YAMAHA 2002

TDM900(P)

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SERVICE MANUAL

EAS00000

TDM900 (P) 2002
SERVICE MANUAL
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NOTICE

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

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

NOTE:

Designs and specifications are subject to change without notice.

EAS00004

IMPORTANT MANUAL INFORMATION

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

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

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

CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.

NOTE: A NOTE provides key information to make procedures easier or clearer.

EAS00007

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.

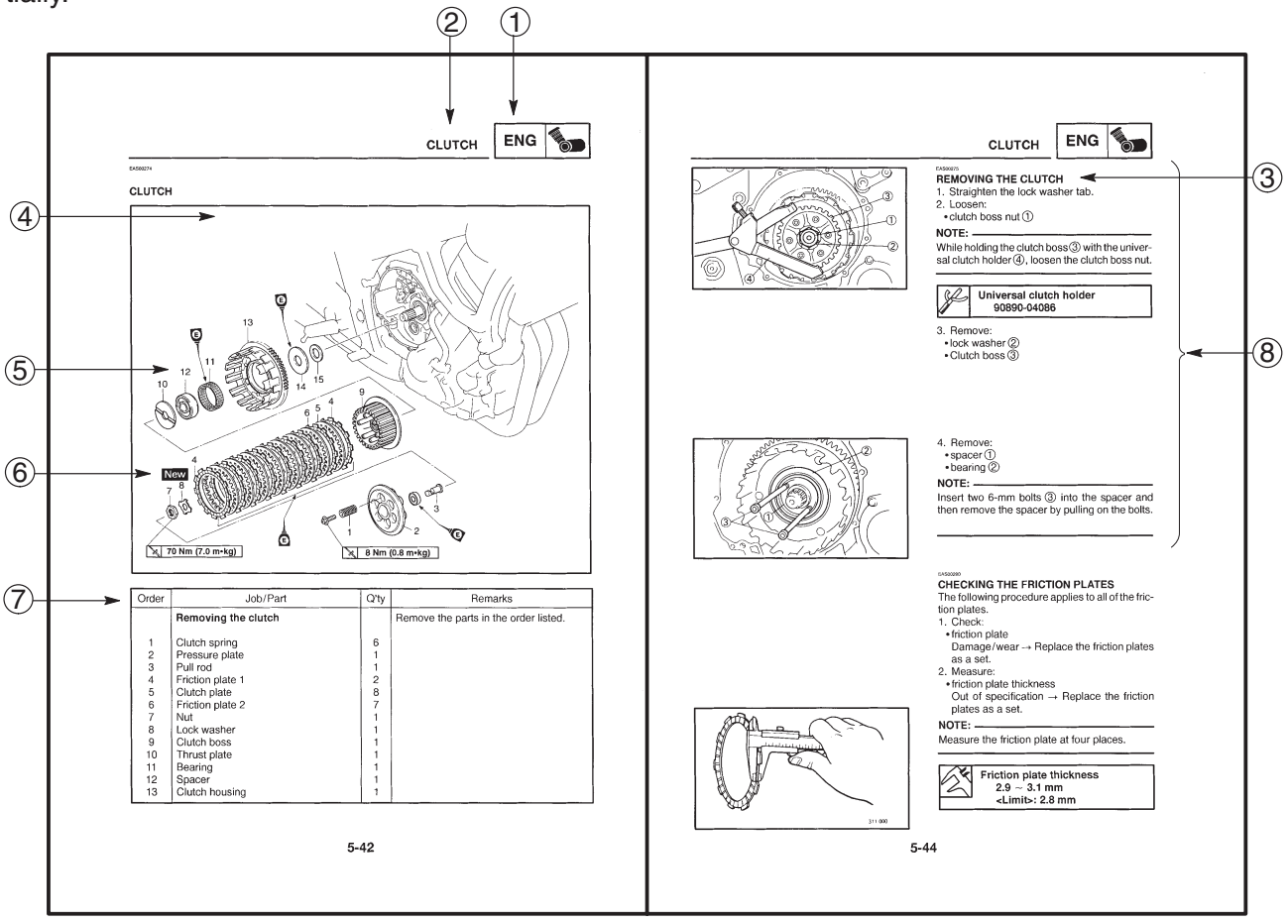
④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

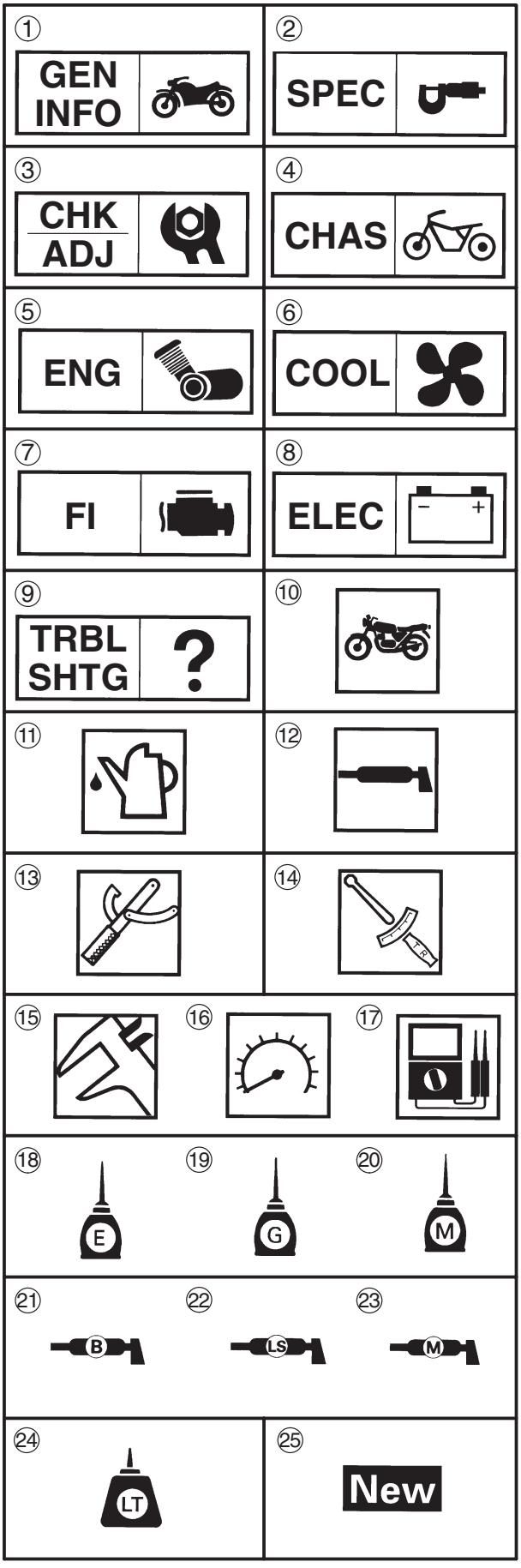
⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.

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.





EAS00008

SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑨ indicate the subject of each chapter.

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

Symbols ⑩ to ⑰ indicate the following.

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

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

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

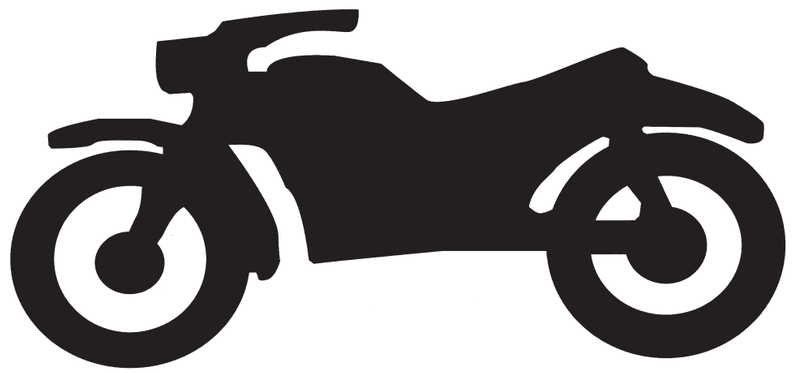
Symbols ㉔ to ㉕ in the exploded diagrams indicate the following.

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

EAS00012

TABLE OF CONTENTS

GENERAL INFORMATION	GEN INFO 1
SPECIFICATIONS	SPEC 2
PERIODIC CHECKS AND ADJUSTMENTS	CHK ADJ 3
CHASSIS	CHAS 4
ENGINE	ENG 5
COOLING SYSTEM	COOL 6
FUEL INJECTION SYSTEM	FI 7
ELECTRICAL SYSTEM	ELEC 8
TROUBLESHOOTING	TRBL SHTG 9



GEN INFO

1

CHAPTER 1
GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION 1-1
VEHICLE IDENTIFICATION NUMBER 1-1
MODEL LABEL 1-1

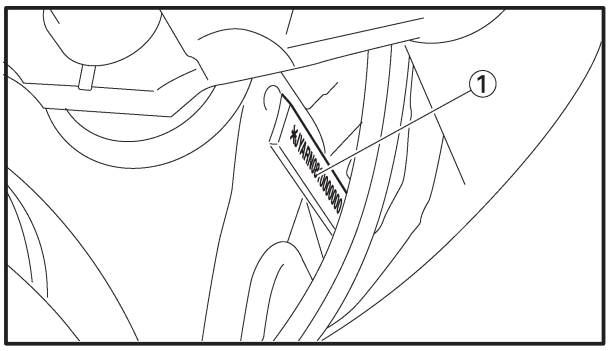
FEATURES 1-2
OUTLINE 1-2
FI SYSTEM 1-3
ECU (Electronic Control Unit) 1-5
THREE-WAY CATALYTIC CONVERTER SYSTEM 1-17
AIR INDUCTION SYSTEM 1-19
INSTRUMENT PANEL 1-21

IMPORTANT INFORMATION 1-23
PREPARATION FOR REMOVAL AND DISASSEMBLY 1-23
REPLACEMENT PARTS 1-23
GASKETS, OIL SEALS AND O-RINGS 1-23
LOCK WASHERS/PLATES AND COTTER PINS 1-24
BEARINGS AND OIL SEALS 1-24
CIRCLIPS 1-24

CHECKING THE CONNECTIONS 1-25

SPECIAL TOOLS 1-26





EAS00014

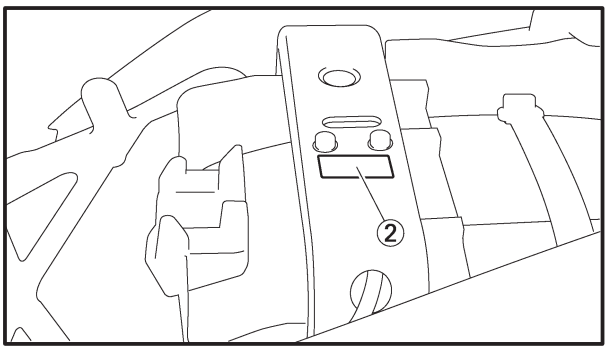
GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

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VEHICLE IDENTIFICATION NUMBER

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



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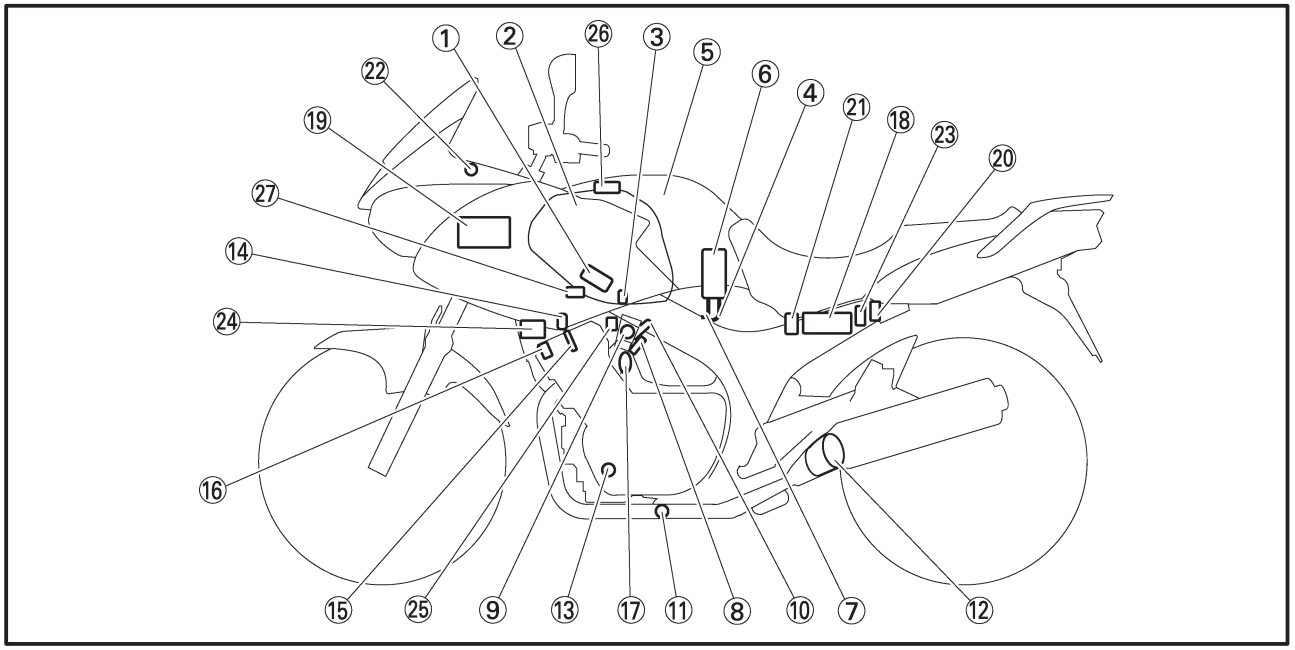
MODEL LABEL

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

FEATURES

OUTLINE

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature.
In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet that is used in the respective chamber.
Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.
As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.
The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions. Furthermore, the air induction system (AI system) has been placed under computer control together with the FI system in order to realize cleaner exhaust gases.

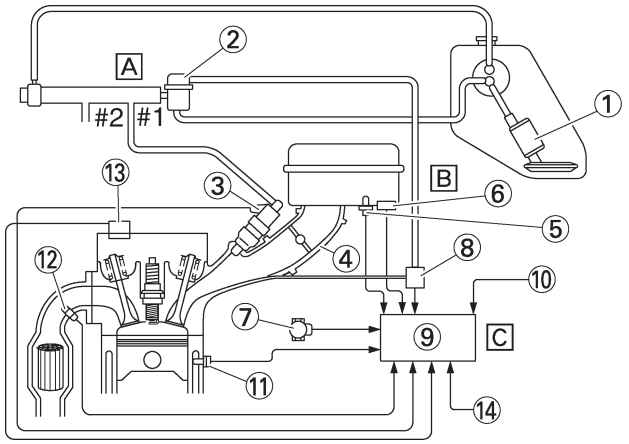


1. Ignition coil
2. Air filter case
3. Intake air temperature sensor
4. Fuel delivery hose
5. Fuel tank
6. Fuel pump
7. Fuel return hose
8. Intake air pressure sensor
9. Throttle position sensor
10. Fuel injector
11. O_2 sensor
12. Catalytic converter
13. Crankshaft position sensor
14. Coolant temperature sensor
15. Spark plug
16. Cylinder identification sensor
17. Pressure regulator
18. Battery
19. ECU
20. Atmospheric pressure sensor
21. Fuel injection system relay
22. Engine trouble warning light
23. Lean angle cut-off switch
24. Air cut-off valve
25. Fast idle plunger
26. Adjustable air intake duct
27. Intake solenoid

FI SYSTEM

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

The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, atmospheric pressure sensor, intake temperature sensor, coolant temperature sensor, and O_2 sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor ands 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
② Pressure regulator
③ Fuel injector
④ Throttle body
⑤ Intake air temperature sensor
⑥ Intake solenoid
⑦ Throttle position sensor
⑧ Intake air pressure sensor
⑨ ECU
⑩ Atmospheric pressure sensor
⑪ Coolant temperature sensor
⑫ O_2 sensor
⑬ Cylinder identification sensor
⑭ Crankshaft position sensor
A Fuel system
B Air system
C Control system

Fuel control block

The fuel control block consists of the following main components:

	Component	Function
Control block	ECU	Total FI system control
	Throttle body	Air volume control
	Pressure regulator	Fuel pressure detection
Sensor block	Intake air pressure sensor	Intake air pressure detection
	Atmospheric pressure sensor	Atmospheric pressure detection
	Coolant temperature sensor	Coolant temperature detection
	Intake air temperature sensor	Intake air temperature detection
	Throttle position sensor	Throttle angle detection
	O_2 sensor	Gas emission O_2 concentration detection
	Cylinder identification sensor	Reference position detection
	Crankshaft position sensor	Crankshaft position detection and engine PRM detection
	Speed sensor	Speed detection
Actuator block	Injector	Fuel injection
	Fuel pump	Fuel feed
	Air induction system, air cut valve	Induction of secondary air
	Intake solenoid	Air volume control

ECU (Electronic Control Unit)

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

• ECU's internal construction and functions

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

A. Power supply circuit

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

B. Input interface circuits

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

C. CPU (Central Processing Unit)

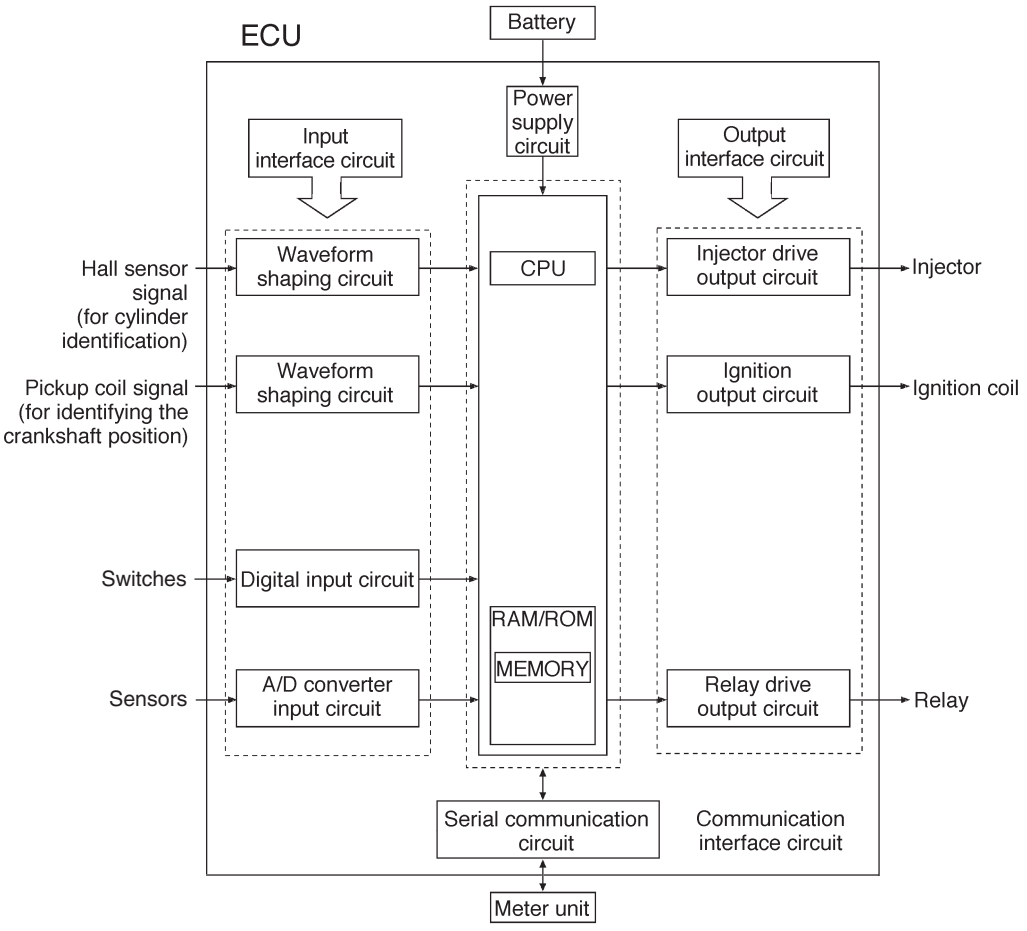
The CPU determines the condition of the sensors in accordance with the level of the signal that is output by the respective sensor. Then, the signals are temporarily stored on the RAM in the CPU. Based on those stored signals and the basic processing program on the ROM, the CPU calculates the fuel injection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

D. Output interface circuits

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

E. Interface circuit for communication

Communicates with the meter.



• Ignition control
The ignition control function of the ECU controls the ignition timing and the duration of ignition energizing. The ignition timing control uses the signals from the throttle position sensor (to detect the angle of the throttle), and the crankshaft position sensor and speed sensor (to detect the speed of the engine). This control establishes an ignition timing that suits the operating condition of the engine through compensations made to the basic ignition timing control map. The ignition energizing duration control establishes the energizing duration to suit the operating conditions by calculating the energizing duration in accordance with the signal received from the crankshaft position sensor and the battery voltage.
• Fuel control
The fuel control function of the ECU controls the injection timing and injection duration. The injection timing control controls the injection timing during the starting of the engine and the injection timing during the normal operation of the engine, based on the signals received from the crankshaft position sensor and the cylinder identification sensor. The injection duration control determines the duration of injection based on the signals received from the atmospheric pressure sensors, temperature sensors, and the position sensors, to which compensations are made to suit various conditions such as the weather, atmospheric pressure, starting, acceleration, and deceleration.
• Load control
The ECU effects load control in the following manner:
1. Stopping the fuel pump and injectors when the motorcycle overturns
   The ECU turns OFF the fuel injection system relay when the lean angle cut-off switch is tripped.
2. Operating the headlight illumination relay
   On the model for Europe, the ECU causes the headlight relay 2 to output a constant ON signal, provided that the main switch is ON. On the model for Australia, the ECU controls the headlight relay 2 in accordance with the engine speed as required by the daytime illumination specification.
3. Operating the radiator fan motor in accordance with the coolant temperature
   The ECU controls the radiator fan motor relay ON/OFF in accordance with the coolant temperature.
4. Operating the AI system solenoid valve
   The ECU controls the energizing of the solenoid valve in accordance with the driving conditions.
5. Operating the intake solenoid valve
   The ECU controls the energizing of the solenoid valve in accordance with the driving conditions.

• Self-diagnosis function
The ECU is equipped with a self-diagnosis function to ensure that the engine control system is operating normally. The ECU mode functions include a diagnosis mode in addition to the normal mode.
Normal mode
• To check for any blown bulbs, this mode illuminates a warning light while the main switch is turned ON, and while the starter switch is being pressed.
• If the starting disable warning is activated, this mode alerts the rider by blinking the warning light while the start switch is being pressed.
• If a malfunction occurs in the system, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the malfunction by illuminating a warning light. After the engine is stopped, this mode displays a fault code on the clock LCD.

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

Fuel pump

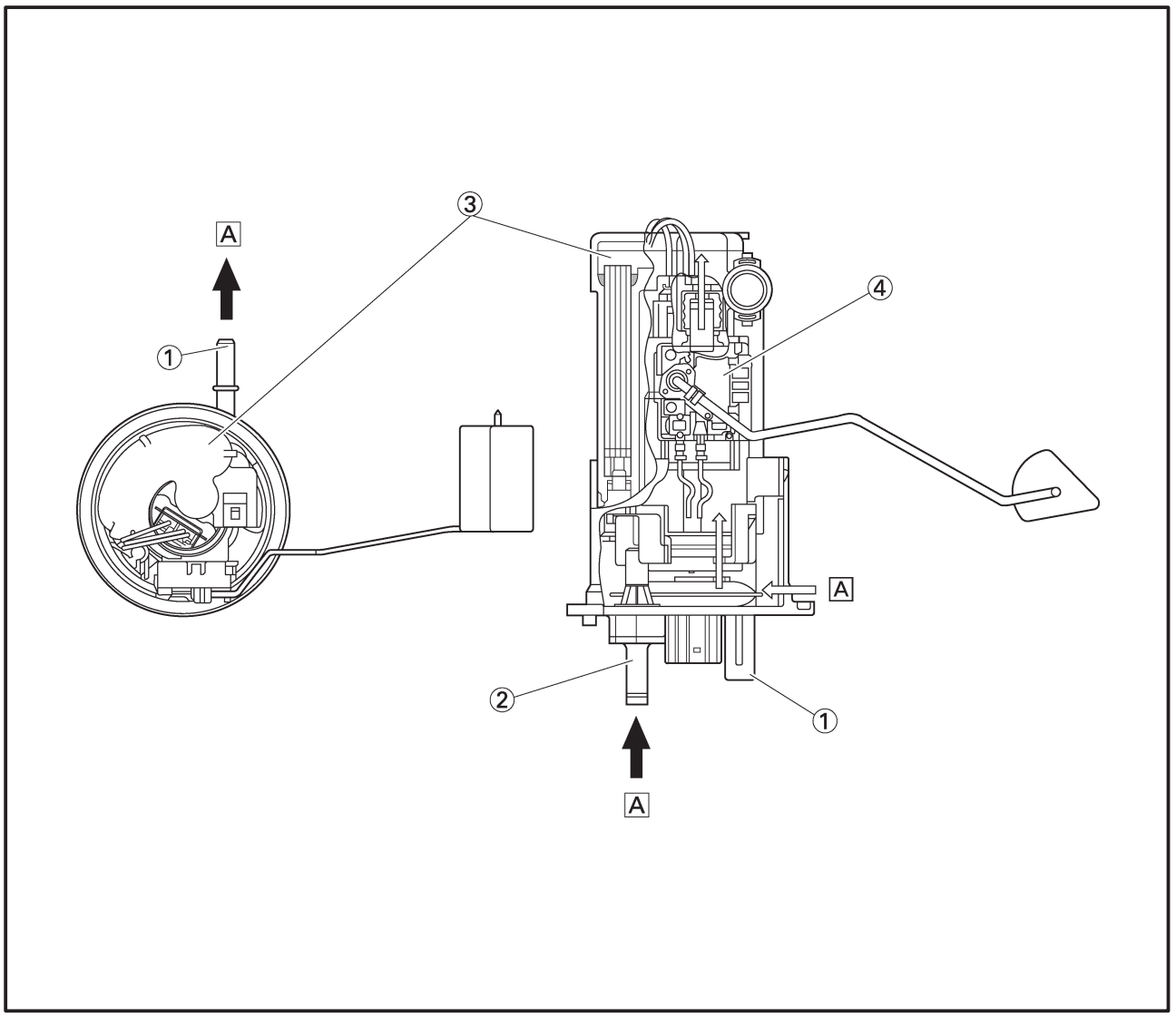
The fuel pump, which is mounted in the fuel tank, draws the fuel directly from the tank and pumps it to the injector.

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

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

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

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



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

Pressure regulator

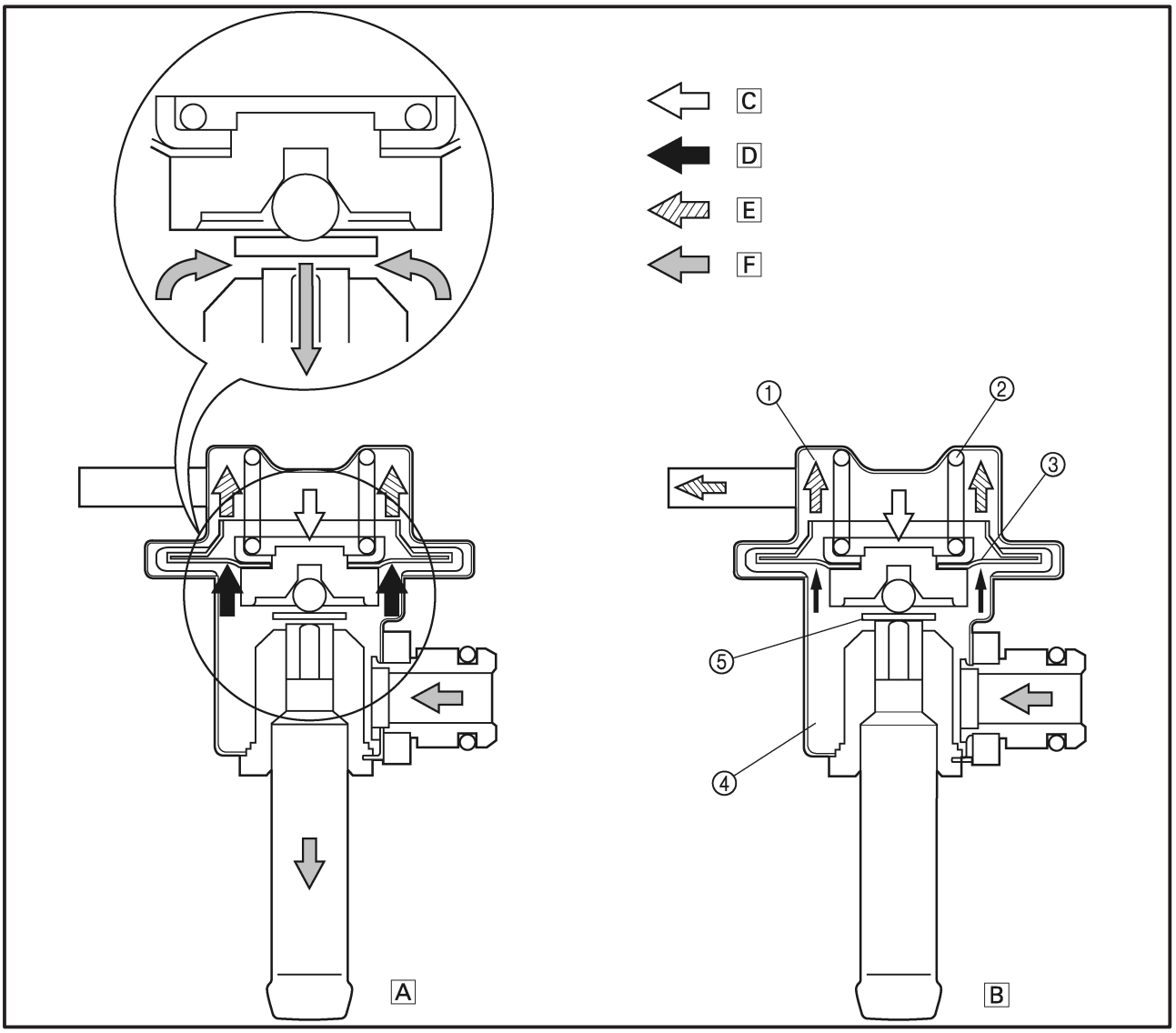
It regulates the fuel pressure that is applied to the injectors that are provided in the cylinders in order to maintain a constant pressure difference with the pressure in the intake manifold.

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

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

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

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



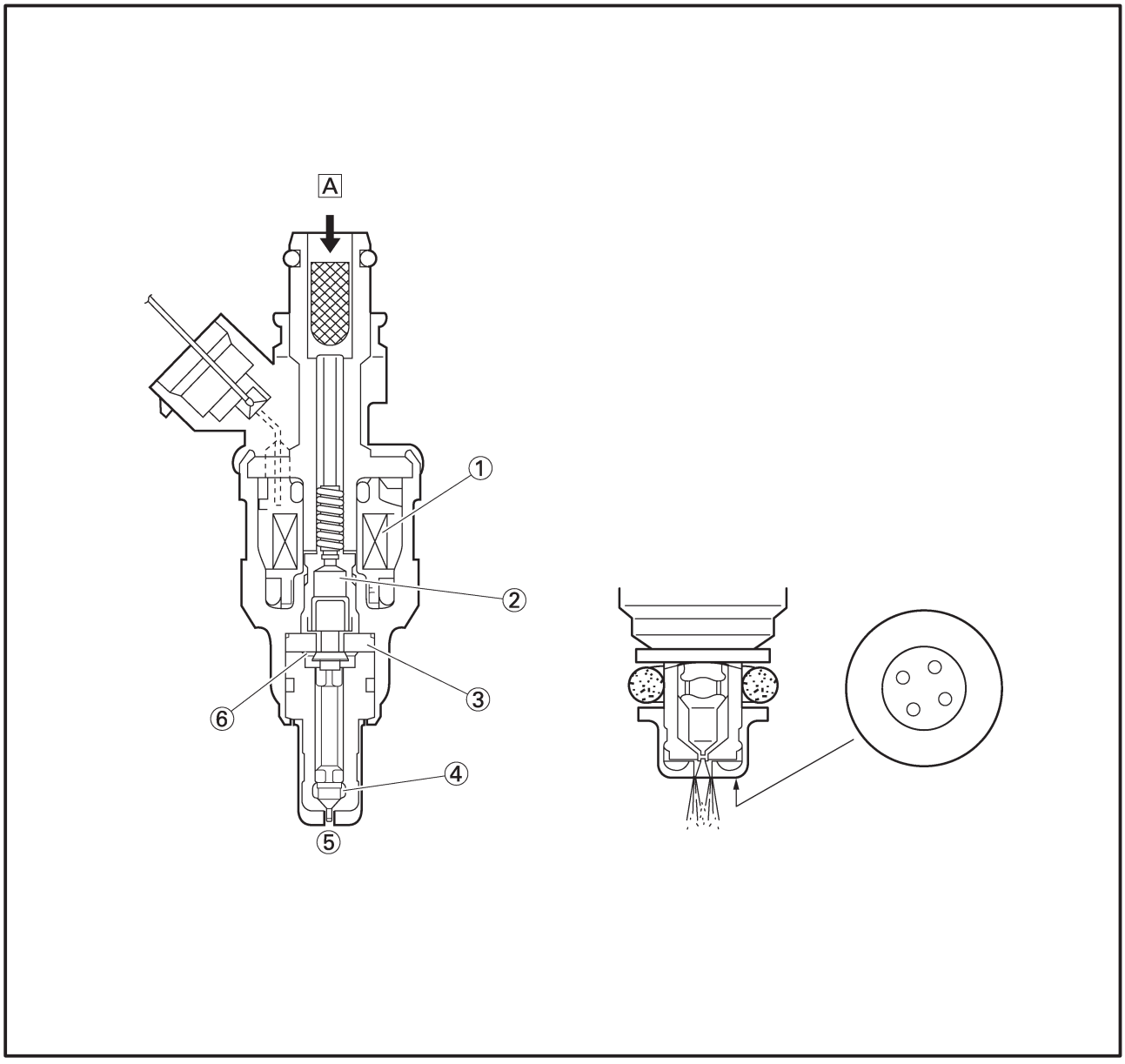
① Spring chamber
② Spring
③ Diaphragm
④ Fuel chamber
⑤ Valve

A Open
B Close
C Spring pressure
D Fuel pressure
E Vacuum pressure
F Fuel

Fuel injector

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

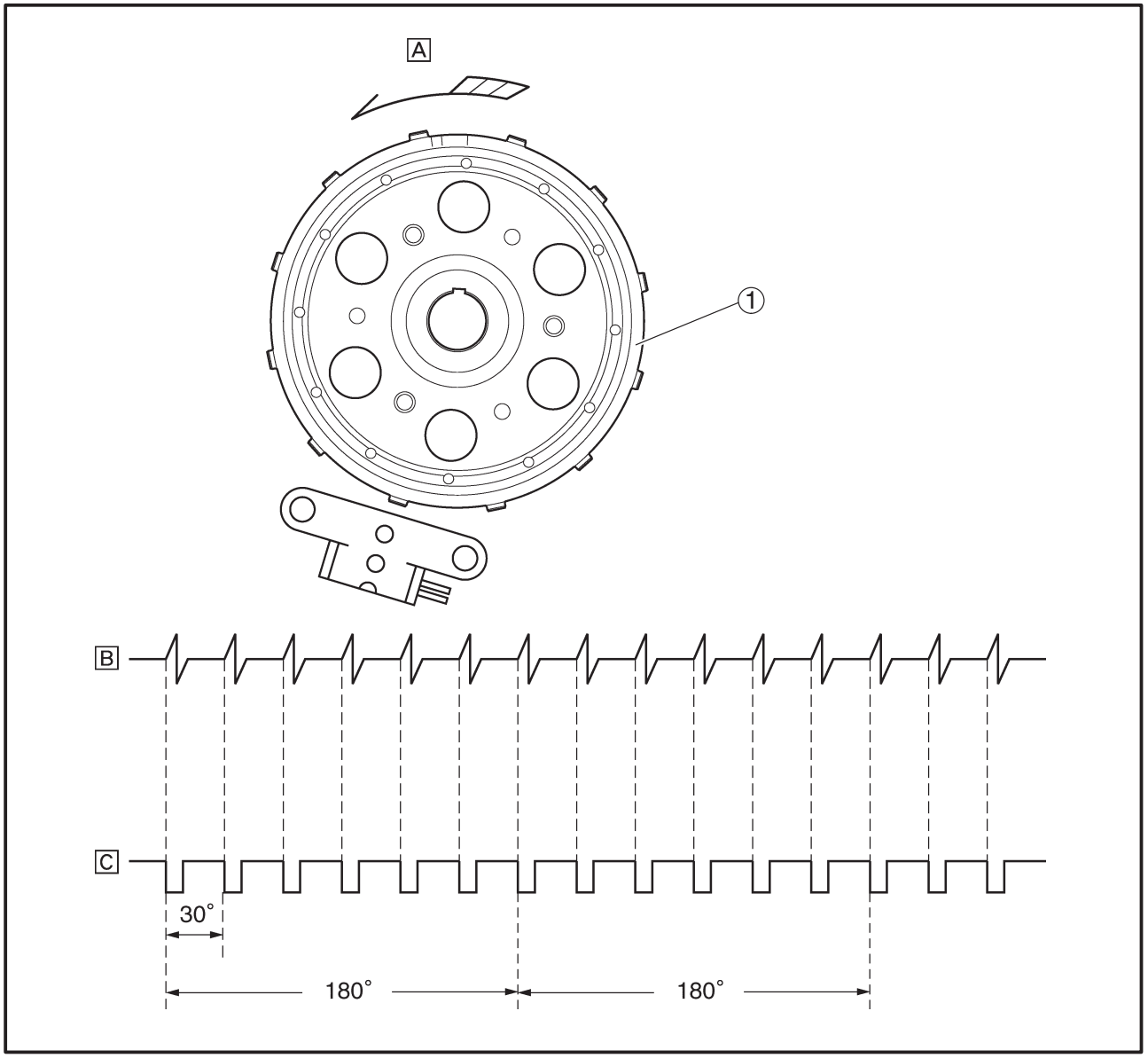
When the current flows to the coil in accordance with the signal from the ECU, the core is drawn upward, allowing the flange that is integrated with the needle to move to the spacer. Since the distance of the movement of the needle is thus kept constant, the opening area of the fuel passage also becomes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



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

Crankshaft position sensor

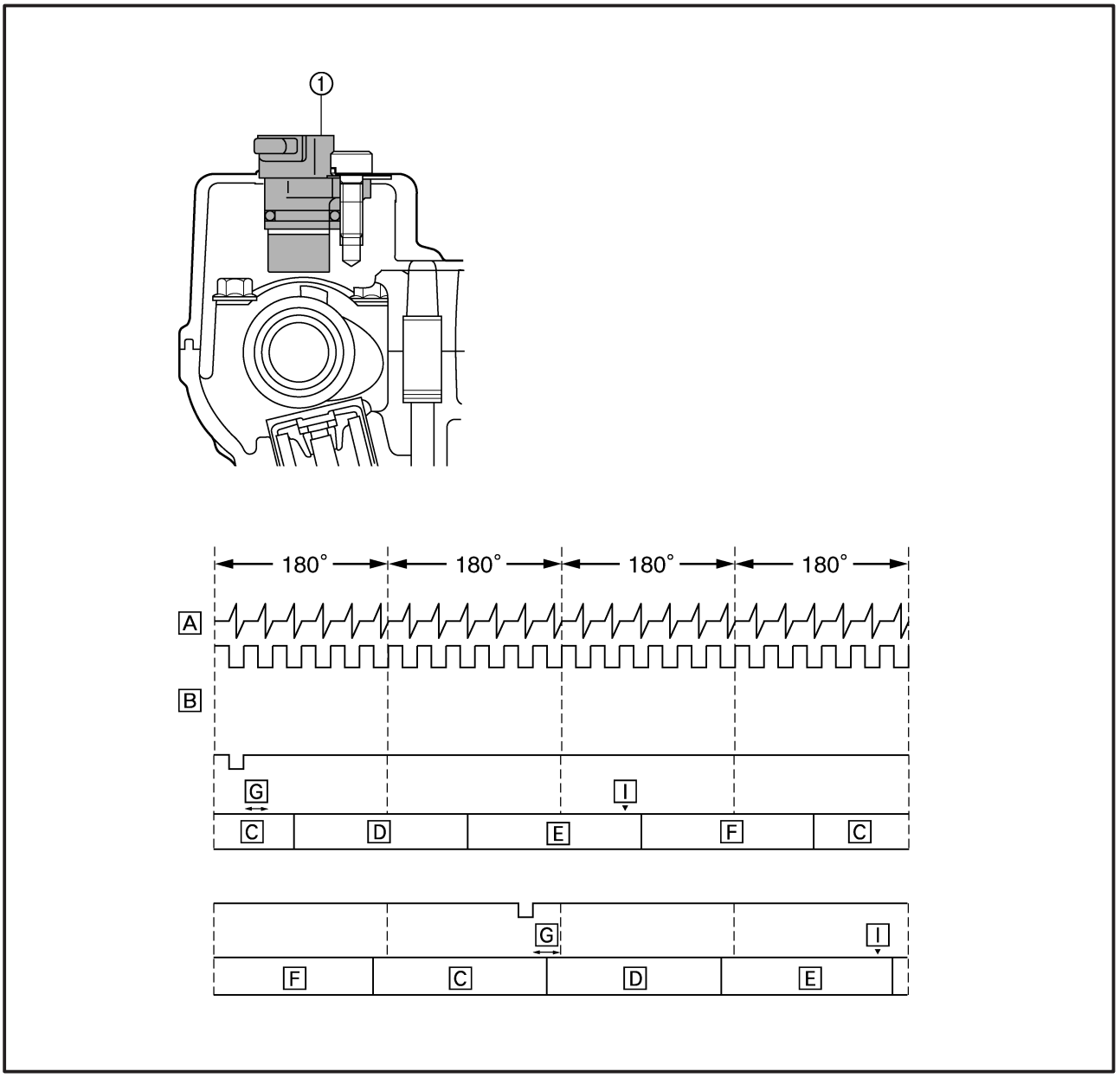
The crankshaft position sensor uses the signals of the pickup coil that is mounted on the right side of the crankshaft. When the rotation of the pickup rotor that is attached to the crankshaft causes the projections on the rotor to pass by the pickup coil, an electromotive force is generated in the coil.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



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

Cylinder identification sensor

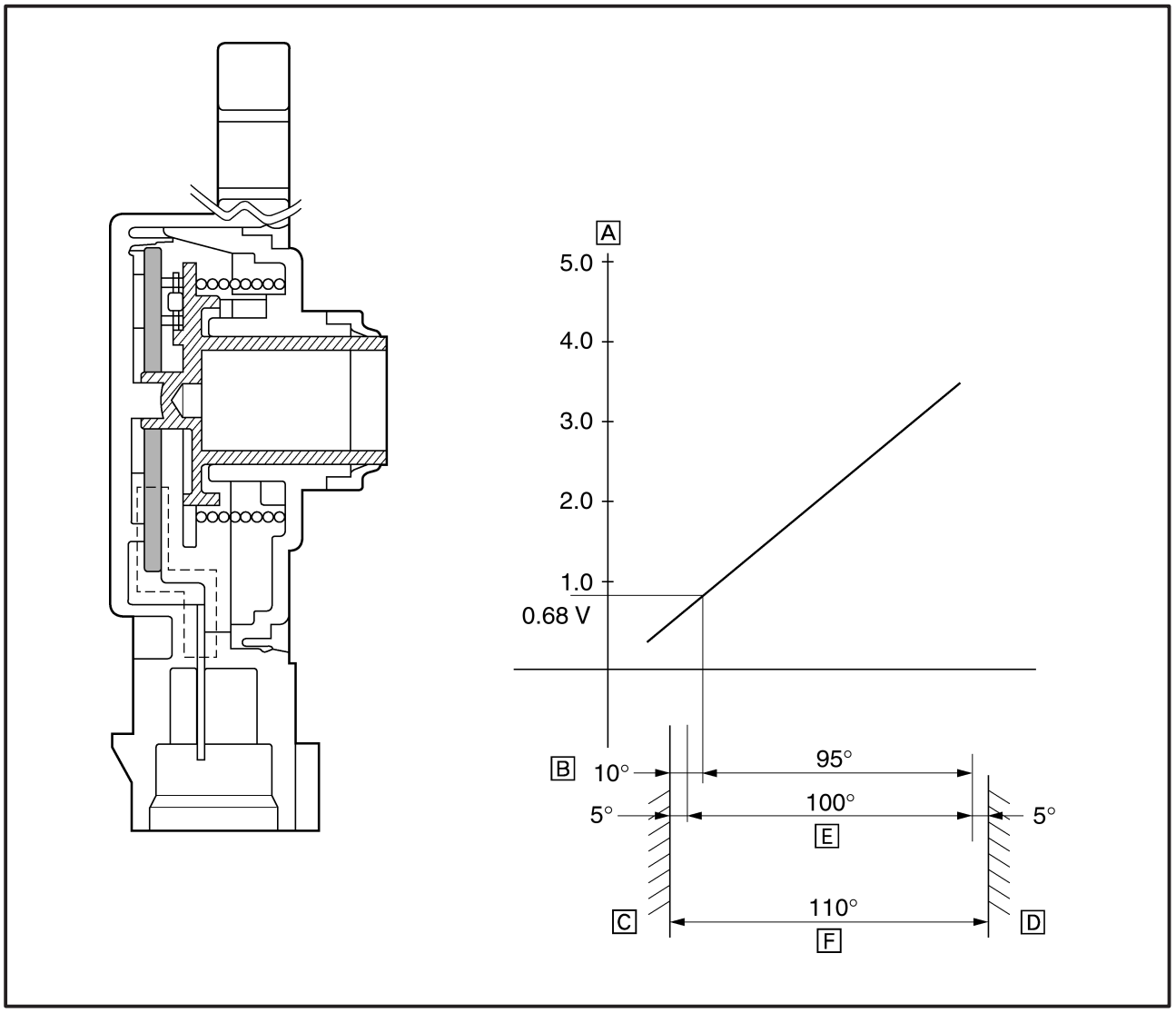
The cylinder identification sensor is mounted on the exhaust head cover of the #1 cylinder. When the exhaust cam of the #1 cylinder rotates and the projection of the cam plate passes by the sensor, the sensor generates a signal and sends it to the ECU. Based on this signal and the signal from the crankshaft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



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

Throttle position sensor

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



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

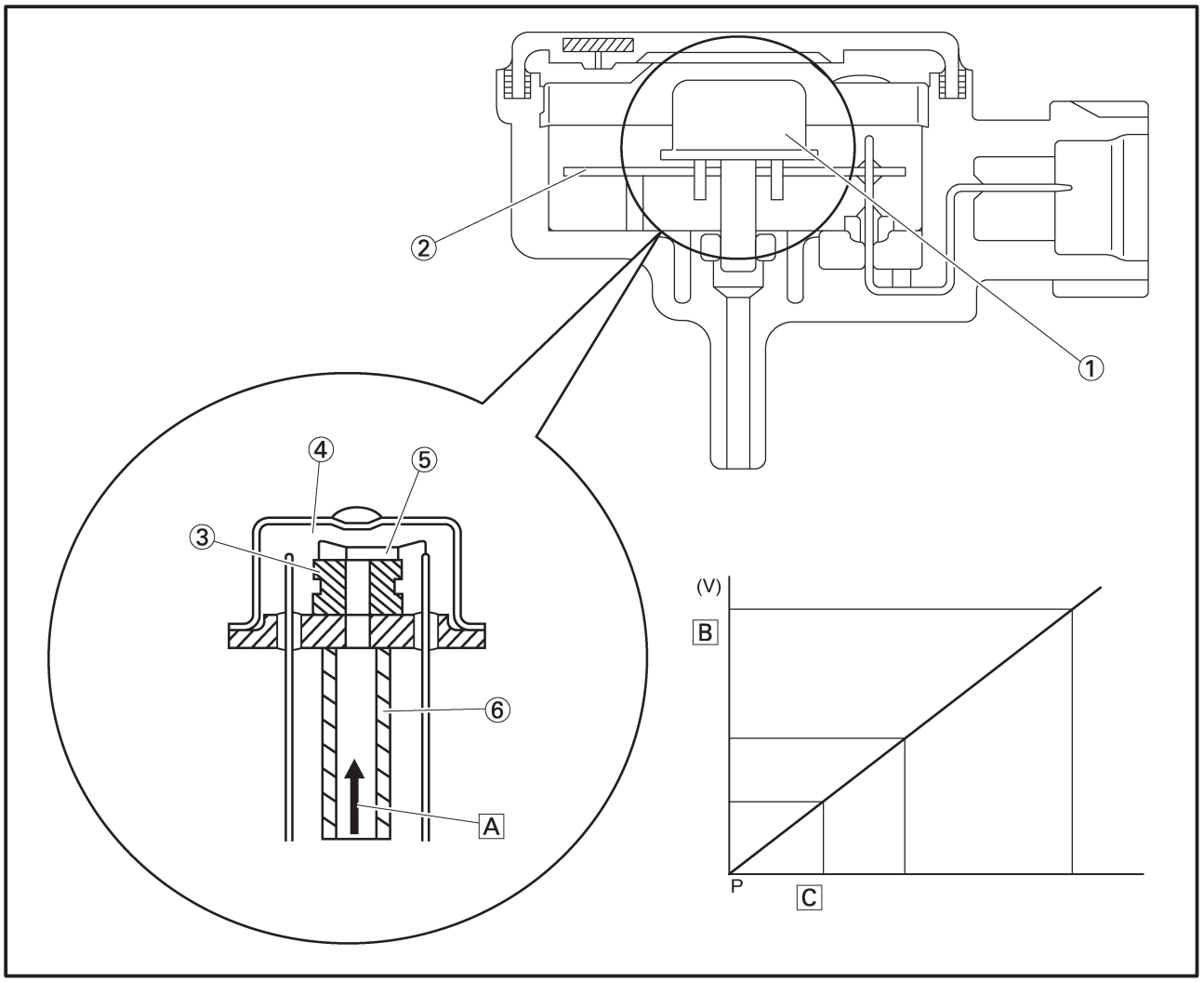
Intake air pressure sensor and atmospheric pressure sensor

- Intake air pressure sensor

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

- Atmospheric pressure sensor

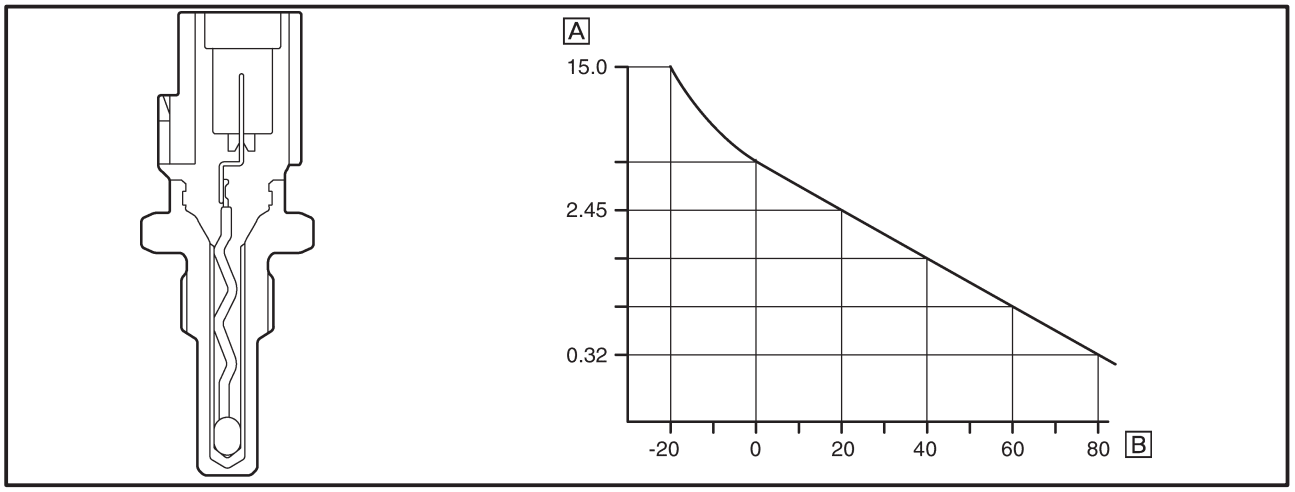
  The atmospheric pressure sensor is used for making compensations to the changes in the air density caused by the changes in the atmospheric pressure (particularly at high altitudes). The operating principle and function of the atmospheric pressure sensor are the same as those of the aforementioned intake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



① Sensor unit
② Hybrid IC
③ Silicon diaphragm
④ Vacuum chamber
⑤ Silicon chip
⑥ Pressure induction pipe
A Atmospheric pressure, intake air pressure
B Output voltage
C Input pressure

Coolant temperature sensor

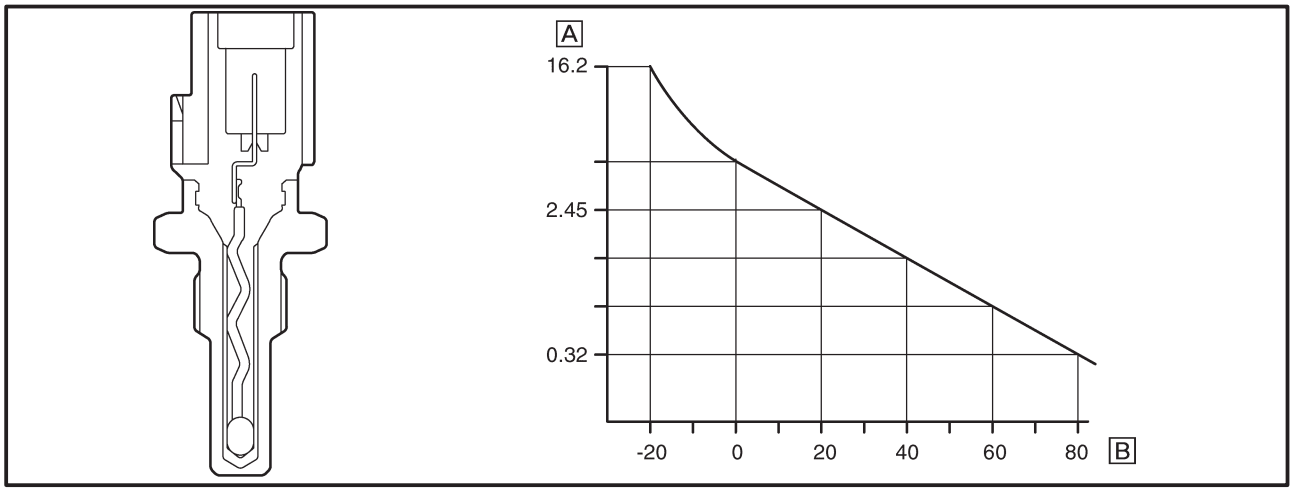
The signals from the coolant temperature sensor are used primarily for making fuel volume compensations during starting and warm-up. The coolant temperature sensor converts the temperature of the coolant into electrical signals and sends them to the ECU.



A Resistance kΩ
B Temperature °C

Intake air temperature sensor

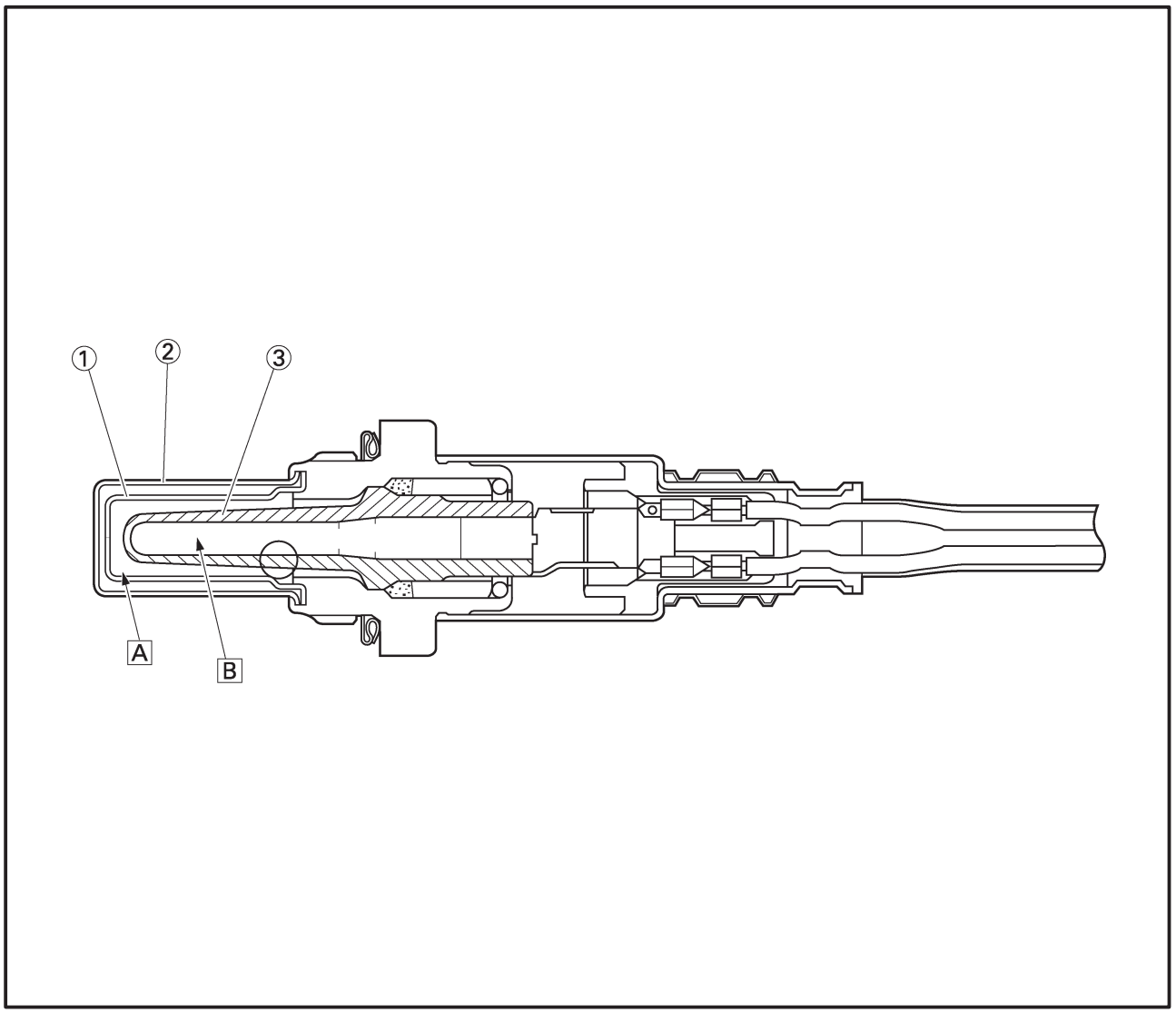
The intake temperature sensor corrects the deviation of the air-fuel mixture that is associated with the changes in the intake air density, which are created by the changes in the intake air temperature that occur due to atmospheric temperatures. This sensor uses a semi-conductor thermistor that has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



A Resistance kΩ
B Temperature °C

O_2 sensor

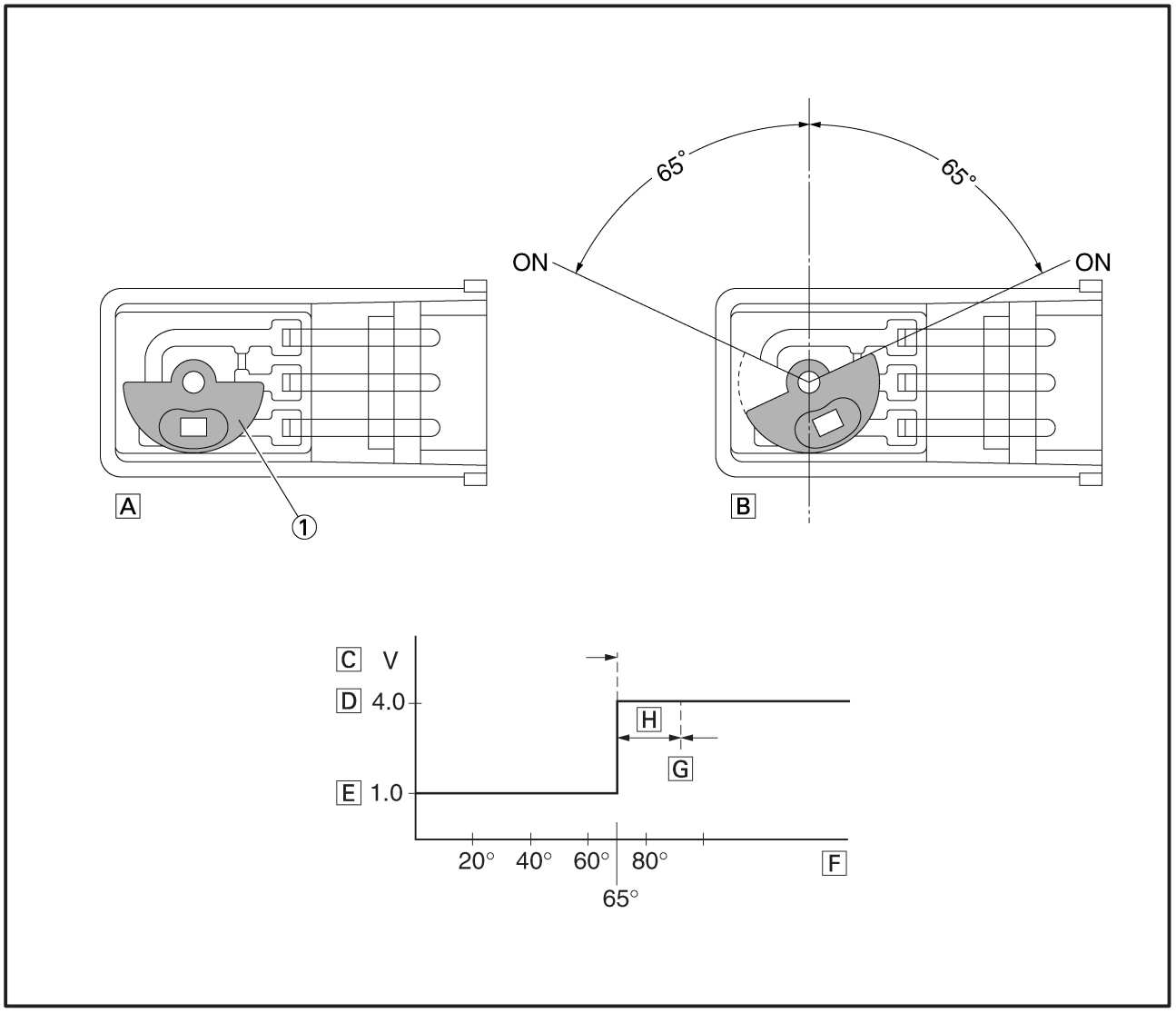
The O_2 sensor has been adopted to enable the catalyst to function at a high degree of efficiency by maintaining the air-fuel mixture near the stoichiometric ratio (14.7 : 1). This sensor, which is a zirconia type, utilizes the oxygen ion conductivity of the solid electrolyte for detecting the oxygen concentration levels. In actual operation, a zironia tube made of solid electrolyte is exposed in the exhaust gas, so that the exterior of the zirconia tube is in contact with the exhaust gas and the interior is in contact with the atmosphere whose oxygen concentration level is known. When a difference in the oxygen concentration level is created between the outside and the inside of the zirconia tube, the oxygen ion passes through the zirconia element and generates an electromotive force. The electromotive force increases when the oxygen concentration level is low (rich air-fuel ratio) and the electromotive force decreases when the oxygen concentration level is high (lean air-fuel ratio). As electromotive force is generated in accordance with the concentration of the exhaust gas, the resultant voltage is input into the ECU in order to correct the duration of the injection of fuel.



① Inner cover
② Outer cover
③ Zirconia tube
A Exhaust gas
B Atmosphere

Lean angle cut-off switch

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



① Float

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

THREE-WAY CATALYTIC CONVERTER SYSTEM

System outline

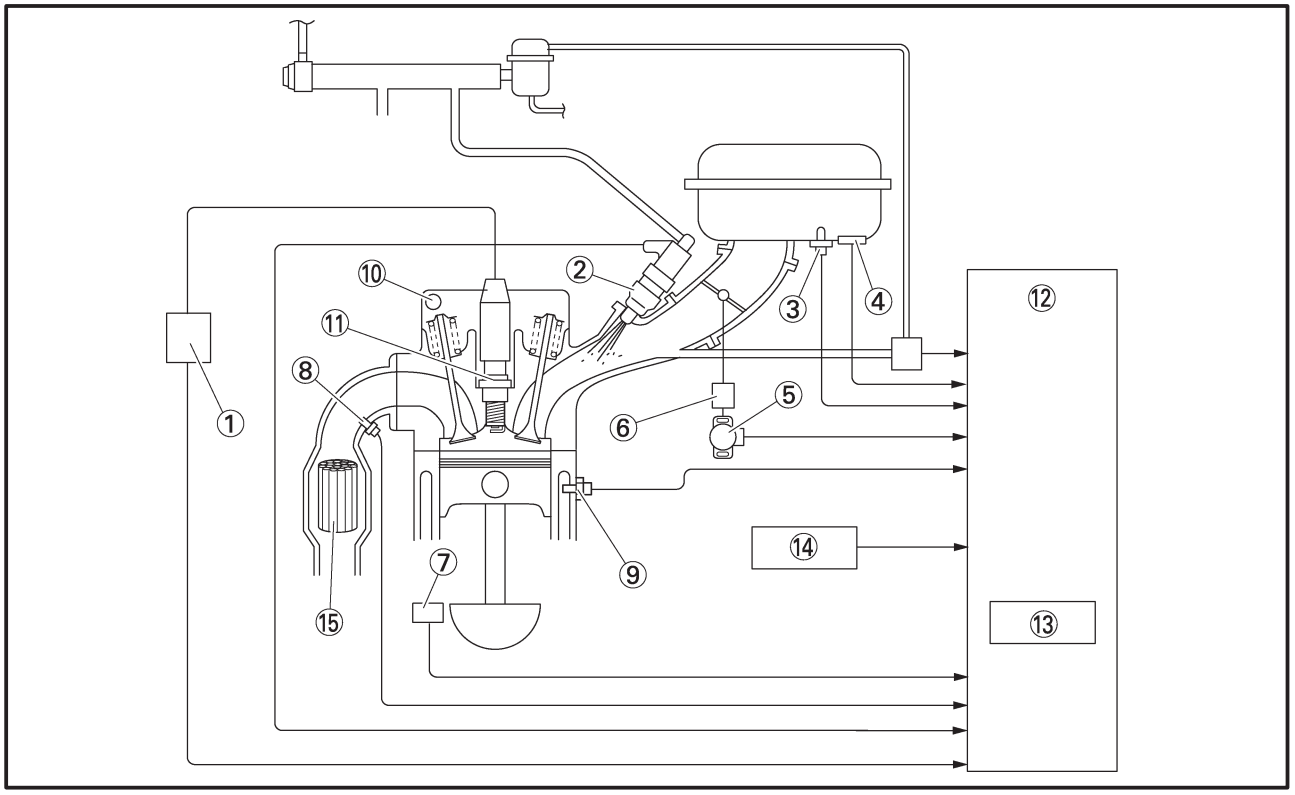
This is a highly efficient exhaust gas cleaning system that effects air-fuel control through a joint effort by the FI system, O_2 sensor, and the three-way catalytic converter system. By effecting comprehensive control of the air-fuel ratio in this manner, this system reduces the CO, HC, and NOx in the exhaust gases.

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

Furthermore, an O_2 sensor that detects the concentration of oxygen that remains in the exhaust gas is provided in the exhaust pipe for the purpose of maximizing the performance of the three-way catalytic converter and to clean the exhaust gas at a high degree of efficiency. Based on this data, the ECU applies more precise compensation to the basic air-fuel ratio, in order to maintain the mixture in the vicinity of the stoichiometric air-fuel ratio of 14.7 : 1.

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

Three-way catalytic converter system diagram



① Ignition coil
② Injector
③ Intake air temperature sensor
④ Intake solenoid
⑤ Throttle position sensor
⑥ Intake air pressure sensor
⑦ Crankshaft position sensor
⑧ O_2 sensor
⑨ Coolant temperature sensor
⑩ Cylinder identification sensor
⑪ Spark plug
⑫ ECU
⑬ Igniter
⑭ Atmospheric pressure sensor
⑮ Catalytic converter

Functions of components

Catalyst

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

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

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

- The CO and HC oxidize with the oxidation function of platinum, and are converted into harmless carbon dioxide (CO_2) and water (H_2O), resulting in cleaner exhaust gases.

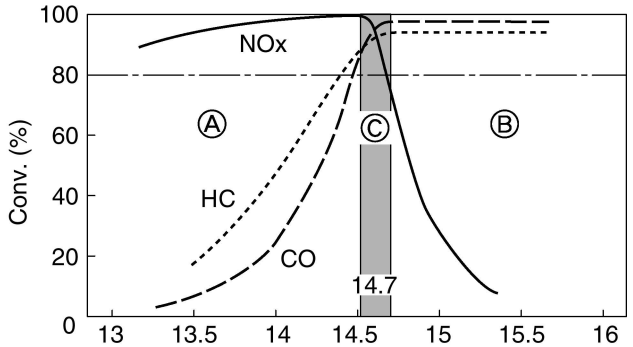
$$CO + 1/2\ O_2 \text{ —} CO_2$$
$$HC + O_2 \text{ ——} CO_2 + H_2O$$

- The NOx is reduced by the reduction function of rhodium, which converts NOx into harmless nitrogen (N_2) and oxygen (O_2), resulting in cleaner exhaust gases.

$$NOx \text{ ———} N_2 + O_2$$

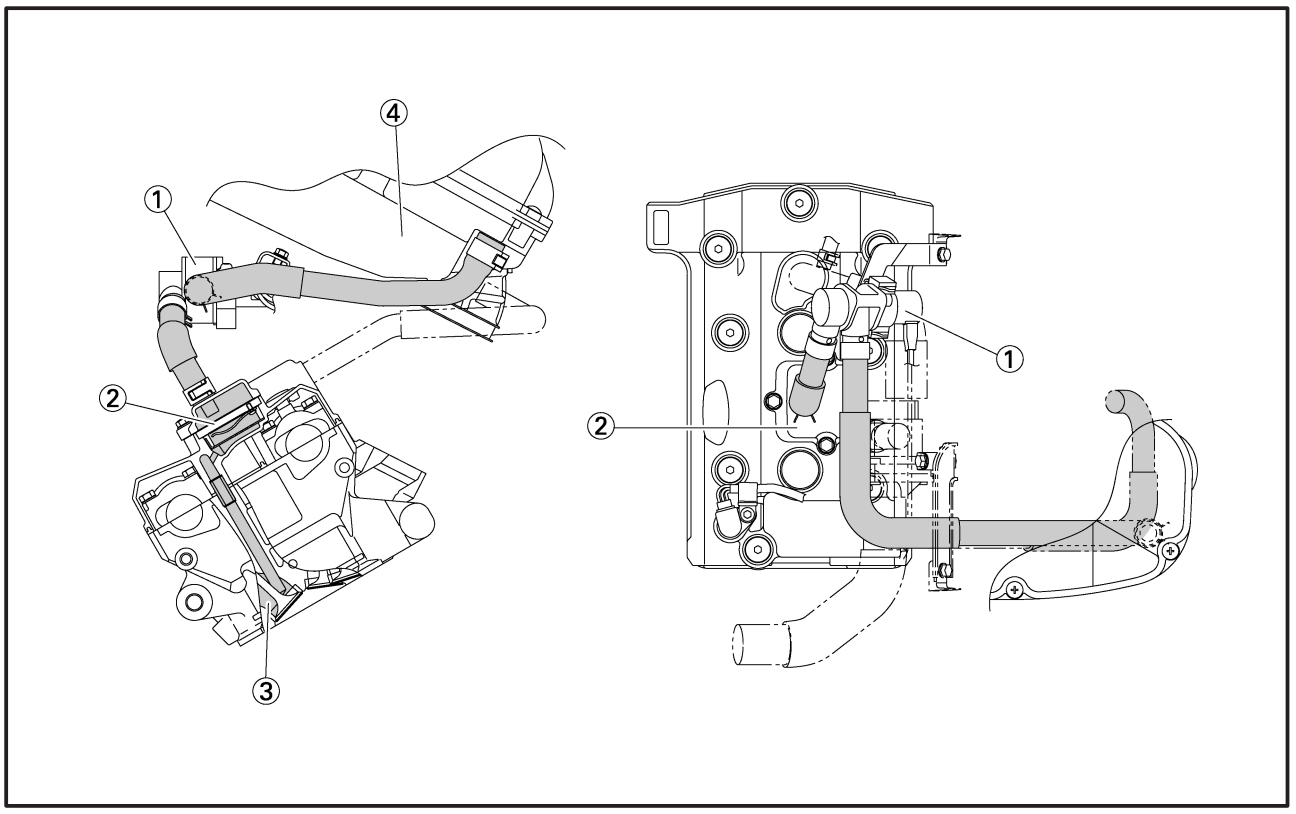
To clean the exhaust gases at a high rate of efficiency through the maximization of these catalytic capacities, it is necessary to maintain and control the mixture in the vicinity of the stoichiometric airfuel ratio of (14.7 : 1) at all times. As a means of maintaining the stoichiometric ratio, this system has adopted an O_2 feedback compensation method that uses an O_2 sensor.

Large amounts of both CO and HC are generated when the mixture is rich (as indicated by insufficient O_2 region Ⓐ). Conversely, large amounts of NOx are generated when the mixture is lean (as indicated by excessive O_2 region Ⓑ). Under these conflicting characteristics, the system maintains the mixture within an extremely narrow range ⓒ of stoichiometric ratio (14.7 : 1). As a result, the function of the catalyst is maximized, making it possible to clean the exhaust gases at a high degree of efficiency.



AIR INDUCTION SYSTEM

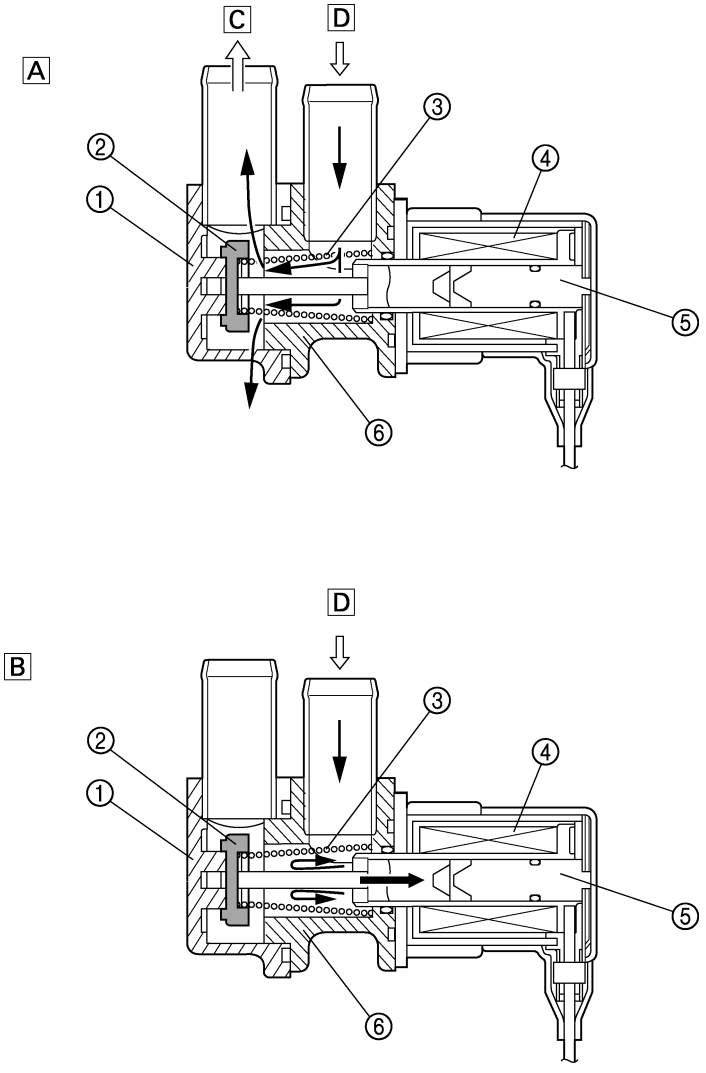
The air induction system (AI system) introduces fresh air into the exhaust port in order to burn the unburned gas (which is present in the exhaust gas) in the exhaust pipe. The burning of the unburned gases in this manner enhances the efficiency of the catalyst and results in cleaner exhaust gases.
The AI system takes a portion of the air from the air cleaner, sends it to the reed valve via the air cut-off valve, and introduces it directly into the exhaust port through the reed valve.
The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut off the flow when the motorcycle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.
The reed valve is provided on the cylinder head cover above the cylinders, and sends air to the exhaust pipe through the inside of the cylinder head.



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

Air cut-off valve

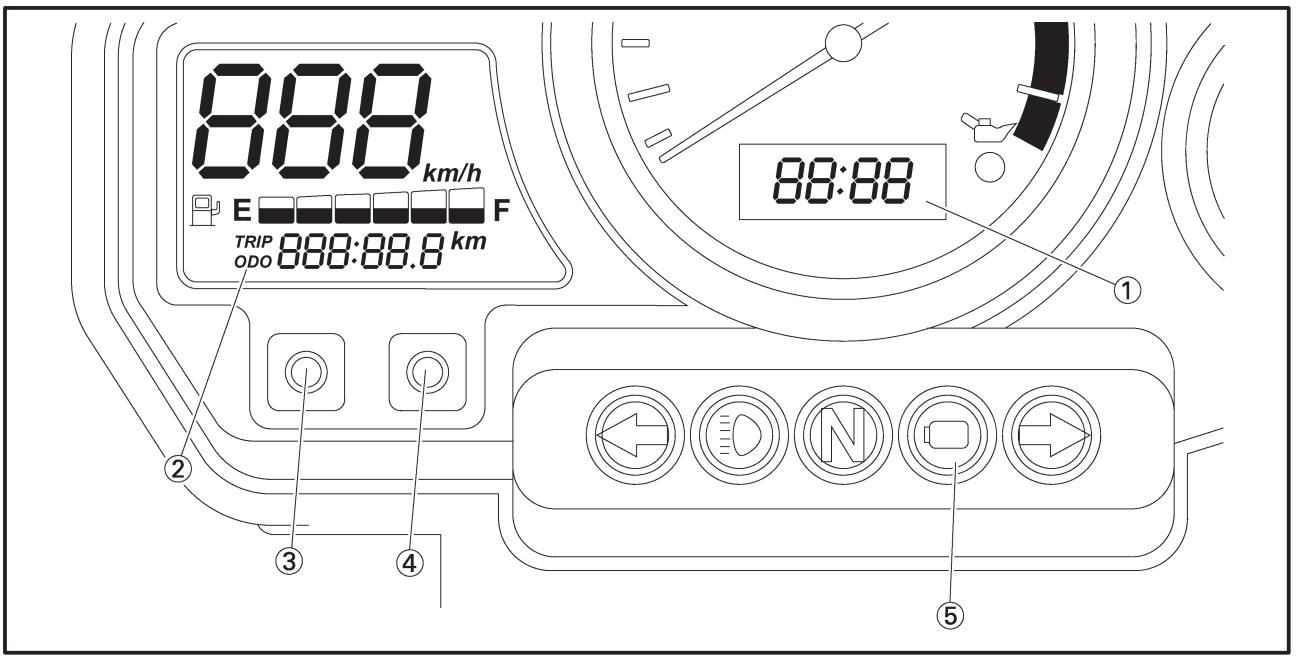
The air cut-off valve consists of a plunger that is mounted inside the core of a solenoid coil, and a valve at the end of the plunger for opening and closing the air passage. Due to the force of a spring, the valve is in constant contact with valve block A, and thus keeps the air passage open. As a result,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



① Valve block A
② Valve
③ Spring
④ Coil
⑤ Core
⑥ Valve block B

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

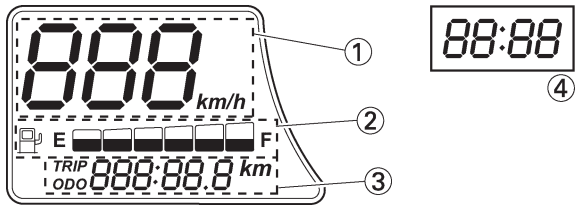
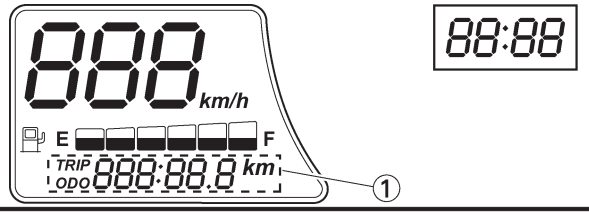
INSTRUMENT PANEL

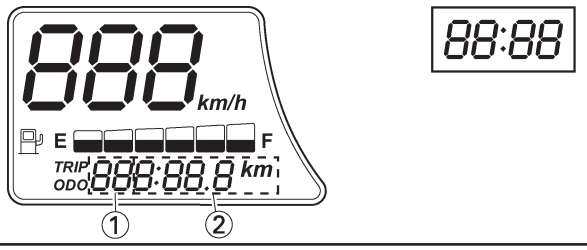
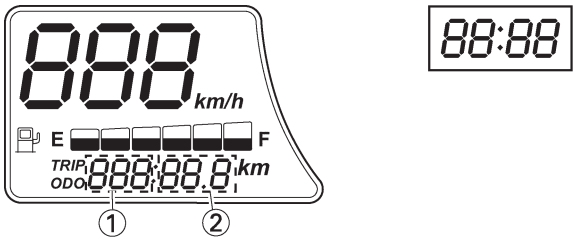
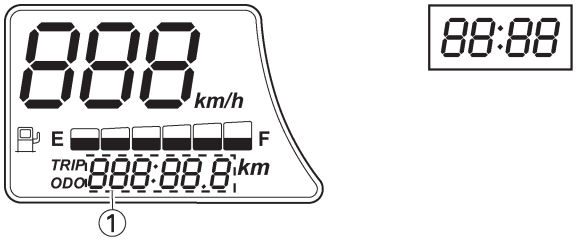


① Clock
② TRIP/ODO meter
③ SELECT button
④ RESET button
⑤ Engine trouble warning light

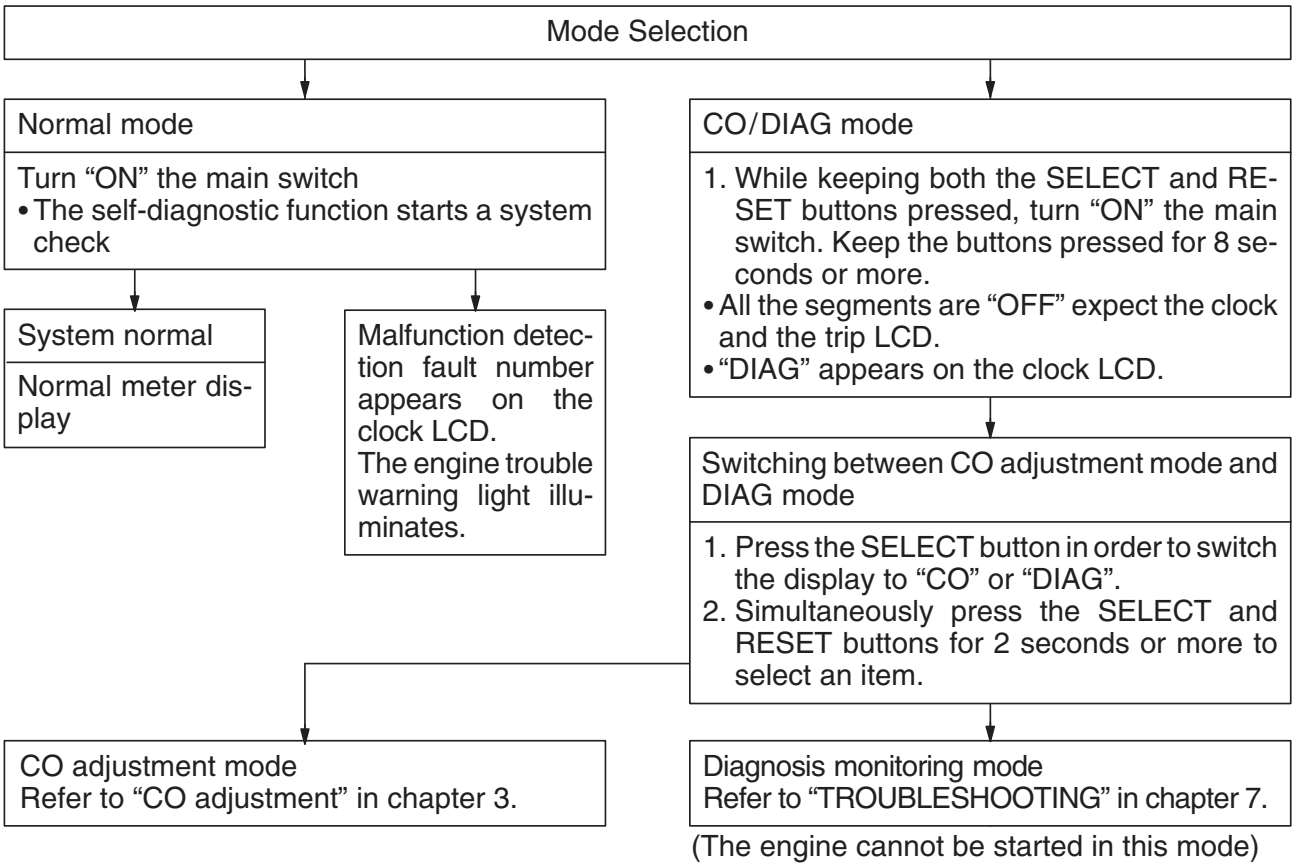
Function indication

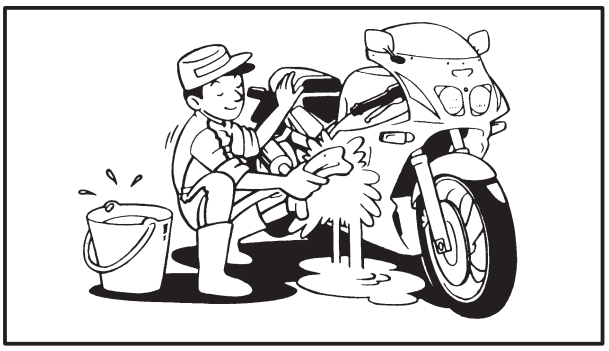
The indications of the self-diagnosis function can be checked and inspection operations can be performed through the use of the multi-function meter on the instrument panel.
Based on the signals received from the sensors, the ECU inputs the signals into the multi-function meter. Then, the conditions of the sensors appear on the clock and trip/odometer display of the multi-function meter.

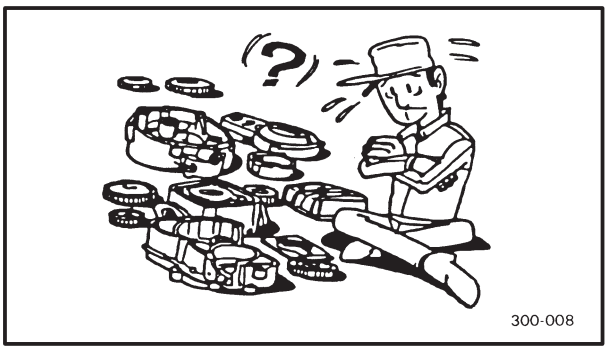
NORMAL MODE  	① Speed meter ② Fuel meter (The symbol " ⛽ " blinks when the gasoline is almost empty) ③ Trip/odometer display ④ Clock display
CO ADJUSTMENT/DIAGNOSTIC MONITORING SELECTION MODE  	① Temporary selection display for CO/DIAG. CO: TRIP ODO 88:88.8 km DIAG: TRIP ODO 888:88.8 km

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

CO adjustment and diagnostic monitoring mode





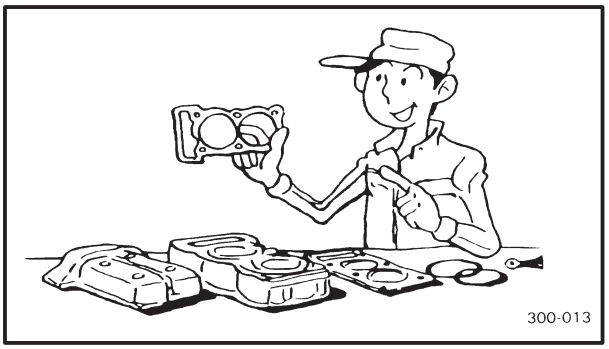


EAS00020

IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY

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



EAS00021

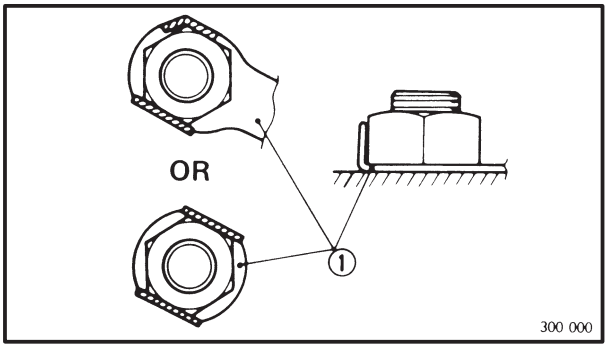
REPLACEMENT PARTS

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

EAS00022

GASKETS, OIL SEALS AND O-RINGS

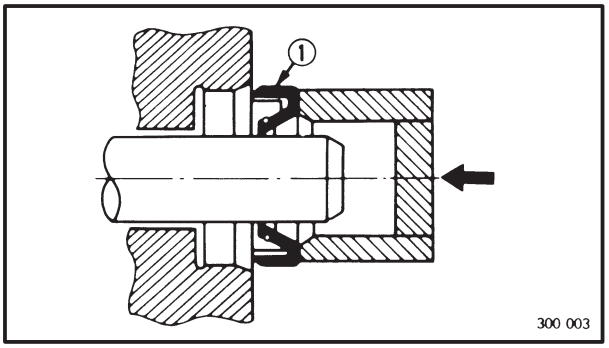
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



EAS00023

LOCK WASHERS/PLATES AND COTTER PINS

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

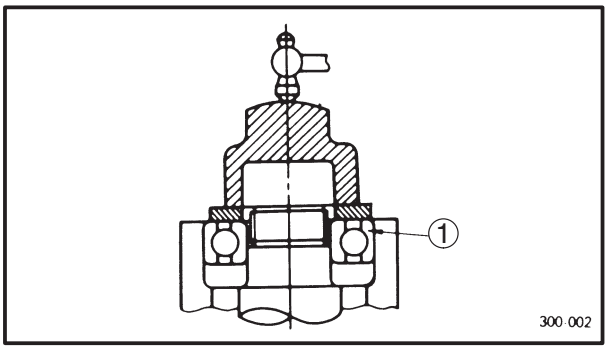


EAS00024

BEARINGS AND OIL SEALS

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

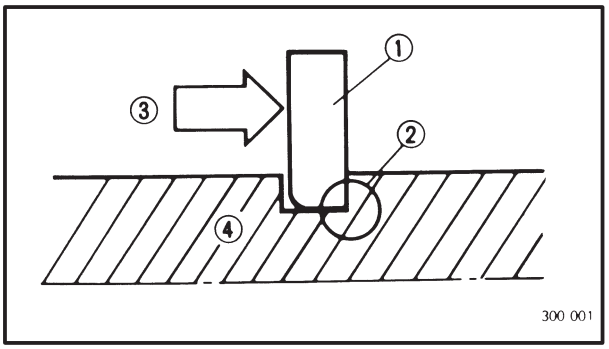
① Oil seal



CAUTION:

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

① Bearing



EAS00025

CIRCLIPS

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

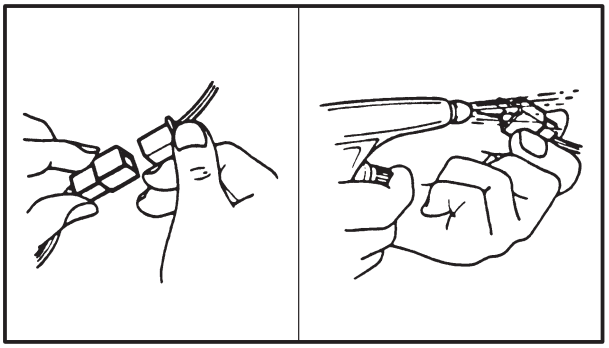
④ Shaft

EAS00026

CHECKING THE CONNECTIONS

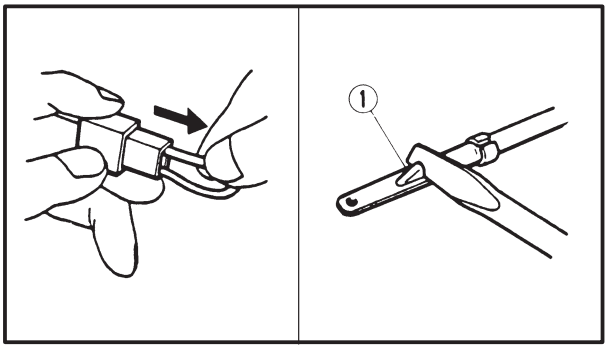
Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - lead
   - coupler
   - connector



2. Check:
   - lead
   - coupler
   - connector

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

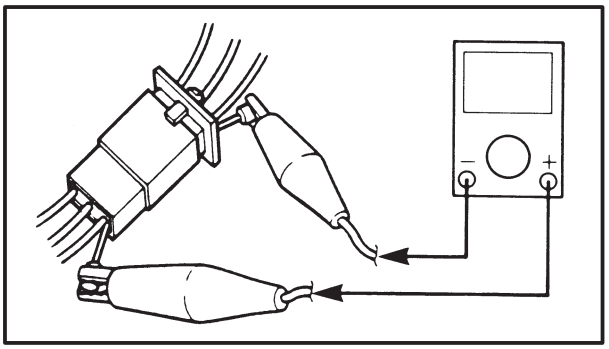


3. Check:
   - all connections

   Loose connection → Connect properly.

NOTE:

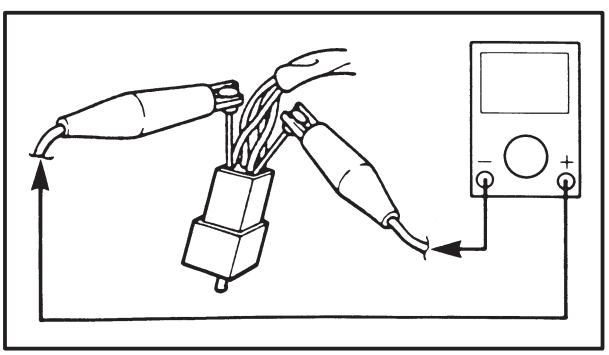
If the pin ① on the terminal is flattened, bend it up.



4. Connect:
   - lead
   - coupler
   - connector

NOTE:

Make sure all connections are tight.



5. Check:
   - continuity

   (with the pocket tester)

	Pocket tester **90890-03112**

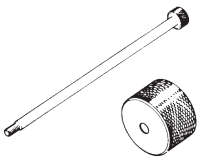
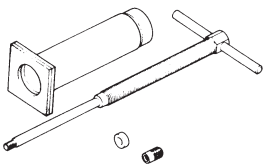
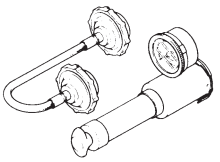
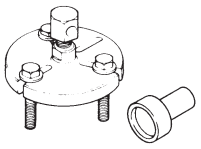
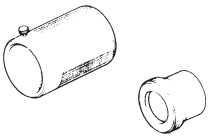
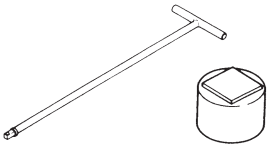
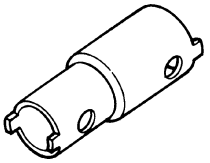
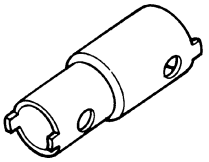
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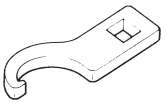
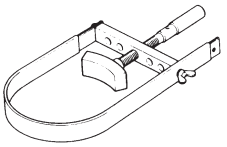
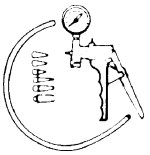
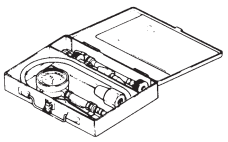
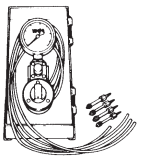
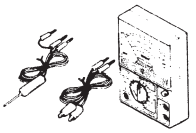
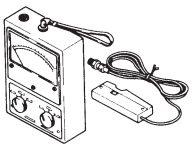
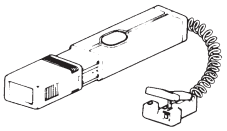
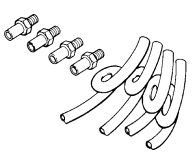
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

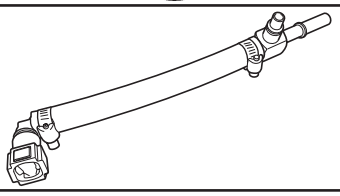
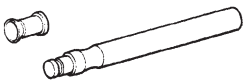
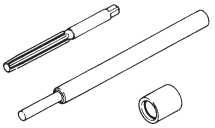
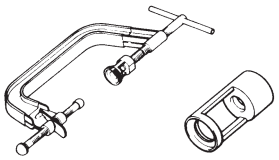
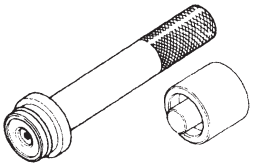
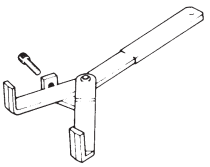
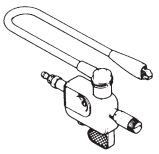
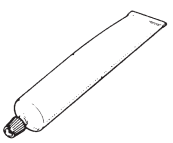
EAS00027

SPECIAL TOOLS

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

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

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

Tool No.	Tool name/How to use	Illustration
90890-03153	Pressure gauge This tool is needed to measure fuel pressure.	
90890-03176	Fuel pressure adapter This tool is needed to measure fuel pressure.	
90890-04101	Valve lapper This tool is needed to remove and install the valve lifter.	
90890-04016	Valve guide remover, installer and reamer (5.5 mm) This tool is needed to remove and install the valve lifter.	
90890-04019 90890-04108	Valve spring compressor Valve spring compressor attachment These tools are needed to remove and install the valve assemblies.	
90890-04058 90890-04078	Middle driven shaft bearing driver Mechanical seal installer These tools are needed to install the water pump seal.	
90890-04086	Universal clutch holder This tool is used to hold the clutch when removing or installing the clutch boss nut.	
90890-06754	Ignition checker This instrument is necessary for checking the ignition system components.	
90890-85505	Yamaha bond No. 1215 This sealant (bond) is used on crankcase mating surfaces, etc.	



SPEC 2

CHAPTER 2
SPECIFICATIONS

GENERAL SPECIFICATIONS 2-1

ENGINE SPECIFICATIONS 2-2

CHASSIS SPECIFICATIONS 2-11

ELECTRICAL SPECIFICATIONS 2-15

CONVERSION TABLE 2-18

GENERAL TIGHTENING TORQUE SPECIFICATIONS 2-18

TIGHTENING TORQUES 2-19
ENGINE TIGHTENING TORQUES 2-19
CHASSIS TIGHTENING TORQUES 2-22

LUBRICATION POINTS AND LUBRICANT TYPES 2-24
ENGINE LUBRICATION POINTS AND LUBRICANT TYPES 2-24
CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES 2-25

OIL FLOW DIAGRAMS 2-26

COOLING SYSTEM DIAGRAMS 2-31

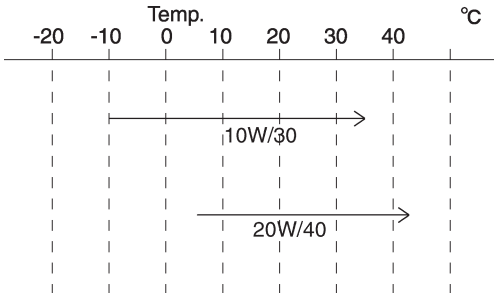
CABLE ROUTING 2-34

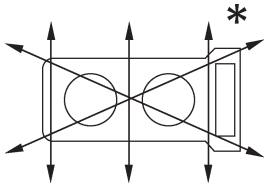
SPECIFICATIONS

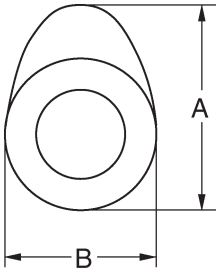
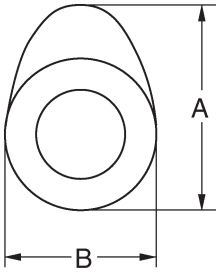
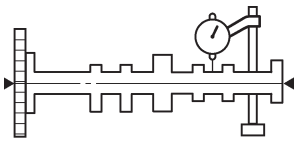
GENERAL SPECIFICATIONS

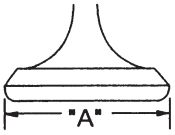
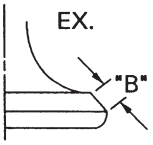
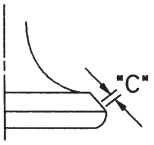
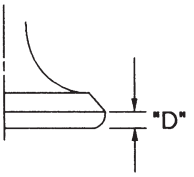
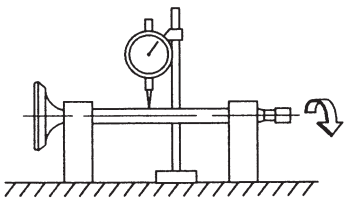
Item	Standard	Limit
Model code	5PS1 (for EUR) 5PS2 (for OCE)	••• •••
Dimensions		
Overall length	2,180 mm	•••
Overall width	800 mm	•••
Overall height	1,290 mm	•••
Seat height	825 mm	•••
Wheelbase	1,485 mm	•••
Minimum ground clearance	160 mm	•••
Minimum turning radius	2,900 mm	•••
Weight		
Wet (with oil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

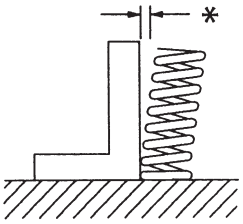
ENGINE SPECIFICATIONS

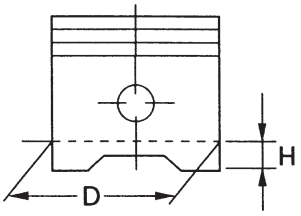
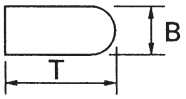
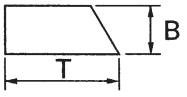
Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	•••
Displacement	897 cm^3	•••
Cylinder arrangement	Forward-inclined parallel 2-cylinder	•••
Bore × stroke	92.0 × 67.5 mm	•••
Compression ratio	10.4 : 1	•••
Engine idling speed	1,100 ~ 1,200 r/min	•••
Vacuum pressure at engine idling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

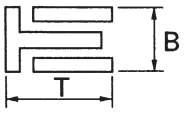
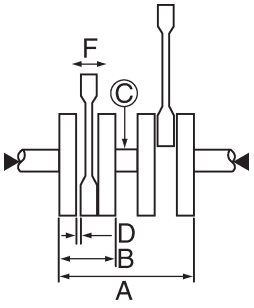
Item	Standard	Limit
Oil filter		
Oil filter type	Paper	•••
Bypass valve opening pressure	40.0 ~ 80.0 kPa (0.40 ~ 0.80 kg/cm^2, 0.40 ~ 0.80 bar)	•••
Oil pump		
Oil pump type	Trochoid	•••
Inner-rotor-to-outer-rotor-tip clearance	0.00 ~ 0.12 mm	0.20 mm
Outer-rotor-to-oil-pump-housing clearance	0.03 ~ 0.08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

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

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

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

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

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

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

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

CHASSIS SPECIFICATIONS

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

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

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

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

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	•••
Ignition system		
Ignition system type	Transistorized coil ignition (digital)	•••
Ignition timing	10° BTDC at 1,150 r/min	•••
Advancer type	Electric	•••
Pickup coil resistance/color	420.8 ~ 569.3 Ω/Gy-B	•••
Transistorized coil ignition unit model (manufacturer)	F8T911 (MITSUBISHI)	•••
Ignition coils		
Model (manufacturer)	JO226 (DENSO)	•••
Minimum ignition spark gap	6 mm	•••
Primary coil resistance	3.4 ~ 4.6 Ω	•••
Secondary coil resistance	10.4 ~ 15.6 kΩ	•••
Spark plug caps		
Material	Resin	•••
Resistance	10 kΩ	•••
Charging system		
System type	A.C. magneto	•••
Model (manufacturer)	LNZ86 (DENSO)	•••
Nominal output	14 V/31.5 A at 5,000 r/min	•••
Stator coil resistance/color	0.18 ~ 0.28 Ω/W-W	•••
Rectifier/regulator		
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	•••
Battery		
Battery type (manufacturer)	GT12B-4 (GS)	•••
Battery voltage/capacity	12 V/10 AH	•••
Specific gravity	1.320	•••
Ten hour rate amperage	1.0 A	•••
Headlight type	Halogen bulb	•••
Indicator light (voltage/wattage × quantity)		
Neutral indicator light	14 V 1.2 W × 1	•••
Turn signal indicator light	14 V 1.2 W × 2	•••
Oil level warning light	LED × 1	•••
High beam indicator light	14 V 1.4 W × 1	•••
Engine trouble warning light	14 V 1.4 W × 1	•••

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

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

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

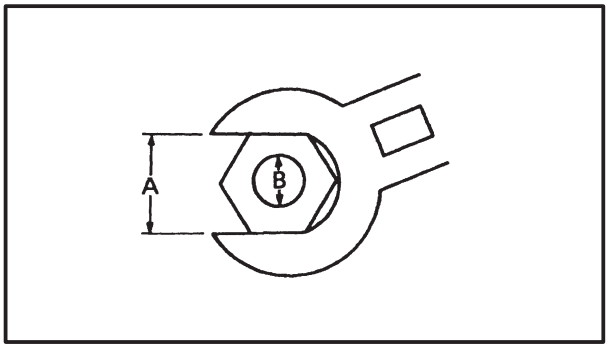
CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Tightening torque	m•kg m•kg cm•kg cm•kg	7.233 86.794 0.0723 0.8679	ft•lb in•lb ft•lb in•lb
Weight	kg g	2.205 0.03527	lb oz
Speed	km/hr	0.6214	mph
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu•in qt (IMP liq.) gal (IMP liq.)
Misc.	kg/mm kg/cm^2 Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in^2) Fahrenheit (°F)

EAS00029

GENERAL TIGHTENING TORQUE SPECIFICATIONS

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



A: Width across flats
B: Thread diameter

A (nut)	B (bolt)	General tightening torques	
		Nm	m•kg
10 mm	6 mm	6	0.6
12 mm	8 mm	15	1.5
14 mm	10 mm	30	3.0
17 mm	12 mm	55	5.5
19 mm	14 mm	85	8.5
22 mm	16 mm	130	13.0

TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES

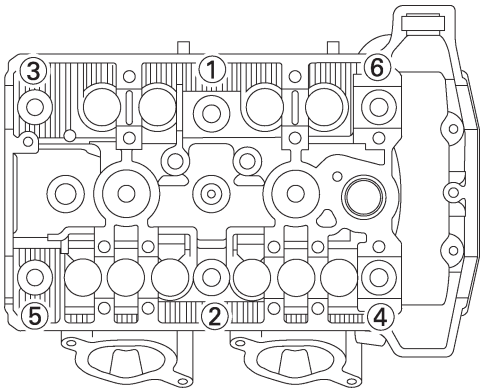
Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m•kg	
Cylinder head stud bolt (exhaust pipe)	Bolt	M8	4	15	1.5	
Camshaft cap	Bolt	M8	16	10	1.0	
Cylinder head bolt	Bolt	M6	2	10	1.0	
Cylinder head nut (initial)	Nut	M10	6	18	1.8	E
(2nd)				18*1	1.8*1	
(final)				150°*2		
Cylinder head cover	Bolt	M6	8	10	1.0	
Oil gallery bolt	Bolt	M6	1	10	1.0	
Spark plug	–	M12	2	18	1.8	
Cylinder head cover breather plate	Screw	M5	3	4	0.4	
Cylinder identification sensor	Bolt	M6	1	10	1.0	ST
Connecting rod	Nut	M9	4	62	6.2	M
Generator rotor	Bolt	M12	1	130	13	
Camshaft sprocket	Bolt	M7	4	24	2.4	
Timing chain tensioner cap	Bolt	M6	1	7	0.7	
Radiator cover	Bolt	M6	2	5	0.5	ST
Radiator cap stopper	Bolt	M5	1	5	0.5	
Radiator	Bolt	M6	4	7	0.7	
Oil pipe 1	Bolt	M6	2	10	1.0	ST
Oil delivery pipe 1	Bolt	M10	2	21	2.1	
Oil pump	Screw	M6	6	6	0.6	
Oil baffle plate	Bolt	M6	2	10	1.0	ST
Engine oil drain bolt	Bolt	M14	1	35	3.5	
Oil strainer	Bolt	M6	4	10	1.0	ST
Relief valve stay	Bolt	M6	1	10	1.0	ST
Oil filter element drain bolt	Bolt	M10	1	30	3.0	
Air filter case	Bolt	M6	1	7	0.7	
Surge tank	Screw	M5	1	4	0.4	
Solenoid valve	Screw	M5	1	4	0.4	
Exhaust check bolt	Bolt	M6	2	10	1.0	
Exhaust pipe	Nut	M8	4	20	2.0	
Exhaust pipe	Bolt	M8	1	24	2.4	
Muffler joint	Bolt	M8	2	20	2.0	
Muffler	Bolt	M8	2	20	2.0	
O_2 sensor protector	Bolt	M6	2	10	1.0	*3
Crankcase (initial)	Bolt	M10	6	10	1.0	M
(2nd)				20*1	2.0*1	
(final)				55°*2		
Crankcase	Bolt	M6	12	12	1.2	E
Crankcase	Bolt	M8	10	24	2.4	E
Balancer shaft	Screw	M6	2	12	1.2	
Balancer holder	Bolt	M6	4	10	1.0	
Clutch cover plate	Screw	M5	3	4	0.4	
Crankcase upper cover	Bolt	M6	11	10	1.0	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m•kg	
Drive chain slider	Bolt	M6	2	10	1.0	
Engine bracket	Bolt	M8	2	24	2.4	
Starter clutch	Bolt	M6	3	10	1.0	
Clutch spring	Screw	M6	6	8	0.8	
Clutch boss	Nut	M20	1	70	7.0	Use a lock washer
Bearing housing	Screw	M6	3	12	1.2	Stake
Drive sprocket	Nut	M22	1	85	8.5	Use a lock washer
Speed sensor rotor	Nut	M10	1	20	2.0	
Sift drum	Screw	M5	1	4	0.4	
Stopper lever	Bolt	M6	1	10	1.0	
Shift fork guide stopper	Bolt	M6	2	12	1.2	
Shift arm	Bolt	M6	1	12	1.2	
Shift rod lock nut	Nut	M6	1	8	0.8	Left-hand threads
Shift rod lock nut	Nut	M6	1	8	0.8	
Shift rod joint	Bolt	M6	1	10	1.0	Left-hand threads
Shift pedal	Bolt	M8	1	22	2.2	
Stopper	Screw	M8	1	22	2.2	
Stator coil	Bolt	M6	3	10	1.0	
Crankshaft position sensor	Bolt	M5	2	4	0.4	
Neutral switch	Screw	M6	2	4	0.4	
Starter motor	Bolt	M6	2	10	1.0	
Thermo unit	–	M12	1	18	1.8	
Intake air temperature sensor	–	M12	1	18	1.8	
O_2 sensor	–	M18	1	45	4.5	
Oil filter element cover bolt	Bolt	M6	6	10	1.0	
Clutch cover	Bolt	M6	9	10	1.0	

NOTE:

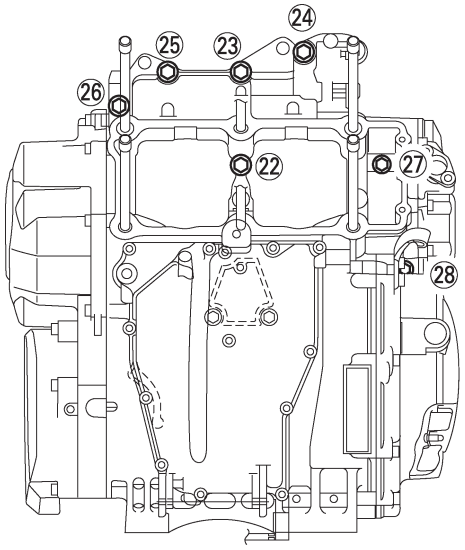
*1. Retighten the bolt (nut) to the specified torque with a torque wrench.
*2. Tighten the bolt (nut) again to the specified angle using an angle torque gauge.
*3. Apply anti-seize lubricant (high temperature grade).

Cylinder head tightening sequence:

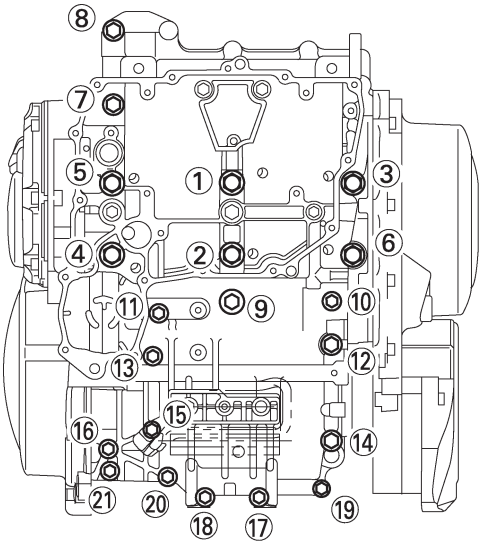


Crankcase tightening sequence:

Upper crankcase



Lower crankcase



CHASSIS TIGHTENING TORQUES

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

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

NOTE:

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

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

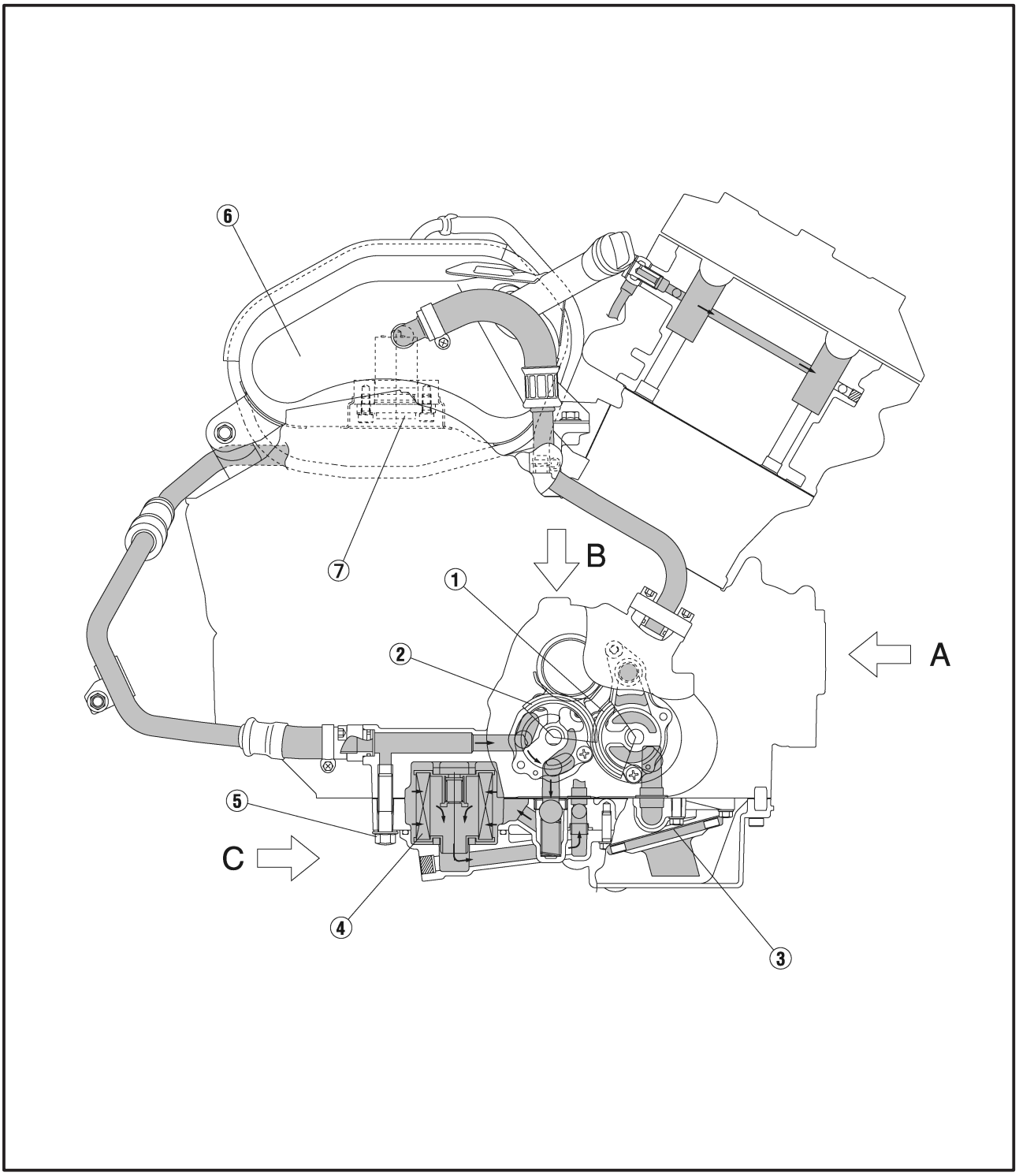
Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Bearings	E
Crankshaft pins	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts and nuts	M
Crankshaft journals	E
Camshaft lobes	M
Camshaft journals	M
Valve stems (intake and exhaust)	M
Valve stem ends (intake and exhaust)	E
Water pump impeller shaft	E
Oil pump rotors (inner and outer)	E
Oil pump housing	E
Oil strainer	E
Pull rod and clutch cover	LS
Shift shaft left side and crankcase	LS
Starter clutch idle gear inner surface	E
Starter clutch assembly	E
Primary driven gear	E
Transmission gears (wheel and pinion)	M
Main axle and drive axle	M
Shift drum	E
Shift forks and shift fork guide bars	E
Shift shaft right side and crankcase	E
Shift pedal bolt	LS
Cylinder head cover mating surface	Yamaha bond No. 1215
Cylinder head cover	Yamaha bond No. 1215
Crankcase mating surface	Yamaha bond No. 1215
Speed sensor gromet	Yamaha bond No. 1215
O_2 sensor protector	Anti-seize lubricant (high temperature grade)

CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

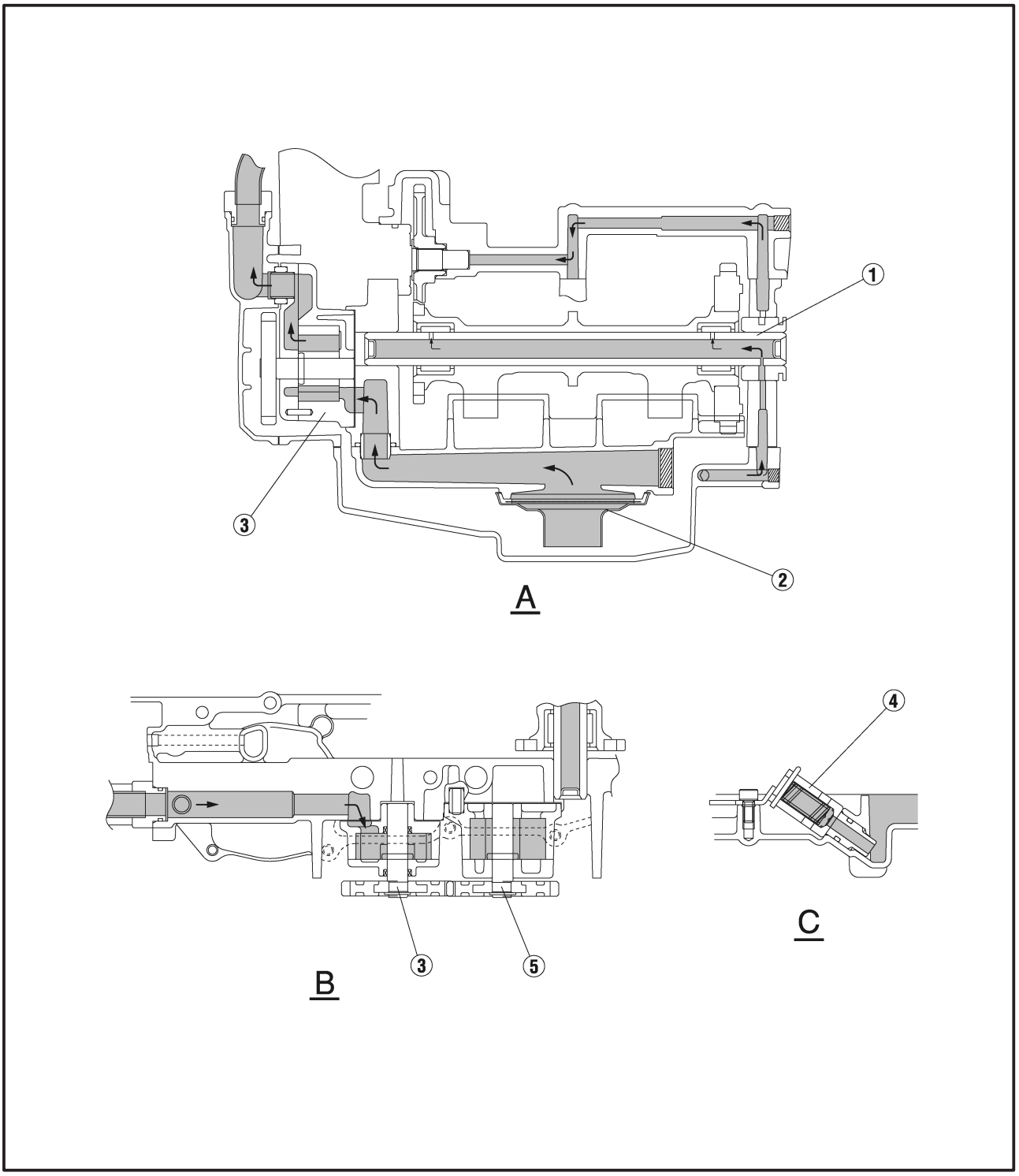
Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	LS
Front wheel oil seal (right and left)	LS
Rear wheel oil seal	LS
Rear wheel drive hub oil seal	LS
Rear wheel drive hub mating surface	LS
Rear brake pedal pivot	LS
Rear footrest pivoting point	LS
Sidestand pivoting point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

OIL FLOW DIAGRAMS

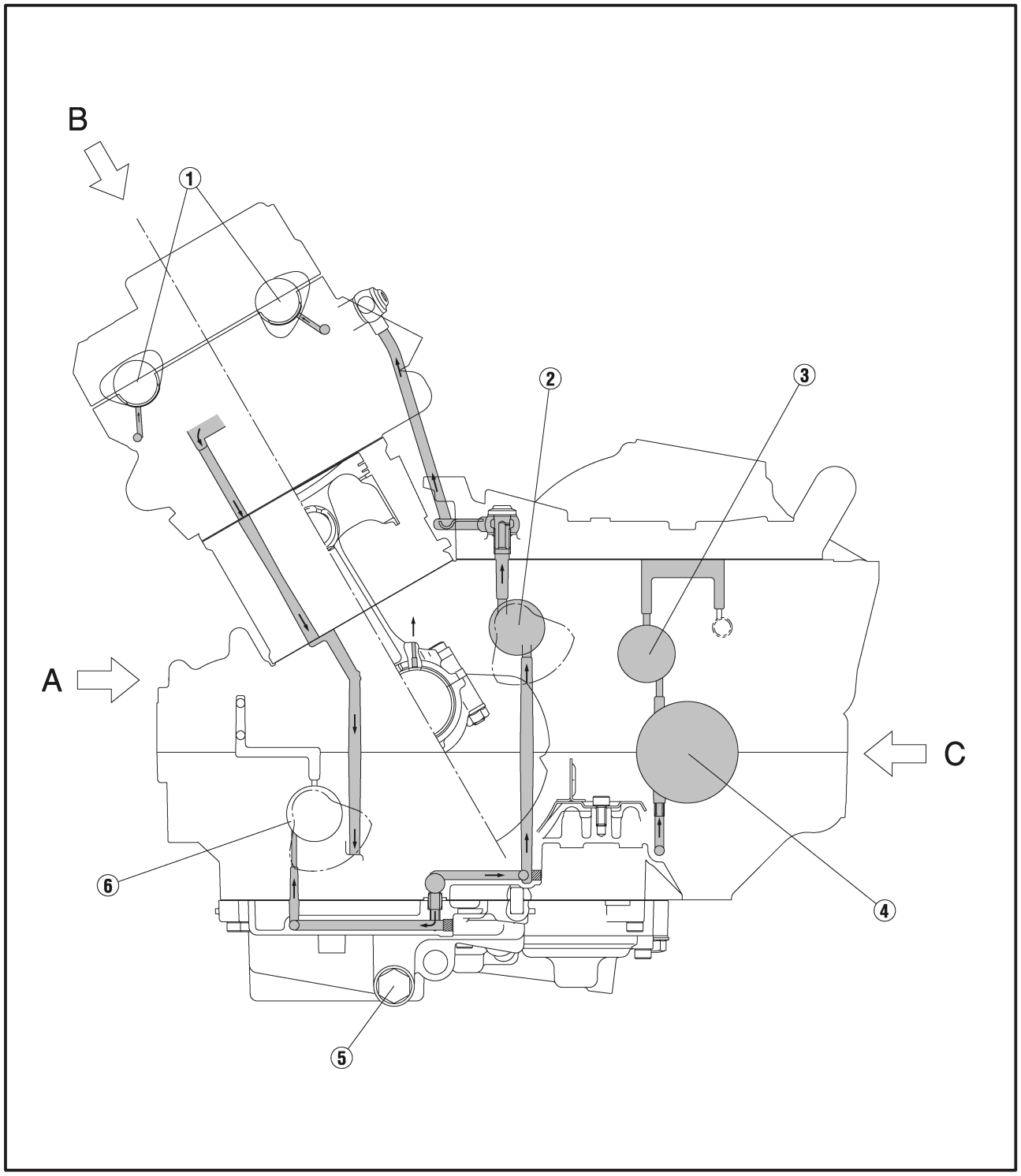
① Scavenge pump
② Feed pump
③ Oil strainer
④ Oil filter element
⑤ Oil drain bolt (oil tank)
⑥ Oil tank
⑦ Oil level switch



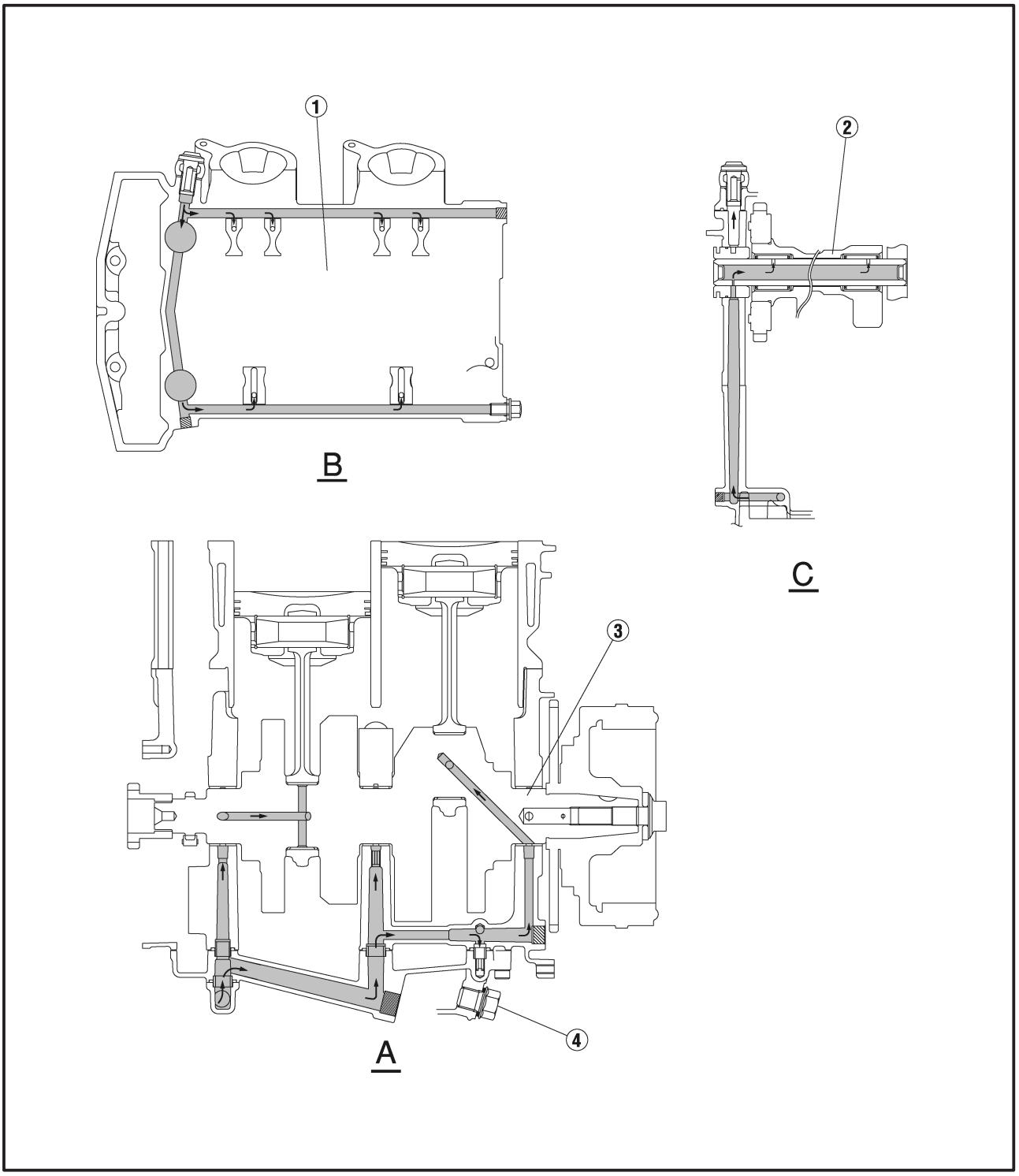
① Front balancer shaft
② Oil strainer
③ Feed pump
④ Relief valve
⑤ Scavenge pump



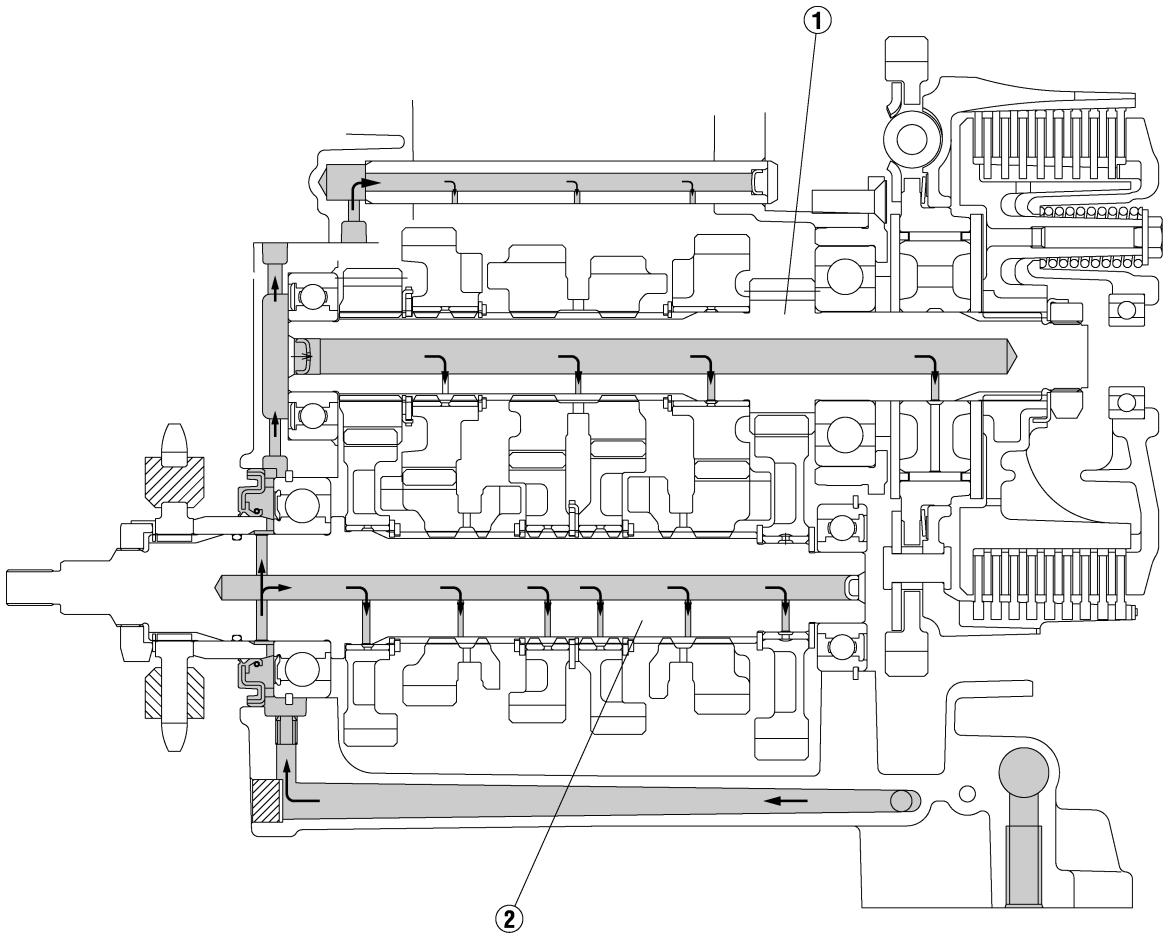
① Cam shaft
② Rear balancer shaft
③ Main axle
④ Drive axle
⑤ Oil drain bolt (engine)
⑥ Front balancer shaft



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

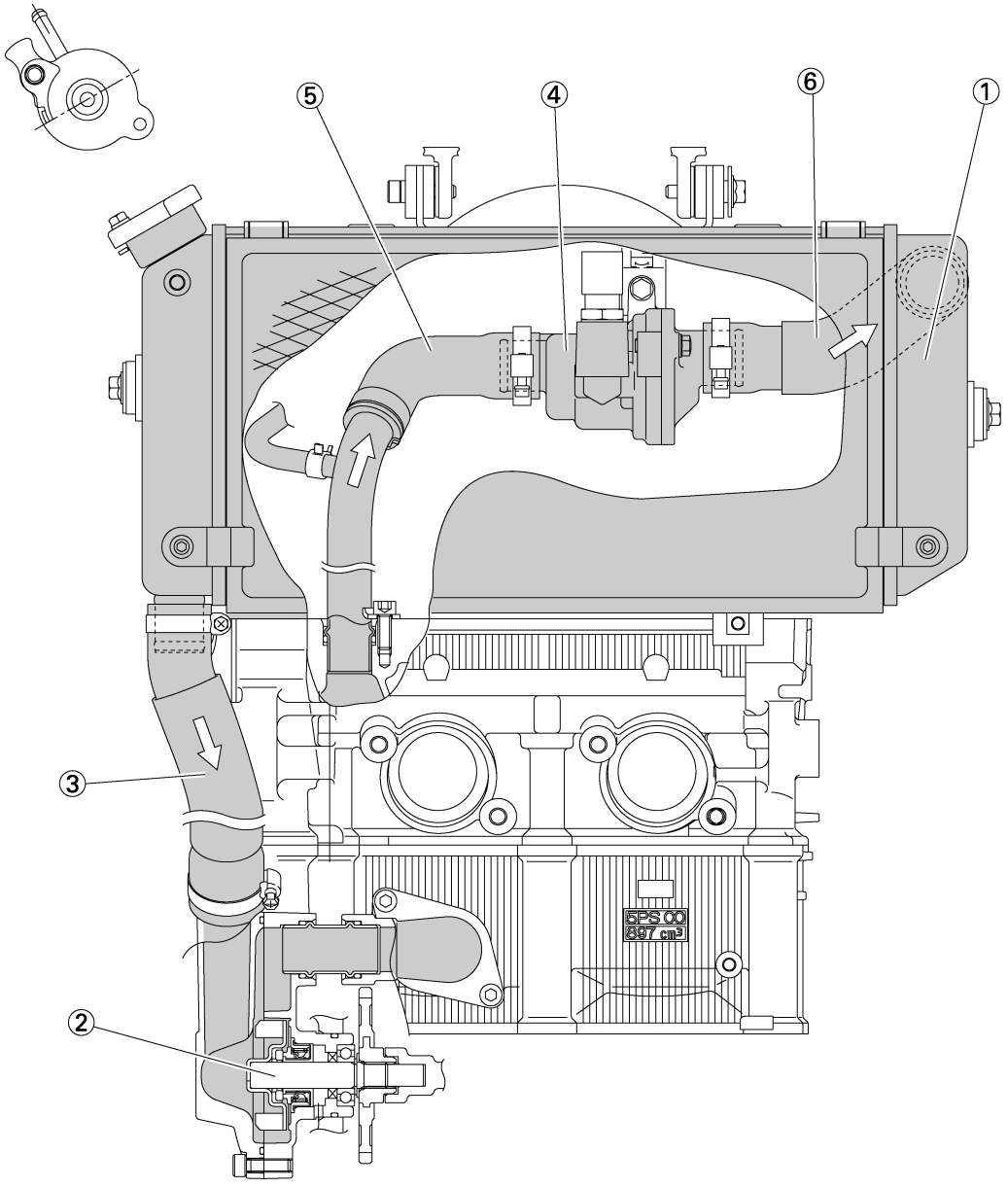


① Main axle
② Drive axle

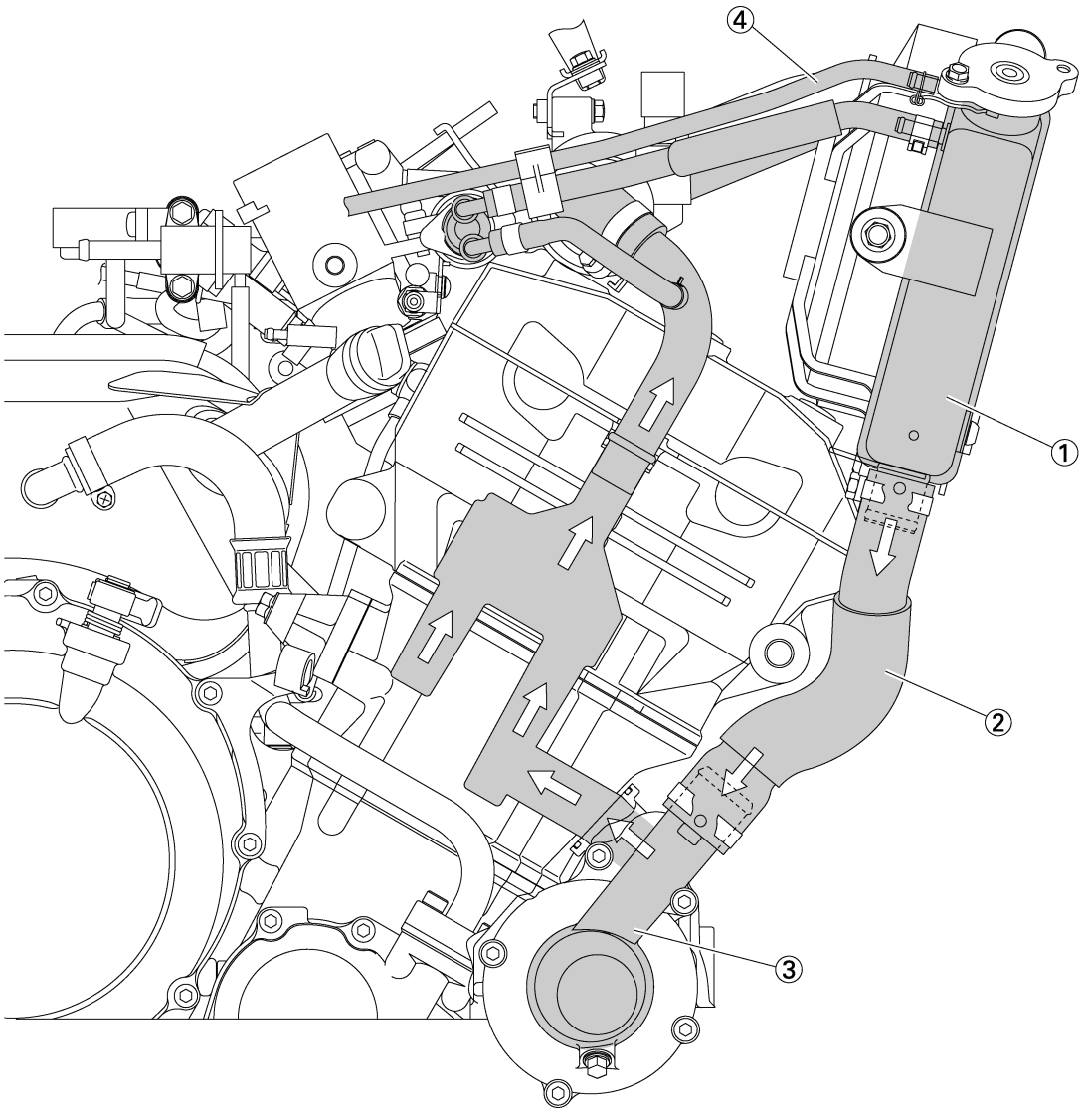


COOLING SYSTEM DIAGRAMS

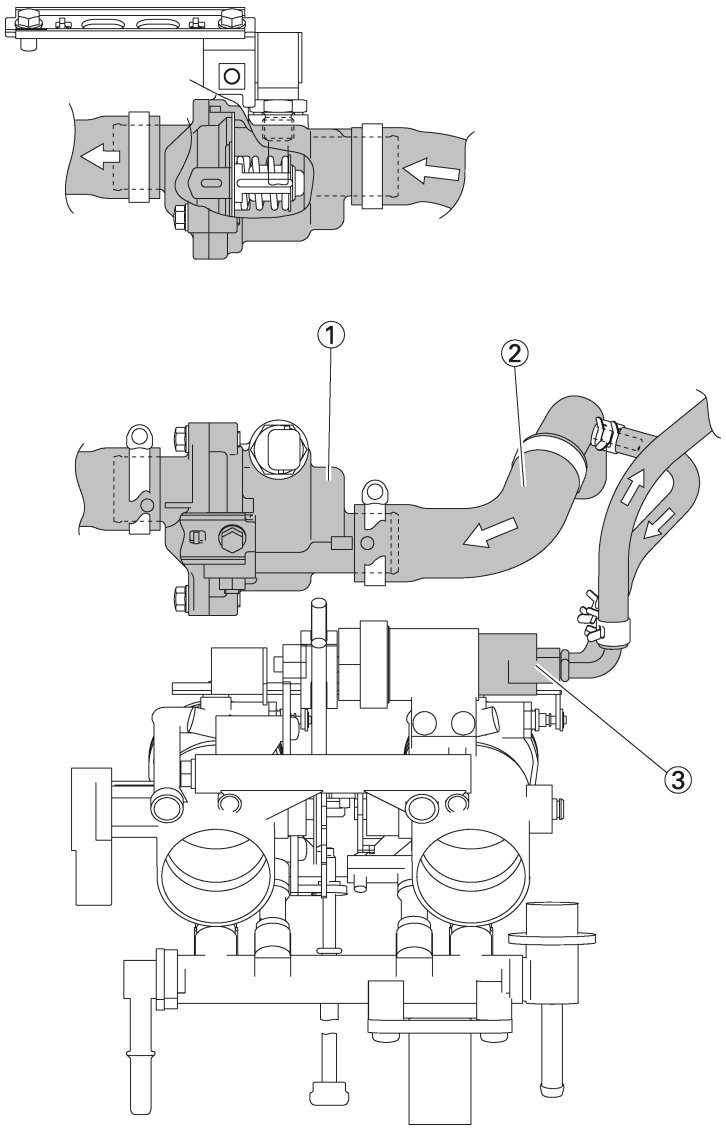
① Radiator
② Water pump
③ Radiator outlet hose
④ Thermostat assembly
⑤ Thermostat inlet hose
⑥ Radiator inlet hose



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

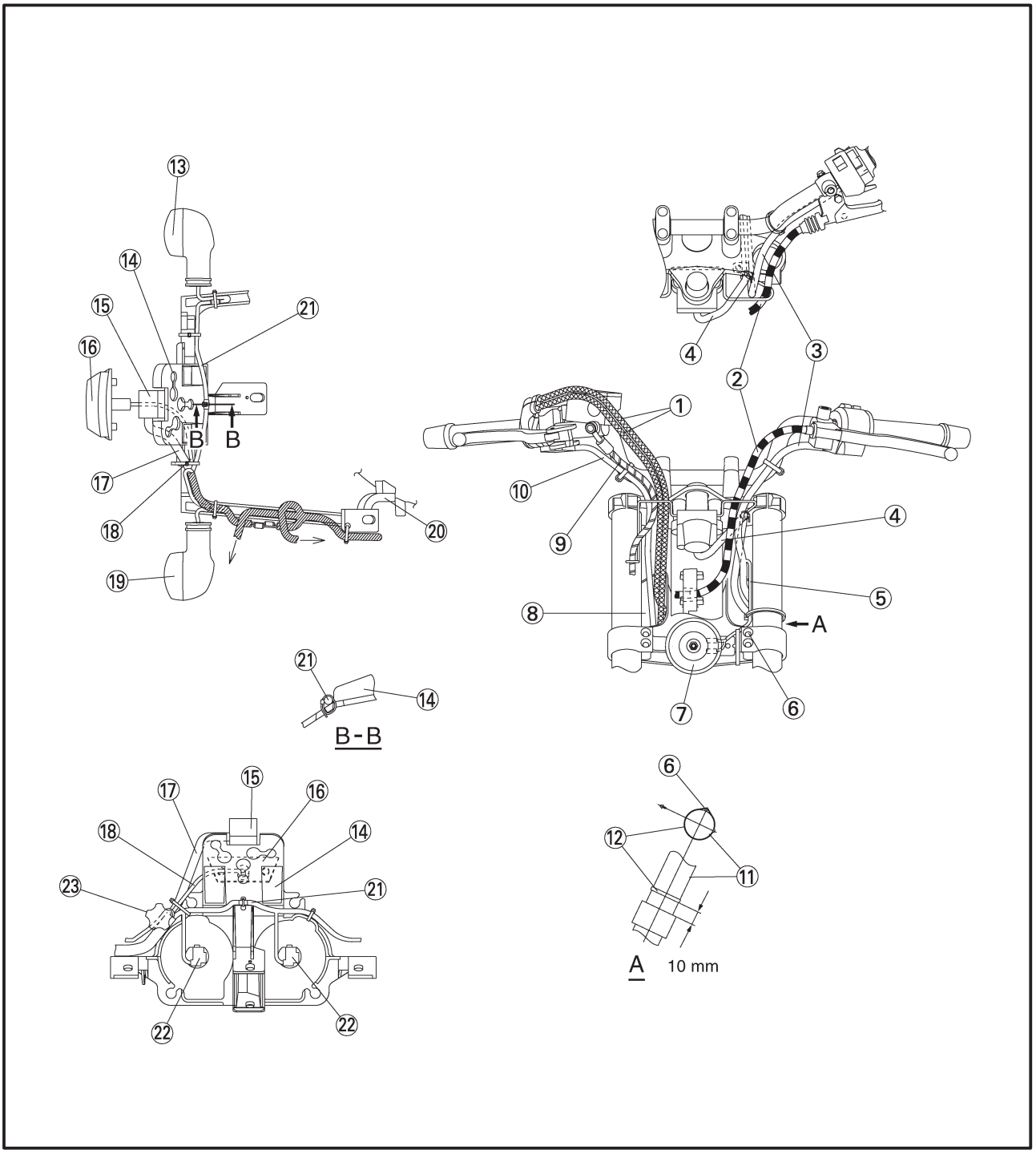


① Thermostat assembly
② Thermostat inlet hose
③ Liner control valve

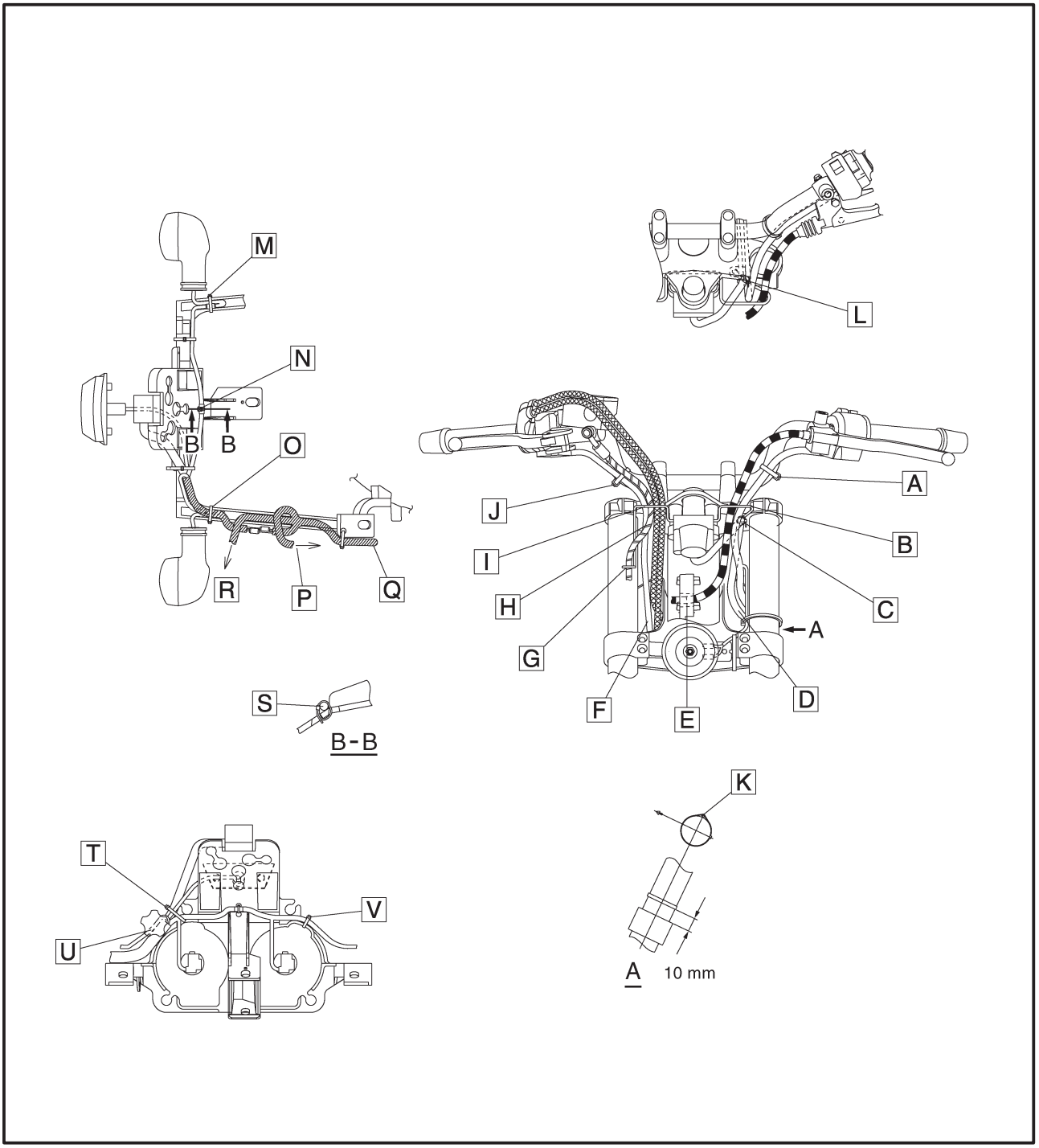


CABLE ROUTING

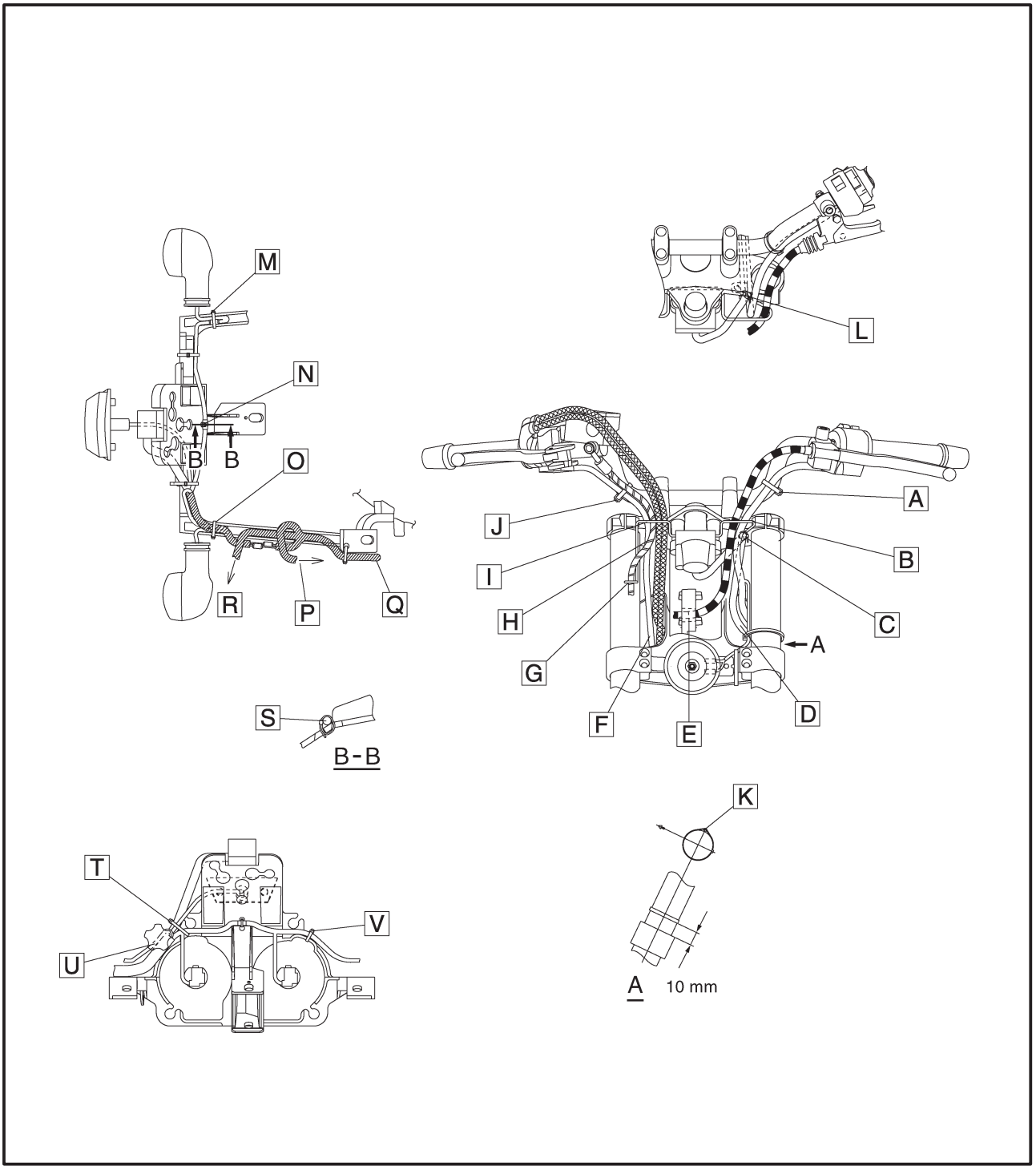
① Throttle cables
② Clutch cable
③ Handlebar switch lead (left)
④ Main switch lead
⑤ Cover 7
⑥ Horn lead
⑦ Horn
⑧ Cover 8
⑨ Front brake hose
⑩ Handlebar switch lead (right)
⑪ Front fork
⑫ Clamp
⑬ Front turn signal light (right)
⑭ Stay 1
⑮ Meter assembly
⑯ Auxiliary light
⑰ Meter lead
⑱ Auxiliary light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



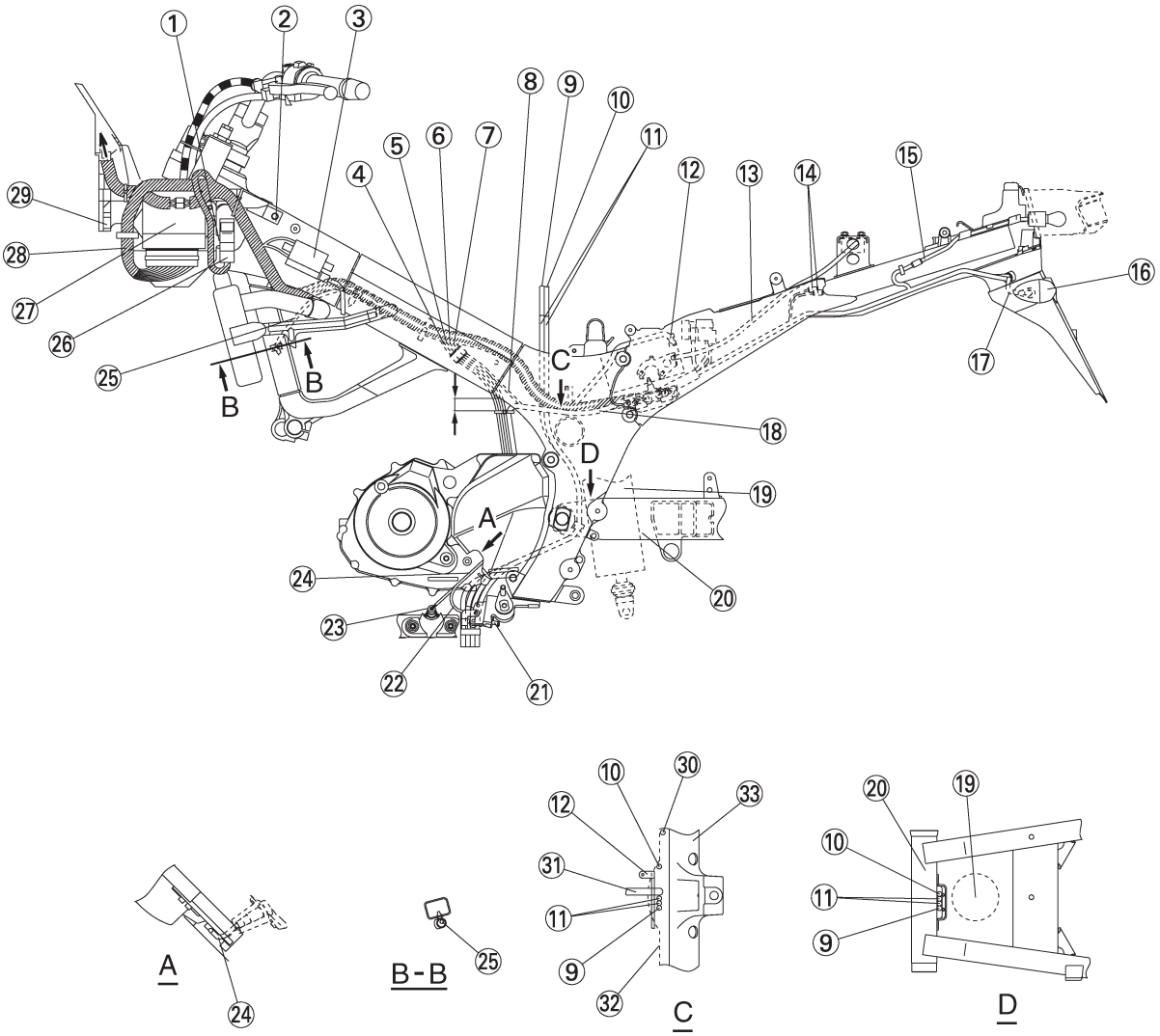
A Fasten the handlebar switch lead (left) to the handlebar with a band.
B Through the handlebar switch lead (left) and clutch cable to the wire guide on the upper bracket.
C Fasten the main switch lead to the wire guide with a clamp. There should be no slack between main switch and wire guide. Cut the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



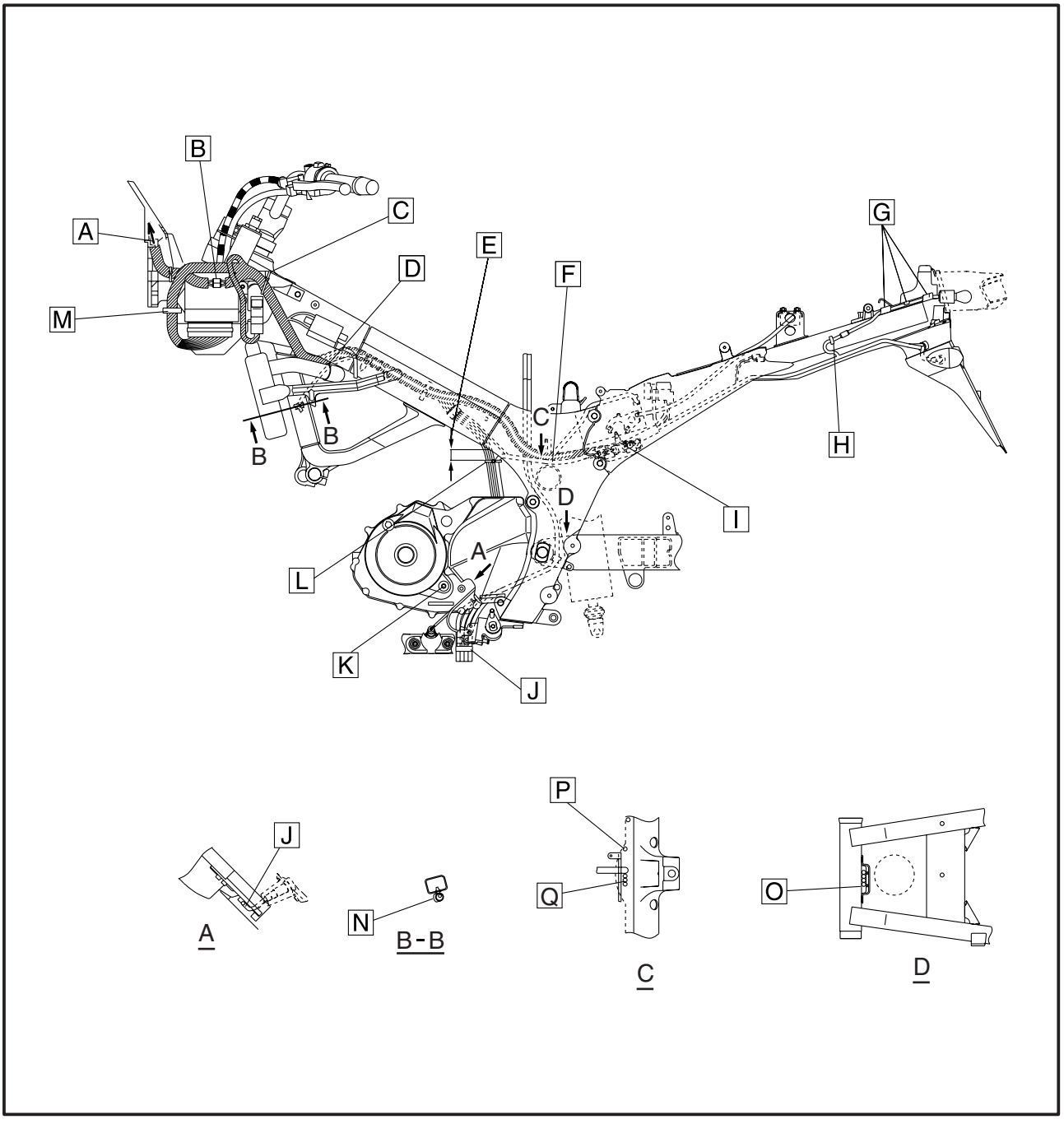
[L] Fasten the main switch lead with a clamp so that it faces the front side of the vehicle.
[M] Fasten the turn signal lead (right) together with the coupler to the stay 1.
[N] Clamp the headlight sub wire harness aligned with the white tape.
[O] Fasten the wire harness and turn signal lead (left) together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



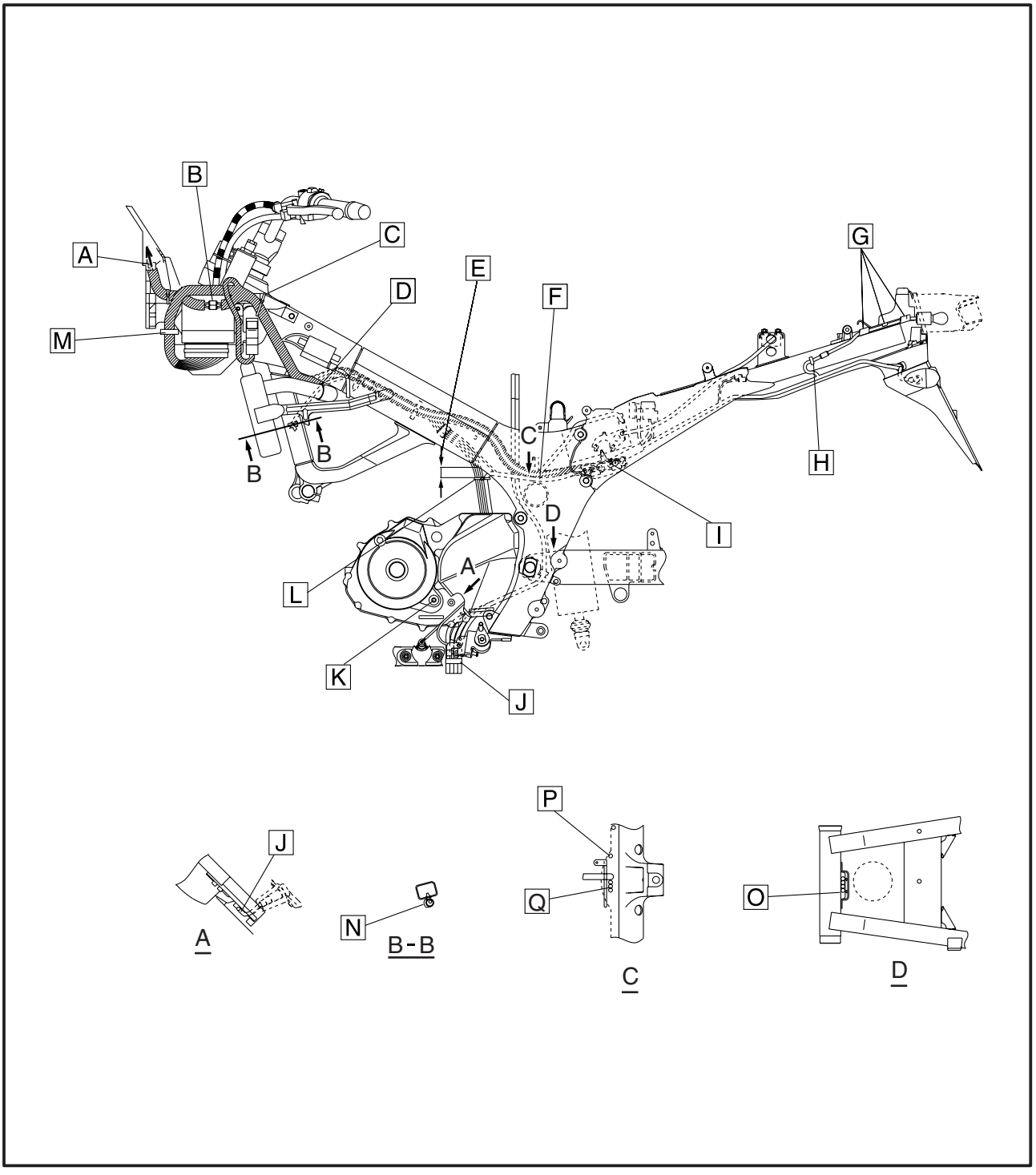
① Plate
② Stay 3
③ Ignition coil
④ Neutral switch lead
⑤ O_2 sensor lead
⑥ Speed sensor lead
⑦ Sidestand switch lead
⑧ Crankshaft position sensor lead
⑨ Air filter case drain hose
⑩ Coolant reservoir tank drain hose
⑪ Fuel drain hose
⑫ Battery negative lead
⑬ Seat lock cable
⑭ Alarm coupler
⑮ Tail/brake light lead
⑯ Rear turn signal light (left)
⑰ Rear turn signal light lead
⑱ Rectifier/regulator lead
⑲ Rear suspension
⑳ Swingarm
㉑ Sidestand switch
㉒ Sidestand switch lead
㉓ O_2 sensor
㉔ O_2 sensor lead
㉕ Cylinder identification sensor
㉖ Headlight relay (for OCE)
㉗ ECU
㉘ ECU lead
㉙ Stay 1
㉚ Starter relay lead
㉛ Oil pipe
㉜ Engine
㉝ Frame



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

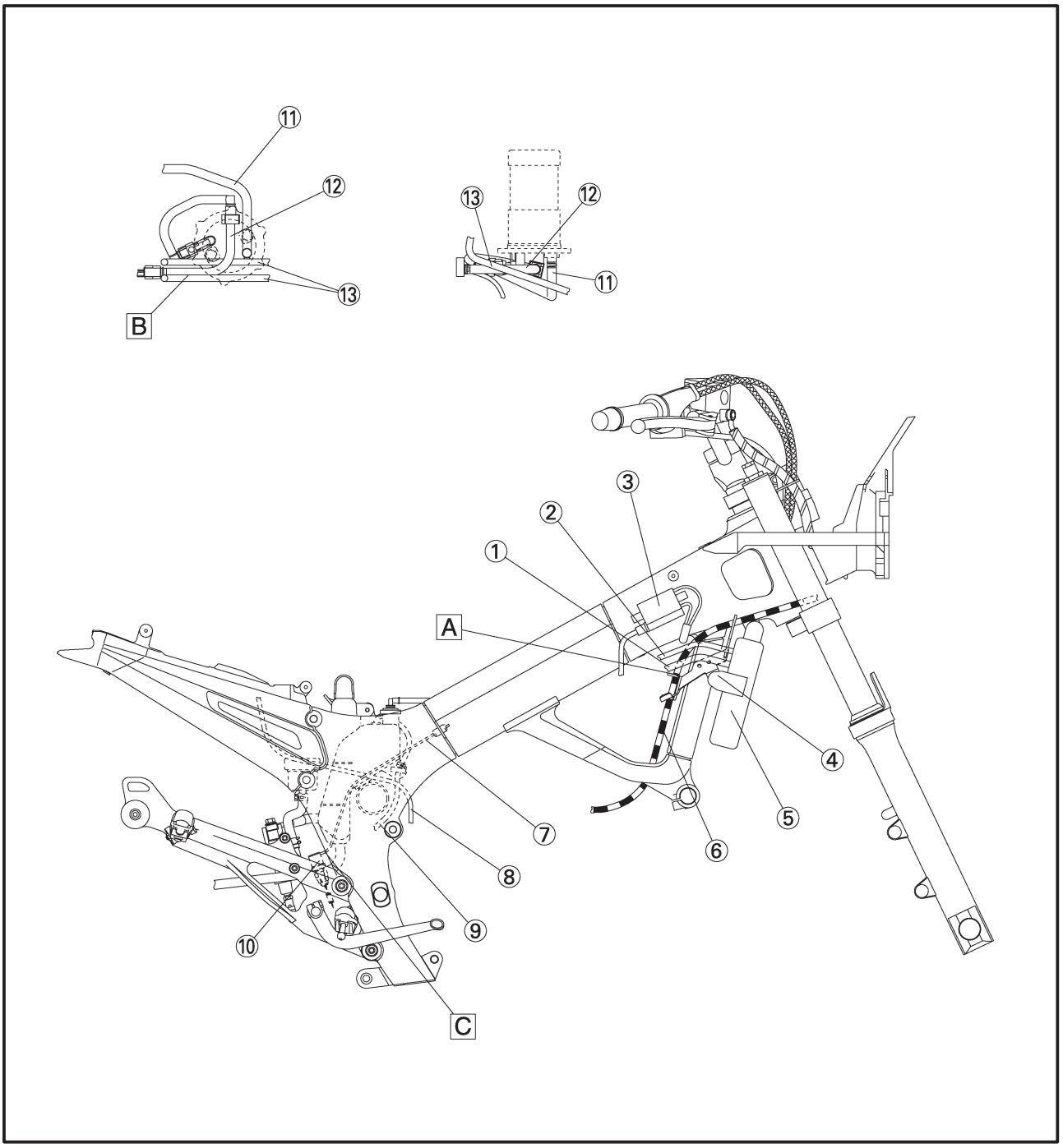


K The O_2 sensor lead should not stick out from the boss seat face to the outside of the vehicle.
L Bind the neutral switch, O_2 sensor, speed sensor, sidestand switch and rectifier/regulator leads with the clamp. Cut the tip with 3 to 8 mm left and make it face to the outside of the vehicle.
M Fasten the ECU lead with the clamp installed to the plate front side hole. Install the clamp to the outside of plate.
N Fasten the cylinder identification sensor lead to the inner side of the frame with a clamp.
O Route the fuel drain hose (2 hoses), air filter case drain hose and radiator reservoir tank drain hose through the guide located behind the swingarm head pipe. Do not make hoses to cross in the area between C and D.
P Pass the radiator reservoir tank drain hose right side of the battery negative lead.
Q Pass the fuel drain hose and air filter case drain hose behind the battery negative lead.

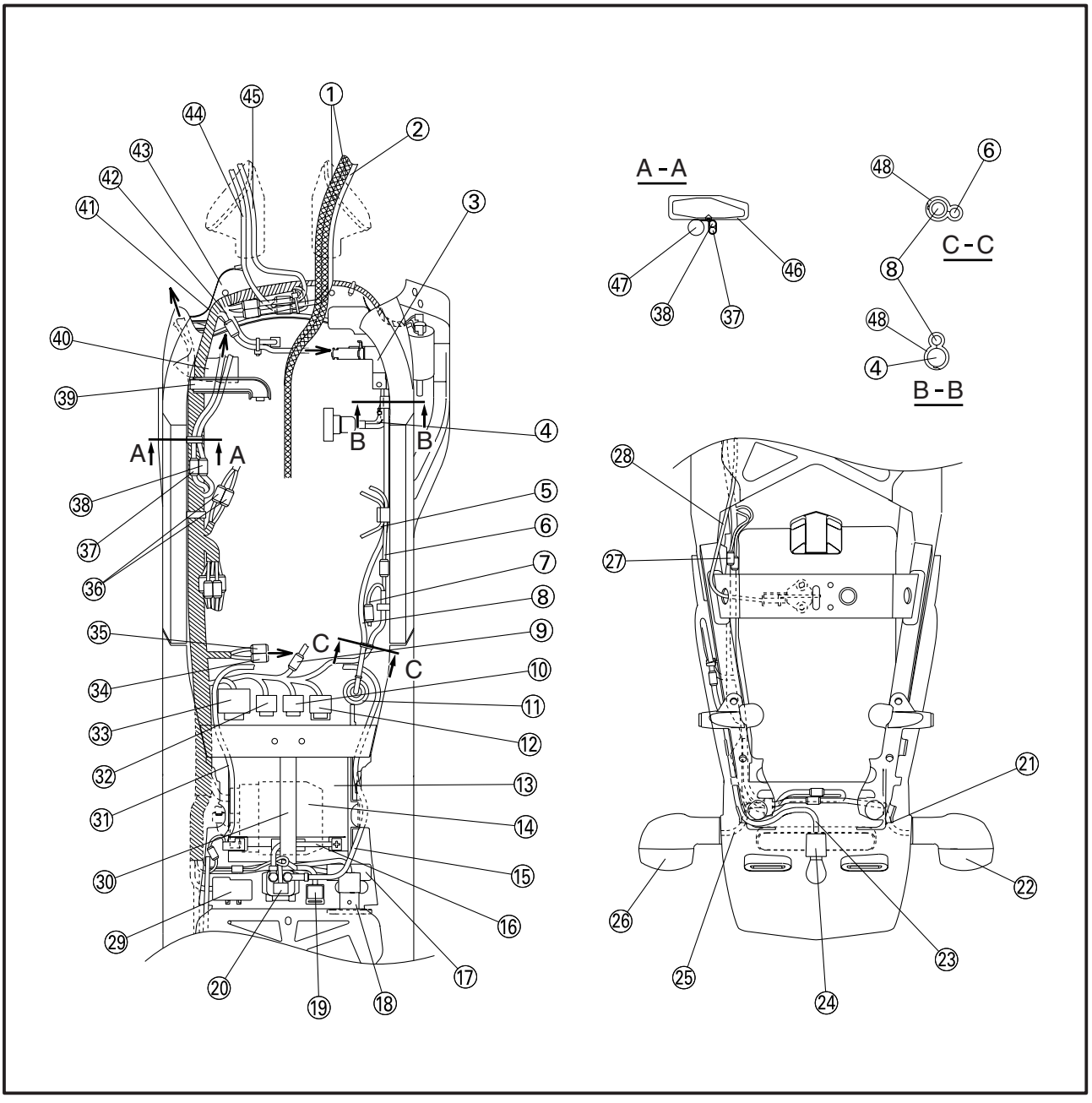


① Hose 2
② Hose
③ Ignition coil
④ Stay 2
⑤ Radiator
⑥ Clutch cable
⑦ Rear brake light switch lead
⑧ Starter relay lead
⑨ Coolant reservoir tank drain hose
⑩ Rear brake light switch
⑪ Fuel return hose
⑫ Fuel hose
⑬ Fuel drain hose

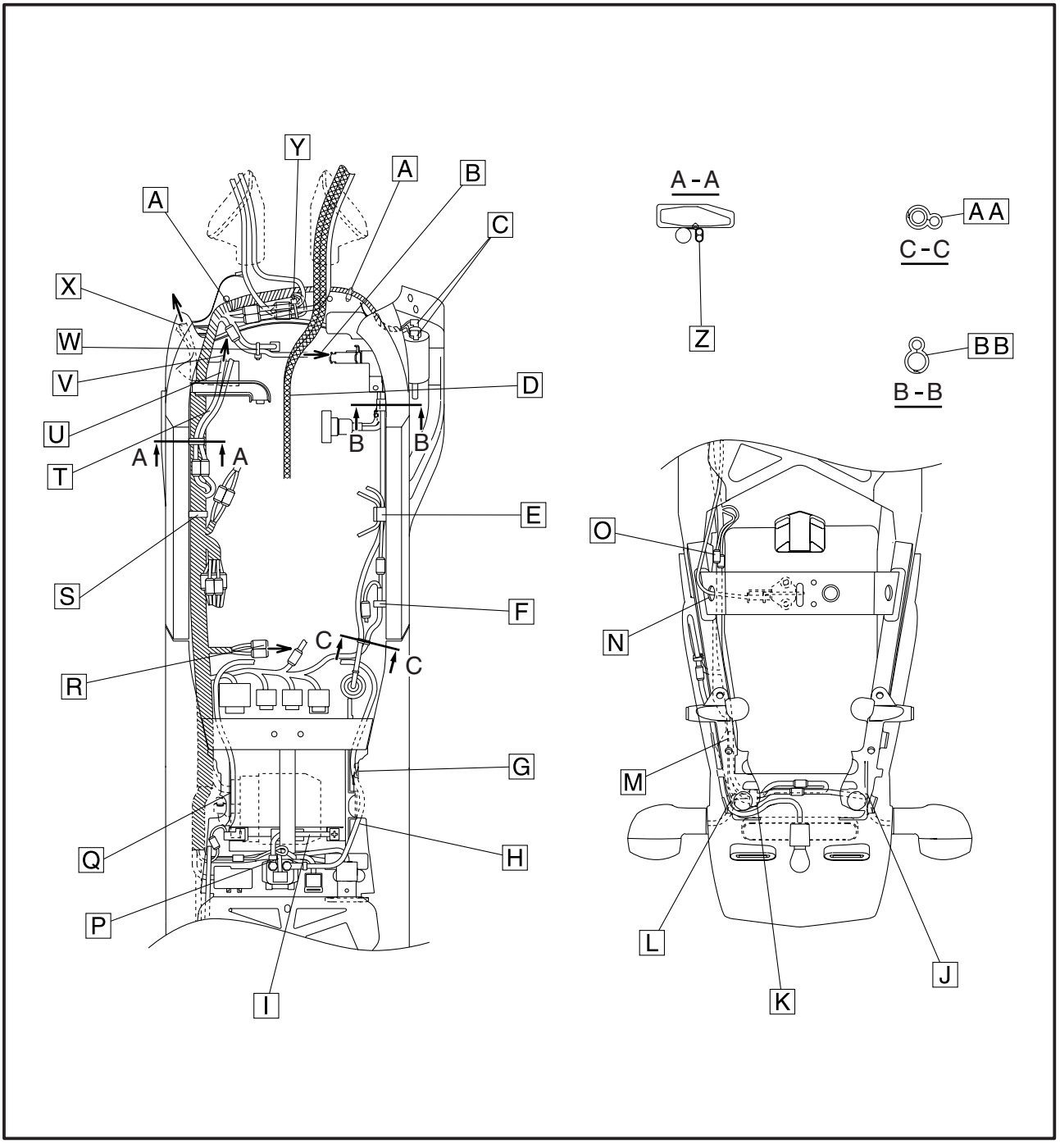
A Route the clutch cable through the guide of stay 2.
B Pass the fuel hose between the fuel drain hoses.
C Direct the take out port of rear brake light switch lead to the front.



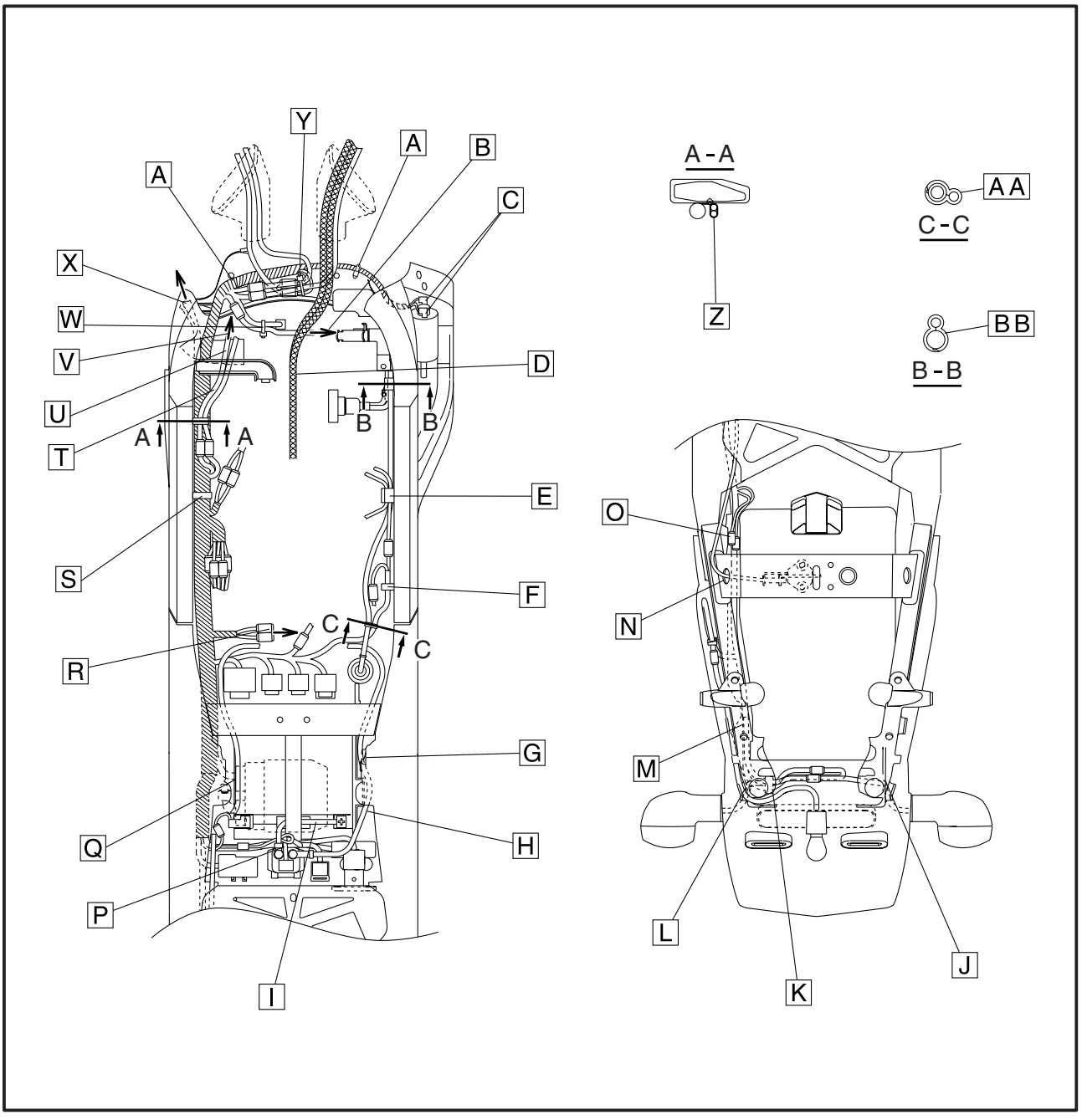
① Throttle cables
② Handlebar switch lead (right)
③ Stay
④ Thermo wax hose
⑤ Intake air vacuum hose
⑥ Sub-wire harness (air filter case)
⑦ Rear brake light switch lead
⑧ Coolant reservoir tank hose
⑨ Oil level switch lead
⑩ Fuel injection system relay
⑪ Coolant reservoir tank
⑫ Turn signal relay
⑬ Battery
⑭ Rectifier/regulator
⑮ Starter motor lead
⑯ Battery positive lead
⑰ Lean angle cut-off switch
⑱ Atmospheric pressure sensor
⑲ Main fuse
⑳ Starter relay
㉑ Rear turn signal light lead (right)
㉒ Rear turn signal light (right)
㉓ Tail/brake light lead
㉔ Tail/brake light
㉕ Rear turn signal light lead (left)
㉖ Rear turn signal light (left)
㉗ Alarm coupler
㉘ Seat lock cable
㉙ Fuse box
㉚ Battery band
㉛ Battery negative lead
㉜ Radiator fan relay
㉝ Starting circuit cut-off relay
㉞ Fuel pump lead 2
㉟ Fuel pump lead 1
㊱ Sub wire harness (throttle body)
㊲ Radiator fan motor lead
㊳ Cylinder identification sensor lead
㊴ Bracket 1
㊵ Hose 1
㊶ AI system lead
㊷ Coolant temperature sensor lead
㊸ Cover 2
㊹ Main switch lead
㊺ Handlebar switch lead (left)
㊻ Frame
㊼ Wire harness
㊽ Clamp



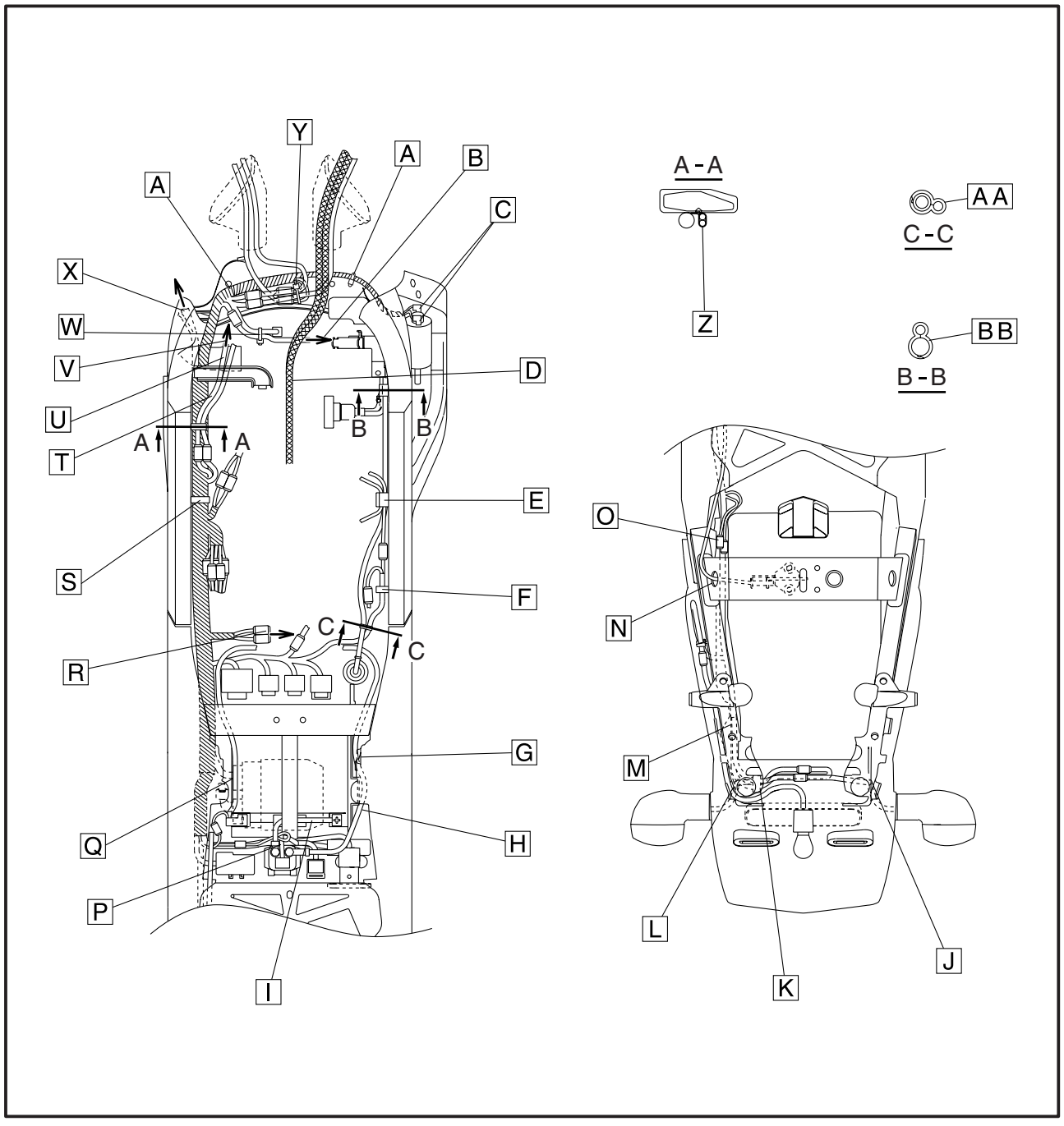
A For the wire harness routing, use clamps to fasten the wire harness to the outer hole of the cover 2.
B To the AI system
C Plug in the ignition coil lead terminals as shown in the drawing (both left and right).
D For the throttle cable, the upper side should be the return side and the lower side should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



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



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





CHK ADJ

3

CHK ADJ

CHAPTER 3
PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION 3-1

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS 3-1

SEAT 3-3

FRONT COWLINGS 3-4

FUEL TANK 3-5
- REMOVING THE FUEL TANK 3-6
- REMOVING THE FUEL PUMP 3-6
- INSTALLING THE FUEL PUMP 3-7
- INSTALLING THE FUEL HOSE 3-7

REAR COWLING 3-8

AIR FILTER CASE 3-9

ENGINE 3-10
- ADJUSTING THE VALVE CLEARANCE 3-10
- SYNCHRONIZING THE THROTTLE BODIES 3-15
- CHECKING AND ADJUSTING THE EXHAUST GAS AT IDLE 3-18
- ADJUSTING THE EXHAUST GAS VOLUME 3-20
- CHECKING THE EXHAUST GAS AT IDLE 3-22
- ADJUSTING THE ENGINE IDLING SPEED 3-24
- ADJUSTING THE THROTTLE CABLE FREE PLAY 3-25
- CHECKING THE SPARK PLUGS 3-27
- CHECKING THE IGNITION TIMING 3-28
- MEASURING THE COMPRESSION PRESSURE 3-29
- CHECKING THE ENGINE OIL LEVEL 3-30
- CHANGING THE ENGINE OIL 3-32
- ADJUSTING THE CLUTCH CABLE FREE PLAY 3-34
- CHECKING THE AIR FILTER ELEMENT 3-35
- CHECKING THE FUEL AND VACUUM HOSES 3-36
- CHECKING THE CRANKCASE BREATHER HOSE 3-36
- CHECKING THE EXHAUST SYSTEM 3-37
- CHECKING THE COOLANT LEVEL 3-38
- CHECKING THE COOLING SYSTEM 3-39
- CHANGING THE COOLANT 3-40

CHASSIS 3-43
ADJUSTING THE FRONT BRAKE 3-43
ADJUSTING THE REAR BRAKE 3-44
CHECKING THE BRAKE FLUID LEVEL 3-45
CHECKING THE FRONT AND REAR BRAKE PADS 3-46
ADJUSTING THE REAR BRAKE LIGHT SWITCH 3-47
CHECKING THE FRONT AND REAR BRAKE HOSES 3-47
BLEEDING THE HYDRAULIC BRAKE SYSTEM 3-48
ADJUSTING THE SHIFT PEDAL 3-49
ADJUSTING THE DRIVE CHAIN SLACK 3-50
LUBRICATING THE DRIVE CHAIN 3-51
CHECKING AND ADJUSTING THE STEERING HEAD 3-52
CHECKING THE FRONT FORK 3-55
ADJUSTING THE FRONT FORK LEGS 3-55
ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY 3-57
CHECKING THE TIRES 3-59
CHECKING THE WHEELS 3-61
CHECKING AND LUBRICATING THE CABLES 3-62
LUBRICATING THE LEVERS AND PEDALS 3-62
LUBRICATING THE SIDESTAND 3-62
LUBRICATING THE REAR SUSPENSION 3-62

ELECTRICAL SYSTEM 3-63
CHECKING AND CHARGING THE BATTERY 3-63
CHECKING THE FUSES 3-68
REPLACING THE HEADLIGHT BULBS 3-70
ADJUSTING THE HEADLIGHT BEAMS 3-71

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.

EAS00037

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

NOTE:

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

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

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

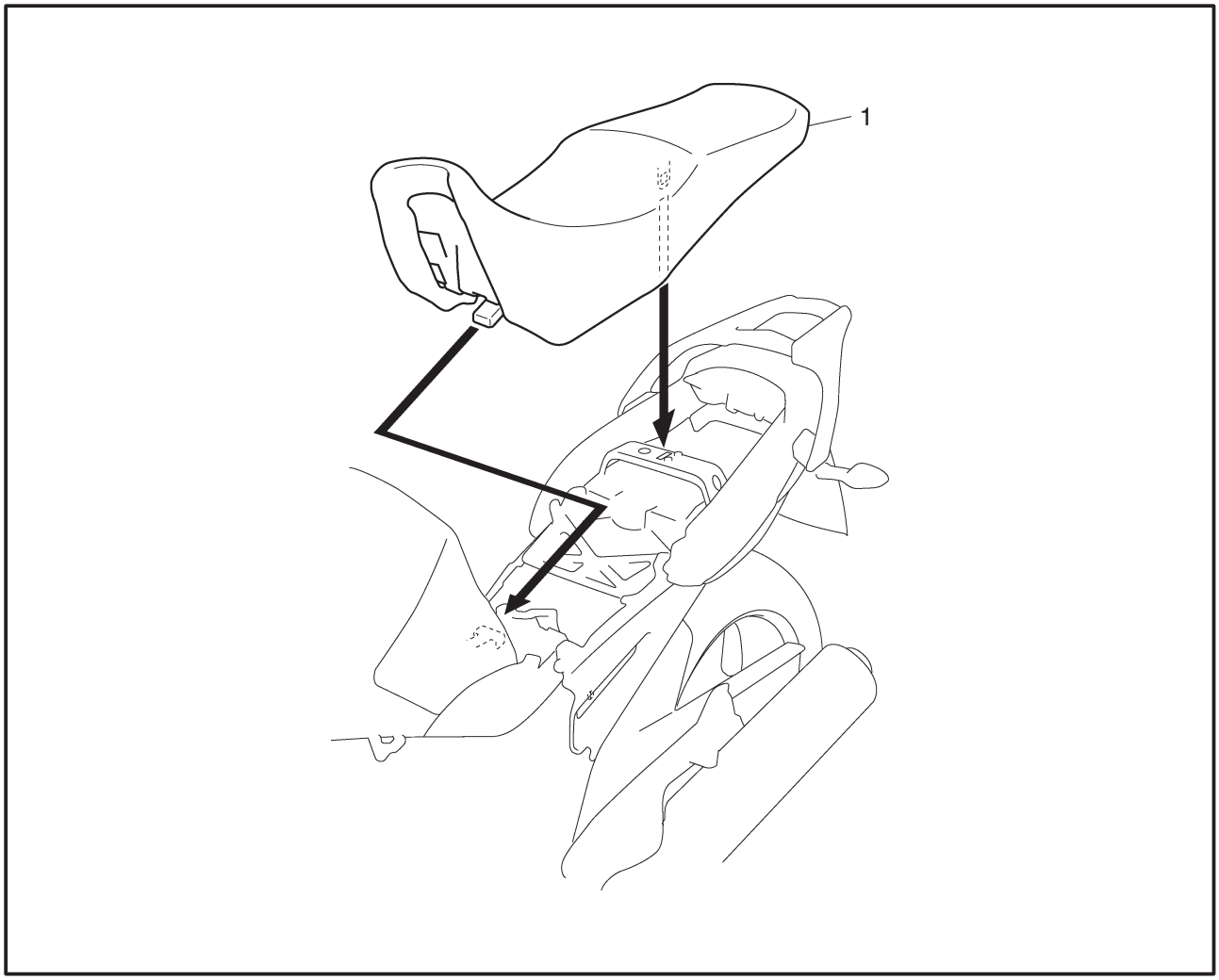
EAU03884

NOTE:

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

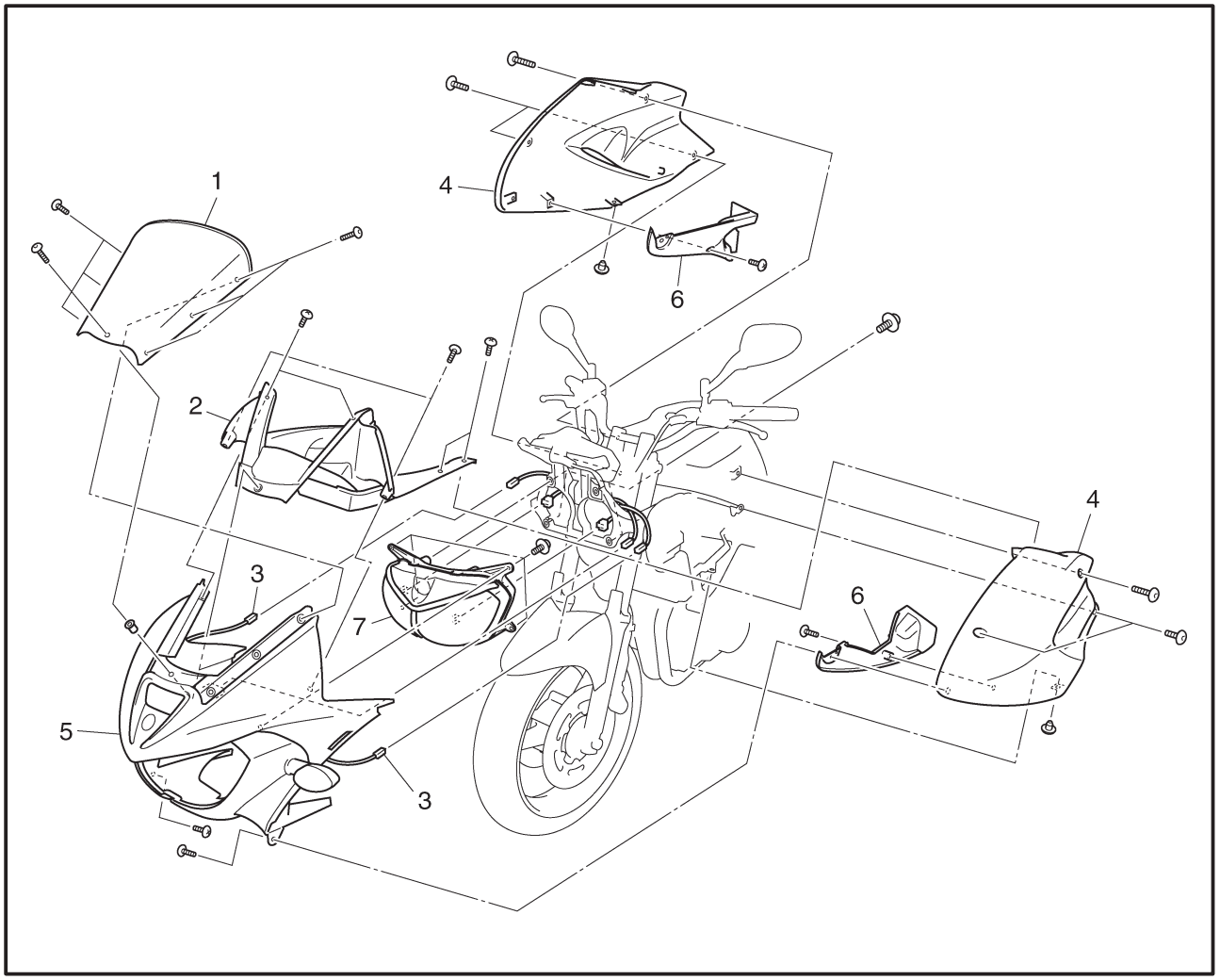
EAS00038

SEAT



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

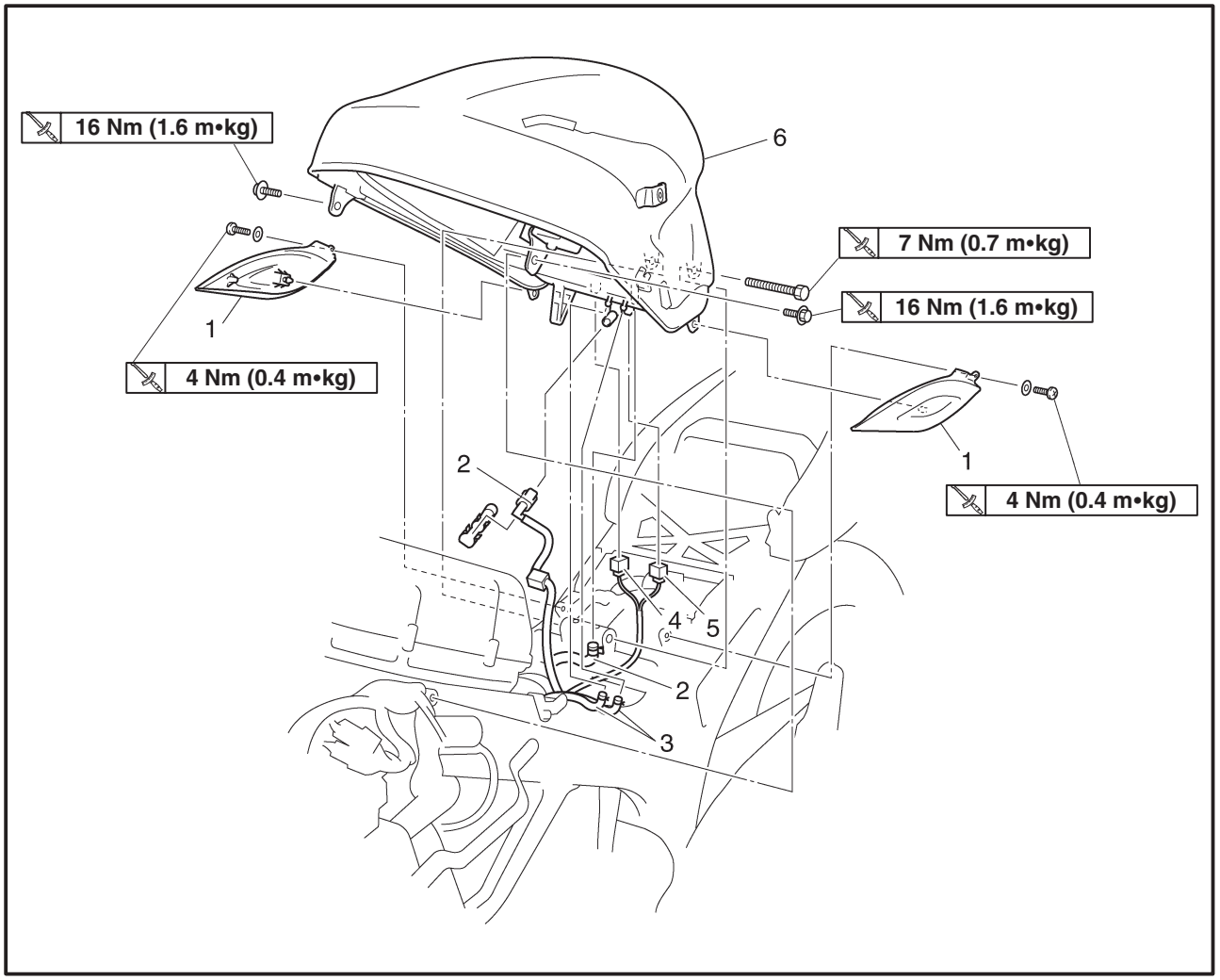
FRONT COWLINGS



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

EAS00040

FUEL TANK



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

REMOVING THE FUEL TANK

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

CAUTION:

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

NOTE:

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

3. Remove:
   - fuel tank

NOTE:

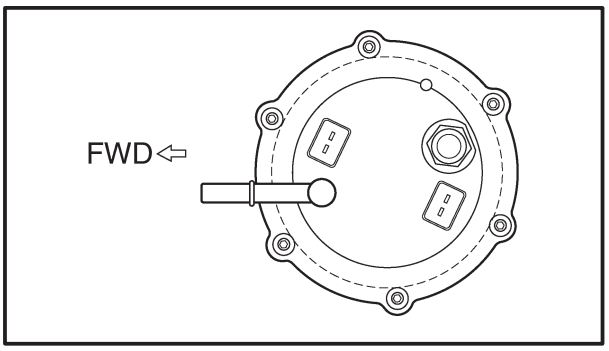
Do not set the fuel tank down so that the installation surface of the fuel pump is directly under the tank. Be sure to lean the fuel tank in an upright position.

REMOVING THE FUEL PUMP

1. Remove:
   - fuel pump

CAUTION:

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



INSTALLING THE FUEL PUMP

1. Install:
   • fuel pump — 4 Nm (0.4 m•kg)

NOTE:

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

INSTALLING THE FUEL HOSE

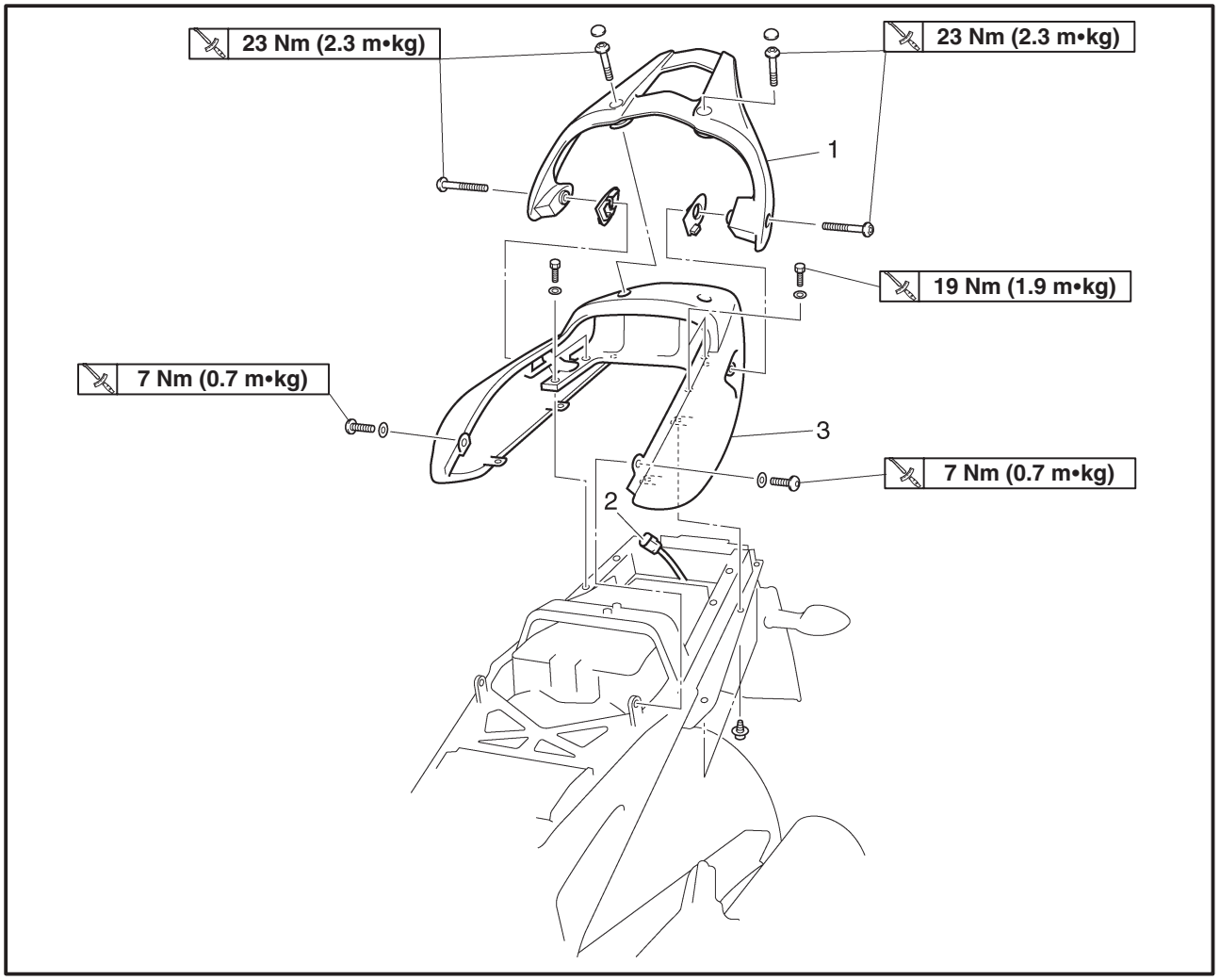
1. Install:
   • fuel hose
   • fuel hose holders

CAUTION:

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

EAS00042

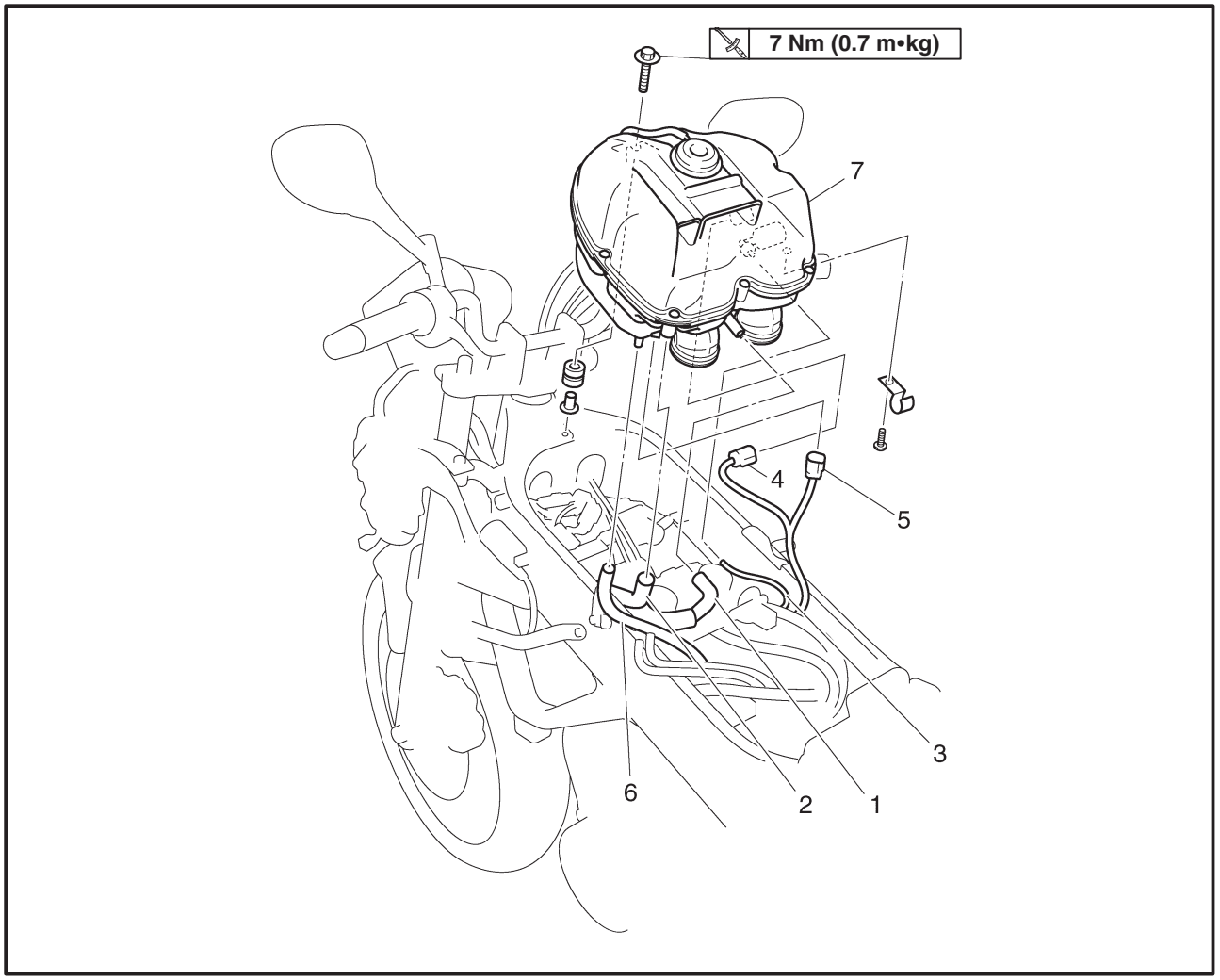
REAR COWLING



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

EAS00043

AIR FILTER CASE



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

EAS00045

ENGINE

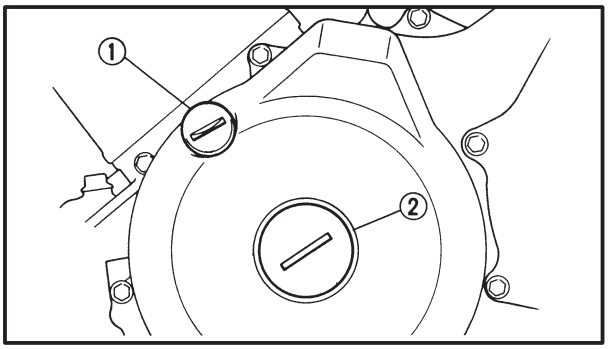
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

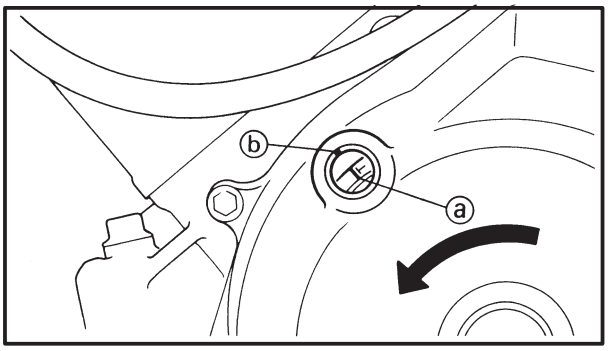
NOTE:

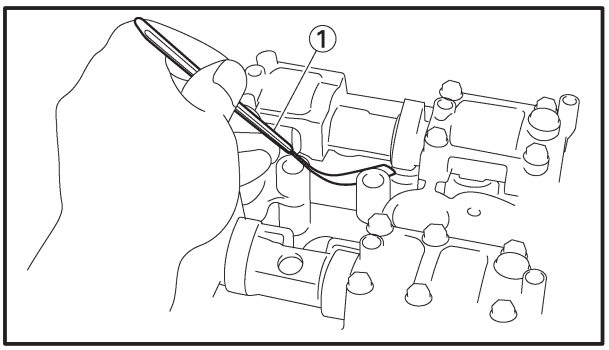
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

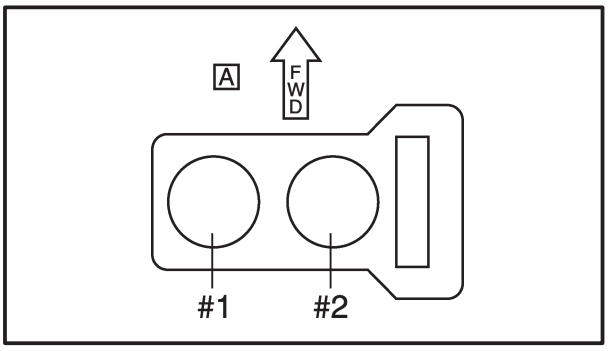
1. Remove:
   - seat
     Refer to “SEAT”.
   - side cowlings
     Refer to “FRONT COWLINGS”.
   - fuel tank
     Refer to “FUEL TANK”.
   - air filter case
     Refer to “AIR FILTER CASE”.
2. Remove:
   - air cut-off valve
     Refer to “AIR CUT-OFF VALVE AND REED VALVE” in chapter 7.
3. Drain:
   -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

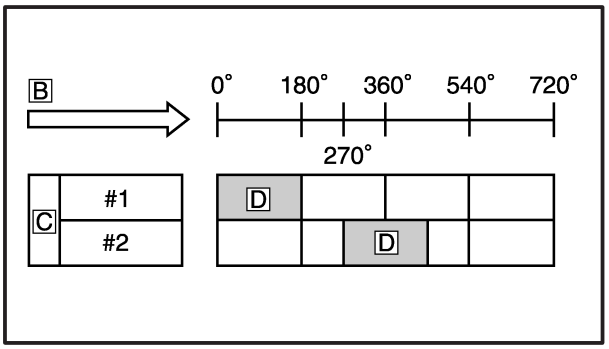


Valve clearance (cold)
Intake valve
0.15 ~ 0.20 mm
Exhaust valve
0.23 ~ 0.28 mm









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

NOTE:

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

c. Measure the valve clearance with a thickness gauge ①.

NOTE:

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

Valve clearance measuring sequence
Cylinder #1 → #2

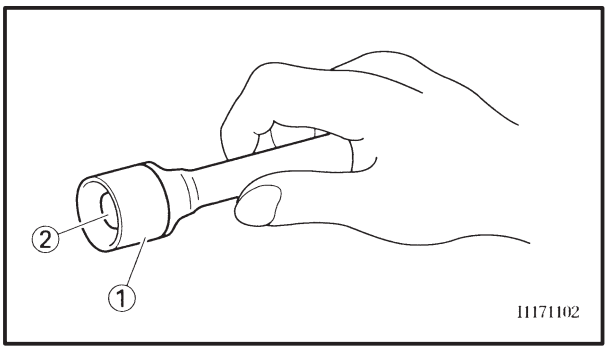
A Front
d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.
B Degrees that the crankshaft is turned counterclockwise
C Cylinder
D Combustion cycle

Cylinder #2	270°

7. Remove:
   - intake camshaft
   - exhaust camshaft

NOTE:

- Refer to “CAMSHAFT” in chapter 5.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.



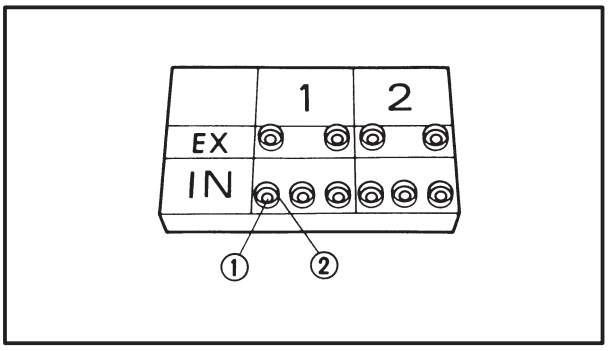
8. Adjust:
   • valve clearance

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

	**Valve lapper** **90890-04101**

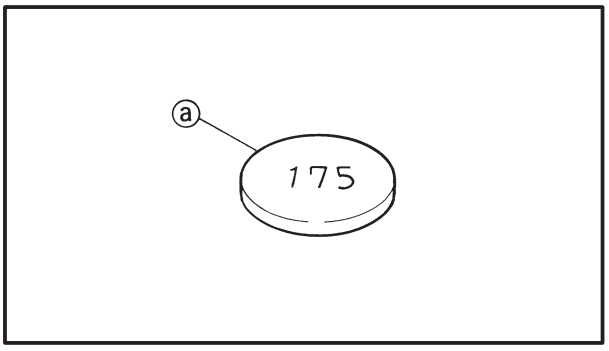
NOTE:

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



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

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

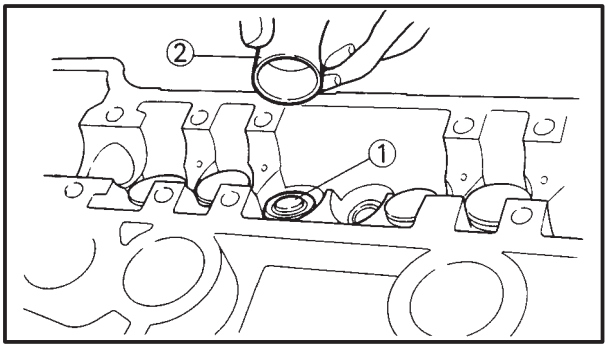


NOTE:

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

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

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



EXAMPLE:
Original valve pad number = 148 (thickness = 1.48 mm (0.058 in))
Rounded value = 150

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

NOTE:

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

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

NOTE:

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

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

	Camshaft cap bolt **10 Nm (1.0 m•kg)**

INTAKE

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

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

EXHAUST

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

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

NOTE:

- Refer to “CAMSHAFTS” in chapter 5.
- Lubricate the camshaft bearings, camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft marks with the camshaft cap marks.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

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

9. Apply:
   - sealant
     (onto the cylinder head cover)

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

10. Install:
    - cylinder head cover — **10 Nm (1.0 m•kg)**

EAS00050

SYNCHRONIZING THE THROTTLE BODIES

NOTE:

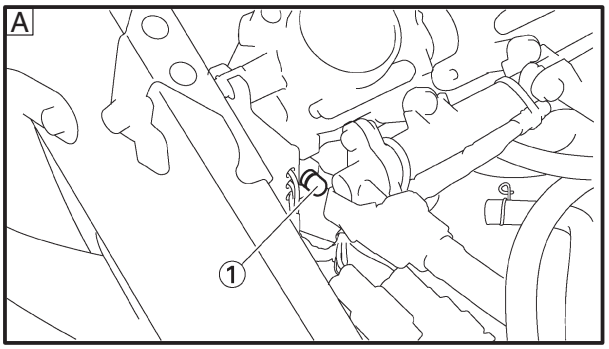
Prior to synchronizing the throttle bodies, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

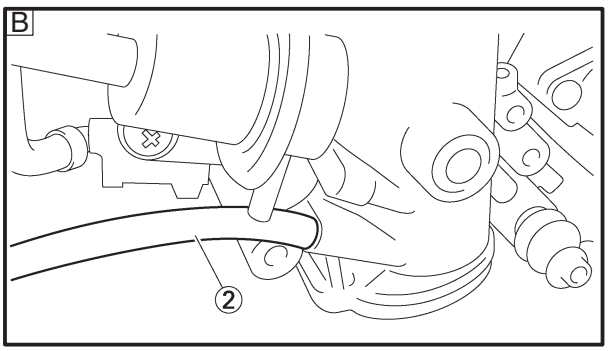
1. Stand the motorcycle on a level surface.

NOTE:

Place the motorcycle on a suitable stand.

2. Remove:
   - rider seat
     Refer to “SEAT”.
   - fuel tank
     Refer to “FUEL TANK”.
   - air filter case
     Refer to “AIR FILTER CASE”.
3. Remove:
   - cap ①
   - hose ②





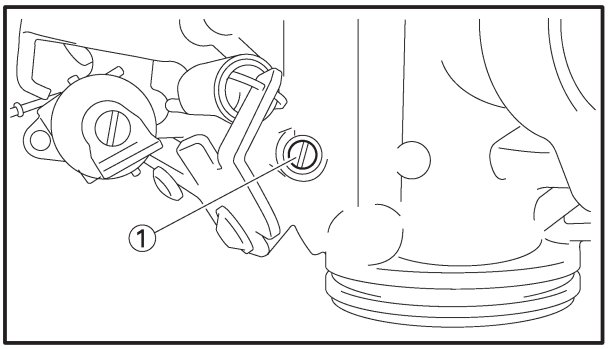
A Cylinder #1
B Cylinder #2

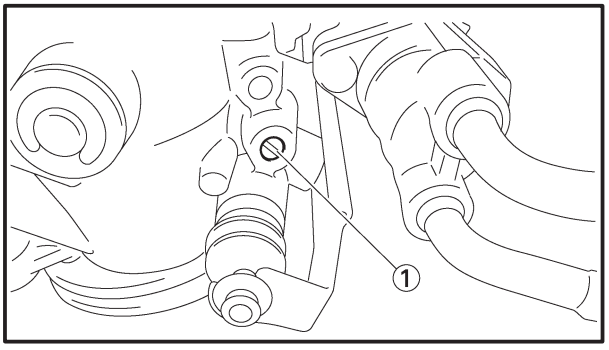
4. Install:
   • engine tachometer
     (to the spark plug lead of cyl. #1)
   • vacuum gauge (to the throttle body)

Vacuum gauge
90890-03094
Engine tachometer
90890-03113

5. Install:
   • fuel tank
     Refer to "FUEL TANK".
6. Start the engine and let it warm up for several minutes.
7. Check:
   • engine idling speed
     Out of specification → Adjust.
     Refer to "ADJUSTING THE ENGINE IDLING SPEED".

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





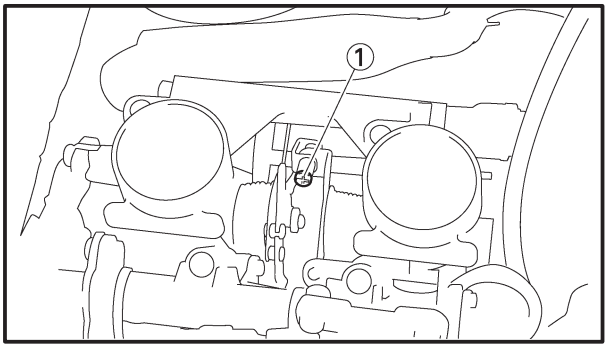
8. Adjust:
   • throttle body synchronization

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. With throttle body #1 as standard, adjust throttle body #2 using the air screws ①.

NOTE:

- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If the air screw is removed, turn the screw 3/4 turn in and be sure to synchronize the throttle body.



CAUTION:

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

Carburetor angle driver
90890-03158

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

NOTE:

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

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9. Measure:
   • engine idling speed
   Out of specification → Adjust.
   Make sure that the vacuum pressure is within specification.
10. Stop the engine and remove the measuring equipment.
11. Adjust:
   • throttle cable free play
   Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.

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

12. Remove:
   • engine tachometer
   • vacuum gauge
13. Remove:
   • fuel tank
   Refer to “FUEL TANK”.
14. Install:
   • fuel tank
   Refer to “FUEL TANK”.
   • rider seat
   Refer to “SEATS AND FUEL TANK”.

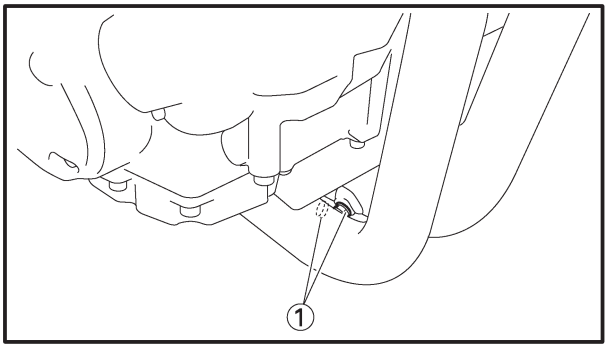
CHECKING AND ADJUSTING THE EXHAUST GAS AT IDLE

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

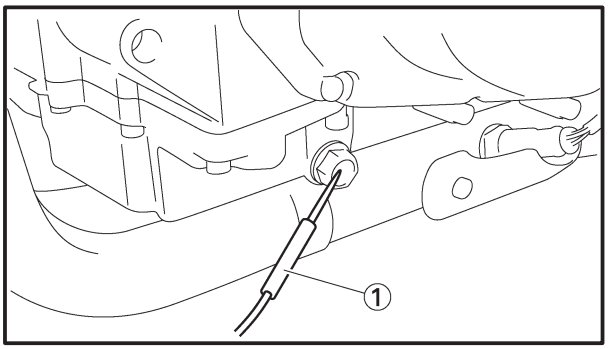
1. Stand the motorcycle on a level surface.

NOTE:

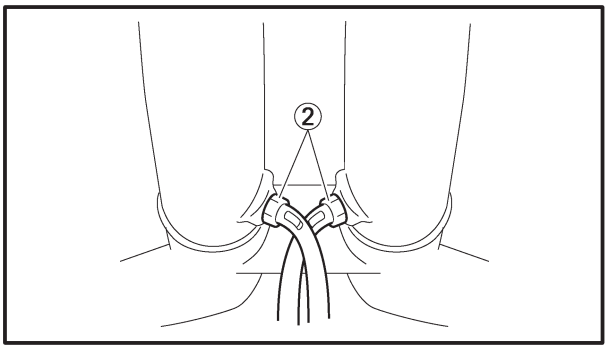
- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.



2. Remove:
   - rider seat
     Refer to “SEAT”.
   - fuel tank
     Refer to “FUEL TANK”.
   - air filter case
     Refer to “AIR FILTER CASE”.
   - exhaust pipe bolts ①

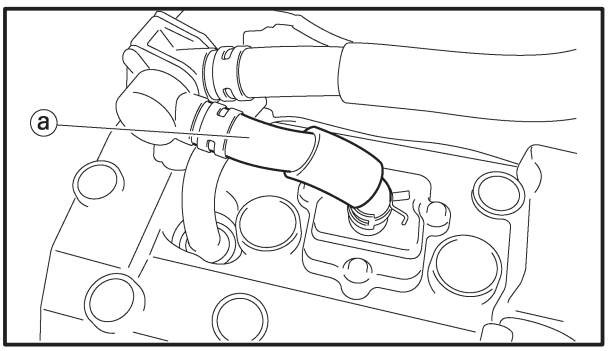


3. Install:
   - pocket tester ①
     (onto the engine oil drain bolt)
   - engine tachometer
     (onto the spark plug lead of cylinder #1)
   - exhaust attachment ②
     (onto the exhaust pipe)





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



4. Stop air induction system operation.

NOTE:

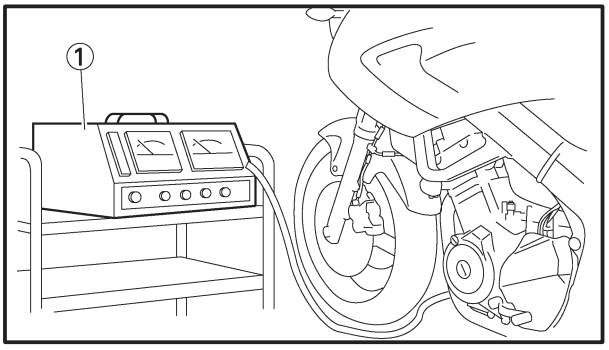
Crimp the hose ⓐ running from the lead valve to the air cut-off valve to prevent the air cut-off valve from operating.
Make sure not to damage the hose while crimping it.

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

Oil temperature
60 ~ 80°C

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

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



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

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

ADJUSTING THE EXHAUST GAS VOLUME

NOTE:

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

Setting steps

NOTE:

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

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

NOTE:

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

- All segments, except the clock and "TRIP", will start flashing.
- "DIAG" will be indicated on the display.

b. To switch to the "CO" adjusting mode
   1) Push the "SELECT" button to switch the display between the "CO" adjusting mode and the "DIAG" mode.
   2) Push the "SELECT" button and "RESET" button together for more than two seconds to set the desired mode.

c. To select the cylinder to be adjusted
   - Push the "SELECT" button or the "RESET" button to select the cylinder.

NOTE:

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

- Push the "RESET" button to scroll down the cylinder numbers.
- Push the "SELECT" button to scroll up the cylinder numbers.
- Push the "SELECT" button and the "RESET" button together for more than two seconds to set the cylinder.

d. To adjust the carbon monoxide exhaust gas volume
   - After selecting the cylinder, adjust the exhaust gas volume by pushing the "SELECT" button or the "RESET" button.

NOTE:

The exhaust gas volume will be indicated on the display.

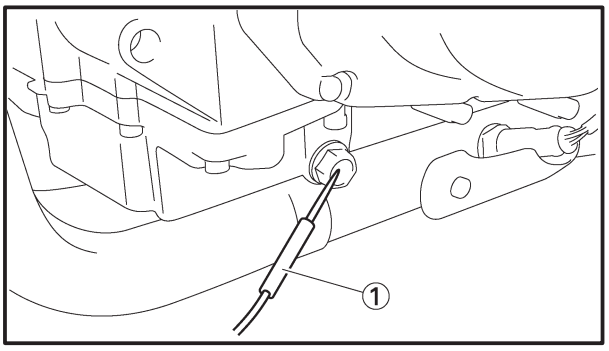
- Push the "RESET" button to increase the volume.
- Push the "SELECT" button to decrease the volume.
- Release the button to set the volume.
- Push the "SELECT" button and the "RESET" button together to return to the selected cylinder.

e. To deactivate the mode set the main switch "OFF".

CHECKING THE EXHAUST GAS AT IDLE
(Measuring the exhaust gas at idle [when air induction system is operating])
1. Stand the motorcycle on a level surface.

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

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



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

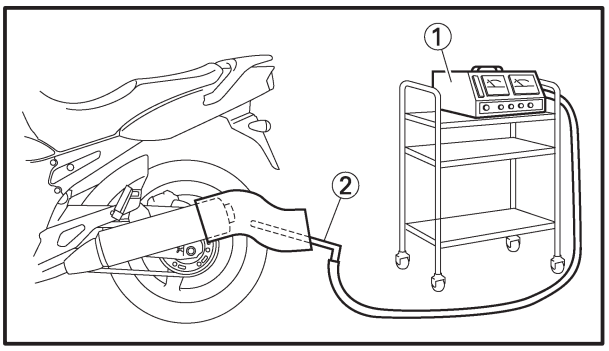
Pocket tester
90890-03132
Engine tachometer
90890-03113

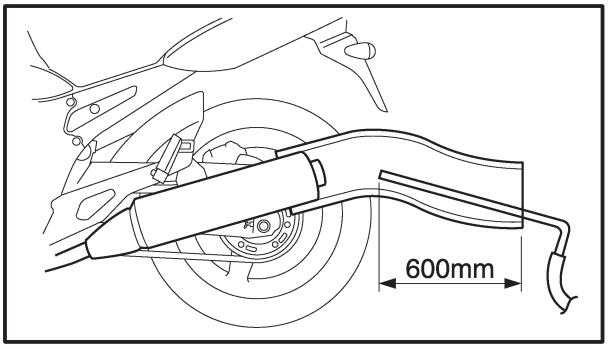
4. Install:
   - fuel tank
     Refer to "FUEL TANK".
5. Start the engine and warm it up until the specified oil temperature is reached.

Oil temperature
60 ~ 80°C

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

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





7. Install:
   • carbon monoxide and hydrocarbon tester ①
   • sampling probe ②

NOTE:

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

8. Measure:
   • carbon monoxide density
   • hydrocarbon density

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

Out of specification → Check air induction system.
Refer to "AIR INDUCTION SYSTEM" in chapter 7.

EAS00052

ADJUSTING THE ENGINE IDLING SPEED

NOTE:

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

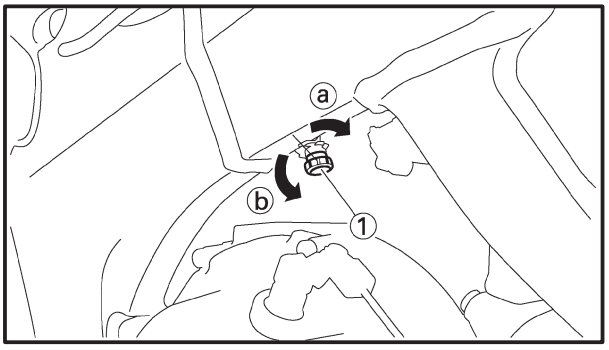
1. Start the engine and let it warm up for several minutes.
2. Attach:
   - engine tachometer
     (onto the spark plug lead of cylinder #1)

	Engine tachometer **90890-03113**

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

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

4. Adjust:
   - engine idling speed



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

Direction ⓐ	**Engine idling speed is increased.**
Direction ⓑ	**Engine idling speed is decreased.**

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

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

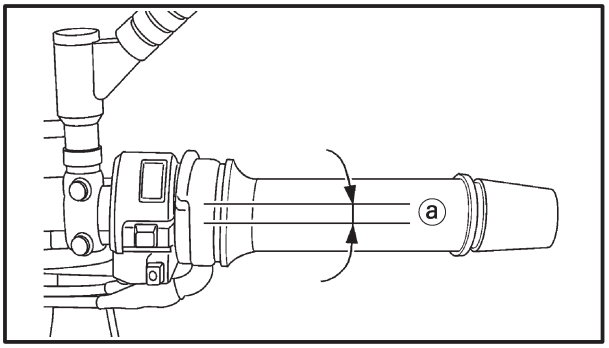
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EAS00055

ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:

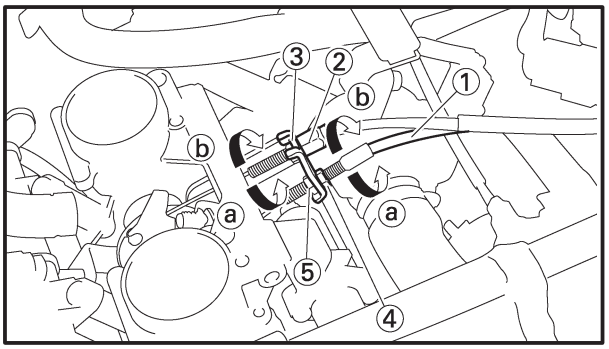
Prior to adjusting the throttle cable free play, the engine idling speed and throttle bodies synchronization should be adjusted properly.



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

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

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



3. Adjust:
   - throttle cable free play

NOTE:

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

Carburetor side

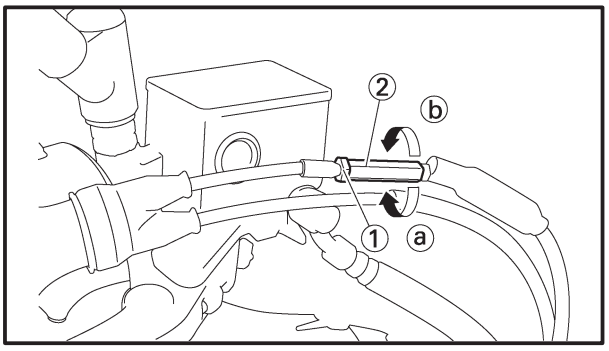
a. Loosen the locknut ② on the decelerator cable.
b. Turn the adjusting nut ③ in direction ⓐ or ⓑ to take up any slack on the decelerator cable.
c. Loosen the locknut ④ on the accelerator cable.
d. Turn the adjusting nut ⑤ in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

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

e. Tighten the locknuts.

NOTE:

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



Handlebar side

a. Loosen the locknut ①.

b. Turn the adjusting nut ② in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

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

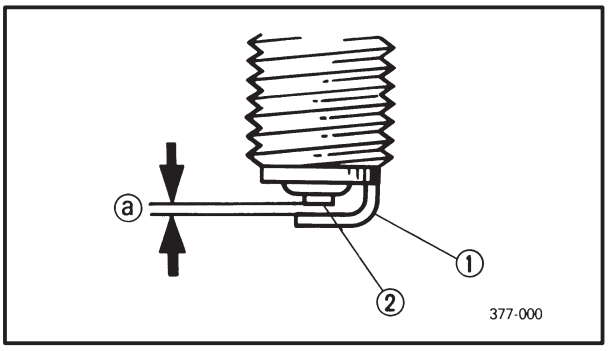
c. Tighten the locknut.

⚠ WARNING

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

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



EAS00059

CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

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

CAUTION:

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

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

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

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

Spark plug gap
0.8 ~ 0.9 mm

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

NOTE:

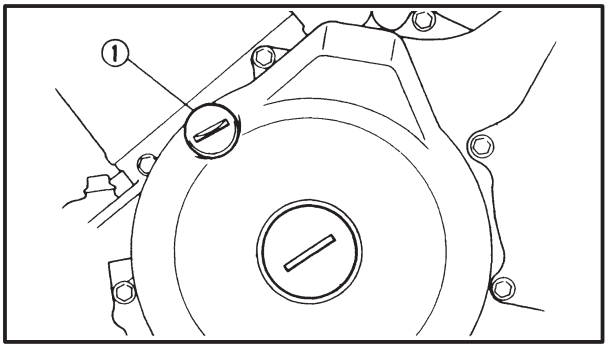
Before installing the spark plug, clean the spark plug and gasket surface.

EAS00064

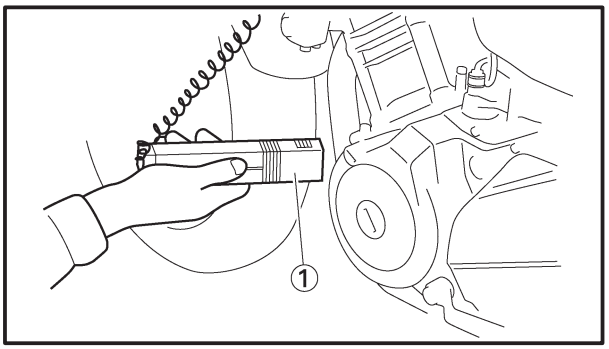
CHECKING THE IGNITION TIMING

NOTE:

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



1. Remove:
   • timing plug ①



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

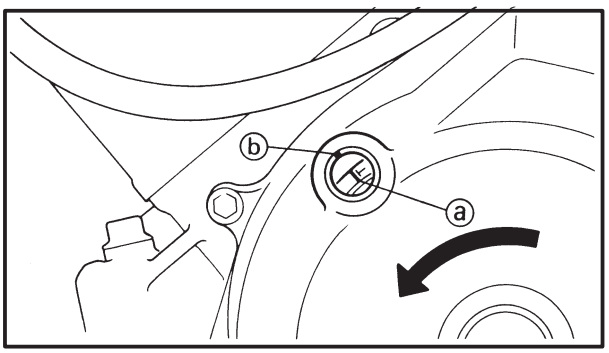
Timing light
90890-03141
Engine tachometer
90890-03113

3. Check:
   • ignition timing

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

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



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

NOTE:

The ignition timing is not adjustable.

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4. Install:
   • timing plug

EAS00065

MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

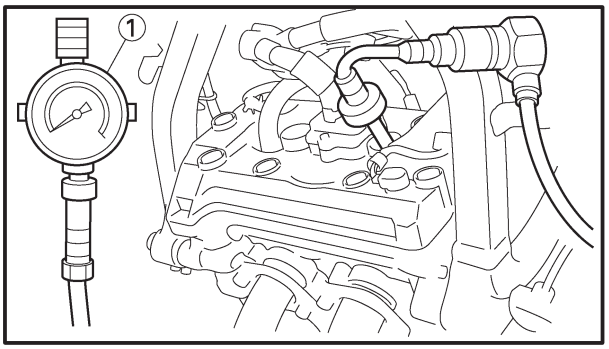
NOTE:

Insufficient compression pressure will result in a loss of performance.

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

CAUTION:

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



5. Install:
   - compression gauge ①

Compression gauge
90890-03081
Compression gauge adapter
90890-04136

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

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

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

⚠ WARNING

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

NOTE:

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

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

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.**

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

EAS00069

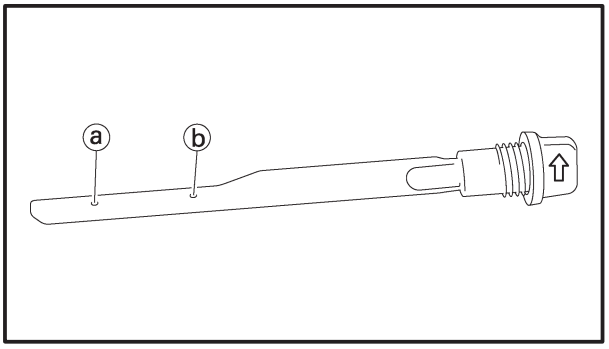
CHECKING THE ENGINE OIL LEVEL

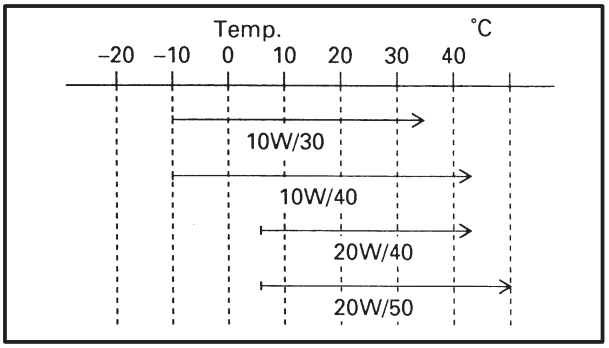
1. Stand the motorcycle on a level surface.

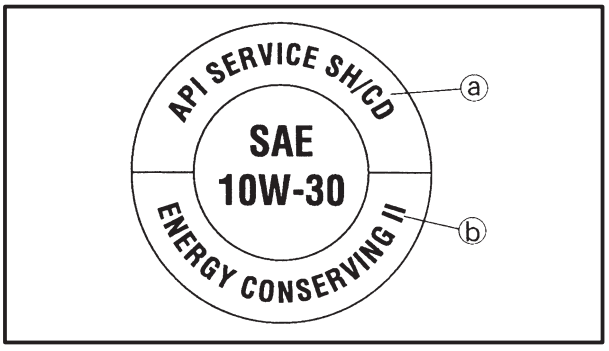
NOTE:

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

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







3. Check:
   • engine oil level
   Wipe the dipstick clean, insert it into the oil filler hole (without screw it in and direct the arrow mark on the cap upward.), and then remove it to check the oil level.
   The engine oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
   Below the minimum level mark → Add the recommended engine oil to the proper level.

Recommended oil
Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.
API standard
SE or higher grade
ACEA standard
G4 or G5

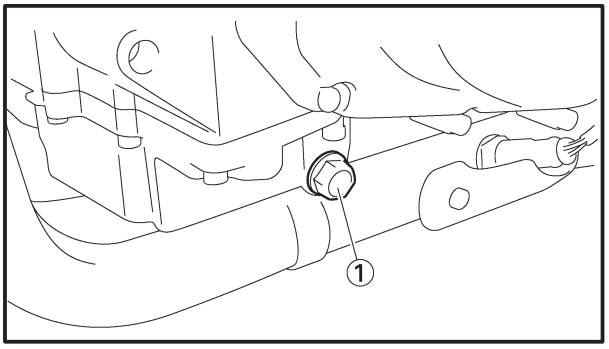
CAUTION:

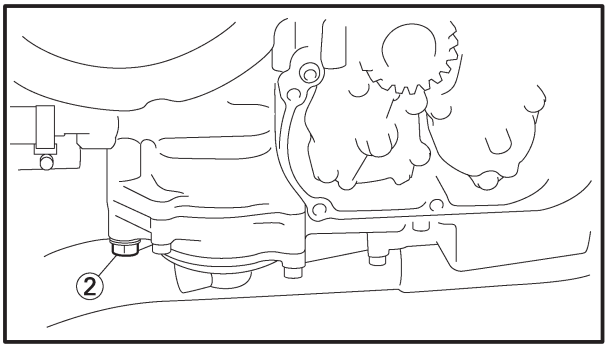
- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD ⓐ or higher and do not use oils labeled "ENERGY CONSERVING II" ⓑ or higher.**
- **Do not allow foreign materials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

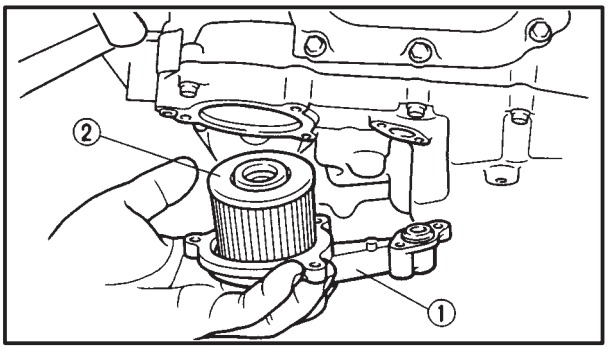
NOTE:
Before checking the engine oil level, wait a few minutes until the oil has settled.

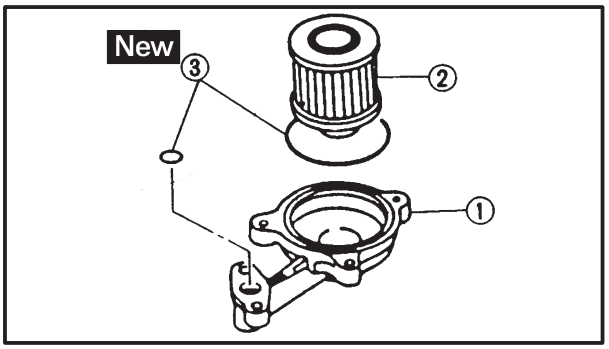
4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check the engine oil level again.

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









EAS00075

CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   - engine oil filler cap
   - engine oil drain bolt (engine) ①
     (along with the gasket)
   - engine oil drain bolt (oil tank) ②
     (along with the gasket)
4. Drain:
   - engine oil
     (completely from the crankcase and oil tank)
5. If the oil filter element is also to be replaced, perform the following procedure.

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a. Remove the oil filter element cover ① and oil filter element ②.
b. Install the new O-ring ③, new oil filter element and the oil filter element cover.

	Oil filter element cover bolt 10 Nm (1.0 m•kg)

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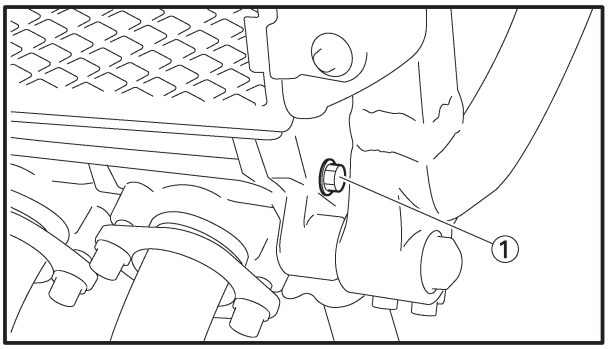
6. Install:
   - engine oil drain bolt (engine)
     (along with the new gasket)
     35 Nm (3.5 m•kg)
   - engine oil drain bolt (oil tank)
     (along with the new gasket)
     30 Nm (3.0 m•kg)
7. Fill:
   - engine oil
     (with the specified amount of the recommended engine oil)

CAUTION:

The engine should be filled with oil in two steps. First fill the engine with 3.0 liters of oil. Then start the engine and race it five or six time. Stop the engine and fill it with oil to the specified level.

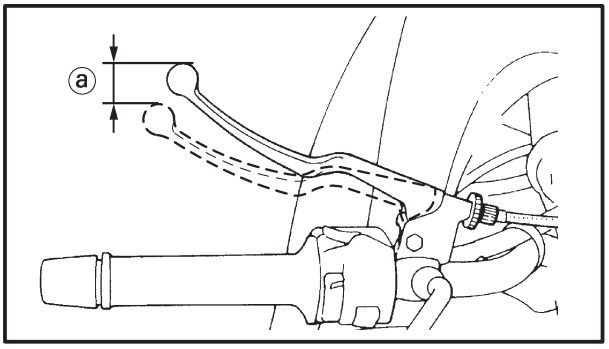
Quantity
Total amount
4.7 L
Without oil filter element replacement
3.8 L
With oil filter element replacement
3.9 L

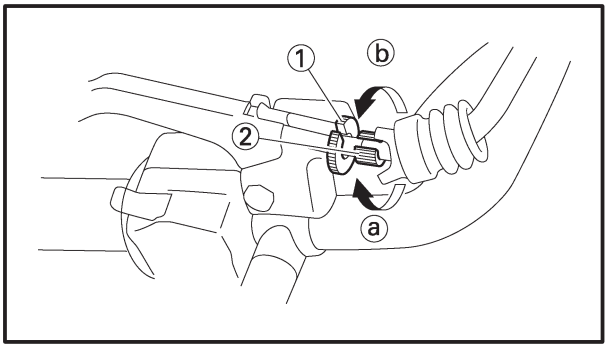
9. Install:
   • engine oil filler cap
10. Start the engine, warm it up for several minutes, and then turn it off.
11. Check:
   • engine
   (for engine oil leaks)
12. Check:
   • engine oil level
   Refer to "CHECKING THE ENGINE OIL LEVEL".
13. Check:
   • engine oil pressure



a. Slightly loosen the oil gallery bolt ①.
b. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
c. Check the engine oil passages, the oil filter and the oil pump for damage or leakage.
d. Start the engine after solving the problem (-s) and check the engine oil pressure again.
e. Tighten the oil gallery bolt to specification.

Oil gallery bolt
10 Nm (1.0 m•kg)





EAS00078

ADJUSTING THE CLUTCH CABLE FREE PLAY

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

Clutch cable free play
(at the end of the clutch lever)
10 ~ 15 mm

2. Adjust:
   • clutch cable free play

Handlebar side

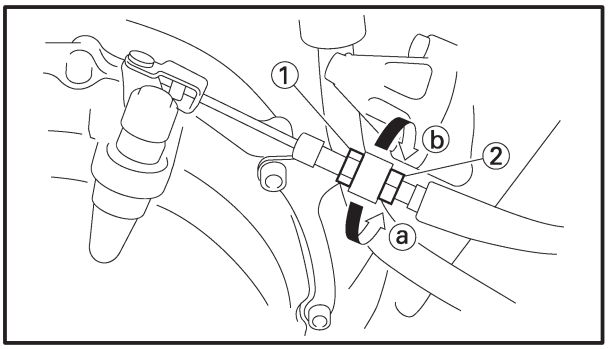
a. Loosen the locknut ①.
b. Turn the adjusting bolt ② in direction ⓐ or ⓑ until the specified clutch cable free play is obtained.

Direction ⓐ	**Clutch cable free play is increased.**
Direction ⓑ	**Clutch cable free play is decreased.**

c. Tighten the locknut.

NOTE:

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



Engine side

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

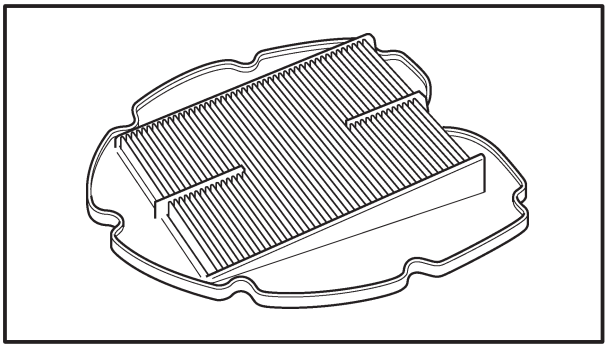
Direction ⓐ	**Clutch cable free play is increased.**
Direction ⓑ	**Clutch cable free play is decreased.**

c. Tighten the locknuts.

EAS00086

CHECKING THE AIR FILTER ELEMENT

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



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

NOTE:

Replace the air filter element at periodic intervals of 40,000 km travel.
The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

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

CAUTION:

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

NOTE:

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

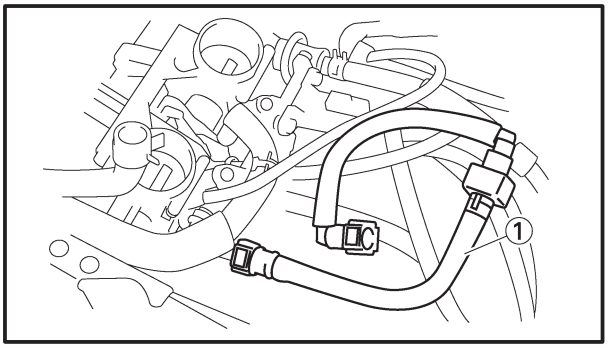
5. Install:
   • fuel tank.

EAS00096

CHECKING THE FUEL AND VACUUM HOSES

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

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

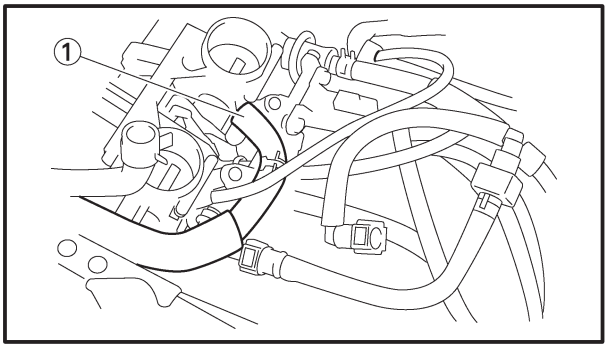


2. Check:
   - fuel hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.
3. Install:
   - fuel tank
   - air filter case

EAS00098

CHECKING THE CRANKCASE BREATHER HOSE

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

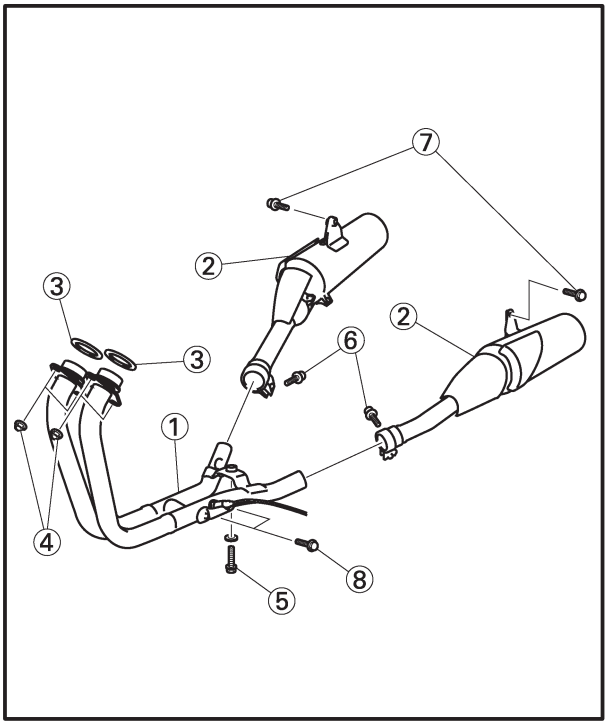


2. Check:
   - crankcase breather hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.

CAUTION:

Make sure the crankcase breather hose is routed correctly.

3. Install:
   - air filter case
   - fuel tank



EAS00100

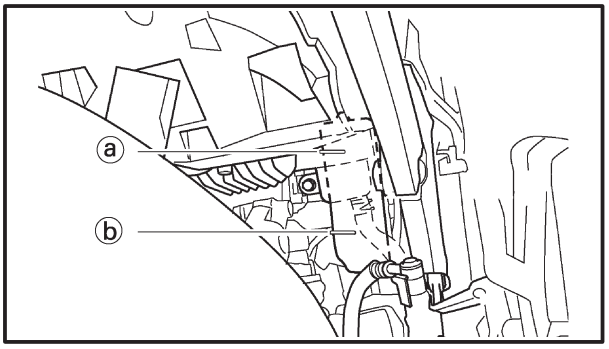
CHECKING THE EXHAUST SYSTEM

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

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



Exhaust pipe nut ④
20 Nm (2.0 m•kg)
Exhaust pipe bolt ⑤
24 Nm (2.4 m•kg)
Exhaust pipe and muffler bolt ⑥
20 Nm (2.0 m•kg)
Muffler and muffler bracket bolt ⑦
24 Nm (2.4 m•kg)
O_2 sensor protector bolt ⑧
10 Nm (1.0 m•kg)



EAS00102

CHECKING THE COOLANT LEVEL

1. Stand the motorcycle on a level surface.

NOTE:

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

2. Remove:
   - seat

   Refer to “SEAT”.
3. Check:
   - coolant level

   The coolant level should be between the maximum level mark ⓐ and minimum level mark ⓑ.

   Below the minimum level mark → Add the recommended coolant to the proper level.

CAUTION:

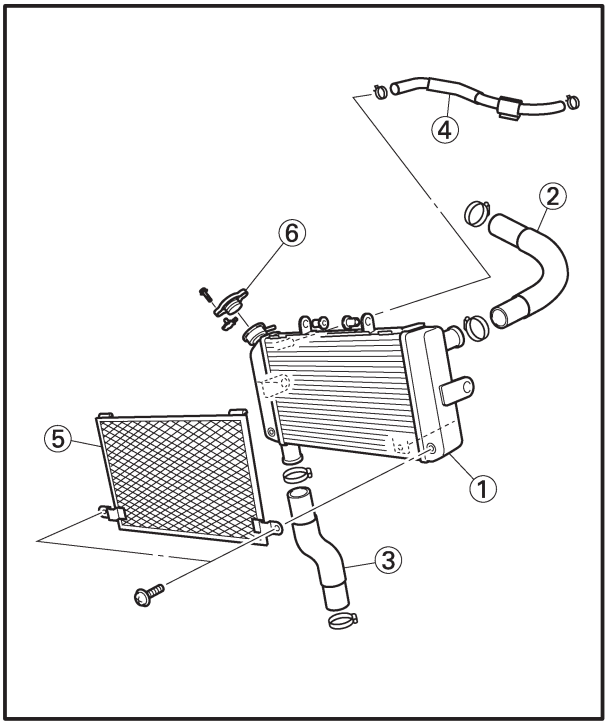
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
   - coolant level

NOTE:

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

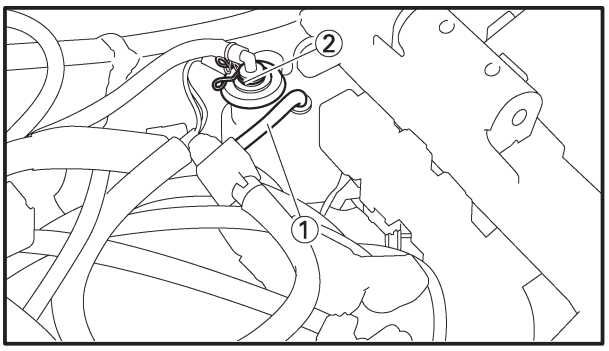
6. Install:
   - seat



EAS00104

CHECKING THE COOLING SYSTEM

1. Remove:
   - fuel tank
     Refer to “FUEL TANK”.
   - air filter case
     Refer to “AIR FILTER CASE”.
2. Check:
   - radiator ①
   - radiator inlet hose ②
   - radiator outlet hose ③
   - radiator reservoir tank hose ④
   - radiator cover ⑤
     Cracks/damage → Replace.
     Refer to “COOLING SYSTEM” in chapter 6.
3. Install:
   - fuel tank
   - air filter case



EAS00105

CHANGING THE COOLANT

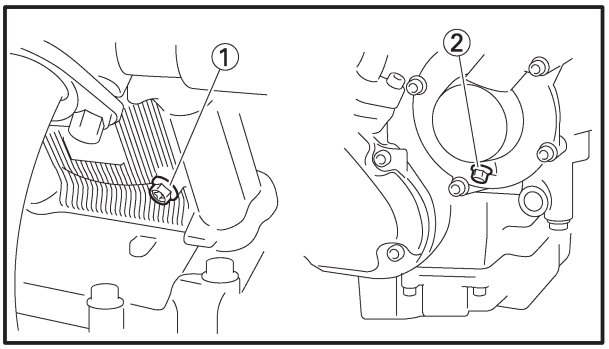
1. Remove:
   - seat
   Refer to “SEAT”.
2. Disconnect:
   - coolant reservoir hose ①
3. Drain:
   - coolant
   (from the coolant reservoir tank)

4. Remove:
   - coolant reservoir tank cap ②

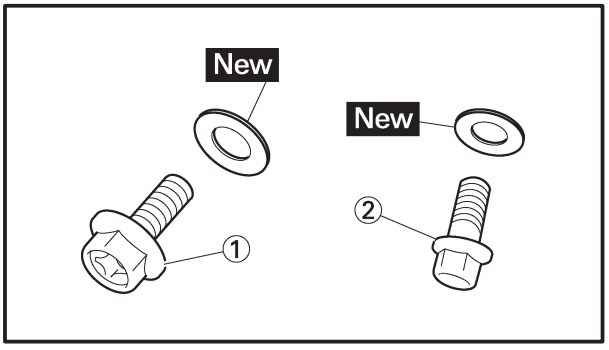
⚠ WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

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



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



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

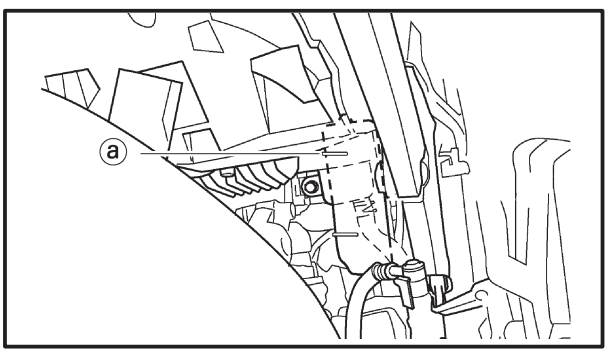
8. Connect:
   • coolant reservoir hose
9. Fill:
   • cooling system
   (with the specified amount of the recommended coolant)

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

Handling notes for coolant
Coolant is potentially harmful and should be handled with special care.

⚠ WARNING

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



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

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

NOTE:

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

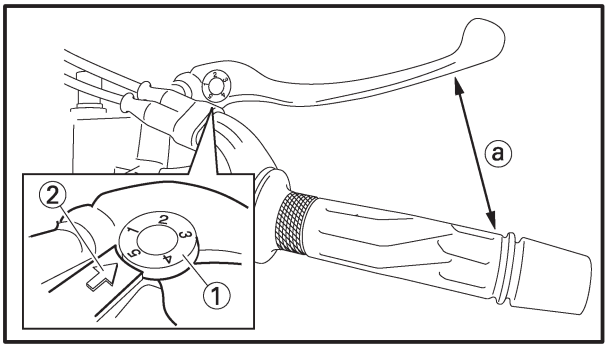
15. Install:
    • seat

EASD0107

CHASSIS

ADJUSTING THE FRONT BRAKE

1. Adjust:
   - brake lever position
     (distance ⓐ from the throttle grip to the brake lever)



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

NOTE:

Be sure to align the setting on the adjusting dial with the arrow mark ② on the brake lever holder.

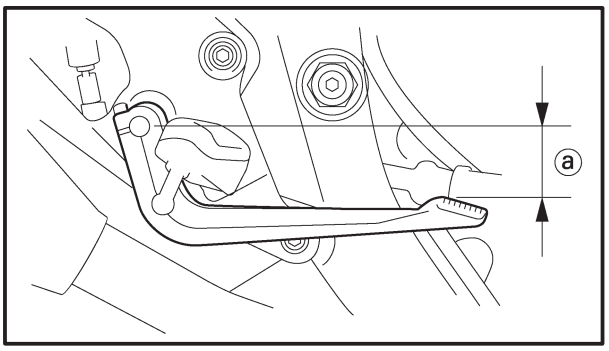
Position #1	**Distance ⓐ is the largest.**
Position #5	**Distance ⓐ is the smallest.**

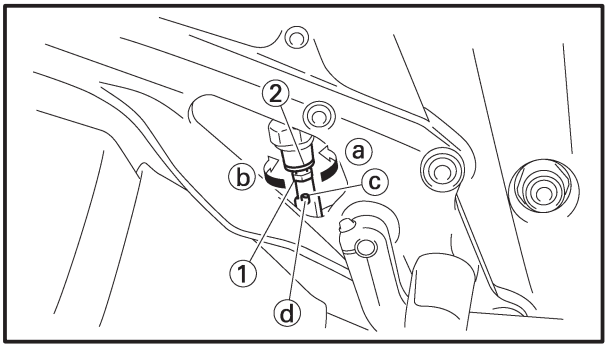
⚠ WARNING

- **After adjusting the brake lever position, make sure that the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.**
- **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 position, make sure that there is no brake drag.





EAS00110

ADJUSTING THE REAR BRAKE

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

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

2. Adjust:
   - brake pedal position

a. Loosen the locknut ①.
b. Turn the adjusting bolt ② in direction ⓐ or ⓑ until the specified brake pedal position is obtained.

Direction ⓐ	**Brake pedal is raised.**
Direction ⓑ	**Brake pedal is lowered.**

⚠ WARNING

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

c. Tighten the locknut ① to specification.

Locknut
10 Nm (1.0 m•kg)

⚠ WARNING

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

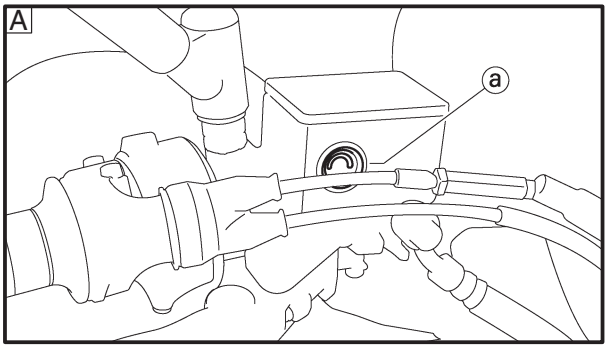
CHECKING THE BRAKE FLUID LEVEL

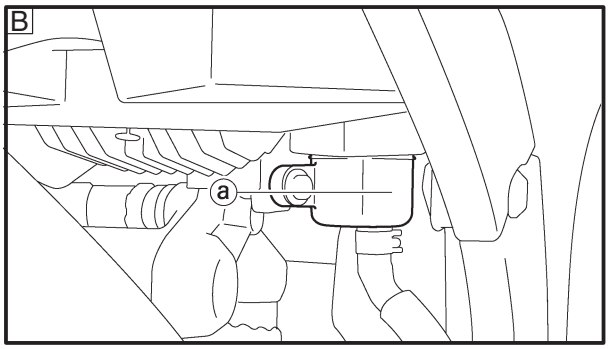
1. Stand the motorcycle on a level surface.

NOTE:

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

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





Recommended brake fluid
DOT 4

A Front brake
B Rear brake

⚠ WARNING

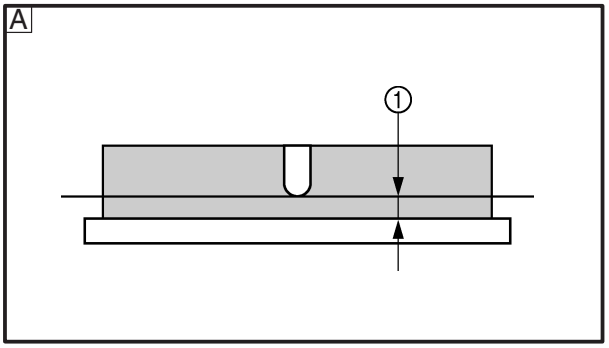
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

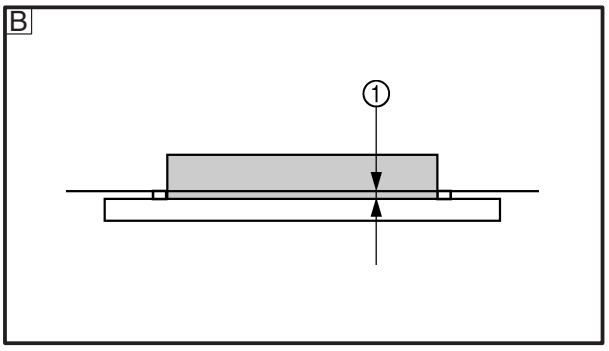
CAUTION:

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

NOTE:

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





EAS00122

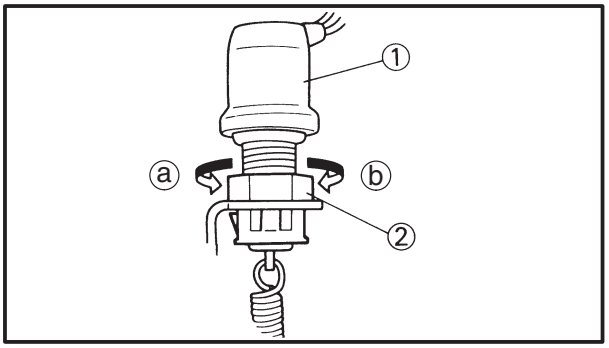
CHECKING THE FRONT AND REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - front brake pad
   - rear brake pad

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

A Front brake
B Rear brake



EAS00128

ADJUSTING THE REAR BRAKE LIGHT SWITCH

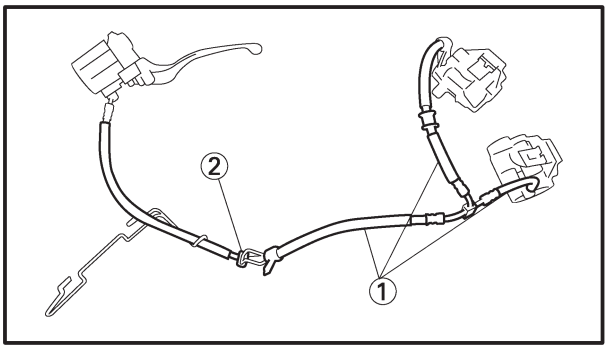
NOTE:

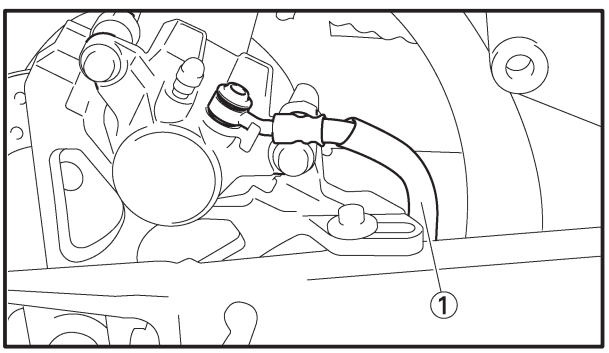
The rear brake light switch is operated by movement of the brake pedal.
The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.

1. Check:
   • rear brake light operation timing
   Incorrect → Adjust.
2. Adjust:
   • rear brake light operation timing

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

Direction ⓐ	**Brake light comes on sooner.**
Direction ⓑ	**Brake light comes on later.**





EAS00131

CHECKING THE FRONT AND REAR BRAKE HOSES

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

1. Check:
   • brake hoses ①
   Cracks/damage/wear → Replace.
   Activate the brake lever or pedal several time.
   Brake fluid leakage → Replace the damaged hose.
   Refer to “FRONT AND REAR BRAKES” in chapter 4.
2. Check:
   • brake hose clamp ②
   Loose → Tighten the clamp bolt.
3. Hold the motorcycle upright and apply the brake several times.

EAS00134

BLEEDING THE HYDRAULIC BRAKE SYSTEM

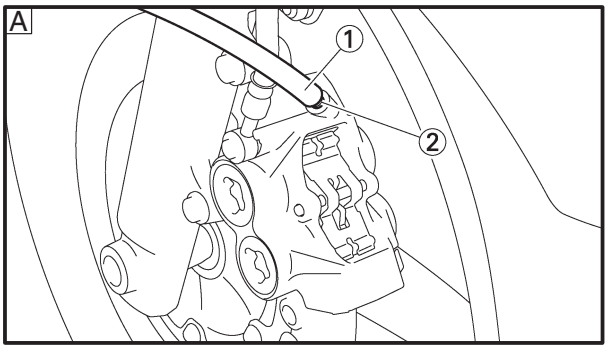
⚠ WARNING

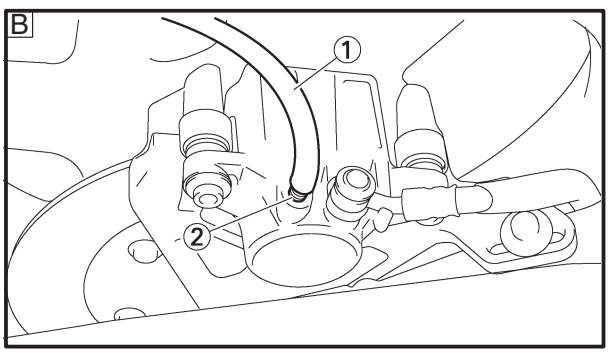
Bleed the hydraulic brake system whenever:
- **the system is disassembled.**
- **a brake hose is loosened, disconnected or replaced.**
- **the brake fluid level is very low.**
- **brake operation is faulty.**

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

1. Bleed:
   - hydraulic brake system

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





A Front
B Rear

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

NOTE:

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

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

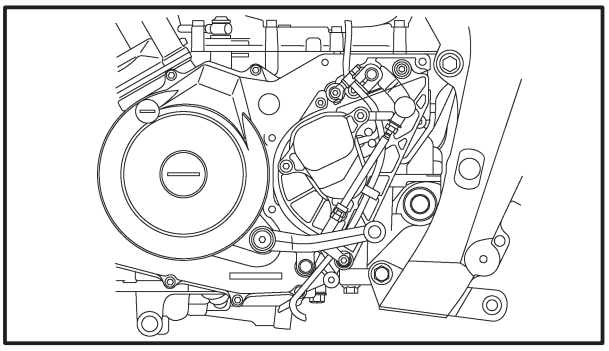
Bleed screw
6 Nm (0.6 m•kg)

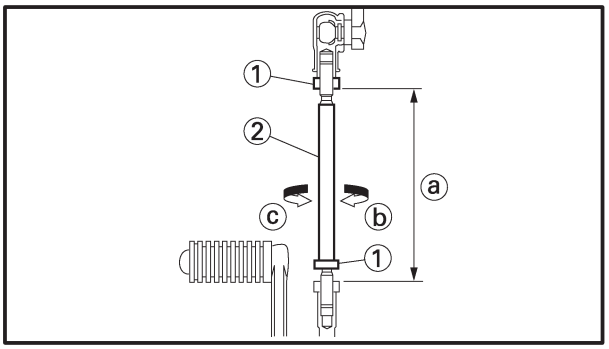
k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
Refer to "CHECKING THE BRAKE FLUID LEVEL".

⚠ WARNING

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

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EAS00137
ADJUSTING THE SHIFT PEDAL

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

1. Measure:
• installed shift rod length ⓐ
Incorrect → Adjust.

Installed shift rod length
94 mm

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

Direction ⓑ	**Installed shift rod length increases.**
Direction ⓒ	**Installed shift rod length decreases.**

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

EAS00140

ADJUSTING THE DRIVE CHAIN SLACK

NOTE:

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

CAUTION:

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

1. Stand the motorcycle on a level surface.

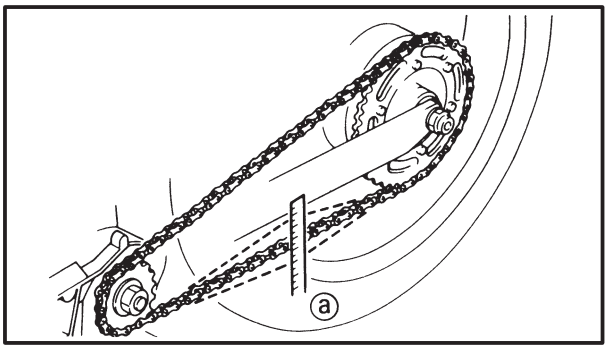
⚠ WARNING

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

NOTE:

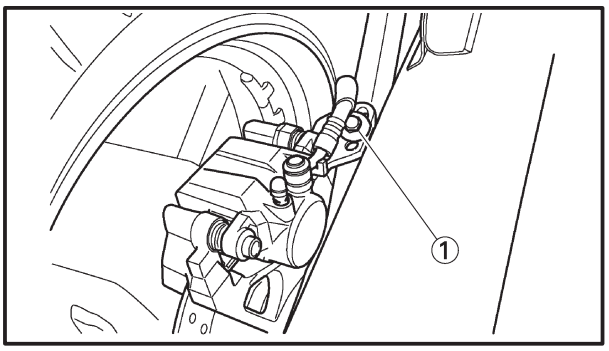
Place the motorcycle on a suitable stand so that the rear wheel is elevated.

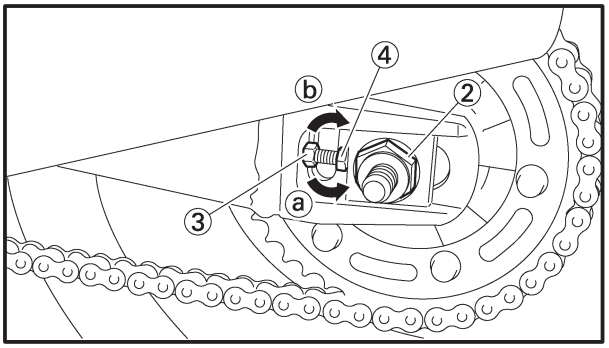
2. Spin the rear wheel several times and find the tightest position of drive chain.



3. Check:
   • drive chain slack ⓐ
   Out of specification → Adjust.

	Drive chain slack **50 ~ 60 mm**





4. Adjust:
   • drive chain slack

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a. Loosen the brake caliper bracket bolt ①.
b. Loosen the wheel axle nut ②.
c. Loosen locknuts ③ (left and right).
d. Turn the each side adjusting bolts ④ in direction ⓐ or ⓑ until the specified drive chain slack is obtained.

Direction ⓐ	**Drive chain is tightened.**
Direction ⓑ	**Drive chain is loosened.**

NOTE:

To maintain the proper wheel alignment, adjust both sides evenly.

e. Tighten both locknuts to specification.

Locknut
16 Nm (1.6 m•kg)

f. Tighten the wheel axle nut to specification.

Wheel axle nut
150 Nm (15.0 m•kg)

g. Tighten the brake caliper bracket bolt to specification.

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

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EAS00143

LUBRICATING THE DRIVE CHAIN

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the motorcycle is used in dusty areas. Use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for non-O-ring chains.

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

EAS00146

CHECKING AND ADJUSTING THE STEERING HEAD

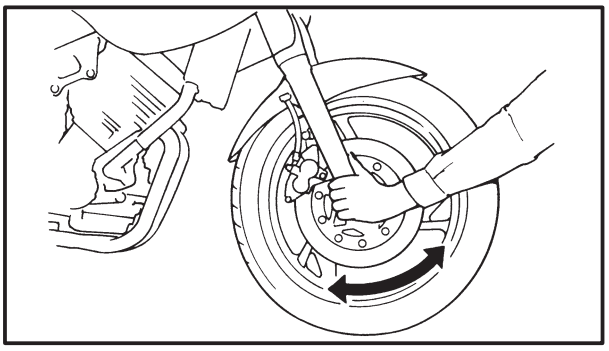
1. Stand the motorcycle on a level surface.

⚠ WARNING

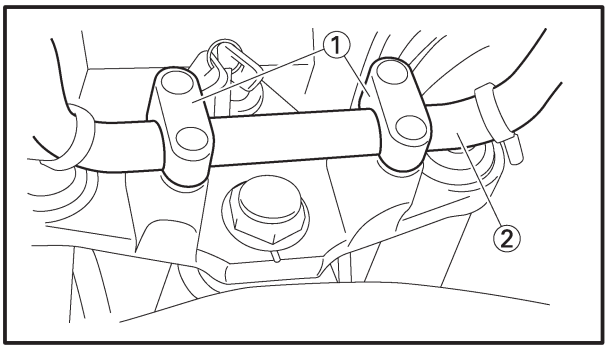
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

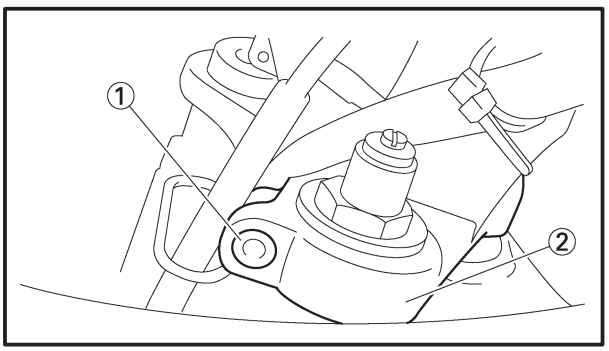
Place the motorcycle on a suitable stand so that the front wheel is elevated.



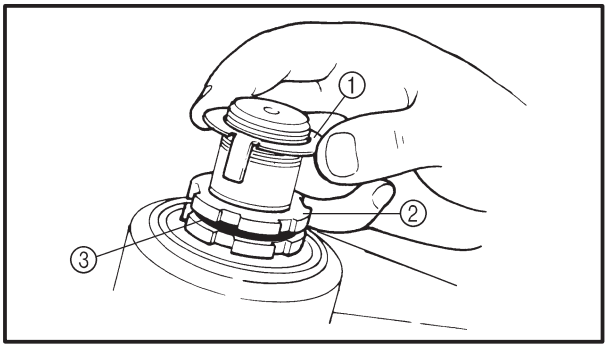
2. Check:
   - steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Binding/looseness → Adjust the steering head.

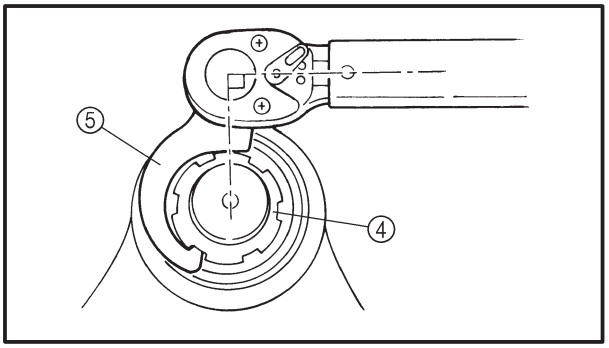


3. Remove:
   - handlebar holder ①
   - handlebar ②



4. Loosen:
   - upper bracket pinch bolts ①
5. Remove:
   - steering stem nut
   - upper bracket ②





4. Adjust:
   • steering head

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

NOTE:

Set the torque wrench at a right angle to the steering nut wrench.

	**Steering nut wrench** **90890-01403**

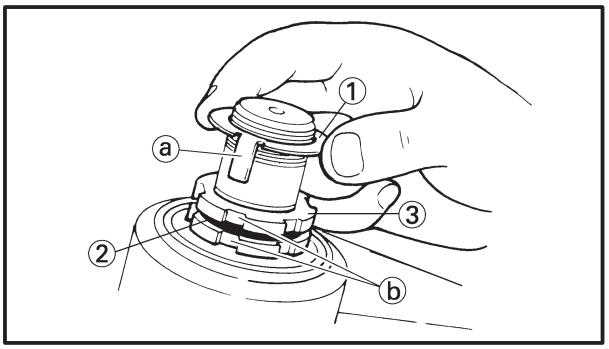
	**Lower ring nut** **(initial tightening torque)** **52 Nm (5.2 m•kg)**

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

⚠ WARNING

Do not overtighten the lower ring nut.

	**Lower ring nut** **(final tightening torque)** **15 Nm (1.5 m•kg)**



d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
   Refer to “STEERING HEAD” in chapter 4.
e. Install the rubber washer ②.
f. Install the upper ring nut ③.

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

NOTE:

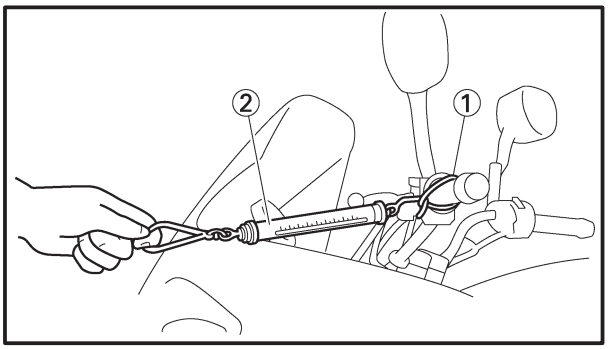
Make sure the lock washer tabs ⓐ sit correctly in the ring nut slots ⓑ.

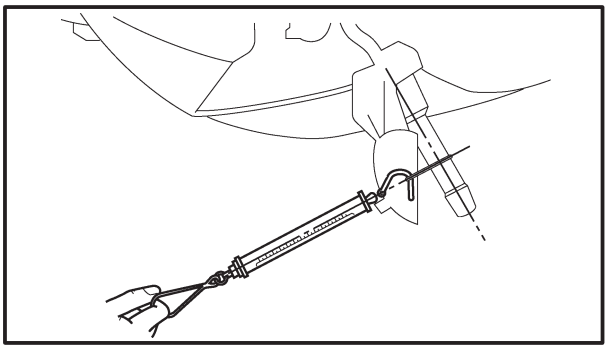
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5. Install:
   - upper bracket — 26 Nm (2.6 m•kg)
   - steering stem nut — 113 Nm (11.3 m•kg)
   - handlebar — 23 Nm (2.3 m•kg)
6. Measure:
   - steering head tension

NOTE:

Make sure all of the cables and wires are properly routed.

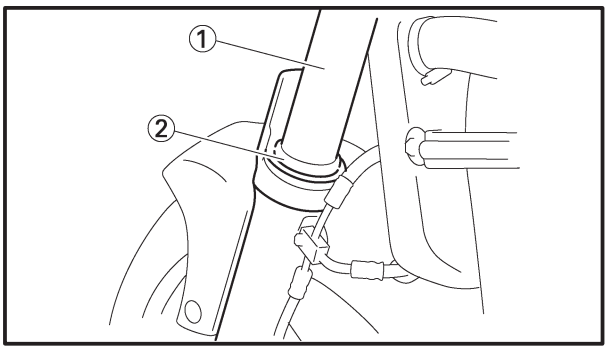


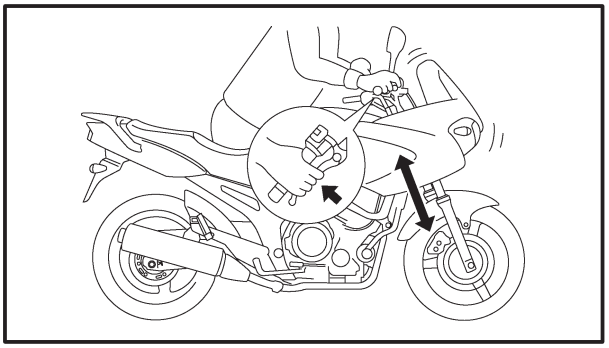


a. Point the front wheel straight ahead.
b. Install a plastic locking tie ① loosely around the end of the handlebar as shown.
c. Hook a spring gauge ② onto the plastic locking tie.
d. Hold the spring gauge at a 90° angle from the handlebar, pull the spring gauge, and then record the measurement when the handlebar starts to run.

Steering head tension
200 ~ 500 g

e. Repeat the above procedure on the opposite handlebar.
f. If the steering head tension is out of specification (both handlebars should be within specification), remove the upper bracket and loosen or tighten the upper ring nut.
g. Reinstall the upper bracket and measure the steering head tension again as described above.
h. Repeat the above procedure until the steering head tension is within specification.
i. Grasp the bottom of the front fork legs and gently rock the front fork.
   Binding/looseness → Adjust the steering head.





EAS00149

CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

2. Check:
   - inner tube ①
     Damage/scratches → Replace.
   - oil seal ②
     Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.
4. Check:
   - front fork operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Rough movement → Repair.
     Refer to “FRONT FORK” in chapter 4.

EAS00154

ADJUSTING THE FRONT FORK LEGS

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

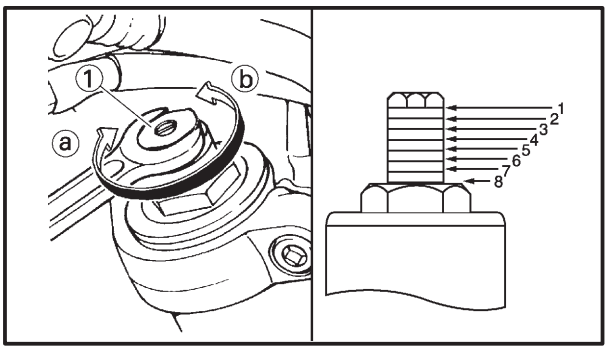
⚠ WARNING

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

Spring preload

CAUTION:

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



1. Adjust:
   • spring preload

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

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

Adjusting positions
Minimum: 8
Standard: 7
Maximum: 1

Rebound damping

CAUTION:

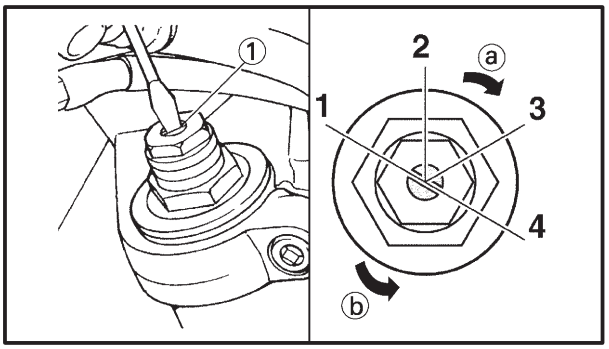
Never go beyond the maximum or minimum adjustment positions.

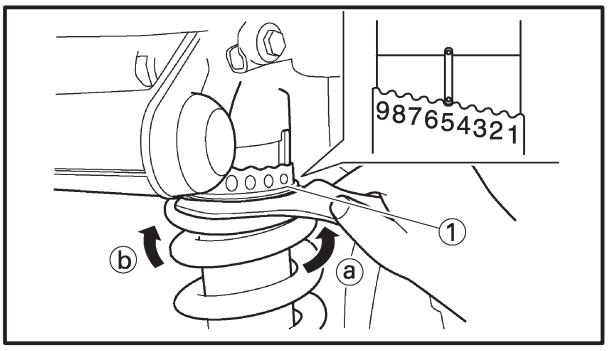
1. Adjust:
   • rebound damping

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

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

Adjusting positions
Minimum: 1
Standard: 2
Maximum: 4





EAS00158

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

⚠ WARNING

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

Spring preload

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • spring preload

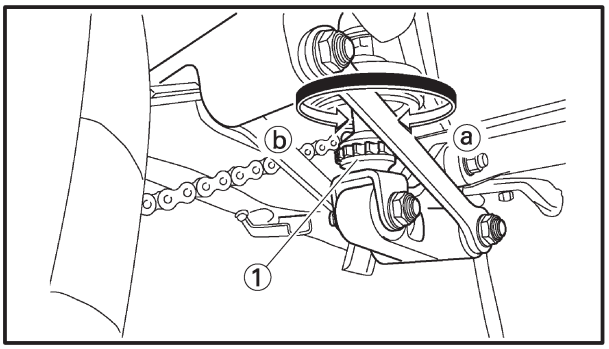
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a. Turn the adjusting ring ① in direction ⓐ or ⓑ.
b. Align the desired position on the adjusting ring with the stopper ②.

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

Adjusting positions
Minimum: 1
Standard: 5
Maximum: 9

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Rebound damping

CAUTION:

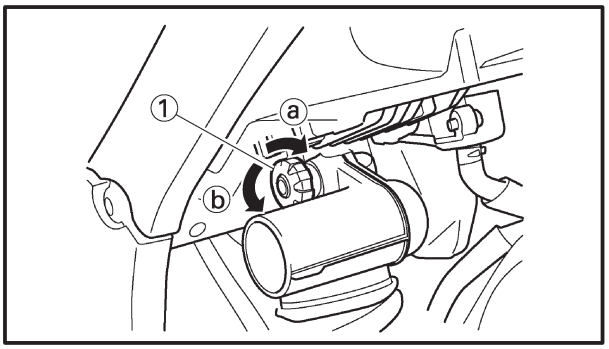
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • rebound damping

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

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

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



Compression damping

CAUTION:

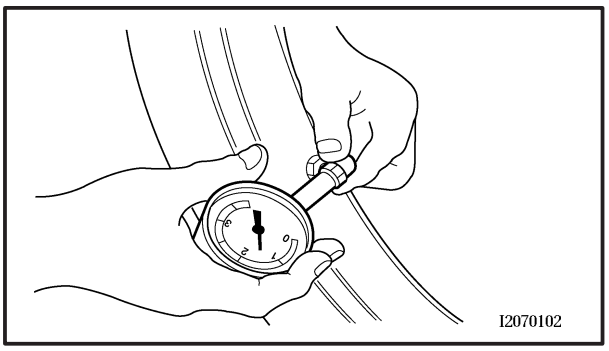
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • compression damping

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

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

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



EAS00166
CHECKING THE TIRES
The following procedure applies to both of the tires.
1. Check:
   • tire pressure
   Out of specification → Regulate.

⚠ WARNING

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

NEVER OVERLOAD THE MOTORCYCLE.

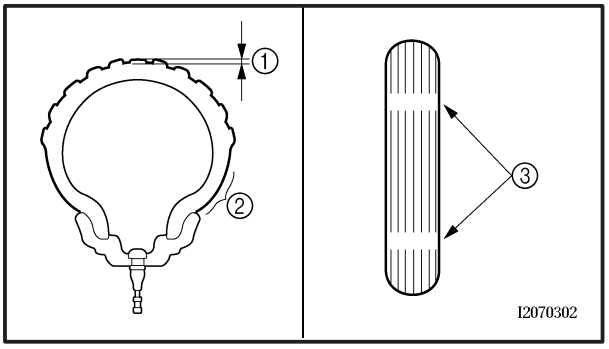
Basic weight (with oil and a full fuel tank)	**221 kg**	
Maximum load*	**371 kg**	
Cold tire pressure	**Front**	**Rear**
Up to 90 kg load*	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**250 kPa (2.5 kgf/cm², 2.5 bar)**
90 kg ~ maximum load*	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**290 kPa (2.9 kgf/cm², 2.9 bar)**
High-speed riding	**250 kPa (2.5 kgf/cm², 2.5 bar)**	**250 kPa (2.5 kgf/cm², 2.5 bar)**

* Total weight of rider, passenger, cargo and accessories

⚠ WARNING

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

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

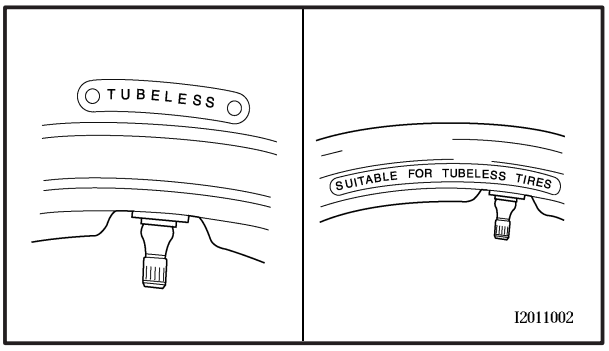


Minimum tire tread depth
1.6 mm

① Tire tread depth
② Sidewall
③ Wear indicator

⚠ WARNING

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



A Tire
B Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

⚠ WARNING

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

Front tire

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

Rear tire

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

EAS00168

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

1. Check:
   - wheel
     Damage/out-of-round → Replace.
     Refer to "CHECKING THE FRONT WHEEL" in chapter 4.

⚠ WARNING

Never attempt to make any repairs to the wheel.

NOTE:

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

EAS00170

CHECKING AND LUBRICATING THE CABLES

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

⚠ WARNING

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

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

Recommended lubricant
Engine oil or a suitable cable lubricant

NOTE:

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

EAS00171

LUBRICATING THE LEVERS AND PEDALS

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

Recommended lubricant
Lithium-soap-based grease

EAS00172

LUBRICATING THE SIDESTAND

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

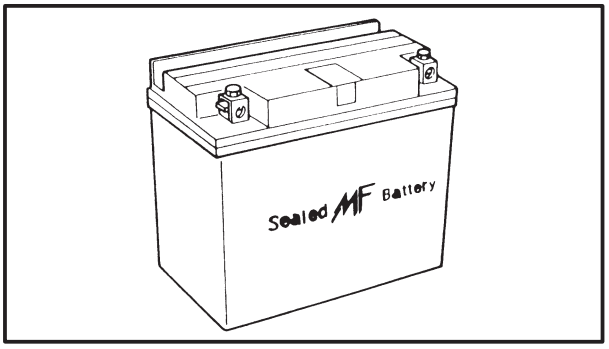
Recommended lubricant
Lithium-soap-based grease

EAS00174

LUBRICATING THE REAR SUSPENSION

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

Recommended lubricant
Molybdenum disulfide grease



EAS00178

ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

⚠ WARNING

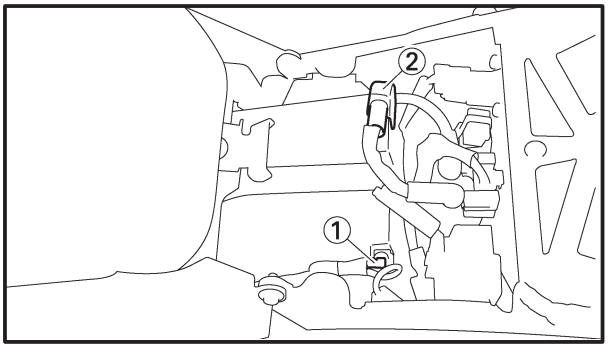
Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid.
Therefore, always follow these preventive measures:
- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

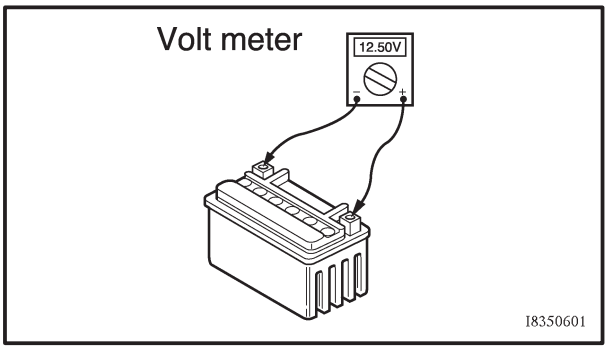
FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin – Wash with water.**
- **Eyes – Flush with water for 15 minutes and get immediate medical attention.**

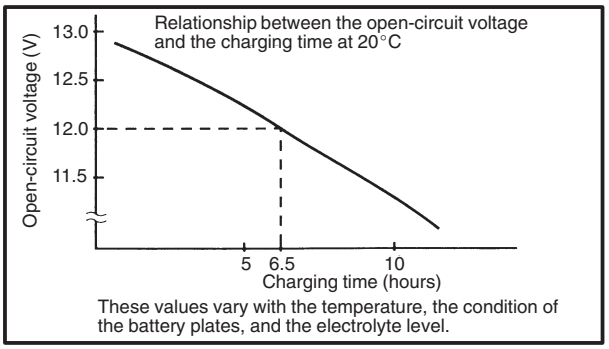
INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:

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







NOTE:

Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   - seat
     Refer to "SEAT".
2. Disconnect:
   - battery leads
     (from the battery terminals)

CAUTION:

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

3. Remove:
   - battery
4. Check:
   - battery charge

a. Connect a pocket tester to the battery terminals.

Positive tester probe → positive battery terminal
Negative tester probe → negative battery terminal

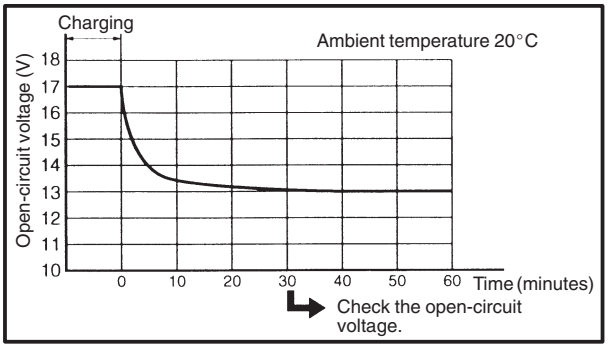
NOTE:

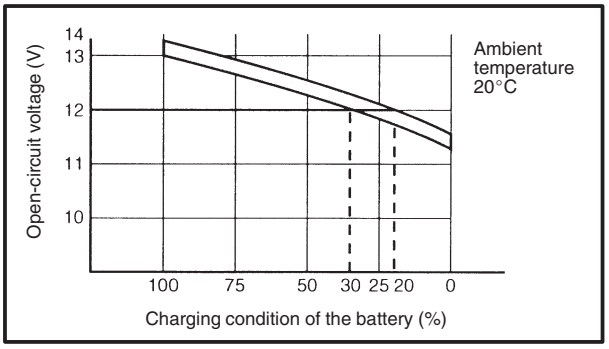
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example

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





5. Charge:
   • battery
   (refer to the appropriate charging method illustration)

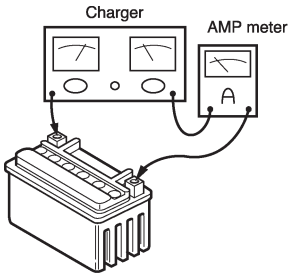
⚠ WARNING

Do not quick charge a battery.

CAUTION:

- **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 voltage charger



I8350101

Measure the open-circuit voltage prior to charging.

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

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

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

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

YES

NO

By turning the charging voltage adjust dial, set the charging voltage at 20 ~ 24 V.

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

YES

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

NO

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

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

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

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

Charging method using a constant voltage charger

Measure the open-circuit voltage prior to charging.

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

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

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

YES

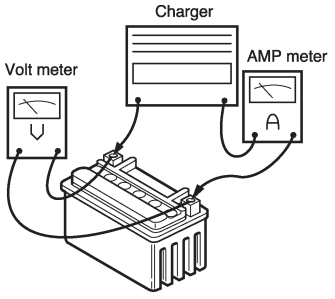
Charge the battery until the battery's charging voltage is 15 V. Charge the battery until the battery's charging voltage is 15 V.

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

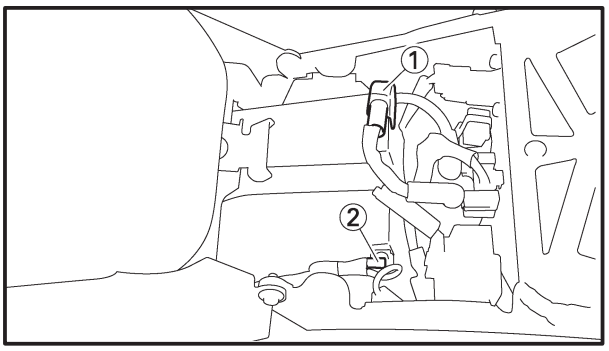
Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.
12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

NO

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



I8350102



6. Install:
   • 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 terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   • battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
    • seat

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.

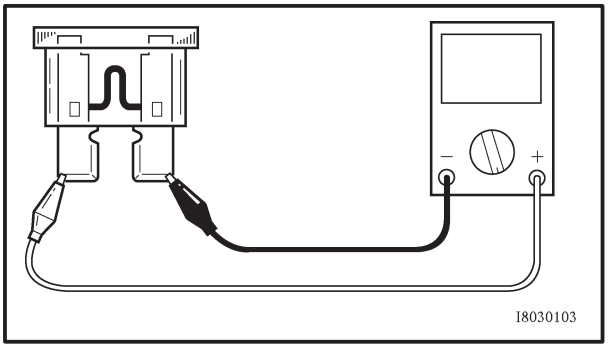
1. Remove:
   • seat
     Refer to "SEAT".
2. Check:
   • fuse

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

NOTE:

Set the pocket tester selector to "Ω × 1".



Pocket tester
90890-03132

b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
   • blown fuse

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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.

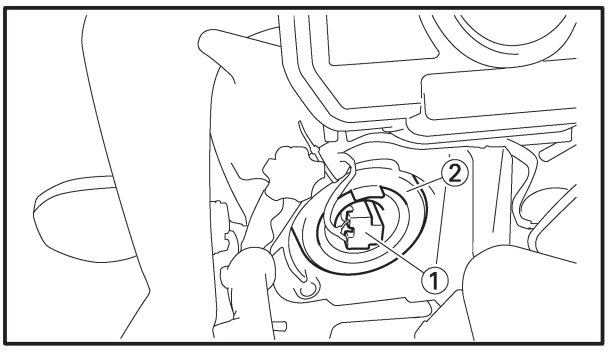
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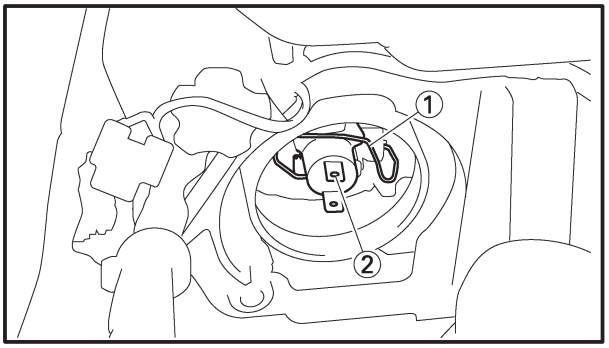
Fuses	Amperage rating	Q'ty
Main	40A	1
Fuel injection system	15A	1
Headlight	15A	1
Signaling system	7.5A (EUR) 10A (OCE)	1
Ignition	10A	1
Radiator fan motor	20A	1
Hazard light	10A	1
Parking light	5A	1
Backup	5A	1
Reserve	20, 15, 10, 7.5 (EUR), 5A	1

⚠ WARNING

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

4. Install:
   • seat





EAS00183
REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Disconnect:
   • headlight coupler ①
2. Remove:
   • headlight bulb holder cover ②
3. Remove:
   • headlight bulb holder ①
4. Remove:
   • headlight bulb ②

⚠ WARNING

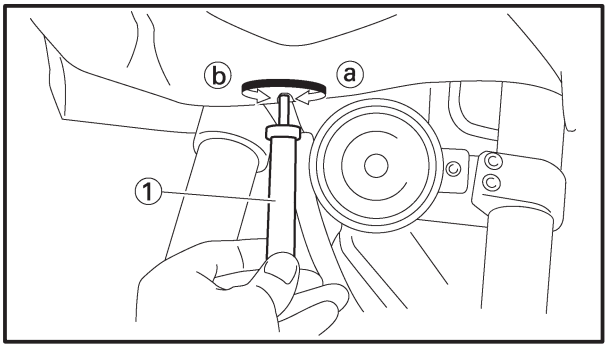
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

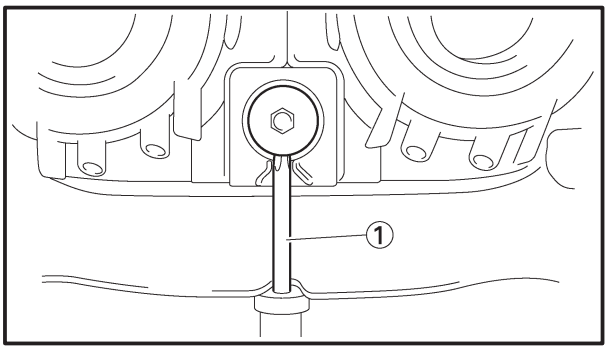
5. Install:
   • headlight bulb New
   Secure the new headlight bulb with the headlight bulb holder.

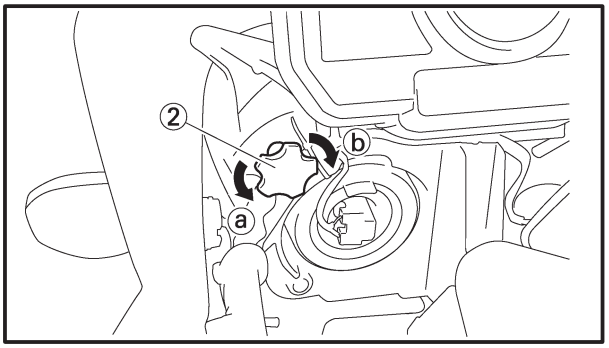
CAUTION:

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

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







EAS00185

ADJUSTING THE HEADLIGHT BEAMS

1. Adjust:
   • headlight beam (vertically)

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a. To adjust the height of headlight, use the No.2 Phillips screwdriver ① and then adjust the headlight height by inserting it from the downside.

b. Turn the adjusting screw in direction ⓐ or ⓑ.

Direction ⓐ	**Headlight beam is raised.**
Direction ⓑ	**Headlight beam is lowered.**

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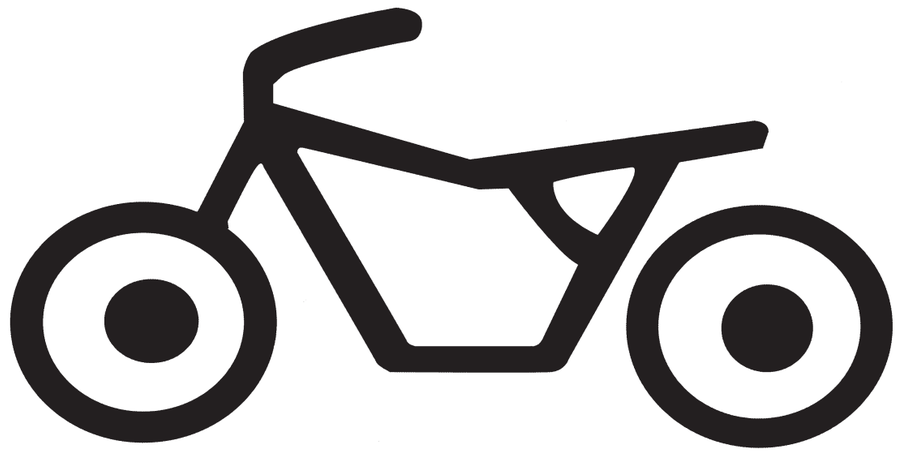
2. Adjust:
   • headlight beam (horizontally)

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a. Turn the headlight adjusting knob ② in direction ⓐ or ⓑ.

Direction ⓐ	**Headlight beam moves to the right.**
Direction ⓑ	**Headlight beam moves to the left.**

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CHAS 4

CHAPTER 4
CHASSIS

FRONT WHEEL AND BRAKE DISCS 4-1
FRONT WHEEL 4-2
REMOVING THE FRONT WHEEL 4-3
CHECKING THE FRONT WHEEL 4-4
CHECKING THE BRAKE DISCS 4-5
ADJUSTING THE FRONT WHEEL STATIC BALANCE 4-6
DISASSEMBLING THE FRONT WHEEL 4-7
ASSEMBLING THE FRONT WHEEL 4-8
INSTALLING THE FRONT WHEEL 4-8

REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET 4-9
REAR WHEEL 4-9
REMOVING THE REAR WHEEL 4-12
CHECKING THE REAR WHEEL 4-12
CHECKING THE REAR WHEEL DRIVE HUB 4-13
CHECKING AND REPLACING THE REAR WHEEL SPROCKET . 4-13
INSTALLING THE REAR WHEEL 4-14
ADJUSTING THE REAR WHEEL STATIC BALANCE 4-15

FRONT AND REAR BRAKES 4-16
FRONT BRAKE PADS 4-16
REAR BRAKE PADS 4-17
REPLACING THE FRONT BRAKE PADS 4-18
REPLACING THE REAR BRAKE PADS 4-21
FRONT BRAKE MASTER CYLINDER 4-23
REAR BRAKE MASTER CYLINDER 4-25
DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER 4-27
DISASSEMBLING THE REAR BRAKE MASTER CYLINDER 4-27
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS 4-28
ASSEMBLYING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER 4-29
ASSEMBLING THE REAR BRAKE MASTER CYLINDER 4-31
FRONT BRAKE CALIPERS 4-33
REAR BRAKE CALIPER 4-35
DISASSEMBLING THE FRONT BRAKE CALIPERS 4-37
DISASSEMBLING THE REAR BRAKE CALIPER 4-38
CHECKING THE FRONT AND REAR BRAKE CALIPERS 4-39
ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS 4-40
ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER 4-42

FRONT FORK 4-44
REMOVING THE FRONT FORK LEGS 4-47
DISASSEMBLING THE FRONT FORK LEGS 4-48
CHECKING THE FRONT FORK LEGS 4-49
ASSEMBLING THE FRONT FORK LEGS 4-50
INSTALLING THE FRONT FORK LEGS 4-54

HANDLEBAR 4-55
REMOVING THE HANDLEBAR 4-57
CHECKING THE HANDLEBAR 4-58
INSTALLING THE HANDLEBAR 4-59

STEERING HEAD 4-61
REMOVING THE LOWER BRACKET 4-63
CHECKING THE STEERING HEAD 4-64
INSTALLING THE STEERING HEAD 4-65

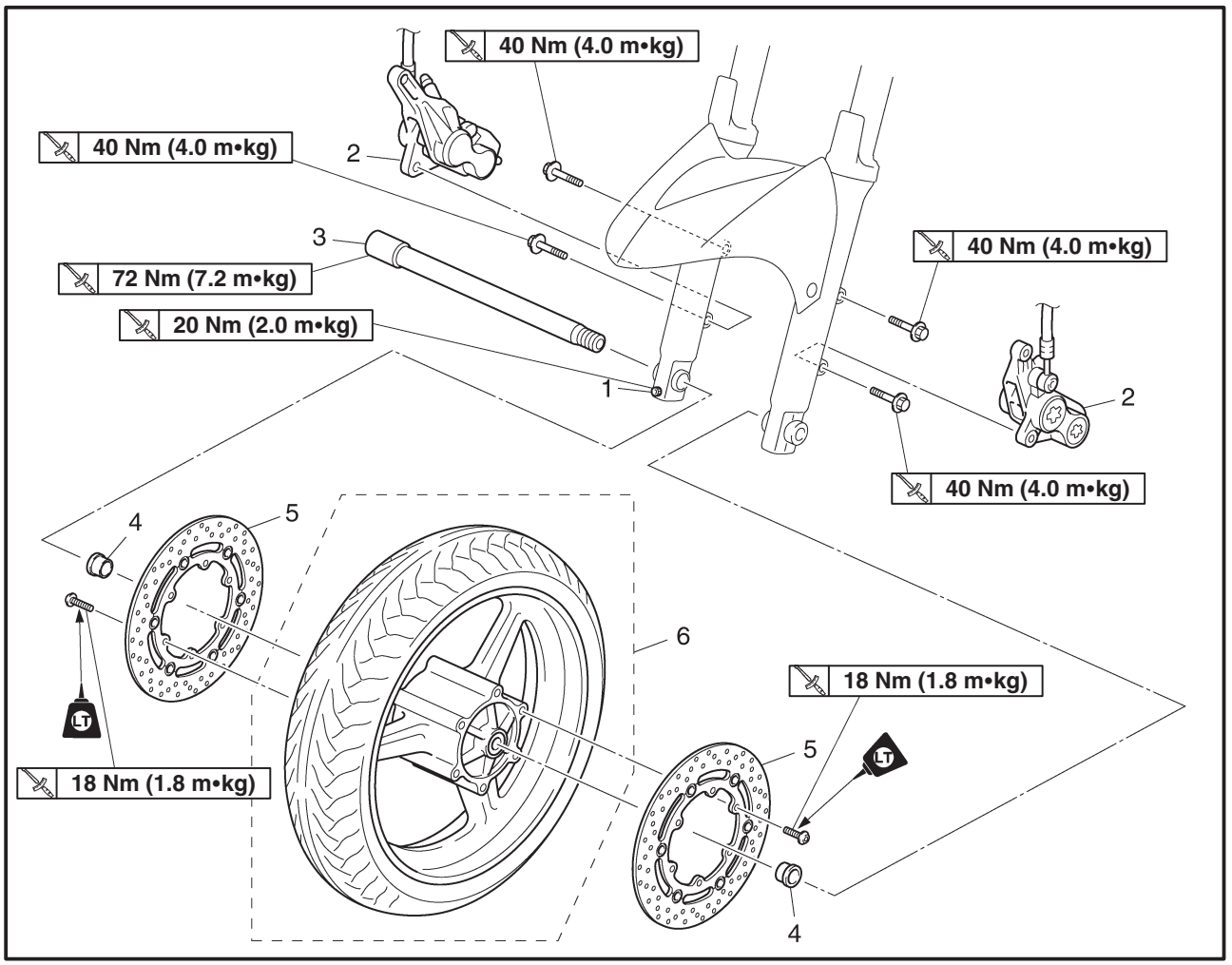
REAR SHOCK ABSORBER ASSEMBLY 4-66
HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER 4-68
DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER 4-68
REMOVING THE REAR CHOCK ABSORBER ASSEMBLY 4-69
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY AND GAS CYLINDER 4-70
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY 4-70

SWINGARM AND DRIVE CHAIN 4-72
REMOVING THE SWINGARM 4-74
REMOVING THE DRIVE CHAIN 4-75
CHECKING THE SWINGARM 4-75
DISASSEMBLING THE SWINGARM 4-76
CHECKING THE CONNECTING ARM AND RELAY ARMS 4-76
ASSEMBLING THE SWINGARM 4-76
CHECKING THE DRIVE CHAIN 4-77
INSTALLING THE SWINGARM 4-79

EAS00514

CHASSIS

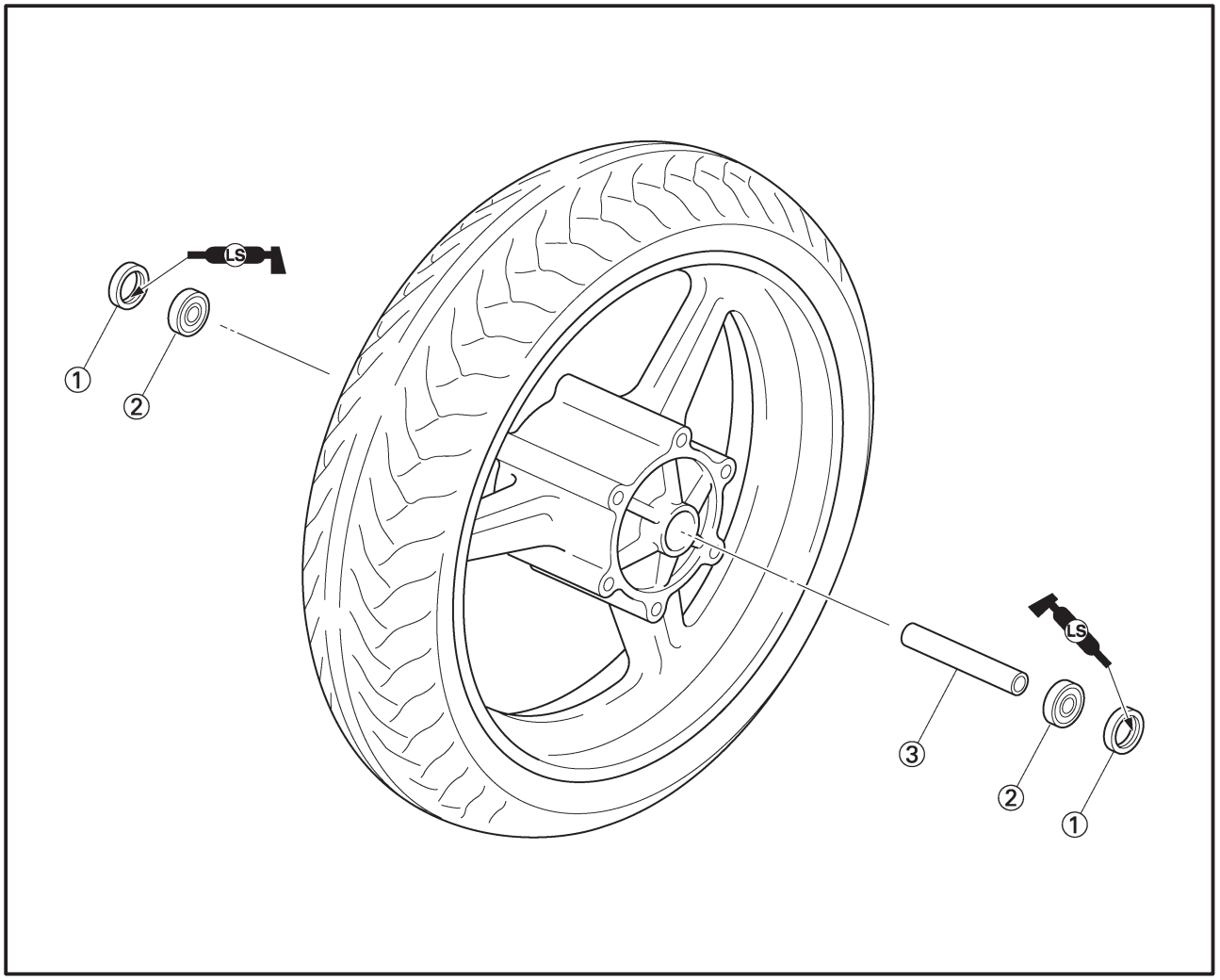
FRONT WHEEL AND BRAKE DISCS



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

EAS00518

FRONT WHEEL



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

EAS00521

REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

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

2. Remove:
   - left brake caliper
   - right brake caliper

NOTE:

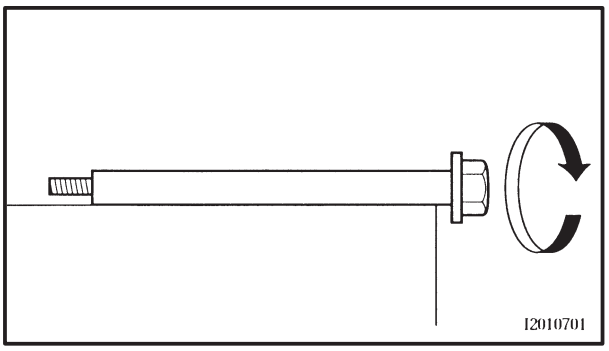
Do not apply the brake lever when removing the brake calipers.

3. Loosen:
   - wheel axle pinch bolt
   - front wheel axle
4. Elevate:
   - front wheel

NOTE:

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

5. Remove:
   - front wheel axle
6. Remove:
   - front wheel
7. Remove:
   - collars



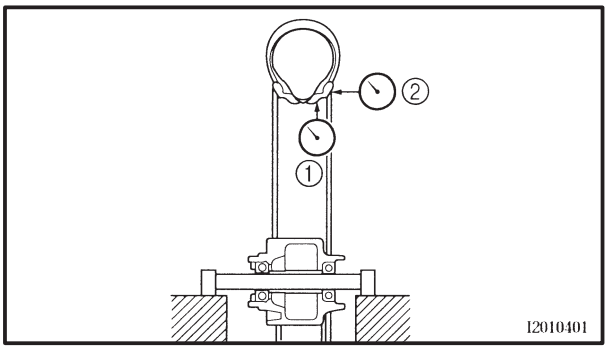
EAS00525
CHECKING THE FRONT WHEEL

1. Check:
   - wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

⚠ WARNING

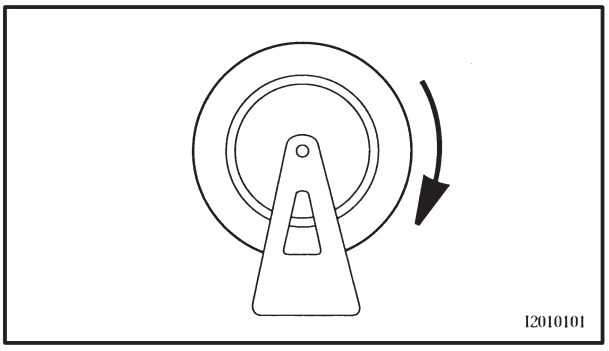
Do not attempt to straighten a bent wheel axle.

2. Check:
   - tire
     Refer to "CHECKING THE TIRES" in chapter 3.
   - front wheel
     Damage/wear → Replace.



3. Measure:
   - radial wheel runout ①
   - lateral wheel runout ②
     Over the specified limits → Replace.

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

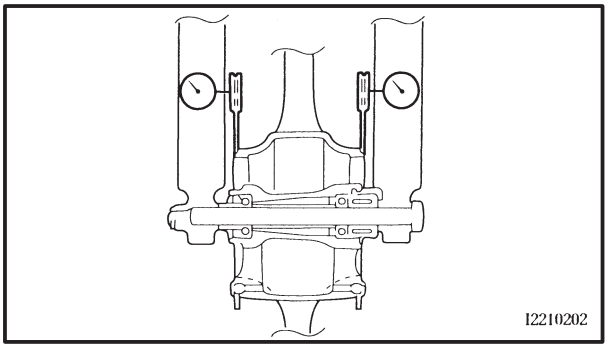


4. Check:
   - wheel bearings
     Front wheel turns roughly or is loose
     → Replace the wheel bearings.
     Refer to "DISASSEMBLING THE FRONT WHEEL" and "ASSEMBLING THE FRONT WHEEL".

EAS00531
CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

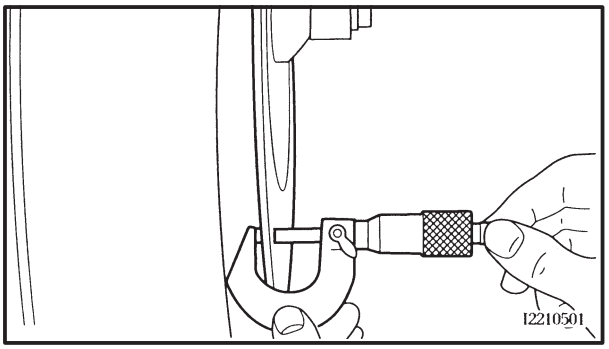
1. Check:
   - brake disc
     Damage/galling → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit (maximum)
Front: 0.1 mm
Rear: 0.1 mm

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

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

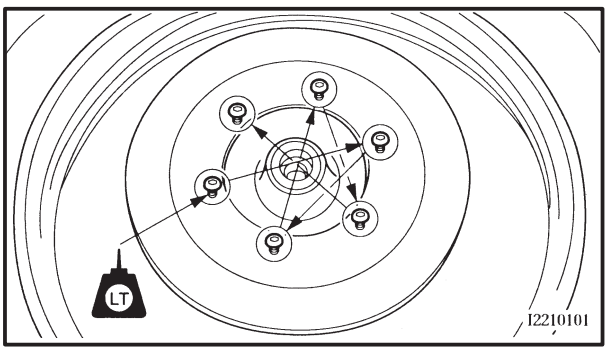


Brake disc thickness limit (minimum)
Front: 4.5 mm
Rear: 4.5 mm

4. Adjust:
   - brake disc deflection

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

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



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

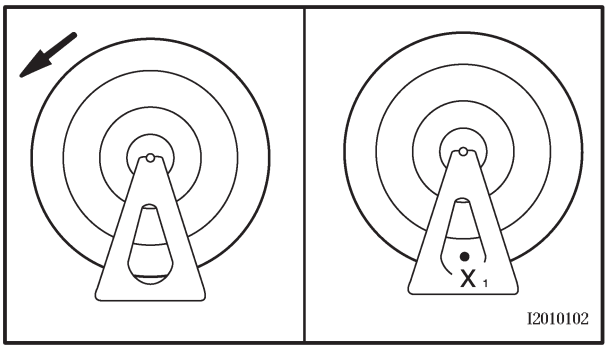
d. Measure the brake disc deflection.
e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

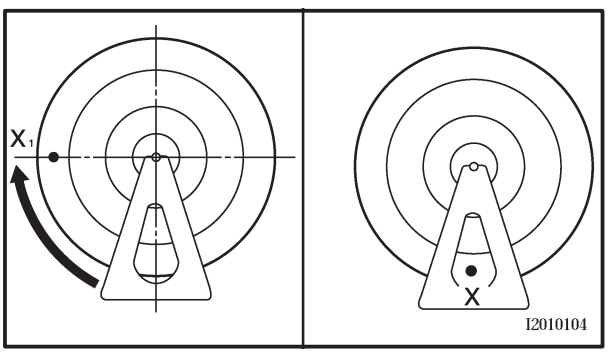
EAS00549
ADJUSTING THE FRONT WHEEL STATIC BALANCE

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

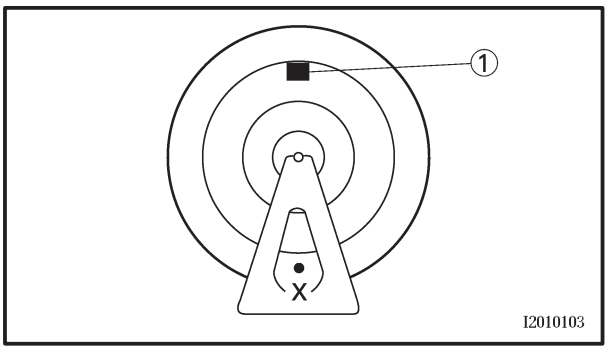
1. Remove:
   - balancing weight(s)
2. Find:
   - front wheel's heavy spot

NOTE:
Place the front wheel on a suitable balancing stand.





a. Spin the front wheel.
b. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.
c. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an "X_2" mark at the bottom of the wheel.
f. Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.
g. The spot where all the marks come to rest is the front wheel's heavy spot "X".



3. Adjust:
   • front wheel static balance

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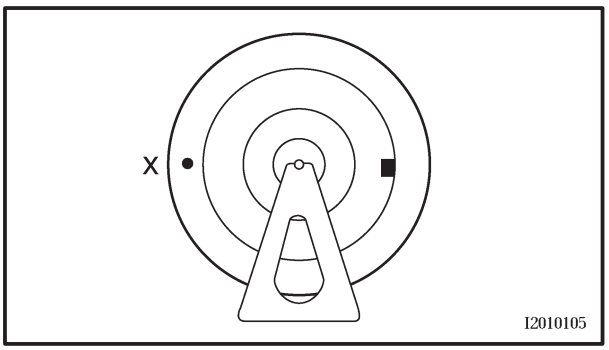
a. Install a balancing weight ① onto the rim exactly opposite the heavy spot "X".

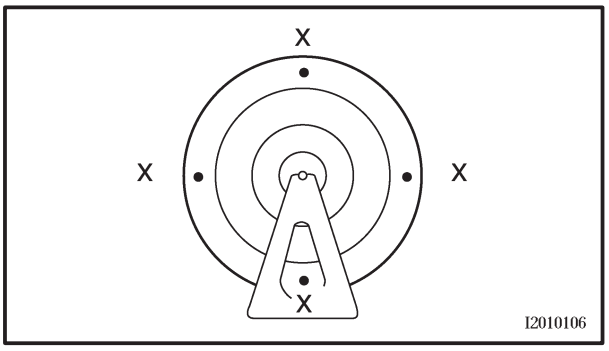
NOTE:

Start with the lightest weight.

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

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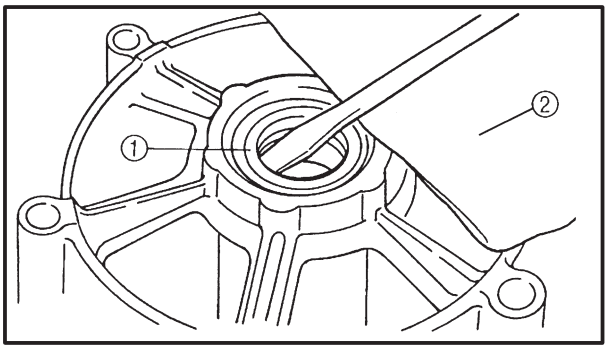


4. Check:
   • front wheel static balance

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a. Turn the front wheel and make sure it stays at each position shown.
b. If the front wheel does not remain stationary at all of the positions, rebalance it.

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EAS00523

DISASSEMBLING THE FRONT WHEEL

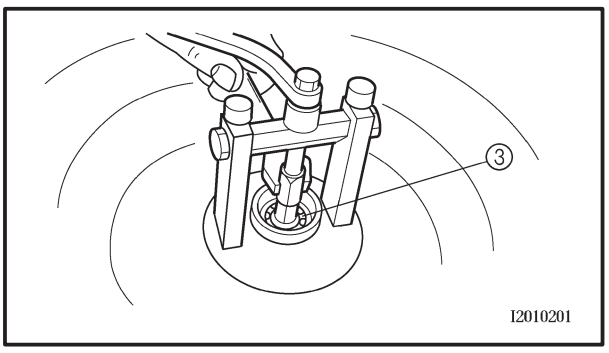
1. Remove:
   • oil seals ①
   • wheel bearings

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

NOTE:

To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel surface.



c. Remove the wheel bearings ③ with a general bearing puller.

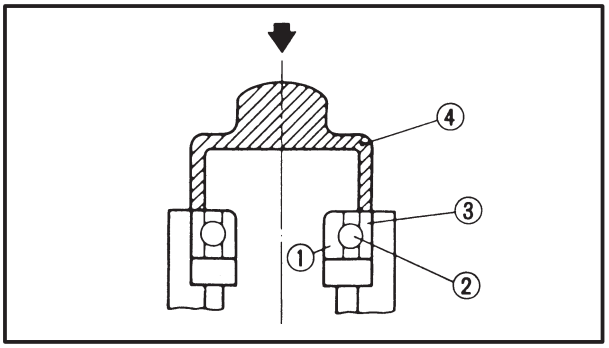
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EAS00539
ASSEMBLING THE FRONT WHEEL
1. Install:
   - wheel bearings
   - oil seals New

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

CAUTION:

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

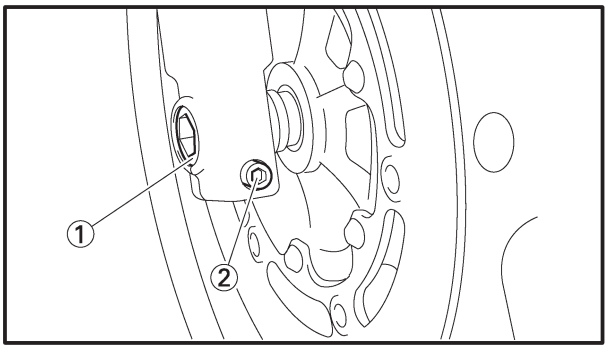


NOTE:

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

EAS00544
INSTALLING THE FRONT WHEEL
The following procedure applies to both of the brake discs.
1. Lubricate:
   - wheel axle
   - oil seal lips

Recommended lubricant
Lithium-soap-based grease



2. Install:
   - collars
3. Tighten:
   - wheel axle ① — **72 Nm (7.2 m•kg)**
   - wheel axle pinch bolt ② — **20 Nm (2.0 m•kg)**

CAUTION:

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

4. Install:
   - brake calipers
   - brake caliper bolts — **40 Nm (4.0 m•kg)**

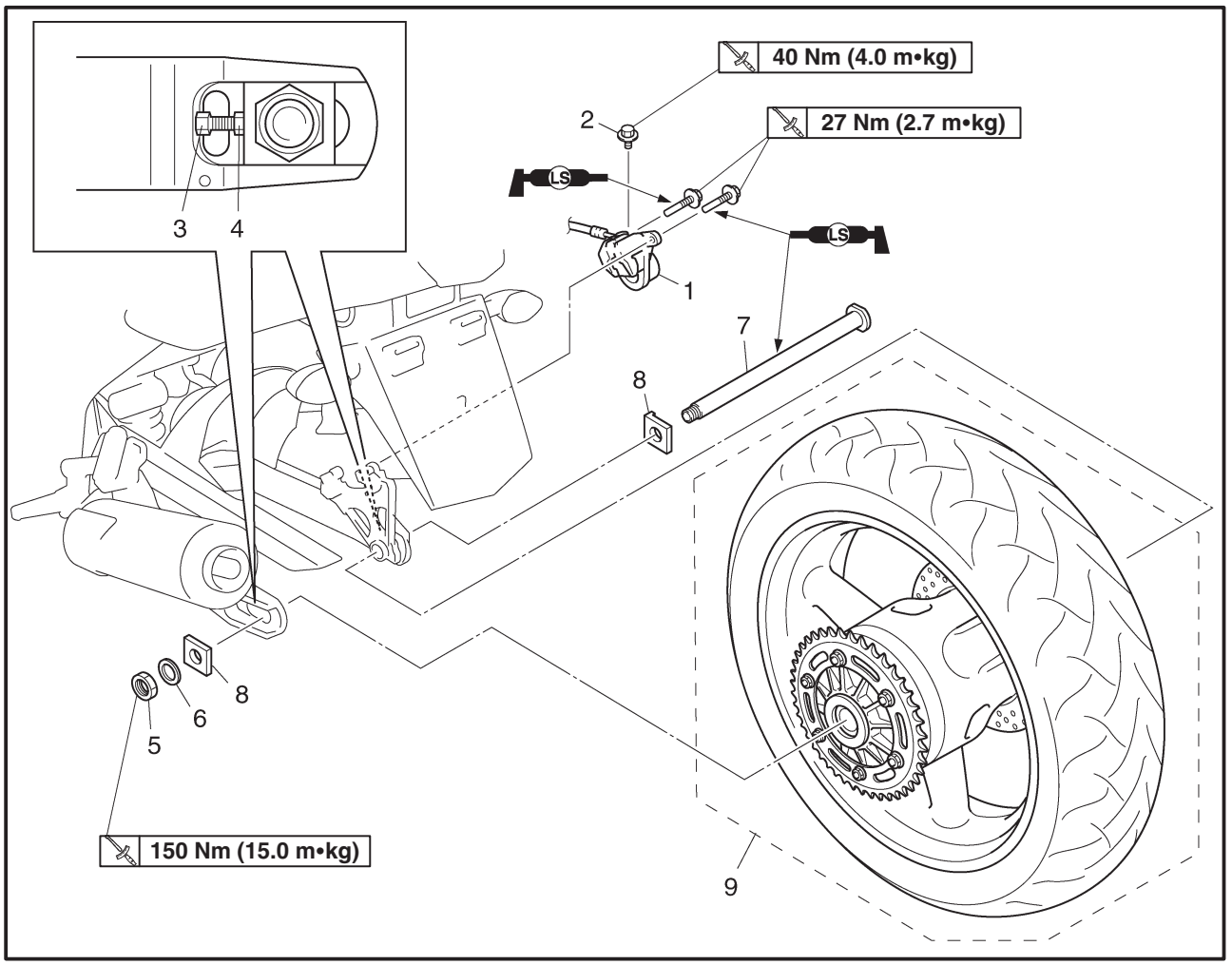
⚠ WARNING

Make sure the brake hose is routed properly.

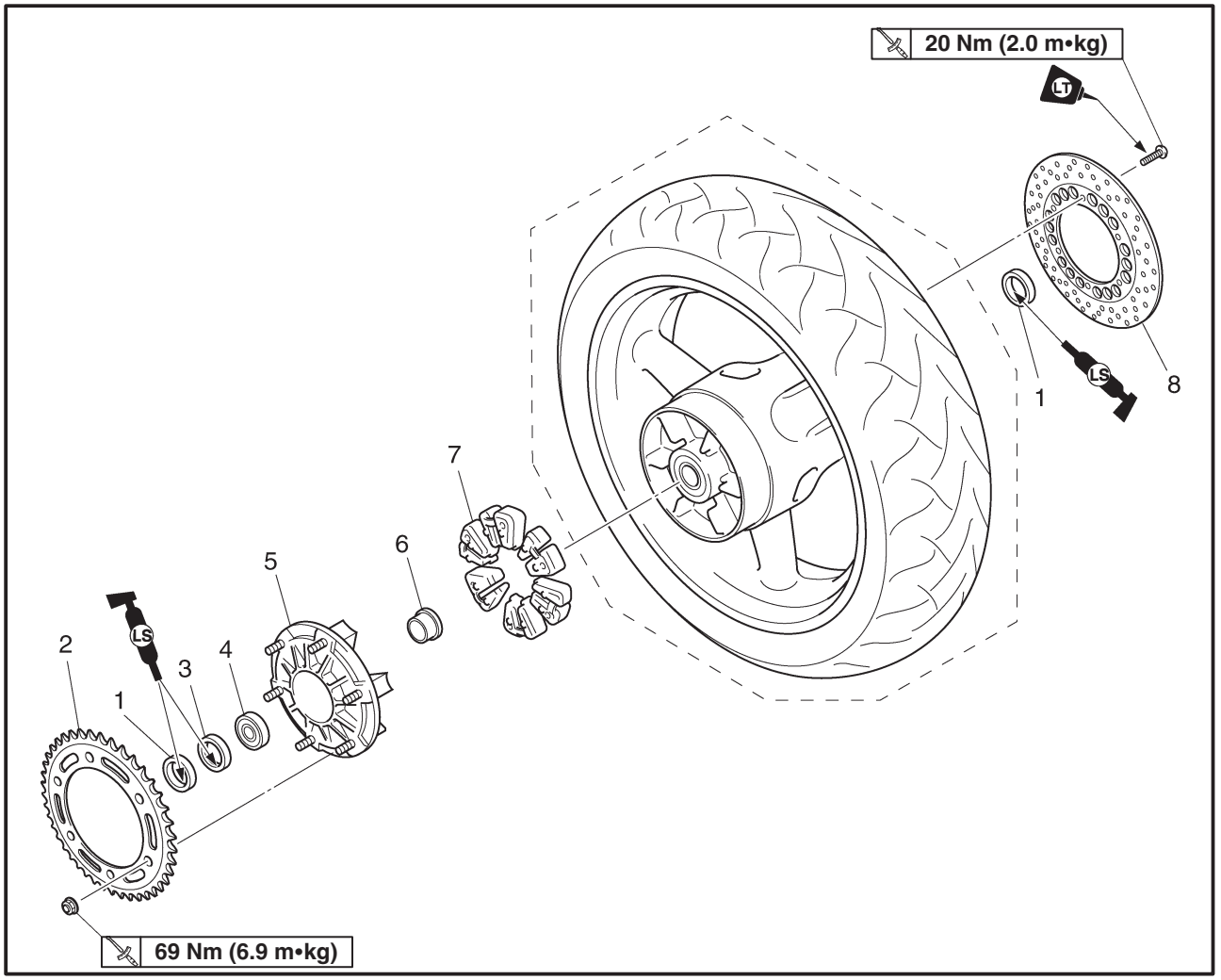
EAS00550

REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET

REAR WHEEL

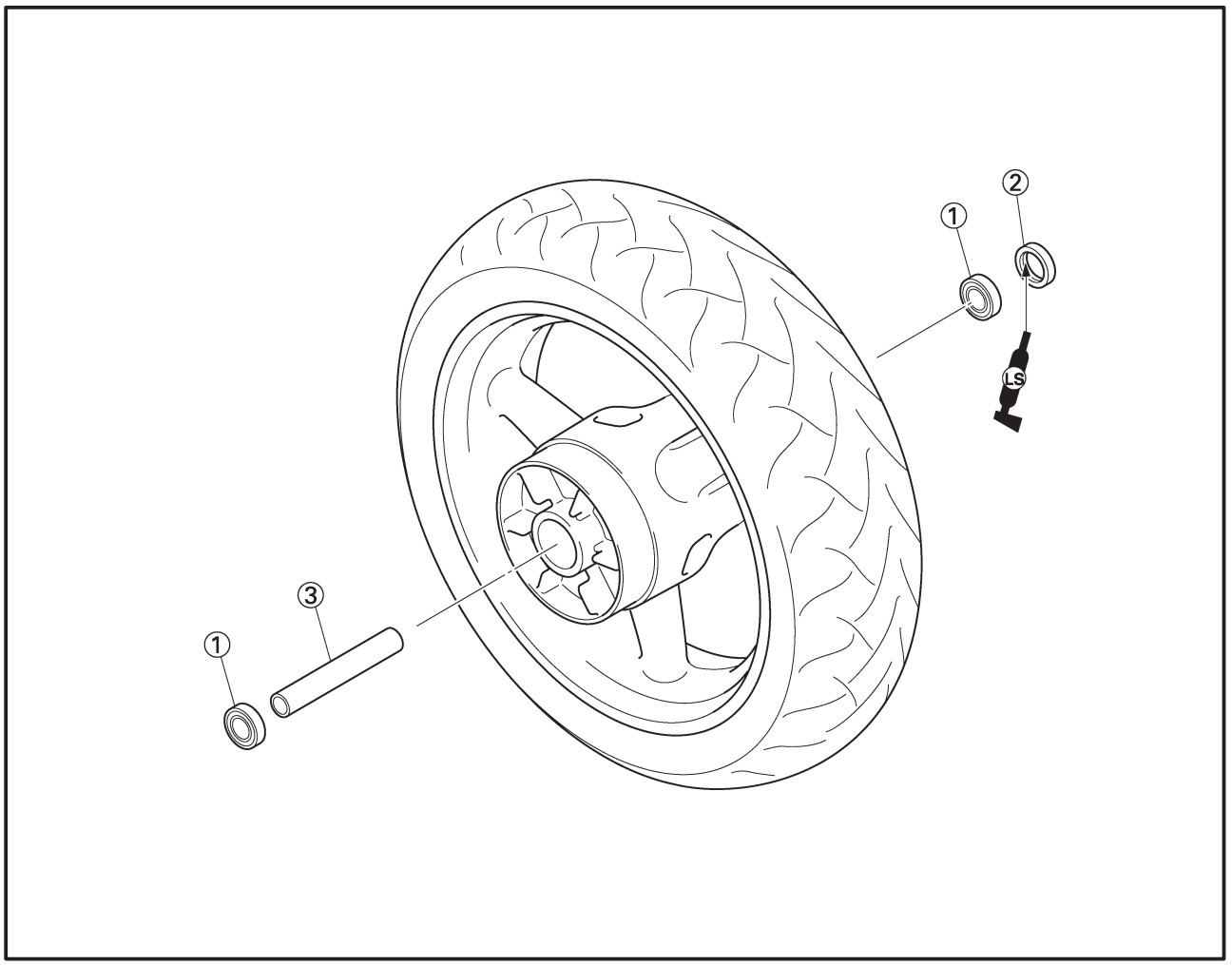


Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake caliper bracket	1	
2	Brake caliper bracket bolt	1	Loosen.
3	Lock nut	2	Loosen.
4	Adjusting bolt	2	Loosen.
5	Wheel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



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

EAS00560



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

EAS00561

REMOVING THE REAR WHEEL

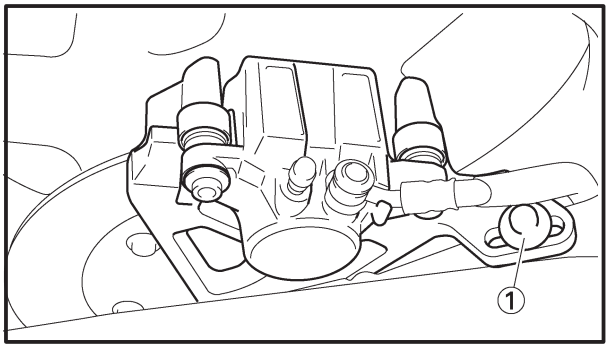
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

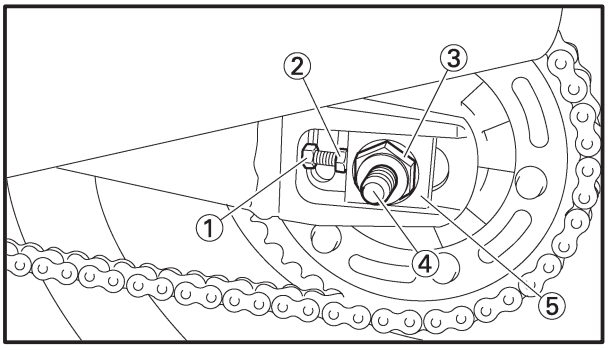
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



2. Remove:
   • brake caliper bracket bolt ①

NOTE:

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



3. Loosen:
   • locknut ① (left and right)
   • adjusting bolt ② (left and right)
4. Remove:
   • wheel axle nut ③
   • wheel axle ④
   • adjusting block ⑤ (left and right)
   • rear wheel

NOTE:

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

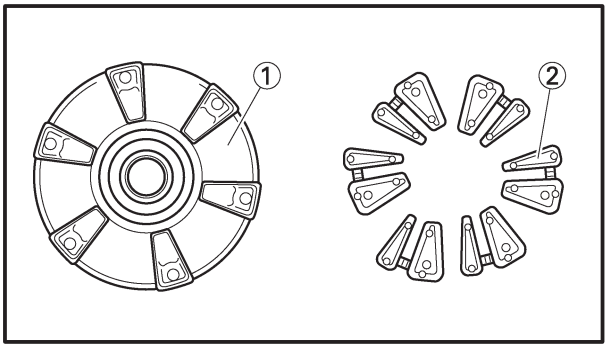
5. Remove:
   • left collar
   • rear wheel drive hub
   • rear wheel drive hub damper

EAS00565

CHECKING THE REAR WHEEL

1. Check:
   • wheel axle
   • rear wheel
   • wheel bearings
   Refer to “CHECKING THE FRONT WHEEL”.

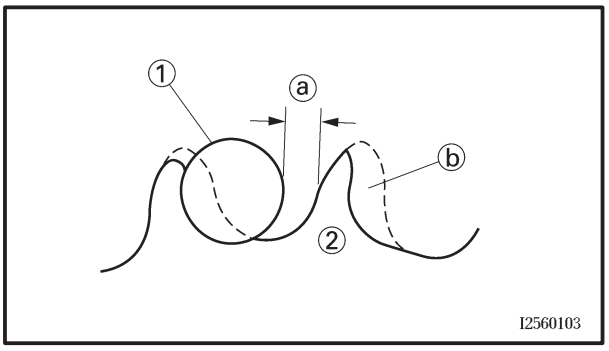
2. Check:
   • tire
     Refer to “CHECKING THE TIRES” in chapter3.
   • rear wheel
     Damage/wear → Replace.
3. Measure:
   • radial wheel runout
   • lateral wheel runout
     Refer to “CHECKING THE FRONT WHEEL”.



EAS00567

CHECKING THE REAR WHEEL DRIVE HUB

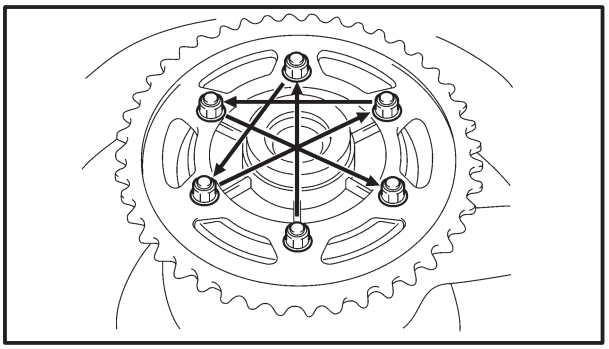
1. Check:
   • rear wheel drive hub ①
     Cracks/damage → Replace.
   • rear wheel drive hub dampers ②
     Damage/wear → Replace.



EAS00568

CHECKING AND REPLACING THE REAR WHEEL SPROCKET

1. Check:
   • rear wheel sprocket
     More than 1/4 tooth ⓐ wear → Replace the rear wheel sprocket, drive sprocket and drive chain as a set.
     Refer to “SWINGARM AND DRIVE CHAIN”.
     Bent teeth → Replace the rear wheel sprocket, drive sprocket and drive chain as a set.
     Refer to “ENGINE” in chapter 5.



ⓑ Correct
① Drive chain roller
② Rear wheel sprocket

2. Replace:
   • rear wheel sprocket

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

Rear wheel sprocket self-locking nut
69 Nm (6.9 m•kg)

NOTE:

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

EAS00572

INSTALLING THE REAR WHEEL

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

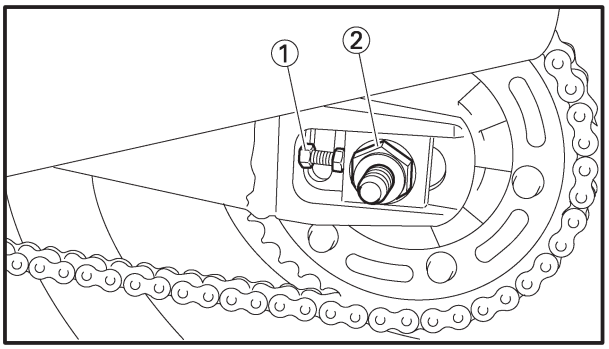
Recommended lubricant
Lithium-soap-based grease

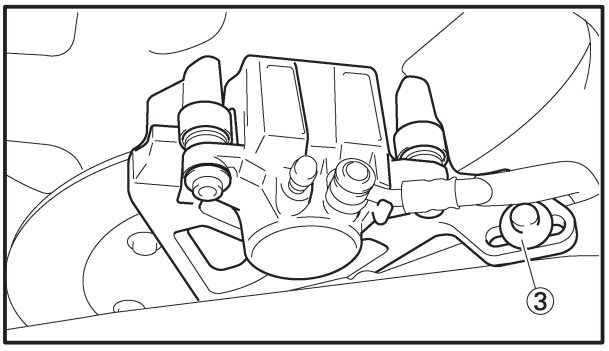
2. Install:
   - rear wheel drive hub damper
   - rear wheel drive hub
   - left collar
3. Install:
   - rear wheel
   - adjusting block (left and right)
   - wheel axle
   - wheel axle nut

4. Adjust:
   - drive chain slack

Drive chain slack
50 ~ 60 mm

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





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

EAS00575

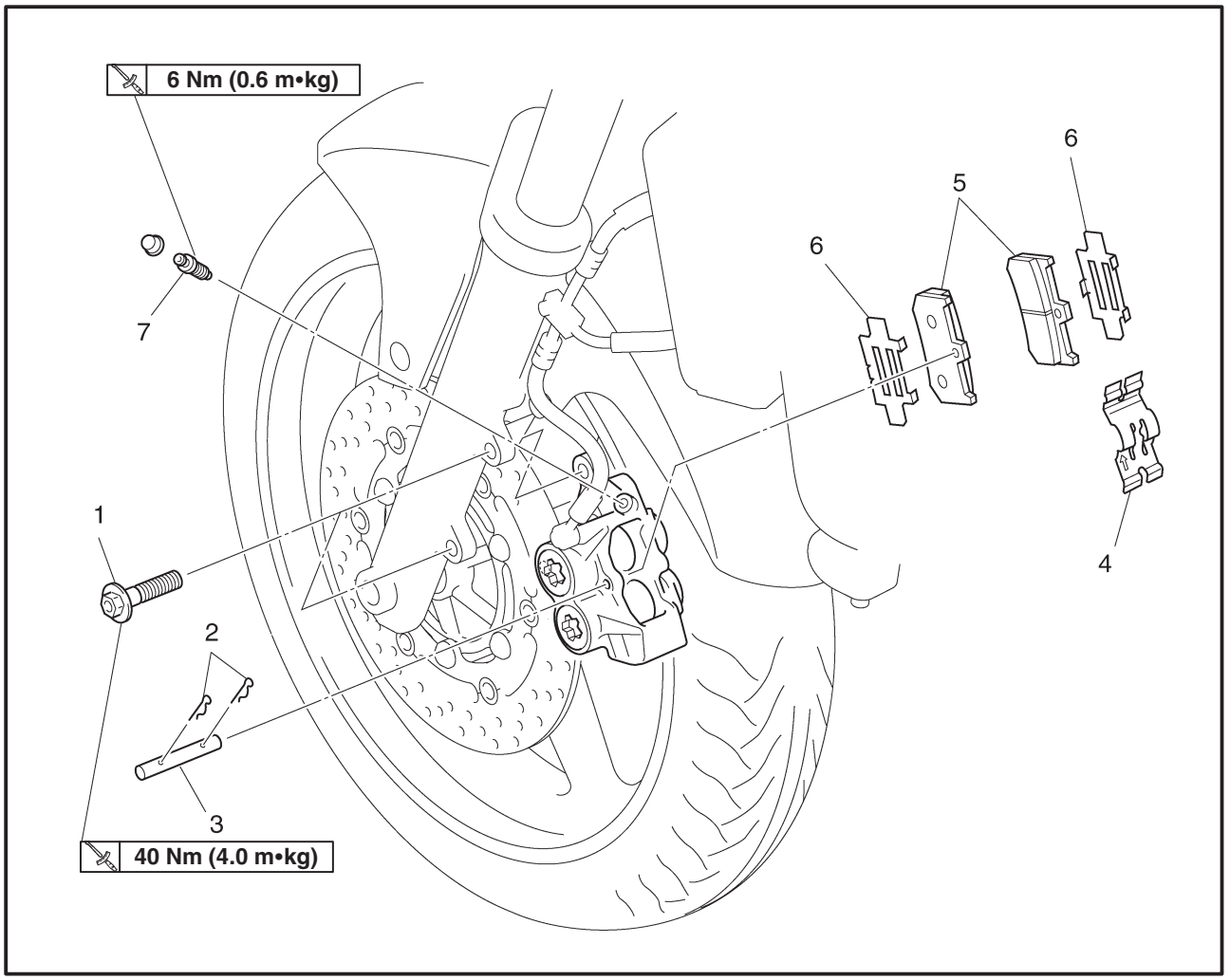
ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:

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

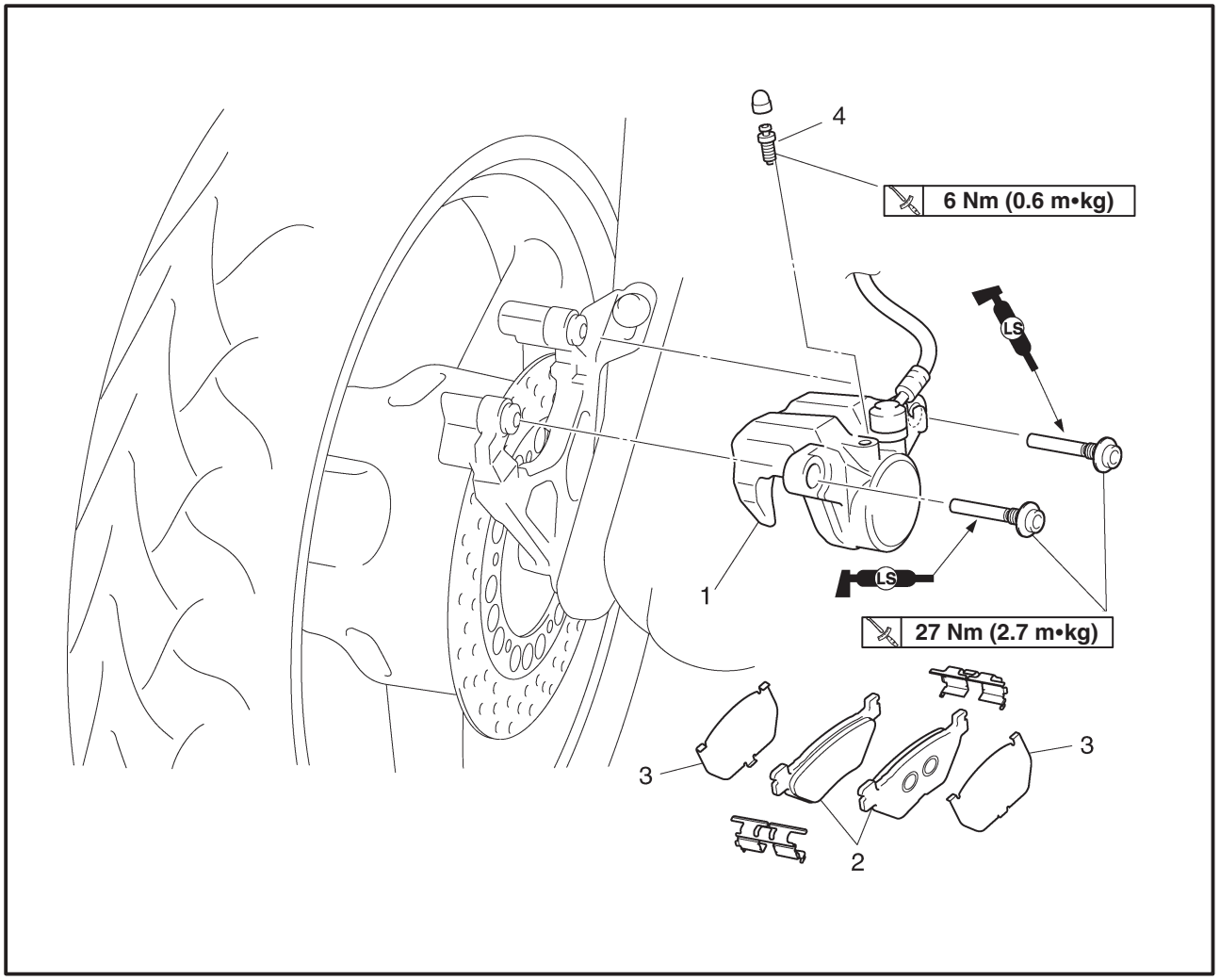
1. Adjust:
   - rear wheel static balance
     Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE”.

EAS00577
FRONT AND REAR BRAKES
FRONT BRAKE PADS



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

REAR BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads.		Remove the parts in the order listed.
1	Rear brake caliper	1	
2	Brake pad	2	
3	Brake pad shim	2	
4	Bleed screw	1	
			For installation, reverse the removal procedure.

EAS00579

CAUTION:

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

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

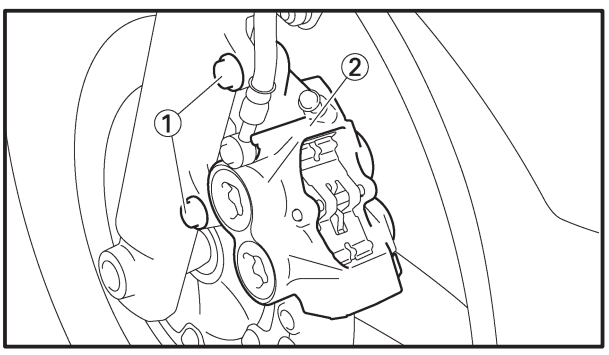
EAS00582

REPLACING THE FRONT BRAKE PADS

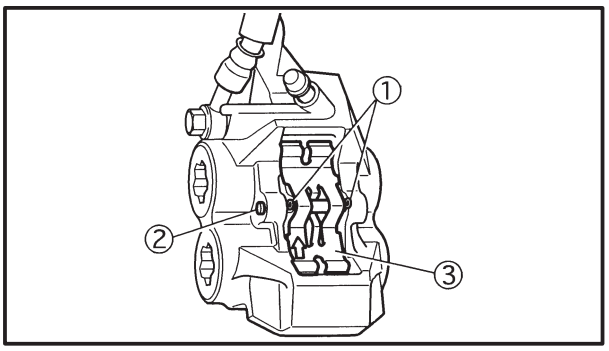
The following procedure applies to both brake calipers.

NOTE:

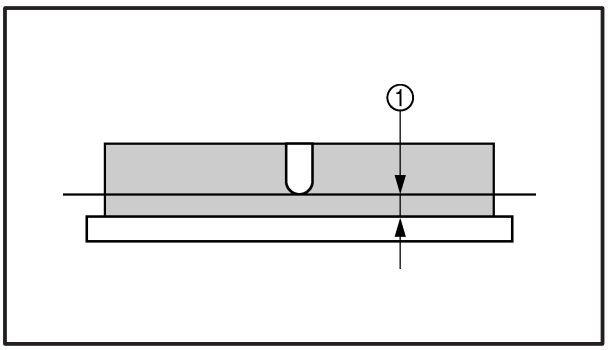
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.



1. Remove:
   - brake caliper bolts①
   - brake caliper ②



2. Remove:
   - brake pad clips ①
   - brake pad pin ②
   - brake pad spring ③
   - brake pads
     (along with the brake pad shims)



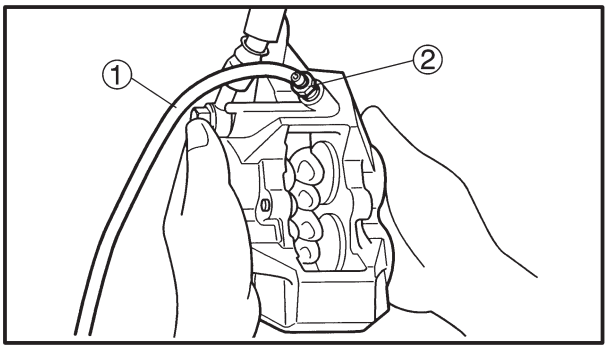
3. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm

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

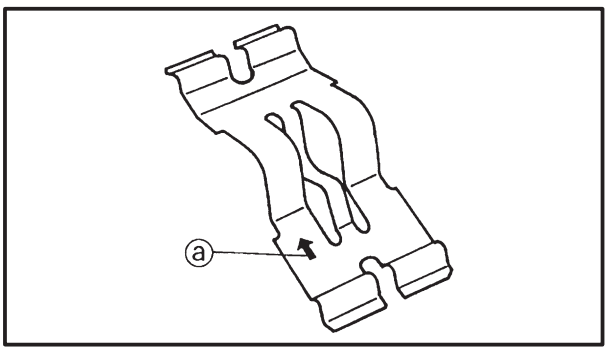
NOTE:

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



a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

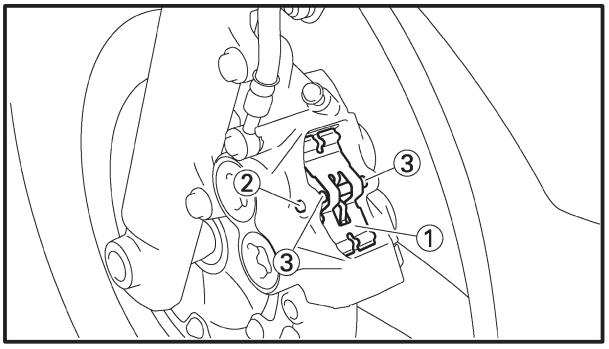
Bleed screw
6 Nm (0.6 m•kg)



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

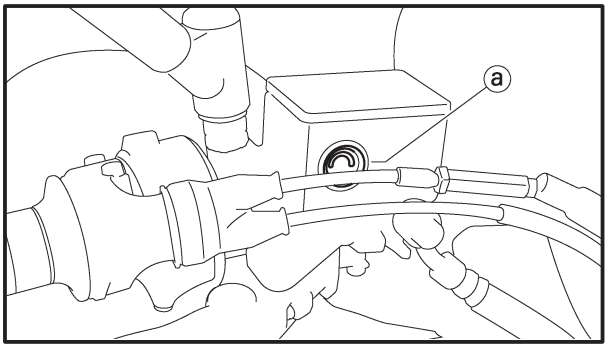
NOTE:

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



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

40 Nm (4.0 m•kg)

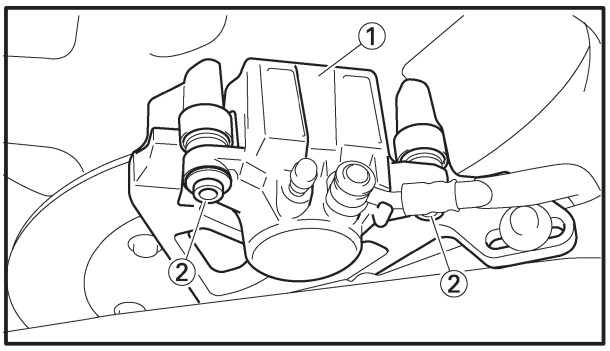


6. Check:
   - brake fluid level

   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
   - brake lever operation

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

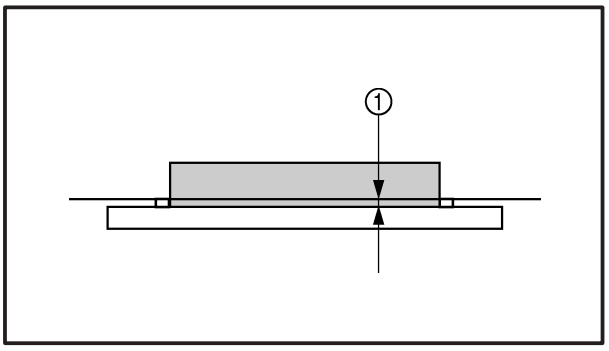


EAS00583
REPLACING THE REAR BRAKE PADS

NOTE:

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

1. Remove:
   - brake caliper ①
   - brake caliper bolts ②
2. Remove:
   - brake pads
     (along with the brake pad shims)



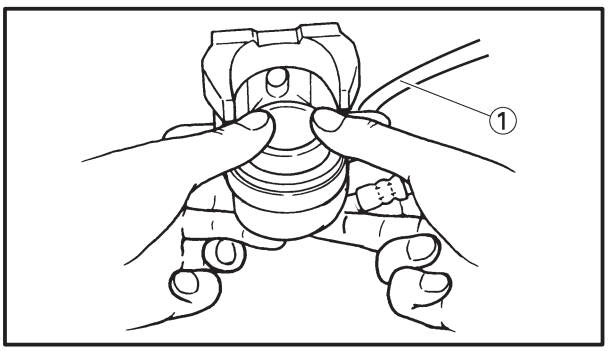
3. Measure:
   - brake pad wear limit ①
     Out of specification → Replace the brake pads as a set.

	Brake pad wear limit **0.8 mm**

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

NOTE:

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

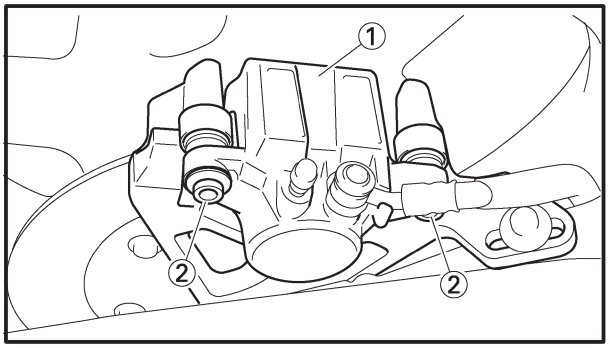


a. Connect a clear plastic hose ① tightly to the bleed screw. Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
c. Tighten the bleed screw.

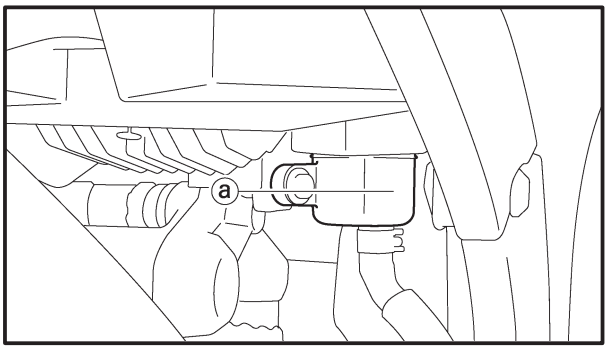
	Bleed screw **6 Nm (0.6 m•kg)**

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

	Recomended lubricant **Lithium-sope-based grease**

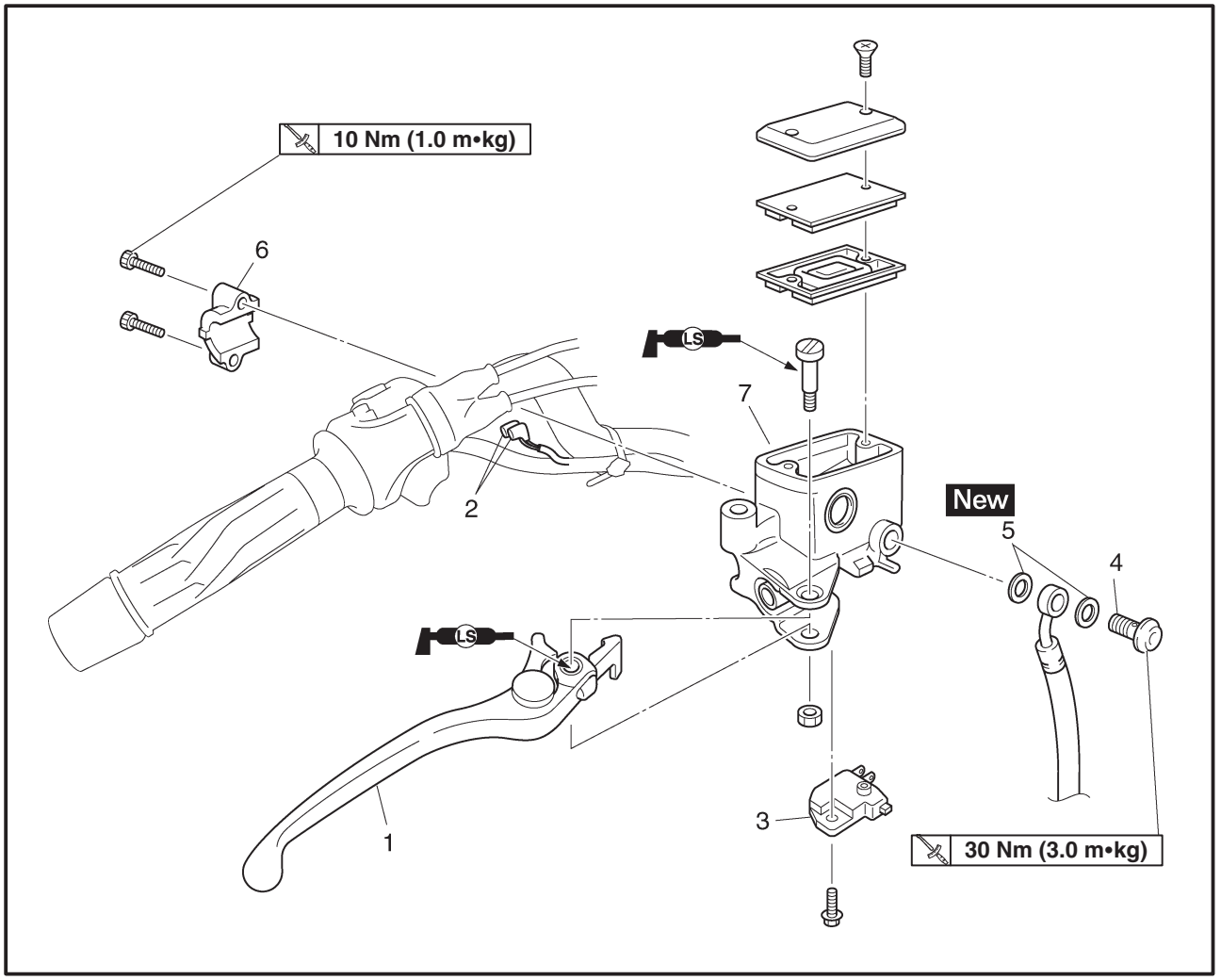


6. Install:
   • brake caliper ①
   • brake caliper bolts ② **27 Nm (2.7 m•kg)**



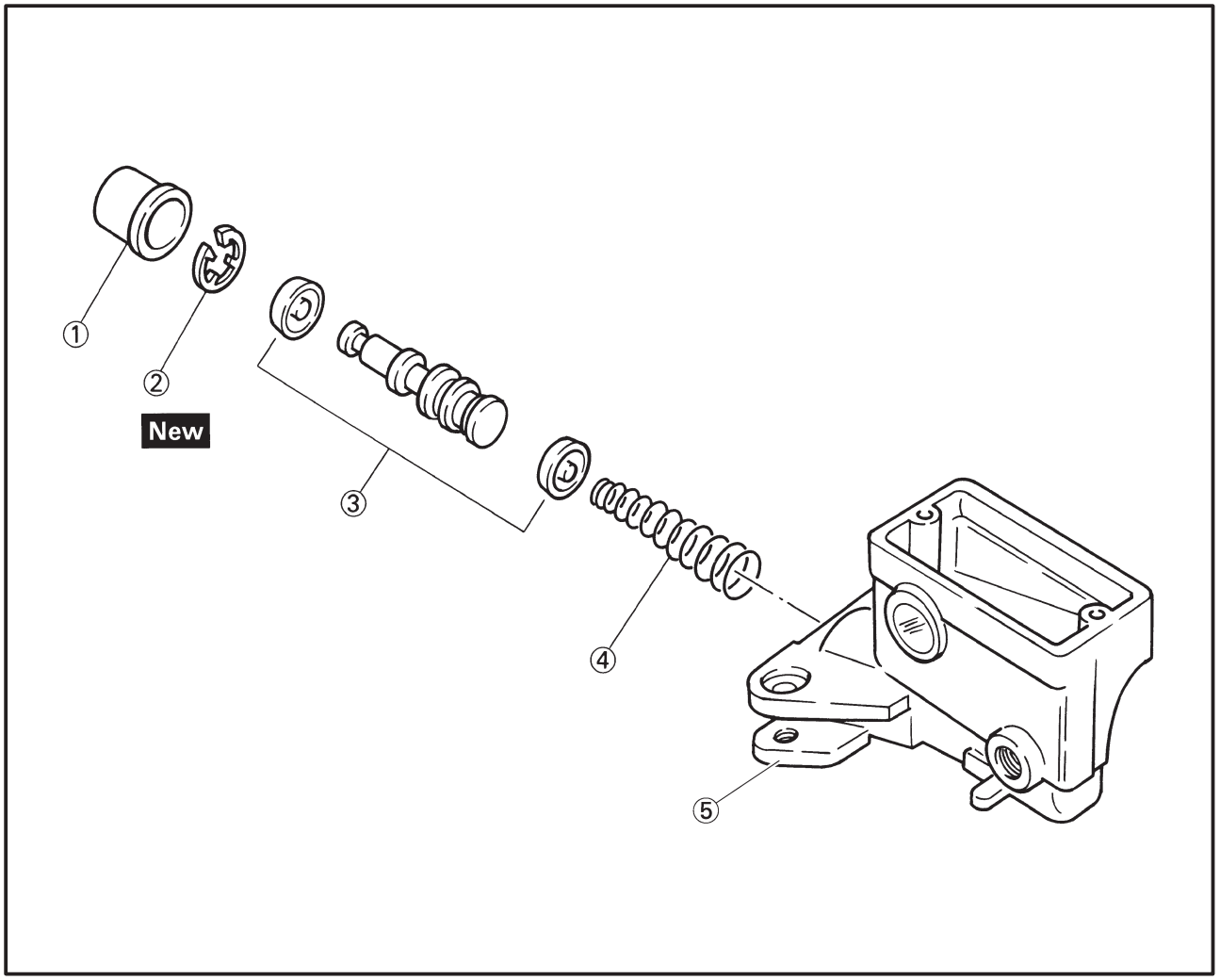
7. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
8. Check:
   • brake pedal operation
   Soft or spongy feeling →Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC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

EAS00584
FRONT BRAKE MASTER CYLINDER



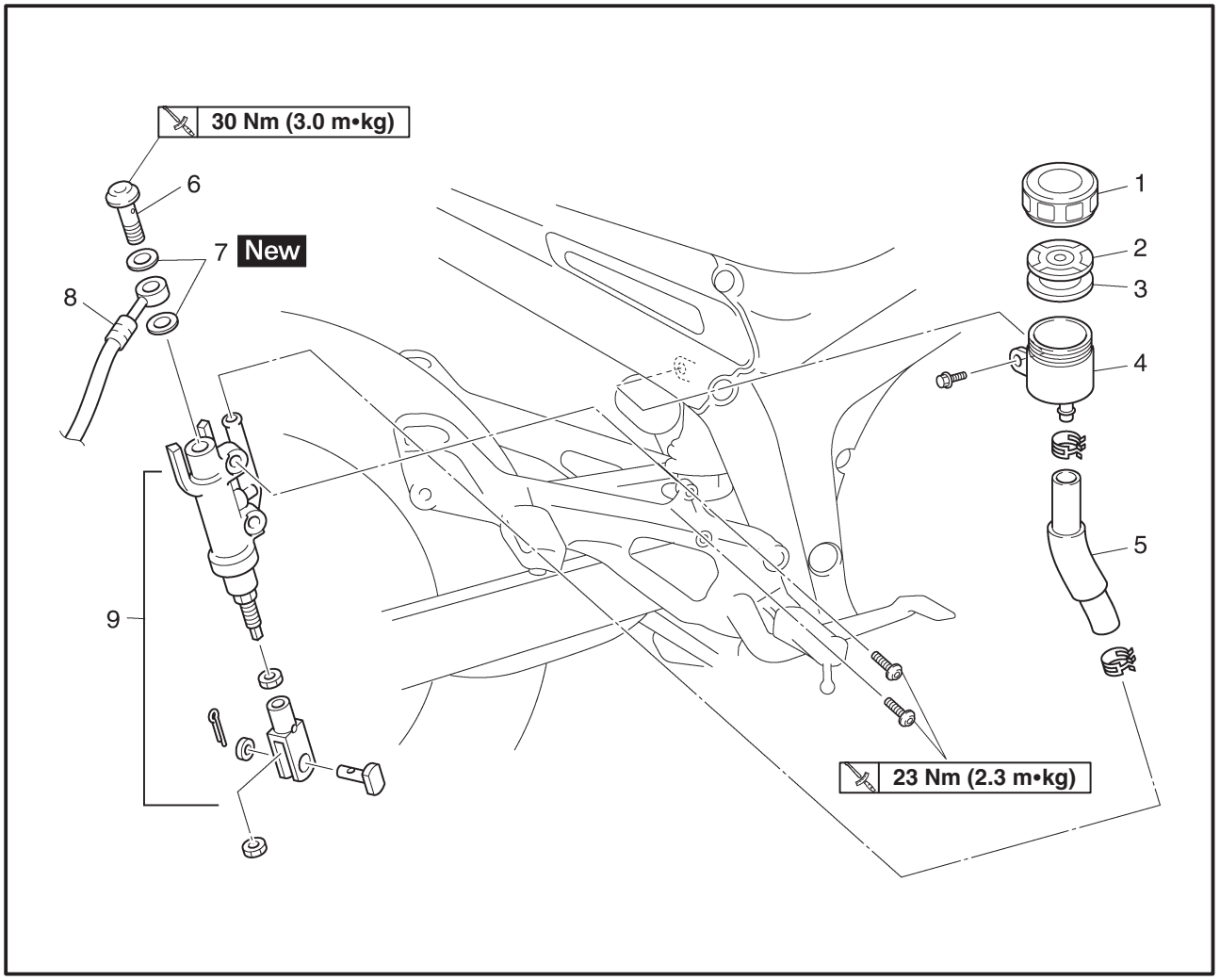
Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake lever	1	
2	Front brake light switch lead coupler	1	Disconnect.
3	Front brake switch	1	
4	Union bolt	1	
5	Copper washer	2	
6	Master cylinder bracket	1	
7	Master cylinder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

EAS00585



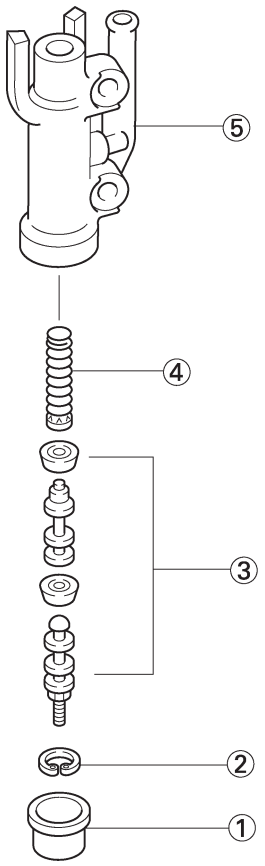
Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake master cylinder		Disassembly the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Master cylinder kit	1	
④	Spring	1	
⑤	Master cylinder body	1	
			For assembly, reverse the disassembly procedure.

EAS00586
REAR BRAKE MASTER CYLINDER



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

EAS00587



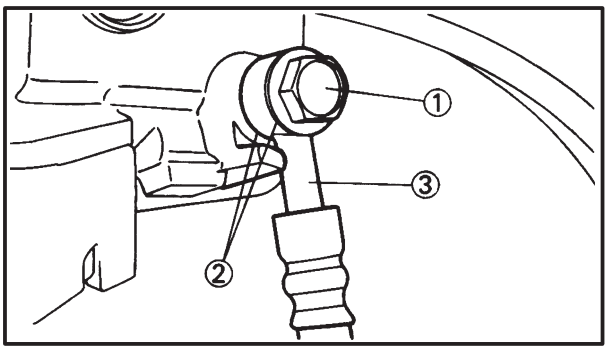
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Disassemble the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Master cylinder kit	1	
④	Spring	1	
⑤	Master cylinder body	1	
			For assembly, reverse the disassembly procedure.

EAS00588

DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

NOTE:

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

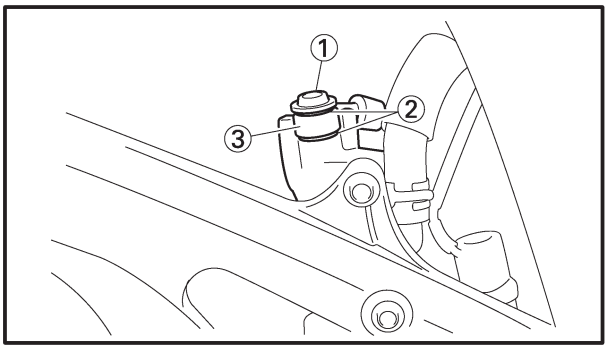


1. Disconnect:
   - brake switch coupler (from the brake switch)
2. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

NOTE:

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

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



EAS00589

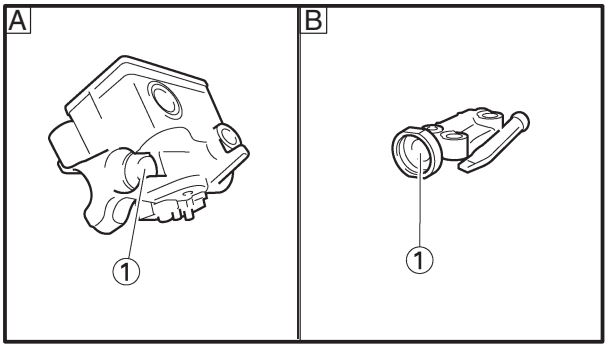
DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

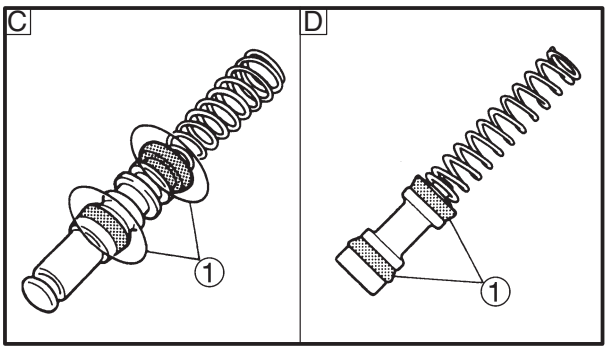
1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

NOTE:

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

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



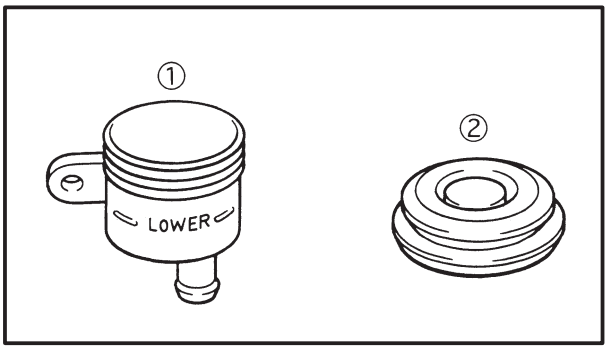


EAS00592
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS
The following procedure applies to the both of the brake master cylinders.
1. Check:
   - brake master cylinder ①
     Damage/scratches/wear → Replace.
   - brake fluid delivery passages (brake master cylinder body)
     Obstruction → Blow out with compressed air.

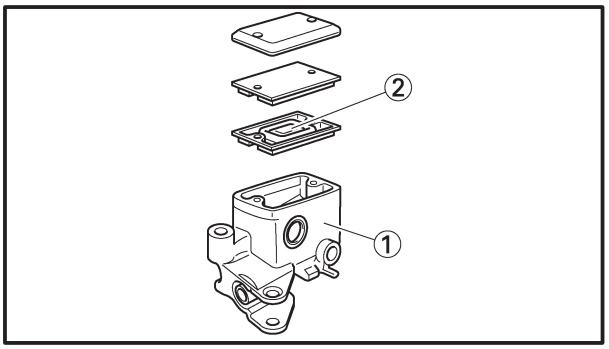
A Front
B Rear

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

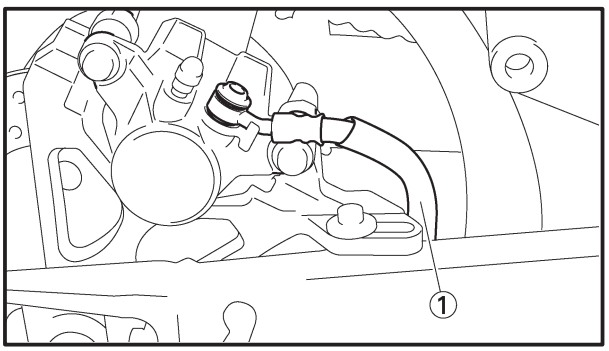
C Front
D Rear



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



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



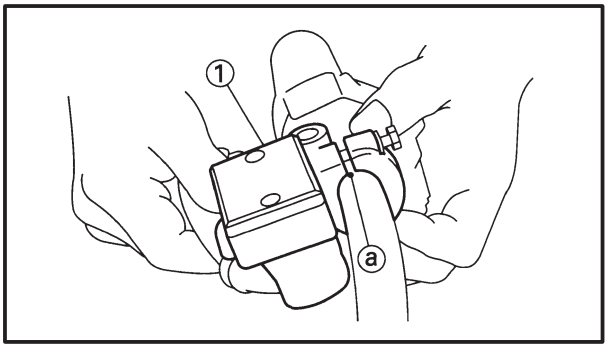
5. Check:
   - brake hoses ①
     Cracks/damage/wear → Replace.

EAS00598

ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

⚠ WARNING

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



Recommended brake fluid
DOT 4

1. Install:
   - master cylinder kit
   - circlip New
   - brake master cylinder ①
   - brake master cylinder holder bolts

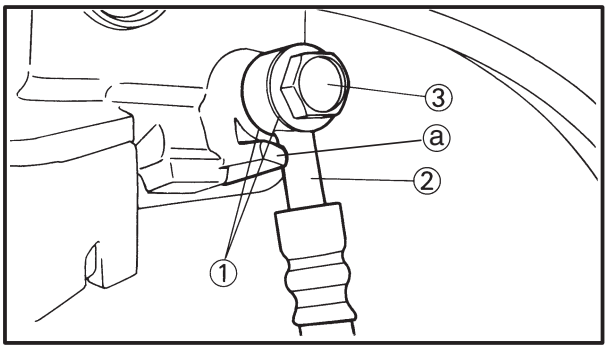
10 Nm (1.0 m•kg)

⚠ WARNING

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

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

30 Nm (3.0 m•kg)



CAUTION:

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

⚠ WARNING

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

NOTE:

- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

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

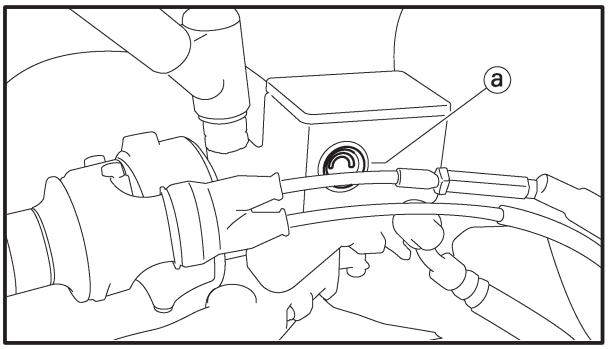
Recommended brake fluid
DOT 4

⚠ WARNING

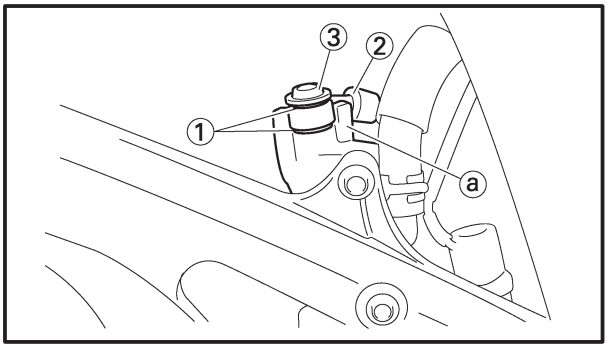
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

CAUTION:

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



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



EAS00608

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   - master cylinder kit
   - circlip New
2. Install:
   - rear brake master cylinder assembly
3. Install:
   - pin (to the brake pedal link)
4. Connect:
   - brake fluid reservoir hose
5. Install:
   - copper washers ① New
   - brake hoses ②
   - union bolt ③

30 Nm (3.0 m•kg)

⚠ WARNING

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

CAUTION:

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

2. Fill:
   - brake fluid reservoir

Recommended brake fluid
DOT 4

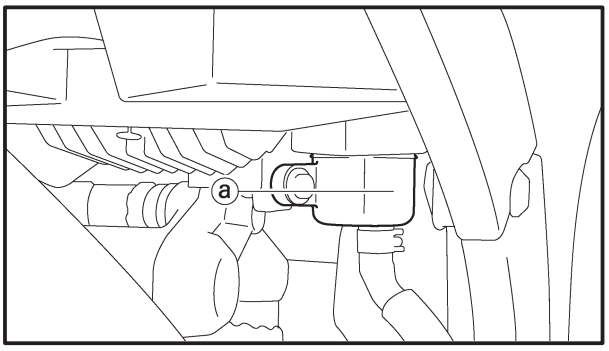
⚠ WARNING

- **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.**

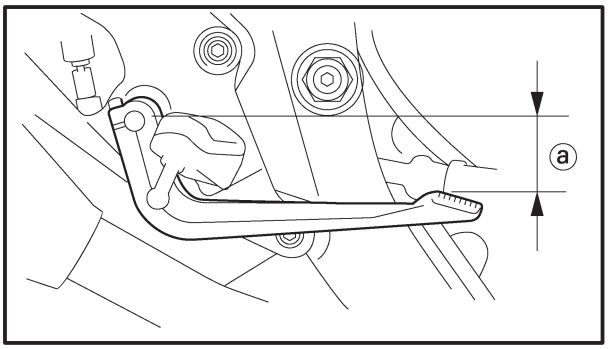
CAUTION:

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 ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

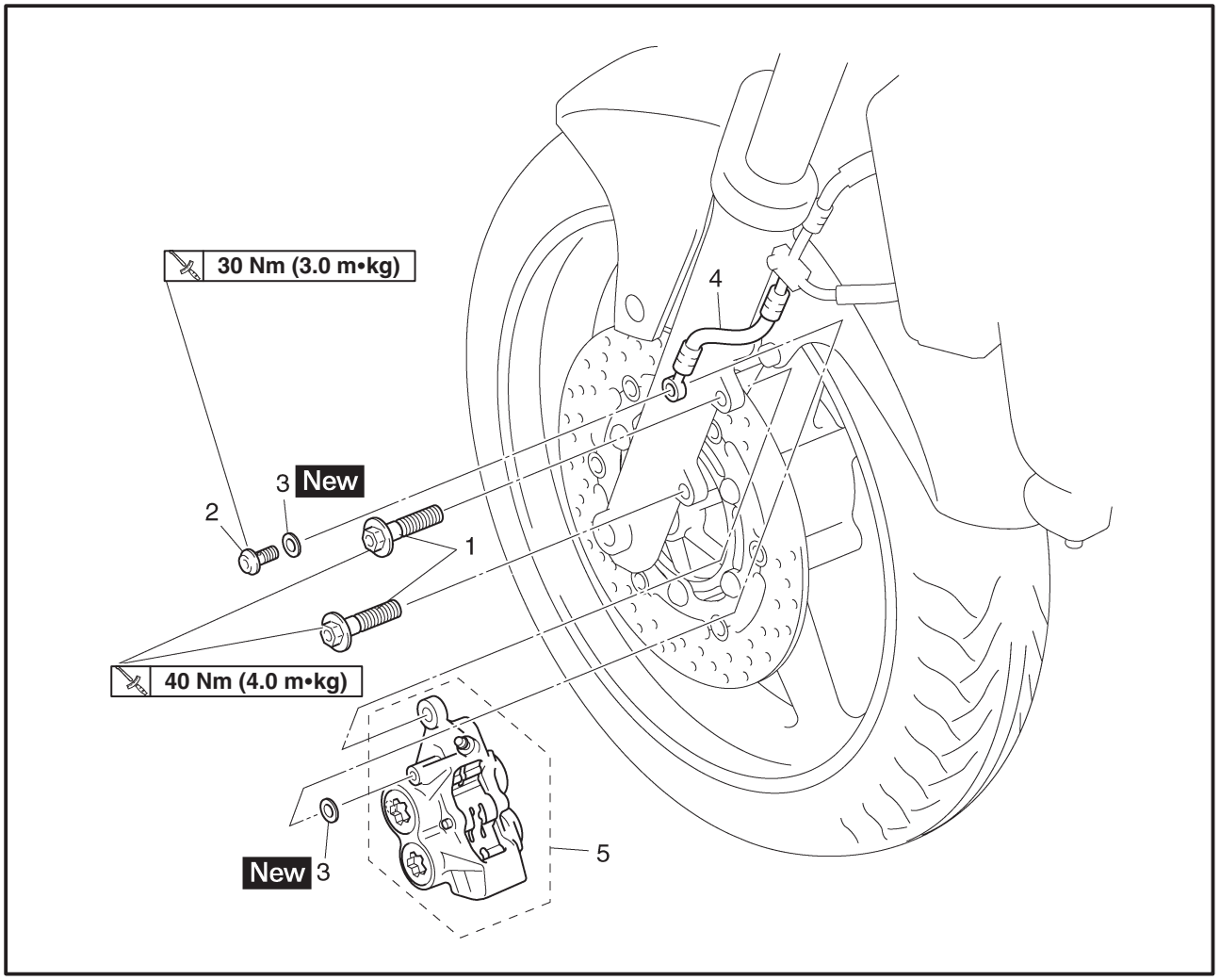


5. Adjust:
   • brake pedal position ⓐ
   Refer to "ADJUSTING THE REAR BRAKE" in chapter 3.

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

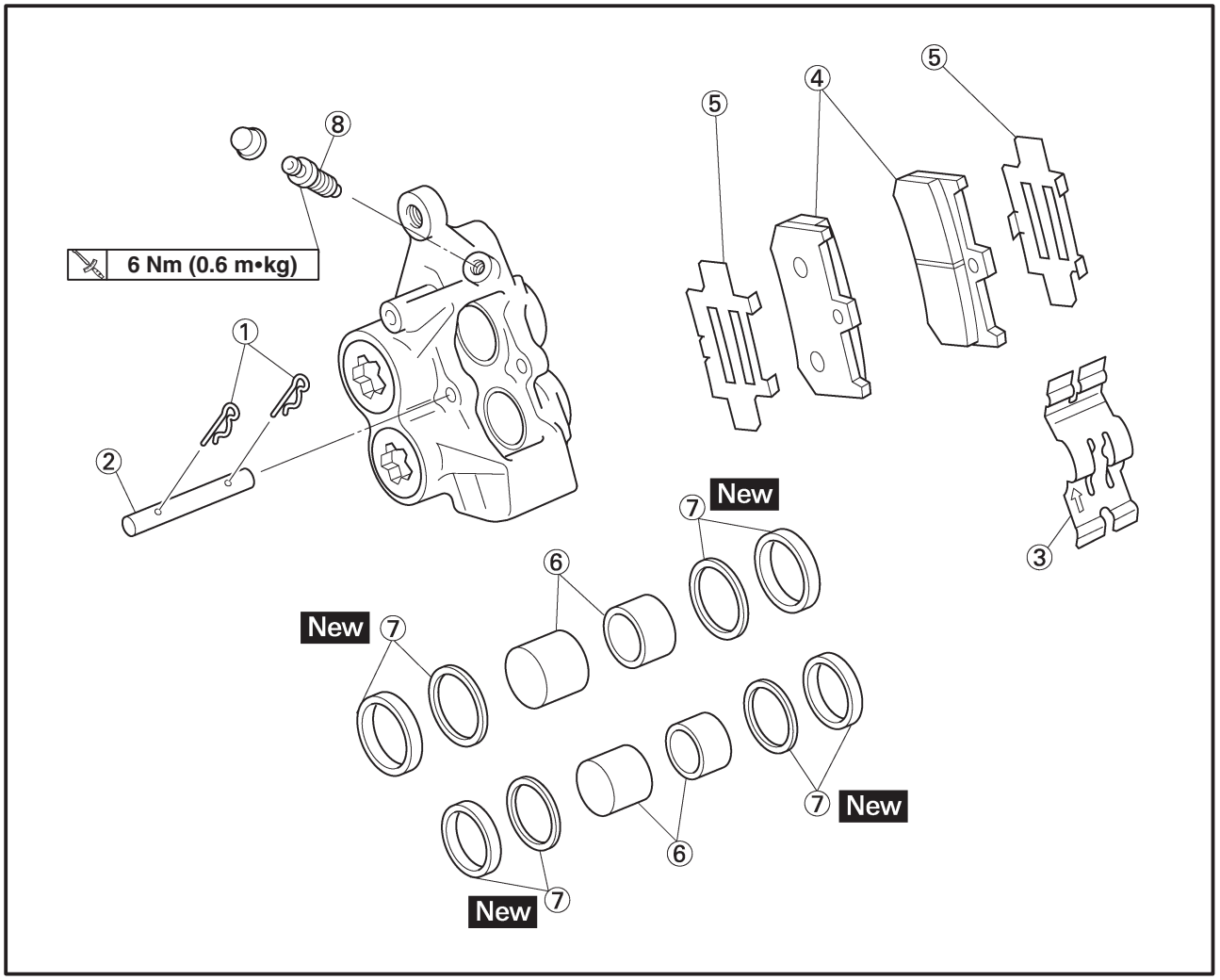
6. Adjust:
   • rear brake light operation timing
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" in chapter 3.

EAS00613
FRONT BRAKE CALIPERS



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

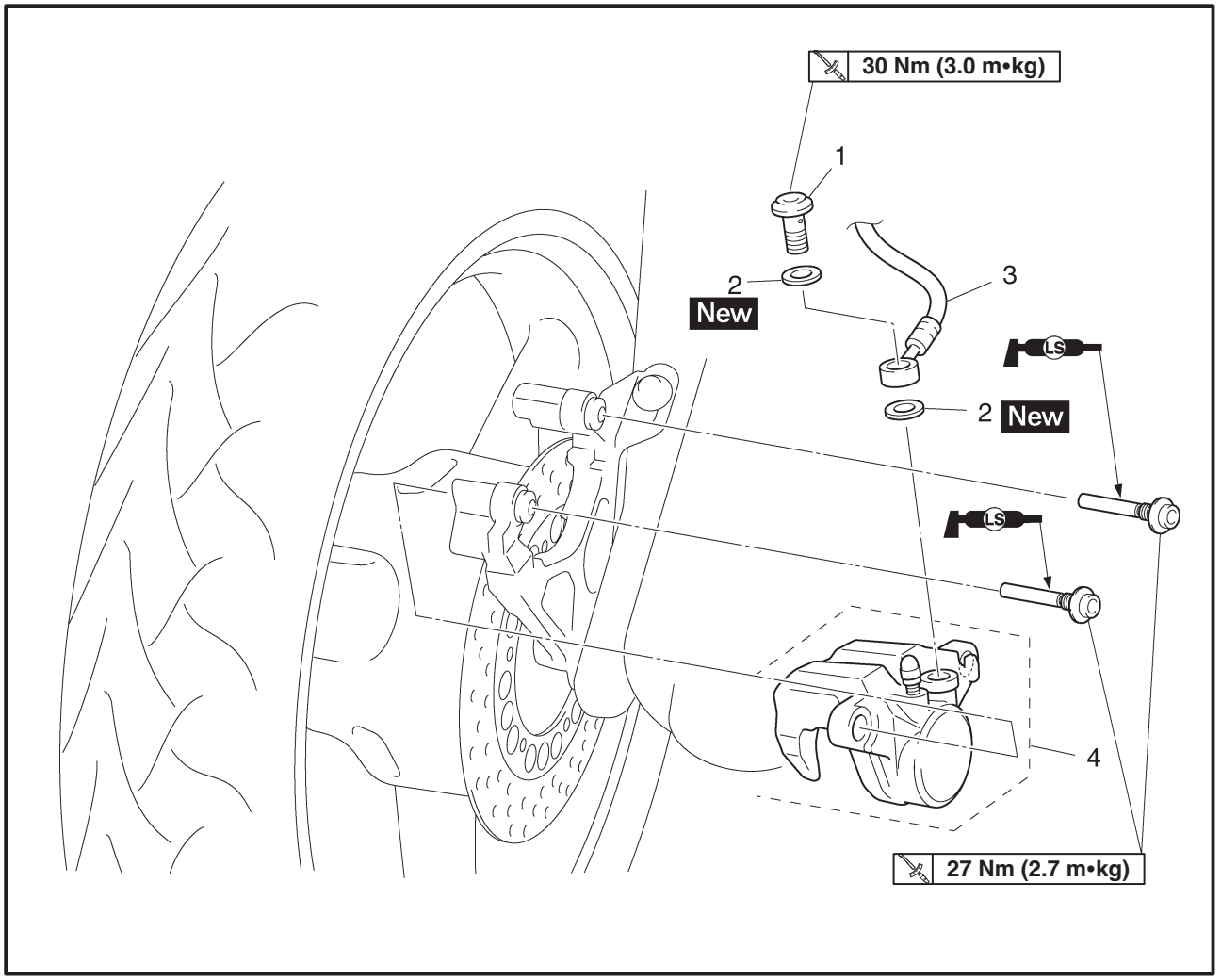
EAS00615



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

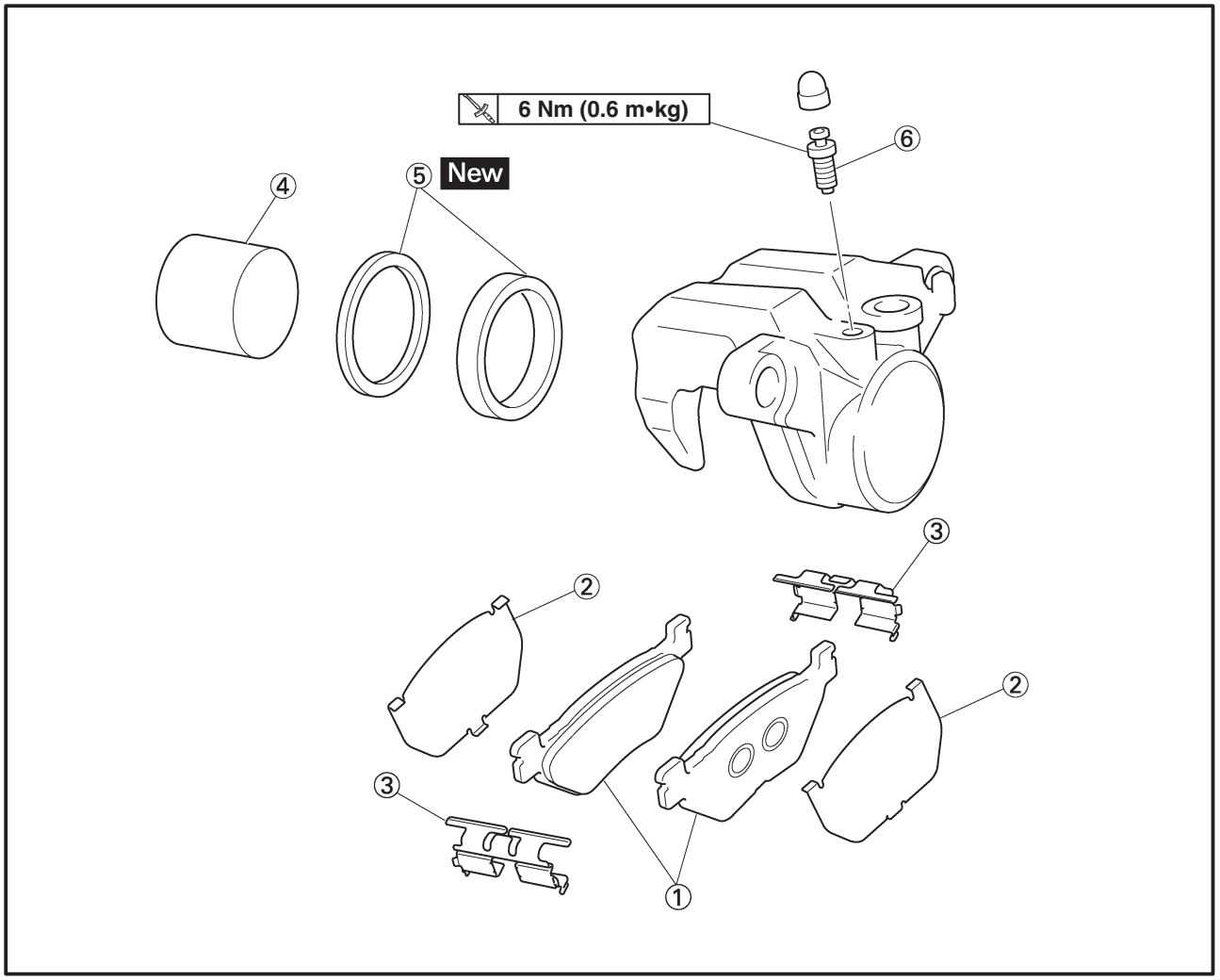
EAS00616

REAR BRAKE CALIPER



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

EAS00617



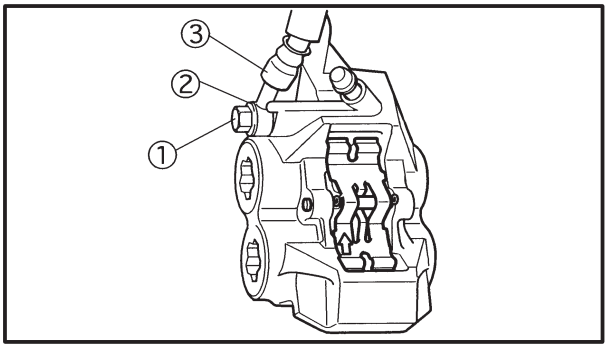
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Disassemble the parts in the order listed.
①	Brake pad	2	
②	Shim	2	
③	Brake pad spring	2	
④	Brake caliper piston	1	
⑤	Brake caliper piston seal kit	1	
⑥	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS00625
DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

NOTE:

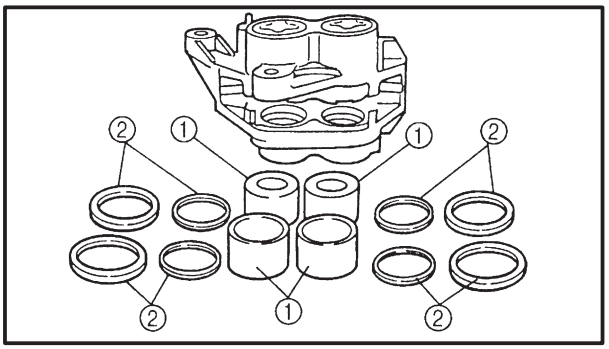
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.



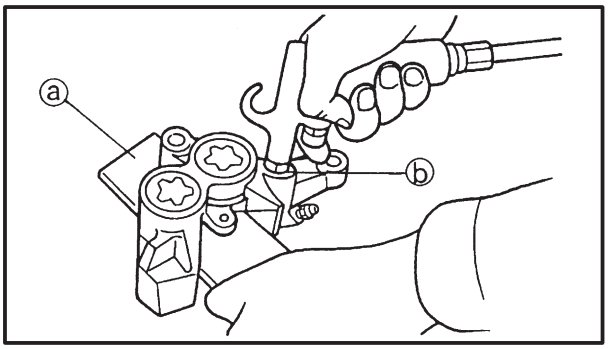
1. Remove:
   - brake caliper bolts
   - union bolt ①
   - copper washers ② New
   - brake hose ③
   - brake caliper assembly

NOTE:

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



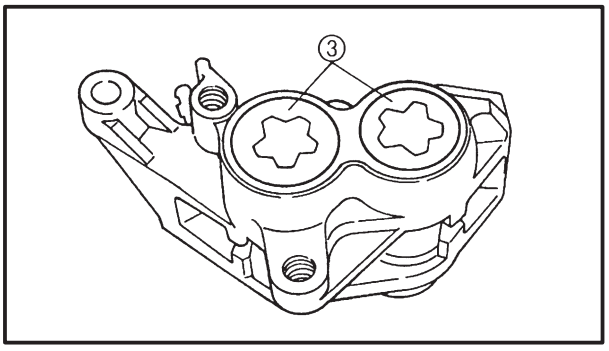
2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ② New



a. Secure the right side brake caliper pistons with a piece of wood ⓐ.
b. Blow compressed air into the brake hose joint opening ⓑ 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.**



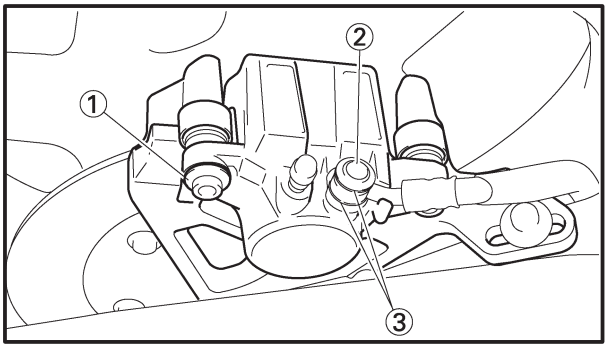
c. Remove the brake caliper piston seals.
d. Repeat the previous steps to force out the right side pistons from the brake caliper.

EAS00626

DISASSEMBLING THE REAR BRAKE CALIPER

NOTE:

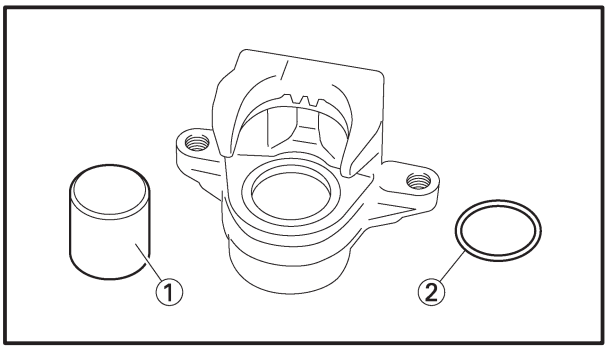
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.



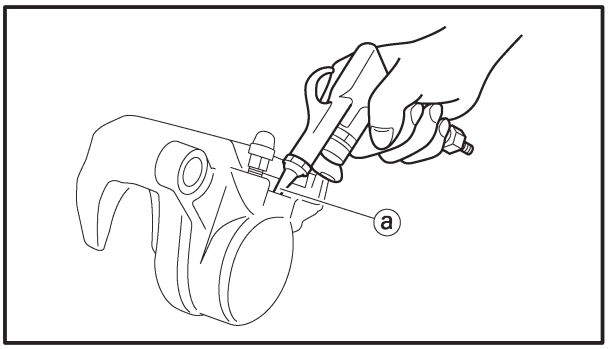
1. Remove:
   - brake caliper bolts ①
   - union bolt ②
   - copper washers ③ New
   - brake hose
   - brake caliper

NOTE:

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



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



a. Blow compressed air into the brake hose joint opening ⓐ to force out the piston from the brake caliper.

⚠ WARNING

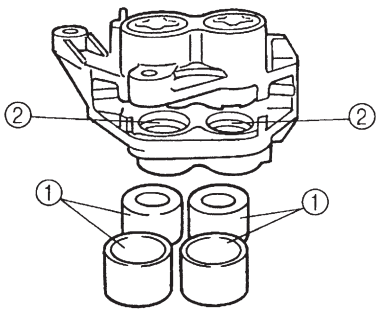
- **Cover the brake caliper piston with a rag. Be careful not to get injured when the piston is expelled from the brake caliper.**
- **Never try to pry out the brake caliper piston.**

b. Remove the brake caliper piston seals.

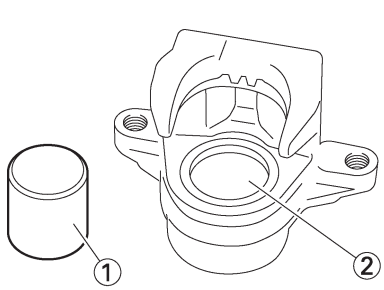
EAS00633
CHECKING THE FRONT AND REAR BRAKE CALIPERS

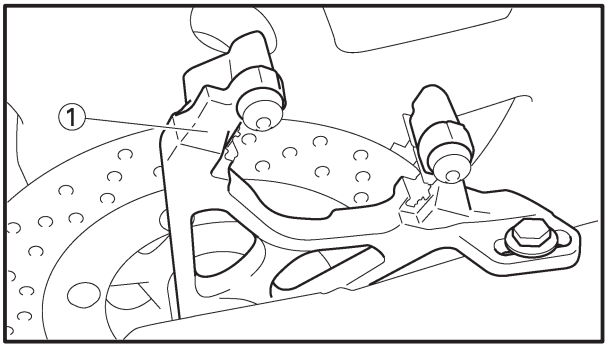
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

A



B





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

⚠ WARNING

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

A Front
B Rear

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

EAS00638

ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

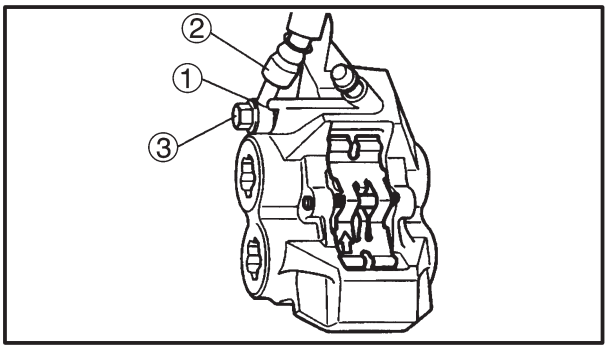
⚠ WARNING

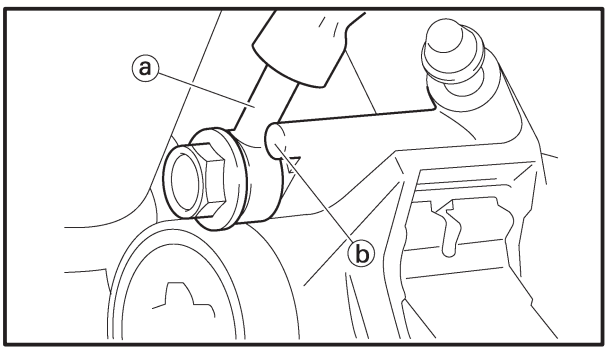
- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper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

Recommended brake fluid
DOT 4

1. Install:
   - brake caliper seals New
   - brake caliper pistons
2. Install:
   - brake pad shims
   - brake pads
   - brake pad spring
   - brake pad pin
   - brake pad clips

   Refer to "REPLACING THE BRAKE PADS".





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

⚠ WARNING

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

CAUTION:

When installing the brake hose onto the brake caliper, make sure the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

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

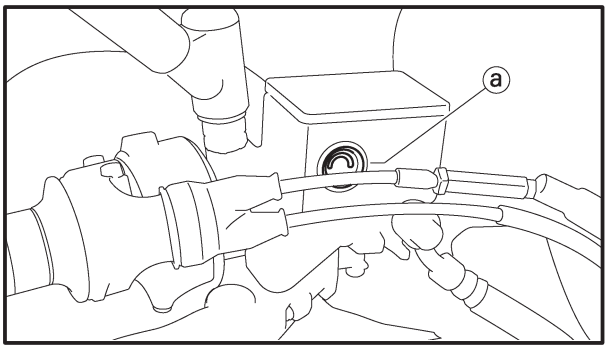
Recommended brake fluid
DOT 4

⚠ WARNING

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

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any 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 ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
7. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

EAS00642

ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER

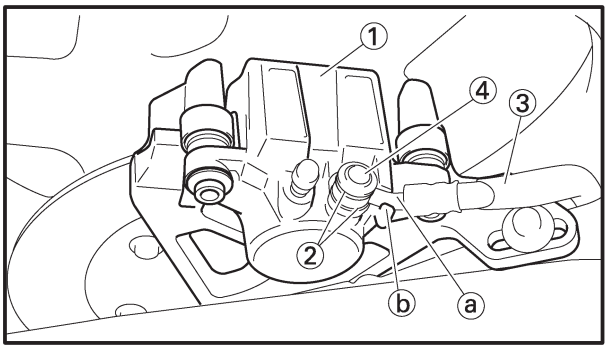
⚠ WARNING

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

Recommended brake fluid
DOT 4

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

   Refer to "REPLACING THE BRAKE PADS".
3. Install:
   - brake caliper ①
     (temporarily)
   - copper washers ② New
   - brake hose ③
   - union bolt ④ — 30 Nm (3.0 m•kg)



⚠ WARNING

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

CAUTION:

When installing the brake hose onto the brake caliper ①, make sure the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

5. Fill:
   • brake fluid reservoir
   (with the specified amount of the recommended brake fluid)

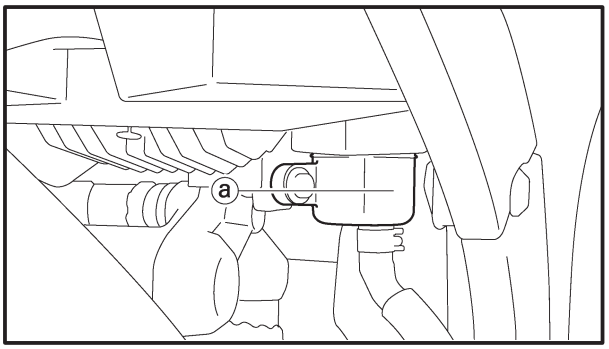
	Recommended brake fluid **DOT 4**

⚠ WARNING

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

CAUTION:

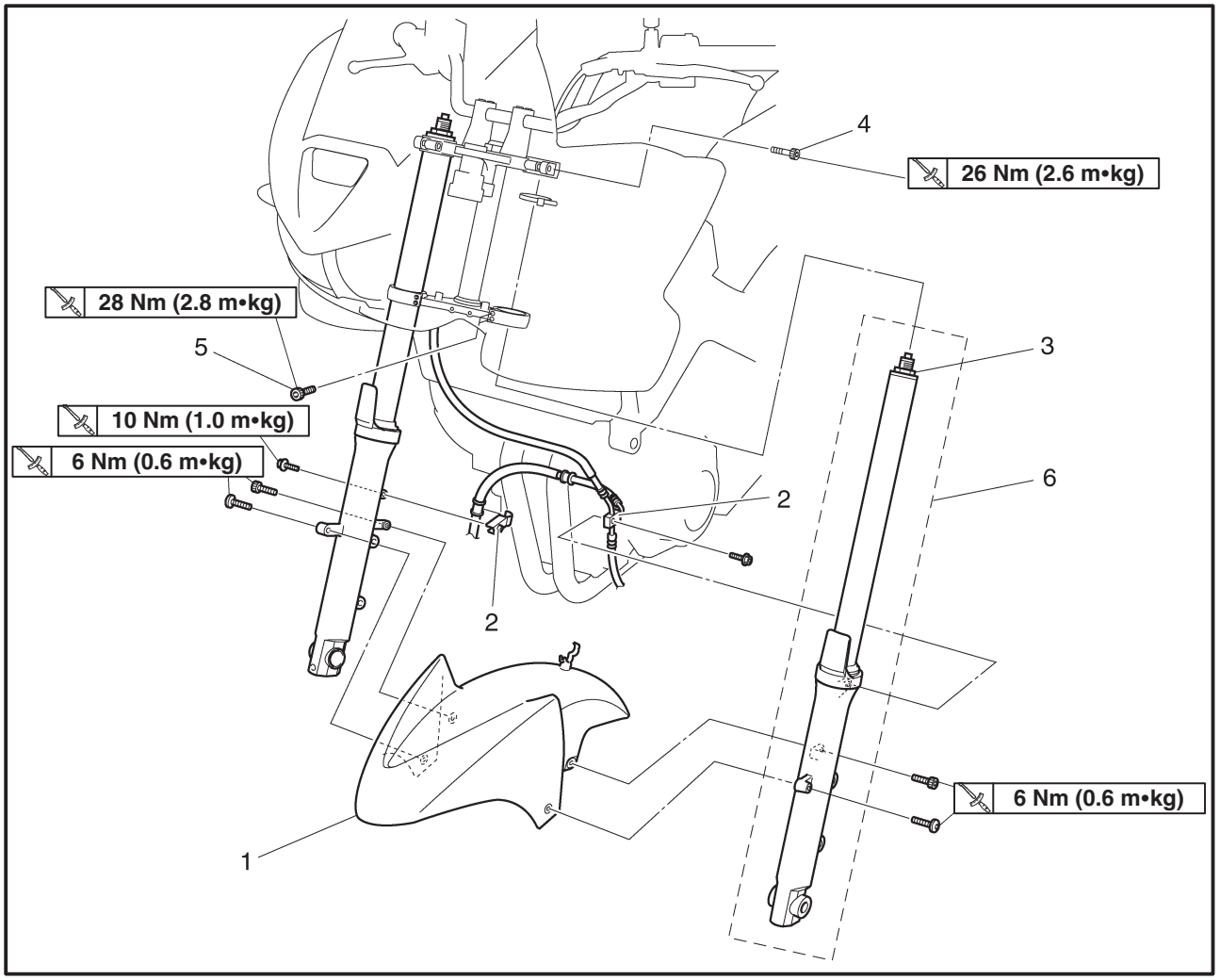
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.



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

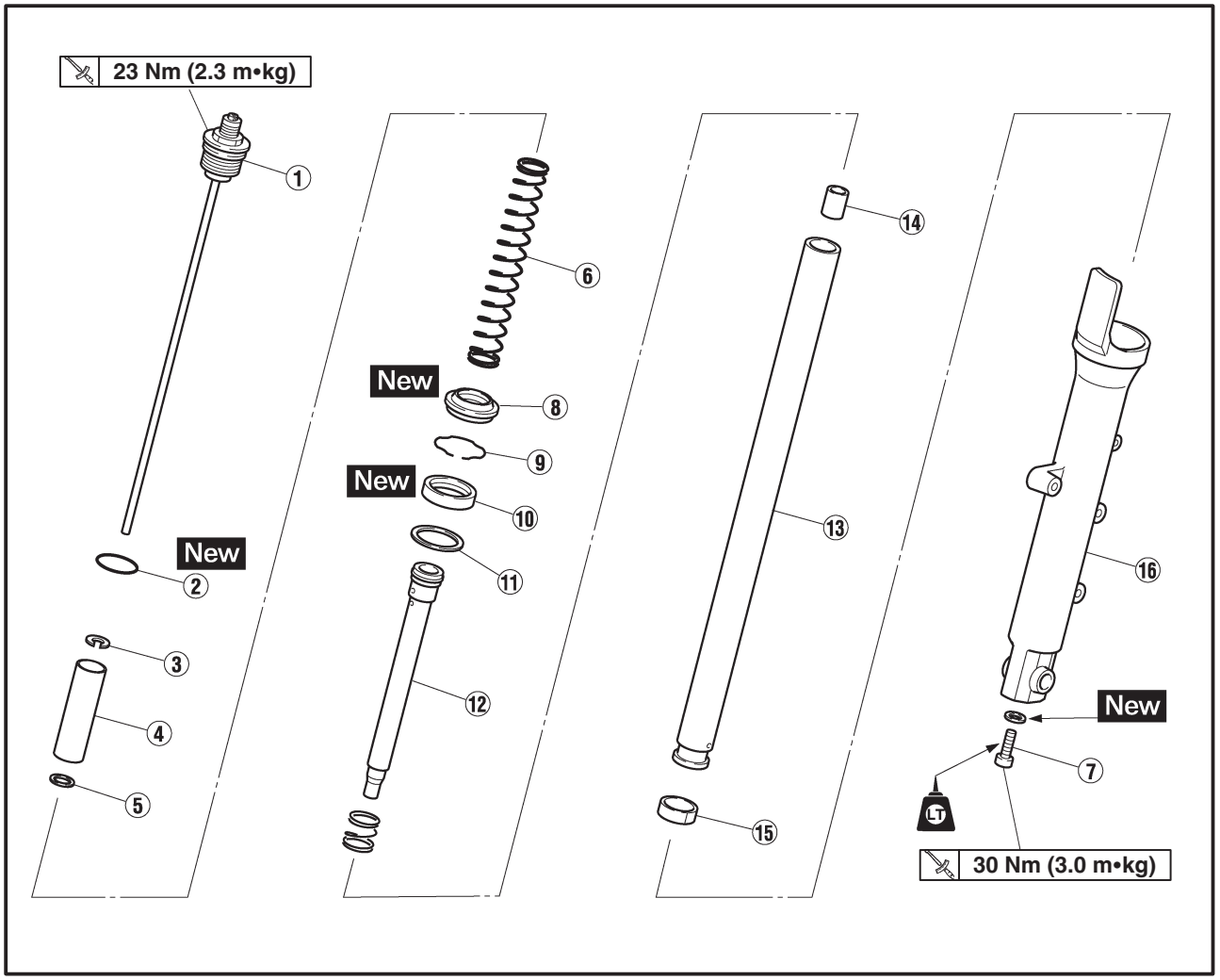
EAS00647

FRONT FORK

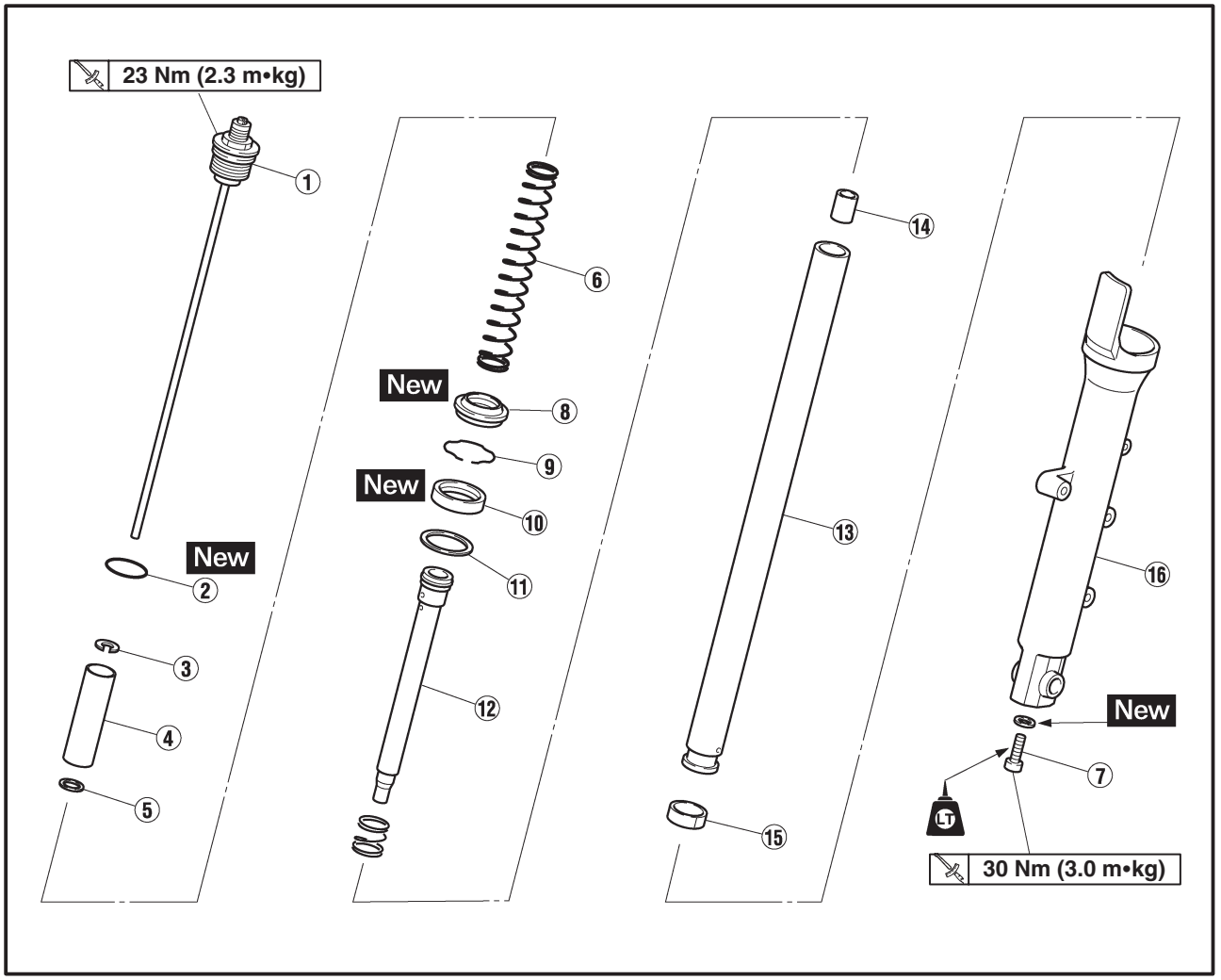


Order	Job/Part	Q'ty	Remarks
	Removing the front fork legs		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front brake caliper		Refer to "FRONT AND REAR BRAKE".
1	Front fender	1	
2	Brake hose holder	2	
3	Cap bolt	1	
4	Upper bracket pinch bolt	2	Loosen.
5	Lower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

EAS00648



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



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

EAS00651

REMOVING THE FRONT FORK LEGS

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

1. Stand the motorcycle on a level surface.

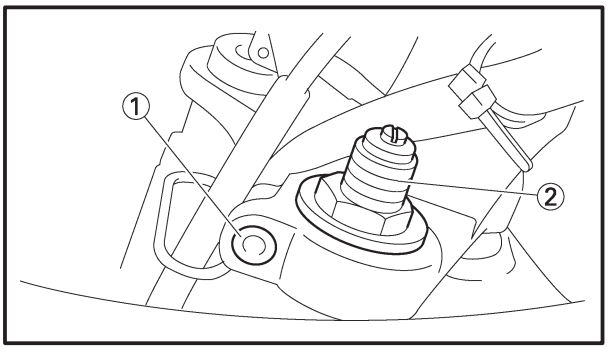
⚠ WARNING

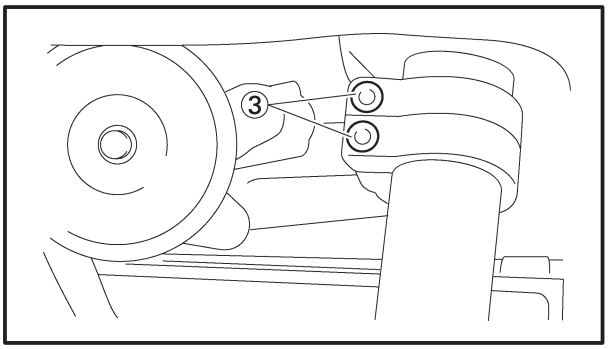
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:

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

2. Remove:
   - front brake caliper
     Refer to “FRONT AND REAR BRAKE”.
   - front wheel
     Refer to “FRONT WHEEL AND BRAKE DISCS”
3. Remove:
   - front fender
4. Loosen:
   - upper bracket pinch bolt ①
5. Loosen:
   - cap bolt ②
6. Loosen:
   - lower bracket pinch bolts ③

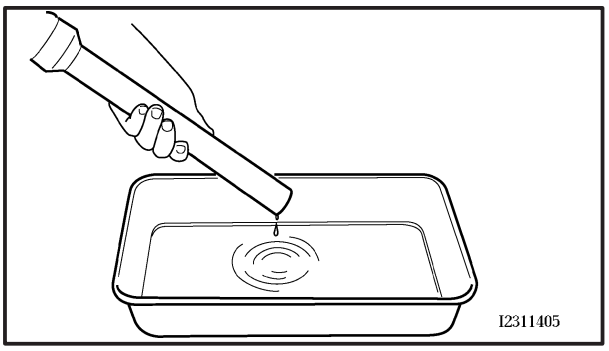


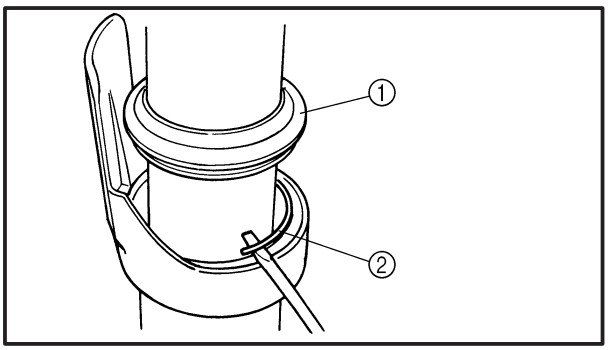


⚠ WARNING

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

7. Remove:
   - front fork leg



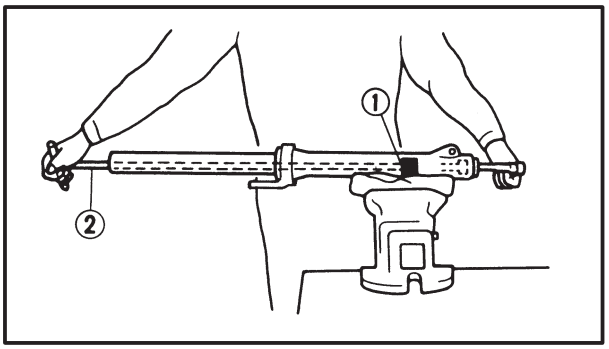


EAS00655
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Remove:
   • cap bolt
   • washers
   • spacer
   • spring
2. Drain:
   • fork oil
3. Remove:
   • dust seal ①
   • oil seal clip ②
   (with a flat-head screwdriver)

CAUTION:

Do not scratch the inner tube.

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

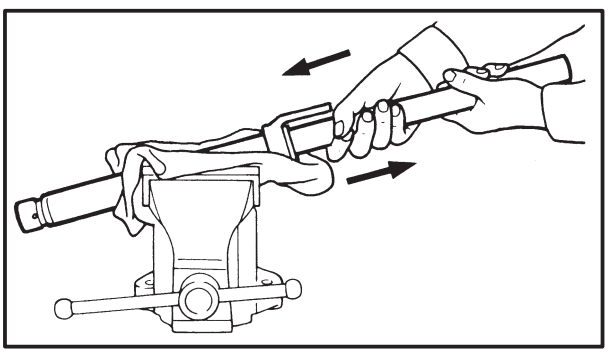


4. Remove:
   • damper rod assembly bolt
   • copper washer

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

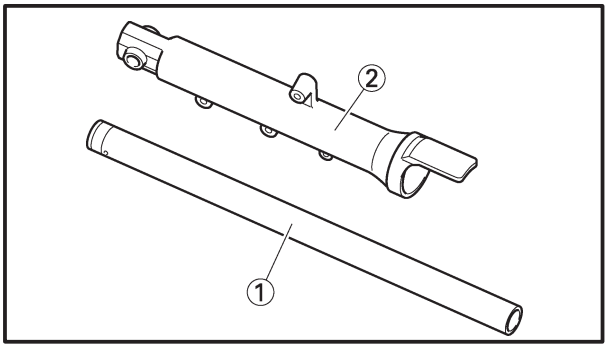


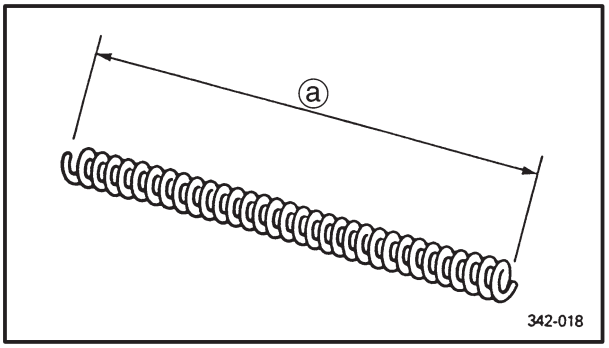
Damper rod holder (29 mm)
90890-01375
T-handle
90890-01326

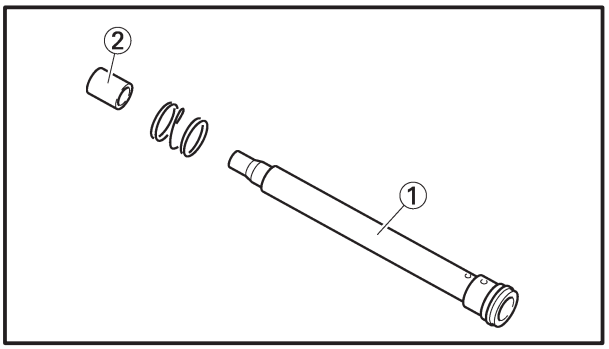


5. Remove:
   • inner tube

a. Hold the front fork leg horizontally.
b. Slowly push the inner tube into the outer tube and just before it bottoms out, pull the inner tube back quickly.
c. Repeat this step until the inner tube separates from the outer tube.







EAS00657
CHECKING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Check:
   - inner tube ①
   - outer tube ②
   Bends/damage/scratches → Replace.

⚠ WARNING

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

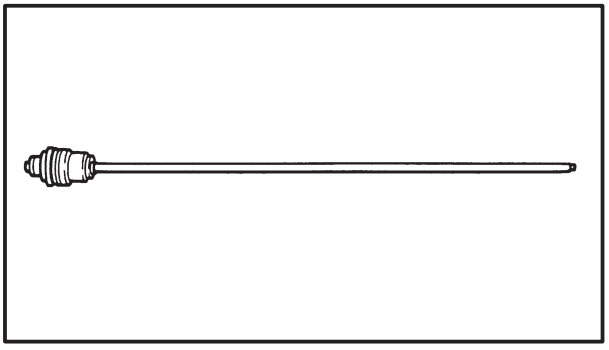
2. Measure:
   - spring free length ⓐ
   Out of specification → Replace.

Spring free length
314 mm
<Limit> : 308 mm

3. Check:
   - damper rod ①
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
   - oil flow stopper ②
   Damage → Replace.

CAUTION:

- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



4. Check:
   - cap bolt
   Damage/wear → Replace.

EAS00661
ASSEMBLING THE FRONT FORK LEGS

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

⚠ WARNING

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

NOTE:

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

1. Install:
   - damper rod

⚠ WARNING

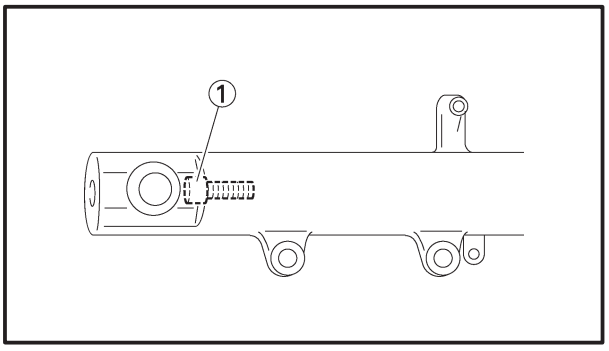
Always use new copper washers.

CAUTION:

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

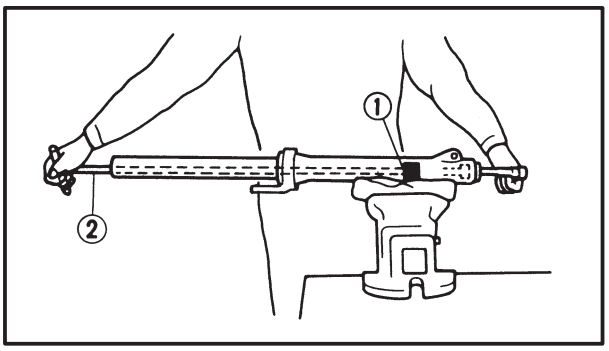
2. Lubricate:
   - inner tube's outer surface

Recommended lubricant
Yamaha fork and shock oil 5W or equivalent



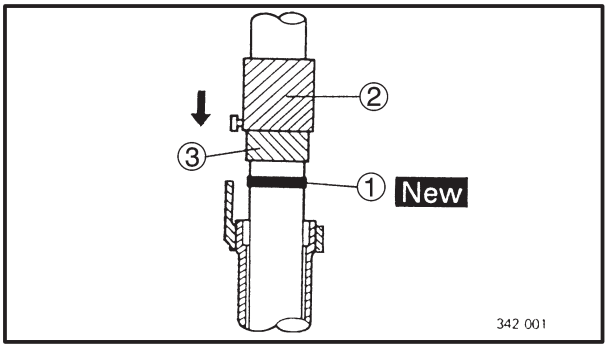
3. Tighten:
   - damper rod assembly bolt ①

30 Nm (3.0 m•kg) **LOCTITE®**



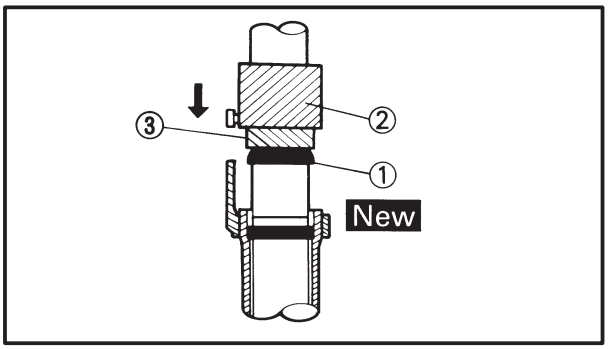
NOTE:
While holding the damper rod assembly with the damper rod holder ① and T-handle ②, tighten the damper rod assembly bolt.

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



4. Install:
   • outer tube bushing ① New
   (with the fork seal driver weight ② and fork seal driver attachment ③)

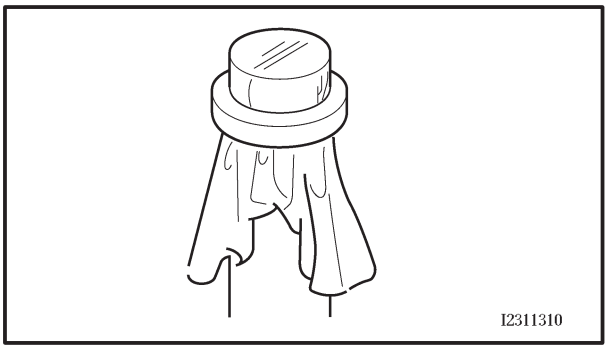
Fork seal driver weight
90890-01367
Fork seal driver attachment
90890-01374



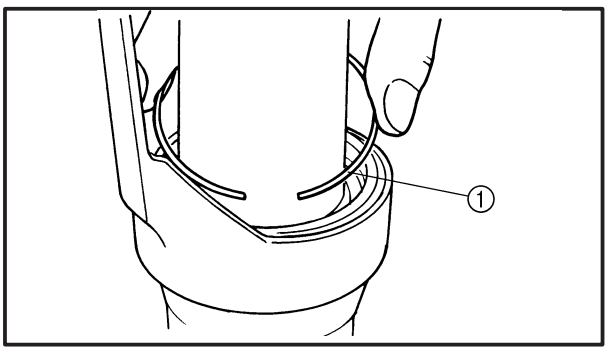
5. Install:
   • washer
   • oil seal ① New
   (with the fork seal driver weight and fork seal driver attachment)

CAUTION:

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

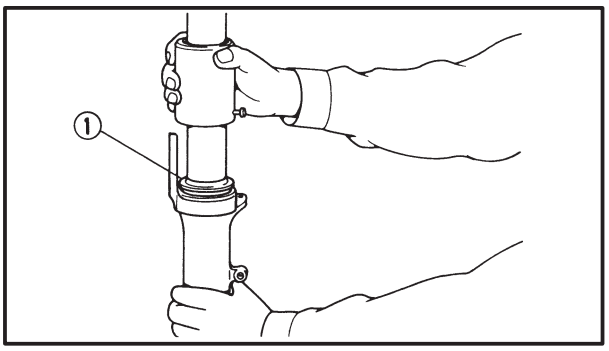


NOTE:
- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag ② to protect the oil seal during installation.



6. Install:
   • oil seal clip ①

NOTE:
Adjust the oil seal clip so that it fits into the outer tube's groove.

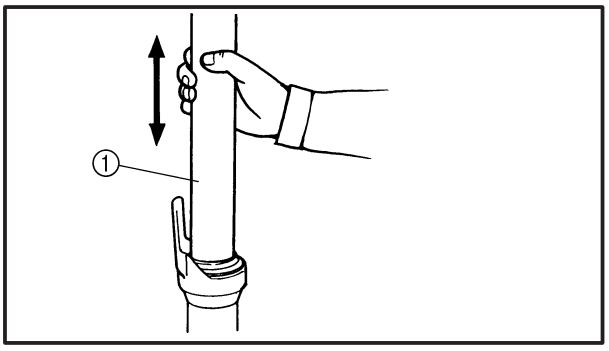


7. Install:
   • dust seal ①
   (with the fork seal driver weight)
8. Fill:
   • front fork leg
   (with the specified amount of the recommended fork oil)

Quantity (each front fork leg)
0.507 L
Recommended oil
Yamaha fork and shock oil 10W or equivalent

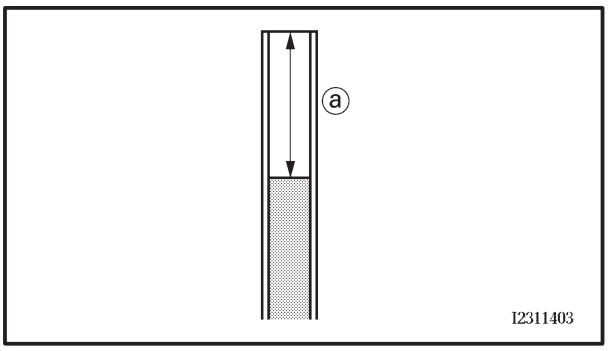
CAUTION:

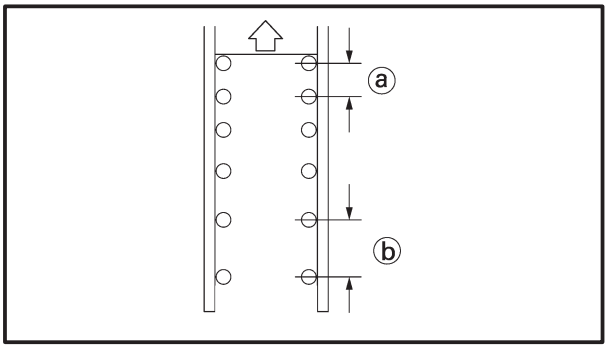
- **Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

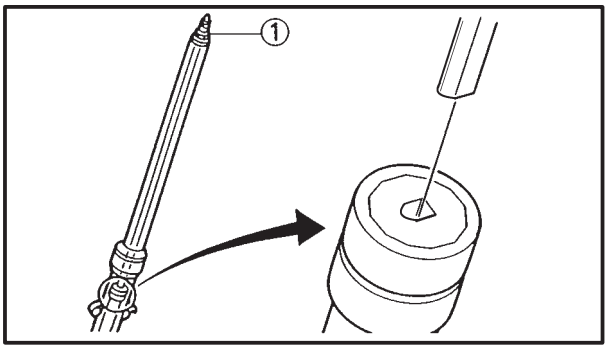


9. Slowly stroke the inner tube ① up and down.
10. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

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







11. Measure:
    • front fork leg oil level ⓐ
    Out of specification → Correct.

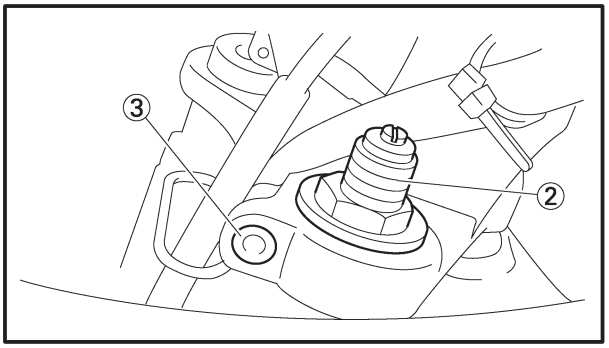
Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)
133 mm

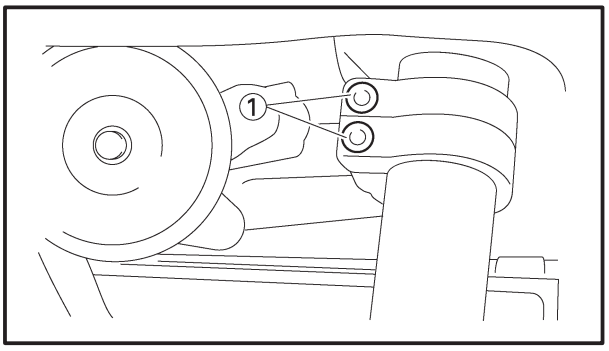
12. Install:
    • spring
    • spring seat
    • spacer
    • washer
    • cap bolt ①

NOTE:

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

ⓑ larger pitch





EAS00662
INSTALLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Install:
   • front fork leg
     Temporarily tighten the upper and lower bracket pinch bolts.

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

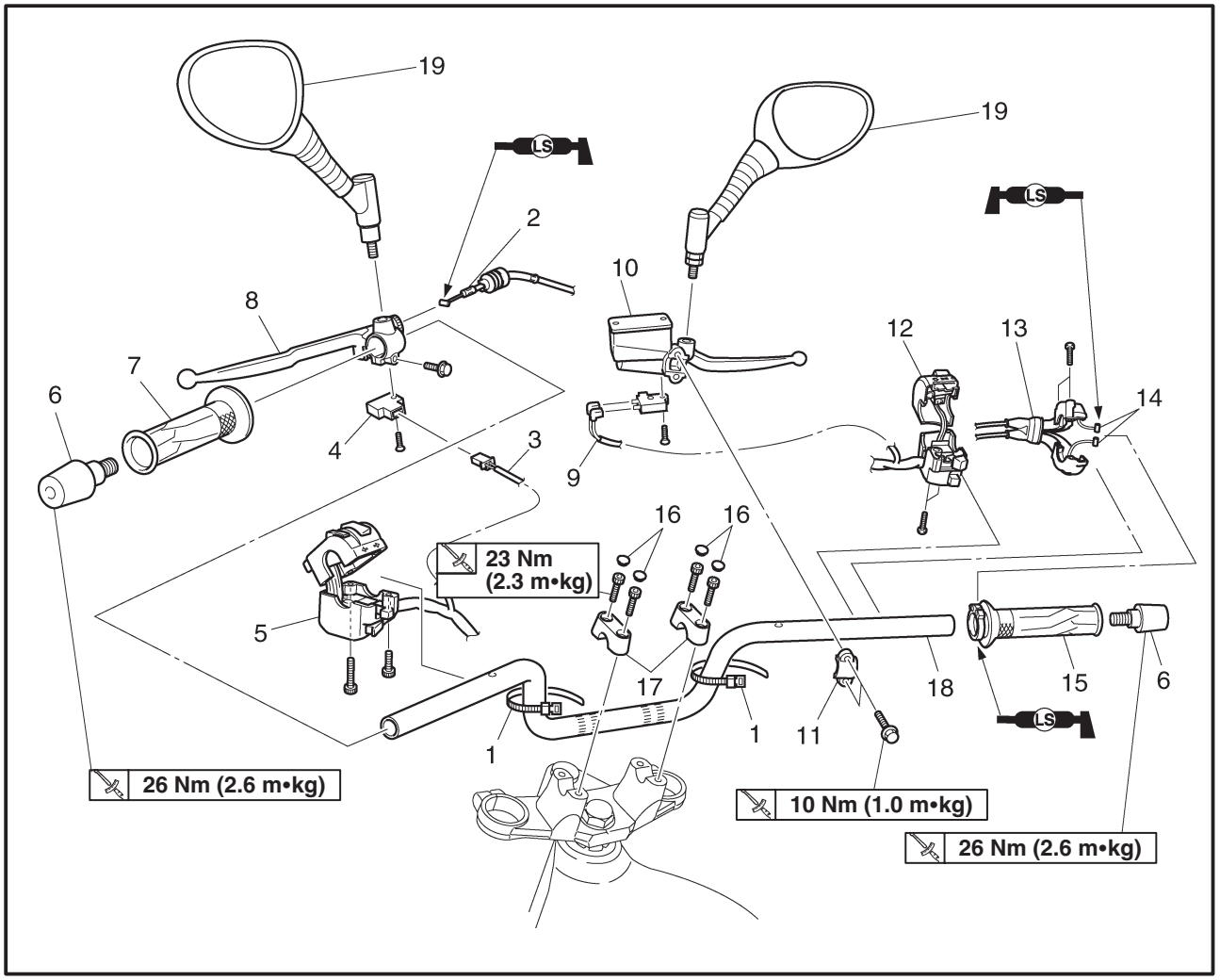
2. Tighten:
   • lower bracket pinch bolts ①
     28 Nm (2.8 m•kg)
   • cap bolt ②
     23 Nm (2.3 m•kg)
   • upper bracket pinch bolt ③
     26 Nm (2.6 m•kg)

⚠ WARNING
Make sure the brake hoses are routed properly.

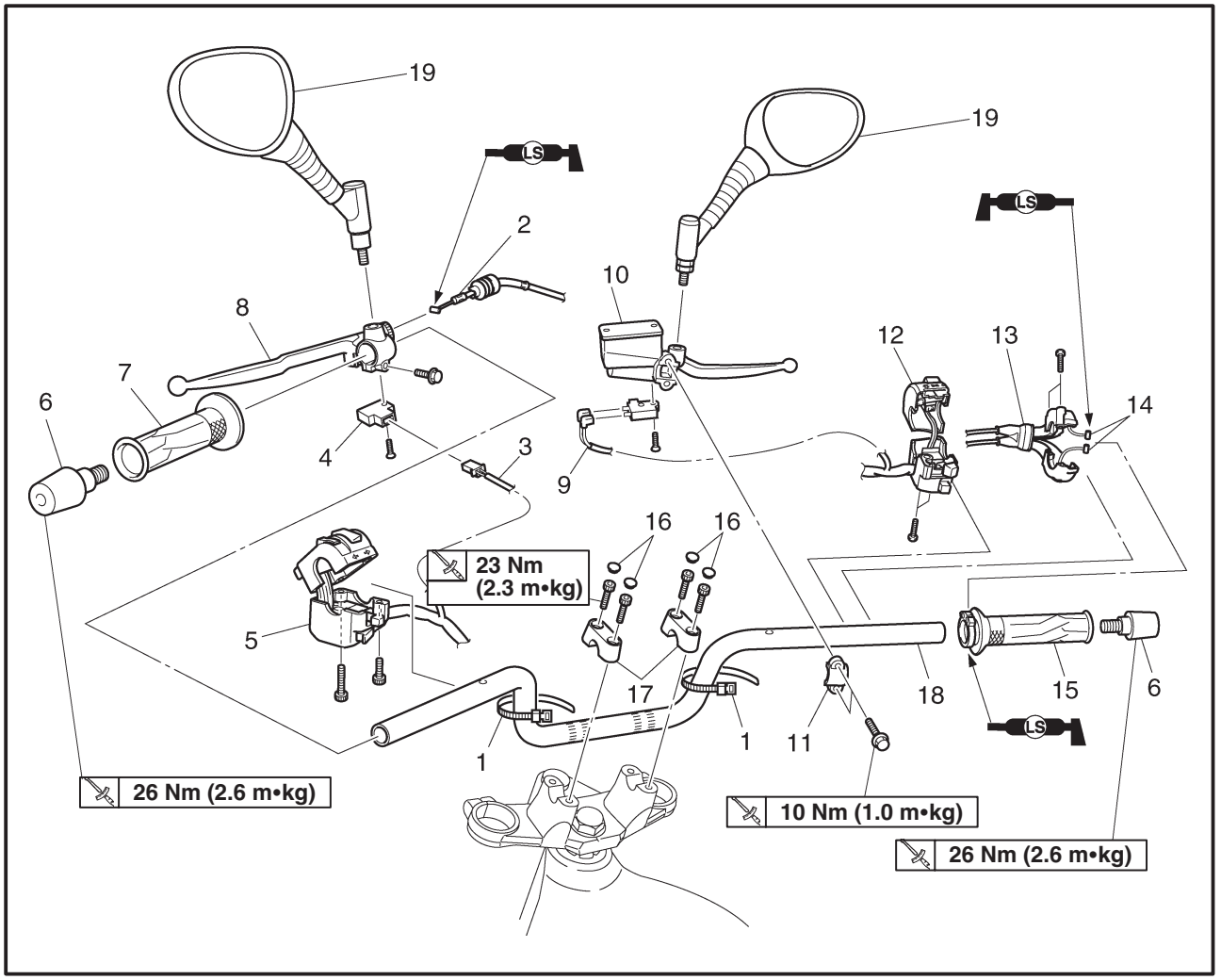
3. Install:
   • front fender
4. Install:
   • front wheel
     Refer to “FRONT WHEEL AND BRAKE DISCS”.
   • front brake caliper **40 Nm (4.0 m•kg)**
     Refer to “FRONT AND REAR BRAKE”.
5. Adjust:
   • spring preload
   • rebound damping
   • Refer to “ADJUSTING THE FRONT FORK LEGS” in chapter 3.

EAS00664

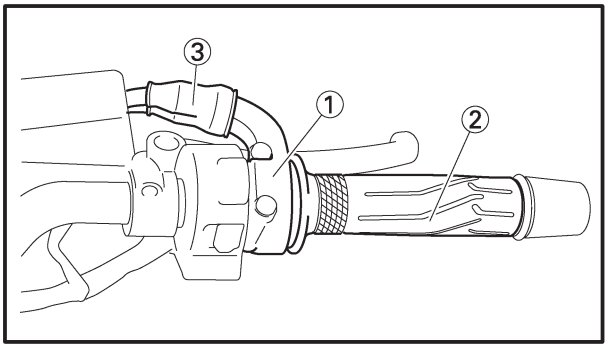
HANDLEBAR

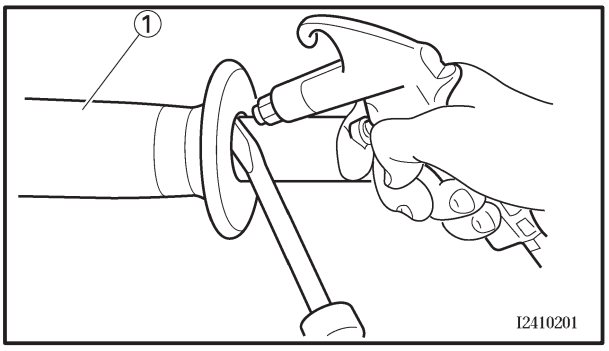


Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed.
1	Band	2	
2	Clutch cable	1	
3	Clutch switch lead coupler	1	Disconnect.
4	Clutch switch	1	
5	Left handlebar switch	1	
6	Grip end	2	
7	Handlebar grip (left)	1	
8	Clutch lever assembly	1	
9	Front brake light switch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



Order	Job/Part	Q'ty	Remarks
17	Upper handlebar holder	2	
18	Handlebar	1	
19	Rear view mirror	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:
   - throttle cable housing ①
   - throttle grip ②

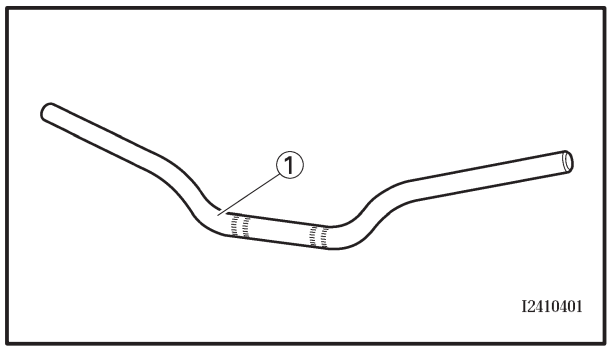
NOTE:

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

3. Remove:
   - handlebar switch (left and right)
4. Remvoe:
   - upper handlebar holder
5. Remove:
   - handlebar grip ①

NOTE:

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



EAS00668
CHECKING THE HANDLEBAR

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

⚠ WARNING

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

2. Install:
   - handlebar grip

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a. Apply a thin coat of rubber adhesive onto the left end of the handlebar.
b. Slide the handlebar grip over the left end of the handlebar.
c. Wipe off any excess rubber adhesive with a clean rag.

⚠ WARNING

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

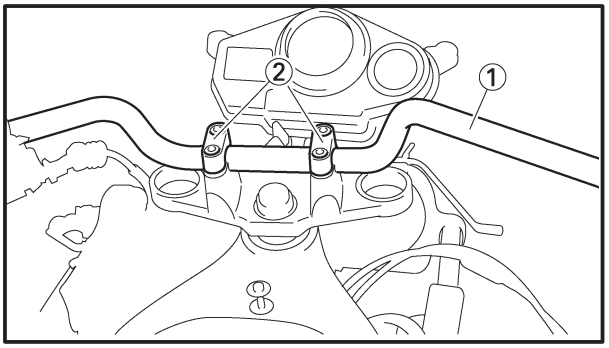
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EAS00670
INSTALLING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

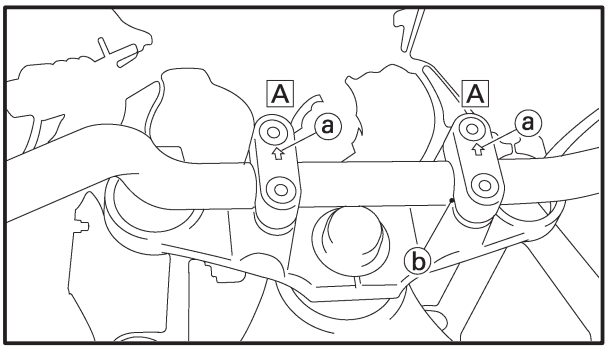


2. Install:
   - handlebar ①
   - upper handlebar holders ②

23 Nm (2.3 m•kg)

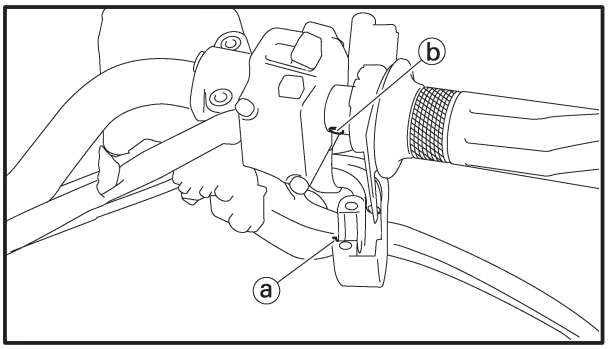
CAUTION:

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



NOTE:

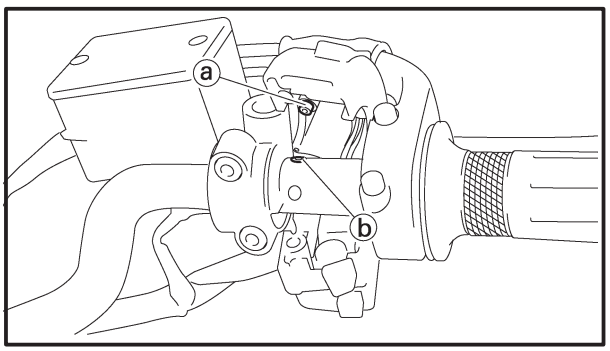
- The upper handlebar holders should be installed with the arrow marks ⓐ facing forward A.
- Align the match marks ⓑ on the handlebar with the upper surface of the lower handlebar holders.



3. Install:
   - throttle grip
   - throttle cable housing
   - throttle cable

NOTE:

Align the projection ⓐ on the throttle cable housing with the hole ⓑ in the handlebar.



4. Install:
   - left handlebar switch
   - right handlebar switch

NOTE:

Align the projections ⓐ on the handlebar switches with the hole ⓑ in the handlebar.

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

NOTE:

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

7. Adjust:
   • clutch cable free 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

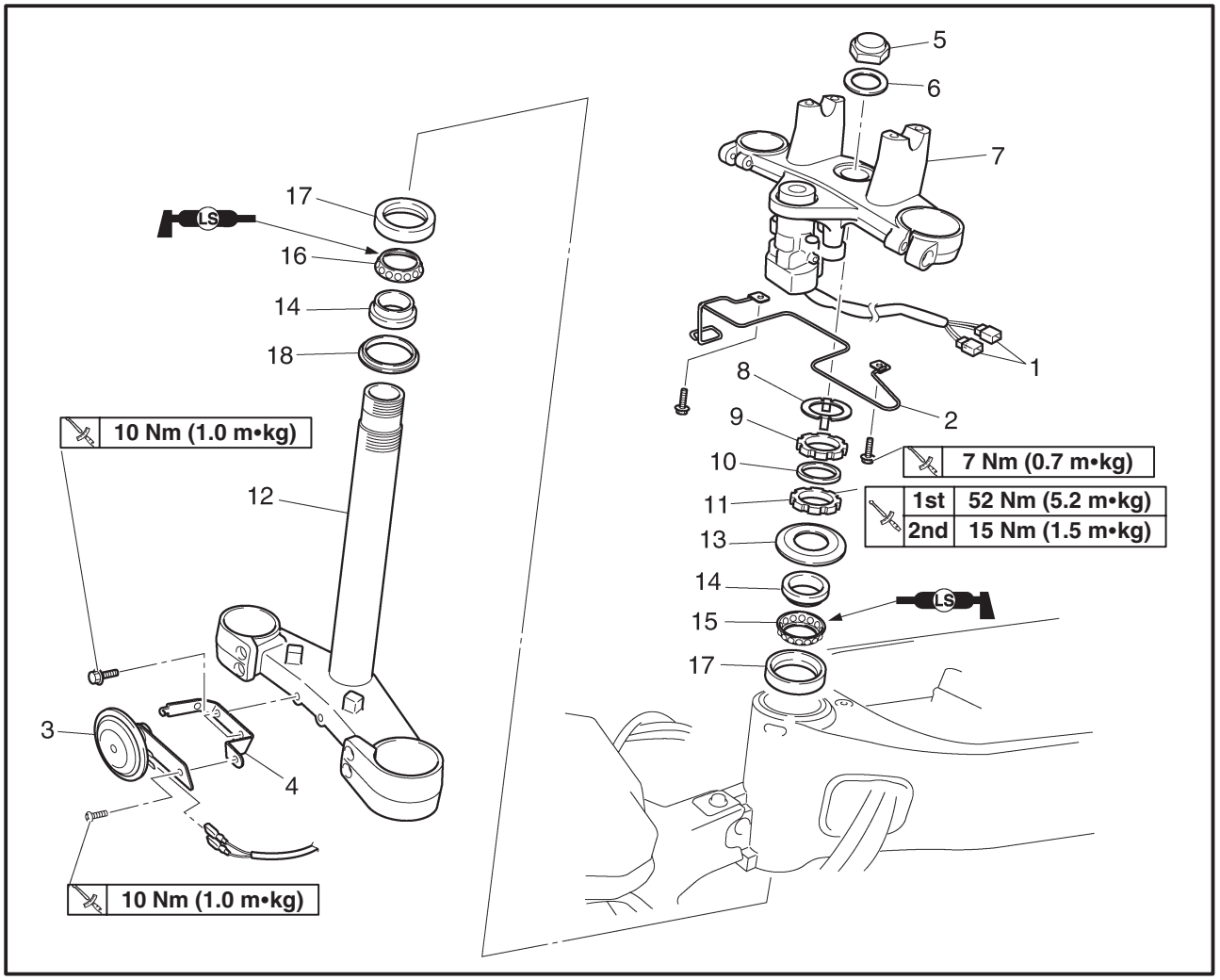
8. Adjust:
   • throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.



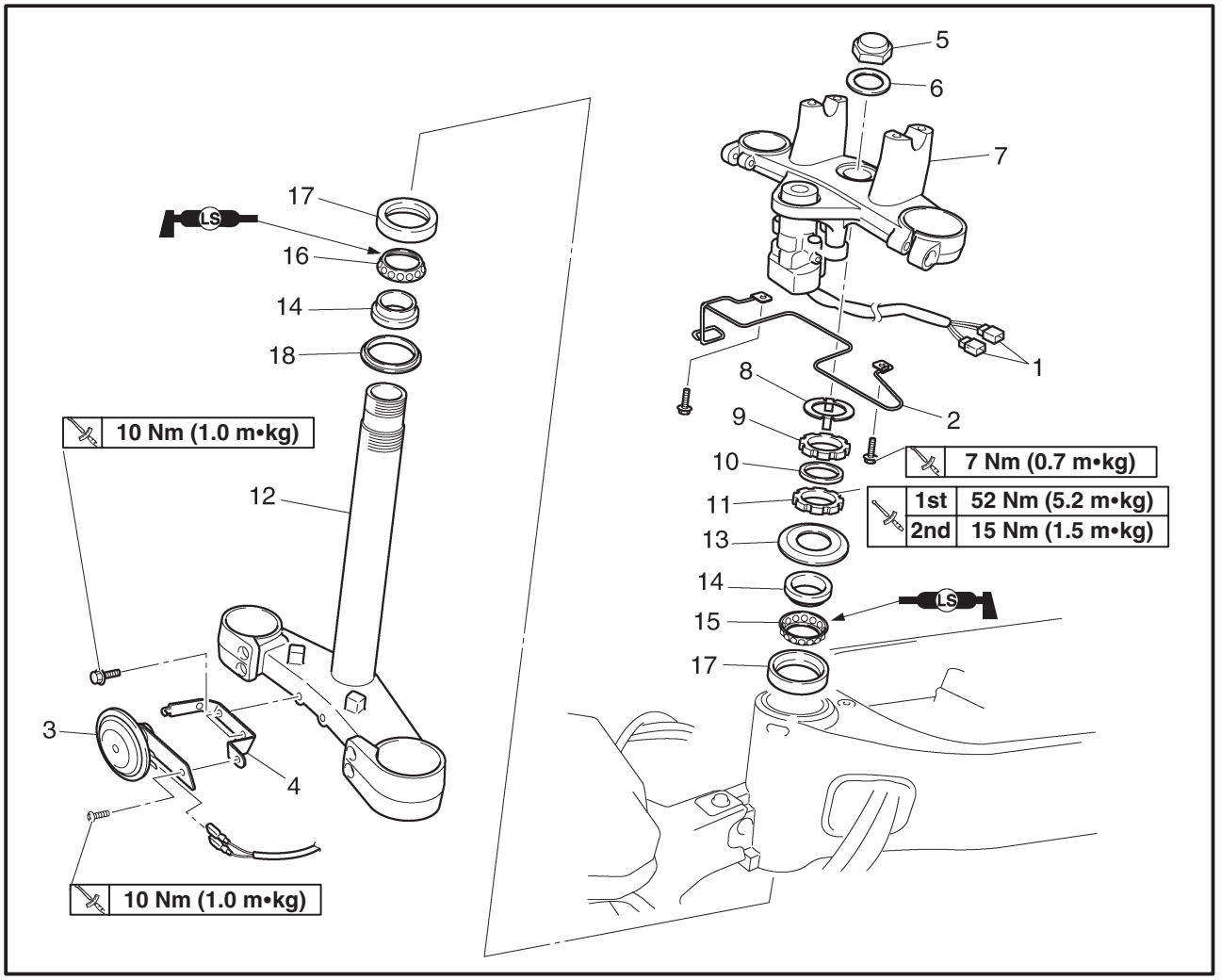
Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm

EAS00676

STEERING HEAD



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



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

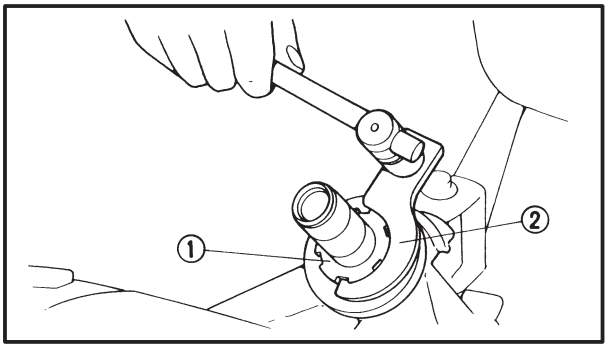
EAS00679
REMOVING THE LOWER BRACKET

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

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





Steering nut wrench
90890-01403

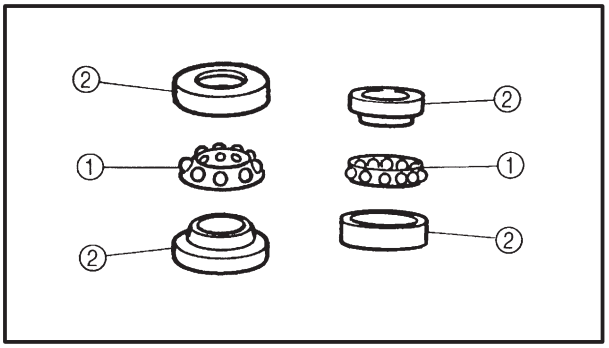
⚠ WARNING

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

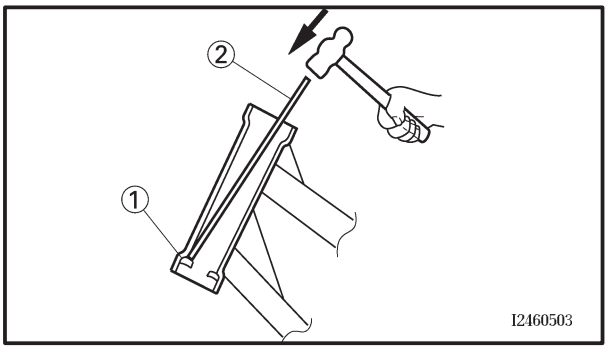
EAS00682
CHECKING THE STEERING HEAD

1. Wash:
   - bearings (upper and lower)
   - bearing races

	Recommended cleaning solvent **Kerosene**



2. Check:
   - bearinsgs ①
   - bearing races ②
     Damage/pitting → Replace.

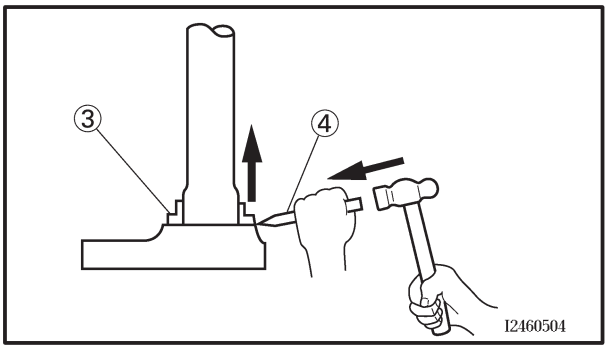


3. Replace:
   - bearings
   - bearing races

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a. Remove the bearing races ① from the steering head pipe with a long rod ② and hammer.
b. Remove the bearing race ③ from the lower bracket with a floor chisel ④ and hammer.
c. Install a new dust seal and new bearing races.

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CAUTION:

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

NOTE:

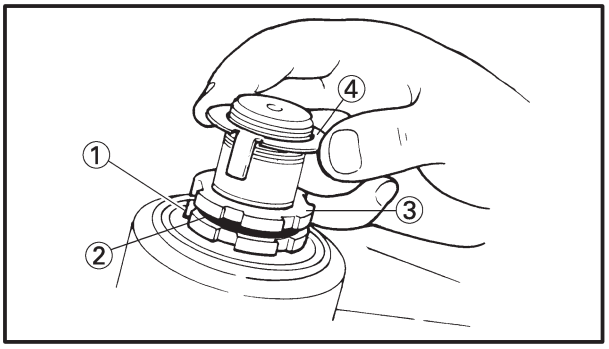
- Always replace the bearing balls and bearing races as a set.
- Whenever the steering head is disassembled, replace the dust seal.

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

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



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

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

NOTE:

Temporarily tighten the steering stem nut.

4. Install:
   - front fork legs

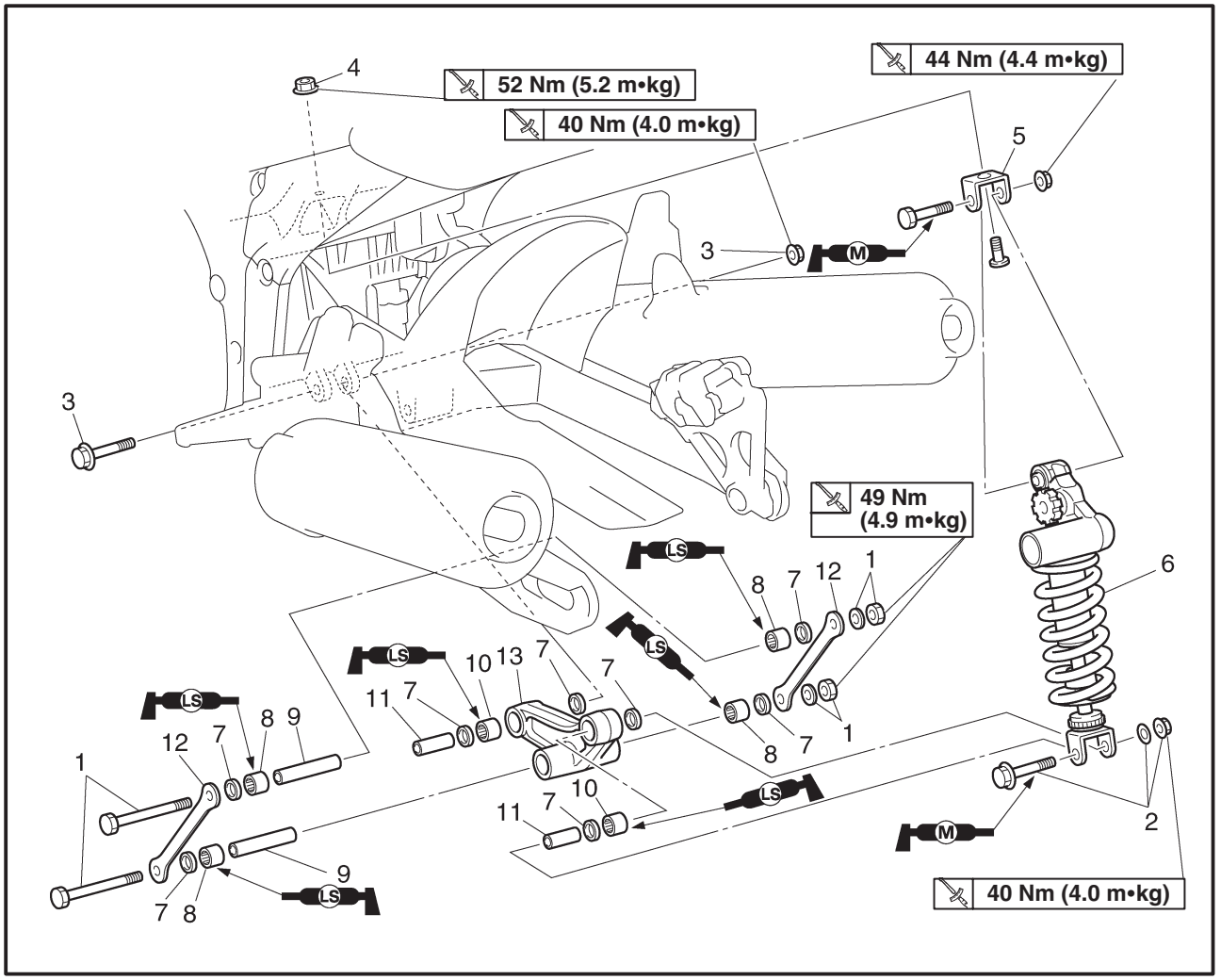
   Refer to "INSTALLING THE FRONT FORK LEGS".

NOTE:

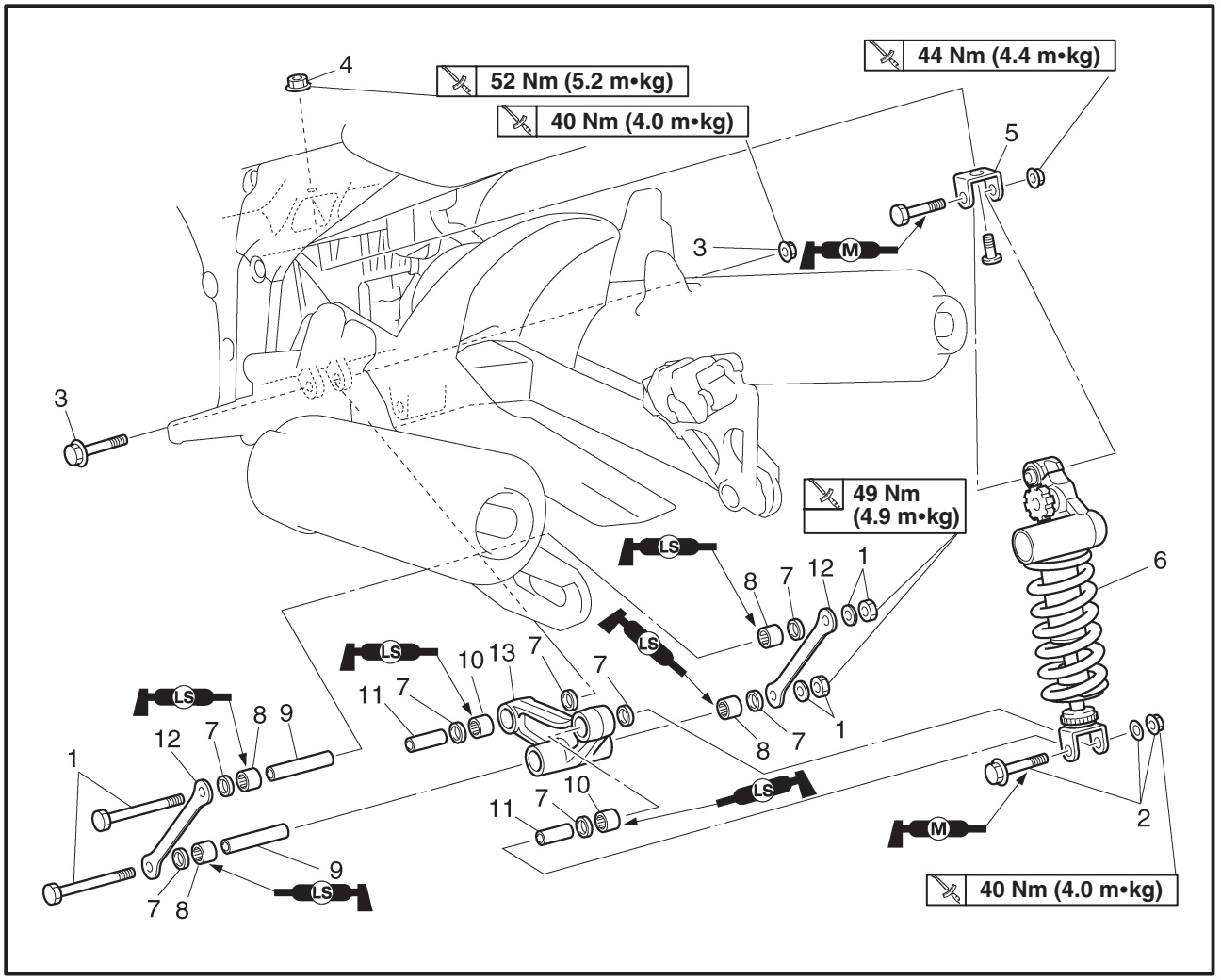
Temporarily tighten the upper and lower bracket pinch bolts.

EAS00685

REAR SHOCK ABSORBER ASSEMBLY



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



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

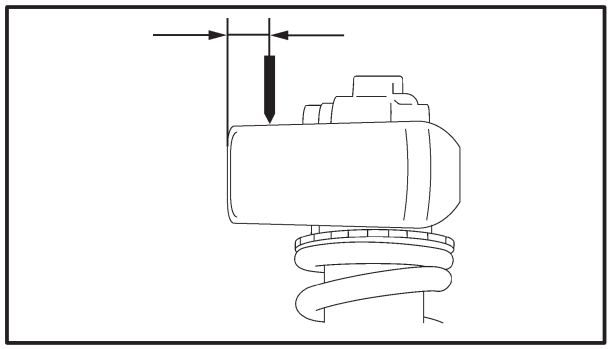
EAS00687

HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

⚠ WARNING

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

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



EAS00689

DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

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

⚠ WARNING

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

EAS00694

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

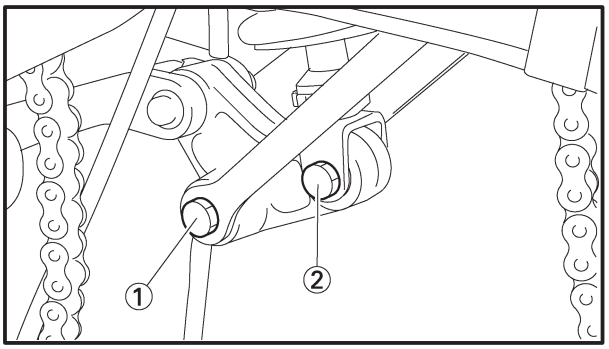
Place the motorcycle on a suitable stand so that the rear wheel is elevated.

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

CAUTION:

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

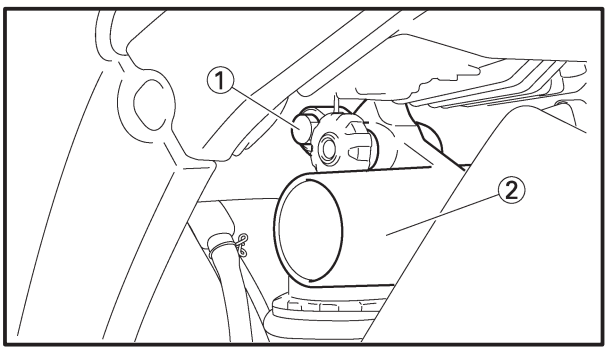
3. Remove:
   - battery



4. Remove:
   - connecting arm bolt ①
   - rear shock absorber assembly lower bolt ②

NOTE:

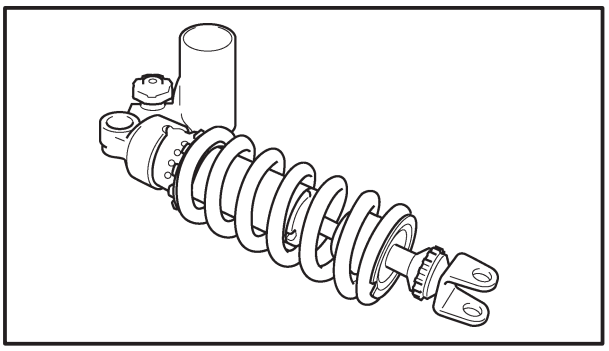
While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.



5. Remove:
   - rear shock absorber assembly upper bolt ①
   - rear shock absorber assembly ②

NOTE:

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



EAS00696

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY AND GAS CYLINDER

1. Check:
   - rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - spring
     Damage/wear → Replace the rear shock absorber assembly.
   - gas cylinder
     Damage/gas leaks → Replace.
   - bushings
     Damage/wear → Replace.
   - dust seals
     Damage/wear → Replace.
   - bolts
     Bends/damage/wear → Replace.

EAS00698

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

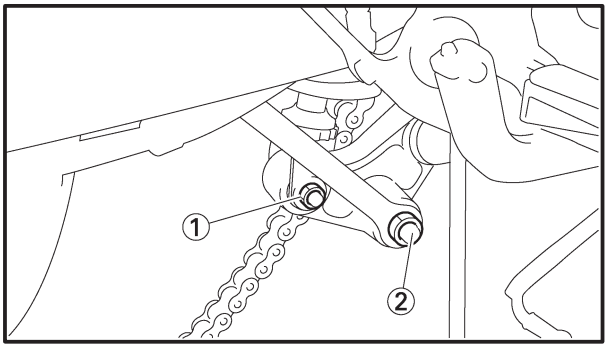
1. Lubricate:
   - spacers
   - bearings

	Recommended lubricant **Molybdenum disulfide grease**

2. Install:
   - rear shock absorber upper bracket
     44 Nm (4.4 m•kg)
   - rear shock absorber assembly

NOTE:

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

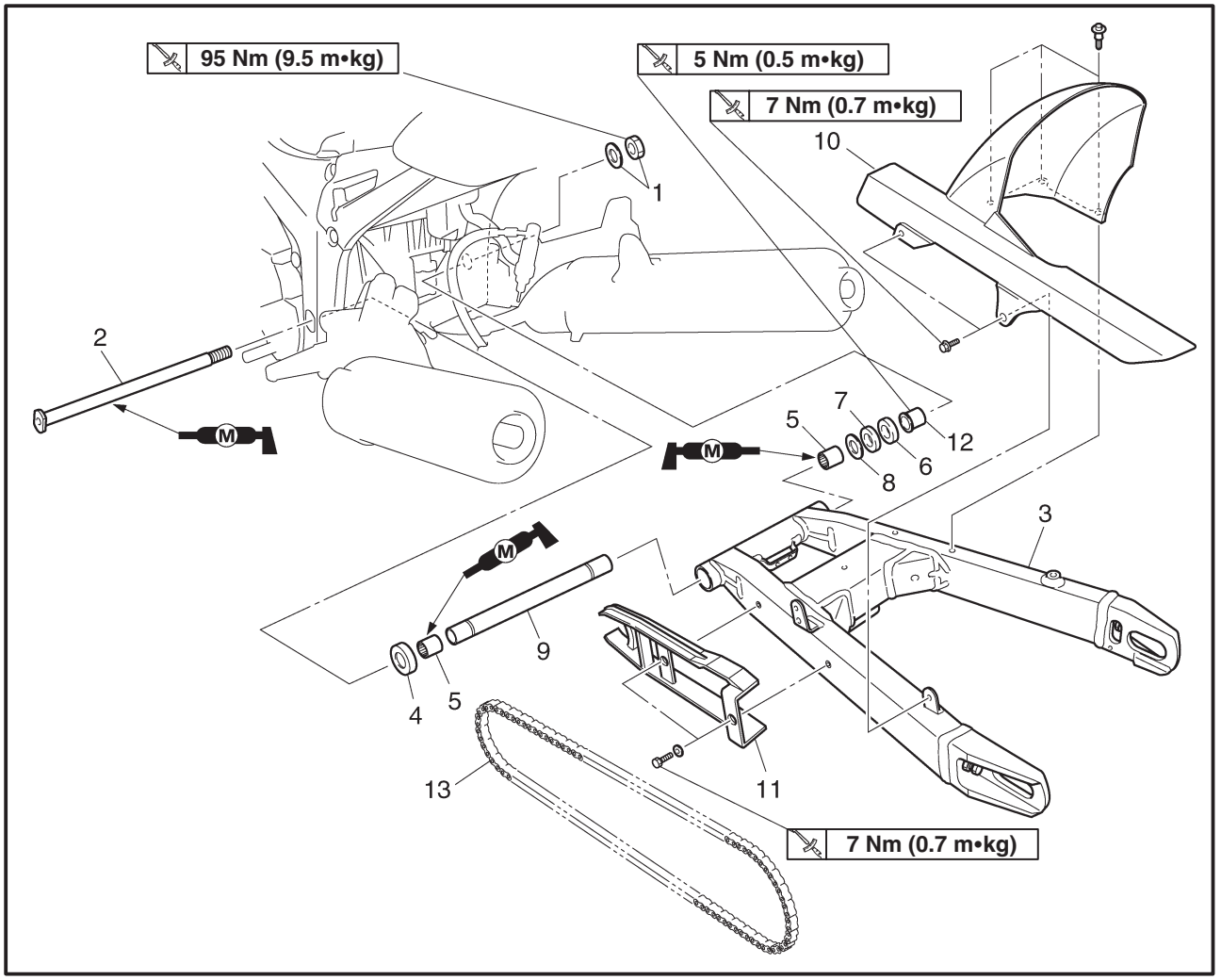


3. Tighten:
   - rear shock absorber assembly upper nut
     40 Nm (4.0 m•kg)
   - rear shock absorber assembly lower nut ①
     40 Nm (4.0 m•kg)
   - connecting arm nut ②
     40 Nm (4.0 m•kg)
   - rear shock absorber upper bracket nut
     52 Nm (5.2 m•kg)
4. Connect:
   - battery leads
     (to the battery terminals)

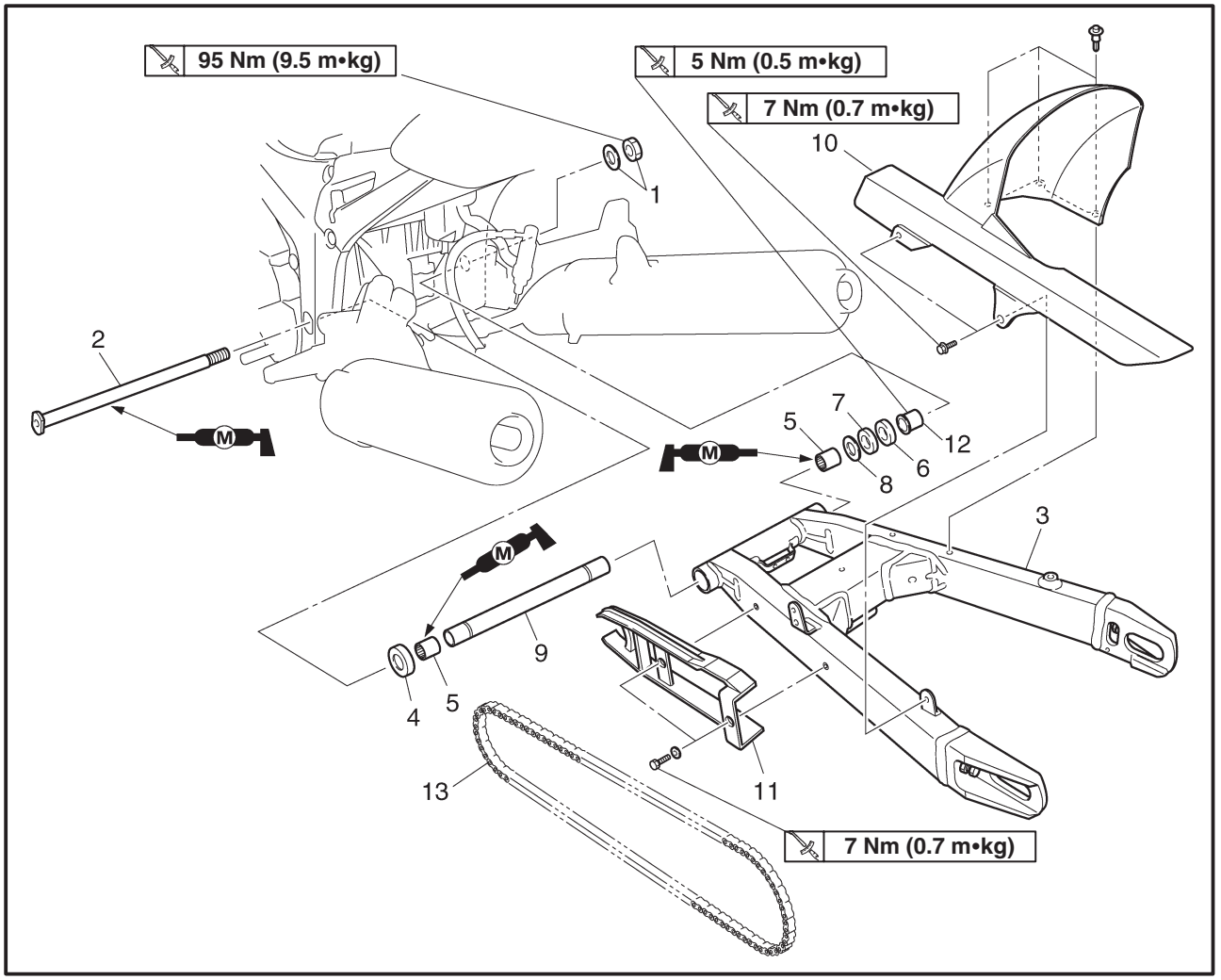
CAUTION:

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

EAS00700
SWINGARM AND DRIVE CHAIN



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



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

EAS00703

REMOVING THE SWINGARM

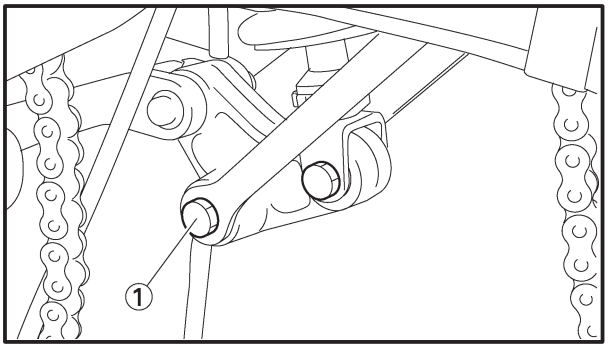
1. Stand the motorcycle on a level surface.

⚠ WARNING

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

NOTE:

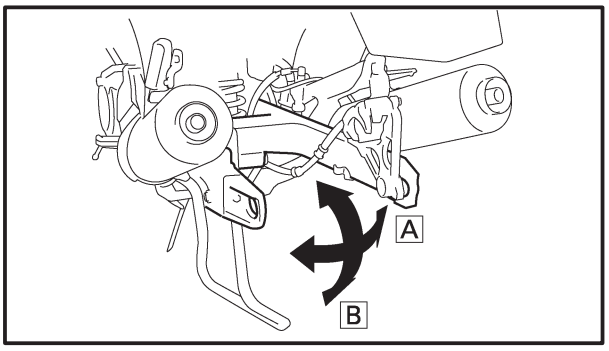
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



2. Remove:
   • connecting arm bolt ①

NOTE:

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



3. Measure:
   • swingarm side play
   • swingarm vertical movement

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

	**Pivot shaft nut** **95 Nm (9.5 m•kg)**

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

	**Swingarm side play** **(at the end of the swingarm)** **1.0 mm**

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

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EAS00706
REMOVING THE DRIVE CHAIN
1. Stand the motorcycle on a level surface.

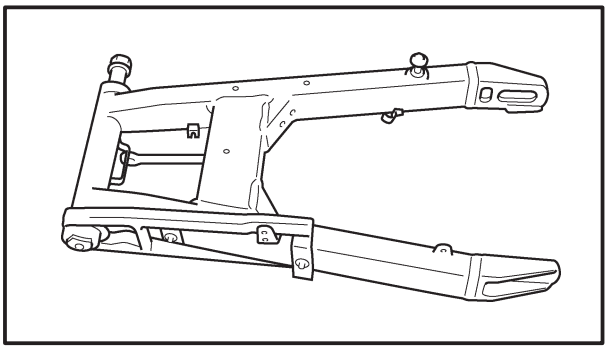
⚠ WARNING

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

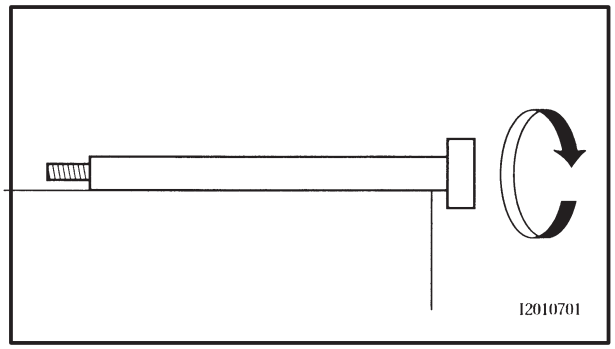
NOTE:

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

2. Remove:
   • swingarm
3. Remove:
   • drive chain



EAS00707
CHECKING THE SWINGARM
1. Check:
   • swingarm
   Bends/cracks/damage → Replace.



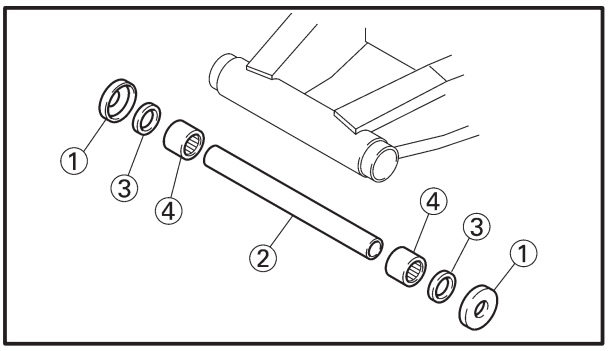
2. Check:
   • pivot shaft
   Roll the pivot shaft on a flat surface.
   Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent pivot shaft.

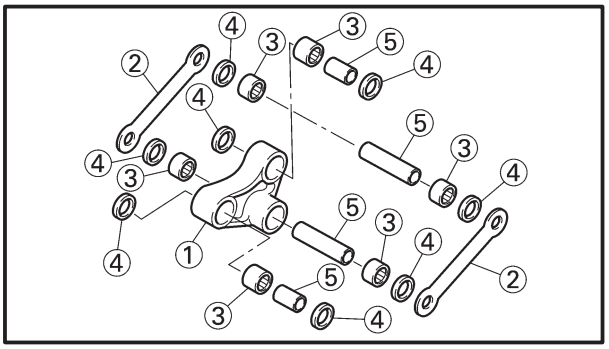
3. Wash:
   • pivot shaft
   • dust covers
   • spacer
   • washers
   • bearings

	Recommended cleaning solvent **Kerosene**



DISASSEMBLING THE SWINGARM

1. Remove:
   - dust covers ①
   - spacer ②
   - oil seals ③
   - bearings ④
2. Check:
   - oil seals ③
     Damage/wear → Replace.
   - bearings ④
     Damage/pitting → Replace.



CHECKING THE CONECTING ARM AND RELAY ARMS

1. Check:
   - connecting arms ①
   - relay arm ②
     Damage/wear → Replace.
2. Check:
   - bearings ③
   - oil seals ④
     Damage/pitting → Replace.
3. Check:
   - spacers ⑤
     Damage/scratches → Replace.

ASSEMBLING THE SWINGARM

1. Install:
   - bearings
   - oil seals New

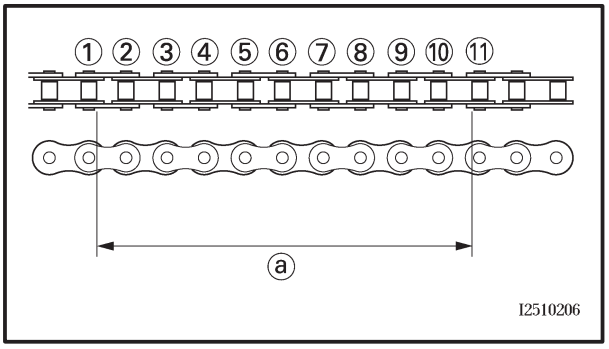
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a. Install the new bearings and oil seals in the reverse order of disassembly.

NOTE:

Use a socket that matches the diameter of the bearing outer race and oil seal.

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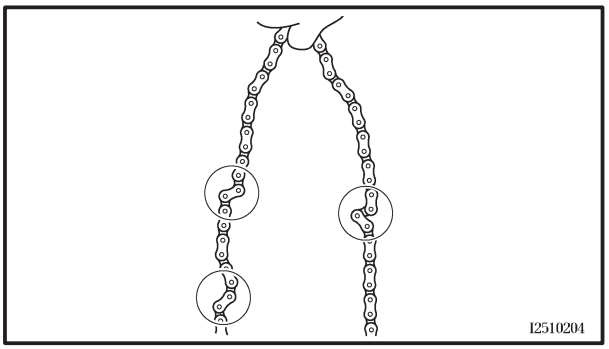


EAS00709
CHECKING THE DRIVE CHAIN

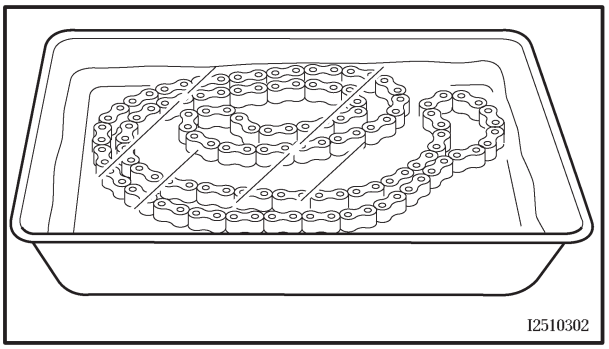
1. Measure:
   • ten-link section ⓐ of the drive chain
   Out of specification → Replace the drive chain.

Ten-link drive chain section limit (maximum)
150.1 mm

NOTE:
- While measuring the ten-link section, push down on the drive chain to increase its tension.
- Measure the length between drive chain roller ① and ⑪ as shown.
- Perform this measurement at two or three different places.



2. Check:
   • drive chain
   Stiffness → Clean and lubricate or replace.

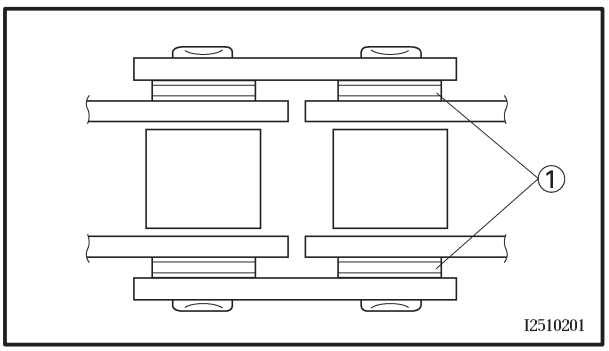


3. Clean:
   • drive chain

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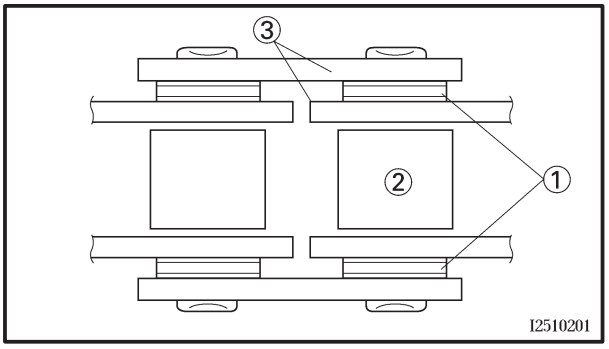
a. Wipe the drive chain with a clean cloth.
b. Put the drive chain in kerosene and remove any remaining dirt.
c. Remove the drive chain from the kerosene and completely dry it.

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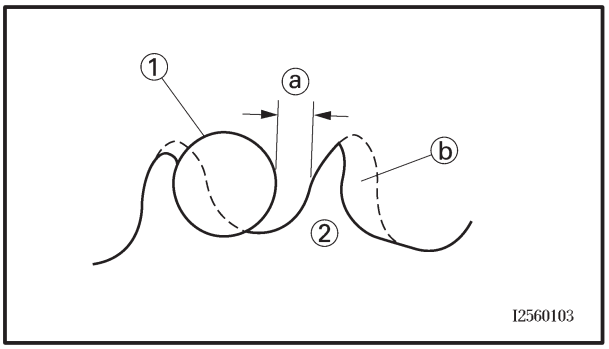
CAUTION:

This motorcycle has a drive chain with small rubber O-rings ① between the drive chain side plate. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain.
High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosine to clean the drive chain.



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

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



6. Check:
   - drive sprocket
   - rear wheel sprocket
     More than 1/4 tooth ⓐ wear → Replace the drive chain sprockets as a set.
     Bent teeth → Replace the drive chain sprockets as a set.

ⓑ Correct
① Drive chain roller
② Drive chain sprocket

EAS00711
INSTALLING THE SWINGARM

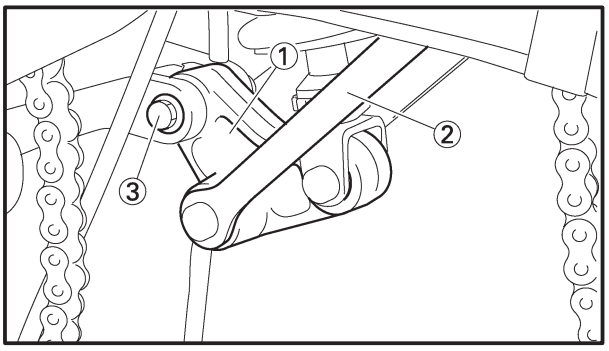
1. Lubricate:
   - bearings
   - spacers
   - dust covers
   - pivot shaft

Recommended lubricant
Molybdenum disulfide grease

2. Lubricate:
   - drive chain

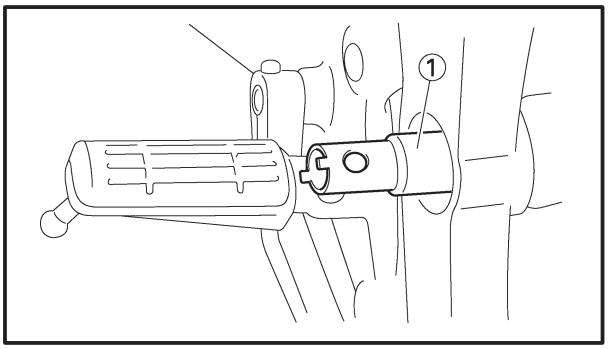
Recommended lubricant
Engine oil or chain lubricant suitable for O-ring chains

3. Install:
   - drive chain (to the swingarm)
4. Install:
   - swingarm (to the frame)



5. Install:
   - relay arm ① **40 Nm (4.0 m•kg)**
   - connecting arms ② **49 Nm (4.9 m•kg)**

NOTE:
Install the connecting arm front bolt ③ from the left.



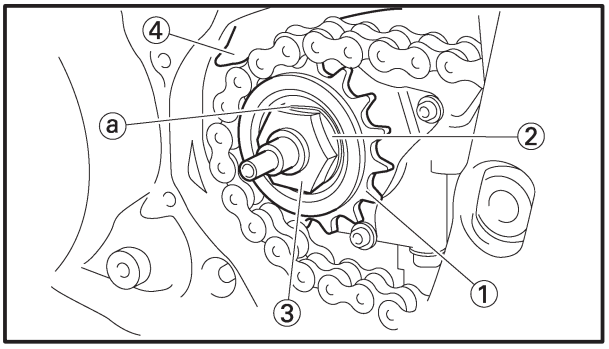
6. Install:
   - pivot shaft adjusting bolt
   - swingarm
   - pivot shaft
   - washer
   - pivot shaft nut **95 Nm (9.5 m•kg)**

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

Pivot shaft wrench
90890-01455

7. Install:
   - rear shock absorber assembly
   - rear wheel

   Refer to "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY" and "INSTALLING THE REAR WHEEL".



8. Install:
   - drive sprocket ①
   - washer ② New
   - drive sprocket nut ③ **85 Nm (8.5 m•kg)**
   - drive chain guide ④

NOTE:

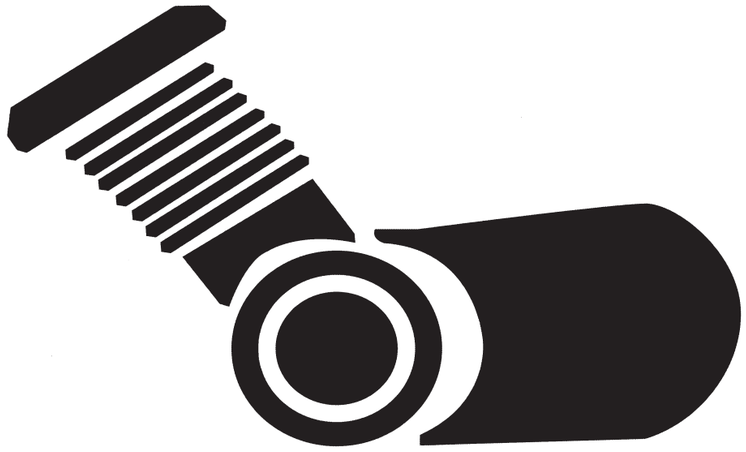
While applying the rear brake, tighten the drive sprocket nut.

9. Bend the lock washer tab ⓐ along a flat side of the nut.
10. Adjust:
    - drive chain slack
      Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.

Drive chain slack
50 ~ 60 mm

CAUTION:

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



ENG 5

CHAPTER 5
ENGINE

ENGINE 5-1
EXHAUST PIPES 5-1
DRIVE SPROCKET 5-2
LEADS AND HOSES 5-3
ENGINE 5-5
INSTALLING THE ENGINE 5-6

CAMSHAFT 5-7
CYLINDER HEAD COVER 5-7
CAMSHAFTS 5-8
REMOVING THE CAMSHAFTS 5-9
CHECKING THE CAMSHAFTS 5-11
CHECKING THE CAMSHAFT SPROCKETS AND TIMING CHAIN GUIDES 5-13
CHECKING THE TIMING CHAIN TENSIONER 5-14
INSTALLING THE CAMSHAFTS 5-15

CYLINDER HEAD 5-19
REMOVING THE CYLINDER HEAD 5-20
CHECKING THE CYLINDER HEAD 5-20
INSTALLING THE CYLINDER HEAD 5-21

VALVES AND VALVE SPRINGS 5-22
REMOVING THE VALVES 5-23
CHECKING THE VALVES AND VALVE GUIDES 5-24
CHECKING THE VALVE SEATS 5-26
CHECKING THE VALVE SPRINGS 5-28
CHECKING THE VALVE LIFTERS 5-29
INSTALLING THE VALVES 5-29

CYLINDER AND PISTONS 5-32
REMOVING THE CYLINDER AND PISTONS 5-33
CHECKING THE CYLINDER AND PISTONS 5-34
CHECKING THE PISTON RINGS 5-36
CHECKING THE PISTON PINS 5-37
INSTALLING THE PISTONS AND CYLINDER 5-38

CLUTCH 5-40
CLUTCH COVER 5-40
PULL LEVER SHAFT 5-41
CLUTCH 5-42
REMOVING THE CLUTCH 5-44
CHECKING THE FRICTION PLATES 5-44
CHECKING THE CLUTCH PLATES 5-46
CHECKING THE CLUTCH SPRINGS 5-46
CHECKING THE CLUTCH HOUSING 5-47
CHECKING THE CLUTCH BOSS 5-47

CHECKING THE PRESSURE PLATE 5-47
CHECKING THE PULL LEVER SHAFT AND PULL ROD 5-48
CHECKING THE PRIMARY DRIVE 5-48
INSTALLING THE CLUTCH 5-49

SIFT SHAFT 5-51
GENERATOR ROTOR COVER 5-51
SHIFT SHAFT AND STOPPER LEVER 5-52
CHECKING THE SHIFT SHAFT 5-53
CHECKING THE STOPPER LEVER 5-53
INSTALLING THE SHIFT SHAFT 5-53

STARTER CLUTCH AND GENERATOR 5-54
STATOR COIL ASSEMBLY 5-54
STARTER CLUTCH AND GENERATOR ROTOR 5-55
REMOVING THE GENERATOR 5-56
REMOVING THE STARTER CLUTCH 5-57
CHECKING THE STARTER CLUTCH 5-57
CHECKING THE GENERATOR SHAFT 5-58
INSTALLING THE STARTER CLUTCH 5-59
INSTALLING THE GENERATOR 5-59

OIL PAN AND OIL PUMP 5-60
OIL PUMP COVER AND OIL PUMP DRIVEN GEAR 5-60
OIL PUMP 5-61
OIL HOSE AND OIL TANK 5-63
OIL PAN 5-64
CHECKING THE OIL PUMP 5-65
REMOVING THE OIL PAN 5-65
CHECKING THE RELIEF VALVE 5-66
CHECKING THE OIL DELIVERY PIPES 5-66
CHECKING THE OIL STRAINER 5-66
CHECKING THE OIL NOZZLES 5-66
ASSEMBLING THE OIL PUMP 5-67
INSTALLING THE OIL PUMP 5-67
INSTALLING THE OIL STRAINER 5-68
INSTALLING THE OIL PAN 5-68

CRANKSHAFT 5-69
BALANCER SHAFT 5-69
CRANKSHAFT ASSEMBLY 5-71
CONNECTING ROD 5-72
DISASSEMBLING THE CRANKCASE 5-73
REMOVING THE CRANKSHAFT ASSEMBLY 5-74
REMOVING THE CONNECTING RODS 5-74
CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE 5-74
CHECKING THE CRANKSHAFT AND CONNECTING RODS 5-75
CHECKING THE CRANKCASE 5-79
CHECKING THE BEARINGS 5-79
CHECKING THE CIRCLIPS AND WASHERS 5-80

INSTALLING THE CONNECTING RODS 5-80
INSTALLING THE CRANKSHAFT 5-82
ASSEMBLING THE CRANKCASE 5-83
INSTALLING THE BALANCER SHAFT 5-85

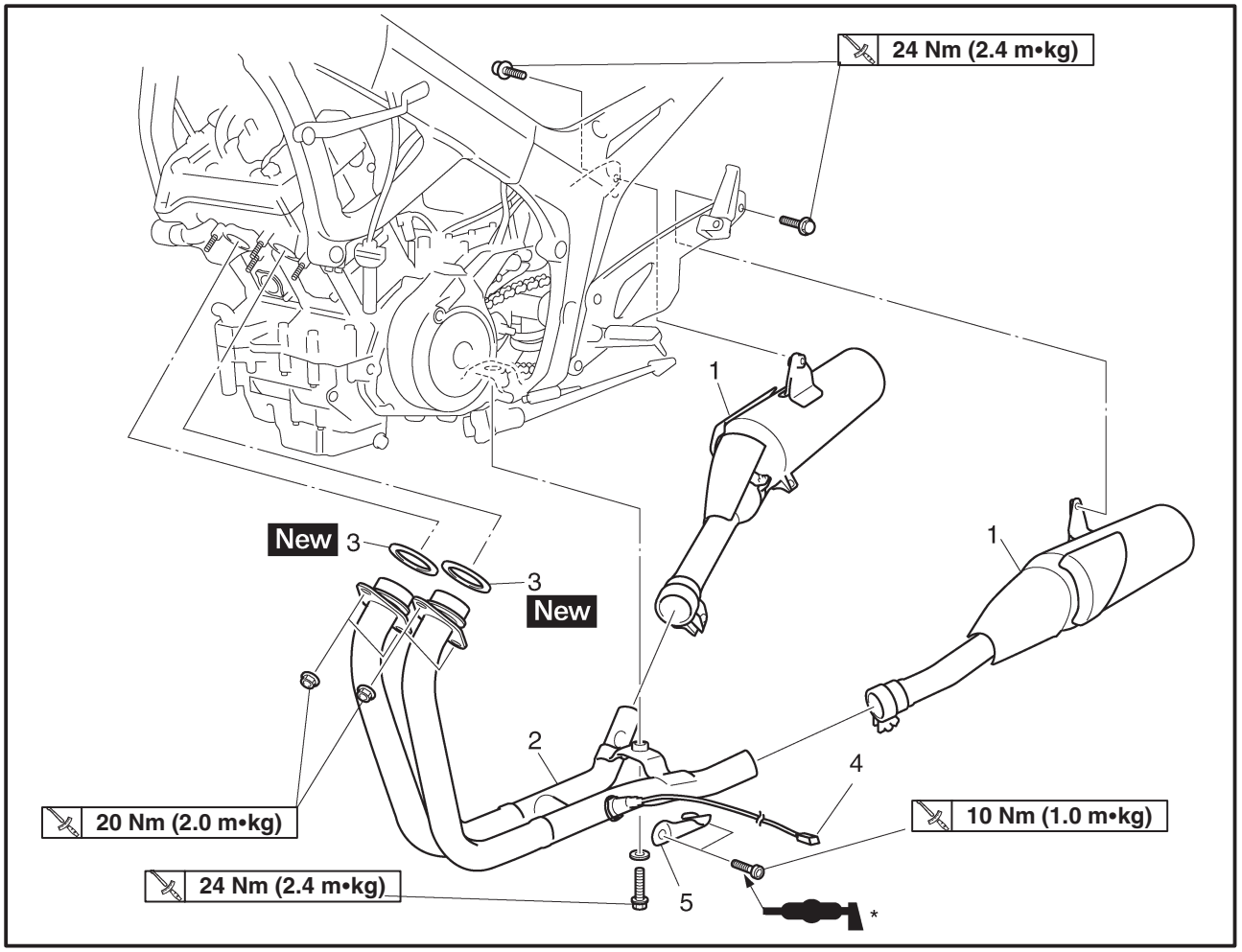
TRANSMISSION 5-87
TRANSMISSION, SHIFT DRUM ASSEMBLY, AND SHIFT FORKS 5-87
REMOVING THE TRANSMISSION 5-92
CHECKING THE SHIFT FORKS 5-92
CHECKING THE SHIFT DRUM ASSEMBLY 5-93
CHECKING THE TRANSMISSION 5-93
INSTALLING THE TRANSMISSION 5-94

EAS00188

ENGINE

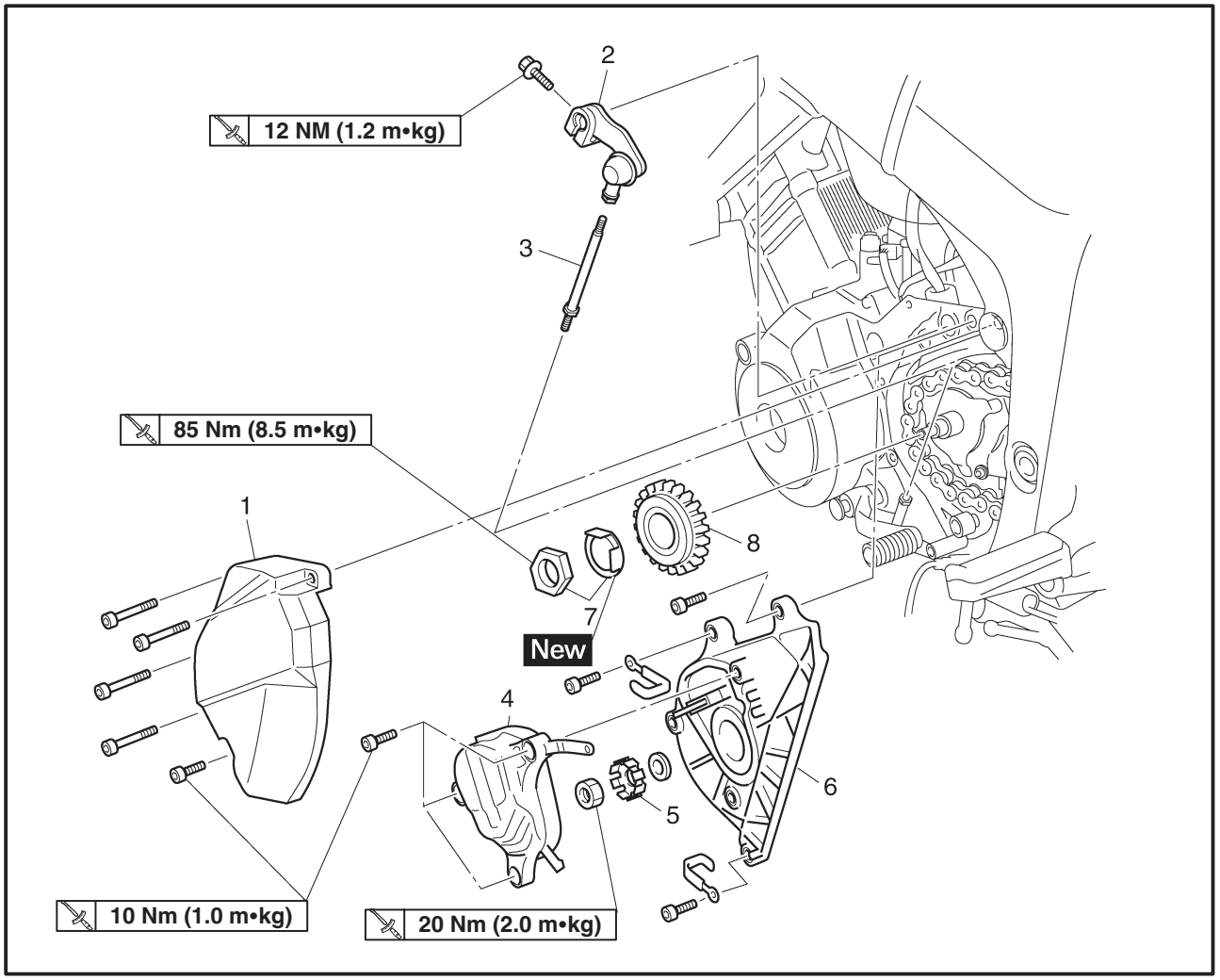
ENGINE
EXHAUST PIPES

* Anti-seize lubricart (high-temparature grade)



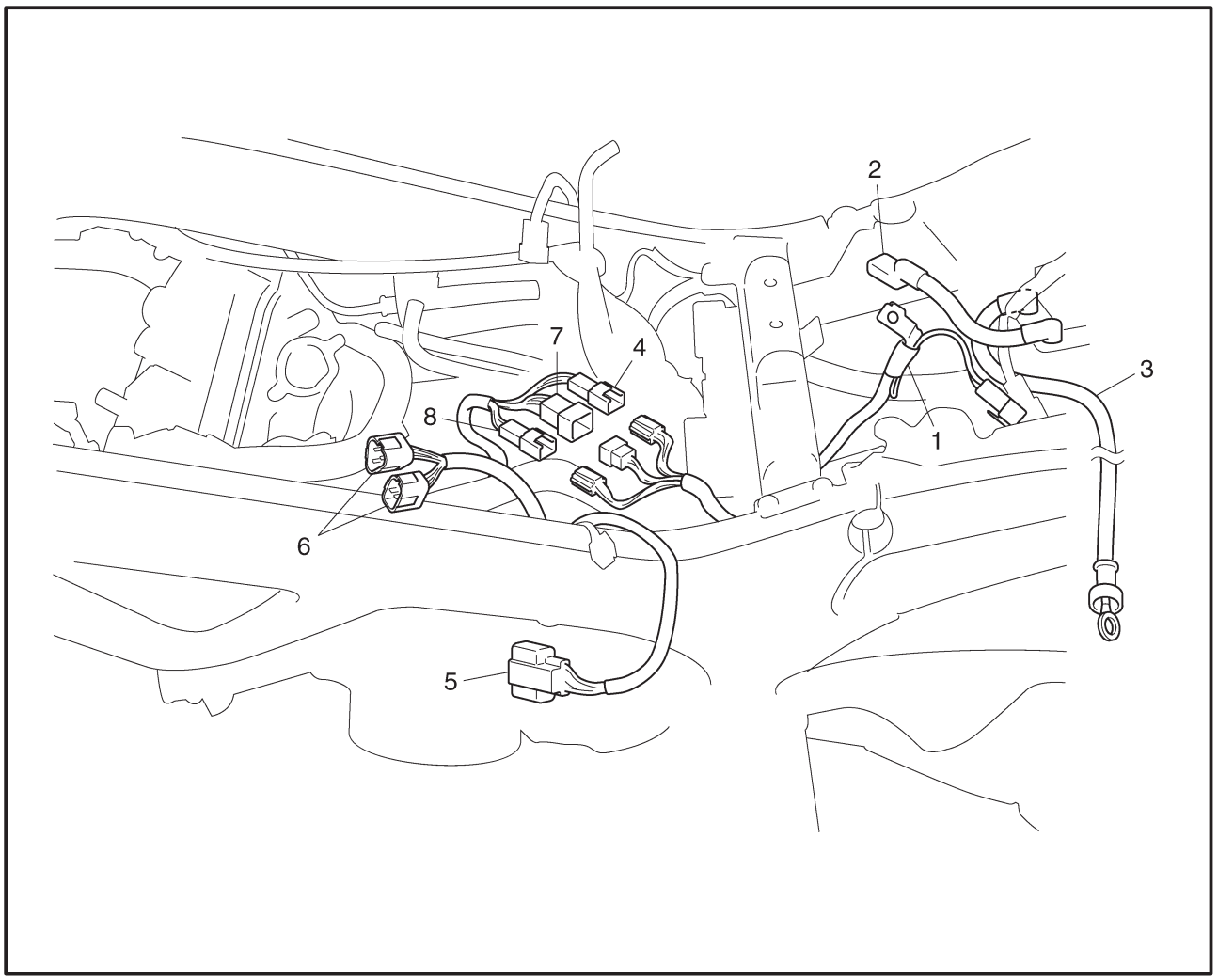
Order	Job/Part	Q'ty	Remarks
	Removing the exhaust pipes		Remove the parts in the order listed. **CAUTION:** **First, disconnect the negative battery lead, and then the positive battery lead. For connecting, reverse the disconnection procedure.**
1	Muffler	1	
2	Exhaust pipe	1	
3	Gasket	2	
4	O_2 sensor coupler	1	Disconnect.
5	O_2 sensor protector	1	
			For installation, reverse the removal procedure.

DRIVE SPROCKET

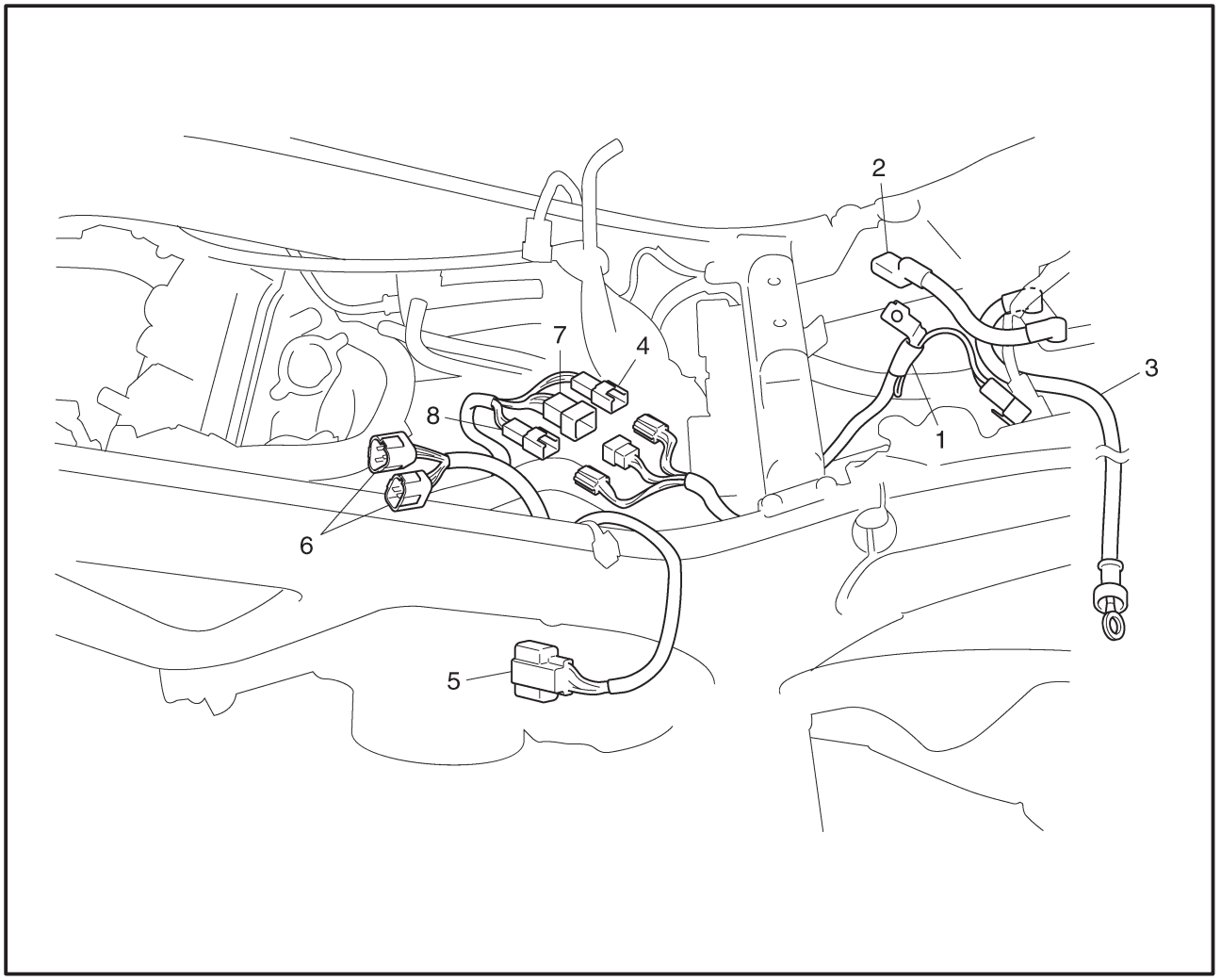


Order	Job/Part	Q'ty	Remarks
	Removing the drive sprocket		Remove the parts in the order listed.
1	Drive sprocket cover	1	
2	Shift arm	1	
3	Shift rod	1	
4	Cover 1	1	
5	Speed sensor rotor	1	
6	Cover 2	1	
7	Nut/lock washer	1/1	
8	Drive sprocket	1	
			For installation, reverse the removal procedure.

EAS00190
LEADS AND HOSES

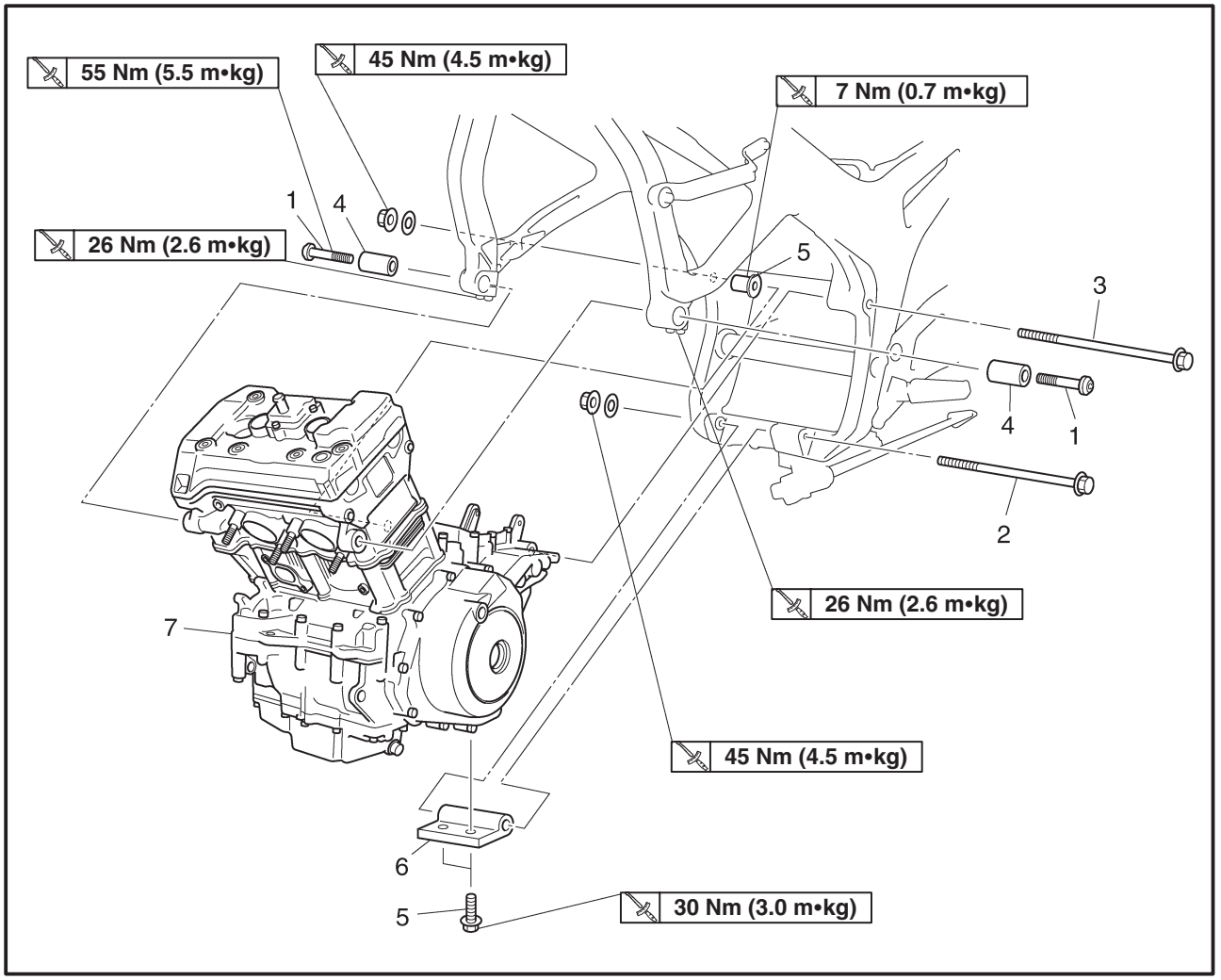


Order	Job/Part	Q'ty	Remarks
	Removing the leads and hoses		Remove the parts in the order listed.
	Seat Side cover Side cowlings Fuel tank Air filter case		Refer to "SEAT", "FUEL TANK", "AIR FILTER CASE" in chapter 3.
	Throttle body		Refer to "FUEL INJECTION SYSTEM" in chapter 7.
	Radiator		Refer to "RADIATOR"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

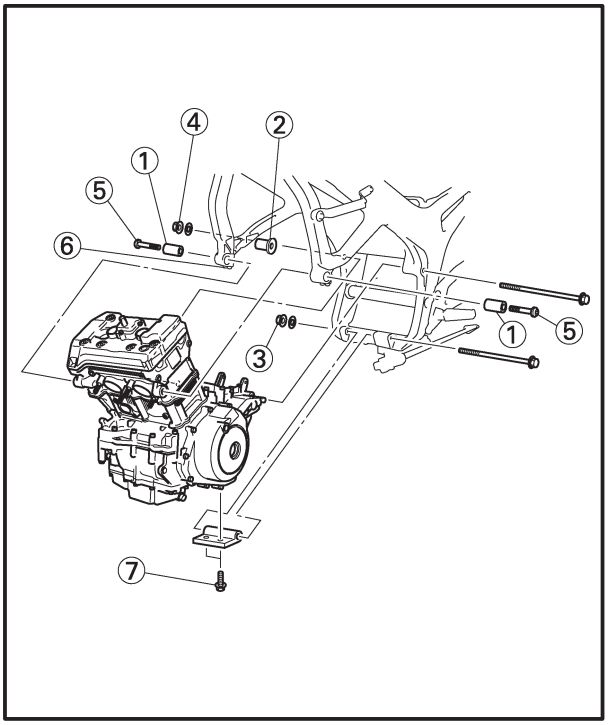


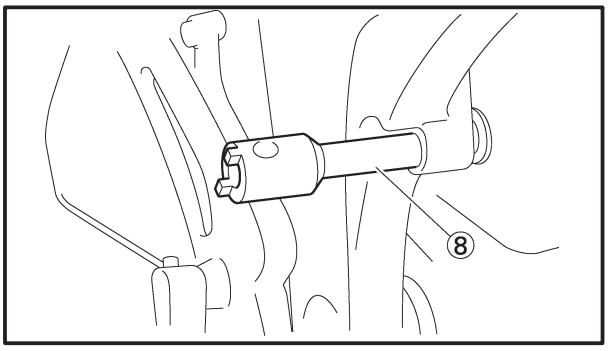
Order	Job/Part	Q'ty	Remarks
4	Neutral switch lead coupler	1	Disconnect.
5	Generator lead coupler	1	Disconnect.
6	Throttle body sub-wire harness coupler	2	Disconnect.
7	Speed sensor lead	1	Disconnect.
			For installation, reverse the removal procedure.

EAS00191
ENGINE



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





EAS00192

INSTALLING THE ENGINE

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

NOTE:

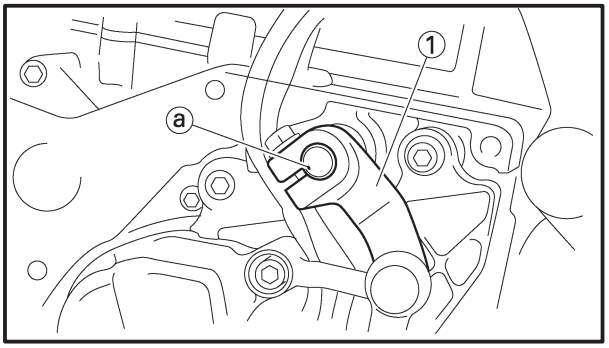
- Lubricate the rear mounting bolt threads with lithium soap base grease.
- Do not fully tighten the bolts.

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

NOTE:

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

Pivot shaft wrench
90890-01471



3. Install:
   - shift arm ① — **10 Nm (1.0 m•kg)**

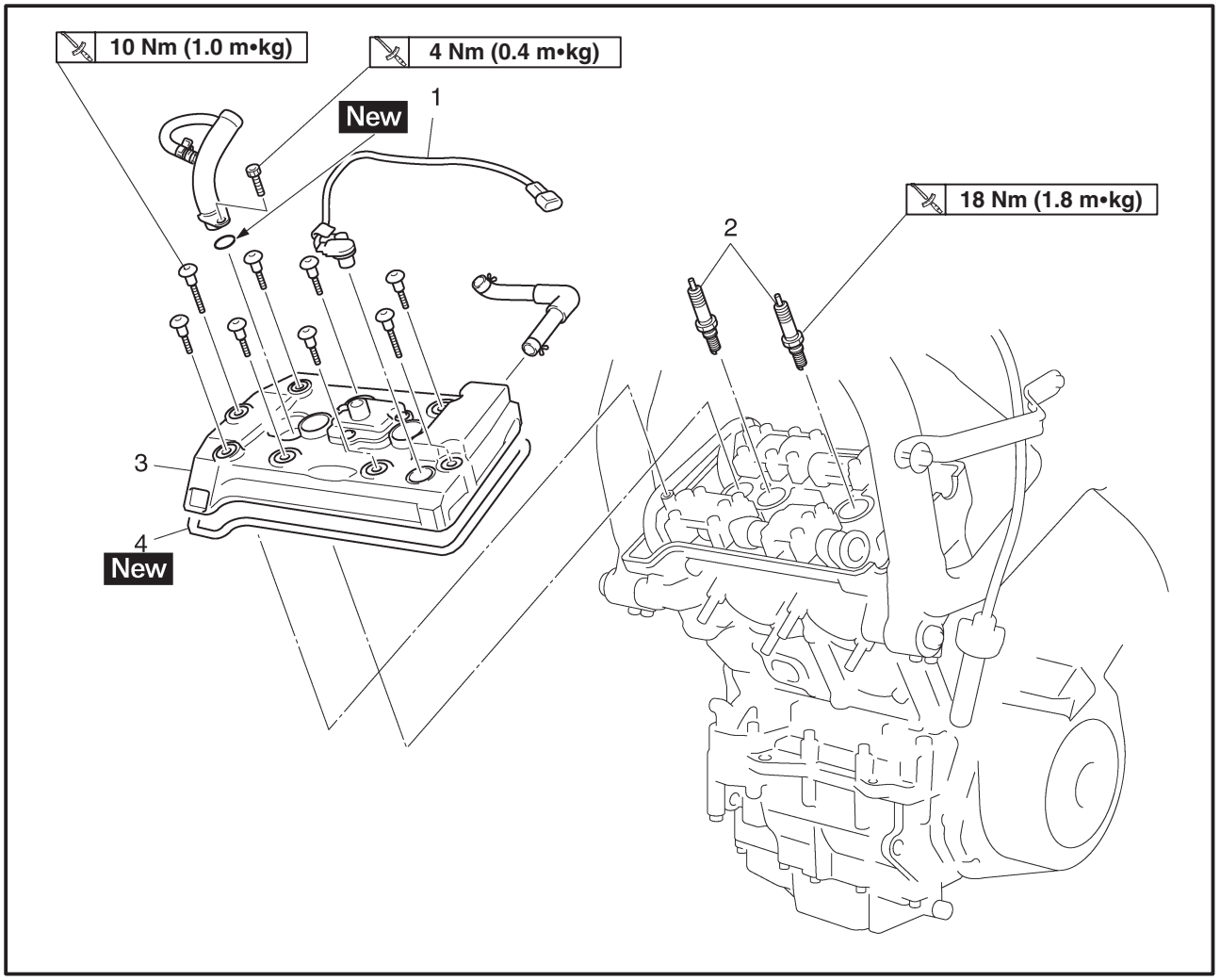
NOTE:

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

EAS00194

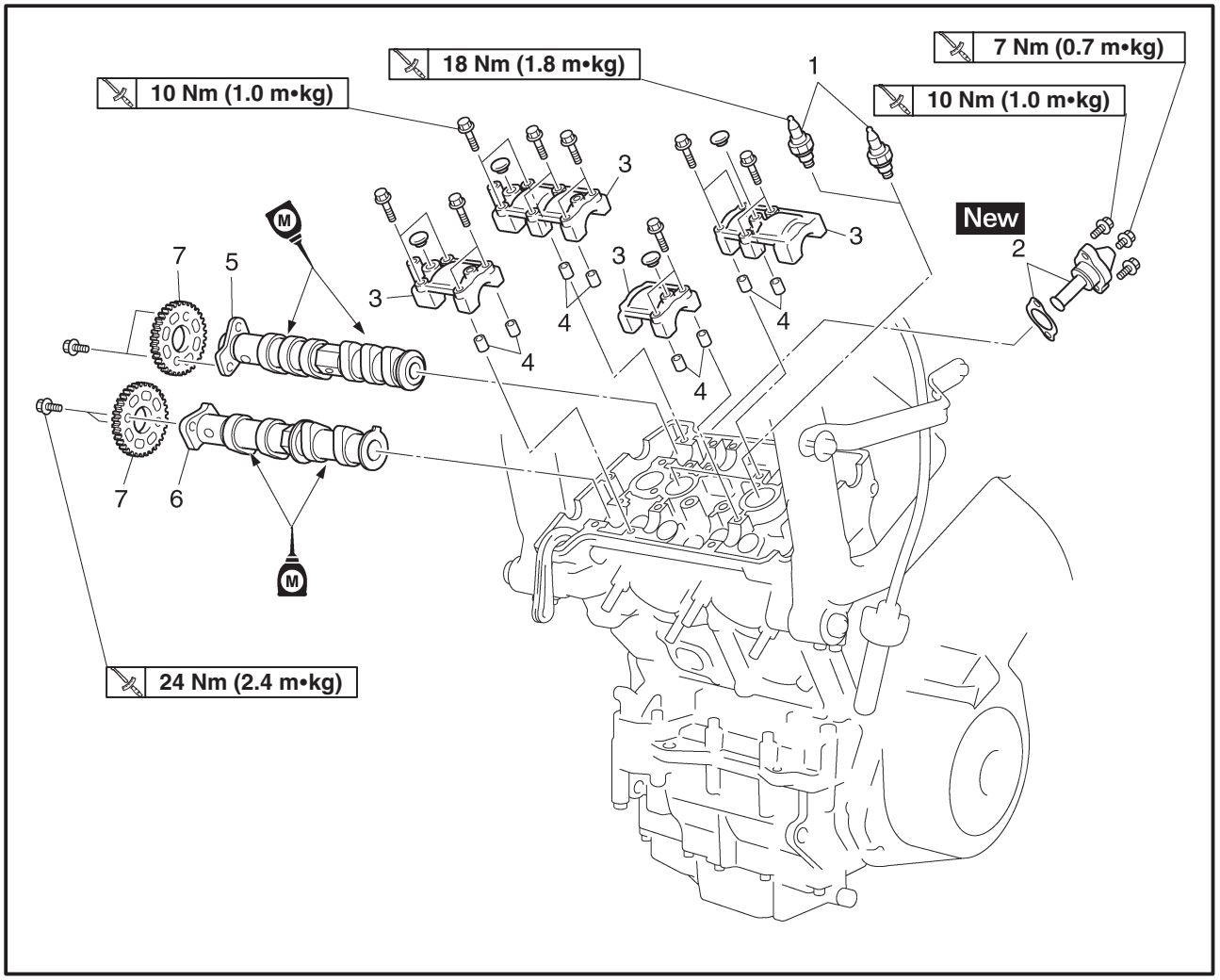
CAMSHAFT

CYLINDER HEAD COVER

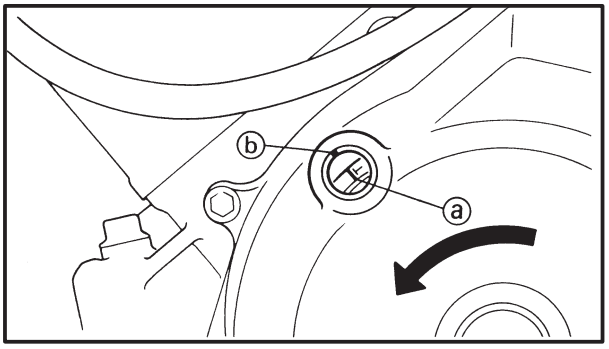


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head cover		Remove the parts in the order listed.
	Seat		Refer to "SEAT" in chapter 3.
	Side cowlings		Refer to "FRONT COWLINGS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
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

EAS00196
CAMSHAFTS



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



EAS00199

REMOVING THE CAMSHAFTS

1. Remove:
   - cylinder head cover
2. Align:
   - "T" mark on the generator rotor ⓐ (with the stationary pointer on the generator cover ⓑ)

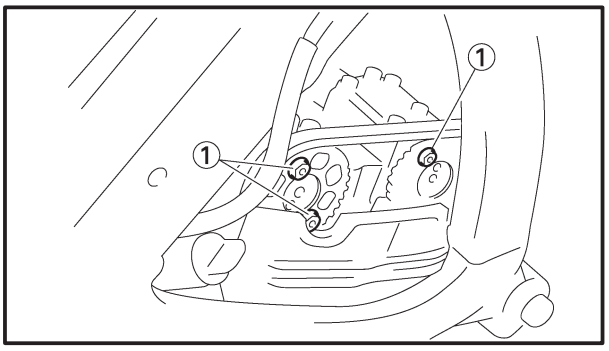
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a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the "T" mark ⓐ with the stationary pointer ⓑ on the generator rotor.

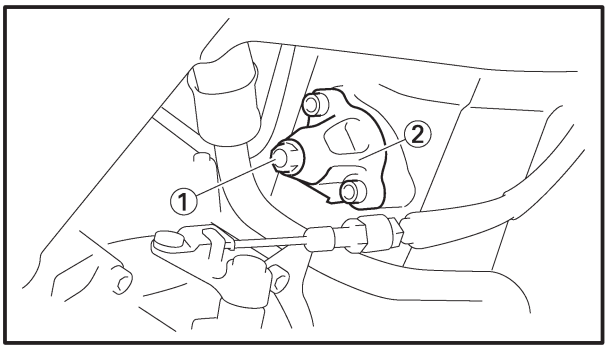
NOTE:

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

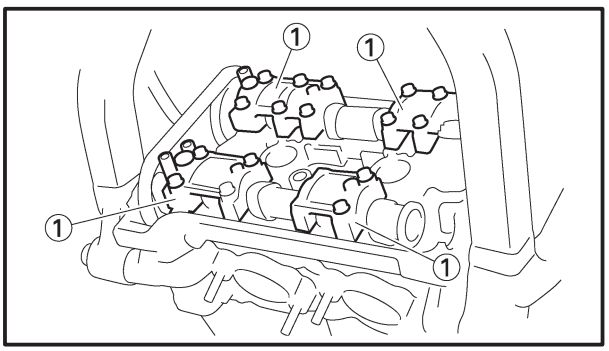
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3. Loosen:
   - camshaft sprocket bolts ①



4. Loosen:
   - cap bolt ①
5. Remove:
   - timing chain tensioner ②
   - gasket



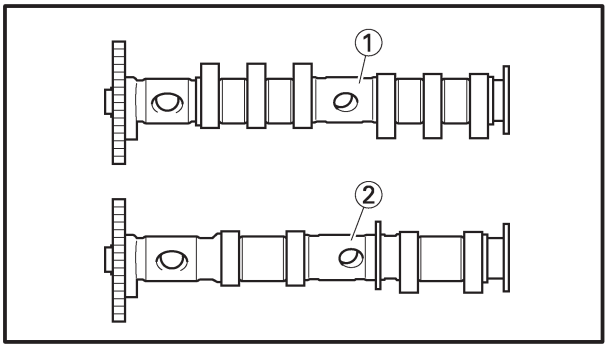
6. Remove:
   - camshaft caps ①
   - dowel pins

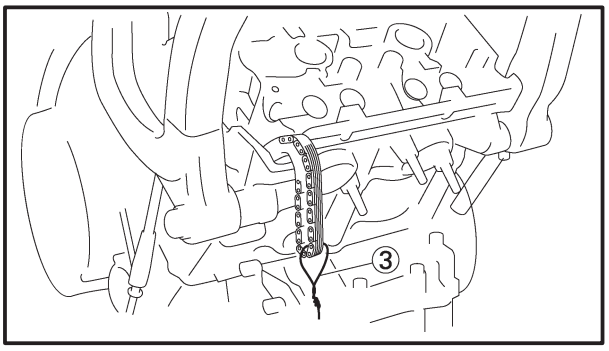
NOTE:

For reference during installation, put identification marks on each camshaft cap.

CAUTION:

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





7. Remove:
   - intake camshaft ①
   - exhaust camshaft ②
   - timing chain guide (exhaust side)

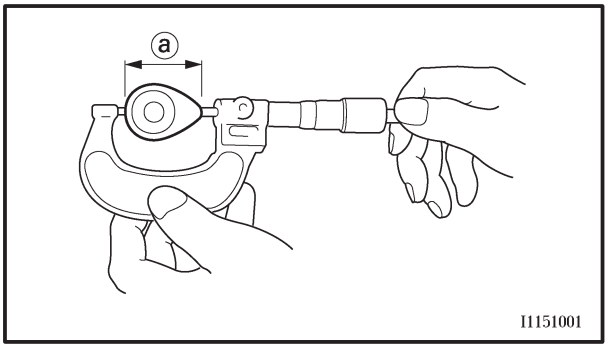
NOTE:

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

8. Remove:
   - camshaft sprocket

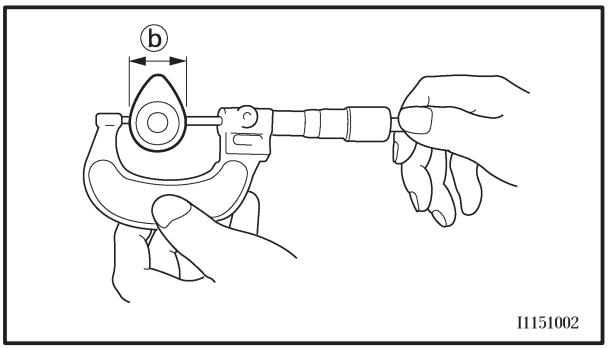
EAS00204
CHECKING THE CAMSHAFTS

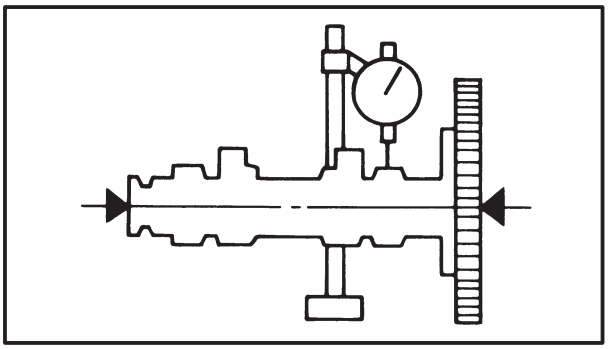
1. Check:
   • camshaft lobes
   Blue discoloration/pitting/scratches → Replace the camshaft.



2. Measure:
   • camshaft lobe dimensions ⓐ and ⓑ
   Out of specification → Replace the camshaft.

Camshaft lobe dimension limit
Intake camshaft
ⓐ 35.60 mm
ⓑ 27.85 mm
Exhaust camshaft
ⓐ 35.60 mm
ⓑ 27.85 mm



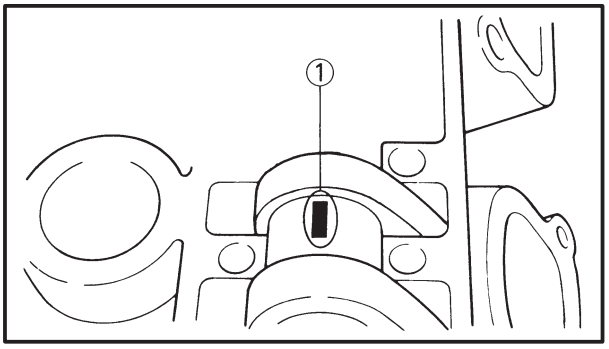


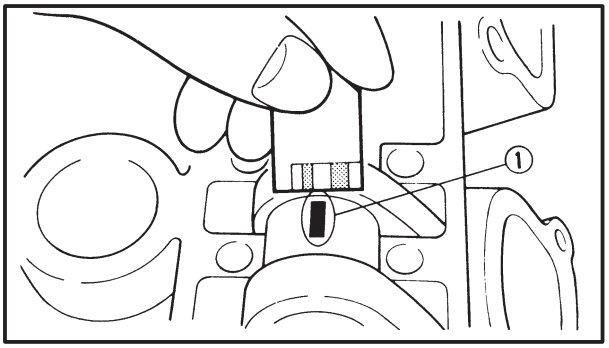
3. Measure:
   • camshaft runout
   Out of specification → Replace.

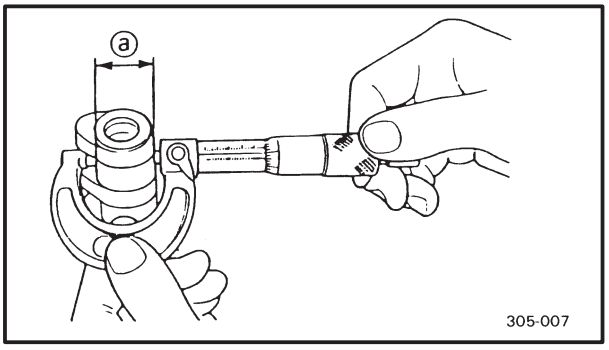
Camshaft runout limit
0.03 mm

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

Camshaft-journal-to-camshaft-cap clearance
0.020 ~ 0.054 mm
<Limit>: 0.08 mm







a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position strip of Plastigauge® ① onto the camshaft journal as shown.
c. Install the dowel pins and camshaft caps.

NOTE:

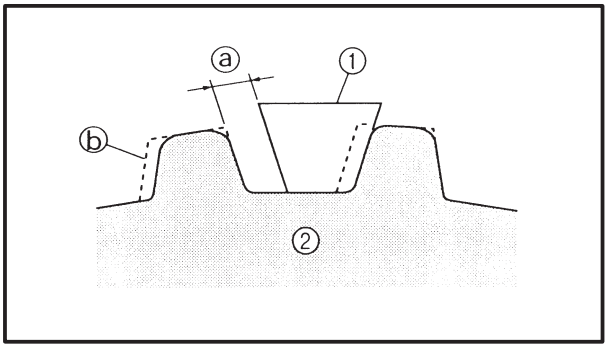
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

	Camshaft cap bolt **10 Nm (1.0 m•kg)**

d. Remove the camshaft caps and then measure the width of the Plastigauge® ①.

5. Measure:
   - camshaft journal diameter ⓐ
     Out of specification → Replace the camshaft.
     Within specification → Replace the cylinder head and the camshaft caps as a set.

	Camshaft journal diameter **24.967 ~ 24.980 mm**

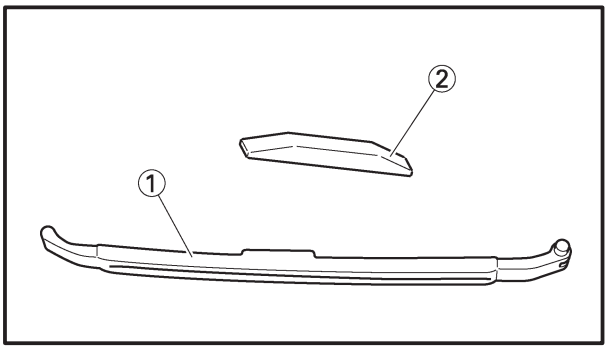


EAS00208
CHECKING CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

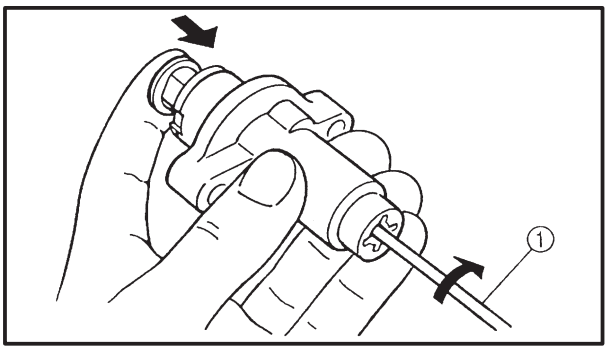
The following procedure applies to all of the camshaft sprockets and timing chain guides.

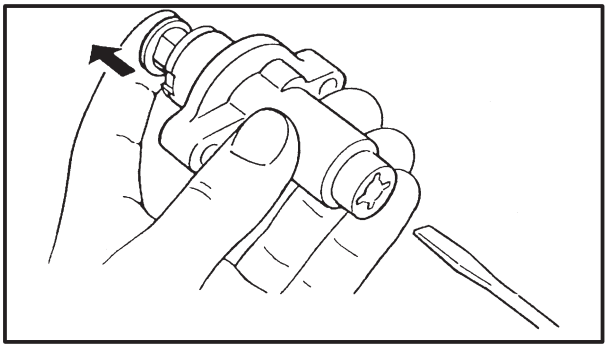
1. Check:
   - camshaft sprocket
     More than 1/4 tooth wear ⓐ → Replace the camshaft sprockets and the timing chain as a set.

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



2. Check:
   - timing chain guide ① (exhaust side)
   - timing chain guide ② (top side)
     Damage/wear → Replace the defective part(s).





EAS00210

CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     Cracks/damage → Replace.
2. Check:
   - one-way cam operation
     Rough movement → Replace the timing chain tensioner assembly.

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

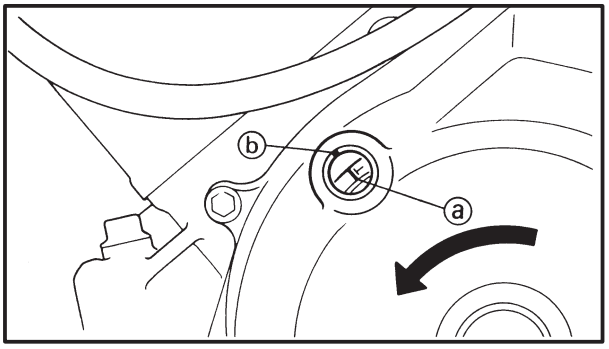
NOTE:

While pressing timing chain tensioner rod, wind it clockwise with a thin screw driver ① unitl it stops.

b. Remove the screwdriver and slowly release the timing chain tensioner rod.
c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

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



INSTALLING THE CAMSHAFTS

1. Align:
   - "T" mark on the generator rotor ⓐ (with the stationary pointer on the generator cover ⓑ)

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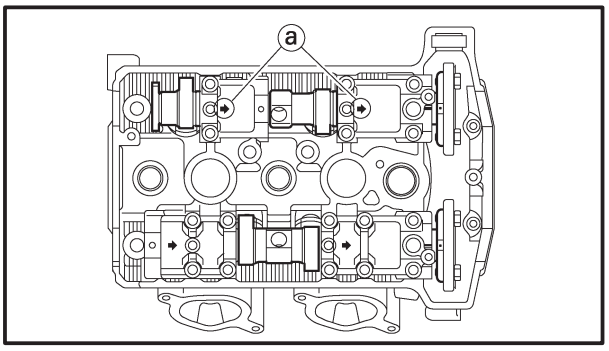
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC, align the "T" mark ⓐ with the stationary pointer ⓑ on the generator rotor.

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2. Install:
   - exhaust camshaft ①
     (with the camshaft sprocket temporarily tightened)

NOTE:

Make sure the punch mark on the camshaft face up.



3. Install:
   - dowel pins
   - exhaust camshaft caps

NOTE:

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

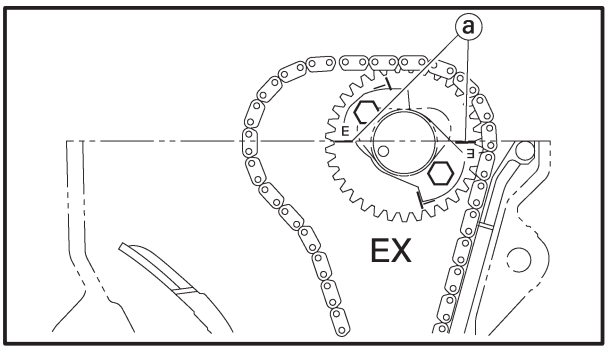
4. Install:
   - camshaft cap bolts **10 Nm (1.0 m•kg)**

NOTE:

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

CAUTION:

- **Lubricate the camshaft cap bolts with the engine oil.**
- **The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.**
- **Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.**



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

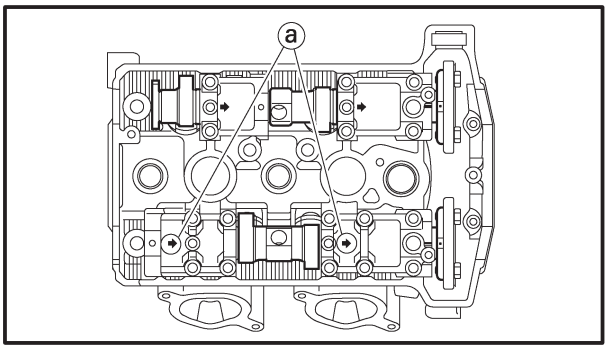
NOTE:

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

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

NOTE:

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



7. Install:
   • dowel pins
   • intake camshaft caps

NOTE:

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

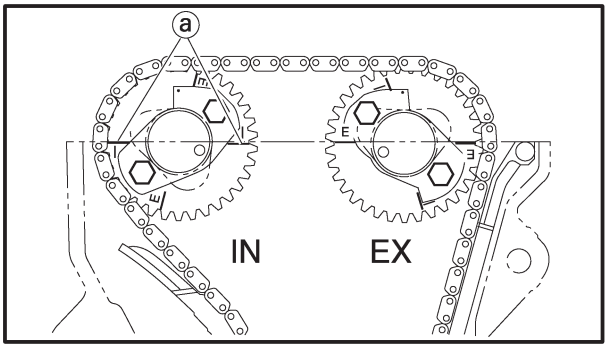
8. Install:
   • camshaft cap bolts — **10 Nm (1.0 m•kg)**

NOTE:

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

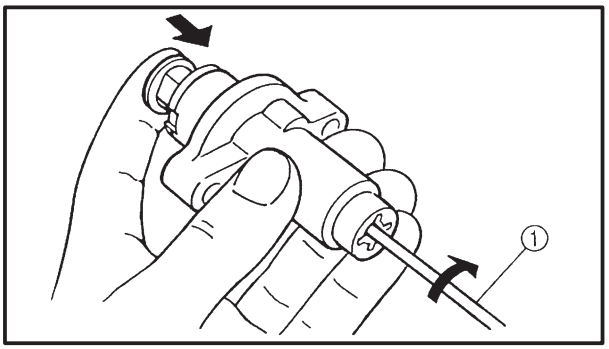
CAUTION:

- **Lubricate the camshaft cap botls with the engine oil.**
- **The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.**
- **Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.**



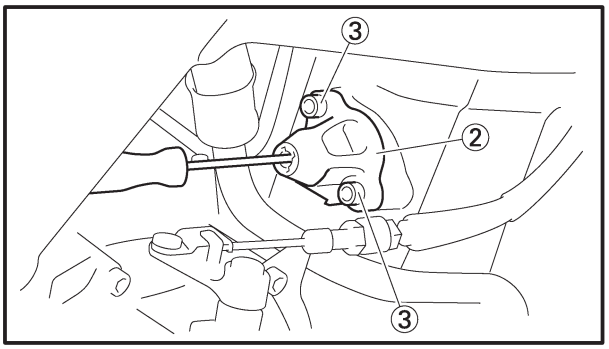
NOTE:

- Make sure the match marks ⓐ are parallel with the edge of the cylinder head.



9. Install:
   - timing chain tensioner

a. While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver ①.
b. With the timing chain tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the gasket and the timing chain tensioner ② onto the cylinder block.



⚠ WARNING

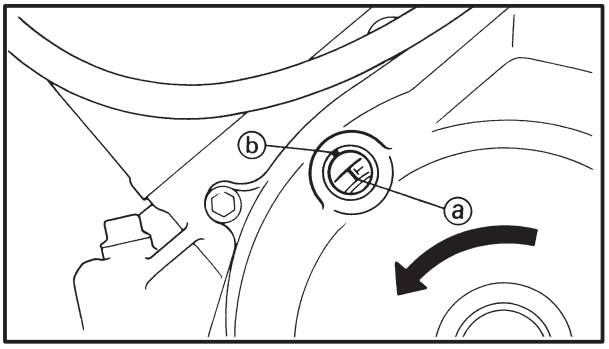
Always use a new gasket.

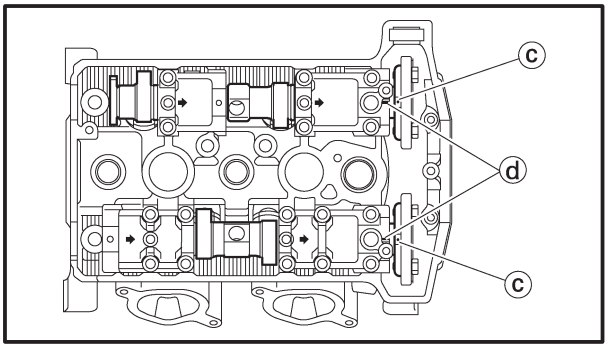
c. Tighten the timing chain tensioner bolts ③ to the specified torque.

	Timing chain tensioner bolt 10 Nm (1.0 m•kg)

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

	Cap bolt 7 Nm (0.7 m•kg)





10. Turn:
    • crankshaft
      (several full turns counterclockwise)
11. Check:
    • "T" mark ⓐ
      Make sure the "T" mark on the generator rotor is aligned with the stationary pointer ⓑ on the generator rotor cover.
    • camshaft punch mark ⓒ
      Make sure the punch marks on the camshafts are aligned with the embossed marks ⓓ on the camshaft cap.
      Out of alignment → Adjust.
      Refer to the installation steps above.
12. Tighten:
    • camshaft sprocket bolts ①

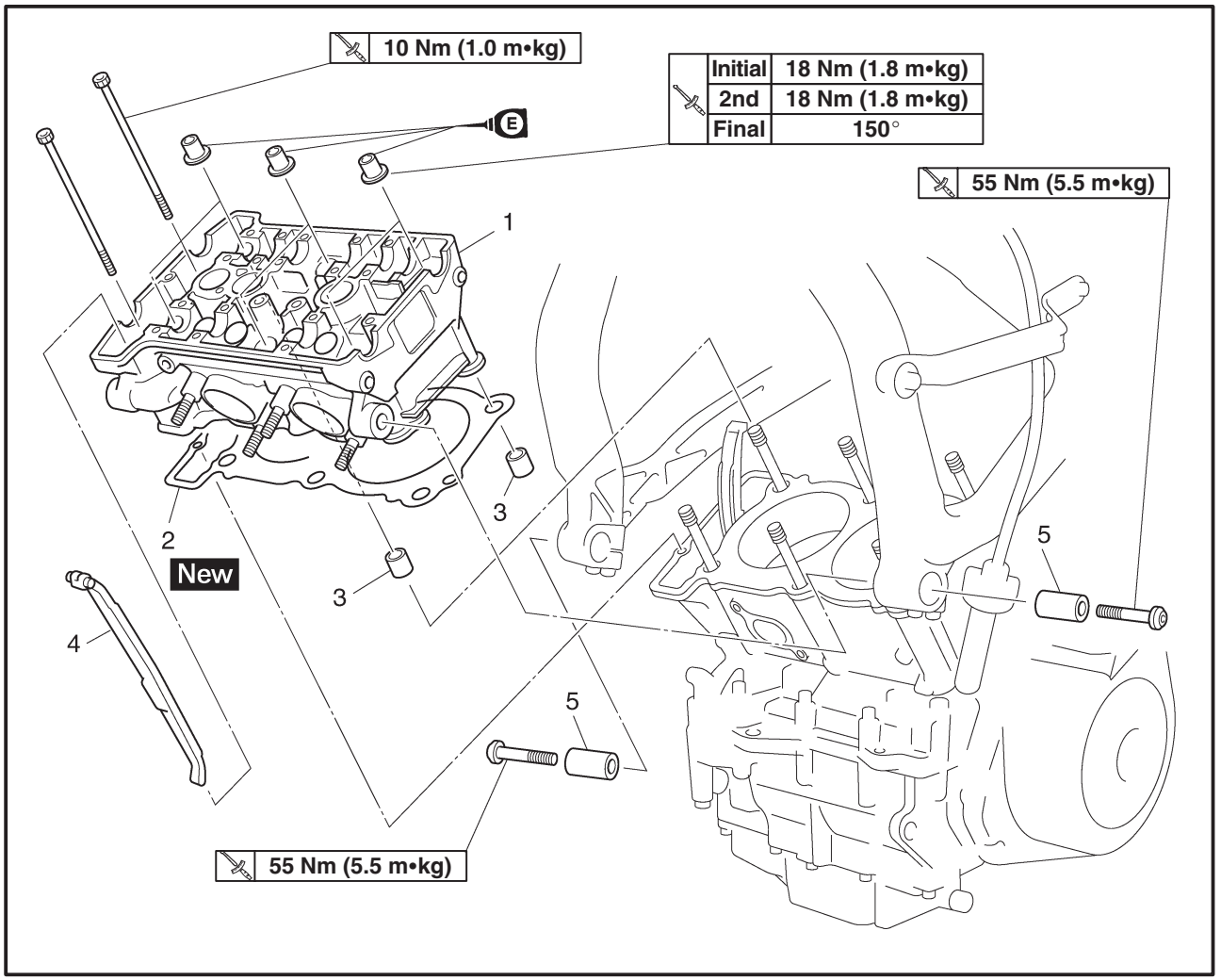
      24 Nm (2.4 m•kg)

CAUTION:

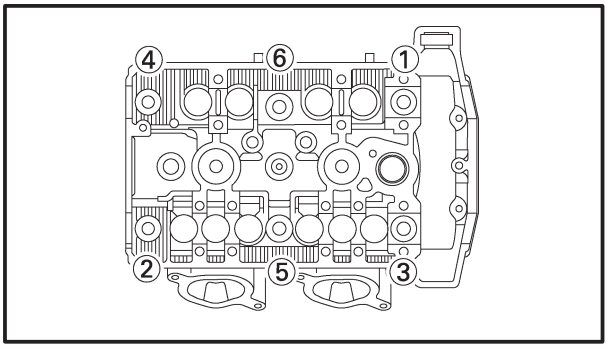
Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

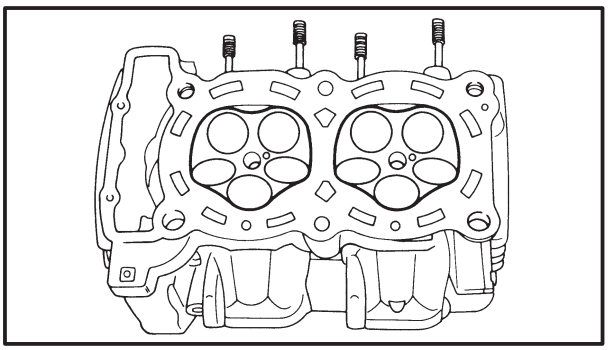
13. Measure:
    • valve clearance
      Out of specification → Adjust.
      Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

EAS00221
CYLINDER HEAD



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





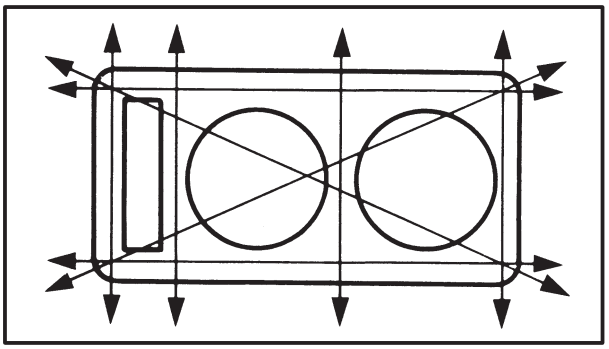
EAS00223
REMOVING THE CYLINDER HEAD
1. Remove:
   • cylinder head bolts
   • cylinder head nuts

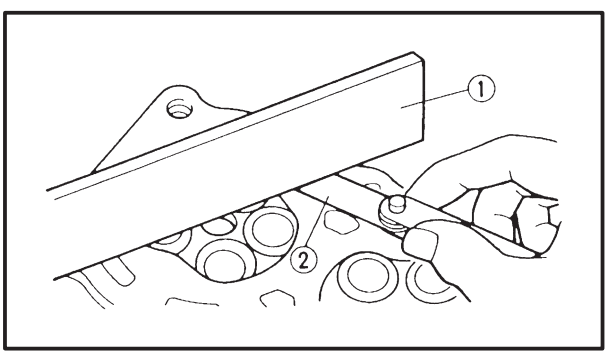
NOTE:
- Loosen the nuts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.

EAS00229
CHECKING THE CYLINDER HEAD
1. Eliminate:
   • combustion chamber carbon deposits (with a rounded scraper)

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

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

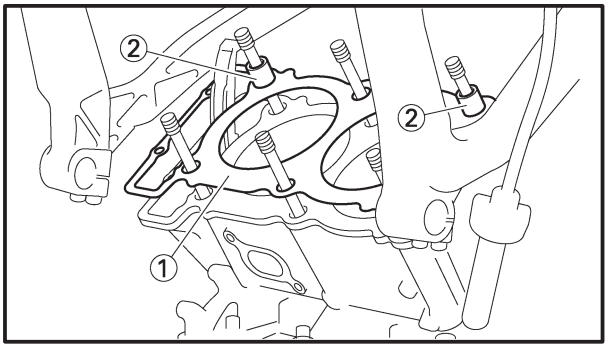


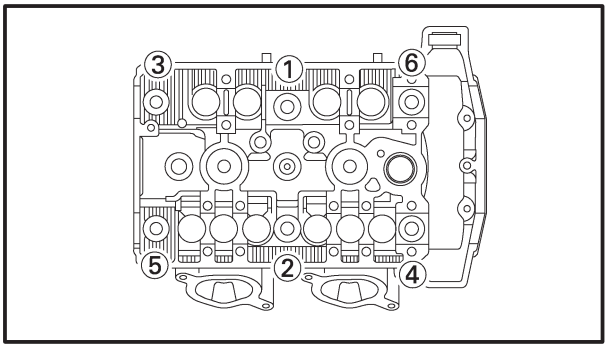


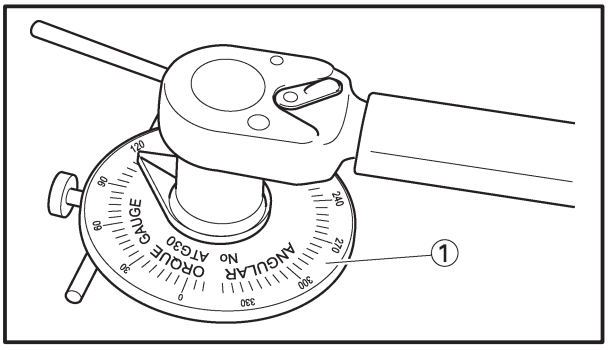
Maximum cylinder head warpage
Less than 0.10 mm

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

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







EAS00233

INSTALLING THE CYLINDER HEAD

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

NOTE:

Pass the timing chain through the timing chain cavity.

3. Tighten:
   - cylinder head nuts ① ~ ⑥

Initial	18 Nm (1.8 m•kg)
2nd	18 Nm (1.8 m•kg)
Final	150°

NOTE:

- Lubricate the cylinder head nuts and bolts with engine oil.

NOTE:

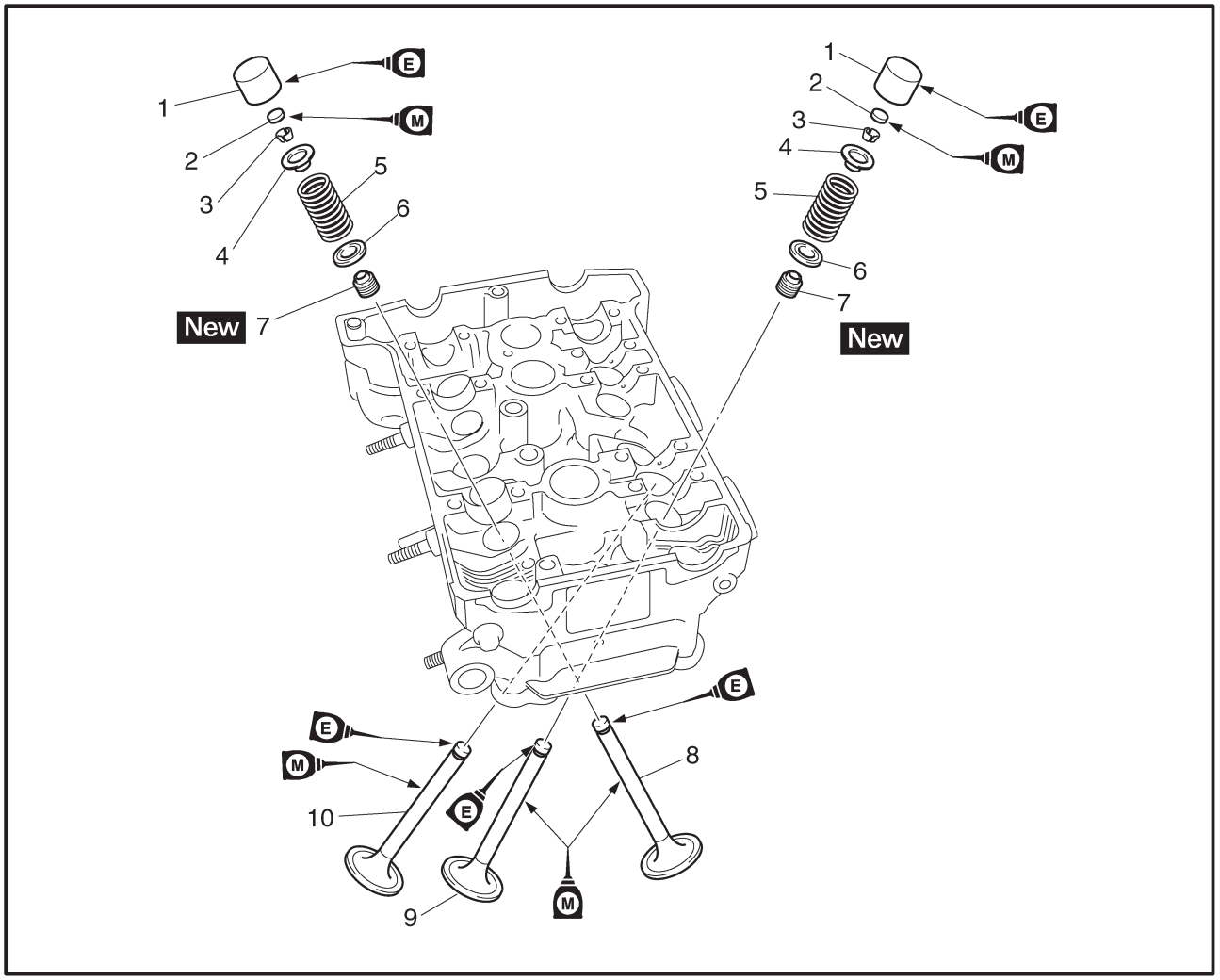
- First, tighten the nuts ① ~ ⑥ to 18 Nm (1.8 m•kg) with a torgue wrench.
- Loosen the nuts one by one following the tightening order and then thighten them to 18 Nm (1.8 m•kg) again.
- Retighten the nuts to 150° with angle torgue gauge.

CAUTION:

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

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

EAS00236
VALVES AND VALVE SPRINGS



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

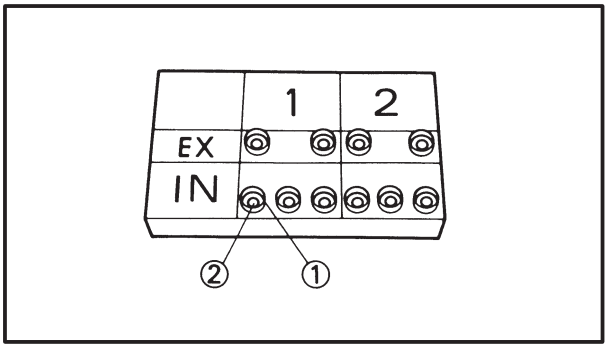
EAS00237

REMOVING THE VALVES

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

NOTE:

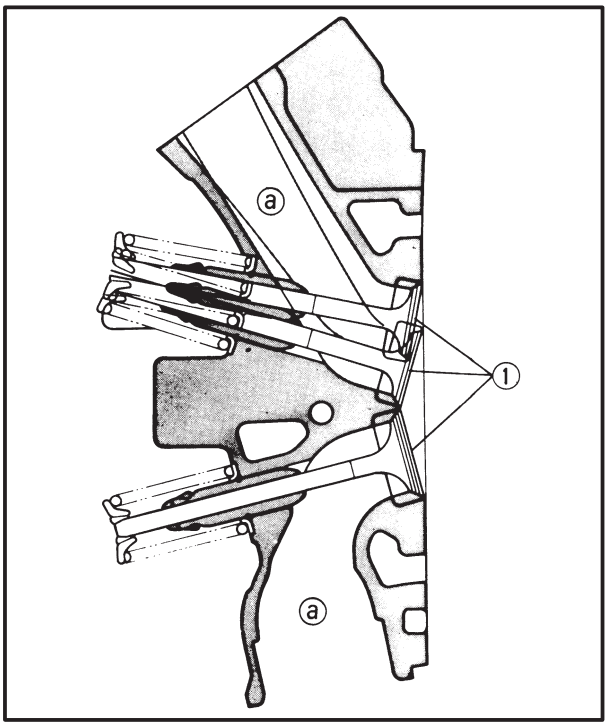
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.



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

NOTE:

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



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

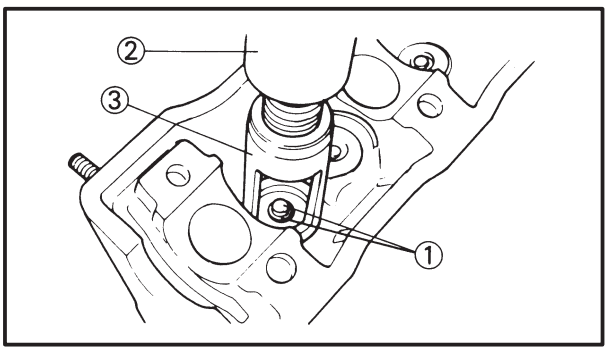
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a. Pour a clean solvent ⓐ into the intake and exhaust ports.
b. Check that the valves properly seal.

NOTE:

There should be no leakage at the valve seat ①.

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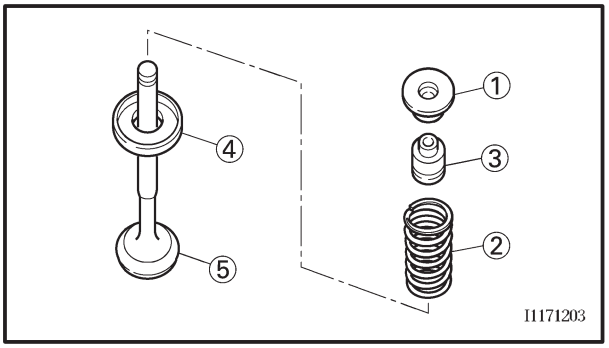


3. Remove:
   - valve cotters ①

NOTE:

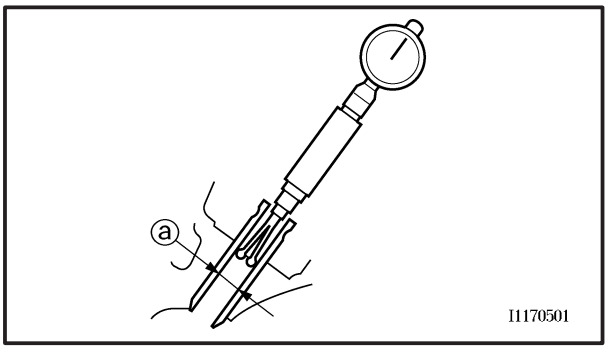
Remove the valve cotters by compressing the valve spring with the valve spring compressor ② and the valve spring compressor attachment ③.

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



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

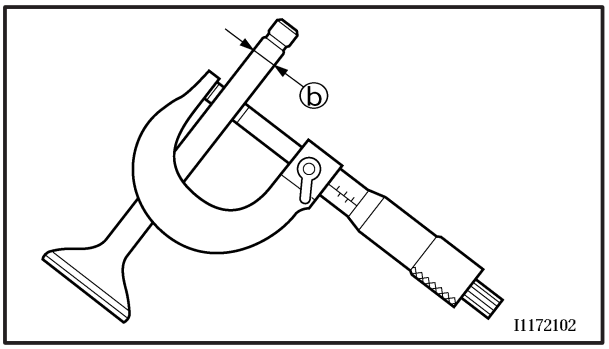
NOTE:
Identify the position of each part very carefully so that it can be reinstalled in its original place.



EAS00239
CHECKING THE VALVES AND VALVE GUIDES
The following procedure applies to all of the valves and valve guides.
1. Measure:
   - valve-stem-to-valve-guide clearance

Valve-stem-to-valve-guide clearance = Valve guide inside diameter ⓐ – Valve stem diameter ⓑ

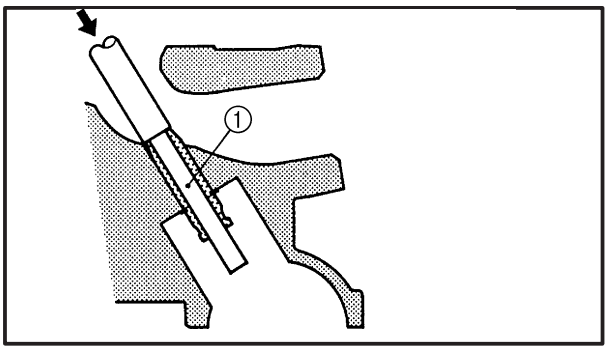
Out of specification → Replace the valve guide.

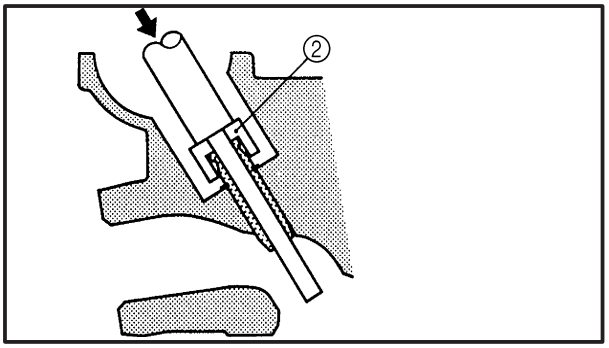


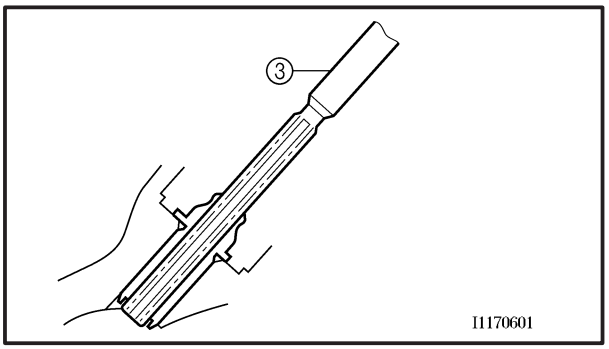
Valve-stem-to-valve-guide clearance
Intake
0.010 ~ 0.037 mm
<Limit>: 0.08 mm
Exhaust
0.025 ~ 0.052 mm
<Limit>: 0.1 mm

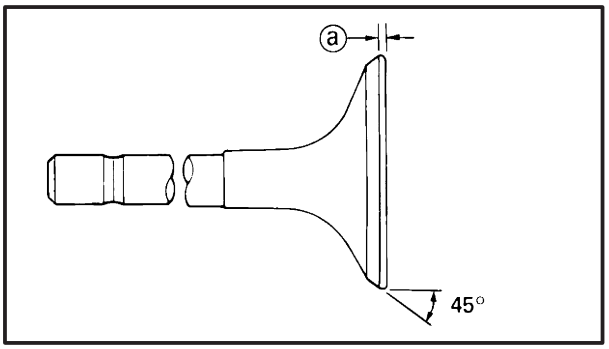
2. Replace:
   - valve guide

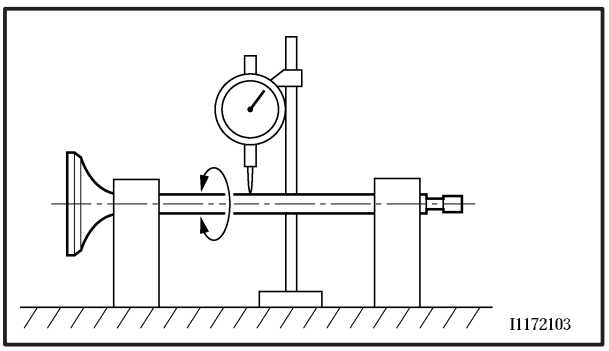
NOTE:
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100°C in an oven.











a. Remove the valve guide with the valve guide remover ①.
b. Install the new valve guide with the valve guide installer ② and valve guide remover ①.
c. After installing the valve guide, bore the valve guide with the valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

NOTE:

After replacing the valve guide, reface the valve seat.

Valve guide remover (5.5 mm)
90890-04016
Valve guide installer (5.5 mm)
90890-04015
Valve guide reamer (5.5 mm)
90890-01196

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.

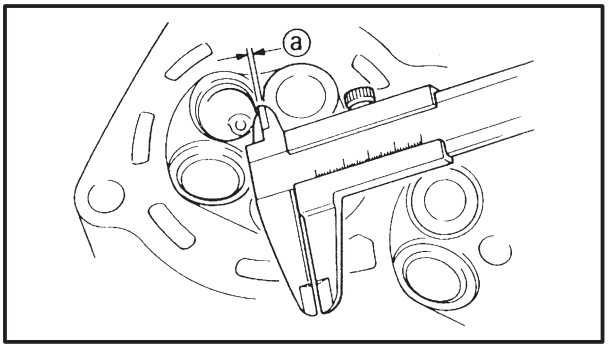
Valve margin thickness
0.8 ~ 1.2 mm

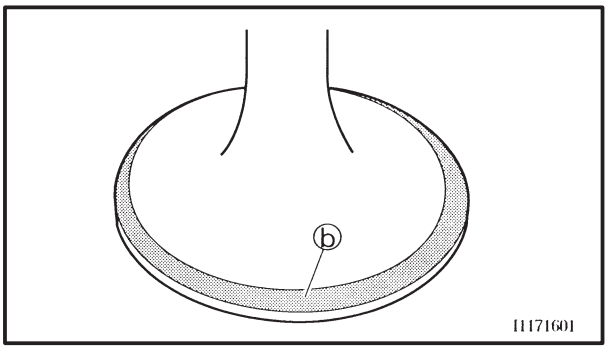
6. Measure:
   • valve stem runout
   Out of specification → Replace the valve.

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





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.
3. Measure:
   • valve seat width ⓐ
   Out of specification → Replace the cylinder head.

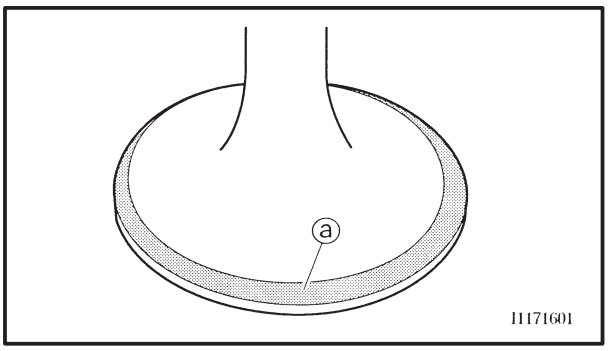
Valve seat width
Intake: 0.9 ~ 1.1 mm
<Limit>:1.6 mm
Exhaust: 0.9 ~ 1.1 mm
<Limit> 1.6 mm

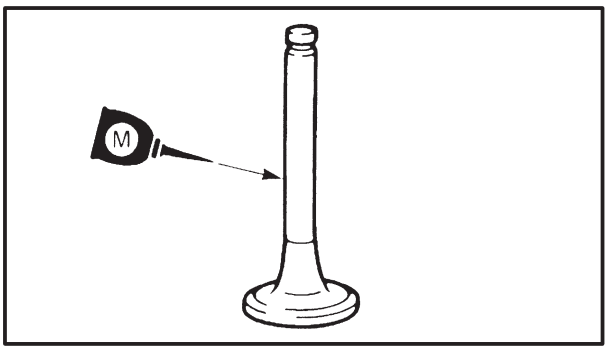
a. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

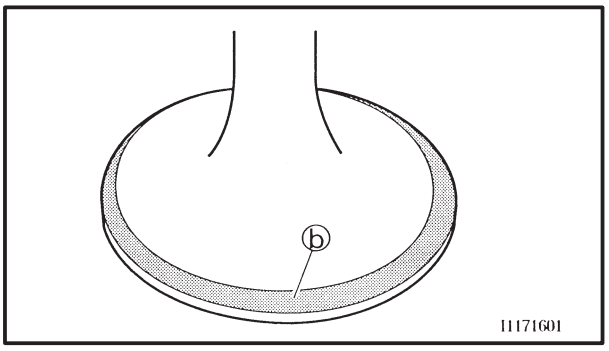
NOTE:
Where the valve seat and valve face contacted one another, the blueing will have been removed.

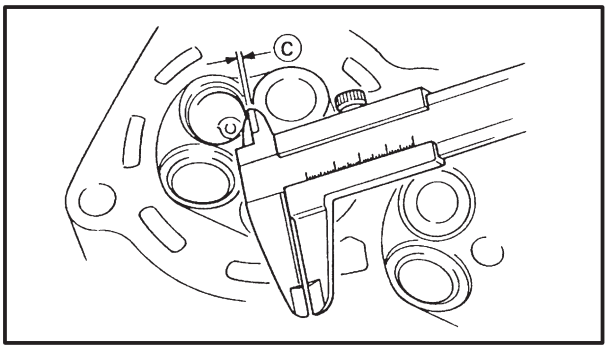
4. Lap:
   • valve face
   • valve seat

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









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

CAUTION:

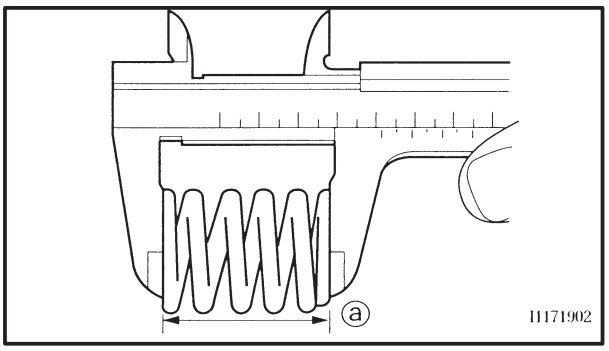
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

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

NOTE:

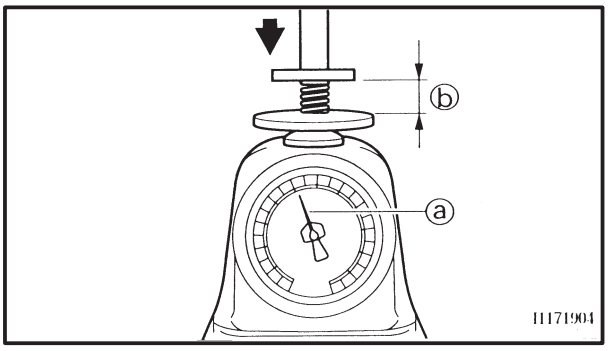
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

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) ⓑ 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 ⓐ
   Out of specification → Replace the valve spring.

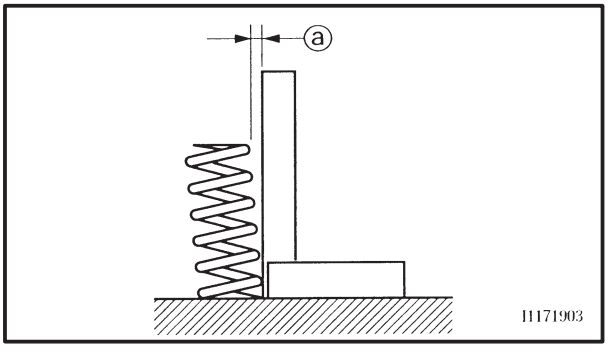
Valve spring free length
Intake and exhaust valve spring
37.3 mm
<Limit>:35.4 mm



2. Measure:
   • compressed valve spring force ⓐ
   Out of specification → Replace the valve spring.

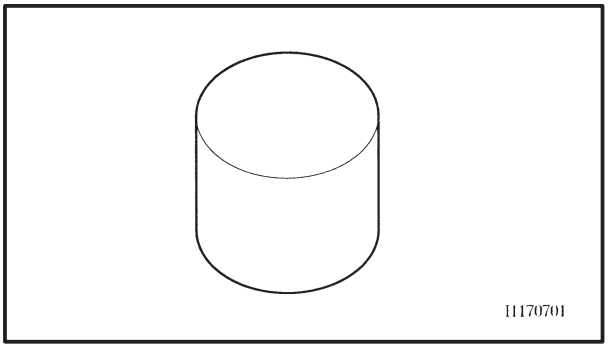
ⓑ Installed length

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

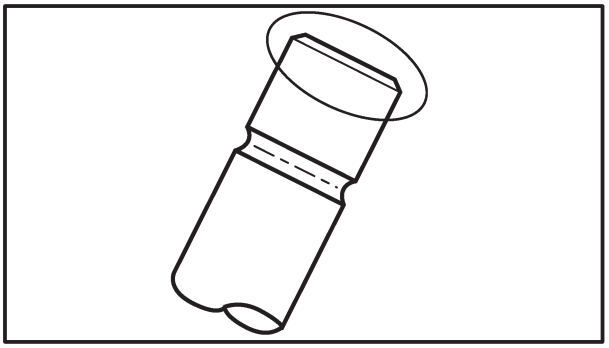


3. Measure:
   • valve spring tilt ⓐ
   Out of specification → Replace the valve spring.

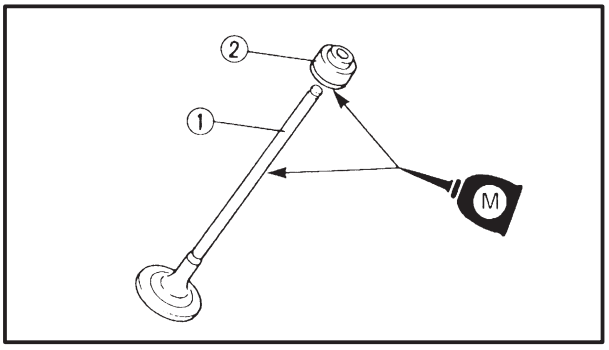
Spring tilt limit
Intake and exhaust valve spring
2.5°/1.7 mm



EAS00242
CHECKING THE VALVE LIFTERS
The following procedure applies to all of the valve lifters.
1. Check:
   • valve lifter
   Damage/scratches → Replace the valve lifters and cylinder head.

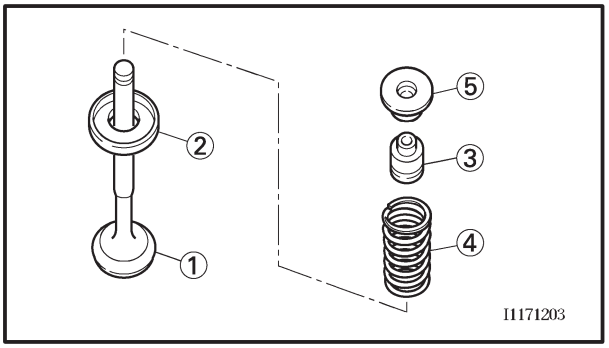


EAS00247
INSTALLING THE VALVES
The following procedure applies to all of the valves and related components.
1. Deburr:
   • valve stem end
   (with an oil stone)

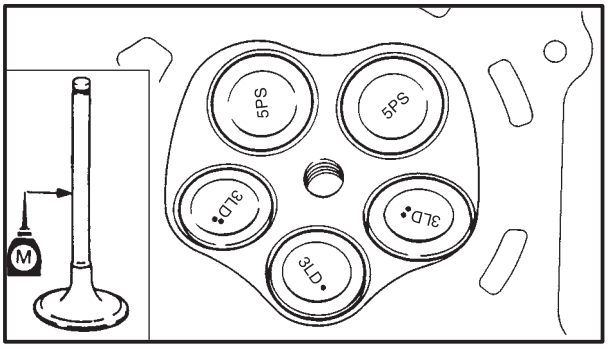


2. Lubricate:
   • valve stem ①
   • valve stem seal ②
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

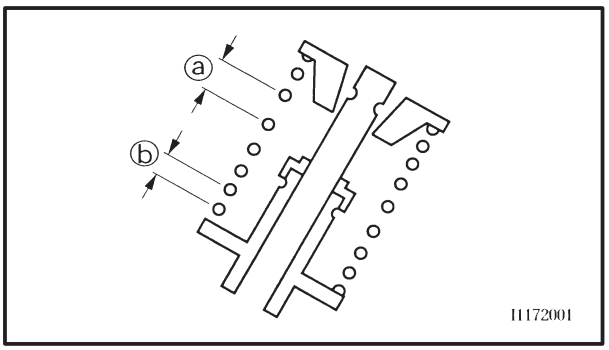


3. Install:
   • valve ①
   • lower spring seat ②
   • valve stem seal ③
   • valve spring ④
   • upper spring seat ⑤
   (into the cylinder head)

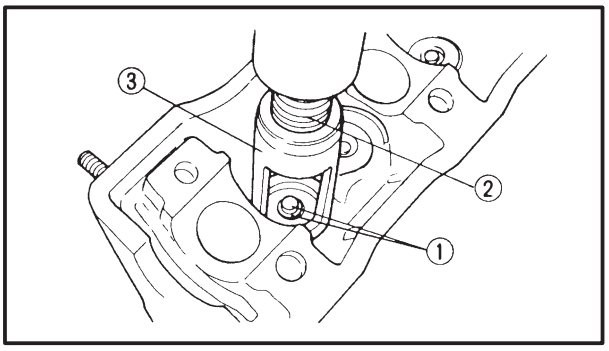


NOTE:

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



ⓑ Smaller pitch



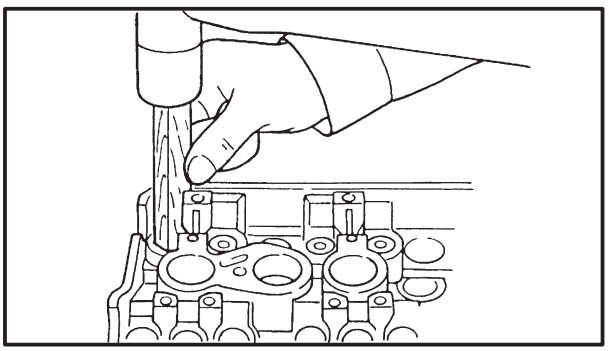
4. Install:
   - valve cotters ①

NOTE:

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



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



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

CAUTION:

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

6. Lubricate:
   • valve pad

	Recommended lubricant **Molybdenum disulfide oil**

   • valve lifter
   (with the recommended lubricant)

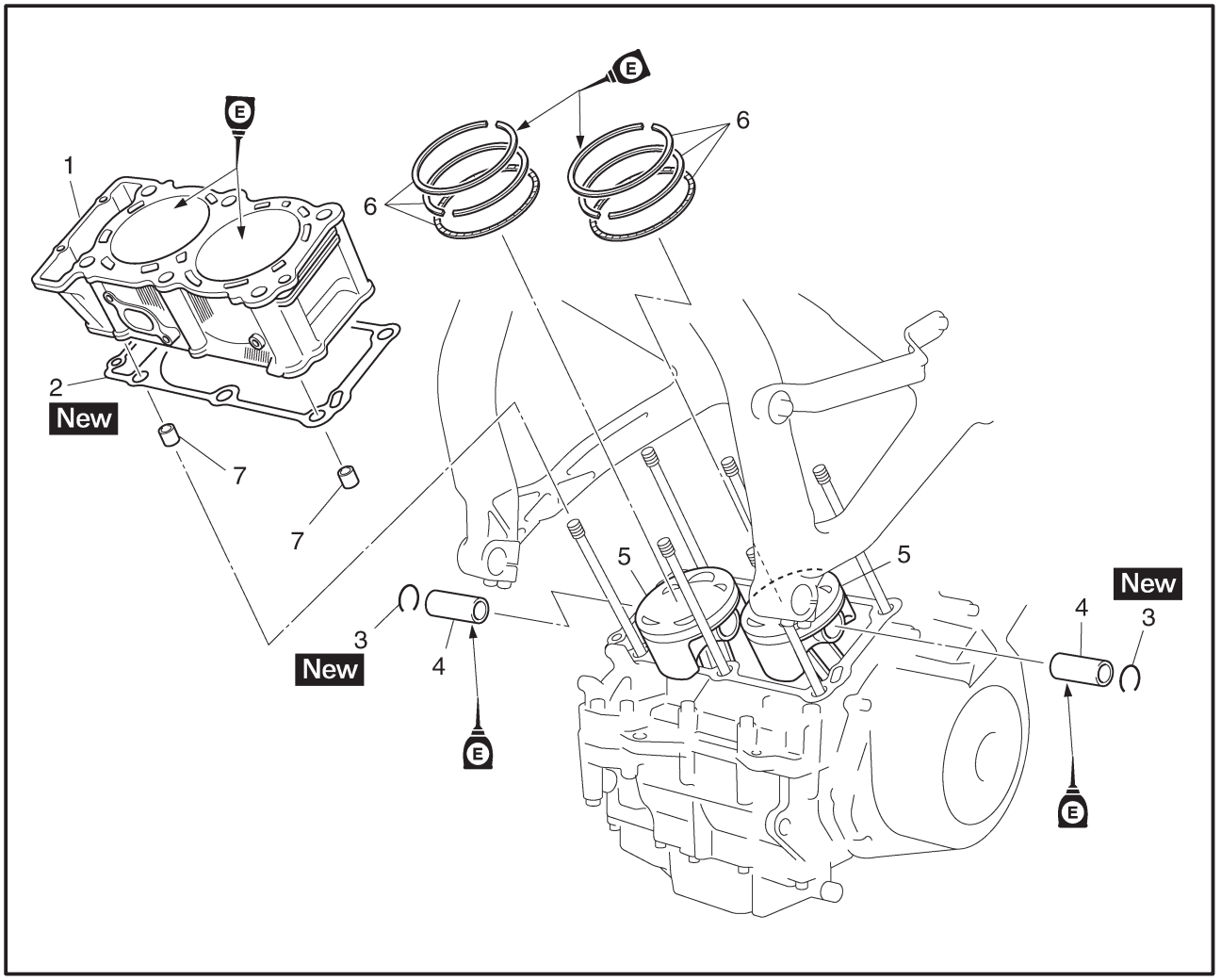
	Recommended lubricant **Engien oil**

7. Install:
   • valve pad
   • valve lifter

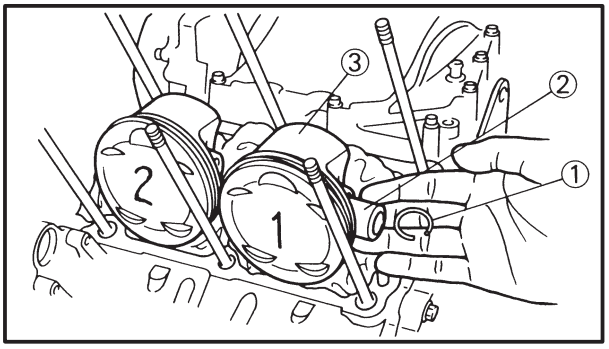
NOTE:

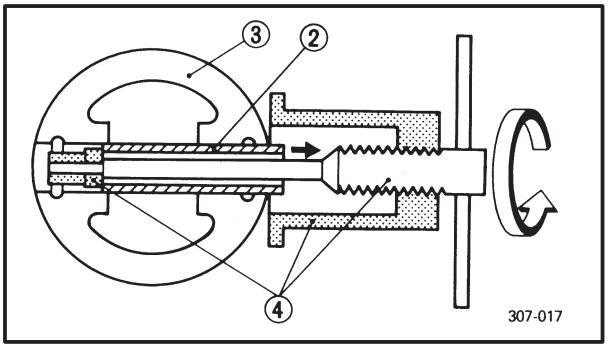
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

EAS00252
CYLINDER AND PISTONS



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





EAS00254

REMOVING THE CYLINDER AND PISTONS

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

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

CAUTION:

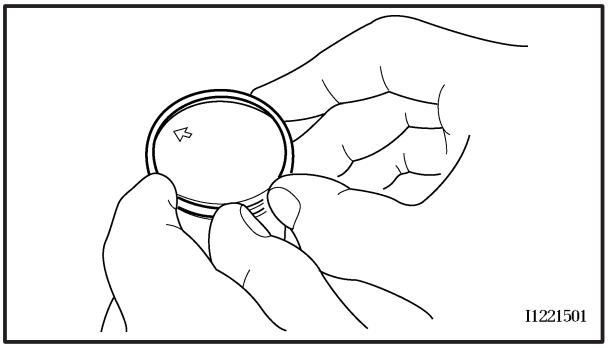
Do not use a hammer to drive the piston pin out.

NOTE:

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin ②, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set ④.



Piston pin puller set
90890-01304



2. Remove:
   - top ring
   - 2nd ring
   - oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

EA262

CHECKING THE CYLINDER AND PISTONS

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

1. Check:
   - piston wall
   - cylinder wall

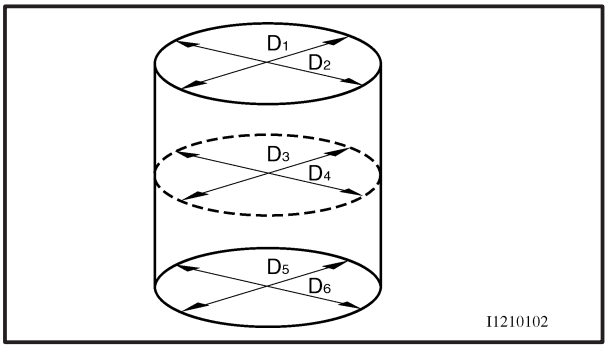
   Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - piston-to-cylinder clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

NOTE:

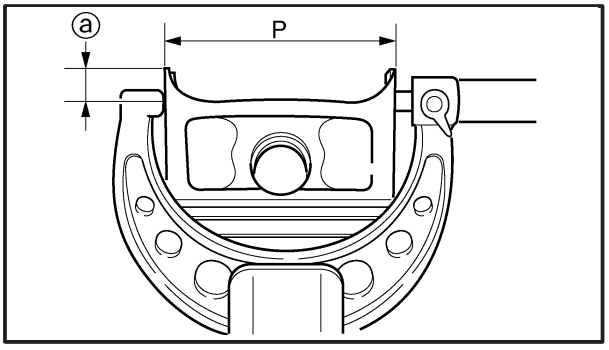
Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.



Cylinder bore "C"	**92.00 ~ 92.01 mm**
Taper limit "T"	**0.05 mm**
Out of round "R"	**0.05 mm**

"C" = maximum of D_1 ~ 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.

ⓐ 5 mm from the bottom edge of the piston

	Piston size "P"
Standard	**91.960 ~ 91.975 mm**

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

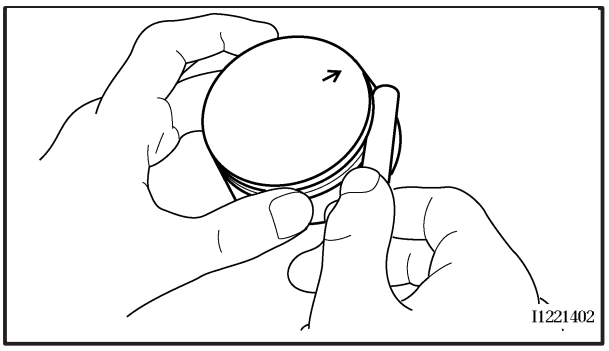
e. Calculate the piston-to-cylinder clearance with the following formula.

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



Piston-to-cylinder clearance
0.025 ~ 0.050 mm
<Limit>: 0.11 mm

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



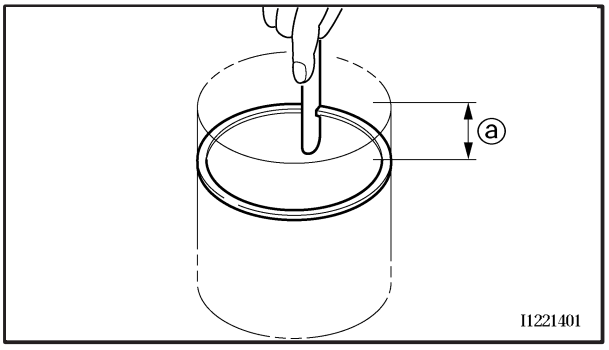
EAS00264
CHECKING THE PISTON RINGS

1. Measure:
   • piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

NOTE:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring side clearance
Top ring
0.03 ~ 0.07 mm
<Limit>: 0.12 mm
2nd ring
0.02 ~ 0.06 mm
<Limit>: 0.12 mm



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

NOTE:

Level the piston ring into the cylinder with the piston crown.

ⓐ 5 mm

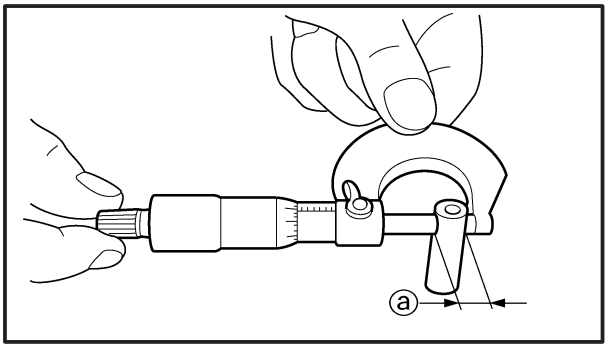
3. Measure:
   • piston ring end gap
   Out of specification → Replace the piston ring.

NOTE:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

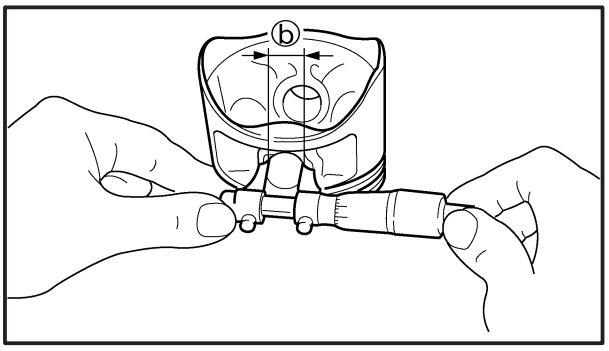
Piston ring end gap
Top ring
0.02 ~ 0.35 mm
<Limit>: 0.6 mm
2nd ring
0.40 ~ 0.55 mm
<Limit>: 0.9 mm
Oil ring
0.20 ~ 0.50 mm

EAS00266
CHECKING THE PISTON PINS
The following procedure applies to all of the piston pins.
1. Check:
   • piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.



2. Measure:
   • piston pin outside diameter ⓐ
   Out of specification → Replace the piston pin.

Piston pin outside diameter
20.991 ~ 21.000 mm
<Limit>: 20.971 mm



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

Piston pin bore diameter (in the piston)
21.004 ~ 21.015 mm
<Limit>: 21.045 mm

4. Calculate:
   • piston-pin-to-piston-pin-bore clearance
   Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston clearance =
Piston pin bore diameter ⓑ –
Piston pin outside diameter ⓐ

Piston-pin-to-piston clearance
0.004 ~ 0.024 mm
<Limit>: 0.074 mm

EAS00272

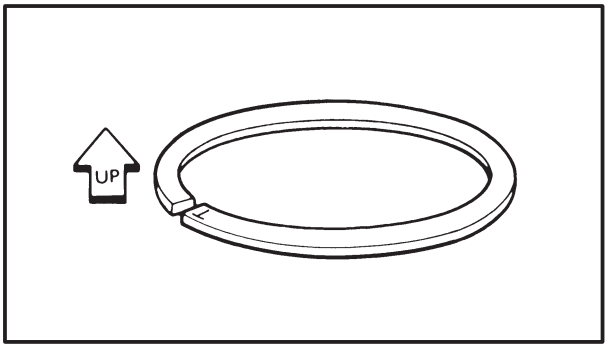
INSTALLING THE PISTONS AND CYLINDER

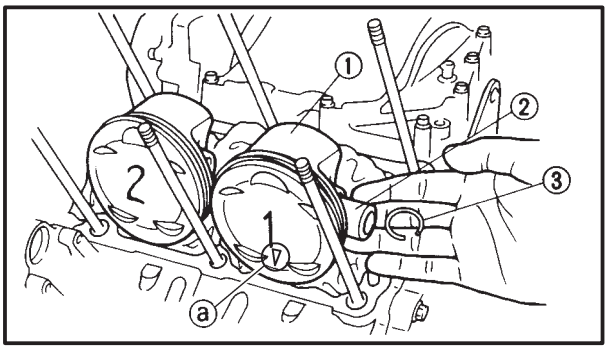
The following procedure applies to all of the pistons and cylinders.

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

NOTE:

Be sure to install the piston rings so that the manufacturer's marks or numbers face up.





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

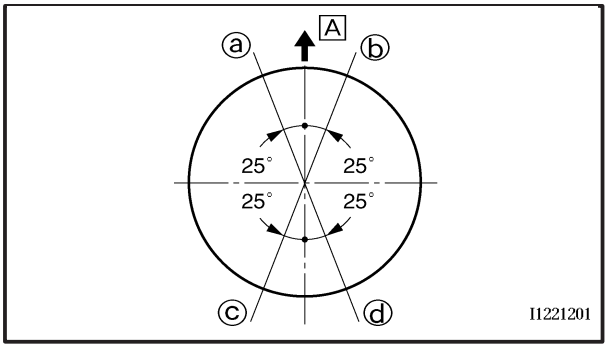
NOTE:

- Apply engine oil onto the piston pin.
- Make sure the "arrow" mark ⓐ on the piston faces towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #2).

3. Install:
   - gasket New
   - dowel pins
4. Lubricate:
   - piston
   - piston rings
   - cylinder

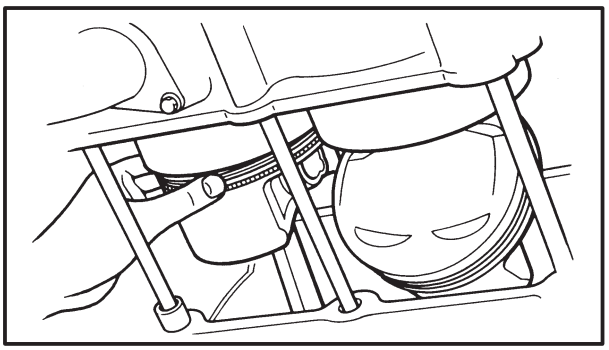
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**



5. Offset:
   • piston ring end gaps

ⓐ Top ring
ⓑ Lower oil ring rail
ⓒ Upper oil ring rail
ⓓ 2nd ring
A Intake side



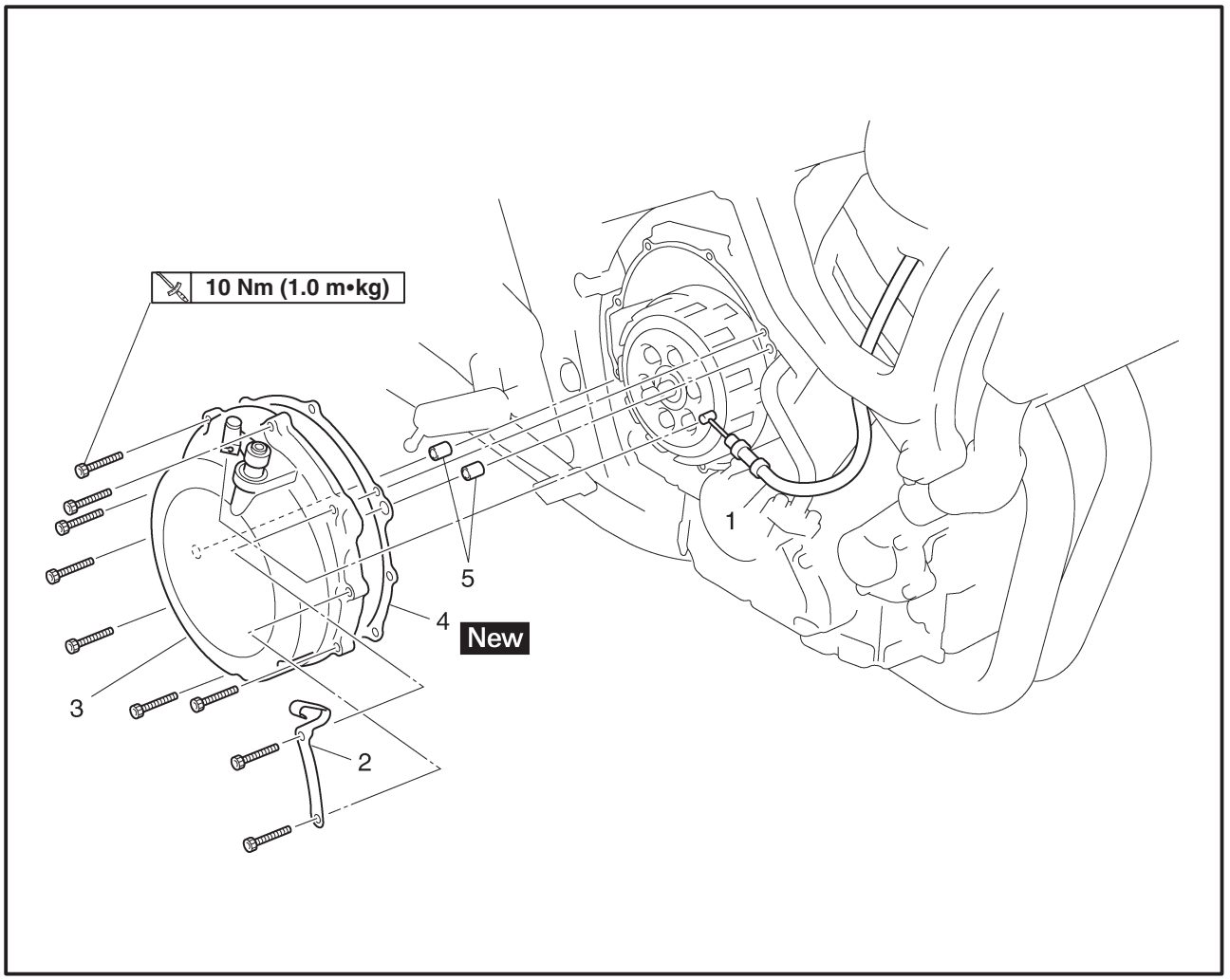
6. Install:
   • cylinder

NOTE:

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

EAS00273

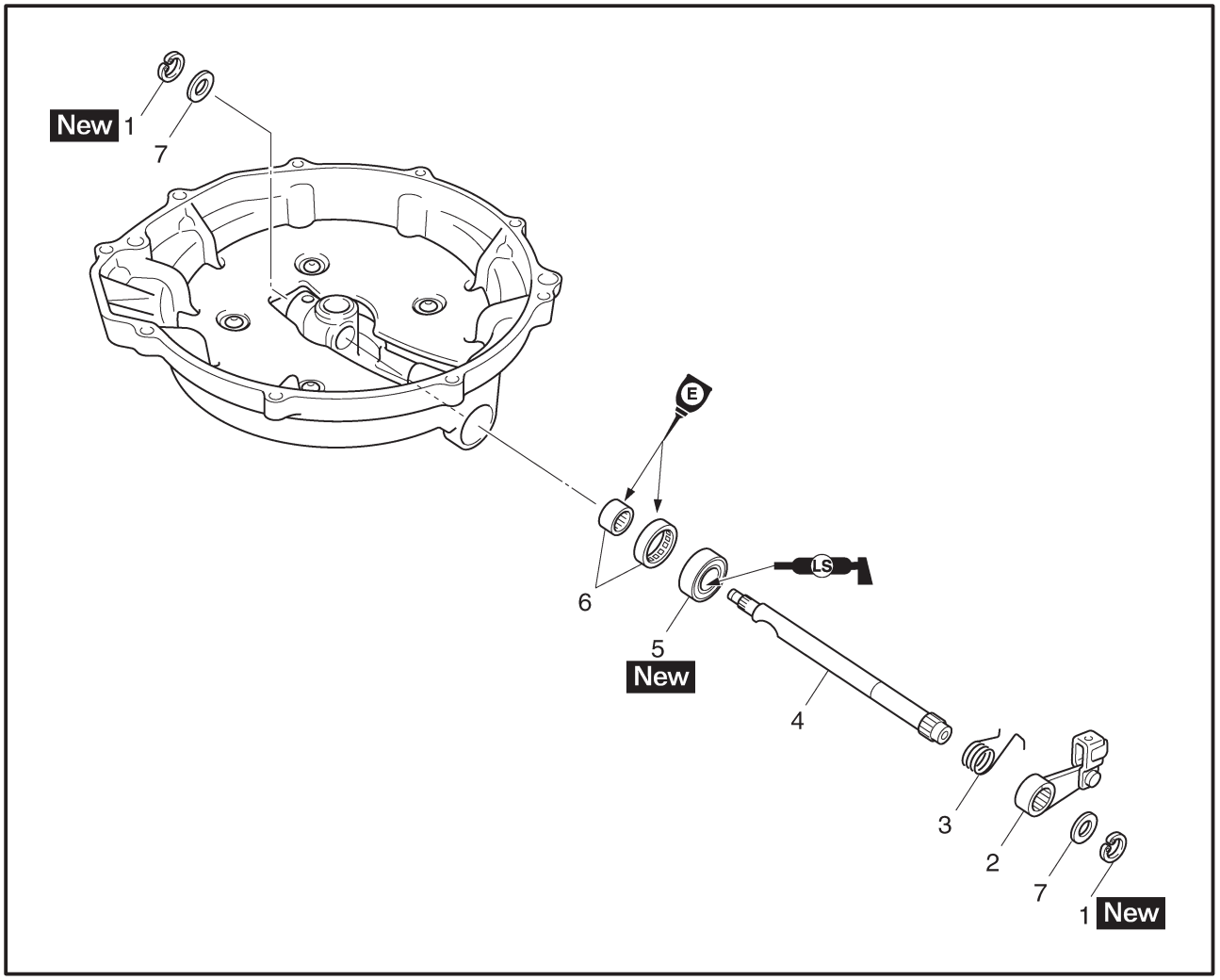
CLUTCH
CLUTCH COVER



Order	Job/Part	Q'ty	Remarks
	Removing the clutch cover Engine oil		Remove the parts in the order listed. Drain Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	
2	Clutch cable stay	1	
3	Clutch cover	1	**NOTE:** Loosen the bolts in a crisscross pattern.
4	Gascket	1	
5	Dowel pin	2	
			For installation, reverse the removal procedure.

EB405010

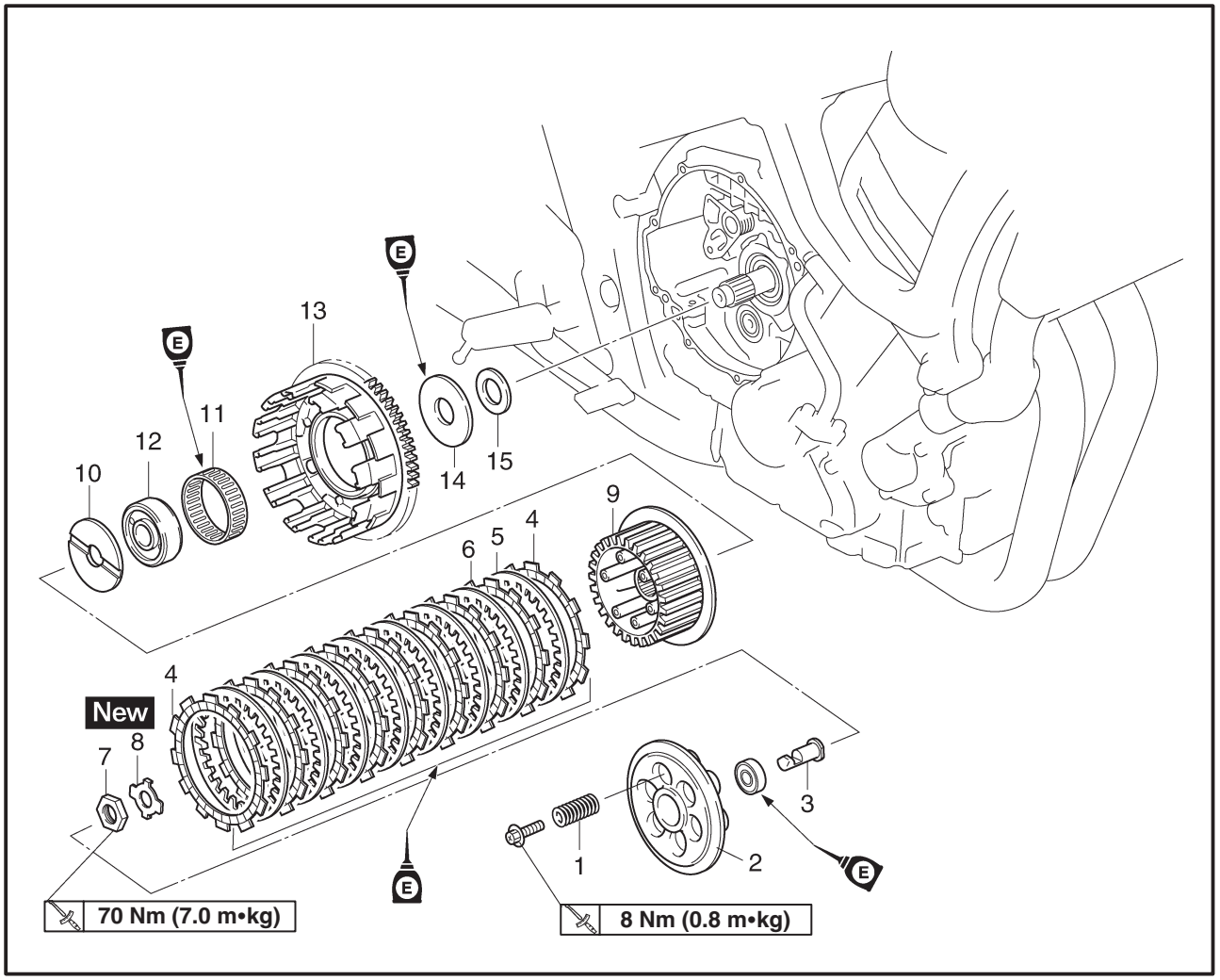
PULL LEVER SHAFT



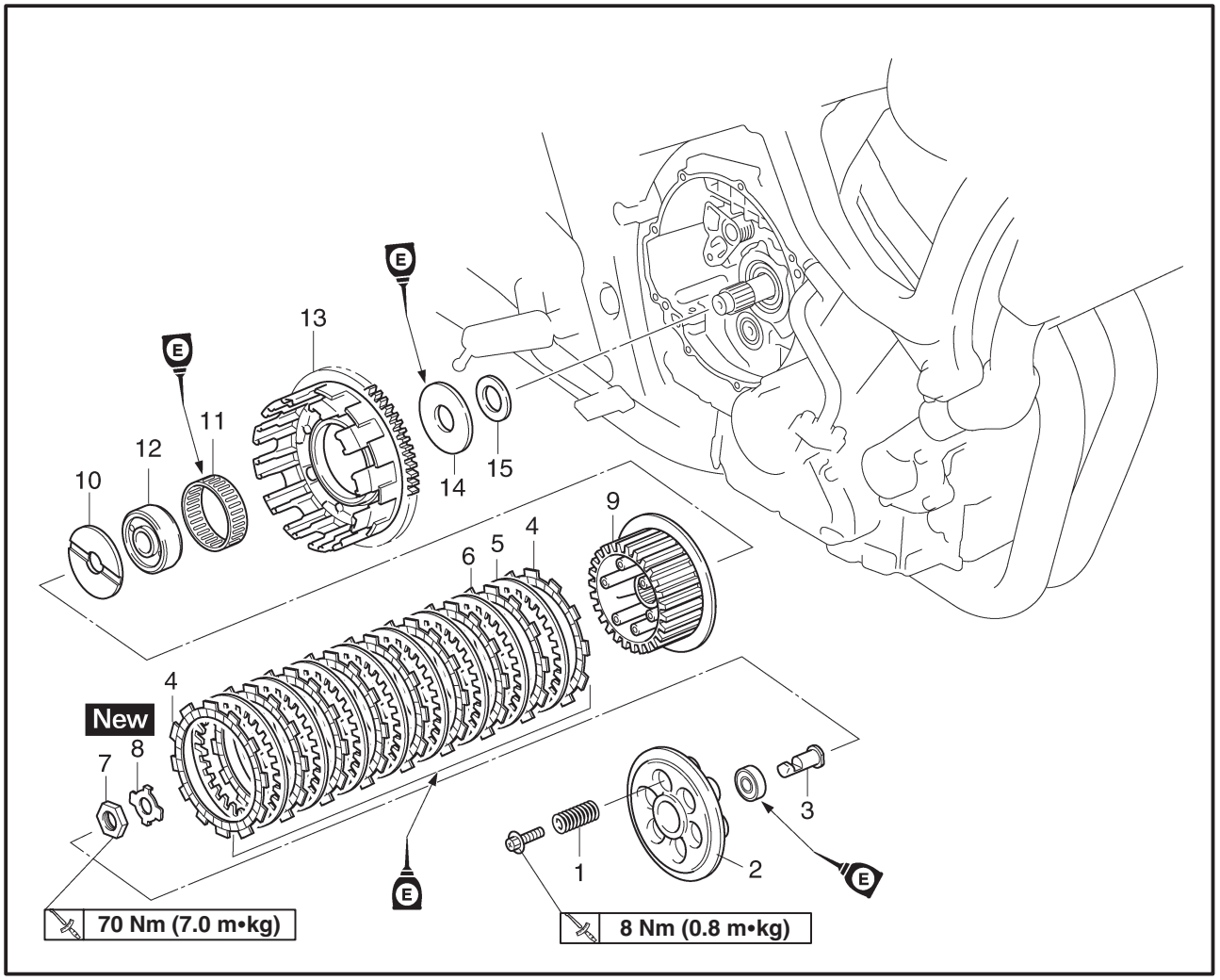
Order	Job/Part	Q'ty	Remarks
	Removing the pull lever shaft		Remove the parts in the order listed.
1	Circlip	2	
2	Pull lever	1	
3	Pull lever spring	1	
4	Pull lever shaft	1	
5	Oil seal	1	
6	Bearing	2	
7	Washer	2	
			For installation, reverse the removal procedure.

EAS00274

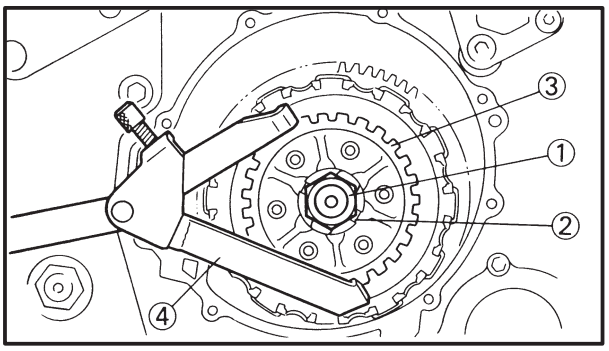
CLUTCH



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



Order	Job/Part	Q'ty	Remarks
14	Thrust plate 1	1	
15	Thrust plate 2	1	
			For installation, reverse the removal procedure.



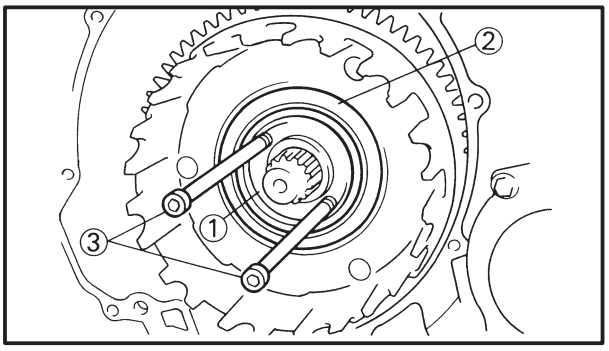
EAS00275
REMOVING THE CLUTCH
1. Straighten the lock washer tab.
2. Loosen:
   • clutch boss nut ①

NOTE:

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

Universal clutch holder
90890-04086

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



4. Remove:
   • spacer ①
   • bearing ②

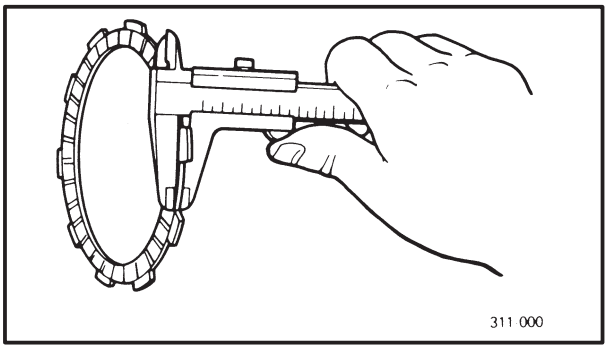
NOTE:

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

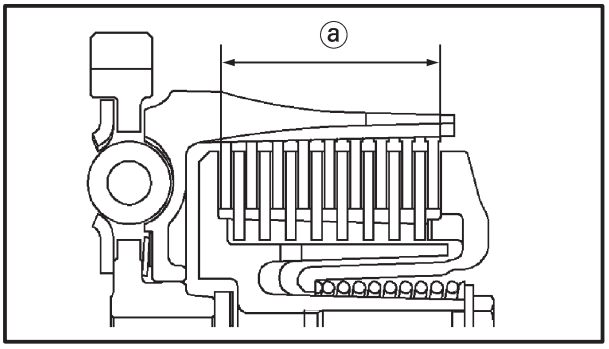
EAS00280
CHECKING THE FRICTION PLATES
The following procedure applies to all of the friction plates.
1. Check:
   • friction plate
   Damage/wear → Replace the friction plates as a set.
2. Measure:
   • friction plate thickness
   Out of specification → Replace the friction plates as a set.

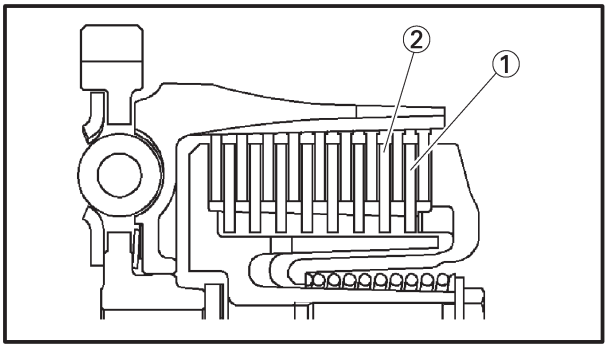
NOTE:

Measure the friction plate at four places.



Friction plate thickness
2.9 ~ 3.1 mm
<Limit>: 2.8 mm





3. Measure:
   • assembly width ⓐ
   Out of specification → Adjust.

Assembly width
42.5 ~ 43.7 mm

a. Assembly width adjusted by clutch plate ① and ②.
b. Select the clutch plate from the following table.

Clutch plate ①

Part No.	Thickness	
168-16325-00	1.6 mm	
3J2-16324-00	2.0 mm	STD
168-16324-00	2.3 mm	

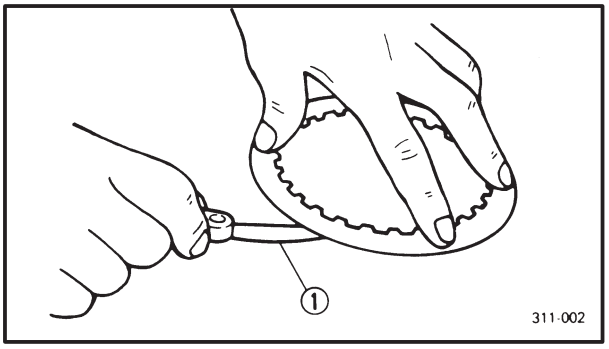
Clutch plate ②

Part No.	Thickness	
3J2-16324-00	2.0 mm	STD
168-16324-00	2.3 mm	

NOTE:

When adjusting the clutch assembly width [by replacing the clutch plate (s)], be sure to replace the clutch plate ① first. After replacing the clutch plate ①, if specifications cannot be met, replace the clutch plate ②.

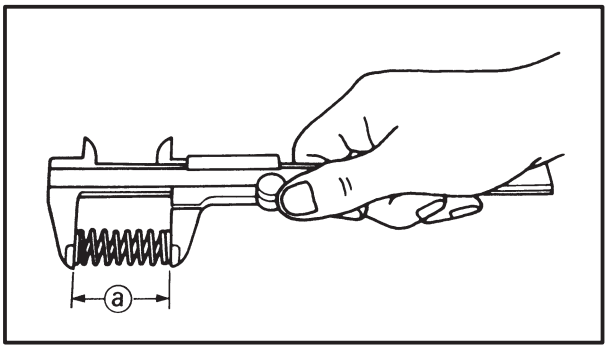
EAS00281
CHECKING THE CLUTCH PLATES
The following procedure applies to all of the clutch plates.
1. Check:
   • clutch plate
   Damage → Replace the clutch plates as a set.



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

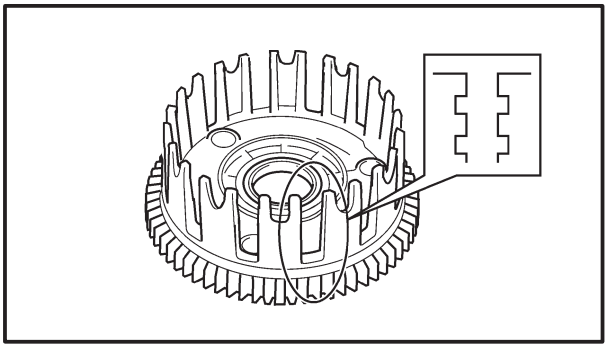
Clutch plate warpage limit
Less than 0.1 mm

EAS00282
CHECKING THE CLUTCH SPRINGS
The following procedure applies to all of the clutch springs.
1. Check:
   • clutch spring
   Damage → Replace the clutch springs as a set.



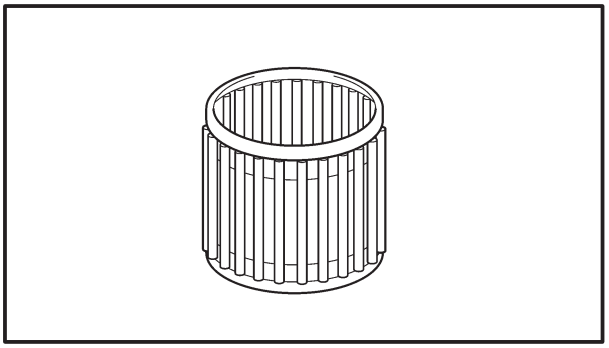
2. Measure:
   • clutch spring free length ⓐ
   Out of specification → Replace the clutch springs as a set.

Clutch spring free length
50 mm
<Limit>: 47.5 mm

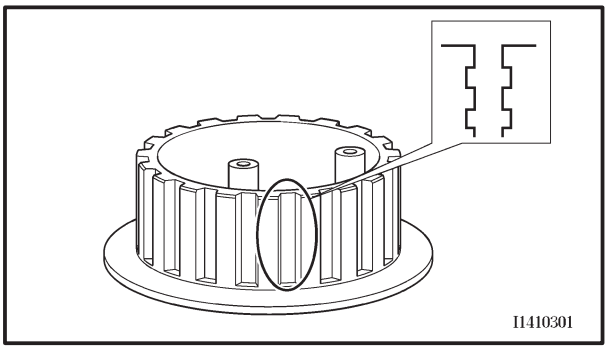


EAS00284
CHECKING THE CLUTCH HOUSING
1. Check:
   • clutch housing dogs
   Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:
Pitting on the clutch housing dogs will cause erratic clutch operation.

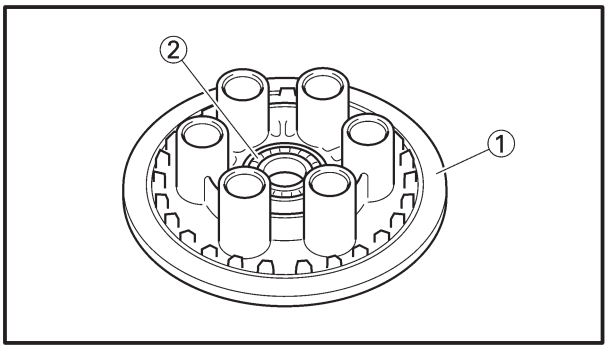


2. Check:
   • bearing
   Damage/wear → Replace the bearing and clutch housing.

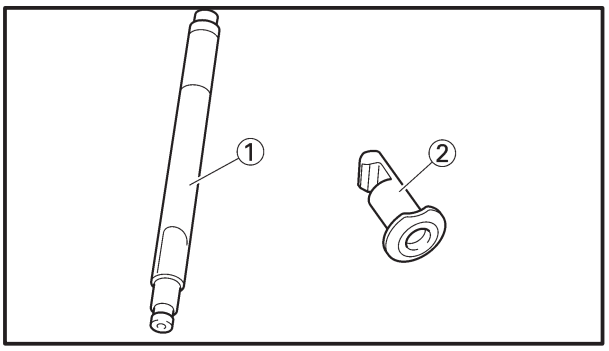


EAS00285
CHECKING THE CLUTCH BOSS
1. Check:
   • clutch boss splines
   Damage/pitting/wear → Replace the clutch boss.

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

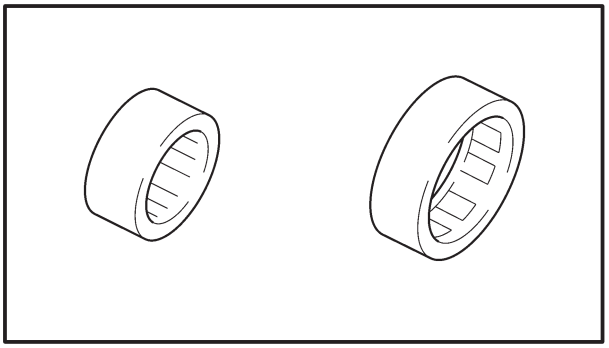


EAS00286
CHECKING THE PRESSURE PLATE
1. Check:
   • pressure plate ①
   Cracks/damage → Replace.
   • bearing ②
   Damage/wear → Replace.



EAS00287
CHECKING THE PULL LEVER SHAFT AND PULL ROD
1. Check:
   - pull lever shaft ①
   - pull rod ②

   Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.



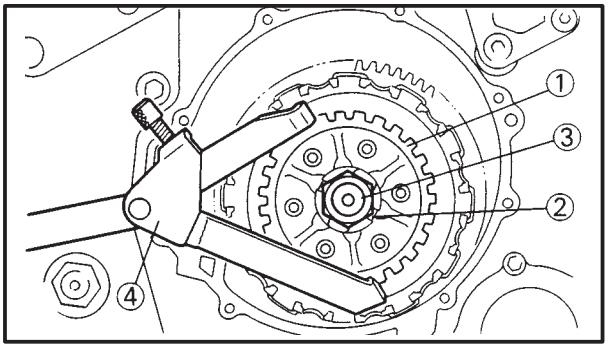
2. Check:
   - pull rod bearing

   Damage/wear → Replace.

EAS00292
CHECKING THE PRIMARY DRIVE
1. Check:
   - primary drive gear

   Damage/wear → Replace the primary drive and primary driven gears as a set.

   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.



EAS00299
INSTALLING THE CLUTCH

1. Install:
   - clutch boss ①
   - lock washer New ②
   - clutch boss nut ③

2. Tighten:
   - clutch boss nut — **70 Nm (7.0 m•kg)**

NOTE:

While holding the clutch boss with the universal clutch holder ④, tighten the clutch boss nut.

Universal clutch holder
90890-04086

3. Bend the lock washer tab along a flat side of the nut.
4. Lubricate:
   - friction plates
   - clutch plates

   (with the recommended lubricant)

Recommended lubricant
Engine oil

5. Install:
   - friction plates
   - clutch plates

NOTE:

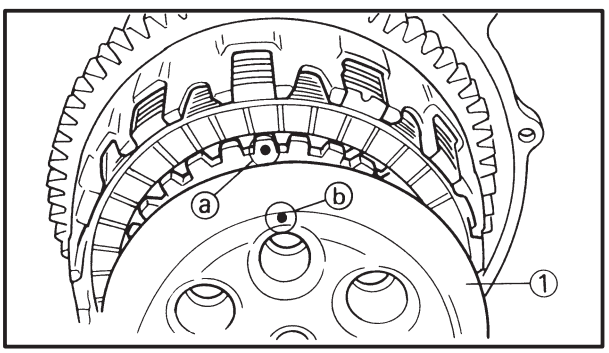
First, install a friction plate and then alternate between a clutch plate and a friction plate.

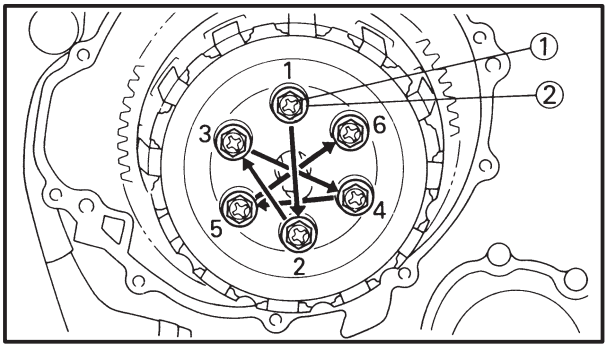
6. Measure:
   - assembly width

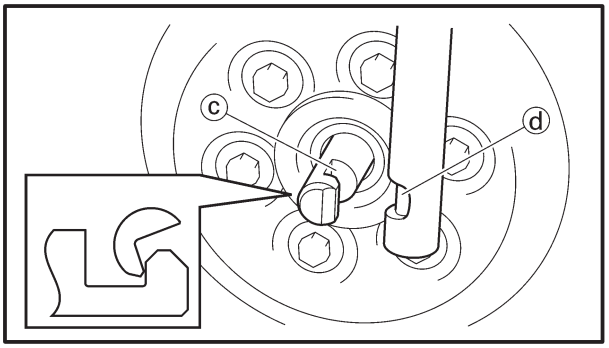
   Out of specification → Adjust.
   Refer to "CHECKING THE FRICTION PLATE".
7. Install:
   - pressure plate ①

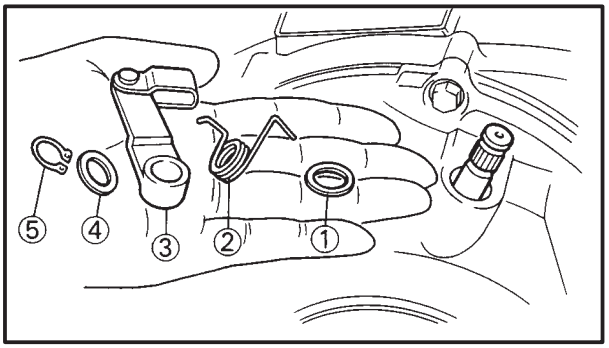
NOTE:

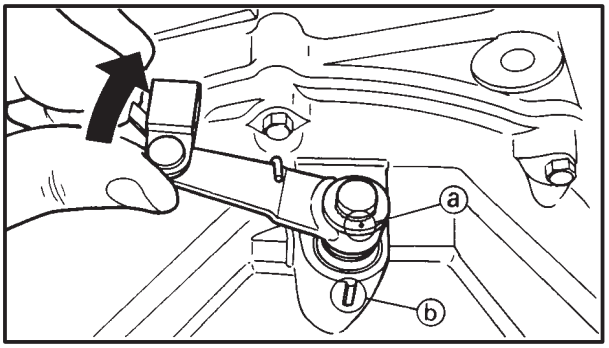
Align the punch mark ⓑ in the pressure plate with the punch mark ⓐ in the clutch boss.











8. Install:
   - clutch springs
   - clutch spring bolts

8 Nm (0.8 m•kg)

NOTE:

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

9. Install:
   - dowel pins
   - gasket New
   - clutch cover

10 Nm (1.0 m•kg)

NOTE:

- When installing the clutch cover, push the pull lever and check that the punch mark ⓐ on the pull lever aligns with the mark ⓑ on the clutch cover. Make sure that the pull rod groove ⓒ and pull lever shaft groove ⓓ are engaged.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

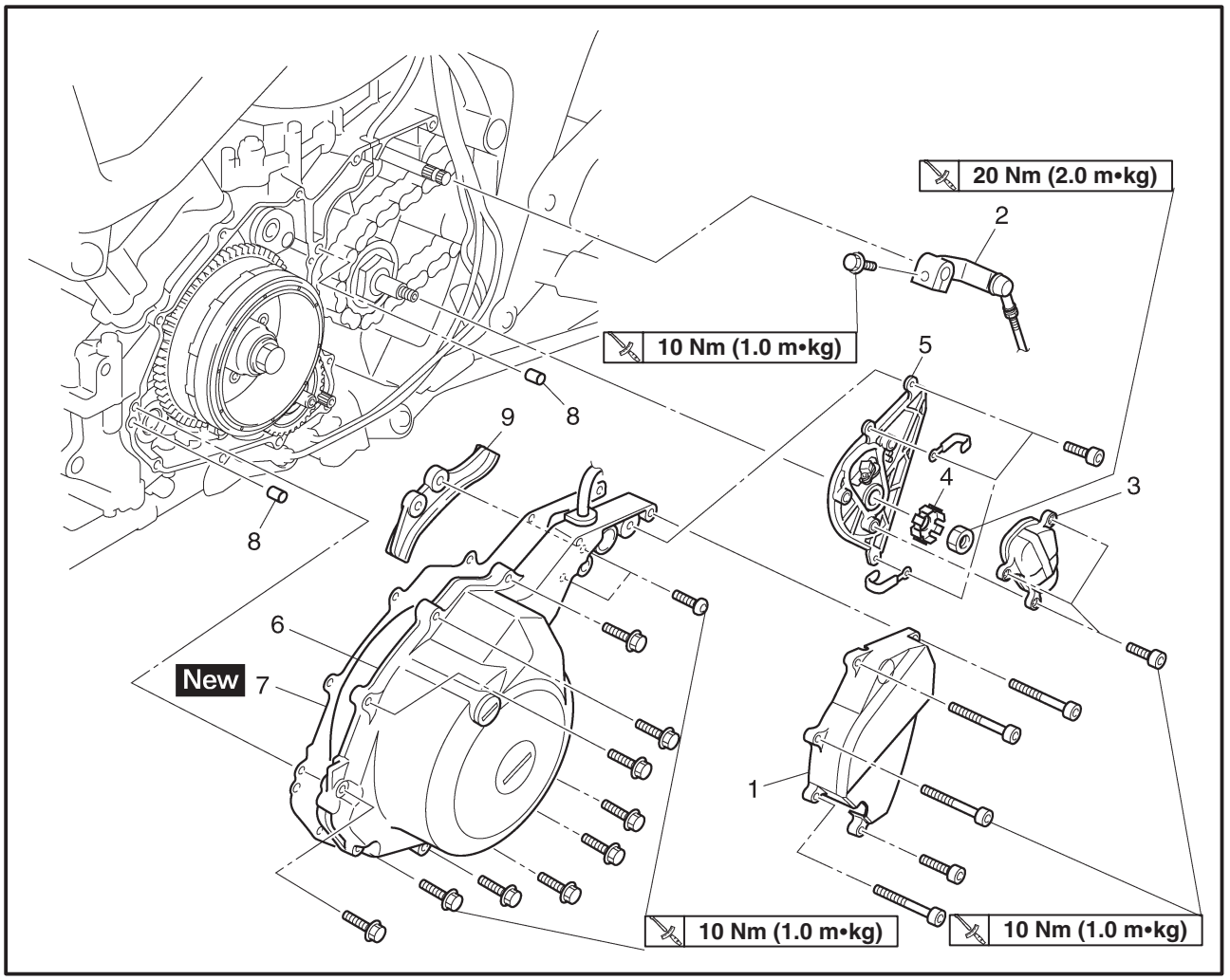
10. Install:
    - washer ①
    - pull lever spring ②
    - pull lever ③
    - washer ④
    - circlip New ⑤

NOTE:

Align the punch mark ⓐ in the pull lever shaft with the mark ⓑ on the clutch cover.

EAS00326

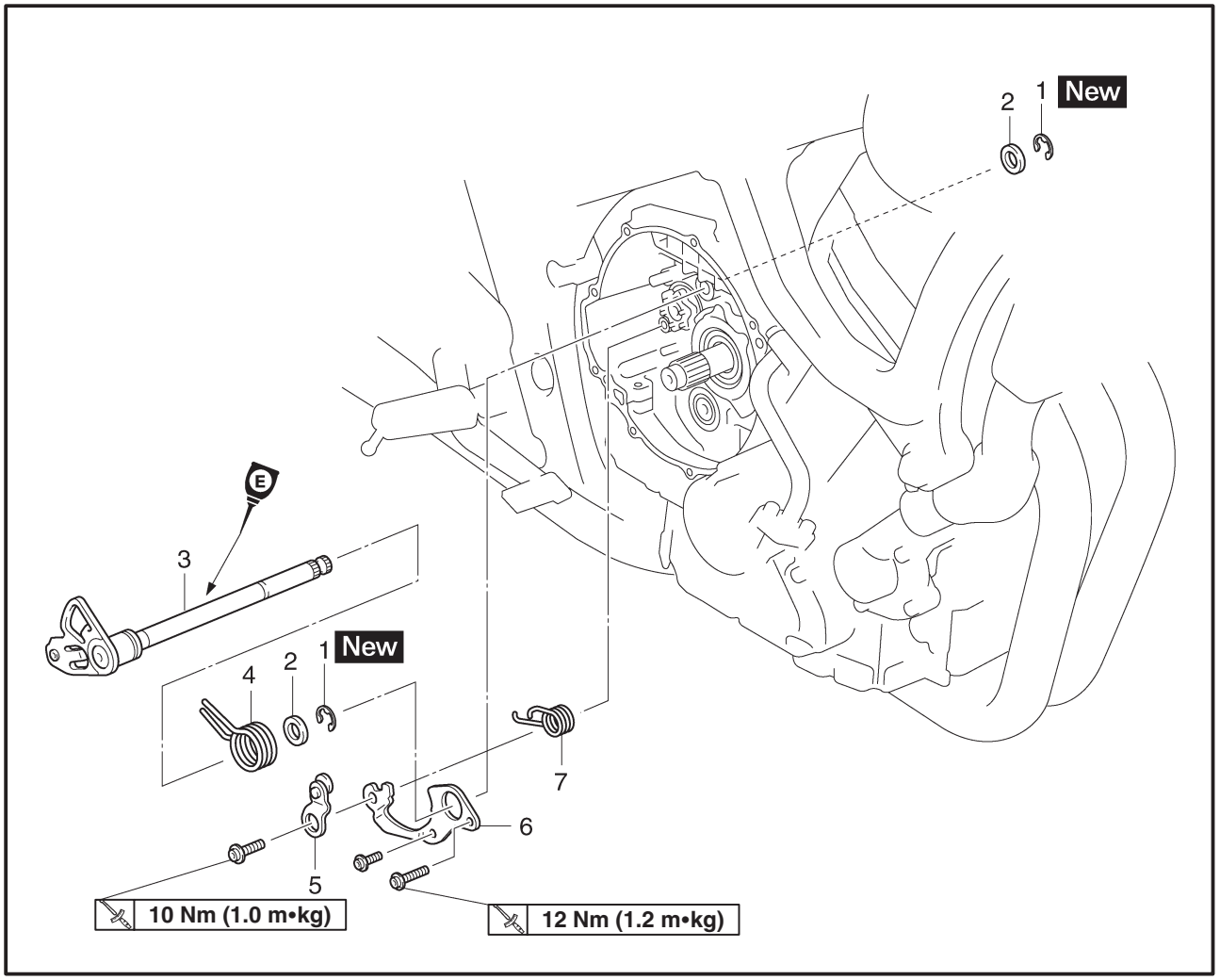
SHIFT SHAFT
GENERATOR ROTOR COVER



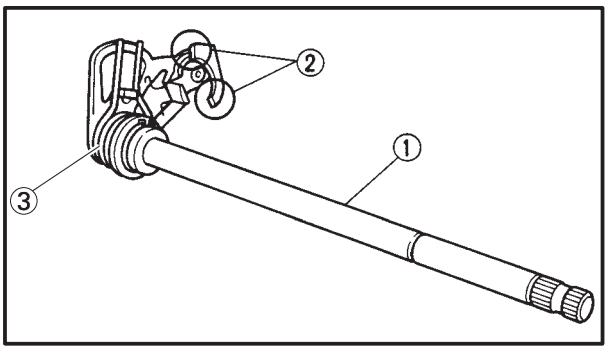
Order	Job/Part	Q'ty	Remarks
	Removing the generator rotor cover		Remove the parts in the order listed.
1	Drive sprocket cover	1	
2	Shift arm	1	
3	Cover 1	1	
4	Speed sensor rotor	1	
5	Cover 2	1	
6	Generator rotor cover	1	
7	Gasket	1	**NOTE:** Loosen the bolts in stages and in a crisscross pattern.
8	Dowel pin	2	
9	Drive chain slider	1	
			For installation, reverse the removal procedure.

EAS00327

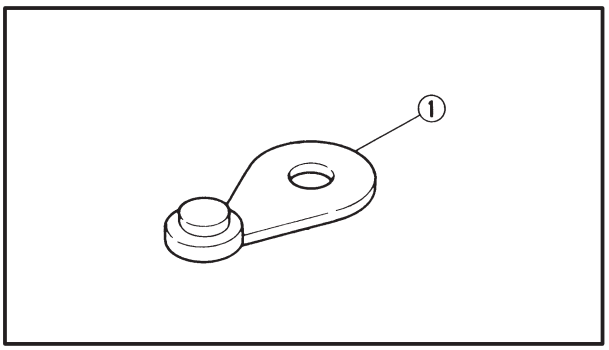
SHIFT SHAFT AND STOPPER LEVER



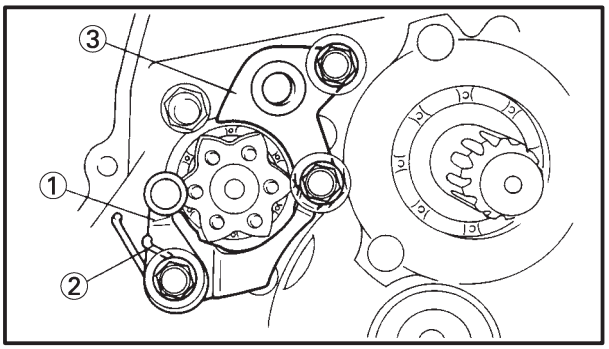
Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Clutch		Refer to "CLUTCH".
	Shift arm		Refer to "GENERATOR ROTOR COVER".
1	Circlip	2	
2	Washer	2	
3	Shift shaft	1	
4	Shift shaft spring	1	
5	Stopper lever	1	
6	Bearing retainer	1	
7	Stopper lever spring	1	
			For installation, reverse the removal procedure.



EAS00328
CHECKING THE SHIFT SHAFT
1. Check:
   - shift shaft ①
   - shift shaft pawl ②
     Bends/damage/wear → Replace.
   - shift lever spring ③
     Damage/wear → Replace.

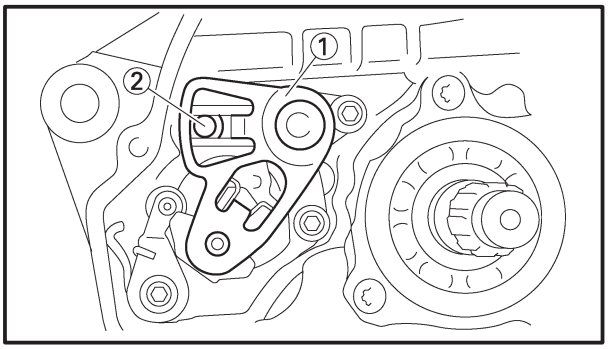


EAS00330
CHECKING THE STOPPER LEVER
1. Check:
   - stopper lever ①
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



EAS00331
INSTALLING THE SHIFT SHAFT
1. Install:
   - stopper lever ①
   - stopper lever spring ②
   - retainer ③

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



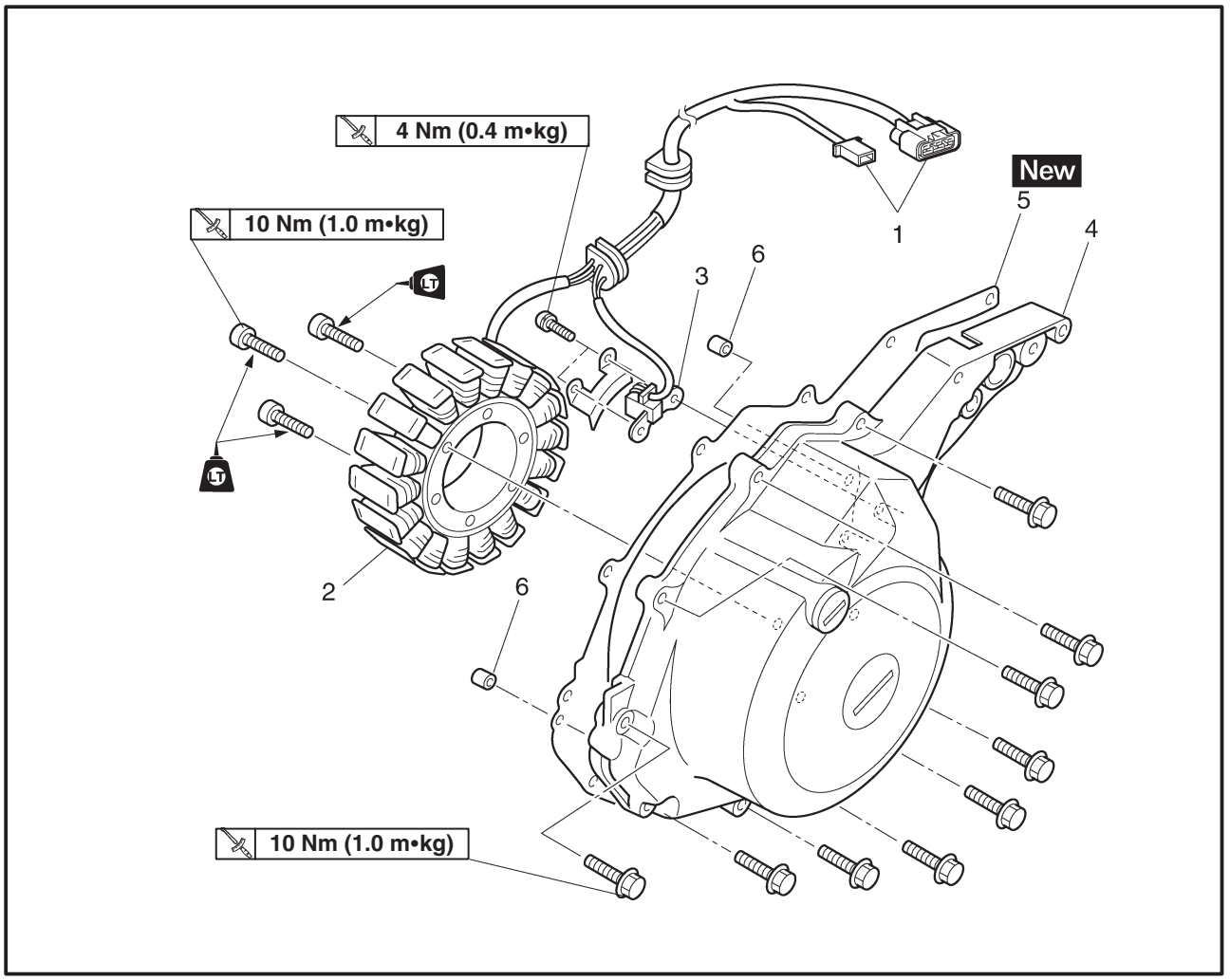
2. Install:
   - washer
   - shift shaft ①

NOTE:
- Lubricate the oil seal lips with lithium-soap-based grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper ②.

EAS00341

STARTER CLUTCH AND GENERATOR

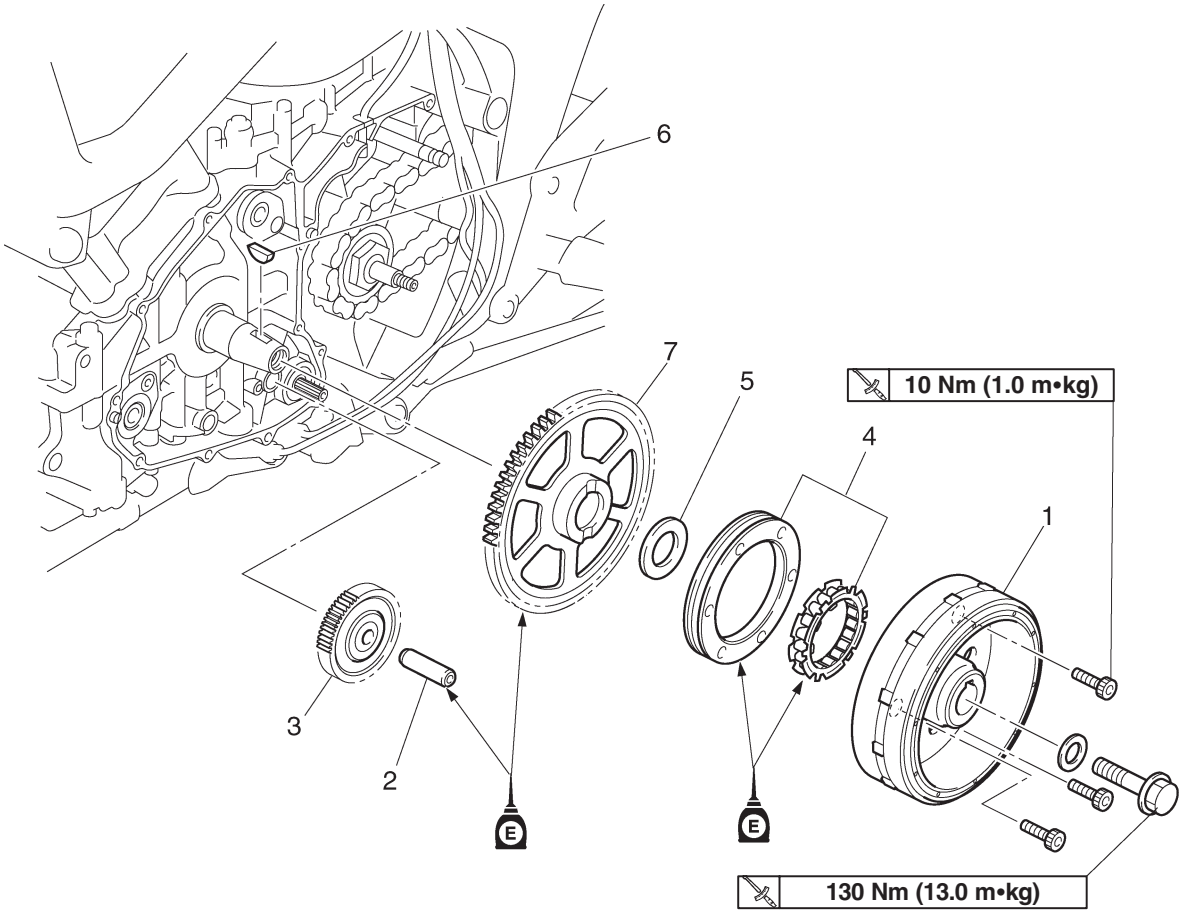
STATOR COIL ASSEMBLY



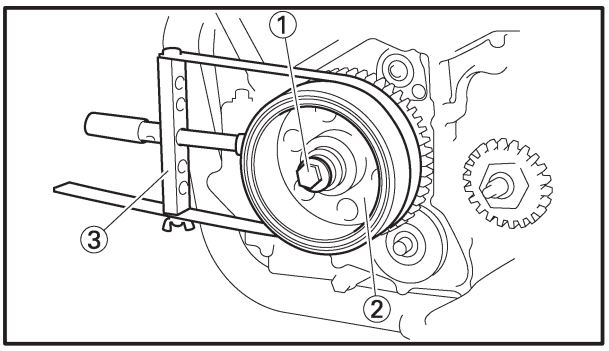
Order	Job/Part	Q'ty	Remarks
	Removing the stator coil assembly		Remove the parts in the order listed.
	Engine oil		Drain
	Generator rotor cover		Refer to "GENERATOR ROTOR COVER".
1	Stator coil coupler/Pickup coil coupler	1	Disconnect.
2	Stator coil	1	
3	Pickup coil	1	
4	Generator cover	1	
5	Gasket	1	
6	Dowel pin	2	
			For installation, reverse the removal procedure.

EAS00343

STARTER CLUTCH AND GENERATOR ROTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter clutch and generator rotor		Remove the parts in the order listed.
1	Generator rotor	1	
2	Idle gear shaft	1	
3	Starter motor idle gear	1	
4	Starter clutch	1	
5	Washer	1	
6	Woodruff key	1	
7	Starter clutch gear	1	
			For installation, reverse the removal procedure.



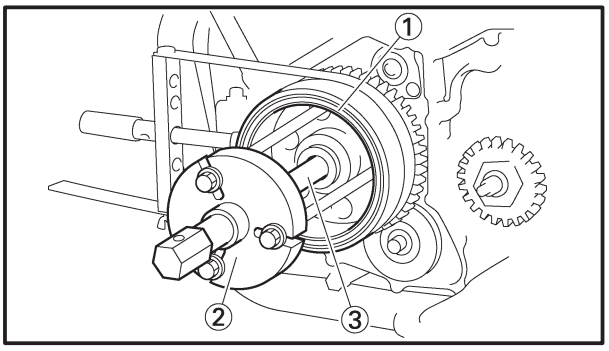
EAS00347
REMOVING THE GENERATOR

1. Remove:
   - generator rotor bolt ①
   - washer

NOTE:

- While holding the generator rotor ② with the sheave holder ③, loosen the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.

	Sheave holder **90890-01701**



2. Remove:
   - generator rotor ①
     (with the flywheel puller ② and flywheel puller attachment ③)
   - woodruff key

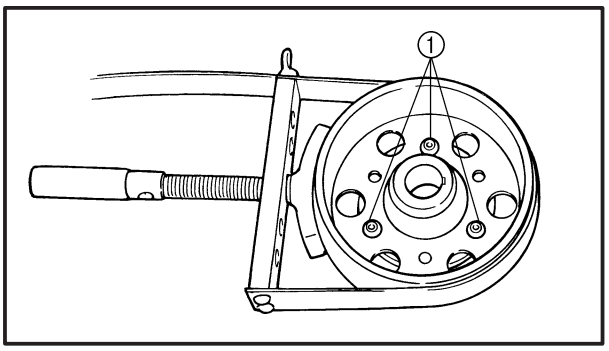
CAUTION:

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set's center bolt and the crankshaft.

NOTE:

Make sure the flywheel puller is centered over the generator rotor.

	Flywheel puller **90890-01362** **Flywheel puller attachment** **90890-01382**



REMOVING THE STARTER CLUTCH

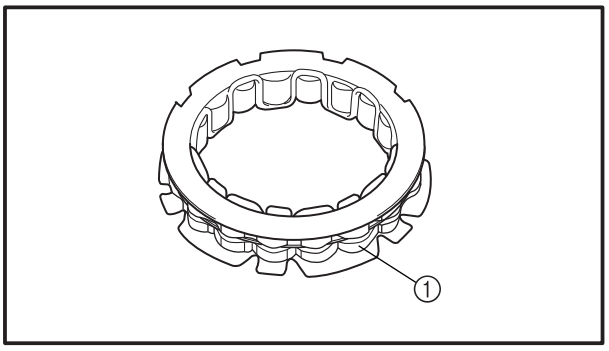
1. Remove:
   • starter clutch bolt ①

NOTE:

- While holding the generator rotor with the sheave holder, remove the starter clutch bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



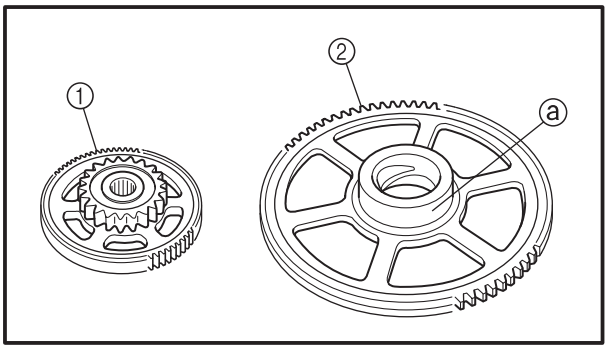
Sheave holder
90890-01701



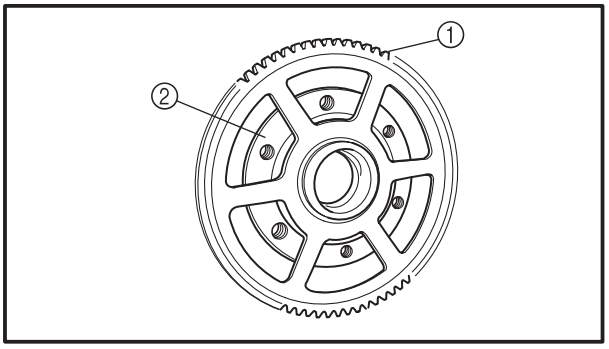
EAS00351

CHECKING THE STARTER CLUTCH

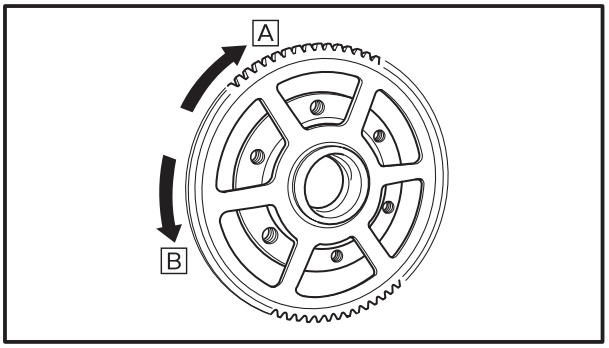
1. Check:
   • starter clutch rollers ①
   Damage/wear → Replace.

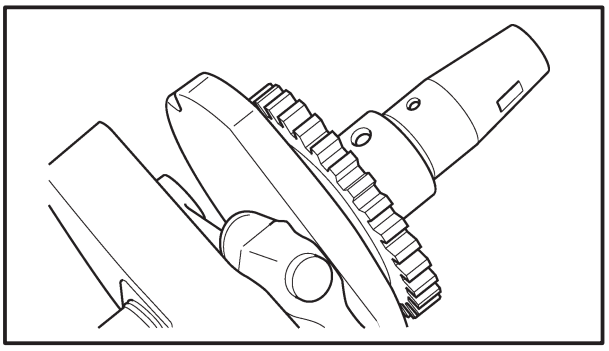


2. Check:
   • starter clutch idle gear ①
   • starter clutch gear ②
   Burrs/chips/roughness/wear → Replace the defective part(s).
3. Check:
   • starter clutch gear's contacting surfaces ⓐ
   Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   • starter clutch operation

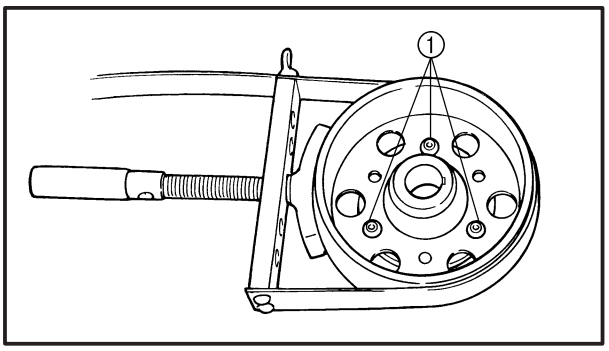


a. Install the starter clutch gear ① onto the starter clutch ② and hold the starter clutch.
b. When turning the starter clutch gear clockwise [A], the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch gear counterclockwise [B], it should turn freely, otherwise the starter clutch is faulty and must be replaced.





EAS00352
CHECKING THE GENERATOR SHAFT
1. Check:
   - generator shaft
     Damage/wear → Replace the generator shaft.
   - oil passages
     Dirt/obstruction → Wash the generator shaft and then blow out the oil passages with compressed air.



EAS00352

INSTALLING THE STARTER CLUTCH

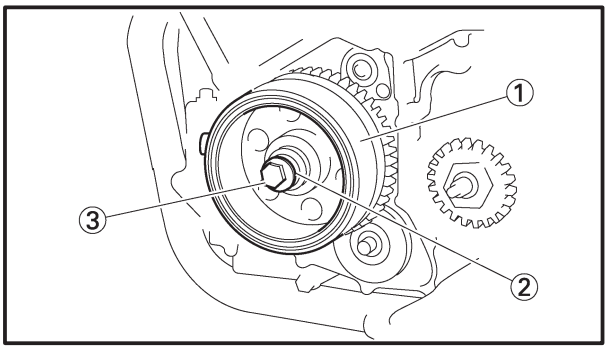
1. Install:
   • starter clutch — 10 Nm (1.0 m•kg)

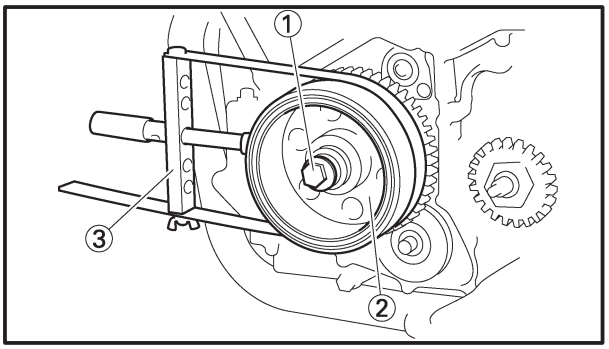
NOTE:

- While holding the generator rotor ① with the sheave holder, tighten the starter clutch bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



Sheave holder
90890-01701





EAS00354

INSTALLING THE GENERATOR

1. Install:
   • woodruff key
   • generator rotor ①
   • washer ②
   • generator rotor bolt ③

NOTE:

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the key-way of the crankshaft.

2. Tighten:
   • generator rotor bolt ① — 130 Nm (13.0 m•kg)

NOTE:

- While holding the generator rotor ② with the sheave holder ③, tighten the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.

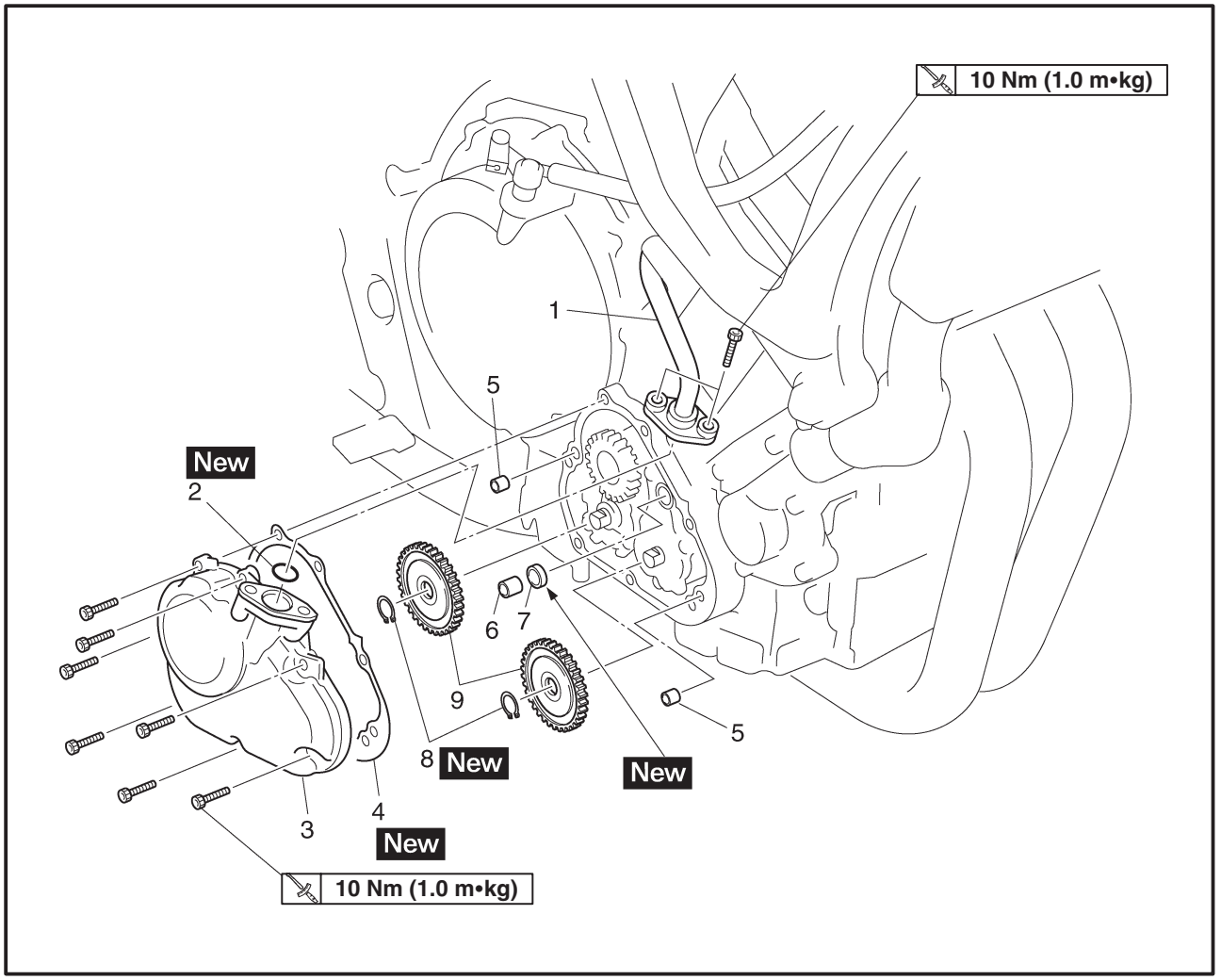


Sheave holder
90890-01701

EAS00357

OIL PAN AND OIL PUMP

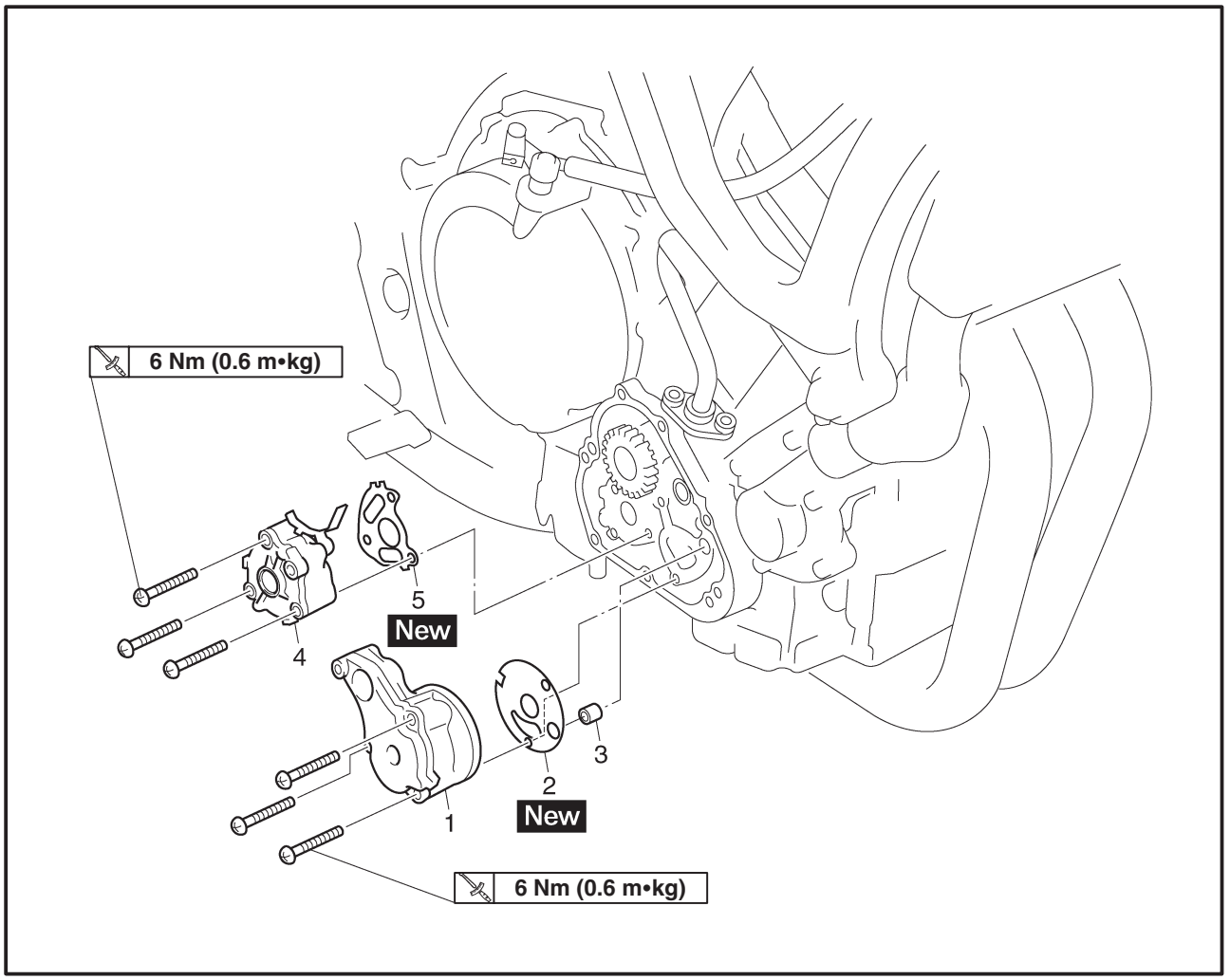
OIL PUMP COVER AND OIL PUMP DRIVEN GEAR



Order	Job/Part	Q'ty	Remarks
	Removing the oil pump cover and oil pump driven gear		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Oil pipe	1	
2	O-ring	1	
3	Oil pump cover	1	
4	Gascket	1	
5	Dowel pin	2	
6	Collar	1	
7	Gascket	1	
8	Circlip	2	
9	Oil pump driver gear	2	
			For installation, reverse the removal procedure.

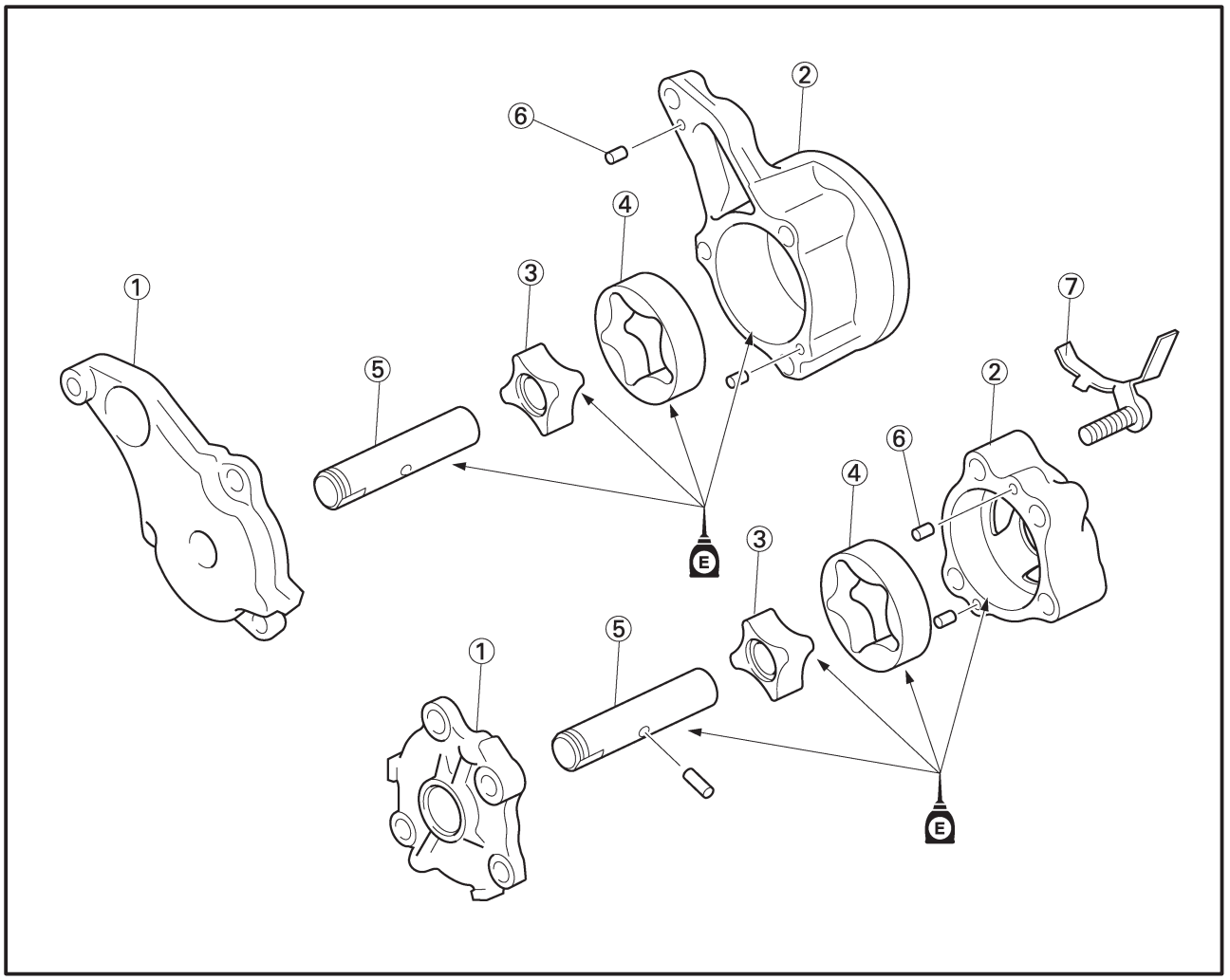
EAS00359

OIL PUMP



Order	Job/Part	Q'ty	Remarks
	Removing the oil pump		Remove the parts in the order listed.
1	Scavenge pump	1	
2	Gascket	1	
3	Dowel pin	1	
4	Feed pump	1	
5	Gascket	1	
			For installation, reverse the removal procedure.

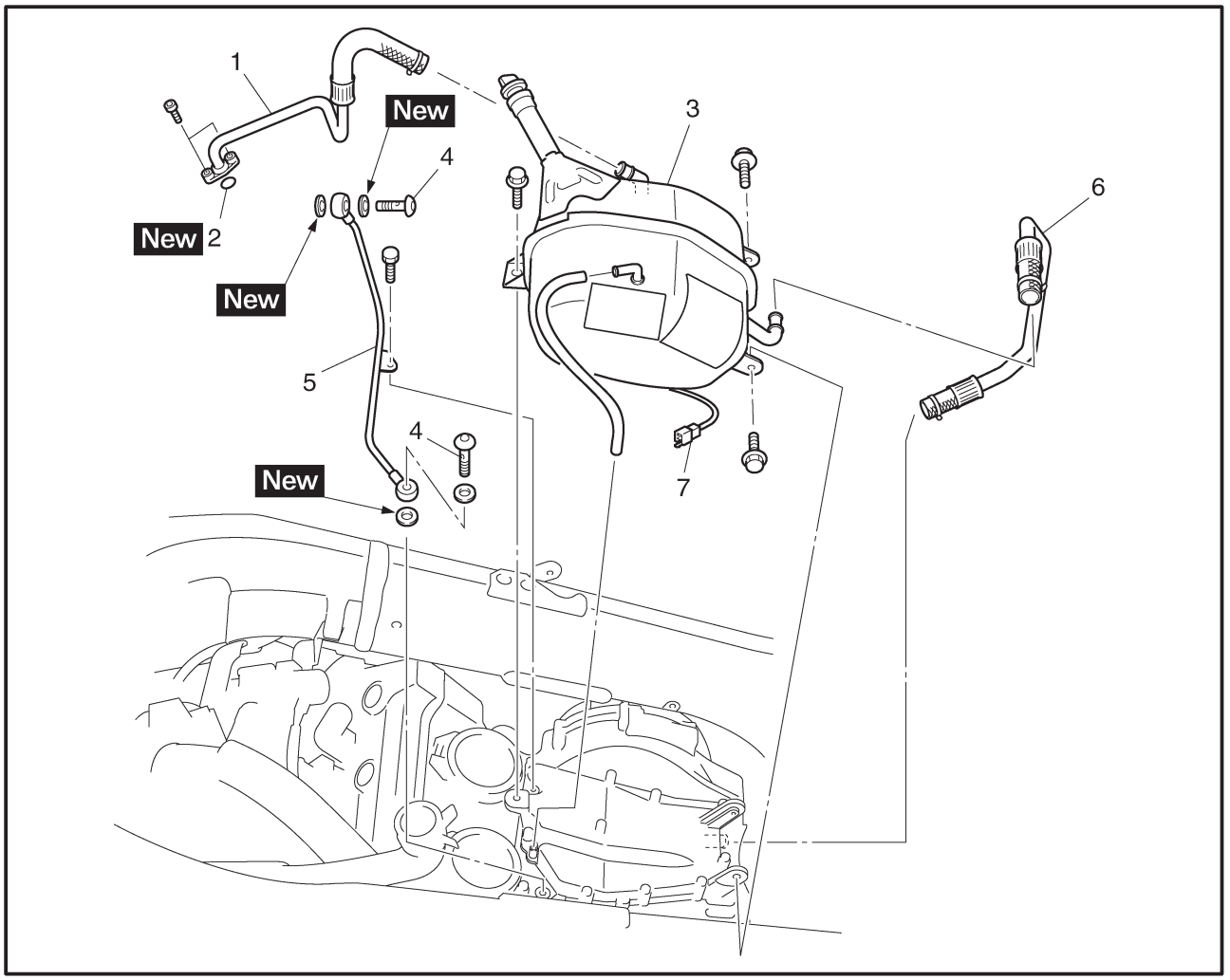
EAS00360



Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
①	Oil pump cover	2	
②	Oil pump housing	2	
③	Inner rotor	2	
④	Outer rotor	2	
⑤	Rotor shaft	2	
⑥	Dowel pin	4	
⑦	Stay	1	
			For assembly, reverse the disassembly procedure.

EAS00358

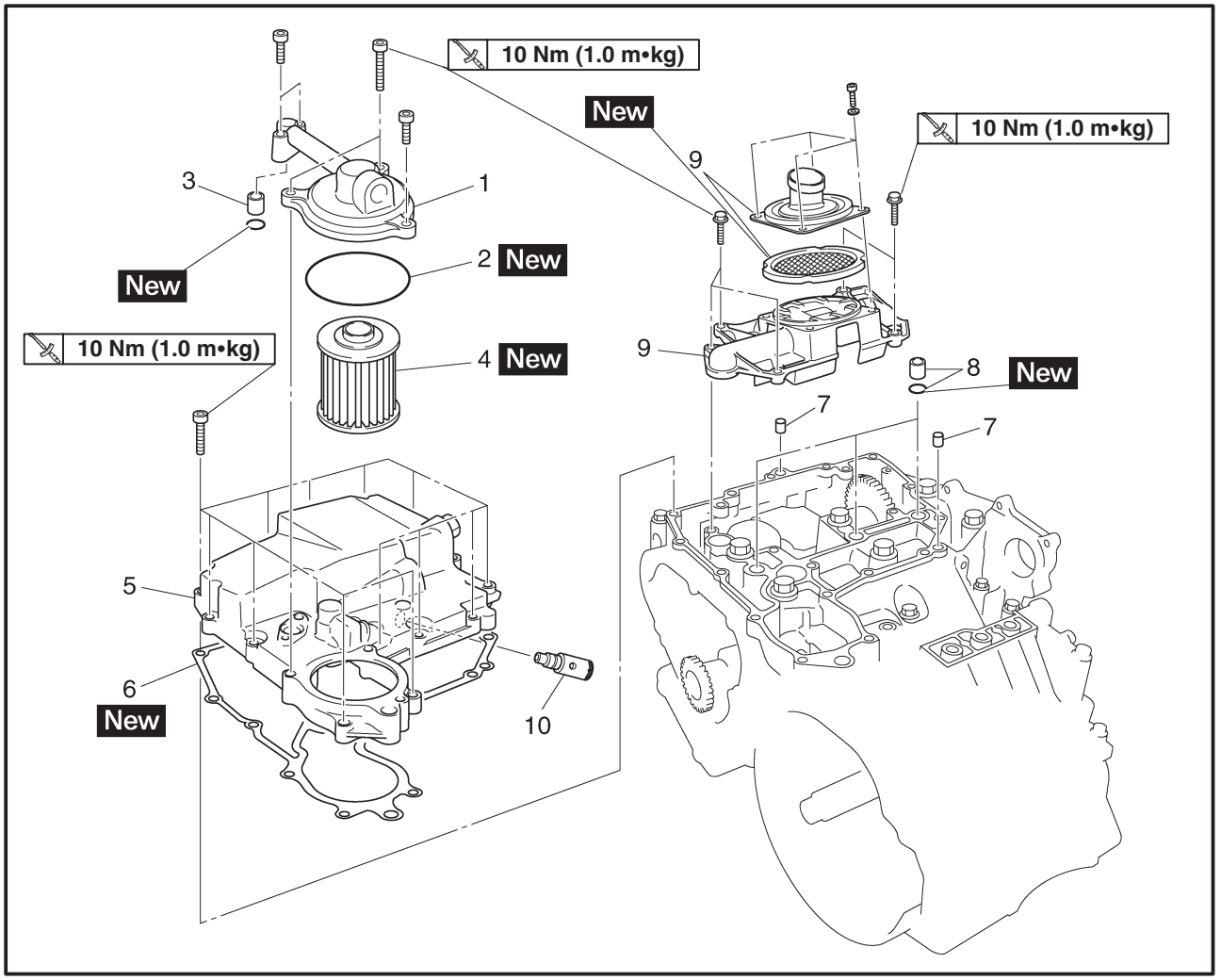
OIL HOSE AND OIL TANK



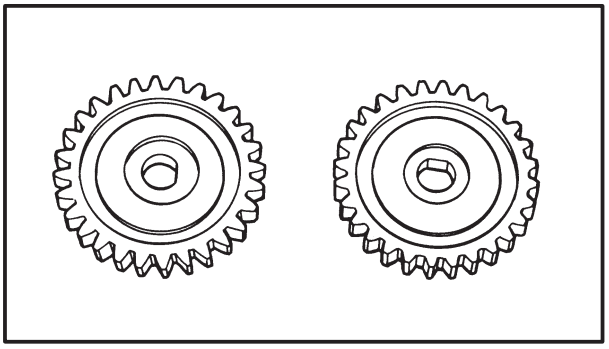
Order	Job/Part	Q'ty	Remarks
	Removing the oil hose and oil tank		Remove the parts in the order listed.
1	Oil hose 1	1	
2	O-ring	1	
3	Oil tank	1	
4	Union bolt	2	
5	Oil pipe	1	
6	Oil hose 2	1	
7	Oil level switch coupler	1	Disconnect. For installation, reverse the removal procedure.

EAS00356

OIL PAN

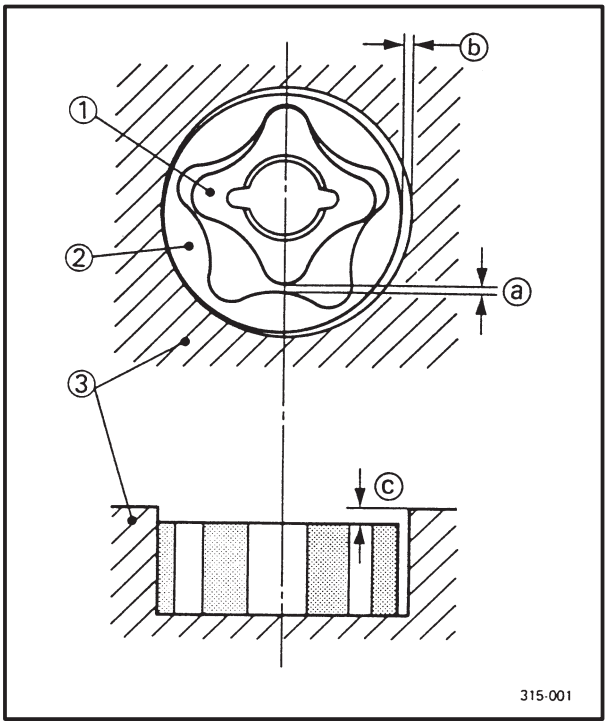


Order	Job/Part	Q'ty	Remarks
	Removing the oil pan		Remove the parts in the order listed.
	Engine oil		Drain.
	Oil hose		Refer to "OIL HOSE".
1	Oil filter cover	1	
2	O-ring	1	
3	Collar	1	
4	Oil filter	1	**NOTE:** Install the oil filter with the projection towards the oil filter cover.
5	Oil pan	1	
6	Gascket	1	
7	Dowel pin	2	
8	O-ring/collar	1/1	
9	Oil strainer (cover/filter/bracket)	1/1/1	
10	Relief valve	1	
			For installation, reverse the removal procedure.



EAS00364
CHECKING THE OIL PUMP
1. Check:
   - oil pump driven gear ①
   - oil pump housing ②
   - oil pump housing cover ③

   Cracks/damage/wear → Replace the defective part(s).

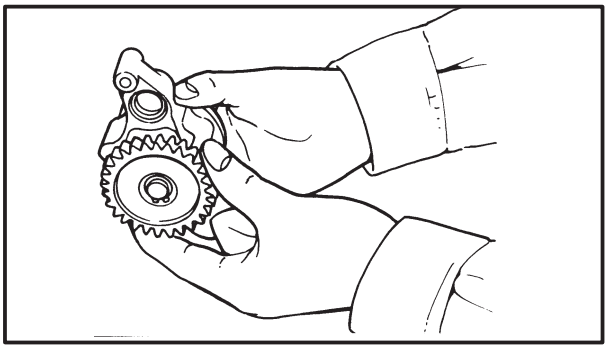


2. Measure:
   - inner-rotor-to-outer-rotor-tip clearance ⓐ
   - outer-rotor-to-oil-pump-housing clearance ⓑ
   - oil-pump-housing-to-inner-rotor-and-outer-rotor clearance ⓒ

   Out of specification → Replace the oil pump.

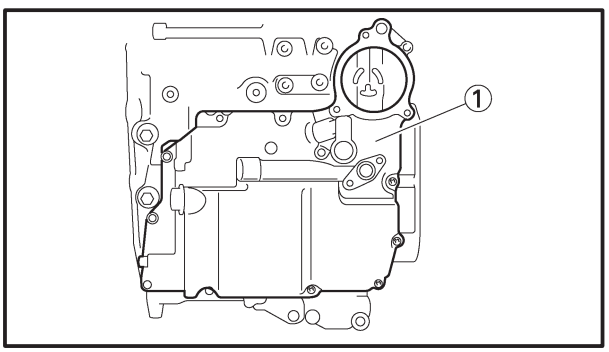
① Inner rotor
② Outer rotor
③ Oil pump housing

Inner-rotor-to-outer-rotor-tip clearance
0.00 ~ 0.12 mm
Outer-rotor-to-oil-pump-housing clearance
0.03 ~ 0.08 mm
Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance
0.03 ~ 0.08 mm



3. Check:
   - oil pump operation

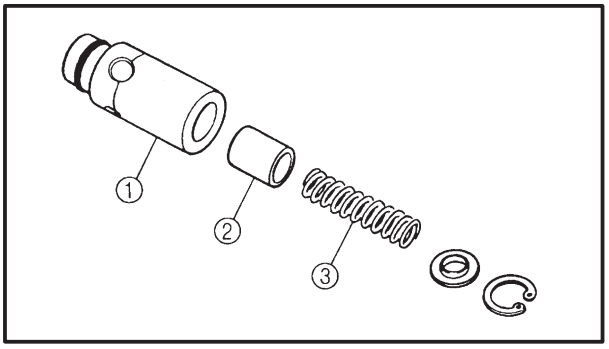
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



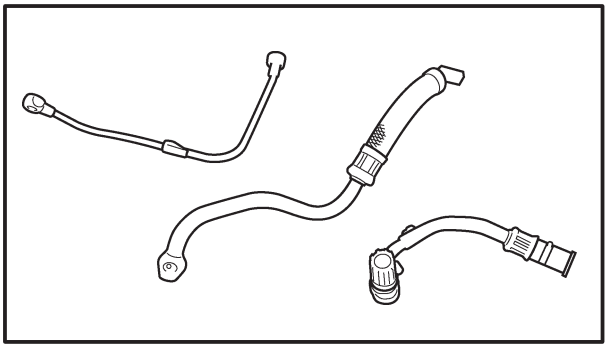
EAS00362
REMOVING THE OIL PAN
1. Remove:
   - oil pan ①
   - gasket
   - dowel pins

NOTE:

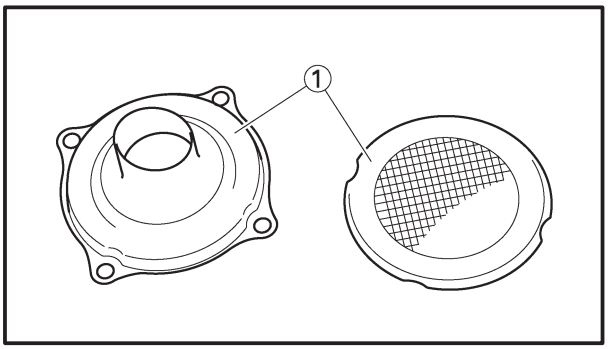
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



EAS00365
CHECKING THE RELIEF VALVE
1. Check:
   - relief valve body ①
   - relief valve ②
   - spring ③



EAS00367
CHECKING THE OIL DELIVERY PIPES
The following procedure applies to all of the oil delivery pipes.
1. Check:
   - oil delivery pipes
     Damage → Replace.
     Obstruction → Wash and blow out with compressed air.



EAS00368
CHECKING THE OIL STRAINER
1. Check:
   - oil strainer ①
     Damage → Replace.
     Contaminants → Clean with solvent.

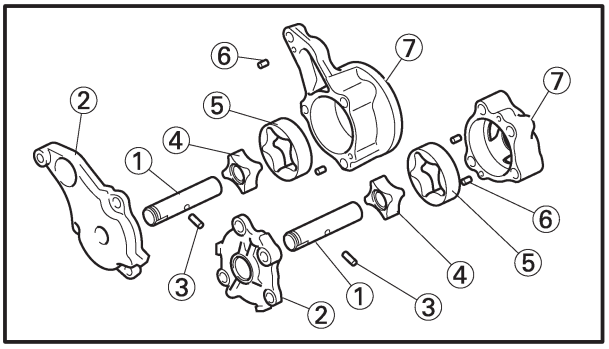
EAS00373
CHECKING THE OIL NOZZLES
The following procedure applies to all of the oil nozzles.
1. Check:
   - oil nozzle
   - check ball
     Damage/wear → Replace the oil nozzle.
   - O-ring
     Damage/wear → Replace.
   - oil nozzle passage
     Obstruction → Blow out with compressed air.

EAS00375

ASSEMBLING THE OIL PUMP

1. Lubricate:
   - inner rotor
   - outer rotor
   - oil pump shaft
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

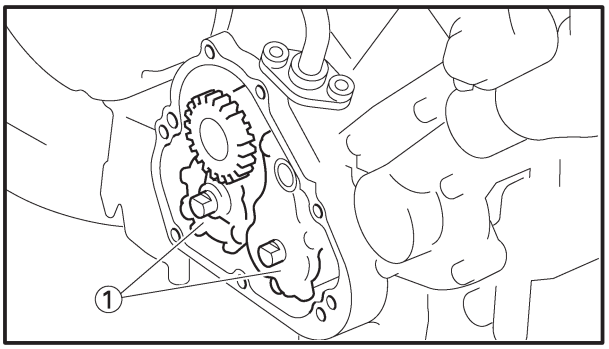


2. Install:
   - oil pump shaft ①
     (to the oil pump cover ②)
   - pin ③
   - inner rotor ④
   - outer rotor ⑤
   - pin ⑥
   - oil pump housing ⑦ — **6 Nm (0.6 m•kg)**

NOTE:

When installing the inner rotor, align the pin ③ in the oil pump shaft with the groove in the inner rotor ④.

3. Check:
   - oil pump operation
     Refer to “CHECKING THE OIL PUMP”.



EAS00376

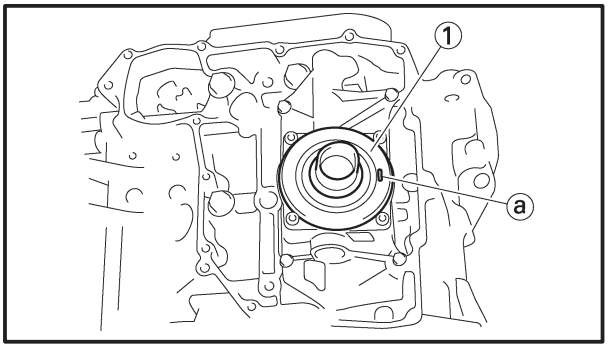
INSTALLING THE OIL PUMP

1. Install:
   - oil pump ① — **6 Nm (0.6 m•kg)**

CAUTION:

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

2. Install:
   - oil pump driven gear

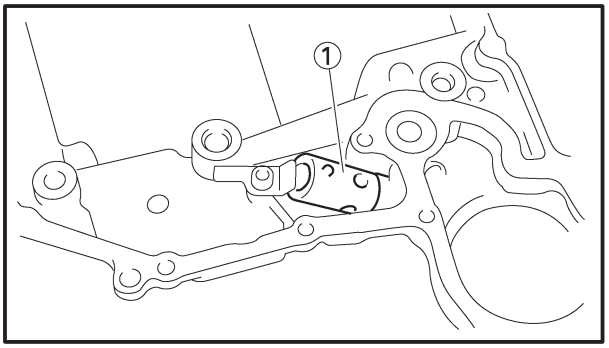


EAS00378
INSTALLING THE OIL STRAINER
1. Install:
   - collar
   - O-ring
   - oil strainer ①

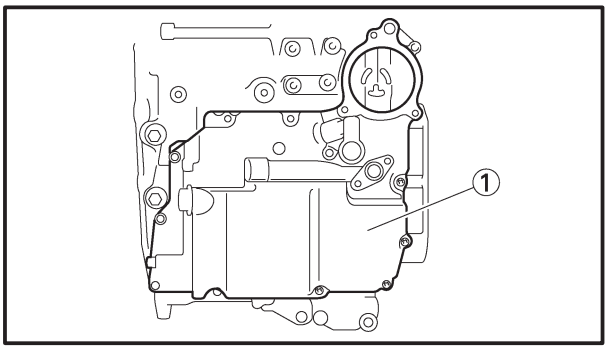
10 Nm (1.0 m•kg)

NOTE:

The mark ⓐ on the oil strainer housing must point towards the front of the engine.



EAS00380
INSTALLING THE OIL PAN
1. Install:
   - relief valve ①



2. Install:
   - dowel pins
   - gasket New
   - oil pan ①
   - engine oil drain bolt

10 Nm (1.0 m•kg)
30 Nm (3.0 m•kg)

⚠ WARNING

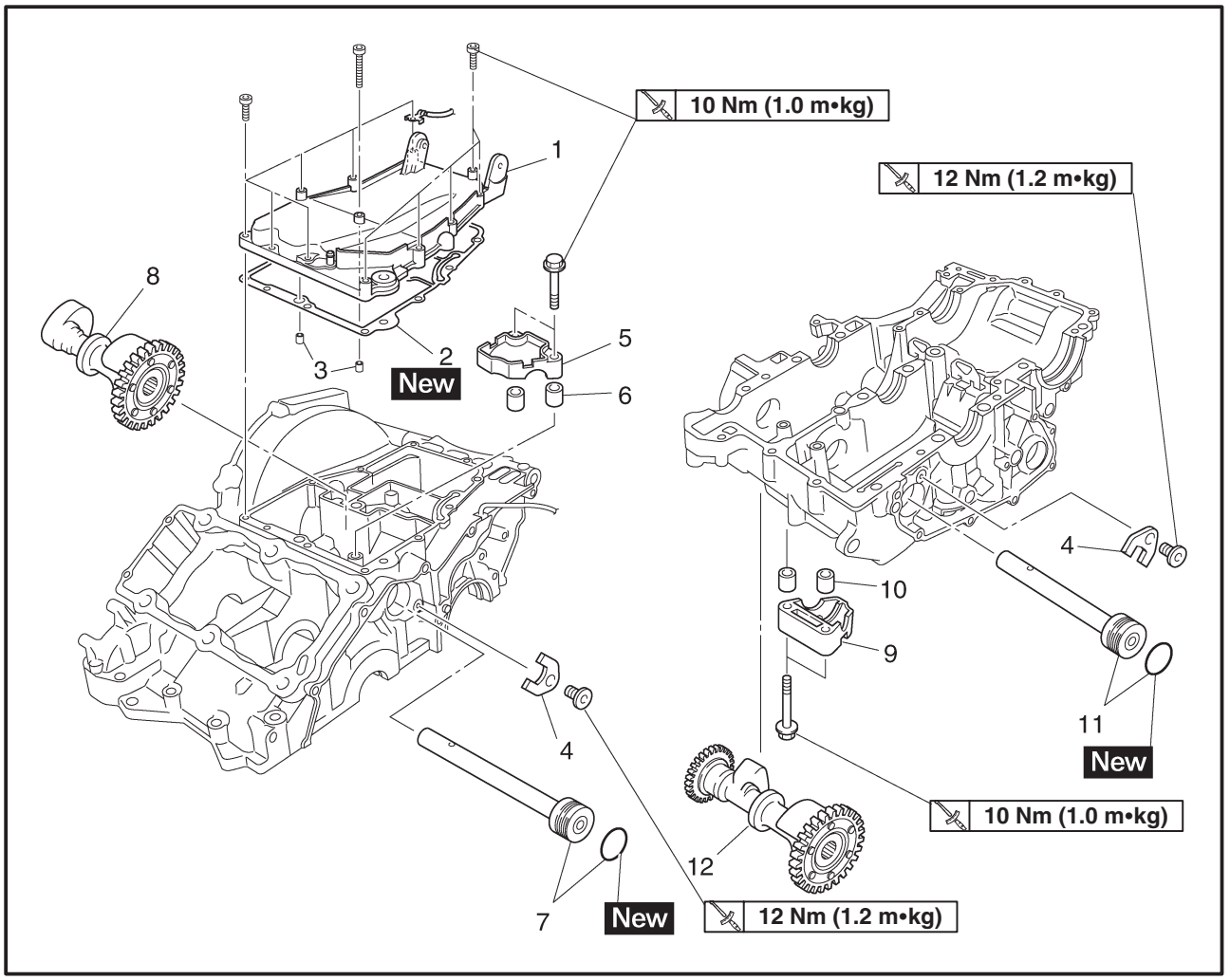
Always use new copper washers.

NOTE:

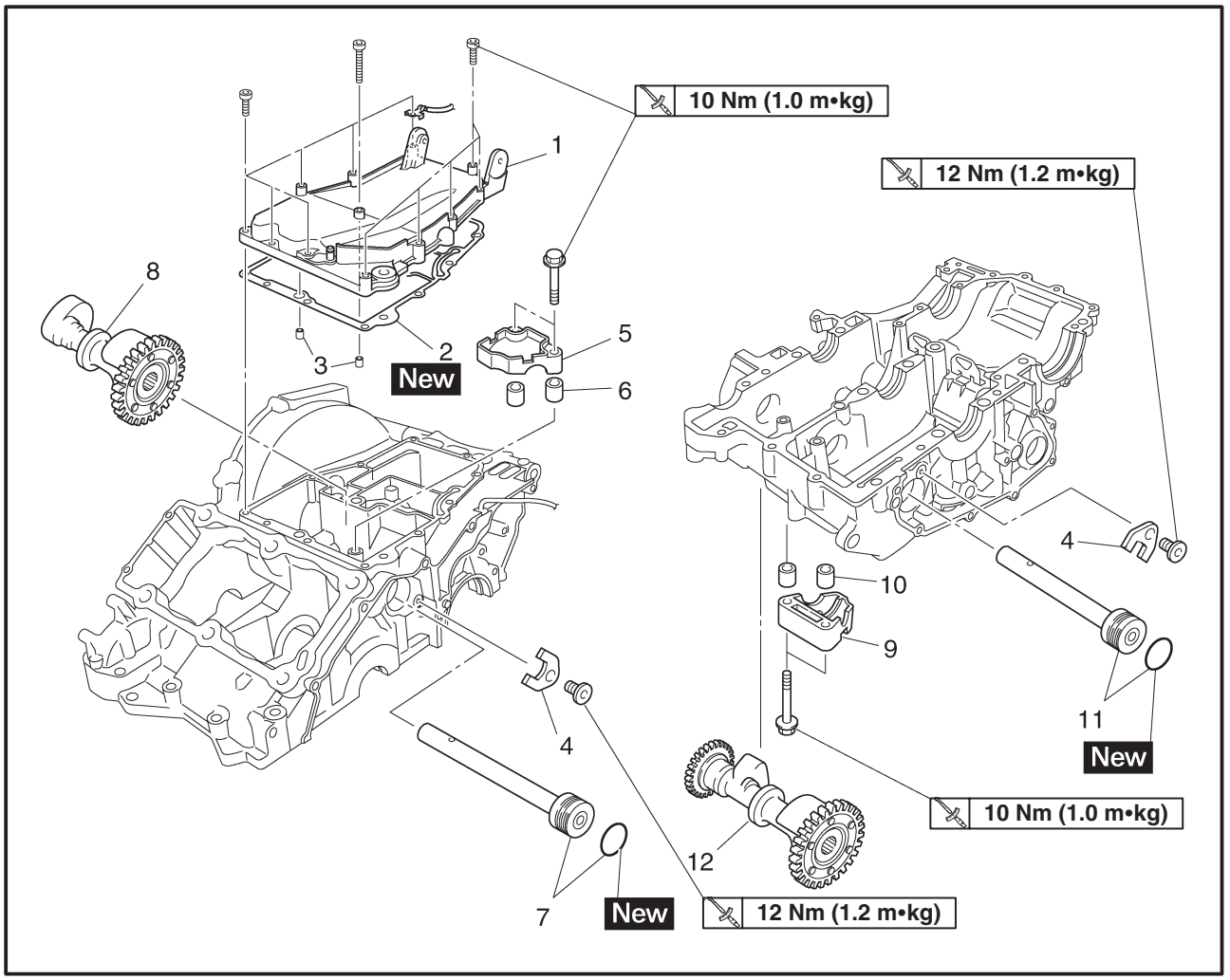
Tighten the oil pan bolts in stages and in a criss-cross pattern.

3. Install:
   - oil tank

CRANKSHAFT
BALANCER SHAFT



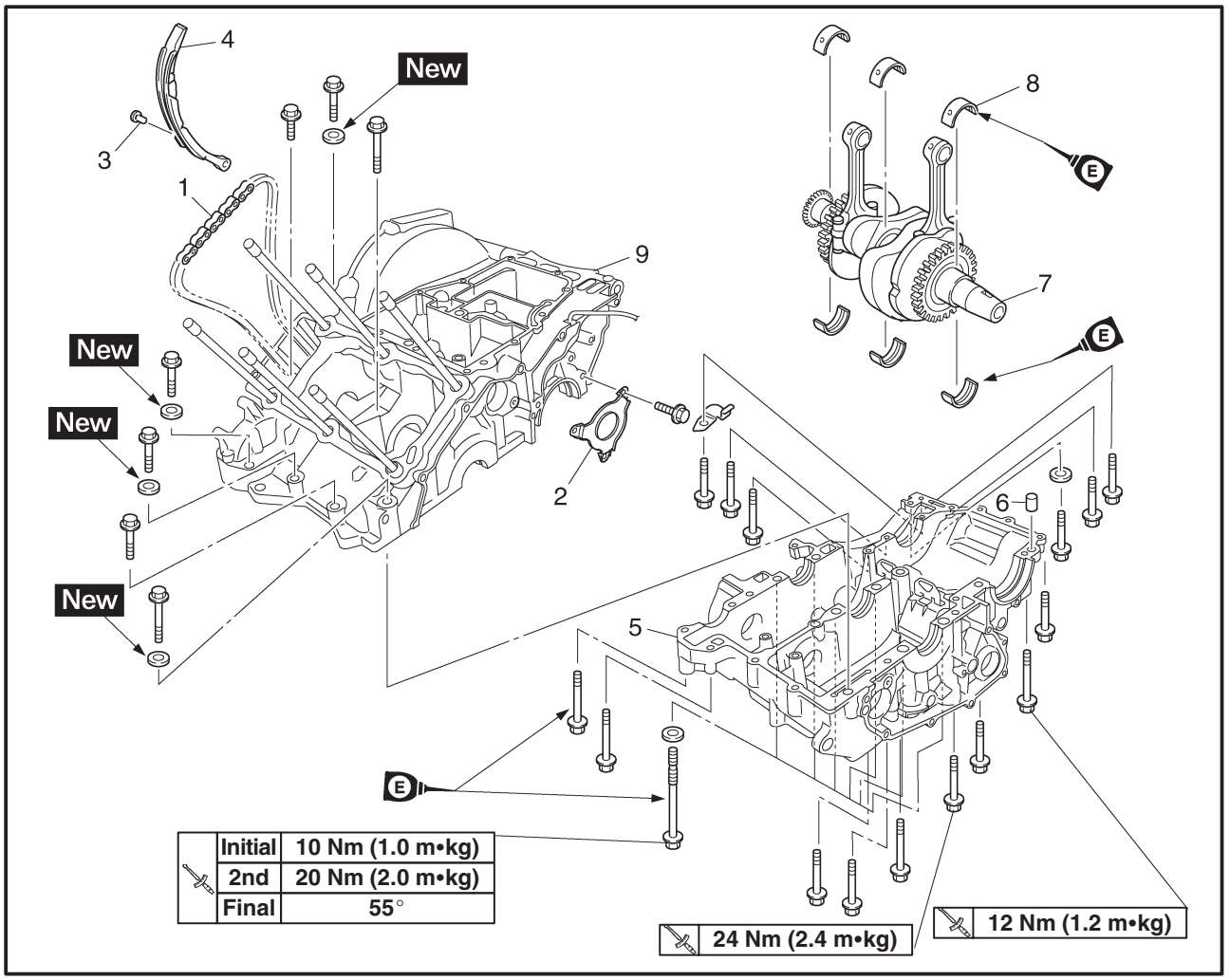
Order	Job/Part	Q'ty	Remarks
	Removing the balancer shaft		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Oil tank		Refer to "OIL TANK".
	Oil pan		Refer to "OIL PAN".
1	Crankcase upper cover	1	
2	Gascket	1	
3	Dowel pin	2	
4	Balancer shaft retainer	2	
5	Rear balancer holder	1	
6	Dowel pin	2	
7	Rear balancer shaft/O-ring	1/1	



Order	Job/Part	Q'ty	Remarks
8	Rear balancer weight	1	
9	Front balancer holder	1	
10	Dowel pin	2	
11	Front balancer shaft/O-ring	1/1	
12	Front balancer weight	1	
	Water pump drive gear		
			For installation, reverse the removal procedure.

EAS00381

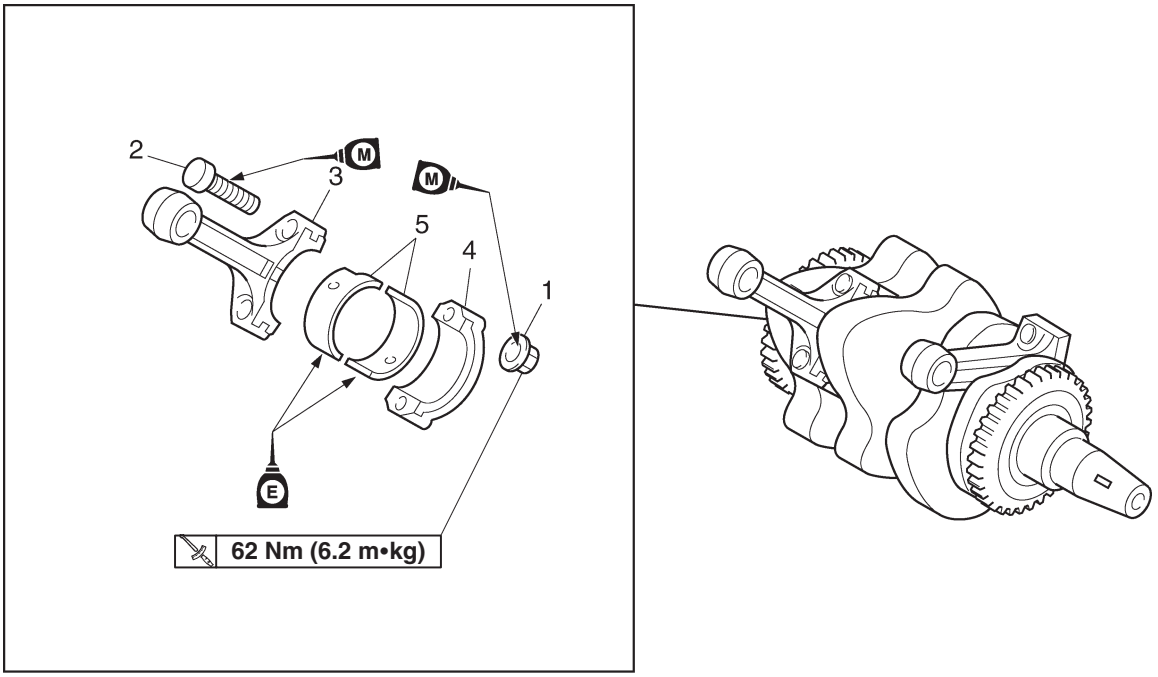
CRANKSHAFT ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft assembly		Remove the parts in the order listed.
	Balancer weight		Refer to "BALANCER".
	Water pump		Refer to "WATER PUMP" in chapter 6.
1	Timing chain	1	
2	Cover plate	1	
3	Pin	1	
4	Timing chain guide (intake)	1	
5	Lower crankcase	1	
6	Dowel pin	1	
7	Crankshaft assembly	1	
8	Main journal bealing	6	
9	Upper crankcase	1	
			For installation, reverse the removal procedure.

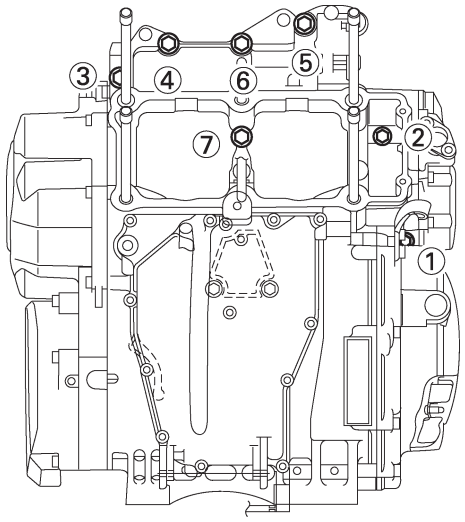
EAS00382

CONNECTING ROD

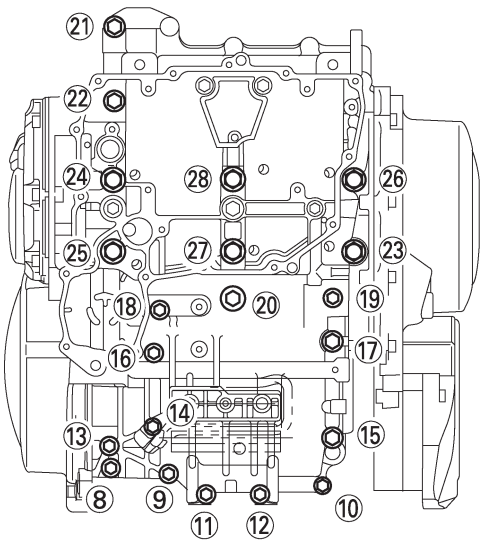


Order	Job/Part	Q'ty	Remarks
	Removing the connecting rod		Remove the parts in the order listed.
1	Nut	4	
2	Connecting rod bolt	4	
3	Connecting rod	2	
4	Connecting rod cap	2	
5	Connecting rod bearing	4	
			For installation, reverse the removal procedure.

A



B



EAS00384

DISASSEMBLING THE CRANKCASE

1. Remove:
   - cover plate
   - timing chain guide (intake)
2. Remove:
   - crankcase bolts

NOTE:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

A Upper crankcase
B Lower crankcase

3. Place the engine upside down.
4. Remove:
   - lower crankcase

CAUTION:

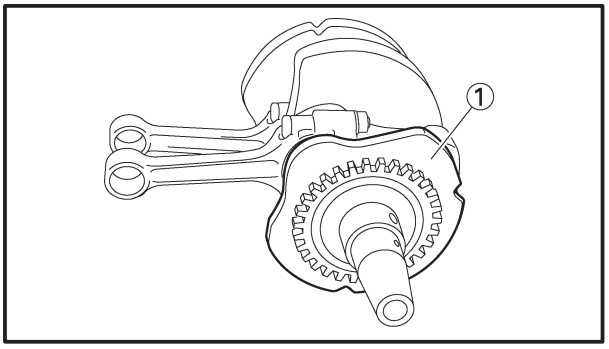
Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

M6 × 70 mm bolts ①, ②, ⑧ ~ ⑭, ⑯, ⑱, ⑲
M8 × 75 mm bolts ③ ~ ⑦, ⑮, ⑰, ⑳ ~ ㉒
M10 × 135 mm bolts ㉓ ~ ㉘

5. Remove:
   - dowel pins
6. Remove:
   - crankshaft journal lower bearing (from the lower crankcase)

NOTE:

Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.



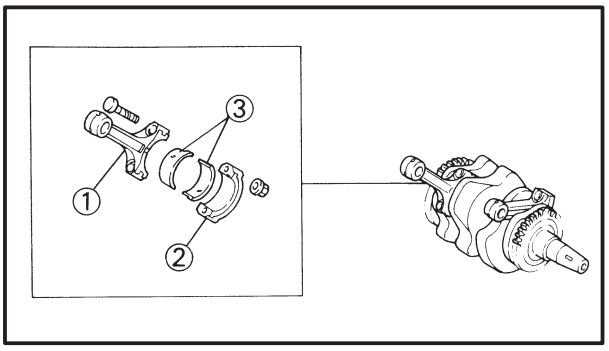
EAS00387

REMOVING THE CRANKSHAFT ASSEMBLY

1. Remove:
   - crankshaft assembly ①
   - crankshaft journal upper bearings (from the upper crankcase)

NOTE:

Identify the position of each crankshaft journal upper bearing so that it can be reinstalled in its original place.



EAS00391

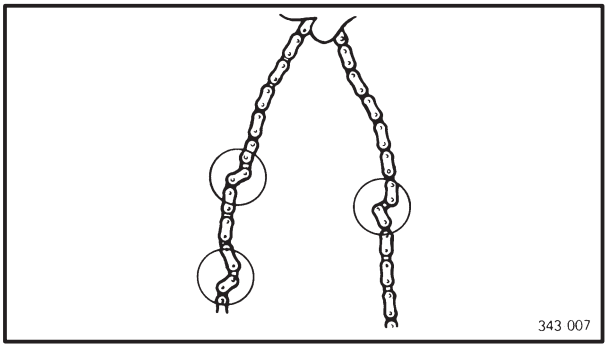
REMOVING THE CONNECTING RODS

The following procedure applies to all of the connecting rods.

1. Remove:
   - connecting rods ①
   - connecting rod caps ②
   - big end bearings ③

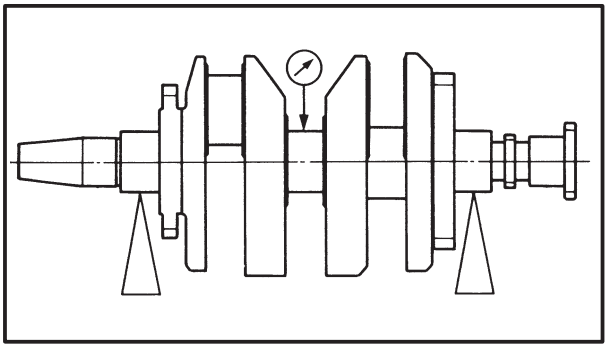
NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE

1. Check:
   - timing chain
     Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.
2. Check:
   - timing chain guide (intake side)
     Damage/wear → Replace the timing chain guide. (intake side)



EAS00395

CHECKING THE CRANKSHAFT AND CONNECTING RODS

1. Measure:
   • crankshaft runout
   Out of specification → Replace the crankshaft.

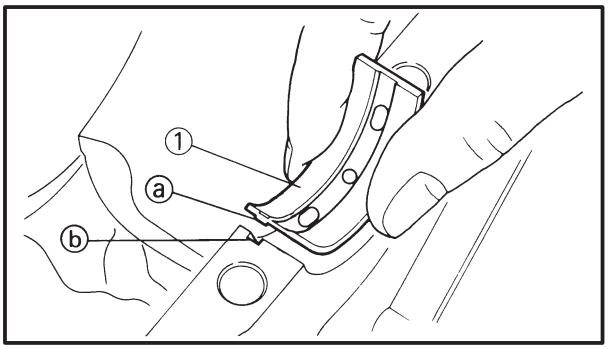
Crankshaft runout
Less than 0.03 mm

2. Check:
   • crankshaft journal surfaces
   • crankshaft pin surfaces
   • bearing surfaces
   Scratches/wear → Replace the crankshaft.
3. Measure:
   • crankshaft-journal-to-crankshaft-journal-bearing clearance
   Out of specification → Replace the crankshaft journal bearings.

Crankshaft-journal-to-crankshaft-journal-bearing clearance
0.020 ~ 0.038 mm

CAUTION:

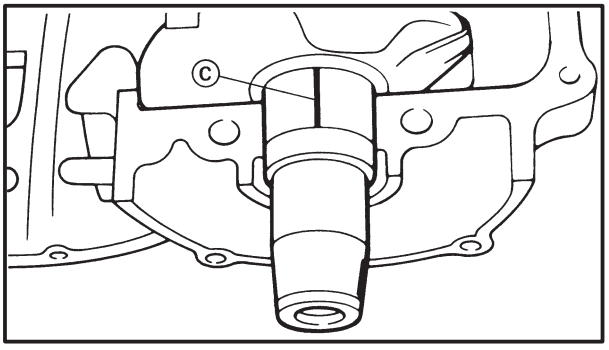
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.



a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.
c. Install the crankshaft journal upper bearings ① and the crankshaft into the upper crankcase.

NOTE:

Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.



d. Put a piece of Plastigauge® ⓒ on each crankshaft journal.

NOTE:

Do not put the Plastigauge® over the oil hole in the crankshaft journal.

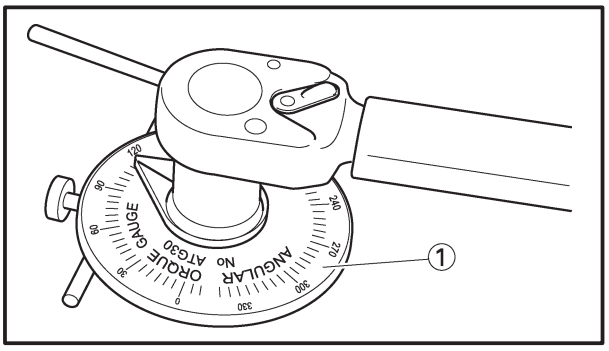
e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

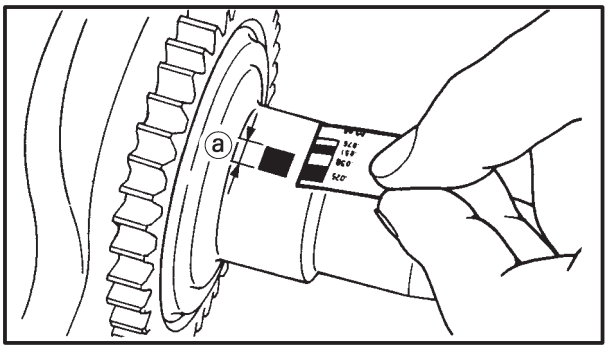
NOTE:

- Align the projections of the crankshaft journal lower bearings with the notches in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

Crankcase bolt
Initial 10 Nm (1.0 m•kg)
2nd 20 Nm (2.0 m•kg)
Final 55°





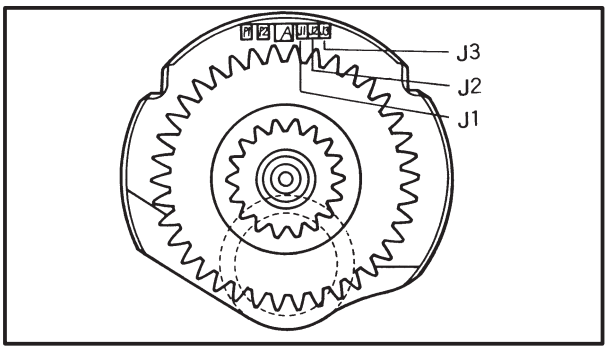
CAUTION:

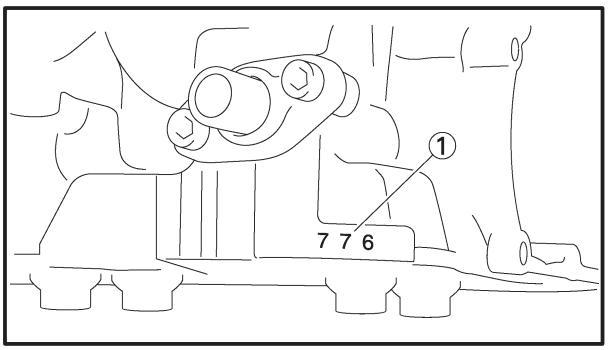
- **Use an angle torgue gauge ① and tighten at the correct angle.**
- **If an angle torque gauge is not available, do not tighten at an angle because accurate tightening cannot be expected.**
  Thightening in this case should be controlled by torgue and final tightening should be to 41 Nm (4.1 m•kg).

NOTE:

Lubricate the crankcase bolt threads with engine oil.

g. Remove the lower crankcase and the crankshaft journal lower bearings.
h. Measure the compressed Plastigauge®width ⓐ on each crankshaft journal. If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.





4. Select:
   • Crankshaft journal bearings (J1 ~ J3)

NOTE:

- The numbers [A] stamped into the crankshaft web and the numbers ① stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J1 ~ J3" refer to the bearings shown in the crankshaft illustration.
- If "J1 ~ J3" are the same, use the same size for all of the bearings.

For example, if the crankcase "J1" and crankshaft web "J1" numbers are "6" and "2" respectively, then the bearing size for "J1" is:

"J1" (crankcase) – "J1" (crankshaft web) =
6 – 2 = 4 (green)

CRANKSHAFT JOURNAL BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green
5	yellow
6	pink
7	red

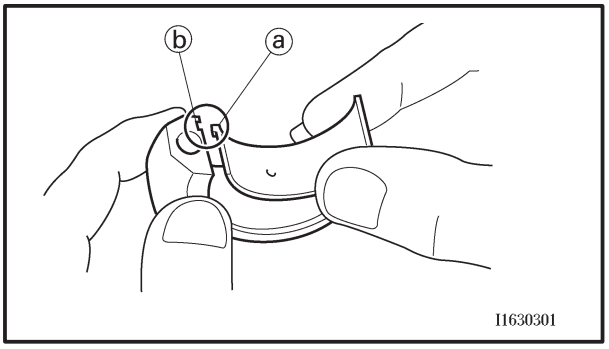
5. Measure:
   • crankshaft-pin-to-big-end-bearing clearance
   Out of specification → Replace the big end bearings.

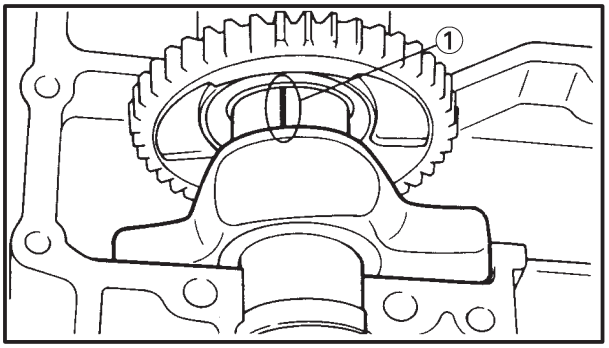
Crankshaft-pin-to-big-end-bearing clearance
0.036 ~ 0.060 mm

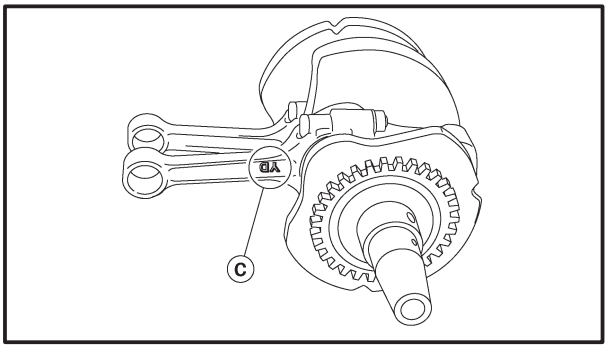
The following procedure applies to all of the connecting rods.

CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.







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

NOTE:

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

c. Put a piece of Plastigauge® ① on the crankshaft pin.
d. Assemble the connecting rod halves.

NOTE:

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with molybdenum disulfide grease.
- Make sure the "Y" mark ⓒ on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters on both the connecting rod and connecting rod cap are aligned.

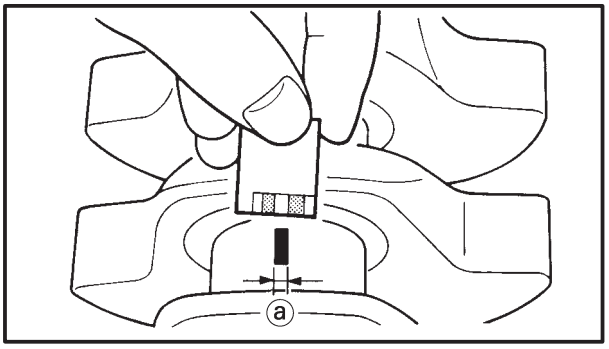
e. Tighten the connecting rod nuts.

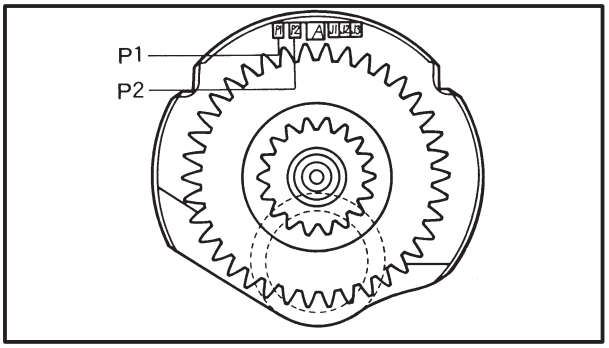
CAUTION:

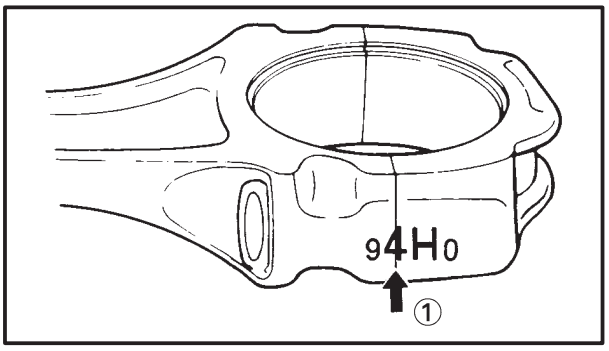
- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 52 and 62 Nm (5.2 and 6.2 m•kg). Once you reach 52 Nm (5.2 m•kg), DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 52 and 62 Nm (5.2 and 6.2 m•kg), loosen the connecting rod nut to less than 52 Nm (5.2 m•kg) and start again.**
  Refer to "INSTALLING THE CONNECTING RODS".

	Connecting rod nut **62 Nm (6.2 m•kg)**

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







g. Measure the compressed Plastigauge® width ⓐ on the crankshaft pin.
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

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6. Select:
   • big end bearings (P1 ~ P2)

NOTE:

- The numbers [A] stamped into the crankshaft web and the numbers ① on the connecting rods are used to determine the replacement big end bearing sizes.
- "P1" ~ "P2" refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod "P1" and the crankshaft web "P1" numbers are "4" and "1" respectively, then the bearing size for "P1" is:

"P1" (connecting rod) – "P1" (crankshaft) =
4 – 1 = 3 (brown)

BIG END BEARING COLOR CODE	
1	blue
2	black
3	brown
4	green

EAS00399

CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
   • crankcase
   Cracks/damage → Replace.
   • oil delivery passages
   Obstruction → Blow out with compressed air.

EAS00401

CHECKING THE BEARINGS

1. Check:
   • bearings
   Clean and lubricate the bearings, then rotate the inner race with your finger.
   Rough movement → Replace.

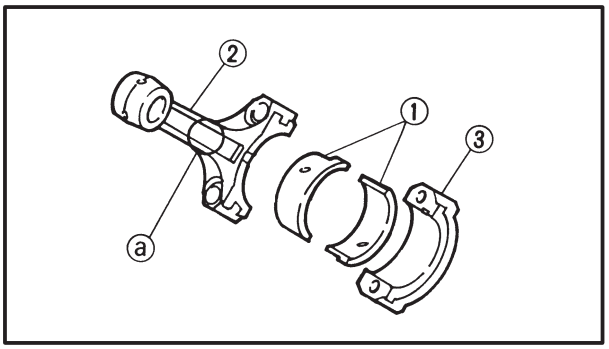
EAS00402
CHECKING THE CIRCLIPS AND WASHERS
1. Check:
   - circlips
     Bends/damage/looseness → Replace.
   - washers
     Bends/damage → Replace.

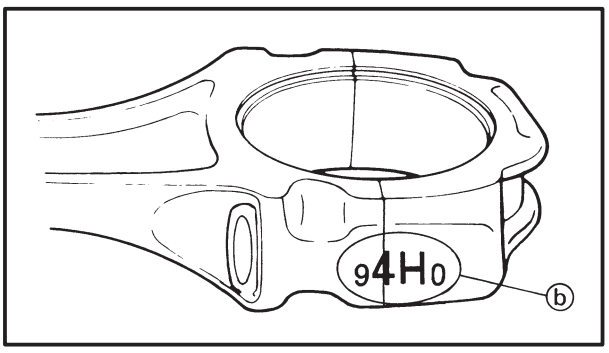
EAS00404
INSTALLING THE CONNECTING RODS
1. Lubricate:
   - bolt threads
   - nut seats
     (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide grease**

2. Lubricate:
   - crankshaft pins
   - big end bearings
   - connecting rod inner surface
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**





3. Install:
   - big end bearings ①
   - connecting rods ②
   - connecting rod caps ③
     (onto the crankshaft pins)

NOTE:
- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the "Y" marks ⓐ on the connecting rods face towards the left side of the crankshaft.
- Make sure the characters ⓑ on both the connecting rod and connecting rod cap are aligned.

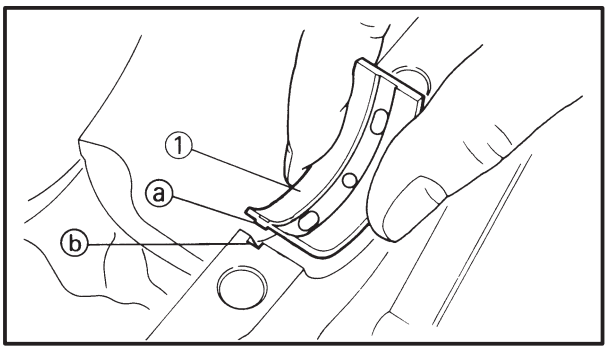
4. Align:
   • bolt heads
     (with the connecting rod caps)
5. Tighten:
   • connecting rod nuts



Connecting rod nuts
62 Nm (6.2 m•kg)

CAUTION:

- **When tightening the connecting rod nuts, be sure to use an F-type torque wrench.**
- **Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 52 and 62 Nm (5.2 and 6.2 m•kg). Once you reach 52 Nm (5.2 m•kg) DO NOT STOP TIGHTENING until the specified torque is reached. If the tightening is interrupted between 52 and 62 Nm (5.2 and 6.2 m•kg), loosen the connecting rod nut to less than 52 Nm (5.2 m•kg) and start again.**

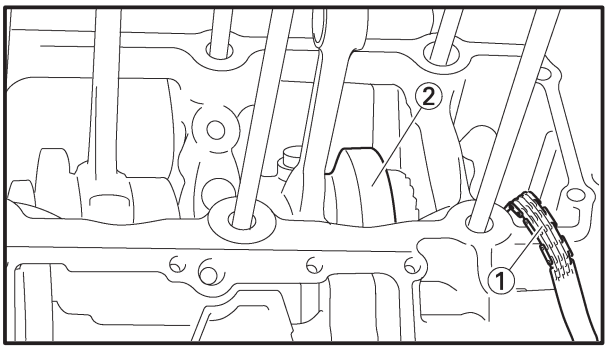


EAS00407
INSTALLING THE CRANKSHAFT

1. Install:
   - crankshaft journal upper bearings (into the upper crankcase)

NOTE:

- Align the projections ⓐ on the crankshaft journal upper bearings ① with the notches ⓑ in the upper crankcase.
- Be sure to install each crankshaft journal upper bearing in its original place.



2. Install:
   - timing chain ① (onto the crankshaft sprocket)
   - crankshaft assembly ②

NOTE:

- Pass the timing chain through the timing chain cavity.
- To prevent the timing chain from falling into the crankcase, fasten it with a wire.

EAS00415

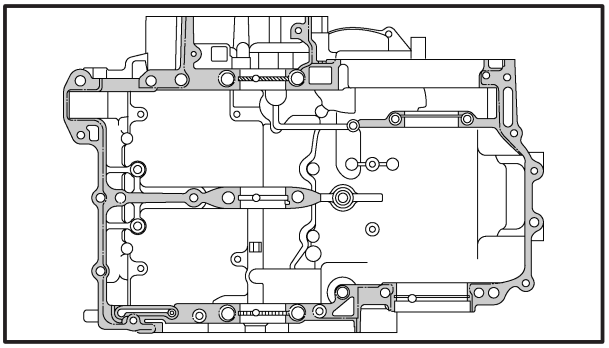
ASSEMBLING THE CRANKCASE

1. Lubricate:
   • crankshaft journal bearings
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

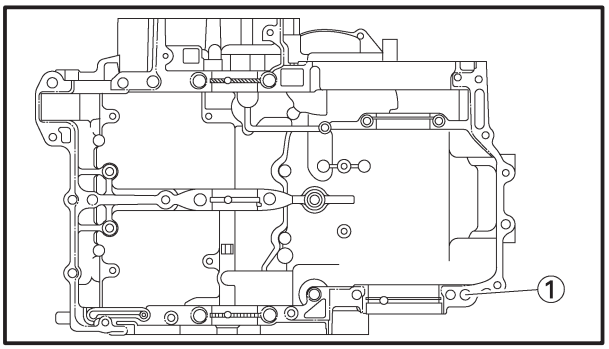
2. Apply:
   • sealant
   (onto the crankcase mating surfaces)

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

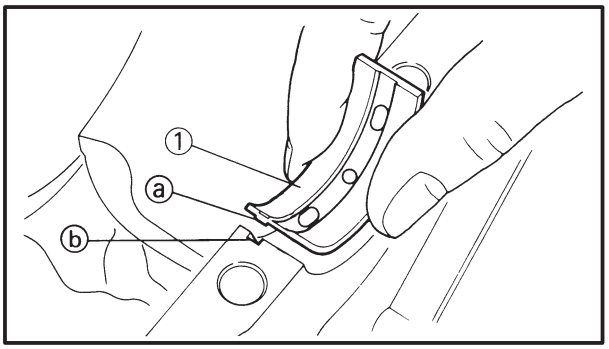


NOTE:

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.



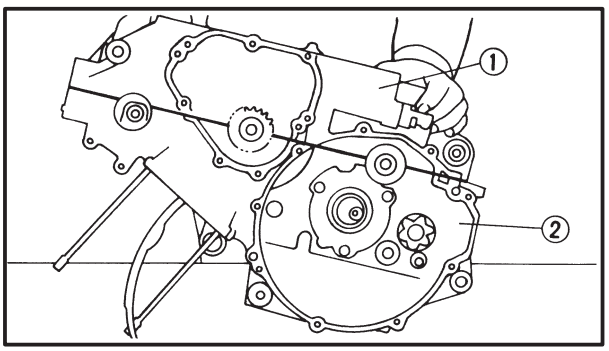
3. Install:
   • dowel pin ①
   • oil jet nozzle



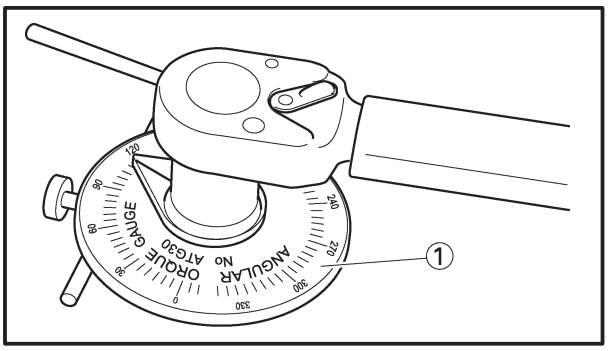
4. Install:
   • crankshaft journal lower bearings
   (into the lower crankcase)

NOTE:

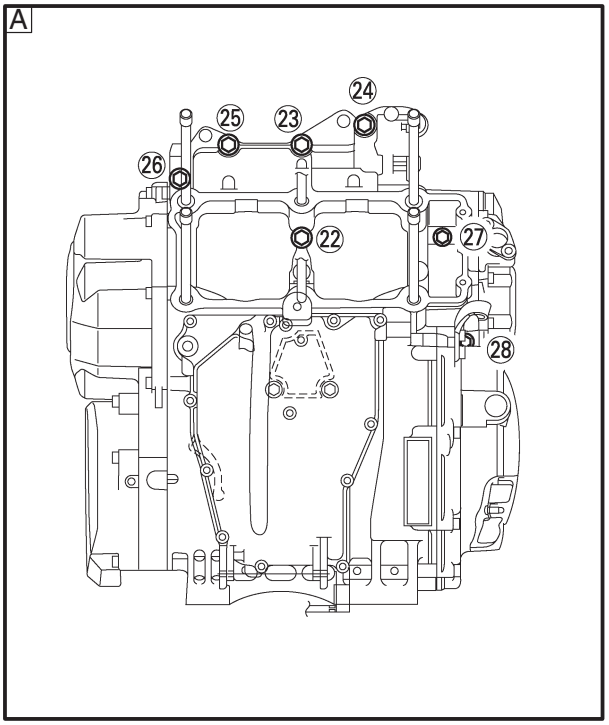
- Align the projections ⓐ on the crankshaft journal lower bearings ① with the notches ⓑ in the lower crankcase.
- Install each crankshaft journal lower bearing in its original place.



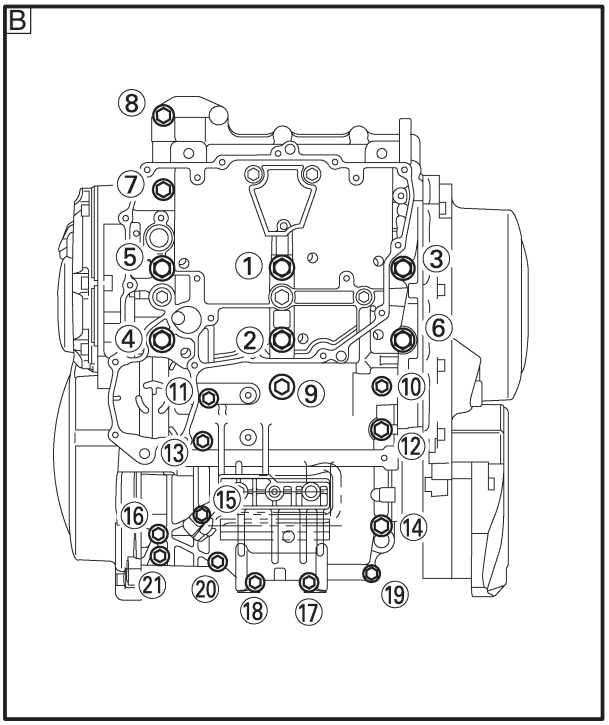
5. Install:
   • lower crankcase ①
   (onto the upper crankcase ②)



A



B



6. Install:
   - crankcase bolts (M10)

initial	10 Nm (1.0 m•kg)
2nd	20 Nm (2.0 m•kg)
final	55°

CAUTION:

- **Use an angle torgue gauge ① and tighten at the correct angle.**
- **If an angle torgue gauge is not available, do not tighten at an angle because accurate tightening cannot be expected.**
  Thightening in this case should be controlled by torgue and final tightening should be to 41 Nm (4.1 m•kg).

   - crankcase bolts (M6)

12 Nm (1.2 m•kg)

   - crankcase bolts (M8)

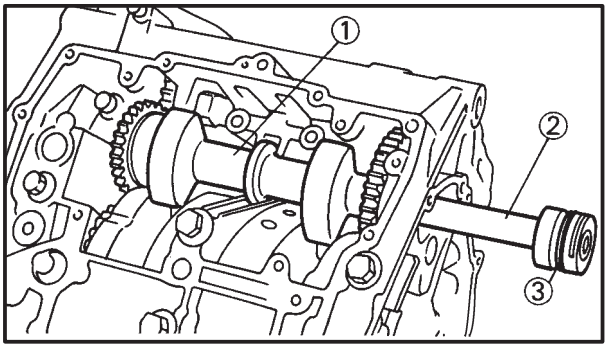
24 Nm (2.4 m•kg)

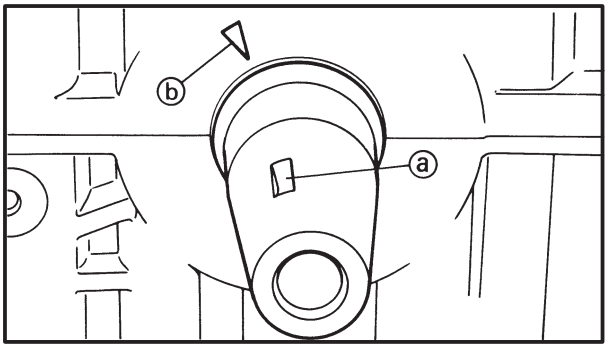
NOTE:

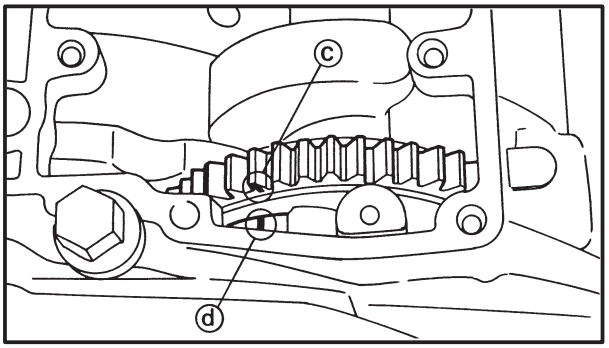
- Lubricate the bolt threads (① ~ ㉘) with engine oil.
- Tighten the bolts in the tightening sequence cast on the crankcase.
- Install a copper washer on bolts ⑯ ㉒ ㉔ ㉖.

A Upper crankcase
B Lower crankcase

7. Install:
   - timing chain guide (intake)
   - cover plate







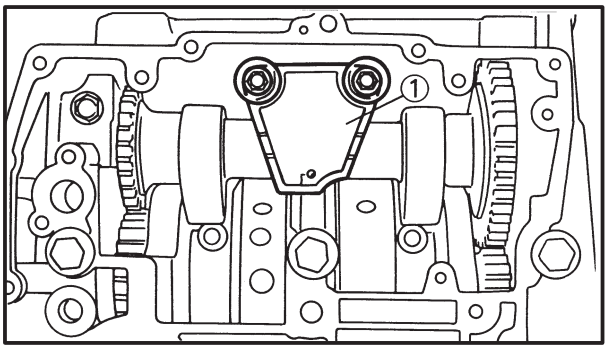
EAS00411
INSTALLING THE BALANCER SHAFT

1. Install:
   - front balancer shaft weight ①
   - front balancer shaft ②
   - O-ring New ③
   - plate (balancer shaft)

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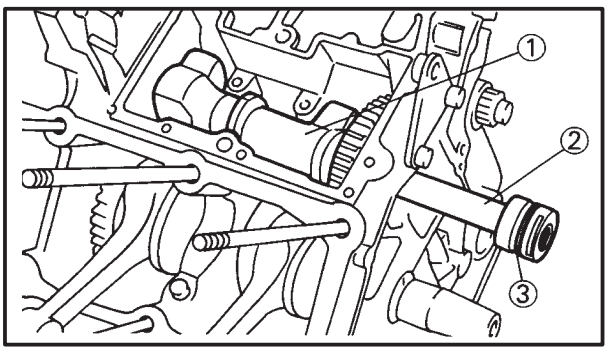
a. Turn the crankshaft until the keyway ⓐ on the crankshaft is aligned with the mark ⓑ on the crankcase.
b. While holding the crankshaft, install the front balancer shaft weight and align the mark ⓒ on the front balancer shaft gear with the mark ⓓ on the crankcase.
c. Install the front balancer shaft.

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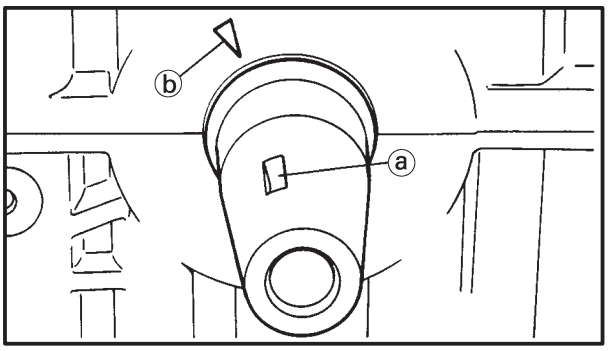


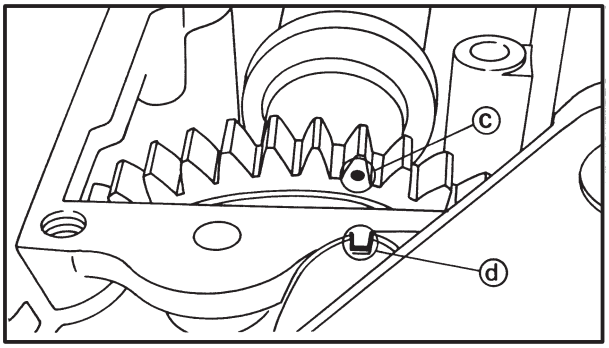
2. Install:
   - dowel pins
   - front balancer holder ①

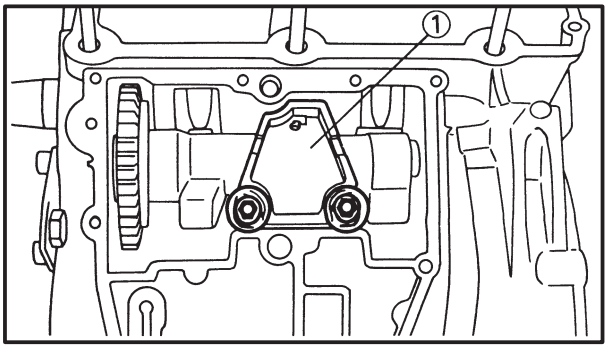
10 Nm (1.0 m•kg)



3. Install:
   - rear balancer shaft weight ①
   - rear balancer shaft ②
   - O-ring New ③







a. Turn the crankshaft until the keyway ⓐ on the crankshaft is aligned with the mark ⓑ on the crankcase.
b. While holding the crankshaft, install the rear balancer shaft weight and align the mark ⓒ on the rear balancer shaft gear with the mark ⓓ on the crankcase.
c. Install the rear balancer shaft.

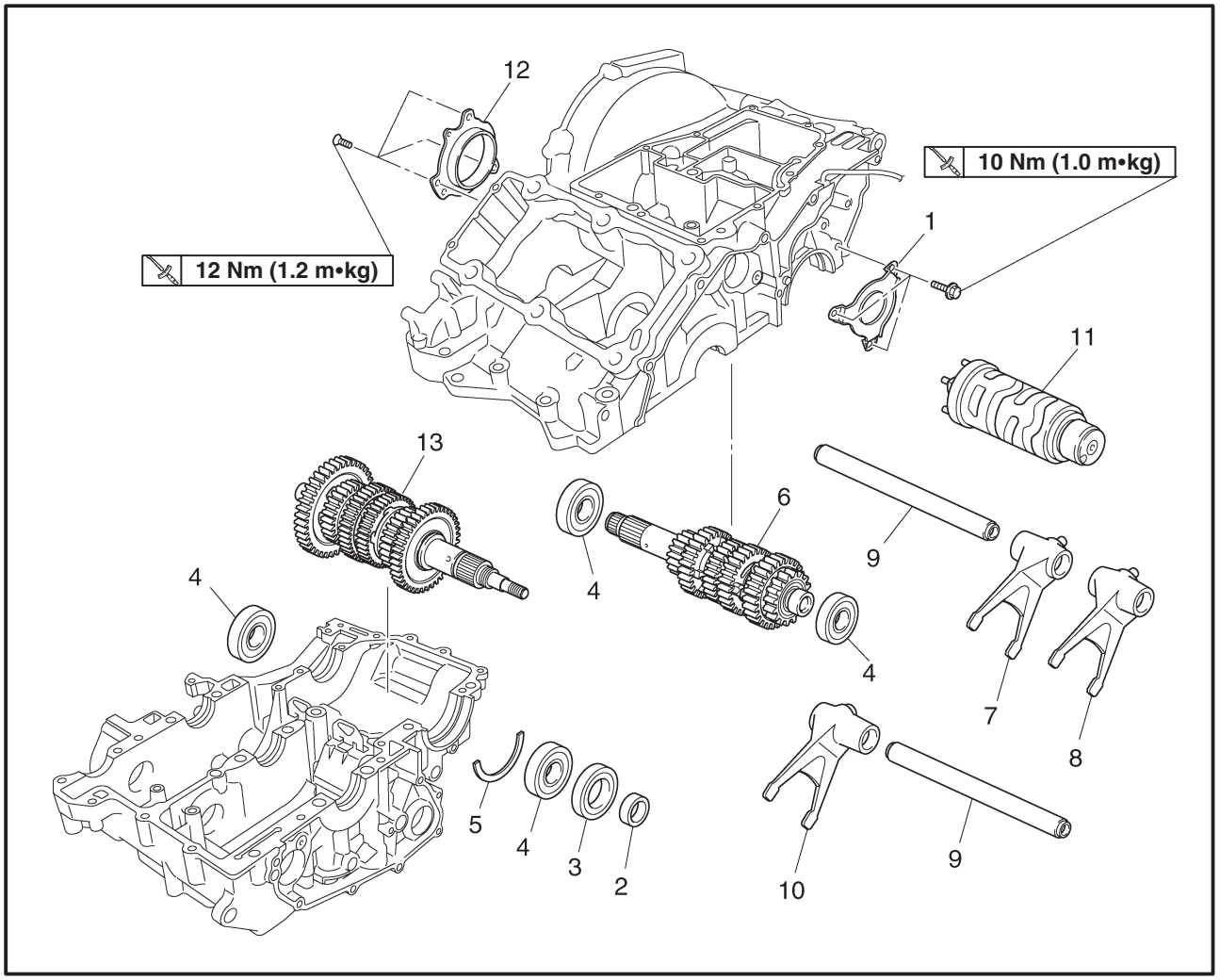
4. Install:
   • dowel pins
   • rear balancer holder ①

10 Nm (1.0 m•kg)

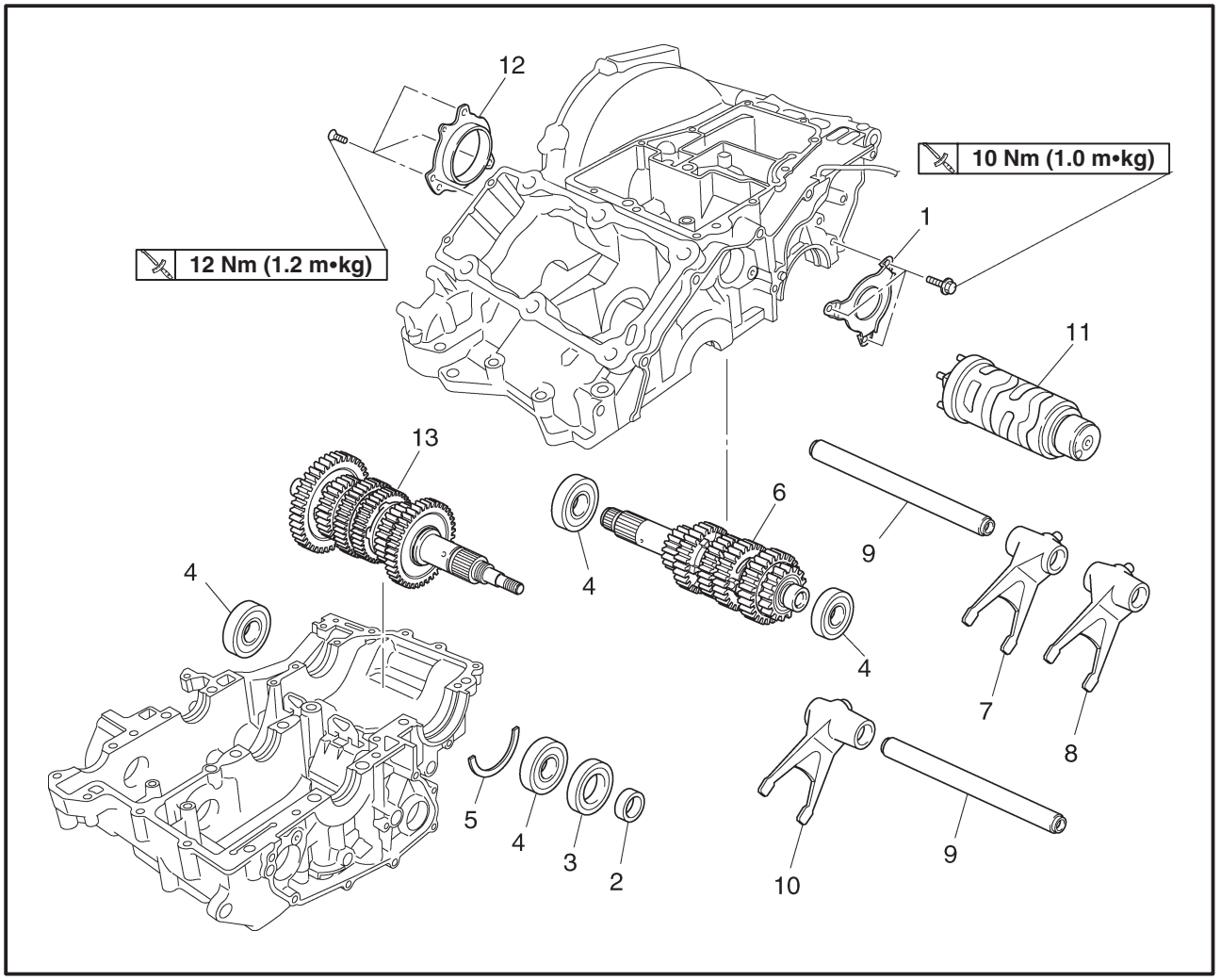
EAS00419

TRANSMISSION

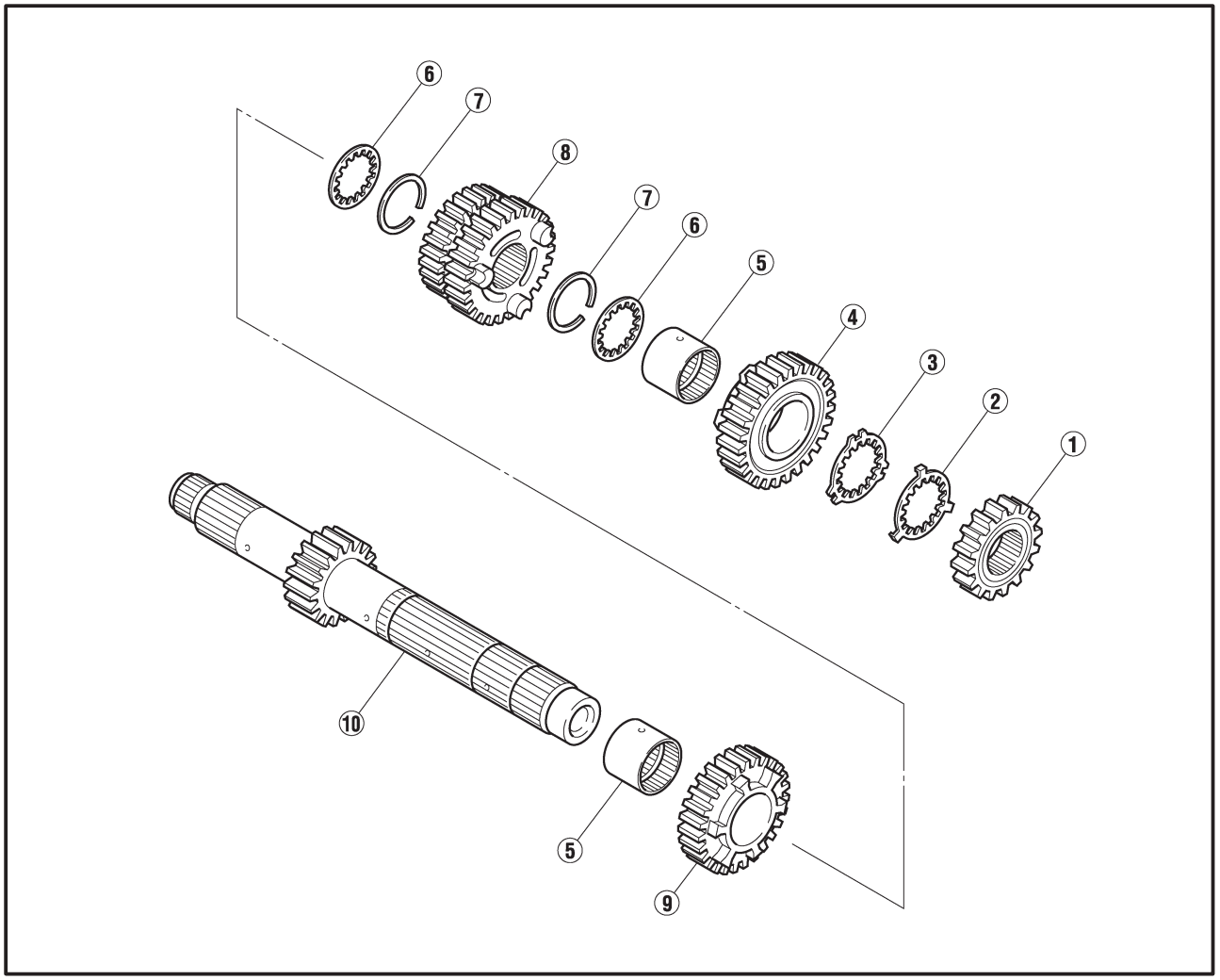
TRANSMISSION, SHIFT DRUM ASSEMBLY, AND SHIFT FORKS



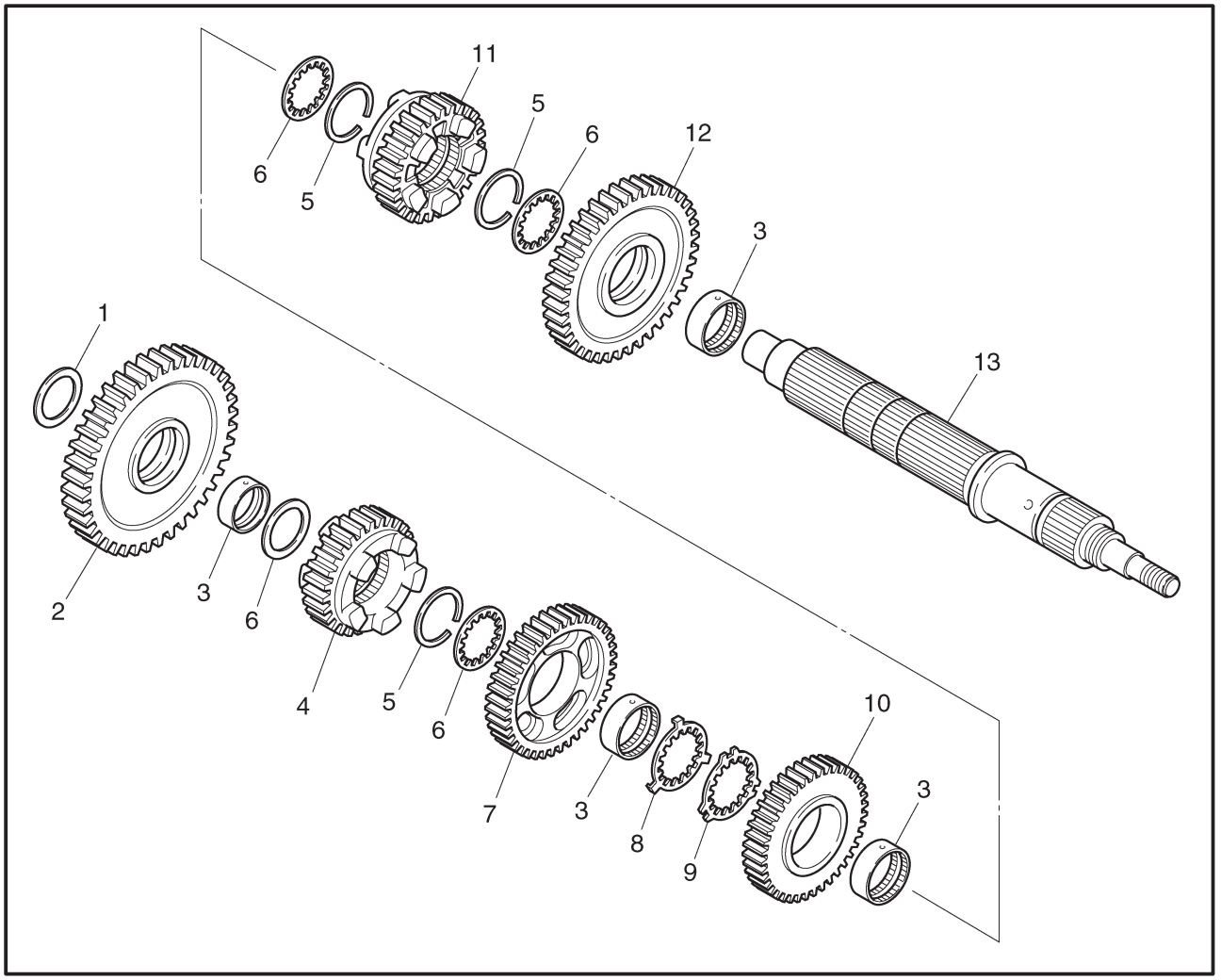
Order	Job/Part	Q'ty	Remarks
	Removing the transmission, shift drum assembly, and shift forks		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
1	Cover plate	1	
2	Collar	1	
3	Oil seal	1	
4	Bearing	4	
5	Circrip	1	
6	Main axle assembly	1	
7	Shift fork "R"	1	
8	Shift fork "L"	1	
9	Shift fork guide bar	2	
10	Shift fork "C"	1	



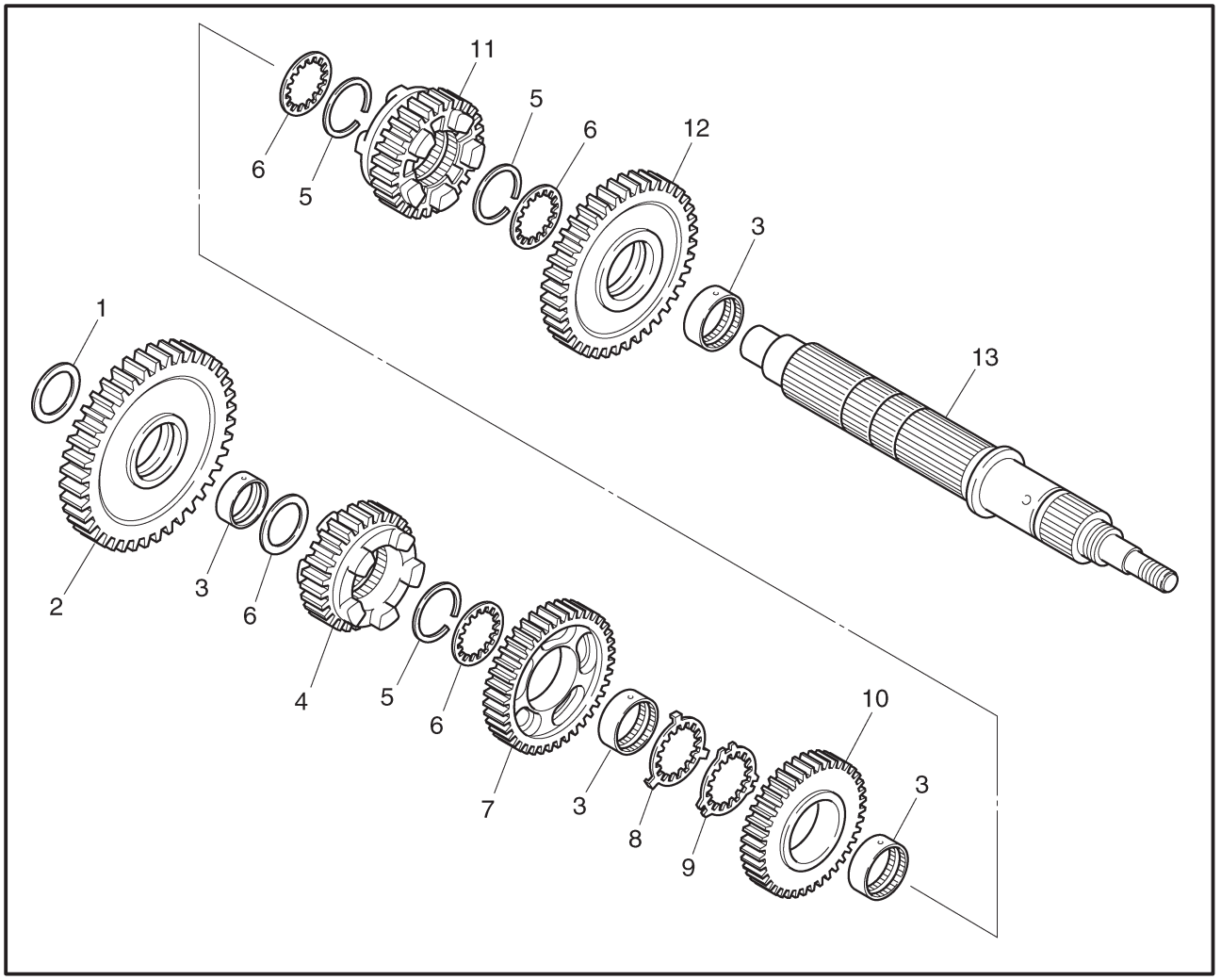
Order	Job/Part	Q'ty	Remarks
11	Shift drum	1	
12	Bearing housing	1	
13	Drive axle assembly	1	
			For installation, reverse the removal procedure.



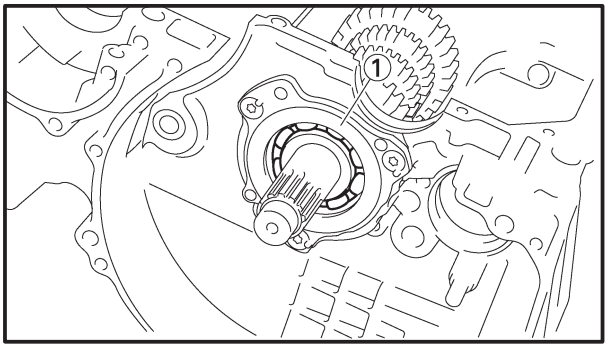
Order	Job/Part	Q'ty	Remarks
	Disassembling the main axle assembly.		Disassemble the parts in the order listed.
①	2nd pinion gear	1	
②	Lock washer	1	
③	Lock washer retainer	1	
④	6th pinion gear	1	
⑤	Collar	2	
⑥	Washer	2	
⑦	Circlip	2	
⑧	3rd/4th pinion gear	1	
⑨	5th pinion gear	1	
⑩	Main axle	1	
			For assembly, reverse the disassembly procedure.

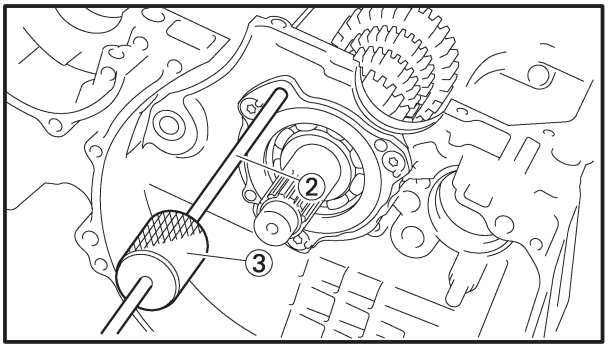


Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly.		Disassemble the parts in the order listed.
①	Washer	1	
②	1st wheel gear	1	
③	Collar	4	
④	5th wheel gear	1	
⑤	Circlip	3	
⑥	Washer	4	
⑦	3rd wheel gear	1	
⑧	Lock washer	1	
⑨	Lock washer retainer	1	
⑩	4th wheel gear	1	



Order	Job/Part	Q'ty	Remarks
⑪	6th wheel gear	1	
⑫	2nd wheel gear	1	
⑬	Drive axle	1	
			For assembly, reverse the disassembly procedure.





EAS00420

REMOVING THE TRANSMISSION

1. Remove:
   - drive axle assembly
   - bearing housing ①
     (with the Torx® wrench)

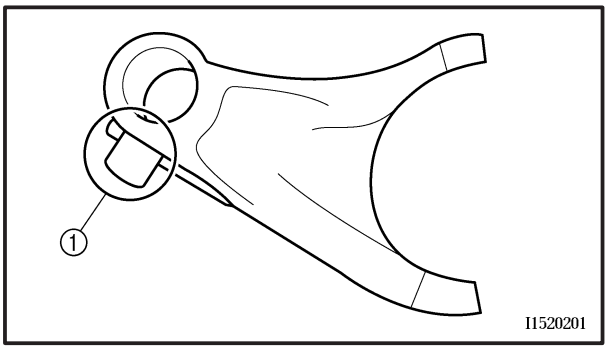
NOTE:

Remove the bearing housing with the slide hammer bolt ② and weight ③.



Slide hammer bolt
90890-01083
Weight
90890-01084

2. Remove:
   - main axle assembly (from the clutch side)

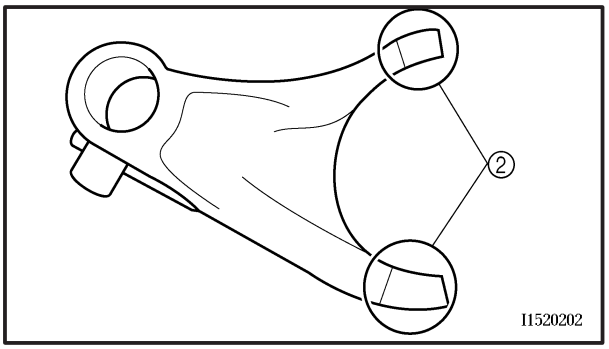


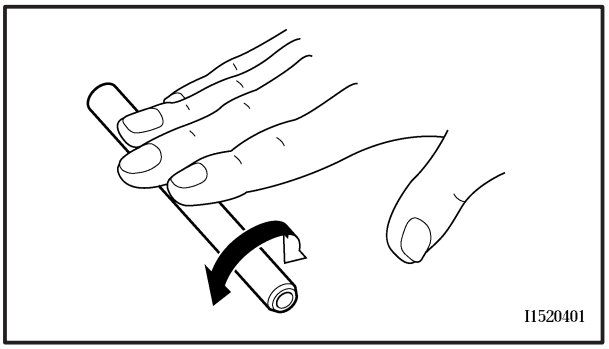
EAS00421

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.

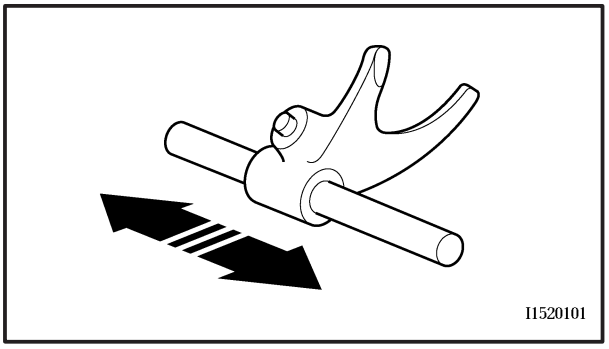




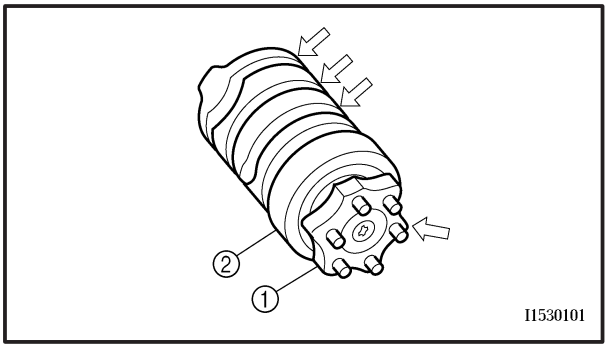
2. Check:
   - shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

⚠ WARNING

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


I1520101

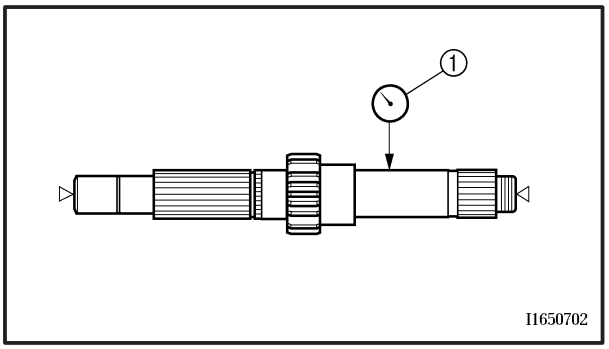
3. Check:
   • shift fork movement
   (along the shift fork guide bar)
   Rough movement → Replace the shift forks and shift fork guide bar as a set.



I1530101

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.

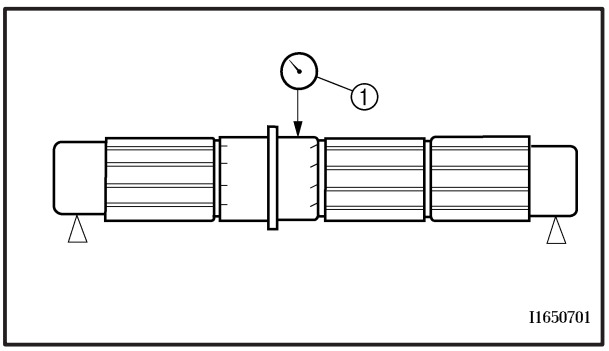


I1650702

EAS00425
CHECKING THE TRANSMISSION

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

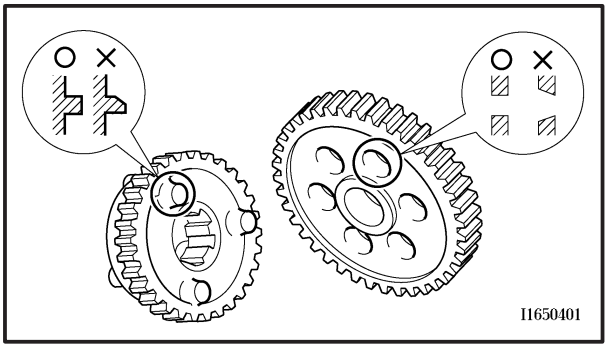
Main axle runout limit
0.08 mm



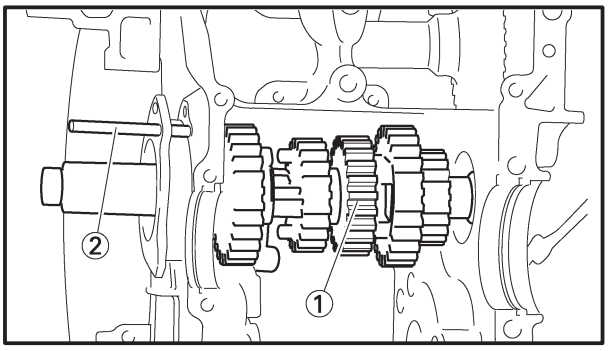
I1650701

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

Drive axle runout limit
0.08 mm



3. Check:
   • transmission gears
   Blue discoloration/pitting/wear → Replace the defective gear(s).
   • transmission gear dogs
   Cracks/damage/rounded edges → Replace the defective gear(s).
4. Check:
   • transmission gear engagement
   (each pinion gear to its respective wheel gear)
   Incorrect → Reassemble the transmission axle assemblies.
5. Check:
   • transmission gear movement
   Rough movement → Replace the defective part(s).
6. Check:
   • circlips
   Bends/damage/looseness → Replace.

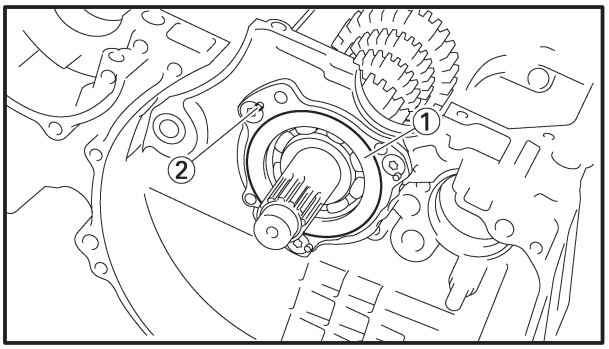


EAS00429
INSTALLING THE TRANSMISSION

1. Install:
   • main axle assembly ①

NOTE:

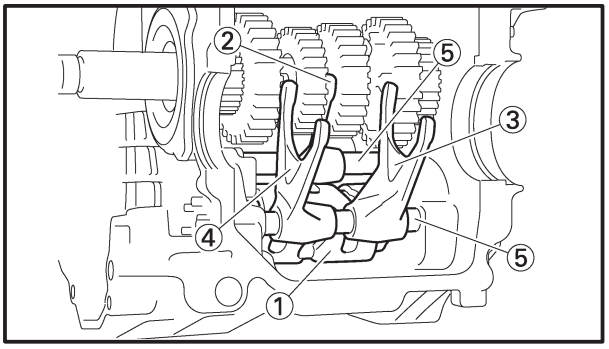
When installing the main axle assembly, use a pin ② to align the bearing housing bolt hole with the corresponding hole in the lower crankcase.



2. Install:
   • bearing housing ① **12 Nm (1.2 m•kg)**

NOTE:

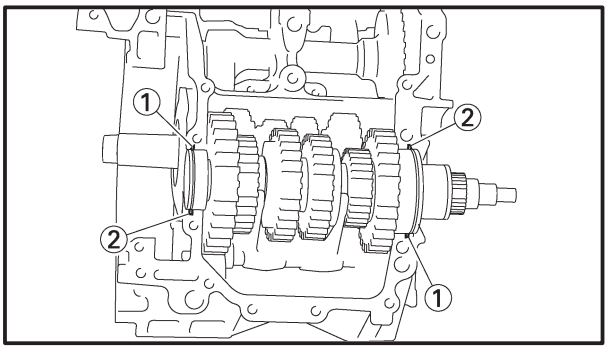
After tightening the bearing housing bolts, stake the outer edge of each bolt head with a center punch ② to prevent them from loosening.



3. Install:
   - shift drum assembly ①
   - shift fork “C” ②
   - shift fork “L” ③
   - shift fork “R” ④
   - shift fork guide bars ⑤

NOTE:

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: “R”, “C”, “L”.
- Install the shift fork guide bars with the tapered end a facing towards the clutch.



4. Install:
   - drive axle assembly

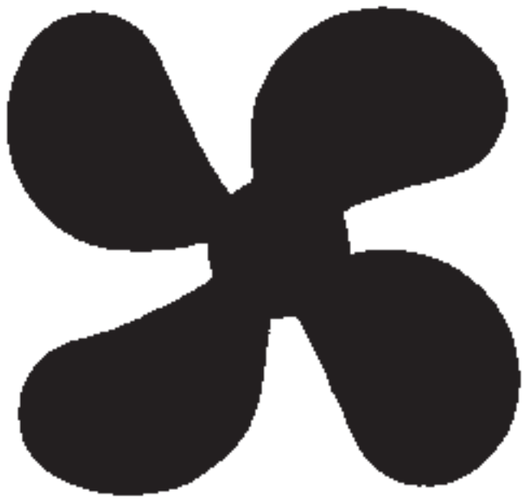
NOTE:

- The drive axle bearing pin must face towards the front of the crankcase.
- Make sure the drive axle bearing circlips ① are inserted into the grooves ② in the upper crankcase.

5. Check:
   - transmission
     Rough movement → Repair.

NOTE:

Oil each gear, shaft, and bearing thoroughly.



COOL 6

CHAPTER 6
COOLING SYSTEM

RADIATOR 6-1
CHECKING THE RADIATOR 6-2
INSTALLING THE RADIATOR 6-3

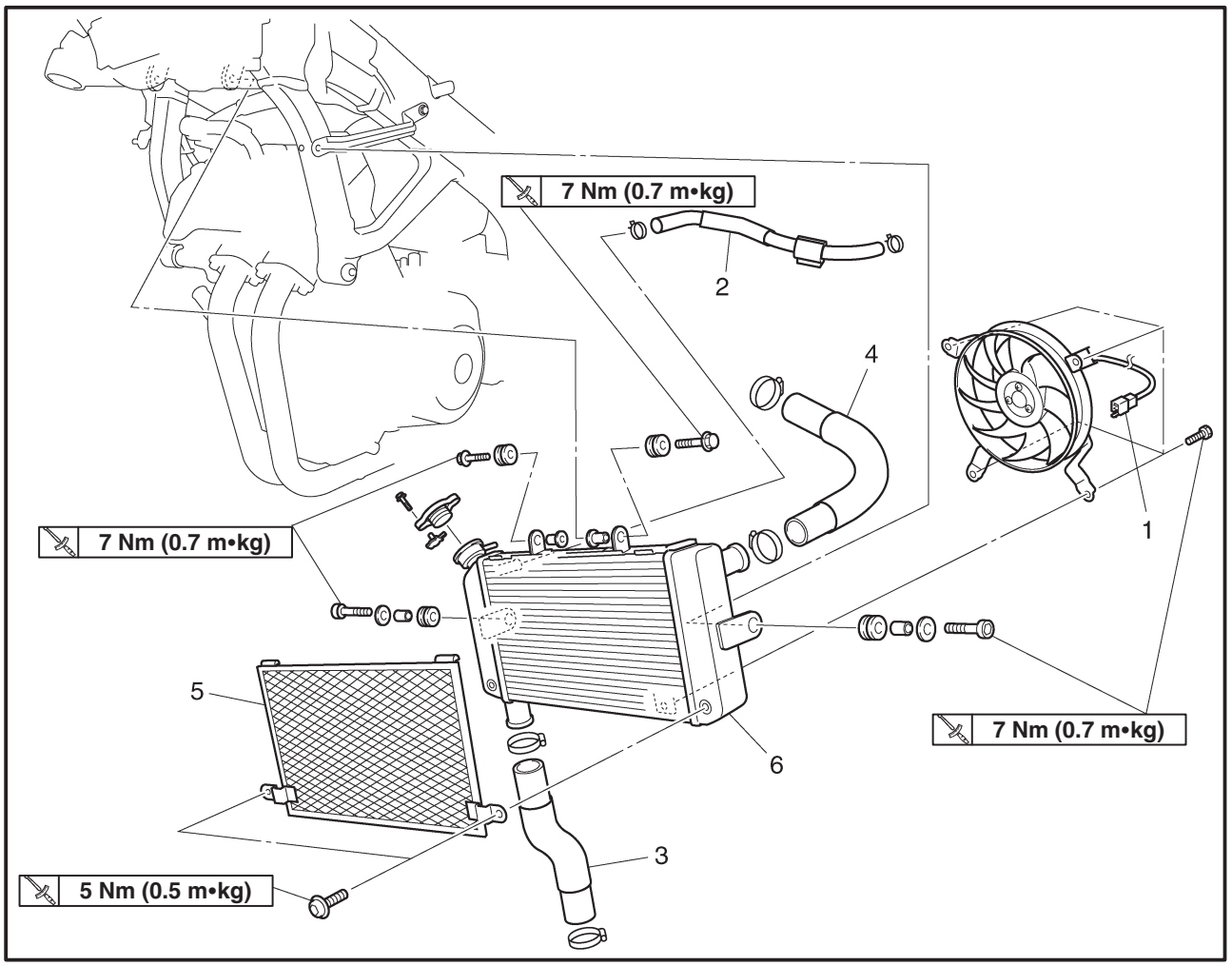
THERMOSTAT 6-4
THERMOSTAT ASSEMBLY 6-4
CHECKING THE THERMOSTAT 6-6
ASSEMBLING THE THERMOSTAT ASSEMBLY 6-7
INSTALLING THE THERMOSTAT ASSEMBLY 6-7

WATER PUMP 6-8
DISASSEMBLING THE WATER PUMP 6-10
CHECKING THE WATER PUMP 6-10
ASSEMBLING THE WATER PUMP 6-11
INSTALLING THE WATER PUMP 6-12

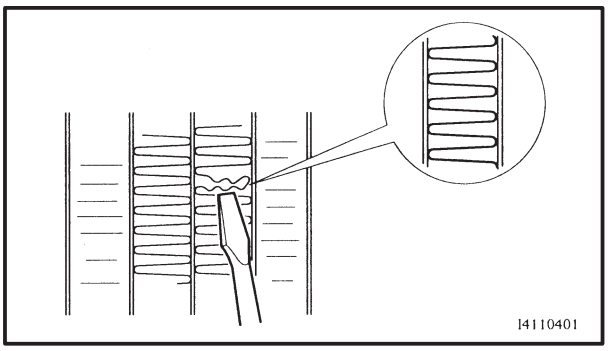
EAS00454

COOLING SYSTEM

RADIATOR



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Side cowlings		Refer to "FRONT COWLING".
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
1	Radiator fan coupler	1	Disconnect.
2	Coolant reservoir hose	1	
3	Radiator outlet hose	1	
4	Radiator inlet hose	1	
5	Radiator cover	1	
6	Radiator	1	
			For installation, reverse the removal procedure.



EAS00455
CHECKING THE RADIATOR

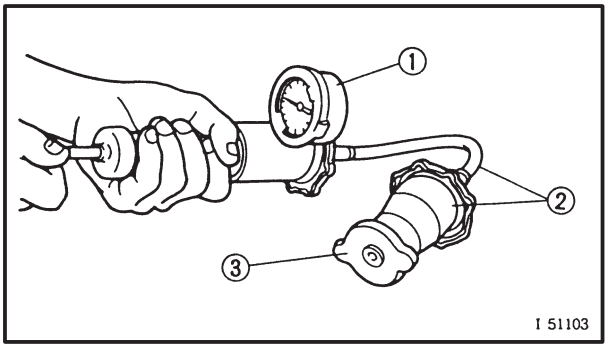
1. Check:
   • radiator fins
   Obstruction → Clean.
   Apply compressed air to the rear of the radiator.
   Damage → Repair or replace.

NOTE:
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
   • radiator hoses
   • radiator pipes
   Cracks/damage → Replace.

3. Measure:
   • radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
95 ~ 125 kPa
(0.95 ~ 1.25 kg/cm²)



a. Install the radiator cap tester ① and radiator cap tester adapter ② to the radiator cap ③.

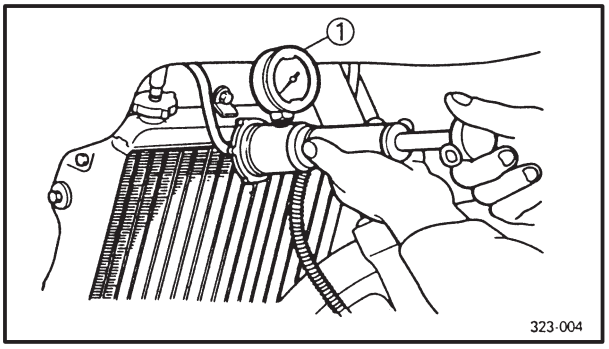
Radiator cap tester
90890-01325
Radiator cap tester adapter
90890-01352

b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

4. Check:
   • radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to “COOLING SYSTEM” in chapter 8.

EAS00456
INSTALLING THE RADIATOR

1. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.



2. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.

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a. Attach the radiator cap tester ① to the radiator.



Radiator cap tester
90890-01325
Radiator cap tester adapter
90890-01352

b. Apply 100 kPa (1.0 kg/cm^2) of pressure.
c. Measure the indicated pressure with the gauge.

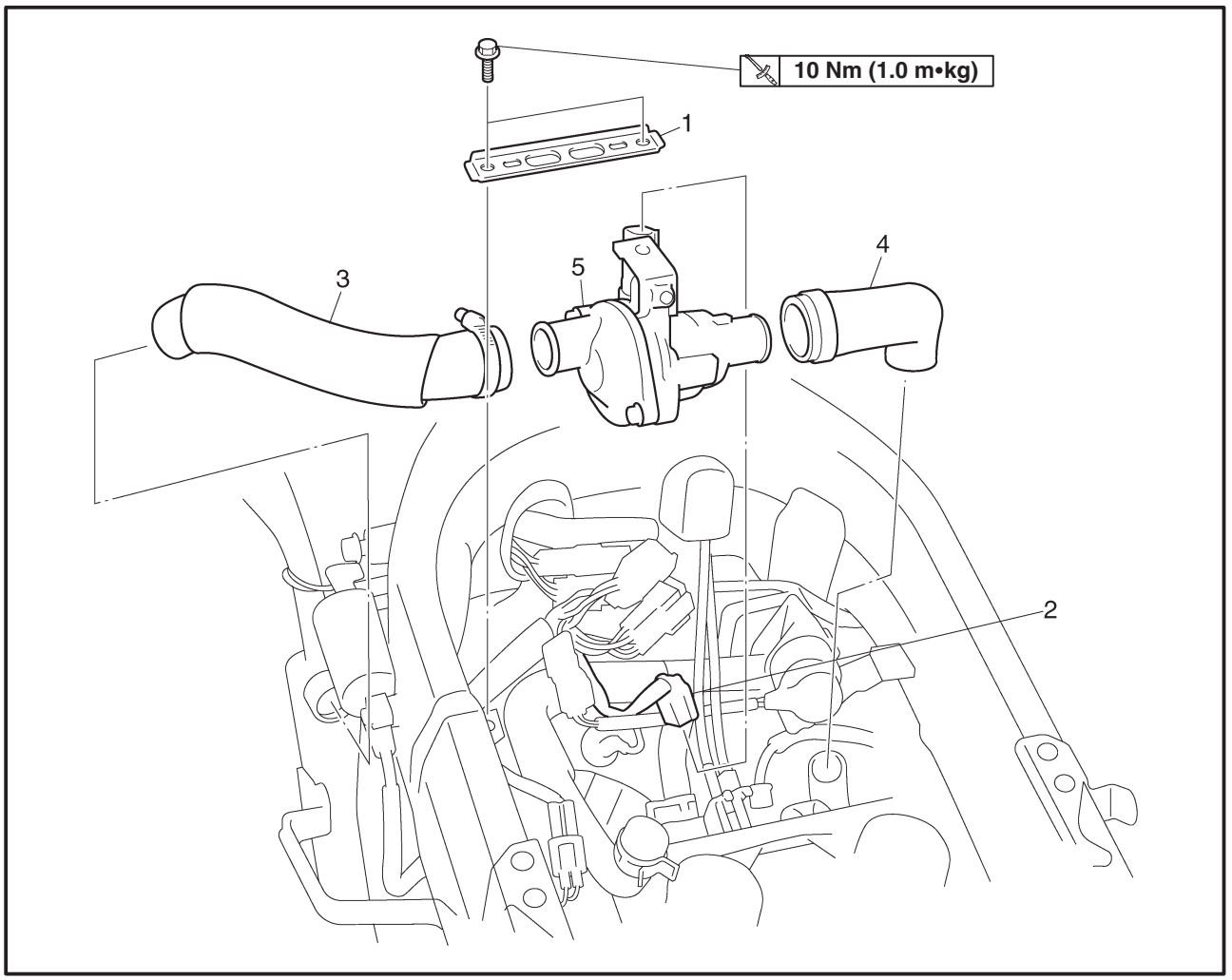
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3. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR”.

EAS00460

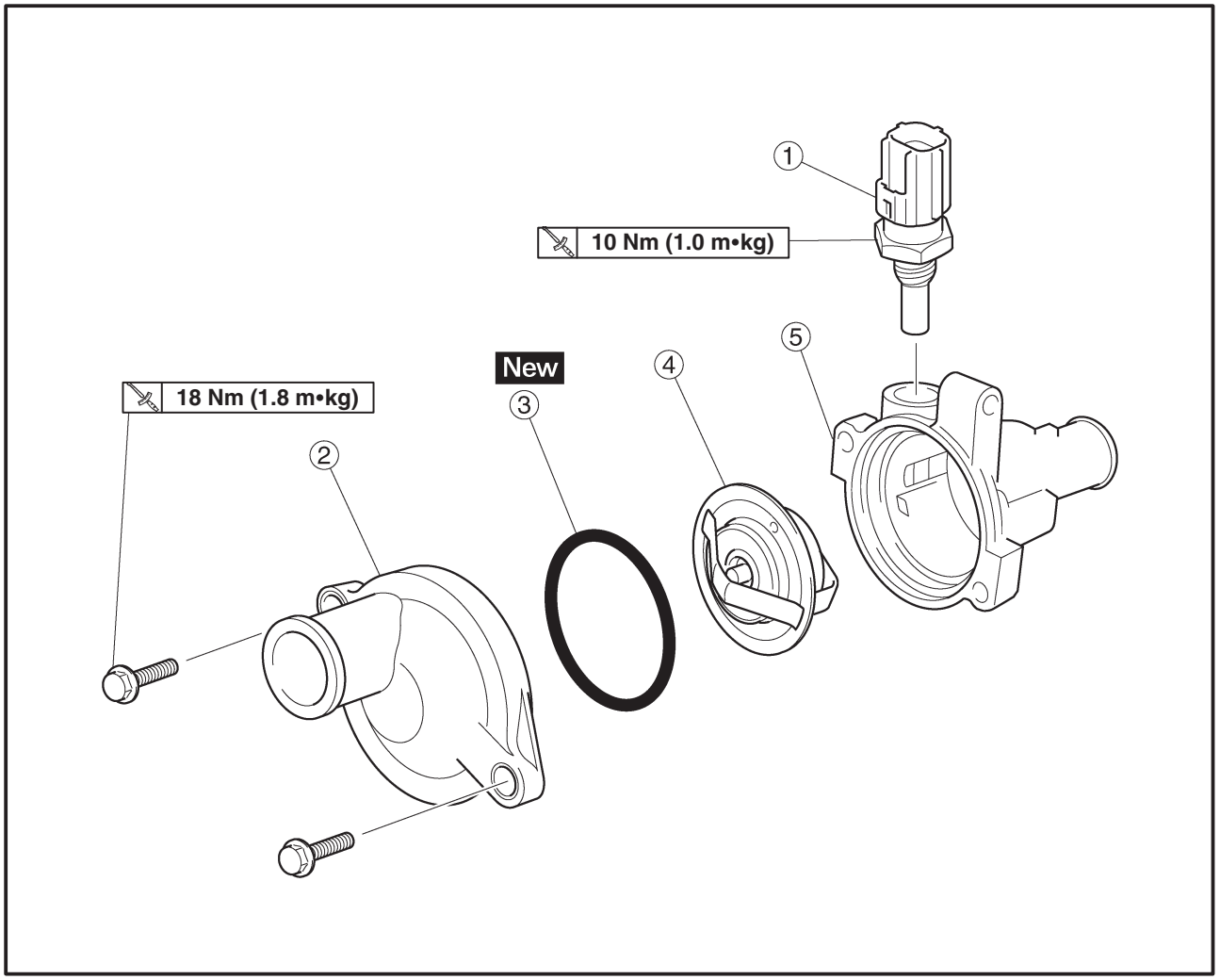
THERMOSTAT

THERMOSTAT ASSEMBLY

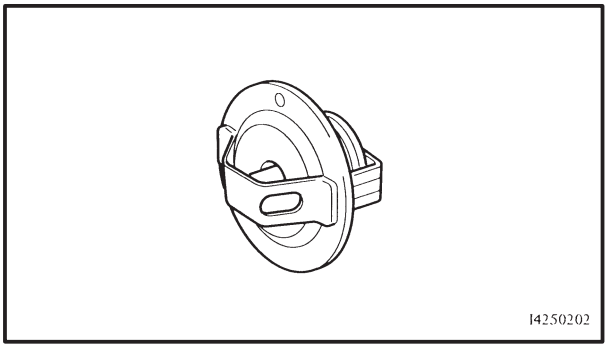


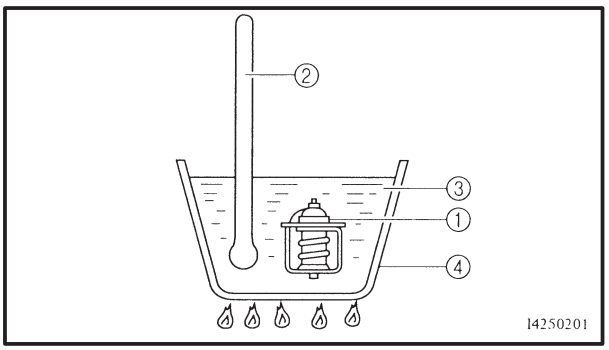
Order	Job/Part	Q'ty	Remarks
	Removing the thermostat assembly		Remove the parts in the order listed.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Coolant		Drain.
1	Bracket	1	
2	Thermo unit lead coupler	1	Disconnect.
3	Thermostat inlet hose	1	
4	Thermostat outlet hose	1	
5	Thermostat assembly	1	
			For installation, reverse the removal procedure.

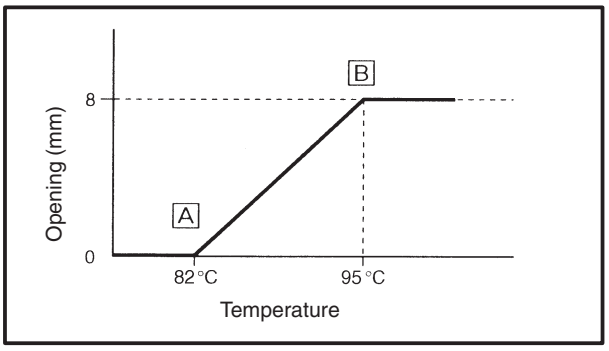
EAS00461

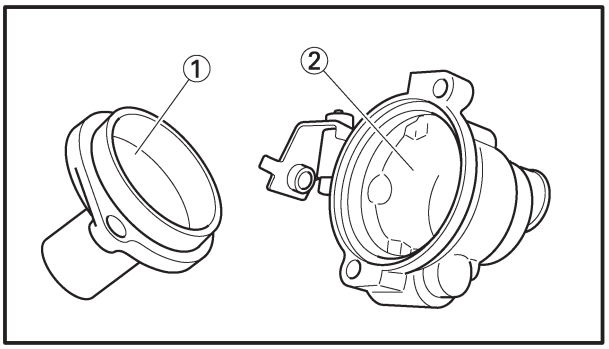


Order	Job/Part	Q'ty	Remarks
	Disassembling the thermostat assembly		Disassembly the parts in the order listed.
①	Thermo unit	1	
②	Thermostat cover	1	
③	O-ring	1	
④	Thermostat	1	
⑤	Thermostat housing	1	
			For assembly, reverse the disassembly procedure.









EAS00463
CHECKING THE THERMOSTAT

1. Check:
   • thermostat ①
   Does not open at 82 ~ 95°C → Replace.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Suspend the thermostat in a container filled with water.
b. Slowly heat the water.
c. Place a thermometer in the water.
d. While stirring the water, observe the thermostat and thermometer's indicated temperature.

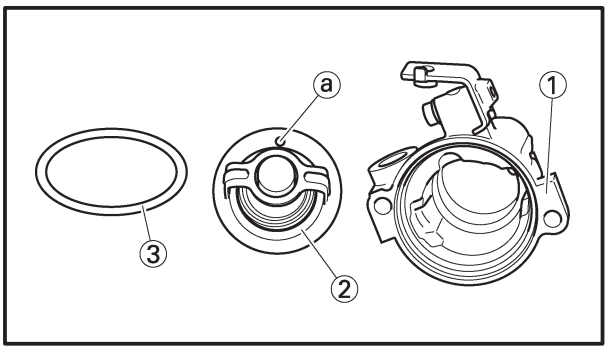
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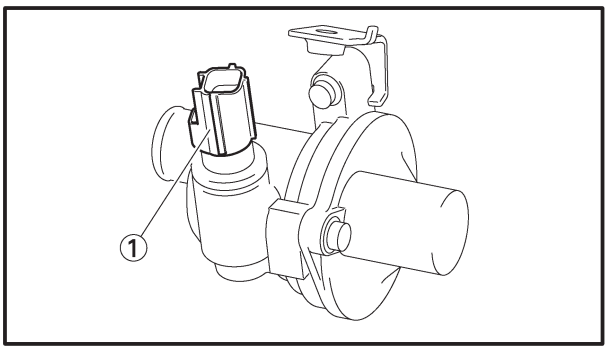
① Thermostat
② Thermometer
③ Water
④ Container
A Fully closed
B Fully open

NOTE:

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:
   • thermostat housing cover ①
   • thermostat housing ②
   Cracks/damage → Replace.
3. Measure:
   • radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR".
4. Check:
   • thermostat housing cover O-ring
   • thermostat housing inlet pipe O-ring
   • thermostat inlet pipe
   • water pump outlet pipe
   Damage → Replace.





EAS00464

ASSEMBLING THE THERMOSTAT ASSEMBLY

1. Install:
   - thermostat housing ①
   - thermostat ②
   - O-ring New ③
   - thermostat housing cover

NOTE:

Install the thermostat with its breather hole ⓐ facing up.

2. Install:
   - thermo unit ①

18 Nm (18 m•kg)

CAUTION:

Use extreme care when handling the thermo unit. Replace any part that was dropped or subjected to a strong impact.

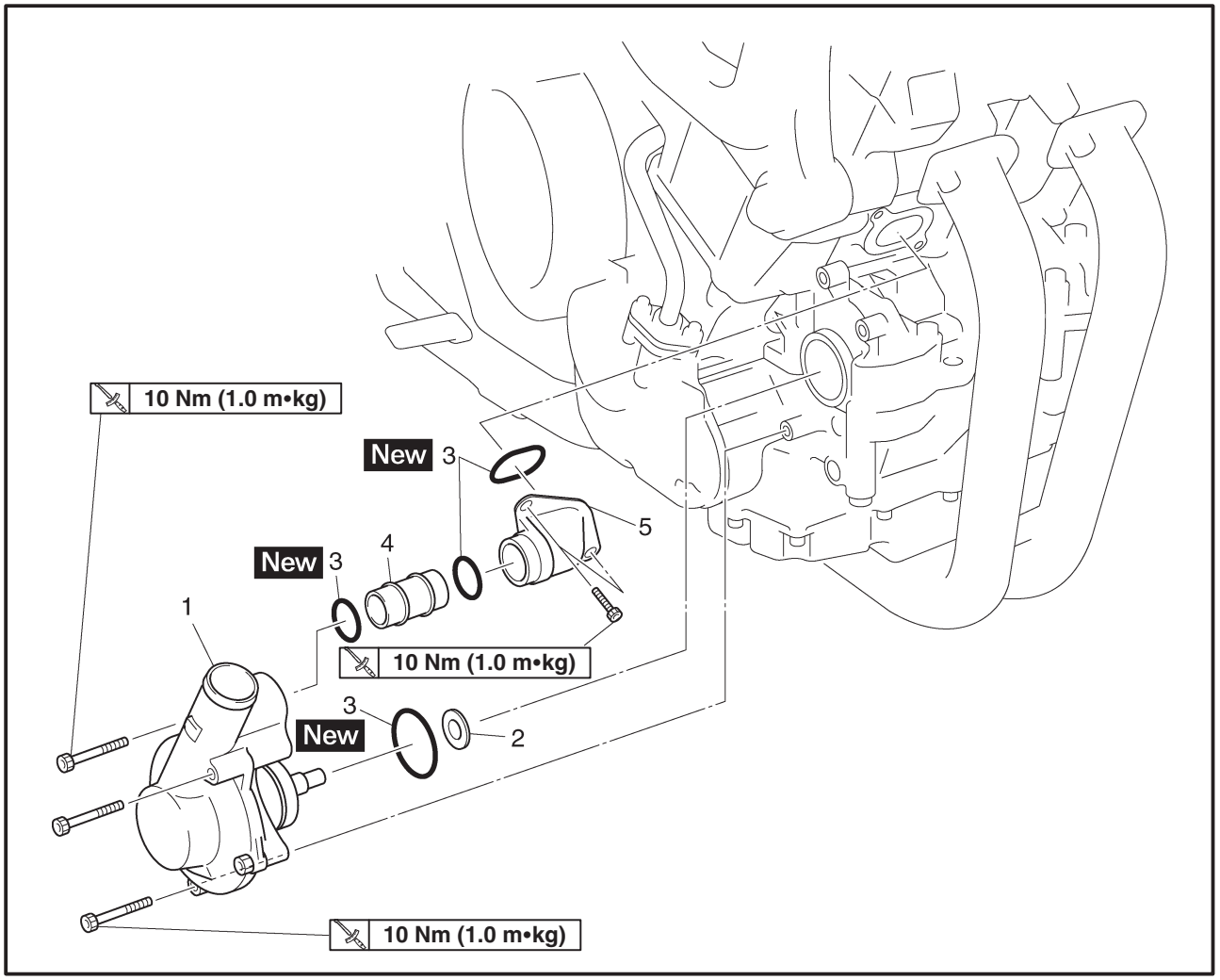
EAS00467

INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
   - thermostat assembly
   - bracket
2. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT ” in chapter 3.
3. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
4. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR”.

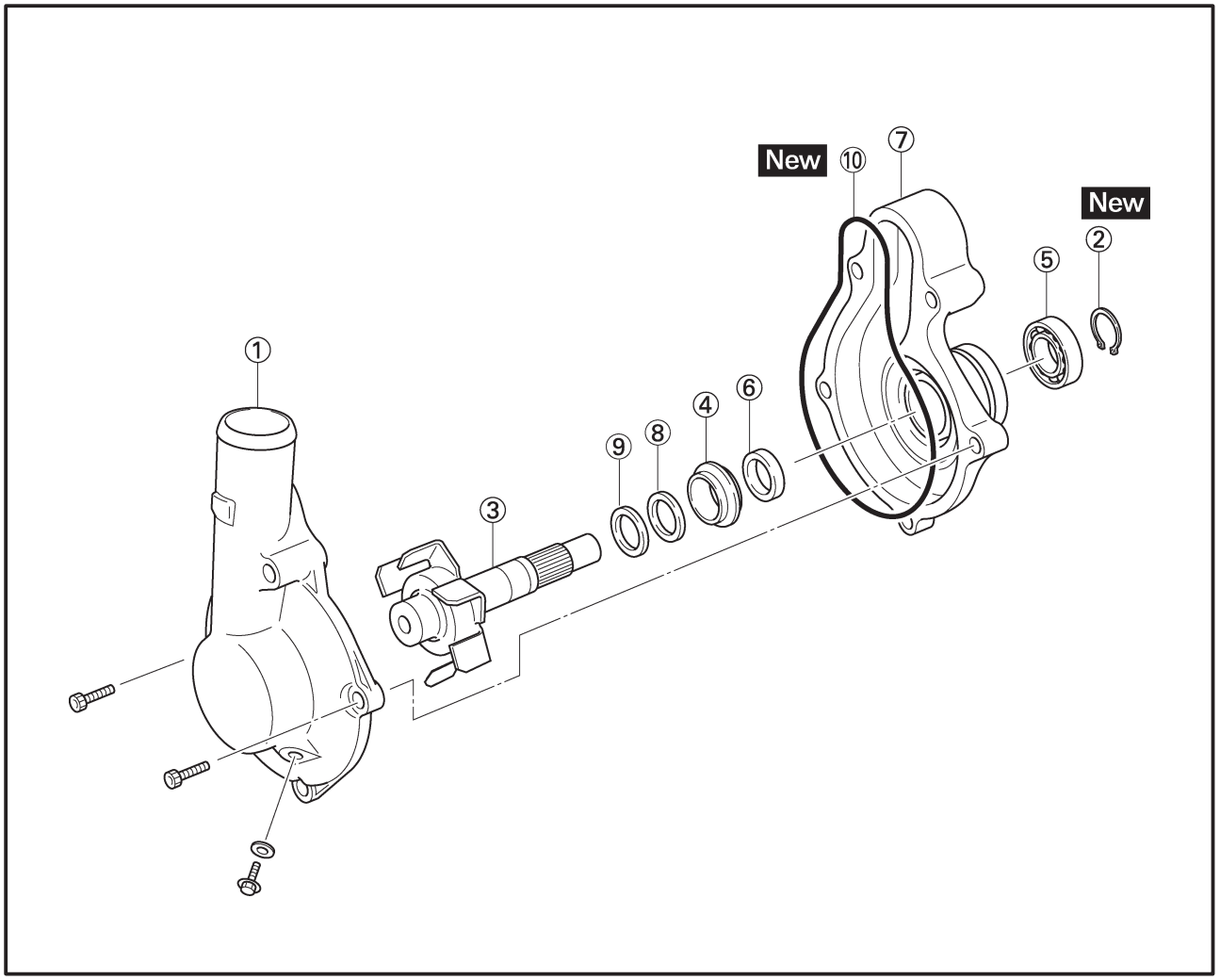
EAS00468

WATER PUMP

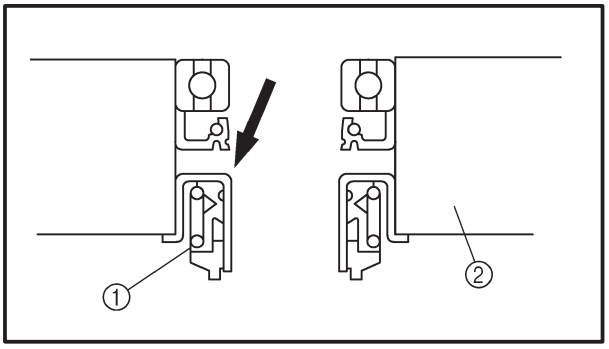


Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed. It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Water pump assembly	1	
2	Washer	1	
3	O-ring	4	
4	Pipe	1	
5	Housing	1	
			For installation, reverse the removal procedure.

EAS00469



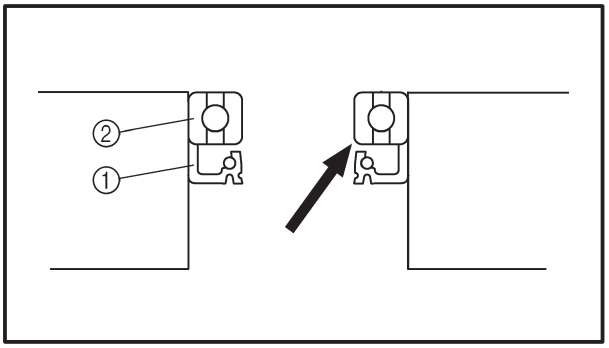
Order	Job/Part	Q'ty	Remarks
	Disassembling the water pump		Disassembly the parts in the order listed.
①	Water pump cover	1	
②	Circlip	1	
③	Impeller	1	
④	Water pump seal	1	
⑤	Bearing	1	
⑥	Oil seal	1	
⑦	Water pump housing	1	
⑧	Rubber damper holder	1	
⑨	Rubber damper	1	
⑩	O-ring	1	
			For assembly, reverse the disassembly procedure.



EAS00470
DISASSEMBLING THE WATER PUMP

1. Remove:
   • impeller
   • water pump seal ①

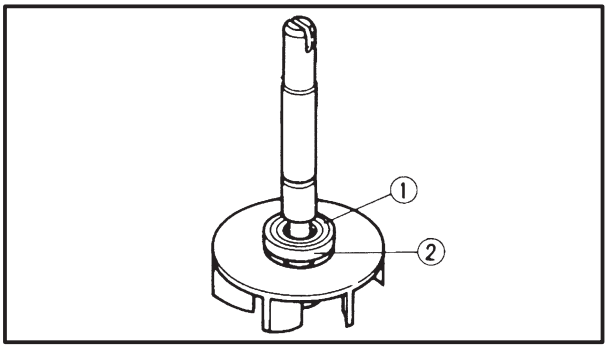
NOTE:
Remove the water pump seal from the inside of the water pump housing.



② Water pump housing

2. Remove:
   • bearing ①
   • oil seal ②

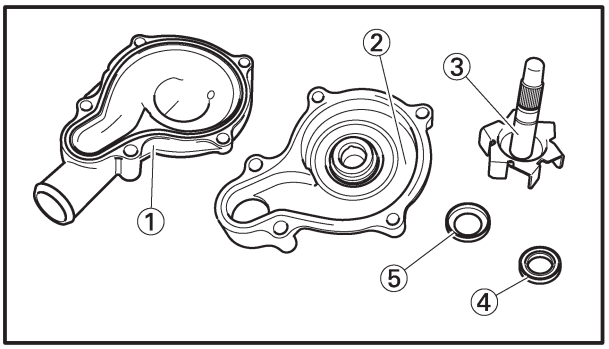
NOTE:
Remove the bearing and oil seal from the inside of the water pump housing.



③ Water pump housing

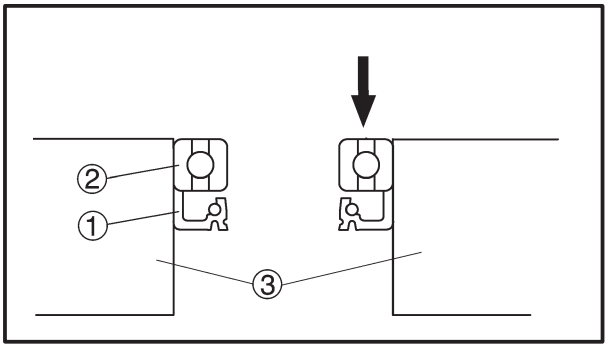
3. Remove:
   • rubber damper holder ①
   • rubber damper ②
   (from the impeller, with a thin, flat-head screwdriver)

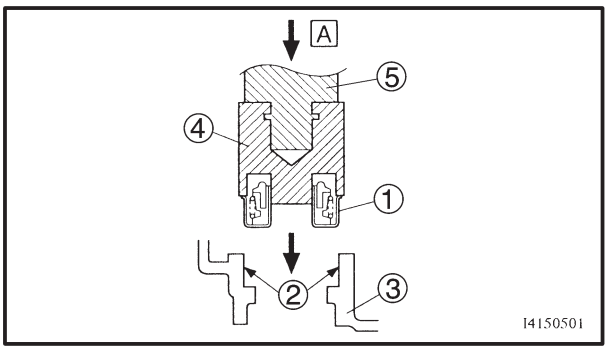
NOTE:
Do not scratch the impeller shaft.



EAS00473
CHECKING THE WATER PUMP

1. Check:
   • water pump cover ①
   • water pump housing ②
   • impeller ③
   • rubber damper ④
   • rubber damper holder ⑤
   • water pump seal
   • oil seal
   Cracks/damage/wear → Replace.
2. Check:
   • bearing
   Rough movement → Replace.
3. Check:
   • water pump outlet pipe
   • radiator outlet hose
   Cracks/damage/wear → Replace.





EAS00475
ASSEMBLING THE WATER PUMP

1. Install:
   - oil seal New ①
     (into the water pump housing ③)
   - bearing ②

NOTE:

- Before installing the oil seal, apply tap water or coolant onto its out surface.
- Install the oil seal with a socket that matches its outside diameter.

2. Install:
   - water pump seal New ①

CAUTION:

Never lubricate the water pump seal surface with oil or grease.

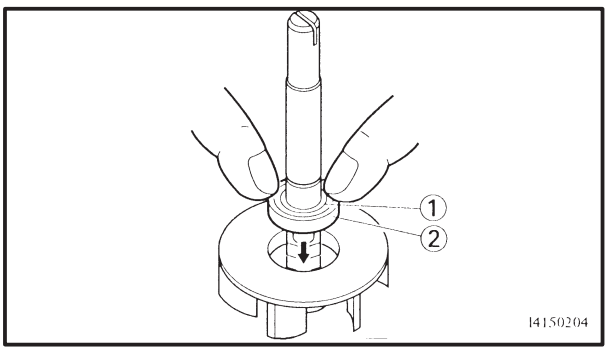
NOTE:

- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 ② to the water pump housing ③.



Mechanical seal installer ④
90890-04078
Middle driven shaft bearing driver ⑤
90890-04058
Yamaha bond No.1215
90890-85505

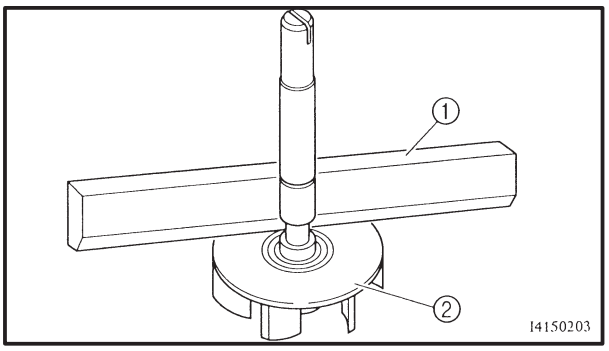
A Push down.



3. Install:
   - rubber damper New ①
   - rubber damper holder New ②

NOTE:

Before installing the rubber damper, apply tap water or coolant onto its outer surface.



4. Measure:
   • impeller shaft tilt
   Out of specification → Repeat steps (3) and (4).

CAUTION:

Make sure the rubber damper and rubber damper holder are flush with the impeller.

Impeller shaft tilt limit
0.15 mm

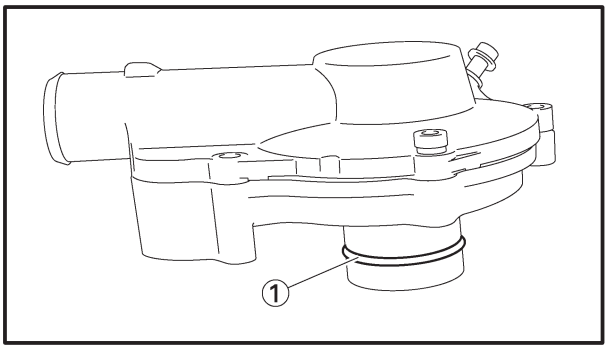
① Straightedge
② Impeller

5. Install:
   • impeller
   • circlip New

NOTE:

After installation, check that the impeller shaft rotates smoothly.

6. Install:
   • water pump cover — **10 Nm (1.0 m•kg)**



EAS00477

INSTALLING THE WATER PUMP

1. Install:
   • O-ring New ①

NOTE:

Lubricate the O-ring with a thin coat of lithium-soap-based grease.

2. Install:
   • water pump assembly
   10 Nm (1.0 m•kg)



FI

7

CHAPTER 7
FUEL INJECTION SYSTEM

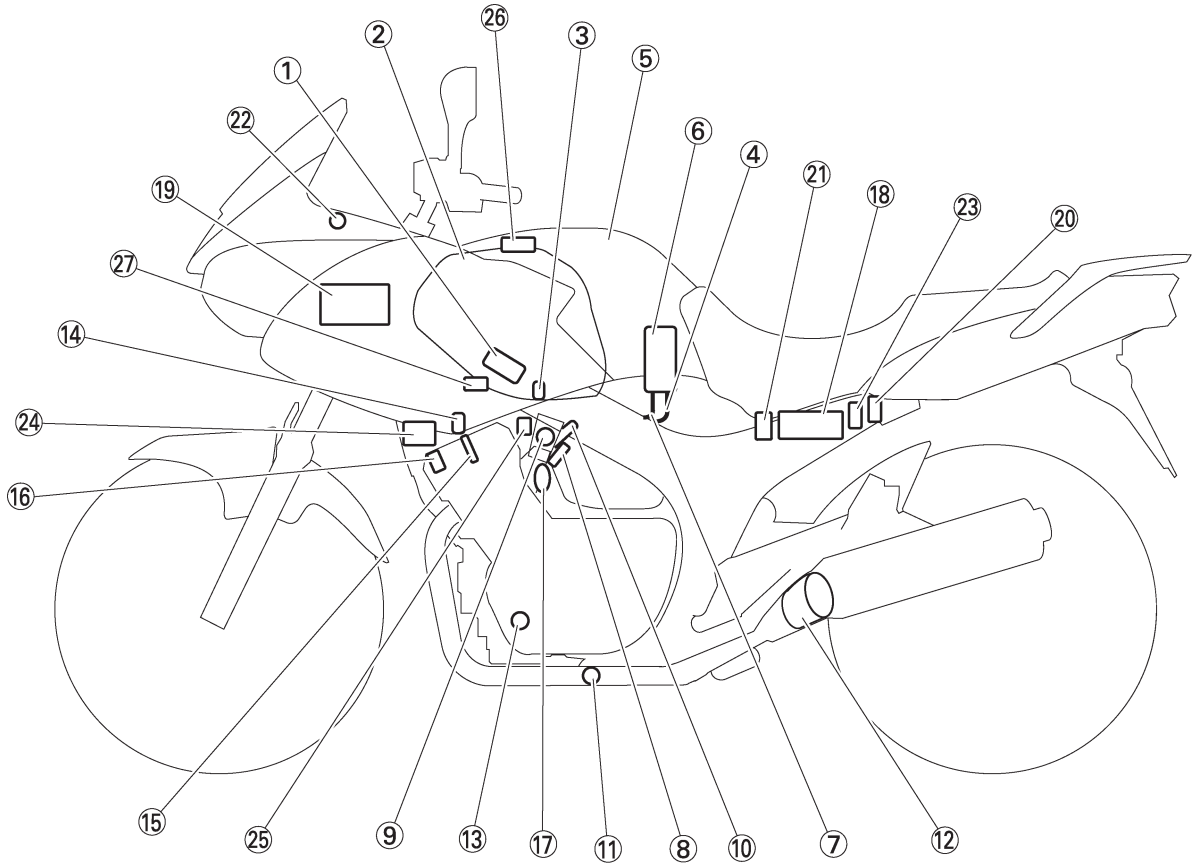
FUEL INJECTION SYSTEM 7-1
CIRCUIT DIAGRAM 7-2
ECU'S SELF-DIAGNOSTIC FUNCTION 7-3
SUBSTITUTE CHARACTERISTICS OPERATION CONTROL (FAIL-SAFE ACTION) 7-4
FAIL-SAFE ACTIONS TABLE 7-4
TROUBLESHOOTING CHART 7-5
DIAGNOSTIC MONITORING MODE 7-6
TROUBLESHOOTING DETAILS 7-11
THROTTLE BODY ASSEMBLY 7-25
CHECKING THE INJECTOR 7-28
CHECKING THE THROTTLE BODY 7-28
CHECKING THE PRESSURE REGULATOR 7-28
CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION 7-29
CHECKING THE THROTTLE BODY JOINTS 7-30
CHECKING THE SURGE TANK 7-30
CHECKING THE ACTUATOR 7-30

AIR INDUCTION SYSTEM 7-31
AIR INJECTION 7-31
AIR CUT-OFF VALVE 7-31
AIR INDUCTION SYSTEM DIAGRAMS 7-32
AIR CUT-OFF VALVE AND REED VALVE 7-33
CHECKING THE AIR INDUCTION SYSTEM 7-34

FUEL INJECTION SYSTEM

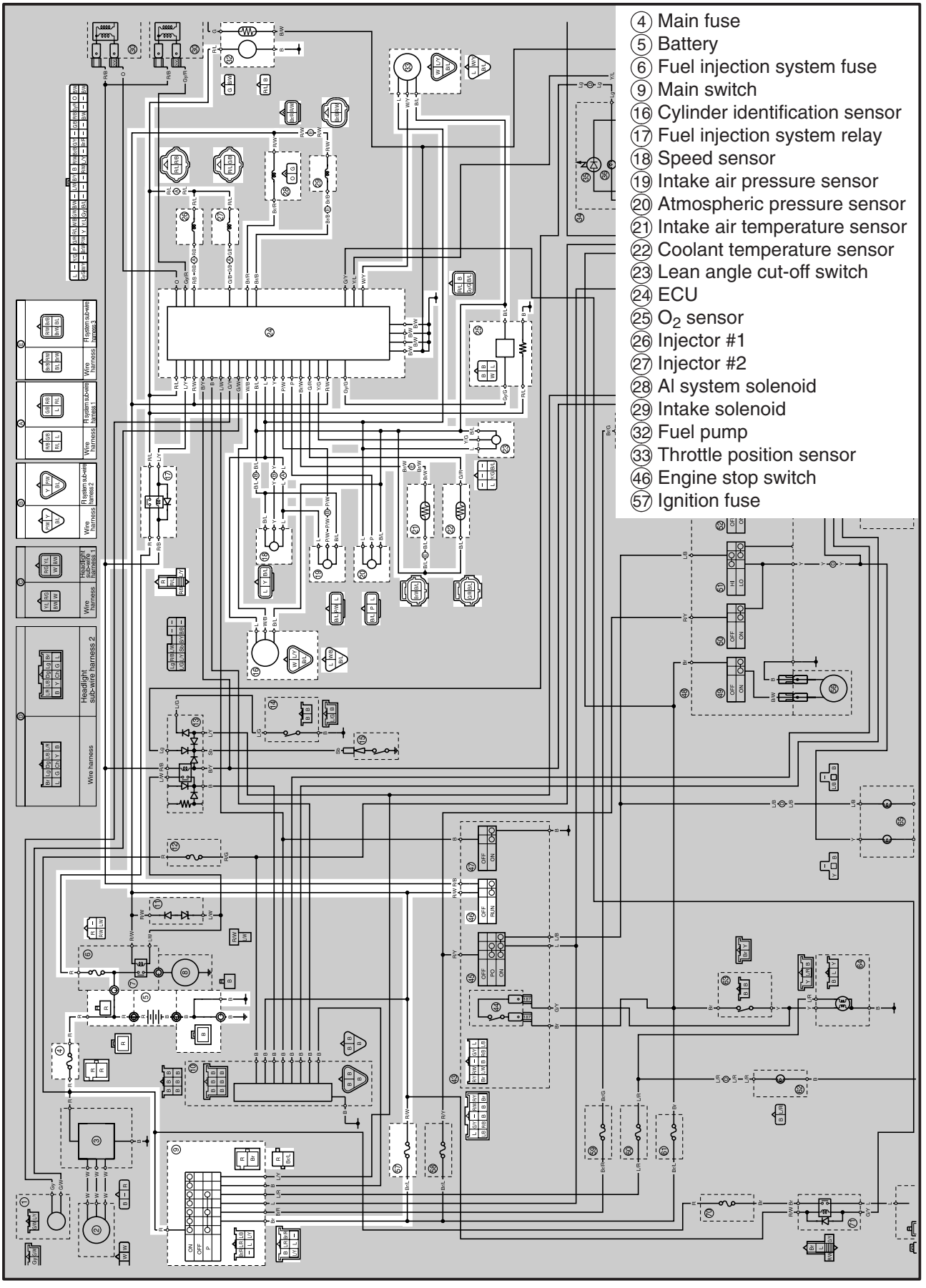
FUEL INJECTION SYSTEM

① Ignition coil
② Air filter case
③ Intake temperature sensor
④ Fuel delivery hose
⑤ Fuel tank
⑥ Fuel pump
⑦ Fuel return hose
⑧ Intake air pressure sensor
⑨ Throttle position sensor
⑩ Fuel injector
⑪ O_2 sensor
⑫ Catalytic converter
⑬ Crankshaft position sensor
⑭ Coolant temperature sensor
⑮ Spark plug
⑯ Cylinder identification sensor
⑰ Pressure regulator
⑱ Battery
⑲ ECU
⑳ Atmospheric pressure sensor
㉑ Fuel injection system relay
㉒ Engine trouble warning light
㉓ Lean angle cut-off switch
㉔ Air cut-off valve
㉕ Fast idle plunger
㉖ Adjustable air intake duct
㉗ Intake Solenoid



EAS00814

CIRCUIT DIAGRAM



ECU'S SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the engine control system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the ECU memory in the form of a fault code.

- To inform the rider that the fuel injection stop function is active, the engine trouble warning light blinks while the start switch is being pressed to start the engine.
- If a malfunction in the system is detected by the self-diagnostic function, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating a engine trouble warning light.
- After the engine has been stopped, digital numbers representing the self-diagnostic fault codes appear on the clock LCD. Once a self-diagnostic fault code has been displayed, it remains stored in the ECU memory until a deletion operation is performed.

Engine trouble warning light indication and FI system operating conditions

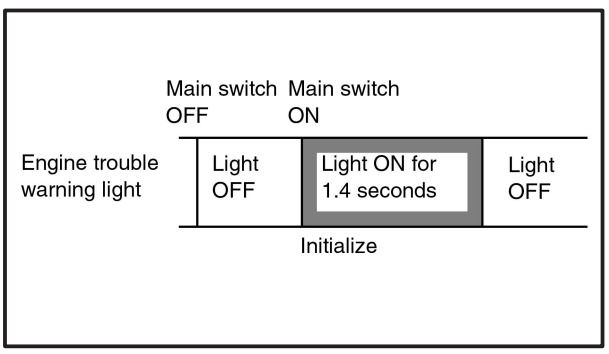
Warning light indication	ECU's operating condition	FI operating condition	Starting and driving
Blinking*	Warning control when unable to start engine	Operation stopped	Unable
Continuous ON	Detecting malfunction	Gives driving instructions with substitute characteristics in accordance with the description of the malfunction.	Able/Unable depending on self-diagnostic fault code

* This control is effected when any one of the conditions listed below is present and the starter switch is turned ON:

11: Cylinder identification sensor
12: Crankshaft position sensor
19: Sidestand switch (open circuit in wire to ECU)
30: Lean angle cut-off switch (latch up detected)
41: Lean angle cut-off switch (open or short circuit)
50: ECU internal malfunction (memory check error)

Function to check for blown engine trouble warning light bulb

The engine trouble warning light illuminates for 1.4 seconds after the main switch has been turned "ON" and while the starter switch is being pressed. If the warning light does not illuminate under these conditions, a problem may have possibly occurred, such as a blown warning light bulb.



SUBSTITUTE CHARACTERISTICS OPERATION CONTROL (FAIL-SAFE ACTION)

If the ECU detects an abnormal signal from a sensor while the motorcycle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with substitute characteristic operation instructions that are appropriate for the type of the malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for every sensor, in order to provide the engine with substitute characteristics operation instructions that enable the engine to continue to operate (or to stop its operation, depending on circumstances).

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

FAIL-SAFE ACTIONS TABLE

Self-Diagnostic Function

Fault code No.	Item	Symptom	Fail-safe action	Able / unable to start	Able / unable to drive
11	Cylinder identification sensor	No normal signals are received from the cylinder identification sensor.	Continues to operate the engine based on the of the cylinder identification that existed up to that point.	Unable	Able
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	• Stops the engine (by stopping the injection and ignition).	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor - open or shor circuit detected.	• Fixes the intake air pressure to 760 mmHg.	Able	Able
14	Intake air pressure sensor (pipe system)	Faulty intake air pressure sensor pipe system a hose is detached, causing the constant application of atmospheric pressure to the sensor, or, the hose is clogged.	• Fixes the intake air pressure to 760 mmHg.	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor - open or short circuit detected.	• Fixes the throttle position sensor to fully open.	Able	Able
19	Sidestand switch (open circuit wire to ECU)	Open circuit is detected in the input line from the sidestand switch to the ECU.	– (No start)	Unable	Unable
20	Intake temperature Atmospheric pressure	Defective values are detected due to the internal malfunction	• Fixes the intake air pressure and atmospheric pressure to 760 mmHg.	Able	Able
21	Coolant temperature sensor	Coolant temperature sensor - open or short circuit detected.	• Fixes the coolant temperature to 60°C.	Able	Able
22	Intake temperature sensor	Intake temperature sensor - open or short circuit detected.	• Fixes the intake temperature to 20°C.	Able	Able
23	Atmospheric pressure sensor	Atmospheric pressure sensor - open or short circuit detected.	• Fixes the atmospheric pressure to 760 mmHg.	Able	Able
24	O_2 sensor (inactive)	No normal signals are received from the O_2 sensor.	–	Able	Able
30	Lean angle cut-off switch (latch up detected)	The motorcycle has overturned.	• Turns OFF the fuel injection system relay of the fuel system.	Unable	Unable
33	Faulty ignition	Open circuit detected in the primary wire of the ignition coil (#1).	• Fuel is cut off only to the cylinder in which a malfunction is detected.	Able (depending on the number of faulty)	Able (depending on the number of faulty)
34		Open circuit detected in the primary wire of the ignition coil (#2).			
41	Lean angle cut-off switch (open or short circuit)	Lean angle cut-off switch - open or short circuit detected.	• Turns OFF the fuel injection system relay of the fuel system.	Unable	Unable
42	Speed sensor, neutral switch	No normal signals are received from the speed sensor, or, an open or short circuit is detected in the neutral switch.	• Fixes the gear to the top gear.	Able	Able
43	Fuel system voltage (monitor voltage)	The ECU is unable to monitor the battery voltage (an open circuit in the line to the ECU).	• Fixes the battery voltage to 12 V.	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	An error is detected while reading or writing on EEPROM (CO adjustment value).	–	Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	–	Unable	Unable

Communication error with the meter

Er-1	ECU internal malfunction (output signal error)	No signals are received from the ECU.	–	Unable	Unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	–	Unable	Unable
Er-3	ECU internal malfunction (output signal error)	Data from the ECU cannot be received correctly.	–	Unable	Unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	–	Unable	Unable

TROUBLE SHOOTING CHART

"Engine runs irregularly." or "Engine trouble warning light is illuminated."
* Engine trouble warning light may not be illuminated even if the engine runs irregularly.

When the engine trouble warning light is illuminated

Checking the self-diagnostic fault code number:
Check the self-diagnostic fault code number displayed on the meter.

Specifying the malfunctioned system:
Specify the malfunctioned system by referring to the Fail-safe actions table.

Presuming the cause:
Presume the malfunction cause by referring to the Diagnostic monitoring code table.

Checking and repaining the presumed place of malfunction.

Diagnostic Monitoring codeNo. YES	Diagnostic Monitoring code No. NONE
Check and repair in accordance with the "Troubleshooting details", monitoring the operation of sensor and actuator in the Diagnostic monitoring mode (Refer to "SENSOR OPERATION TABLE/ACTUATOR OPERATION TABLE" in chapter 7.).	Check and repair in accordance with the trouble shooting details.

ECU reinstatement action:
Perform ECU reinstatement action referring to the reinstatement method in the troubleshooting details.

Checking the meter display:
Check whether the self-diagnostic fault code number is shown after turning the main switch OFF once, and then turning it back ON.

Displayed again.

Not displayed

When the engine trouble warning light is not illuminated

Inspecting the sensor actuator:Check the operation of following sensors and actuators in the Diagnostic monitoring mode (Refer to "SENSOR OPERATION TABLE/ACTUATOR OPERATION TABLE" in chapter 7.)
01: Throttle position sensor (throttle angle)
30: Ignition coil #1
31: Ignition coil #2
36: Injector #1
37: Injector #2
48: AI system solenoid
49: In take solenoid

OK

Malfunction of engine unit

Check and repair the inner parts of engine referring to the engine edition of Chapter 5.

OK

NG

Checking the engine condition.

NG

Defective sensor or actuator

Check and repair the corresponding sensor or actuator.

OK

OK

Repair Completion

Erasing the melfunction history:*
Malfunction history will be stored even if the main switch is turned OFF. To erase the malfunction history, it is required to operate to erase the malfunction history in the Diagnostic monitoring mode. (Refer to "SENSOR OPERATION TABLE" in chapter 7.)

* Operation when the engine trouble warning light is illuminated.

DIAGNOSTIC MONITORING MODE

It is possible to monitor the sensor output data or check the activation of actuators without connecting the measurement equipment by simply switching the meter indication from the Normal mode to the Diagnostic monitoring mode.

Switching the mode to the Diagnostic monitoring mode

Turn OFF the main switch.

↓

Turn OFF the engine stop switch.

↓

Disconnect the coupler fo fuel pump.

↓

Turn ON the main switch while pressing both the select-button and the reset button of meter. (If the state of pressing buttons is continued over 8 seconds, the LCD display of the clock display will be switched to “DIAG”.) Stop pressing the select-button and the reset button when the display is changed.

↓

Selection of the Diagnostic monitoring mode:
Display changes between “CO” (CO adjustment mode) and “DIAG” (Diagnostic monitoring mode) every time the select-button is pressed.

↓

Determining the mode:
Mode can be determined by displaying the “DIAG” (Diagnostic monitoring mode) and pressing both the select-button and the reset button for longer than 2 seconds.

↓

Selection of the Diagnostic monitoring code:
Select the code by pressing the select-button or the reset button.
Select-button: Increase*
Reset button: Decrease*
* When the button is pressed for a long time, the display changes automatically. It stops when the button is released.

↓

Monitoring the sensor output data and checking the activation of actuators
Monitoring the sensor output data:
When the Diagnostic monitoring code is selected, the output data is displayed on the meter. Refer to the Sensor operation table to judge the sensor performance.
Checking the activation of actuators:
• Actuator is activated when the engine stop switch is turned ON after selecting the Diagnostic monitoring code.
* When the Diagnostic monitoring code is selected, if the engine stop switch is turned ON, turn it OFF once, then turn it back ON. Refer to the Actuator operation table to judge the actuator performance.

Diagnostic monitoring code table

Fault Code No.	Symptom	Probable cause of malfunction	Diagnostic monitoring code No.
11	No normal signals are received from the cylinder identification sensor.	• Open or short circuit in wiring sub lead. • Open or short circuit in wiring harness. • Defective cylinder identification sensor. • Malfunction in ECU. • Improperly installed sensor.	—
12	No normal signals are received from the crankshaft position sensor.	• Open or short circuit in wiring harness. • Defective crankshaft position sensor. • Malfunction in pickup rotor. • Malfunction in ECU. • Improperly installed sensor.	—
13	Intake air pressure sensor-open or short circuit detected.	• Open or short circuit in wiring sub lead. • Open or short circuit in wiring harness. • Defective intake air pressure sensor. • Malfunction in ECU.	03
14	Faulty intake air pressure sensor pipe system; • detached hose • clogged hose	• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction of the intake air pressure sensor in the intermediate electrical potential. • Malfunction in ECU.	03
15	Throttle position sensor-open or short circuit detected.	• Open or short circuit in wiring sub lead. • Open or short circuit in wiring harness. • Defective throttle position sensor. • Malfunction in ECU. • Improperly installed throttle position sensor.	01
19	Open circuit in the input line from the sidestand switch to the ECU is detected when the start switch is pressed.	• Open or short circuit in wiring harness. • Malfunction in ECU.	20
20	Defective values are detected due to the internal malfunction of the intake air temperature sensor or the atonospheric pressure sensor.	• Malfunction of the intake air pressure sensor or atmospheric pressure sensor in the intermediate electrical potential. • Open or short circuit in wiring harness. • Open or short circuit in wiring sub lead. • Malfunction in ECU.	—
21	Coolant temperature sensor-open or short circuit detected.	• Open or short circuit in wiring harness. • Defective coolant temperature sensor. • Malfunction in ECU. • Improperly installed sensor.	06
22	Intake temperature sensor-open or short circuit detected.	• Open or short circuit in wiring harness. • Defective intake temperature sensor. • Malfunction in ECU. • Improperly installed sensor.	05
23	Atmospheric pressure sensor-open or short circuit detected.	• Open or short circuit in wiring harness. • Defective atmospheric pressure sensor. • Improperly installed sensor. • Malfunction in ECU.	02
24	No normal signals are received from the O_2 sensor.	• Open or short circuit in wiring harness. • Defective O_2 sensor. • Malfunction in ECU. • Improperly installed sensor.	—
30	The motorcycle has overturned.	• Overturned. • Malfunction in ECU.	08

Fault Code No.	Symptom	Probable cause of malfunction	Diagnostic monitoring code No.
33	Open circuit is detected in the primary wire of the ignition coil (#1).	• Open or short circuit in wiring harness. • Malfunction in ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cutoff circuit system.	30
34	Open circuit is detected in the primary wire of the ignition coil (#2).	• Open or short circuit in wiring harness. • Malfunction in ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cutoff circuit system.	31
41	Lean angle cut-off switch-open or short circuit detected.	• Open or short circuit in wiring harness. • Defective lean angle cut-off switch. • Malfunction in ECU.	08
42	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	• Open or short circuit in wiring harness. • Defective speed sensor. • Malfunction in vehicle speed sensor detected unit. • Defective neutral switch. • Malfunction in the engine side of the neutral switch. • Malfunction in ECU.	07 21
43	The ECU is unable to monitor the battery voltage (an open circuit in the monitor line to the ECU).	• Open circuit in wiring harness. • Malfunction in ECU.	—
44	An error is detected while reading or writing on EEPROM.	• Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory).	60
50	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)	—

Er-1	No signals are received from the ECU.	• Open or short circuit in communication line. • Malfunction in meter unit. • Malfunction in ECU.	—
Er-2	No signals are received from the ECU within the specified duration.	• Open or short circuit in communication line. • Malfunction in meter unit. • Malfunction in ECU.	—
Er-3	Data from the ECU cannot be received correctly.	• Open or short circuit in communication line. • Malfunction in meter unit. • Malfunction in ECU.	—
Er-4	Non-registered data has been received from the meter.	• Open or short circuit in communication line. • Malfunction in meter unit. • Malfunction in ECU.	—

Sensor operation table

Diagnostic monitoring code No.	Item	Meter display	Checking method
01	Throttle angle Fully closed position Fully opened position	 15-17 97-100	 • Check with throttle fully closed. • Check with throttle fully open.
02	Atmospheric pressure	—	Compare the actually measured atmospheric pressure with the meter display value. (*1)
03	Pressure difference (atmospheric pressure-intake air pressure)	—	Turn On the engine stop switch, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)
05	Intake temperature	—	Compare the actually measured intake air temperature with the meter display value. (*2)
06	Coolant temperature	—	Compare the actually measured coolant temperature with the meter display value.
07	Vehicle speed pulse	0-999	Check that the number changes (integrating) when the rear wheels are rotated.
08	Lean angle cut-off switch Upright overturned	 0.4-1.4 3.8-4.2	Remove the lean angle cut-off switch and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
20	Sidestand switch Stand retracted Stand extended	 ON OFF	Turn ON/OFF the Sidestand switch.
21	Neutral switch Neutral In gear	 ON OFF	Perform the shift operation of transmission.
60	E2PROM fault code display No fault Fault detected	 00 01 or 02 (Fault detection cylinder) (If both cylinders are defective, the display alternates every two seconds.)	—
61	Malfunction history code display No history History exists	 00 11-50 (Fault detection code) (If code numbers more than one are detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
62	Malfunction history code erasure No history History exists	 00 00-21 (Memory numbers of the fault detection)	— To erase the history, turn ON the engine stop switch.
70	Control number	00-255	—

*1 If it is not possible to check it with an atmospheric pressure gauge, judge it by using 760 mmHg as the standard.

*2 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Actuator operation table

Diagnostic monitoring code No.	Item	Actuation	Checking method
30	Ignition coil #1	Actuates the ignition coils #1 for five times every second. Illuminates the engine trouble warning light	Check the spark five times. • Connect an ignition checker.
31	Ignition coil #2	Actuates the ignition coils #2 for five times every second. Illuminates the engine trouble warning light.	Check the spark five times. • Connect an ignition checker.
36	Injector #1	Actuates the injector #1 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #1 five times.
37	Injector #2	Actuates the injector #2 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #2 five times.
48	AI system solenoid	Actuates the AI system solenoid for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the AI system solenoid five times.
49	Intake solenoid	Actuates the intake solenoid for five times every second. Illuminates the engine trouble warning light. * Actuators may operate once or twice immediately after the engine stopped or cranking was performed.	Check the operating sound of the intake solenoid five times.
50	Fuel injection system relay	Actuates the fuel injection system relay for five times every second. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel injection system relay five times.
51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles every five-second. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the Radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay for five times every five-second. (ON 2 seconds,, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.

* If the engine stop switch is ON, turn it OFF once, and then turn it back ON.



TROUBLESHOOTING DETAILS

This section dscribes the measures per fault code number displayd on the meter. Carry out check and maintenance on items or components that could be a cause of malfunction in accordance with the order.

When the check and maintenance of malfunctioned part is completed, restore the meter display according to the “Restore method”.

Fault code No.:

Fault code number displayd on the meter when the engine failed to work normally. (Refer to “DIAGNOSTIC MONITORING MODE”.)

Diagnostic monitoring code No.:

Code number to be used when the diagnostic monitoring mode is operated. (Refer to “DIAGNOSTIC MONITORING MODE”.)

Fault code No.	**11**	**symptom**	**A.** No normal signals are received from the cylinder identification sesnsor. **B.** Malfunction of electric starting system
Diagnostic monitoring code No.			

Order	**Item/components**	**Check or maintenance job**	**Restore method**
A-1	Installed state of cylinder identification sensor	Check the installed area for looseness or pinching.	Reinstated by starting the engine and operating it at idle.
A-2	Connected state of connector Cylinder identification sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
A-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 - Yellow White/Black - White Black/Blue - Black/Blue	
A-4	Defective cylinder identification sensor	Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	
B-1	Connected state of connector Alarm short circuit coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
B-2	Defective starter relay or starter motor	Replace if defective Refer to “ELECTRIC STARTING SYSTEM” in chapter 8.	

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Installed state of crankshaft position sensor	Check the installed area for looseness or pinching.	Reinstated by cranking the engine.
2	Connected state of connector Crankshaft position sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit between the main wiring harnesses. Gray - Blue/Yellow Green/White - Green/White	
4	Defective crankshaft position sensor.	Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	

Fault code No.	13	Symptom	Intake air pressure sensor-open or short circuit defected.
Diagnostic monitoring code No.		03	Intake air pressure sensor

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by cranking the engine.
2	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **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	
3	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	

Fault code No.	14	Symptom	Intake air pressure sensor-pipe system malfunction (clogged or deteched hose).
Diagnostic monitoring code No.		03	Intake air pressure sensor

Order	Item/components	Check or maintenance job	Restore method
1	Intake air pressure sensor hose detached, clogged, kinked, or pinched. Intake air pressure sensor malfunction at intermediate electrical potential. Atmosheric pressure sensor malfunction at Intermediate electrical potential.	Repair or replace the sensor hose. Check and repair the connection. Replace it if there is a malfunction.	Reinstated by starting the engine and operating it at idle.
2	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	



Fault code No.	15	Symptom	Throttle position sensor-open or short circuit defected.
Diagnostic monitoring code No.		01	Throttle position sensor

Order	Item/components	Check or maintenance job		Restore 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.		Reinstated by turning the main switch ON.
2	Connected state of connector Throttle position sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.		
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.	Check for open circuit and replace the throttle position sensor. Black/Blue - Yellow		
		Open circuit item	Output voltage	
		Graound wire open circuit	5 V	
		Output wire open circuit	0 V	
		Power supply wire open circuit	0 V	
5	Defective throttle position sensor.	Execute the diagnostic monitoring mode. (Code No. 01) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.		

Fault code No.	19	Symptom	Open circuit is detected in the input line from the sidestand switch to the ECU.
Diagnostic monitoring code No.		20	Sidestand switch

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Main wiring harness ECU coupler (No. 43 pin, black) Alarm coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	If the transmission is in gear, it is reinstated by refracing the sidestand. If the transmission is in neutral, it is reinstated by reconnecting the wiring.
2	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 switch	
3	Defective sidestand switch	Execute the diagnostic monitoring mode. (Code No. 20) Replace if defective. Refer to “CHECKING THE SWITCHES” in chapter 8.	

Fault code No.	20	Symptom		**A.** Intake air pressure sensor-open or short circuit detected. **B.** Defective values are detected due to the internal malfunction of the intake air pressure sensor or the Atmospheric pressure sensor.
Diagnostic monitoring code No.		**A**	**03**	Intake air pressure sensor
		B	**02** **03**	Atmospheric pressure sensor Intake air pressure sensor

Order	Item/components	Check or maintenance job	Restore method
A-1	Connected state of connector Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by cranking the engine.
A-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	
A-3	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	
B-1	Defective atmospheric pressure sensor.	Execute the diagnostic monitoring mode. (Code No. 02) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	Reinstated by turning the main switch ON.
B-2	Defective intake air pressure sensor	Execute the diagnostic monitoring mode. (Code No. 03) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	Reinstated by cranking the engine.

Fault code No.	21	Symptom	Open or short sircuit is detected from the coolant temperature sensor.
Diagnostic monitoring code No.		06	Coolant temperature sensor

Order	Item/components	Check or maintenance job	Restore method
1	Installed state of coolant temperature sensor	Check the installed area for looseness or pinching.	Reinstated by turning the main switch ON.
2	Connected state of connector Coolant temperature sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **Main wiring harness** Black/Blue - Black/Blue Green - Red	
4	Defective coolant temperature sensor.	Execute the diagnostic monitoring mode. (Code No. 06) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	

Fault code No.	22	Symptom	Open or short circuit detected from the intake air temperature sensor.
Diagnostic monitoring code No.		05	Intake air temperature sensor

Order	Item/components	Check or maintenance job	Restore method
1	Installed state of intake air temperature sensor	Check the installed area for looseness or pinching.	Reinstated by turning the main switch ON.
2	Connected state of connector Intake temperature sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **Main wiring harness** Black/Blue - Black/Blue Brown/White - Brown/White	
4	Defective intake air temperature sensor.	Execute the diagnostic monitoring mode. (Code No. 05) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	

Fault code No.	23	Symptom	Open or short circuit detected from the atmospheric pressure sensor.
Diagnostic monitoring code No.		02	Atmospheric pressure sensor

Order	Item/components	Check or maintenance job	Restore method
1	Installed state of atmospheric pressure sensor	Check the installed area for looseness or pinching.	Reinstated by turning the main switch ON.
2	Connected state of connector Atmospheric pressure sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **Main wiring harness** Blue - Blue Black/Blue - Black/Blue Pink - Pink	
4	Defective atmospheric pressure sensor.	Execute the diagnostic monitoring mode. (Code No. 02) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	

Fault code No.	24	Symptom	No normal signal is received from the O2 sensor.
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Installed state of O_2 sensor	Check the installed area for looseness or pinching.	As the returning method, start and warm up the engine until the coolant temperature rises over 60°C. Then, maintain the engine speed at 2000 rpm to 3000 rpm until the warning light goes off. When the warning light goes off, the reset operation is finished.
2	Connected state of connector O_2 sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
3	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **Main wiring harness** Black/Blue - White Gray/Green - Blue	
4	Check fuel pressure	Refer to “CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION”.	
5	Defective O_2 sensor.	Replace if defective.	

Fault code No.	30	Symptom	The motorcycle has overturned.
Diagnostic monitoring code No.		08	Lean angle cut-off switch

Order	Item/components	Check or maintenance job	Restore 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 Lean angle cut-off switch coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	
4	Defective lean angle cut-off switch	Execute the diagnostic monitoring mode. (Code No. 08) Replace if defective.	

Fault code No.	33	Symptom	Malfunction detected in the primary wire of the ignition coil (#1).
Diagnostic monitoring code No.		30	Ignition coil (#1)

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Ignition coil primary side coupler (Orange) Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine and operating it at idle.
2	Open or short circuit in wiring harness or sub lead.	Repair or replace if there is an open or short circuit. **Main wiring harness** Orange - Orange Red/Black - Red/Black	
3	Defective ignition coil	Execute the diagnostic monitoring mode. (Code No. 30) Test the primary and secondary coils for continuity. Replace if defective. Refer to “IGNITION SYSTEM” in chapter 8.	

Fault code No.	34	Symptom	Malfunction detected in the primary wire of the ignition coil (#2).
Diagnostic monitoring code No.		31	Ignition coil (#2)

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Ignition coil primary side coupler (Gray/Red) Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine and operating it at idle.
2	Open or short circuit in lead wire.	Repair or replace if there is an open or short circuit. **Main wiring harness** Gray/Red - Gray/Red Red/Black - Red/Black	
3	Defective ignition coil	Execute the diagnostic monitoring mode. (Code No. 31) Test the primary and secondary coils for continuity. Replace if defective. Refer to “IGNITION SYSTEM” in chapter 8.	

Fault code No.	41	Symptom	Open or short circuit detected in the lean angle cut-off switch.
Diagnostic monitoring code No.		08	Lean angle cut-off switch

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Lean angle cut-off switch coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated immediately when it becomes normal.
2	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	
3	Defective lean angle cut off switch	Execute the diagnostic monitoring mode. (Code No. 08) Replace if defective.	

Fault code No.	42	Symptom		**A.** No normal signal are received from the speed sensor. **B.** Open or short circuit is detected in the neutral switch.
Diagnostic monitoring code No.		A	07	Speed sensor
		B	21	Neutral switch

Order	Item/components	Check or maintenance job	Restore method
A-1	Connected state of connector Speed sensor coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at a 20 to 30 km/h.
A-2	Open or short circuit in lead wire.	Repair or replace if there is an open or short circuit. **Main wiring harness** Blue - Blue White/Yellow - White Black/Blue - Black/Blue	
A-3	Gear for detecting vehicle speed has broken.	Replace if defective. Refer to “TRANSMISSION” in chapter 5.	
A-4	Defective speed sensor	Execute the diagnostic monitoring mode. (Code No. 07) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8.	
B-1	Connected state of connector Neutral switch coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at a 20 to 30 km/h.
B-2	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	
B-3	Faulty shift drum (neutral detection area)	Replace if defective. Refer to “TRANSMISSION” in chapter 5.	
B-4	Defective neutral switch	Execute the diagnostic monitoring mode. (Code No. 21) Replace if defective. Refer to “CHECKING THE SWITCHES” in chapter 8.	

Fault code No.	43	Symptom	The ECU is unable to monitor the battery voltage.
Diagnostic monitoring code No.		50	Fuel injection system relay

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Fuel injection system relay coupler Main wiring harness ECU coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated by starting the engine and operating it at idle.
2	Defective main relay	Replace if defective.	
3	Open or short circuit in the wiring harness.	Repair or replace if there is an open or short circuit. **Main wiring harness** Red - Red Red/Black - Red/Black Red/Blue - Red/Blue Blue/Yellow - Blue/Yellow	
4	Malfunction or open circuit in fuel injection system relay	Execute the diagnostic monitoring mode. (Code No. 50) Replace if defective. Refer to “FUEL INJECTION SYSTEM” in chapter 8. If there is no malfunction with the fuel injection system relay, replace the ECU.	

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).
Diagnostic monitoring code No.		60	EEPROM improper cylinder indication

Order	Item/components	Check or maintenance job	Restore method
1	Malfunction in ECU	Execute the diagnostic monitoring mode. (Code No. 60) *Check the faulty cylinder. (If there are multiple cylinders, the number of the faulty cylinders appear alternately at 2-second intervals.) *Readjust the CO of the displayed cylinder. Refer to “ADJUSTING THE EXHAUST GAS VOLUME” in chapter 3. Replace ECU if defective.	Reinstated by turning the main switch ON

Fault 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.)
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Malfunction in ECU	Replace ECU.	Reinstated by turning the main switch ON

Fault code No.	Er-1	Symptom	No signals are received from the ECU.
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.	Reinstated automatically when it receives a normal signal.
3	Malfunction in ECU	Replace the ECU.	

Fault code No.	Er-2	Symptom	No signals are received from the ECU within the specified duration.
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.	
3	Malfunction in ECU	Replace the ECU.	

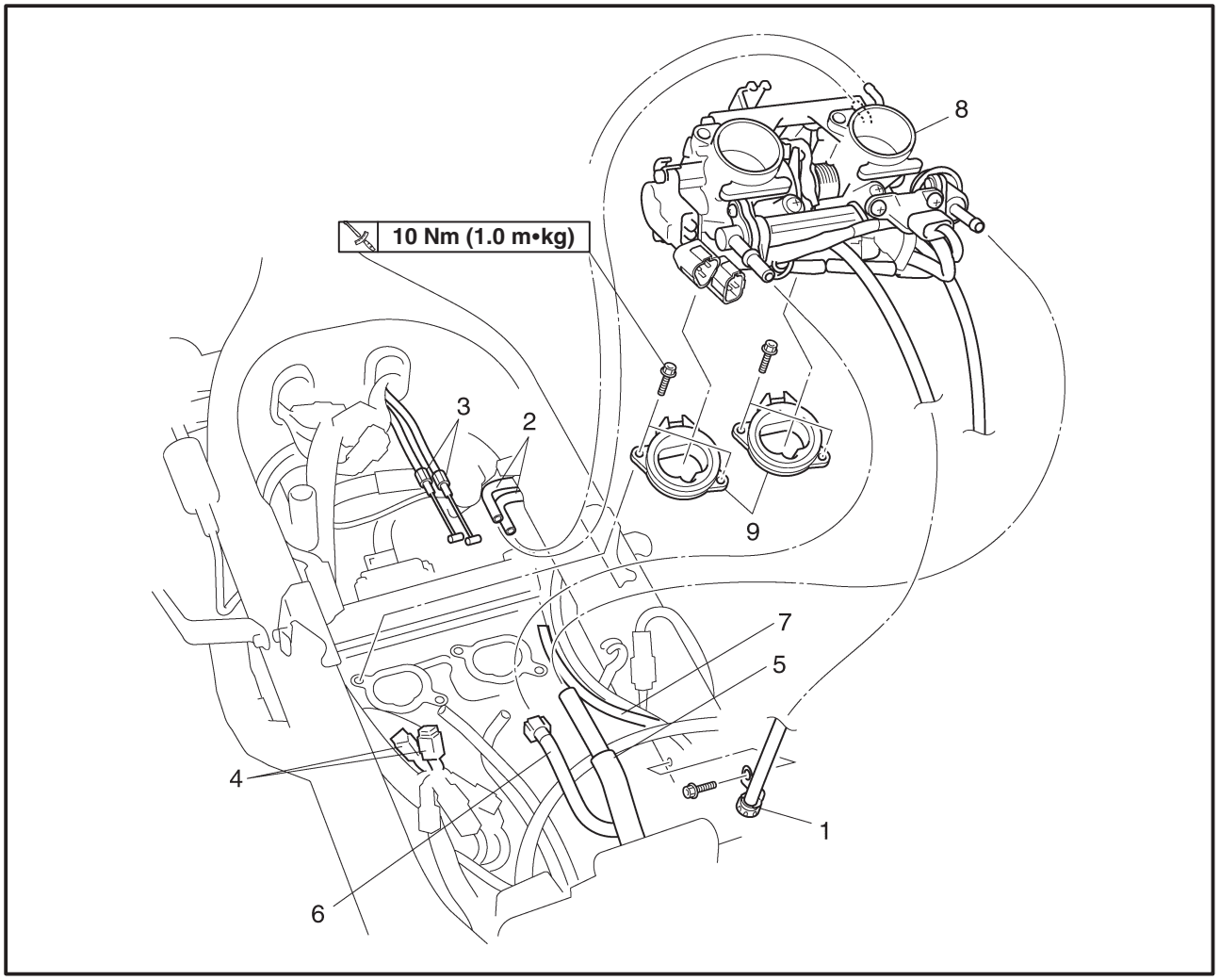
Fault code No.	Er-3	Symptom	Data from the ECu cannot be received correctly.	
Diagnostic monitoring code No.				

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.	
3	Malfunction in ECU	Replace the ECU.	

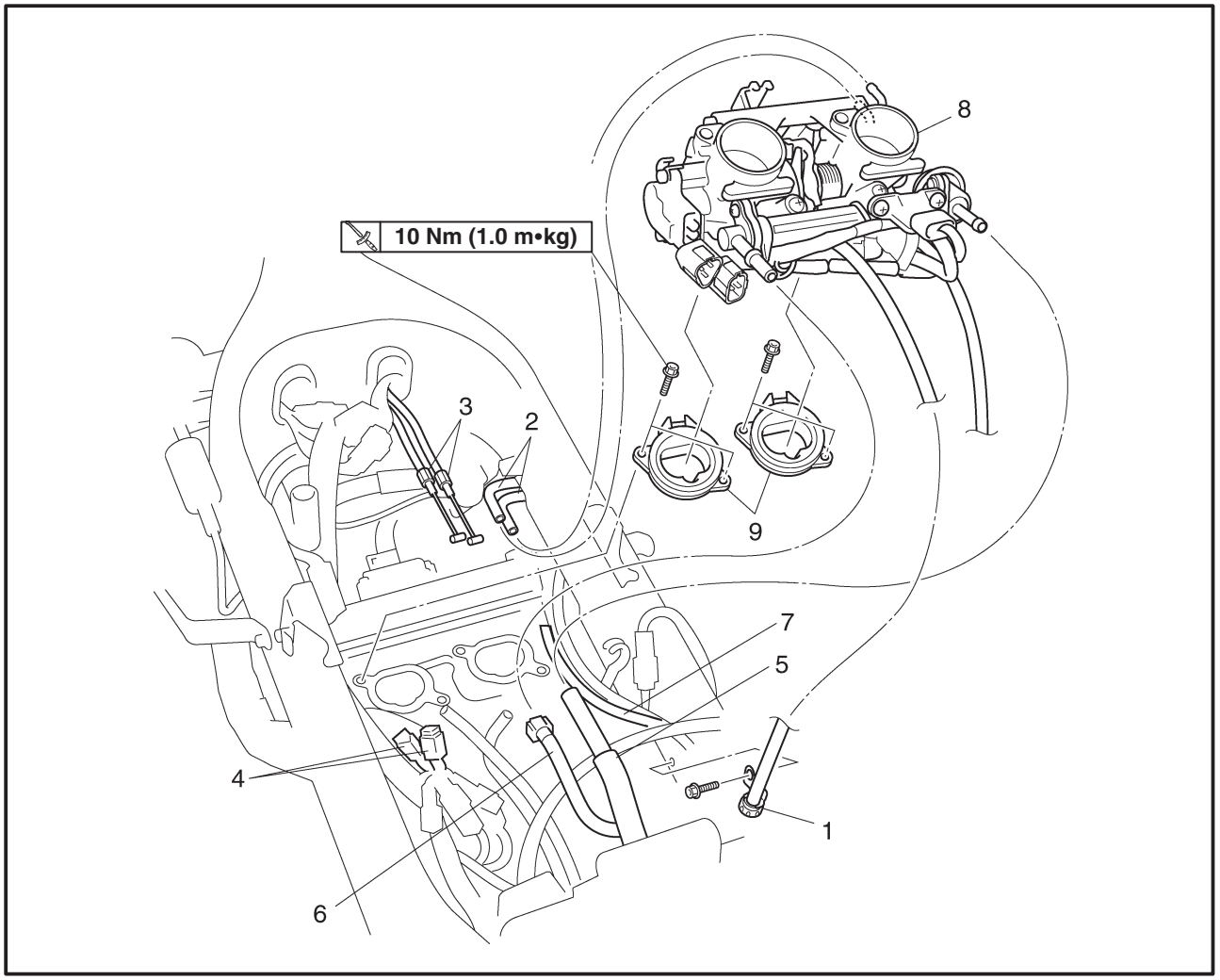
Fault code No.	Er-4	Symptom	Non-registered data has been received from the meter.
Diagnostic monitoring code No.			

Order	Item/components	Check or maintenance job	Restore method
1	Connected state of connector Main wiring harness ECU coupler Main wiring harness meter coupler	Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.	Reinstated automatically when it receives a normal signal.
2	Malfunction in meter unit.	Replace the meter unit.	
3	Malfunction in ECU	Replace the ECU.	

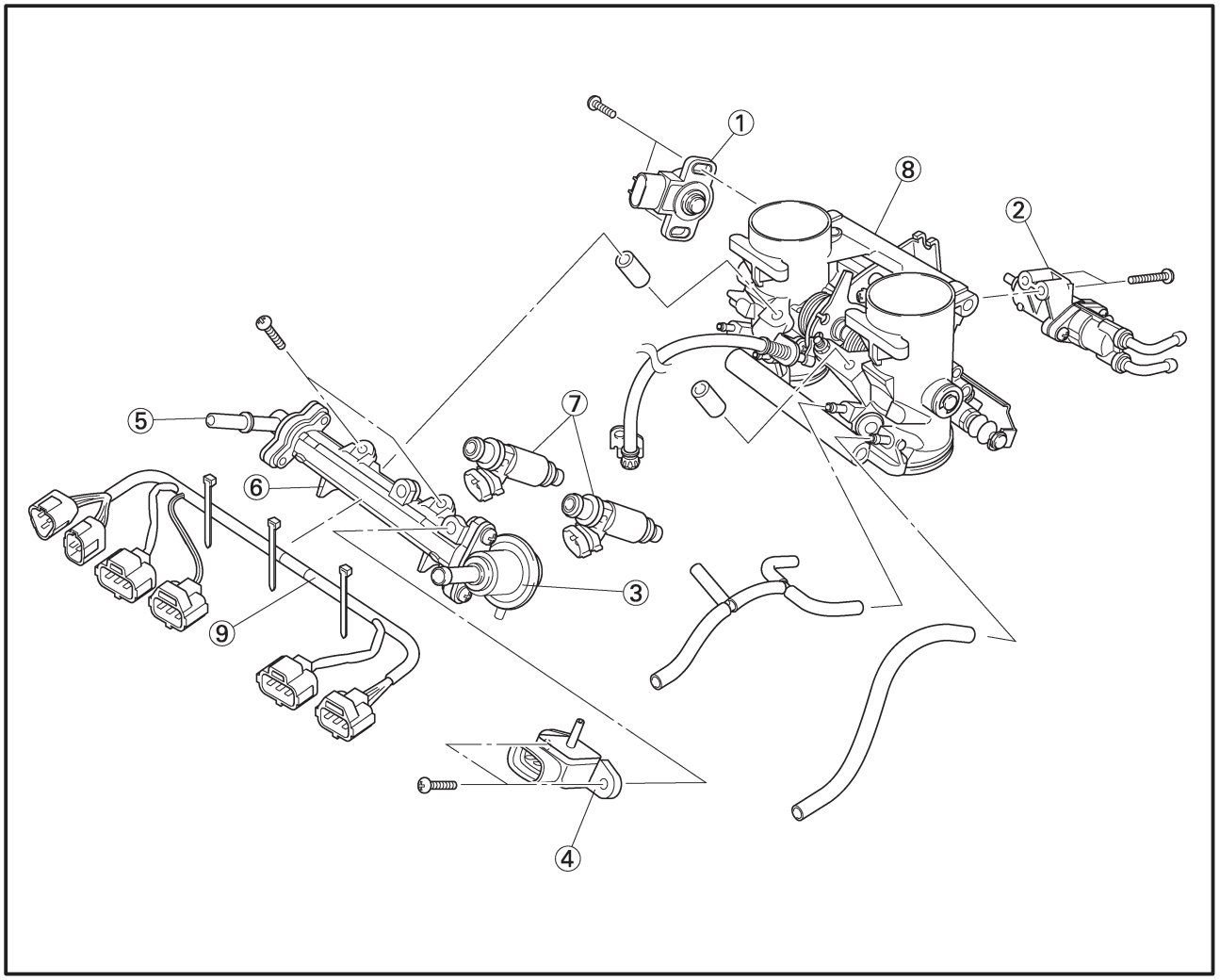
THROTTLE BODY ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the throttle body assembly		Remove the parts in the order listed.
	Seat Fuel tank Air filter case		Refer to "SEAT", "FUEL TANK", "AIR FILTER CASE" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Throttle stop screw	1	
2	Fast idle plunger hose	2	Disconnect.
3	Throttle cable	2	Disconnect.
4	Throttle body sub-wire harness coupler	2	Disconnect.
5	Fuel return hose	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
6	Fuel hose	1	Disconnect.
7	Vacuum hose	1	Disconnect.
8	Throttle body assembly	1	
9	Throttle body joint	2	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the throttle body		Disassemble the parts in the order listed.
①	Throttle position sensor	1	
②	Fast idle plunger	1	
③	Pressur regulator	1	
④	Intake air pressure sensor	1	
⑤	Fuel injection pipe	1	
⑥	Fuel distributor	1	
⑦	Injector	2	
⑧	Throttle body	1	
⑨	Sub-wire harness		**CAUTION** **The throttle bodies should not be disassembled unnecessarily.** For assembly, reverse the removal procedure.

CAUTION:

The throttle bodies should not be disassembled unnecessarily.

CHECKING THE INJECTOR

1. Check:
   - injector
     Damage → Replace.

CHECKING THE THROTTLE BODY

1. Check:
   - throttle body
     Cracks/damage → Replace the throttle bodies.
2. Check:
   - fuel passages
     Obstruction → Clean.

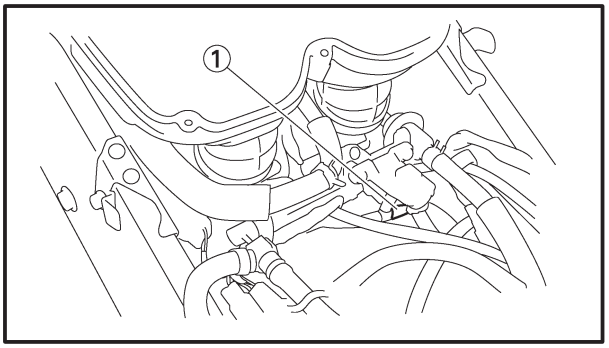
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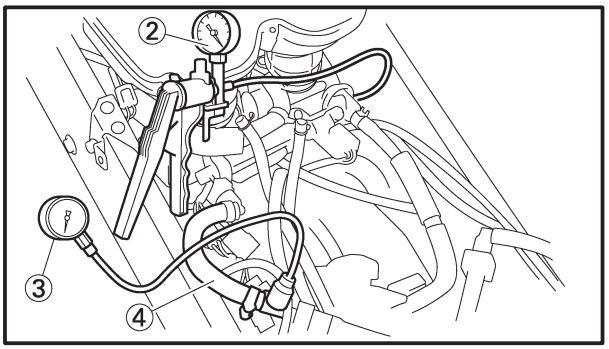
a. Wash the throttle body in a petroleumbased solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of passages with compressed air.

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CHECKING THE PRESSURE REGULATOR

1. Check:
   - pressure regulator
     Damage → Replace.





CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:
   • pressure regulator operation

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a. Remove the fuel tank.
   Refer to "FUEL TANK" in chapter 3.
b. Disconnect the vacuum hose ① from the pressure regulator.
c. Connect the vacuum/pressure pump gauge set ② onto the vacuum hose from the pressure regulator.
d. Connect the fuel pressure gauge ③ and adapter ④ onto the fuel hose.

Vacuum/pressure pump gauge set
90890-06756
Pressure gauge
90890-03153
Adapter
90890-03176

e. Install the fuel tank.
   Refer to "FUEL TANK" in chapter 3.
f. Start the engine.
g. Measure the fuel pressure.

Fuel pressure
294 kPa (2.94 kgf/cm^2, 2.94 bar)

h. Use the vacuum pressure pump gauge set to adjust the fuel pressure in relation to the vacuum pressure as described below.

NOTE:

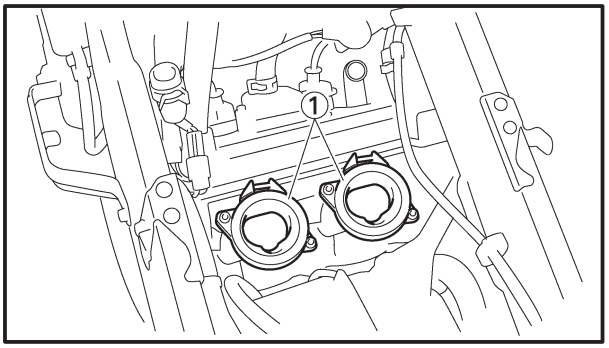
The vacuum pressure should not exceed 100 kPa (1 mmHg).

Increase the vacuum pressure → Fuel pressure is decreased
Decrease the vacuum pressure → Fuel pressure is increased

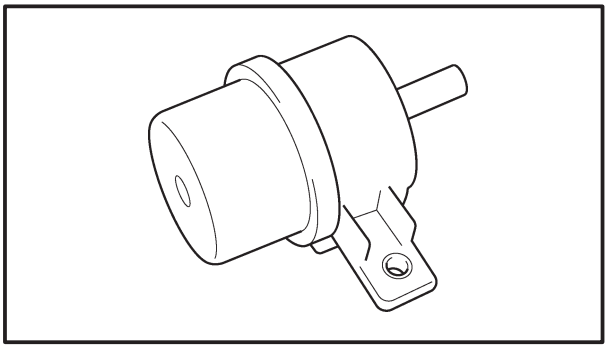
Faulty → Replace the pressure regulator.

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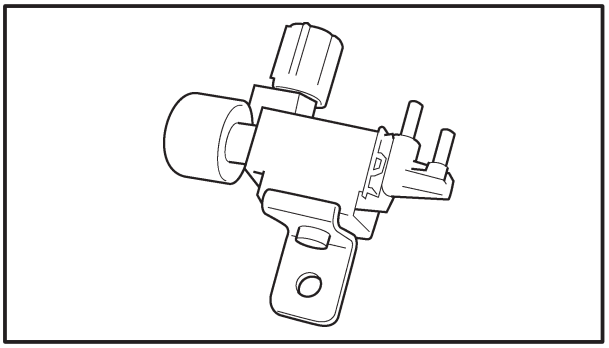
EAS00095
CHECKING THE THROTTLE BODY JOINTS
The following procedure applies to all of the throttle body joints.
1. Remove:
   • fuel tank
     Refer to “FUEL TANK” in chapter 3.
   • air filter case
     Refer to “AIR FILTER CASE” in chapter 3.



2. Check:
   • throttle body joint ①
     Cracks/damage → Replace.
3. Install:
   • air filter case
   • fuel tank



CHECKING THE SURGE TANK
1. Remove:
   • fuel tank
   • air filter case
2. Check:
   • surge tank
     Cracks/damage → Replace.



CHECKING THE ACTUATOR
1. Check:
   • actuator
     Cracks/damage → Replace.

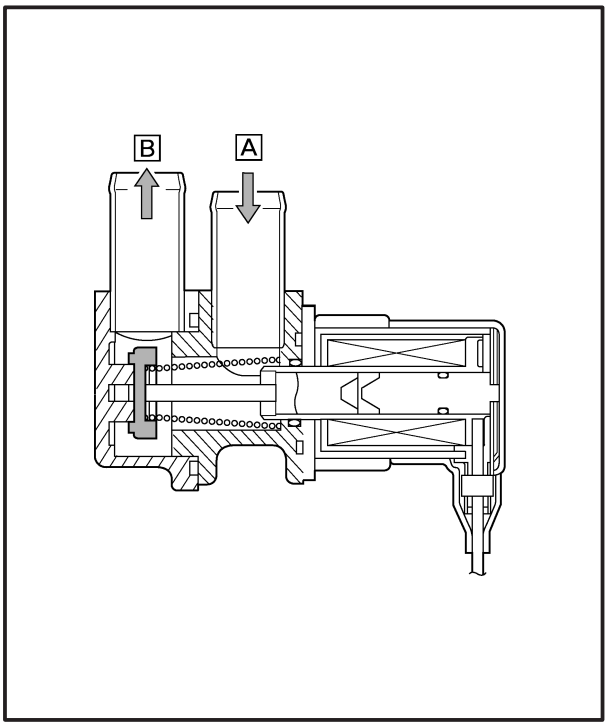
EAS00507

AIR INDUCTION SYSTEM

AIR INJECTION

The air induction system bums unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C.



EAS00508

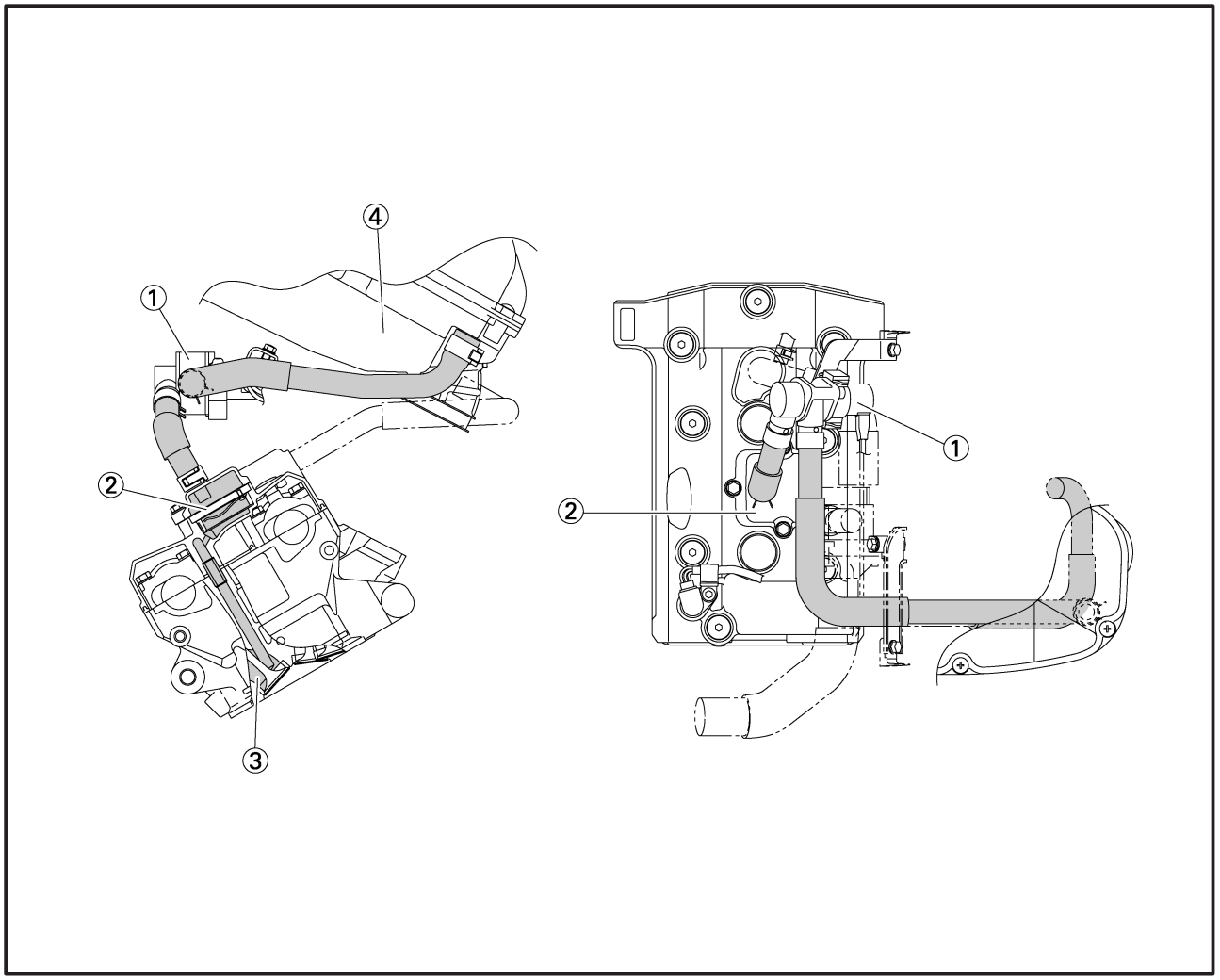
AIR CUT-OFF VALVE

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

A From the air filter case
B To the reed valve

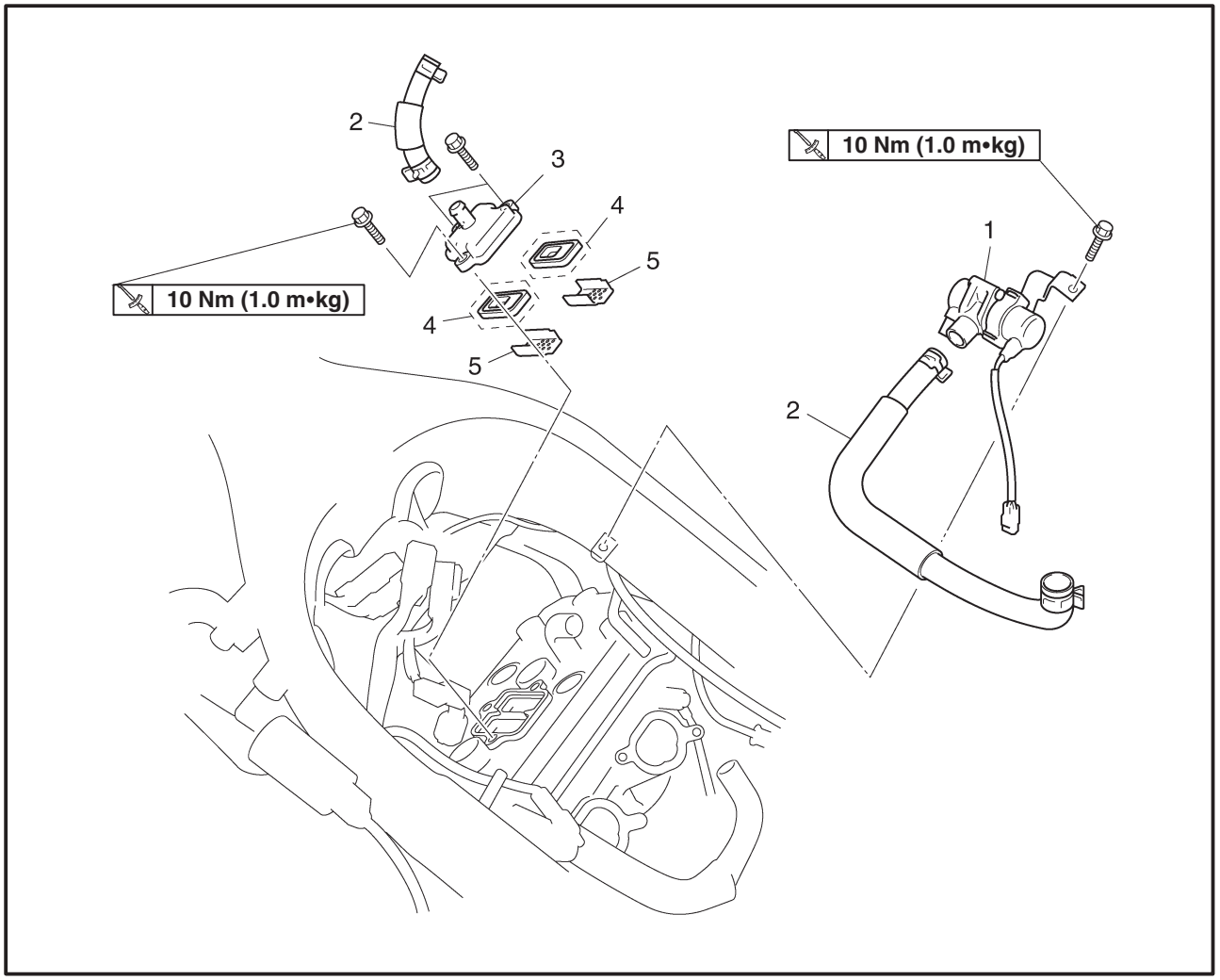
EAS00509

AIR INDUCTION SYSTEM DIAGRAMS



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

AIR CUT-OFF VALVE AND REED VALVE



Order	Job/Part	Q'ty	Remarks
	Removing the air cut-off valve and reed valve		Remove the parts in teh order listed.
	Seat		Refer to "SEAT, FUEL TANK, AIR FILTER CASE" in chapter 3.
	Fuel tank		
	Air filter case		
1	Air cut-off valve	1	
2	Hose	2	
3	Reed valve cover	1	
4	Reed valve assembly	2	
5	Plate	2	
			For installation, reverse the removal procedure.

EAS00510
CHECKING THE AIR INDUCTION SYSTEM

1. Check:
   - hoses
     Loose connection → Connect properly.
     Cracks/damage → Replace.
   - pipes
     Cracks/damage → Replace.

2. Check:
   - steel reed
   - steel reed stopper
   - reed valve seat
     Cracks/damage → Replace the reed valve.

3. Check:
   - air cut-off valve
     Cracks/damage → Replace.



ELEC 8

CHAPTER 8
ELECTRICAL

ELECTRICAL COMPONENTS 8-1

CHECKING SWITCH CONTINUITY 8-3

CHECKING THE SWITCHES 8-4

CHECKING THE BULBS AND BULB SOCKETS 8-5
TYPES OF BULBS 8-5
CHECKING THE CONDITION OF THE BULBS 8-5
CHECKING THE CONDITION OF THE BULB SOCKETS 8-7
CHECKING THE LEDs 8-8

IGNITION SYSTEM 8-9
CIRCUIT DIAGRAM 8-9
TROUBLESHOOTING 8-10

ELECTRIC STARTING SYSTEM 8-14
CIRCUIT DIAGRAM 8-14
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION 8-15
TROUBLESHOOTING 8-16

STARTER MOTOR 8-20
CHECKING THE STARTER MOTOR 8-22
ASSEMBLING THE STARTER MOTOR 8-24

CHARGING SYSTEM 8-25
CIRCUIT DIAGRAM 8-25
TROUBLESHOOTING 8-26

LIGHTING SYSTEM 8-28
CIRCUIT DIAGRAM 8-28
TROUBLESHOOTING 8-29
CHECKING THE LIGHTING SYSTEM 8-31

SIGNALING SYSTEM 8-34
CIRCUIT DIAGRAM 8-34
TROUBLESHOOTING 8-36
CHECKING THE SIGNAL SYSTEM 8-37

COOLING SYSTEM 8-45
CIRCUIT DIAGRAM 8-45
TROUBLESHOOTING 8-46

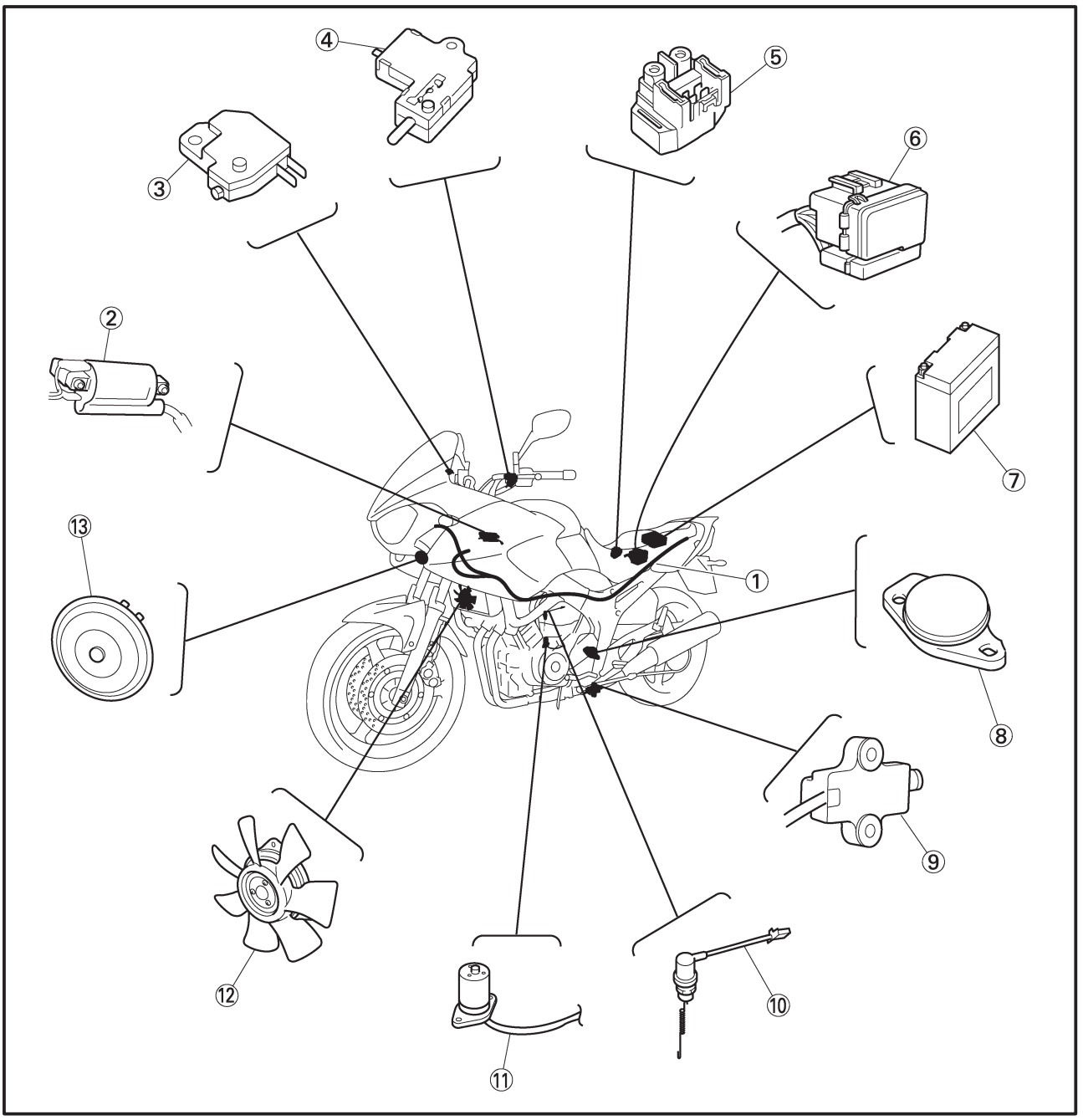
FUEL INJECTION SYSTEM 8-49
CIRCUIT DIAGRAM 8-49
TROUBLESHOOTING 8-50
CHECKING THE FUEL PUMP 8-56
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR 8-57

EAS00729

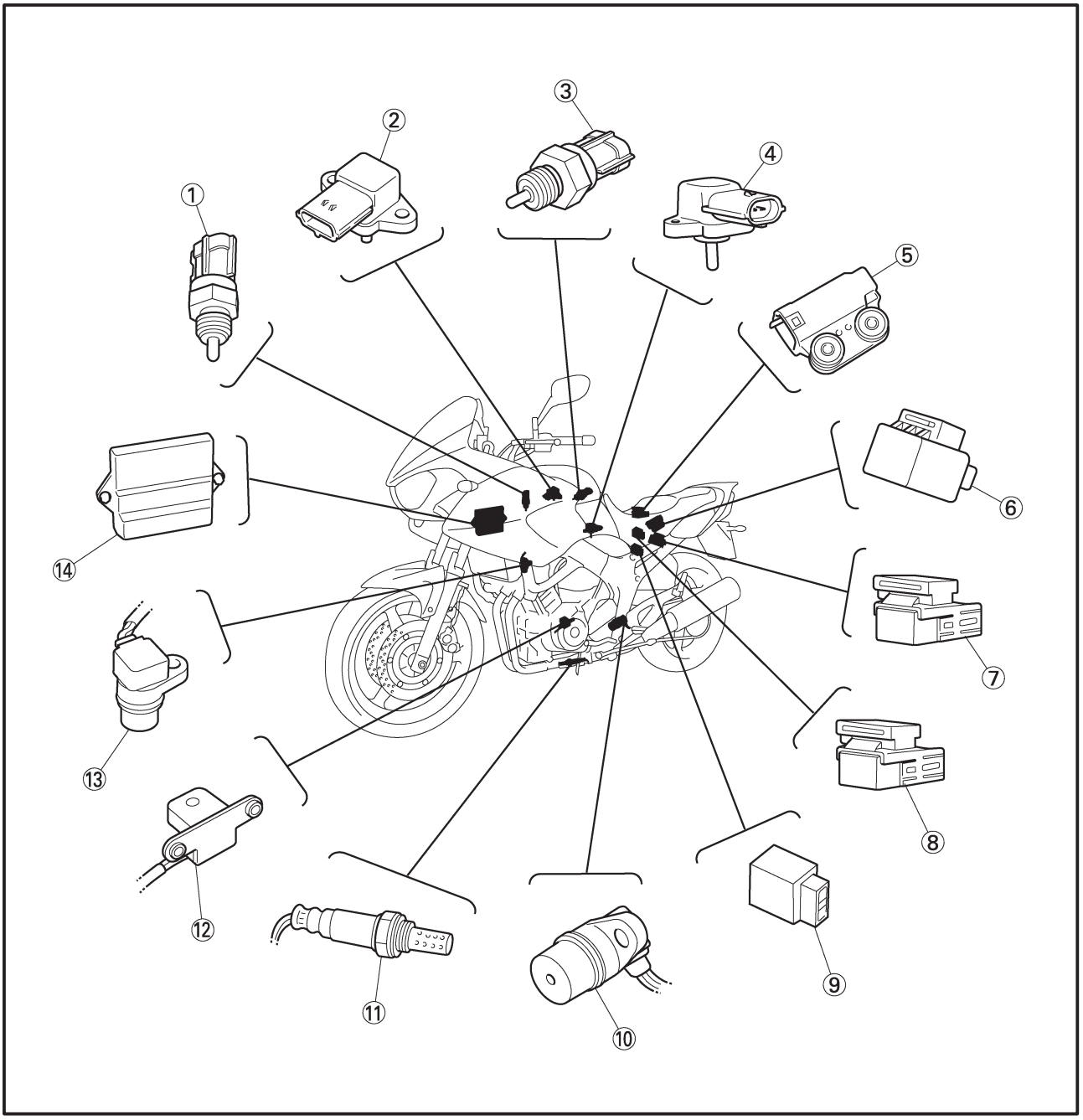
ELECTRICAL

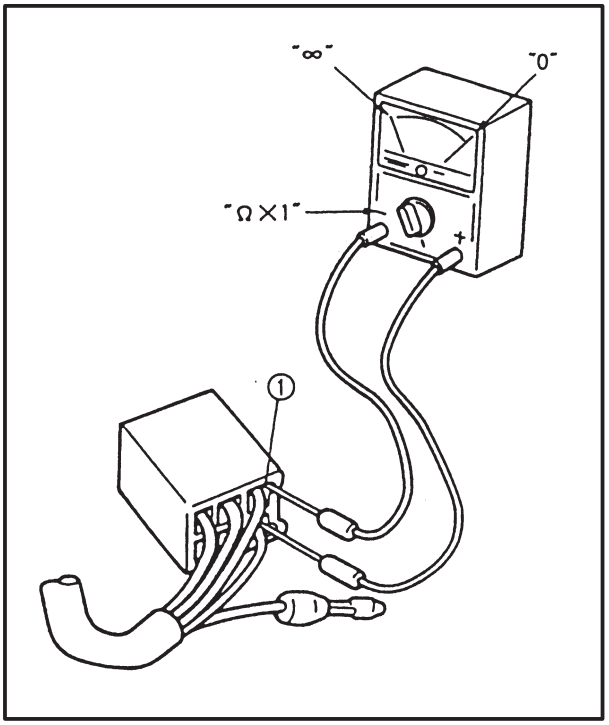
ELECTRICAL COMPONENTS

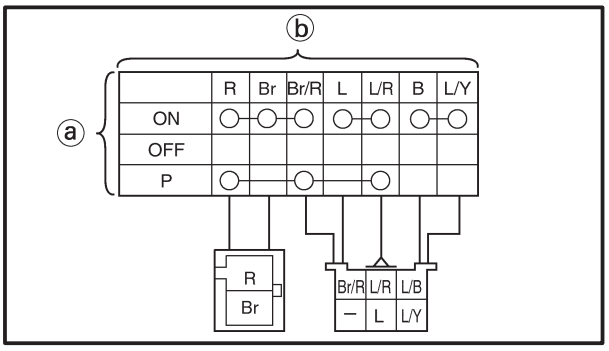
① Wire harness
② Ignition coil
③ Front brake light switch
④ Clutch switch
⑤ Starter relay
⑥ Fuse box
⑦ Battery
⑧ Neutral switch
⑨ Sidestand switch
⑩ Rear brake light switch
⑪ Oil level switch
⑫ Radiator fan motor
⑬ Horn



① Coolant temperature sensor
② Atomospheric pressure sensor
③ Intake air tempreture sensor
④ Intake air pressure sensor
⑤ Lean angle cut-off switch
⑥ Turn signal relay
⑦ Fuel injection system relay
⑧ Radiator fan motor relay
⑨ Starting circuit cut-off relay
⑩ Speed sensor
⑪ O_2 sensor
⑫ Crankshaft position sensor
⑬ Cylinder identification sensor
⑭ ECU







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 ⓐ. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

Pocket tester
90890-03132

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the "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 ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTE:

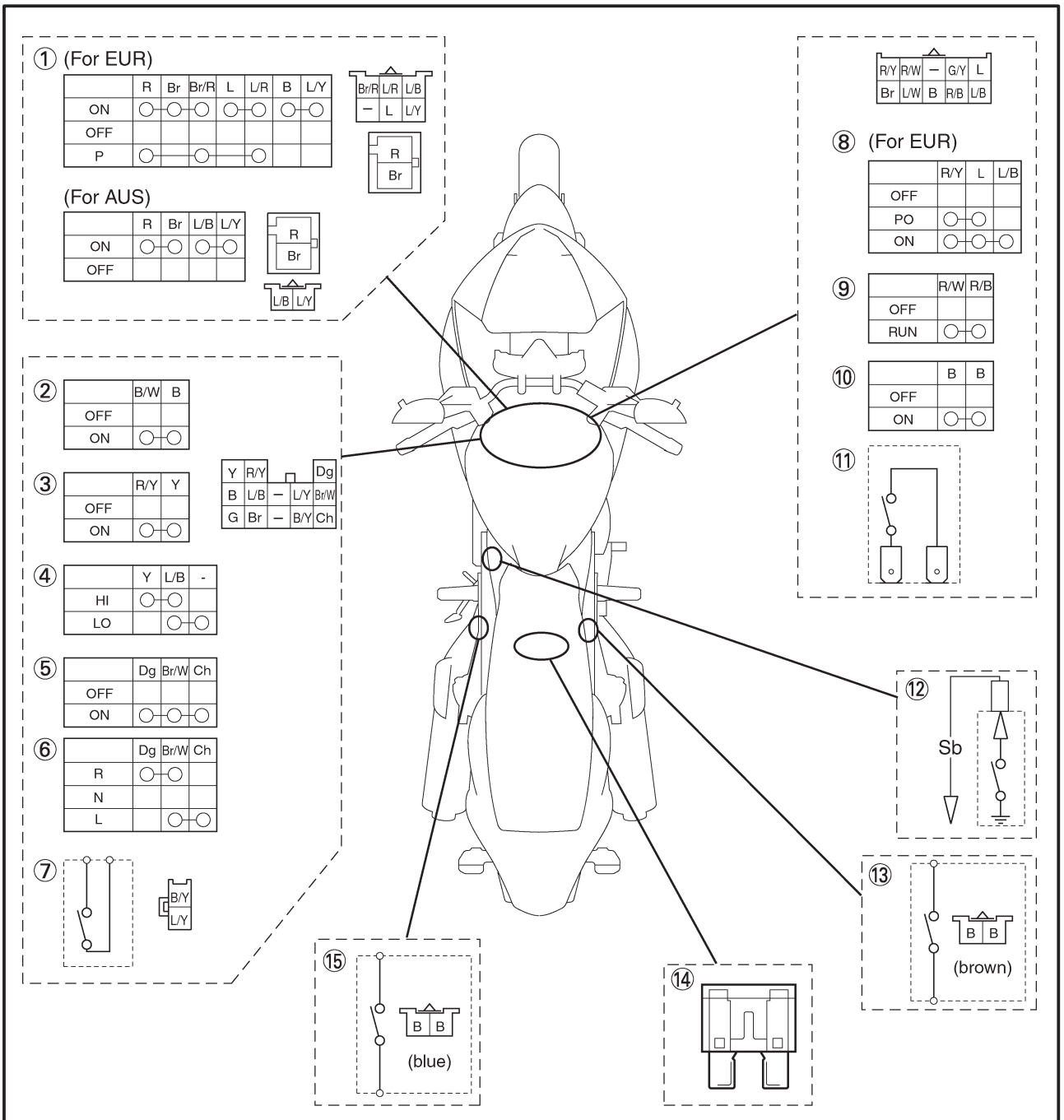
"○——○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:
There is continuity between black and black/white when the switch is set to "OFF".
There is continuity between red and brown when the switch is set to "ON".

EAS00731
CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear → Repair or replace.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.

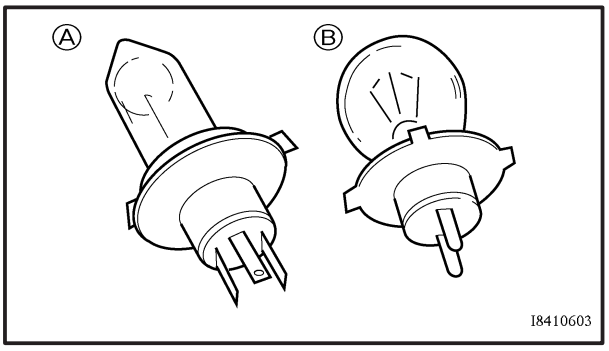


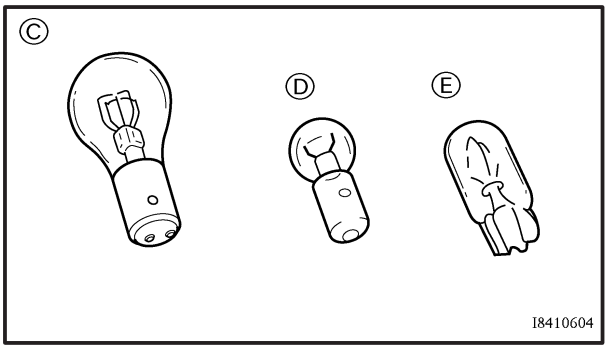
① Main switch
② Horn switch
③ Pass switch
④ Dimmer switch
⑤ Hazard switch
⑥ Turn signal switch
⑦ Clutch switch
⑧ Light switch
⑨ Engine stop switch
⑩ Start switch
⑪ Front brake light switch
⑫ Neutral switch
⑬ Rear brake light switch
⑭ Fuses
⑮ Sidestand switch

EAS00732

CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
No continuity → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs Ⓐ and Ⓑ 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 Ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs Ⓒ and Ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:
   - bulb

⚠ WARNING

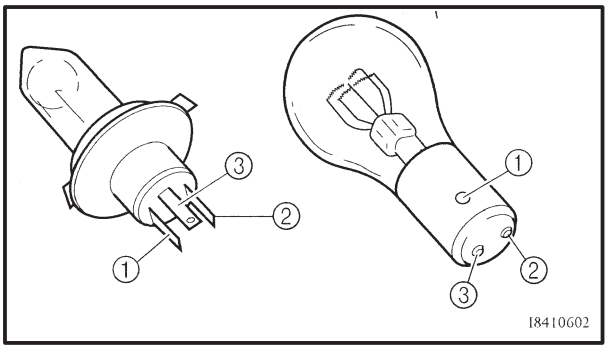
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

CAUTION:

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

	Pocket tester **90890-03132**



NOTE:

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

a. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ②, and check the continuity.
b. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ③, and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
   - bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.



Pocket tester
90890-03132

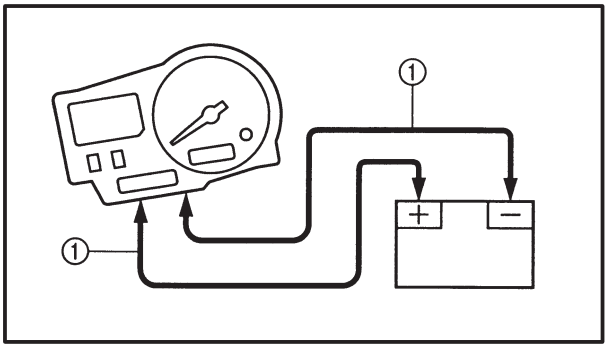
NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲



CHECKING THE LEDs

The following procedures applies to all of the LEDs.

1. Check:
   - LED (for proper operation)
     Improper operation → Replace.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Disconnect the meter assembly coupler (meter assembly side).
b. Connect two jumper leads ① from the battery terminals to the respective coupler terminal as shown.

⚠ WARNING

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

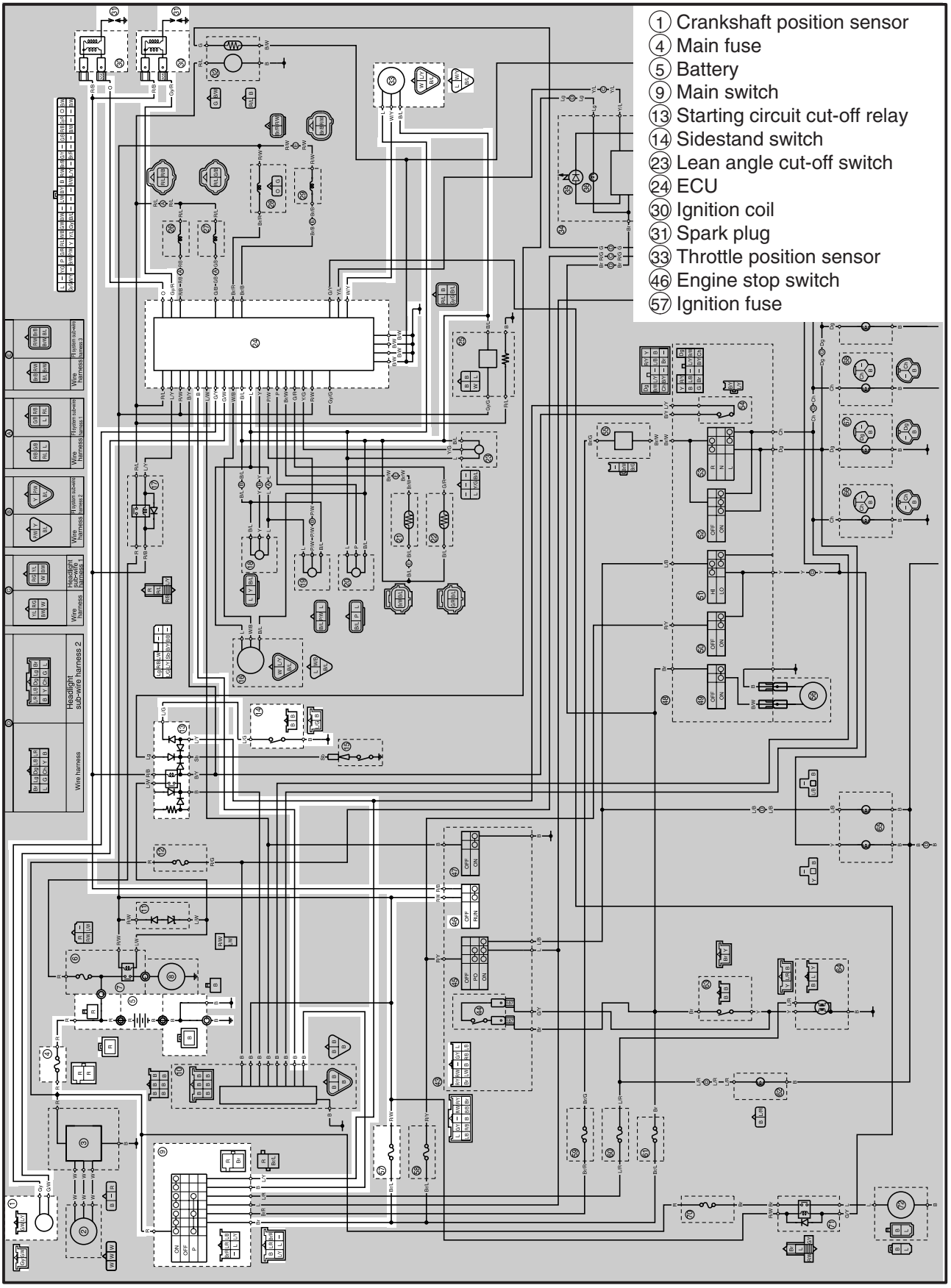
c. When the jumper leads are connected to the terminals the respective LED should illuminate.
   Does not light → Replace the meter assembly.

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EAS00735

IGNITION SYSTEM

CIRCUIT DIAGRAM



EAS00737
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. Main and ignition fuses
2. Battery
3. Spark plugs
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Main switch
8. Engine stop switch
9. Sidestand switch
10. Crankshaft position resistance
11. Starting circuit cut-off relay
12. Wiring connections
    (of the entire ignition system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. fuel tank
3. air filter case
4. side cowlings

- Troubleshoot with the following special tool(s).



Ignition checker
90890-06754
Pocket tester
90890-03132

EAS00738
1. Main and ignition fuses

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

YES

NO → Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EAS00741
3. Spark plugs

The following procedure applies to all of the spark plugs.
- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
  Refer to "CHECKING THE SPARK PLUGS" in chapter 3.



Standard spark plug
DPR8EA-9 (NGK)
X24EPR-U9 (DENSO)
Spark plug gap
0.8 ~ 0.9 mm

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

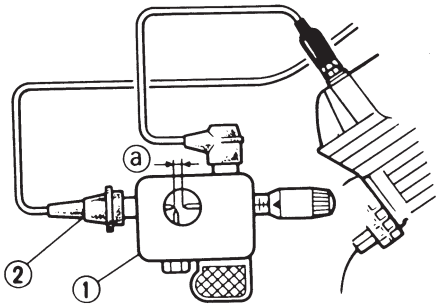
YES

NO → Re-gap or replace the spark plug.

EAS00743

4. Ignition spark gap

The following procedure applies to all of the spark plugs.
- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker ① as shown.
- ② Spark plug cap
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



Minimum ignition spark gap
6 mm

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

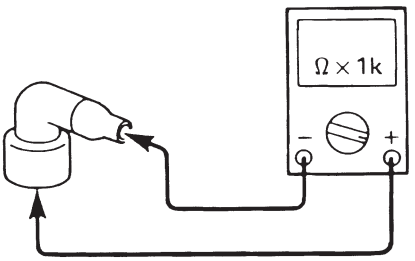
NO → The ignition system is OK.

YES

EAS00745

5. Spark plug cap resistance

The following procedure applies to all of the spark plug caps.
- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ("Ω × 1k") to the spark plug cap as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance
10 kΩ at 20°C

- Is the spark plug cap OK?

YES

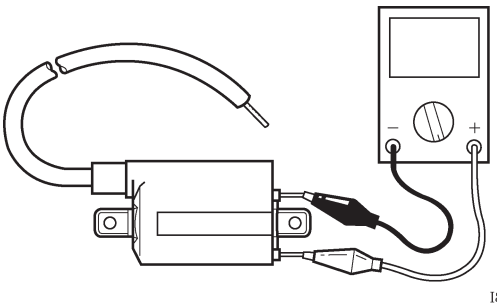
NO → Replace the spark plug cap.

EAS00747

6. Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil leads from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

Positive tester probe → red/black
Negative tester probe → orange (gray)

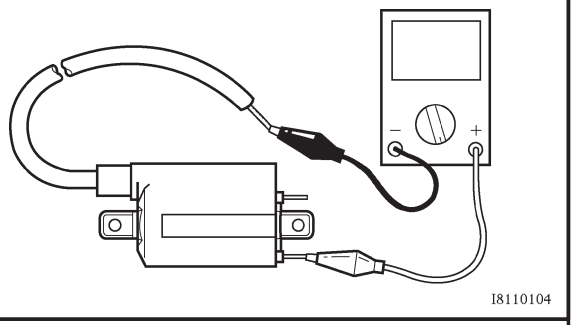


- Measure the primary coil resistance.

Primary coil resistance
3.4 ~ 4.6 Ω at 20°C

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

Negative tester probe →
spark plug lead①
Positive tester probe →
spark plug lead②



• Measure the secondary coil resistance.

Secondary coil resistance
10.4 ~ 15.6 kΩ at 20°C

• Is the ignition coil OK?

YES

NO → Replace the ignition coil.

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.

EAS00752

9. Sidestand switch

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

YES

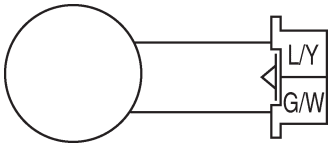
NO → Replace the sidestand switch.

EAS00748

10. Crankshaft position sensor rasistance

- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

Positive tester probe → green/white ①
Negative tester probe → blue/yellow ②



- Measure the crankshaft position sensor resistance.

Crankshaft position sensor resistance
192 ~ 288Ω at 20°C
(between green/white and blue/yellow)

- Is the crankshaft position sensor OK?

YES

NO

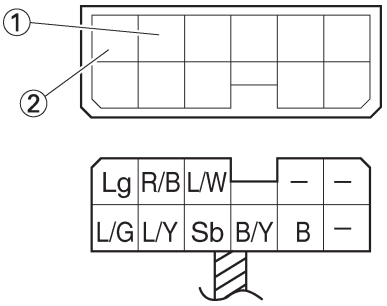
Replace the pickup coil.

EAS00753

11. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the starting circuit cut-off relay coupler as shown.
- Check the starting circuit cut-off relay for continuity.

Positive tester probe → blue/green ② **Negative tester probe → blue/yellow ①**	**Continuity**
Positive tester probe → blue/yellow ① **Negative tester probe → blue/green ②**	**No continuity**



NOTE:
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES

NO

Replace the starting circuit cut-off relay.

EAS00754

12. Wiring

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

YES

NO

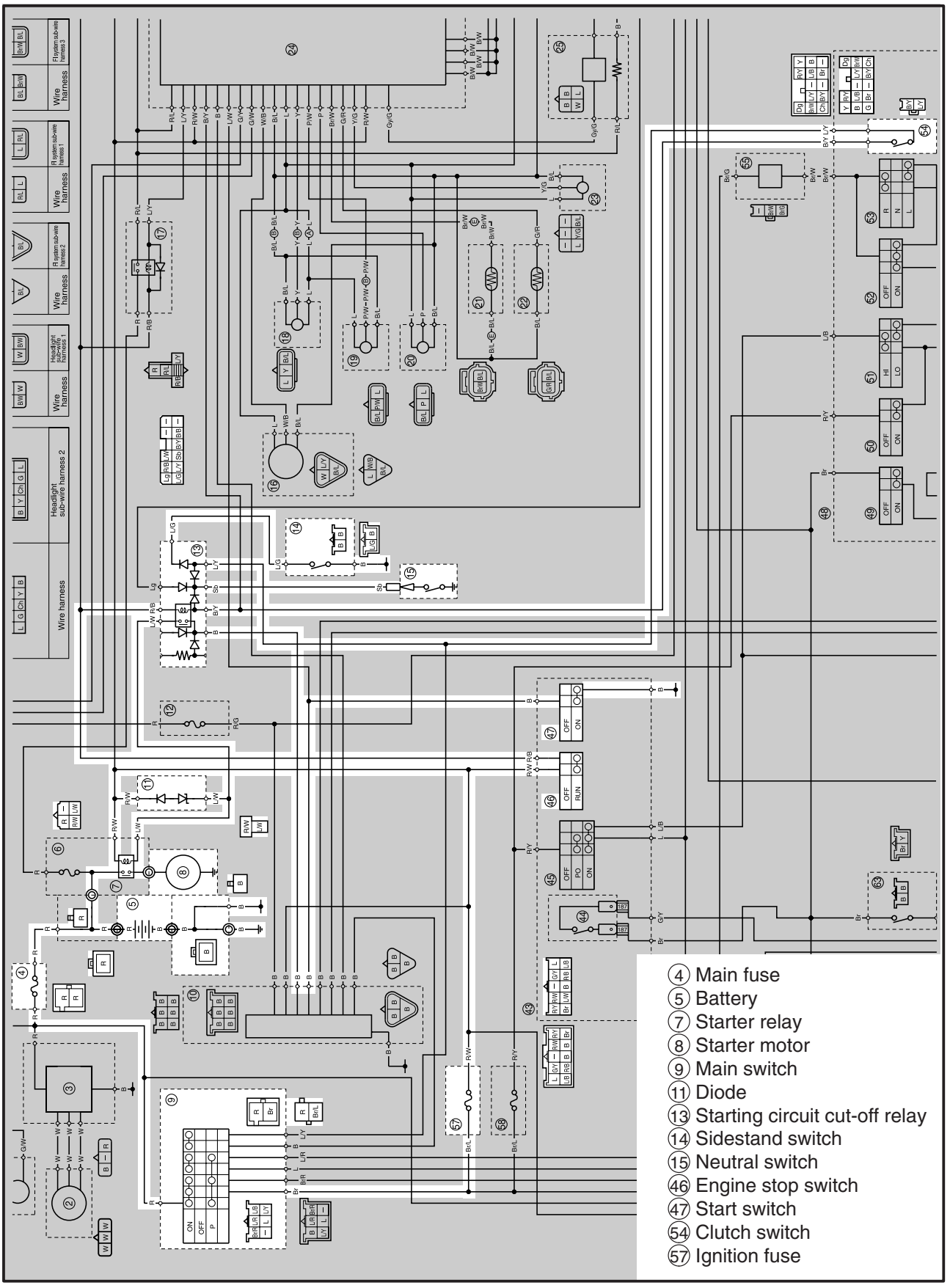
Replace the ignitor unit.

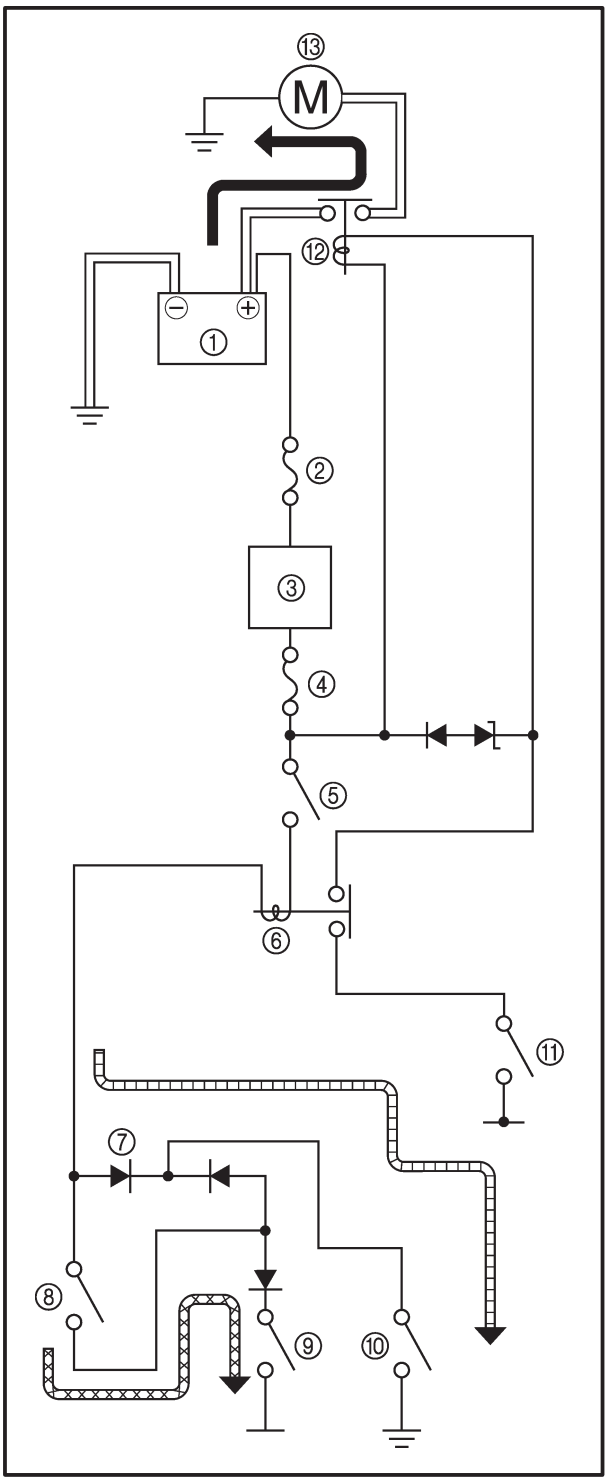
Properly connect or repair the ignition system's wiring.

EAS00755

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





EAS00756

STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “ ” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the starter switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

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

EAS00757

TROUBLESHOOTING

The starter motor fails to turn.

Check:

1. main and ignition fuses
2. Battery
3. starter motor
4. starting circuit cut-off relay
5. Diode
6. starter relay
7. main switch
8. engine stop switch
9. neutral switch
10. sidestand switch
11. clutch switch
12. start switch
13. wiring connections (of the entire starting system)

NOTE:

- Before troubleshooting, remove the following part(s):

1. seat
2. fuel tank
3. air filter case
4. side cowlings

- Troubleshoot with the following special tool(s).

Pocket tester
90890-03132

EAS00738

1. Main and ignition fuses

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

YES

NO

Replace the fuse(s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES

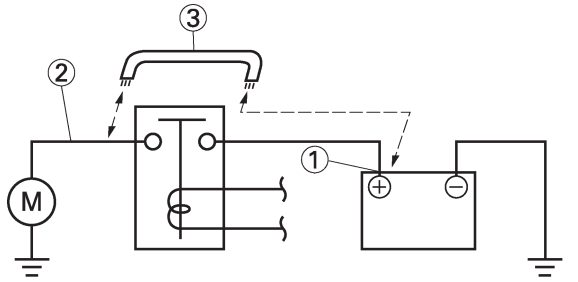
NO

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

EAS00758

3. Starter motor

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



18210801

⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.**

- Does the starter motor turn?

YES

NO

Repair or replace the starter motor.

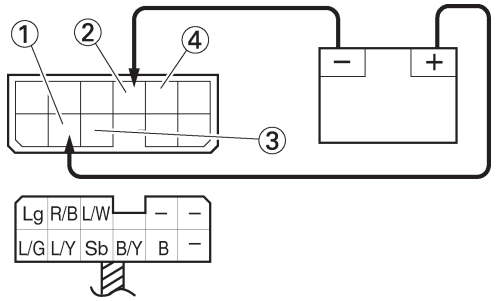
EAS00759

4. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starting circuit cut-off relay terminals as shown.

Battery positive terminal → red/black ①
Battery negative terminal → black/yellow ②

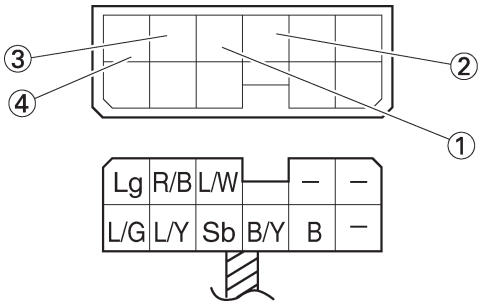
Tester positive prove → blue/white ③
Tester negative prove → black ④



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

YES

Tester positive probe → sky blue ① / Tester negative probe → black/yellow ②	Continuity
Tester positive probe → sky blue ① / Tester negative probe → blue/yellow ③	
Tester positive probe → blue/green ④ / Tester negative probe → blue/yellow ③	
Tester positive probe → black/yellow ② / Tester negative probe → sky blue ①	No continuity
Tester positive probe → blue/yellow ③ / Tester negative probe → sky blue ①	
Tester positive probe → blue/yellow ③ / Tester negative probe → blue/green ④	



NO

Replace the starting circuit cut-off relay.

EAS00760

5. Starting circuit cut-off relay (diode)

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester (Ω × 1) to the starting circuit cut-off relay terminals as shown.
- Measure the starting circuit cut-off relay for continuity as follows.

NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the testing readings correct?

YES

NO

Replace the starting circuit cut-off relay.

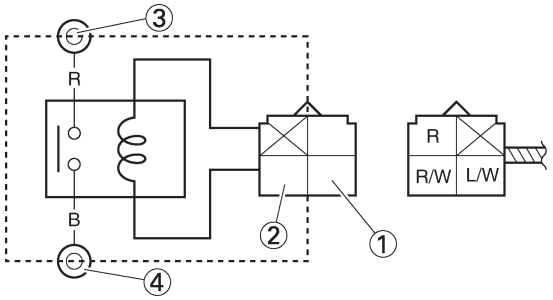
EAS00761

6. Starter relay

- Disconnect the starter relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starter relay terminals as shown.

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

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



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

YES → NO

Replace the starter relay.

EAS00749

7. Main switch

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

YES → NO

Replace the main switch.

EAS00750

8. Engine stop switch

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

YES → NO

Replace the right handlebar switch.

EAS00751

9. Neutral switch

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

YES → NO

Replace the neutral switch.

EAS00752

10. Sidestand switch

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

YES → NO

Replace the 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?

YES

NO → Replace the right handlebar switch.

EAS00766

13. Wiring

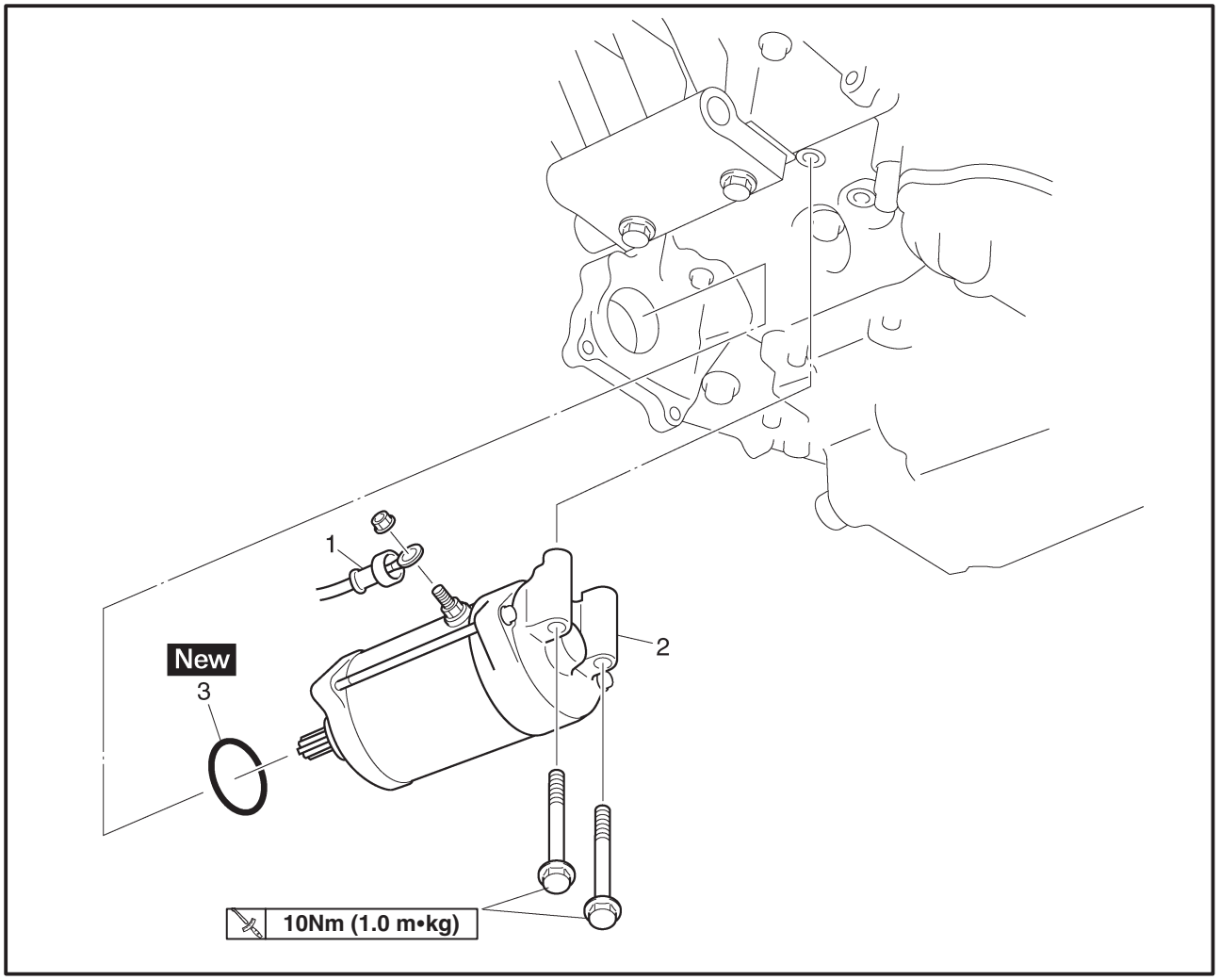
- Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

YES → The starting system circuit is OK.

NO → Properly connect or repair the starting system’s wiring.

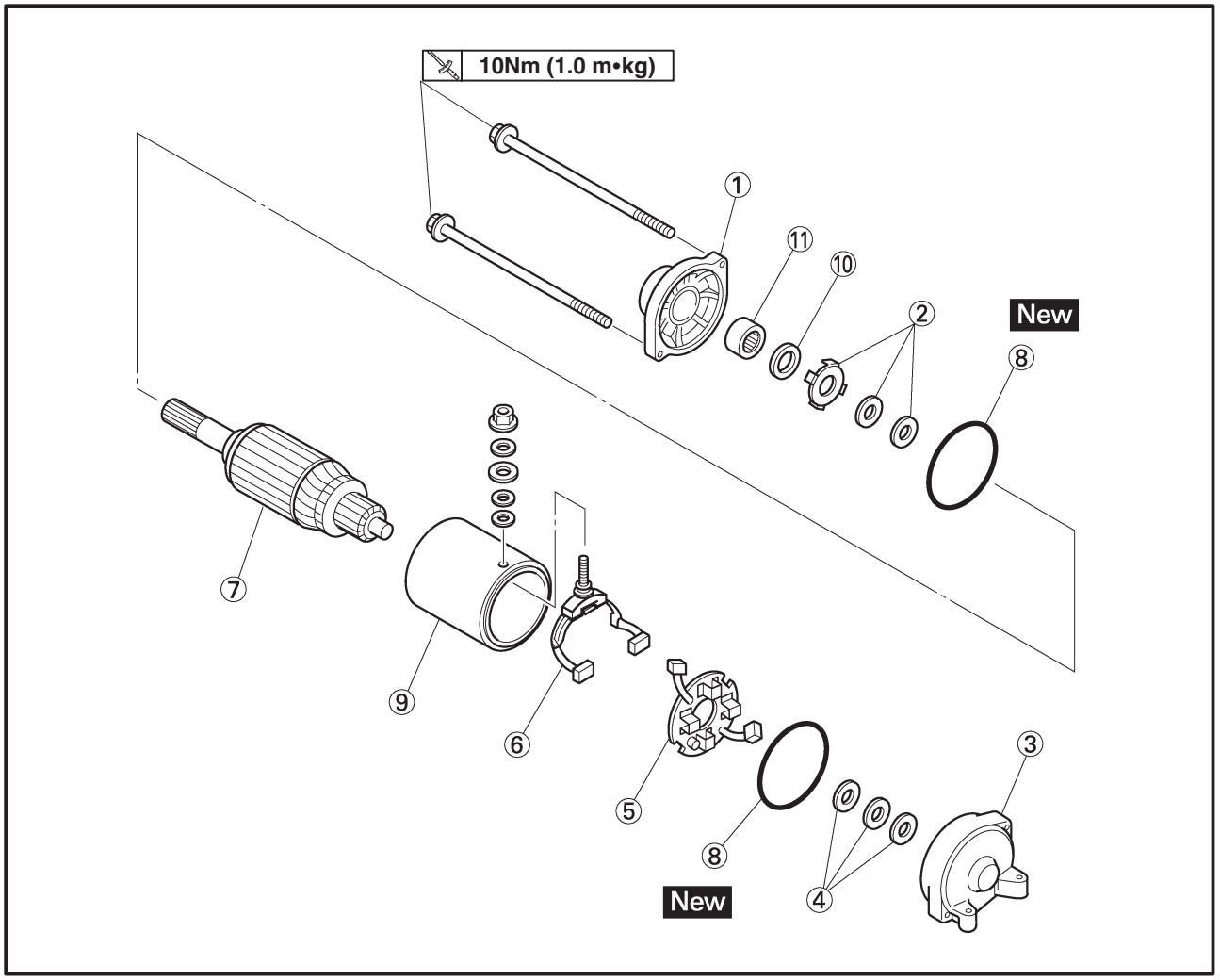
EAS00767

STARTER MOTOR

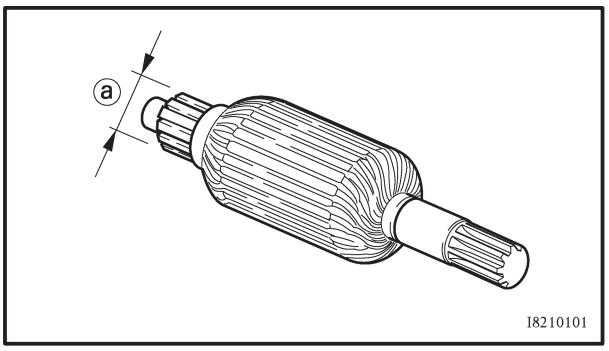


Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
	Exhaust pipe		
1	Starter motor lead	1	Disconnect.
2	Starter motor	1	
3	O-ring	1	
			For installation, reverse the removal procedure.

EAS00768



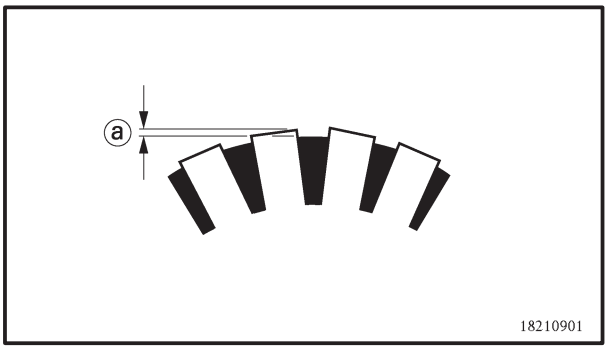
Order	Job/Part	Q'ty	Remarks
	Disassembling the starter motor		Disassemble the parts in the order listed.
①	Front bracket	1	
②	Washer kit	1	
③	Rear bracket	1	
④	Washer kit	1	
⑤	Brush holder	1	
⑥	Brush	2	
⑦	Armature coil	1	
⑧	O-ring	2	
⑨	Starter motor yoke	1	
⑩	Seal	1	
⑪	Bearing	1	
			For assembly, reverse the disassembly procedure.



EAS00770
CHECKING THE STARTER MOTOR

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

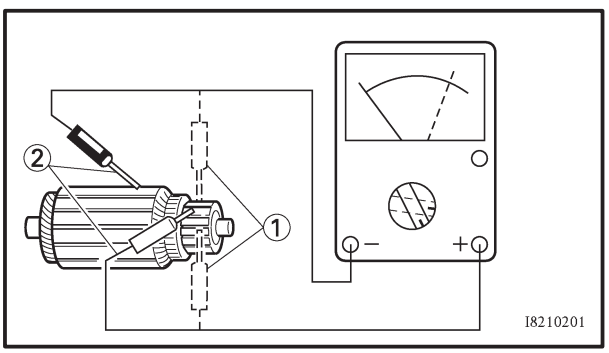
Commutator diameter limit
27 mm



3. Measure:
   • mica undercut ⓐ
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut
0.7 mm

NOTE:
The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
   • armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

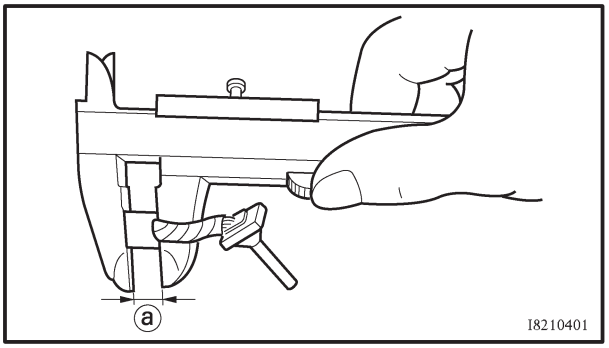
a. Measure the armature assembly resistances with the pocket tester.

Pocket tester
90890-03132

Armature coil
Resistance
0.03 ~ 0.04 Ω at 20°C

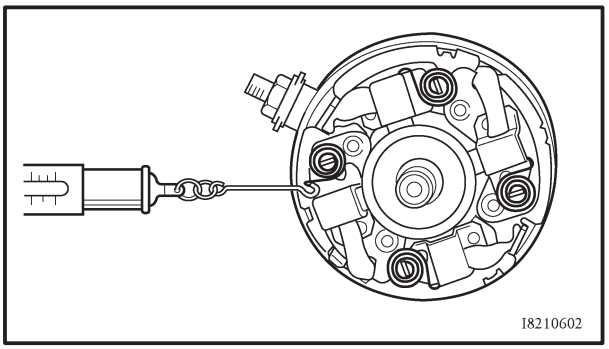
b. If any resistance is out of specification, replace the starter motor.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲



5. Measure:
   • brush length ⓐ.
   Out of specification → Replace the brushes as a set.

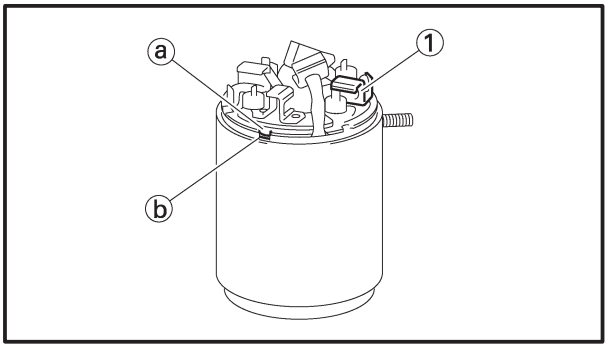
Brush length wear limit
5 mm



6. Measure:
   • brush spring force
   Out of specification → Replace the brush springs as a set.

Brush spring force
8.82 N (882 gf)

7. Check:
   • gear teeth
   Damage/wear → Replace the gear.
8. Check:
   • bearing
   • oil seal
   Damage/wear → Replace the defective part(s).



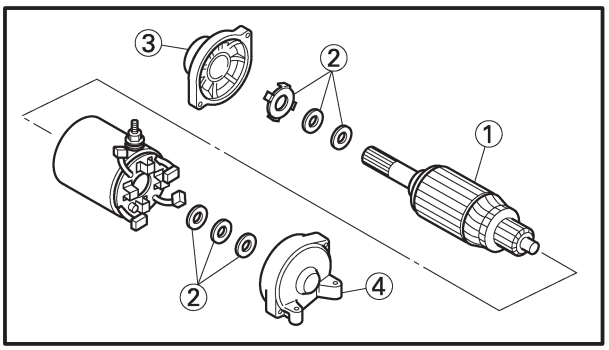
EAS00772

ASSEMBLING THE STARTER MOTOR

1. Install:
   - brush holder ①

NOTE:

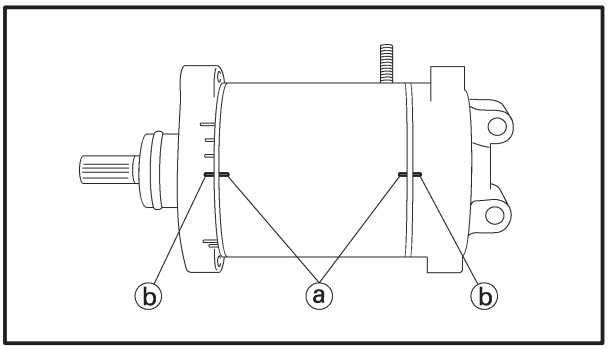
Align the tab ⓐ on the brush holder with the slot ⓑ in the starter motor yoke.

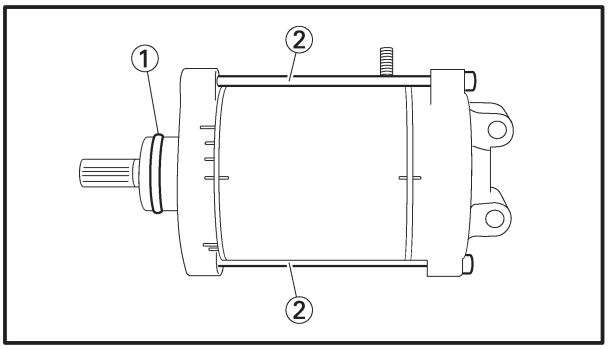


2. Install:
   - armature coil ①
   - washers ②
   - starter motor front cover ③
   - starter motor rear cover ④

NOTE:

Align the match marks ⓐ on the starter motor yoke with the match marks ⓑ on the front and starter motor rear covers.



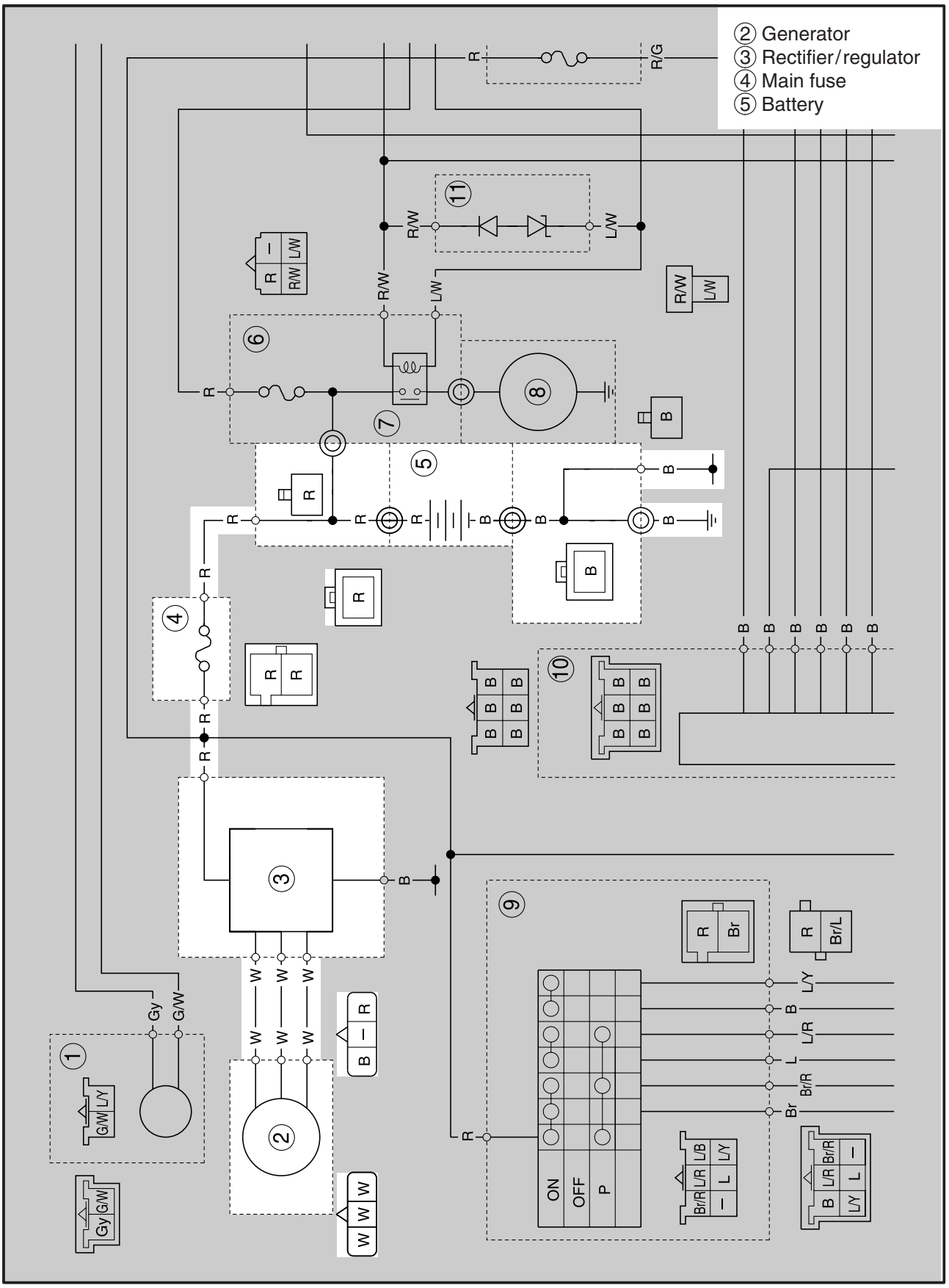


3. Install:
   - O-rings New ①
   - Starter motor bolts ② **10 Nm (1.0 m•kg)**

EAS00773

CHARGING SYSTEM

CIRCUIT DIAGRAM



EAS00774
TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4. stator assembly resistance
5. wiring connections
   (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. fuel tank
3. air filter case

- Troubleshoot with the following special tool(s).

Engine tachometer
90890-03113
Pocket tester
90890-03132

EAS00738
1. Main fuse

- Check the main fuse for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Is the main fuse OK?

YES ⇩

NO ⇩

Replace the fuse.

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES ⇩

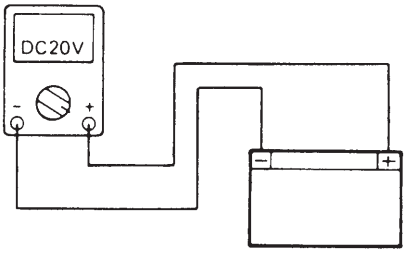
NO ⇩

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

EAS00775
3. Charging voltage

- Connect the engine tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20 V) to the battery as shown.

Positive tester probe →
positive battery terminal
Negative tester probe →
negative battery terminal



- Start the engine and let it run at approximately 5,000 r/min.
- Measure the charging voltage.

Charging voltage
14 V at 5,000 r/min

NOTE:
Make sure the battery is fully charged.

- Is the charging voltage within specification?

NO ⇩

YES ⇩

The charging circuit is OK.

EAS00776

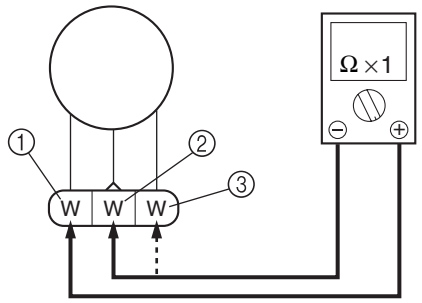
4. Stator coil resistance

- Remove the generator cover.
- Connect the pocket tester (Ω × 1) to the stator coils as shown.

Positive tester probe → white ①
Negative tester probe → white ②

Positive tester probe → white ①
Negative tester probe → white ③

- Measure the stator coil resistances.



Stator coil resistance
0.18 ~ 0.28 Ω at 20°C

- Is the stator coil OK?

YES

NO → Replace the stator coil assembly.

EAS00779

5. Wiring

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

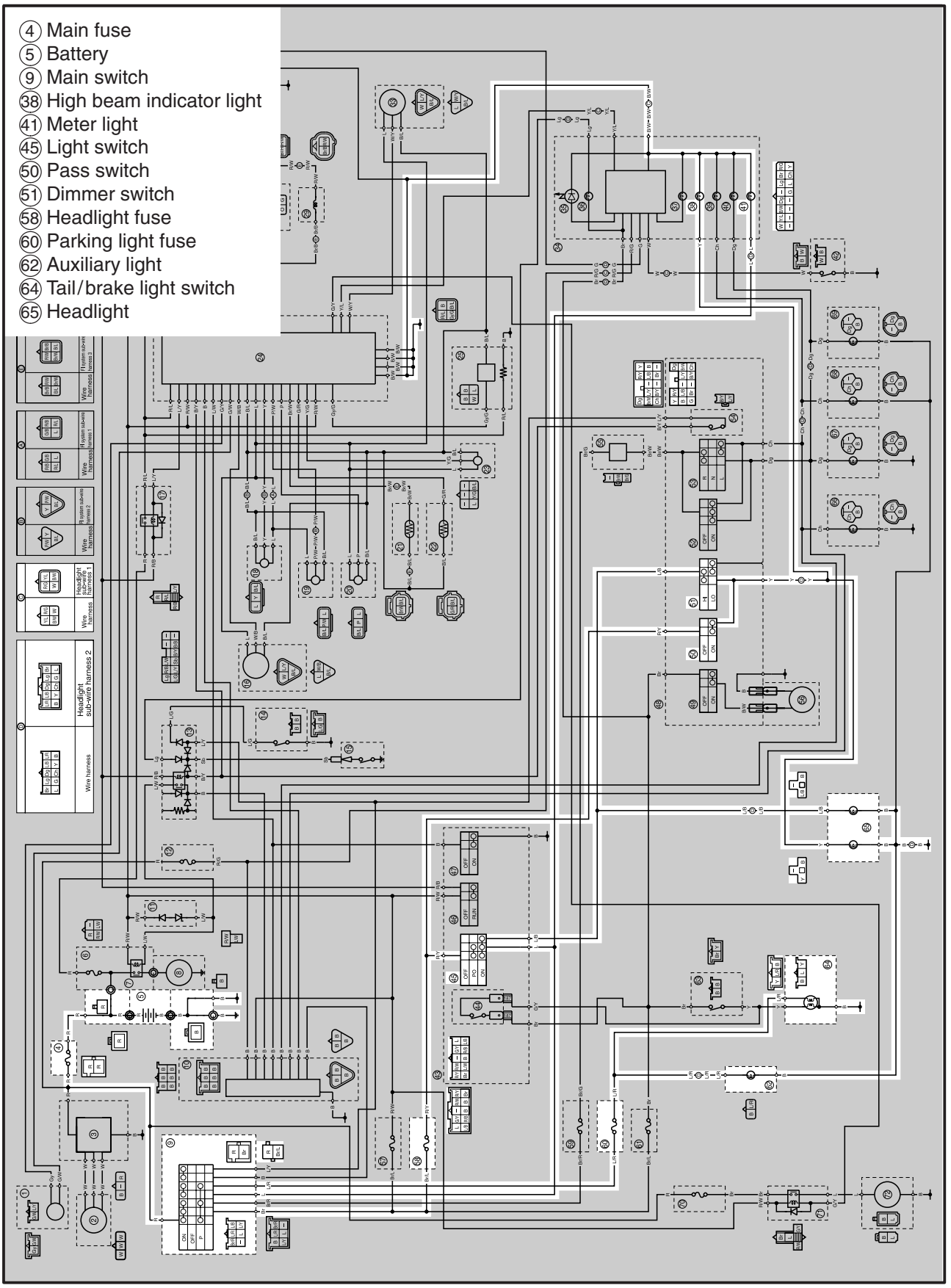
YES → Replace the rectifier/regulator.

NO → Properly connect or repair the charging system's wiring.

EAS00780

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EAS00781
TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light or meter light.

Check:
1. main, parking light, and headlight fuses
2. battery
3. main switch
4. light switch
5. dimmer switch
6. pass switch
7. wiring connections
   (of the entire lighting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. fuel tank
2. front cowling
3. rear cowling

- Troubleshoot with the following special tool(s).



Pocket tester
90890-03132

EAS00738
1. Main, parking lighting and headlight fuses

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

YES → NO

Replace the fuse(s).

EAS00739
2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES → NO

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

EAS00749
3. Main switch

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

YES → NO

Replace the main switch.

EAS00783
4. Light switch

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

YES → NO

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

EAS00784

5. Dimmer switch

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

YES

NO → The dimmer switch is faulty. Replace the left handlebar switch.

EAS00786

6. Pass switch

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

YES

NO → The pass switch is faulty. Replace the left handlebar switch.

EAS00787

7. Wiring

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

YES → Check the condition of each of the lighting system’s circuits. Refer to “CHECKING THE LIGHTING SYSTEM”.

NO → Properly connect or repair the lighting system’s wiring.

EAS00788
CHECKING THE LIGHTING SYSTEM

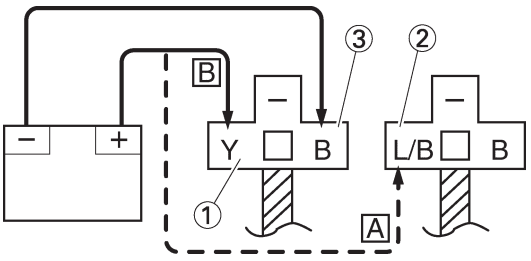
1. The headlight and the high beam indicator light fail to come on.

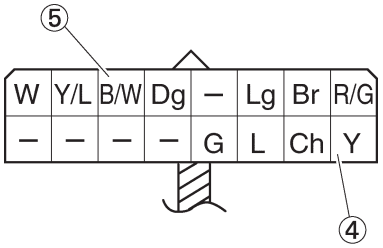
1. Headlight bulb and socket
• Check the headlight bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS" • Are the headlight bulb and socket OK?

⇩ YES ⇩ NO

Replace the headlight bulb, socket or both.

2. Voltage
• Connect the pocket tester (DC 20 V) to the headlight and high beam indicator light couplers as shown.
A When the dimmer switch is set to " ≡D " B When the dimmer switch is set to " ≡D "
Headlight coupler (wire harness side)
Headlight **Positive tester probe → yellow ① or blue/black ②** **Negative tester probe → black ③** **High beam indicator light** **Positive tester probe → yellow ④** **Negative tester probe → black/white ⑤**





Meter assembly coupler (wire harness side)
• Set the main switch to "ON". • Set the light switch to " ☼ ". • Set the dimmer switch to " ≡D " or " ≡D ". • Measure the voltage (DC 12 V) of yellow ④ on the meter assembly coupler (wire harness side). • Is the voltage within specification?

⇩ YES ⇩ NO

This circuit is OK.

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

EAS00789
2. The meter light fails to come on.

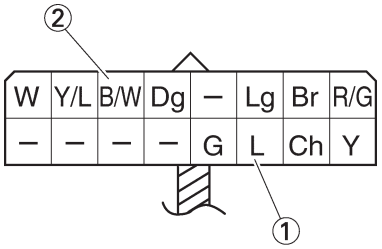
1. Meter light bulb and socket
- Check the meter light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the meter light bulb and socket OK?

YES

NO → Replace the meter light bulb, socket or both.

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

Positive tester probe → blue ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Set the light switch to " ≡D ⊂≡ " or " ☼ ".
- Measure the voltage (DC 12 V) of blue ① on the meter assembly coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EAS00790
3. The tail/brake light fails to come on.

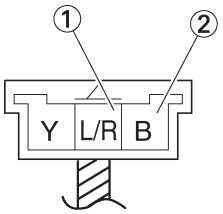
1. Tail/brake light bulb and socket
- Check the tail/brake light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the tail/brake light bulb and socket OK?

YES

NO → Replace the tail/brake light bulb, socket or both.

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

Positive tester probe → blue/red ①
Negative tester probe → black ②



- Set the main switch to "ON".
- Set the light switch to " ≡D ⊂≡ " or " ☼ ".
- Measure the voltage (DC 12 V) of blue/red ① on the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

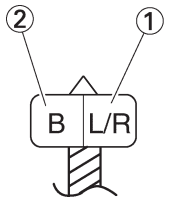
EAS00791

4. The auxiliary light fails to come on.

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

YES

NO → Replace the auxiliary light bulb, socket or both.

2. Voltage
• Connect the pocket tester (DC 20 V) to the auxiliary light coupler (wire harness side) as shown.
Positive tester probe → blue/red ① **Negative tester probe → black ②**

• Set the main switch to “ON”. • Set the light switch to “ ≡D ⊂≡ ” or “ ☼ ”. • Measure the voltage (DC 12 V) of blue/red ① on the auxiliary light coupler (wire harness side). • Is the voltage within specification?

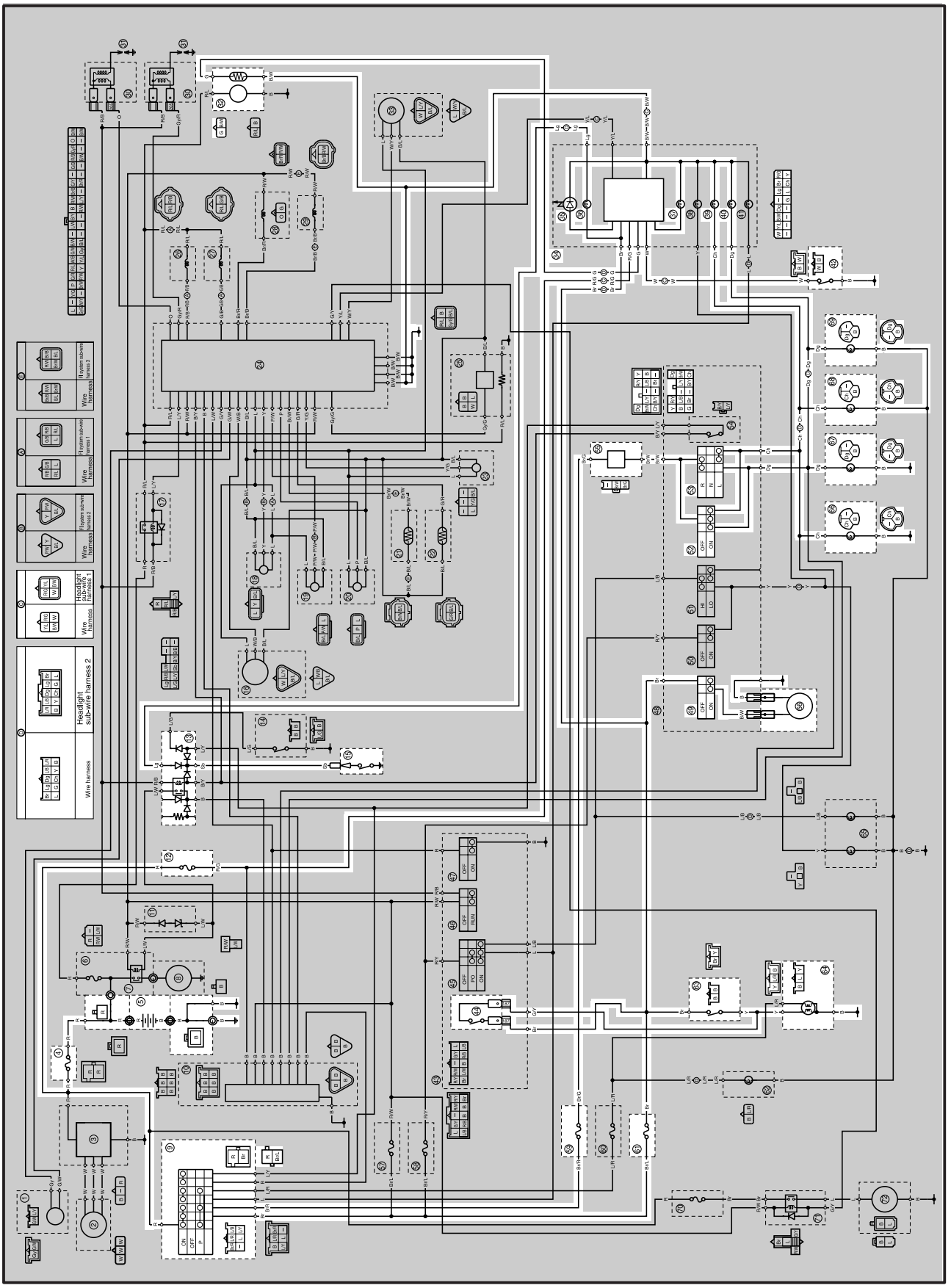
YES → This circuit is OK.

NO → The wiring circuit from the main switch to the auxiliary light coupler is faulty and must be repaired.

EAS00780

SIGNALING SYSTEM

CIRCUIT DIAGRAM



EAS00793

④ Main fuse
⑤ Battery
⑨ Main switch
⑫ Buck up fuse
⑬ Starting circuit cut-off relay
⑮ Neutral switch
㉜ Fuel pump
㉟ Oil level warning light
㊱ Neutral indicator light
㊲ Engine trouble warning light
㊴ Left turn signal indicator light
㊵ Right turn signal indicator light
㊷ Oil level switch
㊹ Front brake light switch
㊾ Horn switch
㊷ Hazard switch
㊸ Turn signal switch
㊺ Turn signal relay
㊻ Horn
㊾ Hazard light fuse
㊶ Signaling system fuse
㊸ Rear brake light switch
㊹ Tail/brake light switch
㊻ Rear turn signal light (left)
㊼ Rear turn signal light (right)
㊽ Front turn signal light (left)
㊾ Front turn signal light (right)

EAS00794
TROUBLESHOOTING

Any of the following fail to light: turn signal light, brake light or an indicator light. The horn fails to sound.

Check:
1. main, signaling, hazard light and back up fuses
2. battery
3. main switch
4. wiring connections (of the entire signaling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. fuel tank
2. front cowling
3. air filter case

- Troubleshoot with the following special tool(s).



Pocket tester
90890-03132

EAS00738

1. Main, signaling system, hazard lighting, windshield motor and backup fuses

- Check the main, signaling system, hazard lighting, windshield motor and backup fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signaling system, hazard lighting, windshield motor and backup fuses OK?

YES ⇩ NO ⇩

Replace the fuse(s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES ⇩ NO ⇩

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

EAS00749

3. Main switch

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

YES ⇩ NO ⇩

Replace the main switch.

EAS00795

4. Wiring

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

YES ⇩ NO ⇩

Check the condition of each of the signaling system's circuits. Refer to "CHECKING THE SIGNALING SYSTEM".

Properly connect or repair the signaling system's wiring.

EAS00796

CHECKING THE SIGNAL SYSTEM

1. The horn fails to sound.

1. Horn switch

- Check the horn switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the horn switch OK?

YES

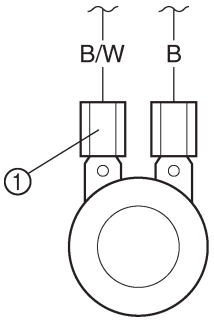
NO

Replace the left handlebar switch.

2. Voltage

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

Positive tester probe → black/white ①
Negative tester probe → ground



- Set the main switch to “ON”.
- Push the horn switch.
- Measure the voltage (DC 12 V) of black/white at the horn terminal.
- Is the voltage within specification?

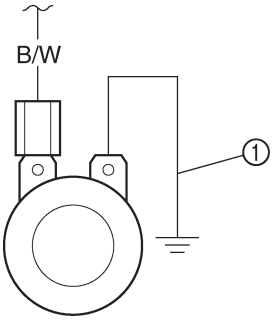
YES

NO

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

3. Horn

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



YES

NO

The horn is OK.

Replace the horn.

EAS00797
2. The tail/brake light fails to come on.

1. Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the tail/brake light bulb and socket OK?

YES

NO

Replace the tail/brake light bulb, socket or both.

2. Brake light switches

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

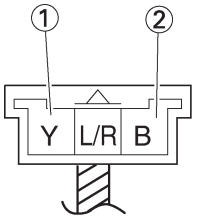
YES

NO

Replace the brake light switch.

3. Voltage

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



Positive tester probe → yellow ①
Negative tester probe → black ②

- Set the main switch to "ON".
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (DC 12 V) of yellow ① on the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

EAS00799
3. The turn signal light, turn signal indicator light or both fail to blink.

1. Turn signal indicator light bulb and socket
- Check the turn signal light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the turn signal light bulb and socket OK?

YES → NO

Replace the turn signal light bulb, socket or both.

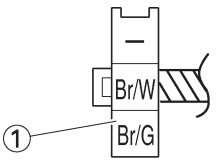
2. Turn signal switch
- Check the turn signal switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?

YES → NO

Replace the left handlebar switch.

3. Voltage
- Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness side) as shown.

Positive tester probe → brown/green ①
Negative tester probe → ground



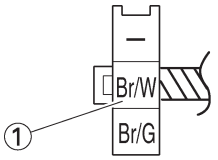
- Set the main switch to "ON".
- Measure the voltage (DC 12 V) on brown/green ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

YES → NO

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

4. Voltage
- Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness side) as shown.

Positive tester probe → brown/white ①
Negative tester probe → ground



- Set the main switch to "ON".
- Set the turn signal switch to "⇦" or "⇨".
- Measure the voltage (DC 12 V) on brown/white ① at the turn signal relay coupler (wire harness side).
- Is the voltage within specification?

YES → NO

The turn signal relay is faulty and must be replaced.

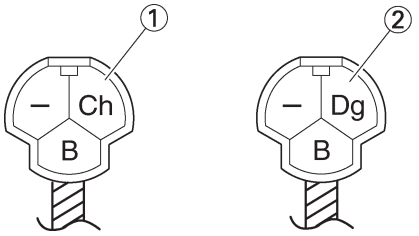
5. Voltage

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

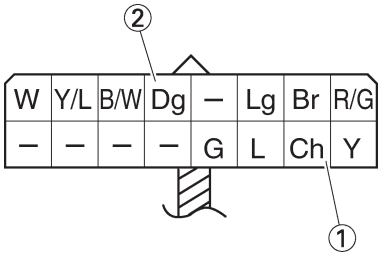
A Turn signal light
B Turn signal indicator light

Left turn signal light
Positive tester probe → chocolate ①
Negative tester probe → ground
Right turn signal light
Positive tester probe → dark green ②
Negative tester probe → ground

A



B



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

YES → This circuit is OK.

NO → The wiring circuit from the turn signal switch to the turn signal light coupler (meter assembly coupler) is faulty and must be repaired.

EAS00800

4. The neutral indicator light fails to come on.

1. Neutral indicator light bulb and socket

- Check the neutral indicator light bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the neutral indicator light bulb and socket OK?

YES

NO → Replace the neutral indicator light bulb, socket or both.

2. Neutral switch

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

YES

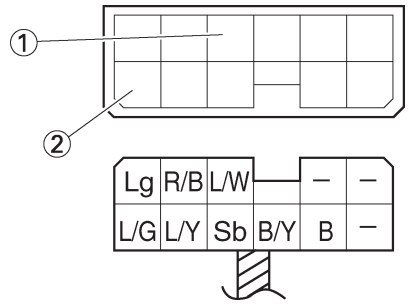
NO → Replace the neutral switch.

EAS00753

3. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester (Ω × 1) to the starting circuit cut-off relay terminals as shown.
- Check the starting circuit cut-off relay for continuity.

Tester positive probe → sky blue ① **Tester negative probe → light green ②**	**Continuity**
Tester positive probe → light green ② **Tester negative probe → sky blue ①**	**No continuity**



NOTE:
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

- Are the tester readings correct?

YES

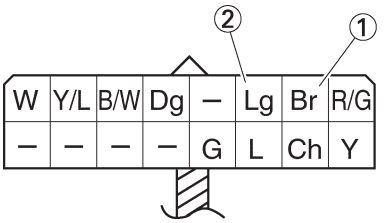
NO

Replace the starting circuit cut-off relay.

4. Voltage

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

Positive tester probe → brown ①
Negative tester probe → light green ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

YES

NO

This circuit is OK.

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

EAS00802

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

1. Oil level warning light bulb and socket

- Check the oil level warning light bulb and socket for continuity.
  Refer to "CHECKING THE LEDs"
- Are the oil level warning light bulb and socket OK?

YES

NO

Replace the oil level warning light bulb, socket or both.

2. Engine oil level switch

- Drain the engine oil and remove the engine oil level switch from the oil tank.
- Check the engine oil level switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the engine oil level switch OK?

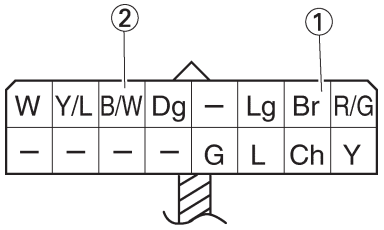
YES

NO → Replace the engine oil level switch.

3. Voltage

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

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

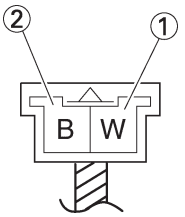
YES

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

4. Voltage

- Connect the pocket tester (DC 20 V) to the engine oil level switch coupler as shown.

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



- Set the main switch to "ON".
- Measure the voltage (5 V) of white ① and black② at the oil level switch coupler.
- Is the voltage within specification?

YES → This circuit is OK.

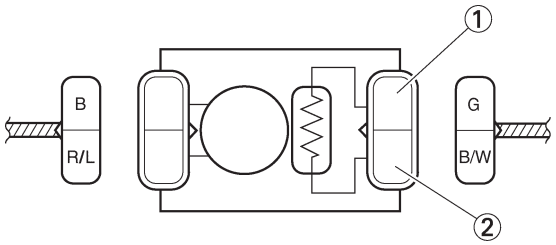
NO → The wiring circuit from the meter assembly to the oil level switch coupler is faulty and must be repaired.

EAS00803
6. The fuel level gauge fails to operate.

1. Fuel sender

- Drain the fuel from the fuel tank and remove the fuel pump assembly from the fuel tank.
- Connect the pocket tester (Ω × 1) to the fuel sender as shown.

Positive tester probe → green ①
Negative tester probe → black/white ②



- Measure the fuel sender resistances.

NOTE:
Measure the resistances when the float arm is in contact with the full position and empty position of the stopper.

Fuel sender resistance
Full position of the float
19 ~ 21 Ω at 20°C
Empty position of the float
139 ~ 141 Ω at 20°C

- Is the fuel sender OK?

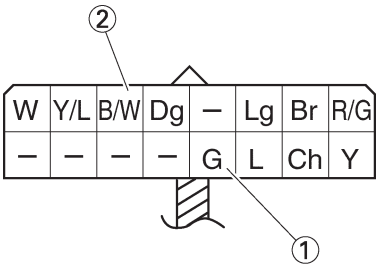
YES → NO

Replace the fuel pump.

2. Voltage

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

Positive tester probe → green ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of green ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

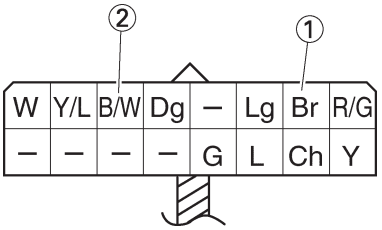
YES → NO

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

3. Voltage

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

Tester positive probe → brown ①
Tester negative probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES → NO

This circuit is OK.

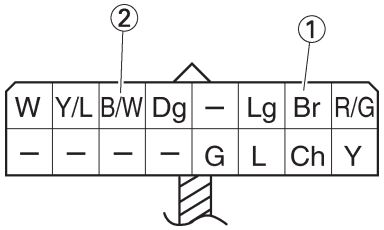
Replace the meter assembly.

EAS00805
7. The clock fails to operate.

1. Voltage

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

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to “ON”.
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

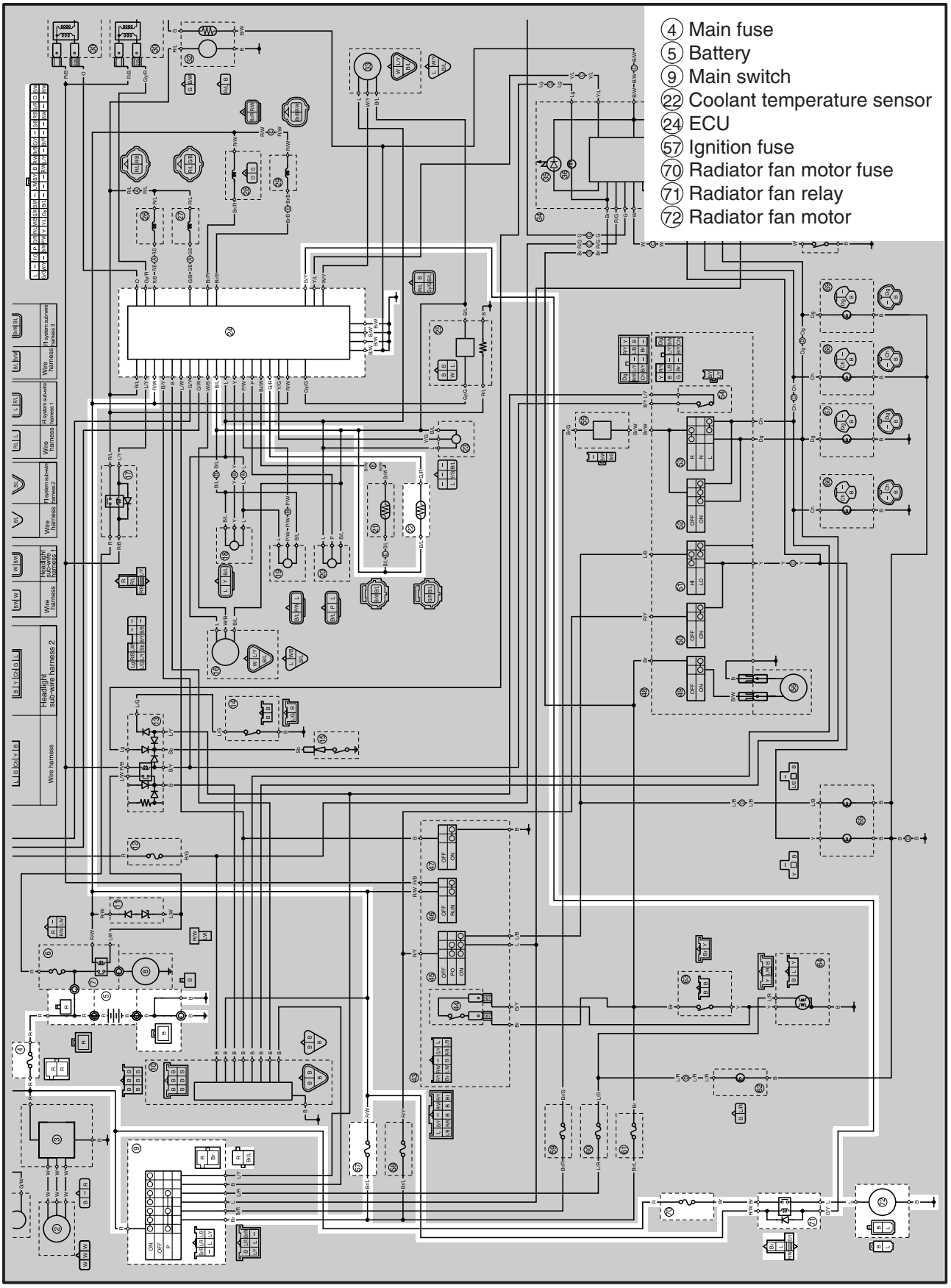
YES → Replace the meter assembly.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EAS00807

COOLING SYSTEM

CIRCUIT DIAGRAM



EAS00808
TROUBLESHOOTING

The radiator fan motor fails to turn.
The water temperature gauge needle fails to move when the engine is warm.

Check:
1. main, turn signal, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. radiator fan motor relay
6. coolant temperature sensor
7. wiring connections (the entire cooling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. fuel tank
3. air filter case
4. side cowlings

- Troubleshoot with the following special tool(s).



Pocket tester
90890-03132

EAS00738

1. Main, ignition, and radiator fan motor fuses

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

YES ⇩ NO ⇩

Replace the fuse(s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES ⇩ NO ⇩

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

EAS00749

3. Main switch

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

YES ⇩ NO ⇩

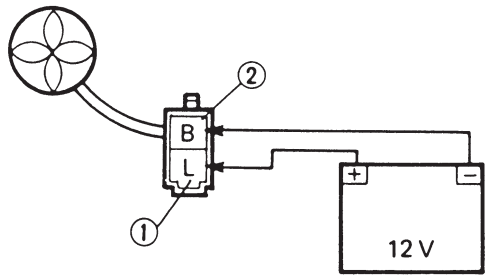
Replace the main switch.

EAS00809

4. Radiator fan motor

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (DC 12 V) as shown.

Positive battery lead → blue ①
Negative battery lead → black ②



- Does the radiator fan motor turn?

YES ⇩

NO ⇩

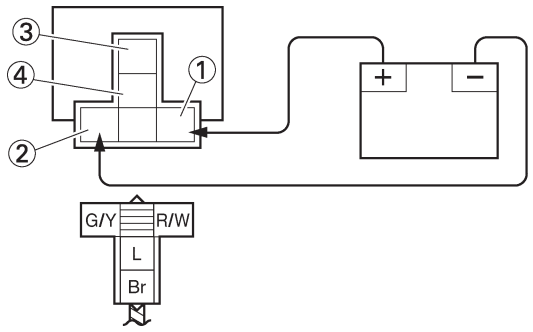
The radiator fan motor is faulty and must be replaced.

5. Radiator fan motor relay

- Disconnect the radiator fan motor relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the radiator fan motor terminal as shown.
- Check the radiator fan motor of continuity.

Battery positive terminal → red/white ①
Battery negative terminal → green/yellow②

Tester positive probe → brown ③
Tester negative probe → blue ④



- Does the radiator fan motor relay have continuity between brown and blue?

YES ⇩

NO ⇩

Replace the radiator fan motor relay.

6. Coolant temperature sensor

- Remove the coolant temperature sensor from the thermostat assembly.
- Connect the pocket tester (Ω × 1) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:
Make sure that the coolant temperature sensor terminals do not get wet.

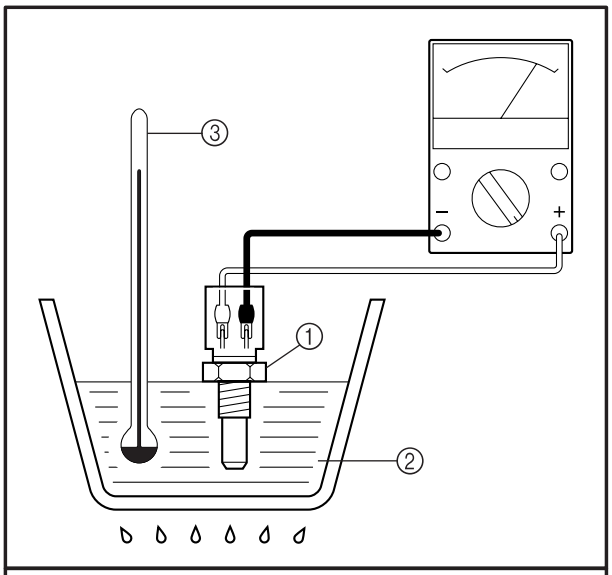
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool down to the specified temperature.
- Check the thermo switch for continuity at the temperatures indicated below.

Test step	Coolant temperature	Resistance
1	20°C	2.32 ~ 2.59 kΩ
2	80°C	0.31 ~ 0.33 kΩ
3	110°C	0.14 ~ 0.15 kΩ

⚠ WARNING

- **Handle the thermo switch with special care.**
- **Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.**

Coolant temperature sensor
20 Nm (2.0 m•kg)
Three bond sealock®10



• Does the coolant temperature sensor operate properly as described above?

YES

NO

Replace the coolant temperature sensor.

EAS00813

7. Wiring

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

YES

NO

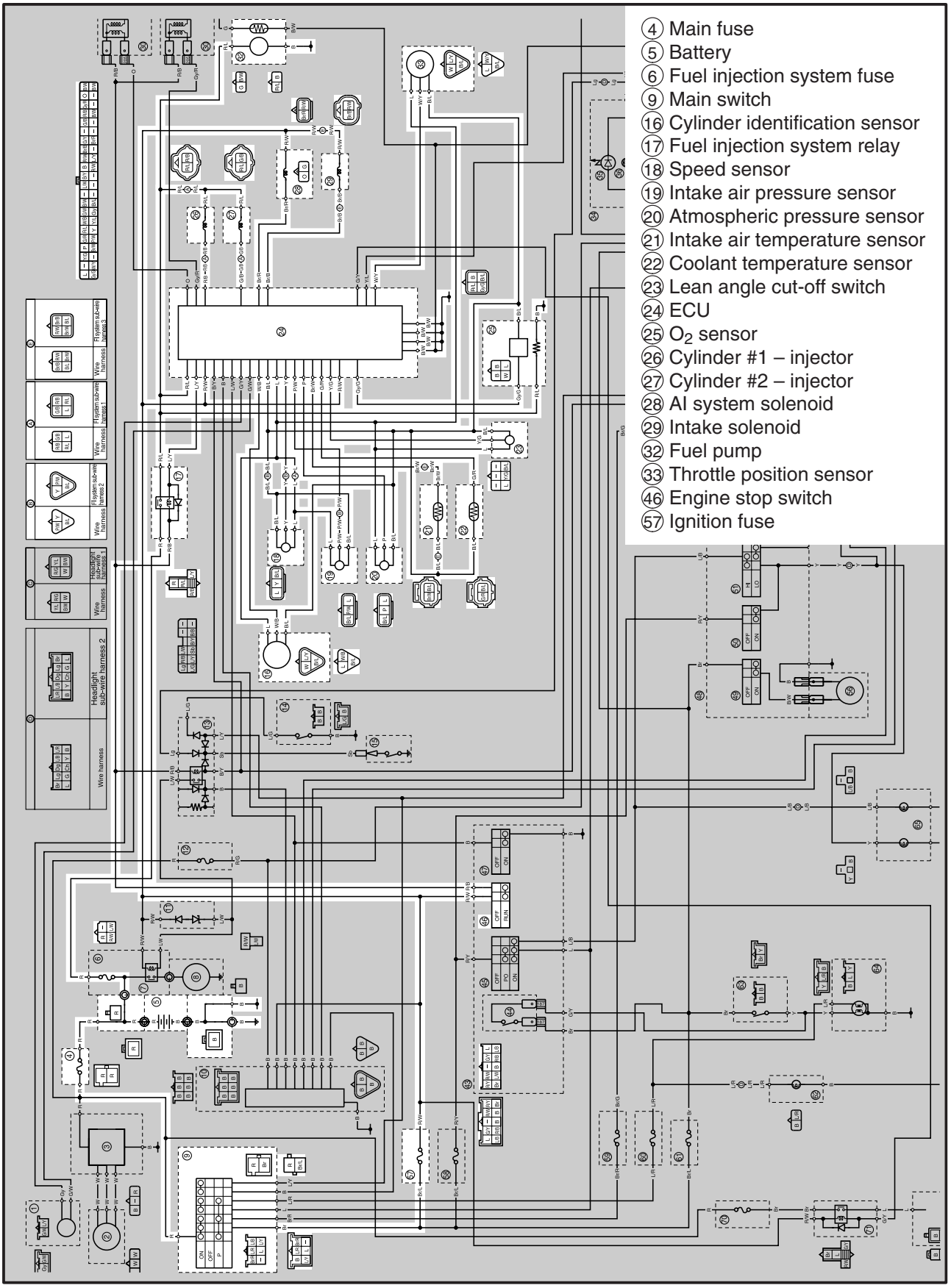
This circuit is OK.

Properly connect or repair the cooling system's wiring.

EAS00814

FUEL INJECTION SYSTEM

CIRCUIT DIAGRAM



EAS00816
TROUBLESHOOTING

If the fuel injection system fails to operate.

Check:
1. main fuel injection system and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. fuel injection system relay
6. fuel pump resistance
7. crankshaft position sensor
8. cylinder identification sensor
9. speed sensor
10. coolant temperature sensor
11. intake air temperature sensor
12. intake air pressure sensor
13. atmospheric pressure sensor
14. AI system solenoid
15. Intake solenoid
16. wiring connections (the entire fuel system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. fuel tank
2. air filter case
3. side cowlings

- Troubleshoot with the following special tool(s).

Pocket tester
90890-03132

EAS00738

1. Main, fuel injection system and ignition fuses

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

YES ⇩ NO ⇩

Replace the fuse(s).

EAS00739

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20°C

- Is the battery OK?

YES ⇩ NO ⇩

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

EAS00749

3. Main switch

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

YES ⇩ NO ⇩

Replace the main switch.

EAS00750

4. Engine stop switch

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

YES ⇩ NO ⇩

Replace the right handlebar switch.

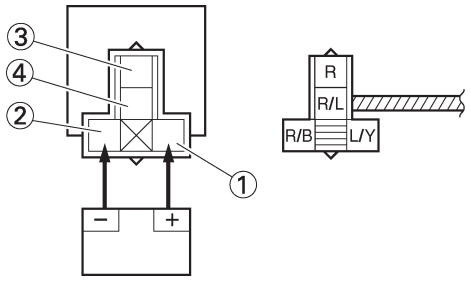
EAS00759

5. Fuel injection system relay

- Disconnect the fuel injection system relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the fuel injection system relay terminals as shown.

Battery positive terminal → red/black ①
Battery negative terminal → blue/yellow ②

Tester positive probe → red ③
Tester negative probe → red/blue ④



- Does the fuel injection system relay have continuity between blue/white and black?

YES

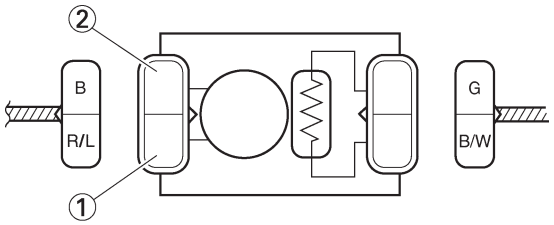
NO → Replace the fuel injection system relay.

EAS00617

6. Fuel pump resistance

- Disconnect the fuel pump coupler from the fuel pump.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler as shown.

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



- Measure the fuel pump resistance.

Fuel pump resistance
0.2 ~ 3.0 Ω at 20°C

- Is the fuel pump OK?

YES

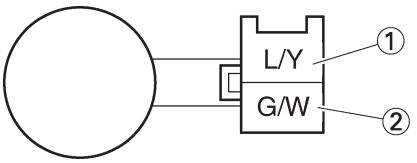
NO → Replace the fuel pump.

EAS00748

7. Crankshaft position sensor resistance

- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

Tester positive probe → blue/yellow ①
Tester negative probe → green/white ②



- Measure the crankshaft position sensor resistance.

Crankshaft position sensor resistance
420 ~ 569 Ω at 20°C
(between gray and black)

- Is the crankshaft position sensor OK?

YES

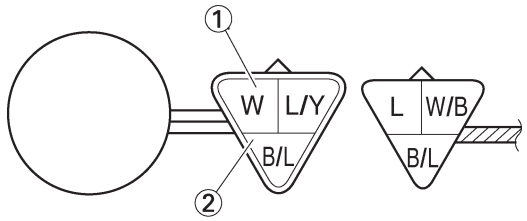
NO

Replace the crankshaft position sensor.

8. Cylinder identification sensor output voltage

- Connect the pocket tester (DC 20 V) to the cylinder identification sensor coupler terminal as shown.

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



- Set the main switch to "ON".
- Measure the cylinder identification sensor output voltage.

Cylinder identification sensor output voltage
When sensor is on
DC 4.8 V or more
When sensor is off
DC 0.6 V or less

- Is the cylinder identification sensor OK?

YES

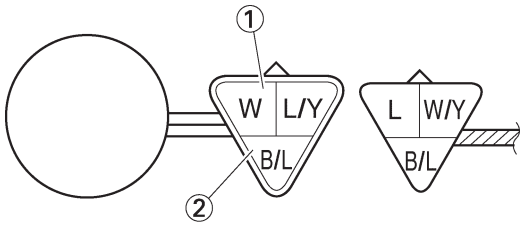
NO

Replace the cylinder identification sensor.

9. Speed sensor output voltage

- Measure the speed sensor output voltage.
- Connect the pocket tester (DC 20 V) to the speed sensor coupler terminal as shown.

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



- Measure the speed sensor output voltage.

Speed sensor output voltage
When sensor is on
DC 4.8 V or more
When sensor is off
DC 0.6 V or less

- Is the speed sensor OK?

YES

NO

Replace the speed sensor.

EAS00811

10. Coolant temperature sensor

- Remove the coolant temperature sensor from the thermostat assembly.
- Connect the pocket tester (Ω × 1) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:
Make sure that the coolant temperature sensor terminals do not get wet.

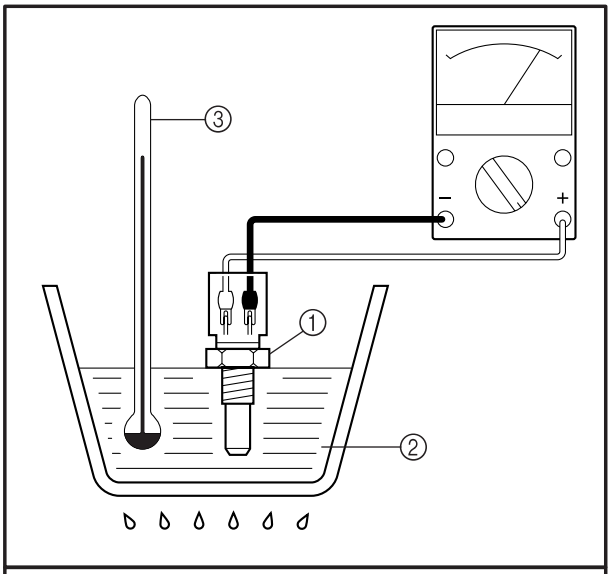
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool down to the specified temperature.
- Check the coolant temperature sensor for continuity at the temperatures indicated below.

Test step	Coolant temperature	Resistance
1	20°C	2.32 ~ 2.59 kΩ
2	80°C	0.31 ~ 0.33 kΩ
3	110°C	0.14 ~ 0.15 kΩ

⚠ WARNING

- **Handle the coolant temperature sensor with special care.**
- **Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.**

Coolant temperature sensor
20 Nm (2.0 m•kg)
Three bond sealock® 10



- Does the coolant temperature sensor operate properly as described above?

YES

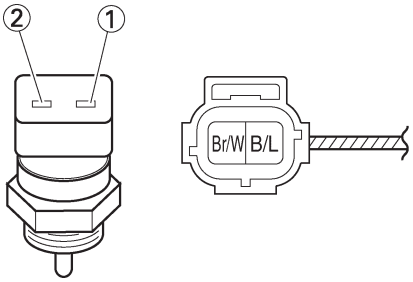
NO

Replace the coolant temperature sensor.

11. Intake air temperature sensor resistance

- Remove the intake air temperature sensor from the air filter case.
- Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

Tester positive probe → brown/white ①
Tester negative probe → black/blue ②



- Measure the intake air temperature sensor resistance.

Intake air temperature sensor resistance
450 ~ 550 Ω at 20°C

⚠ WARNING

- **Handle the intake air temperature sensor with special care.**
- **Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.**

Intake air temperature sensor
18 Nm (1.8 m•kg)

- Is the intake air temperature sensor OK?

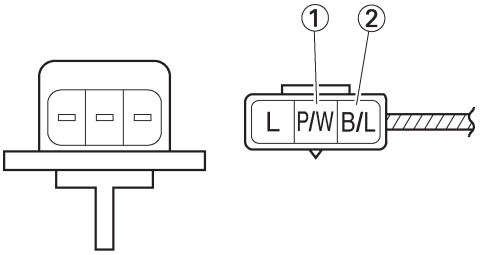
YES

NO → Replace the intake air temperature sensor.

12. Intake air pressure sensor output voltage

- Connect the pocket tester (DC 20 V) to the intake air intake air pressure sensor coupler terminal as shown.

Tester positive probe → pink/white ①
Tester negative probe → black/blue ②



- Set the main switch to "ON".
- Measure the intake air pressure sensor output voltage.

Intake air pressure sensor output voltage
3.75 ~ 4.25 V

- Is the intake air pressure sensor OK?

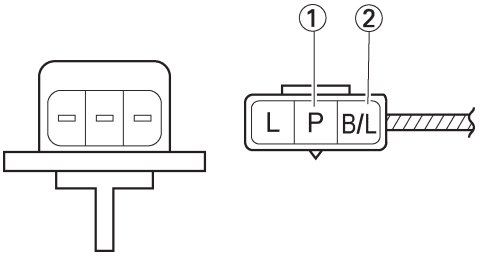
YES

NO → Replace the intake air pressure sensor.

13. Atmospheric pressure sensor output voltage

- Connect the pocket tester (DC 20 V) to the atmospheric pressure sensor coupler terminal as shown.

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



- Set the main switch to "ON".
- Measure the atmospheric pressure sensor output voltage.

Atmospheric pressure sensor output voltage
3.75 ~ 4.25 DCV

- Is the atmospheric pressure sensor OK?

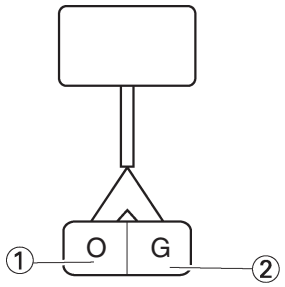
YES

NO → Replace the atmospheric pressure sensor.

14. AI system solenoid

- Remove the AI system solenoid coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the AI system solenoid terminal as shown.

Tester positive probe → orange ①
Tester negative probe → green ②



- Measure the AI system solenoid resistance.

AI system solenoid resistance
19 ~ 25 Ω at 20°C

- Is the AI system solenoid OK?

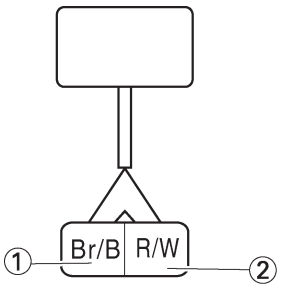
YES

NO → Replace the AI system solenoid.

15. Intake solenoid

- Remove the intake solenoid coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the AI system solenoid terminal as shown.

Tester positive probe → brown/black ①
Tester negative probe → red/white ②



- Measure the intake solenoid resistance.

Intake solenoid resistance
42 ~ 48 Ω at 20°C

- Is the intake solenoid OK?

YES

NO → Replace the intake solenoid.

EAS00818

16. Wiring

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

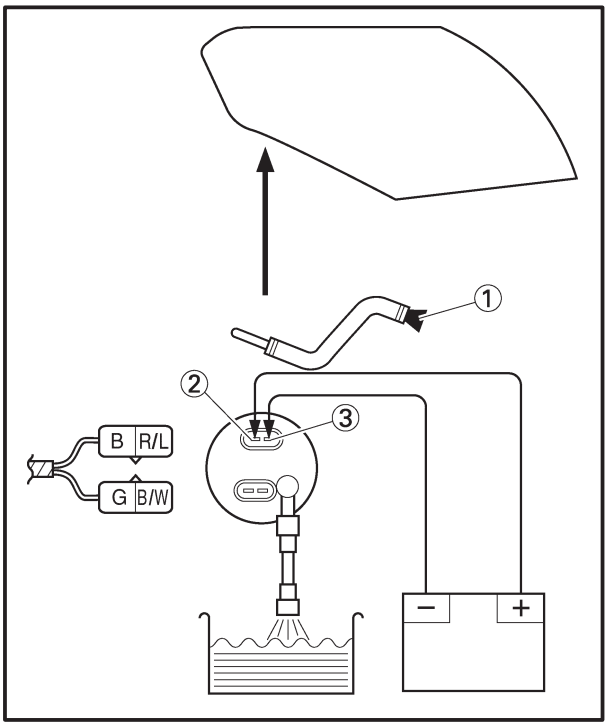
YES → Replace the ECU.

NO → 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

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a. Insert the plug ① to fuel return hose end.
b. Fill the fuel tank.
c. Put the end of the fuel hose into an open container.
d. Connect the battery (DC 12 V) to the fuel pump coupler as shown.

Positive battery lead → red/blue②
Negative battery lead → black ③

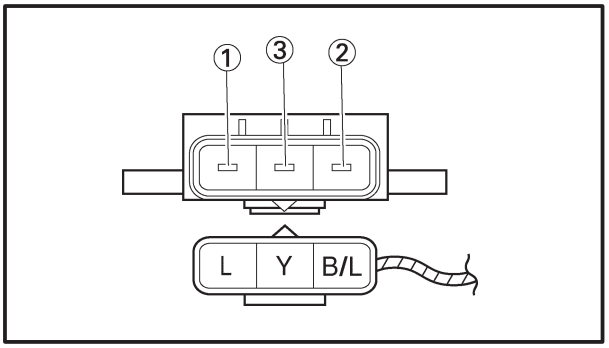
e. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.

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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 (Ω × 1k) to the throttle position sensor.

Tester positive probe → blue terminal ①
Tester negative tester probe → black/blue terminal 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 kΩ at 20°C
(blue – black/blue)

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

Tester positive probe → yellow terminal ③
Tester negative probe → black/blue terminal ②

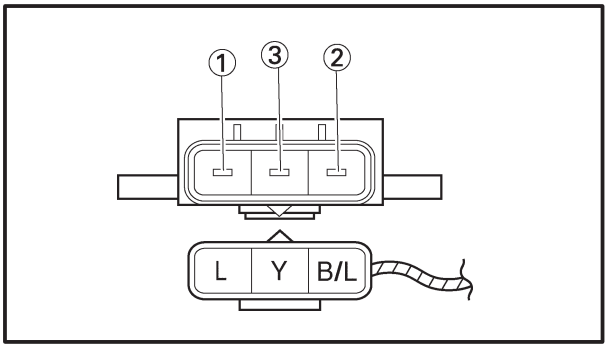
e. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

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 Ω) ~ (4.0 ~ 6.0 kΩ) at 20°C
(yellow – black/blue)



2. Check:
   • throttle position sensor angle

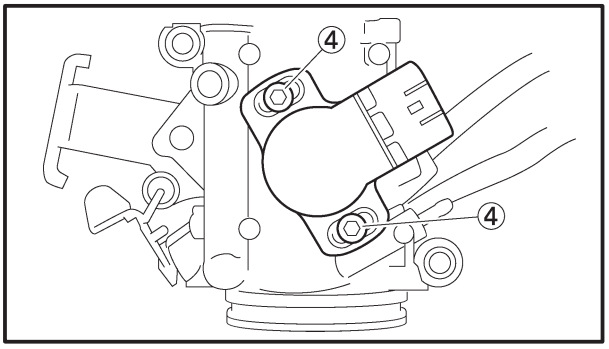
a. Connect the throttle position sensor coupler to the throttle position sensor.
b. Connect the pocket tester (DC 20 V) to the throttle position sensor coupler.

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

c. Measure the throttle position sensor output voltage.

Throttle position sensor output voltage
4.95 ~ 5.05 V

Out of specification
• Check the throttle sensor coupler connection.
• Check the entire fuel injection system's wiring.



3. Adjust:
   • throttle position sensor angle

a. Lift the throttle body assembly slightly out of the intake manifolds.
b. Loosen the throttle position sensor screws ④.
c. Connect the pocket tester (DC20 V) to the throttle position sensor coupler.

Tester positive probe → yellow terminal ③
Tester negative probe → black/blue terminal ②

d. Adjust the throttle position sensor angle so the measured output voltage is within the specified range.



Throttle position sensor output voltage
0.53 ~ 0.83 V

e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws ④.

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TRBL SHTG

9

CHAPTER 9
TROUBLESHOOTING

STARTING FAILURES 9-1
ENGINE 9-1
FUEL SYSTEM 9-1
ELECTRICAL SYSTEMS 9-1

INCORRECT ENGINE IDLING SPEED 9-2
ENGINE 9-2
FUEL SYSTEM 9-2
ELECTRICAL SYSTEMS 9-2

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE 9-3
ENGINE 9-3
FUEL SYSTEM 9-3

FAULTY GEAR SHIFTING 9-3
SHIFTING IS DIFFICULT 9-3
SHIFT PEDAL DOES NOT MOVE 9-3
JUMPS OUT OF GEAR 9-3

FAULTY CLUTCH 9-4
CLUTCH SLIPS 9-4
CLUTCH DRAGS 9-4

OVERHEATING 9-4
ENGINE 9-4
COOLING SYSTEM 9-4
FUEL SYSTEM 9-4
ELECTRICAL SYSTEMS 9-4

OVER COOLING 9-5
COOLING SYSTEM 9-5

POOR BRAKING PERFORMANCE 9-5

FAULTY FRONT FORK LEGS 9-5
LEAKING OIL 9-5
MALFUNCTION 9-5

UNSTABLE HANDLING 9-6

FAULTY LIGHTING OR SIGNALING SYSTEM 9-6
HEADLIGHT DOES NOT COME ON 9-6
HEADLIGHT BULB BURNT OUT 9-6
TAIL/BRAKE LIGHT DOES NOT COME ON 9-6
TAIL/BRAKE LIGHT BULB BURNT OUT 9-6
TURN SIGNAL DOES NOT COME ON 9-6
TURN SIGNAL BLINKS SLOWLY 9-6
TURN SIGNAL REMAINS LIT 9-6
TURN SIGNAL BLINKS QUICKLY 9-6
HORN DOES NOT SOUND 9-6

EAS00844

TROUBLESHOOTING

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING FAILURES

ENGINE

Cylinder(s) and cylinder head(s)
- Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Damaged cylinder gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve

Piston(s) and piston ring(s)
- Improperly installed piston ring
- Damaged, worn or fatigued piston ring
- Seized piston ring
- Seized or damaged piston

Air filter
- Improperly installed air filter
- Clogged air filter element

Crankcase and crankshaft
- Improperly assembled crankcase
- Seized crankshaft

FUEL SYSTEM

Fuel tank
- Empty fuel tank
- Clogged fuel tank drain hose
- Deteriorated or contaminated fuel

Fuel pump
- Faulty fuel pump
- Faulty fuel pump relay

Throttle body(-ies)
- Deteriorated or contaminated fuel
- Sucked-in air

ELECTRICAL SYSTEMS

Battery
- Discharged battery
- Faulty battery

Fuse(s)
- Blown, damaged or incorrect fuse
- Improperly installed fuse

Spark plug(s)
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

Ignition coil(s)
- Cracked or broken ignition coil body
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

Ignition system
- Faulty ECU
- Faulty pickup coil
- Broken generator rotor woodruff key

Switches and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Improperly grounded circuit
- Loose connections

Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cut-off relay
- Faulty starter clutch

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 ignitor unit
- Faulty pickup coil
- Broken generator rotor woodruff key

EAS00849

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

EAS00852

FAULTY CLUTCH

CLUTCH SLIPS

Clutch
- Improperly assembled clutch
- Improperly assembled clutch master cylinder
- Improperly assembled clutch release cylinder
- Incorrect clutch fluid level
- Damaged clutch hose
- Loose or fatigued clutch spring
- Loose union bolt
- Worn friction plate
- Worn clutch plate
- Damaged clutch release cylinder

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

CLUTCH DRAGS

Clutch
- Air in hydraulic clutch system
- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch push rod
- Damaged clutch boss
- Burnt primary driven gear bushing
- Damaged clutch release cylinder
- Match marks not aligned

Engine oil
- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

EAS00855

OVERHEATING

ENGINE

Clogged coolant passages
- Cylinder head(s) and piston(s)
- Heavy carbon buildup

Engine oil
- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

COOLING SYSTEM

Coolant
- Low coolant level

Radiator
- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin

Water pump
- Damaged or faulty water pump
- Thermostat
- Thermostat stays closed
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

FUEL SYSTEM

Throttle body(-ies)
- Faulty throttle body(-ies)
- Damaged or loose throttle body joint

Air filter
- Clogged air filter element

CHASSIS

Brake(s)
- Dragging brake

ELECTRICAL SYSTEMS

Spark plug(s)
- Incorrect spark plug gap
- Incorrect spark plug heat range

Ignition system
- Faulty ECU

EAS00856
OVERCOOLING
COOLING SYSTEM
Thermostat
- Thermostat stays open

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

EAS00860
FAULTY FRONT FORK LEGS
LEAKING OIL
- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

MALFUNCTION
- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

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 or light switch)
- Burnt-out headlight bulb

HEADLIGHT BULB BURNT OUT
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

TAIL/BRAKE LIGHT DOES NOT COME ON
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

TAIL/BRAKE LIGHT BULB BURNT OUT
- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

TURN SIGNAL DOES NOT COME ON
- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

TURN SIGNAL BLINKS SLOWLY
- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

TURN SIGNAL REMAINS LIT
- Faulty turn signal relay
- Burnt-out turn signal bulb

TURN SIGNAL BLINKS QUICKLY
- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

HORN DOES NOT SOUND
- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

WIRING DIAGRAM (EUR)

① Crankshaft position sensor
② Generator
③ Rectifier/regulator
④ Main fuse
⑤ Battery
⑥ Fuel injection system fuse
⑦ Starter relay
⑧ Starter motor
⑨ Main switch
⑩ Alarm
⑪ Diode
⑫ Buck up fuse
⑬ Starting circuit cut-off relay
⑭ Sidestand switch
⑮ Neutral switch
⑯ Cylinder identification sensor
⑰ Fuel injection system relay
⑱ Throttle position sensor
⑲ Intake air pressure sensor
⑳ Atmospheric pressure sensor
㉑ Intake air temperature sensor
㉒ Coolant temperature sensor
㉓ Lean angle cut-off switch
㉔ ECU
㉕ O_2 sensor
㉖ Injector (#1)
㉗ Injector (#2)
㉘ AI system solenoid
㉙ Intake solenoid
㉚ Ignition coil
㉛ Spark plug
㉜ Fuel pump
㉝ Speed sensor
㉞ Meter assembly
㉟ Oil level warning light
㊱ Neutral indicator light
㊲ Engine trouble warning light
㊳ High beam indicator light
㊴ Left turn signal indicator light
㊵ Right turn signal indicator light
㊶ Meter light
㊷ Oil level switch
㊸ Right handlebar switch
㊹ Front brake light switch
㊺ Light switch
㊻ Engine stop switch
㊼ Start switch
㊽ Left handlebar switch
㊾ Horn switch
㊿ Pass switch
(51) Dimmer switch
(52) Hazard switch
(53) Turn signal switch
(54) Clutch switch
(55) Turn signal relay
(56) Horn
(57) Ignition fuse
(58) Headlight fuse
(59) Hazard light fuse
(60) Parking light fuse
(61) Signaling system fuse
(62) Auxiliary light
(63) Rear brake light switch
(64) Tail/brake light
(65) Headlight
(66) Rear turn signal light (left)
(67) Rear turn signal light (right)
(68) Front turn signal light (left)
(69) Front turn signal light (right)
(70) Radiator fan motor fuse
(71) Radiator fan relay
(72) Radiator fan motor

COLOR CODE

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

WIRING DIAGRAM (OCE)

① Crankshaft position sensor
② Generator
③ Rectifier/regulator
④ Main fuse
⑤ Battery
⑥ Fuel injection system fuse
⑦ Starter relay
⑧ Starter motor
⑨ Main switch
⑩ Diode
⑪ Buck up fuse
⑫ Starting circuit cut-off relay
⑬ Sidestand switch
⑭ Neutral switch
⑮ Cylinder identification sensor
⑯ Fuel injection system relay
⑰ Throttle position sensor
⑱ Intake air pressure sensor
⑲ Atmospheric pressure sensor
⑳ Intake air temperature sensor
㉑ Coolant temperature sensor
㉒ Lean angle cut-off switch
㉓ ECU
㉔ O_2 sensor
㉕ Injector (#1)
㉖ Injector (#2)
㉗ AI system solenoid
㉘ Intake solenoid
㉙ Ignition coil
㉚ Spark plug
㉛ Fuel pump
㉜ Speed sensor
㉝ Meter assembly
㉞ Oil level warning light
㉟ Neutral indicator light
㊱ Engine trouble warning light
㊲ High beam indicator light
㊳ Left turn signal indicator light
㊴ Right turn signal indicator light
㊵ Meter light
㊶ Oil level switch
㊷ Right handlebar switch
㊸ Front brake light switch
㊹ Engine stop switch
㊺ Start switch
㊻ Headlight relay
㊼ Left handlebar switch
㊽ Horn switch
㊾ Pass switch
㊿ Dimmer switch
(51) Turn signal switch
(52) Clutch switch
(53) Turn signal relay
(54) Horn
(55) Ignition fuse
(56) Headlight fuse
(57) Signaling system fuse
(58) Auxiliary light
(59) Rear brake light switch
(60) Tail/brake light
(61) Headlight
(62) Rear turn signal light (left)
(63) Rear turn signal light (right)
(64) Front turn signal light (left)
(65) Front turn signal light (right)
(66) Radiator fan motor fuse
(67) Radiator fan relay
(68) Radiator fan motor

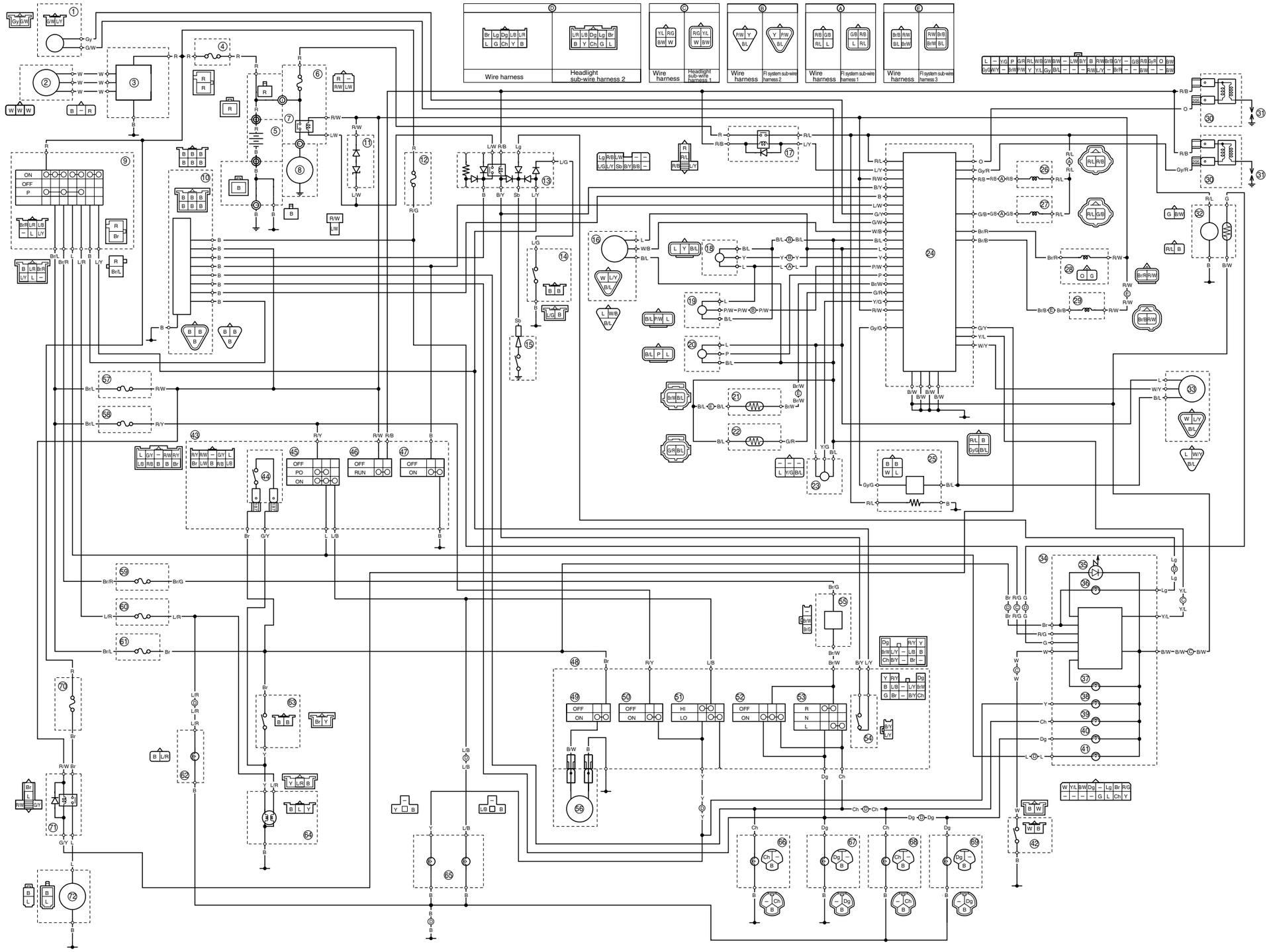
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YAMAHA MOTOR CO., LTD.
2500 SHINGAI IWATA SHIZUOKA JAPAN

TDM900 2002 WIRING DIAGRAM (EUR)



TDM900P 2002 WIRING DIAGRAM (OCE)

