**YM-04058**



EAS00391

## REMOVING THE CONNECTING RODS

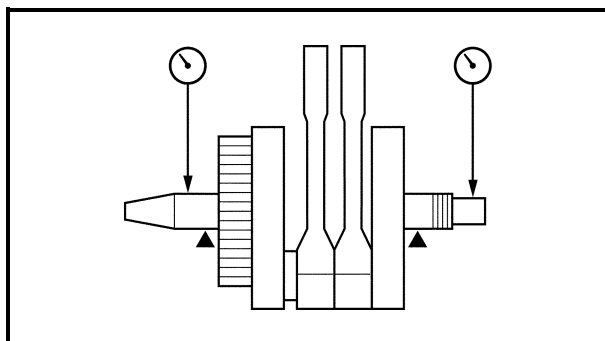
The following procedure applies to all of the connecting rods.

1. Remove:

- connecting rod caps ①
- connecting rod
- big end bearings

### NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



EAS00398

## CHECKING THE CRANKSHAFT AND CONNECTING RODS

1. Measure:

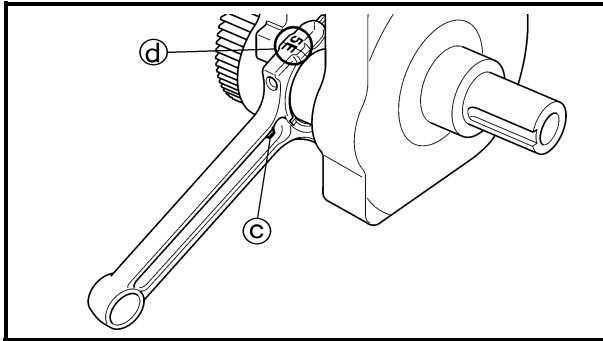
- crankshaft runout  
Out of specification → Replace the crankshaft.



**Crankshaft runout**

**Less than 0.04 mm (0.0016 in)**





d. Assemble the connecting rod halves.

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

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the projection © 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 bolts.


**⚠ WARNING** \_\_\_\_\_

- **Replace the connecting rod bolts with new ones.**
- **Clean the connecting rod bolts.**

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

The tightening procedure of the connecting rod bolts is angle controlled, therefore tighten the bolts using the following procedure.

f. Tighten the connecting rod bolts to the specified torque.

	<p><b>Connecting rod bolt</b>  <b>1st</b>  <b>15 Nm (1.5 m • kg, 11 ft • lb)</b></p>
---	--

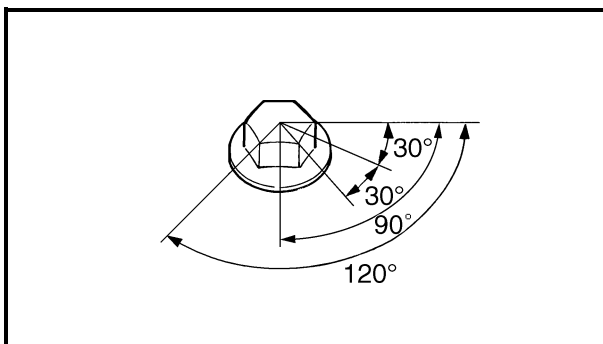
g. Tighten the connecting rod bolts further to reach the specified angle 90° ~ 120°.

	<p><b>Connecting rod bolts</b>  <b>Final</b>  <b>Specified angle 90° ~ 120°</b></p>
---	---

**⚠ WARNING** \_\_\_\_\_

**When the bolts are tightened more than the specified angle, do not loosen the bolt and then retighten it.**

**Replace the bolt with a new one and perform the procedure again.**





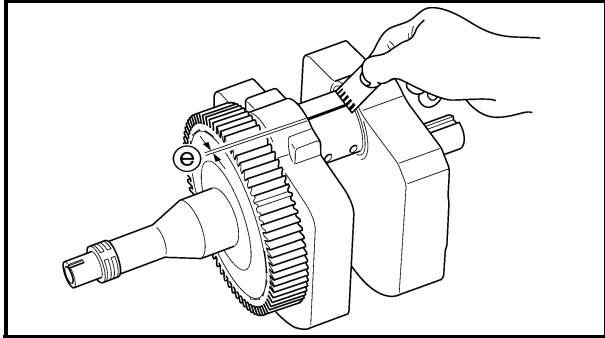


**CAUTION:** \_\_\_\_\_

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is the specified angle.

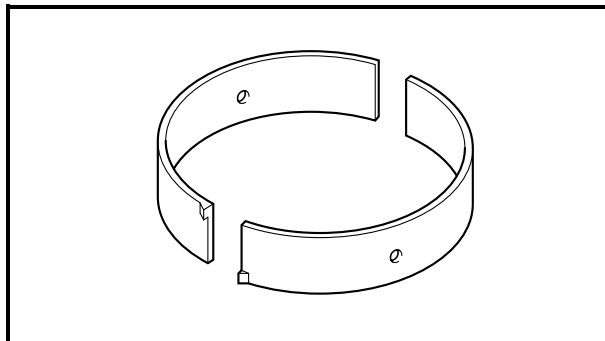
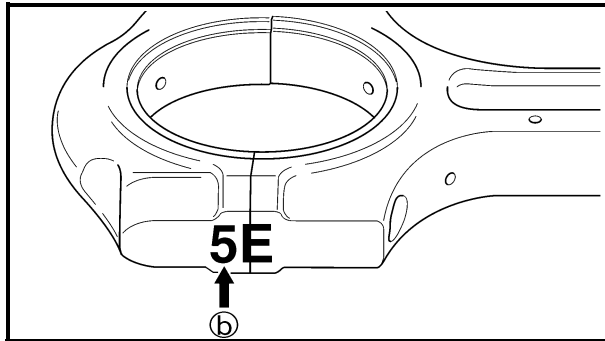
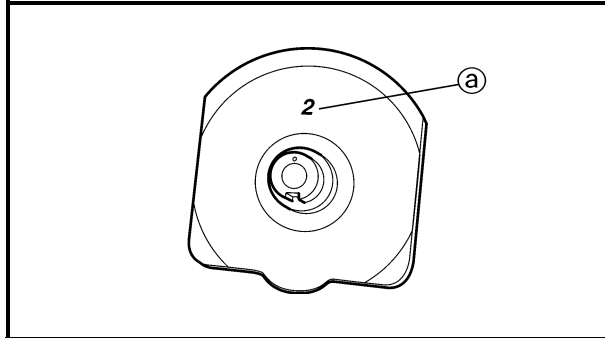
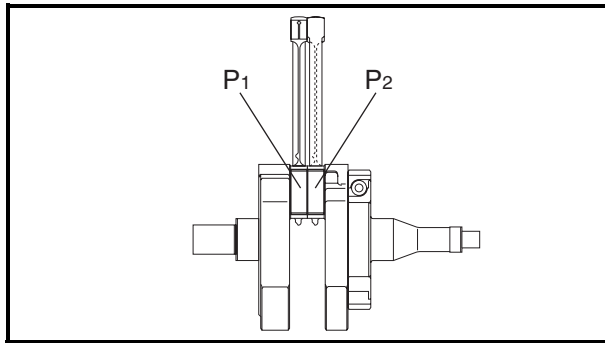
**NOTE:** \_\_\_\_\_

When using a hexagonal bolt note that the angle from one corner to another is 60°.



- h. Remove the connecting rod and big end bearings.  
Refer to "REMOVING THE CONNECTING RODS".
- i. Measure the compressed Plastigauge® width  $\text{ⓔ}$  on each crankshaft pin.  
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.





4. Select:
- big end bearings ( $P_1 \sim P_2$ )

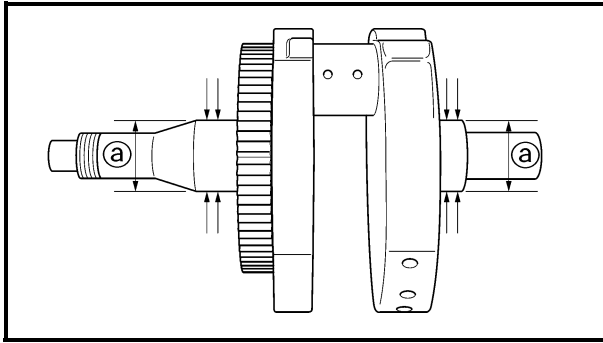
**NOTE:**

- The numbers  $\textcircled{a}$  stamped into the crankshaft web and the numbers  $\textcircled{b}$  on the connecting rods are used to determine the replacement big end bearing sizes.
- “ $P_1$ ” ~ “ $P_2$ ” refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod “ $P_1$ ” and the crankshaft web “P” numbers are “5” and “2” respectively, then the bearing size for “ $P_1$ ” is:

<p>“<math>P_1</math>” (connecting rod) - “P” (crankshaft) = 5 - 2 = 3 (brown)</p>
---

BIG END BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow



5. Measure:

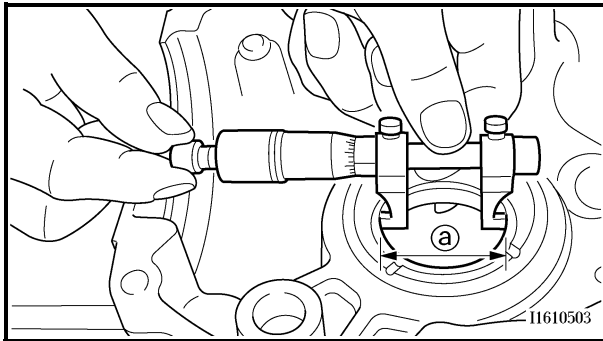
- crankshaft journal diameter (a)  
Out of specification → Replace the crankshaft.



**Crankshaft journal diameter**  
49.968 ~ 49.980 mm  
(1.9672 ~ 1.9677 in)

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

Measure the diameter of each crankshaft journal at two places.



6. Measure:

- crankshaft journal bearing inside diameter (a)  
Out of specification → Replace the crankcase assembly.



**Crankshaft journal bearing inside diameter**  
50.010 ~ 50.028 mm  
(1.9689 ~ 1.9696 in)

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

Measure the inside diameter of each crankshaft journal bearing at two places.



7. Calculate:

- crankshaft journal-to-crankshaft journal bearing clearance  
Out of specification → Replace the crankshaft and crankshaft journal bearings as a set.

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

Calculate the clearance by subtracting the crankshaft journal diameter from the crankshaft journal bearing inside diameter.



**Crankshaft journal-to-crankshaft journal bearing clearance**  
0.030 ~ 0.060 mm  
(0.0012 ~ 0.0024 in)

EAS00403

## INSTALLING THE CONNECTING RODS

1. Lubricate:

- bolt threads  
(with the recommended lubricant)



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

2. Lubricate:

- crankshaft pins
- big end bearings
- connecting rod inner surface  
(with the recommended lubricant)



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





**⚠ WARNING**

When the bolts are tightened more than the specified angle, do not loosen the bolt and then retighten it.

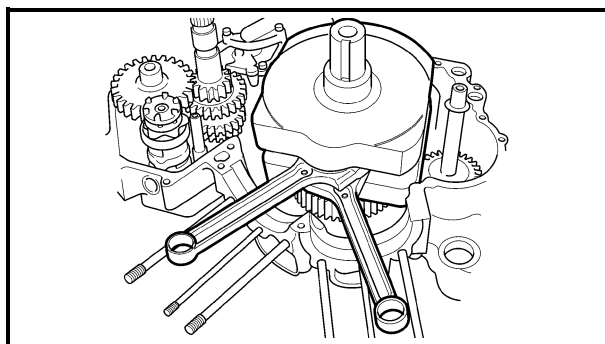
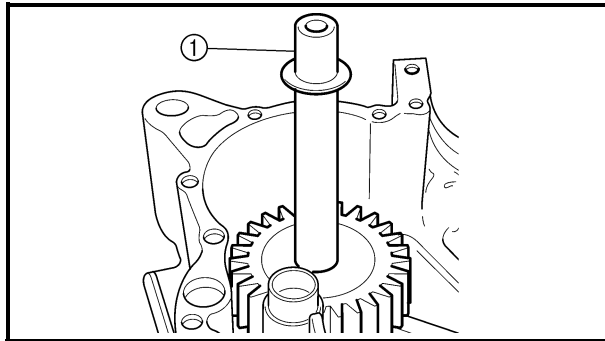
Replace the bolt with a new one and perform the procedure again.

**CAUTION:**

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is the specified angle.

**NOTE:**

When using a hexagonal bolt note that the angle from one corner to another is 60°.



EAS00408

**INSTALLING THE CRANKSHAFT**

1. Install:
  - generator shaft ①

2. Install:
  - crankshaft assembly

**CAUTION:**

To avoid scratching the crankshaft and to ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease and each bearing with engine oil.

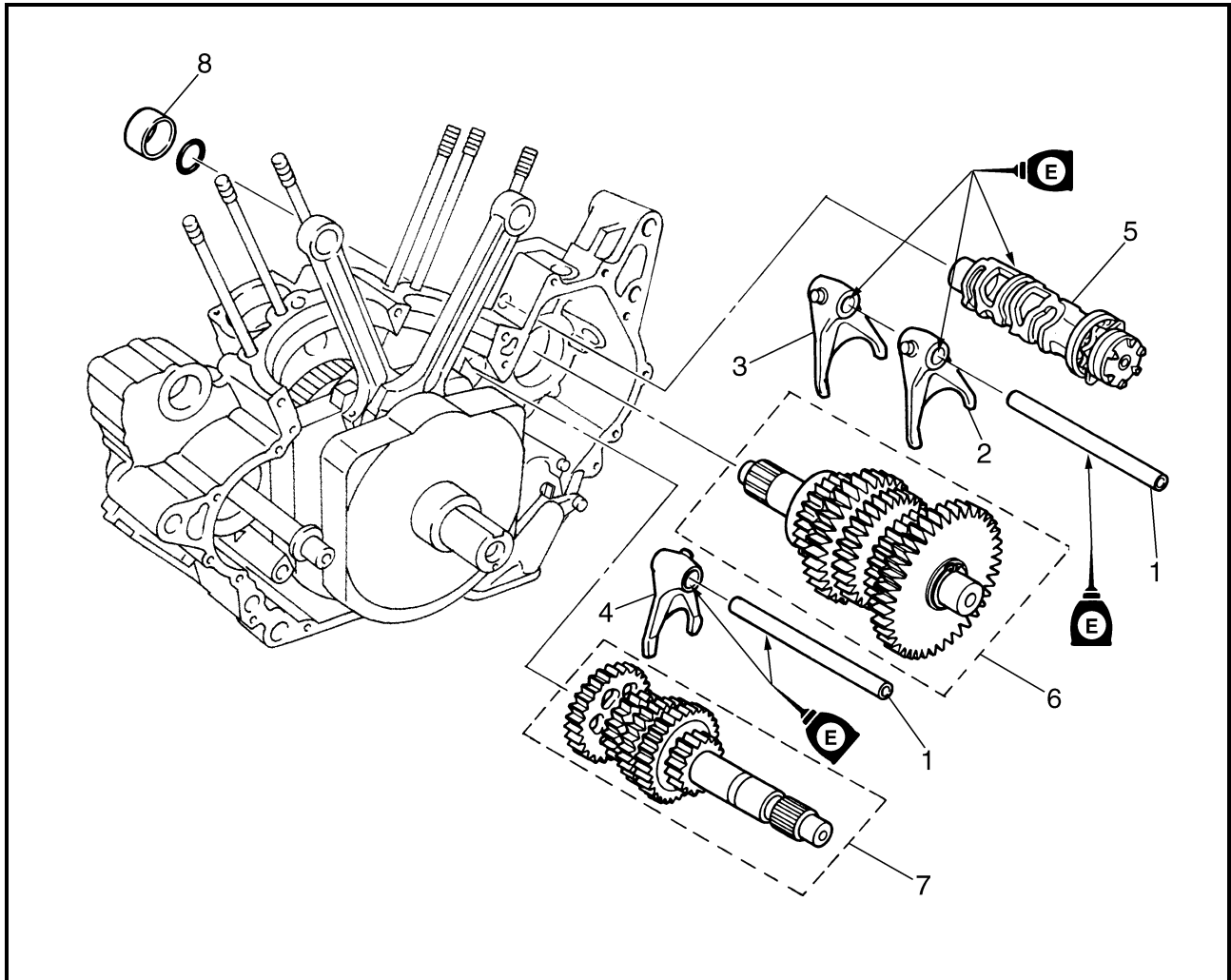
**NOTE:**

- Make sure that the generator shaft drive gear teeth and generator shaft driven gear teeth mesh correctly.
- Align the right connecting rod with the front cylinder sleeve hole.

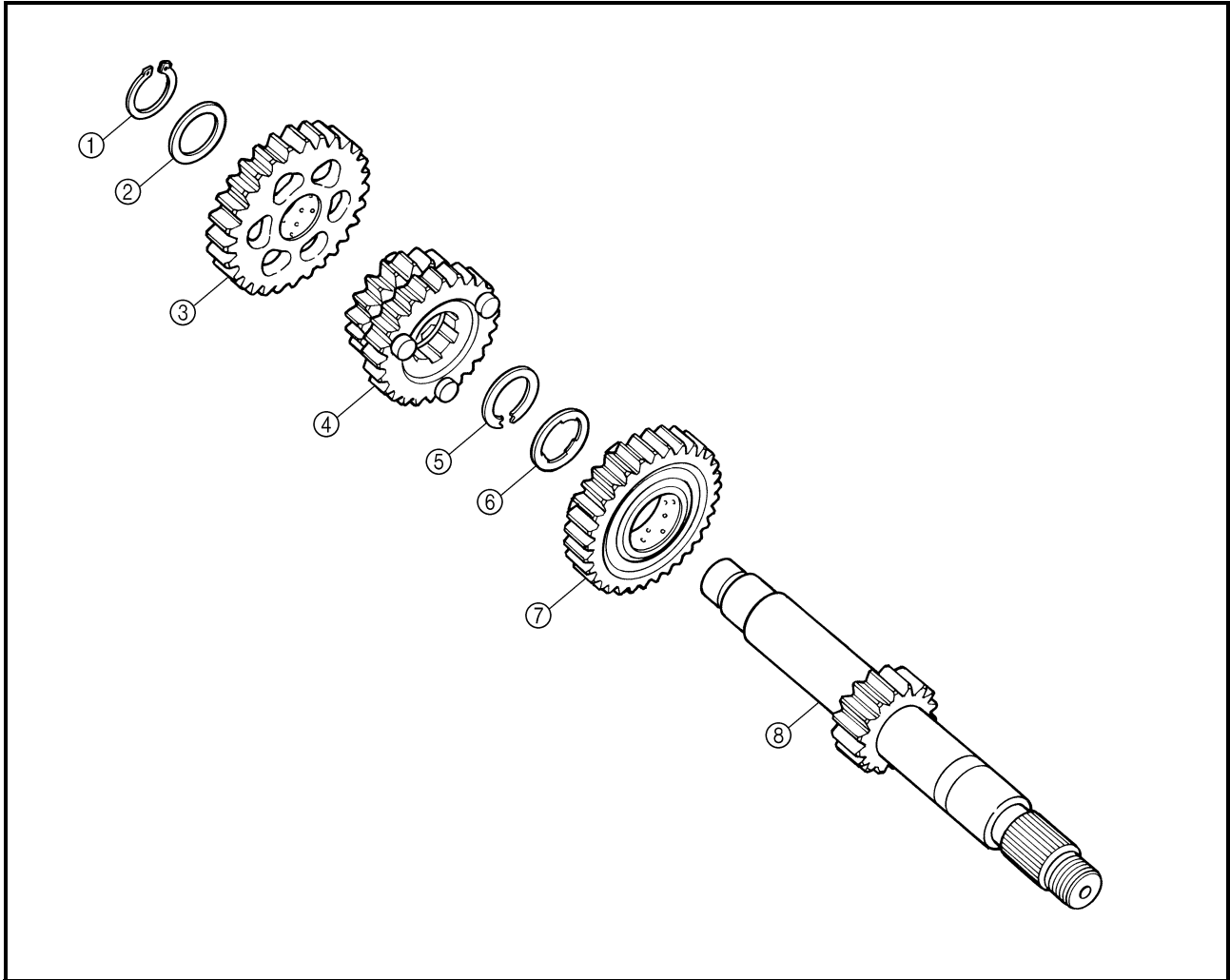


EAS00419

TRANSMISSION

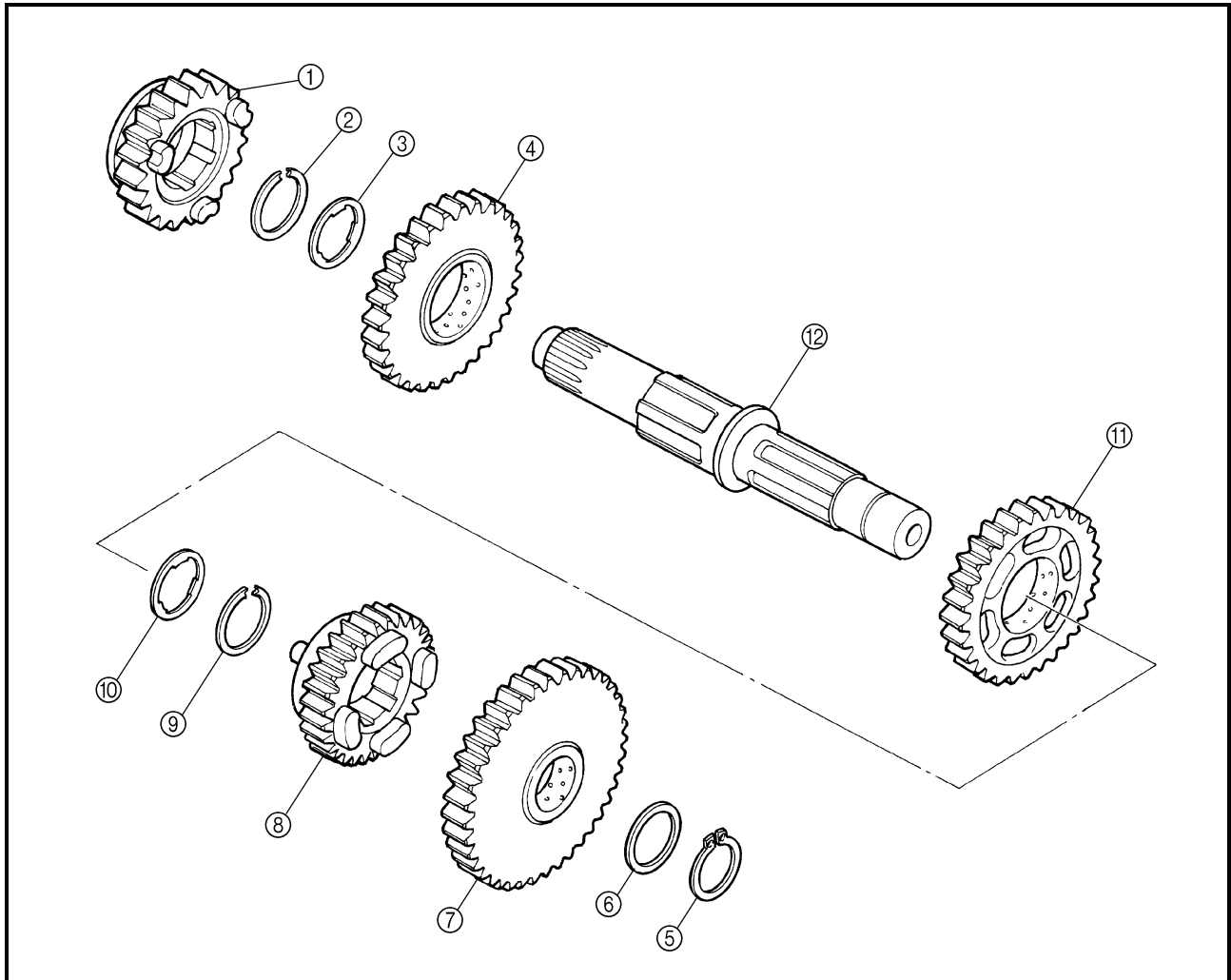


Order	Job/Part	Q'ty	Remarks
	<b>Removing the transmission, shift drum assembly, and shift forks</b>		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Shift fork guide bar	2	
2	Shift fork "L"	1	
3	Shift fork "R"	1	
4	Shift fork "C"	1	
5	Shift drum assembly	1	
6	Drive axle assembly	1	
7	Main axle assembly	1	
8	Spacer	1	
			For installation, reverse the removal procedure.

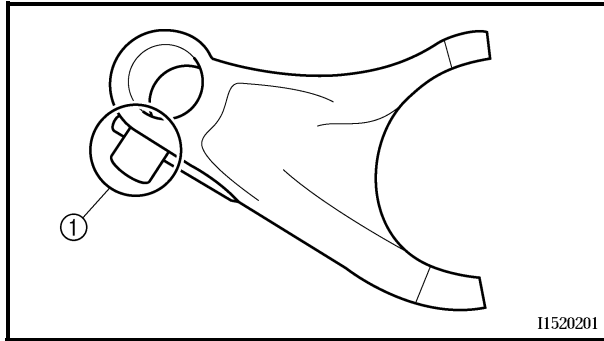


Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the main axle assembly</b>		Remove the parts in the order listed.
①	Circlip	1	
②	Washer	1	
③	5th pinion gear	1	
④	2nd/3rd pinon gear	1	
⑤	Circlip	1	
⑥	Washer	1	
⑦	4th pinon gear	1	
⑧	Main axle/1st pinon gear	1	
			For assembly, reverse the disassembly procedure.





Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the drive axle assembly</b>		Remove the parts in the order listed.
①	5th wheel gear	1	
②	Circlip	1	
③	Washer	1	
④	2nd wheel gear	1	
⑤	Circlip	1	
⑥	Washer	1	
⑦	1st wheel gear	1	
⑧	4th wheel gear	1	
⑨	Circlip	1	
⑩	Washer	1	
⑪	3rd wheel gear	1	
⑫	Drive axle	1	
			For assembly, reverse the disassembly procedure.



EAS00421

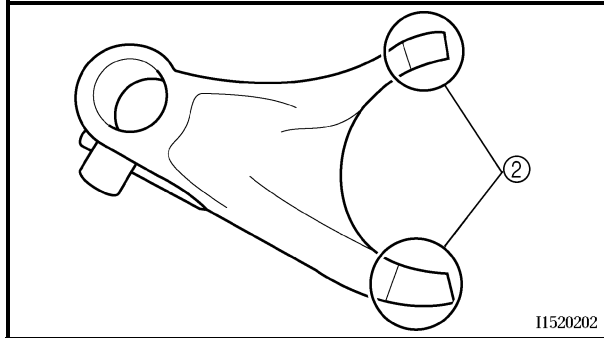
**CHECKING THE SHIFT FORKS**

The following procedure applies to all of the shift forks.

## 1. Check:

- shift fork cam follower ①
- shift fork pawl ②

Bends/damage/scoring/wear → Replace the shift fork.



## 2. Check:

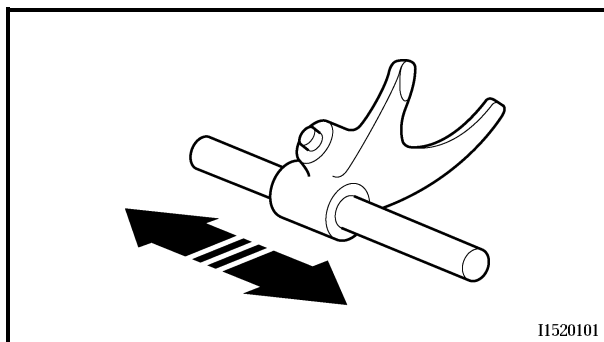
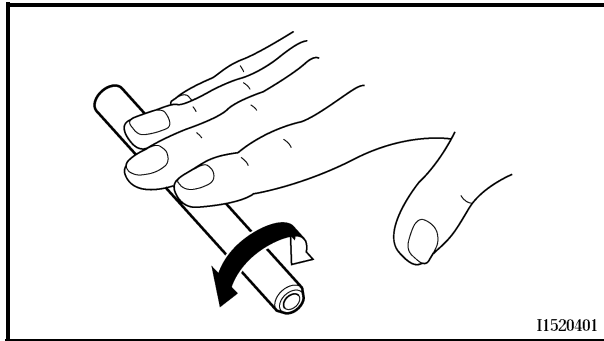
- shift fork guide bar

Roll the shift fork guide bar on a flat surface.

Bends → Replace.

**⚠ WARNING**

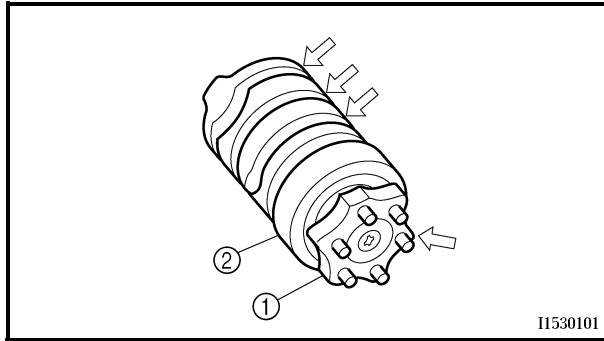
**Do not attempt to straighten a bent shift fork guide bar.**



## 3. Check:

- shift fork movement  
(along the shift fork guide bar)

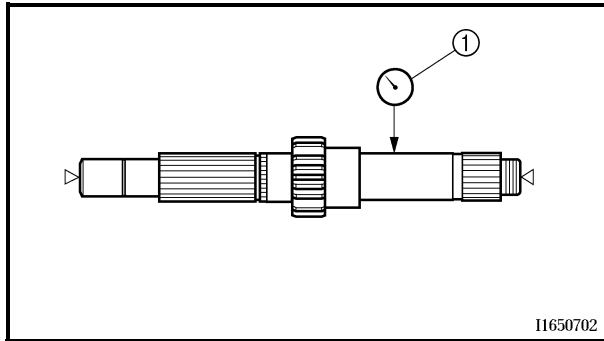
Rough movement → Replace the shift forks and shift fork guide bar as a set.



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.



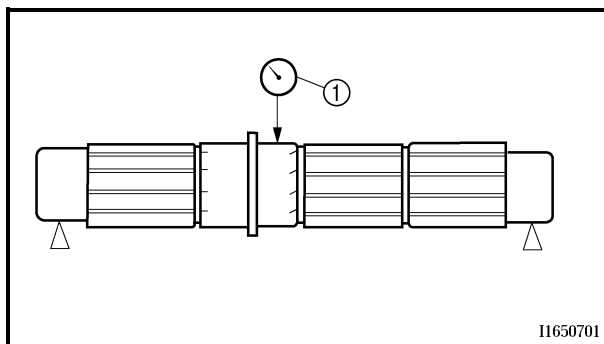
EAS00425

**CHECKING THE TRANSMISSION**

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



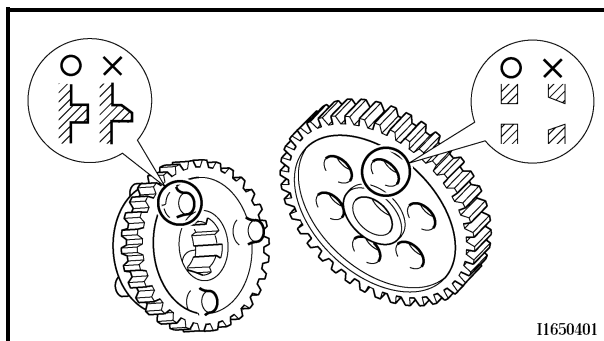
**Main axle runout limit  
0.08 mm (0.003 in)**



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



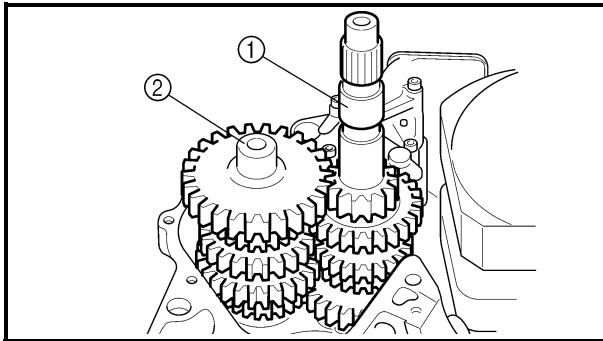
**Drive axle runout limit  
0.08 mm (0.003 in)**



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



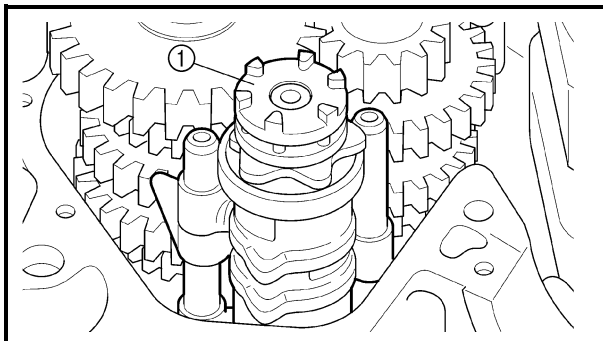
4. Check:
  - transmission gear engagement  
(each pinion gear to its respective wheel gear)  
Incorrect → Reassemble the transmission axle assemblies.
5. Check:
  - transmission gear movement  
Rough movement → Replace the defective part(s).
6. Check:
  - circlips  
Bends/damage/looseness → Replace.



EAS00428

**INSTALLING THE TRANSMISSION**

1. Install:
  - main axle assembly ①
  - drive axle assembly ②
  - O-ring
  - spacer



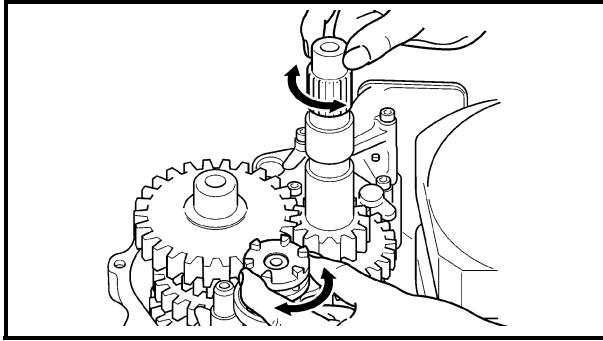
EAS00426

**INSTALLING THE SHIFT FORKS AND SHIFT DRUM ASSEMBLY**

1. Install:
  - shift fork "R"
  - shift fork "C"
  - shift fork "L"
  - shift drum assembly ①
  - shift fork guide bars

**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".



2. Check:

- transmission

Rough movement → Repair.

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

Oil each gear, shaft, and bearing thoroughly.

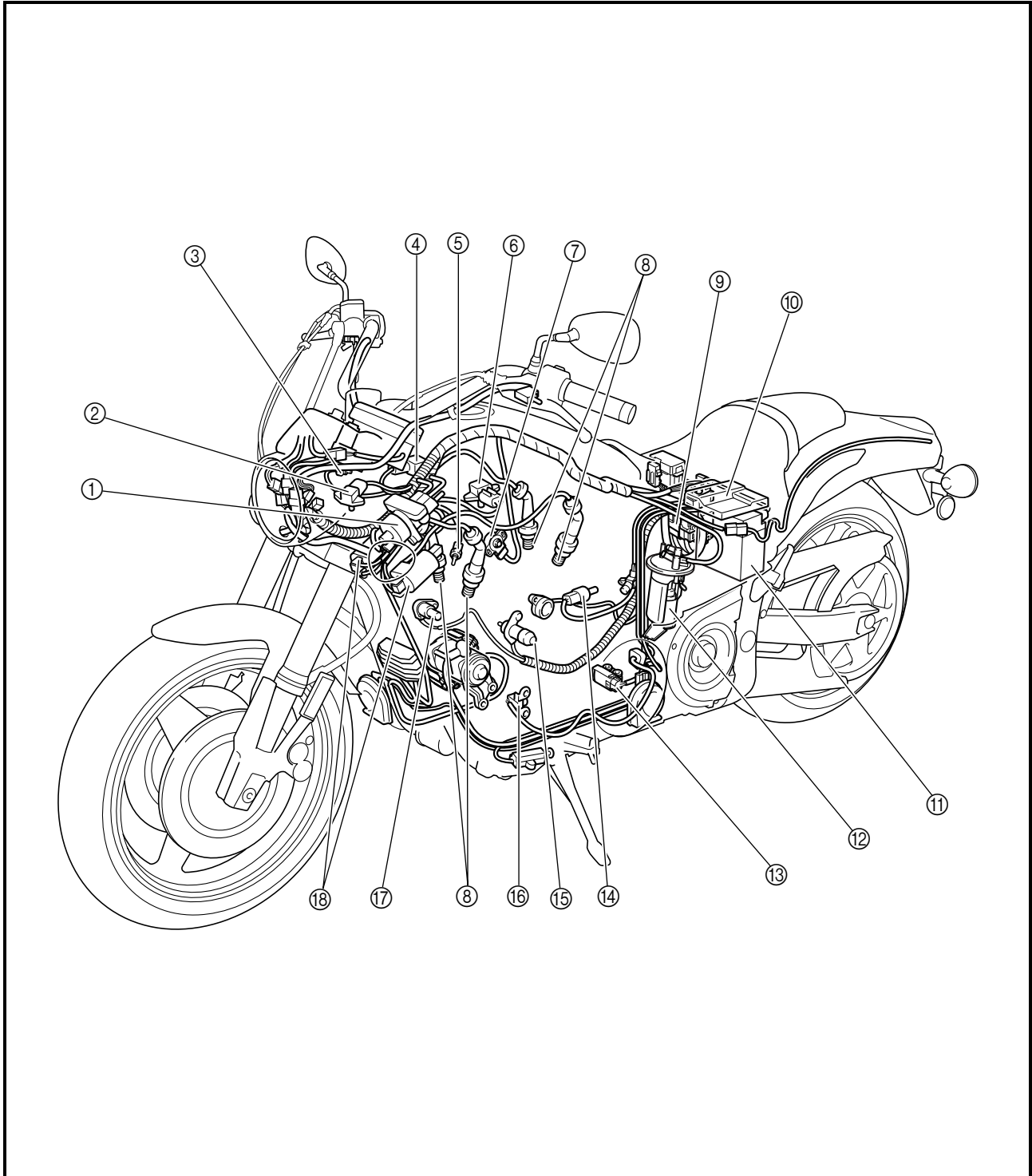
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## FUEL INJECTION SYSTEM

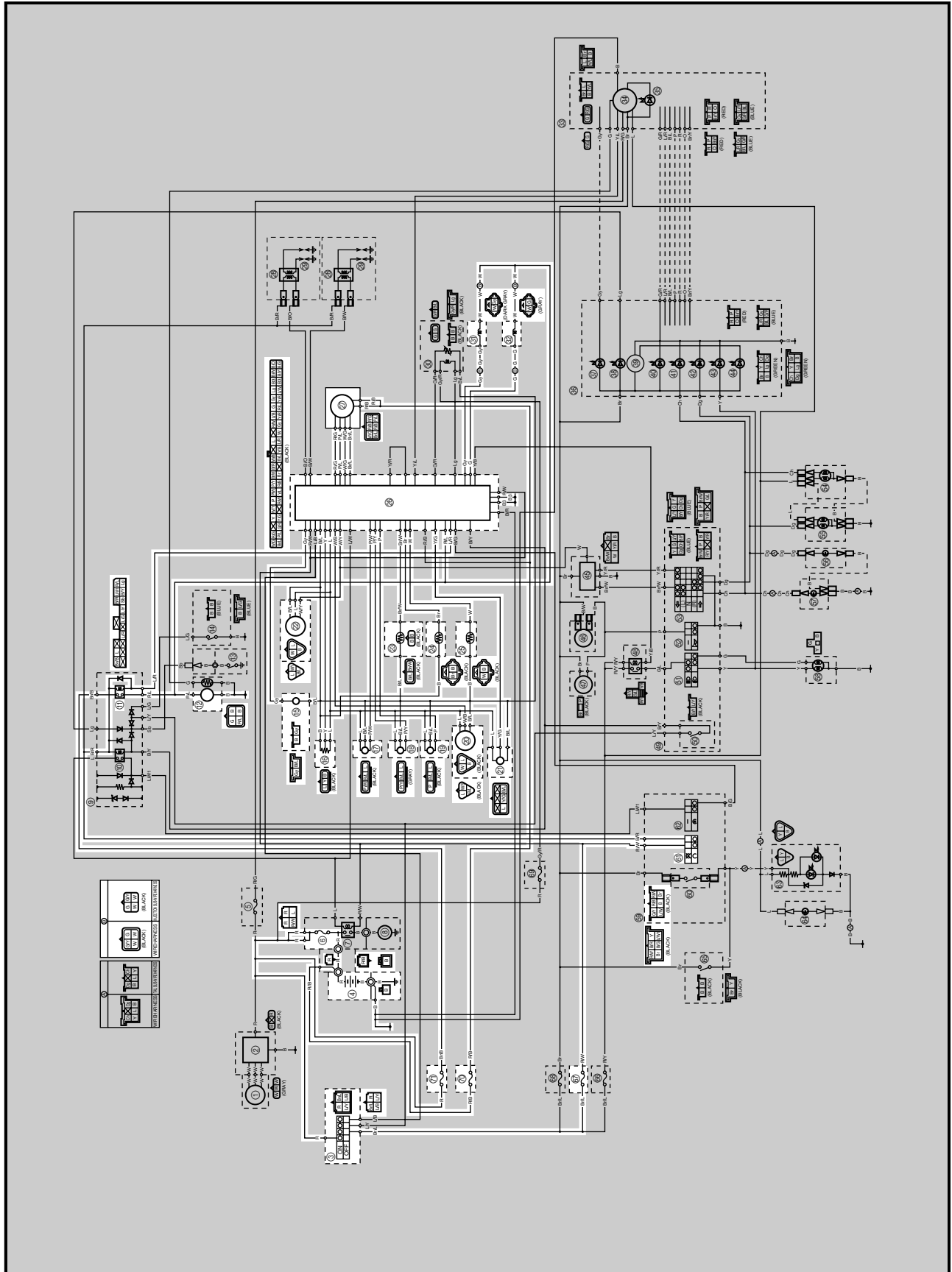
### FUEL INJECTION SYSTEM

- |                                 |                             |                                  |
|---------------------------------|-----------------------------|----------------------------------|
| ① Linear control valve          | ⑧ Spark plug                | ⑮ Decompression solenoid         |
| ② Intake air pressure sensor 2  | ⑨ Relay unit                | ⑯ Crankshaft position sensor     |
| ③ Intake air temperature sensor | ⑩ ECU                       | ⑰ Cylinder identification sensor |
| ④ Intake air pressure sensor 1  | ⑪ Battery                   | ⑱ Ignition coil                  |
| ⑤ Engine temperature sensor     | ⑫ Fuel pump                 |                                  |
| ⑥ Atmospheric pressure sensor   | ⑬ Lean angle cut-off switch |                                  |
| ⑦ Throttle position sensor      | ⑭ Oil temperature sensor    |                                  |





## WIRING DIAGRAM





- ③ Main switch
- ④ Battery
- ⑥ Main fuse
- ⑪ Fuel injection system relay
- ⑫ Fuel pump
- ⑮ Crankshaft position sensor
- ⑯ Throttle position sensor
- ⑰ Intake air pressure sensor 1
- ⑱ Intake air pressure sensor 2
- ⑲ Atmospheric pressure sensor
- ⑳ Cylinder identification sensor
- ㉑ Lean angle cut-off switch
- ㉒ Speed sensor
- ㉓ Intake air temperature sensor
- ㉔ Engine temperature sensor
- ㉕ Oil temperature sensor
- ㉖ ECU
- ㉗ Linear control valve
- ㉘ Cylinder #1-injector
- ㉙ Cylinder #2-injector
- ⑥① Engine stop switch
- ⑥⑦ Ignition fuse
- ⑦⑦ ECU fuse
- ⑦① Fuel injection system 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.

## **ECU's mode function**

The ECU is equipped with a diagnosis mode, in addition to the normal mode in which the ECU operates normally.

### **Normal mode**

- To check whether the warning light bulb is blown, the warning light illuminates for 1.4 seconds after the main switch has been turned ON, and while the starter switch is being pressed.
- To inform the rider that the fuel injection stop function is active, the 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 a 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.

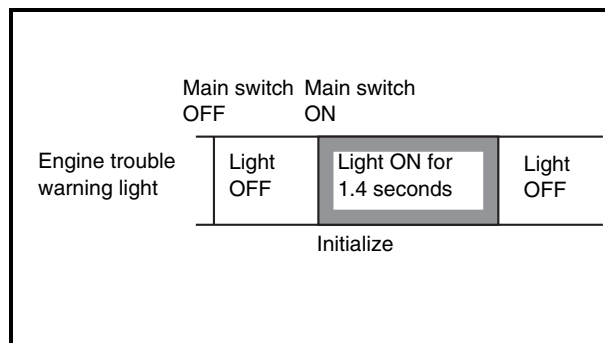
### **Diagnosis mode**

- In this mode, diagnostic codes are input into the ECU in accordance with the number of times the start switch has been operated.
- In accordance with the diagnostic codes, the ECU displays the values received from the sensors and actuates the actuators.
- Whether or not the system is operating normally is determined by a human operator through the observations of the values indicated by the engine trouble warning light or the actuating conditions of the actuators.



## Engine trouble warning light indication and FI system operating conditions (normal mode)

Warning light indication	ECU's operating condition	FI operating condition	Starting and driving
ON and OFF *1	Self-diagnostic function in operation	FI function in operation	Able
Blinking *2	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
OFF *3	Possibly a blown warning light bulb or a malfunction in power supply system or ECU		



\*1

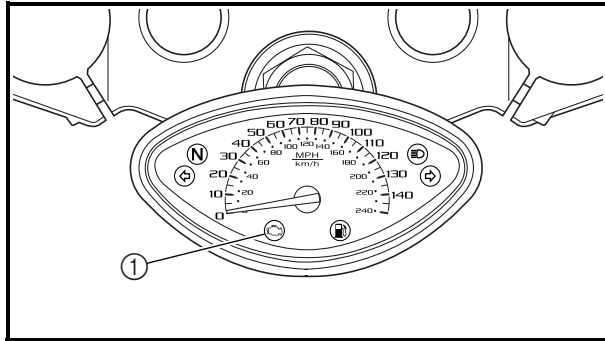
The warning light illuminates 1.4 seconds each time the main switch is turned ON. The ECU performs a self diagnosis during this time and turns OFF the light thereafter.

\*2

Warning control when unable to start engine

This control is effected when any one of the conditions listed below is present and the starter switch is turned ON:

- a. Battery voltage below the specified value (defective Fuel injection system relay, engine stop switch turned OFF, or drained battery)
- b. One of the fault codes listed below has been detected (self-diagnostic code 12, 19, 30, 41, or 50 is output):
  - (12: faulty crankshaft position sensor signal)
  - (19: open circuit in sidestand input line)
  - (30: a fall has been detected)
  - (41: open or short circuit in lean angle cut-off switch)
  - (50: ECU memory check error)

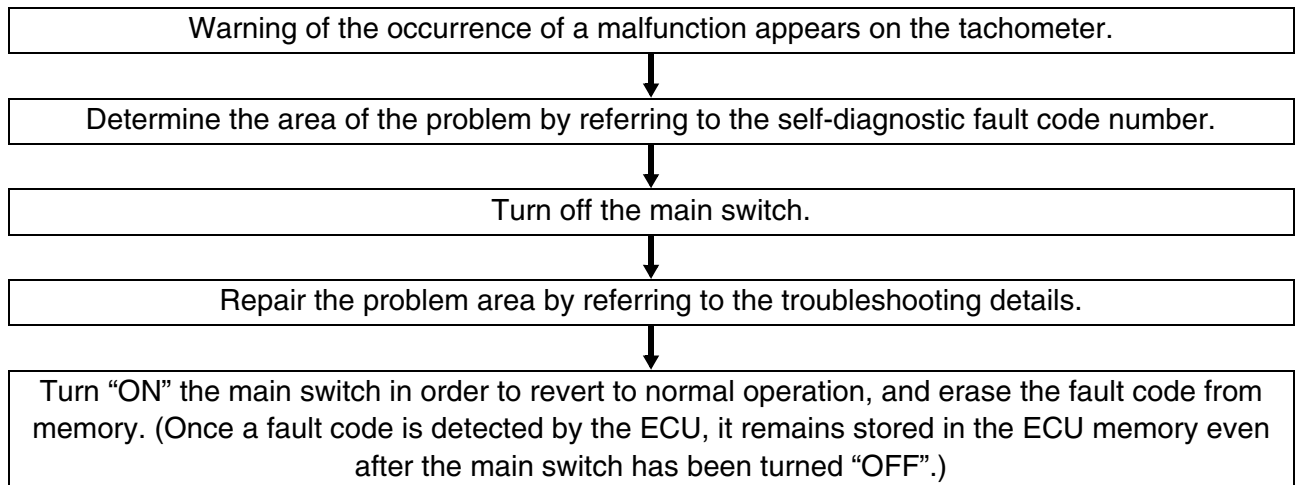


\*3

Function to check for blown warning light bulb  
 The engine trouble warning light illuminates ① 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. Therefore, take an appropriate corrective action by referring to the troubleshooting section.

### Determining the area of the malfunction through the self-diagnostic fault code number

The possible location of the system in which a problem may be occurring can be determined by observing the self-diagnostic fault code number that appears on the tachometer and cross-referencing it on the fault code number table. When used in conjunction with the troubleshooting details, and by checking the possible items one by one, you will be able to identify the cause of the problem in order to carry out an accurate repair work.





\* Table of self-diagnostic fault code numbers displayed on meter

No.	Symptom	Able/ unable to start	Able/ unable to drive	No.	Symptom	Able/ unable to start	Able/ unable to drive
11	No normal signals are received from the cylinder identification sensor.	Able	Able	26	Faulty intake air pressure sensor pipe system 2; a hose is detached, causing the constant application of atmospheric pressure to the sensor; or, the hose is clogged.	Able	Able
12	No normal signals are received from the crankshaft position sensor.	Unable	Unable	27	Oil temperature sensor - open or short circuit detected.	Able	Able
13	Intake air pressure sensor 1 - open or short circuit detected.	Able	Able	28	Engine temperature sensor - open or short circuit detected.	Able	Able
14	Faulty intake air pressure sensor pipe system 1; a hose is detached, causing the constant application of atmospheric pressure to the sensor; or, the hose is clogged.	Able	Able	29	Decompression thermostat - open or short circuit detected.	Able	Able
15	Throttle position sensor - open or short circuit detected.	Able	Able	30	The motorcycle has overturned.	Unable	Unable
16	A stuck throttle position sensor is detected.	Able	Able	37	Linear control valve - faulty valve or motor is detected.	Able	Able
19	Open circuit is detected in the input line from the sidestand switch to the ECU.	Unable	Unable	38	Decompression solenoid - open circuit is detected.	Able	Able
20	Atmospheric pressure sensor or intake air pressure sensor Malfunction of the atmospheric pressure sensor in the intermediate electrical potential. Malfunction of the intake air pressure sensor in the intermediate electrical potential.	Able	Able	41	Lean angle cut-off switch - open or short circuit detected.	Unable	Unable
22	Intake temperature sensor - open or short circuit detected.	Able	Able	42	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	Able	Able
23	Atmospheric pressure sensor - open or short circuit detected.	Able	Able	43	The ECU is unable to monitor the battery voltage (an open circuit in the line to the ECU).	Able	Able
25	Intake air pressure sensor 2 - open or short circuit detected.	Able	Able	50	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	Unable	Unable

• How to erase the self-diagnostic fault code from memory:

If the ECU detects a normal signal upon the completion of the repair of the malfunction, the self-diagnostic fault code disappears from the meter and is replaced by the normal clock display. However, the self-diagnostic fault code of the previous malfunction remains in the ECU memory as part of the malfunction history. To erase the self-diagnostic fault code from the malfunction history, the operation for diagnostic code 62 must be performed in the diagnosis mode.



## 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.

Table of substitute characteristic operation control by self-diagnostic fault code

Code No.	Item	Fail-safe action	Able/unable to start	Able/unable to drive
11	Cylinder identification sensor	<ul style="list-style-type: none"> <li>Continues to operate the engine based on the results of the cylinder identification that existed up to that point.</li> </ul>	Able	Able
12	Crankshaft position sensor	<ul style="list-style-type: none"> <li>Stops the engine (by stopping the injection and ignition).</li> </ul>	Unable	Unable
13 14 25 26	Intake air pressure sensor (open or short circuit) (pipe system)	<ul style="list-style-type: none"> <li>Fixes the intake air pressure to 760 mmHg.</li> </ul>	Able	Able
15 16	Throttle position sensor (open or short circuit) (stuck)	<ul style="list-style-type: none"> <li>Fixes the throttle position sensor to fully open.</li> </ul>	Able	Able
19	Sidestand switch (open circuit in wire to ECU)	-- (No start)	Unable	Unable
20	Atmospheric pressure sensor or intake air pressure sensor	<ul style="list-style-type: none"> <li>Fixes the atmospheric correction value to 0 mmHg.</li> </ul>	Able	Able
22	Intake temperature sensor	<ul style="list-style-type: none"> <li>Fixes the intake temperature to 15 °C (59 °F).</li> </ul>	Able	Able
23	Atmospheric pressure sensor	<ul style="list-style-type: none"> <li>Fixes the atmospheric pressure to 760 mmHg.</li> </ul>	Able	Able
27	Oil temperature sensor	<ul style="list-style-type: none"> <li>Fixes the oil temperature to 80 °C (176 °F).</li> </ul>	Able	Able
28	Engine temperature sensor	<ul style="list-style-type: none"> <li>Fixes the engine temperature to 140 °C (284 °F).</li> </ul>	Able	Able
29	Decompression thermostat	<ul style="list-style-type: none"> <li>Electricity is not circulated to the decompression solenoid and the thermostat is not operated.</li> </ul>	Able	Able
37	Linear control valve	--	Able	Able
38	Decompression solenoid	--	Able	Able
30 41	Lean angle cut-off switch (latch up detected) (open or short circuit)	<ul style="list-style-type: none"> <li>Turns OFF the fuel injection system relay of the fuel system.</li> </ul>	Unable	Unable
42	Speed sensor, neutral switch	<ul style="list-style-type: none"> <li>Fixes the gear to the top gear.</li> </ul>	Able	Able
43	Fuel system voltage (monitor voltage)	<ul style="list-style-type: none"> <li>Fixes the battery voltage to 12 V.</li> </ul>	Able	Able
50	ECU internal malfunction (memory check error)	--	Unable	Unable



## TROUBLESHOOTING

### Diagnosis mode troubleshooting 1 (self-diagnostic malfunction detected)

By entering a diagnostic code in the ECU through the use of the “SELECT” and “RESET” buttons on the tachometer, the sensor output values can be displayed and the actuators can be operated in accordance with the code that has been entered.

The technician determines whether or not the operation is normal by verifying the values displayed on the tachometer or the operating conditions of the actuators. These modes can be used to detect and check the problems that are otherwise difficult to detect in the diagnosis mode.

#### Basic operation procedure

##### Operation preparation

- Verify the self-diagnostic fault code number that is displayed on the meter.
- Based on the self-diagnostic fault code number, select the applicable sensor or actuator from the diagnostic code table.
- If a diagnostic code is available, proceed with the operation procedure given below in order to verify the operating conditions of the applicable sensor or actuator.

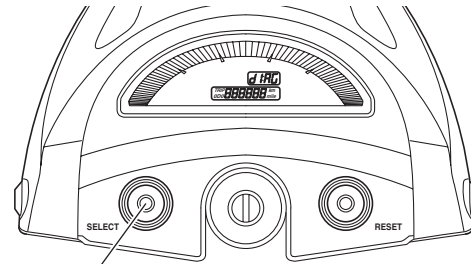
Operation procedure (make sure to turn “OFF” the main switch upon completing the operation preparation)

<p>Setting the ECU in the diagnosis mode</p> <p>1. While keeping the “SELECT” and “RESET” buttons pressed simultaneously, turn “ON” the main switch ① (keep them pressed for 8 seconds or more).</p> <p>* Letters “DIAG” appear on the clock LCD.</p>	
<p>Selecting the diagnosis mode</p> <p>After “DIAG” appears as a result of pressing the “SELECT” button, simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.</p>	

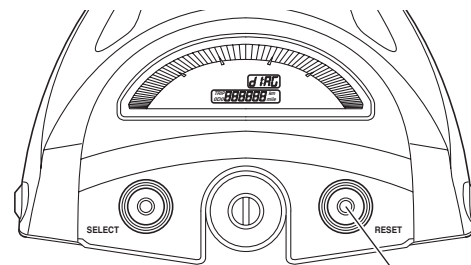


Verifying the operation of various sensors and actuators

1. Disconnect the wiring harness coupler from the fuel pump.
2. Turn the engine stop switch "OFF".
  - Turn the engine stop switch "ON" if diagnostic code numbers 03 and 09 are shown.
3. Select the diagnostic code number that applies to the item that was verified with the self-diagnostic fault code number, and enter it on the meter by operating the "SELECT" or "RESET" button.
  - \* "RESET" button  
Decrement (press 1 second or longer → auto)
  - "SELECT" button  
Increment (press 1 second or longer → auto)
  - \* Diagnostic code number appears on clock LCD (01 ~ 70)
4. Verifying the operation of the displayed diagnostic code
  - Verifying various sensors  
The data representing the operating conditions of the sensors appears on the trip LCD (throttle position sensor angle, coolant temperature, atmospheric pressure, etc.)
  - Verifying the operation of actuators  
Start the operation by turning the stop switch "ON" (injectors, relay, ignition coil, AIS, etc.)
  - \* If the stop switch is "ON", turn it "OFF"; then, turn it back "ON".
5. Check the results by referring to the sensor operation data verification table or the actuator operation verification table.



SELECT  
(01 → 70)



RESET  
(01 ← 70)

Perform individual repairs on the areas where malfunctions have been identified.



Erase the codes appearing on the meter upon the completion of the operation (reinstating the ECU).

- \* Verify the reinstatement procedures detailed in the troubleshooting details in order to carry out the reinstatement operation that is applicable to the malfunctioning item.

Refer to “troubleshooting details”.



Erase the fault code from memory.

- \* Perform the operation for diagnostic code 62.





## Self-diagnostic fault codes, symptoms, and probable causes

### Diagnostic code indication

Code No.	Symptom	Probable cause of malfunction	Diagnostic code
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 1 - 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 1; a hose is detached, causing constant application of the atmospheric pressure to the sensor; or, the hose is clogged.	<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 of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	03 02
	Or, 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
	Or, a stuck throttle position sensor is 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 sensor (stuck throttle position sensor).</li> </ul>	01
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
16	A stuck throttle position sensor is detected. Or, Faulty intake air pressure sensor pipe system; a hose is detached, causing constant application of the atmospheric pressure to the sensor; or, the hose is clogged.	<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 sensor (stuck throttle position sensor).</li> <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 of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	01 03 02
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	When the main switch is turned to ON, the atmospheric sensor voltage and intake air pressure sensor voltage differ greatly.	<ul style="list-style-type: none"> <li>• Atmospheric pressure sensor hose is clogged.</li> <li>• Intake air pressure sensor hose is clogged, kinked, or pinched.</li> <li>• Malfunction of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction of the intake air pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	03 02
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

# FUEL INJECTION SYSTEM

FI



Code No.	Symptom	Probable cause of malfunction	Diagnostic code
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
25	Intake air pressure sensor 2 - 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>	02
26	Faulty intake air pressure sensor pipe system 2; a hose is detached, causing constant application of the atmospheric pressure to the sensor; or, the hose is clogged.	<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 of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	03 02
	Or, 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
	Or, a stuck throttle position sensor is 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 sensor (stuck throttle position sensor).</li> </ul>	01
27	Oil temperature sensor - open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective oil temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	10
28	Engine temperature sensor - open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective engine temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	11
29	Decompression solenoid (thermistor) - open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective decompression solenoid (thermistor).</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	55
30	The motorcycle has overturned.	<ul style="list-style-type: none"> <li>• Overturned.</li> <li>• Malfunction in ECU.</li> </ul>	08
37	A faulty linear control valve or motor is detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective linear control valve.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed linear control valve.</li> </ul>	10 54
38	Decompression solenoid - open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wiring harness.</li> <li>• Defective decompression solenoid.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	55
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> <li>• Improperly installed sensor.</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> <li>• Improperly installed sensor.</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>	—
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>	—



## Sensor operation data display verification table

**NOTE:**

- Check the intake temperature, engine temperature, and oil temperature as close as possible to the area in which the respective sensor is mounted.
- If it is not possible to check it with an atmospheric pressure gauge, judge it by using 760 mmHg as the standard.
- If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Diag code	Item	Description of action	Data displayed on meter (reference value)
01	Throttle angle	Displays the throttle angle. • Check with throttle fully closed. • Check with throttle fully open.	0 ~ 125 degrees • Fully closed position (15 ~ 20) • Fully open position (95 ~ 100)
02	Atmospheric pressure	Displays the atmospheric pressure. * Use an atmospheric pressure gauge to check the atmospheric pressure.	Compare it to the value displayed on the meter.
03	Pressure difference 1	Displays the pressure difference 1 (atmospheric pressure - intake air pressure 1). Engine stop switch is on. * Generate the pressure difference by cranking the engine with the starter, without actually starting the engine.	10 ~ 200 mmHg
04	Pressure difference 2	Displays the pressure difference 2 (atmospheric pressure - intake air pressure 2) * Same as above.	Same as above
05	Intake temperature	Displays the intake air temperature. * Check the temperature in the air cleaner case.	Compare it to the value displayed on the meter.
07	Vehicle speed pulse	Displays the accumulation of the vehicle pulses that are generated when the tire is spun.	(0 ~ 999; resets to 0 after 999) OK if the numbers appear on the meter.
08	Lean angle cut-off switch	Displays the lean angle cut-off switch values.	Upright: 0.4 ~ 1.4 V Overturned: 3.8 ~ 4.2 V
09	Fuel system voltage (monitor voltage)	Displays the fuel system voltage (battery voltage). Engine stop switch is on.	0 ~ 18.7 V Normally, approximately 12.0 V
10	Engine oil temperature	Displays the temperature of the engine oil.	-30 ~ 200 °C (-22 ~ 392 °F) Cold engine: ambient temperature or higher Warm engine: 80 °C or higher
11	Engine temperature	Displays the temperature of the engine.	-30 ~ 200 °C (-22 ~ 392 °F) Cold engine: ambient temperature or higher Warm engine: 100 °C (212 °F) or higher
20	Sidestand switch	Displays that the switch is ON or OFF. (When the gear is in a position other than neutral.)	Stand retracted: ON Stand extended: OFF
21	Neutral switch	Displays that the switch is ON or OFF.	Neutral: ON In gear: OFF
60	E2PROM fault code display	• Displays the faulty cylinder that has been detected by a self-diagnostic fault code. • If multiple malfunctions have been detected, the same data is transmitted 128 times, then different data is transmitted repeatedly.	(01 ~ 02) Displays the cylinder number. (00) Displays when there is no malfunction.
61	Malfunction history code display	• Displays the codes of the history of the self-diagnosis malfunctions (i.e., a code of a malfunction that occurred once and which has been corrected). • If multiple malfunctions have been detected, the same data is transmitted 128 times, then different data is transmitted repeatedly.	11 ~ 55 (00) Displays when there is no malfunction.

# FUEL INJECTION SYSTEM

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Diag code	Item	Description of action	Data displayed on meter (reference value)
62	Malfunction history code erasure	<ul style="list-style-type: none"><li>• Displays the total number of codes that are being detected through self diagnosis and the fault codes in the past history.</li><li>• Erases only the history codes when the engine stop switch is turned from OFF to ON. If the engine stop switch is ON, turn it OFF once, and then turn it back ON.</li></ul>	00 ~ 21 (00) Displays when there is no malfunction.
70	Control number	<ul style="list-style-type: none"><li>• Displays the program control number.</li></ul>	00 ~ 255

# FUEL INJECTION SYSTEM

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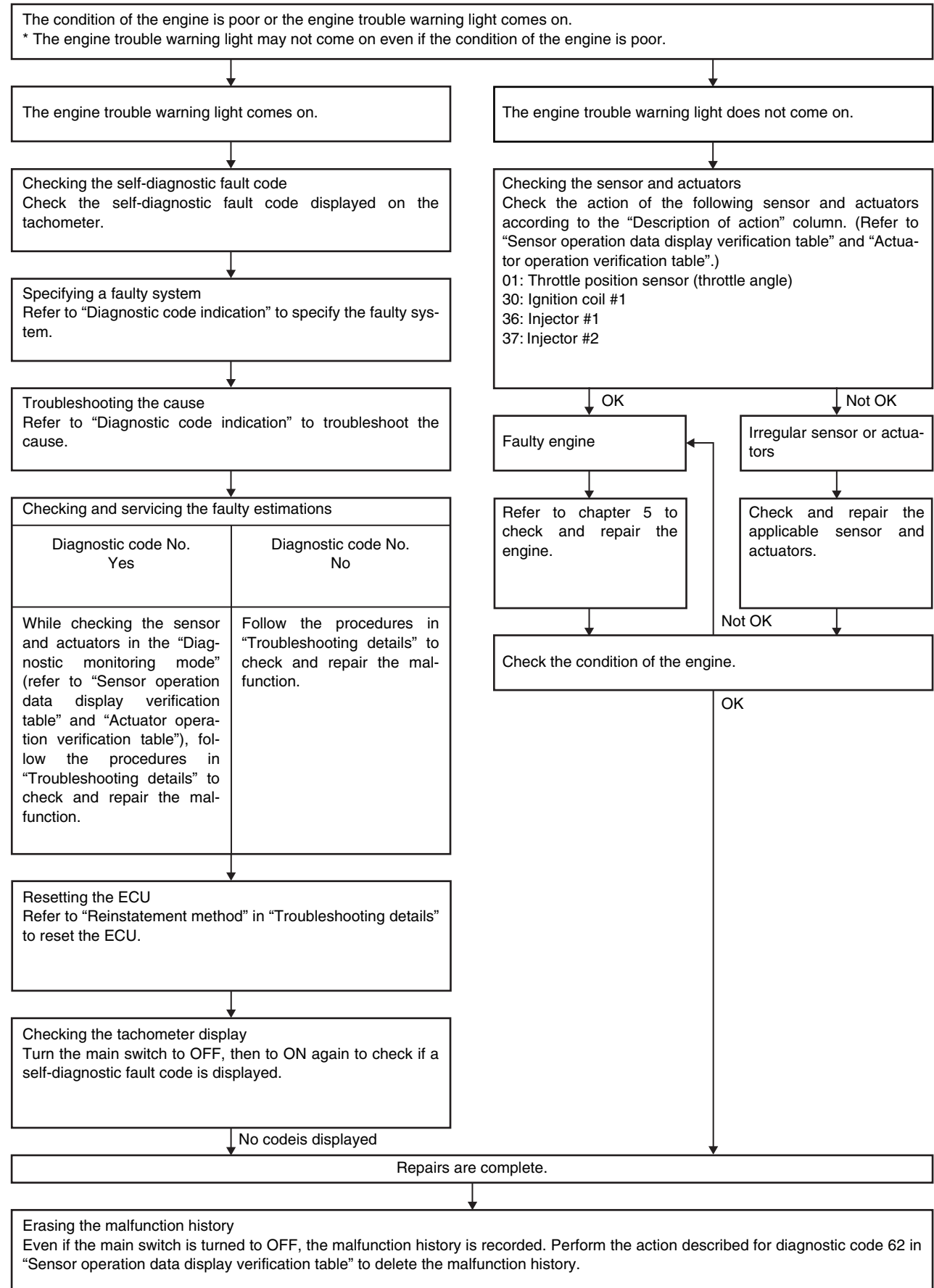


Actuator operation verification table

Diag code	Item	Description of action	Data displayed on meter (reference value)
30	Ignition coil #1	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates ignition coils #1 for five times every second and illuminates the engine trouble warning light. * Connect an ignition checker. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check that spark is generated, 5 times with the engine stop switch ON.
31	Ignition coil #2	Take the same actions as No. 30 above on ignition coils #2. Same as above. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Same as above
36	Injector #1	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the injector five times every second and illuminates the engine trouble warning light. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the operating sound of the injector five times with engine stop switch ON.
37	Injector #2	Take the same actions as No. 36 above on injector #2. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Same as above
50	Fuel injection system relay	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the fuel injection system relay five times every second and illuminates the engine trouble warning light (the light is OFF when the relay is ON, and the light is ON when the relay is OFF). * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the fuel injection system relay operating sound. Same as above
52	Headlight relay	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the headlight relay five times every 5 seconds and illuminates the engine trouble warning light. (ON 2 seconds, OFF 3 seconds) * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the relay operating sound. Same as above
54	Linear control valve	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the linear control valve four times every 5 seconds and illuminates the engine trouble warning light (fully closed 2 seconds, fully open 2 seconds).	Check the linear control valve operating sound, 3 times with the engine stop switch ON.
55	Decompression solenoid	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the decompression solenoid five times every 5 seconds and illuminates the engine trouble warning light (ON 2 seconds, OFF 3 seconds). NOTE: Be sure to turn the start switch to ON, otherwise the above mentioned operation will not be possible.	Check the decompression solenoid operating sound, 5 times with the engine stop switch ON.



## Troubleshooting





## Troubleshooting details

Troubleshooting the self-diagnostic fault code

Code No.	11	Symptom	No normal signals are received from the cylinder identification sensor.	
Used diagnostic code No.				
1. Inspection operation item		Operation item and countermeasure		Reinstatement method
2. Defective cylinder identification sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		Reinstated by starting the engine and operating it at idle.
3. 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 - Blue White/Black - White Black/Blue - Black/Blue		
4. Connected state of connector Inspect 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. Cylinder identification sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler		
5. Installed state of sensor		Check the installed area for looseness or pinching.		

Code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.	
Used diagnostic code No.				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of sensor		Check the installed area for looseness or pinching.		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 between the main wiring harnesses. Gray - Gray Black/Blue - Black/Blue		
3. Connected state of connector Inspect 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. Crankshaft position sensor coupler Main wiring harness ECU coupler		
4. Defective crankshaft position sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	13	Symptom	Intake air pressure sensor 1 - open or short circuit detected.	
Used diagnostic code No. 03 (intake air pressure sensor 1)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue Sub lead Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue		Reinstated by turning the main switch ON.
2. Connected state of connector Inspect 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. Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler		
3. Defective intake air pressure sensor		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		



# FUEL INJECTION SYSTEM

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Code No.	14	Symptom	<p>1 Intake air pressure sensor 1 - pipe system malfunction (clogged or detached hose).</p> <p>2 Intake air pressure sensor 1 - open or short circuit detected.</p> <p>3 Stuck throttle position sensor detected.</p>	
Used diagnostic code	<p>No. 03 (intake air pressure sensor 1)</p> <p>No. 01 (throttle position sensor)</p> <p>No. 02 (atmospheric pressure sensor)</p>			
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
<p>1.Common to 1, 2, and 3: Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.</p>		<p>If there is a malfunction, repair it and connect it securely.</p> <p>Intake air pressure sensor coupler Main wiring harness ECU coupler</p>		<p>Reinstated by starting the engine and operating it at idle.</p>
<p>2-1.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.</p>		<p>Repair or replace the sensor hose. Inspect and repair the connection. Replace it if there is a malfunction.</p> <p>See page 6-25.</p>		<p>Reinstated by starting the engine and operating it at idle.</p>
<p>2-2.Open or short circuit in wiring harness or sub lead.</p>		<p>Repair or replace if there is an open or short circuit.</p> <p>Main wiring harness Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue</p> <p>Sub lead Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue</p>		
<p>2-3.Defective intake air pressure sensor.</p>		<p>Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.</p>		
<p>3-1.Open or short circuit in wiring harness or sub lead.</p>		<p>Repair or replace if there is an open or short circuit.</p> <p>Main wiring harness Black/Blue - Black/Blue Yellow - Yellow Blue - Blue</p> <p>Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue</p>		<p>Reinstated by starting the engine, operating it at idle, and then by racing it.</p>
<p>3-2.Throttle position sensor lead wire open circuit output voltage check (B/L - Y) Black/Blue - Yellow</p>		<p>Open circuit item:                      Output voltage</p> <p>Ground wire open circuit:        5 V</p> <p>Output wire open circuit:        0 V</p> <p>Power supply wire open circuit: 0 V</p> <p>Check for open circuit and replace the throttle position sensor.</p>		
<p>3-3.Defective throttle position sensor.</p>		<p>Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.</p>		

# FUEL INJECTION SYSTEM

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Code No.	15	Symptom	Throttle position sensor - open or short circuit detected.	
Used diagnostic code No. 01 (throttle position sensor)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of throttle position sensor.		Check the installed area for looseness or pinching. Check that it is installed in the specified position. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		Reinstated by turning the main switch ON.
2. Connected state of connector Inspect 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. Throttle position sensor coupler Main wiring harness ECU coupler		
3. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Yellow - Yellow Blue - Blue Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue		
4. Throttle position sensor lead wire open circuit output voltage check (B/L - Y) 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 Check for open circuit and replace the throttle position sensor.		
5. Defective throttle position sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	16	Symptom	1 Stuck throttle position sensor detected. 2 Intake air pressure sensor - pipe system malfunction (clogged or detached hose).	
Used diagnostic code		No. 01 (throttle position sensor) No. 03 (intake air pressure sensor 1) No. 04 (intake air pressure sensor 2) No. 02 (atmospheric pressure sensor)		
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Common to 1 and 2: Connected state of connector Inspect 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. Throttle position sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler		Reinstated by starting the engine, operating it at idle, and then racing it.
2. Installed state of throttle position sensor.		Check the installed area for looseness or pinching. Check that it is installed in the specified position. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		
3. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Yellow - Yellow Blue - Blue Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue		
4. Throttle position sensor lead wire open circuit output voltage check (B/L - Y) 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 Check for open circuit and replace the throttle position sensor.		
5. Defective throttle position sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		
6. 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. Inspect and repair the connection. Replace it if there is a malfunction.  See page 6-25.		

# FUEL INJECTION SYSTEM

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Code No.	19	Symptom	Open circuit is detected in the input line from the sidestand switch to the ECU.	
Used diagnostic code No. 20 (sidestand switch)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. (Between ECU and sidestand)		If the transmission is in gear, it is reinstated by retracting the sidestand. If the transmission is in neutral, it is reinstated by reconnecting the wiring.
2. Connected state of connector Inspect 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. Main wiring harness ECU coupler (No. 43 pin, black) (Alarm coupler) ECU coupler illustration (Indicate No. 43 pin)		
3. Defective sidestand switch		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

Code No.	22	Symptom	Open or short circuit detected from the intake temperature sensor.	
Used diagnostic code No. 05 (intake temperature sensor)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of sensor		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Brown/White - Brown/White		
3. Connected state of connector Inspect 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. Intake temperature sensor coupler Main wiring harness ECU coupler		
4. Defective intake temperature sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	23	Symptom	Open or short circuit detected from the atmospheric pressure sensor.	
Used diagnostic code No. 02 (atmospheric pressure sensor)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of atmospheric pressure sensor		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Blue - Blue Black/Blue - Black/Blue Pink - Pink		
3. Connected state of connector Inspect 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. Atmospheric pressure sensor coupler Main wiring harness ECU coupler		
4. Defective atmospheric pressure sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

Code No.	25	Symptom	Intake air pressure sensor 2 - open or short circuit detected.	
Used diagnostic code No. 03 (intake air pressure sensor 2)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue Sub lead Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue		Reinstated by turning the main switch ON.
2. Connected state of connector Inspect 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. Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler		
3. Defective intake air pressure sensor		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	26	Symptom	1 Intake air pressure sensor 2 - pipe system malfunction (clogged or detached hose). 2 Intake air pressure sensor 2 - open or short circuit detected. 3 Stuck throttle position sensor detected.
Used diagnostic code	No. 04 (intake air pressure sensor 2) No. 01 (throttle position sensor) No. 02 (atmospheric pressure sensor)		
Inspection operation item and probable cause	Operation item and countermeasure		Reinstatement method
1.Common to 1, 2, and 3: Connected state of connector Inspect 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. Intake air pressure sensor coupler Main wiring harness ECU coupler		Reinstated by starting the engine and operating it at idle.
2-1.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. Inspect and repair the connection. Replace it if there is a malfunction.  See page 6-25		Reinstated by starting the engine and operating it at idle.
2-2.Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue Sub lead Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue		
2-3.Defective intake air pressure sensor.	Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		
3-1.Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Yellow - Yellow Blue - Blue Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue		Reinstated by starting the engine, operating it at idle, and then by racing it.
3-2.Throttle position sensor lead wire open circuit output voltage check (B/L - Y) 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 Check for open circuit and replace the throttle position sensor.		
3-3.Defective throttle position sensor.	Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	27	Symptom	Open or short circuit is detected from the oil temperature sensor.	
Used diagnostic code No. 10 (oil temperature sensor)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of sensor		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue White - White		
3. Connected state of connector Inspect 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. Oil temperature sensor coupler Main wiring harness ECU coupler		
4. Defective oil temperature sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

Code No.	28	Symptom	Open or short circuit is detected from the engine temperature sensor.	
Used diagnostic code No. 11 (engine temperature sensor)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of sensor		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black - Black Brown - Brown		
3. Connected state of connector Inspect 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. Engine temperature sensor coupler Main wiring harness ECU coupler		
4. Defective engine temperature sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

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Code No.	29	Symptom	Electricity is not circulated to the decompression solenoid (open or short circuit in thermistor is detected)	
Used diagnostic code No. 55 (decompression solenoid)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of decompression solenoid		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Thermistor side Black/Red - Black/Red Green/Blue - Green/Blue Solenoid side Gray/Red - Gray/Red Light green - Light green		
3. Connected state of connector Inspect 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. Decompression solenoid coupler Main wiring harness ECU coupler		
4. Malfunction in decompression solenoid Check the operating sound or that the warning light is on 5 times with engine stop switch ON and start switch ON. Malfunction in thermistor		Replace if defective. Refer to "ELECTRIC STARTING SYSTEM" in chapter 7. Check the resistance value Refer to "ELECTRIC STARTING SYSTEM" in chapter 7.		

Code No.	30	Symptom	The motorcycle has overturned.	
Used diagnostic code No. 08 (lean angle cut-off switch)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
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 Inspect 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. Lean angle cut-off switch coupler Main wiring harness ECU coupler		
4. Defective lean angle cut-off switch		Replace if defective.		



# FUEL INJECTION SYSTEM

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Code No.	37	Symptom	Faulty linear control valve or motor is detected.	
Used diagnostic code		No. 54 (linear control valve) No. 10 (oil temperature sensor)		
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1-1. Defective linear control valve Check the operating sound or that the warning light is on 3 times with engine stop switch ON.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		Perform diagnostic code 54 to check the operation of the linear control valve.
1-2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Red/Black - Red/Black Brown/Blue - Brown/Blue White/Green - White/Green Pink/Blue - Pink/Blue Red/Green - Red/Green		
1-3. Connected state of connector Inspect 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. Main wiring harness linear control valve coupler Main wiring harness ECU coupler		
1-4. Installed state of linear control valve		Check the installed area for looseness or pinching.		
2-1. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue White - White		Reinstated by turning the main switch ON.
2-2. Connected state of connector Inspect 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. Main wiring harness oil temperature sensor coupler Main wiring harness ECU coupler		
2-3. Defective oil temperature sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.		

Code No.	38	Symptom	Open or short circuit is detected from the decompression solenoid.	
Used diagnostic code		No. 55 (decompression solenoid)		
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Installed state of sensor		Check the installed area for looseness or pinching.		Reinstated by turning the main switch ON.
2. Open or short circuit in wiring harness or sub lead.		Repair or replace if there is an open or short circuit. Main wiring harness Gray/Red - Gray/Red Light green - Light green		
3. Connected state of connector Inspect 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. Decompression solenoid coupler Main wiring harness ECU coupler		
4. Defective decompression solenoid.		Replace if defective. Refer to "ELECTRIC STARTING SYSTEM" in chapter 7.		

# FUEL INJECTION SYSTEM

**FI**



Code No.	41	Symptom	Open or short circuit detected in the lean angle cut-off switch.
Used diagnostic code No. 08 (lean angle cut-off switch)			
Inspection operation item and probable cause		Operation item and countermeasure	Reinstatement method
1. Open or short circuit in lead wire.		Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Yellow/Green - Yellow/Green Red/White - Red/White	Reinstated by turning the main switch ON.
2. Connected state of connector Inspect 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. Lean angle cut-off switch coupler Main wiring harness ECU coupler	
3. Defective lean angle cut-off switch		Replace if defective.	

Code No.	42	Symptom	1 No normal signals are received from the speed sensor. 2 Open or short circuit is detected in the neutral switch.
Used diagnostic code No. 07 (speed sensor) No. 21 (neutral switch)			
Inspection operation item and probable cause		Operation item and countermeasure	Reinstatement method
1-1. Connected state of connector Inspect 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. Speed sensor coupler Main wiring harness ECU coupler	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at a low speed of 20 to 30 km/h.
1-2. Open or short circuit in lead wire.  Gear for detecting vehicle speed has broken.		Repair or replace if there is an open or short circuit. Main wiring harness Blue - Blue White/Yellow - White/Yellow Black/Blue - Black/Blue Replace if defective. Refer to "TRANSMISSION" in chapter 5.	
1-3. Defective speed sensor		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7.	
2-1. Open or short circuit in lead wire		Repair or replace if there is an open or short circuit. Main wiring harness Sky blue/Sky blue	
2-2. Connected state of connector Inspect 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. Neutral switch coupler Main wiring harness ECU coupler	
2-3. Faulty shift drum (neutral detection area)		Replace if defective. Refer to "TRANSMISSION" in chapter 5.	
2-4. Defective neutral switch		Replace if defective. Refer to "CHECKING THE SWITCHES" in chapter 7.	

# FUEL INJECTION SYSTEM

**FI**



Code No.	43	Symptom	The ECU is unable to monitor the battery voltage.	
Used diagnostic code No. 50 (fuel injection system relay)				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Malfunction in ECU		Fuel injection system relay is on.		Reinstated by starting the engine and operating it at idle.
2. Open or short circuit in the wiring harness.		Repair or replace if there is an open or short circuit. Main wiring harness Red - Red Red/Black - Red/Black Red/Blue - Red/Blue Blue/Yellow - Blue/Yellow		
3. Malfunction or open circuit in fuel injection system relay		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 7. If there is no malfunction with the fuel injection system relay, replace the ECU.		
4. Connected state of connector Inspect 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. Fuel injection system relay coupler ECU coupler		

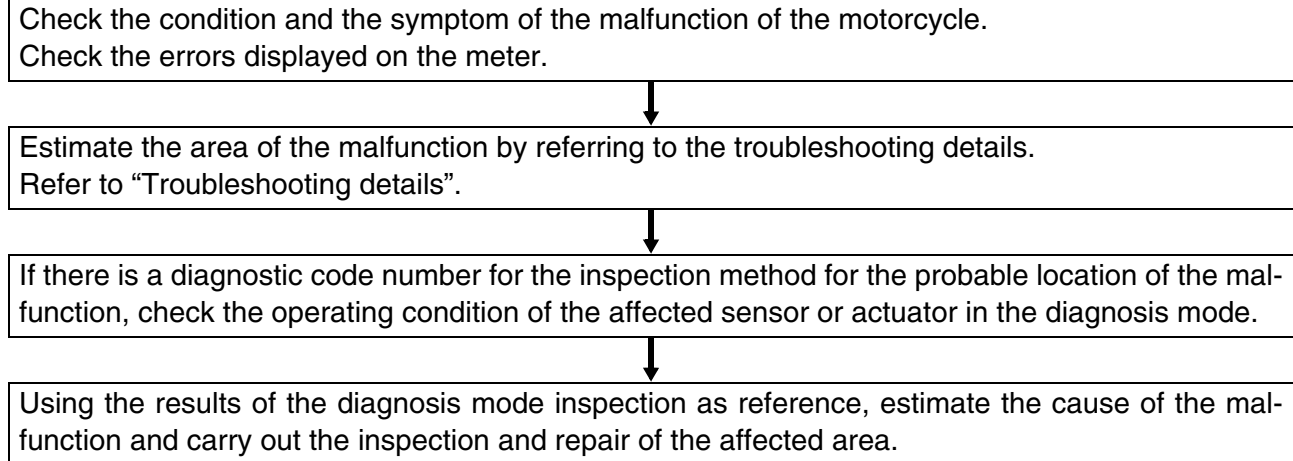
Code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
Used diagnostic code No.				
Inspection operation item and probable cause		Operation item and countermeasure		Reinstatement method
1. Malfunction in ECU		Replace the ECU.		Reinstated by turning the main switch ON.



## Diagnosis mode troubleshooting 2 (self-diagnostic malfunction not detected)

Troubleshooting the sensors and actuator with no malfunctions detected, and special indications  
 Even if the malfunctions of some of the sensors do not appear on the meter because they are not detected by the self-diagnostic function, they can be inspected in the diagnosis mode.

### Basic procedure



### Troubleshooting details

Symptom	The engine trouble warning light does not illuminate when the start switch is pressed.	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Open or short circuit in start switch</li> <li>• Open or short circuit in wiring harness</li> <li>• Open circuit in warning light bulb</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 indicated on the left.	
	<ul style="list-style-type: none"> <li>• Open or short circuit in start switch Inspect the handlebar switch for continuity. Refer to “CHECKING THE SWITCHES” in chapter 7. Defective: replace</li> <li>• Open or short circuit in wiring harness Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>• Open circuit in warning light bulb Inspect the bulb for continuity. Defective: replace</li> </ul>	

# FUEL INJECTION SYSTEM

FI



Symptom	Engine cannot be started or difficult to start. (Fuel is not supplied to the cylinder.)	
Probable mal-function area	<ul style="list-style-type: none"> <li>• Open or short circuit in injector</li> <li>• Open or short circuit in wiring harness</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the are of the malfunction has been narrowed down in the inspection method 1 given on the left.	
<ul style="list-style-type: none"> <li>• Execute diagnostic code No. 36 and No. 37</li> <li>Check the operating sound or that the warning light is on 5 times with engine stop switch ON.</li> </ul>	<ul style="list-style-type: none"> <li>• Open or short circuit in injector</li> <li>Refer to "FUEL INJECTION SYSTEM" in chapter 7.</li> <li>• Open or short circuit in wiring harness</li> <li>Cylinder #1 - injector</li> <li>Gray - Gray</li> <li>White - White</li> <li>Cylinder #2 - injector</li> <li>Green - Green</li> <li>White - White</li> </ul>	

Symptom	The ignition system fails to operate (no spark or intermittent spark)	
Probable mal-function area	<ul style="list-style-type: none"> <li>• Open or short circuit in ignition coil</li> <li>• Open or short circuit in wiring harness</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Open or short circuit in injector Open or short circuit in wiring harness	
<ul style="list-style-type: none"> <li>• Execute diagnostic code No. 30 and No. 31</li> <li>Check the operating sound or that the warning light is on 5 times with engine stop switch ON.</li> <li>* Use a dynamic spark tester (YM-34487)</li> </ul>	<ul style="list-style-type: none"> <li>• Open or short circuit in ignition coil</li> <li>Refer to "IGNITION SYSTEM" in chapter 7.</li> <li>• Open or short in wire harness of primary coil end</li> <li>#1</li> <li>Black/Red - Black/Red</li> <li>Black/Orange - Black/Orange</li> <li>#2</li> <li>Black/Red - Black/Red</li> <li>Black/White - Black/White</li> </ul>	

# FUEL INJECTION SYSTEM

FI



Symptom	The headlight does not turn ON or OFF.	
Probable mal-function area	<ul style="list-style-type: none"> <li>Malfunction in the headlight relay</li> <li>Malfunction in the headlight</li> <li>Open or short circuit in the headlight wiring harness</li> <li>Malfunction in the handlebar switch</li> <li>Open circuit in the headlight bulb</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1.	
<ul style="list-style-type: none"> <li>Execute diagnostic code No. 52 (check the operation of the headlight relay). (Check the operation of the headlight.)</li> <li>* Classify the malfunctions:                             <ul style="list-style-type: none"> <li>Malfunction related to the relay</li> <li>Malfunction related to the wiring harness</li> <li>Malfunction in the headlight itself</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Relay does not operate (as checked by sound or tester). Check the headlight relay. Refer to "LIGHTING SYSTEM" in chapter 7. Defective: replace</li>   <li>Inspect the wiring harness and the couplers for continuity. Defective: repair or replace Replace</li>   <li>The relay operates but the headlight does not illuminate. Inspect the headlight bulb. Blown bulb: replace</li>   <li>Check the headlight relay contact point for continuity. Refer to "LIGHTING SYSTEM" in chapter 7. Defective: replace</li>   <li>Check the handlebar switch. Defective: repair or replace</li>   <li>Inspect the wiring harness and the couplers for continuity. Defective: repair or replace</li> </ul>	

Symptom	Clock LCD displays "Er-1". (No signals are received from the ECU.)	
Probable mal-function area	<ul style="list-style-type: none"> <li>Open or short circuit in communication line</li> <li>Malfunction in meter</li> <li>Malfunction in ECU</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
	<ul style="list-style-type: none"> <li>Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>	

# FUEL INJECTION SYSTEM

FI



Symptom	Clock LCD displays "Er-2". (No signals are received from the ECU within the specified duration.)	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Improper operation of communication line</li> <li>• Malfunction in meter</li> <li>• Malfunction in ECU</li> </ul>	
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.
		<ul style="list-style-type: none"> <li>• Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>• Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>

Symptom	Clock LCD displays "Er-3". (Data from the ECU cannot be received correctly.)	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Improper operation of communication line</li> <li>• Malfunction in meter</li> <li>• Malfunction in ECU</li> </ul>	
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.
		<ul style="list-style-type: none"> <li>• Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>• Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>

Symptom	Clock LCD displays "Er-4". (Non-registered data has been received from the meter.)	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Improper operation of communication line</li> <li>• Malfunction in meter</li> <li>• Malfunction in ECU</li> </ul>	
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.
		<ul style="list-style-type: none"> <li>• Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>• Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>

# FUEL INJECTION SYSTEM

FI



Symptom	Sidestand switch does not function (the engine does not stop when the stand is extended).	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Short circuit in the input line to ECU</li> <li>• Malfunction in the starter circuit cut-off relay</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
<ul style="list-style-type: none"> <li>• Execute diagnostic code 21 Enable the meter to display the ON/OFF status of the sidestand switch (in gear and sidestand is up, ON is displayed; in gear and sidestand is down, OFF is displayed). * To distinguish whether the problem is in the switch or in other areas.</li> <li>• Execute diagnostic code 20 Enable the meter to display the ON/OFF status of the neutral switch (in neutral, ON is displayed; in gear, OFF is displayed). * To distinguish whether the problem is in the switch or in other areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Meter does not display ON/OFF. Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>Inspect the sidestand switch. Refer to "CHECKING THE SWITCHES" in chapter 7. Defective: replace</li> <li>Inspect the neutral switch. Refer to "CHECKING THE SWITCHES" in chapter 7. Defective: replace</li> </ul>	



# FUEL INJECTION SYSTEM

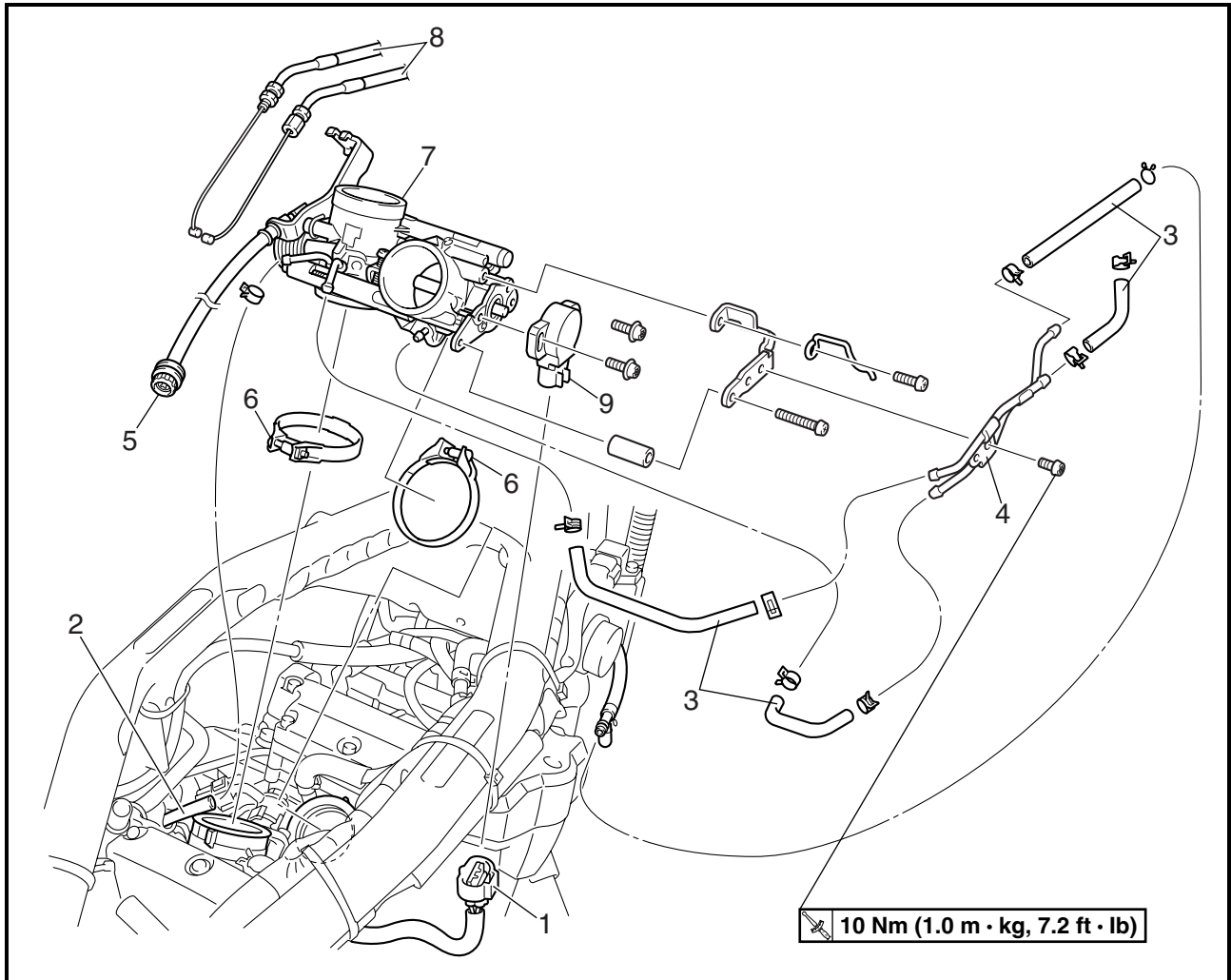
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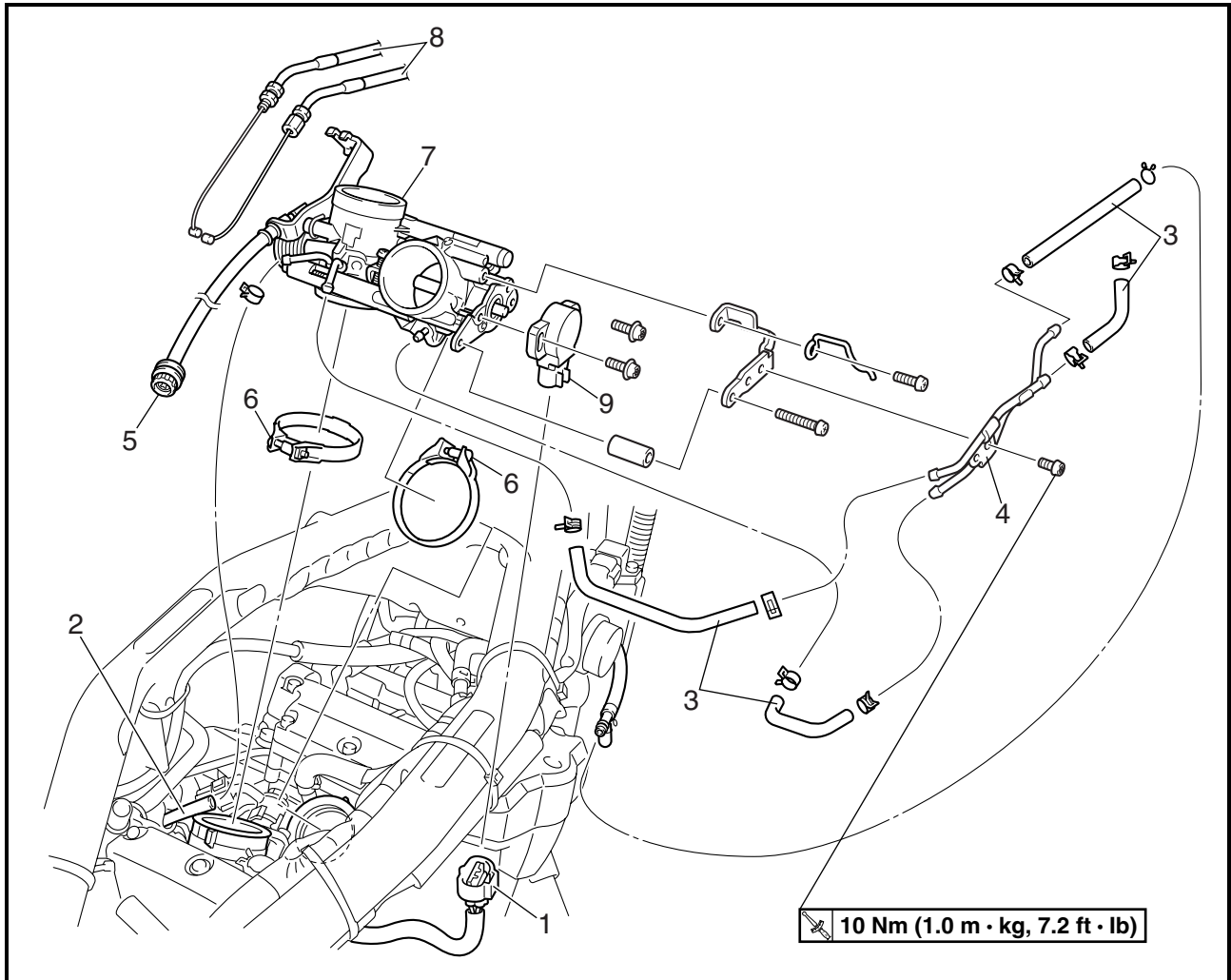
Symptom	Engine trouble warning light blinks while the start switch is being pressed (to warn that the engine is unable to start).	
Probable malfunction area	<ul style="list-style-type: none"> <li>• Malfunction in Fuel injection system relay</li> <li>• Open circuit in wiring harness</li> <li>• Disconnected battery</li> <li>• Defective crankshaft position sensor (See page 5-59.)</li> <li>• Defective sidestand switch (See page 6-24.)</li> <li>• Tripped lean angle cut-off switch (See page 6-28, 6-30.)</li> <li>• ECU memory check error</li> </ul>	
Inspection method 1 Inspection by diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1.	
<ul style="list-style-type: none"> <li>• Execute diagnostic code 50 To trip the relay unit.</li>   <li>• Execute diagnostic code 09 To check the monitor voltage. * To distinguish whether the problem is in the relay or in other areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Relay unit does not trip. Inspect the coil side of the relay unit. Refer to "FUEL INJECTION SYSTEM" in chapter 7. Defective: replace</li>   <li>Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>• Normal voltage is not displayed. Inspect the contact side of the fuel relay unit. Refer to "FUEL INJECTION SYSTEM" in chapter 7. Defective: replace</li>   <li>Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li>   <li>• If a self-diagnostic code is displayed: Inspect the battery. Defective: replace or recharge</li>   <li>Inspect and repair the applicable area of the malfunction.</li> </ul>	



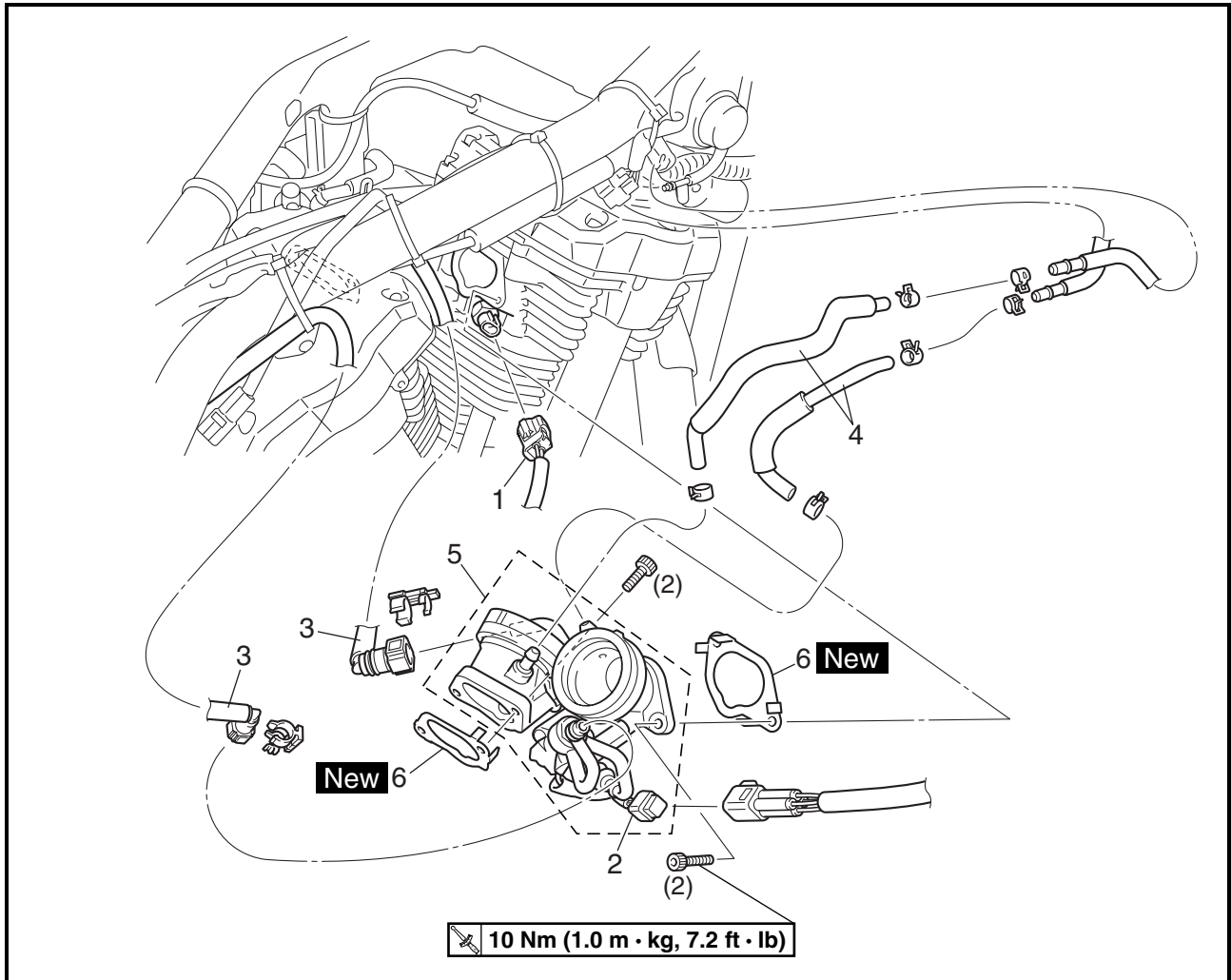
## THROTTLE BODIES



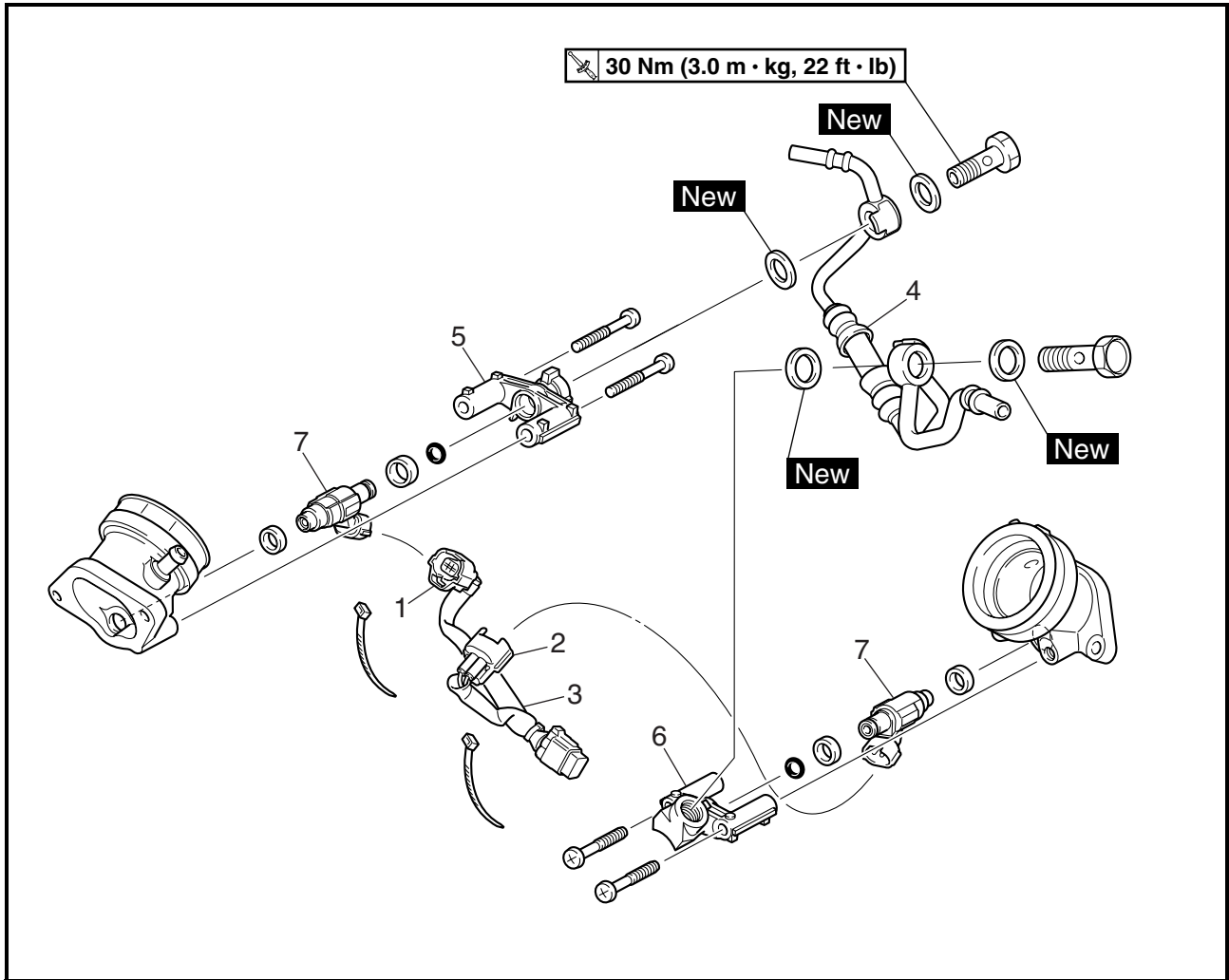
Order	Job/Part	Q'ty	Remarks
	<b>Removing the throttle bodies</b>		Remove the parts in the order listed.
	Seat		Refer to "SEAT AND SIDE COVERS" in chapter 3.
	Fuel tank/Air induction system cover/ air duct		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Silencer air filter case		Refer to "SILENCER AIR FILTER CASE" in chapter 3.
1	Throttle position sensor coupler	1	Disconnect.
2	A.I.S. vacuum hose	1	Disconnect.
3	Intake vacuum hose	4	Disconnect.
4	Intake vacuum hose bracket	1	



Order	Job/Part	Q'ty	Remarks
5	Throttle stop screw	1	
6	Throttle body joint screw	2	
7	Throttle bodies	1	
8	Throttle cable	2	Disconnect.
9	Throttle position sensor	1	Refer to "FUEL INJECTION SYSTEM" in chapter 7. For installation, reverse the removal procedure.

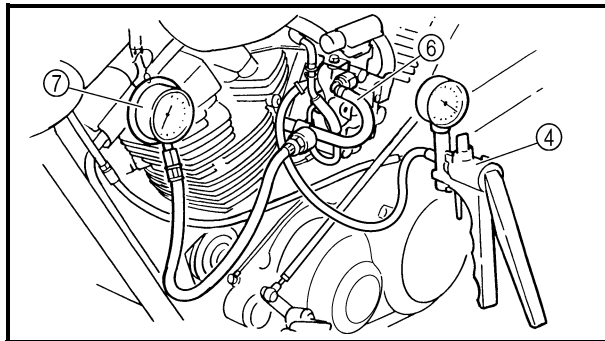
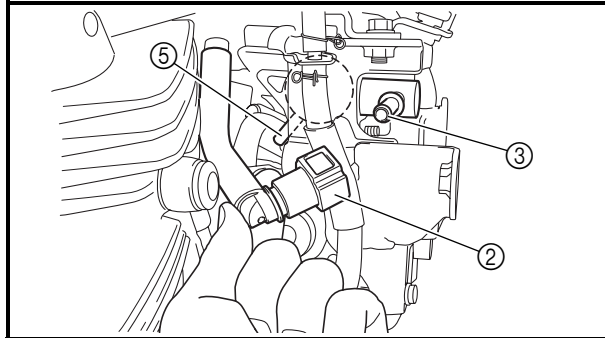
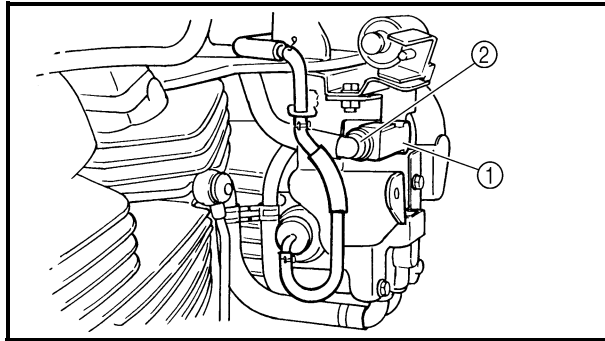


Order	Job/Part	Q'ty	Remarks
	<b>Removing the intake manifolds</b>		Remove the parts in the order listed.
1	Engine temperature sensor coupler	1	Disconnect.
2	Injection sub-wire harness coupler	1	Disconnect.
3	Fuel hose	2	Disconnect.
4	Linear control valve outlet hose	2	Disconnect.
5	Intake manifolds	1	
6	Gasket	2	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	<b>Removing the injectors</b>		Remove the parts in the order listed.
1	Cylinder #1-injector coupler	1	Disconnect.
2	Cylinder #2-injector coupler	1	Disconnect.
3	Injector sub-wire harness	1	
4	Fuel pipe	1	
5	Injector joint 1	1	
6	Injector joint 2	1	
7	Injector	2	
			For installation, reverse the removal procedure.





## CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:
  - pressure regulator operation



- a. Remove the air duct.  
Refer to "FUEL TANK" in chapter 3.
- b. Remove the fuel hose end clamp ①.
- c. Disconnect the fuel hose ② from the fuel injection pipe ③.
- d. Connect the mity vac ④ onto the pipe ⑤ onto the pressure regulator.
- e. Connect the fuel pressure adapter ⑥ to the pressure gauge ⑦.
- f. Connect the fuel pressure adapter between the fuel hose ② and fuel injection pipe ③.



**Mity vac**  
**YB-35956**  
**Pressure gauge**  
**YU-03153**  
**Fuel pressure adapter**  
**YM-03176**

- g. Start the engine.
- h. Measure the fuel pressure.



**Fuel pressure**  
**328 kPa (3.28 kg/cm<sup>2</sup>, 3.28 psi)**

- i. 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.





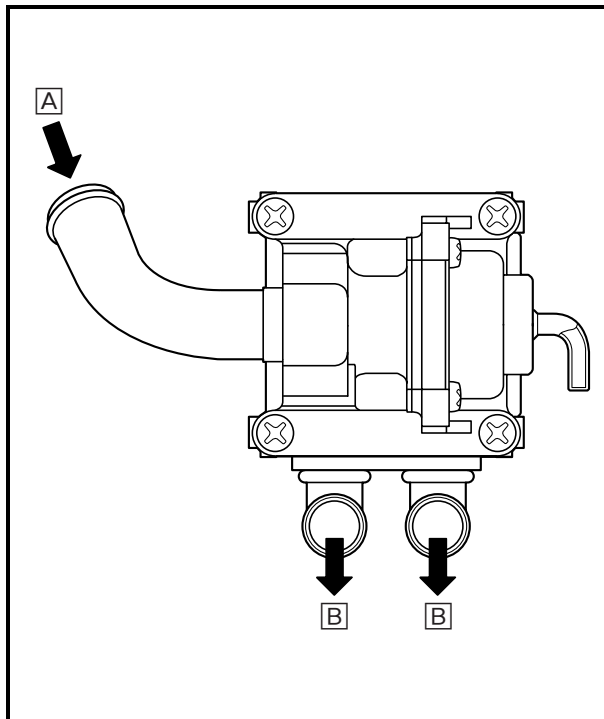
EAS00507

## 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 (1,112 to 1,292 °F).



EAS00508

### AIR CUT-OFF VALVE

The air cut-off valve is operated by the intake gas pressure through the piston valve diaphragm. Normally, the air cut-off valve is open to allow fresh air to flow into the exhaust port. During sudden deceleration (the throttle valve suddenly closes), negative pressure is generated and the air cut-off valve is closed in order to prevent after-burning.

Additionally, at high engine speeds and when the pressure decreases, the air cut-off valve automatically closes to guard against a loss of performance due to self-EGR.

- ① During normal operation, the air cut-off valve is open.
- ② During sudden deceleration (the throttle valve suddenly closes), the air cut-off valve closes.
- ③ At high engine speeds and when the pressure decreases, the air cut-off valve is closed.

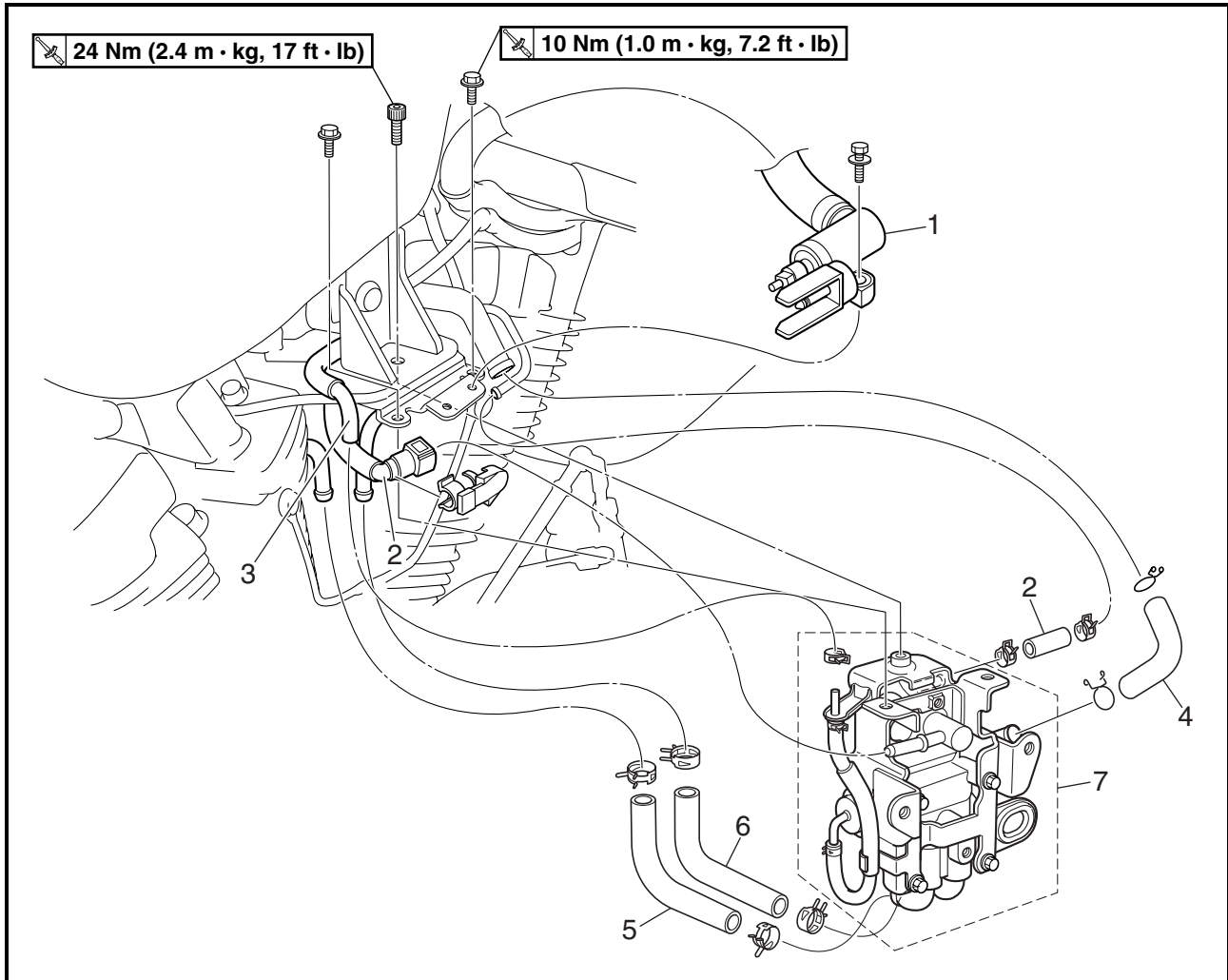
**A** From the air cleaner

**B** From the reed valve





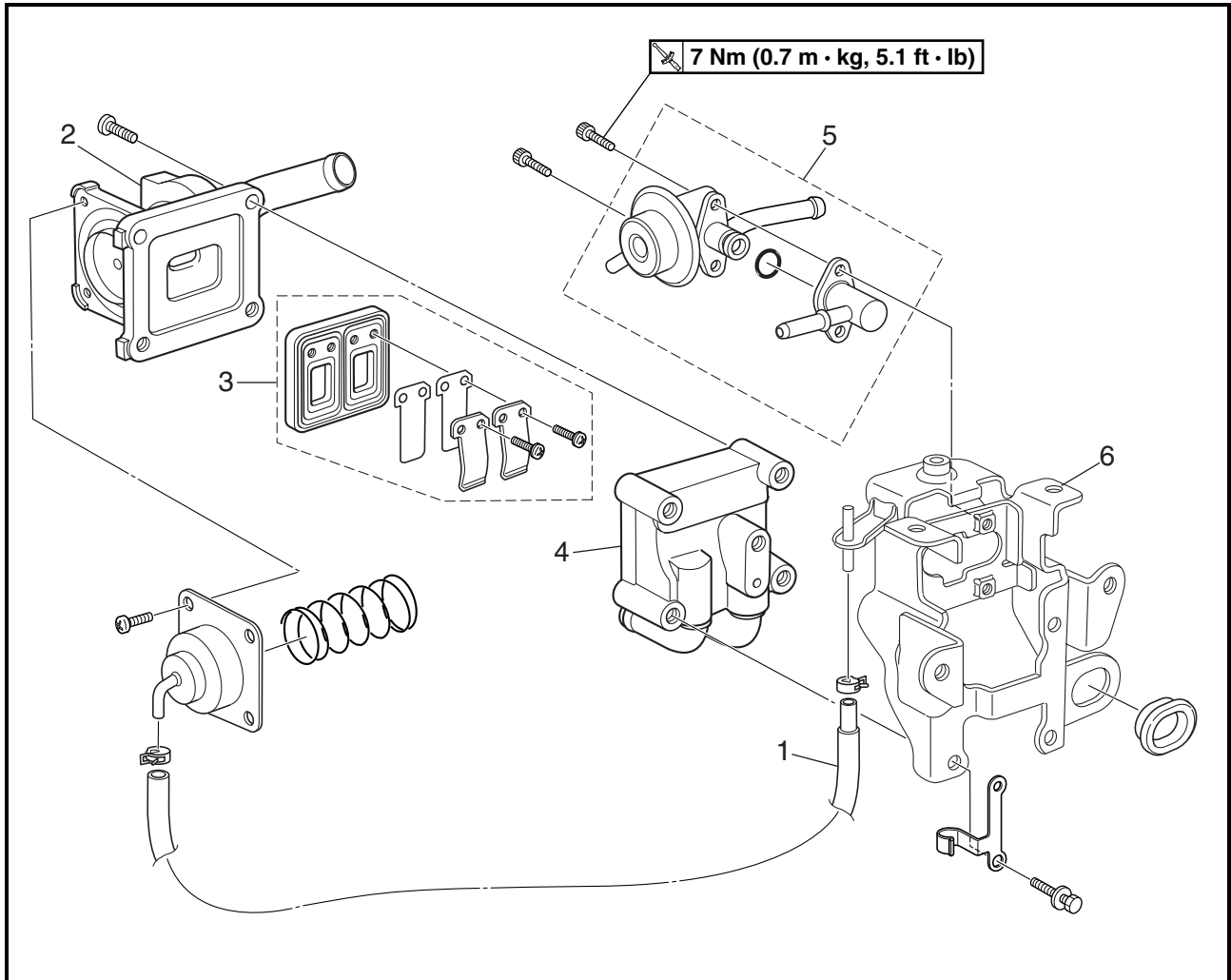
## AIR CUT-OFF VALVE ASSEMBLY AND AIR INDUCTION SYSTEM HOSES



Order	Job/Part	Q'ty	Remarks
	<b>Removing the air cut-off valve assembly and hoses</b>		Remove the parts in the order listed.
	Fuel hose joint 1/air duct		Refer to "FUEL TANK" in chapter 3.
1	Fuel hose joint	1	Disconnect.
2	Fuel hose	2	
3	A.I.S. vacuum hose	1	
4	Resonator hose	1	
5	Reed valve case to front cylinder head hose	1	
6	Reed valve case to rear cylinder head hose	1	
7	Air cut-off valve assembly	1	
			For installation, reverse the removal procedure.



REED VALVES



Order	Job/Part	Q'ty	Remarks
	<b>Removing the reed valves</b>		Remove the parts in the order listed.
	Air cut-off valve assembly/hoses		
1	A.I.S. vacuum hose	1	
2	Reed valve cover	1	
3	Reed valve assembly	1	
4	Reed valve case	1	
5	Pressure regulator	1	
6	A.I.S. bracket	1	
			For installation, reverse the removal procedure.



## CHECKING THE PRESSURE REGULATOR

1. Check:
  - pressure regulator  
Damage → Replace.

EAS00510

## CHECKING THE AIR INDUCTION SYSTEM

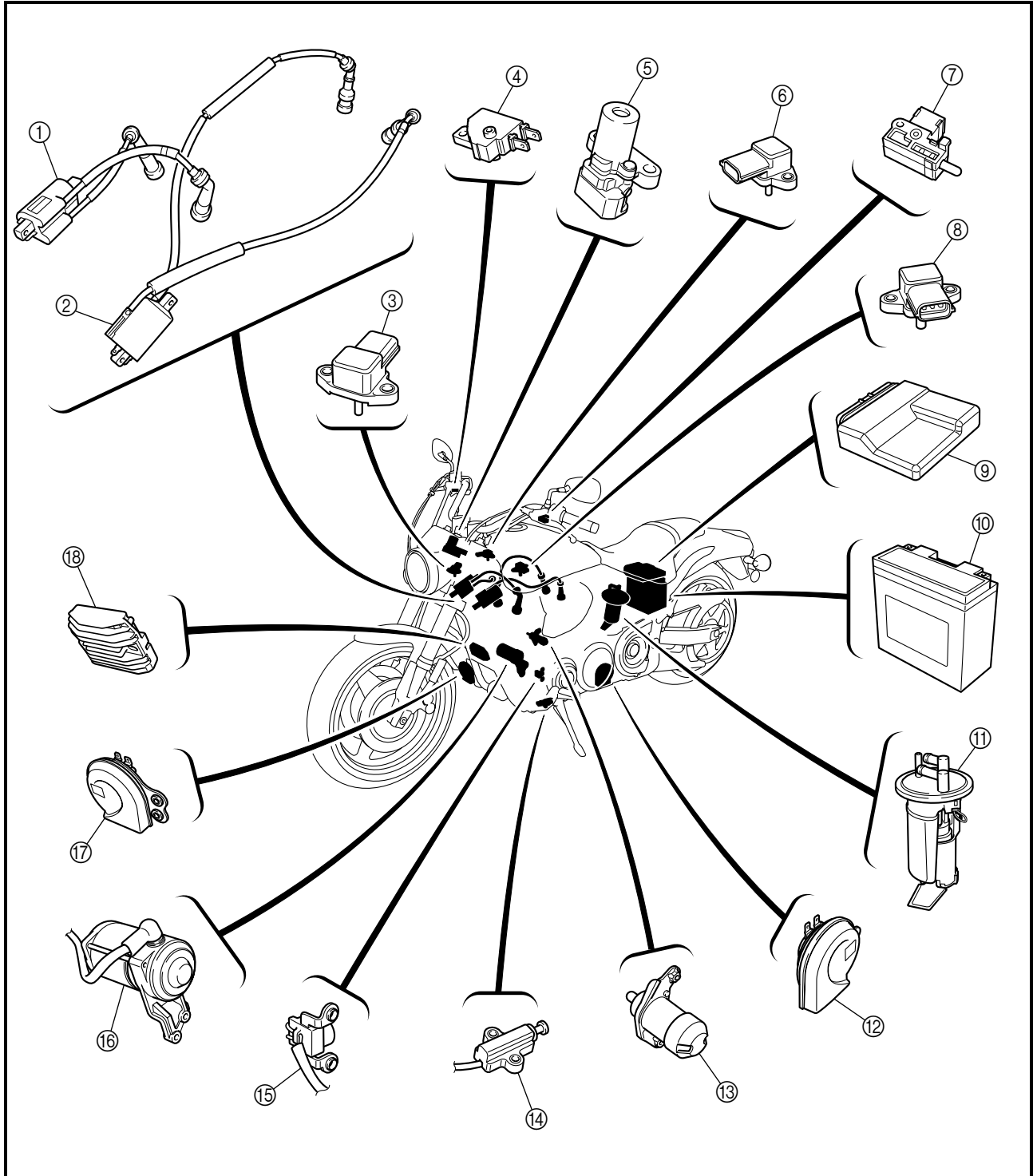
1. Check:
  - hoses  
Loose connection → Connect properly.  
Cracks/damage → Replace.
  - pipes  
Cracks/damage → Replace.
2. Check:
  - fiber reed
  - fiber reed stopper
  - reed valve seat  
Cracks/damage → Replace the reed valve.
3. Check:
  - air cut-off valve  
Cracks/damage → Replace.

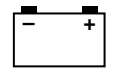
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# ELECTRICAL SYSTEM

## ELECTRICAL COMPONENTS

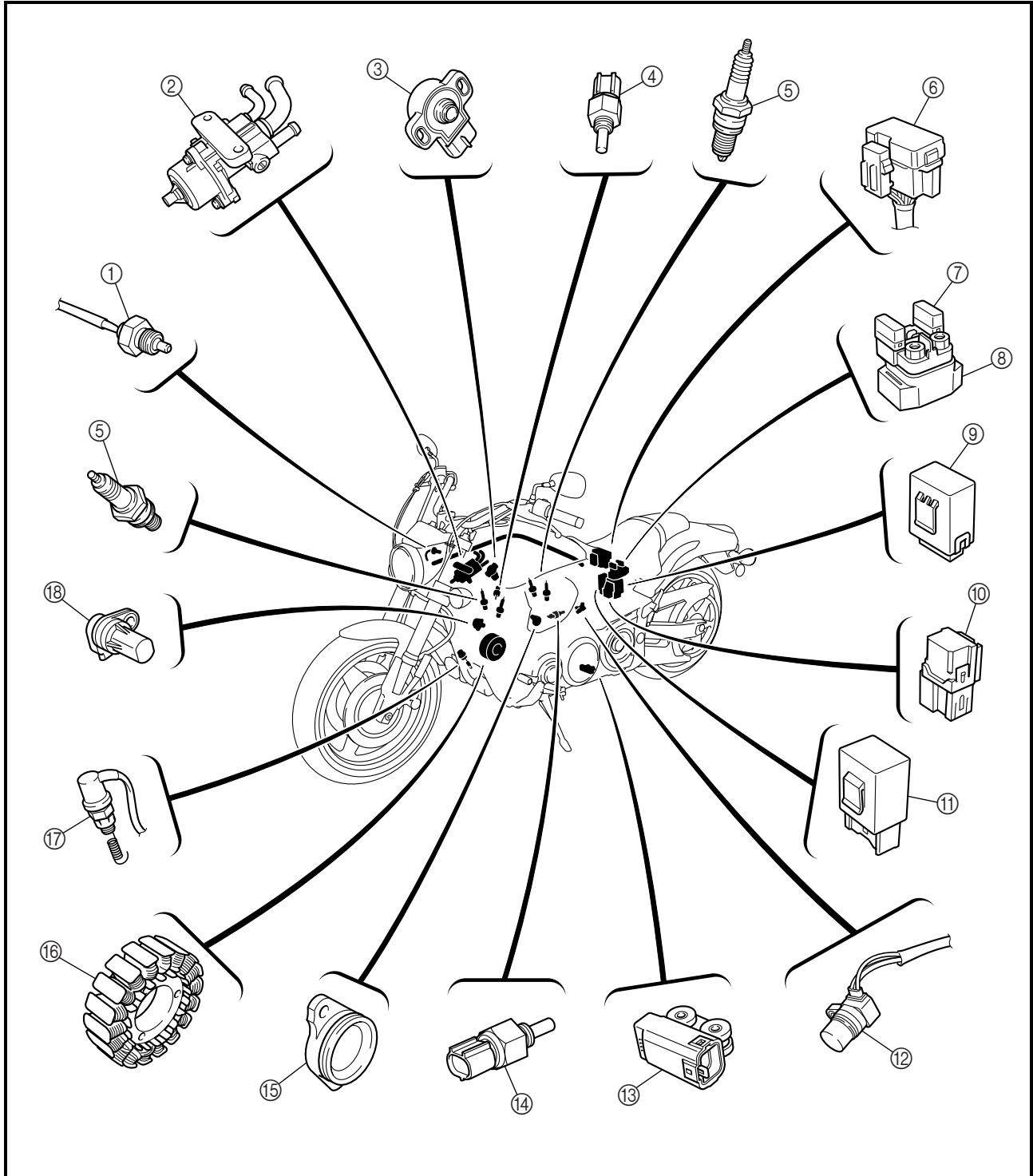
- |                                |                               |                              |
|--------------------------------|-------------------------------|------------------------------|
| ① Ignition coil 2              | ⑦ Clutch switch               | ⑬ Decompression solenoid     |
| ② Ignition coil 1              | ⑧ Atmospheric pressure sensor | ⑭ Sidestand switch           |
| ③ Intake air pressure sensor 2 | ⑨ ECU                         | ⑮ Crankshaft position sensor |
| ④ Front brake light switch     | ⑩ Battery                     | ⑯ Starter motor              |
| ⑤ Main switch                  | ⑪ Fuel pump                   | ⑰ Horn 1                     |
| ⑥ Intake air pressure sensor 1 | ⑫ Horn 2                      | ⑱ Rectifier/regulator        |





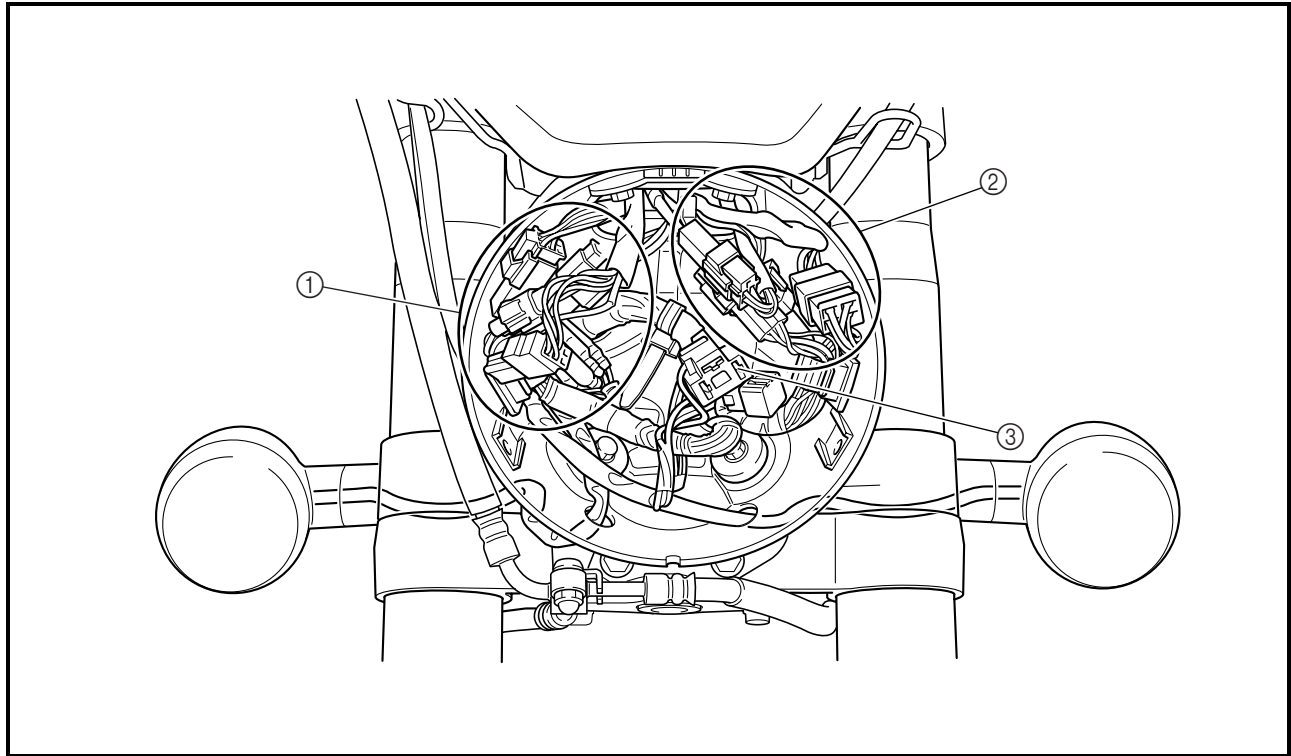
- ① Intake air temperature sensor
- ② Linear control valve
- ③ Throttle position sensor
- ④ Engine temperature sensor
- ⑤ Spark plugs
- ⑥ Fuse box
- ⑦ Main fuse
- ⑧ Starter relay
- ⑨ Turn signal relay
- ⑩ Headlight relay

- ⑪ Relay unit
- ⑫ Speed sensor
- ⑬ Lean angle cut-off switch
- ⑭ Oil temperature sensor
- ⑮ Neutral switch
- ⑯ Stator coil assembly
- ⑰ Rear brake light switch
- ⑱ Cylinder identification sensor

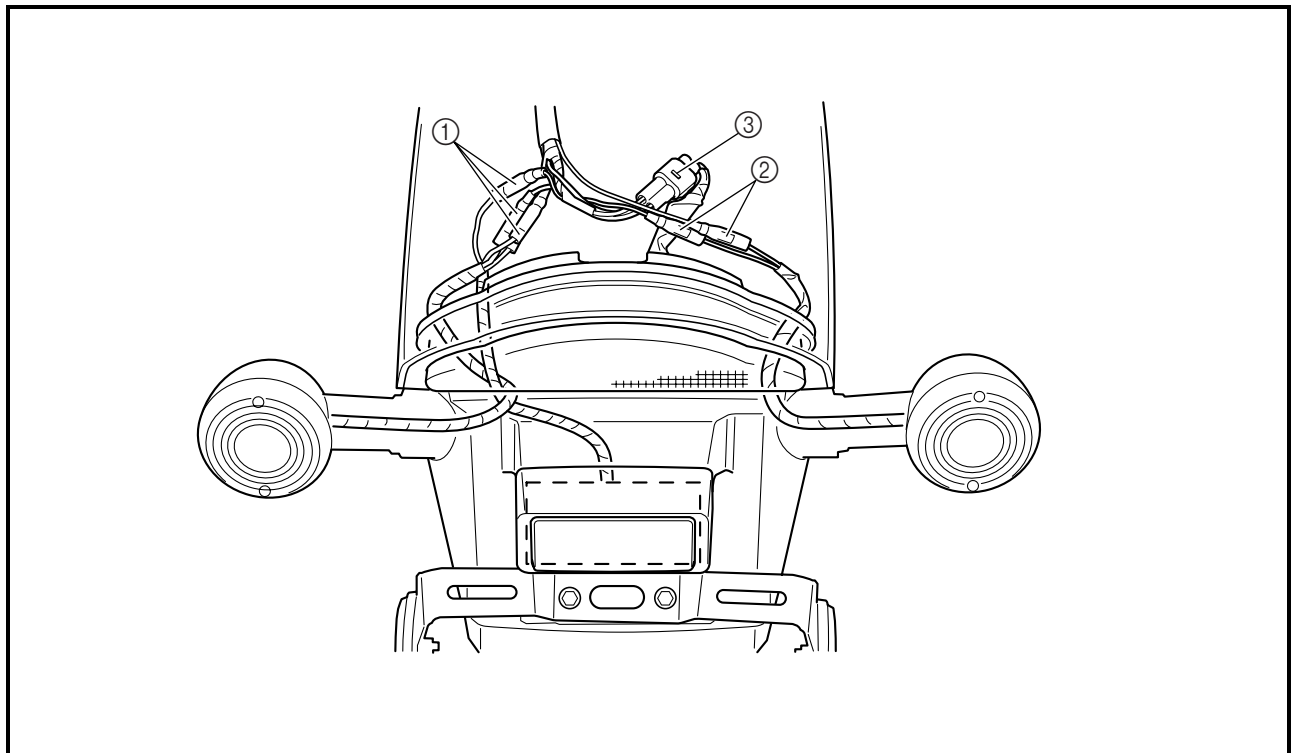


**ARRANGEMENT OF THE ELECTRICAL COMPONENTS AND COUPLERS**

- ① Speedometer coupler, tachometer couplers, right handlebar switch coupler and front turn signal/position connectors
- ② Speedometer coupler, main switch coupler and left handlebar switch couplers
- ③ Headlight coupler

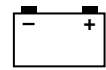


- ① Rear turn signal light (left) connectors and license plate light connectors
- ② Rear turn signal light (right) connectors
- ③ Tail/brake light coupler

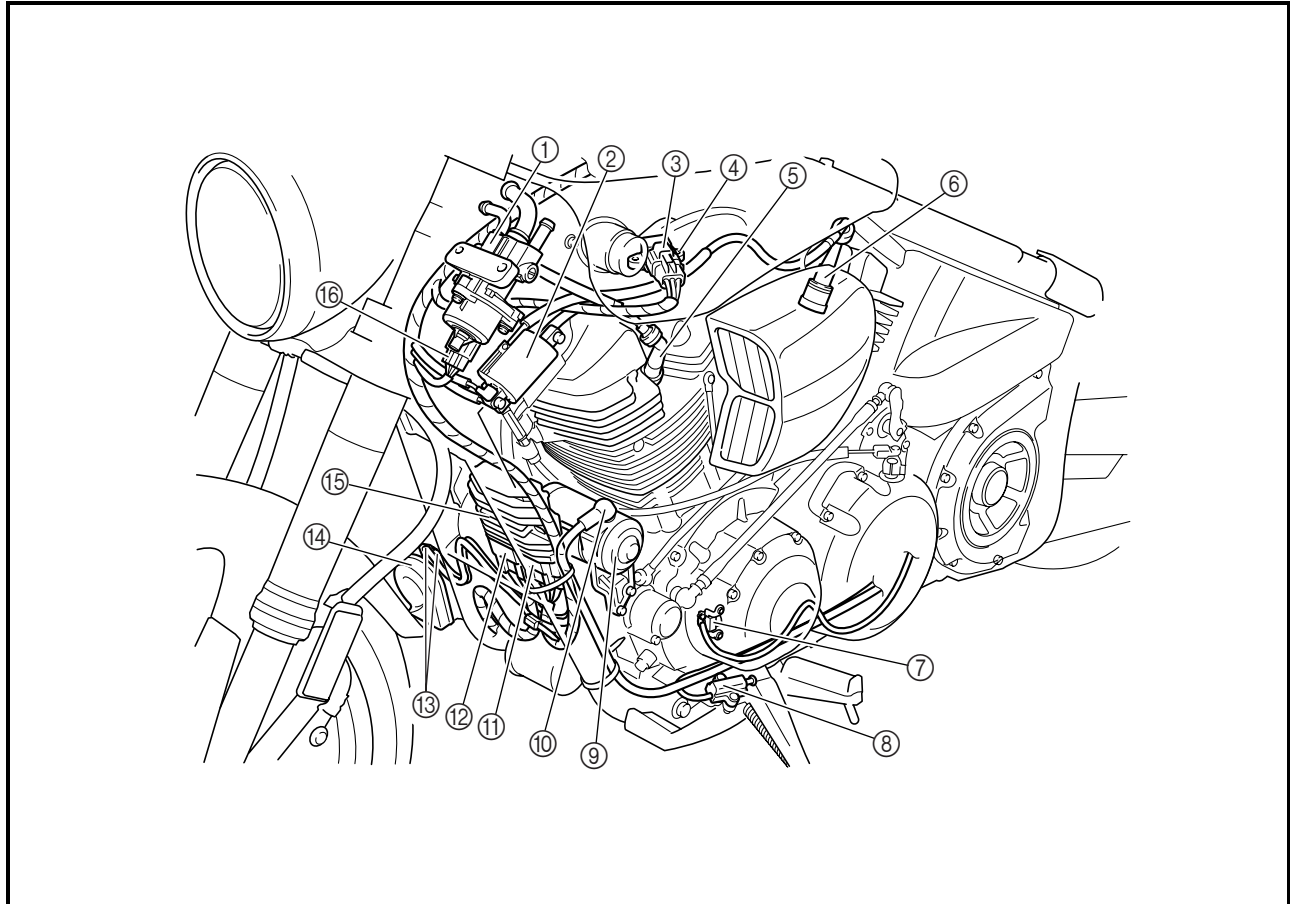


# ARRANGEMENT OF THE ELECTRICAL COMPONENTS AND COUPLERS

**ELEC**

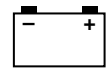


- |  |                                |
|--|--------------------------------|
| ① Linear control valve                                 | ⑨ Starter motor                |
| ② Ignition coil 1 (rear cylinder)                      | ⑩ Starter motor lead           |
| ③ Atmospheric pressure sensor                          | ⑪ Rectifier/regulator coupler  |
| ④ Atmospheric pressure sensor coupler                  | ⑫ Stator coil assembly coupler |
| ⑤ Spark plug cap (ignition coil 2 - L spark plug lead) | ⑬ Horn 1 connectors            |
| ⑥ Spark plug cap (ignition coil 1 - L spark plug lead) | ⑭ Horn 1                       |
| ⑦ Crankshaft position sensor                           | ⑮ Rectifier/regulator          |
| ⑧ Sidestand switch                                     | ⑯ Linear control valve coupler |

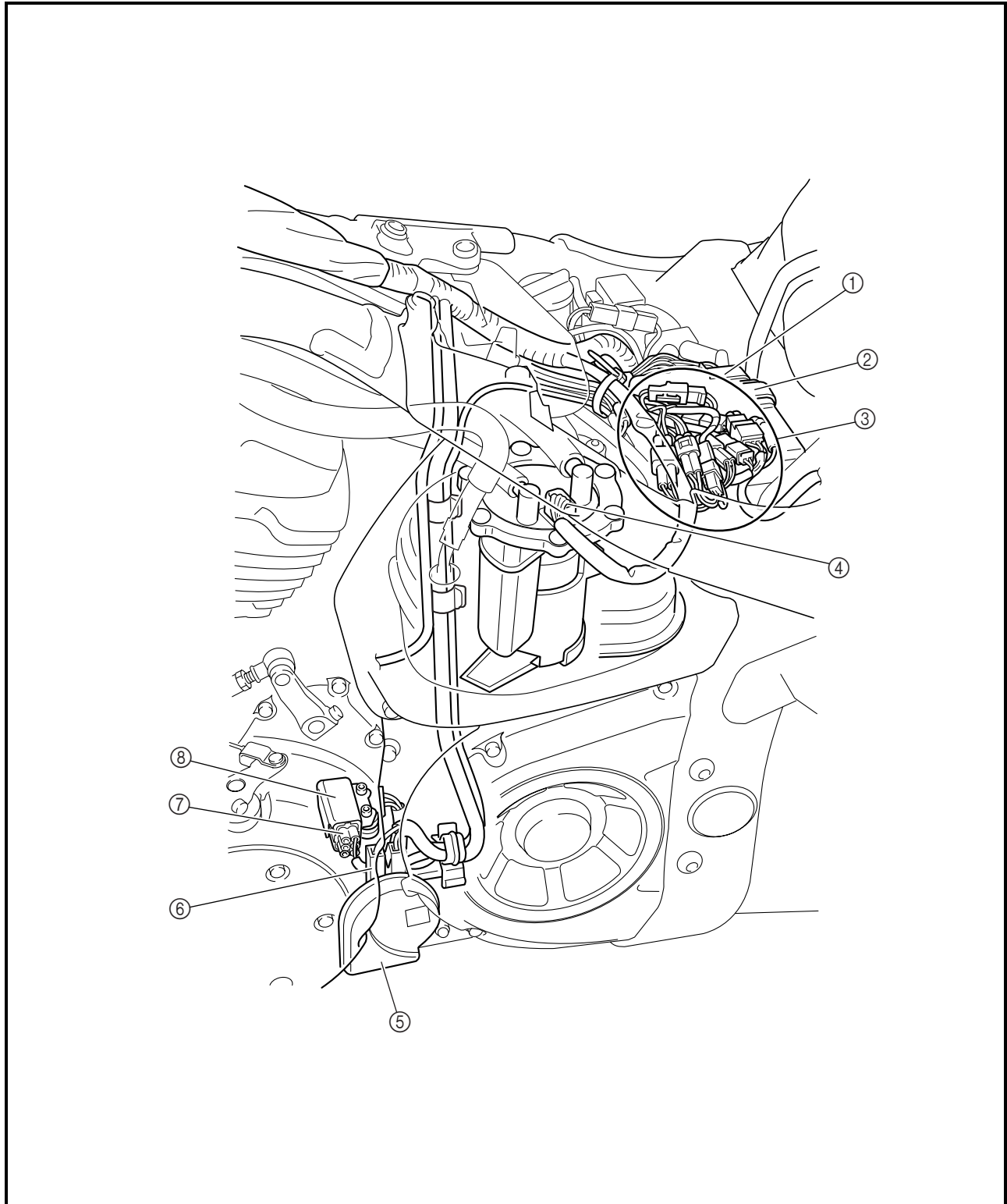


# ARRANGEMENT OF THE ELECTRICAL COMPONENTS AND COUPLERS

**ELEC**

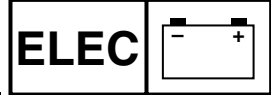


- ① ECU coupler
- ② ECU
- ③ Tail sub-wire harness coupler, decompression solenoid couplers, cylinder identification coupler, crankshaft position sensor coupler, speed sensor coupler, neutral switch connector and sidestand switch coupler
- ④ Fuel pump coupler
- ⑤ Horn 2
- ⑥ Horn 2 coupler
- ⑦ Lean angle cut-off switch coupler
- ⑧ Lean angle cut-off switch

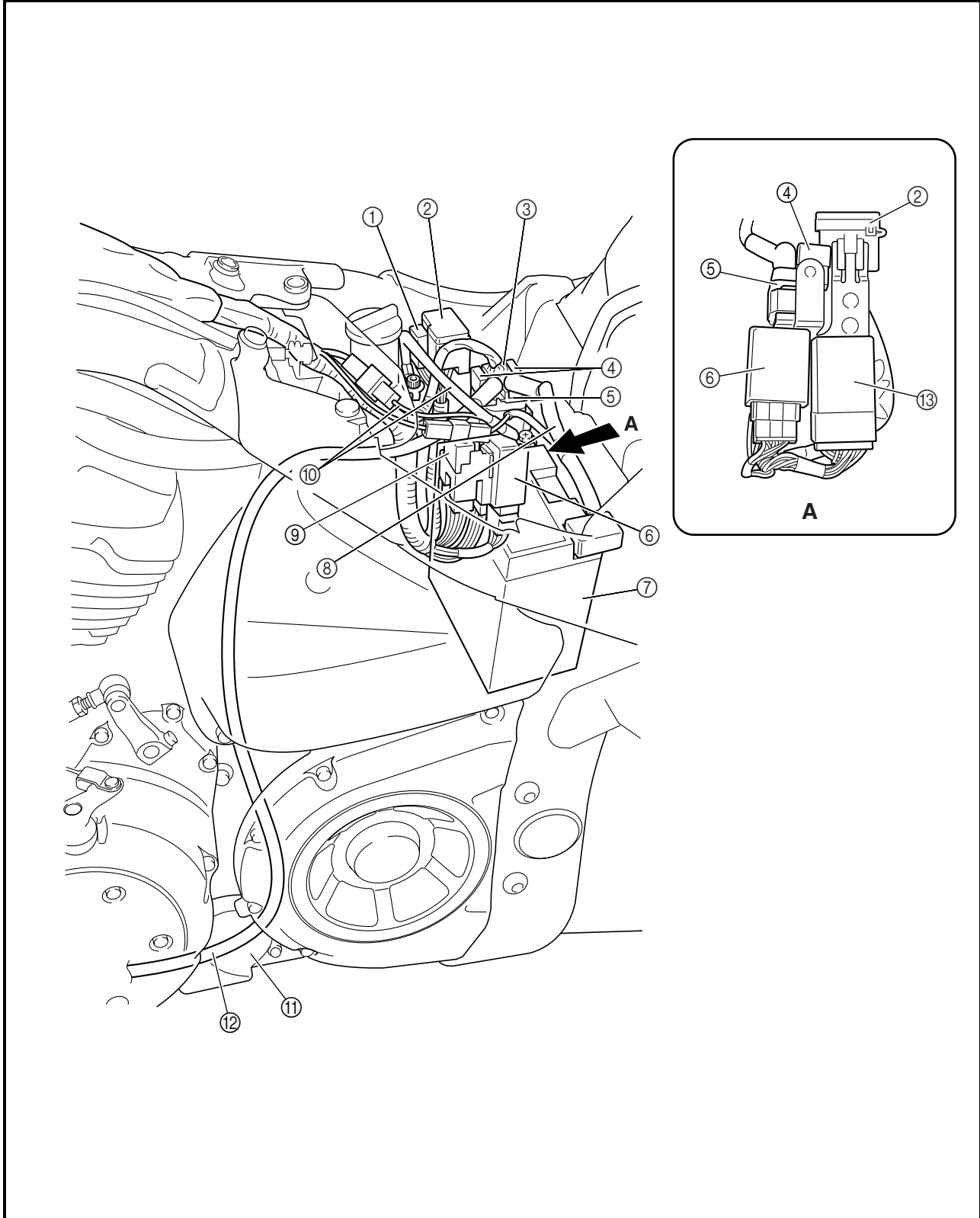




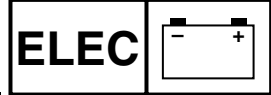
# ARRANGEMENT OF THE ELECTRICAL COMPONENTS AND COUPLERS



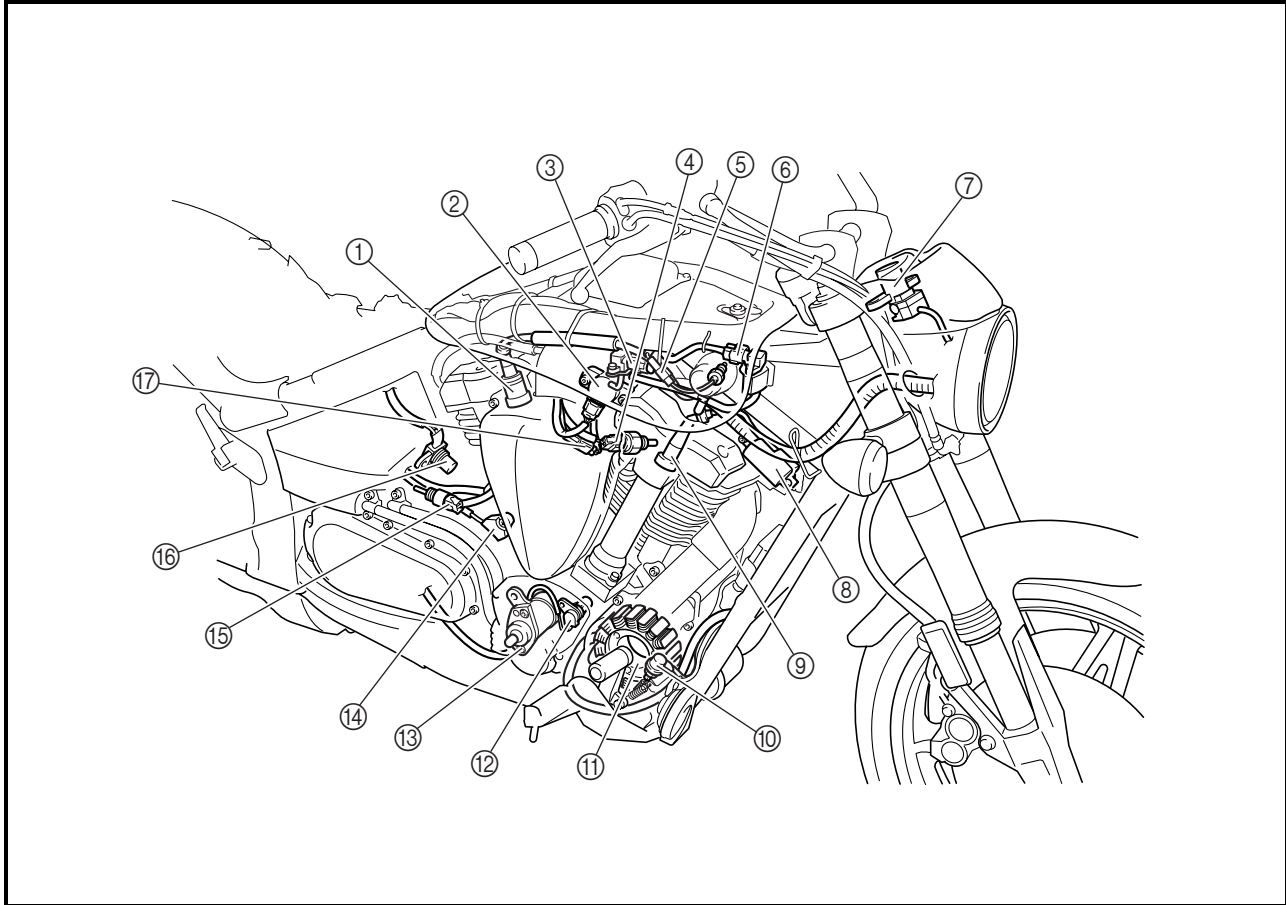
- ① ECU fuse
- ② Fuse box
- ③ Starter relay coupler
- ④ Main fuse
- ⑤ Starter relay
- ⑥ Turn signal relay
- ⑦ Battery
- ⑧ Battery positive lead
- ⑨ Headlight relay
- ⑩ Battery negative lead
- ⑪ Horn 2
- ⑫ Startr motor lead
- ⑬ Relay unit

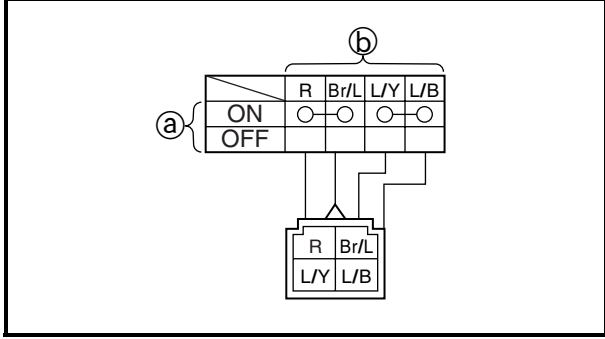
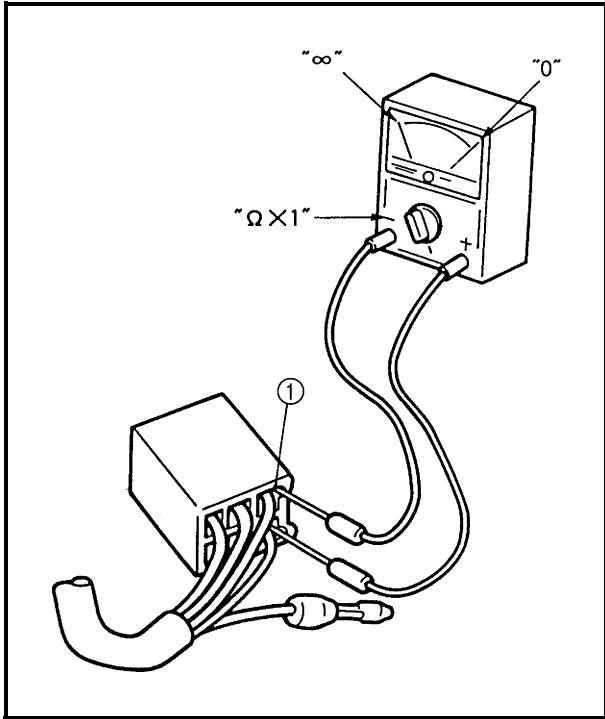


# ARRANGEMENT OF THE ELECTRICAL COMPONENTS AND COUPLERS



- ① Spark plug cap (ignition coil 1 - R spark plug lead)
- ② Throttle position sensor
- ③ Intake air pressure sensor 1 coupler
- ④ Engine temperature sensor coupler
- ⑤ Intake air temperature sensor coupler
- ⑥ Intake air pressure sensor 2 coupler
- ⑦ Main switch
- ⑧ Ignition coil 2 (front cylinder)
- ⑨ Spark plug cap (ignition coil 2 - R spark plug lead)
- ⑩ Rear brake light switch
- ⑪ Stator coil
- ⑫ Cylinder identification sensor
- ⑬ Decompression solenoid
- ⑭ Neutral switch
- ⑮ Oil temperature sensor coupler
- ⑯ Speed sensor
- ⑰ Ignition sub-wire harness coupler





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 ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



**Pocket tester**  
YU-03112

**NOTE:**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

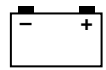
The switch positions ① are shown in the far left column and the switch lead colors ② are shown in the top row in the switch illustration.

**NOTE:**

“○—○” indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

**The example illustration on the left shows that:**

There is continuity between red and brown/blue and between blue/yellow and blue/black when the switch is set to “ON”.



EAS00731

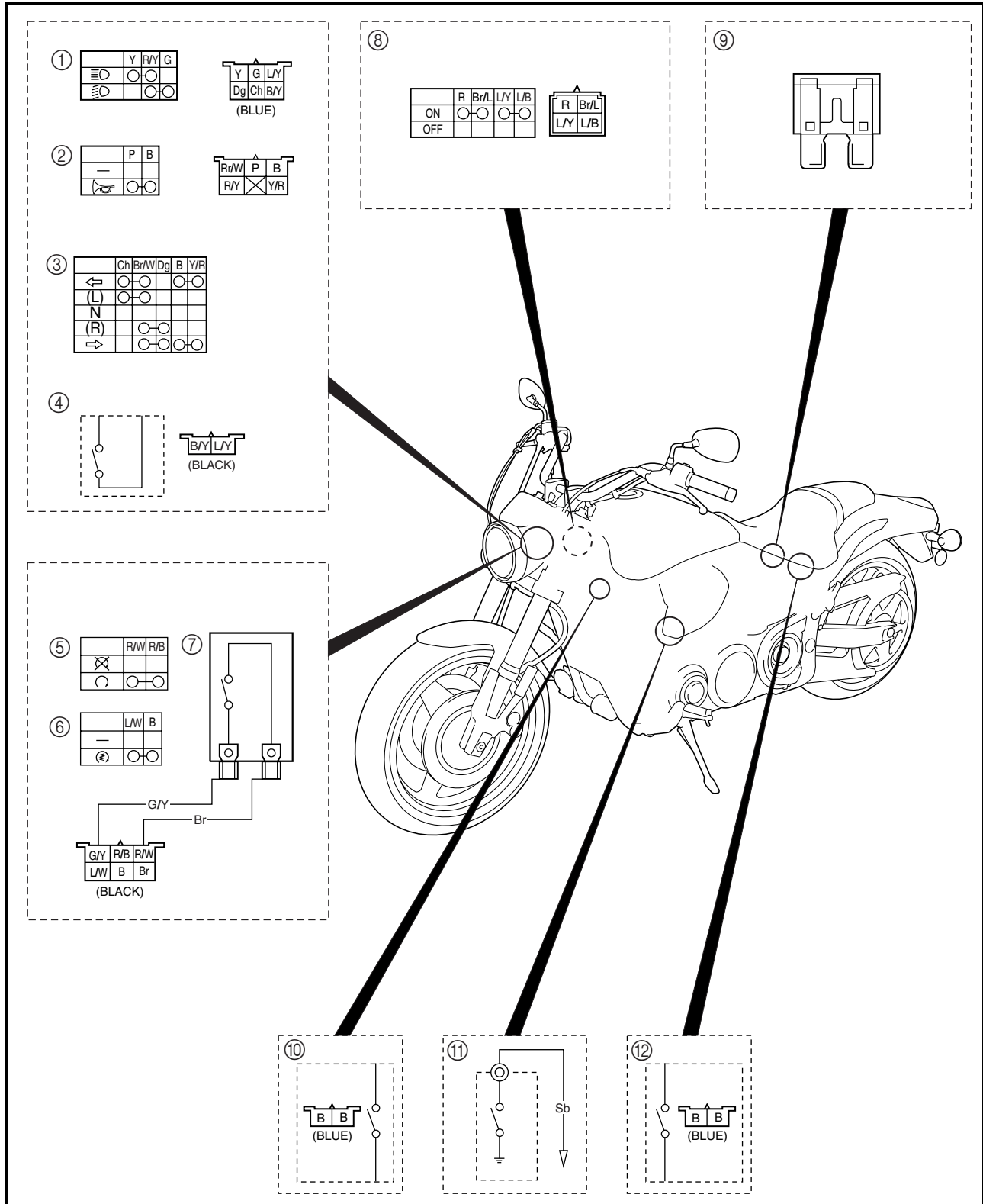
## CHECKING THE SWITCHES

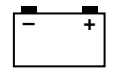
Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".

Damage/wear → Repair or replace the switch.

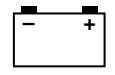
Improperly connected → Properly connect.

Incorrect continuity reading → Replace the switch.





- ① Dimmer switch
- ② Horn switch
- ③ Turn signal switch
- ④ Clutch switch
- ⑤ Engine stop switch
- ⑥ Start switch
- ⑦ Front brake light switch
- ⑧ Main switch
- ⑨ Fuse
- ⑩ Rear brake light switch
- ⑪ Neutral switch
- ⑫ Sidestand switch



EAS00732

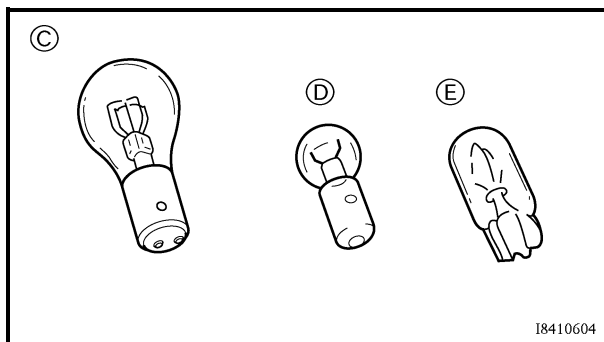
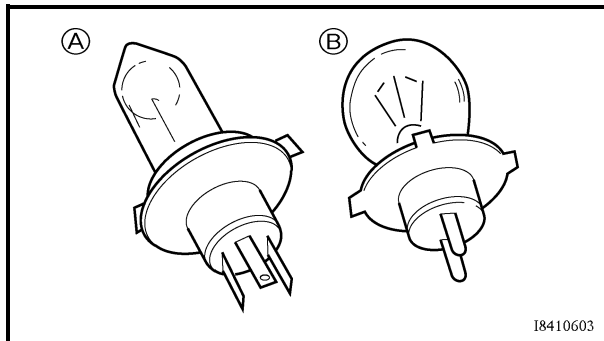
## CHECKING THE BULBS AND BULB SOCKETS

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.



### 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 **D** and **E** are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

### CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

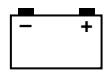
1. Remove:
  - bulb





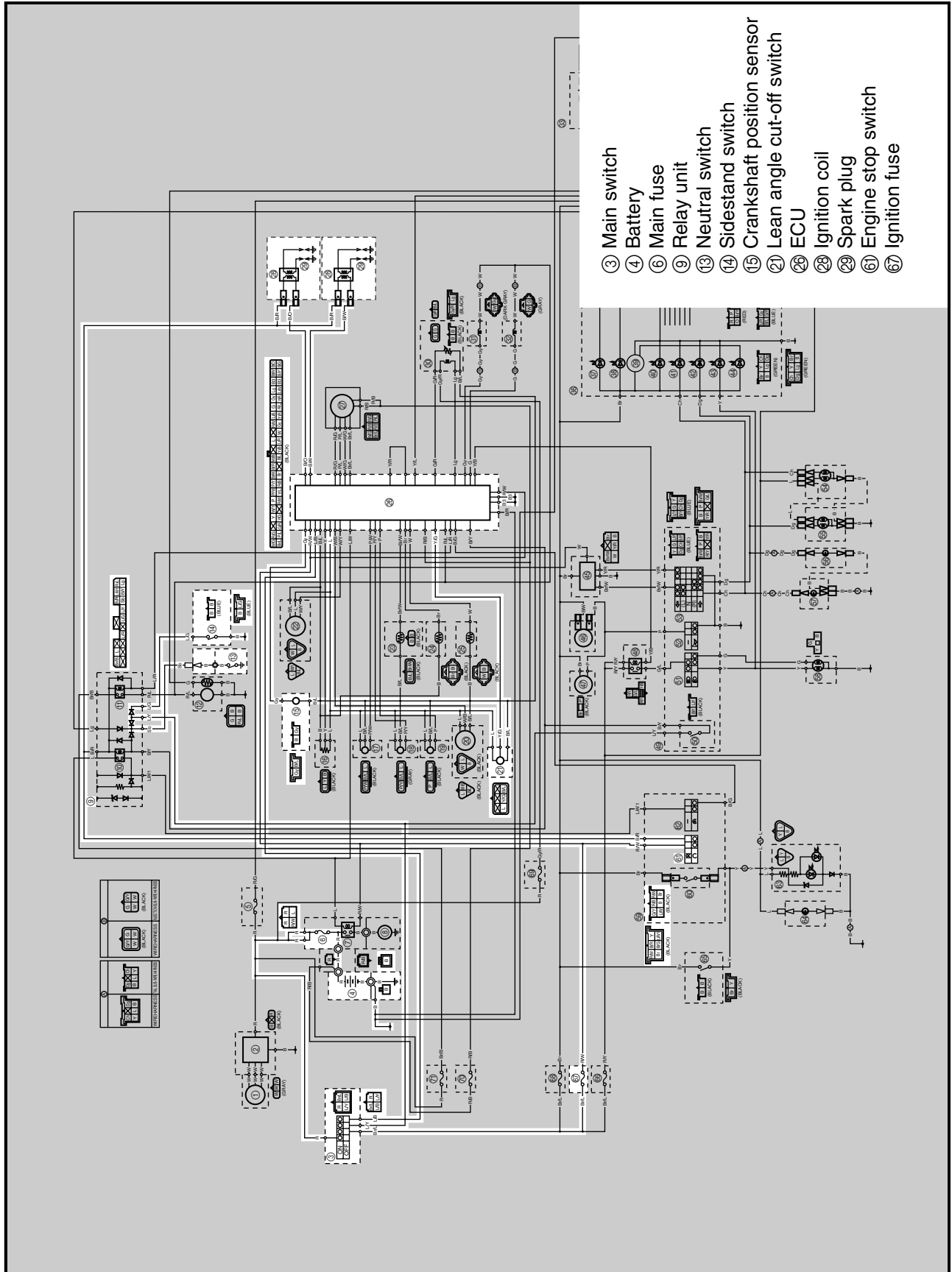




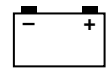


EAS00735

## IGNITION SYSTEM CIRCUIT DIAGRAM



- ③ Main switch
- ④ Battery
- ⑥ Main fuse
- ⑨ Relay unit
- ⑬ Neutral switch
- ⑭ Sidestand switch
- ⑰ Crankshaft position sensor
- ⑲ Lean angle cut-off switch
- ⑳ ECU
- ㉘ Ignition coil
- ㉙ Spark plug
- ⑥① Engine stop switch
- ⑥⑦ Ignition fuse



EAS00737

## TROUBLESHOOTING

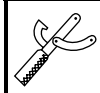
**The ignition system fails to operate (no spark or intermittent spark).**

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. crankshaft position sensor resistance
8. main switch
9. engine stop switch
10. neutral switch
11. sidestand switch
12. lean angle cut-off switch voltage
13. relay unit (diode)
14. wiring connections  
(of the entire ignition system)

**NOTE:**

- Before troubleshooting, remove the following part(s):
  1. seat
  2. fuel tank
  3. silencer air filter case
  4. side covers
  5. ignition coils
  6. headlight lens unit
  7. horn 2
- Troubleshoot with the following special tool(s).



**Dynamic spark tester**  
YM-34487  
**Pocket tester**  
YU-03112

EAS00738

### 1. Main and ignition fuses

- Check the main and ignition fuses for continuity.  
Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and ignition fuses OK?



YES



NO

Replace the fuse(s).

EAS00739

### 2. Battery

- Check the condition of the battery.  
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



**Minimum open-circuit voltage**  
**12.8 V or more at 20 °C (68 °F)**

- Is the battery OK?



YES



NO

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

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**  
**DPR7EA-9 (NGK)**  
**X22EPR-U9 (DENSO)**

**Spark plug gap**  
**0.8 ~ 0.9 mm (0.0315 ~ 0.0354 in)**

• Is the spark plug in good condition, is it of the correct type, and is its gap within specification?



Re-gap or replace the spark plug.

EAS00743

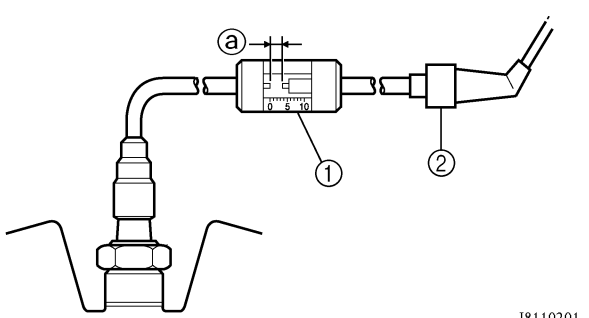
4. Ignition spark gap

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 ②.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



18110201

 **Minimum ignition spark gap**  
**6 mm (0.24 in)**

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



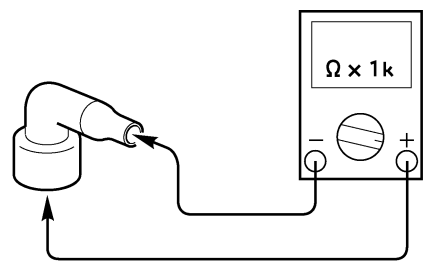
The ignition system is OK.

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.



18040101

 **Spark plug cap resistance**  
**10 kΩ at 20 °C (68 °F)**

• Is the spark plug cap OK?



Replace the spark plug cap.

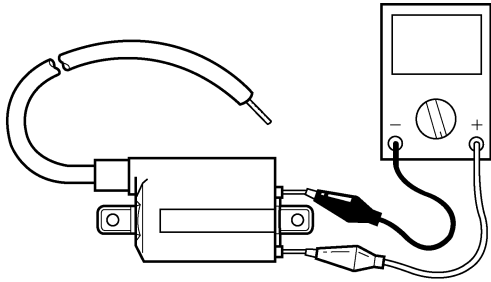
EAS00747

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

**Positive tester probe** → black/red  
**Negative tester probe** → black/orange (black/white)



I8110104

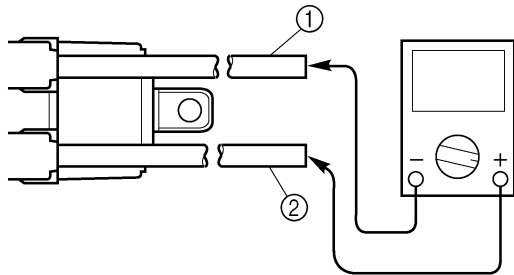
- Measure the primary coil resistance.



**Primary coil resistance**  
 1.31 ~ 1.79  $\Omega$  at 20 °C (68 °F)

- Connect the pocket tester ( $\Omega \times 1k$ ) to the ignition coil as shown.

**Negative tester probe** → spark plug lead ①  
**Positive tester probe** → spark plug lead ②



I8110102

- Measure the secondary coil resistance.



**Secondary coil resistance**  
 12 ~ 18 k $\Omega$  at 20 °C (68 °F)

• Is the ignition coil OK?



YES



NO

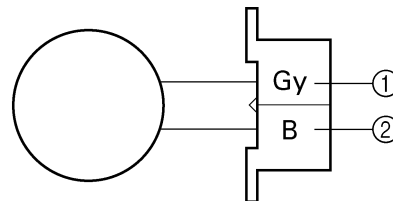
Replace the ignition coil.

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.

**Positive tester probe** → gray ①  
**Negative tester probe** → black ②



- Measure the crankshaft position sensor resistance.



**Crankshaft position sensor resistance**  
 248.0 ~ 372.0  $\Omega$  at 20 °C (68 °F)  
 (between gray and black)

• Is the crankshaft position sensor OK?



YES



NO

Replace the crankshaft position sensor.

EAS00749

**8. Main switch**

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



Replace the main switch.

EAS00750

**9. Engine stop switch**

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?



Replace the right handlebar switch.

EAS00751

**10. Neutral switch**

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



Replace the neutral switch.

EAS00752

**11. Sidestand switch**

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

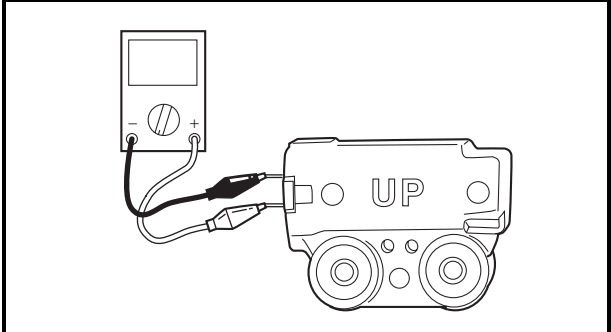


Replace the side-stand switch.

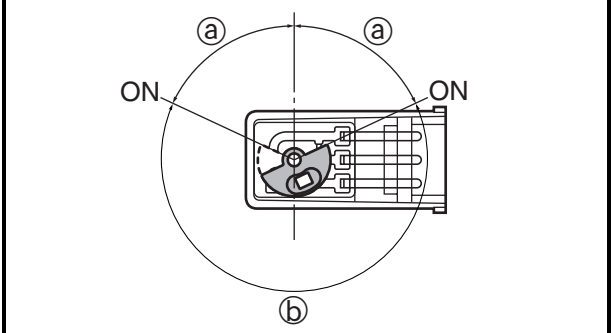
**12. Lean angle cut-off switch voltage**

- Remove the lean angle cut-off switch.
- Connect the pocket tester ( $\Omega \times 1$ ) to the lean angle cut-off switch terminals as shown.

**Positive tester probe → blue**  
**Negative tester probe → yellow/green**



**Lean angle cut-off switch voltage**  
**Less than 65° (a) → Approximately 1 V**  
**More than 65° (b) → Approximately 4 V**



• Is the lean angle cut-off switch OK?



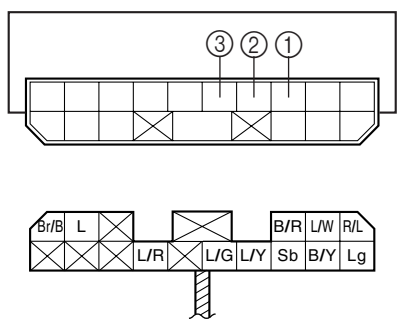
Replace the lean angle cut-off switch.

EAS00760

**13. Relay unit (diode)**

- Remove the relay unit from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the relay unit terminals as shown.
- Measure the diode for continuity as follows.

Positive tester probe → sky blue ① Negative tester probe → blue/yellow ②	<b>Continuity</b>
Positive tester probe → blue/green ③ Negative tester probe → blue/yellow ②	
Positive tester probe → blue/yellow ② Negative tester probe → sky blue ①	<b>No continuity</b>
Positive tester probe → blue/yellow ② Negative tester probe → blue/green ③	



**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?



Replace the starting circuit cut-off relay.

EAS00754

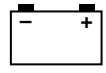
**14. Wiring**

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



Replace the ECU.

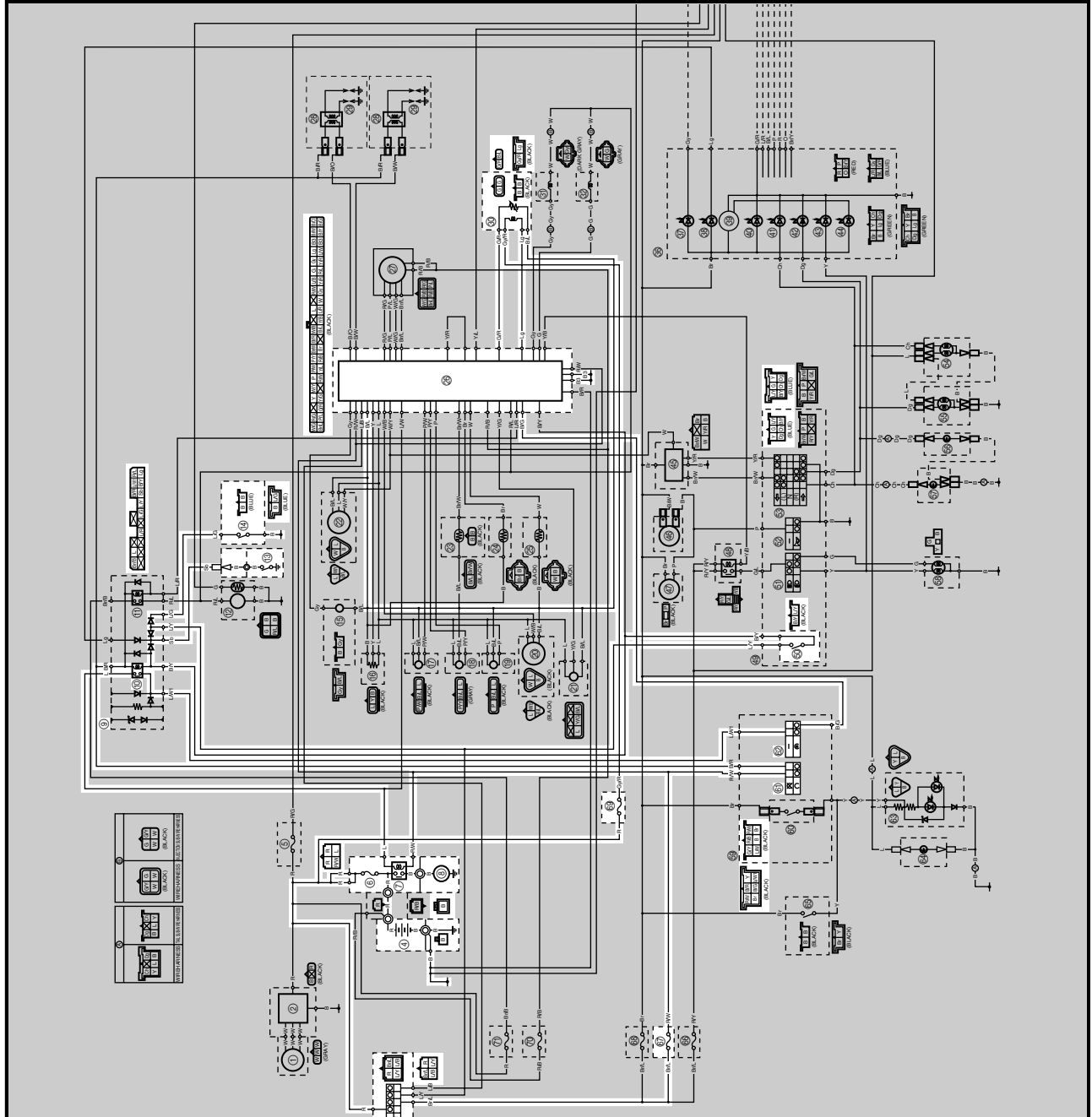
Properly connect or repair the ignition system's wiring.



EAS00755

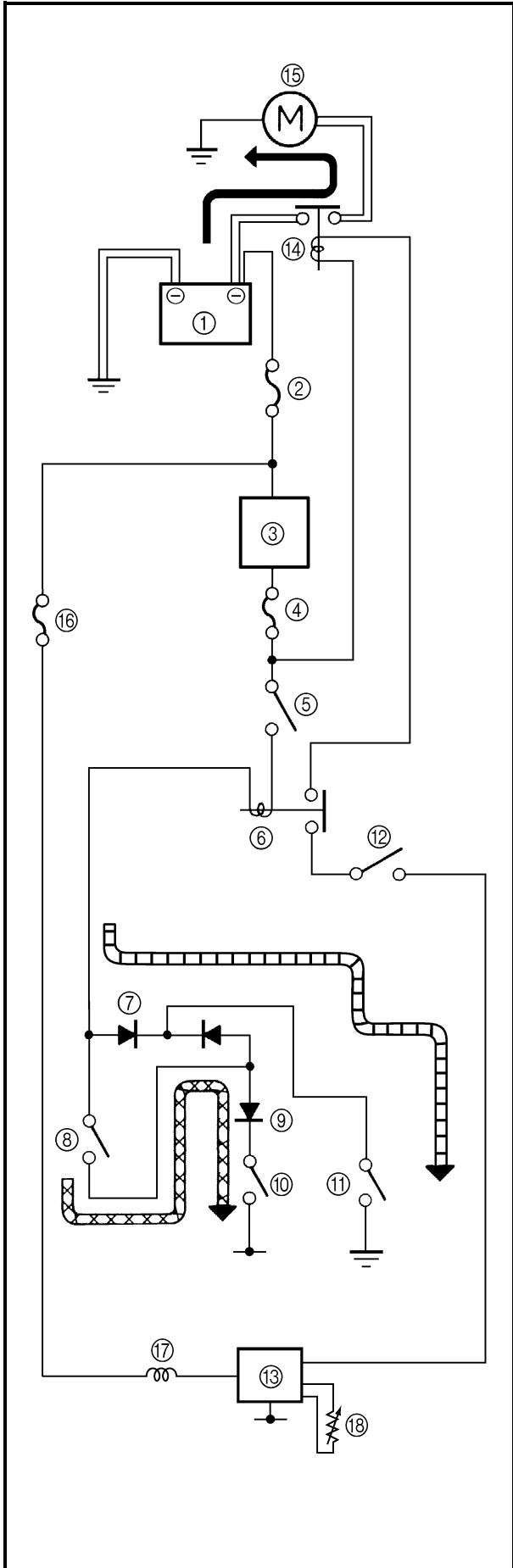
## ELECTRIC STARTING SYSTEM

### CIRCUIT DIAGRAM



- ③ Main switch
- ④ Battery
- ⑥ Main fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Relay unit
- ⑩ Starting circuit cut-off relay
- ⑬ Neutral switch
- ⑭ Sidestand switch
- ⑳ ECU
- ㉑ Decompression solenoid
- ⑵ Clutch switch
- ⑶ Engine stop switch
- ⑷ Start switch
- ⑸ Ignition fuse
- ⑹ Decompression solenoid fuse





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 (relay unit)
- ⑦ Diode (relay unit)
- ⑧ Clutch switch
- ⑨ Diode (relay unit)
- ⑩ Sidestand switch
- ⑪ Neutral switch
- ⑫ Start switch
- ⑬ ECU
- ⑭ Starter relay
- ⑮ Starter motor
- ⑯ Decompression solenoid fuse
- ⑰ Decompression solenoid coil
- ⑱ Decompression solenoid thermistor

EAS00757

## TROUBLESHOOTING

**The starter motor fails to turn.**

Check:

1. main, ignition and decompression solenoid fuses
2. battery
3. starter motor
4. relay unit (starting circuit cut-off relay)
5. relay unit (diode)
6. starter relay
7. main switch
8. engine stop switch
9. neutral switch
10. sidestand switch
11. clutch switch
12. start switch
13. decompression solenoid
14. wiring connections  
(of the entire starting system)

**NOTE:**

- Before troubleshooting, remove the following part(s):
  1. seat
  2. headlight lens unit
- Troubleshoot with the following special tool(s).



**Pocket tester  
YU-03112**

EAS00738

1. Main, ignition and decompression solenoid fuses

- Check the main, ignition and decompression solenoid fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main, ignition and decompression solenoid fuses OK?



Replace the fuse(s).

EAS00739

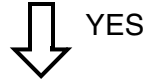
### 2. Battery

- 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 (68 °F)**

- Is the battery OK?

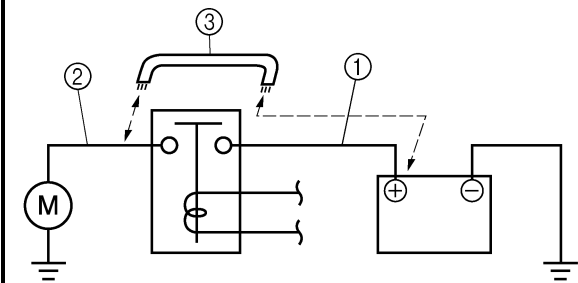


- Clean the battery terminals.
- Recharge or replace the battery.

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?



Repair or replace the starter motor.

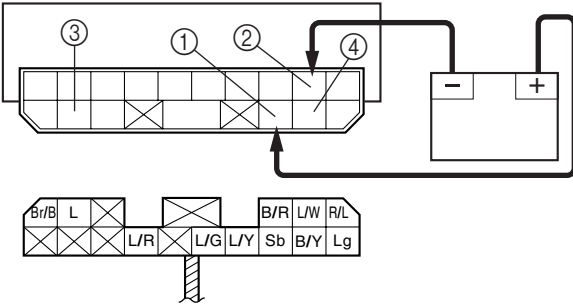
EAS00759

**4. Relay unit (starting circuit cut-off relay)**

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

**Positive battery terminal** → black/red ①  
**Negative battery terminal** → black/yellow ②

**Positive tester probe** → blue ③  
**Negative tester probe** → blue/white ④



- Does the starting circuit cut-off relay have continuity between blue and blue/white?

↓ YES

↓ NO

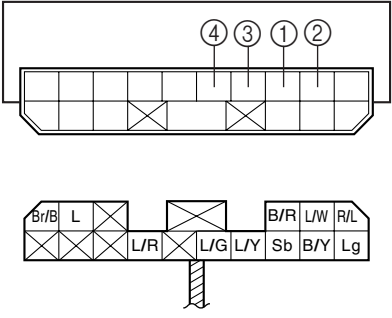
Replace the relay unit.

EAS00760

**5. Relay unit (diode)**

- Remove the relay unit from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the relay unit terminals as shown.
- Measure the diode for continuity as follows.

<p><b>Positive tester probe</b> → sky blue ①  <b>Negative tester probe</b> → black/yellow ②</p>	<b>Continuity</b>
<p><b>Positive tester probe</b> → sky blue ①  <b>Negative tester probe</b> → blue/yellow ③</p>	
<p><b>Positive tester probe</b> → blue/green ④  <b>Negative tester probe</b> → blue/yellow ③</p>	
<p><b>Positive tester probe</b> → black/yellow ②  <b>Negative tester probe</b> → sky blue ①</p>	
<p><b>Positive tester probe</b> → blue/yellow ③  <b>Negative tester probe</b> → sky blue ①</p>	<b>No continuity</b>
<p><b>Positive tester probe</b> → blue/yellow ③  <b>Negative tester probe</b> → sky blue ①</p>	
<p><b>Positive tester probe</b> → blue/yellow ③  <b>Negative tester 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 relay unit.

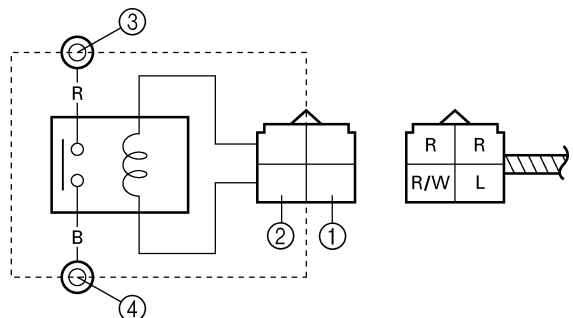
EAS00761

**6. Starter relay**

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

**Positive battery terminal** → red/white ①  
**Negative battery terminal** → blue ②

**Positive tester probe** → red ③  
**Negative tester probe** → black ④



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

↓ YES
↓ NO

Replace the starter relay.

EAS00749

**7. Main switch**

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

↓ YES
↓ NO

Replace the main switch.

EAS00750

**8. Engine stop switch**

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

↓ YES
↓ NO

Replace the right handlebar switch.

EAS00751

**9. Neutral switch**

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

↓ YES
↓ NO

Replace the neutral switch.

EAS00752

**10. Sidestand switch**

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

↓ YES
↓ NO

Replace the sidestand switch.

EAS00763

**11. Clutch switch**

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

↓ YES
↓ NO

Replace the clutch switch.

EAS00764

**12. Start switch**

- Check the start switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

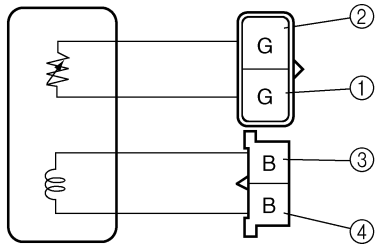


Replace the right handlebar switch.

**13. Decompression solenoid**

- Disconnect the decompression solenoid couplers from the wire harness.
- Connect the pocket tester ( $\Omega \times 10$ ) to the decompression solenoid coupler as shown.

**Positive tester probe** → green ①  
**Negative tester probe** → green ②



- Measure the decompression solenoid resistance.

**Decompression solenoid resistance (thermistor)**  
**70  $\Omega$  at 25 °C (77 °F)**

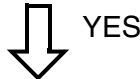
**NOTE:** \_\_\_\_\_  
 The resistance value for the thermistor changes when the temperature changes; therefore, measure the decompression solenoid resistance at the specified temperature.

- Connect the pocket tester ( $\Omega \times 1$ ) to the decompression solenoid coupler as shown.

**Positive tester probe** → black ③  
**Negative tester probe** → black ④

**Decompression solenoid resistance**  
**1.2  $\Omega$  at 20 °C (68 °F)**

- Check the decompression solenoid for continuity.
- Is the decompression solenoid OK?

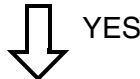


Replace the decompression solenoid.

EAS00766

**14. Wiring**

- Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

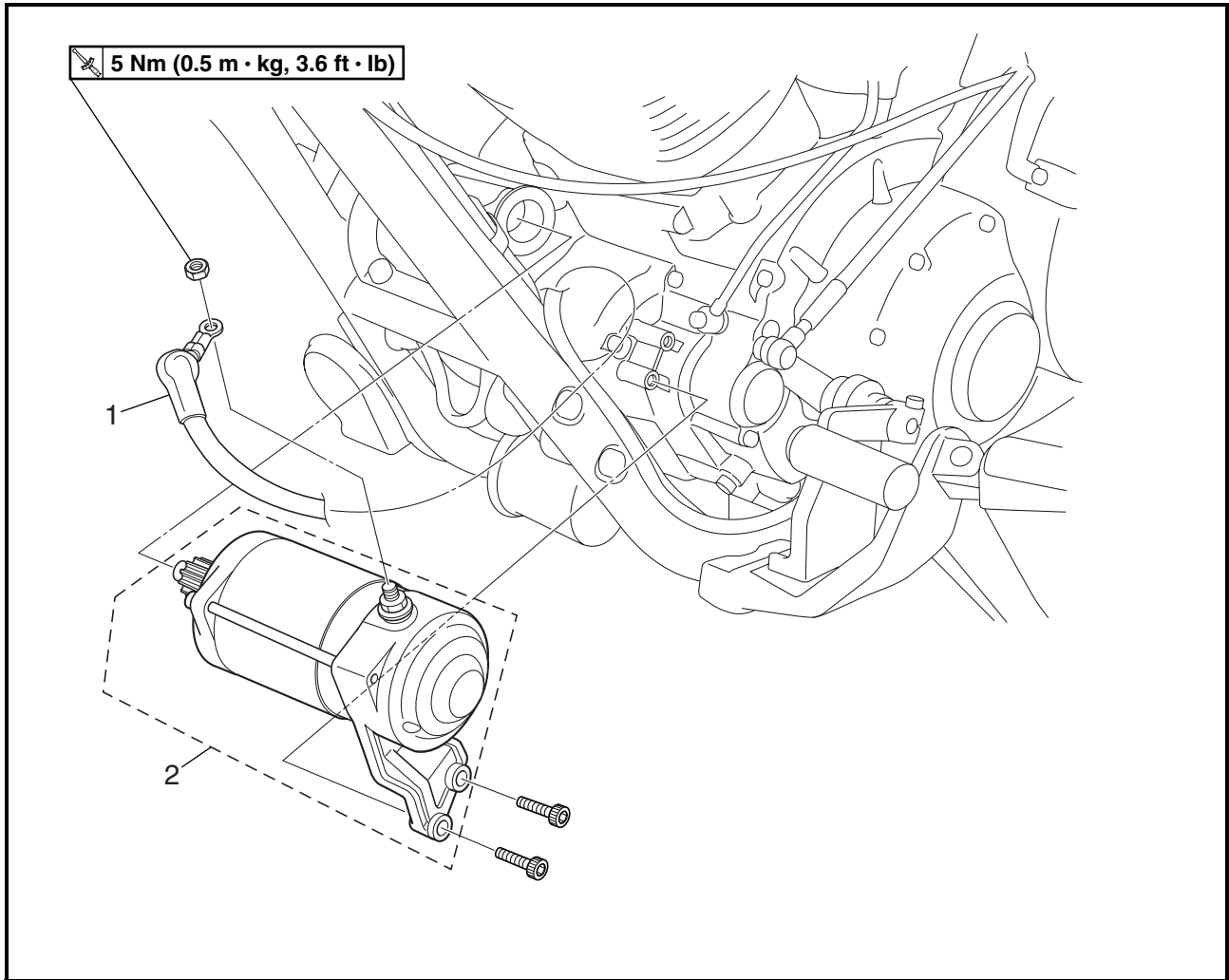


Replace the ECU.

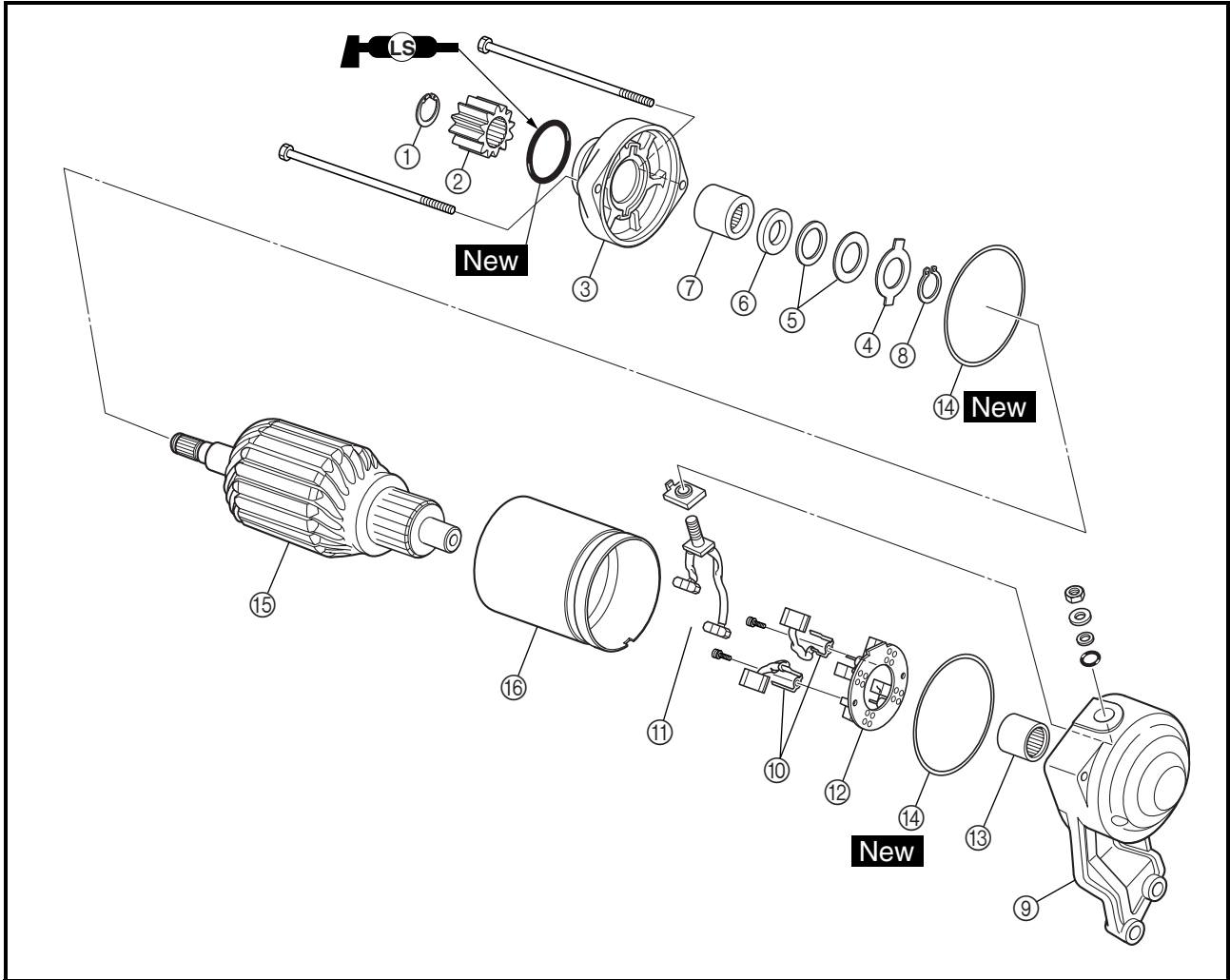
Properly connect or repair the starting system’s wiring.

EAS00767

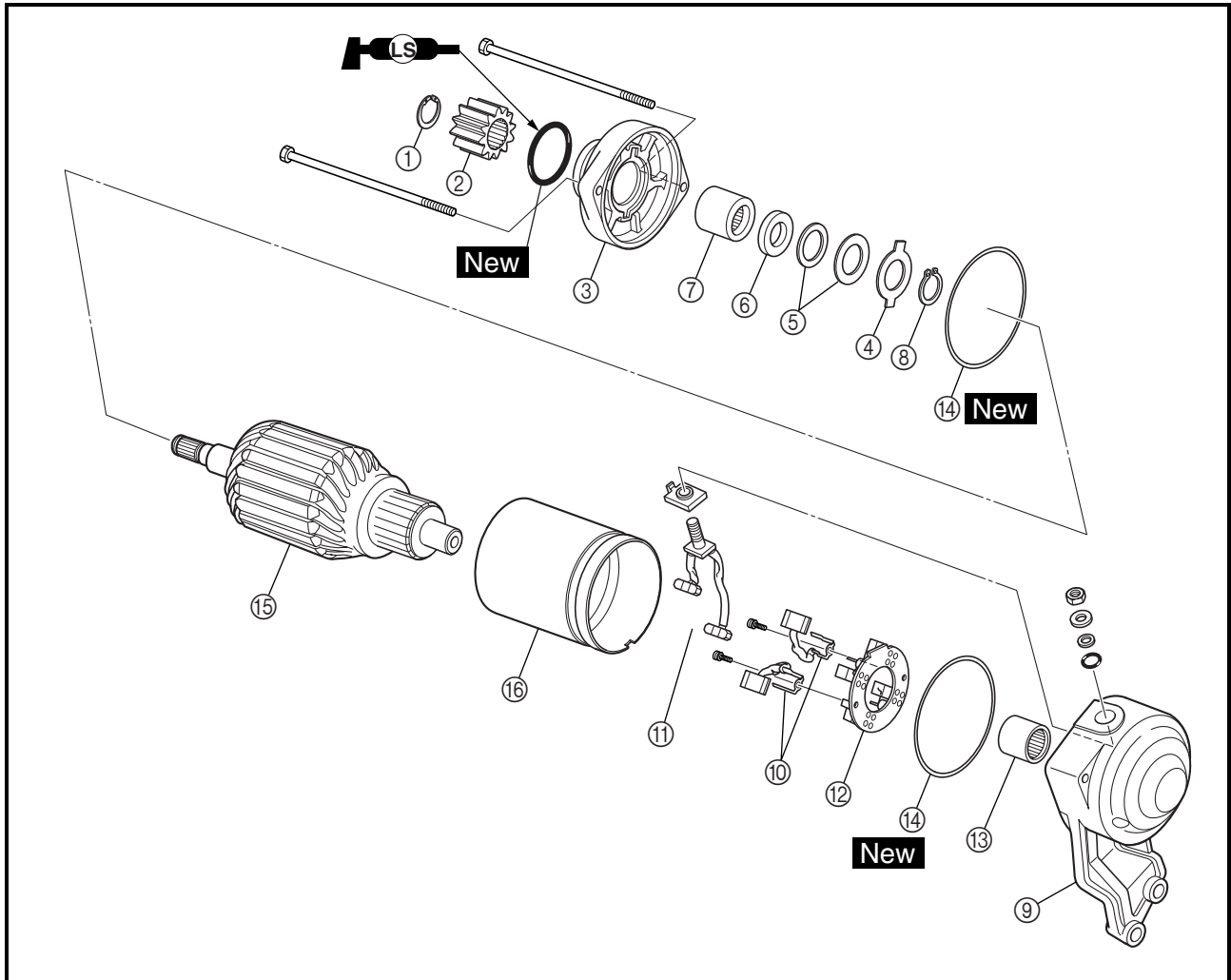
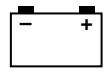
STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the starter motor</b>		
1	Starter motor lead	1	Remove the parts in the order listed.  For installation, reverse the removal procedure.
2	Starter motor assembly	1	

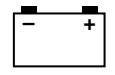


Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the starter motor</b>		Remove the parts in the order listed.
①	Circlip	1	Refer to "ASSEMBLING THE STARTER MOTOR".
②	Starter motor gear	1	
③	Starter motor rear cover	1	
④	Lock washer	1	
⑤	Washer set	1	
⑥	Oil seal	1	
⑦	Bearing	1	
⑧	Circlip	1	
⑨	Starter motor front cover	1	
⑩	Brush	2	



Order	Job/Part	Q'ty	Remarks
①	Brush holder (along with the brushes)	1	Refer to "ASSEMBLING THE STARTER MOTOR".
②	Brush seat (along with the brushes)	1	
③	Bearing	1	
④	Gasket	2	
⑤	Armature assembly	1	
⑥	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.





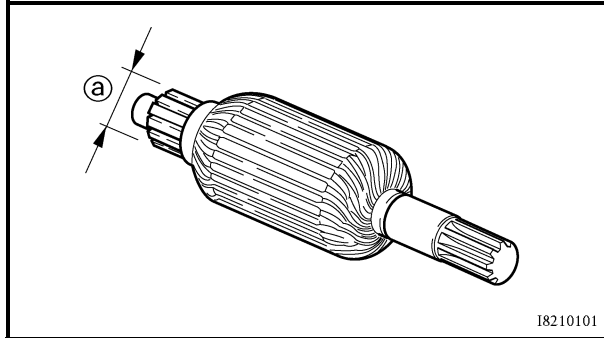
EAS00770

**CHECKING THE STARTER MOTOR**

## 1. Check:

- commutator

Dirt → Clean with 600 grit sandpaper.



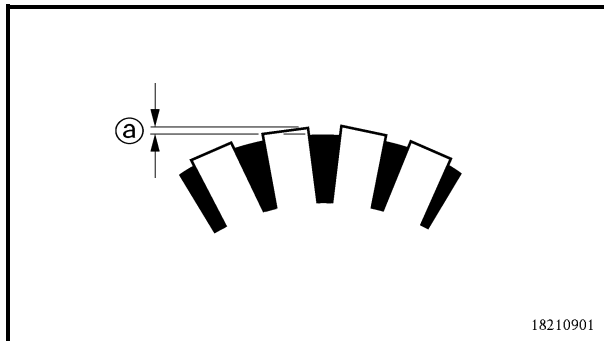
## 2. Measure:

- commutator diameter (a)

Out of specification → Replace the starter motor.



**Commutator wear limit**  
27.5 mm (1.08 in)



## 3. Measure:

- mica undercut (a)

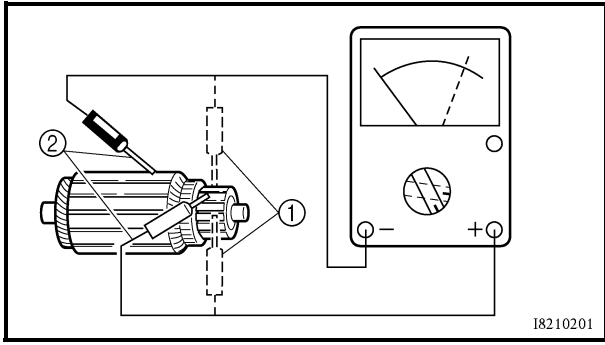
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



**Mica undercut**  
1.5 mm (0.06 in)

**NOTE:**

The mica of the commutator must be undercut to ensure proper operation of the commutator.




18210201

4. Measure:
- armature assembly resistances (commutator and insulation)
- Out of specification → Replace the starter motor.



- a. Measure the armature assembly resistances with the pocket tester.


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

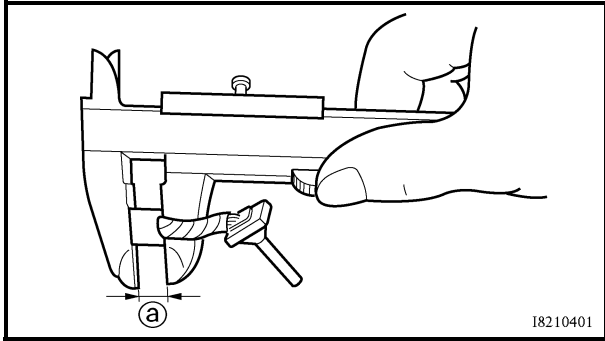
	<b>Armature coil</b> <b>Commutator resistance ①</b> <b>0.0081 ~ 0.0099 Ω at</b> <b>20 °C (68 °F)</b> <b>Insulation resistance ②</b> <b>Above 1 MΩ at 20 °C (68 °F)</b>
---	---

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




5. Measure:
- brush length ③
- Out of specification → Replace the brushes as a set.

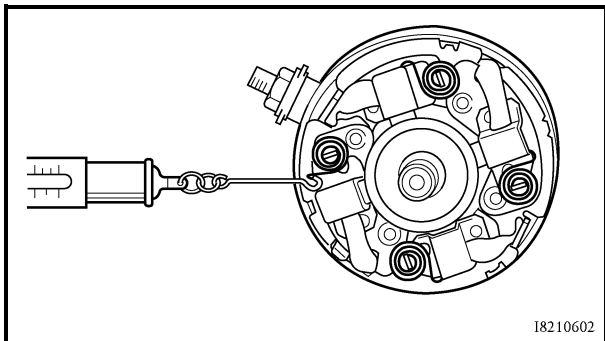
	<b>Brush length wear limit</b> <b>5 mm (0.2 in)</b>
---	--



18210401

6. Measure:
- brush spring force
- Out of specification → Replace the brush springs as a set.

	<b>Brush spring force</b> <b>7.36 ~ 11.04 N (736 ~ 1,104 gf)</b>
---	---



18210602

7. Check:
- gear teeth
- Damage/wear → Replace the gear.

8. Check:
- bearing
  - oil seal
- Damage/wear → Replace the defective part(s).

EAS00772

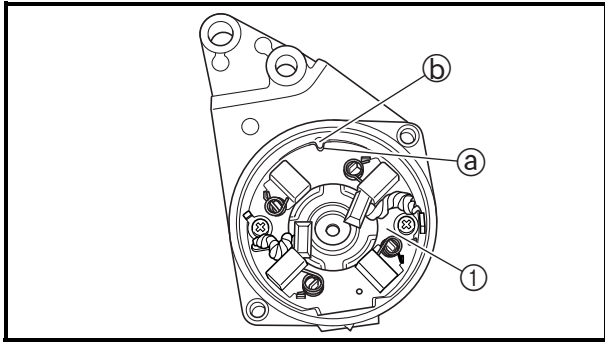
**ASSEMBLING THE STARTER MOTOR**

1. Install:
  - bearing
  - brush seat ①

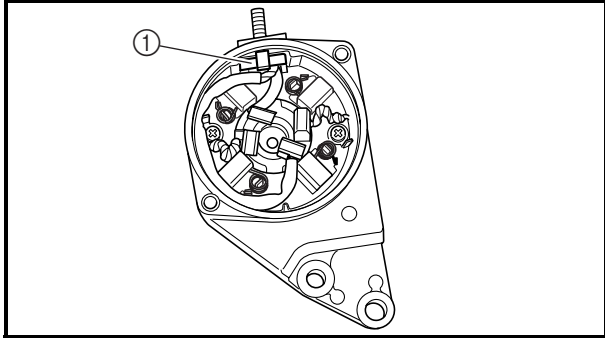
**NOTE:** \_\_\_\_\_

Align the slot ② on the brush seat with the tab ③ in the starter motor front cover.

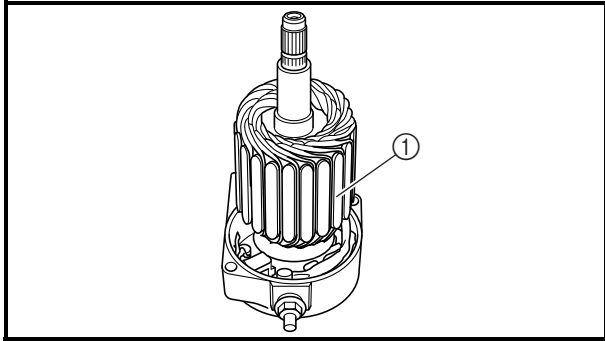
---



2. Install:
  - brush holder (along with the brushes) ①



3. Install:
  - armature assembly ①

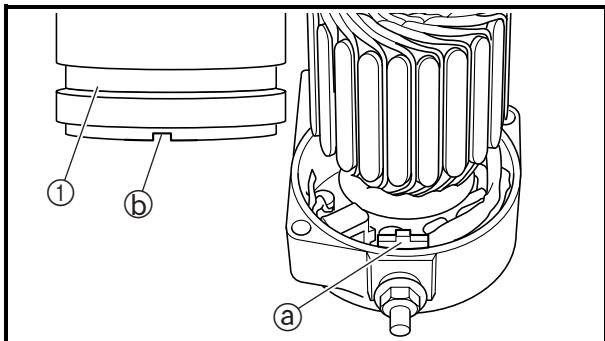


4. Install:
  - gasket **New**
  - starter motor yoke ①
  - circlip

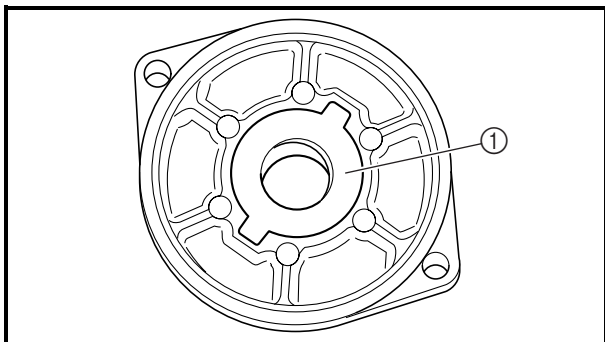
**NOTE:** \_\_\_\_\_

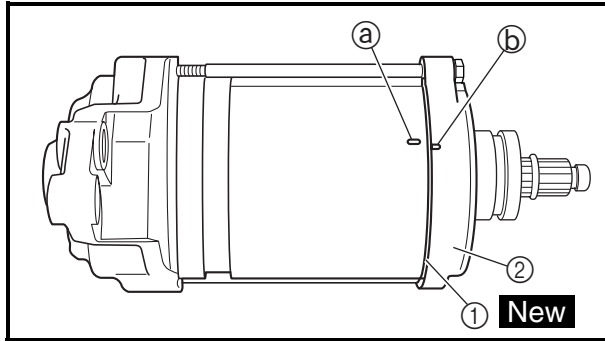
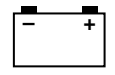
Align the tab ④ on the brush holder with the slot ⑤ in the starter motor yoke.

---



5. Install:
  - bearing
  - oil seal
  - washer set
  - lock washer ①



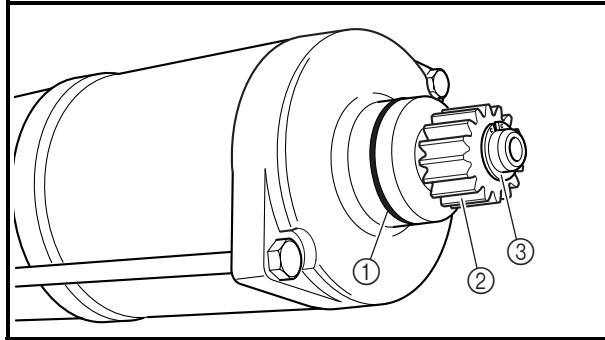


## 6. Install:

- gasket ① **New**
- starter motor cover ②
- bolts

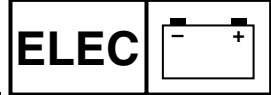
**NOTE:**

Align the match marks (a) on the starter motor yoke with the match marks (b) on the starter motor rear cover.



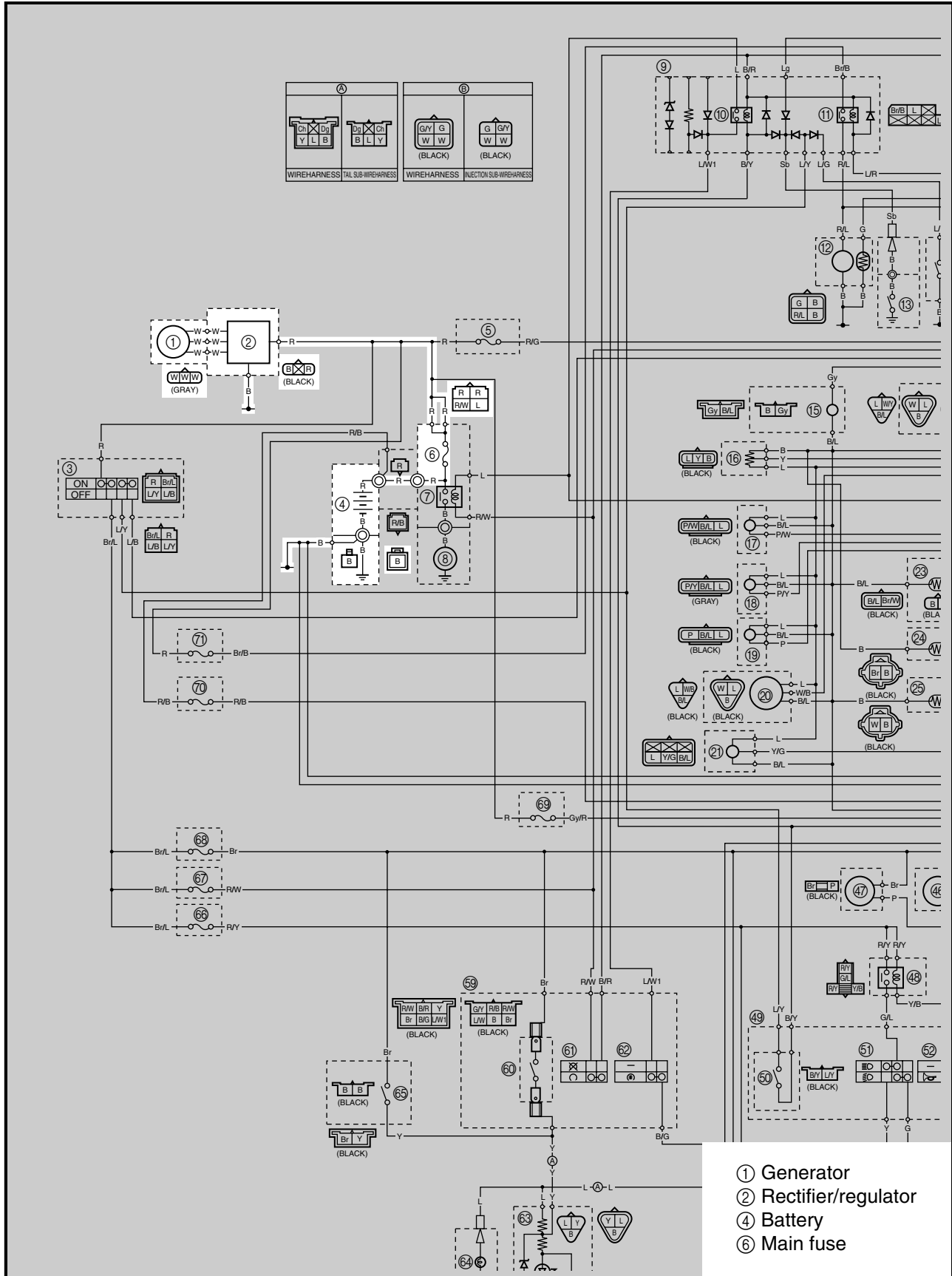
## 7. Install:

- O-rings ① **New**
- starter motor gear ②
- circlip ③

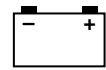


EAS00773

**CHARGING SYSTEM**  
**CIRCUIT DIAGRAM**



- ① Generator
- ② Rectifier/regulator
- ④ Battery
- ⑥ Main fuse



EAS00774

## TROUBLESHOOTING

**The battery is not being charged.**

Check:

1. main fuse
2. battery
3. charging voltage
4. stator coil resistance
5. wiring connections  
(of the entire charging system)

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

- Before troubleshooting, remove the following part(s):
  1. seat
  2. battery compartment
- Troubleshoot with the following special tool(s).



**Inductive tachometer  
YU-8036-A  
Pocket tester  
YU-03112**

EAS00738

### 1. Main fuse

- Check the main fuse for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main fuse OK?

↓ YES

↓ NO

**Replace the fuse.**

EAS00739

### 2. Battery

- Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



**Minimum open-circuit voltage  
12.8 V or more at 20 °C (68 °F)**

- Is the battery OK?

↓ YES

↓ NO

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

EAS00775

### 3. Charging voltage

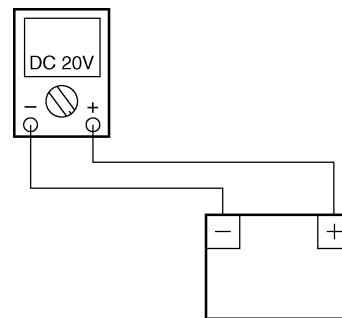
- Connect the inductive tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20 V) to the battery as shown.

**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?



The charging circuit is OK.

EAS00776

4. Stator coil resistance

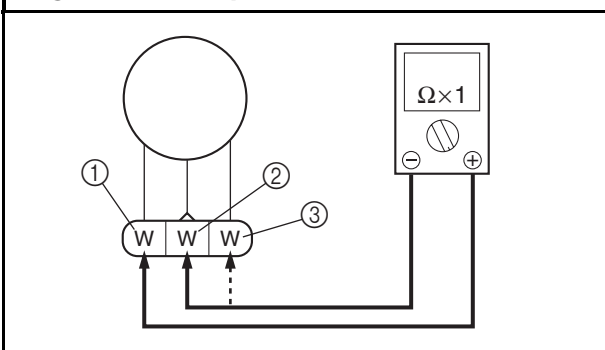
- Remove the generator cover.
- Disconnect the stator coil assembly coupler from the rectifier/regulator.
- Connect the pocket tester ( $\Omega \times 1$ ) to the stator coil assembly coupler as shown.

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**  
0.12 ~ 0.20  $\Omega$  at 20 °C (68 °F)

• Is the stator coil OK?



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?



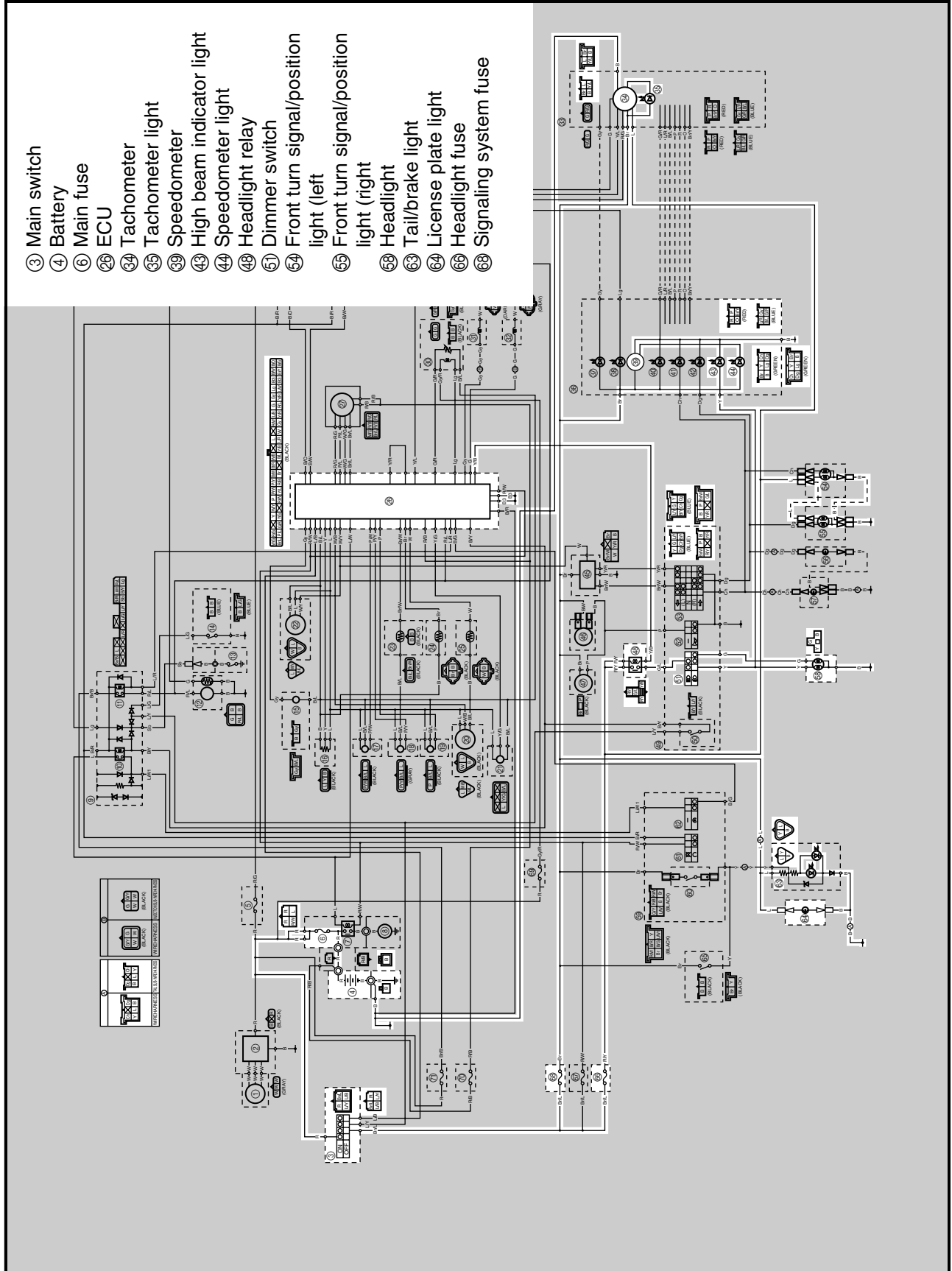
Replace the rectifier/regulator.

Properly connect or repair the charging system’s wiring.

EAS00780

**LIGHTING SYSTEM  
CIRCUIT DIAGRAM**

- ③ Main switch
- ④ Battery
- ⑥ Main fuse
- ⑳ ECU
- ③④ Tachometer
- ③⑤ Tachometer light
- ③⑨ Speedometer
- ④③ High beam indicator light
- ④④ Speedometer light
- ④⑧ Headlight relay
- ⑤① Dimmer switch
- ⑤④ Front turn signal/position light (left)
- ⑤⑤ Front turn signal/position light (right)
- ⑤⑧ Headlight
- ⑥③ Tail/brake light
- ⑥④ License plate light
- ⑥⑥ Headlight fuse
- ⑥⑧ Signaling system fuse





EAS00781

## TROUBLESHOOTING

**Any of the following fail to light: headlight, high beam indicator light, taillight, position light, license plate light or meter light.**

Check:

1. main, headlight and signaling system fuses
2. battery
3. main switch
4. dimmer switch
5. headlight relay
6. wiring connections  
(of the entire lighting system)

**NOTE:**

- Before troubleshooting, remove the following part(s):
  1. seat
  2. headlight lens unit
- Troubleshoot with the following special tool(s).



**Pocket tester**  
**YU-03112**

EAS00738

1. Main, headlight and signaling system fuses

- Check the main, headlight and signaling system fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main, headlight and signaling system 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 (68 °F)**

- 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.

EAS00784

4. Dimmer switch

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

↓ YES

↓ NO

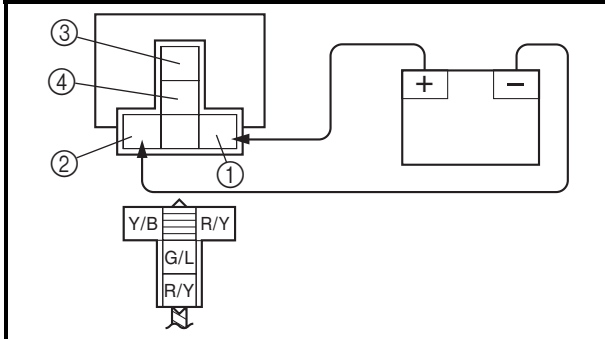
The dimmer switch is faulty. Replace the left handlebar switch.

5. Headlight relay

- Remove the headlight relay from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the headlight relay terminal as shown.
- Check the headlight relay for continuity.

Positive battery terminal → red/yellow ①  
 Negative battery terminal → yellow/black ②

Positive tester probe → red/yellow ③  
 Negative tester probe → green/blue ④



- Does the headlight relay have continuity between red/yellow and green/blue?

YES NO

Replace the headlight relay.

EAS00787

6. 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. High beam indicator light LED

- Check the LED of the high beam indicator light. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the high beam indicator light LED OK?

YES NO

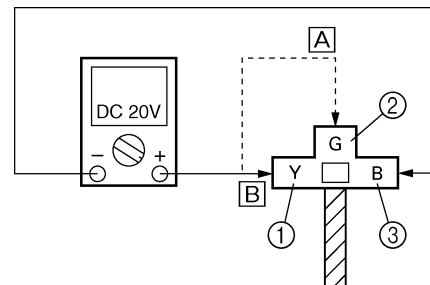
Replace the speedometer assembly.

3. Voltage

- Connect the pocket tester (DC 20 V) to the headlight and speedometer assembly couplers as shown.

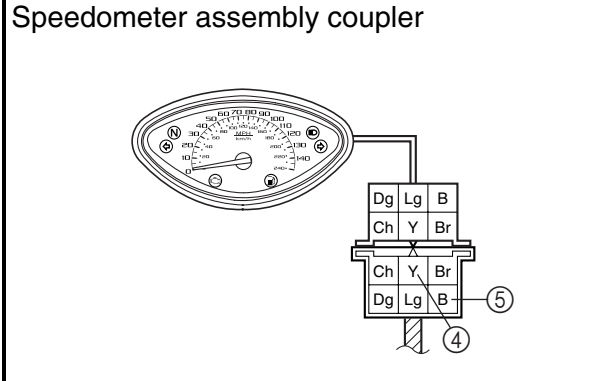
- Ⓐ When the dimmer switch is set to "☹"
- Ⓑ When the dimmer switch is set to "☺"

Headlight coupler



**Headlight**  
**Positive tester probe** → yellow ① or green ②  
**Negative tester probe** → black ③

**High beam indicator light**  
**Positive tester probe** → yellow ④  
**Negative tester probe** → black ⑤



- Set the main switch to "ON".
- Set the dimmer switch to "☰☉" or "☷☉".
- Measure the voltage (DC 12 V) of yellow ① or green ② on the headlight coupler, and yellow ④ on the speedometer assembly coupler.
- Is the voltage within specification?

↓ YES

This circuit is OK.

↓ NO

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

EAS00789

2. The tachometer and speedometer light fails to come on.

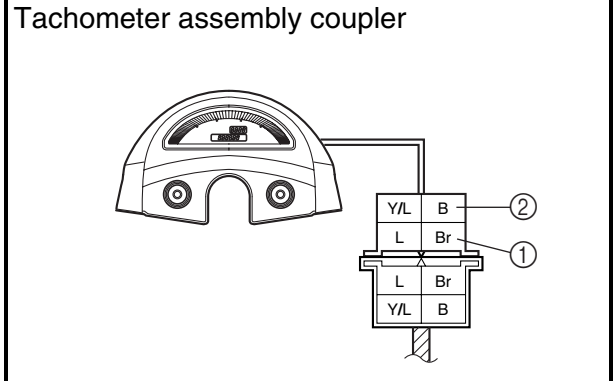
1. Tachometer and speedometer light LED
- Check the LED of the tachometer and speedometer light. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
  - Are the tachometer and speedometer light LED OK?

↓ YES

↓ NO

Replace the tachometer assembly or speedometer assembly.

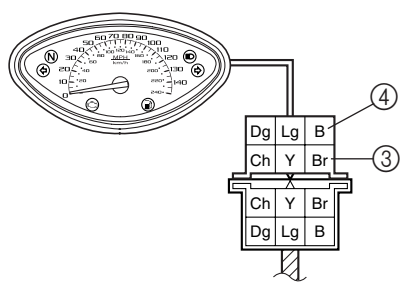
2. Voltage
- Connect the pocket tester (DC 20 V) to the tachometer and speedometer assembly couplers as shown.



**Tachometer light**  
**Positive tester probe** → brown ①  
**Negative tester probe** → black ②

**Speedometer light**  
**Positive tester probe** → brown ③  
**Negative tester probe** → black ④

Speedometer assembly coupler



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ① on the tachometer and speedometer light couplers.
- Is the voltage within specification?

YES NO

This circuit is OK.

The wiring circuit from the main switch to the tachometer and speedometer light couplers is faulty and must be repaired.

EAS00790

3. The tail/brake light fails to come on.

1. Tail/brake light LED

- Check the LED of the tail/brake light. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the tail/brake light LED OK?

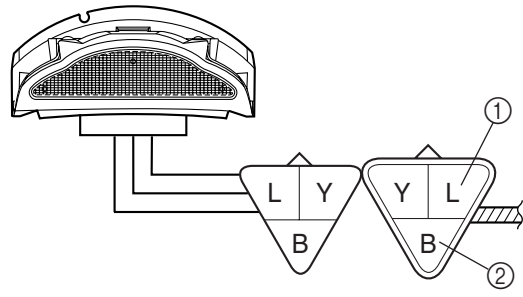
YES NO

Replace the tail/brake light assembly.

2. Voltage

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

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of blue ① on the tail/brake light assembly coupler (tail sub-wire harness side).
- Is the voltage within specification?

YES NO

Replace the tail/brake light assembly.

The wiring circuit from the main switch to the tail/brake light assembly coupler is faulty and must be repaired.

EAS00791

4. The license plate light fails to come on.

1. License plate light bulb and socket

- Check the license plate light bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the license plate light bulb and socket OK?

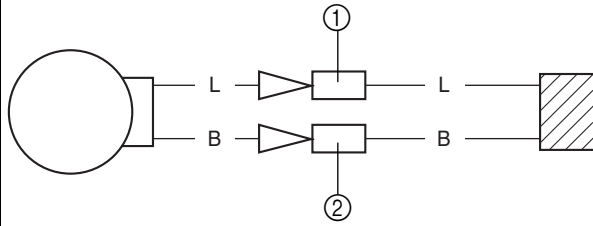
YES NO

Replace the license plate light bulb, socket or both.

2. Voltage

- Connect the pocket tester (DC 20 V) to the license plate light connectors (wire harness side) as shown.

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②



- Set the main switch to “ON”.
- Measure the voltage (DC 12 V) of blue ① on the license plate light connectors (wire harness side).
- Is the voltage within specification?

↓ YES

This circuit is OK.

↓ NO

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

EAS00791

5. The front turn signal/position light fails to come on.

1. Front turn signal/position light bulb and socket

- Check the front turn signal/position light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the front turn signal/position light bulb and socket OK?

↓ YES

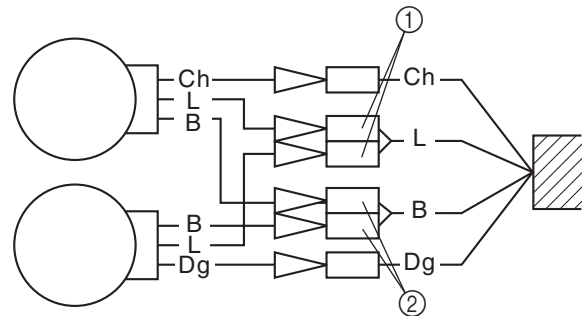
↓ NO

Replace the front turn signal/position light bulb, socket or both.

2. Voltage

- Connect the pocket tester (DC 20 V) to the front turn signal/position light connectors (wire harness side) as shown.

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②



- Set the main switch to “ON”.
- Measure the voltage (DC 12 V) of blue ① on the front turn signal/position light connectors (wire harness side).
- Is the voltage within specification?

↓ YES

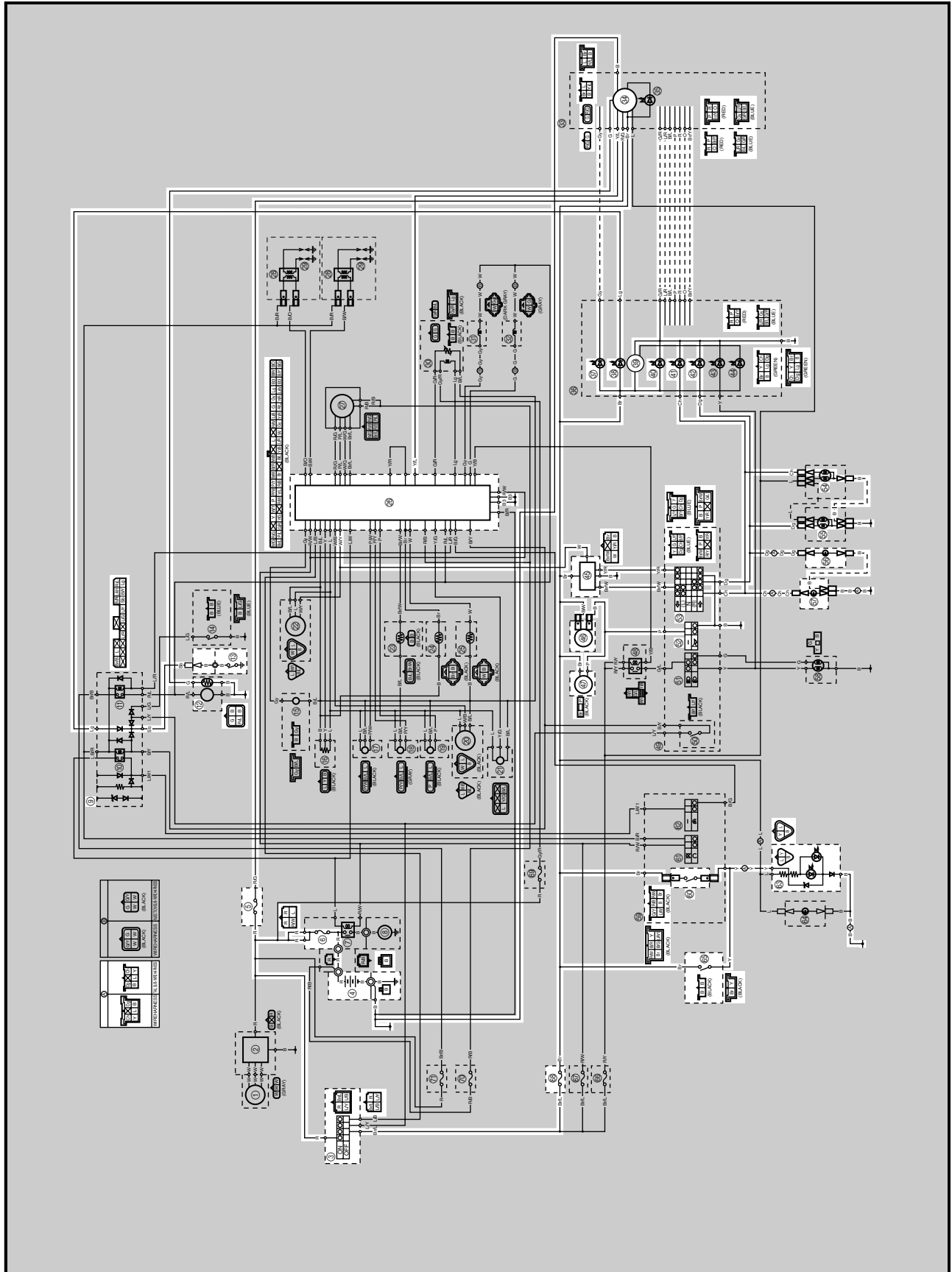
↓ NO

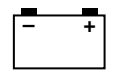
This circuit is OK.

The wiring circuit from the main switch to the front turn signal/position light connectors is faulty and must be repaired.

EAS00793

**SIGNALING SYSTEM**  
**CIRCUIT DIAGRAM**





- ③ Main switch
- ④ Battery
- ⑤ Backup fuse (odometer and clock)
- ⑥ Main fuse
- ⑨ Relay unit
- ⑫ Fuel pump
- ⑬ Neutral switch
- ⑳ ECU
- ㉔ Tachometer
- ㉗ Engine trouble warning light
- ㉘ Neutral indicator light
- ㉙ Speedometer
- ㉚ Fuel level warning light
- ㉛ Left turn signal indicator light
- ㉜ Right turn signal indicator light
- ㉝ Turn signal relay
- ㉞ Horn 1
- ㉟ Horn 2
- ㊱ Horn switch
- ㊲ Turn signal switch
- ㊳ Front turn signal/position light (left)
- ㊴ Front turn signal/position light (right)
- ㊵ Rear turn signal light (right)
- ㊶ Rear turn signal light (left)
- ㊷ Front brake light switch
- ㊸ Tail/brake light
- ㊹ Rear brake light switch
- ㊺ Signaling system fuse

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 system and backup fuses
2. battery
3. main switch
4. wiring connections  
(of the entire signaling system)

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

- Before troubleshooting, remove the following part(s):

  1. seat
  2. headlight lens unit

- Troubleshoot with the following special tool(s).



**Pocket tester  
YU-03112**

EAS00738


1. Main, signaling system and backup fuses
- Check the main, signaling system and backup 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 (68 °F)**
- 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 SIGNALING SYSTEM**

1. The horn 1 fails to sound.

1. Horn switch

- Check the horn switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the horn switch OK?

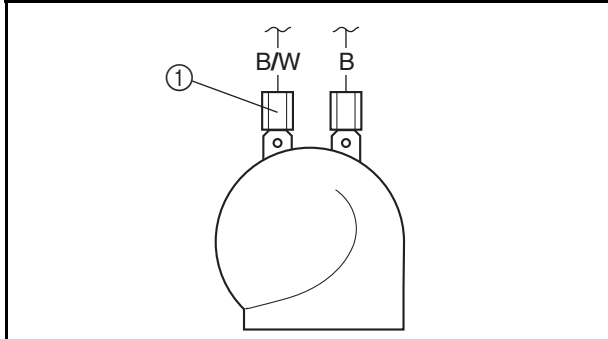


Replace the left handlebar switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the horn 1 connector at the horn 1 terminal as shown.

**Positive tester probe → black/white ①**  
**Negative tester probe → ground**



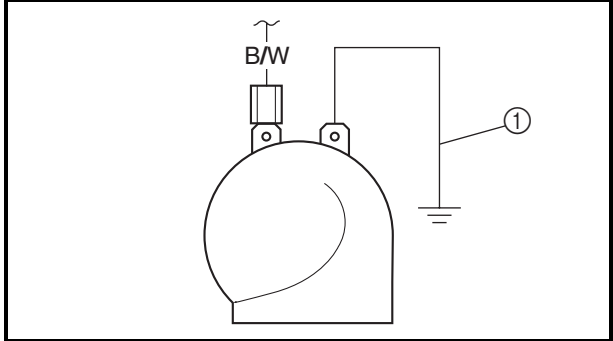
- Set the main switch to “ON”.
- Push the horn switch.
- Measure the voltage (DC 12 V) of black/white at the horn 1 terminal.
- Is the voltage within specification?



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

3. Horn 1

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



Replace the horn 1.

The horn 1 is OK.

EAS00796

2. The horn 2 fails to sound.

1. Horn switch

- Check the horn switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the horn switch OK?

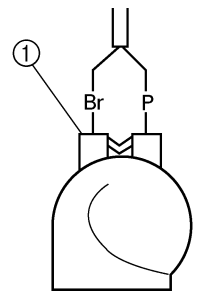


Replace the left handlebar switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the horn 2 coupler as shown.

**Positive tester probe** → brown ①  
**Negative tester probe** → ground



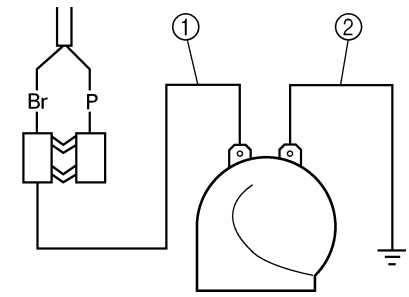
- Set the main switch to “ON”.
- Push the horn switch.
- Measure the voltage (DC 12 V) of brown ① at the horn 2 coupler.
- Is the voltage within specification?



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

3. Horn 2

- Disconnect the horn 2 coupler at the horn 2.
- Connect a jumper lead ① to the brown terminal in the horn coupler and the horn terminal.
- Connect a jumper lead ② to the horn terminal and ground the jumper lead.
- Set the main switch to “ON”.
- Push the horn switch.
- Does the horn 2 sound?



Replace the horn 2.

The horn 2 is OK.

EAS00797

3. The tail/brake light fails to come on.

1. Tail/brake light LED

- Check the LED of the tail/brake light. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the tail/brake light LED OK?



Replace the tail/brake light assembly.

2. Brake light switches

- Check the brake light switches for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the brake light switch OK?

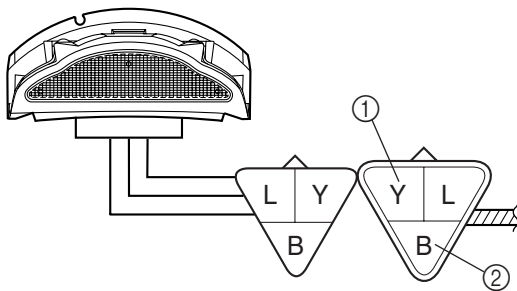


Replace the brake light switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light assembly coupler (tail sub-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 assembly coupler (tail sub-wire harness side).
- Is the voltage within specification?



This circuit is OK.

The wiring circuit from the main switch to the tail/brake light assembly coupler is faulty and must be repaired.

EAS00799

4. The turn signal light, turn signal indicator light or both fail to blink.

1. Turn signal light bulb and socket

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



Replace the turn signal light bulb, socket or both.

2. Turn signal indicator light LED

- Check the LED of the turn signal light. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the turn signal light LED OK?



Replace the speedometer assembly.

3. Turn signal switch

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



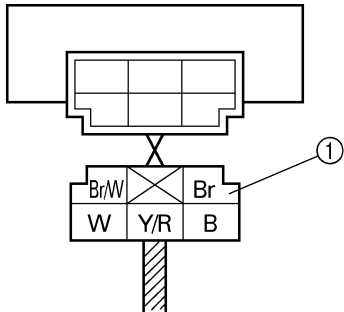
Replace the left handlebar switch.

4. Voltage

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

**Positive tester probe → brown ①**

**Negative tester probe → ground**



- Set the main switch to “ON”.
- Measure the voltage (DC 12 V) on brown ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

↓ YES

↓ NO

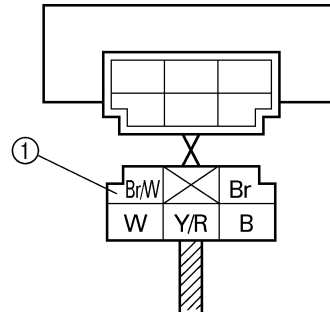
The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

5. 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**

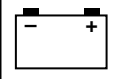


- Set the main switch to “ON”.
- Set the turn signal switch to “←” or “→”.
- Measure the voltage (DC 12 V) on brown/white ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

↓ YES

↓ NO

The turn signal relay is faulty and must be replaced.



6. Voltage

- Connect the pocket tester (DC 20 V) to the turn signal light connectors or speedometer assembly coupler (wire harness side) as shown.

- A Turn signal light
- B Turn signal indicator light

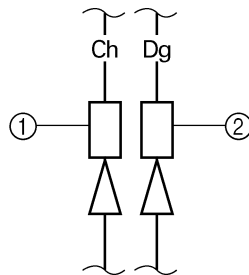
Left turn signal light

Positive tester probe → chocolate ①  
 Negative tester probe → ground

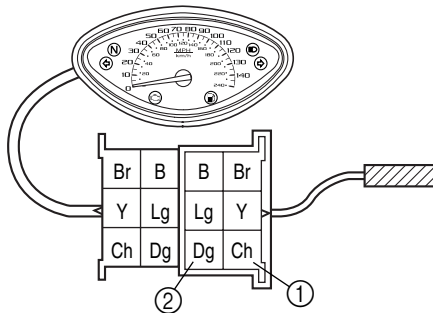
Right turn signal light

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 connectors or the speedometer assembly 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 connector or the speedometer coupler are faulty and must be repaired.

EAS00800

5. The neutral indicator light fails to come on.

1. Neutral indicator light LED

- Check the LED of the neutral indicator light. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the neutral indicator light LED OK?



YES



NO

Replace the speedometer assembly.

2. Neutral switch

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



YES



NO

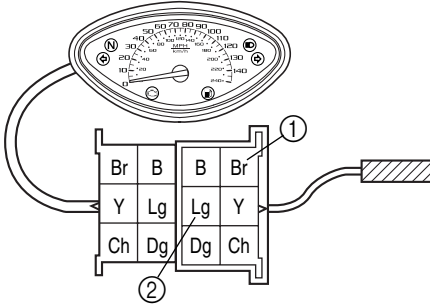
Replace the neutral switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the speedometer 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) of brown ① and light green ② at the speedometer 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 speedometer assembly coupler is faulty and must be repaired.

EAS00803

6. The fuel level indicator light fails to come on.

1. Fuel level indicator light LED

- Check the LED of the fuel level indicator light. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the fuel level indicator light LED OK?

↓ YES

↓ NO

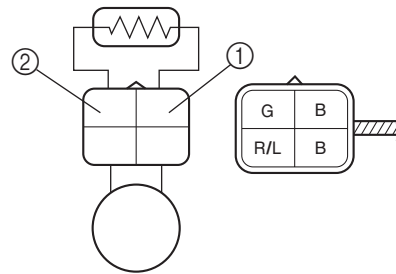
Replace the speedometer assembly.

2. Fuel pump (fuel sender)

- Drain the fuel from the fuel tank and remove the fuel pump from the sub fuel tank.
- Disconnect the fuel pump coupler from the fuel pump.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel pump terminal as shown.

**Positive tester probe** → green ①

**Negative tester probe** → black ②



- Measure the fuel sender resistance.



**Fuel sender resistance**  
900 ~ 2,050  $\Omega$  at 20 °C (68 °F)

- Is the fuel sender OK?

↓ YES

↓ NO

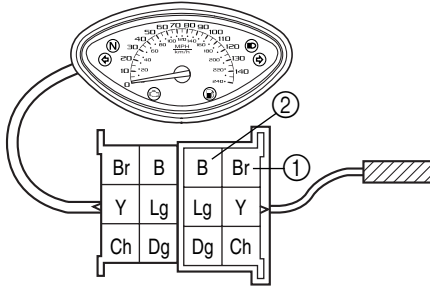
Replace the fuel pump.

**3. Voltage**

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

**Positive tester probe → brown ①**

**Negative tester probe → black ②**



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ① and black ② at the speedometer assembly coupler (wire harness side).
- Is the voltage within specification?

YES

NO

Replace the speedometer assembly.

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

EAS00800

**7. The engine trouble warning light fails to come on.**

**1. Engine trouble warning light LED**

- Check the LED of the engine trouble warning light.  
Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the engine trouble warning light LED OK?

YES

NO

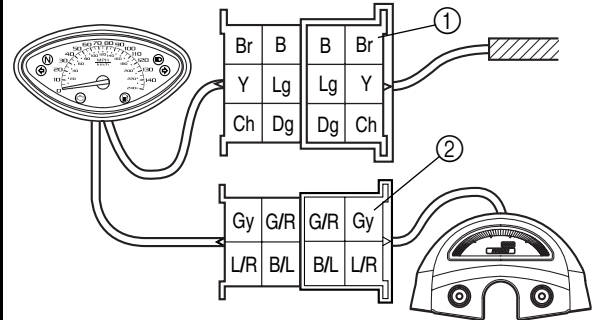
Replace the speedometer assembly.

**2. Voltage**

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

**Positive tester probe → brown ①**

**Negative tester probe → gray ②**



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ① and gray ② at the speedometer assembly coupler (wire harness side).
- Is the voltage within specification?

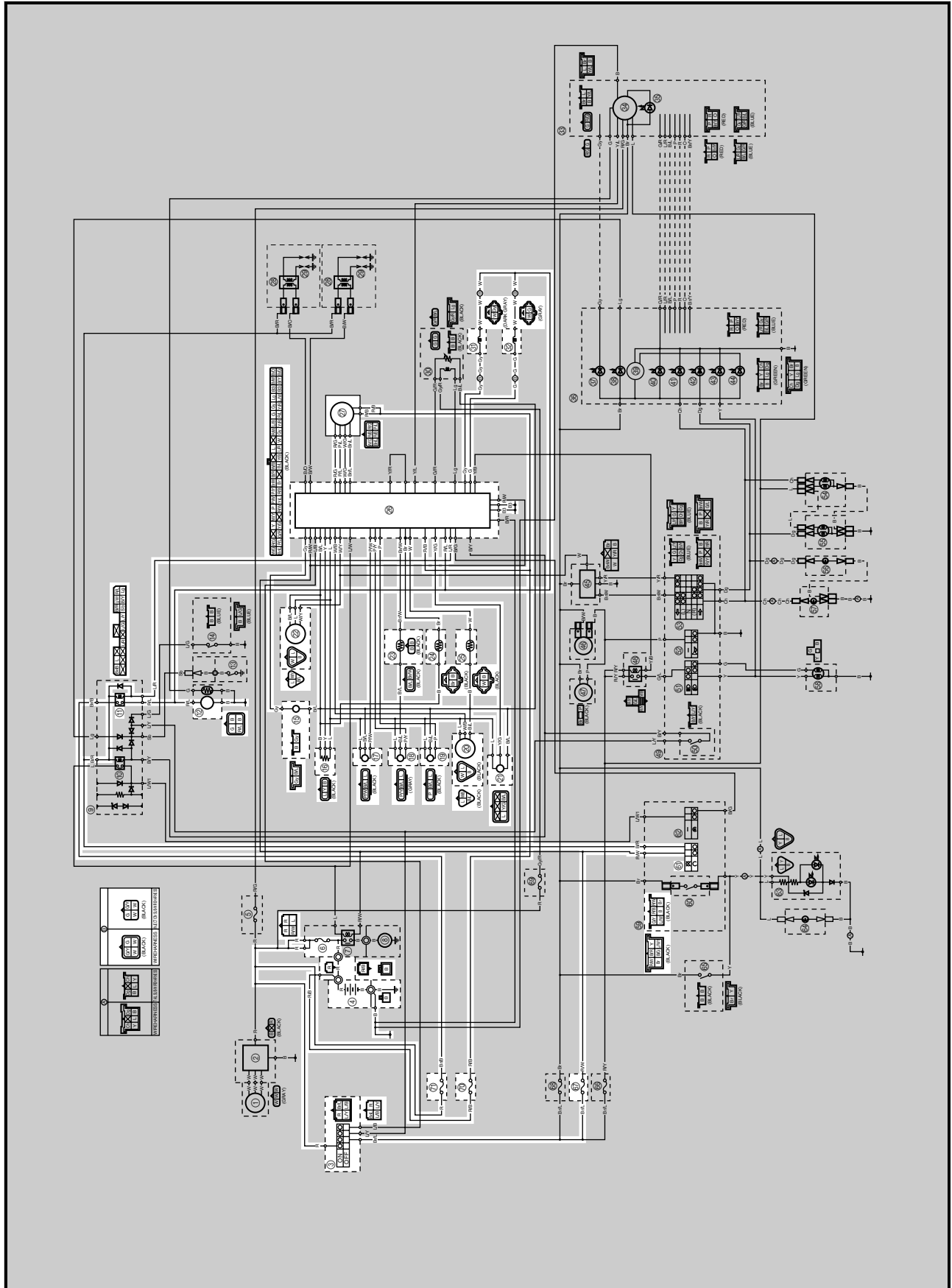
YES

NO

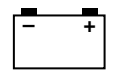
This circuit is OK.

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

FUEL INJECTION SYSTEM  
CIRCUIT DIAGRAM







- ③ Main switch
- ④ Battery
- ⑥ Main fuse
- ⑪ Fuel injection system relay
- ⑫ Fuel pump
- ⑮ Crankshaft position sensor
- ⑯ Throttle position sensor
- ⑰ Intake air pressure sensor 1
- ⑱ Intake air pressure sensor 2
- ⑲ Atmospheric pressure sensor
- ⑳ Cylinder identification sensor
- ㉑ Lean angle cut-off switch
- ㉒ Speed sensor
- ㉓ Intake air temperature sensor
- ㉔ Engine temperature sensor
- ㉕ Oil temperature sensor
- ㉖ ECU
- ㉗ Linear control valve
- ㉘ Cylinder #1-injector
- ㉙ Cylinder #2-injector
- ⑥① Engine stop switch
- ⑥⑦ Ignition fuse
- ⑦⑦ ECU fuse
- ⑦① Fuel injection system fuse

EAS00821

## TROUBLESHOOTING

**If the fuel injection system fails to operate.**

Check:

1. main, ignition, ECU and fuel injection system fuses
2. battery
3. main switch
4. engine stop switch
5. relay unit (fuel injection system relay)
6. cylinder #1-injector resistance
7. cylinder #2-injector resistance
8. fuel pump resistance
9. crankshaft position sensor resistance
10. cylinder identification sensor output voltage
11. speed sensor output voltage
12. intake air temperature sensor resistance
13. intake air pressure sensor 1 output voltage
14. intake air pressure sensor 2 output voltage
15. atmospheric pressure sensor output voltage
16. engine temperature sensor resistance
17. oil temperature sensor resistance
18. wiring connections  
(of the entire carburetor heating system)

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

- Before troubleshooting, remove the following part(s):
  1. seat
  2. headlight lens unit
  3. fuel tank
  4. air induction system cover
  5. air filter case
  6. silencer air filter case
  7. muffler and exhaust pipes
  8. intake manifold
- Troubleshoot with the following special tool(s).

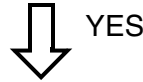


**Pocket tester**  
**YU-03112**

EAS00738

1. Main, ignition, ECU and fuel injection system fuses

- Check the main, ignition, ECU and fuel injection system fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main, ignition, ECU and fuel injection system fuses OK?



Replace the fuse(s).

EAS00739

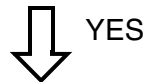
2. Battery

- 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 (68 °F)**

- Is the battery OK?



- 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?



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?



Replace the right handlebar switch.

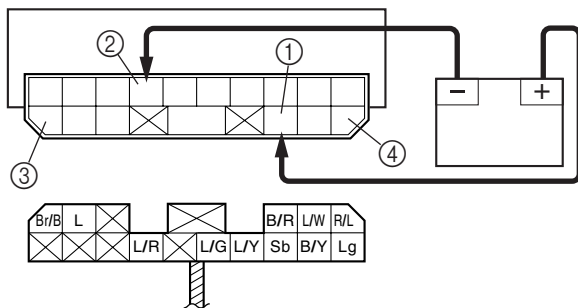
EAS00759

**5. Relay unit (fuel injection system relay)**

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

**Positive battery terminal** → black/red ①  
**Negative battery terminal** → blue/red ②

**Positive tester probe** → brown/black ③  
**Negative tester probe** → red/blue ④



- Does the fuel injection system relay have continuity between brown and red/blue?

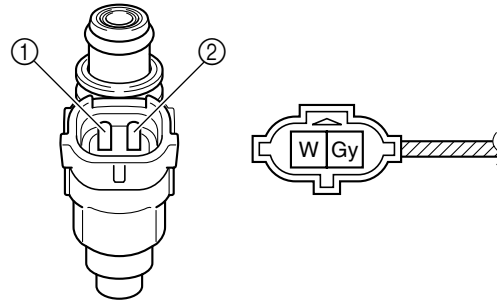


Replace the relay unit.

**6. Cylinder #1-injector resistance**

- Disconnect the injection sub-wire harness coupler from the cylinder #1-injector.
- Connect the pocket tester ( $\Omega \times 1$ ) to the cylinder #1-injector terminal as shown.

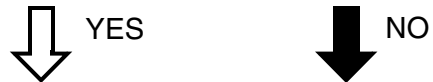
**Positive tester probe** → gray ①  
**Negative tester probe** → white ②



- Measure the cylinder #1-injector resistance.

**Cylinder #1-injector resistance**  
 14.2 ~ 14.8  $\Omega$  at 20 °C (68 °F)

- Is the cylinder #1-injector OK?



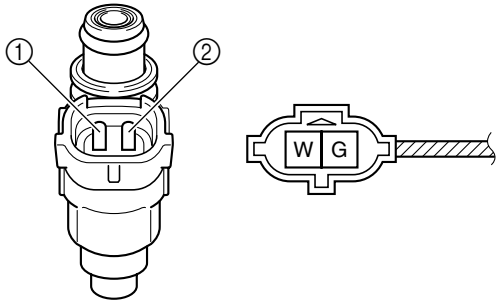
Replace the cylinder #1-injector.

EAS00817


**7. Cylinder #2-injector resistance**

- Disconnect the injection sub-wire harness coupler from the cylinder #2-injector.
- Connect the pocket tester ( $\Omega \times 1$ ) to the cylinder #2-injector terminal as shown.

**Positive tester probe** → green ①  
**Negative tester probe** → white ②



- Measure the cylinder #2-injector resistance.

 **Cylinder #2-injector resistance**  
 14.2 ~ 14.8  $\Omega$  at 20 °C (68 °F)

- Is the cylinder #2-injector OK?

↓ YES

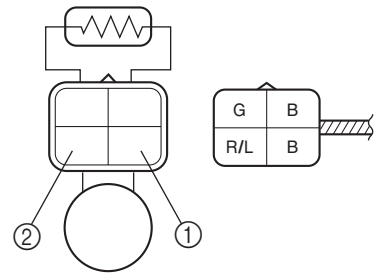
↓ NO

Replace the cylinder #2-injector.


**8. Fuel pump resistance**

- Disconnect the fuel pump coupler from the fuel pump.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel pump terminal as shown.

**Positive tester probe** → red/blue ①  
**Negative tester probe** → black ②



- Measure the fuel pump resistance.

 **Fuel pump resistance**  
 0.2 ~ 3.0  $\Omega$  at 20 °C (68 °F)

- Is the fuel pump OK?

↓ YES

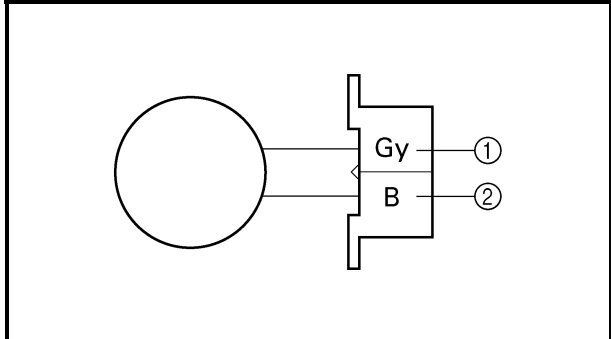
↓ NO

Replace the fuel pump.


EAS00748

- 9. 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** → gray ①  
**Negative tester probe** → black ②



- Measure the crankshaft position sensor resistance.

 **Crankshaft position sensor resistance**  
 248 ~ 372  $\Omega$  at 20 °C (68 °F)  
 (between gray and black)

- Is the crankshaft position sensor OK?

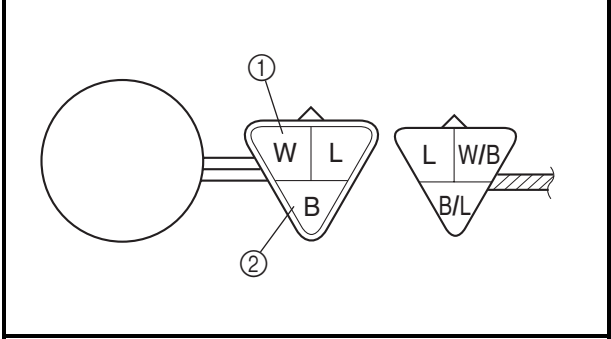
↓ YES

↓ NO


Replace the crankshaft position sensor.

- 10. Cylinder identification sensor output voltage**
- Connect the pocket tester (DC 20 V) to the cylinder identification sensor coupler as shown.

**Positive tester probe** → white ①  
**Negative tester probe** → black ②



- Set the main switch to "ON".
- Measure the cylinder identification sensor output voltage.

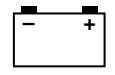
 **Cylinder identification sensor output voltage**  
 When sensor is on  
 DC 4.8 V or more  
 When sensor is off  
 DC 0.8 V or less

- Is the cylinder identification sensor OK?

↓ YES

↓ NO

Replace the cylinder identification sensor.

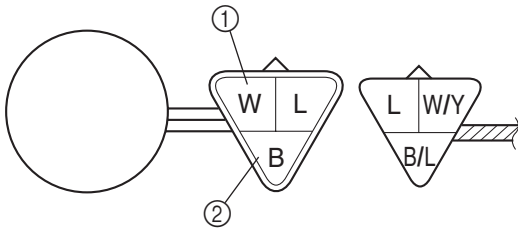


### 11. Speed sensor output voltage

- Measure the speed sensor output voltage.
- Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.

**Positive tester probe** → white ①

**Negative tester probe** → black 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?



Replace the speed sensor.

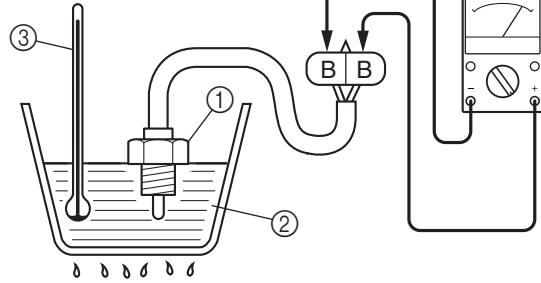
### 12. Intake air temperature sensor resistance

- Remove the intake air temperature sensor from the silencer air filter case.
- Connect the pocket tester ( $\Omega \times 100$ ) to the intake air temperature sensor coupler as shown.
- Immerse the intake air temperature sensor ① in a container filled with water ②.

#### NOTE:

Make sure that the intake air temperature sensor terminals do not get wet.

- Place a thermometer ③ in the water.
- Slowly heat the water, then let it cool down to the specified temperature.



- Measure the intake air temperature sensor resistance.



#### Intake air temperature sensor resistance

290 ~ 390  $\Omega$  at 80 °C (176 °F)

#### ⚠ WARNING

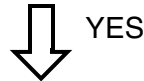
- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.



#### Intake air temperature sensor

15 Nm (1.5 m · kg, 11 ft · lb)

- Is the intake air temperature sensor OK?

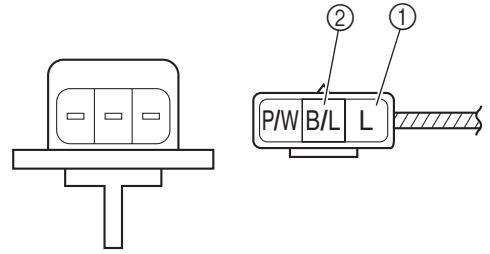


Replace the intake air temperature sensor.


13. Intake air pressure sensor 1 output voltage

- Connect the pocket tester (DC 20 V) to the intake air intake air pressure sensor 1 coupler as shown.

**Positive tester probe** → blue ①  
**Negative tester probe** → black/blue ②



- Set the main switch to "ON".
- Measure the intake air pressure sensor 1 output voltage.

 **Intake air pressure sensor output voltage**  
 4.75 ~ 5.25 DCV

- Is the intake air pressure sensor 1 OK?

↓ YES

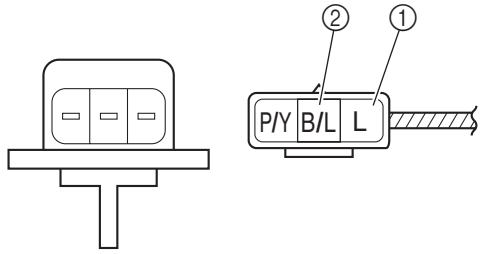
↓ NO

Replace the intake air pressure sensor 1.


14. Intake air pressure sensor 2 output voltage

- Connect the pocket tester (DC 20 V) to the intake air intake air pressure sensor 2 coupler as shown.

**Positive tester probe** → blue ①  
**Negative tester probe** → black/blue ②



- Set the main switch to "ON".
- Measure the intake air pressure sensor 2 output voltage.

 **Intake air pressure sensor output voltage**  
 4.75 ~ 5.25 DCV

- Is the intake air pressure sensor 2 OK?

↓ YES

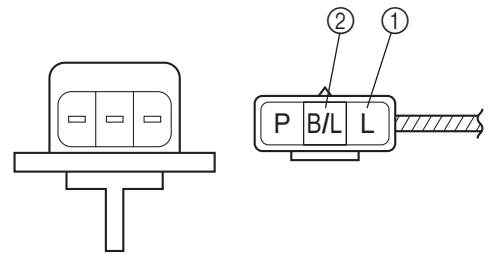
↓ NO

Replace the intake air pressure sensor 2.


15. Atmospheric pressure sensor output voltage

- Connect the pocket tester (DC 20 V) to the atmospheric pressure sensor coupler as shown.

Positive tester probe → blue ①  
 Negative tester probe → black/blue ②



- Set the main switch to “ON”.
- Measure the atmospheric pressure sensor output voltage.

 **Atmospheric pressure sensor output voltage**  
 4.75 ~ 5.25 DCV

• Is the atmospheric pressure sensor OK?



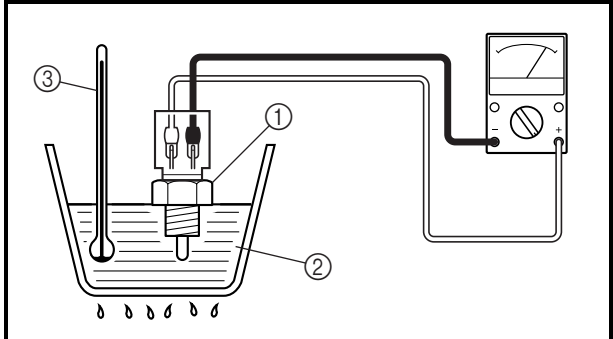
Replace the atmospheric pressure sensor.

## 16. Engine temperature sensor resistance


- Remove the engine temperature sensor from the front cylinder head.
- Connect the pocket tester ( $\Omega \times 100$ ) to the engine temperature sensor terminal as shown.
- Immerse the engine temperature sensor ① in a container filled with water ②.

**NOTE:** \_\_\_\_\_  
 Make sure that the engine temperature sensor terminals do not get wet.

- Place a thermometer ③ in the water.
- Slowly heat the water, then let it cool down to the specified temperature.




- Measure the engine temperature sensor resistance.

 **Engine temperature sensor resistance**  
 898 ~ 1,098  $\Omega$  at 100 °C (212 °F)

**⚠ WARNING** \_\_\_\_\_

- Handle the engine temperature sensor with special care.
- Never subject the engine temperature sensor to strong shocks. If the engine temperature sensor is dropped, replace it.

 **Engine temperature sensor**  
 18 Nm (1.8 m · kg, 13 ft · lb)

• Is the engine temperature sensor OK?



Replace the engine temperature sensor.



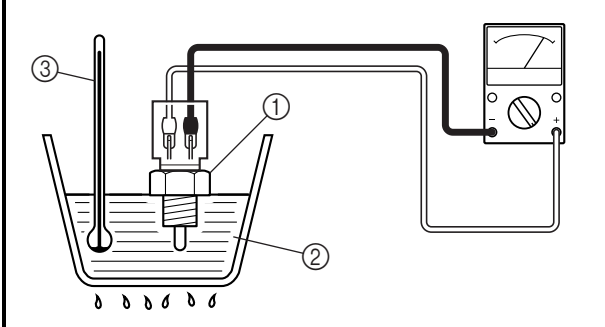
EAS00818

## 17. Oil temperature sensor resistance


- Remove the oil temperature sensor from the oil tank.
- Connect the pocket tester ( $\Omega \times 100$ ) to the oil temperature sensor terminal as shown.
- Immerse the oil temperature sensor ① in a container filled with engine oil ②.

**NOTE:** \_\_\_\_\_  
 Make sure that the oil temperature sensor terminals do not get wet.


- Place a thermometer ③ in the engine oil.
- Slowly heat the engine oil, then let it cool down to the specified temperature.



- Measure the oil temperature sensor resistance.

	<b>Oil temperature sensor resistance</b> 308 ~ 339 $\Omega$ at 150 °C (302 °F) 209 ~ 231 $\Omega$ at 170 °C (338 °F)
---	--

- ⚠ WARNING** \_\_\_\_\_
- Handle the oil temperature sensor with special care.
  - Never subject the oil temperature sensor to strong shocks. If the oil temperature sensor is dropped, replace it.

	<b>Oil temperature sensor</b> 18 Nm (1.8 m · kg, 13 ft · lb)
---	---

- Is the oil temperature sensor OK?



Replace the oil temperature sensor.

## 18. 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.

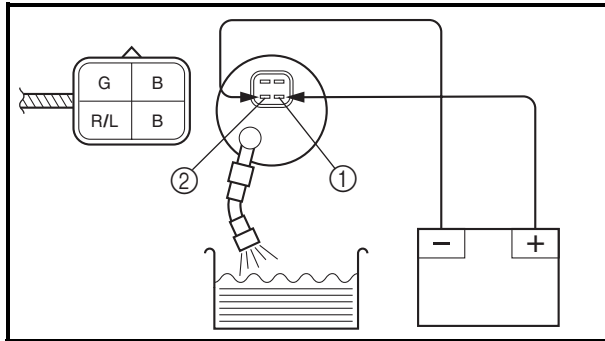
EAS00819

**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. Fill the fuel tank.
- b. Put the end of the fuel hose into an open container.
- c. Connect the battery (12 V) to the fuel pump coupler as shown.

**Positive battery lead** → red/blue ①  
**Negative battery lead** → black ②

- d. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.

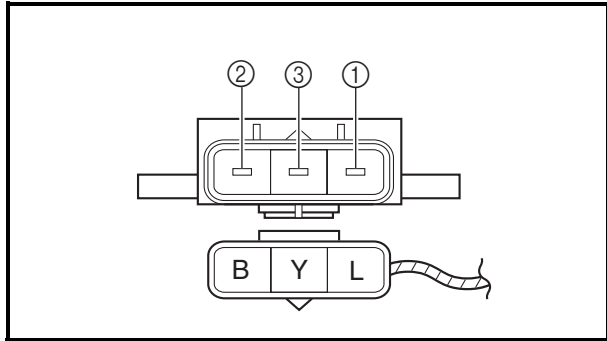


EAS00502

**CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR**

**NOTE:**

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



1. Check:
  - throttle position sensor (installed on the throttle body)

- 
- a. Disconnect the throttle position sensor coupler from the throttle position sensor.
  - b. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②

- c. Measure the maximum throttle position sensor resistance.  
 Out of specification → Replace the throttle position sensor.

**Maximum throttle position sensor resistance**  
**4.0 ~ 6.0 k $\Omega$  at 20 °C (68 °F)**  
**(blue — black)**

- d. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

**Positive tester probe** → yellow ③  
**Negative tester probe** → black ②

- e. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

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

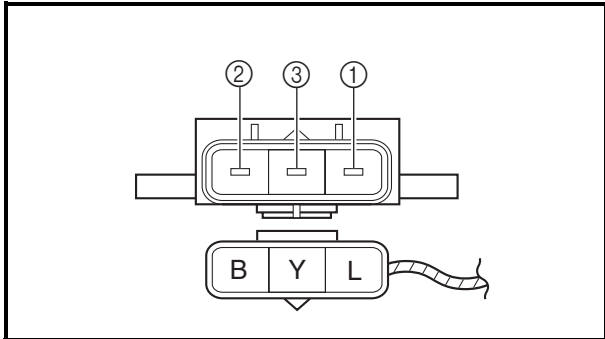
Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

---

Out of specification or the resistance changes abruptly → Go to step 2 below.

**Throttle position sensor resistance**  
**(520 ~ 900  $\Omega$ ) ~ (4.0 ~ 6.0 k $\Omega$ ) at 20 °C (68 °F)**  
**(yellow — black)**






2. Check:
- throttle position sensor (removed from the throttle body)



- Disconnect the throttle position sensor coupler from the throttle position sensor.
- Remove the throttle position sensor from the throttle body.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②

- Measure the maximum throttle position sensor resistance.  
 Out of specification → Replace the throttle position sensor.

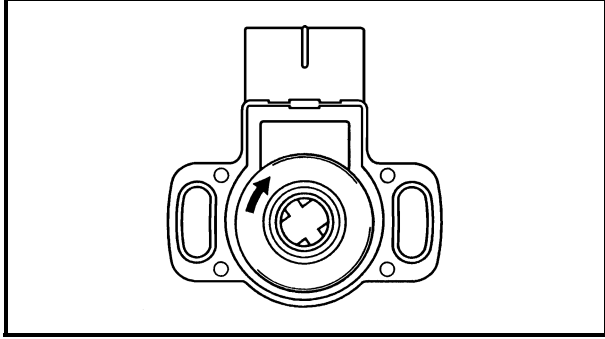
 **Maximum throttle position sensor resistance**  
 4.0 ~ 6.0 k $\Omega$  at 20 °C (68 °F)  
 (blue — black)


- Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

**Positive tester probe** → yellow ③  
**Negative tester probe** → black ②

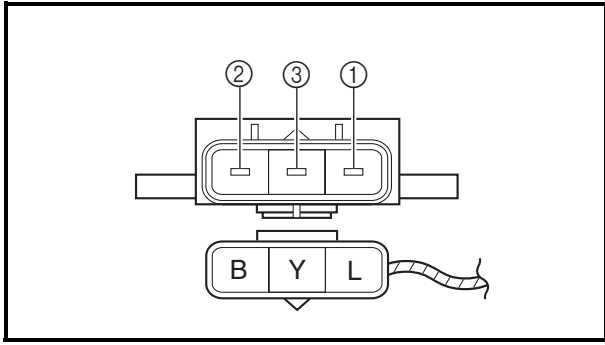
- While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.  
 The resistance does not change or it changes abruptly → Replace the throttle position sensor.  
 The slot is worn or broken → Replace the throttle position sensor.

**NOTE:** \_\_\_\_\_  
 Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.



 **Throttle position sensor resistance**  
 0 ~ 5 ± 1.0 k $\Omega$  at 20 °C (68 °F)  
 (yellow — black)





3. Adjust:
- throttle position sensor angle

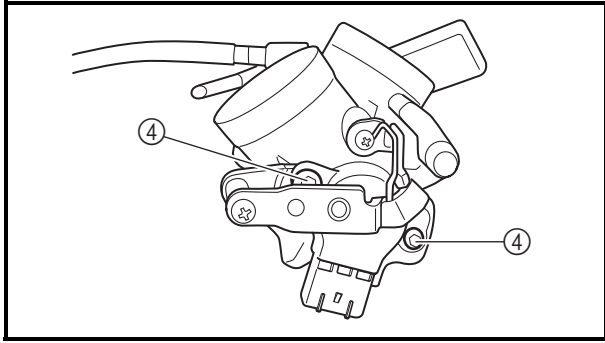


- Disconnect the throttle position sensor coupler from the throttle position sensor.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

**Positive tester probe** → blue ①  
**Negative tester probe** → black ②

- Measure the throttle position sensor maximum resistance.
- Calculate the throttle position sensor maximum resistance when the throttle is closed.

**Throttle position sensor maximum resistance (throttle is fully closed) = Maximum resistance  $\times$  (0.13 ~ 0.15)**



Example:  
 If the maximum resistance = 5 k $\Omega$ , then the throttle position sensor's maximum resistance when the throttle is fully closed should be:

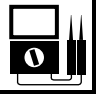
$$5 \text{ k}\Omega \times (0.13 \sim 0.15) = 650 \sim 750 \Omega$$

Lift the throttle body assembly slightly out of the intake manifolds. Loosen the throttle position sensor screws ④.

Connect the pocket tester ( $\Omega \times 100$ ) to the throttle position sensor.

**Positive tester probe** → yellow ③  
**Negative tester probe** → black ②

- Adjust the throttle position sensor angle so the measured resistance is within the specified range.

 **Throttle position sensor resistance**  
 650 ~ 750  $\Omega$   
 (yellow — black)

After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.



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## TROUBLESHOOTING

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**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 filter
- Clogged fuel strainer
- Clogged fuel tank drain hose
- Clogged rollover valve
- Clogged rollover valve hose
- Deteriorated or contaminated fuel

**Fuel pump**

- Faulty fuel pump
- Faulty fuel pump relay

**Throttle body(-ies)**

- Deteriorated or contaminated fuel
- Sucked-in air
- Improperly adjusted starter cable

**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 crankshaft position sensor
- 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

EAS00846

**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 ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

EAS00848

## **POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE**

Refer to "STARTING FAILURES".

### **ENGINE**

#### **Air filter**

- Clogged air filter element

### **FUEL SYSTEM**

#### **Fuel pump**

- Faulty fuel pump

EAS00850

## **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

EAS00851

## **FAULTY CLUTCH**

### **CLUTCH SLIPS**

#### **Clutch**

- Improperly assembled clutch
- Improperly adjusted clutch cable
- Loose or fatigued clutch spring
- Worn friction plate
- Worn clutch plate

#### **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

### **CLUTCH DRAGS**

#### **Clutch**

- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch push rod
- Broken clutch boss
- Burnt primary driven gear bushing
- Match marks not aligned

#### **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil



EAS00854

## **OVERHEATING**

### **ENGINE**

#### **Cylinder head(s) and piston(s)**

- Heavy carbon buildup

#### **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

### **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

EAS00857

## **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

EAS00861

## **FAULTY FRONT FORK LEGS**

### **LEAKING OIL**

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

### **MALFUNCTION**

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS00862

**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

EAS00866

## 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 switch)
- Burnt-out headlight bulb
- Faulty headlight relay
- Faulty ECU

### HEADLIGHT BULB BURNT OUT

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

### TAIL/BRAKE LIGHT DOES NOT COME ON

- Wrong tail/brake light LED
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light LED

### TAIL/BRAKE LIGHT LED BURNT OUT

- Wrong tail/brake light LED
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light LED 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

## XV1700P/XV1700PC WIRING DIAGRAM

- ① Generator
- ② Rectifier/regulator
- ③ Main switch
- ④ Battery
- ⑤ Backup fuse (odometer and clock)
- ⑥ Main fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Relay unit
- ⑩ Starting circuit cut-off relay
- ⑪ Fuel injection system relay
- ⑫ Fuel pump
- ⑬ Neutral switch
- ⑭ Sidestand switch
- ⑮ Crankshaft position sensor
- ⑯ Throttle position sensor
- ⑰ Intake air pressure sensor 1
- ⑱ Intake air pressure sensor 2
- ⑲ Atmospheric pressure sensor
- ⑳ Cylinder identification sensor
- ㉑ Lean angle cut-off switch
- ㉒ Speed sensor
- ㉓ Intake air temperature sensor
- ㉔ Engine temperature sensor
- ㉕ Oil temperature sensor
- ㉖ ECU
- ㉗ Linear control valve
- ㉘ Ignition coil
- ㉙ Spark plug
- ㉚ Decompression solenoid
- ㉛ Cylinder #1 - injector
- ㉜ Cylinder #2 - injector
- ㉝ Tachometer assembly
- ㉞ Tachometer
- ㉟ Tachometer light
- ㊱ Speedometer assembly
- ㊲ Engine trouble warning light
- ㊳ Neutral indicator light
- ㊴ Speedometer
- ㊵ Fuel level warning light
- ㊶ Left turn signal indicator light
- ㊷ Right turn signal indicator light
- ㊸ High beam indicator light
- ㊹ Speedometer light
- ㊺ Turn signal relay
- ㊻ Horn 1
- ㊼ Horn 2
- ㊽ Headlight relay
- ㊾ Left handlebar switch
- ㊿ Clutch switch
- ① Dimmer switch
- ② Horn switch
- ③ Turn signal switch
- ④ Front turn signal/position light (left)
- ⑤ Front turn signal/position light (right)
- ⑥ Rear turn signal light (right)
- ⑦ Rear turn signal light (left)
- ⑧ Headlight
- ⑨ Right handlebar switch
- ⑩ Front brake light switch
- ⑪ Engine stop switch
- ⑫ Start switch
- ⑬ Tail/brake light
- ⑭ License plate light
- ⑮ Rear brake light switch
- ⑯ Headlight fuse
- ⑰ Ignition fuse
- ⑱ Signaling system fuse
- ⑲ Decompression solenoid fuse
- ⑳ ECU fuse
- ㉑ Fuel injection system fuse

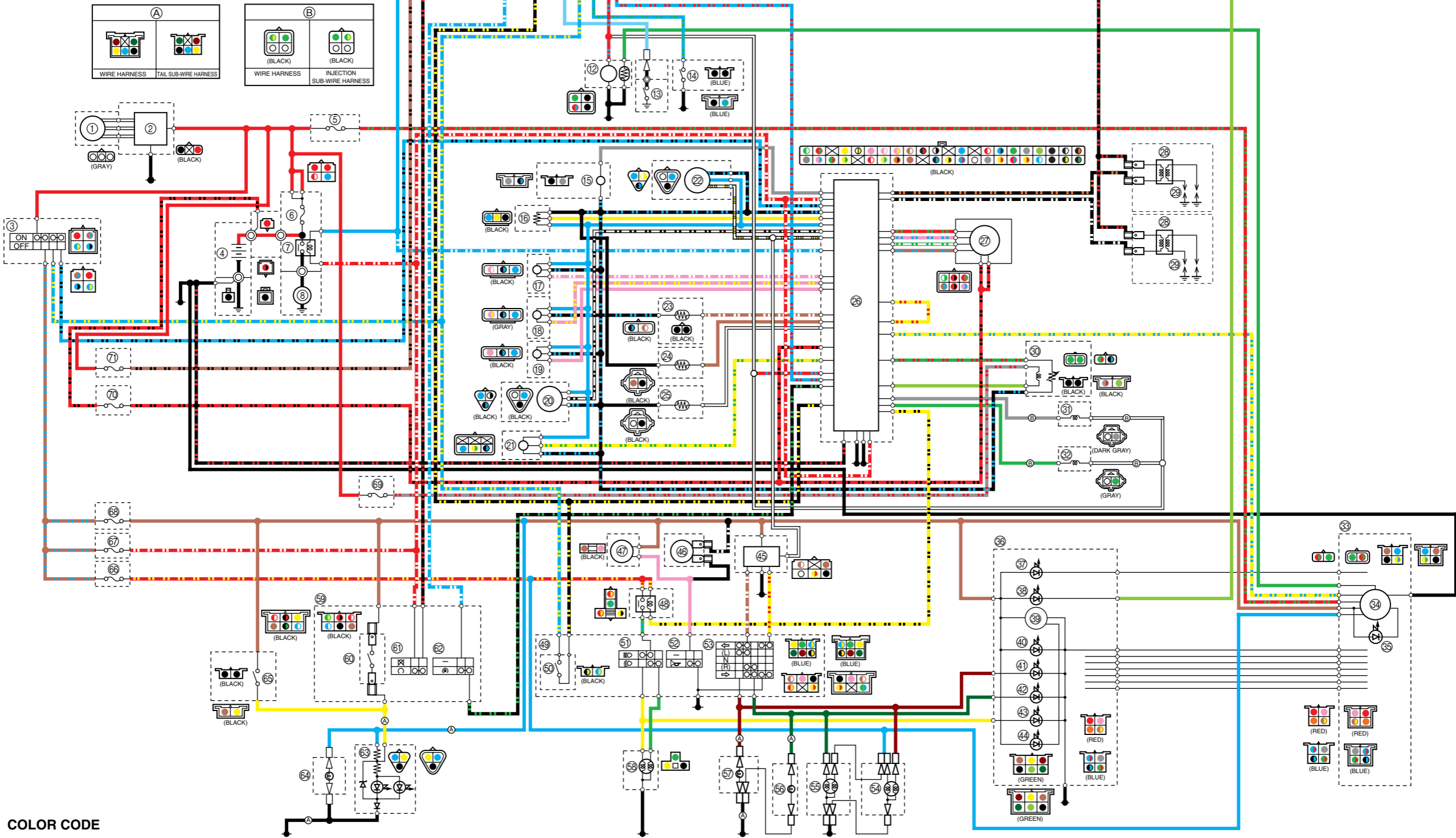




YAMAHA MOTOR CO., LTD.  
2500 SHINGAI IWATA SHIZUOKA JAPAN

PRINTED IN U.S.A.

# XV1700P/XV1700PC WIRING DIAGRAM (For USA)



**COLOR CODE**

● Black	● Dark green	● Orange	○ White	● Black/Orange	● Blue/Black	● Blue/Yellow	● Brown/Yellow	● Gray/Red	● Red/Black	● Red/Yellow	● Yellow/Black
● Blue	● Green	● Pink	● Yellow	● Black/Red	● Blue/Green	● Brown/Black	● Green/Blue	● Pink/Blue	● Red/Green	● White/Black	● Yellow/Green
● Brown	● Gray	● Red	● Black/Green	● Black/White	● Blue/Red	● Brown/Blue	● Green/Red	● Pink/White	● Red/Blue	● White/Green	● Yellow/Blue
● Chocolate	● Light green	● Sky blue	● Black/Blue	● Black/Yellow	● Blue/White	● Brown/White	● Green/Yellow	● Pink/Yellow	● Red/White	● White/Yellow	● Yellow/Red