

# **FJR1300R FJR1300RC**

# **SERVICE MANUAL**



5JW-28197-10

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# NOTICE

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

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

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

#### NOTE:

Designs and specifications are subject to change without notice.

# IMPORTANT MANUAL INFORMATION

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

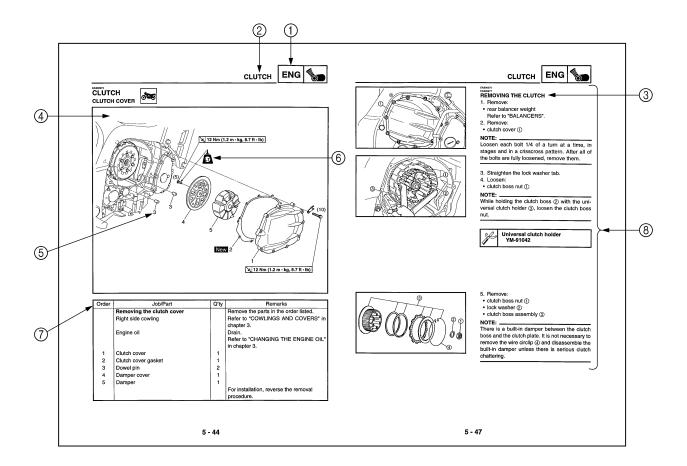
- The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!
   A WARNING
   Failure to follow WARNING instructions could result in severe injury or death to the motorcycle operator, a bystander or a person checking or repairing the motorcycle.
   CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.
- **NOTE:** A NOTE provides key information to make procedures easier or clearer.

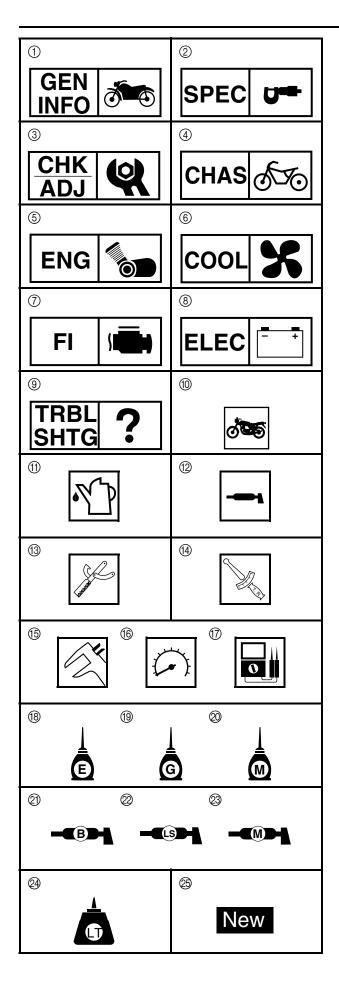
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# HOW TO USE THIS MANUAL

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.

- 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.
- ③ Jobs requiring more information (such as special tools and technical data) are described sequentially.





# 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 system⑦ Fuel injection system
- 8 Electrical system
- Troubleshooting

Symbols (1) to (7) indicate the following.

- 1 Serviceable with engine mounted
- 1) Filling fluid
- 12 Lubricant
- (3) Special tool
- ① Tightening torque
- 15 Wear limit, clearance
- (6) Engine speed
- 17 Electrical data

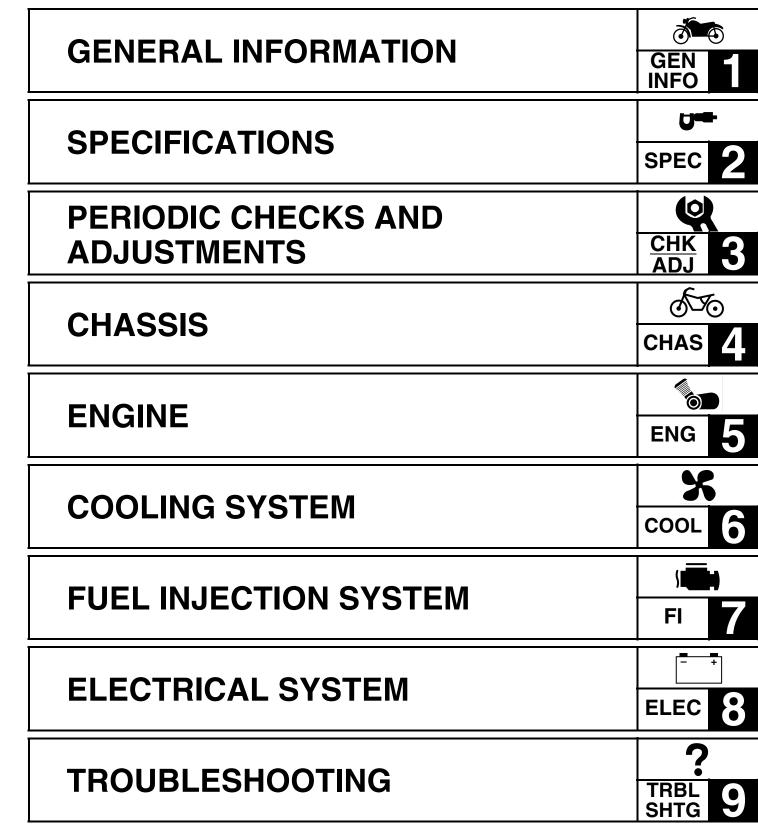
Symbols (18) to (23) in the exploded diagrams indicate the types of lubricants and lubrication points.

- 18 Engine oil
- (19) Gear oil
- Ø Molybdenum disulfide oil
- ② Wheel bearing grease
- O Lithium soap base grease
- 23 Molybdenum disulfide grease

Symbols (2) to (2) in the exploded diagrams indicate the following.

- ② Apply locking agent (LOCTITE<sup>®</sup>)
- 25 Replace the part

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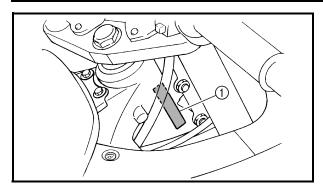
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TURN SIGNAL BLINKS SLOWLY	
TURN SIGNAL REMAINS LIT	
TURN SIGNAL BLINKS QUICKLY	
HORN DOES NOT SOUND	







#### VEHICLE IDENTIFICATION NUMBER

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

# 

# MODEL CODE

The model code label ① is affixed to the frame. This information will be needed to order spare parts.



#### OUTLINE

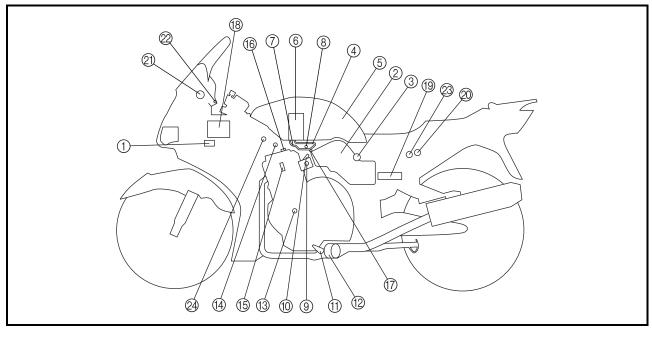
The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature.

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 temperature sensor
- ④ Fuel delivery hose
- ⑤ Fuel tank
- 6 Fuel pump
- ⑦ Fuel return hose

- (8) Intake air pressure
- sensor
- Throttle position sensor
   Evaluation sensor
- (1) Fuel injector(1) O<sub>2</sub> sensor
- (1) O2 sensor
   (12) Catalytic converter
- 13 Crankshaft position sensor
- Generative
   Generative

- 15 Spark plug
- (6) Cylinder identification sensor
- 17 Pressure regulator
- 18 Battery
- 19 ECU
- Atmospheric pressure sensor
- ② Fuel injection system relay

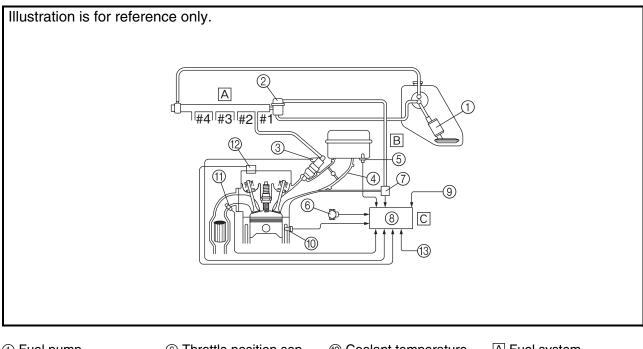
- 2 Engine trouble warn-
- ing light
- Lean angle cut-off switch
- Air cut-off valve



#### **FI SYSTEM**

The fuel pump delivers fuel to the injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the injector at only 2.55 kg/cm<sup>2</sup> higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU energizes the injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the injector is energized (injection duration), the lesser the volume of fuel that is supplied.

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



- Fuel pump
- ② Pressure regulator
- ③ Fuel injector
- (4) Throttle body
- (5) Intake temperature sensor
- (6) Throttle position sen-
- sor
- ⑦ Intake air pressure sensor
- ⑧ ECU
- ④ Atmospheric pressure sensor
- ① Coolant temperature sensor
- 1 O2 sensor
- ② Cylinder identification sensor
- ③ Crankshaft position sensor
- A Fuel systemB Air systemC 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 adjustment
Sensor block	Intake air pressure sensor	Intake air pressure detection
	Atmospheric pressure sensor	Atmospheric pressure detection
	Coolant temperature sensor	Coolant temperature detection
	Intake temperature sensor	Intake temperature detection
	Throttle position sensor	Throttle angle detection
	O2 sensor	Gas emission O <sub>2</sub> concentration detection
	Cylinder identification sensor	Reference position detection
	Crankshaft position sensor	Crankshaft position detection and engine RPM detection
	Speed sensor	Speed detection
Actuator block	Injector	Fuel injection
	Fuel pump	Fuel feed
	Air Induction system, air cut valve	Induction of secondary air

An FI warning light is provided on meter panel.



#### COMPONENTS

#### ECU (Electronic Control Unit)

The ECU is mounted underneath the seat, below the toolbox. 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

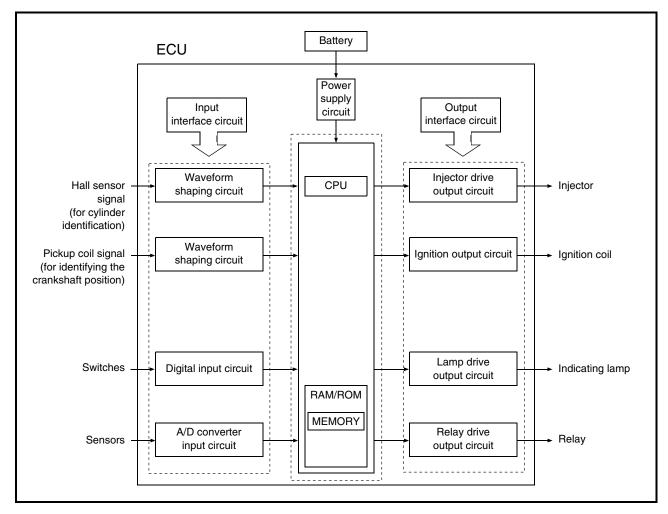
The input interface circuits convert the signals output by all the sensors into digital signals, which can be processed by the CPU, and input them into the CPU.

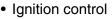
C. CPU (Central Processing Unit)

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 indicator and relay output circuits as needed.





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 crank-shaft 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.
- 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.

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.

GEN

#### Fuel pump

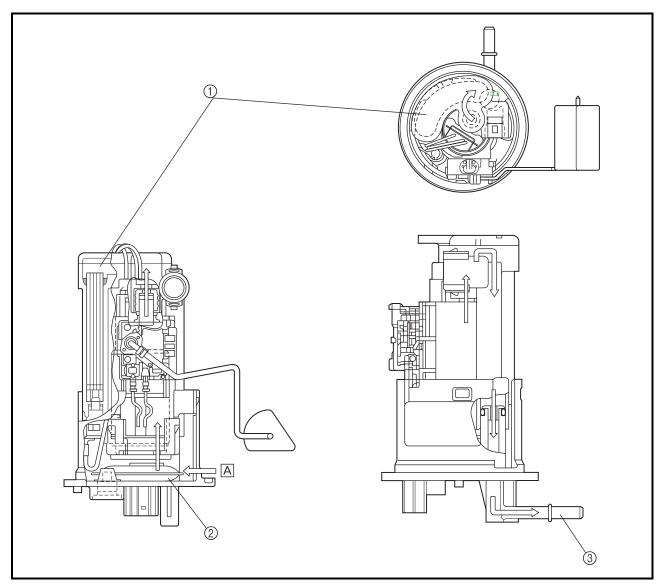
The fuel pump, which is mounted in the fuel tank, draws the fuel directly from the tank and pumps it to the injector.

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

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

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

A relief valve is provided to prevent the fuel pressure from rising abnormally if the fuel hose becomes clogged. This valve opens when the fuel pressure at the discharge outlet reaches between 440 and 640 kpa, and returns the fuel to the fuel tank.



- 1 Fuel filter
- 2 Fuel inlet strainer
- ③ Outlet
- A Fuel

GEN

#### **Pressure regulator**

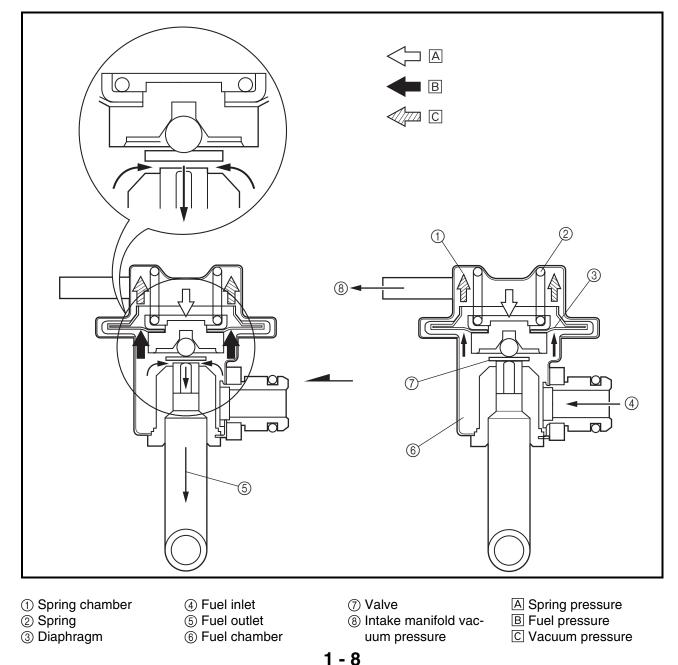
It regulates the fuel pressure that is applied to the injectors that are provided in the cylinders in order to maintain a constant pressure difference with the pressure in the intake manifold.

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.

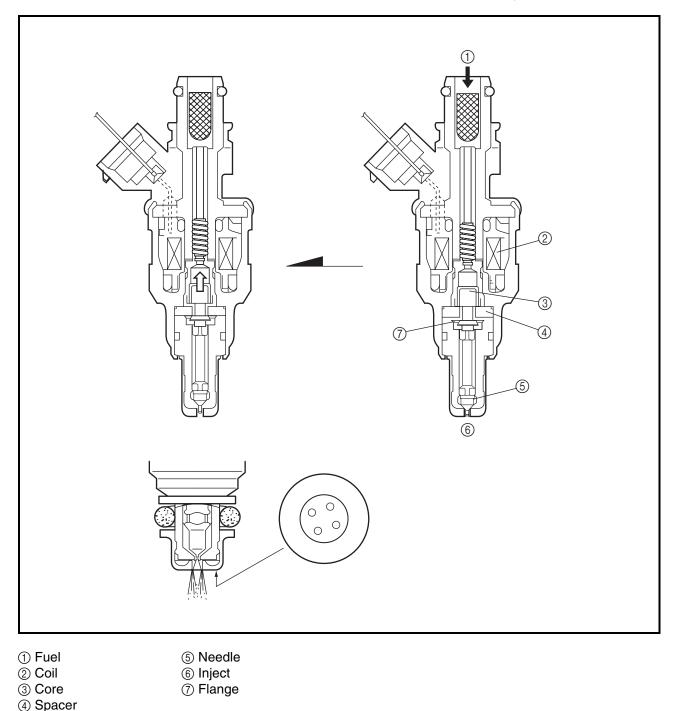
As a result, because the intake vacuum fluctuates in accordance with the changes in the operating conditions in contrast to the constant volume of fuel supplied by the pump, the valve opening/closing pressure also changes to regulate the return fuel volume. Thus, the difference between the fuel pressure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



#### **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.

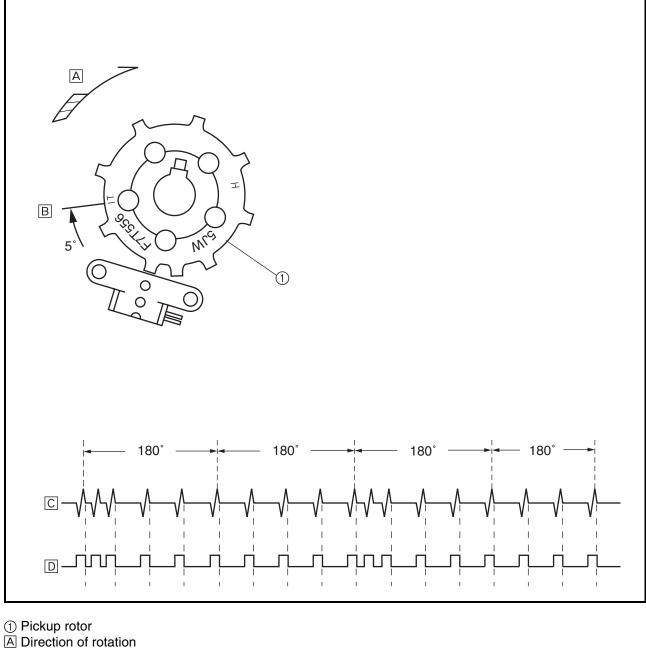
When the current flows to the coil in accordance with the signal from the ECU, the core is drawn upward, allowing the flange that is integrated with the needle to move to the spacer. Since the distance of the movement of the needle is thus kept constant, the opening area of the fuel passage also becomes 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.





#### 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.

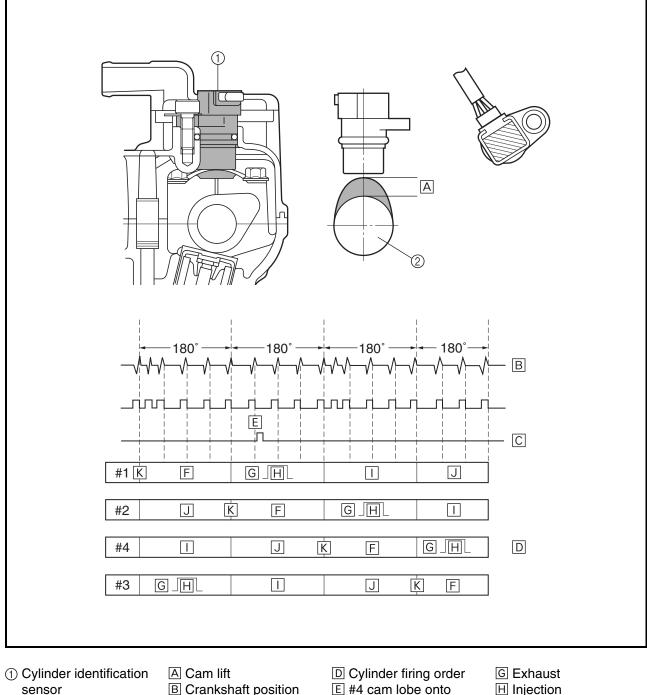


- B #1 cylinder compression stroke, 5° BTDC
- C Pickup signal
- D Trigger pole

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#### Cylinder identification sensor

The cylinder identification sensor is mounted on the exhaust head cover of the #4 cylinder. When the exhaust cam of the #4 cylinder rotates and the lift of the cam 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.



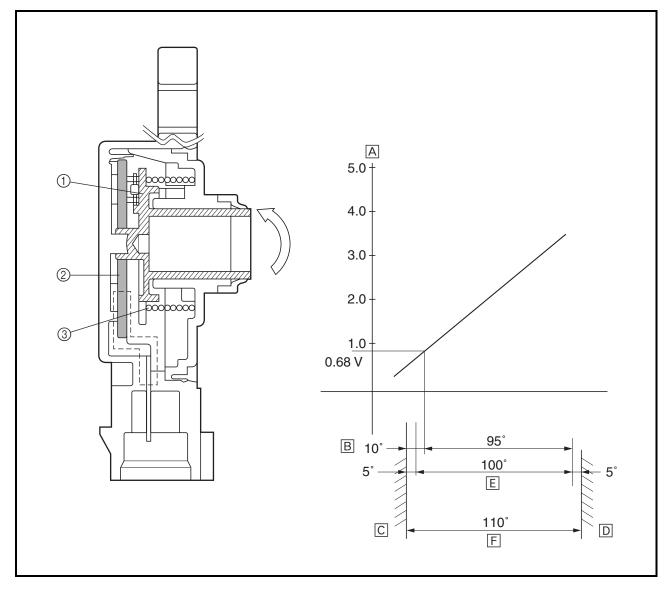
2 Cam

- Granksnall position
- sensor signal
- C Cylinder identification sensor signal
- exhaust camshaft
- F Combustion
  - moustion
- III Intake
- J Compression
- K Ignition

FEATURES INFO

#### Throttle position sensor

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



- 1 Moving contact
- ② Resistor board
- $\bigcirc$  Spring
- A Output voltage
- B Idling output position
- C Mechanical stopper
- D Mechanical stopper
- E Effective electrical
- angle F Sensor operating
  - angle



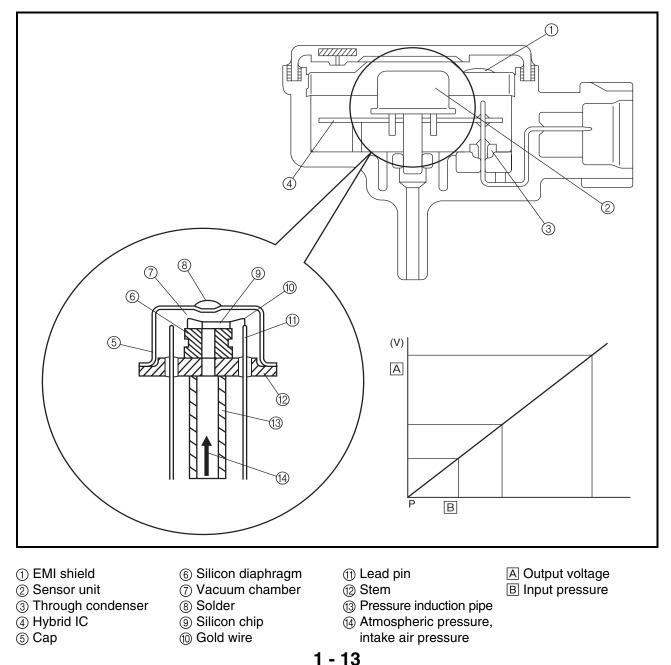
#### Intake air pressure sensor and atmospheric pressure sensor

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

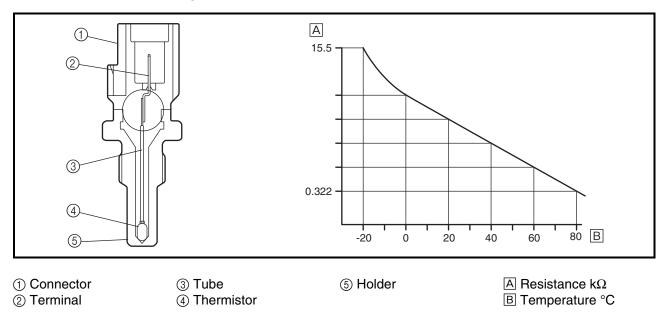
The atmospheric pressure sensor is used for making compensations to the changes in the air density caused by the changes in the atmospheric pressure (particularly at high altitudes). The operating principle and function of the atmospheric pressure sensor are the same as those of the aforementioned intake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





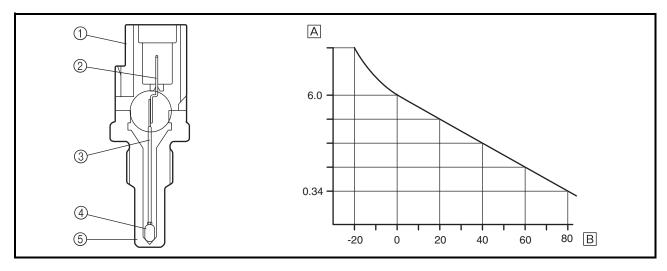
#### **Coolant temperature sensor**

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.



#### Intake temperature sensor

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

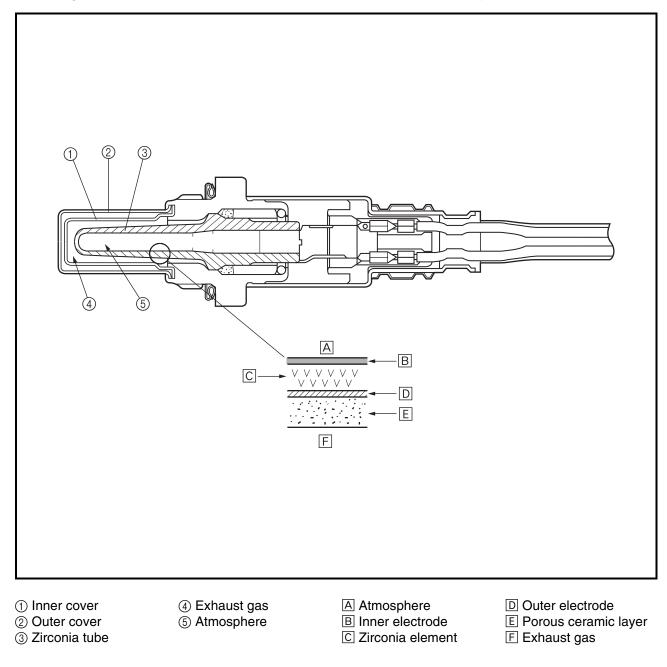


- ① Connector
- A Resistance  $k\Omega$ B Temperature °C
- ② Terminal③ Tube
- (4) Thermistor
- (5) Holder



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

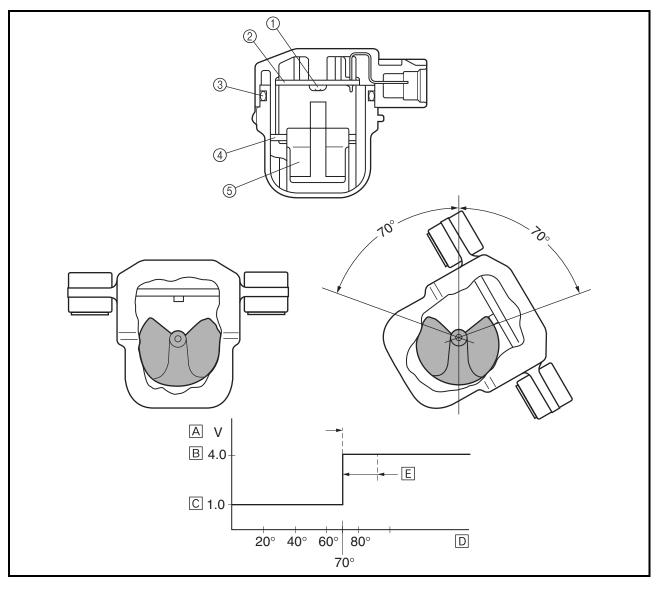
The O<sub>2</sub> sensor has been adopted to enable the catalyst to function at a high degree of efficiency by maintaining the air-fuel mixture near the stoichiometric ratio (14.7:1). This sensor, which is a zirconia type, utilizes the oxygen ion conductivity of the solid electrolyte for detecting the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





#### 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 Thyristor

- IC unit
- ③ O-ring
- ④ Shaft
- 5 Float

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



## FUEL INJECTION SYSTEM

#### Operation and control

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

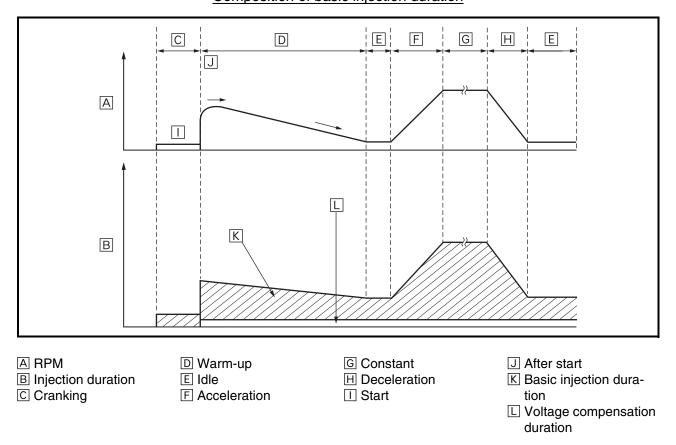
Furthermore, the ECU calculates the final injection timing by adding the following compensations to the aforementioned basic injection duration: those obtained from the state of acceleration, as well as those based on the signals from various sensors such as the coolant temperature, intake temperature,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

#### Determining the basic injection duration

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

#### Detection of intake air volume

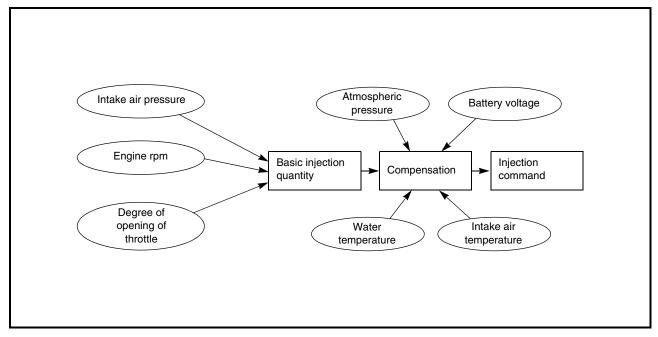
The intake air volume is detected primarily through the signals from the throttle position sensor and the intake air pressure sensor. The intake air volume is determined in accordance with the signals from the atmospheric pressure sensor, intake temperature sensor, and the engine speed data. Composition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





#### Determining the final injection duration

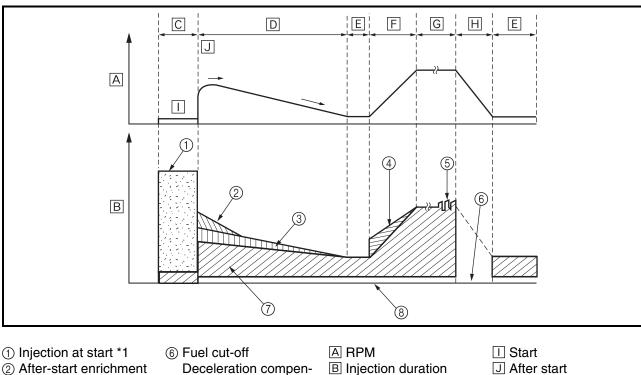
The intake air volume determines the basic injection duration. However, at a given intake air volume, the volume of fuel that is required varies by the engine operating conditions such as acceleration or deceleration, or by weather conditions. This system uses various sensors to precisely check these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



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



#### Composition of final injection duration



- (2) After-start enrichment
  - \*2
- ③ Warm-up enrichment \*3
- (4) Acceleration compensation \*5
- (5) Oxygen feedback \*6
- Deceleration compen-
- sation \*5 (7) Basic injection dura-
- tion
- (8) Voltage compensation F Acceleration duration G Constant
  - H Deceleration

C Cranking

D Warm-up

E Idle

J After start

Reactive injection duration:

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

- High voltage  $\rightarrow$  short reactive injection duration
- Low voltage  $\rightarrow$  long reactive injection duration

Compensation item	Check item	Sensor used
Starting injection *1	Coolant temperature	Coolant temperature sensor
After-start injection:		
After-start enrichment *2	Coolant temperature	Coolant temperature sensor
Warm-up enrichment *3	Coolant temperature	Coolant temperature sensor
Intake temperature compensation *4	Intake temperature	Intake temperature sensor
Acceleration compensation/decelera- tion compensation *5	Intake air pressure	Intake air pressure sensor
	Throttle position	Throttle position sensor
	Coolant temperature	Coolant temperature sensor
Air-fuel ratio feedback compensation *6	Exhaust gas residual oxy- gen concentration	O2 sensor

### LIST OF FUEL INJECTION COMPENSATIONS

#### Fuel control during normal driving

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

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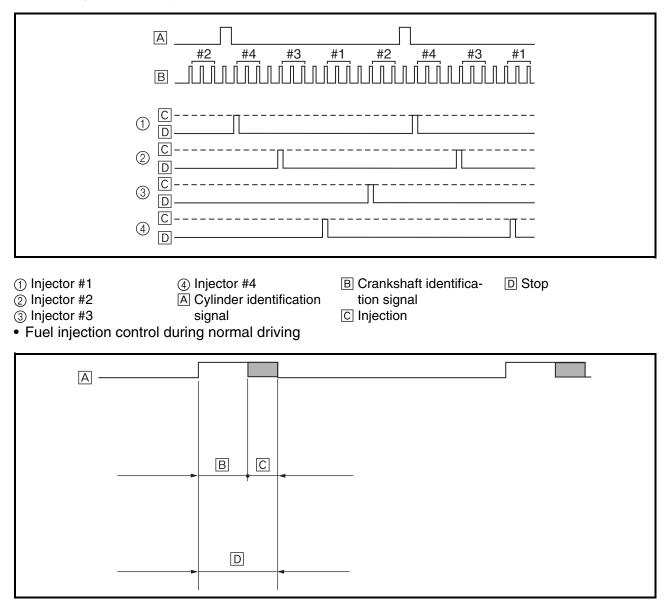
- ① Other than the stop mode
- ② Cylinder identification completed

③ Other than overrun

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

The injection duration is based on the basic injection duration (obtained through the throttle position, intake air pressure, and engine speed) to which injection duration compensation (based on the signals from various sensors such as the intake temperature sensor, atmospheric pressure sensor, and O<sub>2</sub> sensor) is added to determine the final injection duration. As a result, fuel is supplied to the cylinders.

• Normal synchronous injection



A #1 cylinder fuel injection timing

B Basic injection duration C Various types of fuel injection duration compensations Synchronous injection duration (final injection duration)



### Fuel injection compensation control

### • Starting injection control

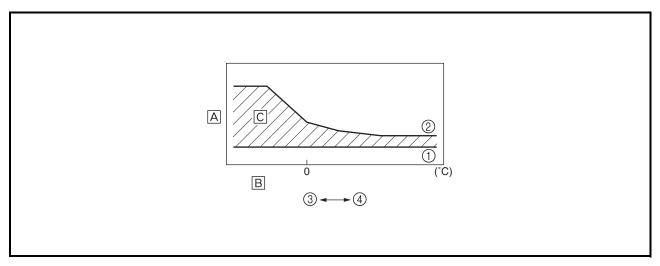
The coolant temperature is used for determining the injection duration in order to ensure proper start ability. To suit the engine's operating conditions, the starting injection duration is determined by applying a starting compensation coefficient to the basic injection duration, which forms the basis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

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

During starting, injection cylinder control is effected together with injection duration compensation. To effect injection cylinder control, the injectors of all the cylinders inject fuel only once immediately upon receiving the signals from the sensors during the cranking of the engine. This is called asynchronous injection, in contrast to synchronous injection, which is a normal cylinder injection that is effected on a cylinder-by-cylinder basis.

After the asynchronous injection is completed, and until the ECU receives signals from the cylinder identification sensor, the injectors are actuated in pairs in sync with the signals from the crankshaft position sensor: cylinders #1 and 4, and cylinders #2 and 3. Controlling both the injection duration and the injection cylinders in this manner enables a precise supply of fuel in accordance with the starting conditions of the engine.

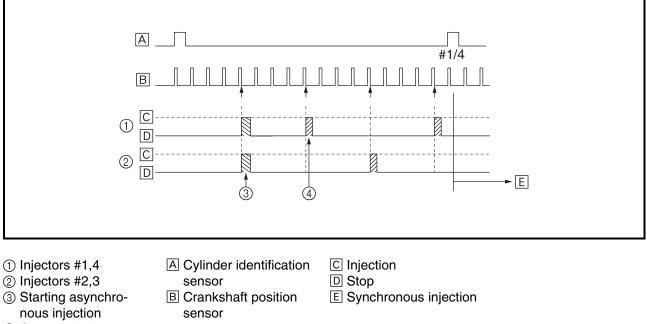
Starting injection duration



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



### • Starting cylinder control

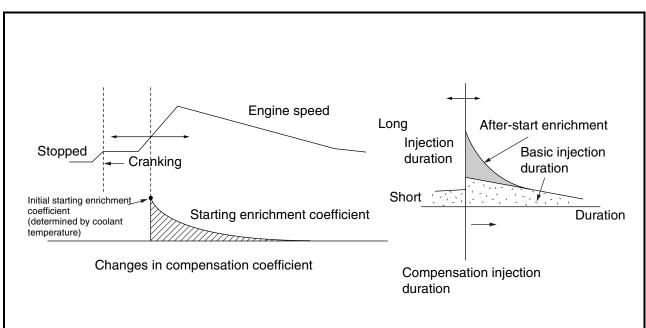


④ Group injection

• After-start enrichment

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

Changes in compensation coefficient and compensation injection duration

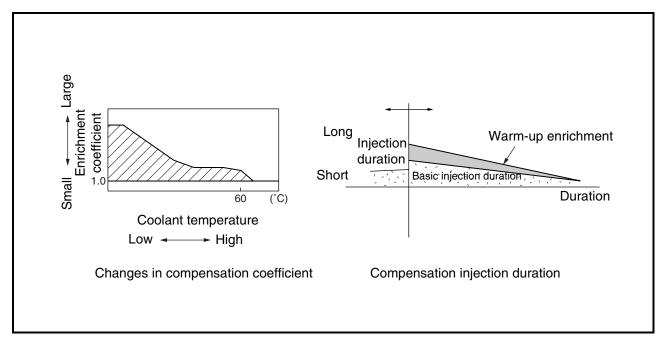




#### • Warm-up enrichment

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

Changes in compensation coefficient and compensation injection duration

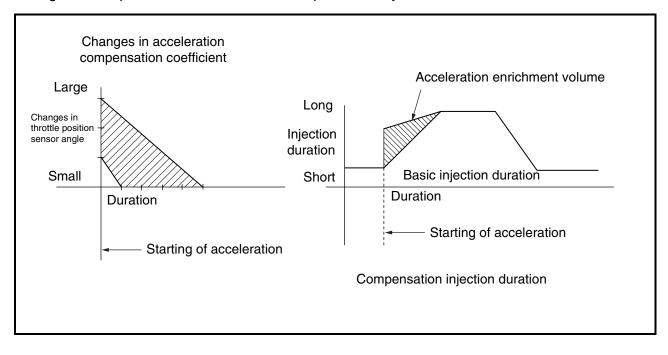




### Acceleration enrichment

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

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

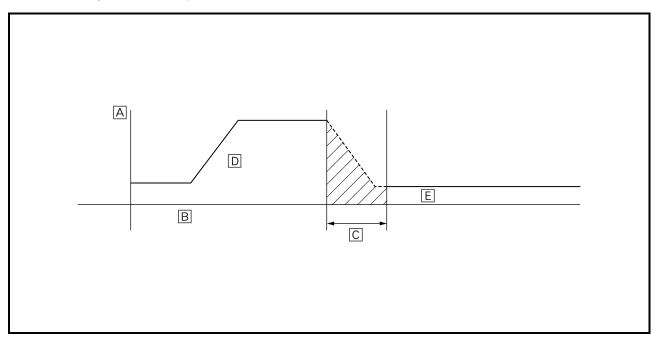


Changes in compensation coefficient and compensation injection duration

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### Deceleration control

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



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

#### Over-revving control

This function effects fuel cut-off control when the engine speed becomes greater than the prescribed value. The fuel cut-off control regulates the engine speed by stopping the injection of fuel into two cylinders when the engine speed becomes greater than the specified value. If the engine speed increases further, this control stops the injection of fuel to all the cylinders. Thus, the overrevving control effects fuel cut-off control in two stages.



### THREE-WAY CATALYTIC CONVERTER SYSTEM

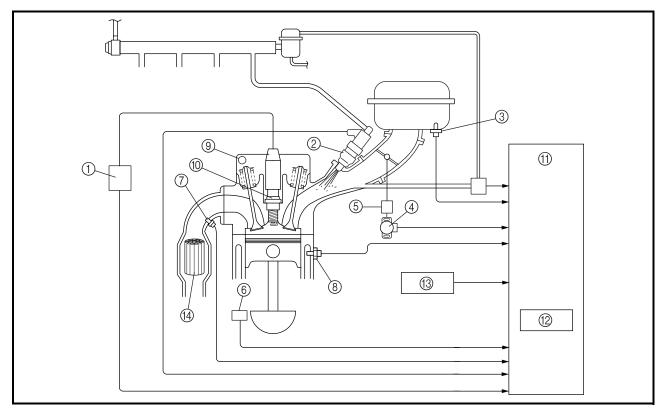
### System outline

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

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

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

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



### Three-way catalytic converter system diagram

- ① Ignition coil
- 2 Injector
- ③ Intake temperature sensor
- ④ Throttle position sensor
- (5) Intake air pressure
- sensor 6 Crankshaft position
- sensor
- ⑦ O<sub>2</sub> sensor
- (8) Coolant temperature sensor
- ③ Cylinder identification
- sensor (1) Spark plug
- 1) ECU
- 12 Igniter
- (3) Atmospheric pressure sensor
- ① Catalytic converter



### Functions of components

	Equipment	Functions	Main components
	Catalyzer (honeycomb type)	Simultaneously reduces CO, HC, and NOx emis- sions.	<ul><li>Catalytic converter</li><li>Catalyst case</li></ul>
Three-way catalytic converter system	Air-fuel compensation equipment	Reduces CO, HC, and NOx emissions. The catalyst pri- marily cleans the exhaust gases in order to ensure the stoichiometric air-fuel ratio.	<ul><li>O2 sensor</li><li>ECU</li></ul>
Ч Ц О	Fuel cut-off equipment	Reduces CO and HC emis- sions, improves fuel econ- omy, and cuts off fuel during deceleration.	<ul><li>Throttle position sensor</li><li>ECU</li></ul>

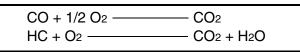
### Catalyst

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

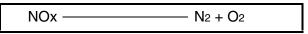
This model has adopted a monolith type metallic catalyst with a honeycomb construction, which achieves a low exhaust resistance through the large surface area of the catalyst body (with a high level of cleaning efficiency).

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

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



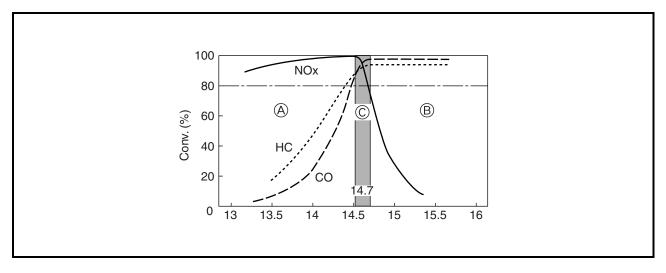
• The NOx is reduced by the reduction function of rhodium, which converts NOx into harmless nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>), resulting in cleaner exhaust gases.



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



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



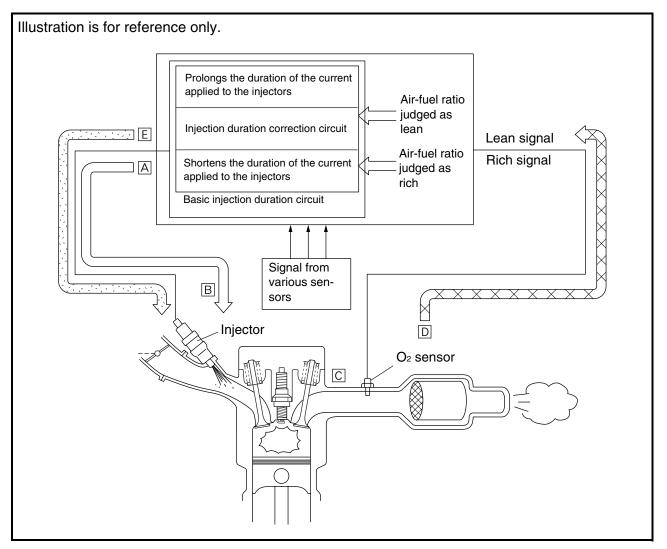


### Air-fuel ratio compensation equipment

An O<sub>2</sub> sensor is provided in the exhaust pipe upstream of the catalyst, to enable the catalyst to operate at a high degree of efficiency. The O<sub>2</sub> sensor detects the level of concentration of the oxygen remaining in the exhaust gases.

A high level of oxygen concentration signifies a lean air-fuel mixture, and when the O<sup>2</sup> sensor detects this condition, it inputs a lean signal into the ECU. Conversely, when the level of oxygen concentration is low, the O<sup>2</sup> sensor inputs a rich signal into the ECU.

The ECU system applies minute corrections to these signals so that the injection volume (the duration of the current applied to the injectors) comes to be within the vicinity of the stoichiometric ratio. Thus, the system is designed to maximize the cleaning function of the catalyst.



### Feedback compensation circuit

- A The ECU determines the basic injection volume based on the signals that are input from various sensors and regulates the duration of the current applied to the injectors.
- B Current is applied to the injectors, enabling them to inject fuel.
- C The engine undergoes combustion and exhaust.
- D The O2 sensor detects the level of oxygen concentration in the exhaust gases, and outputs a lean or rich air-fuel ratio signal in accordance with the detected data.
- E In accordance with the signals from the O<sub>2</sub> sensor, the ECU applies minute corrections to the basic injection duration, determines the subsequent injection volume, and provides instructions to the injectors. The above processes are repeated in order to maintain the mixture at the stoichiometric ratio.

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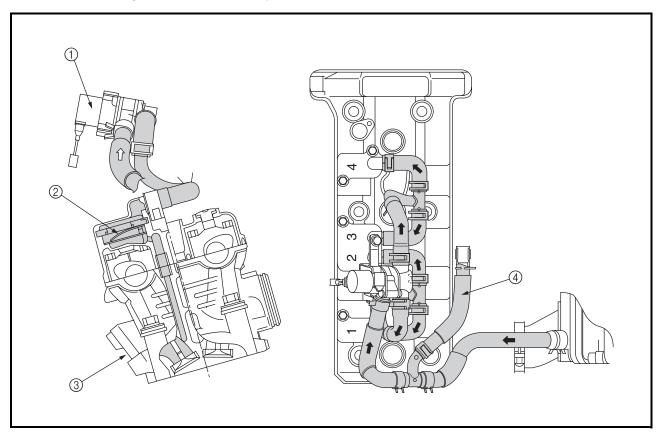


The air induction system (AI system) introduces fresh air into the exhaust port in order to burn the unburned gas (which is present in the exhaust gas) in the exhaust pipe. The burning of the unburned gases in this manner enhances the efficiency of the catalyst and results in cleaner exhaust gases.

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 value 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

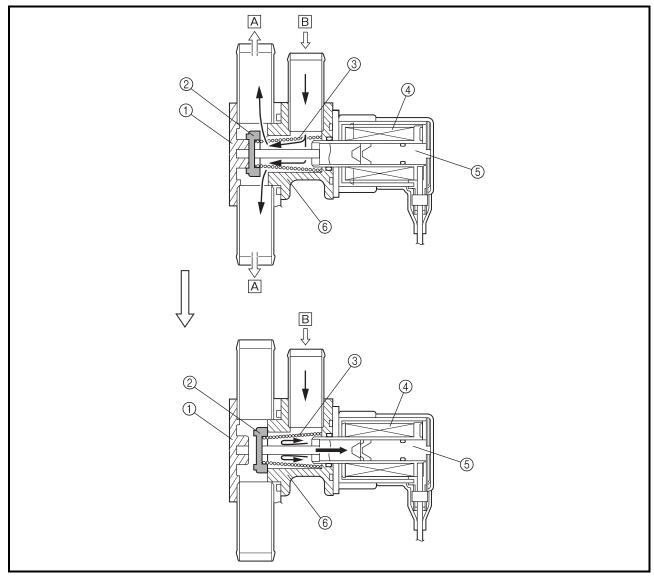
- ② Reed valve
- ③ Exhaust port
- ④ Resonator



### COMPONENTS

### 1.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.



Valve block A
 Valve

③ Spring④ Coil

⑤ Core⑥ Valve block B

A To reed valve B From air cleaner



### Instrument panel

Function indication

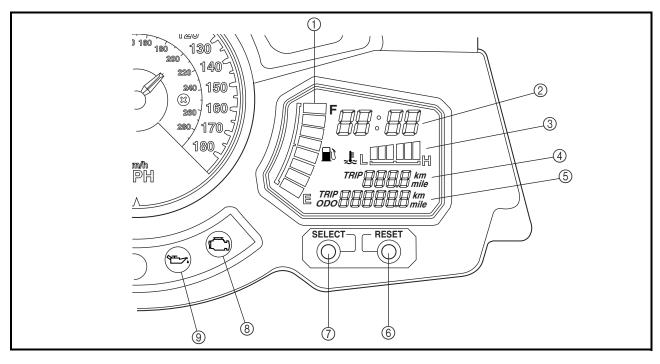
The indications of the self-diagnosis function can be checked and inspection operations can be performed through the use of the multi-function meter on the instrument panel.

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.

#### 1. ECU transmission data and meter display

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

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

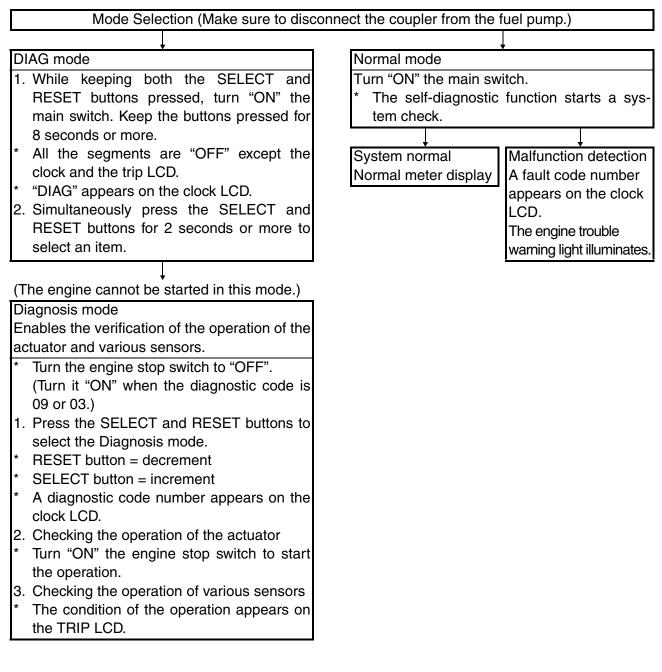


Fuel meter
 Clock

- ③ Coolant temperature meter
   ④ TRIP meter
- ⑤ TRIP/ODO meter
  ⑥ RESET button
  ⑦ SELECT button
- ⑧ Engine trouble warning light
- (9) Oil level warning light

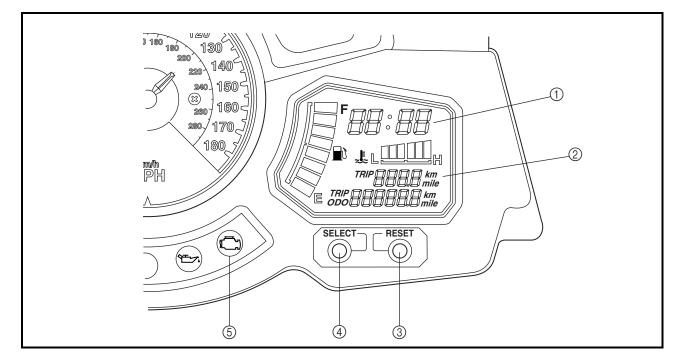


#### 2. DIAG mode inspection and adjustment (multi-function meter)





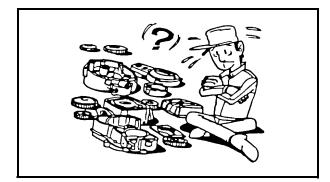




- $\textcircled{1}\mathsf{Clock}$
- 2 TRIP meter
- ③ RESET button
- ④ SELECT button
- (5) Engine trouble warning light

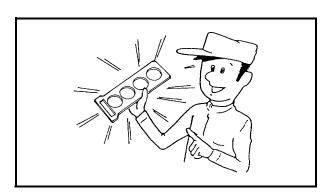






### IMPORTANT INFORMATION PREPARATION FOR REMOVAL AND DISASSEMBLY

- 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.



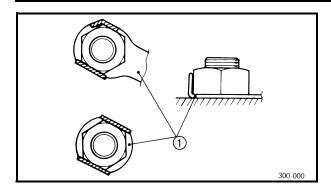
### REPLACEMENT PARTS

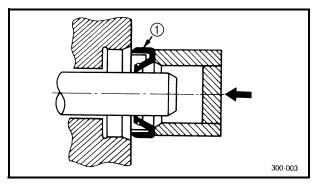
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

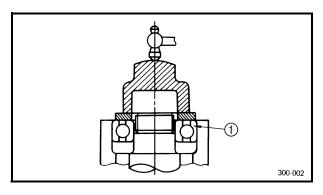
## GASKETS, OIL SEALS AND O-RINGS

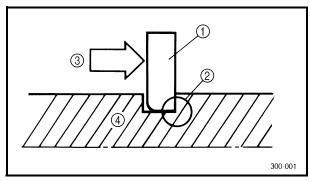
- 1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
- 2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.











### 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.

### 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 base grease. Oil bearings liberally when installing, if appropriate.

#### 1) Oil seal

### CAUTIONS

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

① Bearing

### 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  $\rightarrow$  Dry with an air blower. Rust/stains  $\rightarrow$  Connect and disconnect several times.

- 3. Check:
- all connections
   Loose connection → Connect properly.

### NOTE: .

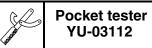
If the pin on the terminal is flattened, bend it up.

- 4. Connect:
- lead
- coupler
- connector

### NOTE:

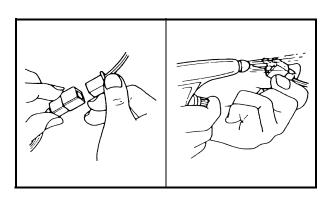
Make sure all connections are tight.

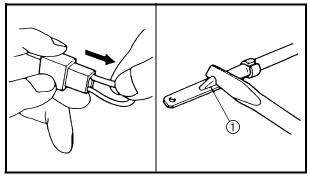
- 5. Check:
- continuity (with the pocket tester)

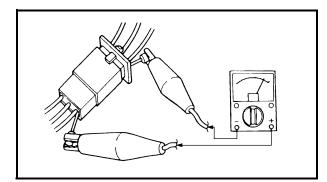


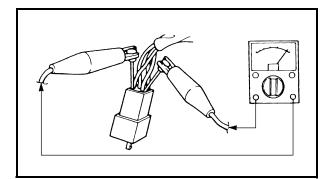
### NOTE:

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











# SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.

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

Tool No.	Tool name/Function	Illustration
Slide hammer bolt YU-01083-1 Weight J-6125-7	Slide hammer bolt Weight These tools are needed to remove the main axle assembly.	
YM-01229	Gear holder This tool is needed when removing or installing the coupling gear nut.	
YM-01230	Final drive gear lash tool This tool is needed when measuring the final gear backlash.	
YU-01235	Universal magneto & rotor holder This tool is needed to hold the camshaft sprocket when loosen or tighten the camshaft sprocket bolts.	
YU-01304	Piston pin puller This tool is used to remove the piston pin.	
Radiator pressure tester YU-24460-01 Radiator pressure tester adapter YU-33984	Radiator pressure tester Radiator pressure tester adapter This tester and its adapter are needed for checking the cooling system.	
YU-33270-B	Heavy duty puller This tool is needed to remove the rotor.	



Tool No.	Tool name/Function	Illustration	
YU-33975	Spanner wrench This tool is needed to loosen and tighten the steering stem ring nut.		
YU-38411	Oil filter wrench This tool is needed to remove and install the oil filter.		
YM-01442	Fork seal installer This tool is needed when installing the slide metal, oil seal and dust seal into the fork.		
YM-01467	Gear lash measurement tool This tool is needed when measuring the middle gear backlash.		
YM-01447	Damper rod holder This tool is needed to hold the damper rod assembly when loosen or tighten the damper rod assembly bolt.		
YM-01471	Frame spanner socket This tool is needed to loosen or tighten the spacer bolt.		
YS-01880-A	Primary sheave holder This tool is used to hold the generator rotor when removing or installing the generator rotor bolt, generator shaft bolt or crankshaft position sensor rotor bolt.		
Compression gauge set 14/18 mm YU-33223 Compression gauge adapter 12 mm YU-33223-3	Compression gauge set 14/18 mm Compression gauge adapter 12 mm These tools are needed to measure engine compression.		



Tool No.	Tool name/Function	Illustration	
YU-08030	Carburetor synchronizer This gauge is needed for throttle bodies synchronization.		
YU-03097	Dial indicator This tool is used to measure the middle gear backlash.		
YU-03112	Pocket tester This instrument is needed for checking the electrical system.	State of the second sec	
YM-33277-A	Timing light This tool is necessary for checking igni- tion timing.		
Pressure gauge 90890-03153 Oil pressure adaptor B 90890-03124	Pressure gauge Oil pressure adaptor B These tools are needed to measure engine oil pressure.		
Valve spring compres- sor set YM-04019 Valve spring compres- sor attachment YM-04108	Valve spring compressor set Valve spring compressor attachment These tools are needed to remove and install the valve assemblies.	and the second of the second s	
YM-04050	Piston bearing retainer remover This tool is needed when removing or installing the final drive housing bearing retainer.		
YM-04057	Middle drive shaft retainer wrench This tool is needed when removing or installing the middle drive shaft bearing retainer.		

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Tool No.	Tool name/Function	Illustration
40 and 50 mm bearing driver YM-04058 Water pump seal installer	40 and 50 mm bearing driver Water pump seal installer These tools are needed to install the	
YM-33221	water pump seal.	
YM-91042	Universal clutch holder This tool is needed to hold the clutch when removing or installing the clutch boss nut.	
YM-33286	Spring compressor push plate This tool is needed when removing or installing the damper spring.	
YM-04097	Valve guide remover (ø5) This tool is needed to remove and install the valve guide.	
YM-04098	Valve guide installer (ø5) This tool is needed to install the valve guide.	
YM-04099	Valve guide reamer (ø5) This tool is needed to rebore the new valve guide.	E A A A A A A A A A A A A A A A A A A A
YM-08037	Piston ring compressor This tool is used to compress the piston rings when installing the piston into the cylinder.	
YM-34487	Dynamic spark tester This tool is used to check the ignition system components.	



Tool No.	Tool name/Function	Illustration
YB-35956	Mity vac This tool used to measure the vacuum pressure.	Clave of the second sec
YU-8036-B	Inductive tachometer This tool is used for check engine speed.	
ACC-11001-05-01	Quick Gasket <sup>®</sup> This sealant is used to seal two mating surfaces (e. g., crankcase mating sur- faces).	i mar
YM-04140	Bearing retainer wrench This tool is needed when removing or installing the middle driven shaft bear- ing retainer.	
YM-03176	Fuel pressure adapter This tool is needed to measure fuel pressure.	J. J



## SPECIFICATIONS

### **GENERAL SPECIFICATIONS**

Item	Standard	Limit
Model code	5JW7 (USA)	
	5JW8 (California)	
Dimensions		
Overall length	2,195 mm (86.4 in)	
Overall width	760 mm (29.9 in)	
Overall height	1,420 mm (55.9 in)	
Seat height	805 mm (31.7 in)	
Wheelbase	1,515 mm (59.6 in)	
Minimum ground clearance	135 mm (5.3 in)	
Minimum turning radius	3,100 mm (122.0 in)	
Weight		
Wet (with oil and a full fuel tank)	274 kg (604 lb) (USA)	
	275 kg (605 lb) (California)	
Dry (without oil and fuel)	237 kg (522 lb)	
Maximum load (total of cargo, rider,	202 kg (445 lb) (USA)	
passenger, and accessories)	201 kg (443 lb) (California)	

2



Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	
Displacement	1,298 cm³ (79.2 cu.in)	
Cylinder arrangement	Forward-inclined parallel 4-cylinder	
Bore $\times$ stroke	79.0 × 66.2 mm (3.11 × 2.61 in)	
Compression ratio	10.8 : 1	
Engine idling speed	1,000 ~ 1,100 r/min	
Vacuum pressure at engine idling	33.3 kPa (250 mm Hg, 9.8 in Hg)	
speed		
Standard compression pressure	1,600 kPa (16 kg/cm², 228 psi)	
(at sea level)	at 400 r/min	
Fuel		
Recommended fuel	Unleaded fuel only	
Fuel tank capacity		
Total (including reserve)	25 L (22.01 Imp qt, 26.43 US qt)	
Reserve only	5 L (4.40 Imp qt, 5.29 US qt)	
Engine oil		
Lubrication system	Wet sump	
Recommended oil		
	Yamalube 4 (20W40) or SAE 20W40 type	
	SE motor oil (5 °C (40 °F) or higher)	
0 10 30 50 70 90 110 130°F		
▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲		
YAMALUBE 4 (20W-40)		
or SAE 20W-40		
-20 -10 0 10 20 30 40 50 °C		
Queretite		
Quantity		
Total amount	4.9 L (4.31 Imp qt, 5.18 US qt)	
Without oil filter cartridge replace-	3.8 L (3.34 Imp qt, 4.02 US qt)	
ment		
With oil filter cartridge replacement	4.0 L (3.52 Imp qt, 4.23 US qt)	
Oil pressure (hot)	30 kPa at 1,000 r/min	
	(0.30 kg/cm <sup>2</sup> , 4.27 psi) at 1,000 r/min	
Relief valve opening pressure	480 ~ 560 kPa	
	(4.80 ~ 5.60 kg/cm <sup>2</sup> , 68.26 ~ 79.63 psi)	
Final gear oil		
Recommended oil	Shaft drive gear oil	
	(Part No. : 9079E-SH001-00)	
Total amount	0.2 L (0.18 Imp qt, 0.21 US qt)	



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Item	Standard	Limit
Oil filter		
Oil filter type	Cartridge (paper)	
Bypass valve opening pressure	78.4 ~ 117.6 kPa	
	(0.78 ~ 1.18 kg/cm <sup>2</sup> , 11.15 ~ 16.72 psi)	
Oil pump		
Oil pump type	Trochoid	
Inner-rotor-to-outer-rotor-tip clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)	0.16 mm
		(0.0063 in)
Outer-rotor-to-oil-pump-housing	0.09 ~ 0.15 mm (0.0035 ~ 0.0059 in)	0.22 mm
clearance		(0.0087 in)
Cooling system		
Radiator capacity (including all routes)	3.2 L (2.82 Imp qt, 3.38 US qt)	
Radiator capacity	1.03 L (0.91 Imp qt, 1.09 US qt)	
Radiator cap opening pressure	93.3 ~ 122.7 kPa	
	(0.93 ~ 1.23 kg/cm², 13.27 ~ 17.45 psi)	
Valve relief pressure	4.9 kPa (0.05 kg/cm², 0.70 psi)	
Radiator core		
Width	360 mm (14.17 in)	
Height	295.8 mm (11.65 in)	
Depth	27 mm (1.06 in)	
Coolant reservoir		
Capacity	0.485 L (0.43 Imp qt, 0.51 US qt)	
<from full="" level="" low="" to=""></from>	0.15 L (0.13 Imp qt, 0.16 US qt)	
Water pump		
Water pump type	Single-suction centrifugal pump	
Reduction ratio	75/48 × 25/28 (1.395)	
Max. impeller shaft tilt		0.15 mm
·		(0.006 in)
Starting system type	Electric starter	
Fuel injectors		
Model	INP-732	
Manufacturer	NIPPON INJECTOR	
Quantity	4	
Spark plugs		
Model (manufacturer) $\times$ quantity	CR8E/U24ESR-N (NGK/DENSO) × 4	
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in)	
Cylinder head	· · · /	
Volume	22.92 ~ 23.52 cm <sup>3</sup> (1.40 ~ 1.44 cu. in)	
Max. warpage		0.1 mm
······································		(0.0039 in)



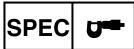
Item	Standard	Limit
Camshafts		
Drive system	Chain drive (right)	
Camshaft cap inside diameter	24.500 ~ 24.521 mm (0.9646 ~ 0.9654 in)	
Camshaft journal diameter	24.459 ~ 24.472 mm (0.9630 ~ 0.9635 in)	
Camshaft-journal-to-camshaft-cap	0.028 ~ 0.062 mm (0.0011 ~ 0.0024 in)	
clearance		
Intake camshaft lobe dimensions		
Measurement A	33.05 ~ 33.15 mm (1.3012 ~ 1.3051 in)	32.05 mm (1.2618 in)
Measurement B	24.997 ~ 25.097 mm (0.9841 ~ 0.9881 in)	23.997 mm (0.9448 in)
Exhaust camshaft lobe dimensions		
Measurement A	33.05 ~ 33.15 mm (1.3012 ~ 1.3051 in)	32.95 mm (1.2972 in)
Measurement B	24.997 ~ 25.097 mm (0.9841 ~ 0.9881 in)	24.897 mm (0.9802 in)
Max. camshaft runout		0.03 mm (0.0012 in)



Item	Standard	Limit
Timing chain		
Model/number of links	RH2015/136	
Tensioning system	Automatic	
Valves, valve seats, valve guides		
Valve clearance (cold)		
Intake	0.15 ~ 0.22 mm (0.0059 ~ 0.0087 in)	
Exhaust	0.18 ~ 0.25 mm (0.0071 ~ 0.0098 in)	
Valve dimensions		
Head Diameter Face Widt	h Seat Width Margin	Thickness
Valve head diameter A		
Intake	29.9 ~ 30.1 mm (1.1772 ~ 1.1850 in)	
Exhaust	25.9 ~ 26.1 mm (1.0197 ~ 1.0276 in)	
Valve face width B		
Intake	1.2 ~ 2.0 mm (0.0472 ~ 0.0787 in)	
Exhaust	1.2 ~ 2.0 mm (0.0472 ~ 0.0787 in)	
Valve seat width C		1.0 mm
Intake	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
Exhaust	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
Valve margin thickness D		(,
Intake	0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in)	
Exhaust	0.5 ~ 0.9 mm (0.0197 ~ 0.0354 in)	
Valve stem diameter		
Intake	4.975 ~ 4.990 mm (0.1959 ~ 0.1965 in)	4.945 mm (0.1947 in)
Exhaust	4.960 ~ 4.975 mm (0.1953 ~ 0.1959 in)	4.930 mm (0.1941 in)
Valve guide inside diameter		(
Intake	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in)	5.05 mm
		(0.1988 in)
Exhaust	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in)	5.05 mm (0.1988 in)
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm
IIIIano	$0.010 \sim 0.007$ mm ( $0.0004 \sim 0.010$ m)	(0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.1 mm (0.004 in)



Item	Standard	Limit
Valve stem runout		0.01 mm
		(0.0004 in)
****		
Valve seat width		
Intake	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm
		(0.0630 in)
Exhaust	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm
<u></u>		(0.0630 in)
Valve springs		
Free length		077
Intake	39.7 mm (1.56 in)	37.7 mm
	20.7 mm (1.50 in)	(1.48 in) 37.7 mm
Exhaust	39.7 mm (1.56 in)	37.7 mm (1.48 in)
Installed length (valve closed)		(1.40 11)
Intake	33 mm (1.30 in)	
Exhaust	33 mm (1.30 in)	
Compressed spring force (installed)		
	136 ~ 158 N	
Intake	(13.9 ~ 16.1 kg, 30.6 ~ 35.5 lb)	
	136 ~ 158 N	
Exhaust	(13.9 ~ 16.1 kg, 30.6 ~ 35.5 lb)	
Spring tilt		
×		
Intake		2.5° /1.7 mm
		(2.5° /0.067 in)
Exhaust		2.5° /1.7 mm
		(2.5° /0.067 in)
Winding direction (top view)		
Intake	Clockwise	
Exhaust	Clockwise	



Cylinders Cylinder arrangement		
Cylinder arrangement		
	Forward inclined parallel 4-cylinder	
Bore $ imes$ stroke	$79.0 \times 66.2 \text{ mm} (3.11 \times 2.61 \text{ in})$	
Compression ratio	10.8 : 1	
Bore	79.00 ~ 79.01 mm (3.1102 ~ 3.1106 in)	
Max. taper		0.05 mm
		(0.002 in)
Max. out-of-round		0.05 mm
		(0.002 in)
Pistons		0.010 mm
Piston-to-cylinder clearance	0.020 ~ 0.045 mm (0.0008 ~ 0.0018 in)	0.012 mm
Diameter D	78.965 ~ 78.980 mm (3.1089 ~ 3.1094 in)	(0.0005 in)
Diameter D	78.905 ~ 78.980 1111 (3.1069 ~ 3.1094 11)	
H		
/ <b>-</b> D►/		
Height H	5 mm (0.2 in)	
Piston pin bore (in the piston)		
	19.004 ~ 19.015 mm (0.7482 ~ 0.7486 in)	19.045 mm
Diameter	· · · · · · · · · · · · · · · · · · ·	(0.7498 in)
Offset	0.5 mm (0.0197 in)	
Offset direction	Intake side	
Piston pins		
Outside diameter	18.991 ~ 19.000 mm (0.7477 ~ 0.7480 in)	18.971 mm
Outside diameter		(0.7469 in)
Piston-pin-to-piston-pin-bore clear-	0.004 ~ 0.024 mm (0.0002 ~ 0.0009 in)	0.074 mm
ance		(0.0029 in)
Piston rings		
Top ring		
В		
Ring type	Barrel	
Dimensions ( $B \times T$ )	$1.0 \times 2.8 \text{ mm} (0.039 \times 0.110 \text{ in})$	
End gap (installed)	$0.35 \sim 0.45$ mm ( $0.014 \sim 0.018$ in)	0.70 mm
		(0.028 in)
Ring side clearance	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.12 mm
5		(0.0047in)



Item	Standard	Limit
2nd ring		
B		
Ring type	Taper	
Dimensions ( $B \times T$ )	1.0 × 2.9 mm (0.039 × 0.114 in)	
End gap (installed)	0.75 ~ 0.85 mm (0.030 ~ 0.033 in)	1.2 mm (0.047 in)
Ring side clearance	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.12 mm (0.0047 in)
Oil ring		
Dimensions ( $B \times T$ )	2.0 × 2.5 mm (0.079 × 0.098 in)	
End gap (installed)	0.2 ~ 0.6 mm (0.008 ~ 0.024 in)	
Ring side clearance	0.06 ~ 0.15 mm (0.0024 ~ 0.0059 in)	
Connecting rods		
Crankshaft-pin-to-big-end-bearing	0.031 ~ 0.048 mm (0.0012 ~ 0.0019 in)	
clearance Rearing color code	1 = Blue 2 = Black 3 = Brown 4 = Green	
Bearing color code	5 = Yellow $6 = $ Pink	
Small end inside diameter	19.005 ~ 19.018 mm (0.7482 ~ 0.7487 in)	
Crankshaft		
$F \stackrel{\leftarrow}{\rightarrow} \bigcirc \bigcirc$		
Width A	61.6 ~ 63.2 mm (2.425 ~ 2.488 in)	
Width B	325.1 ~ 326.3 mm (12.799 ~ 12.846 in)	
Max. runout C		0.03 mm (0.0012 in)
Big end side clearance D	0.160 ~ 0.262 mm (0.0063 ~ 0.0103 in)	
Big end radial clearance	0.021 ~ 0.039 mm (0.0008 ~ 0.0015 in)	
Crankshaft-journal-to-crankshaft-	0.027 ~ 0.045 mm (0.0011 ~ 0.0018 in)	
journal-bearing clearance Bearing color code	2 = Black 3 = Brown 4 = Green	
	5 = Yellow $6 = $ Pink $7 = $ Red $8 = $ White	
Position of thrust bearing	#3 JOURNAL	
Balancer		
Balancer drive method	Gear	



Item	Standard	Limit
Clutch		
Clutch type	Wet, multiple disc	
Clutch release method	Hydraulic inner push	
Operation	Left-hand operation	
Clutch cable free play (at the end of	1.9 ~ 20.7 mm (0.075 ~ 0.815 in)	
the clutch lever)		
Friction plates		
Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	2.8 mm
	· · · · · · · · · · · · · · · · · · ·	(0.1102 in)
Plate quantity	9	· /
Clutch plates		
Thickness	1.9 ~ 2.1 mm (0.075 ~ 0.083 in)	
Plate quantity	8	
Max. warpage		0.1 mm
		(0.004 in)
Clutch spring		(/
Free length	6.78 mm (0.2669 in)	
Spring quantity	1	
Min. length		6.44 mm
		(0.2535 in)
Push rod bending limit		0.2 mm
5		(0.0079 in)
Transmission		
Transmission type	Constant mesh, 5-speed	
Primary reduction system	Helical gear	
Primary reduction ratio	75/48 (1.563)	
Secondary reduction system	Shaft drive	
Secondary reduction ratio	35/36 × 21/27 × 33/9 (2.773)	
Operation	Left-foot operation	
Gear ratios		
1st gear	43/17 (2.529)	
2nd gear	39/22 (1.773)	
3rd gear	31/23 (1.348)	
4th gear	28/26 (1.077)	
5th gear	26/28 (0.929)	
Max. main axle runout		0.08 mm
		(0.003 in)
Max. drive axle runout		0.08 mm
		(0.003 in)
Shifting mechanism		
Shift mechanism type	Shift drum and guide bar	
Max. shift fork guide bar bending		0.1 mm
		(0.0039 in)
Air filter type	Dry element	



Item	Standard	Limit
Fuel pump		
Pump type	Electrical	
Model (manufacturer)	5JW (DENSO)	
Consumption amperage <max></max>	5.5 A	
Output pressure	294 kPa (2.94 kgf/cm <sup>2</sup> , 41.81 psi)	
Throttle bodies		
Model (manufacturer) × quantity	42EHS (MIKUNI) $\times$ 4	
Intake vacuum pressure	33.3 kPa (250 mm Hg, 9.8 in Hg)	
Throttle cable free play (at the flange	3 ~ 5 mm (0.12 ~ 0.20 in)	
of the throttle grip)		
ID mark	FJR1300 5JW1 21 (USA)	
	FJR1300 5JW8 31 (California)	
Shaft drive		
Final gear backlash	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)	

### CHASSIS SPECIFICATIONS



### **CHASSIS SPECIFICATIONS**

Item	Standard	Limit
Frame		
Frame type	Diamond	
Caster angle	26°	
Trail	109 mm (4.29 in)	
Front wheel		
Wheel type	Cast wheel	
Rim		
Size	17 M/C × MT 3.50	
Material	Aluminum	
Wheel travel	135 mm (5.31 in)	
Wheel runout		
Max. radial wheel runout		1.0 mm
		(0.04 in)
Max. lateral wheel runout		0.5 mm
		(0.02 in)
Rear wheel		
Wheel type	Cast wheel	
Rim		
Size	17 M/C × MT 5.50	
Material	Aluminum	
Wheel travel	125 mm (4.92 in)	
Wheel runout		
Max. radial wheel runout		1.0 mm
		(0.04 in)
Max. lateral wheel runout		0.5 mm
		(0.02 in)
Front tire		
Tire type	Tubeless	
Size	120/70 ZR 17 M/C (58 W)	
Model (manufacturer)	MEZ4J FRONT (METZELER)/	
<b></b> . /	BT020F N (BRIDGESTONE)	
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	
90 ~ 202 kg (198 ~ 445 lb)	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)	
High-speed riding	250 kPa (2.5 kgf/cm², 36 psi)	
Min. tire tread depth		1.0 mm
		(0.04 in)

## **CHASSIS SPECIFICATIONS**



Item	Standard	Limit
Rear tire		
Tire type	Tubeless	
Size	180/55 ZR 17 M/C (73 W)	
Model (manufacturer)	MEZ4J (METZELER)/	
	BT020R N (BRIDGESTONE)	
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kgf/cm², 36 psi)	
90 ~ 202 kg (198 ~ 445 lb) (USA)	290 kPa (2.9 kgf/cm <sup>2</sup> , 42 psi)	
90 ~ 201 kg (198 ~ 443 lb)	290 kPa (2.9 kgf/cm <sup>2</sup> , 42 psi)	
(California)		
High-speed riding	250 kPa (2.5 kgf/cm², 36 psi)	
Min. tire tread depth		1.0 mm
		(0.04 in)
Front brakes		
Brake type	Dual-disc brake	
Operation	Right-hand operation	
Brake lever free play (at lever end)	2.2 ~ 11.2 mm (0.09 ~ 0.44 in)	
Recommended fluid	DOT 4	
Brake discs		
Diameter × thickness	298 × 5 mm (11.73 × 0.20 in)	
Min. thickness		4.5 mm
		(0.18 in)
Max. deflection		0.1 mm
		(0.004 in)
Brake pad lining thickness	5.5 mm (0.22 in)	0.5 mm
		(0.02 in)
Master cylinder inside diameter	14 mm (0.55 in)	
Caliper cylinder inside diameter	30.2 mm (1.19 in) and 27 mm (1.06 in)	
Rear brake		
Brake type	Single-disc brake	
Operation	Right-foot operation	
Brake pedal position (below the top	42 mm (1.65 in)	
of the rider footrest)		
Brake pedal free play	4.7 ~ 9.9 mm (0.19 ~ 0.39 in)	
Recommended fluid	DOT 4	
Brake discs		
Diameter $\times$ thickness	282 × 6 mm (11.10 × 0.24 in)	
Min. thickness		5.5 mm
		(0.22 in)
Max. deflection		0.1 mm
		(0.0039 in)
Brake pad lining thickness	5.8 mm (0.23 in)	0.8 mm
		(0.03 in)
Master cylinder inside diameter	14 mm (0.55 in)	
Caliper cylinder inside diameter	41.3 mm (1.63 in)	

# CHASSIS SPECIFICATIONS



Item	Standard	Limit
Clutch		
Recommended fluid	DOT 4	
Master cylinder inside diameter	14 mm (0.55 in)	
Release cylinder inside diameter	33.6 mm (1.32 in)	
Front suspension		
Suspension type	Telescopic fork	
Front fork type	Coil spring/oil damper	
Front fork travel	135 mm (5.31 in)	
Spring		
Free length	261 mm (10.28 in)	256 mm
		(10.08 in)
Spacer length	149.5 mm (5.89 in)	
Installed length	246 mm (9.69 in)	
Spring rate (K1)	7.84 N/mm (0.799 kg/mm, 44.77 lb/in)	
Spring stroke (K1)	0 ~ 91 mm (0 ~ 3.58 in)	
Spring rate (K2)	9.80 N/mm (0.999 kg/mm, 55.96 lb/in)	
Spring stroke (K2)	91 ~ 135 mm (3.58 ~ 5.31 in)	
Optional spring available	No	
Fork oil		
Recommended oil	Suspension oil "M1"	
Quantity (each front fork leg)	670 cm <sup>3</sup> (23.6 lmp oz, 22.3 US oz)	
Level (from the top of the inner	100 mm (3.94 in)	
tube, with the inner tube fully com- pressed, and without the fork		
spring)		
Inner tube outer diameter	48 mm (1.89 in)	
		0.2 mm
Inner tube bearing		(0.01 in)
Damper adjusting rod locknut dis-	12 mm (0.47 in)	
tance		
Spring preload adjusting positions		
Minimum	5	
Standard	3	
Maximum	1	
Rebound damping adjusting posi-		
tions		
Minimum*	17	
Standard*	12	
Maximum*	1	
Compression damping adjusting		
positions		
Minimum*	21	
Standard*	12	
Maximum	1	
*from the fully turned-in position		

# CHASSIS SPECIFICATIONS



Item	Standard	Limit
Steering		
Steering bearing type	Angular	
Lock to lock angle (left)	34°	
Lock to lock angle (right)	34°	
Rear suspension		
Suspension type	Swingarm (link suspension)	
Rear shock absorber assembly type	Coil spring/gas-oil damper	
Rear shock absorber assembly travel	60 mm (2.36 in)	
Upper spring		
Free length	159 mm (6.26 in)	155.82 mm (6.13 in)
Installed length	138.1 mm (5.44 in)	
Lower spring		
Free length	74 mm (2.91 in)	72.52 mm
3		(2.86 in)
Installed length	65.4 mm (2.57 in)	
Spring rate (K1)	71.6 N/mm (7.30 kg/mm, 408.86 lb/in)	
Spring stroke (K1)	0 ~ 31.3 mm (0 ~ 1.23 in)	
Spring rate (K2)	102 N/mm (10.4 kg/mm, 582.45 lb/in)	
Spring stroke (K2)	31.3 ~ 60.0 mm (1.23 ~ 2.36 in)	
Optional spring available	No	
Standard spring preload gas/air pres- sure	1,200 kPa (12.0 kg/cm², 171 psi)	
Spring preload adjusting positions		
Rider only	SOFT	
With passenger or cargo	HARD	
Rebound damping adjusting posi-		
tions		
Minimum*	20	
Standard*	10	
Maximum*	3	
*from the fully turned-in position		
Swingarm		
Free play (at the end of the swingarm)		
Radial		0 mm (0 in)
Axial		0 mm (0 in)



### **ELECTRICAL SPECIFICATIONS**

Item	Standard	Limit
System voltage	12 V	
Ignition system		
Ignition system type	Transistorized coil ignition (digital)	
Ignition timing	5° BTDC at 1,050 r/min	
Advancer type	Electric	
Crankshaft position sensor resis-	420 ~ 569 Ω/Gy–B	
tance/color		
Transistorized coil ignition unit model	F8T919 (MITSUBISHI)	
(manufacturer)		
Ignition coils		
Model (manufacturer)	J0313 (DENSO)	
Minimum ignition spark gap	6 mm (0.24 in)	
Primary coil resistance	1.87 ~ 2.53 Ω	
Secondary coil resistance	12 ~ 18 kΩ	
Spark plug caps		
Material	Resin	
Resistance	10 kΩ	
Charging system		
System type	AC magneto	
Model (manufacturer)	TLNZ79 (DENSO)	
Nominal output	14 V/490 W at 5,000 r/min	
Stator coil resistance/color	0.15 ~ 0.23 Ω/W–W	
Voltage regulator		
Regulator type	Semiconductor, short circuit	
Model (manufacturer)	FH001 (SHINDENGEN)	
No-load regulated voltage	14.1 ~ 14.9 V	
Rectifier		
Model (manufacturer)	FH001 (SHINDENGEN)	
Rectifier capacity	35 A	
Withstand voltage	200 V	
Battery		
Battery type (manufacturer)	GT14B-4 (GS)	
Battery voltage/capacity	12 V/12 AH	
Specific gravity	1.320	
Ten hour rate amperage	1.2 A	
Headlight type	Halogen bulb	
Indicator light		
(voltage/wattage $ imes$ quantity)		
Neutral indicator light	14 V 1.12 W × 1	
Turn signal indicator light	14 V 2 W × 2	
Oil level warning light	14 V 1.12 W × 1	
High beam indicator light	14 V 1.12 W × 1	
Engine trouble warning light	14 V 1.12 W × 1	

# ELECTRICAL SPECIFICATIONS



Item	Standard	Limit
Bulbs (voltage/wattage × quantity)		
Headlight	12 V 60 W/55 W × 2	
Tail/brake light	12 V 5 W/21 W × 2	
Front turn signal/position light	12 V 27 W 8 W × 2	
Rear turn signal light	12 V 21 W × 2	
Meter light	14 V 1.12 W × 4	
Electric starting system		
System type	Constant mesh	
Starter motor		
Model (manufacturer)	5JW (YAMAHA)	
Power output	0.8 kW	
Brushes		
Overall length	10.8 mm (0.43 in)	3.65 mm (0.14 in)
Spring force	5.28 ~ 7.92 N (538 ~ 808 gf, 18.98 ~ 28.50 oz)	
Commutator resistance	0.024 ~ 0.030 Ω	
Commutator diameter	24.5 mm (0.96 in)	23.5 mm
Mica undercut	1.5 mm (0.06 in)	(0.93 in) 
Starter relay		
Model (manufacturer)	2768079-A (JIDECO)	
Amperage	180 A	
Coil resistance	4.18 ~ 4.62 Ω	
Horn		
Horn type	Plane	
Model (manufacturer) × quantity	YF-12 (NIKKO) × 2	
Max. amperage	3 A	
Performance	105 ~ 113 db/2 m (6.6 ft)	
Coil resistance	1.15 ~ 1.25 Ω	
Turn signal relay		
Relay type	Full-transistor	
Model (manufacturer)	FE246BH (DENSO)	
Self-cancelling device built-in	No	
Turn signal blinking frequency	75 ~ 95 cycles/min.	
Wattage	21 W × 2 + 3.4 W	
Oil level switch model (manufacturer)	5JW (DENSO)	
Fuel sender		
Model (manufacturer)	5JW (DENSO)	
Resistance	20 ~ 140 Ω	
Sidestand relay		
Model (manufacturer)	G8R-30Y-N (OMRON)	
Coil resistance	180 Ω	
Headlight relay 2		
Model (manufacturer)	ACM33211 M05 (OMRON)	

# ELECTRICAL SPECIFICATIONS



Item	Standard	Limit
Fuel pump maximum amperage	5.5 A	
Fuel injection system relay model	ACM33211 M05 (MATSUSHITA)	
(manufacturer)		
Radiator fan		
Model (manufacturer)	5JW (DENSO)	
Running rpm	3,300 r/min	
Fan motor relay		
Model (manufacturer)	ACM33211 M05 (OMRON)	
Atmospheric pressure sensor		
Thermostat type (manufacturer)	4FM (NIPPON THERMOSTAT)	
Valve opening temperature	69 ~ 73 °C (156.2 ~ 163.4 °F)	
Valve full open temperature	85 °C (185.0 °F)	
Valve lift – full open	8 mm (0.31 in)	
Intake air temperature sensor		
Model (manufacturer)	25978 (MITSUBISHI)	
Resistance	5.4 ~ 6.6 Ω at 80 °C (176 °F)	
Coolant temperature sender		
Model (manufacturer)	8CC (MITSUBISHI)	
Resistance	5.21 ~ 6.37 kΩ at 0 °C (32 °F)	
	0.290 ~ 0.354 kΩ at 80 °C (176 °F)	
Fuses (amperage $ imes$ quantity)		
Main fuse	50 A × 1	
Fuel injection system fuse	15 A × 1	
Headlight fuse	25 A × 1	
Tail/position light fuse	10 A × 1	
Signaling system fuse	10 A × 1	
Ignition fuse	10 A × 1	
Radiator fan motor fuse	15 A × 1	
Hazard lighting fuse	10 A × 1	
Backup fuse (odometer and clock)	10 A × 1	
Windshield motor fuse	2 A × 1	
Reserve fuse	25 A, 15 A, 10 A, 2 A × 1	

#### 

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

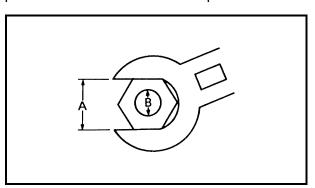
#### **CONVERSION TABLE**

METRIC TO IMPERIAL					
	Metric unit	Multiplier	Imperial unit		
Tighten-	m∙kg	7.233	ft·lb		
ing torque	m∙kg	86.794	in·lb		
g ter que	cm⋅kg	0.0723	ft·lb		
	cm⋅kg	0.8679	in⋅lb		
Weight	kg	2.205	lb		
Weight	g	0.03527	oz		
Speed	km/hr	0.6214	mph		
	km	0.6214	mi		
	m	3.281	ft		
Distance	m	1.094	yd		
	cm	0.3937	in		
	mm	0.03937	in		
	cc (cm <sup>3</sup> )	0.03527	oz (IMP liq.)		
Volume/	cc (cm <sup>3</sup> )	0.06102	cu-in		
Capacity	It (liter)	0.8799	qt (IMP liq.)		
	It (liter)	0.2199	gal (IMP liq.)		
	kg/mm	55.997	lb/in		
Misc.	kg/cm <sup>2</sup>	14.2234	psi (lb/in²)		
101100.	Centigrade	9/5+32	Fahrenheit (°F)		
	(°C)				

## GENERAL TIGHTENING TORQUE SPECIFICATIONS

C

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				
(nut)	(DOIL)	Nm	m•kg	ft∙lb		
10 mm	6 mm	6	0.6	4.3		
12 mm	8 mm	15	1.5	11		
14 mm	10 mm	30	3.0	22		
17 mm	12 mm	55	5.5	40		
19 mm	14 mm	85	8.5	61		
22 mm	16 mm	130	94			



# TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES
---------------------------

Part to be tightened	Part to be tightened Part name Thread Q't		Q'ty	Tight	ening to	orque	Remarks
i art to be tightened	i an name	size	Giy	Nm	m∙kg	ft∙lb	Tiemarks
Spark plug	—	M10	4	13	1.3	9.4	
Camshaft sensor	Bolt	M6	1	10	1.0	7.2	-••
Cylinder head cover	Bolt	M6	8	10	1.0	7.2	
Camshaft cap	Bolt	M6	20	10	1.0	7.2	
Camshaft sprocket	Bolt	M7	4	24	2.4	17	
Timing chain tensioner	Bolt	M6	2	10	1.0	7.2	
Timing chain tensioner cap	Bolt	M6	1	7	0.7	5.1	
Cylinder head	Bolt	M10	10	Se	e NOTE	.*1	
Cylinder head	Bolt	M6	2	12	1.2	8.7	
Cylinder head	Stud bolt	M8	8	15	1.5	11	
Oil gallery bolt	—	M8	1	20	2.0	14	
Generator cover	Bolt	M6	8	12	1.2	8.7	
Generator rotor	Bolt	M12	1	130	13.0	94	
Starter clutch	Bolt	M8	3	32	3.2	23	- 0
Stator assembly	Screw	M6	3	10	1.0	7.2	-••
Stator assembly lead holder	Screw	M6	1	6	0.6	4.3	
Pickup coil rotor cover	Bolt	M6	8	12	1.2	8.7	
Ignition timing check bolt	_	M8	1	15	1.5	11	
Crankshaft position sensor	Bolt	M5	2	4	0.4	2.9	-••
Pickup coil rotor	Bolt	M10	1	45	4.5	32	-
Clutch cover	Bolt	M6	10	12	1.2	8.7	
Damper cover	Screw	M6	4	12	1.2	8.7	-0
Oil guide plate	Bolt	M6	2	10	1.0	7.2	_
Clutch spring plate retainer	Bolt	M6	6	8	0.8	5.8	
Clutch boss	Nut	M20	1	90	9.0	65	Use a lock washer.
Shift arm pinch bolt	_	M6	1	10	1.0	7.2	
Shift rod	Nut	M6	1	7	0.7	5.1	
Shift rod	Nut	M6	1	7	0.7	5.1	Left-hand threads
Shift rod joint	Bolt	M6	1	10	1.0	7.2	-6
Shift pedal	Bolt	M8	1	30	3.0	22	
Oil baffle plate	Bolt	M6	3	10	1.0	7.2	-6
Shift shaft spring stopper	Bolt	M8	1	22	2.2	16	-6
Engine oil drain bolt	—	M14	1	43	4.3	31	
Oil filter cartridge	—	M20	1	17	1.7	12	
Oil filter bolt	_	M20	1	70	7.0	50	
Oil level switch	Bolt	M6	2	10	1.0	7.2	
Oil pan	Bolt	N6	20	12	1.2	8.7	
Oil delivery pipe	Bolt	M6	1	10	1.0	7.2	-0

SPEC U

Part to be tightened	Part name	Thread	Q'ty	Tight	ening to	orque	Remarks
i an to be tightened	i an name	size	Quy	Nm	m∙kg	ft∙lb	Temarks
Oil pipe	Bolt	M6	2	10	1.0	7.2	-0
Oil strainer	Bolt	M6	2	10	1.0	7.2	- 6
Oil pump assembly	Bolt	M6	3	12	1.2	8.7	-6
Oil pump housing cover	Bolt	M6	3	12	1.2	8.7	
Left middle gear cover	Bolt	M6	9	12	1.2	8.7	
Right middle gear cover	Bolt	M6	3	12	1.2	8.7	
Middle driven shaft assembly	Bolt	M8	3	25	2.5	18	-0
Middle driven pinion gear	Nut	M28	1	110	11.0	80	- Stake
Bearing retainer (middle driven shaft)	—	M68	1	110	11.0	80	Stake
Middle drive pinion gear	Nut	M22	1	110	11.0	80	lock washer.
Bearing retainer (middle drive shaft)	_	M88	1	110	11.0	80	Stake
Oil pump drive chain guide	Bolt	M6	2	10	1.0	7.2	-0
Neutral switch	—	M10	1	20	2.0	14	
Speed sensor	Bolt	M6	1	10	1.0	7.2	- 0
Crankcase	Bolt	M9	10	Se	e NOTE	.*2	
Crankcase	Bolt	M8	2	24	2.4	17	
Crankcase	Bolt	M6	2	12	1.2	8.7	
Crankcase	Bolt	M6	17	10	1.0	7.2	
Rear balancer cover	Bolt	M6	4	12	1.2	8.7	
Balancer lever	Bolt	M8	2	14	1.4	10	
Balancer shaft pinch bolt	—	M6	2	10	1.0	7.2	
Plate	Torx screw	M6	2	12	1.2	8.7	- 6
Connecting rod	Nut	M8	8	Se	e NOTE	.*3	
Shift drum retainer	Bolt	M6	2	10	1.0	7.2	-6
Main axle assembly	Torx screw	M6	3	12	1.2	8.7	-   Stake
Air filter case	Bolt	M6	2	7	0.7	5.1	
Air filter case joint clamp screw		M4	4	4	0.4	2.9	
Intake air temperature sensor		M12	1	18	1.8	13	
Throttle body joint clamp screw		M4	8	3	0.3	2.2	
Intake air pressure sensor	Bolt	M5	2	5	0.5	3.6	
Air cut-off valve assembly	Bolt	M6	1	10	1.0	7.2	
Reed valve cover	Bolt	M6	6	14	1.4	10	-0
Radiator	Bolt	M6	3	10	1.0	7.2	
Conduit	Bolt	M6	1	10	1.0	7.2	
Water jacket joint	Bolt	M6	2	10	1.0	7.2	-0
Oil cooler	Bolt	M6	4	12	1.2	8.7	-0
Thermostat assembly inlet pipe	Bolt	M6	2	10	1.0	7.2	
Coolant temperature sensor	<u> </u>	M12	1	18	1.8	13	



Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m∙kg	ft∙lb	nemarks
Thermostat assembly	Torx screw	M6	1	10	1.0	7.2	
Thermostat housing cover	Bolt	M6	2	10	1.0	7.2	
Water pump	Bolt	M6	3	12	1.2	8.7	
Water pump housing cover	Bolt	M6	1	10	1.0	7.2	
Coolant drain bolt		M6	1	10	1.0	7.2	
Muffler joint	Bolt	M8	2	20	2.0	14	
Muffler	Bolt	M10	2	25	2.5	18	
Exhaust pipe	Nut	M8	8	20	2.0	14	
Exhaust pipe	Bolt	M8	2	17	1.7	12	
Exhaust check bolt		M6	4	10	1.0	7.2	
O2 sensor	_	M18	1	45	4.5	32	
Starter motor	Bolt	M6	2	10	1.0	7.2	

NOTE:

\*1: Tighten the cylinder head bolts to 25 Nm (2.5 m • kg, 18 ft • lb) in the proper tightening sequence, loosen and retighten the cylinder head bolts to 25 Nm (2.5 m • kg, 18 ft • lb) in the proper tightening sequence, and then tighten the cylinder head bolts further to reach the specified angle 180° in the proper tightening sequence.

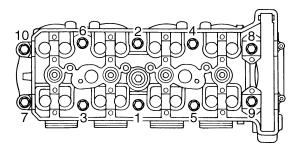
\*2: Tighten the crankcase bolts to 20 Nm (2.0 m • kg, 14 ft • lb) in the proper tightening sequence, loosen and retighten the crankcase bolts to 20 Nm (2.0 m • kg, 14 ft • lb) in the proper tightening sequence, and then tighten the crankcase bolts further to reach the specified angle 120° in the proper tightening sequence.

\*3: Tighten the connecting rod nuts to 20 Nm (2.0 m • kg, 14 ft • lb), and then tighten the connecting rod nuts further to reach the specified angle 120°.

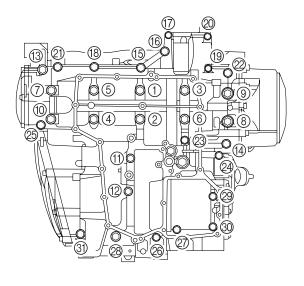


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Cylinder head tightening sequence:



Crankcase tightening sequence:





#### **CHASSIS TIGHTENING TORQUES**

Part to be tightened		Thread Tightening torque			Demerike
Part to be tightened	size	Nm	m∙kg	ft⋅lb	Remarks
Engine mounting:					
Rear lower mounting bolt	M10	45	4.5	32	
Spacer bolt	M16	18	1.8	13	
Rear upper mounting bolt and nut	M10	45	4.5	32	
Front mounting bolt	M12	55	5.5	40	
Pinch bolt	M8	24	2.4	17	
Bolt (engine bracket 1 and frame)	M10	32	3.2	23	
Bolt (engine bracket 1 and engine)	M8	16	1.6	11	
Bolt (engine bracket 2 and engine)	M10	36	3.6	25	
Bolt (engine bracket 2 and frame)	M8	16	1.6	11	
Front wheel axle	M18	72	7.2	52	
Front wheel axle pinch bolt	M8	23	2.3	17	
Brake disc and wheel	M6	18	1.8	13	-1 (1)
Front brake caliper	M10	40	4.0	29	
Front brake hose holder and front fork	M6	7	0.7	5.1	
Brake caliper bleed screw	M8	6	0.6	4.3	
Rear wheel axle nut	M18	125	12.5	90	
Rear wheel axle pinch bolt	M8	16	1.6	11	
Brake torque rod	M8	16	1.6	11	
Rear brake caliper retaining bolt	M10	27	2.7	19	
Brake hose union bolt	M10	30	3.0	22	
Front brake master cylinder	M6	10	1.0	7.2	
Right rider footrest bracket and frame	M8	28	2.8	20	
Rear master cylinder and right rider footrest bracket	M8	18	1.8	13	
Rear brake hose holder and brake torque rod	M6	10	1.0	7.2	
Clutch master cylinder	M6	10	1.0	7.2	
Clutch hose union bolt	M10	30	3.0	22	
Clutch release cylinder	M6	10	1.0	7.2	
Clutch release cylinder bleed screw	M8	6	0.6	4.3	
Front fender	M6	6	0.6	4.3	
Upper bracket pinch bolt	M8	30	3.0	22	
Lower bracket pinch bolt	M8	23	2.3	17	
Front fork cap bolt and inner tube	M45	25	2.5	18	
Front fork cap bolt and nut	M10	25	2.5	18	
Front fork damper rod assembly bolt	M10	35	3.5	25	- 6
Handlebar and upper bracket	M6	23	2.3	17	-
Grip end	M6	4	0.4	2.9	
Steering stem nut	M28	115	11.5	85	
Lower ring nut (steering stem)	M30	18	1.8	13	See NOTE.



Dent to be fielder and	Thread Tightening torque			Damarka	
Part to be tightened	size	Nm	m∙kg	ft∙lb	Remarks
Connecting arm and swingarm	M10	48	4.8	35	
Connecting arm and relay arm	M10	48	4.8	35	
Rear shock assembly and relay arm	M10	40	4.0	29	
Rear shock assembly and frame	M12	64	6.4	46	
Relay arm and frame	M10	40	4.0	29	
Swingarm pivot shaft and locknut	M28	115	11.5	85	
Swingarm pivot shaft and pivot shaft nut	M18	125	12.5	90	
Locknut retainer	M6	10	1.0	7.2	
Final drive housing oil filler bolt	M14	23	2.3	17	
Final drive housing oil drain bolt	M14	23	2.3	17	
Final drive assembly and swingarm	M10	42	4.2	30	
Left rider footrest bracket and frame	M8	28	2.8	20	
Left rider footrest bracket and engine	M10	49	4.9	35	
Left rider footrest bracket, sidestand bracket and	M10	63	6.3	45	
frame	WITO	05	0.5	45	
Ring gear bearing housing and final drive housing	M10	40	4.0	29	
Ring gear bearing housing and final drive housing	M8	23	2.3	17	
Stopper bolt	M10	9	0.9	6.5	
Gear coupling and final drive pinion gear	M16	110	11.0	80	
Final drive pinion gear bearing retainer	M65	110	11.0	80	
Sidestand and sidestand bracket	M10	58	5.8	42	
Centerstand bracket and frame	M10	55	5.5	40	
Centerstand and centerstand bracket	M10	56	5.6	40	
Rear frame and main frame (upper)	M8	28	2.8	20	
Rear frame and main frame (lower)	M10	48	4.8	35	
T-bar and frame	M10	78	7.8	56	
Fuel pump and fuel tank	M5	4	0.4	2.9	
Battery bracket and frame	M6	10	1.0	7.2	
Battery holder and battery bracket	M6	10	1.0	7.2	
Ignition coil	M6	10	1.0	7.2	
Canister and canister bracket	M6	7	0.7	5.1	
Canister	M6	12	1.2	8.7	
Hose holder	M6	7	0.7	5.1	

#### NOTE: \_

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

2.Retighten the lower ring nut to specification.



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

Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearings	
Crankshaft pins	
Piston surfaces	
Piston pins	
Connecting rod bolts and nuts	
Crankshaft journals	
Camshaft lobes	
Camshaft journals	(M
Balancer weights and shafts	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Water pump impeller shaft	
Oil pump rotors (inner and outer)	
Oil pump housing	
Oil strainer	
Starter clutch idle gear inner surface	
Starter clutch assembly	
Primary driven gear	
Push rods and ball	
Transmission gears (wheel and pinion)	
Main axle and drive axle	
Shift drum	
Shift forks and shift fork guide bars	
Shift shaft	
Shift pedal bolt	
Damper drive cam and damper driven cam	
Middle driven gear	
Middle drive pinion gear and middle drive shaft	(E
Middle driven pinion gear and middle driven shaft	

# LUBRICATION POINTS AND LUBRICANT TYPES



Lubrication point	Lubricant
Cylinder head cover mating surface	Sealant
Cylinder head cover	Sealant
Crankcase mating surface	Sealant
Clutch cover (crankcase mating surface)	Sealant
Generator cover (crankcase mating surface)	Sealant
Pickup coil rotor cover (crankcase mating surface)	Sealant
Left middle gear cover (crankcase mating surface)	Sealant

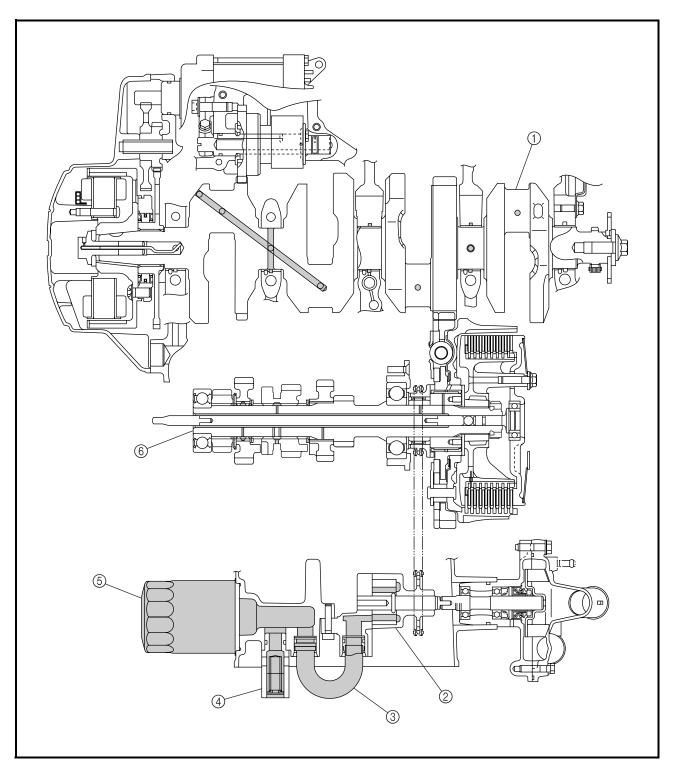


#### CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	
Front wheel oil seal (right and left)	
Rear wheel oil seal	
Rear wheel drive hub oil seal	
Rear wheel drive hub mating surface	
Rear brake pedal pivot	
Footrest pivoting point	
Centerstand pivoting point and sliding surface	
Sidestand pivoting point and metal-to-metal moving parts	
Throttle grip inner surface	
Brake lever pivot bolt and contact surface	
Clutch lever pivot bolt and contact surface	
Rear shock absorber assembly oil seal	
Rear shock absorber assembly bearing	
Rear shock absorber assembly spacer	
Pivot shaft	
Connecting arm bearing	
Spacer (relay arm and connecting arm)	
Oil seal (relay arm and connecting arm)	
Ring gear inner surface	
Thrust washer (ring gear)	
Bearing (ring gear)	
Bearing (final drive pinion gear)	



- 1 Crankshaft
- ② Oil pump
- 3 Oil pipe
- ④ Relief valve
- 5 Oil filter cartridge
- 6 Main axle

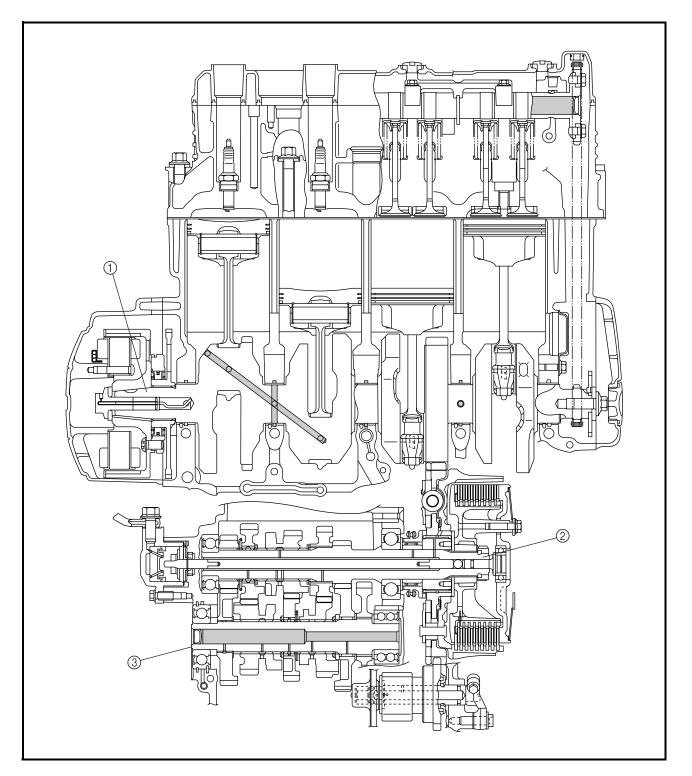




① Crankshaft

② Main axle

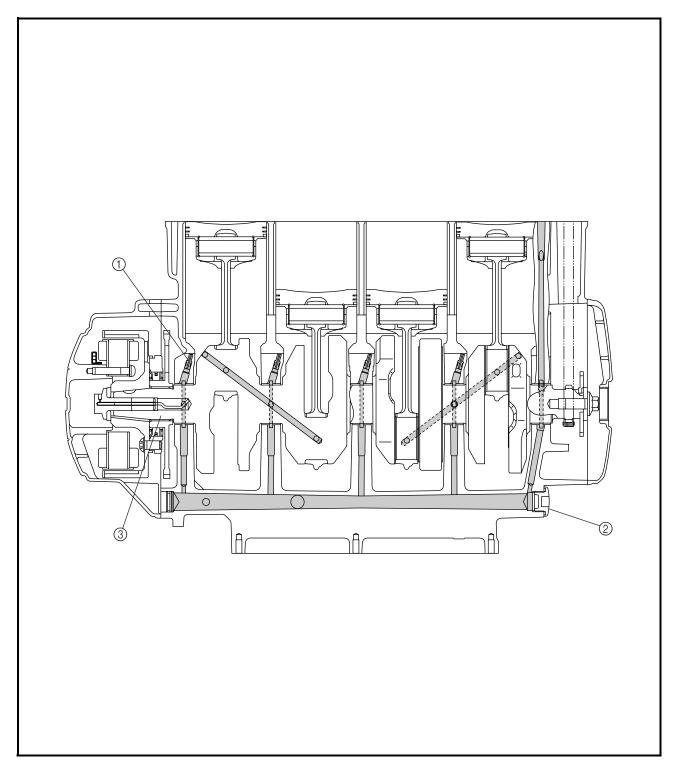
③ Drive axle





① Oil nozzle

2 Main gallery bolt
3 Crankshaft

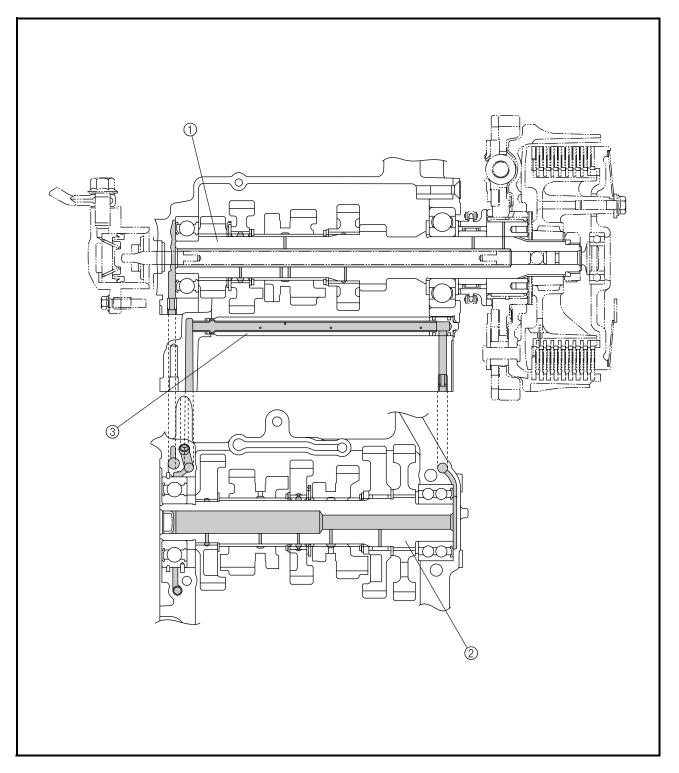




① Main axle

Drive axle

③ Oil delivery pipe

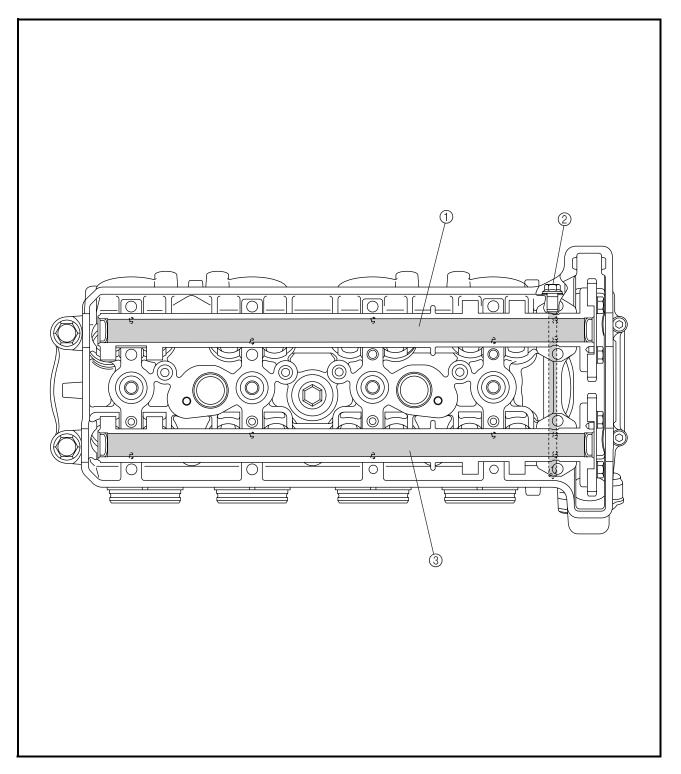




① Exhaust camshaft

② Oil check bolt

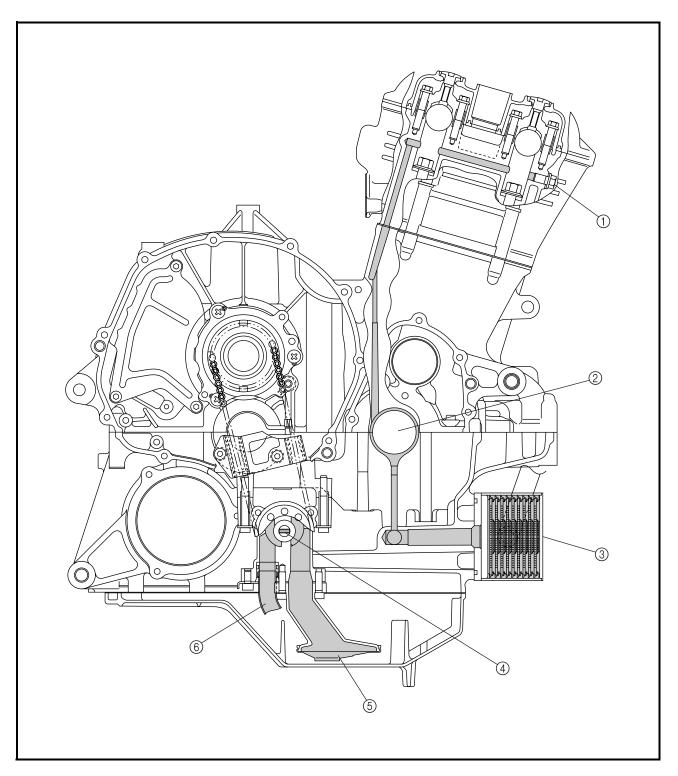
③ Intake camshaft





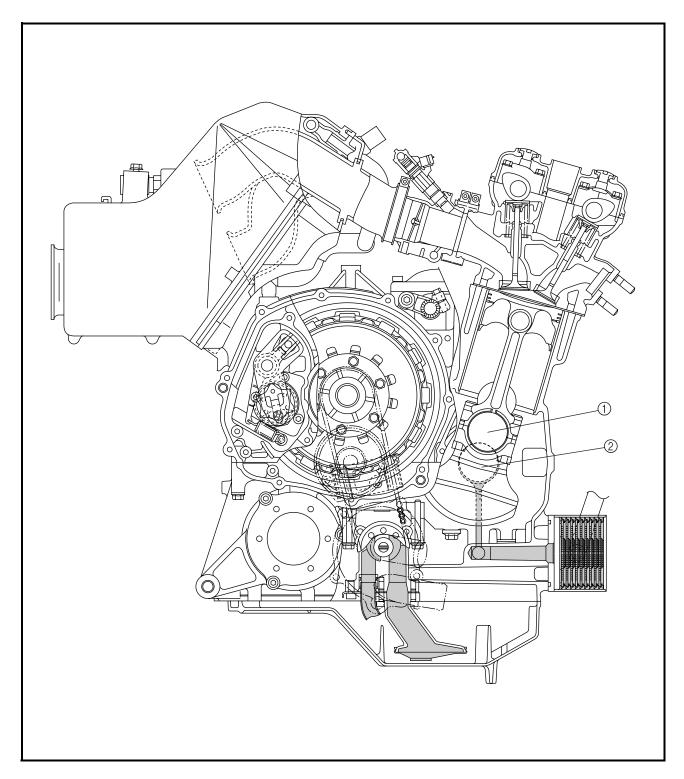
1 Oil check bolt

- ② Crankshaft
- ③ Oil cooler
- ④ Oil pump
  ⑤ Oil strainer
- 6 Oil pipe





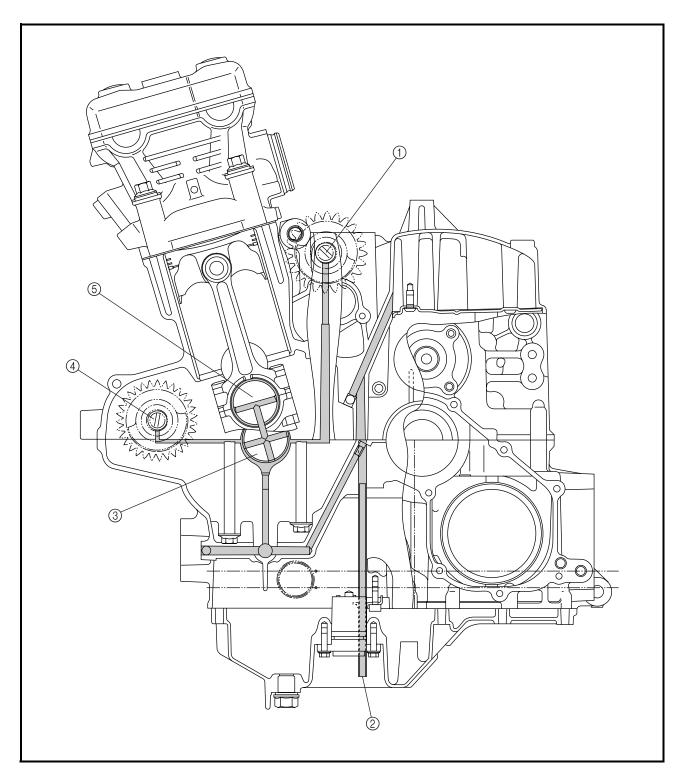
Crank pin
 Crankshaft





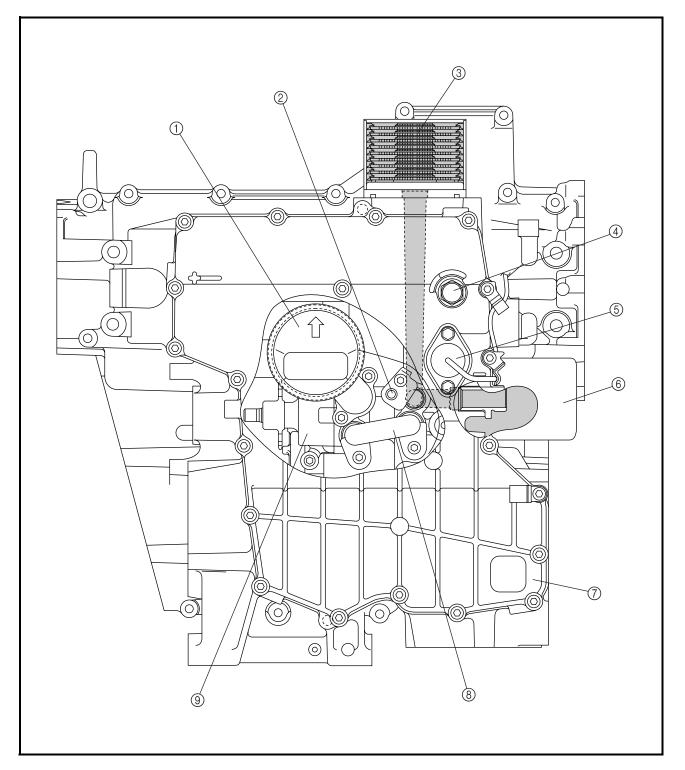
1 Rear balancer

- ② Oil delivery pipe
- ③ Crankshaft
- ④ Front balancer
- ⑤ Crank pin





- 1 Oil strainer
- ② Oil delivery pipe
- ③ Oil cooler
- ④ Engine oil drain bolt
- ⑤ Oil level switch
- 6 Oil filter cartridge
- ⑦ Oil pan
- (8) Oil pipe
- Oil pump

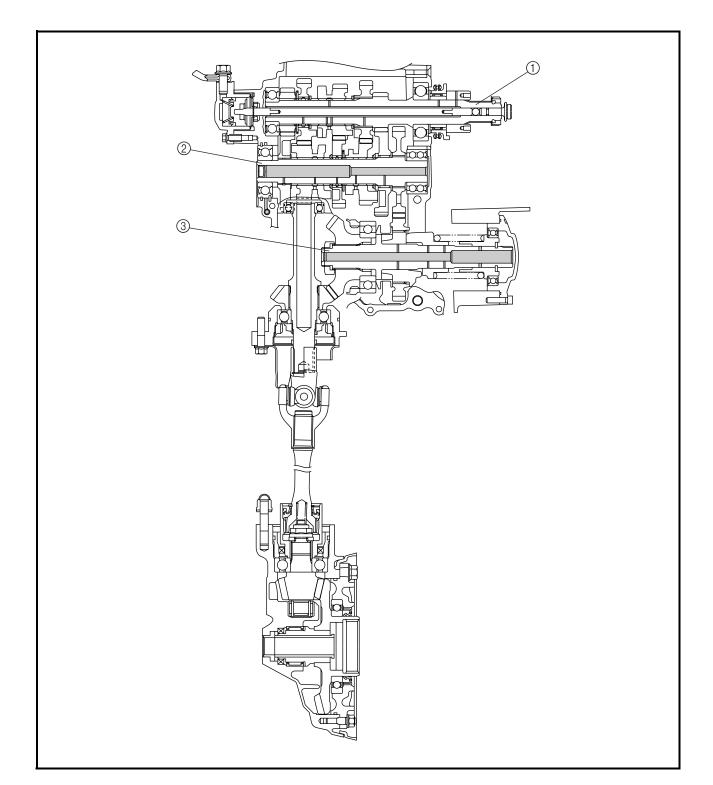


SPEC U

① Main axle

Drive axle

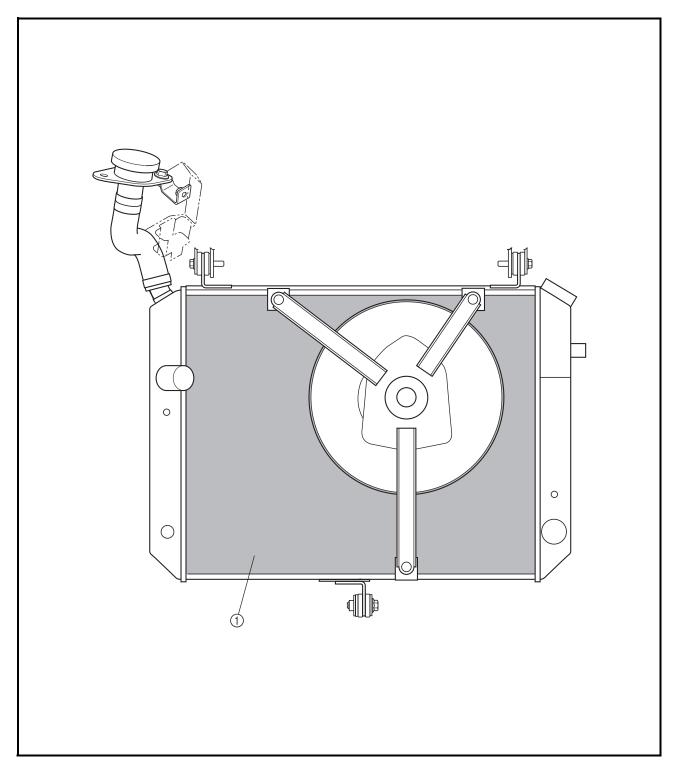
③ Middle drive shaft





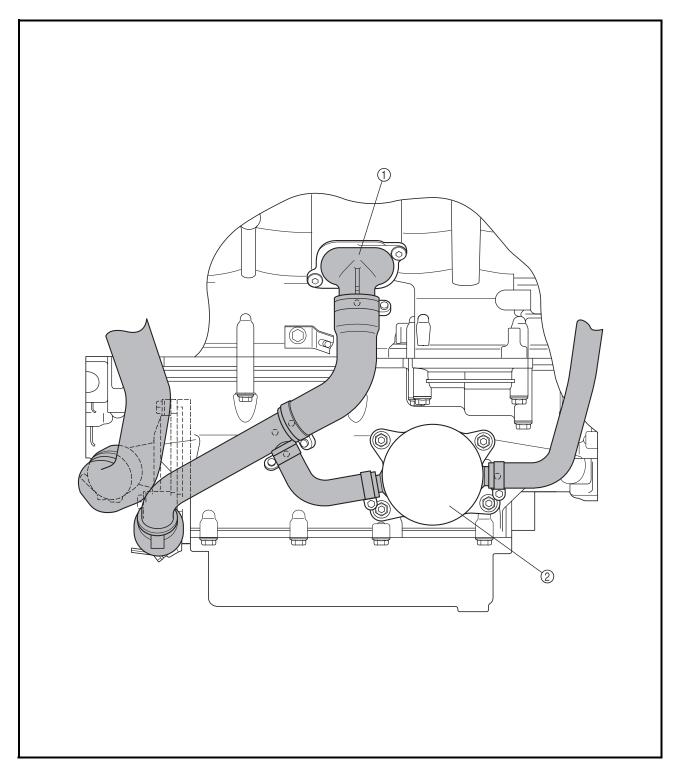
### **COOLING SYSTEM DIAGRAMS**

① Radiator



SPEC U

Water jacket joint
 Oil cooler

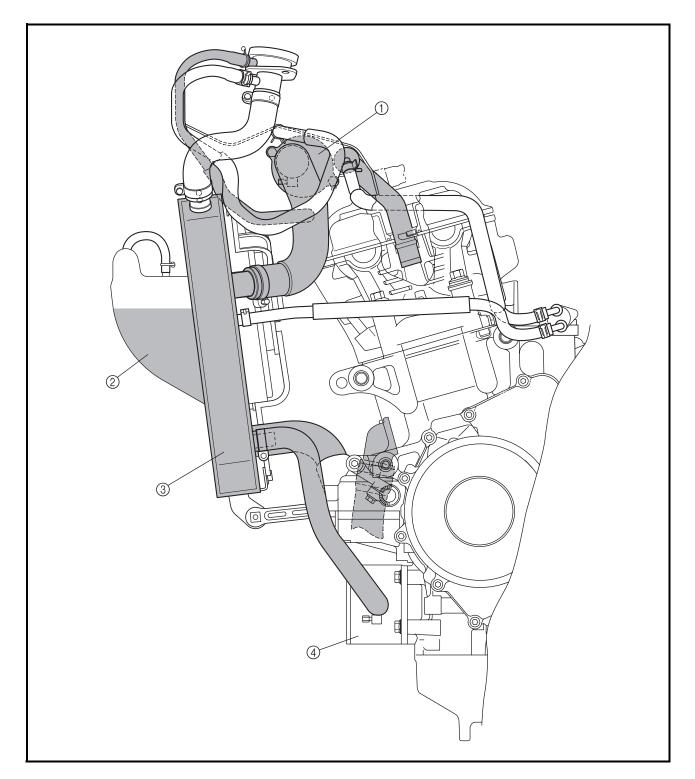


### **COOLING SYSTEM DIAGRAMS**



Thermostat assembly
 Coolant reservoir

- ③ Radiator
- ④ Oil cooler

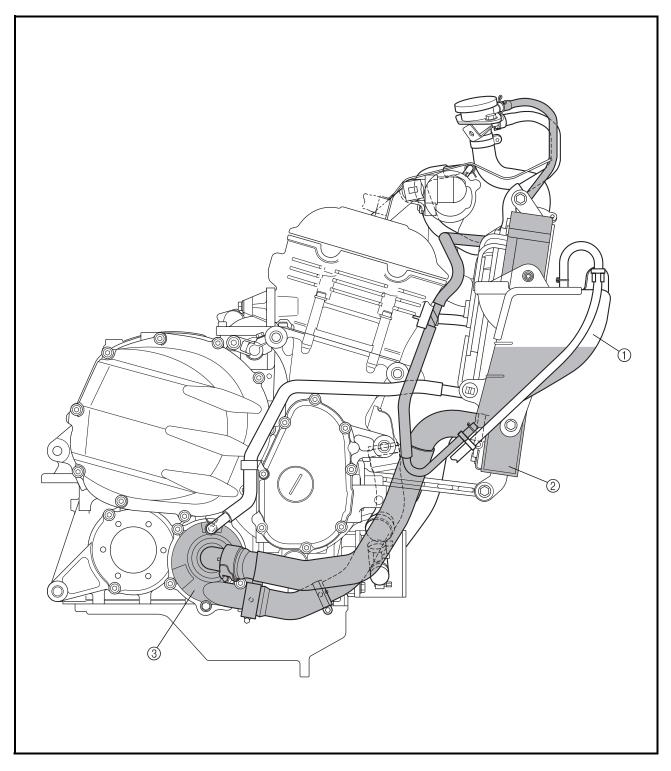




① Coolant reservoir

② Radiator

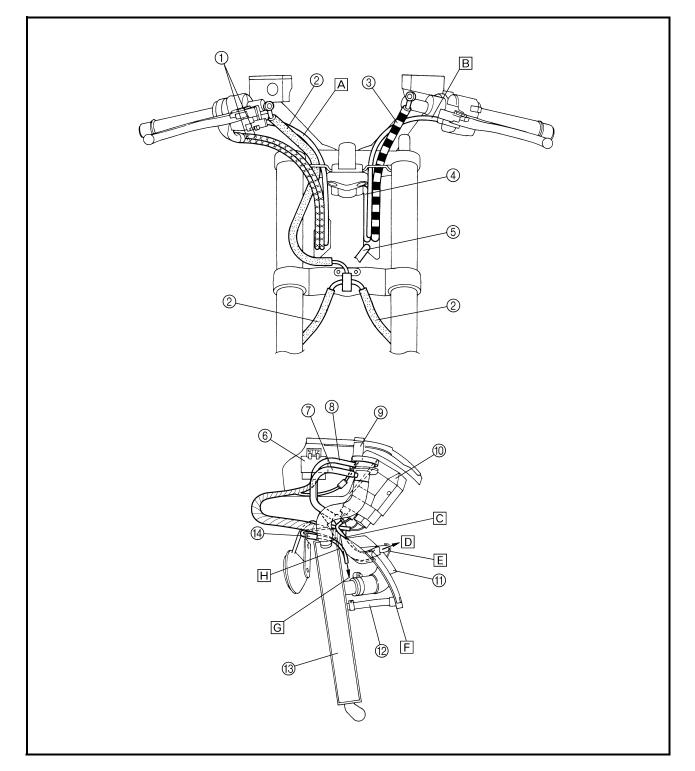
3 Water pump





- ① Throttle cable
- ② Brake cable
- ③ Clutch cable
- ④ Main switch lead
- 5 Headlight lead
- 6 Fuse box
- Thermostat assembly breather hose
- (8) Coolant reservoir hose
- (9) Hazard switch

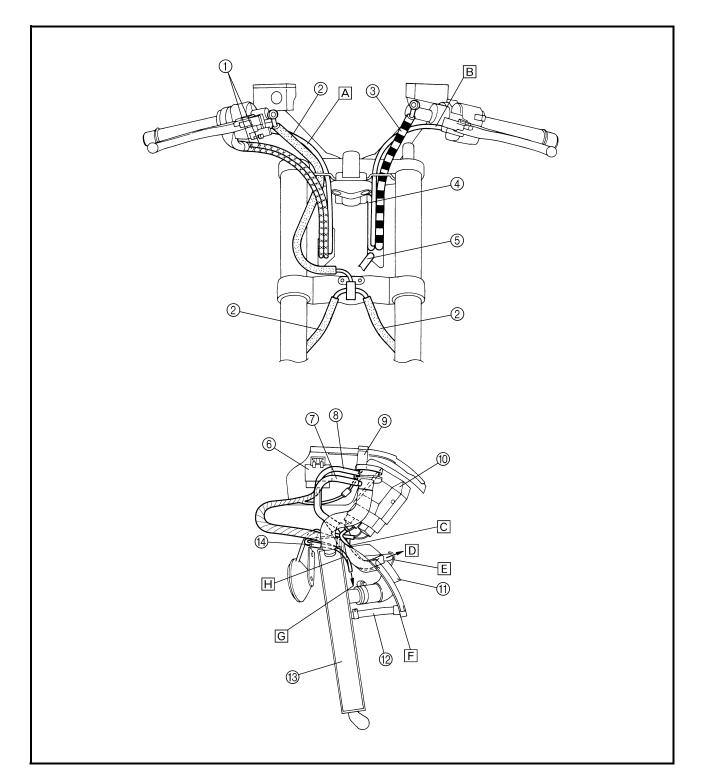
- 1 Rectifier/regulator
- 1) Plate
- 12 Plunger control unit hose 2
- (13) Radiator
- (4) Radiator fan coupler





- A Pass the right handlebar switch lead under the handlebar.
- B Pass the left handlebar switch lead under the handlebar.
- C Pass the wire harness, stator coil lead, coolant reservoir hose, and thermostat assembly breather hose through the left slit of the plate.
- D To the thermostat housing

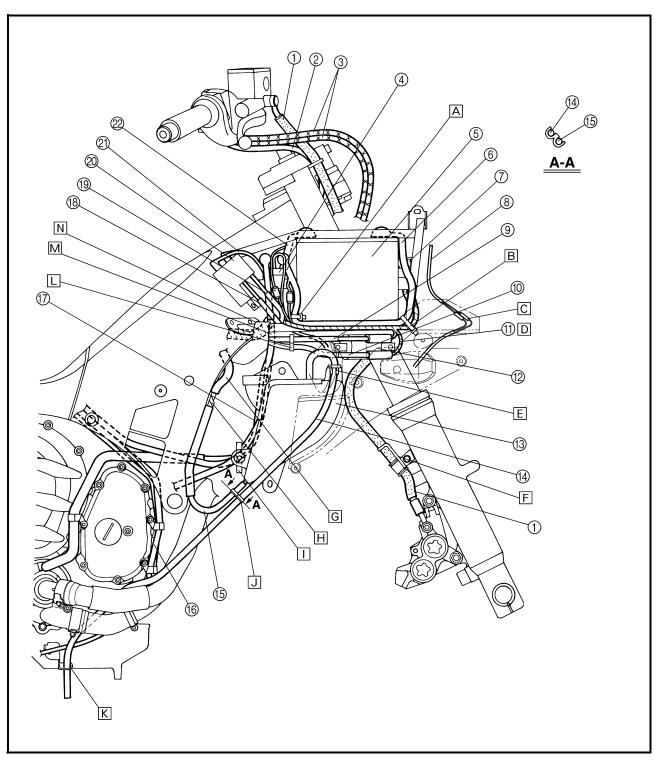
- E After passing the coolant reservoir hose through the two hose guides behind the plate, pass the hose through the right hole of the plate.
- F Pass the plunger control unit hose 2 on the inside of the plate.
- G To the radiator fan
- H Pass the radiator fan lead on the outside of the plate.



- 1) Brake cable
- ② Right handlebar switch lead
- ③ Throttle cable
- ④ Starter relay
- **⑤** Battery
- 6 Positive battery lead
- ⑦ Main fuse
- (8) Front turn signal lead
- (9) Spark plug lead #4
- 1 Spark plug lead #1
- (1) Ignition coil lead (#1, #4)



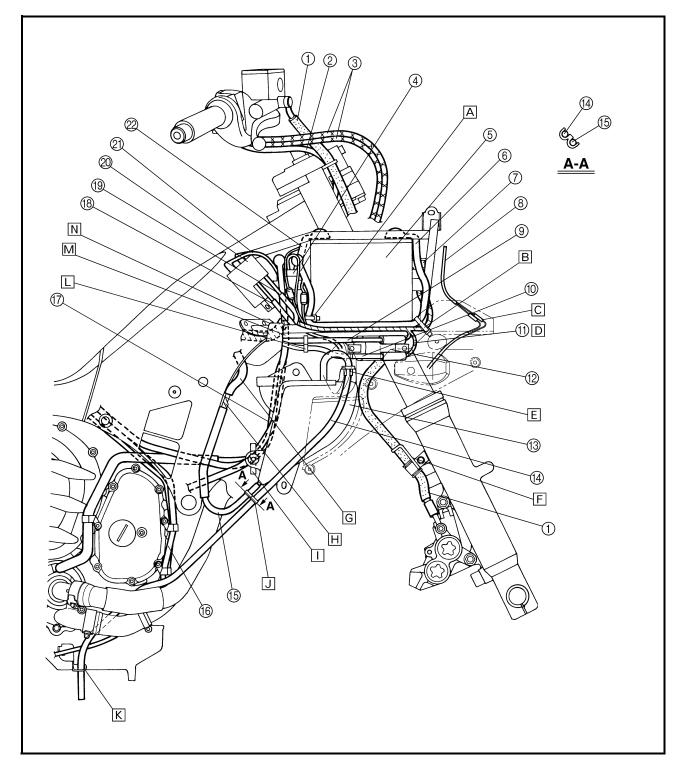
- (2) Ignition coil (#1, #4)
- (13) Coolant reservoir
- (a) Coolant reservoir breather hose
- (5) Coolant reservoir hose
- 16 Pickup coil lead
- Starter motor lead
- Spark plug lead #2
   Spark plug lead #2
- (19) Spark plug lead #3(20) Ignition coil (#2, #3)
- 2) Starter relay
- 2) Statler relay
   2) Negative battery lead



# CABLE ROUTING SP

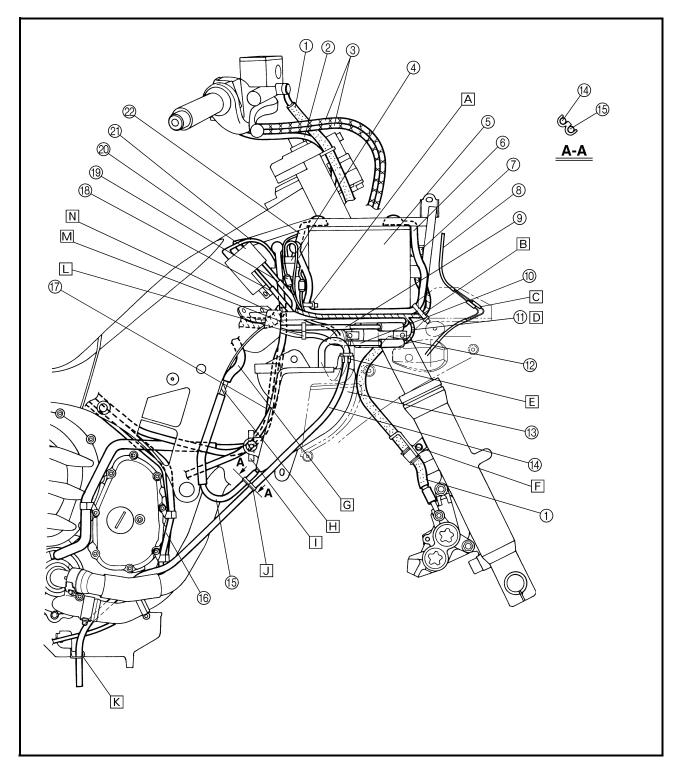


- A Fasten the positive battery lead with a plastic locking tie to the battery stay.
- B Fasten the positive battery lead and main fuse lead with a plastic locking tie to the battery stay.
- C Insert the front turn signal leads into the inner panel.
- Install the connector so that the ignition coil lead can be turned outward.
- E Support the coolant reservoir breather hose with the hose holder attached to the coolant reservoir.
- F Pass the brake cable through the brake cable guide.
- G Pass the coolant reservoir hose through the hole of the plate.
- H Pass the coolant reservoir hose through the hose guide attached to the coolant reservoir.
- Pass the negative battery lead and starter motor lead through the hose guide attached to the coolant reservoir.



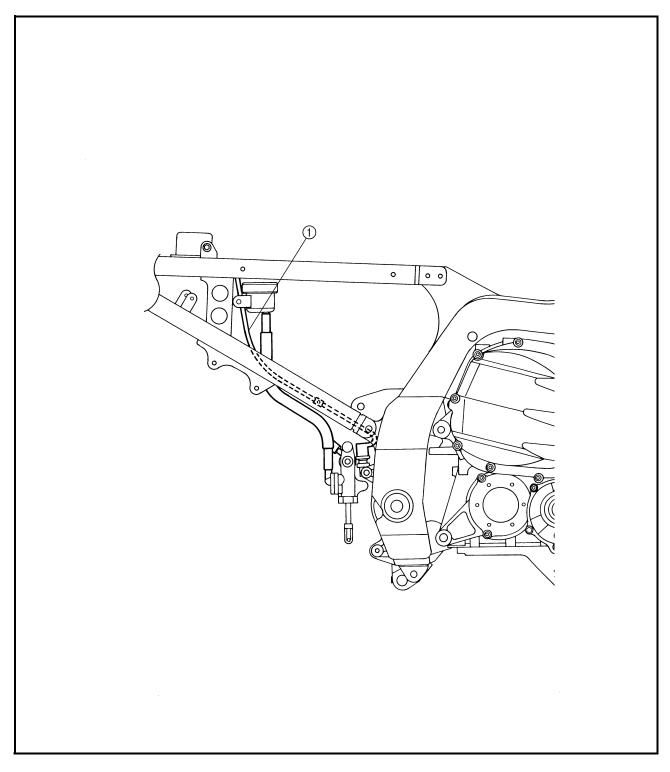


- J Support the coolant reservoir hose and coolant reservoir breather hose with the hose holder located under the coolant reservoir.
- K Pass the coolant reservoir hose through the hole of the coolant reservoir hose guide. The end of the coolant reservoir hose should extend at least 50 mm (2.0 in) from the hose guide.
- □ Fasten the spark plug lead #1 and #4 at the number tag.
- Pass the wire harness, spark plug leads #1, #2, #3, and #4 through the right slit of the battery bracket.
- N Pass the starter motor lead, negative battery lead, wire harness and spark plug leads #2 and #3 through the battery stay. Be sure to pass the starter motor lead and negative battery lead on the battery stay side.





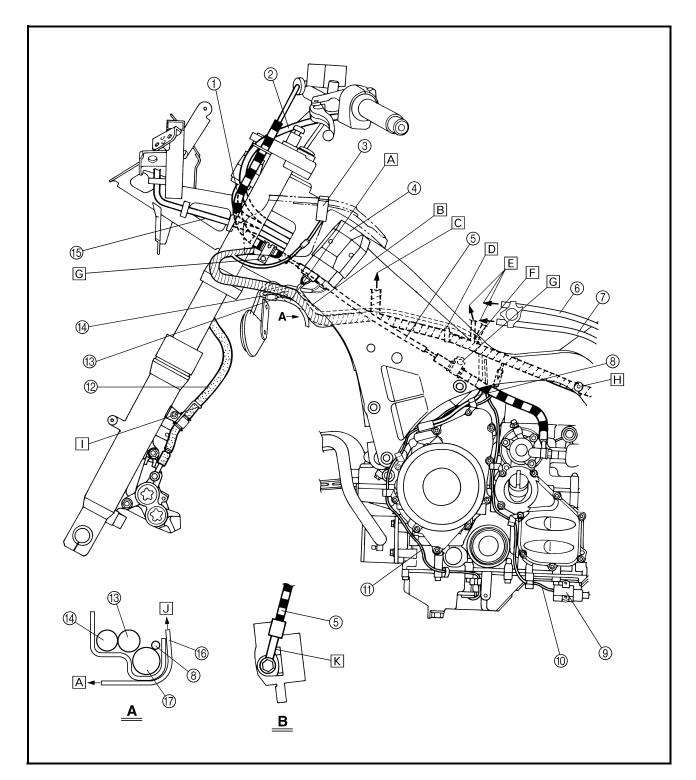
① Tail/brake light lead





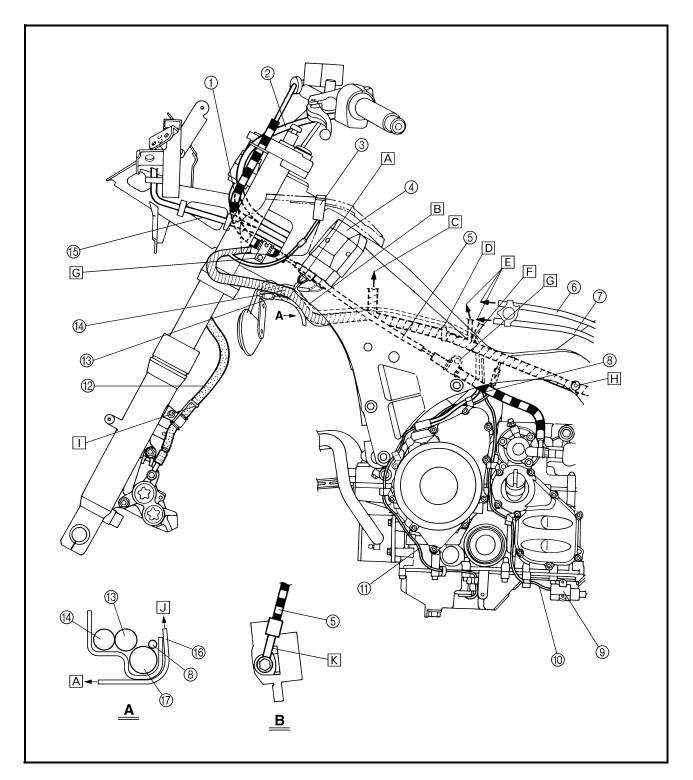
- ① Main switch lead
- ② Left handlebar switch lead
- ③ Hazard switch
- ④ Rectifier/regulator
- (5) Clutch cable
- 6 Fuel tank overflow hose
- ⑦ Fuel tank breather hose
- ⑧ Stator coil lead
- (9) Sidestand switch
- 1 Sidestand switch lead

- (1) Oil level switch lead
- 12 Brake cable
- (3) Coolant reservoir hose
- ( Thermostat assembly breather hose
- (5) Headlight lead
- 16 Radiator fan lead
- 17 Wire harness





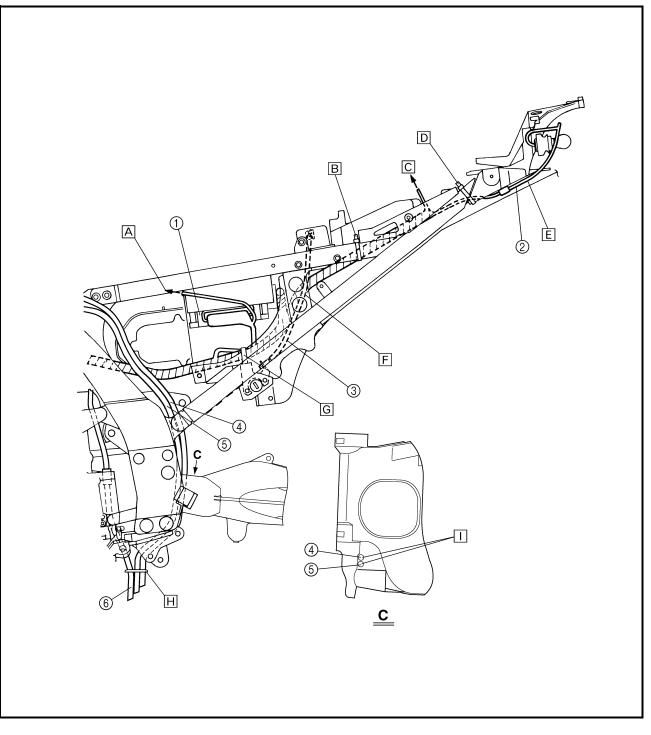
- A To the radiator fan
- B Pass the wire harness, stator coil lead, coolant reservoir hose, and thermostat assembly breather hose through the left slit of the plate.
- C To the right side of the frame
- D Clamp the wire harness with the plastic band attached to the frame.
- E To the fuel tank
- F Pass the stator coil lead at the fork of the wire harness.
- G Attach the clutch cable to the frame using the clutch cable holders.
- $\square$  Insert the harness holder into the hole on the rear end of the frame.
- I Pass the brake cable through the brake cable guide.
- J To the wire harness
- K Contact the clutch cable to the turn stopper.





- 1 ECU
- 2 Tail/brake light lead
- ③ Seat lock cable
- ④ Fuel tank breather hose
- 5 Fuel tank overflow hose
- 6 Air filter case breather hose
- A To the intake air temperature sensor
- B Fasten the wire harness with a plastic band to the frame.
- C To the inside of the U-lock storage box
- Fasten the tail/brake light lead with a plastic band to the frame.

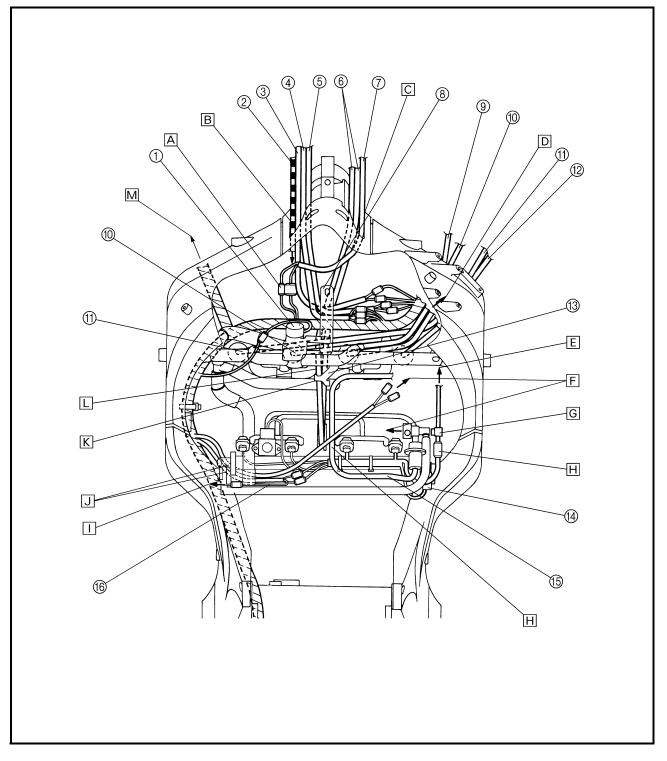
- E Pass the tail/brake light lead between the rear cover and frame.
- F Pass the wire harness on the inside of the seat lock cable.
- G Support the wire harness and ignitor unit lead with the cable holder attached to the tray.
- H Pass the fuel tank breather hose, air filter case breather hose and fuel tank over flow hose through the hose guide.
- ☐ Pass the fuel tank breather hose and fuel tank overflow hose between the swingarm and universal joint.





- 1 Air cut-off valve
- ② Clutch cable
- ③ Left handlebar switch lead
- ④ Headlight lead
- (5) Main switch lead
- 6 Throttle cable
- Right handlebar switch lead
- ⑧ T-bar
- (9) Spark plug lead #3
- 1 Spark plug lead #2

- (1) Spark plug lead #1
- (12) Spark plug lead #4
- (13) Cable guide
- $\underbrace{\overset{\smile}{\textcircled{}}}_{\textcircled{}}$  Throttle position sensor
- (5) Fuel return hose
- (6) Sidestand switch lead

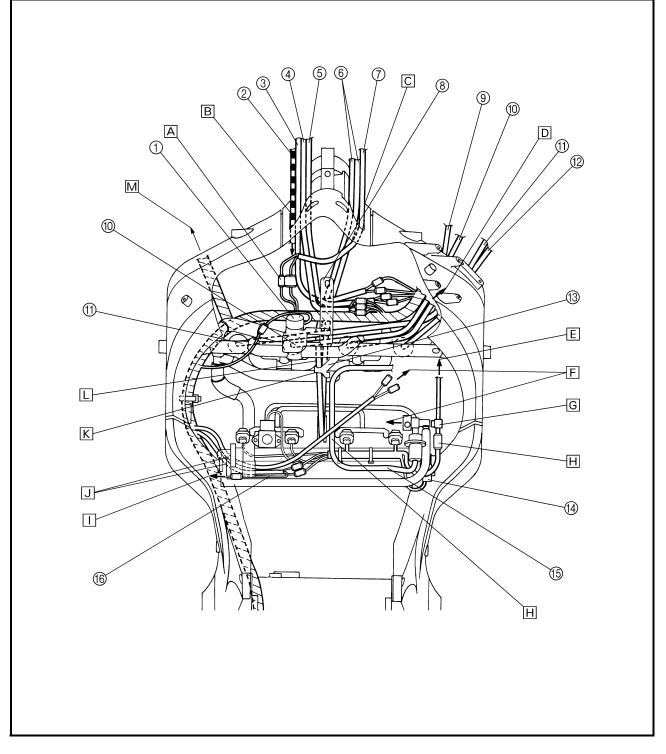


CABLE ROUTING SF



- A Connect the wire harness and right handlebar switch lead.
- B Pass the left handlebar switch lead, main switch lead, headlight lead, and clutch cable through the hole on the left side of the frame.
- C Pass the right handlebar switch lead and throttle cables through the hole on the right side of the frame.
- D To the lower right slit of the plate

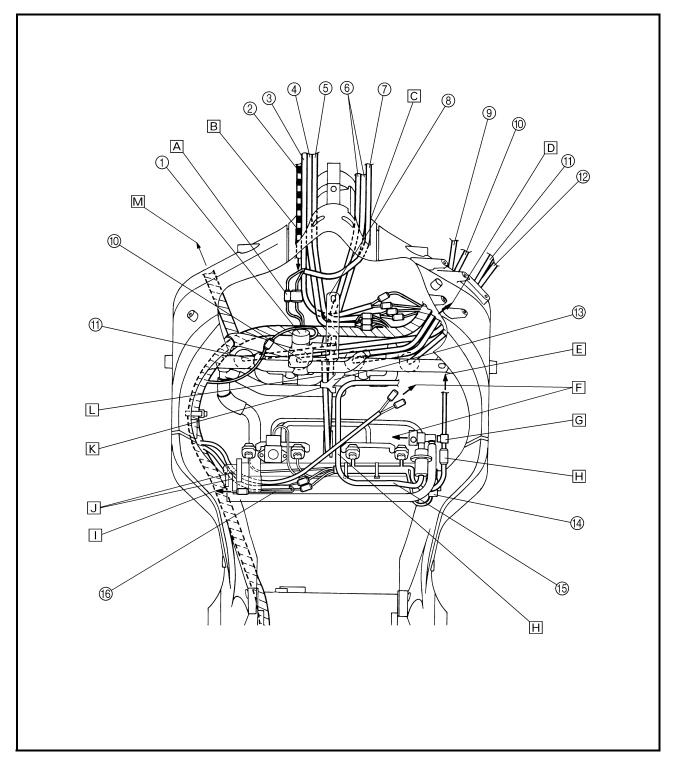
- $\underline{\mathbb{E}}$  To the cylinder identification sensor
- F To the fuel tank
- G Pass the cylinder identification sensor lead through the lead guide of throttle body.
- H Pass the fuel sender lead and fuel pump lead harness over the fuel return hose.
- ☐ To the sidestand switch
- J Pass the cylinder identification sensor lead under the fuel hose and then to the wire harness.





- K Support the throttle cables with the T-bar located behind the cable guide.
- □ Pass the throttle cables under spark plug leads #1, #2, #3, and #4, and the wire harness, headlight lead, main switch lead, right handlebar switch lead, and left handlebar switch lead. Install the thermostat, heat protector, throttle cables, spark plug leads, wire harnesses, and air cut-off valve under the cable guide in the respective order.

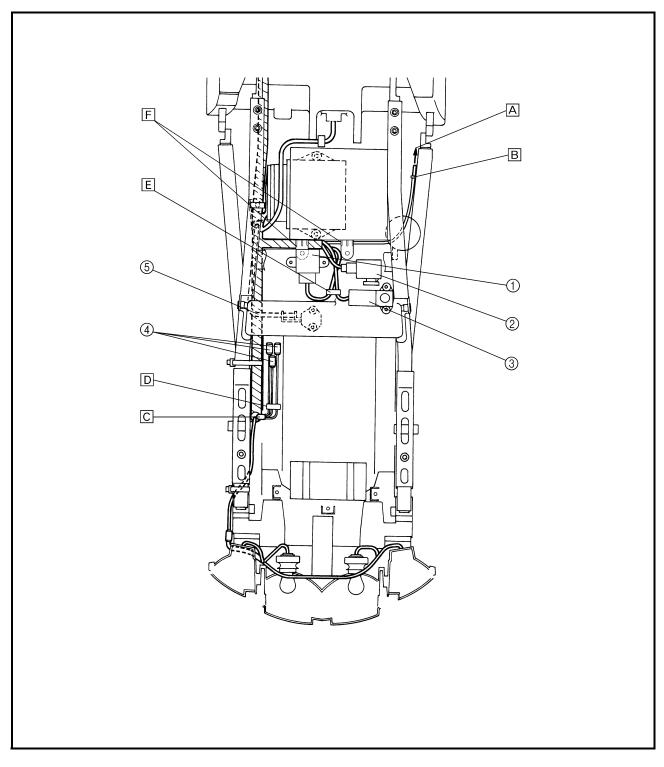
M To the left slit of the plate





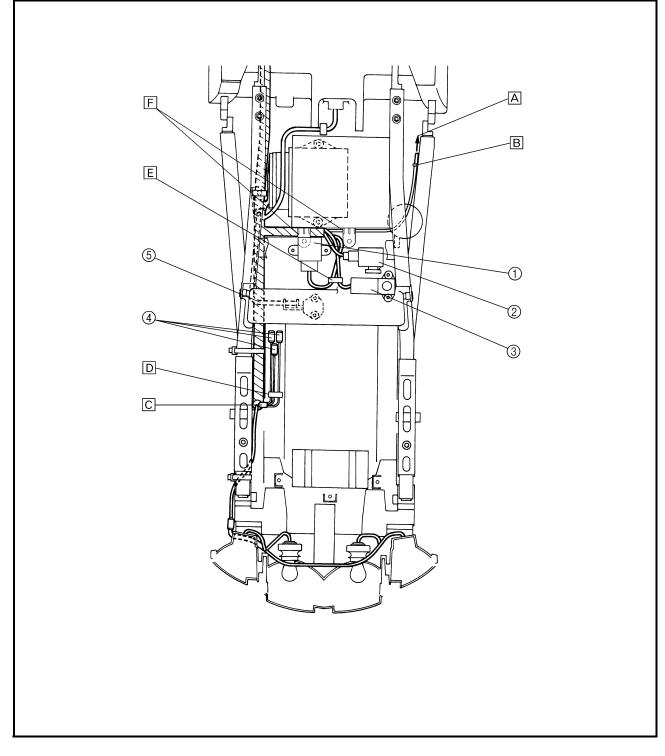
① Engine stop switch

- ② Starting circuit cut-off relay
- ③ Atmospheric pressure sensor
- 4 CYCLELOCK coupler
- 5 Seat lock cable





- A To the rear brake light switch
- B Pass the engine stop switch through the lead guide attached to the frame.
- C Pass the CYCLELOCK coupler through the inside of the storage box of the U-lock.
- D Pass the CYCLELOCK coupler through the lead guide.
- E Pass the pressure sensor lead and engine stop switch lead through the lead guide.
- F Pass the wire harnesses under the tray bracket.

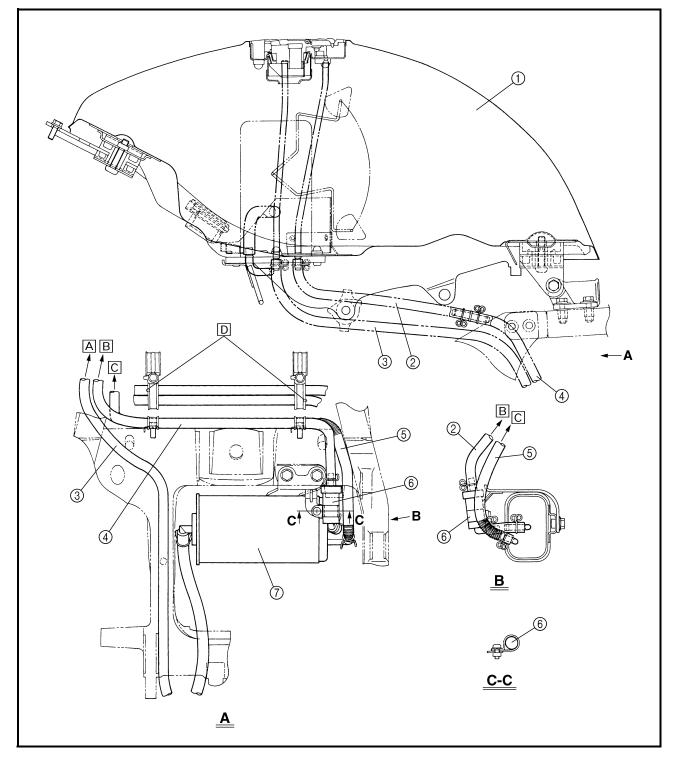




### Canister (California only)

- 1) Fuel tank
- ② Fuel tank breather hose
- ③ Fuel tank overflow hose
- (4) Canister charge hose
- (5) Canister purge hose
- 6 Rollover valve
- ⑦ Canister

- A To the left front of the fuel tank
- B To the left rear of the fuel tank
- C To the throttle bodies
- Align the white paint marks on the canister purge hose and canister charge hose with the outer edges of the hose holders.





#### EAS00036

# PERIODIC CHECKS AND ADJUSTMENTS

# INTRODUCTION

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

# PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

				INITIAL		ODOME	TER RE	DINGS	
N	lo.	ITEM	ROUTINE	600 mi (1,000 km) or 1 month	or	8,000 mi (13,000 km) or 12 months	or	(25,000 km) or	or
1	*	Valve clearance	<ul> <li>Check and adjust valve clearance when engine is cold.</li> </ul>		Ever	y 26,600 r	mi (42,000	) km)	
2	*	Spark plugs	<ul> <li>Check condition.</li> <li>Adjust gap and clean.</li> <li>Replace every 8,000 mi (13,000 km) or 12 months.</li> </ul>		$\checkmark$	Replace.	$\checkmark$	Replace.	
3	*	Crankcase ventila- tion system	<ul><li>Check ventilation hose for cracks or damage.</li><li>Replace if necessary.</li></ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
4	*	Fuel line	<ul> <li>Check fuel hoses and vacuum hose for cracks or damage.</li> <li>Replace if necessary.</li> </ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
5	*	Muffler and exhaust pipe	<ul><li>Check for leakage.</li><li>Tighten if necessary.</li><li>Replace gasket(s) if necessary.</li></ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	
6	*	Electronic fuel injection	Check and adjust engine idle speed and syn- chronization.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
7	*	Evaporative emis- sion control sys- tem (for California only)	<ul><li>Check control system for damage.</li><li>Replace if necessary.</li></ul>				$\checkmark$		
8	*	Air induction sys- tem	<ul> <li>Check the air cut-off valve, reed valve, and hose for damage.</li> <li>Replace any damaged parts if necessary.</li> </ul>						

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

# **GENERAL MAINTENANCE AND LUBRICATION CHART**

Г					INITIAL		ODOM	ETER REA	DINGS	
	No	<b>b</b> .	ITEM	ROUTINE	600 mi (1,000 km) or 1 month	4,000 mi (7,000 km) or 6 months	or	(19,000 km) or	or	20,000 mi (31,000 km) or 30 months
	1		Engine oil	Replace (warm engine before draining). (See NOTE on page 3-3.)	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
:	2	*	Engine oil filter cartridge	<ul> <li>Replace at initial 600 mi (1,000 km) or 1 month, and thereafter every 8,000 mi (13,000 km) or 12 months.</li> </ul>	V		V		$\checkmark$	
	2	*	Air filter element	<ul> <li>Check condition/clean.</li> </ul>		$\checkmark$				$\checkmark$
Ľ	5		An inter element	• Replace.				$\checkmark$		

# **GENERAL MAINTENANCE AND LUBRICATION CHART**



					INITIAL ODOMETER READINGS						
N	<b>D</b> .	ITEM	ROUTINE	600 mi (1,000 km)				16,000 mi (25,000 km)			
				or 1 month	or 6 months	or 12 months	or 18 months	or 24 months	or 30 months		
4	*	Cooling overem	<ul><li>Check hoses for cracks or damage.</li><li>Replace if necessary.</li></ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
4		Cooling system	<ul> <li>Replace with ethylene glycol anti-freeze coolant every 24 months.</li> </ul>					Replace.			
5	*	Brake system	<ul> <li>Check operation, pad wear, and fluid leak- age. (See NOTE on page 3-3.)</li> <li>Correct if necessary.</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
6	*	Clutch	<ul> <li>Check operation and for fluid leakage. (See NOTE on page 3-3.)</li> <li>Correct if necessary.</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
7	*	Control cables	<ul> <li>Apply Yamaha Chain and Cable Lube or engine oil SAE10W-30 (API SE) thoroughly.</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
8	*	Swingarm pivot bearing	<ul> <li>Check bearing assembly for looseness.</li> <li>Moderately repack with lithium-soap-based grease every 16,000 mi (25,000 km) or 24 months.</li> </ul>			$\checkmark$		√ Repack.			
9	*	Rear suspension link pivots	<ul><li>Check operation.</li><li>Correct if necessary.</li></ul>			$\checkmark$		$\checkmark$			
10	*	Shock absorber assembly	<ul><li>Check operation and for oil leakage.</li><li>Replace if necessary.</li></ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
11	*	Front fork	<ul><li>Check operation and for oil leakage.</li><li>Repair if necessary.</li></ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
			Check bearing assembly for looseness.		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
12	*	Steering bearings	<ul> <li>Moderately repack with lithium-soap-based grease every 12,000 mi (19,000 km) or 18 months.</li> </ul>				Repack.				
13		Brake and clutch lever pivot shafts	Apply lithium-soap-based grease lightly.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			
14		Brake and shift pedal pivot shafts	Apply lithium-soap-based grease lightly.		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
4.5		Final waar ail	Check oil level and vehicle for oil leakage.	$\checkmark$		$\checkmark$		$\checkmark$			
15		Final gear oil	• Change.	$\checkmark$				$\checkmark$			
16	*	Wheel bearings	<ul> <li>Check bearings for smooth operation.</li> </ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
17	*	Sidestand pivot	<ul> <li>Check operation.</li> <li>Apply chain lube or lithium-soap-based grease lightly.</li> </ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
18	*	Sidestand switch	<ul> <li>Check and clean or replace if necessary.</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
19	*	Chassis fasteners	<ul><li>Check all chassis fittings and fasteners.</li><li>Correct if necessary.</li></ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			
20	*	Brake hoses	Check for cracks or damage.		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
20		DIAKE NOSES	Replace. (See NOTE on page 3-3.)								
21	*	Wheels	<ul> <li>Check runout and for damage.</li> </ul>		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
22	*	Tires	<ul> <li>Check tread depth and for damage.</li> <li>Replace if necessary.</li> <li>Check air pressure.</li> <li>Correct if necessary.</li> </ul>		V	V		$\checkmark$	$\checkmark$		

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

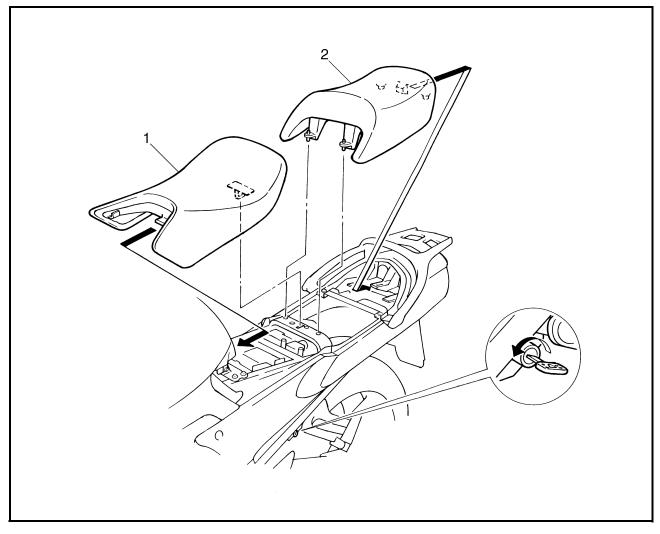


### NOTE:

- From 24,000 mi (37,000 km) or 36 months, repeat the maintenance intervals starting from 4,000 mi (7,000 km) or 6 months.
- Air filter
- The air filter element needs to be replaced more frequently when riding in unusually wet or dusty areas.
- Hydraulic brake and clutch service
- After disassembling the brake or clutch master cylinders, caliper cylinders or clutch release cylinder, always change the fluid. Regularly check the brake and clutch fluid levels and fill the reservoirs as required.
- Every two years replace the internal components of the brake and clutch master cylinders, caliper cylinders and clutch release cylinder, and change the brake and clutch fluid.
- Replace the brake and clutch hoses every four years and if cracked or damaged.
- Engine oil type
- Yamalube 4 (20W-40) or engine oil SAE 20W-40 (API SE) for temperatures of 5 °C (40 °F) or above.



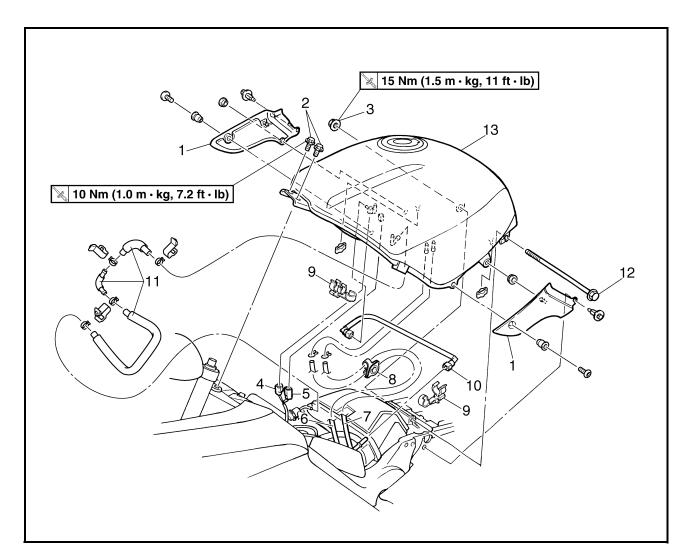
# SEATS AND FUEL TANK SEATS



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



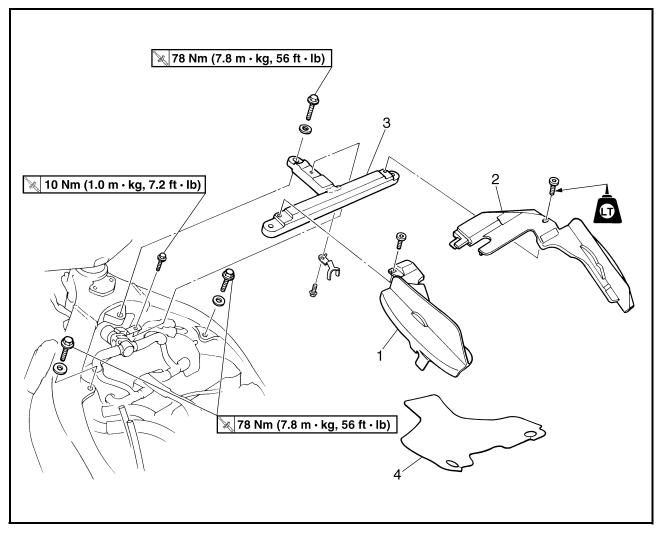
# FUEL TANK



Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank		Remove the parts in the order listed.
	Rider seat		
	Fuel		Drain.
1	Fuel tank side panel (left and right)	1/1	
2	Bolt	2	
3	Nut	1	
4	Fuel sender coupler	1	
5	Fuel pump coupler	1	
6	Fuel tank overflow hose	1	
7	Fuel tank breather hose	1	
8	Hose holder	1	
9	Fuel hose holder	2	
10	Fuel hose	1	Refer to "REMOVING THE FUEL TANK"
11	Fuel return hose	1	and "INSTALLING THE FUEL HOSE".
12	Bolt	1	
13	Fuel tank	1	Refer to "REMOVING THE FUEL TANK".
			For installation, reverse the removal
			procedure.



**T-BAR** 



Order	Job/Part	Q'ty	Remarks
	Removing the T-bar		Remove the parts in the order listed.
	Rider seat/fuel tank		Refer to "SEATS AND FUEL TANK".
1	Left rubber cover	1	
2	Right rubber cover	1	
3	T-bar	1	
4	Rubber sheet	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

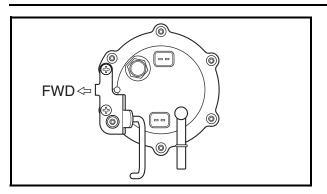
CAUTION:

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



🔌 4 Nm (0.4 m · kg, 2.9 ft · lb)

SEATS AND FUEL TANK



### INSTALLING THE FUEL PUMP

#### 1. Install:

fuel pump

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 crisscross 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.

#### **INSTALLING THE T-BAR**

1. Install:

T-bar

🍾 78 Nm (7.8 m · kg, 56 ft · lb)

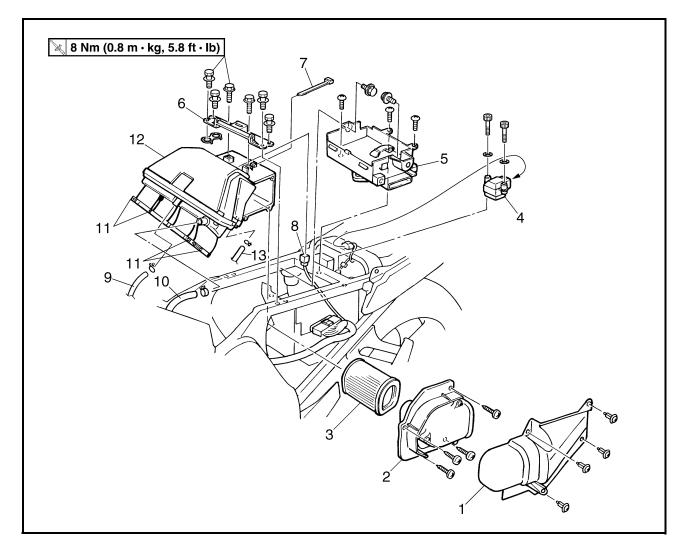
### CAUTION:

Always tighten the T-bar mounting bolts to the specified torque.

**AIR FILTER CASE** 



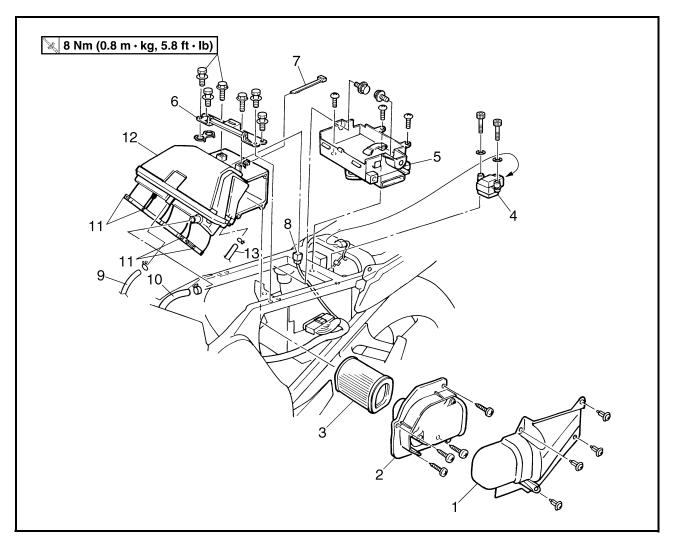
# AIR FILTER CASE



Order	Job/Part	Q'ty	Remarks
	Removing the air filter case		Remove the parts in the order listed.
	Seats/fuel tank		Refer to "SEATS AND FUEL TANK".
	Side covers (left and right)		Refer to "COWLINGS AND COVERS".
1	Air shroud	1	
2	Air filter case cover	1	
3	Air filter element	1	
4	Lean angle cut-off switch	1	
5	Tray	1	
6	Fuel tank bracket	1	
7	Plastic locking tie	1	
8	Intake air temperature sensor coupler	1	
9	Crankcase breather hose	1	Disconnect.

AIR FILTER CASE

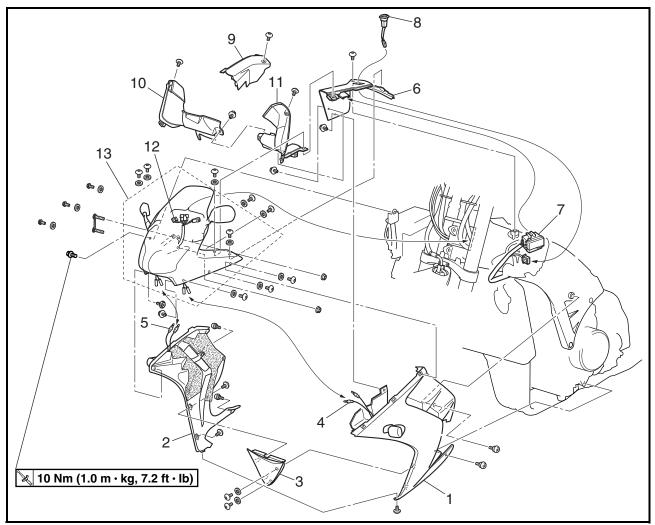




Order	Job/Part	Q'ty	Remarks
10	Air induction system hose 5	1	Disconnect.
11	Clamp screw	4	Loosen.
12	Air filter case	1	
13	Air filter case breather hose	1	
			For installation, reverse the removal
			procedure.

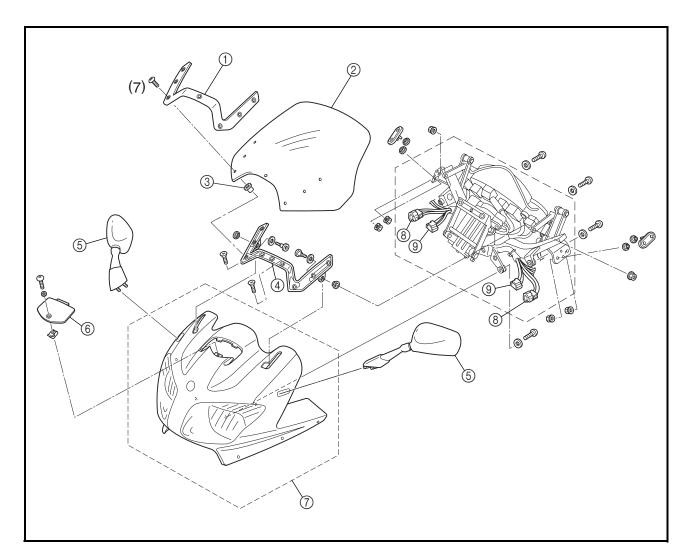


# COWLINGS AND COVERS COWLINGS



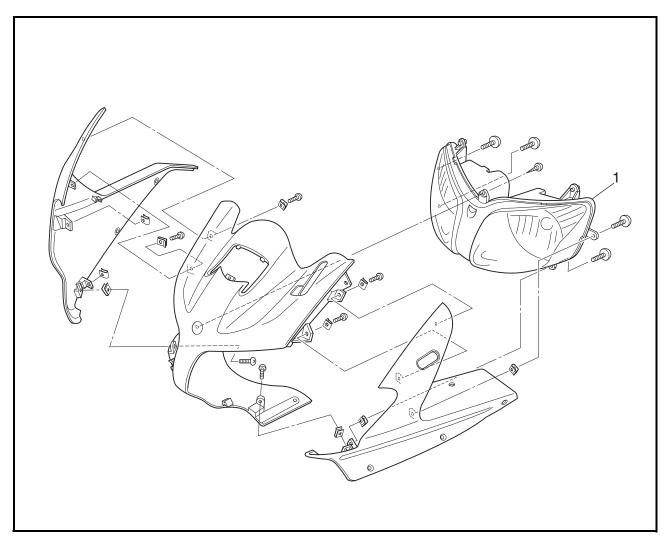
Order	Job/Part	Q'ty	Remarks
	Removing the cowlings		Remove the parts in the order listed.
	Rider seat/fuel tank		Refer to "SEATS AND FUEL TANK".
1	Left side cowling	1	
2	Right side cowling	1	
3	Front bottom cowling	1	
4	Front turn signal connector (left)	2	
5	Front turn signal connector (right)	2	
6	Left inner panel (front cowling)	1	
7	Fuse box	1	
8	Hazard switch	1	
9	Right inner panel (front cowling)	1	
10	Front-right inner panel (front cowling)	1	
11	Front-left inner panel (front cowling)	1	
12	Sub wire harness coupler	3	
13	Front cowling assembly	1	
			For installation, reverse the removal
			procedure.





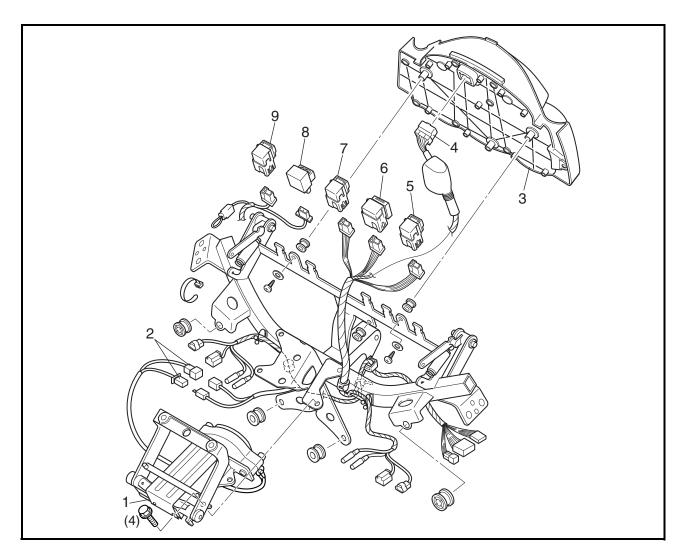
Order	Job/Part	Q'ty	Remarks
	Disassembling the front cowling		Remove the parts in the order listed.
	assembly		
1	Windshield outer bracket	1	
2	Windshield	1	
3	Grommet	7	
4	Windshield inner bracket	1	
5	Rear view mirror (left and right)	2	
6	Panel	1	
7	Front cowling	1	
8	Auxiliary light coupler	2	
9	Headlight coupler	2	
			For assembly, reverse the disassembly
			procedure.





Order	Job/Part	Q'ty	Remarks
	Removing the headlight assembly		Remove the parts in the order listed.
1	Headlight assembly	1	
			For installation, reverse the removal
			procedure.





Order	Job/Part	Q'ty	Remarks
	Removing the windshield drive unit,		Remove the parts in the order listed.
	meter assembly and relays		
1	Windshield drive unit	1	
2	Windshield drive unit coupler	2	
3	Meter assembly	1	
4	Meter assembly coupler	1	
5	Headlight relay 1	1	
6	Headlight relay 2	1	
7	Fuel injection system relay	1	
8	Turn signal relay	1	
9	Radiator fan motor relay	1	
			For installation, reverse the removal
			procedure.



### COVERS

|--|

Order	Job/Part	Q'ty	Remarks
	Removing the covers		Remove the parts in the order listed.
	Seats		Refer to "SEATS AND FUEL TANK".
1	Left side cover	1	
2	Right side cover	1	
3	Rear carrier	1	
4	Rear cover	1	
			For installation, reverse the removal
			procedure.



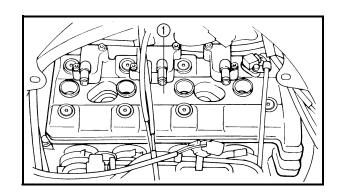
# ENGINE

### ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

### NOTE: .

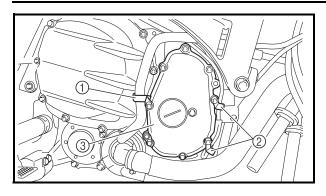
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.
- 1. Remove:
- rider seat
- fuel tank
- T-bar
- rubber sheet Refer to "SEATS AND FUEL TANK".
- side cowlings
- front cowling assembly Refer to "COWLINGS AND COVERS". Refer to "AIR INDUCTION SYSTEM" in chapter 7.
- thermostat assembly Refer to "THERMOSTAT" in chapter 6.
- air cut-off valve assembly
- air induction system hoses

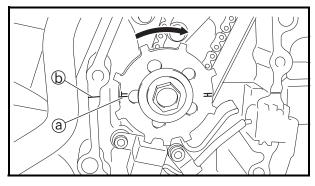


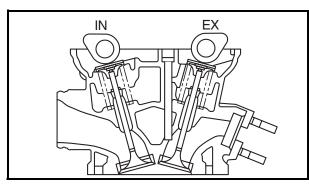
- 2. Remove:
- spark plugs
- cylinder head cover ①
- cylinder head cover gasket

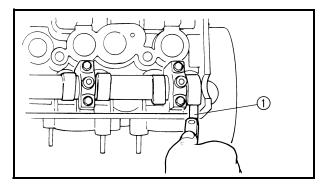
# ADJUSTING THE VALVE CLEARANCE

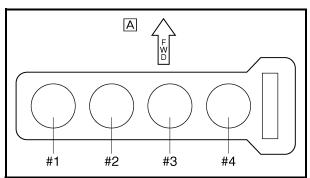






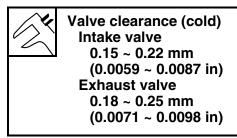






- 3. Remove:
- hose holder 1
- lead holder ②
- pickup coil rotor cover ③

- 4. Measure:
- valve clearance
  - Out of specification  $\rightarrow$  Adjust.



#### \*\*\*\*

- a. Turn the crankshaft clockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "T" mark (a) on the pickup coil rotor with the crankcase mating surface (b).

#### 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.

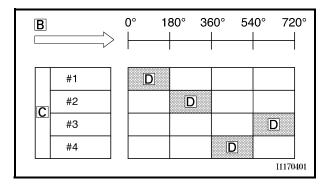
Valve clearance measuring sequence Cylinder #1  $\rightarrow$  #2  $\rightarrow$  #4  $\rightarrow$  #3

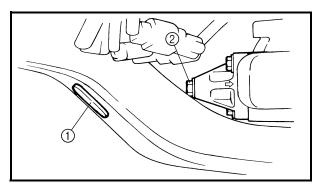
A Front

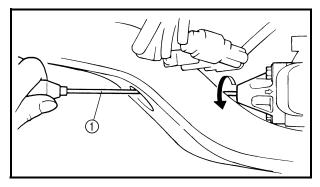
d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.

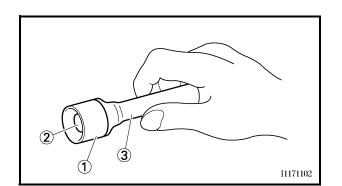
# ADJUSTING THE VALVE CLEARANCE











- B Degrees that the crankshaft is turned counterclockwise
- C Cylinder
- D Combustion cycle

Cylinder #2	180°
Cylinder #4	360°
Cylinder #3	540°

#### \*\*\*\*\*

- 5. Remove:
- rubber plug ①
- timing chain tensioner cap bolt (2)
- gasket

6. Turn the timing chain tensioner rod fully clockwise with a thin screwdriver ①.

#### NOTE: \_

Make sure that the tensioner rod has been fully set clockwise.

- 7. Remove:
- intake camshaft caps
- exhaust camshaft caps
- timing chain (from the camshaft sprockets)
- intake camshaft
- exhaust camshaft

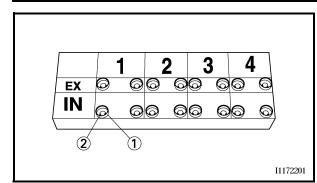
#### NOTE: .

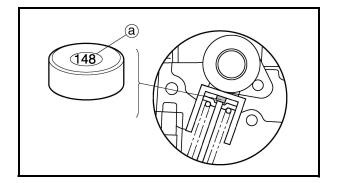
- Refer to "CAMSHAFTS" in chapter 5.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.
- 8. Adjust:
- valve clearance

#### \*\*\*\*

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







### 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 rar		Available valve pads
Nos.	1.20 ~	25 thicknesses in
120 ~ 240	2.40 mm	0.05 mm increments

#### NOTE: \_

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

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

### EXAMPLE:

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

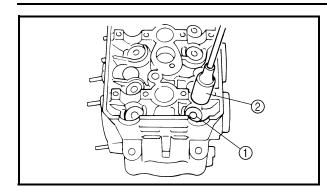
Rounded value = 150

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, 7.2 ft · lb)

#### NOTE: .

- Refer to "INSTALLING THE CAMSHAFTS CAMSHAFTS" in chapter 5.
- Lubricate the camshafts, camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft marks with the camshaft cap marks.
- Turn the crankshaft clockwise several full turns to seat the parts.
- g. Measure the valve clearance again.
- If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

\*\*\*\*\*



### INTAKE

MEASURED										ORIC	AINA	L VA	VE	PAD	NUN	1BEF	{								
CLEARANCE	120 1	125 1	130	135	140	145	150	155										205	210	215	220	225	230	235	240
0.00 ~ 0.04																							215		
0.05 ~ 0.09		1	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	1	120 1	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 ~ 0.22										S	TAN	DAR	D CL	EAR	ANC	E									
0.23 ~ 0.27	125 1	130 1	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.28 ~ 0.32	130 1																								
0.33 ~ 0.37	135 1																					240			
0.38 ~ 0.42						165																			
0.43 ~ 0.47	145 1																			240					
0.48 ~ 0.52	150 1																			ļ					
0.53 ~ 0.57	155 1																								
0.58 ~ 0.62						185											240								
0.63 ~ 0.67						190																			
0.68 ~ 0.72	170 1																								
0.73 ~ 0.77	175 1													240											
0.78 ~ 0.82	180 1																			_					
0.83 ~ 0.87	185 1														VAL	_VE	CLE	EAR	AN	CE (	colo	i):			
0.88 ~ 0.92	190 1											ļ			C	).15	~ 0.	.22 ו	mm	(0.0	059	~ 0	.008	37 ir	ר)
0.93 ~ 0.97	195 2														Exa	mpl	e: Ir	nstal	led	is pa	ad 1	50			-
0.98 ~ 1.02	200 2																			nce i			nm		
1.03 ~ 1.07	205 2							240								0.01									
1.08 ~ 1.12	210 2						240								•					ith r	hoo	160			
1.13 ~ 1.17	215 2																			ith p		100			
1.18 ~ 1.22	220 2				240														•	kam					
1.23 ~ 1.27	225 2			240																		•	059		
1.28 ~ 1.32	230 2		240												F	Pad	No.	160	= 1	.60	mm	(0.0	063	in)	
1.33 ~ 1.37	235 2	240													Alw	ays	inst	all p	ad v	with	nun	nber	r dov	wn.	
1.38 ~ 1.42	240																	· P							

## EXHAUST

MEASURED										ORIC	AINA	L VA	VE	PAD	NUM	1BEF	}								
CLEARANCE	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	220
0.03 ~ 0.06				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.08 ~ 0.11			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
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	235
0.18 ~ 0.25												DAR													
0.23 ~ 0.30			135																						
0.31 ~ 0.35	130																								
0.36 ~ 0.40			145																				ļ		
0.41 ~ 0.45			150																						
0.46 ~ 0.50			155																						
0.51 ~ 0.55			160																240	J					
0.56 ~ 0.60			165															240							
0.61 ~ 0.65			170																						
0.66 ~ 0.70			175													240	ļ								
0.71 ~ 0.75			180																						
0.76 ~ 0.80			185											240											
0.81 ~ 0.85			190																						
0.86 ~ 0.90			195															EAR							
0.91 ~ 0.95			200									ļ			C	).18	~ 0.	.25 ו	пm	(0.0	071	~ 0	.00	98 iı	n)
0.96 ~ 1.00			205							240					Exa	mpl	e: Ir	nstal	led	is p	ad 1	75			
1.01 ~ 1.05			210						240									d cl					mn	n	
1.06 ~ 1.10			215					240									I3 in							•	
1.11 ~ 1.15			220				240								•			d 17	75 14	vith •	her	195			
1.16 ~ 1.20	215					240																			
1.21 ~ 1.25			230		240													ber	•		• •				
1.26 ~ 1.30	225			240														175							
1.31 ~ 1.35	230		240												F	Pad	No.	185	= 1	.85	mm	(0.0	)73	in)	
1.36 ~ 1.40	235	240													Alw	ays	inst	all p	ad v	with	nun	nbei	r do'	wn.	
1.41 ~ 1.45	240															-									



- 9. Install:
- all removed parts

### NOTE: \_

For installation, reverse the removal procedure.

# SYNCHRONIZING THE THROTTLE BODIES

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.

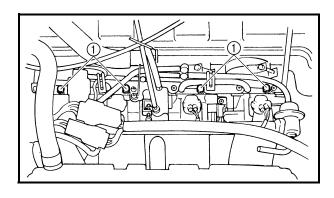
# NOTE: \_

Place the motorcycle on a suitable stand.

- 2. Remove:
- rider seat
- fuel tank
- T-bar Refer to "SEATS AND FUEL TANK".
- 3. Remove:
- caps (1)
- 4. Install:
- carburetor synchronizer (onto the pipes)
- inductive tachometer (onto the spark plug lead of cylinder #1)

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

- 5. Install:
- fuel tank Refer to "SEATS AND FUEL TANK".
- 6. Start the engine and let it warm up for several minutes.



SYNCHRONIZING THE THROTTLE BODIES



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

Engine idling speed 1,000 ~ 1,100 r/min

- 8. Adjust:
- throttle body synchronization

#### \*\*\*\*\*

a. With throttle body #3 as standard, adjust throttle bodies #1, #2, and #4 using the air screw 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 to adjust the throttle body synchronization.



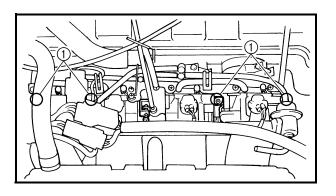
<sup>(250</sup> mm Hg, 9.8 in Hg)

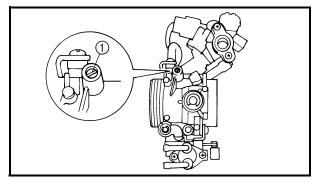
### NOTE: \_

The difference in vacuum pressure between two throttle bodies should not exceed 1.33 kPa (10 mm Hg, 0.39 in Hg).

#### \*\*\*\*\*

- 9. Measure:
- engine idling speed Out of specification → Adjust.
   Make sure that the vacuum pressure is within specification.
- 10.Stop the engine and remove the measuring equipment.





SYNCHRONIZING THE THROTTLE BODIES



- 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 (0.12 ~ 0.20 in)

- 12.Remove:
- engine tachometer
- vacuum gauge

13.Remove:

fuel tank

- 14.Install:
- T-bar

15.Install:

- fuel tank
- rider seat

Refer to "SEATS AND FUEL TANK".

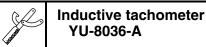


# ADJUSTING THE ENGINE IDLING SPEED

#### 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. Remove:
- fuel tank side panels (left and right)
- fuel tank front mounting bolts
- 3. Lift up the front of the fuel tank.
- 4. Attach:
- inductive tachometer (onto the spark plug lead of cylinder #1)



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

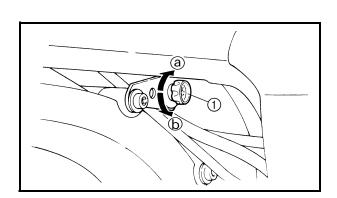
Engine idling speed 1,000 ~ 1,100 r/min

- 6. Adjust:
- engine idling speed

#### \*\*\*\*\*

a. Turn the throttle stop screw ① in direction
③ or ⑤ until the specified engine idling speed is obtained.

Direction ⓐ	Engine idling speed is increased.
Direction (b)	Engine idling speed is decreased.



\*\*\*\*

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



- 7. 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 (0.12 ~ 0.20 in)

- 8. Install:
- fuel tank front mounting bolts
- fuel tank side panels (left and right) Refer to "SEATS AND FUEL TANK".

EAS00055

# ADJUSTING THE THROTTLE CABLE FREE PLAY

#### NOTE: \_

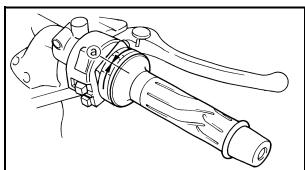
Prior to adjusting the throttle cable free play, the engine idling speed and carburetor synchronization should be adjusted properly.

- 1. Check: • throttle cable free play (a)
  - Out of specification  $\rightarrow$  Adjust.

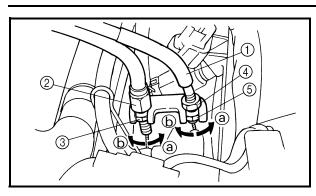


Throttle cable free play (at the flange of the throttle grip) 3 ~ 5 mm (0.12 ~ 0.20 in)

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







- 3. Adjust:
- throttle cable free play

#### NOTE: \_

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

# Throttle body side

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

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

e. Tighten the locknuts.

#### NOTE:

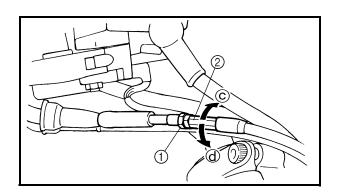
If the specified throttle cable free play cannot be obtained on the throttle body side of the cable, use the adjusting nut on the handlebar side.

### Handlebar side

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

Direction ©	Throttle cable free play is increased.
Direction (d)	Throttle cable free play is decreased.

c. Tighten the locknut.



ADJUSTING THE THROTTLE CABLE FREE PLAY/ CHECKING THE SPARK PLUGS



# A WARNING

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

#### \*\*\*\*\*

- 4. Install:
- fuel tank
- rider seat Refer to "SEATS AND FUEL TANK".

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#### CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

- 1. Remove:
- rider seat
- fuel tank
- T-bar
  - Refer to "SEATS AND FUEL TANK".
- 2. Disconnect:
- spark plug cap
- 3. Remove:

spark plug

#### CAUTION:

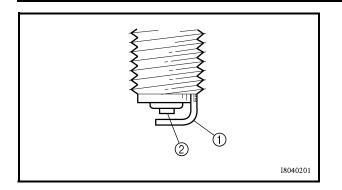
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

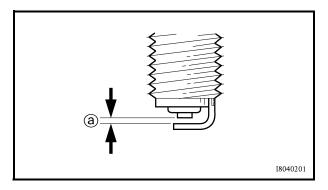
- 4. Check:
- spark plug type Incorrect → Change.

Spark plug type (manufacturer)
 CR8E (NGK)
 U24ESR-N (DENSO)

# CHECKING THE SPARK PLUGS/ CHECKING THE IGNITION TIMING







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

(with a spark plug cleaner or wire brush)

- 7. Measure:
- spark plug gap ⓐ

   (with a wire gauge)
   Out of specification → Regap.



### Spark plug gap

0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

- 8. Install:
- spark plug 🛛 🔌 13 Nm (1.3 m · kg, 9.4 ft · lb)

NOTE:

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

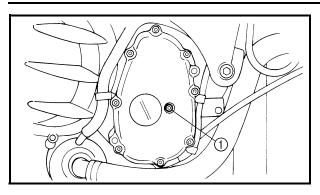
- 9. Connect:
- spark plug cap
- 10.Install:
- T-bar
- fuel tank
- rider seat
  - Refer to "SEATS AND FUEL TANK".

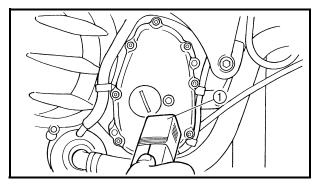
# CHECKING THE IGNITION TIMING NOTE:

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.

# CHECKING THE IGNITION TIMING







- 1. Remove:
- rider seat
- fuel tank
- T-bar Refer to "SEATS AND FUEL TANK".
- right side cowling Refer to "COWLINGS AND COVERS".
- timing mark accessing screw (1)
- 2. Attach:
- timing light ①
- inductive tachometer (onto the spark plug lead of cylinder #1)



# Inductive tachometer

- 3. Install:
- fuel tank
  - Refer to "SEATS AND FUEL TANK".
- 4. Check:
- ignition timing

### \*\*\*\*\*

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



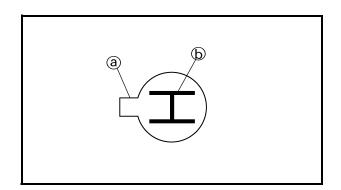
### Engine idling speed 1,000 ~ 1,100 r/min

b. Check that the mark (a) is within the required firing range (b) on the timing plate. Incorrect firing range  $\rightarrow$  Check the ignition system.

### NOTE:

The ignition timing is not adjustable.





### CHECKING THE IGNITION TIMING/ MEASURING THE COMPRESSION PRESSURE



- 5. Remove:
- fuel tank
- engine tachometer
- timing light
- 6. Install:
- timing mark accessing screw
- right side cowling Refer to "COWLINGS AND COVERS".
- T-bar
- fuel tank
- rider seat Refer to "SEATS AND FUEL TANK".

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### MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

### NOTE:

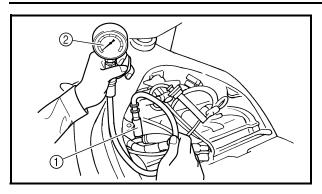
Insufficient compression pressure will result in a loss of performance.

- 1. Measure:
- valve clearance Out of specification → Adjust. Refer to "ADJUSTING THE VALVE CLEARANCE".
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Remove:
- rider seat
- fuel tank
- T-bar
  - Refer to "SEATS AND FUEL TANK".
- 4. Disconnect:
- spark plug cap
- 5. 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.





- 6. Install:
- compression gauge adapter ①
- compression gauge 2

Compression gauge set 14/18 mm YU-33223 Compression gauge adapter 12 mm YU-33223-3

- 7. Install:
- fuel tank
- 8. Measure:
- compression pressure

Out of specification  $\rightarrow$  Refer to steps (c) and (d).

Compression pressure (at sea level) Minimum 1,390 kPa (13.9 kg/cm<sup>2</sup>, 198 psi) Standard 1,600 kPa (16.0 kg/cm<sup>2</sup>, 228 psi) Maximum 1,790 kPa (17.9 kg/cm<sup>2</sup>, 255 psi)

### 

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

### A WARNING

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

### NOTE: \_

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm<sup>2</sup>, 14.22 psi).

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.

Carbon deposits  $\rightarrow$  Eliminate.

d. If the compression pressure is below the minimum specification, squirt a few drops of oil into the cylinder and measure again.



Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading Diagnosis	
Higher than with- out oil	Piston wear or damage $\rightarrow$ Repair.
Same as without oil	Piston ring(s), valves, cylinder head gasket or pis- ton possibly defec- tive $\rightarrow$ Repair.

### \*\*\*\*\*

🔌 13 Nm (1.3 m · kg, 9.4 ft · lb)

- 9. Remove:
- fuel tank

10.Install:

- spark plug
- 11.Connect:
- spark plug cap
- 12.Install:
- T-bar
- fuel tank
- rider seat

# CHECKING THE ENGINE OIL LEVEL

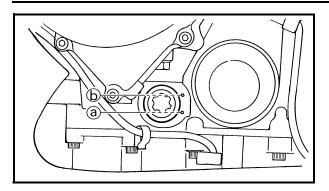
1. Stand the motorcycle on a level surface.

### NOTE:

- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.
- 2. Start the engine, warm it up for several minutes, and then turn it off.

# CHECKING THE ENGINE OIL LEVEL





- 3. Check:
- engine oil level

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

Below the minimum level mark  $\rightarrow$  Add the recommended engine oil to the proper level.

### Record Yam SAE

Recommended oil Yamalube 4 (20W40) or SAE 20W40 type SE motor oil

### CAUTION:

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

### NOTE: \_

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

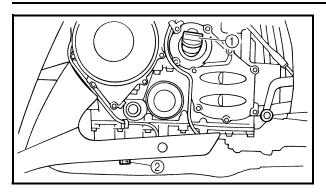
- 4. Start the engine, warm it up for several minutes, and then turn it off.
- 5. Check the engine oil level again.

### NOTE:

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

# CHANGING THE ENGINE OIL

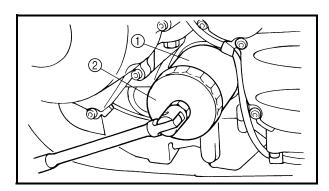


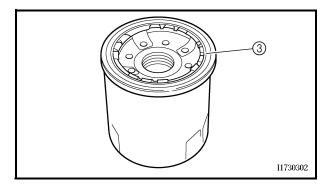


# CHANGING THE ENGINE OIL

- 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 ②

   (along with the gasket)
- 4. Drain:
- engine oil (completely from the crankcase)





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

### \*\*\*\*

- a. Remove the left side cowling. Refer to "COWLINGS AND COVERS".
- b. Remove the oil filter cartridge ① with an oil filter wrench ②.



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

### CAUTION

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

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



Oil filter cartridge 17 Nm (1.7 m · kg, 12 ft · lb)

e. Install the left side cowling. Refer to "COWLINGS AND COVERS".



# **CHANGING THE ENGINE OIL**

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

```
🔌 43 Nm (4.3 m · kg, 31 ft · lb)
```

- 8. Fill:
- crankcase

(with the specified amount of the recommended engine oil)

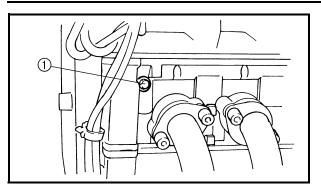
Υγ	Quantity Total amount
	4.9 L (4.31 Imp qt, 5.18 US qt)
	Without oil filter cartridge
	replacement
	3.8 L (3.34 Imp qt, 4.02 US qt)
	With oil filter cartridge replace-
	ment
	4.0 L (3.52 Imp qt, 4.23 US qt)

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".

# CHANGING THE ENGINE OIL/ MEASURING THE ENGINE OIL PRESSURE





- 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 cartridge and the oil pump for damage or leakage. Refer to "OIL PAN AND OIL PUMP" in chapter 5.
- 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 20 Nm (2.0 m · kg, 14 ft · lb)

\*\*\*\*\*

### MEASURING THE ENGINE OIL PRESSURE

- 1. Check:
- engine oil level Below the minimum level mark → Add the recommended engine oil to the proper level.
- 2. Remove:
- side cowlings
- 3. Start the engine, warm it up for several minutes, and then turn it off.

### CAUTION

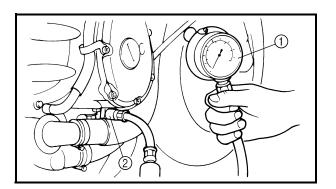
When the engine is cold, the engine oil will have a higher viscosity, causing the engine oil pressure to increase. Therefore, be sure to measure the engine oil pressure after warming up the engine.



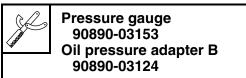
- 4. Remove:
- main gallery bolt

### A WARNING

The engine, muffler and engine oil are extremely hot.



- 5. Install:
- $\bullet$  pressure gauge (1)
- oil pressure adapter B ②



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

73 °C (163 °F)	(Jet	Engine oil pressure 30 kPa (0.30 kg/cm <sup>2</sup> , 4.27 psi) Engine speed Approx. 1,000 ~ 1,100 r/min Engine oil temperature
		Engine oil temperature

Out of specification  $\rightarrow$  Adjust.

Engine oil pressure	Possible causes
Below specifica- tion	<ul> <li>Faulty oil pump</li> <li>Clogged oil filter</li> <li>Leaking oil passage</li> <li>Broken or damaged oil seal</li> </ul>
Above specifica- tion	<ul> <li>Leaking oil passage</li> <li>Faulty oil filter</li> <li>Oil viscosity too high</li> </ul>

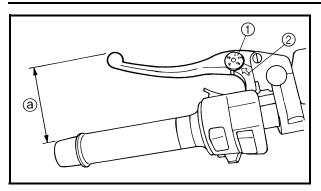
- 7. Install:
  - main gallery bolt



Main gallery bolt 12 Nm (1.2 m · kg, 8.7 ft · lb)

# ADJUSTING THE CLUTCH LEVER/ CHECKING THE CLUTCH FLUID LEVEL





# ADJUSTING THE CLUTCH LEVER

### 1. Adjust:

 clutch lever position (distance (a) from the handlebar grip to the clutch lever)

### \*\*\*\*

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

### NOTE: .

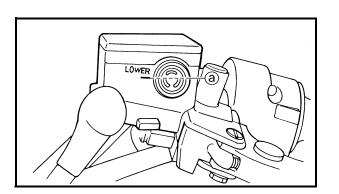
Be sure to align the setting on the adjusting dial with the arrow mark ② on the clutch lever holder.

Position #1	Distance ⓐ is the larg- est.
Position #5	Distance ⓐ is the small- est.

### A WARNING

After adjusting the clutch lever position, make sure the pin on the clutch lever holder is firmly inserted in the hole in the adjusting dial.

### \*\*\*\*\*



### EAS00083

CHECKING THE CLUTCH FLUID LEVEL

1. Stand the motorcycle on a level surface.

### NOTE:

Place the motorcycle on a suitable stand.

- 2. Check:
- clutch fluid level

Below the minimum level mark (a)  $\rightarrow$  Add the recommended clutch fluid to the proper level.



Recommended clutch fluid Brake fluid DOT 4



### A WARNING

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

### CAUTIONE

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.

### NOTE: \_

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

EAS00084

BLEEDING THE HYDRAULIC CLUTCH SYSTEM

### A WARNING

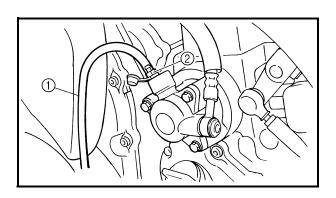
Bleed the hydraulic clutch system whenever:

- the system was disassembled,
- a clutch hose was loosened or removed,
- the clutch fluid level is very low,
- clutch operation is faulty.



### NOTE: .

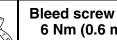
- Be careful not to spill any clutch fluid or allow the clutch master cylinder reservoir to overflow.
- When bleeding the hydraulic clutch system, make sure there is always enough clutch fluid before applying the clutch lever. Ignoring this precaution could allow air to enter the hydraulic clutch system,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



- 1. Bleed:
- hydraulic clutch system

### \*\*\*\*

- a. Add the recommended clutch fluid to the proper level.
- b. Install the clutch master cylinder reservoir diaphragm.
- c. Connect a clear plastic hose ① tightly to the bleed screw ②.
- d. Place the other end of the hose into a container.
- e. Slowly squeeze the clutch lever several times.
- f. Fully squeeze the clutch lever without releasing it.
- g. Loosen the bleed screw.This will release the tension and cause the clutch lever to contact the handlebar grip.
- h. Tighten the bleed screw and then release the clutch lever.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the clutch fluid in the plastic hose.
- j. Tighten the bleed screw to specification.



6 Nm (0.6 m  $\cdot$  kg, 4.3 ft  $\cdot$  lb)

BLEEDING THE HYDRAULIC CLUTCH SYSTEM/ CLEANING THE AIR FILTER ELEMENT

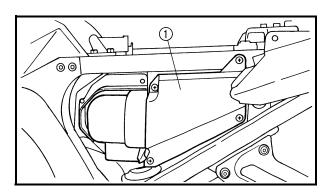


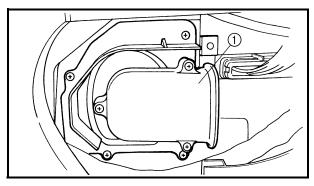
k. Add the recommended clutch fluid to the proper level.
 Refer to "CHECKING THE CLUTCH FLUID LEVEL".

### A WARNING

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

\*\*\*\*\*





# CLEANING THE AIR FILTER ELEMENT

- 1. Remove:
- seats
- Refer to "SEATS AND FUEL TANK". • left side cover Refer to "COWLINGS AND COVERS".
- 2. Remove:
- air shroud ①
- 3. Remove:
- air filter case cover 1
- air filter element

- 4. Clean:
- air filter element Apply compressed air to the outer surface of the air filter element.
- 5. Check:
- air filter element
   Damage → Replace.



- 6. 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 throttle body 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.

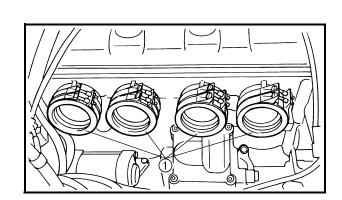
- 7. Install:
- air shroud
- 8. Install:
- left side cover
   Refer to "COWLINGS AND COVERS".
- seats Refer to "SEATS AND FUEL TANK".

EAS00095

### CHECKING THE THROTTLE BODY JOINTS

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

- 1. Remove:
- rider seat
- fuel tank Refer to "SEATS AND FUEL TANK".
- 2. Check:
- throttle body joint ① Cracks/damage → Replace. Refer to "FUEL INJECTION SYSTEM" in chapter 7.
- 3. Install:
- fuel tank
- rider seat Refer to "SEATS AND FUEL TANK".



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



# CHECKING THE FUEL AND VACUUM HOSES

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

1. Remove:

- rider seat
- fuel tank
  - Refer to "SEATS AND FUEL TANK".
- 2. Check:
- vacuum hose
- fuel hose Cracks/damage → Replace. Loose connection → Connect properly.
   Install:
- fuel tank
- rider seat Refer to "SEATS AND FUEL TANK".

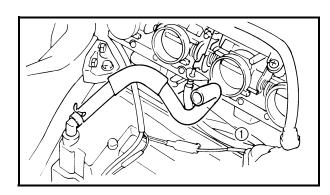
# CHECKING THE CRANKCASE BREATHER HOSE

- 1. Remove:
- rider seat
- fuel tank Refer to "SEATS AND FUEL TANK".
- air filter case Refer to "AIR FILTER CASE".
- 2. Check:
- crankcase breather hose ①
   Cracks/damage → Replace.
   Loose connection → Connect properly.

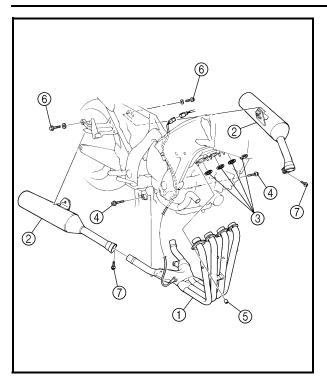
### CAUTION:

# Make sure the crankcase breather hose is routed correctly.

- 3. Install:
- air filter case Refer to "AIR FILTER CASE".
- fuel tank
- rider seat
  - Refer to "SEATS AND FUEL TANK".







# CHECKING THE EXHAUST SYSTEM

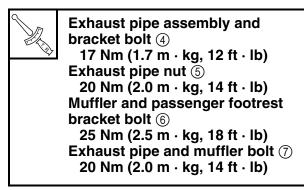
The following procedure applies to all of the exhaust pipes and gaskets.

- 1. Remove:
- side cowlings

Refer to "COWLINGS AND COVERS".

- 2. Check:
- exhaust pipe 1
- muffler (2)
  - $Cracks/damage \rightarrow Replace.$
- gasket ③ Exhaust gas leaks  $\rightarrow$  Replace.

- 3. Check:
- tightening torque



4. Install:

• side cowlings Refer to "COWLINGS AND COVERS".



# 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:
- right side cowling Refer to "COWLINGS AND COVERS".
- 3. Check:
- coolant level

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

Below the minimum level mark  $\rightarrow$  Add the recommended coolant to the proper level.

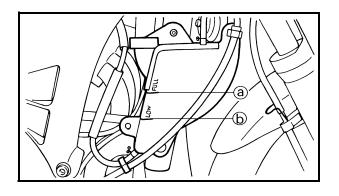
### CAUTION:

- 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:

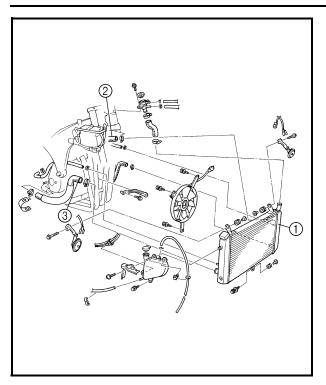
Before checking the coolant level, wait a few minutes until it settles.

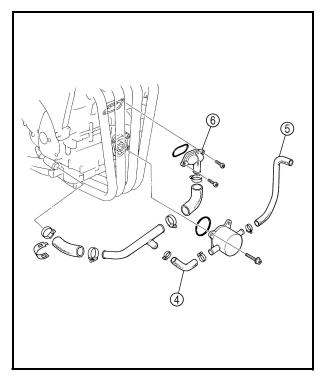
- 6. Install:
- side cowling (right) Refer to "COWLINGS AND COVERS".



# CHECKING THE COOLING SYSTEM





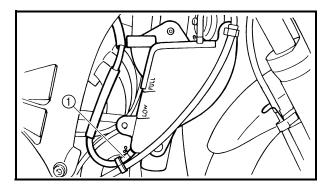


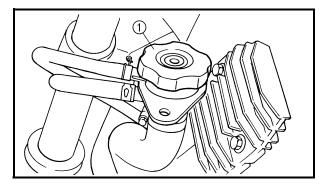
# CHECKING THE COOLING SYSTEM

- 1. Remove:
- rider seat
- fuel tank
  - Refer to "SEATS AND FUEL TANK".
- side cowlings
- front cowling assembly Refer to "COWLINGS AND COVERS".
- 2. Check:
- radiator ①
- radiator inlet hose 2
- radiator outlet hose ③
- oil cooler inlet hose ④
- oil cooler outlet hose (5)
- water jacket joint ⑥
   Cracks/damage → Replace.
   Refer to "COOLING SYSTEM" in chapter 6.
- 3. Install:
- front cowling assembly
- side cowlings Refer to "COWLINGS AND COVERS".
- fuel tank
- rider seat
  - Refer to "SEATS AND FUEL TANK".

# CHANGING THE COOLANT







# CHANGING THE COOLANT

1. Stand the motorcycle on a level surface.

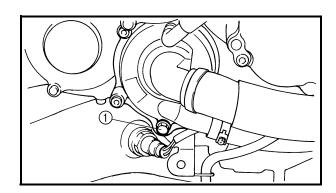
NOTE: .

- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.
- 2. Remove:
- side cowlings
- front cowling assembly Refer to "COWLINGS AND COVERS".
- 3. Disconnect:
- coolant reservoir hose ①
- 4. Drain:
- coolant
  - (from the coolant reservoir)
- 5. Remove:
- radiator cap ①

### A 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.



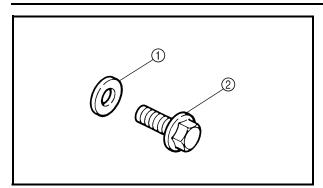
The following procedure applies to all of the coolant drain bolts and copper washers.

- 6. Remove:
- coolant drain bolt ①

   (along with the copper washer)
- 7. Drain:
- coolant (from the engine and radiator)



# **CHANGING THE COOLANT**



- 8. Check:
- copper washer ① (coolant drain bolt ②)
   Damage → Replace.
- 9. Install:
- coolant drain bolt

🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

- 10.Connect:
- coolant reservoir hose
- 11.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 3.2 L (2.82 Imp qt, 3.38 US qt) Coolant reservoir capacity 0.485 L (0.43 Imp qt, 0.51 US qt) From minimum to maximum level mark 0.15 L (0.13 Imp qt, 0.16 US qt)

### Handling notes for coolant

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

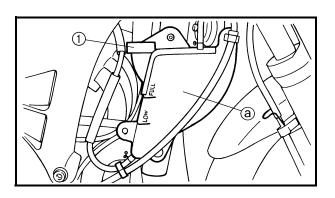
### A WARNING

- 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.



### 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.
- If coolant comes into contact with painted surfaces, immediately wash them with water.
- Do not mix different types of antifreeze.



- 12.Install:
- radiator cap
- 13.Remove:
- coolant reservoir cap cover ①
- coolant reservoir cap
- 14.Fill:
- coolant reservoir (with the recommended coolant to the maximum level mark (a))
- 15.Install:
- · coolant reservoir cap
- coolant reservoir cap cover
- 16.Start the engine, warm it up for several minutes, and then stop it.
- 17.Check:
- coolant level
- Refer to "CHECKING THE COOLANT LEVEL".

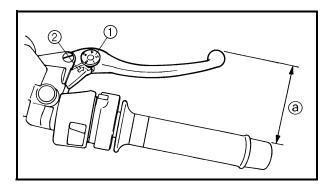
### NOTE: \_

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

18.Install:

- front cowling assembly
- side cowlings Refer to "COWLINGS AND COVERS".





# CHASSIS

### ADJUSTING THE FRONT BRAKE

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

### NOTE:

- While pushing the brake lever forward, turn the adjusting dial ① until the brake lever is in the desired position.
- 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 larg- est.
Position #5	Distance ⓐ is the small- est.

### 

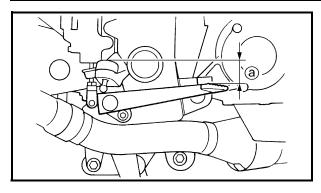
- After adjusting the brake lever position, make sure the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.
- A soft or spongy feeling in the brake system lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed 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.

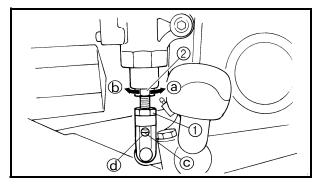
### CAUTION:

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

# ADJUSTING THE REAR BRAKE







# 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) 42 mm (1.65 in)

- 2. Adjust:
- brake pedal position
- a. Loosen the locknut ①.
- b. Turn the adjusting bolt ② in direction ③ or
   ⑤ until the specified brake pedal position is obtained.

Direction (a)	Brake pedal is raised.
Direction (b)	Brake pedal is lowered.

### A WARNING

After adjusting the brake pedal position, check that the end of the adjusting bolt  $\bigcirc$  is visible through the hole  $\bigcirc$ .

c. Tighten the locknut ① to specification.



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

### A 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:

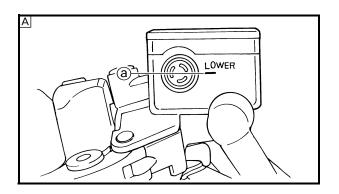
After adjusting the brake pedal position, make sure there is no brake drag.

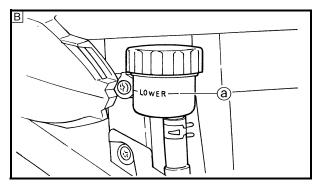
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ADJUSTING THE REAR BRAKE/ CHECKING THE BRAKE FLUID LEVEL



- 3. Adjust:
- rear brake light switch Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH".





# CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

### NOTE:

- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.
- 2. Remove: (rear brake only)
- seats Refer to "SEATS AND FUEL TANK".
   right side source
- right side cover Refer to "COWLINGS AND COVERS".
- 3. Check:
- brake fluid level

Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.



Recommended brake fluid DOT 4

A Front brake

B Rear brake

A 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.

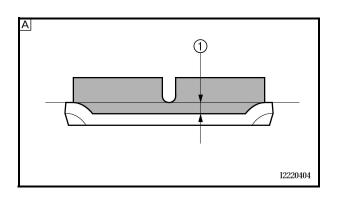


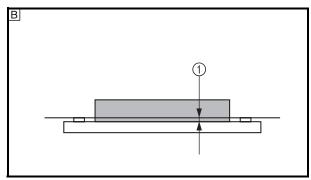
### CAUTION:

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.





# CHECKING THE BRAKE PADS

The following procedure applies to all of the brake pads.

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

Wear indicator (1) almost touch the brake disc  $\rightarrow$  Replace the brake pads as a set. Refer to "FRONT AND REAR BRAKES" in chapter 4.

• rear brake pad

Wear indicator ① almost touch the brake disc  $\rightarrow$  Replace the brake pads as a set. Refer to "FRONT AND REAR BRAKES" in chapter 4.

- A Front brake
- B Rear brake

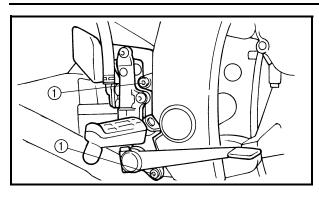
# ADJUSTING THE REAR BRAKE LIGHT SWITCH

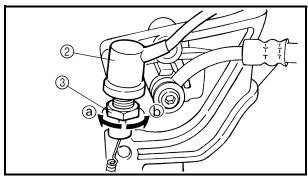
### NOTE: \_

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.

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







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

### \*\*\*\*

- a. Remove the right footrest bracket bolts (1).
- b. Hold the main body ② of the rear brake light switch so that it does not rotate and turn the adjusting nut ③ in direction ③ or ⑤ until the rear brake light comes on at the proper time.

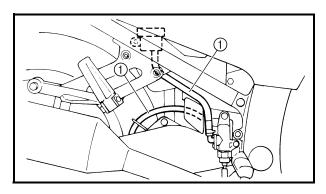
Direction ⓐ	Brake light sooner.	comes	on
Direction (b)	Brake light later.	comes	on

c. Install the right footrest bracket bolts.

Right 28

Right footrest bracket bolt 28 Nm (2.8 m · kg, 20 ft · lb)

. . . . . . . . . . . . . . . . . . . .



### 

### CHECKING THE BRAKE HOSES

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

- 1. Check:
- brake hose (1) Cracks/damage/wear  $\rightarrow$  Replace.
- 2. Check:
- brake hose clamp Loose → Tighten the clamp bolt.
- 3. Hold the motorcycle upright and apply the brake several times.
- 4. Check:
- brake hose

Activate the brake several times.

Brake fluid leakage  $\rightarrow$  Replace the damaged hose.

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



# BLEEDING THE HYDRAULIC BRAKE SYSTEM

### A WARNING

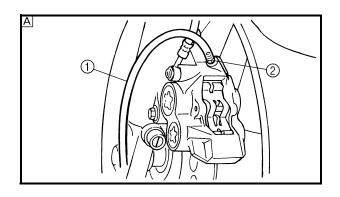
Bleed the hydraulic brake system whenever: the system is disassembled, a brake hose is loosened, disconnected or replaced, the brake fluid level is very low, brake operation is faulty.

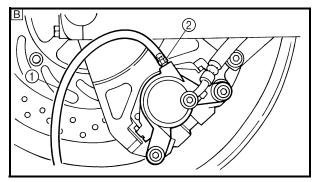
### NOTE: .

- 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. Remove:
- right side cover Refer to "COWLINGS AND COVERS".
- 2. 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 squeeze the brake lever or fully depress the brake pedal and hold it in position.





# BLEEDING THE HYDRAULIC BRAKE SYSTEM/ ADJUSTING THE SHIFT PEDAL



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.



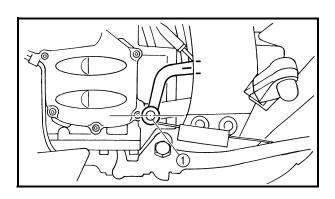
Bleed screw 6 Nm (0.6 m · kg, 4.3 ft · lb)

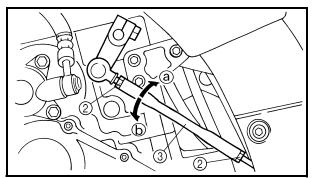
 k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
 Refer to "CHECKING THE BRAKE FLUID LEVEL".

### A WARNING

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

### \*\*\*\*\*





### EAS00136

### ADJUSTING THE SHIFT PEDAL

- 1. Check:
- shift pedal position
   The end ① of the shift pedal with the left middle gear cover bolt.

 $\text{Incorrect} \rightarrow \text{Adjust}.$ 

- 2. Adjust:
- shift pedal position

### \*\*\*\*

- a. Loosen both locknuts 2.
- b. Turn the shift rod ③ in direction ④ or ⓑ to obtain the correct shift pedal position.

Direction (a)	Shift pedal is raised.
Direction (b)	Shift pedal is lowered.

# ADJUSTING THE SHIFT PEDAL/CHECKING THE FINAL DRIVE OIL LEVEL/CHANGING THE FINAL DRIVE OIL

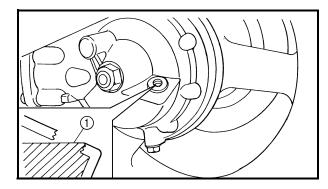


### NOTE: \_

c. Tighten both locknuts.

Make sure that the mark on the shift pedal is between the marks on the frame.

\_\_\_\_\_



### EAS00144 CHECKING THE FINAL DRIVE OIL LEVEL

1. Stand the motorcycle on a level surface.

### NOTE:

- Place the motorcycle on a suitable stand.
- Make sure the motorcycle is upright.
- 2. Remove:
- final drive housing oil filler bolt (1)
- 3. Check:
- final drive oil level The final drive oil level should be to the bot-

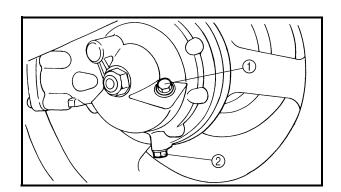
tom brim (1) of the filler hole.

Below the bottom brim  $\rightarrow$  Add the recommended final drive oil to the proper level.

Recommended oil Shaft drive gear oil (Part No.: 9079E-SH001-00)

- 4. Install:
- final drive housing oil filler bolt

🔌 23 Nm (2.3 m · kg, 17 ft · lb)



### EAS00145 CHANGING THE FINAL DRIVE OIL

- 1. Place a container under the final drive housing.
- 2. Remove:
- final drive housing oil filler bolt ①
- final drive housing oil drain bolt (2) Completely drain the final drive housing of its oil.

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



- 3. Check:
- final drive housing oil drain bolt gasket Damage → Replace.
- 4. Install:
- final drive housing oil drain bolt
  - 🔌 23 Nm (2.3 m · kg, 17 ft · lb)
- 5. Fill:
- final drive housing

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



Quantity 0.2 L (0.18 Imp qt, 0.21 US qt)

Refer to "CHECKING THE FINAL DRIVE OIL LEVEL".

# CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the motorcycle on a level surface.

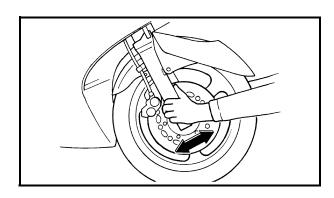
### A WARNING

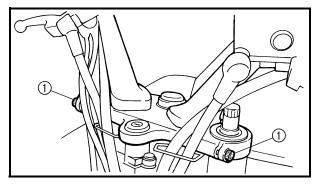
Securely support the motorcycle so that there is no danger of it falling over.

### NOTE: \_

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

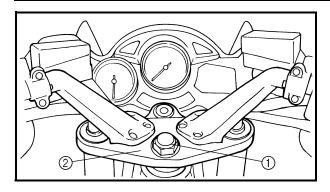
- 2. Check:
- steering head Grasp the bottom of the front fork legs and gently rock the front fork.
   Binding/looseness → Adjust the steering head.
- 3. Loosen:
- upper bracket pinch bolts ①

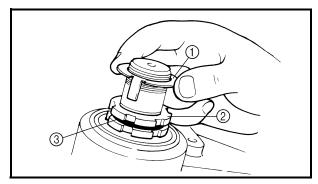


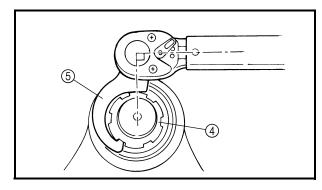


# CHECKING AND ADJUSTING THE STEERING HEAD









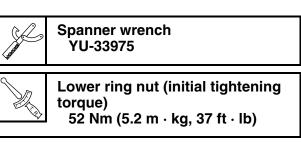
- 4. Remove:
- steering stem nut 1
- washer
- upper bracket ②
   (with the handlebars)
- 5. Adjust:
- · steering head

### \*\*\*\*\*

- a. Remove the lock washer ①, the upper ring nut ②, and the rubber washer ③.
- b. Tighten the lower ring nut ④ with a spanner wrench ⑤.

### NOTE: .

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



c. Loosen the lower ring nut one turn and then tighten it to specification with a steering nut wrench.

### A WARNING

Do not overtighten the lower ring nut.



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

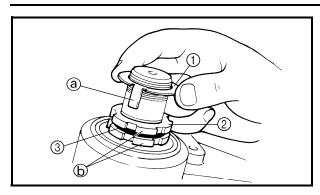
d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings. Refer to "HANDLEBARS" and "STEERING

HEAD" in chapter 4.

- e. Install the rubber washer.
- f. Install the upper ring nut.

# CHECKING AND ADJUSTING THE STEERING HEAD/ CHECKING THE FRONT FORK





- g. Finger tighten the upper ring nut, 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.

### NOTE:

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

### \*\*\*\*\*

- 6. Install:
- upper bracket
  - (with the handlebars)
- washer
- steering stem nut
   115 Nm (11.5 m · kg, 85 ft · lb)
- 7. Tighten:
- upper bracket pinch bolts

🔌 34 Nm (3.4 m ⋅ kg, 24 ft ⋅ lb)

EAS00150

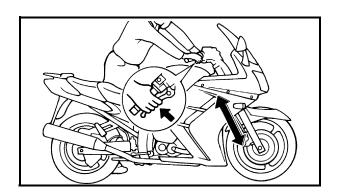
### CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

### A WARNING

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

- 2. Check:
- inner tube Damage/scratches  $\rightarrow$  Replace.
- oil seal
  - $\label{eq:oil_leakage} \mathsf{Oil} \ \mathsf{leakage} \to \mathsf{Replace}.$
- 3. Hold the motorcycle upright and apply the front brake.



- 4. Check:
- front fork operation
  - Push down hard on the handlebars several times and check if the front fork rebounds smoothly.

Rough movement  $\rightarrow$  Repair.

Refer to "FRONT FORK" in chapter 4.



# ADJUSTING THE FRONT FORK LEGS

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

### A 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 ③ or ⑤.

Direction ⓐ	Spring preload is increased (suspension is harder).
Direction (b)	Spring preload is decreased (suspension is softer).
Adjusting posit Minimum: 5 Standard: 3 Maximum: 1	ions

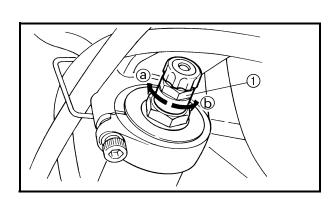
### \*\*\*\*\*

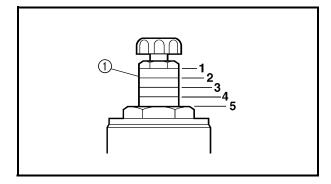
### **Rebound damping**

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

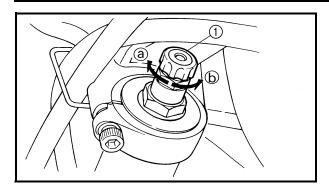
- 1. Adjust:
- rebound damping





# **ADJUSTING THE FRONT FORK LEGS**





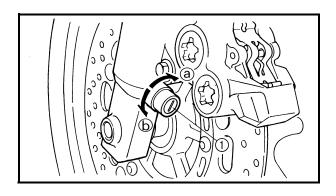
### \*\*\*\*

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

Direction ⓐ	Rebound damping is increased (suspension is harder).
Direction (b)	Rebound damping is decreased (suspension is softer).
Adjusting positions Minimum: 17 clicks out* Standard: 12 clicks out* Maximum: 1 click 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 ③ or ⑤.

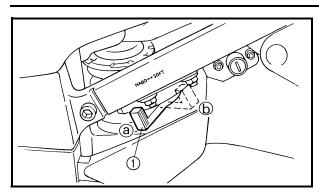
Direction ⓐ	Compression damping is increased (suspension is harder).
Direction (b)	Compression damping is decreased (suspension is softer).
Adjusting positions Minimum: 21 clicks out* Standard: 12 clicks out* Maximum: 1 click out*	

\* from the fully turned-in position

\*\*\*\*\*

# ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY





# ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

### A WARNING

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

### Spring preload

- 1. Adjust:
- spring preload

### \*\*\*\*\*

- a. Move the adjusting lever ① in direction ⓐ or ⑤.
- b. Adjust the adjusting lever to HARD or SOFT.

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

.....

# 

### **Rebound damping**

### CAUTION:

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- rebound damping

### \*\*\*\*

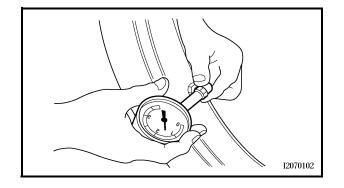
a. Turn the adjusting knob ① in direction ⓐ or ⓑ.

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

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY/CHECKING THE TIRES



Adjusting positions Minimum: 20 clicks out\* Standard: 10 clicks out\* Maximum: 3 clicks out\*



\* from the fully turned-in position (a)

# CHECKING THE TIRES

The following procedure applies to both of the tires.

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

#### A 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	274 kg (604 lb) (USA)			
a full fuel	275 kg (605 lb) (California)			
tank)				
Maximum	202 kg (445 lb	) (USA)		
load*	201 kg (443 lb) (California)			
Cold tire	Front	Rear		
pressure	From	near		
Up to 00 kg	250 kPa	250 kPa		
Up to 90 kg	(2.5 kgf/cm <sup>2</sup> ,	(2.5 kgf/cm <sup>2</sup> ,		
load*	36 psi)	36 psi)		
00 kg movi	250 kPa	290 kPa		
90 kg ~ maxi- mum load*	(2.5 kgf/cm <sup>2</sup> ,	(2.9 kgf/cm <sup>2</sup> ,		
mumioau	36 psi)	42 psi)		
High anod	250 kPa	250 kPa		
High-speed	(2.5 kgf/cm <sup>2</sup> ,	(2.5 kgf/cm <sup>2</sup> ,		
riding	36 psi)	36 psi)		

\* total of cargo, rider, passenger and accesso-



## A 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  $\rightarrow$  Replace the tire.



Minimum tire tread depth 1.0 mm (0.04 in)

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

#### **WARNING**

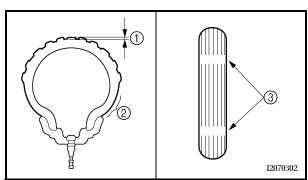
- Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.
- Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel 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.

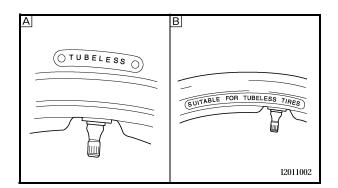
А	Tire
	3.4.0

B Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

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





## CHECKING THE TIRES/ CHECKING THE WHEELS



#### Front tire

Manufacturer	Model	Size
METZELER	MEZ4J	120/70 ZR17 M/C
	FRONT	(58W)
BRIDGESTONE	BT020F	120/70 ZR17 M/C
BRIDGESTONE	Ν	(58W)

**Rear tire** 

Manufacturer	Model	Size
METZELER	MEZ4J	180/55 ZR17 M/C (73W)
BRIDGESTONE	BT020R N	180/55 ZR17 M/C (73W)

## A WARNING

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

#### NOTE: \_\_\_\_

For tires with a direction of rotation mark (4):

- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark (5) with the valve installation point.

# CHECKING THE WHEELS

The following procedure applies to both of the wheels.

- 1. Check:
- wheel

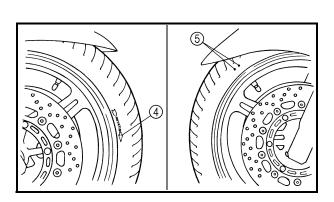
Damage/out-of-round  $\rightarrow$  Replace.

#### A 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.





## CHECKING AND LUBRICATING THE CABLES

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

#### A WARNING

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

- 1. Check:
- cable sheath Damage  $\rightarrow$  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 base grease

# LUBRICATING THE SIDESTAND

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



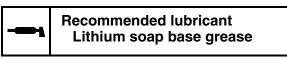
Recommended lubricant Lithium soap base grease

## LUBRICATING THE CENTERSTAND/ LUBRICATING THE REAR SUSPENSION



# LUBRICATING THE CENTERSTAND

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



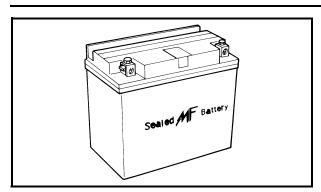
# LUBRICATING THE REAR SUSPENSION

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



Recommended lubricant Lithium soap base grease





## ELECTRICAL SYSTEM CHECKING AND CHARGING THE BATTERY

## A 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.



- right inner panel (front cowling) Refer to "COWLINGS AND COVERS".
- 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. Measure:
- battery charge

#### \*\*\*\*

 Connect a pocket tester to the battery terminals.

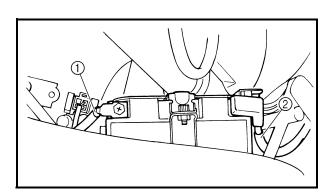
Positive tester probe  $\rightarrow$  positive battery terminal Negative tester probe  $\rightarrow$  negative battery terminal

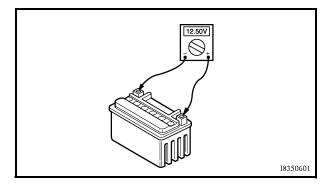
#### NOTE: \_

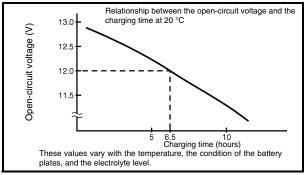
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.
- b. Check the charge of the battery, as shown in the charts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

#### Example

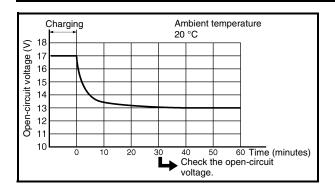
- c. Open-circuit voltage = 12.0 V
- d. Charging time = 6.5 hours
- e. Charge of the battery =  $20 \sim 30\%$

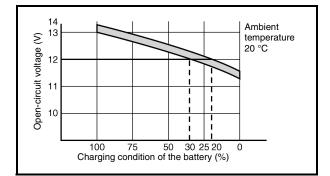












- 5. Charge:
- battery

(refer to the appropriate charging method illustration)

#### A WARNING

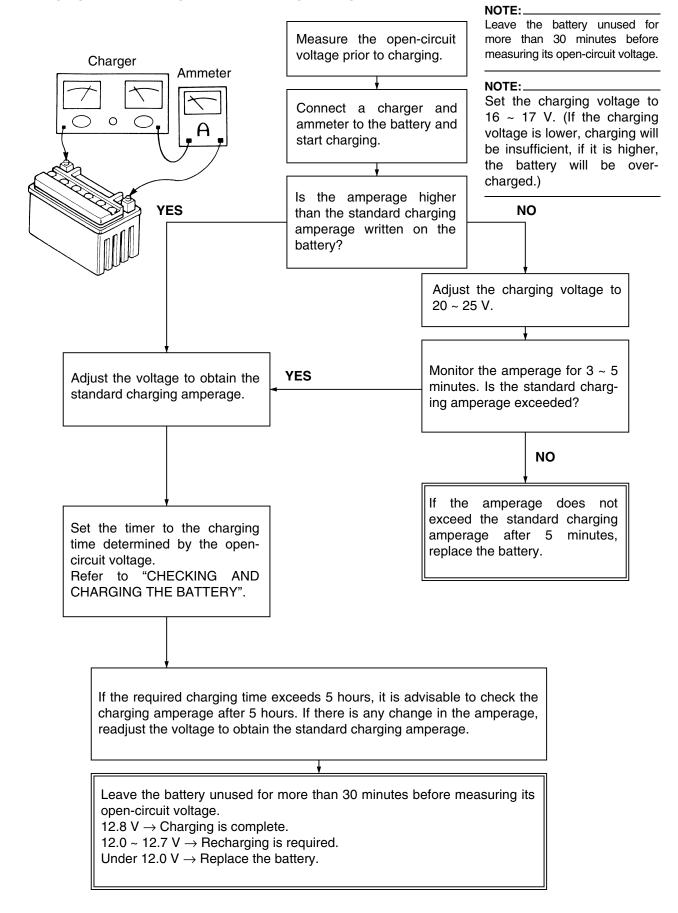
Do not quick charge a battery.

#### 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.



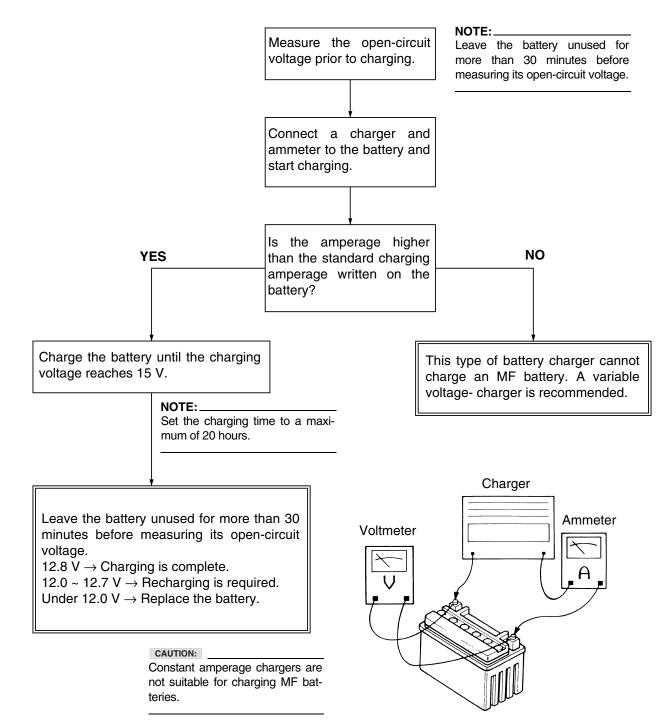
#### Charging method using a variable voltage charger



CHECKING AND CHARGING THE BATTERY

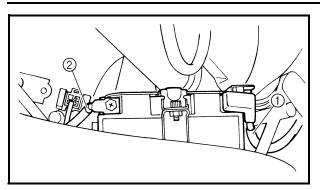


#### Charging method using a constant voltage charger



# CHECKING AND CHARGING THE BATTERY/ CHECKING THE FUSES





- 6. Install:
- battery7. Connect:
- battery leads (to the battery terminals)

CAUTION:

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

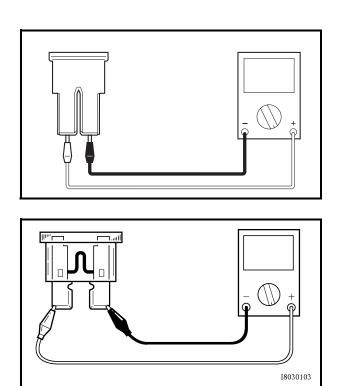
- 8. Check:
- battery terminals
   Dirt → Clean with a wire brush.
   Loose connection → Connect properly.
- 9. Lubricate:
- battery terminals



#### Recommended lubricant Dielectric grease

10.Install:

• right inner panel (front cowling) Refer to "COWLINGS AND COVERS".



# 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:
- right inner panel (front cowling)
- left inner panel (front cowling)
- front-right inner panel (front cowling) Refer to "COWLINGS AND COVERS".
- 2. Check:
- continuity

#### \*\*\*\*

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



#### NOTE: \_

Set the pocket tester selector to " $\Omega \times 1$ ".

## Pocket tester YU-03112

b. If the pocket tester indicates " $\infty$ ", replace the fuse.

\*\*\*\*

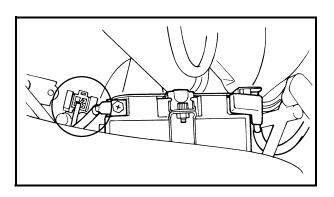
- 3. Replace:
- blown fuse

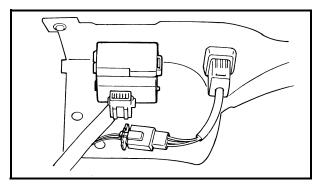
#### \*\*\*\*

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

Items	Amperage rating	Q'ty
Main fuse	50 A	1
Headlight fuse	25 A	1
Radiator fan motor fuse	15 A	1
Signaling system fuse	10 A	1
Fuel injection system fuse	15 A	1
Ignition fuse	10 A	1
Tail/position light fuse	10 A	1
Windshield motor fuse	2 A	1
Hazard lighting fuse	10 A	1
Backup fuse	10 A	1
Reserve fuse	25 A	1
Reserve fuse	15 A	2
Reserve fuse	10 A	1
Reserve fuse	2 A	1

\*\*\*\*\*





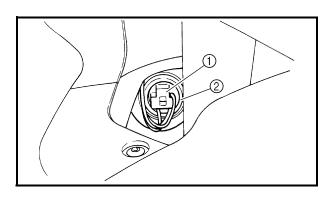
## CHECKING THE FUSES/ REPLACING THE HEADLIGHT BULBS

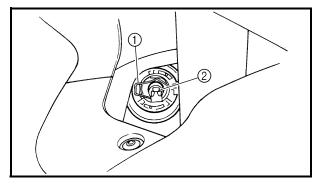


## A WARNING

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:
- front-right inner panel (front cowling)
- right inner panel (front cowling)
- left inner panel (front cowling) Refer to "COWLINGS AND COVERS".





# REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

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

## A WARNING

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

## REPLACING THE HEADLIGHT BULBS/ ADJUSTING THE HEADLIGHT BEAMS

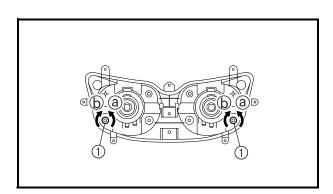


- 5. Install:
- headlight bulb New
  Secure the new headlight bulb with the
  headlight bulb holder.

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



# ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

- 1. Adjust:
- headlight beam (vertically)

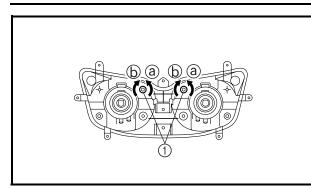
#### \*\*\*\*

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

Direction ⓐ	Headlight beam is raised.
Direction (b)	Headlight beam is low- ered.

\*\*\*\*\*





- 2. Adjust:
- headlight beam (horizontally)

#### \*\*\*\*\*

a. Turn the adjusting screw ① in direction ③ or ⑤.

Left headlight

Direction ⓐ	Headlight beam moves to the right.
Direction (b)	Headlight beam moves to the left.

Right headlight

Direction ⓐ	Headlight beam moves to the right.
Direction (b)	Headlight beam moves to the left.

\*\*\*\*\*

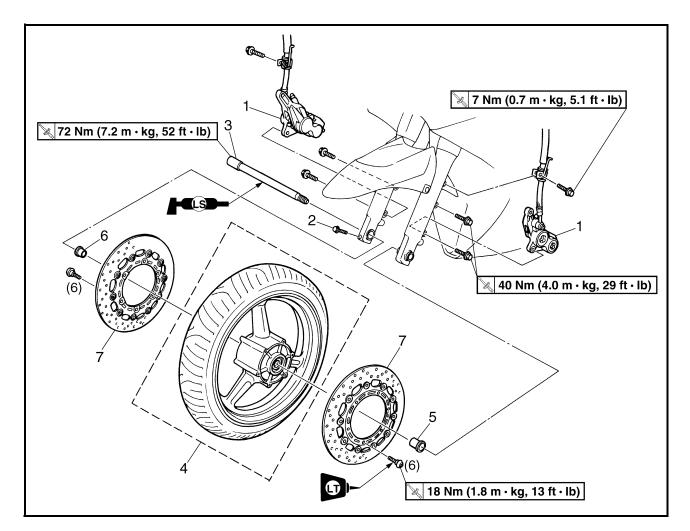




EAS00514

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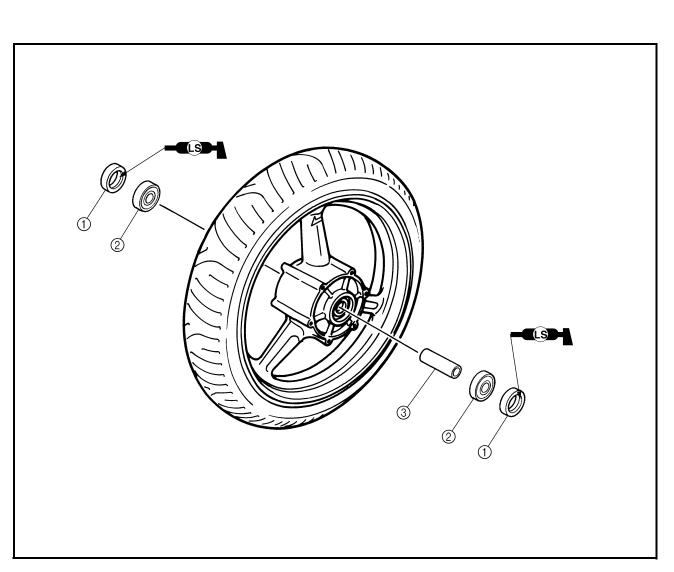
FRONT WHEEL AND BRAKE DISCS



Order	Job/Part	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed.
			<b>NOTE:</b> Place the motorcycle on a suitable stand so that the front wheel is elevated.
1 2 3 4 5 6 7	Brake caliper (left and right) Wheel axle pinch bolt Front wheel axle Front wheel Collar (left) Collar (right) Brake disc (left and right)	2 1 1 1 1 2	Loosen. INSTALLING THE FRONT WHEEL".
			For installation, reverse the removal procedure.

EAS00518

CHAS



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



# REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

#### A 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

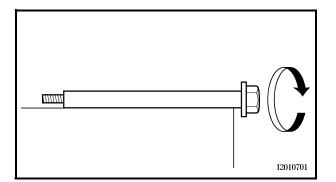
#### NOTE: \_

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

- 3. Elevate:
- front wheel

#### NOTE: \_

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



#### EAS00525

#### CHECKING THE FRONT WHEEL

- 1. Check:
- wheel axle
   Roll the wheel axle on

Roll the wheel axle on a flat surface. Bends  $\rightarrow$  Replace.

#### A WARNING

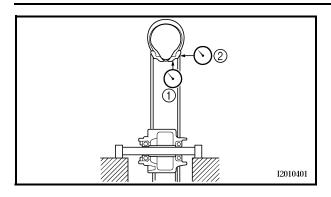
Do not attempt to straighten a bent wheel axle.

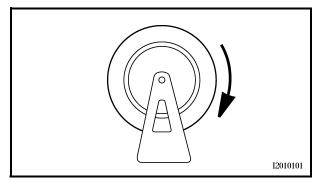
- 2. Check:
- tire

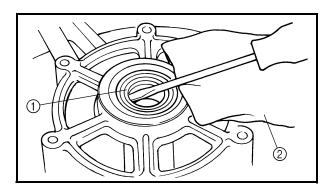
 front wheel Damage/wear → Replace. Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.

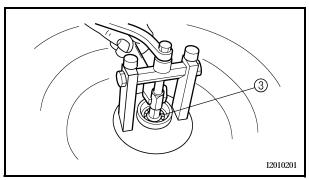
# FRONT WHEEL AND BRAKE DISCS

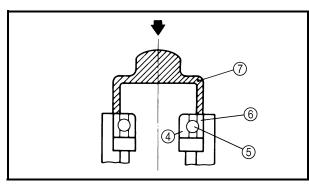












- 3. Measure:
- radial wheel runout (1)
- lateral wheel runout ②
   Over the specified limits → Replace.



Radial wheel runout limit 1.0 mm (0.04 in) Lateral wheel runout limit 0.5 mm (0.02 in)

- 4. Check:
- wheel bearings

Front wheel turns roughly or is loose  $\rightarrow$  Replace the wheel bearings.

- oil seals Damage/wear  $\rightarrow$  Replace.
- 5. Replace:
- wheel bearings New
- oil seals New

#### \*\*\*\*

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

#### NOTE: .

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

- c. Remove the wheel bearings ③ with a general bearing puller.
- d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

#### CAUTION:

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

#### NOTE: \_

Use a socket ⑦ that matches the diameter of the wheel bearing outer race and oil seal.

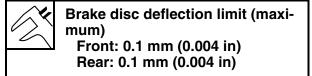


# CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

- 1. Check:
- brake disc
  - $\mathsf{Damage/galling} \to \mathsf{Replace}.$
- 2. Measure:
- brake disc deflection

Out of specification  $\rightarrow$  Correct the brake disc deflection or replace the brake disc.



#### \*\*\*\*

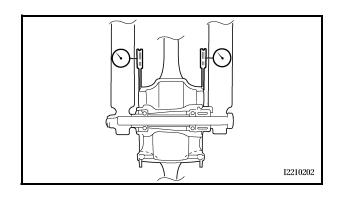
- a. Place the motorcycle on a suitable stand so that the wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebars to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 1.5 mm (0.059 in) below the edge of the brake disc.

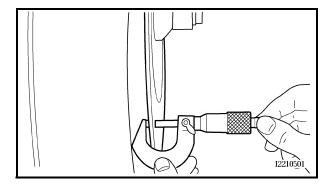
\*\*\*\*

- 3. Measure:
  - brake disc thickness
     Measure the brake disc thickness at a few different locations.

Out of specification  $\rightarrow$  Replace.

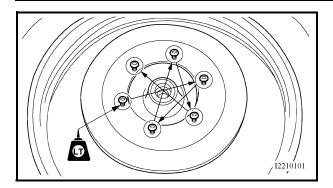






# FRONT WHEEL AND BRAKE DISCS





- 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 18 Nm (1.8 m · kg, 13 ft · lb) 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.

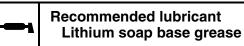
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EAS00545

#### **INSTALLING THE FRONT WHEEL**

The following procedure applies to both brake discs.

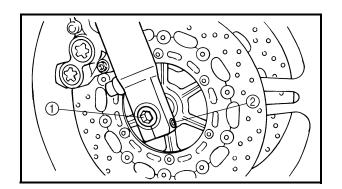
- 1. Lubricate:
- wheel axle
- oil seal lips



- 2. Tighten:
- wheel axle (1) x 72 Nm (7.2 m · kg, 52 ft · lb)
- wheel axle pinch bolt (2)
  - 🍇 23 Nm (2.3 m · kg, 17 ft · lb)

#### CAUTION:

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





- 3. Install:
- brake caliper 3 40 Nm (4.0 m · kg, 29 ft · lb)

#### 

Make sure the brake hose is routed properly.

# EAS00540

#### 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

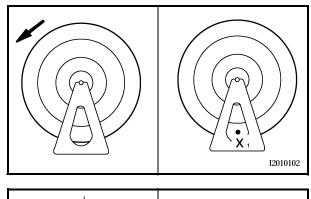
#### NOTE: \_

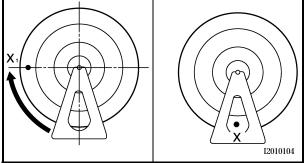
Place the front wheel on a suitable balancing stand.

#### \*\*\*\*\*

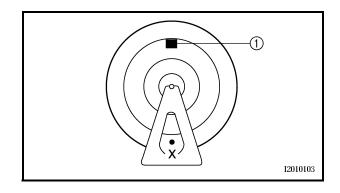
- a. Spin the front wheel.
- b. When the front wheel stops, put an "X" mark at the bottom of the wheel.
- c. Turn the front wheel 90° so that the "X" mark is positioned as shown.
- d. Release the front wheel.
- e. When the wheel stops, put an "X" mark at the bottom of the wheel.
- f. Repeat steps (d) 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".

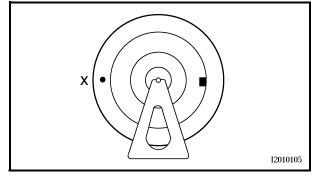
#### \_\_\_\_\_

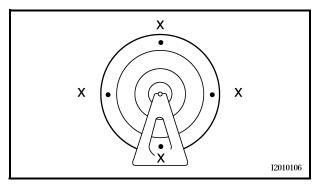












- 3. Adjust:
- front wheel static balance

#### \*\*\*\*

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

#### NOTE: .

Start with the lightest weight.

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

\*\*\*\*\*

- 4. Check:
- front wheel static balance

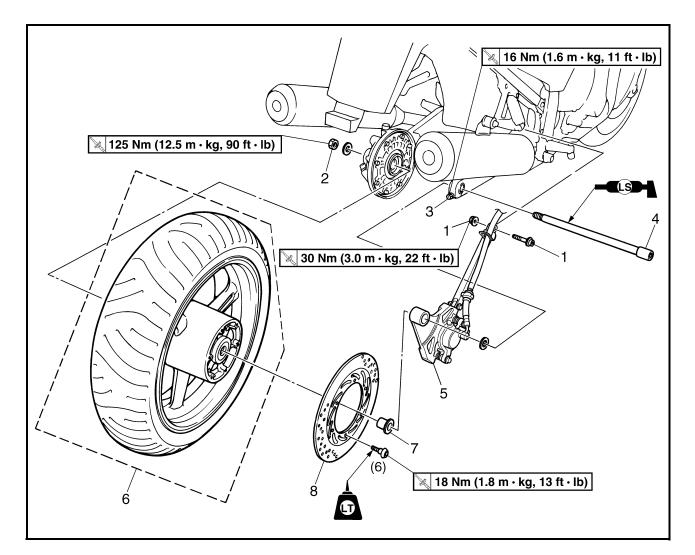
#### \*\*\*\*

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

\*\*\*\*\*



# REAR WHEEL AND BRAKE DISC



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel and brake		Remove the parts in the order listed.
	disc		
			NOTE:
			Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake torque rod nut/bolt	1/1	Refer to "INSTALLING
2	Wheel axle nut	1	THE REAR WHEEL".
3	Wheel axle pinch bolt	1	Loosen.
4	Rear wheel axle	1	
5	Rear brake caliper	1	
6	Rear wheel	1	
7	Collar	1	
8	Brake disc	1	
			For installation, reverse the removal procedure.

3

ØØ

Bearing

12

Order	Job/Part	Q'ty	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed.
1	Dust cover	1	
2	Rear wheel drive hub	1	
3	Dust seal	1	
4	Wheel bearing	2	
5	Rear wheel drive hub damper	6	
6	Oil seal	1	
$\overline{O}$	Circlip	1	
8	Wheel bearing	1	
9	Spacer	1	
10	Collar	1	
1	Oil seal	1	

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procedure.

For assembly, reverse the disassembly



# REMOVING THE REAR WHEEL

1. Stand the motorcycle on a level surface.

#### A 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

#### NOTE:

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

- 3. Remove:
- rear wheel

#### NOTE: \_

Move the rear wheel to the right to separate it from the final drive housing.

EAS00565

#### CHECKING THE REAR WHEEL

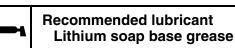
- 1. Check:
- wheel axle
- rear wheel
- wheel bearings
- oil seals Refer to "FRONT WHEEL AND BRAKE DISCS".
- 2. Check:
- tire
- rear wheel Damage/wear → Replace. Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.



- 3. Measure:
- radial wheel runout
- lateral wheel runout Refer to "FRONT WHEEL AND BRAKE DISCS".

#### EEAS00572 INSTALLING THE REAR WHEEL

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



- 2. Tighten:
- brake torque rod nut

🔌 30 Nm (3.0 m · kg, 22 ft · lb)

wheel axle nut

🔌 125 Nm (12.5 m · kg, 90 ft · lb)

wheel axle pinch bolt
 16 Nm (1.6 m · kg, 11 ft · lb)

EAS00575

# ADJUSTING THE REAR WHEEL STATIC BALANCE

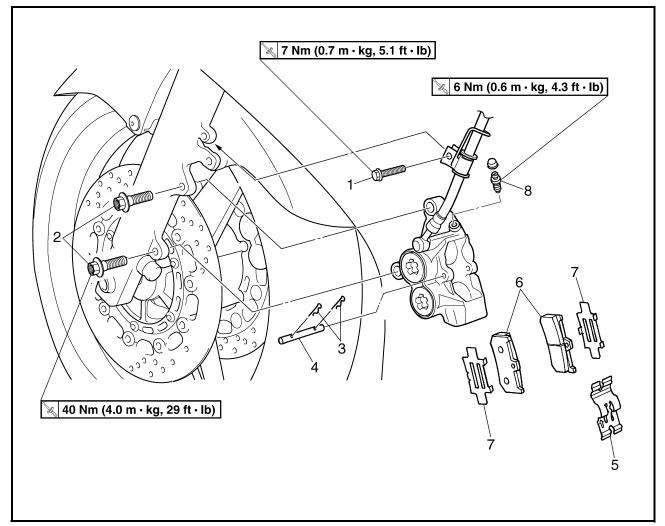
#### NOTE:

- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.
- 1. Adjust:
- rear wheel static balance Refer to "FRONT WHEEL AND BRAKE DISCS".

## FRONT AND REAR BRAKES



# FRONT AND REAR BRAKES FRONT BRAKE PADS

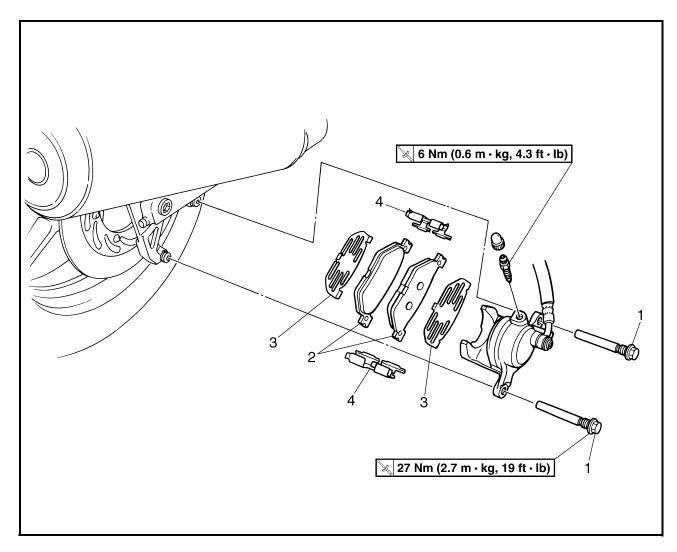


Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed.
			The following procedure applies to both of the front brake calipers.
1	Brake hose holder bolt	1	
2	Brake caliper bolt	2	
3	Brake pad clip	2	
4	Brake pad pin	1	
5	Brake pad spring	1	
6	Brake pad	2	
7	Brake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

FRONT AND REAR BRAKES



# REAR BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
1	Retaining bolt	2	
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.

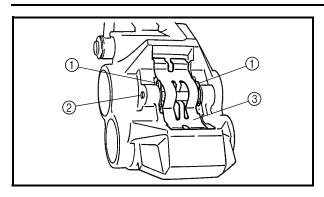
#### NOTE:

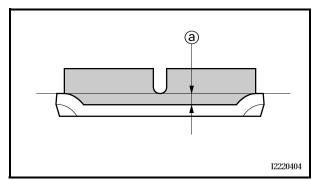
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

- 1. Remove:
- brake hose holder bolt (1)
- brake caliper 2

# FRONT AND REAR BRAKES







- 2. Remove:
- brake pad clips ①
- brake pad pins 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 (0.02 in)

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

#### NOTE: .

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

#### \*\*\*\*\*

- 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.



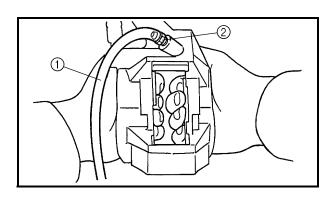
Bleed screw 6 Nm (0.6 m  $\cdot$  kg, 4.3 ft  $\cdot$  lb)

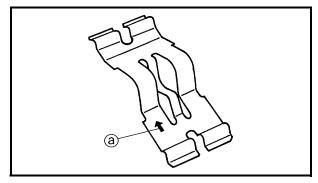
- d. Install a new brake pad shim onto the new brake pads.
- e. Install new brake pads and a new brake pad spring.

#### NOTE:

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

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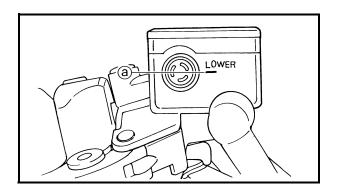


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## FRONT AND REAR BRAKES

- 5. Install:
- brake pad pins
- brake pad clips
- brake caliper 🔌 40 Nm (4.0 m · kg, 29 ft · lb)
- brake hose holder

🍾 7 Nm (0.7 m · kg, 5.1 ft · lb)



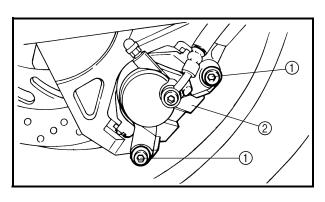
- 6. Check:
- brake fluid level

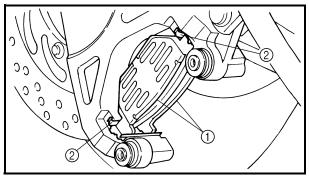
Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.

Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 7. Check:
- brake lever operation
   Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.





# REPLACING THE REAR BRAKE PADS

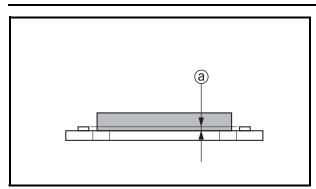
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

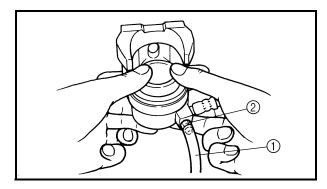
- 1. Remove:
- retaining bolts (1)
- brake caliper ②
- 2. Remove:
- brake pads ①

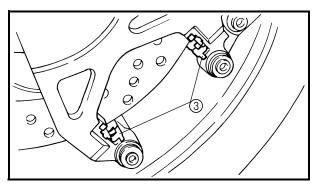
   (along with the brake pad shims)
- brake pad springs (2)

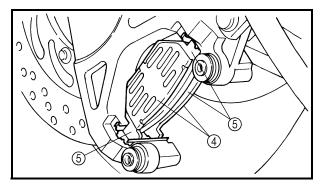
# FRONT AND REAR BRAKES



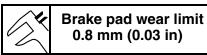








- 3. Measure:
  - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.



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

#### 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 piston into the brake caliper with your finger.
- c. Tighten the bleed screw.



Bleed screw 6 Nm (0.6 m  $\cdot$  kg, 4.3 ft  $\cdot$  lb)

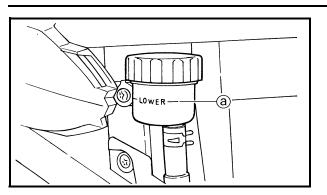
- d. Install new brake pad springs ③.
- e. Install a new brake pad shim ④ onto each new brake pad ⑤.
- f. Install new brake pads.

#### \*\*\*\*\*

- 5. Install:
- retaining bolts

🍇 26 Nm (2.6 m · kg, 19 ft · lb)





- 6. Check:
- brake fluid level

Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.

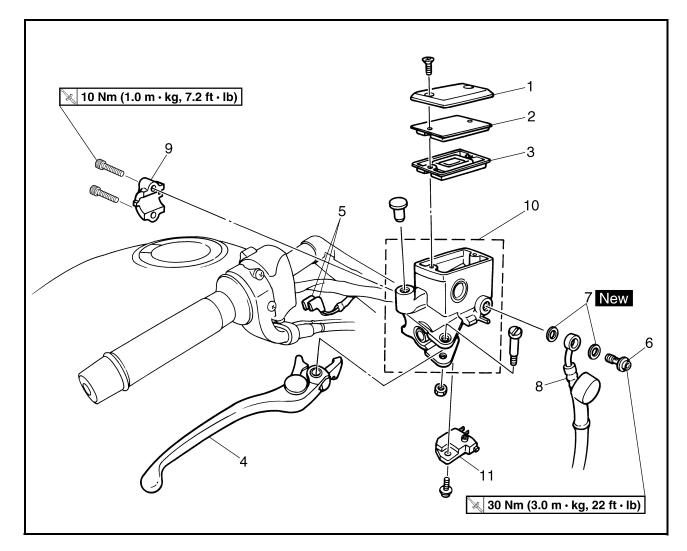
Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 7. Check:
- brake pedal operation
   Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

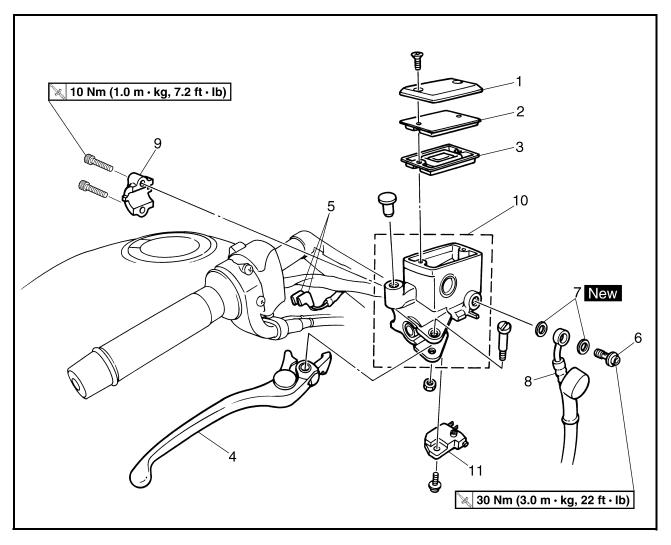


# FRONT BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	Removing the front brake master		Remove the parts in the order listed.
	cylinder		
	Brake fluid		Drain.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir dia-	1	
	phragm holder		
3	Brake master cylinder reservoir dia-	1	
	phragm		
4	Brake lever	1	
5	Front brake light switch connector	2	Disconnect.

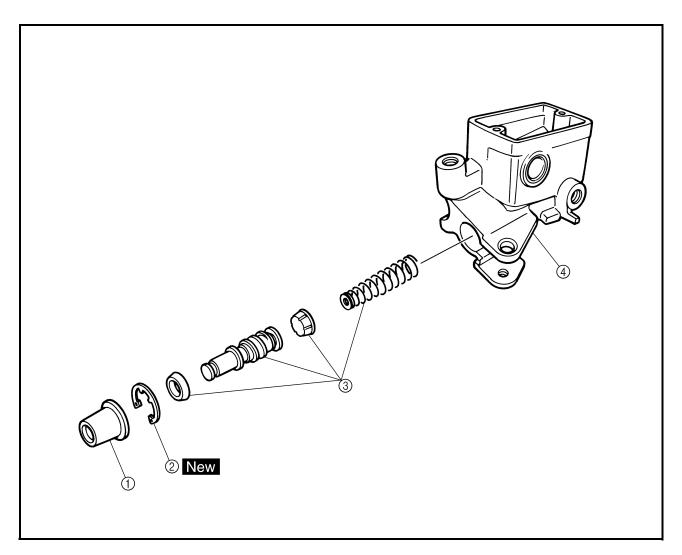




Order	Job/Part	Q'ty	Remarks
6	Union bolt	1	<sub>ا R</sub> efer to
7	Copper washer	2	"DISASSEMBLING/
8	Brake hose	1	Disconnect. ASSEMBLING AND
9	Brake master cylinder holder	1	INSTALLING THE
10	Brake master cylinder	1	FRONT BRAKE MASTER CYLINDER".
11	Front brake light switch	1	
			For installation, reverse the removal procedure.

EAS00585

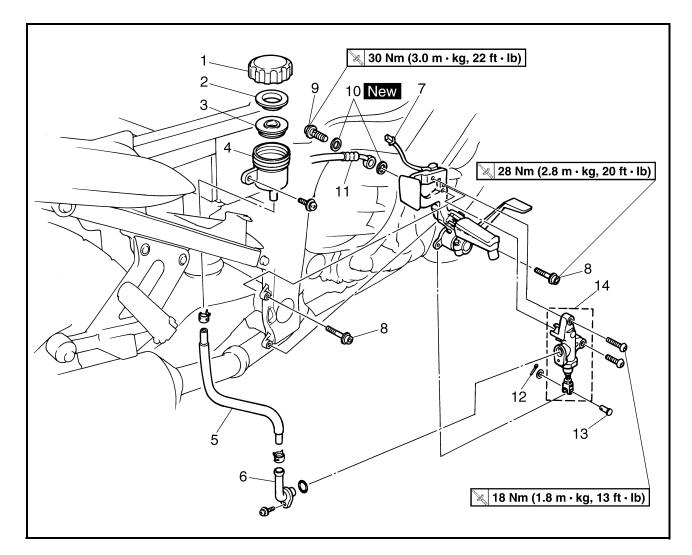




Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake mas-		Remove the parts in the order listed.
	ter cylinder		
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder	1	
			For assembly, reverse the disassembly
			procedure.

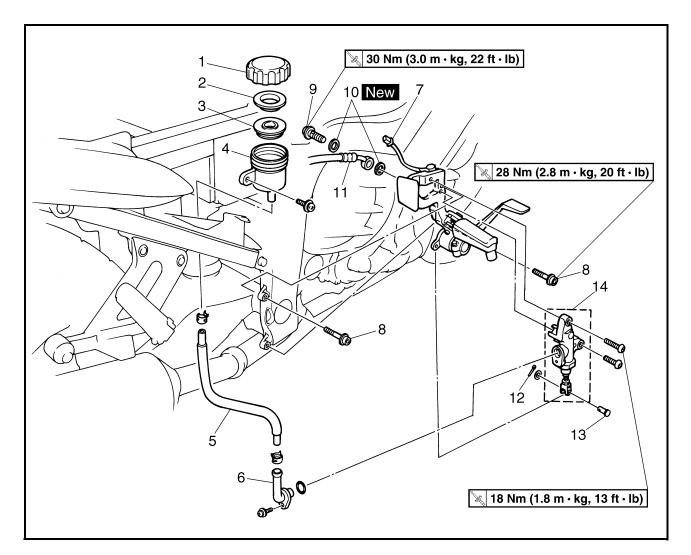


## REAR BRAKE MASTER CYLINDER



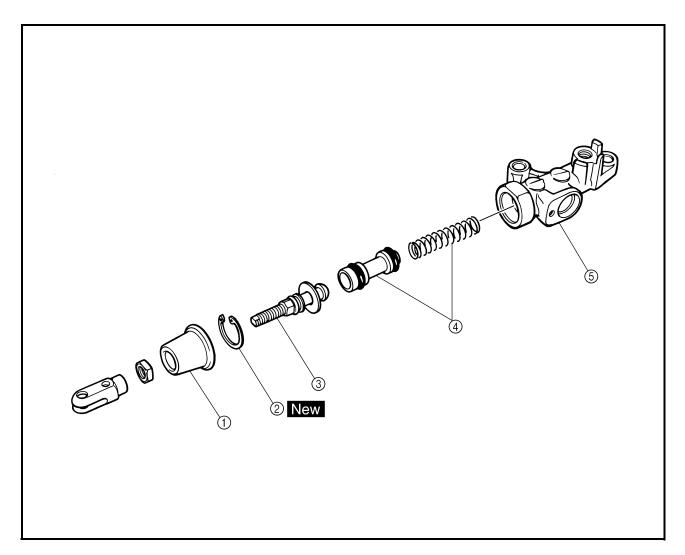
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cyl-		Remove the parts in the order listed.
	inder		
	Side cover (right)		Refer to "COWLINGS AND COVERS" in
			chapter 3.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Brake fluid reservoir hose	1	
6	Hose joint	1	
7	Rear brake light switch coupler	1	Disconnect.
8	Right footrest bracket bolt	2	





Order	Job/Part	Q'ty	Remarks
9	Union bolt	1	<sub>ا R</sub> efer to
10	Copper washer	2	- "DISASSEMBLING/
11	Brake hose	1	Disconnect. JASSEMBLING THE REAR BRAKE MASTER CYLINDER".
12	Cotter pin	1	
13	Pin	1	
14	Brake master cylinder	1	
			For installation, reverse the removal procedure.





Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake mas- ter cylinder		Remove the parts in the order listed.
	Dust boot	1	
		4	
2	Circlip	1	
3	Push rod	1	
(4)	Brake master cylinder kit	1	
5	Brake master cylinder	1	
			For assembly, reverse the disassembly
			procedure.

EAS00587



## DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

#### NOTE:

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

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

#### NOTE: \_

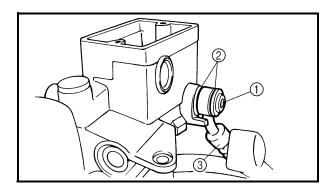
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

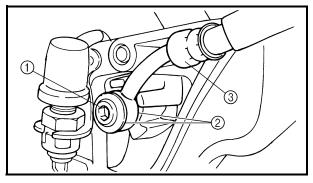
## DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

- 1. Remove:
- $\bullet$  union bolt (1)
- copper washers (2)
- brake hose ③

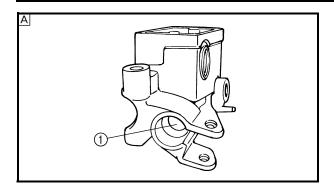
#### NOTE: \_

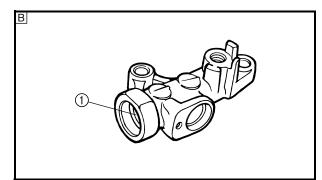
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

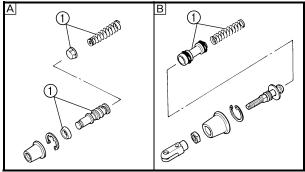


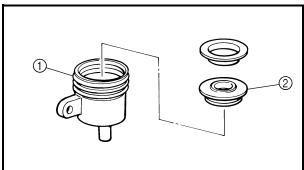


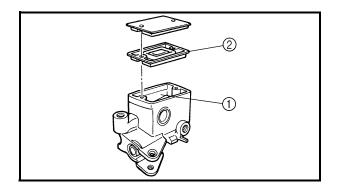












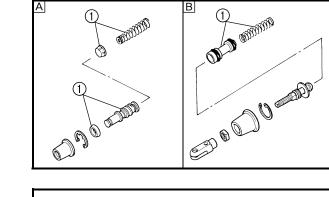
#### EAS00592 **CHECKING THE FRONT AND REAR BRAKE** MASTER CYLINDERS

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

- 1. Check:
- brake master cylinder (1) Damage/scratches/wear  $\rightarrow$  Replace.
- brake fluid delivery passages (brake master cylinder body) Obstruction  $\rightarrow$  Blow out with compressed air.
- A Front
- **B** Rear

- 2. Check:
- brake master cylinder kit (1) Damage/scratches/wear  $\rightarrow$  Replace.
- A Front
- **B** Rear
- 3. Check:
- rear brake fluid reservoir (1) Cracks/damage  $\rightarrow$  Replace.
- rear brake fluid reservoir diaphragm 2 Cracks/damage  $\rightarrow$  Replace.
- 4. Check:
- front brake master cylinder reservoir (1) Cracks/damage  $\rightarrow$  Replace.
- front brake master cylinder reservoir diaphragm (2)

Damage/wear  $\rightarrow$  Replace.



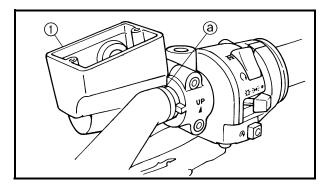


- 5. Check:
- brake hoses Cracks/damage/wear  $\rightarrow$  Replace.

ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

#### 

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



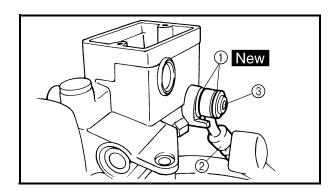
#### Recommended brake fluid DOT 4

- 1. Install:
- brake master cylinder (1)

#### 🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE:

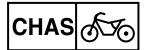
- Install the brake master cylinder holder with the "UP" mark facing up.
- Align the end of the brake master cylinder holder with the punch mark (a) in the right handlebar.
- First, tighten the upper bolt, then the lower bolt.

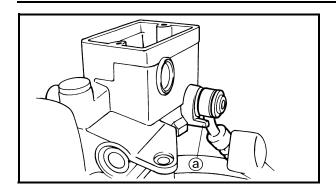


- 2. Install:
- copper washers ① New
- brake hose 2
- union bolt ③ 🛛 🔀 30 Nm (3.0 m · kg, 22 ft · lb)

#### 

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 (a) as shown.

#### NOTE: \_

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

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



Recommended brake fluid DOT 4

#### A WARNING

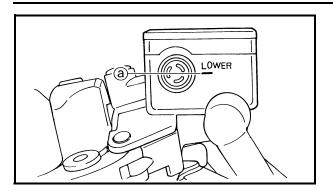
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

#### CAUTION:

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

- 4. Bleed:
  - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.





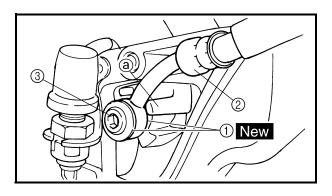
- 5. Check:
- brake fluid level

Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.

Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 6. Check:
- brake lever operation
   Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



## ASSEMBLING THE REAR BRAKE MASTER CYLINDER

- 1. Install:
- copper washers ① New
- brake hose 2
- union bolt ③ 🛛 🔀 30 Nm (3.0 m · kg, 22 ft · lb)

#### A 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 (a) as shown.

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

**Recommended brake fluid** 

DOT 4

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#### A 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.

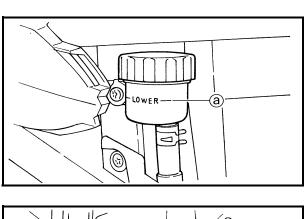
- 3. Bleed:
- brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
- 4. Check:
- brake fluid level Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.

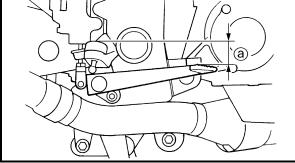
Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

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



Brake pedal position (below the top of the rider footrest) 42 mm (1.65 in)



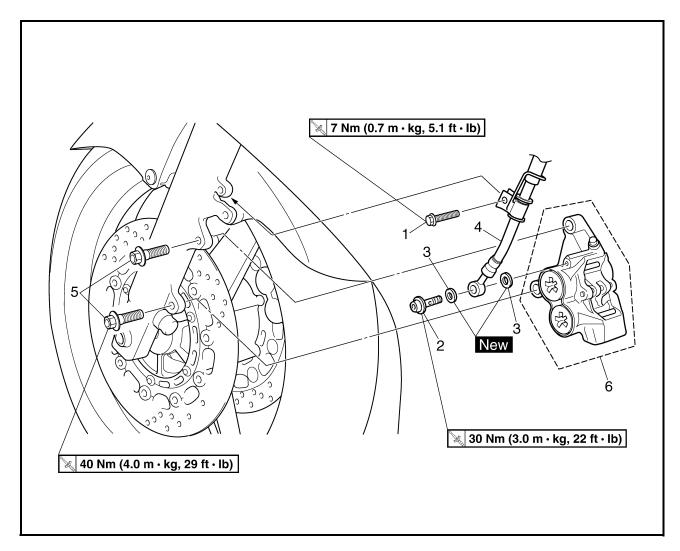




- 6. Adjust:
- rear brake light operation timing Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" in chapter 3.



## FRONT BRAKE CALIPERS



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



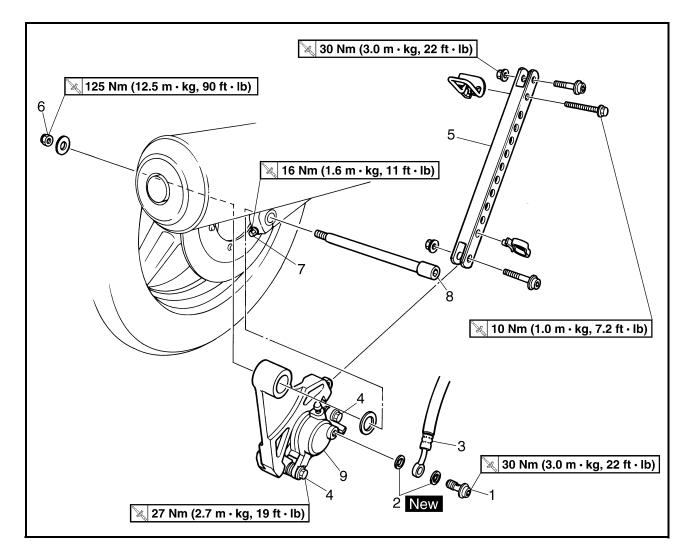
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Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake cali-		Remove the parts in the order listed.
	pers		
			The following procedure applies to both
			of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Brake pad/brake pad shim	2/2	
5	Brake caliper piston	4	□ Refer to "DISASSEMBLING THE
6	Brake caliper piston seal	8	FRONT BRAKE CALIPERS".
$\overline{O}$	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS00615



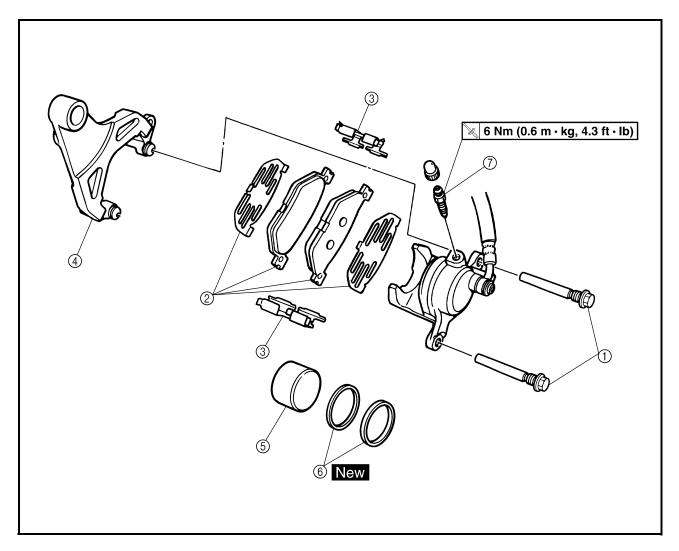
## REAR BRAKE CALIPER



Order	Job/Part	Q'ty		Remarks
	Removing the rear brake caliper		Remove the p	parts in the order listed.
	Brake fluid		Drain.	
1	Union bolt	1		
2	Copper washer	2	-	
3	Brake hose	1	Disconnect.	Refer to
4	Retaining bolt	2	Loosen.	"DISASSEMBLING/
5	Brake torque rod	1		ASSEMBLING AND
6	Wheel axle nut	1		INSTALLING THE REAR
7	Wheel axle pinch bolt	1	Loosen.	BRAKE CALIPER".
8	Rear wheel axle	1		
9	Brake caliper	1		
			For installatio	n, reverse the removal
			procedure.	

EAS00617





Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake cali-		Remove the parts in the order listed.
	per		
1	Retaining bolt	2	
2	Brake pad/brake pad shim	2/2	
3	Brake pad spring	2	
4	Rear brake caliper bracket	1	
5	Brake caliper piston	1	□ Refer to "DISASSEMBLING THE
6	Brake caliper piston seal	2	REAR BRAKE CALIPER".
7	Bleed screw	1	
			For assembly, reverse the disassembly
			procedure.



### DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

#### NOTE:

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

- 1. Remove:
- union bolt ①
- copper washers (2)
- $\bullet$  brake hose 3

#### NOTE: .

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

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

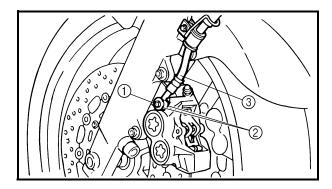
#### \*\*\*\*

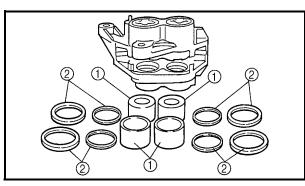
- a. Secure the right side brake caliper pistons with a piece of wood (a).
- b. Blow compressed air into the brake hose joint opening (b) to force out the left side pistons from the brake caliper.

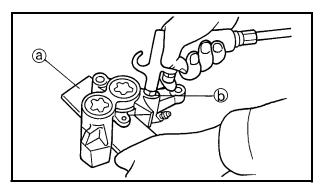
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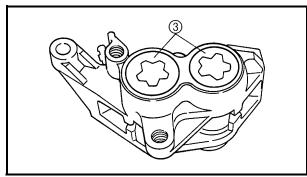
- Never try to pry out the brake caliper pistons.
- Do not loosen the bolts ③.
- c. Remove the brake caliper piston seals.
- d. Repeat the previous steps to force out the right side pistons from the brake caliper.

\*\*\*\*\*







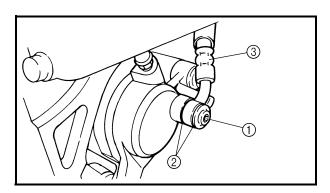


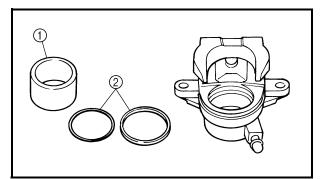


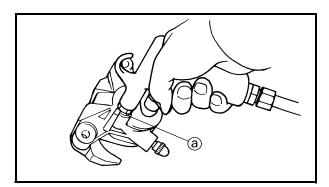
## DISASSEMBLING THE REAR BRAKE CALIPER

#### NOTE:

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







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

#### 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)

#### •••••

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

#### 

- 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.

\*\*\*\*\*



## CHECKING THE FRONT AND REAR BRAKE CALIPERS

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

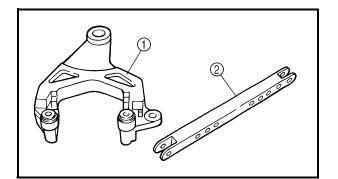
- 1. Check:
- brake caliper pistons ①
   Rust/scratches/wear → Replace the brake caliper.
- brake caliper cylinders ②
   Scratches/wear → Replace the brake caliper.
- brake calipers
   Cracks/damage → Replace.
- brake fluid delivery passages (brake caliper body)
   Obstruction → Blow out with compressed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

#### A WARNING

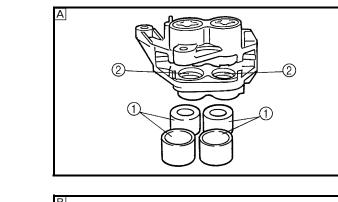
Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

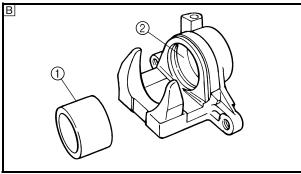
А	Front
	<b>D</b>

B Rear



- 2. Check:
  - rear brake caliper bracket ①
- brake torque rod ②
   Cracks/damage → Replace.







### ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

#### A WARNING

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



Recommended brake fluid DOT 4

- 1. Install:
- brake caliper (1) (temporarily)
- copper washers New
- brake hose ②
- union bolt ③ 🛛 🛛 🕅 30 Nm (3.0 m · kg, 22 ft · lb)

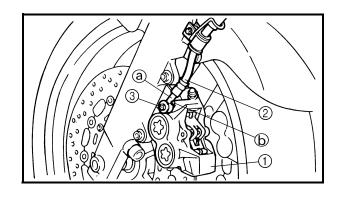
#### A WARNING

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.

- 2. Remove:
- brake caliper





- 3. Install:
- brake pads
- brake pad spring
- brake caliper 🛛 🔀 40 Nm (4.0 m · kg, 29 ft · lb)
- brake hose holder

Nm (0.7 m · kg, 5.1 ft · lb)Refer to "REPLACING THE FRONTBRAKE PADS".

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

Recommended brake fluid DOT 4

### A WARNING

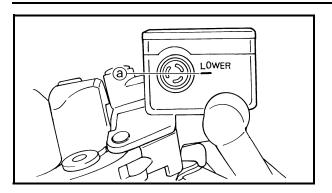
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

#### CAUTION:

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

- 5. Bleed:
- brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.





- 6. Check:
- brake fluid level

Below the minimum level mark (a)  $\rightarrow$  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

#### A 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. Lubricate:
- wheel axle

Recommended lubricant Lithium soap base grease

KES CHAS

### FRONT AND REAR BRAKES

- 2. Tighten:
- brake torque rod
   30 Nm (3.0 m · kg, 22 ft · lb)
- wheel axle nut
  - 🔌 125 Nm (12.5 m · kg, 90 ft · lb)
- wheel axle pinch bolt
   16 Nm (1.6 m · kg, 11 ft · lb)
- 3. Install:
  - brake caliper (temporarily)
  - copper washers ① New
  - brake hose 2
  - union bolt ③ 🛛 🔀 30 Nm (3.0 m · kg, 22 ft · lb)

#### A 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 (a) touches the projection (b) on the brake caliper.

- 4. Remove:
- brake caliper

- 5. Install:
- brake pad springs
- brake pads
- brake caliper
- retaining bolts

🎉 26 Nm (2.6 m · kg, 19 ft · lb)

Refer to "REPLACING THE REAR BRAKE PADS".



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



Recommended brake fluid DOT 4

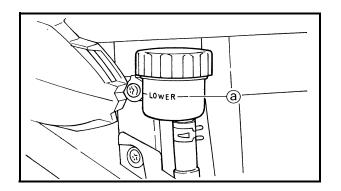
#### A WARNING

- 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:

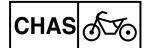
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 7. Bleed:
- brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



- 8. Check:
- brake fluid level
  - Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.

Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.



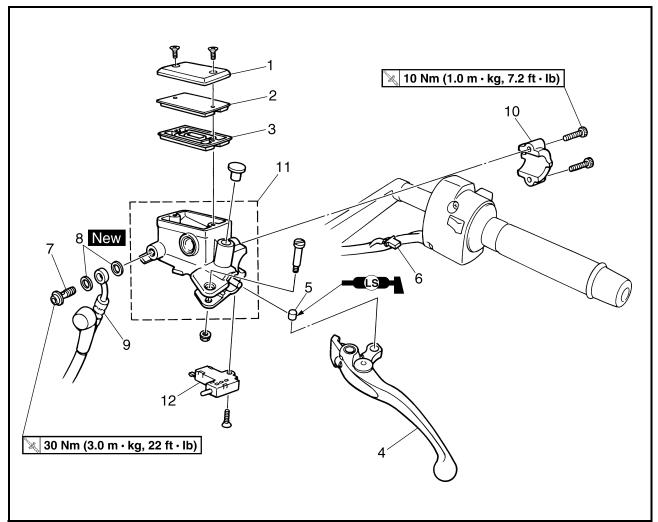
- 9. Check:
- brake pedal operation Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

## HYDRAULIC CLUTCH

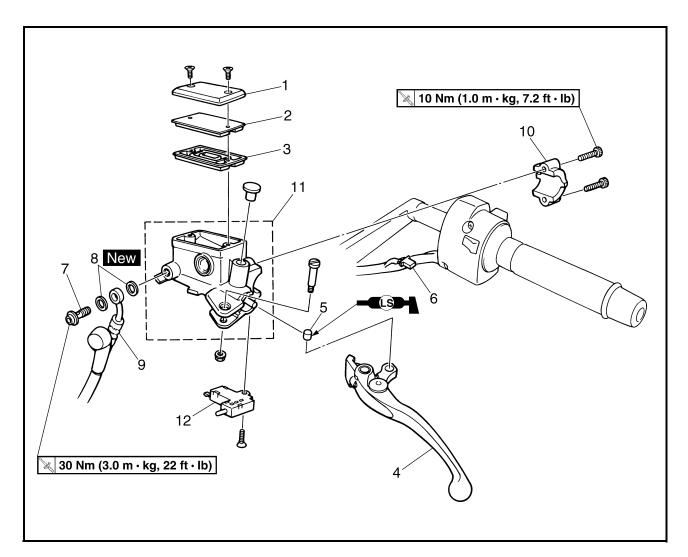


## HYDRAULIC CLUTCH CLUTCH MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	Removing the clutch master cylin-		Remove the parts in the order listed.
	der		
	Clutch fluid		Drain.
1	Clutch master reservoir cap	1	
2	Clutch master reservoir diaphram	1	
	holder		
3	Clutch master reservoir diaphram	1	
4	Clutch lever	1	
5	Bushing	1	
6	Clutch switch coupler	1	Disconnect.

HYDRAULIC CLUTCH CHAS



Order	Job/Part	Q'ty	Remarks
7	Union bolt	1	<sub>ا Refer to</sub>
8	Copper washer	2	"DISASSEMBLING/
9	Clutch hose	1	Disconnect. ASSEMBLING AND
10	Clutch master cylinder holder	1	J INSTALLING THE CLUTCH MASTER CYLINDER".
11	Clutch master cylinder	1	Refer to "ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER".
12	Clutch switch	1	For installation, reverse the removal procedure.

EAS00306

# HYDRAULIC CLUTCH CHAS



|--|

Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch master cylinder		Remove the parts in the order listed.
1	Clutch master cylinder push rod	1	
2	Dust seal	1	
3	Circlip	1	
(4)	Washer	1	
5	Clutch master cylinder kit	1	
6	Clutch master cylinder	1	
			For assembly, reverse the disassembly
			procedure.



## CAUTION:

EAS00307

Clutch components rarely require disassembly.

Therefore, always follow these preventive measures:

- Never disassemble clutch components unless absolutely necessary.
- If any connection on the hydraulic clutch system is disconnected, the entire clutch system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal clutch components.
- Use only clean or new clutch fluid for cleaning clutch components.
- Clutch fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt fluid immediately.
- Avoid clutch fluid coming into contact with the eyes as it can cause serious injury.
- First aid for clutch fluid entering the eyes:
- Flush with water for 15 minutes and get immediate medical attention.

# DISASSEMBLING THE CLUTCH MASTER CYLINDER

NOTE:

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

- C LOWER C LOWE
- 1. Remove:
- union bolt (1)
- copper washers (2)
- clutch hose ③

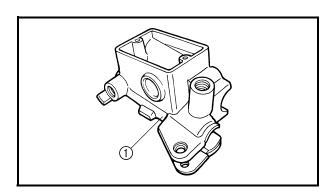
#### NOTE:

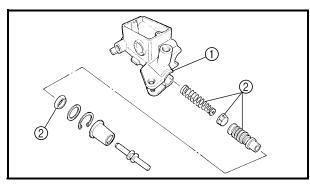
To collect any remaining clutch fluid, place a container under the master cylinder and the end of the clutch hose.

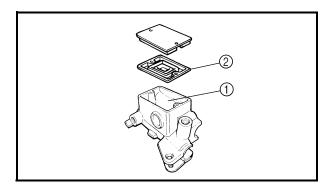


## CHECKING THE CLUTCH MASTER CYLINDER

Recommended clutch component replacement schedule		
Piston seals	Every two years	
Clutch hose	Every two years	
Clutch fluid	Every two years and whenever the clutch is disassem- bled	







- 1. Check:
- clutch master cylinder body ①
   Cracks/damage → Replace the clutch master cylinder.
- clutch fluid delivery passage (clutch master cylinder body)
   Obstruction → Blow out with compressed air.
- 2. Check:
- $\bullet$  clutch master cylinder (1)
- clutch master cylinder kit ② Rust/scratches/wear → Replace the clutch master cylinder and clutch master cylinder kit as a set.
- 3. Check:
- clutch master cylinder reservoir ① Cranks/damage → Replace.
- clutch master cylinder reservoir diaphragm ②
   Damage/wear → Replace.
- 4. Check:
- clutch hose Cracks/damage/wear  $\rightarrow$  Replace.

#### EAS00309 EAS00310

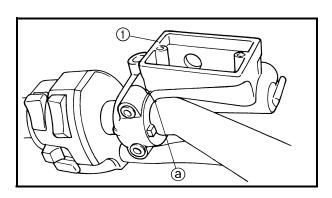
## ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER

#### 

- Before installation, all internal clutch components must be cleaned and lubricated with clean or new clutch fluid.
- Never use solvents on internal clutch components as they will cause the piston seals to swell and distort.



Recommended clutch fluid Brake fluid DOT 4

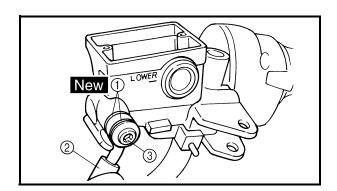


- 1. Install:
- clutch master cylinder ①

🖎 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE:

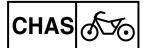
- Install the clutch master cylinder holder with the "UP" mark facing up.
- Align the end of the clutch master cylinder holder with the punch mark (a) in the left handlebar.
- First, tighten the upper bolt, then the lower bolt.



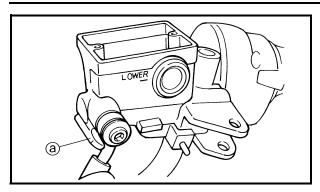
- 2. Install:
- copper washers ① New
- clutch hose 2
- union bolt ③ 🛛 🛛 🗐 🛛 Nm (3.0 m · kg, 22 ft · lb)

#### 

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







#### CAUTION:

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

#### NOTE: \_

Turn the handlebars to the left and to the right to make sure the clutch hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

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



Recommended clutch fluid Brake fluid DOT 4

#### A WARNING

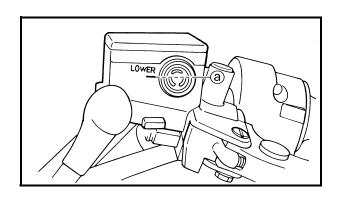
- Use only the designated clutch fluid. Other clutch fluids may cause the rubber seals to deteriorate, causing leakage and poor clutch performance.
- Refill with the same type of clutch fluid that is already in the system. Mixing clutch fluids may result in a harmful chemical reaction, leading to poor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

#### **CAUTION:**

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.



- 4. Bleed:
- clutch system
   Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.



- 5. Check:
- clutch fluid level

Below the minimum level mark (a)  $\rightarrow$  Add the recommended clutch fluid to the proper level.

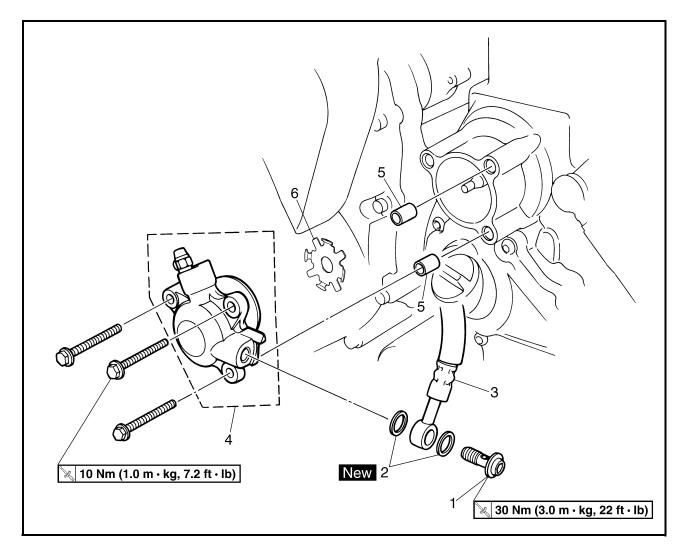
Refer to "CHECKING THE CLUTCH FLUID LEVEL" in chapter 3.

- 6. Check:
- clutch lever operation Soft or spongy feeling → Bleed the clutch system.
   Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.

HYDRAULIC CLUTCH

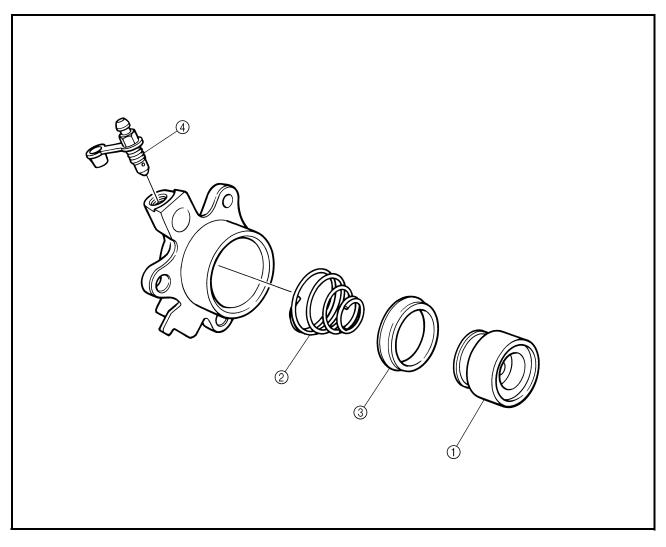


## CLUTCH RELEASE CYLINDER



Order	Job/Part	Q'ty	Remarks
	Removing the clutch release cylin-		Remove the parts in the order listed.
	der		
	Clutch fluid		Drain.
1	Union bolt	1	<sub>⊐</sub> Refer to
2	Copper washer	2	"DISASSEMBLING/
3	Clutch hose	1	Disconnect. ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER".
4	Clutch release cylinder	1	
5	Dowel pin	2	
6	Plate	1	
			For installation, reverse the removal procedure.

HYDRAULIC CLUTCH CHAS



Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch release cylinder		Remove the parts in the order listed.
1 2 3 4	Clutch release cylinder piston Clutch release cylinder spring Clutch release cylinder piston seal Bleed screw	1 1 1 1	Refer to "DISASSEMBLING THE CLUTCH RELEASE CYLINDER".
			For assembly, reverse the disassembly procedure.



## DISASSEMBLING THE CLUTCH RELEASE CYLINDER

#### NOTE:

Before disassembling the clutch release cylinder, drain the clutch fluid from the entire clutch system.

- 1. Remove:
- $\bullet$  union bolt (1)
- copper washers ②
- clutch hose ③

#### NOTE: \_

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

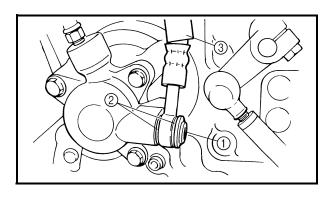
- 2. Remove:
- clutch release cylinder piston (1)
- clutch release cylinder spring (2)
- clutch release cylinder piston seal ③

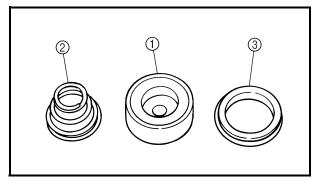
a. Blow compressed air into the clutch hose joint opening (a) to force out the piston from the clutch release cylinder.

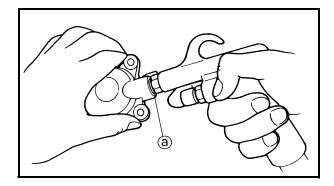
#### A WARNING

- Cover the clutch release cylinder with a rag. Be careful not to get injured when the piston is expelled from the clutch release cylinder.
- Never try to pry out the clutch release cylinder piston.
- b. Remove the clutch release cylinder spring and piston seal.

\*\*\*\*\*









## CHECKING THE CLUTCH RELEASE CYLINDER

Recommended clutch component replacement schedule		
Piston seal	Every two years	
Clutch hose	Every two years	
Clutch fluid	Every two years and whenever the clutch is disassem- bled	

- 1. Check:
- clutch release cylinder body ①
   Cracks/damage → Replace the clutch release cylinder.
- 2. Check:
- clutch release cylinder ①
- clutch release cylinder piston ② Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.

EAS00315

## ASSEMBLING AND INSTALLING THE CLUTCH RELEASE CYLINDER

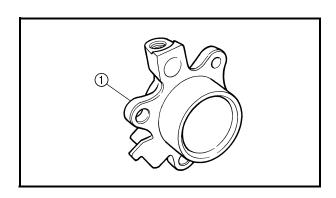
- 1. Install:
- copper washers ① New
- clutch hose 2
- union bolt ③ 🛛 🛰 30 Nm (3.0 m · kg, 22 ft · lb)

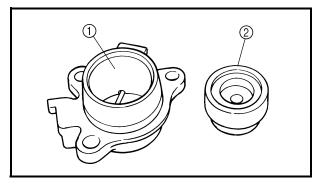
## A WARNING

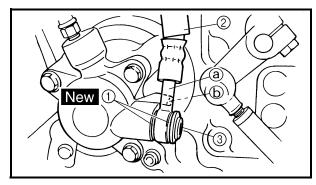
Proper clutch hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

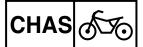
### CAUTION:

When installing the clutch hose onto the clutch release cylinder, make sure the clutch pipe (a) touches the projection (b) on the clutch release cylinder.









HYDRAULIC CLUTCH

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



Recommended clutch fluid Brake fluid DOT 4

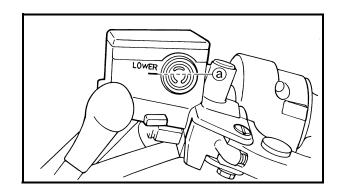
## A WARNING

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

## CAUTION:

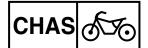
Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.

- 3. Bleed:
- clutch system
   Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.



- 4. Check:
- clutch fluid level
  - Below the minimum level mark (a)  $\rightarrow$  Add the recommended clutch fluid to the proper level.

Refer to "CHECKING THE CLUTCH FLUID LEVEL" in chapter 3.



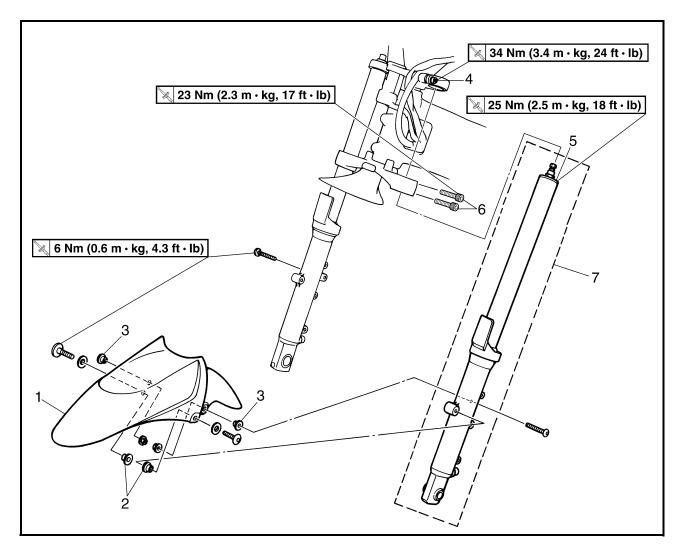
## HYDRAULIC CLUTCH

- 5. Check:
- clutch lever operation Soft or spongy feeling  $\rightarrow$  Bleed the clutch system.

Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.



#### EAS00647 **FRONT FORK**

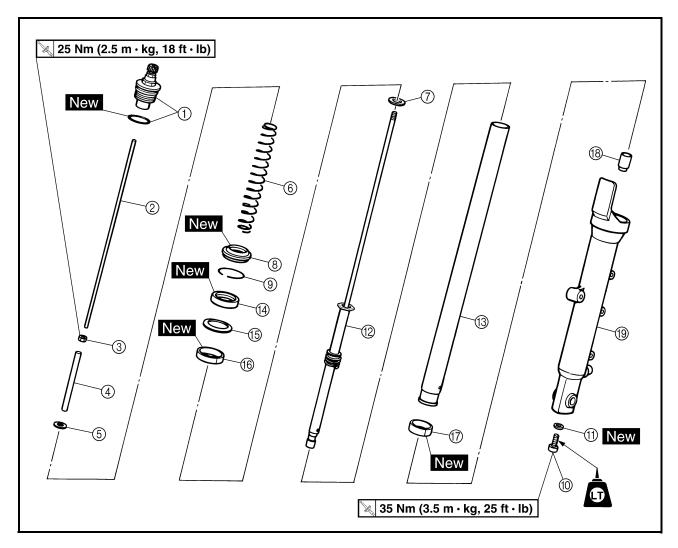


Order	Job/Part	Q'ty	Remarks
	Removing the front fork legs Front cowling assembly Front wheel		Remove the parts in the order listed. The following procedure applies to both of the front fork legs. Refer to "COWLINGS" AND "COVERS" in chapter 3. Refer to "FRONT WHEEL AND BRAKE
1 2 3 4 5 6 7	Front fender Collar Collar Upper bracket pinch bolt Cap bolt Lower bracket pinch bolt Front fork leg	1 2 1 1 2 1	DISCS". Loosen. Loosen. Loosen. FRONT FORK LEGS".
			For installation, reverse the removal procedure.

EAS00648

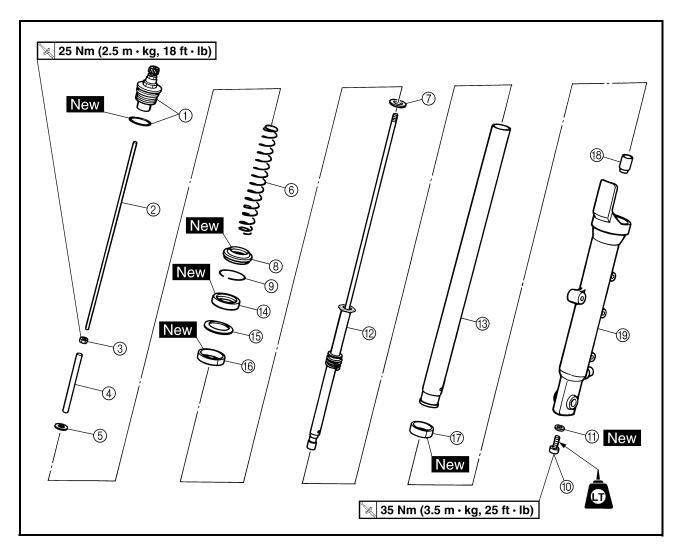
FRONT FORK

CHAS 55



Order	Job/Part	Q'ty	Remarks
	Disassembling the front fork legs		Remove the parts in the order listed.
			The following procedure applies to both
			of the front fork legs.
1	Cap bolt/O-ring	1/1	
2	Damper adjusting rod	1	
3	Nut	1	
4	Spacer	1	
5	Washer	1	Refer to "DISASSEMBLING/
6	Fork spring	1	ASSEMBLING THE FRONT FORK
$\overline{O}$	Spring seat	1	LEGS".
8	Dust seal	1	
9	Oil seal clip	1	
10	Damper rod assembly bolt	1	
(1)	Copper washer	1	

CHAS



Order	Job/Part	Q'ty	Remarks
12	Damper rod assembly	1	Refer to "DISASSEMBLING/
13	Inner tube	1	ASSEMBLING THE FRONT FORK
			LEGS".
(14)	Oil seal	1	
15	Seal spacer	1	Refer to "ASSEMBLING THE FRONT
16	Outer tube bushing	1	FORK LEGS".
17	Inner tube bushing	1	
18	Oil flow stopper	1	
(19)	Outer tube	1	
			For assembly, reverse the disassembly
			procedure.

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## REMOVING THE FRONT FORK LEGS

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

1. Stand the motorcycle on a level surface.

## 

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

#### NOTE: \_\_\_\_\_

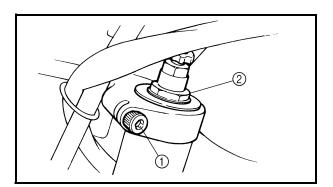
Place the motorcycle on a suitable stand so that the front wheel is elevated.

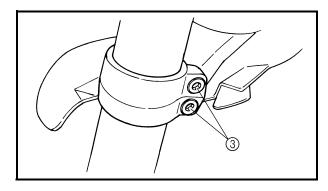
- 2. Loosen:
- upper bracket pinch bolt ①
- cap bolt 2
- lower bracket pinch bolts ③

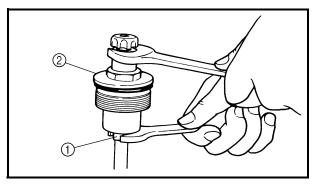
## A WARNING

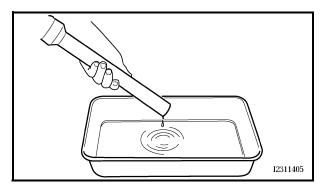
Before loosening the upper and lower bracket pinch bolts, support the front fork leg.

- 3. Remove:
- front fork leg









## DISASSEMBLING THE FRONT FORK LEGS

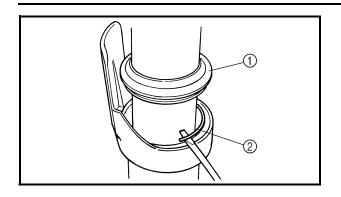
The following procedure applies to both of the front fork legs.

- 1. Loosen:
- nut (1)
- cap bolt 2
- 2. Remove:
- cap bolt
- nut
- 3. Drain:
- fork oil

#### NOTE: .

Stroke the inner tube several times while draining the fork oil.





- 4. 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.
- 5. Remove:
- washer
- damper rod assembly bolt ①
- copper washer

#### NOTE: \_

- If the washer is difficult to remove, use an impact wrench to loosen the damper rod assembly bolt.
- While holding the damper rod with the damper rod holder ②, loosen the damper rod assembly bolt.



6. Remove:

• inner tube

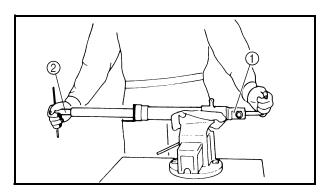
#### \*\*\*\*

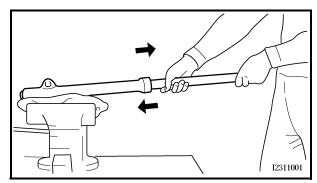
- a. Hold the front fork leg horizontally.
- b. Securely clamp the brake caliper bracket in a vise with soft jaws.
- c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.

#### \*\*\*\*\*

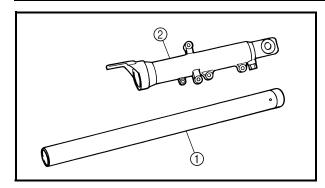
## CAUTION:

- Excessive force will damage the oil seal and bushing. A damaged oil seal or bushing must be replaced.
- Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil flow stopper will be damaged.









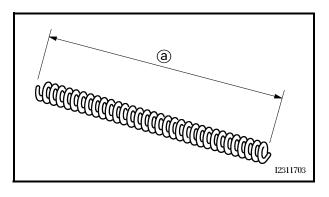
## CHECKING THE FRONT FORK LEGS

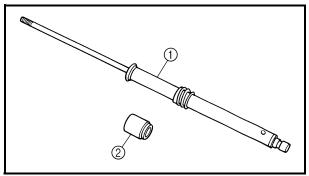
The following procedure applies to both of the front fork legs.

- 1. Check:
- inner tube ①
- outer tube ②
   Bends/damage/scratches → Replace.

## 

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 261 mm (10.28 in)

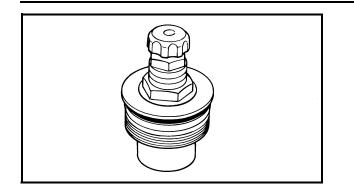
- 3. Check:
- damper rod ①
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
- oil flow stopper ②
   Damage → Replace.

## 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 O-ring Damage/wear  $\rightarrow$  Replace.



## ASSEMBLING THE FRONT FORK LEGS

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

## A WARNING

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

## NOTE: \_

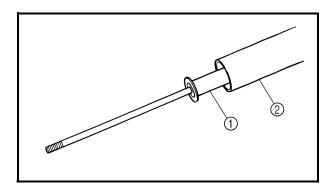
- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure all of the components are clean.
- 1. Install:
- damper rod assembly ①

## CAUTION:

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

- 2. Lubricate:
- inner tube's outer surface

Recommended lubricant Yamaha fork and shock oil 01 or equivalent





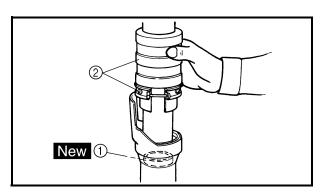
- 3. Tighten:
- damper rod assembly bolt ①
   35 Nm (3.5 m · kg, 25 ft · lb)

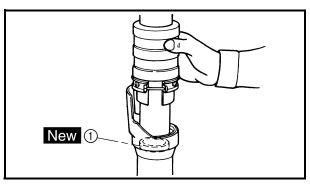
### NOTE: .

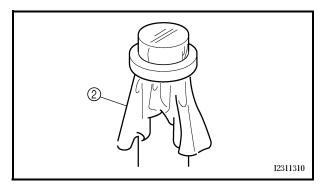
- If the washer has not been removed during disassembly, strike the washer lightly, and then remove it.
- While holding the damper rod assembly with the damper rod holder ②, tighten the damper rod assembly bolt.



Damper rod holder YM-01447







- 4. Install:
- outer tube bushing ① New (with the fork seal installer ②)

Fork seal installer YM-01442

- 5. Install:
- seal spacer
- oil seal ① New (with the fork seal driver)

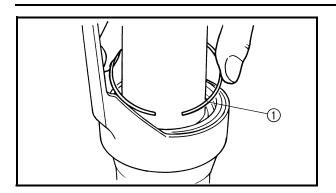
CAUTIONS

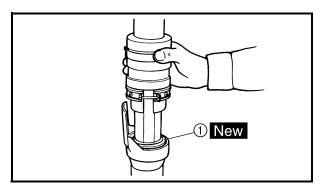
Make sure the numbered side of the oil seal faces up.

## NOTE: \_

- Before installing the oil seal, lubricate its lips with lithium soap base 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.







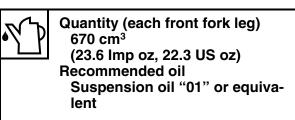
- 6. Install:
- $\bullet$  oil seal clip (1)

## NOTE: .

Adjust the oil seal clip so that it fits into the groove of the outer tube.

- 7. Install:
- dust seal ① New (with the fork seal driver)

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

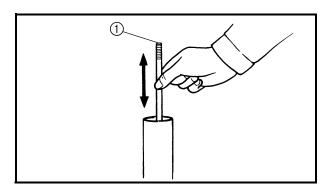


## CAUTION:

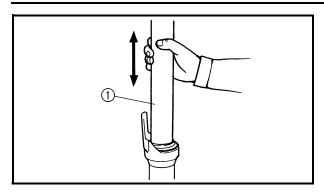
- Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.
- When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.
- 10.After filling the front fork leg, slowly stroke the damper rod ① up and down (at least ten times) to distribute the fork oil.

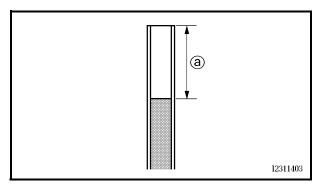
## NOTE: \_

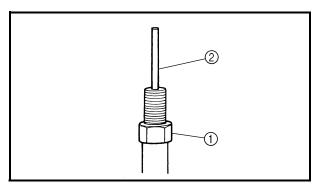
Be sure to stroke the damper rod slowly because the fork oil may spurt out.

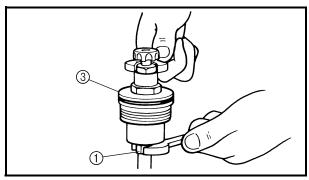












- 11.Slowly stroke the inner tube ① up and down.
- 12.Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

### NOTE:

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

#### 13.Measure:

- front fork leg oil level (a)
  - Out of specification  $\rightarrow$  Correct.



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

14.Install:

- nut ①
- damper adjusting rod (2)
- cap bolt ③

### \*\*\*\*

- a. Install the nut and finger tighten it.
- b. Install the damper adjusting rod 2.
- c. Install the cap bolt (3) and finger tighten it.

## A WARNING

Always use a new cap bolt O-ring.

d. Hold the cap bolt and tighten the nut ① to specification.

Nut 25 Nm (2.5 m · kg, 18 ft · lb)

.....

- 15.Install:
- cap bolt
  - (to the outer tube)

NOTE: .

- Before installing the cap bolt, lubricate its Oring with grease.
- Temporarily tighten the cap bolt.



#### EAS00662 **INSTALLING THE FRONT FORK LEGS**

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

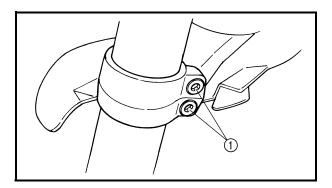
- 1. Install:
- front fork leg

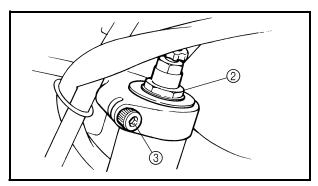
#### NOTE: \_

- Make sure that the inner tube end is flush with the top of the upper bracket.
- Temporarily tighten the upper and lower bracket pinch bolts.

## 

Make sure the brake hoses are routed properly.



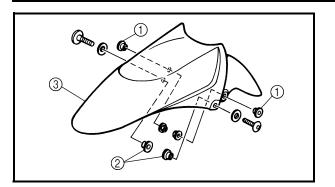


- 2. Tighten:
- lower bracket pinch bolts (1)
- 🔌 23 Nm (2.3 m · kg, 17 ft · lb) • cap bolt 2

🔌 25 Nm (2.5 m · kg, 18 ft · lb)

• upper bracket pinch bolt ③ 🔀 34 Nm (3.4 m · kg, 24 ft · lb)

CHAS 55



- 3. Install:
- collar (1)
- collar (2)
- front fender ③
- front fender bolts

**FRONT FORK** 

🔌 6 Nm (0.6 m ⋅ kg, 4.3 ft ⋅ lb)

#### NOTE: \_

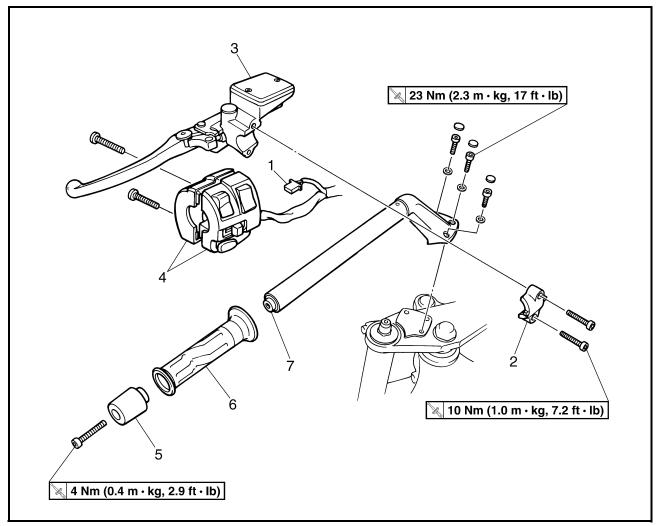
- Install the collar ① from the outside of the front fender.
- Install the collar ② from the inside of the front fender.
- When installing the front fender, make sure that there is no dirt between the front fender and front fork.

- 4. Adjust:
- spring preload
- rebound damping
- compression damping Refer to "ADJUSTING THE FRONT FORK LEGS" in chapter 3.

## HANDLEBARS

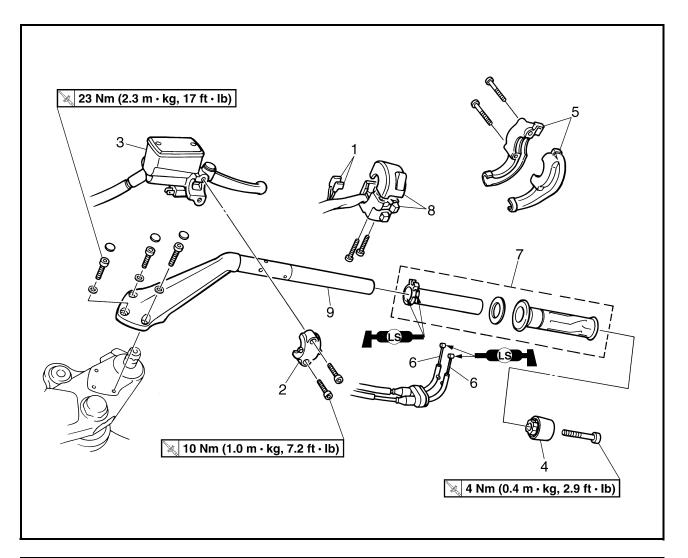


# HANDLEBARS



Order	Job/Part	Q'ty	Remarks
	Removing the left handlebar		Remove the parts in the order listed.
1	Clutch switch coupler	1	Disconnect.
2	Clutch master cylinder holder	1	
3	Clutch master cylinder	1	
4	Left handlebar switch	1	Refer to "REMOVING/INSTALLING THE HANDLEBARS".
5	Grip end	1	HANDLEBANS .
6	Handlebar grip	1	
7	Left handlebar	1	
			For installation, reverse the removal
			procedure.

**RIGHT HANDLEBAR** 



CHAS

HANDLEBARS

Order	Job/Part	Q'ty		Remarks
	Removing the right handlebar		Remove the p	parts in the order listed.
1	Front brake light switch connector	2	Disconnect.	
2	Brake master cylinder holder	1	-	1
3	Brake master cylinder	1		
4	Grip end	1		Refer to "REMOVING/
5	Throttle cable housing	1		INSTALLING THE
6	Throttle cable	2	Disconnect.	HANDLEBARS".
7	Throttle grip	1		
8	Right handlebar switch	1	-	
9	Right handlebar	1		
			For installatio	n, reverse the removal
			procedure.	

## REMOVING THE HANDLEBARS

**HANDLEBARS** 

1. Stand the motorcycle on a level surface.

## A WARNING

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

- 2. Remove:
  - handlebar grip

### NOTE: .

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

- 3. Remove:
- throttle cable housing (1)
- throttle grip ②

#### NOTE: \_

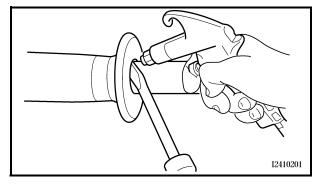
While removing the throttle cable housing, pull back the rubber cover ③.

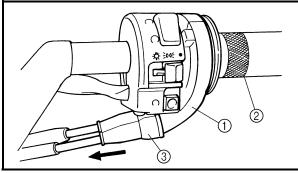
EAS00669

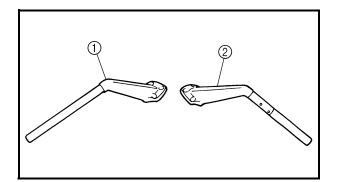
- CHECKING THE HANDLEBARS
- 1. Check:
- left handlebar ①
- right handlebar ②
   Bends/cracks/damage → Replace.

## A WARNING

Do not attempt to straighten bent handlebars as this may dangerously weaken them.







## INSTALLING THE HANDLEBARS

**HANDLEBARS** 

1. Stand the motorcycle on a level surface.

## A WARNING

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

- 2. Install:
  - right handlebar switch ①

## NOTE:

Align the projection (a) on the right handlebar switch with the hole (b) in the right handlebar.

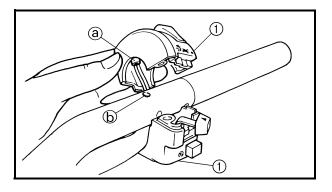
- 3. Install:
- throttle grip ①
- throttle cable housing ②
- throttle cables
- grip end 🛛 🔌 4 Nm (0.4 m · kg, 2.9 ft · lb)

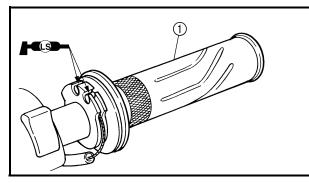
## NOTE:

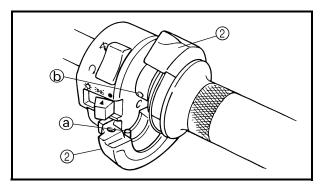
- Lubricate the inside of the throttle grip with a thin coat of lithium soap base grease and install it onto the handlebar.
- Align the projection (a) on the throttle cable housing with the hole (b) in the right handle-bar.
- There should be 1 ~ 3 mm (0.04 ~ 0.12 in) of clearance ⓒ between the throttle grip and the grip end.

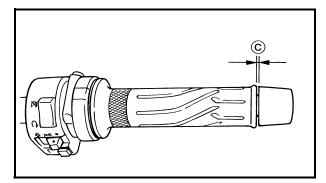
## 

Make sure the throttle grip operates smoothly.

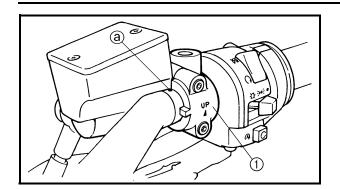












- 4. Install:
- brake master cylinder

**HANDLEBARS** 

• brake master cylinder holder (1)

🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE: .

- Install the brake master cylinder holder with the "UP" mark facing up.
- First, tighten the upper bolt, and then the lower bolt.
- Align the mating surfaces of the brake master cylinder holder with the punch mark (a) in the right handlebar.

- 5. Install:
- handlebar grip
- grip end 🛛 🔌 4 Nm (0.4 m · kg, 2.9 ft · lb)

\*\*\*\*\*

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

## 

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

### NOTE: \_\_\_\_\_

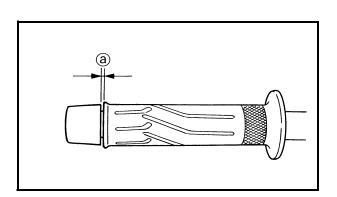
There should be 1 ~ 3 mm (0.04 ~ 0.12 in) of clearance (a) between the throttle grip and the grip end.

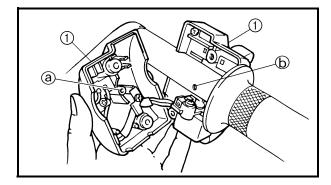
### \*\*\*\*\*

- 6. Install:
- left handlebar switch ①

#### NOTE: .

Align the projection (a) on the left handlebar switch with the hole (b) in the left handlebar.







- 7. Install:
- clutch master cylinder

**HANDLEBARS** 

• clutch master cylinder holder ①

## 🍾 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE: \_

Align the slit in the clutch master cylinder holder with the punch mark (a) in the left handlebar.

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

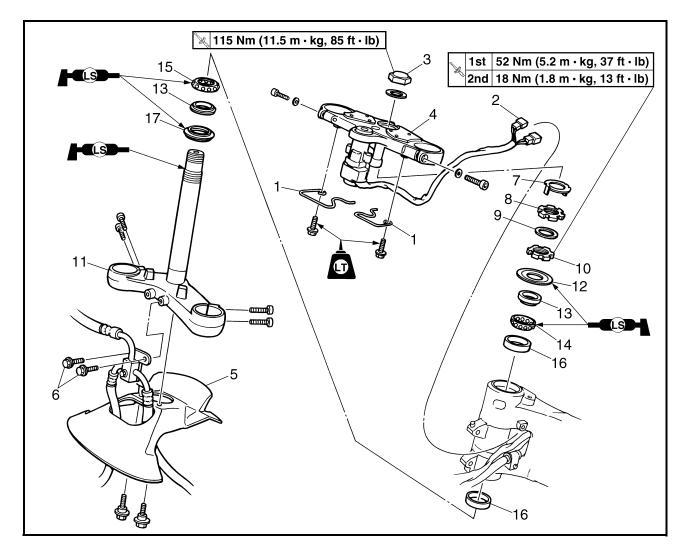


Throttle cable free play (at the flange of the throttle grip) 3 ~ 5 mm (0.12 ~ 0.20 in)

**STEERING HEAD** 



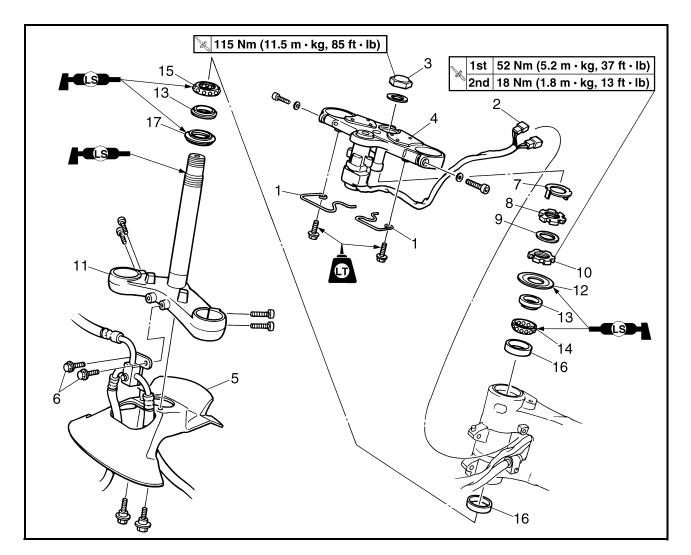
## STEERING HEAD



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".
	Handlebars		Refer to "HANDLEBARS".
1	Lead guide	2	
2	Main switch coupler	2	Disconnect.
3	Steering stem nut	1	Refer to "INSTALLING THE STEERING HEAD".
4	Upper bracket	1	_ THE STEERING HEAD .
5	Lower bracket panel	1	
6	Brake hose holding bolt	2	



CHAS



Order	Job/Part	Q'ty	Remarks
7	Lock washer	1	٦
8	Upper ring nut	1	Refer to "REMOVING THE LOWER
9	Rubber washer	1	BRACKET" and "INSTALLING THE
10	Lower ring nut	1	STEERING HEAD".
11	Lower bracket	1	
12	Bearing cover	1	
13	Bearing inner race	2	
14	Upper bearing	1	
15	Lower bearing	1	
16	Bearing outer race	2	
17	Dust seal	1	
			For installation, reverse the removal procedure.

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## REMOVING THE LOWER BRACKET

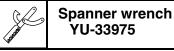
1. Stand the motorcycle on a level surface.

## A WARNING

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

- 2. Remove:
- lower ring nut ①

   (with the special tool ②)



## A WARNING

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

EAS00681

### **CHECKING THE STEERING HEAD**

- 1. Wash:
- bearings
- bearing races



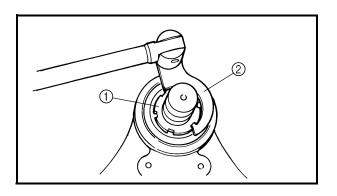
Recommended cleaning solvent Kerosene

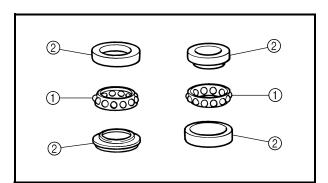
- 2. Check:
- bearings ①
- bearing races ②
   Damage/pitting → Replace.

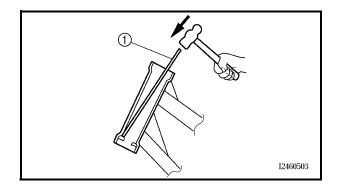
- 3. Replace:
- bearings
- · bearing races

#### \*\*\*\*

a. Remove the bearing races from the steering head pipe with a long rod ① and hammer.

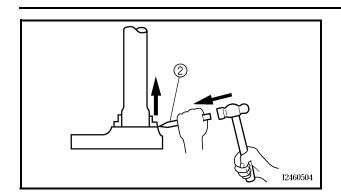






## STEERING HEAD





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

## CAUTION:

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

#### NOTE: \_

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

\_\_\_\_\_

- 4. Check:upper bracket
- lower bracket

   lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

EAS00683

**INSTALLING THE STEERING HEAD** 

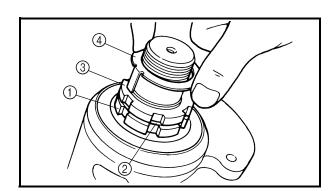
- 1. Lubricate:
- upper bearing
- lower bearing
- bearing races

- Re

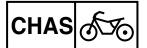
Recommended lubricant Lithium soap base grease

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

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



## **STEERING HEAD**



- 3. Install:
- upper bracket
- steering stem nut

### NOTE:

Temporarily tighten the steering stem nut.

- 4. Install:
- front fork legs Refer to "FRONT FORK".

## NOTE: \_\_\_\_

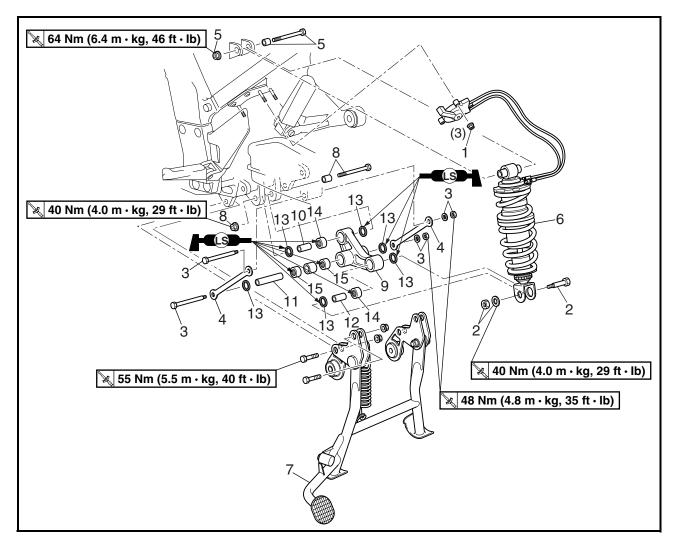
Temporarily tighten the lower and upper bracket pinch bolts.

- 5. Tighten:
- steering stem nut

🔌 115 Nm (11.5 m · kg, 85 ft · lb)



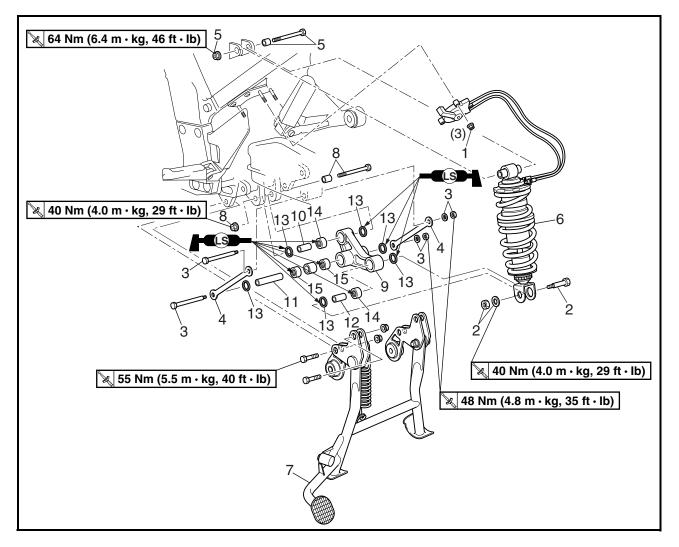
## REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM



Order	Job/Part	Q'ty	Remarks
	Removing the rear shock absorber		Remove the parts in the order listed.
	assembly and relay arm		
	Rear wheel		Refer to "REAR WHEEL AND BRAKE
			DISC".
	Mufflers/exhaust pipe		Refer to "ENGINE" in chapter 5.
1	Nut	3	
2	Nut/washer/bolt	1/1/1	Bolt $\ell = 54 \text{ mm}$
			(2.13 in) <sub>¬</sub> Refer to
3	Nut/washer/bolt	2/2/2	Bolt $\ell = 117 \text{ mm}$ "REMOVING/
			(4.61 in) INSTALLING THE
4	Connecting arm	2	REAR SHOCK
5	Nut/bolt/spacer	1/1/1	Bolt $\ell = 105 \text{ mm}$ $\square$ ABSORBER
			(4.13 in) ASSEMBLY".
6	Rear shock absorber assembly	1	
7	Centerstand	1	
8	Nut/bolt/spacer	1/1/1	Bolt <i>ℓ</i> = 76 mm (2.99 in)

REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

CHAS



Order	Job/Part	Q'ty	Remarks
9	Relay arm	1	
10	Collar	1	
11	Collar	1	
12	Collar	1	
13	Oil seal	6	
14	Bearing	2	Refer to "INSTALLING THE RELAY
15	Bearing	2	ARM".
			For installation, reverse the removal
			procedure.

## A WARNING

EAS0068

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

HANDLING THE REAR SHOCK ABSORBER

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.

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EAS00688
```

### DISPOSING OF A REAR SHOCK ABSORBER

Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2  $\sim$  3-mm (0.08  $\sim$  0.12 in) hole through the rear shock absorber at a point 15  $\sim$  20 mm (0.59  $\sim$  0.79 in) from its end as shown.

## A 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.

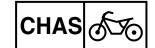
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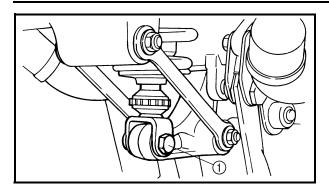
Securely support the motorcycle so that there is no danger of it falling over.

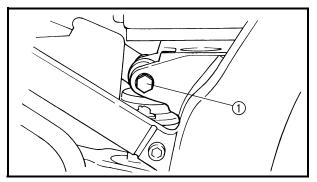
## NOTE:

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

## REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM







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

#### NOTE:

While removing the connecting arm bolt, hold the swingarm so that it does not drop down.

- 3. Remove:
- rear shock absorber assembly upper bolt ①
- rear shock absorber assembly

#### NOTE: \_

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

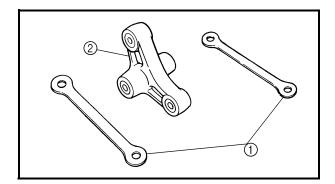
#### EAS00695

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

- 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  $\rightarrow$  Replace the rear shock absorber assembly.

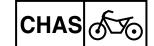
• bolts Bends/damage/wear  $\rightarrow$  Replace.



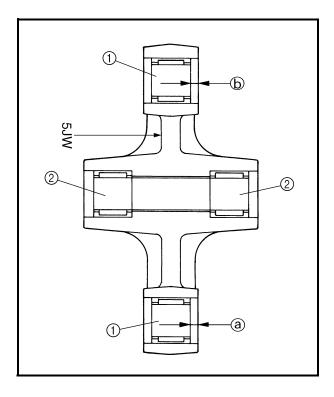
## CHECKING THE CONNECTING ARM AND RELAY ARM

- 1. Check:
- $\bullet$  connecting arms ()
- relay arm ②
   Damage/wear → Replace.

REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

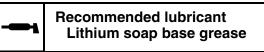


- 2. Check:
- bearings
- oil seals
- Damage/pitting  $\rightarrow$  Replace.
- 3. Check:
- spacers Damage/scratches  $\rightarrow$  Replace.



### INSTALLING THE RELAY ARM

- 1. Lubricate:
- spacers
- bearings



- 2. Install:
- bearing (1), (2)

(to the relay arm)



EAS00698

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Lubricate:
- spacers
- bearings

----

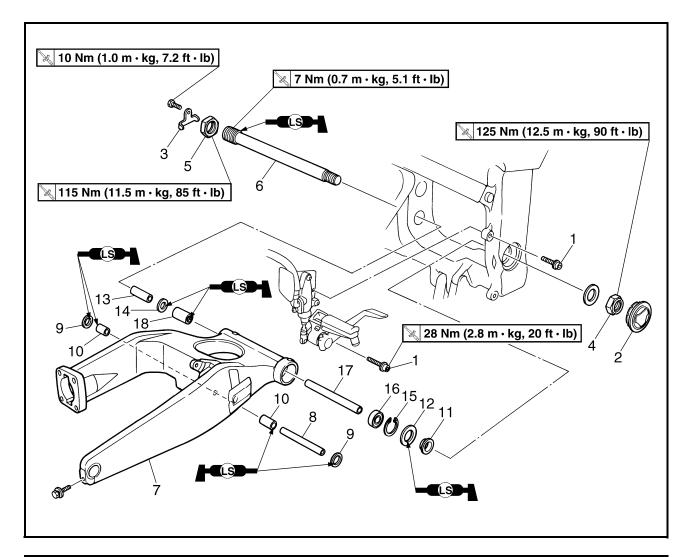
Recommended lubricant Lithium soap base grease

- 2. Install:
- rear shock absorber assembly

### NOTE: .

When installing the rear shock absorber assembly, lift up the swingarm.

## SWINGARM



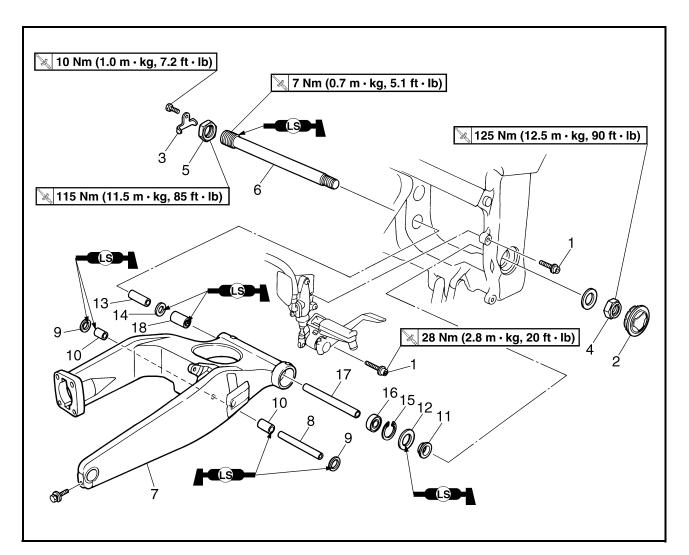
CHAS

SWINGARM

Order	Job/Part	Q'ty	Remarks
	Removing the swingarm		Remove the parts in the order listed.
	Mufflers		Refer to "ENGINE" in chapter 5.
	Rear wheel		Refer to "REAR WHEEL AND BRAKE DISC".
	Final drive assembly/universal joint		Refer to "SHAFT DRIVE".
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM".
1	Right footrest bracket bolt	2	
2	Cover	1	
3	Cover	1	
4	Pivot shaft nut	1	
5	Locknut	1	Refer to "REMOVING THE
6	Pivot shaft	1	SWINGARM".
7	Swingarm	1	
8	Spacer	1	

SWINGARM

CHAS



Order	Job/Part	Q'ty	Remarks
9	Oil seal	2	
10	Bearing	2	Refer to "INSTALLING THE SWINGARM".
11	Spacer	1	
12	Oil seal	1	
13	Bushing	1	
14	Oil seal	1	
15	Circlip	1	
16	Bearing	1	
17	Spacer	1	
18	Bearing	1	Refer to "INSTALLING THE
			SWINGARM".
			For installation, reverse the removal
			procedure.

## REMOVING THE SWINGARM

SWINGARM

1. Stand the motorcycle on a level surface.

## A 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.

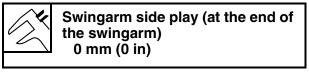
- 2. Measure:
- swingarm side play
- swingarm vertical movement

\*\*\*\*

a. Measure the tightening torque of the swingarm pivot shaft, pivot shaft nut and locknut.



- 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, bushing and bearings.



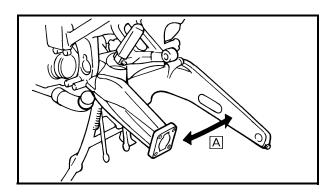
d. Check the swingarm vertical movement B by moving the swingarm up and down.

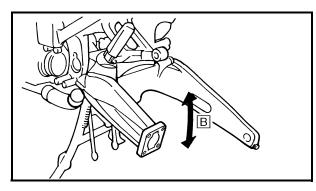
If swingarm vertical movement is not smooth or if there is binding, check the spacers, bushing and bearings.

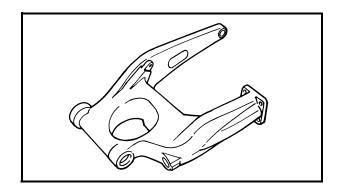
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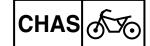
#### EAS00707 CHECKING THE SWINGARM

- 1. Check:
- swingarm Bends/cracks/damage  $\rightarrow$  Replace.

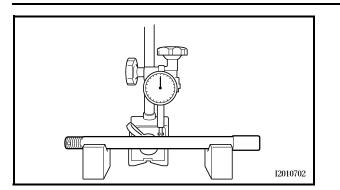










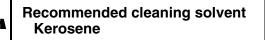


- Check:
   pivot shaft
  - Roll the pivot shaft on a flat surface. Bends  $\rightarrow$  Replace.

## A WARNING

Do not attempt to straighten a bent pivot shaft.

- 3. Wash:
- pivot shaft
- spacers
- bushing
- bearings

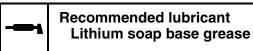


- 4. Check:
- spacers
- bushing
- oil seals
- Damage/wear → Replace. • bearings
  - Damage/pitting  $\rightarrow$  Replace.

EAS00712

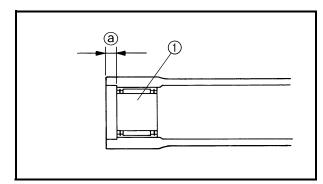
### **INSTALLING THE SWINGARM**

- 1. Lubricate:
- bearings
- spacers
- oil seals
- pivot shaft



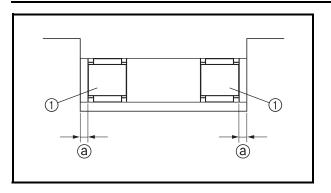
- 2. Install:
- bearing ①
   (to the swingarm)

Installed depth ⓐ 7.0 mm (0.28 in)









- 3. Install:
- bearing ① (to the swingarm)



Installed depth ⓐ 4.0 mm (0.16 in)

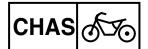


# SHAFT DRIVE

4	٩	Symptom	В	Possible cause
1.		pronounced hesitation or jerky movement		
	dυ	uring acceleration, deceleration or sustained	B. Im	proper gear backlash
	sp	peeds. (not to be confused with engine surg-	C. Da	amaged gear teeth
	in	g or transmission-related movements.)	D. Br	oken drive shaft
2.	А	rolling "rumble" noticeable at low speeds, a	E. Br	oken gear teeth
	hi	gh-pitched whine or a "clunk" from a shaft	F. Se	eizure due to lack of lubrication
	dr	rive component, or from the vicinity of the	G. Sr	nall foreign objects lodged between moving
	sh	naft drive.	ра	rts
3.	Tł	ne shaft drive is locked up or no power is		
	tra	ansmitted from the engine to the rear wheel.		

#### NOTE:

Causes A, B, and C may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal operating noises. If there is reason to believe that these components are damaged, remove them and check them individual.



#### Inspection notes

1. Investigate any unusual noises.

# The following noises may indicate a mechanical defect:

a. A rolling "rumble" during coasting, acceleration or deceleration (increases with the rear wheel speed, but does not increase with higher engine or transmission speeds).

Diagnosis: Possible wheel bearing damage

 b. A whining noise that varies with acceleration and deceleration.
 Diagnosis: Possible incorrect reassembly or

## A WARNING

too little gear backlash

Insufficient gear backlash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

 A slight "clunk" evident at low speed operation (not to be confused with normal motorcycle operation).

Diagnosis: Possible broken gear teeth

#### A WARNING

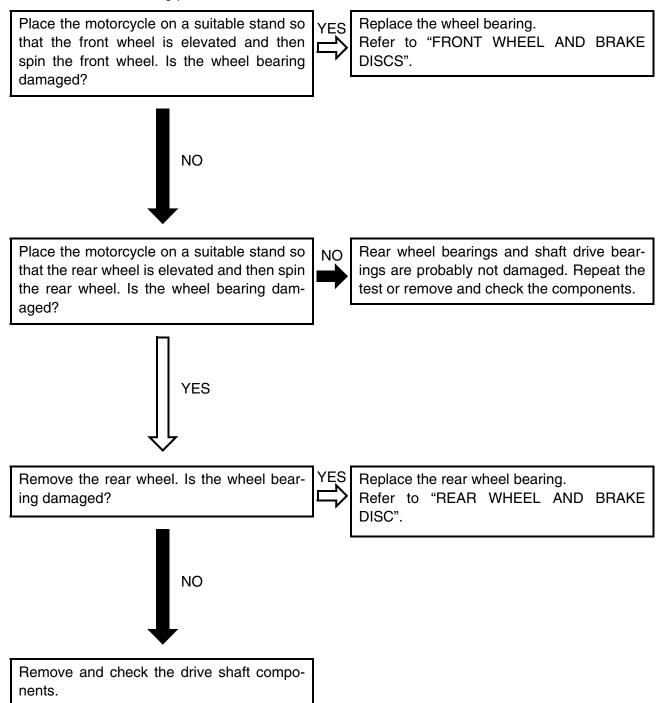
Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

\*\*\*\*



#### EAS00716 Troubleshooting chart

When causes (A) or (B) shown in the table at the beginning of the "TROUBLESHOOTING" section exist, check the following points.





## CHECKING THE FINAL DRIVE OIL FOR CONTAMINATION AND CHECKING THE SHAFT DRIVE FOR LEAKS

#### 1. Drain:

- final drive oil (from the final drive housing)
   Refer to "CHANGING THE FINAL DRIVE OIL" in chapter 3.
- 2. Check:
- final drive oil

Large amount of metal particles  $\rightarrow$  Check for bearing seizure.

#### NOTE: \_

A small amount of metal particles in the final drive oil is normal.

- 3. Check:
- shaft drive housing (for oil leaks)

#### \*\*\*\*

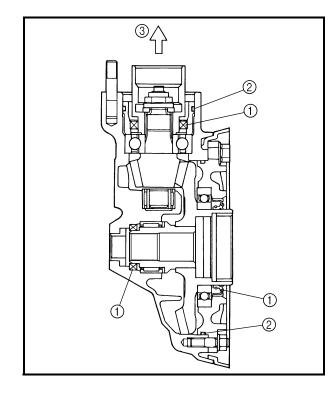
- a. Thoroughly clean the entire motorcycle and then completely dry it.
- b. Apply a leak-locating compound or dry powder spray to the shaft drive.
- c. Test ride the motorcycle long enough to locate a leak.
  - Oil leak  $\rightarrow$  Repair or replace the faulty part(s).
- 1) Oil seal
- ② O-ring

③ Forward

NOTE:

- What may appear to be an oil leak on a new or fairly new motorcycle, may result from the application of a rust preventive coating or excessive seal lubrication.
- Always clean the motorcycle and recheck the area where the leak is thought to originate from.

\*\*\*\*\*





# MEASURING THE RING GEAR BACKLASH

- 1. Secure the final drive assembly in a vise.
- 2. Remove:
- final drive oil drain bolt
- 3. Drain:
- final drive oil (from the final drive assembly)
- 4. Measure:
  - ring gear backlash
     Out of specification → Adjust.



Ring gear backlash 0.25 ~ 0.45 mm (0.010 ~ 0.018 in)

#### \*\*\*\*

- a. Install a bolt ① of the specified size, into the final drive oil filler hole.
- b. Finger tighten the bolt until it stops the ring gear from moving.

#### NOTE: .

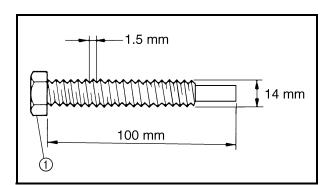
Do not overtighten the bolt.

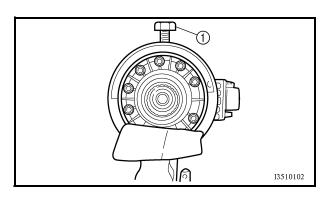
c. Install the final drive gear lash tool ② and dial gauge ③.

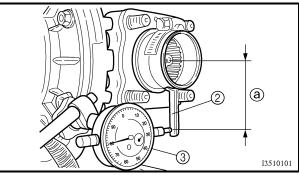


- (a) Dial-gauge-plunger contact point 60 mm (2.36 in)
- d. Gently rotate the gear coupling from engagement to engagement.
- e. Record the reading on the dial gauge.
- f. Remove the dial gauge, final gear backlash band, and bolt.
- g. Rotate the final drive pinion gear 90°.
- h. Reinstall the bolt, special tool, and dial gauge.
- i. Repeat steps (d) to (h) three more times (for a total of four measurements).
- j. If any of the readings are over specification, adjust the ring gear backlash.

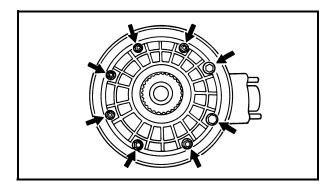
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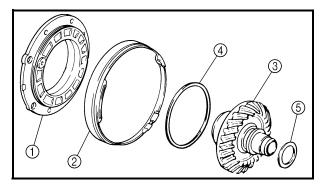












## ADJUSTING THE RING GEAR BACKLASH 1. Remove:

- ring gear bearing housing nuts
- ring gear bearing housing bolts

#### NOTE:

Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

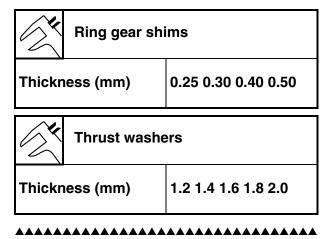
- 2. Remove:
- ring gear bearing housing ①
- dust cover ②
- ring gear ③
- ring gear shim(s) ④
- thrust washer (5)
- 3. Adjust:
- ring gear backlash

#### .....

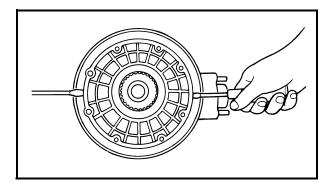
a. Select the suitable shim(s) and thrust washer with the following chart.

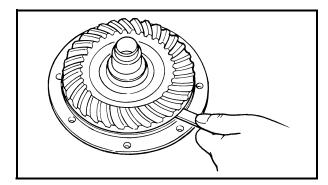
Thinner shim	Ring gear backlash is increased.
Thicker shim	Ring gear backlash is decreased.

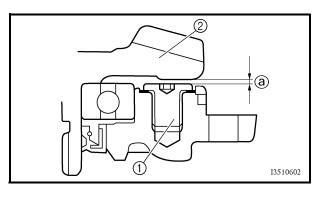
- b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
- c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2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

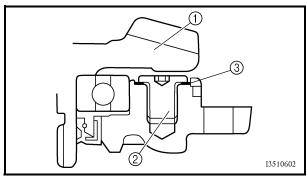








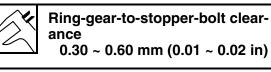




# MEASURING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE

#### 1. Remove:

- ring gear bearing housing (along with the ring gear)
   Refer to "ADJUSTING THE RING GEAR BACKLASH".
- 2. Measure:
- ring-gear-to-stopper-bolt clearance ⓐ Out of specification → Adjust.

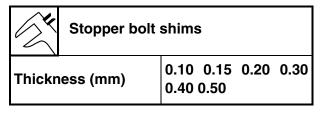


- ① Stopper bolt
- ② Ring gear
- 3. Install:
- ring gear bearing housing (along with the ring gear)

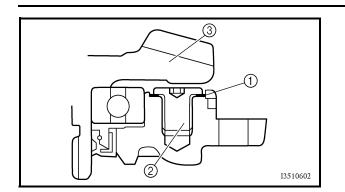
EAS00722

#### ADJUSTING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE

- 1. Remove:
- ring gear ①
- stopper bolt ②
- stopper bolt shim(s) (3)
- ring gear bearing housing
- 2. Select:
- stopper bolt shim(s)







- 3. Install:
- stopper bolt shim(s) ①

stopper bolt ②

🔌 9 Nm (0.9 m · kg, 6.5 ft · lb)

- ring gear ③
- ring gear bearing housing

#### CAUTION:

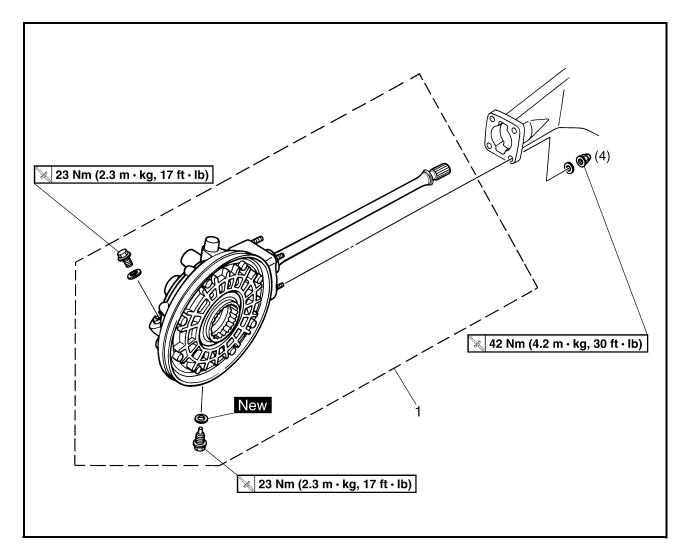
- The stopper bolt has left-hand threads. To tighten the stopper bolt, turn it counter-clockwise.
- Apply LOCTITE<sup>®</sup> onto the stopper bolt.
- 4. Measure:
- ring-gear-to-stopper-bolt clearance

#### NOTE: .

If the ring-gear-to-stopper-bolt clearance is out of specification, repeat the above procedure.

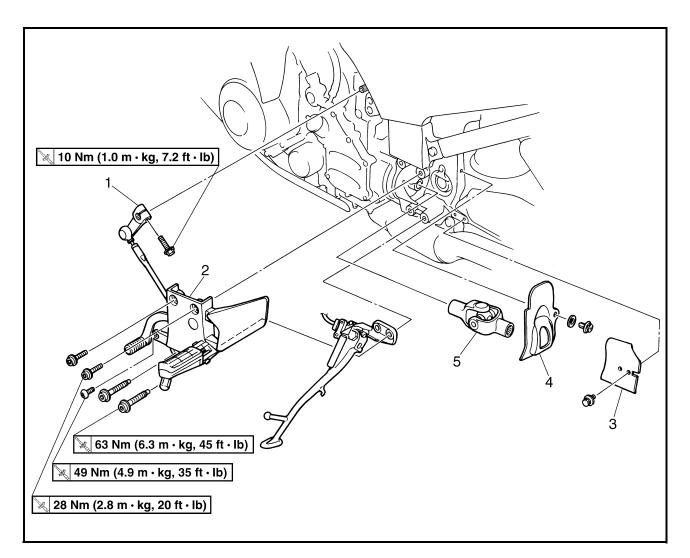
EAS00718





Order	Job/Part	Q'ty	Remarks
	Removing the final drive assembly		Remove the parts in the order listed.
	Final gear oil		Drain.
	Rear wheel		Refer to "REAR WHEEL AND BRAKE DISC".
1	Final drive assembly	1	Refer to "INSTALLING THE UNIVERSAL JOINT AND FINAL DRIVE ASSEMBLY". For installation, reverse the removal procedure.

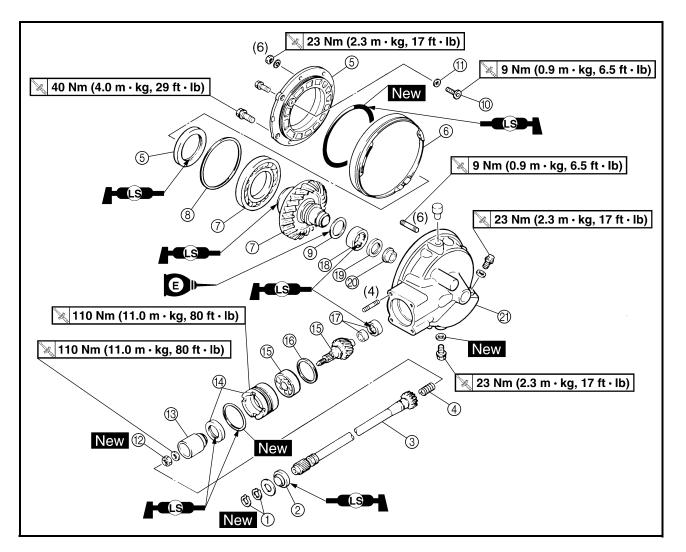
SHAFT DRIVE CHAS



Order	Job/Part	Q'ty	Remarks
	Removing the universal joint		Remove the parts in the order listed.
	Final drive assembly		
1	Shift arm	1	Refer to "INSTALLING THE UNIVERSAL JOINT AND FINAL DRIVE ASSEMBLY".
2	Left footrest bracket	1	Refer to "REMOVING THE LEFT FOOTREST BRACKET".
3	Dust cover	1	
4	Dust seal	1	
5	Universal joint	1	
			For installation, reverse the removal procedure.

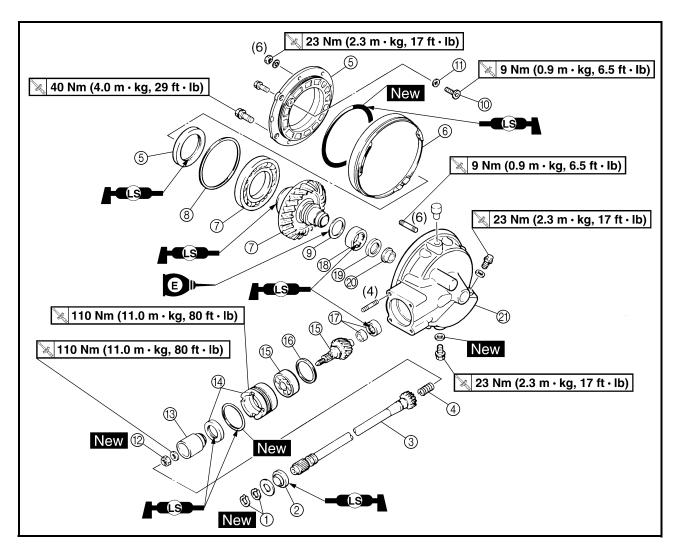
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EAS00723



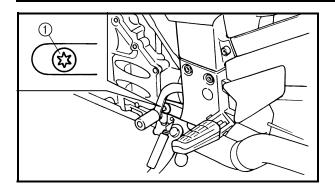
Order	Job/Part	Q'ty	Rem	narks
	Disassembling the final drive		Remove the parts in	the order listed.
	assembly			
1	Circlip	2		
2	Oil seal	1		
3	Drive shaft	1		
4	Spring	1		
5	Ring gear bearing housing/oil seal	1/1		
6	Dust cover	1		1
7	Ring gear/bearing	1/1		Refer to "ALIGNING
8	Ring gear shim(s)			THE FINAL DRIVE
9	Thrust washer	1		PINION GEAR AND
10	Stopper bolt	1	Left-hand threads.	RING GEAR".
(1)	Stopper bolt shim(s)			

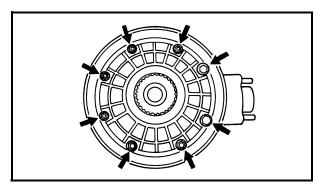


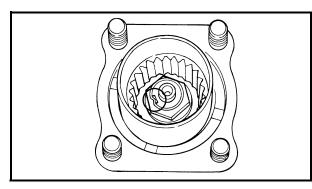


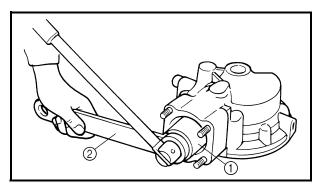
Order	Job/Part	Q'ty	Remarks
12	Nut	1	Left-hand threads. TRefer to
(13)	Gear coupling	1	"DISASSEMBLING
14)	Bearing retainer/oil seal	1/1	Left-hand threads. THE FINAL DRIVE
15	Final drive pinion gear/bearing	1/1	ASSEMBLY" and
16	Final drive pinion gear shim(s)		] "ALIGNING THE
17	Bearing	1	FINAL DRIVE
(18)	Bearing	1	PINION GEAR AND
(19)	Oil seal	1	RING GEAR".
20	Collar	1	
21	Final drive housing	1	
			For assembly, reverse the disassembly
			procedure.











#### REMOVING THE LEFT FOOTREST BRACKET

#### 1. Remove:

 left footrest bracket bolt ① (with the T50 torx wrench)

# DISASSEMBLING THE FINAL DRIVE ASSEMBLY

- 1. Remove:
- ring gear bearing housing nuts
- ring gear bearing housing bolts

#### NOTE:

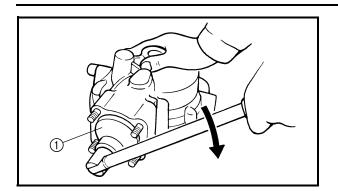
Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

- 2. Straighten:
- punched portion of the nut

- 3. Remove:
- nut
- gear coupling
  - (with the gear holder 2)

Gear holder YM-01229





4. Remove:

bearing retainer
 (with the piston bearing retainer remover
 (1)

Piston bearing retainer remover YU-04050

#### CAUTION:

The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.

- 5. Remove:
- final drive pinion gear

#### A WARNING

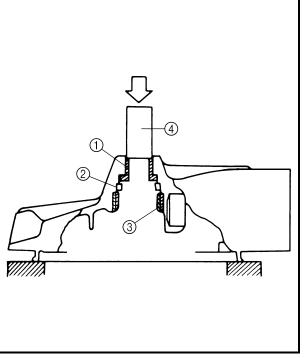
Always use new bearings.

## CAUTION:

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

#### NOTE: \_

Lightly tap on the end of the final drive pinion gear with a soft hammer.



## REMOVING AND INSTALLING THE RING GEAR BEARINGS

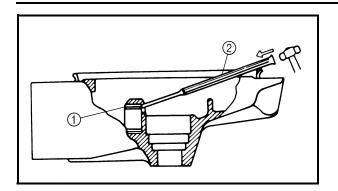
- 1. Remove:
- collar (1)
- oil seal 2
- bearing ③

(with an suitable press tool ④ and an appropriate support for the final drive housing)

- 2. Check:
- bearing  $Damage \rightarrow Replace.$

## EAS00725 REMO GEAR





- 3. Remove:
- bearing ①

#### \*\*\*\*

- a. Heat the final drive housing to approximately 150 °C (302 °F).
- b. Remove the bearing outer races with an appropriately shaped punch ②.
- c. Remove the inner race from the final drive pinion gear.

#### NOTE: .

The removal of the final drive pinion gear bearing is a difficult procedure and is rarely necessary.

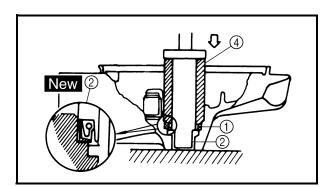
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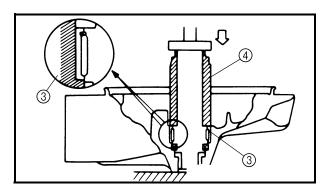
- 4. Install:
- bearing New

#### \*\*\*\*

- a. Heat the final gear case to approximately 150 °C (302 °F).
- b. Install the bearing outer races with a socket or appropriate tool that matches the diameter of the races.
- c. Install the inner race onto the final drive pinion gear.

\*\*\*\*\*





- 5. Install:
- collar ①
- oil seal ② New
- bearing ③

(with a suitable press tool ④ and an appropriate support for the final drive housing)

#### NOTE:

The bearing can be reused, but Yamaha recommends installing a new one.



# ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR

#### NOTE: \_

Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:

- Final drive housing
- Ring gear bearing housing
- Any bearing
- 1. Select:

(1)

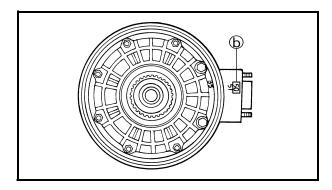
(2)

- final drive pinion gear shim(s) ①
- ring gear shim(s) 2

#### \*\*\*\*

- a. Position the final drive pinion gear and the ring gear with shims ① and ②. Calculate the respective thicknesses from information marked on the final drive housing and the drive pinion gear.
- 1) Final drive pinion gear shim
- ② Ring gear shim
- ③ Thrust washer

3



b. To find final drive pinion gear shim thickness "A", use the following formula:

Final drive pinion gear shim thickness A = (84 + @/100) - (83 + @/100)

#### Where:

(a) = a numeral (positive or negative) on the final drive pinion gear, to be divided by 100 and added to "84". If there is not a numeral available on the final drive pinion gear, (a) equals zero.

(b) = a numeral on the final drive housing, to be divided by 100 and added to "83".

#### Example:

If the final drive pinion gear is marked "+01" and the final drive housing is marked "50":

- A = (84 + 1/100) (83 + 50/100)
  - = (84 + 0.01) (83 + 0.50)



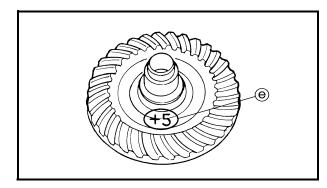
Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm (0.02 in). Shim sizes are supplied in the following thicknesses.

J.	Final drive pinion gear shims	
Thickness (mm)		0.30 0.40 0.50

Since the final drive pinion gear shims are only available in 0.10 mm (0.004 in) increments, round off to the hundredths digit.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm (0.02 in). The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm (0.02 in) final drive pinion gear shim.



c. To find ring gear shim thickness "B", use the following formula:

Ring gear shim thickness B = (45 + ⓒ/100) + (3 + ⓓ/100) -[(35.40 - ⓔ/100) + ᠿ]

#### Where:

 $\bigcirc$  = a numeral on the final drive housing, to be divided by 100 and added to "45".

 $\bigcirc$  = a numeral usually on the outside of the ring gear bearing housing, to be divided by 100 and added to "3".

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

(f) = the ring gear bearing thickness constant.



Ring gear bearing thickness "①" 13.00 mm (0.51 in)



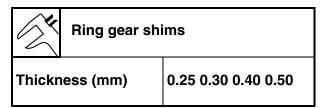
#### Example:

If the final drive housing is marked "51", the ring gear bearing housing is marked "35", the ring gear is marked "-05", and " $\bigcirc$ " is 13.00:

- B = (45 + 51/100) + (3 + 35/100) -
  - [(35.40 5/100) + 13]
  - = (45 + 0.51) + (3 + 0.35) -
  - [(35.40 0.05) + 13]
  - = 45.51 + 3.35 [(35.40 0.05) + 13]
  - = 48.86 [35.35 + 13]

Therefore, the calculated ring gear shim thickness is 0.51 mm (0.02 in).

Shim sizes are supplied in the following thicknesses.

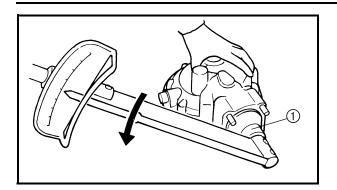


Since the ring gear shims are only available in 0.10 mm (0.004 in) increments, round off the hundredths digit.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

In the example above, the calculated ring gear shim thickness is 0.51 mm (0.02 in). The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm (0.02 in) ring gear shim.





- 2. Install:
- shims (as calculated)

- final drive pinion gear
- bearing retainer

🔌 110 Nm (11.0 m · kg, 80 ft · lb)

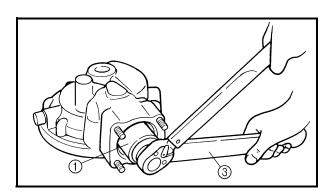
(with the piston bearing retainer remover 1)

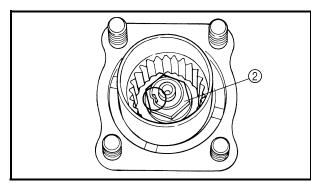
#### CAUTION:

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



Piston bearing retainer remover YM-04050





- 3. Install:
- gear coupling ①
- nut (2) [110 Nm (11.0 m · kg, 80 ft · lb)] (with the coupling gear holder (3))

Gear holder YM-01229

CAUTION:

Apply LOCTITE<sup>®</sup> to the nut.

4. Lock the threads with a drift punch.

- 5. Install:
- ring gear bearing housing (along with the ring gear, but without the thrust washer)
- 6. Adjust:
- ring gear backlash Refer to "MEASURING THE RING GEAR BACKLASH" and "ADJUSTING THE RING GEAR BACKLASH".



- 7. Measure:
- ring-gear-to-thrust-washer clearance

#### \*\*\*\*\*

- a. Remove the ring gear bearing housing (along with the ring gear).
- b. Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
- c. Install the ring gear bearing housing and tighten the bolts and nuts to specification.



Ring gear bearing housing bolt 40 Nm (4.0 m · kg, 29 ft · lb) Ring gear bearing housing nut 23 Nm (2.3 m · kg, 17 ft · lb)

#### NOTE:

Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrustwasher clearance with Plastigauge<sup>®</sup>.

- d. Remove the ring gear bearing housing.
- e. Measure the width of the flattened Plastigauge<sup>®</sup> (1).



0.10 ~ 0.20 mm (0.004 ~ 0.008 in)

- f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).
- g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
- h. Select the suitable thrust washer from the following chart.



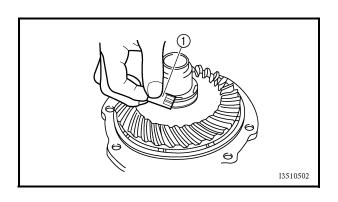
Thickness (mm)

1.2 1.4 1.6 1.8 2.0

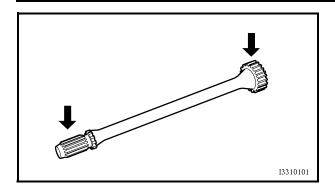
i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.

> Ring-gear-to-thrust-washer clearance 0.10 ~ 0.20 mm (0.004 ~ 0.008 in)

\_\_\_\_\_







#### EAS00727 CHECKING THE DRIVE SHAFT

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

EAS00728

#### INSTALLING THE UNIVERSAL JOINT AND FINAL DRIVE ASSEMBLY

- 1. Lubricate:
- universal joint splines
- drive shaft splines



### Recommended lubricant Lithium soap base grease

- 2. Install:
- universal joint
- final drive assembly

#### NOTE: \_

Align the drive shaft splines with the driven yoke of the universal joint.

- 3. Tighten:
- final drive assembly nuts

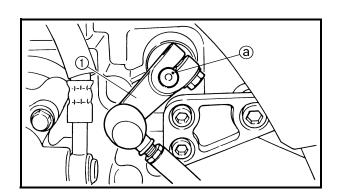
¾ 42 Nm (4.2 m · kg, 30 ft · lb)

- 4. Install:
- shift arm () 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE: \_

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

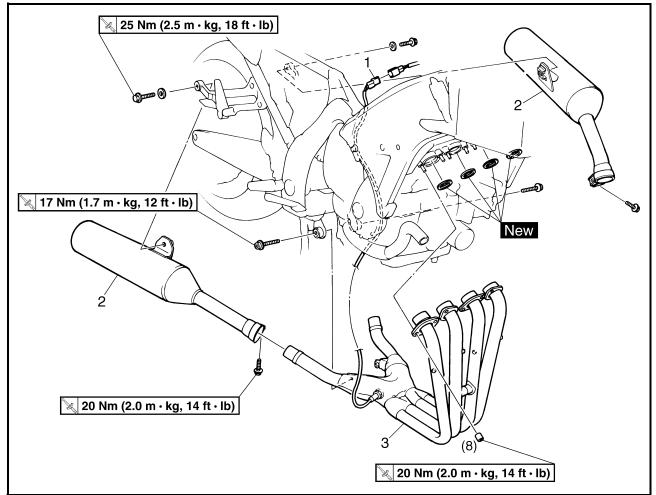
- 5. Install:
- rear wheel
  - Refer to "REAR WHEEL AND BRAKE DISC".
- 6. Fill:
- final drive assembly Refer to "CHECKING THE FINAL DRIVE OIL LEVEL" in chapter 3.
- 7. Check:
- shift pedal position
  - Refer to "ADJUSTING THE SHIFT PEDAL" in chapter 3.



ENGINE

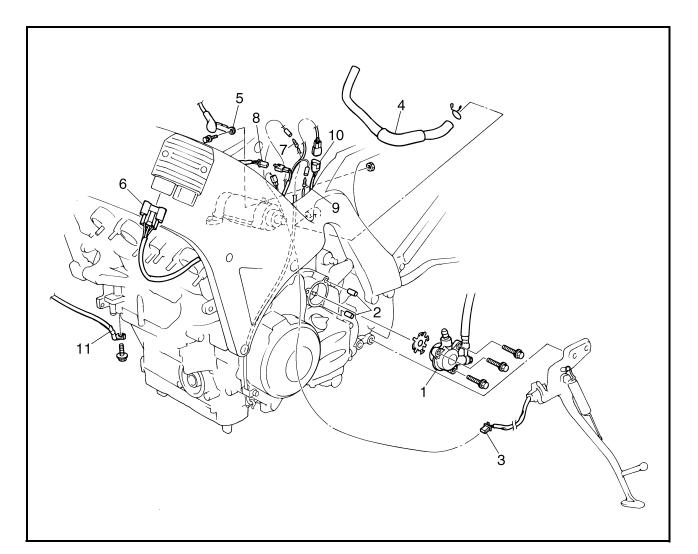
## ENGINE

MUFFLERS AND EXHAUST PIPE ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the mufflers and exhaust		Remove the parts in the order listed.
	pipe assembly Seats/fuel tank/T-bar/rubber seat		Refer to "SEATS AND FUEL TANK" in
	Seals/Idei lain/ 1-bai/Idbbei Seal		chapter 3.
	Side cowlings/front cowling assembly		Refer to "COWLINGS" in chapter 3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator		Refer to "RADIATOR" in chapter 6.
1	O2 sensor coupler	1	Disconnect.
2	Muffler (left and right)	2	
3	Exhaust pipe assembly	1	
			For installation, reverse the removal procedure.

#### LEADS AND HOSES



Order	Job/Part	Q'ty	Remarks
	Removing the leads and hoses		Remove the parts in the order listed.
	Air filter case		Refer to "AIR FILTER CASE" in chapter
			3.
	Throttle bodies		Refer to "FUEL INJECTION SYSTEM" in
			chapter 7.
	Air cut-off valve assembly/hoses/reed		Refer to "AIR INDUCTION SYSTEM" in
	valves		chapter 7.
	Thermostat assembly		Refer to "THERMOSTAT" in chapter 6.
	Engine oil/oil filter cartridge		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
	Oil cooler		Refer to "OIL COOLER" in chapter 6.
	Water pump		Refer to "WATER PUMP" in chapter 6.

5

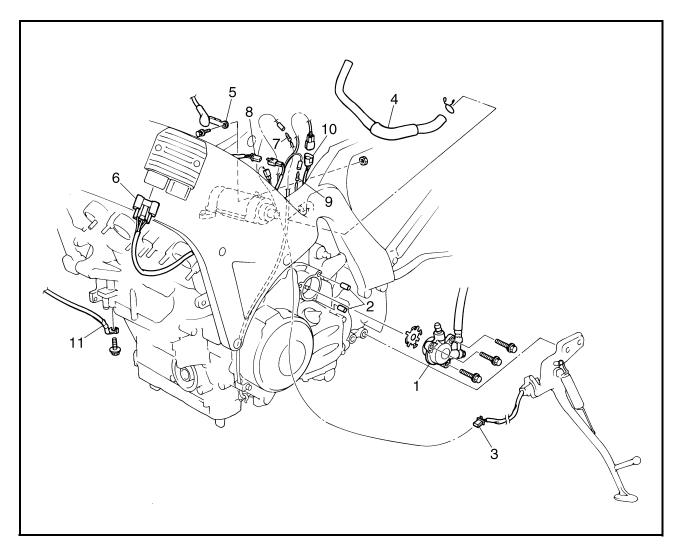
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ENGINE

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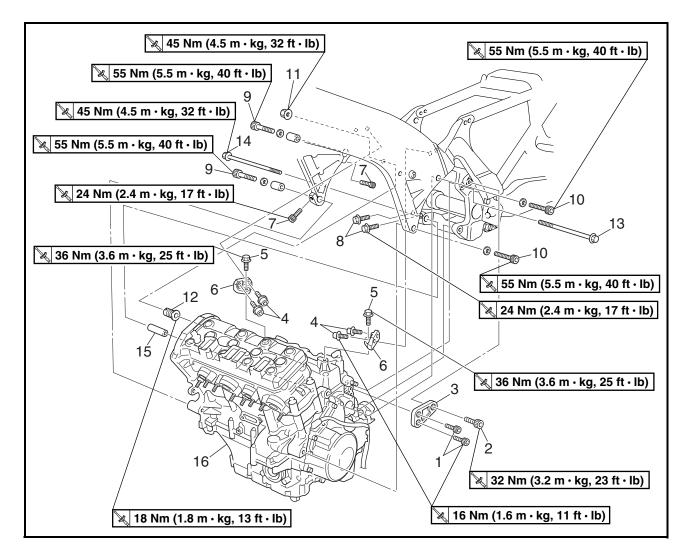
ENGINE





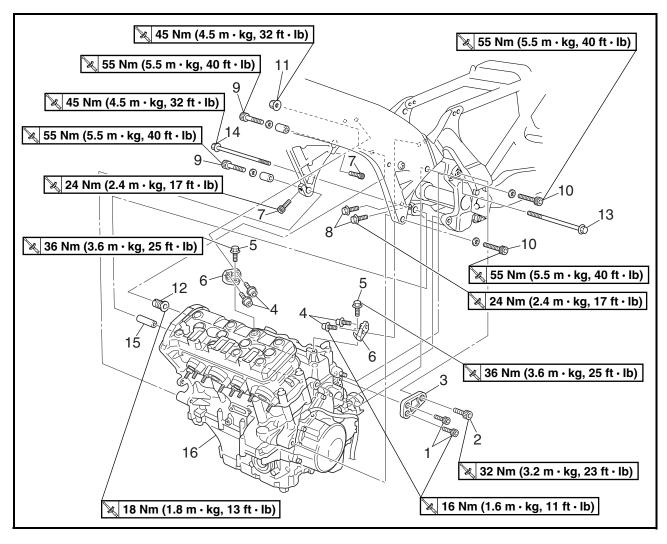
Order	Job/Part	Q'ty	Remarks
	Left footrest bracket/dust cover		Refer to "SHAFT DRIVE" in chapter 4.
1	Clutch release cylinder	1	
2	Dowel pin	2	
3	Sidestand switch coupler	1	Disconnect.
4	Crankcase breather hose	1	
5	Starter motor lead	1	Disconnect.
6	Stator assembly coupler	1	Disconnect.
7	Oil level sensor connector	1	Disconnect.
8	Crankshaft position sensor coupler	1	Disconnect.
9	Neutral switch connector	1	Disconnect.
10	Speed sensor coupler	1	Disconnect.
11	Ground lead	1	
			For installation, reverse the removal
			procedure.

# EAS00191



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.
1	Bolt (engine bracket 1 and engine)	2	
2	Bolt (engine bracket 1 and frame)	1	
3	Engine bracket 1	1	
4	Bolt (engine bracket 2 and frame)	4	
5	Bolt (engine bracket 2 and engine)	2	Refer to "INSTALLING THE ENGINE".
6	Engine bracket 2	2	Refer to INSTALLING THE ENGINE .
7	Pinch bolt	2	
8	Pinch bolt	2	
9	Front mounting bolt (right)	2	
10	Front mounting bolt (left)	2	μ

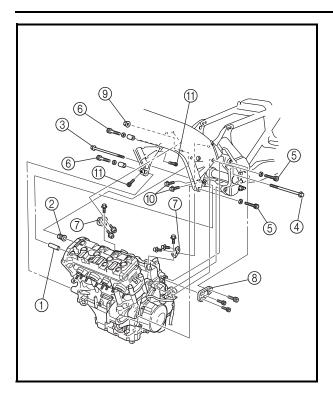


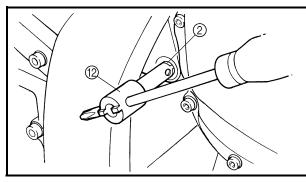


Order	Job/Part	Q'ty	Remarks
11	Nut	1	г
12	Spacer bolt	1	Loosen.
13	Rear upper mounting bolt	1	Refer to "INSTALLING
14	Rear lower mounting bolt	1	THE ENGINE".
15	Spacer	1	
16	Engine	1	
			For installation, reverse the removal
			procedure.

ENGINE







#### EAS00192 **INSTALLING THE ENGINE**

- 1. Install:
- spacer (1)
- spacer bolt (2)
- rear lower mounting bolt ③
- rear upper mounting bolt ④
- front mounting bolts (5), (6)
- engine bracket 2 ⑦
- engine bracket 1 (8)

#### NOTE:

Do not fully tighten the bolts.

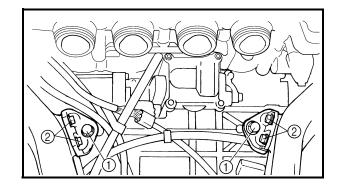
- 2. Tighten the bolts in the following order.
- front mounting bolts (left) (5) 🔌 55 Nm (5.5 m · kg, 40 ft · lb)
- rear lower mounting bolt ③ 🔌 45 Nm (4.5 m · kg, 32 ft · lb)
- spacer bolt 2
- 🔌 18 Nm (1.8 m · kg, 13 ft · lb) • nut (9)
  - 💐 45 Nm (4.5 m · kg, 32 ft · lb)
- front mounting bolts (left) (5) 🍇 55 Nm (5.5 m · kg, 40 ft · lb)
- front mounting bolts (right) ⑥ 🔀 55 Nm (5.5 m ⋅ kg, 40 ft ⋅ lb)
- pinch bolts (1) 24 Nm (2.4 m · kg, 17 ft · lb)
- pinch bolt (1) 🛛 24 Nm (2.4 m · kg, 17 ft · lb)

#### NOTE: .

- Tighten the spacer bolt (2) to specification with a frame spanner socket 12.
- When tightened, the spacer bolt (2) should be flat against the engine surface.



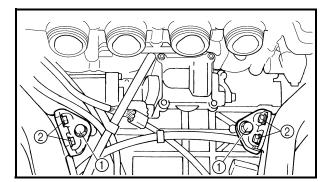
Frame spanner socket YM-01471

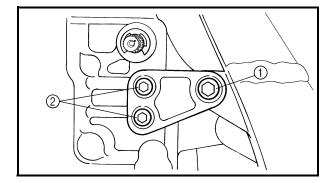


3. Temporarily tighten the bolts (engine bracket 2 and engine) (1) and bolts (engine bracket 2 and frame) 2.

#### NOTE:

When temporarily tightened, the bolts (1), (2) should be flat against the engine and frame surface.





# ENGINE



- 4. Tighten the bolts in the following order.
  bolts (engine bracket 2 and engine) ①
  - $\frac{1}{\sqrt{36}} \frac{2 \text{ and engine}}{36 \text{ Nm (3.6 m · kg, 25 ft · lb)}}$
- bolts (engine bracket 2 and frame) ②
   16 Nm (1.6 m · kg, 11 ft · lb)
- Temporarily tighten the bolt (engine bracket 1 and frame) ① and bolts (engine bracket 1 and engine) ②.

#### NOTE: \_

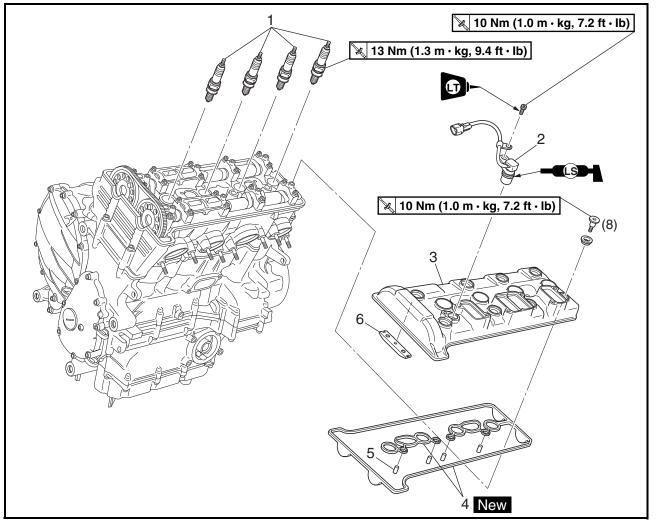
When temporarily tightened, the bolts (1), (2) should be flat against the engine and frame surface.

- 6. Tighten the bolts in the following order.
- bolt (engine bracket 1 and engine) ①
- bolts (engine bracket 1 and fame) 2

🔌 16 Nm (1.6 m · kg, 11 ft · lb)



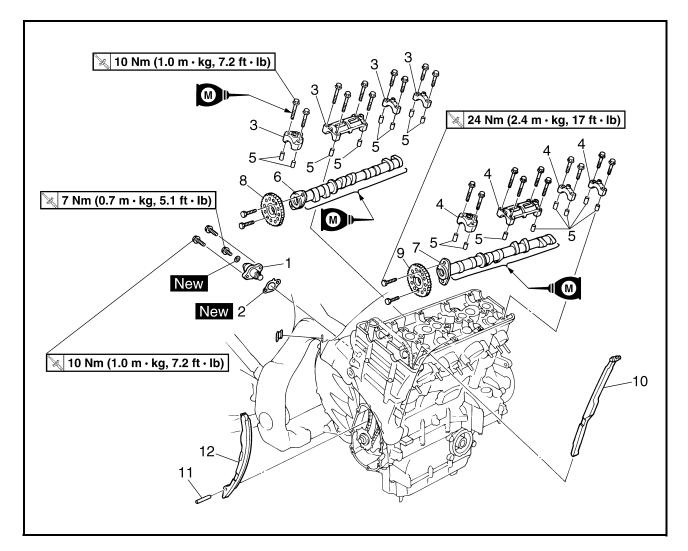




Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head cover		Remove the parts in the order listed.
	Reed valves		Refer to "AIR INDUCTION SYSTEM" in
			chapter 7.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
1	Spark plug	4	
2	Cylinder identification sensor	1	
3	Cylinder head cover	1	Refer to "INSTALLING THE CAM-
4	Cylinder head cover gasket	1	SHAFTS".
5	Dowel pin	4	
6	Timing chain guide (top side)	1	
			For installation, reverse the removal
			procedure.

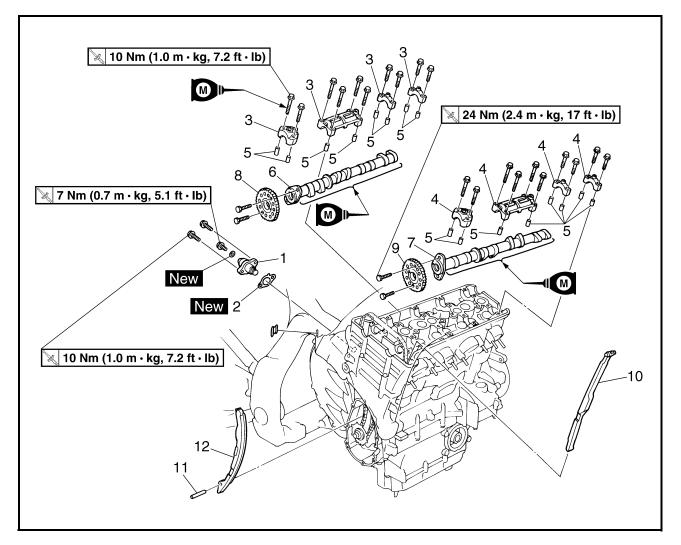


#### EAS00196 CAMSHAFTS



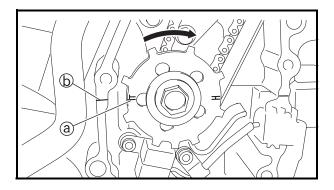
Order	Job/Part	Q'ty	Remarks
	Removing the camshafts		Remove the parts in the order listed.
	Throttle bodies		Refer to "FUEL INJECTION SYSTEM" in chapter 7.
	Pickup coil rotor cover		Refer to "PICKUP COIL ROTOR".
1	Timing chain tensioner	1	
2	Timing chain tensioner gasket	1	
3	Intake camshaft cap	4	
4	Exhaust camshaft cap	4	Refer to "REMOVING/INSTALLING THE CAMSHAFTS".
5	Dowel pin	16	
6	Intake camshaft	1	
7	Exhaust camshaft	1	
8	Intake camshaft sprocket	1	Refer to "INSTALLING THE CAM-
9	Exhaust camshaft sprocket	1	SHAFTS".





Order	Job/Part	Q'ty	Remarks
10	Timing chain guide (exhaust side)	1	
11	Pin	1	
12	Timing chain guide (intake side)	1	
			For installation, reverse the removal
			procedure.





# REMOVING THE CAMSHAFTS

#### 1. Align:

• "T" mark on the pickup coil rotor (with the crankcase mating surface)

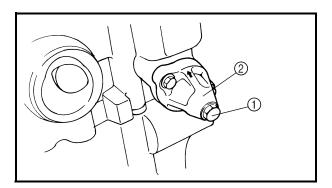
#### \*\*\*\*

- a. Turn the crankshaft clockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "T" mark (a) on the pickup coil rotor with the crankcase mating surface (b).

#### NOTE: .

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

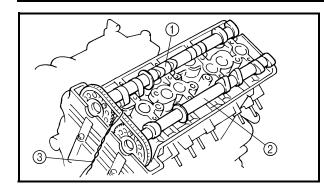
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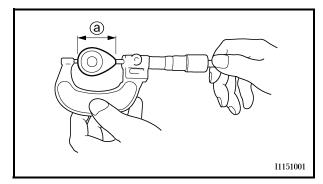


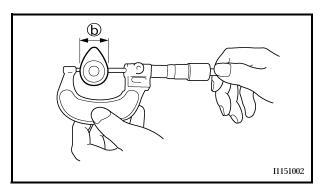
- 2. Loosen:
- cap bolt ①
- 3. Remove:
- timing chain tensioner 2
- gasket
- 4. Remove:
- camshaft caps
- dowel pins
- CAUTION:

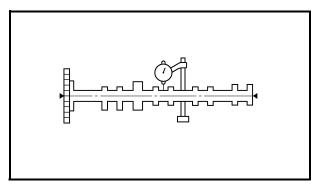
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a crisscross pattern, working from the outside in.











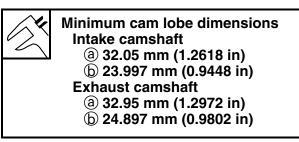
- 5. Remove:
- intake camshaft ①
- exhaust camshaft (2)

#### NOTE: .

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

# CHECKING THE CAMSHAFTS

- 1. Check:
- camshaft lobes Blue discoloration/pitting/scratches  $\rightarrow$  Replace the camshaft.
- 2. Measure:
- camshaft lobe dimensions ⓐ and ⓑ Out of specification → Replace the camshaft.



- 3. Measure:
- camshaft runout
   Out of specification → Replace.



Maximum camshaft runout 0.03 mm (0.0012 in)

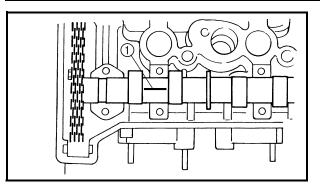
- 4. Measure:
- camshaft-journal-to-camshaft-cap clearance

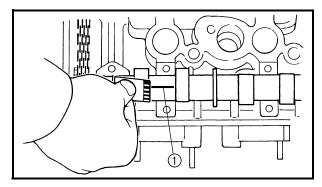
Out of specification  $\rightarrow$  Measure the camshaft journal diameter.



Camshaft-journal-to-camshaftcap clearance 0.028 ~ 0.062 mm (0.0011 ~ 0.0024 in)







- a lastall the complete into the outinder bood
- a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
- b. Position a strip of Plastigauge<sup>®</sup> ① onto the camshaft journal as shown.
- c. Install the dowel pins and camshaft caps.

#### NOTE: .

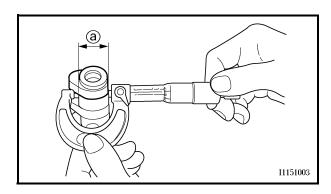
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge<sup>®</sup>.

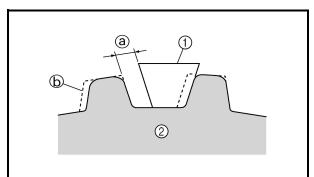


Camshaft cap bolt 10 Nm (1.0 m · kg, 7.2 ft · lb)

d. Remove the camshaft caps and then measure the width of the Plastigauge<sup>®</sup> ①.

\*\*\*\*\*





- 5. Measure:
- camshaft journal diameter ⓐ
  - Out of specification  $\rightarrow$  Replace the camshaft.

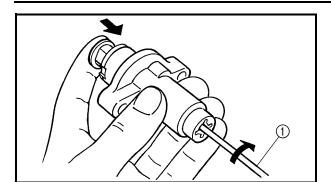
Within specification  $\rightarrow$  Replace the cylinder head and the camshaft caps as a set.

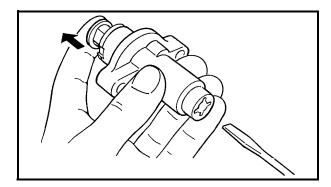


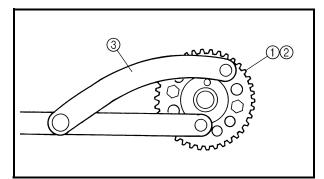
Camshaft journal diameter 24.459 ~ 24.472 mm (0.9630 ~ 0.9635 in)

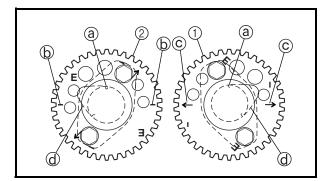
#### CHECKING THE CAMSHAFT SPROCKETS

- 1. Check:
- camshaft sprocket
   Wear/damage → Replace the camshaft sprockets and timing chain as a set.
- (a) 1/4 of a tooth
- (b) Correct
- ① Timing chain
- ② Camshaft sprocket









# CHECKING THE TIMING CHAIN TENSIONER

CAMSHAFTS

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

#### \*\*\*\*

ENG

 $\bigcirc$ 

- a. While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver ①.
- 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.

\*\*\*\*\*

#### EAS00217

#### **INSTALLING THE CAMSHAFTS**

- 1. Install:
- exhaust camshaft sprocket (1)

🍇 24 Nm (2.4 m ⋅ kg, 17 ft ⋅ lb)

intake camshaft sprocket ②
 24 Nm (2.4 m · kg, 17 ft · lb)

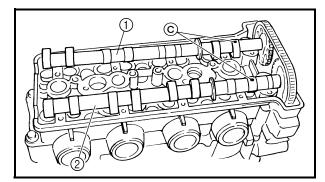
(with the special tool ③)

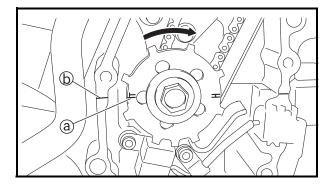


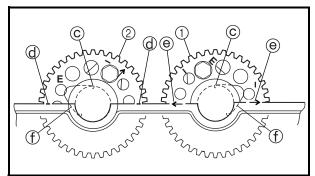
#### NOTE: \_

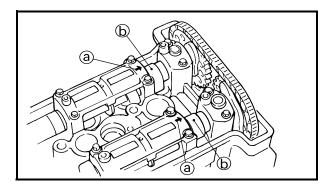
Make sure that the holes (a) in the cylinder #4 cam and marks (b) and (c) on the camshaft sprockets are in the position shown in the illustration.

- (b) : Intake side "—"
- $\bigcirc$  : Exhaust side " $\rightarrow$ "
- (d) : Cylinder #1 cam











- 2. Install:
- exhaust camshaft (1)
- intake camshaft ② (with the camshaft sprockets)

#### ··<u>·</u>····

- a. Turn the crankshaft clockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "T" mark (a) on the pickup coil rotor with the crankcase mating surface (b).
- c. Install the timing chain onto both camshaft sprockets, and then install the camshafts.

#### NOTE:

- Install the camshafts with the hole © in the cylinder #4 cam facing up.
- When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
- Make sure the marks (e) on the timing chain sprockets are parallel with the edge of the cylinder head.
- d : Intake side "---"
- e : Exhaust side " $\rightarrow$ "
- ①: Cylinder #1 cam

#### **\*\*\*\***

- 3. Install:
- dowel pins
- intake camshaft caps
- exhaust camshaft caps

#### NOTE:

- The "I" mark refers to the intake camshaft caps and the "E" mark refers to the exhaust camshaft cap.
- Install the camshaft caps with the arrow mark
   (a) pointing towards the right side of the engine.
- Make sure the punch marks (b) in the camshaft are aligned with the arrow mark (a) on the camshaft caps.



- CAMSHAFTS
- 4. Install:
- camshaft cap bolts

# 🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

## 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 tensioner

#### \*\*\*\*

a. While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver ①.

#### NOTE: \_

Make sure that the tensioner rod has been fully set clockwise.

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.

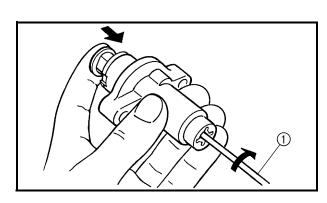
## A WARNING

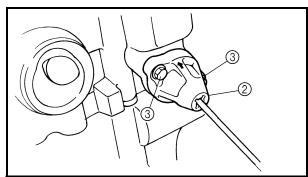
#### Always use a new gasket.

c. Tighten the timing chain tensioner bolts ③ to the specified torque.



Timing chain tensioner bolt 10 Nm (1.0 m  $\cdot$  kg, 7.2 ft  $\cdot$  lb)





CAMSHAFTS

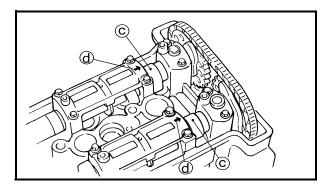


d. Remove the screwdriver, make sure the timing chain tensioner rod releases, and then tighten the cap bolt to the specified torque.

> Cap bolt 10 Nm

10 Nm (1.0 m  $\cdot$  kg, 7.2 ft  $\cdot$  lb)

.....



- 6. Turn:
  - crankshaft (several turns clockwise)
- 7. Check:
- "T" mark (a) Make sure the "T"
  - Make sure the "T" mark (a) on the pickup coil rotor is aligned with the crankcase mating surface (b).
- camshaft holes © Make sure the holes © in the cylinder #4 cam are aligned with the arrow marks (d) on the camshaft caps.

Out of alignment  $\rightarrow$  Adjust.

Refer to the installation steps above.

- 8. Measure:
- valve clearance
   Out of specification → Adjust.
   Refer to "ADJUSTING THE VALVE
   CLEARANCE" in chapter 3.



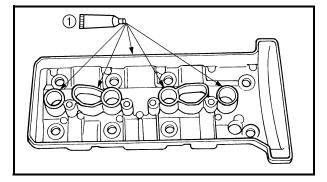


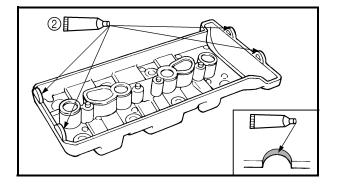
- 9. Install:
- cylinder head cover gasket New
- cylinder head cover

🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

## NOTE:

- Apply bond T1541 ① onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply bond YGK8624-C1 ② onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- Tighten the cylinder head cover bolts stages and in a crisscross pattern.

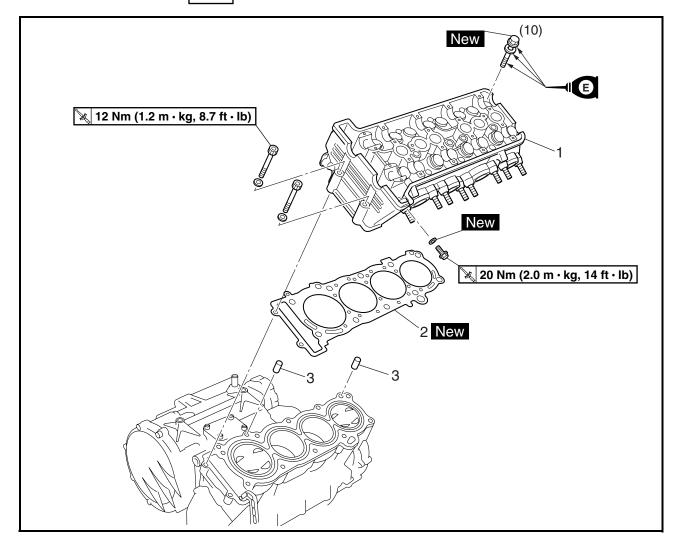






**CYLINDER HEAD** 





Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Radiator		Refer to "RADIATOR" in chapter 6.
	Exhaust pipe assembly		Refer to "ENGINE".
	Camshafts		Refer to "CAMSHAFTS".
1	Cylinder head	1	Refer to "INSTALLING THE CYLINDER
2	Cylinder head gasket	1	HEAD".
3	Dowel pin	2	LINEAD .
			For installation, reverse the removal
			procedure.



# REMOVING THE CYLINDER HEAD

- 1. Remove:
- cylinder head bolts

#### NOTE: .

Loosen each bolt 1/2 of a turn at a time. After all of the bolt are fully loosened, remove them.

#### EAS00229

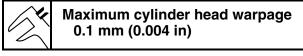
#### CHECKING THE CYLINDER HEAD

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

#### NOTE: .

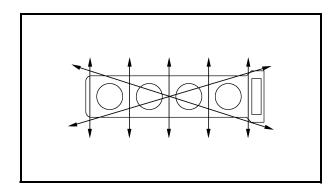
Do not use a sharp instrument to avoid damaging or scratching:

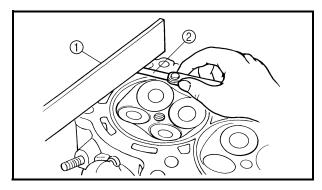
- spark plug bore threads
- valve seats
- 2. Check:
- cylinder head Damage/scratches  $\rightarrow$  Replace.
- cylinder head water jacket Mineral deposits/rust → Eliminate.
- 3. Measure:
- cylinder head warpage Out of specification → Resurface the cylinder head.



#### 

- 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.





# CYLINDER HEAD

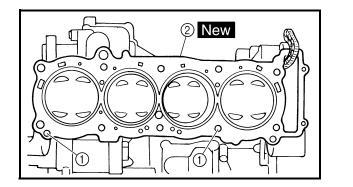


 d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

#### NOTE: .

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

\*\*\*\*\*

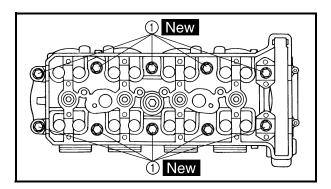


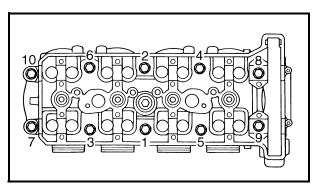
INSTALLING THE CYLINDER HEAD

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

## NOTE:

Pass the timing chain through the timing chain cavity.





- 3. Tighten:
- cylinder head bolts (M10) ① New

## NOTE: \_

- Do not reuse the cylinder head bolts.
- The tightening procedure of the cylinder head bolts is angle controlled, therefore tighten the bolts using the following procedure.

## \*\*\*\*

- a. Lubricate the cylinder head bolts and washers with engine oil.
- b. Install the washers and cylinder head bolts.
- c. Tighten the cylinder head bolts in the proper tightening sequence as shown.



Cylinder head bolt (M10) 1st 25 Nm (2.5 m · kg, 18 ft · lb)

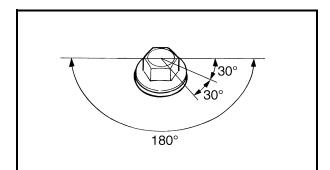
**CYLINDER HEAD** 



d. Loosen and retighten the cylinder head bolts in the proper tightening sequence as shown.



Cylinder head bolt (M10) 2nd 25 Nm (2.5 m · kg, 18 ft · lb)



e. Tighten the cylinder head bolts further to reach the specified angle 180° in the proper tightening sequence as shown.



Cylinder head bolt (M10) Final

Specified angle 180°

# A WARNING

When the bolts are tightened more than the specified angle, do not loosen the bolt and then retighten it.

Replace the bolt with a new one and perform the procedure again.

## CAUTION:

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is at the specified angle.

#### NOTE:

When using a hexagonal bolt, note that the angle from one corner to another is 60°.

\*\*\*\*\*

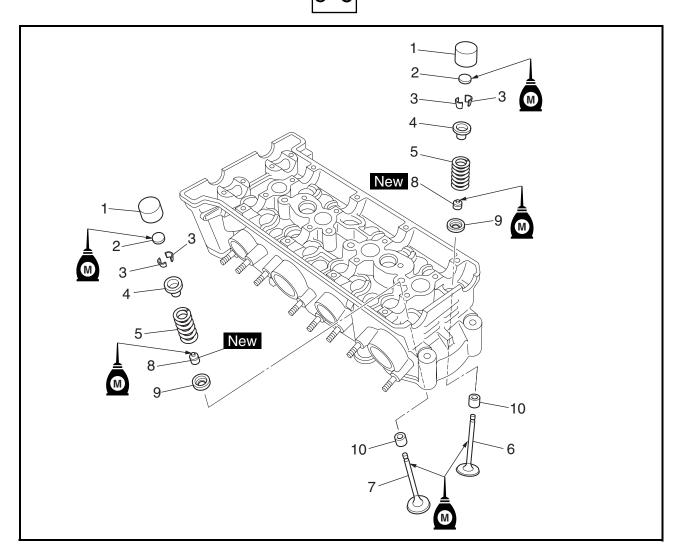
- 4. Tighten:
- cylinder head bolts (M6) ①

🔌 12 Nm (1.2 m · kg, 8.7 ft · lb)

# VALVES AND VALVE SPRINGS







Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve		Remove the parts in the order listed.
	springs		
	Cylinder head		Refer to "CYLINDER HEAD".
1	Valve lifter	16	
2	Valve pad	16	
3	Valve cotter	32	
4	Upper spring seat	16	
5	Valve spring	16	Refer to "REMOVING/INSTALLING THE
6	Intake valve	4	VALVES".
7	Exhaust valve	4	
8	Oil seal	16	
9	Lower spring seat	16	
10	Valve guide	16	
			For installation, reverse the removal
			procedure.



# REMOVING THE VALVES

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

#### NOTE:

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure 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

(for leakage) Leakage at the valve seat  $\rightarrow$  Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS".

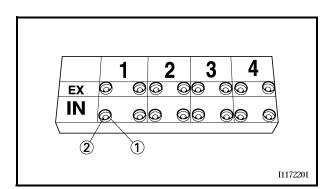
#### \*\*\*\*\*

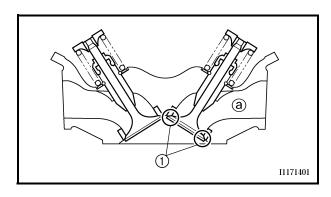
- a. Pour a clean solvent (a) into the intake and exhaust ports.
- b. Check that the valves properly seal.

#### NOTE: \_

There should be no leakage at the valve seat (1).

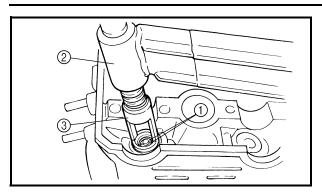
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# VALVES AND VALVE SPRINGS



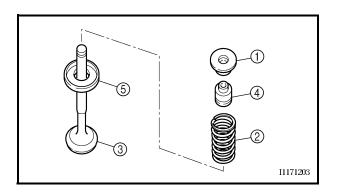


- 3. Remove:
- valve cotters (1)

#### NOTE: \_

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





- 4. Remove:
- upper spring seat ①
- valve spring (2)
- valve ③
- oil seal ④
- lower spring seat (5)

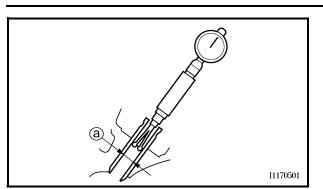
#### NOTE: .

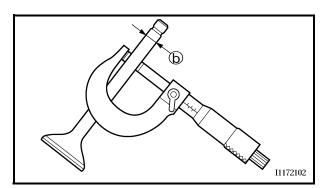
Identify the position of each part very carefully so that it can be reinstalled in its original place.

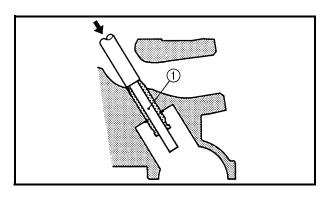
# CHECKING THE VALVES AND VALVE GUIDES

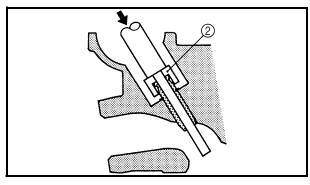
The following procedure applies to all of the valves and valve guides.

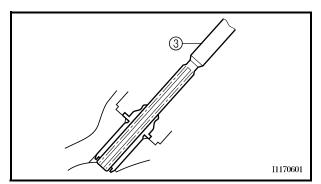












- 1. Measure:
- valve-stem-to-valve-guide clearance

Valve-stem-to-valve-guide clearance = Valve guide inside diameter (a) – Valve stem diameter (b)

Out of specification  $\rightarrow$  Replace the valve guide.

(Jet	Valve-stem-to-valve-guide clear- ance Intake 0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in) <limit>: 0.08 mm (0.0031 in)</limit>
	Exhaust 0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in) <limit>: 0.1 mm (0.004 in)</limit>

- 2. Replace:
- valve guide

#### NOTE: \_

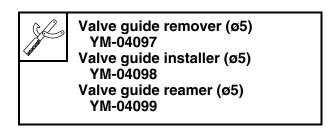
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100  $^{\circ}$ C (212  $^{\circ}$ F) in an oven.

#### \*\*\*\*

- 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: .

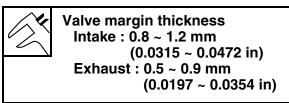
After replacing the valve guide, reface the valve seat.



\*\*\*\*\*



- 3. Eliminate:
- carbon deposits (from the valve face and valve seat)
- 4. Check:
- valve face
  - Pitting/wear  $\rightarrow$  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.



- 6. Measure:
- valve stem runout
   Out of specification → Replace the valve.

#### NOTE: .

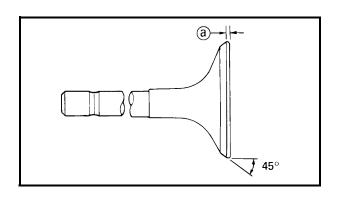
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

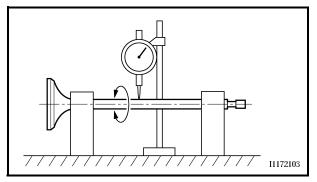
## Valve stem runout 0.01 mm (0.0004 in)

# CHECKING THE VALVE SEATS

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

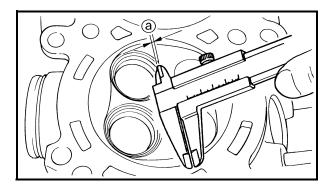
- 1. Eliminate:
- carbon deposits
  - (from the valve face and valve seat)
- 2. Check:
- valve seat Pitting/wear  $\rightarrow$  Replace the cylinder head.

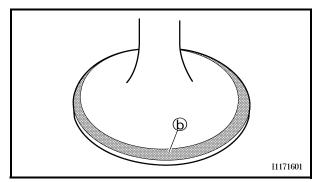




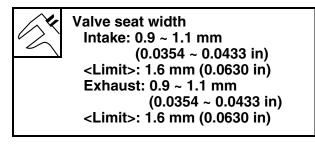
# VALVES AND VALVE SPRINGS







- 3. Measure:
- valve seat width ⓐ
   Out of specification → Replace the cylinder head.



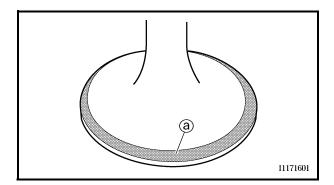
#### \*\*\*\*

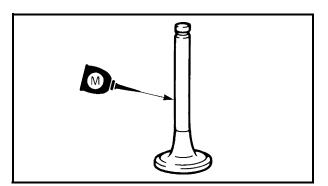
- a. Apply Mechanic's blueing dye (Dykem) (b) onto the valve face.
- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width.

#### NOTE: .

Where the valve seat and valve face contacted one another, the blueing will have been removed.

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- 4. Lap:
- valve face
- valve seat

#### NOTE: .

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

#### \*\*\*\*

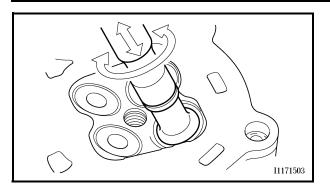
a. Apply a coarse lapping compound (a) to the valve face.

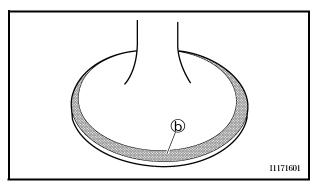
#### CAUTION:

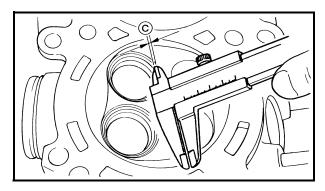
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

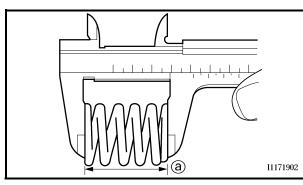
b. Apply molybdenum disulfide oil onto the valve stem.











- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

#### NOTE:

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic's blueing dye (Dykem) (b) onto the valve face.
- h. Install the valve into the cylinder head.
- i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- j. Measure the valve seat width © again. If the valve seat width is out of specification, reface and lap the valve seat.

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EAS0024

## **CHECKING THE VALVE SPRINGS**

The following procedure applies to all of the valve springs.

- 1. Measure:
- valve spring free length (a)

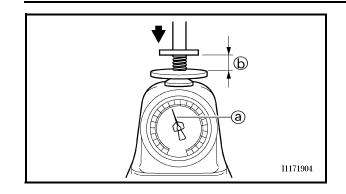
Out of specification  $\rightarrow$  Replace the valve spring.



Valve spring free length (intake and exhaust) 39.7 mm (1.56 in) <Limit> : 37.7 mm (1.48 in)

# VALVES AND VALVE SPRINGS



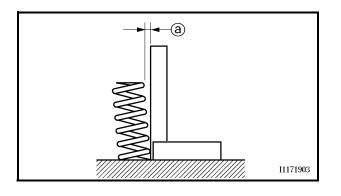


- 2. Measure:
- compressed valve spring force ⓐ
   Out of specification → Replace the valve spring.

(b) Installed length



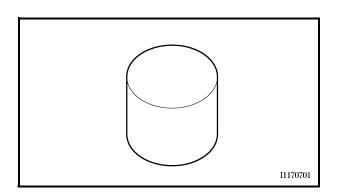
Compressed valve spring force (installed) 13.9 ~ 16.1 kg at 33 mm (30.6 ~ 35.5 lb at 1.30 in)



- 3. Measure:
- valve spring tilt ⓐ
   Out of specification → Replace the valve spring.



Maximum valve spring tilt 1.7 mm (0.07 in)

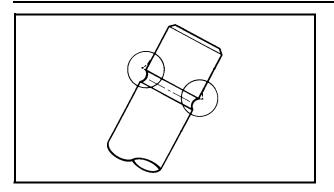


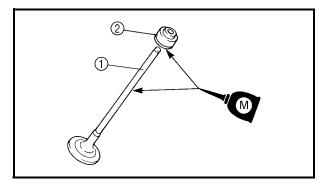
# CHECKING THE VALVE LIFTERS

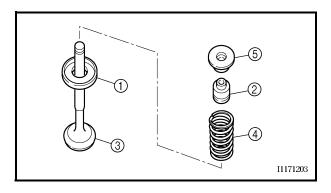
The following procedure applies to all of the valve lifters.

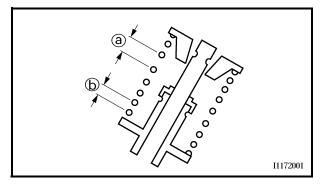
- 1. Check:
- valve lifter
   Damage/scratches → Replace the valve lifters and cylinder head.











#### EAS00249 INSTALLING THE VALVES

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

- 1. Deburr:
- valve stem end (with an oil stone)
- 2. Lubricate:
- valve stem 1
- oil seal ② (with the recommended lubricant)

Recommended lubricant Molybdenum disulfide oil

- 3. Install:
- lower spring seat ①
- oil seal 2
- valve ③
- valve spring ④
- upper spring seat (5) (into the cylinder head)

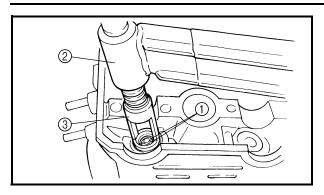
#### NOTE: .

- Make sure each valve is installed in its original place.
- Install the valve spring with the larger pitch (a) facing up.

(b) Smaller pitch

# VALVES AND VALVE SPRINGS



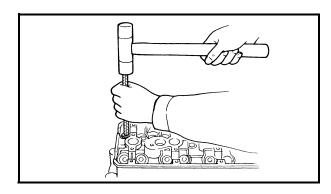


- 4. Install:
- valve cotters 1

#### NOTE: \_

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





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

## CAUTION:

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

- 6. Lubricate:
- valve pad
- valve lifter

(with the recommended lubricant)

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Recommended lubricant Molybdenum disulfide oil

- 7. Install:
- valve pad
- valve lifter

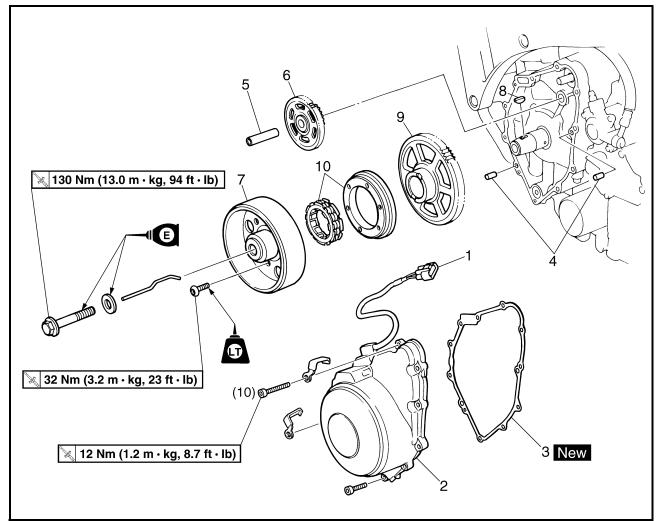
## NOTE: \_

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

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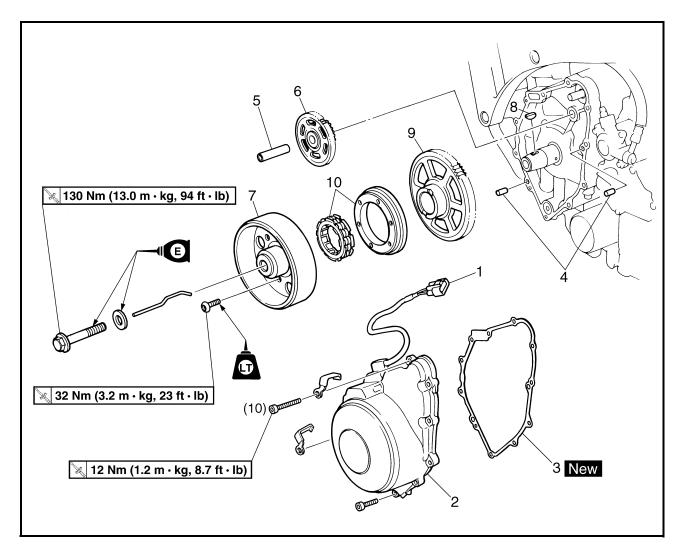


# GENERATOR AND STARTER CLUTCH GENERATOR ROTOR AND STARTER CLUTCH



Order	Job/Part	Q'ty	Remarks
	Removing the generator rotor and		Remove the parts in the order listed.
	starter clutch		
	Fuel tank/seats/T-bar/rubber seat		Refer to "SEATS AND FUEL TANK" in
			chapter 3.
	Side covers/front cowling assembly		Refer to "COWLINGS AND COVERS" in
			chapter 3.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
1	Stator assembly coupler	1	Disconnect.
2	Generator cover	1	Refer to "REMOVING THE GENERA-
			TOR".
3	Generator cover gasket	1	
4	Dowel pin	2	

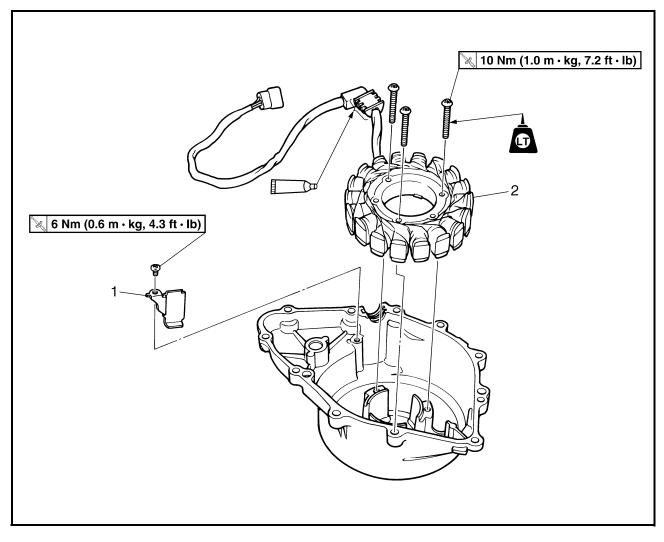




Order	Job/Part	Q'ty	Remarks
5	Starter clutch idle gear shaft	1	
6	starter clutch idle gear	1	
7	Generator rotor	1	Refer to "REMOVING/INSTALLING THE
8	Woodruff key	1	GENERATOR".
9	Starter clutch gear	1	Refer to "REMOVING/INSTALLING THE
10	Starter clutch	1	STARTER CLUTCH".
			For installation, reverse the removal
			procedure.



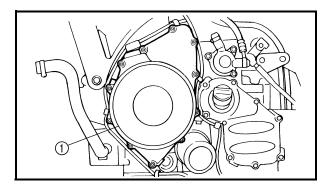
## STATOR ASSEMBLY

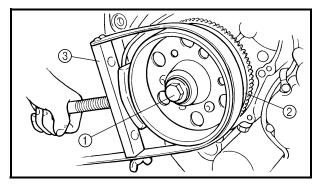


Order	Job/Part	Q'ty	Remarks
	Removing the stator assembly		Remove the parts in the order listed.
1	Lead holder	1	Refer to "INSTALLING THE GENERA-
2	Stator assembly	1	J TOR".
			For installation, reverse the removal
			procedure.

# **GENERATOR AND STARTER CLUTCH**







# REMOVING THE GENERATOR

- 1. Remove:
- generator cover ①

#### NOTE: .

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

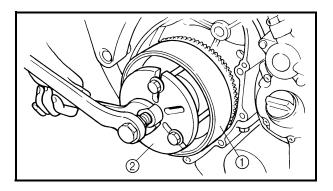
- 2. Remove:
- generator rotor bolt ①
- washer

## NOTE: .

While holding the generator rotor 2 with the primary sheave holder 3, loosen the generator rotor bolt.



Primary sheave holder YS-01880-A

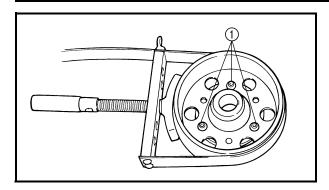


- 3. Remove:
- generator rotor ① (with the heavy duty puller ②)
- woodruff key

Heavy duty puller YU-33270-B

# **GENERATOR AND STARTER CLUTCH**





## **REMOVING THE STARTER CLUTCH**

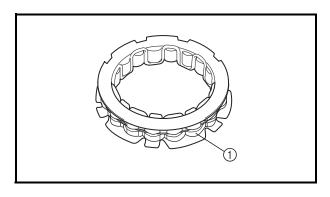
#### 1. Remove:

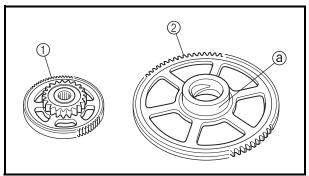
- starter clutch bolts ①
- starter clutch

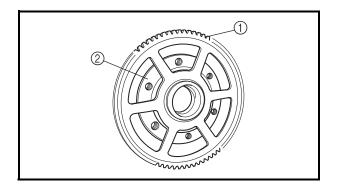
#### NOTE:

While holding the generator rotor with the primary sheave holder, remove the starter clutch bolts.

## Primary sheave holder YS-01880-A







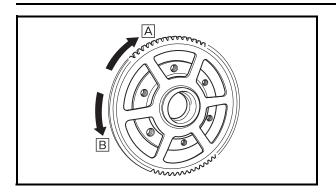
# CHECKING THE STARTER CLUTCH

- 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

#### \*\*\*\*\*

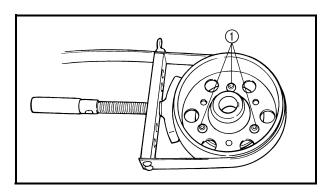
a. Install the starter clutch gear ① onto the starter clutch ② and hold the starter clutch.





- b. When turning the starter clutch drive gear clockwise A, the starter clutch and the starter clutch drive gear should engage, otherwise the starter clutch is faulty and must be replaced.
- c. When turning the starter clutch drive gear counterclockwise B, it should turn freely, otherwise the starter clutch is faulty and must be replaced.

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## INSTALLING THE STARTER CLUTCH

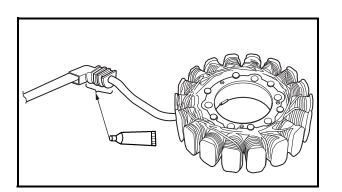
- 1. Install:
- starter clutch
- starter clutch bolts ① -

🎉 32 Nm (3.2 m · kg, 23 ft · lb)

#### NOTE: \_

While holding the generator rotor with the primary sheave holder, tighten the starter clutch bolt.

## Primary sheave holder YS-01880-A



#### EAS00354 INSTALLING THE GENERATOR

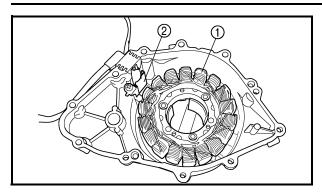
- 1. Apply:
- sealant

(onto the stator assembly lead grommet)

Quick Gasket<sup>®</sup> ACC-11001-05-01

# **GENERATOR AND STARTER CLUTCH**





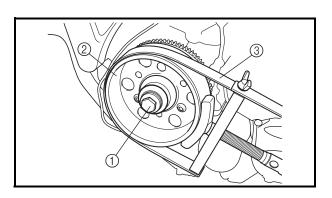
- 2. Install:
- stator assembly ①
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- lead holder 2

🔌 6 Nm (0.6 m · kg, 4.3 ft · lb)

- 3. Install:
- woodruff key
- generator rotor
- washer
- generator rotor bolt

## NOTE:

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.
- Lubricate the generator rotor bolt and washer with engine oil.



- 4. Tighten:
- generator rotor bolt ()

🍾 130 Nm (13.0 m · kg, 94 ft · lb)

## NOTE: .

While holding the generator rotor ② with the primary sheave holder ③, tighten the generator rotor bolt.

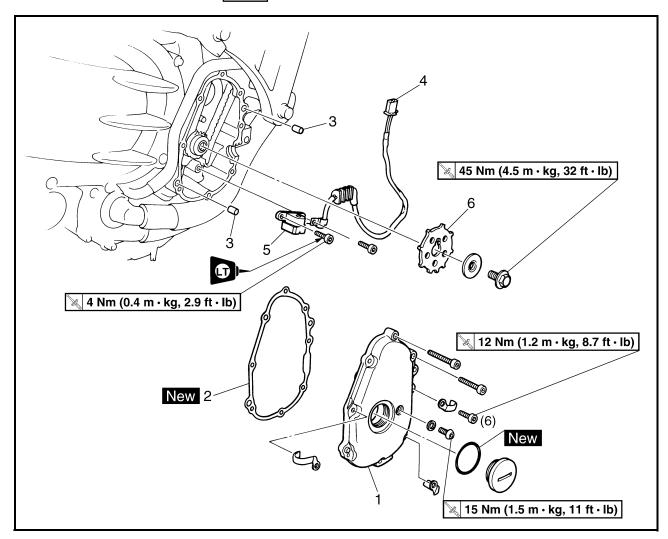
# Prima YS-

Primary sheave holder YS-01880-A



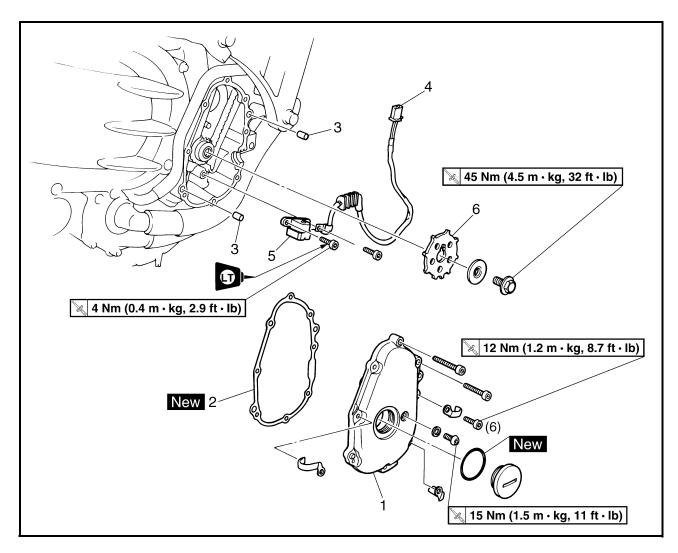
PICKUP COIL ROTOR





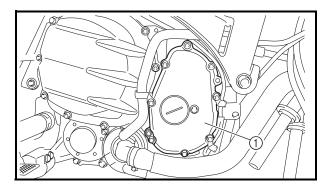
Order	Job/Part	Q'ty	Remarks
	Removing the pickup coil rotor		Remove the parts in the order listed.
	Fuel tank/seats/T-bar/rubber seat		Refer to "SEATS AND FUEL TANK" in
			chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter
			3.
	Side covers/front cowling assembly		Refer to "COWLINGS AND COVERS" in
			chapter 3.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
	Generator cover		Refer to "GENERATOR ROTOR AND
			STARTER CLUTCH".
1	Pickup coil rotor cover	1	Refer to "REMOVING/INSTALLING THE
			PICKUP COIL ROTOR".
2	Pickup coil rotor cover gasket	1	

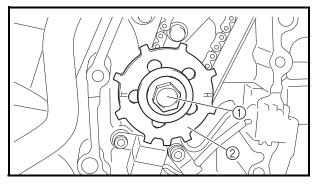


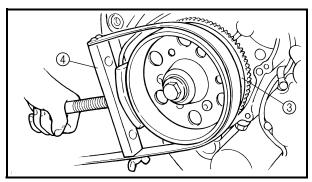


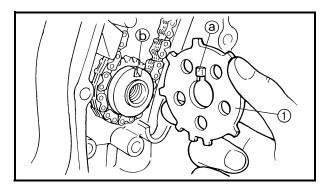
Order	Job/Part	Q'ty	Remarks
3	Dowel pin	2	
4	Crankshaft position sensor coupler	1	Disconnect.
5	Crankshaft position sensor	1	Refer to "INSTALLING THE PICKUP COIL ROTOR".
6	Pickup coil rotor	1	Refer to "REMOVING/INSTALLING THE PICKUP COIL ROTOR". For installation, reverse the removal procedure.











#### **REMOVING THE PICKUP COIL ROTOR**

- 1. Remove:
- pickup coil rotor cover ①

#### NOTE: .

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

- 2. Remove:
- pickup coil rotor bolt ①
- washer
- pickup coil rotor 2

#### NOTE: .

While holding the generator rotor ③ with the primary sheave holder ④, remove the pickup coil rotor bolt.

Prir Y

Primary sheave holder YS-01880-A

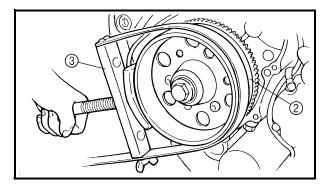
#### INSTALLING THE PICKUP COIL ROTOR

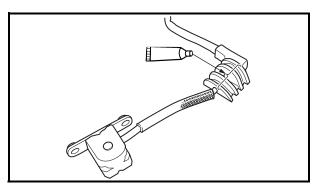
- 1. Install:
- pickup coil rotor ①
- washer
- pickup coil rotor bolt

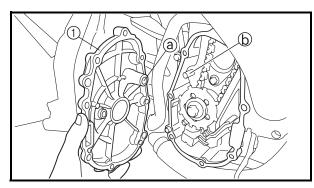
#### NOTE: \_

Align the projection (a) into the pickup coil rotor with the groove (b) into the crankshaft.









- 2. Tighten:
- pickup coil rotor bolt ①
   32 ft · lb)

## NOTE: .

While holding the generator rotor ② with the primary sheave holder ③, tighten the pickup coil rotor bolt.



- 3. Apply:
- sealant
- (onto the crankshaft position sensor lead grommet)

ر Quick Gasket<sup>®</sup> ACC-11001-05-01

- 4. Install:
- pickup coil rotor cover 1

🍾 12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE: \_

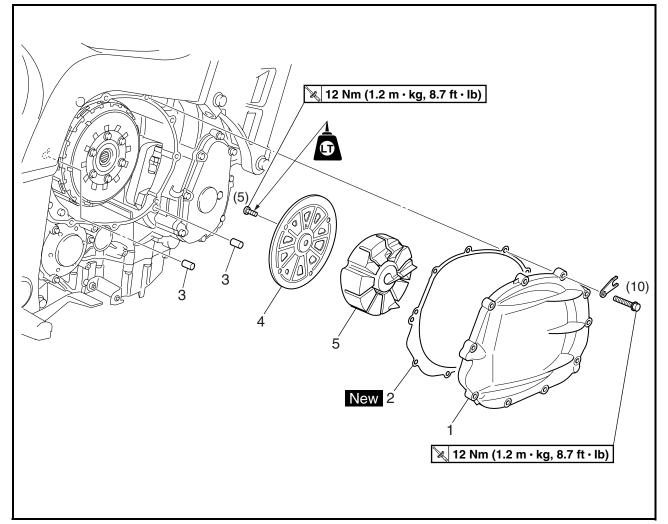
Align the hole (a) into the pickup coil rotor cover with the pin (b).





# CLUTCH COVER

000

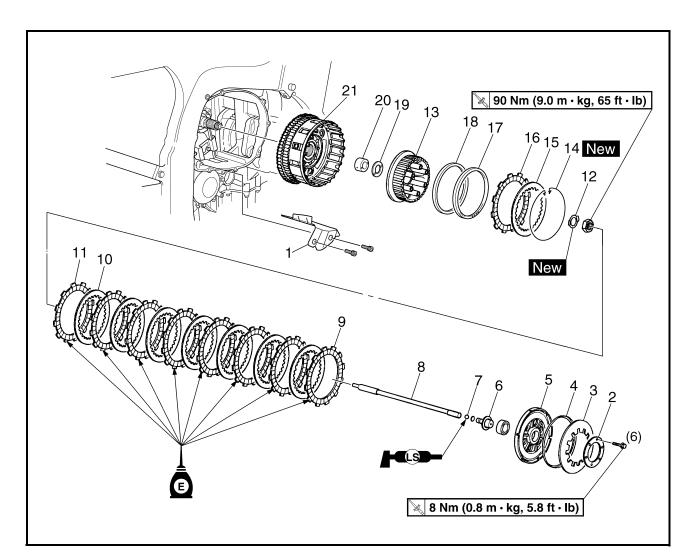


Order	Job/Part	Q'ty	Remarks
	Removing the clutch cover		Remove the parts in the order listed.
	Right side cowling		Refer to "COWLINGS AND COVERS" in
	Engine oil		chapter 3. Drain.
			Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cover	1	
2	Clutch cover gasket	1	
3	Dowel pin	2	
4	Damper cover	1	
5	Damper	1	
			For installation, reverse the removal procedure.



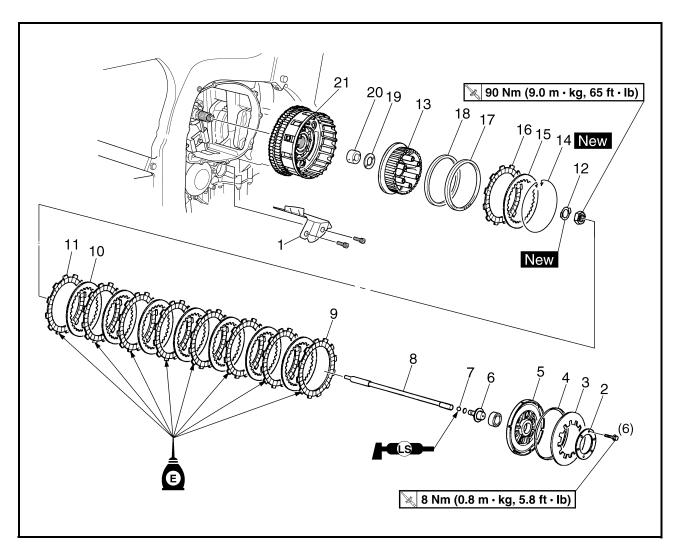


# EAS00274



Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
	Clutch release cylinder		Refer to "HYDRAULIC CLUTCH" in chap- ter 4.
	Rear balancer		Refer to "BALANCERS".
1	Oil guide plate	1	
2	Clutch spring plate retainer	1	
3	Clutch spring plate	1	
4	Clutch spring plate seat	1	
5	Pressure plate	1	
6	Short clutch push rod	1	Refer to "REMOVING/INSTALLING THE CLUTCH".
7	Ball	1	
8	Long clutch push rod	1	
9	Friction plate 1	1	
10	Clutch plate	7	
11	Friction plate 2	7	

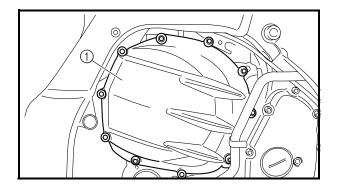
CLUTCH ENG

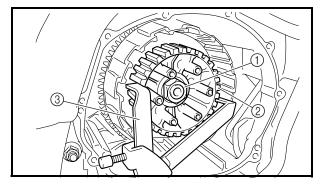


Order	Job/Part	Q'ty	Remarks
12	Lock washer	1	7
13	Clutch boss	1	
14	Wire circlip	1	
15	Clutch plate 2	1	
16	Friction plate 3	1	Refer to "REMOVING/INSTALLING THE
17	Clutch damper spring	1	CLUTCH".
18	Clutch damper spring seat	1	
19	Thrust washer	1	
20	Spacer	1	
21	Clutch housing	1	
			For installation, reverse the removal
			procedure.









#### EAS00275 EAS00277

## **REMOVING THE CLUTCH**

- 1. Remove:
- rear balancer weight Refer to "BALANCERS".
- 2. Remove:
- $\bullet$  clutch cover (1)

#### NOTE: .

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

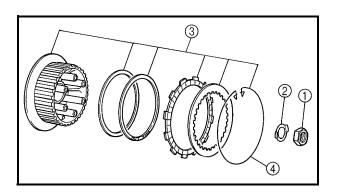
- 3. Straighten the lock washer tab.
- 4. Loosen:
- $\bullet$  clutch boss nut (1)

#### NOTE: \_

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



Universal clutch holder YM-91042

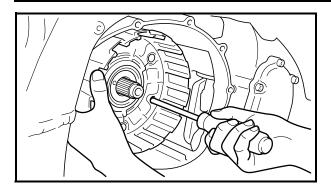


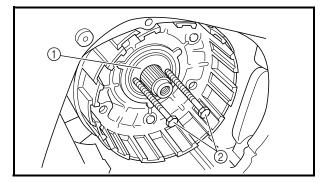
- 5. Remove:
- clutch boss nut ①
- lock washer ②
- clutch boss assembly ③

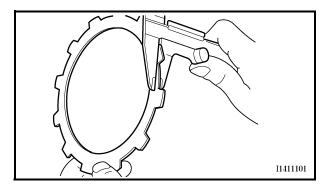
#### NOTE: \_

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









6. Remove:

CLUTCH

• spacer ①

# NOTE:

- Insert a cross-headed screwdriver into one of the holes of the clutch housing and primary driven gear, and then rotate the inner primary driven gear until both primary driver gears are aligned. The teeth of both primary driven gears must be aligned for installation.
- Insert two 5-mm (0.20 in) bolts ② into the spacer and then remove the spacer by pulling on the bolts.

# CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

- 1. Check:
- friction plate
   Damage/wear → Replace the friction plates as a set.
- 2. Measure:
- friction plate thickness
   Out of specification → Replace the friction plates as a set.

## NOTE:

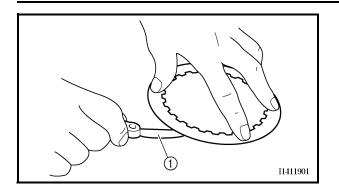
Measure the friction plate at four places.



Friction plate thickness 2.9 ~ 3.1 mm (0.114 ~ 0.122 in) <Limit>: 2.8 mm (0.110 in)

CLUTCH





# CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

- 1. Check:
- clutch plate

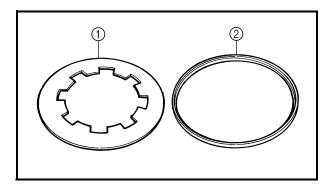
 $\label{eq:def-Damage} \ensuremath{\mathsf{Damage}} \to \ensuremath{\mathsf{Replace}}\xspace$  the clutch plates as a set.

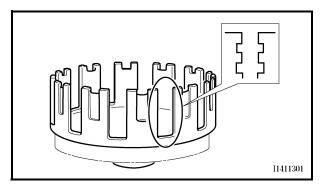
- 2. Measure:
- clutch plate warpage (with a surface plate and thickness gauge (1))

Out of specification  $\rightarrow$  Replace the clutch plates as a set.



Maximum clutch plate warpage 0.1 mm (0.004 in)





# CHECKING THE CLUTCH SPRING PLATE

- 1. Check:
- clutch spring plate ①
   Damage → Replace.
- 2. Check:
- clutch spring plate seat ②
   Damage → Replace.

## CHECKING THE CLUTCH HOUSING

- 1. Check:
- clutch housing dogs
   Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

#### NOTE: \_

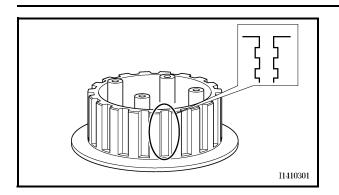
Pitting on the clutch housing dogs will cause erratic clutch operation.

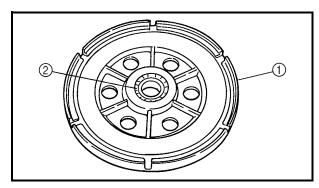
- 2. Check:
- bearing Damage/wear → Replace the bearing and clutch housing.

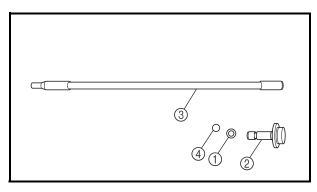
EAS00284

CLUTCH









#### EAS00285 **CHECKING THE CLUTCH BOSS**

## 1. Check:

 clutch boss splines Damage/pitting/wear  $\rightarrow$  Replace the clutch boss.

## NOTE:

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

#### EAS00286 CHECKING THE PRESSURE PLATE

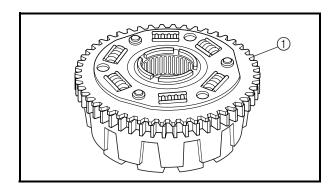
- 1. Check:
- pressure plate (1) Cracks/damage  $\rightarrow$  Replace.
- bearing (2) Damage/wear  $\rightarrow$  Replace.

#### EAS0028 CHECKING THE CLUTCH PUSH RODS

- 1. Check:
- **O**-ring (1)
- short clutch push rod ②
- long clutch push rod ③
- ball ④ Cracks/damage/wear  $\rightarrow$  Replace the defective part(s).
- 2. Measure:
- long clutch push rod bending Out of specification  $\rightarrow$  Replace the long clutch push rod.

limit

Long clutch push rod bending 0.37 mm (0.015 in)



#### EAS00292 CHECKING THE PRIMARY DRIVEN GEAR

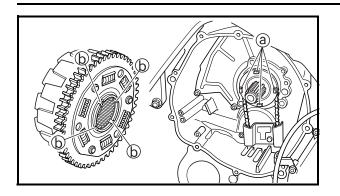
- 1. Check:
- primary driven gear ①

Damage/wear  $\rightarrow$  Replace the clutch housing and crankshaft as a set.

Excessive noise during operation  $\rightarrow$ Replace the clutch housing and crankshaft as a set.

CLUTCH





# EAS00294 INSTALLING THE CLUTCH

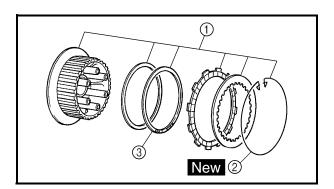
- 1. Install:
- $\bullet$  clutch housing ()

#### NOTE: \_

- Make sure that the slots (a) into the clutch housing align with the tabs (b) onto the oil pump drive sprocket.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- Insert a cross-headed screwdriver into one of the holes of the clutch housing and primary driven gear, and then rotate the inner primary driven gear until both primary driver gears are aligned. The teeth of both primary driven gears must be aligned for installation.
- 2. Install:
- spacer

#### NOTE: .

Install the spacer with the two screw holes facing towards the clutch boss.

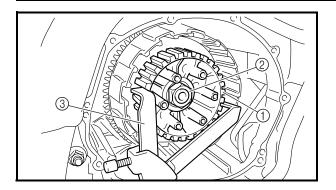


- 3. Install:
- clutch boss assembly ①

#### NOTE: \_

- If the wire circlip (2) has been removed, carefully install a new one as shown.
- Install the clutch spring plate ③ with the "OUTSIDE" mark facing out.





- 4. Install:
- thrust washer
- clutch boss ①
- lock washer New
- clutch boss nut 2

**CLUTCH** 

🔌 90 Nm (9.0 m ⋅ kg, 65 ft ⋅ lb)

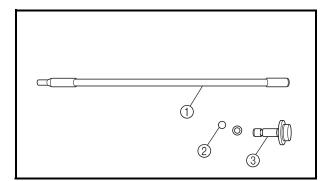
### NOTE: \_

While holding the clutch boss with the universal clutch holder ③, tighten the clutch boss nut.



#### Universal clutch holder YM-91042

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



- 6. Lubricate:
- long clutch push rod ①
- ball (2)
- short clutch push rod ③
  - (with the recommended lubricant)



Recommended lubricant Lithium soap base grease

- 7. Install:
- long clutch push rod
- ball
- short clutch push rod (along with a new O-ring)
- 8. Lubricate:
- friction plates
- clutch plates (with the recommended lubricant)



Recommended lubricant Engine oil

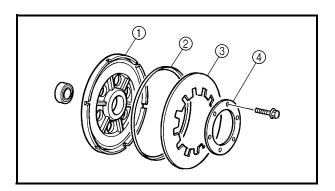


 $\bigcirc$ 

- 9. Install:
- friction plates
- clutch plates

### NOTE:

First, install a friction plate and then alternate between a clutch plate and a friction plate.



10.Install:

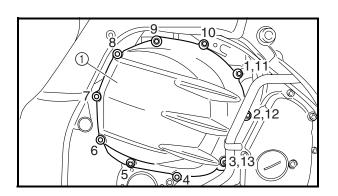
- pressure plate ①
- clutch spring plate seat 2
- clutch spring plate ③
- clutch spring plate retainer ④
   ⑧ 8 Nm (0.8 m · kg, 5.8 ft · lb)

### NOTE: .

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

11.Install:

• rear balancer weight Refer to "BALANCERS".



12.Install:

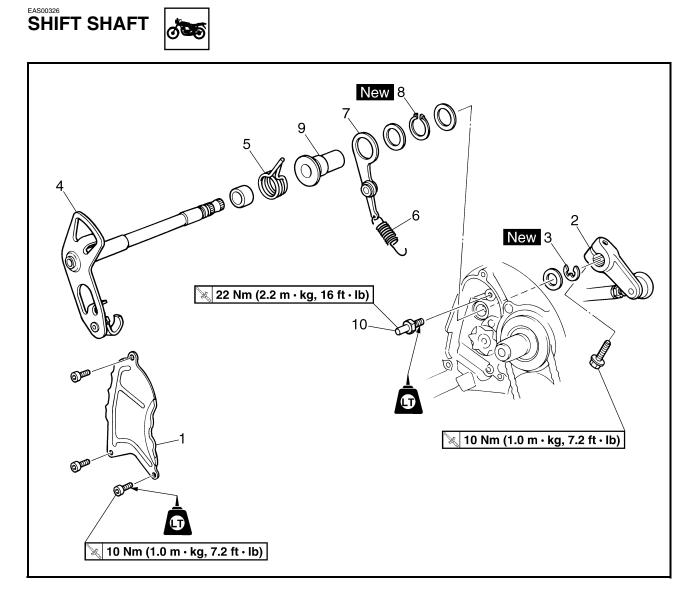
• clutch cover ①

🍾 12 Nm (1.2 m · kg, 8.7 ft · lb)

### NOTE:

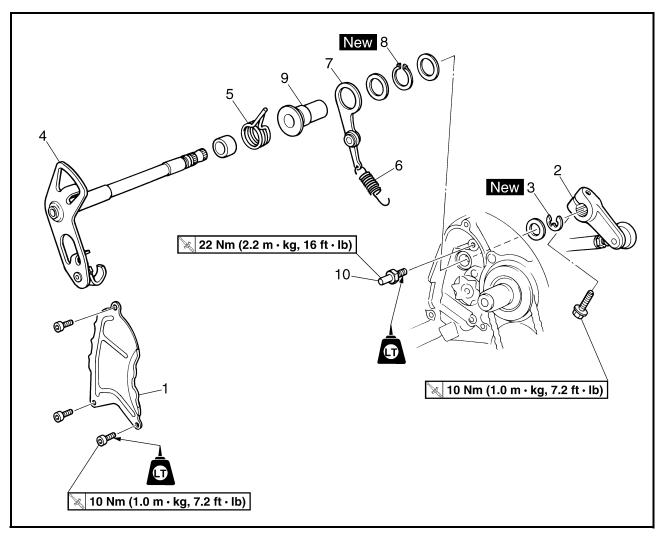
Tighten the clutch cover bolts in the proper tightening sequence as show.





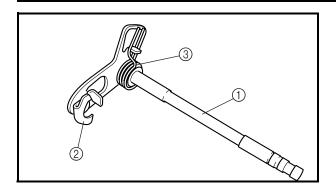
Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft		Remove the parts in the order listed.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
	Clutch housing		Refer to "CLUTCH".
1	Oil baffle plate	1	
2	Shift arm	1	
3	Circlip	1	
4	Shift shaft	1	Refer to "INSTALLING THE SHIFT
			SHAFT".
5	Shift shaft spring	1	

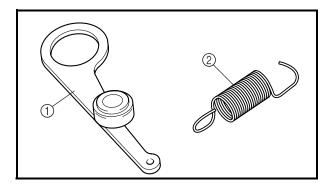


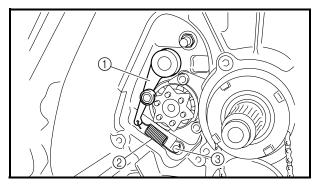


Order	Job/Part	Q'ty	Remarks
6	Stopper lever spring	1	□ Refer to "INSTALLING THE SHIFT
7	Stopper lever	1	SHAFT".
8	Circlip	1	
9	Collar	1	
10	Shift shaft spring stopper	1	
			For installation, reverse the removal
			procedure.









### CHECKING THE SHIFT SHAFT

- 1. Check:
- shift shaft ①
- shift shaft pawl ②
   Bends/damage/wear → Replace.
- shift shaft spring ③
   Damage/wear → Replace.

### CHECKING THE STOPPER LEVER

- 1. Check:
- stopper lever ①
   Bends/damage → Replace.
- Roller turns roughly → Replace the stopper lever.
- stopper lever spring ②
   Damage/wear → Replace.

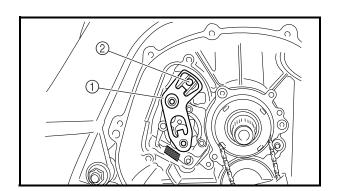
#### EAS00331

### INSTALLING THE SHIFT SHAFT

- 1. Install:
- $\bullet$  stopper lever ()
- stopper lever spring ②

### NOTE: .

- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss ③.
- Mesh the stopper lever with the shift drum segment assembly.



- 2. Install:
- shift shaft (1)

### NOTE: .

- Lubricate the oil seal lips with lithium soap base grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper ②.



🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

- 3. Install:
- shift arm (1)

### NOTE: \_

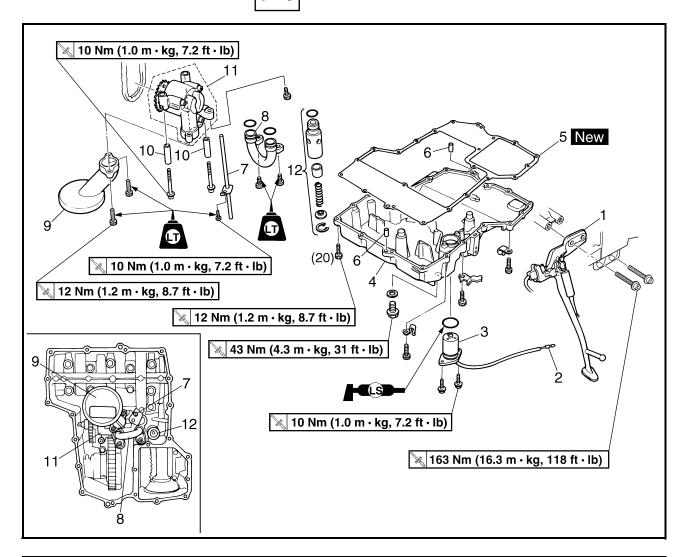
Align the punch mark (a) in the shift shaft with the slot in the shift arm.

### OIL PAN AND OIL PUMP



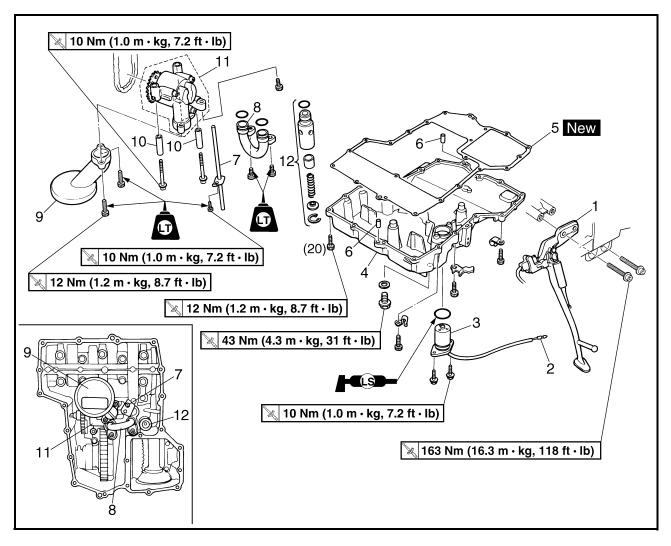
OIL PAN AND OIL PUMP





Order	Job/Part	Q'ty	Remarks
	Removing the oil pan and oil pump		Remove the parts in the order listed.
	Exhaust pipe assembly		Refer to "ENGINE".
	Air filter case		Refer to "AIR FILTER CASE" in chapter
			3.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
1	Sidestand	1	
2	Oil level switch connector	1	Disconnect.
3	Oil level switch	1	
4	Oil pan	1	Refer to "REMOVING/INSTALLING THE
5	Oil pan gasket	1	OIL PAN".
6	Dowel pin	2	
7	Oil delivery pipe	1	
8	Oil pipe	1	

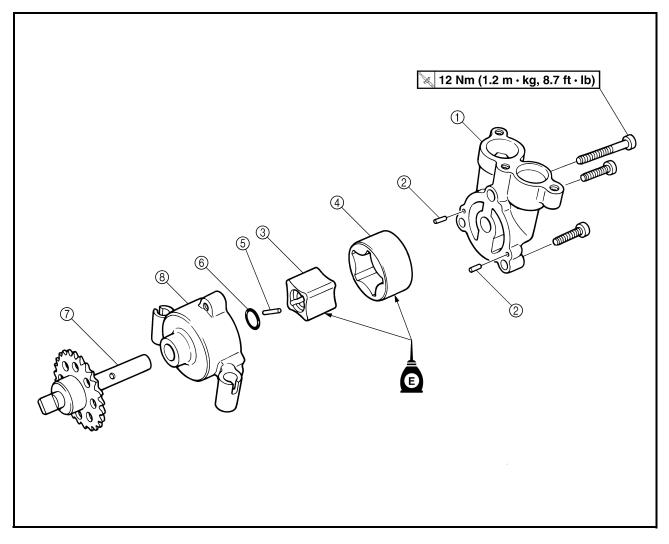




Order	Job/Part	Q'ty	Remarks
9	Oil strainer	1	Refer to "INSTALLING THE OIL STRAINER".
10	Dowel pin	2	
11	Oil pump	1	Refer to "INSTALLING THE OIL PUMP".
12	Relief valve assembly	1	
			For installation, reverse the removal
			procedure.

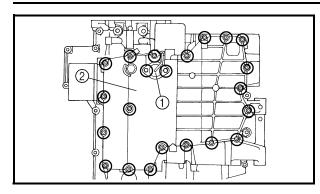


# OIL PUMP



Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
1	Oil pump housing cover	1	
2	Pin	2	
3	Oil pump inner rotor	1	
4	Oil pump outer rotor	1	
5	Pin	1	
6	Washer	1	
$\overline{O}$	Oil pump shaft	1	
8	Oil pump housing	1	
			For assembly, reverse the disassembly
			procedure.



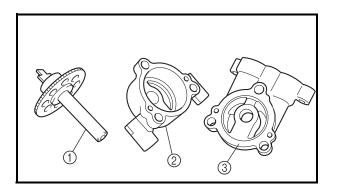


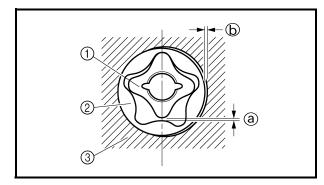
## REMOVING THE OIL PAN

- 1. Remove:
- $\bullet$  oil level switch ()
- oil pan 2
- 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.



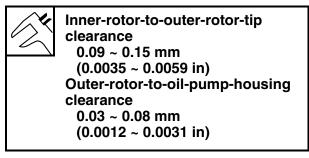


### CHECKING THE OIL PUMP

- 1. Check:
- oil pump shaft 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 (a)
- outer-rotor-to-oil-pump-housing clearance

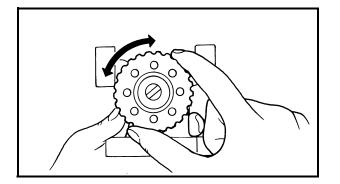
Out of specification  $\rightarrow$  Replace the oil pump.

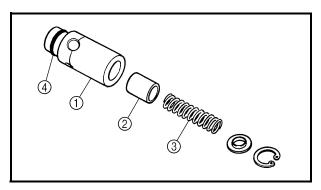
- ① Inner rotor
- ② Outer rotor
- ③ Oil pump housing

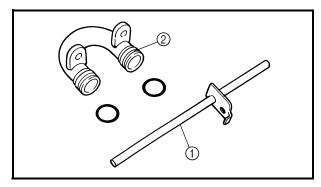


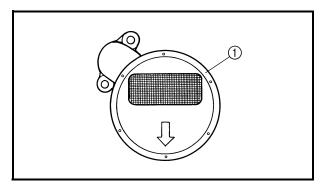
### OIL PAN AND OIL PUMP











- 3. Check:
- oil pump operation Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

### CHECKING THE RELIEF VALVE

- 1. Check:
- relief valve body ①
- relief valve 2
- spring ③
- O-ring ④

Damage/wear  $\rightarrow$  Replace the defective part(s).

## CHECKING THE OIL DELIVERY PIPES

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

- 1. Check:
- oil delivery pipe 1
- oil pipe ②
  - Damage  $\rightarrow$  Replace.

Obstruction  $\rightarrow$  Wash and blow out with compressed air.

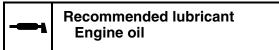
### EAS00368

### CHECKING THE OIL STRAINER

- 1. Check:
- oil strainer ①
  - Damage  $\rightarrow$  Replace. Contaminants  $\rightarrow$  Clean with engine oil.

ASSEMBLING THE OIL PUMP

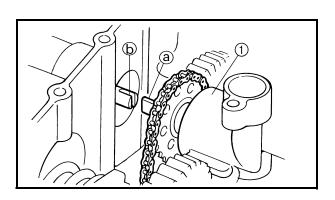
- 1. Lubricate:
- inner rotor
- outer rotor
- oil pump shaft (with the recommended lubricant)







- 2. Check:
- oil pump operation Refer to "CHECKING THE OIL PUMP".



#### EAS00376 INSTALLING THE OIL PUMP

- 1. Install:
- oil pump ①

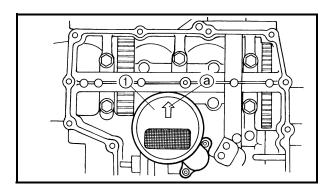
-💽 🔌 12 Nm (1.2 m · kg, 8.7 ft · lb)

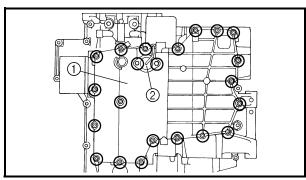
### A WARNING

Align the projection (a) on the oil pump with the slit (b) on the impeller shaft.

### CAUTION:

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





### 

INSTALLING THE OIL STRAINER

- 1. Install:
- oil strainer ①

-🕒 🔀 10 Nm (1.0 m · kg, 7.2 ft · lb)

### NOTE:

The arrow (a) on the oil strainer cover must point towards the front of the engine.

#### EAS00380 INSTALLING THE OIL PAN

- 1. Install:
- dowel pins
- gasket New
- oil pan () 12 Nm (1.2 m · kg, 8.7 ft · lb)
- oil level switch (2)
  - 🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)
- engine oil drain bolt

🔀 43 Nm (4.3 m · kg, 31 ft · lb)



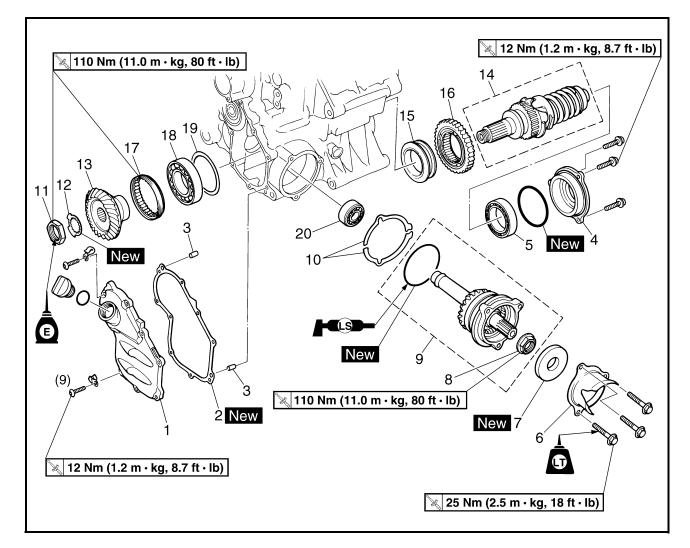
### A WARNING

Always use new copper washers.

#### NOTE: \_

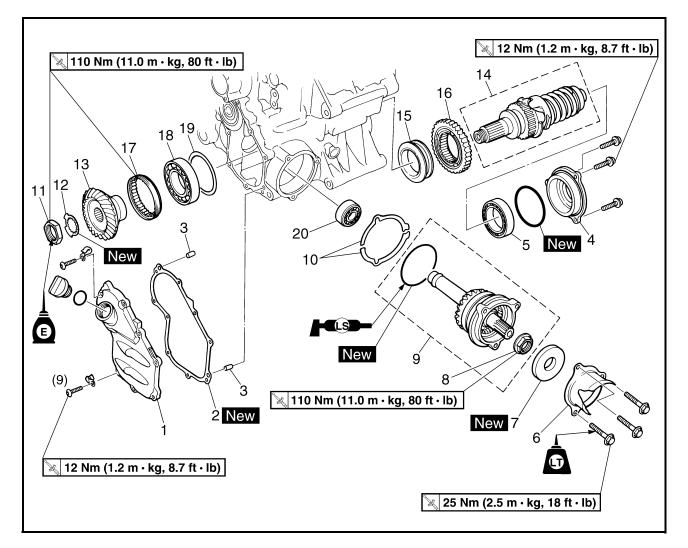
- Tighten the oil pan bolts in stages and in a crisscross pattern.
- Lubricate the oil level switch O-ring with engine oil.





Order	Job/Part	Q'ty	Remarks
	Removing the middle gear		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Oil pan/oil pump		Refer to "OIL PAN AND OIL PUMP".
1	Left middle gear cover	1	
2	Left middle gear cover gasket	1	
3	Dowel pin	2	
4	Right middle gear cover	1	
5	Bearing	1	
6	Middle driven shaft end cover	1	
7	Oil seal	1	
8	Middle driven pinion gear nut	1	Loosen.
9	Middle driven shaft assembly	1	Refer to "REMOVING THE MIDDLE
10	Middle driven shaft shim	2	GEAR" and "INSTALLING THE MIDDLE DRIVEN SHAFT ASSEMBLY".



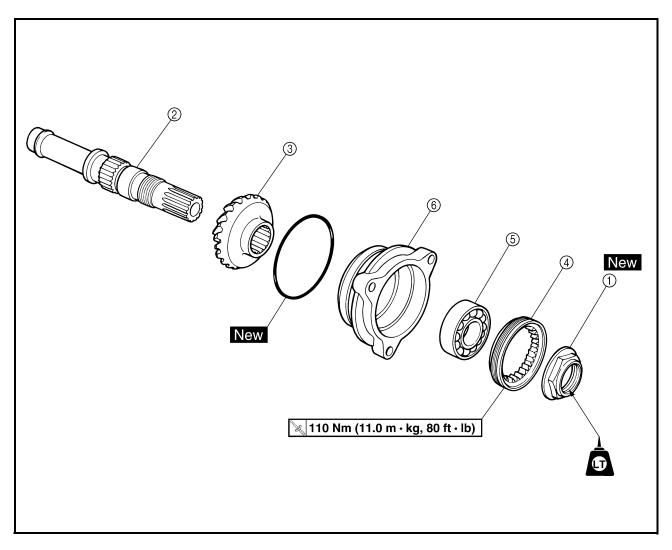


Order	Job/Part	Q'ty	Remarks
11	Middle drive pinion gear nut	1	Refer to "REMOVING THE MIDDLE
12	Lock washer	1	GEAR" and "INSTALLING THE MIDDLE
13	Middle drive pinion gear	1	DRIVE SHAFT ASSEMBLY".
14	Middle drive shaft assembly	1	
15	Spacer	1	
16	Middle driven gear	1	
17	Bearing retainer	1	Refer to "REMOVING THE MIDDLE GEAR" and "INSTALLING THE MIDDLE DRIVE SHAFT ASSEMBLY".
18	Bearing	1	
19	Middle drive shaft shim	1	
20	Bearing	1	
			For installation, reverse the removal procedure.



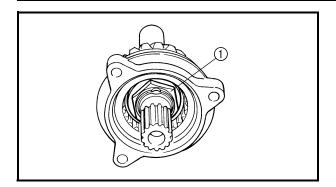
Order	Job/Part	Q'ty	Remarks
	Disassembling the middle drive		Remove the parts in the order listed.
	shaft assembly		
1	Spring retainer	2	Refer to "DISASSEMBLING/ASSEM-
			BLING THE MIDDLE DRIVE SHAFT
			ASSEMBLY".
2	Spring seat	1	
3	Damper spring	1	
(4)	Damper driven cam	1	
5	Damper drive cam	1	
6	Middle drive shaft	1	
			For assembly, reverse the disassembly
			procedure.

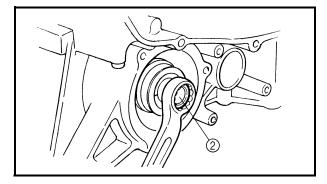


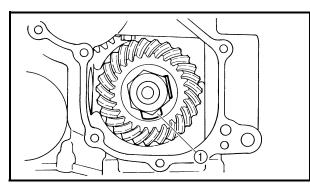


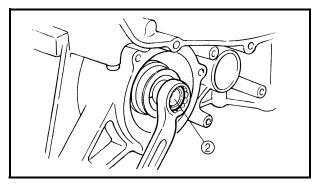
Order	Job/Part	Q'ty	Remarks
	Disassembling the middle driven		Remove the parts in the order listed.
	shaft assembly		
1	Middle driven pinion gear nut	1	
2	Middle driven shaft	1	
3	Middle driven pinion gear	1	
4	Bearing retainer	1	Refer to "DISASSEMBLING/ASSEM-
			BLING THE MIDDLE DRIVEN SHAFT
			ASSEMBLY".
5	Bearing	1	
6	Middle driven shaft bearing housing	1	
			For assembly, reverse the disassembly
			procedure.

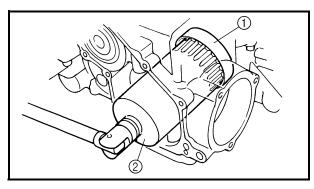












### REMOVING THE MIDDLE GEAR

- 1. Straighten the punched point of the middle driven shaft nut.
- 2. Loosen:
- middle driven shaft nut

### NOTE:

While holding the middle drive shaft ②.

- 3. Straighten the lock washer tab.
- 4. Loosen:
- middle drive shaft nut ①

### NOTE: .

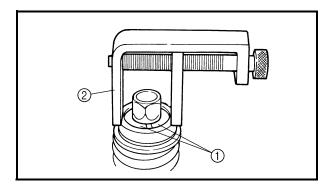
While holding the middle drive shaft ②.

- 5. Straighten the punched point of the middle drive shaft bearing retainer.
- 6. Loosen:
- bearing retainer ①
- (with the middle drive shaft retainer wrench ②)



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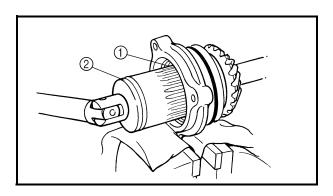
### DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

- 1. Remove:
- spring retainers (1)

#### NOTE: .

While compressing the spring with the spring compressor push plate ②, remove the spring retainers.

Spring compressor push plate YM-33286



### DISASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

- 1. Straighten the punched point of the bearing retainer.
- 2. Loosen:
- bearing retainer ①
   (with the bearing retainer wrench ②)



Bearing retainer wrench YM-04140

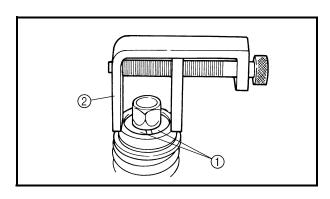
### CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY

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



### CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY

- 1. Check:
- middle driven gear Galling/pitting/wear → Replace the middle driven shaft assembly.
- 2. Check:
- bearings
   Damage/pitting → Replace the middle drive shaft bearing housing assembly.
- 3. Check:
- O-ring
- oil seal
  - Damage  $\rightarrow$  Replace the defective part(s).



### ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

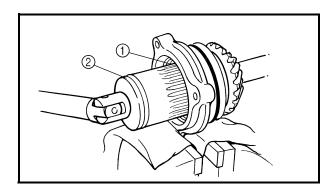
- 1. Install:
- spring retainers (1)

### NOTE: .

While compressing the spring with the spring compressor push plate ②, install the spring retainers.



Spring compressor push plate YM-33286



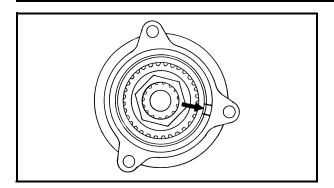
### ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

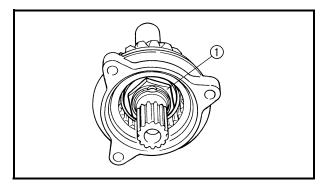
- 1. Tighten:
- bearing retainer ①

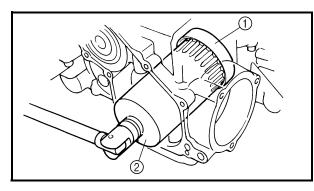
(with the bearing retainer wrench ②)

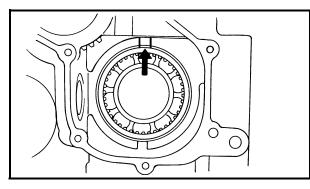


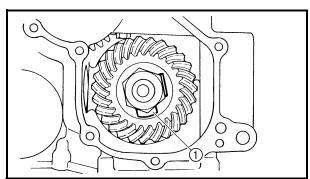












#### NOTE: \_

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

- 2. Install:
- middle driven shaft nut ①

#### NOTE: \_

Temporarily tighten the middle driven shaft nut.

### INSTALLING THE MIDDLE DRIVE SHAFT ASSEMBLY

- 1. Install:
- middle drive shaft shim
- bearing
- bearing retainer ①

🔌 110 Nm (11.0 m · kg, 80 ft · lb)

(with the middle drive shaft retainer wrench ②)



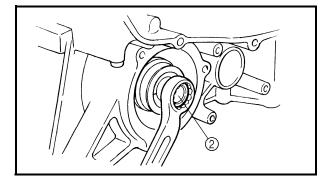
#### NOTE: \_

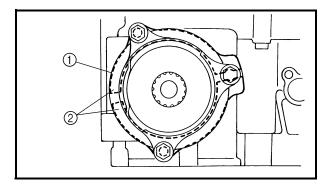
Lock the threads on the bearing retainer by staking them with a center punch.

- 2. Install:
- middle drive pinion gear
- lock washer New
- middle drive pinion gear nut ①

🔀 110 Nm (11.0 m · kg, 80 ft · lb)







### NOTE: \_

While holding the middle drive shaft ②.

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

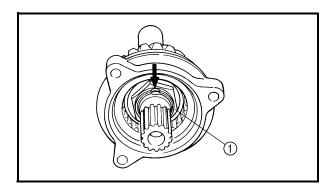
# INSTALLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

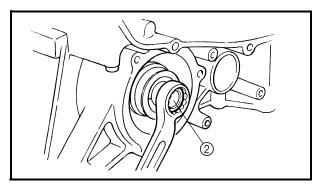
1. Install:

- middle driven shaft assembly 1
- middle driven shaft shims (2)
- middle driven shaft bearing housing bolts

### NOTE:

Finger tighten the middle driven shaft housing bolts.





- 2. Tighten:
- middle driven shaft nut ①
   110 Nm (11.0 m · kg, 80 ft · lb)

### NOTE:

- While holding the middle drive shaft 2.
- Lock the threads on the middle driven shaft nut by staking them with a center punch.



- 3. Tighten:
- middle driven shaft bearing housing bolts
   25 Nm (2.5 m · kg, 18 ft · lb)

### NOTE: .

Before tightening the bolts:

- Adjust the middle gear backlash. Refer to "ADJUSTING THE MIDDLE GEAR BACKLASH".
- 2. Check that the middle driven gear turns smoothly.

#### EAS00449

# MEASURING THE MIDDLE GEAR BACKLASH

- 1. Measure:
- middle gear backlash Out of specification  $\rightarrow$  Refer to "ADJUST-ING THE MIDDLE GEAR BACKLASH".



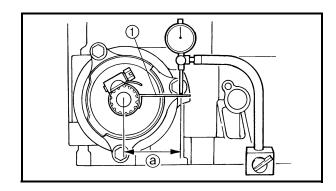
Middle gear backlash 0.10 ~ 0.20 mm (0.004 ~ 0.008 in)

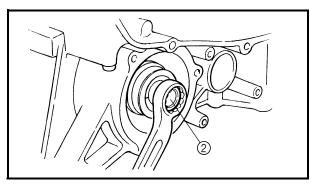
a. Install the gear lash measurement tool ① as shown.



#### Gear lash measurement tool YM-01467

- b. Make sure the dial gauge plunger contacts the measuring point (a) on the middle gear backlash band as shown.
- (a): 38 mm (1.50 in)
- c. Hold the middle drive shaft 2.







d. While gently turning the middle driven shaft back and forth, measure the middle gear backlash.

#### NOTE: .

Measure the middle gear backlash at four positions. Rotate the middle driven shaft 90° each time and observe the reading on the dial gauge.

\*\*\*\*\*

#### EAS00450

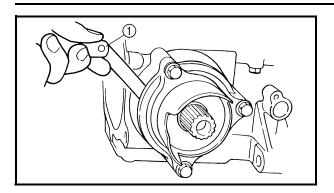
### ADJUSTING THE MIDDLE GEAR BACKLASH

- 1. Loosen:
- middle driven shaft bearing housing bolts
- 2. Remove:
- shim(s)
- 3. Tighten:
- middle driven shaft bearing housing bolts

### CAUTION:

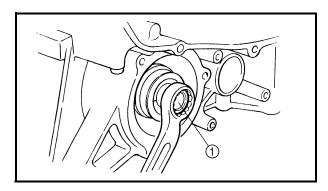
Do not overtighten the middle driven shaft bearing housing bolts or you may obtain too little middle gear backlash and damage the middle gears. If the bolts are overtightened, loosen them until the crankcase-tomiddle-driven-shaft-bearing-housing clearance is within specification, as stated below. Then, repeat all of the previous steps.





### NOTE: .

- Tighten the middle driven shaft bearing housing bolts carefully, one thread turn at a time only. Push in the middle driven shaft bearing housing and then tighten the bolts to specification.
- Clearance between the crankcase and the middle driven shaft bearing housing should be approximately 2 mm (0.08 in), when measured with a thickness gauge ①.



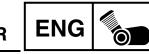
4. Hold the middle drive shaft  $\bigcirc$ .

- 5. Turn:
- middle driven shaft

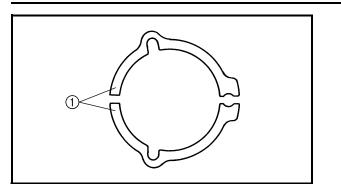
### NOTE: \_

While carefully tightening the middle driven shaft bearing housing bolts in stages and in a crisscross pattern, turn the middle driven shaft back and forth until the dial gauge reads  $0.10 \sim 0.20$  mm (0.004 ~ 0.008 in).

- 6. Measure:
- crankcase-to-middle-driven-shaft-bearinghousing clearance (with a thickness gauge)







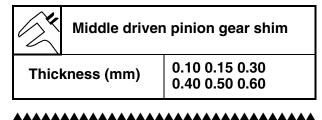
- 7. Select:
- shim(s) ①

### \*\*\*\*

- a. Shims can only be selected in 0.05 mm (0.002 in) increments, therefore round off to the hundredth's digit of the calculated thickness and select the appropriate shim with the following chart.
- b. For example, the clearance between the crankcase and the middle driven shaft bearing housing is 0.42 mm (0.017 in). Therefore, the chart instructs you to round off the 2 to 0. Thus, you should use one 0.40 mm (0.016 in) shim.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.



- 8. Loosen:
- middle driven shaft bearing housing bolts
- 9. Install:
- shim(s)
- 10.Tighten:
- middle driven shaft bearing housing bolts
   25 Nm (2.5 m · kg, 18 ft · lb)

11.Measure:

- middle gear backlash
  - Out of specification  $\rightarrow$  Refer to "MEASUR-ING THE MIDDLE GEAR BACKLASH".



## ALIGNING THE MIDDLE GEAR

### NOTE: .

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

- Crankcase
- Middle drive shaft
- Middle driven shaft bearing housing
- 1. Select:
- middle drive shaft shim(s) ①
- middle driven shaft shim(s) ②

### NOTE:

Select the middle driven shaft shim(s) ② by calculating the middle drive shaft shim thickness and then measuring the middle gear backlash.

#### \*\*\*\*

- a. Position the middle gear with the appropriate shim(s) ① and ② that has had its respective thickness calculated from information marked on the crankcase and the end of the middle drive gear.
- ① Middle drive gear shim thickness "A"
- 2 Middle drive gear shim thickness "B"
- b. To find middle drive shaft shim thickness "A", use the following formula.



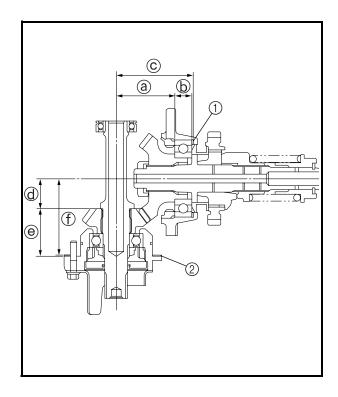
(a) = "65.00"

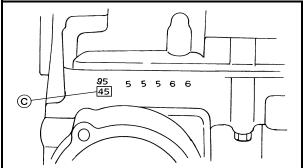
(b) = bearing thickness constant

 $\bigcirc$  = a numeral on the upper crankcase near the main bearing selection numbers and which is added to the nominal size "84"

### Example:

(a) is 65.00(b) is 18.94If the upper crankcase is marked "45" (c) is 84.45 (i.e., 84.00 + 0.45 = 84.45) "A" = 84.45 - 65.00 - 18.94 = 0.51Round off to the hundredths digit and select the appropriate shim(s).





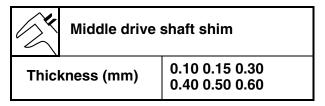


#### NOTE: \_

In the above example, the calculated number is 0.51. The chart instructs you to round off the 1 to 0. Thus, the shim thickness is 0.50 mm (0.002 in).

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.



c. To find middle driven shaft shim thickness "B", use the following formula.

Middle driven shaft shim thickness "B" =  $(\mathbf{d} + (\mathbf{e} - \mathbf{f}))$ 

 $\bigcirc$  = a numeral on the middle driven pinion gear which is added to the nominal size "34"  $\bigcirc$  = Measured value

 $\Theta$  = Measured value

(f) = a numeral on the upper crankcase near the main bearing selection numbers and which is added to the nominal size "88"

### Example:

If the middle driven pinion gear is marked "- 03"

(d) is 33.97 (i.e., 34.00 + (-0.03) = 33.97)

@ is 54.49

If the upper crankcase is marked "95"

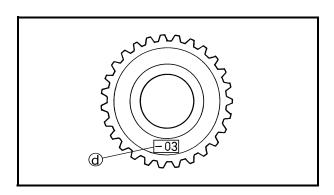
(f) is 87.95 (i.e., 87.00 + 0.95 = 87.95)

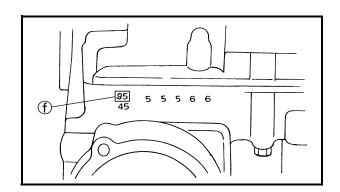
"B" = 33.97 + 54.49 - 87.95 = 0.51

Round off to the hundredths digit and select the appropriate shim(s).

### NOTE: .

In the above example, the calculated number is 0.51. The chart instructs you to round off the 1 to 0. Thus, the shim thickness is 0.50 mm (0.002 in).







Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

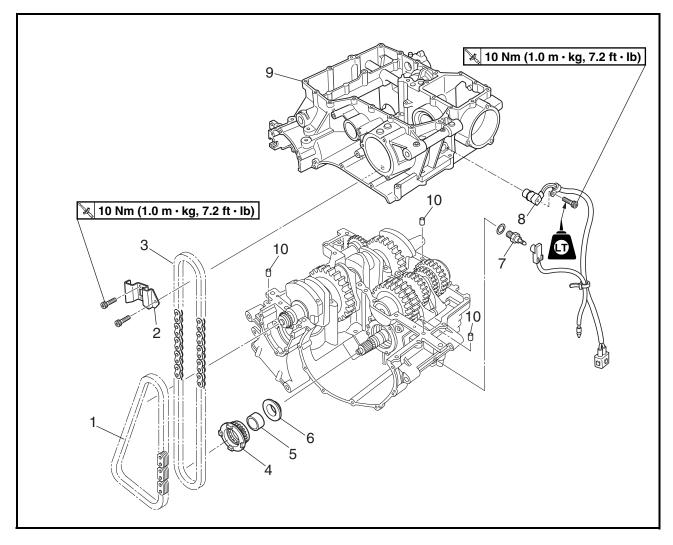
Shims are supplied in the following thicknesses.

Thickness (mm) 0.10 0.15 0.30	K	Middle drive	shaft shim
0.40 0.50 0.60	Thic	kness (mm)	0.10 0.15 0.30 0.40 0.50 0.60

\*\*\*\*\*

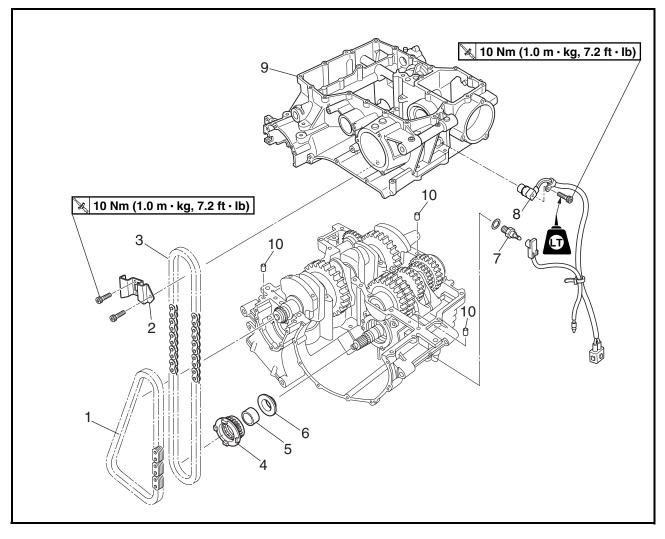


### CRANKCASE



Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Cylinder head		Refer to "CYLINDER HEAD".
	Generator rotor		Refer to "GENERATOR AND STARTER
			CLUTCH".
	Pickup coil rotor		Refer to "PICKUP COIL ROTOR".
	Stopper lever		Refer to "SHIFT SHAFT".
	Oil pump		Refer to "OIL PAN AND OIL PUMP".
	Middle drive shaft		Refer to "MIDDLE GEAR".
1	Timing chain	1	
2	Oil pump drive chain guide	1	
3	Oil pump drive chain	1	
4	Oil pump drive sprocket	1	

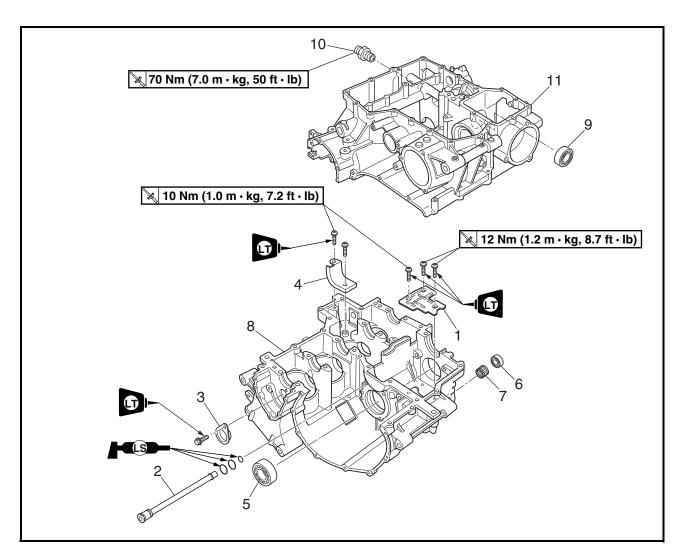




Order	Job/Part	Q'ty	Remarks
5	Collar	1	
6	Spacer	1	
7	Neutral switch	1	
8	Speed sensor	1	
9	Lower crankcase	1	Refer to "DISASSEMBLING/ASSEM- BLING THE CRANKCASE".
10	Dowel pin	3	For installation, reverse the removal procedure.

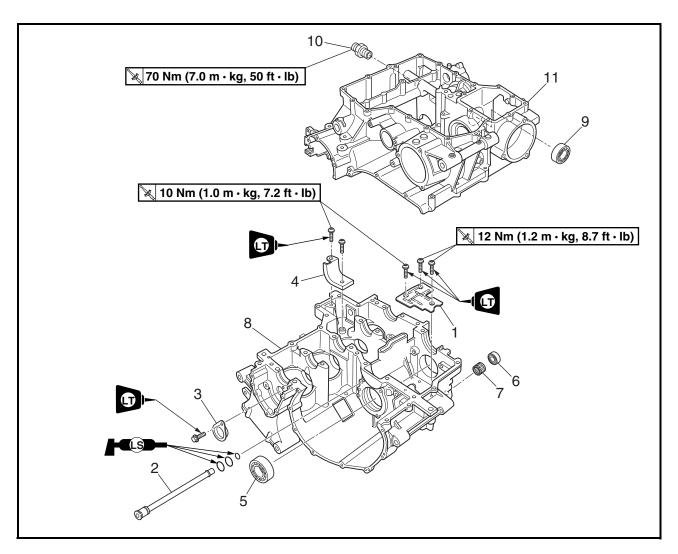
CRANKCASE ENG

0



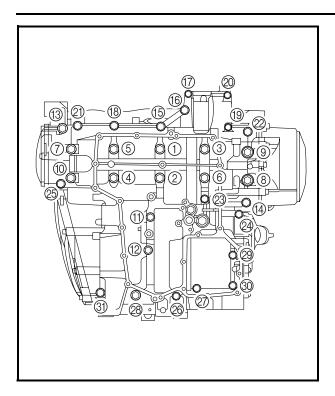
Order	Job/Part	Q'ty	Remarks
	Removing the oil baffle plates and		Remove the parts in the order listed.
	bearings		
	Connecting rod assemblies		Refer to "CONNECTING RODS AND
			PISTONS".
	Crankshaft/crankshaft journal bearings		Refer to "CRANKCASE".
	Transmission		Refer to "TRANSMISSION".
1	Oil baffle plate	1	
2	Oil delivery pipe	1	
3	Plate	1	
4	Oil baffle plate	1	
5	Bearing	1	

CRANKCASE ENG



Order	Job/Part	Q'ty	Remarks
6	Oil seal	1	
7	Bearing	1	
8	Upper crankcase	1	
9	Bearing	1	
10	Oil filter bolt	1	
11	Lower crankcase	1	
			For installation, reverse the removal
			procedure.





### DISASSEMBLING THE CRANKCASE

- 1. Remove:
- crankcase bolts

#### NOTE: \_

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.
- 2. Place the engine upside down.
- 3. 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.

M9 × 115 mm bolts: ① ~ ⑩
$M8 \times 65 \text{ mm bolts:} (1)$
M8 $\times$ 50 mm bolts: 12
M6 $\times$ 80 mm bolts: $(23)$ , $(25)$
$M6 \times 65 \text{ mm bolts: } \textcircled{3}, \textcircled{4}$
M6 × 65 mm bolts: 19, 22, 24, 26
M6 × 55 mm bolts: 15 ~ 18, 20, 21, 27 ~ 30
$M6 \times 45 \text{ mm bolts: } \textcircled{3}$

- 4. Remove:
- dowel pins



#### EAS00399 CHECKING THE CRANKCASE

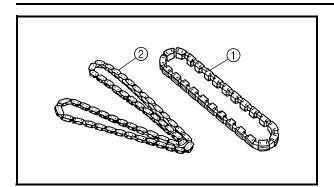
- 1. Thoroughly wash the crankcase halves in a mild solvent.
- 2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
- 3. Check:
- crankcase Cracks/damage  $\rightarrow$  Replace.
- oil delivery passages Obstruction  $\rightarrow$  Blow out with compressed air.

EAS00401

# CHECKING THE BEARINGS AND OIL SEALS

- 1. Check:
- bearings
   Clean and lubricate the bearings, then
   rotate the inner race with your finger.
   Rough movement → Replace.
- 2. Check:
- oil seals  $\label{eq:def-Damage} \mathsf{Damage/wear} \to \mathsf{Replace}.$





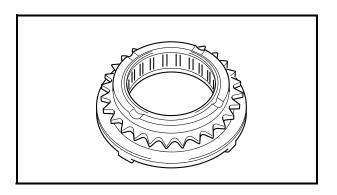
### CHECKING THE TIMING CHAIN AND OIL PUMP DRIVE CHAIN

The following procedure applies to all of the camshaft sprockets and timing chain guides. 1. Check:

• timing chain ①

Damage/stiffness  $\rightarrow$  Replace the timing chain and camshaft sprockets as a set.

 oil pump drive chain ②
 Damage/stiffness → Replace the oil pump drive chain, oil pump drive sprocket and oil pump shaft as a set.



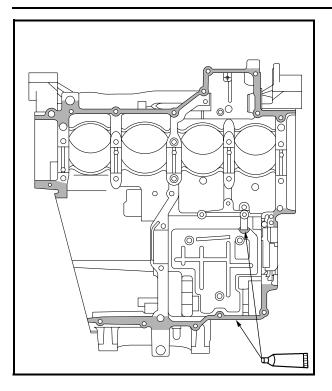
- 2. Check:
- oil pump drive sprocket Cracks/damage/wear → Replace the oil pump drive sprocket and the oil pump drive chain as a set.

EAS00413

### ASSEMBLING THE CRANKCASE

- 1. Lubricate:
- crankshaft journal bearings (with the recommended lubricant)

Recommended lubricant Engine oil



CRANKCASE



2. Apply:sealant

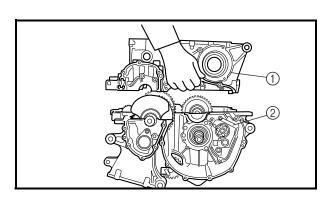
(onto the crankcase mating surfaces)

Quick Gasket® ACC-11001-05-01

# NOTE: \_

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within  $2 \sim 3 \text{ mm}$  (0.08 ~ 0.12 in) of the crankshaft journal bearings.

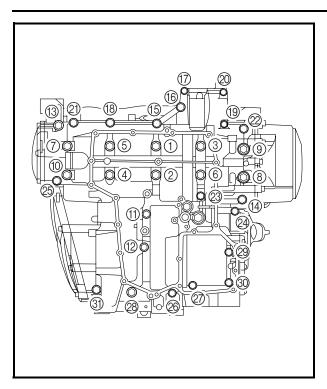
- 3. Install:
- dowel pins
- 4. Set the shift drum assembly and transmission gears in the neutral position.

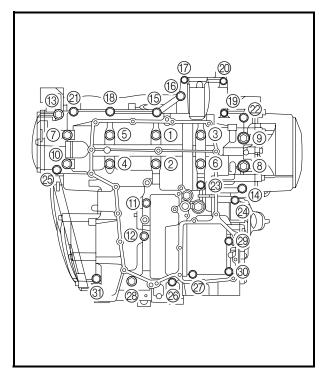


- 5. Install:
- lower crankcase ①
   (onto the upper crankcase ②)

# CAUTION:

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.





CRANKCASE



- 6. Install:
- crankcase bolts

# NOTE:

- Lubricate the bolt threads and washers with engine oil.
- Finger tighten the crankcase bolts.

 $\begin{array}{c|c} \text{M9} \times 115 \text{ mm bolts: (1)} \sim (10) & \text{New} \\ \text{M8} \times 65 \text{ mm bolts: (1)} \\ \text{M8} \times 50 \text{ mm bolts: (2)} \\ \text{M6} \times 80 \text{ mm bolts: (2)} , (2) \\ \text{M6} \times 65 \text{ mm bolts: (3)} , (4) \\ \text{M6} \times 65 \text{ mm bolts: (1)} , (2) , (2) , (2) \\ \text{M6} \times 55 \text{ mm bolts: (1)} \sim (18) , (2) , (2) , (2) \\ \text{M6} \times 55 \text{ mm bolts: (1)} \sim (18) , (2) , (2) , (2) \\ \text{M6} \times 55 \text{ mm bolts: (1)} \sim (18) , (2) , (2) , (2) \\ \text{M6} \times (15) \text{ mm bolts: (1)} \sim (18) , (2) , (2) \\ \text{M6} \times (15) \text{ mm bolts: (15)} \sim (18) , (2) , (2) \\ \text{M6} \times (15) \text{ mm bolts: (15)} \sim (18) , (2) , (2) \\ \text{M6} \times (15) \text{ mm bolts: (15)} \\ \text{M6} \times (15) \text{$ 

 $M6 \times 45 \text{ mm bolts:}$ 

- 7. Tighten:
- crankcase bolts (1) ~ (1)

# NOTE:

- Do not reuse crankcase bolts ① ~ ⑩.
- The tightening procedure of crankcase bolts
   (1) ~ (10) is angle controlled, therefore tighten the bolts using the following procedure.

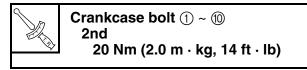
# \*\*\*\*

a. Tighten the bolts in the tightening sequence cast on the crankcase.



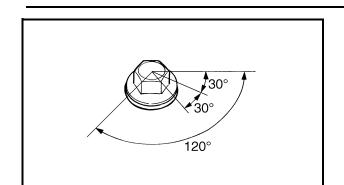
Crankcase bolt ① ~ ⑩ 1st 20 Nm (2.0 m · kg, 14 ft · lb)

b. Loosen and retighten the crankcase bolts in the proper tightening sequence as shown.



CRANKCASE





c. Tighten the crankcase bolts further to reach the specified angle 120° in the proper tightening sequence as shown.



Crankcase bolt ① ~ ⑩ Final Specified angle 120°

# A WARNING

When the bolts are tightened more than the specified angle, do not loosen the bolt and then retighten it.

Replace the bolt with a new one and perform the procedure again.

# CAUTION

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is at the specified angle.

# NOTE: \_

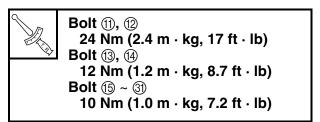
When using a hexagonal bolt, note that the angle from one corner to another is 60°.

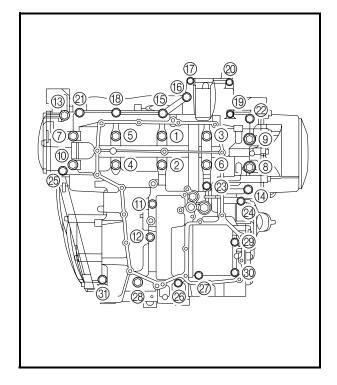
\*\*\*\*\*

- 8. Tighten:
- crankcase bolts (1) ~ (3)

# NOTE:

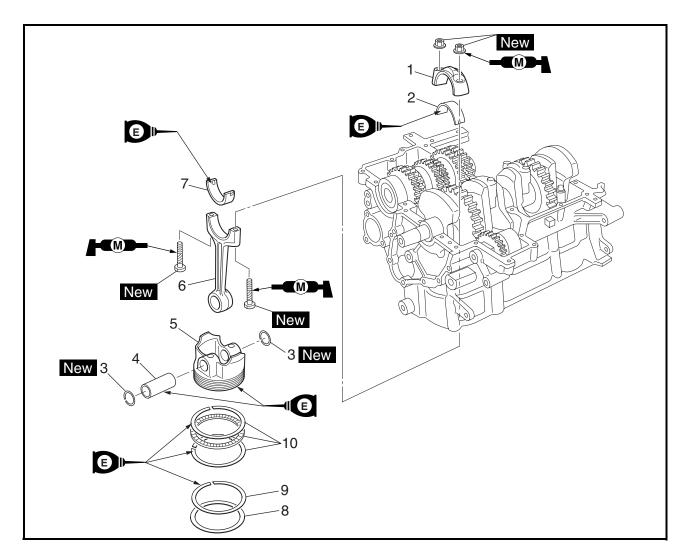
Tighten the bolts in the tightening sequence cast on the crankcase.





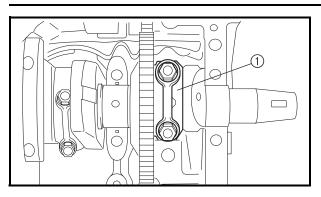


# CONNECTING RODS AND PISTONS



Order	Job/Part	Q'ty	Remarks
	Removing the connecting rods and		Remove the parts in the order listed.
	pistons		
	Crankcase		Separate.
			Refer to "CRANKCASE".
1	Connecting rod cap	4	
2	Big end lower bearing	4	
3	Piston pin clip	8	
4	Piston pin	4	Refer to "REMOVING THE CONNECT-
5	Piston	4	ING RODS AND PISTONS" and
6	Connecting rod	4	"INSTALLING THE CONNECTING
7	Big end upper bearing	4	RODS AND PISTONS".
8	Top ring	4	
9	2nd ring	4	
10	Oil ring	4	
			For installation, reverse the removal
			procedure.





# REMOVING THE CONNECTING RODS AND PISTONS

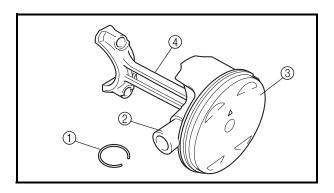
The following procedure applies to all of the connecting rods and pistons.

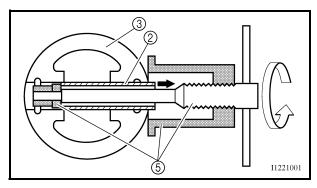
1. Remove:

- connecting rod cap (1)
- big end bearings

# NOTE: .

Identify the position of each big end bearing so that it can be reinstalled in its original place.





- 2. Remove:
- piston pin clips ①
- piston pin ②
- piston ③
- connecting rod 4

CAUTION:

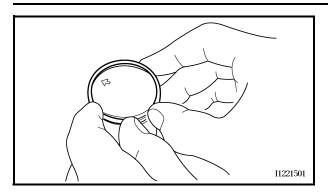
Do not use a hammer to drive the piston pin out.

# NOTE:

- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller (5).







- 3. Remove:
- top ring
- 2nd ring
- oil ring

# NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

# CHECKING THE CYLINDERS AND PISTONS

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

- 1. Check:
- piston wall
- cylinder wall
   Vertical scratches → Replace the cylinder, and the piston and piston rings as a set.
- 2. Measure:
- piston-to-cylinder clearance

## \*\*\*\*

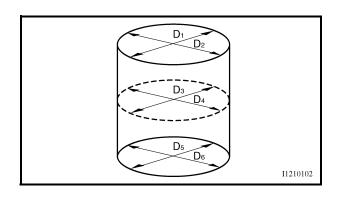
a. Measure cylinder bore "C" with the cylinder bore gauge.

# NOTE: \_

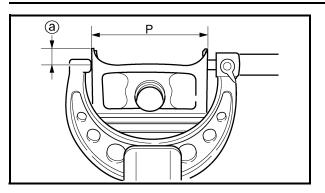
Measure cylinder bore "C" by taking side-toside and front-to-back measurements of the cylinder. Then, find the average of the measurements.

Cylinder bore "C"	79.00 ~ 79.01 mm (3.1102 ~ 3.1106 in)			
Taper limit "T"	0.05 mm (0.002 in)			
Out of round "R"	0.05 mm (0.002 in)			
"C" - movimum of Dr. Do				
"C" – maximum of				
"C" = maximum of I	D1 ~ D6			
	D1 ~ D6 D1 or D2 – maximum of			

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

	Piston size "P"
Standard	78.965 ~ 78.980 mm (3.1089 ~ 3.1094 in)

- 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.

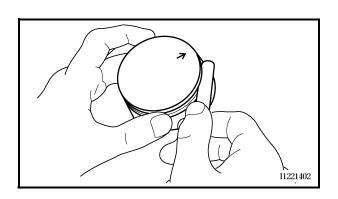
Piston-to-cylinder clearance = Cylinder bore "C" – Piston skirt diameter "P"



Piston-to-cylinder clearance 0.020 ~ 0.045 mm (0.0008 ~ 0.0018 in) <Limit>: 0.012 mm (0.0005 in)

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

**\*\*\*\*** 



# CHECKING THE PISTON RINGS

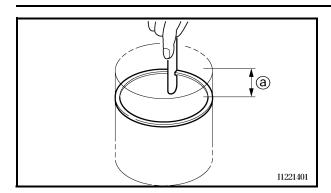
- 1. Measure:
- piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

# 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 (0.0012 ~ 0.0028 in) <Limit>: 0.12 mm (0.0047 in) 2nd ring 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) <Limit>: 0.12 mm (0.0047 in)





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

### NOTE:

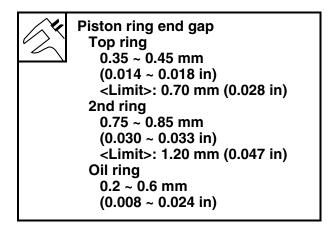
Level the piston ring in the cylinder with the piston crown.

(a) 5 mm (0.20 in)

- 3. Measure:
- piston ring end gap Out of specification → Replace the piston ring.

# NOTE:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.



# EAS00266

# CHECKING THE PISTON PINS

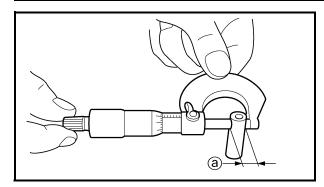
The following procedure applies to all of the piston pins.

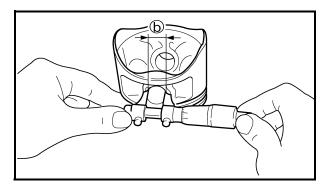
- 1. Check:
- piston pin

Blue discoloration/grooves  $\rightarrow$  Replace the piston pin and then check the lubrication system.

# **CONNECTING RODS AND PISTONS**





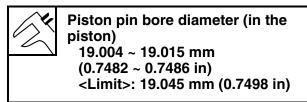


- 2. Measure:
- piston pin outside diameter ⓐ
   Out of specification → Replace the piston pin.



Piston pin outside diameter 18.991 ~ 19.000 mm (0.7477 ~ 0.7480 in) <Limit>: 19.045 mm (0.7498 in)

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



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

Piston-pin-to-piston clearance = Piston pin bore diameter (in the piston) (b) -

Piston pin outside diameter ⓐ

P c

Piston-pin-to-piston-pin-bore clearance 0.004 ~ 0.024 mm (0.0002 ~ 0.0009 in) <Limit>: 0.074 mm (0.0029 in)



# CHECKING THE CONNECTING RODS

- 1. Measure:
- crankshaft-pin-to-big-end-bearing clearance

Out of specification  $\rightarrow$  Replace the big end bearings.



Crankshaft-pin-to-big-end-bearing clearance 0.021 ~ 0.039 mm (0.0008 ~ 0.0015 in)

The following procedure applies to all of the connecting rods.

# CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

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

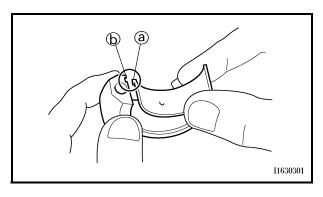
# NOTE: .

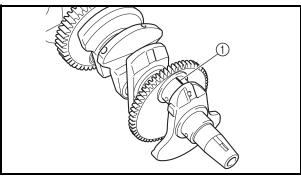
Align the projections (a) on the big end bearings with the notches (b) in the connecting rod and connecting rod cap.

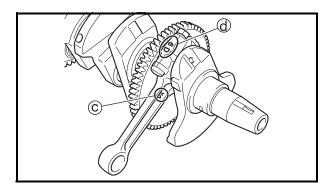
- c. Put a piece of Plastigauge<sup>®</sup> ① on the crank-shaft pin.
- d. Assemble the connecting rod halves.

# NOTE:

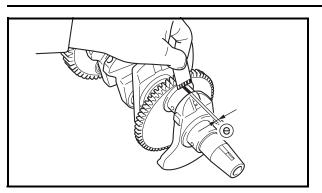
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the "Y" mark © on the connecting rod faces towards the left side of the crank-shaft.
- Make sure the characters (d) on both the connecting rod and connecting rod cap are aligned.









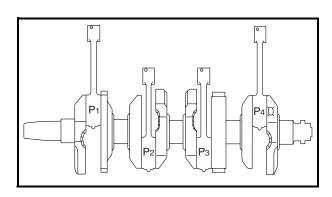


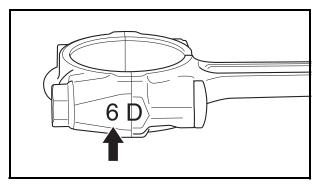
- e. Tighten the connecting rod nuts. Refer to "INSTALLING THE CONNECTING RODS AND PISTONS".
- f. Remove the connecting rod and big end bearings.

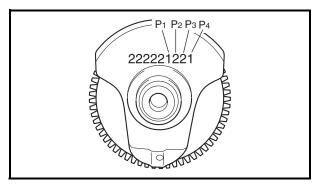
Refer to "REMOVING THE CONNECTING RODS AND PISTONS".

g. Measure the compressed Plastigauge<sup>®</sup> width (a) on the crankshaft pin.
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

\*\*\*\*\*







- 2. Select:
- big end bearings (P1 ~ P4)

# NOTE: \_

- The numbers stamped into the crankshaft web and the numbers on the connecting rods are used to determine the replacement big end bearing sizes.
- "P1" ~ "P4" refer to the bearings shown in the crankshaft illustration.

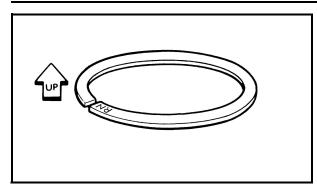
For example, if the connecting rod "P1" and the crankshaft web "P1" numbers are "6" and "1" respectively, then the bearing size for "P1" is:

Bearing size of P1:				
"P1" (connecting	rod) –	" <b>P</b> 1"	(crank-	
shaft web)				
6 – 1 = 5 (yellow)				

BEARING COLOR CODE			
1	blue		
2	black		
3	brown		
4	green		
5	yellow		
6	pink		

. . . . . . . . . . . . . . . . . .





EAS00271 EAS00404

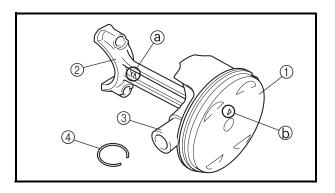
# INSTALLING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the pistons and connecting rods.

- 1. Install:
- top ring
- 2nd ring
- oil ring

# NOTE: \_

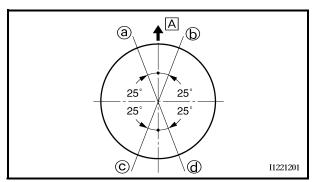
Be sure to install the piston rings so that the manufacturer's marks or numbers face up.



- 2. Install:
- piston ①
- connecting rod ②
- piston pin ③
- piston pin clip ④ New

# NOTE:

- Apply engine oil onto the piston pin.
- Make sure that the "Y" mark (a) on the connecting rod left when the arrow mark (b) on the piston is pointing up. Refer to the illustration.
- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #4).



- 3. Offset:
- piston ring end gaps
- a Top ring
- b Lower oil ring rail
- © Upper oil ring rail
- (d) 2nd ring(A) Intake side

5 - 99



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

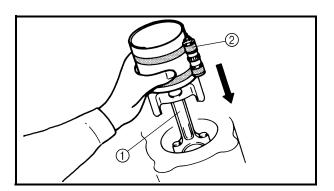
- 5. Lubricate:
- bolt threads
- nut seats (with the recommended lubricant)

Recommended lubricant Molybdenum disulfide grease

- 6. Lubricate:
- crankshaft pins
- big end bearings
- connecting rod inner surface (with the recommended lubricant)



# Recommended lubricant Engine oil



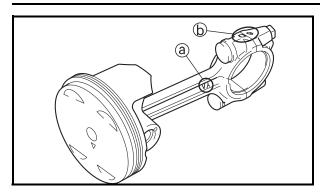
- 7. Install:
- big end bearings
- connecting rod assembly ① (into the cylinder and onto the crankshaft pin)
- connecting rod cap (onto the crankshaft pin)

# 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.
- While compressing the piston rings with piston ring compressor ②, install the connecting rod assembly into the cylinder with the other hand.

# **CONNECTING RODS AND PISTONS**

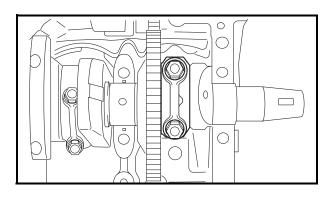




- Make sure the "Y" marks (a) on the connecting rods face towards the left side of the crankshaft.
- Make sure the characters (b) on both the connecting rod and connecting rod cap are aligned.

# Piston ring compressor YM-08037

- 8. Align:
- bolt heads (with the connecting rod)



- 9. Tighten:
- connecting rod nuts

# A WARNING

- Replace the connecting rod bolts and nuts with new ones.
- Clean the connecting rod bolts and nuts.

# NOTE:

The tightening procedure of the connecting rod nuts is angle controlled, therefore tighten the nuts using the following procedure.

### \*\*\*\*\*

a. Tighten the connecting rod nuts to the specified torque.

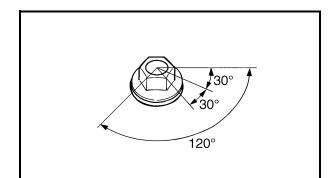


Connecting rod nut 1st

- 20 Nm (2.0 m · kg, 14 ft · lb)
- b. Tighten the connecting rod nuts further to reach the specified angle 120°.



Connecting rod nut Final Specified angle 120°





# A WARNING

When the nuts are tightened more than the specified angle, do not loosen the nut and then retighten it.

Replace the nut with a new one and perform the procedure again.

# CAUTION:

- Do not use a torque wrench to tighten the nut to the specified angle.
- Tighten the nut until it is at the specified angle.

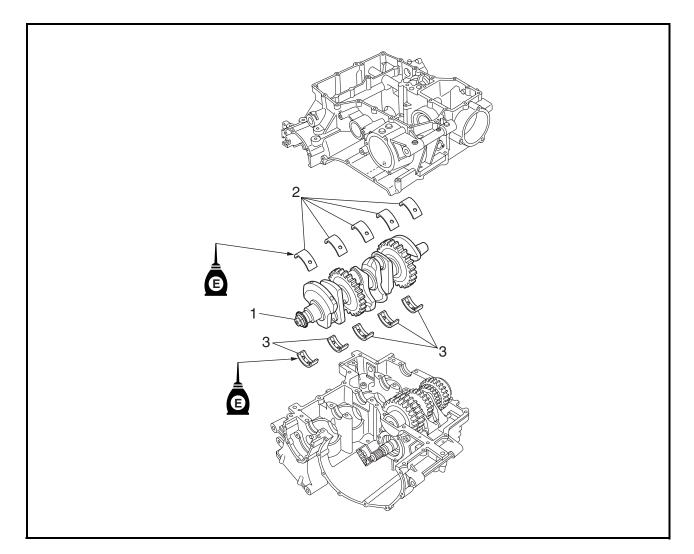
## NOTE: \_

When using a hexagonal nut, note that the angle from one corner to another is 60°.

\*\*\*\*\*

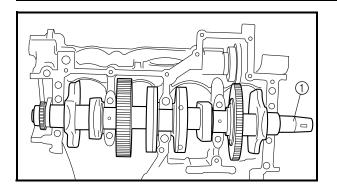


# CRANKSHAFT



Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft		Remove the parts in the order listed.
	Crankcase		Separate.
			Refer to "CRANKCASE".
	Connecting rod caps		Refer to "CONNECTING RODS AND PISTONS".
1	Crankshaft	1	Refer to "REMOVING/INSTALLING THE
2	Crankshaft journal lower bearing	5	CRANKSHAFT".
3	Crankshaft journal upper bearing	5	
			For installation, reverse the removal procedure.



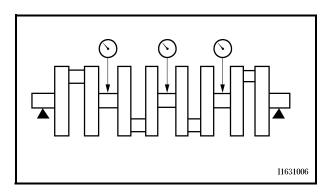


# REMOVING THE CRANKSHAFT

- 1. Remove:
- crankshaft ①
- crankshaft journal lower bearings (from the lower crankcase)
- crankshaft journal upper bearings (from the upper crankcase)

## NOTE: .

Identify the position of each crankshaft journal bearing so that it can be reinstalled in its original place.



### EAS00396 CHECKING THE CRANKSHAFT

- 1. Measure:
- crankshaft runout
   Out of specification → Replace the crankshaft.



Maximum crankshaft runout 0.03 mm (0.0012 in)

- 2. Check:
- crankshaft journal surfaces
- crankshaft pin surfaces
- bearing surfaces Scratches/wear  $\rightarrow$  Replace the crankshaft.
- 3. Measure:
- crankshaft-journal-to-crankshaft-journalbearing clearance
   Out of specification → Replace the crankshaft journal bearings.

Ľ

Crankshaft-journal-to-crankshaftjournal-bearing clearance 0.027 ~ 0.045 mm (0.0011 ~ 0.0018 in)



# CAUTION:

Do not interchange the crankshaft journal bearings. To obtain the correct crankshaftjournal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

### \*\*\*\*

- 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 (a) of the crankshaft journal upper bearings with the notches (b) in the upper crankcase.

d. Put a piece of Plastigauge<sup>®</sup> ② on each crankshaft journal.

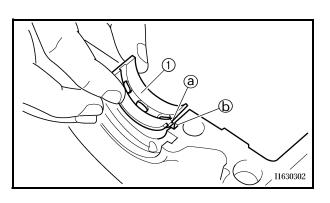
# NOTE: .

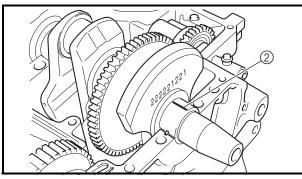
Do not put the Plastigauge<sup>®</sup> over the oil hole in the crankshaft journal.

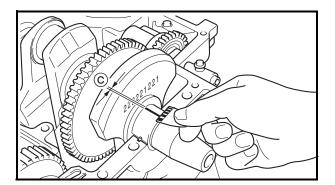
e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

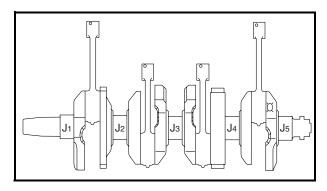
# NOTE: .

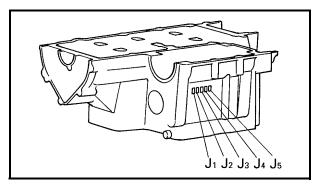
- Align the projections (a) of the crankshaft journal lower bearings with the notches (b) in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.
- f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.
   Refer to "ASSEMBLING THE CRANK-CASE— CRANKCASE".
- g. Remove the lower crankcase and the crankshaft journal lower bearings.

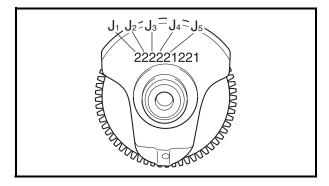














h. Measure the compressed Plastigauge<sup>®</sup> width © on each crankshaft journal. If the crankshaft-journal-to-crankshaft-jour-

nal-bearing clearance is out of specification, select replacement crankshaft journal bearings.

\*\*\*\*\*

- 4. Select:
- Crankshaft journal bearings (J1 ~ J5)

## NOTE: .

- The numbers stamped into the crankshaft web and the numbers stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J1 ~ J5" refer to the bearings shown in the crankshaft illustration.
- If "J1 ~ J5" 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:

## Bearing size of J<sub>1</sub>:

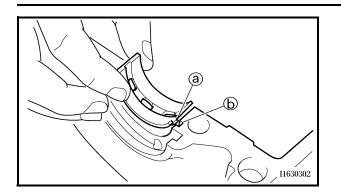
"J1" (crankcase) – "J1"	(crankshaft web)
+ 2	

6 - 2 + 2 = 6 (pink)

k
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е

\*\*\*\*\*





### EAS00407 INSTALLING THE CRANKSHAFT

- 1. Install:
- crankshaft journal upper bearings (into the upper crankcase)
- crankshaft journal lower bearings (into the lower crankcase)

# NOTE:

- Align the projections (a) on the crankshaft journal upper bearings with the notches (b) in the upper crankcase.
- Be sure to install each crankshaft journal bearing in its original place.

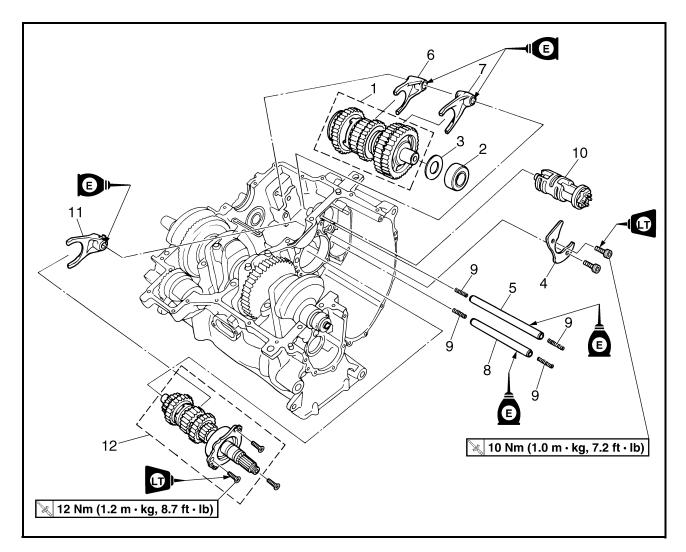
- 2. Lubricate:
- crankshaft pins
- connecting rod inner surface (with the recommended lubricant)

-----

Recommended lubricant Engine oil

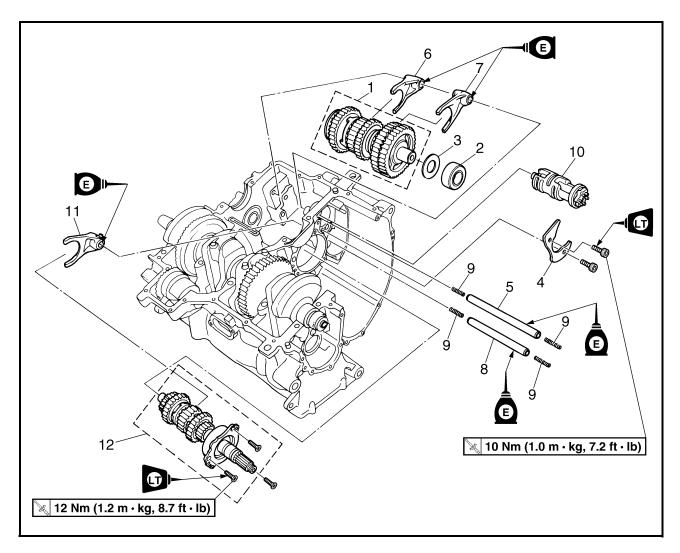


# TRANSMISSION



Order	Job/Part	Q'ty	Remarks
	Removing the transmission, shift		Remove the parts in the order listed.
	drum assembly, and shift forks		
	Crankcase		Separate.
			Refer to "CRANKCASE".
1	Drive axle assembly	1	
2	Bearing	1	
3	Washer	1	
4	Shift drum retainer	1	
5	Long shift fork guide bar	1	Refer to "INSTALLING THE TRANSMIS-
6	Shift fork "L"	1	SION .
7	Shift fork "R"	1	
8	Short shift fork guide bar	1	
9	Spring	4	

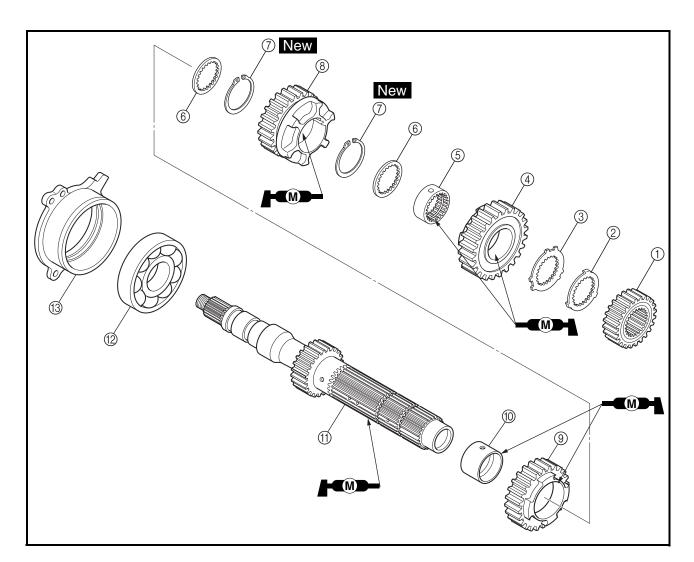




Order	Job/Part	Q'ty	Remarks
10	Shift drum assembly	1	Refer to "INSTALLING THE TRANSMIS-
11	Shift fork "C"	1	SION".
12	Main axle assembly	1	Refer to "REMOVING/INSTALLING THE TRANSMISSION". For installation, reverse the removal procedure.

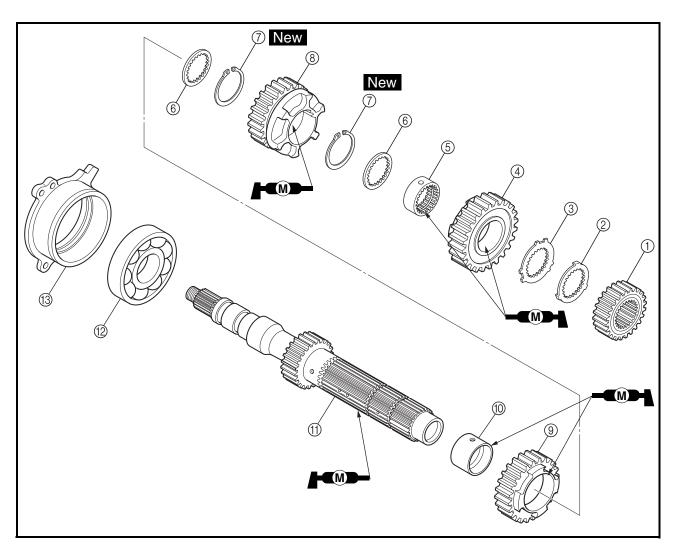






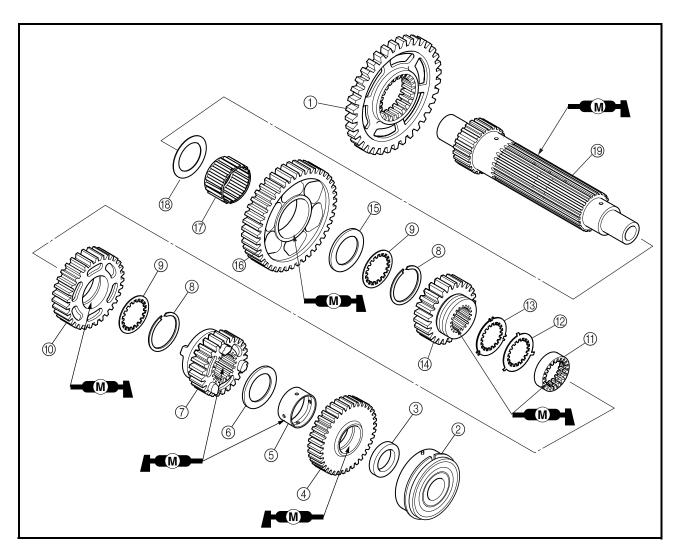
Order	Job/Part	Q'ty	Remarks
	Disassembling the main axle assem-		Remove the parts in the order listed.
	bly		
1	2nd pinion gear	1	
2	Toothed lock washer	1	
3	Toothed lock washer retainer	1	
4	5th pinion gear	1	
5	Toothed spacer	1	
6	Toothed washer	2	
7	Circlip	2	
8	3rd pinion gear	1	
9	4th pinion gear	1	
10	Collar	1	





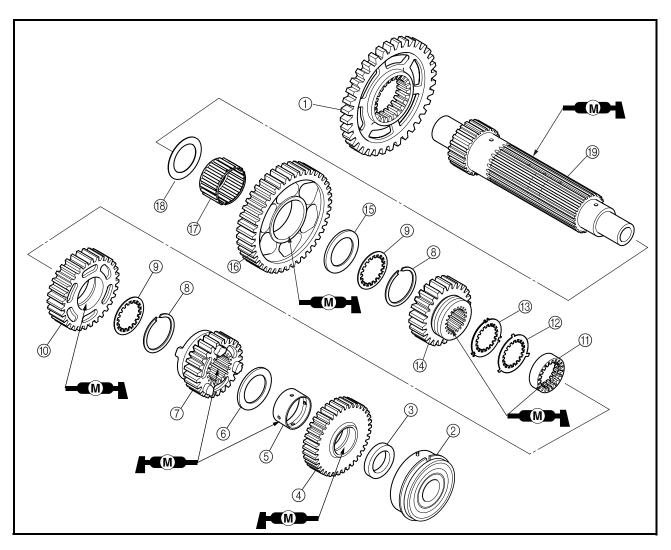
Order	Job/Part	Q'ty	Remarks
(1)	Main axle/1st pinion gear	1	
(12)	Bearing	1	
13	Main axle bearing housing	1	
			For assembly, reverse the disassembly
			procedure.





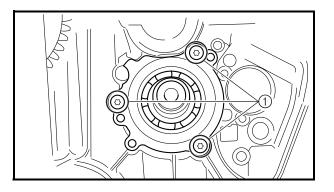
Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Remove the parts in the order listed.
1	Middle drive gear	1	
2	Bearing	1	
3	Washer	1	
4	2nd wheel gear	1	
5	Collar	1	
6	washer	1	
7	5th wheel gear	1	
8	Circlip	2	
9	Toothed washer	2	
10	3rd wheel gear	1	

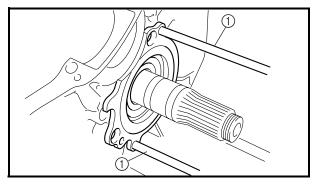




Order	Job/Part	Q'ty	Remarks
(1)	Toothed spacer	1	
12	Toothed lock washer	1	
13	Toothed lock washer retainer	1	
(14)	4th wheel gear	1	
15	Washer	1	
16	1st wheel gear	1	
17	Bearing	1	
18	Washer	1	
(19)	Drive axle	1	
			For assembly, reverse the disassembly
			procedure.







# REMOVING THE TRANSMISSION

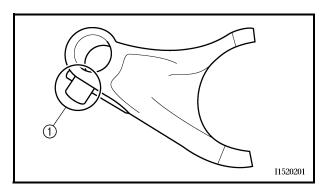
- 1. Remove:
- bearing housing bolts (1) (with the Torx wrench T30)
- 2. Remove:
- main axle assembly (from the clutch side)

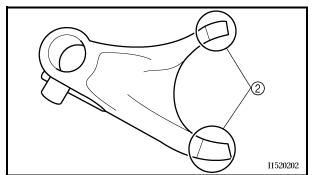
### NOTE: \_

Remove the main axle assembly with the slide hammer bolt ① and weight.



Slide hammer bolt YU-01083-1 Weight J-6125-7



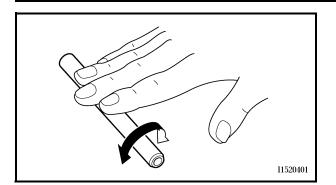


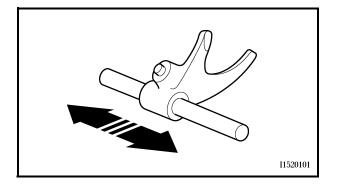
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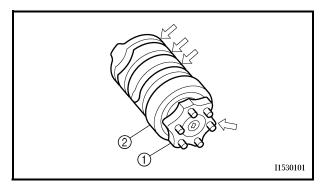
# **CHECKING THE SHIFT FORKS**

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  $\rightarrow$  Replace.

# A WARNING

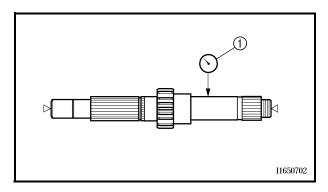
Do not attempt to straighten a bent shift fork guide bar.

- 3. Check:
- shift fork movement

   (along the shift fork guide bar)
   Rough movement → Replace the shift forks
   and shift fork guide bar as a set.

# 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.

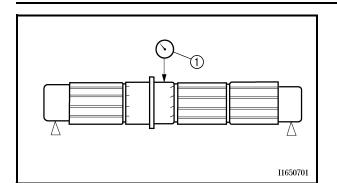


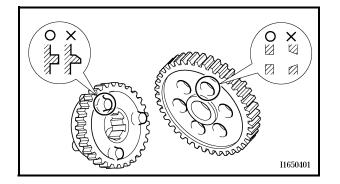
# CHECKING THE TRANSMISSION

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



Main axle runout limit 0.08 mm (0.003 in)







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

Drive axle runout limit 0.08 mm (0.003 in)

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



# INSTALLING THE TRANSMISSION

- 1. Install:
- main axle assembly
  - 🔌 12 Nm (1.2 m · kg, 8.7 ft · lb)
- shift fork "C"
- shift drum assembly
- shift fork "R"
- shift fork "L"
- shift fork guide bars
- shift drum retainer

# 🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

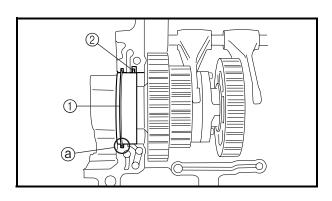
• drive axle assembly

# NOTE: .

- When installing the main axle assembly, use a pin to align the bearing housing bolt hole with the corresponding hole in the upper crankcase.
- 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".
- Make sure the drive axle bearing circlip ① is inserted into the grooves ⓐ in the upper crankcase.
- The drive axle bearing pin ② must face towards the rear of the crankcase.
- 2. Check:
- transmission
   Rough movement → Repair.

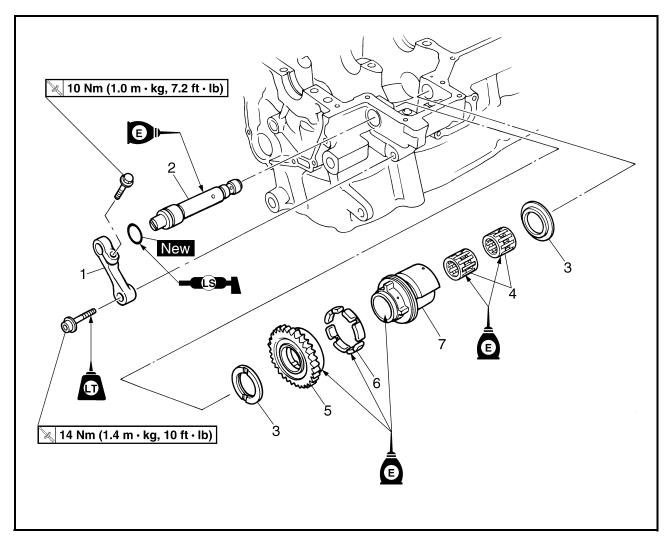
NOTE: .

Oil each gear, shaft, and bearing thoroughly.





# BALANCERS FRONT BALANCER

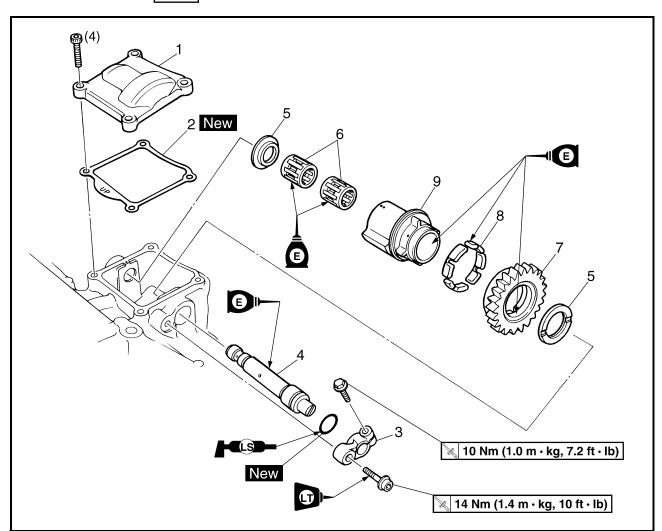


Order	Job/Part	Q'ty	Remarks
	Removing the front balancer		Remove the parts in the order listed.
	Crankcase		Separate.
			Refer to "CRANKCASE".
1	Balancer lever	1	
2	Balancer shaft	1	
3	Washer	2	
4	Bearing	2	Refer to "INSTALLING THE FRONT BALANCER".
5	Balancer gear	1	DALANCEN .
6	Absorber	4	
7	Balancer weight	1	
			For installation, reverse the removal
			procedure.









Order	Job/Part	Q'ty	Remarks
	Removing the rear balancer		Remove the parts in the order listed.
	Throttle bodies		Refer to "FUEL INJECTION SYSTEM" in
			chapter 7.
	Clutch cover		Refer to "CLUTCH".
1	Balancer cover	1	
2	Balancer cover gasket	1	
3	Balancer lever	1	
4	Balancer shaft	1	
5	Washer	2	
6	Bearing	2	Refer to "INSTALLING THE REAR BAL-
7	Balancer gear	1	ANCER".
8	Absorber	4	
9	Balancer weight	1	
			For installation, reverse the removal procedure.

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# CHECKING THE BALANCER

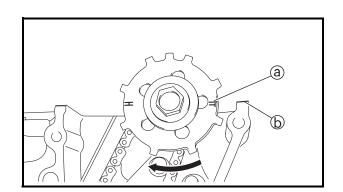
- 1. Check:
- front balancer gear Damage/wear → Replace the front balancer gear and crankshaft.
- rear balancer gear
   Damage/wear → Replace the rear balancer gear and primary driven gear.
- 2. Check:
- balancer shaft ① Cracks/damage/wear → Replace the balancer shaft and bearings. Dirt → Clean.
- bearings ②
   Damage/wear → Replace.
- absorbers Damage/wear  $\rightarrow$  Replace.

# INSTALLING THE FRONT BALANCER

- 1. Install:
- balancer weight ①
- absorbers
- balancer gear 2
- bearings
- washers

# NOTE:

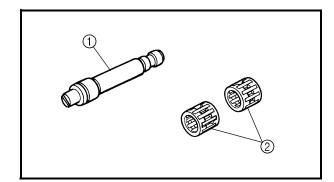
Align the punch mark (a) in the balancer weight with the mark (b) in the balancer gear.

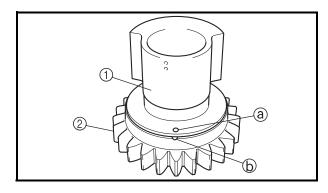


- 2. Align:
- "T" mark on the pickup coil rotor (with the crankcase mating surface)

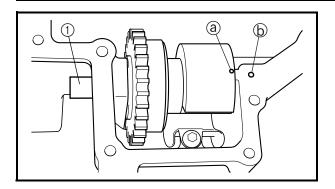
# •••••

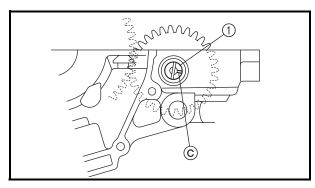
- a. Turn the crankshaft clockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "T" mark (a) on the pickup coil rotor with the crankcase mating surface (b).
- \*\*\*\*\*

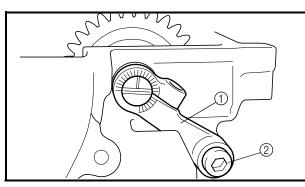


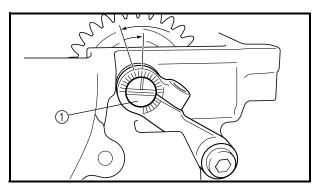


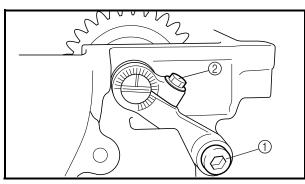












- 3. Install:
- balancer shaft ①

# NOTE:

- Align the punch mark (a) in the balancer weight with the oil hole (b) in the upper crank-case.
- Make sure that the front balancer gear teeth and the primary drive gear teeth mesh correctly.
- Make sure that the slot ⓒ is facing in the direction indicated in the illustration when installing the balancer shaft.

- 4. Install:
- balancer lever (1)
- balancer lever bolt 2 -

# NOTE:

Temporarily tighten the balancer lever bolt.

- 5. Tighten:
- balancer shaft ①

🔌 0.4 Nm (0.04 m · kg, 0.29 ft · lb)

# NOTE:

Tighten the balancer shaft to the specified torque by turning it counterclockwise, and then turn it one scale back on the balancer lever scale.

- 6. Tighten:
- $\bullet$  balancer lever bolt ()
  - 🔌 14 Nm (1.4 m · kg, 10 ft · lb)
- balancer shaft pinch bolt ②

🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

# NOTE: .

Make sure that the balancer shaft does not rotate.

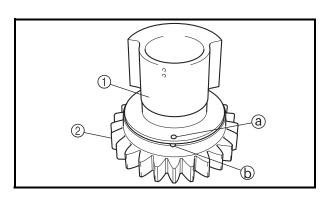


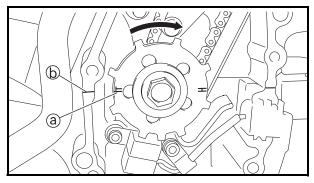
 Start the engine and check that there is no abnormal noise coming from the balancer gear. If noise is abnormal, adjust the gear lash by turning the balancer shaft.

### NOTE: .

With each adjustment, turn the balancer shaft one scale.

Clockwise	Decrease gear lash
Counterclockwise	Increase gear lash





# INSTALLING THE REAR BALANCER

- 1. Install:
- balancer weight ①
- absorbers
- balancer gear 2
- bearings
- washers

# NOTE: .

Align the punch mark (a) in the balancer weight with the mark (b) in the balancer gear.

- 2. Align:
- "T" mark on the pickup coil rotor (with the crankcase mating surface)

### \*\*\*\*

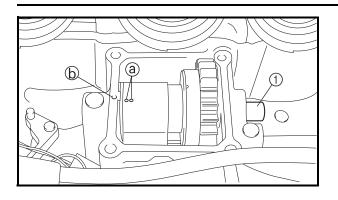
- a. Turn the crankshaft clockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "T" mark (a) on the pickup coil rotor with the crankcase mating surface (b).

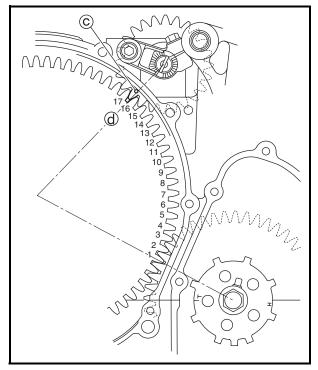
# NOTE:

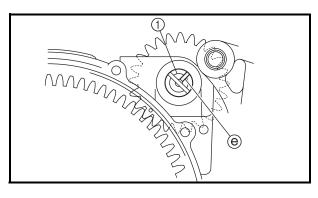
TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

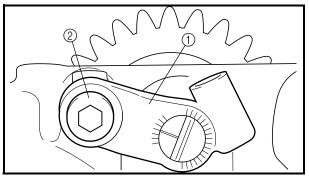
.......











- 3. Install:
- balancer shaft ①

# NOTE:

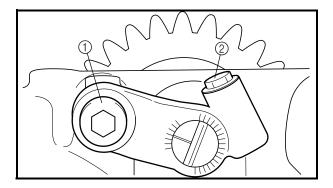
- Align the punch marks (a) in the balancer weight with the oil hole (b) in the upper crank-case.
- Make sure that the rear balancer gear teeth and the primary driven gear teeth mesh correctly.
- Make sure that the balancer gear punch mark ⓒ is aligned with the primary driven gear point ⓓ.
- Make sure that the slot (e) is facing in the direction indicated in the illustration when installing the balancer shaft.

- 4. Install:
- balancer lever ①
- balancer lever bolt ② -

NOTE:

Temporarily tighten the balancer lever bolt.





- 5. Tighten:
- balancer shaft ①
   (0.4 Nm (0.04 m · kg, 0.29 ft · lb)

#### NOTE: .

Tighten the balancer shaft to the specified torque by turning it counterclockwise, and then turn it two scales back on the balancer lever scale.

- 6. Tighten:
- balancer lever bolt ①

🔌 14 Nm (1.4 m · kg, 10 ft · lb)

• balancer shaft pinch bolt (2)

**BALANCERS** 

🔌 10 Nm (1.0 m · kg, 7.2 ft · lb)

#### NOTE: \_

Make sure that the balancer shaft does not rotate.

 Start the engine and check that there is no abnormal noise coming from the balancer gear. If noise is abnormal, adjust the gear lash by turning the balancer shaft.

#### NOTE: .

With each adjustment, turn the balancer shaft one scale.

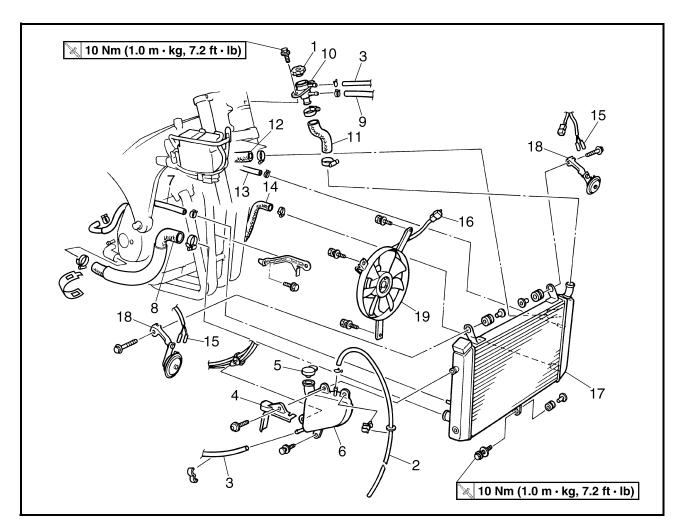
Clockwise	Decrease gear lash
Counterclockwise	Increase gear lash

#### EAS00454



# **COOLING SYSTEM**

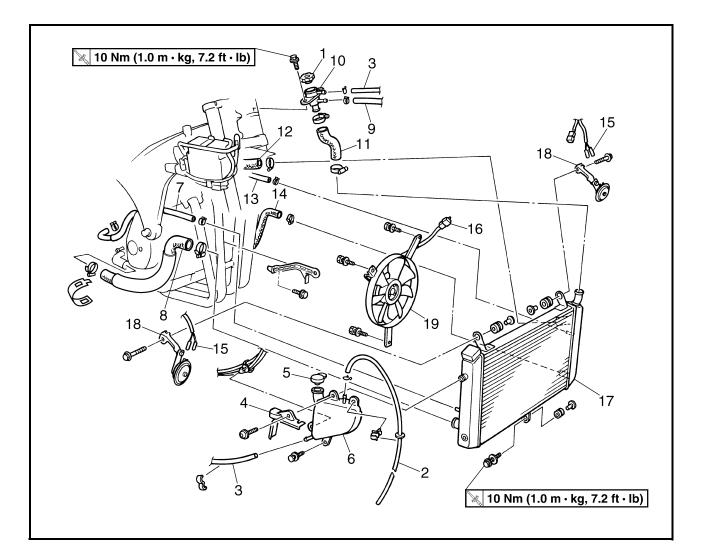
# RADIATOR



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Rider seat/fuel tank		Refer to "SEATS AND FUEL TANK" in chapter 3.
	Side cowlings/front cowling assembly		Refer to "COWLINGS AND COVERS" in chapter 3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator cap	1	
2	Coolant reservoir breather hose	1	
3	Coolant reservoir hose	1	
4	Coolant reservoir cap cover	1	
5	Coolant reservoir cap	1	
6	Coolant reservoir	1	
7	Water pump breather hose	1	

RADIATOR

COOL

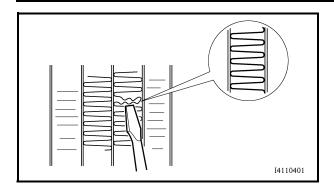


Order	Job/Part	Q'ty	Remarks
8	Radiator outlet hose	1	
9	Thermostat assembly breather hose	1	Disconnect.
10	Conduit	1	
11	Conduit hose	1	
12	Radiator inlet hose	1	Disconnect.
13	Plunger control unit hose 2	1	Disconnect.
14	Oil cooler outlet hose	1	Disconnect.
15	Horn connector	4	Disconnect.
16	Radiator fan motor coupler	1	Disconnect.
17	Radiator	1	
18	Horn bracket (left and right)	2	
19	Radiator fan	1	
			For installation, reverse the removal
			procedure.

6

RADIATOR





# CHECKING THE RADIATOR

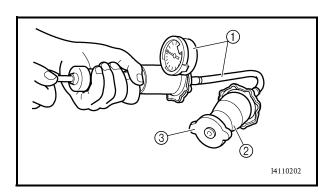
1. Check:

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, flathead screwdriver.

- 2. Check:
- radiator hoses Cracks/damage  $\rightarrow$  Replace.



- 3. Measure:
- radiator cap opening pressure Below the specified pressure → Replace the radiator cap.



Radiator cap opening pressure 93.3 ~ 122.7 kPa (0.93 ~ 1.23 kg/cm<sup>2</sup>, 13.27 ~ 17.45 psi)

a. Install the radiator pressure tester ① and radiator pressure tester adapter ② to the radiator cap ③.



#### Radiator pressure tester YU-24460-01 Radiator pressure tester adapter YU-33270-B

b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

#### \*\*\*\*\*

- 4. Check:
- radiator fan

Damage  $\rightarrow$  Replace. Malfunction  $\rightarrow$  Check and repair. Refer to "COOLING SYSTEM" in chapter 8.

RADIATOR



#### EAS00456 INSTALLING THE RADIATOR

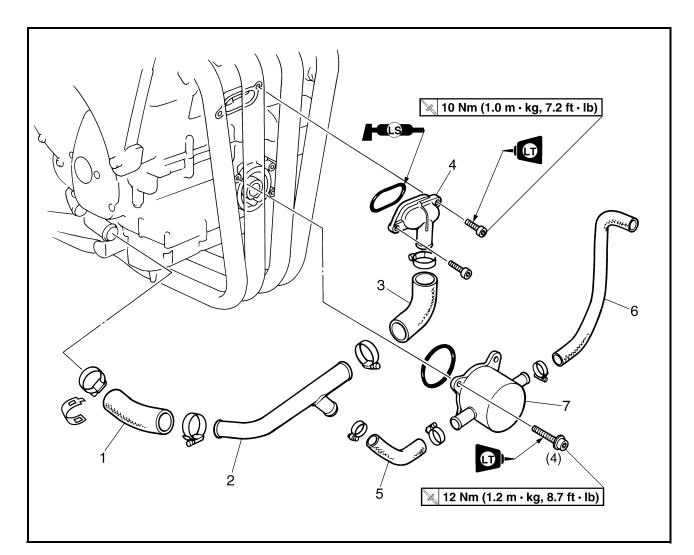
- 1. Fill:
- cooling system (with the specified amount of the recommended coolant) Refer to "CHANGING THE COOLANT" in chapter 3.
- 2. Check:
- cooling system
   Leaks → Repair or replace any faulty part.
- 3. Measure:
- radiator cap opening pressure Below the specified pressure → Replace the radiator cap.

Refer to "CHECKING THE RADIATOR".

OIL COOLER



# OIL COOLER



Order	Job/Part	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL"
			in chapter 3.
	Radiator assembly		Refer to "RADIATOR".
1	Water pump outlet hose	1	
2	Water pump outlet pipe	1	
3	Water jacket joint inlet hose	1	
4	Water jacket joint	1	
5	Oil cooler inlet hose	1	
6	Oil cooler outlet hose	1	
7	Oil cooler	1	
			For installation, reverse the removal
			procedure.

**OIL COOLER** 



# CHECKING THE OIL COOLER

- 1. Check:
- oil cooler
  - $Cracks/damage \rightarrow Replace.$
- 2. Check:
- oil cooler inlet hose
- oil cooler outlet hose Cracks/damage/wear → Replace.

EAS00459

#### INSTALLING THE OIL COOLER

- 1. Clean:
- mating surfaces of the oil cooler and the crankcase

(with a cloth dampened with lacquer thinner)

#### 2. Install:

O-ring New

• oil cooler 🛛 🔀 12 Nm (1.2 m · kg, 8.7 ft · lb)

### NOTE:

Make sure the O-ring is positioned properly.

- 3. Fill:
- cooling system (with the specified amount of the recommended coolant) Refer to "CHANGING THE COOLANT" in chapter 3.
- crankcase (with the specified amount of the recommended engine oil) Refer to "CHANGING THE ENGINE OIL" in chapter 3.

**OIL COOLER** 



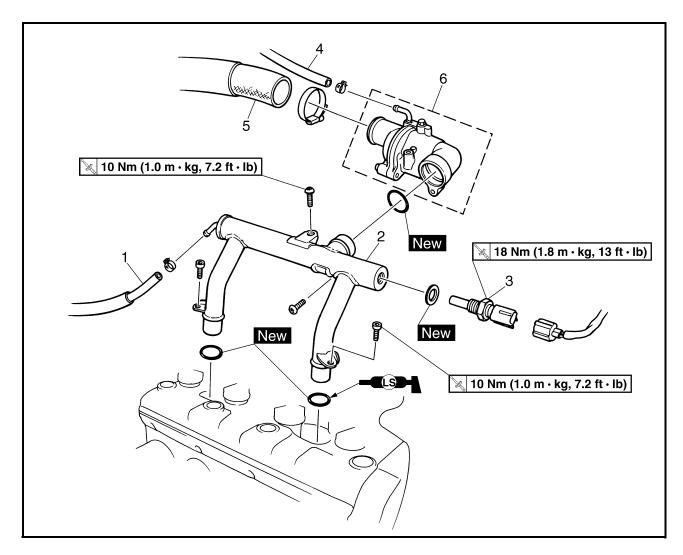
- 4. Check:
- cooling system Leaks  $\rightarrow$  Repair or replace any faulty part.
- 5. Measure:
- radiator cap opening pressure Below the specified pressure → Replace the radiator cap.

Refer to "CHECKING THE RADIATOR".

THERMOSTAT



# THERMOSTAT



Order	Job/Part	Q'ty	Remarks
	Removing the thermostat assembly		Remove the parts in the order listed.
	Side cowlings/front cowling assembly		Refer to "COWLINGS AND COVERS" in
			chapter 3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in
			chapter 3.
	Air cut-off valve assembly/hoses		Refer to "AIR INDUCTION SYSTEM" in
			chapter 7.
1	Plunger control unit hose 1	1	Disconnect.
2	Thermostat assembly inlet pipe	1	
3	Coolant temperature sensor	1	
4	Thermostat assembly breather hose	1	Disconnect.
5	Radiator inlet hose	1	Disconnect.
6	Thermostat assembly	1	
			For installation, reverse the removal
			procedure.

EAS00461

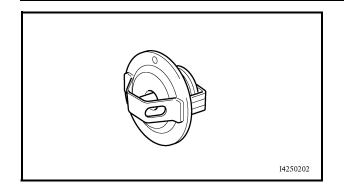


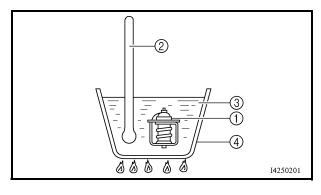
10 Nm (1.0 m · kg, 7.2 ft · lb) 10 Nm (1.0 m · kg, 7.2 ft · lb)
--

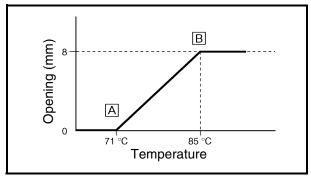
Order	Job/Part		Job/Part		Remarks
	Disassembling the thermosta assembly	t	Remove the parts in the order listed.		
1 2 3	Thermostat housing cover Thermostat Thermostat housing	1 1 1	Refer to "ASSEMBLING THE THERMO- STAT ASSEMBLY". For assembly, reverse the disassembly procedure.		

THERMOSTAT









#### EAS00463 CHECKING THE THERMOSTAT

- 1. Check:
- thermostat ①
   Does not open at 71 ~ 85 °C (159.8 ~ 185.0 °F)
   → 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.

#### \*\*\*\*\*

- ① Thermostat
- <sup>(2)</sup> Thermometer
- ③ Water
- (4) Container
- A Fully closed
- B Fully open

#### NOTE:

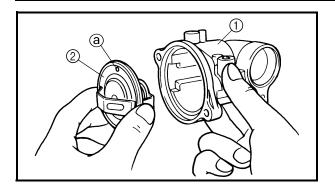
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or over cooling.

- 2. Check:
- thermostat housing cover
- thermostat housing Cracks/damage  $\rightarrow$  Replace.

- 3. Check:
  - thermostat housing O-ring
- thermostat housing inlet pipe O-ring Damage → Replace.

THERMOSTAT





# ASSEMBLING THE THERMOSTAT ASSEMBLY

- 1. Install:
- thermostat housing ①
- thermostat 2
- thermostat housing cover

#### NOTE: .

Install the thermostat with its breather hole (a) a facing up.

EAS00466

### INSTALLING THE THERMOSTAT ASSEMBLY

- 1. Lubricate:
- O-ring (thermostat assembly and thermostat assembly inlet pipe)

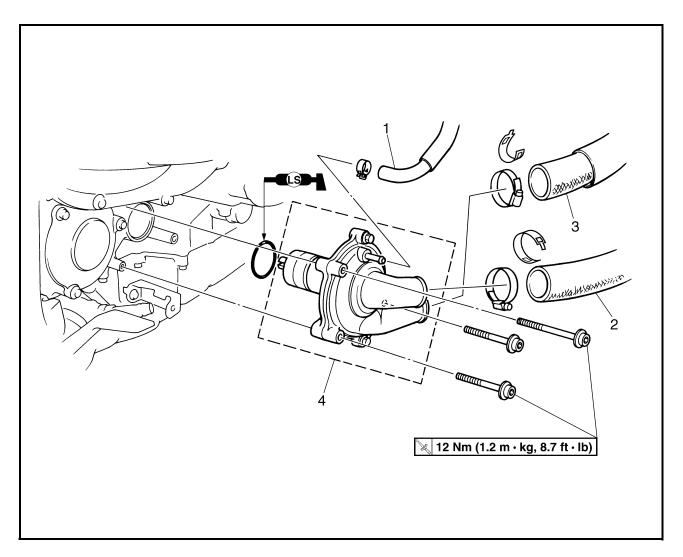


## Recommended lubricant LLC

- 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  $\rightarrow$  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".

# WATER PUMP



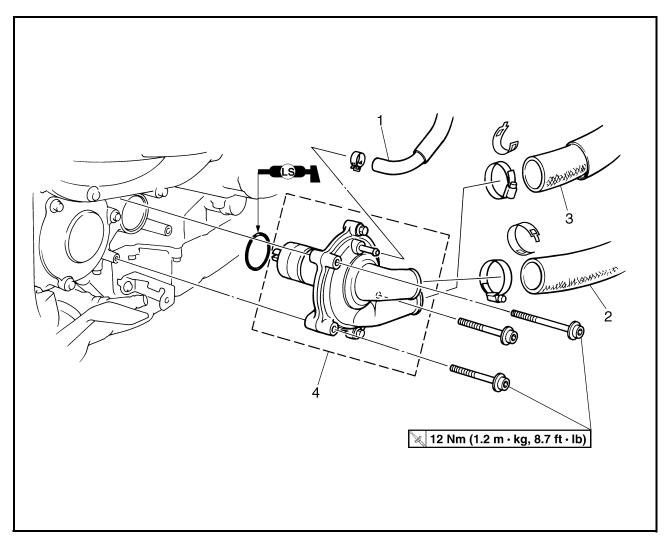
COOL

WATER PUMP

Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed.
			NOTE:
			It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Right side cowling		Refer to "COWLINGS AND COVERS" in chapter 3.
	Engine oil		Drain.
			Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in chapter 3.

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WATER PUMP COOL

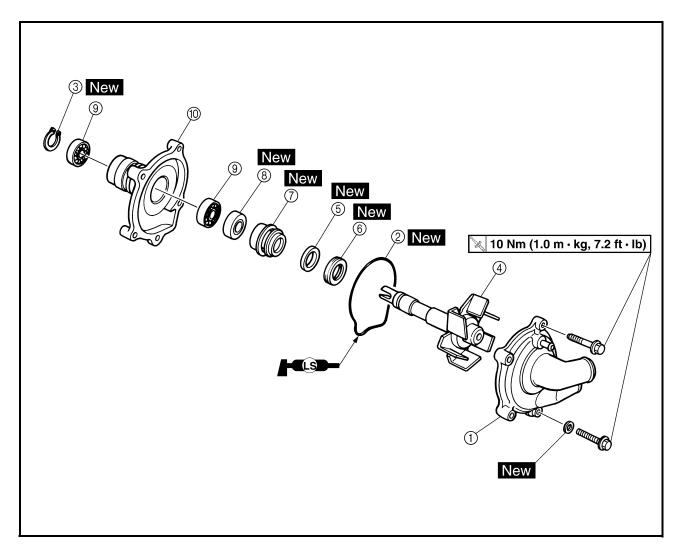


Order	Job/Part	Q'ty	Remarks
1	Water pump breather hose	1	Disconnect.
2	Radiator outlet hose	1	Disconnect.
3	Water pump outlet hose	1	Disconnect.
4	Water pump	1	Refer to "INSTALLING THE WATER PUMP".
			For installation, reverse the removal procedure.

EAS00469

WATER PUMP

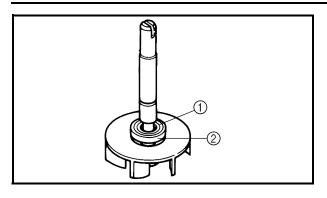


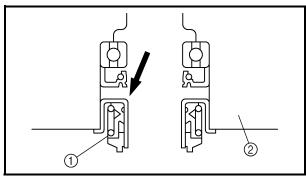


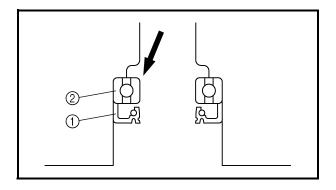
Order	Job/Part	Q'ty	Remarks		
	Disassembling the water pump		Remove the parts in the order listed.		
1	Water pump housing cover	1			
2	O-ring	1			
3	Circlip	1			
4	Impeller shaft	1			
5	Rubber damper holder	1	Refer to "ASSEMBLING THE WATER		
6	Rubber damper	1	PUMP".		
7	Water pump seal	1			
8	Oil seal	1			
9	Bearing	2			
10	Water pump housing	1			
			For assembly, reverse the disassembly		
			procedure.		

WATER PUMP









#### EAS00470 DISASSEMBLING THE WATER PUMP

- 1. Remove:
- rubber damper holder ①
- rubber damper (2) (from the impeller, with a thin, flat-head screwdriver)

#### NOTE: .

Do not scratch the impeller shaft.

- 2. Remove:
- water pump seal ①

#### NOTE: .

Tap out the water pump seal from the inside of the water pump housing 2.

- 3. Remove:
- oil seal (1)
- bearing (2)

### NOTE: .

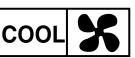
Tap out the bearing and oil seal from the outside of the water pump housing.

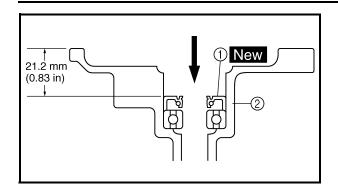
EAS00473

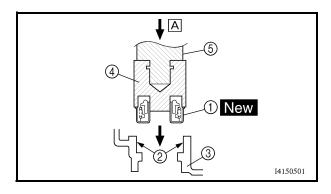
# **CHECKING THE WATER PUMP**

- 1. Check:
- water pump housing cover
- water pump housing
- impeller
- rubber damper
- rubber damper holder
- water pump seals
- oil seal
  - Cracks/damage/wear  $\rightarrow$  Replace.
- 2. Check:
- bearing
  - Rough movement  $\rightarrow$  Replace.
- 3. Check:
- water pump outlet pipe
- radiator outlet hose Cracks/damage/wear  $\rightarrow$  Replace.

WATER PUMP







# ASSEMBLING THE WATER PUMP

- 1. Install:
- oil seal ① New

(into the water pump housing 2)

#### NOTE:

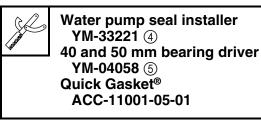
- Before installing the oil seal, apply tap water or coolant onto its out surface.
- Install the oil seal with a socket that matches its outside diameter.
- 2. Install:
- water pump seal ① New

# CAUTION:

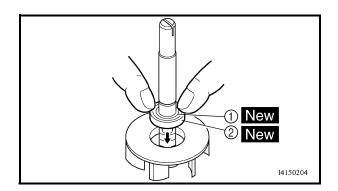
Never lubricate the water pump seal surface with oil or grease.

#### NOTE: .

- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Quick Gasket<sup>®</sup> (2) to the water pump housing (3).



A Push down.



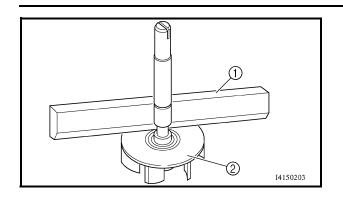
- 3. Install:
- rubber damper ① New
- rubber damper holder ② New

#### 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).

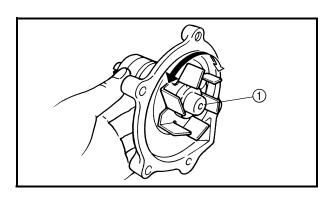
## CAUTION:

Make sure the rubber damper and rubber damper holder are flush with the impeller.



Max. impeller shaft tilt 0.15 mm (0.006 in)

- ① Straightedge
- 2 Impeller



- 5. Install:
- impeller ①
- circlip New

### NOTE: \_

After installation, check that the impeller shaft rotates smoothly.

- 6. Install:
- O-ring New

### NOTE: \_

Lubricate the O-ring with a thin coat of lithium soap base grease.

7. Install:

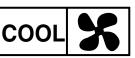
- water pump housing
- water pump housing cover

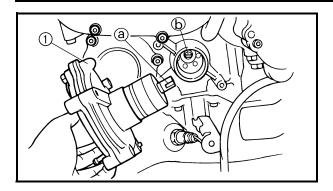
### 🍾 10 Nm (1.0 m · kg, 7.2 ft · lb)

## 

Always use a new copper washer.

WATER PUMP





#### EAS00478 INSTALLING THE WATER PUMP

- 1. Install:
- O-ring New
- water pump assembly ①

# 🍾 12 Nm (1.2 m ⋅ kg, 8.7 ft ⋅ lb)

### A WARNING

- Align the slit (a) on the impeller shaft with the projection (b) on the oil pump shaft.
- Lubricate the O-ring with a thin coat of lithium soap base grease.

- 2. Fill:
- cooling system (with the specified amount of the recommended coolant) Refer to "CHANGING THE COOLANT" in

chapter 3.

- crankcase (with the specified amount of the recommended engine oil) Refer to "CHANGING THE ENGINE OIL" in chapter 3.
- 3. Check:
- cooling system

Leaks  $\rightarrow$  Repair or replace the faulty part.

- 4. Measure:
- radiator cap opening pressure Below the specified pressure → Replace the radiator cap.

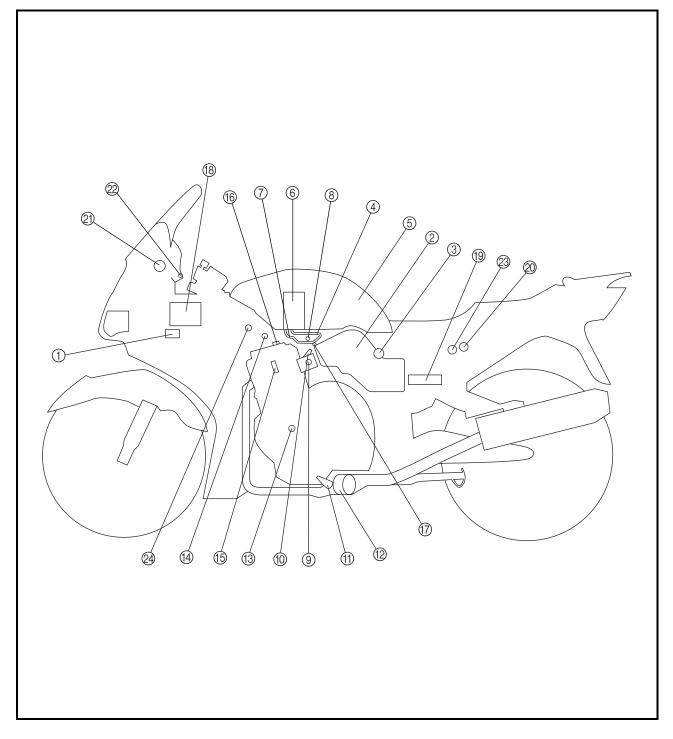
Refer to "CHECKING THE RADIATOR".



# **FUEL INJECTION SYSTEM**

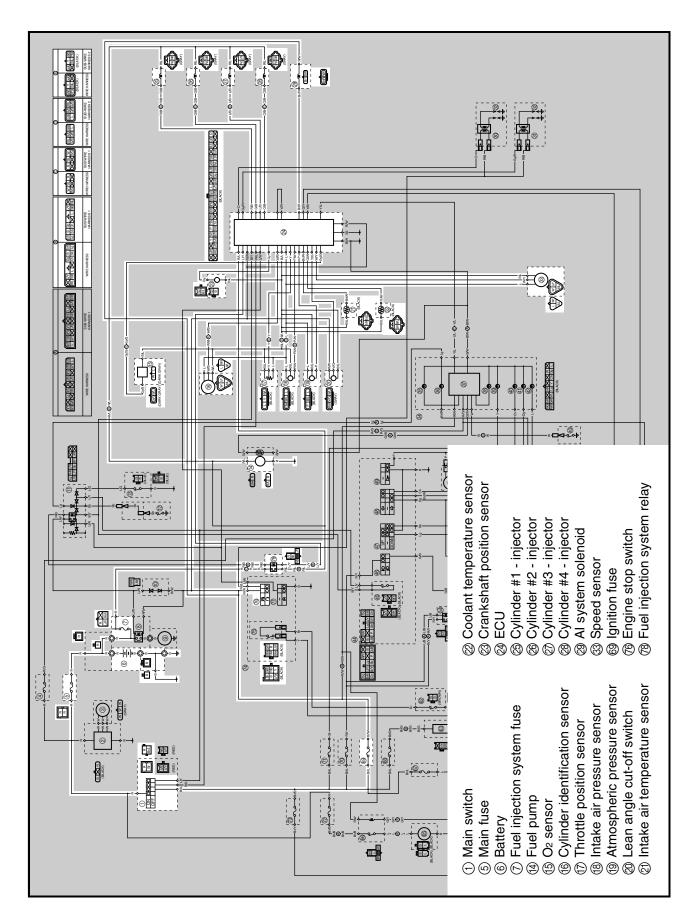
- (1) Ignition coil
- 2 Air filter case
- ③ Intake temperature sensor
- ④ Fuel delivery hose
- (5) Fuel tank
- 6 Fuel pump
- (7) Fuel return hose
- (8) Intake air pressure sensor
- (9) Throttle position sensor
- 1 Fuel injector (1) O2 sensor
- (13) Crankshaft
- 12 Catalytic converter
- position sensor
- (4) Coolant temperature sensor
- (5) Spark plug
- (6) Cylinder identification sensor
- (7) Pressure regulator 18 Battery
- (19) ECU

- ② Atmospheric pressure sensor
- 2 Fuel injection system relay
- 2 Engine trouble warning light
- 2 Lean angle cut-off switch
- 24 Air cut-off valve





#### WIRING 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.

### ECU's mode function

The ECU is equipped with a diagnosis mode, in addition to the normal mode in which the ECU operates normally.

Normal mode

- To check whether the warning light bulb is blown, the warning light illuminates for 1.4 seconds after the main switch has been turned ON, and while the starter switch is being pressed.
- To inform the rider that the fuel injection stop function is active, the warning light blinks while the start switch is being pressed to start the engine.
- If a malfunction in the system is detected by the self-diagnostic function, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating a warning light.
- After the engine has been stopped, digital numbers representing the self-diagnostic fault codes appear on the clock LCD. Once a self-diagnostic fault code has been displayed, it remains stored in the ECU memory until a deletion operation is performed.

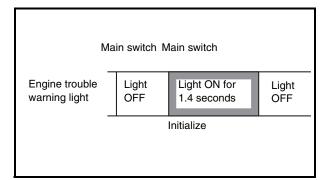
Diagnosis mode

- In this mode, diagnostic codes are input into the ECU in accordance with the number of times the start switch has been operated.
- In accordance with the diagnostic codes, the ECU displays the values received from the sensors and actuates the actuators.
- Whether or not the system is operating normally is determined by a human operator through the observations of the values indicated by the engine trouble warning light or the actuating conditions of the actuators.



#### Engine trouble warning light indication and FI system operating conditions (normal mode)

Warning light indication	ECU's operating condition	FI operating condition	Starting and driving
ON and OFF *1	Self-diagnostic func- tion in operation	FI function in operation	Able
Blinking *2	Warning control when unable to start engine	Operation stopped	Unable
Continuous ON	Detecting malfunction	Gives driving instruc- tions with substitute characteristics in accor- dance with the descrip- tion of the malfunction.	Able/Unable depend- ing on self-diagnostic fault code
OFF *3	Possibly a blown warn- ing light bulb or a mal- function in power supply system or ECU		



#### \*1

The warning light illuminates 1.4 seconds each time the main switch is turned ON. The ECU performs a self diagnosis during this time and turns OFF the light thereafter.

### \*2

Warning control when unable to start engine This control is effected when any one of the conditions listed below is present and the starter switch is turned ON:

- a. Battery voltage below the specified value (defective fuel injection system relay, engine stop switch turned OFF, or drained battery)
- b. One of the fault codes listed below has been detected (self-diagnostic code 12, 19, 30, 33, 34, 41, or 50 is output):

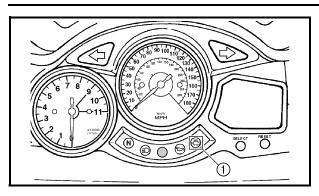
(12: faulty crankshaft position sensor signal)

- (19: open circuit in sidestand input line)
- (30: motorcycle has fallen over)
- (33, 34: faulty ignition)

(41: open or short circuit in lean angle cutoff switch)

(50: ECU memory check error)



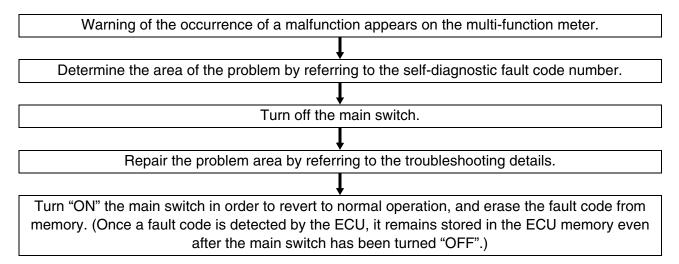


\*3

Function to check for blown warning light bulb The engine trouble warning light illuminates ① for 1.4 seconds after the main switch has been turned "ON" and while the starter switch is being pressed. If the warning light does not illuminate under these conditions, a problem may have possibly occurred, such as a blown warning light bulb. Therefore, take an appropriate corrective action by referring to the troubleshooting section.

### Determining the area of the malfunction through the self-diagnostic fault code number

The possible location of the system in which a problem may be occurring can be determined by observing the self-diagnostic fault code number that appears on the multi-function meter and cross-referencing it on the fault code number table. When used in conjunction with the troubleshooting details, and by checking the possible items one by one, you will be able to identify the cause of the problem in order to carry out an accurate repair work.





#### \* Table of self-diagnostic fault code numbers displayed on meter

No.	Symptom	Able/ unable to start	Able/ unable to drive	No.	Symptom	Able/ unable to start	Able/ unable to drive
11	No normal signals are received from the cylinder identification sensor.	Able	Able	30	The motorcycle has overturned.	Unable	Unable
12	No normal signals are received from the crankshaft position sen- sor.	Unable	Unable	31	The amount of air-fuel ratio feed- back compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio).	Able	Able
13	Intake air pressure sensor - open or short circuit detected.	Able	Able	32	The amount of air-fuel ratio feed- back compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio).	Able	Able
14	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.	Able	Able	33	Open circuit detected in the pri- mary wire of the ignition coil (#1,4).	Able	Able
15	Throttle position sensor - open or short circuit detected.	Able	Able	34	Open circuit detected in the pri- mary wire of the ignition coil (#2, 3).	Able	Able
16	A stuck throttle position sensor is detected.	Able	Able	41	Lean angle cut-off switch - open or short circuit detected.	Unable	Unable
19	Open circuit is detected in the input line from the sidestand switch to the ECU.	Unable	Unable	42	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	Able	Able
21	Coolant temperature sensor - open or short circuit detected.	Able	Able	43	The ECU is unable to monitor the battery voltage (an open circuit in the line to the ECU).	Able	Able
22	Intake temperature sensor - open or short circuit detected.	Able	Able	50	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	Unable	Unable
23	Atmospheric pressure sensor - open or short circuit detected.	Able	Able				
24	No normal signals are received from the O <sub>2</sub> sensor.	Able	Able				

• How to erase the self-diagnostic fault code from memory:

If the ECU detects a normal signal upon the completion of the repair of the malfunction, the selfdiagnostic fault code disappears from the meter and is replaced by the normal clock display. However, the self-diagnostic fault code of the previous malfunction remains in the ECU memory as part of the malfunction history. To erase the self-diagnostic fault code from the malfunction history, the operation for diagnostic code 62 must be performed in the diagnosis mode.



### SUBSTITUTE CHARACTERISTICS OPERATION CONTROL (FAIL-SAFE ACTION)

If the ECU detects an abnormal signal from a sensor while the motorcycle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with substitute characteristic operation instructions that are appropriate for the type of the malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for every sensor, in order to provide the engine with substitute characteristics operation instructions that enable the engine to continue to operate (or to stop its operation, depending on circumstances).

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

Code No.	Item	Fail-safe action	Able/unable to start	Able/unable to drive	
11	Cylinder identification sensor	Continues to operate the engine based on the results of the cylinder identification that existed up to that point.	Able	Able	
12	Crankshaft position sen- sor	• Stops the engine (by stopping the injection and ignition).	Unable	Unable	
13 14	Intake air pressure sensor (open or short circuit) (pipe system)	<ul> <li>Fixes the intake air pressure to 760 mm Hg (29.92 in Hg).</li> </ul>	Able	Able	
15 16	Throttle position sensor (open or short circuit) (stuck)	• Fixes the throttle position sensor to fully open.	Able	Able	
19	Sidestand switch (open circuit in wire to ECU)	(No start)	Unable	Unable	
21	Coolant temperature sen- sor	• Fixes the coolant temperature to 60 °C (140 °F).	Able	Able	
22	Intake temperature sen- sor	• Fixes the intake temperature to 20 °C (68 °F).	Able	Able	
23	Atmospheric pressure sensor	<ul> <li>Fixes the atmospheric pressure to 760 mm Hg (29.92 in Hg).</li> </ul>	Able	Able	
24 31 32	O2 sensor (inactive) (compensation stuck to upper limit) (compensation stuck to lower limit)		Able	Able	
33 34	Faulty ignition	• Fuel is cut off only to the cylinder in which a mal- function is detected.	Able (depending on the number of faulty cylinders)	Able (depending on the number of faulty cylinders	
30 41	Lean angle cut-off switch (latch up detected) (open or short circuit)	<ul> <li>Turns OFF the fuel injection system relay of the fuel system.</li> </ul>	Unable	Unable	
42	Speed sensor, neutral switch	• Fixes the gear to the top gear.	Able	Able	
43	Fuel system voltage (monitor voltage)	• Fixes the battery voltage to 12 V.	Able	Able	
50	ECU internal malfunction (memory check error)		Unable	Unable	

Table of substitute characteristic operation control by self-diagnostic fault code



## TROUBLESHOOTING

### Diagnosis mode troubleshooting 1 (self-diagnostic malfunction detected)

By entering a diagnostic code in the ECU through the use of the "SELECT" and "RESET" buttons on the multi-function meter, the sensor output values can be displayed and the actuators can be operated in accordance with the code that has been entered.

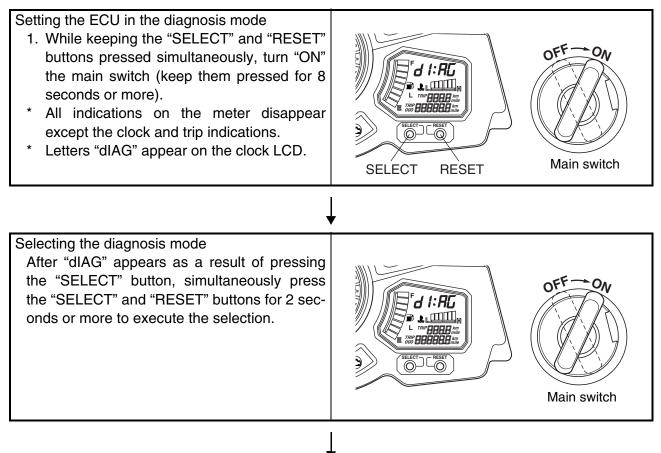
The technician determines whether or not the operation is normal by verifying the values displayed on the multi-function meter or the operating conditions of the actuators. These modes can be used to detect and check the problems that are otherwise difficult to detect in the diagnosis mode.

Basic operation procedure

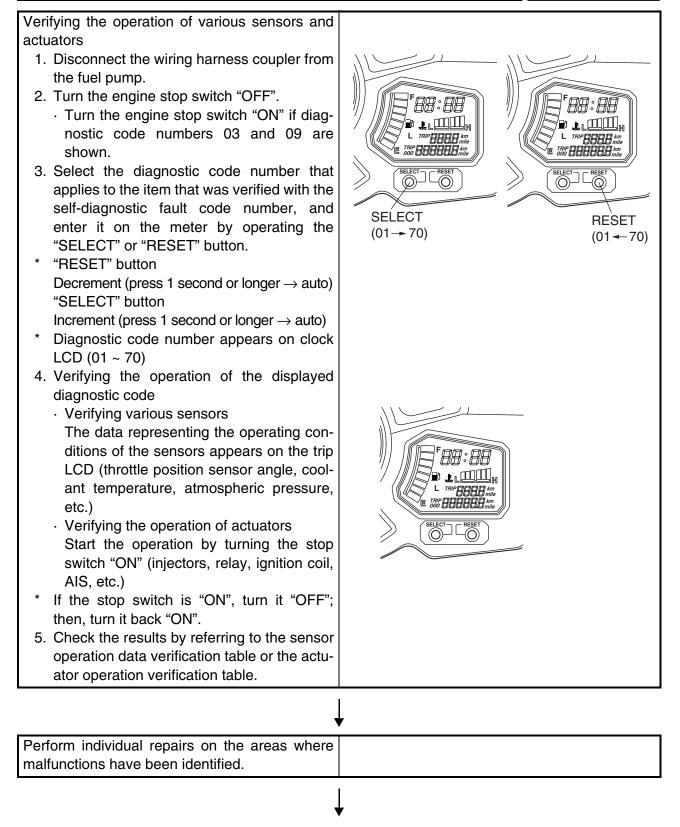
Operation preparation

- Verify the self-diagnostic fault code number that is displayed on the meter.
- Based on the self-diagnostic fault code number, select the applicable sensor or actuator from the diagnostic code table.
- If a diagnostic code is available, proceed with the operation procedure given below in order to verify the operating conditions of the applicable sensor or actuator.

Operation procedure (make sure to turn "OFF" the main switch upon completing the operation preparation)









<ul> <li>Erase the codes appearing on the meter upon the completion of the operation (reinstating the ECU).</li> <li>* Verify the reinstatement procedures detailed in the troubleshooting details in order to carry out the reinstatement operation that is applicable to the malfunctioning item.</li> <li>Refer to the troubleshooting details.</li> </ul>	
Erase the fault code from memory. * Perform the operation for diagnostic code 62.	



# Self-diagnostic fault codes, symptoms, and probable causes

Diagnostic code indication

Code No.	Symptom	Probable cause of malfunction	Diagnostic code
11	No normal signals are received from the cylinder identification sensor.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective cylinder identification sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul>	_
12	No normal signals are received from the crankshaft position sensor.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective crankshaft position sensor.</li> <li>Malfunction in pickup rotor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul>	_
13	Intake air pressure sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective intake air pressure sensor.</li> <li>Malfunction in ECU.</li> </ul>	03
	Faulty intake air pressure sensor pipe system; a hose is detached, causing constant application of the atmo- spheric pressure to the sensor; or, the hose is clogged.	<ul> <li>Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>Malfunction of the intake air pressure sensor in the intermediate electrical potential.</li> <li>Malfunction of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>Malfunction in ECU.</li> </ul>	03 02
14	Or, intake air pressure sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective intake air pressure sensor.</li> <li>Malfunction in ECU.</li> </ul>	03
	Or, a stuck throttle position sensor is detected.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective sensor (stuck throttle position sensor).</li> </ul>	01
15	Throttle position sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective throttle position sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed throttle position sensor.</li> </ul>	01
16	A stuck throttle position sensor is detected. Or, Faulty intake air pressure sensor pipe system; a hose is detached, causing constant application of the atmo- spheric pressure to the sensor; or, the hose is clogged.	<ul> <li>Open or short circuit in wiring sub lead.</li> <li>Open or short circuit in wiring harness.</li> <li>Defective sensor (stuck throttle position sensor).</li> <li>Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>Malfunction of the intake air pressure sensor in the intermediate electrical potential.</li> <li>Malfunction of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>Malfunction in ECU.</li> </ul>	01 03 02
19	Open circuit in the input line from the sidestand switch to the ECU is detected when the start switch is pressed.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Malfunction in ECU.</li> </ul>	20
21	Coolant temperature sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective coolant temperature sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul>	06
22	Intake temperature sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective intake temperature sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul>	05



Code No.	Symptom	Probable cause of malfunction	Diagnostic code
23	Atmospheric pressure sensor - open or short circuit detected.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective atmospheric pressure sensor.</li> <li>Improperly installed sensor.</li> <li>Malfunction in ECU.</li> </ul>	02
24	No normal signals are received from the O <sub>2</sub> sensor.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective O<sub>2</sub> sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul>	_
30	The motorcycle has overturned.	<ul><li>Overturned.</li><li>Malfunction in ECU.</li></ul>	08
31	The amount of air-fuel ratio feedback compensation is maintained continu- ously in the vicinity of the upper limit (lean air-fuel ratio).	<ul> <li>Open or short circuit in wiring harness.</li> <li>Fuel pressure too low.</li> <li>Clogged injectors.</li> <li>Defective O<sub>2</sub> sensor (unable to output a rich signal).</li> <li>Malfunction in ECU.</li> <li>Malfunction in other areas of the fuel system.</li> </ul>	_
32	The amount of air-fuel ratio feedback compensation is maintained continu- ously in the vicinity of the lower limit (rich air-fuel ratio).	<ul> <li>Open or short circuit in wiring harness.</li> <li>Fuel pressure too high.</li> <li>Faulty injectors (excessive injection volume).</li> <li>Defective O<sub>2</sub> sensor (unable to output a lean signal).</li> <li>Malfunction in ECU.</li> <li>Malfunction in other areas of the fuel system.</li> </ul>	_
33	Open circuit is detected in the primary wire of the ignition coil (#1, 4).	<ul> <li>Open or short circuit in wiring harness.</li> <li>Malfunction in ignition coil.</li> <li>Malfunction in ECU.</li> <li>Malfunction in a component of ignition cutoff circuit system.</li> </ul>	30
34	Open circuit is detected in the primary wire of the ignition coil (#2, 3).	<ul> <li>Open or short circuit in wiring harness.</li> <li>Malfunction in ignition coil.</li> <li>Malfunction in ECU.</li> <li>Malfunction in a component of ignition cutoff circuit system.</li> </ul>	31
41	Lean angle cut-off switch - open or short circuit detected.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective lean angle cut-off switch.</li> <li>Malfunction in ECU.</li> </ul>	08
42	No normal signals are received from the speed sensor; or, an open or short circuit is detected in the neutral switch.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective speed sensor.</li> <li>Malfunction in vehicle speed sensor detected unit.</li> <li>Defective neutral switch.</li> <li>Malfunction in the engine side of the neutral switch.</li> <li>Malfunction in ECU.</li> </ul>	07 21
43	The ECU is unable to monitor the bat- tery voltage (an open circuit in the monitor line to the ECU).	<ul><li> Open circuit in wiring harness.</li><li> Malfunction in ECU.</li></ul>	_
50	Faulty ECU memory. When this mal- function is detected, the code number might not appear on the meter.	<ul> <li>Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)</li> </ul>	_



Sensor operation data display verification table

#### NOTE:

- Check the intake temperature and coolant temperature as close as possible to the area in which the respective sensor is mounted.
- If it is not possible to check it with an atmospheric pressure gauge, judge it by using 760 mm Hg (29.92 in Hg) as the standard.
- If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Diag code	Item	Description of action	Data displayed on meter (reference value)
01	Throttle angle	Displays the throttle angle. • Check with throttle fully closed. • Check with throttle fully open.	0 ~ 125 degrees • Fully closed position (15 ~ 17) • Fully open position (97 ~ 100)
02	Atmospheric pres- sure	Displays the atmospheric pressure. * Use an atmospheric pressure gauge to check the atmo- spheric pressure.	Compare it to the value dis- played on the meter.
03	Pressure difference (atmospheric pres- sure - intake air pres- sure)	Displays the pressure difference (atmospheric pressure - intake air pressure). Engine stop switch is on. * Generate the pressure difference by cranking the engine with the starter, without actually starting the engine.	10 ~ 200 mm Hg (0.39 ~ 7.87 in Hg)
05	Intake temperature	Displays the intake air temperature. * Check the temperature in the air cleaner case.	Compare it to the value dis- played on the meter.
06	Coolant temperature	Displays the coolant temperature. * Check the temperature of the coolant.	Compare it to the value displayed on the meter.
07	Vehicle speed pulse	Displays the accumulation of the vehicle pulses that are generated when the tire is spun.	$(0 \sim 999;$ resets to 0 after 999) OK if the numbers appear on the meter.
08	Lean angle cut-off switch	Displays the lean angle cut-off switch values.	Upright: 0.4 ~ 1.4 V Overturned: 3.8 ~ 4.2 V
09	Fuel system voltage (battery voltage)	Displays the fuel system voltage (battery voltage). Engine stop switch is on.	0 ~ 18.7 V Normally, approximately 12.0 V
20	Sidestand switch	Displays that the switch is ON or OFF. (When the gear is in a position other than neutral.)	Stand retracted: ON Stand extended: OFF
21	Neutral switch	Displays that the switch is ON or OFF.	Neutral: ON In gear: OFF
60	E2PROM fault code display		
61	Malfunction history code display	<ul> <li>Displays the codes of the history of the self-diagnosis malfunctions (i.e., a code of a malfunction that occurred once and which has been corrected).</li> <li>If multiple malfunctions have been detected, different codes are displayed at 2-second intervals, and this process is repeated.</li> </ul>	11 ~ 50 (00) Displays when there is no malfunction.
62	Malfunction history code erasure	<ul> <li>Displays the total number of codes that are being detected through self diagnosis and the fault codes in the past history.</li> <li>Erases only the history codes when the engine stop switch is turned from OFF to ON. If the engine stop switch is ON, turn it OFF once, and then turn it back ON.</li> </ul>	00 ~ 21 (00) Displays when there is no malfunction.
70	Control number	Displays the program control number.	00 ~ 255





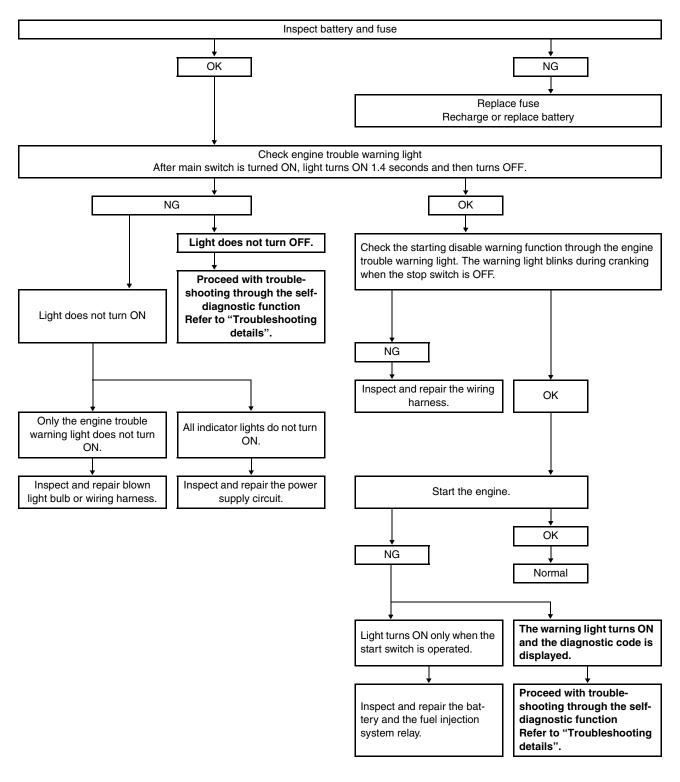
# Actuator operation verification table

Diag code	Item	Description of action	Data displayed on meter (reference value)
30	Ignition coil #1, 4	<ul> <li>After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates ignition coils #1, and 4 for five times every second and illuminates the engine trouble warning light.</li> <li>* Connect an ignition checker.</li> <li>* If the engine stop switch is ON, turn it OFF once, and then turn it back ON.</li> </ul>	Check that spark is generated, 5 times with the engine stop switch ON.
31	Ignition coils #2, 3	<ul> <li>Take the same actions as No. 30 above on ignition coils #2, and 3.</li> <li>Same as above.</li> <li>* If the engine stop switch is ON, turn it OFF once, and then turn it back ON.</li> </ul>	Same as above
36	Injector #1	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the injec- tor five times every second and illuminates the engine trouble warning light. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the operating sound of the injector five times with engine stop switch ON.
37	Injector #2	Take the same actions as No. 36 above on injector #2. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Same as above
38	Injector #3	Take the same actions as No. 36 above on injector #3. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Same as above
39	Injector #4	Take the same actions as No. 36 on injector #4. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Same as above
48	Al system solenoid	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the AI system solenoid five times every second and illuminates the engine trouble warning light. * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the operating sound of the Al system solenoid. Same as above
50	Fuel injection system relay	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the fuel injection system relay five times every second and illuminates the engine trouble warning light (the light is OFF when the relay is ON, and the light is ON when the relay is OFF). * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the fuel injection system relay operating sound. Same as above
51	Radiator fan motor relay	After 1 second has elapsed from the time the engine stop switch has been turned from OFF to ON, it actuates the radia- tor fan motor relay five times every 5 seconds and illuminates the engine trouble warning light. (ON 2 seconds, OFF 3 sec- onds) * If the engine stop switch is ON, turn it OFF once, and then turn it back ON.	Check the radiator fan motor relay operating sound. Same as above
52	Headlight relay 1	<ul> <li>Take the same actions as in No. 51 above, on the headlight relay 1. (ON 2 seconds, OFF 3 seconds)</li> <li>* If the engine stop switch is ON, turn it OFF once, and then turn it back ON.</li> </ul>	Check the relay operating sound. Same as above



### Troubleshooting

Basic procedure 1





# Troubleshooting details

Troubleshooting the self-diagnostic fault code

Code No.	11	Symptom I	No norma	al signals are received from the cylinder iden	tification sensor.
Used diagnos	stic code No.				
Inspection operation item				peration item and countermeasure	Reinstatement method
Installed state of sensor				neck the installed area for looseness or nching.	Reinstated by starting the engine
Defective cylinder identification sensor.				eplace if defective. efer to "FUEL INJECTION SYSTEM" in apter 8.	and operating it at idle.
Open or short circuit in wiring harness or sub lead.			cir Be I	epair or replace if there is an open or short rcuit. etween main wiring harness and sub lead Blue - Blue White/Black - White Black/Blue - Black/Blue	
Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.			ay se ( oler. I	there is a malfunction, repair it and connect it ecurely. Cylinder identification sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler	

Code No.	Code No.12SymptomNo normal signals are received from the crankshaft position sensor.						
Used diagno	stic code No.						
Inspection operation item and probable cause				Operation item and countermeasure	Reinstatement method		
Installed state of sensor				Check the installed area for looseness or pinching.	Reinstated by cranking the		
Defective crankshaft position sensor.				Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	engine.		
Open or short circuit in wiring harness or sub lead.			r sub	Repair or replace if there is an open or short circuit between the main wiring harnesses. Gray - Gray Black/Blue - Black/Blue			
			•	If there is a malfunction, repair it and connect it securely. Crankshaft position sensor coupler Main wiring harness ECU coupler			



Code No.	13	Symptom	Intake	air pressure sensor - open or short circuit dete	cted.		
Used diagnostic code No. 03 (intake air pressure sensor)							
Inspection operation item and probable cause			cause	Operation item and countermeasure	Reinstatement method		
Defective intake air pressure sensor				Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	Reinstated by turn- ing the main switch ON.		
Open or short circuit in wiring harness or sub lead.			r sub	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			
Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.				If there is a malfunction, repair it and connect it securely. Intake air pressure sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler			



Code No.		2 3 0. 03 (intake air	deta Intal Stuc pres	ke air pressure sensor - pipe system malfunctio ched hose). ke air pressure sensor - open or short circuit de sk throttle position sensor detected. ssure sensor) pressure sensor)	
		o. 01 (throttle po			
Inspection op	eration item a	and probable ca	use	Operation item and countermeasure	Reinstatement method
clogged, kin Intake air p intermediat Atmospher	nked, or pinch ressure sense e electrical po	or malfunction a otential. ensor malfunction	t	Repair or replace the sensor hose. Inspect and repair the connection. Replace it if there is a malfunction.	Reinstated by starting the engine and operating it at idle.
2 Open or sh sub lead.	ort circuit in w	viring harness or		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	
Defective inta	ike air pressu	re sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	
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	Reinstated by starting the engine, operating it at idle, and then by racing it.
Defective three	Defective throttle position sensor.			Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	
Throttle posit output voltag (B/L - Y) Black/Blue - `	e check	ad wire open circ	cuit	Open circuit item:Output voltageGround wire open circuit:5 VOutput wire open circuit:0 VPower supply wire open circuit:0 VCheck for open circuit and replace the throttleposition sensor.	
have pulled	ate of connec coupler for a l out.	ctor ny pins that may ion of the couple		If there is a malfunction, repair it and connect it securely. Intake air pressure sensor coupler Main wiring harness ECU coupler	Reinstated by starting the engine and operating it at idle.



Code No.	15	Symptom	Thrott	le position sensor - open or short ci	ircuit detector	Ч
				•		u.
Used diagnos				,		Deinstatement
Inspection op	eration item a	and probable	cause	Operation item and countermeasu	ire	Reinstatement method
Defective thro	ottle position s	sensor.		Replace if defective. Refer to "FUEL INJECTION SYST chapter 8.	EM" in	Reinstated by turn- ing the main switch ON.
Throttle position sensor lead wire open circuit output voltage check (B/L - Y) Black/Blue - Yellow				Open circuit item: Ou Ground wire open circuit: 5 \ Output wire open circuit: 0 \ Power supply wire open circuit: 0 \ Check for open circuit and replace position sensor.	V V	
Open or short circuit in wiring harness or sub lead.				Repair or replace if there is an ope circuit. Main wiring harness Black/Blue - Black/Blue Yellow - Yellow Blue - Blue Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue	en or short	
Installed state of throttle position sensor.				Check the installed area for looser pinching. Check that it is installed in the spe tion. Refer to "FUEL INJECTION SYST chapter 8.	cified posi-	
have pulled	coupler for a l out.	tor ny pins that m ion of the cou	-	If there is a malfunction, repair it an securely. Throttle position sensor coupler Main wiring harness ECU couple		



Code No.	16		2 Inta	ck throttle position sensor detected. ke air pressure sensor - pipe system malfunction ached hose).	n (clogged or				
Used diagnostic code No. 03 (intake air pressure sensor) No. 02 (atmospheric pressure sensor) No. 01 (throttle position sensor)									
Inspection op	eration item a	and probable o	cause	Operation item and countermeasure	Reinstatement method				
1 Defective th	nrottle position	n sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	Reinstated by starting the engine, operating it at idle,				
Throttle posit output voltag (B/L - Y) Black/Blue - `	e check	ad wire open c	ircuit	Open circuit item:Output voltageGround wire open circuit:5 VOutput wire open circuit:0 VPower supply wire open circuit:0 VCheck for open circuit and replace the throttleposition sensor.	and then racing it.				
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 Yellow - Yellow Blue - Blue Sub lead Black/Blue - Black/Blue Yellow - Yellow Blue - Blue					
1 Installed state of throttle position sensor.				Check the installed area for looseness or pinching. Check that it is installed in the specified position. Refer to "FUEL INJECTION SYSTEM" in chapter 8.					
<ul> <li>2 Intake air pressure sensor hose detached, clogged, kinked, or pinched.</li> <li>Intake air pressure sensor malfunction at intermediate electrical potential.</li> <li>Atmospheric pressure sensor malfunction at intermediate electrical potential.</li> </ul>				Repair or replace the sensor hose. Inspect and repair the connection. Replace it if there is a malfunction.					
Inspect the have pulled	ate of connec coupler for a l out.	ctor ny pins that m tion of the couj		If there is a malfunction, repair it and connect it securely. Throttle position sensor coupler Main wiring harness ECU coupler Sub-wire harness coupler					



Code No.	19	· ·	Open ECU.	circuit is detected in the input line from the side	stand switch to the					
Used diagnos	Jsed diagnostic code No. 20 (sidestand switch)									
Inspection operation item and probable cause				Operation item and countermeasure	Reinstatement method					
				Replace if defective. Refer to "CHECKING THE SWITCHES" in chapter 8.	If the transmission is in gear, it is rein- stated by retracting					
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)	the sidestand. If the transmission is in neutral, it is					
Inspect the coupler for any pins that may				If there is a malfunction, repair it and connect it securely. Main wiring harness ECU coupler (No. 43 pin, black)	reinstated by reconnecting the wiring.					

	04	0								
Code No.										
Used diagnos	Used diagnostic code No. 06 (coolant temperature sensor)									
Inspection op	peration item a	and probable	cause	Operation item and countermeasure	Reinstatement method					
Installed state	e of sensor			Check the installed area for looseness or pinching.	Reinstated by turn- ing the main switch					
Defective coolant temperature sensor.				Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	ON.					
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/White - Green/White						
Inspect the have pulled	tate of connect coupler for a dout. locking condit	ny pins that m		If there is a malfunction, repair it and connect it securely. Coolant temperature sensor coupler Main wiring harness ECU coupler						

Code No.	ode No. 22 Symptom Open or short circuit detected from the intake temperature sensor.							
Used diagnostic code No. 05 (intake temperature sensor)								
Inspection op	peration item a	and probable	cause	Operation item and countermeasure	Reinstatement method			
Installed state	e of sensor			Check the installed area for looseness or pinching.	Reinstated by turn- ing the main switch			
Defective inta	ake temperatu	ire sensor.		Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	ON.			
lead.				Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - Black/Blue Brown/White - Brown/White				
				If there is a malfunction, repair it and connect it securely. Intake temperature sensor coupler Main wiring harness ECU coupler				



			•						
Code No.         23         Symptom         Open or short circuit detected from the atmospheric press									
Used diagnos	Used diagnostic code No. 02 (atmospheric pressure sensor)								
Inspection op	peration item a	and probable (	cause	Operation item and countermeasure	Reinstatement method				
Defective atmospheric pressure sensor.				Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	Reinstated by turn- ing the main switch ON.				
Open or short circuit in wiring harness or sub lead.			r sub	Repair or replace if there is an open or short circuit. Main wiring harness Blue - Blue Black/Blue - Black/Blue Pink - Pink					
Installed state of atmospheric pressure sensor			sensor	Check the installed area for looseness or pinching.					
Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.				If there is a malfunction, repair it and connect it securely. Atmospheric pressure sensor coupler Main wiring harness ECU coupler					

Code No.	Code No.24SymptomNo normal signal is received from the O2 sensor.								
Used diagno:	stic code No.								
Inspection operation item and probable cause				Operation item and countermeasure	Reinstatement method				
Defective O2	sensor.			Replace if defective.	Reinstated by				
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	starting the engine, warming it up until the coolant tem- perature is 60 °C (140 °F) or more,				
Installed state	e of O2 senso	r		Check the installed area for looseness or pinching.	and then running it between 2,000 ~ 3,000 r/min until				
Inspect the have pulled	tate of connec coupler for a d out. locking condit	ny pins that m	-	If there is a malfunction, repair it and connect it securely. O2 sensor coupler Main wiring ECU harness coupler Sub-wire harness coupler	the engine trouble indicator turns off.				
Check fuel pressure				Inspect fault codes 31/32. Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION".					



Code No.	30 Symptom The motorcycle has overturned.							
Used diagnostic code No. 08 (lean angle cut-off switch)								
Inspection operation item and probable cause				Operation item and countermeasure	Reinstatement method			
Defective lean angle cut-off switch				Replace if defective.	Reinstated by turn-			
The motorcy	cle has overtu	ırned.		Raise the motorcycle upright.	ing the main switc ON (however, the			
Installed state of the lean angle cut-off switch				Check the installed area for looseness or pinching.	engine cannot be restarted unless			
			•	If there is a malfunction, repair it and connect it securely. Lean angle cut-off switch coupler Main wiring harness ECU coupler	the main switch is first turned OFF).			

Code No.	31	Symptom		mount of air-fuel ratio feedback compensation is in the vicinity of the upper limit.	s maintained contin-
Used diagnos	stic code No.	01 (throttle po	osition s	sensor)	
Inspection op	eration item	and probable	cause	Operation item and countermeasure	Reinstatement method
Defective O2 (unable to ou		gnal).		Replace if defective.	Reinstated by starting the engine,
Clogged injec	ctor.			Replace if defective. Refer to "CHECKING THE INJECTOR".	warming it up until the coolant tem- perature is 60 °C
Open circuit o or sub lead.	or ground sho	ort in wiring ha	arness	Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - White Gray/Green - Blue	(140 °F) or more, and then running it between 2,000 ~ 3,000 r/min until the engine trouble
throttle open.	fuel pressure	e at idle and w	vith		indicator turns off.
About the sar Too low $\rightarrow$	Inspe	ct the fuel pun		Replace if defective. Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION".	
	for pir	ct the delivery nching or kinki	ng.	Repair or replace if there is a malfunction.	
	ulator	ct the pressur	e reg-	Replace if defective. Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION".	
	•	ct the throttle   ensor.	posi-	Execute diagnostic code 01.	
Other: Malfunction in the fuel system (disconnec- tion, etc.). Improper sealing of the intake system.				Repair or replace if there is a malfunction.	
Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.				If there is a malfunction, repair it and connect it securely. O2 sensor coupler Engine wiring harness coupler Main wiring harness ECU coupler Sub-wire harness coupler	



Code No.	32	Symptom		mount of air-fuel ratio feedback compensation is y in the vicinity of the lower limit (air-fuel ratio is							
Used diagnos	Used diagnostic code No. 01 (throttle position sensor)										
<u> </u>		· ·		Operation item and countermeasure	Reinstatement method						
Defective O2 (unable to ou	sensor Itput a lean si	gnal).		Replace if defective.	Reinstated by starting the engine,						
Excessive vo	lume of fuel i	njected by inje	ector.		warming it up until the coolant tem-						
•	on the 5 V sid ss or sub lead	le or short circ	cuit in	Repair or replace if there is an open or short circuit. Main wiring harness Black/Blue - White Gray/Green - Blue	perature is 60 °C (140 °F) or more, and then running it between 2,000 ~ 3,000 r/min until						
Compare the throttle open.		at idle and w	/ith		the engine trouble indicator turns off.						
About the sate Too high $\rightarrow$	ulator.	ct the pressure	C	Replace if defective. Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION". Repair or replace if there is a malfunction.							
	ulator hose for pinching or kinking. Inspect the fuel return hose for pinching or kink-			Repair or replace if there is a malfunction.							
	ing. Inspec tion se	ct the throttle person	posi-	Execute diagnostic code 01.							
Other: Malfunction in the fuel system (clogging, etc.).				Repair or replace if there is a malfunction.							
Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.				If there is a malfunction, repair it and connect it securely. O2 sensor coupler Sub wiring harness coupler Main wiring harness ECU coupler Sub-wire harness coupler							



Code No.	33	Symptom	Malfur	nction detected in the primary wire of the ignition	n coil (#1, 4).			
Used diagnostic code No. 30 (ignition coil #1, 4)								
Inspection operation item and probable cause				Operation item and countermeasure	Reinstatement method			
Defective ignition coil (test the primary and secondary coils for continuity).			nd	Replace if defective. Refer to "IGNITION SYSTEM" in chapter 8.	Reinstated by starting the engine			
				Repair or replace if there is an open or short circuit. Main wiring harness Orange - Orange Red/Black - Red/Black	and operating it at idle.			
				If there is a malfunction, repair it and connect it securely. Ignition coil primary side coupler - Orange Main wiring harness ECU coupler				

Code No.	34	Symptom	Malfunction detected in the primary wire of the ignition coil (#2, 3).		
Used diagnos	stic code No.	31 (ignition co	oil #2, 3	3)	
Inspection operation item and probable cause			cause	Operation item and countermeasure	Reinstatement method
Defective ignition coil (test the primary and secondary coils for continuity).			nd	Replace if defective. Refer to "IGNITION SYSTEM" in chapter 8.	Reinstated by starting the engine
				Repair or replace if there is an open or short circuit. Main wiring harness Gray/Red - Gray/Red Red/Black - Red/Black	and operating it at idle.
			-	If there is a malfunction, repair it and connect it securely. Ignition coil primary side coupler - Gray/Red Main wiring harness ECU coupler	

Code No.	41	Symptom	mptom Open or short circuit detected in the lean angle cut-off switch.		
Used diagno	stic code No.	08 (lean angle	e cut-o	ff switch)	
Inspection operation item and probable cause			cause	Operation item and countermeasure	Reinstatement method
Defective lean angle cut-off switch				Replace if defective.	Reinstated by turn-
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	ing the main switch ON.
		If there is a malfunction, repair it and connect it securely. Lean angle cut-off switch coupler Main wiring harness ECU coupler			



Code No.	42	• •		normal signals are received from the speed sen n or short circuit is detected in the neutral switc	
Used diagno		o. 07 (speed s o. 21 (neutral s			
Inspection op	peration item a	and probable c	ause	Operation item and countermeasure	Reinstatement method
1 Defective s	speed sensor			Replace if defective. Refer to "FUEL INJECTION SYSTEM" in chapter 8.	Reinstated by starting the engine, and inputting the
<ol> <li>Open or short circuit in lead wire.</li> <li>Gear for detecting vehicle speed has broken.</li> </ol>			ro-	Repair or replace if there is an open or short circuit. Main wiring harness Blue - Blue White/Yellow - White/Yellow Black/Blue - Black/Blue Replace if defective. Refer to "TRANSMISSION" in chapter 5.	vehicle speed sig- nals by operating the motorcycle at a low speed of 20 to 30 km/h.
1 Connected state of connector Inspect the coupler for any pins that may have pulled out. Check the locking condition of the coupler.			-	If there is a malfunction, repair it and connect it securely. Speed sensor coupler Main wiring harness ECU coupler	
2 Defective neutral switch				Replace if defective. Refer to "CHECKING THE SWITCHES" in chapter 8.	
2 Faulty shift drum (neutral detection area)				Replace if defective. Refer to "TRANSMISSION" in chapter 5.	
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	
			-	If there is a malfunction, repair it and connect it securely. Neutral switch coupler Main wiring harness ECU coupler	

Code No.	43	Symptom	The E	CU is unable to monitor the battery voltage.		
Used diagno	Jsed diagnostic code No. 50 (fuel injection system relay)					
Inspection operation item and probable cause			cause	Operation item and countermeasure	Reinstatement method	
Malfunction i	n ECU			Fuel injection system relay is on.	Reinstated by	
			SS.	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	starting the engine and operating it at idle.	
Malfunction or open circuit in fuel injection sys- tem relay			on sys-	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.		
			5	If there is a malfunction, repair it and connect it securely. Fuel injection system relay coupler ECU coupler		



Code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)			
Used diagnos	Used diagnostic code No.					
Inspection operation item and probable cause Operation item an				Operation item and countermeasure	Reinstatement method	
Malfunction in	n ECU			Replace the ECU.	Reinstated by turn- ing the main switch ON.	



#### Diagnosis mode troubleshooting 2 (self-diagnostic malfunction not detected)

Even if the malfunctions of some of the sensors do not appear on the meter because they are not detected by the self-diagnostic function, they can be inspected in the diagnosis mode.

Basic procedure
Check the condition and the symptom of the malfunction of the motorcycle.
Check the errors displayed on the meter.
Estimate the area of the malfunction by referring to the troubleshooting details.
Refer to "Troubleshooting details".
If there is a diagnostic code number for the inspection method for the probable location of the mal-

Using the results of the diagnosis mode inspection as reference, estimate the cause of the mal-

function, check the operating condition of the affected sensor or actuator in the diagnosis mode.

#### Troubleshooting details

Troubleshooting the sensors with no malfunctions detected, and special indications

function and carry out the inspection and repair of the affected area.

Symptom	The engine trouble warning light	The engine trouble warning light does not illuminate when the start switch is pressed.		
Probable mal- function area	<ul> <li>Open or short circuit in start switch</li> <li>Open or short circuit in wiring harness</li> <li>Open circuit in warning light bulb</li> </ul>			
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 indicated on the left.		
		<ul> <li>Open or short circuit in start switch Inspect the handlebar switch for continuity. Refer to "CHECKING THE SWITCHES" in chapter 8. Defective: replace</li> </ul>		
		<ul> <li>Open or short circuit in wiring harness Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>		
		<ul> <li>Open circuit in warning light bulb Inspect the bulb for continuity. Defective: replace</li> </ul>		



Symptom	The headlight does not turn ON	l or OFF.		
Probable mal- function area	<ul> <li>Malfunction in the headlight relay 1</li> <li>Malfunction in the headlight</li> <li>Open or short circuit in the headlight wiring harness</li> <li>Malfunction in the handlebar switch</li> <li>Open circuit in the headlight bulb</li> </ul>			
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1.		
<ul> <li>Execute diagnostic code No. 52 (check the operation of the headlight relay 1). (Check the operation of the headlight.)</li> <li>* Classify the malfunctions: Malfunction related to the relay Malfunction related to the wiring harness Malfunction in the headlight itself</li> </ul>		<ul> <li>Relay does not operate (as checked by sound or tester). Check the headlight relay 2. Refer to "LIGHTING SYSTEM" in chapter 8. Defective: replace</li> <li>Inspect the wiring harness and the couplers for continuity. Defective: repair or replace Replace</li> <li>The relay operates but the headlight does not illuminate. Inspect the headlight bulb. Blown bulb: replace</li> <li>Check the headlight relay 2 contact point for continuity. Refer to "LIGHTING SYSTEM" in chapter 8. Defective: replace</li> <li>Check the handlebar switch. Defective: repair or replace</li> <li>Inspect the wiring harness and the couplers for continuity.</li> </ul>		



Symptom	Fan does not operate.	
Probable mal- function area	<ul> <li>Malfunction in radiator fan mot</li> <li>Malfunction in fan</li> <li>Open or short circuit in fan wiri</li> </ul>	
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.
(Check the op relay.) (Check the op * Classify the Malfunction Malfunction	nostic code No. 51. peration of the radiator fan motor peration of the fan motor.) e malfunctions: related to the relay related to the wiring harness in the fan itself	<ul> <li>Relay does not operate. Check the radiator fan motor relay. Refer to "COOLING SYSTEM" in chapter 8. Defective: replace</li> <li>Inspect the wiring harness and couplers for continuity. Defective: repair or replace Replace</li> <li>Relay operates but fan does not operate. Inspect the fan. Refer to "COOLING SYSTEM" in chapter 8. Defective: replace</li> <li>Check the continuity at the contact point of the radiator fan motor relay. Refer to "COOLING SYSTEM" in chapter 8. Defective: replace</li> <li>Inspect the wiring harness and couplers for continuity. Defective: replace</li> <li>Inspect the wiring harness and couplers for continuity. Defective: replace</li> <li>Normal according to the diagnosis mode Inspect the coolant temperature sensor (by executing diag- nostic code No. 06). Refer to "COOLING SYSTEM" in chapter 8. Defective: replace</li> </ul>

Symptom	Clock LCD displays "Er-1". (No signals are received from the ECU.)		
Probable mal- function area	<ul> <li>Open or short circuit in communication line</li> <li>Malfunction in meter</li> <li>Malfunction in ECU</li> </ul>		
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
		<ul> <li>Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>	



Symptom	Clock LCD displays "Er-2". (No signals are received from the ECU within the specified duration.)		
Probable mal- function area	<ul> <li>Improper operation of communication line</li> <li>Malfunction in meter</li> <li>Malfunction in ECU</li> </ul>		
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
		<ul> <li>Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>	

Symptom	Clock LCD displays "Er-3". (Data from the ECU cannot be received correctly.)		
Probable mal- function area	<ul> <li>Improper operation of communication line</li> <li>Malfunction in meter</li> <li>Malfunction in ECU</li> </ul>		
Inspection method 1 Inspection by diagnosis mode		Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
		Inspect ECU coupler     Inspect the wiring harness and couplers for continuity.     Defective: repair or replace	
		<ul> <li>Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>	

Symptom	Clock LCD displays "Er-4". (Non-registered data has been received from the meter.)		
Probable mal- function area	<ul> <li>Improper operation of communication line</li> <li>Malfunction in meter</li> <li>Malfunction in ECU</li> </ul>		
Inspection meth Inspection by	od 1 diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.	
		<ul> <li>Inspect ECU coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>Inspect meter coupler Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>	

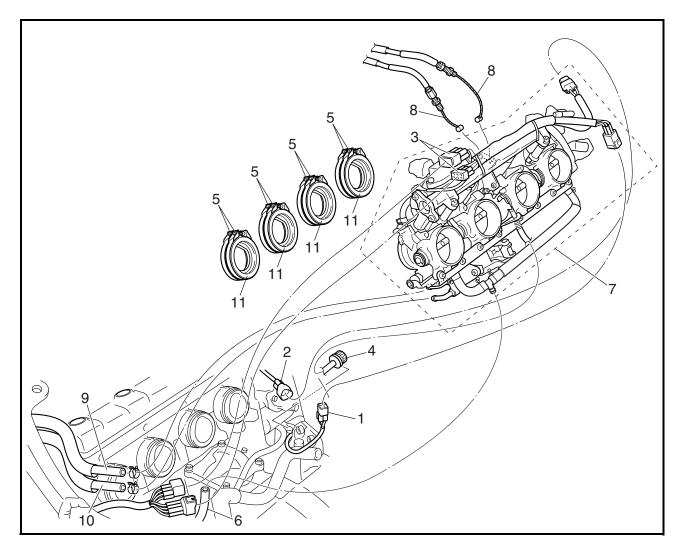


Symptom	Sidestand switch does not function (the engine does not stop when the stand is extended).			
Probable mal- function area	<ul> <li>Short circuit in the input line to ECU</li> <li>Malfunction in the starter circuit cut-off relay</li> </ul>			
Inspection meth Inspection by	od 1 diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1 given on the left.		
of the sidesta tral). * To distingui	nostic code 21 eter to display the ON/OFF states nd switch (in gear other than neu- sh whether the problem is in the other areas.	<ul> <li>Meter does not display ON/OFF. Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> <li>Inspect the sidestand switch. Refer to "CHECKING THE SWITCHES" in chapter 8. Defective: replace</li> </ul>		

Symptom	Engine trouble warning light blinks while the start switch is being pressed (to warn that the engine is unable to start).					
Probable mal- function area	, ,					
Inspection meth Inspection by	nod 1 diagnosis mode	Inspection method 2 Inspection of a malfunction that cannot be identified in the diagnosis mode, and in case the area of the malfunction has been narrowed down in the inspection method 1.				
<ul> <li>Execute diagnostic code 50 To trip the Fuel injection system relay.</li> </ul>		<ul> <li>Fuel injection system relay does not trip. Inspect the coil side of the fuel injection system relay. Refer to "FUEL INJECTION SYSTEM" in chapter 8. Defective: replace</li> <li>Inspect the wiring harness and couplers for continuity. Defective: repair or replace</li> </ul>				
<ul> <li>Execute diagnostic code 09 To check the monitor voltage.</li> <li>* To distinguish whether the problem is in the relay or in other areas.</li> </ul>		<ul> <li>Normal voltage is not displayed. Inspect the contact side of the fuel injection system relay. Refer to "FUEL INJECTION SYSTEM" in chapter 8. Defective: replace</li> <li>Inspect the wiring harness and couplers for continuity.</li> </ul>				
		<ul> <li>If a self-diagnostic code is displayed: Inspect the battery. Defective: replace or recharge</li> <li>Inspect and repair the applicable area of the malfunction.</li> </ul>				

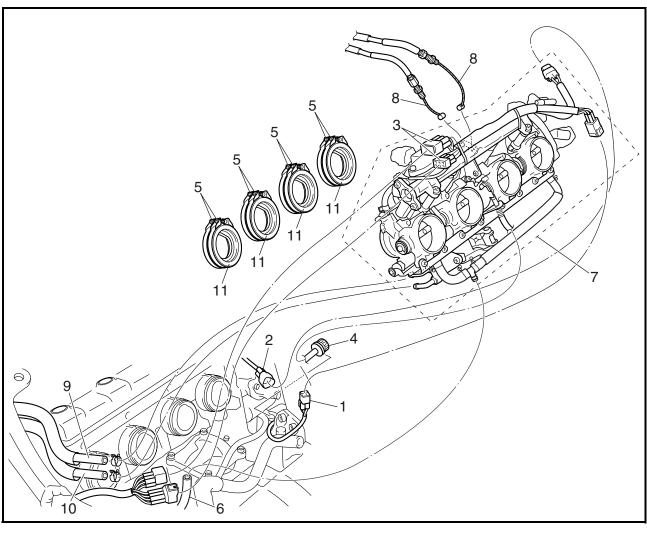


#### THROTTLE BODIES



Order	Job/Part	Q'ty	Remarks
	Removing the throttle bodies		Remove the parts in the order listed.
	Seats/fuel tank/T-bar/rubber sheet		Refer to "SEATS AND FUEL TANK" in
			chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter
			3.
	Coolant		Drain.
			Refer to "CHANGING THE COOLANT" in
			chapter 3.
1	O2 sensor coupler	1	Disconnect.
2	Cylinder identification sensor coupler	1	Disconnect.
3	Sub-wire harness 2 coupler	2	Disconnect.
4	Throttle stop screw	1	
5	Throttle body joint clamp screw	8	
6	Canister purge hose	1	Disconnect.
7	Throttle bodies	1	

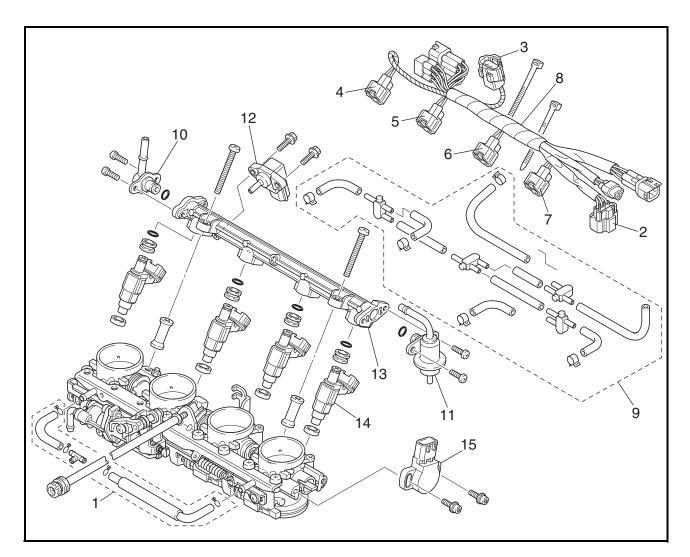




Order	Job/Part	Q'ty	Remarks
8	Throttle cable	2	Disconnect.
9	Plunger control unit hose 1	1	Disconnect.
10	Plunger control unit hose 2	1	Disconnect.
11	Throttle body joint	4	
			For installation, reverse the removal
			procedure.



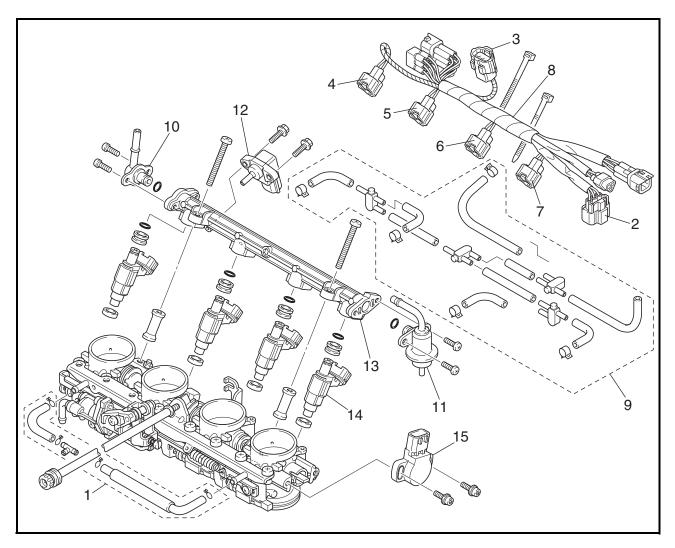




Order	Job/Part	Q'ty	Remarks
	Removing the injector		Remove the parts in the order listed.
1	Canister purge hose	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	Intake air pressure sensor	1	Disconnect.
4	Cylinder #1-injector coupler	1	Disconnect.
5	Cylinder #2-injector coupler	1	Disconnect.
6	Cylinder #3-injector coupler	1	Disconnect.
7	Cylinder #4-injector coupler	1	Disconnect.
8	Subwire harness 2	1	
9	Negative pressure hose	1	Disconnect.
10	Fuel injection pipe	1	
11	Pressure regulator	1	







Order	Job/Part	Q'ty	Remarks
12	Intake air pressure sensor	1	
13	Fuel distributor	1	
14	Injector	4	
15	Throttle position sensor	1	
			For installation, reverse the removal
			procedure.



#### CAUTION:

The throttle bodies should not be disassembled unnecessarily.

#### **CHECKING THE INJECTOR**

- 1. Check:
- injector Damage  $\rightarrow$  Replace.

#### CHECKING THE THROTTLE BODY

- 1. Check:
- throttle body Cracks/damage → Replace the throttle bodies.
- 2. Check:
- fuel passages Obstruction  $\rightarrow$  Clean.

#### \*\*\*\*

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.

# CHECKING THE PRESSURE REGULATOR

- 1. Check:
- pressure regulator
   Damage → Replace.

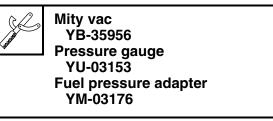


# CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

- 1. Check:
- pressure regulator operation

#### •••••

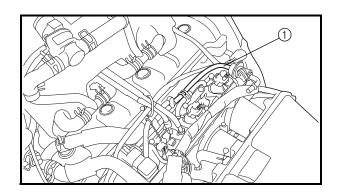
- Remove the fuel tank.
   Refer to "SEATS AND FUEL TANK" in chapter 3.
- b. Disconnect the negative pressure hose ① from the pressure regulator at the joint.
- c. Connect the mity vac set ② onto the negative pressure hose from the pressure regulator.
- d. Connect the pressure gauge ③ and adapter④ onto the fuel injector pipe.

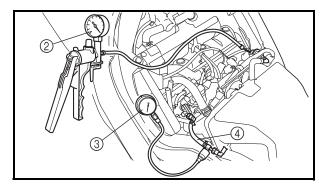


- e. Install the fuel tank.
   Refer to "SEATS AND FUEL TANK" in chapter 3.
- f. Start the engine.
- g. Measure the fuel pressure.



Fuel pressure 250 kPa (2.5 kg/cm<sup>2</sup>, 36 psi)







h. Use the mity vac 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 mm Hg, 0.039 in Hg).

Increase the vacuum pressure  $\rightarrow$  Fuel pressure is decreased

Decrease the vacuum pressure  $\rightarrow$  Fuel pressure is increased

Faulty  $\rightarrow$  Replace the pressure regulator.

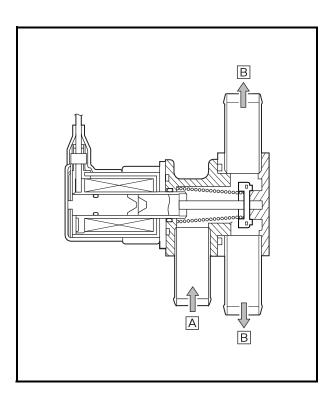
\*\*\*\*\*

FI

# AIR INDUCTION SYSTEM

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 (1,112 °F) to 700 °C (1,292 °F).



# AIR CUT-OFF VALVE

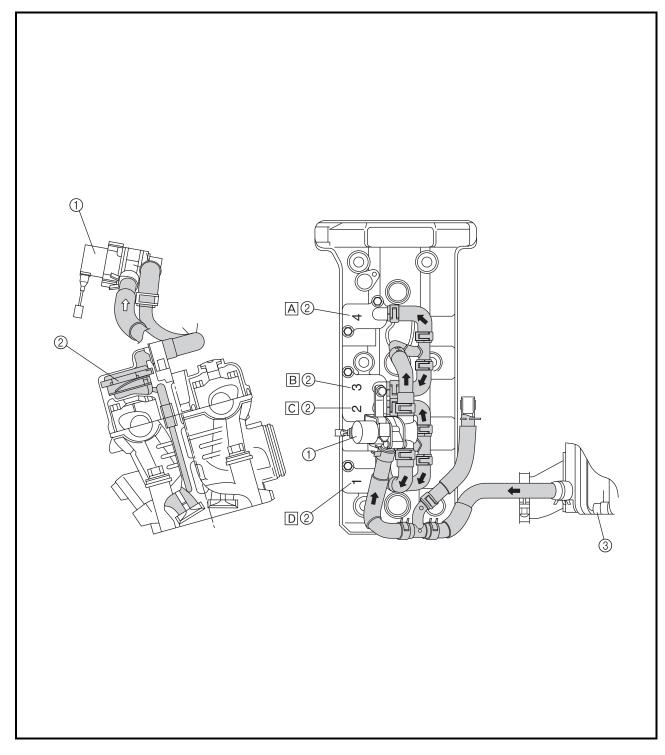
The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the motorcycle is being driven. However, if the coolant temperature is below the 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**

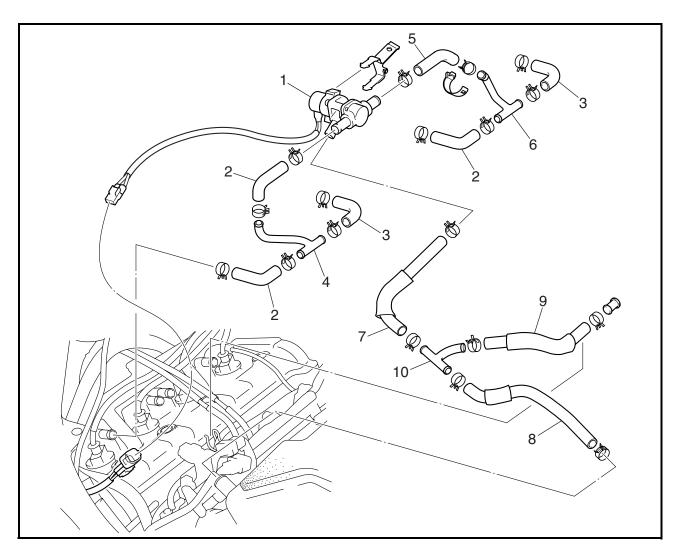
- (1) Air cut-off valve
- 2 Reed valve
- ③ Air-filter case

- A To cylinder #4 B To cylinder #3 C To cylinder #2 D To cylinder #1



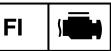


#### AIR CUT-OFF VALVE ASSEMBLY AND AIR INDUCTION SYSTEM HOSES

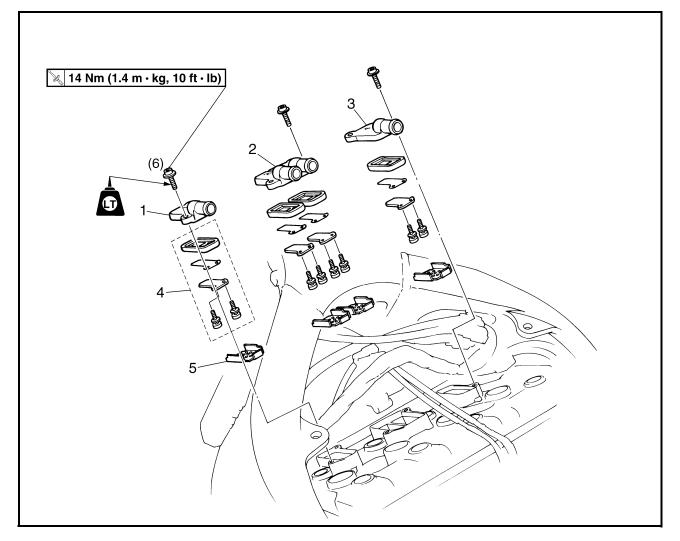


Order	Job/Part	Q'ty	Remarks
	Removing the air cut-off valve		Remove the parts in the order listed.
	assembly and hoses		
	Rider seat/fuel tank/T-bar/rubber sheet		Refer to "SEATS AND FUEL TANK" in
			chapter 3.
1	Air cut-off valve assembly	1	
2	Hose 1	3	
3	Hose 2	2	
4	Pipe 1	1	
5	Hose 3	1	
6	Pipe 2	1	
7	Hose 4	1	
8	Hose 5	1	
9	Resonator hose	1	
10	Pipe 3	1	
			For installation, reverse the removal
			procedure.

# **AIR INDUCTION SYSTEM**



#### **REED VALVES**



Order	Job/Part	Q'ty	Remarks
	Removing the reed valves		Remove the parts in the order listed.
	Air cut-off valve assembly/hoses		
	Thermostat assembly		Refer to "THERMOSTAT" in chapter 6.
	Spark plug caps		
1	Reed valve cover (1)	1	
2	Reed valve cover (2, 3)	1	
3	Reed valve cover (4)	1	
4	Reed valve assembly	4	
5	Plate	4	
			For installation, reverse the removal procedure.



# CHECKING THE AIR INDUCTION SYSTEM

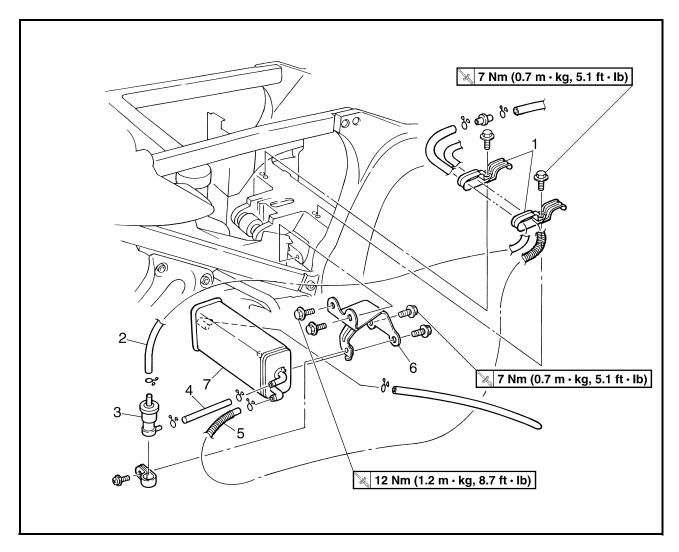
1. Check:

 hoses
 Loose connection → Connect properly. Cracks/damage → Replace.

- pipes Cracks/damage  $\rightarrow$  Replace.
- 2. Check:
- fibre reed
- fibre reed stopper
- reed valve seat Cracks/damage  $\rightarrow$  Replace the reed valve assembly.
- 3. Check:
- air cut-off valve Cracks/damage → Replace.



### **CANISTER (FOR CALIFORNIA ONLY)**



Order	Job/Part	Q'ty	Remarks
	Removing the canister		Remove the parts in the order listed.
	Seats/fuel tank/T-bar/rubber sheet		Refer to "SEATS AND FUEL TANK" in
			chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter
			3.
1	Clamp	2	
2	Canister charge hose	1	Disconnect.
3	Rollover valve	1	
4	Canister to rollover valve hose	1	Disconnect.
5	Canister purge hose	1	Disconnect.
6	Canister bracket	1	
7	Canister	1	
			For installation, reverse the removal procedure.



EAS00729

# ELECTRICAL

### **ELECTRICAL COMPONENTS**

- ① Windshield drive unit
- ② Battery
- ③ Starter relay
- ④ Fuel injection system fuse
- ⑤ Front brake switch
- 6 Clutch switch

- (9) Wire harness
- 1 Neutral switch
- (1) Sidestand switch
- 12 Oil level switch
- (3) Rear brake switch
- Horn
- ⑦ Fuse box (5) Ignition coil (8) Radiator fan motor (6) Main fuse (3)6 (5) **C** (7)15 9 8 0 0) (14 0 (10)

(0

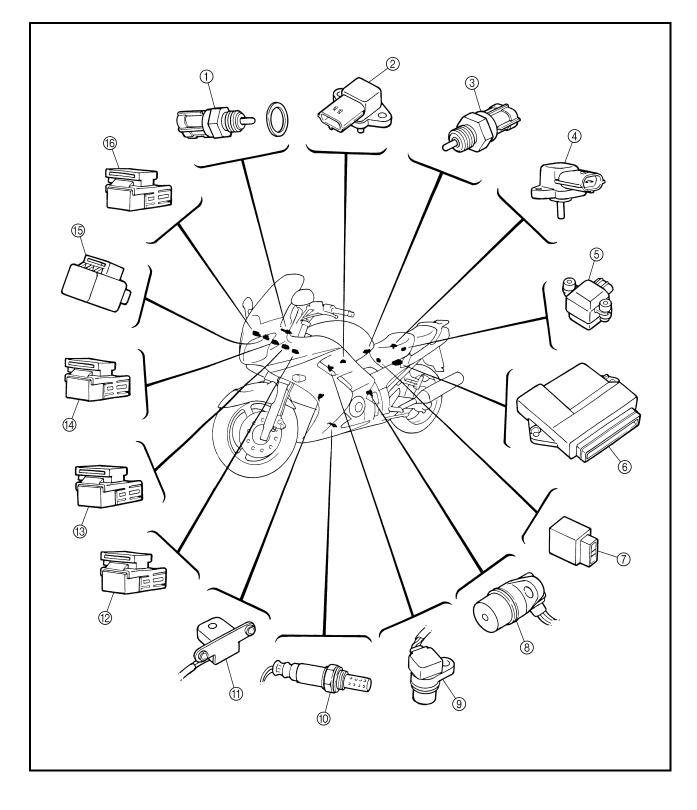
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### ELECTRICAL COMPONENTS

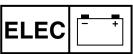


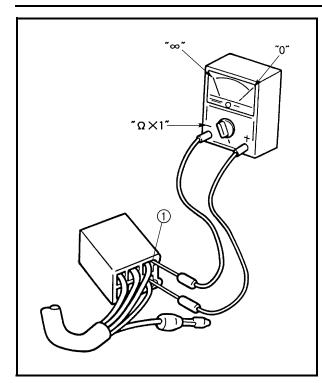
- ① Coolant temperature sensor
- ② Intake air pressure sensor
- ③ Intake air temperature sensor
- ④ Atmospheric pressure sensor
- 5 Lean angle cut-off switch
- 6 ECU
- ⑦ Starting circuit cut-off relay
- ⑧ Speed sensor

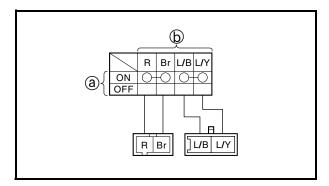
- (9) Cylinder identification sensor
- 1 O2 sensor
- (f) Crankshaft position sensor
- 12 Headlight relay 1
- 13 Headlight relay 2
- (1) Fuel injection system relay
- 15 Turn signal relay
- (6) Radiator fan motor relay



### CHECKING SWITCH CONTINUITY







### CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

#### CAUTION:

Never insert the tester probes into the coupler terminal slots (1). Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Pocket tester YU-03112

#### NOTE: .

- · Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions (a) are shown in the far left column and the switch lead colors (b) are shown in the top row in the switch illustration.

#### NOTE:

"O—O" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

#### The example illustration on the left shows that:

There is continuity between red and, brown between white/blue and blue/yellow when the switch is set to "ON".



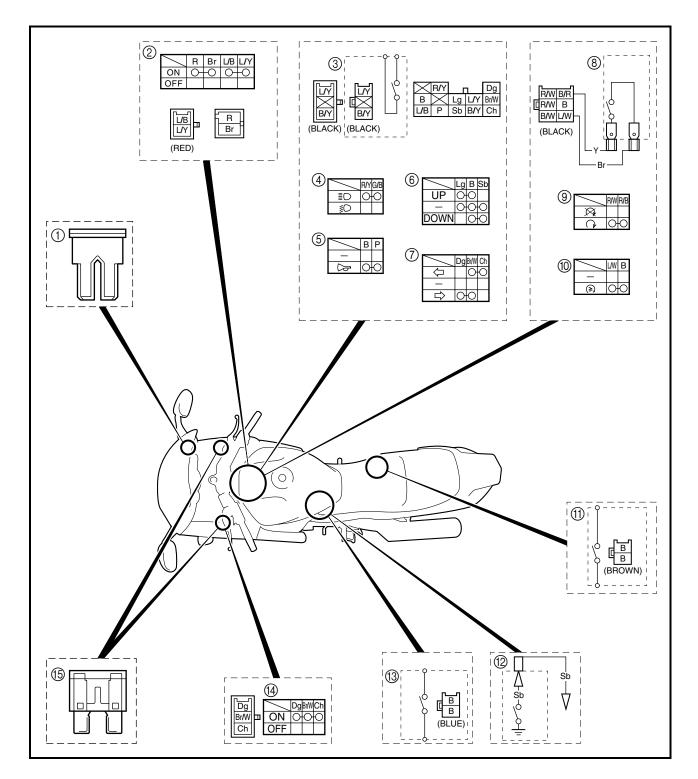
# CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".

Damage/wear  $\rightarrow$  Repair or replace.

Improperly connected  $\rightarrow$  Properly connect.

Incorrect continuity reading  $\rightarrow$  Replace the switch.





- ① Main fuse
- ② Main switch
- ③ Clutch switch
- ④ Dimmer switch
- (5) Horn switch
- 6 Windshield position switch
- Turn signal switch
- (8) Front brake light switch
- (9) Engine stop switch
- 1 Start switch
- (1) Rear brake light switch
- 12 Neutral switch
- 13 Sidestand switch
- 14 Hazard switch
- 15 Fuse



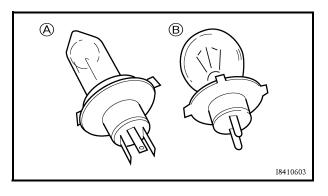
# CHECKING THE BULBS AND BULB SOCKETS

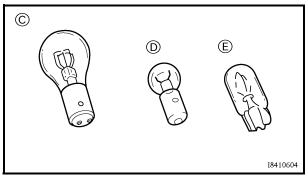
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear  $\rightarrow$  Repair or replace the bulb, bulb socket or both.

Improperly connected  $\rightarrow$  Properly connect.

No continuity  $\rightarrow$  Repair or replace the bulb, bulb socket or both.





#### TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs (A) and (B) are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs © is used for turn signal and tail/ brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs D and E are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

# CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

- 1. Remove:
- bulb



#### A WARNING

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

#### CAUTION:

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.
- 2. Check:
- bulb (for continuity) (with the pocket tester) No continuity → Replace.



Pocket tester YU-03112

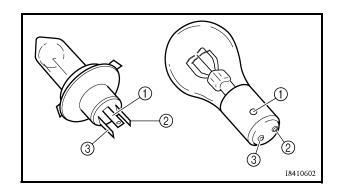
#### NOTE: .

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times$  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 YU-03112

#### NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

#### \*\*\*\*

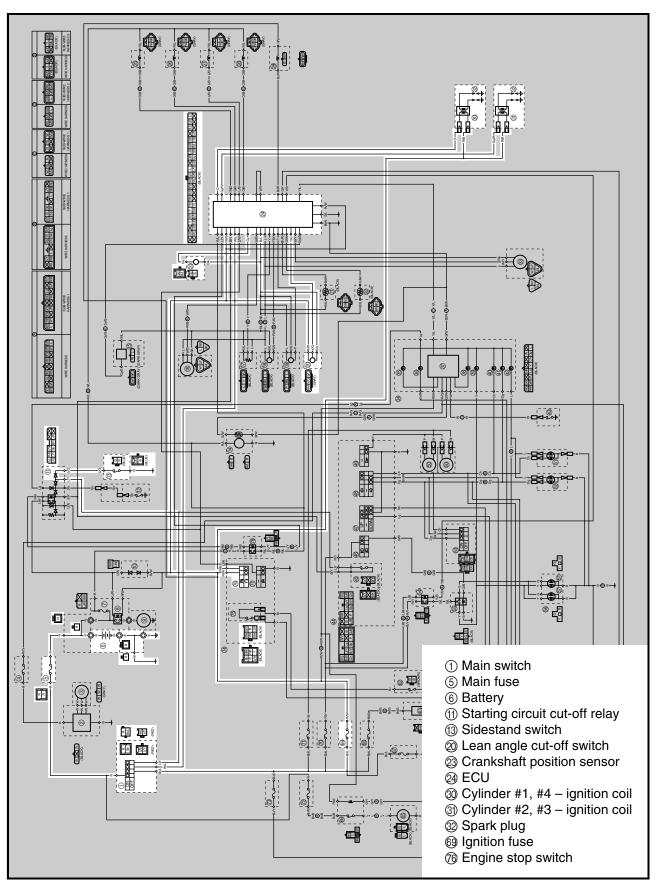
- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

\*\*\*\*\*

**IGNITION SYSTEM** 



## IGNITION SYSTEM CIRCUIT DIAGRAM



## **IGNITION SYSTEM**



## TROUBLESHOOTING

## The ignition system fails to operate (no spark or intermittent spark).

#### Procedure

Check:

- 1. main and ignition fuses
- 2. battery
- 3. spark plugs
- 4. ignition spark gap
- 5. spark plug cap resistance
- 6. ignition coil resistance
- 7. crankshaft position sensor resistance
- 8. main switch
- 9. engine stop switch
- 10.neutral switch
- 11.sidestand switch
- 12.starting circuit cut-off relay
- 13.wiring connections
  - (of the entire ignition system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1) Seat
- 2) Fuel tank and T-bar
- 3) Side cowlings
- 4) Front cowling assembly
- 5) Air filter case
- Troubleshoot with the following special tool(s).

Dynamic spark tester YM-34487 Pocket tester YU-03112

EAS00738

1. Main and ignition fuses

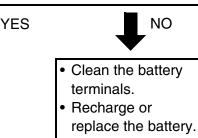
- Check the main and ignition fuses for continuity.
   Refer to "CHECKING THE FUSES" in
- chapter 3.
- Are the main and ignition fuses OK?



EAS00739

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
- Minimum open-circuit voltage 12.8 V or more at 20 °C (68 °F)

#### Is the battery OK?



#### 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.

0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

 Is the spark plug in good condition, is it of the correct type, and is its gap within specification?



Re-gap or replace the spark plug.

## **IGNITION SYSTEM**

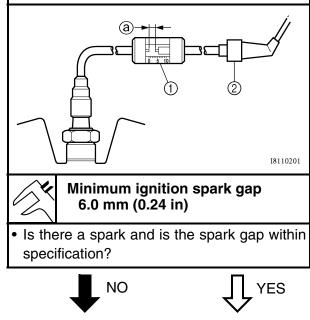


#### EAS00743

#### 4. Ignition spark gap

The following procedure applies to all of the spark plugs. Disconnect the spark plug cap from the spark plug.

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



EAS00745

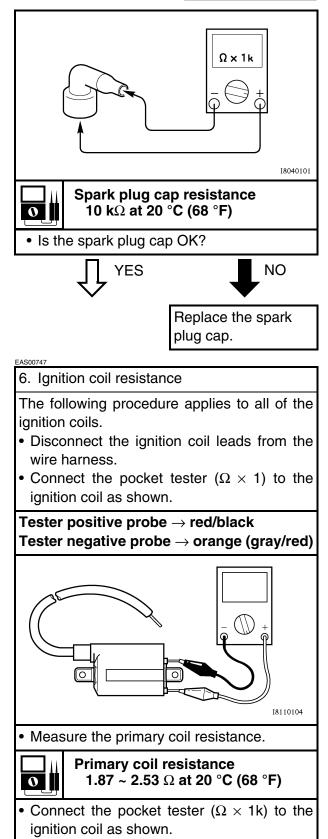
5. Spark plug cap resistance

The following procedure applies to all of the spark plug caps.

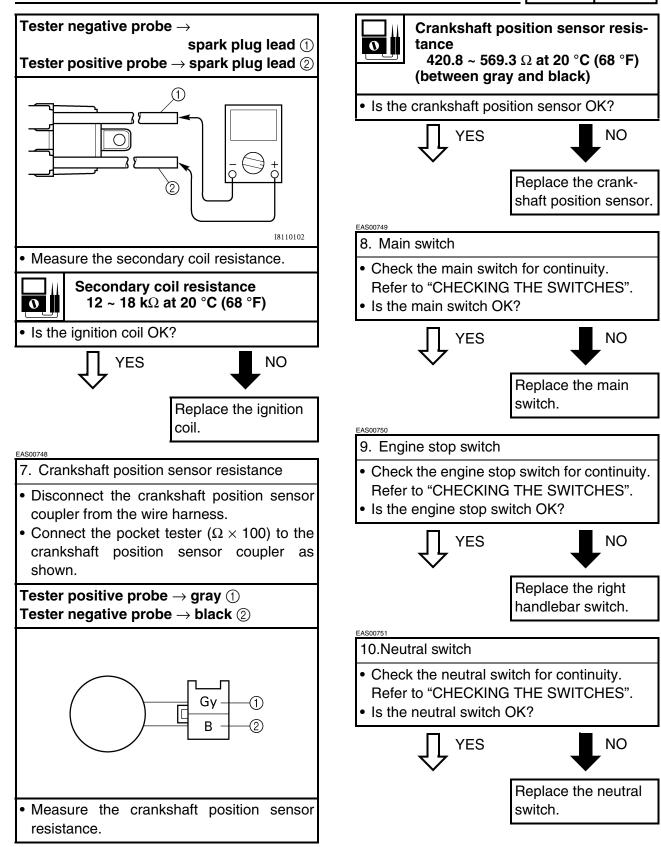
is OK.

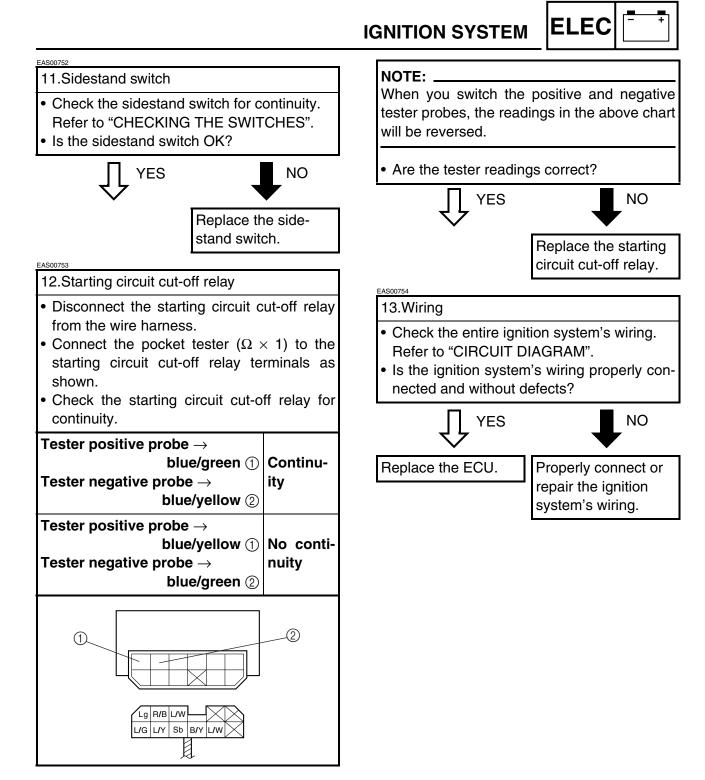
The ignition system

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



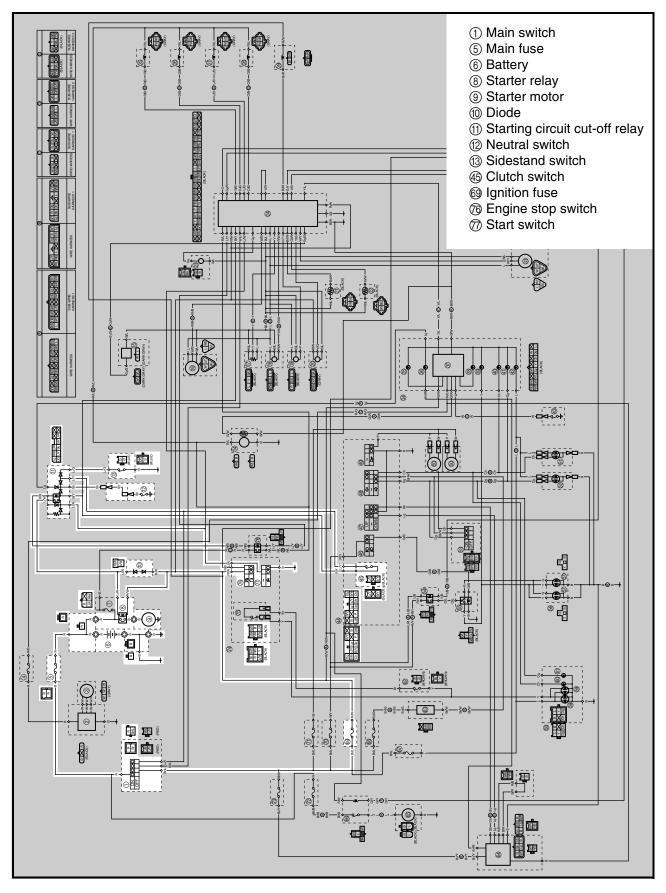


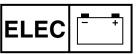


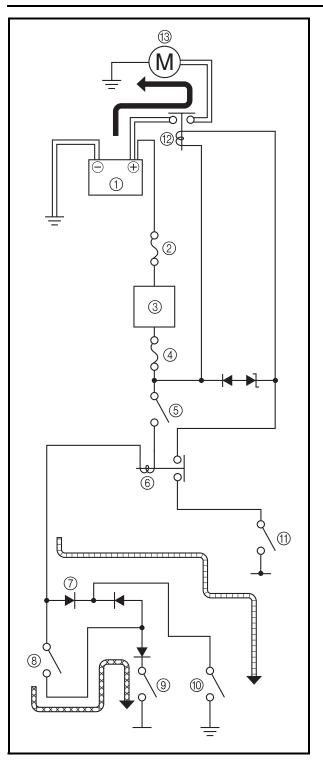




## ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM







## STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to " $\bigcirc$ " 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
- ③ Sidestand switch
- 1 Neutral switch
- (1) Start switch
- 12 Starter relay
- (3) Starter motor

EAS00739

2. Battery

0

AS00758

3. Starter motor

Is the battery OK?

Check the condition of the battery.

THE BATTERY" in chapter 3.

YES

3

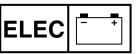
Refer to "CHECKING AND CHARGING

Minimum open-circuit voltage

• Connect the positive battery terminal (1) and

starter motor lead (2) with a jumper lead (3).

12.8 V or more at 20 °C (68 °F)



NO

Clean the battery

replace the battery.

terminals.

Recharge or

## EAS00757

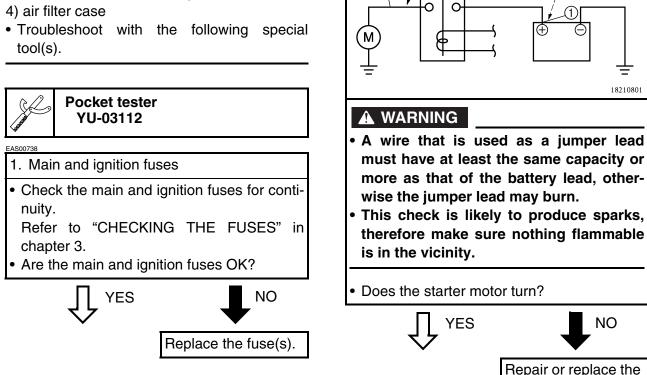
#### The starter motor fails to turn.

Check:

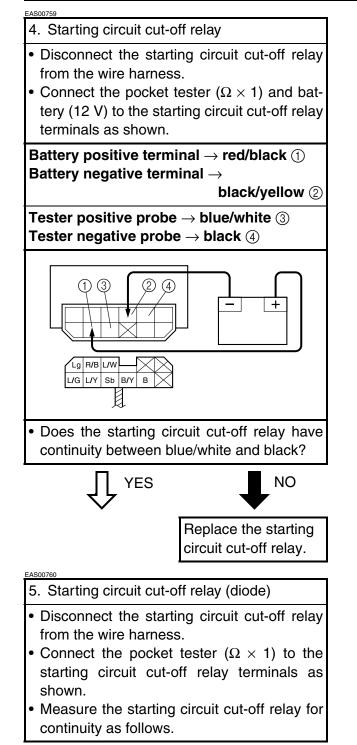
- 1. main and ignition fuses
- 2. battery
- 3. starter motor
- 4. starting circuit cut-off relay
- 5. starter circuit cut-off relay (diode)
- 6. starter relay
- 7. main switch
- 8. engine stop switch
- 9. neutral switch
- 10.sidestand switch
- 11.clutch switch
- 12.start switch
- 13.wiring connections
  - (of the entire starting system)

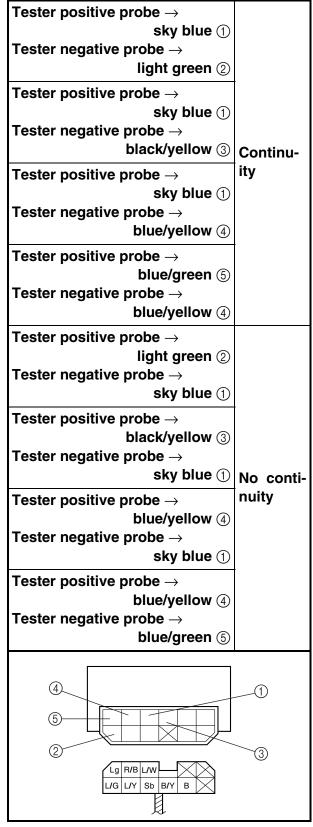
#### NOTE:

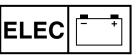
- Before troubleshooting, remove the following part(s):
- 1) seats
- 2) fuel tank
- 3) inner panels (front cowling)

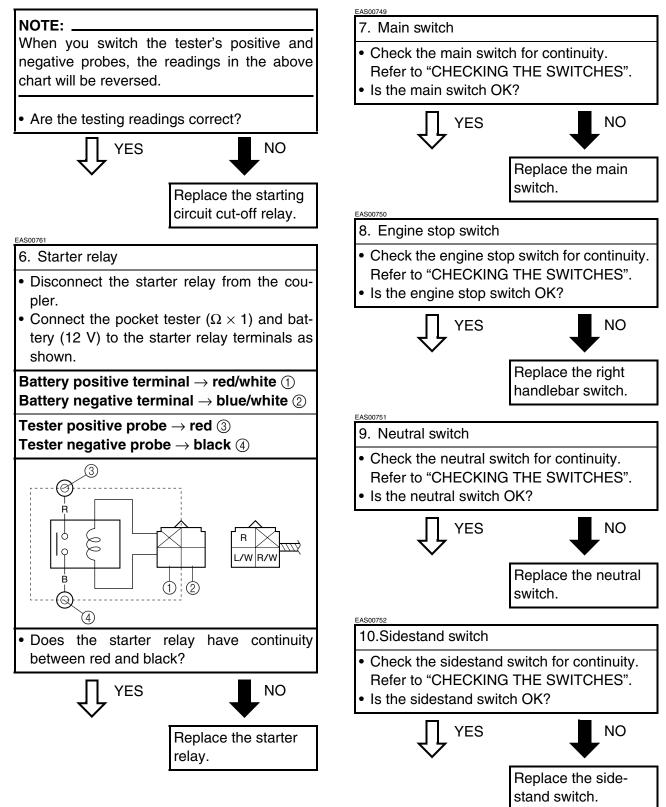




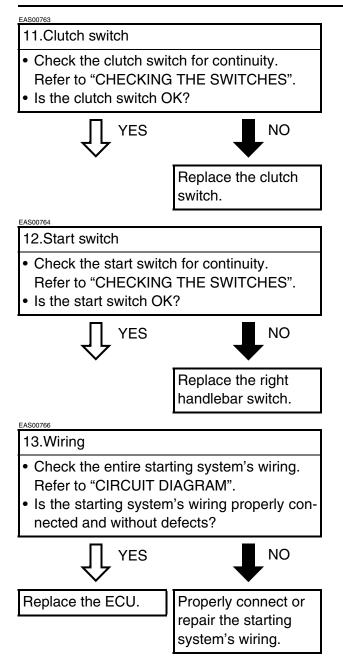








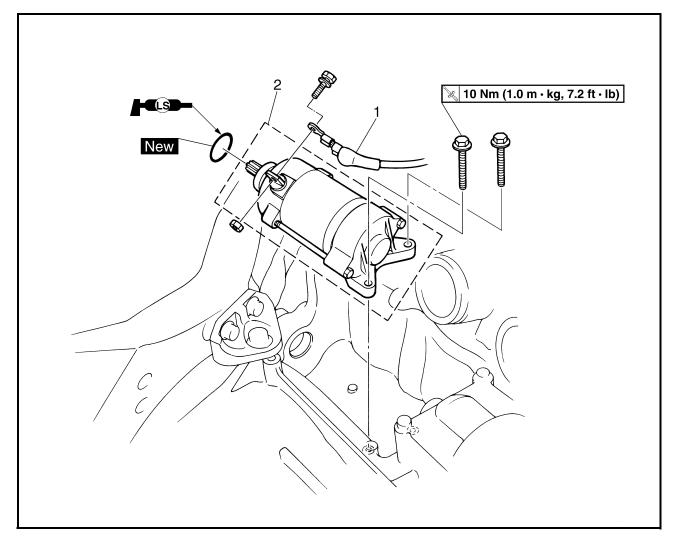




STARTER MOTOR |ELEC



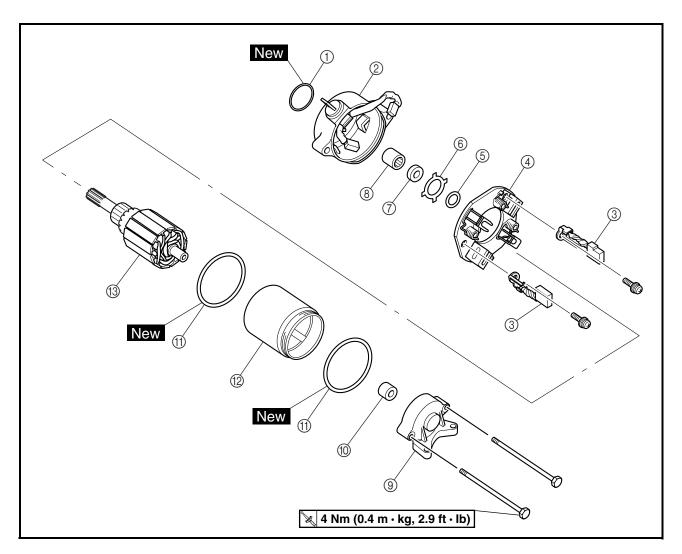
## STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
	Throttle bodies		Refer to "FUEL INJECTION SYSTEM" in
			chapter 7.
1	Starter motor lead	1	Disconnect.
2	Starter motor	1	
			For installation, reverse the removal
			procedure.

STARTER MOTOR

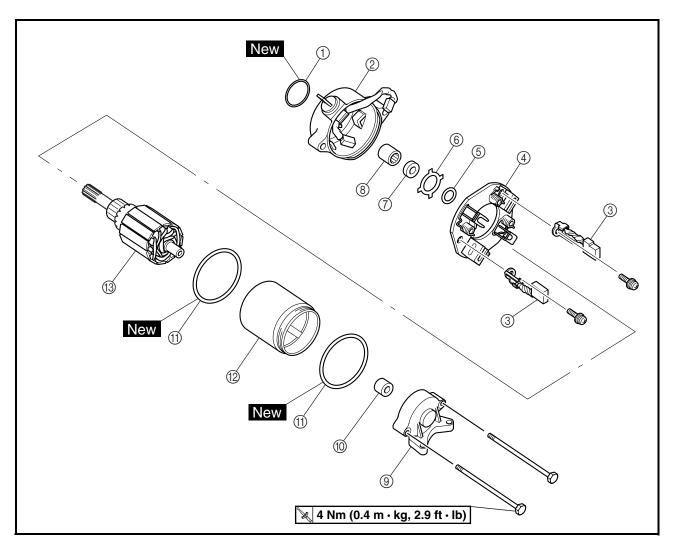




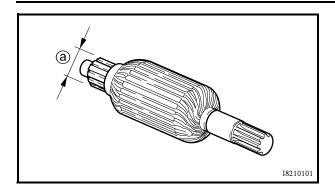
Order	Job/Part	Q'ty	Remarks
	Disassembly the starter motor		Remove the parts in the order listed.
1	O-ring	1	
2	Starter motor front cover	1	
3	Brush	2	
4	Brush seat	1	
5	Washer	1	
6	Lock washer	1	
7	Oil seal	1	
8	Bearing	1	
9	Starter motor rear cover	1	
10	Collar	1	

STARTER MOTOR





Order	Job/Part	Q'ty	Remarks
(1)	O-ring	1	
12	Starter motor yoke	1	
13	Armature assembly	1	
			For assembly, reverse the disassembly
			procedure.



## CHECKING THE STARTER MOTOR

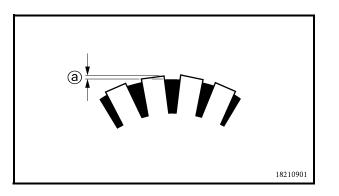
- 1. Check:
- commutator

**STARTER MOTOR** 

 $\mbox{Dirt} \rightarrow \mbox{Clean}$  with 600 grit sandpaper.

- 2. Measure:
- commutator diameter (a)

Out of specification  $\rightarrow$  Replace the starter motor.



Commutator wear limit 23.5 mm (0.93 in)

- 3. Measure:
- mica undercut (a)

Out of specification  $\rightarrow$  Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut 1.5 mm (0.06 in)

#### NOTE: \_

The mica of the commutator must be undercut to ensure proper operation of the commutator.



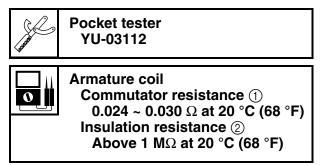
**STARTER MOTOR** 

- 4. Measure:
- armature assembly resistances (commutator and insulation)

Out of specification  $\rightarrow$  Replace the starter motor.

#### \*\*\*\*

a. Measure the armature assembly resistances with the pocket tester.



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

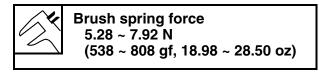
#### \*\*\*\*\*

- 5. Measure:
- brush length ⓐ
   Out of specification → Replace the brushes
   as a set.



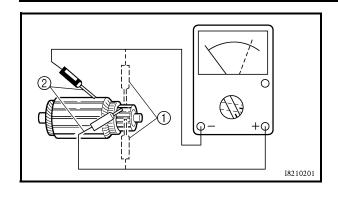
Brush length wear limit 3.65 mm (0.14 in)

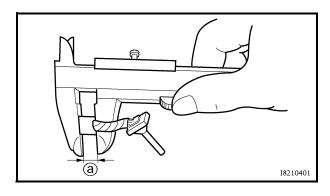
- 6. Measure:
- brush spring force
   Out of specification → Replace the brush springs as a set.

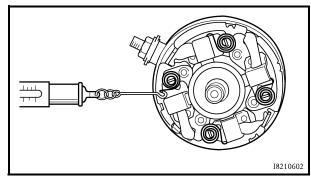


- 7. Check:
- gear teeth
  - Damage/wear  $\rightarrow$  Replace the gear.
- 8. Check:
- bearing
- oil seal

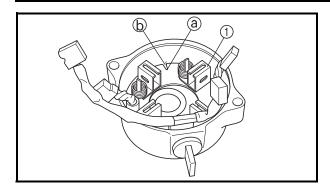
Damage/wear  $\rightarrow$  Replace the defective part(s).

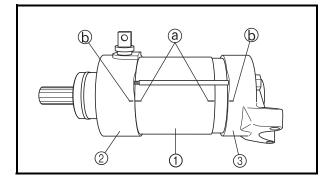












## ASSEMBLING THE STARTER MOTOR

- 1. Install:
- brush seat ①

**STARTER MOTOR** 

#### NOTE: \_

Align the slot (a) on the brush seat with the tab (b) in the starter motor front cover.

- 2. Install:
- starter motor yoke ①
- starter motor front cover ②
- starter motor rear cover 3

#### NOTE: \_

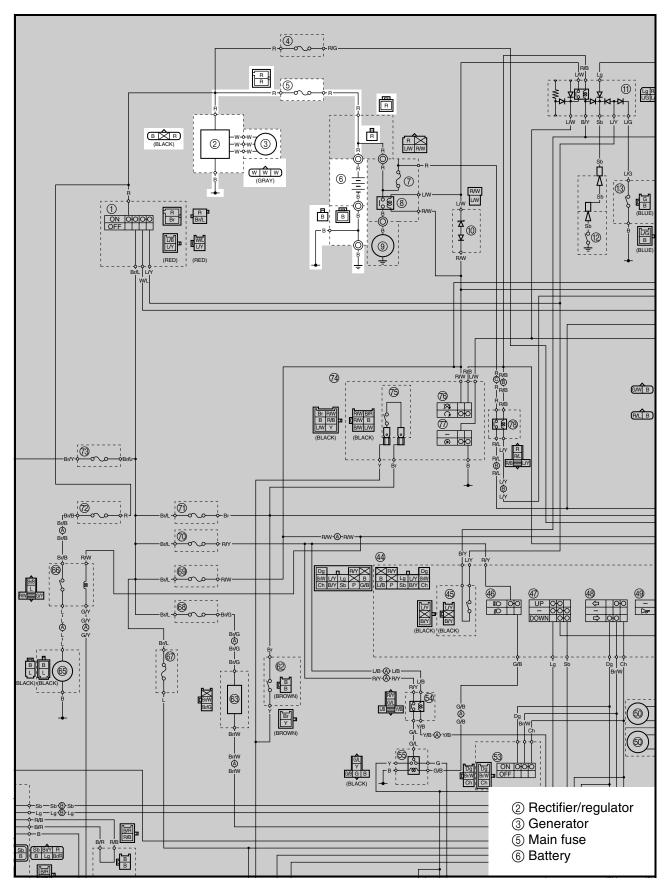
Align the match marks (a) on the starter motor yoke with the match marks (b) on the front and rear covers.

- 3. Install:
- O-rings New
- bolts
- 🔌 4 Nm (0.4 m · kg, 2.9 ft · lb)

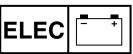
## **CHARGING SYSTEM**



# CHARGING SYSTEM



CHARGING SYSTEM



#### EAS00774 TROUBLESHOOTING

#### The battery is not being charged.

#### Check:

- 1. main fuse
- 2. battery
- 3. charging voltage
- 4. stator assembly resistance
- 5. wiring connections (of the entire charging system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1) front cowling assembly
- 2) fuel tank
- 3) air filter case
- Troubleshoot with the following special tool(s).



EAS00738

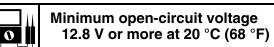
1. Main fuse

- Check the main fuse for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Is the main fuse OK?

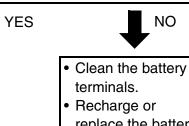
2. Battery

EAS00739

• Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



#### Is the battery OK?



replace the battery.

#### 3. Charging voltage

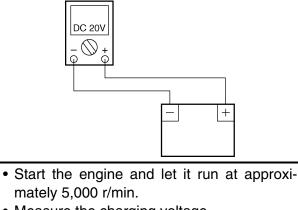
- Connect the engine tachometer to the spark plug lead of cylinder #1.
- Connect the pocket tester (DC 20 V) to the battery as shown.

#### Tester positive probe ightarrow

positive battery terminal

## Tester negative probe $\rightarrow$

negative battery terminal

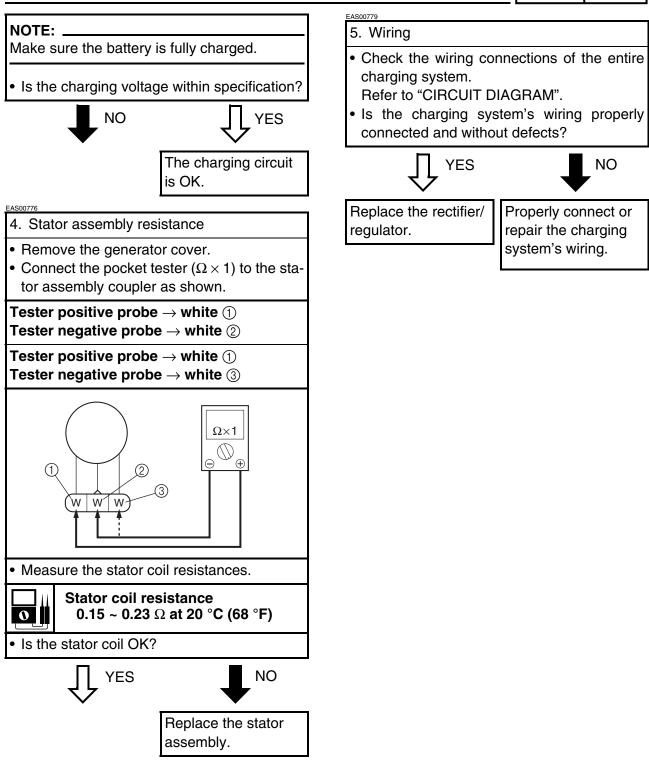


• Measure the charging voltage.



**Charging voltage** 14 V at 5,000 r/min

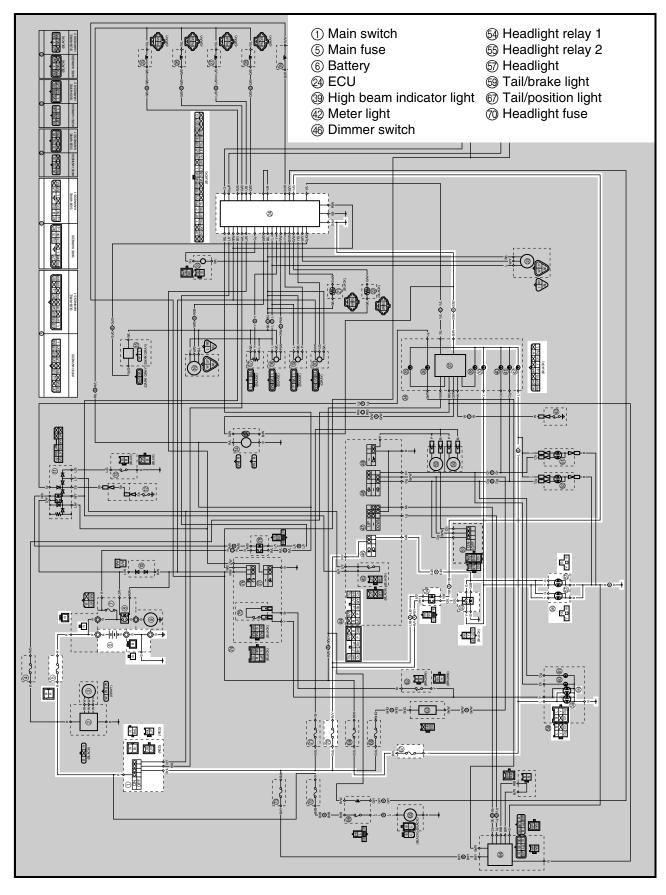
# 



**CHARGING SYSTEM** 



# LIGHTING SYSTEM





## TROUBLESHOOTING

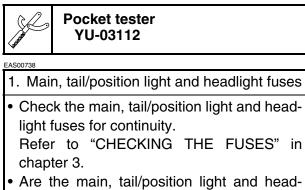
Any of the following fail to light: headlight, high beam indicator light, taillight or meter light.

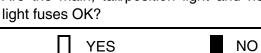
Check:

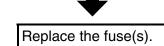
- 1. main, tail/position light and headlight fuses
- 2. battery
- 3. main switch
- 4. dimmer switch
- 5. headlight relay 1
- 6. headlight relay 2
- 7. wiring connections
  - (of the entire lighting system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1) fuel tank
- 2) front cowling assembly
- 3) rear cover
- Troubleshoot with the following special tool(s).



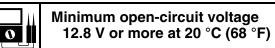




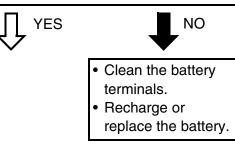


EAS00739

• Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



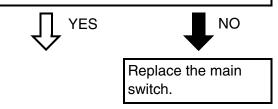
#### Is the battery OK?



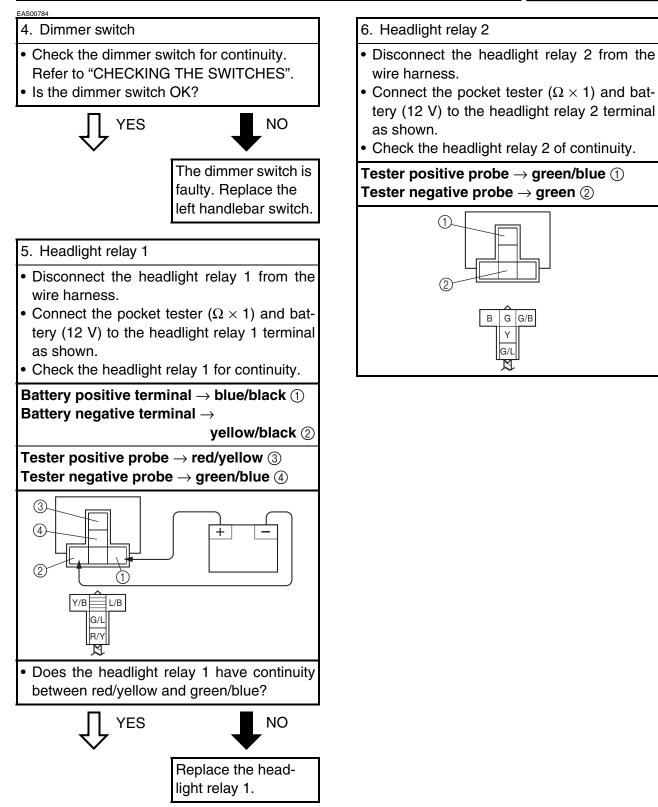
3. Main switch

EAS00749

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

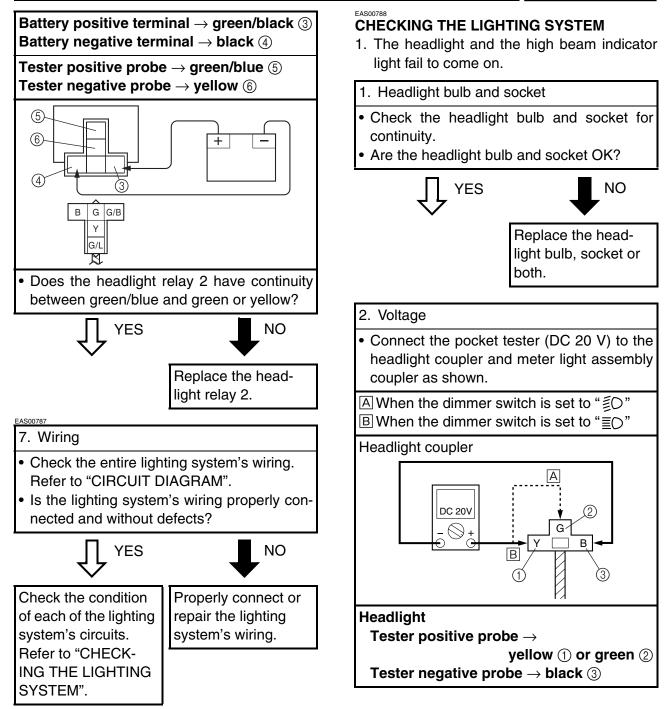


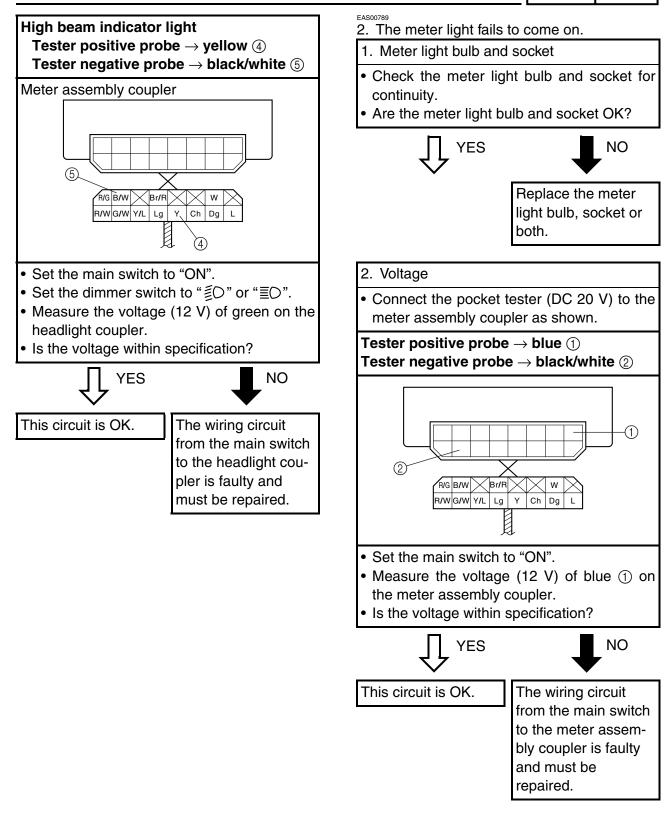




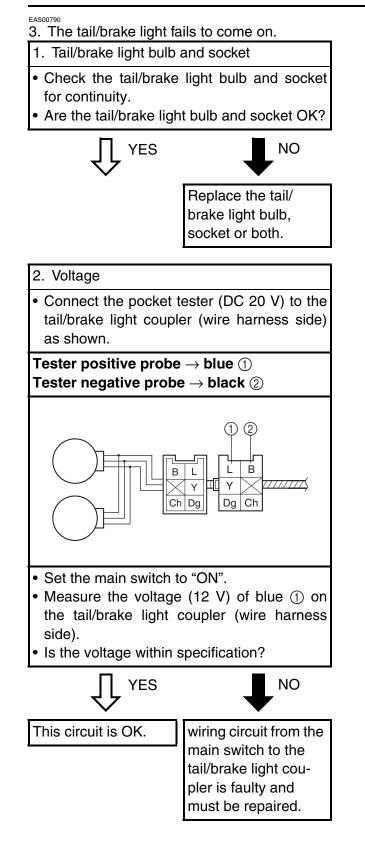
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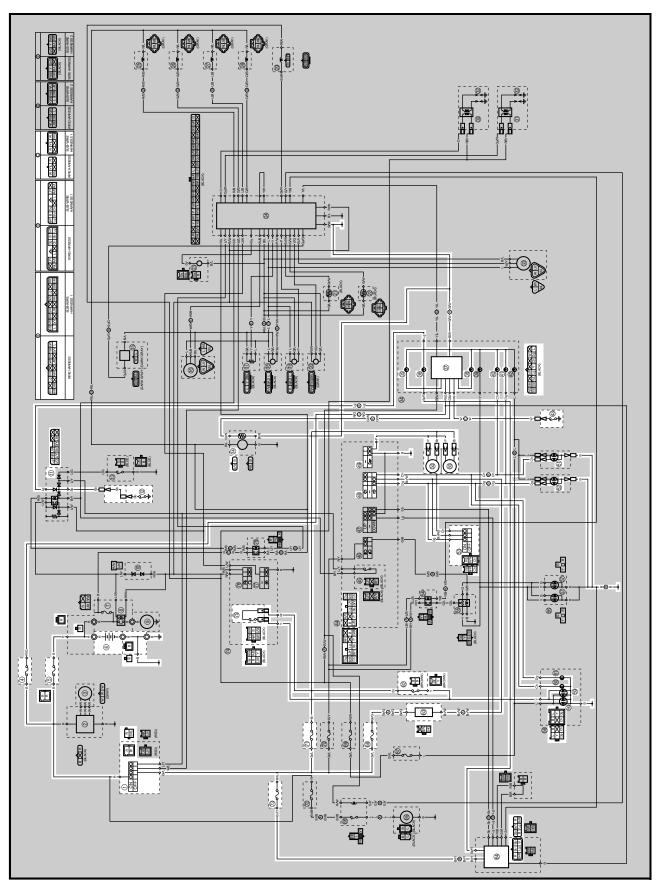








# SIGNALING SYSTEM





- 1 Main switch
- ④ Backup fuse (odometer, clock and windshield)
- (5) Main fuse
- 6 Battery
- (1) Starting circuit cut-off relay
- 12 Neutral switch
- (4) Fuel pump
- 3 Oil level warning light
- 36 Neutral indicator light
- ③ Multi-function meter
- 38 Engine trouble warning light
- ④ Left turn signal indicator light
- ④ Right turn signal indicator light
- ④ Oil level switch
- 48 Turn signal switch
- 49 Horn switch
- 50 Horn
- (5) Front turn signal light (left)
- Front turn signal light (right)
- 63 Hazard switch
- 69 Tail/brake light
- <sup>60</sup> Rear turn signal light (left)
- (6) Rear turn signal light (right)
- Rear brake light switch
- 63 Turn signal relay
- 6 Windshield drive unit
- 68 Hazard lighting fuse
- ⑦ Signaling system fuse
- ⑦ Windshield motor fuse
- 75 Front brake light switch

• Check the condition of the battery.

EAS00739

2. Battery



#### EAS00794 TROUBLESHOOTING

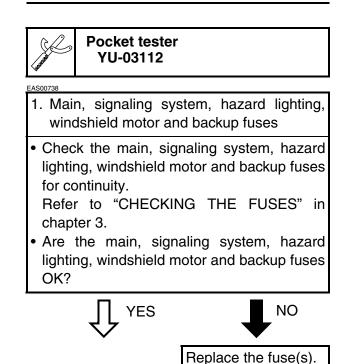
- Any of the following fail to light: flasher light, brake light or an indicator light.
- The horn fails to sound.

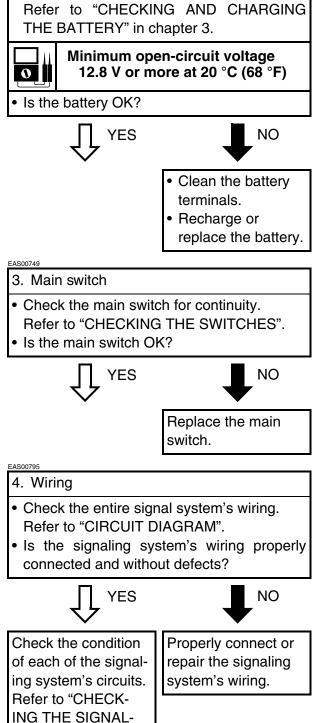
#### Check:

- 1. main, signaling system, hazard lighting, windshield motor and backup fuses
- 2. battery
- 3. main switch
- wiring connections
   (of the entire signaling system)

#### NOTE:

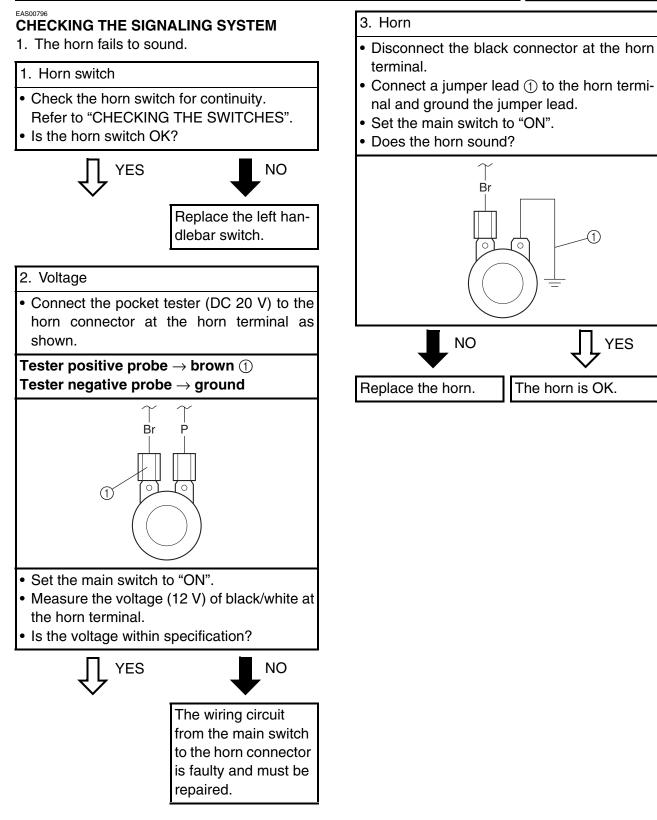
- Before troubleshooting, remove the following part(s):
- 1) fuel tank
- 2) front cowling assembly
- 3) air filter case
- Troubleshoot with the following special tool(s).





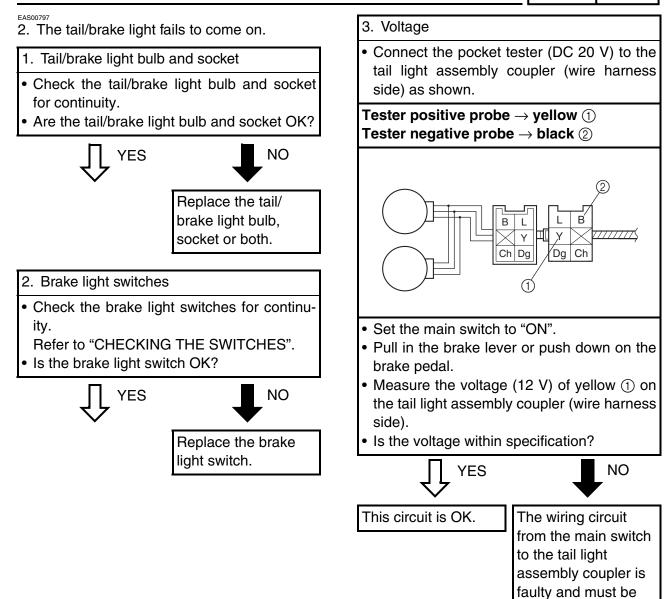
ING SYSTEM".



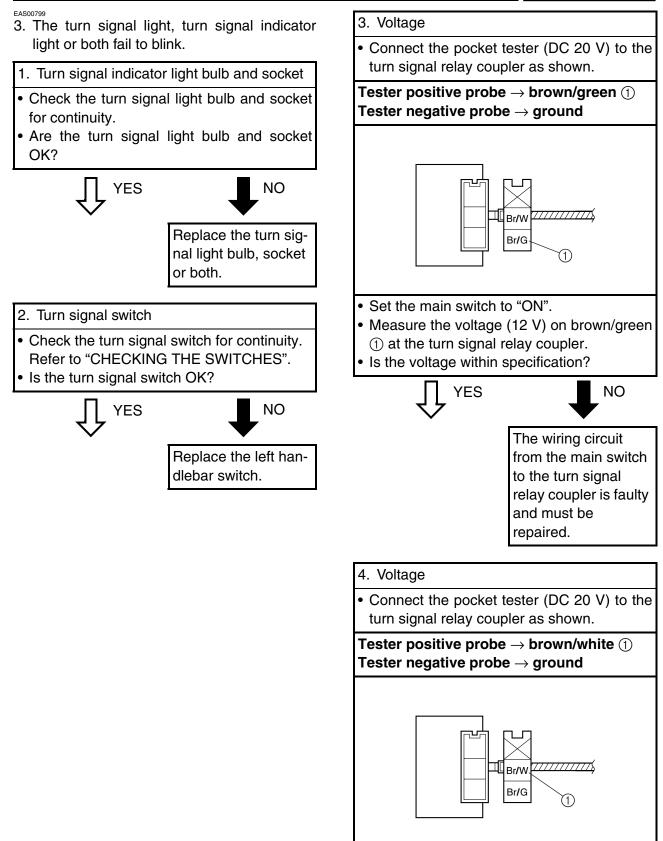


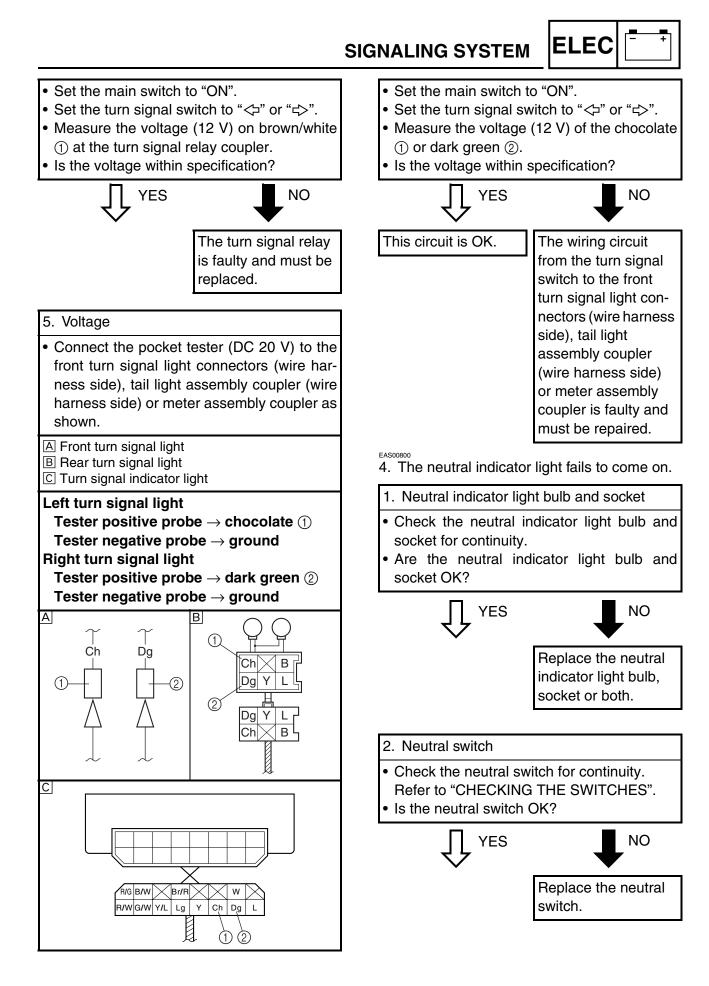


repaired.

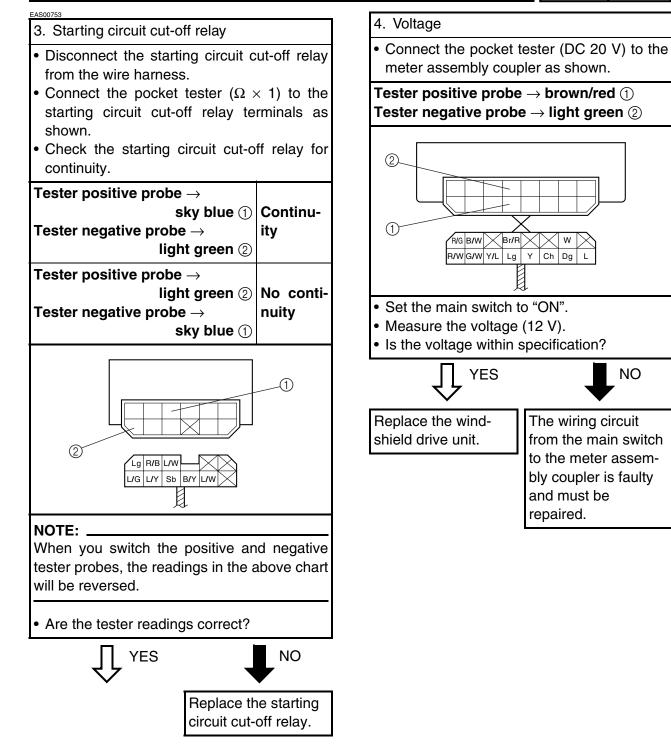




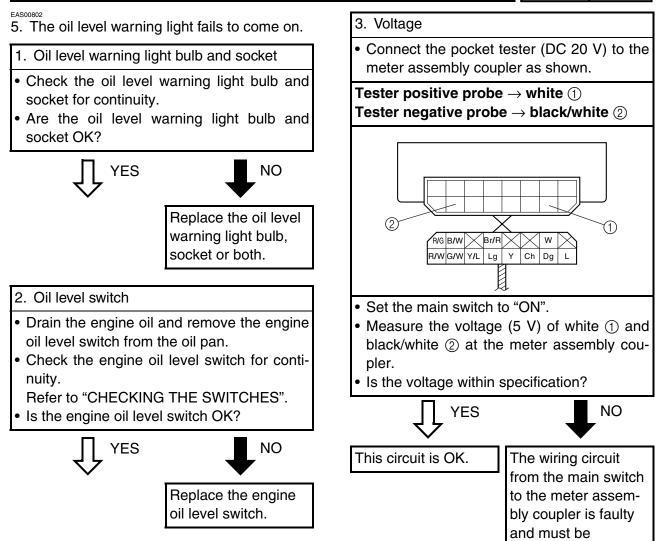








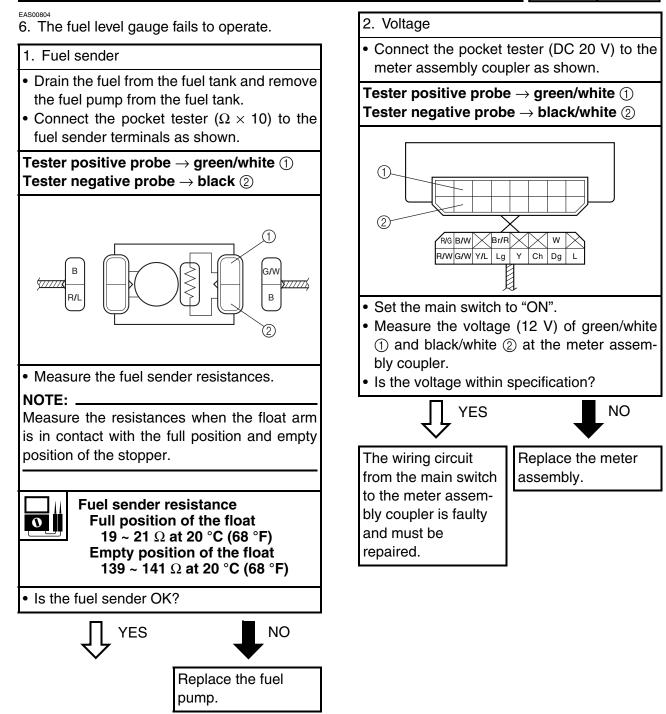




repaired.

SIGNALING SYSTEM

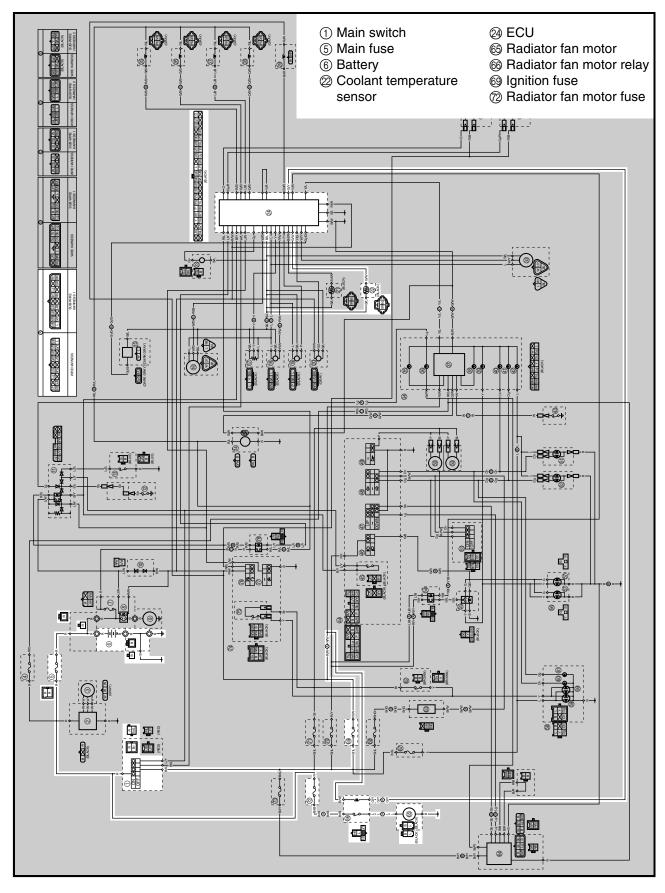




+

COOLING SYSTEM

# COOLING SYSTEM



# COOLING SYSTEM



#### EAS00808 TROUBLESHOOTING

- The radiator fan motor fails to turn.
- The coolant temperature gauge needle fails to move when the engine is warm.

#### Check:

- 1. main, ignition, 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) fuel tank and T-bar
- 2) front cowling assembly
- Troubleshoot with the following special tool(s).

#### Pocket tester YU-03112

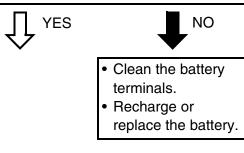
- 1. Main, ignition, and radiator fan motor fuses • Check the main, ignition, and radiator fan
- motor fuses for continuity. Refer to "CHECKING THE FUSES" in
- chapter 3. • Are the main, ignition, and radiator fan motor fuses OK?



EAS00739

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
- Minimum open-circuit voltage 12.8 V or more at 20 °C (68 °F) 0

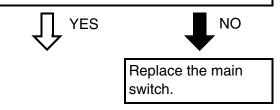
#### Is the battery OK?

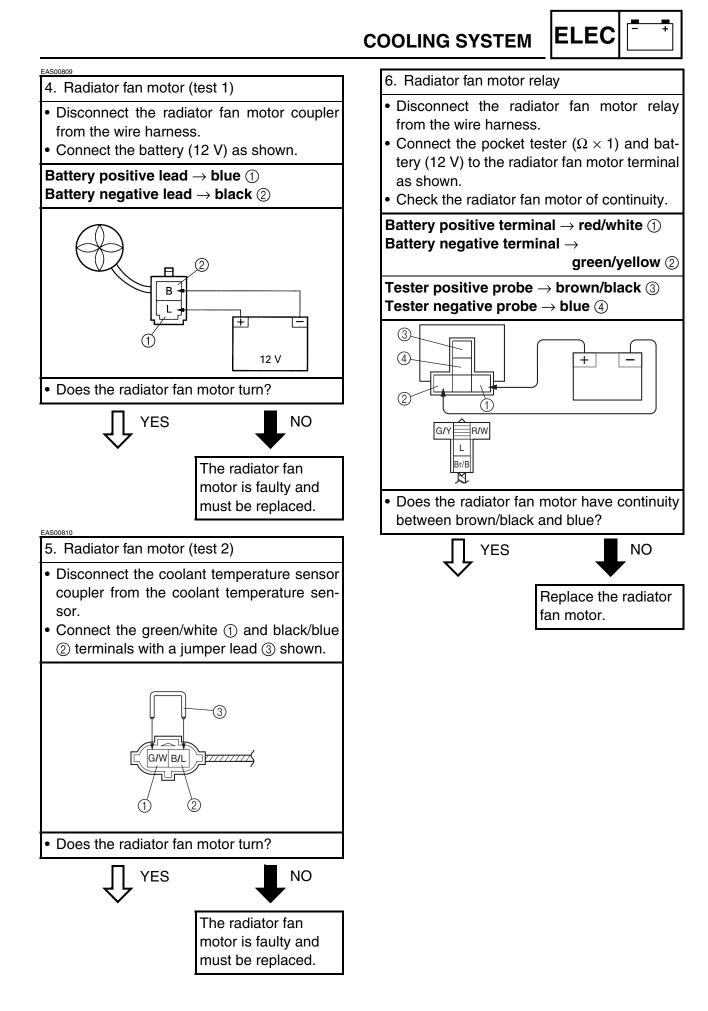


3. Main switch

EAS00749

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





# **COOLING SYSTEM**

#### EAS00811

- 7. Coolant temperature sensor
- Remove the coolant temperature sensor from the thermostat assembly inlet pipe.
- 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.

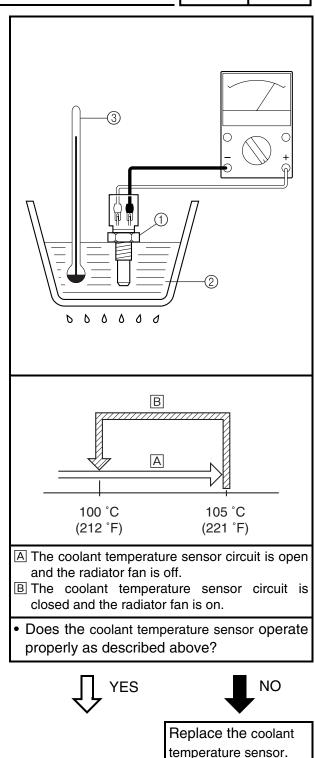
Test step	Coolanttemperature	Continu- ity
	Coolant temperature sensor	
1	Less than 105 °C (221 °F)	NO
2	More than 105 °C (221 °F)	YES
3	More than 100 °C (212 °F)	YES
4	Less than 100 °C (212 °F)	NO
<b>-</b>		

Test steps 1 & 2: Heating phase Test steps 3 & 4: Cooling phase

#### A 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.

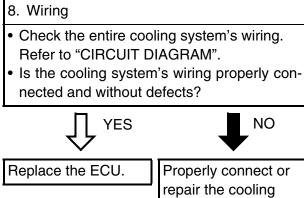
Coolant temperature sensor 20 Nm (2.0 m · kg, 14 ft · lb) Three bond sealock<sup>®</sup>10



# **COOLING SYSTEM**





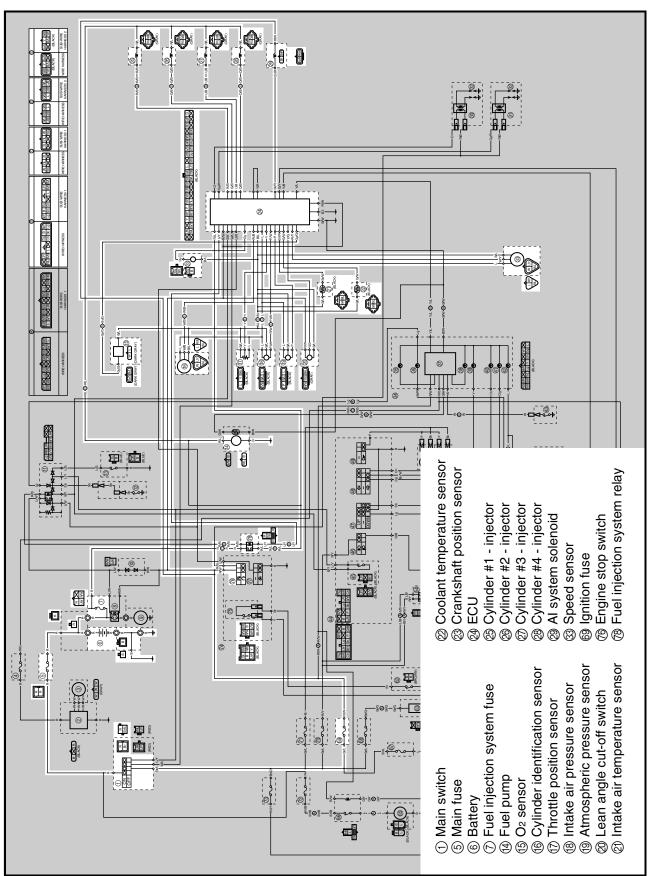


system's wiring.



# FUEL INJECTION SYSTEM

#### CIRCUIT DIAGRAM



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8 - 51



#### EAS00816 TROUBLESHOOTING

If the fuel injection system fails to operate.

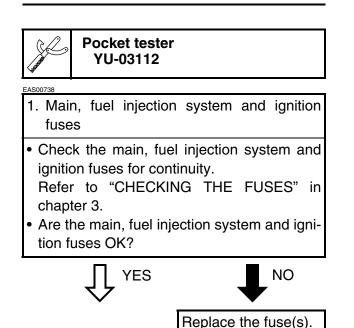
Check:

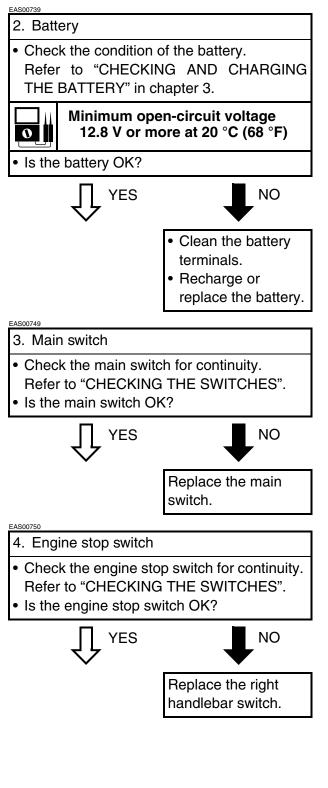
- 1. main, fuel injection system and ignition fuses
- 2. battery
- 3. main switch
- 4. engine stop switch
- 5. fuel injection system relay
- 6. fuel pump resistance
- 7. crankshaft position sensor
- 8. cylinder indication sensor
- 9. speed sensor
- 10.coolant temperature sensor
- 11.intake air temperature sensor
- 12.intake air pressure sensor
- 13.atmospheric pressure sensor
- 14.AI system solenoid
- 15.wiring connections

(the entire fuel system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1) fuel tank
- 2) front cowling assembly
- 3) air filter case
- Troubleshoot with the following special tool(s).

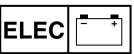


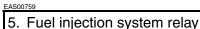


6. Fuel pump resistance

• Disconnect the fuel pump coupler from the

EAS00817

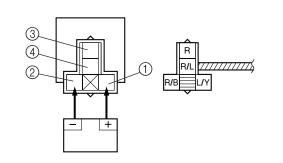




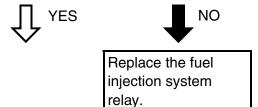
- Disconnect the fuel injection system relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the fuel injection system relay terminals as shown.

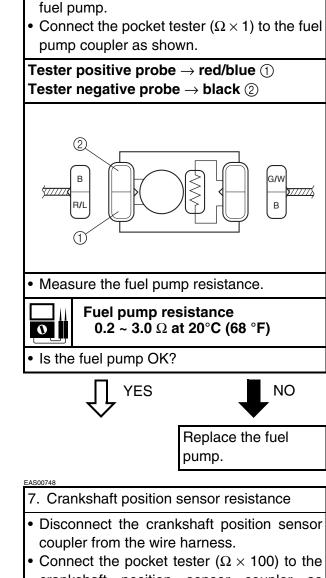
#### Battery positive terminal $\rightarrow$ red/black (1) Battery negative terminal $\rightarrow$ blue/yellow (2)

Tester positive probe  $\rightarrow$  red (3) Tester negative probe  $\rightarrow$  red/blue (4)



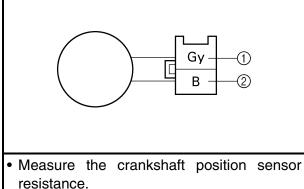
 Does the fuel injection system relay have continuity between blue/white and black?



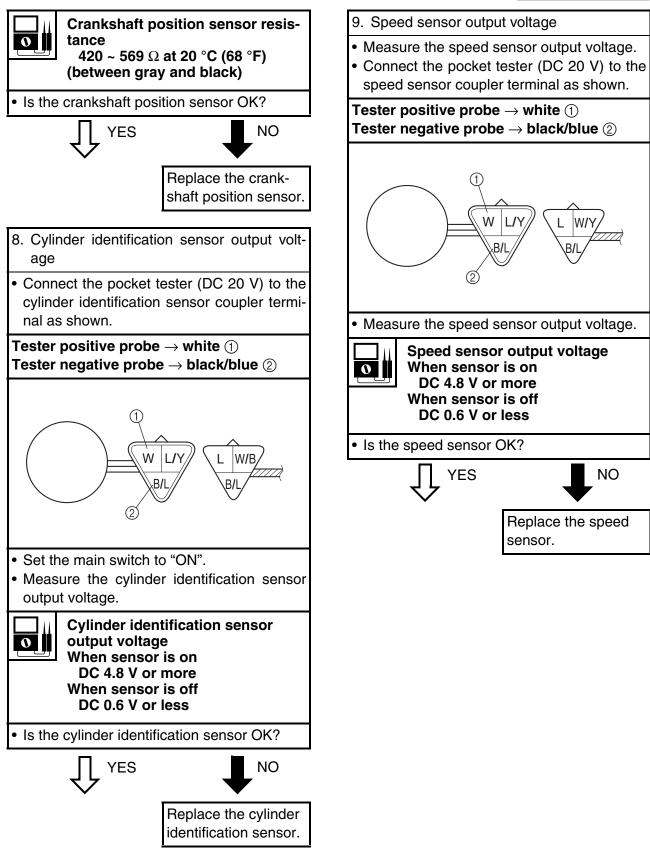


 Connect the pocket tester (22 × 100) to the crankshaft position sensor coupler as shown.

Tester positive probe  $\rightarrow$  gray () Tester negative probe  $\rightarrow$  black (2)







#### EAS00811

#### 10.Coolant temperature sensor

- Remove the coolant temperature sensor from the thermostat assembly inlet pipe.
- 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.

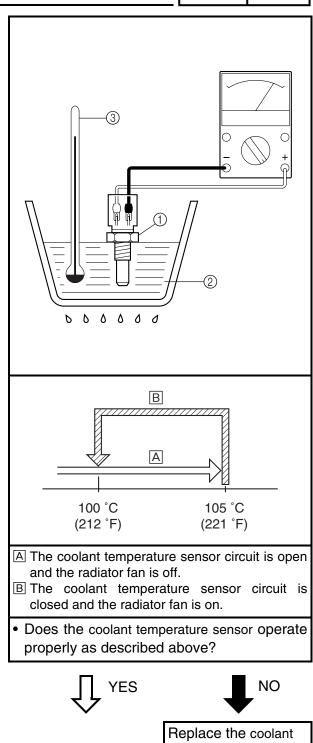
Test step	Coolanttemperature	Continu- ity
	Coolant temperature sensor	
1	Less than 105 °C (221 °F)	NO
2	More than 105 °C (221 °F)	YES
3	More than 100 °C (212 °F)	YES
4	Less than 100 °C (212 °F)	NO
- · ·		

Test steps 1 & 2: Heating phase Test steps 3 & 4: Cooling phase

#### 

- 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, 14 ft · lb) Three bond sealock<sup>®</sup>10



temperature sensor.

voltage

3.75 ~ 4.25 DCV

YES



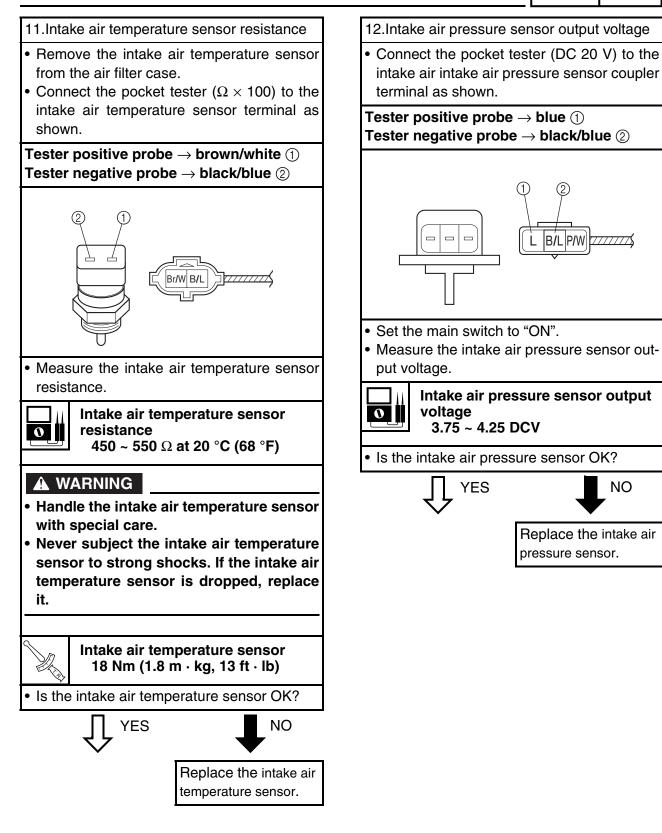
B/L P/W

Intake air pressure sensor output

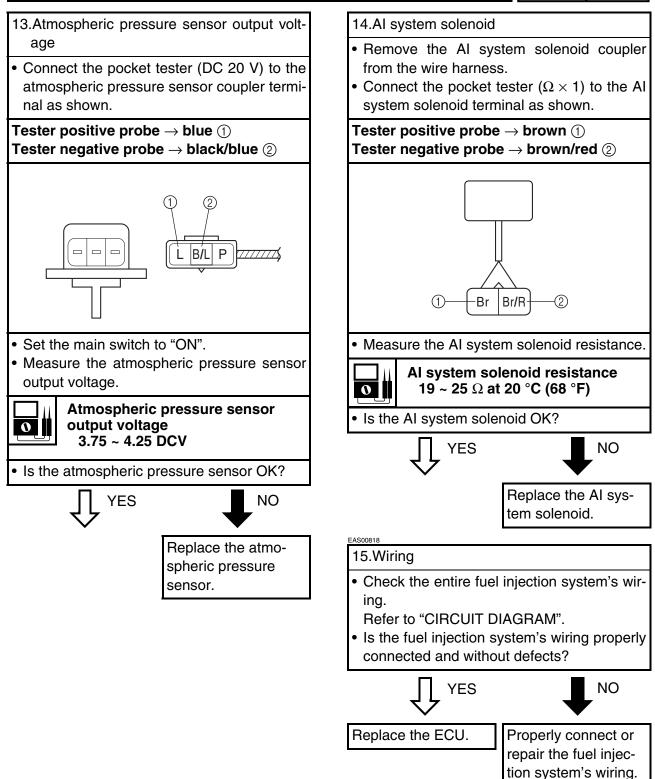
NO

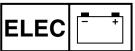
Replace the intake air

pressure sensor.









# CHECKING THE FUEL PUMP

#### A WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:

- Stop the engine before refueling.
- Do not smoke, and keep away from open flames, sparks, or any other source of fire.
- If you do accidentally spill gasoline, wipe it up immediately with dry rags.
- If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure the engine is completely cool before performing the following test.
- 1. Check:
- fuel pump operation

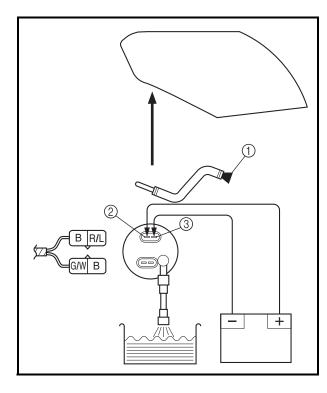
#### \*\*\*\*

- a. Insert the plug (1) to fuel return hose end.
- b. Fill the fuel tank.
- c. Put the end of the fuel hose into an open container.
- d. Connect the battery (12 V) to the fuel pump terminals as shown.

Battery positive lead  $\rightarrow$  red/blue (2) Battery negative lead  $\rightarrow$  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.

\*\*\*\*\*





# CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

#### NOTE: \_

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



• throttle position sensor (installed on the throttle body)

#### \*\*\*\*

- Disconnect the throttle position sensor coupler from the throttle position sensor.
- b. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

Tester positive probe  $\rightarrow$  blue terminal (1) Tester negative tester probe  $\rightarrow$ black/blue terminal (2)

c. Measure the maximum throttle position sensor resistance.

Out of specification  $\rightarrow$  Replace the throttle position sensor.



Maximum throttle position sensor resistance  $4.0 \sim 6.0 \text{ k}\Omega$  at 20 °C (68 °F) (blue — black/blue)

d. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

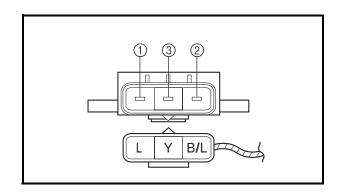
 $\begin{array}{l} \mbox{Tester positive probe} \rightarrow \mbox{yellow terminal } \textcircled{3} \\ \mbox{Tester negative probe} \rightarrow \\ \mbox{black/blue terminal } \textcircled{2} \end{array}$ 

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  $\rightarrow$  Go to step 2 below.







Throttle position sensor resistance (520 ~ 900  $\Omega$ ) ~ (4.0 ~ 6.0 k $\Omega$ ) at 20 °C (68 °F) (yellow — black/blue)

- 2. Check:
- throttle position sensor (removed from the throttle body)

#### \*\*\*\*

\*\*\*\*\*

- a. Disconnect the throttle position sensor coupler from the throttle position sensor.
- b. Remove the throttle position sensor from the throttle body.
- c. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

Tester positive probe  $\rightarrow$  blue terminal (1) Tester negative probe  $\rightarrow$ black/blue terminal (2)

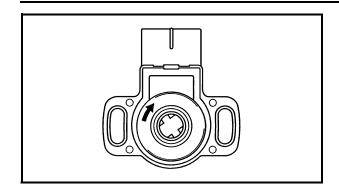
d. Measure the maximum throttle position sensor resistance.

Out of specification  $\rightarrow$  Replace the throttle position sensor.



Maximum throttle position sensor resistance  $4.0 \sim 6.0 \text{ k}\Omega$  at 20 °C (68 °F) (blue — black/blue)





e. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

Tester positive probe  $\rightarrow$  yellow terminal (3) Tester negative probe  $\rightarrow$ black/blue terminal (2)

f. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

The resistance does not change or it changes abruptly  $\rightarrow$  Replace the throttle position sensor.

The slot is worn or broken  $\rightarrow$  Replace the throttle position sensor.

#### NOTE:

Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

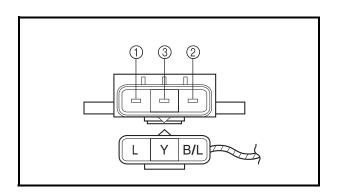


#### Throttle position sensor resis-

tance 0 ~ 5 ± 1.0 kΩ at 20 °C (68 °F)

(yellow — black/blue)

\*\*\*\*\*



- 3. Adjust:
- throttle position sensor angle

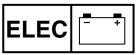
#### \*\*\*\*

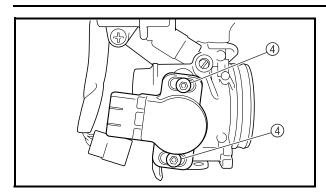
- a. Disconnect the throttle position sensor coupler from the throttle position sensor.
- b. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

Tester positive probe  $\rightarrow$  blue terminal (1) Tester negative probe  $\rightarrow$ black/blue terminal (2)

- c. Measure the throttle position sensor maximum resistance.
- d. Calculate the throttle position sensor maximum resistance when the throttle is closed.

Throttle position sensor maximum resistance (throttle is fully closed) = Maximum resistance  $\times$  (0.13 ~ 0.15)





Example:

If the maximum resistance = 5 k $\Omega$ , then the throttle position sensor's maximum resistance when the throttle is fully closed should be:

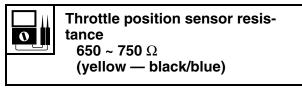
 $5 \text{ k}\Omega \times (0.13 \sim 0.15) = 650 \sim 750 \Omega$ 

Lift the throttle body assembly slightly out of the intake manifolds. Loosen the throttle position sensor screws (4).

Connect the pocket tester ( $\Omega \times 100$ ) to the throttle position sensor.

Tester positive probe $ ightarrow$			
yellow terminal (3)			
Tester negative probe $ ightarrow$			
black/blue terminal (2)			

e. Adjust the throttle position sensor angle so the measured resistance is within the specified range.



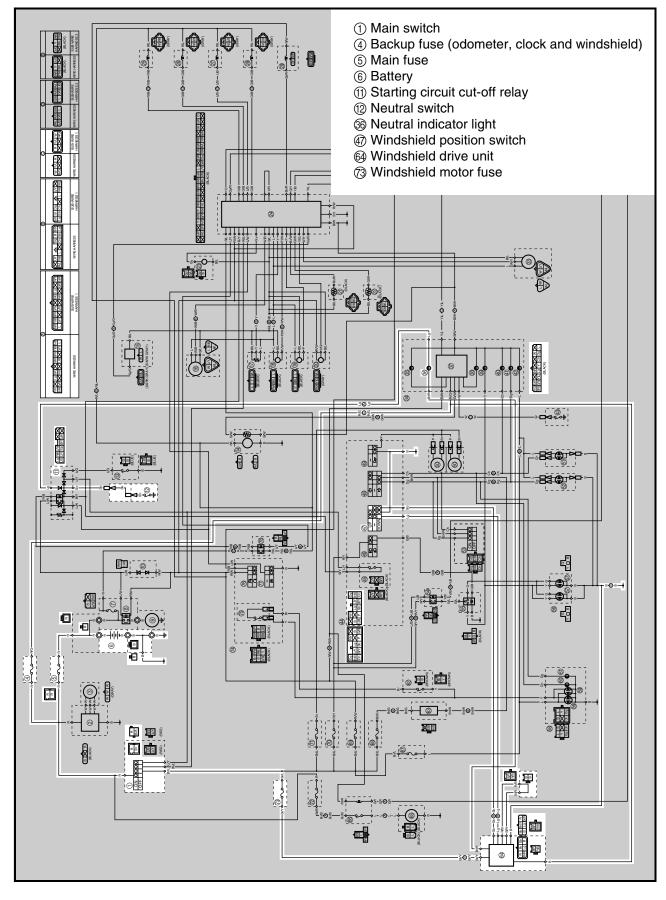
After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.

\*\*\*\*\*



# WINDSHIELD DRIVE SYSTEM

### CIRCUIT DIAGRAM



## WINDSHIELD DRIVE SYSTEM

EAS00739

2. Battery

0

EAS00749

3. Main switch

Is the battery OK?

• Check the condition of the battery.

THE BATTERY" in chapter 3.

YES

Refer to "CHECKING AND CHARGING

Minimum open-circuit voltage 12.8 V or more at 20 °C (68 °F)



NO

Clean the battery

replace the battery.

Replace the left han-

dlebar switch.

terminals.

Recharge or

#### TROUBLESHOOTING

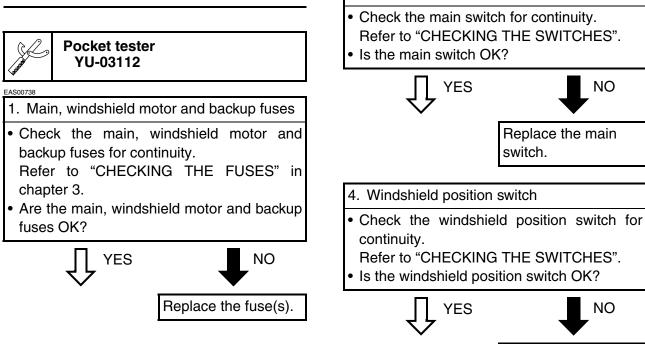
#### The windshield fails to operate.

Check:

- 1. main, windshield motor and backup fuses
- 2. battery
- 3. main switch
- 4. windshield position switch
- wiring connections (of the windshield drive system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1) fuel tank
- 2) front cowling assembly
- 3) air filter case
- Troubleshoot with the following special tool(s).



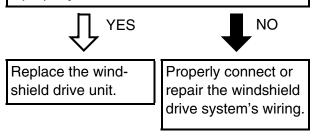


# 5. Wiring

Check the entire windshield drive system's

wiring. Refer to "CIRCUIT DIAGRAM".

 Is the windshield drive system's wiring properly connected and without defects?



#### NOTE: .

- If the windshield is up, it will go down when the gear is in the neutral position and the main switch is set to "OFF".
- The neutral indicator light will blink until the windshield has stopped and is all the way down. If the neutral indicator light does not turn off, replace the windshield drive unit.



# TROUBLESHOOTING

#### NOTE:

EAS00844

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 PROBLEMS**

#### ENGINE

#### Cylinder(s) and cylinder head(s)

- Loose spark plug
- Loose cylinder head
- 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
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

#### 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

## Ignition system

- Faulty ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

### Switches and wiring

- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- · Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Improperly grounded circuit
- Loose connections

#### Starting system

- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cut-off relay
- Faulty starter clutch

#### 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



Refer to "STARTING PROBLEMS".

#### ENGINE

#### Air filter

• Clogged air filter element

# 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

## FUEL SYSTEM

#### Fuel pump

• Faulty fuel pump

#### JUMPS OUT OF GEAR Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

TRBI

SHTG

## Shift forks

• Worn shift fork

## Shift drum

- Incorrect axial play
- Worn shift drum groove

#### Transmission

• Worn gear dog



# 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

#### EAS00855

# **OVERHEATING**

#### ENGINE

- Clogged coolant passages
- Heavy carbon buildup in cylinder head(s) and piston(s)

#### 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
- Damaged or faulty water pump
- Thermostat stays closed
- Clogged or damaged oil cooler
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

## **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

## 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

POOR BRAKING PERFORMANCE/ FAULTY FRONT FORK LEGS



# POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper seal

#### 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

- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

### MALFUNCTION

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level



# UNSTABLE HANDLING

#### Handlebars

- · Bent or improperly installed right handlebar
- Bent or improperly installed left 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

# FAULTY LIGHTING OR SIGNALING SYSTEM

## HEADLIGHT DOES NOT LIGHT

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main)
- Burnt-out headlight bulb
- Faulty headlight relay 1
- Faulty headlight relay 2
- Faulty ECU

## HEADLIGHT BULB BURNT OUT

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

#### TAIL/BRAKE LIGHT DOES NOT LIGHT

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

#### 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

#### 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 LIGHT

- 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

## FJR1300R/FJR1300RC WIRING DIAGRAM (For USA)

- ① Main switch
- ② Rectifier/regulator
- ③ Generator
- (4) Backup fuse (odometer, clock and windshield)
- ⑤ Main fuse
- 6 Battery
- ⑦ Fuel injection system fuse
- ⑧ Starter relay
- Starter motor
   Star
- Diode
- (f) Starting circuit cut-off relay
- 1 Neutral switch
- (i) Sidestand switch
- Hel pump
- (15) O2 sensor
- (6) Cylinder identification sensor
- Throttle position sensor
- (B) Intake air pressure sensor
- (19) Atmospheric pressure sensor
- Dean angle cut-off switch
- Di Intake air temperature sensor
- 2 Coolant temperature sensor
- 2 Crankshaft position sensor
- 🖗 ECU
- Optimized Strategy Cylinder #1 injector
- ② Cylinder #2 injector
- Dylinder #3 injector
- ② Cylinder #4 injector
- Al system solenoid
- Or Stein (1, #4 ignition coil)
- (i) Cylinder #2, #3 ignition coil
- ③ Spark plug
- ③ Speed sensor
- Meter assembly
- 3 Oil level warning light
- 3 Neutral indicator light
- 3 Multi-function meter
- Big Engine trouble warning light
- High beam indicator light
- Left turn signal indicator light
- (i) Right turn signal indicator light
- Meter light
- (3) Oil level switch
- 4 Left handlebar switch
- Clutch switch
- ④ Dimmer switch
- Windshield position switch
- Turn signal switch
- 49 Horn switch
- 60 Horn
- 6 Front turn signal light (left)
- 62 Front turn signal light (right)
- B Hazard switch
- 6 Headlight relay 1
- 65 Headlight relay 2
- 6 Headlight assembly
- 6 Headlight
- B Taillight assembly
- 69 Tail/brake light
- Rear turn signal light (left)
- (i) Rear turn signal light (right)
- Rear brake light switch
- Turn signal relay
- 6 Windshield drive unit
- B Radiator fan motor
- 6 Radiator fan motor relay
- Tail/position light fuse
- 68 Hazard lighting fuse
- 69 Ignition fuse

- ⑦ Headlight fuse
- ⑦ Signaling system fuse
- Radiator fan motor fuse
- Windshield motor fuse
- Bight handlebar switch
- Tront brake light switch
- 6 Engine stop switch
- ⑦ Start switch
- Fuel injection system relay



