



**YAMAHA**

**2008**

# **SERVICE MANUAL**

## **YZFR6X(C)**

***RG***

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EAS20050

**YZFR6X(C)  
SERVICE MANUAL  
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## NOTICE

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

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

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

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### NOTE:

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
  - Designs and specifications are subject to change without notice.
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## IMPORTANT MANUAL INFORMATION

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



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



### WARNING

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

### CAUTION:

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

### NOTE:

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

## HOW TO USE THIS MANUAL

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

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

1  
↓  
**CLUTCH**

**EAS20090**  
**CLUTCH**

3 **Removing the clutch cover**

4 **12 Nm (1.2 m·kg, 8.9 ft·lb)**

5 **12 Nm (1.2 m·kg, 8.9 ft·lb)**

6 **12 Nm (1.2 m·kg, 8.9 ft·lb)**

6

Order	Job/Parts to remove	Q'ty	Remarks
	Side cowl assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-21.
1	Water pump breather hose	1	Disconnect.
2	Clutch cable	1	Disconnect.
3	Pull lever	1	
4	Pull lever spring	1	
5	Clutch cover	1	
6	Clutch cover gasket	1	
7	Dowel pin	2	

For installation, reverse the removal procedure.

**CLUTCH**

**EAS20070**  
**REMOVING THE CLUTCH**

1. Remove:

- Oil strainer  
Refer to "OIL PUMP" on page 5-48.
- Water pump  
Refer to "WATER PUMP" on page 6-8.
- Friction plates
- Clutch plates

**NOTE:**  
Be sure to mark the friction plates and clutch plates or note the position of each part so that they are installed in their original positions.

2. Loosen:

- Clutch boss nut "1"

**NOTE:**  
While holding the clutch boss "2" with the universal clutch holder "3", loosen the clutch boss nut.

**Universal clutch holder**  
90890-04086  
YM-91042

3. Remove:

- Spacer "1"
- Bearing
- Clutch housing "2"
- Oil pump drive chain

**NOTE:**  
Remove the spacer and bearing from the main axle, then remove the oil pump drive chain from the oil pump driven sprocket, and then remove the clutch housing and oil pump drive chain from the main axle.

**EAS20100**  
**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**  
2.92-3.08 mm (0.115-0.121 in)  
**Wear limit**  
2.80 mm (0.1102 in)

**EAS20110**  
**CHECKING THE CLUTCH PLATES**

The following procedure applies to all of the clutch plates.

1. Check:

- Clutch plate  
Damage → Replace the clutch plates as a set.

2. Measure:

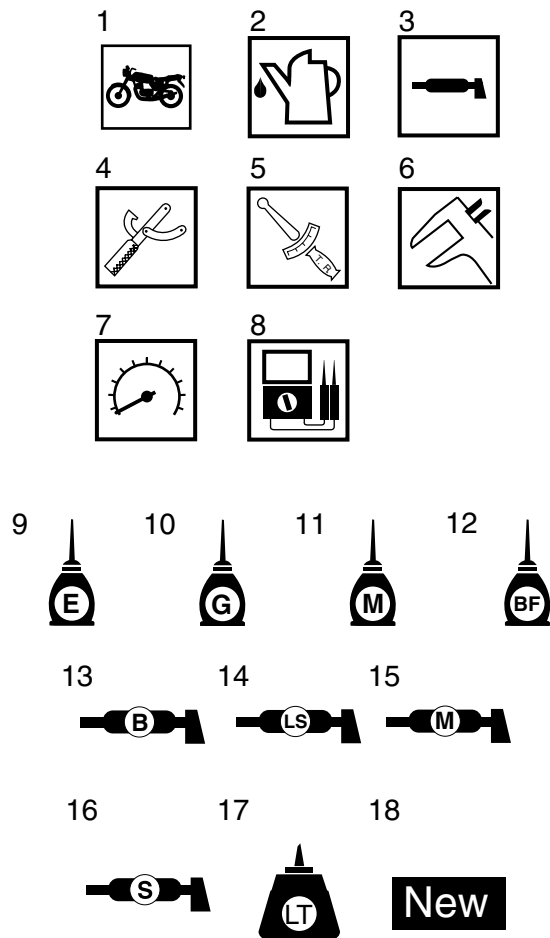
- Clutch plate warpage  
(with a surface plate and thickness gauge "1")  
Out of specification → Replace the clutch plates as a set.

## SYMBOLS

The following symbols are used in this manual for easier understanding.

### NOTE:

The following symbols are not relevant to every vehicle.



- 15.Molybdenum-disulfide grease
- 16.Silicone grease
- 17.Apply locking agent (LOCTITE®)
- 18.Replace the part

- 1. Serviceable with engine mounted
- 2. Filling fluid
- 3. Lubricant
- 4. Special tool
- 5. Tightening torque
- 6. Wear limit, clearance
- 7. Engine speed
- 8. Electrical data
- 9. Engine oil
- 10.Gear oil
- 11.Molybdenum-disulfide oil
- 12.Brake fluid
- 13.Wheel-bearing grease
- 14.Lithium-soap-based grease



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## GENERAL INFORMATION

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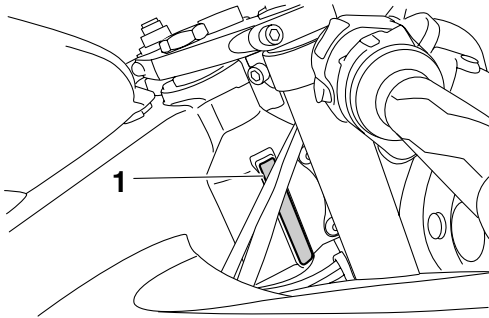
EAS20130

## IDENTIFICATION

EAS20140

### VEHICLE IDENTIFICATION NUMBER

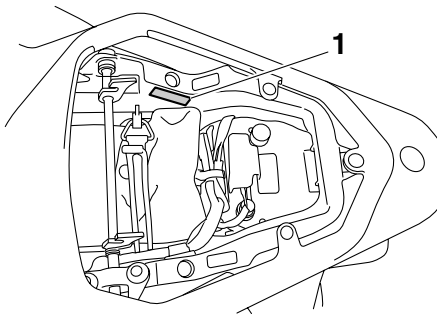
The vehicle identification number “1” is stamped on the right side of the steering head pipe.



EAS20150

### MODEL LABEL

The model label “1” is affixed to the frame under the passenger seat. This information will be needed to order spare parts.



EAS20170

## FEATURES

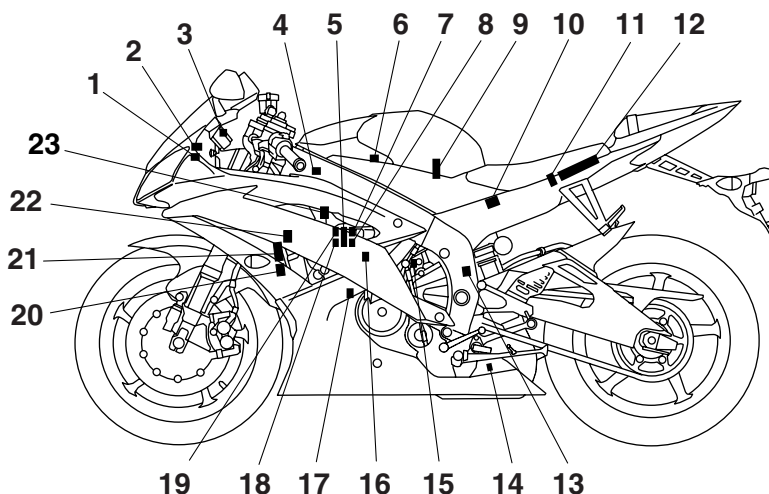
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### OUTLINE OF THE FI SYSTEM

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 used in the respective carburetor.

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

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



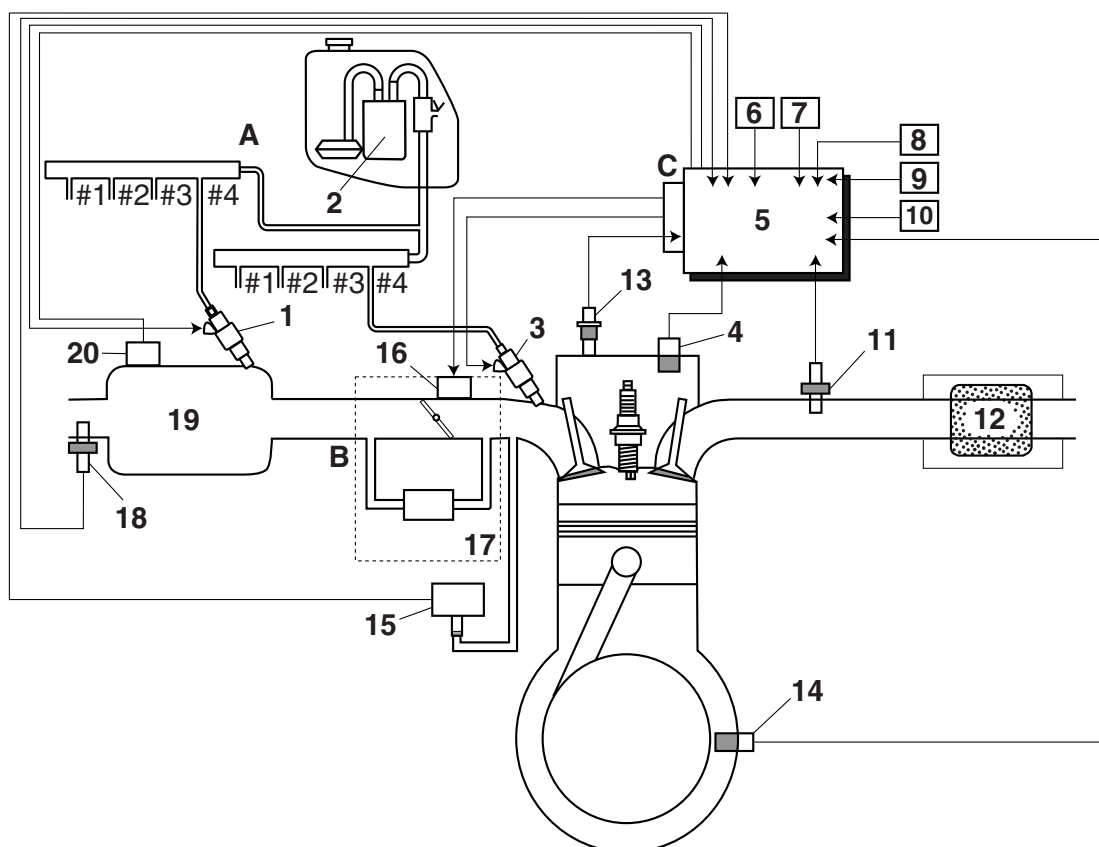
- |                                  |  |
|----------------------------------|--|
| 1. Intake air temperature sensor | 14. O <sub>2</sub> sensor                                |
| 2. Atmospheric pressure sensor   | 15. Speed sensor   |
| 3. Engine trouble warning light  | 16. Coolant temperature sensor                           |
| 4. Air induction system solenoid | 17. Crankshaft position sensor                           |
| 5. Throttle servo motor          | 18. Throttle position sensor (for throttle cable pulley) |
| 6. Secondary injectors           | 19. Throttle position sensor (for throttle valves)       |
| 7. Primary injectors             | 20. Spark plug   |
| 8. Intake air pressure sensor    | 21. Ignition coil  |
| 9. Fuel pump                     | 22. Cylinder identification sensor                       |
| 10. Relay unit (fuel pump relay) | 23. Intake funnel servo motor                            |
| 11. Lean angle sensor            |  |
| 12. ECU (engine control unit)    |  |
| 13. EXUP servo motor             |  |

ET2C01019

## FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kg/cm<sup>2</sup>, 46.1 psi). Accordingly, when the energizing signal from the ECU energizes the fuel 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 fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel 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 (for throttle cable pulley), throttle position sensor (for throttle valves), coolant temperature sensor, atmospheric pressure sensor, cylinder identification sensor, lean angle sensor, crankshaft position sensor, intake air pressure sensor, air temperature sensor, speed 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. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



1. Secondary injector
2. Fuel pump
3. Primary injector
4. Cylinder identification sensor
5. ECU (engine control unit)
6. Throttle position sensor (for throttle cable pulley)
7. Throttle position sensor (for throttle valves)
8. Speed sensor
9. Air temperature sensor
10. Lean angle sensor
11. O<sub>2</sub> sensor
12. Catalytic converter

13. Coolant temperature sensor
14. Crankshaft position sensor
15. Intake air pressure sensor
16. Throttle servo motor
17. Throttle body
18. Atmospheric pressure sensor
19. Air filter case
20. Intake funnel servo motor

- A. Fuel system
- B. Air system
- C. Control system

EAS4C81011

## YCC-T (Yamaha Chip Controlled Throttle)

## YCC-I (Yamaha Chip Controlled Intake)

### Mechanism characteristics

Yamaha developed the YCC-T and YCC-I system employing the most advanced electronic control technologies. Electronic control throttle systems have been used on automobiles, but Yamaha has developed a faster, more compact system specifically for the needs of a sports motorcycle. The Yamaha-developed system has a high-speed calculating capacity that produces computations of running conditions every 1/1000th of a second.

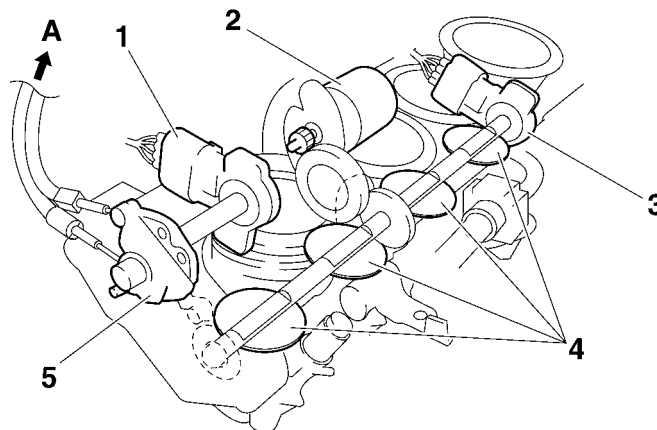
The YCC-T system is designed to respond to the throttle action of the rider by having the ECU instantaneously calculate the ideal throttle valve opening and generate signals to operate the motor-driven throttle valves and thus actively control the intake air volume.

The ECU contains three CPUs with a capacity about five times that of conventional units, making it possible for the system to respond extremely quickly to the slightest adjustments made by the rider. In particular, optimized control of the throttle valve opening provides the optimum volume of intake air for easy-to-use torque, even in a high-revving engine.

The YCC-I system calculates the value from the engine revolution number and throttle opening rate, activates the intake air funnel with the electronic control motor drive to control the intake pipe length in order to gain the high power output in all revolution ranges from low speeds to high speeds.

### Aims and advantages of using YCC-T system

- Increased engine power  
By shortening the air intake path, higher engine speed is possible → Increased engine power.
- Improved driveability  
Air intake volume is controlled according to the operating conditions → Improved throttle response to meet engine requirement.  
Driving force is controlled at the optimal level according to the transmission gear position and engine speed → Improved throttle control.
- Engine braking control  
Due to the throttle control, optimal engine braking is made possible.
- Simplified idle speed control (ISC) mechanism  
The bypass mechanism and ISC actuator are eliminated → A simple mechanism is used to maintain a steady idle speed.
- Reduced weight  
Compared to using a sub-throttle mechanism, weight is reduced.



1. Throttle position sensor (for throttle cable pulley)
2. Throttle servo motor
3. Throttle position sensor (for throttle valves)
4. Throttle valves

5. Throttle cable pulley with linkage guard
- A. To throttle grip

## Aims and advantages of using YCC-I system

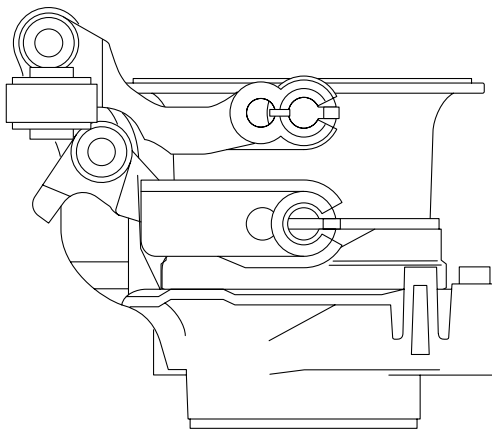
- Improvement of the engine power characteristics

The high power design in all ranges is now provided by having both two features of the short intake function to ensure the power at the high speed revolution of engine, and the long intake function to ensure the power in the practical use range.

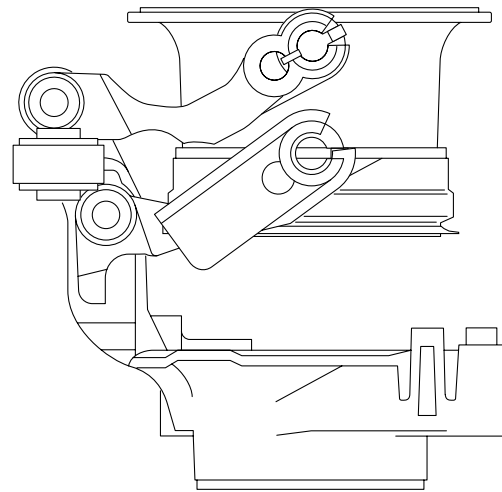
- Intake pipe length switching control using the motor

The intake pipe length switching operation in a minute time is now available by means of the motor drive using the electronic control. The smooth power characteristic is provided, which does not let an operator feel the switching action by the optimization of its switching revolution number and the most suitable application of engine at the time of changing the revolution.

A

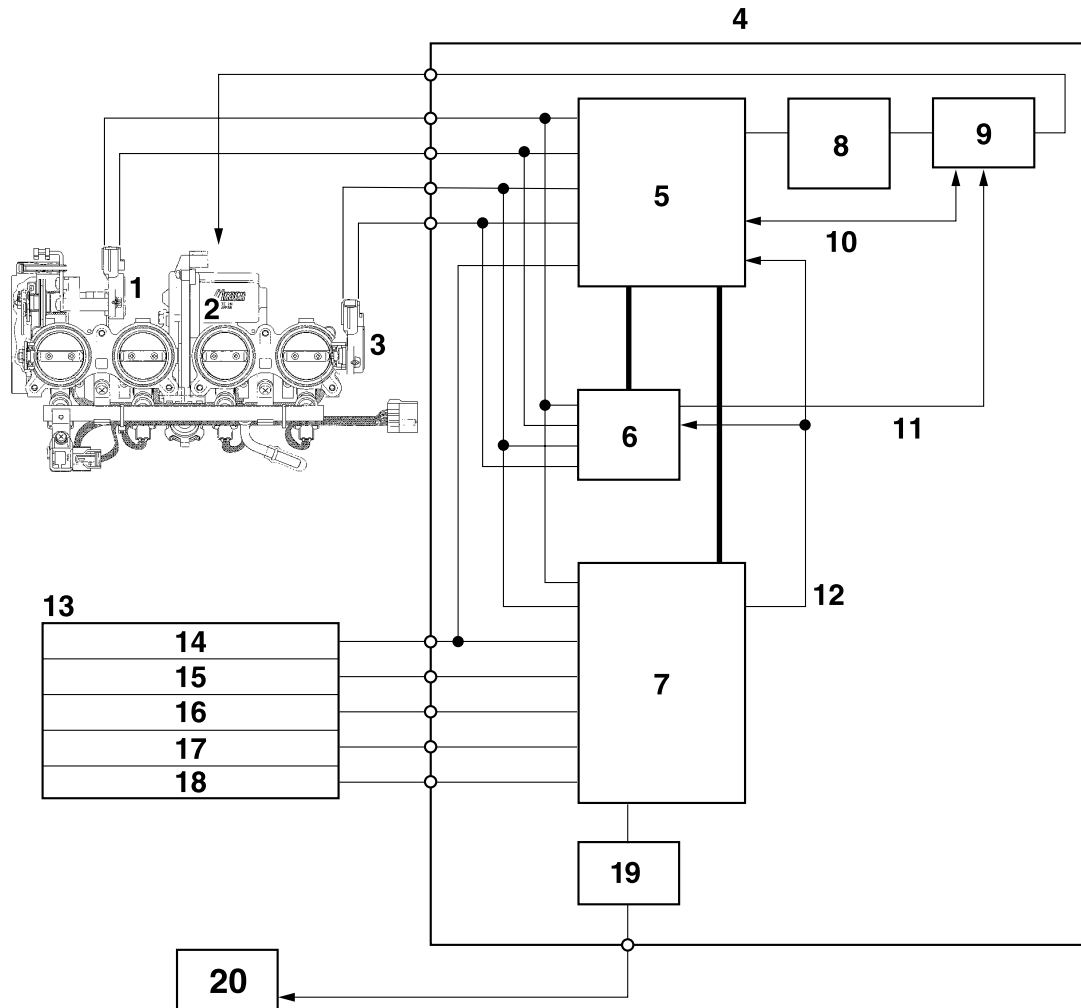


B



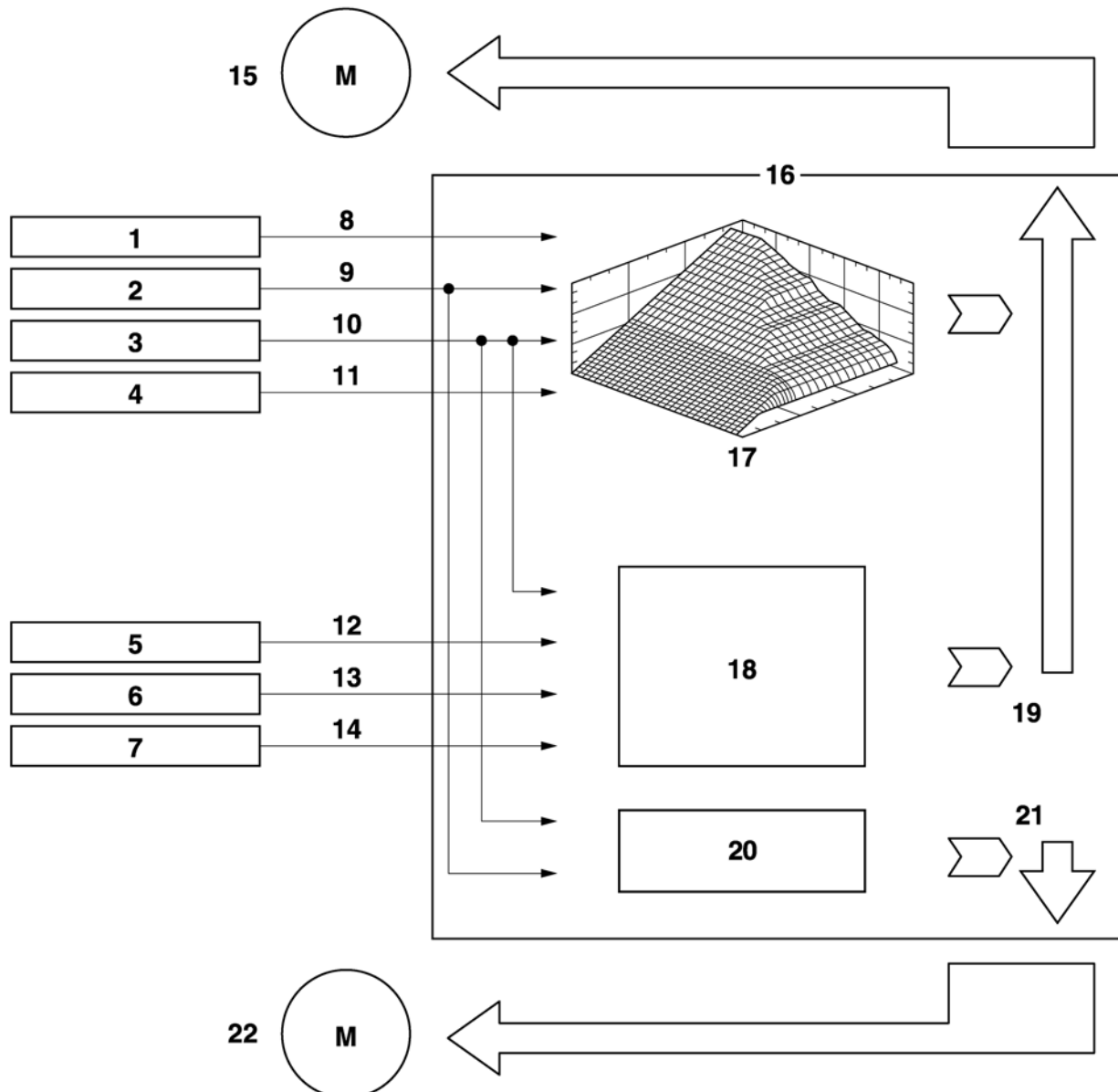
- A. Down position (long intake)  
(Low rpm to Mid rpm)
- B. Up position (short intake)  
(High rpm)

## YCC-T/YCC-I system outline



1. Throttle position sensor (for throttle cable pulley)
2. Throttle servo motor
3. Throttle position sensor (for throttle valves)
4. ECU (engine control unit)
5. ETV main CPU (32 bit)
6. ETV sub CPU (16 bit)
7. FI CPU (32 bit)
8. Throttle servo motor driver
9. Throttle servo motor driver operation sensing/shut off circuit
10. Throttle servo motor driver operation sensing feedback/emergency stop
11. Emergency stop
12. Engine revolution (pulse signal)
13. Sensor input
14. Neutral switch
15. Crankshaft position sensor
16. Speed sensor
17. Coolant temperature sensor
18. Atmospheric pressure sensor
19. Intake funnel servo motor driver
20. Intake funnel servo motor

## YCC-T/YCC-I control outline



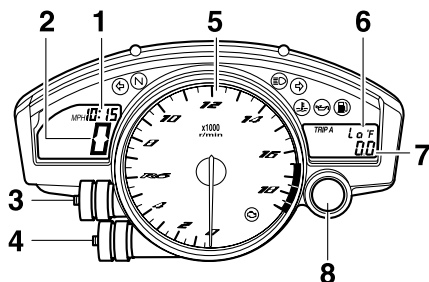
1. Throttle position sensor (for throttle cable pulley)
2. Throttle position sensor (for throttle valves)
3. Crankshaft position sensor
4. Speed sensor
5. Coolant temperature sensor
6. Neutral switch
7. Atmospheric pressure sensor
8. Accelerator position (two signals)
9. Throttle position (two signals)
10. Engine revolution
11. Vehicle speed
12. Coolant temperature
13. Neutral/In gear
14. Atmospheric pressure

15. Throttle servo motor
16. ECU (engine control unit)
17. Base map
18. Idle speed control
19. Calculated throttle valve opening angle
20. Base map
21. Air funnel position (Calculation value)
22. Intake funnel servo motor

ET2C01020

## INSTRUMENT FUNCTIONS

### Multi-function meter unit



1. Clock
2. Speedometer
3. "SELECT" button
4. "RESET" button
5. Tachometer
6. Coolant temperature display/air intake temperature display
7. Odometer/tripmeters/fuel reserve tripmeter/stopwatch
8. Shift timing indicator light

EWA13S1006



**Be sure to stop the vehicle before making any setting changes to the multi-function meter unit.**

The multi-function meter unit is equipped with the following:

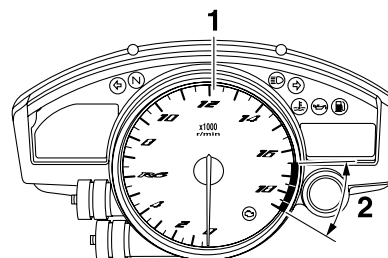
- a speedometer (which shows the riding speed)
- a tachometer (which shows engine speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled since the fuel level warning light came on)
- a stopwatch
- a clock
- a coolant temperature display
- an air intake temperature display
- a self-diagnosis device
- a display brightness and shift timing indicator light control mode

#### NOTE:

- Be sure to turn the key to "ON" before using the "SELECT" and "RESET" buttons, except for setting the display brightness and shift timing indicator light control mode.

- To switch the speedometer and odometer/tripmeter displays between kilometers and miles, press the "SELECT" button for at least one second.

### Tachometer



1. Tachometer
2. Tachometer red zone

The electric tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

When the key is turned to "ON", the tachometer needle will sweep once across the r/min range and then return to zero r/min in order to test the electrical circuit.

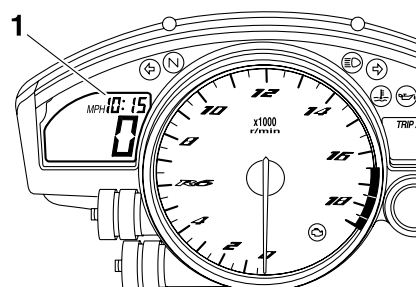
ECA13S1001

#### CAUTION:

**Do not operate the engine in the tachometer red zone.**

**Red zone: 16500 r/min and above**

### Clock



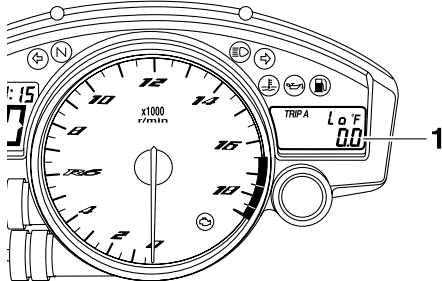
1. Clock

#### To set the clock:

1. Turn the key to "ON".
2. Push the "SELECT" button and "RESET" button together for at least two seconds.
3. When the hour digits start flashing, push the "RESET" button to set the hours.
4. Push the "SELECT" button, and the minute digits will start flashing.

5. Push the “RESET” button to set the minutes.
6. Push the “SELECT” button and then release it to start the clock.

## Odometer, tripmeter, and stopwatch modes



1. Odometer/tripmeters/fuel reserve tripmeter/stopwatch

Push the “SELECT” button to switch the display between the odometer mode “ODO”, the tripmeter modes “TRIP A” and “TRIP B” and the stopwatch mode in the following order: TRIP A → TRIP B → ODO → Stopwatch → TRIP A

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

F-TRIP → Stopwatch → TRIP A → TRIP B → ODO → F-TRIP

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

### Stopwatch mode

To change the display to the stopwatch mode, select it by pushing the “SELECT” button. (The stopwatch digits will start flashing.) Release the “SELECT” button, and then push it again for a few seconds until the stopwatch digits stop flashing.

### Standard measurement

1. Push the “RESET” button to start the stopwatch.

2. Push the “SELECT” button to stop the stopwatch.
3. Push the “SELECT” button again to reset the stopwatch.

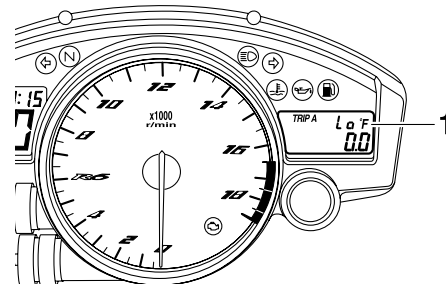
### Split-time measurement

1. Push the “RESET” button to start the stopwatch.
2. Push the “RESET” button or start switch “⊗” to measure split-times. (The colon “:” will start flashing.)
3. Push the “RESET” button or start switch “⊗” to display the final split-time or push the “SELECT” button to stop the stopwatch and display total elapsed time.
4. Push the “SELECT” button to reset the stopwatch.

### NOTE:

To change the display back to the prior mode, push the “SELECT” button for a few seconds until the stopwatch digits flash.

## Coolant temperature display



1. Coolant temperature display

The coolant temperature display indicates the temperature of the coolant.

Push the “RESET” button to switch the coolant temperature display to the air intake temperature display.

### NOTE:

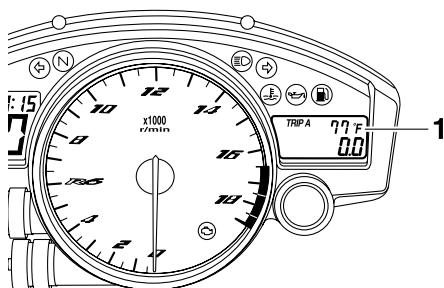
When the coolant temperature display is selected, “C” is displayed for one second, and then the coolant temperature is displayed.

ECA13S1002

### CAUTION:

**Do not operate the engine if it is overheated.**

## Air intake temperature display



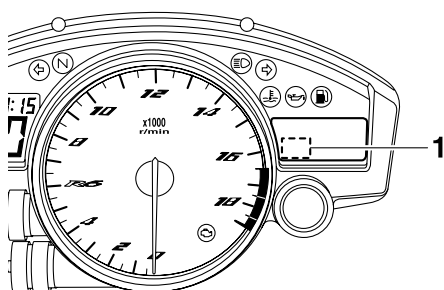
1. Air intake temperature display

The air intake temperature display indicates the temperature of the air drawn into the air intake duct. Push the “RESET” button to switch the coolant temperature display to the air intake temperature display.

### NOTE:

- Even if the air intake temperature is set to be displayed, the coolant temperature warning light comes on when the engine overheats.
- When the key is turned to “ON”, the coolant temperature is automatically displayed, even if the air intake temperature was displayed prior to turning the key to “OFF”.
- When the air intake temperature display is selected, “A” is displayed for one second, and then the air intake temperature is displayed.

## Self-diagnosis device



1. Error code display

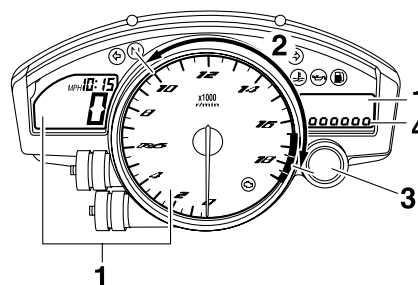
This model is equipped with a self-diagnosis device for various electrical circuits. If any of those circuits are defective, the engine trouble warning light will come on, and then the right display will indicate a two-digit error code. If the right display indicates any error codes, note the code number, and then have a Yamaha dealer check the vehicle.

ECA13S1003

### CAUTION:

If the display indicates an error code, the vehicle should be checked as soon as possible in order to avoid engine damage.

## Display brightness and shift timing indicator light control mode



1. Display brightness
2. Shift timing indicator light activation/deactivation
3. Shift timing indicator light
4. Brightness level

This mode cycles through five control functions, allowing you to make the following settings in the order listed below.

- Display brightness:  
This function allows you to adjust the brightness of the displays and tachometer to suit the outside lighting conditions.
- Shift timing indicator light activity:  
This function allows you to choose whether or not the indicator light should be activated and whether it should flash or stay on when activated.
- Shift timing indicator light activation:  
This function allows you to select the engine speed at which the indicator light will be activated.
- Shift timing indicator light deactivation:  
This function allows you to select the engine speed at which the indicator light will be deactivated.
- Shift timing indicator light brightness:  
This function allows you to adjust the brightness of the indicator light to suit your preference.

### NOTE:

In this mode, the right display shows the current setting for each function (except the shift timing indicator light activity function).

---

## To adjust the brightness of the multifunction meter displays and tachometer

1. Turn the key to “OFF”.
2. Push and hold the “SELECT” button.
3. Turn the key to “ON”, and then release the “SELECT” button after five seconds.
4. Push the “RESET” button to select the desired brightness level.
5. Push the “SELECT” button to confirm the selected brightness level. The control mode changes to the shift timing indicator light activity function.

## To set the shift timing indicator light activity function

1. Push the “RESET” button to select one of the following indicator light activity settings:
  - The indicator light will stay on when activated. (This setting is selected when the indicator light stays on.)
  - The indicator light will flash when activated. (This setting is selected when the indicator light flashes four times per second.)
  - The indicator light is deactivated; in other words, it will not come on or flash. (This setting is selected when the indicator light flashes once every two seconds.)
2. Push the “SELECT” button to confirm the selected indicator light activity. The control mode changes to the shift timing indicator light activation function.

## To set the shift timing indicator light activation function

### **NOTE:**

The shift timing indicator light activation function can be set between 10000 r/min and 18000 r/min. From 10000 r/min to 13000 r/min, the indicator light can be set in increments of 500 r/min. From 13000 r/min to 18000 r/min, the indicator light can be set in increments of 200 r/min.

1. Push the “RESET” button to select the desired engine speed for activating the indicator light.
2. Push the “SELECT” button to confirm the selected engine speed. The control mode changes to the shift timing indicator light deactivation function.

## To set the shift timing indicator light deactivation function

### **NOTE:**

- The shift timing indicator light deactivation function can be set between 10000 r/min and 18000 r/min. From 10000 r/min to 13000 r/min, the indicator light can be set in increments of 500 r/min. From 13000 r/min to 18000 r/min, the indicator light can be set in increments of 200 r/min.
- Be sure to set the deactivation function to a higher engine speed than for the activation function, otherwise the shift timing indicator light will remain deactivated.

1. Push the “RESET” button to select the desired engine speed for deactivating the indicator light.
2. Push the “SELECT” button to confirm the selected engine speed. The control mode changes to the shift timing indicator light brightness function.

## To adjust the shift timing indicator light brightness

1. Push the “RESET” button to select the desired indicator light brightness level.
2. Push the “SELECT” button to confirm the selected indicator light brightness level. The right display will return to the odometer or tripmeter mode.

EAS20180

## IMPORTANT INFORMATION

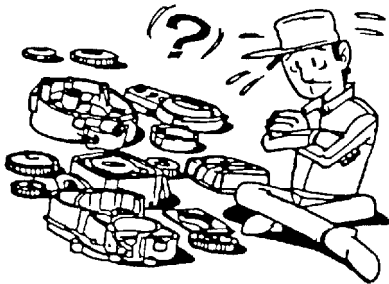
EAS20190

### 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 "SPECIAL TOOLS" on page 1-15.
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.

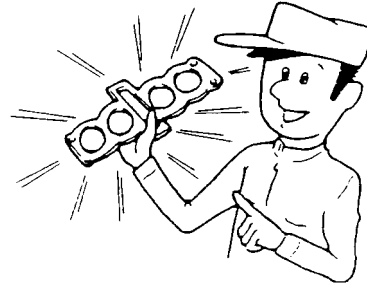


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200

### REPLACEMENT PARTS

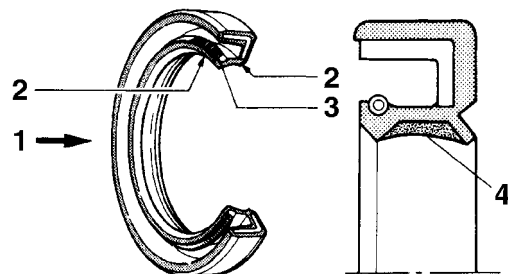
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

### 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.

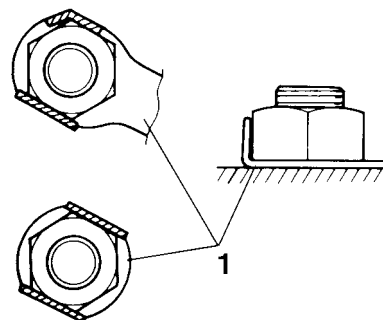


1. Oil
2. Lip
3. Spring
4. Grease

EAS20220

### 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.



EAS20230

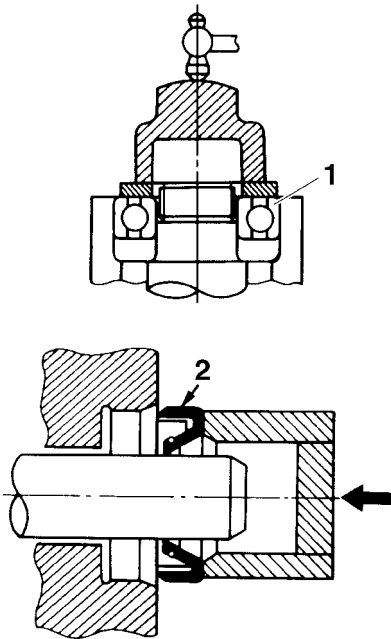
## BEARINGS AND OIL SEALS

Install bearings "1" and oil seals "2" so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

ECA13300

### CAUTION:

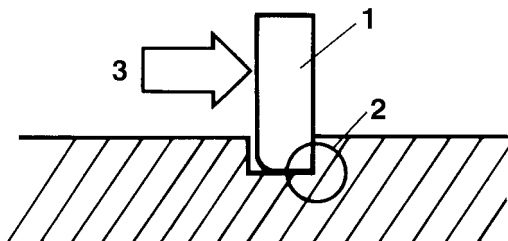
**Do not spin the bearing with compressed air because this will damage the bearing surfaces.**



EAS20240

## 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.



EAS20250

## CHECKING THE CONNECTIONS

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

1. Disconnect:

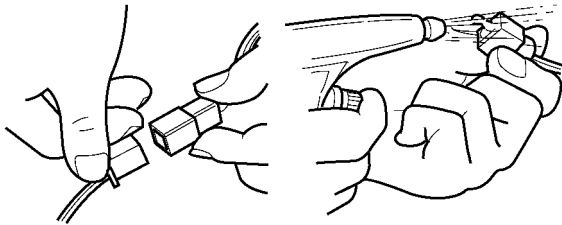
- Lead
- Coupler
- Connector

2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



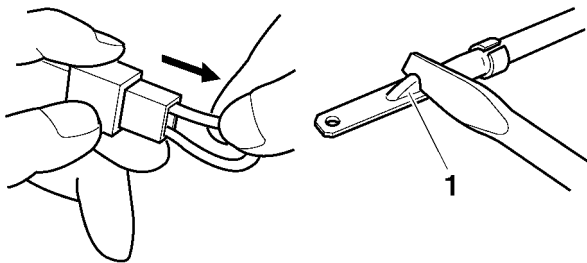
3. Check:

- All connections

Loose connection → Connect properly.

**NOTE:**

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



4. Connect:

- Lead
- Coupler
- Connector

**NOTE:**

Make sure all connections are tight.

5. Check:

- Continuity  
(with the pocket tester)



**Pocket tester**

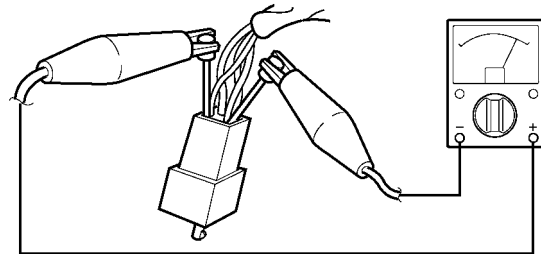
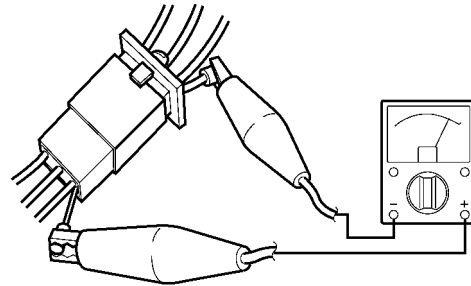
**90890-03112**

**Analog pocket tester**

**YU-03112-C**

**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.



EAS20260

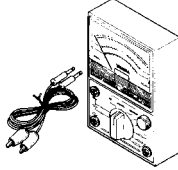

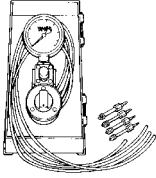

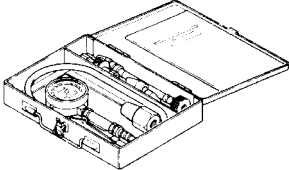
## SPECIAL TOOLS

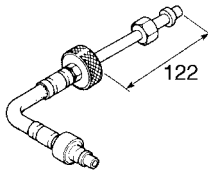
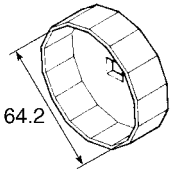
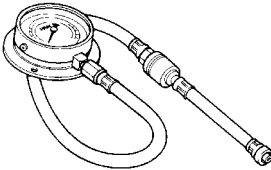
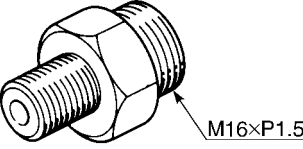
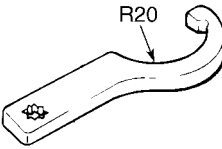
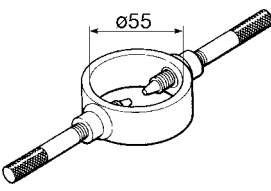
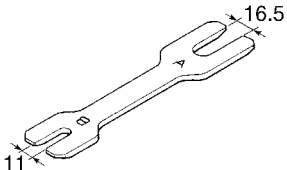
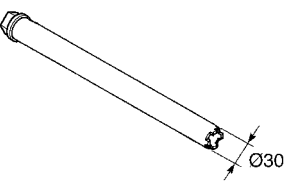
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.

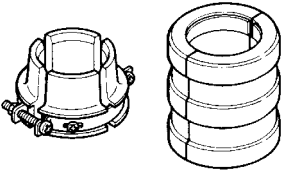
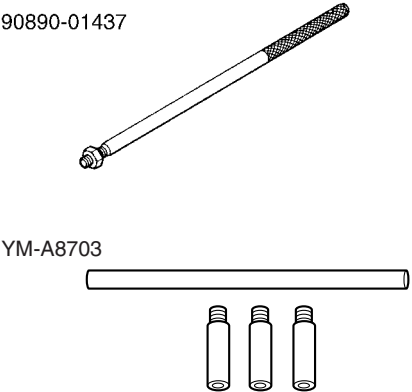
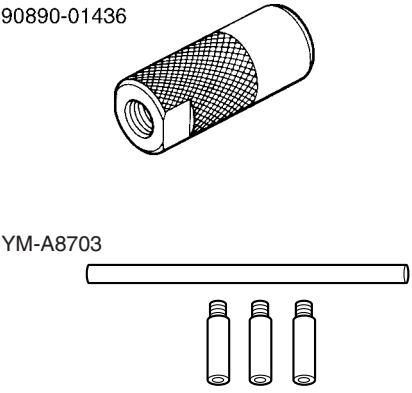
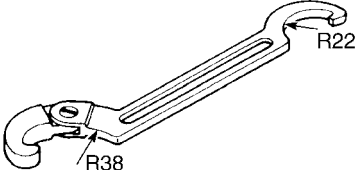
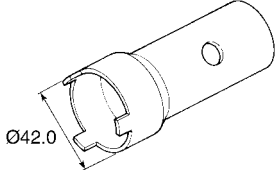
When placing an order, refer to the list provided below to avoid any mistakes.

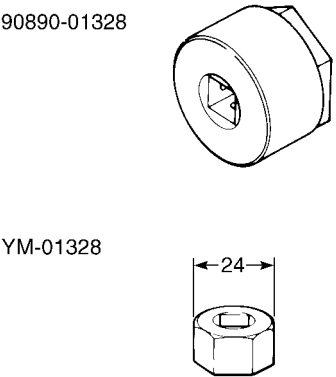
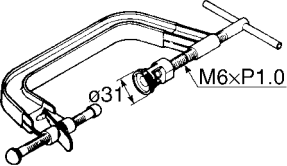
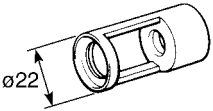
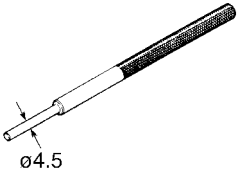
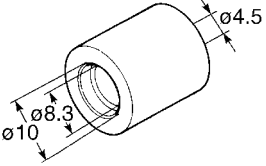
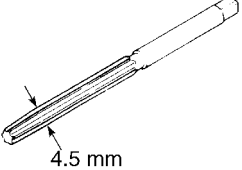
### NOTE:

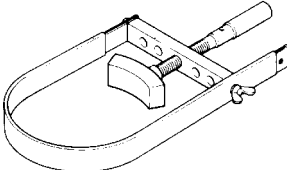
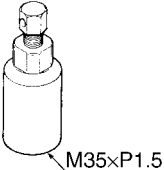
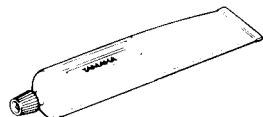
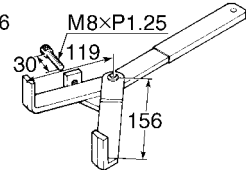
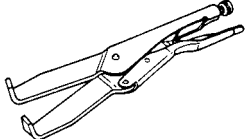
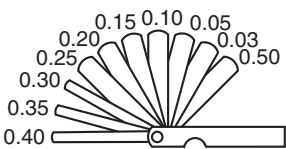
- For U.S.A. and Canada, use part number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part number starting with “90890-”.

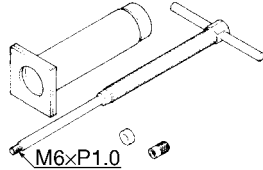
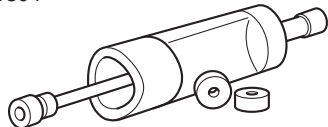
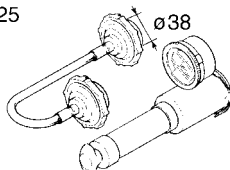
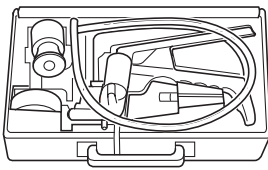
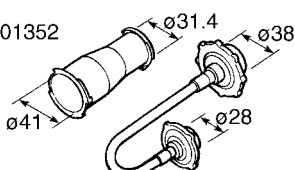
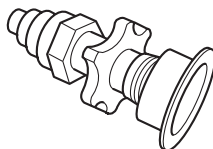
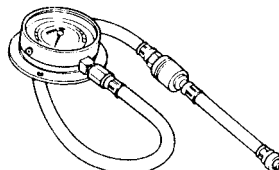
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-14, 5-34, 8-83, 8-84, 8-85, 8-89, 8-90, 8-91, 8-92, 8-93, 8-94, 8-95, 8-96, 8-97, 8-98, 8-99, 8-100, 8-101
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-5
Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456	<div>90890-03094 </div> <div>YU-44456 </div>	3-7
Compression gauge 90890-03081 Engine compression tester YU-33223		3-10

Tool name/Tool No.	Illustration	Reference pages
Extension 90890-04136		3-10
Oil filter wrench 90890-01426 YU-38411		3-12
Oil pressure gauge set 90890-03120		3-13
Oil pressure adapter H 90890-03139		3-13
Steering nut wrench 90890-01403 Spanner wrench YU-33975		3-28, 4-57
Fork spring compressor 90890-01441 YM-01441		4-47, 4-52
Rod holder 90890-01434 Damper rod holder double ended YM-01434		4-47, 4-52
Damper rod holder 90890-01506		4-48, 4-49

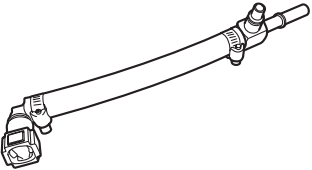
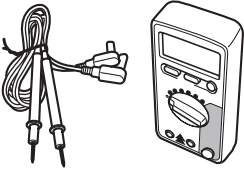
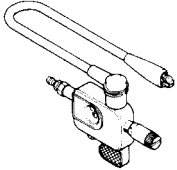
Tool name/Tool No.	Illustration	Reference pages
Fork seal driver 90890-01442 Adjustable fork seal driver (36–46 mm) YM-01442		4-50
Rod puller 90890-01437 Universal damping rod bleeding tool set YM-A8703		4-51, 4-52
Rod puller attachment (M10) 90890-01436 Universal damping rod bleeding tool set YM-A8703		4-51, 4-52
Ring nut wrench 90890-01268 Spanner wrench YU-01268		4-57
Ring nut wrench 90890-01507		4-65, 4-67

Tool name/Tool No.	Illustration	Reference pages
Damper rod holder (24 mm) 90890-01328 YM-01328	 <p>90890-01328</p> <p>YM-01328</p>	4-65, 4-66
Valve spring compressor 90890-04019 YM-04019		5-19, 5-24
Valve spring compressor attachment 90890-04108 Valve spring compressor adapter 22 mm YM-04108		5-19, 5-24
Valve guide remover (ø4.5) 90890-04116 Valve guide remover (4.5 mm) YM-04116		5-21
Valve guide installer (ø4.5) 90890-04117 Valve guide installer (4.5 mm) YM-04117		5-21
Valve guide reamer (ø4.5) 90890-04118 Valve guide reamer (4.5 mm) YM-04118		5-21

Tool name/Tool No.	Illustration	Reference pages
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-27, 5-28, 5-30
Flywheel puller 90890-01404 Flywheel puller YM-01404		5-27
Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®)		5-28, 5-30, 5-55, 6-11
Universal clutch holder 90890-04086 YM-91042	<div>  <p>90890-04086</p> </div> <div>  <p>YM-91042</p> </div>	5-40, 5-44
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		5-41

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	<p>90890-01304</p>  <p>M6xP1.0</p> <p>YU-01304</p> 	5-58
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01	<p>90890-01325</p>  <p>ø38</p> <p>YU-24460-01</p> 	6-2
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984	<p>90890-01352</p>  <p>ø31.4 ø38 ø41</p> <p>YU-33984</p> 	6-2
Pressure gauge 90890-03153 Pressure gauge YU-03153		7-12

# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Fuel pressure adapter 90890-03176 YM-03176		7-12
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		7-13, 7-14
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		8-92

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## SPECIFICATIONS

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<b>ELECTRICAL SPECIFICATIONS .....</b>	<b>2-12</b>
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CHASSIS TIGHTENING TORQUES .....	2-20
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CHASSIS .....	2-25
<b>LUBRICATION SYSTEM CHART AND DIAGRAMS .....</b>	<b>2-27</b>
ENGINE OIL LUBRICATION CHART .....	2-27
LUBRICATION DIAGRAMS .....	2-29
<b>COOLING SYSTEM DIAGRAMS .....</b>	<b>2-41</b>
<b>CABLE ROUTING .....</b>	<b>2-45</b>

# GENERAL SPECIFICATIONS

EAS20280

## GENERAL SPECIFICATIONS

### Model

Model	13S4/13S7 (USA) 13S5/13S8 (California)
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### Dimensions

Overall length	2040 mm (80.3 in)
Overall width	705 mm (27.8 in)
Overall height	1100 mm (43.3 in)
Seat height	850 mm (33.5 in)
Wheelbase	1380 mm (54.3 in)
Ground clearance	130 mm (5.12 in)
Minimum turning radius	3600 mm (141.7 in)

### Weight

With oil and fuel	188 kg (414 lb)
Maximum load	187 kg (412 lb)

EAS20290

## ENGINE SPECIFICATIONS

### Engine

Engine type	Liquid-cooled 4-stroke, DOHC
Displacement	599 cm <sup>3</sup> (36.55 cu.in)
Cylinder arrangement	Forward-inclined parallel 4-cylinder
Bore × stroke	67.0 × 42.5 mm (2.64 × 1.67 in)
Compression ratio	13.1:1
Standard compression pressure (at sea level)	1600 kPa/400 r/min (227.6 psi/400 r/min) (16.0 kgf/cm <sup>2</sup> /400 r/min)
Minimum–maximum	1350–1650 kPa (195.8–239.3 psi) (13.5–16.5 kgf/cm <sup>2</sup> )
Starting system	Electric starter

### Fuel

Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	17.3 L (4.57 US gal) (3.81 Imp.gal)
Fuel reserve amount	3.5 L (0.92 US gal) (0.77 Imp.gal)

### Engine oil

Lubrication system	Wet sump
Type	YAMALUBE 4, SAE10W-30 or SAE20W-40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	3.40 L (3.59 US qt) (2.99 Imp.qt)
Without oil filter cartridge replacement	2.40 L (2.54 US qt) (2.11 Imp.qt)
With oil filter cartridge replacement	2.60 L (2.75 US qt) (2.29 Imp.qt)
Oil cooler capacity (including all routes)	0.20 L (0.21 US qt) (0.18 Imp.qt)
Oil pressure (hot)	80.0 kPa/1300 r/min (11.6 psi/1300 r/min) (0.80 kgf/cm <sup>2</sup> /1300 r/min)

### Oil filter

Oil filter type	Formed
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### Oil pump

Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.12 mm (less than 0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.090–0.150 mm (0.0035–0.0059 in)
Limit	0.220 mm (0.0087 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.06–0.11 mm (0.0024–0.0043 in)
Limit	0.18 mm (0.0071 in)
Bypass valve opening pressure	78.4–117.6 kPa (11.4–17.1 psi) (0.78–1.18 kgf/cm <sup>2</sup> )
Relief valve operating pressure	660.0–740.0 kPa (95.7–107.3 psi) (6.60–7.40 kgf/cm <sup>2</sup> )
Pressure check location	MAIN GALLERY

### Cooling system

Radiator capacity (including all routes)	2.30 L (2.43 US qt) (2.02 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.25 L (0.26 US qt) (0.22 Imp.qt)
Radiator cap opening pressure	107.9–137.3 kPa (15.6–19.9 psi) (1.08–1.37 kgf/cm <sup>2</sup> )

# ENGINE SPECIFICATIONS

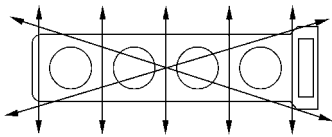
Thermostat	
Valve opening temperature	71 °C (159.8 °F)
Valve full open temperature	85 °C (185 °F)
Valve lift (full open)	More than 8 mm (0.31 in)
Radiator core	
Width	374.0 mm (14.72 in)
Height	257.8 mm (10.15 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single-suction centrifugal pump
Reduction ratio	85/41 × 29/31 (1.939)
Impeller shaft tilt limit	0.15 mm (0.006 in)

## Spark plug (s)

Manufacturer/model	NGK/CR10EK
Spark plug gap	0.6–0.7 mm (0.024–0.028 in)

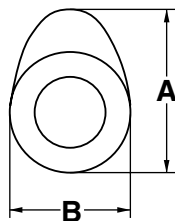
## Cylinder head

Volume	7.40–8.20 cm <sup>3</sup> (0.45–0.50 cu.in)
Warpage limit	0.05 mm (0.0020 in)

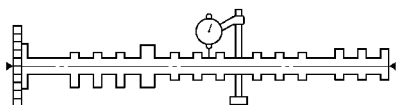


## Camshaft

Drive system	Chain drive (right)
Camshaft cap inside diameter	22.500–22.521 mm (0.8858–0.8867 in)
Camshaft journal diameter	22.459–22.472 mm (0.8842–0.8847 in)
Camshaft-journal-to-camshaft-cap clearance	0.028–0.062 mm (0.0011–0.0024 in)
Limit	0.080 mm (0.0032 in)
Camshaft lobe dimensions	
Intake A	33.725–33.875 mm (1.3278–1.3337 in)
Limit	33.675 mm (1.3258 in)
Intake B	25.225–25.325 mm (0.9931–0.9970 in)
Limit	25.175 mm (0.9911 in)
Exhaust A	32.925–33.075 mm (1.2963–1.3022 in)
Limit	32.875 mm (1.2943 in)
Exhaust B	25.082–25.182 mm (0.9875–0.9914 in)
Limit	25.032 mm (0.9855 in)



Camshaft runout limit	0.030 mm (0.0012 in)
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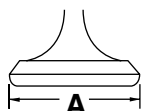


## Timing chain

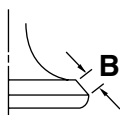
Model/number of links	98XRH2015/118
Tensioning system	Automatic

## Valve, valve seat, valve guide

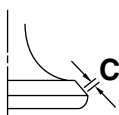
Valve clearance (cold)	
Intake	0.12–0.19 mm (0.0047–0.0075 in)
Exhaust	0.16–0.23 mm (0.0063–0.0091 in)
Valve dimensions	
Valve head diameter A (intake)	26.90–27.10 mm (1.0591–1.0669 in)
Valve head diameter A (exhaust)	22.90–23.10 mm (0.9016–0.9094 in)



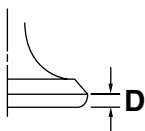
Valve face width B (intake)	1.410–2.550 mm (0.0555–0.1004 in)
Valve face width B (exhaust)	1.400–2.670 mm (0.0551–0.1051 in)



Valve seat width C (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)
Valve seat width C (exhaust)	1.10–1.30 mm (0.0433–0.0512 in)
Limit	1.8 mm (0.07 in)



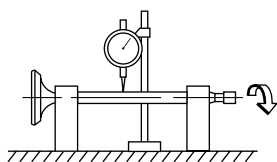
Valve margin thickness D (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	0.8 mm (0.03 in)
Valve margin thickness D (exhaust)	1.10–1.30 mm (0.0433–0.0512 in)
Limit	1.0 mm (0.04 in)



Valve stem diameter (intake)	4.475–4.490 mm (0.1762–0.1768 in)
Limit	4.460 mm (0.1756 in)
Valve stem diameter (exhaust)	4.460–4.475 mm (0.1756–0.1762 in)
Limit	4.445 mm (0.1750 in)
Valve guide inside diameter (intake)	4.500–4.512 mm (0.1772–0.1776 in)
Limit	4.542 mm (0.1788 in)
Valve guide inside diameter (exhaust)	4.500–4.512 mm (0.1772–0.1776 in)
Limit	4.542 mm (0.1788 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.095 mm (0.0037 in)

# ENGINE SPECIFICATIONS

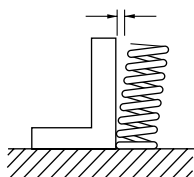
Valve stem runout	0.040 mm (0.0016 in)
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Cylinder head valve seat width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)
Cylinder head valve seat width (exhaust)	1.10–1.30 mm (0.0433–0.0512 in)
Limit	1.8 mm (0.07 in)

## Valve spring

Free length (intake)	37.47 mm (1.48 in)
Limit	35.60 mm (1.40 in)
Free length (exhaust)	37.67 mm (1.48 in)
Limit	35.79 mm (1.42 in)
Installed length (intake)	32.80 mm (1.29 in)
Installed length (exhaust)	32.80 mm (1.29 in)
Spring rate K1 (intake)	38.11 N/mm (217.61 lb/in) (3.89 kgf/mm)
Spring rate K2 (intake)	52.40 N/mm (299.20 lb/in) (5.34 kgf/mm)
Spring rate K1 (exhaust)	36.36 N/mm (207.62 lb/in) (3.71 kgf/mm)
Spring rate K2 (exhaust)	53.40 N/mm (304.91 lb/in) (5.45 kgf/mm)
Installed compression spring force (intake)	166.00–190.00 N (37.32–42.71 lbf) (16.93–19.37 kgf)
Installed compression spring force (exhaust)	165.00–189.00 N (37.09–42.49 lbf) (16.83–19.27 kgf)
Spring tilt (intake)	2.5°/1.6 mm
Spring tilt (exhaust)	2.5°/1.6 mm



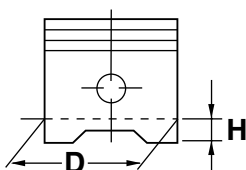
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise

## Cylinder

Bore	67.000–67.010 mm (2.6378–2.6382 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

## Piston

Piston-to-cylinder clearance	0.010–0.035 mm (0.0004–0.0014 in)
Limit	0.05 mm (0.0022 in)
Diameter D	66.975–66.990 mm (2.6368–2.6374 in)
Height H	10.0 mm (0.39 in)



# ENGINE SPECIFICATIONS

Offset	0.50 mm (0.0197 in)
Offset direction	Intake side
Piston pin bore inside diameter	15.002–15.013 mm (0.5906–0.5911 in)
Limit	15.043 mm (0.5922 in)
Piston pin outside diameter	14.991–15.000 mm (0.5902–0.5906 in)
Limit	14.971 mm (0.5894 in)
Piston-pin-to-piston-pin-bore clearance	0.002–0.022 mm (0.00007–0.00068 in)

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<b>Piston ring</b>	
Top ring	
Ring type	Barrel
Dimensions (B × T)	0.80 × 2.40 mm (0.03 × 0.09 in)

A cross-sectional diagram of a barrel ring. It shows a rectangular shape with rounded ends. The width is labeled 'B' and the thickness is labeled 'T'.

End gap (installed)	0.25–0.35 mm (0.0098–0.0138 in)
Limit	0.60 mm (0.0236 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)

2nd ring	
Ring type	Taper
Dimensions (B × T)	0.80 × 2.50 mm (0.03 × 0.10 in)

A cross-sectional diagram of a tapered ring. It shows a rectangular shape with a tapered top edge. The width is labeled 'B' and the thickness is labeled 'T'.

End gap (installed)	0.70–0.80 mm (0.0276–0.0315 in)
Limit	1.15 mm (0.0453 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)

Oil ring	
Dimensions (B × T)	1.50 × 2.00 mm (0.06 × 0.08 in)

A cross-sectional diagram of an oil ring. It shows a complex shape with multiple steps. The width is labeled 'B' and the thickness is labeled 'T'.

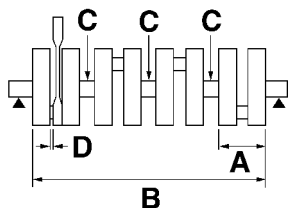
End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
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<b>Connecting rod</b>	
Oil clearance (using plastigauge®)	0.037–0.061 mm (0.0015–0.0024 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green

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<b>Crankshaft</b>	
Width A	Cylinders #1 and #2: 48.20–48.25 mm (1.898–1.900 in) Cylinders #3 and #4: 47.90–47.95 mm (1.886–1.888 in)
Width B	268.80–270.00 mm (10.58–10.63 in)
Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.160–0.262 mm (0.0063–0.0103 in)



Small end free play F	0.32–0.50 mm (0.01–0.02 in)
Journal oil clearance (using plastigauge®)	0.020–0.044 mm (0.0008–0.0017 in)
Bearing color code	0.White 1.Blue 2.Black 3.Brown 4.Green

## Clutch

Clutch type	Wet, multiple-disc
Clutch release method	Outer pull, rack and pinion pull
Clutch lever free play	10.0–15.0 mm (0.39–0.59 in)
Friction plate thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.80 mm (0.1102 in)
Plate quantity	9 pcs
Clutch plate thickness	1.90–2.10 mm (0.075–0.083 in)
Plate quantity	8 pcs
Warpage limit	0.10 mm (0.0039 in)
Clutch spring free length	55.00 mm (2.17 in)
Minimum length	54.00 mm (2.13 in)
Spring quantity	6 pcs

## Transmission

Transmission type	Constant mesh 6-speed
Primary reduction system	Spur gear
Primary reduction ratio	85/41 (2.073)
Secondary reduction system	Chain drive
Secondary reduction ratio	45/16 (2.813)
Operation	Left foot operation
Gear ratio	
1st	31/12 (2.583)
2nd	32/16 (2.000)
3rd	30/18 (1.667)
4th	26/18 (1.444)
5th	27/21 (1.286)
6th	23/20 (1.150)
Main axle runout limit	0.02 mm (0.0008 in)
Drive axle runout limit	0.02 mm (0.0008 in)

## Shifting mechanism

Shift mechanism type	Shift drum
Shift fork guide bar bending limit	0.050 mm (0.0020 in)
Shift fork thickness (L, R)	5.76–5.89 mm (0.2268–0.2319 in)
Shift fork thickness (C)	5.795–5.868 mm (0.2281–0.2310 in)

## Air filter

Air filter element	Oil-coated paper element
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## Fuel pump

Pump type	Electrical
Model/manufacturer	4C8/DENSO
Maximum consumption amperage	6.0 A

# ENGINE SPECIFICATIONS

Output pressure	319.0–329.0 kPa (46.3–47.7 psi) (3.19–3.29 kgf/cm <sup>2</sup> )
<b>Fuel injector</b>	
Model/quantity	297500–0640/4, 297500–1250/4
Manufacturer	DENSO
<b>Throttle body</b>	
Type/quantity	41EIDW/1
Manufacturer	MIKUNI
ID mark	13S1 00 (USA) 13S5 10 (California)
Throttle valve size	#50
<b>Throttle position sensor</b>	
Resistance	2.0–3.0 k $\Omega$
Output voltage (at idle)	0.68 V
<b>Fuel injection sensor</b>	
Crankshaft position sensor resistance	248–372 $\Omega$ at 20 °C (68 °F)
Cylinder identification sensor output voltage (ON)	Less than 0.8 V
Cylinder identification sensor output voltage (OFF)	More than 4.8 V
Intake air pressure sensor output voltage	3.15–4.15 V
Atmospheric pressure sensor output voltage	3.15–4.15 V
<b>Idling condition</b>	
Engine idling speed	1250–1350 r/min
Intake vacuum	20.0 kPa (5.9 inHg) (150 mmHg)
Water temperature	95.0–105.0 °C (203.0–221.0 °F)
Oil temperature	85.0–95.0 °C (185.0–203.0 °F)
Throttle cable free play	3.0–5.0 mm (0.12–0.20 in)
<b>Air induction system</b>	
Reed valve bending limit	0.4 mm (0.016 in)
Solenoid resistance	18–22 $\Omega$ at 20 °C (68 °F)

EAS20300

## CHASSIS SPECIFICATIONS

### Chassis

Frame type	Diamond
Caster angle	24.00°
Trail	97.0 mm (3.82 in)

### Front wheel

Wheel type	Cast wheel
Rim size	17M/C × MT3.50
Rim material	Aluminum
Wheel travel	115.0 mm (4.53 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)

### Rear wheel

Wheel type	Cast wheel
Rim size	17M/C × MT5.50
Rim material	Aluminum
Wheel travel	120.0 mm (4.72 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)

### Front tire

Type	Tubeless
Size	120/70 ZR17M/C (58W)
Manufacturer/model	DUNLOP/Qualifier PT M
Wear limit (front)	1.0 mm (0.04 in)

### Rear tire

Type	Tubeless
Size	180/55 ZR17M/C (73W)
Manufacturer/model	DUNLOP/Qualifier PT M
Wear limit (rear)	1.0 mm (0.04 in)

### Tire air pressure (measured on cold tires)

Loading condition	0–90 kg (0–198 lb)
Front	250 kPa (36 psi) (2.50 kgf/cm <sup>2</sup> )
Rear	290 kPa (42 psi) (2.90 kgf/cm <sup>2</sup> )
Loading condition	90–187 kg (198–412 lb)
Front	250 kPa (36 psi) (2.50 kgf/cm <sup>2</sup> )
Rear	290 kPa (42 psi) (2.90 kgf/cm <sup>2</sup> )
High-speed riding	
Front	250 kPa (36 psi) (2.50 kgf/cm <sup>2</sup> )
Rear	290 kPa (42 psi) (2.90 kgf/cm <sup>2</sup> )

### Front brake

Type	Dual disc brake
Operation	Right hand operation
Front brake lever free play	6.7–18.1 mm (0.26–0.71 in)
Front disc brake	
Disc outside diameter × thickness	310.0 × 5.0 mm (12.20 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc deflection limit	0.10 mm (0.0039 in)

# CHASSIS SPECIFICATIONS

Brake pad lining thickness (inner)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Brake pad lining thickness (outer)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	16.00 mm (0.63 in)
Caliper cylinder inside diameter	30.20 mm × 1 (1.19 in × 1)
Caliper cylinder inside diameter	27.00 mm × 1 (1.06 in × 1)
Recommended fluid	DOT 4
<b>Rear brake</b>	
Type	Single disc brake
Operation	Right foot operation
Brake pedal free play	4.3–9.0 mm (0.17–0.35 in)
Rear disc brake	
Disc outside diameter × thickness	220.0 × 5.0 mm (8.66 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	38.10 mm (1.50 in)
Recommended fluid	DOT 4
<b>Steering</b>	
Steering bearing type	Angular bearing
Center to lock angle (left)	25.0°
Center to lock angle (right)	25.0°
<b>Front suspension</b>	
Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	115.0 mm (4.53 in)
Fork spring free length	254.0 mm (10.00 in)
Limit	248.9 mm (9.80 in)
Collar length	77.0 mm (3.03 in)
Installed length	243.5 mm (9.59 in)
Spring rate K1	9.00 N/mm (51.39 lb/in) (0.92 kgf/mm)
Spring stroke K1	0.0–115.0 mm (0.00–4.53 in)
Inner tube outer diameter	41.0 mm (1.61 in)
Inner tube bending limit	0.2 mm (0.01 in)
Optional spring available	No
Recommended oil	Ohlins R & T43
Quantity	482.0 cm <sup>3</sup> (16.30 US oz) (17.00 Imp.oz)
Level	103.0 mm (4.06 in)
Spring preload adjusting positions	
Minimum	0
Standard	2
Maximum	5
Rebound damping adjusting positions	
Minimum	25
Standard	20
Maximum	1
<b>Rear suspension</b>	
Type	Swingarm (link suspension)

## CHASSIS SPECIFICATIONS

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Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	60.0 mm (2.36 in)
Spring free length	161.5 mm (6.36 in)
Installed length	152.5 mm (6.00 in)
Spring rate K1	103.00 N/mm (588.13 lb/in) (10.50 kgf/mm)
Spring stroke K1	0.0–60.0 mm (0.00–2.36 in)
Optional spring available	No
Enclosed gas/air pressure (STD)	1200 kPa (174.1 psi) (12.0 kgf/cm <sup>2</sup> )
Spring preload adjusting positions	
Minimum	1
Standard	4
Maximum	9
Rebound damping adjusting positions	
Minimum	20
Standard	16
Maximum	3

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<b>Drive chain</b>	
Type/manufacturer	525V8/DAIDO
Link quantity	114
Drive chain slack	30.0–45.0 mm (1.18–1.77 in)
15-link length limit	239.3 mm (9.42 in)

# ELECTRICAL SPECIFICATIONS

EAS20310

## ELECTRICAL SPECIFICATIONS

### Voltage

System voltage	12 V
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### Ignition system

Ignition system	Transistorized coil ignition (digital)
Advancer type	Throttle position sensor and electrical
Ignition timing (B.T.D.C.)	10.0°/1300 r/min

### Engine control unit

Model/manufacture	TBDF61/DENSO
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### Ignition coil

Model/manufacture	F6T568/MITSUBISHI
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	0.85–1.15 $\Omega$
Secondary coil resistance	5.01–6.78 k $\Omega$

### AC magneto

Model/manufacture	LMX62/DENSO
Standard output	14.0 V 420 W 5000 r/min
Stator coil resistance	0.12–0.18 $\Omega$ at 20 °C (68 °F)

### Rectifier/regulator

Regulator type	Semi conductor-short circuit
Model/manufacture	SH678–11/SHINDENGEN
Regulated voltage (DC)	14.1–14.9 V
Rectifier capacity	22.0 A
Withstand voltage	200.0 V

### Battery

Model	YTZ10S
Voltage, capacity	12 V, 8.6 Ah
Manufacturer	GS YUASA
Ten hour rate amperage	0.86 A

### Headlight

Bulb type	Halogen bulb
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### Bulb voltage, wattage × quantity

Headlight	12 V, 55.0 W × 2
Tail/brake light	LED
Front turn signal/position light	12 V, 21.0 W/5.0 W × 2
Rear turn signal light	12 V, 21.0 W × 2
License plate light	12 V, 5.0 W × 1
Meter lighting	LED

### Indicator light

Neutral indicator light	LED
Turn signal indicator light	LED
Oil level warning light	LED
High beam indicator light	LED
Fuel level warning light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED
Shift timing indicator light	LED

# ELECTRICAL SPECIFICATIONS

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## Electric starting system

System type	Constant mesh
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## Starter motor

Model/manufacture	SM14/MITSUBA
Power output	0.60 kW
Armature coil resistance	0.0012–0.0022 $\Omega$ at 20 °C (68 °F)
Brush overall length	10.0 mm (0.39 in)
Limit	3.50 mm (0.14 in)
Brush spring force	7.16–9.52 N (25.77–34.27 oz) (730–971 gf)
Commutator diameter	28.0 mm (1.10 in)
Limit	27.0 mm (1.06 in)
Mica undercut (depth)	0.70 mm (0.03 in)

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## Starter relay

Model/manufacture	S537726-A/JIDECO
Amperage	180.0 A
Coil resistance	4.18–4.62 $\Omega$

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## Horn

Horn type	Plane
Quantity	1 pc
Model/manufacture	YF-12/NIKKO
Maximum amperage	3.0 A
Coil resistance	1.15–1.25 $\Omega$ at 20 °C (68 °F)
Performance	105–113 dB/2m

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## Turn signal relay

Relay type	Full transistor
Model/manufacture	FE246BH/DENSO
Built-in, self-canceling device	No
Turn signal blinking frequency	75.0–95.0 cycles/min
Wattage	(21, 23, 27) W $\times$ 2.0 + 3.4 W

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## Oil level gauge

Model/manufacture	5VX/SOMIC ISHIKAWA
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## Fuel gauge

Model/manufacture	4C8/DENSO
Sender unit resistance (full)	750.0–1100.0 $\Omega$

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## Starting circuit cut-off relay

Model/manufacture	G8R-30Y-V4/OMRON
Coil resistance	162.0–198.0 $\Omega$

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## Headlight relay

Model/manufacture	ACA12115/MATSUSHITA
Coil resistance	72.0–88.0 $\Omega$

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## Fuel pump relay

Model/manufacture	G8R-30Y-V4/OMRON
Coil resistance	162.0–198.0 $\Omega$

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## Thermo sensor

Model/manufacture	K003T20191/MITSUBISHI
Resistance at 80 °C	290–354 $\Omega$

# ELECTRICAL SPECIFICATIONS

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## Fan motor relay

Model/manufacturer

ACM33211M05/MATSUSHITA

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## Fuses

Main fuse	50.0 A
Headlight fuse	15.0 A
Signaling system fuse	10.0 A
Ignition fuse	15.0 A
Radiator fan fuse	15.0 A × 2
Fuel injection system fuse	15.0 A
Backup fuse	7.5 A
Electric throttle valve fuse	7.5 A
Reserve fuse	15.0 A
Reserve fuse	10.0 A
Reserve fuse	7.5 A

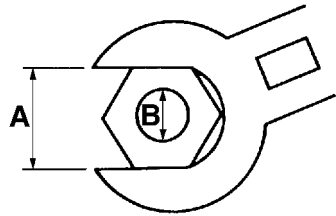
EAS20320

## TIGHTENING TORQUES

EAS20330

### GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

















- A. Distance between flats
- B. Outside thread diameter

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















# TIGHTENING TORQUES

EAS20340









## ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Camshaft cap bolt (intake and exhaust)	M6	20	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Cylinder head stud bolt (exhaust pipe assembly)	M8	8	15 Nm (1.5 m·kg, 11 ft·lb)	
Cylinder head nut (1st)	M10	8	25 Nm (2.5 m·kg, 18 ft·lb)	
Cylinder head nut (final)	M10	8	42 Nm (4.2 m·kg, 31 ft·lb)	
Cylinder head cap nut (1st)	M10	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Cylinder head cap nut (final)	M10	2	60 Nm (6.0 m·kg, 44 ft·lb)	
Cylinder head bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Spark plug	M10	4	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Cylinder head cover bolt	M6	6	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil check bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Reed valve cover bolt	M6	4	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Camshaft sprocket bolt	M7	4	24 Nm (2.4 m·kg, 18 ft·lb)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Throttle body joint bolt	M6	8	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Connecting rod nut (1st)	M7	8	15 Nm (1.5 m·kg, 11 ft·lb)	See NOTE 
Connecting rod nut (final)	M7	8	Specified angle 175°–185°	See NOTE 
Generator rotor bolt	M12	1	70 Nm (7.0 m·kg, 52 ft·lb)	
Timing chain tensioner bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Thermostat cover bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Water jacket joint bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Water pump assembly bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Water pump housing cover bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Oil pump assembly bolt	M6	3	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil pan bolt	M6	13	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kg, 32 ft·lb)	
Oil filter cartridge bolt	M20	1	70 Nm (7.0 m·kg, 52 ft·lb)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kg, 13 ft·lb)	
Oil pump drive chain guide	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil pipe bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil cooler union bolt	M20	1	63 Nm (6.3 m·kg, 47 ft·lb)	
Upper air filter case to secondary injector holder bolt	M6	4	5 Nm (0.5 m·kg, 3.7 ft·lb)	
Upper air filter case to lower air filter case bolt	M5	10	2 Nm (0.2 m·kg, 1.5 ft·lb)	
Air filter bolt	M5	1	2 Nm (0.2 m·kg, 1.5 ft·lb)	
Secondary injector fuel rail	M6	2	5 Nm (0.5 m·kg, 3.7 ft·lb)	
Throttle body joint clamp	M5	4	2 Nm (0.2 m·kg, 1.5 ft·lb)	

# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Intake funnel to throttle body	M5	6	4 Nm (0.4 m·kg, 3.0 ft·lb)	
Intake funnel bolt	M5	2	3 Nm (0.3 m·kg, 2.2 ft·lb)	
Locknut (throttle cable)	M6	2	5 Nm (0.5 m·kg, 3.7 ft·lb)	
Exhaust pipe assembly nut	M8	8	20 Nm (2.0 m·kg, 15 ft·lb)	
Exhaust pipe assembly bolt	M8	2	20 Nm (2.0 m·kg, 15 ft·lb)	
Exhaust pipe assembly bracket bolt (left lower side)	M8	1	34 Nm (3.4 m·kg, 25 ft·lb)	
Muffler clamp bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Muffler bolt	M8	1	20 Nm (2.0 m·kg, 15 ft·lb)	
Locknut (EXUP cable adjusting bolt)	M6	2	6 Nm (0.6 m·kg, 4.4 ft·lb)	
EXUP servo motor drive pulley bolt	M5	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
EXUP servo motor bolt	M6	2	8 Nm (0.8 m·kg, 5.9 ft·lb)	
EXUP servo motor bracket bolt	M6	2	8 Nm (0.8 m·kg, 5.9 ft·lb)	
EXUP valve pulley cover bolt (front side)	M6	1	8 Nm (0.8 m·kg, 5.9 ft·lb)	
EXUP valve pulley cover bolt (rear side)	M6	2	7 Nm (0.7 m·kg, 5.2 ft·lb)	
EXUP valve nut	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Crankcase bolt	M8	2	See NOTE	l=115 mm (4.53 in) 
Crankcase bolt	M8	8	See NOTE	l=85 mm (3.35 in) 
Crankcase bolt	M8	2	24 Nm (2.4 m·kg, 18 ft·lb)	l=65 mm (2.56 in) 
Crankcase bolt	M6	16	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Generator cover bolt	M6	9	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Clutch cover bolt	M6	7	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Clutch cover bolt	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Pickup rotor cover bolt	M6	7	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Timing mark accessing bolt	M8	1	15 Nm (1.5 m·kg, 11 ft·lb)	
Oil baffle plate 1 bolt	M6	1	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil baffle plate 2 bolt	M6	3	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Stator coil assembly bolt	M6	3	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Stator coil assembly lead holder bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Drive sprocket cover bolt	M6	3	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Main gallery plug	M16	2	8 Nm (0.8 m·kg, 5.9 ft·lb)	
Ventilation chamber cover bolt	M6	5	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Oil pipe	M6	2	12 Nm (1.2 m·kg, 8.9 ft·lb)	
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	

# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Crankcase stud bolt	M10	10	See NOTE	
Pressure plate bolt	M6	6	8 Nm (0.8 m·kg, 5.9 ft·lb)	
Clutch boss nut	M20	1	115 Nm (11.5 m·kg, 85 ft·lb)	Stake 
Clutch boss plate stud bolt	M8	6	25 Nm (2.5 m·kg, 18 ft·lb)	
Drive sprocket nut	M20	1	85 Nm (8.5 m·kg, 63 ft·lb)	Stake 
Main axle screw	M6	3	12 Nm (1.2 m·kg, 8.9 ft·lb)	Stake 
Shift drum retainer bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Shift shaft spring stopper	M8	1	22 Nm (2.2 m·kg, 16 ft·lb)	
Shift arm bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Pickup rotor bolt	M8	1	35 Nm (3.5 m·kg, 26 ft·lb)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Neutral switch	M10	1	20 Nm (2.0 m·kg, 15 ft·lb)	
Oil level switch bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Speed sensor bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Cylinder identification sensor bolt	M6	1	8 Nm (0.8 m·kg, 5.9 ft·lb)	
Negative battery terminal/engine ground terminal bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
O <sub>2</sub> sensor	M18	1	45 Nm (4.5 m·kg, 33 ft·lb)	

## NOTE:

### Connecting rod nut

Tighten the connecting rod nuts to 15 Nm (1.5 m·kg, 11 ft·lb), and then tighten them further to reach the specified angle 175°–185°.

## NOTE:

### Crankcase bolt

1. First, tighten the bolts to approximately 20 Nm (2.0 m·kg, 14 ft·lb) with a torque wrench.
2. Loosen all bolts one by one following the tightening order and then retighten the bolts 12 Nm (1.2 m·kg, 8.8 ft·lb) with a torque wrench.
3. Tighten at 45°–55° angle according to the tightening order.
4. Tighten at 70°–80° angle according to the tightening order.

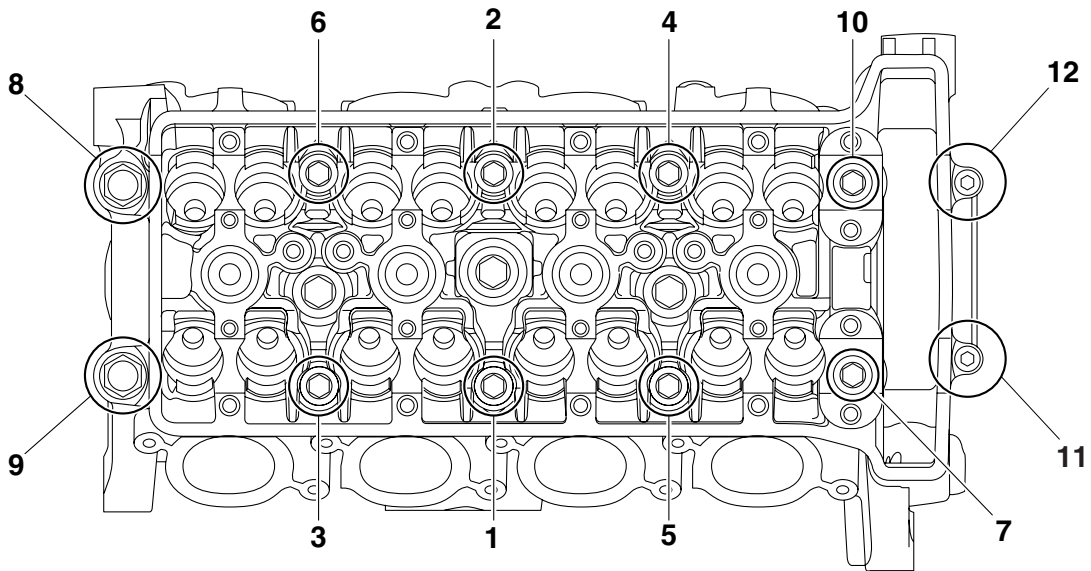
## NOTE:

### Crankcase stud bolt

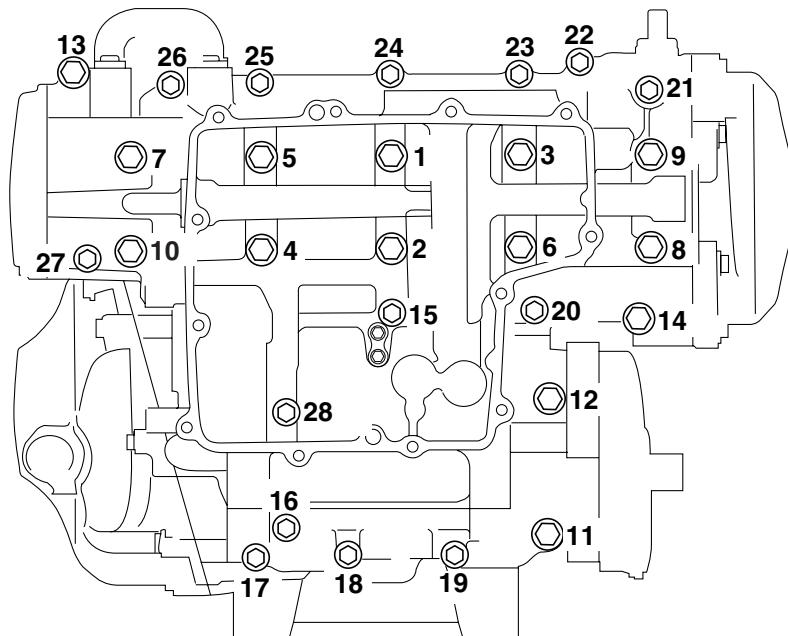
Install the crankcase stud bolts (M10) so that their installed length is 68.2 mm (2.69 in).

# TIGHTENING TORQUES

Cylinder head tightening sequence:









Crankcase tightening sequence:






# TIGHTENING TORQUES

EAS20350

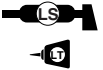

## CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting bolt (front right side)	M10	2	45 Nm (4.5 m·kg, 33 ft·lb)	
Engine mounting bolt (front left side)	M10	2	45 Nm (4.5 m·kg, 33 ft·lb)	
Engine mounting nut (rear upper side)	M12	1	64 Nm (6.4 m·kg, 47 ft·lb)	
Engine mounting nut (rear lower side)	M12	1	64 Nm (6.4 m·kg, 47 ft·lb)	
Front wheel axle	M14	1	91 Nm (9.1 m·kg, 67 ft·lb)	
Front wheel axle pinch bolt	M8	4	21 Nm (2.1 m·kg, 16 ft·lb)	See NOTE
Front brake disc bolt	M6	10	18 Nm (1.8 m·kg, 13 ft·lb)	
Rear wheel axle nut	M24	1	110 Nm (11.0 m·kg, 81 ft·lb)	
Rear wheel sprocket nut	M10	6	100 Nm (10.0 m·kg, 74 ft·lb)	
Rear brake disc bolt	M8	5	30 Nm (3.0 m·kg, 22 ft·lb)	
Front brake hose union bolt	M10	3	30 Nm (3.0 m·kg, 22 ft·lb)	
Front brake caliper bolt	M10	4	35 Nm (3.5 m·kg, 26 ft·lb)	
Brake caliper bleed screw (front and rear)	M8	3	5 Nm (0.5 m·kg, 3.7 ft·lb)	
Front brake hose holder bolt	M6	2	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Rear brake hose union bolt	M10	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Rear brake caliper bolt	M8	1	22 Nm (2.2 m·kg, 16 ft·lb)	
Rear brake caliper bolt	M12	1	27 Nm (2.7 m·kg, 20 ft·lb)	
Rear brake pad pin	M10	1	17 Nm (1.7 m·kg, 13 ft·lb)	
Rear brake screw plug	—	1	2 Nm (0.2 m·kg, 1.5 ft·lb)	
Handlebar pinch bolt	M8	2	32 Nm (3.2 m·kg, 24 ft·lb)	
Handlebar bolt	M6	2	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Front brake master cylinder bolt	M6	2	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Front brake master cylinder bleed screw	M8	1	6 Nm (0.6 m·kg, 4.4 ft·lb)	
Rear view mirror nut	M6	4	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Clutch lever assembly bolt	M6	1	11 Nm (1.1 m·kg, 8.1 ft·lb)	
Clutch cable locknut (engine side)	M8	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Upper bracket pinch bolt	M8	2	26 Nm (2.6 m·kg, 19 ft·lb)	
Steering stem nut	M28	1	115 Nm (11.5 m·kg, 85 ft·lb)	
Lower ring nut (initial tightening torque)	M30	1	52 Nm (5.2 m·kg, 38 ft·lb)	See NOTE
Lower ring nut (final tightening torque)	M30	1	14 Nm (1.4 m·kg, 10 ft·lb)	See NOTE
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	See NOTE

# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Lower bracket and front brake hose joint bracket bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Front brake hose joint and front brake hose joint bracket bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Cap bolt	M47	2	20 Nm (2.0 m·kg, 15 ft·lb)	
Cap bolt (damper rod assembly and nut)	M10	2	25 Nm (2.5 m·kg, 18 ft·lb)	
Damper rod assembly	M24	2	35 Nm (3.5 m·kg, 26 ft·lb)	
Front fender bolt	M6	2	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Relay arm and frame nut	M10	1	40 Nm (4.0 m·kg, 30 ft·lb)	
Connecting arm and relay arm nut	M12	1	40 Nm (4.0 m·kg, 30 ft·lb)	
Connecting arm and swingarm nut	M12	1	40 Nm (4.0 m·kg, 30 ft·lb)	
Rear shock absorber assembly upper nut	M12	1	44 Nm (4.4 m·kg, 33 ft·lb)	
Rear shock absorber assembly lower nut	M12	1	40 Nm (4.0 m·kg, 30 ft·lb)	
Rear shock absorber assembly spacer bolt	M22	1	16 Nm (1.6 m·kg, 12 ft·lb)	
Rear shock absorber assembly bracket nut	M14	1	52 Nm (5.2 m·kg, 38 ft·lb)	
Swingarm pivot shaft	M32	1	16 Nm (1.6 m·kg, 12 ft·lb)	
Swingarm pivot shaft ring nut	M32	1	95 Nm (9.5 m·kg, 70 ft·lb)	
Swingarm pivot shaft nut	M22	1	70 Nm (7.0 m·kg, 52 ft·lb)	
Drive chain guide (swingarm side) bolt	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Drive chain guard bolt	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Drive chain adjusting locknut	M8	2	16 Nm (1.6 m·kg, 12 ft·lb)	
Drive chain adjusting bolt	M8	2	2 Nm (0.2 m·kg, 1.5 ft·lb)	
Rear fender bolt	M6	3	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Fuel pump bolt	M5	6	4 Nm (0.4 m·kg, 3.0 ft·lb)	
Fuel tank upper cover and frame bolt	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Fuel tank bolt	M6	2	9 Nm (0.9 m·kg, 6.6 ft·lb)	
Fuel tank bracket and frame bolt	M6	4	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Fuel tank bracket and fuel tank bolt	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Radiator bolt	M6	2	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Radiator and radiator bracket bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Radiator bracket and frame bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Radiator outlet hose holder bolt	M10	1	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Radiator and rectifier/regulator bracket bolt	M6	2	5 Nm (0.5 m·kg, 3.7 ft·lb)	
Coolant reservoir bolt	M6	2	5 Nm (0.5 m·kg, 3.7 ft·lb)	

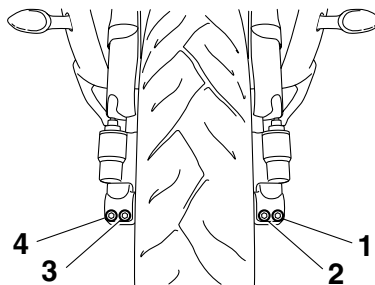
# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Front cowling assembly bolt	M6	4	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Seat lock assembly bolt	M6	2	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Rider seat and frame	M6	2	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Battery box and frame	M6	2	4 Nm (0.4 m·kg, 3.0 ft·lb)	
Rear upper cowling damper plate and frame	M6	4	7 Nm (0.7 m·kg, 5.2 ft·lb)	
License plate light assembly bolt	M6	4	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Rider footrest (left and right) assembly bolt	M8	4	28 Nm (2.8 m·kg, 21 ft·lb)	
Passenger footrest (left and right) bolt	M8	4	28 Nm (2.8 m·kg, 21 ft·lb)	
Rear brake master cylinder bolt	M6	2	13 Nm (1.3 m·kg, 9.6 ft·lb)	
Sidestand assembly and frame bolt	M8	3	26 Nm (2.6 m·kg, 19 ft·lb)	
Coupler holder (left and right) and frame bolt	M6	4	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Shift arm bolt	M6	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Locknut (shift rod upper side)	M6	1	7 Nm (0.7 m·kg, 5.2 ft·lb)	
Locknut (shift rod lower side)	M8	1	10 Nm (1.0 m·kg, 7.4 ft·lb)	

## NOTE:

### Front wheel axle pinch bolt

1. Insert the front wheel axle from the right side and tighten it with the flange bolt from the left side to 91 Nm (9.1 m·kg, 66 ft·lb) without performing temporary tightening.
2. In the order pinch bolt "2" → pinch bolt "1" → pinch bolt "2", tighten each bolt to 21 Nm (2.1 m·kg, 15 ft·lb) without performing temporary tightening.
3. Check that the right end of the front axle is flush with the front fork. If necessary, manually push the front axle or lightly tap it with a soft hammer until its end is flush with the front fork. However, if the surface of the front axle end is not parallel to the surface of the front fork, align a point on the outer edge of the axle with the fork, making sure that the axle does not protrude past the fork.
4. In the order pinch bolt "4" → pinch bolt "3" → pinch bolt "4", tighten each bolt to 21 Nm (2.1 m·kg, 15 ft·lb) without performing temporary tightening.



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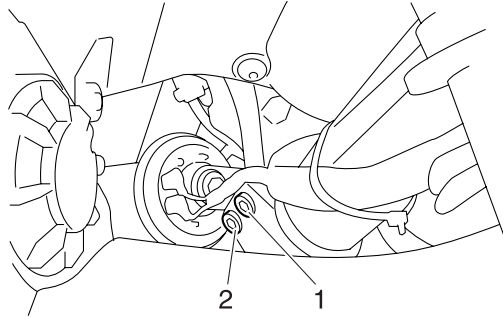
**NOTE:****Lower ring nut**

1. First, tighten the lower ring nut to approximately 52 Nm (5.2 m·kg, 37 ft·lb) with a torque wrench, then loosen the lower ring nut completely.
  2. Retighten the lower ring nut to 14 Nm (1.4 m·kg, 10 ft·lb) with a torque wrench.
- 

**NOTE:****Lower bracket pinch bolt**

Tighten each bolt to 23 Nm (2.3 m·kg, 17 ft·lb) in the order pinch bolt “1” → pinch bolt “2” → pinch bolt “1” → pinch bolt “2”.

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# LUBRICATION POINTS AND LUBRICANT TYPES

EAS20360

## LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370

### ENGINE












Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearings	
Crankshaft pins	
Piston surface	
Piston pins	
Connecting rod bolts and nuts	
Crankshaft journals	
Generator rotor bolt and washer	
Camshaft cam lobes and camshaft journals	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Valve lifter surface	
Oil pump rotors (inner and outer) and oil pump housing	
Oil strainer screen (inside oil strainer)	
Oil strainer seal	
Oil cooler bolt	
Oil nozzle (O-ring)	
Starter clutch idle gear shaft	
Starter clutch roller and starter clutch idle gear outer surface	
Primary driven gear inner surface	
Clutch boss nut	
Clutch pull rod	
Transmission gears (wheel and pinion) and collars	
Main axle and drive axle	
Shift forks and shift fork guide bars	
Shift shaft	
Cylinder head cover mating surface	Yamaha bond No.1215 (Three Bond No.1215 <sup>®</sup> )
Cylinder head cover gasket	Bond TB1215B
Crankcase mating surface	Yamaha bond No.1215 (Three Bond No.1215 <sup>®</sup> ) Three Bond No.1280B

# LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Crankshaft position sensor lead grommet	Yamaha bond No.1215 (Three Bond No.1215 <sup>®</sup> )
Stator coil lead grommet	Yamaha bond No.1215 (Three Bond No.1215 <sup>®</sup> )

EAS20380

## CHASSIS

Lubrication point	Lubricant
Steering bearings and upper bearing cover lip	
Lower bearing dust seal lip	
Tube guide (throttle grip) inner surface and throttle cables	
Brake lever pivoting point and metal-to-metal moving parts	
Brake caliper piston seal	
Brake caliper piston dust seal	
Clutch cable end	
Clutch lever pivoting point and metal-to-metal moving parts	
Relay arm, connecting arm and rear shock absorber spacer	
Swingarm pivot shaft	
Swingarm pivot shaft bearings	
Swingarm dust cover lips	
Swingarm pivot shaft nut	
Oil seals (rear shock absorber, relay arm and connecting arm)	
Seat lock lever pivoting point	
Sidestand pivoting point and metal-to-metal moving parts	
Sidestand switch striker and sidestand switch contact point	
Sidestand hook and spring	
Sidestand bracket and sidestand bolt	
Shift rod pivoting point	
Shift pedal pivoting point	
Brake pedal shaft pivoting point	
Front wheel oil seal lips (left and right)	
Front wheel axle bolt	
Rear wheel oil seal lips (left and right)	
Rear wheel drive hub oil seal	
Rear wheel drive hub mating surface	
Rear wheel axle	
Engine mounting bolts (rear upper and lower side)	

## LUBRICATION POINTS AND LUBRICANT TYPES

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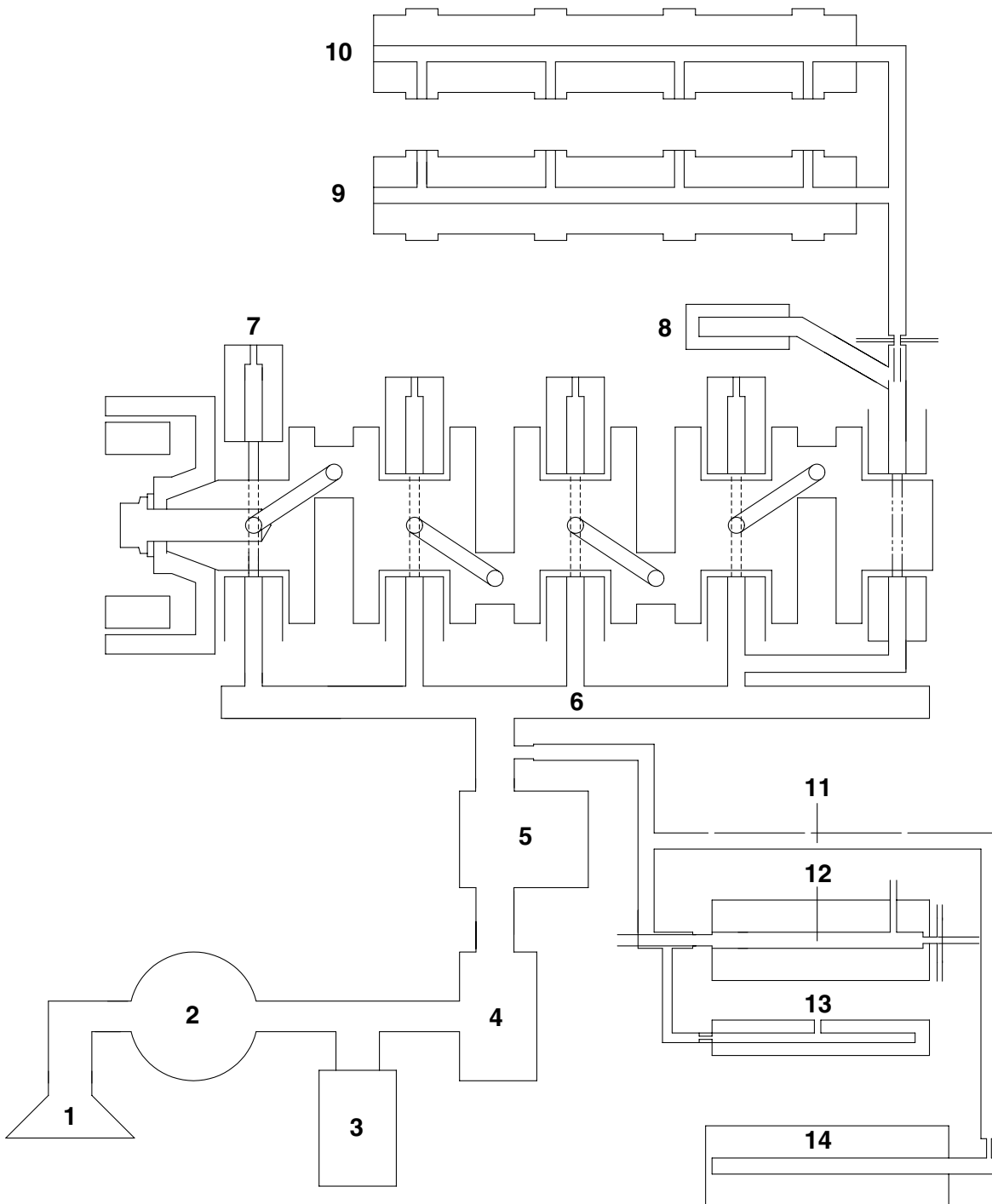
# LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20390

## LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20400

### ENGINE OIL LUBRICATION CHART



# LUBRICATION SYSTEM CHART AND DIAGRAMS

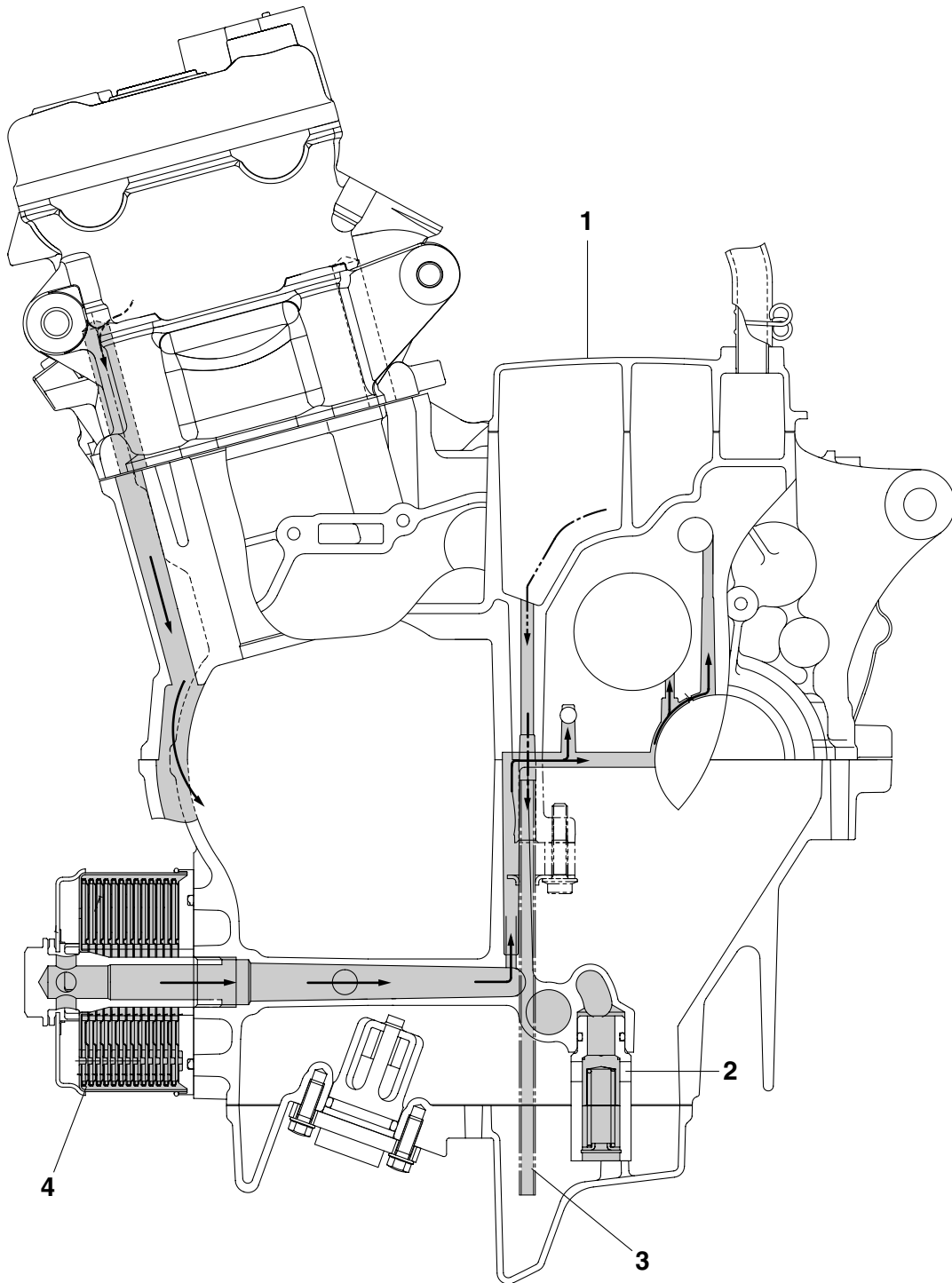
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1. Oil strainer
2. Oil pump
3. Relief valve
4. Oil filter
5. Oil cooler
6. Main gallery
7. Oil nozzle
8. Timing chain tensioner
9. Intake camshaft
10. Exhaust camshaft
11. Oil pipe
12. Main axle
13. Shift fork
14. Drive axle

# LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410

## LUBRICATION DIAGRAMS



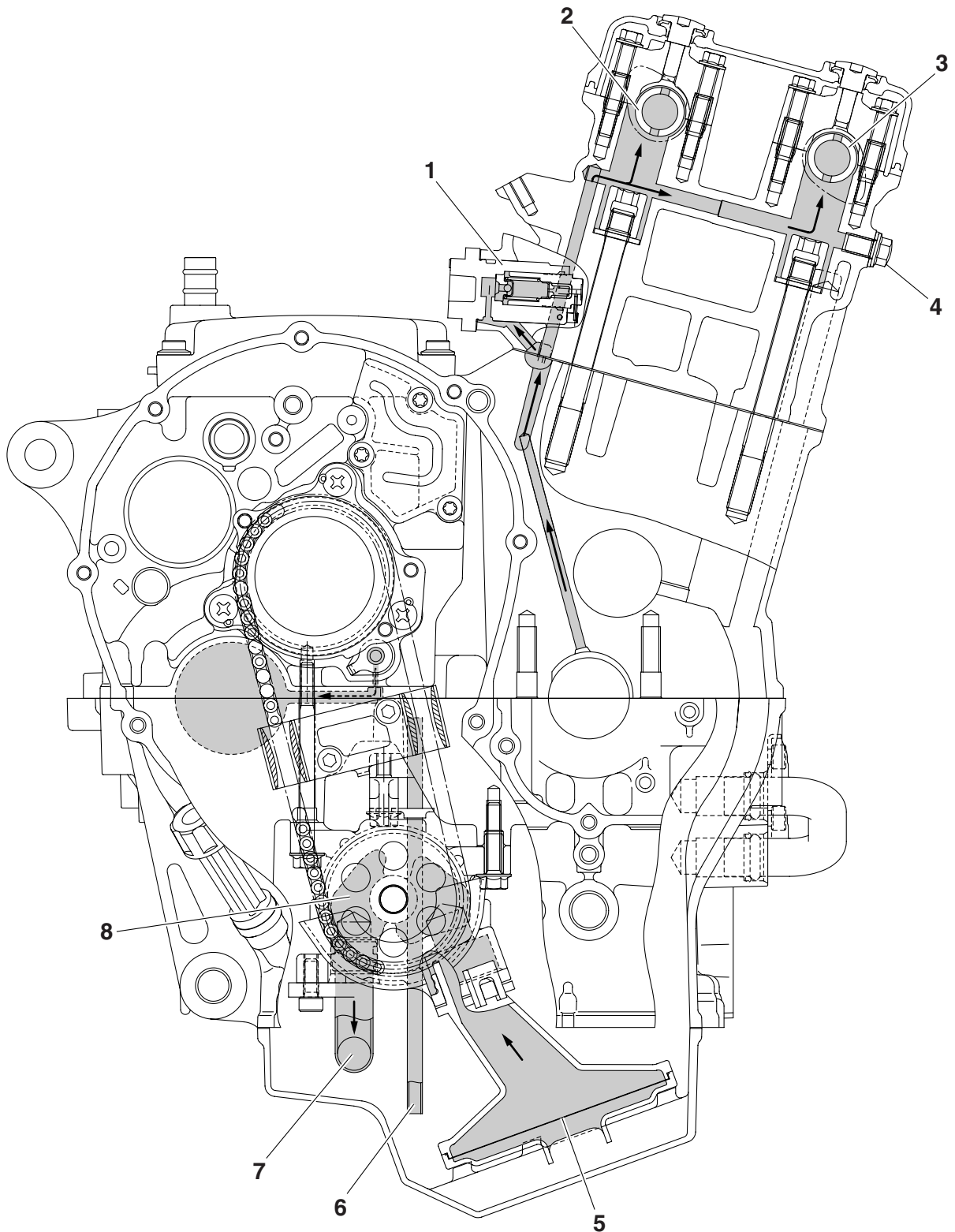
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Ventilation chamber cover
2. Relief valve
3. Ventilation chamber oil drain pipe
4. Oil cooler

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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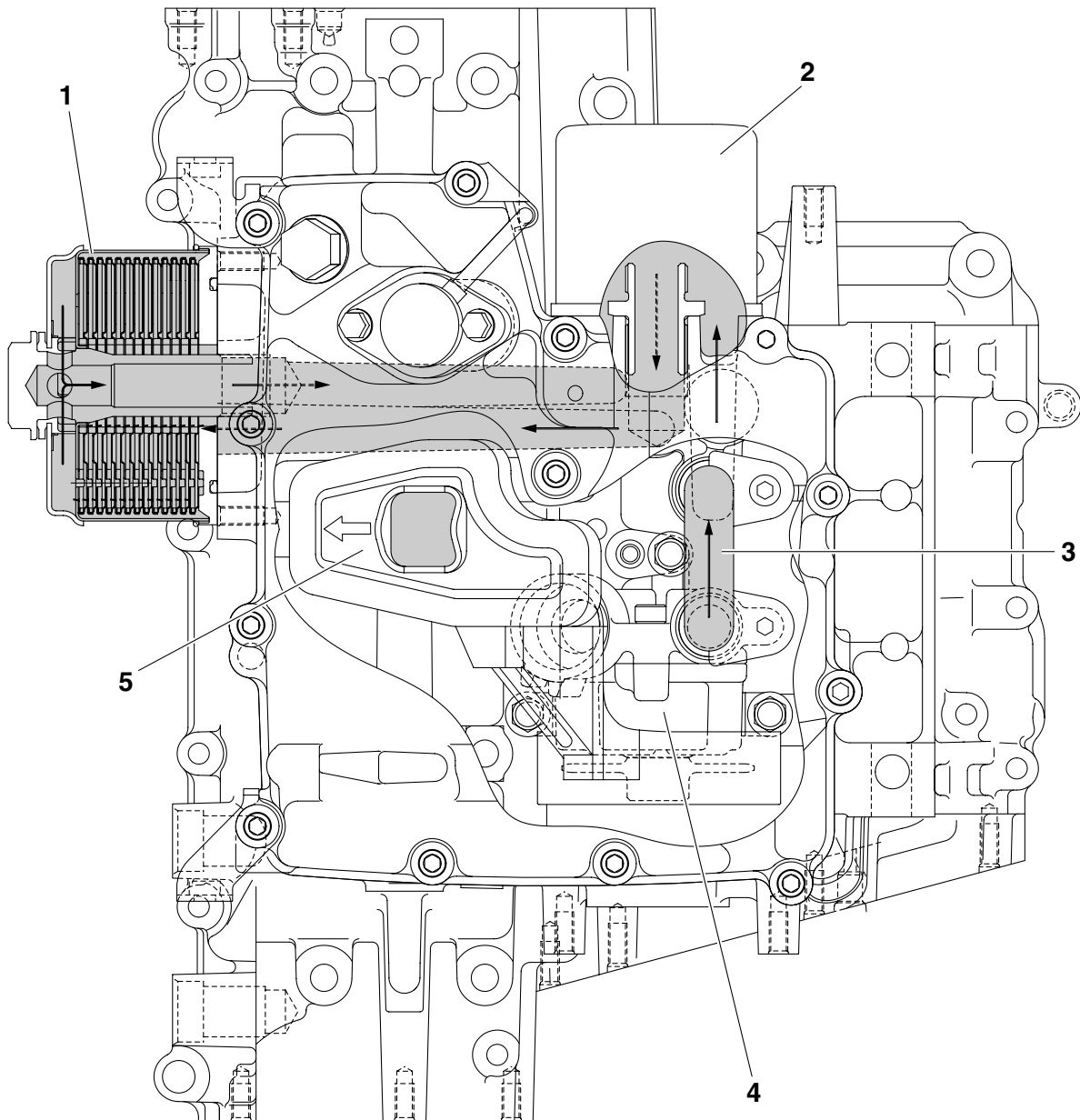
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Timing chain tensioner
2. Intake camshaft
3. Exhaust camshaft
4. Oil check bolt
5. Oil strainer
6. Ventilation chamber oil drain pipe
7. Oil pipe
8. Oil pump

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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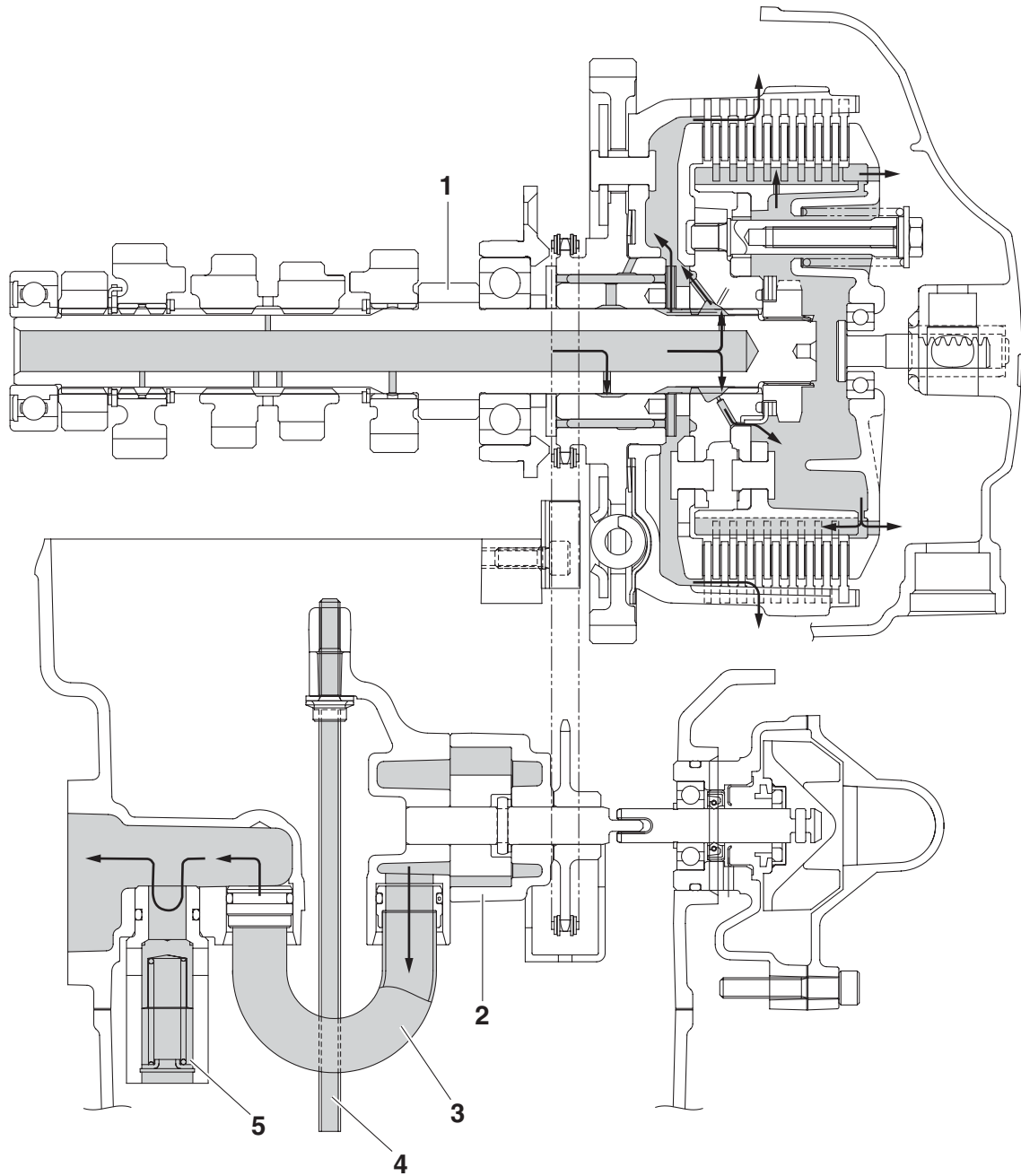
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Oil cooler
2. Oil filter
3. Oil pipe
4. Oil pump
5. Oil strainer

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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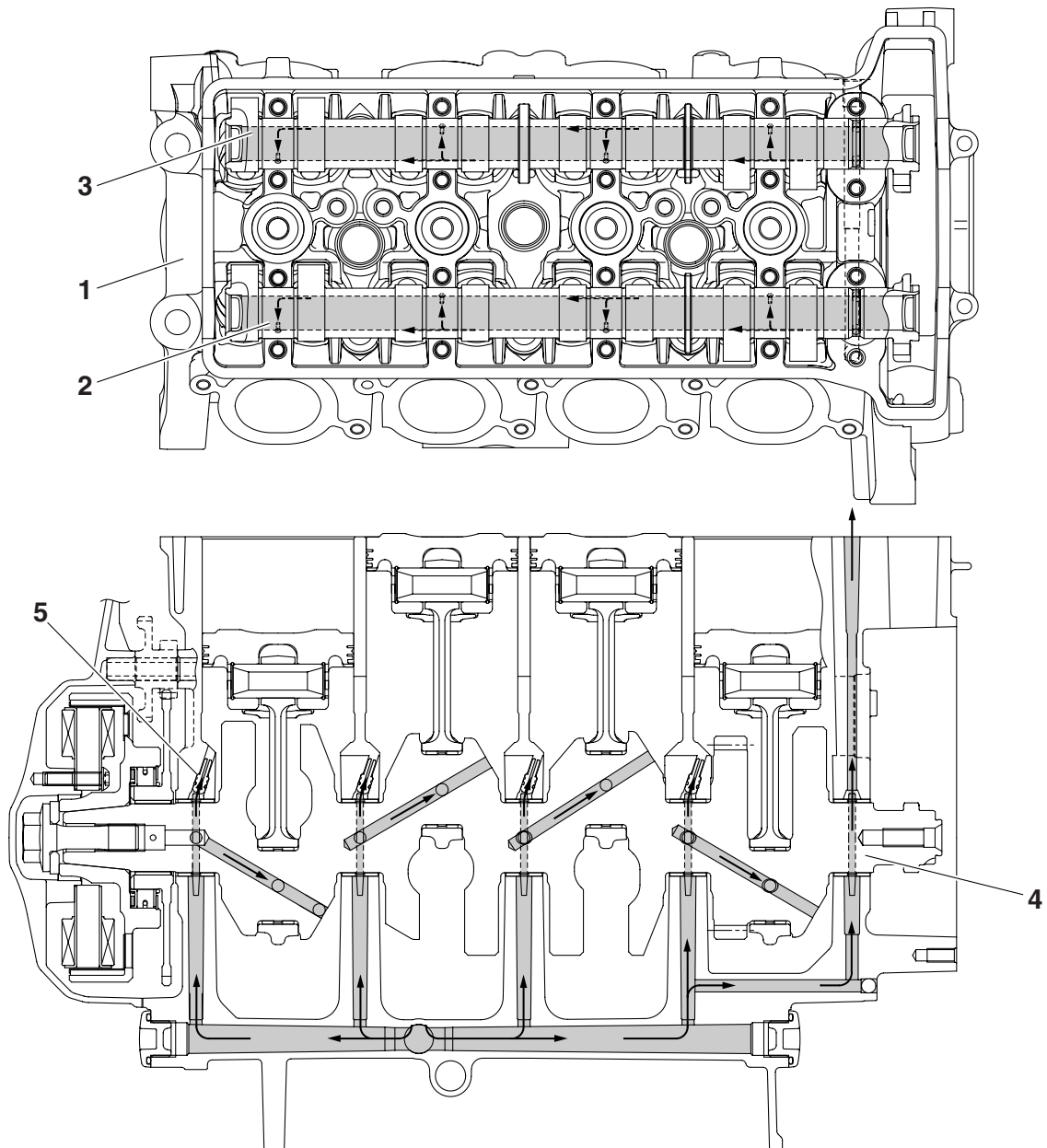
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Main axle
2. Oil pump
3. Oil pipe
4. Ventilation chamber oil drain pipe
5. Relief valve

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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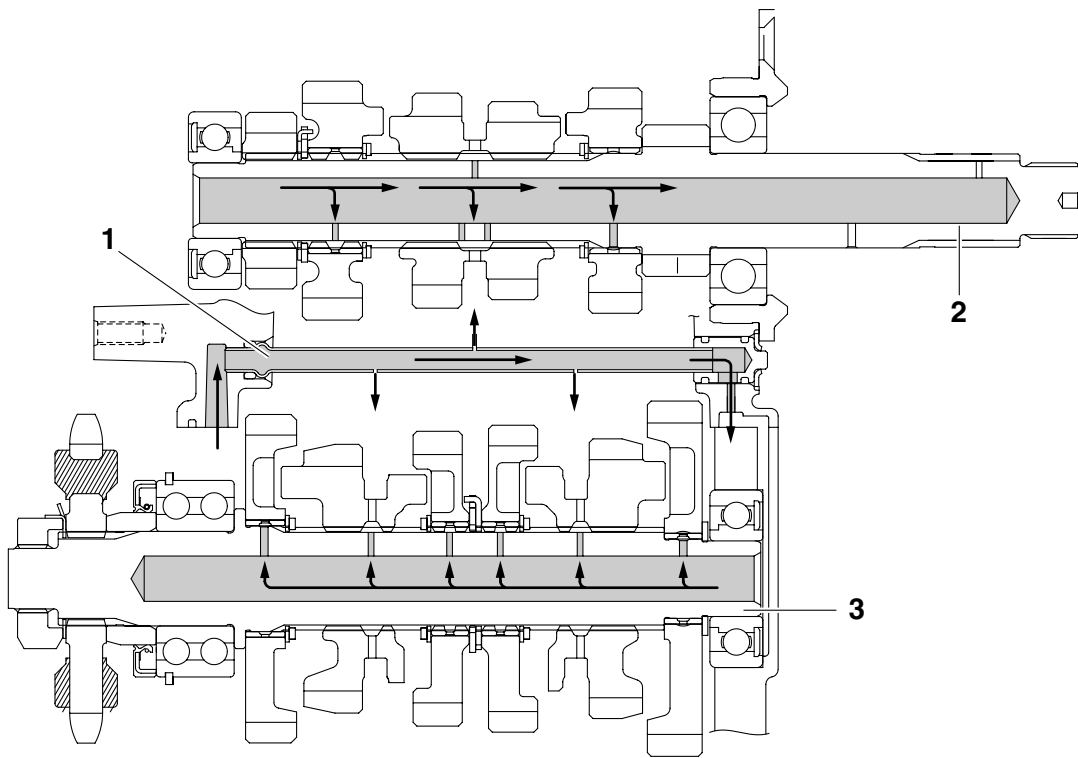
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Cylinder head
2. Intake camshaft
3. Exhaust camshaft
4. Crankshaft
5. Oil nozzle

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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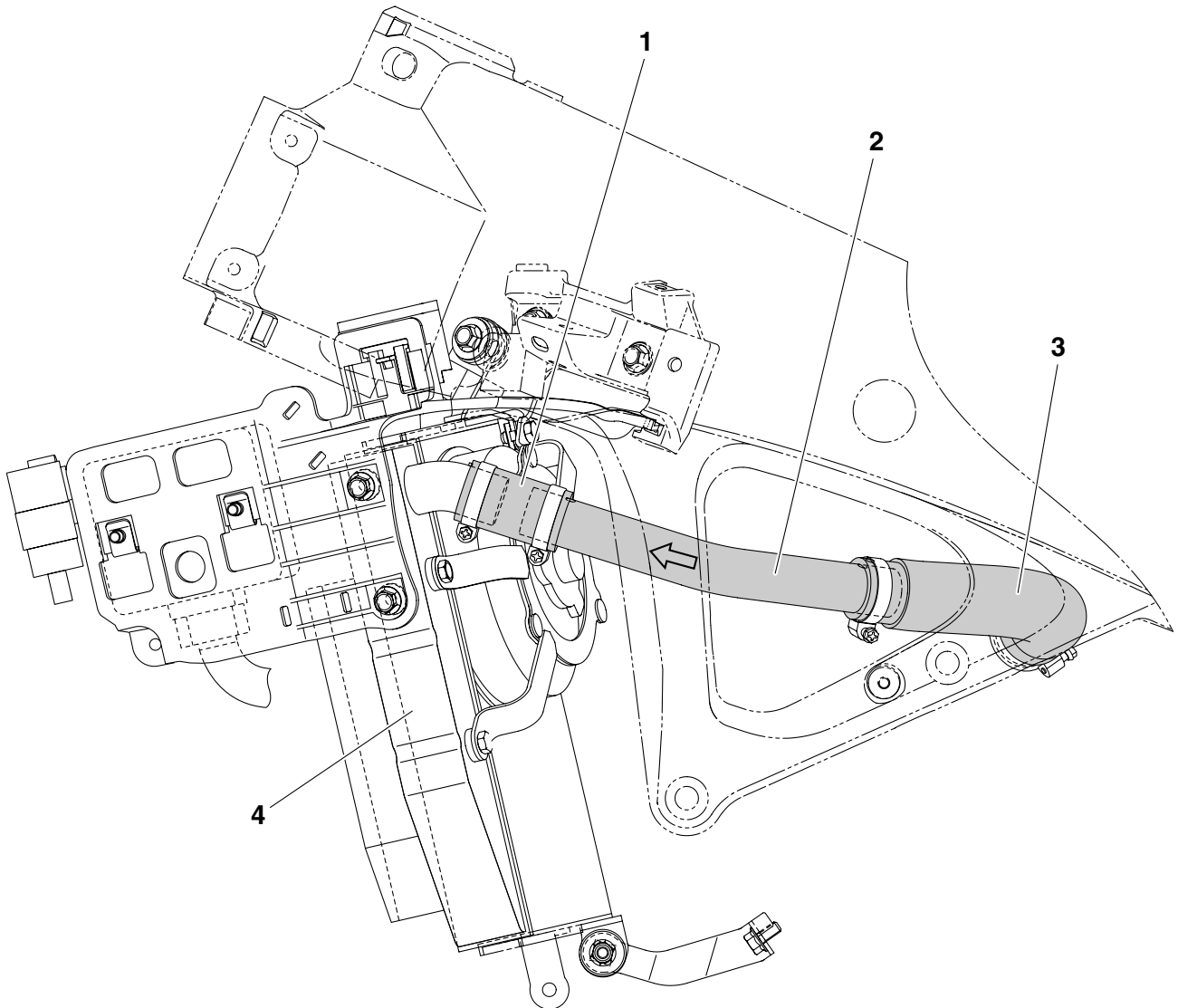
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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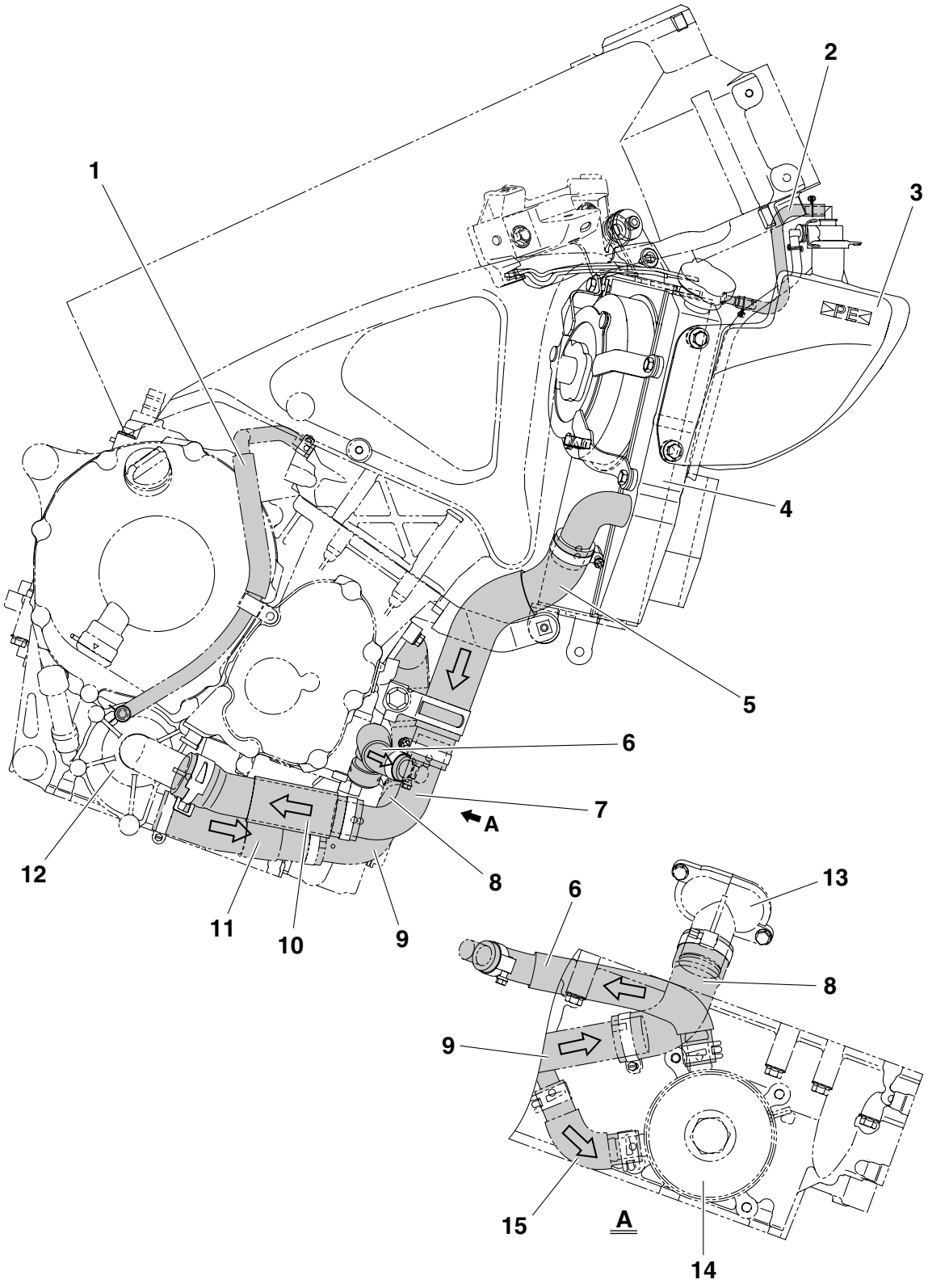
1. Oil pipe
2. Main axle
3. Drive axle

EAS20420

## COOLING SYSTEM DIAGRAMS



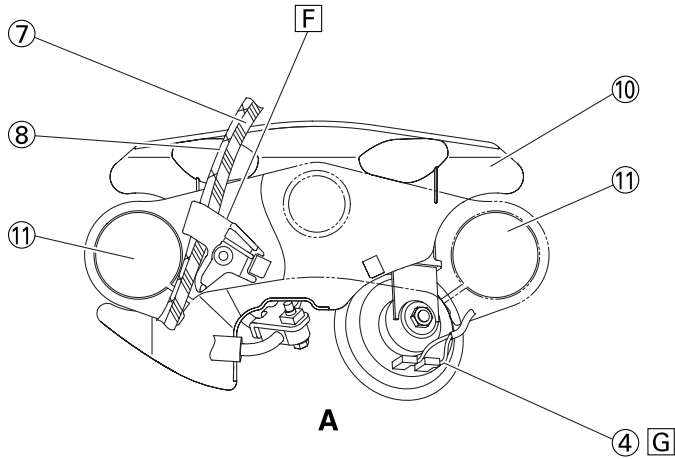
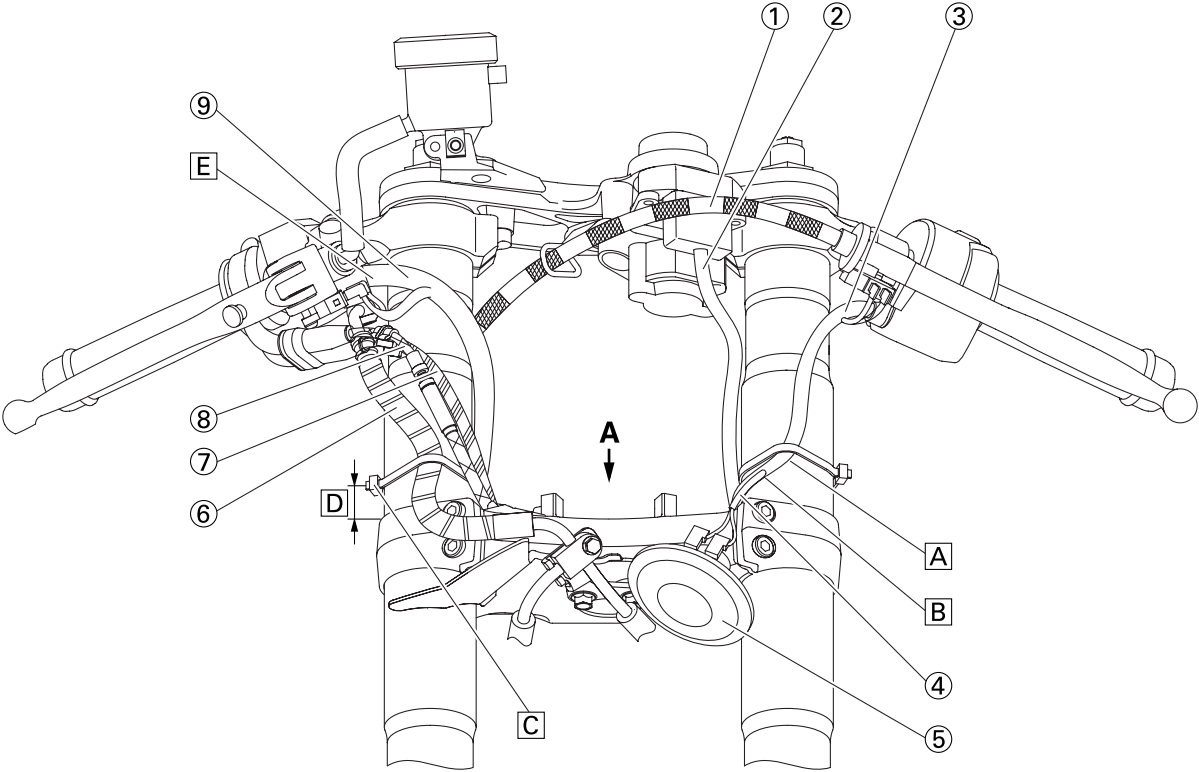
1. Radiator inlet hose
2. Radiator inlet pipe
3. Thermostat outlet hose
4. Radiator



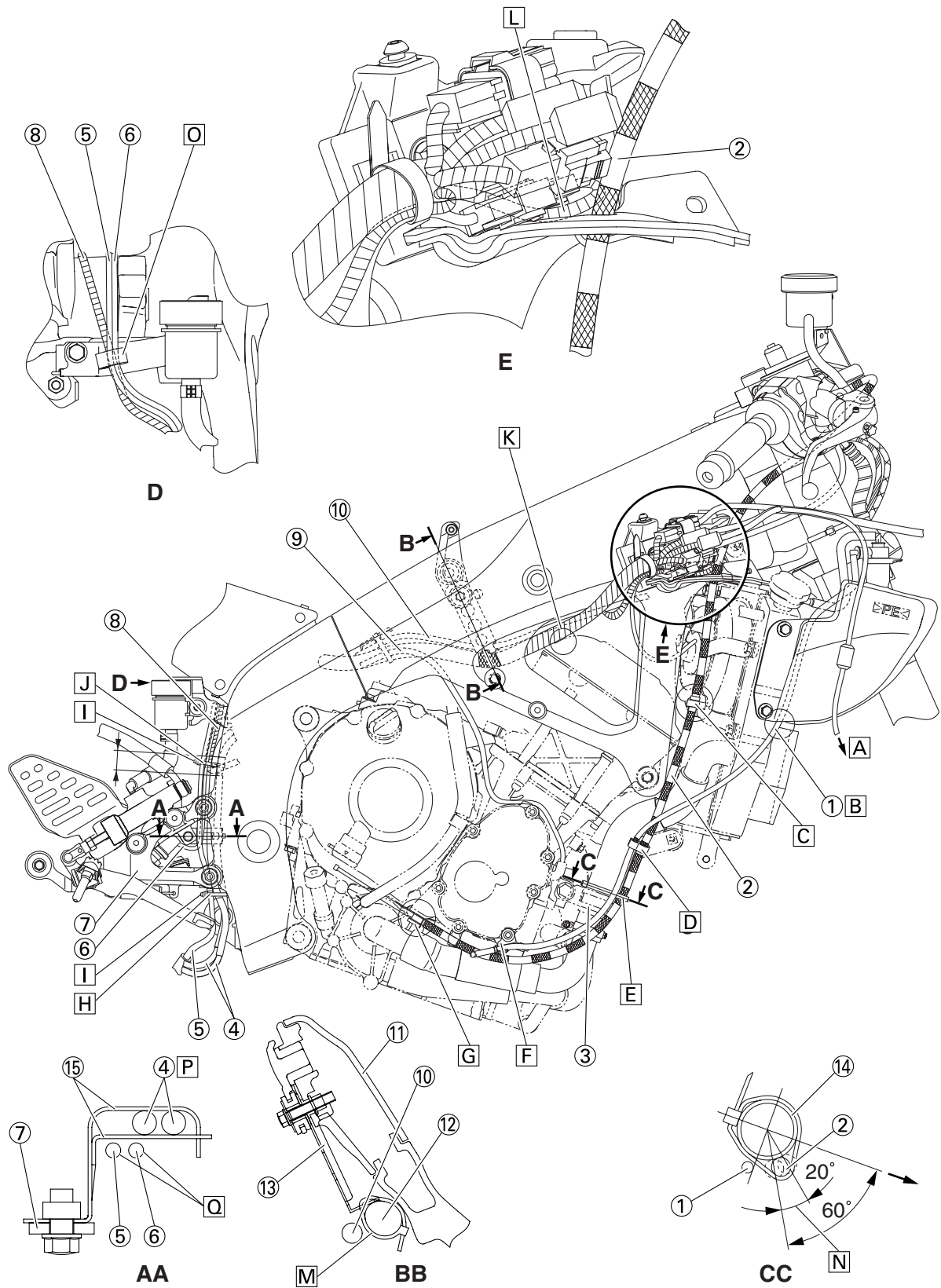
1. Water pump breather hose
2. Coolant reservoir hose
3. Coolant reservoir
4. Radiator
5. Radiator outlet hose
6. Oil cooler outlet hose
7. Radiator outlet pipe
8. Water jacket joint inlet hose
9. Water pump outlet pipe
10. Water pump inlet hose
11. Water pump outlet hose
12. Water pump
13. Water jacket joint
14. Oil cooler
15. Oil cooler inlet hose

EAS20430

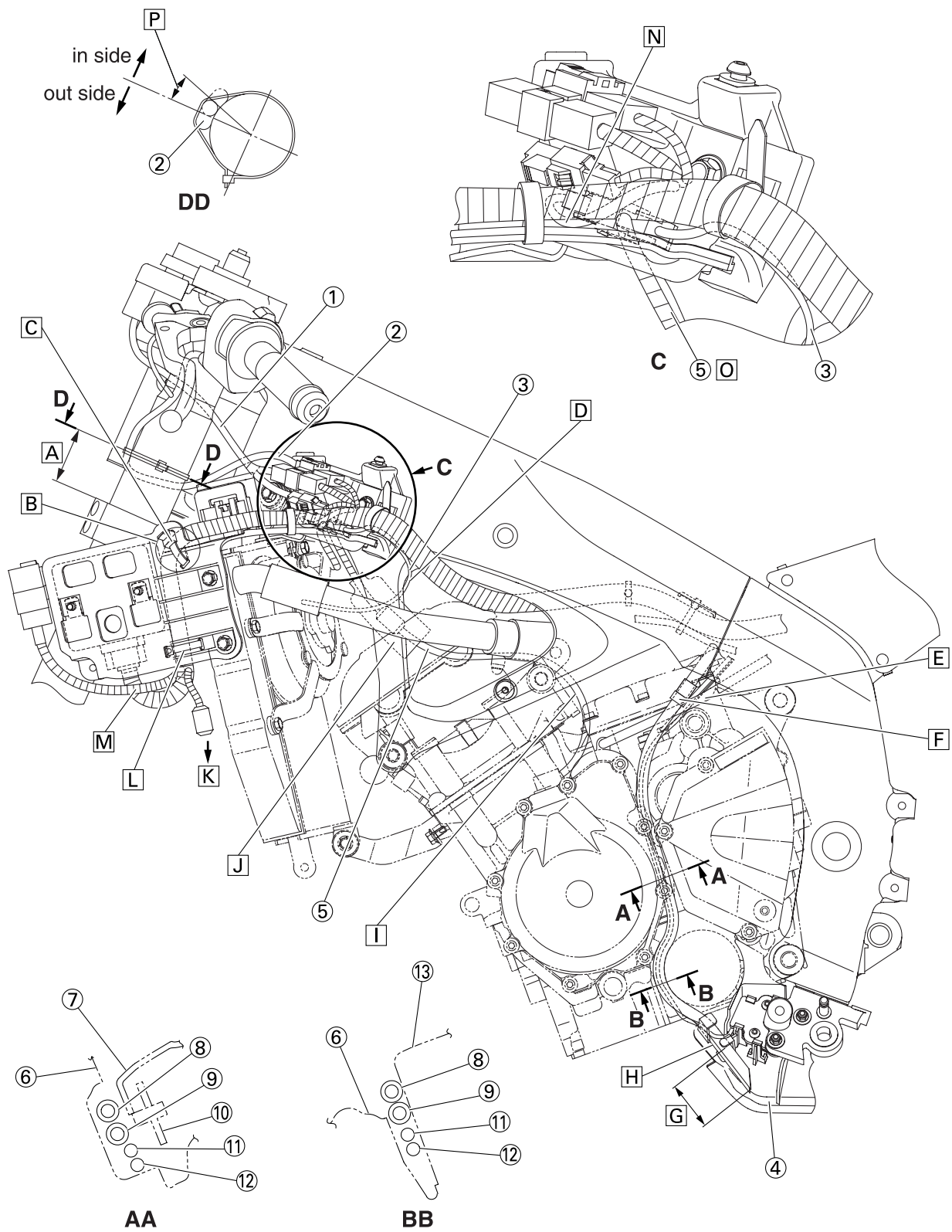
CABLE ROUTING



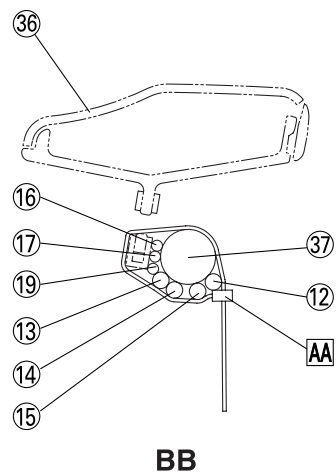
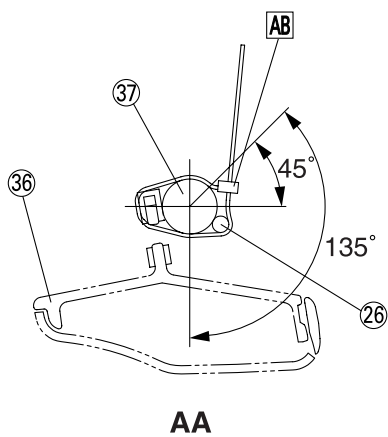
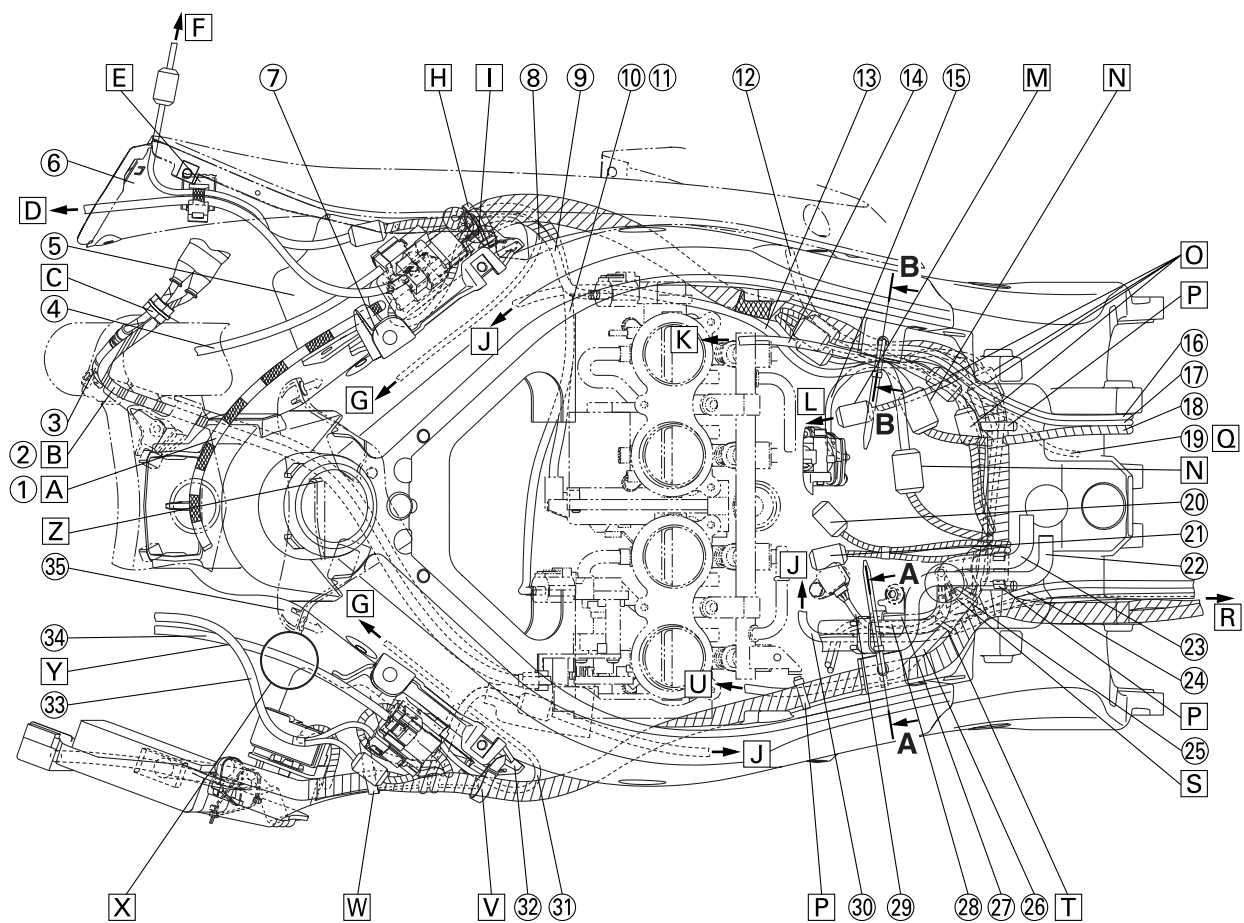
1. Clutch cable
  2. Main switch lead
  3. Left handlebar switch lead
  4. Horn lead
  5. Horn
  6. Front brake hose
  7. Throttle cable (return side)
  8. Throttle cable (pull side)
  9. Right handlebar switch lead
  10. Steering cover
  11. Front fork
- 
- A. Fasten the left handlebar switch lead in front of the front fork with a plastic locking tie. Face the end of the plastic locking tie outward and cut off the excess end of the tie to 1–5 mm (0.04–0.20 in).
  - B. Be sure to position the plastic locking tie above where the horn leads branch off from the other leads.
  - C. Set the front brake hose in front of the vehicle and outward and secure it between 2–22 degrees angle. Direct the tip of the plastic locking tie to outer side of the vehicle and cut it by leaving the tip 2–4 mm (0.08–0.16 in).
  - D. 20–30 mm (0.79–1.18 in)
  - E. Route the right handlebar switch lead between the front brake master cylinder, front fork and handlebar and above the front brake hose union bolt.
  - F. Route the throttle cable through the cable guide so that the throttle cable (pull side) is under the throttle cable (return side).
  - G. Install the horn lead L-shaped connectors so that the leads are routed outward.



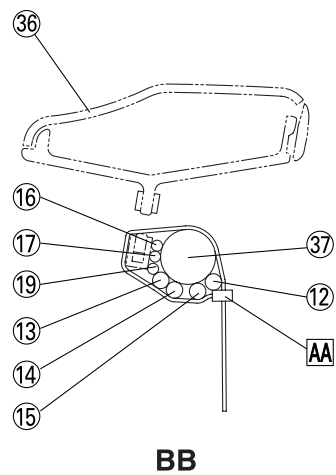
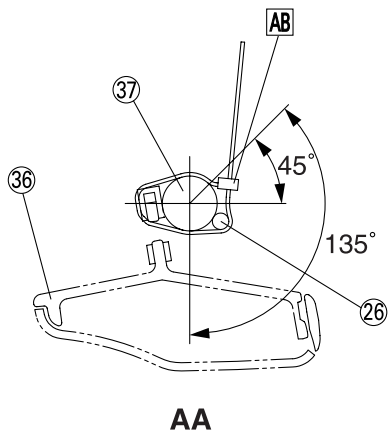
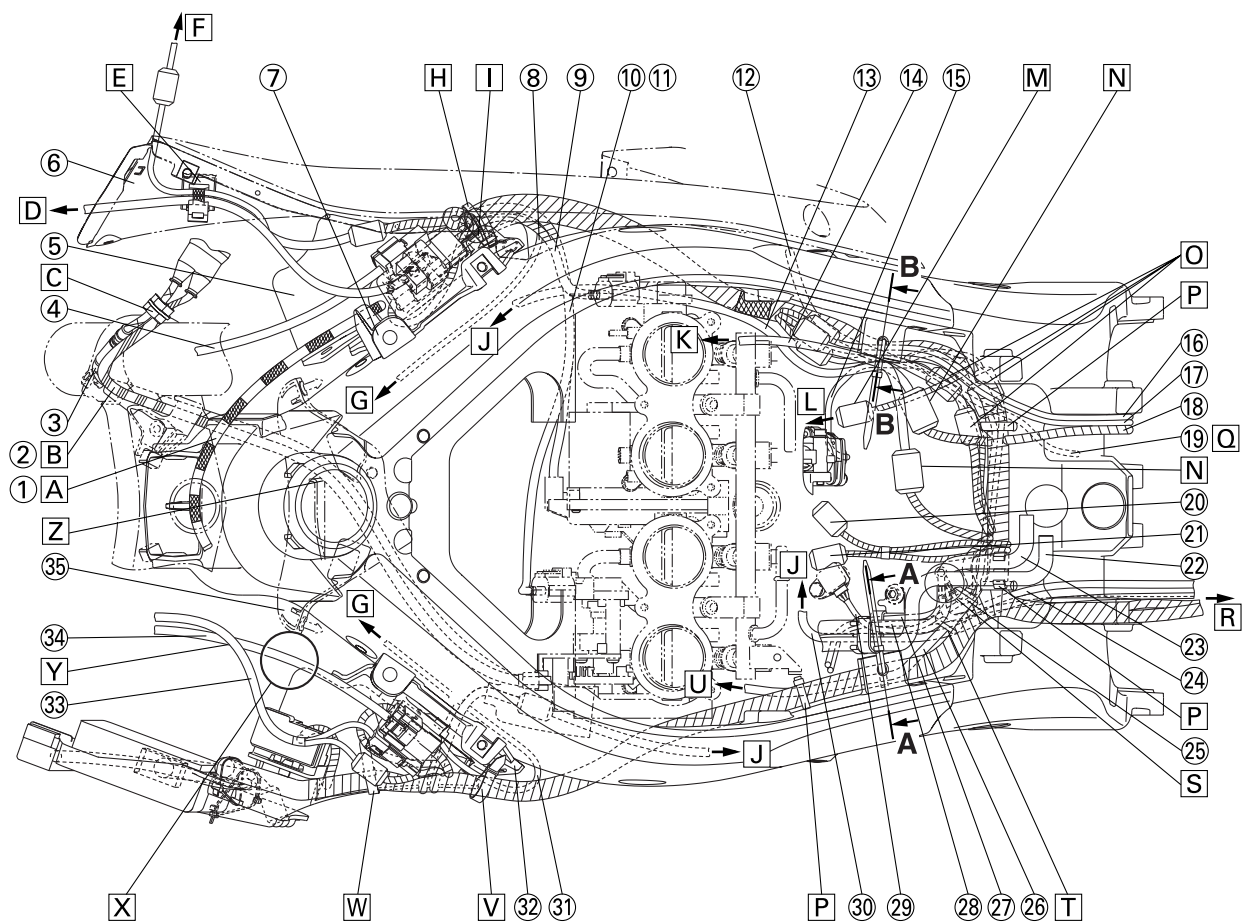
1. Coolant reservoir breather hose
  2. Clutch cable
  3. Hose clamp
  4. EXUP cable
  5. O<sub>2</sub> sensor lead
  6. Rear brake light switch lead
  7. Footrest bracket
  8. EXUP servo motor lead
  9. Pickup coil lead
  10. Ignition coil lead
  11. Frame
  12. Main harness
  13. Guide bars
  14. Radiator outlet hose
  15. Bracket
- A. To the front right turn signal light.
  - B. Route the coolant reservoir breather hose between the radiator and coolant reservoir and outside of the damper to be attached to the radiator.
  - C. The clutch cable position should be at the top of the clutch.
  - D. Cross the clutch cable and coolant reservoir breather hose and then fasten them with a holder. Make sure the clamp is positioned below the white paint mark.
  - E. Fasten the clutch cable with a plastic locking tie along the top of the radiator outlet hose holder. Face the end of the plastic locking tie inward.
  - F. Clamp the coolant reservoir breather hose, making sure to position the white paint mark behind the clamp.
  - G. Route the clutch cable through the guide on the engine.
  - H. Fasten the EXUP cable and O<sub>2</sub> sensor lead under the O<sub>2</sub> sensor lead insulator lock within 20mm (0.79 in) from insulator lock position. Face the end of the plastic locking tie backward. Cut off the excess end of the plastic locking tie to 1–5 mm (0.04–0.20 in).
  - I. Make sure that the EXUP cable and O<sub>2</sub> sensor lead between the top and bottom plastic locking ties are not twisted or crossed.
  - J. Clamp the EXUP servo motor lead, EXUP cable, rear brake light switch lead and O<sub>2</sub> sensor. Clamp position should be above the EXUP cable holder and within 20mm (0.79 in) from the bottom of the EXUP cable holder. Face the tip of the plastic locking tie to back of the vehicle and cut off the excess end of the plastic locking tie to 1–5 mm (0.04–0.20 in).
  - K. Route the main harness on the heat protector, and making sure to push the main harness inward.
  - L. Bend the lead on the side of the fan motor main harness toward the back of the vehicle as shown in the illustration and insert it into the right coupler holder. Route the bended part inside of the fan lead coupler.
  - M. Fasten the main harness with a plastic locking tie, making sure to align the positioning tape of the main harness with the holes and groove of the guide bar. Face the end of the plastic locking tie to downward and cut off the excess end of the plastic locking tie to 1–5 mm (0.04–0.20 in).
  - N. Fasten the clutch cable with a plastic tie, making sure the clutch cable positioned within 20° as shown in the illustration.
  - O. Clamp the EXUP servo motor lead, rear brake light switch lead and O<sub>2</sub> sensor lead.
  - P. Temporally install the EXUP cable by aligning the paint on the cable to the hole of the bracket. The paint mark can be anywhere after installing the bracket to the footrest bracket.
  - Q. There is no order for placing the O<sub>2</sub> sensor lead and rear brake light switch lead.



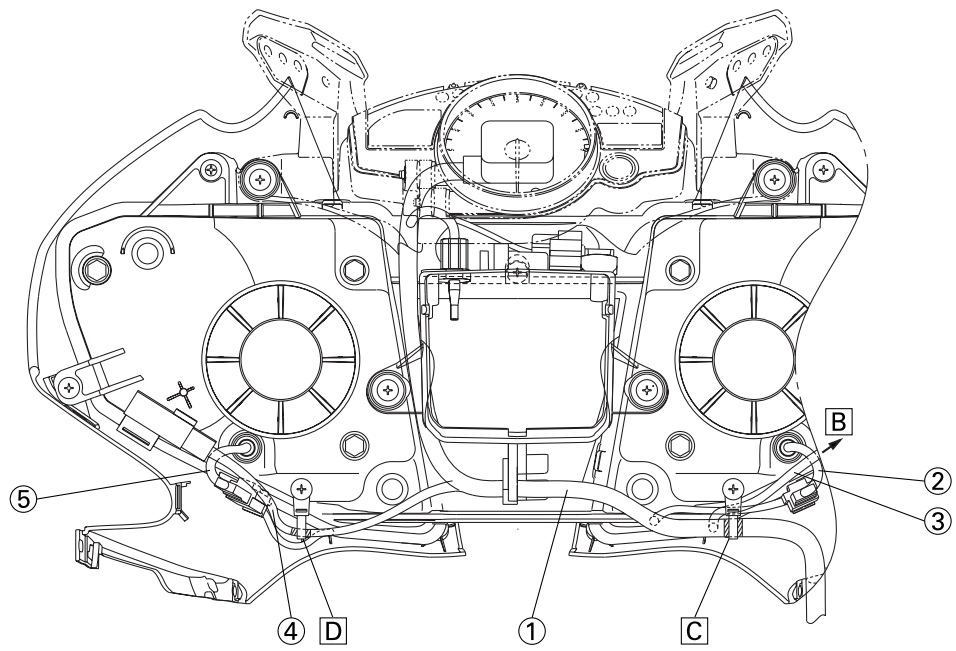
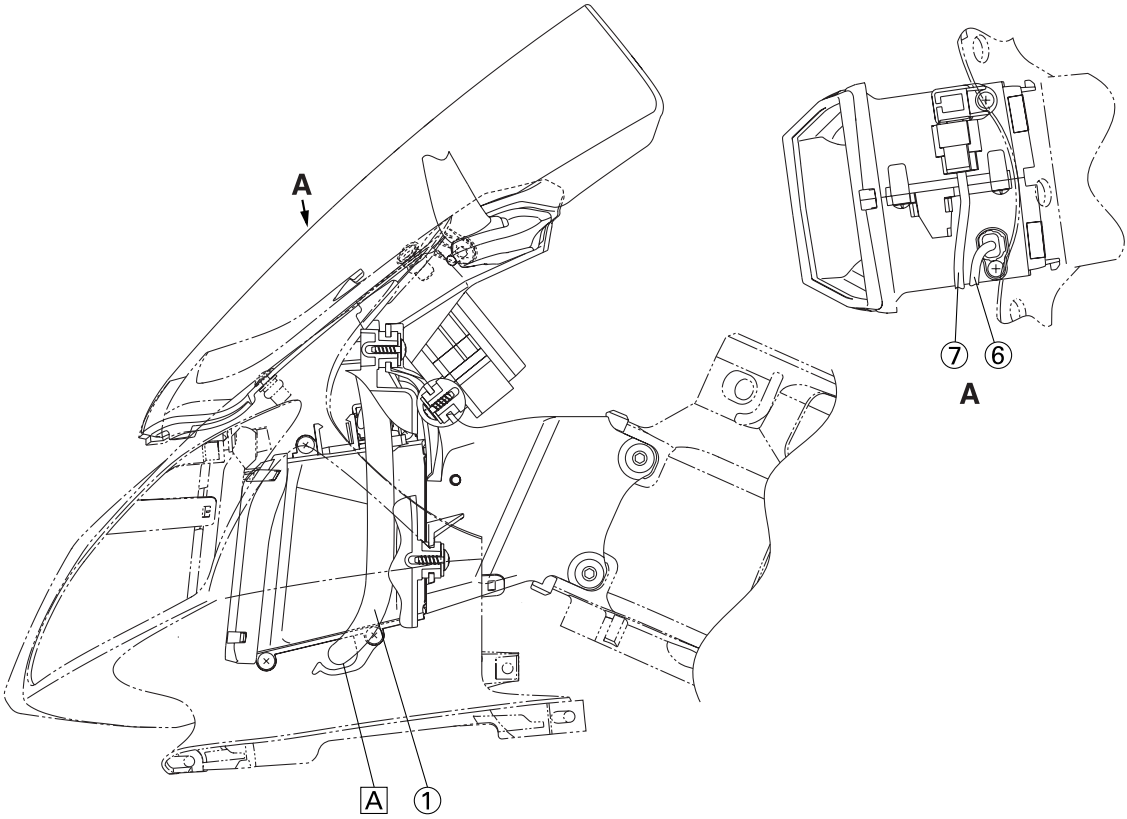
1. Main switch lead
  2. Left handlebar switch lead
  3. Left radiator fan motor lead
  4. Sidestand bracket cover
  5. AC magneto lead
  6. Crankcase
  7. Drive sprocket cover
  8. Fuel tank breather hose
  9. Fuel tank drain hose
  10. Drive chain guide
  11. Sidestand switch lead
  12. Oil level switch lead
  13. Oil filter
- A. 45–55 mm (1.77–2.17 in)
- B. Bend the main harness as shown in the illustration.
- C. Route the plastic locking tie through the hole of the rectifier/regulator bracket and fasten the main harness. Face the end of the plastic locking tie outward. Cut off the excess end of the plastic locking tie to 1–5 mm (0.04–0.20 in).
- D. Route the left radiator fan motor lead from where engine is suspended to under the main harness.
- E. Route the starter motor lead, speed sensor lead, sidestand switch lead and oil level switch lead between the clamp and crankcase shift boss. When routing, set the starter motor lead outside. There is no order for placing other leads.
- F. The clamp on the fuel tank drain hose and fuel tank breather hose should be below the engine clamp.
- G. 30–50 mm (1.18–1.97 in)
- H. Route the fuel tank drain hose and fuel tank breather hose through the guide of the sidestand bracket cover. Route the sidestand switch lead from between the guides to inside of the hose.
- I. Route the AC magneto lead between the frame and throttle body and under the hose.
- J. After connecting the connector of the AC magneto lead, put a cover on.
- K. To the front left turn signal light.
- L. Route the plastic locking tie through the hole of the rectifier/regulator bracket and fasten the main harness. Face the end of the plastic locking tie outward. Cut off the excess end of the plastic locking tie to 1–5 mm (0.04–0.20 in).
- M. There is no order of setting which harness front or back.
- N. Fold back the radiator fan motor lead (main harness side) toward back of the vehicle as shown in the illustration and insert it into the left coupler holder. The folded part can be either outside or inside of the radiator fan motor lead coupler.
- O. Route the AC magneto lead under the left radiator fan motor lead.
- P. Fasten the left handle bar switch lead with a plastic locking tie, making sure the left handle bar switch lead is positioned as shown in the illustration.



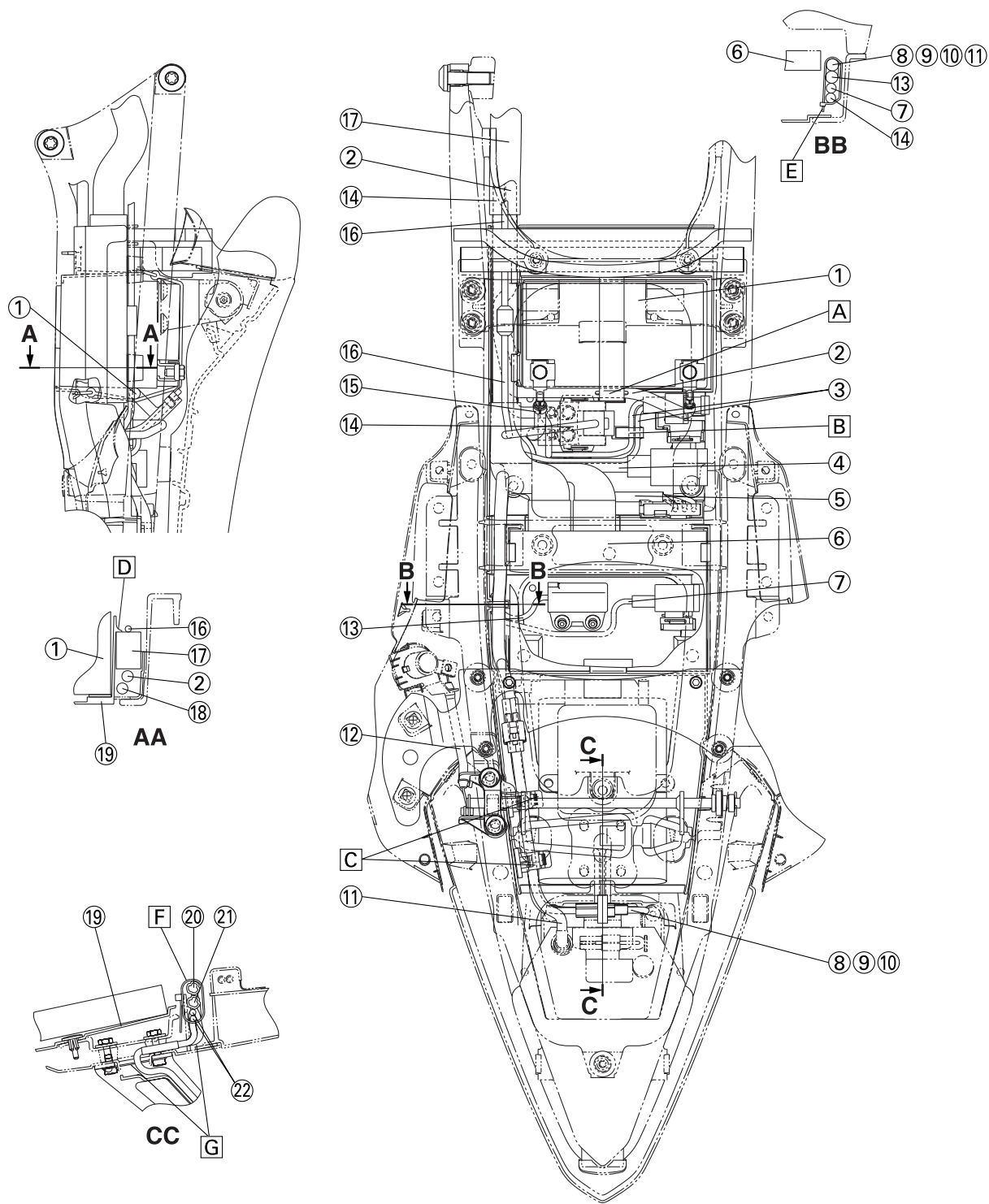
1. Clutch cable
  2. Throttle cable (return side)
  3. Throttle cable (pull side)
  4. Right handlebar switch lead
  5. Right radiator cover
  6. Right upper side cowling
  7. Right coupler holder
  8. Right radiator fan motor lead
  9. TPS lead
  10. Throttle servo motor lead
  11. Accelerator position sensor lead
  12. Pickup coil lead
  13. Ignition coil lead
  14. Throttle body lead
  15. Intake funnel servo motor lead
  16. Rear brake light switch lead
  17. O<sub>2</sub> sensor lead
  18. EXUP servo motor lead
  19. Neutral switch lead
  20. Fuel pump coupler
  21. Fuel sender coupler
  22. Fuel tank breather hose
  23. Fuel tank drain hose
  24. Battery negative lead
  25. Engine ground lead
  26. Sub-wire harness (secondary injector)
  27. Oil level switch lead
  28. Sidestand switch lead
  29. Speed sensor lead
  30. Starter motor lead
  31. Left radiator fan motor lead
  32. Left coupler holder
  33. Main switch lead
  34. Left handlebar switch lead
  35. Radiator plate
  36. Frame
  37. Main harness
- A. Route the clutch cable above the cover and from the space next to the right coupler holder to bottom of the vehicle.
  - B. Make sure that the throttle cable is not twisted or crossed.
  - C. Route the throttle cable along the edge of the protector on the return side of the throttle cable and fit in the clamp on the cable from upper side of the vehicle to the bottom.
  - D. To the headlight.
  - E. Fasten the headlight harness and right front turn signal light lead at the positioning tape with a clamp.
  - F. To the front right turn signal light.
  - G. To the radiator.
  - H. Fasten the main harness, right radiator fan motor lead, throttle position sensor lead, throttle servo motor lead and accelerator position sensor lead with a plastic locking tie. Face the plastic locking tie to upward and insert it into the hole of the right coupler holder.
  - I. Route the right radiator fan motor lead through the inside of the main harness. There is no order for placing the throttle position sensor lead and throttle servo motor lead.
  - J. To the engine.
  - K. To the throttle body.
  - L. To the coolant temperature sensor.
  - M. Route the coolant temperature sensor lead above the pickup coil lead, neutral switch lead, oil level switch lead and speed sensor lead.
  - N. Push the throttle body lead inward and place the ignition coil lead coupler so that it does not overlap or underlap with the throttle body lead coupler.
  - O. The oil level switch lead, speed sensor lead, pickup coil lead coupler and intake funnel servo motor lead coupler should be at inner and under the main harness. There is no order for placing the neutral switch lead.
  - P. Insert the plastic locking tie on the main harness to the hole of the frame securely so that it does not float.
  - Q. Route the neutral switch lead between the frame and engine.
  - R. To the rear fender.
  - S. Install both the negative battery lead and engine ground lead to the crankcase with the bolt. There is no order for placing the leads and install so that projection on each lead are facing up. Route the oil level switch lead and speed sensor lead under the negative battery lead and engine ground lead.
  - T. Sub-wire harness (secondary injector) coupler must be under the main harness.
  - U. To the secondary injector.
  - V. Fasten the main harness and left radiator fan motor lead with a plastic locking tie. Face the tip of the plastic locking tie to upward and insert it into the hole of the left coupler holder.
  - W. Face the end of the plastic locking tie inward, route the hole of the rectifier/regulator bracket, then fasten the main harness.
  - X. When turning the handle fullest to the right, make sure that the left handlebar switch lead is not strained.
  - Y. The left handlebar switch lead and main switch lead can either be on top or bottom.
  - Z. Route the throttle cable through the right side of the rib on the plate above the radiator. Make sure that it is not twisted.



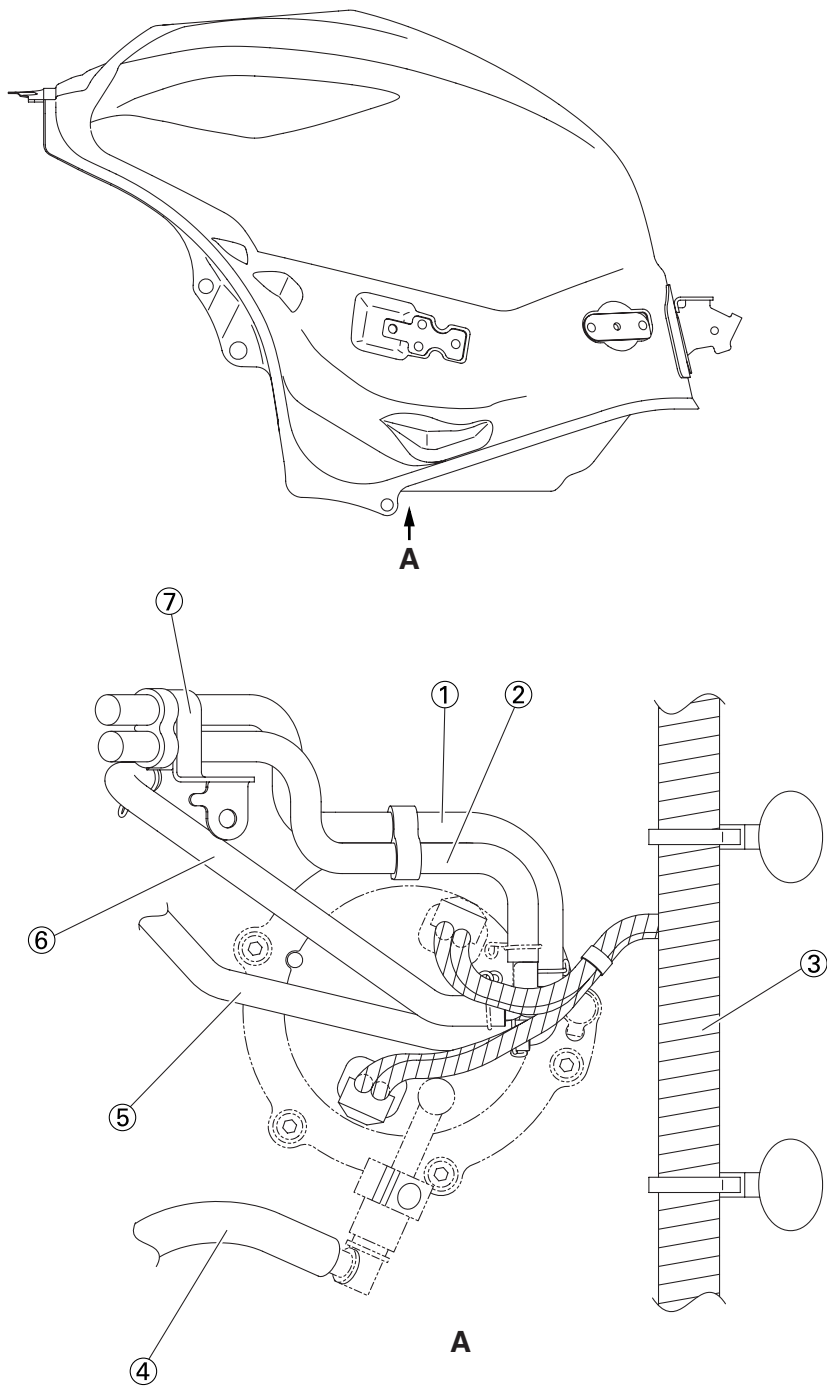
- AA.Route each lead under the frame plate.  
There is no order for placing each lead.  
Insert the plastic locking tie from upper part of the frame and direct the remaining part of the tip toward inner side of the vehicle.
- AB.Route the sub-wire harness (secondary injector) through the area shown in the illustration. Insert the plastic locking tie from upper part of the frame and direct the remaining part of the tip toward inner side of the vehicle.



1. Headlight sub-wire harness
  2. Headlight lead (low beam)
  3. Headlight relay lead (on/off)
  4. Headlight relay lead (dimmer)
  5. Headlight lead (high beam)
  6. Air temperature sensor lead
  7. Atmospheric pressure sensor lead
- 
- A. Secure the headlight sub-wire harness with the air duct hook.
  - B. To the headlight relay (on/off)
  - C. Clamp the white tape part on the headlight sub-wire harness.
  - D. Clamp the white tape part only on the lead connecting to the headlight relay (dimmer).



1. Battery
  2. Battery negative lead
  3. Main fuse lead
  4. Starting circuit cut-off relay lead
  5. Fuse box lead
  6. ECU (engine control unit)
  7. Turn signal relay lead
  8. Rear left turn signal light lead
  9. Rear right turn signal light lead
  10. License plate light lead
  11. Tail/brake light lead
  12. Seat lock cable
  13. Lean angle sensor lead
  14. Starter relay lead
  15. Battery positive lead
  16. Sidestand switch lead
  17. Main harness
  18. Starter motor lead
  19. Battery box assembly
  20. Rear left turn signal light coupler
  21. Rear right turn signal light coupler
  22. License plate light connector
- 
- A. Route the battery negative lead through the inside of the battery band.
  - B. Make sure to fit in the main fuse lead to the hook on the battery box assembly.
  - C. Fasten the left rear turn signal light lead, right rear turn signal light lead, license plate light lead and tail/brake light lead with a clamp.
  - D. Make sure to hook the main harness case to the tab on the battery box assembly. Be careful not to pinch the leads.
  - E. When securing each lead with the plastic locking tie, the leads should not touch the ECU (engine control unit). Face the end of the plastic locking tie downward. There is no order for placing each lead.
  - F. Insert the plastic locking tie attaching to the left rear turn signal light coupler, right rear turn signal light coupler and license connector from the front of the vehicle to the back and secure it to the rib of the rear fender. Insert the tip of the plastic locking tie between the rear frame and the rib of the rear fender. There is no order for placing each lead.
  - G. Route the left rear turn signal light lead, right rear turn signal light lead and license plate light lead through the hole of the rib of the rear fender. There is no order for placing each lead.



1. Fuel tank breather hose (Except for California)
2. Fuel tank drain hose
3. Main harness
4. Fuel hoses
5. Fuel tank breather hose (Except for California)
6. Fuel tank drain hose
7. Clamp



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## PERIODIC CHECKS AND ADJUSTMENTS

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EAS20450

## PERIODIC MAINTENANCE

EAS20460

### 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.

EAS13S1007

### PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

NO.		ITEM	ROUTINE	INITIAL	ODOMETER READING					
				600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
1	*	Fuel line	<ul style="list-style-type: none"><li>• Check fuel hoses for cracks or damage.</li><li>• Replace if necessary.</li></ul>		√	√	√	√	√	
2	*	Spark plugs	<ul style="list-style-type: none"><li>• Check condition.</li><li>• Adjust gap and clean.</li><li>• Replace every 8000 mi (13000 km) or 12 months.</li></ul>		√	Replace.	√	Replace.	√	
3	*	Valve clearance	<ul style="list-style-type: none"><li>• Check and adjust valve clearance when engine is cold.</li></ul>	Every 26600 mi (42000 km)						
4	*	Crankcase breather system	<ul style="list-style-type: none"><li>• Check breather hose for cracks or damage.</li><li>• Replace if necessary.</li></ul>		√	√	√	√	√	
5		Fuel injection	<ul style="list-style-type: none"><li>• Adjust synchronization.</li></ul>		√	√	√	√	√	
6	*	Exhaust system	<ul style="list-style-type: none"><li>• Check for leakage.</li><li>• Tighten if necessary.</li><li>• Replace gasket(s) if necessary.</li></ul>		√	√	√	√	√	
7	*	Evaporative emission control system (For California only)	<ul style="list-style-type: none"><li>• Check control system for damage.</li><li>• Replace if necessary.</li></ul>				√			
8	*	Air induction system	<ul style="list-style-type: none"><li>• Check the air cut-off valve, reed valve, and hose for damage.</li><li>• Replace any damaged parts.</li></ul>			√		√		

EAS13S1008

### GENERAL MAINTENANCE AND LUBRICATION CHART

NO.		ITEM	ROUTINE	INITIAL	ODOMETER READING					
				600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
1	*	Air filter element	• Replace.	Every 24000 mi (37000 km)						
2	*	Clutch	• Check operation. • Adjust or replace cable.	√	√	√	√	√	√	
3	*	Front brake	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√	
4	*	Rear brake	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√	

# PERIODIC MAINTENANCE

NO.	ITEM	ROUTINE	INITIAL	ODOMETER READING					
			600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
5	Brake hoses	• Check for cracks or damage.		√	√	√	√	√	
		• Replace.	Every 4 years						
6	* Wheels	• Check runout and for damage. • Replace if necessary.		√	√	√	√	√	
7	* Tires	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√	
8	* Wheel bearings	• Check bearings for smooth operation. • Replace if necessary.		√	√	√	√	√	
9	* Swingarm pivot bearings	• Check operation and for excessive play.		√	√	√	√	√	
		• Lubricate with lithium-soap-based grease.	Every 30000 mi (50000 km)						
10	Drive chain	• Check chain slack, alignment and condition. • Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.	Every 500 mi (800 km) and after washing the motorcycle or riding in the rain						
11	* Steering bearings	• Check bearing assemblies for looseness.	√	√	√	√	√	√	
		• Moderately repack with lithium-soap-based grease.	Every 12000 mi (19000 km)						
12	* Chassis fasteners	• Check all chassis fitting and fasteners. • Correct if necessary.		√	√	√	√	√	
13	Brake lever pivot shaft	• Apply silicone grease lightly.		√	√	√	√	√	
14	Brake pedal pivot shaft	• Apply lithium-soap-based grease lightly.		√	√	√	√	√	
15	Clutch lever pivot shaft	• Apply lithium-soap-based grease lightly.		√	√	√	√	√	
16	Shift pedal pivot shaft	• Apply lithium-soap-based grease lightly.		√	√	√	√	√	
17	Sidestand pivot	• Check operation. • Apply lithium-soap-based grease lightly.		√	√	√	√	√	
18	* Sidestand switch	• Check operation and replace if necessary.	√	√	√	√	√	√	
19	* Front fork	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	√	
20	* Shock absorber assembly	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	√	
21	* Rear suspension link pivots	• Check operation. • Correct if necessary.			√		√		
22	Engine oil	• Change (warm engine before draining).	√	√	√	√	√	√	
23	* Engine oil filter cartridge	• Replace.	√		√		√		

# PERIODIC MAINTENANCE

NO.		ITEM	ROUTINE	INITIAL	ODOMETER READING					
				600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
24	*	Cooling system	<ul style="list-style-type: none"><li>• Check hoses for cracks or damage.</li><li>• Replace if necessary.</li></ul>		√	√	√	√	√	
			<ul style="list-style-type: none"><li>• Change with ethylene glycol antifreeze coolant every 24 months.</li></ul>				Change.			
25	*	Front and rear brake switches	<ul style="list-style-type: none"><li>• Check operation.</li></ul>	√	√	√	√	√	√	
26	*	Control cables	<ul style="list-style-type: none"><li>• Apply Yamaha chain and cable lube or engine oil SAE 10W-30 thoroughly.</li></ul>	√	√	√	√	√	√	
27	*	Throttle grip housing and cable	<ul style="list-style-type: none"><li>• Check operation and free play.</li><li>• Adjust the throttle cable free play if necessary.</li><li>• Lubricate the throttle grip housing and cable.</li></ul>		√	√	√	√	√	
28	*	Lights, signals and switches	<ul style="list-style-type: none"><li>• Check operation.</li><li>• Adjust headlight beam.</li></ul>	√	√	√	√	√	√	

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

## NOTE:

From 24000 mi (37000 km) or 36 months, repeat the maintenance intervals starting from 8000 mi (13000 km) or 12 months.

## NOTE:

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

EAS20470

## ENGINE

EAS20490

### 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:

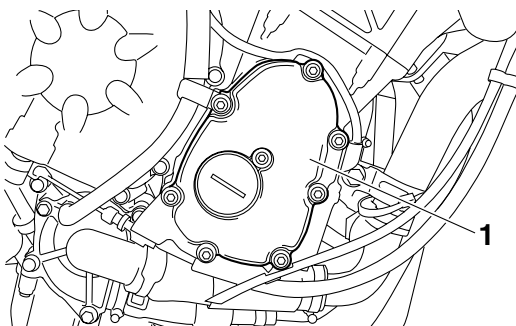
- Rider seat
- Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank  
Refer to "FUEL TANK" on page 7-1.
- Air filter case  
Refer to "AIR FILTER CASE" on page 7-4.
- Throttle body  
Refer to "THROTTLE BODIES" on page 7-9.
- Air cut-off valve  
Refer to "AIR INDUCTION SYSTEM" on page 7-15.
- Radiator  
Refer to "RADIATOR" on page 6-1.

#### 2. Remove:

- Ignition coils
- Spark plugs
- Cylinder head cover  
Refer to "CAMSHAFTS" on page 5-7.

#### 3. Remove:

- Pickup rotor cover "1"



#### 4. Measure:

- Valve clearance  
Out of specification → Adjust.



#### Valve clearance (cold)

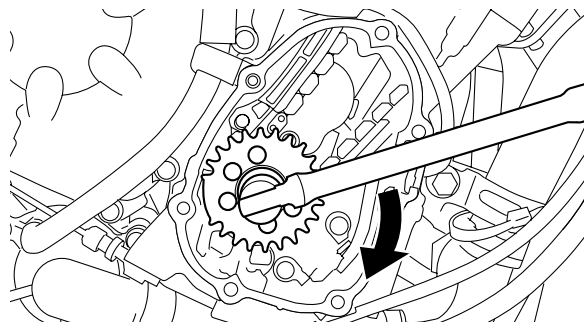
##### Intake

0.12–0.19 mm (0.0047–0.0075 in)

##### Exhaust

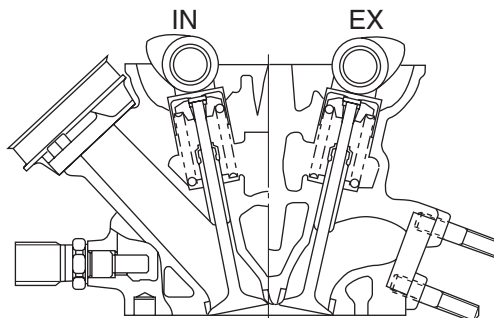
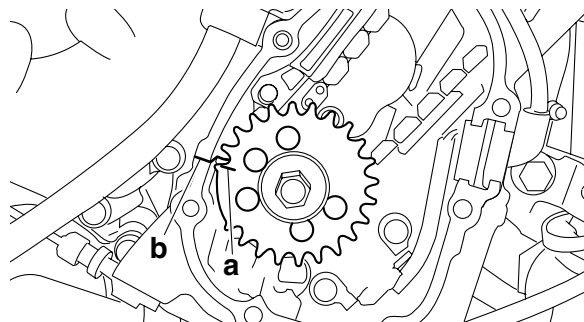
0.16–0.23 mm (0.0063–0.0091 in)

- a. Turn the crankshaft clockwise.



- b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the pickup 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.

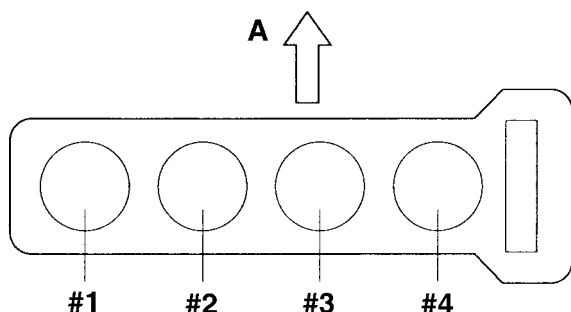
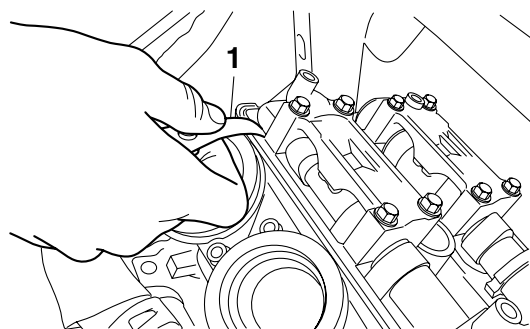


- c. Measure the valve clearance with a thickness gauge "1".

## NOTE:

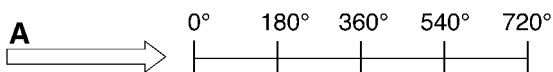
- If the valve clearance is incorrect, note the measured reading.
- Measure the valve clearance in the following sequence.

**Valve clearance measuring sequence**  
Cylinder #1 → #2 → #4 → #3



A. Front

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



<b>B</b>	#1	<b>C</b>			
	#2		<b>C</b>		
	#3				<b>C</b>
	#4			<b>C</b>	

- A. Degrees that the crankshaft is turned clockwise  
B. Cylinder  
C. Combustion cycle

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

5. Remove:

- Camshafts

## NOTE:

- Refer to "CAMSHAFTS" on page 5-7.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

6. Adjust:

- Valve clearance



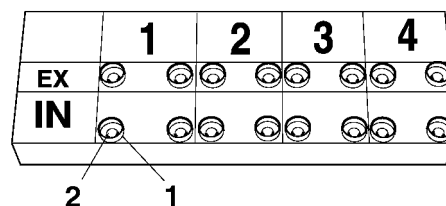
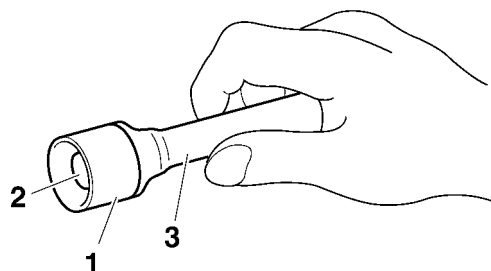
- a. Remove the valve lifter "1" and the valve pad "2" with a valve lapper "3".



**Valve lapper**  
**90890-04101**  
**Valve lapping tool**  
**YM-A8998**

## 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. Calculate the difference between the specified valve clearance and the measured valve clearance.

Example:

Specified valve clearance = 0.11–0.20 mm  
(0.004–0.008 in)





EAS20570

## SYNCHRONIZING THE THROTTLE BODIES

### NOTE:

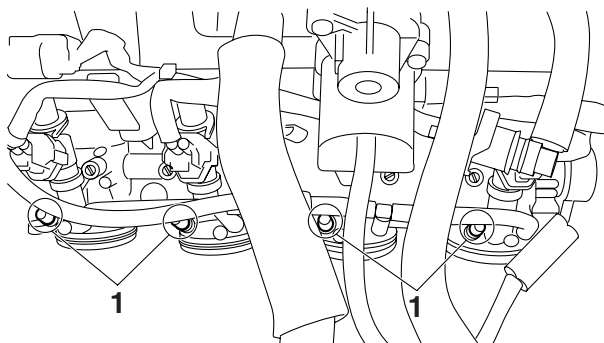
Prior to synchronizing the throttle bodies, the valve clearance and the engine idling speed should be properly adjusted.

1. Stand the vehicle on a level surface.

### NOTE:

Place the vehicle on a suitable stand.

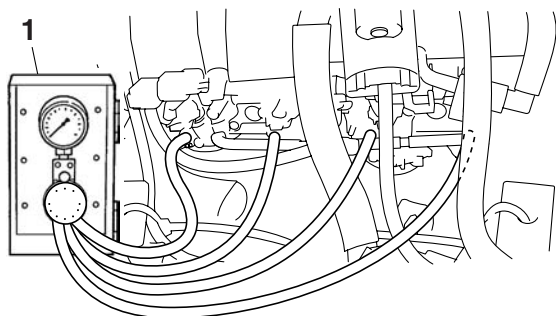
2. Remove:
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
3. Remove:
  - Caps "1"



4. Install:
  - Vacuum gauge "1"
  - Digital tachometer



**Vacuum gauge**  
90890-03094  
**Carburetor synchronizer**  
YU-44456



5. Install:
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
6. Adjust:

- Throttle body synchronization



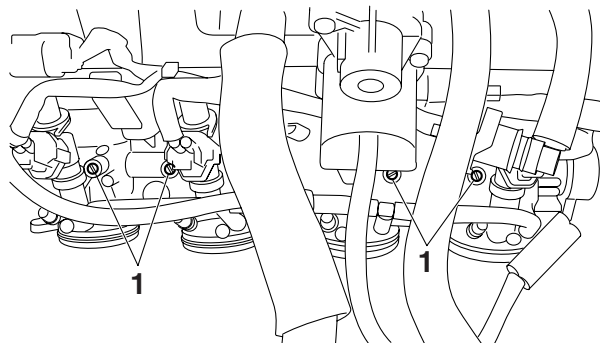
### Basic procedure

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



**Engine idling speed**  
1250–1350 r/min

- b. Turn the bypass air screw "1" with a white paint mark out a little, and then turn it in fully.



- c. Using the throttle body that has the bypass air screw with a white paint mark as the standard, turn the bypass air screws without white paint marks in or out to adjust the other throttle bodies.

### NOTE:

- If more than one throttle body has a bypass air screw with a white paint mark, use the one with the lowest vacuum pressure as the standard.
- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If an air screw was removed, turn the screw 3/4 turn in and be sure to synchronize the throttle body.



**Intake vacuum**  
20.0 kPa (5.9 inHg) (150 mmHg)

### NOTE:

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

- If you are unable to adjust the throttle body synchronization using this procedure, use the following procedure instead.



## Alternate procedure

### NOTE:

Use this alternate procedure if you are unable to adjust the throttle body synchronization using the basic procedure.

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



**Engine idling speed**  
**1250–1350 r/min**

- Turn all of the bypass air screws in fully.
- Using the throttle body with the lowest vacuum pressure as the standard, turn out the bypass air screws of the other throttle bodies to adjust them.

### NOTE:

- Do not turn out the bypass air screw of the throttle body with the lowest vacuum pressure.
- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If an air screw was removed, turn the screw 3/4 turn in and be sure to synchronize the throttle body.



**Intake vacuum**  
**20.0 kPa (5.9 inHg) (150 mmHg)**

### NOTE:

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



- Stop the engine and remove the measuring equipment.
- Allow the engine to cool, and then start the engine and check that the engine speed does not rise abnormally high.
- Adjust:
  - Throttle cable free play

Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-8.



**Throttle cable free play**  
**3.0–5.0 mm (0.12–0.20 in)**

### 10. Install:

- Caps
- Fuel tank  
Refer to “FUEL TANK” on page 7-1.
- Rider seat  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS20630

## ADJUSTING THE THROTTLE CABLE FREE PLAY

### NOTE:

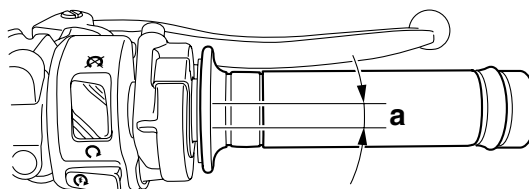
Prior to adjusting the throttle cable free play, the engine idling speed and carburetor synchronization should be adjusted properly.

### 1. Check:

- Throttle cable free play “a”  
Out of specification → Adjust.



**Throttle cable free play**  
**3.0–5.0 mm (0.12–0.20 in)**



### 2. Adjust:

- Throttle cable free play



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

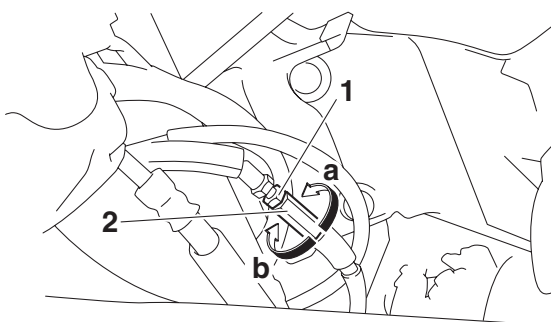
### Direction “a”

**Throttle cable free play is increased.**

### Direction “b”

**Throttle cable free play is decreased.**

- Tighten the locknut “1”.



EWA12910

## **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.



EAS20680

## **CHECKING THE SPARK PLUGS**

The following procedure applies to all of the spark plugs.

1. Remove:
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Air filter case  
Refer to "AIR FILTER CASE" on page 7-4.
  - Air induction system solenoid  
Refer to "AIR INDUCTION SYSTEM" on page 7-15.
2. Remove:
  - Ignition coils
  - Spark plugs

ECA13320

## **CAUTION:**

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

3. Check:
  - Spark plug type  
Incorrect → Change.



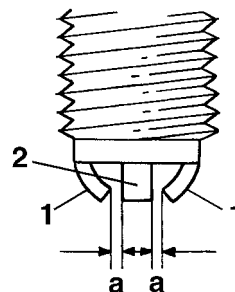
**Manufacturer/model**  
**NGK/CR10EK**

4. Check:
  - Electrode "1"

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



**Spark plug gap**  
**0.6–0.7 mm (0.024–0.028 in)**



7. Install:
  - Spark plugs
  - Ignition coils



**Spark plug**  
**13 Nm (1.3 m·kg, 9.6 ft·lb)**

## **NOTE:**

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

8. Install:
  - Air induction system solenoid  
Refer to "AIR INDUCTION SYSTEM" on page 7-15.
  - Air filter case  
Refer to "AIR FILTER CASE" on page 7-4.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS20710

## **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” on page 3-4.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
  - Side cowling assembly  
Refer to “GENERAL CHASSIS” on page 4-1.
  - Radiator  
Refer to “RADIATOR” on page 6-1.
4. Remove:
  - Ignition coils
  - Spark plugs

ECA13340

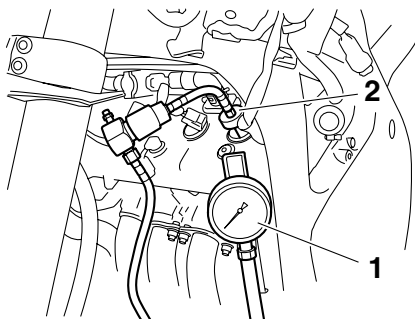
## CAUTION:

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

5. Install:
  - Compression gauge “1”
  - Extension “2”



**Compression gauge**  
**90890-03081**  
**Engine compression tester**  
**YU-33223**  
**Extension**  
**90890-04136**



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



**Standard compression pressure (at sea level)**

**1600 kPa/400 r/min (227.6 psi/400 r/min) (16.0 kgf/cm²/400 r/min)**

**Minimum–maximum**

**1350–1650 kPa (195.8–239.3 psi) (13.5–16.5 kgf/cm²)**



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

EWA12940

## WARNING

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

## NOTE:

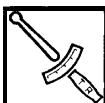
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 14 psi).

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

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



7. Install:
  - Spark plugs
  - Ignition coils



**Spark plug**  
**13 Nm (1.3 m·kg, 9.6 ft·lb)**

## 8. Install:

- Radiator  
Refer to "RADIATOR" on page 6-1.
- Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS20730

## CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

### NOTE:

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

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

3. Remove:

- Dipstick "1"

4. Check:

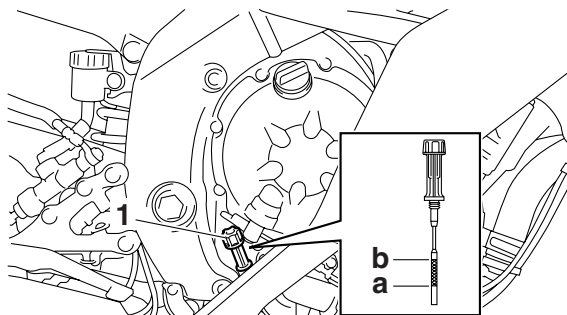
- Engine oil level

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

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

### NOTE:

- Before checking the engine oil level, wait a few minutes until the oil has settled.
- Do not screw the dipstick in when inspecting the oil level.



### Type

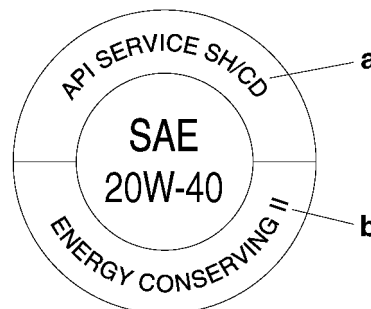
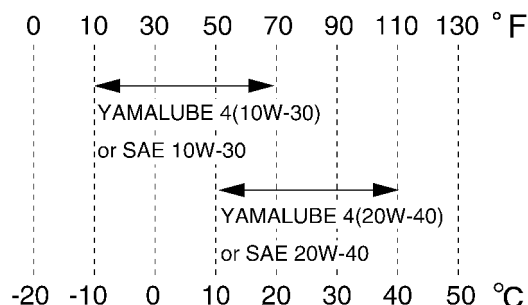
**YAMALUBE 4, SAE10W-30 or SAE20W-40**

**Recommended engine oil grade  
API service SG type or higher,  
JASO standard MA**

EC2C01005

### CAUTION:

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



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

6. Check the engine oil level again.

### NOTE:

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

7. Install:

- Dipstick

EAS20780

## CHANGING THE ENGINE OIL

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

2. Remove:

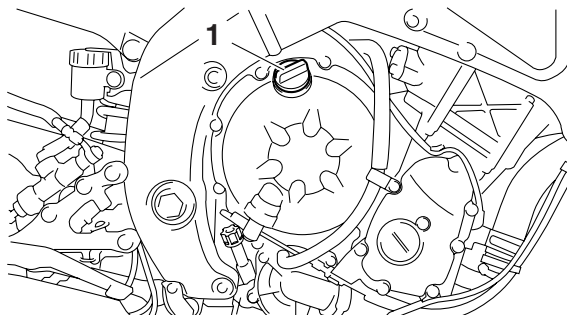
- Side cowling assembly

Refer to "GENERAL CHASSIS" on page 4-1.

3. Place a container under the engine oil drain bolt.

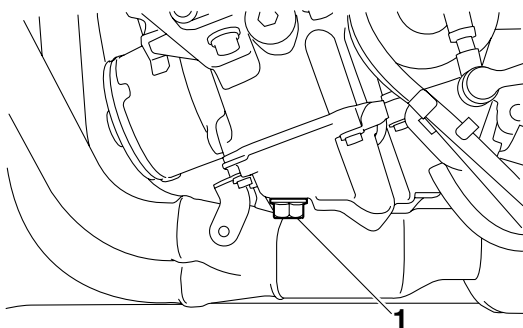
4. Remove:

- Engine oil filler cap “1”



5. Remove:

- Engine oil drain bolt “1”  
(along with the gasket)

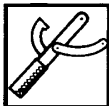


6. Drain:

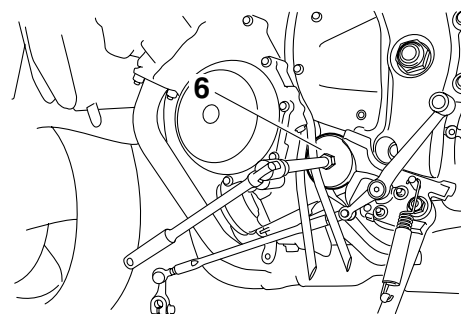
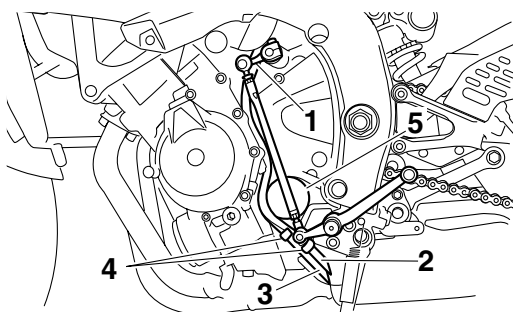
- Engine oil  
(completely from the crankcase)

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

- Remove the shift arm “1”.
- Pull the fuel tank breather hose “2” and fuel tank overflow hose “3” upward to remove them from the guide “4”.
- Remove the oil filter cartridge “5” with an oil filter wrench “6”.



**Oil filter wrench**  
90890-01426  
YU-38411

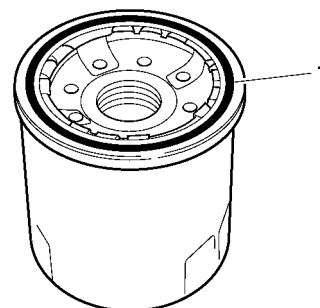


- Lubricate the O-ring “1” of the new oil filter cartridge with a thin coat of engine oil.

EC2C01006

**CAUTION:**

**Make sure the O-ring “1” is positioned correctly in the groove of the oil filter cartridge.**

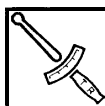


- Tighten the new oil filter cartridge to specification with an oil filter wrench.

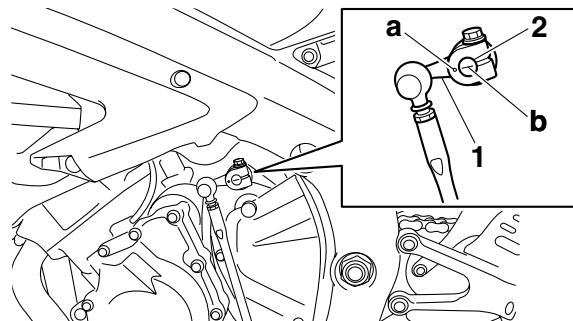


**Oil filter cartridge**  
17 Nm (1.7 m·kg, 13 ft·lb)

- Insert the fuel tank breather hose and fuel tank overflow hose into the guide and place them in their original position.
- Install the shift arm “1” by aligning the match mark “a” on the shift arm with the match mark “b” on the shift shaft “2”.



**Shift arm bolt**  
10 Nm (1.0 m·kg, 7.4 ft·lb)



8. Check:
  - Engine oil drain bolt gasket  
Damage → Replace.
9. Install:
  - Engine oil drain bolt  
(along with the gasket)



**Engine oil drain bolt**  
**43 Nm (4.3 m·kg, 32 ft·lb)**

10. Fill:
  - Crankcase  
(with the specified amount of the recommended engine oil)



**Engine oil quantity**  
**Total amount**  
**3.40 L (3.59 US qt) (2.99 Imp.qt)**  
**Without oil filter cartridge replacement**  
**2.40 L (2.54 US qt) (2.11 Imp.qt)**  
**With oil filter cartridge replacement**  
**2.60 L (2.75 US qt) (2.29 Imp.qt)**

11. Install:
  - Engine oil filler cap
12. Start the engine, warm it up for several minutes, and then turn it off.
13. Check:
  - Engine  
(for engine oil leaks)
14. Check:
  - Engine oil level  
Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-11.

EAS20820

## MEASURING THE ENGINE OIL PRESSURE

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

ECA13410

### CAUTION:

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

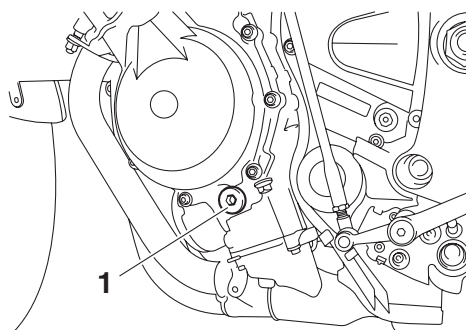
**to measure the engine oil pressure after warming up the engine.**

3. Remove:
  - Side cowling assembly  
Refer to “GENERAL CHASSIS” on page 4-1.
4. Remove:
  - Main gallery bolt “1”

EWA12980

### WARNING

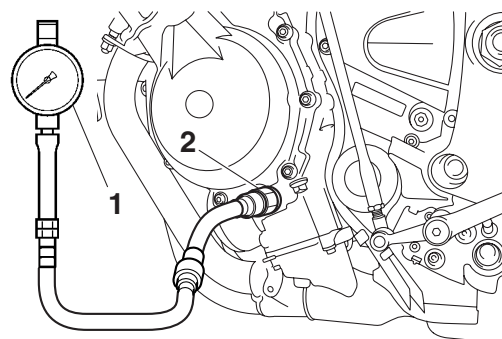
**The engine, muffler and engine oil are extremely hot.**



5. Install:
  - Oil pressure gauge set “1”
  - Oil pressure adapter H “2”



**Oil pressure gauge set**  
**90890-03120**  
**Oil pressure adapter H**  
**90890-03139**



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

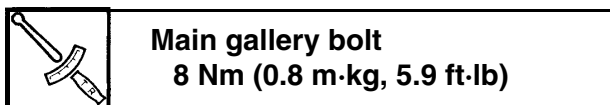


**Oil pressure (hot)**  
**80.0 kPa/1300 r/min (11.6 psi/**  
**1300 r/min) (0.80 kgf/cm²/1300**  
**r/min)**  
**Oil temperature**  
**85.0–95.0 °C (185.0–203.0 °F)**

Out of specification → Adjust.

Engine oil pressure	Possible causes
Below specification	<ul style="list-style-type: none"> <li>Faulty oil pump</li> <li>Clogged oil filter</li> <li>Leaking oil passage</li> <li>Broken or damaged oil seal</li> </ul>
Above specification	<ul style="list-style-type: none"> <li>Leaking oil passage</li> <li>Faulty oil filter</li> <li>Oil viscosity too high</li> </ul>

7. Install:
- Main gallery bolt

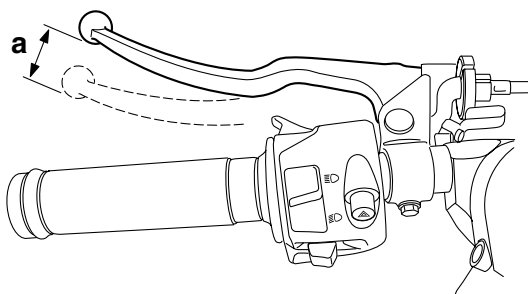


8. Install:
- Side cowl assembly  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS20870

## ADJUSTING THE CLUTCH LEVER FREE PLAY

1. Check:
- Clutch lever free play “a”  
Out of specification → Adjust.

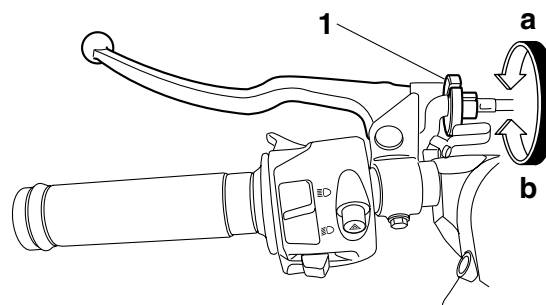


2. Adjust:
- Clutch lever free play

### Handlebar side

- a. Turn the adjusting bolt “1” in direction “a” or “b” until the specified clutch lever free play is obtained.

**Direction “a”**  
Clutch lever free play is increased.  
**Direction “b”**  
Clutch lever free play is decreased.



### NOTE:

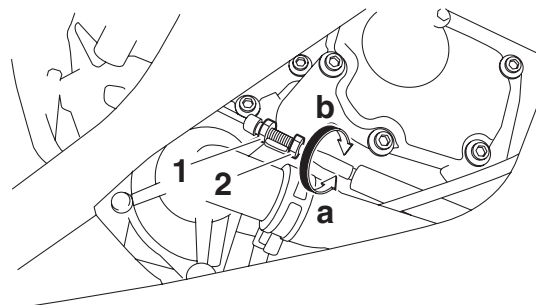
If the specified clutch lever free play cannot be obtained on the handlebar side of the cable, use the adjusting nut on the engine side.

### Engine side

- a. Loosen the locknut “1”.  
b. Turn the adjusting nut “2” in direction “a” or “b” until the specified clutch lever free play is obtained.

**Direction “a”**  
Clutch lever free play is increased.  
**Direction “b”**  
Clutch lever free play is decreased.

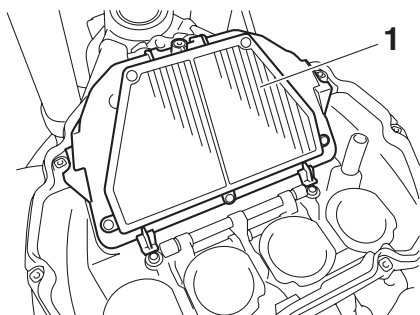
- c. Tighten the locknut “1”.



EAS20960

## REPLACING THE AIR FILTER ELEMENT

1. Remove:
- Rider seat  
Refer to “GENERAL CHASSIS” on page 4-1.
  - Fuel tank  
Refer to “FUEL TANK” on page 7-1.
  - Upper air filter case  
Refer to “AIR FILTER CASE” on page 7-4.
2. Remove:
- Air filter element “1”



3. Check:
  - Air filter element  
Damage → Replace.

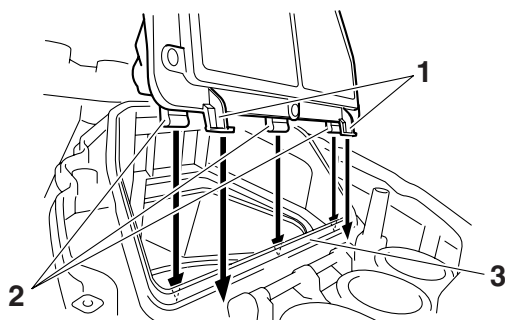
**NOTE:**

- Replace the air filter element every 40000 km (2400 mi) of operation.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

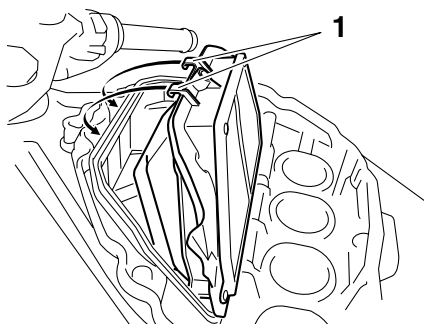
4. Install:
  - Air filter element



- a. Insert the air filter projections “1” “2” into the part of the air filter case “3”.



- b. Fold the air filter “1” forward and then fit into the air filter case.



EC2C01007

**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 synchronization, leading to poor engine performance and possible overheating.

**NOTE:**

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

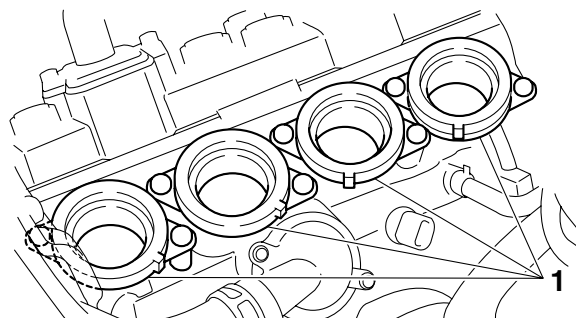
5. Install:
  - Upper air filter case  
Refer to “AIR FILTER CASE” on page 7-4.
  - Fuel tank  
Refer to “FUEL TANK” on page 7-1.
  - Rider seat  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS21010

**CHECKING THE THROTTLE BODY JOINTS**

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

1. Remove:
  - Rider seat  
Refer to “GENERAL CHASSIS” on page 4-1.
  - Fuel tank  
Refer to “FUEL TANK” on page 7-1.
  - Air filter case  
Refer to “AIR FILTER CASE” on page 7-4.
  - Throttle body  
Refer to “THROTTLE BODIES” on page 7-9.
2. Check:
  - Throttle body joints “1”  
Cracks/damage → Replace.



3. Install:
  - Throttle body  
Refer to "THROTTLE BODIES" on page 7-9.
  - Air filter case  
Refer to "AIR FILTER CASE" on page 7-4.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21030

## CHECKING THE FUEL LINE

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

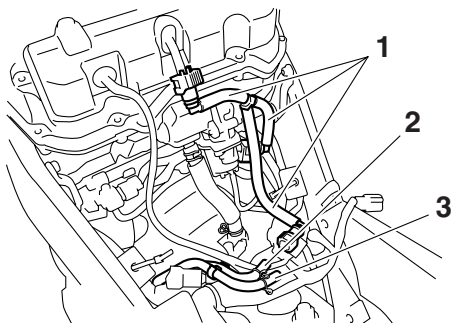
1. Remove:
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
2. Check:
  - Fuel hoses "1"
  - Vacuum hoses
  - Overflow hose "2"
  - Breather hose "3"

Cracks/damage → Replace.  
Loose connection → Connect properly.

ECA14940

### CAUTION:

**Make sure the fuel tank breather hose is routed correctly.**



3. Install:
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21070

## CHECKING THE CRANKCASE BREATHER HOSE

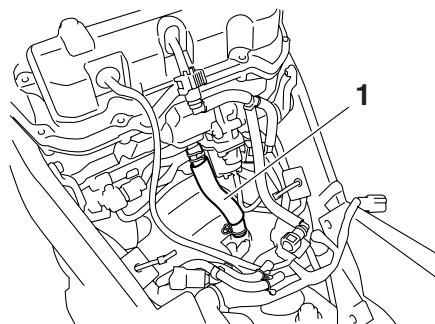
1. Remove:
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
2. Check:
  - Crankcase breather hose "1"

Cracks/damage → Replace.  
Loose connection → Connect properly.

ECA13450

### CAUTION:

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



3. Install:
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21080

## CHECKING THE EXHAUST SYSTEM

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

1. Remove:
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
  - Exhaust pipe assembly "1"
  - Muffler "2"

Cracks/damage → Replace.

  - Gaskets "3"

Exhaust gas leaks → Replace.
3. Check:
 

Tightening torque

  - Exhaust pipe assembly and cylinder head nuts "4"

- Exhaust pipe assembly bracket (left upper side and right side) and frame bolts "5"
- Exhaust pipe assembly bracket (left upper side) and exhaust pipe assembly bracket (left lower side) bolt "6"
- Exhaust pipe assembly and exhaust pipe assembly bracket (left and right) bolts "7"
- Exhaust pipe assembly and muffler clamp bolt "8"
- Muffler and right rider footrest bracket bolt "9"



## Exhaust pipe assembly and cylinder head nut

20 Nm (2.0 m·kg, 15 ft·lb)

## Exhaust pipe assembly bracket (left upper side and right side) and frame bolt

30 Nm (3.0 m·kg, 22 ft·lb)

## Exhaust pipe assembly bracket (left upper side) and exhaust pipe assembly bracket (left lower side) bolt

34 Nm (3.4 m·kg, 25 ft·lb)

## Exhaust pipe assembly and exhaust pipe assembly bracket (left and right) bolt

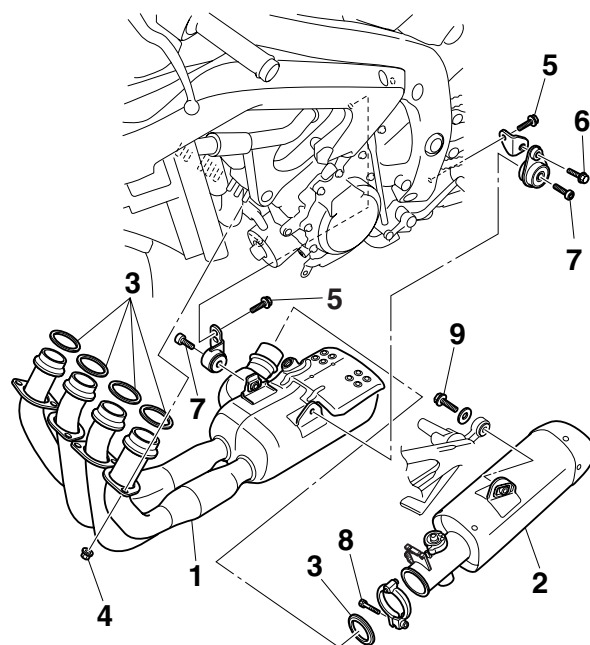
20 Nm (2.0 m·kg, 15 ft·lb)

## Exhaust pipe assembly and muffler clamp bolt

10 Nm (1.0 m·kg, 7.4 ft·lb)

## Muffler and right rider footrest bracket bolt

20 Nm (2.0 m·kg, 15 ft·lb)

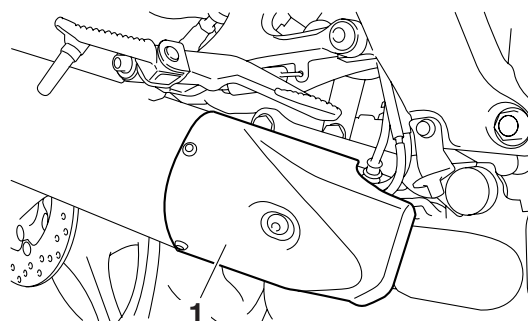


4. Install:
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21100

## ADJUSTING THE EXUP CABLES

1. Remove:
  - EXUP valve pulley cover "1"



2. Check:
  - EXUP system operation

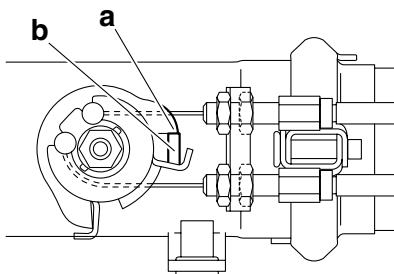


- a. Activate the diagnostic mode and select the diagnostic code number "53".  
Refer to "FUEL INJECTION SYSTEM" on page 8-33.
- b. Set the engine stop switch to "○".
- c. Check that the EXUP valve operates properly.

### NOTE:

Check that the projection "a" on the EXUP valve pulley contacts the stopper "b" (fully open

position). If the projection does not contact the stopper, adjust the EXUP cable free play.



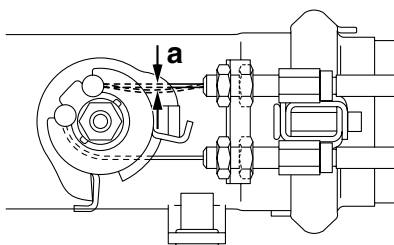
3. Check:

- EXUP cable free play (at the EXUP valve pulley) "a"

Out of specification → Adjust.



**EXUP cable free play (at the EXUP valve pulley)**  
1.5 mm (0.06 in) or less



4. Adjust:

- EXUP cable free play



a. Loosen the locknuts "1" and "2".

b. Turn the adjusting bolt "3" in direction "a" or "b" until the specification.

**Direction "a"**

Free play is increased.

**Direction "b"**

Free play is decreased.



**EXUP cable free play (at the EXUP valve pulley)**  
c: 1.5 mm (0.06 in) or less

c. Tighten the locknut "1" to specification.



**Locknut (EXUP cable adjusting bolt)**  
6 Nm (0.6 m·kg, 4.4 ft·lb)

d. Turn the adjusting bolt "4" in direction "a" or "b" until the specification.

**Direction "a"**

Free play is increased.

**Direction "b"**

Free play is decreased.

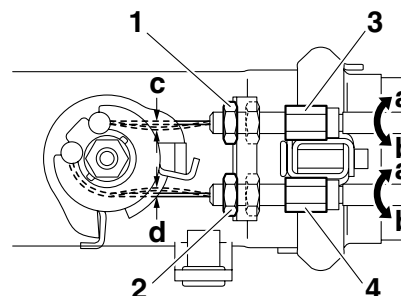


**EXUP cable free play (at the EXUP valve pulley)**  
d: 1.5 mm (0.06 in) or less

e. Tighten the locknut "2" to specification.



**Locknut (EXUP cable adjusting bolt)**  
6 Nm (0.6 m·kg, 4.4 ft·lb)



f. Repeat steps (2) and (3).



5. Install:

- EXUP valve pulley cover



**EXUP valve pulley cover bolt (front side)**  
8 Nm (0.8 m·kg, 5.9 ft·lb)  
**EXUP valve pulley cover bolt (rear side)**  
7 Nm (0.7 m·kg, 5.2 ft·lb)

EAS21110

## CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

**NOTE:**

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

2. Check:

- Coolant level  
The coolant level should be between the maximum level mark "a" and minimum level mark "b".  
Below the minimum level mark →  
Remove the coolant reservoir cap, add

the recommended coolant to the proper level.

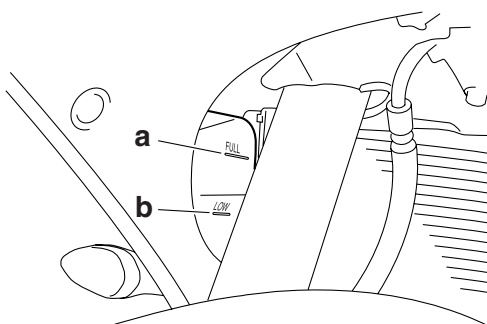
**NOTE:**

To access the coolant reservoir cap, remove the right side panel. Refer to "GENERAL CHASSIS" on page 4-1.

ECA13470

**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.



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

**NOTE:**

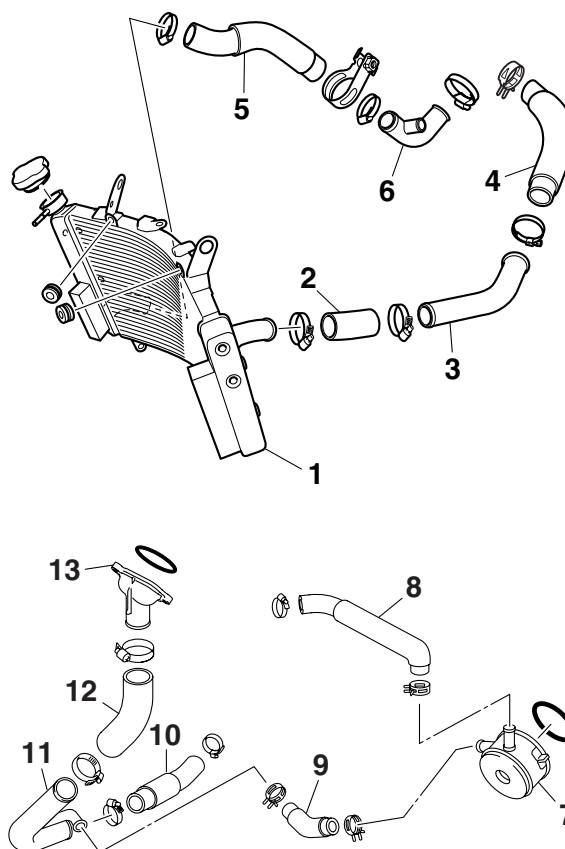
Before checking the coolant level, wait a few minutes until it settles.

EAS21120

## CHECKING THE COOLING SYSTEM

1. Remove:
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Exhaust pipe assembly  
Refer to "ENGINE REMOVAL" on page 5-1.
2. Check:
  - Radiator "1"
  - Radiator inlet hose "2"
  - Radiator inlet pipe "3"
  - Thermostat outlet hose "4"
  - Radiator outlet hose "5"
  - Radiator outlet pipe "6"
  - Oil cooler "7"

- Oil cooler outlet hose "8"
  - Oil cooler inlet hose "9"
  - Water pump outlet hose "10"
  - Water pump inlet hose
  - Water pump outlet pipe "11"
  - Water jacket joint inlet hose "12"
  - Water jacket joint "13"
- Cracks/damage → Replace.  
Refer to and "OIL COOLER" on page 6-4.



3. Install:
  - Exhaust pipe assembly  
Refer to "ENGINE REMOVAL" on page 5-1.
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21130

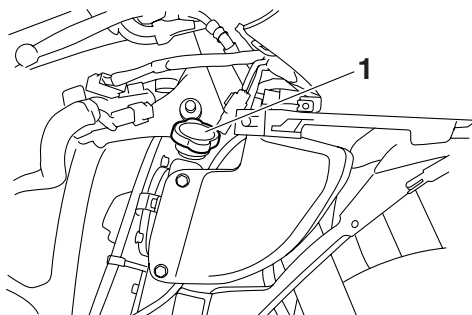
## CHANGING THE COOLANT

1. Remove:
  - Side panel
  - Upper side cowling
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
  - Radiator cap "1"

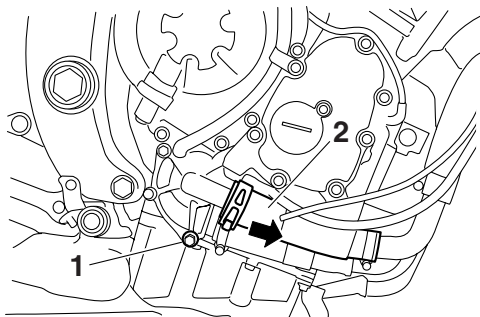
EWA13030

## **WARNING**

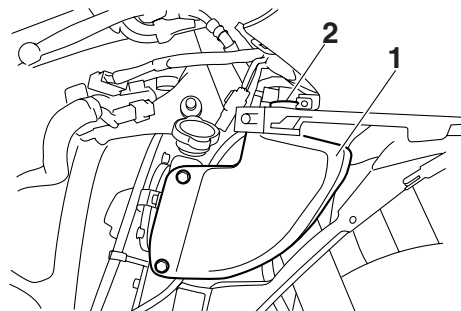
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows: Place a thick rag or a towel over the radiator cap and slowly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



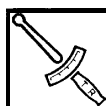
3. Remove:
  - Coolant drain bolt (water pump) “1” (along with the copper washer)
4. Disconnect:
  - Water pump inlet hose “2”



5. Drain:
  - Coolant (from the engine and radiator)
6. Remove:
  - Coolant reservoir “1”
  - Coolant reservoir cap “2”



7. Drain:
  - Coolant (from the coolant reservoir)
8. Install:
  - Coolant reservoir
9. Connect:
  - Water pump inlet hose
10. Install:
  - Coolant drain bolt (water pump) (along with the copper washer **New**)



**Coolant drain bolt (water pump)**  
**10 Nm (1.0 m·kg, 7.4 ft·lb)**

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)**

**Radiator capacity (including all routes)**

**2.30 L (2.43 US qt) (2.02 Imp.qt)**

**Coolant reservoir capacity (up to the maximum level mark)**

**0.25 L (0.26 US qt) (0.22 Imp.qt)**

Handling notes for coolant

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

EWA13040

## **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.

Refer to “GENERAL CHASSIS” on page 4-1.

ECA13480

**CAUTION:**

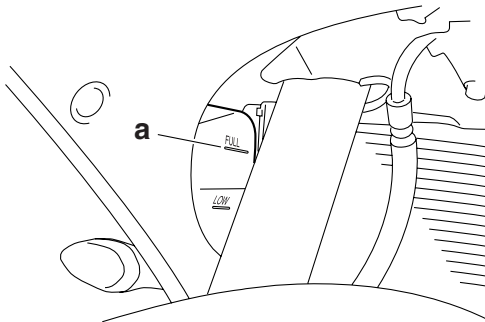
- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant comes into contact with painted surfaces, immediately wash them with water.
- Do not mix different types of antifreeze.

12. Install:

- Radiator cap

13. Fill:

- Coolant reservoir  
(with the recommended coolant to the maximum level mark “a”)



14. Install:

- Coolant reservoir cap

15. Start the engine, warm it up for several minutes, and then stop it.

16. Check:

- Coolant level  
Refer to “CHECKING THE COOLANT LEVEL” on page 3-18.

**NOTE:**

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

17. Install:

- Side cowl assembly
- Upper side cowl
- Side panel

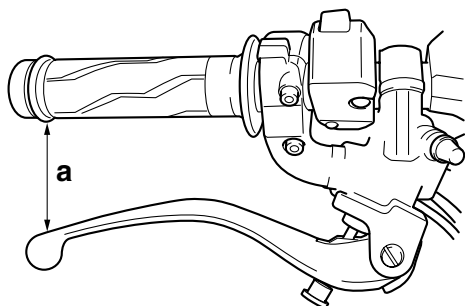
FAS21140

## CHASSIS

EAS21150

## ADJUSTING THE FRONT DISC BRAKE

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



- a. Push the brake lever forward.
- b. Turn the adjusting knob “1” in direction “a” or “b” until the brake lever is in the desired position.

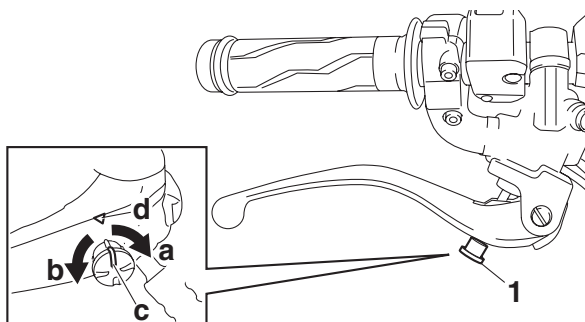
### Direction “a”

**Brake lever distance is increased.**

**Direction “b”**

**Brake lever distance is decreased.**

- c. Align the mark “c” on the adjusting knob with the mark “d” on the brake lever.



EWA13050



**A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.**

ECA13490

**CAUTION:**

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

FAS21190

## ADJUSTING THE REAR DISC BRAKE

1. Adjust:
  - Brake pedal position

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

### Direction “a”

**Brake pedal is raised.**

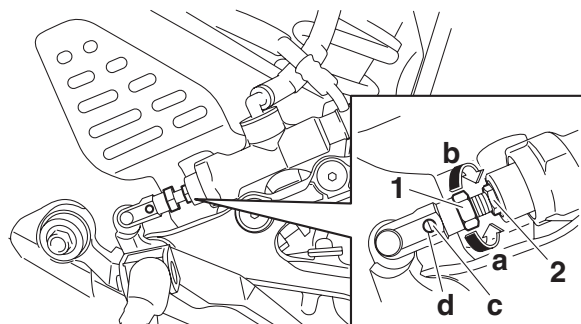
### Direction “b”

**Brake pedal is lowered.**

FWA13070



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



- c. Tighten the locknut “1” to specification.



## Locknut

**16 Nm (1.6 m·kg, 11 ft·lb)**

EW2C01004



**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.**

EC2C01009

**CAUTION:**

**After adjusting the installed rear master cylinder length, make sure there is no brake drag.**

2. Adjust:
  - Rear brake light switch
 Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-24.

EAS21240

## CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

### NOTE:

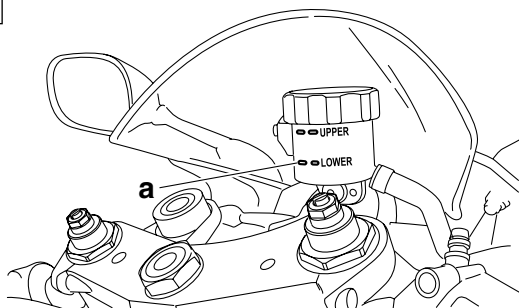
- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:
  - Brake fluid level
 Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.

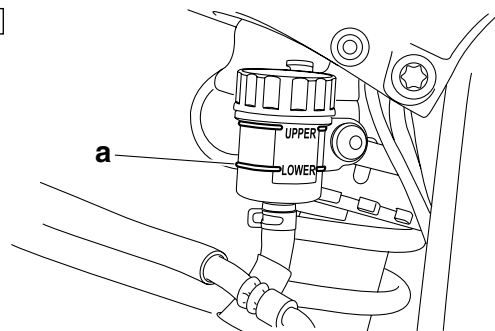


**Front brake**  
**Recommended fluid**  
**DOT 4**  
**Rear brake**  
**Recommended fluid**  
**DOT 4**

A



B



- A. Front brake  
B. Rear brake

EWA13090



### 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.

ECA13540

### CAUTION:

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

### NOTE:

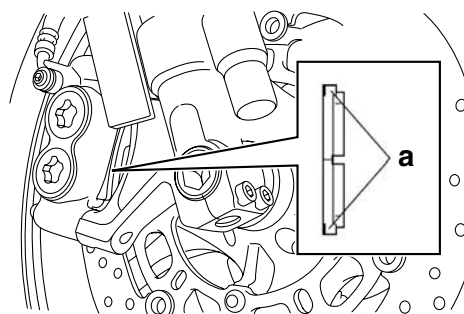
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

EAS21250

## CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
  - Front brake pad
 Wear indicators “a” almost touch the brake disc → Replace the brake pads as a set.  
Refer to “FRONT BRAKE” on page 4-18.



EAS21260

## CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
  - Rear brake pad
 Wear limit “a” reached → Replace the brake pads as a set.  
Refer to “REAR BRAKE” on page 4-30.

- 

-

EAS21360

**BLEEDING THE HYDRAULIC BRAKE SYSTEM**

EWA13100

**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:**

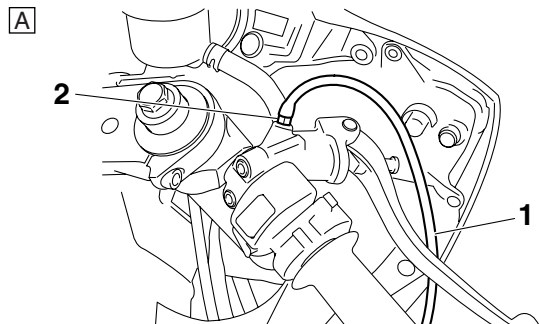
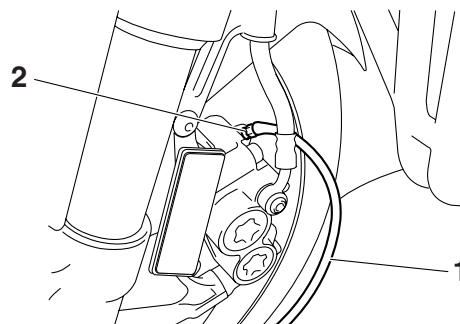
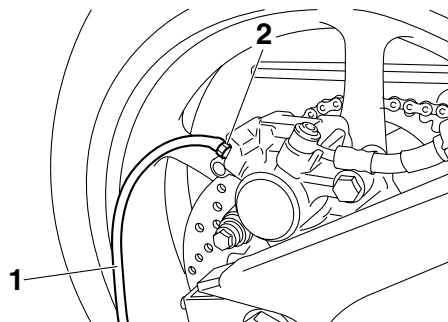
- Be careful not to spill any brake fluid or allow the brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening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

**1. Bleed:**

- Hydraulic brake system



- Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
- Install the brake fluid reservoir diaphragm.
- Connect a clear plastic hose "1" tightly to the bleed screw "2".

**B****C**

- A. Front brake master cylinder  
B. Front brake caliper  
C. Rear brake caliper

**NOTE:**

The bleeding order of the front hydraulic brake system is the following:

- Front brake master cylinder
- Front brake calipers
- Front brake master cylinder

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

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



**Bleed screw (front brake master cylinder)**

**6 Nm (0.6 m·kg, 4.4 ft·lb)**

**Bleed screw (front brake caliper)**

**5 Nm (0.5 m·kg, 3.7 ft·lb)**

**Bleed screw (rear brake caliper)**

**5 Nm (0.5 m·kg, 3.7 ft·lb)**

- k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.

EWA13110



**WARNING**

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



EAS21380

## ADJUSTING THE SHIFT PEDAL

### NOTE:

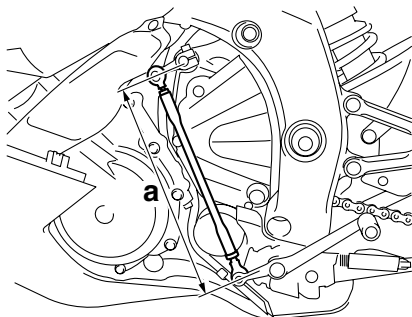
The shift pedal position is determined by the installed shift rod length "a".

1. Remove:
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.
2. Measure:
  - Installed shift rod length "a"  
Incorrect → Adjust.



**Installed shift rod length**

**267.2–269.2 mm (10.52–10.60 in)**



3. Adjust:
  - Installed shift rod length



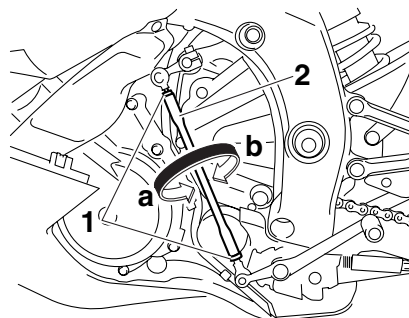
- a. Loosen both locknuts "1".
- b. Turn the shift rod "2" in direction "a" or "b" until the specified installed shift rod length is obtained.

**Direction "a"**

**Installed shift rod length increases.**

**Direction "b"**

**Installed shift rod length decreases.**



- c. Tighten both locknuts to specification.



**Locknut (shift rod upper side)**

**7 Nm (0.7 m·kg, 5.2 ft·lb)**

**Locknut (shift rod lower side)**

**10 Nm (1.0 m·kg, 7.4 ft·lb)**

- d. Make sure the installed shift rod length is within specification.



4. Install:
  - Side cowling assembly  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21390

## ADJUSTING THE DRIVE CHAIN SLACK

ECA13550

### CAUTION:

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

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

### NOTE:

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

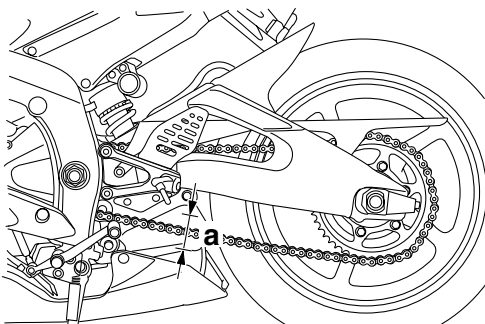
2. Check:
  - Drive chain slack "a"  
Out of specification → Adjust.



**Drive chain slack**  
30.0–45.0 mm (1.18–1.77 in)

**NOTE:**

Measure the drive chain slack halfway between the drive axle and the rear wheel axle.



## 3. Adjust:

- Drive chain slack

- Loosen the wheel axle nut “1”.
- Loosen both locknuts “2”.
- Turn both adjusting bolts “3” in direction “a” or “b” until the specified drive chain slack is obtained.

**Direction “a”**

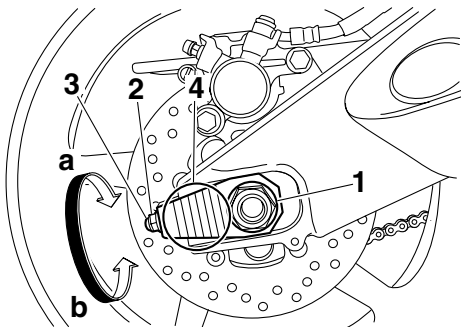
**Drive chain is tightened.**

**Direction “b”**

**Drive chain is loosened.**

**NOTE:**

Using the alignment marks “4” on each side of the swingarm, make sure that both chain pullers are in the same position for proper wheel alignment.



- Tighten the wheel axle nut to specification.



**Wheel axle nut**  
110 Nm (11.0 m·kg, 81 ft·lb)

- Tighten the drive chain adjusting bolts in direction “a” to specification.



**Drive chain adjusting bolt**  
2 Nm (0.2 m·kg, 1.5 ft·lb)

- Tighten the locknuts to specification.



**Drive chain adjusting locknut**  
16 Nm (1.6 m·kg, 12 ft·lb)



EAS21440

**LUBRICATING THE DRIVE CHAIN**

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the vehicle is used in dusty areas.

This vehicle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.



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

EAS21500

**CHECKING AND ADJUSTING THE STEERING HEAD**

- Stand the vehicle on a level surface.

EWA13120



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

**NOTE:**

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

- Check:

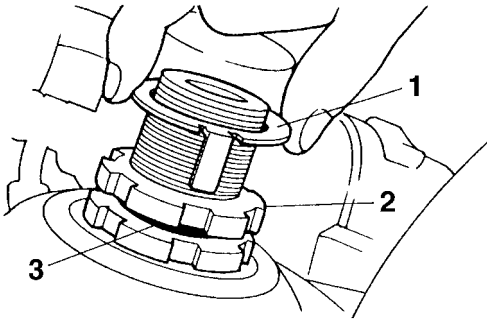
- Steering head

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

Binding/looseness → Adjust the steering head.



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



- b. Loosen the lower ring nut “4” and then tighten it to specification with a steering nut wrench “5”.



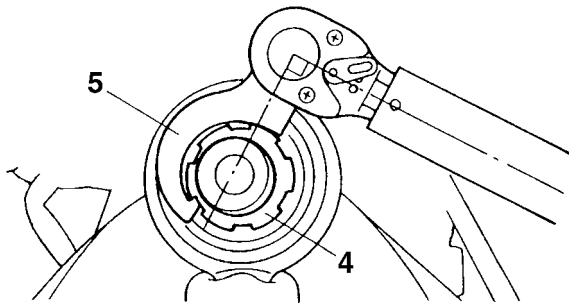
**Steering nut wrench**  
**90890-01403**  
**Spanner wrench**  
**YU-33975**



**Lower ring nut (initial tightening torque)**  
52 Nm (5.2 m·kg, 38 ft·lb)

**NOTE:**

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



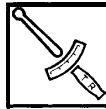
- c. Loosen the lower ring nut completely, then tighten it to specification.

EWA13140



## WARNING

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

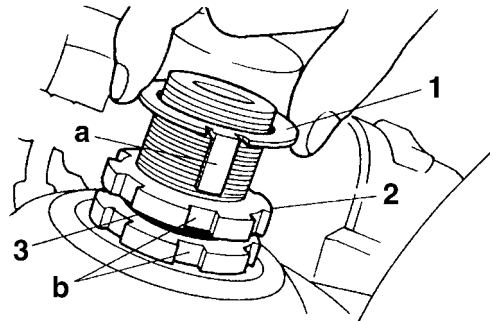


**Lower ring nut (final tightening torque)**  
**14 Nm (1.4 m·kg, 10 ft·lb)**

- 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 “STEERING HEAD” on page 4-55.
- e. Install the rubber washer “3”.
- f. Install the upper ring nut “2”.
- g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
- h. Install the lock washer “1”.

**NOTE:**

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



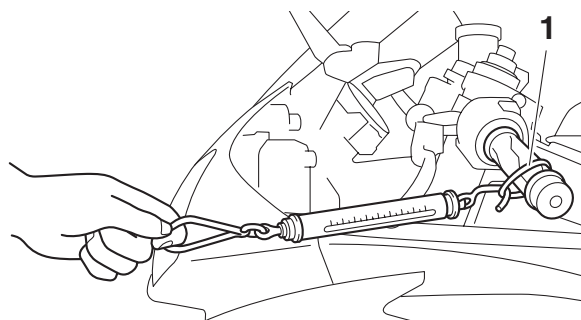
5. Install:
  - Upper bracketRefer to “STEERING HEAD” on page 4-55.
6. Measure:
  - Steering head tension



**NOTE:**

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

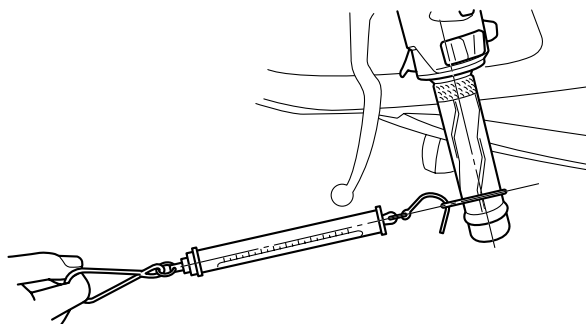
- Point the front wheel straight ahead.
- Install a plastic locking tie "1" loosely around the end of the handlebar as shown.
- Hook a spring gauge "2" onto the plastic locking tie.



- d. Hold the spring gauge at a 90° angle from the handlebar, pull the spring gauge, and then record the measurement when the handlebar starts to run.



**Steering head tension**  
200–500 g



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



EAS21530

## CHECKING THE FRONT FORK

1. Stand the vehicle on a level surface.

EWA13120

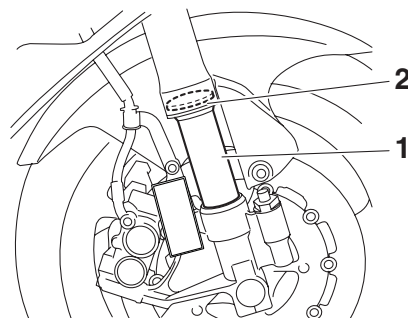


**WARNING**

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

2. Check:

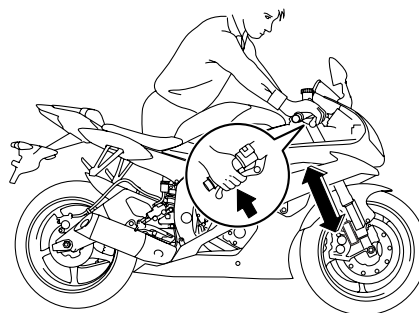
- Inner tube “1”  
Damage/scratches → Replace.
- Oil seal “2”  
Oil leakage → Replace.



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

4. Check:

- Front fork operation  
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.  
Rough movement → Repair.  
Refer to “FRONT FORK” on page 4-45.



EAS21580

## ADJUSTING THE FRONT FORK LEGS

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

EW2C01006



**WARNING**

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

## Spring preload

ECA13570

### CAUTION:

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

- Adjust:
  - Spring preload

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

#### Direction "a"

Spring preload is increased (suspension is harder).

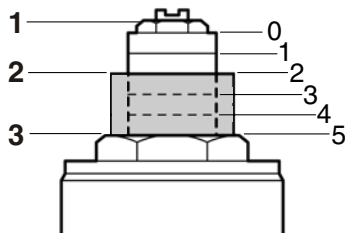
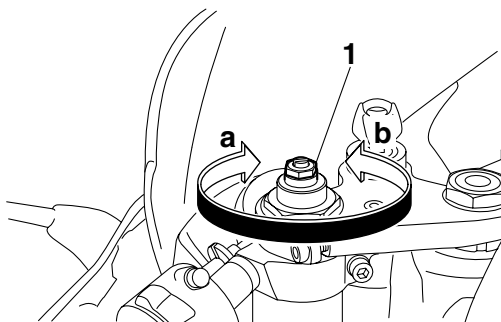
#### Direction "b"

Spring preload is decreased (suspension is softer).



#### Spring preload adjusting positions

Minimum  
0  
Standard  
2  
Maximum  
5



1. Adjusting bolt

- Current setting
- Cap bolt collar

## Rebound damping

ECA13590

### CAUTION:

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
  - Rebound damping

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

#### Direction "a" (turn in)

Rebound damping is increased (suspension is harder).

#### Direction "b" (turn out)

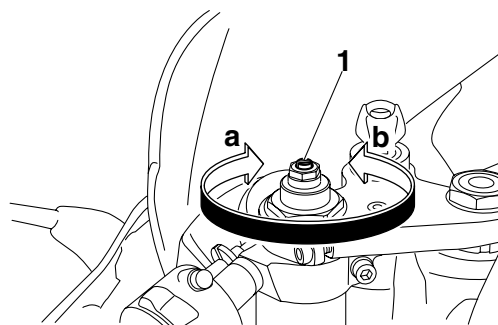
Rebound damping is decreased (suspension is softer).



#### Rebound damping adjusting positions

Minimum  
25 click(s) out\*  
Standard  
20 click(s) out\*  
Maximum  
1 click(s) out\*

\* With the adjusting screw fully turned in



## Compression damping

ECA13590

### CAUTION:

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
  - Compression damping (fast compression damping)





### Spring preload adjusting positions

Minimum

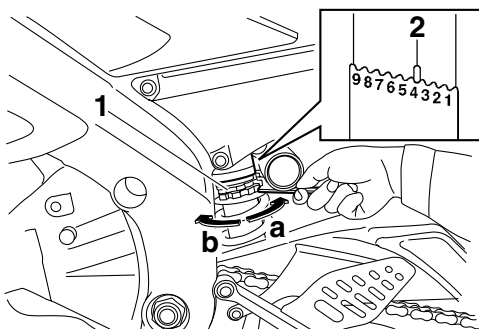
1

Standard

4

Maximum

9



### Rebound damping

ECA13590

**CAUTION:**

**Never go beyond the maximum or minimum adjustment positions.**

1. Adjust:

- Rebound damping

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

Direction "a" (turn in)  
Rebound damping is increased  
(suspension is harder).  
Direction "b" (turn out)  
Rebound damping is decreased  
(suspension is softer).



### Rebound damping adjusting positions

Minimum

20 click(s) out\*

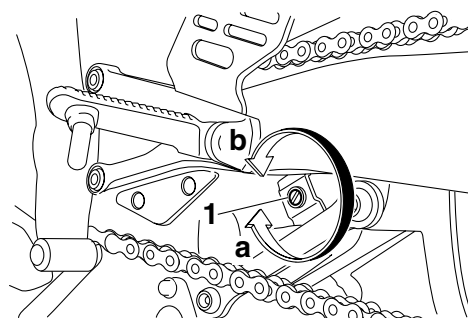
Standard

16 click(s) out\*

Maximum

3 click(s) out\*

\* With the adjusting screw fully turned in



### Compression damping

ECA13590

**CAUTION:**

**Never go beyond the maximum or minimum adjustment positions.**

1. Adjust:

- Compression damping (fast compression damping)

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

Direction "a" (turn in)  
Rebound damping is increased  
(suspension is harder).  
Direction "b" (turn out)  
Rebound damping is decreased  
(suspension is softer).



### Compression damping adjusting positions (fast compression damping)

Minimum

4 turn(s) in direction "b"\*

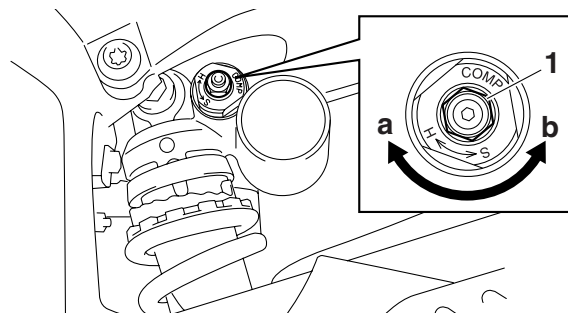
Standard

3 turn(s) in direction "b"\*

Maximum

0 turn(s) in direction "b"\*

\* With the adjusting screw fully turned in



## 2. Adjust:

- Compression damping (slow compression damping)



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

**Direction "a" (turn in)**

Compression damping is increased  
(suspension is harder).

**Direction "b" (turn out)**

Compression damping is decreased  
(suspension is softer).



### Compression damping adjusting positions (slow compression damping)

**Minimum**

20 click(s) out\*

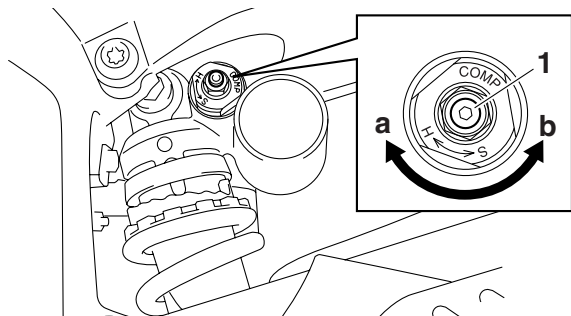
**Standard**

16 click(s) out\*

**Maximum**

1 click(s) out\*

\* With the adjusting screw fully turned in



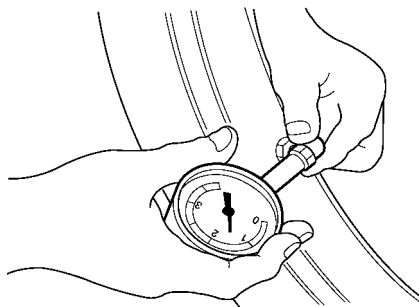
EAS21650

**CHECKING THE TIRES**

The following procedure applies to both of the tires.

## 1. Check:

- Tire pressure  
Out of specification → Regulate.



EWA13180

**! 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 vehicle could cause tire damage, an accident or an injury.

**NEVER OVERLOAD THE VEHICLE.**



### Tire air pressure (measured on cold tires)

**Loading condition**

0–90 kg (0–198 lb)

**Front**

250 kPa (36 psi) (2.50 kgf/cm<sup>2</sup>)

**Rear**

290 kPa (42 psi) (2.90 kgf/cm<sup>2</sup>)

**Loading condition**

90–187 kg (198–412 lb)

**Front**

250 kPa (36 psi) (2.50 kgf/cm<sup>2</sup>)

**Rear**

290 kPa (42 psi) (2.90 kgf/cm<sup>2</sup>)

**High-speed riding****Front**

250 kPa (36 psi) (2.50 kgf/cm<sup>2</sup>)

**Rear**

290 kPa (42 psi) (2.90 kgf/cm<sup>2</sup>)

**Maximum load**

187 kg (412 lb)

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

EWA13190

**WARNING**

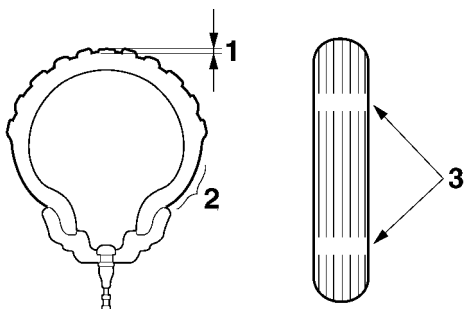
**It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.**

## 2. Check:

- Tire surfaces
- Damage/wear → Replace the tire.



**Wear limit (front)**  
1.0 mm (0.04 in)  
**Wear limit (rear)**  
1.0 mm (0.04 in)



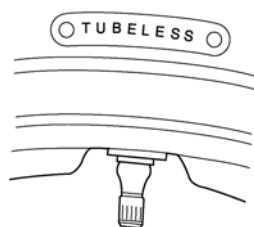
1. Tire tread depth
2. Side wall
3. Wear indicator

EWA14080

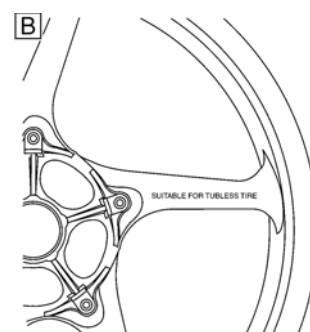
**WARNING**

- 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.

A



B



- A. Tire  
B. Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

EWA14090

**WARNING**

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

**Front tire**

**Size**  
120/70 ZR17M/C (58W)  
**Manufacturer/model**  
DUNLOP/Qualifier PT M

**Rear tire**

**Size**  
180/55 ZR17M/C (73W)  
**Manufacturer/model**  
DUNLOP/Qualifier PT M

EWA13210

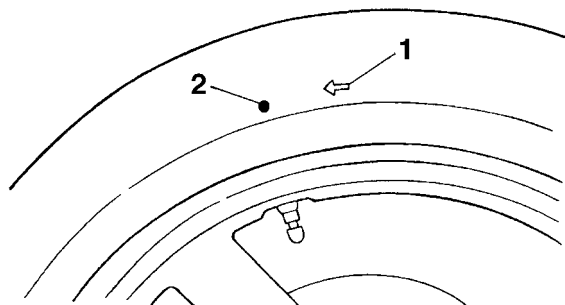
**WARNING**

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

## NOTE:

For tires with a direction of rotation mark "1":

- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark "2" with the valve installation point.



EAS21670

## CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

EWA13260

## 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.

EAS21690

## CHECKING AND LUBRICATING THE CABLES

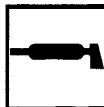
The following procedure applies to all of the inner and outer cables.

EWA13270

## WARNING

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

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



**Recommended lubricant**  
**Engine oil or a suitable cable lubricant**

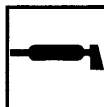
## NOTE:

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

EAS21700

## LUBRICATING THE LEVERS

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

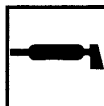


**Recommended lubricant**  
**Lithium-soap-based grease**

EAS21710

## LUBRICATING THE PEDALS

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

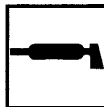


**Recommended lubricant**  
**Lithium-soap-based grease**

EAS21720

## LUBRICATING THE SIDESTAND

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

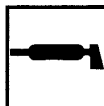


**Recommended lubricant**  
**Lithium-soap-based grease**

EAS21740

## LUBRICATING THE REAR SUSPENSION

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



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

EAS21750

## ELECTRICAL SYSTEM

EAS21760

### CHECKING AND CHARGING THE BATTERY

Refer to "ELECTRICAL COMPONENTS" on page 8-77.

EAS21770

### CHECKING THE FUSES

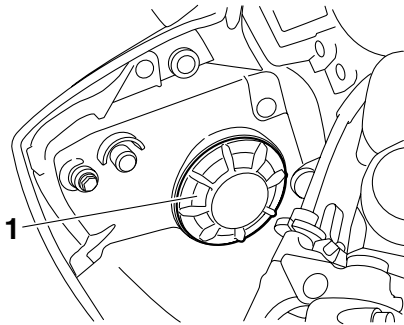
Refer to "ELECTRICAL COMPONENTS" on page 8-77.

EAS21790

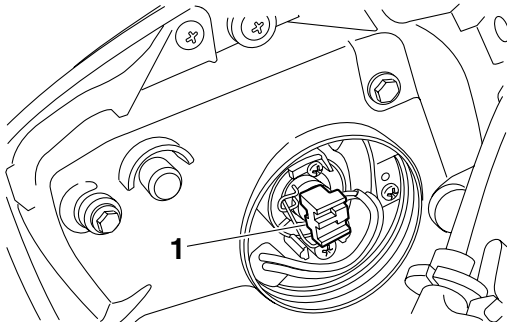
### REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

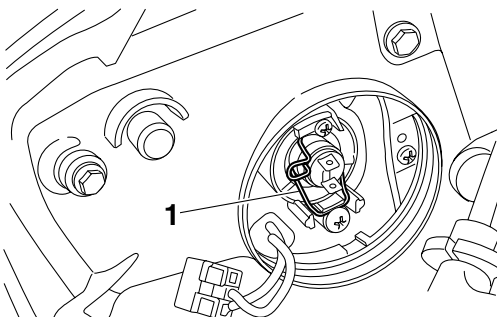
1. Remove:
  - Headlight bulb cover "1"



2. Disconnect:
  - Headlight coupler "1"



3. Detach:
  - Headlight bulb holder "1"



4. Remove:
  - Headlight bulb

EWA13320

### WARNING

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

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

ECA13690

### 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. Connect:
  - Headlight coupler
8. Install:
  - Headlight bulb cover

EAS21810

### ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

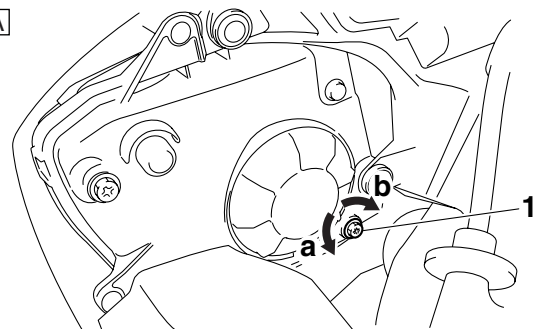
1. Adjust:
  - Headlight beam (vertically)



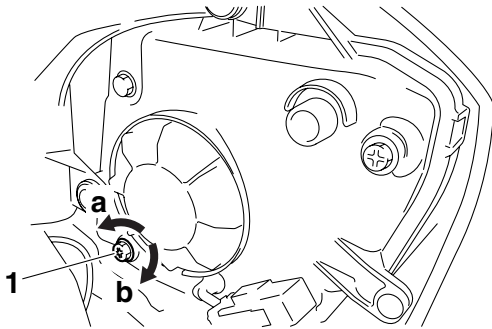
- a. Turn the adjusting screw "1" in direction "a" or "b".

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

A



B



- A. Left headlight
- B. Right headlight



2. Adjust:
  - Headlight beam (horizontally)



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

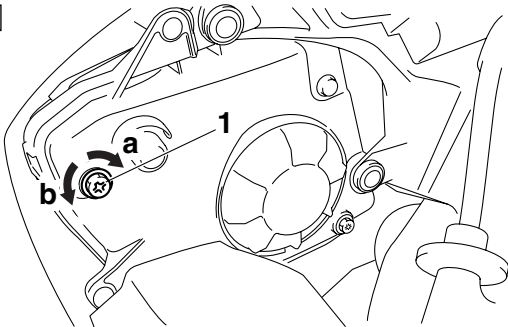
**Direction "a"**

**Headlight beam moves to the left.**

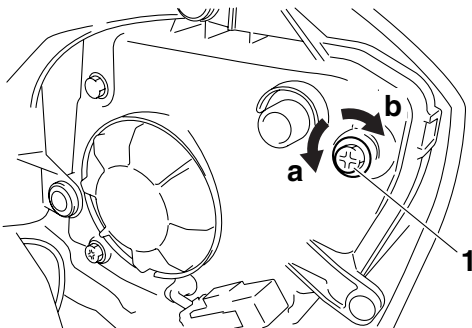
**Direction "b"**

**Headlight beam moves to the right.**

A



B



- A. Left headlight
- B. Right headlight



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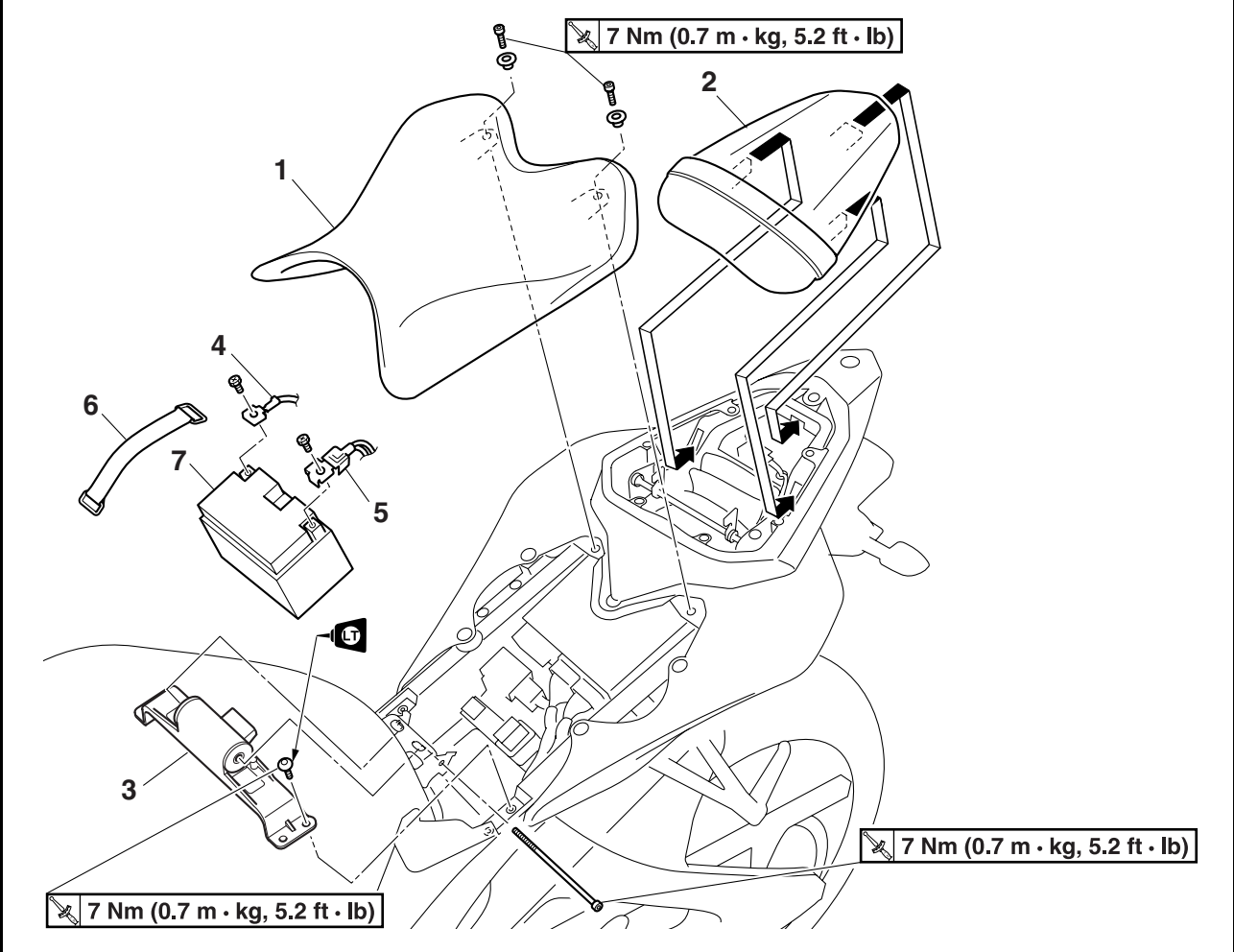
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EAS21830

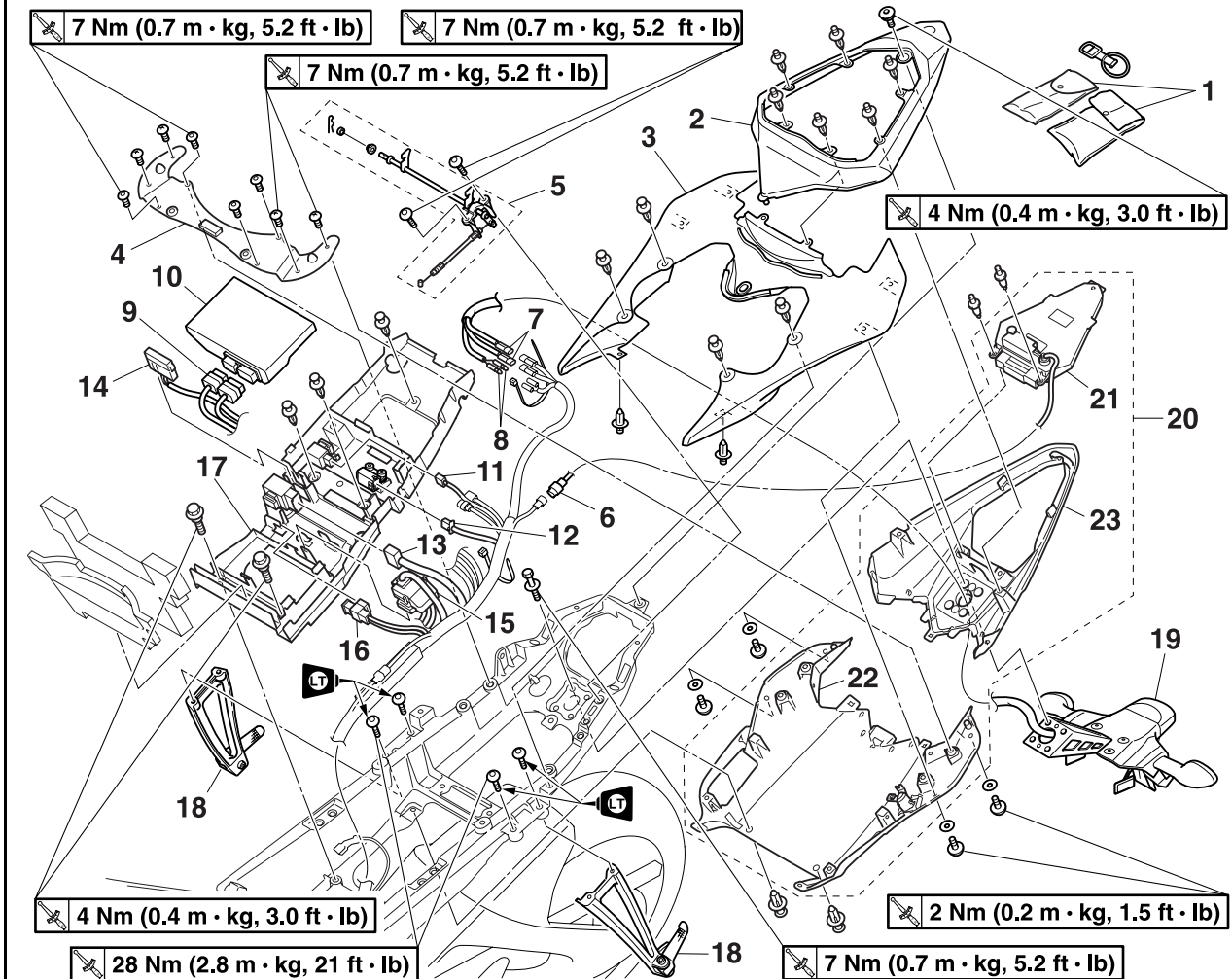
GENERAL CHASSIS

Removing the seat and battery



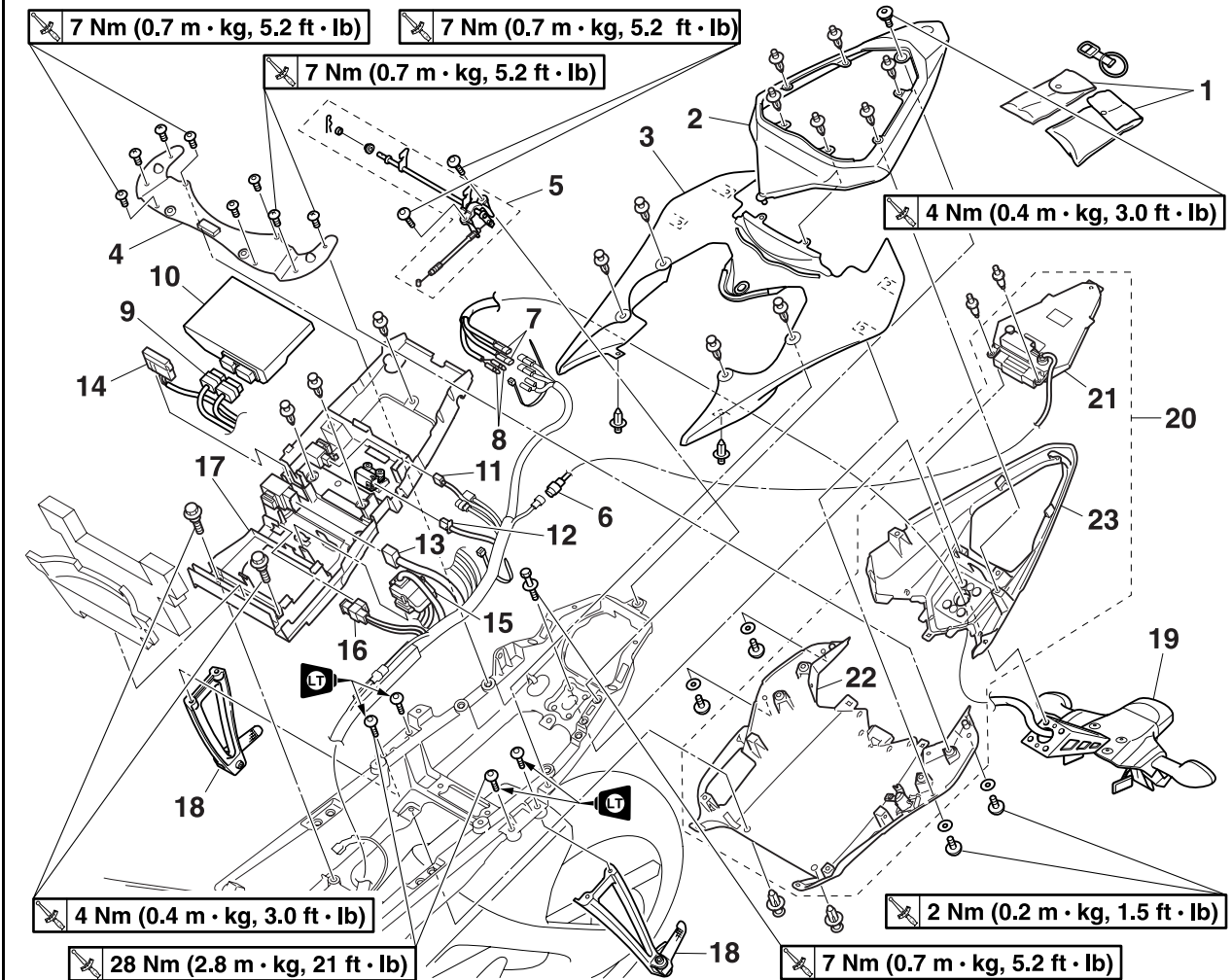
Order	Job/Parts to remove	Q'ty	Remarks
1	Rider seat	1	
2	Passenger seat	1	
3	Fuel tank bracket	1	
4	Battery negative lead	1	Disconnect.
5	Battery positive lead	1	Disconnect.
6	Battery band	1	
7	Battery	1	
			For installation, reverse the removal procedure.

## Removing the tail/brake light assembly



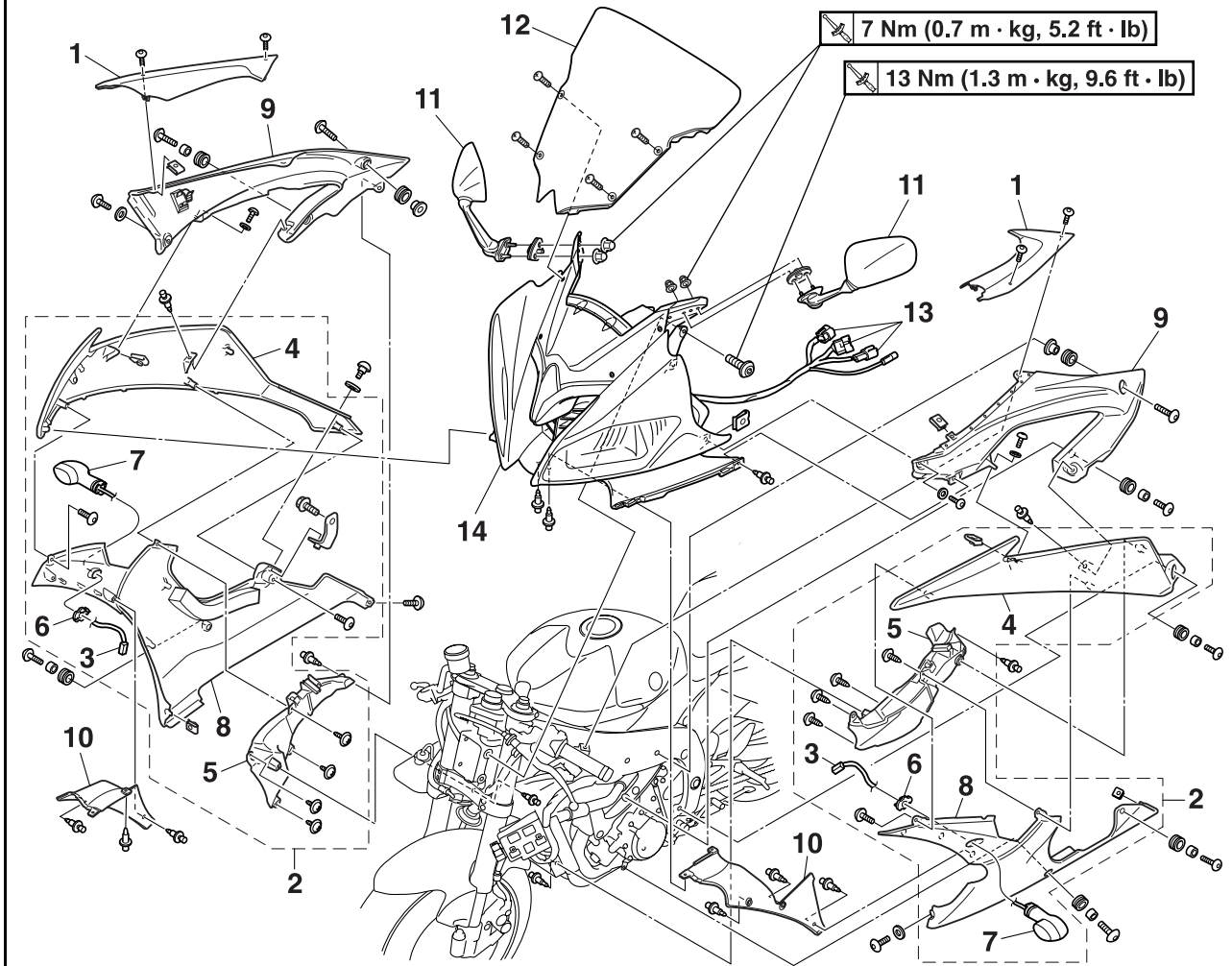
Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Passenger seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Battery		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Owner's tool kit	2	
2	Rear upper cowling cover	1	
3	Rear upper cowling	1	
4	Rear upper cowling damper plate	1	
5	Seat lock assembly	1	
6	Tail/brake light coupler	1	Disconnect.
7	Rear turn signal light coupler	2	Disconnect.
8	License plate light connector	2	Disconnect.
9	ECU coupler	2	Disconnect.
10	ECU (engine control unit)	1	
11	Turn signal light relay coupler	1	Disconnect.
12	Lean angle sensor coupler	1	Disconnect.
13	Starting circuit cut-off relay coupler	1	Disconnect.
14	Fuse box	1	
15	Starter relay	1	
16	Main fuse	1	
17	Battery case assembly	1	

## Removing the tail/brake light assembly



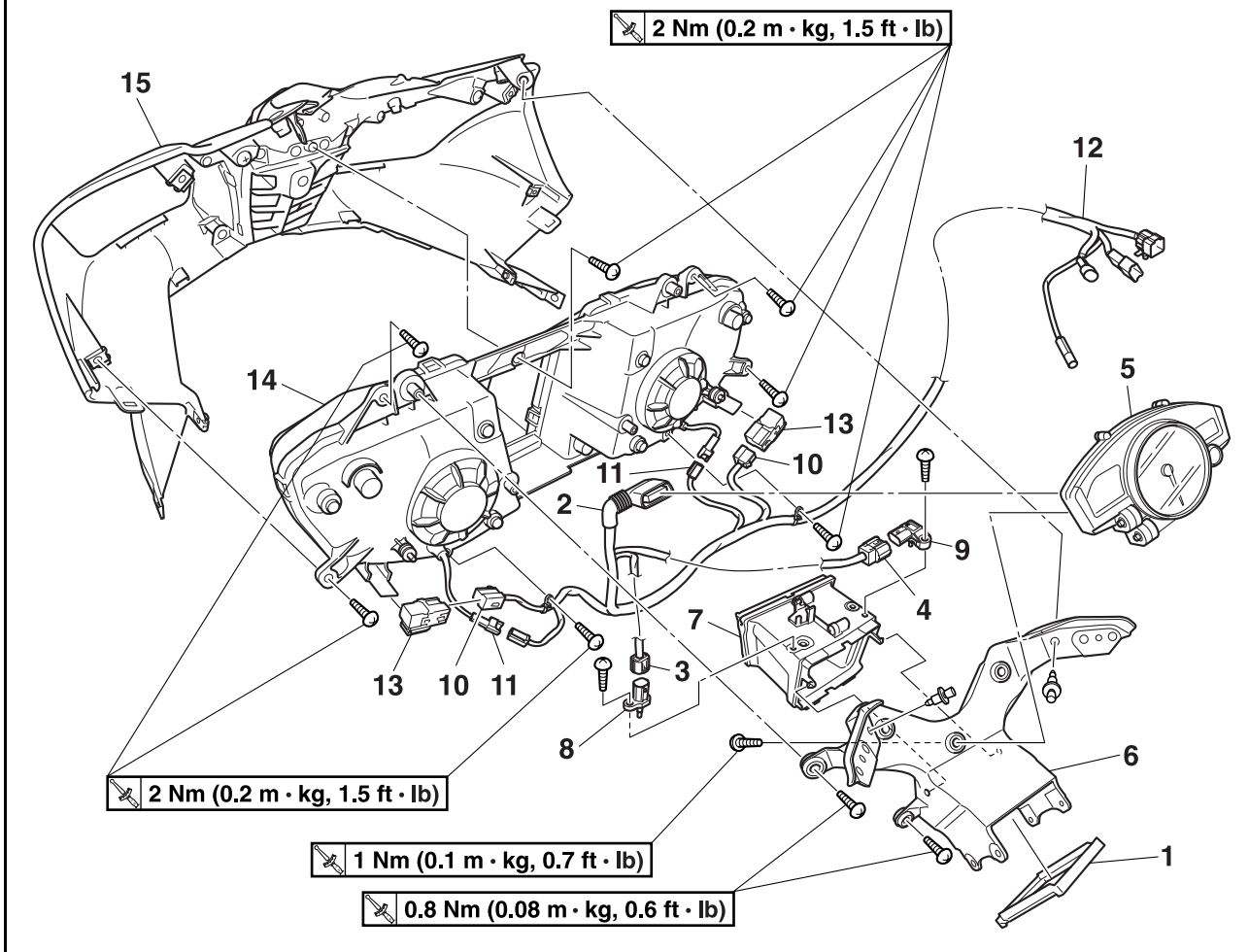
Order	Job/Parts to remove	Q'ty	Remarks
18	Passenger footrest	2	EC2C01026 <b>CAUTION:</b> Install the cowling hole cover if the vehicle is registered for only a solo rider.
19	License plate light assembly	1	
20	Rear lower cowling assembly	1	
21	Tail/brake light assembly	1	
22	Rear lower cowling	1	
23	Tail/brake light cover	1	
			For installation, reverse the removal procedure.

## Removing the side cowlings and front cowl assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Side panel	2	
2	Side cowl assembly	2	
3	Front turn signal light coupler	2	Disconnect.
4	Middle side cowl	2	
5	Air intake duct	2	
6	Front turn signal light bracket	2	
7	Front turn signal light	2	
8	Bottom cowl	2	
9	Upper side cowl	2	
10	Bottom cowl inner panel	2	
11	Rear view mirror	2	
12	Windshield	1	
13	Headlight sub-wire harness coupler	3	Disconnect.
14	Front cowl assembly	1	
			For installation, reverse the removal procedure.

## Removing the front cowling assembly

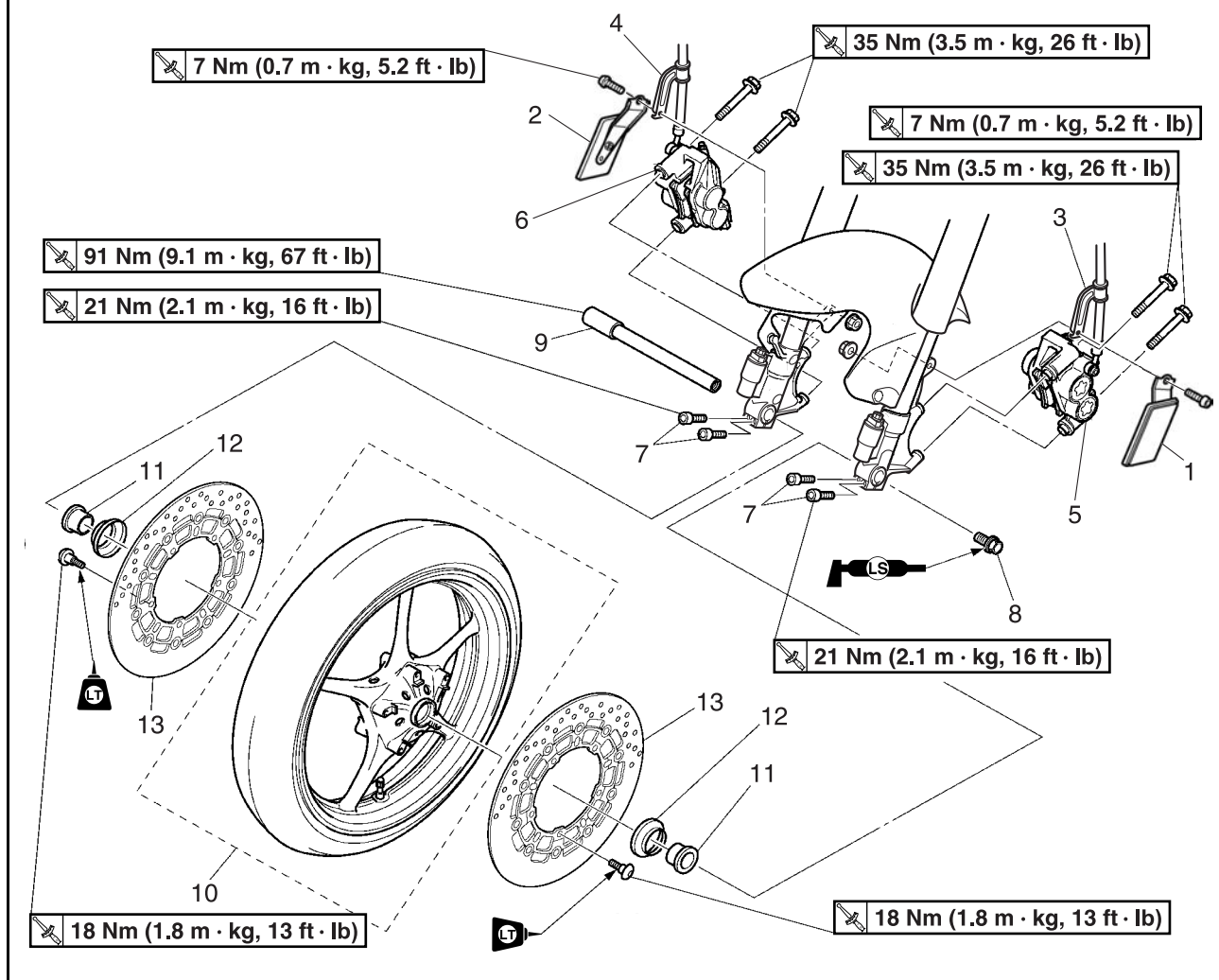


Order	Job/Parts to remove	Q'ty	Remarks
1	Spacer	1	
2	Meter assembly coupler	1	Disconnect.
3	Air temperature sensor coupler	1	Disconnect.
4	Atmospheric pressure sensor coupler	1	Disconnect.
5	Meter assembly	1	
6	Meter bracket	1	
7	Air duct	1	
8	Air temperature sensor	1	
9	Atmospheric pressure sensor	1	
10	Headlight relay coupler	2	Disconnect.
11	Headlight coupler	2	Disconnect.
12	Headlight sub-wire harness	1	
13	Headlight relay	2	
14	Headlight assembly	1	
15	Front cowling	1	
			For installation, reverse the removal procedure.

EAS21870

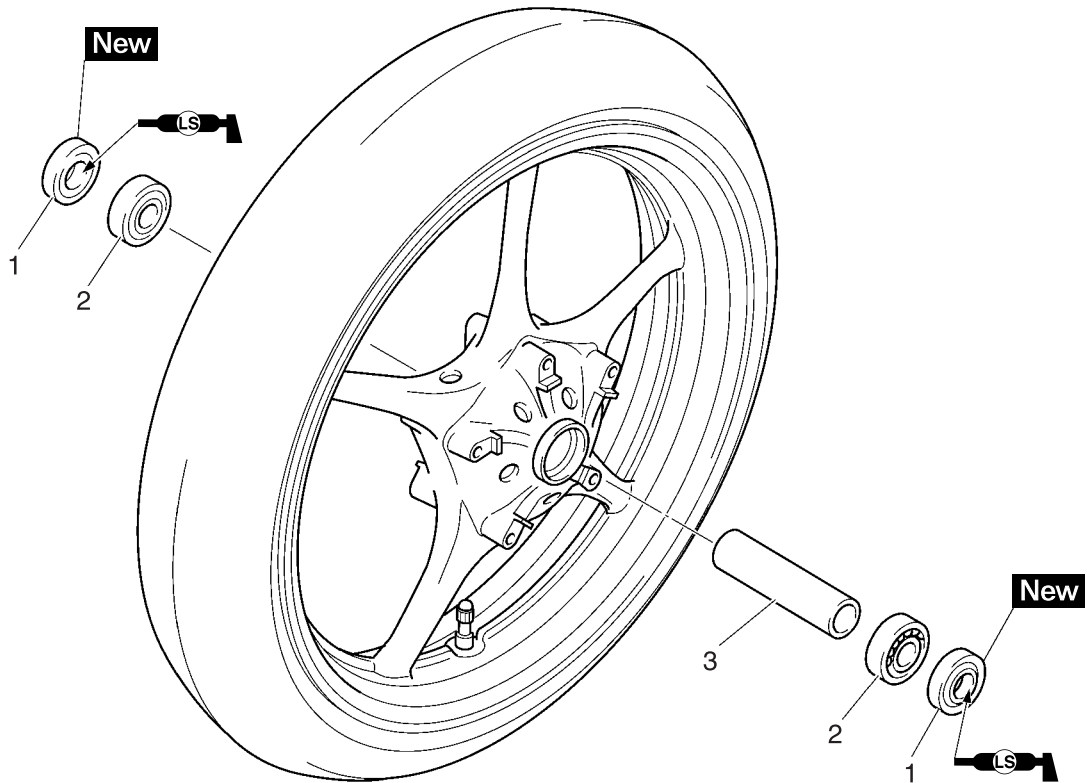
## FRONT WHEEL

### Removing the front wheel and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
1	Left reflector assembly	1	
2	Right reflector assembly	1	
3	Left front brake hose holder	1	
4	Right front brake hose holder	1	
5	Left front brake caliper	1	
6	Right front brake caliper	1	
7	Front wheel axle pinch bolt	4	Loosen.
8	Front wheel axle bolt	1	
9	Front wheel axle	1	
10	Front wheel	1	
11	Collar	2	
12	Dust cover	2	
13	Front brake disc	2	
			For installation, reverse the removal procedure.

## Disassembling the front wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	2	
2	Wheel bearing	2	
3	Spacer	1	
			For assembly, reverse the disassembly procedure.

EAS21900

## REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

### NOTE:

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

2. Remove:

- Left brake caliper
- Right brake caliper

### NOTE:

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

EAS21910

## DISASSEMBLING THE FRONT WHEEL

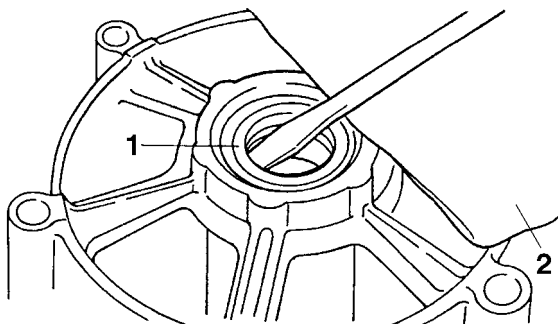
1. Remove:

- Oil seals
- Wheel bearings

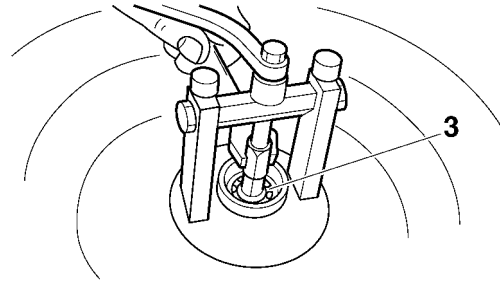
- a. Clean the outside of the front wheel hub.
- b. Remove the oil seals "1" with a flat-head screwdriver.

### 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.



EAS21920

## CHECKING THE FRONT WHEEL

1. Check:

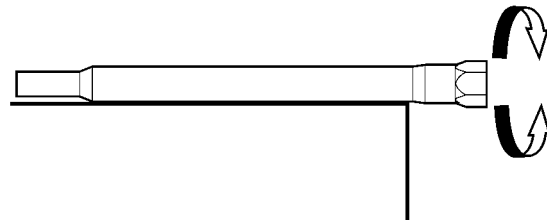
- Wheel axle
  - Roll the wheel axle on a flat surface.
  - Bends → Replace.

EWA13460



**WARNING**

**Do not attempt to straighten a bent wheel axle.**



2. Check:

- Tire
- Front wheel
  - Damage/wear → Replace.
  - Refer to "CHECKING THE TIRES" on page 3-33 and "CHECKING THE WHEELS" on page 3-35.

3. Measure:

- Radial wheel runout "1"
- Lateral wheel runout "2"
- Over the specified limits → Replace.

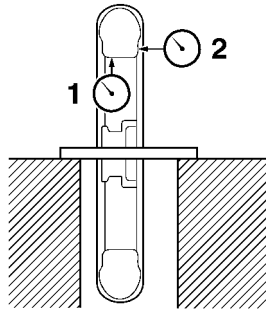


**Radial wheel runout limit**

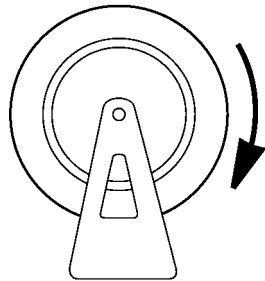
**1.0 mm (0.04 in)**

**Lateral wheel runout limit**

**0.5 mm (0.02 in)**



4. Check:
- Wheel bearings  
Front wheel turns roughly or is loose → Replace the wheel bearings.
  - Oil seals  
Damage/wear → Replace.



EAS21960

## ASSEMBLING THE FRONT WHEEL

1. Install:

- Wheel bearings **New**
- Oil seals **New**

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

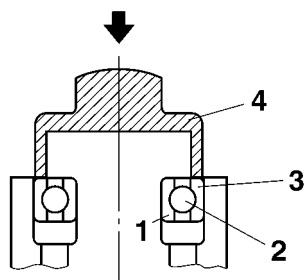
EC2C01010

### CAUTION:

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

### NOTE:

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



EAS21970

## 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 disc installed.

1. Remove:

- Balancing weight(s)

2. Find:

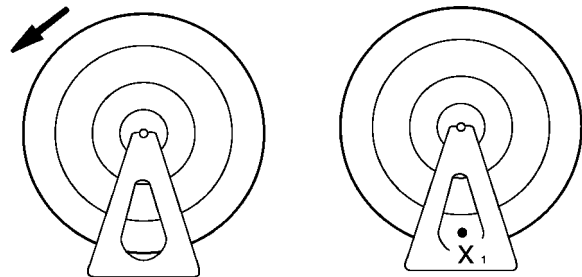
- Front wheel's heavy spot

### NOTE:

Place the front wheel on a suitable balancing stand.

- a. Spin the front wheel.

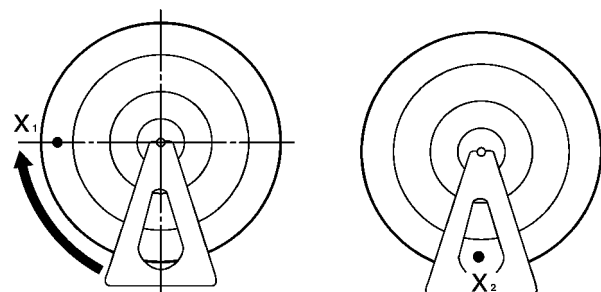
- b. When the front wheel stops, put an "X<sub>1</sub>" mark at the bottom of the wheel.



- c. Turn the front wheel 90° so that the "X<sub>1</sub>" mark is positioned as shown.

- d. Release the front wheel.

- e. When the wheel stops, put an "X<sub>2</sub>" mark at the bottom of the wheel.



- f. Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.

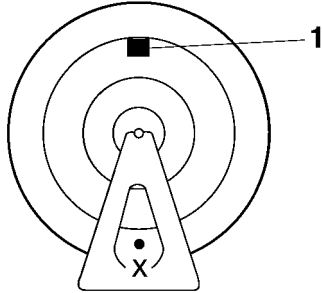
- g. The spot where all the marks come to rest is the front wheel's heavy spot "X".

3. Adjust:
- Front wheel static balance

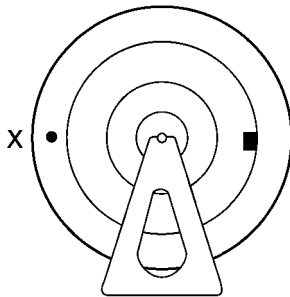


- a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

**NOTE:** Start with the lightest weight.



- b. Turn the front wheel 90° so that the heavy spot is positioned as shown.



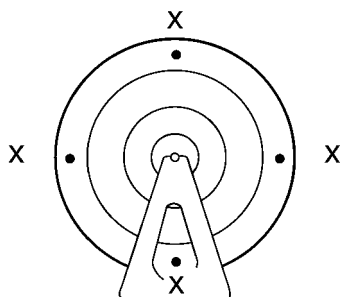
- c. If the heavy spot does not stay in that position, install a heavier weight.  
d. Repeat steps (b) and (c) until the front wheel is balanced.



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.



ET2C01002

## CHECKING THE FRONT BRAKE DISCS

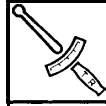
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.

EAS22000

## INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)

The following procedure applies to both of the brake discs.

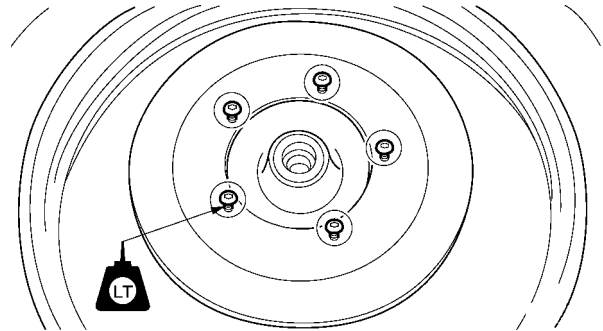
1. Install:
- Front brake disc



**Front brake disc bolt**  
**18 Nm (1.8 m·kg, 13 ft·lb)**  
**LOCTITE®**

**NOTE:**

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



2. Check:
- Front brake discs  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.
3. Lubricate:
- Oil seal lips

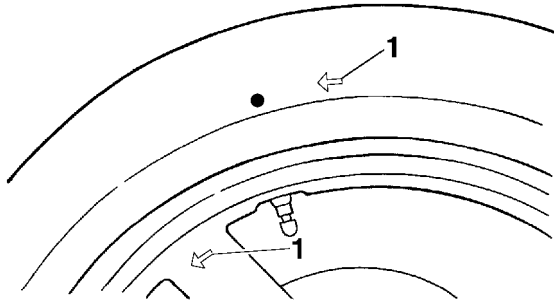


**Recommended lubricant**  
**Lithium-soap-based grease**

4. Install:
- Front wheel

**NOTE:**

Install the tire and wheel with the mark "1" pointing in the direction of wheel rotation.



5. Install:

- Front wheel axle
- Front wheel axle bolt
- Front wheel axle pinch bolts



**Front wheel axle**  
**91 Nm (9.1 m·kg, 67 ft·lb)**  
**Front wheel axle pinch bolt**  
**21 Nm (2.1 m·kg, 16 ft·lb)**

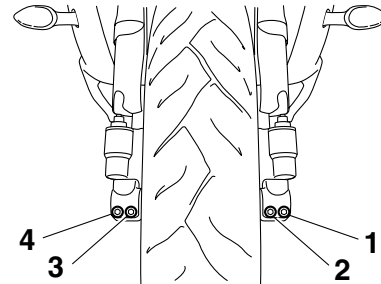
EC2C01015

**CAUTION:**

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

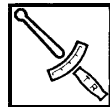
**NOTE:**

Lubricate the front wheel axle bolt mating surfaces with lithium-soap-based grease.



6. Install:

- Front brake calipers



**Front brake caliper bolt**  
**35 Nm (3.5 m·kg, 26 ft·lb)**

EWA13500

**WARNING**

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

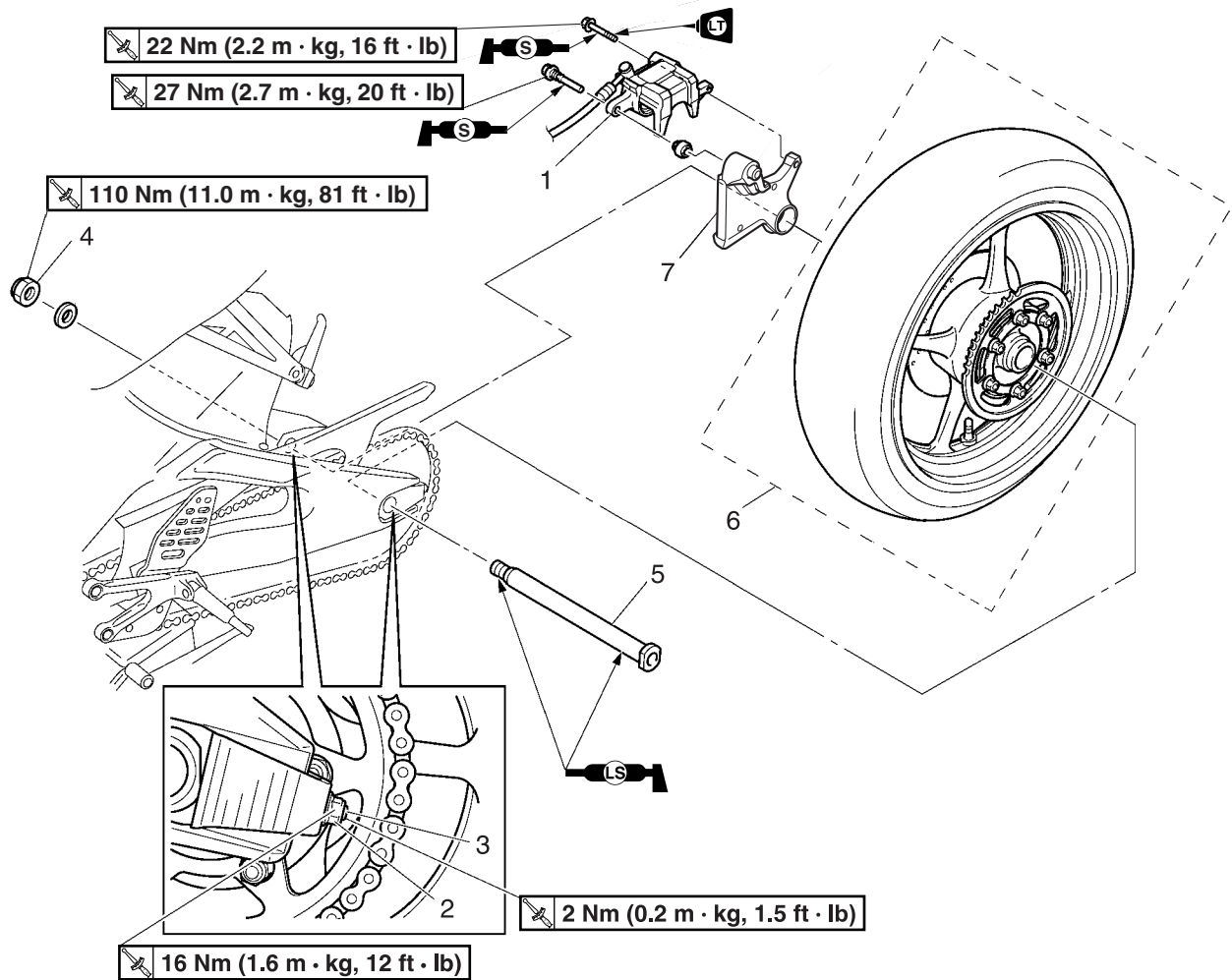


- Insert the front wheel axle from the right side and tighten it with the front wheel axle bolt from the left side to 91 Nm (9.1 m·kg, 66 ft·lb) without performing temporary tightening.
- In the order pinch bolt “2” → pinch bolt “1” → pinch bolt “2”, tighten each bolt to 21 Nm (2.1 m·kg, 15 ft·lb) without performing temporary tightening.
- Check that the right end of the front wheel axle is flush with the front fork. If necessary, manually push the front wheel axle or lightly tap it with a soft hammer until its end is flush with the front fork. However, if the surface of the front wheel axle end is not parallel to the surface of the front fork, align a point on the outer edge of the axle with the fork, making sure that the axle does not protrude past the fork.
- In the order pinch bolt “4” → pinch bolt “3” → pinch bolt “4”, tighten each bolt to 21 Nm (2.1 m·kg, 15 ft·lb) without performing temporary tightening.

EAS22020

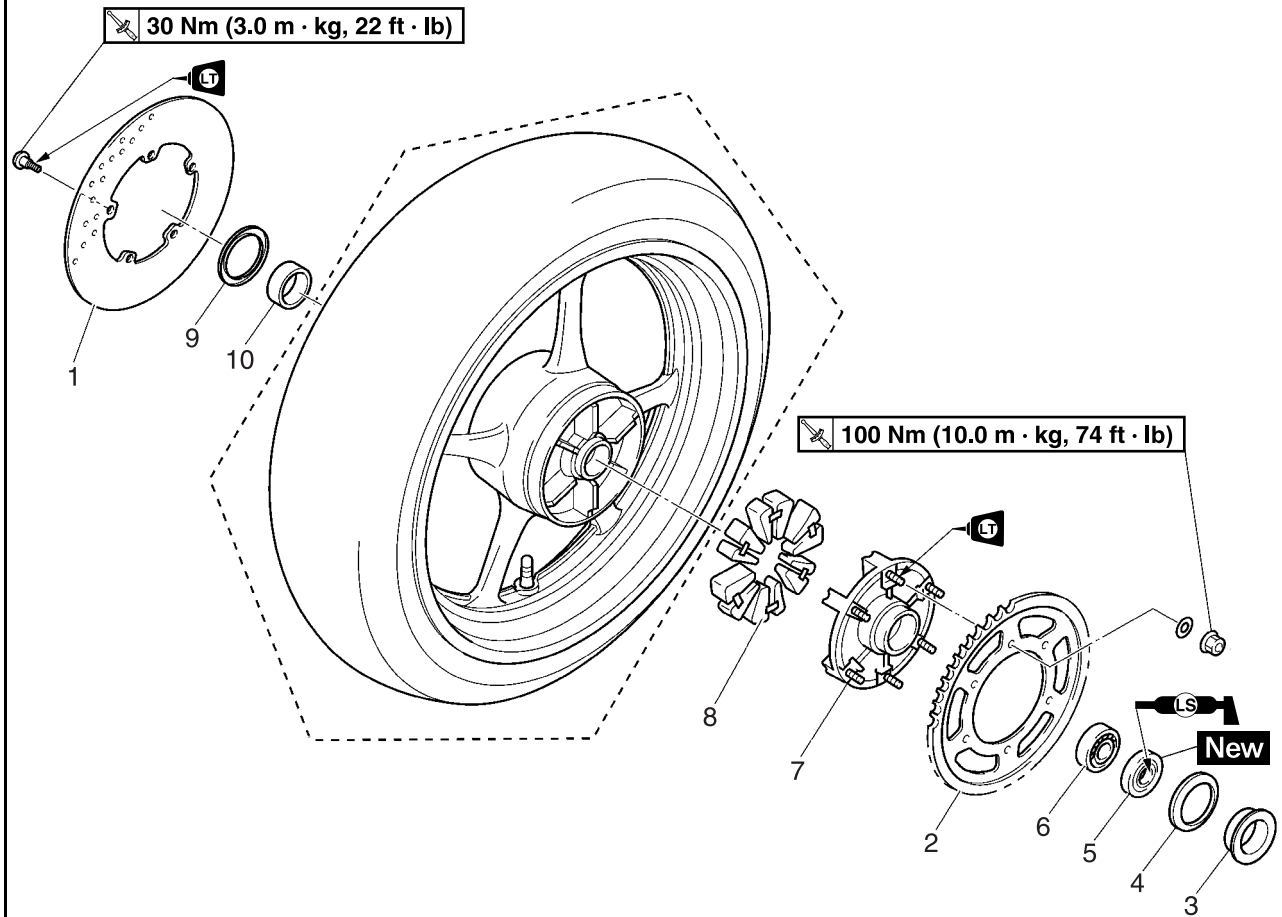
## REAR WHEEL

### Removing the rear wheel



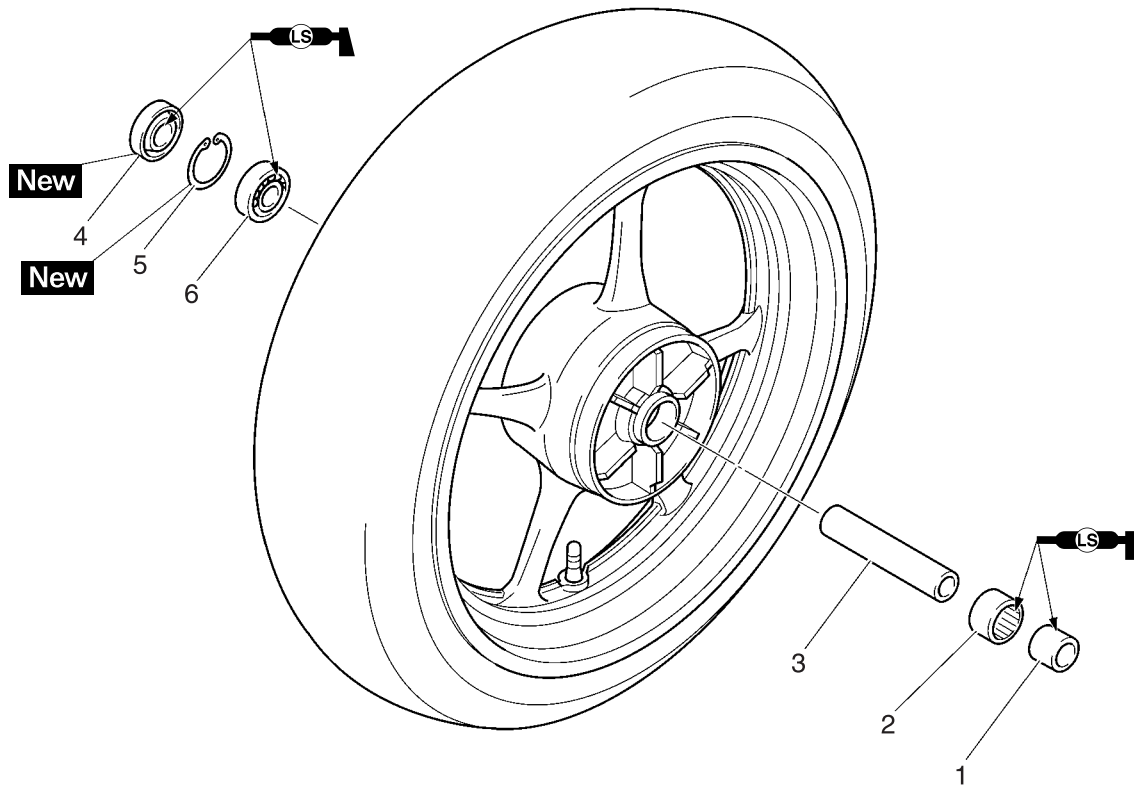
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake caliper	1	
2	Drive chain adjusting locknut	2	Loosen.
3	Drive chain adjusting bolt	2	Loosen.
4	Rear wheel axle nut	1	
5	Rear wheel axle	1	
6	Rear wheel	1	
7	Rear brake caliper bracket	1	
			For installation, reverse the removal procedure.

## Removing the rear brake disc and rear wheel sprocket



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake disc	1	
2	Rear wheel sprocket	1	
3	Collar	1	
4	Dust cover	1	
5	Oil seal	1	
6	Bearing	1	
7	Rear wheel drive hub	1	
8	Rear wheel drive hub damper	6	
9	Dust cover	1	
10	Collar	1	
			For installation, reverse the removal procedure.

## Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Collar	1	
2	Bearing	1	
3	Spacer	1	
4	Oil seal	1	
5	Circlip	1	
6	Bearing	1	
			For assembly, reverse the disassembly procedure.

EAS22040

## REMOVING THE REAR WHEEL

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

### NOTE:

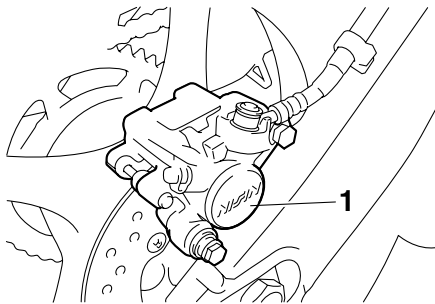
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Rear brake caliper "1"

### NOTE:

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

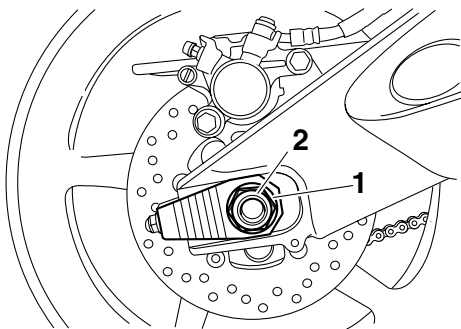


3. Remove:

- Rear wheel axle nut "1"
- Rear wheel axle "2"
- Rear wheel

### NOTE:

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



EAS22080

## DISASSEMBLING THE REAR WHEEL

1. Remove:

- Oil seals
- Wheel bearings

Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-8.

EAS22090

## CHECKING THE REAR WHEEL

1. Check:

- Rear wheel axle
- Rear wheel
- Wheel bearings
- Oil seals

Refer to "CHECKING THE FRONT WHEEL" on page 4-8.

2. Check:

- Tire
  - Rear wheel
- Damage/wear → Replace.

Refer to "CHECKING THE TIRES" on page 3-33 and "CHECKING THE WHEELS" on page 3-35.

3. Measure:

- Radial wheel runout
- Lateral wheel runout

Refer to "CHECKING THE FRONT WHEEL" on page 4-8.



**Radial wheel runout limit**

**1.0 mm (0.04 in)**

**Lateral wheel runout limit**

**0.5 mm (0.02 in)**

ET2C01024

## CHECKING THE REAR BRAKE CALIPER BRACKET

1. Check:

- Rear brake caliper bracket
- Cracks/damage → Replace.

EAS22110

## CHECKING THE REAR WHEEL DRIVE HUB

1. Check:

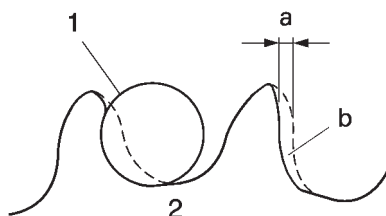
- Rear wheel drive hub
- Cracks/damage → Replace.
- Rear wheel drive hub dampers
- Damage/wear → Replace.

EAS22120

## CHECKING AND REPLACING THE REAR WHEEL SPROCKET

1. Check:

- Rear wheel sprocket
- More than 1/4 tooth "a" wear → Replace the rear wheel sprocket.
- Bent teeth → Replace the rear wheel sprocket.



b. Correct

1. Drive chain roller
2. Rear wheel sprocket

2. Replace:
  - Rear wheel sprocket

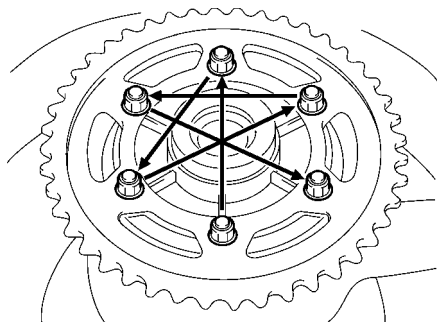
- a. Remove the self-locking nuts and the rear wheel sprocket.
- b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
- c. Install the new rear wheel sprocket.



**Rear wheel sprocket self-locking nut**  
100 Nm (10.0 m·kg, 74 ft·lb)

## NOTE:

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



EAS22140

## ASSEMBLING THE REAR WHEEL

1. Install:
  - Wheel bearings **New**
  - Oil seals **New**

Refer to “ASSEMBLING THE FRONT WHEEL” on page 4-9.

EAS22150

## ADJUSTING THE REAR WHEEL STATIC BALANCE

### NOTE:

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

1. Adjust:
  - Rear wheel static balance

Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-9.

ET2C01004

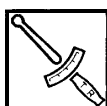
## CHECKING THE REAR BRAKE DISC

Refer to “CHECKING THE REAR BRAKE DISC” on page 4-35.

EAS22160

## INSTALLING THE REAR WHEEL (REAR BRAKE DISC)

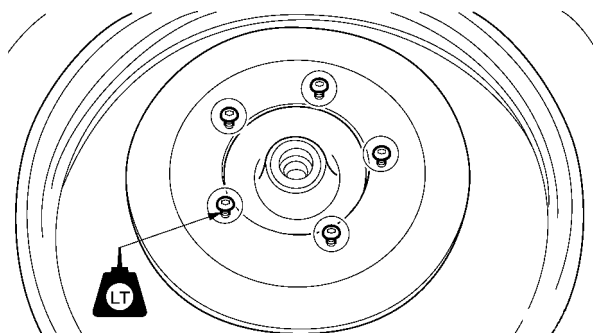
1. Install:
  - Rear brake disc



**Rear brake disc bolt**  
30 Nm (3.0 m·kg, 22 ft·lb)  
LOCTITE®

## NOTE:

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



2. Check:
  - Rear brake disc

Refer to “CHECKING THE REAR BRAKE DISC” on page 4-35.
3. Lubricate:
  - Rear wheel axle
  - Wheel bearings
  - Oil seal lips
  - Collars



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

4. Adjust:

- Drive chain slack

Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-26.



**Drive chain slack**

**30.0–45.0 mm (1.18–1.77 in)**

5. Install:

- Rear brake caliper



**Rear brake caliper bolt (M12)**

**27 Nm (2.7 m·kg, 20 ft·lb)**

**Rear brake caliper bolt (M8)**

**22 Nm (2.2 m·kg, 16 ft·lb)**

**LOCTITE®**

EWA13500



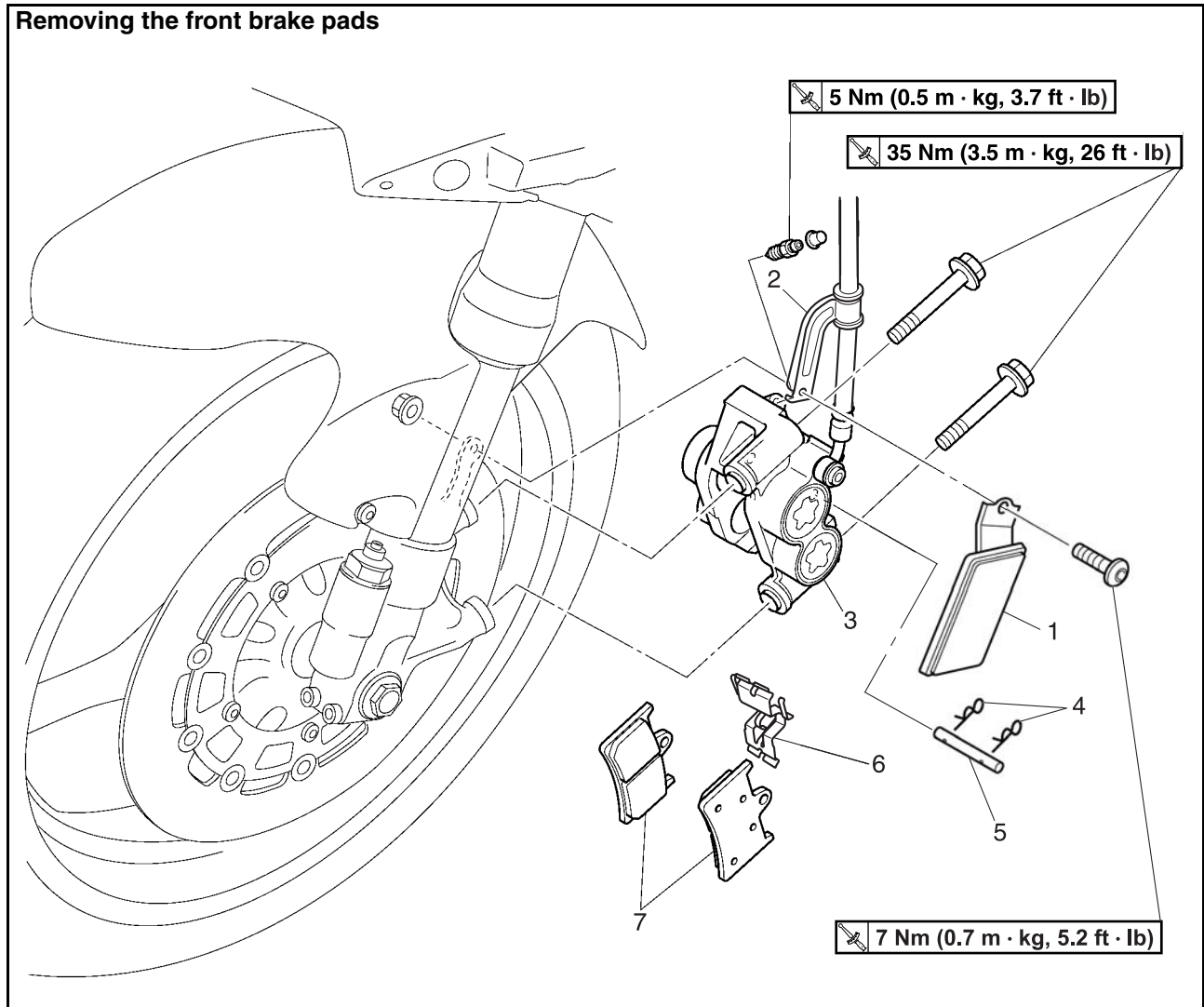
**WARNING**

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

EAS22210

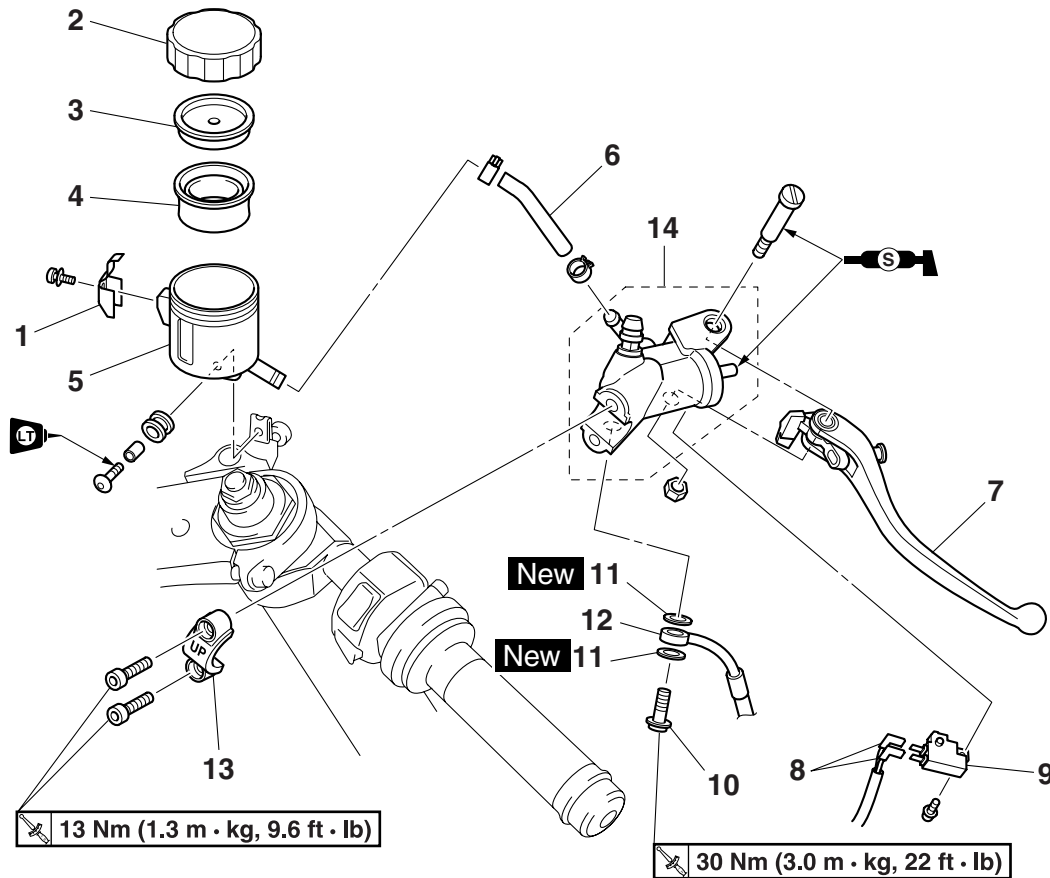
## FRONT BRAKE

### Removing the front brake pads



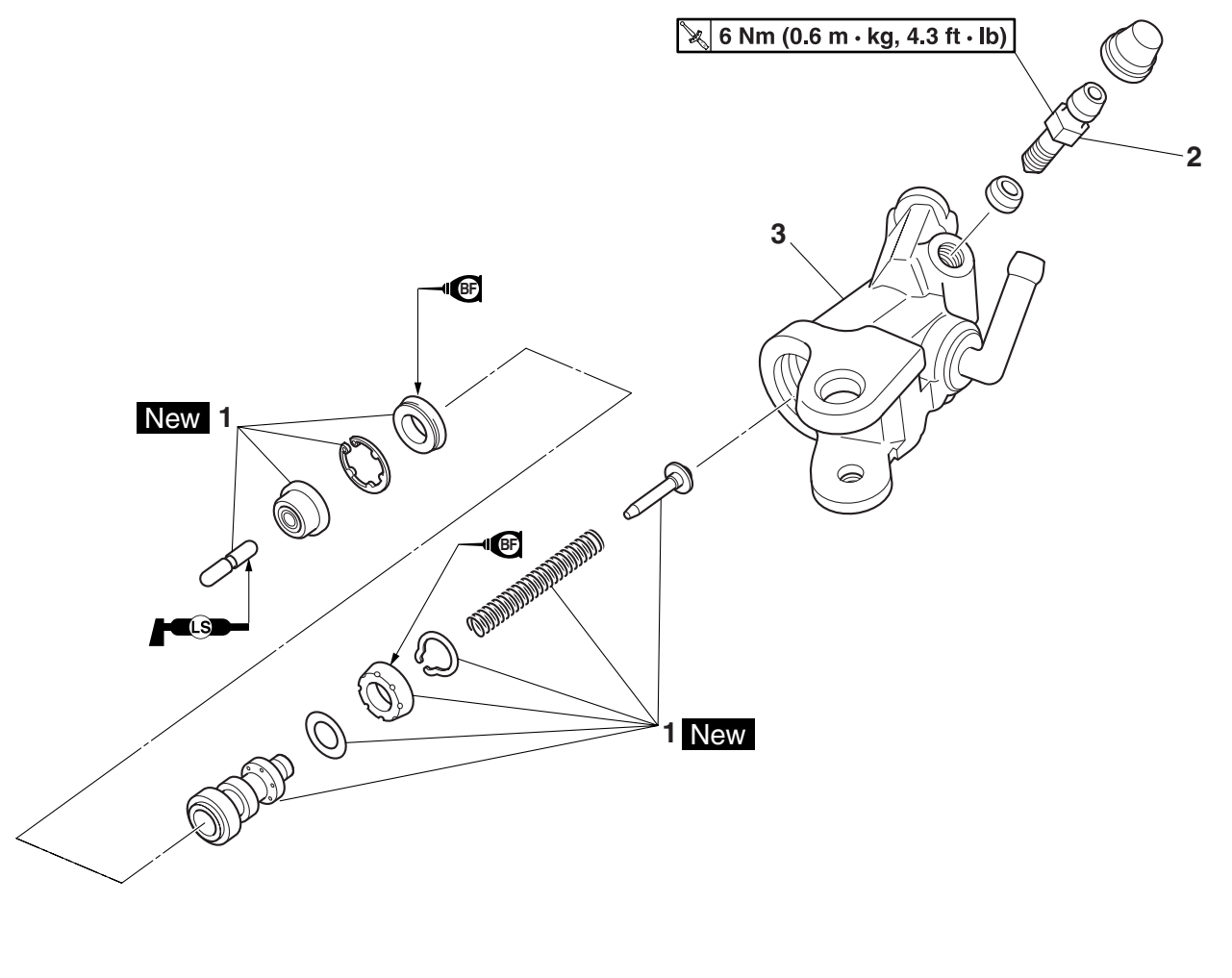
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Reflector assembly	1	
2	Brake hose holder	1	
3	Front brake caliper	1	
4	Brake pad clip	2	
5	Brake pad pin	1	
6	Brake pad spring	1	
7	Front brake pad	2	
			For installation, reverse the removal procedure.

## Removing the front brake master cylinder



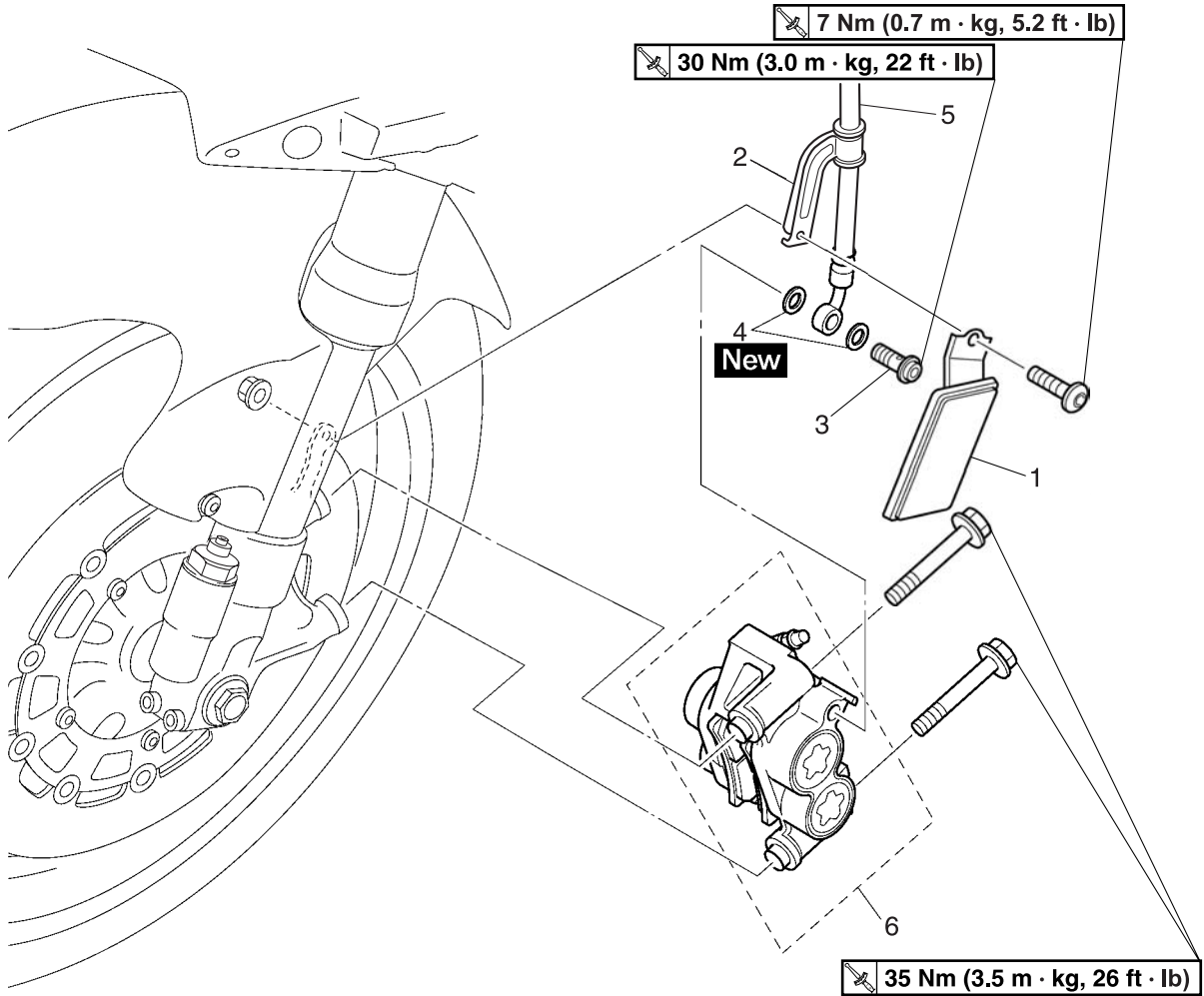
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
1	Brake fluid reservoir cap holder	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
7	Brake lever	1	
8	Front brake light switch connector	2	Disconnect.
9	Front brake light switch	1	
10	Front brake hose union bolt	1	
11	Copper washer	2	
12	Front brake hose	1	
13	Front brake master cylinder holder	1	
14	Front brake master cylinder	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



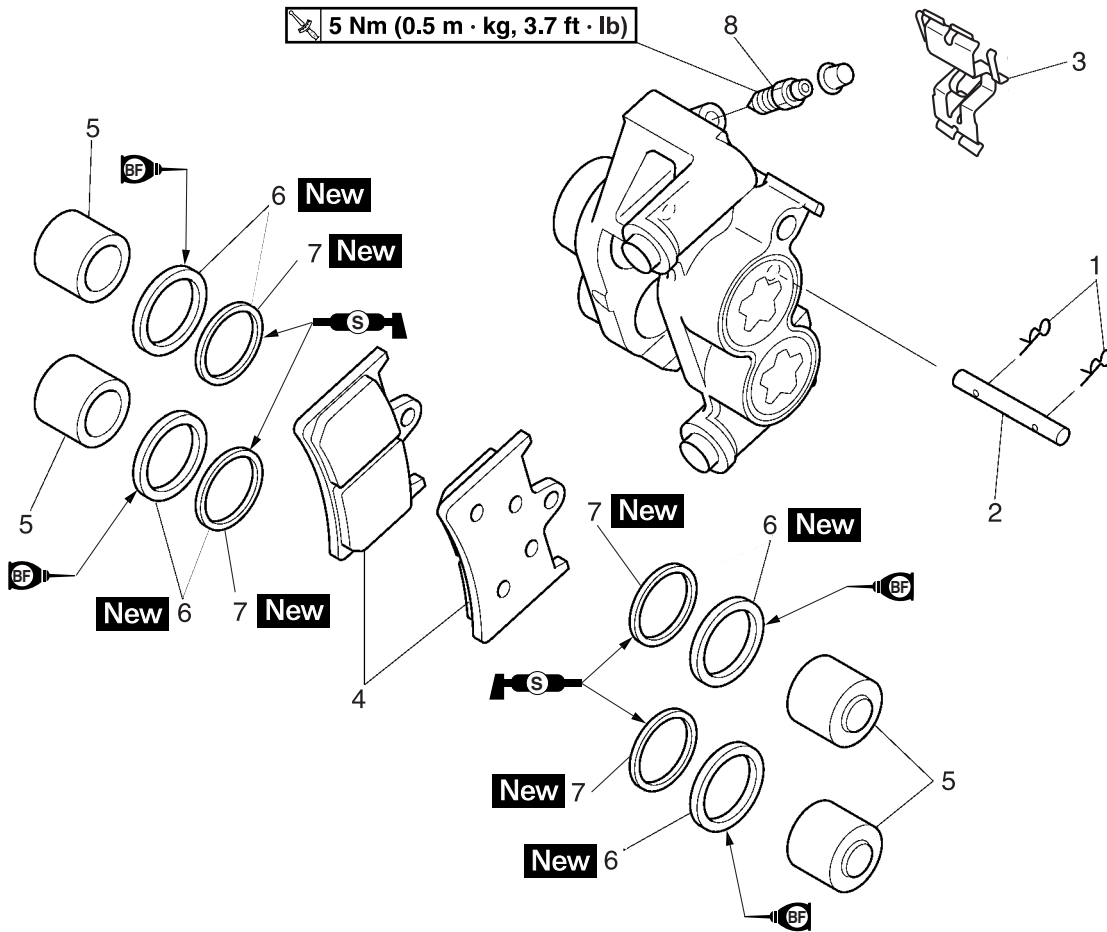
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Bleed screw	1	
3	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

## Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
1	Reflector assembly	1	
2	Brake hose holder	1	
3	Front brake hose union bolt	1	
4	Copper washer	2	
5	Front brake hose	1	
6	Front brake caliper	1	
			For installation, reverse the removal procedure.

## Disassembling the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			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	Front brake pad	2	
5	Brake caliper piston	4	
6	Brake caliper piston seal	4	
7	Brake caliper piston dust seal	4	
8	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS22220

# INTRODUCTION

EWA14100



**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.**

EAS22240

## CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

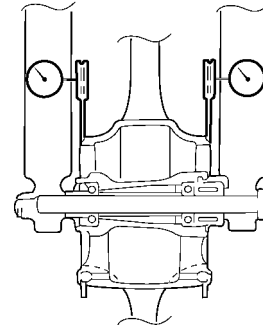
1. Remove:
  - Front wheel  
Refer to “FRONT WHEEL” on page 4-6.
2. Check:
  - Brake disc  
Damage/galling → Replace.
3. Measure:
  - Brake disc deflection  
Out of specification → Correct the brake disc deflection or replace the brake disc.



**Brake disc deflection limit**  
**0.10 mm (0.0039 in)**

- Place the vehicle on a suitable stand so that the front wheel is elevated.
- Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.

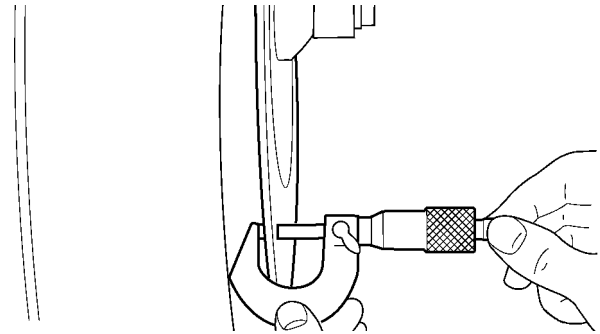
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.



- e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.



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



**Brake disc thickness limit**  
**4.5 mm (0.18 in)**

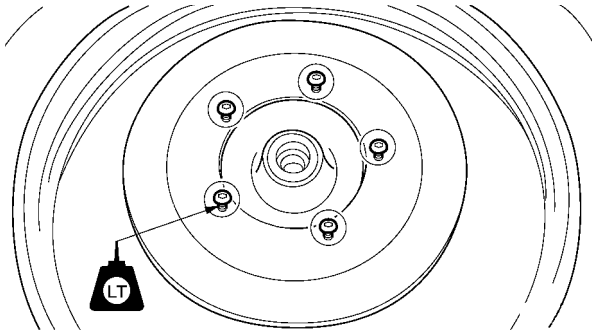
- Brake disc deflection



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

**NOTE:**

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



**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.



6. Install:
  - Front wheel
 Refer to "FRONT WHEEL" on page 4-6.

EAS22270

## REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

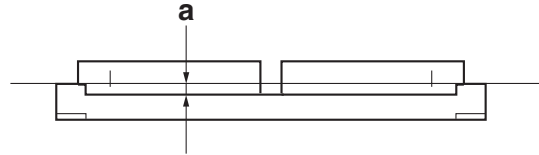
### NOTE:

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

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



**Brake pad lining thickness (inner)**  
**4.5 mm (0.18 in)**  
**Limit**  
**0.5 mm (0.02 in)**  
**Brake pad lining thickness (outer)**  
**4.5 mm (0.18 in)**  
**Limit**  
**0.5 mm (0.02 in)**



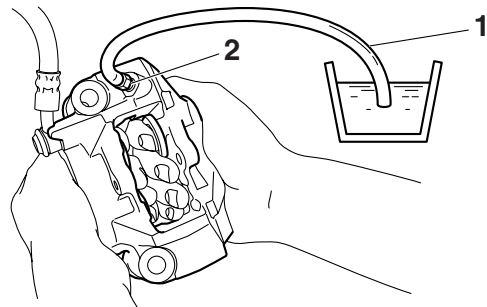
2. Install:
  - Brake pads
  - Brake pad spring

### NOTE:

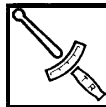
Always install new brake pads, and a brake pad spring as a set.



- 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.

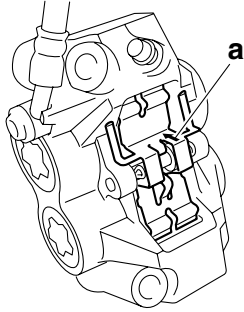


**Bleed screw**  
**5 Nm (0.5 m·kg, 3.7 ft·lb)**

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

### NOTE:

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



### 3. Install:

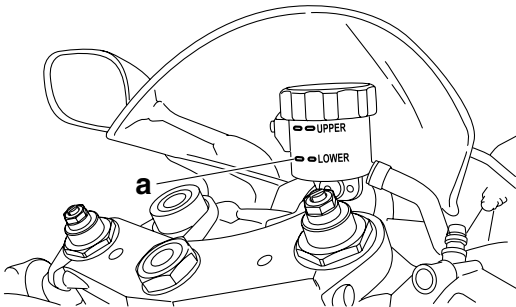
- Brake pad pin
- Brake pad clips
- Front brake caliper



**Brake caliper bolt**  
35 Nm (3.5 m·kg, 26 ft·lb)

### 4. Check:

- Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-23.



### 5. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

EAS22300

## REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

### NOTE:

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

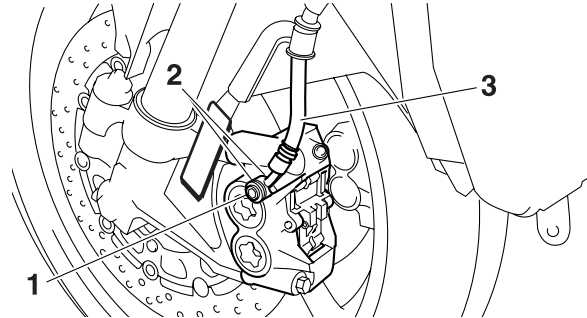
### 1. Remove:

- Front brake hose union bolt “1”

- Copper washers “2”
- Front brake hose “3”

### NOTE:

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



EAS22360

## DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

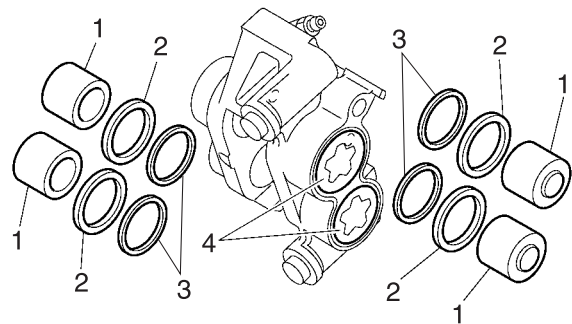
### 1. Remove:

- Brake caliper pistons “1”
- Brake caliper piston seals “2”
- Brake caliper piston dust seals “3”

EWA13S1001

### ⚠ WARNING

**Do not loosen the bolts “4”.**

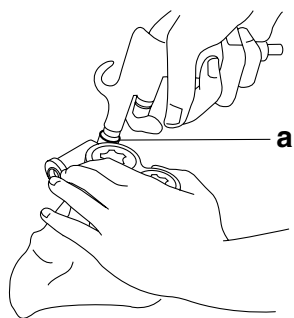


- Blow compressed air into the brake hose joint opening “a” to force out the left side pistons from the brake caliper.

EWA13580

### ⚠ WARNING

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



- b. Remove the brake caliper piston seals and brake caliper piston dust seals.



EAS22390

## CHECKING THE FRONT BRAKE CALIPERS

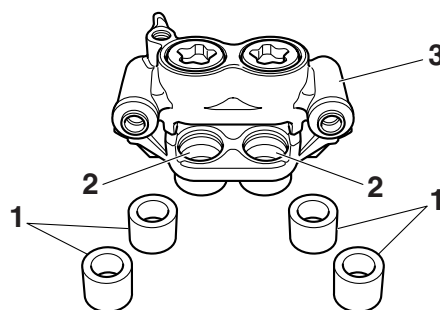
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals and piston dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

1. Check:
  - Brake caliper pistons “1”  
Rust/scratches/wear → Replace the brake caliper pistons.
  - Brake caliper cylinders “2”  
Scratches/wear → Replace the brake caliper assembly.
  - Brake caliper body “3”  
Cracks/damage → Replace the brake caliper assembly.
  - Brake fluid delivery passages (brake caliper body)  
Obstruction → Blow out with compressed air.

EWA13S1002

### **WARNING**

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



EAS22410

## ASSEMBLING THE FRONT BRAKE CALIPERS

EWA13S1003

### **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 and brake caliper piston dust seals.



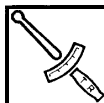
**Recommended fluid  
DOT 4**

EAS22450

## INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:
  - Front brake caliper “1”  
(temporarily)
  - Copper washers **New**
  - Front brake hose “2”
  - Front brake hose union bolt “3”



**Front brake hose union bolt  
30 Nm (3.0 m·kg, 22 ft·lb)**

EWA13S30

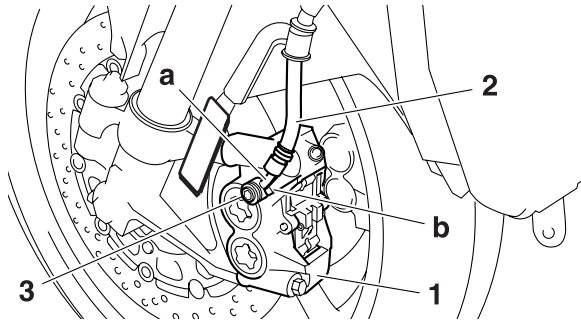
### **WARNING**

**Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-45.**

ECA14170

## CAUTION:

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



2. Remove:
  - Front brake caliper
3. Install:
  - Front brake pads
  - Brake pad spring
  - Brake pad pin
  - Brake pad clips
  - Front brake caliper



**Front brake caliper bolt**  
35 Nm (3.5 m·kg, 26 ft·lb)

Refer to “REPLACING THE FRONT BRAKE PADS” on page 4-24.

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



**Recommended fluid**  
DOT 4

EWA13090

## 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

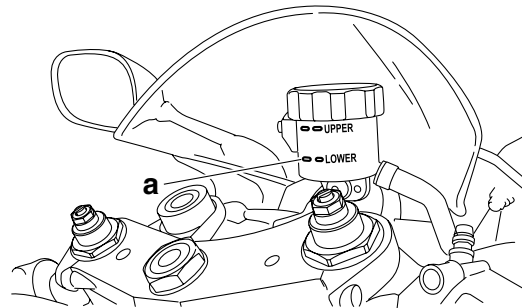
the brake fluid and could cause vapor lock.

ECA13540

## 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” on page 3-25.
6. Check:
  - Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-23.



7. Check:
  - Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

EAS22490

## REMOVING THE FRONT BRAKE MASTER CYLINDER

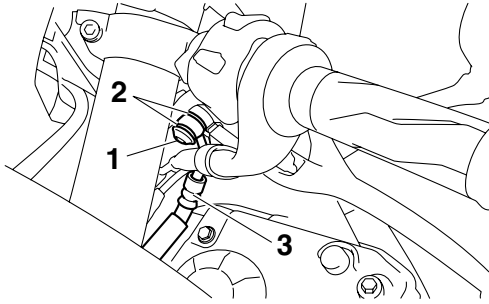
### NOTE:

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

1. Remove:
  - Front brake hose union bolt “1”
  - Copper washers “2”
  - Front brake hoses “3”

### NOTE:

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



EAS22510

## CHECKING THE FRONT BRAKE MASTER CYLINDER

1. Check:
  - Front brake master cylinder  
Damage/scratches/wear → Replace.
  - Brake fluid delivery passages  
(brake master cylinder body)  
Obstruction → Blow out with compressed air.
2. Check:
  - Brake master cylinder kit  
Damage/scratches/wear → Replace.
3. Check:
  - Brake fluid reservoir  
Cracks/damage → Replace.
  - Brake fluid reservoir diaphragm  
Damage/wear → Replace.
4. Check:
  - Brake hose
  - Brake fluid reservoir hose  
Cracks/damage/wear → Replace.

EAS22520

## ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

### WARNING

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

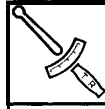


**Recommended fluid**  
**DOT 4**

EAS22540

## INSTALLING THE FRONT BRAKE MASTER CYLINDER

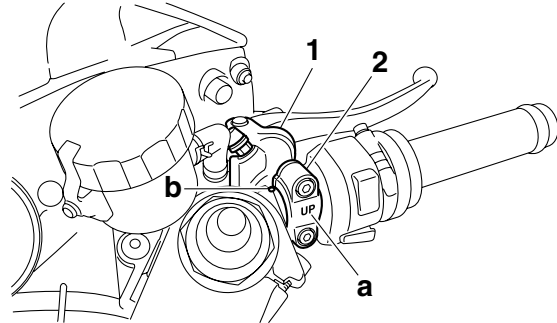
1. Install:
  - Front brake master cylinder “1”
  - Front brake master cylinder holder “2”



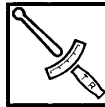
**Front brake master cylinder holder bolt**  
**13 Nm (1.3 m·kg, 9.6 ft·lb)**

### NOTE:

- Install the brake master cylinder holder with the “UP” mark “a” facing up.
- Align the mating surfaces of the brake master cylinder holder with the punch mark “b” on the handlebar.



2. Install:
  - Front brake hose “1”
  - Copper washers “2” **New**
  - Front brake hose union bolt “3”



**Front brake hose union bolt**  
**30 Nm (3.0 m·kg, 22 ft·lb)**

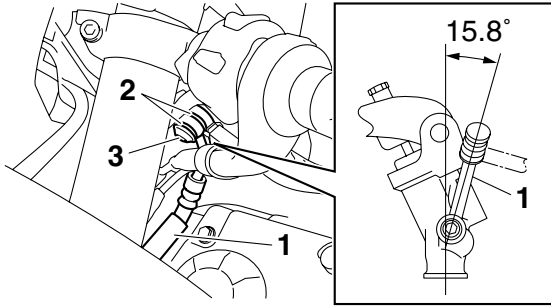
EWA13530

### WARNING

**Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-45.**

### NOTE:

- Install the brake hose at a 15.8° angle to the front brake master cylinder as shown in the illustration.
- While holding the brake hose, tighten the union bolt.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



## 3. Fill:

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



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

EWA13090

## **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.

ECA13540

## **CAUTION:**

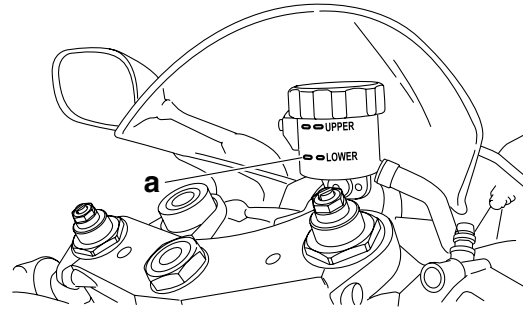
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**

## 4. Bleed:

- Brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

## 5. Check:

- Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-23.



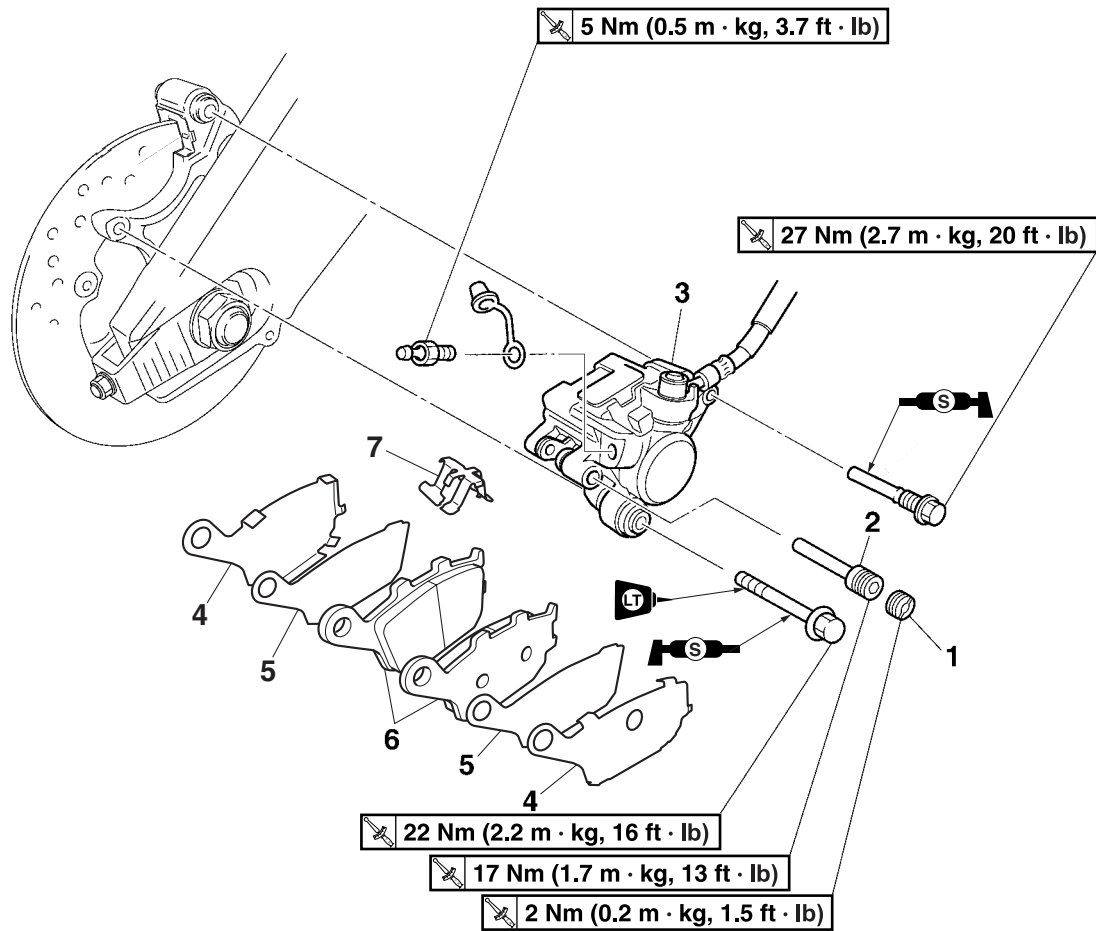
## 6. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

EAS22550

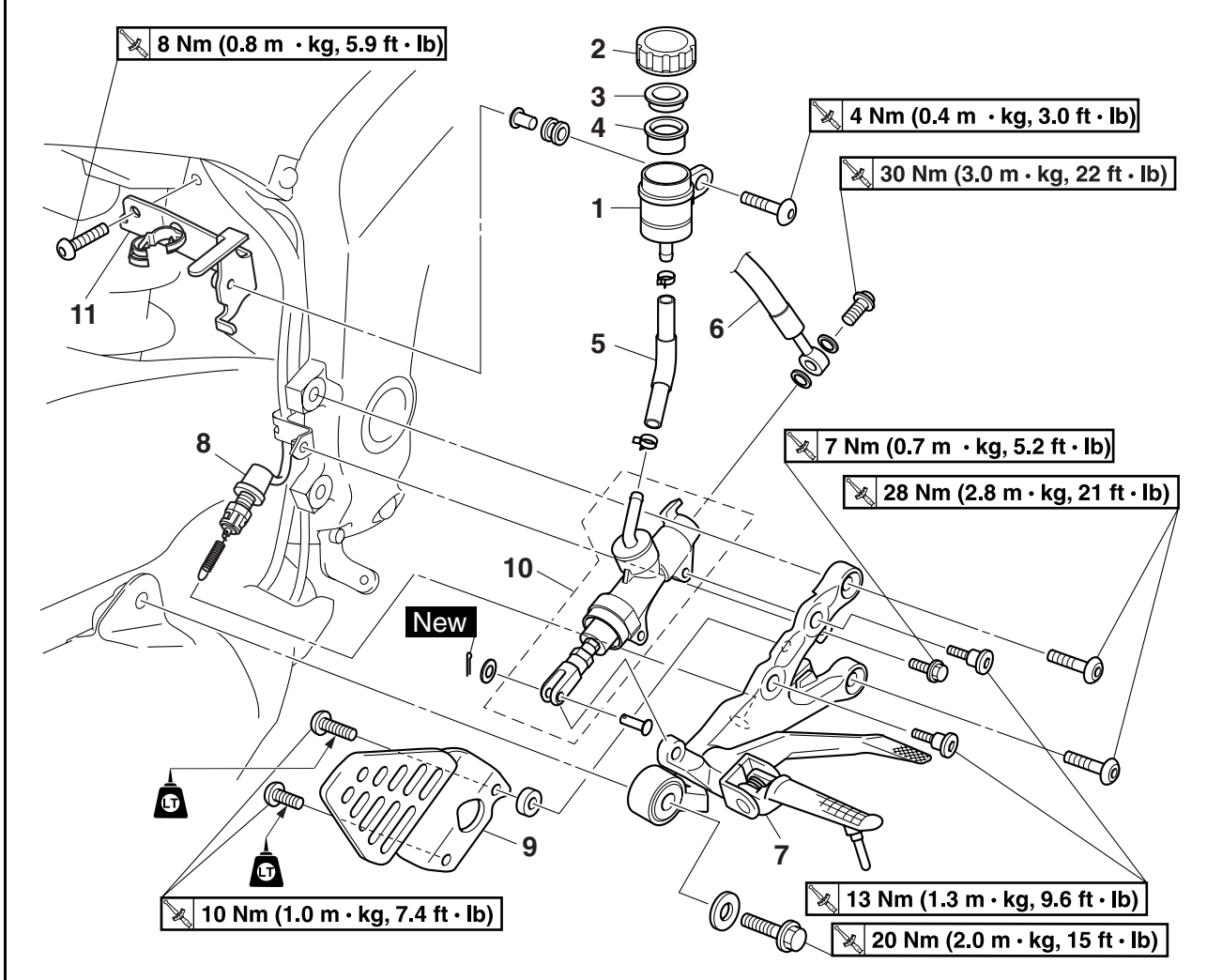
## REAR BRAKE

### Removing the rear brake pads



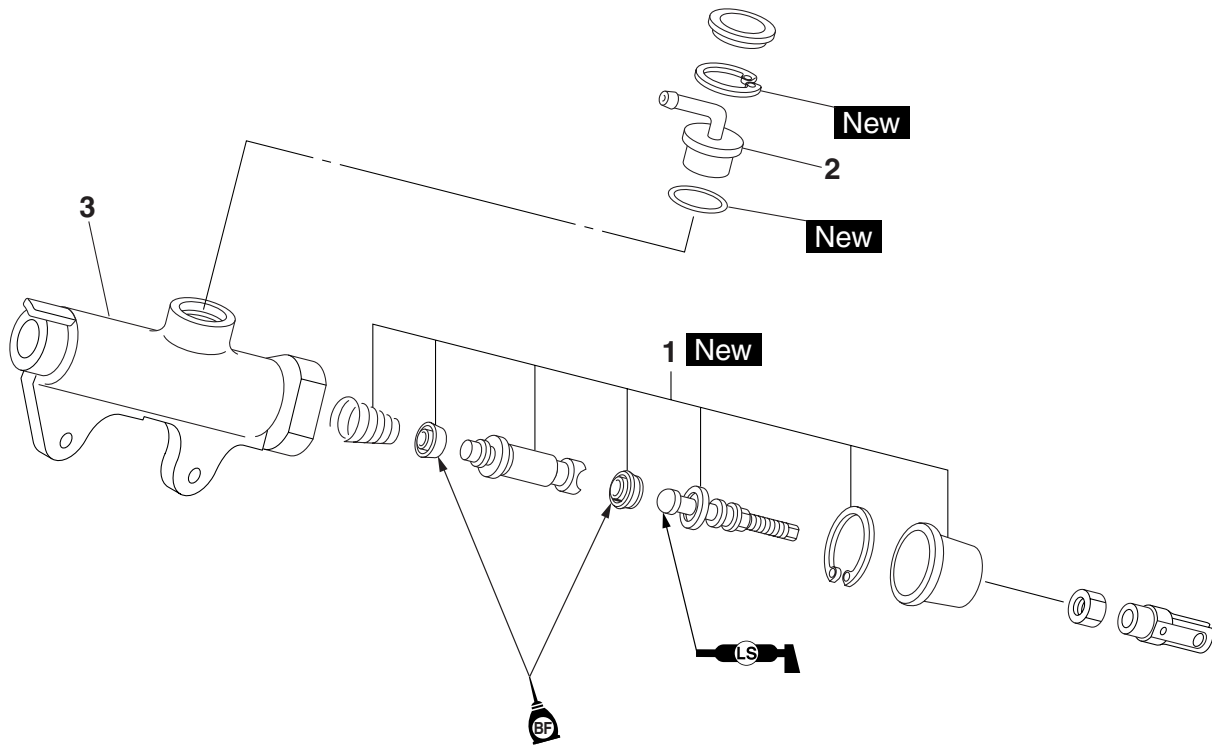
Order	Job/Parts to remove	Q'ty	Remarks
1	Screw plug	1	
2	Brake pad pin	1	
3	Rear brake caliper	1	
4	Brake pad shim	2	
5	Brake pad insulator	2	
6	Rear brake pad	2	
7	Brake pad spring	1	
			For installation, reverse the removal procedure.

## Removing the rear brake master cylinder



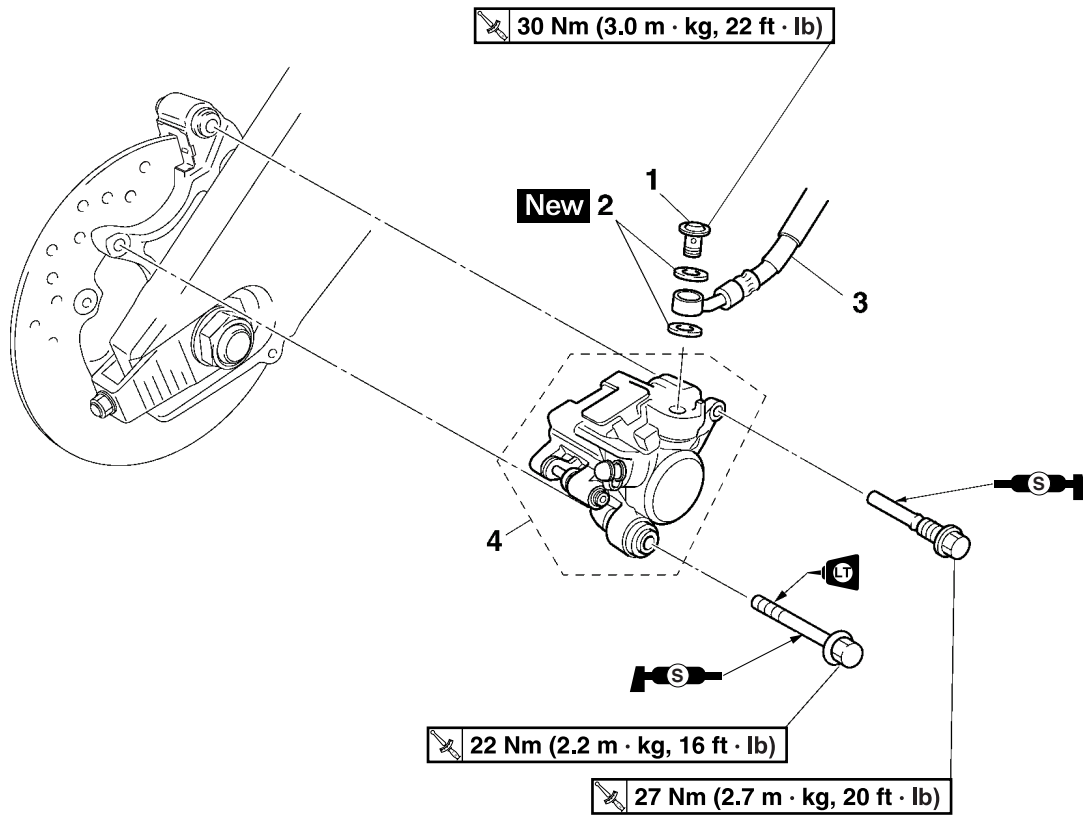
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
1	Brake fluid reservoir	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir hose	1	
6	Rear brake hose	1	
7	Right footrest assembly	1	
8	Rear brake light switch	1	
9	Footrest plate	1	
10	Rear brake master cylinder	1	
11	Brake fluid reservoir bracket	1	
			For installation, reverse the removal procedure.

## Disassembling the rear brake master cylinder



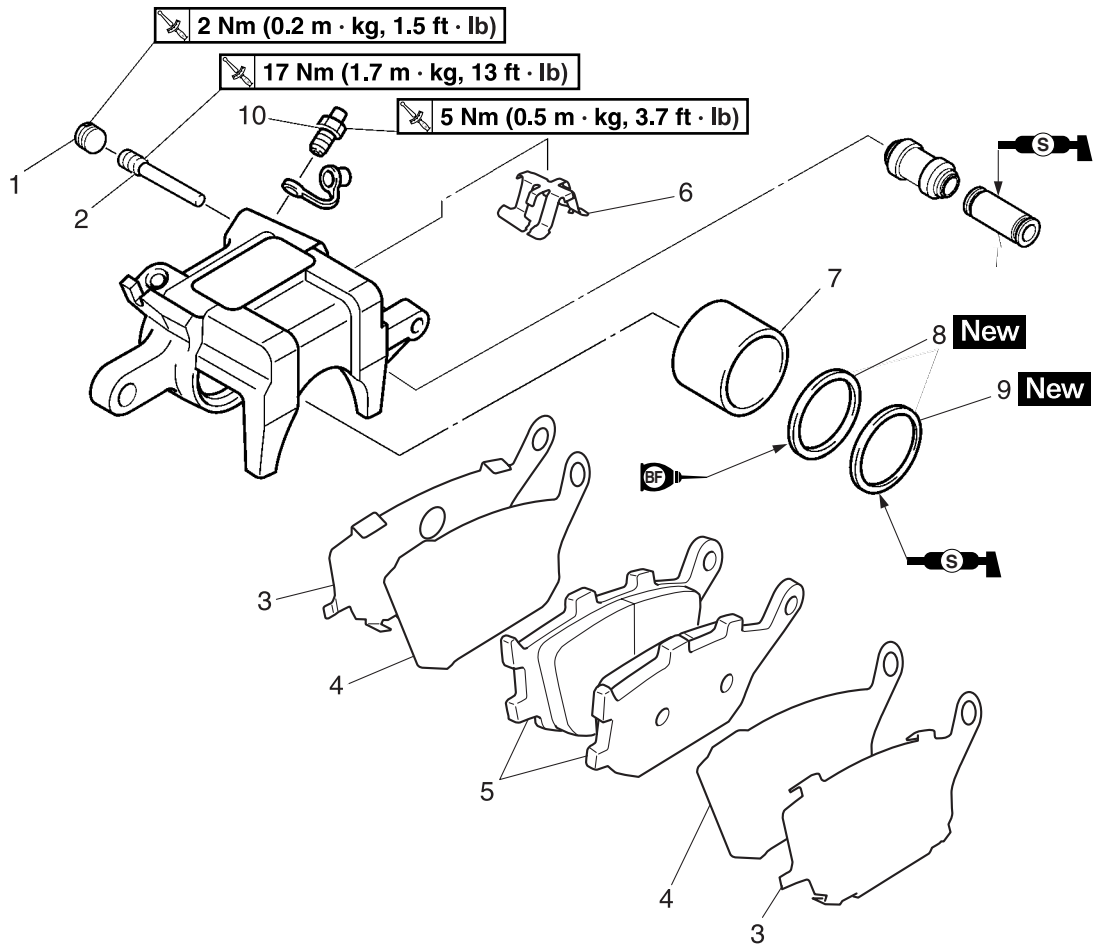
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake hose joint	1	
3	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

## Removing the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
1	Rear brake hose union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	
4	Rear brake caliper	1	
			For installation, reverse the removal procedure.

## Disassembling the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Screw plug	1	
2	Brake pad pin	1	
3	Brake pad shim	2	
4	Brake pad insulator	2	
5	Rear brake pad	2	
6	Brake pad spring	1	
7	Brake caliper piston	1	
8	Brake caliper piston seal	1	
9	Brake caliper piston dust seal	1	
10	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS22560

## INTRODUCTION

EWA14100



### WARNING

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.

EAS22570

## CHECKING THE REAR BRAKE DISC

1. Remove:
  - Rear wheel  
Refer to "REAR WHEEL" on page 4-12.
2. Check:
  - Brake disc  
Damage/galling → Replace.
3. Measure:
  - Brake disc deflection  
Out of specification → Correct the brake disc deflection or replace the brake disc.  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.



**Brake disc deflection limit**  
**0.15 mm (0.0059 in)**

4. Measure:
  - Brake disc thickness  
Measure the brake disc thickness at a few different locations.  
Out of specification → Replace.  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.



**Brake disc thickness limit**  
**4.5 mm (0.18 in)**

5. Adjust:
  - Brake disc deflection  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.



**Rear brake disc bolt**  
**30 Nm (3.0 m·kg, 22 ft·lb)**  
**LOCTITE®**

6. Install:
  - Rear wheel  
Refer to "REAR WHEEL" on page 4-12.

EAS22580

## REPLACING THE REAR BRAKE PADS

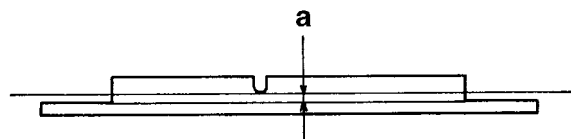
### NOTE:

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

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



**Brake pad lining thickness (inner)**  
**6.0 mm (0.24 in)**  
**Limit**  
**1.0 mm (0.04 in)**  
**Brake pad lining thickness (outer)**  
**6.0 mm (0.24 in)**  
**Limit**  
**1.0 mm (0.04 in)**

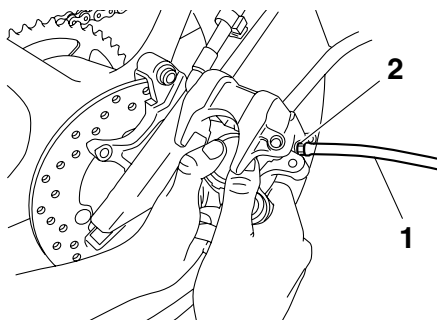


2. Install:
  - Brake pad insulators (onto the brake pads)
  - Brake pad shims (onto the brake pads)
  - Brake pads
  - Brake pad spring

## NOTE:

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

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

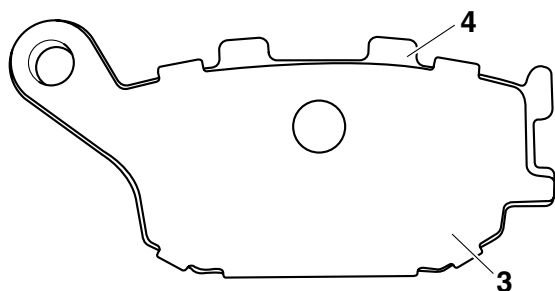


- Tighten the bleed screw.



**Bleed screw**  
5 Nm (0.5 m·kg, 3.6 ft·lb)

- Install a new brake pad insulator and new brake pad shim "3" onto each new brake pad "4".



- Install:

- Rear brake caliper
- Brake pad pin
- Screw plug

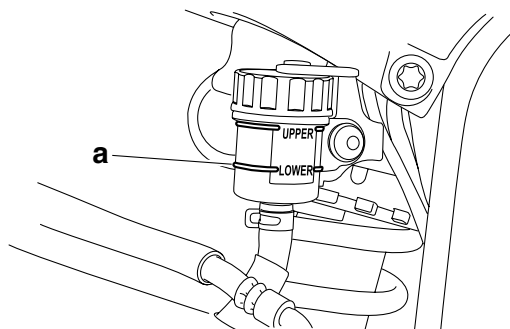


**Rear brake caliper bolt (M12)**  
27 Nm (2.7 m·kg, 20 ft·lb)  
**Rear brake caliper bolt (M8)**  
22 Nm (2.2 m·kg, 16 ft·lb)  
**LOCTITE®**

- Check:

- Brake fluid level

Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.  
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.



- Check:

- Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAS22590

## REMOVING THE REAR BRAKE CALIPER

### NOTE:

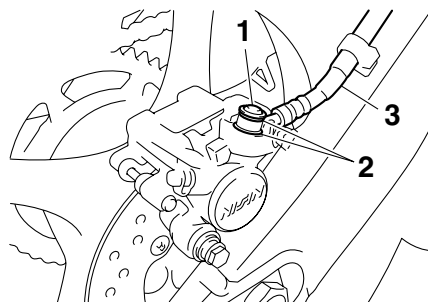
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

- Remove:

- Rear brake hose union bolt "1"
- Copper washers "2"
- Rear brake hose "3"

### NOTE:

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

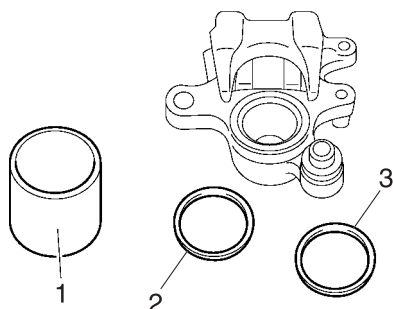


EAS22600

## DISASSEMBLING THE REAR BRAKE CALIPER

- Remove:

- Brake caliper piston "1"
- Brake caliper piston seal "2"
- Brake caliper piston dust seal "3"

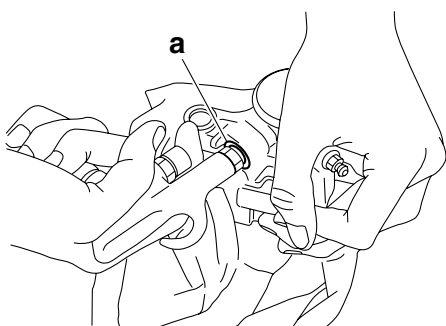


- a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA13550

## ⚠ WARNING

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



- b. Remove the brake caliper piston seal and brake caliper piston dust seal.

EAS22640

## CHECKING THE REAR BRAKE CALIPER

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

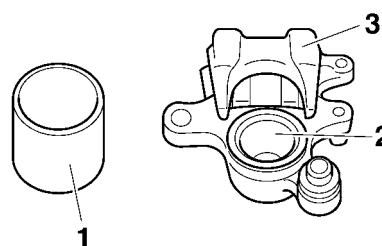
1. Check:
- Brake caliper piston “1”  
Rust/scratches/wear → Replace the brake caliper pistons.

- Brake caliper cylinder “2”  
Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body “3”  
Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages (brake caliper body)  
Obstruction → Blow out with compressed air.

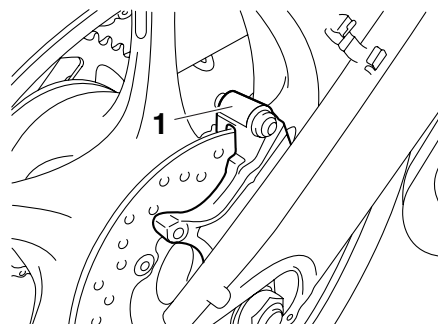
EWA13S1004

## ⚠ WARNING

**Whenever a brake caliper is disassembled, replace the brake caliper piston seal and brake caliper piston dust seal.**



2. Check:
- Brake caliper bracket “1”  
Cracks/damage → Replace.



EAS22650

## ASSEMBLING THE REAR BRAKE CALIPER

EWA13S1005

## ⚠ 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 seal and brake caliper piston dust seal.



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

EAS22670

## INSTALLING THE REAR BRAKE CALIPER

### 1. Install:

- Rear brake caliper “1” (temporarily)
- Copper washers **New**
- Rear brake hose “2”
- Rear brake hose union bolt “3”



**Rear brake hose union bolt**  
**30 Nm (3.0 m·kg, 22 ft·lb)**

EWA13530



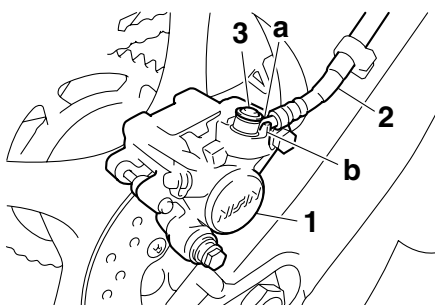
**WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “**CABLE ROUTING**” on page 2-45.

ECA14170

**CAUTION:**

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



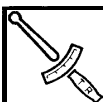
### 2. Remove:

- Rear brake caliper

### 3. Install:

- Rear brake pads
- Brake pad springs
- Brake pad pin
- Rear brake caliper

Refer to “**REPLACING THE REAR BRAKE PADS**” on page 4-35.



**Rear brake caliper bolt (M12)**  
**27 Nm (2.7 m·kg, 20 ft·lb)**  
**Rear brake caliper bolt (M8)**  
**22 Nm (2.2 m·kg, 16 ft·lb)**  
**LOCTITE®**

### 4. Fill:

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



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

EWA13090



**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.

ECA13540

**CAUTION:**

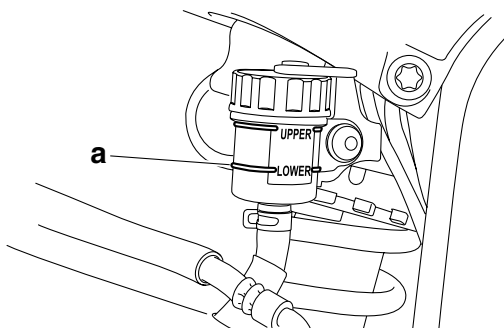
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

### 5. Bleed:

- Brake system  
Refer to “**BLEEDING THE HYDRAULIC BRAKE SYSTEM**” on page 3-25.

### 6. Check:

- Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “**CHECKING THE BRAKE FLUID LEVEL**” on page 3-23.



### 7. Check:

- Brake pedal operation

Soft or spongy feeling → Bleed the brake system.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

EAS22700

## REMOVING THE REAR BRAKE MASTER CYLINDER

### NOTE:

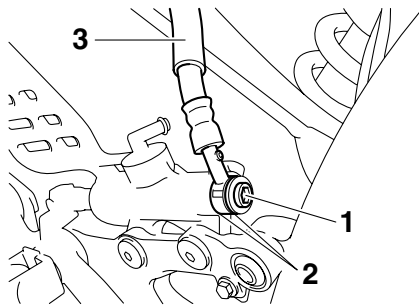
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

#### 1. Remove:

- Rear brake hose union bolt “1”
- Copper washers “2”
- Rear brake hose “3”

### NOTE:

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



EAS22720

## CHECKING THE REAR BRAKE MASTER CYLINDER

#### 1. Check:

- Brake master cylinder  
Damage/scratches/wear → Replace.
- Brake fluid delivery passages (brake master cylinder body)  
Obstruction → Blow out with compressed air.

#### 2. Check:

- Brake master cylinder kit  
Damage/scratches/wear → Replace.

#### 3. Check:

- Brake fluid reservoir  
Cracks/damage → Replace.
- Brake fluid reservoir diaphragm  
Cracks/damage → Replace.

#### 4. Check:

- Rear brake hose
- Brake fluid reservoir hose  
Cracks/damage/wear → Replace.

EAS22730

## ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

### WARNING

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



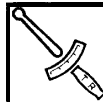
Recommended fluid  
DOT 4

EAS22740

## INSTALLING THE REAR BRAKE MASTER CYLINDER

#### 1. Install:

- Rear brake hose “1”
- Copper washers “2” **New**
- Rear brake hose union bolt “3”



Rear brake hose union bolt  
30 Nm (3.0 m·kg, 22 ft·lb)

EWA13530

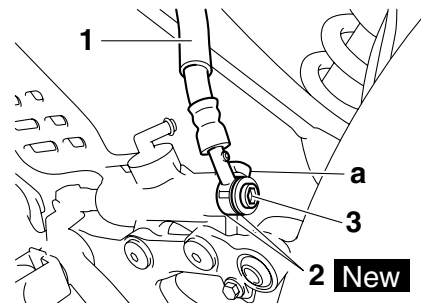
### WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-45.

ECA14160

### 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 fluid  
DOT 4

EWA13090

## **WARNING**

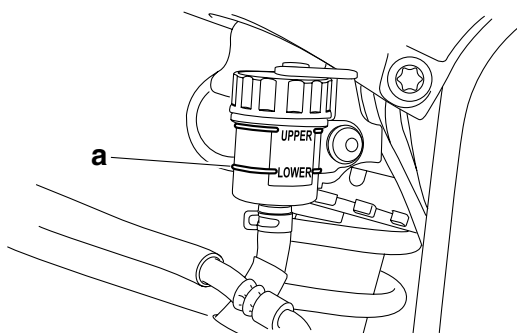
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540

## **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” on page 3-25.
4. Check:
  - Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-23.



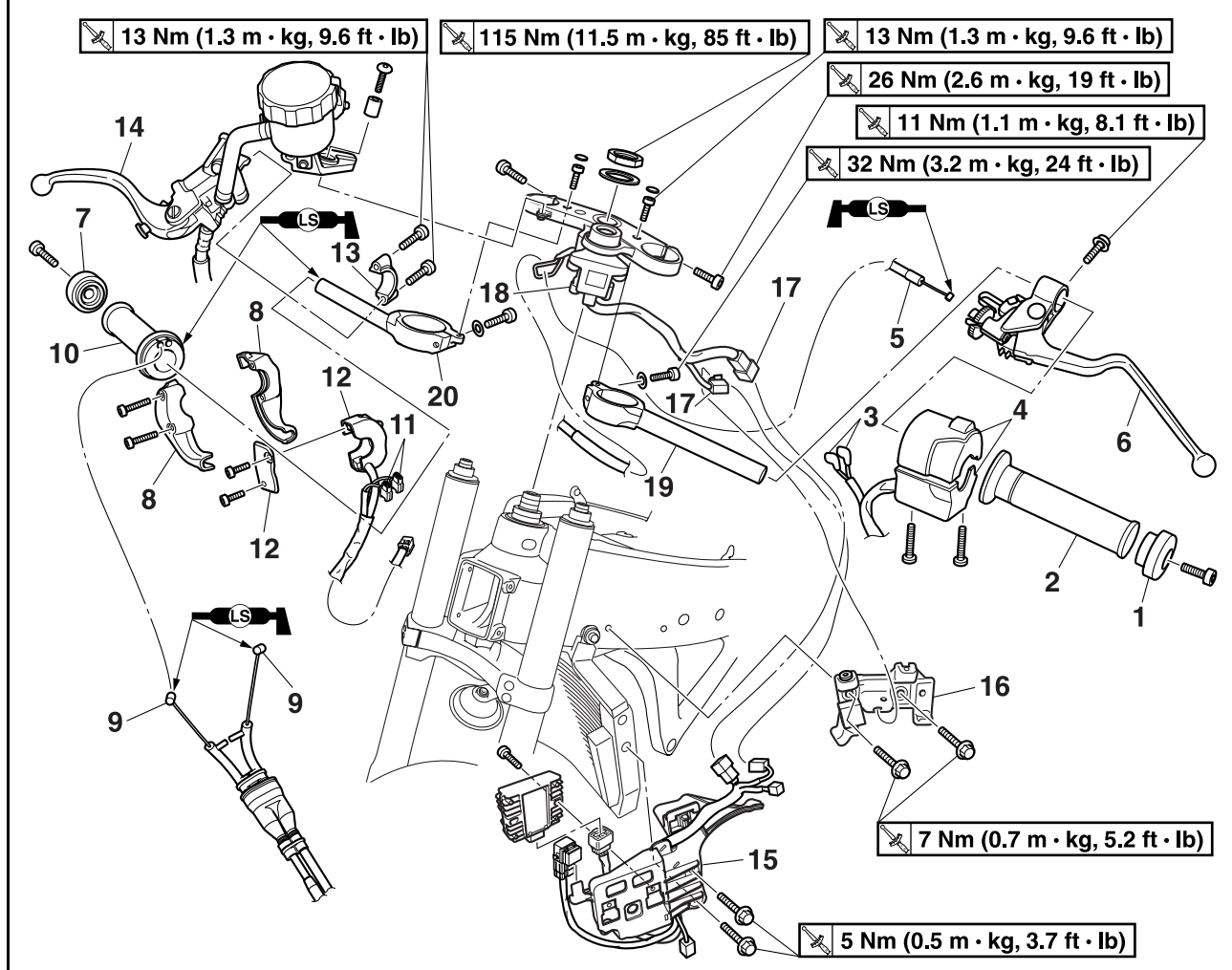
5. Check:
  - Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

6. Adjust:
  - Brake pedal position  
Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-22.
7. Adjust:
  - Rear brake light operation timing  
Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-24.

EAS22850

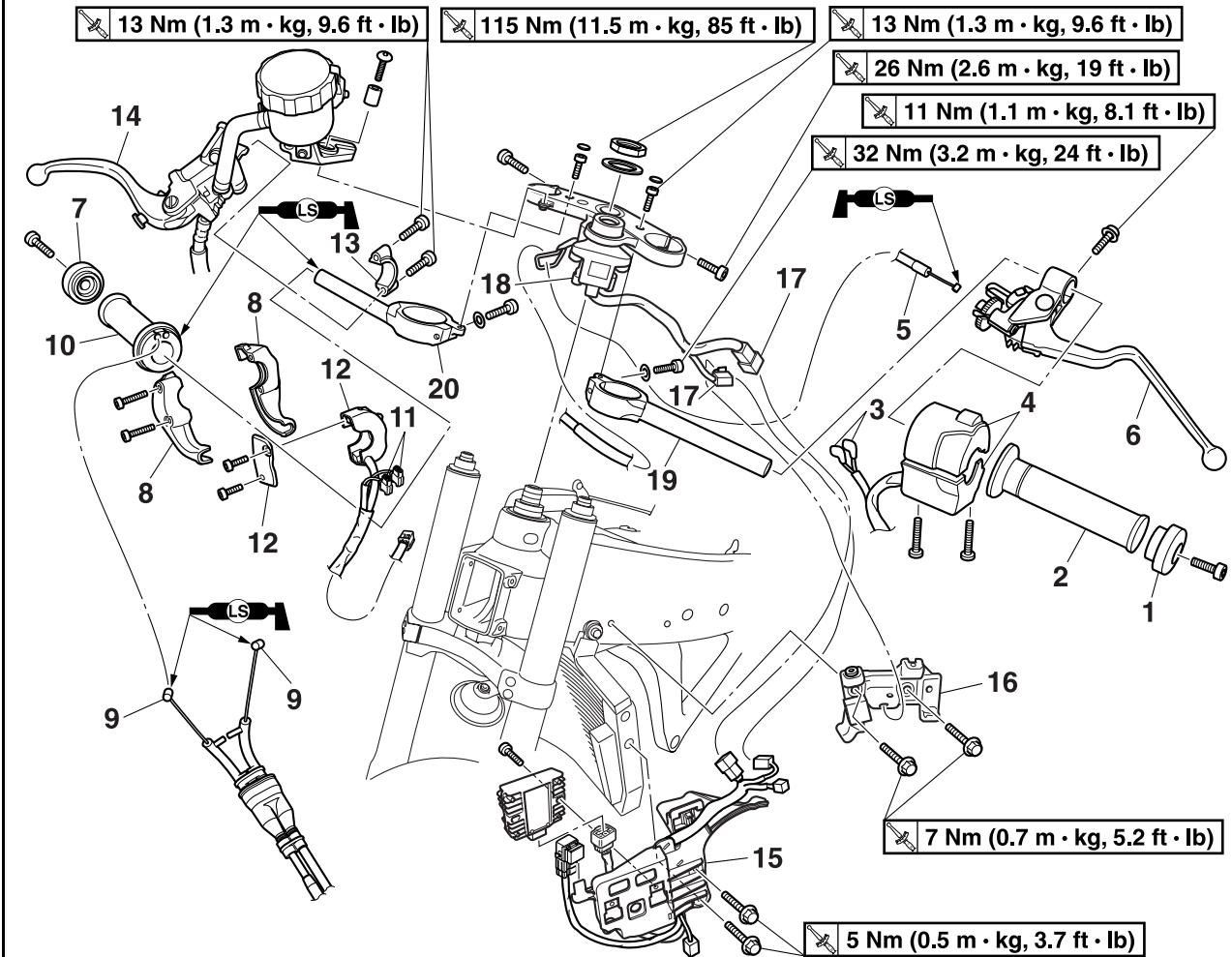
## HANDLEBARS

### Removing the handlebars



Order	Job/Parts to remove	Q'ty	Remarks
	Left side panel/Left upper side cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Air induction system cover		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
1	Left grip end	1	
2	Handlebar grip	1	
3	Clutch switch connector	2	Disconnect.
4	Left handlebar switch	1	
5	Clutch cable	1	Disconnect.
6	Clutch lever assembly	1	
7	Right grip end	1	
8	Throttle cable housing	2	
9	Throttle cable	2	Disconnect.
10	Throttle grip	1	
11	Front brake light switch connector	2	Disconnect.
12	Right handlebar switch/Bracket	1/1	
13	Front brake master cylinder holder	1	
14	Front brake master cylinder assembly	1	
15	Rectifier/regulator bracket	1	

## Removing the handlebars



Order	Job/Parts to remove	Q'ty	Remarks
16	Left coupler holder	1	
17	Main switch coupler	2	Disconnect.
18	Upper bracket	1	
19	Left handlebar	1	
20	Right handlebar	1	
			For installation, reverse the removal procedure.

EAS22870

## REMOVING THE HANDLEBARS

1. Stand the vehicle on a level surface.

EWA13120

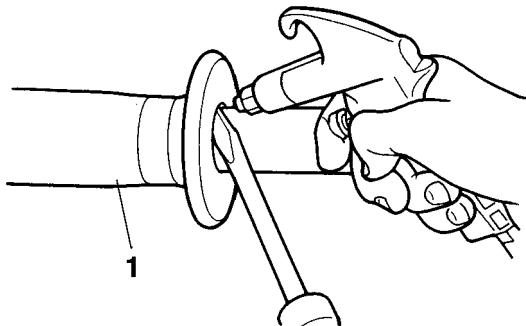


**Securely support the vehicle so that there is no danger of it falling over.**

2. Remove:
  - Handlebar grip "1"

### NOTE:

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



EAS22890

## CHECKING THE HANDLEBARS

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

EWA13690



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

EAS22900

## INSTALLING THE HANDLEBARS

1. Stand the vehicle on a level surface.

EWA13120



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

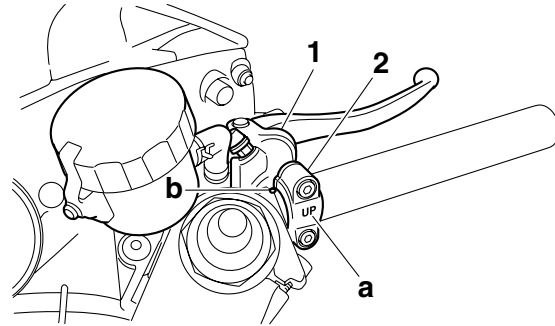
2. Install:
  - Front brake master cylinder "1"
  - Front brake master cylinder holder "2"



**Front brake master cylinder holder bolt**  
13 Nm (1.3 m·kg, 9.6 ft·lb)

### NOTE:

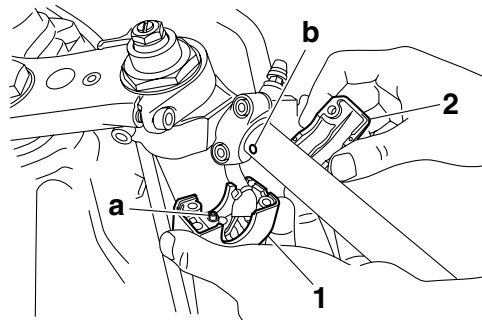
- Install the brake master cylinder holder with the "UP" mark "a" facing up.
- Align the mating surfaces of the brake master cylinder holder with the punch mark "b" on the handlebar.



3. Install:
  - Right handlebar switch "1"
  - Right handlebar switch bracket "2"

### NOTE:

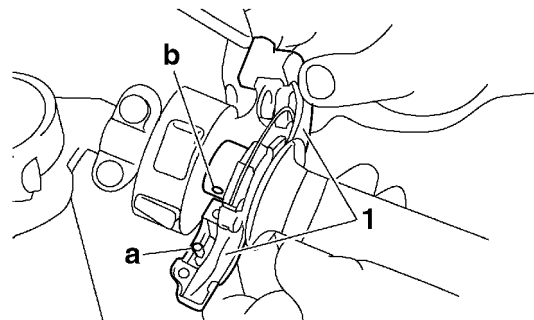
Align the projection "a" on the right handlebar switch with the hole "b" on the right handlebar.



4. Install:
  - Throttle grip
  - Throttle cables
  - Throttle cable housings "1"

### NOTE:

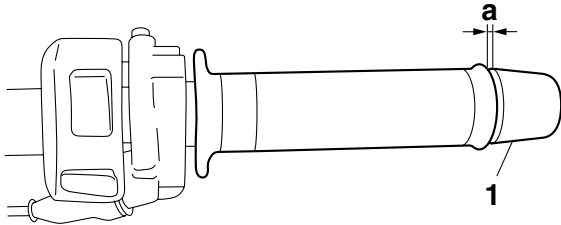
Align the projection "a" on the throttle cable housing with the hole "b" in the right handlebar.



5. Install:
  - Right grip end "1"

**NOTE:**

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



6. Install:

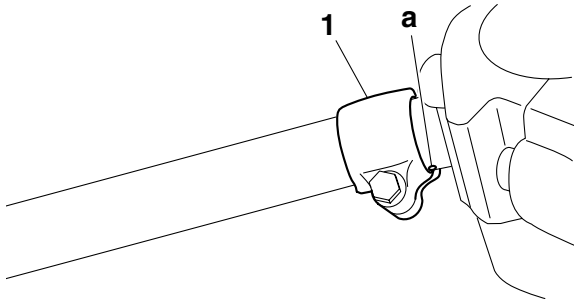
- Clutch lever assembly “1”



**Clutch lever bolt**  
11 Nm (1.1 m·kg, 8.1 ft·lb)

**NOTE:**

Align the mating surfaces of the clutch lever assembly with the punch mark “a” on the left handlebar.

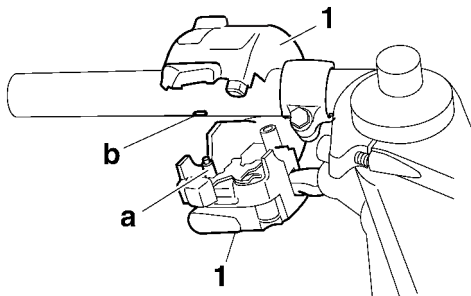


7. Install:

- Left handlebar switch “1”

**NOTE:**

Align the projection “a” on the left handlebar switch with the hole “b” in the left handlebar.



8. Install:

- Handlebar grip “1”

- Left grip end “2”



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

EWA13700



**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 handlebar grip and the grip end.



9. Check:

- Cable routing

**NOTE:**

Make sure the main switch lead, brake hoses, throttle cables, clutch cable, and handlebar switch leads are routed properly. Refer to “CABLE ROUTING” on page 2-45.

10. Adjust:

- Clutch cable free play  
Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-14.



**Clutch lever free play**  
10.0–15.0 mm (0.39–0.59 in)

11. Adjust:

- Throttle cable free play  
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-8.

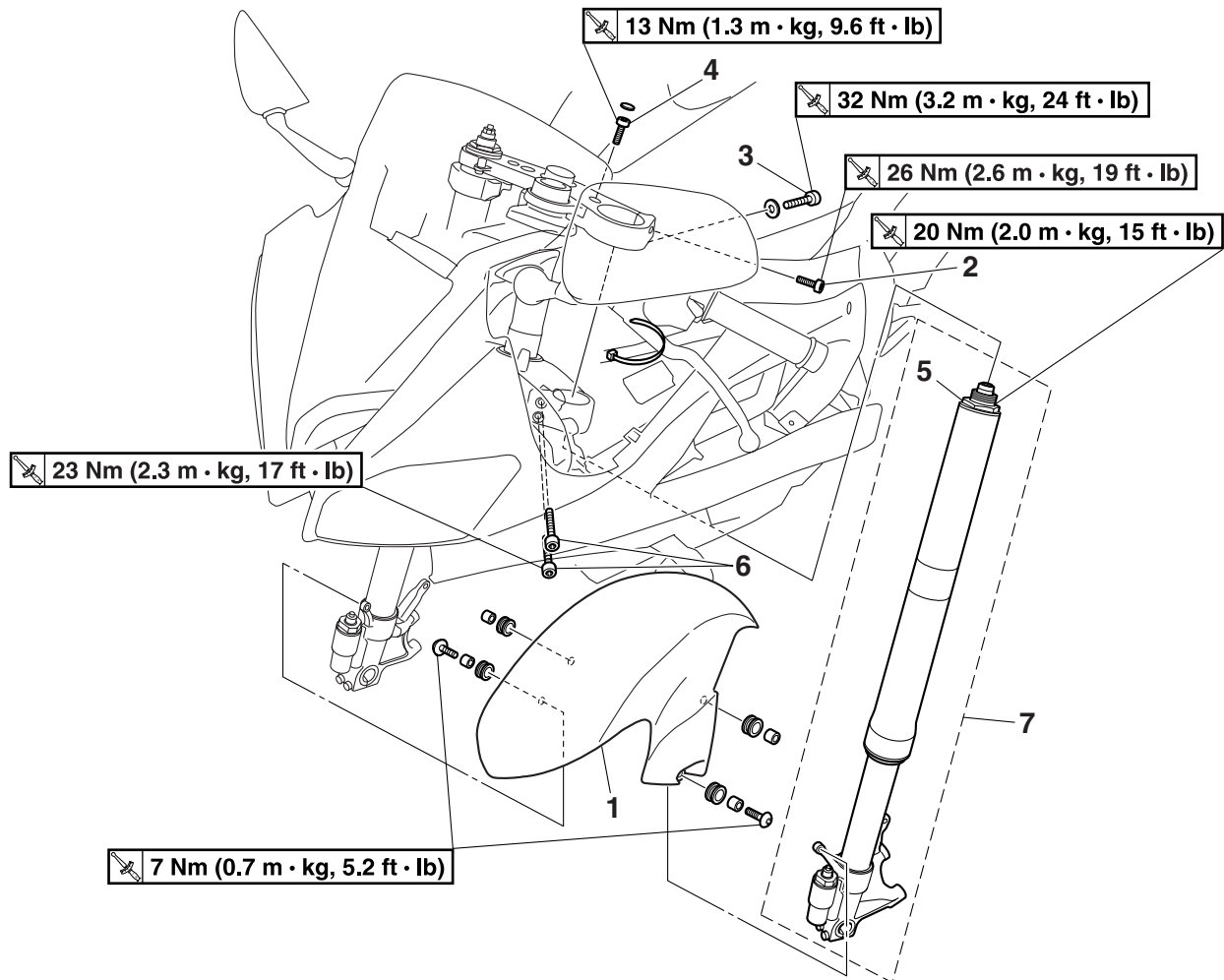


**Throttle cable free play**  
3.0–5.0 mm (0.12–0.20 in)

EAS22950

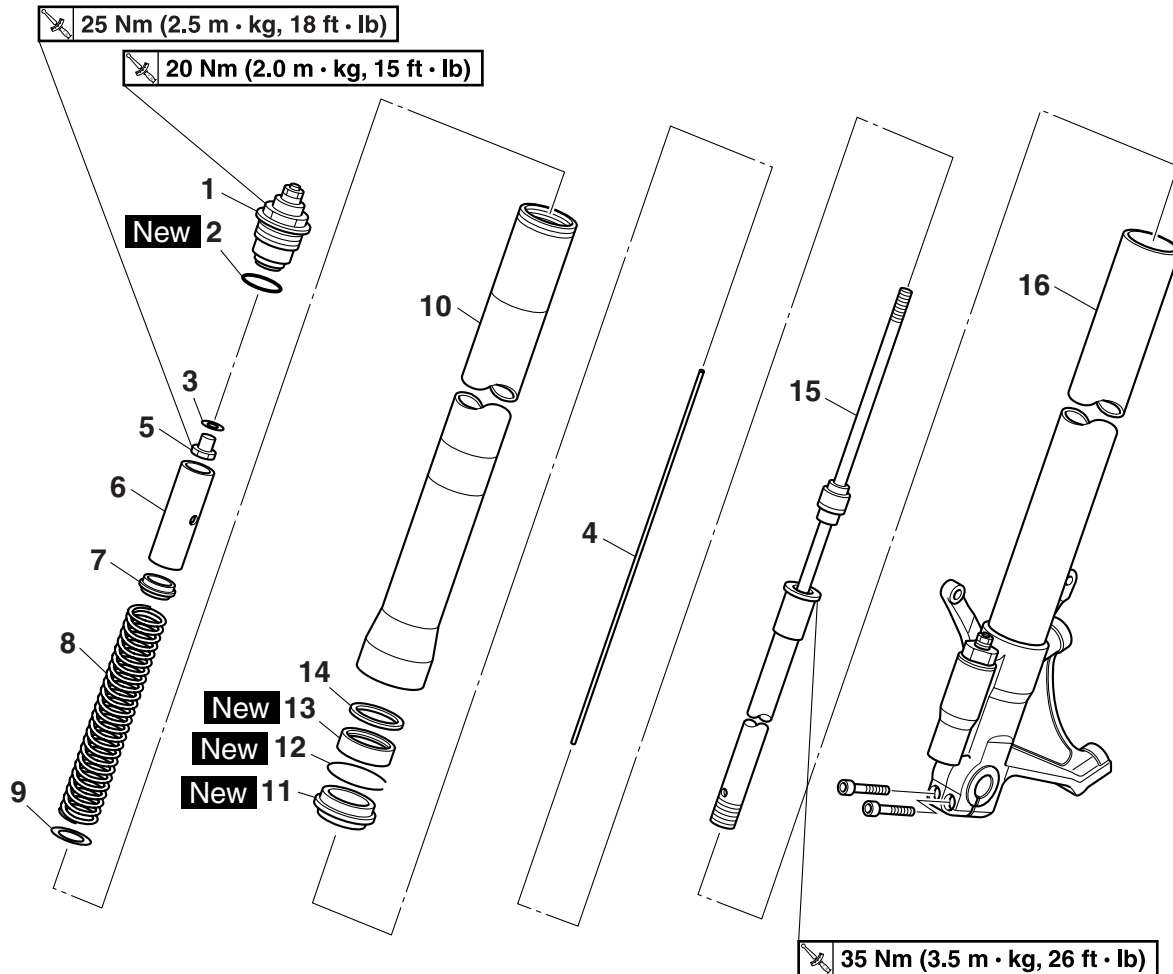
## FRONT FORK

### Removing the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Side panels		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-6.
1	Front fender	1	
2	Upper bracket pinch bolt	1	Loosen.
3	Handlebar pinch bolt	1	Loosen.
4	Handlebar bolt	1	Loosen.
5	Cap bolt	1	Loosen.
6	Lower bracket pinch bolt	2	Loosen.
7	Front fork leg	1	
			For installation, reverse the removal procedure.

## Disassembling the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
1	Cap bolt	1	
2	O-ring	1	
3	Washer	1	
4	Damper adjusting rod	1	
5	Nut	1	
6	Spacer	1	
7	Upper spring seat	1	
8	Fork spring	1	
9	Under spring seat	1	
10	Outer tube	1	
11	Dust seal	1	
12	Oil seal clip	1	
13	Oil seal	1	
14	Washer	1	
15	Damper rod assembly	1	
16	Inner tube	1	
			For assembly, reverse the disassembly procedure.

EAS22970

## REMOVING THE FRONT FORK LEGS

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

1. Stand the vehicle on a level surface.

EWA13120

### WARNING

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

### NOTE:

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

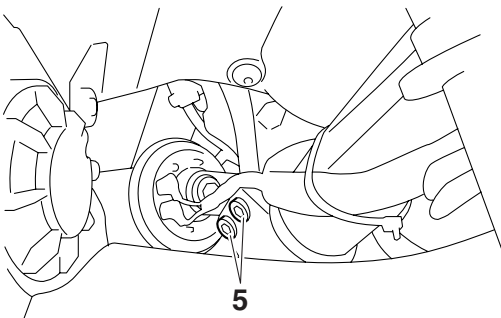
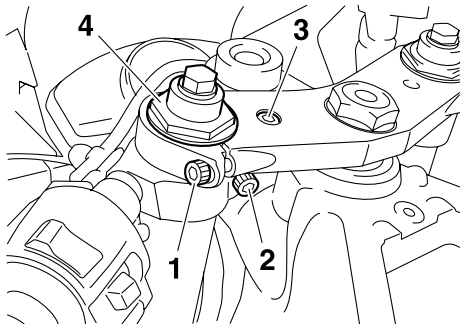
2. Loosen:

- Upper bracket pinch bolt "1"
- Handlebar pinch bolt "2"
- Handlebar bolt "3"
- Cap bolt "4"
- Lower bracket pinch bolts "5"

EWA13640

### WARNING

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

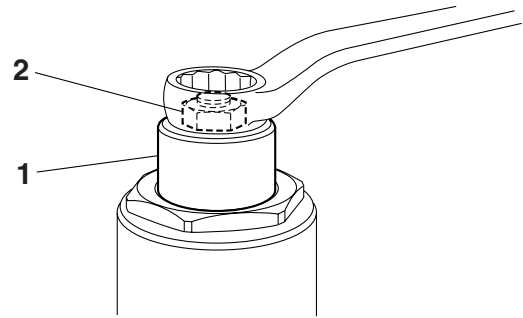


EAS22990

## DISASSEMBLING THE FRONT FORK LEGS

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

1. Position the collar "1" as shown in the illustration by turning the spring preload adjusting bolt "2" counterclockwise until it stops.



2. Remove:

- Cap bolt "1"
- (from the damper adjusting rod)
- Spacer "2"
- Nut "3"



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



**Fork spring compressor**

**90890-01441**

**YM-01441**

**Rod holder**

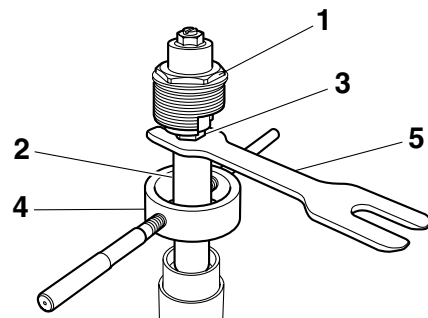
**90890-01434**

**Damper rod holder double ended**

**YM-01434**

### NOTE:

Use the side of the rod holder that is marked "B".



- c. Hold the spring preload adjusting bolt "6" and loosen the nut "3".

EC2C01011

### CAUTION:

**When loosening the nut "3", be sure not to break the projections "a" on the collar "7" of the cap bolt "1".**



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

- Damper adjusting rod  
Bends/damage → Replace.

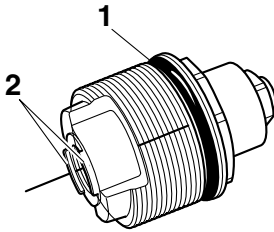
ECA14200

## 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 "1"
- Damage/wear → Replace.
- Cap bolt collar projections "2"
- Cracks/damage → Replace.



EAS23040

## ASSEMBLING THE FRONT FORK LEGS

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

EWA13660

## 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:
  - Oil seal
  - Dust seal
  - O-ring
- Before assembling the front fork leg, make sure all of the components are clean.

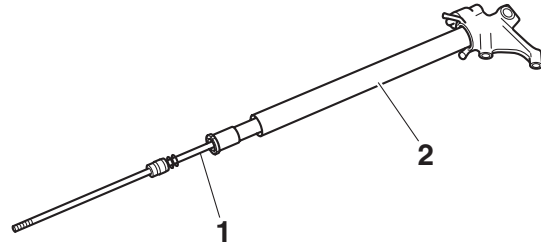
### 1. Install:

- Damper rod assembly "1"
- Inner tube "2"

ECA14210


## 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

	<b>Recommended oil</b> <b>Ohlins R &amp; T43</b>
---	---

### 3. Tighten:

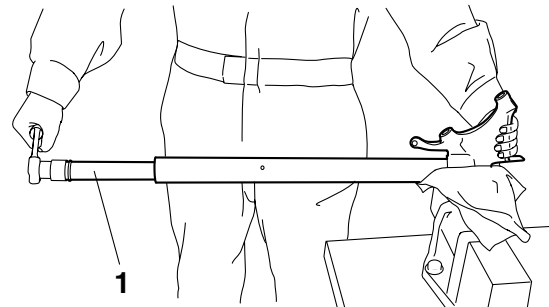
- Damper rod assembly

	<b>Damper rod assembly</b> <b>35 Nm (3.5 m·kg, 26 ft·lb)</b>
--	---

### NOTE:

Tighten the damper rod assembly with the damper rod holder "1".

	<b>Damper rod holder</b> <b>90890-01506</b>
---	--



### 4. Install:

- Dust seal "1" **New**
- Oil seal clip "2" **New**
- Oil seal "3" **New**
- Washer "4"

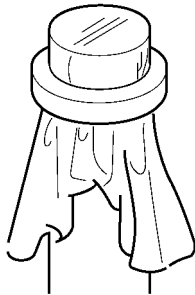
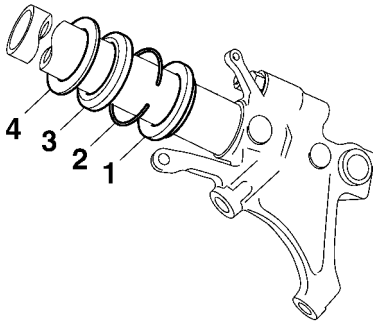
EC2C01012

## CAUTION:

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

## NOTE:

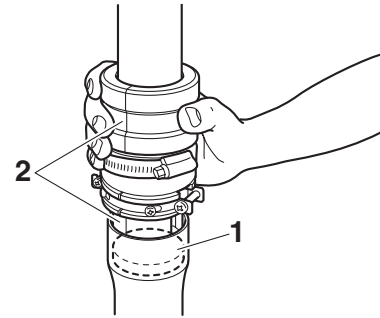
- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag to protect the oil seal during installation.



5. Install:
  - Outer tube  
(to the inner tube)
6. Install:
  - Washer
  - Oil seal "1"  
(with the fork seal driver "2")



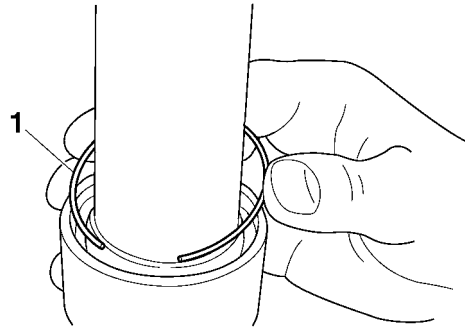
**Fork seal driver**  
90890-01442  
**Adjustable fork seal driver (36–46 mm)**  
YM-01442



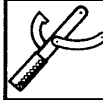
7. Install:
  - Oil seal clip "1"

## NOTE:

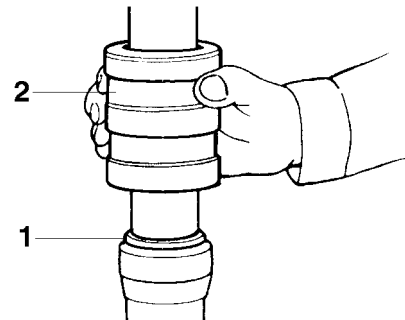
Adjust the oil seal clip so that it fits into the outer tube's groove.



8. Install:
  - Dust seal "1"  
(with the fork seal driver weight "2")



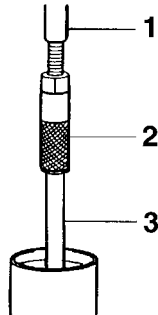
**Fork seal driver**  
90890-01442  
**Adjustable fork seal driver (36–46 mm)**  
YM-01442



9. Install:
  - Rod puller "1"
  - Rod puller attachment "2"  
(onto the damper rod "3")



**Rod puller**  
**90890-01437**  
**Universal damping rod bleeding**  
**tool set**  
**YM-A8703**  
**Rod puller attachment (M10)**  
**90890-01436**  
**Universal damping rod bleeding**  
**tool set**  
**YM-A8703**



10. Fully compress the front fork leg.

11. Fill:

- Front fork leg  
(with the specified amount of the recommended fork oil)



**Quantity**  
**482.0 cm<sup>3</sup> (16.30 US oz) (17.00**  
**Imp.oz)**  
**Recommended oil**  
**Ohlins R & T43**

ECA14230

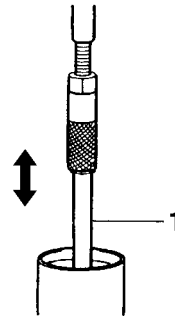
## CAUTION:

- **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.**

12. 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.



13. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

## NOTE:

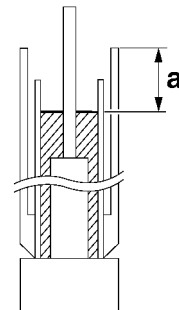
Be sure to bleed the front fork leg of any residual air.

14. Measure:

- Front fork leg oil level "a"  
(from the top of the outer tube, with the outer tube fully compressed and without the fork spring)  
Out of specification → Correct.

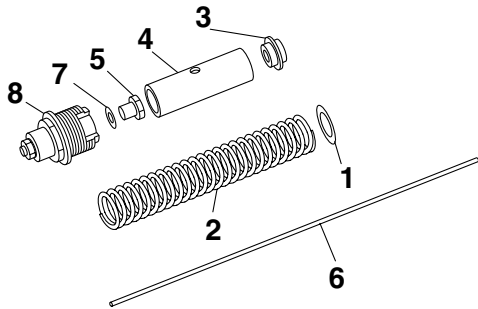


**Level**  
**103.0 mm (4.06 in)**



15. Install:

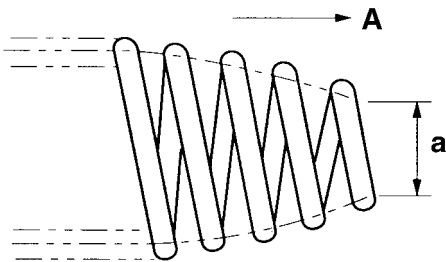
- Under spring seat "1"
- Fork spring "2"
- Upper spring seat "3"
- Spacer "4"
- Nut "5"
- Damper adjusting rod "6"
- Washer "7"
- Cap bolt "8"  
(with O-ring)



- a. Remove the rod puller attachment.
- b. Install the under spring seat.
- c. Install the fork spring.

**NOTE:**

Install the spring with the smaller pitch "a" facing up "A".



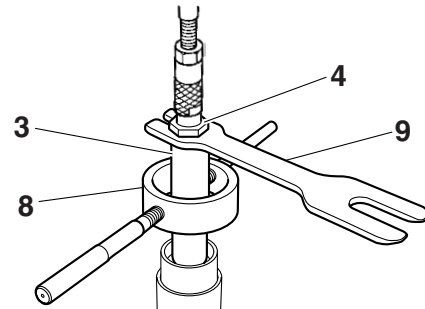
- d. Install the upper spring seat.
- e. Install the spacer.
- f. Install the nut.
- g. Reinstall the rod puller attachment.
- h. Press down on the spacer with the fork spring compressor "8".
- i. Pull up the rod puller and install the rod holder "9" between the nut "4" and the spacer "3".



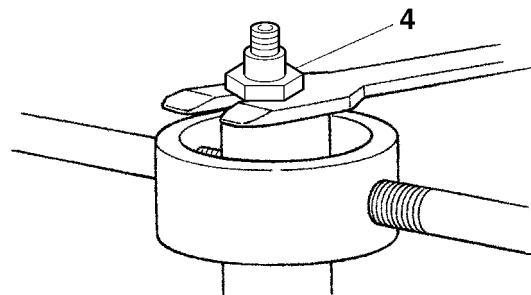
**Rod puller**  
**90890-01437**  
**Universal damping rod bleeding**  
**tool set**  
**YM-A8703**  
**Rod puller attachment (M10)**  
**90890-01436**  
**Universal damping rod bleeding**  
**tool set**  
**YM-A8703**  
**Fork spring compressor**  
**90890-01441**  
**YM-01441**  
**Rod holder**  
**90890-01434**  
**Damper rod holder double**  
**ended**  
**YM-01434**

**NOTE:**

Use the side of the rod holder that is marked "B".



- j. Remove the rod puller and rod puller attachment.
- k. Install the nut "4" all the way onto the damper rod assembly.



- l. Install the damper adjusting rod.
- m. Install the washer and cap bolt, and then finger tighten the cap bolt.
- n. Hold the nut and tighten the spring preload adjusting bolt "10" into the cap bolt to specification.

EWA13670

## **WARNING**

**Always use a new cap bolt O-ring.**

EC2C01013

## **CAUTION:**

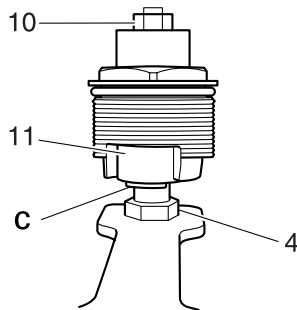
**When tightening the spring preload adjusting bolt "10" into the cap bolt, be sure not to break the projections "c" on the collar "11".**

## **NOTE:**

Hold the nut "4" using a proper tool that has a thickness of 3 mm (0.12 in) or less.



**Nut and cap bolt**  
**25 Nm (2.5 m·kg, 18 ft·lb)**



- o. Remove the rod holder and fork spring compressor.



## 16. Install:

- Cap bolt  
(to the outer tube)

## **NOTE:**

Temporarily tighten the cap bolt.

EAS23050

## **INSTALLING THE FRONT FORK LEGS**

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

## 1. Install:

- Front fork leg  
Temporarily tighten the upper and lower bracket pinch bolts.

EWA13680

## **WARNING**

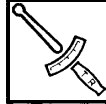
**Make sure the brake hoses are routed properly.**

## **NOTE:**

Make sure the outer tube is flush with the top of the upper bracket.

## 2. Tighten:

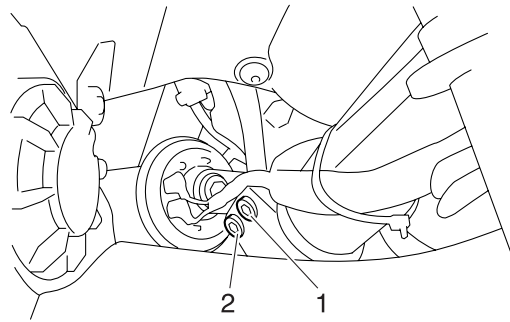
- Lower bracket pinch bolts "1" and "2"



**Lower bracket pinch bolt**  
**23 Nm (2.3 m·kg, 17 ft·lb)**

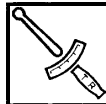
## **NOTE:**

Tighten each bolt to 23 Nm (2.3 m·kg, 17 ft·lb) in the order pinch bolt "1" → pinch bolt "2" → pinch bolt "1" → pinch bolt "2".



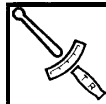
## 3. Tighten:

- Cap bolt "1"



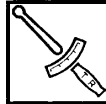
**Cap bolt**  
**20 Nm (2.0 m·kg, 15 ft·lb)**

- Handlebar bolt "2"



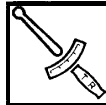
**Handlebar bolt**  
**13 Nm (1.3 m·kg, 9.6 ft·lb)**

- Handlebar pinch bolt "3"

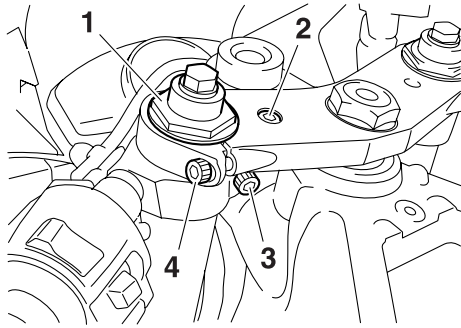


**Handlebar pinch bolt**  
**32 Nm (3.2 m·kg, 24 ft·lb)**

- Upper bracket pinch bolt "4"



**Upper bracket pinch bolt**  
**26 Nm (2.6 m·kg, 19 ft·lb)**



4. Check:
- Cable routing

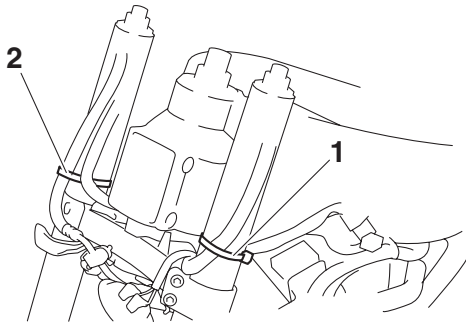
**NOTE:**

Make sure the brake hose, throttle cables, clutch cable, and handlebar switch leads are routed properly. Refer to “CABLE ROUTING” on page 2-45.

5. Install:
- Plastic locking tie “1”
  - Plastic locking tie “2”

**NOTE:**

- Fasten the left handlebar switch lead to the left front fork leg with the plastic locking tie.
- Fasten the front brake hose to the right front fork leg with the plastic locking tie.

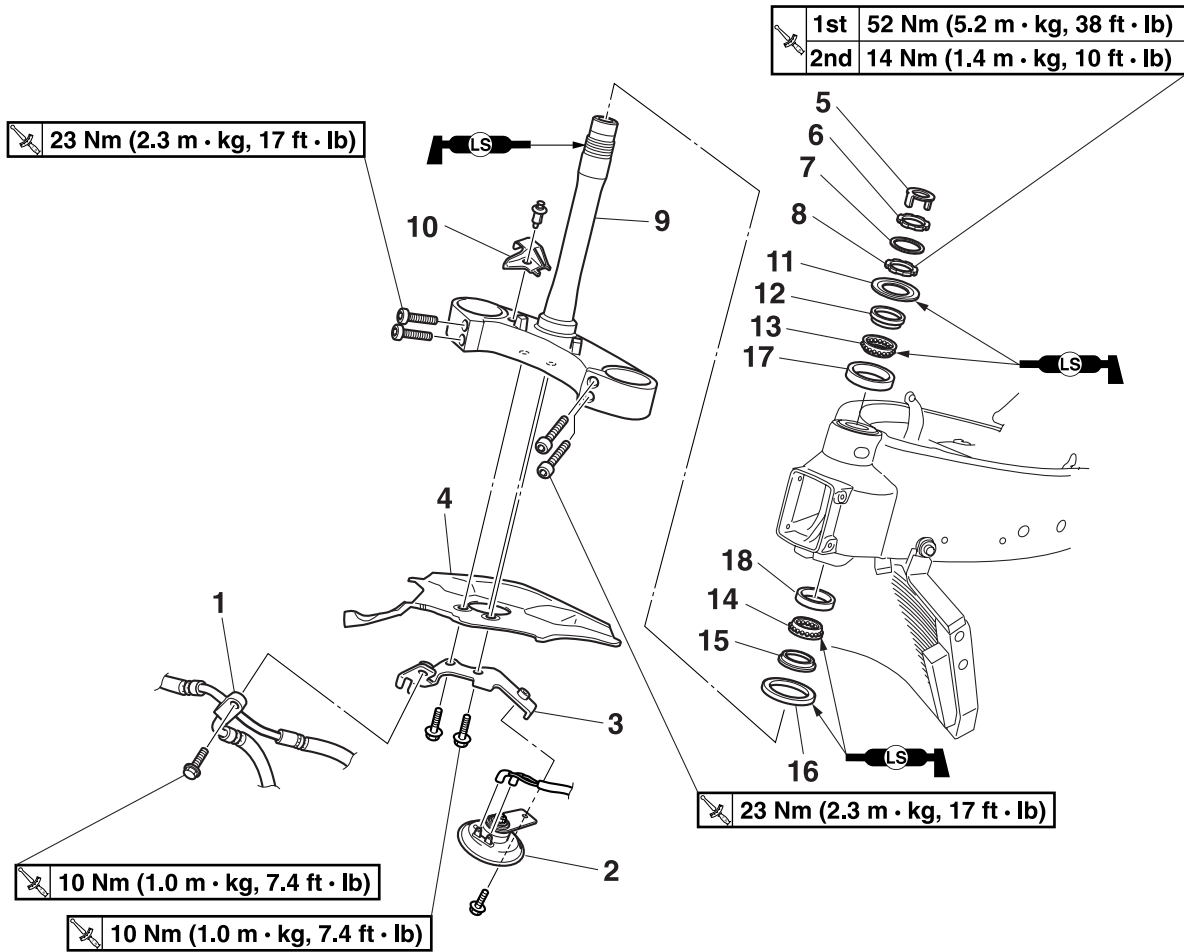


6. Adjust:
- Spring preload
  - Rebound damping
  - Compression damping
- Refer to “ADJUSTING THE FRONT FORK LEGS” on page 3-29.

EAS23090

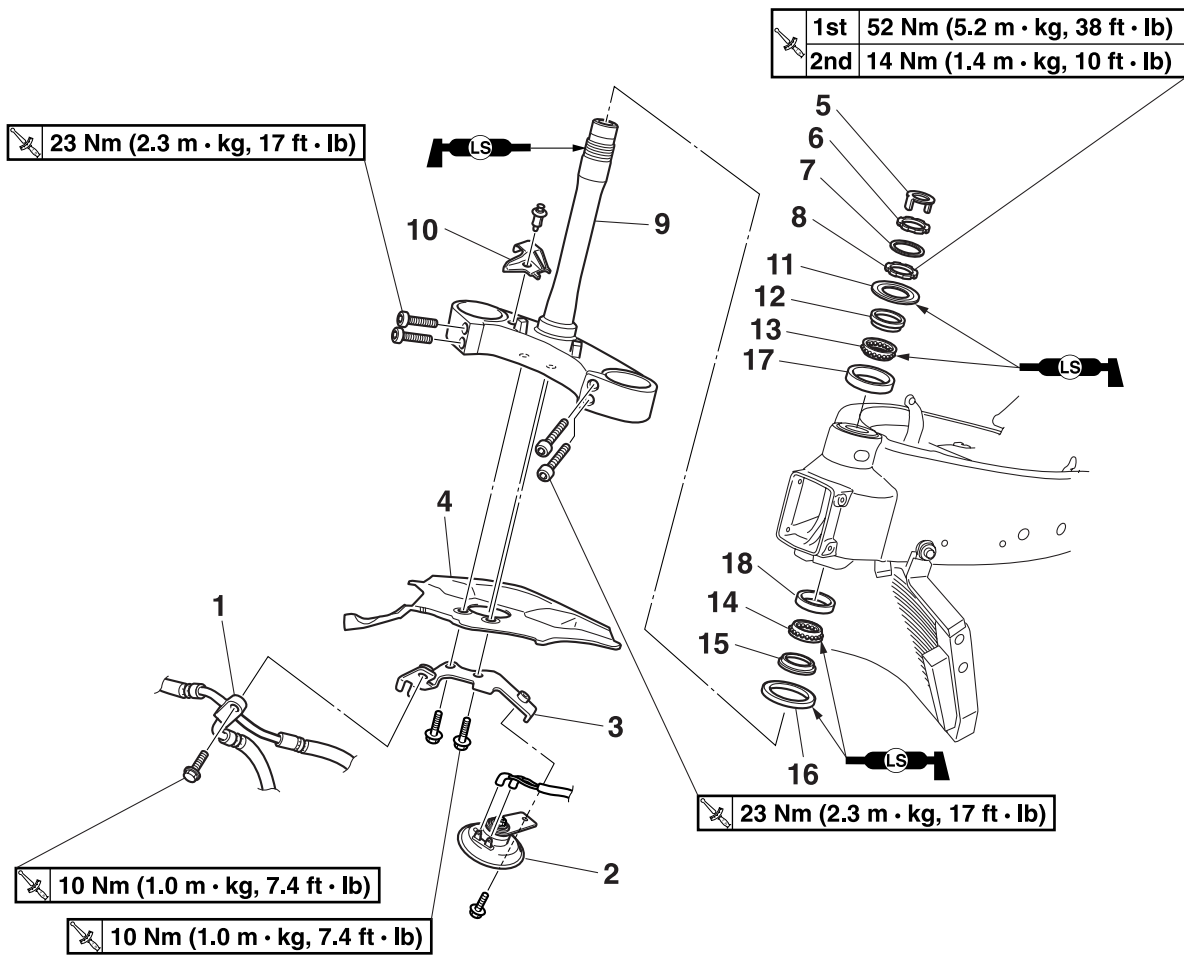
## STEERING HEAD

### Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Front fork legs		Refer to "FRONT FORK" on page 4-45.
	Handlebars		Refer to "HANDLEBARS" on page 4-41.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Air induction system cover		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
1	Front brake hose joint	1	
2	Horn	1	
3	Front brake hose joint bracket	1	
4	Lower bracket cover	1	
5	Lock washer	1	
6	Upper ring nut	1	
7	Rubber washer	1	
8	Lower ring nut	1	
9	Lower bracket	1	
10	Throttle cable guide	1	
11	Upper bearing cover	1	
12	Upper bearing inner race	1	

## Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
13	Upper bearing	1	
14	Lower bearing	1	
15	Lower bearing inner race	1	
16	Lower bearing dust seal	1	
17	Upper bearing outer race	1	
18	Lower bearing outer race	1	
			For installation, reverse the removal procedure.

EAS23110

## REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

2. Remove:

- Upper ring nut "1"
- Rubber washer
- Lower ring nut "2"
- Lower bracket

EWA13730



**WARNING**

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

### NOTE:

Hold the lower ring nut with the ring nut wrench "3", and then remove the upper ring nut with the steering nut wrench "4".



**Ring nut wrench**

**90890-01268**

**Spanner wrench**

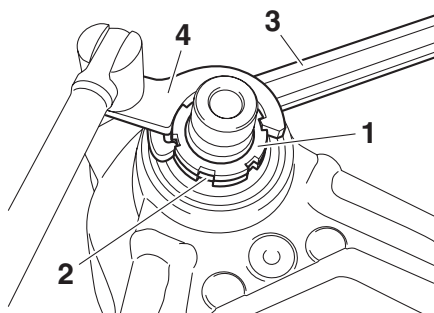
**YU-01268**

**Steering nut wrench**

**90890-01403**

**Spanner wrench**

**YU-33975**



EAS23120

## CHECKING THE STEERING HEAD

1. Wash:

- Bearings
- Bearing races



**Recommended cleaning solvent**

**Kerosene**

2. Check:

- Bearings
  - Bearing races
- Damage/pitting → Replace.

3. Replace:

- Bearings
- Bearing races



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

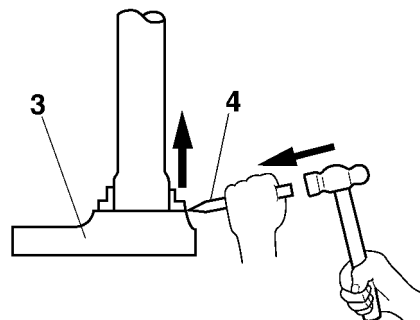
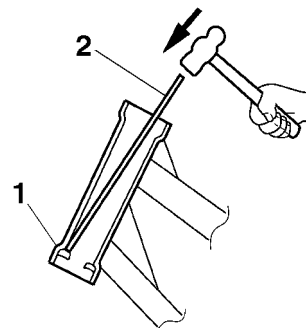
ECA14270

### 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.



4. Check:

- Upper bracket  
Refer to "HANDLEBARS" on page 4-41.
- Lower bracket  
(along with the steering stem)  
Bends/cracks/damage → Replace.

EAS23140

## INSTALLING THE STEERING HEAD

1. Lubricate:

- Upper bearing
- Lower bearing
- Bearing races

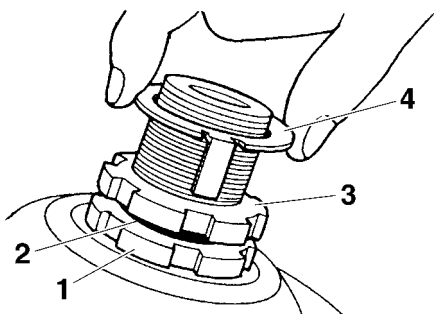


**Recommended lubricant**  
**Lithium-soap-based grease**

2. Install:

- Lower ring nut “1”
- Rubber washer “2”
- Upper ring nut “3”
- Lock washer “4”

Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-27.



3. Install:

- Upper bracket
- Steering stem nut
- Right handlebar assembly
- Left handlebar assembly

**NOTE:**

Temporarily tighten the steering stem nut and handlebar bolts.

4. Install:

- Front fork legs

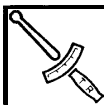
Refer to “FRONT FORK” on page 4-45.

**NOTE:**

Temporarily tighten the lower bracket pinch bolts.

5. Tighten:

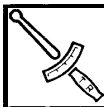
- Steering stem nut



**Steering stem nut**  
**115 Nm (11.5 m·kg, 85 ft·lb)**

6. Install:

- Front brake hose joint bracket “1”



**Front brake hose joint bracket bolt**  
**10 Nm (1.0 m·kg, 7.4 ft·lb)**

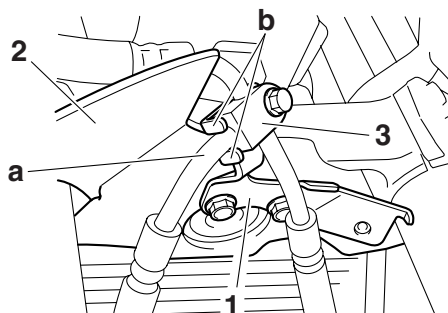
- Lower bracket cover “2”
- Front brake hose joint “3”



**Front brake hose joint bolt**  
**10 Nm (1.0 m·kg, 7.4 ft·lb)**

**NOTE:**

Route the right brake pipe “a” through the projections “b” of the front brake hose joint bracket.



7. Check:

- Cable routing

**NOTE:**

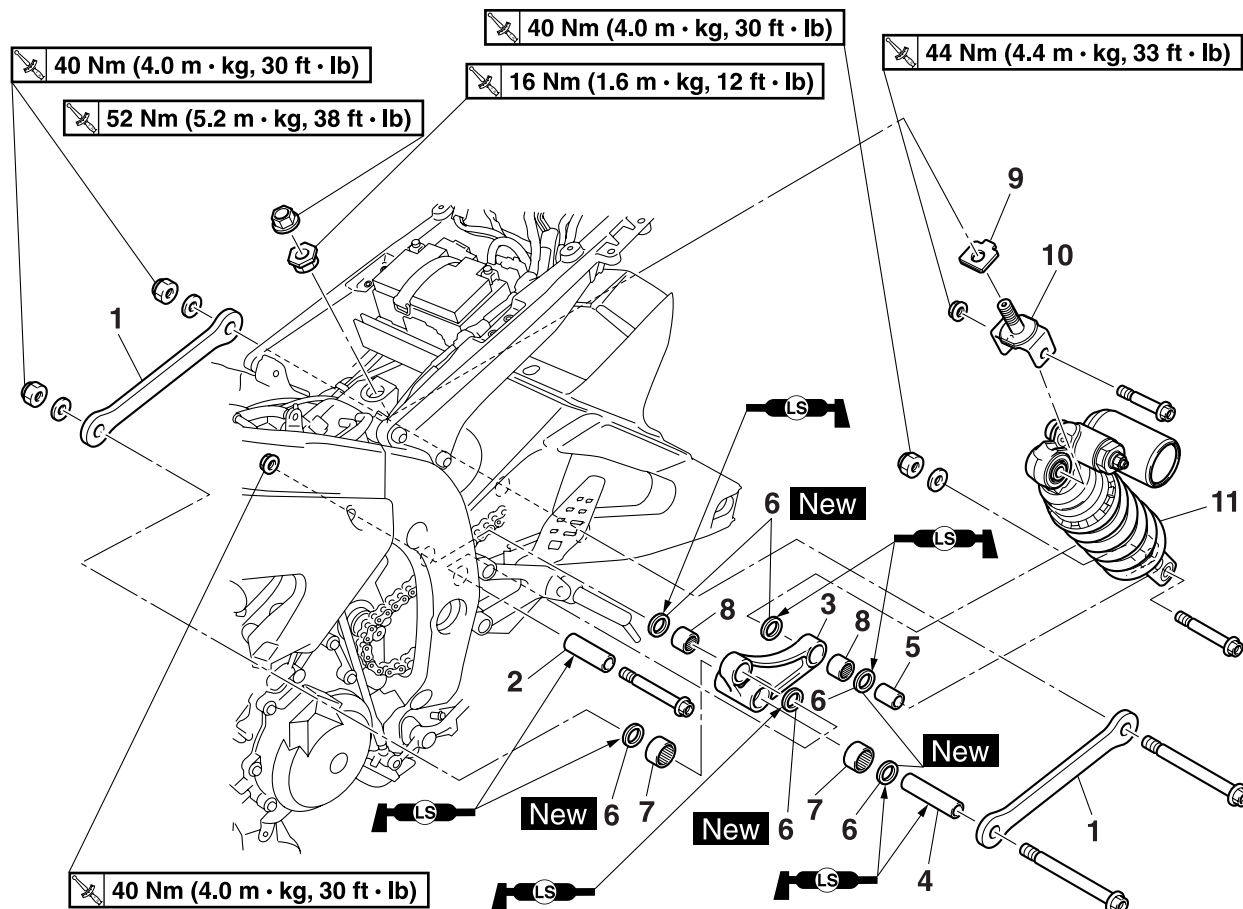
Make sure the main switch lead, brake hoses, throttle cables, clutch cable, and handlebar switch leads are routed properly. Refer to “CABLE ROUTING” on page 2-45.

# REAR SHOCK ABSORBER ASSEMBLY

EAS23160

## REAR SHOCK ABSORBER ASSEMBLY

### Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Exhaust pipe assembly brackets		Refer to "ENGINE REMOVAL" on page 5-1.
	Rear wheel		Refer to "REAR WHEEL" on page 4-12.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Connecting arm	2	
2	Relay arm collar	1	
3	Relay arm	1	
4	Collar	1	
5	Collar	1	
6	Oil seal	6	
7	Bearing	2	
8	Bearing	2	
9	Washer	1	
10	Rear shock absorber assembly bracket	1	
11	Rear shock absorber assembly	1	
			For installation, reverse the removal procedure.

# REAR SHOCK ABSORBER ASSEMBLY

EAS23180

## HANDLING THE REAR SHOCK ABSORBER

EWA13740

### WARNING

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

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

EAS23190

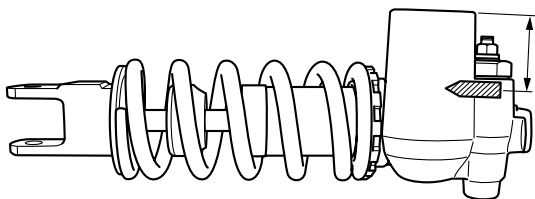
## DISPOSING OF A REAR SHOCK ABSORBER

1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the rear shock absorber at a point 50 mm (1.97 in) from its end as shown.

EWA13760

### WARNING

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



EAS23230

## REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120

### WARNING

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

#### NOTE:

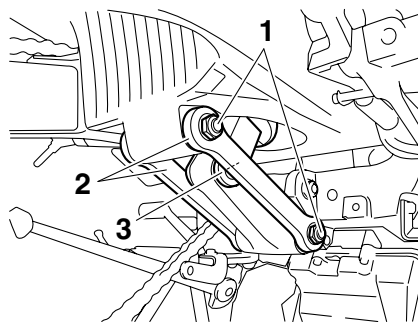
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Connecting arm bolts “1”
- Connecting arms “2”
- Rear shock absorber assembly lower bolt “3”

#### NOTE:

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

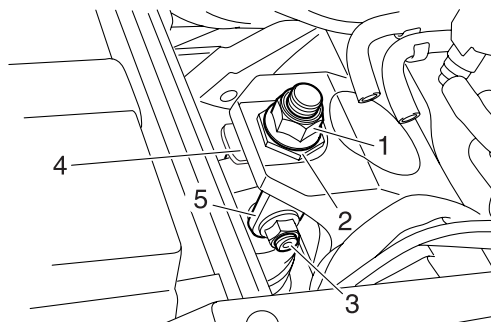


3. Remove:

- Rear shock absorber assembly bracket nut “1”
- Spacer bolt “2”
- Rear shock absorber assembly upper bolt “3”
- Washer “4”
- Rear shock absorber assembly bracket “5”
- Rear shock absorber assembly

#### NOTE:

Lower the swingarm, and then remove the rear shock absorber assembly from between the swingarm and frame.



# REAR SHOCK ABSORBER ASSEMBLY

EAS23240

## 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 → Replace the rear shock absorber assembly.
  - Bushing  
Damage/wear → Replace.
  - Collar  
Damage/scratches → Replace.
  - Bolts  
Bends/damage/wear → Replace.

EAS23260

## CHECKING THE CONNECTING ARM AND RELAY ARM

1. Check:
  - Connecting arms
  - Relay arm  
Damage/wear → Replace.
2. Check:
  - Bearings
  - Oil seals  
Damage/pitting → Replace.
3. Check:
  - Collars  
Damage/scratches → Replace.

EAS23270

## INSTALLING THE RELAY ARM

1. Lubricate:

- Collars
- Bearings



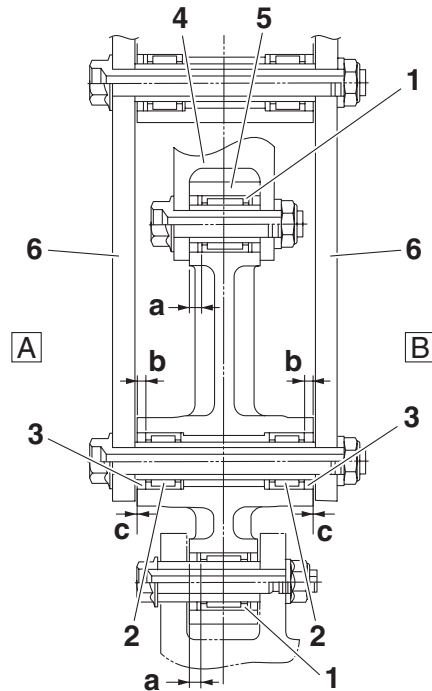
**Recommended lubricant**  
**Lithium-soap-based grease**

2. Install:

- Bearings “1”, “2”  
(to the relay arm)
- Oil seals “3”



**Installed depth of bearing “a”**  
**4.5 mm (0.18 in)**  
**Installed depth of bearing “b”**  
**3.5 mm (0.14 in)**  
**Installed depth of oil seal “c”**  
**1.0 mm (0.04 in)**



4. Rear shock absorber
5. Relay arm
6. Connecting arms

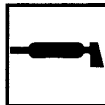
- A. Left side  
B. Right side

EAS23310

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:

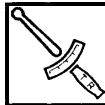
- Collar
- Bearings



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

2. Tighten:

- Relay arm nut



**Relay arm nut**  
**40 Nm (4.0 m·kg, 30 ft·lb)**

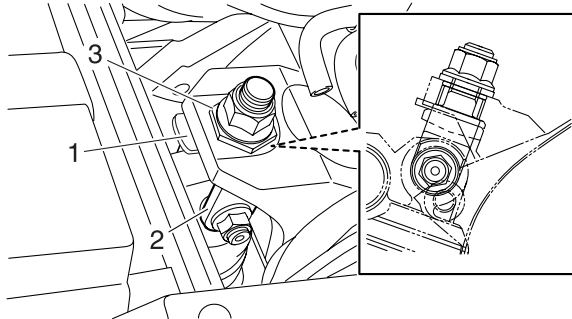
3. Install:

- Rear shock absorber assembly
- Washer “1”
- Rear shock absorber assembly bracket “2”
- Spacer bolt “3”

# REAR SHOCK ABSORBER ASSEMBLY

**NOTE:**

Install the washer with the brim pointing back of the vehicle and the "UP" punch mark facing up.

**4. Tighten:**

- Spacer bolt



**Spacer bolt**  
**16 Nm (1.6 m·kg, 12 ft·lb)**

- Rear shock absorber assembly lower nut



**Rear shock absorber assembly lower nut**  
**40 Nm (4.0 m·kg, 30 ft·lb)**

- Rear shock absorber assembly upper nut



**Rear shock absorber assembly upper nut**  
**44 Nm (4.4 m·kg, 33 ft·lb)**

- Rear shock absorber assembly bracket nut



**Rear shock absorber assembly bracket nut**  
**52 Nm (5.2 m·kg, 38 ft·lb)**

**5. Install:**

- Connecting arms

**NOTE:**

When installing the connecting arms, lift up the swingarm.

**6. Tighten:**

- Connecting arm nuts

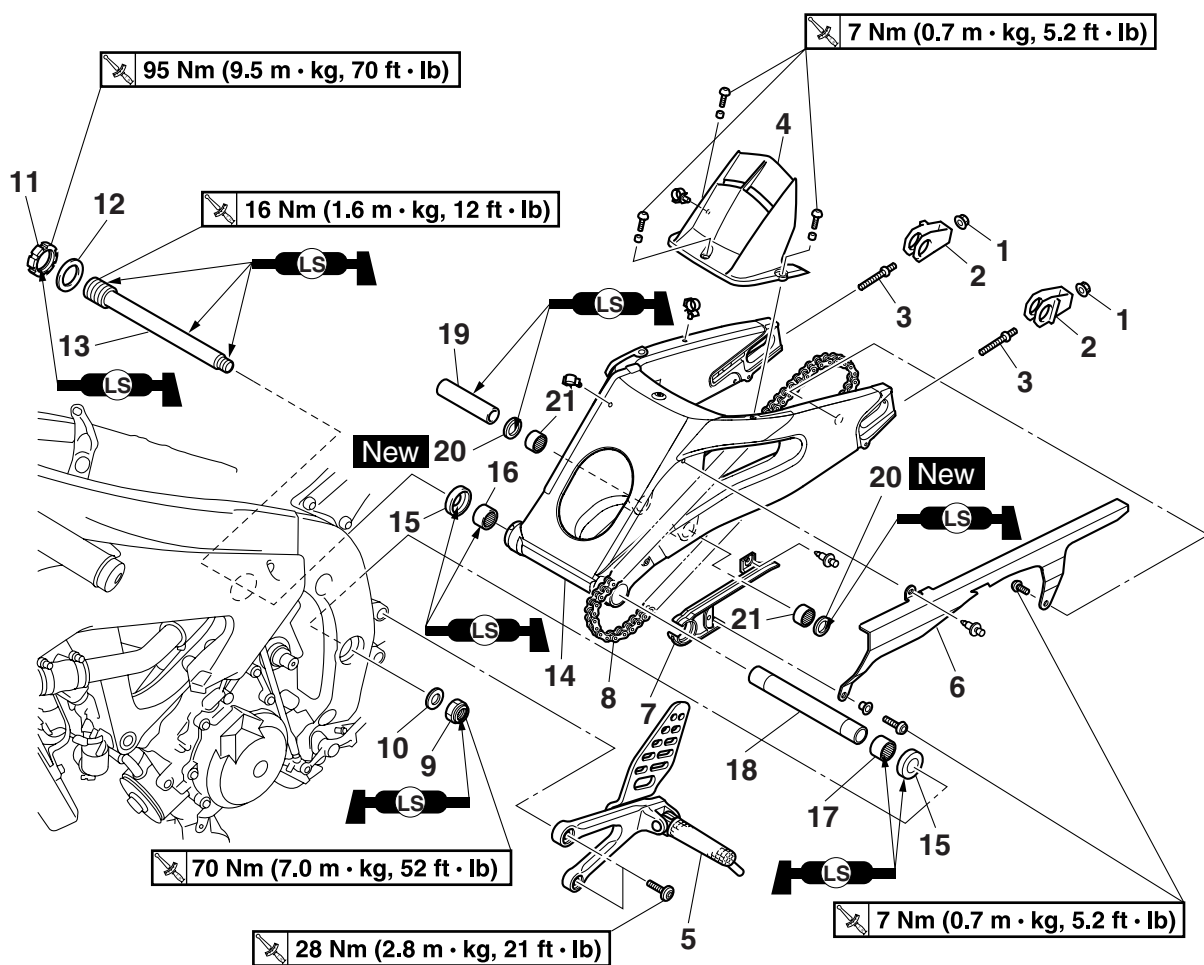


**Connecting arm nuts**  
**40 Nm (4.0 m·kg, 30 ft·lb)**

EAS23330

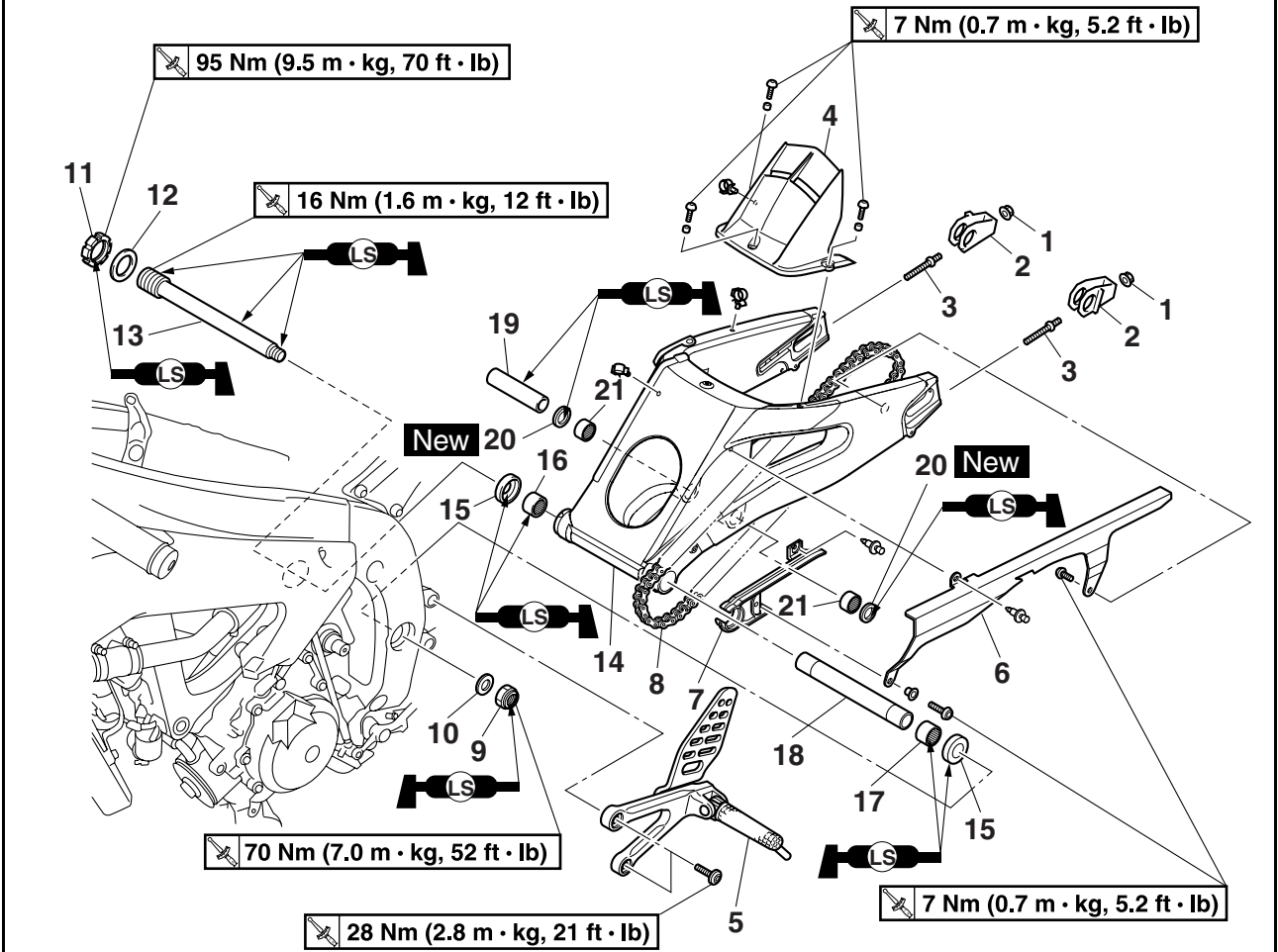
## SWINGARM

### Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REAR WHEEL" on page 4-12.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-59.
	Drive chain guide (drive sprocket side)		Refer to "CHAIN DRIVE" on page 4-68.
1	Drive chain adjusting locknut	2	
2	Drive chain puller	2	
3	Drive chain adjusting bolt	2	
4	Rear fender	1	
5	Left footrest assembly	1	
6	Drive chain guard	1	
7	Drive chain guide (swingarm side)	1	
8	Drive chain	1	
9	Swingarm pivot shaft nut	1	
10	Washer	1	
11	Swingarm pivot shaft ring nut	1	
12	Washer	1	
13	Swingarm pivot shaft	1	
14	Swingarm	1	
15	Dust cover	2	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
16	Bearing	1	
17	Bearing	1	
18	Collar	1	
19	Collar	1	
20	Oil seal	2	
21	Bearing	2	
			For installation, reverse the removal procedure.

EAS23350

## REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

EWA13120



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

### NOTE:

Place the vehicle 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 pivot shaft nut, pivot shaft ring nut, and pivot shaft.



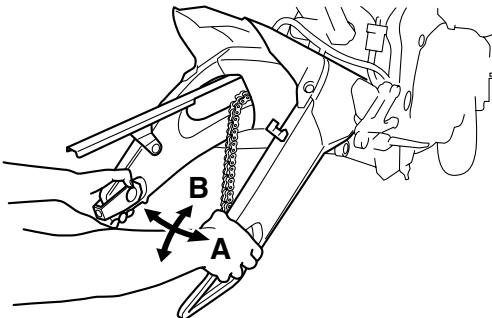
**Swingarm pivot shaft nut**  
70 Nm (7.0 m·kg, 52 ft·lb)  
**Swingarm pivot shaft ring nut**  
95 Nm (9.5 m·kg, 70 ft·lb)  
**Swingarm pivot shaft**  
16 Nm (1.6 m·kg, 12 ft·lb)

- 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 collars, bearings, washers, and dust covers.



**Swingarm side play (at the end of the swingarm)**  
1.0 mm (0.04 in)

- 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 collars, bearings, washers, and dust covers.



3. Remove:
  - Drive chain

Refer to "REMOVING THE DRIVE CHAIN" on page 4-69.

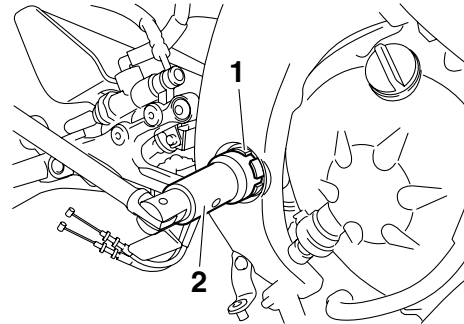
4. Remove:
  - Swingarm pivot shaft ring nut "1"

### NOTE:

Loosen the swingarm pivot shaft ring nut with the ring nut wrench "2".



**Ring nut wrench**  
90890-01507



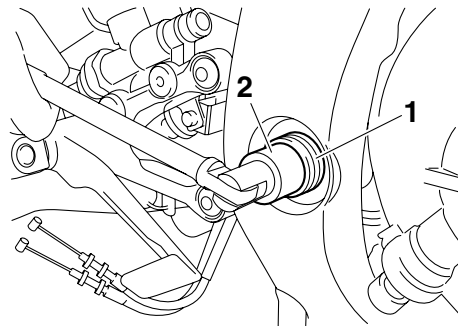
5. Remove:
  - Swingarm pivot shaft "1"

### NOTE:

Loosen the swingarm pivot shaft with the damper rod holder (24 mm) "2".



**Damper rod holder (24 mm)**  
90890-01328  
YM-01328



EAS23360

## CHECKING THE SWINGARM

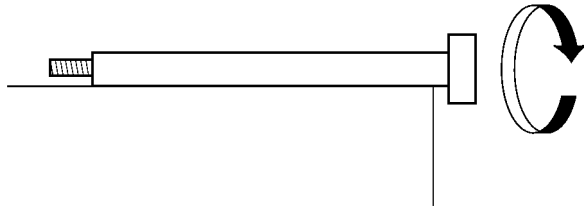
1. Check:
  - Swingarm  
Bends/cracks/damage → Replace.
2. Check:
  - Pivot shaft  
Roll the pivot shaft on a flat surface.  
Bends → Replace.

EWA13770



## WARNING

**Do not attempt to straighten a bent pivot shaft.**



### 3. Wash:

- Pivot shaft
- Dust covers
- Collars
- Washers
- Bearings



**Recommended cleaning solvent**  
**Kerosene**

### 4. Check:

- Dust covers
- Collars
- Oil seals
- Damage/wear → Replace.
- Bearings
- Damage/pitting → Replace.

EAS23380

## INSTALLING THE SWINGARM

### 1. Lubricate:

- Bearings
- Collars
- Dust covers
- Pivot shaft



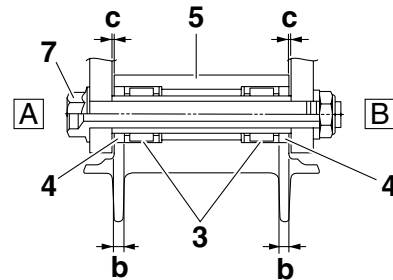
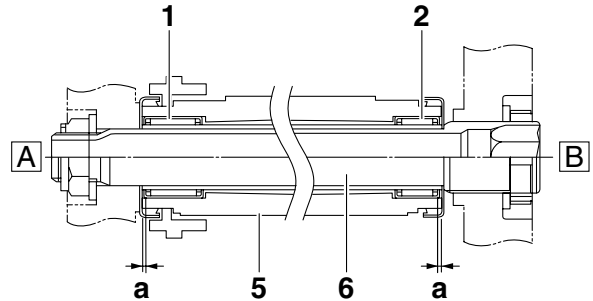
**Recommended lubricant**  
**Lithium-soap-based grease**

### 2. Install:

- Bearing “1”
- Bearing “2”
- Bearings “3”
- Oil seals “4”



Installed depth of bearing “a”  
0–1.0 mm (0–0.04 in)  
Installed depth of bearing “b”  
4.0 mm (0.16 in)  
Installed depth of oil seal “c”  
1.0 mm (0.04 in)

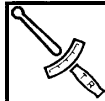


- 5. Swingarm
- 6. Swingarm pivot shaft
- 7. Bolt

- A. Left side
- B. Right side

### 3. Install:

- Swingarm pivot shaft “1”



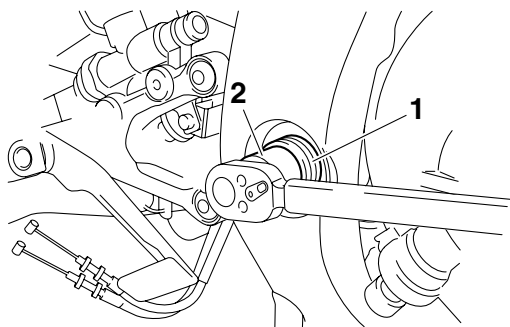
**Swingarm pivot shaft**  
**16 Nm (1.6 m·kg, 12 ft·lb)**

### NOTE:

Tighten the swingarm pivot shaft with the damper rod holder (24 mm) “2”.



**Damper rod holder (24 mm)**  
**90890-01328**  
**YM-01328**



**Drive chain slack**  
30.0–45.0 mm (1.18–1.77 in)

4. Install:

- Swingarm pivot shaft ring nut “1”



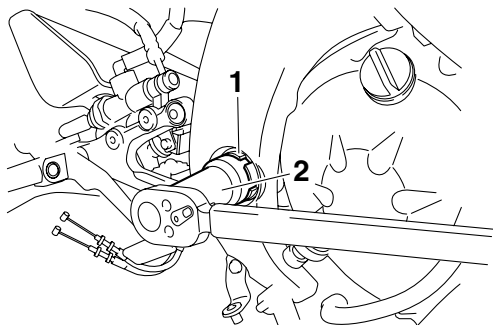
**Swingarm pivot shaft ring nut**  
95 Nm (9.5 m·kg, 70 ft·lb)

**NOTE:**

- Lubricate the swingarm pivot ring nut threads and mating surfaces with lithium-soap-based grease.
- Tighten the swingarm pivot shaft ring nut with the ring nut wrench “2”.



**Ring nut wrench**  
90890-01507



5. Install:

- Swingarm pivot shaft nut



**Swingarm pivot shaft nut**  
70 Nm (7.0 m·kg, 52 ft·lb)

**NOTE:**

Lubricate the swingarm pivot shaft nut threads and mating surfaces with lithium-soap-based grease.

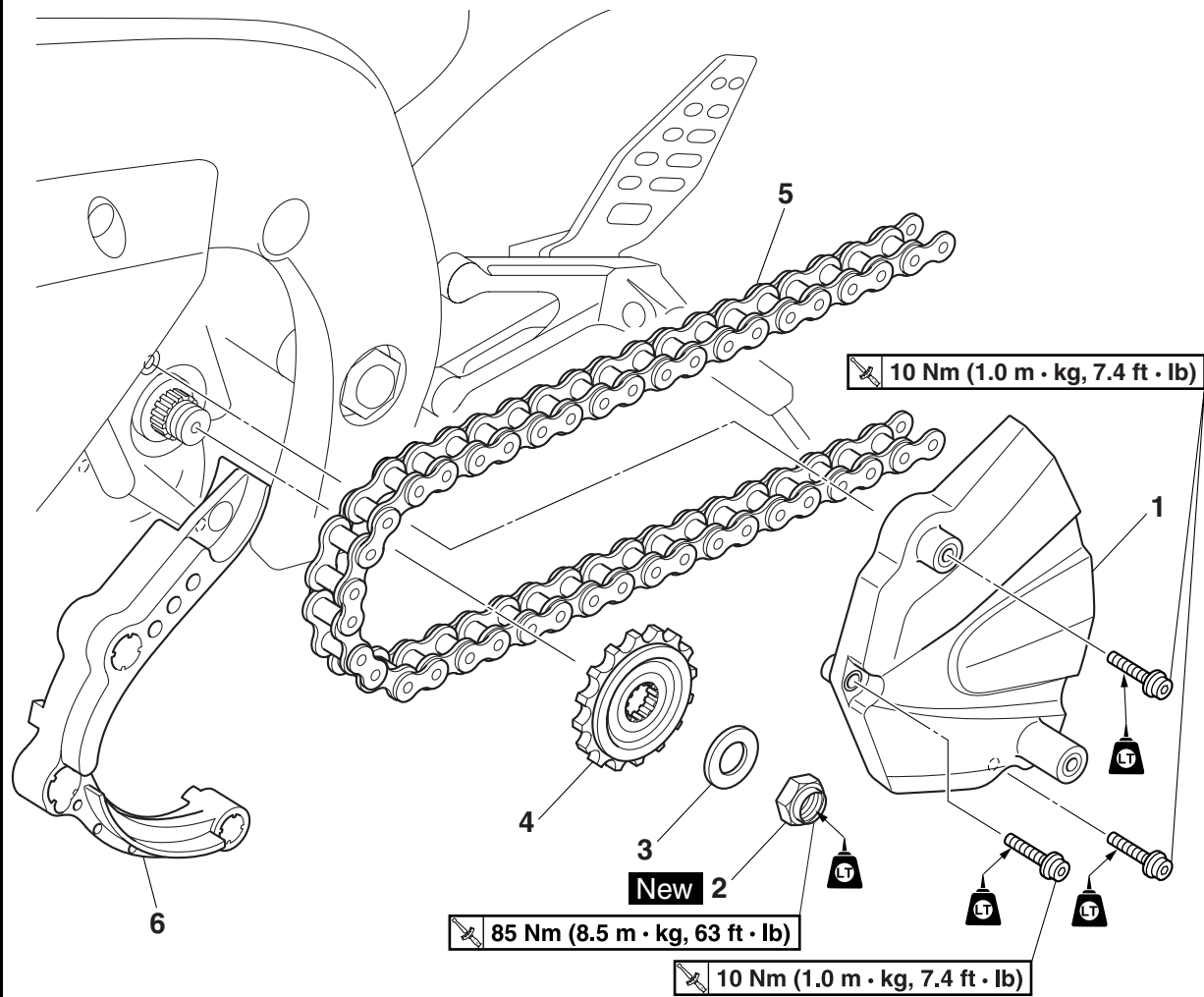
6. Adjust:

- Drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-26.

EAS23400

CHAIN DRIVE

Removing the drive sprocket and drive chain



Order	Job/Parts to remove	Q'ty	Remarks
	Left lower side cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Left bottom cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Shift rod		Refer to "ENGINE REMOVAL" on page 5-1.
1	Drive sprocket cover	1	
2	Drive sprocket nut	1	
3	Washer	1	
4	Drive sprocket	1	
5	Drive chain	1	
6	Drive chain guide (drive sprocket side)	1	
			For installation, reverse the removal procedure.

EAS23410

## REMOVING THE DRIVE CHAIN

1. Stand the vehicle on a level surface.

EWA13120



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

### NOTE:

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

2. Remove:
  - Drive chain  
(with the drive chain cutter)

### NOTE:

Only cut the drive chain if it or the swingarm is to be replaced.

EAS23440

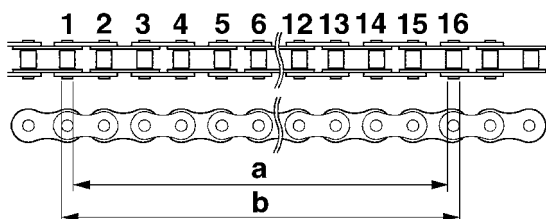
## CHECKING THE DRIVE CHAIN

1. Measure:
  - 15-link section “a” of the drive chain  
Out of specification → Replace the drive chain.



**15-link length limit  
239.3 mm (9.42 in)**

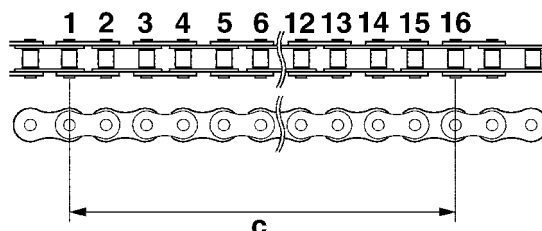
- a. Measure the length “a” between the inner sides of the pins and the length “b” between the outer sides of the pins on a 15-link section of the drive chain as shown in the illustration.



- b. Calculate the length “c” of the 15-link section of the drive chain using the following formula.  
Drive chain 15-link section length “c” =  
(length “a” between pin inner sides + length “b” between pin outer sides)/2

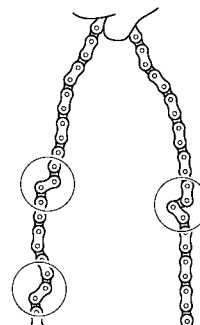
### NOTE:

- When measuring a 15-link section of the drive chain, make sure that the drive chain is taut.
- Perform this procedure 2–3 times, at a different location each time.



2. Check:

- Drive chain  
Stiffness → Clean and lubricate or replace.



3. Clean:
  - Drive chain

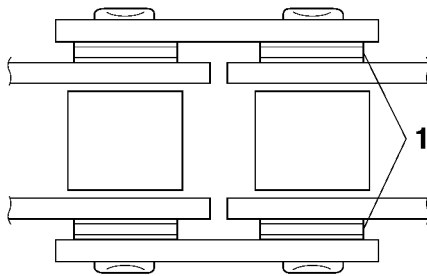
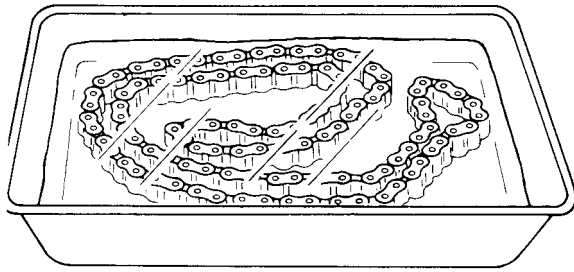
- a. Wipe the drive chain with a clean cloth.
- b. Put the drive chain in kerosene and remove any remaining dirt.
- c. Remove the drive chain from the kerosene and completely dry it.

EC2C01014

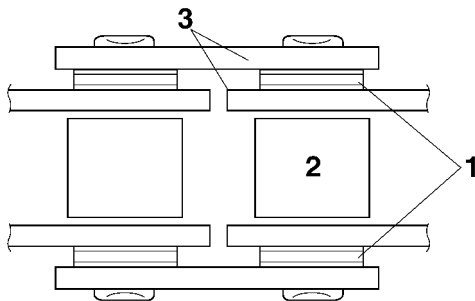
### CAUTION:

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

- Do not soak the drive chain in kerosene for more than ten minutes, otherwise the O-rings can be damaged.



4. Check:
- O-rings "1"  
Damage → Replace the drive chain.
  - Drive chain rollers "2"  
Damage/wear → Replace the drive chain.
  - Drive chain side plates "3"  
Damage/wear/cracks → Replace the drive chain.



5. Lubricate:
- Drive chain



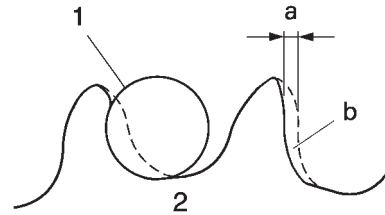
**Recommended lubricant**  
Engine oil or chain lubricant  
suitable for O-ring chains

EAS23460

## CHECKING THE DRIVE SPROCKET

1. Check:
- Drive sprocket

More than 1/4 tooth "a" wear → Replace the drive chain sprockets as a set.  
Bent teeth → Replace the drive chain sprockets as a set.



b. Correct

1. Drive chain roller
2. Drive chain sprocket

EAS23470

## CHECKING THE REAR WHEEL SPROCKET

Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-15.

EAS23480

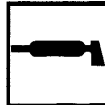
## CHECKING THE REAR WHEEL DRIVE HUB

Refer to "CHECKING THE REAR WHEEL DRIVE HUB" on page 4-15.

EAS28800

## INSTALLING THE DRIVE CHAIN

1. Lubricate:
- Drive chain

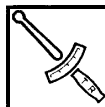


**Recommended lubricant**  
Engine oil or chain lubricant  
suitable for O-ring chains

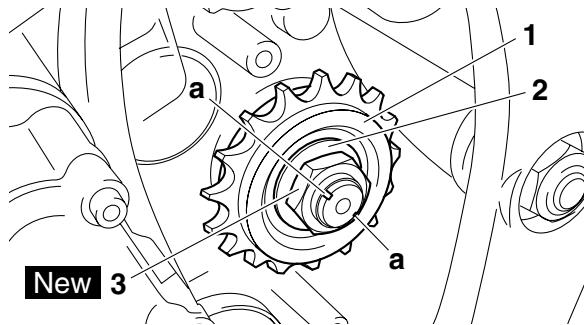
2. Install:
- Drive sprocket "1"
  - Washer "2"
  - Drive sprocket nut "3" **New**

### NOTE:

- While applying the rear brake, tighten the drive sprocket nut.
- Stake the drive sprocket nut "3" at a cutout "a" in the drive axle.



**Drive sprocket nut**  
85 Nm (8.5 m·kg, 63 ft·lb)  
**LOCTITE®**



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## ENGINE

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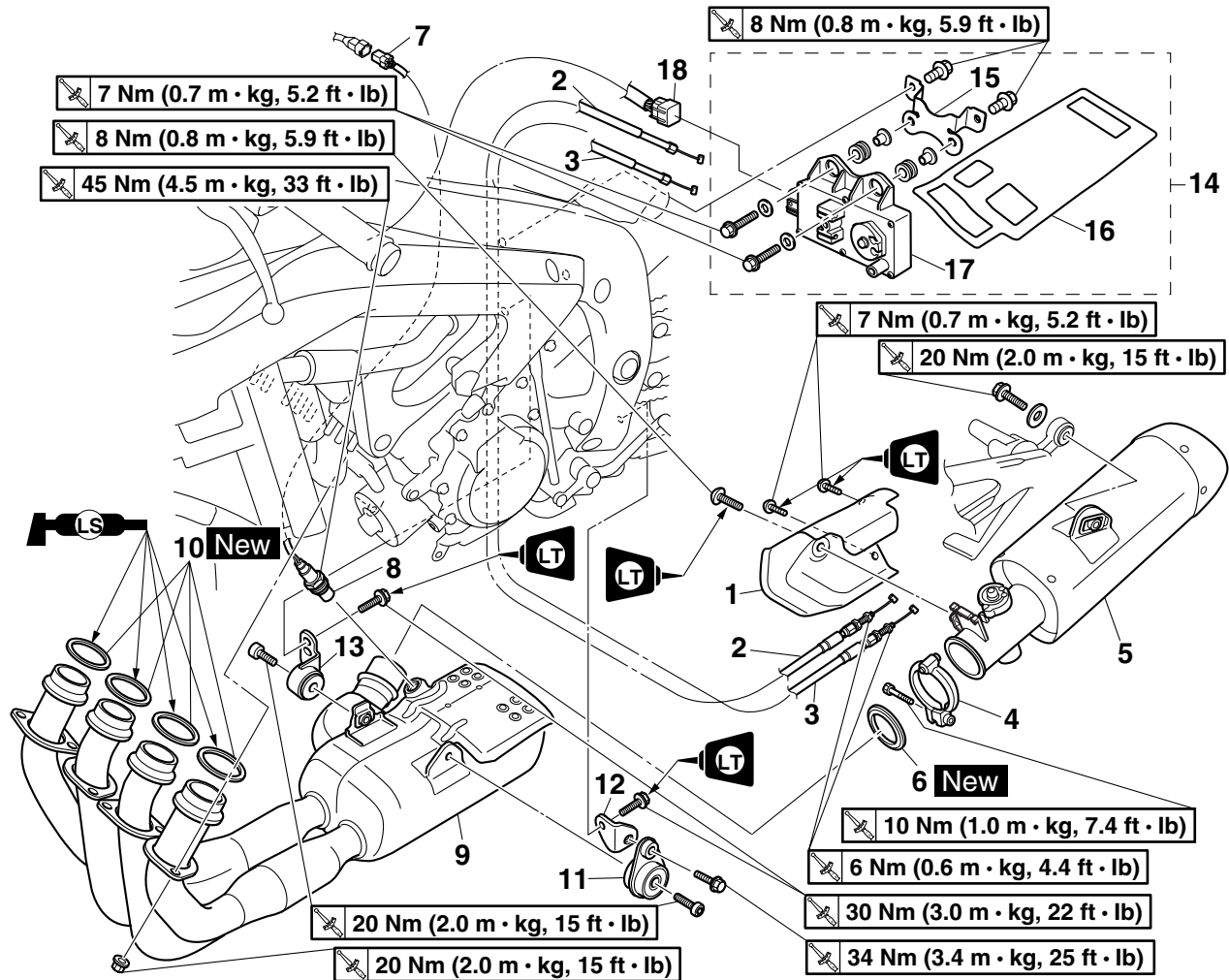
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EAS23710

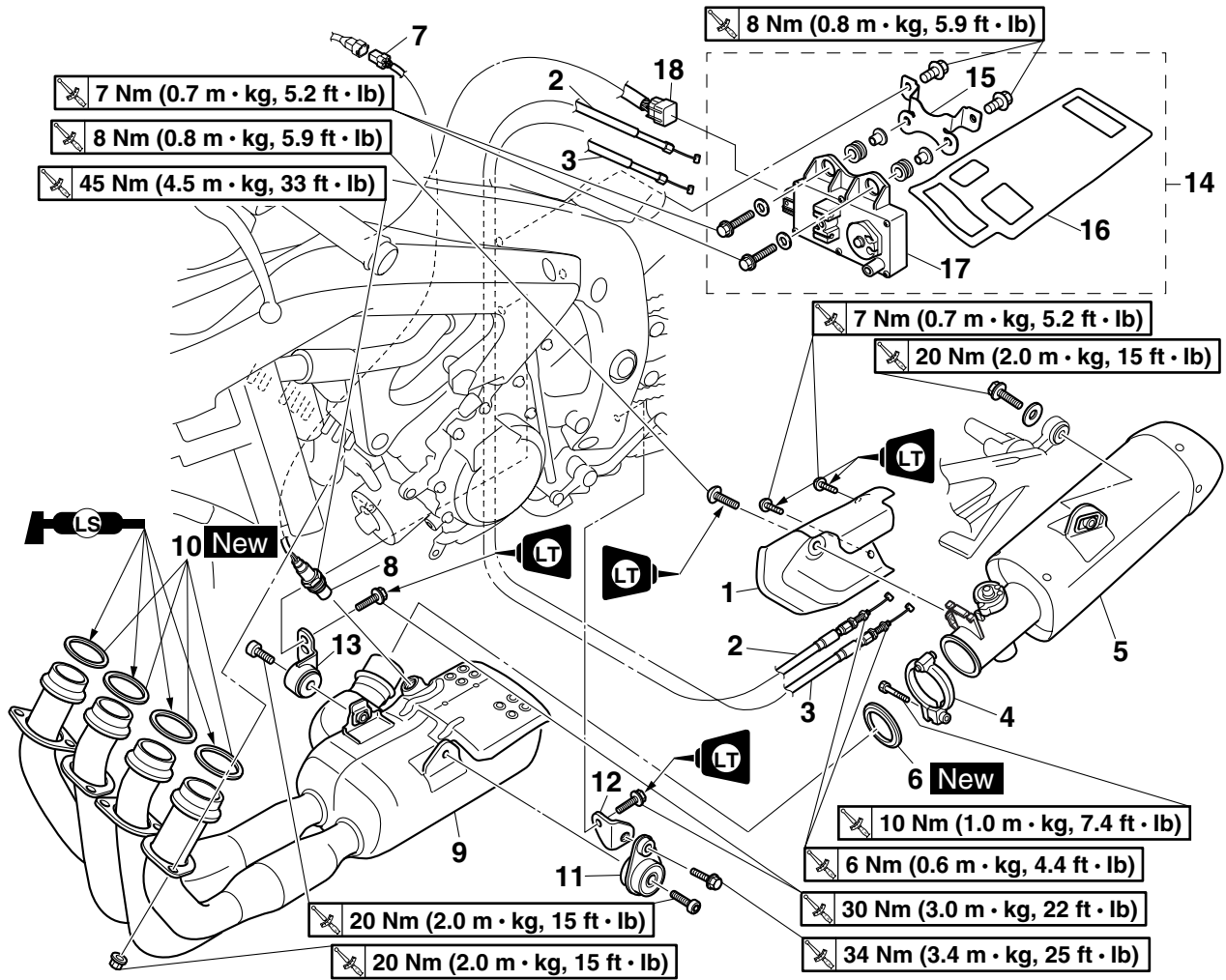
## ENGINE REMOVAL

### Removing the exhaust pipe assembly



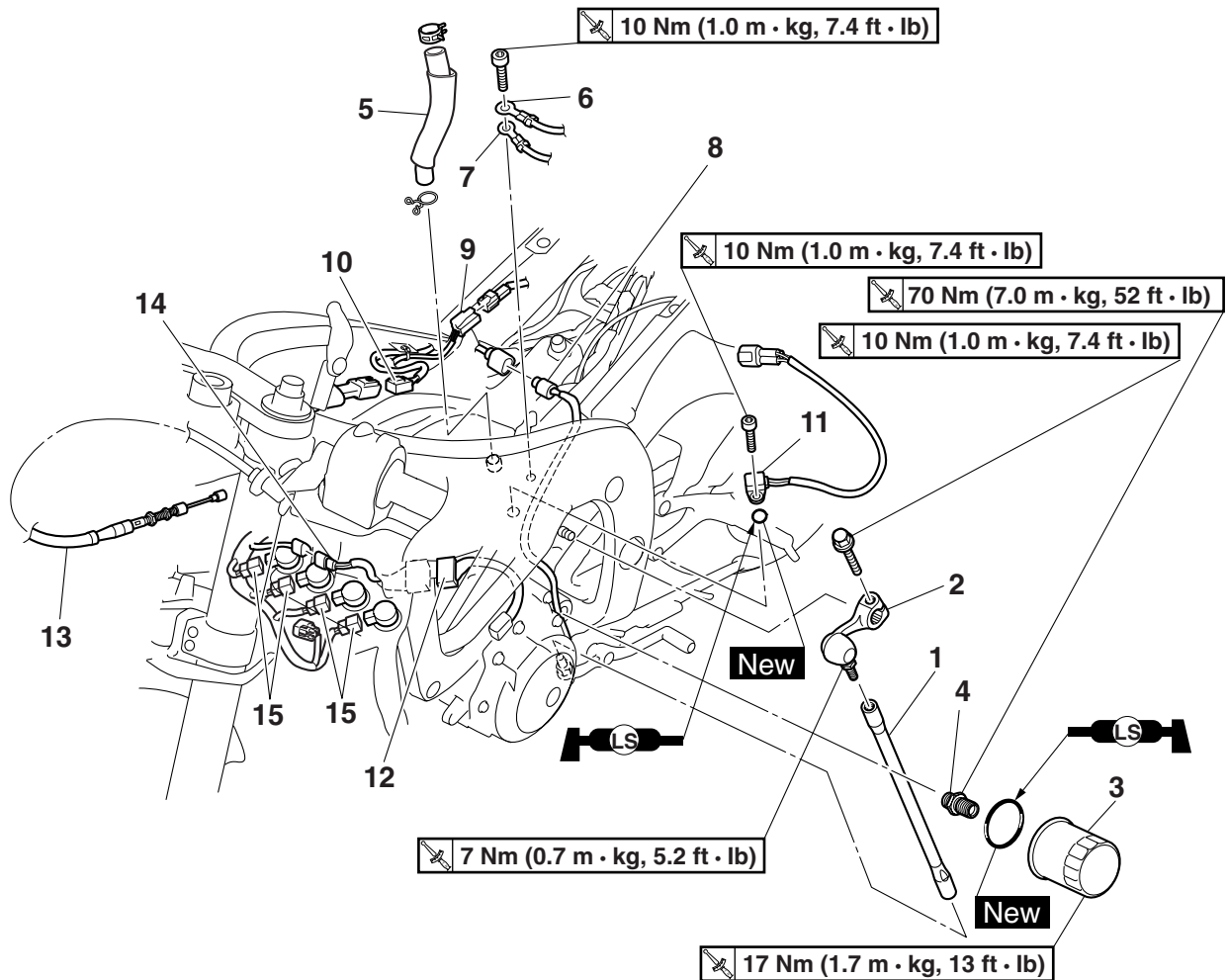
Order	Job/Parts to remove	Q'ty	Remarks
	Side cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Upper side cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Radiator bracket		Refer to "RADIATOR" on page 6-1.
1	EXUP valve pulley cover	1	
2	EXUP cable	1	Black adjusting bolt
3	EXUP cable	1	
4	Clamp	1	
5	Muffler	1	
6	Gasket	1	
7	O <sub>2</sub> sensor coupler	1	Disconnect.
8	O <sub>2</sub> sensor	1	
9	Exhaust pipe assembly	1	
10	Gasket	4	
11	Exhaust pipe assembly bracket (left lower side)	1	
12	Exhaust pipe assembly bracket (left upper side)	1	
13	Exhaust pipe assembly bracket (right side)	1	
14	EXUP servo motor assembly	1	
15	EXUP servo motor bracket	1	

Removing the exhaust pipe assembly



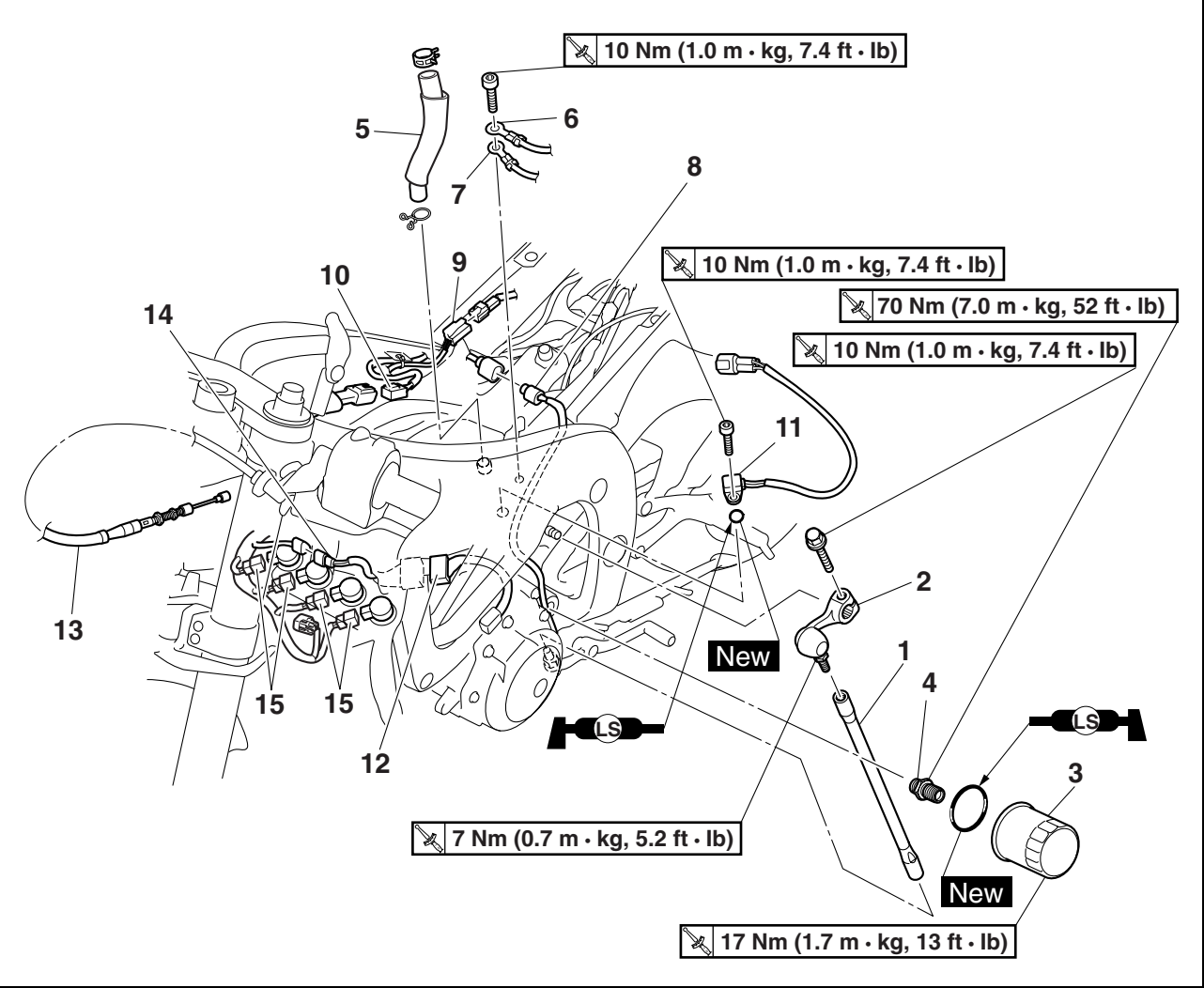
Order	Job/Parts to remove	Q'ty	Remarks
16	EXUP servo motor cover	1	
17	EXUP servo motor	1	
18	EXUP servo motor coupler	1	Disconnect.
			For installation, reverse the removal procedure.

## Disconnecting the leads and hoses



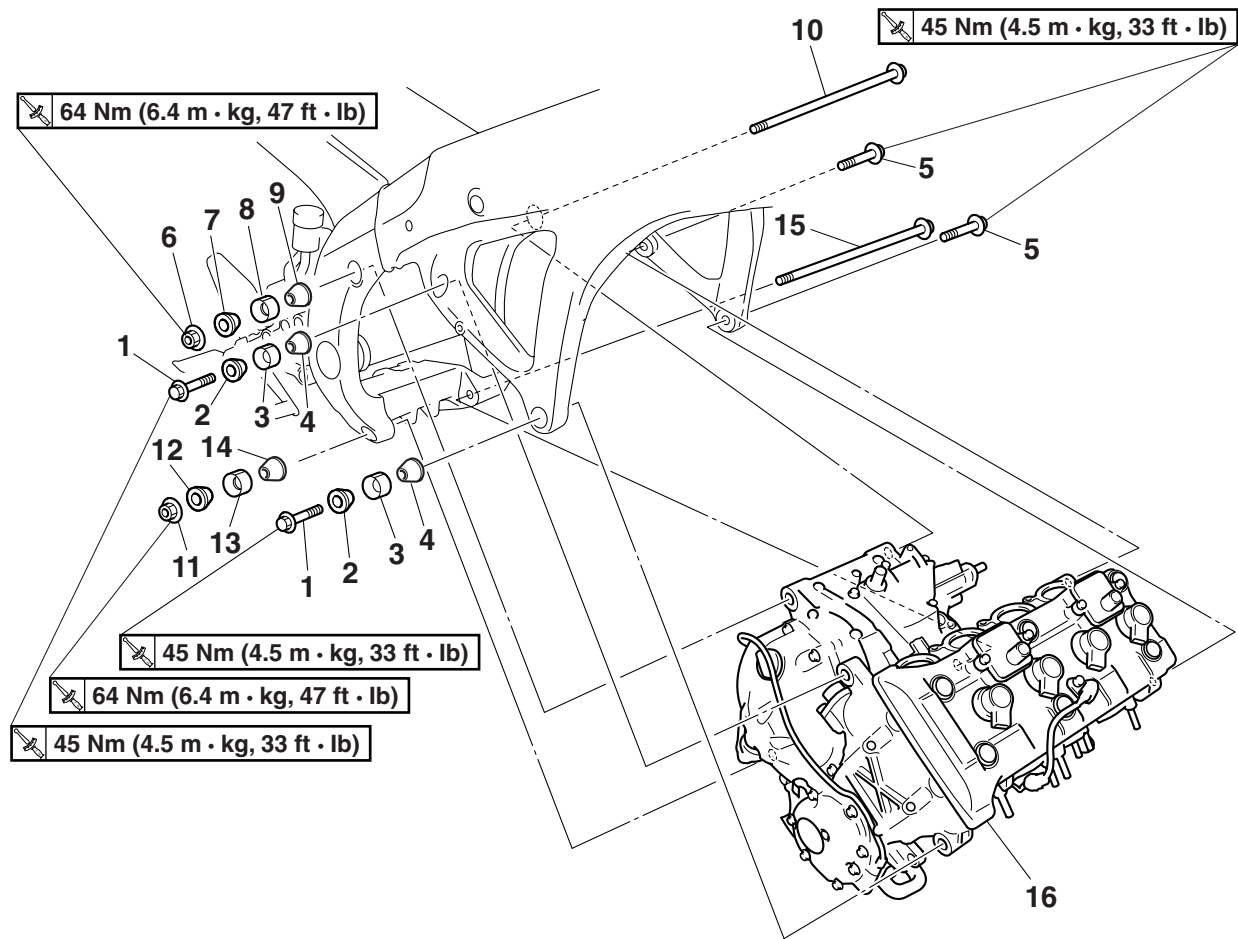
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Throttle body		Refer to "THROTTLE BODIES" on page 7-9.
	Air cut-off valve		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-32.
	Thermostat		Refer to "THERMOSTAT" on page 6-6.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Oil cooler		Refer to "OIL COOLER" on page 6-4.
	Water pump		Refer to "WATER PUMP" on page 6-8.
	Drive sprocket		Refer to "CHAIN DRIVE" on page 4-68.
1	Shift rod	1	
2	Shift arm	1	
3	Oil filter cartridge	1	
4	Oil filter cartridge bolt	1	
5	Crankcase breather hose	1	
6	Negative battery terminal	1	Disconnect.
7	Engine ground terminal	1	Disconnect.
8	Oil level switch coupler	1	Disconnect.
9	Crankshaft position sensor coupler	1	Disconnect.

Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
10	Neutral switch coupler	1	Disconnect.
11	Speed sensor	1	
12	Stator coil assembly coupler	1	Disconnect.
13	Clutch cable	1	Disconnect.
14	Cylinder identification sensor coupler	1	Disconnect.
15	Ignition coil coupler	4	Disconnect.
			For installation, reverse the removal procedure.

## Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
			<b>NOTE:</b> Place a suitable stand under the engine.
1	Engine mounting bolt (front right side)	2	
2	Engine mounting collar (outside)	2	
3	Engine mounting collar (center)	2	
4	Engine mounting collar (inside)	2	
5	Engine mounting bolt (front left side)	2	
6	Engine mounting nut (rear upper side)	1	
7	Engine mounting collar (outside)	1	
8	Engine mounting collar (center)	1	
9	Engine mounting collar (inside)	1	
10	Engine mounting bolt (rear upper side)	1	
11	Engine mounting nut (rear lower side)	1	
12	Engine mounting collar (outside)	1	
13	Engine mounting collar (center)	1	
14	Engine mounting collar (inside)	1	
15	Engine mounting bolt (rear lower side)	1	
16	Engine	1	
			For installation, reverse the removal procedure.

EAS23720

## INSTALLING THE ENGINE

### 1. Install:

- Engine "1"
- Engine mounting bolt (rear lower side) "2"
- Engine mounting bolt (rear upper side) "3"
- Engine mounting collars (inside) "4"
- Engine mounting collar (center) "5"
- Engine mounting collars (outside) "6"
- Engine mounting nut (rear lower side) "7" (temporarily tighten)
- Engine mounting nut (rear upper side) "8" (temporarily tighten)
- Engine mounting bolts (front left side) "9" (temporarily tighten)
- Engine mounting collars (inside) "10"
- Engine mounting collar (center) "11"
- Engine mounting collars (outside) "12"
- Engine mounting bolts (front right side) "13" (temporarily tighten)

### NOTE:

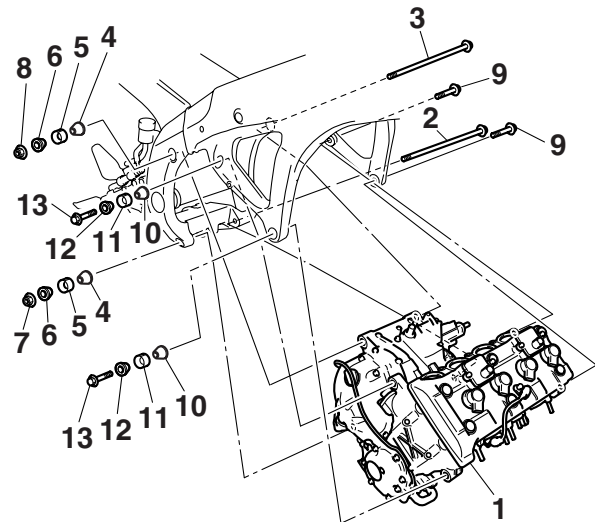
- Be sure to pass the drive axle through the drive chain when installing the engine "1".
- Do not fully tighten the bolts and nuts.

### 2. Tighten:

- Engine mounting nut (rear lower side) "7"
- Engine mounting nut (rear upper side) "8"
- Engine mounting bolts (front left side) "9"
- Engine mounting bolts (front right side) "13"

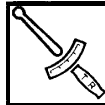


**Engine mounting nut (rear lower side)**  
64 Nm (6.4 m·kg, 47 ft·lb)  
**Engine mounting nut (rear upper side)**  
64 Nm (6.4 m·kg, 47 ft·lb)  
**Engine mounting bolt (front left side)**  
45 Nm (4.5 m·kg, 32 ft·lb)  
**Engine mounting bolt (front right side)**  
45 Nm (4.5 m·kg, 32 ft·lb)



### 3. Install:

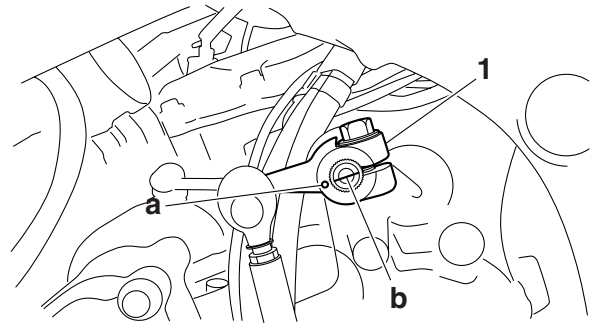
- Shift arm "1"



**Shift arm bolt**  
10 Nm (1.0 m·kg, 7.4 ft·lb)

### NOTE:

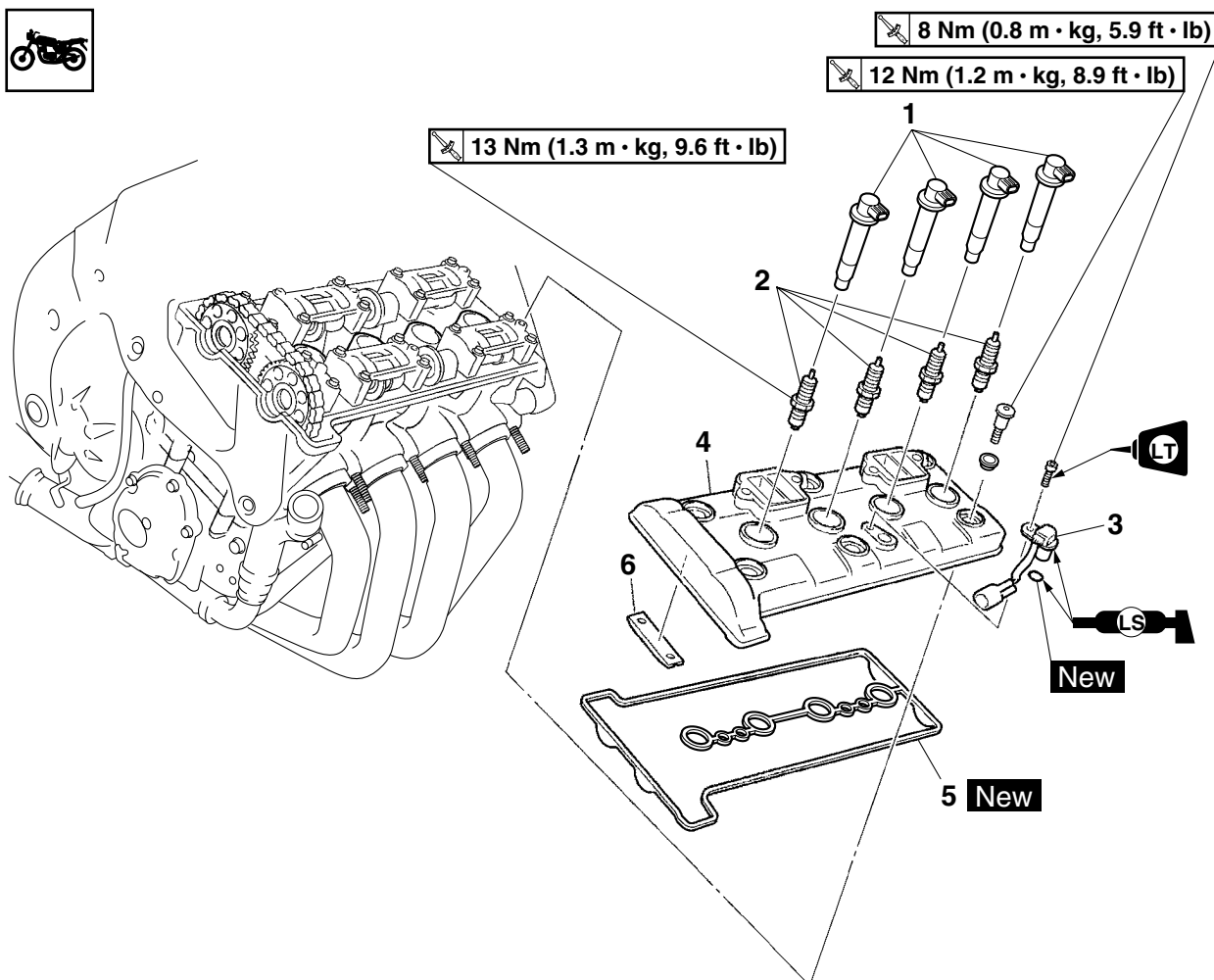
Install the shift arm "1" with its punch mark "a" aligned with the notch "b" in end of the shift shaft.



EAS23760

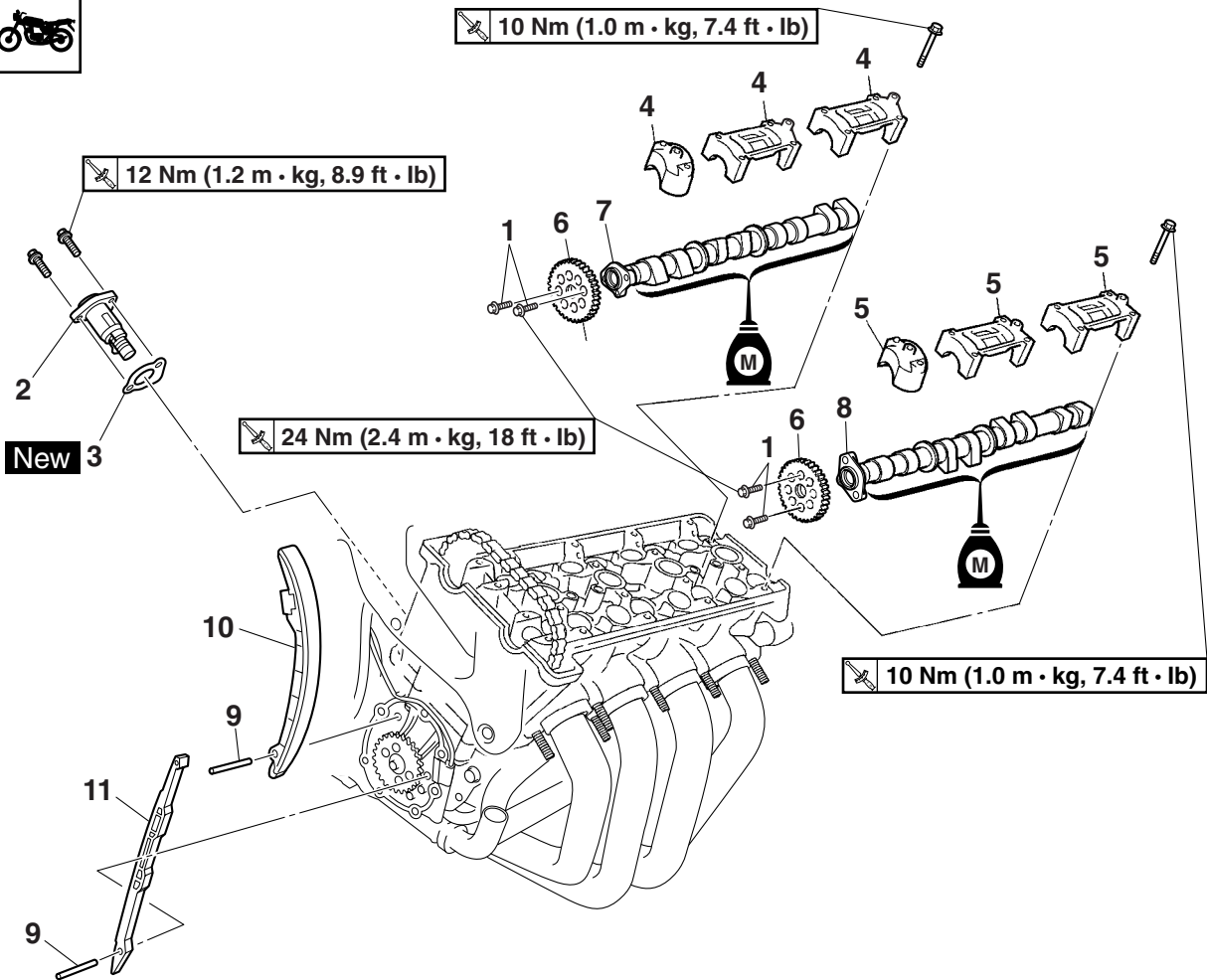
## CAMSHAFTS

## Removing the cylinder head cover



Order	Job/Parts to remove	Q'ty	Remarks
	Radiator		Refer to "RADIATOR" on page 6-1.
	Throttle body		Refer to "THROTTLE BODIES" on page 7-9.
	Air cut-off valve/Reed valve assembly		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
1	Ignition coil	4	
2	Spark plug	4	
3	Cylinder identification sensor	1	
4	Cylinder head cover	1	
5	Cylinder head cover gasket	1	
6	Timing chain guide (upper side)	1	
			For installation, reverse the removal procedure.

## Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
	Pickup rotor cover		Refer to "PICKUP ROTOR" on page 5-29.
1	Camshaft sprocket bolt	4	Loosen.
2	Timing chain tensioner	1	
3	Timing chain tensioner gasket	1	
4	Intake camshaft cap	3	
5	Exhaust camshaft cap	3	
6	Camshaft sprocket	2	
7	Intake camshaft	1	
8	Exhaust camshaft	1	
9	Pin	2	
10	Timing chain guide (intake side)	1	
11	Timing chain guide (exhaust side)	1	
			For installation, reverse the removal procedure.

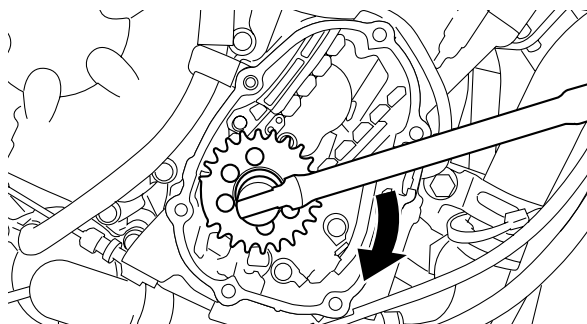
EAS23810

## REMOVING THE CAMSHAFTS

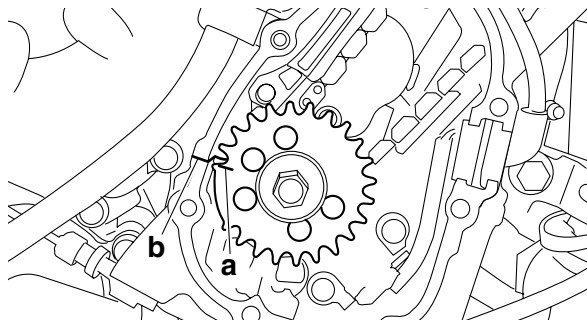
1. Remove:
  - Pickup rotor cover
 Refer to "PICKUP ROTOR" on page 5-29.
2. Align:
  - TDC mark on the pickup rotor (with the crankcase mating surface)



- a. Turn the crankshaft clockwise.

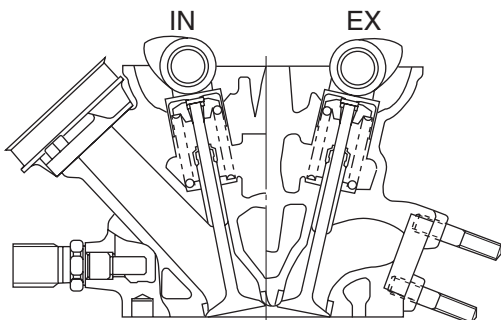


- b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the pickup rotor with the crankcase mating surface "b".



### NOTE:

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

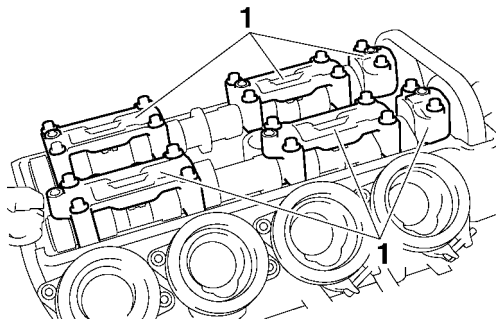


3. Remove:
  - Camshaft caps "1"

ECA13720

### CAUTION:

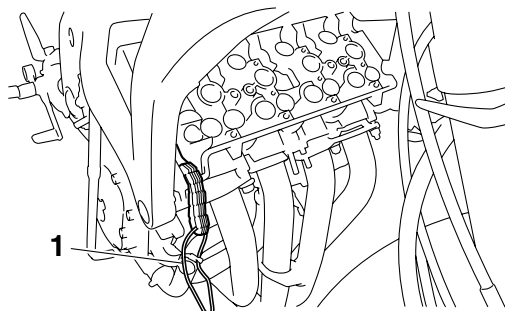
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.



4. Remove:
  - Intake camshaft
  - Exhaust camshaft

### NOTE:

To prevent the timing chain from falling into the crankcase, fasten it with a wire "1".



EAS23850

## CHECKING THE CAMSHAFTS

1. Check:
  - Camshaft lobes
 Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
  - Camshaft lobe dimensions "a" and "b"
 Out of specification → Replace the camshaft.



## Camshaft lobe dimensions

### Intake A

33.725–33.875 mm (1.3278–1.3337 in)

### Limit

33.675 mm (1.3258 in)

### Intake B

25.225–25.325 mm (0.9931–0.9970 in)

### Limit

25.175 mm (0.9911 in)

### Exhaust A

32.925–33.075 mm (1.2963–1.3022 in)

### Limit

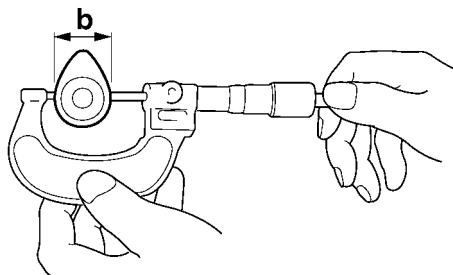
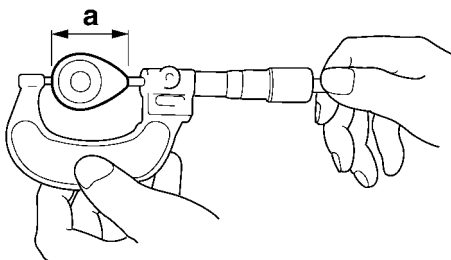
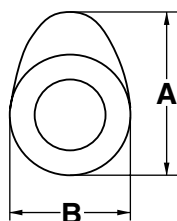
32.875 mm (1.2943 in)

### Exhaust B

25.082–25.182 mm (0.9875–0.9914 in)

### Limit

25.032 mm (0.9855 in)



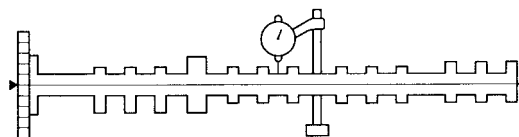
## 3. Measure:

- Camshaft runout
- Out of specification → Replace.



## Camshaft runout limit

0.030 mm (0.0012 in)



## 4. Measure:

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



## Camshaft-journal-to-camshaft-cap clearance

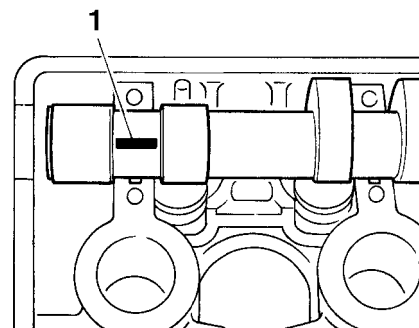
0.028–0.062 mm (0.0011–0.0024 in)

### Limit

0.080 mm (0.0032 in)



- Install the camshaft into the cylinder head (without the camshaft caps).
- Position a strip of Plastigauge® “1” onto the camshaft journal as shown.



- Install the camshaft caps.

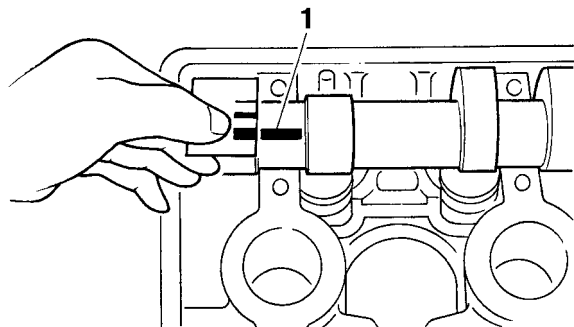
## NOTE:

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.



**Camshaft cap bolt**  
10 Nm (1.0 m·kg, 7.4 ft·lb)

- d. Remove the camshaft caps and then measure the width of the Plastigauge® “1”.

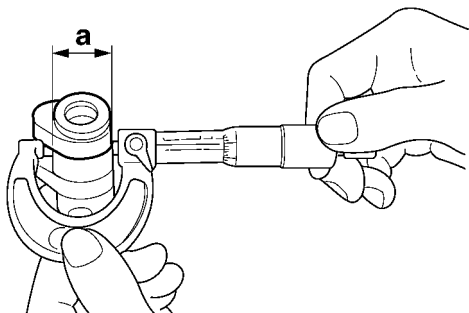


5. Measure:

- Camshaft journal diameter “a”  
Out of specification → Replace the camshaft.  
Within specification → Replace the cylinder head and the camshaft caps as a set.



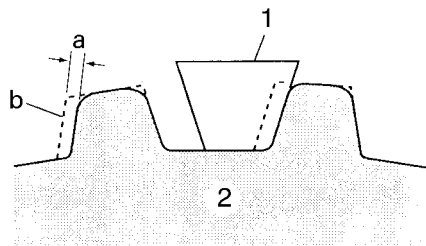
**Camshaft journal diameter**  
22.459–22.472 mm (0.8842–0.8847 in)



EAS23870

## CHECKING THE TIMING CHAIN, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

1. Check:
  - Timing chain “1”  
Damage/stiffness → Replace the timing chain and camshaft and camshaft sprocket as a set.
2. Check:
  - Camshaft sprocket  
More than 1/4 tooth wear “a” → Replace the camshaft sprocket and the timing chain as a set.



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

3. Check:
  - Timing chain guide (exhaust side)
  - Timing chain guide (intake side)
  - Timing chain guide (upper side)
 Damage/wear → Replace the defective part(s).

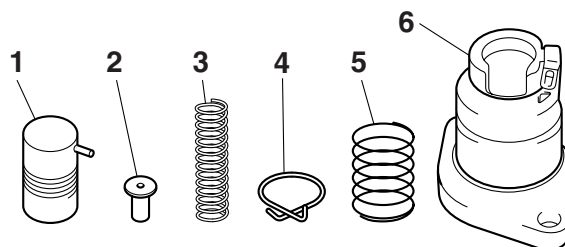
EAS23970

## CHECKING THE TIMING CHAIN TENSIONER

1. Remove:
  - Timing chain tensioner rod “1”
  - Timing chain tensioner spring seat “2”
  - Timing chain tensioner inner spring “3”
  - Timing chain tensioner outer spring “5”
  - Timing chain tensioner housing “6”

### NOTE:

Squeeze the timing chain tensioner clip “4”, and then remove the timing chain tensioner springs and timing chain tensioner rod.

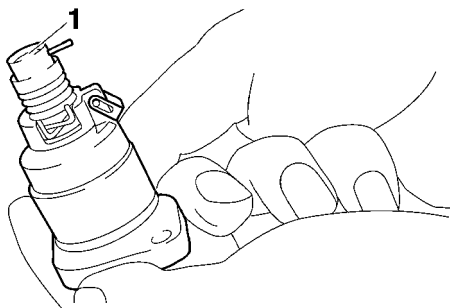


2. Check:
  - Timing chain tensioner housing
  - Timing chain tensioner rod
  - Timing chain tensioner spring seat
  - Timing chain tensioner springs
 Damage/wear → Replace the as a set.
3. Assemble:
  - Timing chain tensioner springs
  - Timing chain tensioner spring seat
  - Timing chain tensioner rod

## NOTE:

Prior to installing the timing chain tensioner rod, drain the engine oil from the timing chain tensioner housing.

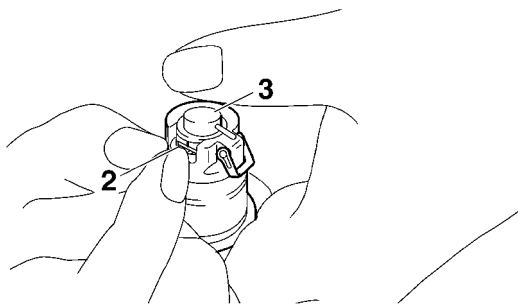
- a. Install the timing chain tensioner springs, timing chain tensioner spring seat, and timing chain tensioner rod "1".



- b. Squeeze the timing chain tensioner clip "2", and then push the timing chain tensioner rod "3" into the timing chain tensioner housing.

## NOTE:

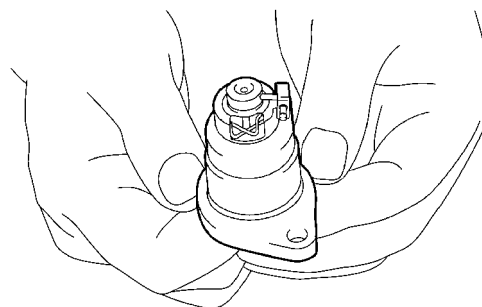
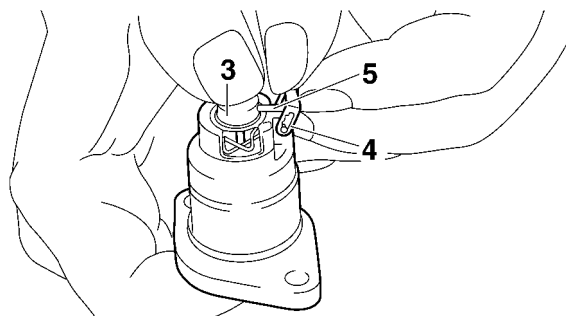
Do not release the timing chain tensioner clip while pushing the rod into the housing, otherwise the rod may be ejected.



- c. Hook the clip "4" to the timing chain tensioner rod "3".

## NOTE:

Hook the timing chain tensioner rod pin "5" to the center of the clip "4". After the installation, check that the clip "4" can come off by its own weight by pushing the timing chain tensioner rod "3" at the position of installation.



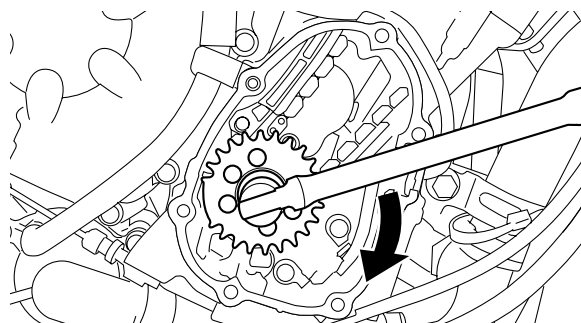
EAS24010

## INSTALLING THE CAMSHAFTS

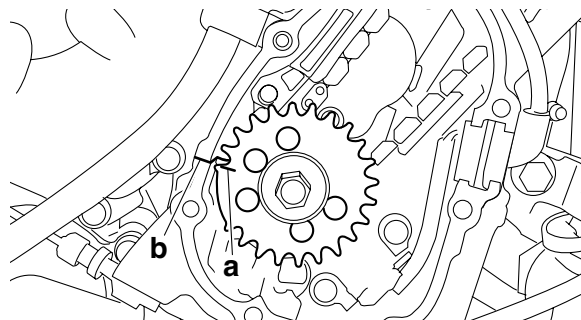
1. Align:

- TDC mark on the pickup rotor (with the crankcase mating surface)

- a. Turn the crankshaft clockwise.



- b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the pickup rotor with the crankcase mating surface "b".

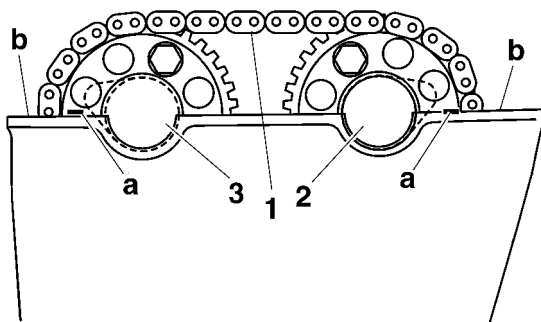


## 2. Install:

- Timing chain “1”
- Exhaust camshaft “2”
- Intake camshaft “3”  
(with the camshaft sprockets temporarily tightened)

### NOTE:

- Make sure the match marks “a” on the camshaft sprockets are aligned with the cylinder head edge “b”.
- Be sure to install the timing chain so that the exhaust side of the chain is taut and the intake side is slack.

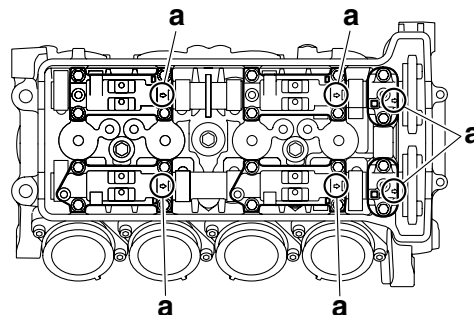
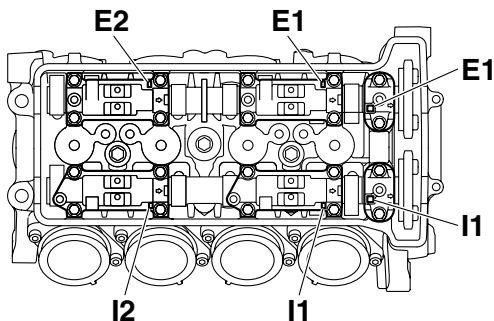


## 3. Install:

- Intake camshaft caps
- Exhaust camshaft caps

### NOTE:

- Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:  
“I1”, “I2”: Intake  
“E1”, “E2”: Exhaust
- Make sure the arrow mark “a” on each camshaft points towards the right side of the engine.



## 4. Install:

- Camshaft cap bolts



**Camshaft cap bolt**  
**10 Nm (1.0 m·kg, 7.4 ft·lb)**

ECA13730

### CAUTION:

**The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.**

### NOTE:

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

## 5. Install:

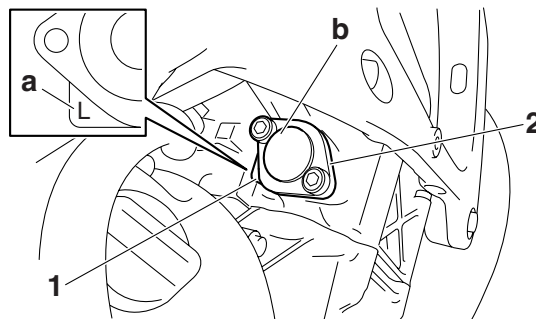
- Timing chain tensioner gasket “1” **New**
- Timing chain tensioner “2”



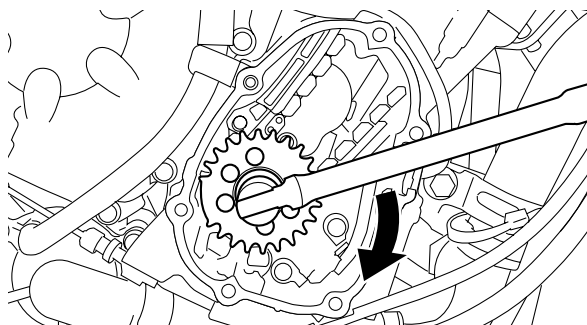
**Timing chain tensioner bolt**  
**12 Nm (1.2 m·kg, 8.9 ft·lb)**

### NOTE:

- Be sure to install the timing chain tensioner gasket so that its section with the “L” mark “a” is protruding from the lower left side of the timing chain tensioner.
- The punch mark “b” on the timing chain tensioner should face up.



6. Rotate the crankshaft a few times to release the timing chain tensioner rod.



**NOTE:**

If the engine is not disassembled, set the engine stop switch to “ $\times$ ”, and then crank the engine a few times by pressing the start switch for approximately 0.5–1.0 second each time.

7. Check that the timing chain is taut. If the chain is slack, reinstall the timing chain tensioner.

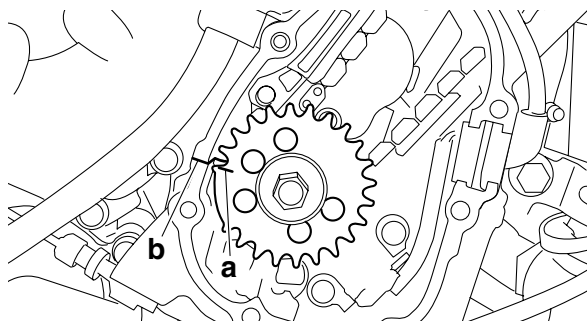
**NOTE:**

If the engine is not disassembled, start the engine and check for any abnormal noise. If any abnormal noise is heard, reinstall the timing chain tensioner.

8. Check:

- TDC mark “a”

Make sure the TDC mark on the pickup rotor is aligned with the crankcase mating surface “b”.

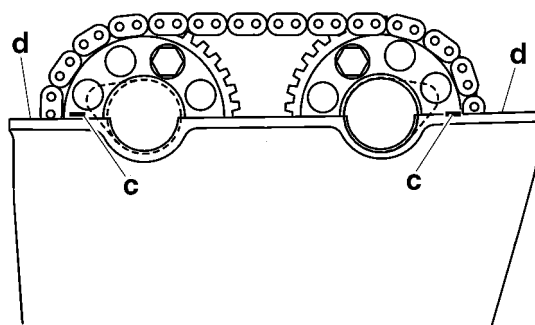


- Camshaft sprocket match mark “c”

Make sure the marks on the camshaft sprockets are aligned with the edge of the cylinder head “d”.

Out of alignment → Adjust.

Refer to the installation steps above.



9. Measure:

- Valve clearance  
Out of specification → Adjust.  
Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.

10. Install:

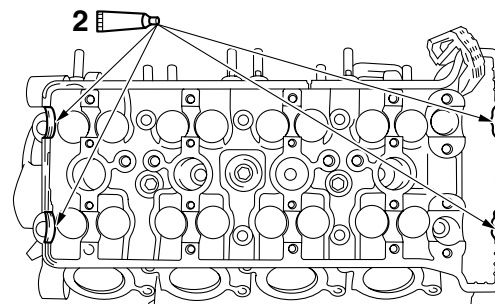
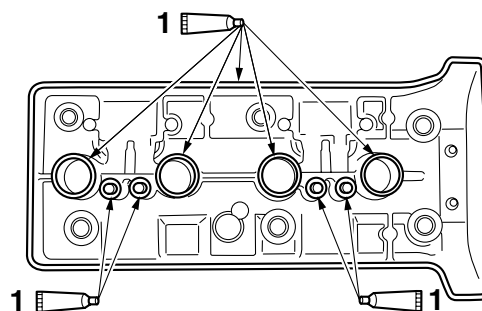
- Cylinder head cover gasket **New**
- Cylinder head cover



**Cylinder head cover bolt**  
**12 Nm (1.2 m·kg, 8.9 ft·lb)**

**NOTE:**

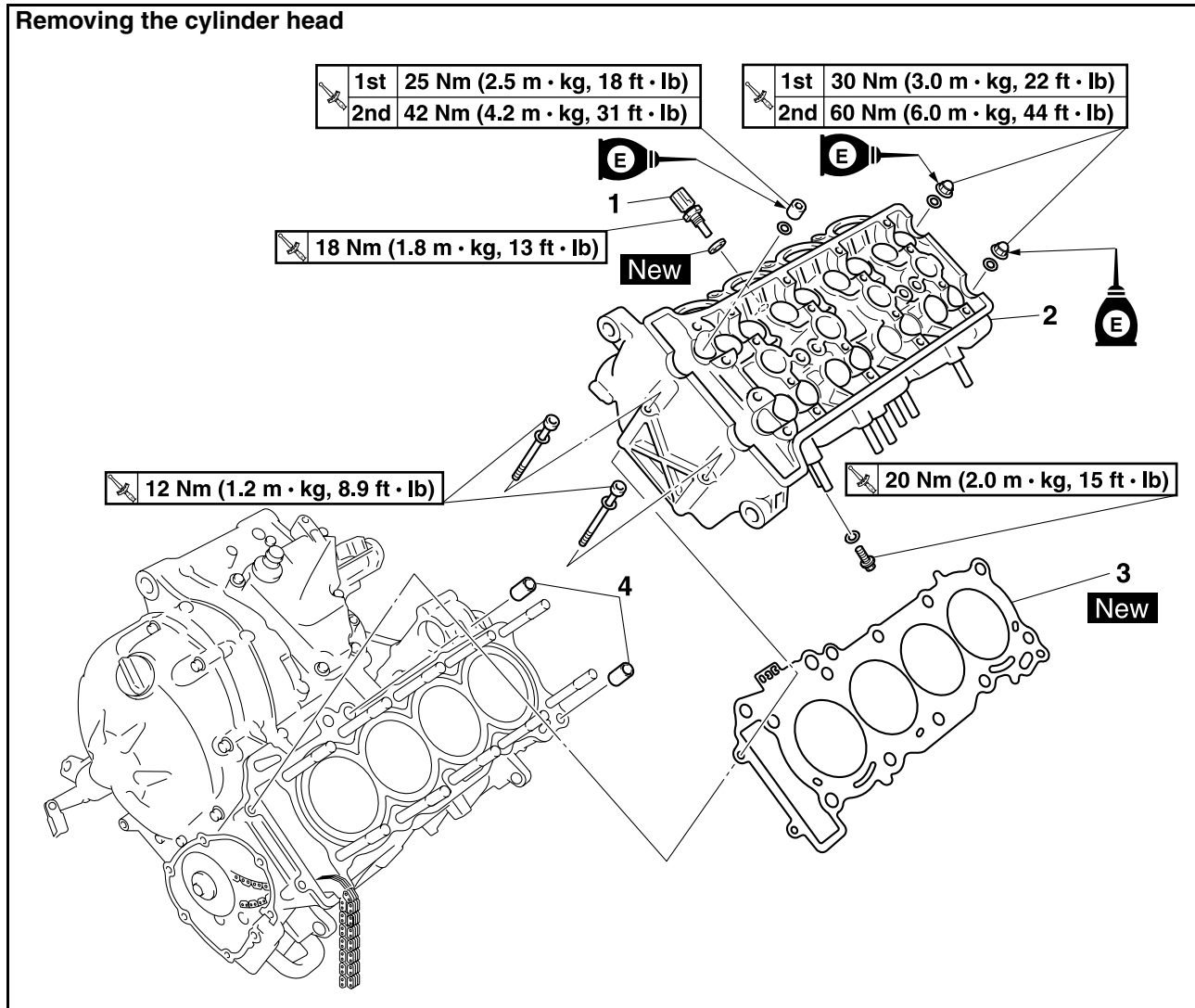
- Apply bond TB1541B “1” onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply bond TB1215B “2” onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- Tighten the cylinder head cover bolts stages and in a crisscross pattern.



EAS24100

## CYLINDER HEAD

### Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Camshafts		Refer to "CAMSHAFTS" on page 5-7.
1	Coolant temperature sensor	1	
2	Cylinder head	1	
3	Cylinder head gasket	1	
4	Dowel pin	2	
			For installation, reverse the removal procedure.

EAS24120

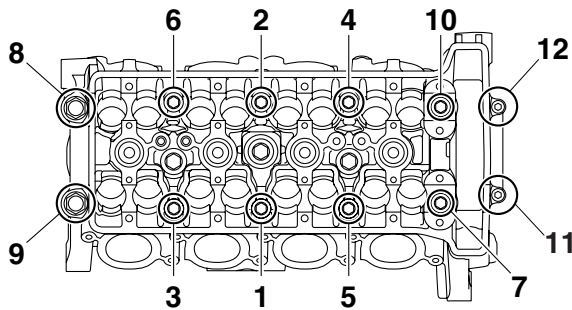
## REMOVING THE CYLINDER HEAD

### 1. Remove:

- Cylinder head bolts
- Cylinder head nuts

### NOTE:

- Loosen the nuts, cap nuts, and bolts in decreasing numerical order (refer to the numbers in the illustration).
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.



EAS24160

## CHECKING THE CYLINDER HEAD

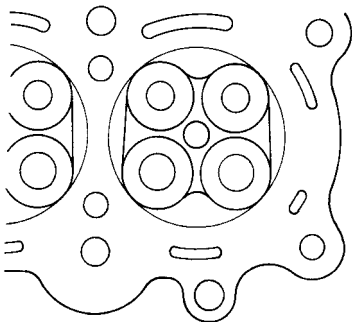
### 1. Eliminate:

- Combustion chamber carbon deposits (with a rounded scraper)

### NOTE:

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

- Spark plug bore threads
- Valve seats



### 2. Check:

- Cylinder head  
Damage/scratches → Replace.

### NOTE:

Replace the titanium valves with the cylinder head.

Refer to "CHECKING THE VALVE SEATS" on page 5-21.

- Cylinder head water jacket

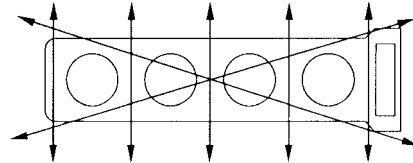
Mineral deposits/rust → Eliminate.

### 3. Measure:

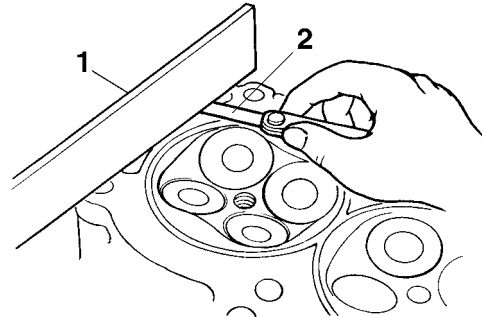
- Cylinder head warpage  
Out of specification → Resurface the cylinder head.



**Warpage limit**  
**0.05 mm (0.0020 in)**



- Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



- Measure the warpage.
- If the limit is exceeded, resurface the cylinder head as follows.
- 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.

EAS24240

## INSTALLING THE CYLINDER HEAD

### 1. Install:

- Cylinder head

### NOTE:

Pass the timing chain through the timing chain cavity.

### 2. Tighten:

- Cylinder head nuts "1"–"7", "10"



**Cylinder head nut (1st)**  
**25 Nm (2.5 m·kg, 18 ft·lb)**  
**Cylinder head nut (final)**  
**42 Nm (4.2 m·kg, 31 ft·lb)**

- Cylinder head cap nuts “8”, “9”



**Cylinder head cap nut (1st)**  
**30 Nm (3.0 m·kg, 22 ft·lb)**  
**Cylinder head cap nut (final)**  
**60 Nm (6.0 m·kg, 44 ft·lb)**

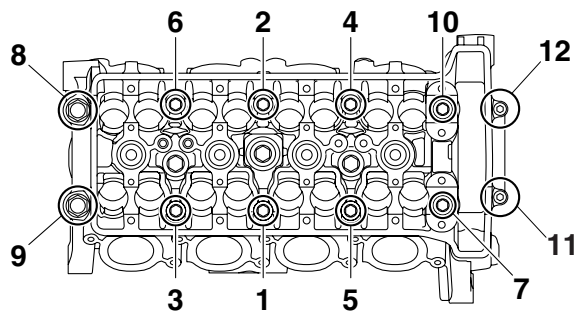
- Cylinder head bolts “11”, “12”



**Cylinder head bolt**  
**12 Nm (1.2 m·kg, 8.9 ft·lb)**

**NOTE:**

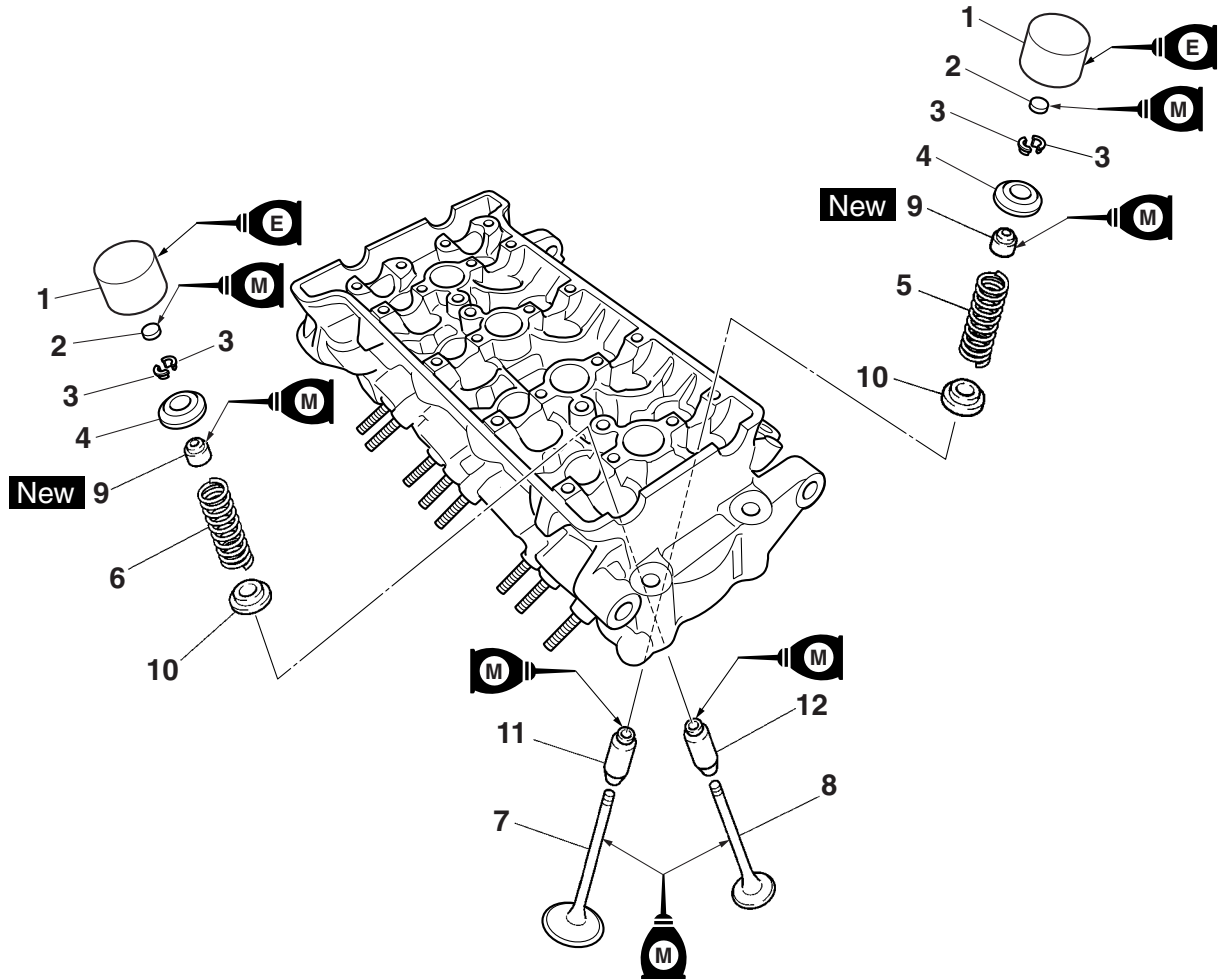
- Lubricate the bolt threads and the bearing surfaces with engine oil.
- Tighten the cylinder head nuts, cap nuts, and bolts in the proper tightening sequence as shown and torque them in two stages.



EAS24270

## VALVES AND VALVE SPRINGS

### Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
1	Valve lifter	16	
2	Valve pad	16	
3	Valve cotter	32	
4	Upper spring seat	16	
5	Intake valve spring	8	
6	Exhaust valve spring	8	
7	Intake valve	8	
8	Exhaust valve	8	
9	Valve stem seal	16	
10	Lower spring seat	16	
11	Intake valve guide	8	
12	Exhaust valve guide	8	
			For installation, reverse the removal procedure.

EAS24280

## REMOVING THE VALVES

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

### NOTE:

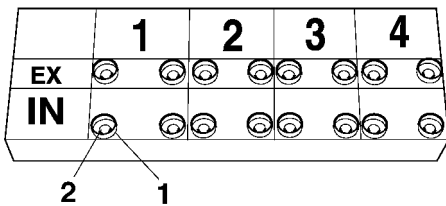
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

#### 1. Remove:

- Valve lifter "1"
- Valve pad "2"

### NOTE:

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



#### 2. Check:

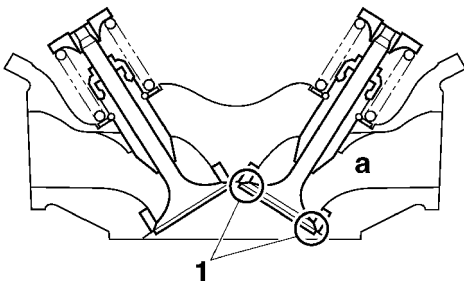
- Valve sealing  
Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.  
Refer to "CHECKING THE VALVE SEATS" on page 5-21.



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

### NOTE:

There should be no leakage at the valve seat "1".



#### 3. Remove:

- Valve cotters "1"

### NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



Valve spring compressor

90890-04019

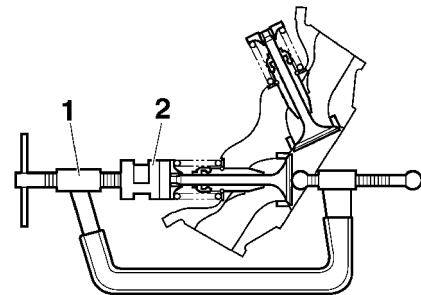
YM-04019

Valve spring compressor attachment

90890-04108

Valve spring compressor adapter 22 mm

YM-04108

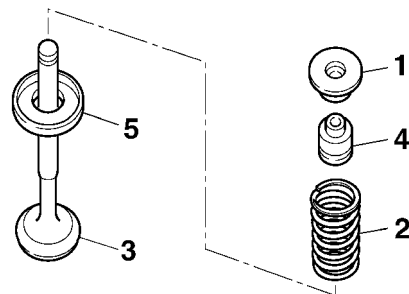


#### 4. Remove:

- Upper spring seat "1"
- Valve spring "2"
- Valve "3"
- Valve stem 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.



EAS24290

## 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  
Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance =  
Valve guide inside diameter "a" -  
Valve stem diameter "b"



## Valve-stem-to-valve-guide clearance (intake)

0.010–0.037 mm (0.0004–0.0015 in)

### Limit

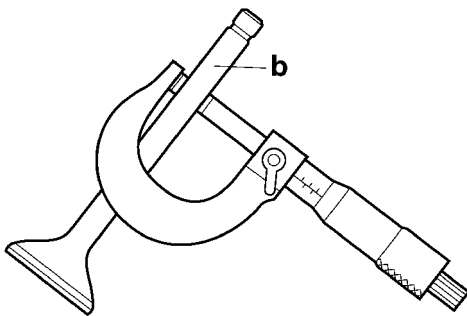
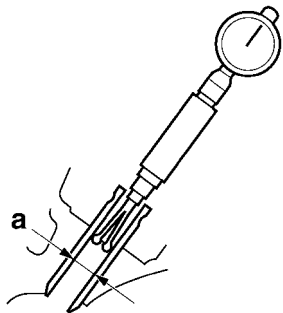
0.080 mm (0.0032 in)

## Valve-stem-to-valve-guide clearance (exhaust)

0.025–0.052 mm (0.0010–0.0020 in)

### Limit

0.095 mm (0.0037 in)



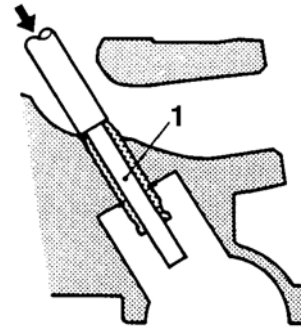
2. Replace:
- Valve guide

### NOTE:

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



- a. Remove the valve guide with the valve guide remover "1".

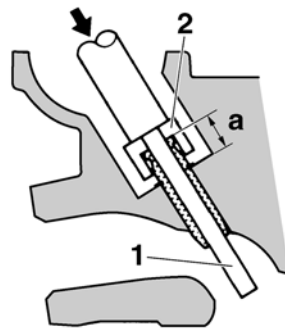


- b. Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



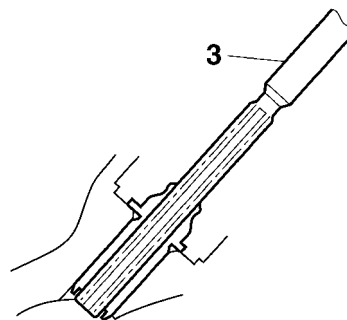
## Valve guide position

15.80 mm–16.20 mm (0.622–0.638 in)



- a. Valve guide position

- c. After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.



### NOTE:

After replacing the valve guide, reface the valve seat.



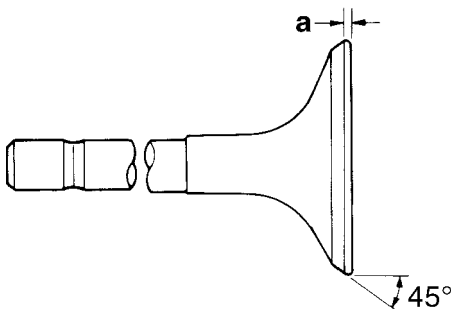
**Valve guide remover (ø4.5)**  
90890-04116  
**Valve guide remover (4.5 mm)**  
YM-04116  
**Valve guide installer (ø4.5)**  
90890-04117  
**Valve guide installer (4.5 mm)**  
YM-04117  
**Valve guide reamer (ø4.5)**  
90890-04118  
**Valve guide reamer (4.5 mm)**  
YM-04118



3. Eliminate:
  - Carbon deposits  
(from the valve face and valve seat)
4. Check:
  - Valve face  
Pitting/wear → Grind the valve face.
  - Valve stem end  
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
  - Valve margin thickness D "a"  
Out of specification → Replace the valve.



**Valve margin thickness D (intake)**  
0.90–1.10 mm (0.0354–0.0433 in)  
**Limit**  
0.8 mm (0.03 in)  
**Valve margin thickness D (exhaust)**  
1.10–1.30 mm (0.0433–0.0512 in)  
**Limit**  
1.0 mm (0.04 in)



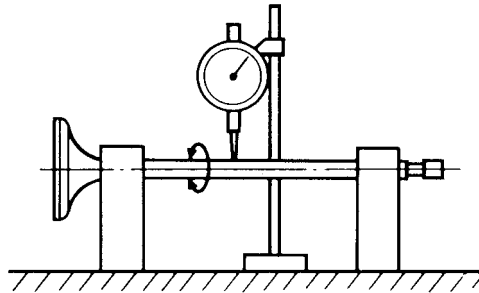
6. Measure:
  - Valve stem runout  
Out of specification → Replace the valve.

## NOTE:

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.



**Valve stem runout**  
0.040 mm (0.0016 in)



EAS24300

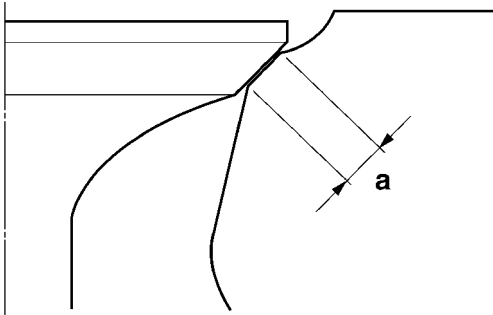
## CHECKING THE VALVE SEATS

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

1. Eliminate:
  - Carbon deposits  
(from the valve face and valve seat)
2. Check:
  - Valve seat  
Pitting/wear → Replace the cylinder head.
3. Measure:
  - Valve seat width C "a"  
Out of specification → Replace the cylinder head.



**Valve seat width C (intake)**  
0.90–1.10 mm (0.0354–0.0433 in)  
**Limit**  
1.6 mm (0.06 in)  
**Valve seat width C (exhaust)**  
1.10–1.30 mm (0.0433–0.0512 in)  
**Limit**  
1.8 mm (0.07 in)



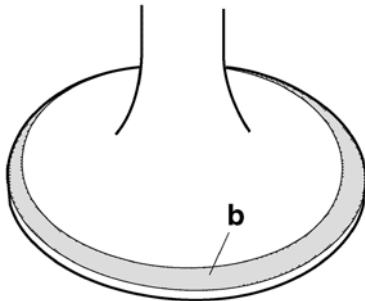
- a. Apply a coarse lapping compound "a" to the valve face.

ECA13790

**CAUTION:**

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

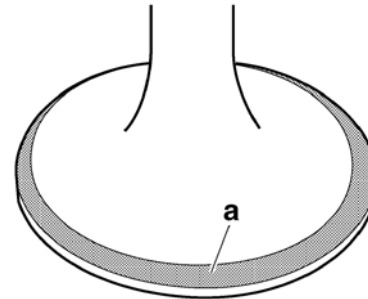
- a. Apply Mechanic's blueing dye (Dykem) "b" onto the valve face.



- 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:**

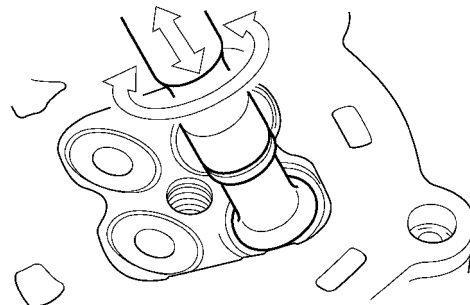
Where the valve seat and valve face contacted one another, the blueing will have been removed.



- 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.



4. Lap:
- Valve face
  - Valve seat

EC2C01028

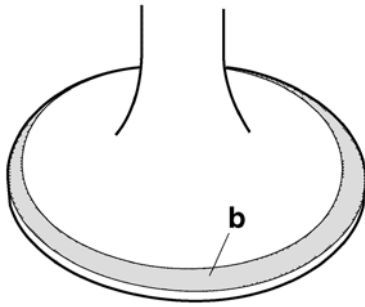
**CAUTION:**

**This model uses titanium intake and exhaust valves. Titanium valves that have been used to lap the valve seats must not be used. Always replace lapped valves with new valves.**

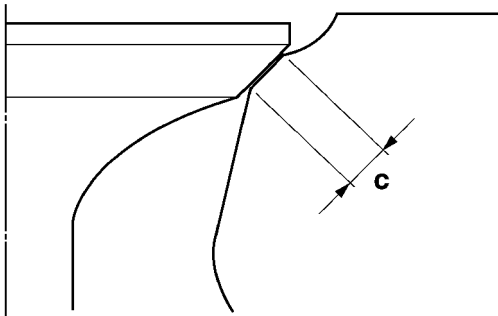
**NOTE:**

- When replacing the cylinder head, replace the valves without lapping the valve seats and valve faces.
- When replacing the valves or valve guides, use new valves to lap the valve seats, and then replace them with new valves.

- 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 "c" again. If the valve seat width is out of specification, reface and lap the valve seat.



EAS24310

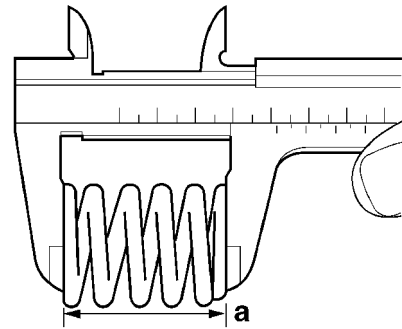
## CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:
  - Valve spring free length "a"
  - Out of specification → Replace the valve spring.



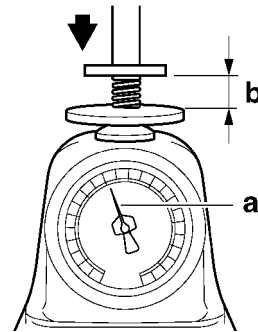
**Free length (intake)**  
37.47 mm (1.48 in)  
**Limit**  
35.60 mm (1.40 in)  
**Free length (exhaust)**  
37.67 mm (1.48 in)  
**Limit**  
35.79 mm (1.42 in)



2. Measure:
  - Compressed valve spring force "a"
  - Out of specification → Replace the valve spring.



**Installed compression spring force (intake)**  
166.00–190.00 N (37.32–42.71 lbf) (16.93–19.37 kgf)  
**Installed compression spring force (exhaust)**  
165.00–189.00 N (37.09–42.49 lbf) (16.83–19.27 kgf)  
**Installed length (intake)**  
32.80 mm (1.29 in)  
**Installed length (exhaust)**  
32.80 mm (1.29 in)

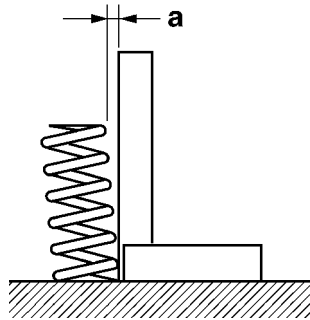


- b. Installed length

3. Measure:
  - Valve spring tilt "a"
  - Out of specification → Replace the valve spring.



**Spring tilt (intake)**  
2.5°/1.6 mm  
**Spring tilt (exhaust)**  
2.5°/1.6 mm



EAS24320

## 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.

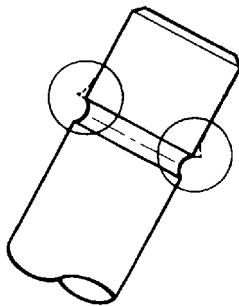
EAS24340

## INSTALLING THE VALVES

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

### 1. Deburr:

- Valve stem end  
(with an oil stone)

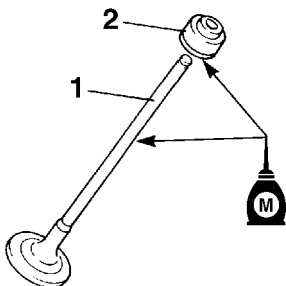


### 2. Lubricate:

- Valve stem "1"
  - Valve stem seal "2"
- (with the recommended lubricant)



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

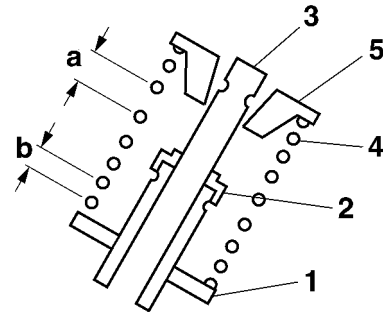
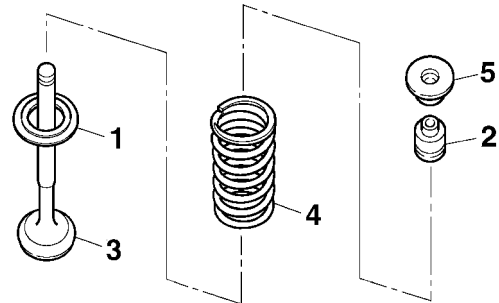


### 3. Install:

- Lower spring seat "1"
  - Valve stem 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 springs with the larger pitch "a" facing up.



b. Smaller pitch

### 4. Install:

- Valve cotters "1"

### NOTE:

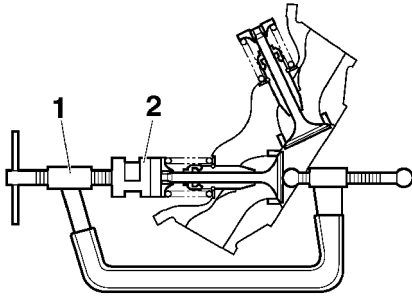
Install the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



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

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

**Valve spring compressor adapter 22 mm**  
**YM-04108**

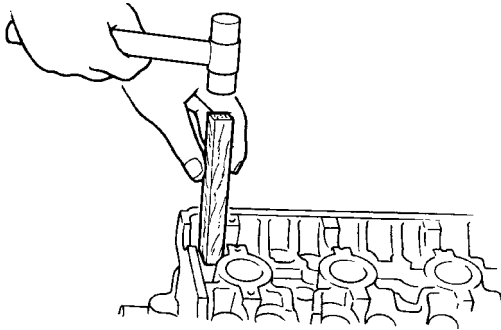


5. To secure the valve cotteners onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

**CAUTION:**

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



6. Lubricate:
- Valve lifter  
(with the recommended lubricant)



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

7. Install:
- Valve pad
  - Valve lifter

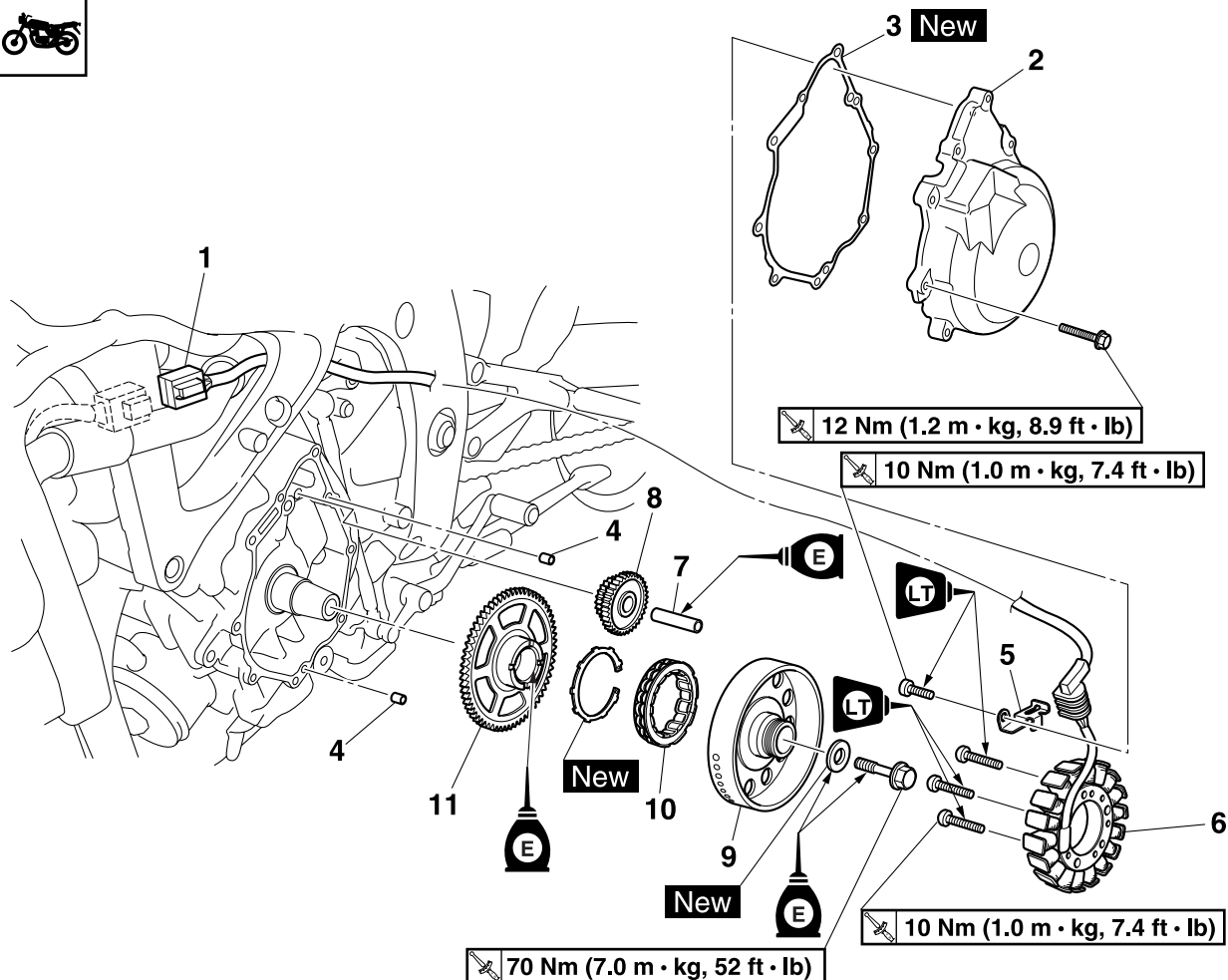
**NOTE:**

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

EAS24480

## GENERATOR AND STARTER CLUTCH

## Removing the generator and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Side cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-11.
1	Stator coil assembly coupler	1	Disconnect.
2	Generator cover	1	
3	Generator cover gasket	1	
4	Dowel pin	2	
5	Stator coil assembly lead holder	1	
6	Stator coil assembly	1	
7	Starter clutch idle gear shaft	1	
8	Starter clutch idle gear	1	
9	Generator rotor	1	
10	Starter clutch	1	
11	Starter clutch gear	1	
			For installation, reverse the removal procedure.

# GENERATOR AND STARTER CLUTCH

EAS24490

## REMOVING THE GENERATOR

### 1. Remove:

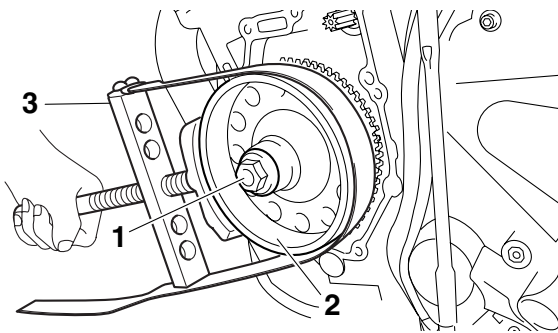
- Generator rotor bolt “1”
- Washer

### NOTE:

While holding the generator rotor “2” with the sheave holder “3”, loosen the generator rotor bolt.



**Sheave holder**  
**90890-01701**  
**Primary clutch holder**  
**YS-01880-A**



### 2. Remove:

- Generator rotor “1”  
(with the flywheel puller “2”)

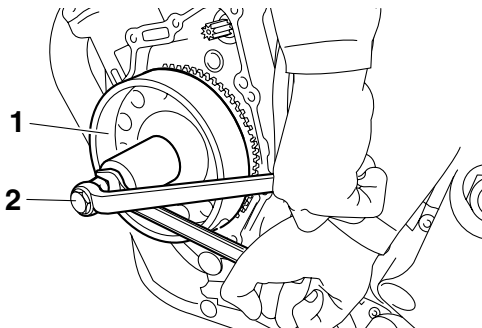
ECA13880

### CAUTION:

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set's center bolt and the crankshaft.



**Flywheel puller**  
**90890-01404**  
**Flywheel puller**  
**YM-01404**



EAS24570

## CHECKING THE STARTER CLUTCH

### 1. Check:

- Starter clutch rollers

Damage/wear → Replace.

### 2. Check:

- Starter clutch idle gear
- Starter clutch gear  
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.

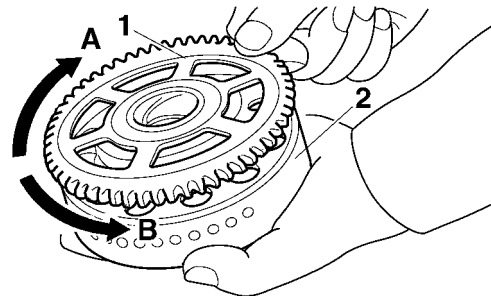
### 4. Check:

- Starter clutch operation

a. Install the starter clutch gear “1” onto the generator rotor “2” and hold the generator rotor.

b. When turning the starter clutch gear clockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.

c. When turning the starter clutch gear counterclockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.



EAS24600

## INSTALLING THE STARTER CLUTCH

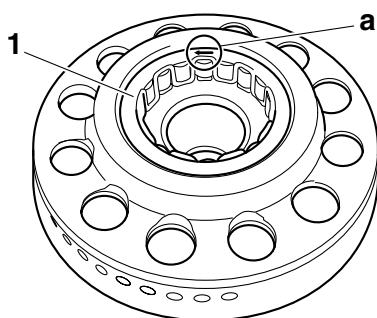
### 1. Install:

- Starter clutch “1”

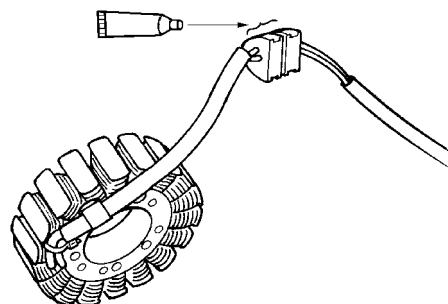
### NOTE:

Be sure to install the starter clutch so that its side with the arrow mark “a” is facing inward, away from the rotor.

# GENERATOR AND STARTER CLUTCH



Yamaha bond No. 1215  
90890-85505  
(Three Bond No.1215®)



EAS24500

## INSTALLING THE GENERATOR

### 1. Install:

- Generator rotor
- Washer **New**
- Generator rotor bolt

### NOTE:

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- Lubricate the generator rotor bolt threads and washer mating surfaces with engine oil.

### 2. Tighten:

- Generator rotor bolt "1"



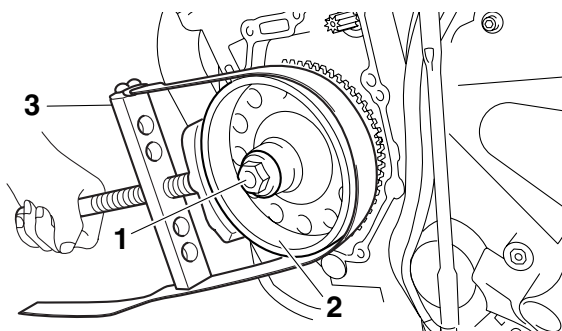
**Generator rotor bolt**  
**70 Nm (7.0 m·kg, 52 ft·lb)**

### NOTE:

While holding the generator rotor "2" with the sheave holder "3", tighten the generator rotor bolt.



**Sheave holder**  
**90890-01701**  
**Primary clutch holder**  
**YS-01880-A**



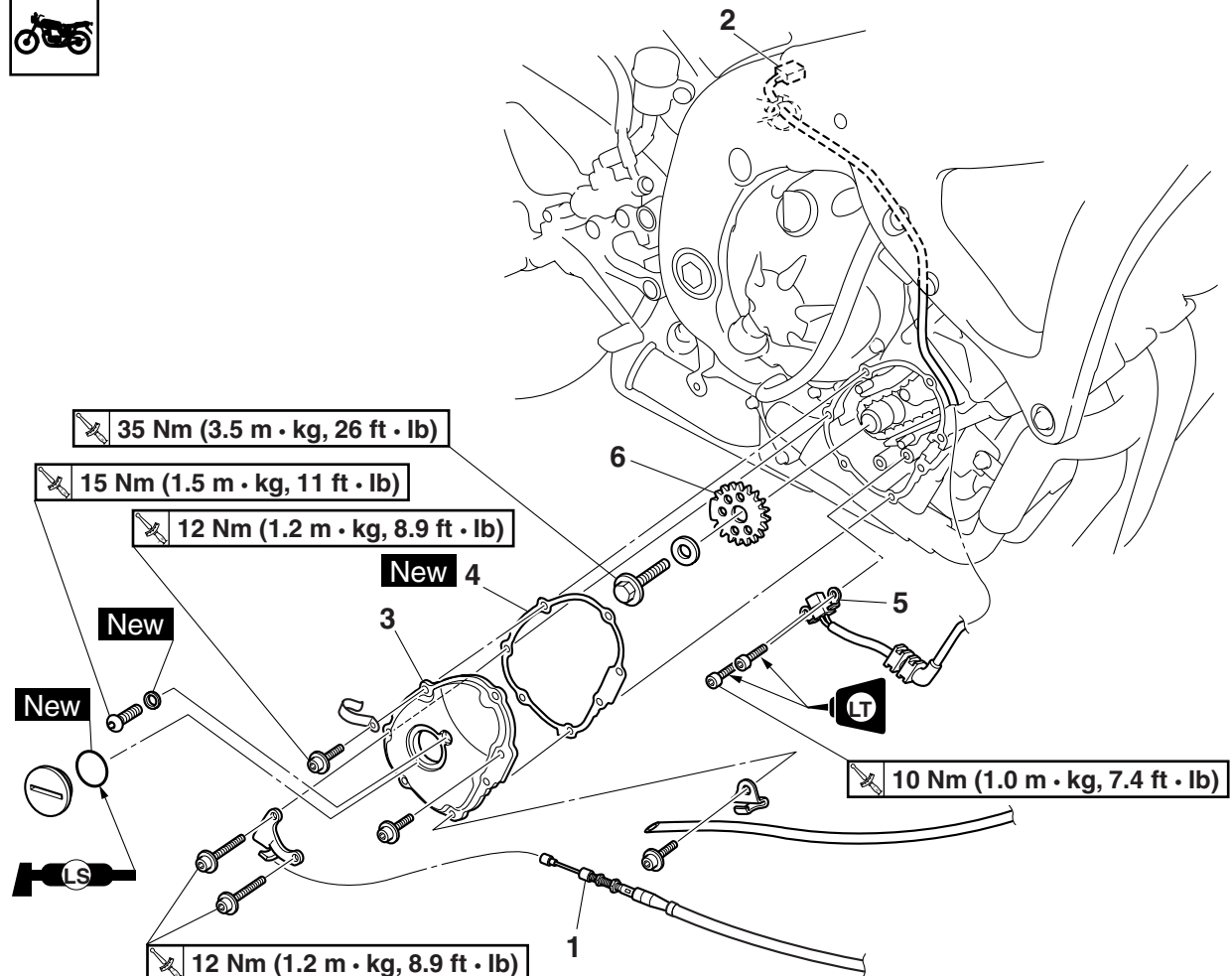
### 3. Apply:

- Sealant  
(onto the stator coil assembly lead grommet)

EAS24520

## PICKUP ROTOR

### Removing the pickup rotor



Order	Job/Parts to remove	Q'ty	Remarks
	Side cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Generator cover		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-26.
1	Clutch cable	1	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Pickup rotor cover	1	
4	Pickup rotor cover gasket	1	
5	Crankshaft position sensor	1	
6	Pickup rotor	1	
			For installation, reverse the removal procedure.

EAS24530

## REMOVING THE PICKUP ROTOR

### 1. Remove:

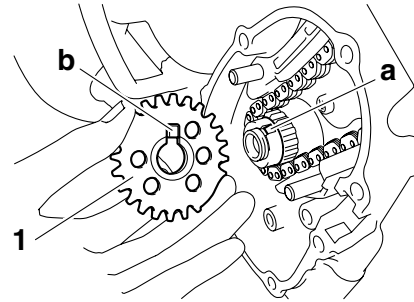
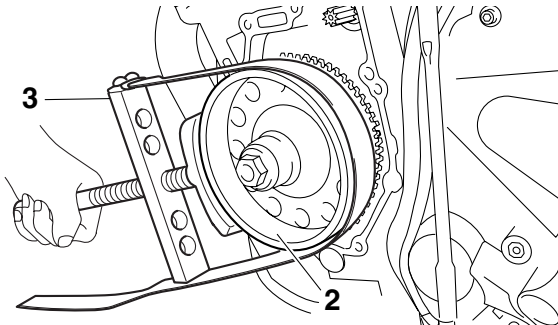
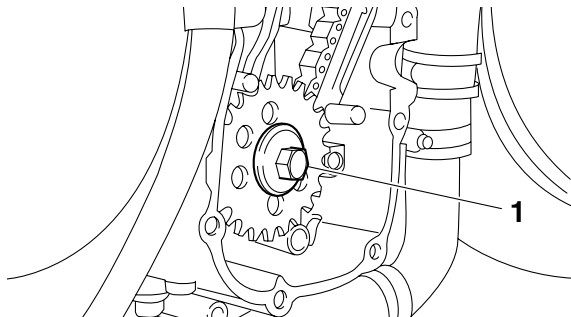
- Pickup rotor bolt "1"
- Washer
- Pickup rotor

### NOTE:

While holding the generator rotor "2" with the rotor sheave holder "3", loosen the pickup rotor bolt.

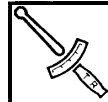


**Sheave holder**  
**90890-01701**  
**Primary clutch holder**  
**YS-01880-A**



### 2. Tighten:

- Pickup rotor bolt "1"



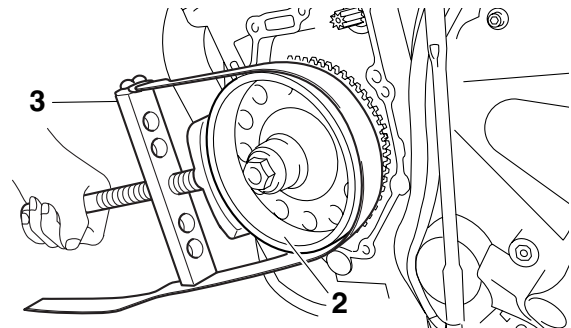
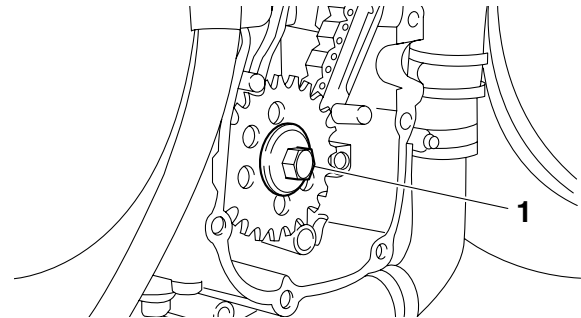
**Pickup coil rotor bolt**  
**35 Nm (3.5 m·kg, 26 ft·lb)**

### NOTE:

While holding the generator rotor "2" with the sheave holder "3", tighten the pickup rotor bolt.



**Sheave holder**  
**90890-01701**  
**Primary clutch holder**  
**YS-01880-A**



EAS24540

## INSTALLING THE PICKUP ROTOR

### 1. Install:

- Pickup rotor "1"
- Washer
- Pickup rotor bolt

### NOTE:

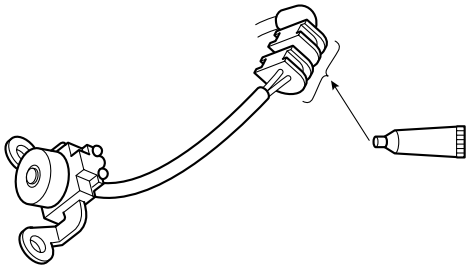
When installing the pickup rotor, align the groove "a" in the crankshaft with the projection "b" on the pickup rotor.

### 3. Apply:

- Sealant  
(onto the crankshaft position sensor lead grommet)



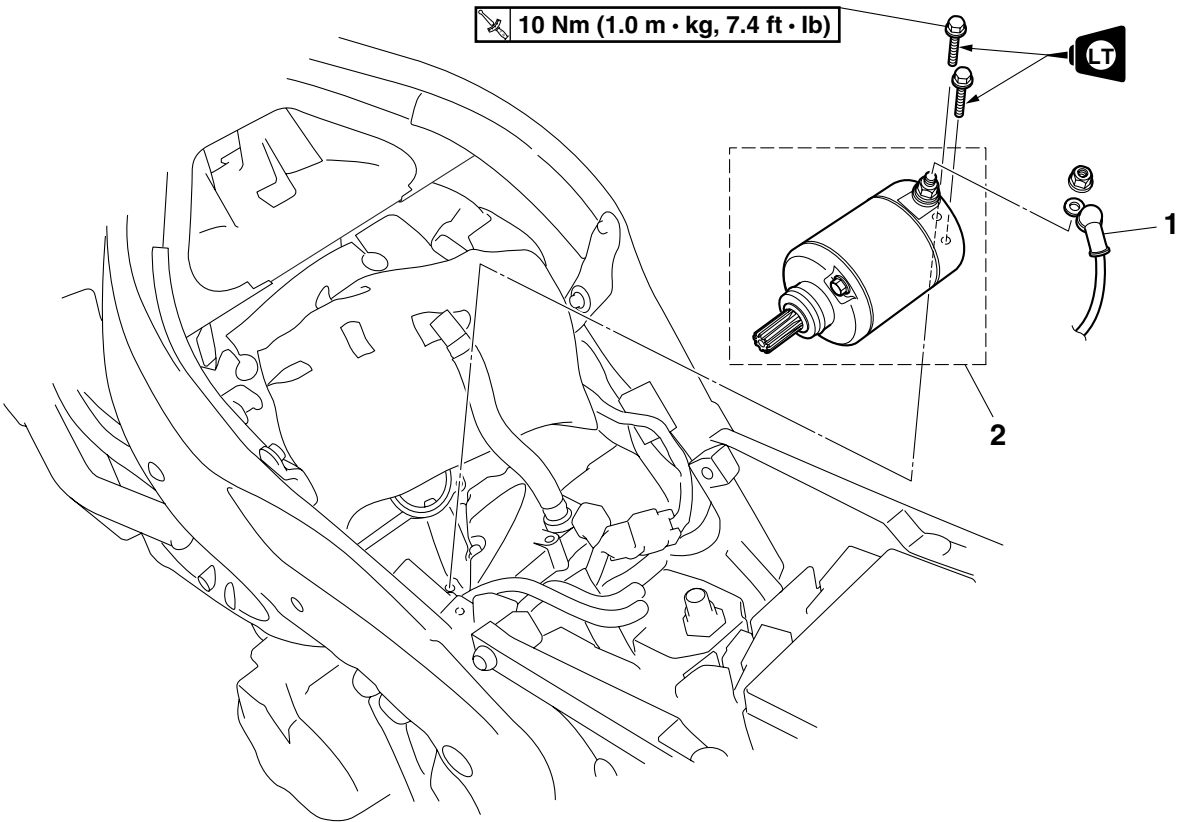
**Yamaha bond No. 1215**  
**90890-85505**  
**(Three Bond No.1215®)**



EAS24780

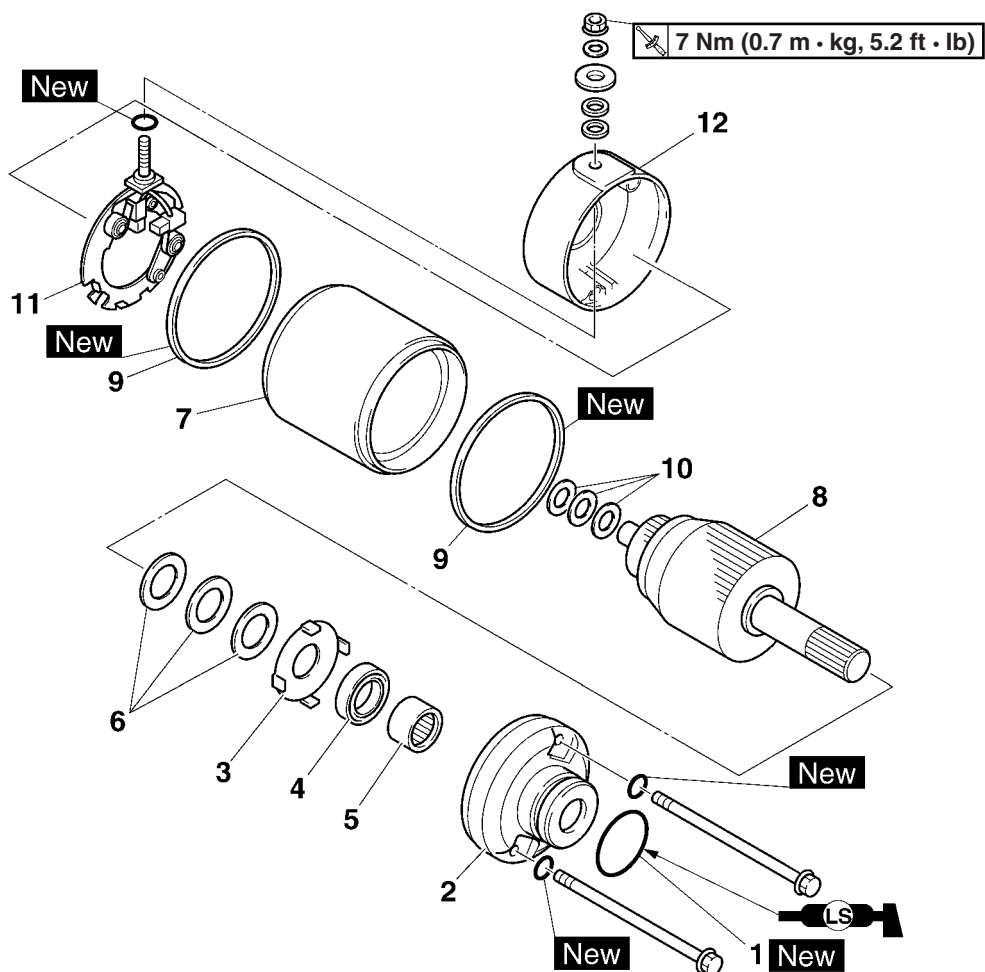
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Thermostat		Refer to "THERMOSTAT" on page 6-6.
1	Starter motor lead	1	
2	Starter motor assembly	1	
			For installation, reverse the removal procedure.

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	O-ring	1	
2	Starter motor front cover	1	
3	Lock washer	1	
4	Oil seal	1	
5	Bearing	1	
6	Washer set	1	
7	Starter motor yoke	1	
8	Armature assembly	1	
9	Gasket	2	
10	Washer set	2	
11	Brush holder (along with the brushes)	1	
12	Starter motor rear cover	1	
			For assembly, reverse the disassembly procedure.

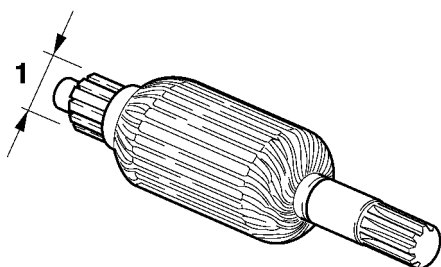
EAS24790

## CHECKING THE STARTER MOTOR

1. Check:
  - Commutator  
Dirt → Clean with 600 grit sandpaper.
2. Measure:
  - Commutator diameter “1”  
Out of specification → Replace the starter motor.



**Limit**  
**27.0 mm (1.06 in)**



3. Measure:
  - Mica undercut “a”  
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



**Mica undercut (depth)**  
**0.70 mm (0.03 in)**

### NOTE:

The mica of the commutator must be undercut to ensure proper operation of the commutator.



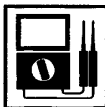
4. Measure:
  - Armature assembly resistances (commutator and insulation)  
Out of specification → Replace the starter motor.



- a. Measure the armature assembly resistances with the pocket tester.

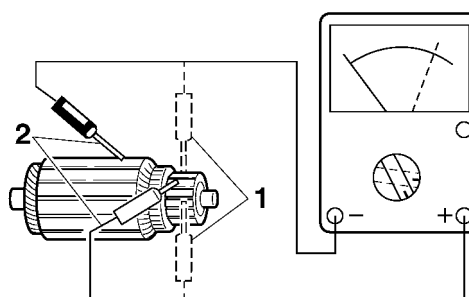


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**



**Armature coil**  
**Commutator resistance “1”**  
**0.0012–0.0022 Ω at 20 °C (68 °F)**  
**Insulation resistance “2”**  
**Above 1 MΩ at 20 °C (68 °F)**

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

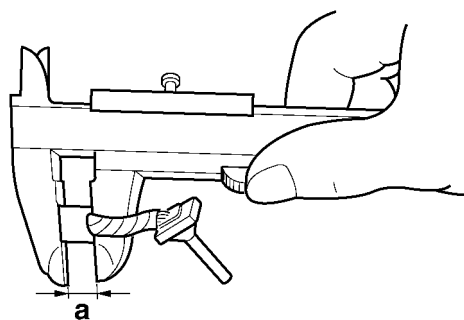


5. Measure:

- Brush length “a”  
Out of specification → Replace the brushes as a set.



**Limit**  
**3.50 mm (0.14 in)**

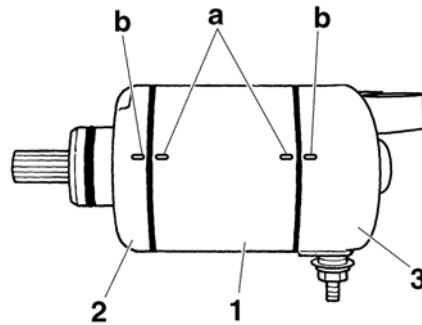
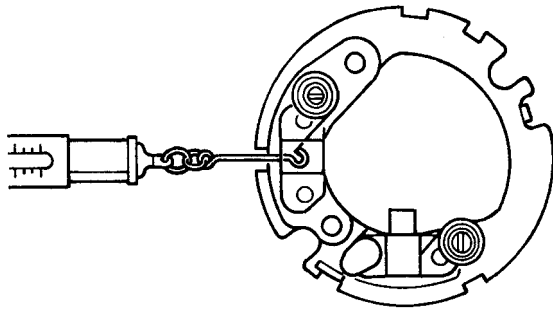


6. Measure:

- Brush spring force  
Out of specification → Replace the brush springs as a set.



**Brush spring force**  
**7.16–9.52 N (25.77–34.27 oz)**  
**(730–971 gf)**



7. Check:
  - Gear teethDamage/wear → Replace the gear.
8. Check:
  - Bearing
  - Oil sealDamage/wear → Replace the defective part(s).

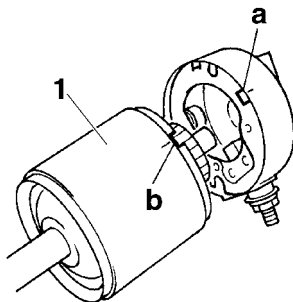
EAS24800

## ASSEMBLING THE STARTER MOTOR

1. Install:
  - Starter motor yoke "1"

### NOTE:

Align the tab "a" on the brush holder with the slot "b" in the starter motor yoke.

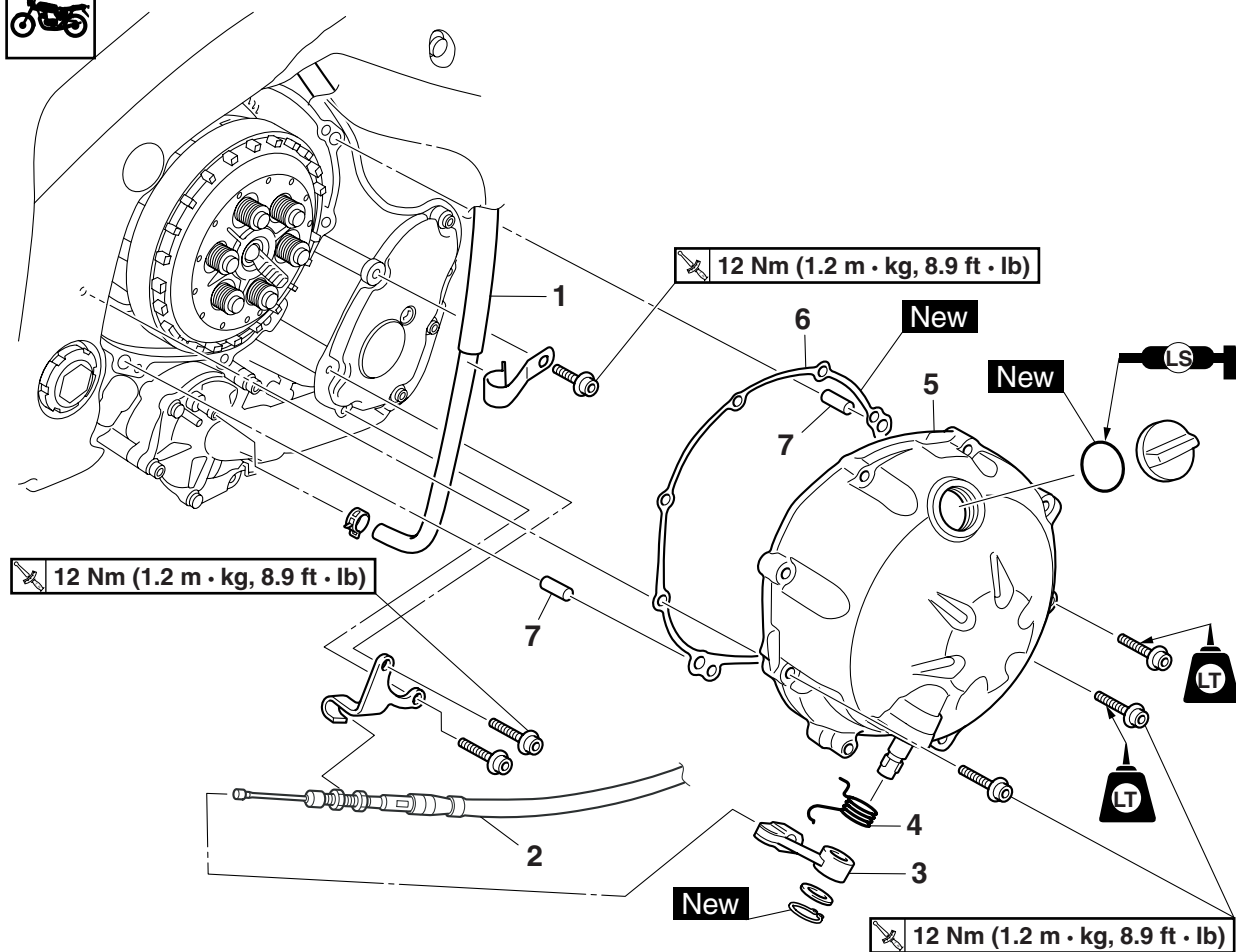


2. Install:
  - Starter motor yoke "1"
  - Starter motor front cover "2"
  - Starter motor rear cover "3"

### NOTE:

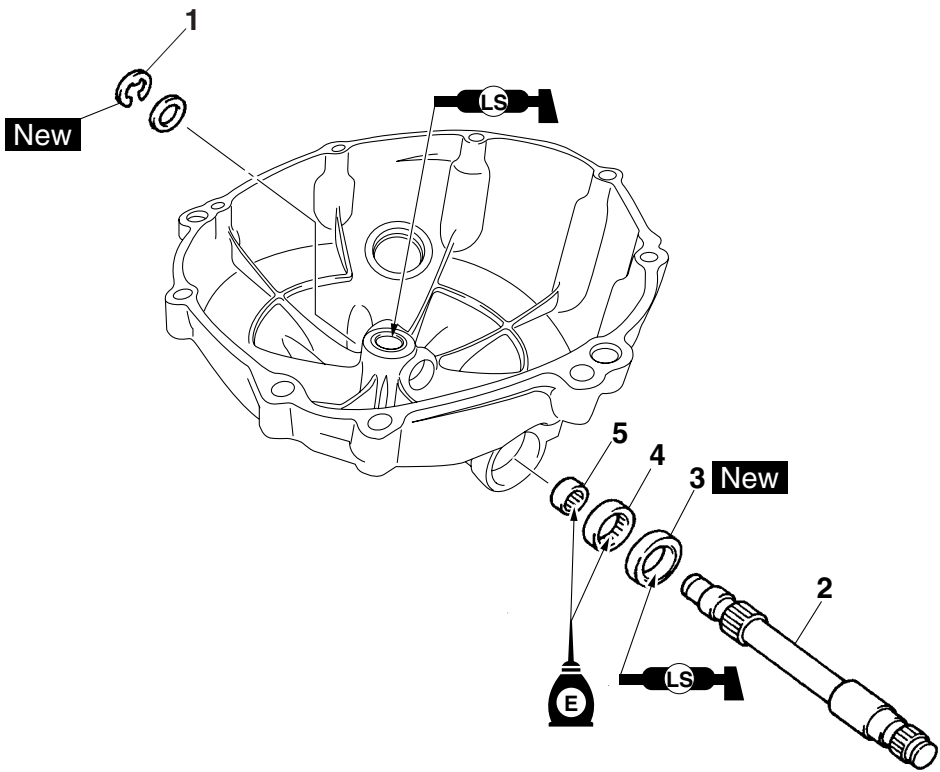
Align the match marks "a" on the starter motor yoke with the match marks "b" on the front and starter motor rear covers.

EAS25060

**CLUTCH****Removing the clutch cover**

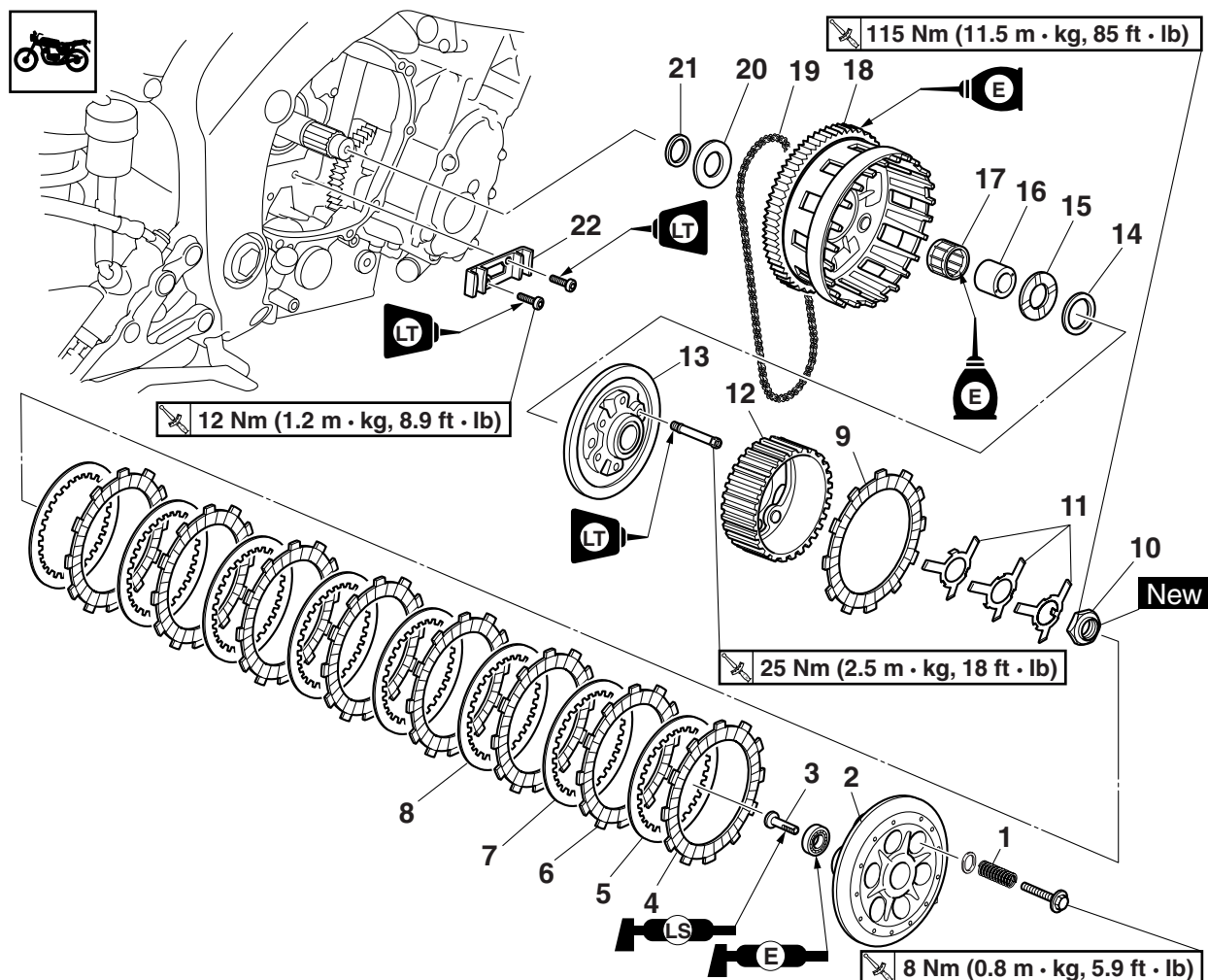
Order	Job/Parts to remove	Q'ty	Remarks
	Side cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-11.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Water pump breather hose	1	Disconnect.
2	Clutch cable	1	Disconnect.
3	Pull lever	1	
4	Pull lever spring	1	
5	Clutch cover	1	
6	Clutch cover gasket	1	
7	Dowel pin	2	
			For installation, reverse the removal procedure.

Removing the pull lever shaft



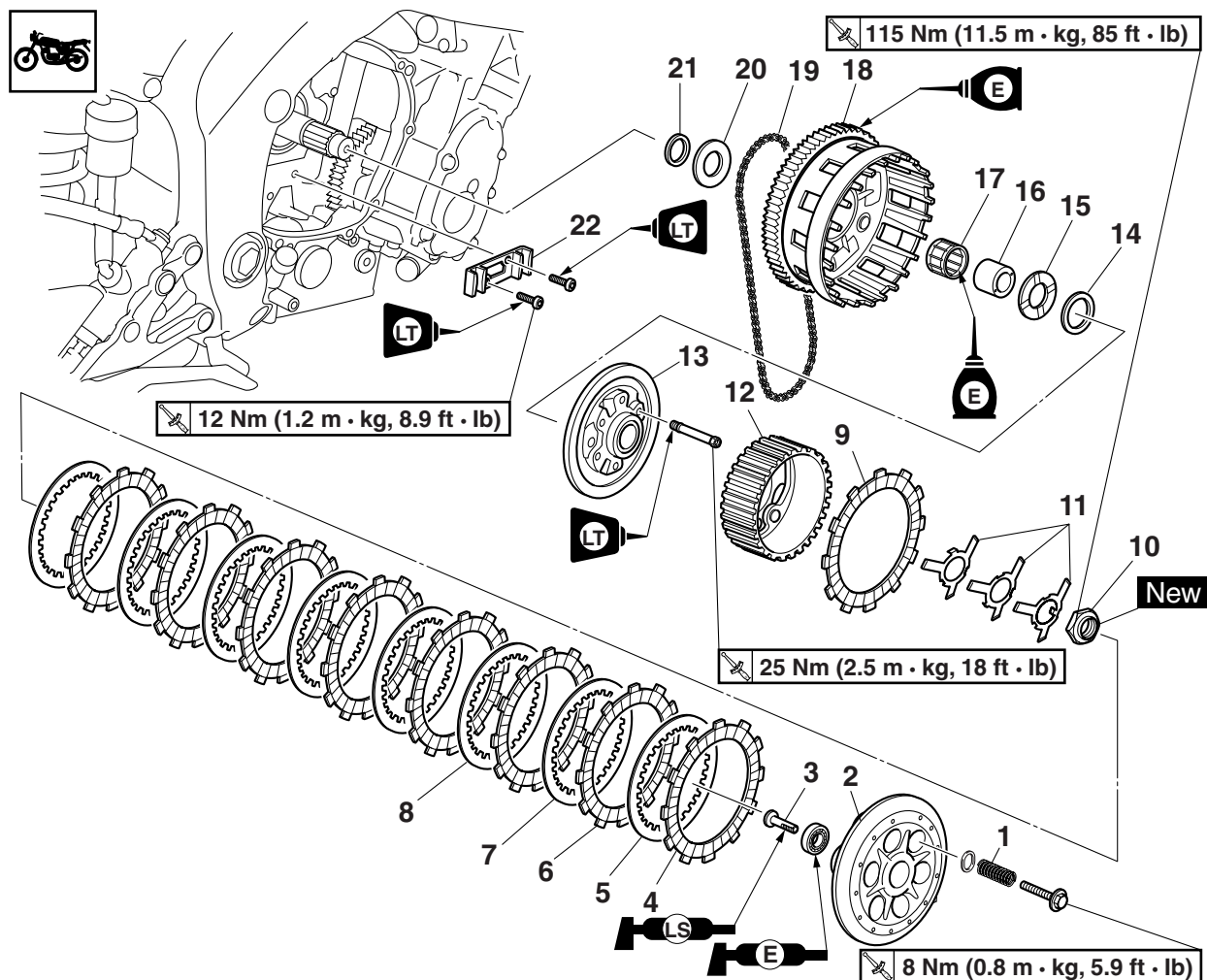
Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Pull lever shaft	1	
3	Oil seal	1	
4	Bearing	1	
5	Bearing	1	
			For installation, reverse the removal procedure.

## Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Oil strainer		Refer to "OIL PUMP" on page 5-48.
	Water pump		Refer to "WATER PUMP" on page 6-8.
1	Clutch spring	6	
2	Pressure plate	1	
3	Pull rod	1	
4	Friction plate 1	1	brown painting
5	Clutch plate 1	1	
6	Friction plate 2	7	black painting
7	Clutch plate 2	1	
8	Clutch plate 3	6	
9	Friction plate 3	1	purple painting
10	Clutch boss nut	1	
11	Spring	3	
12	Clutch boss	1	
13	Clutch boss plate	1	
14	Washer	1	
15	Thrust washer 1	1	
16	Spacer	1	
17	Bearing	1	
18	Clutch housing	1	

## Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
19	Oil pump drive chain	1	
20	Thrust washer 2	1	
21	Thrust washer 3	1	
22	Oil pump drive chain guide	1	
			For installation, reverse the removal procedure.

EAS25070

## REMOVING THE CLUTCH

### 1. Remove:

- Oil strainer  
Refer to "OIL PUMP" on page 5-48.
- Water pump  
Refer to "WATER PUMP" on page 6-8.
- Friction plates
- Clutch plates

### NOTE:

Be sure to mark the friction plates and clutch plates or note the position of each part so that they are installed in their original positions.

### 2. Loosen:

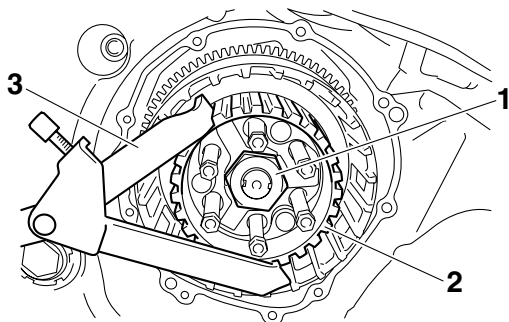
- Clutch boss nut "1"

### NOTE:

While holding the clutch boss "2" with the universal clutch holder "3", loosen the clutch boss nut.



**Universal clutch holder**  
**90890-04086**  
**YM-91042**

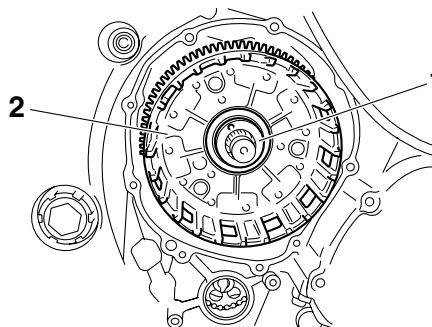


### 3. Remove:

- Spacer "1"
- Bearing
- Clutch housing "2"
- Oil pump drive chain

### NOTE:

Remove the spacer and bearing from the main axle, then remove the oil pump drive chain from the oil pump driven sprocket, and then remove the clutch housing and oil pump drive chain from the main axle.



EAS25100

## 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:

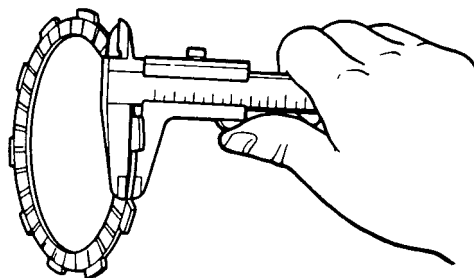
- Friction plate thickness  
Out of specification → Replace the friction plates as a set.

### NOTE:

Measure the friction plate at four places.



**Friction plate thickness**  
**2.92–3.08 mm (0.115–0.121 in)**  
**Wear limit**  
**2.80 mm (0.1102 in)**



EAS25110

## CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

### 1. Check:

- Clutch plate  
Damage → Replace the clutch plates as a set.

### 2. Measure:

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



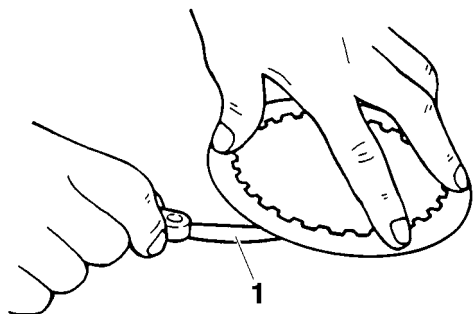
**Thickness gauge**  
90890-03180  
**Feeler gauge set**  
YU-26900-9



**Clutch plate thickness**  
1.90–2.10 mm (0.075–0.083 in)  
**Warpage limit**  
0.10 mm (0.0039 in)

**NOTE:**

The clutch plate thickness specification listed above is for the plates with the standard thickness only. If a clutch plate with one of the other two plate thicknesses is installed, use 1.50–1.70 mm (0.059–0.067 in) or 2.20–2.40 mm (0.086–0.094 in) for the specification according to the plate.

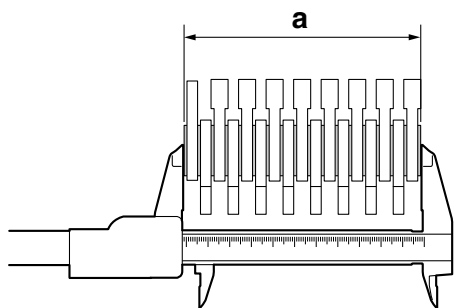


## 3. Measure:

- Total width “a” of the friction plates and clutch plates
- Out of specification → Adjust.



**Total width of the friction plates and clutch plates**  
42.4–43.0 mm (1.67–1.69 in)



- Adjust the total width by replacing the clutch plate “1” and, if necessary, clutch plate “2”.
- Select the clutch plate from the following table.

**Clutch plate “1”**

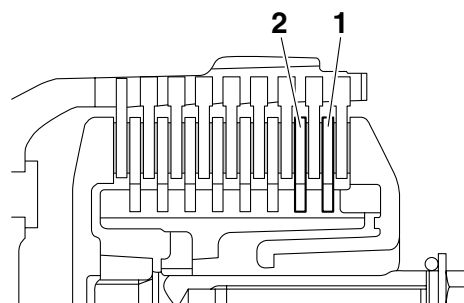
Part No.	Thickness	
168-16325-00	1.6 mm (0.063 in)	
3J2-16324-00	2.0 mm (0.079 in)	STD
168-16324-00	2.3 mm (0.091 in)	

**Clutch plate “2”**

Part No.	Thickness	
3J2-16324-00	2.0 mm (0.079 in)	STD
168-16324-00	2.3 mm (0.091 in)	

**NOTE:**

When adjusting the clutch assembly width (by replacing the clutch plate(s)), be sure to replace the clutch plate “1” first. After replacing the clutch plate “1”, if specifications cannot be met, replace the clutch plate “2”.



EAS25140

**CHECKING THE CLUTCH SPRINGS**

The following procedure applies to all of the clutch springs.

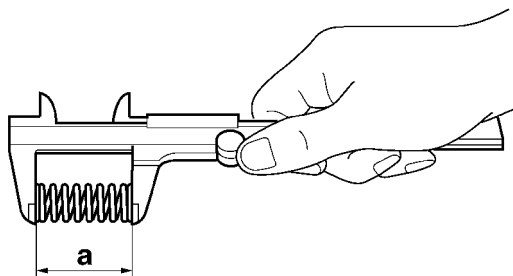
- Check:
  - Clutch spring

Damage → Replace the clutch springs as a set.
- Measure:
  - Clutch spring free length “a”

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



**Clutch spring free length**  
55.00 mm (2.17 in)  
**Minimum length**  
54.00 mm (2.13 in)



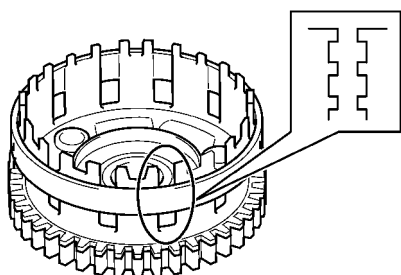
EAS25150

## 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.

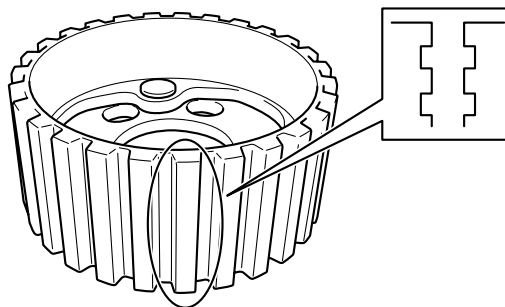
EAS25160

## CHECKING THE CLUTCH BOSS

1. Check:
  - Clutch boss splines  
Damage/pitting/wear → Replace the clutch boss.

### NOTE:

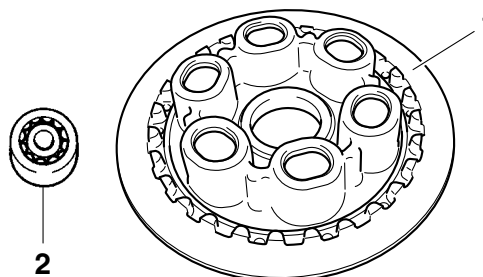
Pitting on the clutch boss splines will cause erratic clutch operation.



EAS25170

## CHECKING THE PRESSURE PLATE

1. Check:
  - Pressure plate "1"  
Cracks/damage → Replace.
  - Bearing "2"  
Damage/wear → Replace.



EAS25200

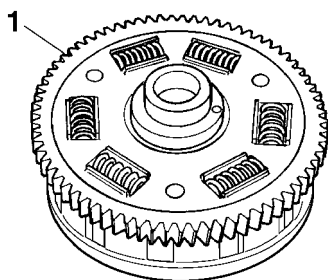
## CHECKING THE PRIMARY DRIVE GEAR

1. Check:
  - Primary drive gear  
Damage/wear → Replace the clutch housing and crankshaft as a set.  
Excessive noise during operation → Replace the clutch housing and crankshaft as a set.

EAS25210

## CHECKING THE PRIMARY DRIVEN GEAR

1. Check:
  - Primary driven gear "1"  
Damage/wear → Replace the clutch housing and crankshaft as a set.  
Excessive noise during operation → Replace the clutch housing and crankshaft as a set.



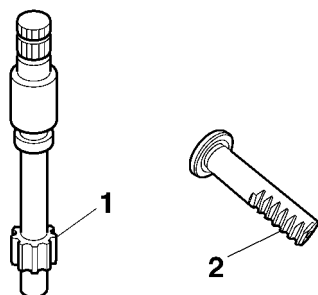
EAS25220

## CHECKING THE PULL LEVER SHAFT AND PULL ROD

### 1. Check:

- Pull lever shaft pinion gear teeth "1"
- Pull rod teeth "2"

Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.



### 2. Check:

- Bearing

Damage/wear → Replace.

ET2C01011

## CHECKING THE OIL PUMP DRIVE SPROCKET AND OIL PUMP DRIVE CHAIN

### 1. Check:

- Oil pump drive sprocket
- Cracks/damage/wear → Replace the clutch housing, oil pump drive chain, and oil pump driven sprocket as a set.

### 2. Check:

- Oil pump drive chain

Damage/stiffness → Replace the clutch housing, oil pump drive chain, and oil pump driven sprocket as a set.

EAS25270

## INSTALLING THE CLUTCH

### 1. Install:

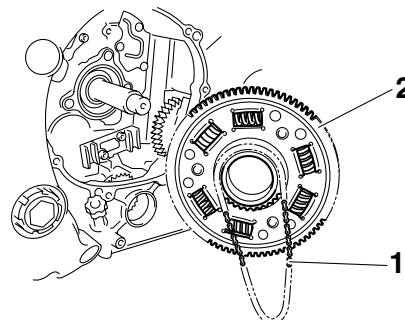
- Oil pump drive chain "1"
- Clutch housing "2"

#### NOTE:

- Install the oil pump drive chain onto the clutch housing, and then install the chain

onto the oil pump driven sprocket while installing the clutch housing onto the main axle.

- Make sure that the oil pump drive chain passes through the oil pump drive chain guide.

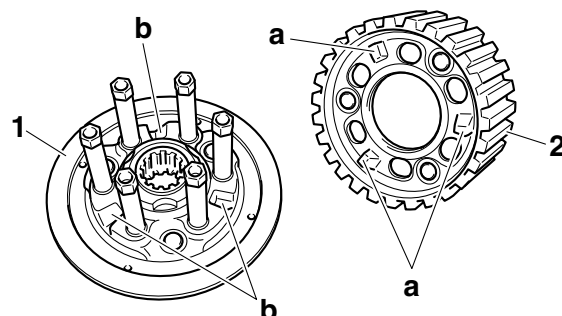


### 2. Install:

- Clutch boss plate "1"
- Clutch boss "2"

#### NOTE:

Fit the projections "a" on the clutch boss into the grooves "b" in the clutch boss plate.

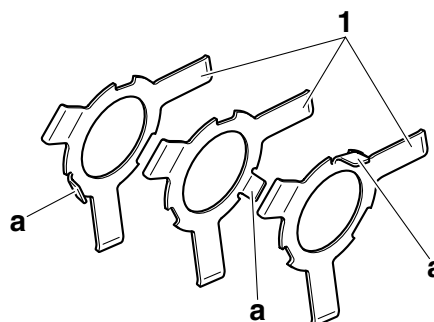


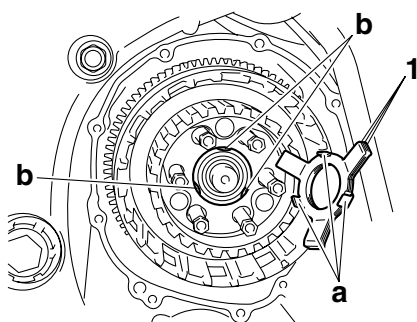
### 3. Install:

- Springs "1"

#### NOTE:

- Stack the springs on top of each other, making sure that the tab "a" on each spring is in a different position.
- Fit the tabs "a" on the springs into the grooves "b" in the clutch boss plate.





## 4. Tighten:

- Clutch boss nut "1" **New**



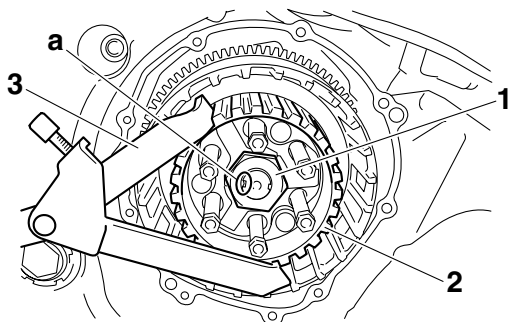
**Clutch boss nut**  
115 Nm (11.5 m·kg, 85 ft·lb)

## NOTE:

- While holding the clutch boss "2" with the universal clutch holder "3", tighten the clutch boss nut.
- Stake the clutch boss nut at a cutout "a" in the main axle.



**Universal clutch holder**  
90890-04086  
YM-91042



## 5. Lubricate:

- Friction plates
- Clutch plates  
(with the recommended lubricant)



**Recommended lubricant**  
Engine oil

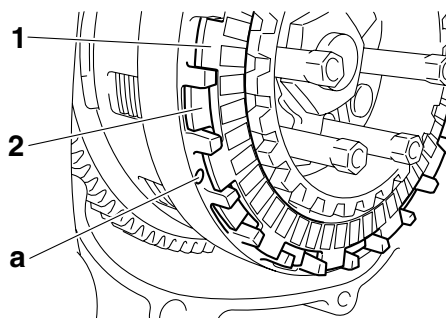
## 6. Install:

- Friction plates
- Clutch plates

## NOTE:

- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Install the last friction plate "1" offset from the other friction plates "2", making sure to align

a projection on the friction plate with the punch mark "a" on the clutch housing.

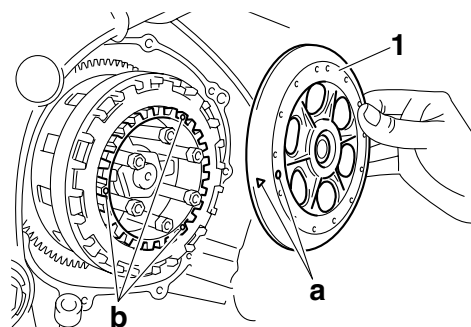


## 7. Install:

- Pressure plate "1"

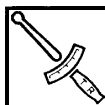
## NOTE:

Align the punch marks "a" in the pressure plate with one of the three punch marks "b" in the clutch boss.



## 8. Install:

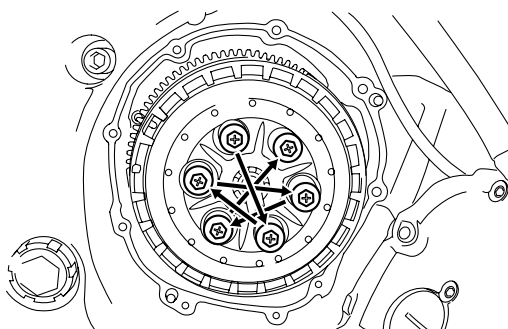
- Seat plate
- Clutch springs
- Clutch spring bolts



**Clutch spring bolt**  
8 Nm (0.8 m·kg, 5.9 ft·lb)

## NOTE:

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



## 9. Install:

- Dowel pins

- Clutch cover gasket **New**
- Clutch cover “1”

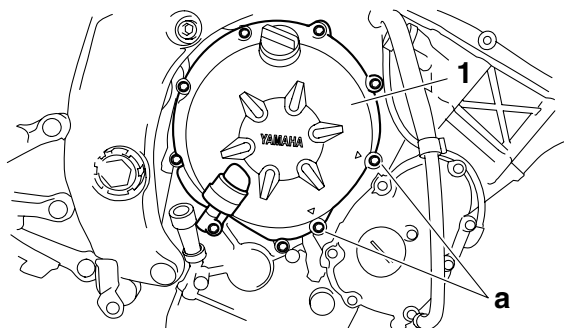
Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-14.



**Clutch cover bolt**  
**12 Nm (1.2 m·kg, 8.9 ft·lb)**

**NOTE:**

- Position the pull rod so that the teeth “a” face towards the rear of the vehicle. Then, install the clutch cover.
- Apply locking agent (LOCTITE®) to the threads of only the clutch cover bolts “a” shown in the illustration.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

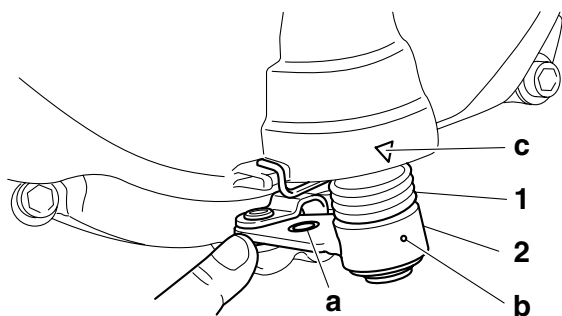


**10. Install:**

- Pull lever spring “1”
- Pull lever “2”
- Washer
- Circlip **New**

**NOTE:**

- Make sure that the mark “a” on the pull lever is facing up.
- When installing the pull lever, push it and check that its punch mark “b” aligns with the mark “c” on the clutch cover. Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.



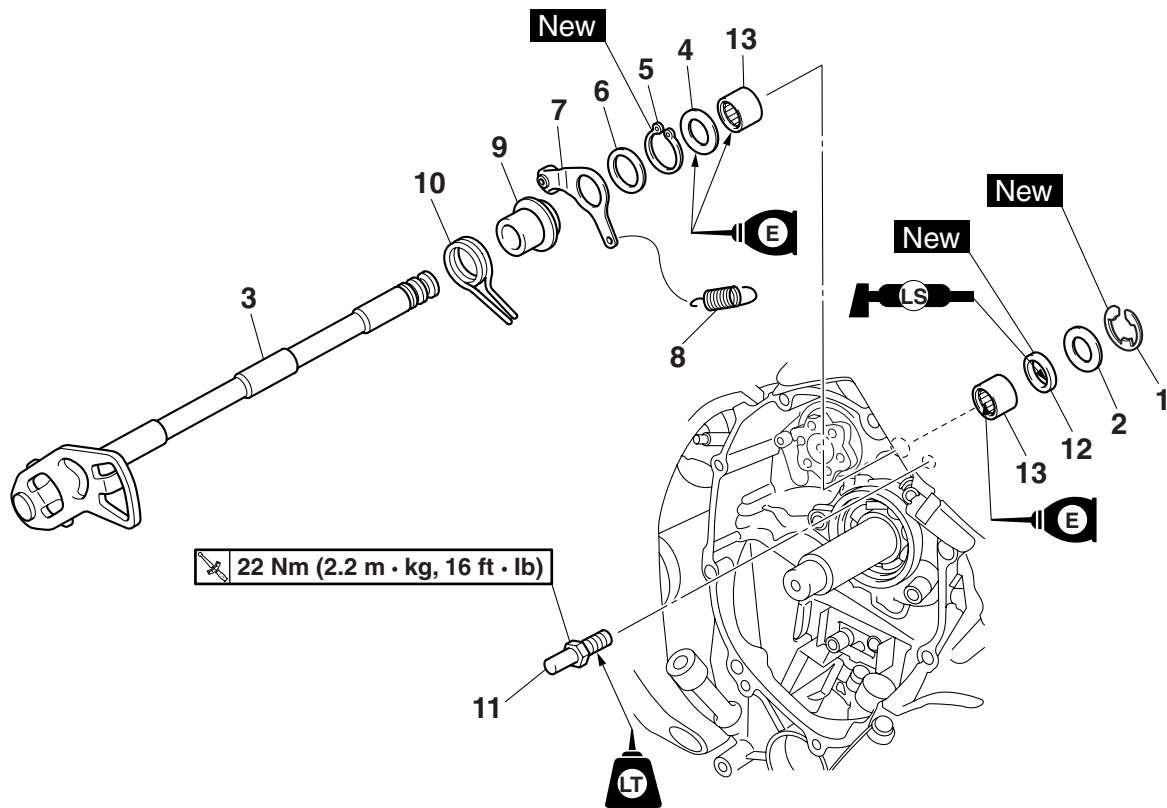
**11. Adjust:**

- Clutch cable free play

EAS25410

SHIFT SHAFT

Removing the shift shaft and stopper lever



Order	Job/Parts to remove	Q'ty	Remarks
	Shift arm		Refer to "ENGINE REMOVAL" on page 5-1.
	Clutch housing		Refer to "CLUTCH" on page 5-36.
1	Circlip	1	
2	Washer	1	
3	Shift shaft	1	
4	Washer	1	
5	Circlip	1	
6	Washer	1	
7	Stopper lever	1	
8	Stopper lever spring	1	
9	Spacer	1	
10	Shift shaft spring	1	
11	Shift shaft spring stopper	1	
12	Oil seal	1	
13	Bearing	2	
			For installation, reverse the removal procedure.

EAS25420

## CHECKING THE SHIFT SHAFT

1. Check:
  - Shift shaft  
Bends/damage/wear → Replace.
  - Shift shaft spring  
Damage/wear → Replace.

EAS25430

## CHECKING THE STOPPER LEVER

1. Check:
  - Stopper lever  
Bends/damage → Replace.  
Roller turns roughly → Replace the stopper lever.
  - Stopper lever spring  
Damage/wear → Replace.

EAS25450

## INSTALLING THE SHIFT SHAFT

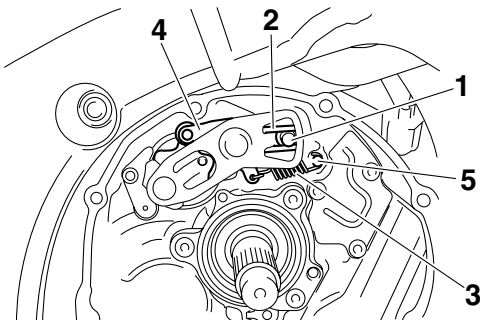
1. Install:
  - Shift shaft spring stopper “1”
  - Shift shaft assembly
  - Shift shaft spring “2”



**Shift shaft spring stopper**  
**22 Nm (2.2 m·kg, 16 ft·lb)**  
**LOCTITE®**

### NOTE:

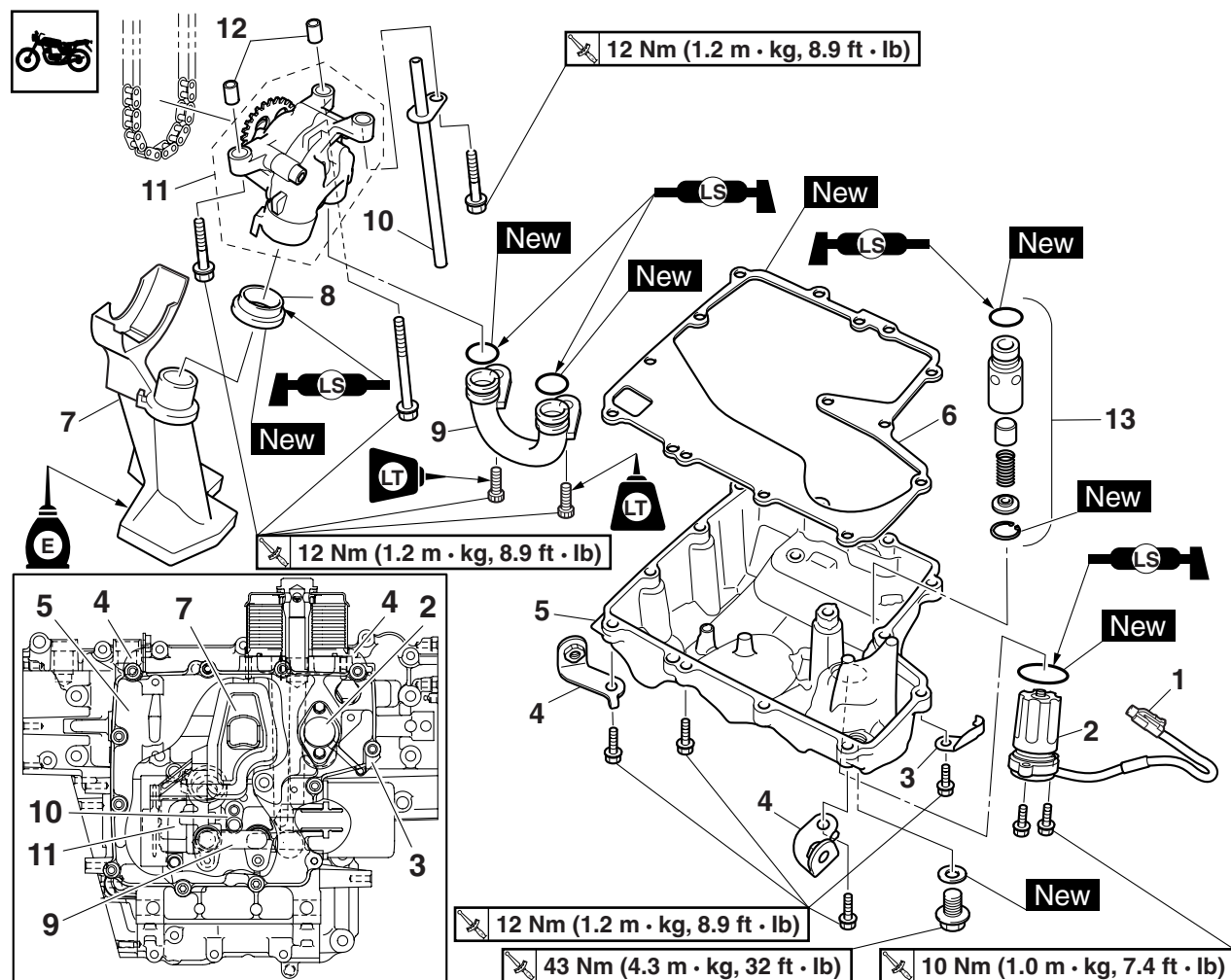
- Lubricate the oil seal lips with lithium-soap-based grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper.
- Hook the ends of the stopper lever spring “3” onto the stopper lever “4” and the crankcase boss “5”.
- Mesh the stopper lever with the shift drum segment assembly.



EAS24920

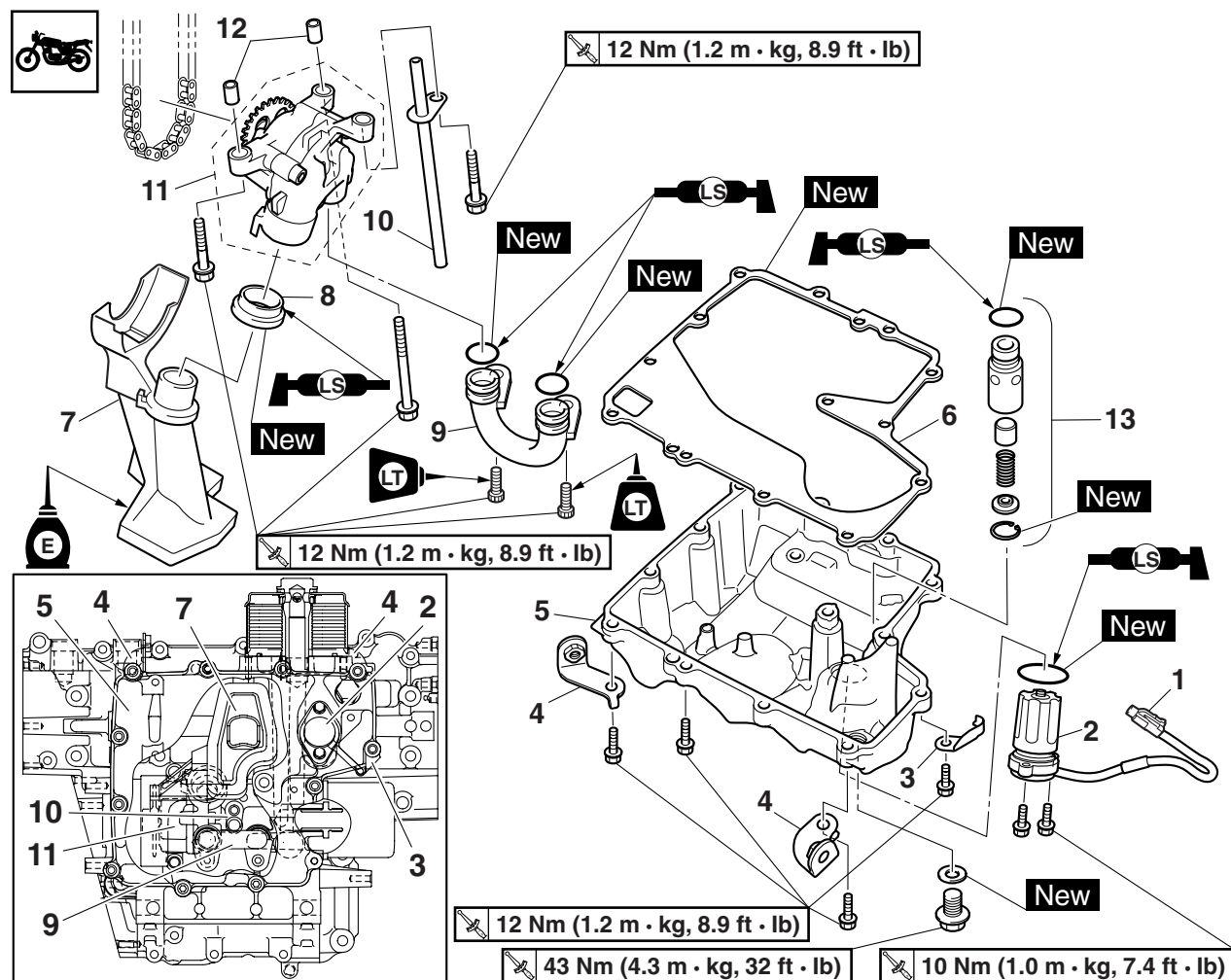
## OIL PUMP

## Removing the oil pan and oil pump



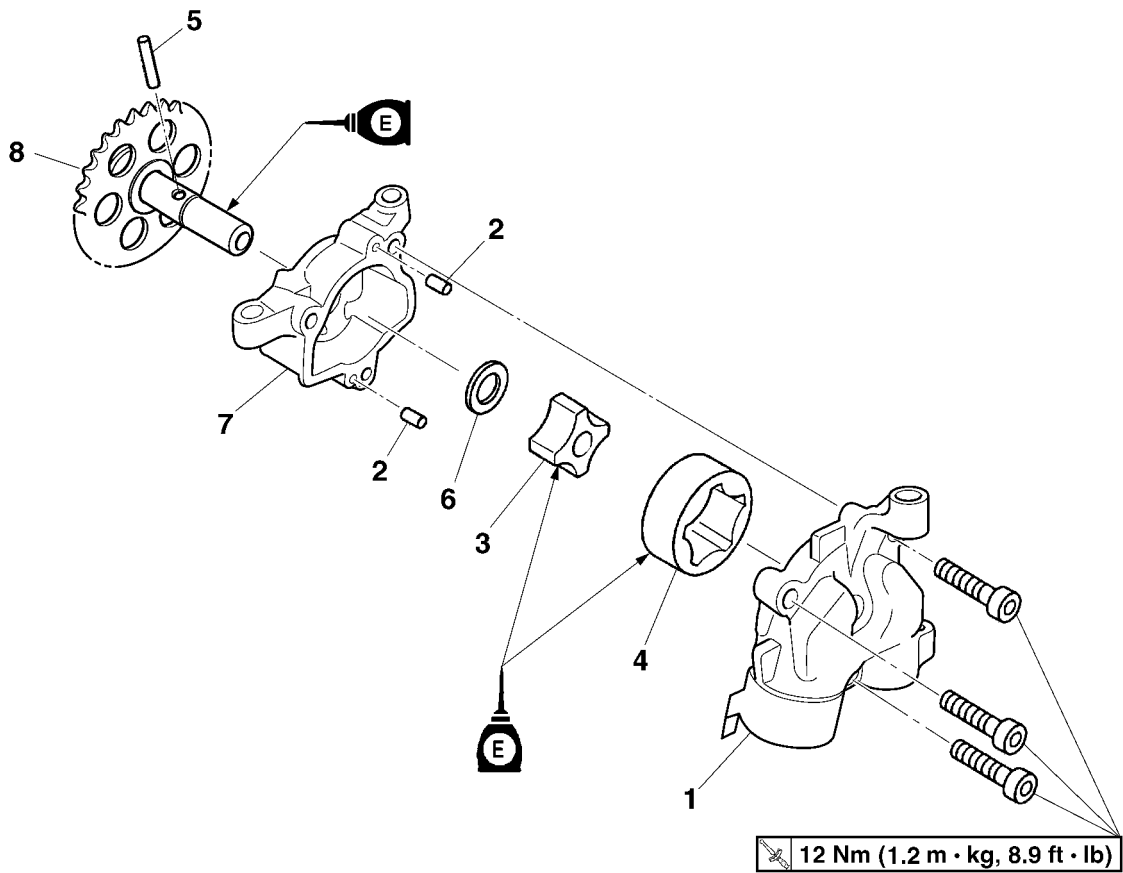
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-11.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
	Exhaust pipe assembly		Refer to "ENGINE REMOVAL" on page 5-1.
	Water pump		Refer to "WATER PUMP" on page 6-8.
	Clutch housing		Refer to "CLUTCH" on page 5-36.
1	Oil level switch coupler	1	Disconnect.
2	Oil level switch	1	
3	Oil level switch lead holder	1	
4	Bottom cowl bracket	2	
5	Oil pan	1	
6	Oil pan gasket	1	
7	Oil strainer	1	
8	Oil strainer gasket	1	
9	Oil pipe	1	
10	Ventilation chamber oil drain pipe	1	

## Removing the oil pan and oil pump



Order	Job/Parts to remove	Q'ty	Remarks
11	Oil pump assembly	1	
12	Dowel pin	2	
13	Relief valve assembly	1	
			For installation, reverse the removal procedure.

Disassembling the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
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	
7	Oil pump housing	1	
8	Oil pump driven sprocket	1	
			For assembly, reverse the disassembly procedure.

EAS24930

## REMOVING THE OIL PAN

1. Remove:
  - Oil level switch lead holder
  - Bottom cowling brackets
  - Oil pan
  - Oil pan gasket

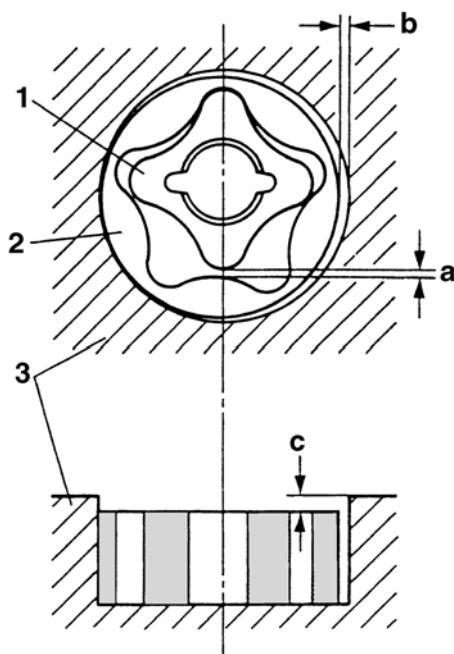
### NOTE:

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.

EAS24960

## CHECKING THE OIL PUMP

1. Check:
  - Oil pump driven sprocket
  - Oil pump housing
  - Oil pump housing cover
 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 "b"
  - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance "c"
 Out of specification → Replace the oil pump.



1. Inner rotor
2. Outer rotor
3. Oil pump housing



### Inner-rotor-to-outer-rotor-tip clearance

Less than 0.12 mm (less than 0.0047 in)

### Limit

0.20 mm (0.0079 in)

### Outer-rotor-to-oil-pump-housing clearance

0.090–0.150 mm (0.0035–0.0059 in)

### Limit

0.220 mm (0.0087 in)

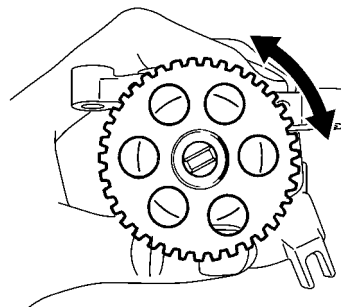
### Oil-pump-housing-to-inner-and-outer-rotor clearance

0.06–0.11 mm (0.0024–0.0043 in)

### Limit

0.18 mm (0.0071 in)

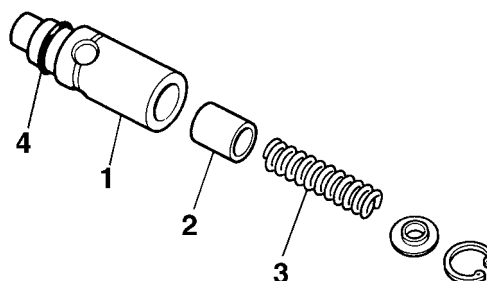
3. Check:
  - Oil pump operation
 Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS24970

## CHECKING THE RELIEF VALVE

1. Check:
  - Relief valve body "1"
  - Relief valve "2"
  - Spring "3"
  - O-ring "4"
 Damage/wear → Replace the defective part(s).



EAS24980

## CHECKING THE OIL PIPES

The following procedure applies to all of the oil delivery pipes.

1. Check:
  - Ventilation chamber oil drain pipe
  - Oil pipe
    - Damage → Replace.
    - Obstruction → Wash and blow out with compressed air.

EAS24990

## CHECKING THE OIL STRAINER

1. Check:
  - Oil strainer
    - Damage → Replace.
    - Contaminants → Clean with solvent.

EAS25010

## ASSEMBLING THE OIL PUMP

1. Lubricate:
  - Inner rotor
  - Outer rotor
  - Oil pump shaft
    - (with the recommended lubricant)

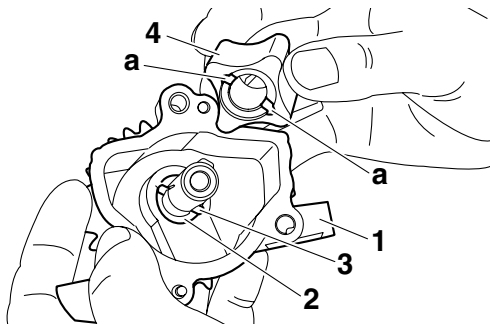


**Recommended lubricant**  
**Engine oil**

2. Install:
  - Oil pump driven sprocket
  - Oil pump housing “1”
  - Washer “2”
  - Pin “3”
  - Oil pump inner rotor “4”
  - Oil pump outer rotor

### NOTE:

When installing the inner rotor, align the pin “3” in the oil pump shaft with the groove “a” in the inner rotor “4”.

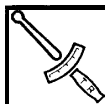


3. Check:
  - Oil pump operation
    - Refer to “CHECKING THE OIL PUMP” on page 5-51.

EAS25050

## INSTALLING THE OIL PAN

1. Install:
  - Oil pan gasket **New**
  - Oil pan
  - Bottom cowling brackets
  - Oil level switch lead holder



**Oil pan bolt**  
**12 Nm (1.2 m·kg, 8.9 ft·lb)**

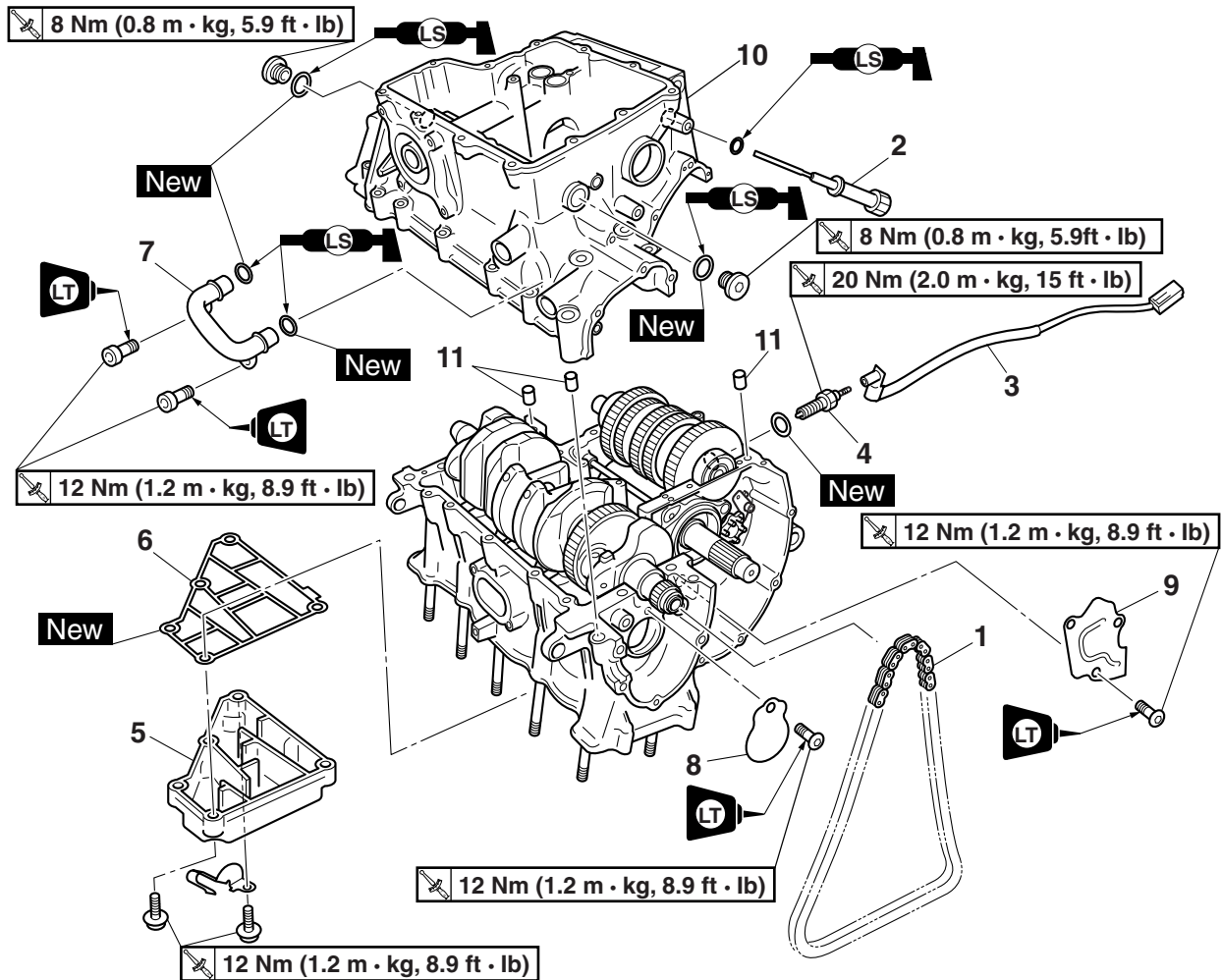
### NOTE:

Tighten the oil pan bolts in stages and in a crisscross pattern.

EAS25540

## CRANKCASE

### Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
	Starter clutch		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-26.
	Shift shaft		Refer to "SHIFT SHAFT" on page 5-46.
	Pickup rotor		Refer to "PICKUP ROTOR" on page 5-29.
	Oil pump drive chain guide		Refer to "CLUTCH" on page 5-36.
	Oil pump assembly		Refer to "OIL PUMP" on page 5-48.
1	Timing chain	1	
2	Dipstick	1	
3	Neutral switch lead	1	
4	Neutral switch	1	
5	Ventilation chamber cover	1	
6	Ventilation chamber cover gasket	1	
7	Oil pipe	1	
8	Oil baffle plate 1	1	
9	Oil baffle plate 2	1	
10	Lower crankcase	1	
11	Dowel pin	3	

Separating the crankcase

Diagram illustrating the separation of the crankcase, showing various components and their removal steps with torque specifications:

- 8 Nm (0.8 m · kg, 5.9 ft · lb)
- 8 Nm (0.8 m · kg, 5.9 ft · lb)
- 20 Nm (2.0 m · kg, 15 ft · lb)
- 12 Nm (1.2 m · kg, 8.9 ft · lb)
- 12 Nm (1.2 m · kg, 8.9 ft · lb)
- 12 Nm (1.2 m · kg, 8.9 ft · lb)
- 12 Nm (1.2 m · kg, 8.9 ft · lb)

Components labeled as 'New' include:

- 7
- 11
- 6
- 5
- 8
- 4
- 9

Other components shown include:

- 10
- 2
- 11
- 3
- 1

Order	Job/Parts to remove	Q'ty	Remarks
			For installation, reverse the removal procedure.

EAS25550

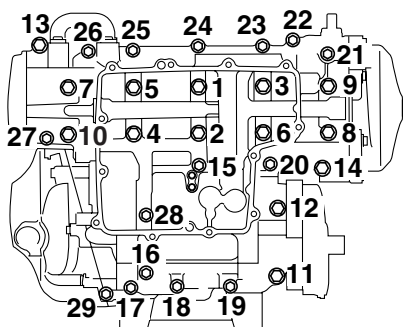
## DISASSEMBLING THE CRANKCASE

1. Place the engine upside down.
2. Remove:
  - Crankcase bolts

### NOTE:

- Loosen each bolt 1/4 of a turn at a time. 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.

- M8 × 115 mm bolts: “8”, “9”
- M8 × 85 mm bolts: “1”–“7”, “10”
- M8 × 65 mm bolts: “11”, “12”
- M6 × 80 mm bolt: “28”
- M6 × 65 mm shoulder bolts: “13”, “14”
- M6 × 65 mm bolts: “16”, “20”, “21”
- M6 × 55 mm bolts: “15”, “22”–“27”
- M6 × 45 mm bolts: “17”–“19”
- M6 × 30 mm bolt: “29”



3. Remove:
  - Lower crankcase

ECA13900

### 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.

EAS25580

## CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
  - Crankcase  
Cracks/damage → Replace.
  - Oil delivery passages

Obstruction → Blow out with compressed air.

EAS25600

## CHECKING THE OIL PIPE

1. Check:
  - Oil pipe  
Damage → Replace.  
Obstruction → Wash and blow out with compressed air.

EAS25620

## CHECKING THE TIMING CHAIN

Refer to “CAMSHAFTS” on page 5-7.

EAS25640

## ASSEMBLING THE CRANKCASE

1. Lubricate:
  - Crankshaft journal bearings  
(with the recommended lubricant)



**Recommended lubricant  
Engine oil**

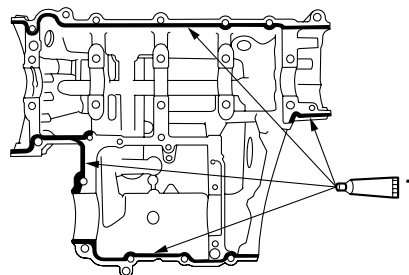
2. Apply:
  - Sealant  
(onto the crankcase mating surfaces)



**Yamaha bond No. 1215  
90890-85505  
(Three Bond No.1215®)**

### NOTE:

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2–3 mm (0.08–0.12 in) of the crankshaft journal bearings.



1. Three Bond No.1215®
3. Install:
  - Dowel pins
4. Set the shift drum assembly and transmission gears in the neutral position.

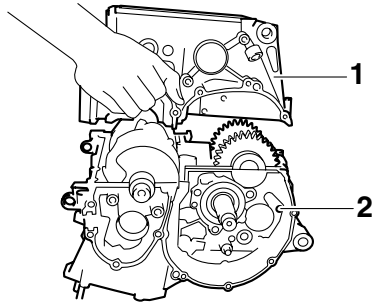
## 5. Install:

- Lower crankcase “1”  
(onto the upper crankcase “2”)

ECA13980

### CAUTION:

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.



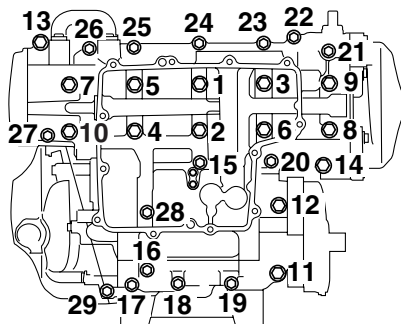
## 6. Install:

- Crankcase bolts

### NOTE:

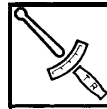
- Lubricate the bolts “1”–“10” thread part and washers with engine oil.
- Lubricate the bolts “11”–“29” thread part and mating surfaces with engine oil.
- Finger tighten the crankcase bolts.

- M8 × 115 mm bolts: “8”, “9”
- M8 × 85 mm bolts: “1”–“7”, “10”
- M8 × 65 mm bolts: “11”, “12”
- M6 × 80 mm bolt: “28”
- M6 × 65 mm shoulder bolts: “13”, “14”
- M6 × 65 mm bolts: “16”, “20”, “21”
- M6 × 55 mm bolts: “15”, “22”–“27”
- M6 × 45 mm bolts: “17”–“19”
- M6 × 30 mm bolt: “29”



## 7. Tighten:

- Crankcase bolts “1”–“10”



**Crankcase bolt (M8 × 115 mm, M8 × 85 mm)**

**1st: 20 Nm (2.0 m·kg, 14 ft·lb)**

**\*2nd: 12 Nm (1.2 m·kg, 8.9 ft·lb)**

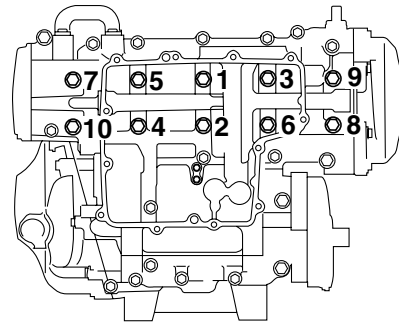
**3rd: 45°–55°**

**4th: 70°–80°**

\*Loosen all bolts following the tightening order and then tighten to specification torque.

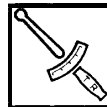
### NOTE:

- Lubricate the bolt threads and the bearing surfaces with engine oil.
- Tighten the bolts in the tightening sequence cast on the crankcase.



## 8. Tighten:

- Crankcase bolts “11”–“29”



**Crankcase bolt (M8 × 65 mm)**

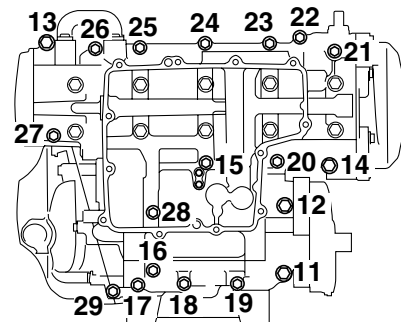
**24 Nm (2.4 m·kg, 17 ft·lb)**

**Crankcase bolt (M6)**

**10 Nm (1.0 m·kg, 7.2 ft·lb)**

### NOTE:

- Lubricate the bolt threads and the bearing surfaces with engine oil.
- Tighten the bolts in the tightening sequence cast on the crankcase.





EAS26030

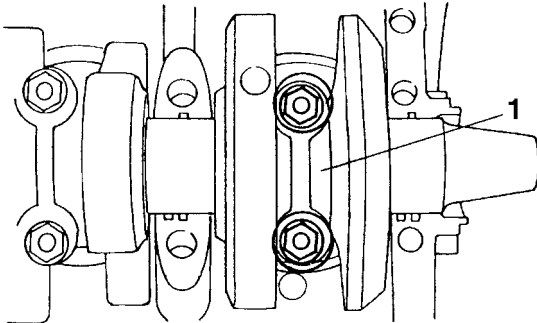
## REMOVING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the connecting rods and pistons.

1. Remove:
  - Connecting rod cap "1"

### NOTE:

Identify the position of each connecting rod so that it can be reinstalled in its original place.



2. Remove:
  - Big end bearings  
(from the connecting rods and connecting rod caps)

### NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.

3. Remove:
  - Piston pin clips "1"
  - Piston pin "2"
  - Piston "3"
  - Connecting rod "4"

ECA13810

### CAUTION:

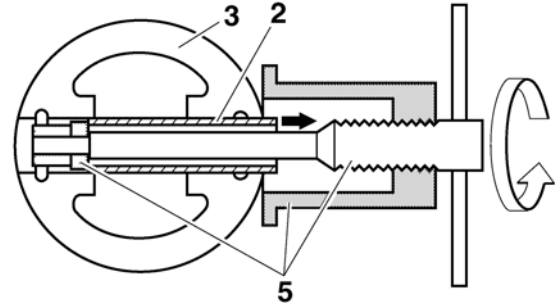
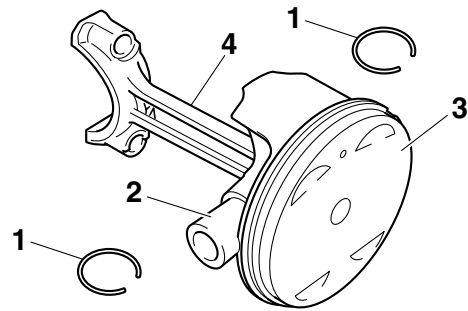
**Do not use a hammer to drive the piston pin out.**

### NOTE:

- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "5".



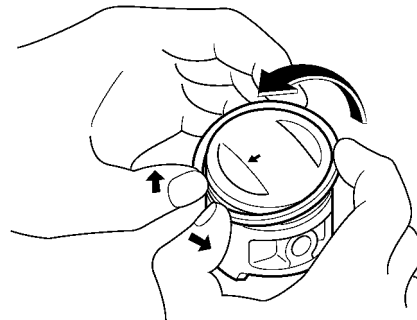
**Piston pin puller set**  
**90890-01304**  
**Piston pin puller**  
**YU-01304**



4. 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.



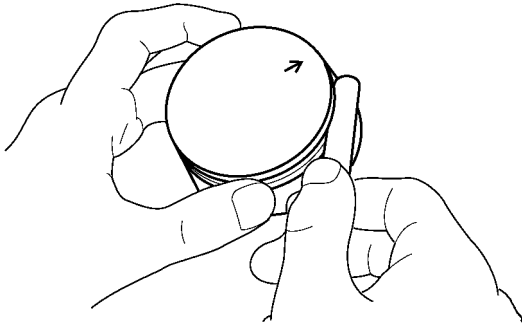
EAS24410

## CHECKING THE CYLINDERS AND PISTONS

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

1. Check:
  - Piston wall
  - Cylinder wall  
Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
  - Piston-to-cylinder clearance

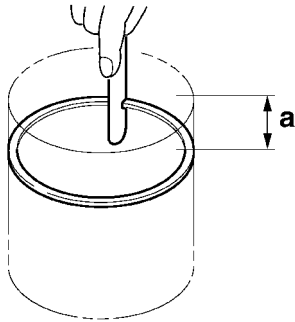




2. Install:
  - Piston ring  
(into the cylinder)

**NOTE:**

Level the piston ring into 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.



**Piston ring**

**Top ring**

**End gap (installed)**

0.25–0.35 mm (0.0098–0.0138 in)

**Limit**

0.60 mm (0.0236 in)

**2nd ring**

**End gap (installed)**

0.70–0.80 mm (0.0276–0.0315 in)

**Limit**

1.15 mm (0.0453 in)

**Oil ring**

**End gap (installed)**

0.10–0.35 mm (0.0039–0.0138 in)

EAS24440

**CHECKING THE PISTON PINS**

The following procedure applies to all of the piston pins.

1. Check:
  - Piston pin  
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
  - Piston pin outside diameter “a”  
Out of specification → Replace the piston pin.

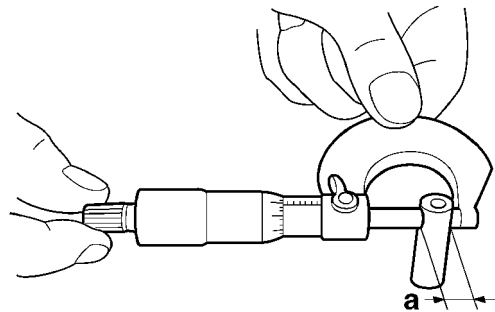


**Piston pin outside diameter**

14.991–15.000 mm (0.5902–0.5906 in)

**Limit**

14.971 mm (0.5894 in)

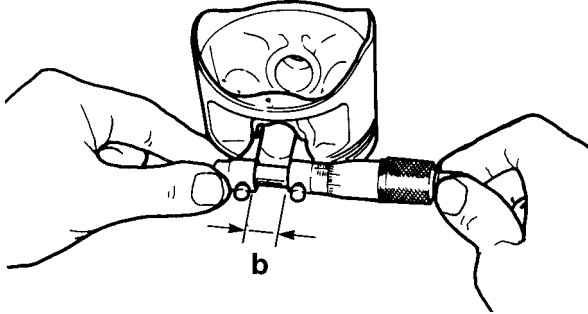


3. Measure:
  - Piston pin bore diameter “b”  
Out of specification → Replace the piston.

## CONNECTING RODS AND PISTONS



**Piston pin bore inside diameter**  
15.002–15.013 mm (0.5906–0.5911 in)  
**Limit**  
15.043 mm (0.5922 in)



4. Calculate:
  - Piston-pin-to-piston-pin-bore clearance  
Out of specification → Replace the piston pin and piston as a set.

- Piston-pin-to-piston-pin-bore clearance =  
Piston pin bore diameter “b” -  
Piston pin outside diameter “a”



**Piston-pin-to-piston-pin-bore clearance**  
0.002–0.022 mm (0.00007–0.00068 in)

ET2C01013

## CHECKING THE CONNECTING RODS

1. Measure:
  - Crankshaft-pin-to-big-end-bearing clearance  
Out of specification → Replace the big end bearings.



**Oil clearance (using plasti-gauge®)**  
0.037–0.061 mm (0.0015–0.0024 in)

The following procedure applies to all of the connecting rods.

ECA13930

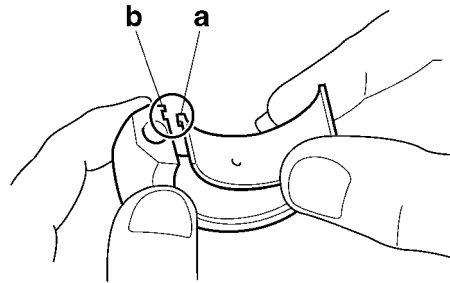
**CAUTION:**

**Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.**

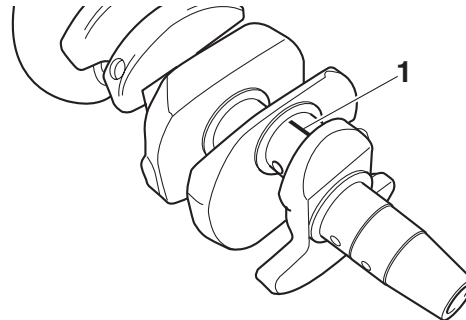
- Clean the big end bearings, crankshaft pins, and the inside of the connecting rods halves.
- Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

**NOTE:**

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



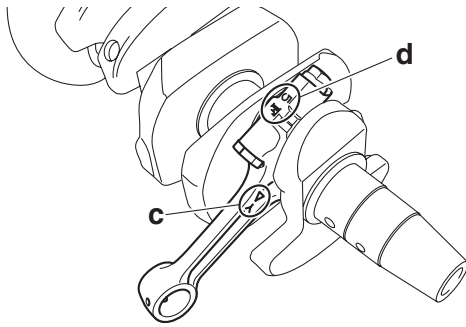
- c. Put a piece of Plastigauge<sup>®</sup> “1” on the crankshaft pin.



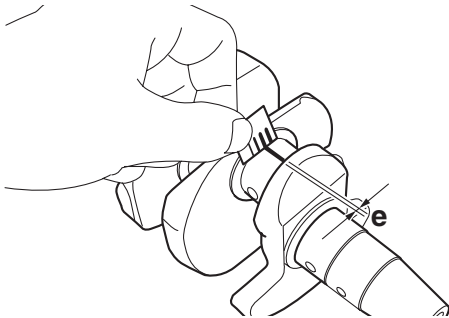
- d. Assemble the connecting rod halves.

**NOTE:**

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with molybdenum disulfide grease.
- Make sure the “Y” mark “c” on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “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” on page 5-62.
- f. Remove the connecting rod and big end bearings.  
Refer to “REMOVING THE CONNECTING RODS AND PISTONS” on page 5-58.
- g. Measure the compressed Plastigauge® width “e” on the crankshaft pin.  
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

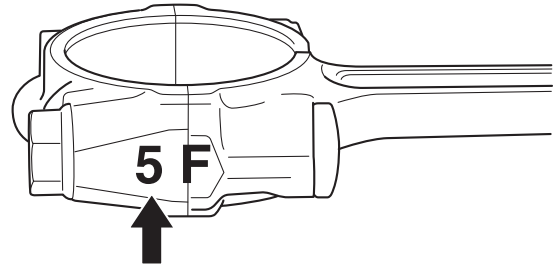
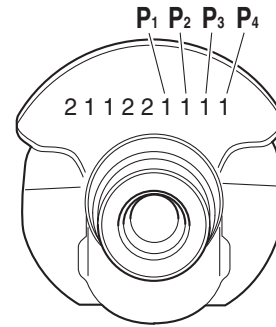
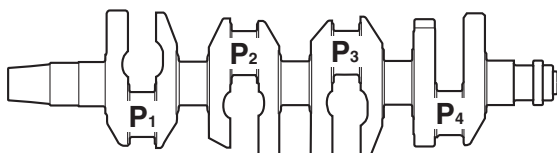


2. Select:

- Big end bearings ( $P_1$ – $P_4$ )

**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.
- $P_1$ – $P_4$  refer to the bearings shown in the crankshaft illustration.



For example, if the connecting rod  $P_1$  and the crankshaft web  $P_1$  numbers are 5 and 1 respectively, then the bearing size for  $P_1$  is:

$$P_1 \text{ (connecting rod)} - P_1 \text{ (crankshaft)} \\ = \\ 5 - 1 = 4 \text{ (green)}$$



**Bearing color code**

- |          |          |          |
|----------|----------|----------|
| 1. Blue  | 2. Black | 3. Brown |
| 4. Green |          |          |

EAS26170

## INSTALLING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the pistons and connecting rods.

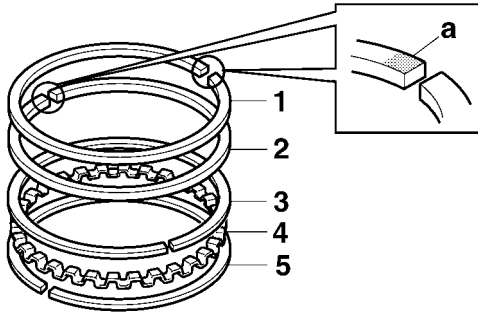
1. Install:

- Top ring “1”
- 2nd ring “2”
- Upper oil ring rail “3”
- Oil ring expander “4”
- Lower oil ring rail “5”

**NOTE:**

Be sure to install the piston rings so that the manufacturer’s marks or numbers “a” face up.

# CONNECTING RODS AND PISTONS

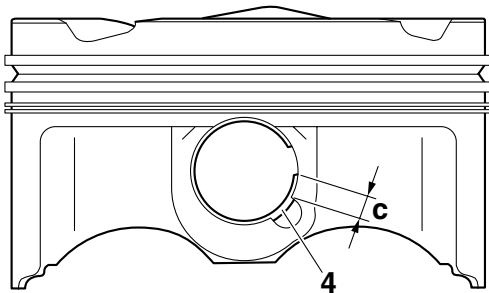
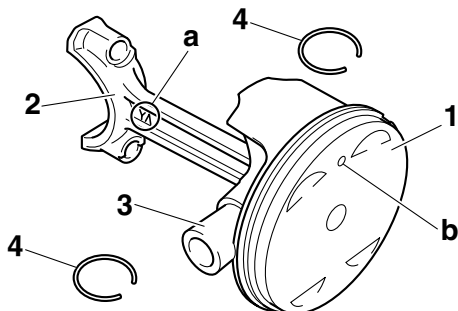


## 2. Install:

- Piston "1"
- (onto the respective connecting rod "2")
- Piston pin "3"
- Piston pin clips "4" **New**

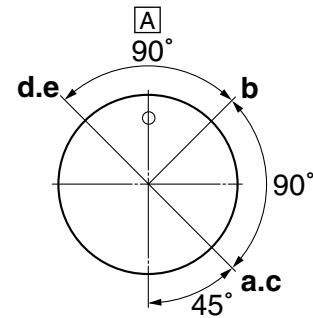
## NOTE:

- Apply engine oil onto the piston pin.
- Make sure that the "Y" mark "a" on the connecting rod left when the punch mark "b" on the piston is pointing up. Refer to the illustration.
- Install the piston pin clips, so that the clip ends are 3 mm (0.12 in) "c" or more from the cutout in the piston.
- 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. Upper oil ring rail
- c. Oil ring expander
- d. 2nd ring
- e. Lower oil ring rail

- A. Exhaust side

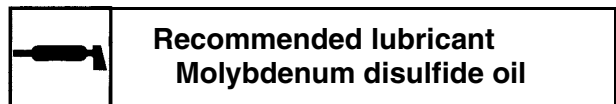
## 4. Lubricate:

- Piston
- Piston rings
- Cylinder (with the recommended lubricant)



## 5. Lubricate:

- Bolt threads
- Nut seats (with the recommended lubricant)



## 6. Lubricate:

- Crankshaft pins
- Big end bearings
- Connecting rod inner surface (with the recommended lubricant)



## 7. Install:

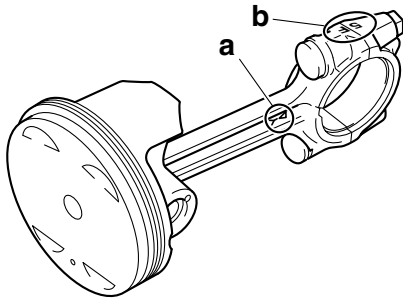
- Big end bearings
- Connecting rod and piston assembly
- Connecting rod cap

## NOTE:

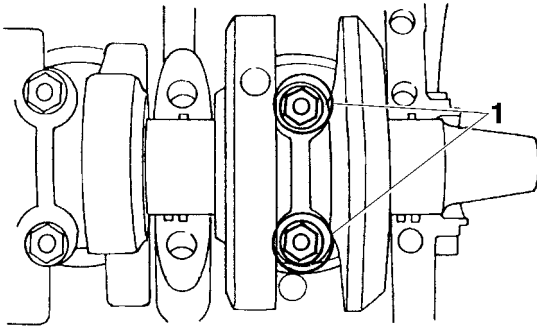
- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.

# CONNECTING RODS AND PISTONS

- While compressing the piston rings one hand, install the connecting rod assembly into the cylinder with the other hand.
- 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.



8. Tighten:
- Connecting rod nuts “1”



EW2C01007

## **WARNING**

**Replace the connecting rod bolts and nuts with new ones.**

### **NOTE:**

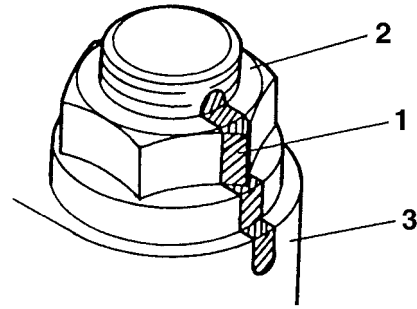
Tighten the connecting rod nuts using the following procedure.

- a. Tighten the connecting rod nuts with a torque wrench.

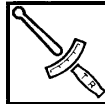


**Connecting rod nut (1st)**  
**15 Nm (1.5 m·kg, 11 ft·lb)**

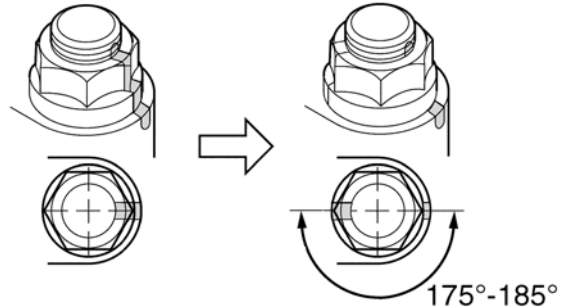
- b. Put a mark “1” on the corner of the connecting rod nut “2” and the connecting rod “3”.



- c. Tighten the connecting rod nuts further to reach the specified angle 175°–185°.



**Connecting rod nut (final)**  
**Specified angle 175°–185°**



EWA13400

## **WARNING**

**If the connecting rod nut is tightened more than the specified angle, do not loosen the nut and then retighten it. Instead, replace the connecting rod bolt and nut with a new one and perform the procedure again.**

ECA13950

## **CAUTION:**

**Do not use a torque wrench to tighten the connecting rod nut to the specified angle.**

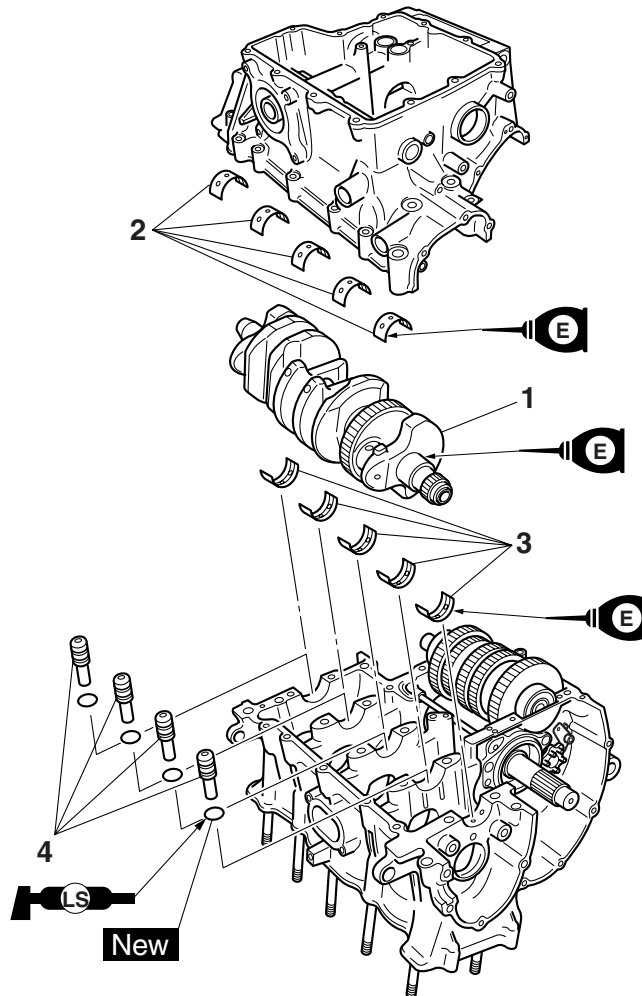
### **NOTE:**

On a hexagonal nut, note that the angle from one corner to another is 60°.



## CRANKSHAFT

## Removing the crankshaft



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-53.
	Connecting rod caps		Refer to "CONNECTING RODS AND PISTONS" on page 5-57.
1	Crankshaft	1	
2	Crankshaft journal lower bearing	5	
3	Crankshaft journal upper bearing	5	
4	Oil nozzle	4	
			For installation, reverse the removal procedure.

EAS26040

## REMOVING THE CRANKSHAFT JOURNAL BEARINGS

1. Remove:
  - 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.

ET2C01018

## CHECKING THE OIL NOZZLES

The following procedure applies to all of the oil nozzles.

1. Check:
  - Oil nozzle  
Damage/wear → Replace the oil nozzle.
  - O-ring  
Damage/wear → Replace.
  - Oil passage  
Obstruction → Blow out with compressed air.

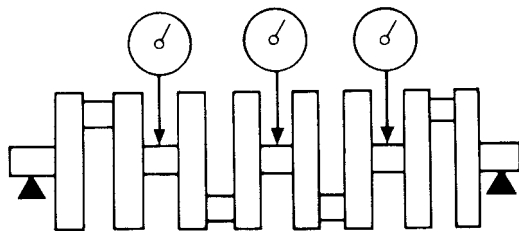
EAS26070

## CHECKING THE CRANKSHAFT AND CONNECTING RODS

1. Measure:
  - Crankshaft runout  
Out of specification → Replace the crankshaft.



**Runout limit C**  
**0.030 mm (0.0012 in)**



2. Check:
  - Crankshaft journal surfaces
  - Crankshaft pin surfaces
  - Bearing surfaces  
Scratches/wear → Replace the crankshaft.

3. Measure:

- Crankshaft-journal-to-crankshaft-journal-bearing clearance  
Out of specification → Replace the crankshaft journal bearings.



**Journal oil clearance (using plastigauge®)**  
**0.020–0.044 mm (0.0008–0.0017 in)**

ECA13920

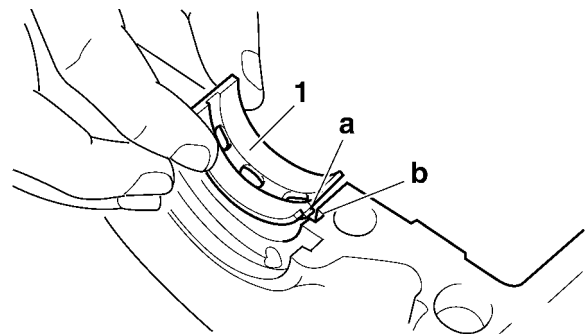
### CAUTION:

**Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.**

- a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
- b. Place the upper crankcase upside down on a bench.
- c. Install the crankshaft journal upper bearings "1" and the crankshaft into the upper crankcase.

### NOTE:

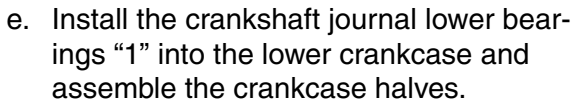
Align the projections "a" on the crankshaft journal upper bearings with the notches "b" in the upper crankcase.



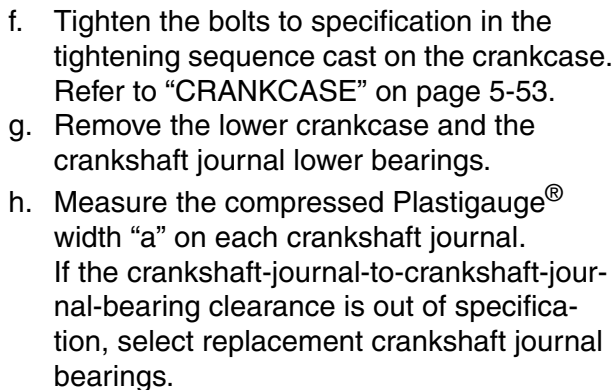
- d. Put a piece of Plastigauge® "1" on each crankshaft journal.

### NOTE:

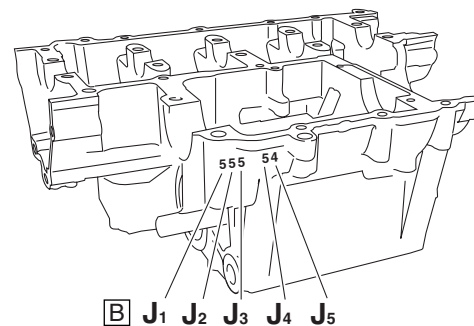
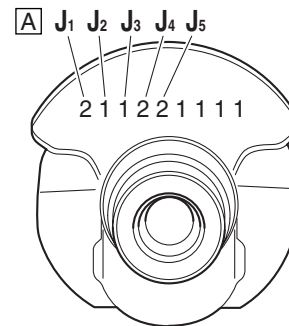
Do not put the Plastigauge® over the oil hole in the crankshaft journal.



- 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.



- The numbers “A” stamped into the crankshaft web and the numbers “B” stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- J<sub>1</sub>–J<sub>5</sub> refer to the bearings shown in the crankshaft illustration.
- If J<sub>1</sub>–J<sub>5</sub> are the same, use the same size for all of the bearings.



$J_1$ (crankcase) - $J_1$ (crankshaft web) - 1 = $6 - 2 - 1 = 3$ (brown)
--

**Bearing color code**

0.White    1.Blue    2.Black  
3.Brown 4.Green

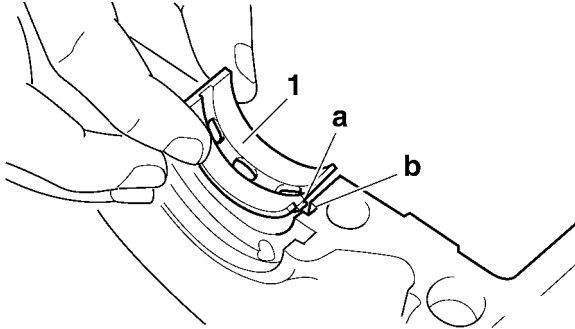
EAS26200

**INSTALLING THE CRANKSHAFT****1. Install:**

- Crankshaft journal upper bearings  
(into the upper crankcase)
- Crankshaft journal lower bearings  
(into the lower crankcase)

**NOTE:**

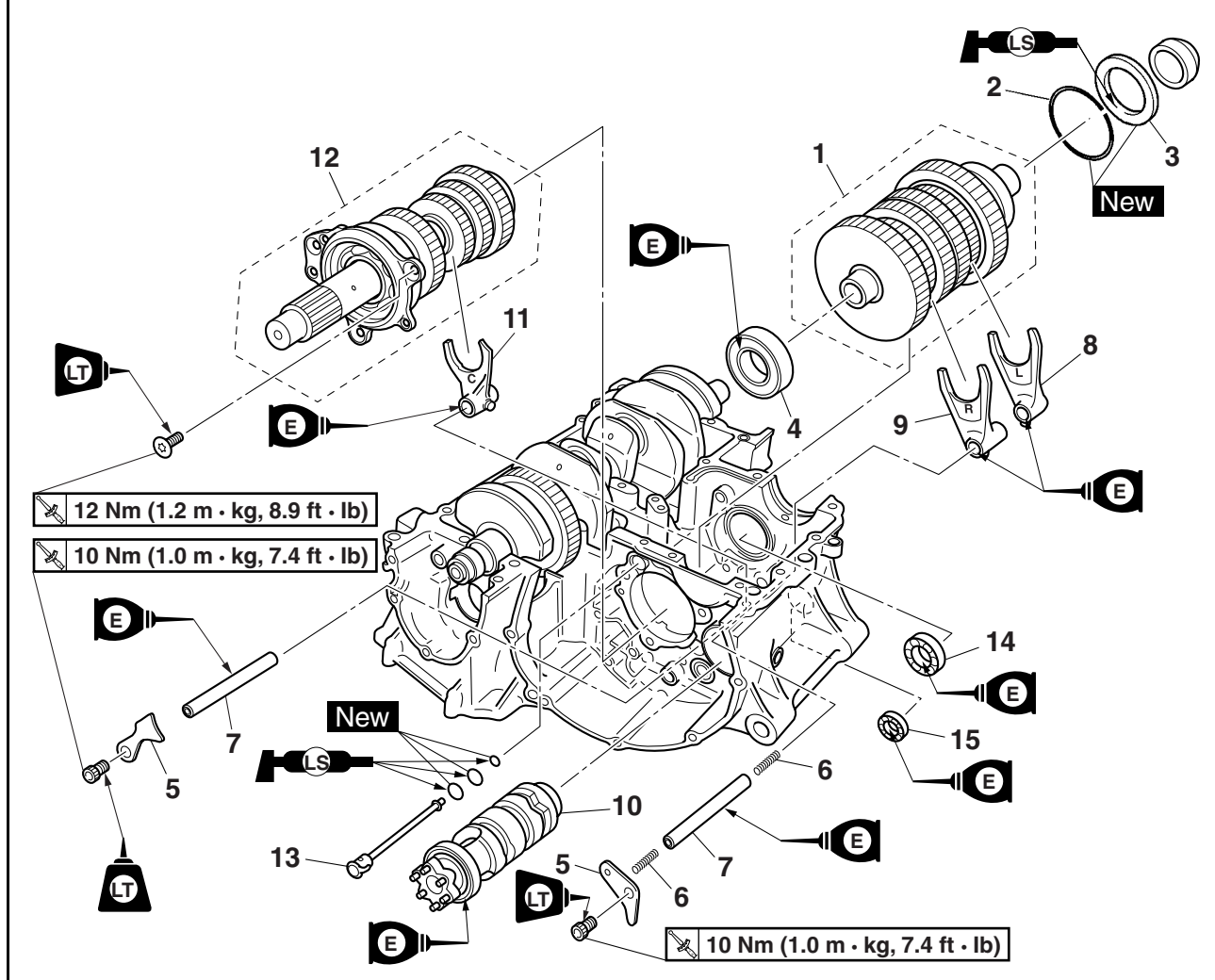
- Align the projections “a” on the crankshaft journal bearings “1” with the notches “b” in the crankcases.
- Be sure to install each crankshaft journal bearing in its original place.



EAS26240

## TRANSMISSION

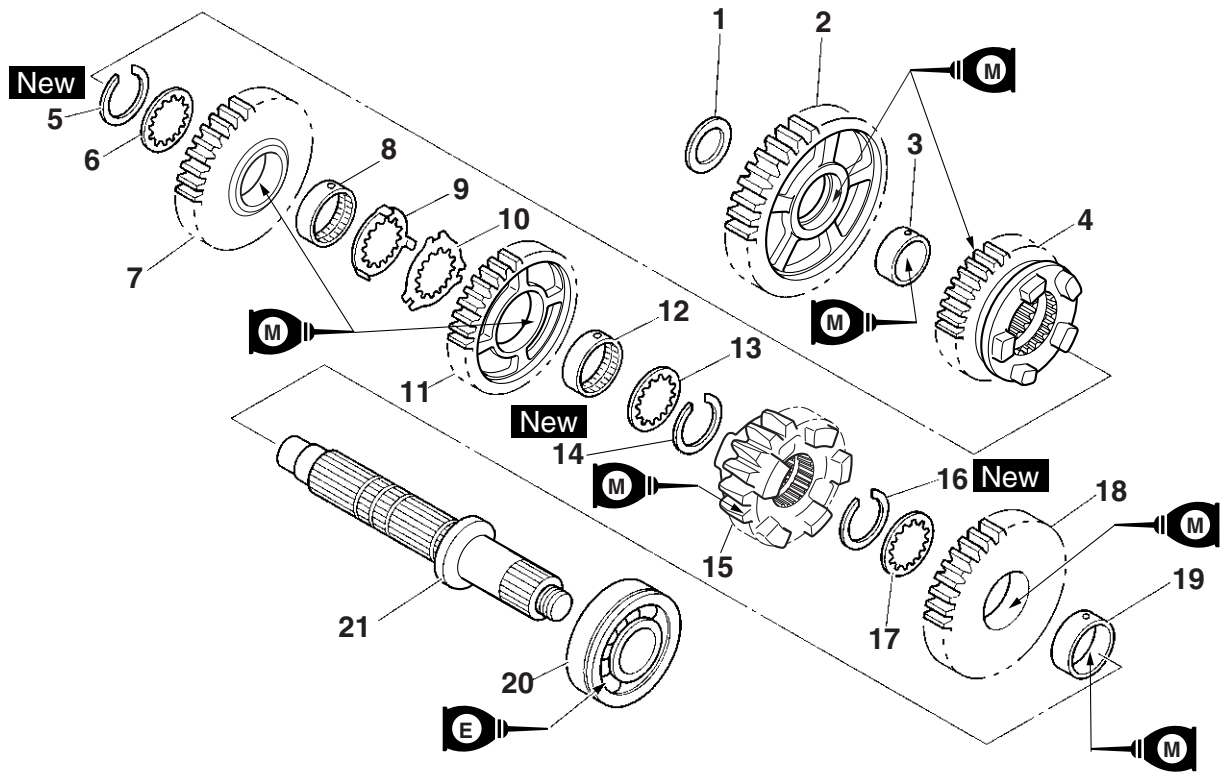
### Removing the transmission, shift drum assembly, and shift forks



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-53.
1	Drive axle assembly	1	
2	Circlip	1	
3	Oil seal	1	
4	Bearing	1	
5	Shift drum retainer	2	
6	Spring	2	
7	Shift fork guide bar	2	
8	Shift fork-L	1	
9	Shift fork-R	1	
10	Shift drum assembly	1	
11	Shift fork-C	1	
12	Main axle assembly	1	
13	Oil pipe	1	
14	Bearing	1	
15	Bearing	1	
			For installation, reverse the removal procedure.

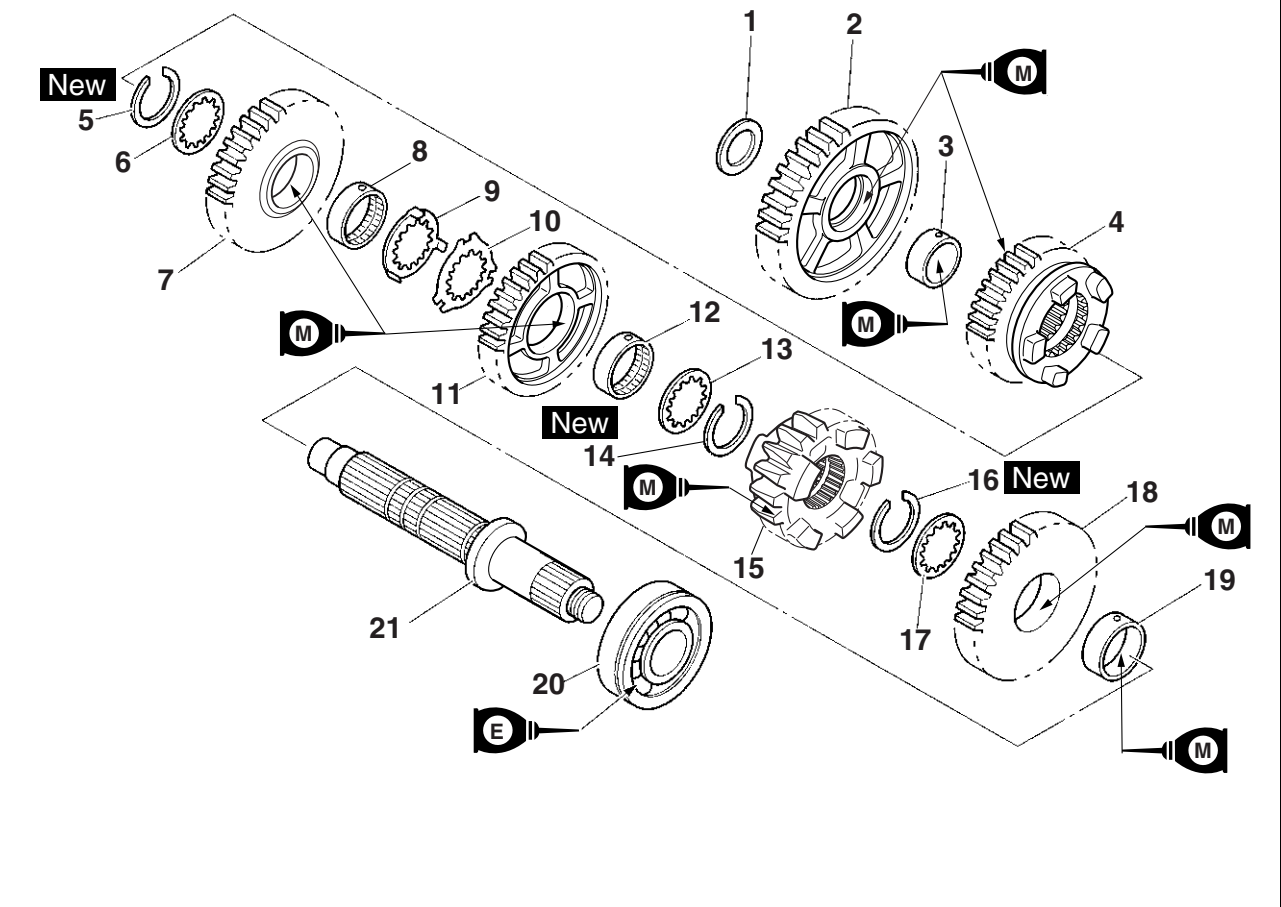


## Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Washer	1	
2	1st wheel gear	1	
3	Collar	1	
4	5th wheel gear	1	
5	Circlip	1	
6	Washer	1	
7	3rd wheel gear	1	
8	Collar	1	
9	Toothed lock washer	1	
10	Toothed lock washer retainer	1	
11	4th wheel gear	1	
12	Collar	1	
13	Washer	1	
14	Circlip	1	
15	6th wheel gear	1	
16	Circlip	1	
17	Washer	1	
18	2nd wheel gear	1	
19	Collar	1	
20	Bearing	1	
21	Drive axle	1	

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
			For assembly, reverse the disassembly procedure.

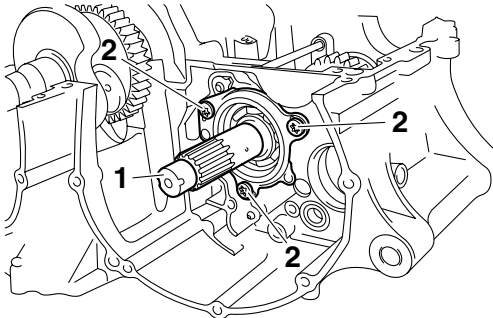
ET2C01014

## REMOVING THE TRANSMISSION

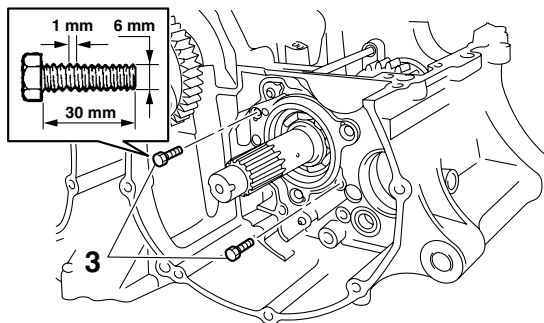
### 1. Remove:

- Main axle assembly "1"

### a. Remove the main axle assembly bearing housing bolts "2"



### b. Insert two bolts "3" of the proper size, as shown in the illustration, into the main axle assembly bearing housing.



### c. Tighten the bolts until they contact the crankcase surface.

### d. Continue tightening the bolts until the main axle assembly comes free from the upper crankcase.

EAS26260

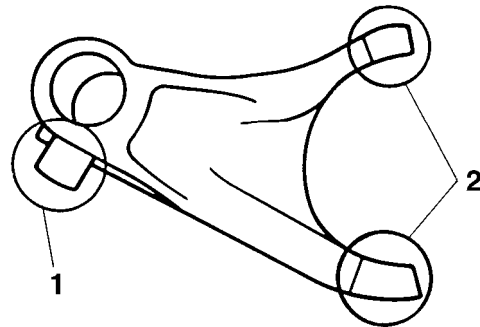
## CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

### 1. Check:

- Shift fork cam follower "1"
- Shift fork pawl "2"

Bends/damage/scoring/wear → Replace the shift fork.



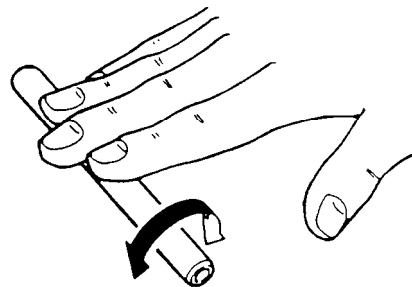
### 2. Check:

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

EWA12840

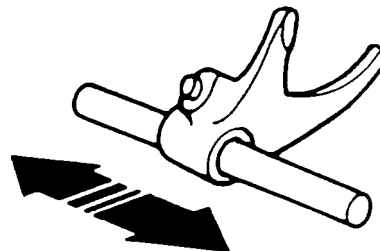
## WARNING

**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.



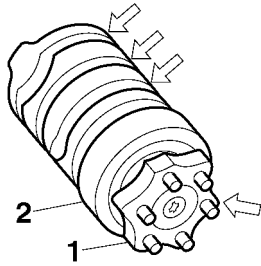
EAS26270

## CHECKING THE SHIFT DRUM ASSEMBLY

### 1. Check:

- Shift drum groove  
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.



EAS26300

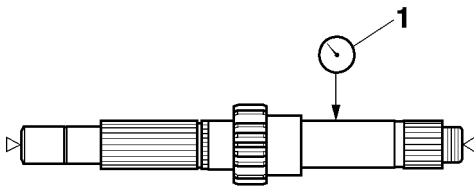
## CHECKING THE TRANSMISSION

### 1. Measure:

- Main axle runout  
(with a centering device and dial gauge “1”)  
Out of specification → Replace the main axle.



**Main axle runout limit**  
**0.02 mm (0.0008 in)**

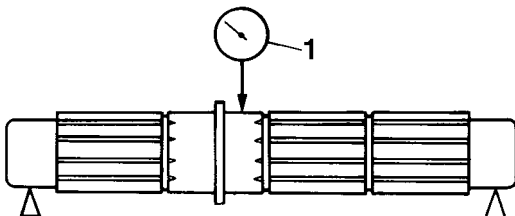


### 2. Measure:

- Drive axle runout  
(with a centering device and dial gauge “1”)  
Out of specification → Replace the drive axle.

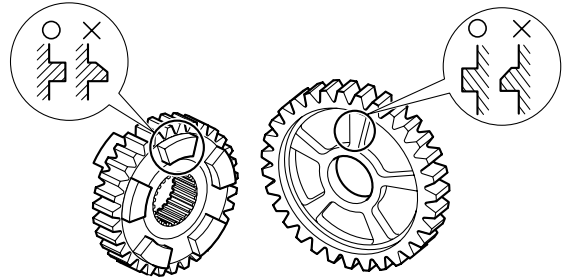


**Drive axle runout limit**  
**0.02 mm (0.0008 in)**



### 3. Check:

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



### 4. Check:

- Transmission gear engagement  
(each pinion gear to its respective wheel gear)  
Incorrect → Reassemble the transmission axle assemblies.

### 5. Check:

- Transmission gear movement  
Rough movement → Replace the defective part(s).

### 6. Check:

- Circlips  
Bends/damage/looseness → Replace.

ET2C01015

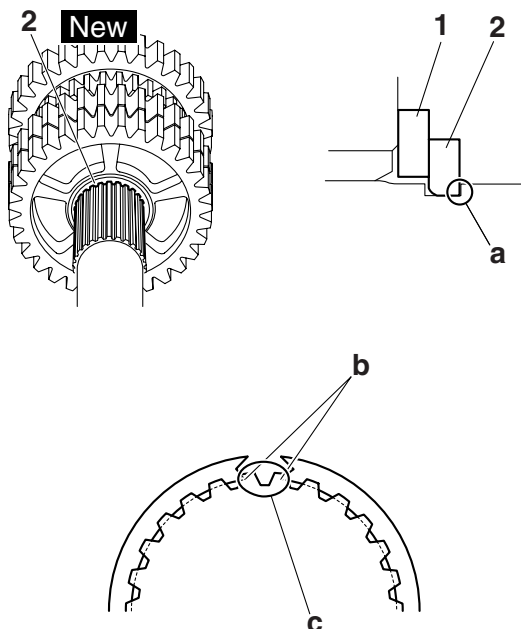
## ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

### 1. Install:

- Toothed washer “1”
- Circlip “2” **New**

### NOTE:

- Be sure the circlip sharp-edged corner “a” is positioned opposite side to the toothed washer and gear.
- Install the circlip so that both ends “b” rest on the sides of a spline “c” with both axles aligned.

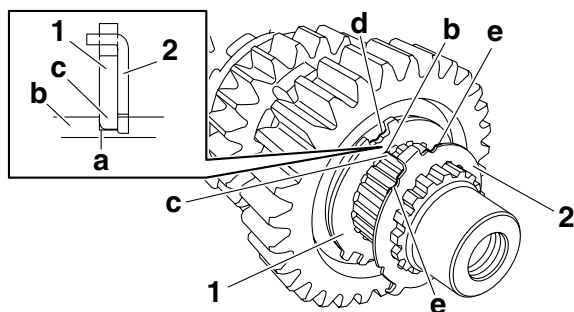


2. Install:

- Toothed lock washer retainer "1"
- Toothed lock washer "2"

**NOTE:**

- With the toothed lock washer retainer "1" in the groove "a" in the axle, align the projection "c" on the retainer with an axle spline "b", and then install the toothed lock washer "2".
- Be sure to align the projection on the toothed lock washer that is between the alignment marks "e" with the alignment mark "d" on the retainer.



ET2C01016

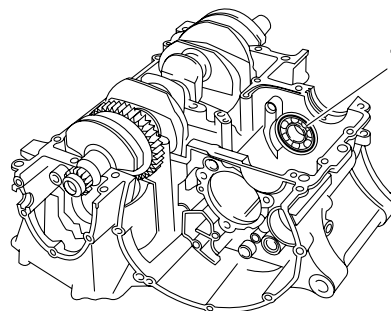
## INSTALLING THE TRANSMISSION

1. Install:

- Bearing "1"

**NOTE:**

Face the seal side of the bearing to the outside and install it close to the right side end of the crankcase.

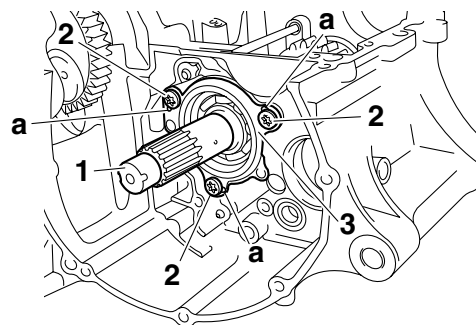


2. Install:

- Main axle assembly "1"

**NOTE:**

Stake the main axle assembly bearing housing bolts "2" at a cutout "a" in the main axle assembly bearing housing "3".

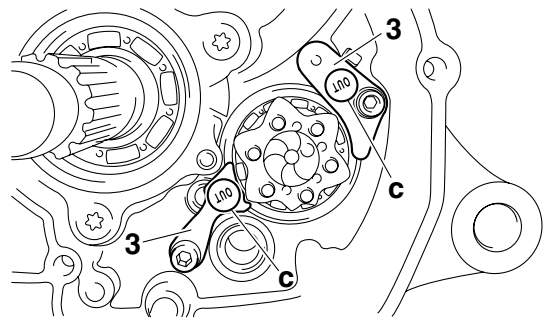
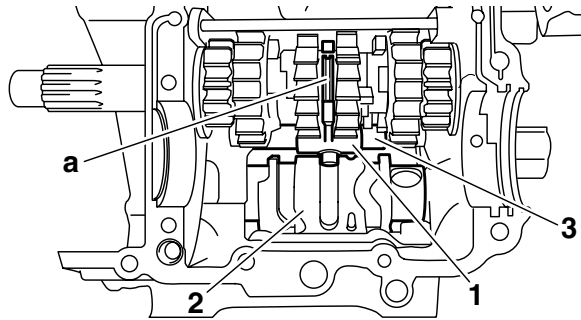


3. Install:

- Shift fork-C "1"
- Shift drum assembly "2"
- Shift fork guide bar "3"

**NOTE:**

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C", "L".
- Carefully position the shift forks so that they are installed correctly into the transmission gears.
- Install shift fork-C into the groove "a" in the 3rd and 4th pinion gear on the main axle.



## 4. Install:

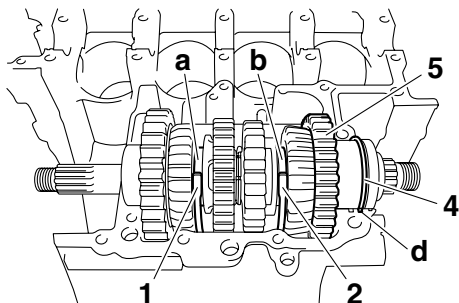
- Shift fork-R “1”
- Shift fork-L “2”
- Shift fork guide bar
- Springs
- Shift drum retainers “3”
- Bearing
- Oil seal
- Circlip “4”
- Drive axle assembly “5”



**Shift drum retainer bolt**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**  
**LOCTITE®**

## NOTE:

- Install shift fork-R into the groove “a” in the 5th wheel gear and shift fork-L into the groove “b” in the 6th wheel gear on the drive axle.
- Install the shift drum retainer with its “OUT” mark “c” facing outward.
- Make sure that the drive axle bearing circlip “4” is inserted into the grooves “d” in the upper crankcase.





---

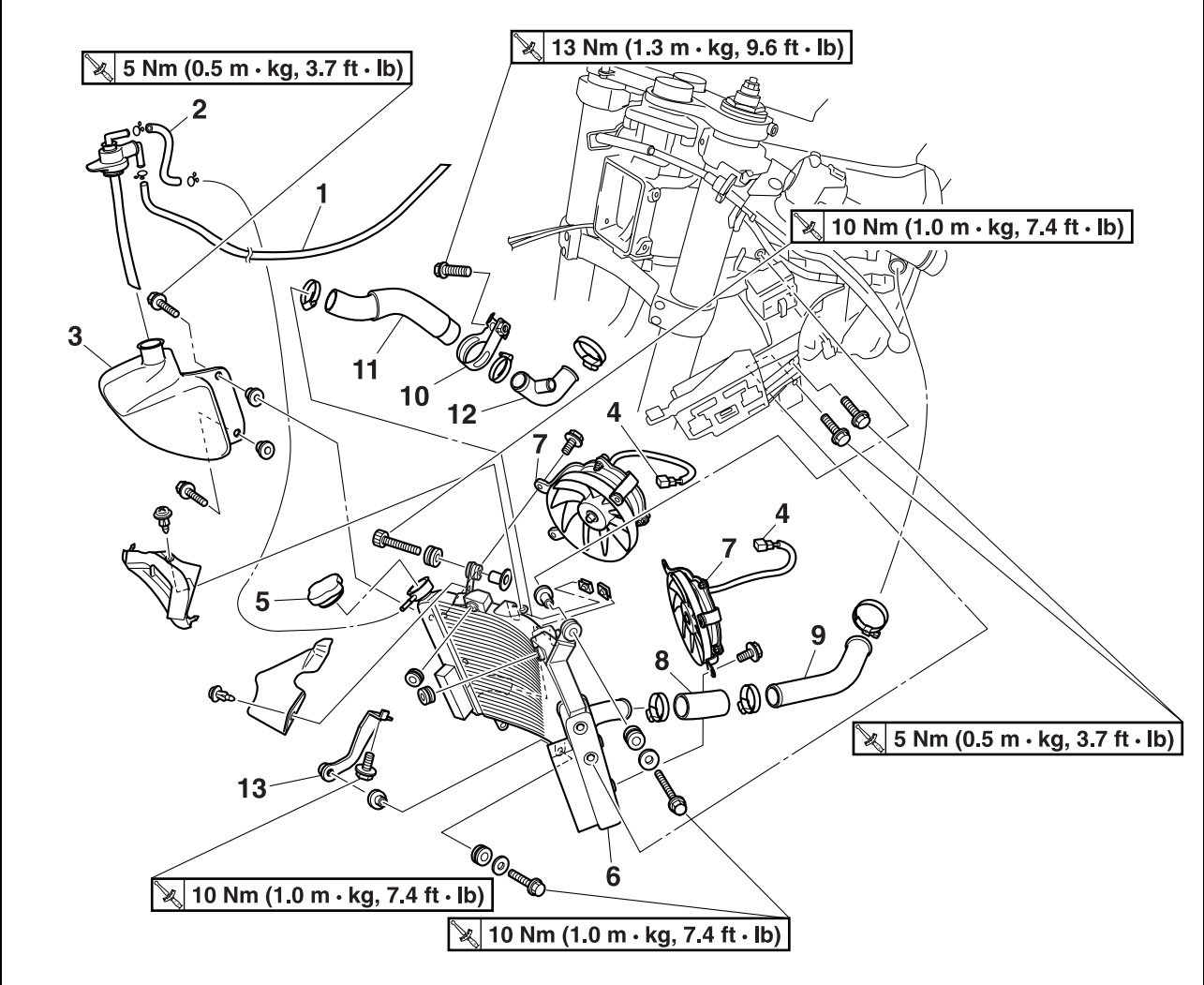
## COOLING SYSTEM

<b>RADIATOR</b> .....	6-1
CHECKING THE RADIATOR .....	6-2
INSTALLING THE RADIATOR .....	6-2
 <b>OIL COOLER</b> .....	6-4
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INSTALLING THE OIL COOLER .....	6-5
 <b>THERMOSTAT</b> .....	6-6
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DISASSEMBLING THE WATER PUMP .....	6-10
CHECKING THE WATER PUMP .....	6-10
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EAS26380

RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Lower side cowlings/Bottom cowlings		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Coolant reservoir breather hose	1	
2	Coolant reservoir hose	1	
3	Coolant reservoir	1	
4	Radiator fan motor coupler	2	Disconnect.
5	Radiator cap	1	
6	Radiator	1	
7	Radiator fan	2	
8	Radiator inlet hose	1	
9	Radiator inlet pipe	1	
10	Radiator outlet hose holder	1	
11	Radiator outlet hose	1	
12	Radiator outlet pipe	1	
13	Radiator bracket	1	
			For installation, reverse the removal procedure.

EAS26390

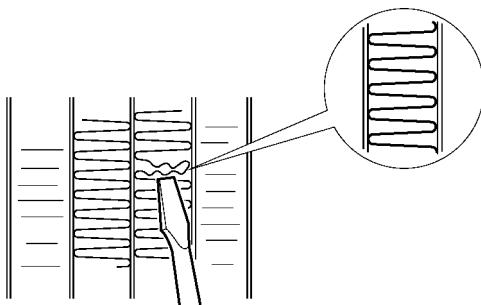
## CHECKING THE RADIATOR

### 1. Check:

- Radiator fins  
Obstruction → Clean.  
Apply compressed air to the rear of the radiator.  
Damage → Repair or replace.

### NOTE:

Straighten any flattened fins with a thin, flat-head screwdriver.



### 2. Check:

- Radiator hoses
- Radiator pipes  
Cracks/damage → Replace.

### 3. Measure:

- Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.



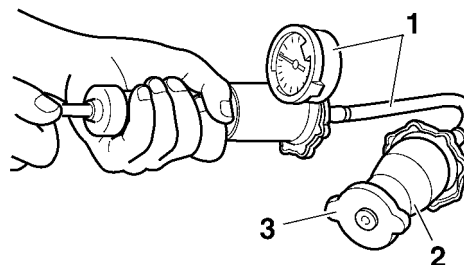
**Radiator cap opening pressure**  
107.9–137.3 kPa (15.6–19.9 psi) (1.08–1.37 kgf/cm<sup>2</sup>)



- a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.



**Radiator cap tester**  
90890-01325  
**Radiator pressure tester**  
YU-24460-01  
**Radiator cap tester adapter**  
90890-01352  
**Radiator pressure tester adapter**  
YU-33984



- b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.



### 4. Check:

- Radiator fan  
Damage → Replace.  
Malfunction → Check and repair.  
Refer to “COOLING SYSTEM” on page 8-29.

EAS26400

## INSTALLING THE RADIATOR

### 1. Fill:

- Cooling system  
(with the specified amount of the recommended coolant)  
Refer to “CHANGING THE COOLANT” on page 3-19.

### 2. Check:

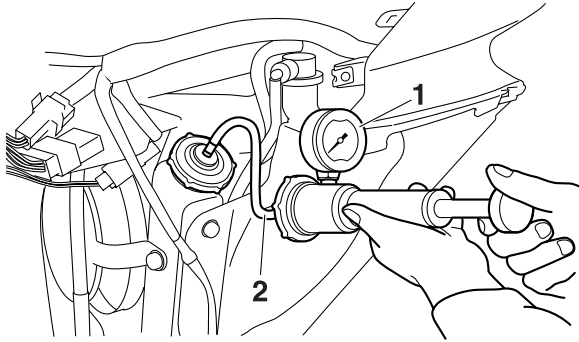
- Cooling system  
Leaks → Repair or replace any faulty part.



- a. Attach the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator.



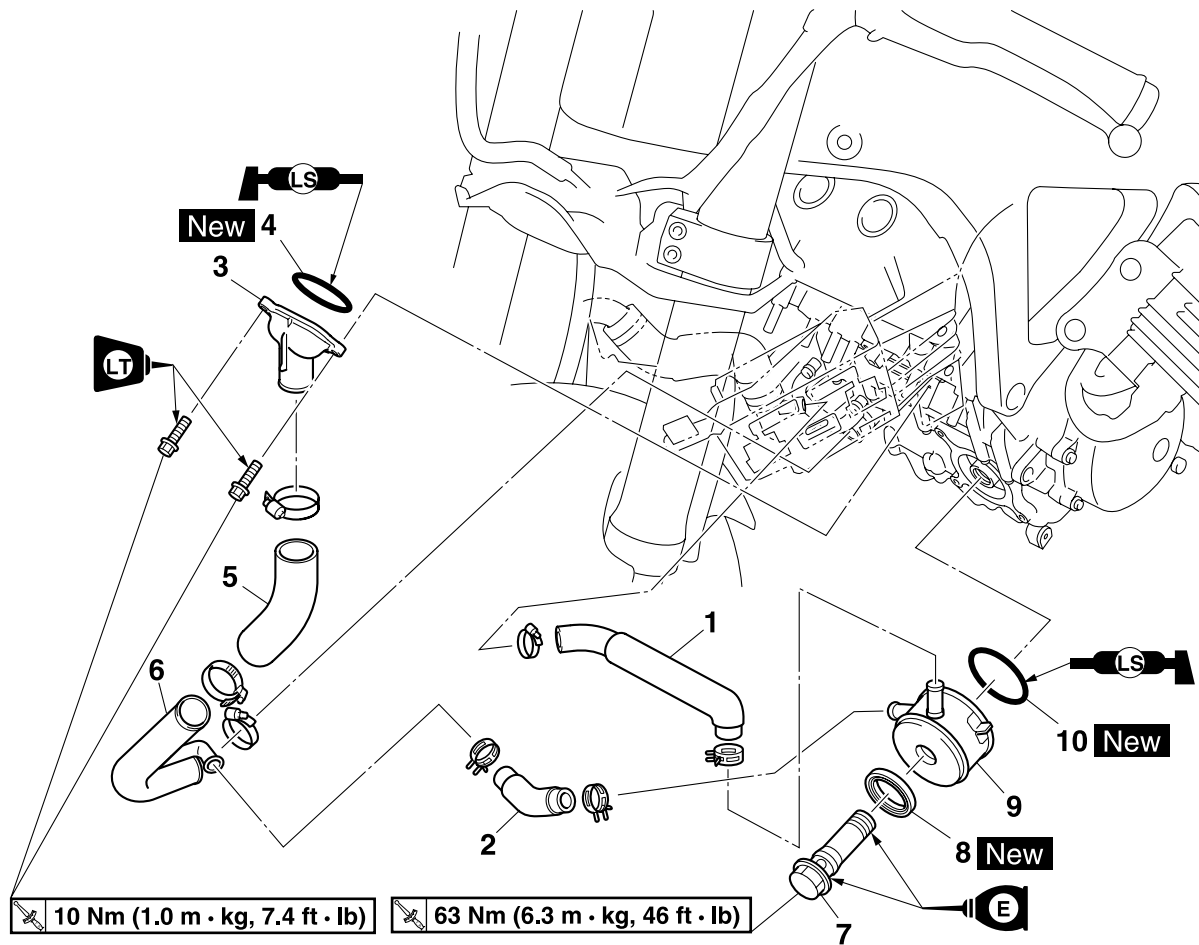
**Radiator cap tester**  
90890-01325  
**Radiator pressure tester**  
YU-24460-01  
**Radiator cap tester adapter**  
90890-01352  
**Radiator pressure tester adapter**  
YU-33984



- b. Apply 100 kPa (14.50 psi) (1.0 kg/cm<sup>2</sup>) of pressure.
- c. Measure the indicated pressure with the gauge.



EAS26410

**OIL COOLER****Removing the oil cooler**

Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-11.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
	Exhaust pipe assembly		Refer to "ENGINE REMOVAL" on page 5-1.
1	Oil cooler outlet hose	1	
2	Oil cooler inlet hose	1	
3	Water jacket joint	1	
4	O-ring	1	
5	Water jacket joint inlet hose	1	
6	Water pump outlet pipe	1	
7	Oil cooler union bolt	1	
8	Gasket	1	
9	Oil cooler	1	
10	O-ring	1	
			For installation, reverse the removal procedure.

EAS26420

## CHECKING THE OIL COOLER

1. Check:
  - Oil cooler  
Cracks/damage → Replace.
2. Check:
  - Oil cooler inlet hose
  - Oil cooler outlet hose
  - Water jacket joint inlet hose  
Cracks/damage/wear → Replace.
3. Check:
  - Water pump outlet pipe  
Damage → Replace.  
Obstruction → Wash and blow out with compressed air.

Refer to “CHANGING THE COOLANT” on page 3-19.

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

Refer to “CHANGING THE ENGINE OIL” on page 3-11.

4. Check:
  - Cooling system  
Leaks → Repair or replace any faulty part.

EAS26430

## INSTALLING THE OIL COOLER

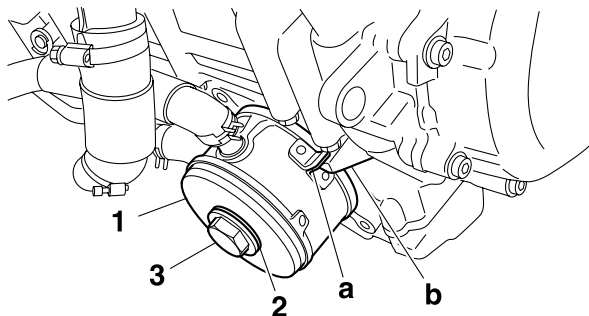
1. Clean:
  - Mating surfaces of the oil cooler and the crankcase  
(with a cloth dampened with lacquer thinner)
2. Install:
  - O-ring **New**
  - Oil cooler “1”
  - Gasket “2” **New**
  - Oil cooler union bolt “3”



**Oil cooler union bolt**  
**63 Nm (6.3 m·kg, 46 ft·lb)**

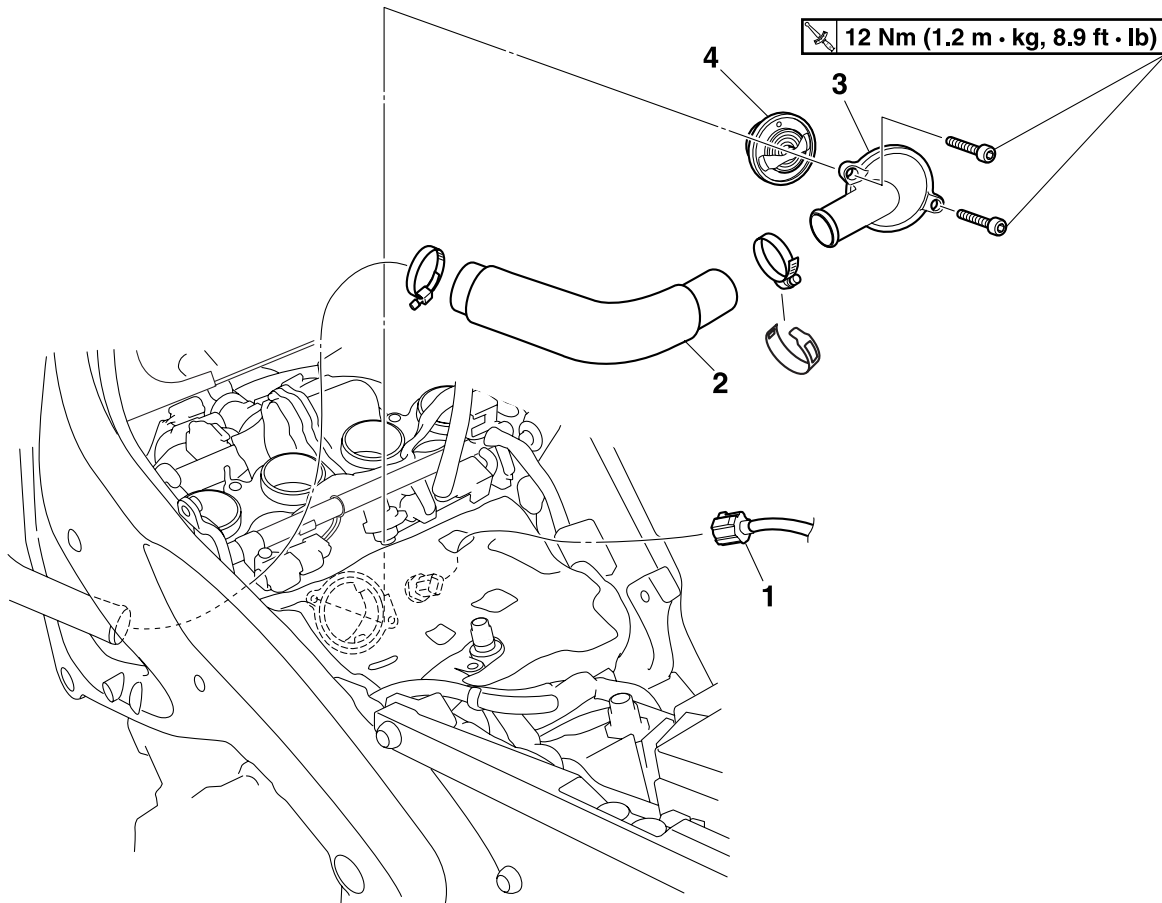
### NOTE:

- Before installing the oil cooler, lubricate the its union bolt with a thin coat of engine oil.
- Make sure the O-ring is positioned properly.
- Make sure the projection “a” on the oil cooler touches the projection “b” on the crankcase.



3. Fill:
  - Cooling system  
(with the specified amount of the recommended coolant)

EAS26440

**THERMOSTAT****Removing the thermostat**

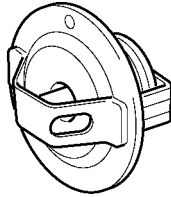
Order	Job/Parts to remove	Q'ty	Remarks
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Coolant temperature sensor coupler	1	Disconnect.
2	Thermostat outlet hose	1	
3	Thermostat cover	1	
4	Thermostat	1	
			For installation, reverse the removal procedure.

EAS26450

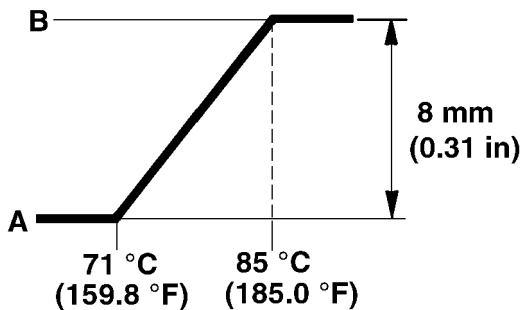
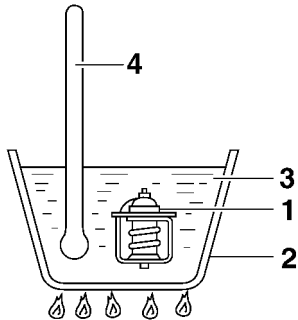
## CHECKING THE THERMOSTAT

### 1. Check:

- Thermostat  
Does not open at 71–85 °C (159.8–185.0 °F) → Replace.



- Suspend the thermostat “1” in a container “2” filled with water.
- Slowly heat the water “3”.
- Place a thermometer “4” in the water.
- While stirring the water, observe the thermostat and thermometer’s indicated temperature.



- Fully closed
- Fully open

### NOTE:

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

- Thermostat cover  
Cracks/damage → Replace.

EAS26480

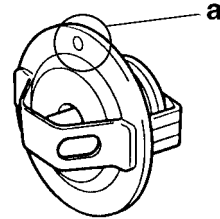
## INSTALLING THE THERMOSTAT

### 1. Install:

- Thermostat

### NOTE:

Install the thermostat with its breather hole “a” facing up.



### 2. Fill:

- Cooling system  
(with the specified amount of the recommended coolant)  
Refer to “CHANGING THE COOLANT” on page 3-19.

### 3. Check:

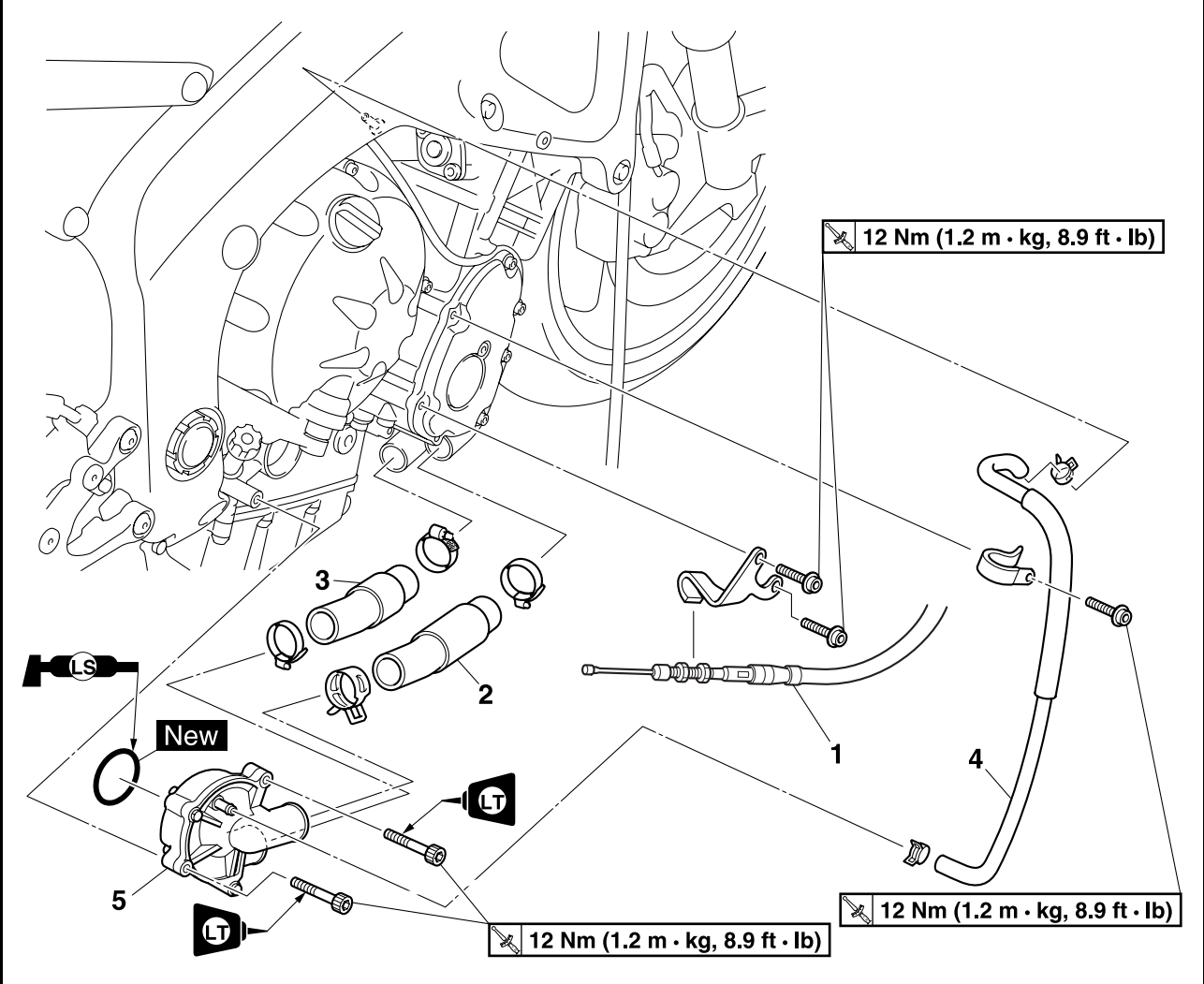
- Cooling system  
Leaks → Repair or replace any faulty part.

### 2. Check:

EAS26500

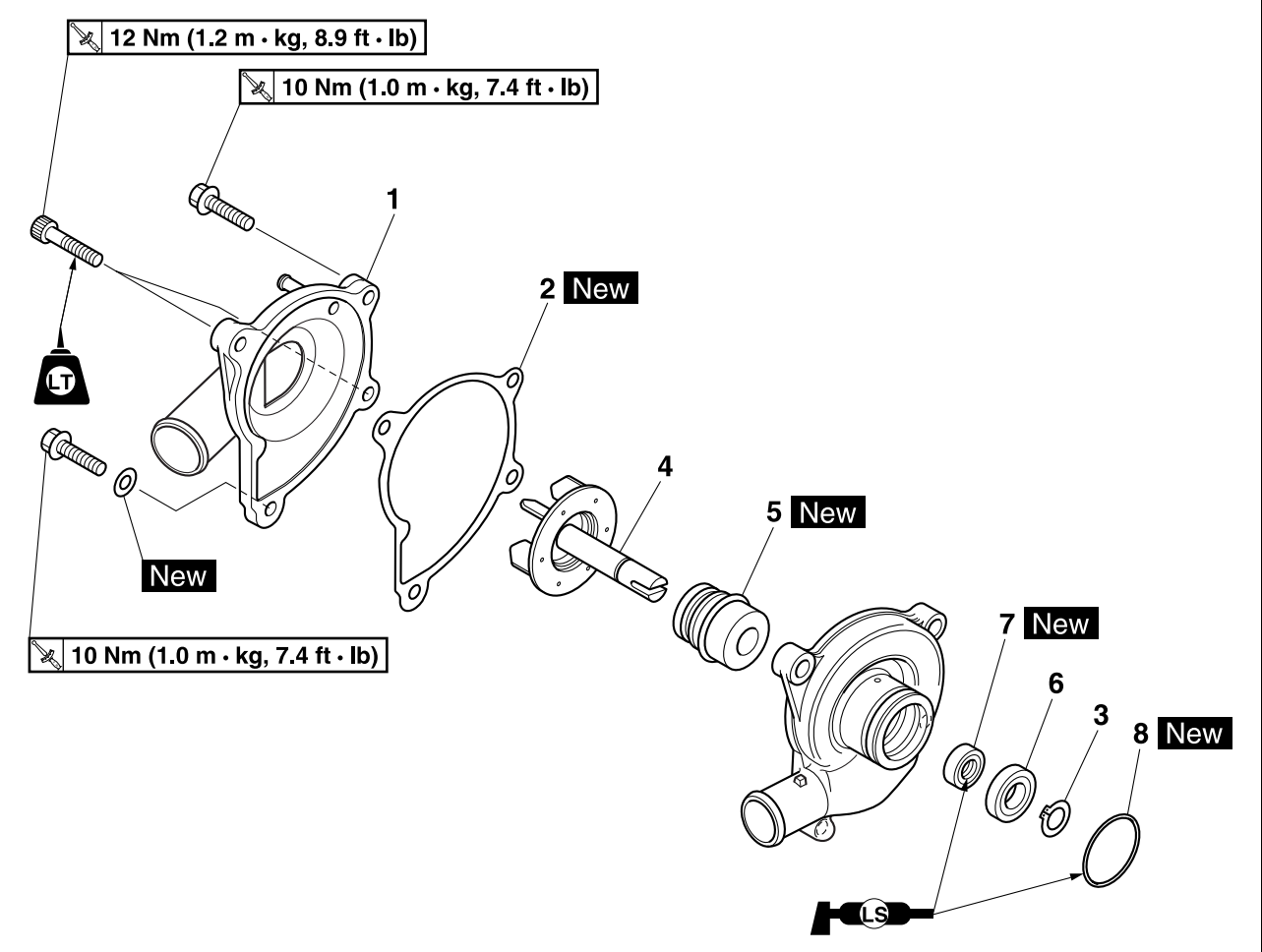
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
			It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Right bottom cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Clutch cable	1	Disconnect.
2	Water pump inlet hose	1	
3	Water pump outlet hose	1	
4	Water pump breather hose	1	
5	Water pump assembly	1	
			For installation, reverse the removal procedure.

Disassembling the water pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Water pump cover	1	
2	Gasket	1	
3	Circlip	1	
4	Impeller shaft (along with the impeller)	1	
5	Water pump seal	1	
6	Bearing	1	
7	Oil seal	1	
8	O-ring	1	
			For installation, reverse the removal procedure.

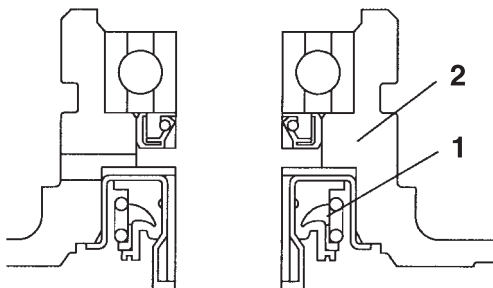
EAS26520

## DISASSEMBLING THE WATER PUMP

1. Remove:
  - Circlip
  - Impeller shaft
2. Remove:
  - Water pump seal "1"

### NOTE:

Remove the water pump seal from the outside of the water pump housing.

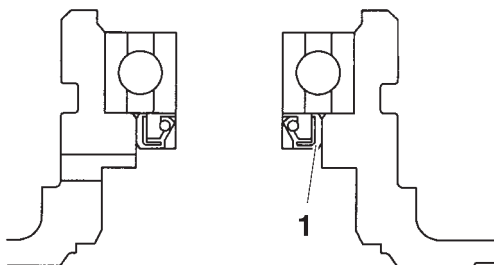


2. Water pump housing

3. Remove:
  - Oil seal "1"
  - (with a thin, flat-head screwdriver)

### NOTE:

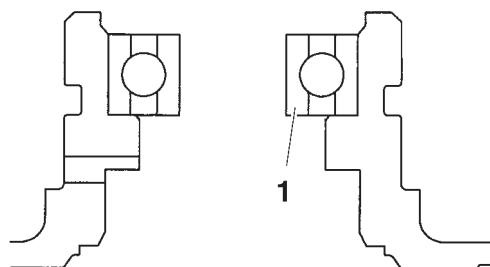
Remove the oil seal from the outside of the water pump housing.



4. Remove:
  - Bearing "1"

### NOTE:

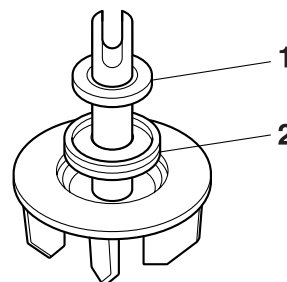
Remove the bearing from inside of the water pump housing.



5. Remove:
  - Rubber damper holder "1"
  - Rubber damper "2"
 (from the impeller, with a thin, flat-head screwdriver)

### NOTE:

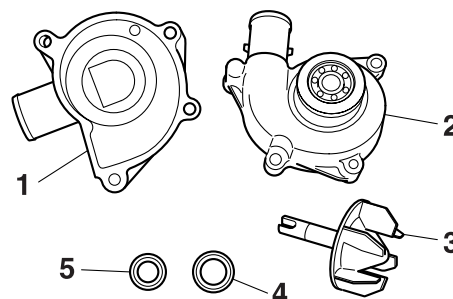
Do not scratch the impeller shaft.



EAS26540

## CHECKING THE WATER PUMP

1. Check:
  - Water pump housing cover "1"
  - Water pump housing "2"
  - Impeller shaft "3"
  - Rubber damper "4"
  - Rubber damper holder "5"
  - Water pump seals
  - Oil seal
 Cracks/damage/wear → Replace.



2. Check:
  - Bearing
 Rough movement → Replace.

## 3. Check:

- Water pump inlet pipe
  - Water pump outlet hose
  - Water pump breather hose
- Cracks/damage/wear → Replace.

EAS26560

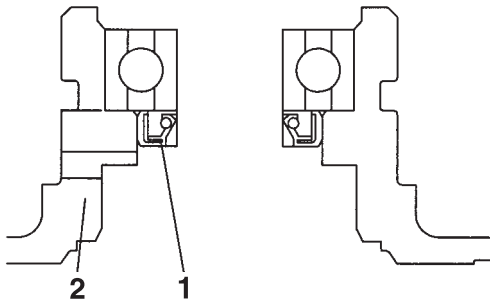
## ASSEMBLING THE WATER PUMP

### 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**

ECA14080

#### CAUTION:

**Never lubricate the water pump seal surface with oil or grease.**

#### NOTE:

- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 (Three Bond No.1215®) “2” to the water pump housing “3”.



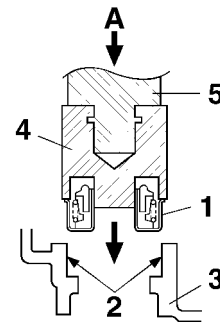
**Mechanical seal installer**  
**90890-04078**

**Water pump seal installer**  
**YM-33221-A**

**Middle driven shaft bearing driver**  
**90890-04058**

**Bearing driver 40 mm**  
**YM-04058**

**Yamaha bond No. 1215 (Three Bond No.1215®)**  
**90890-85505**



A. Push down

4. Mechanical seal installer

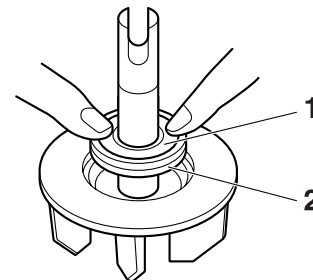
5. Middle driven shaft bearing driver

### 3. Install:

- Rubber damper holder “1” **New**
- Rubber damper “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).

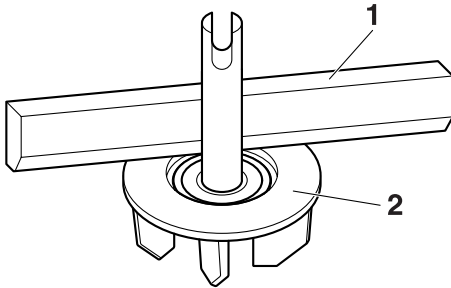
ECA14090

**CAUTION:**

**Make sure the rubber damper and rubber damper holder are flush with the impeller.**



**Impeller shaft tilt limit  
0.15 mm (0.006 in)**



1. Straightedge
2. Impeller

EAS26590

## INSTALLING THE WATER PUMP

### 1. Install:

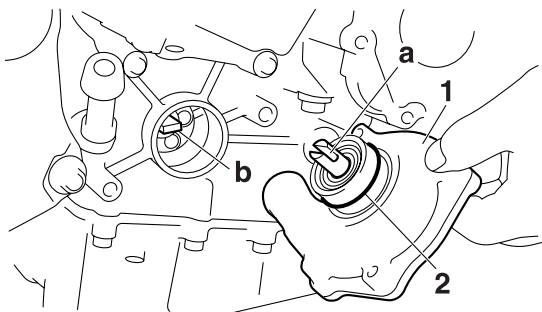
- Water pump assembly “1”
- O-ring “2” **New**



**Water pump bolt  
12 Nm (1.2 m·kg, 8.9 ft·lb)**

**NOTE:**

- 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-based grease.



### 2. Fill:

- Cooling system  
(with the specified amount of the recommended coolant)

Refer to “CHANGING THE COOLANT” on page 3-19.

### 3. Check:

- Cooling system  
Leaks → Repair or replace the faulty part.



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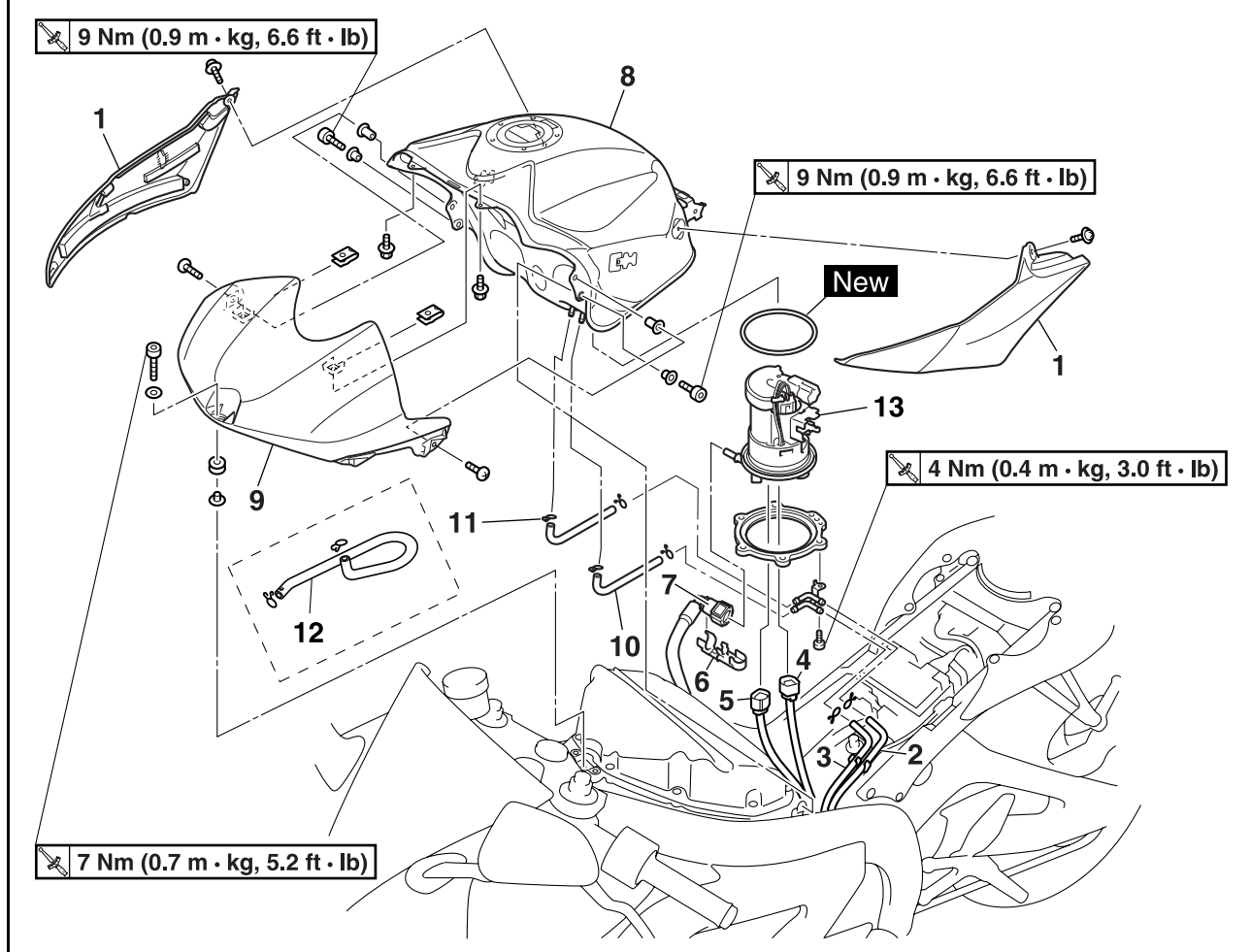
## FUEL SYSTEM

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EAS26620

## FUEL TANK

### Removing the fuel tank and fuel pump



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Fuel tank bracket		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel tank side cover	2	
2	Fuel tank breather hose	1	Except for california Disconnect.
3	Fuel tank overflow hose	1	Disconnect.
4	Fuel pump coupler	1	Disconnect.
5	Fuel sender coupler	1	Disconnect.
6	Fuel hose connector cover	1	
7	Fuel hose (fuel tank side)	1	Disconnect.
8	Fuel tank	1	
9	Fuel tank upper cover	1	
10	Fuel tank overflow hose (fuel tank to hose joint)	1	
11	Fuel tank breather hose (fuel tank to hose joint)	1	Except for california
12	Fuel tank breather hose (fuel tank to rollover valve)	1	For california only
13	Fuel pump	1	
			For installation, reverse the removal procedure.

EAS26630

## REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
  - Fuel sender coupler
  - Fuel pump coupler
  - Fuel hose connector cover
  - Fuel hose (fuel tank side)
  - Fuel tank breather hose
  - Fuel tank overflow hose

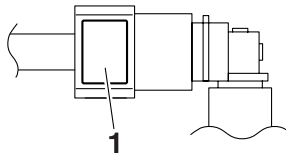
EW2C01008

### **WARNING**

**Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hoses.**

### NOTE:

- To remove the fuel hose from the fuel pump, press the two buttons “1” on the sides of the connector, and then remove the hose.
- Remove the fuel hose manually without using any tools.
- Before removing the hose, place a few rags in the area under where it will be removed.



3. Remove:
  - Fuel tank

### NOTE:

- Place the fuel tank on a level surface.
- Make sure that the fuel pipe does not contact the ground; otherwise, the fuel pump could be damaged.

EAS26640

## REMOVING THE FUEL PUMP

1. Remove:
  - Fuel pump

ECA14720

### **CAUTION:**

- Do not drop the fuel pump or give it a strong shock.

- Do not touch the base section of the fuel sender.

EAS26670

## CHECKING THE FUEL PUMP BODY

1. Check:
  - Fuel pump body
    - Obstruction → Clean.
    - Cracks/damage → Replace fuel pump assembly.
2. Check:
  - Diaphragms and gaskets
    - Tears/fatigue/cracks → Replace fuel pump assembly.

EAS26690

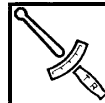
## CHECKING THE FUEL PUMP OPERATION

1. Check:
  - Fuel pump operation
    - Refer to “CHECKING THE FUEL PUMP” on page 8-98.

EAS26710

## INSTALLING THE FUEL PUMP

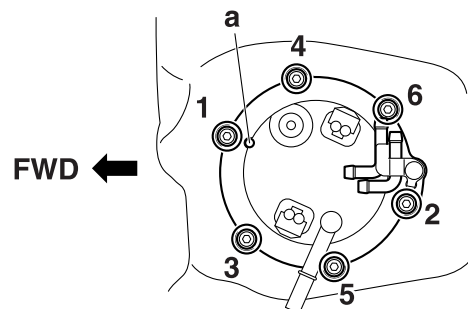
1. Tighten:
  - Fuel pump



**Fuel pump bolt**  
**4 Nm (0.4 m·kg, 3.0 ft·lb)**

### NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align the projection “a” on the fuel pump with the slot in the fuel pump bracket.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



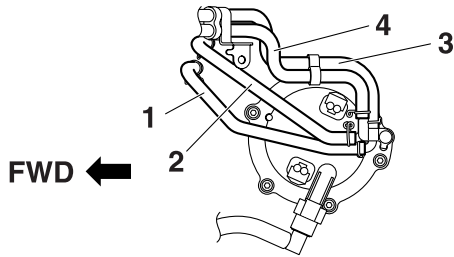
ET2C01010

## INSTALLING THE FUEL TANK

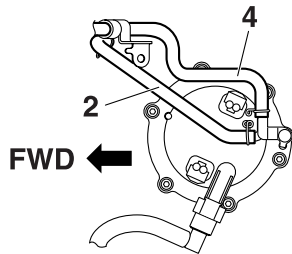
### 1. Connect:

- Fuel tank breather hose (fuel tank to hose joint) “1”
- Fuel tank overflow hose (fuel tank to hose joint) “2”
- Fuel tank breather hose “3”
- Fuel tank overflow hose “4”

A



B



A. Except for California

B. For California

### 2. Connect:

- Fuel hose (fuel tank side)

EC2C01017

### CAUTION:

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

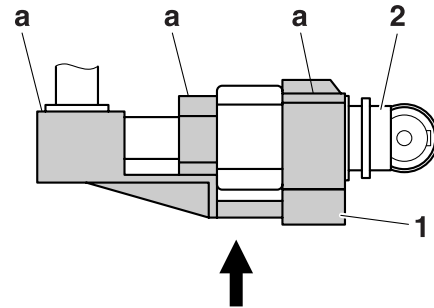
### NOTE:

Install the fuel hose securely onto the fuel pump until a distinct “click” is heard.

- Fuel hose connector cover

### NOTE:

Attach the fuel hose connector cover “1” to the fuel hose connector “2” from the bottom. Make sure that parts “a” are firmly attached to the fuel hose connector “2”.



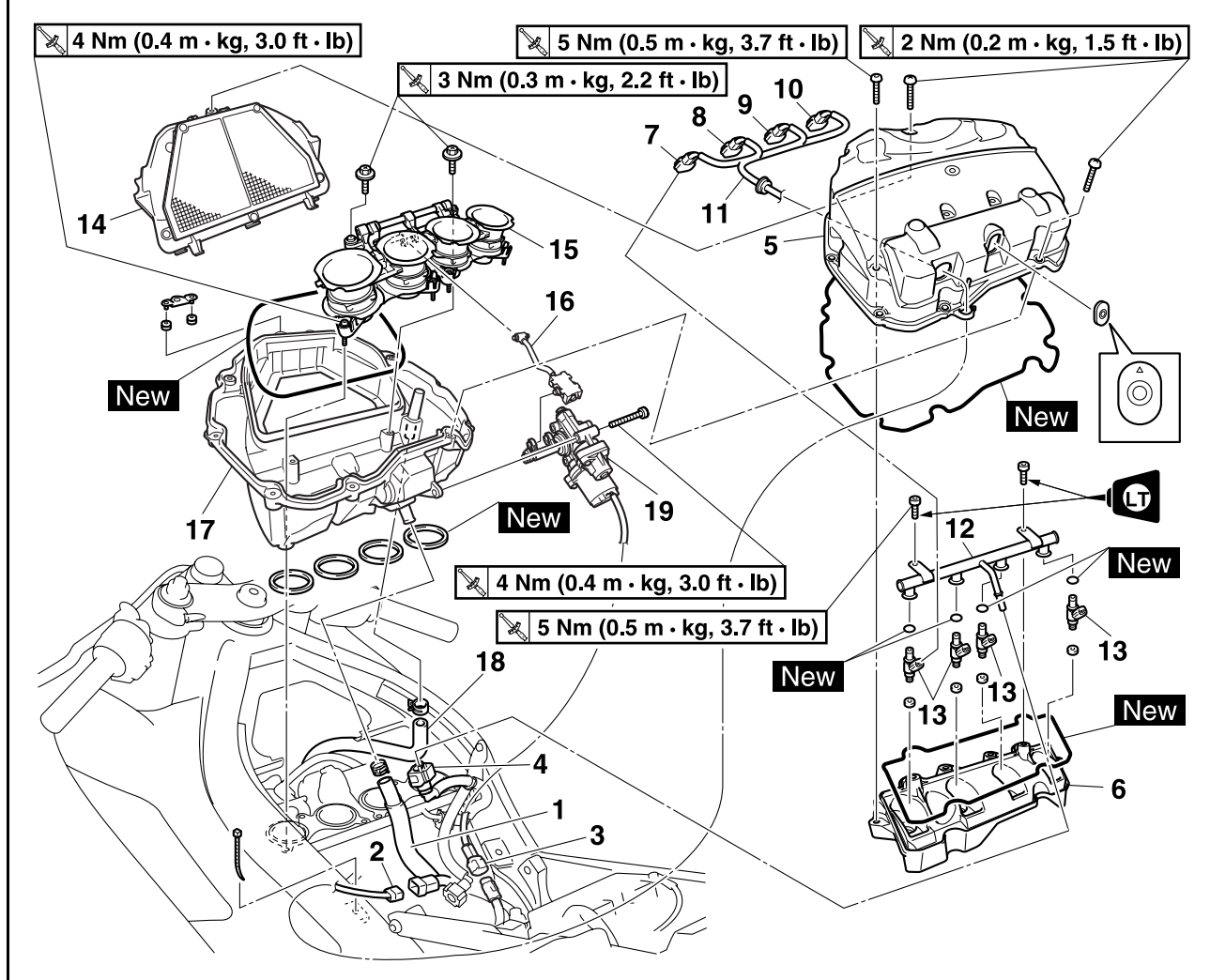
### 3. Connect:

- Fuel sender coupler
- Fuel pump coupler

ET2C01003

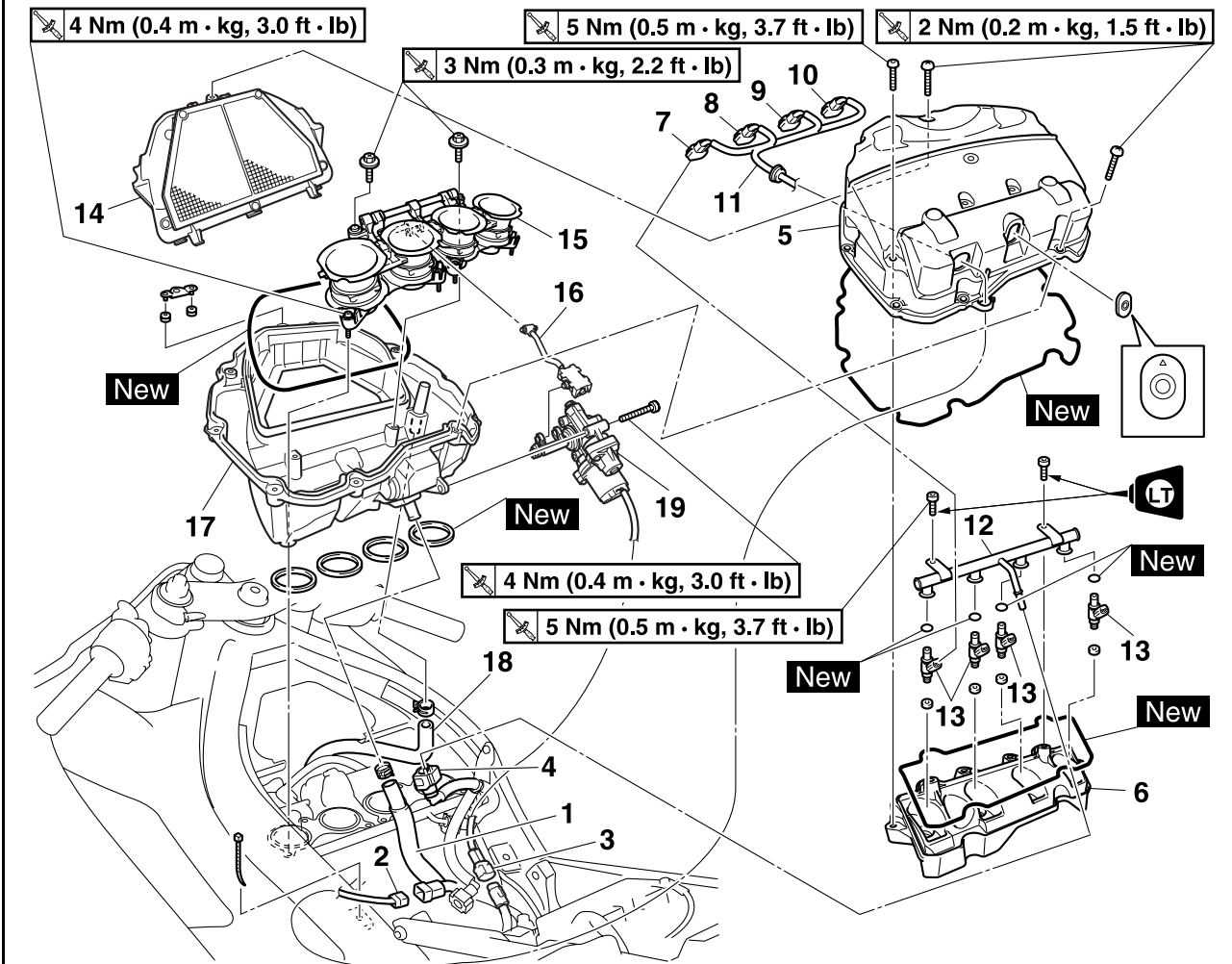
## AIR FILTER CASE

### Removing the air filter case and secondary injectors



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Crankcase breather hose	1	Disconnect.
2	Sub-wire harness coupler	1	Disconnect.
3	Intake funnel servo motor coupler	1	
4	Fuel hose (secondary injector fuel rail side)	1	Disconnect.
5	Upper air filter case	1	
6	Secondary injector holder	1	
7	Cylinder-#1 secondary injector coupler	1	Disconnect.
8	Cylinder-#2 secondary injector coupler	1	Disconnect.
9	Cylinder-#3 secondary injector coupler	1	Disconnect.
10	Cylinder-#4 secondary injector coupler	1	Disconnect.
11	Sub-wire harness	1	
12	Secondary injector fuel rail	1	
13	Secondary injector	4	
14	Air filter element	1	
15	Intake funnel assembly	1	
16	Intake funnel servo motor rod assembly	1	
17	Lower air filter case	1	

## Removing the air filter case and secondary injectors



Order	Job/Parts to remove	Q'ty	Remarks
18	Air induction system hose (air filter case to air cut-off valve)	1	Disconnect.
19	Intake funnel servo motor	1	
			For installation, reverse the removal procedure.

ET2C01005

## REMOVING THE FUEL HOSE (PRIMARY INJECTOR FUEL RAIL SIDE AND SECONDARY INJECTOR FUEL RAIL SIDE)

1. Remove:
  - Fuel hose (primary injector fuel rail side and secondary injector fuel rail side)

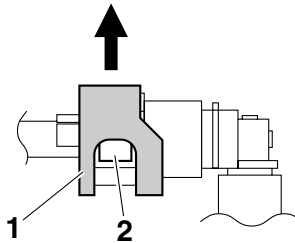
EW2C01008

### **WARNING**

**Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hoses.**

### NOTE:

- To remove the fuel hose from the secondary injector fuel rail, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then remove the hose.
- Remove the fuel hose manually without using any tools.
- Before removing the hose, place a few rags in the area under where it will be removed.



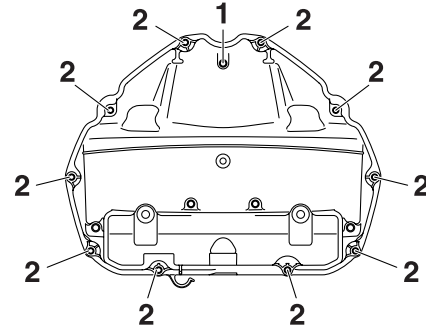
EAS13S1001

## REMOVING THE AIR FILTER CASE

1. Remove:
  - Upper air filter case

### NOTE:

Loosen the upper air filter case bolts in proper sequence as shown.



ET2C01017

## CHECKING THE SECONDARY INJECTORS

1. Check:
  - Injectors
 Damage → Replace.

EAS13S1002

## REMOVING THE INTAKE FUNNEL

1. Remove:
  - Intake funnel joint bolts

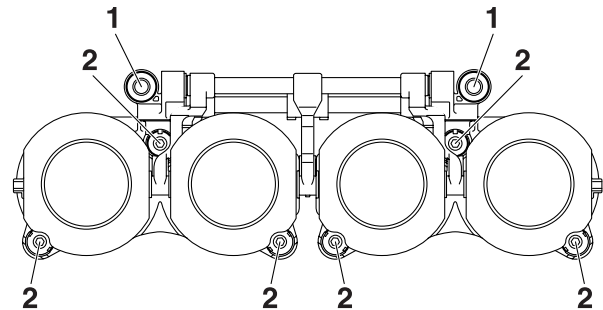
ECA4C81022

### **CAUTION:**

**Do not remove the bolts "2" from the intake funnel joint.**

### NOTE:

Loosen the intake funnel joint bolts in proper sequence as shown.



- Intake funnel assembly
- Intake funnel servo motor rod assembly

EAS4C81025

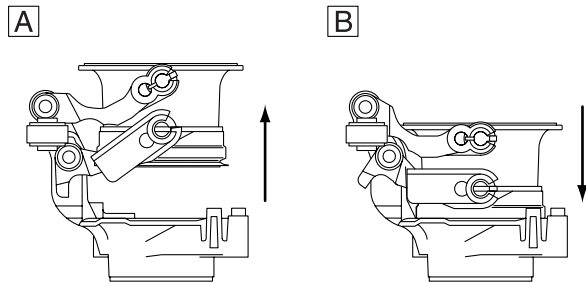
## CHECKING THE INTAKE FUNNEL

1. Check:
  - Intake funnel servo motor rod assembly  
Damage/scratches → Replace.
  - Intake funnel assembly  
Cracks/damage → Replace.
2. Check:
  - Intake funnel movement  
Sticks → Replace the intake funnel assembly.

ECA4C81020

## CAUTION:

- Make sure that the intake funnel smoothly moves to the contacting surface between upper stopper and lower seating position when it is moved by hand.
- Make sure that the intake funnel smoothly strokes from the upper position to the seating position by its own weight.



A. Upper  
B. Lower

EAS131004

## INSTALLING THE INTAKE FUNNEL

1. Install:
  - Intake funnel servo motor rod assembly
  - Intake funnel assembly
  - Intake funnel joint bolts "1"

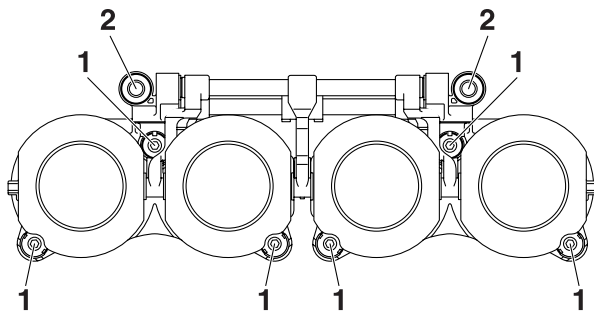


**Intake funnel joint bolt**  
4 Nm (0.4 m·kg, 3.0 ft·lb)

- Intake funnel joint bolts "2"



**Intake funnel joint bolt**  
3 Nm (0.3 m·kg, 2.2 ft·lb)



EAS4C81027

## CHECKING THE INTAKE FUNNEL OPERATION

1. Check:
  - Intake funnel operation



- Activate the diagnostic mode and select the diagnostic code number "34". Refer to "FUEL INJECTION SYSTEM" on page 8-33.
- Set the engine stop switch to "○".
- Check that the intake funnel operate smoothly strokes from the upper position to the lower seating position.



EAS13S1003

## INSTALLING THE AIR FILTER CASE

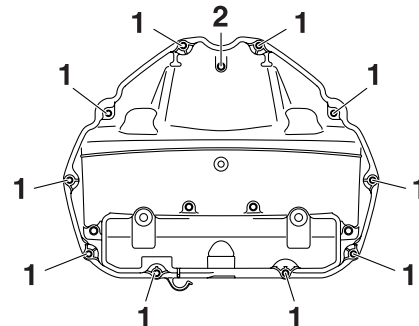
1. Install:
  - Upper air filter case



**Upper air filter case bolt**  
2 Nm (0.2 m·kg, 1.5 ft·lb)

## NOTE:

Tighten the upper air filter case bolts in proper sequence as shown.



ET2C01006

## INSTALLING THE FUEL HOSE (PRIMARY INJECTOR FUEL RAIL SIDE AND SECONDARY INJECTOR FUEL RAIL SIDE)

1. Connect:
  - Fuel hose (primary injector fuel rail side and secondary injector fuel rail side)

EC2C01017

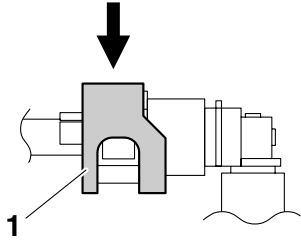
## CAUTION:

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

## NOTE:

- Install the fuel hose securely onto the secondary injector fuel rail until a distinct "click" is heard.

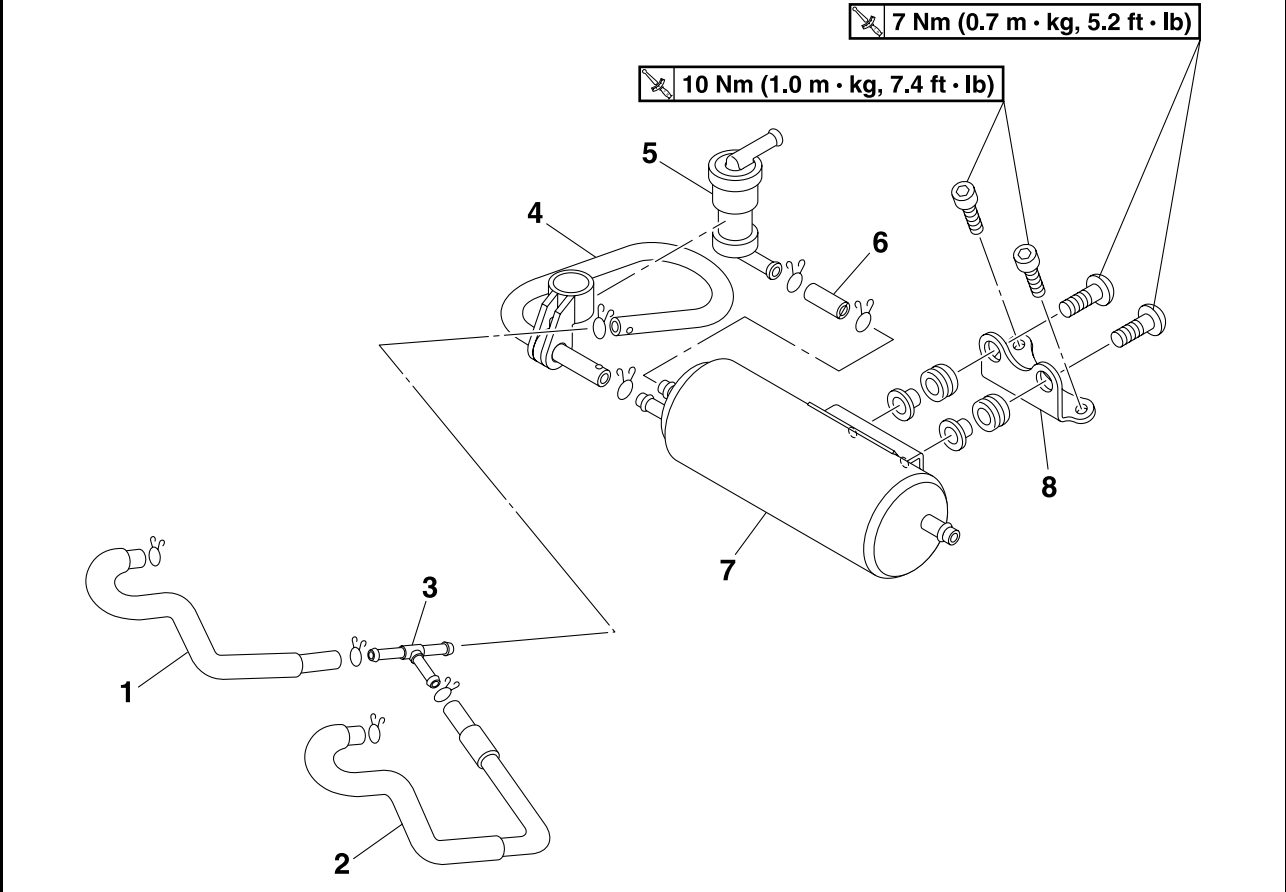
- To install the fuel hose onto the secondary injector fuel rail, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown.
- 



EAS26970

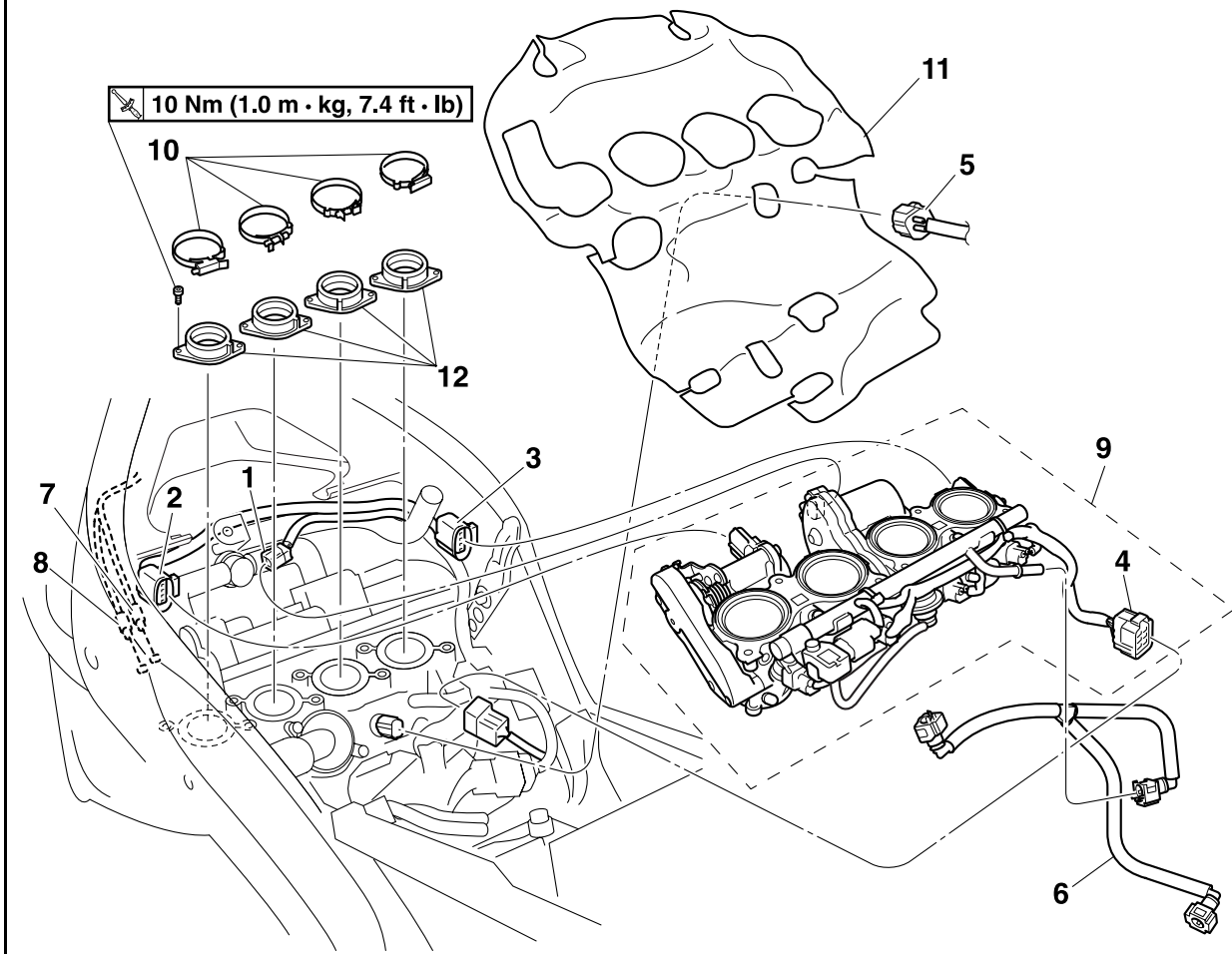
THROTTLE BODIES

Removing the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
1	Canister purge hose (throttle body-#4 to 3-way joint)	1	
2	Canister purge hose (throttle body-#2 to 3-way joint)	1	
3	3-way joint	1	
4	Canister purge hose (3-way joint to canister)	1	
5	Rollover valve	1	
6	Fuel tank breather hose (rollover valve to canister)	1	
7	Canister	1	
8	Canister bracket	1	
			For installation, reverse the removal procedure.

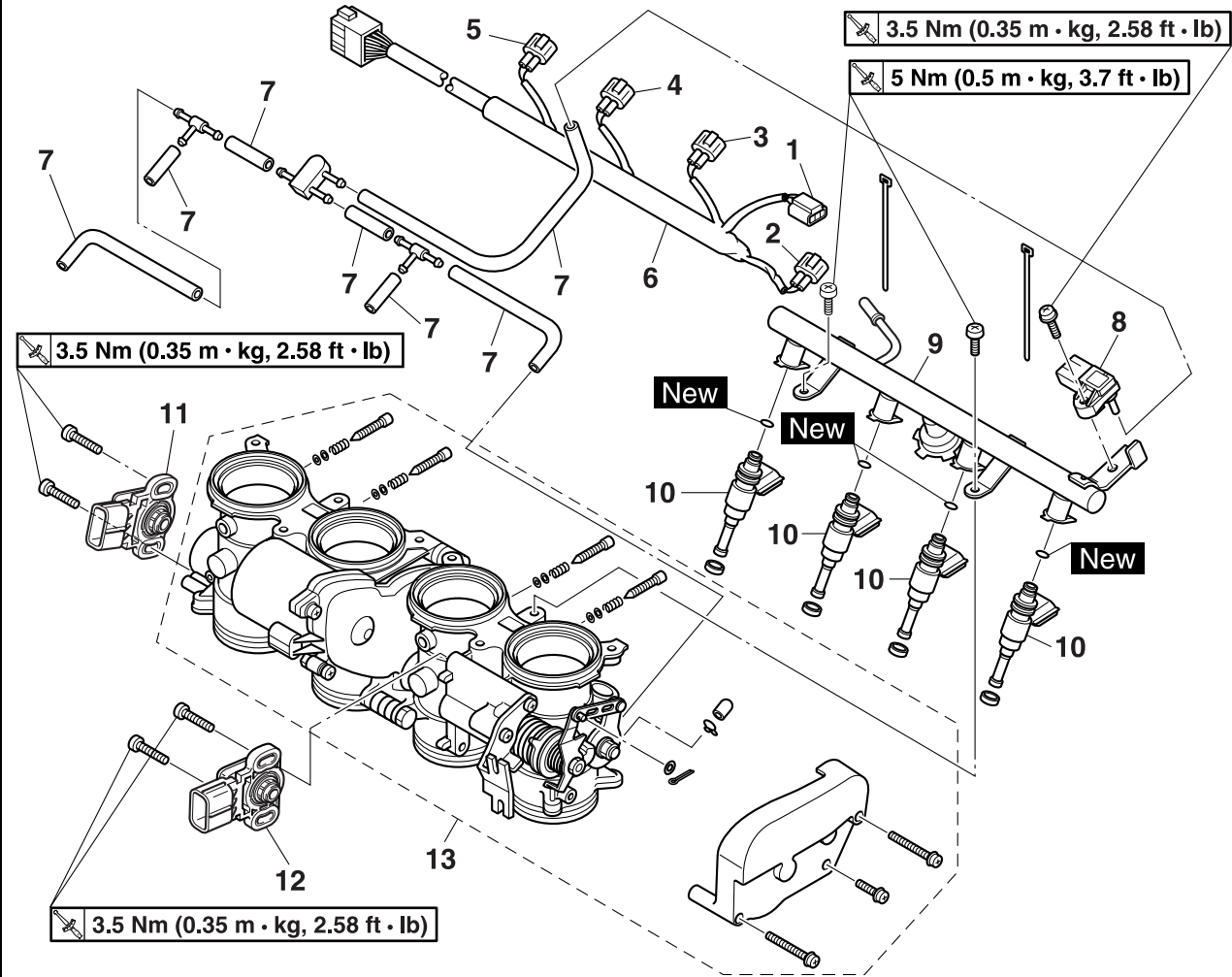
## Removing the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
	Air induction system cover		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
1	Throttle servo motor coupler	1	Disconnect.
2	Throttle position sensor (for throttle cable pulley) coupler	1	Disconnect.
3	Throttle position sensor (for throttle valves) coupler	1	Disconnect.
4	Sub-wire harness coupler	1	Disconnect.
5	Coolant temperature sensor coupler	1	Disconnect.
6	Fuel hose	1	
7	Throttle cable (decelerator cable)	1	
8	Throttle cable (accelerator cable)	1	
9	Throttle body assembly	1	
10	Throttle body joint clamp	4	
11	Heat protector	1	
12	Throttle body joint	4	
			For installation, reverse the removal procedure.

# THROTTLE BODIES

## Removing the primary injectors



Order	Job/Parts to remove	Q'ty	Remarks
1	Intake air pressure sensor coupler	1	Disconnect.
2	Cylinder-#1 primary injector coupler	1	Disconnect.
3	Cylinder-#2 primary injector coupler	1	Disconnect.
4	Cylinder-#3 primary injector coupler	1	Disconnect.
5	Cylinder-#4 primary injector coupler	1	Disconnect.
6	Sub-wire harness	1	
7	Intake air pressure sensor hose	7	
8	Intake air pressure sensor	1	
9	Primary injector fuel rail	1	
10	Primary injector	4	
11	Throttle position sensor (for throttle valves)	1	
12	Throttle position sensor (for throttle cable pulley)	1	
13	Throttle bodies	1	
			For installation, reverse the removal procedure.

EAS26980

## CHECKING THE PRIMARY INJECTORS

1. Check:
  - Injectors
 Damage → Replace.

EAS26990

## CHECKING THE THROTTLE BODIES

1. Check:
  - Throttle bodies
 Cracks/damage → Replace the throttle body assembly.

ECA14600

### CAUTION:

**The throttle bodies should not be disassembled.**

2. Check:
  - Fuel passages
 Obstructions → Clean.

- a. Wash the throttle bodies in a petroleum-based solvent.  
Do not use any caustic carburetor cleaning solution.
- b. Blow out all of the passages with compressed air.

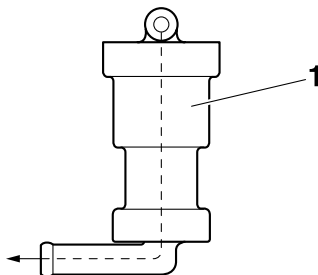
ET2C05001

## CHECKING THE ROLLOVER VALVE (for California only)

1. Check:
  - Rollve valve “1”
 Damage/faulty → Replace.

### NOTE:

- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.



EAS27010

## CHECKING THE FUEL PRESSURE

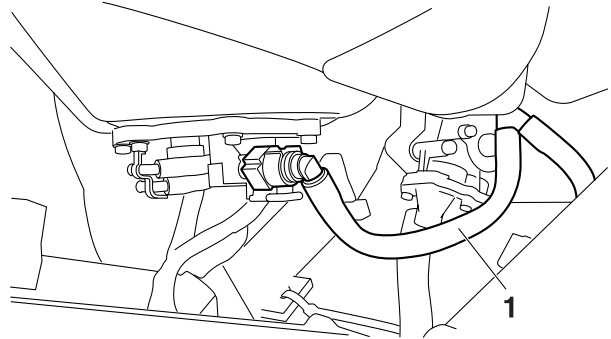
1. Check:
  - Fuel pressure

- a. Remove the rider seat.  
Refer to “GENERAL CHASSIS” on page 4-1.
- b. Disconnect the fuel hose “1” from the fuel tank.

EW2C01008

### WARNING

**Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hoses.**



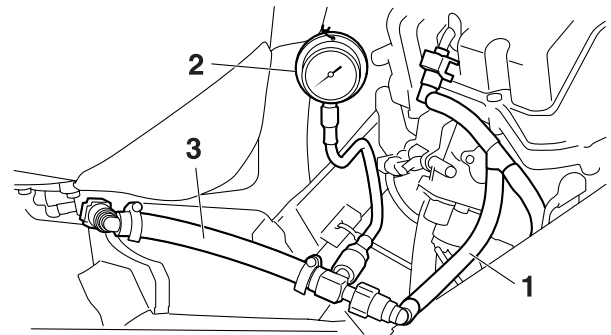
- c. Connect the pressure gauge “2” and adapter “3” to the fuel hose “1”.



**Pressure gauge**  
**90890-03153**

**Pressure gauge**  
**YU-03153**

**Fuel pressure adapter**  
**90890-03176**  
**YM-03176**



- d. Start the engine.
- e. Measure the fuel pressure.



**Fuel pressure**  
324.0 kPa (47.0 psi) (3.24 kg/cm<sup>2</sup>)

Faulty → Replace the fuel pump.



ET2C01007

## ADJUSTING THE THROTTLE POSITION SENSOR (FOR THROTTLE VALVES)

1. Check:
  - Throttle position sensor (for throttle valves)

Refer to “CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE VALVES)” on page 8-97.

2. Adjust:
  - Throttle position sensor angle



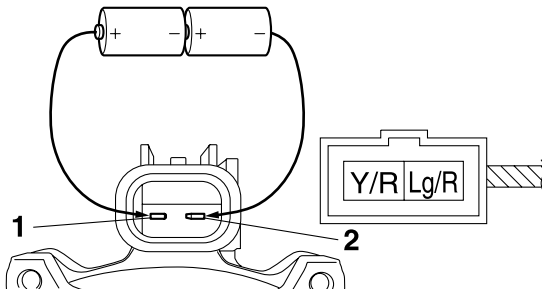
- a. Connect the two C size batteries to the throttle servo motor terminal as shown.

- Positive battery lead  
light green/red terminal “1”
- Negative battery lead  
yellow/red terminal “2”

EC2C01027

### CAUTION:

**Do not use a 12 V battery to operate the throttle valves.**



- b. Check that the throttle valves are fully closed.
- c. Connect the throttle position sensor coupler to the throttle position sensor.
- d. Connect the digital circuit tester to the throttle position sensor.

- Positive tester probe  
blue terminal “1” or green terminal “2”
- Negative tester probe  
black/blue terminal “3”



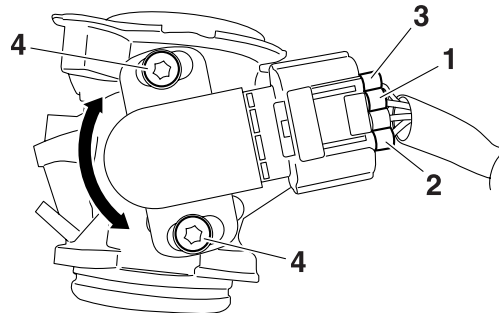
**Digital circuit tester**  
90890-03174  
**Model 88 Multimeter with tachometer**  
**YU-A1927**

- e. Measure the throttle position sensor voltage.
- f. Adjust the throttle position sensor angle so that the voltage is within the specified range.



**Output voltage**  
**0.590–0.690 V**

- g. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “4”.



ET2C01008

## ADJUSTING THE THROTTLE POSITION SENSOR (FOR THROTTLE CABLE PULLEY)

1. Check:
  - Throttle position sensor (for throttle cable pulley)

Refer to “CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE CABLE PULLEY)” on page 8-98.

2. Adjust:
  - Throttle position sensor angle



- a. Connect the throttle position sensor coupler to the throttle position sensor.
- b. Connect the digital circuit tester to the throttle position sensor.

- Positive tester probe  
white terminal “1” or white/red terminal “2”
- Negative tester probe  
black/blue terminal “3”



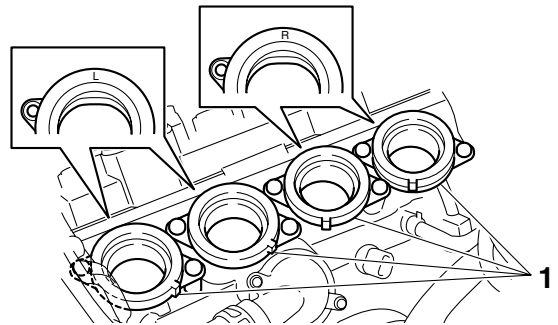
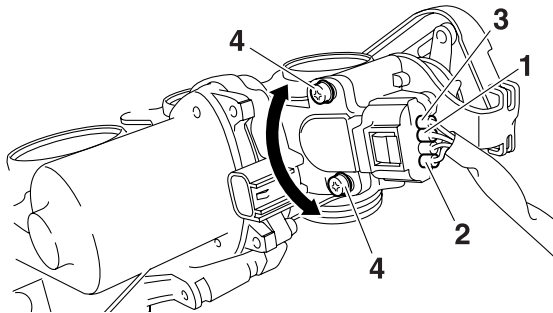
**Digital circuit tester**  
90890-03174  
**Model 88 Multimeter with**  
**tachometer**  
YU-A1927

- c. Measure the throttle position sensor voltage.
- d. Adjust the throttle position sensor angle so that the voltage is within the specified range.



**Output voltage**  
0.630–0.730 V

- e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “4”.



ET2C01009

## INSTALLING THE THROTTLE BODY JOINTS

1. Install:
  - Throttle body joints “1”



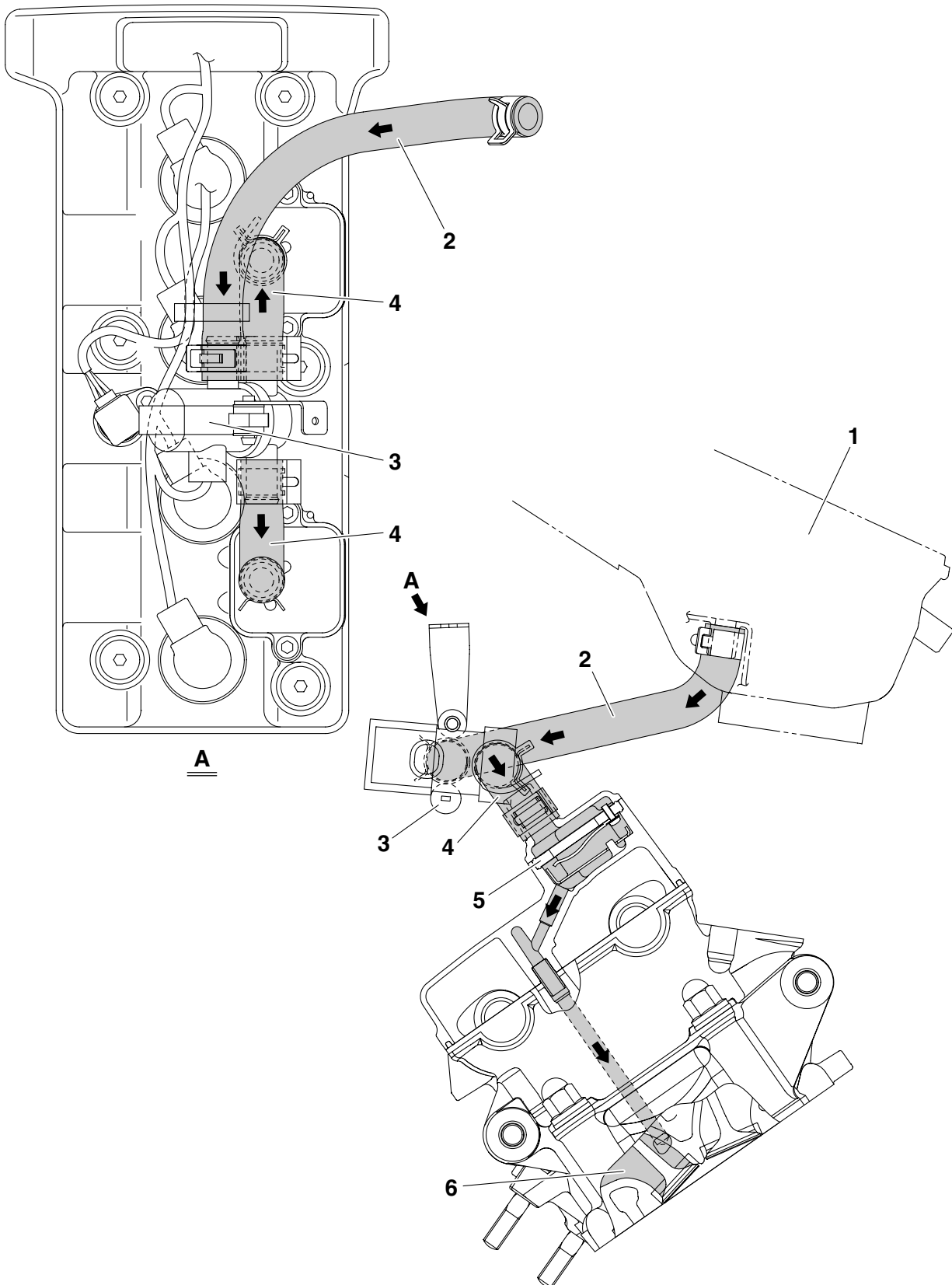
**Throttle body joint bolt**  
10 Nm (1.0 m·kg, 7.4 ft·lb)

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

Be sure to install the throttle body joints with the “L” mark onto the throttle body openings for cylinders #1 and #2 and the joints with the “R” mark onto the openings for cylinders #3 and #4.

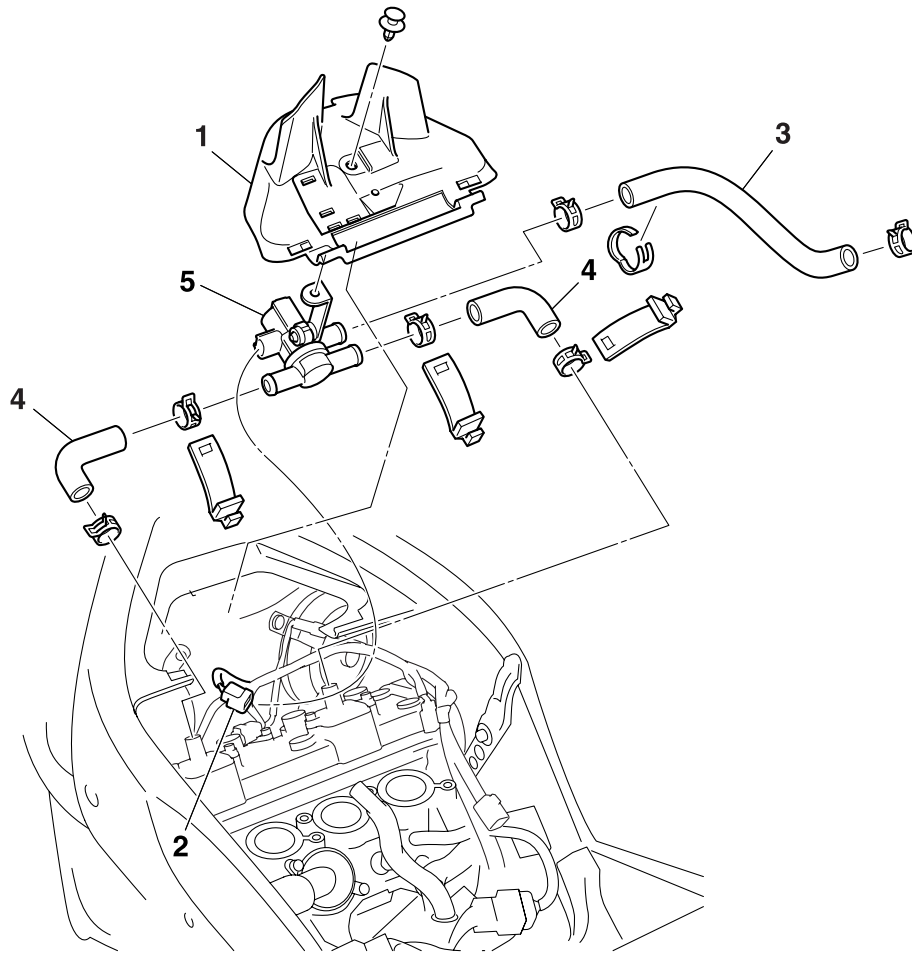
EAS27040

## AIR INDUCTION SYSTEM



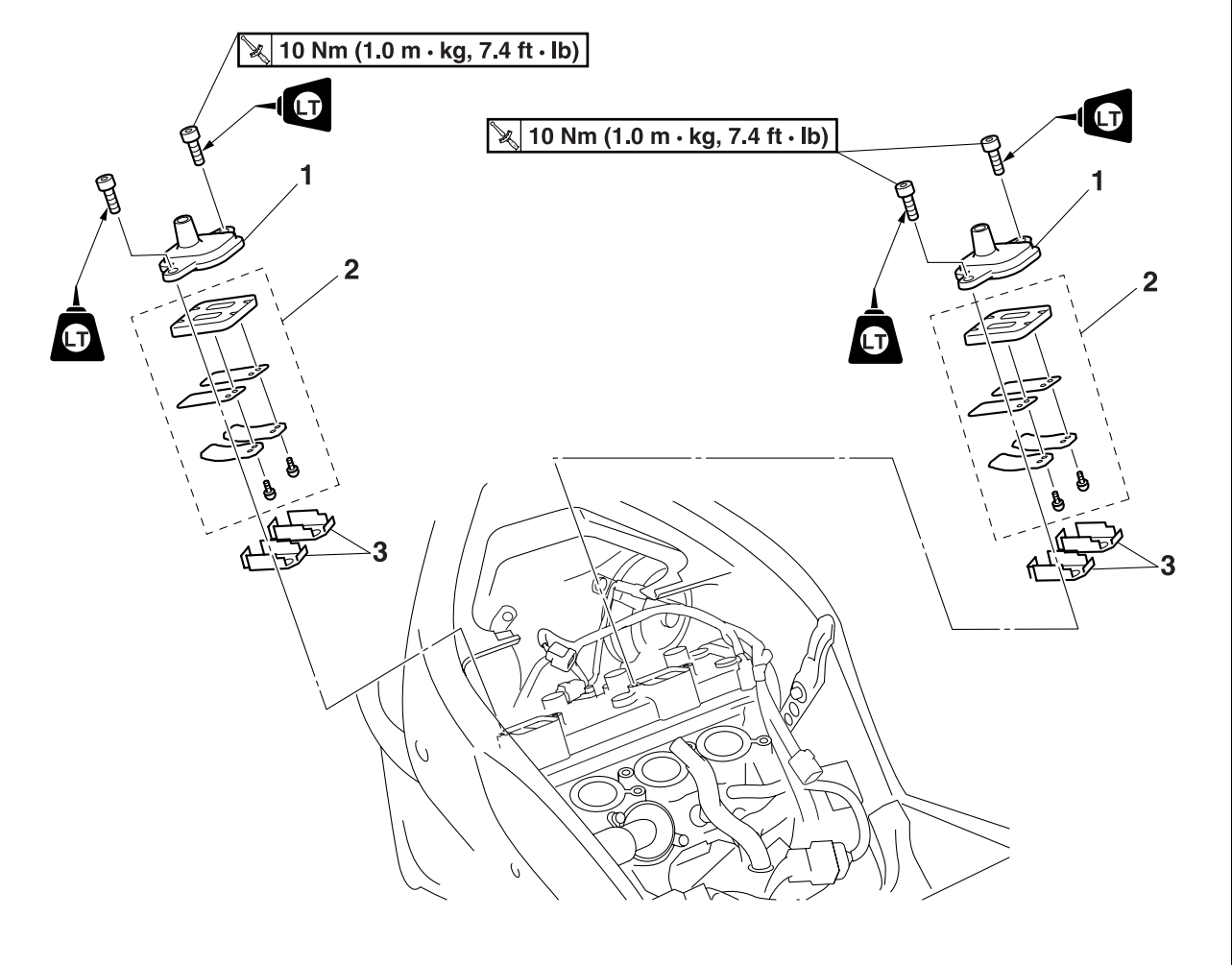
1. Lower air filter case
2. Air induction system hose (air filter case to air cut-off valve)
3. Air cut-off valve
4. Air induction system hose (air cut-off valve to cylinder head cover)
5. Reed valve assembly
6. Exhaust port

## Removing the air cut-off valve



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-4.
1	Air induction system cover	1	
2	Air induction system solenoid coupler	1	Disconnect.
3	Air induction system hose (air filter case to air cut-off valve)	1	
4	Air induction system hose (air cut-off valve to cylinder head cover)	2	
5	Air cut-off valve	1	
			For installation, reverse the removal procedure.

Removing the reed valves



Order	Job/Parts to remove	Q'ty	Remarks
1	Reed valve cover	2	
2	Reed valve assembly	2	
3	Reed valve plate	4	
			For installation, reverse the removal procedure.

EAS27060

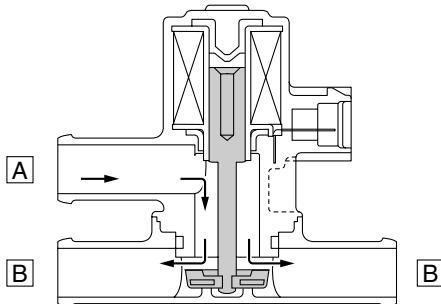
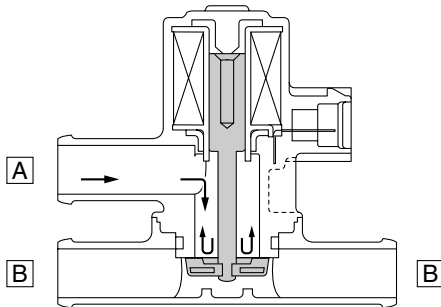
## CHECKING THE AIR INDUCTION SYSTEM

### Air injection

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C (1112 to 1292 °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 vehicle 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 assembly until the temperature becomes higher than the specified value.



A. From the air filter case

B. To the cylinder head

### 1. Check:

- Hoses

Loose connections → Connect properly.

Cracks/damage → Replace.

### 2. Check:

- Reed valve
- Reed valve stopper
- Reed valve seat

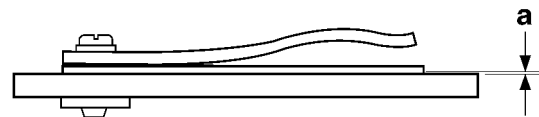
Cracks/damage → Replace the reed valve assembly.

### 3. Measure:

- Reed valve bending limit "a"
- Out of specification → Replace the reed valve assembly.



**Reed valve bending limit**  
**0.4 mm (0.016 in)**



### 4. Check:

- Air cut-off valve
- Cracks/damage → Replace.

### 5. Check:

- Air induction system solenoid
- Refer to "CHECKING THE AIR INDUCTION SYSTEM SOLENOID" on page 8-99.

---

## ELECTRICAL SYSTEM

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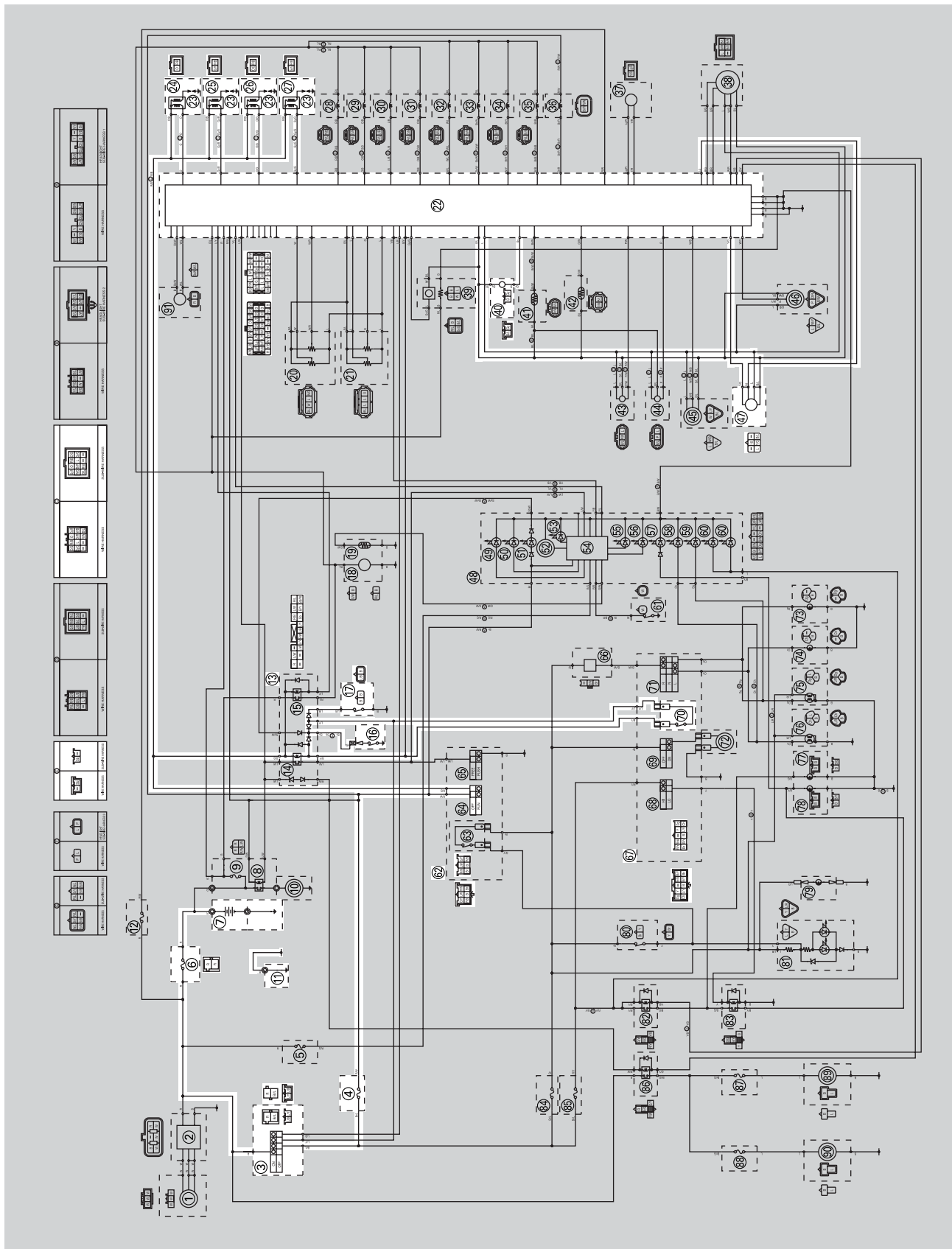
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EAS27090

## IGNITION SYSTEM

EAS27110

## CIRCUIT DIAGRAM



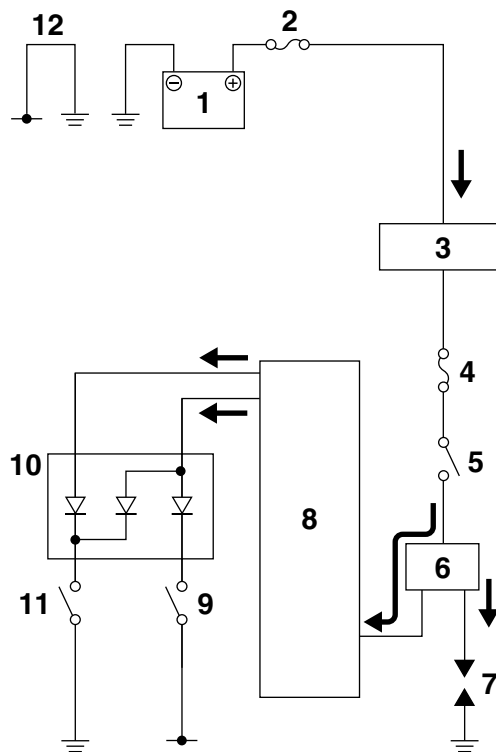
- 3. Main switch
- 4. Ignition fuse
- 6. Main fuse
- 7. Battery
- 11.Engine ground
- 13.Relay unit
- 14.Starting circuit cut-off relay
- 16.Neutral switch
- 17.Sidestand switch
- 22.ECU (engine control unit)
- 23.Spark plug
- 24.Cylinder-#1 ignition coil
- 25.Cylinder-#2 ignition coil
- 26.Cylinder-#3 ignition coil
- 27.Cylinder-#4 ignition coil
- 40.Crankshaft position sensor
- 47.Lean angle sensor
- 64.Engine stop switch

ET2C01023

## ENGINE STOPPING DUE TO SIDE STAND OPERATION

When the engine is running and the transmission is in gear, the engine will stop if the sidestand is moved down. This is because the electric current from the ignition coils does not flow to the ECU when both the neutral switch and sidestand switch are set to “OFF”, thereby preventing the spark plugs from producing a spark. However, the engine continues to run under the following conditions:

- The transmission is in gear (the neutral switch circuit is open) and the sidestand is up (the sidestand switch circuit is closed).
- The transmission is in neutral (the neutral switch circuit is closed) and the sidestand is down (the sidestand switch circuit is open).



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Ignition coil
7. Spark plug
8. ECU (engine control unit)
9. Sidestand switch
10. Relay unit (diode)
11. Neutral switch
12. Engine ground

EAS27150

## TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

### NOTE:

- Before troubleshooting, remove the following part(s):

1. Rider seat
2. Fuel tank
3. Air filter case
4. Side cowlings
5. Bottom cowlings

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the spark plugs. Refer to "CHECKING THE SPARK PLUGS" on page 3-9.	NG→	Re-gap or replace the spark plug(s).
OK↓		
4. Check the ignition spark gap. Refer to "CHECKING THE IGNI- TION COILS" on page 8-92.	OK→	Ignition system is OK.
NG↓		
5. Check the ignition coils. Refer to "CHECKING THE IGNI- TION COILS" on page 8-92.	NG→	Replace the ignition coil(s).
OK↓		
6. Check the crankshaft position sen- sor. Refer to "CHECKING THE CRANKSHAFT POSITION SEN- SOR" on page 8-93.	NG→	Replace the crankshaft position sen- sor.
OK↓		
7. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		

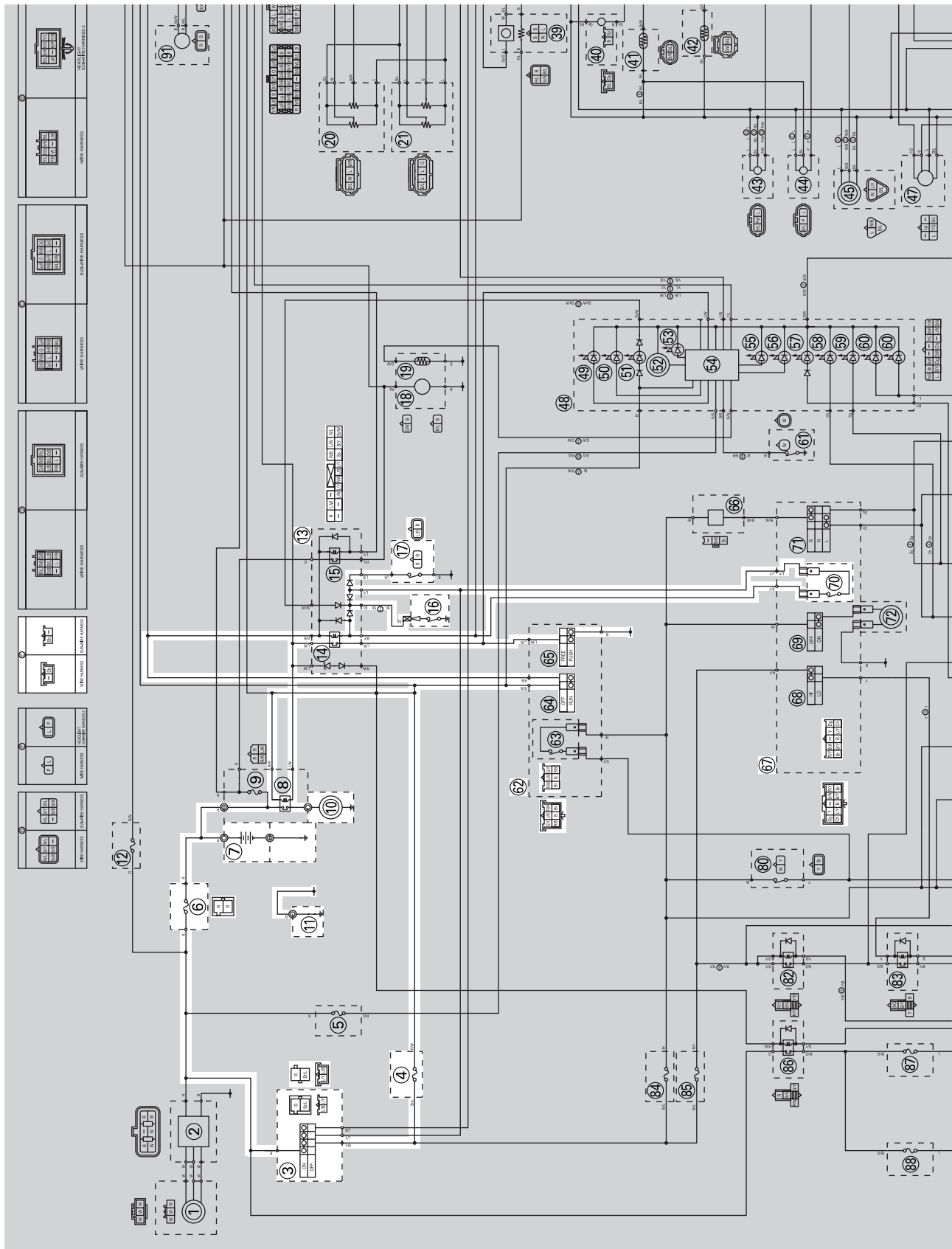
8. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the right handlebar switch.
OK↓		
9. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the neutral switch.
OK↓		
10. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the sidestand switch.
OK↓		
11. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the relay unit.
OK↓		
12. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-91.	NG→	Replace the relay unit.
OK↓		
13. Check the lean angle sensor. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-93.	NG→	Replace the lean angle sensor.
OK↓		
14. Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-1.	NG→	Properly connect or repair the ignition system's wiring.
OK↓		
Replace the ECU.		

EAS27160

## ELECTRIC STARTING SYSTEM

EAS27170

## CIRCUIT DIAGRAM



- 3. Main switch
- 4. Ignition fuse
- 6. Main fuse
- 7. Battery
- 8. Starter relay
- 10. Starter motor
- 11. Engine ground
- 13. Relay unit
- 14. Starting circuit cut-off relay
- 16. Neutral switch
- 17. Sidestand switch
- 64. Engine stop switch
- 65. Start switch
- 70. Clutch switch

## ELECTRIC STARTING SYSTEM

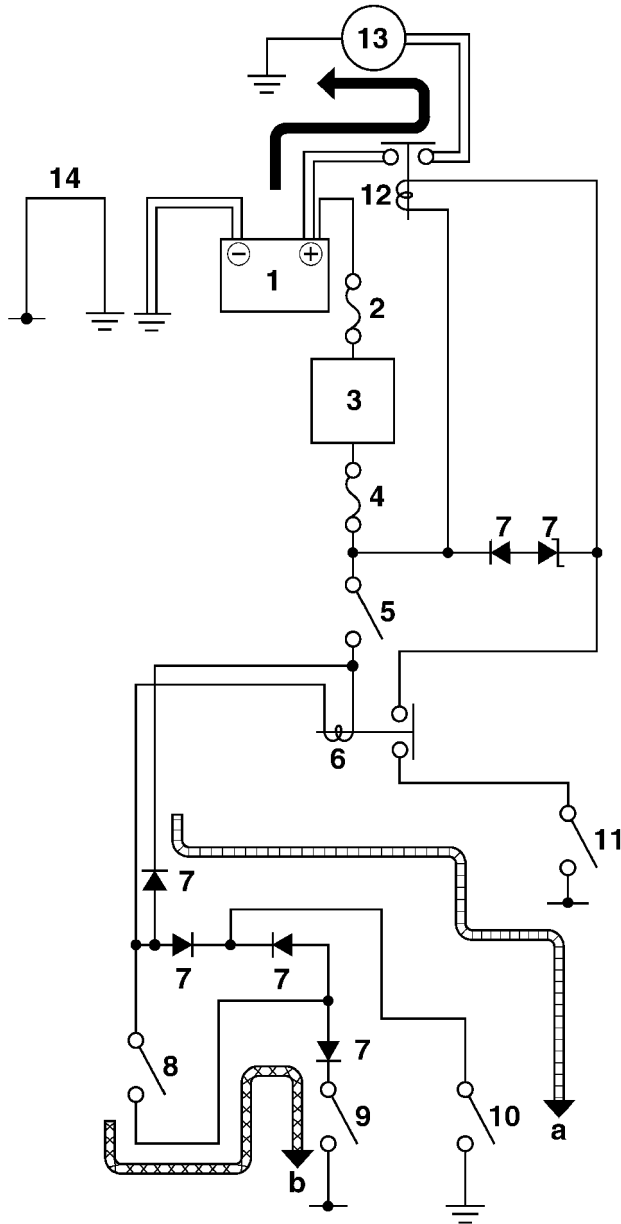
EAS27180

## STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the start switch.



- a. WHEN THE TRANSMISSION IS IN NEUTRAL
- b. 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. Relay unit (starting circuit cut-off relay)
- 7. Relay unit (diode)
- 8. Clutch switch
- 9. Sidestand switch
- 10. Neutral switch
- 11. Start switch
- 12. Starter relay
- 13. Starter motor
- 14. Engine ground

EAS27190

## TROUBLESHOOTING

The starter motor fails to turn.

### NOTE:

- Before troubleshooting, remove the following part(s):

1. Rider seat
2. Fuel tank
3. Air filter case
4. Side cowlings
5. Thermostat

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-93.	OK→	Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.
NG↓		
4. Check the starter motor. Refer to "CHECKING THE STARTER MOTOR" on page 5-34.	NG→	Repair or replace the starter motor.
OK↓		
5. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the relay unit.
OK↓		
6. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-91.	NG→	Replace the relay unit.
OK↓		
7. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the starter relay.
OK↓		

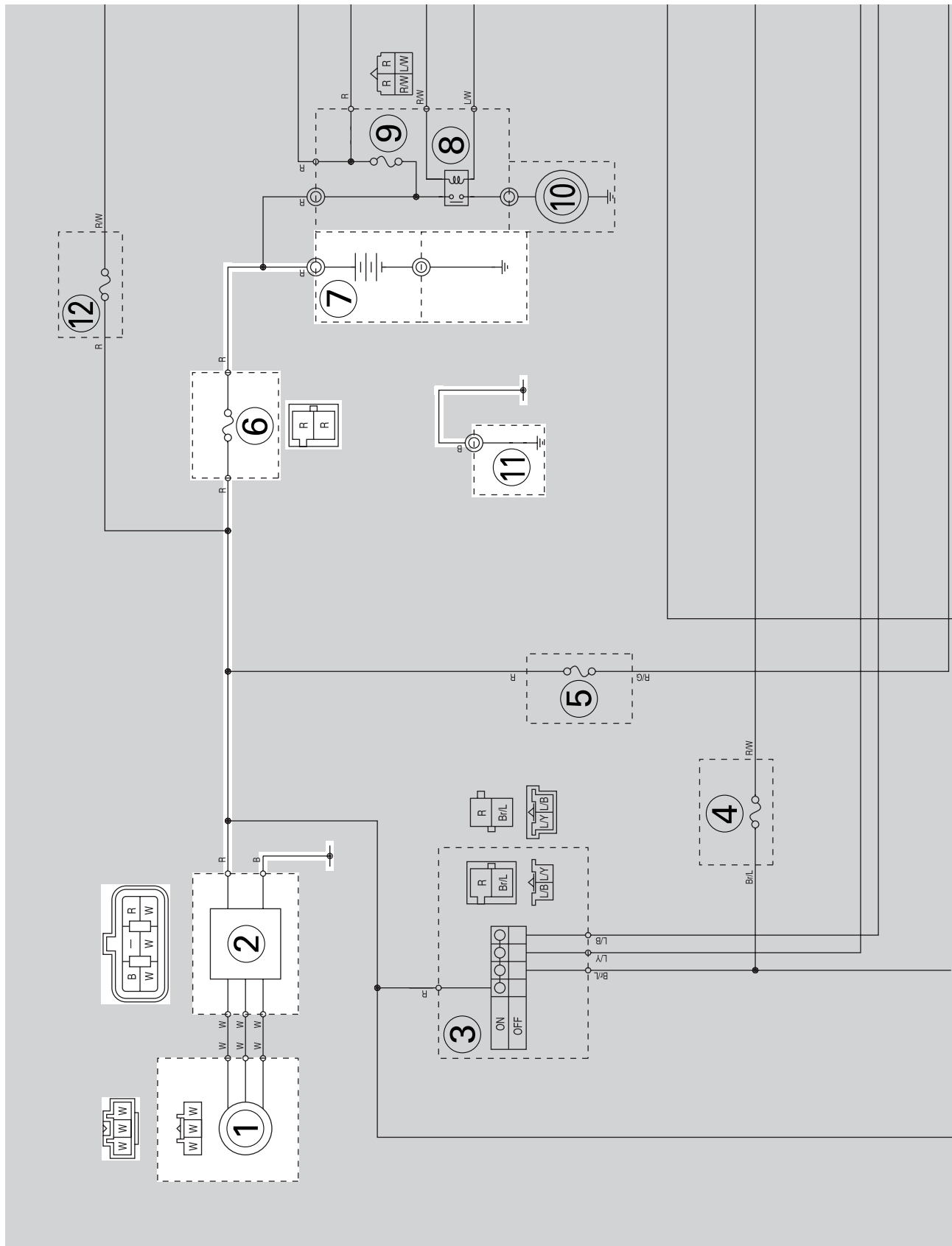
# ELECTRIC STARTING SYSTEM

8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		
9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the right handlebar switch.
OK↓		
10. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the neutral switch.
OK↓		
11. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the sidestand switch.
OK↓		
12. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the clutch switch.
OK↓		
13. Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the right handlebar switch.
OK↓		
14. Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-7.	NG→	Properly connect or repair the starting system's wiring.
OK↓		
The starting system circuit is OK.		

## CHARGING SYSTEM

EAS27210

### CIRCUIT DIAGRAM



1. AC magneto
2. Rectifier/regulator
6. Main fuse
7. Battery
- 11.Engine ground

EAS27230

## TROUBLESHOOTING

The battery is not being charged.

### NOTE:

- Before troubleshooting, remove the following part(s):

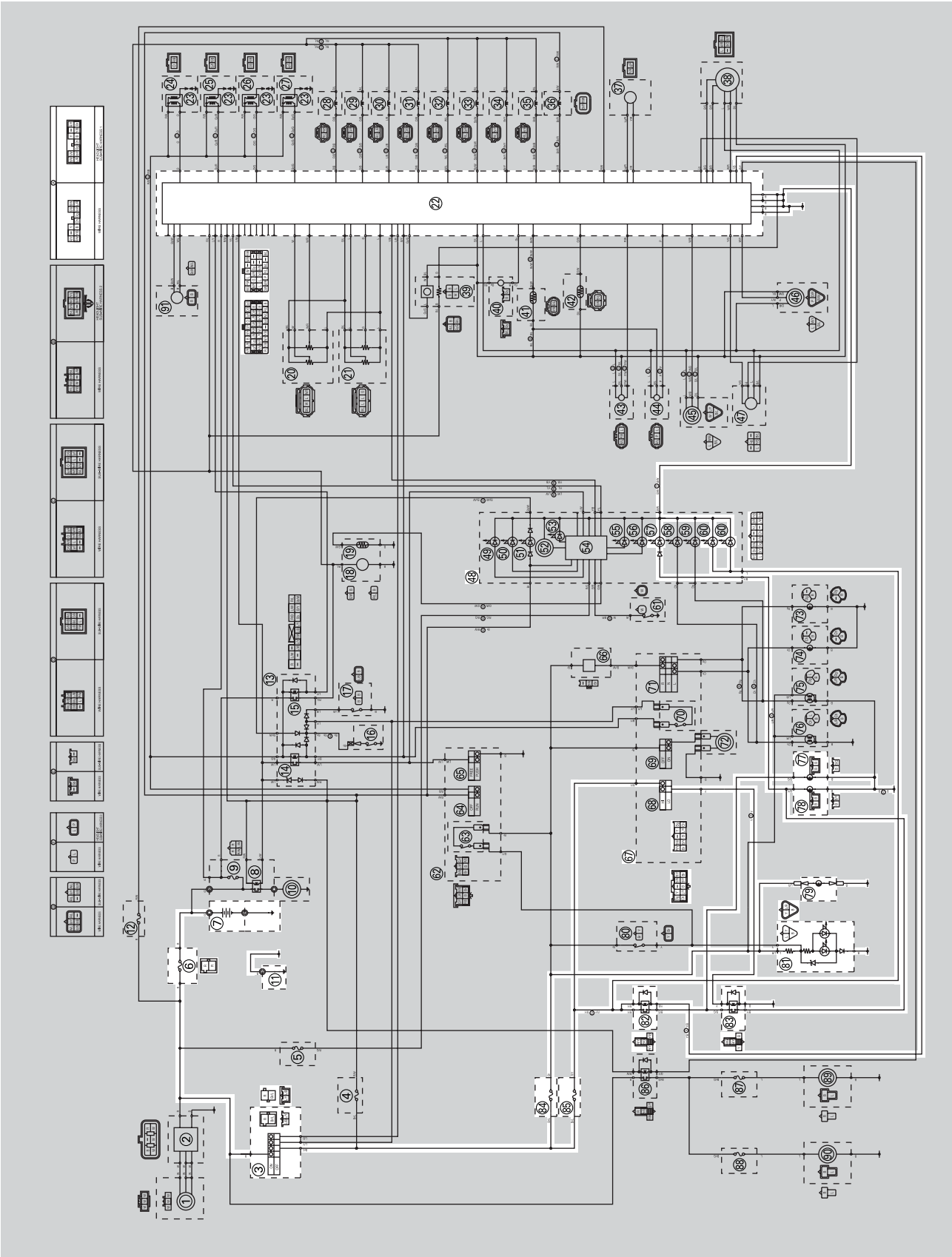
1. Rider seat
2. Fuel tank
3. Bottom cowlings

1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-94.	NG→	<ul style="list-style-type: none"> <li>• Replace the stator coil assembly.</li> </ul>
OK↓		
4. Check the rectifier/regulator. Refer to "CHECKING THE RECTI- FIER/REGULATOR" on page 8-94.	NG→	Replace the rectifier/regulator.
OK↓		
5. Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-13.	NG→	Properly connect or repair the charg- ing system's wiring.
OK↓		
The charging system circuit is OK.		



EAS27240  
LIGHTING SYSTEM

EAS27250  
CIRCUIT DIAGRAM



- 3. Main switch
- 6. Main fuse
- 7. Battery
- 11.Engine ground
- 22.ECU (engine control unit)
- 57.High beam indicator light
- 60.Meter light
- 68.Dimmer switch
- 77.Headlight (low beam)
- 78.Headlight (high beam)
- 79.License plate light
- 81.Tail/brake light
- 82.Headlight relay (on/off)
- 83.Headlight relay (dimmer)
- 85.Headlight fuse

EAS27260

## TROUBLESHOOTING

Any of the following fail to light: headlight (high beam), headlight (low beam), high beam indicator light, taillight, license plate light, auxiliary light or meter light.

### NOTE:

- Before troubleshooting, remove the following part(s):

1. Rider seat
2. Fuel tank
3. Side cowlings
4. Rear cowl
5. Front cowl

1. Check the condition of each bulb and bulb socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-84.	NG→	Replace the bulb(s) and bulb socket(s).
OK↓		
2. Check the fuses. (Main and headlight) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		
5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the left handlebar switch.
OK↓		
6. Check the pass switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the left handlebar switch.
OK↓		
7. Check the headlight relay (on/off). Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the headlight relay (on/off).
OK↓		

8. Check the headlight relay (dimmer).  
Refer to "CHECKING THE  
RELAYS" on page 8-89.

NG→

Replace the headlight relay (dimmer).

OK↓

9. Check the entire lighting system's  
wiring.  
Refer to "CIRCUIT DIAGRAM" on  
page 8-17.

NG→

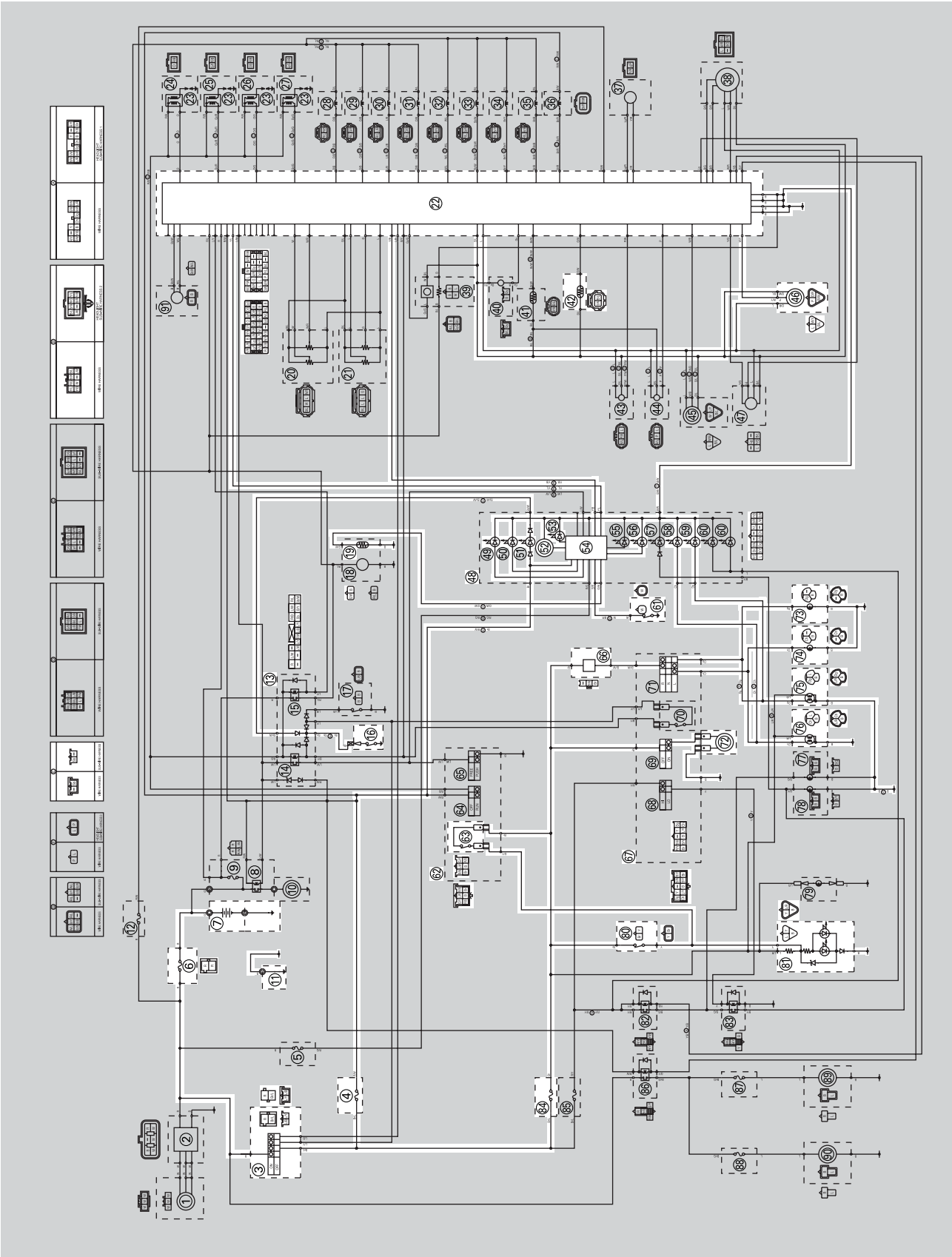
Properly connect or repair the lighting  
system's wiring.

OK↓

This circuit is OK.

EAS27270  
SIGNALING SYSTEM

EAS27280  
CIRCUIT DIAGRAM



- 3. Main switch
- 4. Ignition fuse
- 6. Main fuse
- 7. Battery
- 11.Engine ground
- 13.Relay unit
- 16.Neutral switch
- 19.Fuel sender
- 22.ECU (engine control unit)
- 42.Coolant temperature sensor
- 46.Speed sensor
- 49.Fuel level warning light
- 50.Oil level warning light
- 51.Neutral indicator light
- 52.Tachometer
- 53.Shift timing indicator light
- 54.Multi-function meter
- 56.Coolant temperature warning light
- 58.Left turn signal indicator light
- 59.Right turn signal indicator light
- 61.Oil level switch
- 63.Front brake light switch
- 66.Turn signal relay
- 69.Horn switch
- 71.Turn signal switch
- 72.Horn
- 73.Rear right turn signal light
- 74.Rear left turn signal light
- 75.Front right turn signal/position light
- 76.Front left turn signal/position light
- 80.Rear brake light switch
- 81.Tail/brake light
- 84.Signaling system fuse

EAS27290

## TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or indicator light.
- The horn fails to sound.

### NOTE:

- Before troubleshooting, remove the following part(s):
  1. Rider seat
  2. Fuel tank
  3. Side cowlings
  4. Bottom cowlings
  5. Rear cowling

1. Check the fuses. (Main, ignition and signaling system) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		
4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
Check the condition of each of the signaling system's circuits. Refer to "Checking the signaling system".		

## Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the left handlebar switch.
OK↓		

<p>2. Check the horn. Refer to "CHECKING THE HORN" on page 8-95.</p>	NG→	<p>Replace the horn.</p>
OK↓		
<p>3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</p>	NG→	<p>Properly connect or repair the signaling system's wiring.</p>
OK↓		
<p>This circuit is OK.</p>		
<p><u>The brake light fails to come on.</u></p>		
<p>1. Check the front brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-81.</p>	NG→	<p>Replace the front brake light switch.</p>
OK↓		
<p>2. Check the rear brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-81.</p>	NG→	<p>Replace the rear brake light switch.</p>
OK↓		
<p>3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</p>	NG→	<p>Properly connect or repair the signaling system's wiring.</p>
OK↓		
<p>This circuit is OK.</p>		
<p><u>The turn signal light, turn signal indicator light or both fail to blink.</u></p>		
<p>1. Check the turn signal light bulbs and sockets. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-84.</p>	NG→	<p>Replace the turn signal light bulb(s), socket(s) or both.</p>
OK↓		
<p>2. Check the turn signal switch. Refer to "CHECKING THE SWITCHES" on page 8-81.</p>	NG→	<p>Replace the left handlebar switch.</p>
OK↓		
<p>3. Check the hazard switch. Refer to "CHECKING THE SWITCHES" on page 8-81.</p>	NG→	<p>Replace the left handlebar switch.</p>
OK↓		

<div>4. Check the turn signal/hazard relay. Refer to “CHECKING THE TURN SIGNAL/HAZARD RELAY” on page 8-90.</div>	NG→	<div>Replace the turn signal/hazard relay.</div>
OK↓		
<div>5. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-21.</div>	NG→	<div>Properly connect or repair the signaling system’s wiring.</div>
OK↓		
<div>This circuit is OK.</div>		
The neutral indicator light fails to come.		
<div>1. Check the neutral switch. Refer to “CHECKING THE SWITCHES” on page 8-81.</div>	NG→	<div>Replace the neutral switch.</div>
OK↓		
<div>2. Check the relay unit (diode). Refer to “CHECKING THE RELAY UNIT (DIODE)” on page 8-91.</div>	NG→	<div>Replace the relay unit.</div>
OK↓		
<div>3. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-21.</div>	NG→	<div>Properly connect or repair the signaling system’s wiring.</div>
OK↓		
<div>This circuit is OK.</div>		
The oil level warning light fails to come.		
<div>1. Check the oil level switch. Refer to “CHECKING THE OIL LEVEL SWITCH” on page 8-95.</div>	NG→	<div>Replace the oil level switch.</div>
OK↓		

<div>2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</div>	NG→	<div>Properly connect or repair the signaling system's wiring.</div>
OK↓		
<div>This circuit is OK.</div>		
<u>The fuel level warning light fails to come.</u>		
<div>1. Check the fuel sender. Refer to "CHECKING THE FUEL SENDER" on page 8-96.</div>	NG→	<div>Replace the fuel pump assembly.</div>
OK↓		
<div>2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</div>	NG→	<div>Properly connect or repair the signaling system's wiring.</div>
OK↓		
<div>This circuit is OK.</div>		
<u>The coolant temperature warning light fails to come.</u>		
<div>1. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-97.</div>	NG→	<div>Replace the coolant temperature sensor.</div>
OK↓		
<div>2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</div>	NG→	<div>Properly connect or repair the signaling system's wiring.</div>
OK↓		
<div>This circuit is OK.</div>		
<u>The speedometer fails to operate.</u>		
<div>1. Check the speed sensor. Refer to "CHECKING THE SPEED SENSOR" on page 8-96.</div>	NG→	<div>Replace the speed sensor.</div>
OK↓		

2. Check the entire signaling system's wiring.  
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

Replace the meter assembly.

The shift timing indicator light fails to come.

1. Check that the shift timing indicator light is set to come on and that the brightness level of the light is adjusted properly.  
Refer to "FEATURES" on page 1-2.

NG→

Replace the meter assembly.

OK↓

2. Check the entire signaling system's wiring.  
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG→

Properly connect or repair the signaling system's wiring.

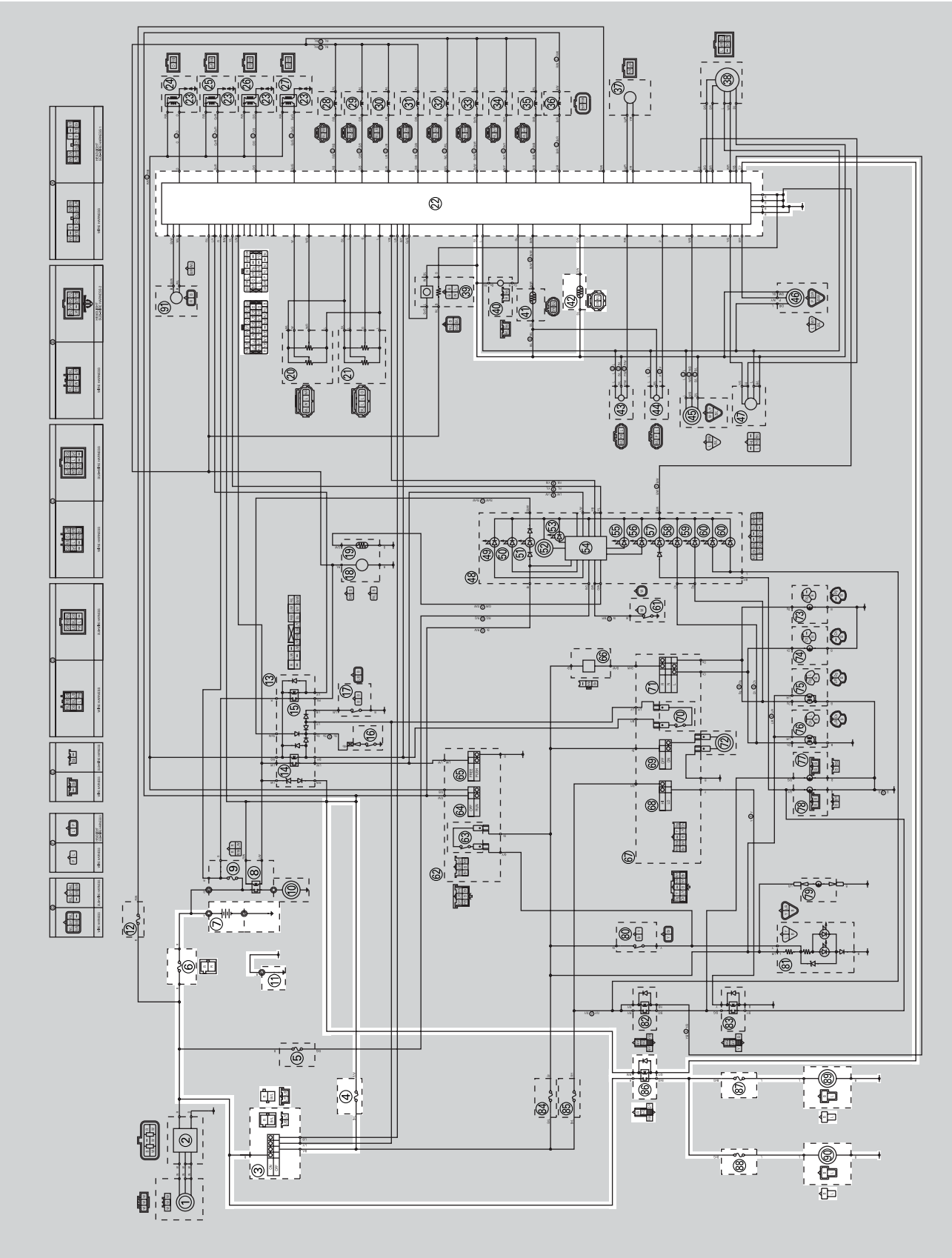
OK↓

This circuit is OK.



EAS27300  
**COOLING SYSTEM**

EAS27310  
**CIRCUIT DIAGRAM**



- 3. Main switch
- 4. Ignition fuse
- 6. Main fuse
- 7. Battery
- 11.Engine ground
- 22.ECU (engine control unit)
- 42.Coolant temperature sensor
- 86.Radiator fan motor relay
- 87.Right radiator fan motor fuse
- 88.Left radiator fan motor fuse
- 89.Right radiator fan motor
- 90.Left radiator fan motor

EAS27320

## TROUBLESHOOTING

### NOTE:

- Before troubleshooting, remove the following part(s):

1. Rider seat
2. Fuel tank
3. Side cowlings

1. Check the fuses. (Main, ignition and radiator fan motor) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		
4. Check the radiator fan motors. Refer to "CHECKING THE RADIATOR FAN MOTORS" on page 8-97.	NG→	Replace the radiator fan motor(s).
OK↓		
5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the radiator fan motor relay.
OK↓		
6. Check the coolant temperature. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-97.	NG→	Replace the coolant temperature sensor.
OK↓		
7. Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-29.	NG→	Properly connect or repair the cooling system's wiring.
OK↓		
This circuit is OK.		

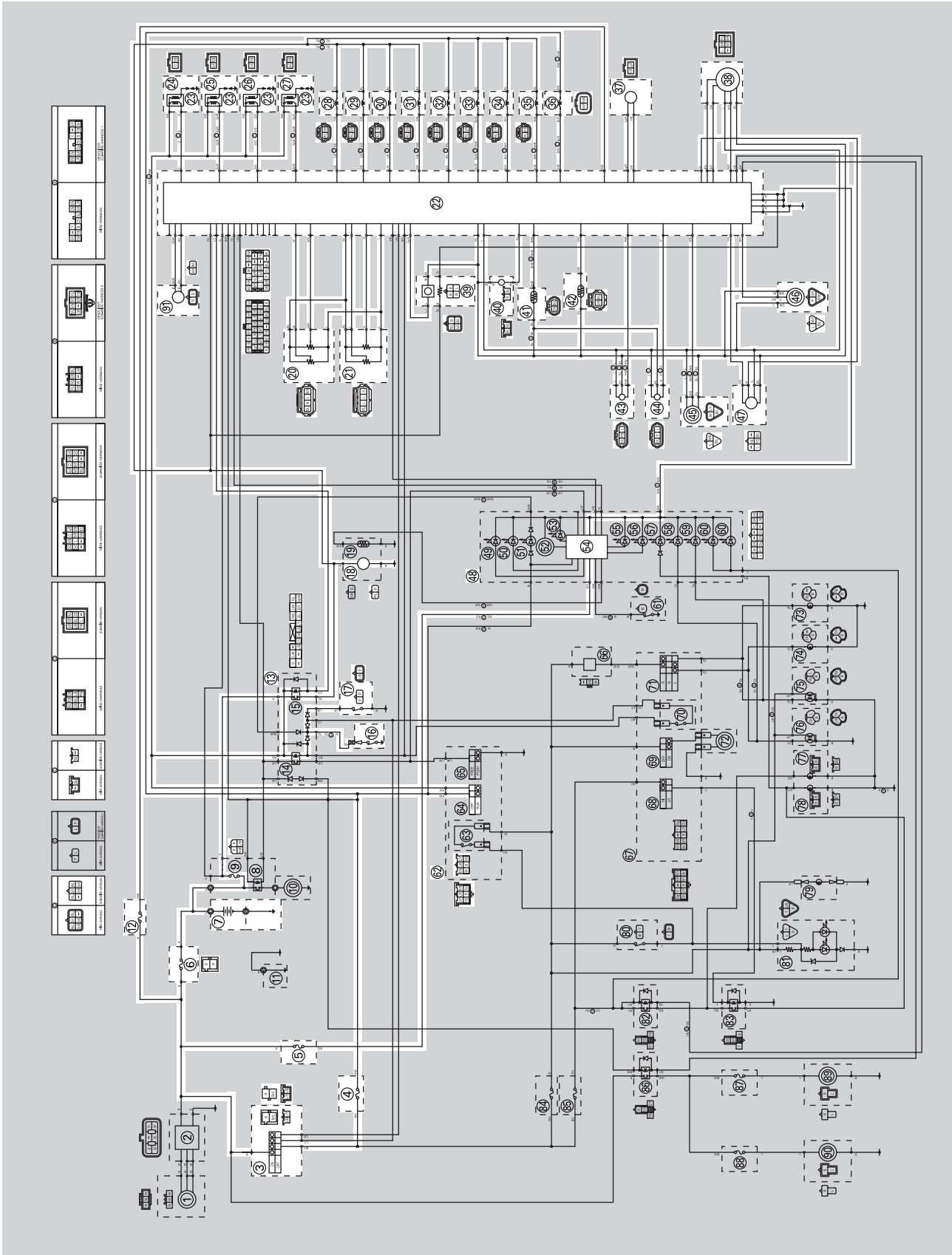


EAS27330

FUEL INJECTION SYSTEM

EAS27340

CIRCUIT DIAGRAM



- 3. Main switch
- 4. Ignition fuse
- 5. Backup fuse (odometer and clock)
- 6. Main fuse
- 7. Battery
- 9. Fuel injection system fuse
- 11. Engine ground
- 12. ETV fuse
- 13. Relay unit
- 14. Starting circuit cut-off relay
- 15. Fuel pump relay
- 16. Neutral switch
- 17. Sidestand switch
- 18. Fuel pump
- 20. Throttle position sensor (for throttle cable pulley)
- 21. Throttle position sensor (for throttle valves)
- 22. ECU (engine control unit)
- 23. Spark plug
- 24. Cylinder-#1 ignition coil
- 25. Cylinder-#2 ignition coil
- 26. Cylinder-#3 ignition coil
- 27. Cylinder-#4 ignition coil
- 28. Primary injector #1
- 29. Primary injector #2
- 30. Primary injector #3
- 31. Primary injector #4
- 32. Secondary injector #1
- 33. Secondary injector #2
- 34. Secondary injector #3
- 35. Secondary injector #4
- 36. Air induction system solenoid
- 37. Throttle servo motor
- 38. EXUP servo motor
- 39. O<sub>2</sub> sensor
- 40. Crankshaft position sensor
- 41. Air temperature sensor
- 42. Coolant temperature sensor
- 43. Intake air pressure sensor
- 44. Atmospheric pressure sensor
- 45. Cylinder identification sensor
- 46. Speed sensor
- 47. Lean angle sensor
- 54. Multi-function meter
- 64. Engine stop switch
- 91. Intake funnel servo motor

EAS27350

## ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection 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, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the odometer/tripmeter/fuel reserve tripmeter LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

### Engine trouble warning light indication and fuel injection system operation

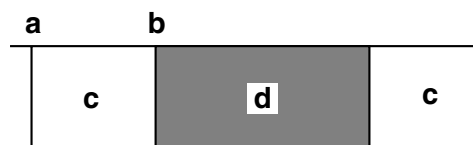
Warning light indication	ECU operation	Fuel injection operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

\* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

11:	Cylinder identification sensor	30:	Lean angle sensor (latch up detected)
12:	Crankshaft position sensor	41:	Lean angle sensor (open or short-circuit)
19:	Sidestand switch (open circuit in the wire to the ECU)	50:	ECU internal malfunction (memory check error)

### Checking the engine trouble warning light

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and it comes on while the start switch is being pushed. If the warning light does not come on under these conditions, the warning light (LED) may be defective.



- a. Main switch "OFF"
- b. Main switch "ON"

- c. Engine trouble warning light off
- d. Engine trouble warning light on for 1.4 seconds

EAS27380

## SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

**Self-Diagnostic Function table**

Fault code No.	Item	Symptom	Able/ unable to start	Able/ unable to drive
11	Cylinder identification sensor	No normal signals are received from the cylinder identification sensor when the engine is started or while the vehicle is being driven.	Unable	Able
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor: open or short circuit detected.	Able	Able
14	Intake air pressure sensor hose line (piping system)	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (for throttle valves) (open or short circuit/ loose connection)	Throttle position sensor (for throttle valves): open or short circuit detected. Throttle position sensor (for throttle valves) coupler connection is loose.	Able/Unable	Able/Unable
17	EXUP servo motor circuit (open or short circuit)	EXUP servo motor circuit: open or short circuit detected.	Able	Able
18	EXUP servo motor (stuck)	EXUP servo motor is stuck.	Able	Able
19	Sidestand switch (open circuit in the wire to the ECU)	Open circuit is detected in the input line from the sidestand switch to the ECU.	Unable	Unable
20	Intake air pressure sensor or atmospheric pressure sensor	When the main switch is turned to "ON", the atmospheric pressure sensor voltage and intake air pressure sensor voltage differ greatly.	Able	Able
21	Coolant temperature sensor (open or short circuit)	Coolant temperature sensor: open or short circuit detected.	Able	Able
22	Air temperature sensor (open or short circuit)	Air temperature sensor: open or short circuit detected.	Able	Able

# FUEL INJECTION SYSTEM

Fault code No.	Item	Symptom	Able/ unable to start	Able/ unable to drive
23	Atmospheric pressure sensor (open or short circuit)	Atmospheric pressure sensor: open or short circuit detected.	Able	Able
24	O <sub>2</sub> sensor	No normal signal is received from the O <sub>2</sub> sensor.	Able	Able
30	Lean angle sensor	Latch up detected. No normal signal is received from the lean angle sensor.	Unable	Unable
33	Cylinder-#1 ignition coil (open circuit)	Primary lead of the cylinder-#1 ignition coil: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
34	Cylinder-#2 ignition coil (open circuit)	Primary lead of the cylinder-#2 ignition coil: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
35	Cylinder-#3 ignition coil (open circuit)	Primary lead of the cylinder-#3 ignition coil: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
36	Cylinder-#4 ignition coil (open circuit)	Primary lead of the cylinder-#4 ignition coil: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
39	Primary injector (open circuit)	Primary injector: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
40	Secondary injector (open circuit)	Secondary injector: open circuit detected.	Able (depending on the num- ber of faulty cylinders)	Able (depending on the num- ber of faulty cylinders)
41	Lean angle sensor (open or short-circuit)	Lean angle sensor: open or short circuit detected.	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.	Able	Able
	Neutral switch	Neutral switch: open or short circuit detected.		
43	Fuel system voltage (monitoring voltage)	Power supply to the injectors and the fuel pump is not normal.	Able	Able

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>Item</b>	<b>Symptom</b>	<b>Able/ unable to start</b>	<b>Able/ unable to drive</b>
44	Error in writing the amount of CO adjustment on EEPROM	An error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (monitoring voltage)	Power supply is not normal.	Able	Able
50	ECU internal malfunction	ECU memory is faulty. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	Able/Unable	Able/Unable
59	Throttle position sensor (for throttle cable pulley) (open or short circuit/ loose connection)	Throttle position sensor (for throttle cable pulley): open or short circuit detected. Throttle position sensor (for throttle cable pulley) coupler connection is loose.	Able/Unable	Able/Unable
60	Throttle servo motor	Throttle servo motor: open or short circuit detected. Motor is defective or ECU internal malfunction.	Able/Unable	Able/Unable

## Communication error with the meter

<b>Fault code No.</b>	<b>Item</b>	<b>Symptom</b>	<b>Able/ unable to start</b>	<b>Able/ unable to drive</b>
Er-1	ECU internal malfunction (output signal error)	No signals are received from the ECU.	Unable	Unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	Unable	Unable
Er-3	ECU internal malfunction (output signal error)	Data from the ECU cannot be received correctly.	Unable	Unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	Unable	Unable

EAS27400

TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
- Fault code number



- a. Check the fault code number displayed on the meter.
- b. Identify the faulty system with the fault code. Refer to “Self-Diagnostic Function table”.
- c. Identify the probable cause of the malfunction. Refer to “Fault code table”.



2. Check and repair the probable cause of malfunction.

Fault code No.	No fault code No.
Check and repair. Refer to “TROUBLE-SHOOTING DETAILS” on page 8-49. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.	Check and repair.

3. Perform Fuel injection system reinstatement action.  
Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS”.
4. Turn the main switch to “OFF” and back to “ON”, then check that no fault code number is displayed.

**NOTE:** \_\_\_\_\_  
If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (Diagnostic code No. 62)”.

**NOTE:** \_\_\_\_\_  
Turning the main switch to “OFF” will not erase the malfunction history.

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the Diagnostic mode.  
Refer to “Sensor operation table” and “Actuator operation table”.

01: Throttle position sensor (for throttle valves) signal 1 (throttle angle)
13: Throttle position sensor (for throttle valves) signal 2 (throttle angle)
14: Throttle position sensor (for throttle cable pulley) signal 1 (throttle angle)
15: Throttle position sensor (for throttle cable pulley) signal 2 (throttle angle)
48: Air induction system solenoid

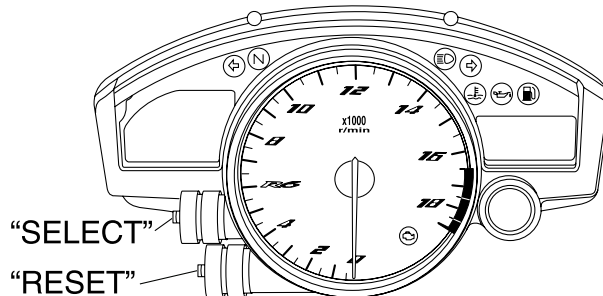
If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.  
If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

EAS27420

## DIAGNOSTIC MODE

Setting the diagnostic mode

1. Turn the main switch to "OFF".
2. Disconnect the wire harness coupler from the fuel pump.
3. Press and hold the "SELECT" and "RESET" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.



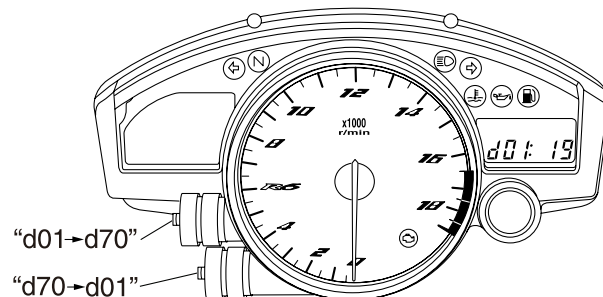
### NOTE:

- All displays on the meter disappear except the odometer/trip meter/fuel reserve trip meter/stopwatch display.
- "dIAG" appears on the odometer/trip meter/fuel reserve trip meter/stopwatch LCD.

4. Press the "SELECT" button to select the diagnostic mode "dIAG".
5. After selecting "dIAG", simultaneously press the "SELECT" and "RESET" buttons for 2 seconds or more to activate the diagnostic mode. The diagnostic code number "d01" appears on the clock LCD.
6. Select the diagnostic code number corresponding to the fault code number by pressing the "SELECT" and "RESET" buttons.

### NOTE:

- To decrease the selected diagnostic code number, press the "RESET" button. Press the "RESET" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "SELECT" button. Press the "SELECT" button for 1 second or longer to automatically increase the diagnostic code numbers.



7. Verify the operation of the sensor or actuator.
  - Sensor operation  
The data representing the operating conditions of the sensor appears on the odometer/trip meter/fuel reserve trip meter/stopwatch LCD.
  - Actuator operation  
Set the engine stop switch to "○" to operate the actuator.

### NOTE:

If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.

8. Turn the main switch to "OFF" to cancel the diagnostic mode.

**Fault code table**

<b>Fault code No.</b>	<b>Symptom</b>	<b>Probable cause of malfunction</b>	<b>Diagnostic code No.</b>
11	No normal signals are received from the cylinder identification sensor when the engine is started or while the vehicle is being driven.	<ul style="list-style-type: none"> <li>• Open or short circuit in sub-wire-harness 1.</li> <li>• Open or short circuit in wire harness.</li> <li>• Defective cylinder identification sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
12	No normal signals are received from the crankshaft position sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective crankshaft position sensor.</li> <li>• Malfunction in pickup rotor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
13	Intake air pressure sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective intake air pressure sensor.</li> <li>• Malfunction in ECU.</li> </ul>	03
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	<ul style="list-style-type: none"> <li>• Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>• Malfunction in ECU.</li> </ul>	03
15	Throttle position sensor (for throttle valves): open or short circuit detected. Throttle position sensor (for throttle valves) coupler connection is loose.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective throttle position sensor (for throttle valves).</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed throttle position sensor (for throttle valves).</li> </ul>	01 13
17	EXUP servo motor circuit: open or short circuit detected or loose connection.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective EXUP servo motor (potentiometer circuit).</li> </ul>	53
18	EXUP servo motor is stuck.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Stuck EXUP servo motor (mechanism).</li> <li>• Stuck EXUP servo motor (motor).</li> </ul>	53
19	Open circuit is detected in the input lead from the side-stand switch to the ECU.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness (ECU coupler).</li> <li>• Malfunction in ECU.</li> <li>• Relay unit (diode)</li> </ul>	20
20	When the main switch is turned to "ON", the atmospheric pressure sensor voltage and intake air pressure sensor voltage differ greatly.	<ul style="list-style-type: none"> <li>• Atmospheric pressure sensor hose is clogged.</li> <li>• Intake air pressure sensor hose is clogged, kinked, or pinched.</li> <li>• Malfunction of the atmospheric pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction of the intake air pressure sensor in the intermediate electrical potential.</li> <li>• Malfunction in ECU.</li> </ul>	03 02

# FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
21	Coolant temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective coolant temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed coolant temperature sensor.</li> </ul>	06
22	Air temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective air temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed air temperature sensor.</li> </ul>	05
23	Atmospheric pressure sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective atmospheric pressure sensor.</li> <li>• Improperly installed atmospheric pressure sensor.</li> <li>• Malfunction in ECU.</li> </ul>	02
24	No normal signal is received from the O <sub>2</sub> sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective O<sub>2</sub> sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed O<sub>2</sub> sensor.</li> </ul>	—
30	Latch up detected. No normal signal is received from the lean angle sensor.	<ul style="list-style-type: none"> <li>• The vehicle has overturned.</li> <li>• Defective lean angle sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed lean angle sensor.</li> </ul>	08
33	Open circuit detected in the primary lead of the cylinder-#1 ignition coil.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> </ul>	30
34	Open circuit detected in the primary lead of the cylinder-#2 ignition coil.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> </ul>	31
35	Open circuit detected in the primary lead of the cylinder-#3 ignition coil.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> </ul>	32
36	Open circuit detected in the primary lead of the cylinder-#4 ignition coil.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> </ul>	33
39	Open circuit detected in a primary injector.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective primary injector.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed primary injector.</li> </ul>	36 37 38 39
40	Open circuit detected in a secondary injector.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective secondary injector.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed secondary injector.</li> </ul>	40 41 42 43
41	Lean angle sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective lean angle sensor.</li> <li>• Malfunction in ECU.</li> </ul>	08

# FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
42	No normal signals are received from the speed sensor.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in speed sensor.</li> <li>• Malfunction in ECU.</li> </ul>	07
	Neutral switch: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness.</li> <li>• Malfunction in neutral switch.</li> <li>• Malfunction in ECU.</li> </ul>	21
43	Power supply to the injectors and the fuel pump is not normal.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Malfunction in ECU.</li> </ul>	09
44	An error is detected while reading or writing on EEPROM (CO adjustment value).	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory).</li> </ul>	60
46	Power supply is not normal.	<ul style="list-style-type: none"> <li>• Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 8-13.</li> </ul>	—
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)</li> </ul>	—
59	Throttle position sensor (for throttle cable pulley): open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective throttle position sensor.</li> <li>• Improperly installed throttle position sensor.</li> <li>• Malfunction in ECU.</li> </ul>	14 15
	Throttle position sensor (for throttle cable pulley) coupler connection is loose.		
60	Throttle servo motor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective throttle servo motor (potentiometer circuit).</li> <li>• Stuck throttle servo motor (mechanism).</li> <li>• Stuck throttle servo motor (motor).</li> <li>• Malfunction in ECU.</li> </ul>	01
	Defective throttle servo motor. Malfunction in ECU (servo motor driving system).		
Er-1	No signals are received from the ECU.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Malfunction in meter.</li> <li>• Malfunction in ECU.</li> <li>• Defective wire connection of the ECU coupler.</li> </ul>	—
Er-2	No signals are received from the ECU within the specified duration.	<ul style="list-style-type: none"> <li>• Improper connection in wire harness.</li> <li>• Malfunction in meter.</li> <li>• Malfunction in ECU.</li> </ul>	—
Er-3	Data from the ECU cannot be received correctly.	<ul style="list-style-type: none"> <li>• Improper connection in wire harness.</li> <li>• Malfunction in meter.</li> <li>• Malfunction in ECU.</li> </ul>	—

# FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
Er-4	Non-registered data has been received from the meter.	<ul style="list-style-type: none"> <li>Improper connection in wire harness.</li> <li>Malfunction in meter.</li> <li>Malfunction in ECU.</li> </ul>	—

**Sensor operation table**

Diagnostic code No.	Item	Meter display	Checking method
01	Throttle position sensor (for throttle valves) signal 1 <ul style="list-style-type: none"> <li>Fully closed position</li> <li>Fully opened position</li> </ul>	12–21  97–106	Check with throttle valves fully closed.  Check with throttle valves fully opened.
02	Atmospheric pressure	Displays the atmospheric pressure.	Compare the actually measured atmospheric pressure with the meter display value.
03	Intake air pressure	Displays intake air pressure.	Compare the actually measured atmospheric pressure with the meter display value without cranking the engine.
05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured air temperature with the meter display value.
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter display value.
07	Vehicle speed pulse	0–999	Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
08	Lean angle sensor <ul style="list-style-type: none"> <li>Upright</li> <li>Overturned</li> </ul>	0.4–1.4 3.7–4.4	Remove the lean angle sensor and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Set the engine stop switch to “○”, and then compare with the actually measured battery voltage. (If the battery voltage is lower, recharge the battery.)

# FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Meter display	Checking method
13	Throttle position sensor (for throttle valves) signal 2 <ul style="list-style-type: none"> <li>Fully closed position</li> <li>Fully opened position</li> </ul>	9–23 94–108	Check with throttle valve fully closed. Check with throttle valve fully opened.
14	Throttle position sensor (for throttle cable pulley) signal 1 <ul style="list-style-type: none"> <li>Fully closed position</li> <li>Fully opened position</li> </ul>	12–22 97–107	Check with throttle grip fully closed. Check with throttle grip fully opened.
15	Throttle position sensor (for throttle cable pulley) signal 2 <ul style="list-style-type: none"> <li>Fully closed position</li> <li>Fully opened position</li> </ul>	10–24 95–109	Check with throttle grip fully closed. Check with throttle grip fully opened.
20	Sidestand switch <ul style="list-style-type: none"> <li>Stand retracted</li> <li>Stand extended</li> </ul>	ON OFF	Set ON/OFF the sidestand switch (with the transmission in gear).
21	Neutral switch <ul style="list-style-type: none"> <li>Neutral</li> <li>In gear</li> </ul>	ON OFF	Shift the transmission.
60	EEPROM fault cylinder No. <ul style="list-style-type: none"> <li>No history</li> <li>History exists</li> </ul>	00 01-04 (fault cylinder No.) <ul style="list-style-type: none"> <li>(If more than one cylinder is defective, the display changes every two seconds to show all the detected cylinder numbers. When all cylinder numbers are shown, the display repeats.)</li> </ul>	—
61	Malfunction history code <ul style="list-style-type: none"> <li>No history</li> <li>History exists</li> </ul>	00 Fault codes 11-60 <ul style="list-style-type: none"> <li>(If more than one code number is detected, the display changes every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats.)</li> </ul>	—

# FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Meter display	Checking method
62	Malfunction history code erasure <ul style="list-style-type: none"> <li>No history</li> <li>History exists</li> </ul>	00 <ul style="list-style-type: none"> <li>Displays the total number of malfunctions, including the current malfunction, that have occurred since the history was last erased. (For example, if there have been three malfunctions, "03" is displayed.)</li> </ul>	— To erase the history, set the engine stop switch from "⊗" to "○".
63	Malfunction code reinstate (for fault code No. 24 and 40 only) <ul style="list-style-type: none"> <li>No malfunction code</li> <li>Malfunction code exists</li> </ul>	00 Fault codes 24, 40 <ul style="list-style-type: none"> <li>(If more than one code number is detected, the display changes every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats.)</li> </ul>	— To reinstate, set the engine stop switch from "⊗" to "○".
70	Control number	00	—

## Actuator operation table

Diagnostic code No.	Item	Actuation	Checking method
30	Cylinder-#1 ignition coil	Actuates the cylinder-#1 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> <li>Connect an ignition checker.</li> </ul>
31	Cylinder-#2 ignition coil	Actuates the cylinder-#2 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> <li>Connect an ignition checker.</li> </ul>
32	Cylinder-#3 ignition coil	Actuates the cylinder-#3 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> <li>Connect an ignition checker.</li> </ul>

# FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Actuation	Checking method
33	Cylinder-#4 ignition coil	Actuates the cylinder-#4 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. • Connect an ignition checker.
34	Intake funnel	Actuates the intake funnel (up position down position for each 3 seconds). Illuminates the engine trouble warning light.	Check the operating sound of the intake funnel.
36	Primary injector #1	Actuates the primary injector #1 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the primary injector #1 five times.
37	Primary injector #2	Actuates the primary injector #2 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the primary injector #2 five times.
38	Primary injector #3	Actuates the primary injector #3 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the primary injector #3 five times.
39	Primary injector #4	Actuates the primary injector #4 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the primary injector #4 five times.
40	Secondary injector #1	Actuates the secondary injector #1 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the secondary injector #1 five times.
41	Secondary injector #2	Actuates the secondary injector #2 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the secondary injector #2 five times.
42	Secondary injector #3	Actuates the secondary injector #3 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the secondary injector #3 five times.

# FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Actuation	Checking method
43	Secondary injector #4	Actuates the secondary injector #4 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the secondary injector #4 five times.
48	Air induction system solenoid	Actuates the air induction system solenoid five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the air induction system solenoid five times.
50	Fuel injection system relay	Actuates the fuel injection system relay five times at one-second intervals. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel injection system relay five times.
51	Radiator fan motor relay	Actuates the radiator fan motor relay five times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay five times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.
53	EXUP servo motor	Actuates the servo motor (turns to open side and to closed side). Illuminates the engine trouble warning light.	Check the operating sound.

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## TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the meter display according to the reinstatement method.

Fault code No.:

Code number displayed on the meter when the engine failed to work normally. Refer to "Self-Diagnostic Function table".

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-40.

Fault code No.	11	Symptom	No normal signals are received from the cylinder identification sensor when the engine is started or while the vehicle is being driven.		
Diagnostic code No.		—	—		
Order	Item/components and probable cause		Check or maintenance job		Reinstatement method
1	Installed condition of cylinder identification sensor.		Check for looseness or pinching.		Cranking the engine.
2	Connections <ul style="list-style-type: none"><li>• Cylinder identification sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>		
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between the cylinder identification sensor coupler and ECU coupler. (blue–blue) (white/black–white/black) (black/blue–black/blue)</li></ul>		
4	Defective cylinder identification sensor.		<ul style="list-style-type: none"><li>• Replace if defective. Refer to “CHECKING THE CYLINDER IDENTIFICATION SENSOR” on page 8-100.</li></ul>		

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>12</b>	<b>Symptom</b>	<b>No normal signals are received from the crankshaft position sensor.</b>	
<b>Diagnostic code No.</b>	—	—		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Installed condition of crankshaft position sensor.		Check for looseness or pinching.	Cranking the engine.
2	Connections <ul style="list-style-type: none"> <li>• Crankshaft position sensor coupler</li> <li>• Main wire harness ECU coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between the crankshaft position sensor coupler and ECU coupler. (gray–gray) (black/blue–black/blue)</li> </ul>	
4	Defective crankshaft position sensor.		<ul style="list-style-type: none"> <li>• Replace if defective. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-93.</li> </ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>13</b>	<b>Symptom</b>	<b>Intake air pressure sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>		<b>03</b>	<b>Intake air pressure sensor</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"><li>• Intake air pressure sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in wire harness and/or sub-wire-harness 2.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between intake air pressure sensor coupler and ECU coupler. (black/blue–black/blue) (pink/white–pink/white) (blue–blue)</li></ul>	
3	Defective intake air pressure sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 03)</li><li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-100.</li></ul>	

Fault code No.	14	Symptom	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	
Diagnostic code No.		03	Intake air pressure sensor	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose		<ul style="list-style-type: none"><li>• Check the intake air pressure sensor hose condition.</li><li>• Repair or replace the sensor hose.</li></ul>	Cranking the engine.
2	Defective intake air pressure sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 03)</li><li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-100.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	15	Symptom	Throttle position sensor (for throttle valves): open or short circuit detected.	
Diagnostic code No.	01 13	Throttle position sensor (for throttle valves) signal 1 Throttle position sensor (for throttle valves) signal 2		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor (for throttle valves).		<ul style="list-style-type: none"><li>• Check for looseness or pinching.</li><li>• Check that the sensor is installed in the specified position.</li></ul>	Turning the main switch to “ON”.
2	Connections <ul style="list-style-type: none"><li>• Throttle position sensor (for throttle valves) coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between throttle position sensor (for throttle valves) coupler and ECU coupler. (black/blue–black/blue) (blue–blue) (blue–blue) (green–green)</li></ul>	
4	Defective throttle position sensor (for throttle valves).		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code Nos. 01, 13)</li><li>• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE VALVES)” on page 8-97.</li></ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>17</b>	<b>Symptom</b>	<b>EXUP servo motor circuit: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>	<b>53</b>	<b>EXUP servo motor</b>		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"><li>• EXUP servo motor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between EXUP servo motor coupler and ECU coupler. (blue–blue) (white/red–white/red) (black/blue–black/blue)</li></ul>	
3	Defective EXUP servo motor (potentiometer circuit).		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 53)</li><li>• Replace if defective.</li></ul>	

<b>Fault code No.</b>	<b>18</b>	<b>Symptom</b>	<b>EXUP servo motor is stuck.</b>	
<b>Diagnostic code No.</b>		<b>53</b>	<b>EXUP servo motor</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"><li>EXUP servo motor coupler</li><li>Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>Check the couplers for any pins that may be pulled out.</li><li>Check the locking condition of the couplers.</li><li>If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Turning the main switch to “ON”. It takes 3 seconds at the maximum before the original state returns.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>Repair or replace if there is an open or short circuit.</li><li>Between EXUP servo motor coupler and ECU coupler. (black/green–black/green) (black/red–black/red)</li></ul>	
3	Defective EXUP servo motor.		<ul style="list-style-type: none"><li>Execute the diagnostic mode. (Code No. 53)</li><li>Replace if defective.</li></ul>	
4	Defective EXUP valve, pulley, and cables.		Replace if defective.	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>19</b>	<b>Symptom</b>	<b>Open circuit is detected in the input lead from the side-stand switch to the ECU.</b>	
<b>Diagnostic code No.</b>		<b>20</b>	<b>Sidestand switch</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections • Main wire harness ECU coupler		<ul style="list-style-type: none"> <li>• Execute the diagnostic mode. (Code No. 20)</li> <li>• Check the coupler for any pins that may be pulled out.</li> <li>• Check the locking condition of the coupler.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	If the transmission is in gear, retracting the sidestand. If the transmission is in neutral, reconnecting the wiring.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between ECU coupler and relay unit coupler. (blue/yellow–blue/yellow)</li> <li>• Between relay unit coupler and sidestand switch coupler. (blue/black–blue/black)</li> <li>• Between sidestand switch coupler and engine ground. (black–black)</li> </ul>	
3	Defective sidestand switch.		<ul style="list-style-type: none"> <li>• Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-81.</li> </ul>	

<b>Fault code No.</b>	<b>20</b>	<b>Symptom</b>	<b>When the main switch is turned to “ON”, the atmospheric pressure sensor voltage and intake air pressure sensor voltage differ greatly.</b>	
<b>Diagnostic code No.</b>		<b>03 02</b>	<b>Intake air pressure sensor Atmospheric pressure sensor</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Defective intake air pressure sensor or atmospheric pressure sensor.		<ul style="list-style-type: none"> <li>• Execute the diagnostic mode. (Code Nos. 03, 02)</li> <li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-100 or “CHECKING THE ATMOSPHERIC PRESSURE SENSOR” on page 8-99.</li> </ul>	Turning the main switch to “ON”.

# FUEL INJECTION SYSTEM

Fault code No.	21	Symptom	Coolant temperature sensor: open or short circuit detected.	
Diagnostic code No.	06	Coolant temperature sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Coolant temperature sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between coolant temperature sensor coupler and ECU coupler. (green/white–green/white) (black/blue–black/blue)</li></ul>	
3	Defective coolant temperature sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 06)</li><li>• Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-97.</li></ul>	

<b>Fault code No.</b>	<b>22</b>	<b>Symptom</b>	<b>Air temperature sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>	<b>05</b>	<b>Air temperature sensor</b>		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"><li>• Air temperature sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between air temperature sensor coupler and ECU coupler. (brown/white–brown/white) (black/blue–black/blue)</li></ul>	
3	Defective air temperature sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 05)</li><li>• Replace if defective. Refer to “CHECKING THE AIR TEMPERATURE SENSOR” on page 8-101.</li></ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>23</b>	<b>Symptom</b>	<b>Atmospheric pressure sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>		<b>02</b>	<b>Atmospheric pressure sensor</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"><li>• Atmospheric pressure sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in wire harness and/or sub-wire-harness 2.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between atmospheric pressure sensor coupler and ECU coupler. (black/blue–black/blue) (pink–pink) (blue–blue)</li></ul>	
3	Defective atmospheric pressure sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 02)</li><li>• Replace if defective. Refer to “CHECKING THE ATMOSPHERIC PRESSURE SENSOR” on page 8-99.</li></ul>	

Fault code No.	24	Symptom	No normal signal is received from the O <sub>2</sub> sensor.	
Diagnostic code No.	—	—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed state of O <sub>2</sub> sensor.		Check for looseness or pinching.	Execute the diagnostic mode (Code No. 63). (Set the engine stop switch to “○”.)
2	Connections <ul style="list-style-type: none"> <li>O<sub>2</sub> sensor coupler</li> <li>Main wire harness ECU coupler</li> </ul>		<ul style="list-style-type: none"> <li>Check the couplers for any pins that may be pulled out.</li> <li>Check the locking condition of the couplers.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>Repair or replace if there is an open or short circuit.</li> <li>Between O<sub>2</sub> sensor coupler and ECU coupler. (gray/green–gray/green) (black/blue–black/blue) (black–black) (red/blue–red/blue)</li> </ul>	
4	Check fuel pressure.		Refer to “THROTTLE BODIES” on page 7-9.	
5	Defective O <sub>2</sub> sensor.		Replace if defective.	

# FUEL INJECTION SYSTEM

Fault code No.	30	Symptom	Latch up detected. No normal signal is received from the lean angle sensor.	
Diagnostic code No.	08	Lean angle sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	The vehicle has overturned.		Raise the vehicle upright.	Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned to “OFF”).
2	Installed state of the lean angle sensor.		Check the installed direction and condition of the sensor.	
3	Defective lean angle sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 08)</li><li>• Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-93.</li></ul>	

Fault code No.	33	Symptom	Open circuit detected in the primary lead of the cylinder-#1 ignition coil.	
Diagnostic code No.	30	Cylinder-#1 ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Cylinder-#1 ignition coil coupler</li><li>• Main wire harness ECU coupler</li><li>• Sub-wire harness 1 coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Cranking the engine. (Connect the cylinder-#1 ignition coil coupler.)
2	Open or short circuit in wire harness and/or sub-wire harness 1.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between cylinder-#1 ignition coil coupler and ECU coupler. (red/black-red/black) (orange-orange)</li></ul>	
3	Defective cylinder-#1 ignition coil.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 30)</li><li>• Test the primary and secondary coils for continuity.</li><li>• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-92.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	34	Symptom	Open circuit detected in the primary lead of the cylinder-#2 ignition coil.	
Diagnostic code No.	31	Cylinder-#2 ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Cylinder-#2 ignition coil coupler</li><li>• Main wire harness ECU coupler</li><li>• Sub-wire harness 1 coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Cranking the engine. (Connect the cylinder-#2 ignition coil coupler.)
2	Open or short circuit in wire harness and/or sub-wire harness 1.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between cylinder-#2 ignition coil coupler and ECU coupler. (red/black–red/black) (gray/red–gray/red)</li></ul>	
3	Defective cylinder-#2 ignition coil.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 31)</li><li>• Test the primary and secondary coils for continuity.</li><li>• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-92.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	35	Symptom	Open circuit detected in the primary lead of the cylinder-#3 ignition coil.	
Diagnostic code No.	32	Cylinder-#3 ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Cylinder-#3 ignition coil coupler</li><li>• Main wire harness ECU coupler</li><li>• Sub-wire harness 1 coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Cranking the engine. (Connect the cylinder-#3 ignition coil coupler.)
2	Open or short circuit in wire harness and/or sub-wire harness 1.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between cylinder-#3 ignition coil coupler and ECU coupler. (red/black–red/black) (orange/green–orange/green)</li></ul>	
3	Defective cylinder-#3 ignition coil.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 32)</li><li>• Test the primary and secondary coils for continuity.</li><li>• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-92.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	36	Symptom	Open circuit detected in the primary lead of the cylinder-#4 ignition coil.	
Diagnostic code No.	33	Cylinder-#4 ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Cylinder-#4 ignition coil coupler</li><li>• Main wire harness ECU coupler</li><li>• Sub-wire harness 1 coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Cranking the engine. (Connect the cylinder-#4 ignition coil coupler.)
2	Open or short circuit in wire harness and/or sub-wire harness 1.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between cylinder-#4 ignition coil coupler and ECU coupler/main wire harness. (red/black–red/black) (gray/green–gray/green)</li></ul>	
3	Defective cylinder-#4 ignition coil.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 33)</li><li>• Test the primary and secondary coils for continuity.</li><li>• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-92.</li></ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>39</b>	<b>Symptom</b>	<b>Open circuit detected in a primary injector.</b>	
<b>Diagnostic code No.</b>		<b>36</b> <b>37</b> <b>38</b> <b>39</b>	<b>Primary injector #1</b> <b>Primary injector #2</b> <b>Primary injector #3</b> <b>Primary injector #4</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"> <li>• Primary injector coupler</li> <li>• Main wire harness ECU coupler</li> <li>• Sub-wire harness 2 coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Cranking the engine. (Connect the fuel injector couplers.)
2	Open or short circuit in wire harness and/or sub-wire harness 2.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between primary injector coupler and ECU coupler. (red/blue–red/blue) #1: (red/black–red/black) #2: (green/black–green/black) #3: (blue/black–blue/black) #4: (orange/black–orange/black)</li> </ul>	
3	Defective primary injector.		<ul style="list-style-type: none"> <li>• Execute the diagnostic mode. (Code Nos. 36, 37, 38, 39)</li> <li>• Replace if defective. Refer to “CHECKING THE PRIMARY INJECTORS” on page 7-12.</li> </ul>	

# FUEL INJECTION SYSTEM

Fault code No.	40	Symptom	Open circuit detected in a secondary injector.	
Diagnostic code No.		40	Secondary injector #1	
		41	Secondary injector #2	
		42	Secondary injector #3	
		43	Secondary injector #4	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Secondary injector coupler</li><li>• Main wire harness ECU coupler</li><li>• Sub-wire harness 2 coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Execute the diagnostic mode (Code No. 63). (Set the engine stop switch to “○”.)
2	Open or short circuit in wire harness and/or sub-wire harness 2.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between secondary injector coupler and ECU coupler. (red/blue–red/blue) #1: (white/blue–white/blue) #2: (sky blue/white–sky blue/white) #3: (brown/yellow–brown/yel-low) #4: (brown/black–brown/black)</li></ul>	
3	Defective secondary injector.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code Nos. 40, 41, 42, 43)</li><li>• Replace if defective. Refer to “CHECKING THE SECONDARY INJECTORS” on page 7-6.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	41	Symptom	Lean angle sensor: open or short circuit detected.	
Diagnostic code No.		08	Lean angle sensor	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Lean angle sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically if a normal signal is received.
2	Open or short circuit in lead.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between lean angle sensor coupler and ECU coupler. (blue–blue) (yellow/green–yellow/green) (black/blue–black/blue) (light green–light green)</li></ul>	
3	Defective lean angle sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 08)</li><li>• Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-93.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	42	Symptom	A. No normal signals are received from the speed sensor. B. Open circuit is detected in the neutral switch.		
Diagnostic code No.		A	07	Speed sensor	
		B	21	Neutral switch	
Order	Item/components and probable cause			Check or maintenance job	Reinstatement method
A-1	Installed state of speed sensor.			Check for looseness or pinching.	Starting the engine, and activating the speed sensor by operating the vehicle.
A-2	Connections <ul style="list-style-type: none"><li>• Speed sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>			<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
A-3	Open or short circuit in lead.			<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between speed sensor coupler and ECU coupler. (blue–blue) (white/yellow–white/yellow) (black/blue–black/blue)</li></ul>	
A-4	Defective speed sensor.			<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 07)</li><li>• Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 8-96.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.		42	Symptom		A. No normal signals are received from the speed sensor. B. Open circuit is detected in the neutral switch.	
Diagnostic code No.			A	07	Speed sensor	
			B	21	Neutral switch	
Order	Item/components and probable cause				Check or maintenance job	Reinstatement method
B-1	Installed state of neutral switch.				Check for looseness or pinching.	Starting the engine, and activating the speed sensor by operating the vehicle.
B-2	Connections <ul style="list-style-type: none"><li>• Neutral switch coupler</li><li>• Main wire harness ECU coupler</li></ul>				<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
B-3	Open circuit in neutral switch lead.				<ul style="list-style-type: none"><li>• Repair or replace if there is an open circuit.</li><li>• Between neutral switch coupler and relay unit coupler. (sky blue–sky blue)</li><li>• Between relay unit coupler and ECU coupler. (blue/yellow–blue/yellow)</li></ul>	
B-4	Defective neutral switch.				<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 21)</li><li>• Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-81.</li></ul>	
B-5	Faulty shift drum (neutral detection area).				<ul style="list-style-type: none"><li>• Replace if defective. Refer to “TRANSMISSION” on page 5-69.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	43	Symptom	Power supply to the injectors and fuel pump is not normal.	
Diagnostic code No.		09	Fuel system voltage (battery voltage)	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"><li>• Relay unit coupler (fuel pump relay)</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Turning the main switch to “ON” when the engine stop switch is set to “○”.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between relay unit coupler and ECU coupler. (blue/yellow–blue/yellow) (red/blue–red/blue)</li><li>• Between relay unit coupler and starter relay coupler. (red–red)</li><li>• Between relay unit coupler and right handlebar switch coupler. (red/black–red/black)</li></ul>	
3	Malfunction or open circuit in fuel pump relay.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code No. 09)</li><li>• Replace if defective.</li><li>• If there is no malfunction with the fuel pump relay, replace the ECU.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	44	Symptom	An error is detected while reading or writing on EEPROM (CO adjustment value).	
Diagnostic code No.		60	EEPROM fault cylinder No.	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU.		<ul style="list-style-type: none"><li>Set the faulty cylinder's exhaust gas volume.<ol style="list-style-type: none"><li>Execute the diagnostic mode (Code No. 60) to check the faulty cylinder number. (If multiple cylinders are defective, the numbers of the faulty cylinders are displayed alternately at 2-second intervals.)</li><li>Execute the CO adjustment mode and set the exhaust gas volume of the faulty cylinder to "0".</li></ol></li><li>Replace ECU if it does not recover from the malfunction.</li></ul>	Turning the main switch to "ON". (Readjust the exhaust gas volume after it is reinstated.)

Fault code No.	46	Symptom	Power supply is not normal.	
Diagnostic code No.	—		—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in rectifier/regulator		• Replace if defective. Refer to “CHARGING SYSTEM” on page 8-13.	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit in the charging system's wiring. Refer to “CHARGING SYSTEM” on page 8-13.	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU.		Replace the ECU.  <b>NOTE:</b> _____ Be sure to turn the main switch to “OFF” before replacing the ECU. _____	Turning the main switch to “ON”.

# FUEL INJECTION SYSTEM

Fault code No.		59	Symptom	Throttle position sensor (for throttle cable pulley): open or short circuit detected. Throttle position sensor (for throttle cable pulley): coupler connection is loose.	
Diagnostic code No.			14 15	Throttle position sensor (for throttle cable pulley) signal 1 Throttle position sensor (for throttle cable pulley) signal 2	
Order	Item/components and probable cause			Check or maintenance job	Reinstatement method
1	Installed state of throttle position sensor (for throttle cable pulley).			<ul style="list-style-type: none"><li>• Check for looseness or pinching.</li><li>• Check that the sensor is installed in the specified position.</li></ul>	Turning the main switch to “ON”.
2	Connections <ul style="list-style-type: none"><li>• Throttle position sensor (for throttle cable pulley) coupler</li><li>• Main wire harness ECU coupler</li></ul>			<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
3	Open or short circuit in wire harness.			<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between throttle position sensor (for throttle cable pulley) coupler and ECU coupler. (black/blue–black/blue) (white–white) (white/red–white/red) (blue–blue)</li></ul>	
4	Defective throttle position sensor (for throttle cable pulley).			<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code Nos. 14, 15)</li><li>• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE CABLE PULLEY)” on page 8-98.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	60	Symptom	Throttle servo motor: open or short circuit detected. Defective throttle servo motor. Malfunction in ECU (servo motor driving system).	
Diagnostic code No.		01 13	Throttle position sensor (for throttle valves) signal 1 Throttle position sensor (for throttle valves) signal 2	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed state of throttle position sensor (for throttle valves).		<ul style="list-style-type: none"><li>• Check for looseness or pinching.</li><li>• Check that the sensor is installed in the specified position.</li></ul>	Turning the main switch to “ON”.
2	Connections <ul style="list-style-type: none"><li>• Throttle servo motor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the couplers for any pins that may be pulled out.</li><li>• Check the locking condition of the couplers.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between throttle servo motor coupler and ECU coupler. (yellow/red–yellow/red) (light green/red–light green/red)</li></ul>	
4	Defective throttle servo motor.		<ul style="list-style-type: none"><li>• Execute the diagnostic mode. (Code Nos. 01, 13)</li><li>• Replace the throttle body assembly if defective.</li></ul>	
5	Malfunction in ECU.		Replace the ECU.	

<b>Fault code No.</b>	<b>Er-1</b>	<b>Symptom</b>	<b>No signals are received from the ECU.</b>	
<b>Diagnostic code No.</b>	<b>—</b>	<b>—</b>	<b>—</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connections <ul style="list-style-type: none"> <li>• Main wire harness ECU coupler</li> <li>• Main wire harness meter assembly coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue)</li> </ul>	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

# FUEL INJECTION SYSTEM

Fault code No.	Er-2	Symptom	No signals are received from the ECU within the specified duration.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> <li>• Main wire harness ECU coupler</li> <li>• Main wire harness meter assembly coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue)</li> </ul>	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

Fault code No.	Er-3	Symptom	Data from the ECU cannot be received correctly.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> <li>• Main wire harness ECU coupler</li> <li>• Main wire harness meter assembly coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue)</li> </ul>	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

# FUEL INJECTION SYSTEM

Fault code No.	Er-4	Symptom	Non-registered data has been received from the meter.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> <li>• Main wire harness ECU coupler</li> <li>• Main wire harness meter assembly coupler</li> </ul>		<ul style="list-style-type: none"> <li>• Check the couplers for any pins that may be pulled out.</li> <li>• Check the locking condition of the couplers.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue)</li> </ul>	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

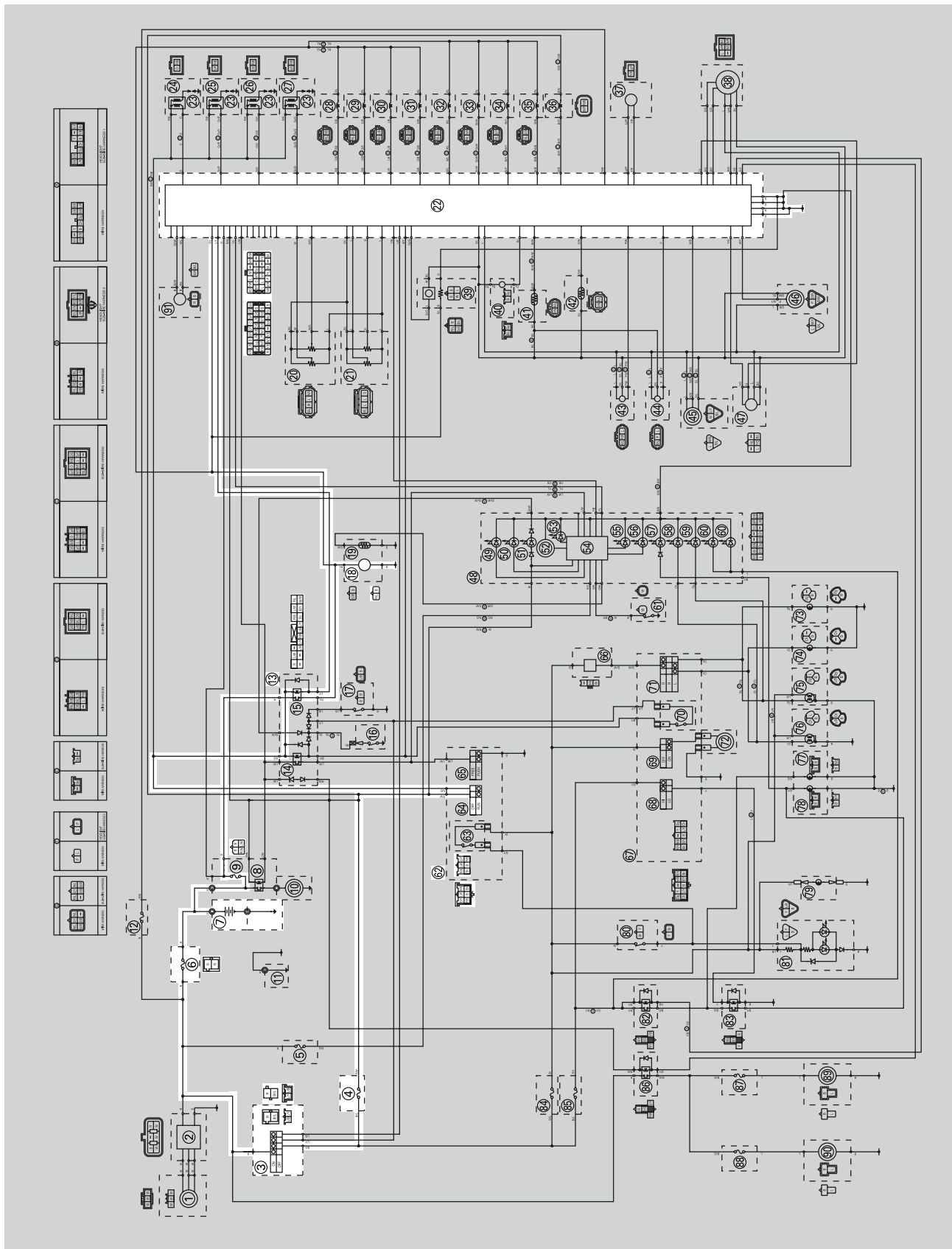


EAS27550

## FUEL PUMP SYSTEM

EAS27560

## CIRCUIT DIAGRAM



- 3. Main switch
- 4. Ignition fuse
- 6. Main fuse
- 7. Battery
- 9. Fuel injection system fuse
- 11. Engine ground
- 13. Relay unit
- 15. Fuel pump relay
- 18. Fuel pump
- 22. ECU (engine control unit)
- 64. Engine stop switch

EAS27570

## TROUBLESHOOTING

If the fuel pump fails to operate.

### NOTE:

- Before troubleshooting, remove the following part(s):

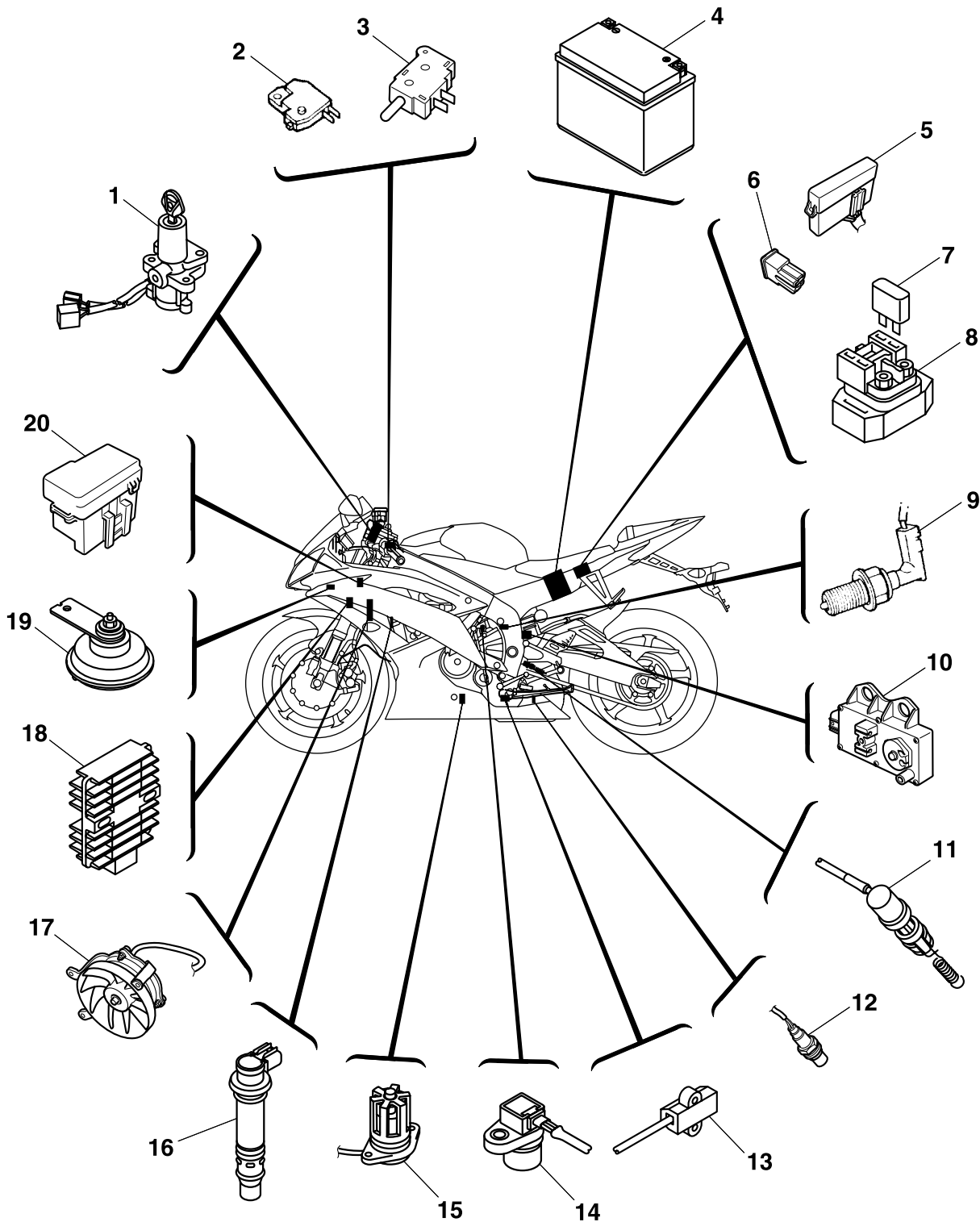
1. Rider seat
2. Fuel tank
3. Side cowlings

1. Check the fuses. (Main, ignition and fuel injection system) Refer to "CHECKING THE FUSES" on page 8-85.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-86.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the main switch.
OK↓		
4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-81.	NG→	Replace the right handlebar switch.
OK↓		
5. Check the relay unit (fuel pump relay). Refer to "CHECKING THE RELAYS" on page 8-89.	NG→	Replace the relay unit.
OK↓		
6. Check the fuel pump. Refer to "CHECKING THE FUEL PUMP" on page 8-98.	NG→	Replace the fuel pump.
OK↓		
7. Check the entire fuel pump system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-73.	NG→	Properly connect or repair the fuel pump system's wiring.
OK↓		
Replace the ECU.		



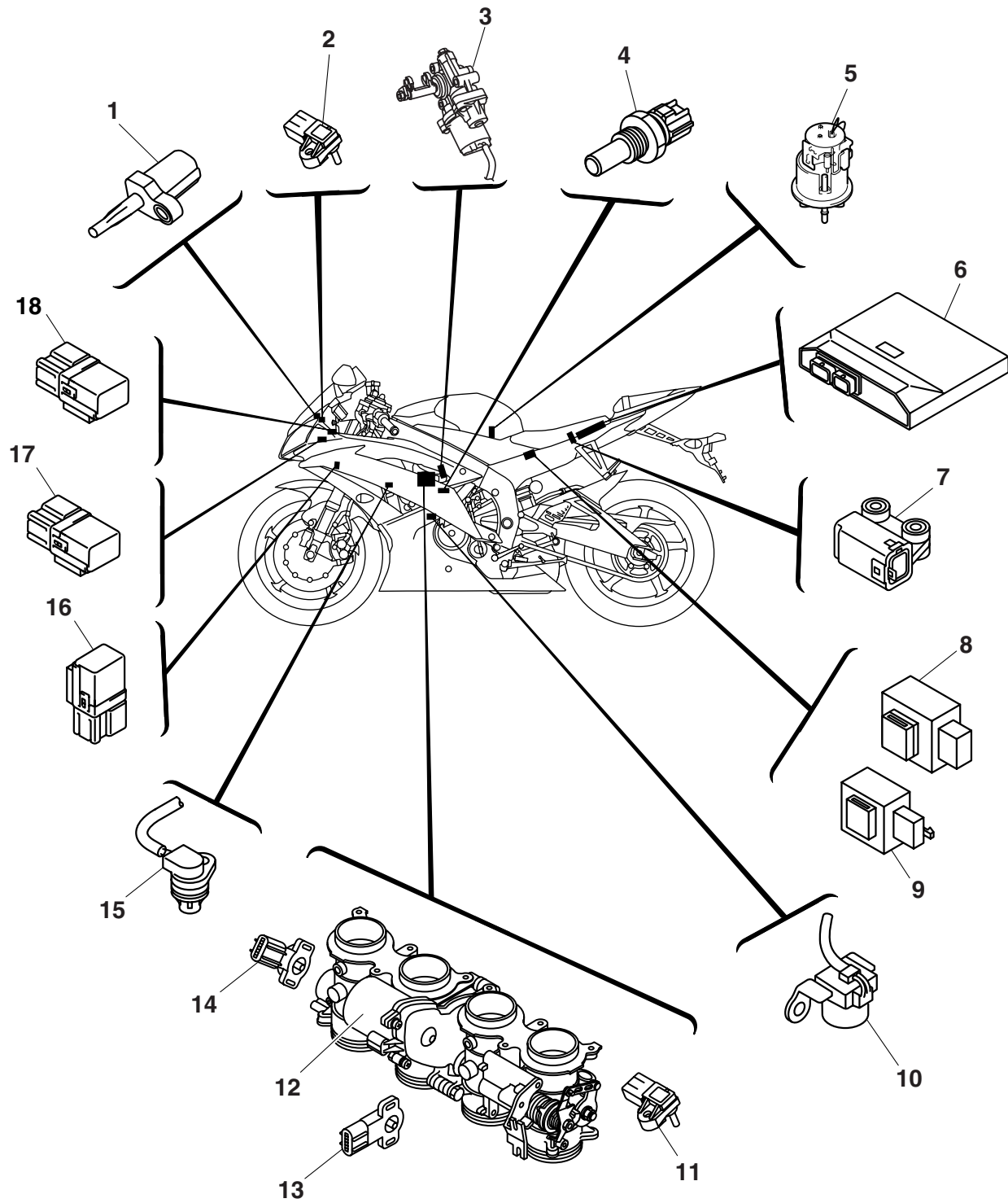
EAS27970

ELECTRICAL COMPONENTS



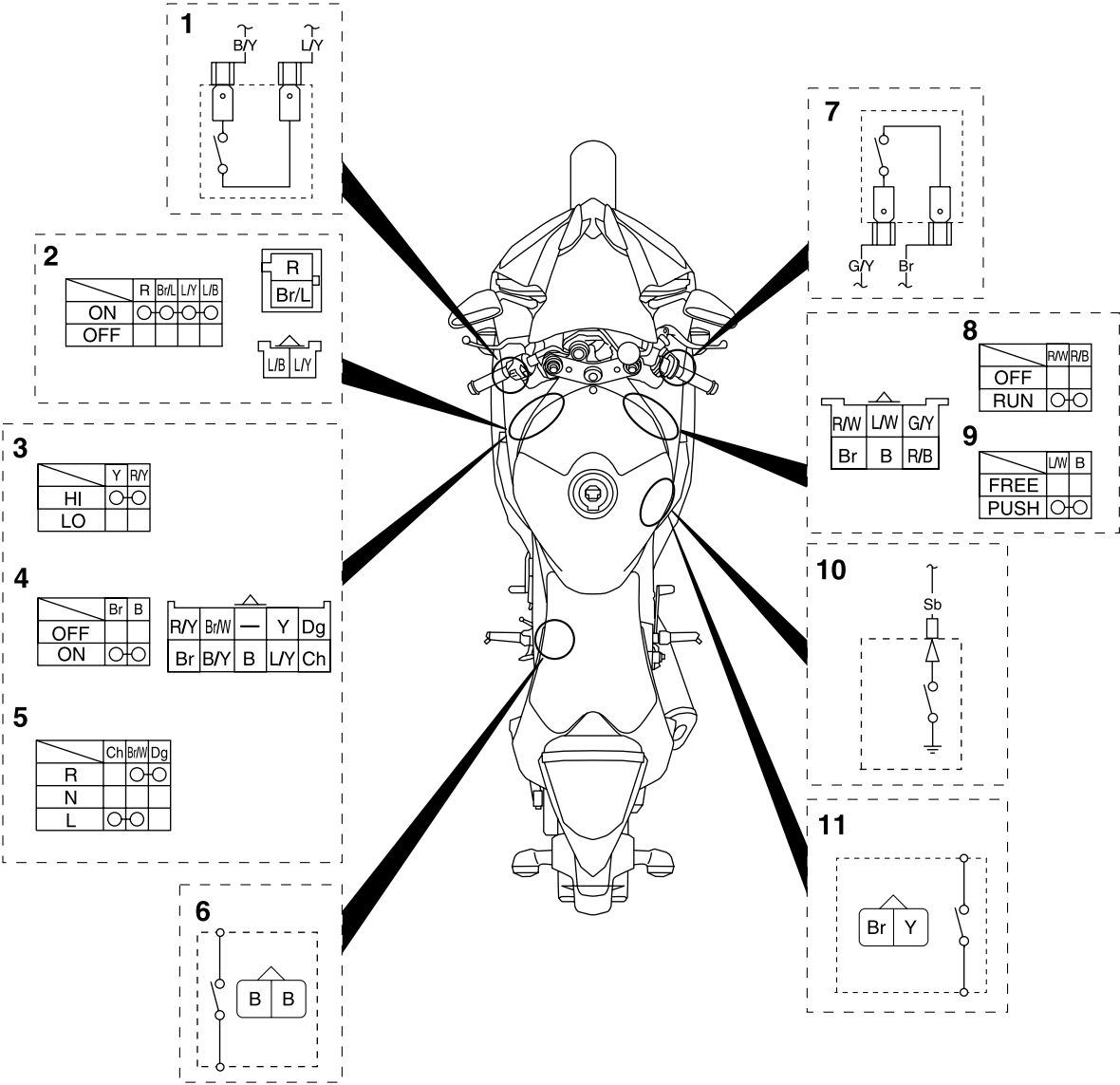
1. Main switch
2. Front brake light switch
3. Clutch switch
4. Battery
5. Fuse box (backup, ETV, spare)
6. Main fuse
7. Fuel injection system fuse
8. Starter relay
9. Neutral switch
10. EXUP servo motor
11. Rear brake light switch
12. O<sub>2</sub> sensor
13. Sidestand switch
14. Speed sensor
15. Oil level switch
16. Ignition coil
17. Radiator fan motor
18. Rectifier/regulator
19. Horn
20. Fuse box (radiator fan motor, signaling system, ignition, headlight)

# ELECTRICAL COMPONENTS



1. Intake air temperature sensor
2. Atmospheric pressure sensor
3. Intake funnel servo motor
4. Coolant temperature sensor
5. Fuel pump
6. ECU (engine control unit)
7. Lean angle sensor
8. Relay unit
9. Turn signal/hazard relay
10. Crankshaft position sensor
11. Intake air pressure sensor
12. Throttle servo motor
13. Throttle position sensor (for throttle cable pulley)
14. Throttle position sensor (for throttle valves)
15. Cylinder identification sensor
16. Radiator fan motor relay
17. Headlight relay (dimmer)
18. Headlight relay (on/off)

EAS27980  
CHECKING THE SWITCHES



1. Clutch switch
2. Main switch
3. Dimmer switch
4. Horn switch
5. Turn signal switch
6. Sidestand switch
7. Front brake light switch
8. Engine stop switch
9. Start switch
10. Neutral switch
11. Rear brake light switch

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.

ECA14370

**CAUTION:**

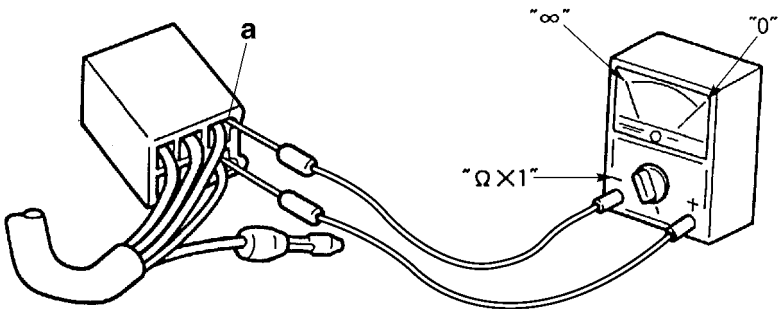
Never insert the tester probes into the coupler terminal slots “a”. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Pocket tester  
90890-03112  
Analog pocket tester  
YU-03112-C

**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 switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row.

The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indication by “ $\bigcirc - \bigcirc$ ”. There is continuity between red, brown/blue, and brown/red when the switch is set to “ON” and between red and brown/red when the switch is set to “P $\leq$ ”.

		b		
a		R	Br/L	Br/R
	ON	$\bigcirc - \bigcirc$	$\bigcirc - \bigcirc$	$\bigcirc - \bigcirc$
	OFF			
	P $\leq$	$\bigcirc - \bigcirc$		$\bigcirc - \bigcirc$
		<div>R Br/L</div>	<div>Br/R</div>	

EAS27990

## CHECKING THE BULBS AND BULB SOCKETS

**NOTE:**

Do not check any of the lights that use LEDs.

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

Damage/wear → Repair or replace the bulb, bulb socket or both.

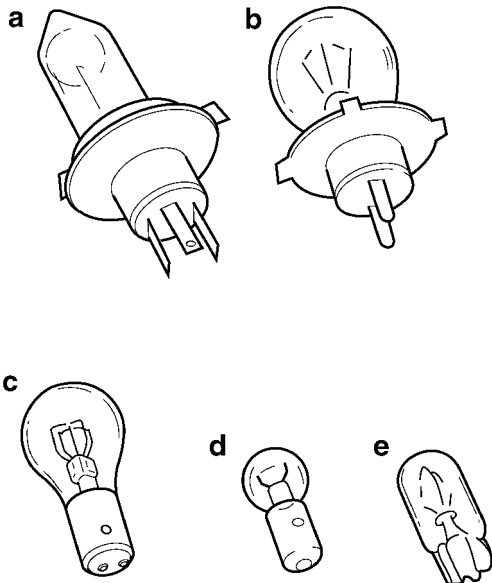
Improperly connected  $\rightarrow$  Properly connect.

No continuity → Repair or replace the bulb, bulb socket or both.

## Types of bulbs

The bulbs used on this vehicle are shown in the following illustration.

- Bulbs “a” and “b” are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs “c” are 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

EW2C01001



**Since headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.**

EC2C01002

**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 a 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 a headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.
- 
2. Check:
- Bulb (for continuity)  
(with the pocket tester)  
No continuity → Replace.

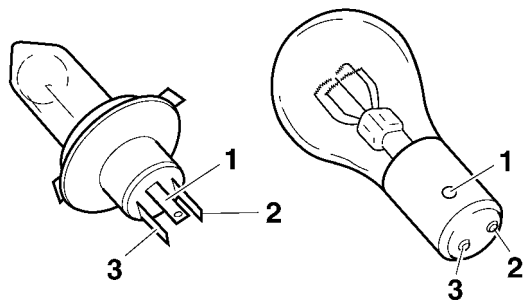


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

**NOTE:**

Before checking for continuity, set the pocket tester to “0” and to the “ $\Omega \times 1$ ” range.

- Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
- Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "3", and check the continuity.
- If either of the readings indicate no continuity, replace the bulb.



Checking the condition of the bulb sockets

The following procedure applies to all of the bulb sockets.

1. Check:
  - Bulb socket (for continuity) (with the pocket tester)No continuity → Replace.



**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

**CHECKING THE FUSES**

The following procedure applies to all of the fuses.

EC2C01003

**CAUTION:**

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

1. Remove:
  - Rider seat
  - Left upper side cowlRefer to “GENERAL CHASSIS” on page 4-1.
2. Check:
  - Fuse

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

NOTE:

Set the pocket tester selector to “Ω × 1”.



**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

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

3. Replace:
  - Blown fuse

- a. Set the main switch to “OFF”.

- b. Install a new fuse of the correct amperage rating.

- c. Set on the switches to verify if the electrical circuit is operational.

- d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	50 A	1
Ignition	15 A	1
Headlight	15 A	1
Fuel injection system	15 A	1
Left radiator fan motor	15 A	1
Right radiator fan motor	15 A	1
Signaling system	10 A	1
Backup (odometer, clock and immobilizer system)	7.5 A	1
ETV	7.5 A	1
Spare	15 A	1
Spare	10 A	1
Spare	7.5 A	1

EWA13310

**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:

- Left upper side cowling
  - Rider seat
- Refer to “GENERAL CHASSIS” on page 4-1.

EAS28030

## CHECKING AND CHARGING THE BATTERY

EWA13290

### 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.

EC2C01024

### 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 according to the instructions for the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

### NOTE:

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

#### 1. Remove:

- Rider seat
  - Fuel tank bracket
- Refer to “GENERAL CHASSIS” on page 4-1.

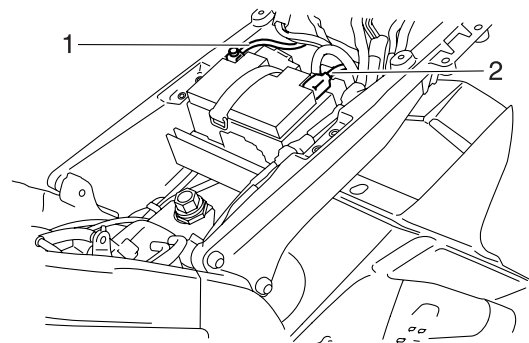
#### 2. Disconnect:

- Battery leads  
(from the battery terminals)

ECA13640

### CAUTION:

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



#### 3. Remove:

- Battery band
- Battery

#### 4. Check:

- Battery charge



- a. Connect a pocket tester to the battery terminals.

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

### NOTE:

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

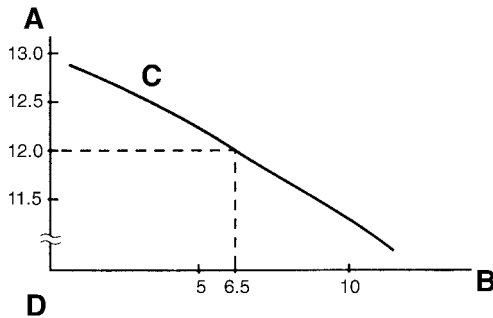
- b. Check the charge of the battery, as shown in the charts and the following example.

## Example

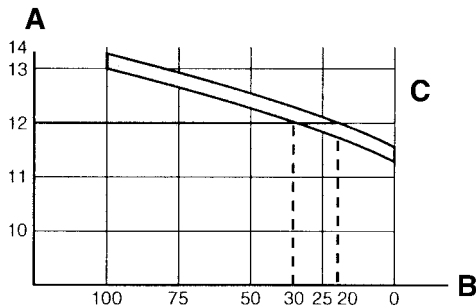
Open-circuit voltage = 12.0 V

Charging time = 6.5 hours

Charge of the battery = 20–30%



- A. Open-circuit voltage (V)  
B. Charging time (hours)  
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)  
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



- A. Open-circuit voltage (V)  
B. Charging condition of the battery (%)  
C. Ambient temperature 20 °C (68 °F)



5. Charge:
- Battery (refer to the appropriate charging method illustration)

EWA13300



**WARNING**

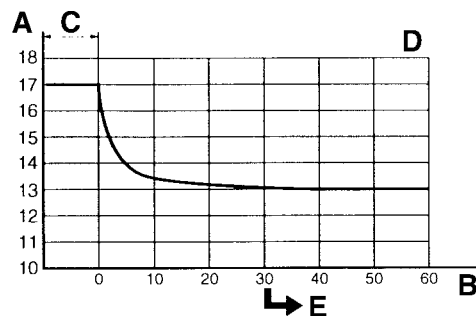
**Do not quick charge a battery.**

ECA13670

**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 vehicle. (If charging has to be done with the battery mounted on the vehicle, 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.



- A. Open-circuit voltage (V)  
B. Time (minutes)  
C. Charging  
D. Ambient temperature 20 °C (68 °F)  
E. Check the open-circuit voltage.

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

- Measure the open-circuit voltage prior to charging.

### NOTE:

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

- Connect a charger and ammeter to the battery and start charging.

### NOTE:

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

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

### NOTE:

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Standard charging current is reached  
Battery is good.
- Standard charging current is not reached  
Replace the battery.

- Adjust the voltage so that the current is at the standard charging level.
- Set the time according to the charging time suitable for the open-circuit voltage.
- If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
- Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.  
12.7 V or less --- Recharging is required.  
Under 12.0 V --- Replace the battery.

## Charging method using a constant voltage charger

- Measure the open-circuit voltage prior to charging.

### NOTE:

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

- Connect a charger and ammeter to the battery and start charging.
- Make sure that the current is higher than the standard charging current written on the battery.

### NOTE:

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

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

### NOTE:

Set the charging time at 20 hours (maximum).

- Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.  
12.7 V or less --- Recharging is required.  
Under 12.0 V --- Replace the battery.

## 6. Install:

- Battery
- Battery band

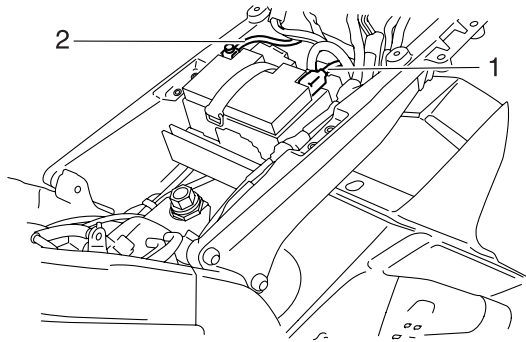
## 7. Connect:

- Battery leads  
(to the battery terminals)

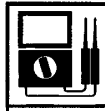
ECA13630

### CAUTION:

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

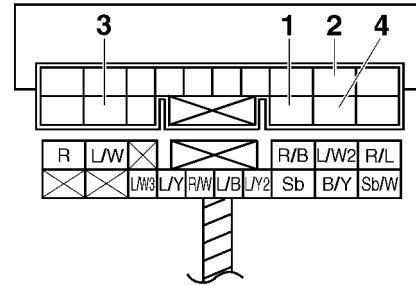


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

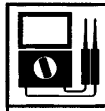


**Result**  
**Continuity**  
(between "3" and "4")

**Relay unit (starting circuit cut-off relay)**

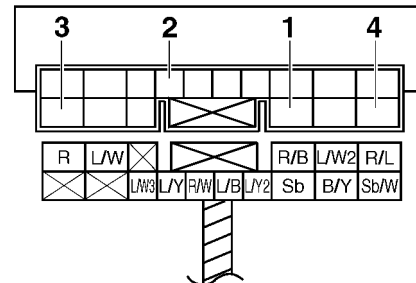


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

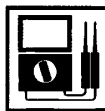


**Result**  
**Continuity**  
(between "3" and "4")

**Relay unit (fuel pump relay)**



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

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



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

10. Install:
  - Fuel tank bracket
  - Rider seat  
Refer to "GENERAL CHASSIS" on page 4-1.

EAS28040

## CHECKING THE RELAYS

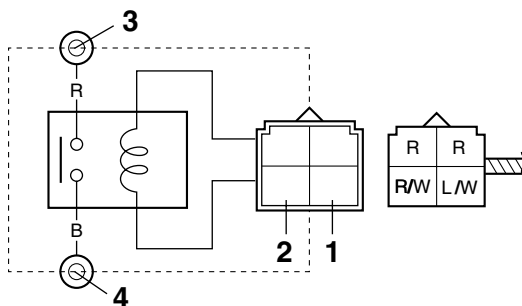
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.



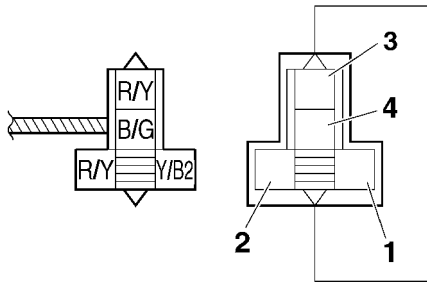
**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminal as shown.  
Check the relay operation.  
Out of specification → Replace.

### Starter relay



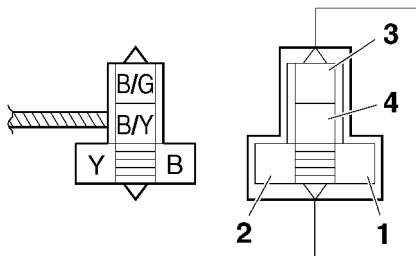
## Headlight relay (on/off)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



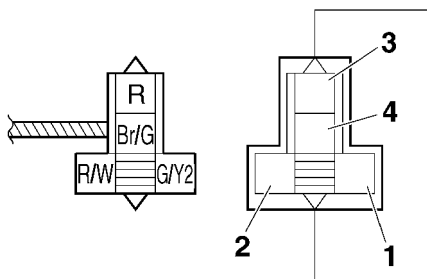
## Headlight relay (dimmer)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

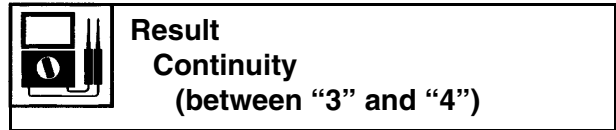


## Radiator fan motor relay



1. Positive battery terminal

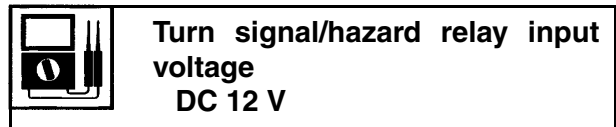
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



ET2C01021

## CHECKING THE TURN SIGNAL/HAZARD RELAY

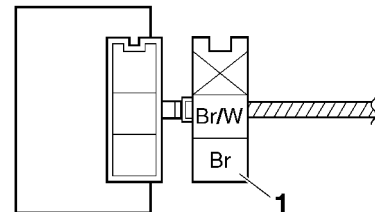
1. Check:
  - Turn signal/hazard relay input voltage  
Out of specification → The wiring circuit from the main switch to the turn signal/hazard relay coupler is faulty and must be repaired.



- a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.



- Positive tester probe → brown "1"
- Negative tester probe → ground



- b. Turn the main switch to "ON".
- c. Measure the turn signal/hazard relay input voltage.

2. Check:
  - Turn signal/hazard relay output voltage  
Out of specification → Replace.



Turn signal/hazard relay output voltage  
DC 12 V

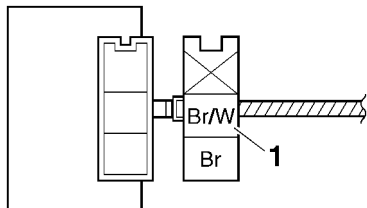


- a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.



Pocket tester  
90890-03112  
Analog pocket tester  
YU-03112-C

- Positive tester probe → brown/white “1”
- Negative tester probe → ground



- b. Turn the main switch to “ON”.  
c. Measure the turn signal/hazard relay output voltage.



EAS28050

CHECKING THE RELAY UNIT (DIODE)

1. Check:
- Relay unit (diode)  
Out of specification → Replace.

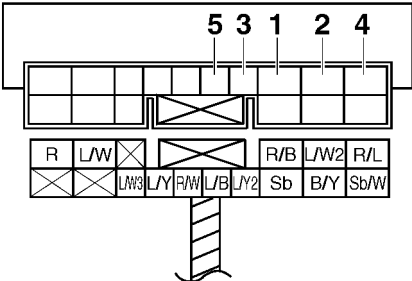


Pocket tester  
90890-03112  
Analog pocket tester  
YU-03112-C

**NOTE:** \_\_\_\_\_  
The pocket tester or the analog pocket tester readings are shown in the following table.



Continuity  
Positive tester probe → sky blue “1”  
Negative tester probe → black/ yellow “2”  
No continuity  
Positive tester probe → black/ yellow “2”  
Negative tester probe → sky blue “1”  
Continuity  
Positive tester probe → sky blue “1”  
Negative tester probe → blue/ yellow “3”  
No continuity  
Positive tester probe → blue/ yellow “3”  
Negative tester probe → sky blue “1”  
Continuity  
Positive tester probe → sky blue “1”  
Negative tester probe → sky blue/white “4”  
No continuity  
Positive tester probe → sky blue/white “4”  
Negative tester probe → sky blue “1”  
Continuity  
Positive tester probe → blue/ black “5”  
Negative tester probe → blue/ yellow “3”  
No continuity  
Positive tester probe → blue/ yellow “3”  
Negative tester probe → blue/ black “5”



- a. Disconnect the relay unit coupler from the wire harness.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the relay unit terminal as shown.
- c. Check the relay unit (diode) for continuity.
- d. Check the relay unit (diode) for no continuity.

EAS28100

## CHECKING THE IGNITION COILS

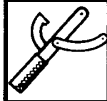
The following procedure applies to all of the ignition coils.

1. Check:
  - Primary coil resistance
 Out of specification → Replace.



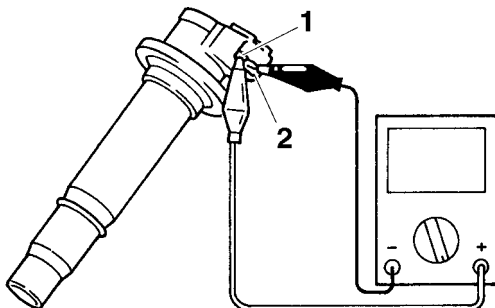
**Primary coil resistance**  
0.85–1.15  $\Omega$

- a. Remove the ignition coil from the spark plug.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the ignition coil as shown.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Positive tester probe → red/black “1”
- Negative tester probe → orange or gray/red or orange/green or gray/green “2”



- c. Measure the primary coil resistance.

2. Check:
  - Secondary coil resistance
 Out of specification → Replace.



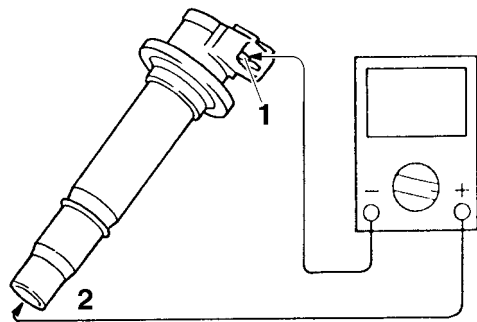
**Secondary coil resistance**  
5.01–6.78 k $\Omega$

- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the ignition coil as shown.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Negative tester probe → red/black “1”
- Positive tester probe → spark plug terminal “2”



- b. Measure the secondary coil resistance.

3. Check:

- Ignition spark gap
- Out of specification → Replace.

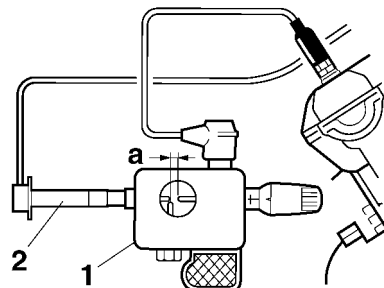


**Minimum ignition spark gap**  
6.0 mm (0.24 in)

- a. Connect the ignition checker “1” as shown.



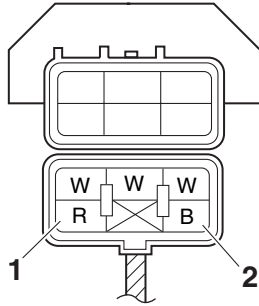
**Ignition checker**  
90890-06754  
**Opama pet-4000 spark checker**  
YM-34487



2. Ignition coil







- c. Start the engine and let it run at approximately 5000 r/min.
- d. Measure the charging voltage.



EAS28180

## CHECKING THE HORN

1. Check:
  - Horn resistance
 Out of specification → Replace.



**Coil resistance**  
1.15–1.25  $\Omega$  at 20 °C (68 °F)

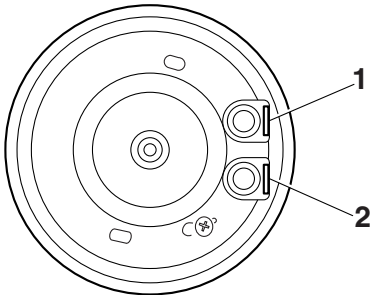


- a. Disconnect the horn leads from the horn terminals.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the horn terminals.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Positive tester probe → horn terminal “1”
- Negative tester probe → horn terminal “2”



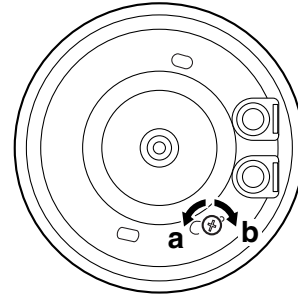
- c. Measure the horn resistance.



2. Check:
  - Horn sound
 Faulty sound → Adjust or replace.



- a. Connect a battery (12 V) to the horn.
- b. Turn the adjusting screw in direction “a” or “b” until the horn sound is obtained.



EAS28190

## CHECKING THE OIL LEVEL SWITCH

1. Drain:
  - Engine oil
2. Remove:
  - Oil level switch (from the oil pan)
3. Check:
  - Oil level switch resistance
 Out of specification → Replace the oil level switch.



**Oil level switch resistance**  
**Maximum level position**  
484–536  $\Omega$   
**Minimum level position**  
114–126  $\Omega$



- a. Connect the pocket tester ( $\Omega \times 100$ ) to the oil level switch terminal as shown.



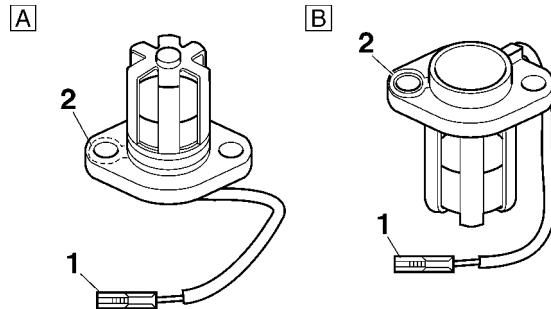
**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

Minimum level position “A”

- Positive tester probe → connector (white) “1”
- Negative tester probe → body earth “2”

Maximum level position "B"

- Positive tester probe → connector (white) "1"
- Negative tester probe → body earth "2"



b. Measure the oil level switch resistance.



EAS28230

## CHECKING THE FUEL SENDER

1. Disconnect:
  - Fuel pump coupler
  - Fuel sender coupler (from the wire harness)
2. Remove:
  - Fuel tank
3. Remove:
  - Fuel pump (from the fuel tank)
4. Check:
  - Fuel sender resistance



**Fuel sender resistance**  
900–1050  $\Omega$  at 25 °C (77 °F)

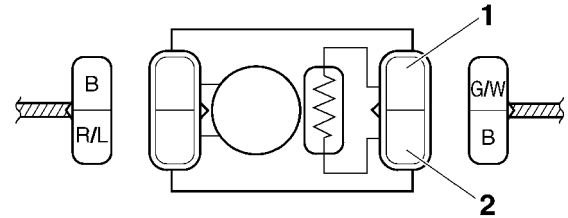


- a. Connect the pocket tester ( $\Omega \times 1$ ) to the fuel sender terminal as shown.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Positive tester probe → green/white "1"
- Negative tester probe → black "2"



b. Measure the fuel sender resistance.



EAS28240

## CHECKING THE SPEED SENSOR

1. Check:
  - Speed sensor output voltage
 Out of specification → Replace.



**Output voltage reading cycle**  
0.6 V to 4.8 V to 0.6 V to 4.8 V

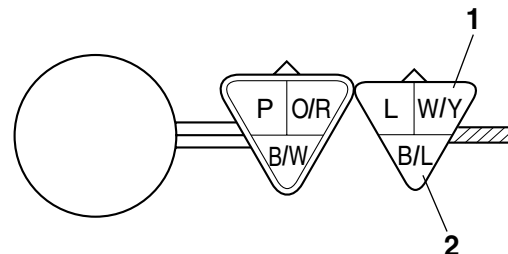


- a. Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Positive tester probe → white/yellow "1"
- Negative tester probe → black/blue "2"



- b. Turn the main switch to "ON".
- c. Elevate the rear wheel and slowly rotate it.
- d. Measure the voltage of white/yellow and black/blue. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.



EAS28250

## CHECKING THE RADIATOR FAN MOTORS

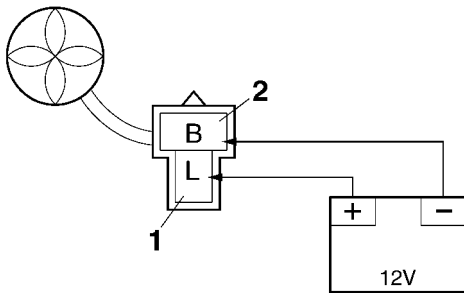
### 1. Check:

- Radiator fan motor  
Faulty/rough movement → Replace.



- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (DC 12 V) as shown.

- Positive tester probe → blue "1"
- Negative tester probe → black "2"



- Measure the radiator fan motor movement.



EAS28260

## CHECKING THE COOLANT TEMPERATURE SENSOR

### 1. Remove:

- Coolant temperature sensor  
Refer to "THERMOSTAT" on page 6-6.

EWA14130

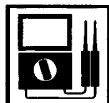


**WARNING**

- 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.

### 2. Check:

- Coolant temperature sensor resistance  
Out of specification → Replace.



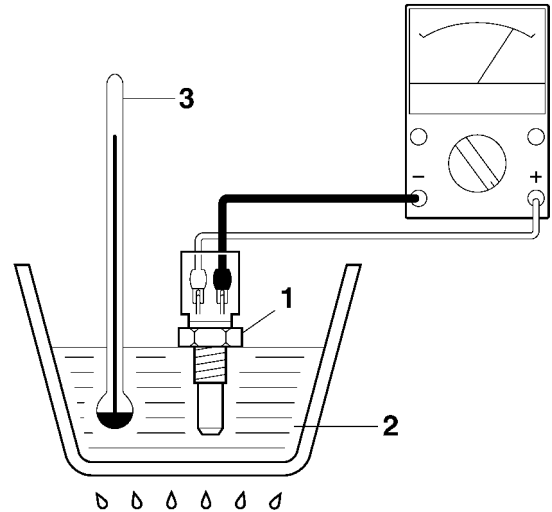
**Resistance at 80 °C**  
**290–354 Ω**



- Connect the pocket tester ( $\Omega \times 100$ ) to the coolant temperature sensor as shown.



**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**



- Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

### NOTE:

Make sure 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.
- Measure the coolant temperature sensor resistance.



EAS28300

## CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE VALVES)

### 1. Remove:

- Throttle position sensor (for throttle valves)  
(from the throttle body)

### 2. Check:

- Throttle position sensor (for throttle valves) maximum resistance  
Out of specification → Replace the throttle position sensor (for throttle valves).



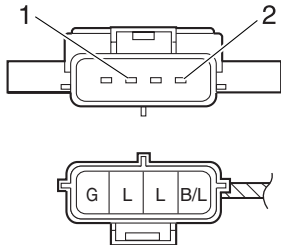
**Resistance**  
**2.0–3.0 kΩ**

- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor (for throttle valves) terminal as shown.



**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

- Positive tester probe → blue “1”
- Negative tester probe → black/blue “2”



- b. Measure the throttle position sensor (for throttle valves) maximum resistance.

3. Install:
- Throttle position sensor (for throttle valves)

**NOTE:**

When installing the throttle position sensor (for throttle valves), adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR (FOR THROTTLE VALVES)” on page 7-13.

ET2C01001

## CHECKING THE THROTTLE POSITION SENSOR (FOR THROTTLE CABLE PULLEY)

1. Remove:
  - Throttle position sensor (for throttle cable pulley) (from the throttle body)
2. Check:
  - Throttle position sensor (for throttle cable pulley) maximum resistance

Out of specification → Replace the throttle position sensor (for throttle cable pulley).



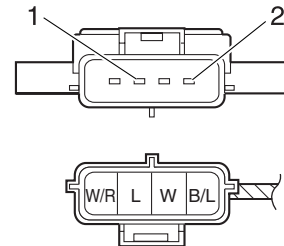
**Resistance**  
**2.0–3.0 kΩ**

- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor (for throttle cable pulley) terminal as shown.



**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

- Positive tester probe → blue “1”
- Negative tester probe → black/blue “2”



- b. Measure the throttle position sensor (for throttle cable pulley) maximum resistance.

3. Install:
- Throttle position sensor (for throttle cable pulley)

**NOTE:**

When installing the throttle position sensor (for throttle cable pulley), adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR (FOR THROTTLE CABLE PULLEY)” on page 7-13.

EAS28350

## CHECKING THE FUEL PUMP

EWA13850



**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:**

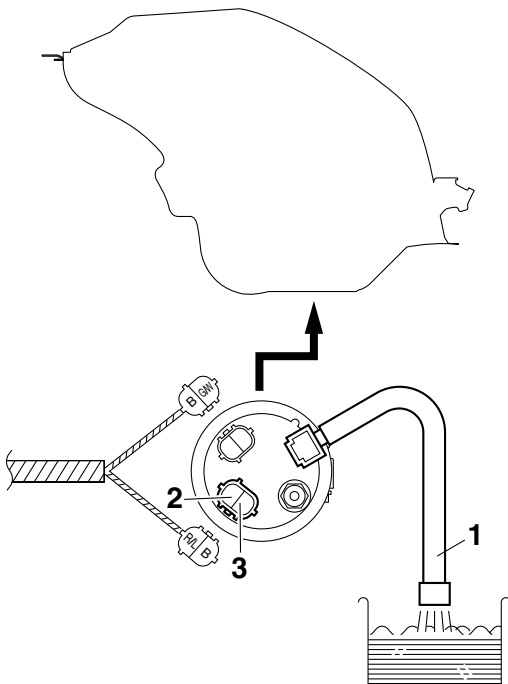
- Stop the engine before refueling.

- 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. Disconnect:
  - Fuel pump coupler
  - Fuel sender coupler (from the wire harness)
2. Remove:
  - Fuel tank
3. Check:
  - Fuel pump operation
 Faulty/rough movement → Replace.

- a. Fill the fuel tank.
- b. Put the end of the fuel hose "1" into an open container.
- c. Connect the battery (DC 12 V) to the fuel pump terminal as shown.

- Positive battery lead → red/blue "2"
- Negative battery lead → black "3"



- d. Check the fuel pump operation.

EAS28370

## CHECKING THE AIR INDUCTION SYSTEM SOLENOID

1. Check:
  - Air induction system solenoid resistance
 Out of specification → Replace.



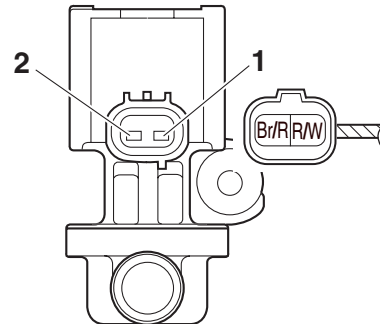
**Solenoid resistance**  
18–22  $\Omega$  at 20 °C (68 °F)

- a. Disconnect the air induction system solenoid coupler from the air induction system solenoid.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the air induction system solenoid terminal as shown.



**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- Positive tester probe → brown/red "1"
- Negative tester probe → red/white "2"

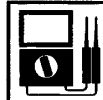


- c. Measure the air induction system solenoid resistance.

EAS28380

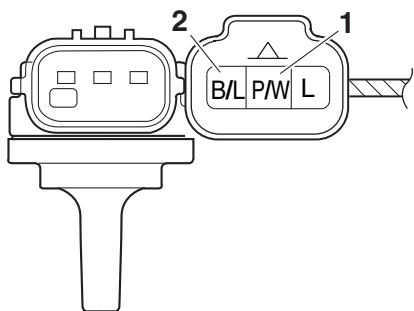
## CHECKING THE ATMOSPHERIC PRESSURE SENSOR

1. Check:
  - Atmospheric pressure sensor output voltage
 Out of specification → Replace.



**Atmospheric pressure sensor output voltage**  
3.15–4.15 V





- b. Turn the main switch to “ON”.
- c. Measure the intake air pressure sensor output voltage.



ET2C01022  
**CHECKING THE AIR TEMPERATURE SENSOR**

- 1. Remove:
  - Air temperature sensor

EW2C01002  
**⚠ WARNING**

- Handle the air temperature sensor with special care.
- Never subject the air temperature sensor to strong shocks. If the air temperature sensor is dropped, replace it.

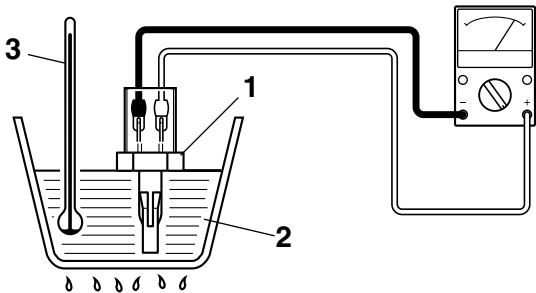
- 2. Check:
  - Air temperature sensor resistanceOut of specification → Replace.

**Air temperature sensor resistance**  
290–390 Ω at 80 °C (176 °F)



- a. Connect the pocket tester ( $\Omega \times 100$ ) to the air temperature sensor terminal as shown.

**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C



- b. Immerse the air temperature sensor “1” in a container filled with water “2”.

**NOTE:** \_\_\_\_\_  
Make sure that the air temperature sensor terminals do not get wet.

- c. Place a thermometer “3” in the water.
- d. Slowly heat the water, then let it cool down to the specified temperature.
- e. Measure the air temperature sensor resistance.



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## TROUBLESHOOTING

<b>TROUBLESHOOTING .....</b>	<b>9-1</b>
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EAS28450

## TROUBLESHOOTING

EAS28460

### GENERAL INFORMATION

#### NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470

### STARTING FAILURES

#### Engine

1. Cylinder(s) and cylinder head
  - Loose spark plug
  - Loose cylinder head
  - Damaged cylinder head 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
2. Piston(s) and piston ring(s)
  - Improperly installed piston ring
  - Damaged, worn or fatigued piston ring
  - Seized piston ring
  - Seized or damaged piston
3. Air filter
  - Improperly installed air filter
  - Clogged air filter element
4. Crankcase and crankshaft
  - Improperly assembled crankcase
  - Seized crankshaft

#### Fuel system

1. Fuel tank
  - Empty fuel tank
  - Clogged fuel tank drain hose
  - Deteriorated or contaminated fuel
2. Fuel pump
  - Faulty fuel pump
  - Faulty fuel pump relay
3. Throttle body(-ies)
  - Deteriorated or contaminated fuel
  - Sucked-in air

#### Electrical system

1. Battery

- Discharged battery
  - Faulty battery
2. Fuse(s)
    - Blown, damaged or incorrect fuse
    - Improperly installed fuse
  3. Spark plug(s)
    - Incorrect spark plug gap
    - Incorrect spark plug heat range
    - Fouled spark plug
    - Worn or damaged electrode
    - Worn or damaged insulator
  4. Ignition coil(s)
    - Cracked or broken ignition coil body
    - Broken or shorted primary or secondary coils
  5. Ignition system
    - Faulty ECU
    - Faulty crankshaft position sensor
    - Faulty cylinder identification sensor
  6. 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
  7. Starting system
    - Faulty starter motor
    - Faulty starter relay
    - Faulty starting circuit cut-off relay
    - Faulty starter clutch

EAS28490

### INCORRECT ENGINE IDLING SPEED

#### Engine

1. Cylinder(s) and cylinder head
  - Incorrect valve clearance
  - Damaged valve train components
2. Air filter
  - Clogged air filter element

#### Fuel system

1. Throttle body(-ies)
  - Damaged or loose throttle body joint
  - Improperly synchronized throttle bodies
  - Improper throttle cable free play
  - Flooded throttle body
  - Faulty air induction system

## Electrical system

1. Battery
  - Discharged battery
  - Faulty battery
2. Spark plug(s)
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
  - Worn or damaged insulator
3. Ignition coil(s)
  - Broken or shorted primary or secondary coils
  - Cracked or broken ignition coil
4. Ignition system
  - Faulty ECU
  - Faulty crankshaft position sensor
  - Faulty cylinder identification sensor

EAS28510

## POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURES” on page 9-1.

## Engine

1. Air filter
  - Clogged air filter element
  - Faulty YCC-T and YCC-I

## Fuel system

1. Fuel pump
  - Faulty fuel pump

EAS28530

## FAULTY GEAR SHIFTING

### Shifting is difficult

Refer to “Clutch drags”.

EAS28540

## 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

EAS28550

## JUMPS OUT OF GEAR

### Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

### Shift forks

- Worn shift fork

### Shift drum

- Incorrect axial play
- Worn shift drum groove

### Transmission

- Worn gear dog

EAS28560

## FAULTY CLUTCH

### Clutch slips

1. Clutch
  - Improperly assembled clutch
  - Improperly adjusted clutch cable
  - Loose or fatigued clutch spring
  - Worn friction plate
  - Worn clutch plate
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (low)
  - Deteriorated oil

### Clutch drags

1. Clutch
  - Unevenly tensioned clutch springs
  - Warped pressure plate
  - Bent clutch plate
  - Swollen friction plate
  - Bent clutch pull rod
  - Damaged clutch boss
  - Burnt primary driven gear bushing
  - Match marks not aligned
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (high)
  - Deteriorated oil

EAS28600

## OVERHEATING

### Engine

1. Clogged coolant passages
  - Cylinder head and piston(s)
  - Heavy carbon buildup
2. Engine oil
  - Incorrect oil level

- Incorrect oil viscosity
- Inferior oil quality

## Cooling system

1. Coolant
  - Low coolant level
2. Radiator
  - Damaged or leaking radiator
  - Faulty radiator cap
  - Bent or damaged radiator fin
3. Water pump
  - Damaged or faulty water pump
  - Thermostat
  - Thermostat stays closed
  - Oil cooler
  - Clogged or damaged oil cooler
  - Hose(s) and pipe(s)
  - Damaged hose
  - Improperly connected hose
  - Damaged pipe
  - Improperly connected pipe

## Fuel system

1. Throttle body(-ies)
  - Damaged or loose throttle body joint
2. Air filter
  - Clogged air filter element

## Chassis

1. Brake(s)
  - Dragging brake

## Electrical system

1. Spark plug(s)
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
2. Ignition system
  - Faulty ECU
3. Cooling system
  - Faulty radiator fan motor relay
  - Faulty coolant temperature sensor
  - Faulty ECU

EAS28610

## OVERCOOLING

### Cooling system

1. Thermostat
  - Thermostat stays open

EAS28620

## POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system

- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28660

## 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
- Cracked or damaged cap bolt O-ring

### Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28680

## UNSTABLE HANDLING

### Handlebars

- Bent or improperly installed right handlebar
- Bent or improperly installed left handlebar

1. Steering head components
  - Improperly installed upper bracket
  - Improperly installed lower bracket (improperly tightened ring nut)
  - Bent steering stem
  - Damaged ball bearing or bearing race
2. 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
3. Swingarm
  - Worn bearing or bushing
  - Bent or damaged swingarm

### Rear shock absorber assembly

- 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

EAS28710

## **FAULTY LIGHTING OR SIGNALING SYSTEM**

### **Headlight does not come on**

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main switch)
- Burnt-out headlight bulb

### **Headlight bulb burnt out**

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

### **Tail/brake light does not come on**

- Wrong tail/brake light LED
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light LED

### **Tail/brake light bulb burnt out**

- Wrong tail/brake light LED
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light LED life expired

### **Turn signal does not come on**

- Faulty turn signal switch
- Faulty turn signal/hazard 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 flashes 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 flashes quickly**

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

### **Horn does not sound**

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

**WIRING DIAGRAM****YZFR6X(C)**

1. AC magneto
2. Rectifier/regulator
3. Main switch
4. Ignition fuse
5. Backup fuse (odometer, clock and immobilizer system)
6. Main fuse
7. Battery
8. Starter relay
9. Fuel injection system fuse
10. Starter motor
11. Engine ground
12. ETV fuse
13. Relay unit
14. Starting circuit cut-off relay
15. Fuel pump relay
16. Neutral switch
17. Sidestand switch
18. Fuel pump
19. Fuel sender
20. Throttle position sensor (for throttle cable pulley)
21. Throttle position sensor (for throttle valves)
22. ECU (engine control unit)
23. Spark plug
24. Cylinder-#1 ignition coil
25. Cylinder-#2 ignition coil
26. Cylinder-#3 ignition coil
27. Cylinder-#4 ignition coil
28. Primary injector #1
29. Primary injector #2
30. Primary injector #3
31. Primary injector #4
32. Secondary injector #1
33. Secondary injector #2
34. Secondary injector #3
35. Secondary injector #4
36. Air induction system solenoid
37. Throttle servo motor
38. EXUP servo motor
39. O<sub>2</sub> sensor
40. Crankshaft position sensor
41. Air temperature sensor
42. Coolant temperature sensor
43. Intake air pressure sensor
44. Atmospheric pressure sensor
45. Cylinder identification sensor
46. Speed sensor
47. Lean angle sensor
48. Meter assembly
49. Fuel level warning light
50. Oil level warning light
51. Neutral indicator light
52. Tachometer
53. Shift timing indicator light
54. Multi-function meter

55. Engine trouble warning light
56. Coolant temperature warning light
57. High beam indicator light
58. Left turn signal indicator light
59. Right turn signal indicator light
60. Meter light
61. Oil level switch
62. Right handlebar switch
63. Front brake light switch
64. Engine stop switch
65. Start switch
66. Turn signal relay
67. Left handlebar switch
68. Dimmer switch
69. Horn switch
70. Clutch switch
71. Turn signal switch
72. Horn
73. Rear right turn signal light
74. Rear left turn signal light
75. Front right turn signal/position light
76. Front left turn signal/position light
77. Headlight (low beam)
78. Headlight (high beam)
79. License plate light
80. Rear brake light switch
81. Tail/brake light
82. Headlight relay (on/off)
83. Headlight relay (dimmer)
84. Signaling system fuse
85. Headlight fuse
86. Radiator fan motor relay
87. Right radiator fan motor fuse
88. Left radiator fan motor fuse
89. Right radiator fan motor
90. Left radiator fan motor
91. Intake funnel servo motor

B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/B	Brown/Black
Br/G	Brown/Green
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
Br/Y	Brown/Yellow
G/B	Green/Black
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
Gy/R	Gray/Red
L/B	Blue/Black
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
Lg/R	Light green/Red
O/B	Orange/Black
O/G	Orange/Green
P/B	Pink/Black
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
Sb/W	Sky blue/White
W/B	White/Black
W/L	White/Blue
W/R	White/Red
W/Y	White/Yellow
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red

**COLOR CODE**

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

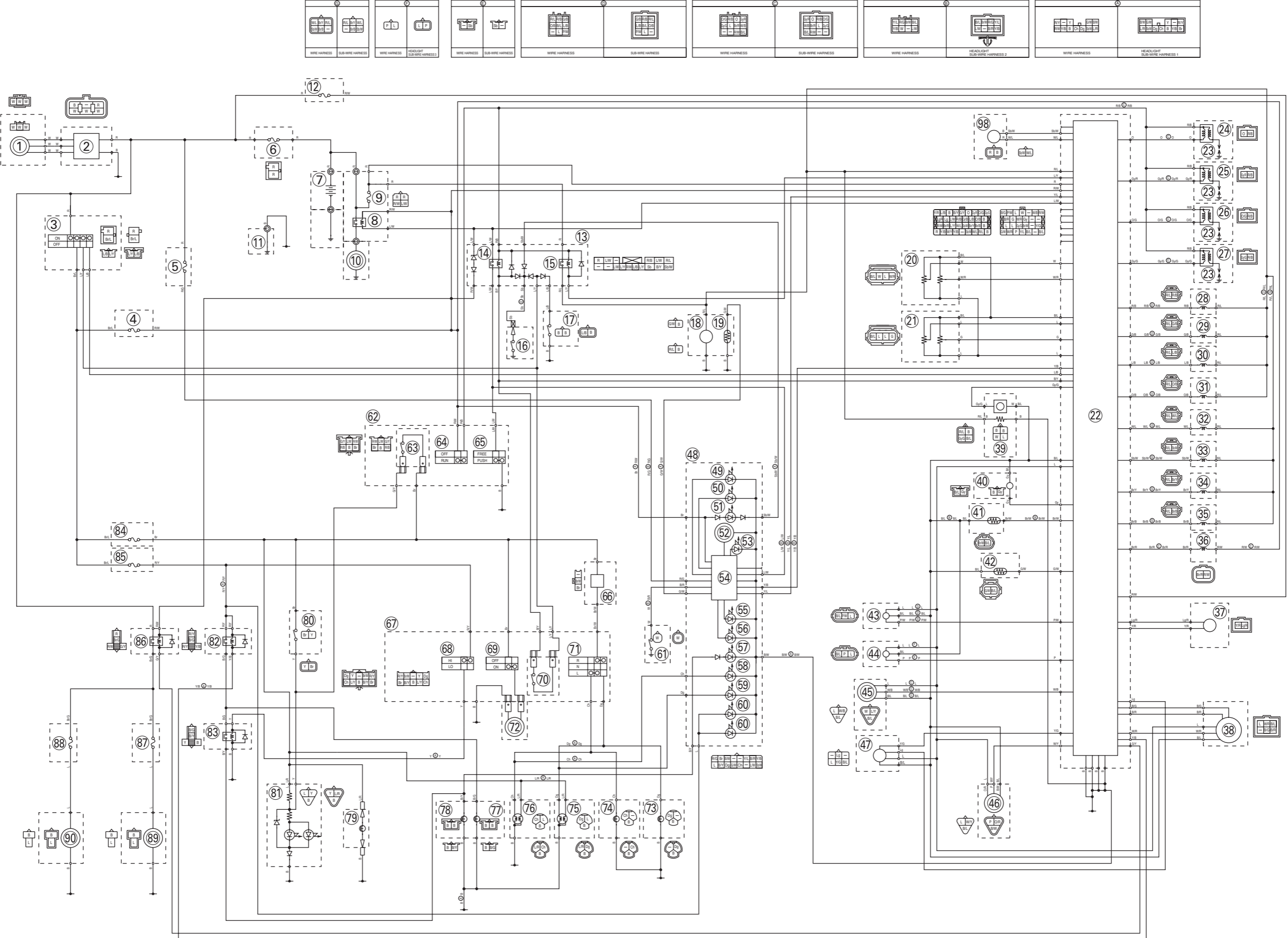




YAMAHA MOTOR CO., LTD.

2500 SHINGAI IWATA SHIZUOKA JAPAN

YZFR6X(C)  
WIRING DIAGRAM



YZFR6X(C)  
WIRING DIAGRAM

