YAMAHA 2012

SERVICE MANUAL

XP500A

TMAX

59C-28197-E1

EAS20040

XP500A
SERVICE MANUAL
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EAS20071
IMPORTANT

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.
Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

TIP
Designs and specifications are subject to change without notice.

EAS20081
IMPORTANT MANUAL INFORMATION

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

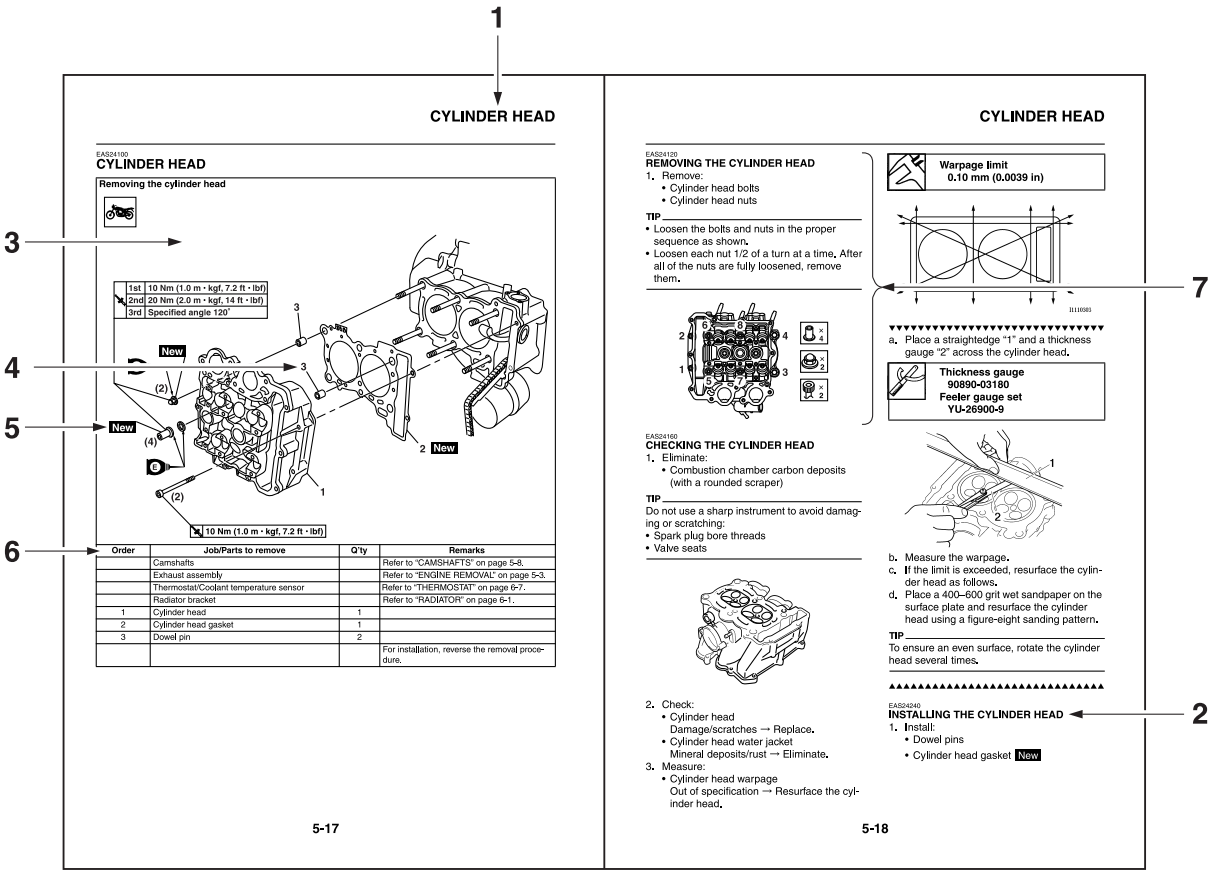
⚠	**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**
⚠ WARNING	**A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
NOTICE	**A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.**
TIP	A TIP provides key information to make procedures easier or clearer.

EAS20091

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.

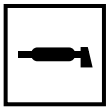


EAS20101
SYMBOLS

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

TIP

The following symbols are not relevant to every vehicle.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Serviceable with engine mounted		Gear oil
	Filling fluid		Molybdenum disulfide oil
	Lubricant		Brake fluid
	Special tool		Wheel bearing grease
	Tightening torque		Lithium-soap-based grease
	Wear limit, clearance		Molybdenum disulfide grease
	Engine speed		Silicone grease
	Electrical data		Apply locking agent (LOCTITE®).
	Engine oil	New	Replace the part with a new one.

EAS20110

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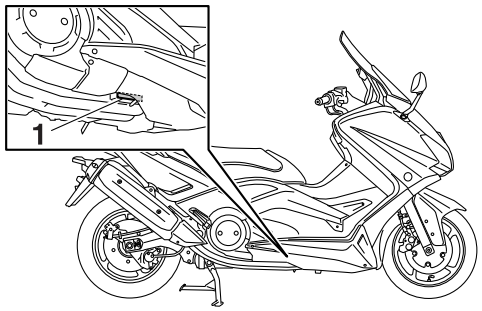
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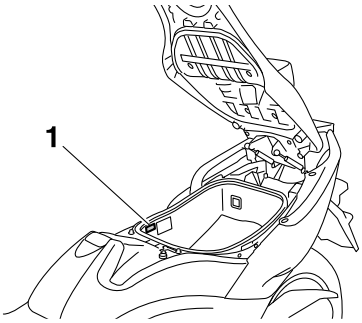
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EAS20130
IDENTIFICATION

EAS20140
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the frame.



EAS20150
MODEL LABEL
The model label “1” is affixed to the storage box. This information will be needed to order spare parts.



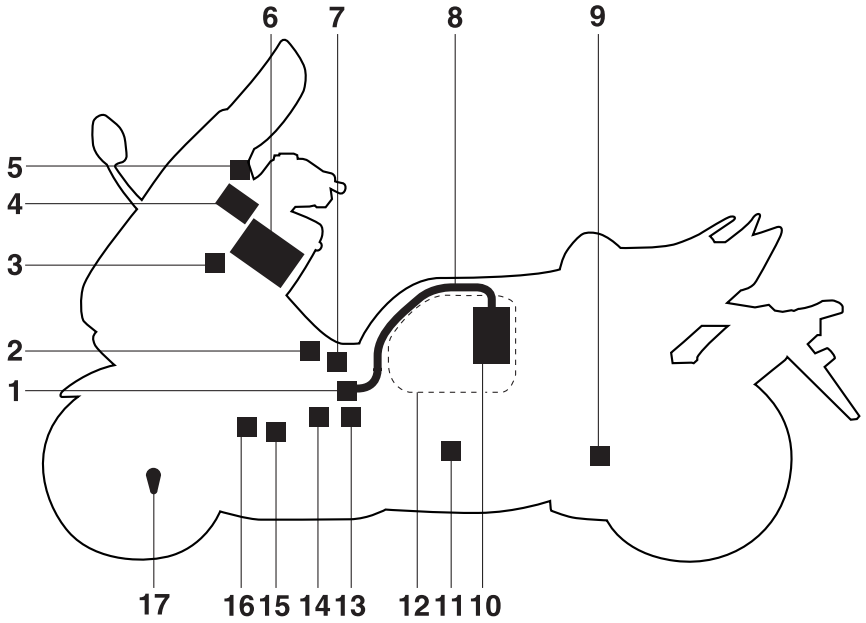
EAS20170
FEATURES

EAS4B51038
OUTLINE OF 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. In a 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 chamber. Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operation 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 engines 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 a 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.

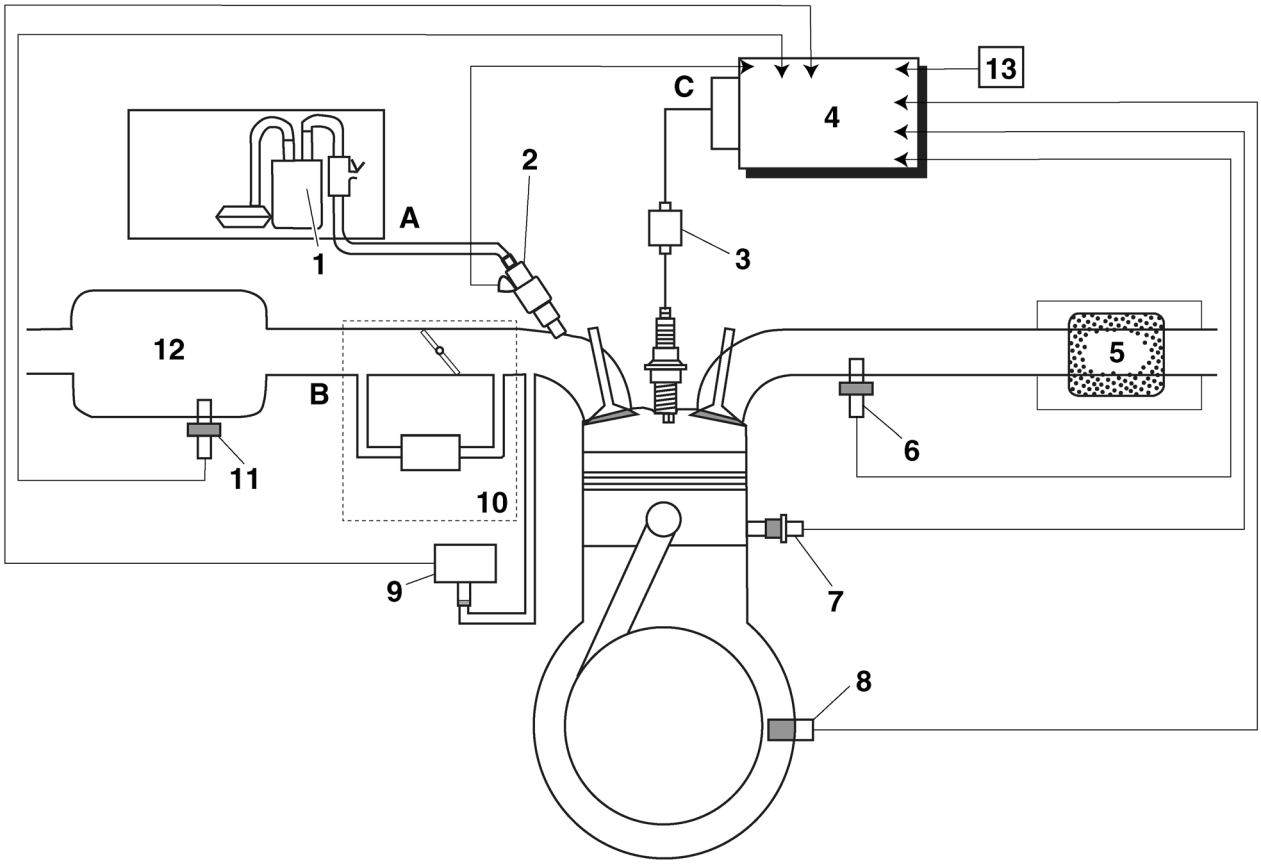
Adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.



1. Fuel injector
2. Intake air temperature sensor
3. Lean angle sensor
4. ECU (engine control unit)
5. Engine trouble warning light
6. Battery
7. Intake air pressure sensor
8. Fuel hose
9. O_2 sensor
10. Fuel pump
11. Crankshaft position sensor
12. Fuel tank
13. Coolant temperature sensor
14. Throttle position sensor
15. Spark plug
16. Ignition coil
17. Front wheel sensor

EAS4B51039
FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator (in the fuel pump) maintains the fuel pressure that is applied to the fuel injector at a certain level. Accordingly, when the energizing signal from the ECU (engine control unit) 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 (engine control unit). Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, and O_2 sensor enable the ECU (engine control unit) 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.
Illustration is for reference only.



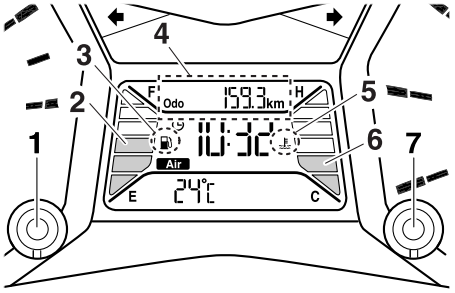
1. Fuel pump
2. Fuel injector
3. Ignition coil
4. ECU (engine control unit)
5. Catalyst
6. O_2 sensor
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Intake air pressure sensor
10. Throttle body
11. Intake air temperature sensor
12. Air filter case
13. Throttle position sensor

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

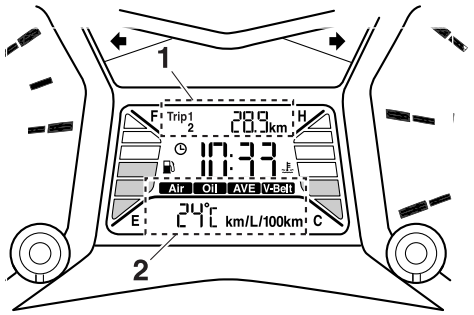
EAS52240
MULTI-FUNCTION DISPLAY
EWA12312

⚠ WARNING

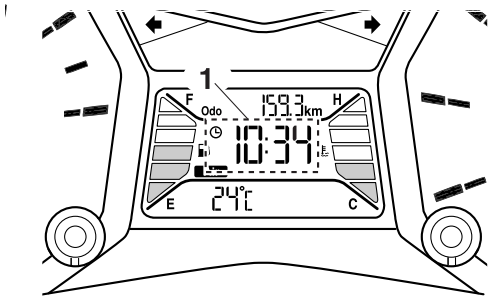
Be sure to stop the vehicle before making any setting changes to the multi-function display. Changing settings while riding can distract the operator and increase the risk of an accident.



1. Left set button
2. Fuel meter
3. Fuel level warning indicator "⛽"
4. Odometer
5. Coolant temperature warning indicator "🌡"
6. Coolant temperature meter
7. Right set button



1. Tripmeter/fuel reserve tripmeter
2. Ambient temperature/average fuel consumption/instantaneous fuel consumption

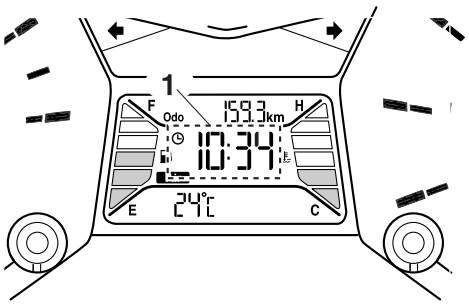


1. Clock

The multi-function display is equipped with the following:
- A fuel meter
- A coolant temperature meter
- An odometer
- Two tripmeters (which show the distance traveled since they were last set to zero)
- A fuel reserve tripmeter (which shows the distance traveled when the remaining fuel in the fuel tank reaches approximately 3.0 L (0.79 US gal, 0.66 Imp.gal))
- A self-diagnosis device
- A clock
- An ambient temperature display
- A fuel consumption display (average and instantaneous consumption functions)
- An oil change tripmeter (which shows the distance traveled since the last engine oil change)
- A V-belt replacement tripmeter (which shows the distance traveled since the last V-belt replacement)

TIP
- Be sure to turn the key to "ON" before using the left and right set buttons.
- When the key is turned to "ON", all of the display segments of the multi-function display will appear one after the other and then disappear, in order to test the electrical circuits.

Clock

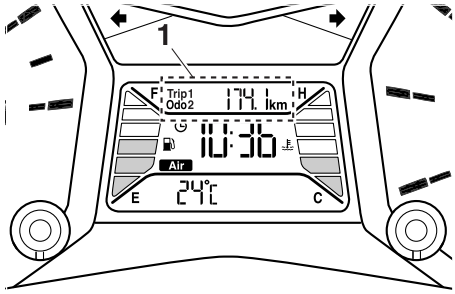


1. Clock

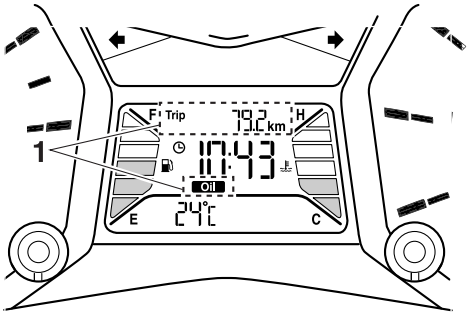
To set the clock:
1. Push the left set button and right set button together for at least two seconds.
2. When the hour digits start flashing, push the right set button to set the hours.
3. Push the left set button, and the minute digits will start flashing.
4. Push the right set button to set the minutes.

5. Push the left set button and then release it to start the clock.

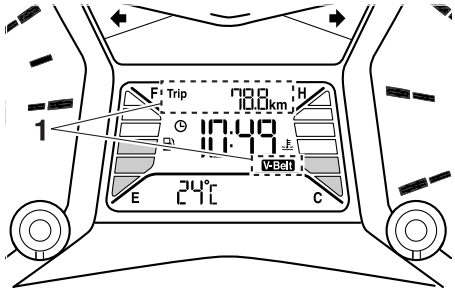
Odometer and tripmeter modes



1. Odometer/tripmeters/fuel reserve tripmeter

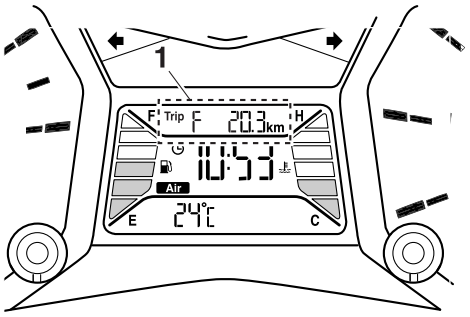


1. Oil change tripmeter



1. V-belt replacement tripmeter

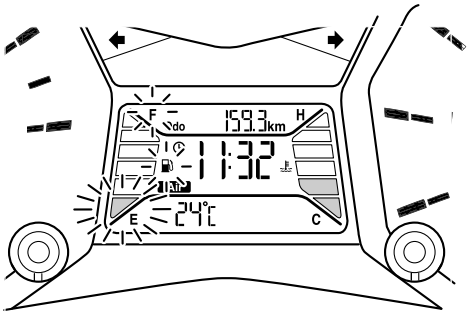
Pushing the left set button switches the display between the odometer mode and the tripmeter modes in the following order:
Odo → Trip 1 → Trip 2 → V-Belt Trip → Oil Trip → Odo
When approximately 3.0 L (0.79 US gal, 0.66 Imp.gal) of fuel remains in the fuel tank, the display will automatically change to the fuel reserve tripmeter mode “Trip F” and start counting the distance traveled from that point. In that case, pushing the left set button switches the display between the various tripmeter and odometer modes in the following order:
Odo → Trip 1 → Trip 2 → Trip F → V-Belt Trip → Oil Trip → Odo



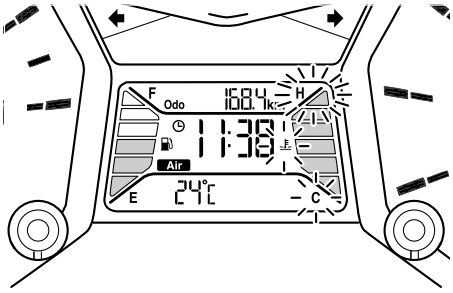
1. Fuel reserve tripmeter

To reset a tripmeter, select it by pushing the left set button until “Trip F”, “Trip 1” or “Trip 2” is displayed. While “Trip F”, “Trip 1” or “Trip 2” is displayed, push the left set 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).

Fuel meter
With the key in the “ON” position, the fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear towards “E” (Empty) as the fuel level decreases. When the fuel level reaches the bottom segment near “E”, the fuel level warning indicator, “F”, “E”, and the bottom segment will flash. Refuel as soon as possible.



Coolant temperature meter
With the key in the “ON” position, the coolant temperature meter indicates the temperature of the coolant. The coolant temperature varies with changes in the weather and engine load. If the top segment, “H”, “C”, and coolant temperature warning indicator flash, stop the vehicle and let the engine cool.

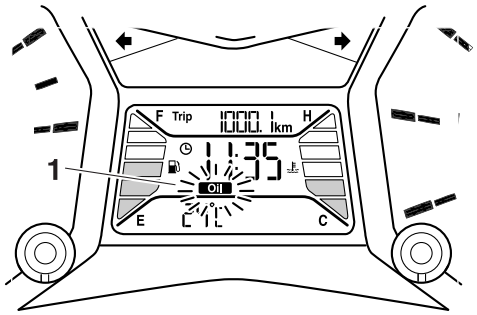


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NOTICE

Do not continue to operate the engine if it is overheating.

Oil change indicator “Oil”

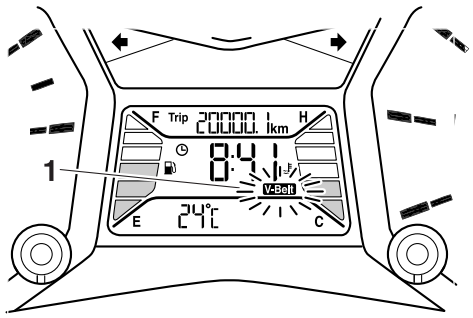


1. Oil change indicator “Oil”

This indicator flashes at the initial 1000 km (600 mi), then at 5000 km (3000 mi) and every 5000 km (3000 mi) thereafter to indicate that the engine oil should be changed.
After changing the engine oil, reset the oil change indicator. To reset the oil change indicator, select it by pushing the left set button until “Oil Trip” is displayed, and then push the left set button at least one second. When pushing the left set button, “Oil Trip” starts flashing. While “Oil Trip” is flashing, push the left set button for at least three seconds.
If the engine oil is changed before the oil change indicator “Oil” flashes (i.e. before the periodic oil change interval has been reached), the indicator “Oil” must be reset after the oil change for the next periodic oil change to be indicated at the correct time.
The electrical circuit of the indicator can be checked according to the following procedure.

1. Set the engine stop switch to “○” and turn the key to “ON”.
2. Check that the oil change indicator comes on for a few seconds and then goes off.
3. If the oil change indicator does not come on, check the electrical circuit.
   (Refer to “SIGNALING SYSTEM” on page 8-19)

V-belt replacement indicator “V-Belt”

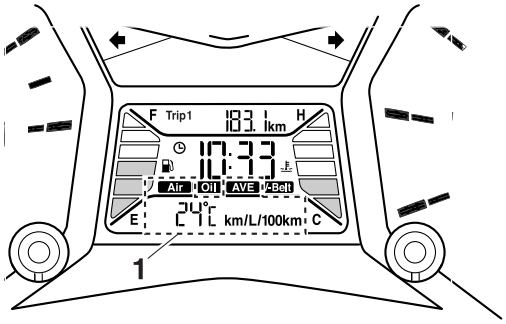


1. V-belt replacement indicator “V-Belt”

This indicator flashes every 20000 km (12500 mi) when the V-belt needs to be replaced. After changing the V-belt, reset the V-belt replacement indicator. To reset the V-belt replacement indicator, select it by pushing the left set button until “V-Belt Trip” is displayed, and then push the left set button at least one second. When pushing the left set button, “V-Belt Trip” starts flashing. While “V-Belt Trip” is flashing, push the left set button for at least three seconds.
If the V-belt is changed before the V-belt replacement indicator “V-Belt” flashes (i.e. before the periodic V-belt change interval has been reached), the indicator “V-Belt” must be reset after the V-belt change for the next periodic V-belt change to be indicated at the correct time.
The electrical circuit of the indicator can be checked according to the following procedure.

1. Turn the key to “ON” and make sure that the engine stop switch is set to “○”.
2. Check that the V-belt replacement indicator comes on for a few seconds and then goes off.
3. If the V-belt replacement indicator does not come on, check the electrical circuit.
   (Refer to “SIGNALING SYSTEM” on page 8-19)

Ambient temperature display, average fuel consumption and instantaneous fuel consumption modes



1. Ambient temperature/average fuel consumption/instantaneous fuel consumption

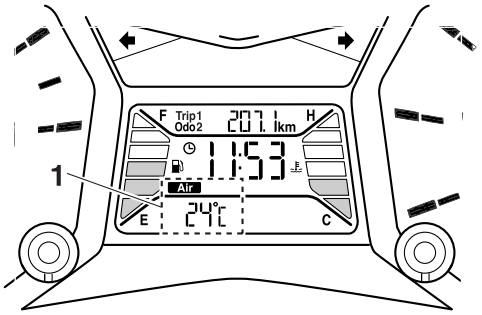
Push the right set button to switch the display between the ambient temperature display “Air”, the average fuel consumption mode “AVE_ _._ km/L” or “AVE_ _._ L/100 km”, and the instantaneous fuel consumption mode “km/L” or “L/100 km” in the following order:

Air → AVE_ _._ km/L or AVE_ _._ L/100 km → km/L or L/100 km → Air

For the UK only:
Push the right set button to switch the display between the ambient temperature display “Air”, the average fuel consumption mode “AVE_ _._ MPG”, and the instantaneous fuel consumption mode “MPG” in the following order:

Air → AVE_ _._ MPG → MPG → Air

Ambient temperature display

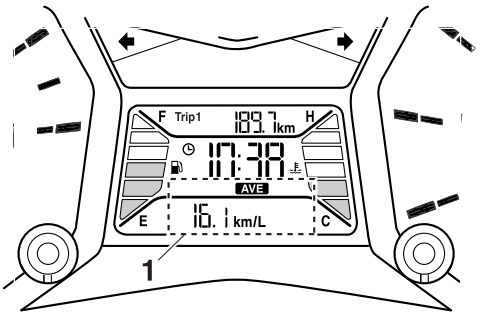


1. Ambient temperature display

This display shows the ambient temperature from -9 °C to 40 °C in 1 °C increments.

For the UK only:
15 °F to 104 °F in 1 °F increments.
The temperature displayed may vary from the ambient temperature. Pushing the right set button switches the ambient temperature display to the average fuel consumption and instantaneous fuel consumption modes.

Average fuel consumption mode



1. Average fuel consumption display

The average fuel consumption display can be set to either “AVE_ _._ km/L” or “AVE_ _._ L/100 km” (except for the UK).

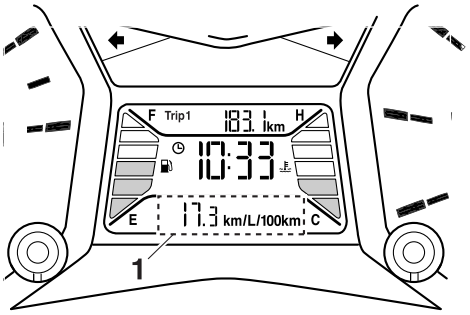
For the UK only:
The average fuel consumption is displayed “AVE_ _._ MPG”.

This display shows the average fuel consumption since it was last reset.
- When the display is set to “AVE_ _._ km/L”, the average distance that can be traveled on 1.0 L of fuel is shown.
- When the display is set to “AVE_ _._ L/100 km”, the average amount of fuel necessary to travel 100 km is shown.
- For the UK only: When the display is set to “AVE_ _._ MPG”, the average distance that can be traveled on 1.0 Imp.gal of fuel is shown.

To switch between the instantaneous fuel consumption displays, push the right set button for one second when one of the displays is shown (except for the UK).
To reset the average fuel consumption display, select it by pushing the right set button, and then push the right set button for at least one second.

TIP
After resetting an average fuel consumption display, "_ _._" is shown for that display until the vehicle has traveled 1 km (0.6 mi).

Instantaneous fuel consumption mode



1. Instantaneous fuel consumption display

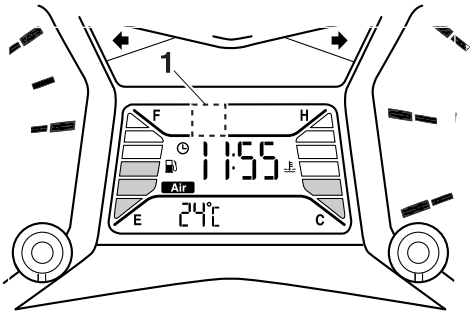
The instantaneous fuel consumption display can be set to either "km/L" or "L/100 km" (except for the UK).

For the UK only:
The instantaneous fuel consumption is displayed "MPG".

- When the display is set to "km/L", the distance that can be traveled on 1.0 L of fuel under the current riding conditions is shown.
- When the display is set to "L/100 km", the amount of fuel necessary to travel 100 km under the current riding conditions is shown.
- For the UK only: The distance that can be traveled on 1.0 Imp.gal of fuel under the current riding conditions is shown.

TIP
If traveling at speeds under 10 km/h (6.0 mi/h), "_ _._" is displayed.

Self-diagnosis device



1. Error code display

This model is equipped with a self-diagnosis device for various electrical circuits.
If a problem is detected in any of those circuits, the engine trouble warning light comes on and the display indicates an error code.
If the display indicates any error codes, note the code number, and check the fuel injection system (Refer to "FUEL INJECTION SYSTEM" on page 8-29).
The self-diagnosis device also detects problems in the immobilizer system circuits.
If a problem is detected in any of the immobilizer system circuits, the immobilizer system indicator light flashes and the display indicates an error code.

TIP
If the display indicates error code 52, this could be caused by transponder interference. If this error code appears, try the following.

1. Use the code re-registering key to start the engine.

TIP
Make sure there are no other immobilizer keys close to the main switch, and do not keep more than one immobilizer key on the same key ring! Immobilizer system keys may cause signal interference, which may prevent the engine from starting.

2. If the engine starts, turn it off and try starting the engine with the standard keys.
3. If one or both of the standard keys do not start the engine, check the immobilizer system (Refer to "IMMOBILIZER SYSTEM" on page 8-75).

ECA11590

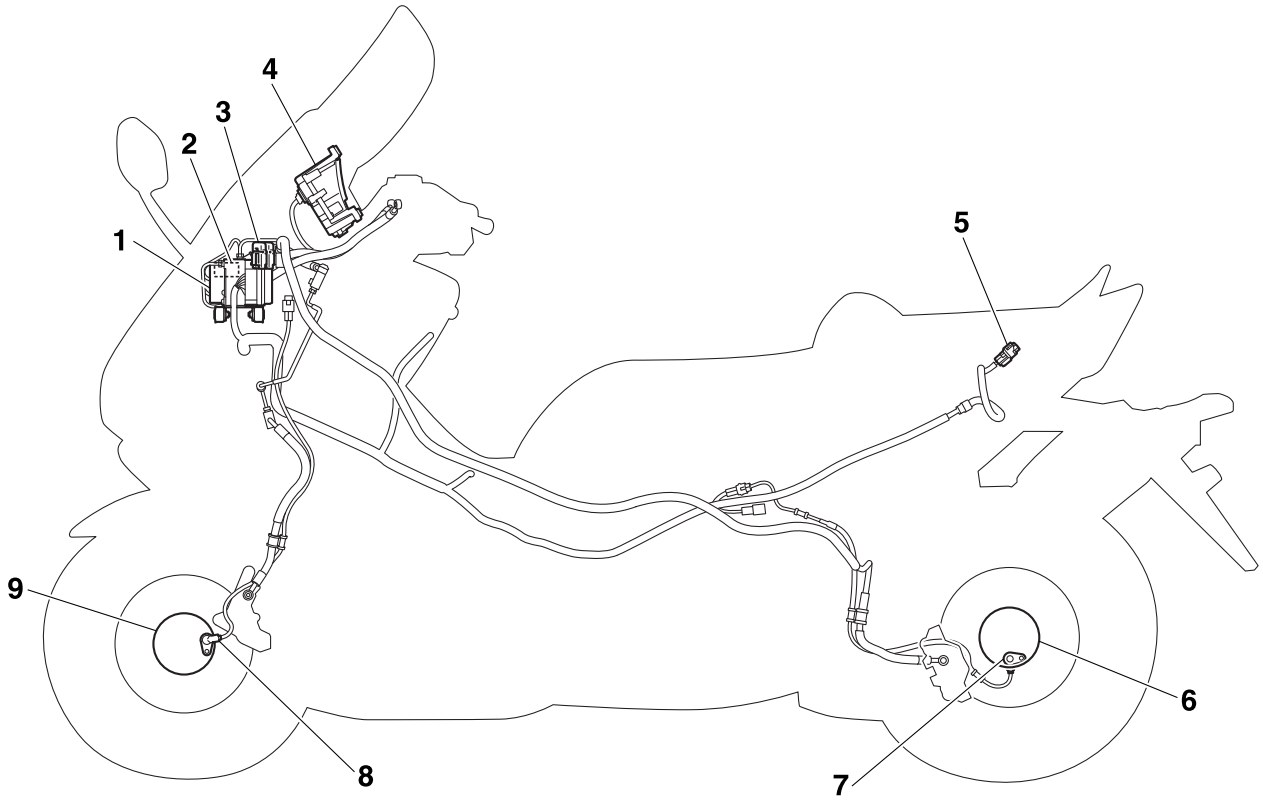
NOTICE

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

EAS59C2101
OUTLINE OF THE ABS

1. The Yamaha ABS (anti-lock brake system) features an electronic control system, which acts on the front and rear brakes independently.
2. The ABS features a compact and lightweight design to help maintain the basic maneuverability of the vehicle.

ABS layout



1. Hydraulic unit assembly (ABS ECU)
2. Fuse box (right)
3. Fuse box (left)
4. ABS warning light
5. ABS test coupler
6. Rear wheel sensor rotor
7. Rear wheel sensor
8. Front wheel sensor
9. Front wheel sensor rotor

ABS

The operation of the Yamaha ABS brakes is the same as conventional brakes on other vehicles, with a front brake lever for operating the front brake and a rear brake lever for operating the rear brake. When wheel lock is detected during emergency braking, hydraulic control is performed by the hydraulic system on the front and rear brakes independently.

Useful terms

- Wheel speed:
  The rotation speed of the front and rear wheels.
- Chassis speed:
  The speed of the chassis.
  When the brakes are applied, wheel speed and chassis speed are reduced. However, the chassis travels forward by its inertia even though the wheel speed is reduced.
- Brake force:
  The force applied by braking to reduce the wheel speed.
- Wheel lock:
  A condition that occurs when the rotation of one or both of the wheels has stopped, but the vehicle continues to travel.
- Side force:
  The force on the tires which supports the vehicle when cornering.
- Slip ratio:
  When the brakes are applied, slipping occurs between the tires and the road surface. This causes a difference between the wheel speed and the chassis speed.
  Slip ratio is the value that shows the rate of wheel slippage and is defined by the following formula.

$$\text{Slip ratio} = \frac{\text{Chassis speed} - \text{Wheel speed}}{\text{Chassis speed}} \times 100\ (\%)$$

0%: There is no slipping between the wheel and the road surface. The chassis speed is equal to the wheel speed.
100%: The wheel speed is “0”, but the chassis is moving (i.e., wheel lock).

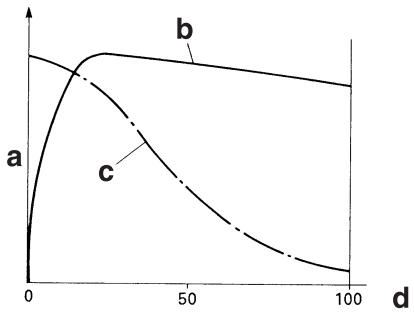
Brake force and vehicle stability

When the brake pressure is increased, wheel speed is reduced. Slipping occurs between the tire and the road surface and brake force is generated. The limit of this brake force is determined by the friction force between the tire and the road surface and is closely related to wheel slippage. Wheel slippage is represented by the slip ratio.

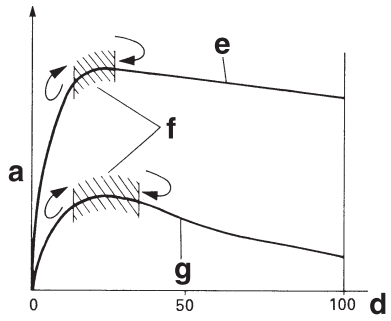
Side force is also closely related to wheel slippage. See figure “A”. If the brakes are applied while keeping the proper slip ratio, it is possible to obtain the maximum brake force without losing much side force.

ABS allows full use of the tires’ capabilities even on slippery road surfaces or less slippery road surfaces. See figure “B”.

A



B



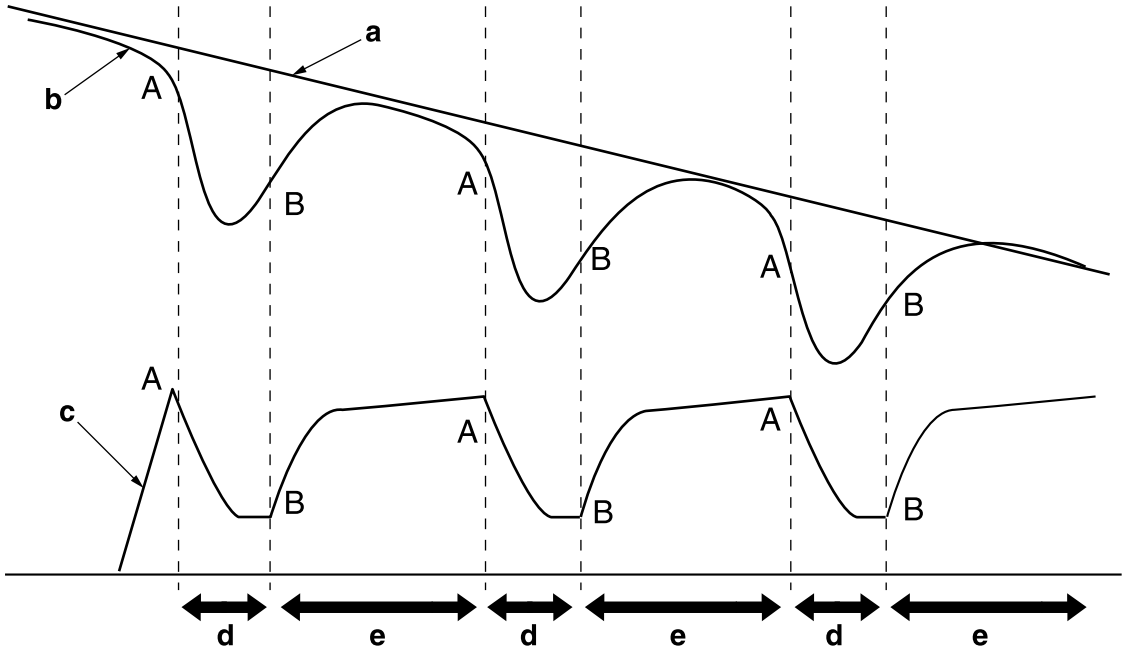
a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio (%)
e. Less slippery road surface
f. Controlling zone
g. Slippery road surface

Wheel slip and hydraulic control

The ABS ECU calculates the wheel speed of each wheel according to the rotation signal received from the front and rear wheel sensors. In addition, the ABS ECU calculates the vehicle chassis speed and the rate of speed reduction based on the wheel speed values.

The difference between the chassis speed and the wheel speed calculated in the slip ratio formula is equal to the wheel slip. When the wheel speed is suddenly reduced, the wheel has a tendency to lock. When the wheel slip and the wheel speed reduction rate exceed the preset values, the ABS ECU determines that the wheel has a tendency to lock.

If the slip is large and the wheel has a tendency to lock (point A in the following figure), the ABS ECU reduces the brake fluid pressure in the brake caliper. Once the ABS ECU determines that the tendency of the wheel to lock has diminished after the brake fluid pressure is reduced, it increases the hydraulic pressure (point B in the following figure). The hydraulic pressure is initially increased quickly, and then it is increased gradually.



a. Chassis speed
b. Wheel speed
c. Brake force
d. Depressurizing phase
e. Pressurizing phase

ABS operation and vehicle control

If the ABS starts operating, there is a tendency of the wheel to lock, and the vehicle is approaching the limit of control. To make the rider aware of this condition, the ABS has been designed to generate a reaction-force pulsating action in the front brake lever and rear brake lever independently.

TIP

When the ABS is activated, a pulsating action may be felt at the front brake lever or rear brake lever, but this does not indicate a malfunction.

The higher the side force on a tire, the less traction there is available for braking. This is true whether the vehicle is equipped with ABS or not. Therefore, sudden braking while cornering is not recommended. Excessive side force, which ABS cannot prevent, could cause the tire to slip sideways.

EWA59C2101

⚠ WARNING

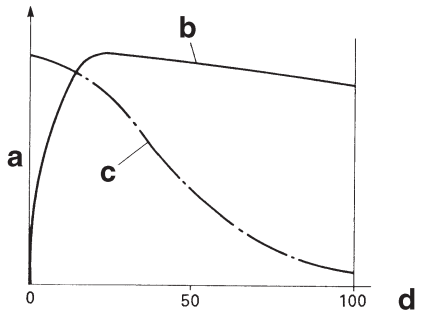
The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even in vehicles equipped with ABS, overturning of the vehicle cannot be prevented if it is braked suddenly.

The ABS functions to prevent the tendency of the wheel to lock by controlling the brake fluid pressure. However, if there is a tendency of the wheel to lock on a slippery road surface, due to engine braking, the ABS may not be able to prevent the wheel from locking.

EWA59C2102

⚠ WARNING

The ABS controls only the tendency of the wheel to lock caused by applying the brakes. The ABS cannot prevent wheel lock on slippery surfaces, such as ice, when it is caused by engine braking, even if the ABS is operating.



a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio (%)

Electronic ABS features

The Yamaha ABS (anti-lock brake system) has been developed with the most advanced electronic technology.

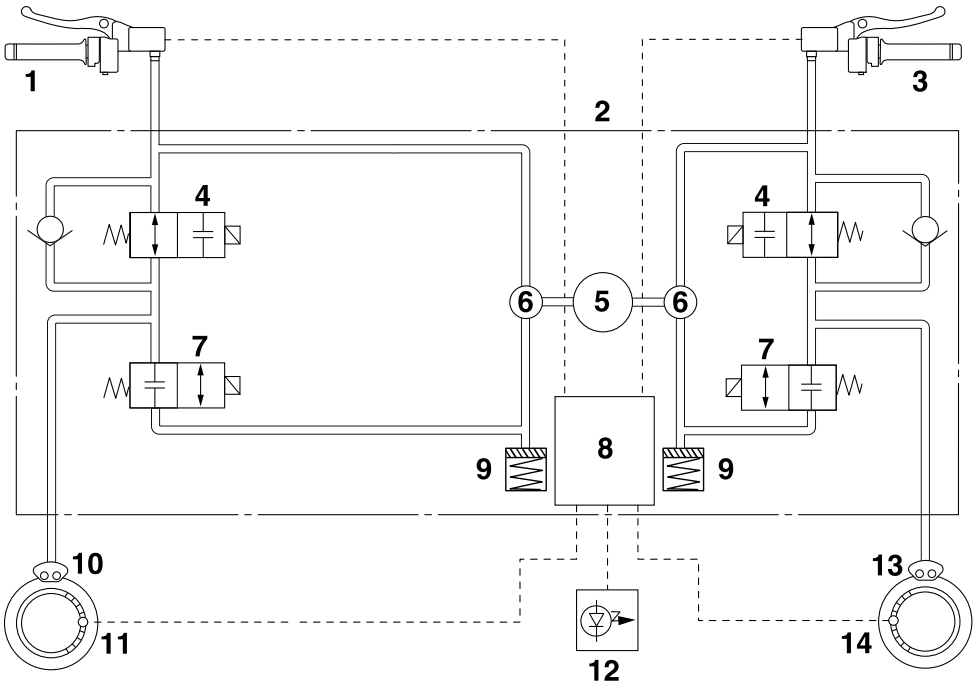
The ABS control is processed with good response under various vehicle travel conditions.

The ABS also includes a highly developed self-diagnosis function. The ABS detects any problem condition and allows normal braking even if the ABS is not operating properly.

When this occurs, the ABS warning light on the meter assembly comes on.

The ABS stores the fault codes in the memory of the ABS ECU for easy problem identification and troubleshooting.

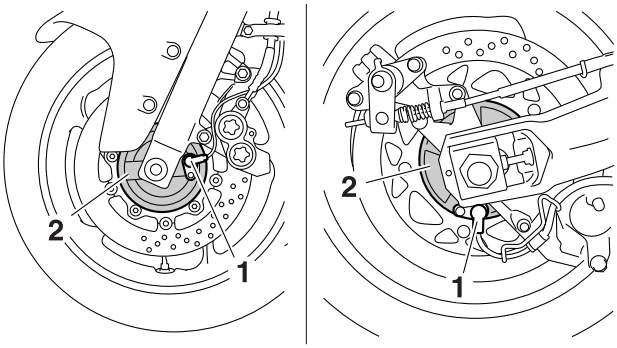
ABS block diagram

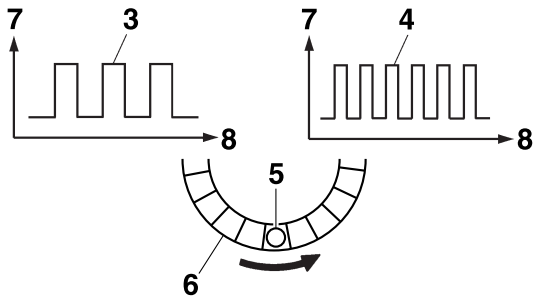


1. Rear brake master cylinder
2. Hydraulic unit assembly
3. Front brake master cylinder
4. Inlet solenoid valve
5. ABS motor
6. Hydraulic pump
7. Outlet solenoid valve
8. ABS ECU
9. Buffer chamber
10. Rear brake caliper
11. Rear wheel sensor
12. ABS warning light
13. Front brake caliper
14. Front wheel sensor

EAS59C2102
ABS COMPONENT FUNCTIONS

Wheel sensors and wheel sensor rotors
Wheel sensors “1” detect the wheel rotation speed and transmit the wheel rotation signal to the ABS ECU.
Each wheel sensor contains a Hall IC. The wheel sensors are installed in the sensor housing for each wheel.
Sensor rotors “2” are installed on the inner side of the front and rear wheel hubs and rotate with the wheels.
The front sensor rotor has 80 magnetic poles (40 pairs) and the rear sensor rotor has 92 magnetic poles (46 pairs). They are installed close to the wheel sensors. As the sensor rotor rotates, the Hall element in the Hall IC installed in the wheel sensor generates pulses. The pulse frequency, which is proportional to the magnetic flux density, is converted into a wave in the Hall IC so that it can be output.
The ABS ECU calculates the wheel rotation speed by detecting the pulse frequency.



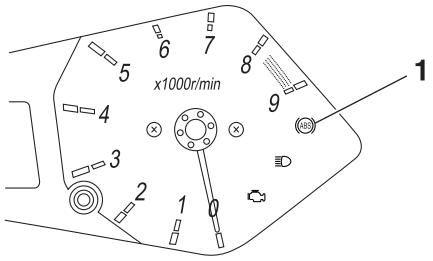


3. At low speed
4. At high speed
5. Wheel sensor
6. Wheel sensor rotor
7. Voltage
8. Time

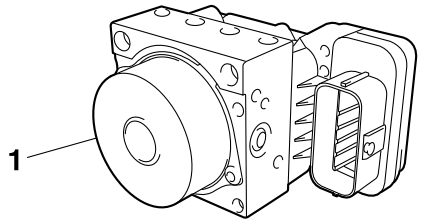
ABS warning light
The ABS warning light "1" comes on to warn the rider if a malfunction in the ABS occurs.
When the main switch is set to "ON", the ABS warning light comes on to check the electrical circuit and the system function (ABS self-diagnosis), and goes off when the vehicle is operated (the function check is properly completed at a speed of about 6 to 10 km/h [3.8 to 6.3 mi/h]).

TIP
- The ABS warning light may go off later than usual when the vehicle is operated while the brakes are applied (the brake switch turned to "ON").
- The ABS warning light goes off when walking or operating the vehicle at a speed of faster than 7 km/h (4.4 mi/h) after correcting malfunctions that have occurred in the past with all the necessary checks and services completed.

The ABS warning light comes on to check the electrical circuit while the start switch is being pushed.
ECA59C2101
NOTICE
If the rear wheel is raced with the vehicle on a centerstand, the system may determine that a malfunction has been detected, and the ABS warning light may flash or come on. If this occurs, set the main switch to "OFF", then back to "ON". The system is normal if the ABS warning light goes off after starting off. If the fault codes have not been deleted, the fault codes remain in the memory and the ABS warning light goes off when the vehicle is operated at a speed of about 30 km/h (18.8 mi/h).



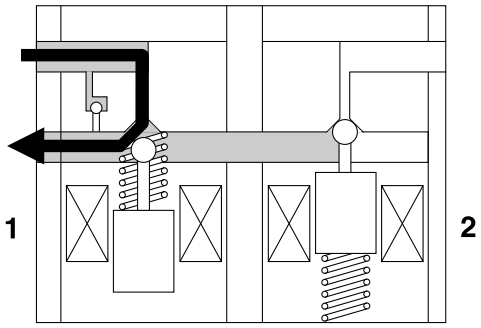
Hydraulic unit assembly
The hydraulic unit assembly "1" is composed of hydraulic control valves (each with a outlet solenoid valve and inlet solenoid valve), buffer chambers, hydraulic pumps, an ABS motor, and ABS ECU. The hydraulic unit adjusts the front and rear wheel brake fluid pressure to control the wheel speed according to signals transmitted from the ABS ECU.



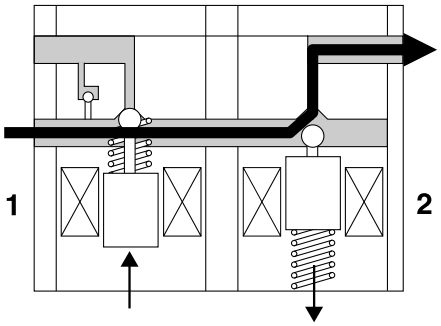
- **Hydraulic control valve**

  The hydraulic control valve is composed of a inlet solenoid valve and outlet solenoid valve.
  The electromagnetic force generated in the inlet solenoid valve varies proportionally with the duty cycle control voltage that is supplied to it. Since this voltage is continuously variable, the solenoid valve moves smoothly and the hydraulic pressure is adjusted linearly.

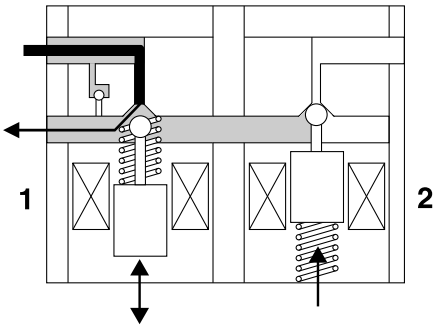
  1. When the brakes are operated normally, the inlet solenoid valve “1” is open and the outlet solenoid valve “2” is closed. The brake line between the brake master cylinder and brake caliper is open.



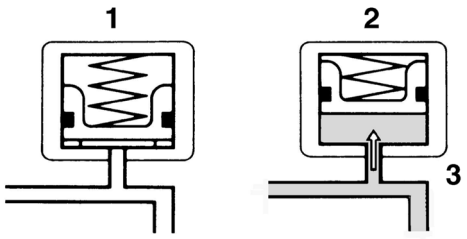
  2. When the ABS is activated, the inlet solenoid valve “1” closes and the outlet solenoid valve “2” opens using the power supplied from the ABS ECU signals. This reduces the hydraulic pressure.



  3. When the ABS ECU sends a signal to stop reducing the hydraulic pressure, the outlet solenoid valve “2” closes and the brake fluid is pressurized again. The inlet solenoid valve “1” controls the hydraulic pressure difference between the brake fluid in the upper brake lines (brake master cylinder side) and the brake fluid in the lower brake lines (brake caliper side).



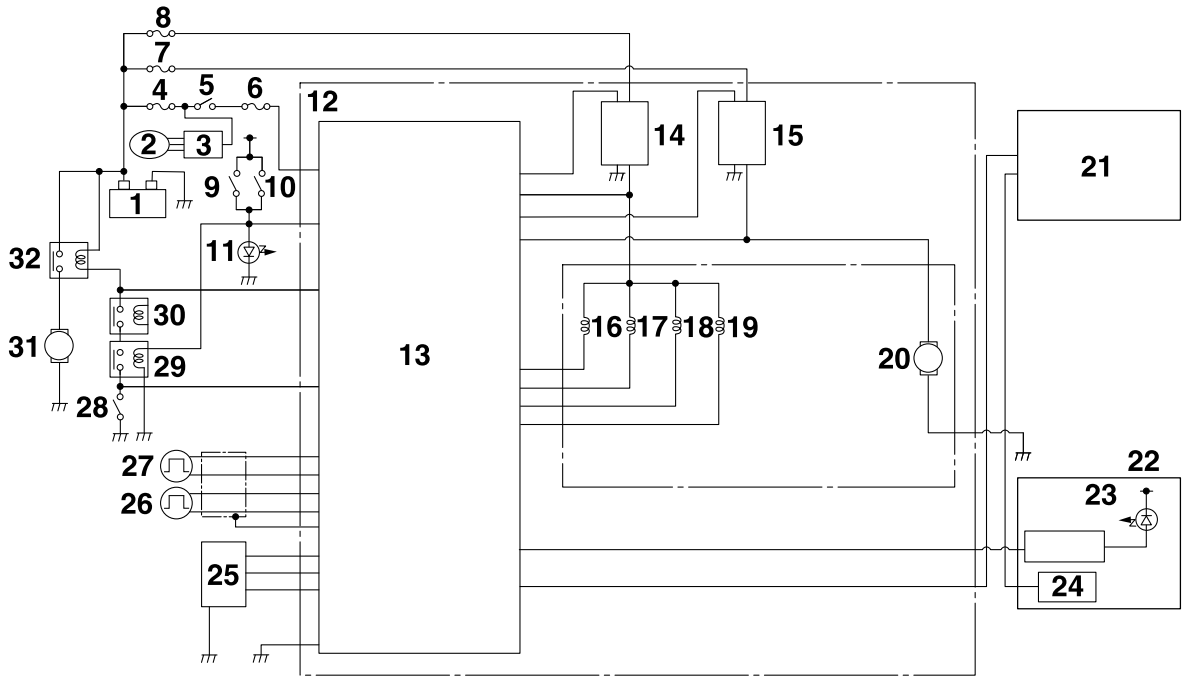
- **Buffer chamber**
  The buffer chamber accumulates the brake fluid that is depressurized while the ABS is operating.



1. Buffer chamber (pressurizing phase)
2. Buffer chamber (depressurizing phase)
3. Raised piston

ABS ECU

The ABS ECU is integrated with the hydraulic unit to achieve a compact and lightweight design. As shown in the following block diagram, the ABS ECU receives wheel sensor signals from the front and rear wheels and also receives signals from other monitor circuits.



1. Battery
2. AC magneto
3. Rectifier/regulator
4. Main fuse
5. Main switch
6. ABS ECU fuse
7. ABS motor fuse
8. ABS solenoid fuse
9. Front brake light switch
10. Rear brake light switch
11. Tail/brake light
12. Hydraulic unit assembly
13. ABS ECU
14. Solenoid relay
15. ABS motor relay
16. Front brake inlet solenoid
17. Front brake outlet solenoid
18. Rear brake inlet solenoid
19. Rear brake outlet solenoid
20. ABS motor
21. ECU (engine control unit)
22. Meter assembly
23. ABS warning light
24. Speedometer
25. ABS test coupler
26. Rear wheel sensor
27. Front wheel sensor
28. Start switch
29. Starting circuit cut-off relay 2
30. Starting circuit cut-off relay 1
31. Starter motor
32. Starter relay

The necessary actions are confirmed using the monitor circuit and control signals are transmitted to the hydraulic unit assembly.

ABS control operation

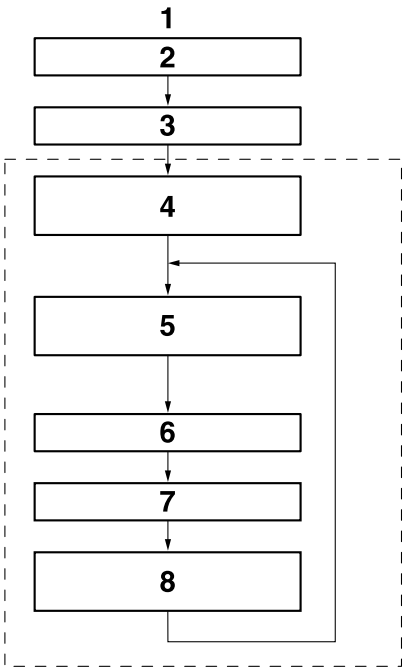
The ABS control operation performed in the ABS ECU is divided into the following two parts.

- Hydraulic control
- Self-diagnosis

When a malfunction is detected in the ABS, a fault code is stored in the memory of the ABS ECU for easy problem identification and troubleshooting.

TIP

- Some types of malfunctions are not recorded in the memory of the ABS ECU (e.g., a blown ABS ECU fuse).
- The ABS performs a self-diagnosis test for a few seconds each time the vehicle starts up for the first time after the main switch was set to “ON”. During this test, a “clicking” noise can be heard from front side of the vehicle, and if the front brake lever or rear brake lever are even slightly applied, a vibration can be felt at the levers, but these do not indicate a malfunction.



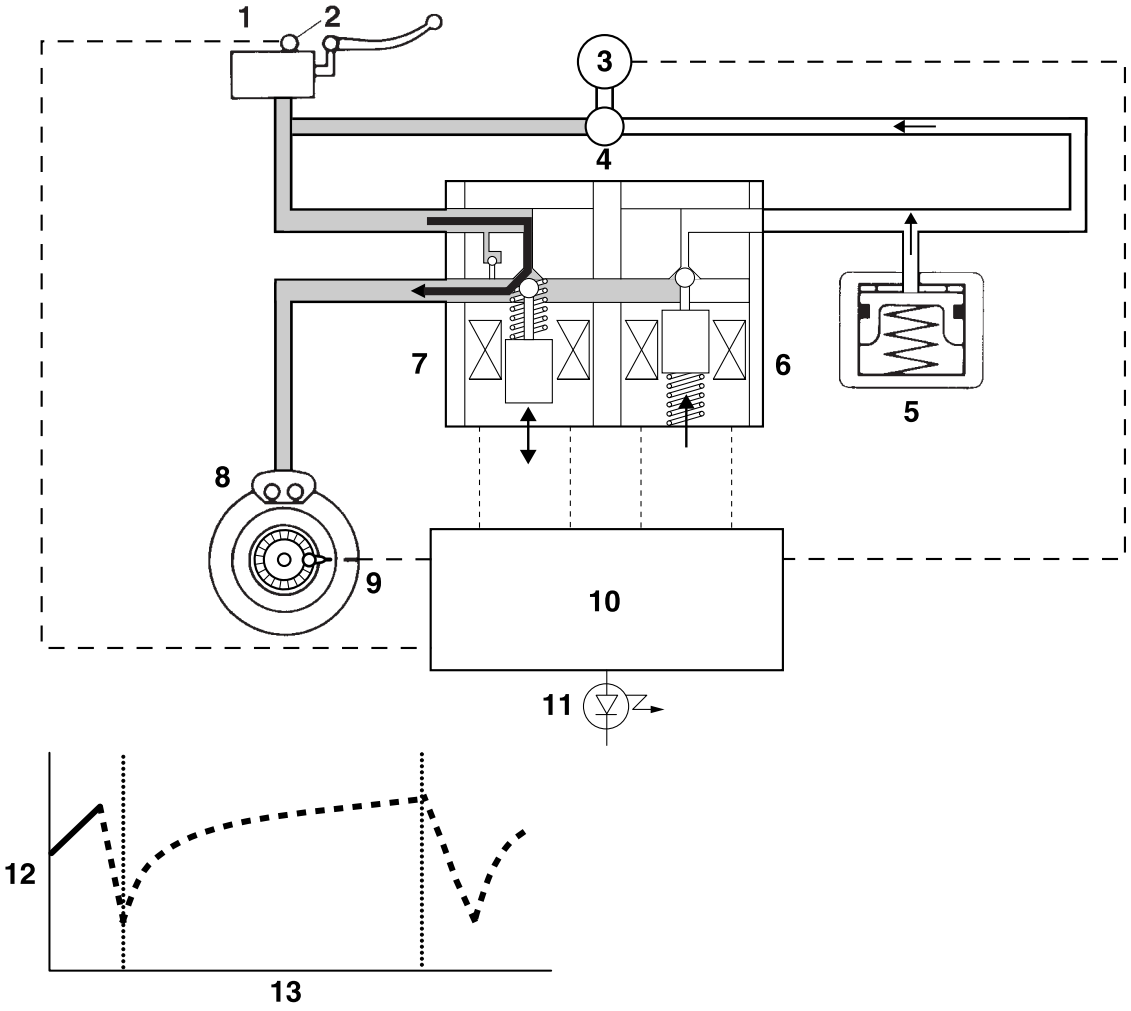
1. Software operation flow
2. Main switch “ON”
3. Initialize
4. Self-diagnosis (when static)
5. Self-diagnosis (when riding)
6. Receive signals
7. Control operation
8. Depressurize/pressurize

EAS59C2103
ABS OPERATION

The ABS hydraulic circuit consists of two systems: the front wheel, and rear wheel. The following describes the system for the front wheel only.

Normal braking (ABS not activated)

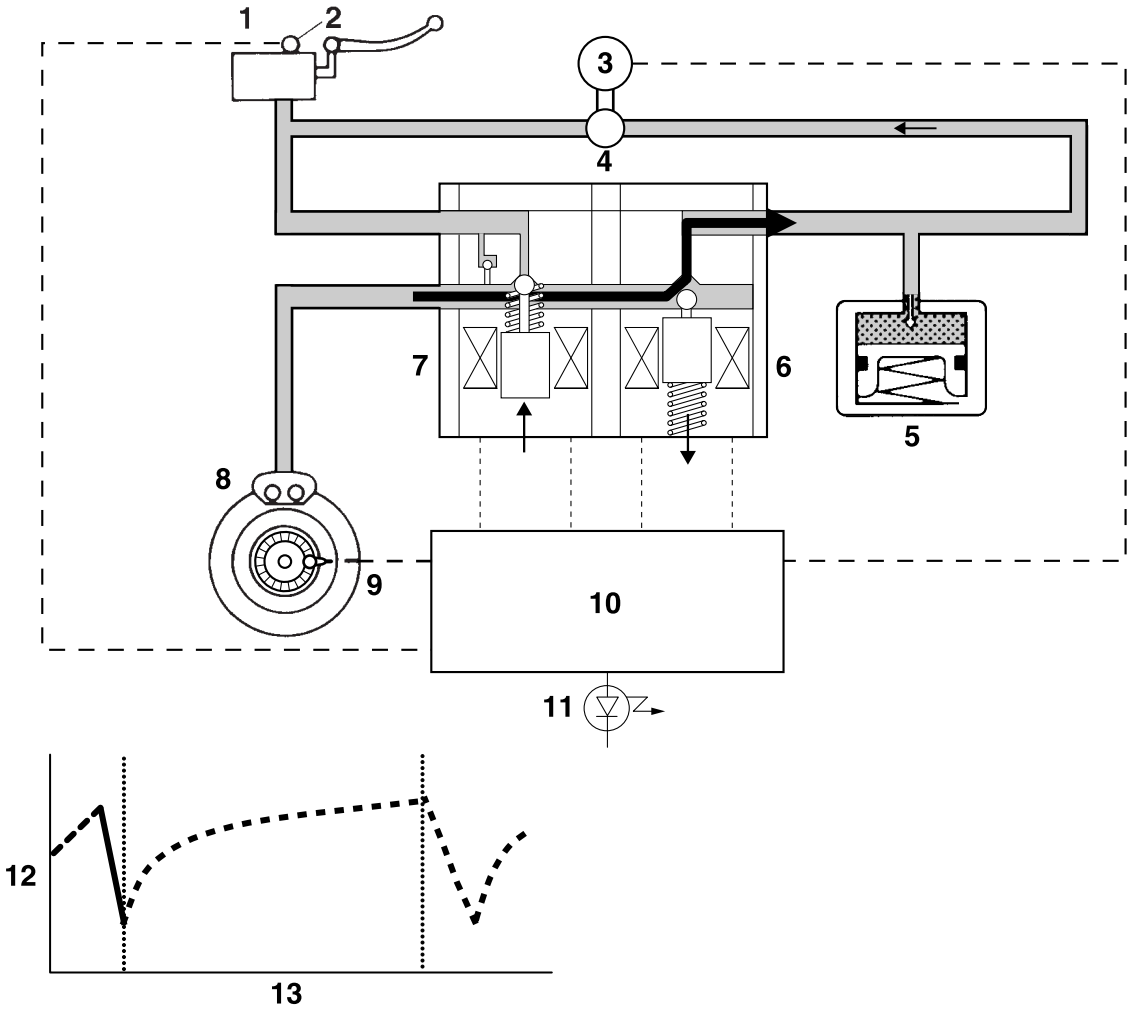
When the ABS is not activated, the inlet solenoid valve is open and the outlet solenoid valve is closed because a control signal has not been transmitted from the ABS ECU. Therefore, when the brake lever is squeezed, the hydraulic pressure in the brake master cylinder increases and the brake fluid is sent to the brake caliper.
At this time, the inlet and outlet check valves of the hydraulic pump are closed. As a result of eliminating the orifice, the brake master cylinder directly pressurizes the brake caliper during normal braking. When the brake lever is released, the brake fluid in the brake caliper returns to the brake master cylinder.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

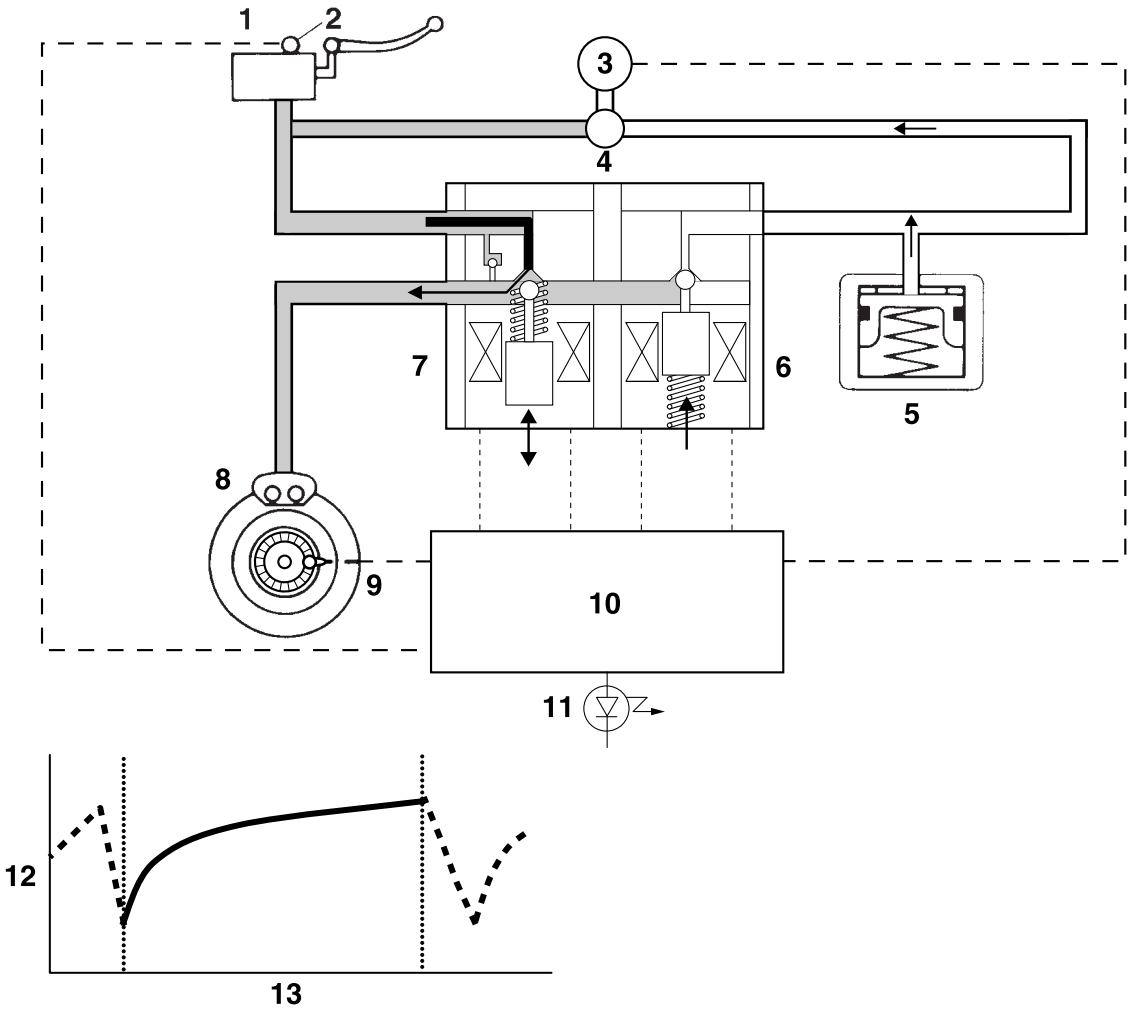
Emergency braking (ABS activated)

1. Depressurizing phase
   When the front wheel is about to lock, the outlet solenoid valve is opened by the “depressurization” signal transmitted from the ABS ECU. When this occurs, the inlet solenoid valve compresses the spring and closes the brake line from the brake master cylinder. Because the outlet solenoid valve is open, the brake fluid is sent to the buffer chamber. As a result, the hydraulic pressure in the brake caliper is reduced.
   The brake fluid stored in the buffer chamber is pumped back to the brake master cylinder by the hydraulic pump linked to the ABS motor.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

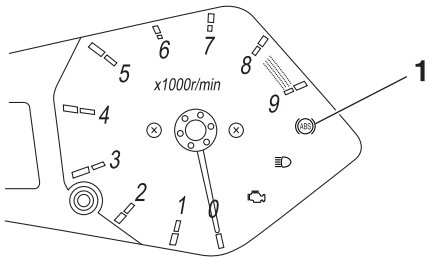
2. Pressurizing phase
   The outlet solenoid valve is closed by the “pressurization” signal transmitted from the ABS ECU. At this time, the ABS ECU controls the opening of the inlet solenoid valve. As the inlet solenoid valve opens, the brake line from the brake master cylinder opens, allowing the brake fluid to be sent to the brake caliper.



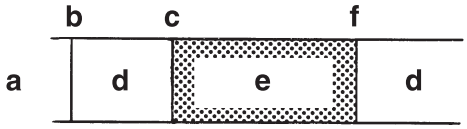
1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

EAS59C2104
ABS SELF-DIAGNOSIS FUNCTION

ABS warning light
The ABS warning light “1” comes on when a malfunction is detected by the ABS self-diagnosis. It is located in the meter assembly.

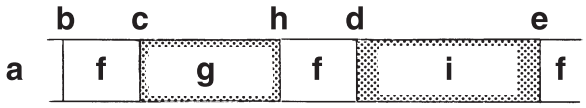


Instances when the ABS warning light comes on
1. The ABS warning light comes on when the main switch is set to “ON”.
   The ABS warning light comes on while the ABS is performing a self-diagnosis, then goes off if there are no malfunctions.
   The self-diagnosis begins when the main switch is set to “ON”, and is completed when the vehicle is operated at a speed of about 10 km/h (6.3 mi/h). (Refer to “ABS warning light” on page 1-17.)



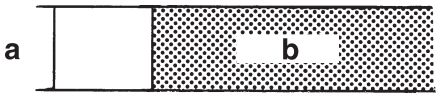
a. ABS warning light
b. Main switch “OFF”
c. Main switch “ON”
d. Goes off
e. Comes on
f. The ABS self-diagnosis is completed (at a speed of about 10 km/h [6.3 mi/h]: refer to “ABS warning light” on page 1-17.)

2. The ABS warning light comes on while the start switch is being pushed.



a. ABS warning light
b. Main switch “OFF”
c. Main switch “ON”
d. Start switch “ON”
e. Start switch “OFF”
f. Goes off
g. Comes on
h. The ABS self-diagnosis is completed (walking the vehicle at a speed of faster than 7 km/h [4.4 mi/h].)
i. Comes on while the start switch is being pushed

3. The ABS warning light comes on while riding.
   If the ABS warning light comes on while riding, a malfunction has been detected in the ABS. The ABS hydraulic control will not be performed. The ABS will have recourse to manual braking if this occurs.

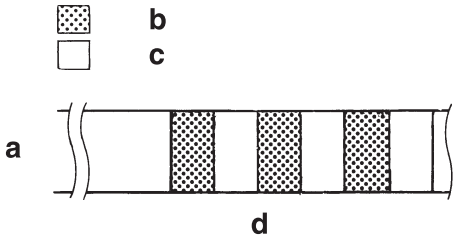


a. ABS warning light
b. Comes on

4. The ABS warning light flashes while riding.
   If the ABS warning light flashes while riding, there is no problem with the function of the ABS. However, the ABS ECU input has unstable factors. (For details, refer to “ABS TROUBLESHOOTING OUTLINE” on page 8-91.)

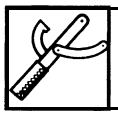
TIP

The ABS warning light comes on or flashes if the vehicle is ridden with the test coupler adapter connected to the ABS test coupler.



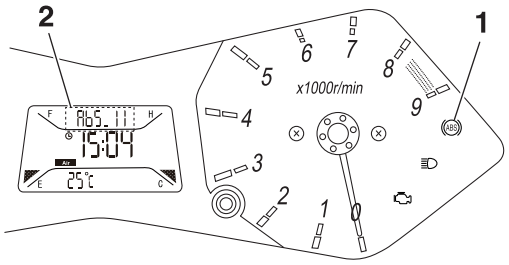
a. ABS warning light
b. Comes on
c. Goes off
d. Unstable ABS ECU input

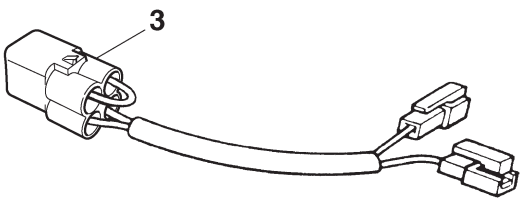
5. The ABS warning light “1” flashes and a fault code “2” is indicated on the multi-function display when the test coupler adapter “3” is connected to the ABS test coupler “4” for troubleshooting the ABS.
   When the test coupler adapter is connected to the ABS test coupler, the ABS warning light starts flashing and the multi-function display indicates all the fault codes recorded in the ABS ECU.

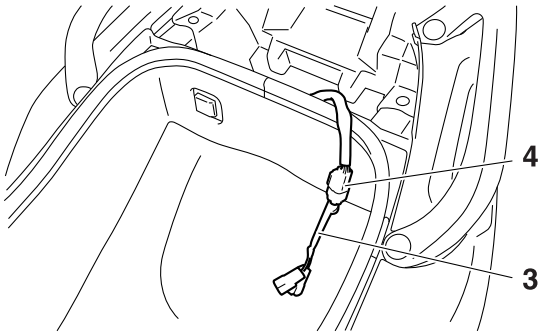


Test coupler adapter
90890-03149

TIP
The ABS warning light comes on or flashes if the vehicle is ridden with the test coupler adapter connected to the ABS test coupler.







EAS59C2105
ABS WARNING LIGHT AND OPERATION

ABS function
EWA59C2103

⚠ WARNING

- **When hydraulic control is performed by the ABS, the brake system alerts the rider that the wheels have a tendency to lock by generating a reaction-force pulsating action in the front brake lever or rear brake lever. When the ABS is activated, the grip between the road surface and tires is close to the limit. The ABS cannot prevent wheel lock* on slippery surfaces, such as ice, when it is caused by engine braking, even if the ABS is activated. Use extreme care when operating the vehicle under these conditions.**
- **The ABS is not designed to shorten the braking distance or improve the cornering performance.**
- **Depending on the road conditions, the braking distance may be longer compared to that of vehicles not equipped with ABS. Therefore, ride at a safe speed and keep a safe distance between yourself and other vehicles.**
- **The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even vehicles equipped with ABS cannot be prevented from falling over if braked suddenly.**
- **The ABS does not work when the main switch is set to "OFF". The conventional braking function can be used.**

*** Wheel lock: A condition that occurs when the rotation of one or both of the wheels has stopped, but the vehicle continues to travel.**

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 1-37.
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.

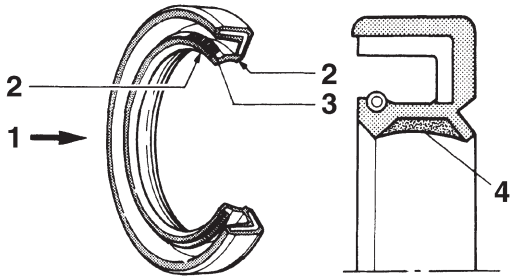


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

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.

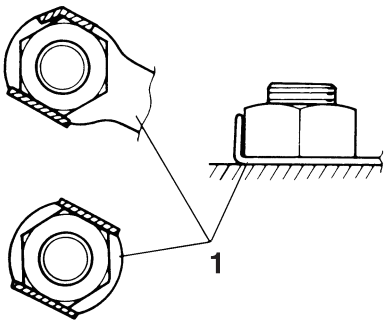


EAS20210
GASKETS, OIL SEALS AND O-RINGS
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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

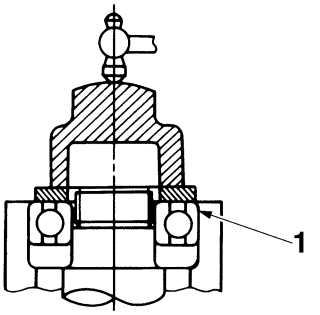
EAS20220
LOCK WASHERS/PLATES AND COTTER PINS
After removal, replace all lock washers/plates “1” and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.

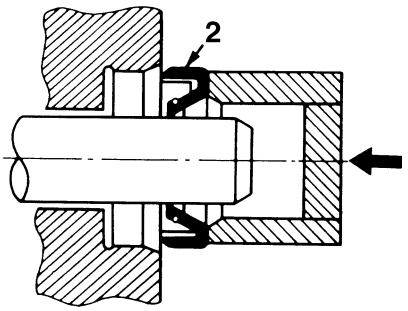


EAS20231
BEARINGS AND OIL SEALS
Install bearings “1” and oil seals “2” so that the manufacturer marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

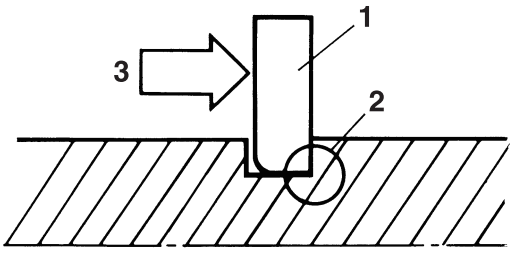
ECA13300
NOTICE

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.



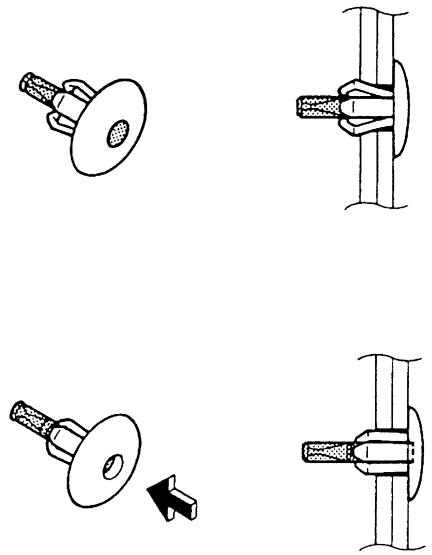
EAS59C1101
RUBBER PARTS
Check rubber parts for deterioration during inspection. Some of the rubber parts are sensitive to gasoline, flammable oil, grease, etc. Do not allow any items other than the specified one to contact the parts.

EAS30380
BASIC SERVICE INFORMATION

EAS30390
QUICK FASTENERS

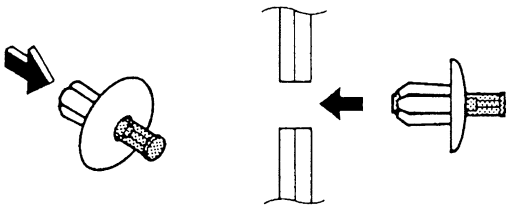
Rivet type
1. Remove:
   • Quick fastener

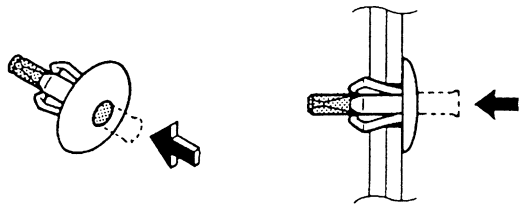
TIP
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.



2. Install:
   • Quick fastener

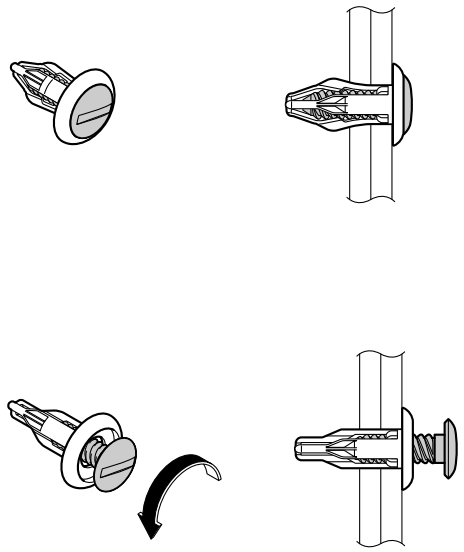
TIP
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the part to be secured and push the pin in with a screwdriver. Make sure that the pin is flush with the fastener's head.





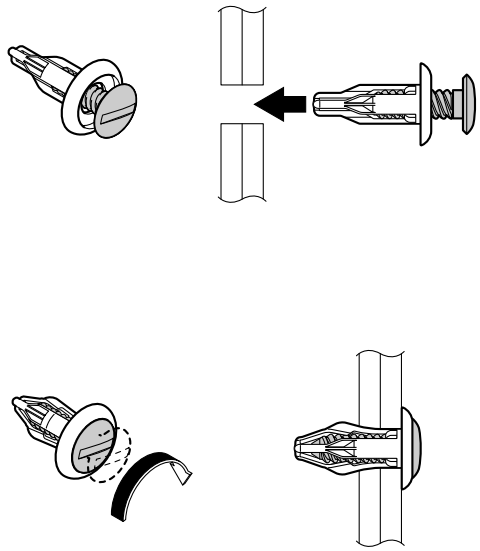
Screw type
1. Remove:
   • Quick fastener

TIP
To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.



2. Install:
   • Quick fastener

TIP
To install the quick fastener, insert the fastener into the part to be secured and tighten the screw.



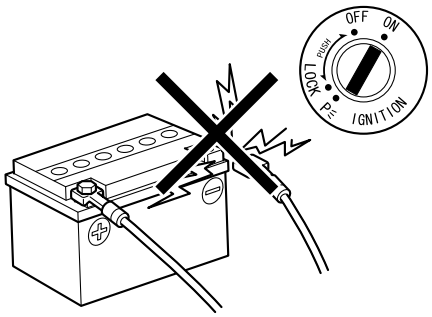
EAS30402
ELECTRICAL SYSTEM

Electrical parts handling

ECA16600

NOTICE

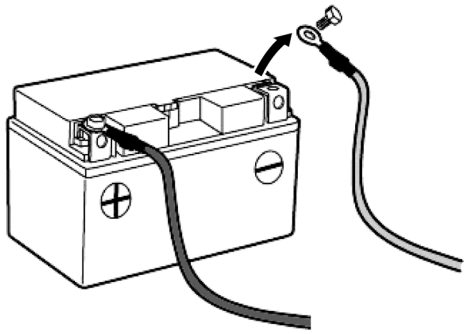
Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.



ECA16751

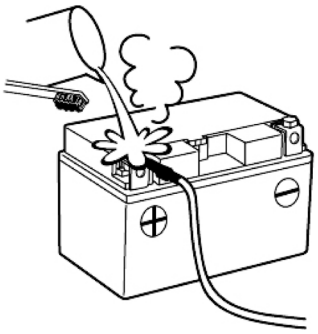
NOTICE

When disconnecting the battery leads from the battery, be sure to disconnect the negative battery lead first, then the positive battery lead. If the positive battery lead is disconnected first and a tool or similar item contacts the vehicle, a spark could be generated, which is extremely dangerous.



TIP

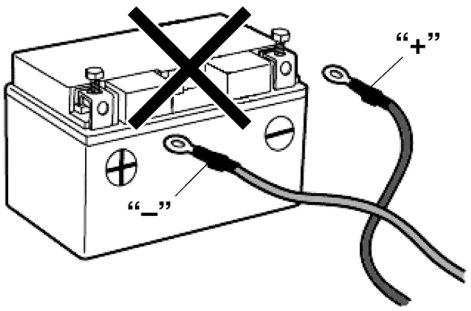
If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.



ECA16760

NOTICE

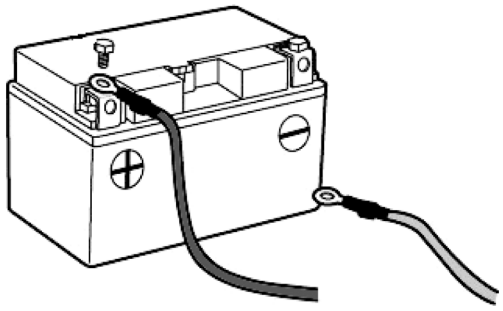
Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.



ECA16771

NOTICE

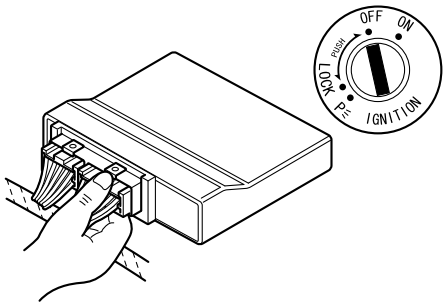
When connecting the battery leads to the battery, be sure to connect the positive battery lead first, then the negative battery lead. If the negative battery lead is connected first and a tool or similar item contacts the vehicle while the positive battery lead is being connected, a spark could be generated, which is extremely dangerous.



ECA16610

NOTICE

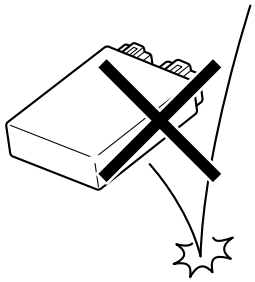
Set the main switch to "OFF" before disconnecting or connecting an electrical component.



ECA16620

NOTICE

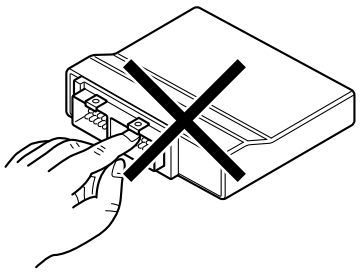
Handle electrical components with special care, and do not subject them to strong shocks.



ECA16630

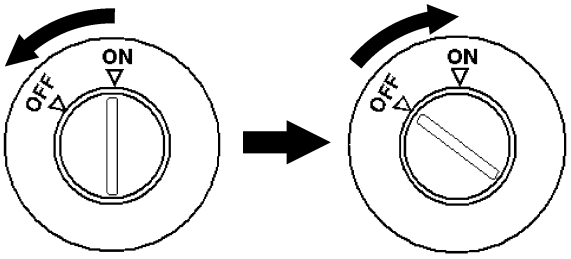
NOTICE

Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.



TIP

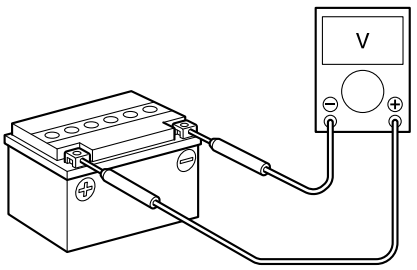
When resetting the ECU by turning the main switch to "OFF", be sure to wait approximately 5 seconds before turning the main switch back to "ON".



Checking the electrical system

TIP

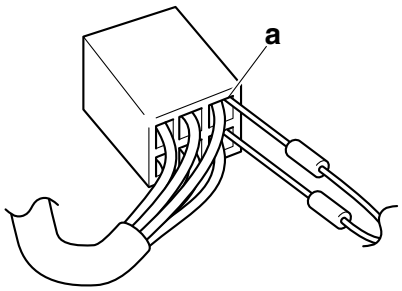
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECA14371

NOTICE

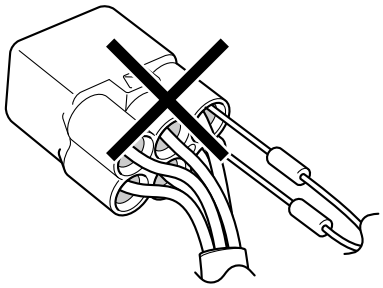
Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.



ECA16640

NOTICE

For waterproof couplers, never insert the tester probes directly into the coupler. When performing any checks using a waterproof coupler, use the specified test harness or a suitable commercially available test harness.



Checking the connections

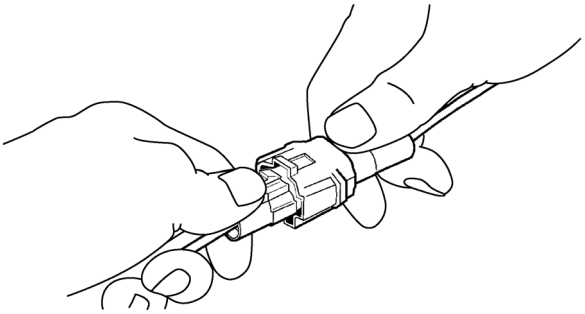
Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Lead
   - Coupler
   - Connector

ECA16780

NOTICE

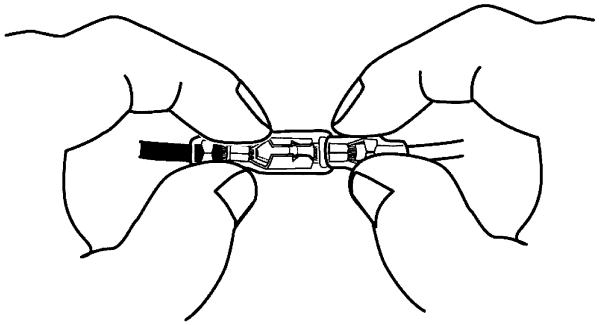
- **When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.**
- **There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.**



ECA16790

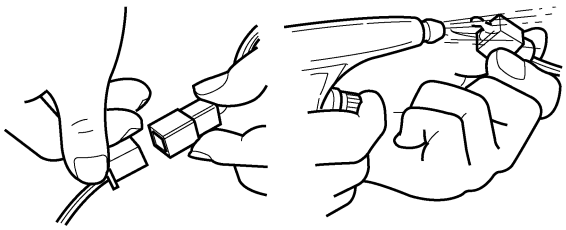
NOTICE

When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.



2. Check:
   - Lead
   - Coupler
   - Connector

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



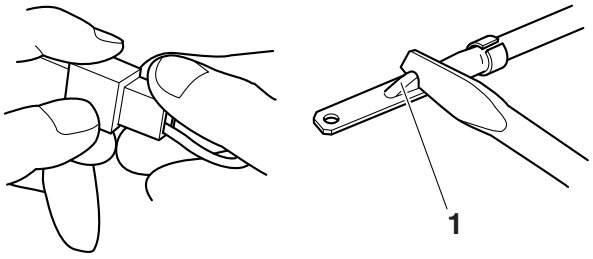
3. Check:
   - All connections

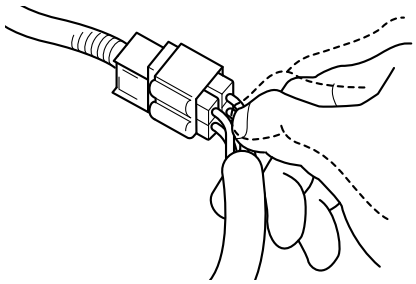
   Loose connection → Connect properly.

TIP

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

• After disassembling and assembling a coupler, pull on the leads to make sure that they are installed securely.

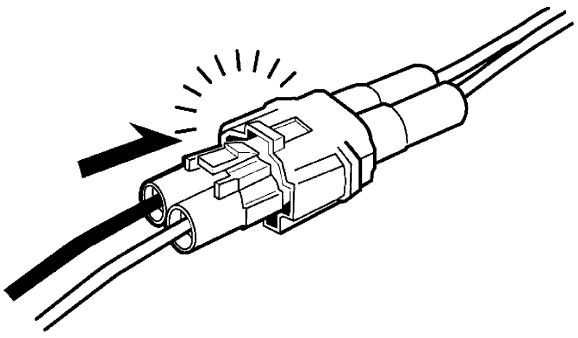


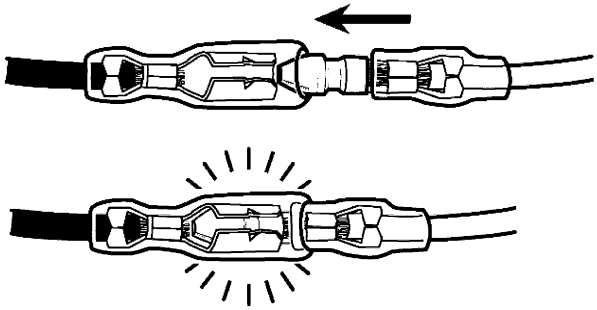


4. Connect:
   • Lead
   • Coupler
   • Connector

TIP

• When connecting a coupler or connector, push both sections of the coupler or connector together until they are connected securely.
• Make sure all connections are tight.





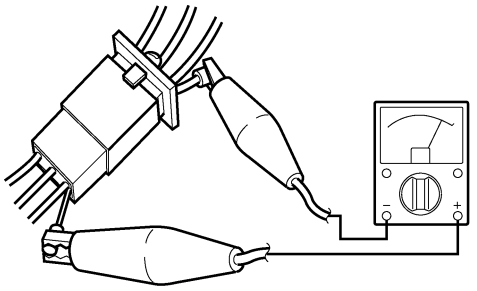
5. Check:
   • Continuity
   (with the pocket tester)

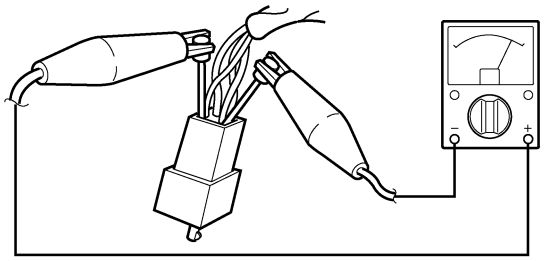


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

• 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.





6. Check:
   • Resistance

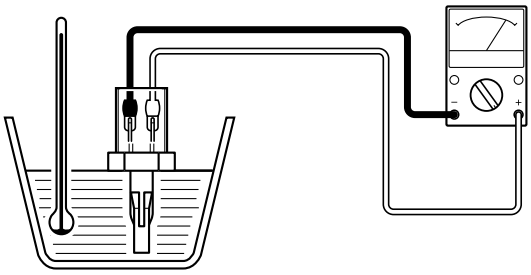


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

The resistance values shown were obtained at the standard measuring temperature of 20 °C (68 °F). If the measuring temperature is not 20 °C (68 °F), the specified measuring conditions will be shown.

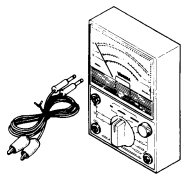
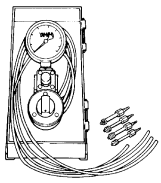
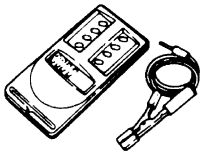
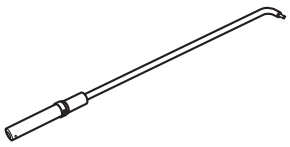
Intake air temperature sensor resistance
5.4–6.6 kΩ at 0 °C (32 °F)
290–390 Ω at 80 °C (176 °F)

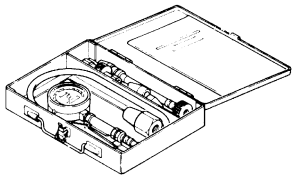
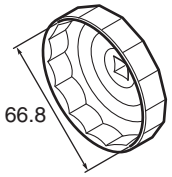
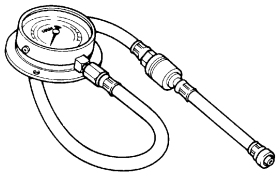
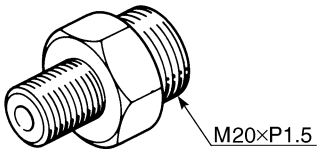
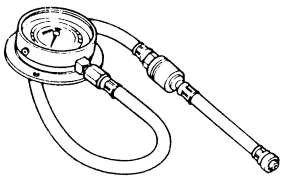
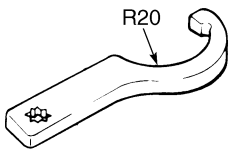
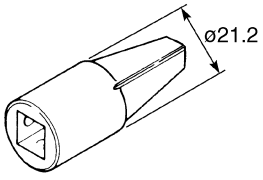


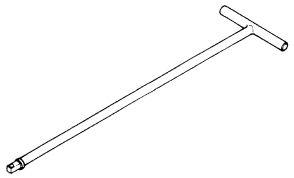
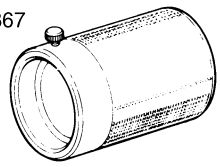
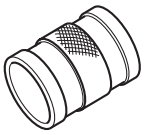
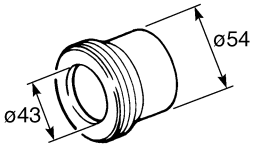
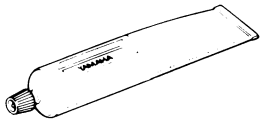
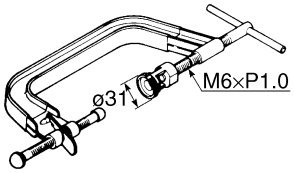
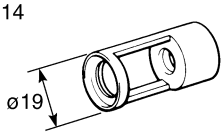
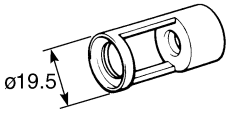
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SPECIAL TOOLS

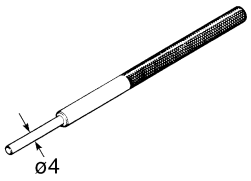
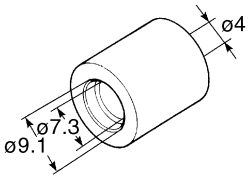
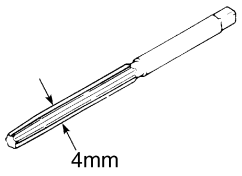
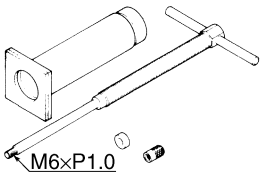
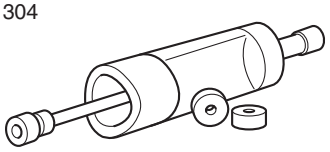
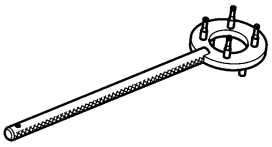
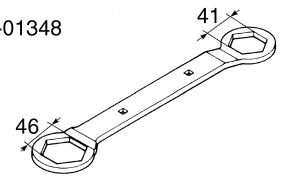
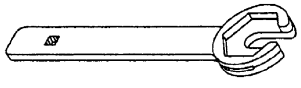
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

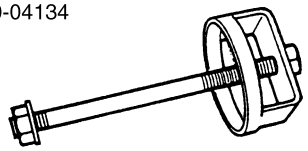
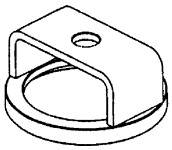
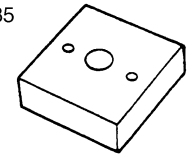
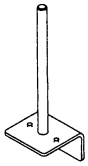
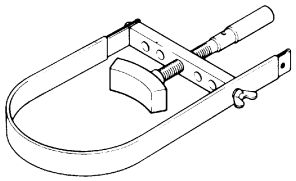
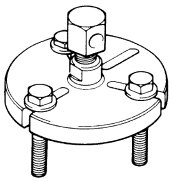
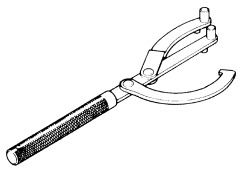
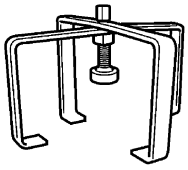
TIP
- For U.S.A. and Canada, use part numbers starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part numbers starting with “90890-”.

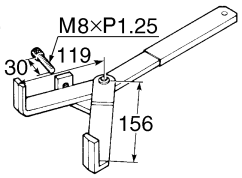
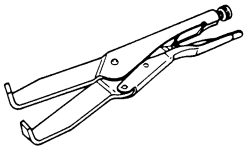
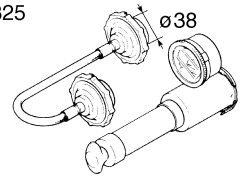
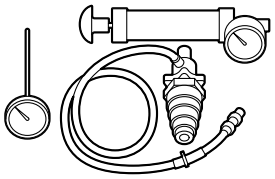
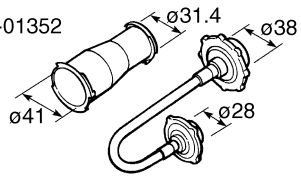
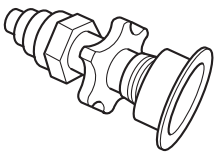
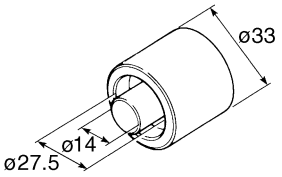
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-35, 8-125, 8-126, 8-127, 8-131, 8-133, 8-134, 8-135, 8-136, 8-137, 8-138, 8-139, 8-141
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-6
Vacuum gauge 90890-03094 Vacuummate YU-44456	90890-03094  YU-44456 	3-9
Digital tachometer 90890-06760 YU-39951-B		3-8, 3-9
Carburetor angle driver 2 90890-03173		3-10

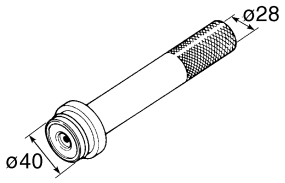
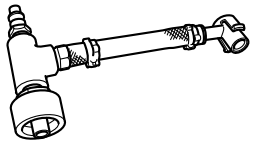
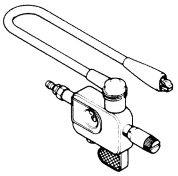
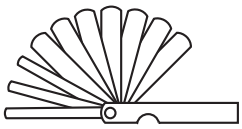
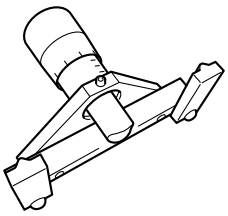
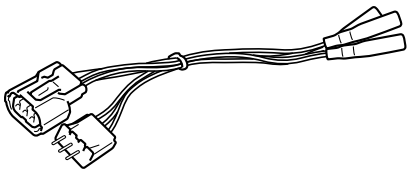
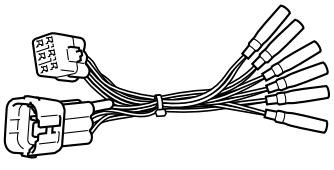
Tool name/Tool No.	Illustration	Reference pages
Compression gauge 90890-03081 Engine compression tester YU-33223		5-1
Oil filter wrench 90890-01469 YM-01469		3-26, 6-6
Oil pressure gauge set 90890-03120		3-28
Oil pressure adapter B 90890-03124		3-28
Test coupler adapter 90890-03149		1-27, 4-73, 4-74
Pressure gauge 90890-03153 YU-03153		3-28, 7-4
Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472		3-24, 4-90
Damper rod holder 90890-01460		4-84, 4-85

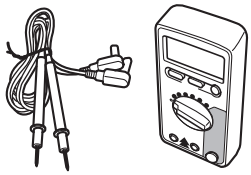
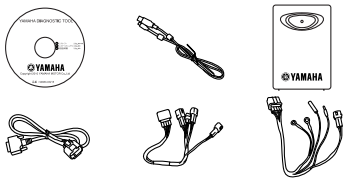
Tool name/Tool No.	Illustration	Reference pages
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-84, 4-85
Fork seal driver weight 90890-01367 Replacement hammer YM-A9409-7	90890-01367  YM-A9409-7/YM-A5142-4 	4-86
Fork seal driver attachment (ø43) 90890-01374 Replacement 43 mm YM-A5142-3		4-86
Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®)		5-17, 5-48, 5-55, 5-72
Valve spring compressor 90890-04019 YM-04019		5-22, 5-28
Valve spring compressor attachment 90890-04114 Valve spring compressor adapter 19.5 mm YM-04114	90890-04114  YM-04114 	5-22, 5-28

Tool name/Tool No.	Illustration	Reference pages
Valve guide remover (ø4) 90890-04111 Valve guide remover (4.0 mm) YM-04111		5-24
Valve guide installer (ø4) 90890-04112 Valve guide installer (4.0 mm) YM-04112		5-24
Valve guide reamer (ø4) 90890-04113 Valve guide reamer (4.0 mm) YM-04113		5-24
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-30
Sheave holder 90890-01481		5-44, 5-47, 5-48, 5-49
Locknut wrench 90890-01348 YM-01348	90890-01348  YM-01348 	5-44, 5-45, 5-47

Tool name/Tool No.	Illustration	Reference pages
Sheave spring compressor 90890-04134 YM-04134	90890-04134  YM-04134 	5-45, 5-47
Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135	90890-04135  YM-04135 	5-45, 5-47
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-53, 5-55
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-53
Rotor holding tool 90890-01235 Universal magneto & rotor holder YU-01235		5-60, 5-64
Clutch spring compressor 90890-01482		5-60, 5-63

Tool name/Tool No.	Illustration	Reference pages
Universal clutch holder 90890-04086 YM-91042	90890-04086  YM-91042 	5-60, 5-63
Plane bearing installer 90890-04139		5-76, 5-80
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	90890-01325  YU-24460-A 	6-3
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	90890-01352  YU-33984 	6-3
Mechanical seal installer 90890-04132 Water pump seal installer YM-33221-A		6-12

Tool name/Tool No.	Illustration	Reference pages
Middle driven shaft bearing driver 90890-04058 Middle drive bearing installer 40 & 50 mm YM-04058		6-12
Fuel pressure adapter 90890-03181 YM-03181		7-4
Ignition checker 90890-06754 Oppama pet-4000 spark checker YM-34487		8-135
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		5-19, 5-61
Tension gauge 90890-03226 YM-03226		3-21
Test harness S- pressure sensor (3P) 90890-03207 YU-03207		8-140
Test harness- lean angle sensor (6P) 90890-03209 YU-03209		8-136

Tool name/Tool No.	Illustration	Reference pages
Digital circuit tester 90890-03189 Model 88 Multimeter with tachometer YU-A1927		5-37, 8-115, 8-116, 8-137, 8-140
Yamaha diagnostic tool 90890-03215		8-35

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EAS20280
GENERAL SPECIFICATIONS

Model	
Model	59C2
Dimensions	
Overall length	2200 mm (86.6 in)
Overall width	775 mm (30.5 in)
Overall height	1420/1475 mm (55.9/58.1 in)
Seat height	800 mm (31.5 in)
Wheelbase	1580 mm (62.2 in)
Ground clearance	125 mm (4.92 in)
Minimum turning radius	2800 mm (110.2 in)
Weight	
Curb weight	221 kg (487 lb)
Maximum load	194 kg (428 lb)

EAS20290
ENGINE SPECIFICATIONS

Engine	
Engine type	Liquid cooled 4-stroke, DOHC
Displacement	530 cm³
Cylinder arrangement	Inline 2-cylinder
Bore × stroke	68.0 × 73.0 mm (2.68 × 2.87 in)
Compression ratio	10.90 : 1
Standard compression pressure (at sea level)	1950 kPa/470 r/min (19.5 kgf/cm²/470 r/min, 282.8 psi/470 r/min)
Minimum–maximum	1700–2180 kPa/470 r/min (17.0–21.8 kgf/cm²/470 r/min, 246.1–316.8 psi/470 r/min)
Starting system	Electric starter
Fuel	
Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	15.0 L (3.96 US gal, 3.30 Imp.gal)
Fuel reserve amount	3.0 L (0.79 US gal, 0.66 Imp.gal)
Engine oil	
Lubrication system	Dry sump
Recommended brand	YAMALUBE
Type	SAE 10W-30 or SAE 10W-40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	3.50 L (3.70 US qt, 3.08 Imp.qt)
Without oil filter cartridge replacement	2.70 L (2.85 US qt, 2.38 Imp.qt)
With oil filter cartridge replacement	2.90 L (3.07 US qt, 2.55 Imp.qt)
Oil pressure (hot)	120.0 kPa/1200 r/min (1.20 kgf/cm²/1200 r/min, 17.4 psi/1200 r/min)
Oil filter	
Oil filter type	Cartridge
Oil pump	
Oil pump type	Trochoid
Oil pressure	120 kPa/1200 r/min (1.20 kgf/cm²/1200 r/min, 17.4 psi/1200 r/min) at 70.0 °C (158.0 °F)
Bypass valve opening pressure	78.0–118.0 kPa (0.78–1.18 kgf/cm², 11.3–17.1 psi)
Relief valve operating pressure	450.0–550.0 kPa (4.50–5.50 kgf/cm², 65.3–79.8 psi)
Pressure check location	MAIN GALLERY
Cooling system	
Radiator capacity (including all routes)	1.50 L (1.59 US qt, 1.32 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.27 L (0.29 US qt, 0.24 Imp.qt)
Radiator cap opening pressure	107.9–137.3 kPa (1.08–1.37 kgf/cm², 15.7–19.9 psi)
Thermostat	
Valve opening temperature	69.0–73.0 °C (156.20–163.40 °F)
Valve full open temperature	85.0 °C (185.00 °F)
Valve lift (full open)	8.0 mm (0.31 in)

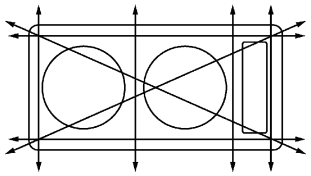
Radiator core	
Width	329.0 mm (12.95 in)
Height	149.8 mm (5.90 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	23/19 (1.210)
Impeller shaft tilt limit	0.15 mm (0.0059 in)

Spark plug(s)

Manufacturer/model	NGK/CR7E
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)

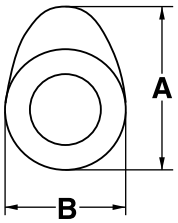
Cylinder head

Combustion chamber volume	16.93–17.73 cm³ (1.03–1.08 cu.in)
Warpage limit	0.03 mm (0.0012 in)

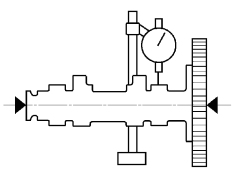


Camshaft

Drive system	Chain drive (left)
Camshaft cap inside diameter	23.000–23.021 mm (0.9055–0.9063 in)
Camshaft journal diameter	22.959–22.972 mm (0.9039–0.9044 in)
Camshaft-journal-to-camshaft-cap clearance	0.028–0.062 mm (0.0011–0.0024 in)
Limit	0.08 mm (0.0031 in)
Camshaft lobe dimensions	
Intake A	32.490–32.590 mm (1.2791–1.2831 in)
Limit	32.390 mm (1.2752 in)
Intake B	24.950–25.050 mm (0.9823–0.9862 in)
Limit	24.850 mm (0.9783 in)
Exhaust A	32.690–32.790 mm (1.2870–1.2909 in)
Limit	32.590 mm (1.2831 in)
Exhaust B	24.950–25.050 mm (0.9823–0.9862 in)
Limit	24.850 mm (0.9783 in)



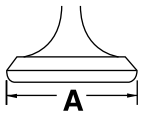
Camshaft runout limit	0.030 mm (0.0012 in)



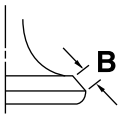
Timing chain

Tensioning system	Automatic

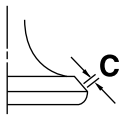
Valve, valve seat, valve guide	
Valve clearance (cold)	
Intake	0.15–0.22 mm (0.0059–0.0087 in)
Exhaust	0.25–0.32 mm (0.0098–0.0126 in)
Valve dimensions	
Valve head diameter (intake)	25.9–26.1 mm (1.0197–1.0276 in)
Valve head diameter (exhaust)	21.9–22.1 mm (0.8622–0.8701 in)



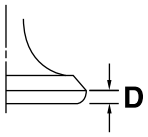
Valve face width (intake)	1.202–2.475 mm (0.0473–0.0974 in)
Valve face width (exhaust)	1.202–2.475 mm (0.0473–0.0974 in)



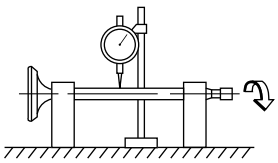
Valve seat width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)
Valve seat width (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)



Valve margin thickness (intake)	0.50–0.90 mm (0.0197–0.0354 in)
Valve margin thickness (exhaust)	0.50–0.90 mm (0.0197–0.0354 in)

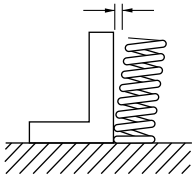


Valve stem diameter (intake)	3.975–3.990 mm (0.1565–0.1571 in)
Limit	3.945 mm (0.1553 in)
Valve stem diameter (exhaust)	3.960–3.975 mm (0.1559–0.1565 in)
Limit	3.930 mm (0.1547 in)
Valve guide inside diameter (intake)	4.000–4.012 mm (0.1575–0.1580 in)
Limit	4.050 mm (0.1594 in)
Valve guide inside diameter (exhaust)	4.000–4.012 mm (0.1575–0.1580 in)
Limit	4.050 mm (0.1594 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	0.100 mm (0.0039 in)
Valve stem runout	0.040 mm (0.0016 in)



Valve spring	
Free length (intake)	36.73 mm (1.45 in)
Limit	34.89 mm (1.37 in)

Free length (exhaust)	36.73 mm (1.45 in)
Limit	34.89 mm (1.37 in)
Installed compression spring force (intake)	96.6–111.2 N (9.85–11.34 kgf, 21.72–25.00 lbf)
Installed compression spring force (exhaust)	96.6–111.2 N (9.85–11.34 kgf, 21.72–25.00 lbf)
Installed length (intake)	30.60 mm (1.20 in)
Installed length (exhaust)	30.60 mm (1.20 in)
Spring rate K1 (intake)	16.95 N/mm (1.73 kgf/mm, 96.78 lb/in)
Spring rate K2 (intake)	23.19 N/mm (2.36 kgf/mm, 132.41 lb/in)
Spring rate K1 (exhaust)	16.95 N/mm (1.73 kgf/mm, 96.78 lb/in)
Spring rate K2 (exhaust)	23.19 N/mm (2.36 kgf/mm, 132.41 lb/in)
Spring tilt (intake)	1.6 mm (0.06 in)
Spring tilt (exhaust)	1.6 mm (0.06 in)



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

Valve lifter

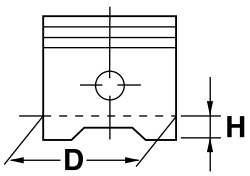
Valve lifter outside diameter (intake)	24.482–24.488 mm (0.9639–0.9641 in)
Limit	24.457 mm (0.9629 in)
Valve lifter outside diameter (exhaust)	24.482–24.488 mm (0.9639–0.9641 in)
Limit	24.457 mm (0.9629 in)

Cylinder

Bore	68.000–68.010 mm (2.6772–2.6776 in)
Wear limit	68.100 mm (2.6811 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

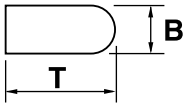
Piston

Piston-to-cylinder clearance	0.010–0.035 mm (0.0004–0.0014 in)
Limit	0.15 mm (0.0059 in)
Diameter D	67.975–67.990 mm (2.6762–2.6768 in)
Height H	9.0 mm (0.35 in)

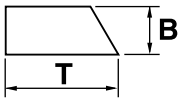


Offset	0.25 mm (0.0098 in)
Offset direction	Intake side
Piston pin bore inside diameter	16.002–16.013 mm (0.6300–0.6304 in)
Limit	16.043 mm (0.6316 in)
Piston pin outside diameter	15.991–16.000 mm (0.6296–0.6299 in)
Limit	15.971 mm (0.6288 in)
Piston-pin-to-piston-pin-bore clearance	0.002–0.022 mm (0.0001–0.0009 in)

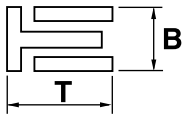
Piston ring	
Top ring	
Ring type	Barrel
Dimensions (B × T)	0.90 × 2.60 mm (0.04 × 0.10 in)



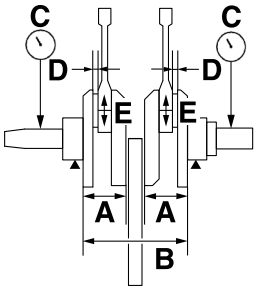
End gap (installed)	0.25–0.35 mm (0.0098–0.0138 in)
Limit	0.60 mm (0.0236 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)
Limit	0.100 mm (0.0039 in)
2nd ring	
Ring type	Taper
Dimensions (B × T)	0.80 × 2.50 mm (0.03 × 0.10 in)



End gap (installed)	0.35–0.50 mm (0.0138–0.0197 in)
Limit	0.75 mm (0.0295 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.100 mm (0.0039 in)
Oil ring	
Dimensions (B × T)	1.50 × 2.00 mm (0.06 × 0.08 in)



End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
Connecting rod	
Oil clearance	0.040–0.064 mm (0.0016–0.0025 in)
Bearing color code	1: Blue 2: Black 3: Brown 4: Green
Small end inside diameter	16.005–16.018 mm (0.6301–0.6306 in)
Crankshaft	
Width A	49.90–50.60 mm (1.964–1.992 in)
Width B	118.55–118.60 mm (4.67–4.67 in)
Runout limit C	0.050 mm (0.0020 in)
Big end side clearance D	0.160–0.262 mm (0.0063–0.0103 in)
Big end radial clearance E	0.040–0.064 mm (0.0016–0.0025 in)



Journal oil clearance	0.040–0.082 mm (0.0016–0.0032 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green
Journal diameter	54.984–55.000 mm (2.1647–2.1654 in)

Balancer	
Balancer drive method	Piston
Connecting rod oil clearance	0.036–0.060 mm (0.0014–0.0024 in)
Clutch	
Clutch type	Wet, multiple-disc automatic
Clutch release method	Automatic
Friction plate thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.1110 in)
Plate quantity	6 pcs
Clutch plate 1 thickness	1.30–1.50 mm (0.051–0.059 in)
Plate quantity	5 pcs
Warpage limit	0.10 mm (0.0039 in)
Clutch plate 2 thickness	1.80–2.00 mm (0.071–0.079 in)
Plate quantity	2 pcs
Warpage limit	0.20 mm (0.0079 in)
Clutch spring free length	31.90 mm (1.26 in)
Limit	24.80 mm (0.98 in)
Spring quantity	6 pcs
Clutch damper spring height	3.50 mm (0.14 in)
Minimum height	3.10 mm (0.12 in)
Spring quantity	7 pcs
Clutch spring plate height	4.70 mm (0.19 in)
Minimum height	4.40 mm (0.17 in)
Spring quantity	1 pcs
V-belt	
V-belt width	32.9 mm (1.30 in)
Limit	31.4 mm (1.24 in)
Transmission	
Transmission type	V-belt automatic
Primary reduction ratio	1.000
Secondary reduction ratio	6.034 (52/32 × 36/22 × 59/26)
Final drive	Belt
Gear ratio	2.041–0.758 : 1
Primary sheave weight outside diameter	24.9–25.1 mm (0.98–0.99 in)
Limit	24.4 mm (0.96 in)
Drive axle runout limit	0.100 mm (0.0039 in)
Secondary shaft runout limit	0.120 mm (0.0047 in)
Air filter	
Air filter element	Oil-coated paper element
Fuel pump	
Pump type	Electrical
Maximum consumption amperage	1.7 A
Output pressure	250.0 kPa (2.50 kgf/cm², 36.3 psi)
Fuel injector	
Model/quantity	0660/2
Resistance	12.0 Ω
Throttle body	
Type/quantity	ACW34-10/1
ID mark	59C1 00

Fuel injection sensor	
Coolant temperature sensor resistance	2.32–2.59 kΩ at 20 °C (68 °F) 310.0–326.0 Ω at 80 °C (176 °F)
Throttle position sensor maximum resistance	2.64–6.16 kΩ
Throttle position sensor resistance	0–6.16 kΩ
Intake air pressure output voltage	3.57–3.71 V at 101.32 kPa
Intake air temperature sensor resistance	5.4–6.6 kΩ at 0 °C (32 °F) 290–390 Ω at 80 °C (176 °F)
Idling condition	
Engine idling speed	1100–1300 r/min
Intake vacuum	29.3–31.9 kPa (220–239 mmHg, 8.7–9.4 inHg)
Water temperature	85.0–105.0 °C (185.00–221.00 °F)
Oil temperature	60.0–80.0 °C (140.00–176.00 °F)
Throttle grip free play	3.0–5.0 mm (0.12–0.20 in)
Fuel line pressure (at idle)	220–300 kPa (2.20–3.00 kgf/cm², 31.3–42.7 psi)

EAS20300
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Diamond
Caster angle	25.00°
Trail	92 mm (3.6 in)
Front wheel	
Wheel type	Cast wheel
Rim size	15M/C × MT3.50
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)
Wheel axle bending limit	0.25 mm (0.01 in)
Wheel sensor rotor deflection limit	0.15 mm (0.0059 in)
Rear wheel	
Wheel type	Cast wheel
Rim size	15M/C × MT5.00
Rim material	Aluminum
Wheel travel	116.0 mm (4.57 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)
Wheel sensor rotor deflection limit	0.15 mm (0.0059 in)
Front tire	
Type	Tubeless
Size	120/70R15 M/C 56H
Manufacturer/model	DUNLOP/GPR-100F
Manufacturer/model	BRIDGESTONE/BT011F
Wear limit (front)	1.6 mm (0.06 in)
Rear tire	
Type	Tubeless
Size	160/60R15 M/C 67H
Manufacturer/model	DUNLOP/GPR-100L
Manufacturer/model	BRIDGESTONE/BT012R
Wear limit (rear)	1.6 mm (0.06 in)
Tire air pressure (measured on cold tires)	
Loading condition	0–90 kg (0–198 lb)
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	250 kPa (2.50 kgf/cm², 36 psi)
Loading condition	90–194 kg (198–428 lb)
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	280 kPa (2.80 kgf/cm², 41 psi)
Front brake	
Type	Dual disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	267.0 × 4.0 mm (10.51 × 0.16 in)
Brake disc thickness limit	3.5 mm (0.14 in)
Brake disc deflection limit	0.15 mm (0.0059 in)

Brake pad lining thickness (inner)	4.0 mm (0.16 in)
Limit	0.5 mm (0.02 in)
Brake pad lining thickness (outer)	4.0 mm (0.16 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	15.00 mm (0.59 in)
Caliper cylinder inside diameter	30.23 mm (1.19 in) 27.00 mm (1.06 in)
Specified brake fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Left hand operation
Rear disc brake	
Disc outside diameter × thickness	282.0 × 5.0 mm (11.10 × 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)	8.0 mm (0.31 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	8.0 mm (0.31 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	14.0 mm (0.55 in)
Caliper cylinder inside diameter	38.10 mm (1.50 in)
Specified brake fluid	DOT 4

Rear brake lock

Rear brake lock pad	
Brake pad lining thickness	3.0 mm (0.12 in)
Limit	0.8 mm (0.03 in)
Rear brake lock cable length	43–45 mm (1.69–1.77 in)

Steering

Steering bearing type	Angular bearing
Center to lock angle (left)	38.5°
Center to lock angle (right)	38.5°

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	120.0 mm (4.72 in)
Fork spring free length	303.9 mm (11.96 in)
Limit	297.8 mm (11.72 in)
Collar length	195.0 mm (7.68 in)
Fork spring installed length	284.9 mm (11.22 in)
Spring rate K1	16.28 N/mm (1.66 kgf/mm, 92.96 lb/in)
Spring stroke K1	0.0–120.0 mm (0.00–4.72 in)
Inner tube outer diameter	43.0 mm (1.69 in)
Inner tube bending limit	0.2 mm (0.01 in)
Optional spring available	No
Recommended oil	Fork oil 10W or equivalent
Quantity	517.0 cm³ (17.48 US oz, 18.23 Imp.oz)
Level	87.0 mm (3.43 in)

Rear suspension

Type	Swingarm
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	43.0 mm (1.69 in)
Spring free length	191.2 mm (7.53 in)

Spring installed length	180.0 mm (7.09 in)
Spring rate K1	225.60 N/mm (23.00 kgf/mm, 1288.18 lb/in)
Spring rate K2	294.00 N/mm (29.98 kgf/mm, 1678.74 lb/in)
Spring stroke K1	0.0–28.8 mm (0.00–1.13 in)
Spring stroke K2	28.8–43.0 mm (1.13–1.69 in)
Optional spring available	No
Enclosed gas/air pressure (STD)	4900 kPa (49.0 kgf/cm^2, 696.9 psi)
Swingarm	
Swingarm end free play limit (radial)	1.0 mm (0.04 in)
Swingarm end free play limit (axial)	1.0 mm (0.04 in)
Drive belt	
Drive belt slack (scale position)	13.4

EAS20310
ELECTRICAL SPECIFICATIONS

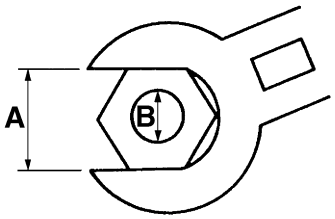
Voltage	
System voltage	12 V
Ignition system	
Ignition system	TCI
Advancer type	Digital
Ignition timing (B.T.D.C.)	5.0°/1200 r/min
TCI	
Crankshaft position sensor resistance	248–372 Ω (Gy-B)
Ignition coil	
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	1.87–2.53 Ω
Secondary coil resistance	12.00–18.00 kΩ
Spark plug cap	
Material	Resin
Resistance	7.5–12.5 kΩ
AC magneto	
Standard output	14.0 V, 25.0 A at 5000 r/min
Standard output	14.0 V, 350 W at 5000 r/min
Stator coil resistance	0.224–0.336 Ω (W-W)
Rectifier/regulator	
Regulator type	Semi conductor-short circuit
Regulated voltage (DC)	14.1–14.9 V
Rectifier capacity (DC)	22.0 A
Battery	
Model	YTZ12S
Voltage, capacity	12 V, 11.0 Ah
Specific gravity	1.310
Manufacturer	GS YUASA
Ten hour rate amperage	1.10 A
Headlight	
Bulb type	Halogen bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 55 W × 2
Auxiliary light	12 V, 5.0 W × 1
Tail/brake light	LED
Front turn signal light	12 V, 21.0 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	
Turn signal indicator light	LED × 2
High beam indicator light	LED
Engine trouble warning light	LED
ABS warning light	LED
Immobilizer system indicator light	LED

Electric starting system	
System type	Constant mesh
Starter motor	
Power output	0.70 kW
Armature coil commutator resistance	0.0100–0.0200 Ω
Armature coil insulation resistance	Above 1 MΩ
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.02–6.51 N (614–664 gf, 21.65–23.41 oz)
Mica undercut (depth)	0.70 mm (0.03 in)
Starter relay	
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω
Horn	
Horn type	Plane
Quantity	1 pcs
Maximum amperage	3.0 A
Coil resistance	1.06–1.11 Ω
Turn signal/hazard relay	
Relay type	Full transistor
Built-in, self-canceling device	No
Fuel sender unit	
Sender unit resistance (full)	4.0–10.0 Ω
Sender unit resistance (empty)	93.0–100.0 Ω
Fuses	
Main fuse	40.0 A
Headlight fuse	20.0 A
Signaling system fuse	15.0 A
Ignition fuse	7.5 A
Radiator fan fuse	15.0 A
Parking lighting fuse	10.0 A
Fuel injection system fuse	7.5 A
ABS motor fuse	30.0 A
ABS control unit fuse	5.0 A
ABS solenoid fuse	20.0 A
Backup fuse	7.5 A
Spare fuse	40.0 A
Spare fuse	30.0 A
Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	10.0 A
Spare fuse	7.5 A
Spare fuse	5.0 A

EAS20320
TIGHTENING TORQUES

EAS20331
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·kgf	ft·lbf
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

EAS20340
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Camshaft cap bolt	M6	12	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	E
Engine oil check bolt	M8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Exhaust pipe stud bolt	M8	4	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Cylinder head nut	M9	6	See TIP.	E
Cylinder head bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Spark plug	M10	2	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Cylinder head cover bolt	M6	10	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner rod accessing plug	M20	1	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Cylinder stud bolt	M9	6	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	See TIP.
Connecting rod nut	M7	4	See TIP.	M
Balancer connecting rod nut	M9	2	60 Nm (6.0 m·kgf, 43 ft·lbf)	M
Balancer cylinder bolt	M10	4	58 Nm (5.8 m·kgf, 42 ft·lbf)	LT
Generator rotor nut	M18	1	See TIP.	E
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain guide (intake side) bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Water pump housing cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump assembly bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump inlet and outlet pipes bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Thermostat cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant pipe bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant drain bolt	M12	1	1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)	
Oil pump bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil strainer bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Oil filter cartridge union bolt	M20	1	63 Nm (6.3 m·kgf, 46 ft·lbf)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Oil delivery pipe bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Intake manifold bolt	M6	4	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Intake manifold joint clamp	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Throttle body joint clamp	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Air filter case bolt	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Exhaust assembly nut (front)	M8	4	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Exhaust assembly nut (rear)	M10	1	31 Nm (3.1 m·kgf, 22 ft·lbf)	
Crankcase bolt	M6	5	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	L = 35 mm (1.38 in)
Crankcase bolt	M6	8	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	L = 50 mm (1.97 in)
Crankcase bolt	M8	8	24 Nm (2.4 m·kgf, 17 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine oil pressure check point plug	M20	1	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Engine oil check bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kgf, 31 ft·lbf)	
Oil tank bolt	M6	7	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Stator coil base screw	M6	3	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Timing mark accessing plug	M16	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Generator cover bolt	M6	19	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Outer V-belt case bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Outer V-belt case bolt	M8	6	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Inner V-belt case plate bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Inner V-belt case bolt	M8	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	L = 25 mm (0.98 in)
Inner V-belt case bolt	M8	1	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Outer V-belt case nut	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Crankshaft end access cover screw	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
V-belt case air filter case screw	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Generator cover protector screw	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
V-belt case air filter case cover screw	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Generator cover protector cover screw	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
V-belt case air filter element (left) bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
V-belt case air duct joint clamp	M4	1	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
V-belt case air filter element joint clamp	M4	1	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Starter clutch bolt	M8	3	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Clutch assembly nut	M16	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Clutch boss nut	M48	1	130 Nm (13 m·kgf, 94 ft·lbf)	
Bearing housing bolt	M8	3	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Primary sheave nut	M20	1	160 Nm (16 m·kgf, 116 ft·lbf)	Shell Sunlight Grease 3®
Secondary sheave nut	M18	1	90 Nm (9.0 m·kgf, 65 ft·lbf)	YAMAHA GREASE "H" or Polyurea Grease®
Secondary sheave spring seat nut	M36	1	90 Nm (9.0 m·kgf, 65 ft·lbf)	
Crankshaft right end bearing retainer screw	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Secondary shaft bearing retainer bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Stator coil bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
O_2 sensor	M18	1	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	

TIP

Cylinder head nut

1. Tighten the nuts to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).
2. Tighten the nuts to 20 Nm (2.0 m·kgf, 14 ft·lbf).
3. Tighten the nuts further to reach the specified angle 120°.

TIP

Cylinder head stud bolt

- The tightening torque is for reference only. Install the cylinder head stud bolt so that it protrudes 150.2–152.2 mm (5.91–5.99 in) from the crankcase.

TIP

Connecting rod nut

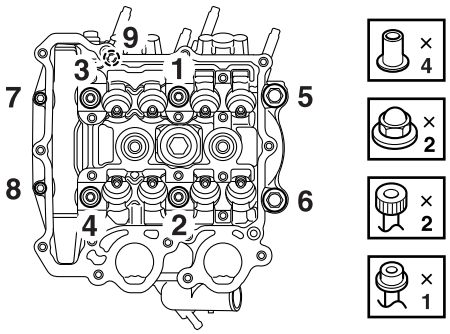
- Tighten the connecting rod nuts to 16 Nm (1.6 m·kgf, 12 ft·lbf), and then tighten them further to reach the specified angle 90°.

TIP

Generator rotor nut

- Tighten the generator rotor nuts to 65 Nm (6.5 m·kgf, 47 ft·lbf), and then tighten them further to reach the specified angle 120°.

Cylinder head tightening sequence:



EAS20350
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting nut (front upper side)	M12	1	88 Nm (8.8 m·kgf, 64 ft·lbf)	
Engine mounting bolt (front lower side)	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Engine mounting nut (rear side)	M12	1	105 Nm (10.5 m·kgf, 76 ft·lbf)	
Rear frame bolt	M12	2	83 Nm (8.3 m·kgf, 60 ft·lbf)	
Front cowling stay bolt	M10	2	48 Nm (4.8m·kgf, 35 ft·lbf)	
Battery box bolt (lower)	M8	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Battery box bolt (upper and center)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Battery box bolt (air cleaner bracket)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Footboard bracket bolt (front side)	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Radiator bracket bolt	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Main switch/immobilizer unit screw	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Muffler stay nut	M10	1	32 Nm (3.2 m·kgf, 23 ft·lbf)	
Fuel tank bracket bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Pivot shaft	M22	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Pivot shaft nut	M22	1	100 Nm (10 m·kgf, 72 ft·lbf)	
Rear shock absorber assembly rear nut	M12	1	53 Nm (5.3 m·kgf, 38 ft·lbf)	
Rear shock absorber assembly front bolt	M16	1	68 Nm (6.8 m·kgf, 49 ft·lbf)	
Swingarm bolt	M10	3	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Drive pulley assembly bolt	M10	5	48 Nm (4.8 m·kgf, 35 ft·lbf)	L = 25 mm (0.98 in), L = 90 mm (3.54 in)
Drive belt guard bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Swingarm cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Holder cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Upper bracket pinch bolt	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Front fork cap bolt	M40	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Damper rod assembly bolt	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Steering stem nut	M28	1	115 Nm (11.5 m·kgf, 83 ft·lbf)	
Lower ring nut	M30	1	See TIP.	
Upper handlebar holder bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Lower handlebar holder nut	M10	2	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Brake hose union bolt (master cylinder side)	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Brake master cylinder holder bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Brake master cylinder cap screw	M4	4	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Grip end	M16	2	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Throttle cable bolt	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Throttle cable adjusting locknut	M8	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Brake hose union bolt (Brake joint side)	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Fuel tank bolt	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Fuel tank nut	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Fuel pump bolt	M5	6	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Fuel rail screw	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Storage box bolt	M6	10	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Seat lock bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Grab bar bolt	M8	4	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Side cover bolt (front side)	M6	4	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Front cowling bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Head light bolt	M6	4	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Footboard bolt	M6	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Footboard bolt (rear upper of right side)	M6	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Headlight bolt (center)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front turn signal light bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Windshield screw	M5	4	0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)	
Windshield stay bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Side cover bolt (rear side)	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Storage compartment bolt	M6	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Recovery tank bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fender bolt (hexagon socket bolt)	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Front fender bolt (flange bolt)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front wheel axle	M18	1	72 Nm (7.2 m·kgf, 52 ft·lbf)	
Rear wheel axle nut	M24	1	160 Nm (16 m·kgf, 116 ft·lbf)	
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Front wheel axle pinch bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Drive belt adjusting locknut	M8	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Front brake caliper bolt	M10	4	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Rear brake caliper bolt	M10	2	27 Nm (2.7 m·kgf, 20 ft·lbf)	
Front brake disc bolt	M8	10	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Rear brake disc bolt	M8	5	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Front brake hose union bolt (caliper side)	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake hose union bolt (caliper side)	M10	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Front brake caliper bleed screw	M8	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Rear brake caliper bleed screw	M7	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Front wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake lock caliper bolt	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Rear brake lock caliper slide pin bolt	M8	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Rear brake lock caliper bracket bolt	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Rear brake lock caliper piston locknut	M16	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	Left-hand thread.
Rear brake lock adjusting nut	M8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Front brake hose joint nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose holder bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose holder bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Rear brake lock cable holder bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Rear brake hose holder bolt (rear left footrest)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front wheel sensor rotor bolt	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Rear wheel sensor rotor bolt	M5	5	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Centerstand bracket nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Centerstand nut	M10	2	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Sidestand nut	M10	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Rear footrest bracket bolt	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Lean angle sensor bolt	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Starter relay lead bolt	M6	2	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Sidestand switch nut	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Intake air pressure sensor bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Ambient temperature sensor bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Throttle position sensor screw	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
ECU (engine control unit) nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Hydraulic unit assembly bracket bolt	M8	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Hydraulic unit assembly and hydraulic unit assembly bracket bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Brake hose flare nut	M10	4	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Damper mount bolt nut	M8	3	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Brake joint assembly bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Damper cap bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

TIP

Lower ring nut

1. First, tighten the lower ring nut approximately 52 Nm (5.2 m·kgf, 38 ft·lbf) by using the ring nut wrench and turn the steering right and left a few times, then loosen the lower ring nut completely.
2. Retighten the lower ring nut 14 Nm (1.4 m·kgf, 10 ft·lbf).

EAS20360
LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370
ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Coolant hose insertion part	Water or silicone fluid
Bearings and bushings	E
Cylinder head nut seats and washers	E
Camshaft cap bolt seats	E
Crankshaft big ends	E
Piston surfaces	E
Piston pins	E
Crankshaft journals	E
Balancer piston surface	E
Balancer piston pin	E
Generator rotor nut	E
Camshaft lobes and journals (intake and exhaust)	M
Valve stem seals (intake and exhaust)	Silicone fluid
Valve stems and stem ends (intake and exhaust)	M
Valve lifter outer surface (intake and exhaust)	E
Water pump impeller shaft	M
O-ring (coolant pipe)	LS or silicone fluid
Oil pump shaft and rotors (inner and outer)	E
Oil pump gaskets	LS
V-belt case air filter case screw bushing	Water
V-belt case air filter case cover screw bushing	Water
Crankshaft end access cover screw bushing	Water or silicone fluid
Generator cover protector cover screw bushing	Water or silicone fluid
Generator cover protector screw bushing	Water or silicone fluid
Starter clutch idle gear inner surface	E
Starter clutch idle gear shaft	E
Starter clutch and starter clutch gear	E
Primary driven gear spline and main axle spline	E
1st pinion gear spline and main axle spline	E
1st wheel gear spline and drive axle spline	E
Primary sheave spacer and o-ring	Shell Sunlight grease 3®
Primary sheave nut	Shell Sunlight grease 3®
Secondary sheave nut	YAMAHA GREASE “H” or Polyurea Grease®

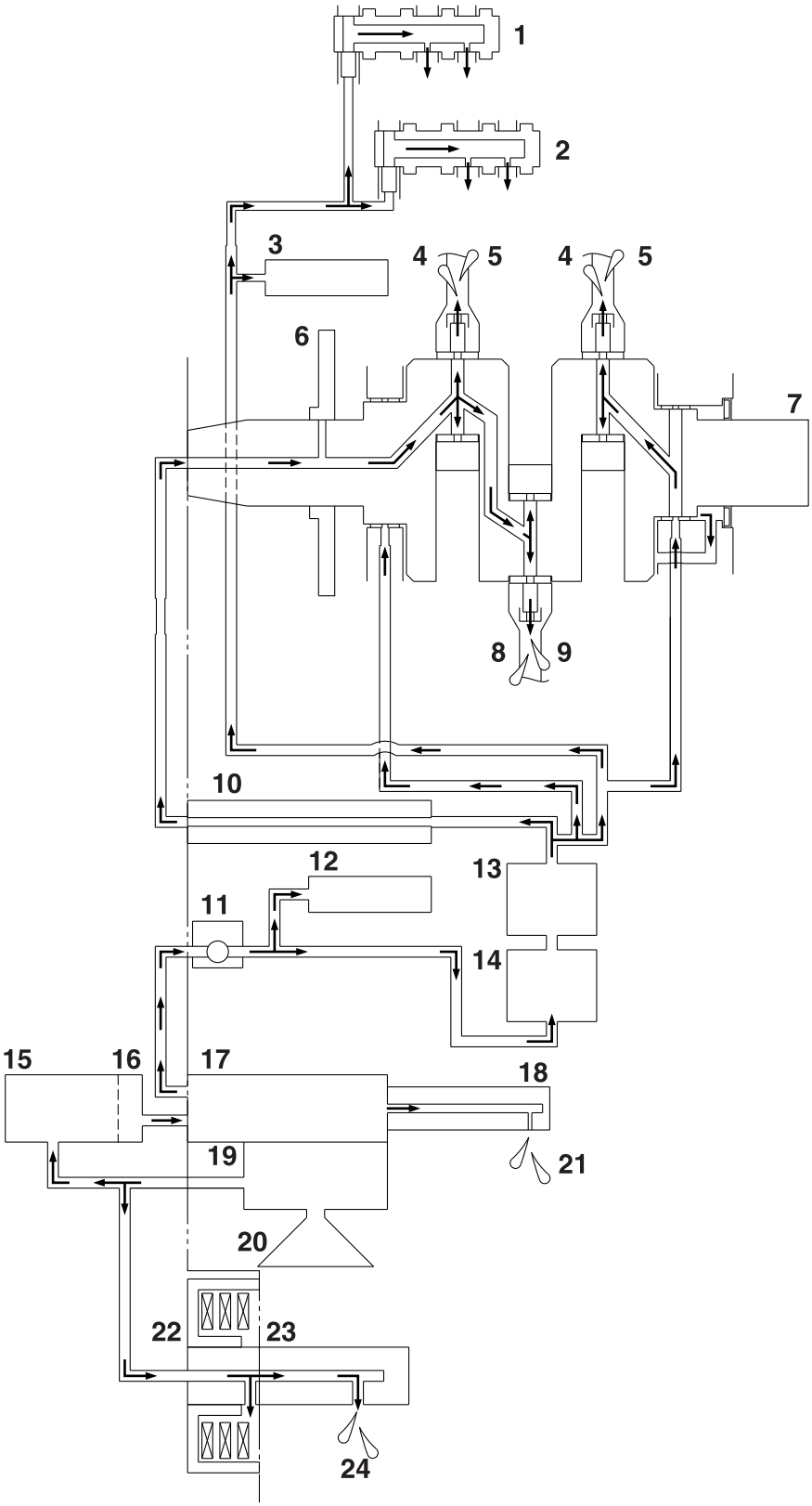
Lubrication point	Lubricant
Secondary shaft right end bearing	
Pivot shaft taper roller bearing	
Crankcase mating surface	Yamaha bond No.1215 (Three bond No.1215®)
Inner V-belt case seal mating surface	Yamaha bond No.1215 (Three bond No.1215®)
Crankshaft position sensor/stator lead grommet	Yamaha bond No.1215 (Three bond No.1215®)

EAS20380
CHASSIS

Lubrication point	Lubricant
Steering bearings (upper and lower)	LS
Upper bearing cover seal lip and lower bearing dust seal lip	LS
Tube guide (throttle grip) inner surface and throttle cables	LS
Rear brake lock cable end (lever end)	YAMAHA GREASE “F”
Brake lever pivoting point and metal-to-metal moving parts	S
Drive axle spline	YAMAHA GREASE “H” or Polyurea Grease®
Drive pulley assembly pivoting point	YAMAHA GREASE “H” or Polyurea Grease®
Rear shock absorber assembly bearing inner surface	LS
Rear shock absorber assembly spacer and collar	LS
Pivot shaft oil seal and collar	LS
Rear shock absorber assembly front bolt seats	LS
Seat lock metal-to-metal moving parts	LS
Seat hinge metal-to-metal moving parts	LS
Seat lock cable	LS
Passenger footrest pivoting point	LS
Centerstand pivoting point and metal-to-metal moving parts	LS
Centerstand hook and spring contact point	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Sidestand hook and spring contact point	LS
Front wheel oil seal lip	LS
Rear wheel oil seal lip	LS
Fuel lid pivoting point	LS

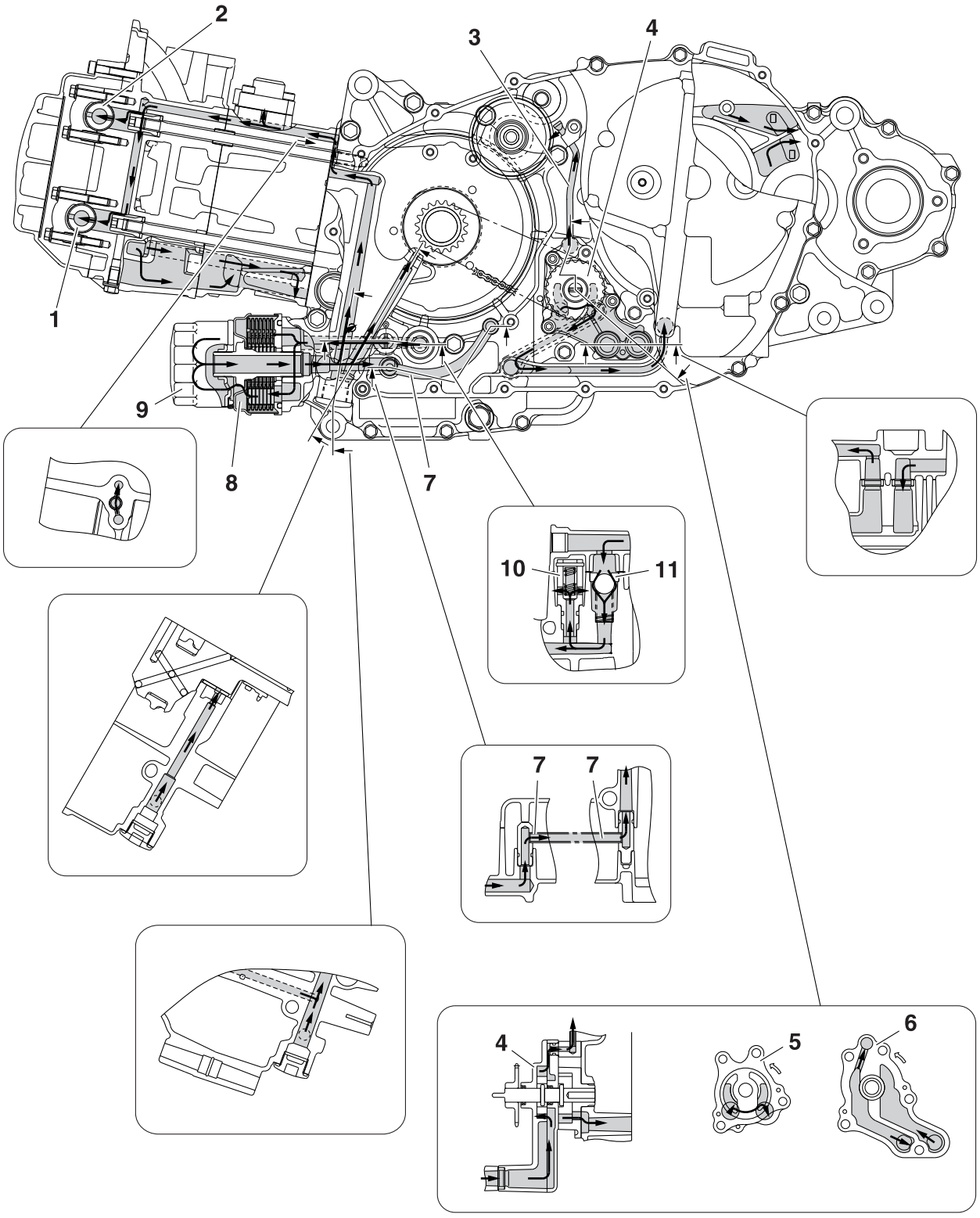
EAS20390
LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20400
ENGINE OIL LUBRICATION CHART

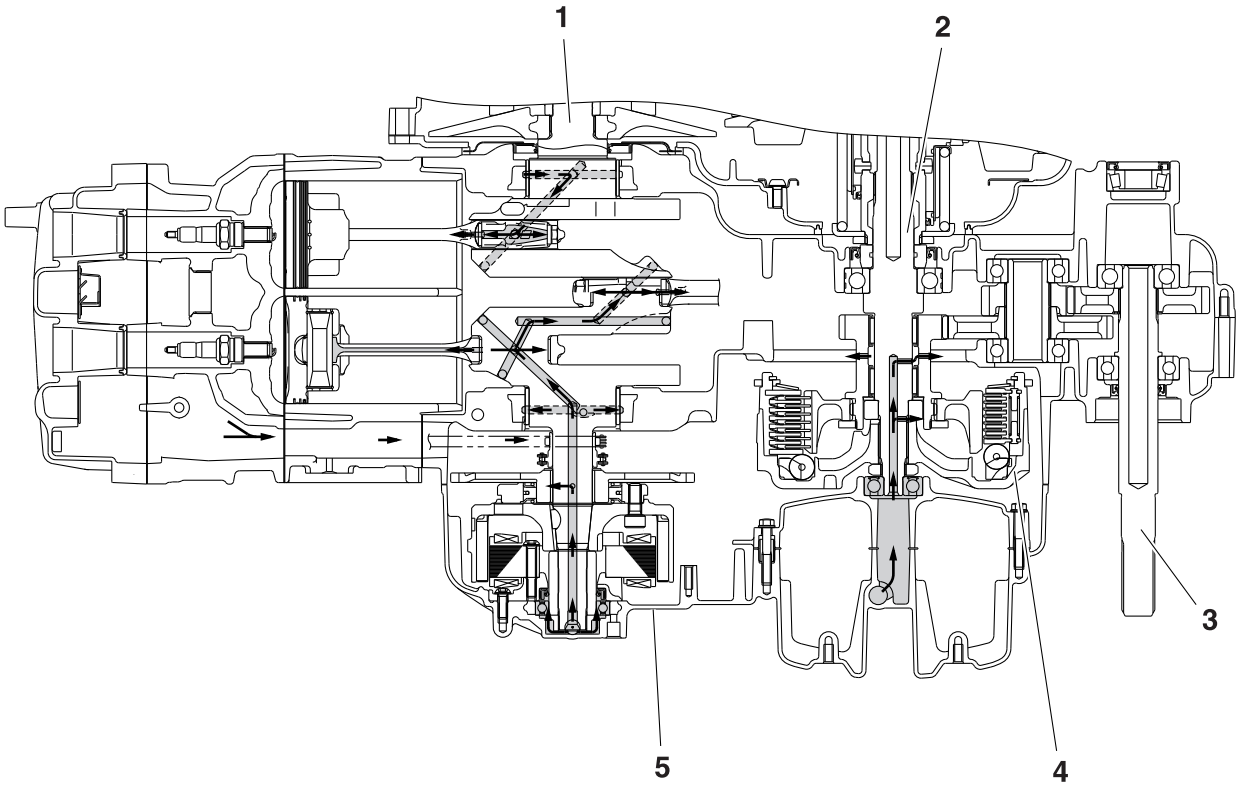


1. Intake camshaft
2. Exhaust camshaft
3. Timing chain tensioner
4. Connecting rod
5. To piston
6. Starter clutch gear
7. Crankshaft
8. Balancer connecting rod
9. To balancer piston
10. Oil pipe
11. Check valve
12. Relief valve
13. Oil filter
14. Oil cooler
15. Oil tank
16. Oil strainer
17. Feed pump
18. Delivery pipe
19. Scavenge pump
20. Oil strainer
21. To starter idle gear
22. Clutch
23. Secondary shaft
24. To transmission

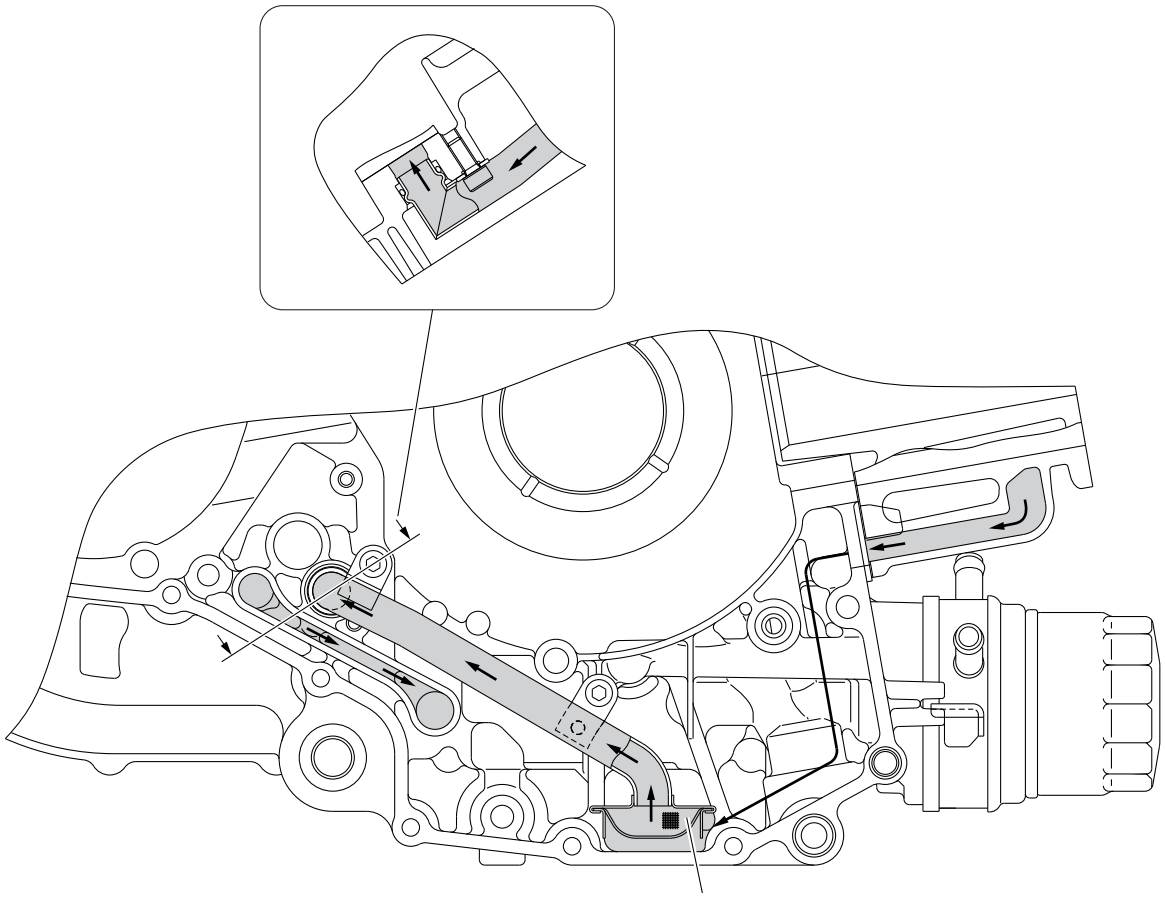
EAS20410
LUBRICATION DIAGRAMS

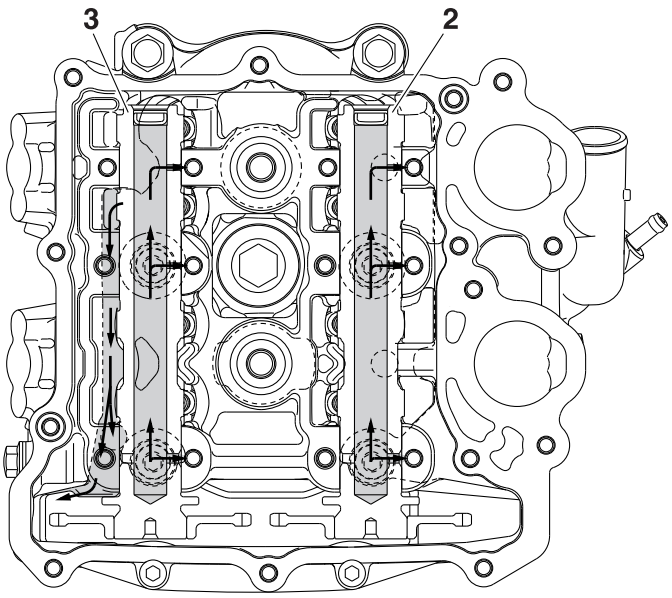


1. Exhaust camshaft
2. Intake camshaft
3. Delivery pipe
4. Oil pump assembly
5. Scavenge pump
6. Feed pump
7. Oil pipe
8. Oil cooler
9. Oil filter
10. Relief valve
11. Check valve

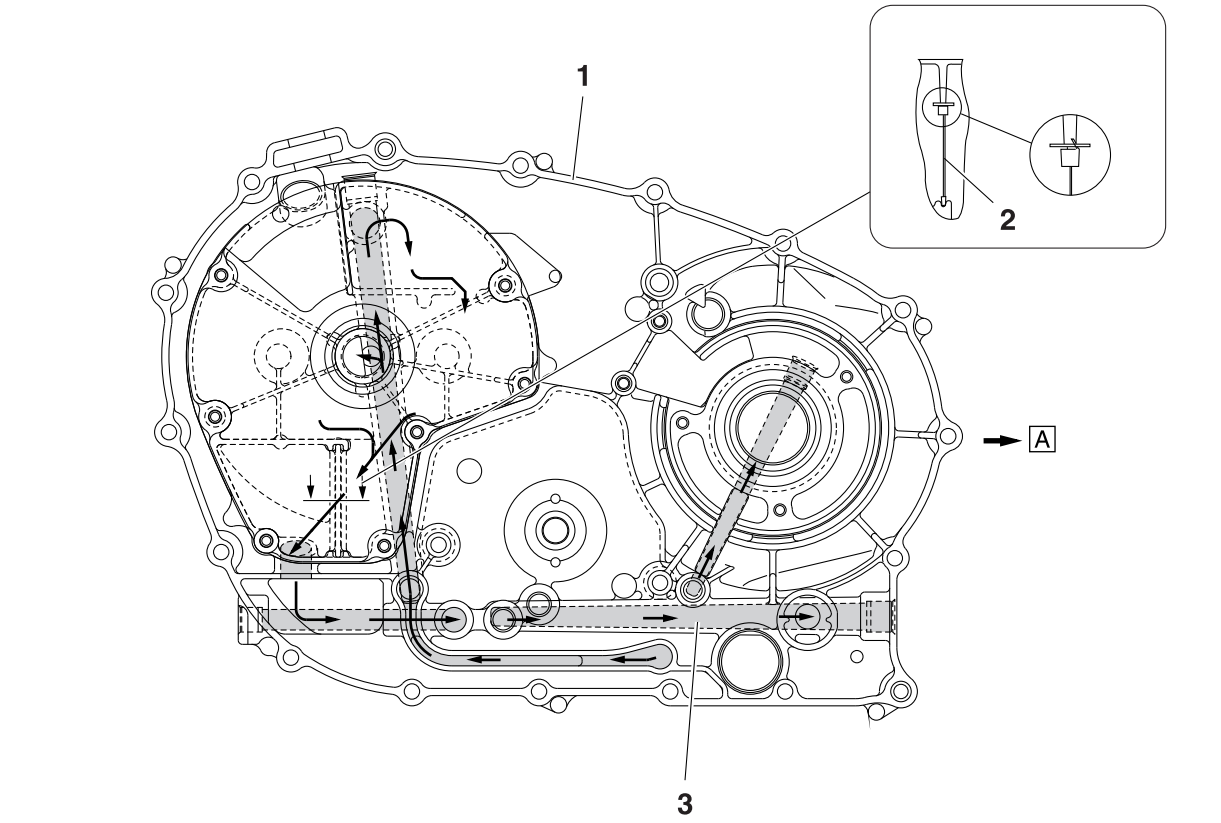

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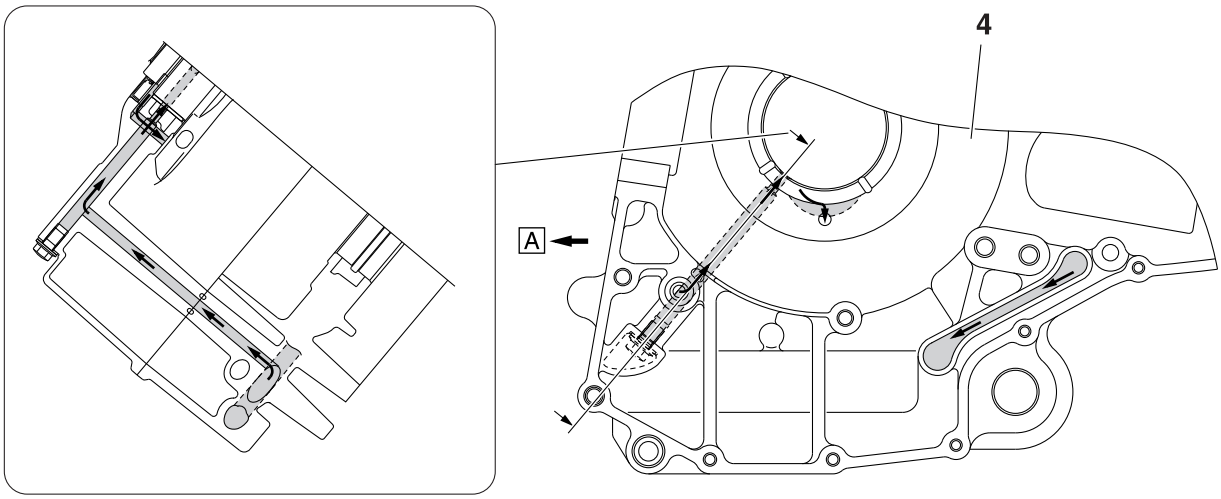
1. Crankshaft
2. Secondary shaft
3. Drive axle
4. Clutch
5. Generator cover


1


3
2

1. Oil strainer
2. Intake camshaft
3. Exhaust camshaft

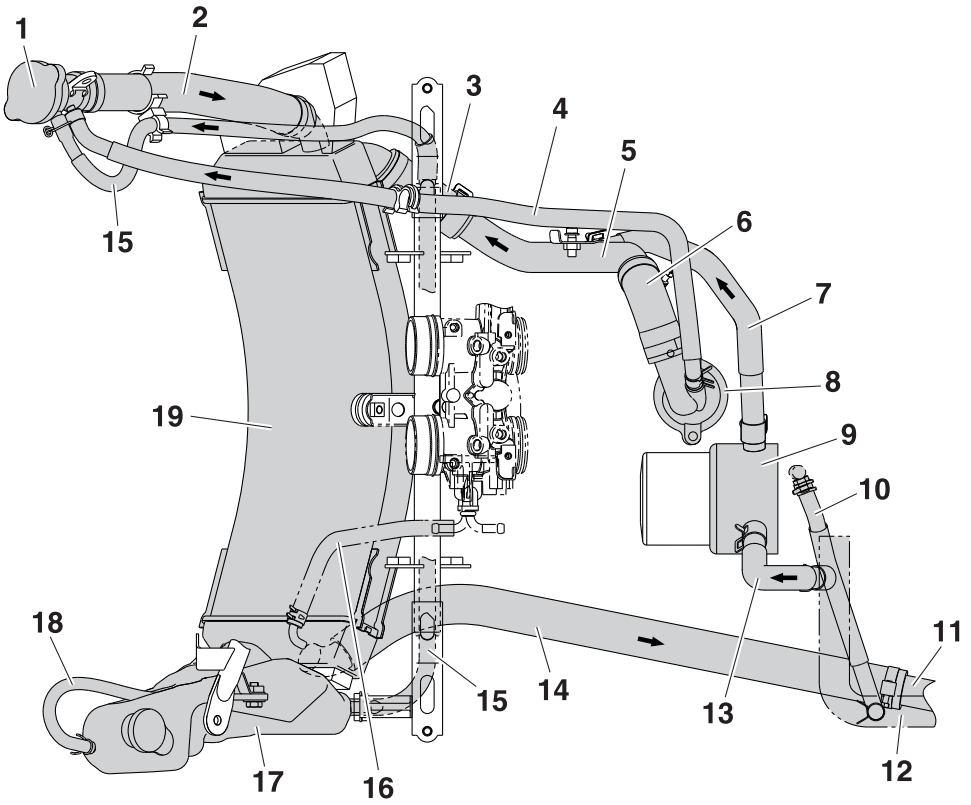

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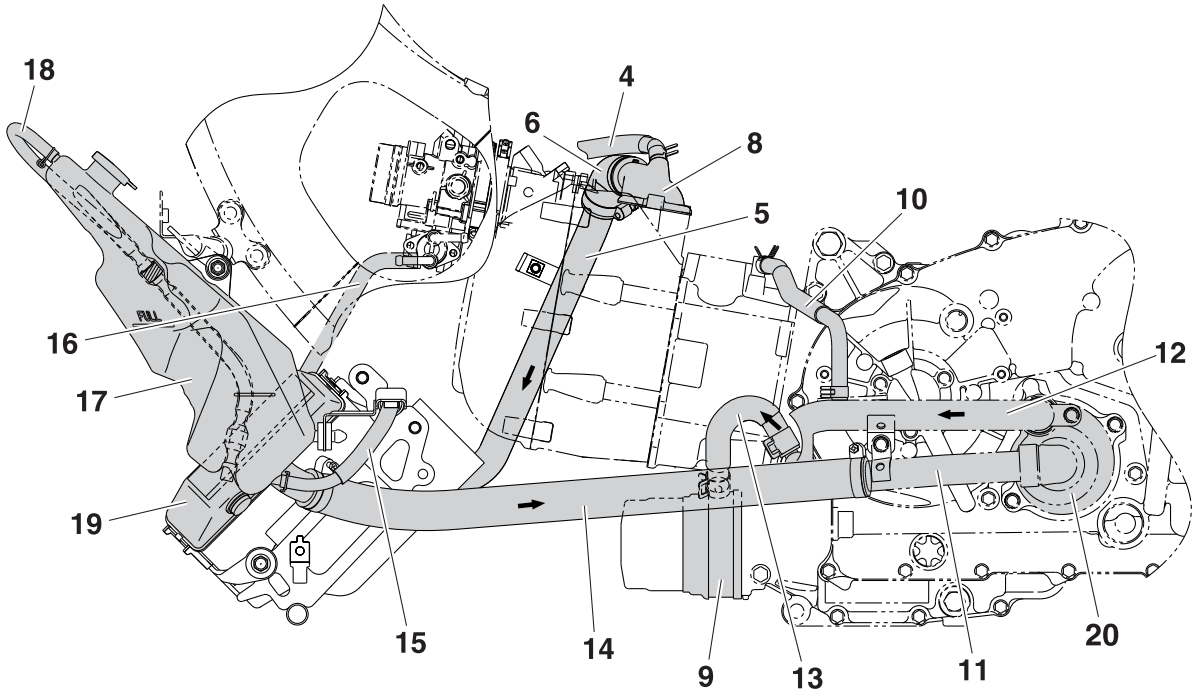

4
A

1. Generator cover
2. Oil strainer
3. Main gallery
4. Right crankcase

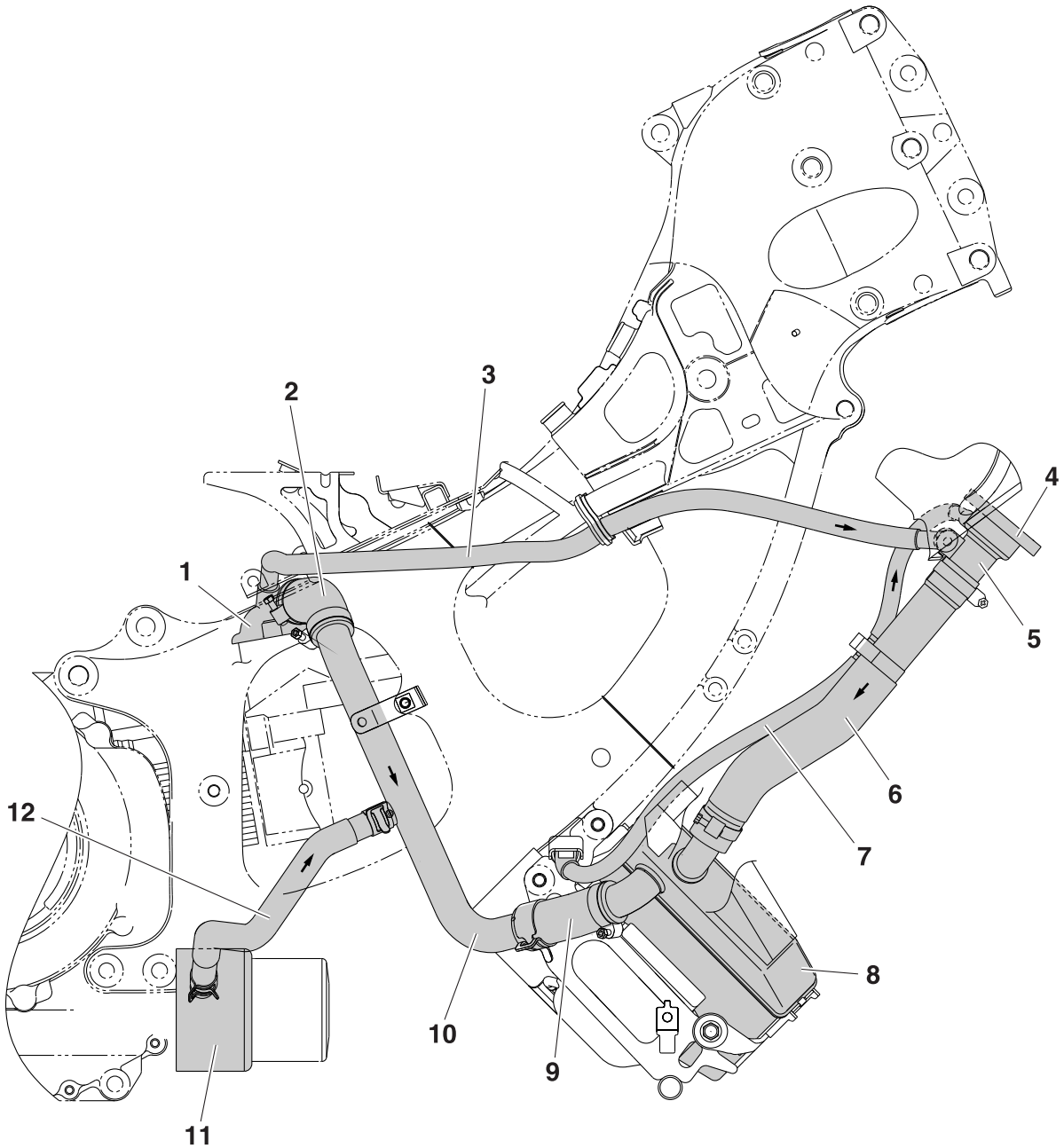
A. Forward

EAS20420
COOLING SYSTEM DIAGRAMS



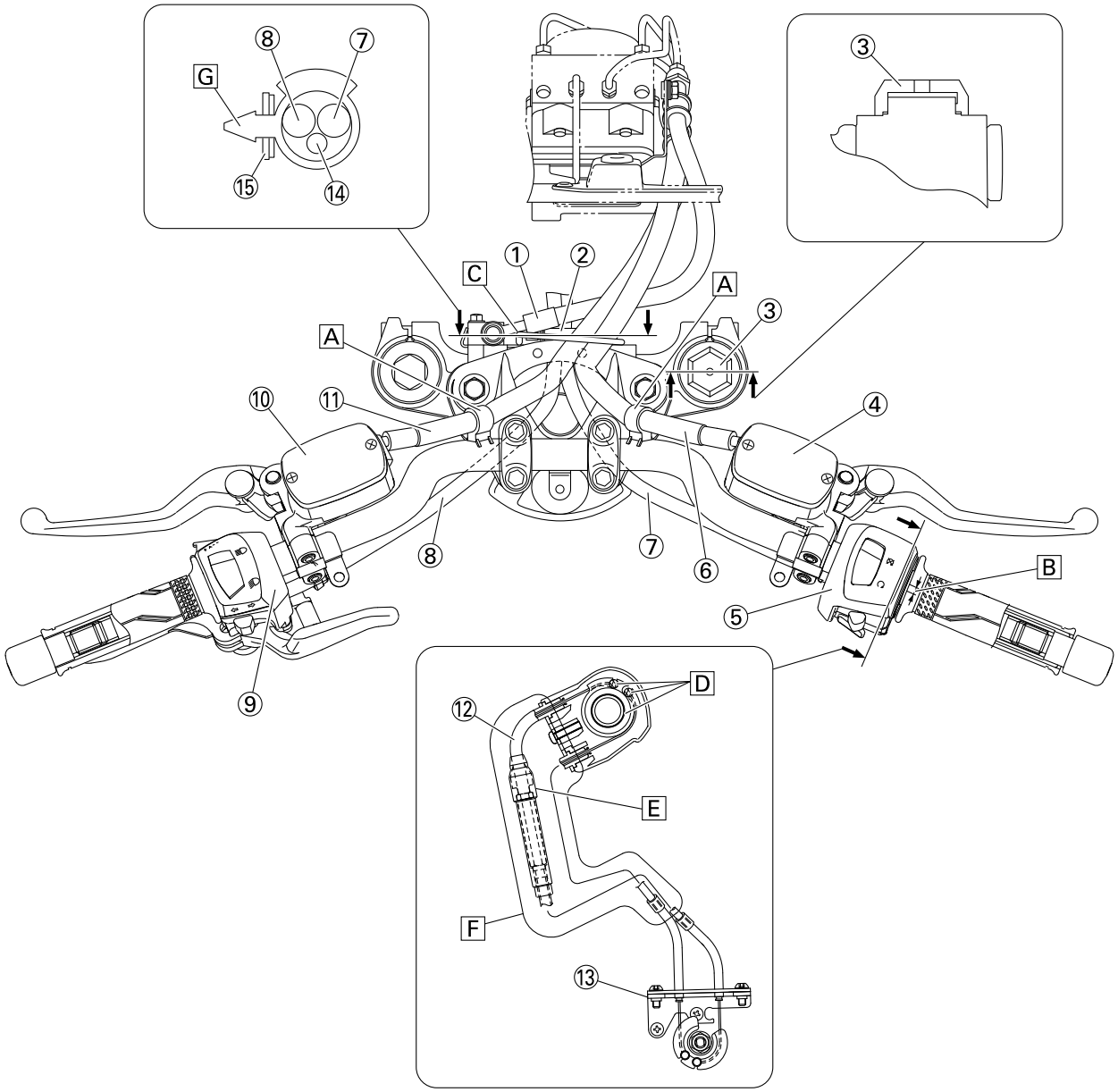


1. Radiator cap
2. Radiator filler hose
3. Radiator inlet hose
4. Cooling system air bleed hose
5. Coolant pipe
6. Thermostat outlet hose
7. Oil cooler outlet hose
8. Thermostat
9. Oil cooler
10. Coolant hose
11. Water pump inlet pipe
12. Water pump outlet pipe
13. Oil cooler inlet hose
14. Radiator outlet hose
15. Coolant reservoir hose
16. Fast idle plunger outlet coolant hose
17. Coolant reservoir
18. Coolant reservoir breather hose
19. Radiator
20. Water pump


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12

1. Thermostat
2. Thermostat outlet hose
3. Cooling system air bleed hose
4. Radiator cap
5. Radiator filler pipe
6. Radiator filler hose
7. Coolant reservoir hose
8. Radiator
9. Radiator inlet hose
10. Coolant pipe
11. Oil cooler
12. Oil cooler outlet hose

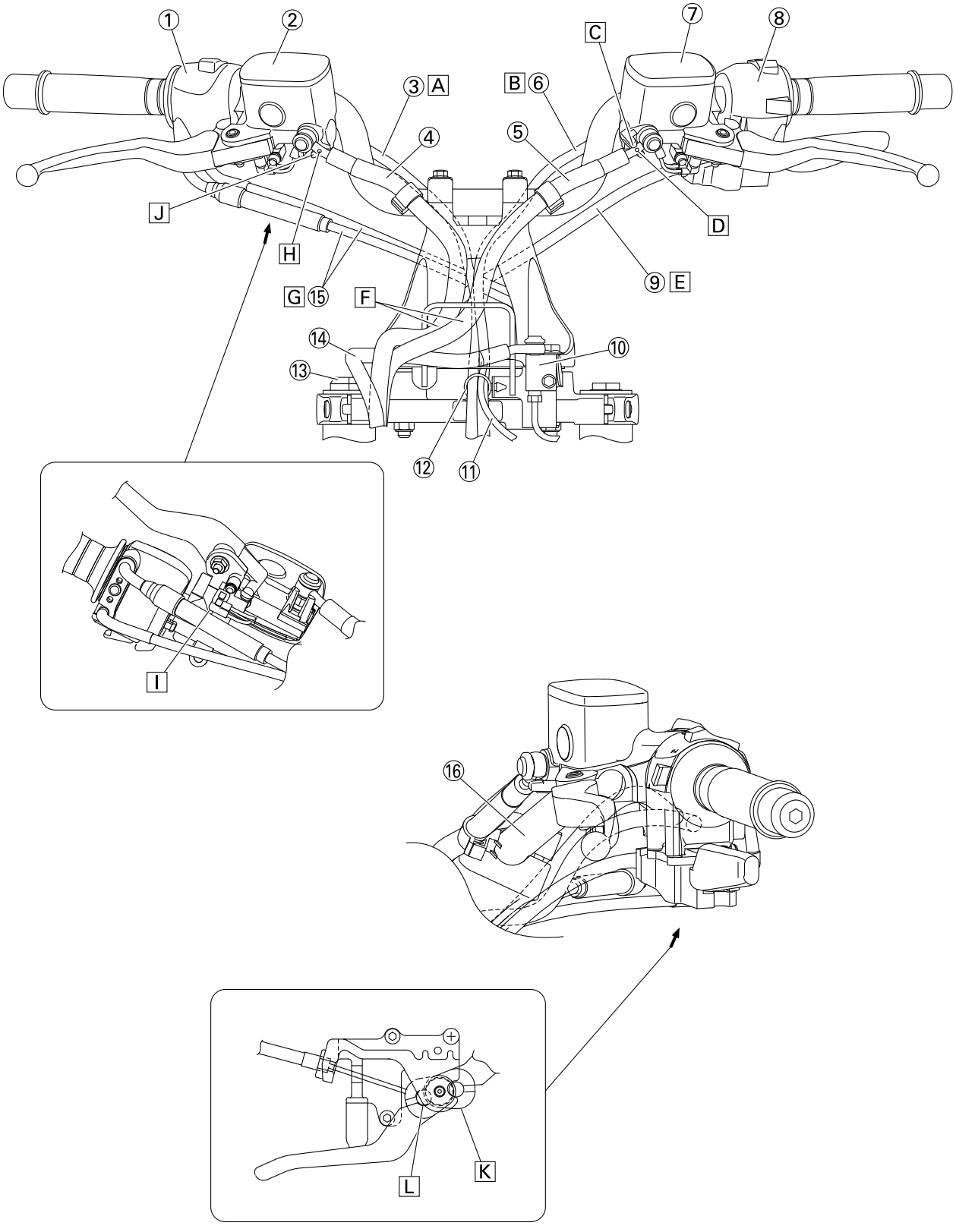
EAS20430
CABLE ROUTING
Handlebar (top side view)



1. Front brake hose (hydraulic unit to front brake hose joint)
2. Lead holder
3. Cap bolt cover
4. Front brake master cylinder
5. Right handlebar switch
6. Front brake hose (front brake master cylinder to hydraulic unit)
7. Right handlebar switch lead
8. Left handlebar switch lead
9. Left handlebar switch
10. Rear brake master cylinder
11. Rear brake hose (rear brake master cylinder to hydraulic unit)
12. Throttle cable
13. Throttle body
14. Horn lead
15. Brake hose bracket

A. Route the brake hose so that the opening faces outside of the vehicle.
B. Adjust the free play of the accelerator grip so that the free play is 3 to 5 mm (0.12 to 0.20 in) when measured at the outer circumference of the rim.
C. Tighten the union bolt, pushing the brake pipe against the guide wire.
D. Apply grease to the cable end and tube guide when installing the throttle cable. Apply a pea-sized amount (approx. 0.2 g (0.007 oz)) of grease to the cable end.
E. Adjust the free play of the throttle grip. After tightening the nuts, make sure to cover with rubber cover.
F. When installing the throttle cable to the vehicle, route the cables on the pull side and return side carefully, so that the cables do not get twisted or return by itself.
G. Face the opening of the lead holder to the bottom of the vehicle.

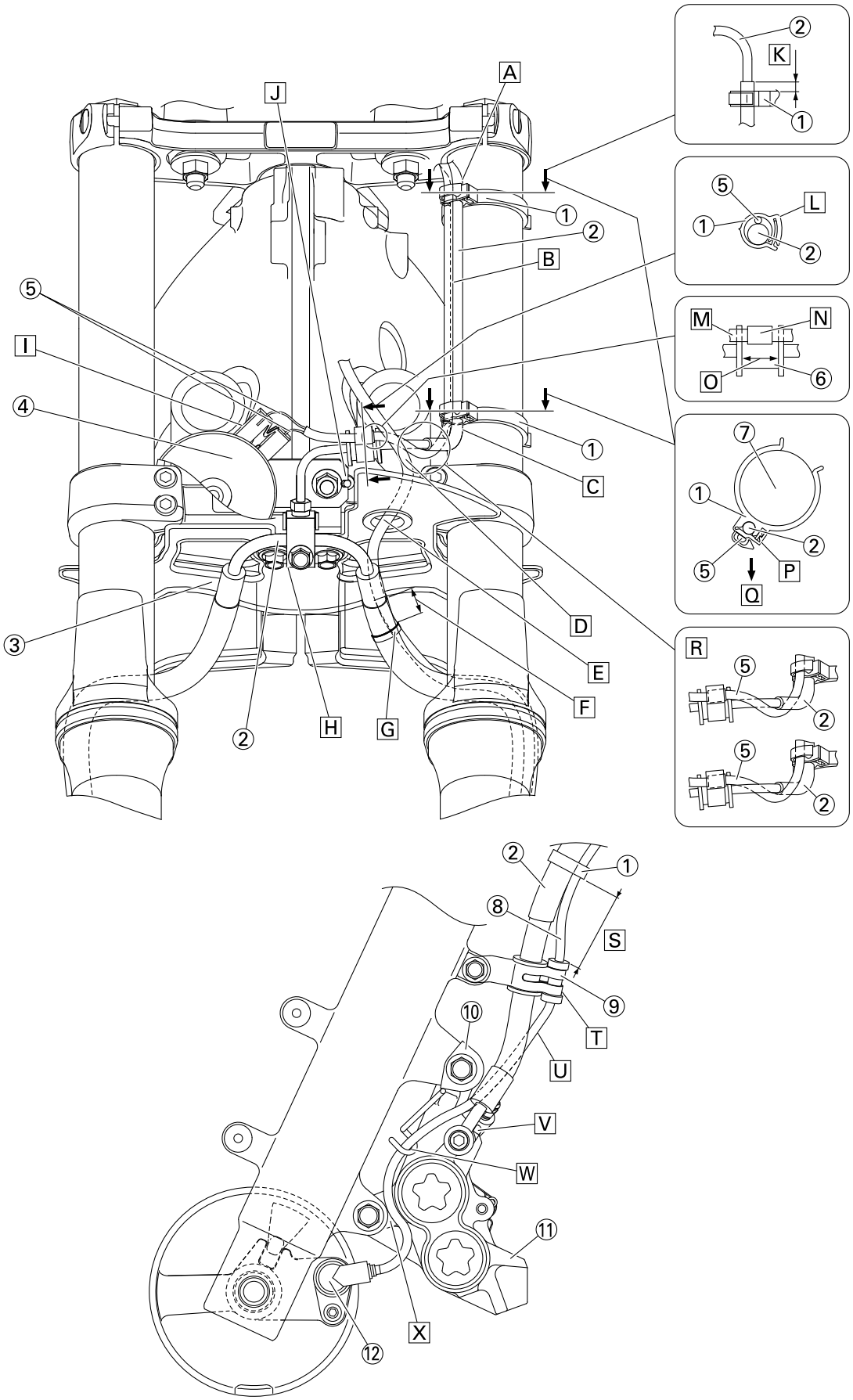
Handlebar (front side and left side view)



1. Right handlebar switch
2. Front brake master cylinder
3. Right handlebar switch lead
4. Front brake hose (front brake master cylinder to hydraulic unit)
5. Rear brake hose (rear brake master cylinder to hydraulic unit)
6. Left handlebar switch lead
7. Rear brake master cylinder
8. Left handlebar switch
9. Rear brake lock cable
10. Front brake pipe/joint assembly
11. Horn lead
12. Lead holder
13. Cap bolt cover
14. Front brake hose (hydraulic unit to front brake hose joint)
15. Throttle cables
16. Handlebar

A. Route the right handlebar switch lead in front of the throttle cables and through the upper bracket forward.
B. Route the left handlebar switch lead in front of the rear brake lock cable and through the upper bracket forward.
C. Pass the brake pipe between the projections.
D. Install the rear brake hose so that the yellow paint mark on the pipe faces to the front of the vehicle.
E. Route the rear brake lock cable behind the handlebar switch leads and throttle cables.
F. Pass the brake hoses through the guide wire.
G. Route the throttle cables behind the handlebar switch leads and front of the rear brake lock cable.
H. Install the front brake hose so that the white paint mark on the pipe faces to the front of the vehicle.
I. Connect the wire harness of the front and rear brake switch connectors from inside the vehicle.
J. Install the brake pipe against the projection.
K. Install the rear brake lock cable after rotating the rear brake lock lever to the position shown in the illustration.
L. Apply YAMAHA GREASE “F” to the end of the rear brake lock cable and install it.

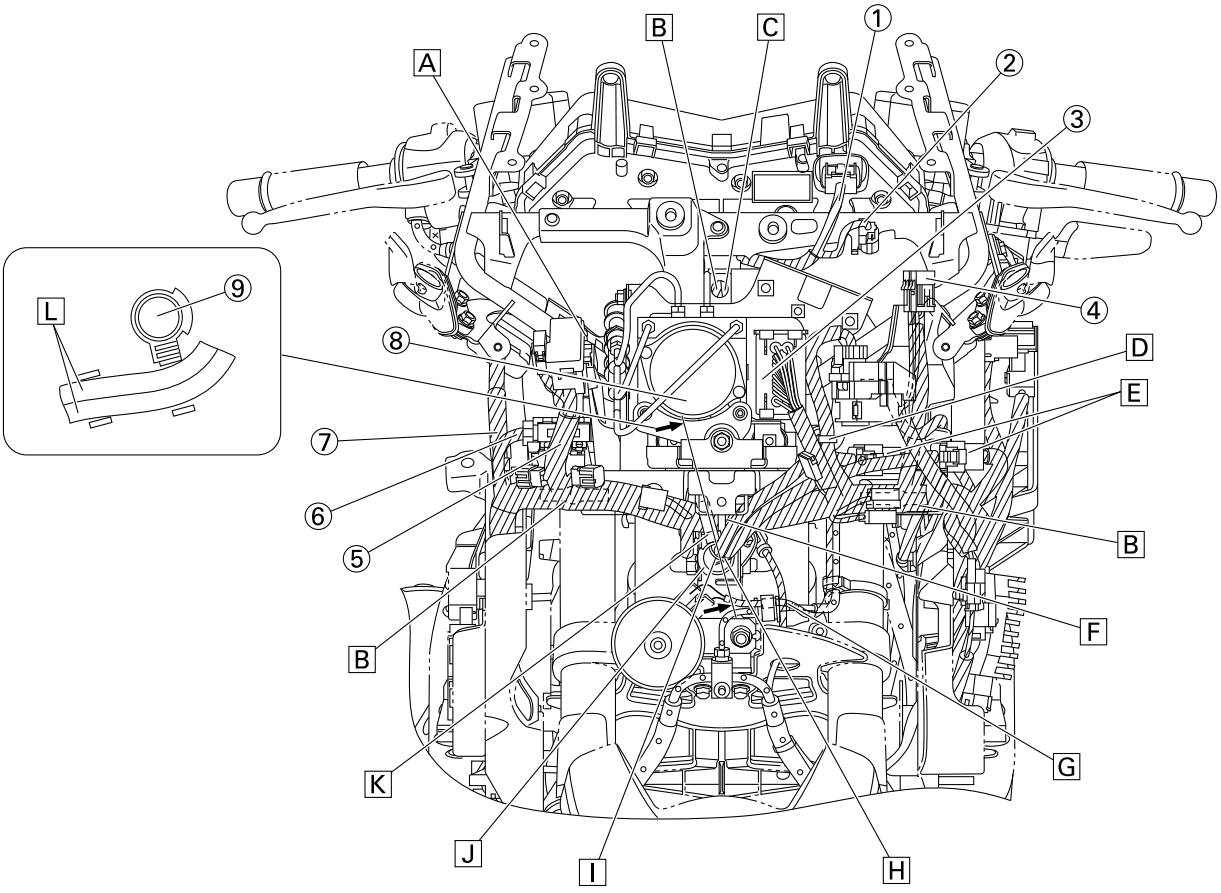
Front brake (front side and left side view)

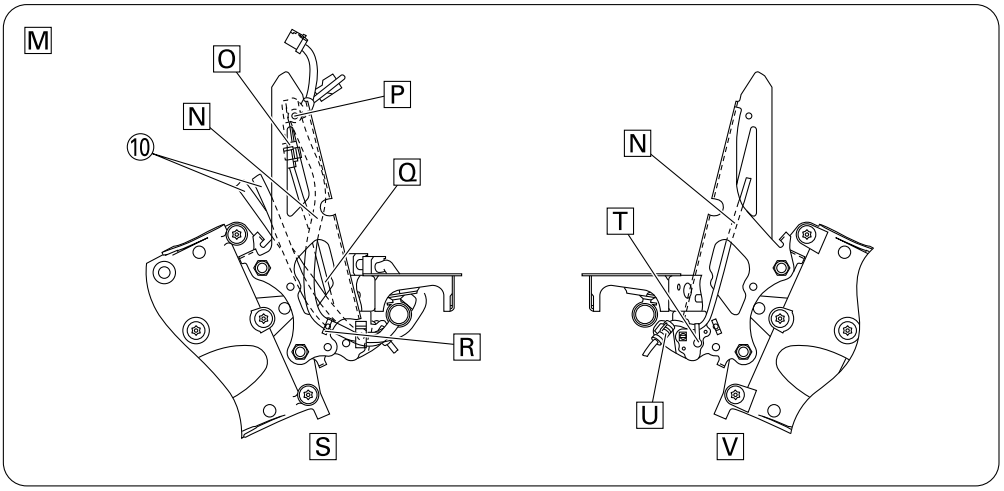


1. Holder
2. Brake hose
3. Lower bracket cover
4. Horn
5. Horn lead
6. Grommet
7. Front fork
8. Front wheel sensor lead
9. Front brake hose holder
10. Cable guide
11. Front brake caliper
12. Front wheel sensor

A. Fasten at a position 0 to 5 mm (0 to 0.20 in) from the protector end of the brake hose.
B. Route the horn lead along the brake hose. Make sure that there is no slack in the lead.
C. Fasten at a position 0 to 5 mm (0 to 0.20 in) from the bending part of the brake hose.
D. Route the front wheel sensor lead in front of the brake hose and horn lead.
E. Pass the front wheel sensor lead through the hole in the lower bracket cover.
F. 10–20 mm (0.39–0.79 in)
G. Fasten the front wheel sensor lead at the end of the plastic tape.
H. Insert the brake hose joint into the stopper claw of the horn bracket.
I. Insert the horn lead coupler. Install the black lead to the bracket side (bottom).
J. Install the horn bracket, aligning the projection of the horn bracket with the groove of the horn.
K. 0–5 mm (0–0.20 in)
L. Face the holder opening to the rear of the vehicle.
M. Bring the both ends of the white tape on the horn lead into position between brake hose grommet flanges.
N. White tape
O. Between brake hose grommet flanges
P. Face the holder opening to the front of the vehicle.
Q. Front of the vehicle
R. Route the horn lead between the holders under the brake hose. Both routes shown in the illustration are acceptable.
S. 70–80 mm (2.76–3.15 in)
T. Only the left side, fasten the grommet part of the front wheel sensor.
U. Route the front wheel sensor lead inside of the brake hose.
V. Tighten the union bolts, pushing the brake pipe against the projection of the brake caliper.
W. Pass the front wheel sensor lead through the cable guide.
X. Route the front wheel sensor lead between the front brake caliper and the outer tube.

Frame (front side view)

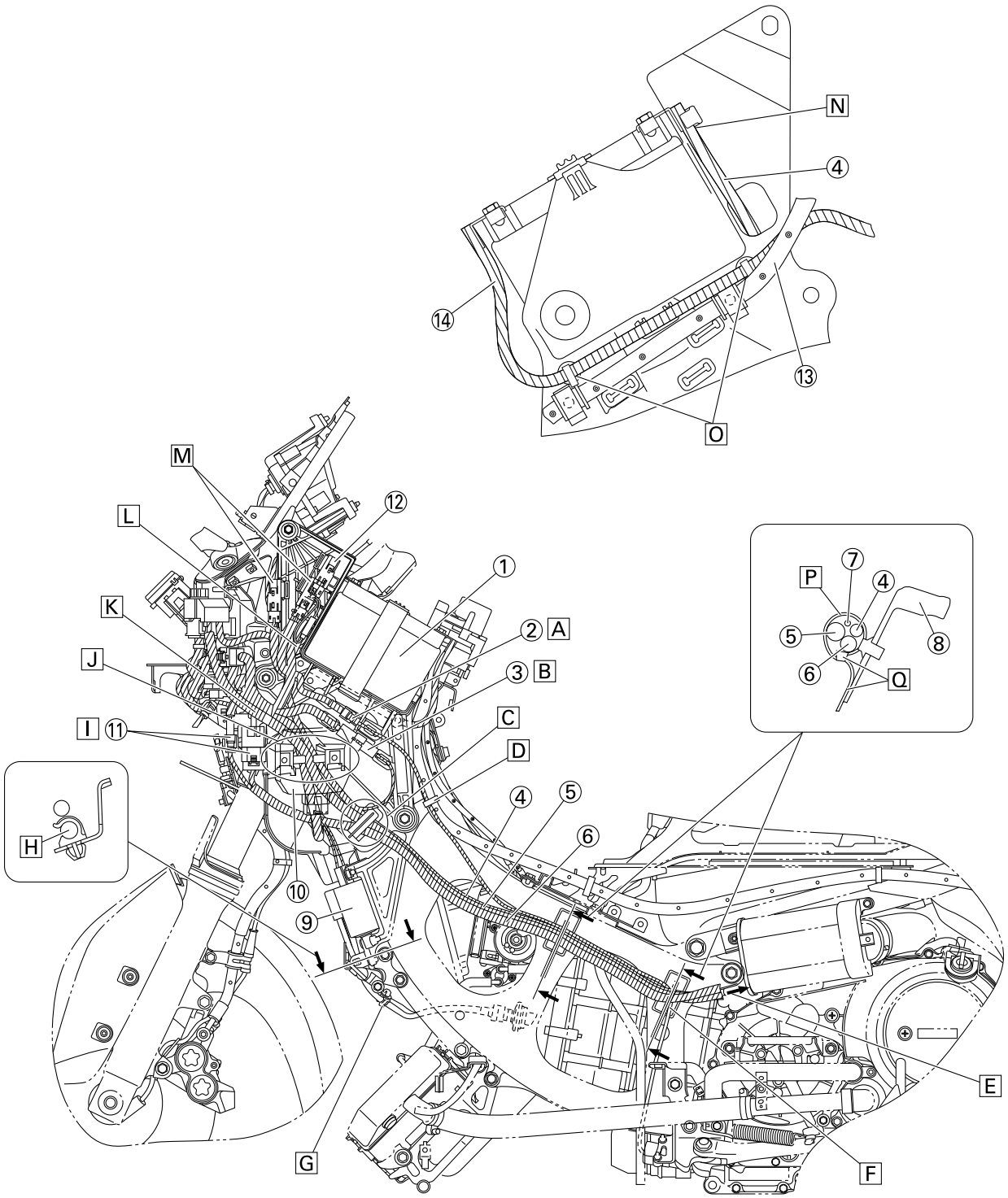




1. Meter lead
2. Ambient temperature sensor lead
3. ABS ECU coupler
4. Fuse box (left)
5. Fuse box lead
6. Lean angle sensor lead
7. ECU (engine control unit) lead
8. Hydraulic unit assembly
9. Wire harness
10. Handlebar switch lead

A. Install the fuse box (right) securely to the plastic stay.
B. Insert the wire harness holder into stay 1.
C. Connect the front wheel sensor lead to the connector attached to the wire harness.
D. Fasten the starter relay lead to the plastic stay. Route and insert the handlebar switch lead inside the vehicle.
E. Fasten the right and left handlebar switch couplers to the plastic stay.
F. Insert the wire harness holder (with white tape) into stay 1.
G. Route the horn lead and front wheel sensor lead as shown in the illustration.
H. Fasten the right and left handlebar switch leads and insert them into stay 1. The ratchet may be faced to any direction.
I. Route the right and left handlebar switch leads between stay 1.
J. Pass the handlebar switch leads through the holder. The opening can be oriented in any direction.
K. Install the holder between the wire harness holder and meter lead. The opening can be oriented in any direction.
L. The left and right handlebar switch leads can be positioned in either way.
M. Detailed illustration of the steering head pipe front side routing
N. Inside of stay 1.
O. Connect to the coupler fastened to the wire harness.
P. Insert the wire harness holder into stay 1 from the inside of the vehicle.
Q. Route the front wheel sensor lead further to the left of the vehicle than the right and left handlebar switch leads.
R. Insert the wire harness holder into stay 1.
S. Right side
T. Insert the front wheel sensor lead holder into stay 1.
U. Insert the front wheel sensor lead holder into stay 1. Face the opening to the top of the vehicle.
V. Left side

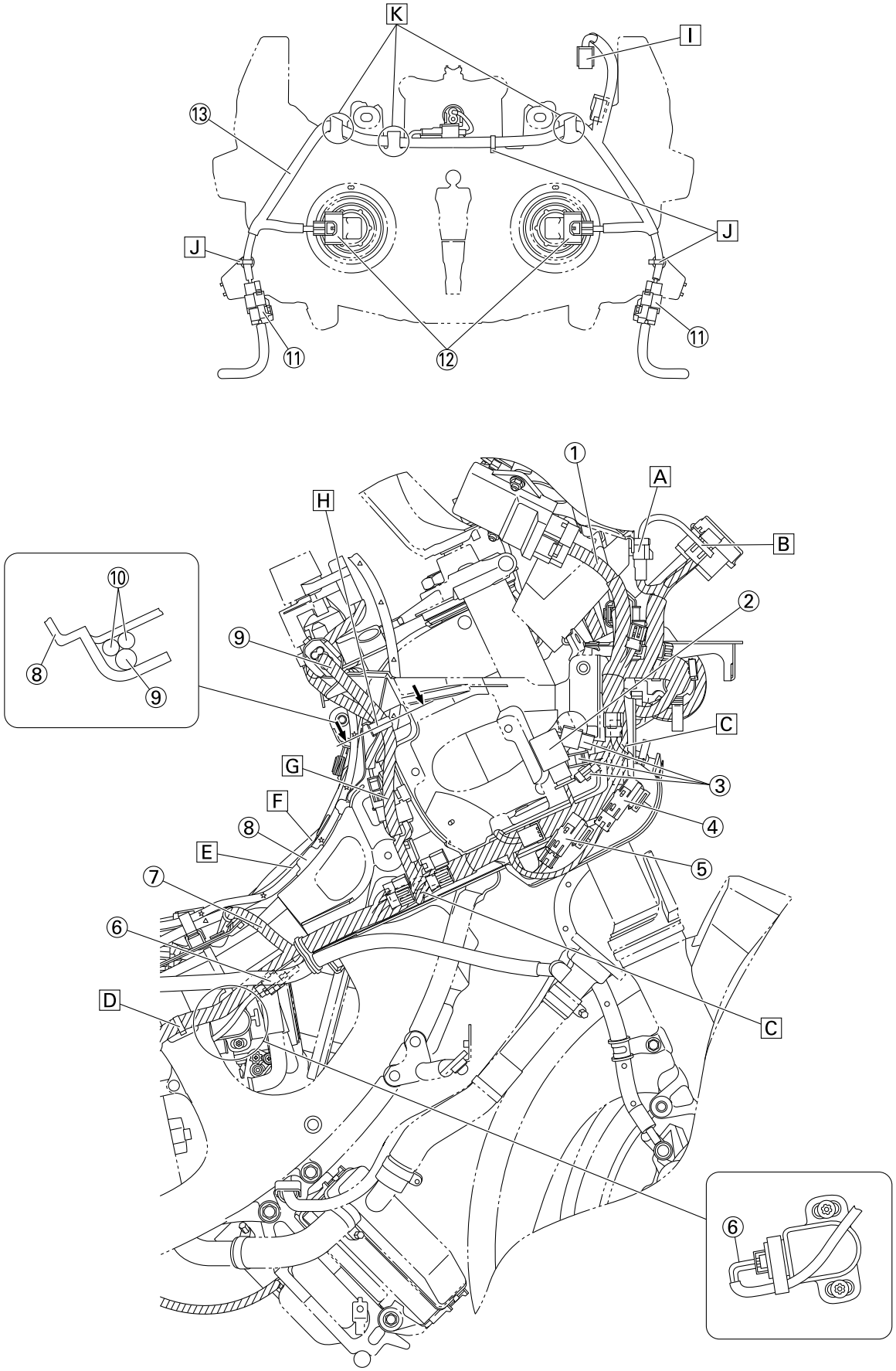
Frame (left side view)



1. Battery
2. Sidestand switch coupler
3. Battery negative lead coupler
4. Battery negative lead
5. Starter motor lead
6. AC magneto lead
7. Sidestand switch lead
8. Frame
9. Ignition coil
10. Rectifier/regulator
11. AC magneto coupler
12. Fuel injection system relay
13. Rear brake hose
14. Battery positive lead

A. Insert the lead of the sidestand switch coupler into the battery box rib.
B. Insert the leads of the battery negative lead coupler into the battery box rib.
C. Pass the AC magneto lead, starter motor lead, and battery negative lead through the plastic guide. The leads may be placed anywhere in the guide.
D. Fasten the sidestand switch lead and rear brake hose to the brake hose holder.
E. To the starter motor and AC magneto
F. Fasten with the sidestand switch lead positioning tape.
G. Fasten the spark plug leads with the holder.
H. Fasten spark plug #1 lead to the holder. Face the opening to the bottom of the vehicle.
I. Install the AC magneto coupler to the battery box.
J. With the rectifier/regulator disconnected, install the battery negative lead, starter motor lead, and wire harness. Insert them into the battery box rib. The harness may be placed anywhere in the rib.
K. Route the starter motor lead outside the AC magneto lead.
L. Pass the battery negative lead through the hole of the battery box.
M. Starting circuit cut-off relay 1 and 2 can be installed to the both holders.
N. Pass the battery negative lead through the battery box rib.
O. Insert the plastic band of the battery positive lead so that the cutting end of the band faces to the bottom of the vehicle.
P. Fasten the leads to the wire harness holder. This wire harness holder is secured at two points. The order of leads does not need to be controlled.
Q. Face the wire harness holder block to the bottom of the vehicle. Face the end of the holder downward along the frame.

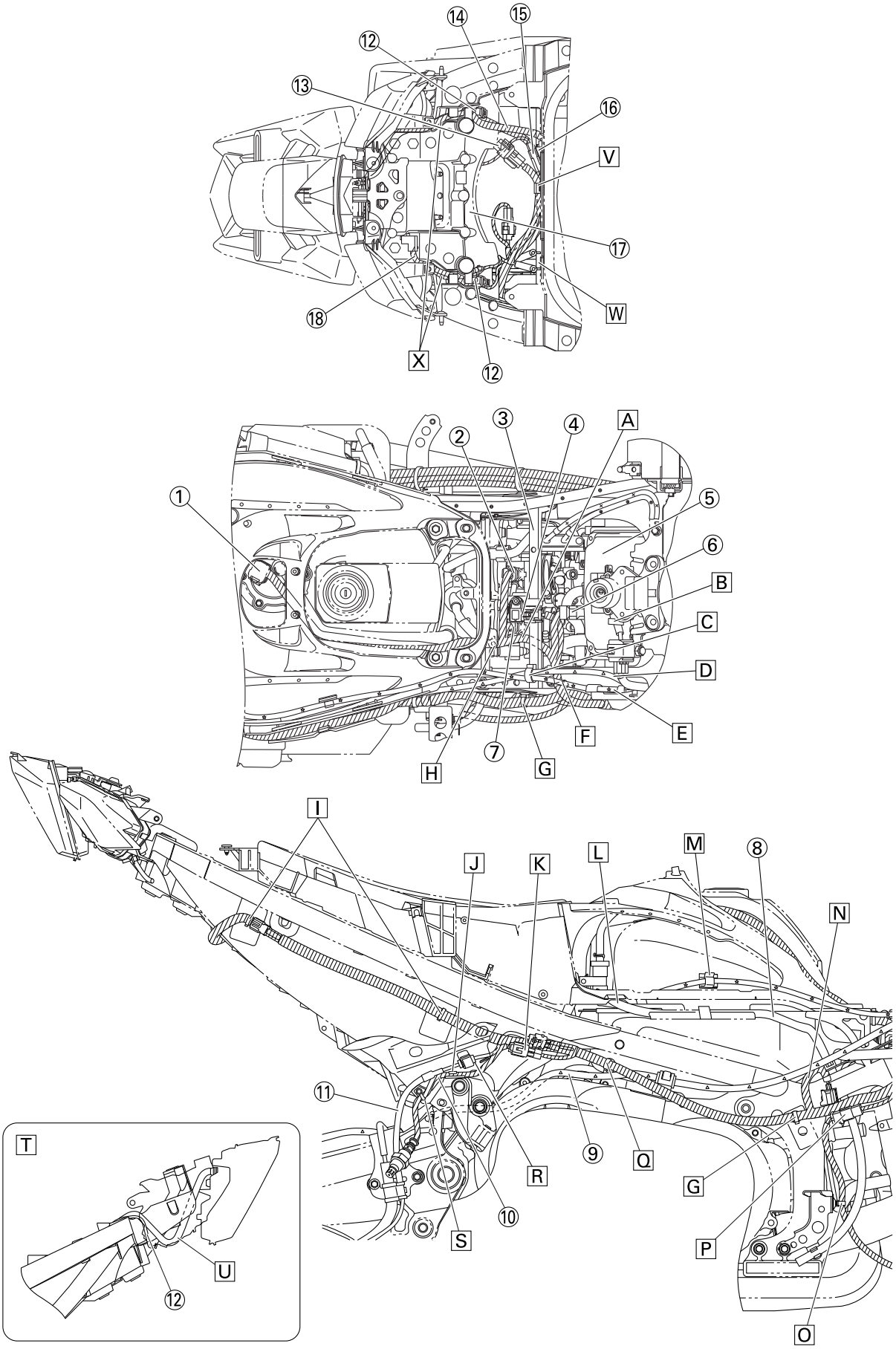
Frame (right side view)



1. ECU (engine control unit) lead
2. Turn signal/hazard relay
3. Couplers
4. Headlight relay
5. Radiator fan motor relay
6. Throttle position sensor sub-wire harness
7. Fuel pump lead
8. Bracket 1
9. Immobilizer lead
10. Main switch leads
11. Turn signal light lead coupler
12. Headlight coupler
13. Headlight sub-wire harness

A. Insert the headlight sub-wire harness coupler into the plastic stay.
B. Route the headlight sub-wire harness further outside of the vehicle than the fuse box.
C. Insert the wire harness holder into bracket 1.
D. Insert the wire harness holder into the frame.
E. Install the seat lock cable to bracket 1.
F. Route the rear brake lock cable further inside of the vehicle than bracket 1.
G. Route the immobilizer lead over the main switch coupler.
H. Pass the wire harness side of the immobilizer lead, and the main switch side of the main switch leads through the rib of bracket 1.
I. After installing the headlight, connect to the wire harness side.
J. Insert the wire harness holder into the headlight body.
K. Pass securely through the headlight body rib. (3 points)

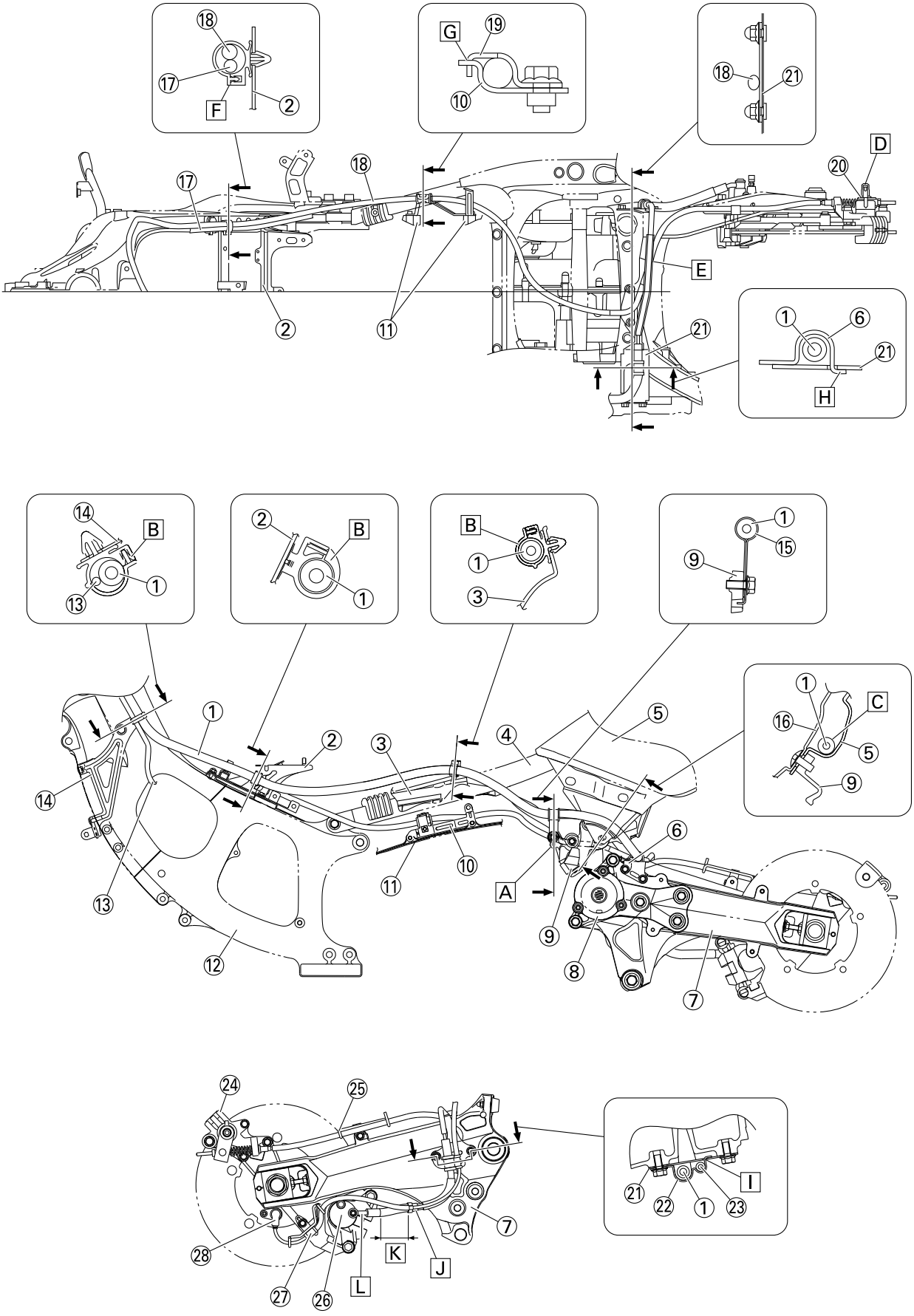
Rear frame (top side and right side view)



1. Fuel pump coupler
2. Fuel injector #1
3. Fuel tank fitting bracket
4. Intake air pressure sensor
5. Air filter case
6. Intake air temperature sensor
7. Fuel injector #2
8. Fuel tank breather hose
9. Rear brake lock cable
10. O_2 sensor lead
11. Rear wheel sensor lead
12. Rear turn signal light lead
13. ABS test coupler
14. Tail/brake light lead
15. License plate light lead coupler
16. Tail/brake light lead coupler
17. Taillight lead cover
18. Storage box light switch lead

A. Route the wire harness under the fuel tank fitting bracket and then through the hole of the storage box.
B. Fasten the main switch lead and immobilizer lead. The cable holder may be fastened to any direction.
C. Insert the cable holder into the fuel tank fitting bracket. Fasten the seat lock cable and rear brake lock cable.
D. Route the rear brake lock cable between bracket 10 and the frame.
E. Install the seat lock cable to bracket 10.
F. Insert the wire harness holder into the fuel tank fitting bracket. Route the wire harness under the seat lock cable and rear brake lock cable.
G. Insert the wire harness holder into the frame.
H. Insert the wire harness holder into the bottom side of the fuel tank fitting bracket.
I. Insert the wire harness holder into the rear frame. (2 points)
J. Fit it to the rib part of the side cover.
K. Secure the O_2 sensor coupler to the wire harness.
L. Route the fuel tank breather hose between the storage box and fuel tank.
M. Fasten the seat lock cable to the cable holder attached to the fuel tank.
N. Route the coolant temperature sensor lead under the rear brake lock cable.
O. Fasten the radiator fan motor lead to the plastic band. Face the end of the band to the outside of the vehicle.
P. Secure the wire sub-lead coupler to the wire harness.
Q. Insert the wire harness holder into the bracket.
R. When inserting the rear wheel sensor lead into the holder, soapy water or silicone fluid may be applied.
S. Install it so that the lead passes under the insert part of the side cover cavity.
T. Tail light routing diagram
U. Routing of the tail light lead.
V. Fasten the ABS test coupler lead to the holder which is applied to the storage box.
W. Insert it all the way into the storage box light.
X. Pass the leads through the rib part of the taillight lead cover. Route the turn signal light lead and storage box light switch lead to the right of the vehicle. Route the turn signal light lead and tail light lead to the left of the vehicle. Route the leads further inside of the vehicle than the turn signal light installation part.

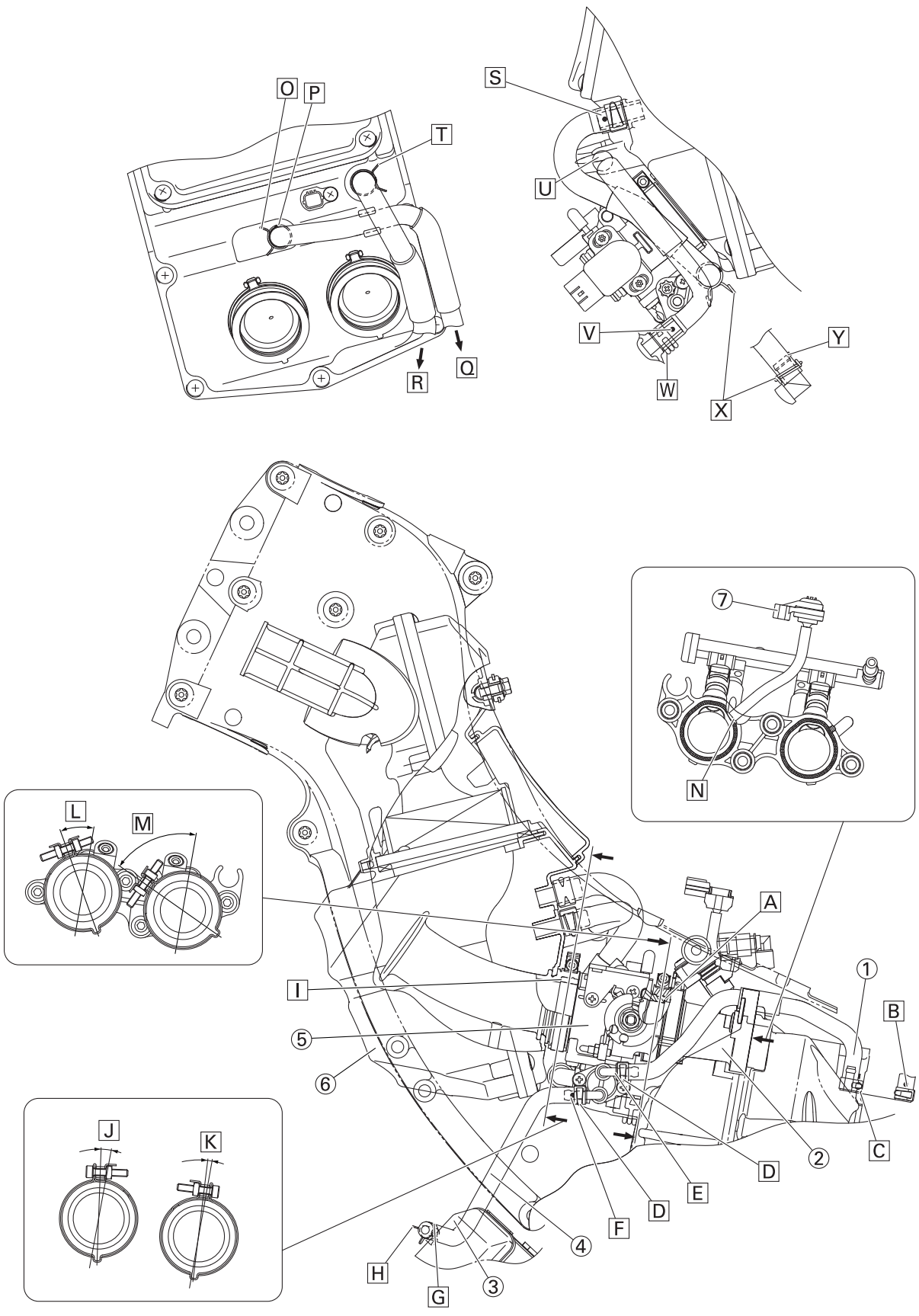
Rear brake (top side and left side view)



1. Rear brake hose
2. Fuel tank fitting bracket
3. Footboard
4. Rear frame
5. Left rear cowling
6. Rear brake hose holder (left)
7. Swingarm
8. Drive pulley cover
9. Passenger footrest
10. Rear brake lock cable holder bracket
11. Crankcase
12. Frame
13. Sidestand switch lead
14. Stay
15. Brake hose holder
16. Side cover (left)
17. Seat lock cable
18. Rear brake lock cable
19. Rear brake lock cable holder (crankcase)
20. Rear brake lock adjusting nut
21. Rear brake hose bracket
22. Rear brake hose holder (right)
23. Rear wheel sensor lead
24. Rear brake lock caliper
25. Rear brake lock cable holder (swingarm)
26. Rear brake caliper
27. Rear wheel sensor holder
28. Rear wheel sensor

A. Install the brake hose holder, aligning the stopper of the brake hose holder with the hole of the passenger footrest. To prevent kinks, install the rear brake hose holder (left) first and then brake hose holder.
B. Face the opening of the brake hose holder upward.
C. Route the brake hose along the concave face of the left rear cowling.
D. Install the cap, pushing it against the nut and washer.
E. Route the rear brake lock cable under the brake hose.
F. Face the opening of the cable holder to the inside of the vehicle.
G. Install the rear brake lock cable holder (crankcase), inserting the projection of the cable guide into the hole of the rear brake lock cable holder bracket.
H. Install the rear brake hose holder (left), inserting the projection of the rear brake hose holder (left) into the hole of the rear brake hose bracket.
I. Install the rear brake hose holder (right), inserting the projection of the rear brake hose holder (right) into the hole of the rear brake hose bracket.
J. Install the holder, pushing it against the rear wheel sensor protector end.
K. 60–70 mm (2.36–2.76 in)
L. Tighten the union bolt, pushing the brake pipe against the projection of the brake caliper.

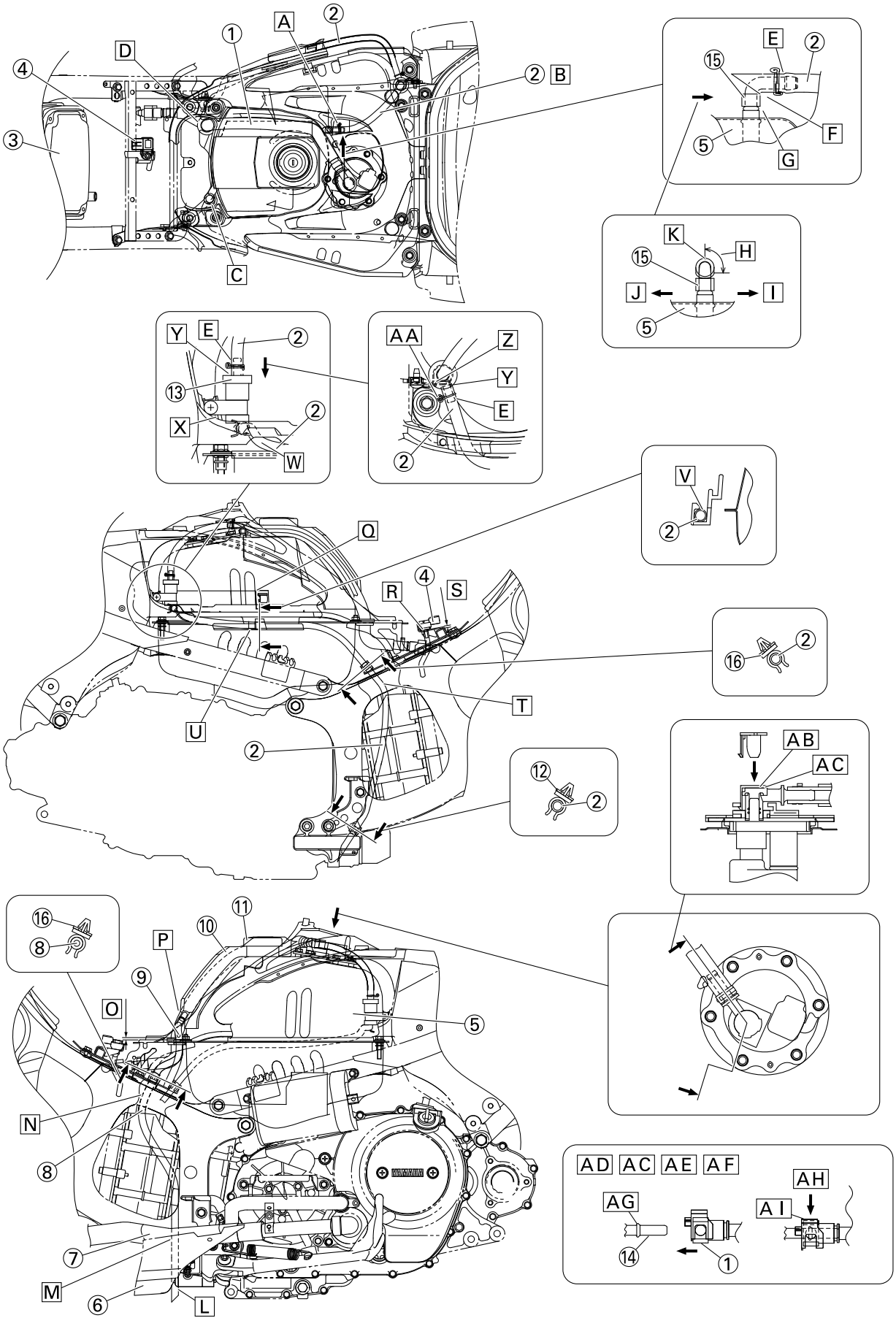
Throttle body (left side view)



1. Fast idle plunger inlet coolant hose
2. Intake manifold
3. Radiator
4. Fast idle plunger outlet coolant hose
5. Throttle body assembly
6. Air filter case
7. Intake air pressure sensor

A. Insert the throttle body into the intake manifold until it does not move any further. Engine oil may be applied.
B. Insert the coolant hose until it does not move any further. Face the pink paint mark to the rear of the vehicle.
C. Position the clip at least 1 mm (0.04 in) away from the end of the hose, making sure that it does not run on the spool. Face the clip to the rear of the vehicle.
D. Position the clip at least 1 mm (0.04 in) away from the end of the hose, making sure that it does not run on the spool. Face the clip to the left of the vehicle.
E. Insert the fast idle plunger inlet coolant hose until the bending part of the pipe.
F. Insert the fast idle plunger outlet coolant hose until the bending part of the pipe. Face the white paint mark to the left of the vehicle.
G. Insert the fast idle plunger outlet coolant hose until the bending part of the pipe. Face the yellow paint mark to the top the vehicle.
H. Position the clip at least 1 mm (0.04 in) away from the end of the hose, making sure that it does not run on the spool. Turn the clip, so that it does not interfere with the spark plug leads and radiator (should be turned downwards slightly to the front).
I. Insert the air filter case until it touches the throttle body. Engine oil may be applied.
J. 8°
K. 3°
L. 30°
M. 65°
N. Insert the intake air pressure sensor hose until it does not move any further.
O. Position the clip 1 to 4 mm (0.04 to 0.16 in) away from the end of the cylinder head breather hose. Face the clip to the left of the vehicle.
P. Insert the cylinder head breather hose until it does not move any further. Face the white paint mark to the top of the vehicle.
Q. To the cylinder head cover
R. To the throttle body assembly
S. Insert the fast idle plunger intake hose until it does not move any further. Face the blue paint mark to the right of the vehicle.
T. Position the clip 1 to 4 mm (0.04 to 0.16 in) away from the end of the fast idle plunger intake hose. Face the clip to the right of the vehicle.
U. Fasten the cylinder head breather hose to the air filter case.
V. Insert the cylinder head breather hose until it does not move any further. Face the yellow paint mark to the right of the vehicle.
W. Position the clip 1 to 4 mm (0.04 to 0.16 in) away from the end of the cylinder head breather hose. The clip may be rotated to any direction.
X. Position the clip at least 1 mm (0.04 in) away from the end of the hose, making sure that it does not run on the spool. Face the clip to the bottom of the vehicle.
Y. Insert the fast idle plunger intake hose until it does not move any further. Face the yellow paint mark to the front of the vehicle.

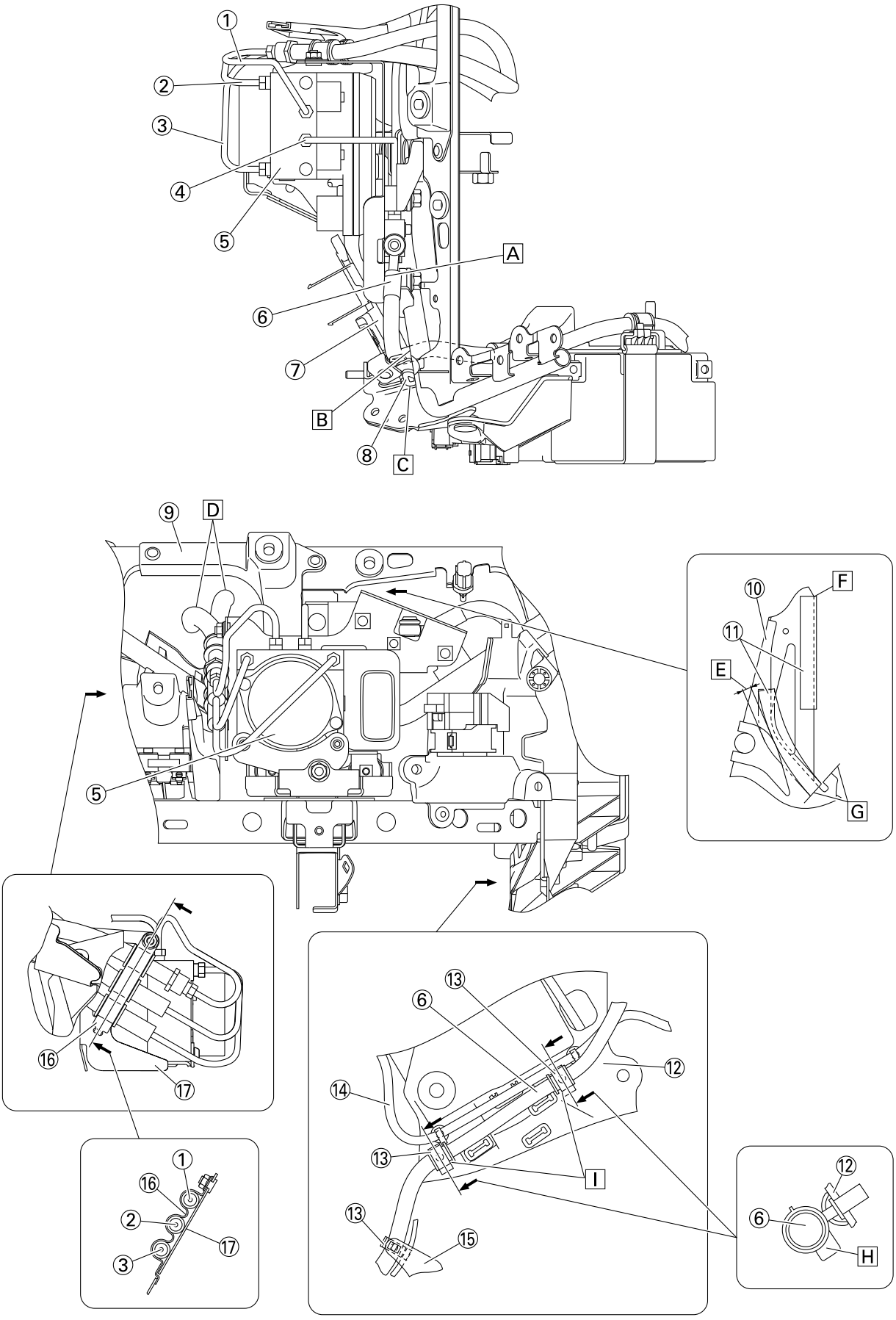
Fuel tank (top side, left side and right side view)



1. Fuel hose
2. Fuel tank breather hose
3. Air filter case
4. Intake air pressure sensor
5. Fuel tank
6. Bottom center cowling
7. Radiator outlet hose
8. Fuel tank overflow hose
9. White paint mark
10. Filler cover
11. Fuel tank cap
12. Bracket 2
13. Rollover valve
14. Fuel rail
15. Fuel tank protector
16. Fuel tank fitting bracket

A. Face the clip knob to any direction but to the top of the vehicle.
B. When inserting the fuel tank breather hose into the fuel tank, 2-stroke engine oil may be applied.
C. Push the grommet securely into the fuel tank. When inserting the fuel tank breather hose into the grommet, soapy water or silicone fluid may be applied.
D. Push the grommet securely into the fuel tank. Soapy water or silicone fluid may be applied.
E. Make sure that the clip does run on the spool.
F. Insert the fuel tank breather hose until it touches the end of the fuel tank protector.
G. Insert the fuel tank protector until the separator spool of the fuel tank.
H. Insert the end of the fuel tank breather hose according to the area shown in the illustration.
I. Inside of the vehicle
J. Outside of the vehicle
K. End of the fuel tank breather hose
L. Route the end of the fuel tank overflow hose so that it comes out under the bottom center cowling.
M. Route the fuel tank overflow hose between the radiator outlet hose and frame.
N. Route the fuel tank overflow hose inside of the frame.
O. 7 to 10 mm (0.28 to 0.39 in) (From the lower end of the paint mark to the upper end of grommet)
P. Install the fuel tank overflow hose and filler cover, pressing them against the connector boss.
Q. Apply the holder, aligning it with the upper end of the damper. Face the holder opening upward or downwards. Make sure that the end of the holder does not run on the bending part of the tank.
R. Insert the intake pressure sensor hose until it touches the pipe of the intake air pressure sensor.
S. 0 to 3 mm (0 to 0.12 in)
T. Route the fuel tank breather hose inside of the frame.
U. Install the fuel tank breather hose, holding the positioning protector behind the holder.
V. Push the fuel tank breather hose into the storage box hook.
W. Route the fuel tank breather hose to the concave of the storage box.
X. Install the rollover valve stay, pushing it against the projection of the storage box.
Y. Push the fuel tank breather hose against the rollover valve.
Z. Face the clip knob to the outside of the vehicle.
AA. Face the clip knob to the rear of the vehicle.
AB. After installing the fuel hose, check that the claw is inserted firmly to the end.
AC. Make sure to remove/install the fuel hose manually without using tools.
AD. Fuel hose connector assembly drawing
AE. Assembly drawing from the fuel rail to the fuel hose
AF. Insert the connector until the click sound is heard and check that the connector does not come off. Make sure that no foreign matter is caught in the sealing section. (It is prohibited to wear the cotton work gloves or equivalent coverings.)
AG. This part works as a dropout stopper.
AH. After “AF” work is finished, slide the fuel hose connector cover attached to the fuel hose connector as shown in the illustration. Make sure that it is attached completely tight.
AI. Fuel hose connector cover

Hydraulic unit (top side and front side view)



1. Front brake hose (hydraulic unit to front brake hose joint)
2. Front brake hose (front brake master cylinder to hydraulic unit)
3. Rear brake hose (rear brake master cylinder to hydraulic unit)
4. Rear brake pipe/joint assembly (hydraulic unit to rear brake hose)
5. Hydraulic unit assembly
6. Rear brake hose (rear brake pipe/joint assembly to rear brake caliper)
7. Battery box 2
8. Grommet
9. Relay stay
10. Stay 1
11. Mold
12. Battery box 1
13. Brake hose holder
14. Battery positive lead
15. Stay
16. Brake hose holder 1
17. Hydraulic unit assembly bracket

A. Tighten the union bolt, pushing the brake pipe against the hydraulic unit assembly bracket.
B. Pass the rear brake hose between the battery box 2 and stay 1.
C. Install the grommet, fitting it into the hole of the stay 1 at the space between the pipe of the stay 1 and the battery box 2.
D. Pass the brake hoses through the hole of the relay stay.
E. Install the end of the mold until the area shown in the illustration.
F. Insert the mold all the way into the stay 1, aligning the end of the mold with the rounded end of the stay 1.
G. Install the mold aligning with the end of the stay 1.
H. Face the opening of the holder to the bottom of the vehicle.
I. Fasten the rear brake hose grommets to the brake hose holders.

PERIODIC CHECKS AND ADJUSTMENTS

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EAS20451
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.

TIP
- **The annual checks must be performed every year, except if a kilometer-based maintenance, or for the UK, a mileage-based maintenance, is performed instead.**
- From 50000 km (30000 mi), repeat the maintenance intervals starting from 10000 km (6000 mi).
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

EAS59C1302
PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
1	*	Fuel line	• Check fuel hoses for cracks or damage.		√	√	√	√	√
2	*	Spark plugs	• Check condition. • Clean and regap.		√		√		
			• Replace.			√		√	
3	*	Valves	• Check valve clearance. • Adjust.	Every 40000 km (24000 mi)					
4	*	Fuel injection	• Adjust engine idling speed and synchronization.	√	√	√	√	√	√

EAS59C1303
GENERAL MAINTENANCE AND LUBRICATION CHART

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
1		**Air filter element**	• Replace.			√		√	
2	*	**V-belt case air filter elements**	• Clean.		√		√		
			• Replace.			√		√	
3	*	**Front brake**	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
			• Replace brake pads.	Whenever worn to the limit					
4	*	**Rear brake**	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
			• Replace brake pads.	Whenever worn to the limit					
5	*	**Brake hoses**	• Check for cracks or damage. • Check for correct routing and clamping.		√	√	√	√	√
			• Replace.	Every 4 years					
6		**Rear brake lock cable**	• Check cable length. • Adjust if necessary.	√	4000 km (2400 mi) after the initial 1000 km (600 mi) and every 5000 km (3000 mi) thereafter				
7	*	**Rear brake lock**	• Check operation. • Check rubber boots. • Check wear indicator. • Adjust if necessary.	√	√	√	√	√	√
8	*	**Wheels**	• Check runout and for damage.		√	√	√	√	
9	*	**Tires**	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√
10	*	**Wheel bearings**	• Check bearing for looseness or damage.		√	√	√	√	
11	*	**Drive belt**	• Check belt condition. • Replace if damaged. • Check belt tension. • Adjust if necessary.	√	Every 10000 km (6000 mi) until 40000 km (24000 mi), and every 5000 km (3000 mi) thereafter				
12	*	**Drive pulley and drive axle**	• Lubricate.			√		√	
13	*	**Steering bearings**	• Check bearing play and steering for roughness.	√	√	√	√	√	
			• Lubricate with lithium-soap-based grease.	Every 20000 km (12000 mi)					
14	*	**Chassis fasteners**	• Make sure that all nuts, bolts and screws are properly tightened.		√	√	√	√	√
15		**Front brake lever pivot shaft**	• Lubricate with silicone grease.		√	√	√	√	√
16		**Rear brake lever pivot shaft**	• Lubricate with silicone grease.		√	√	√	√	√
17		**Sidestand, centerstand**	• Check operation. • Lubricate with lithium-soap-based grease.		√	√	√	√	√
18	*	**Sidestand switch**	• Check operation.	√	√	√	√	√	√
19	*	**Front fork**	• Check operation and for oil leakage.		√	√	√	√	
20	*	**Shock absorber assembly**	• Check operation and shock absorber for oil leakage.		√	√	√	√	
21		**Engine oil**	• Change.	√	When the oil change indicator flashes				
			• Check oil level and vehicle for oil leakage.	Every 5000 km (3000 mi)					√
22		**Engine oil filter cartridge**	• Replace.	√		√		√	

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
23	*	**Cooling system**	• Check coolant level and vehicle for coolant leakage.		√	√	√	√	√
			• Change with ethylene glycol anti-freeze coolant.	Every 3 years					
24	*	**V-belt**	• Replace.	When the V-belt replacement indicator flashes [every 20000 km (12500 mi)]					
25	*	**Front and rear brake switches**	• Check operation.	√	√	√	√	√	√
26		**Moving parts and cables**	• Lubricate.		√	√	√	√	√
27	*	**Throttle grip**	• Check operation. • Check throttle grip free play, and adjust if necessary. • Lubricate cable and grip housing.		√	√	√	√	√
28	*	**Lights, signals and switches**	• Check operation. • Adjust headlight beam.	√	√	√	√	√	√

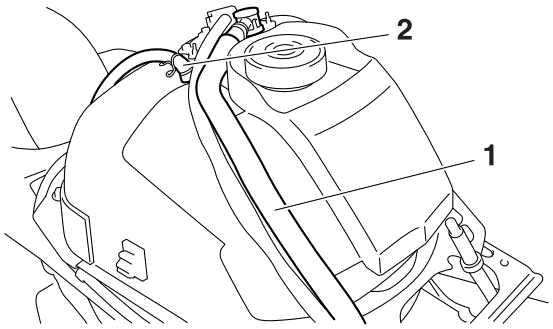
TIP

- Engine air filter and V-belt air filters
  - This model's engine air filter is equipped with a disposable oil-coated paper element, which must not be cleaned with compressed air to avoid damaging it.
  - The engine air filter element needs to be replaced and the V-belt air filter elements need to be serviced 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.

EAS21030
CHECKING THE FUEL LINE
The following procedure applies to all of the fuel and breather hoses.
1. Remove:
   - Center cover
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Side covers
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Footboards
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Storage box
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   - Fuel hose "1"
   - Fuel tank breather hose "2"
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14940
NOTICE

Make sure the fuel tank breather hose is routed correctly.



3. Install:
   - Storage box
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Footboards
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Side covers
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Center cover
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS20680
CHECKING THE SPARK PLUGS
The following procedure applies to all of the spark plugs.
1. Remove:
   - Radiator cover
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   - Spark plug cap
3. Remove:
   - Spark plug

ECA13320
NOTICE

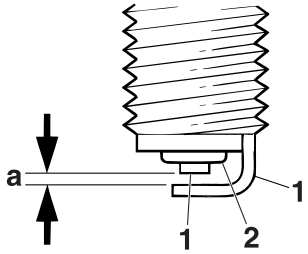
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

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

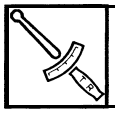
Manufacturer/model
NGK/CR7E

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

Spark plug gap
0.7–0.8 mm (0.028–0.031 in)



8. Install:
   • Spark plug



Spark plug
13 Nm (1.3 m·kgf, 9.4 ft·lbf)

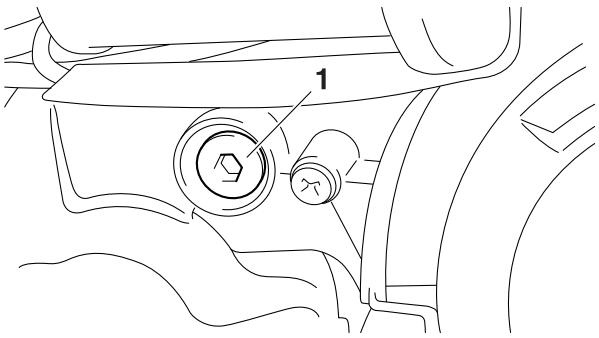
TIP
Before installing the spark plug, clean the spark plug and gasket surface.

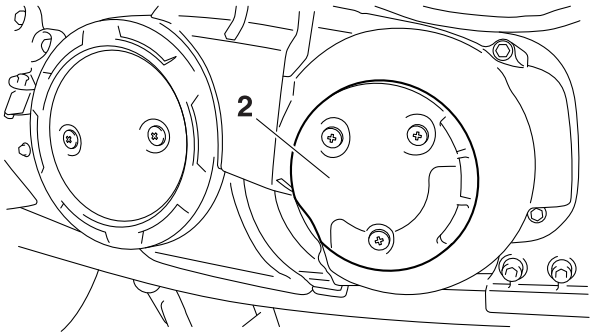
9. Connect:
   • Spark plug cap
10. Install:
    • Radiator cover
      Refer to "GENERAL CHASSIS" on page 4-1.

EAS20490
ADJUSTING THE VALVE CLEARANCE
The following procedure applies to all of the valves.

TIP
- 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:
   • Radiator cover
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
   • Radiator bracket
     Refer to "RADIATOR" on page 6-1.
3. Remove:
   • Storage box
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Remove:
   • Fuel tank
     Refer to "FUEL TANK" on page 7-1.
5. Remove:
   • Air filter case
   • Throttle body
   • Intake manifold
     Refer to "THROTTLE BODY" on page 7-5.
6. Remove:
   • Spark plugs
   • Cylinder head cover
   • Cylinder head cover gasket
     Refer to "CAMSHAFTS" on page 5-8.
7. Remove:
   • Timing mark accessing plug "1"
   • Crankshaft end access cover "2"





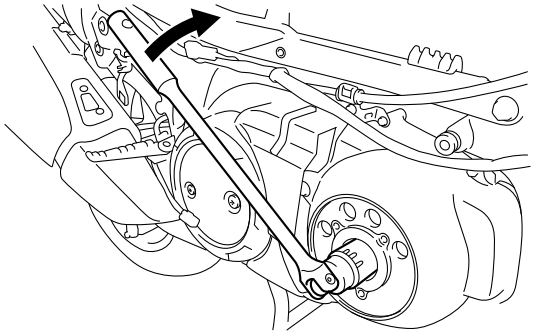
8. Measure:
   • Valve clearance
     Out of specification → Adjust.



Valve clearance (cold)
Intake
0.15–0.22 mm (0.0059–0.0087 in)
Exhaust
0.25–0.32 mm (0.0098–0.0126 in)

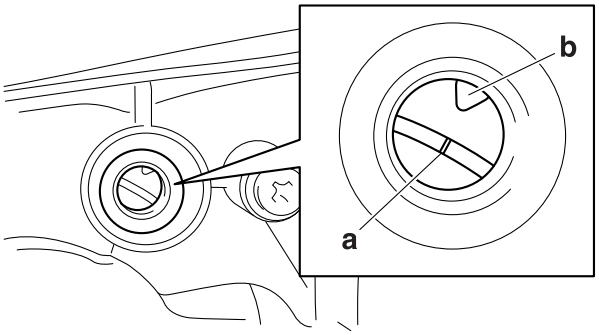
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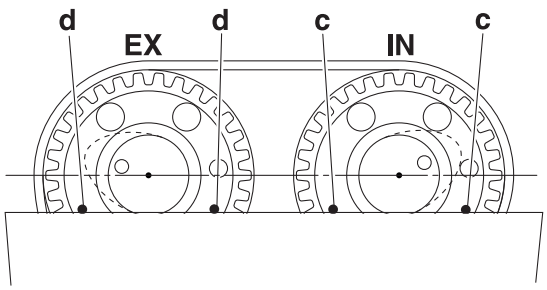
a. Turn the crankshaft clockwise.



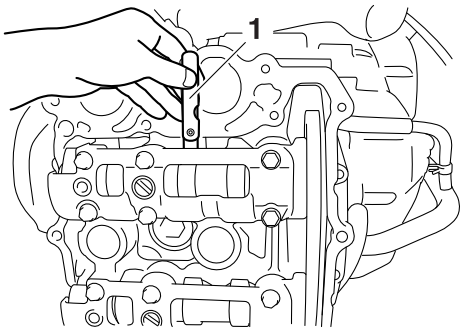
b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the mark "b" on the generator cover.

TIP
- TDC on the compression stroke can be found when the cylinder #1 camshaft lobes are turned away from each other.
- In order to be sure that the piston is at TDC, the alignment mark “c” on the intake camshaft sprocket and the alignment mark “d” on the exhaust camshaft sprocket must align with the cylinder head mating surface as shown in the illustration.



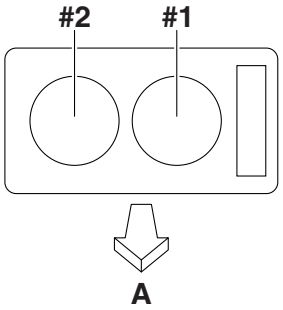


c. Measure the valve clearance with a thickness gauge “1”.



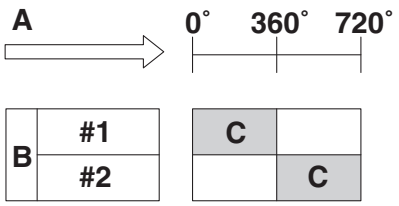
TIP
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2



A. Front

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



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

Cylinder #2	360°

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9. Remove:
   - Camshafts

TIP
- Refer to “CAMSHAFTS” on page 5-8.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

10. Adjust:
    - Valve clearance

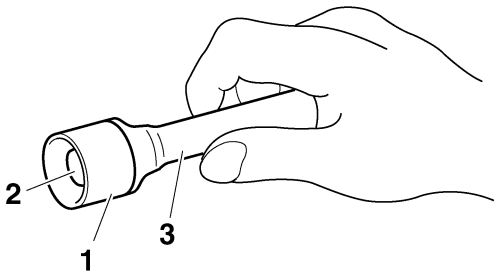
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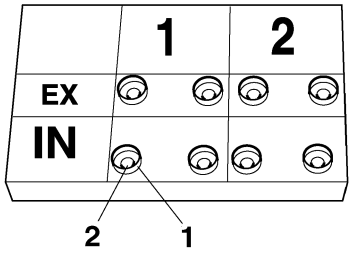
a. Remove the valve lifter “1” and the valve pad “2” with a valve lapper “3”.



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

TIP
- 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.

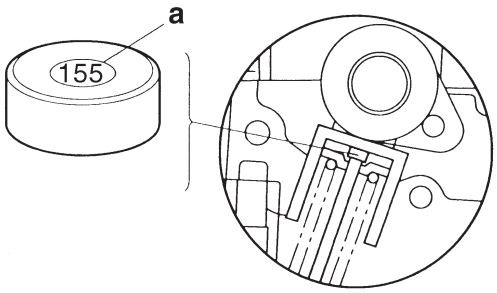




b. Calculate the difference between the specified valve clearance and the measured valve clearance.
   Example:
   Specified valve clearance = 0.15–0.22 mm (0.0059–0.0087 in)
   Measured valve clearance = 0.25 mm (0.0098 in)
   0.25 mm (0.0098 in) - 0.22 mm (0.0087 in) = 0.03 mm (0.001 in)
c. Check the thickness of the current valve pad.

TIP
The thickness "a" of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.

Example:
If the valve pad is marked "155", the pad thickness is 1.55 mm (0.061 in).



d. Calculate the sum of the values obtained in steps (b) and (c) to determine the required valve pad thickness and the valve pad number.
   Example:
   1.55 mm (0.061 in) + 0.03 mm (0.001 in) = 1.58 mm (0.062 in)
   The valve pad number is 158.
e. Round off the valve pad number according to the following table, and then select the suitable valve pad.

Last digit	Rounded value
0, 1, 2	0
3, 4, 5, 6	5
7, 8, 9	10

TIP
Refer to the following table for the available valve pads.

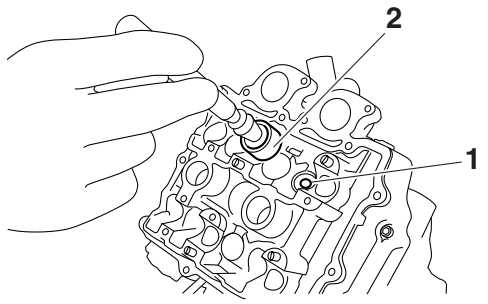
Valve pad range	Nos. 120–240
Valve pad thickness	1.20–2.40 mm (0.047–0.094 in)
Available valve pads	25 thicknesses in 0.05 mm (0.002 in) increments

Example:
Valve pad number = 158
Rounded value = 160
New valve pad number = 160

f. Install the new valve pad "1" and the valve lifter "2".

TIP
- Lubricate the valve pad with molybdenum disulfide oil.
- Lubricate the valve lifter (Top side) with molybdenum disulfide oil.
- Lubricate the valve lifter (Outer side) with engine oil.

- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.



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

Camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP
- Refer to "CAMSHAFTS" on page 5-8.
- Lubricate the camshaft lobes and camshaft journals with molybdenum disulfide oil.
- First, install the exhaust camshaft.
- Turn the crankshaft clockwise several full turns to seat the parts.

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

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11. Install:
    - All removed parts

TIP
For installation, reverse the removal procedure.

12. Adjust:
    - Throttle grip free play
      Refer to "CHECKING THE THROTTLE GRIP" on page 3-32.

EAS20610
ADJUSTING THE ENGINE IDLING SPEED

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

1. Start the engine and let it warm up for several minutes.
2. Remove:
   - Radiator cover
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Side cover (right)
     Refer to "GENERAL CHASSIS" on page 4-1.
3. Install:
   - Digital tachometer
     (onto the spark plug lead of cylinder #1)

Digital tachometer
90890-06760
YU-39951-B

4. Check:
   - Engine idling speed
     Out of specification → Adjust.

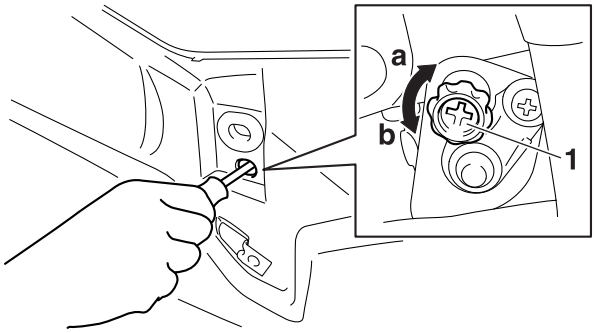
Engine idling speed
1100–1300 r/min

5. Adjust:
   - Engine idling speed

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

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



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6. Install:
   - Side cover (right)
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Radiator cover
     Refer to “GENERAL CHASSIS” on page 4-1.

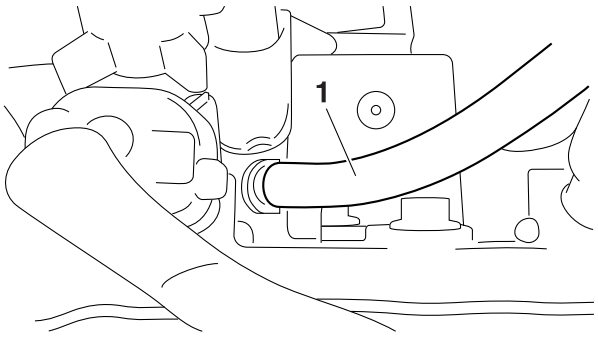
EAS20571
SYNCHRONIZING THE THROTTLE BODY

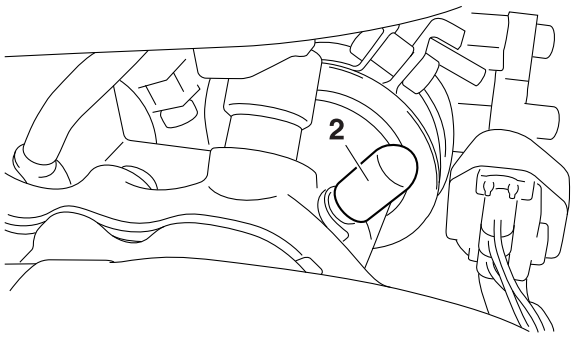
TIP
Prior to synchronizing the throttle body, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the vehicle on a level surface.

TIP
Place the vehicle on a centerstand.

2. Remove:
   - Radiator cover
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Side covers
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Footboards
     Refer to “GENERAL CHASSIS” on page 4-1.
3. Remove:
   - Intake air pressure sensor hose for cylinder #1 “1”
   - Synchronizing pipe cap for cylinder #2 “2”

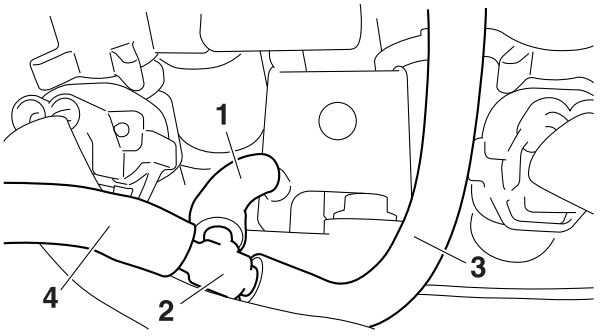


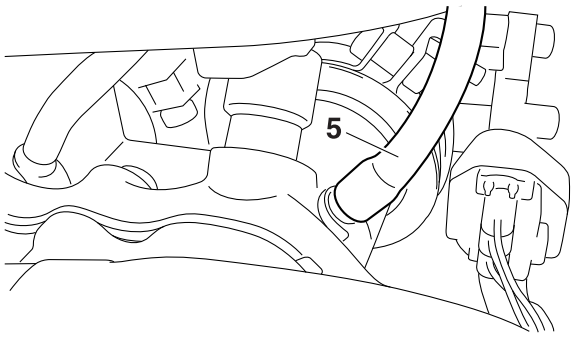


4. Install:
   - Hose “1” (Parts No.: 5JW-24311-00)
   - 3-Way joint “2” (Parts No.: 68V-24376-00)
   - Cylinder #1 intake air pressure sensor hose “3”
   - Vacuum gauge hose for cylinder #1 “4”
   - Vacuum gauge hose for cylinder #2 “5”
   - Vacuum gauge
   - Digital tachometer
     (onto the spark plug lead of cylinder #1)



Vacuum gauge
90890-03094
Vacuummate
YU-44456
Digital tachometer
90890-06760
YU-39951-B





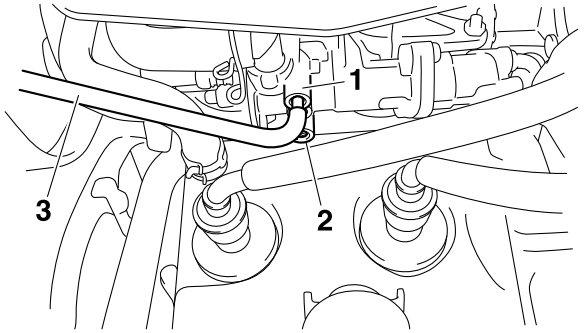
5. Start the engine and let it warm up for several minutes.
6. Check:
   • Engine idling speed
   Out of specification → Adjust.
   Refer to "ADJUSTING THE ENGINE IDLING SPEED" on page 3-8.

Engine idling speed
1100–1300 r/min

7. Adjust:
   • Throttle body synchronization

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a. Turn the cylinder #1 air screw "1" and cylinder #2 air screw "2" using the carburetor angle driver 2 "3".



TIP

- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If the air screw is removed, turn the screw is fully, and then turn it out 3/4 turn. Then, synchronize the throttle body.

Carburetor angle driver 2
90890-03173

Intake vacuum
29.3–31.9 kPa (220–239 mmHg, 8.7–9.4 inHg)

TIP

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

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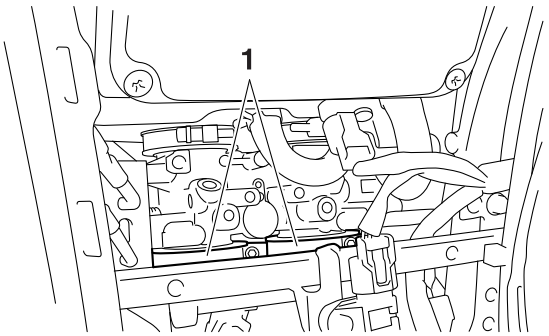
8. Measure:
   • Engine idling speed
   Out of specification → Adjust.
   Make sure that the vacuum pressure is within specification.
9. Stop the engine and remove the measuring equipment.
10. Adjust:
    • Throttle grip free play
    Refer to "CHECKING THE THROTTLE GRIP" on page 3-32.

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

11. Install:
    • All removed parts

EAS21010
CHECKING THE THROTTLE BODY JOINTS

1. Remove:
   • Center cover
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Throttle body joints "1"
   Cracks/damage → Replace.



3. Install:
   • Center cover
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS21050
CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
   • Center cover
   Refer to "GENERAL CHASSIS" on page 4-1.
   • Side cover (right)
   Refer to "GENERAL CHASSIS" on page 4-1.

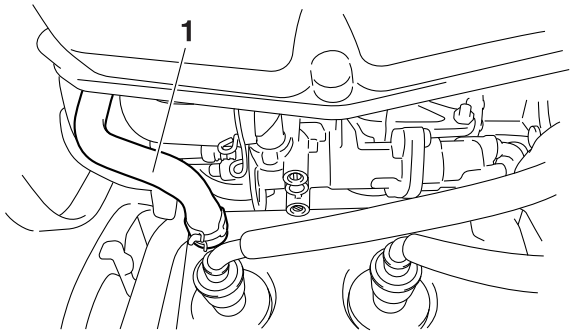
- Footboard (right)
  Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:
   - Cylinder head breather hose “1”
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14920

NOTICE

Make sure the cylinder head breather hose is routed correctly.



3. Install:
   - All removed parts

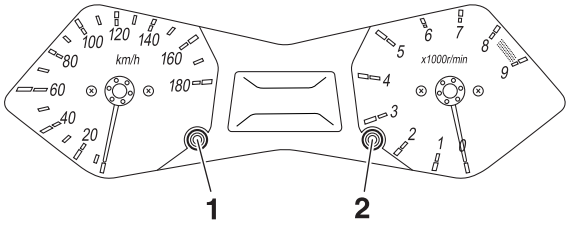
EAS20600

ADJUSTING THE EXHAUST GAS VOLUME

TIP

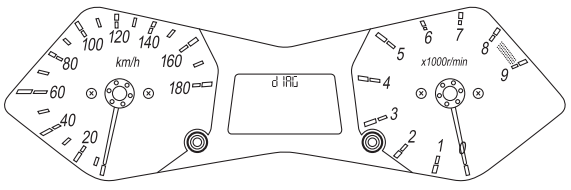
Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.

1. Set the main switch to “OFF” and set the engine stop switch to “ ”.
2. Simultaneously press and hold the left set “1” and right set “2” buttons, set the main switch to “ON”, and continue to press the buttons for 8 seconds or more.

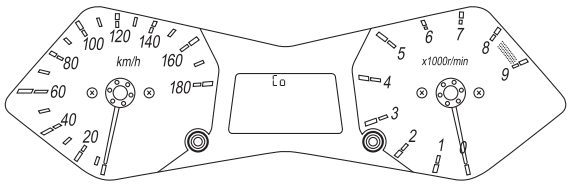


TIP

“dIAG” appears on the odometer LCD.



3. Press the left set button to select the CO adjustment mode “Co” or the diagnostic monitoring mode “dIAG”.



4. After selecting “Co”, simultaneously press the left set and right set buttons for 2 seconds or more to execute the selection.
5. Press the left set and right set buttons to select a cylinder.

TIP

The selected cylinder number appears on the clock LCD.

- To decrease the selected cylinder number, press the right set button.
- To increase the selected cylinder number, press the left set button.

6. After selecting the cylinder, simultaneously press the left set and right set buttons for 2 seconds or more to execute the selection.
7. Change the CO adjustment volume by pressing the left set and right set buttons.

TIP

The CO adjustment volume appears on the odometer LCD.

- To decrease the CO adjustment volume, press the right set button.
- To increase the CO adjustment volume, press the left set button.

8. Release the switch to execute the selection.
9. Simultaneously press the left set and right set buttons to return to the cylinder selection (step 5).
10. Set the main switch to “OFF” to cancel the mode.

EAS21081

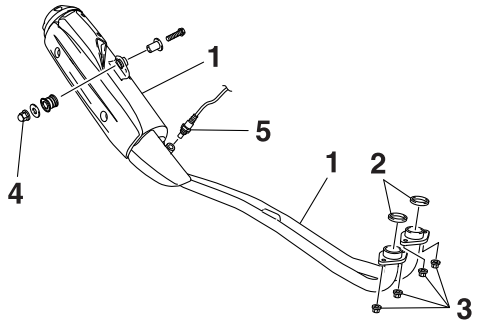
CHECKING THE EXHAUST SYSTEM

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

1. Remove:
   - Side cover (right)
     Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:
   - Exhaust assembly “1”
     Cracks/damage → Replace.
   - Gasket “2”
     Exhaust gas leaks → Replace.
3. Check:
   Tightening torque
   - Exhaust assembly nut (front) “3”
   - Exhaust assembly nut (rear) “4”
   - O_2 sensor “5”

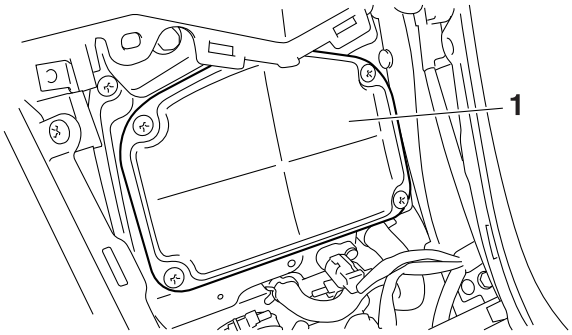
Exhaust assembly nut (front)
20 Nm (2.0 m·kgf, 14 ft·lbf)
Exhaust assembly nut (rear)
31 Nm (3.1 m·kgf, 22 ft·lbf)
O_2 sensor
45 Nm (4.5 m·kgf, 33 ft·lbf)



4. Install:
   - Side cover (right)
     Refer to “GENERAL CHASSIS” on page 4-1.

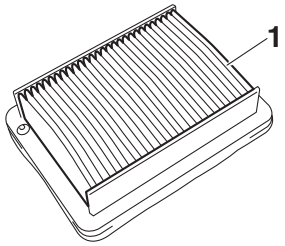
EAS20961
REPLACING THE AIR FILTER ELEMENT

1. Remove:
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
   - Air filter case cover “1”



3. Check:
   - Air filter element “1”
     Damage → Replace.

TIP
- Replace the air filter element every 20000 km (12000 mi) of operation.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.



4. Install:
   - Air filter case cover

ECA4B51003
NOTICE
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 throttle body synchronization, leading to poor engine performance and possible overheating.

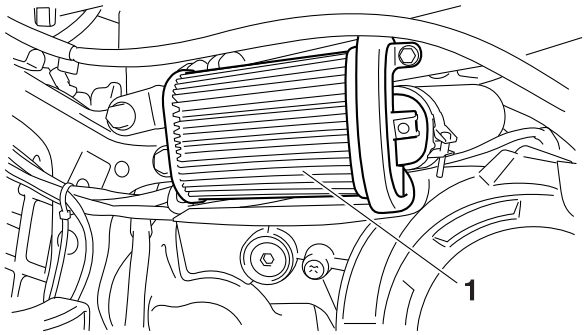
TIP
When installing the air filter element into the air filter case cover, make sure that the sealing surfaces are aligned to prevent any air leaks.

5. Install:
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.

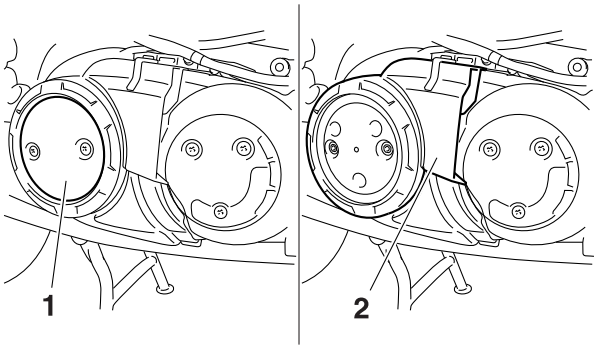
EAS20980
CLEANING THE V-BELT CASE AIR FILTER ELEMENT

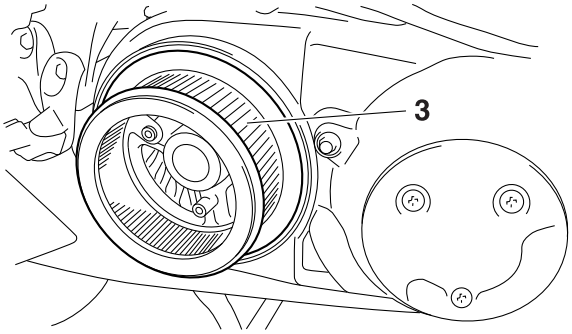
1. Remove:
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Footboards
     Refer to “GENERAL CHASSIS” on page 4-1.

2. Remove:
   • V-belt case air filter element (left) “1”

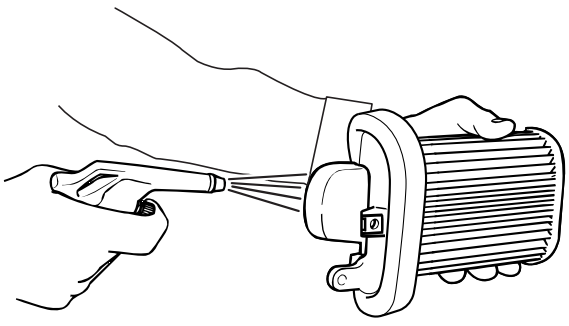


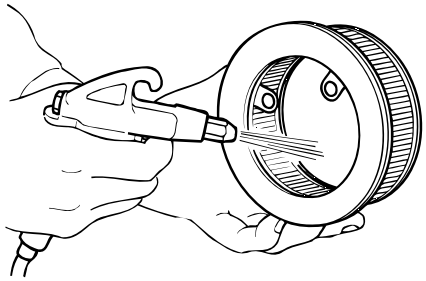
3. Remove:
   • V-belt case air filter case cover “1”
   • V-belt case air filter case “2”
   • V-belt case air filter element (right) “3”





4. Clean:
   • V-belt case air filter elements
   Blow the compressed air to the outer surface of the V-belt case air filter element.





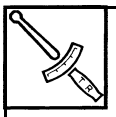
5. Check:
   • V-belt case air filter elements
   Damage → Replace.

ECA13440

NOTICE

Since the V-belt case air filter element is a dry type, do not let grease or water contact it.

6. Install:
   • V-belt case air filter element (right)
   • V-belt case air filter case
   • V-belt case air filter case cover



V-belt case air filter case screw
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
V-belt case air filter case cover screw
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

7. Install:
   • V-belt case air filter element (left)



V-belt case air filter element (left) bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

8. Install:
   • Footboards
   Refer to “GENERAL CHASSIS” on page 4-1.
   • Center cover
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS30921

CHECKING THE BRAKE OPERATION

1. Check:
   • Brake operation
   Brake not working properly → Check the brake system.
   Refer to “FRONT BRAKE” on page 4-37 and “REAR BRAKE” on page 4-50.

TIP
Drive on the road, operate the front and rear brakes separately and check to see if the brakes are operating properly.

EAS21240
CHECKING THE BRAKE FLUID LEVEL

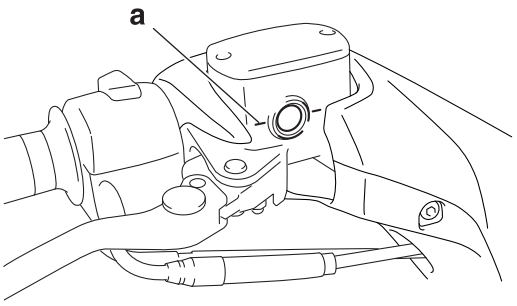
1. Stand the vehicle on a level surface.

TIP
- Place the vehicle on the centerstand.
- Make sure the vehicle is upright.

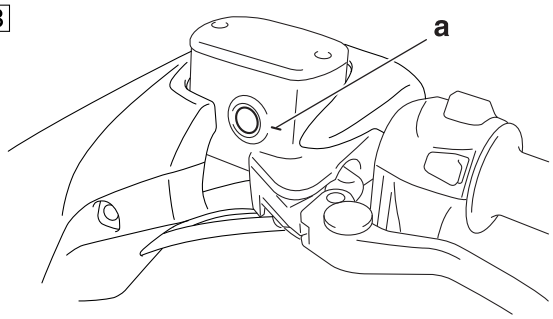
2. Check:
   - Brake fluid level
     Below the minimum level mark "a"→ Add the recommended brake fluid to the proper level.

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

ECA13540
NOTICE

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

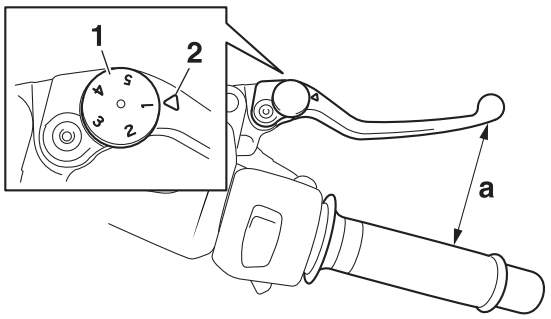
TIP
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake master cylinder reservoir is horizontal.

EAS21160
ADJUSTING THE FRONT DISC BRAKE

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

TIP
- While pushing the brake lever forward, turn the adjusting dial "1" until the brake lever is in the desired position.
- Be sure to align the setting on the adjusting dial with the arrow mark "2" on the brake lever.

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



EWA13060
⚠ WARNING

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

• A soft or spongy feeling in the brake 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 in loss of control and possibly an accident. Therefore, check and if necessary, bleed the brake system.

ECA13490

NOTICE

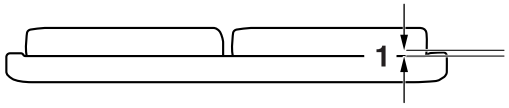
After adjusting the brake lever position, make sure there is no brake drag.

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 "1" almost touch the brake disc → Replace the brake pads as a set.
     Refer to "FRONT BRAKE" on page 4-37.



EAS21210

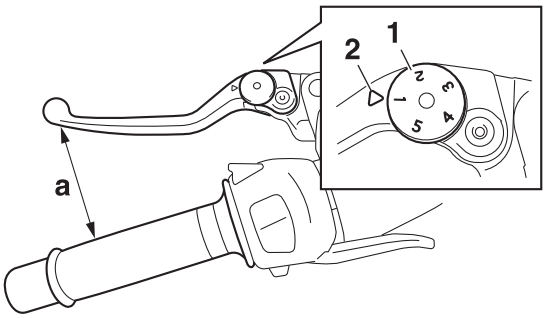
ADJUSTING THE REAR DISC BRAKE

1. Adjust:
   - Brake lever position
     (distance "a" from the left side grip to the brake lever)

TIP

- While pushing the brake lever forward, turn the adjusting dial "1" until the brake lever is in the desired position.
- Be sure to align the setting on the adjusting dial with the arrow mark "2" on the brake lever holder.

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



EWA13060

⚠ WARNING

• After adjusting the brake lever position, make sure the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.
• A soft or spongy feeling in the brake 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 in loss of control and possibly an accident. Therefore, check and if necessary, bleed the brake system.

ECA13490

NOTICE

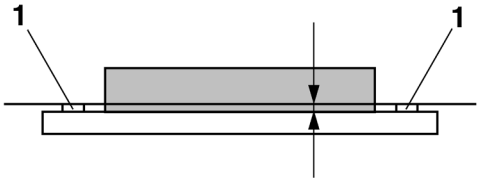
After adjusting the brake lever position, make sure there is no brake drag.

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 indicators "1" almost touch the brake disc → Replace the brake pads as a set.
     Refer to "REAR BRAKE" on page 4-50.



EAS30770
BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)

EWA14000
⚠ WARNING

Always bleed the brake system when the brake related parts are removed.

ECA17050
NOTICE

- **Bleed the brake system in the following order.**
- **1st step: Front brake calipers**
- **2rd step: Rear brake caliper**

EWA15740
⚠ WARNING

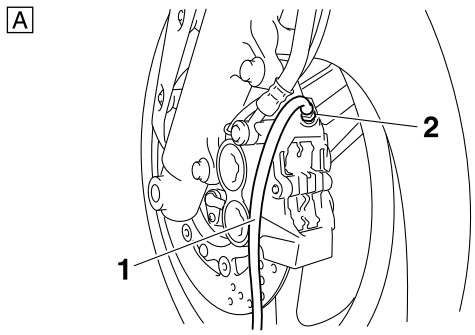
Bleed the ABS whenever:
- **the system is disassembled.**
- **a brake hose is loosened, disconnected or replaced.**
- **the brake fluid level is very low.**
- **brake operation is faulty.**

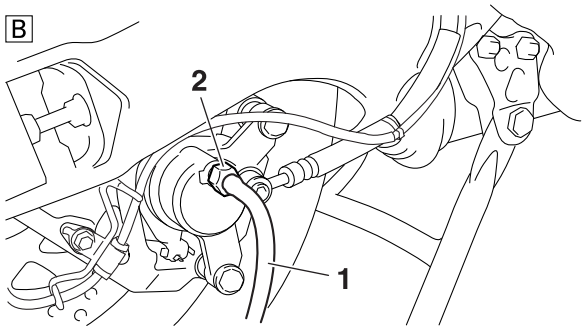
TIP
- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir to overflow.
- When bleeding the ABS, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the ABS, considerably lengthening the bleeding 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:
   - ABS

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a. Fill the brake master cylinder reservoir to the proper level with the specified brake fluid.
b. Install the brake master cylinder reservoir diaphragm.
c. Connect a clear plastic hose “1” tightly to the bleed screw “2”.





A. Front brake caliper
B. Rear brake caliper

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

TIP

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

h. Tighten the bleed screw and then release the brake lever.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Check the operation of the hydraulic unit. Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-72.

ECA17060
NOTICE

Make sure that the main switch is set to “OFF” before checking the operation of the hydraulic unit.

k. After operating the ABS, repeat steps (e) to (i), and then fill the brake master cylinder reservoir to the proper level with the specified brake fluid.

l. Tighten the bleed screw to specification.

Front brake caliper bleed screw
5 Nm (0.5 m·kgf, 3.6 ft·lbf)
Rear brake caliper bleed screw
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

m. Fill the brake master cylinder reservoir to the proper level with the specified brake fluid.
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.

EWA13110

⚠ WARNING

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

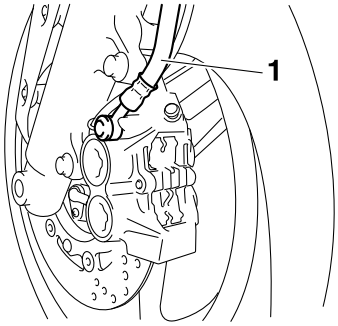
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EAS21280

CHECKING THE FRONT BRAKE HOSES

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

1. Check:
   - Brake hose "1"
     Cracks/damage/wear → Replace.

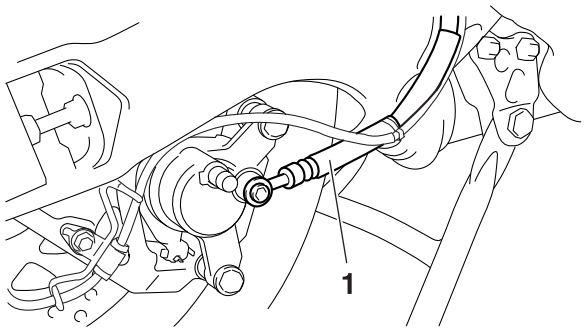


2. Check:
   - Brake hose holder
     Loose → Tighten the holder bolt.
3. Hold the vehicle upright and apply the front brake several times.
4. Check:
   - Brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to "FRONT BRAKE" on page 4-37.

EAS21290

CHECKING THE REAR BRAKE HOSE

1. Check:
   - Brake hose "1"
     Cracks/damage/wear → Replace.



2. Check:
   - Brake hose holders
     Loose connection → Tighten the holder bolt.
3. Hold the vehicle upright and apply the rear brake several times.
4. Check:
   - Brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to "REAR BRAKE" on page 4-50.

EAS21320

ADJUSTING THE REAR BRAKE LOCK CABLE

EWA59C1301

⚠ WARNING

Do not use the rear brake lock lever while driving.

TIP

Place the vehicle on the centerstand.

1. Measure:
   - Rear brake lock cable length "a"
     Out of specification → Adjust.

TIP

Measure while the rear brake lock lever is released.

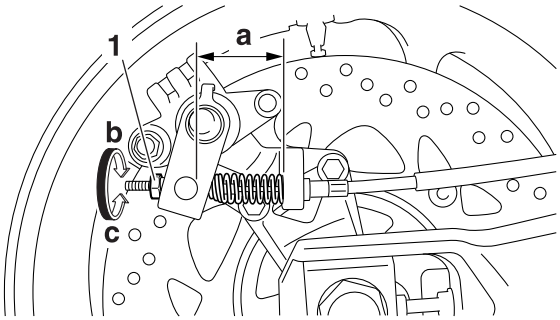
Rear brake lock cable length
43–45 mm (1.69–1.77 in)

2. Adjust:
   - Rear brake lock cable length

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a. Turn the rear brake lock cable adjusting nut "1" in direction "b" or "c" until the specified rear brake lock cable free play is obtained.

Direction “b”
Rear brake lock cable length increased.
Direction “c”
Rear brake lock cable length decreased.



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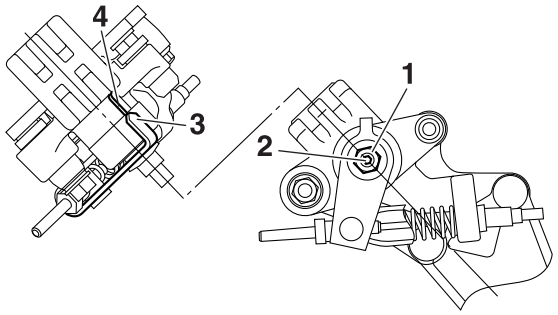
3. Adjust:
   • Clearance between the brake pad and brake disc.

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a. Remove the cap of the rear brake lock adjusting nut.
b. Loosen the rear brake lock adjusting nut “1” slightly.
c. Adjust the piston adjusting bolt “2” so that the wear indicator “3” is placed within the width of the wear indicator groove “4” when the rear brake lock is activated.
   Recommended procedure:
   Tighten the piston adjusting bolt to 3.0 Nm (0.30 m·kgf, 2.2 ft·lbf) and then loosen the bolt 1-1/2 turn.
d. Tighten the rear brake lock adjusting nut while holding the piston adjusting bolt so as not to turn the bolt.

Rear brake lock adjusting nut
15 Nm (1.5 m·kgf, 11 ft·lbf)

e. Make sure that the tire can be turned by hand when the rear brake lock is deactivated.
f. Make sure that the wear indicator is placed within the width of the wear indicator groove when the rear brake lock is activated.

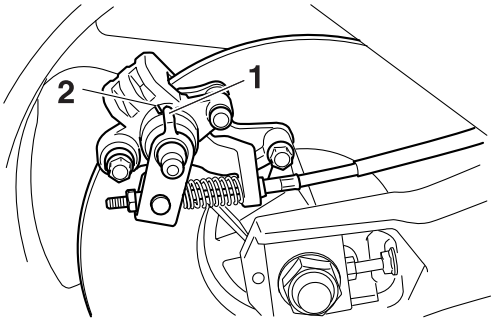


g. Install the cap of the rear brake lock adjusting nut.

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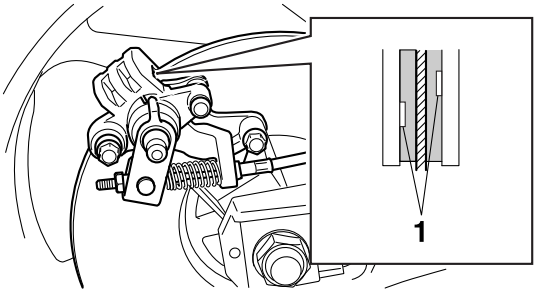
EAS59C1305
CHECKING THE REAR BRAKE LOCK

1. Check:
   • Rear brake lock operation
   Apply the rear brake lock, and then pushing the vehicle for properly locks the rear brake lock.
   Rear brake lock not working properly → Check the rear brake lock cable and rear brake lock pads.
   Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17 and “CHECKING THE REAR BRAKE LOCK PADS” on page 3-19.
2. Check:
   • Rear brake lock cable length
   Out of specification → Adjust.
   Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.
3. Check:
   • Wear indicator “1”
   Check the position of the indicator while applying the rear brake lock lever.
   Passed the wear indicator groove “2” → Adjust the rear brake lock cable length.
   Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.



4. Check:
   • Rear brake lock caliper boots
   Cracks/damage → Replace.
   Refer to “REAR BRAKE” on page 4-50.

EAS59C1301
CHECKING THE REAR BRAKE LOCK PADS
The following procedure applies to all of the brake pads.
1. Operate the rear brake lock.
2. Check:
   • Rear brake lock pad
   Wear indicators “1” almost touch the brake disc → Replace the brake pads as a set.
   Refer to “REPLACING THE REAR BRAKE LOCK PADS” on page 4-64.



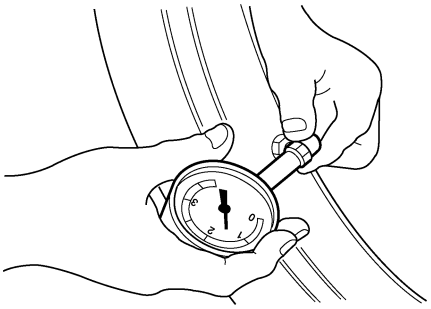
EAS21670
CHECKING THE WHEELS
The following procedure applies to both of the wheels.
1. Check:
   • Wheel
   Damage/out-of-round → Replace.

EWA13260
⚠ WARNING

Never attempt to make any repairs to the wheel.

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

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.

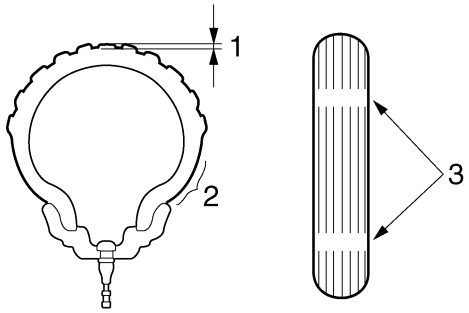
Tire air pressure (measured on cold tires)
Loading condition
0–90 kg (0–198 lb)
Front
225 kPa (2.25 kgf/cm², 33 psi)
Rear
250 kPa (2.50 kgf/cm², 36 psi)
Loading condition
90–194 kg (198–428 lb)
Front
225 kPa (2.25 kgf/cm², 33 psi)
Rear
280 kPa (2.80 kgf/cm², 41 psi)
Maximum load
194 kg (428 lb)

*** 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.



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

Wear limit (front)
1.6 mm (0.06 in)
Wear limit (rear)
1.6 mm (0.06 in)

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
120/70R15 M/C 56H
Manufacturer/model
DUNLOP/GPR-100F
Manufacturer/model
BRIDGESTONE/BT011F

Rear tire
Size
160/60R15 M/C 67H
Manufacturer/model
DUNLOP/GPR-100L
Manufacturer/model
BRIDGESTONE/BT012R

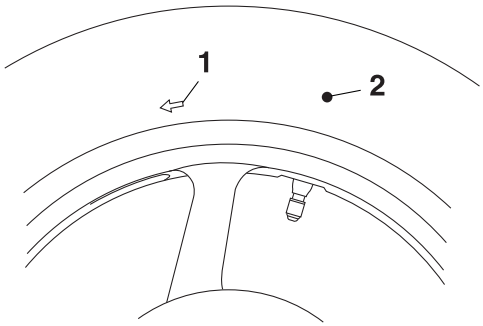
EWA13210

⚠ 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.

TIP

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.



EAS30780

CHECKING THE WHEEL BEARINGS

The following procedure applies to all of the wheel bearings.

1. Check:
   • Wheel bearings
   Refer to "CHECKING THE FRONT WHEEL" on page 4-20 and "CHECKING THE REAR WHEEL" on page 4-32.

EAS30790

CHECKING THE SWINGARM

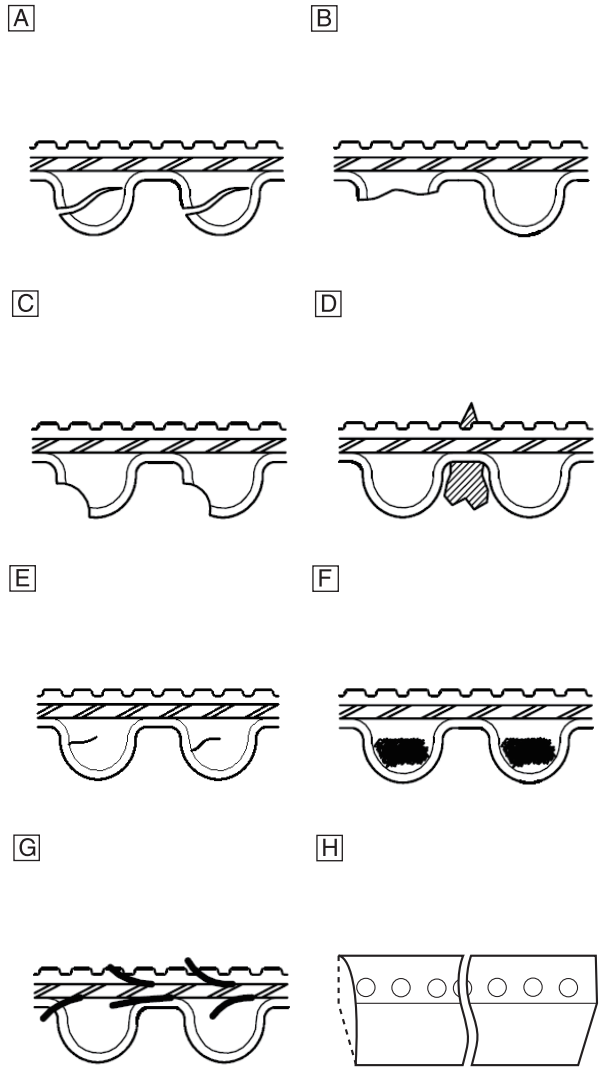
1. Check:
   • Swingarm operation
   Swingarm not working properly → Check the swingarm.
   Refer to "REMOVING THE SWINGARM" on page 4-99.
2. Check:
   • Swingarm excessive play
   Refer to "REMOVING THE SWINGARM" on page 4-99.

EAS59C1307

CHECKING THE DRIVE BELT

1. Remove:
   • Drive belt upper guard and lower guard
   Refer to "REAR WHEEL" on page 4-27.

2. Check:
   • Drive belt
   External tooth cracks “A” → Replace.
   Missing teeth “B” → Replace.
   Hook wear “C” → Replace.
   Stone damage “D” → Replace if damage is on the edge.
   Internal tooth cracks (hairline) “E” → OK to run, but monitor condition.
   Chipping (not serious) “F” → OK to run, but monitor condition.
   Fuzzy edge cord “G” → OK to run, but monitor condition
   Bevel wear (outboard edge only) “H” → OK to run, but monitor condition.
   Refer to “BELT DRIVE” on page 4-92.



3. Install:
   • Drive belt upper guard and lower guard
   Refer to “REAR WHEEL” on page 4-27.

EAS21430
ADJUSTING THE DRIVE BELT SLACK

ECA59C1301
NOTICE

A drive belt that is too tight will cause loud noises, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive belt slack within the specified limits.

TIP
Measure the drive belt slack when the drive belt is at room temperature, and when the drive belt is dry.

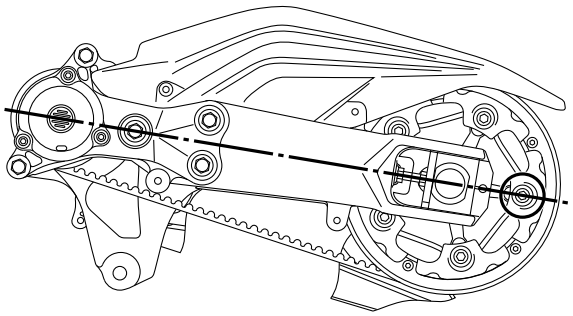
1. Stand the vehicle on a level surface.

EWA59C1302
⚠ WARNING

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

TIP
Place the vehicle on the centerstand.

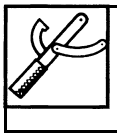
2. Remove the drive belt upper guard or lower guard.
3. Align the rear wheel pulley bolt and center line of the swingarm as shown in the illustration.



4. Set the tension gauge “1” to upside or downside of the drive belt.

TIP
To set correctly between protruding portion “2” of the tension gauge and teeth “3” of cog when scaling drive belt slack.

5. Measure:
   • Drive belt slack
   (The scale position “a” on the tension gauge.)
   Out of specification → Adjust.

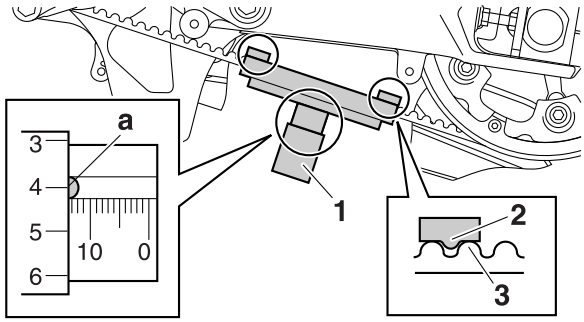


Tension gauge
90890-03226
YM-03226

TIP

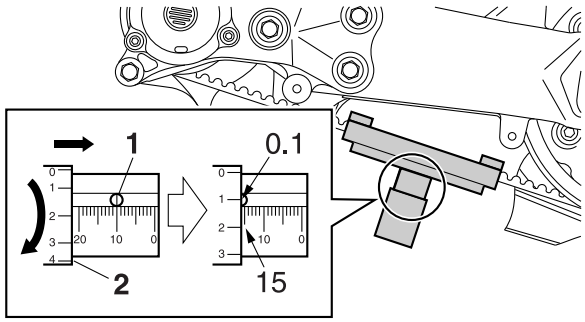
Measure the drive belt slack after setting the tension gauge at 13.4 position on the scale.

Drive belt slack (scale position)
13.4



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a. Turn the handle of the tension gauge until indicator "1" and edge "2" of handle to lap over.
b. Read the scale at over lap point, which is current drive belt slack scale.
Example: 15.1



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6. Adjust:
   • Drive belt slack

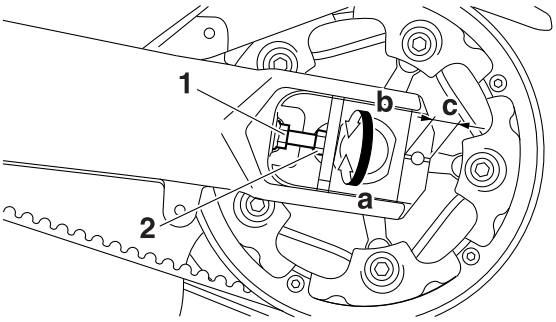
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a. Loosen the wheel axle nut and both left and right locknuts "1".
b. Turn both adjusting bolts "2" in direction "a" or "b" until the specified drive belt slack is obtained.

Direction "a"
Drive belt is tightened.
Direction "b"
Drive belt is loosened.

TIP

- Push the rear wheel forward to make sure that there is no clearance between the adjusting block and the ends of the swingarm.
- After adjusting the drive belt slack to 13.4, measure the distance "c" on the left side and then adjust the distance on the right side to the same value as measured on the left side. The difference in the distance "c" between the left and right sides should be 0.5 mm (0.02 in) or less.



c. Tighten the wheel axle nut to specification.

Wheel axle nut
160 Nm (16 m·kgf, 116 ft·lbf)

d. Tighten the locknuts to specification.

Locknut
16 Nm (1.6 m·kgf, 12 ft·lbf)

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EAS59C1304

LUBRICATING THE DRIVE PULLEY AND DRIVE AXLE

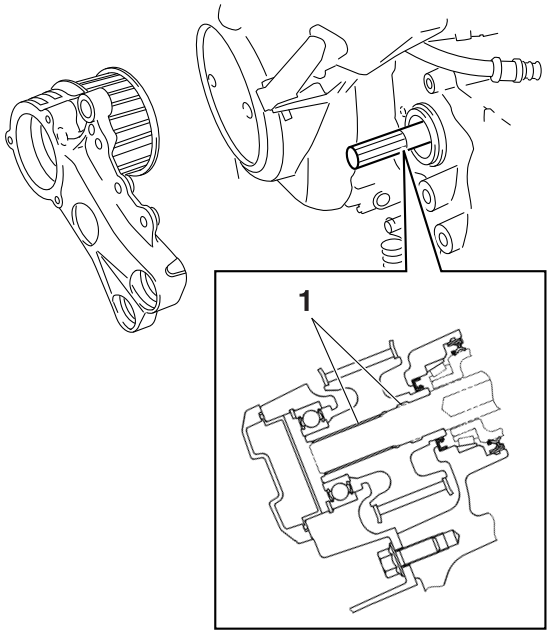
1. Remove:
   • Drive belt upper guard and lower guard
   Refer to "REAR WHEEL" on page 4-27.
2. Remove:
   • Drive belt
   Refer to "BELT DRIVE" on page 4-92.
3. Remove:
   • Drive pulley cover
   Refer to "BELT DRIVE" on page 4-92.
   • Dust cover
   Refer to "BELT DRIVE" on page 4-92.
   • Drive pulley assembly
   Refer to "BELT DRIVE" on page 4-92.
4. Clean:
   • Drive axle "1"
   • Drive pulley assembly inner part "2"

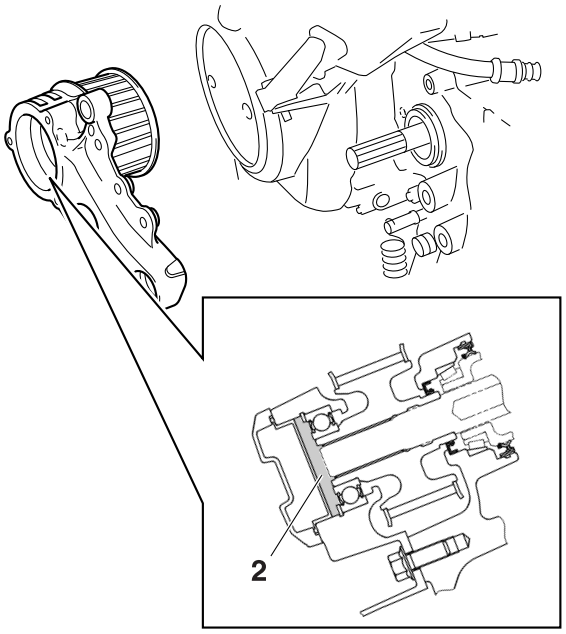
5. Lubricate:
   • Drive axle “1”

Recommended lubricant
YAMAHA GREASE “H” or Polyurea Grease®

6. Lubricate:
   • Drive pulley assembly inner part “2”

Recommended lubricant
YAMAHA GREASE “H” or Polyurea Grease®





7. Install:
   • All removed parts
8. Adjust:
   • Drive belt slack
   Refer to “ADJUSTING THE DRIVE BELT SLACK” on page 3-21.

EAS21500
CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

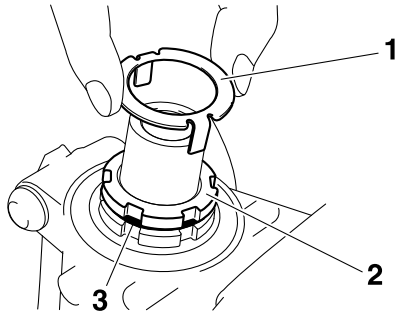
Securely support the vehicle so that there is no danger of it falling over.

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

2. Check:
   • Steering head
   Grasp the bottom of the front fork legs and gently rock the front fork.
   Binding/looseness → Adjust the steering head.
3. Remove:
   • Upper bracket
   Refer to “STEERING HEAD” on page 4-89.
4. Adjust:
   • Steering head

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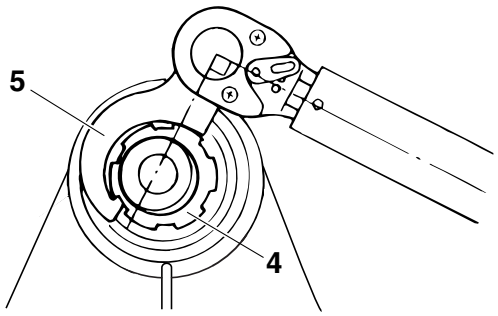
a. Remove the lock washer “1”, the upper ring nut “2”, and the rubber washer “3”.



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

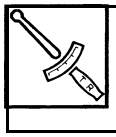
TIP

- Set a torque wrench at a right angle to the steering nut wrench.
- Move the steering to the left and right a couple of time to check that it moves smoothly.





Steering nut wrench
90890-01403
Exhaust flange nut wrench
YU-A9472



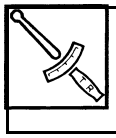
Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kgf, 38 ft·lbf)

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

EWA13140

⚠ WARNING

Do not overtighten the lower ring nut.

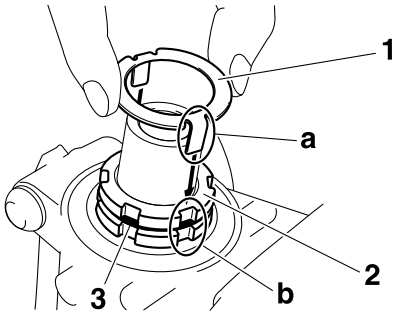


Lower ring nut (final tightening torque)
14 Nm (1.4 m·kgf, 10 ft·lbf)

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 4-89.
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”.

TIP

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



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5. Install:
   - Upper bracket
   Refer to “STEERING HEAD” on page 4-89.

EAS30840

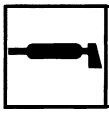
CHECKING THE CHASSIS FASTENERS

Make sure that all nuts, bolts, and screws are properly tightened.
Refer to “CHASSIS TIGHTENING TORQUES” on page 2-18.

EAS21700

LUBRICATING THE LEVERS

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



Recommended lubricant
Silicone grease

EAS30850

CHECKING THE SIDESTAND

1. Check:
   - Sidestand operation
   Check that the sidestand moves smoothly.
   Rough movement → Repair or replace.

EAS21720
LUBRICATING THE SIDESTAND
Lubricate the pivoting point, metal-to-metal moving parts and spring contact point of the sidestand.

Recommended lubricant
Lithium-soap-based grease

EAS30860
CHECKING THE CENTERSTAND
1. Check:
   - Centerstand operation
     Check that the centerstand moves smoothly.
     Rough movement → Repair or replace.

EAS21730
LUBRICATING THE CENTERSTAND
Lubricate the pivoting point, metal-to-metal moving parts and spring contact point of the centerstand.

Recommended lubricant
Lithium-soap-based grease

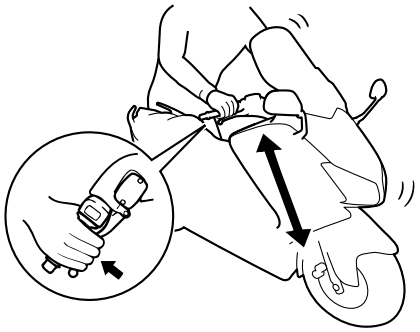
EAS30870
CHECKING THE SIDESTAND SWITCH
Refer to "CHECKING THE SWITCHES" on page 8-123.

EAS21531
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
     Damage/scratches → Replace.
   - Front fork leg
     Oil leaks between inner tube and outer tube → Replace the oil seal.
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 4-81.

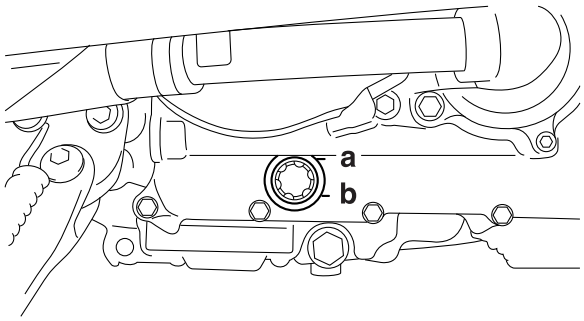


EAS59C1306
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY
1. Check:
   - Rear shock absorber assembly operation
     Push down hard on the seat several times and check if the rear shock absorber rebound smoothly.
     Rough movement → Replace.
     Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-94.
2. Check:
   - Rear shock absorber assembly
     Gas leaks/oil leaks → Replace.
     Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-94.

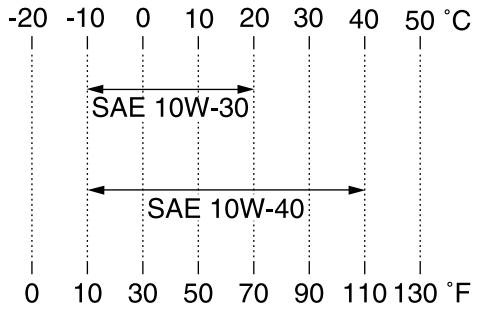
EAS20731
CHECKING THE ENGINE OIL LEVEL
1. Stand the vehicle on a level surface.

TIP
- Place the vehicle on the centerstand.
- Make sure the vehicle is upright.

2. Start the engine, warm it up for several minutes, and then turn it off.
3. Check:
   - Engine oil level
     The engine oil level should be between the minimum level mark "a" and maximum level mark "b".
     Below the minimum level mark → Add the recommended engine oil to the proper level.



Recommended brand
YAMALUBE
Type
SAE 10W-30 or SAE 10W-40
Recommended engine oil grade
API service SG type or higher, JASO standard MA



ECA13361

NOTICE

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

TIP

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

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

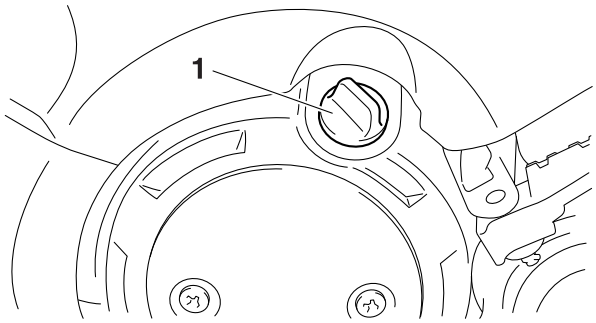
TIP

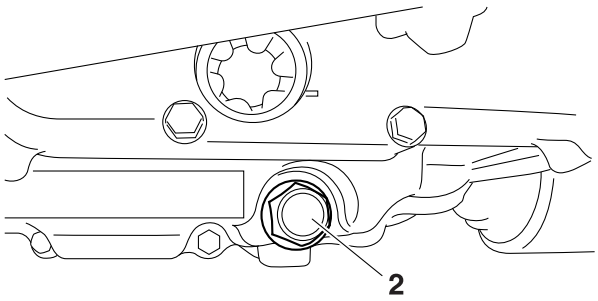
Before checking the engine oil level, wait a few minutes until the oil has settled.

EAS20791

CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   - Engine oil filler cap "1" (along with the O-ring)
   - Engine oil drain bolt "2" (along with the gasket)



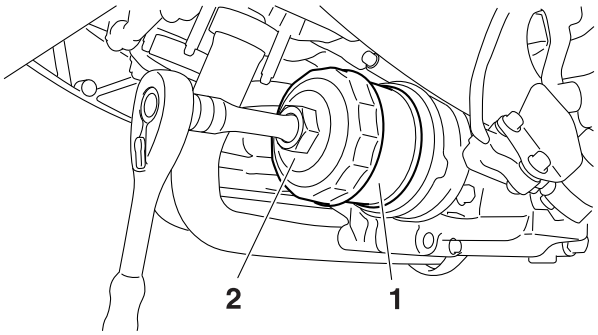


4. Drain:
   - Engine oil (completely from the crankcase)
5. If the oil filter cartridge is also to be replaced, perform the following procedure.

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

Oil filter wrench
90890-01469
YM-01469

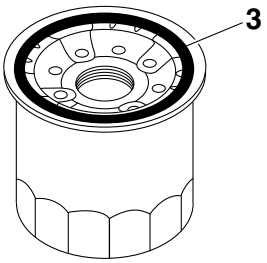


b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of lithium-soap-based grease.

ECA13390

NOTICE

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



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

Oil filter cartridge
17 Nm (1.7 m·kgf, 12 ft·lbf)

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6. Install:
   - Engine oil drain bolt
     (along with the gasket New)

TIP

Lubricate the O-ring of the engine oil drain bolt with a thin coat of lithium-soap-based grease.

Engine oil drain bolt
43 Nm (4.3 m·kgf, 31 ft·lbf)

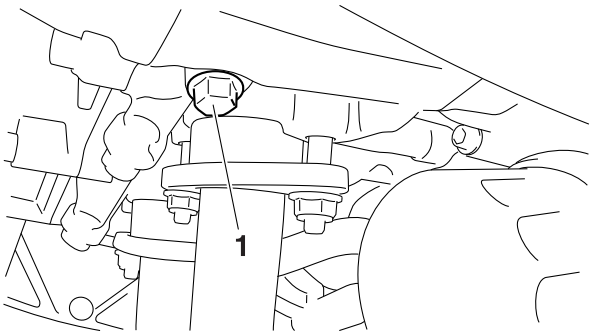
7. Fill:
   - Crankcase
     (with the specified amount of the recommended engine oil)

Engine oil quantity
Total amount
3.50 L (3.70 US qt, 3.08 Imp.qt)
Without oil filter cartridge replacement
2.70 L (2.85 US qt, 2.38 Imp.qt)
With oil filter cartridge replacement
2.90 L (3.07 US qt, 2.55 Imp.qt)

8. Install:
   - Engine oil filler cap
     (along with the O-ring New)
9. Start the engine, warm it up for several minutes, and then turn it off.
10. Check:
    - Engine
      (for engine oil leaks)
11. Check:
    - Engine oil level
      Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-25.
12. Check:
    - Engine oil pressure

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a. Remove the bottom side cowling and bottom center cowling.
   Refer to "GENERAL CHASSIS" on page 4-1.
b. Slightly loosen the oil check bolt "1".



c. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
d. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage.
   Refer to "OIL PUMP" on page 5-65.
e. Start the engine after solving the problem(s) and check the engine oil pressure again.

f. Tighten the oil check bolt to specification.

Engine oil check bolt
20 Nm (2.0 m·kgf, 14 ft·lbf)

g. Install the bottom side cowling and bottom center cowling.
Refer to "GENERAL CHASSIS" on page 4-1.

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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.

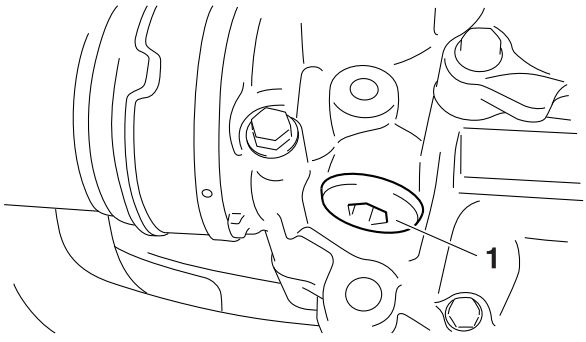
ECA13410
NOTICE

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:
   - Engine oil pressure check point plug "1" (Bottom of the crankcase)

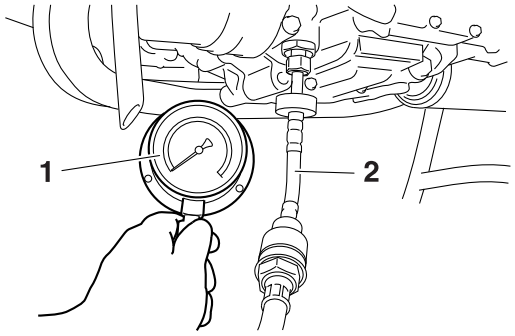
EWA12980
⚠ WARNING

The engine, muffler and engine oil are extremely hot.



4. Install:
   - Oil pressure gauge "1"
   - Adapter "2"

Oil pressure gauge set
90890-03120
or
Oil pressure adapter B
90890-03124
Pressure gauge
90890-03153
YU-03153



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

Oil pressure (hot)
120.0 kPa/1200 r/min (1.20 kgf/cm²/1200 r/min, 17.4 psi/1200 r/min)
Oil temperature
60.0–80.0 °C (140.00–176.00 °F)

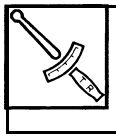
Out of specification → Adjust.

Engine oil pressure	Possible causes
Below specification	• Faulty oil pump • Clogged oil filter • Leaking oil passage • Broken or damaged oil seal
Above specification	• Leaking oil passage • Faulty oil filter • Oil viscosity too high

6. Install:
   - Engine oil pressure check point plug

TIP

Lubricate the O-ring of the engine oil pressure check point plug with a thin coat of lithium-soap-based grease.



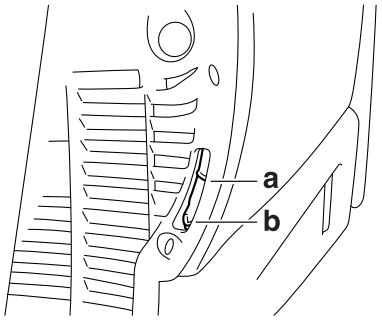
Engine oil pressure check point plug
12 Nm (1.2 m·kgf, 8.7 ft·lbf)

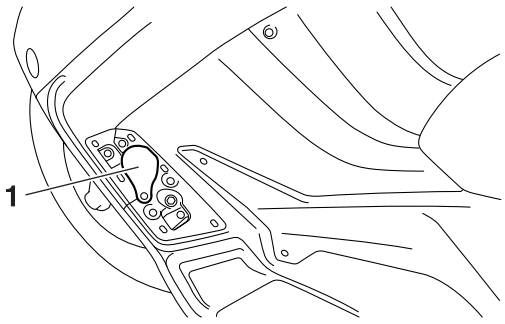
EAS21110
CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

TIP
- Place the vehicle on the centerstand.
- 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 left footboard mat, coolant reservoir cap access panel "1", and coolant reservoir cap, and then add the recommended coolant to the proper level.





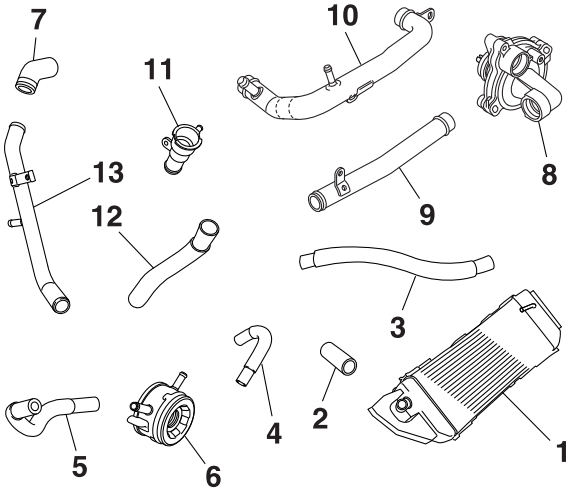
ECA13470
NOTICE
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**

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

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

EAS21120
CHECKING THE COOLING SYSTEM

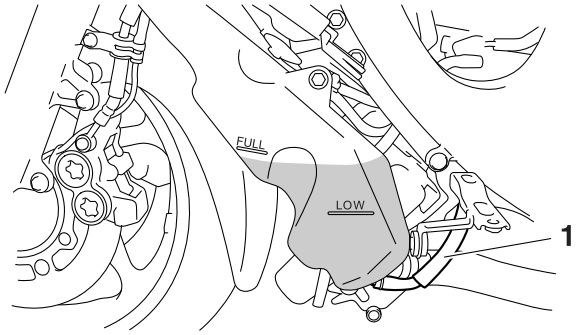
1. Remove:
   - Center cover
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Side covers
     Refer to "GENERAL CHASSIS" on page 4-1.
   - Footboards
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   - Radiator "1"
   - Radiator inlet hose "2"
   - Radiator outlet hose "3"
   - Oil cooler inlet hose "4"
   - Oil cooler outlet hose "5"
   - Oil cooler "6"
   - Thermostat outlet hose "7"
   - Water pump "8"
   - Water pump inlet pipe "9"
   - Water pump outlet pipe "10"
   - Radiator filler pipe "11"
   - Radiator filler hose "12"
   - Coolant pipe "13"
     Cracks/damage → Replace.
     Refer to "RADIATOR" on page 6-1, "THERMOSTAT" on page 6-7 and "WATER PUMP" on page 6-9.



3. Install:
   - Footboards
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Side covers
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.

EAS21131
CHANGING THE COOLANT

1. Remove:
   - Center cover
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Side cover (left)
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Footboard (left)
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
   - Coolant reservoir hose “1”

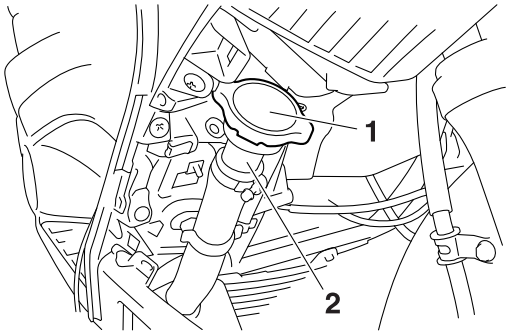


3. Drain:
   - Coolant
     (from the coolant reservoir)
4. Remove:
   - Radiator cap “1”

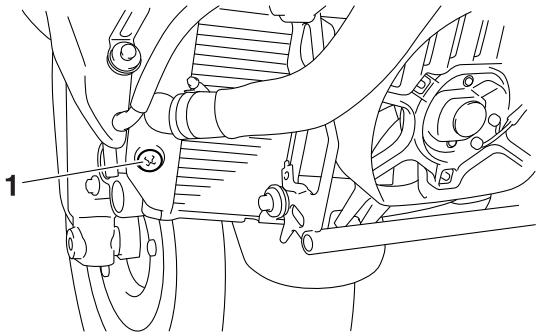
EWA13030
WARNING

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.

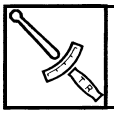
TIP
When removing the radiator cap, hold the radiator filler pipe “2”.



5. Remove:
   - Coolant drain bolt “1”
     (along with the O-ring)



6. Drain:
   - Coolant
     (from the engine and radiator)
7. Install:
   - Coolant drain bolt
     (along with the O-ring New)

	**Coolant drain bolt** **1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)**

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

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Radiator capacity (including all routes)
1.50 L (1.59 US qt, 1.32 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)
0.27 L (0.29 US qt, 0.24 Imp.qt)

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

EWA13040

WARNING

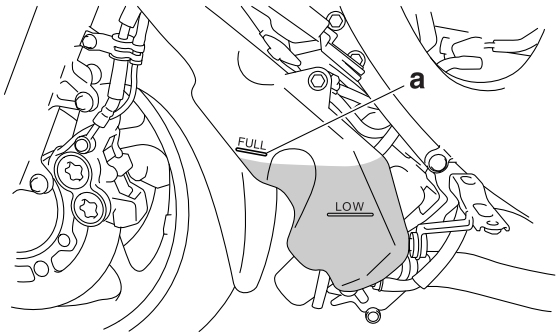
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

ECA13480

NOTICE

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

10. Install:
    - Radiator cap
11. Fill:
    - Coolant reservoir
      (with the recommended coolant to the maximum level mark “a”)



12. Install:
    - Coolant reservoir cap
13. Start the engine, warm it up for several minutes, and then stop it.
14. Check:
    - Coolant level
      Refer to “CHECKING THE COOLANT LEVEL” on page 3-29.

TIP

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

15. Install:
    - Footboard (left)
      Refer to “GENERAL CHASSIS” on page 4-1.
    - Side cover (left)
      Refer to “GENERAL CHASSIS” on page 4-1.
    - Center cover
      Refer to “GENERAL CHASSIS” on page 4-1.

EAS4B51007

REPLACING THE V-BELT

1. Remove:
    - Center cover
      Refer to “GENERAL CHASSIS” on page 4-1.
    - Side cover (right)
      Refer to “GENERAL CHASSIS” on page 4-1.
    - Footboard (right)
      Refer to “GENERAL CHASSIS” on page 4-1.
    - Outer V-belt case
      Refer to “V-BELT AUTOMATIC TRANSMISSION” on page 5-39.

2. Check:
   • V-belt
   Cranks/damage/wear → Replace.
   Grease/oil → Clean the primary and secondary pulleys.
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.

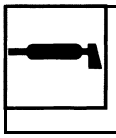
TIP
Replace the V-belt every 20000 km (12500 mi) of operation.

3. Install:
   • Outer V-belt case
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.
   • Footboard (right)
   Refer to "GENERAL CHASSIS" on page 4-1.
   • Side cover (right)
   Refer to "GENERAL CHASSIS" on page 4-1.
   • Center cover
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS30960
CHECKING THE BRAKE LIGHT SWITCHES
1. Check:
   • Front brake light switch operation
   • Rear brake light switch operation
   When operating the brake lever, confirm that the brake light comes on.
   Faulty → Refer to "CHECKING THE SWITCHES" on page 8-123.

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.

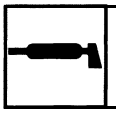
1. Check:
   • Outer cable
   Damage → Replace.
2. Check:
   • Cable operation
   Rough movement → Lubricate.



Recommended lubricant
Engine oil or a suitable cable lubricant

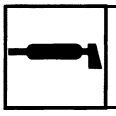
TIP
Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubricating device.

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

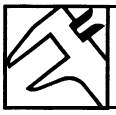
EAS30890
CHECKING THE THROTTLE GRIP
1. Check:
   • Throttle cables
   Damage/deterioration → Replace.
   • Throttle cable installation
   Incorrect → Reinstall the throttle cables.
   Refer to "HANDLEBAR" on page 4-76.
2. Check:
   • Throttle grip movement
   Rough movement → Lubricate or replace the defective part(s).



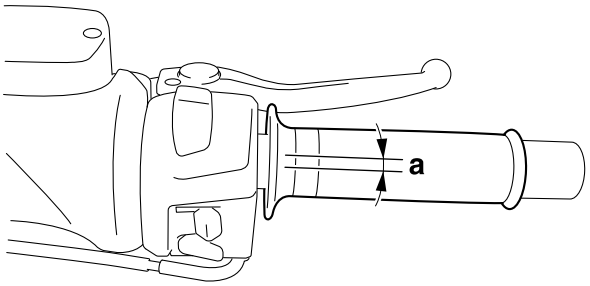
Recommended lubricant
Suitable cable lubricant

TIP
With the engine stopped, turn the throttle grip slowly and release it. Make sure that the throttle grip turns smoothly and returns properly when released.
Repeat this check with the handlebar turned all the way to the left and right.

3. Check:
   • Throttle grip free play "a"
   Out of specification → Adjust.



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



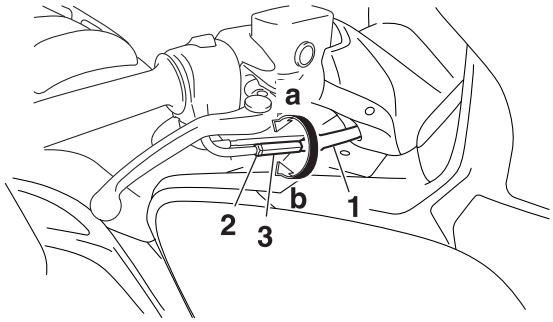
4. Adjust:
   • Throttle grip free play

TIP
Prior to adjusting the throttle grip free play, throttle body synchronization should be adjusted properly.

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a. Slide back the rubber cover "1".
b. Loosen the locknut "2".
c. Turn the adjusting nut "3" in direction "a" or "b" until the specified throttle grip free play is obtained.

Direction "a"
Throttle grip free play is increased.
Direction "b"
Throttle grip free play is decreased.



d. Tighten the locknut.

Locknut
3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)

e. Slide the rubber cover to its original position.

TIP
Make sure that the adjusting nut is covered completely by the rubber cover.

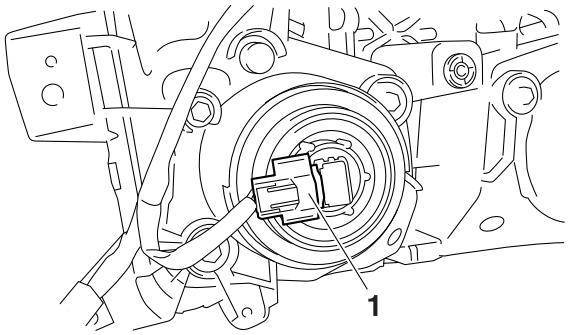
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EAS21760
CHECKING AND CHARGING THE BATTERY
Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-127.

EAS21770
CHECKING THE FUSES
Refer to "CHECKING THE FUSES" on page 8-127.

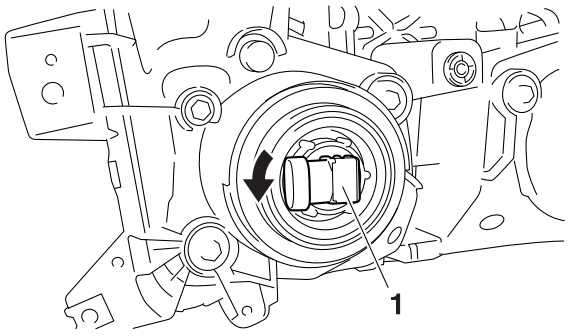
EAS21790
REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.

1. Remove:
   • Front cover
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   • Headlight coupler "1"



3. Remove:
   • Headlight bulb "1"

EWA13320
⚠ WARNING
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.



4. Install:
   • Headlight bulb New

ECA13690

NOTICE

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.

5. Connect:
   - Headlight coupler
6. Install:
   - Front cover
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS21810

ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

1. Adjust:
   - Headlight beam (vertically)

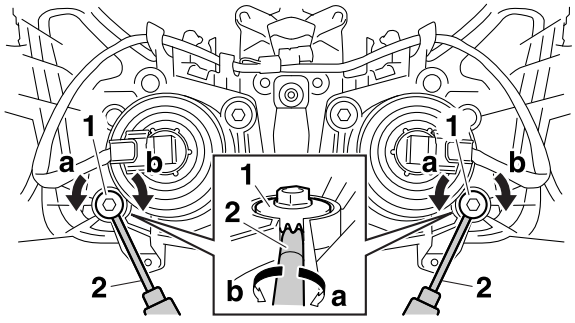
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a. Turn the adjusting screw "1" in direction "a" or "b".

TIP

Other than the socket wrench, the adjusting screws can be turned with a screwdriver (Phillips No. 2) "2" as shown in the illustration.

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



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2. Adjust:
   - Headlight beam (horizontally)

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

TIP

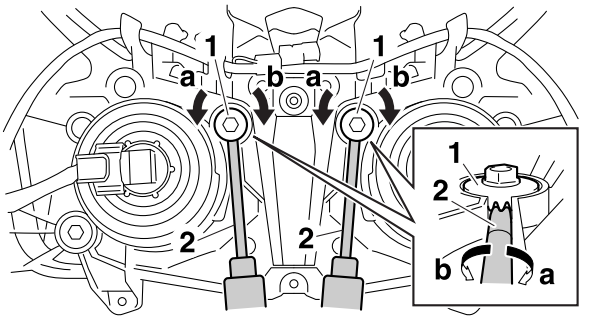
Other than the socket wrench, the adjusting screws can be turned with a screwdriver (Phillips No. 2) "2" as shown in the illustration.

Left headlight

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

Right headlight

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



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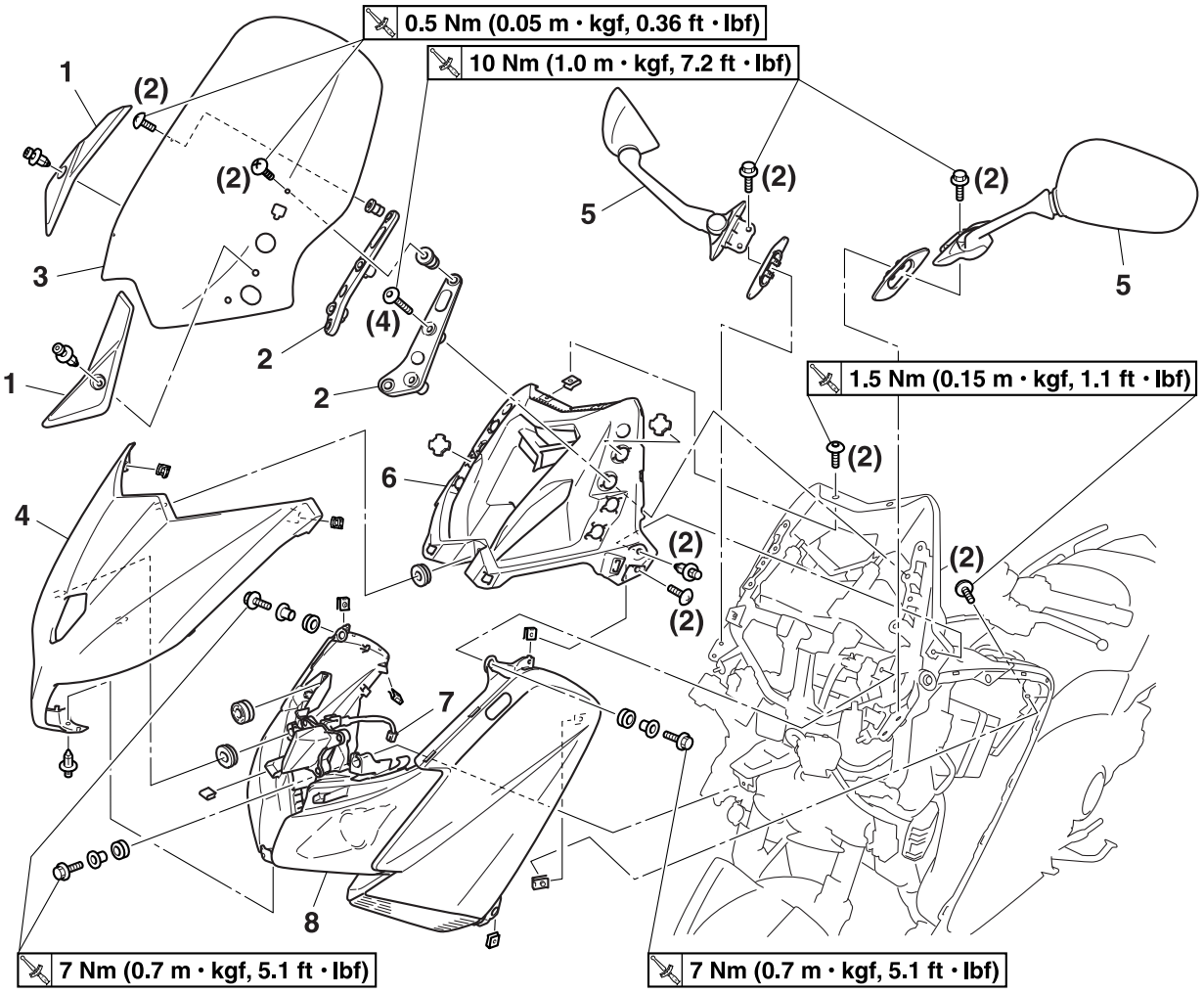
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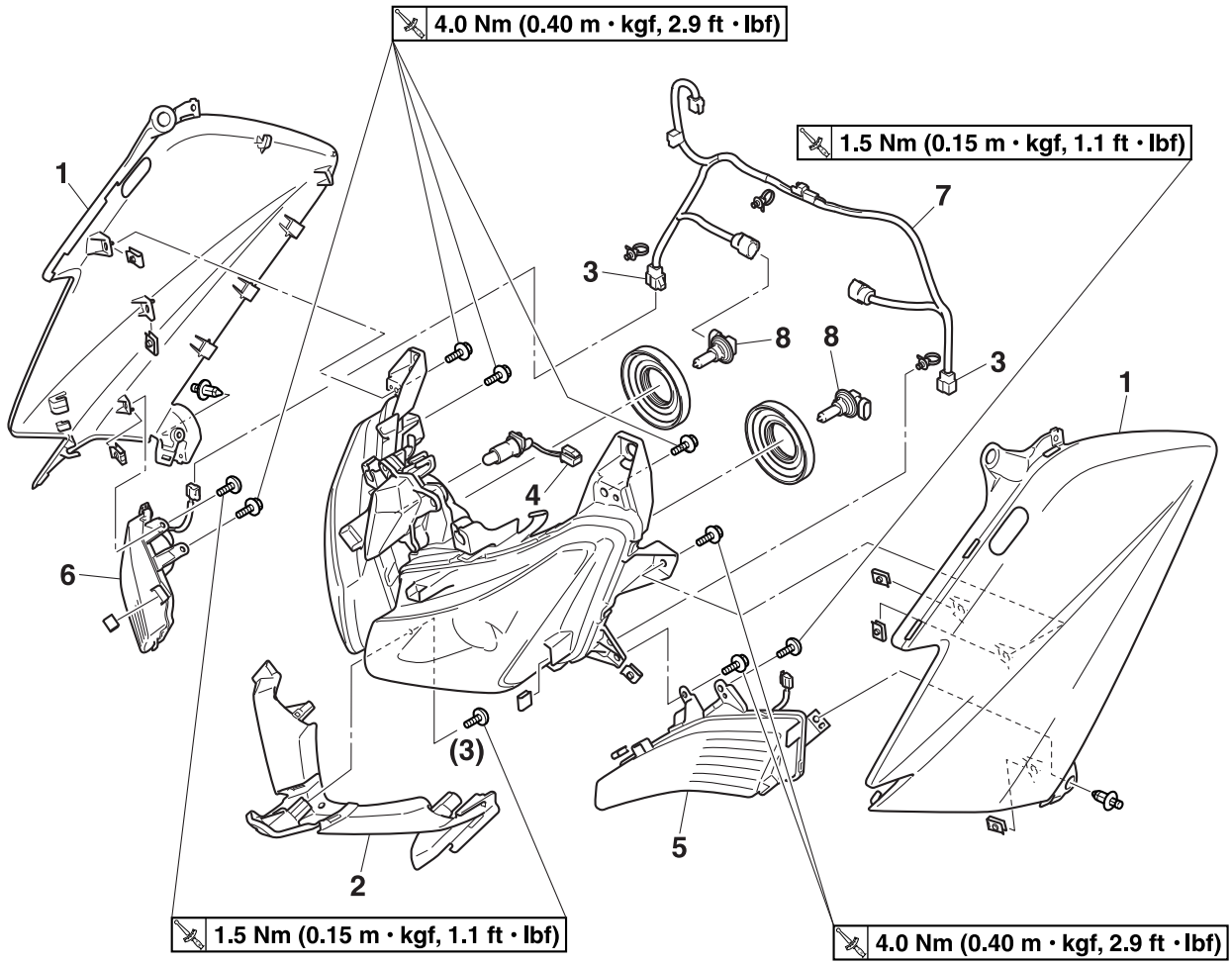
EAS21830
GENERAL CHASSIS

Removing the windshield and front cowling assembly



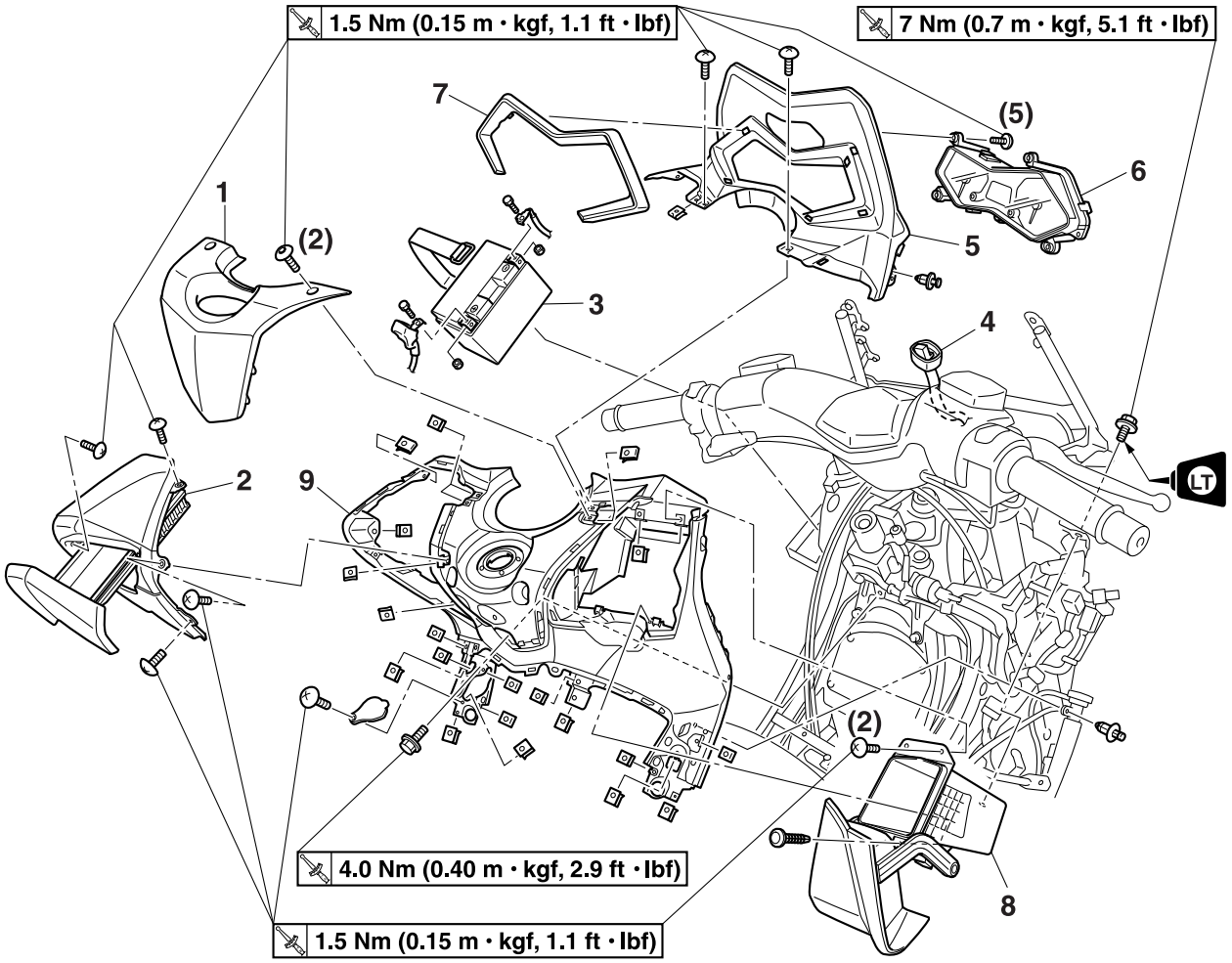
Order	Job/Parts to remove	Q'ty	Remarks
	Front left storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Radiator cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Side panel		Refer to "GENERAL CHASSIS" on page 4-1.
1	Windshield cover	2	
2	Windshield bracket	2	
3	Windshield	1	
4	Front cover	1	
5	Rear view mirror	2	
6	Windshield inner panel	1	
7	Headlight sub-wire harness coupler	1	Disconnect.
8	Front cowling assembly	1	
			For installation, reverse the removal procedure.

Disassembling the front cowling assembly



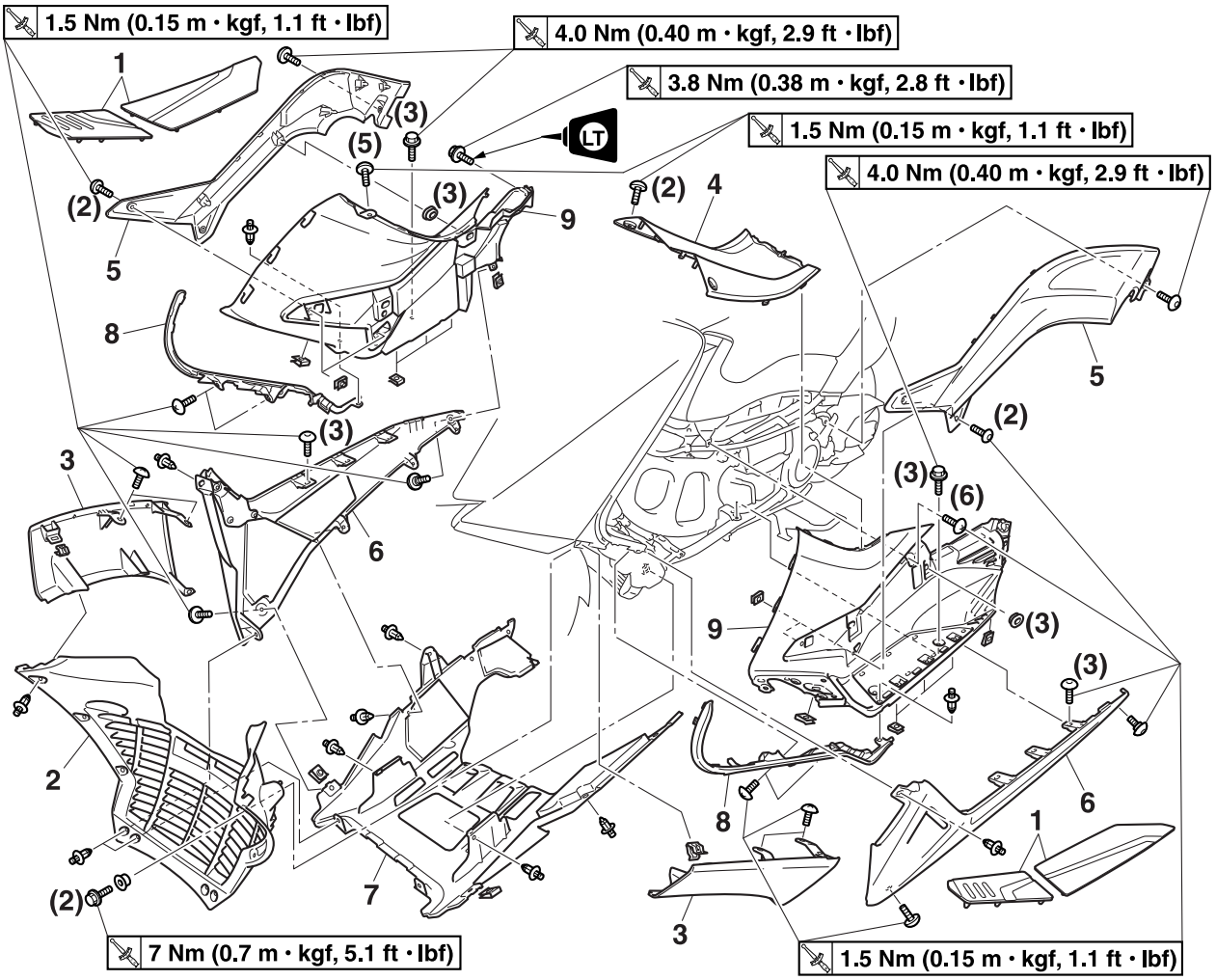
Order	Job/Parts to remove	Q'ty	Remarks
1	Side cowling	2	
2	Headlight under panel	1	
3	Turn signal light coupler	2	Disconnect.
4	Auxiliary light coupler	1	Disconnect.
5	Left turn signal light	1	
6	Right turn signal light	1	
7	Headlight sub-wire harness	1	
8	Headlight bulb	2	
			For assembly, reverse the disassembly procedure.

Removing the storage compartment



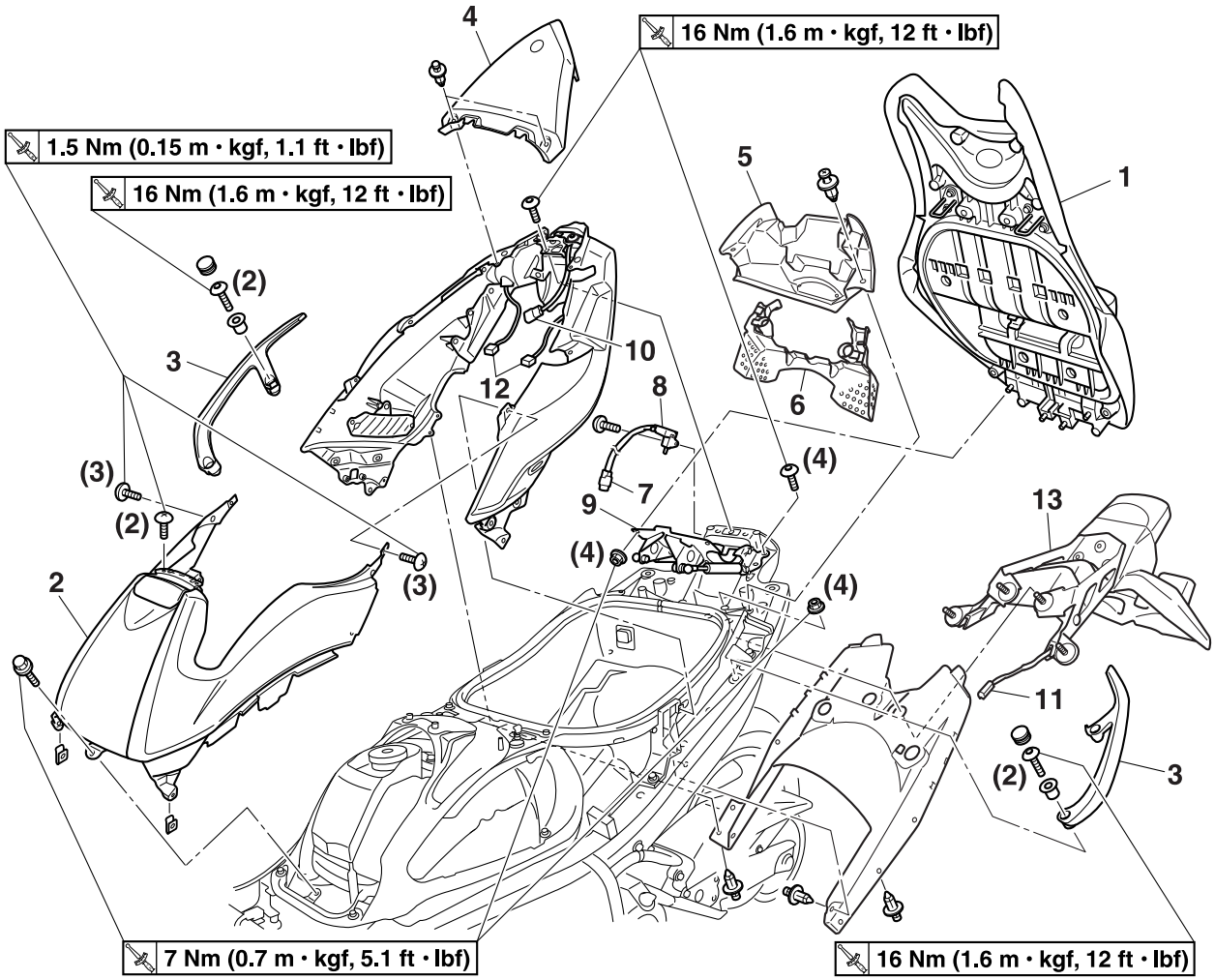
Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
1	Inner panel center cover	1	
2	Front left storage box	1	
3	Battery	1	
4	Meter coupler	1	Disconnect.
5	Meter panel assembly	1	
6	Meter assembly	1	
7	Meter cover	1	
8	Front right storage box	1	
9	Storage compartment	1	
			For installation, reverse the removal procedure.

Removing the bottom cowling



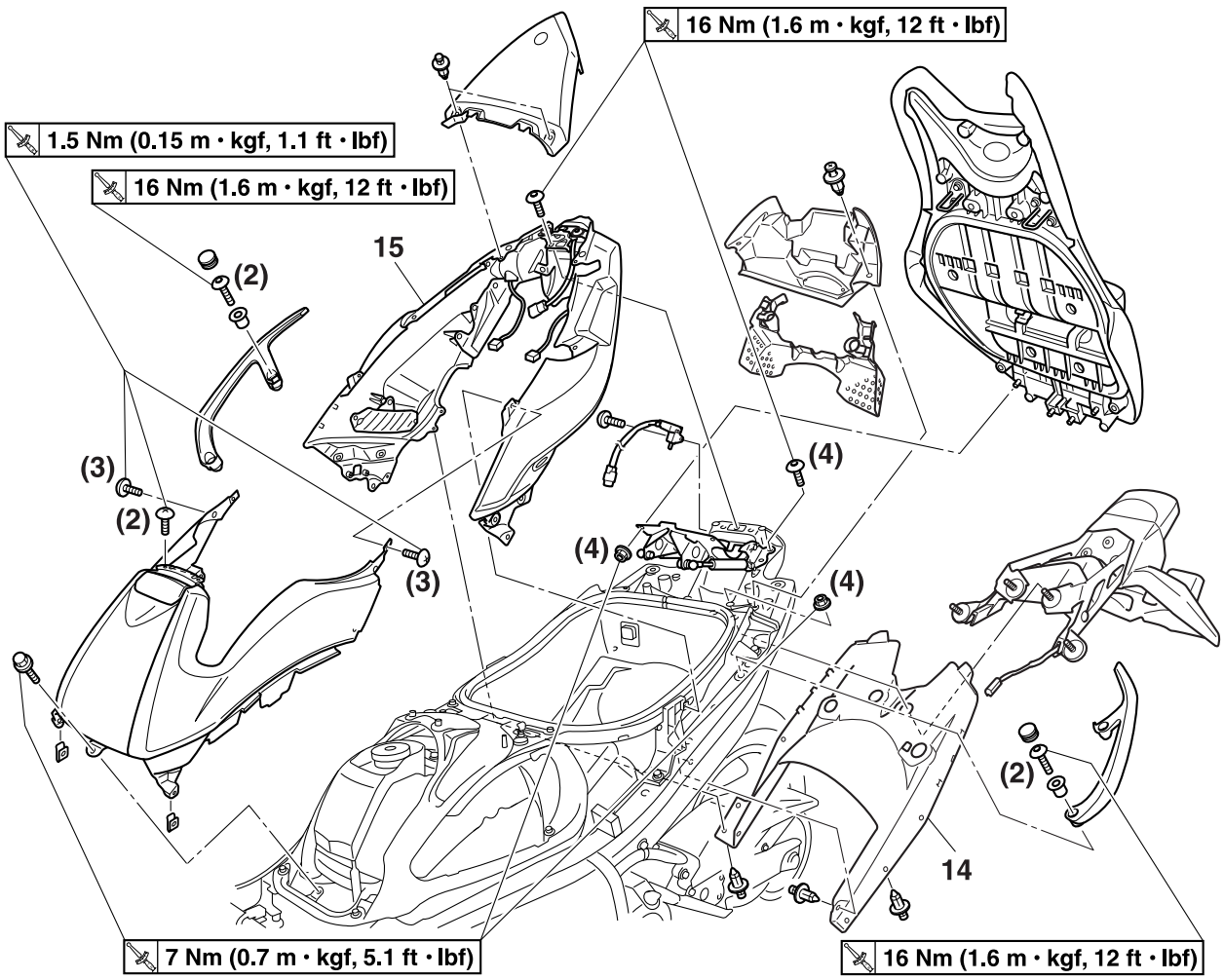
Order	Job/Parts to remove	Q'ty	Remarks
1	Footboard mat	4	
2	Radiator cover	1	
3	Side panel	2	
4	Center cover	1	
5	Side cover	2	
6	Bottom side cowling	2	
7	Bottom center cowling	1	
8	Side cover moulding	2	
9	Footboard	2	
			For installation, reverse the removal procedure.

Removing the rear cowling assembly



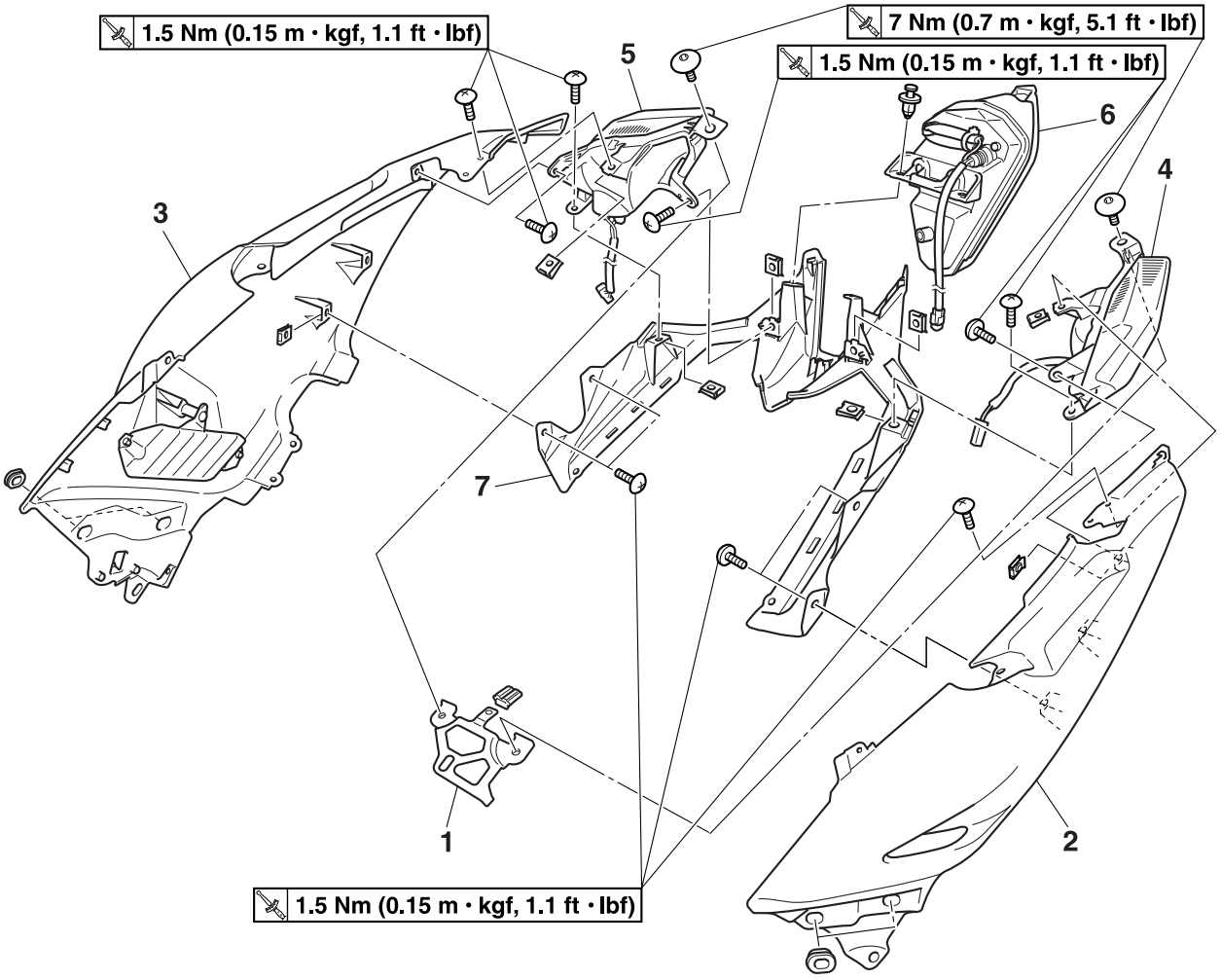
Order	Job/Parts to remove	Q'ty	Remarks
	Side panel		Refer to "GENERAL CHASSIS" on page 4-1.
	Footboard		Refer to "GENERAL CHASSIS" on page 4-1.
	O_2 sensor lead		Refer to "ENGINE REMOVAL" on page 5-3.
1	Seat	1	
2	Fuel tank cover	1	
3	Grab bar	2	
4	Rear cover	1	
5	Taillight lead cover	1	
6	Taillight lead guide	1	
7	Storage box light switch coupler	1	Disconnect.
8	Storage box light switch	1	
9	Seat hinge assembly	1	
10	Taillight assembly coupler	1	Disconnect.
11	License plate light lead coupler	1	Disconnect.
12	Rear turn signal light lead coupler	2	Disconnect.
13	Mud guard	1	

Removing the rear cowling assembly



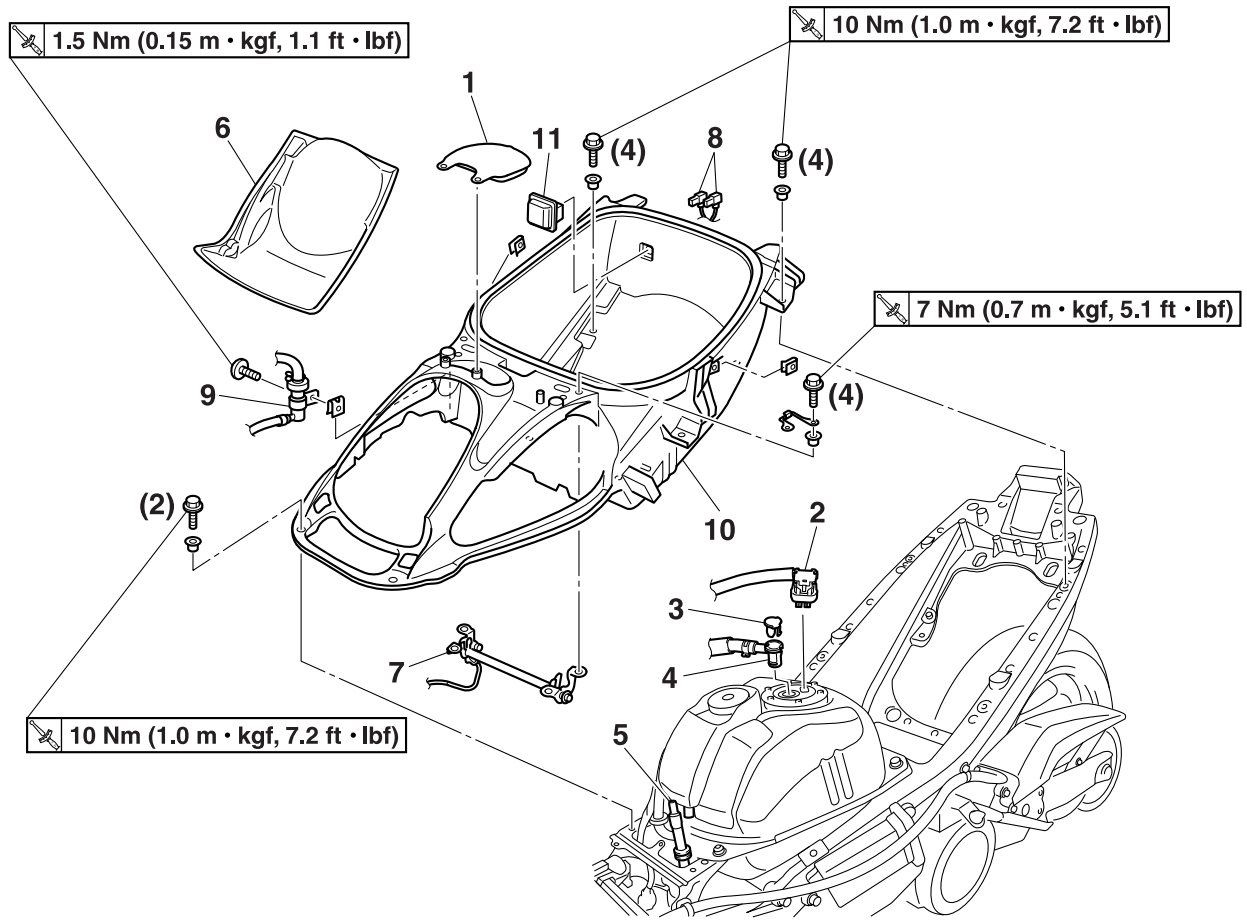
Order	Job/Parts to remove	Q'ty	Remarks
14	Rear fender	1	
15	Rear cowling assembly	1	
			For installation, reverse the removal procedure.

Disassembling the rear cowling assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Taillight bracket	1	
2	Left rear cowling	1	
3	Right rear cowling	1	
4	Left turn signal light	1	
5	Right turn signal light	1	
6	Taillight	1	
7	Taillight cover	1	
			For assembly, reverse the disassembly procedure.

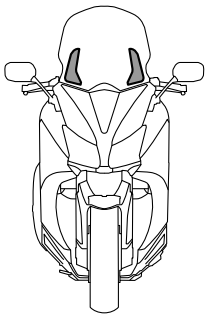
Removing the storage box



Order	Job/Parts to remove	Q'ty	Remarks
1	Fuel pump coupler access cover	1	
2	Fuel pump coupler	1	Disconnect.
3	Fuel hose connector cover	1	
4	Fuel hose	1	Disconnect.
5	Fuel tank overflow hose	1	
6	Storage box inner mat	1	
7	Seat lock	1	
8	Storage box light connector	2	Disconnect.
9	Rollover valve stay	1	
10	Storage box	1	
11	Storage box light	1	
			For installation, reverse the removal procedure.

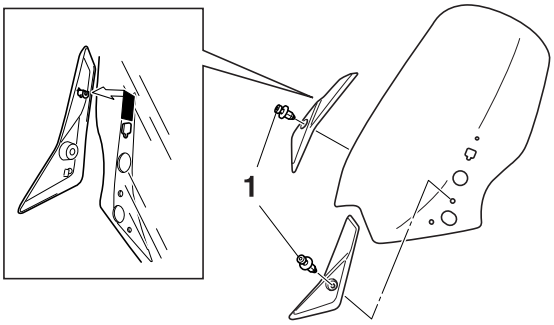
EAS59C1407
REMOVING THE WINDSHIELD

1. Remove:
   • Windshield cover



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a. Remove the quick fastener “1”.



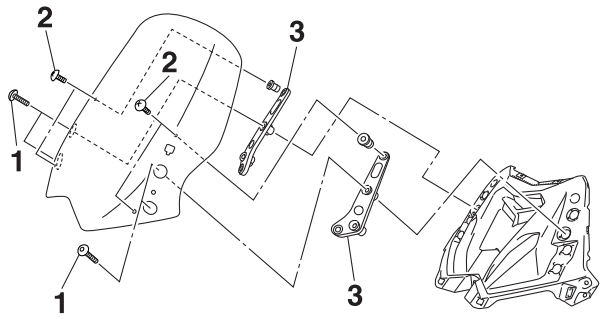
b. Slide it upwards and pull it toward you.

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2. Remove:
   • Windshield

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a. Removing the windshield bracket bolts “1”.
b. Removing the windshield assembly.
c. Removing the windshield screws “2”.
d. Removing the windshield brackets “3”.



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EAS59C1408
INSTALLING THE WINDSHIELD

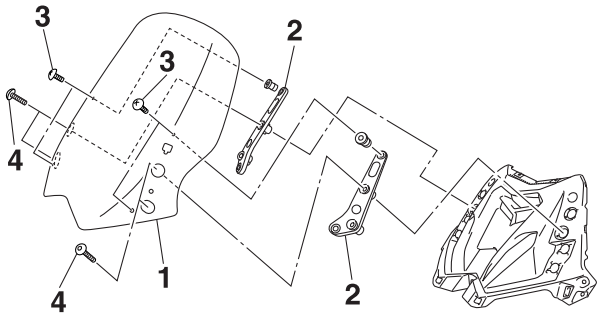
1. Install:
   • Windshield

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a. Assembling the windshield “1” and windshield brackets “2” with the windshield screws “3”.
b. Installing the windshield assembly with the windshield bracket bolts “4”.

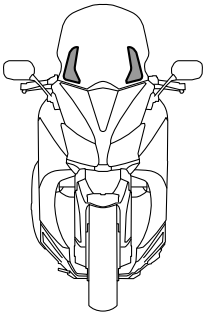


Windshield screw
0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)
Windshield bracket bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)



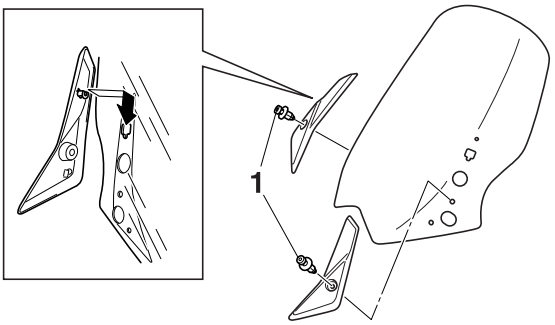
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2. Install:
   • Windshield cover



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a. Insert the projection into the hole and slide it downwards.
b. Installing the quick fastener “1”.



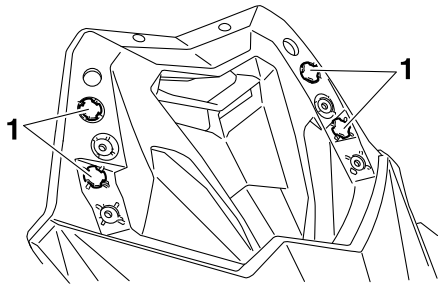
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EAS59C1427
ADJUSTING THE WINDSHIELD HEIGHT

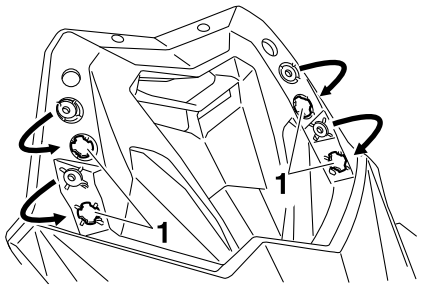
1. Adjust:
   • Windshield height

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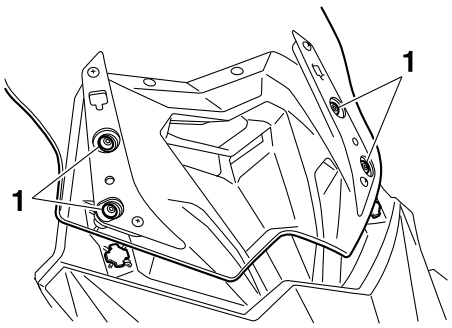
a. Remove the windshield cover and windshield assembly.
   Refer to "REMOVING THE WINDSHIELD" on page 4-9.
b. Remove the rubber caps "1".



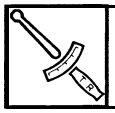
c. Install the rubber caps "1" in the desired position.



d. Install the windshield assembly to the desired position by installing the bolts "1".



e. Tighten the bolts to the specified torque.

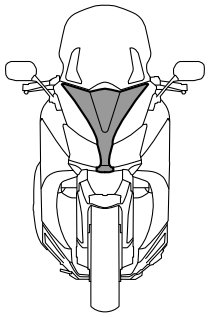
	**Windshield bracket bolt** **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

f. Installing the windshield cover.
   Refer to "INSTALLING THE WINDSHIELD" on page 4-9.

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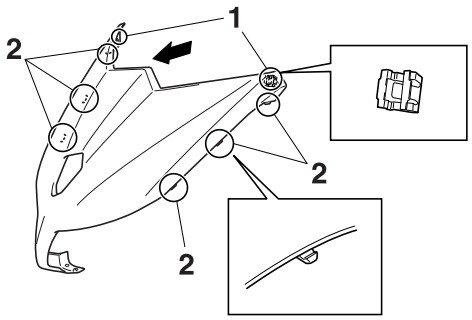
EAS59C1409
REMOVING THE FRONT COVER

1. Remove:
   • Front cover

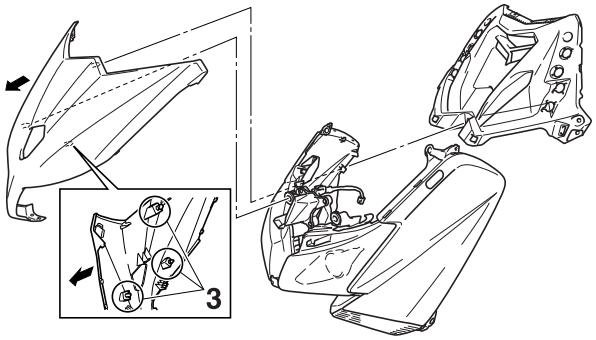


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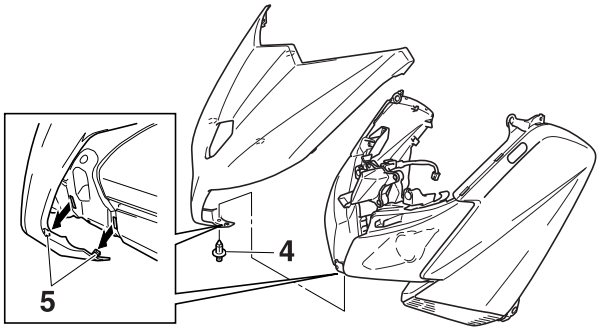
a. Remove the two metal clips "1" and six claws "2" from the front cover.



b. Pull the three projections "3" of the front cover to the front side and remove them.



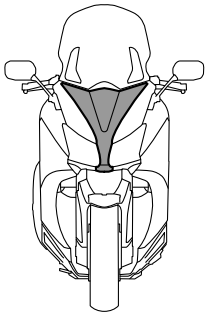
c. Remove the quick fastener "4".
d. Remove the two claws "5" from the end of the front cover.



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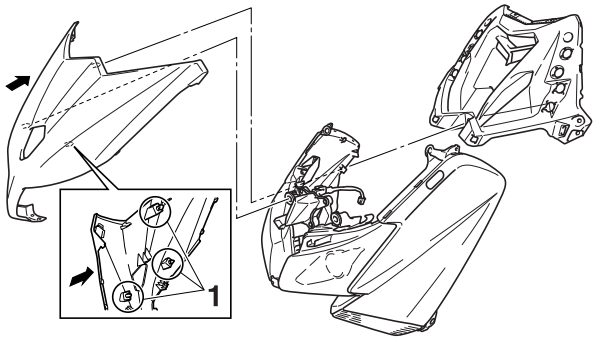
EAS59C1410
INSTALLING THE FRONT COVER

1. Install:
   • Front cover

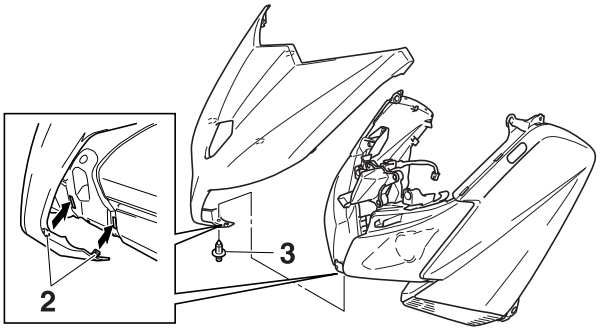


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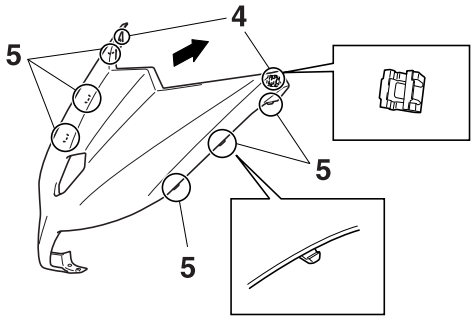
a. Insert the three projections “1” of the front cover.



b. Fit the two claws “2” of the end of the front cover.
c. Installing the quick fastener “3”.



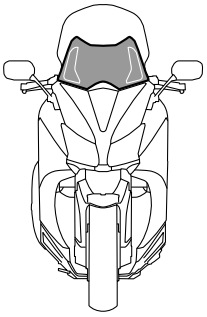
d. Fit the two metal clips “4” and six claws “5” of the front cover.



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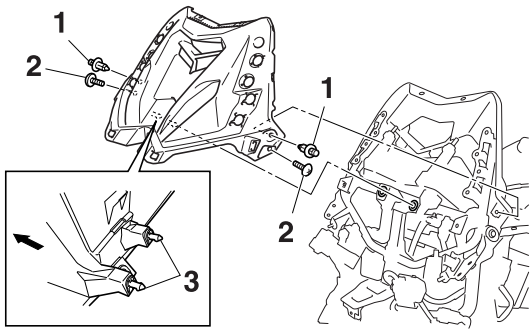
EAS59C1411
REMOVING THE WINDSHIELD INNER PANEL

1. Remove:
   • Windshield inner panel



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a. Removing the quick fasteners “1”.
b. Removing the bolts “2”.
c. Pull the two projections “3” of the windshield inner panel to the front side and remove them.

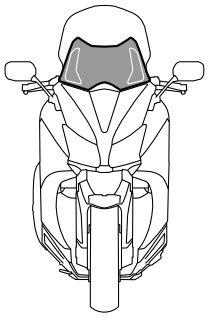


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EAS59C1412

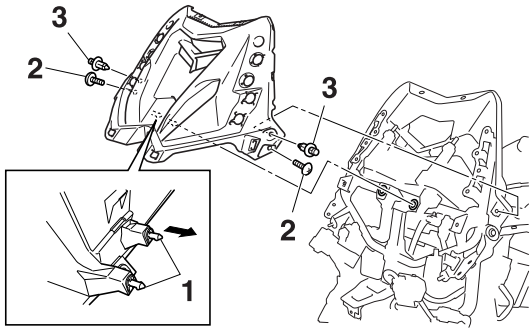
INSTALLING THE WINDSHIELD INNER PANEL

1. Install:
   - Windshield inner panel



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a. Insert the two projections “1” of the windshield inner panel.
b. Installing the bolts “2”.
c. Installing the quick fasteners “3”.

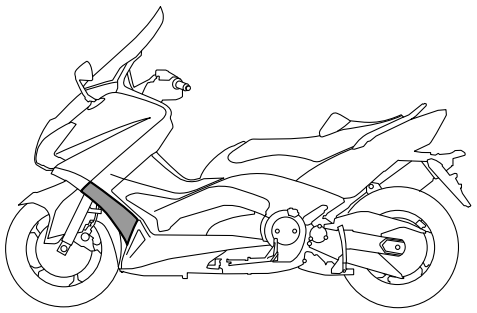


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EAS59C1413

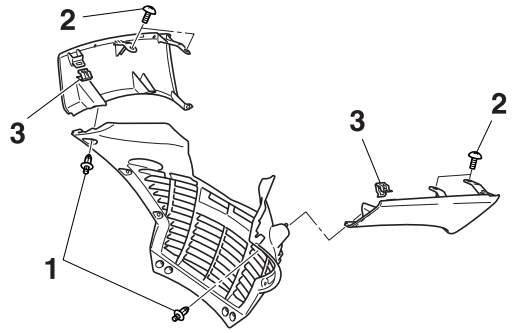
REMOVING THE SIDE PANEL

1. Remove:
   - Side panel



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a. Removing the quick fasteners “1”.
b. Removing the screws “2”.
c. Remove the metal clip “3”.

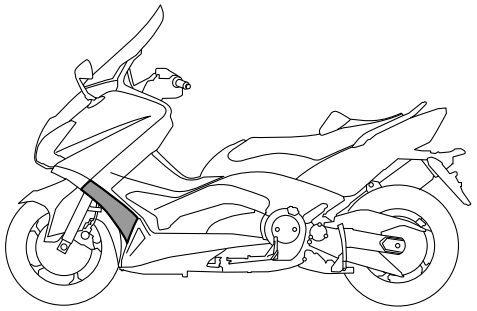


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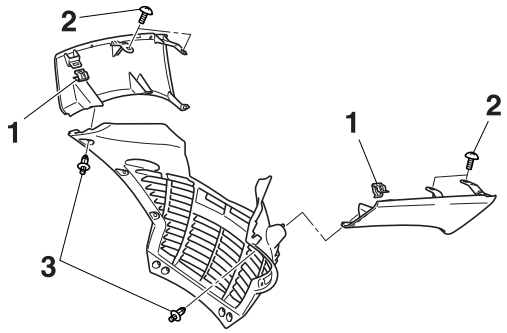
INSTALLING THE SIDE PANEL

1. Install:
   - Side panel



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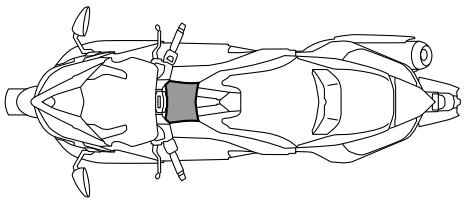
a. Insert the metal clip “1”.
b. Installing the screws “2”.
c. Installing the quick fasteners “3”.



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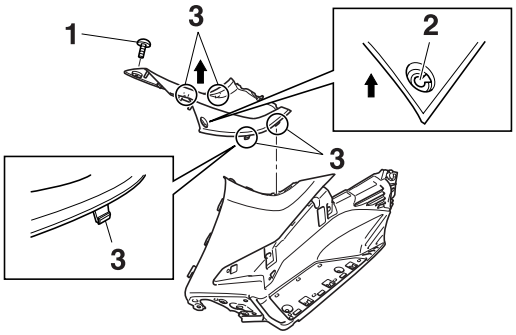
EAS59C1415
REMOVING THE CENTER COVER

1. Remove:
   • Center cover



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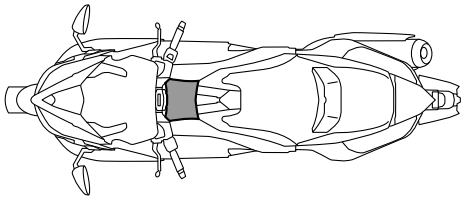
a. Removing the screws “1”.
b. Use an appropriate hook from the service hole “2” to raise the center cover.
c. When the center cover is raised, pull the center cover upwards and remove the four claws “3”.



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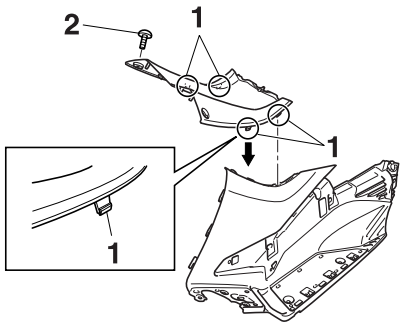
EAS59C1416
INSTALLING THE CENTER COVER

1. Install:
   • Center cover



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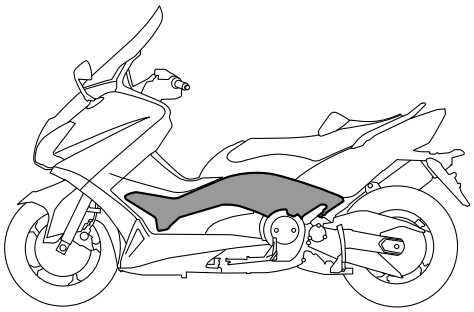
a. Insert the four claws “1”.
b. Installing the screws “2”.



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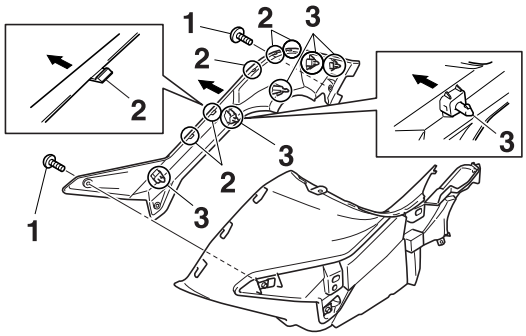
EAS59C1417
REMOVING THE SIDE COVER

1. Remove:
   • Side cover



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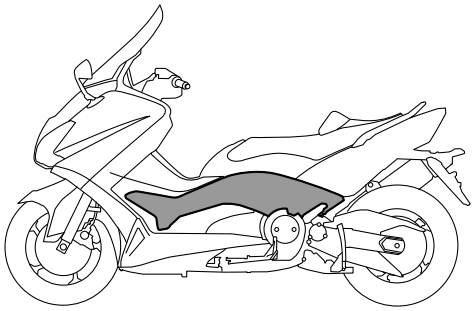
a. Removing the bolts “1”.
b. Pull the five claws “2” outside of the vehicle and raise them.
c. When the side cover is raised, pull the side cover outsides of the vehicle and remove the five projections “3”.



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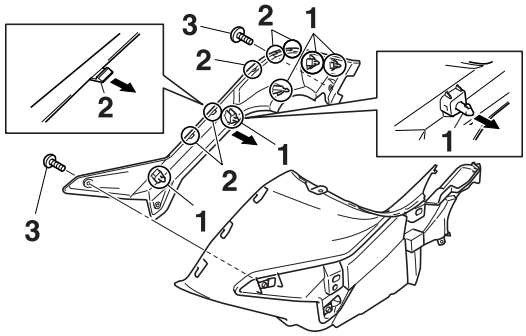
EAS59C1418
INSTALLING THE SIDE COVER

1. Install:
   • Side cover



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a. Insert the five projections “1”.
b. Insert the five claws “2”.
c. Installing the bolts “3”.

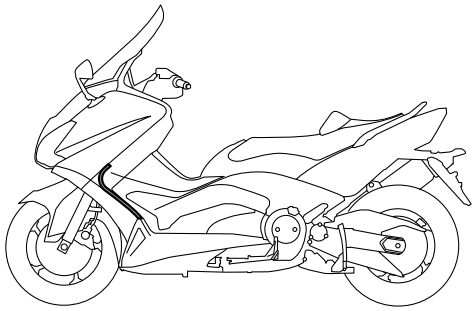


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EAS59C1419

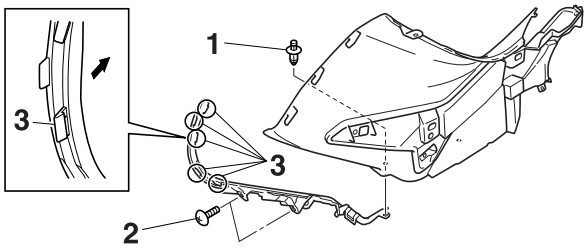
REMOVING THE SIDE COVER MOULDING

1. Remove:
   • Side cover moulding



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a. Removing the quick fastener “1”.
b. Removing the screws “2”.
c. Pull the side moulding outside of the vehicle and remove the five claws “3”.

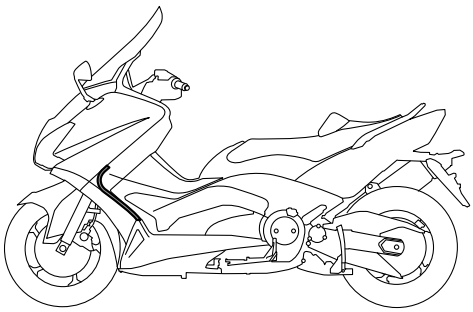


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EAS59C1420

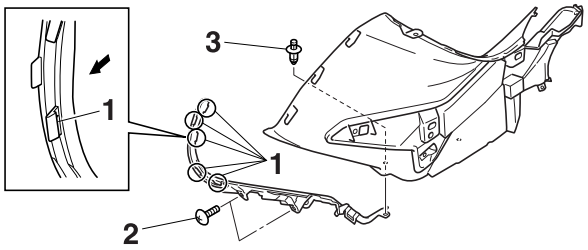
INSTALLING THE SIDE COVER MOULDING

1. Install:
   • Side cover moulding



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a. Insert the five claws “1”.
b. Installing the screws “2”.
c. Installing the quick fastener “3”.

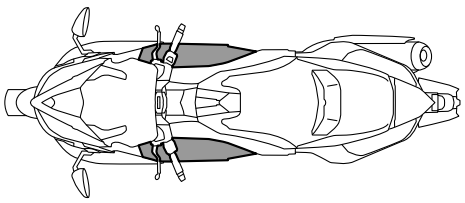


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EAS59C1421

REMOVING THE FOOTBOARD

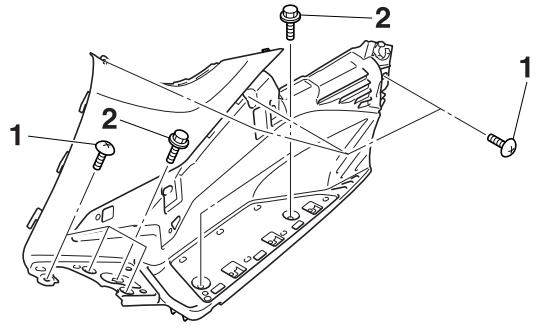
1. Remove:
   • Footboard



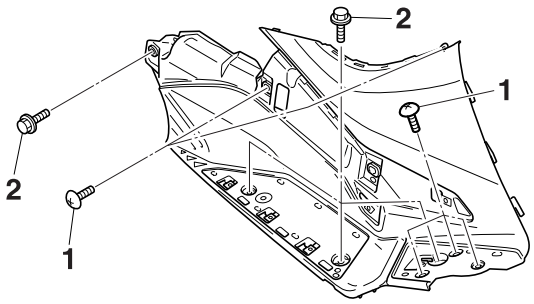
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a. Removing the screws “1”.
b. Removing the bolts “2”.

A

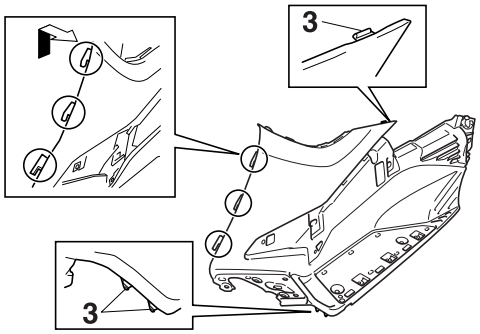


B



A. Left side
B. Right side

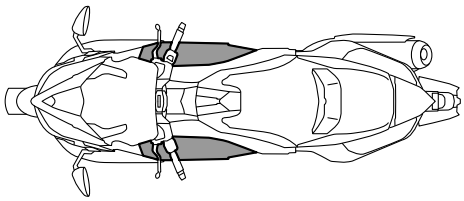
c. Remove the three claws “3”.
d. Slide the footboard upwards, pull it toward you, and then remove it.



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EAS59C1422
INSTALLING THE FOOTBOARD

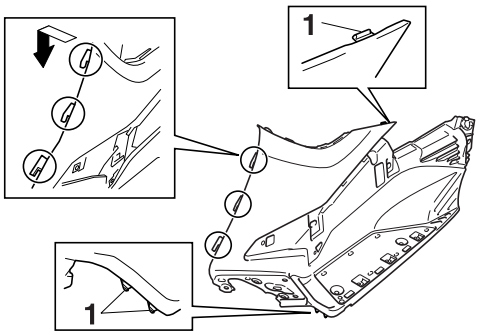
1. Install:
   • Footboard



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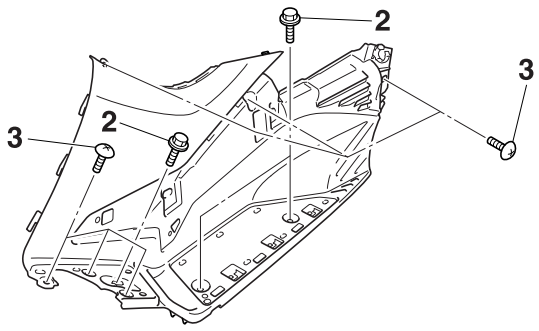
a. Insert the three hooks of the footboard.

b. Fit the three claws “1”.

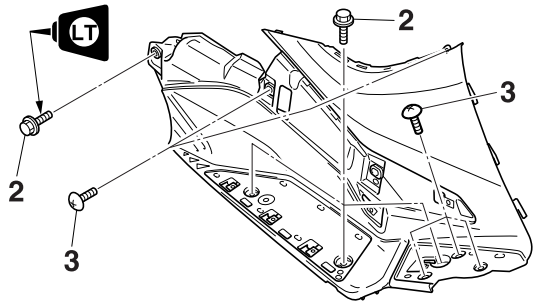


c. Installing the bolts “2”.
d. Installing the screws “3”.

A



B

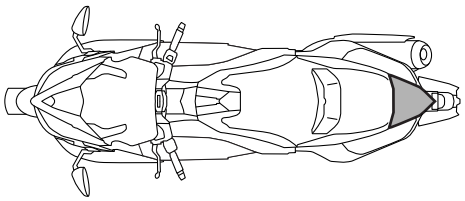


A. Left side
B. Right side

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EAS59C1423
REMOVING THE REAR COVER

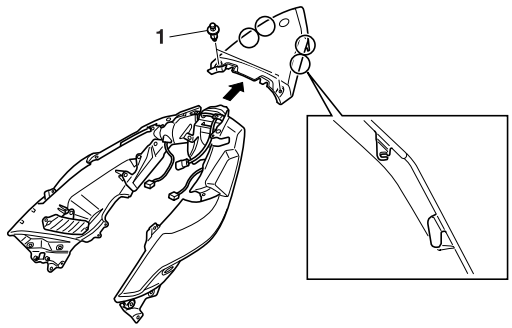
1. Remove:
   • Rear cowling



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a. Removing the quick fasteners “1”.

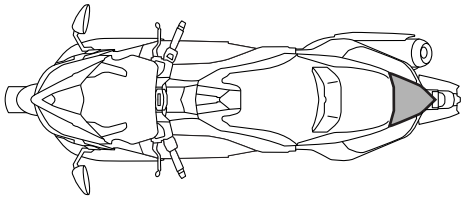
b. Holding the rear side of the rear cover and slightly applying a force upward, slide the cover rearward to remove it.



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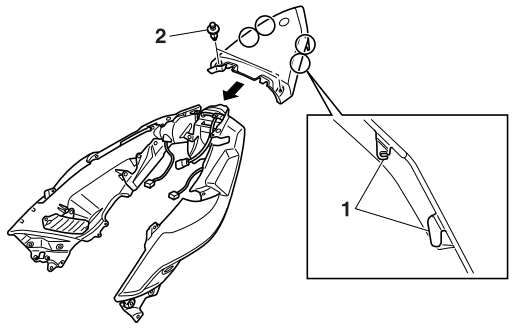
EAS59C1424
INSTALLING THE REAR COVER

1. Install:
   • Rear cowling



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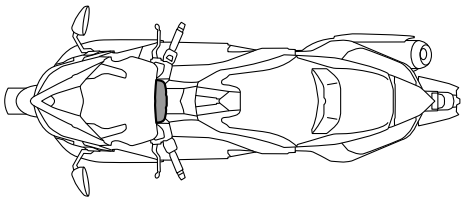
a. Insert the four claws “1” of the rear cover though the holes of the rear cowling assembly. Slide the cover forward to install it.
b. Installing the quick fasteners “2”.



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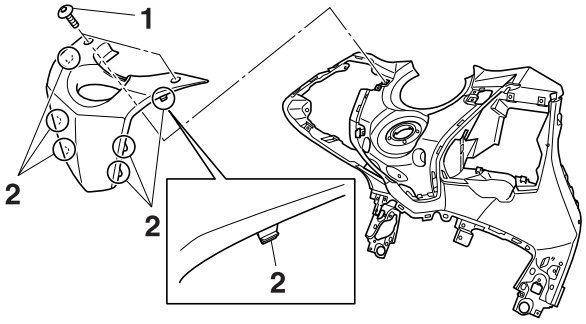
EAS59C1425
REMOVING THE INNER PANEL CENTER COVER

1. Remove:
   • Inner panel center cover



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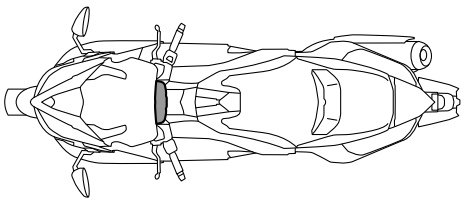
a. Removing the screws “1”.
b. There are six claws “2”. Remove them, starting from the top.



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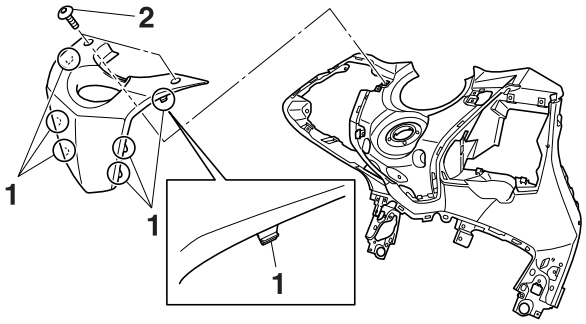
EAS59C1426
INSTALLING THE INNER PANEL CENTER COVER

1. Install:
   • Inner panel center cover



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a. Fit the six claws “1”, starting from the bottom.
b. Installing the screws “2”.



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EAS59C1428
REMOVING THE FUEL HOSE

1. Remove:
   • Fuel hose connector cover “1”
2. Disconnect:
   • Fuel hose “2”

EWA15910
⚠ WARNING

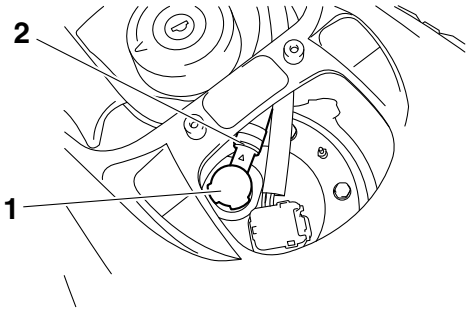
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

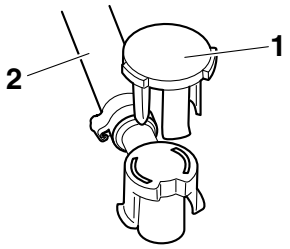
ECA59C1701
NOTICE

- **Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**
- **Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.**
- **Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.**

TIP

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





EAS59C1429
INSTALLING THE FUEL HOSE

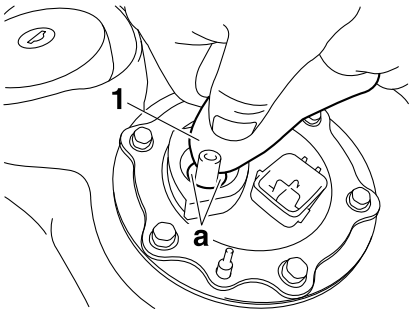
1. Connect:
   • Fuel hose
2. Install:
   • Fuel hose connector cover

ECA59C1702
NOTICE

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

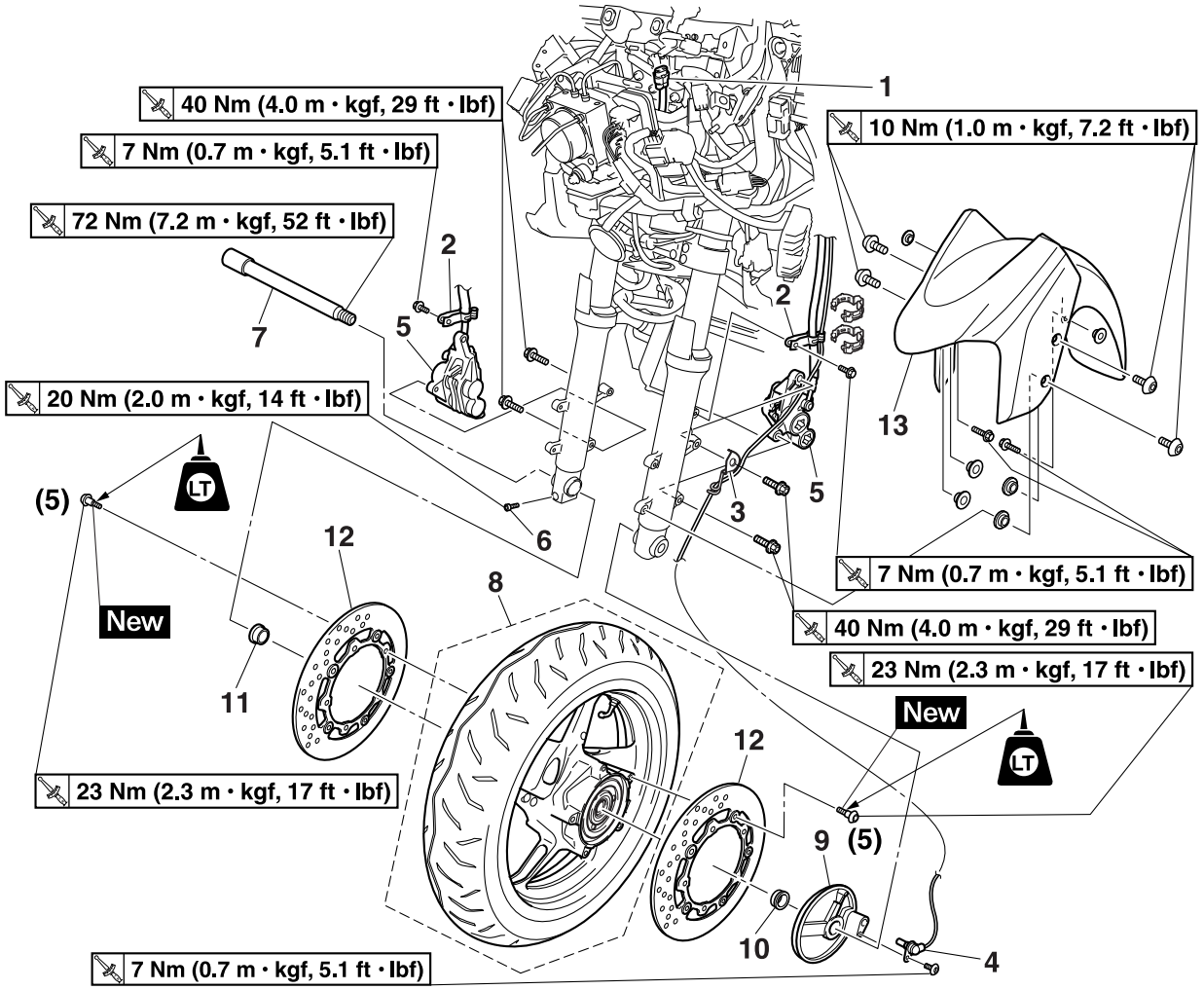
TIP

- Wipe up any fuel remaining in the recess “a” in the fuel pump with a dry rag “1”.
- After installing the fuel hose connector cover, make sure that it is installed securely.



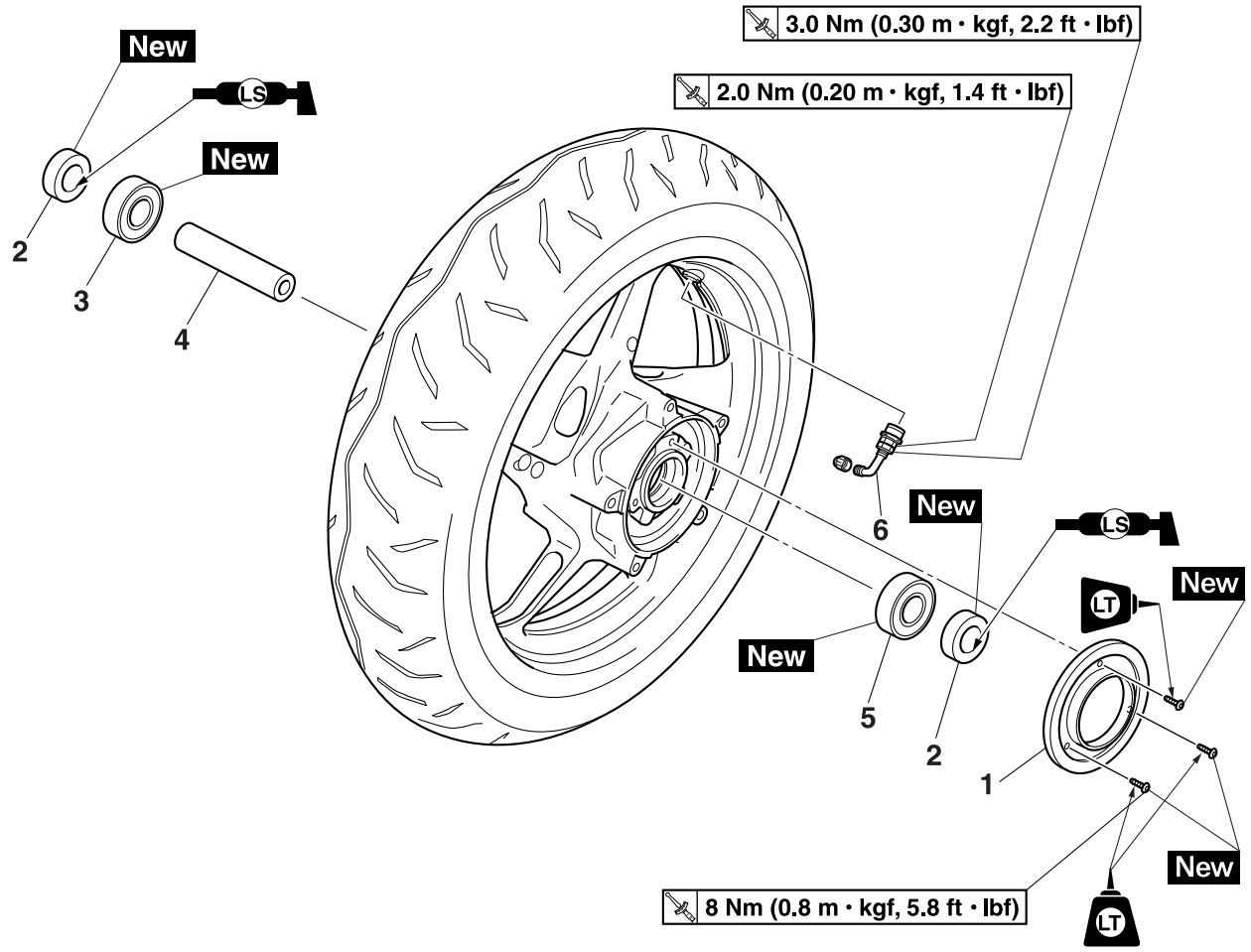
EAS21870
FRONT WHEEL

Removing the front wheel and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
1	Front wheel sensor coupler	1	Disconnect.
2	Front brake hose holder	2	
3	Cable guide	1	
4	Front wheel sensor	1	
5	Front brake caliper	2	
6	Front wheel axle pinch bolt	1	Loosen.
7	Front wheel axle	1	
8	Front wheel	1	
9	Front wheel sensor housing	1	
10	Collar	1	Length: 12 mm (0.47 in)
11	Collar	1	Length: 18 mm (0.71 in)
12	Front brake disc	2	
13	Front fender	1	
			For installation, reverse the removal procedure.

Disassembling the front wheel

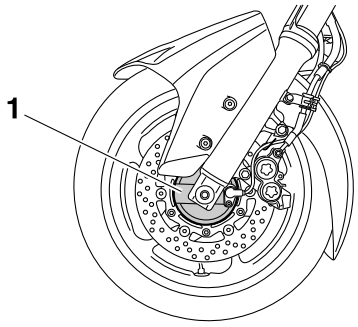


Order	Job/Parts to remove	Q'ty	Remarks
1	Front wheel sensor rotor	1	
2	Oil seal	2	
3	Wheel bearing (right)	1	
4	Collar	1	
5	Wheel bearing (left)	1	
6	Air valve	1	
			For assembly, reverse the disassembly procedure.

EAS21900
REMOVING THE FRONT WHEEL
ECA59C2405

NOTICE

Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the front wheel hub "1", otherwise the wheel sensor rotor equipped in the wheel hub may be damaged, resulting in improper performance of the ABS system.



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:
   - Front wheel sensor
   - Front brake calipers

TIP

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

3. Elevate:
   - Front wheel

TIP

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

4. Loosen:
   - Front wheel axle pinch bolt
5. Remove:
   - Front wheel axle
   - Front wheel sensor housing
   - Collars
   - Front wheel

EAS21910
DISASSEMBLING THE FRONT WHEEL
ECA59C2406

NOTICE

- **Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel sensor rotor.**
- **Do not drop the wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the wheel sensor rotor, wipe it off immediately.**

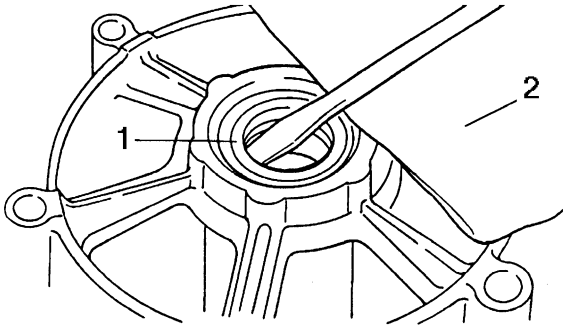
1. Remove:
   - Front wheel sensor rotor
   - Oil seals
   - Wheel bearings

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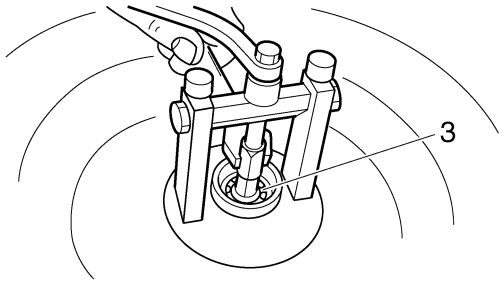
a. Remove the front wheel sensor rotor.
b. Clean the surface of the front wheel hub.
c. Remove the oil seals "1" with a flat-head screwdriver.

TIP

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



d. Remove the wheel bearings "3" with a general bearing puller.



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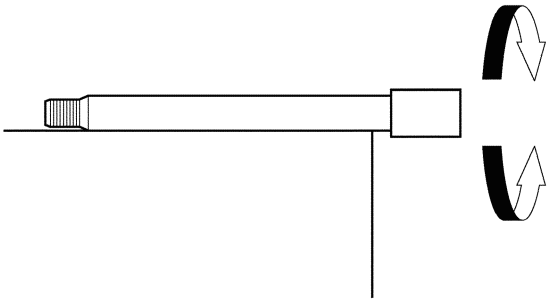
2. Remove:
   - Air valve

EAS21922
CHECKING THE FRONT WHEEL
1. Check:
   - Wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

EWA13460

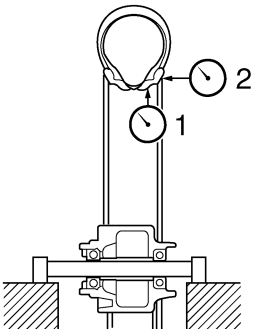
⚠ WARNING

Do not attempt to straighten a bent wheel axle.

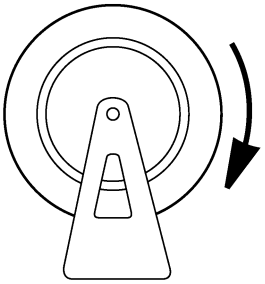


2. Check:
   - Tire
   - Front wheel
     Damage/wear → Replace.
     Refer to "CHECKING THE TIRES" on page 3-19 and "CHECKING THE WHEELS" on page 3-19.
3. Measure:
   - Radial wheel runout "1"
   - Lateral wheel runout "2"
     Over the specified limits → Replace.

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.



EAS22010

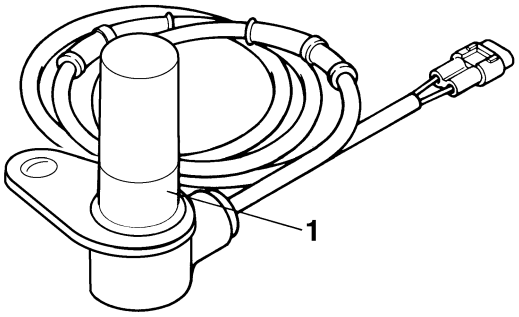
MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR

ECA59C2407

NOTICE

- **Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.**
- **The front wheel sensor cannot be disassembled. Do not attempt to disassemble it. If faulty, replace with a new one.**
- **Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel sensor rotor.**
- **Do not drop or shock the wheel sensor or the wheel sensor rotor.**

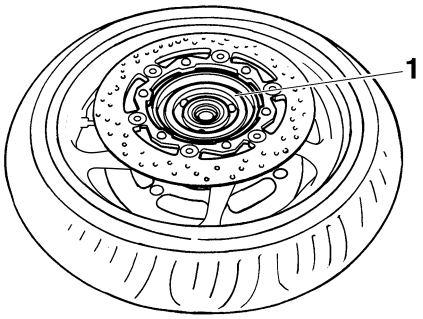
1. Check:
   - Front wheel sensor "1"
     Cracks/bends/distortion → Replace.
     Iron powder/dust → Clean.



2. Check:
   - Front wheel sensor rotor "1"
     Cracks/damage/scratches → Replace the front wheel sensor rotor.
     Iron powder/dust/solvent → Clean.

TIP

- The wheel sensor rotor is installed on the inner side of the wheel hub.
- When cleaning the wheel sensor rotor, be careful not to damage the surface of the rotor magnet.



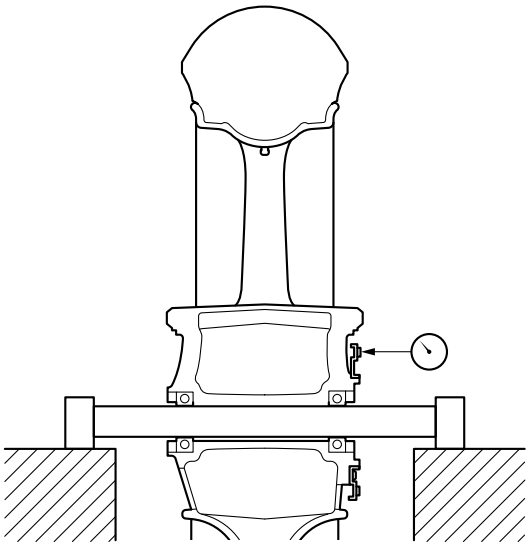
3. Measure:
   • Front wheel sensor rotor deflection
   Out of specification → Clean the installation surface of the wheel sensor rotor and correct the wheel sensor rotor deflection, or replace the wheel sensor rotor.

Wheel sensor rotor deflection limit
0.15 mm (0.0059 in)

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a. Hold the dial gauge at a right angle against the wheel sensor rotor surface.
b. Measure the deflection 6 mm (0.24 in) below the edge of the wheel sensor rotor.

TIP
Do not touch the surface of the rotor magnet with a sharp object.



c. If the deflection is above specification, remove the sensor rotor from the wheel, rotate it by one bolt hole, and then install it.

Wheel sensor rotor bolt
8 Nm (0.8 m·kgf, 5.8 ft·lbf)
LOCTITE®

ECA59C2408
NOTICE
Replace the wheel sensor rotor bolts with new ones.

d. If the deflection is still above specification, replace the wheel sensor rotor.

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EAS21960
ASSEMBLING THE FRONT WHEEL

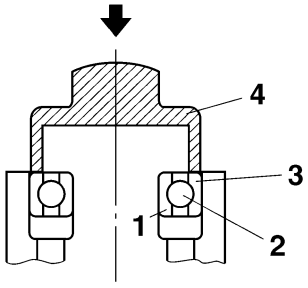
1. Install:
   • Wheel bearings New
   • Oil seals New

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a. Install the new wheel bearing (left side).

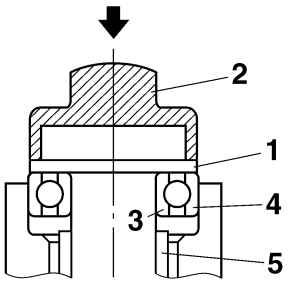
ECA4B51004
NOTICE
Do not apply pressure to the wheel bearing inner race "1" or balls "2". Pressure should only be applied to the outer race "3".

TIP
Use a socket "4" that matches the diameter of the wheel bearing outer race.



b. Install the collar.
c. Install the new wheel bearing (right side).

TIP
Place a suitable washer "1" between the socket "2" and the bearing so that both the inner race "3" and outer race "4" are pressed at the same time, and then press the bearing until the inner race makes contact with the collar "5".



d. Install the new oil seals

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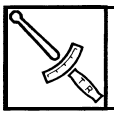
2. Install:
   • Air valve

TIP

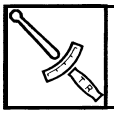
- Fasten air valve nut "1" and tighten air valve locknut "2" to 3.0 Nm (0.30 m·kgf, 2.2 ft·lbf).
- When installing the air valve, orient the air valve referring to the illustration.

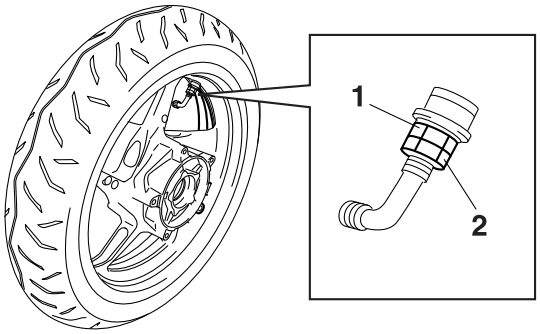
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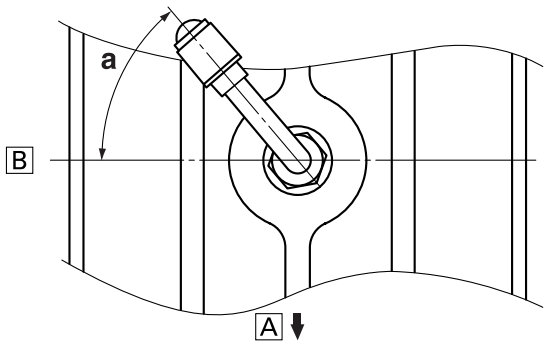
a. Tighten the air valve nut "1".

	**Air valve nut** **2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)**

b. Tighten the air valve locknut "2" while holding the air valve nut so as not to turn the nut.

	**Air valve locknut** **3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)**





a. 45°–55°

A. Wheel rotation direction
B. Left side

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EAS21970

ADJUSTING THE FRONT WHEEL STATIC BALANCE

TIP

- 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.

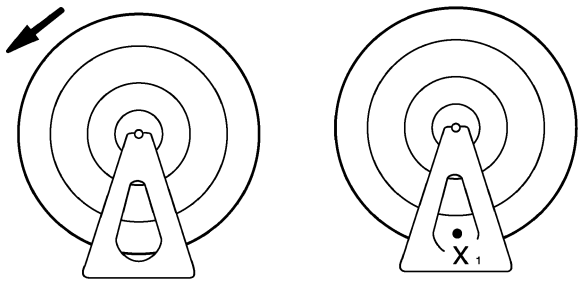
1. Remove:
   • Balancing weight(s)
2. Find:
   • Front wheel's heavy spot

TIP

Place the front wheel on a suitable balancing stand.

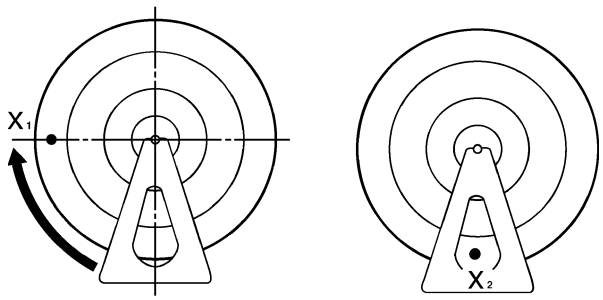
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a. Spin the front wheel.
b. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.



c. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.
d. Release the front wheel.

e. When the wheel stops, put an "X_2" mark at the bottom of the wheel.



f. Repeat steps (c) through (e) 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".

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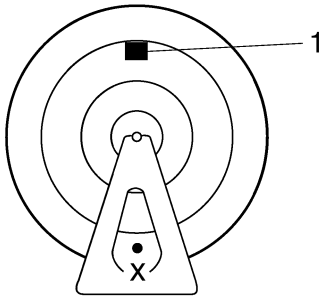
3. Adjust:
   • Front wheel static balance

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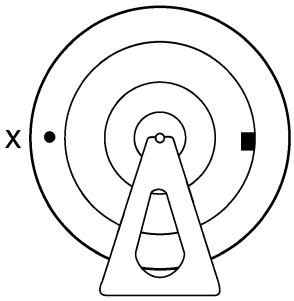
a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

TIP

Start with the lightest weight.



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



c. If the heavy spot does not stay in that position, install a heavier weight.

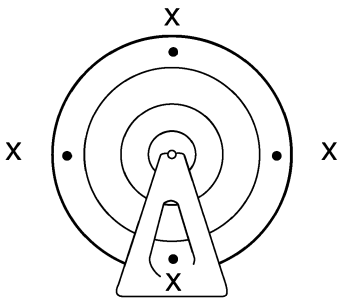
d. Repeat steps (b) and (c) until the front wheel is balanced.

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4. Check:
   • Front wheel static balance

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a. Turn the front wheel and make sure it stays at each position shown.



b. If the front wheel does not remain stationary at all of the positions, rebalance it.

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EAS21990

INSTALLING THE FRONT WHEEL (DISCS)

1. Install:
   • Front brake discs



Front brake disc bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)
LOCTITE®

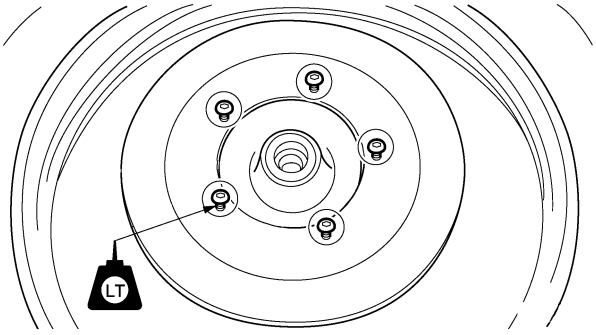
ECA59C1401

NOTICE

Replace the brake disc bolts with new ones.

TIP

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

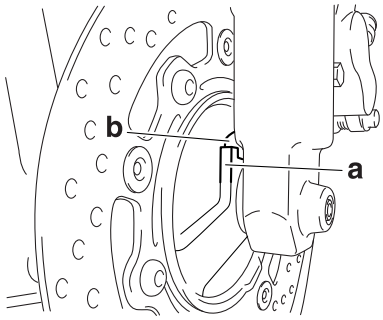


2. Check:
   • Front brake discs
   Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-42.
3. Lubricate:
   • Oil seal lips

Recommended lubricant
Lithium-soap-based grease

4. Install:
   • Collars
   • Front wheel sensor housing
   • Front wheel
   • Front wheel axle

TIP
Align the slot “a” in the front wheel sensor housing with the projection “b” of the front fork before assembly.



5. Tighten:
   • Front wheel axle
   • Front wheel axle pinch bolt

Front wheel axle
72 Nm (7.2 m·kgf, 52 ft·lbf)
Front wheel axle pinch bolt
20 Nm (2.0 m·kgf, 14 ft·lbf)

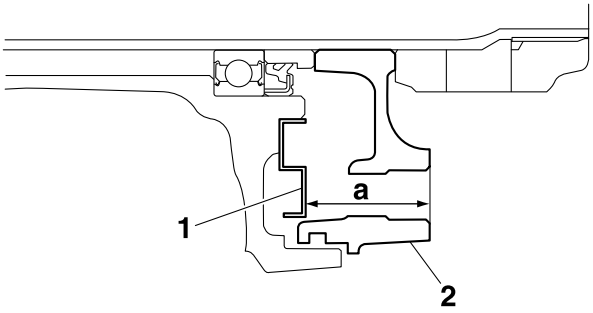
ECA59C1402
NOTICE
Before tightening the wheel axle, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

6. Measure:

TIP
Measure the distance “a” only if the wheel bearings, wheel sensor rotor, or both were replaced.

   • Distance “a”
   (between the wheel sensor rotor “1” and wheel sensor housing “2”)
   Out of specification → Reinstall the bearing or replace the wheel sensor rotor.

Distance “a” (between the wheel sensor rotor and wheel sensor housing)
28.7–29.3 mm (1.13–1.15 in)



7. Install:
   • Front brake calipers
   • Cable guide
   • Front wheel sensor
   • Front brake hose holders

Front brake caliper bolt
40 Nm (4.0 m·kgf, 29 ft·lbf)
Front wheel sensor bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Front brake hose holder bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP
When installing the front wheel sensor, check the wheel sensor lead for twists and the sensor electrode for foreign materials.

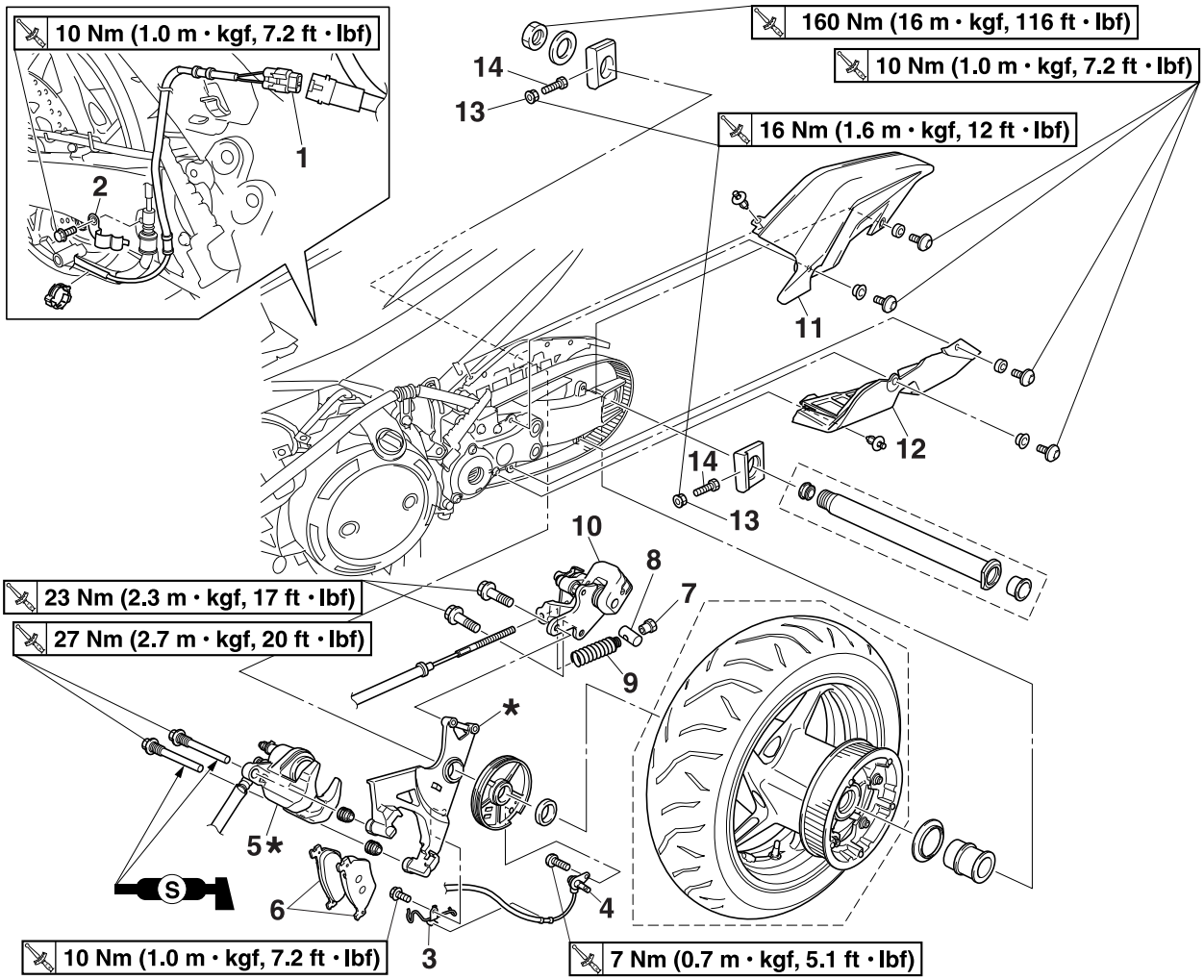
ECA59C2409
NOTICE
- **Make sure there are no foreign materials in the wheel hub. Foreign materials cause damage to the inner sensor rotor and wheel sensor.**
- **To route the front wheel sensor lead, refer to “CABLE ROUTING” on page 2-39.**

EWA13500
⚠ WARNING
Make sure the brake hose is routed properly.

8. Check:
   - Front wheel sensor installation
     Check if the wheel sensor housing is installed properly.

EAS22020
REAR WHEEL

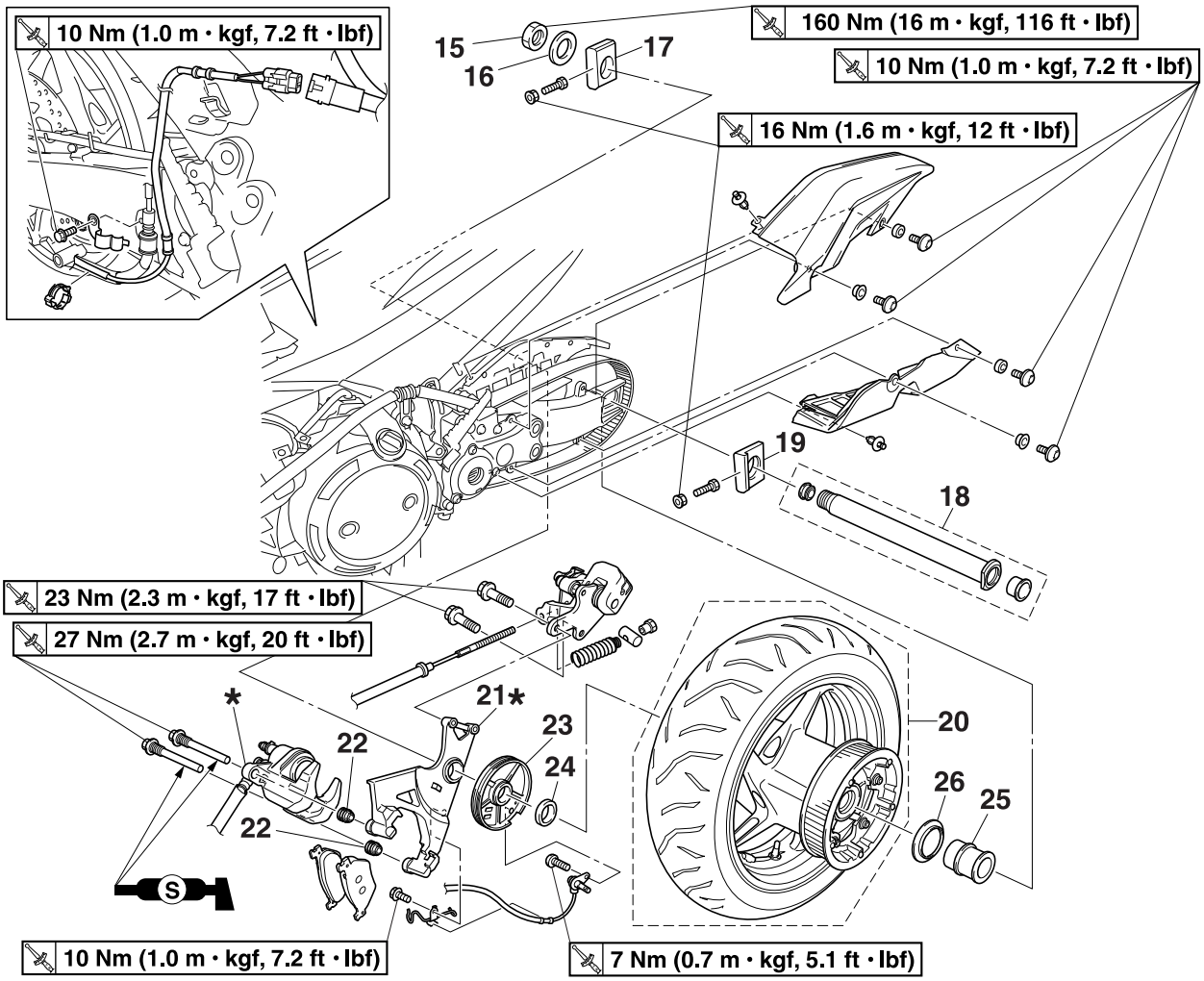
Removing the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
	Side cover (right)		Refer to "GENERAL CHASSIS" on page 4-1.
1	Rear wheel sensor coupler	1	Disconnect.
2	Rear brake hose holder (right)	1	
3	Rear wheel sensor lead holder	1	
4	Rear wheel sensor	1	
5	Rear brake caliper	1	
6	Rear brake pad	2	
7	Rear brake lock cable adjusting nut	1	
8	Pin	1	
9	Rear brake lock spring	1	
10	Rear brake lock caliper	1	
11	Drive belt upper guard	1	Non-disassemble
12	Drive belt lower guard	1	Non-disassemble
13	Drive belt adjusting locknut	2	Loosen.
14	Drive belt adjusting bolt	2	Loosen.

* When replacing the rear brake caliper or rear brake caliper bracket, replace them as a set.

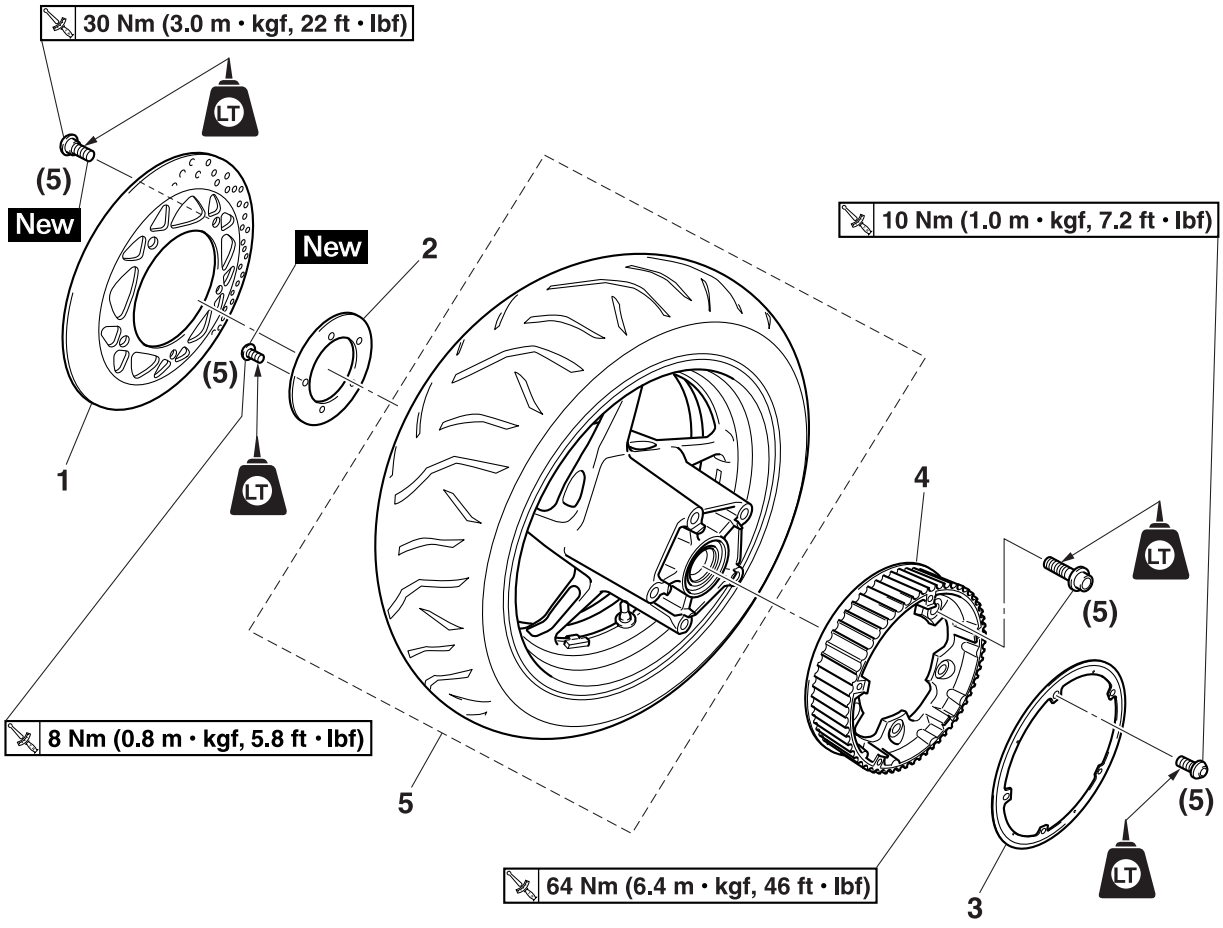
Removing the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
15	Wheel axle nut	1	
16	Washer	1	
17	Adjusting block (right)	1	
18	Rear wheel axle	1	
19	Adjusting block (left)	1	
20	Rear wheel	1	
21	Rear brake caliper bracket	1	
22	Caliper bolt boot	2	
23	Rear wheel sensor housing	1	
24	Collar (right)	1	
25	Collar (left)	1	
26	Dust cover	1	
			For installation, reverse the removal procedure.

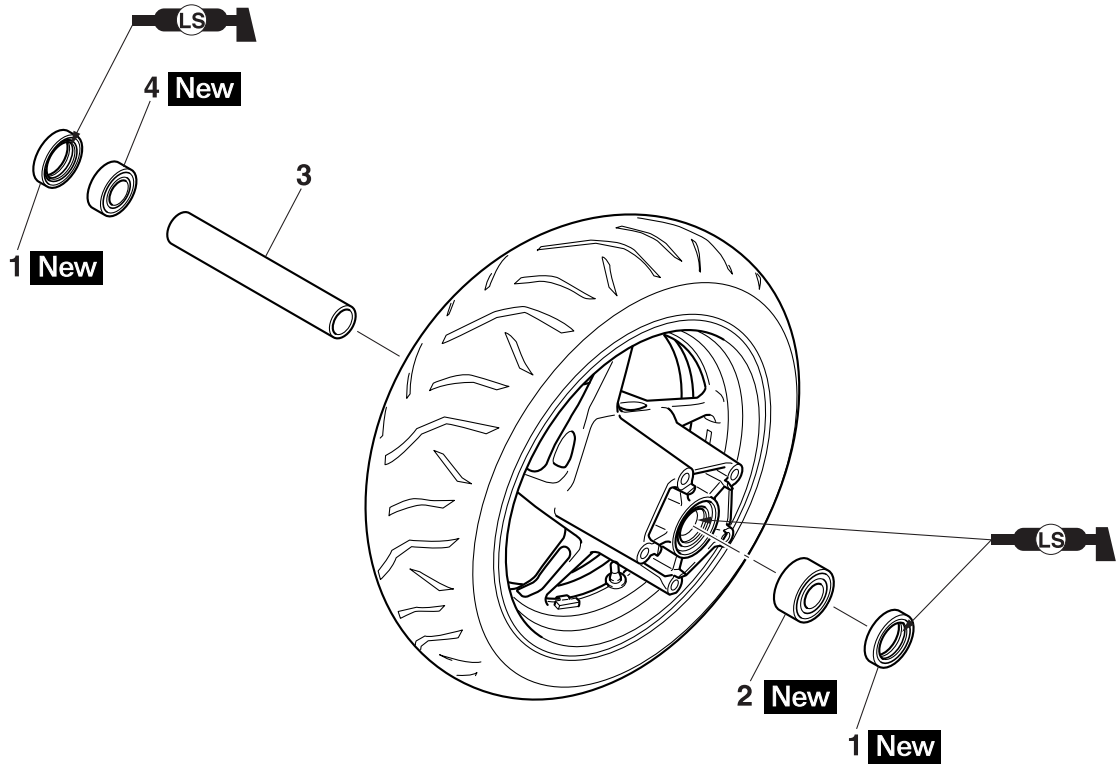
* When replacing the rear brake caliper or rear brake caliper bracket, replace them as a set.

Removing the rear brake disc and rear wheel pulley



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake disc	1	
2	Rear wheel sensor rotor	1	
3	Drive belt guide	1	
4	Rear wheel pulley	1	
5	Rear wheel	1	
			For installation, reverse the removal procedure.

Disassembling the rear wheel assembly

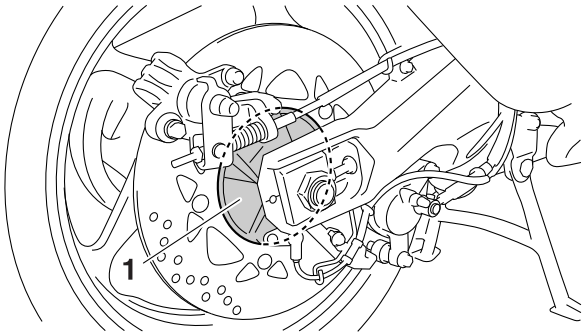


Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	2	
2	Wheel bearing (left)	1	
3	Collar	1	
4	Wheel bearing (right)	1	
			For assembly, reverse the disassembly procedure.

EAS22040
REMOVING THE REAR WHEEL (DISC)
ECA59C2410

NOTICE

Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the rear wheel hub "1", otherwise the wheel sensor rotor equipped in the wheel hub may be damaged, resulting in improper performance of the ABS system.



1. Stand the vehicle on a level surface.

EWA13120

⚠ WARNING

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

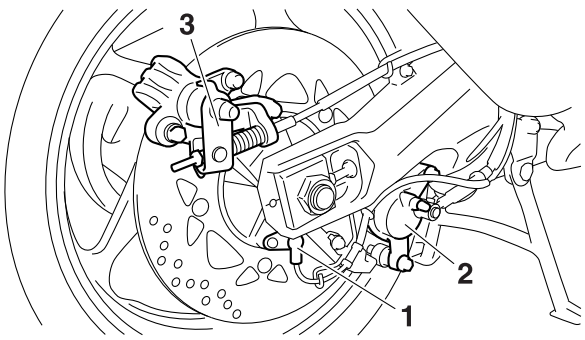
TIP

Place the vehicle on the centerstand so that the rear wheel is elevated.

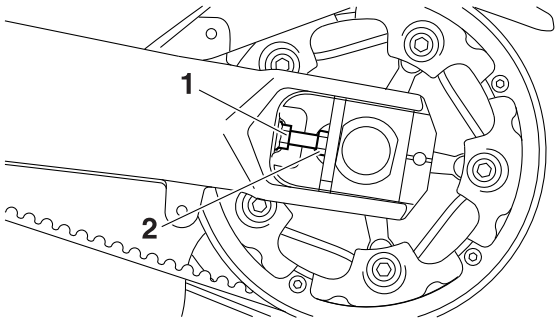
2. Remove:
   - Rear wheel sensor "1"
   - Rear brake caliper "2"
   - Rear brake lock caliper "3"

TIP

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



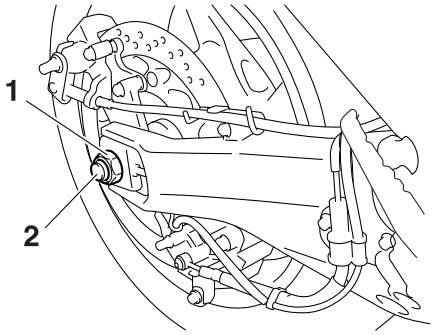
3. Loosen:
   - Locknuts "1"
   - Adjusting bolts "2" (left side and right side)



4. Remove:
   - Wheel axle nut "1"
   - Washer
   - Rear wheel axle "2"
   - Rear wheel
   - Rear brake caliper bracket
   - Rear wheel sensor housing
   - Collars

TIP

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



EAS22080
DISASSEMBLING THE REAR WHEEL
ECA59C2406

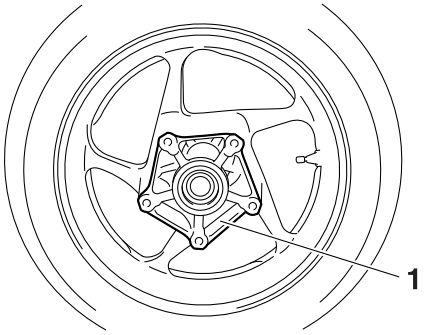
NOTICE

- **Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel sensor rotor.**
- **Do not drop the wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the wheel sensor rotor, wipe it off immediately.**

1. Remove:
   - Rear wheel sensor rotor
   - Oil seals
   - Wheel bearings
   Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-20.

EAS22091
CHECKING THE REAR WHEEL
1. Check:
   - Wheel axle
   - Wheel bearings
   - Oil seals
   Refer to “CHECKING THE FRONT WHEEL” on page 4-20.
2. Check:
   - Tire
   - Rear wheel
   Damage/wear → Replace.
   Refer to “CHECKING THE TIRES” on page 3-19 and “CHECKING THE WHEELS” on page 3-19.
3. Measure:
   - Radial wheel runout
   - Lateral wheel runout
   Refer to “CHECKING THE FRONT WHEEL” on page 4-20.

EAS22110
CHECKING THE REAR WHEEL DRIVE HUB
1. Check:
   - Rear wheel drive hub “1”
   Cracks/damage → Replace the rear wheel.



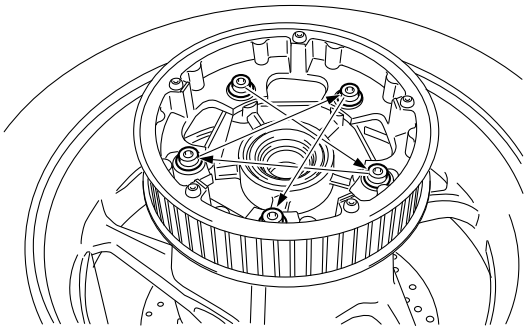
EAS59C1430
CHECKING AND REPLACING THE REAR WHEEL PULLEY
1. Check:
   - Rear wheel pulley
   Surface plating has come off → Replace the rear wheel pulley.
   Bent teeth → Replace the rear wheel pulley.
   - Drive belt guide
   Cracks/damage/wear → Replace the drive belt guide.
2. Replace:
   - Rear wheel pulley

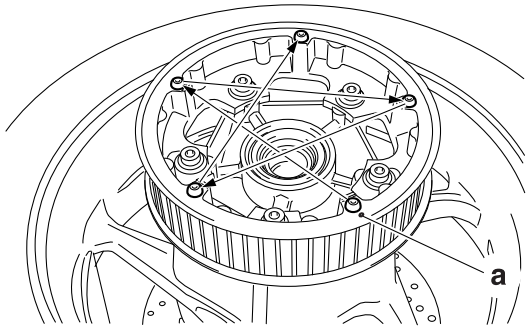
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a. Remove the drive belt guide bolts and the drive belt guide.
b. Remove the rear wheel pulley bolts and the rear wheel pulley.
c. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the pulley.
d. Install the new rear wheel pulley and drive belt guide.

Rear wheel pulley bolt
64 Nm (6.4 m·kgf, 46 ft·lbf)
LOCTITE®
Drive belt guide bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
LOCTITE®

TIP
- Tighten the rear wheel pulley bolts in stages and in a crisscross pattern.
- When tightening the drive belt guide bolts, tighten the bolt at the punch mark “a” first and then other bolts in stages and in a crisscross pattern.





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EAS22200
MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR

ECA59C2411
NOTICE

- **Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.**
- **The rear wheel sensor cannot be disassembled. Do not attempt to disassemble it. If faulty, replace with a new one.**
- **Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel sensor rotor.**
- **Do not drop or shock the wheel sensor or the wheel sensor rotor.**

1. Check:
   - Rear wheel sensor
     Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-21.
2. Check:
   - Rear wheel sensor rotor
     Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-21.
3. Measure:
   - Rear wheel sensor rotor deflection
     Out of specification → Clean the installation surface of the wheel sensor rotor and correct the wheel sensor rotor deflection, or replace the wheel sensor rotor.

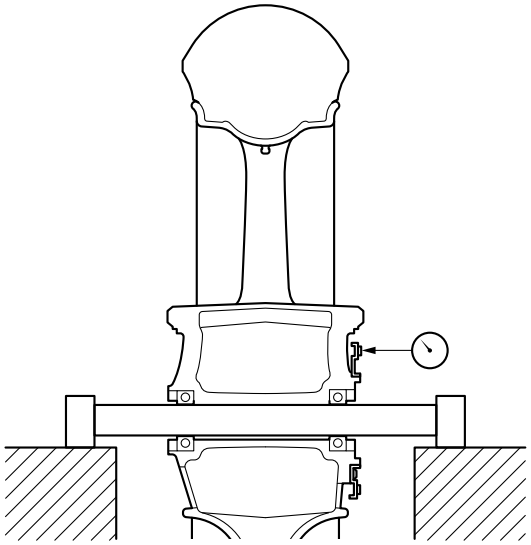


Wheel sensor rotor deflection limit
0.15 mm (0.0059 in)

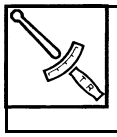
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a. Hold the dial gauge at a right angle against the wheel sensor rotor surface.
b. Measure the deflection 5.5 mm (0.22 in) below the edge of the wheel sensor rotor.

TIP
Do not touch the surface of the rotor magnet with a sharp object.



c. If the deflection is above specification, remove the sensor rotor from the wheel, rotate it by two bolt holes, and then install it.



Wheel sensor rotor bolt
8 Nm (0.8 m·kgf, 5.8 ft·lbf)
LOCTITE®

ECA59C2408
NOTICE

Replace the wheel sensor rotor bolts with new ones.

d. If the deflection is still above specification, replace the wheel sensor rotor.

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EAS22140
ASSEMBLING THE REAR WHEEL

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

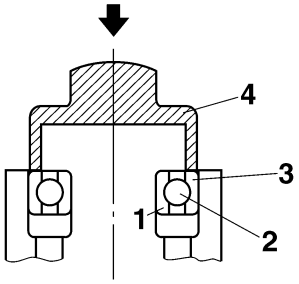
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a. Install the new wheel bearing (right side).

ECA4B56011
NOTICE

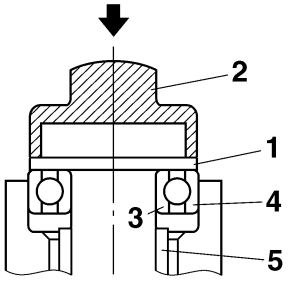
Do not contact the wheel bearing inner race "1" or balls "2". Contact should be made only with the outer race "3".

TIP
Use a socket “4” that matches the diameter of the wheel bearing outer race.



b. Install the collar.
c. Install the new wheel bearing (left side).

TIP
Place a suitable washer “1” between the socket “2” and the bearing so that both the inner race “3” and outer race “4” are pressed at the same time, and then press the bearing until the inner race makes contact with the collar “5”.



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EAS22150
ADJUSTING THE REAR WHEEL STATIC BALANCE

TIP
- 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 pulley installed.

1. Adjust:
   - Rear wheel static balance
     Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-23.

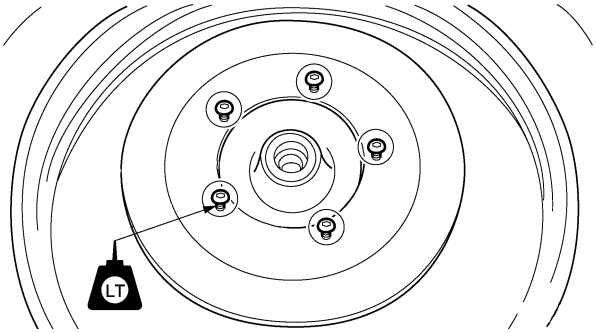
EAS22160
INSTALLING THE REAR WHEEL (DISC)

1. Install:
   - Rear brake disc

Rear brake disc bolt
30Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

ECA59C1401
NOTICE
Replace the brake disc bolts with new ones.

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



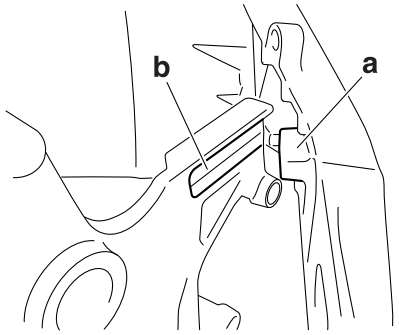
2. Check:
   - Rear brake disc
     Refer to “CHECKING THE REAR BRAKE DISC” on page 4-58.
3. Lubricate:
   - Oil seal lips

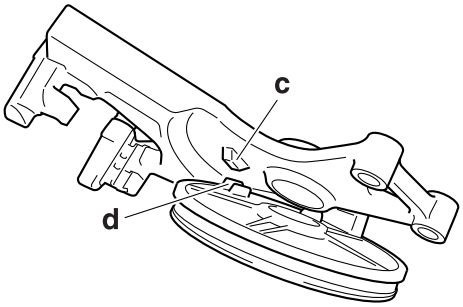
Recommended lubricant
Lithium-soap-based grease

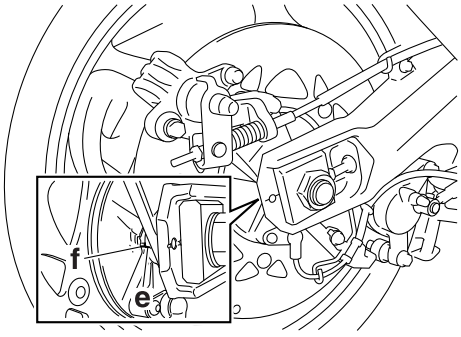
4. Install:
   - Dust cover
   - Collars
   - Rear wheel sensor housing
   - Rear brake caliper bracket
   - Rear wheel
   - Adjusting blocks
   - Rear wheel axle
   - Washer
   - Wheel axle nut

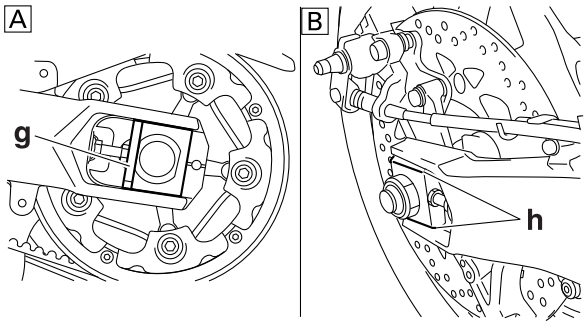
TIP
- Do not install the brake caliper and brake lock caliper.
- Fit the brake torque stop pin “a” on the swingarm into the slot “b” on the rear brake caliper bracket.

- When installing the rear brake caliper bracket and the rear wheel sensor housing, align the projection “c” on the rear brake caliper bracket with the slot “d” of the rear wheel sensor housing.
- After installing the rear wheel to the vehicle, make sure that the projection “e” on the brake caliper bracket and the projection “f” on the rear wheel sensor housing are aligned.
- Install the left adjusting block so that projection “g” faces to the front of the vehicle.
- Install the right adjusting block so that upper chamfer “h” faces to the top of the vehicle and lower chamfer “h” faces to the bottom of the vehicle.









A. Left side
B. Right side

5. Install:
   - Rear brake caliper
   - Rear brake lock caliper (temporarily)
6. Adjust:
   - Drive belt slack
     Refer to “ADJUSTING THE DRIVE BELT SLACK” on page 3-21.
7. Tighten:
   - Wheel axle nut
   - Rear brake caliper bolts
   - Rear brake lock caliper bolts

Wheel axle nut
160 Nm (16 m·kgf, 116 ft·lbf)
Rear brake caliper bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)
Rear brake lock caliper bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

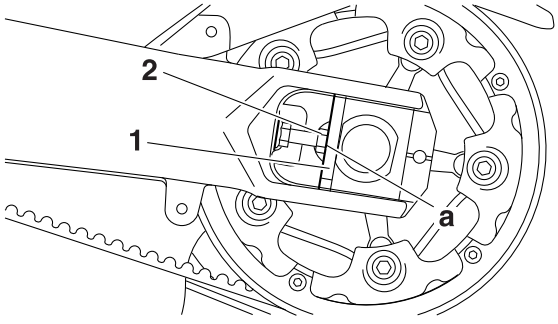
EWA13500

⚠ WARNING

Make sure the brake hose is routed properly.

TIP

When tightening the wheel axle nut, there should be no clearance “a” between the adjusting block “1” and adjusting bolt “2”.



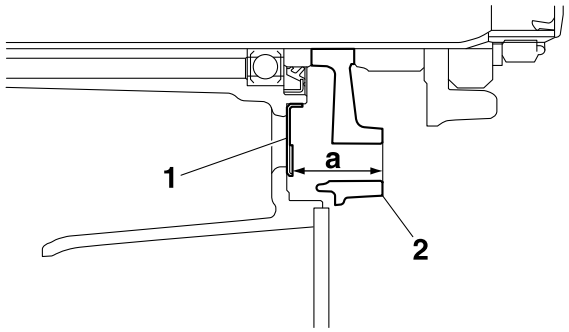
8. Measure:

TIP

Measure the distance “a” only if the wheel bearings, wheel sensor rotor, or both were replaced.

- Distance “a”
  (between the wheel sensor rotor “1” and wheel sensor housing “2”)
  Out of specification → Reinstall the bearing or replace the wheel sensor rotor.

Distance “a” (between the wheel sensor rotor and wheel sensor housing)
29.2–29.7 mm (1.15–1.17 in)

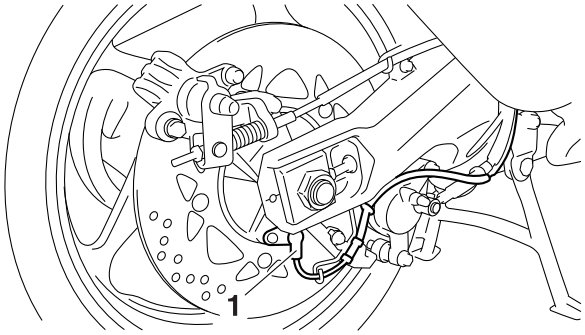


9. Install:
   - Rear wheel sensor “1”

Rear wheel sensor bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

When installing the rear wheel sensor, check the rear wheel sensor lead for twists and the sensor electrode for foreign materials.



ECA14500

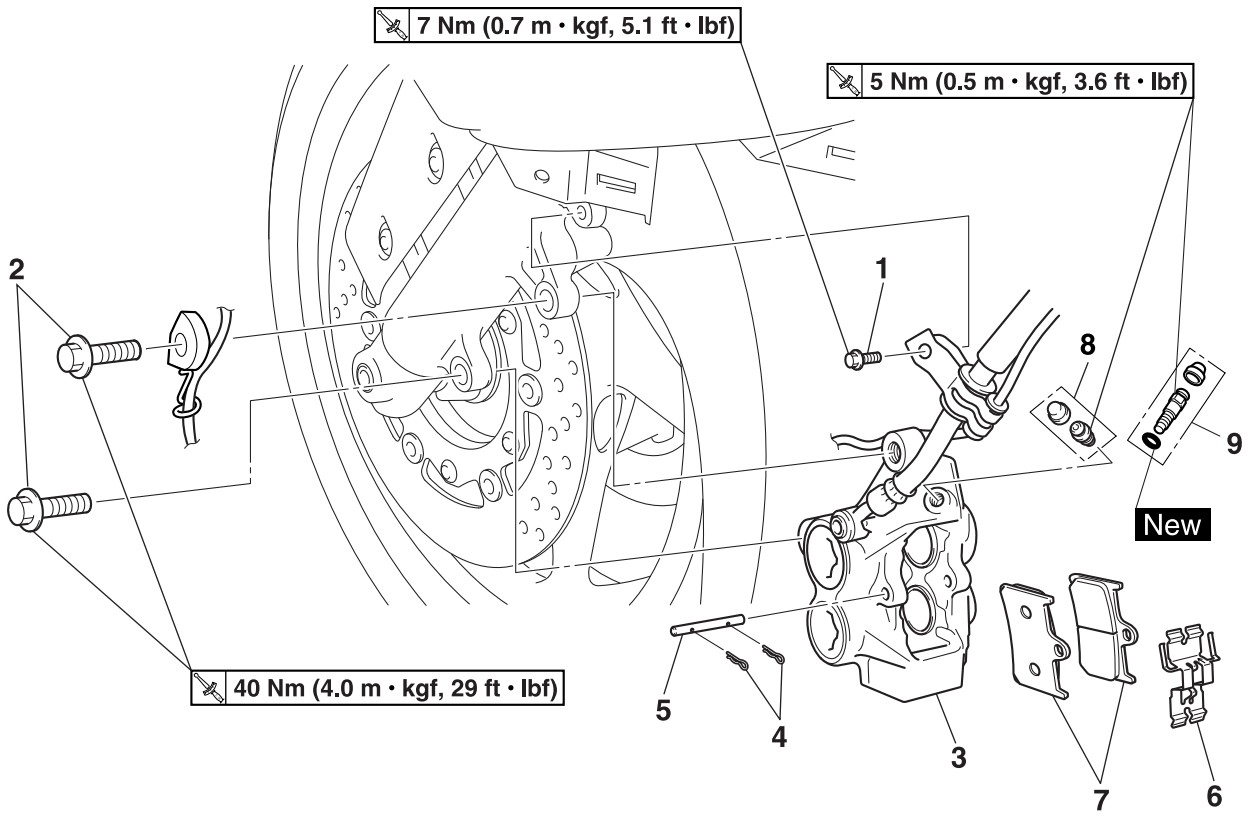
NOTICE

To route the rear wheel sensor lead, refer to “CABLE ROUTING” on page 2-39.

10. Check:
    - Rear wheel sensor installation
      Check if the wheel sensor housing is installed properly.

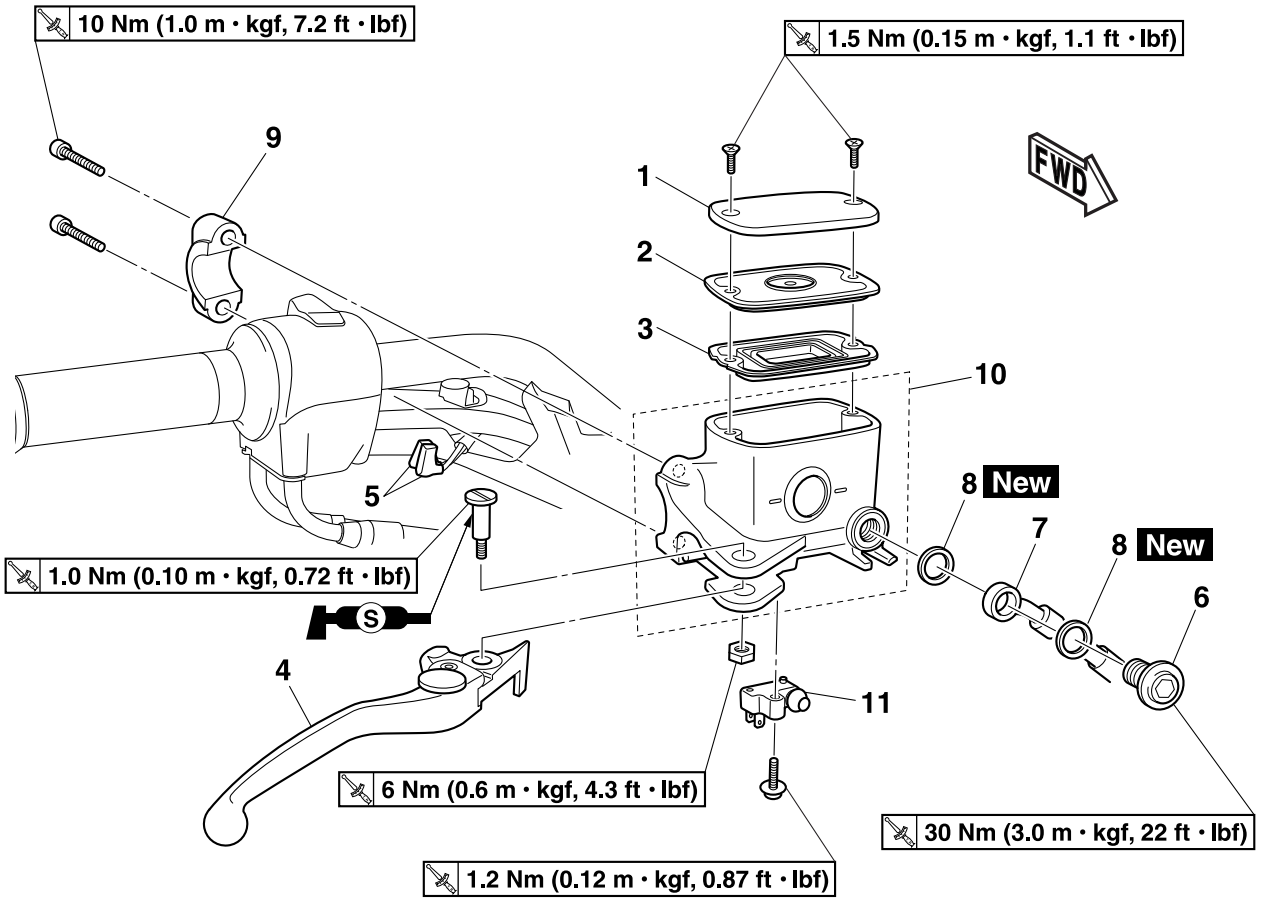
EAS22210
FRONT BRAKE

Removing the front brake pads



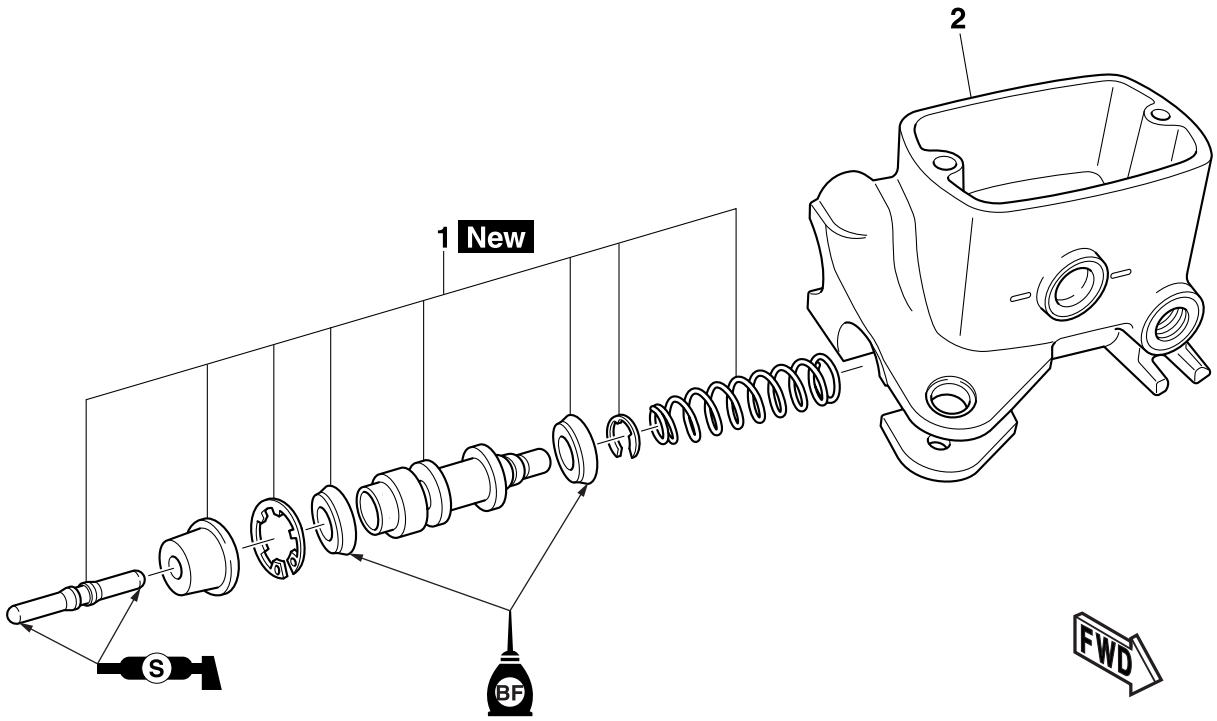
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Front brake hose holder bolt	1	
2	Front brake caliper bolt	2	
3	Front brake caliper	1	
4	Brake pad clip	2	
5	Brake pad pin	1	
6	Brake pad spring	1	
7	Front brake pad	2	
8	Bleed screw	1	Left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

Removing the front brake master cylinder



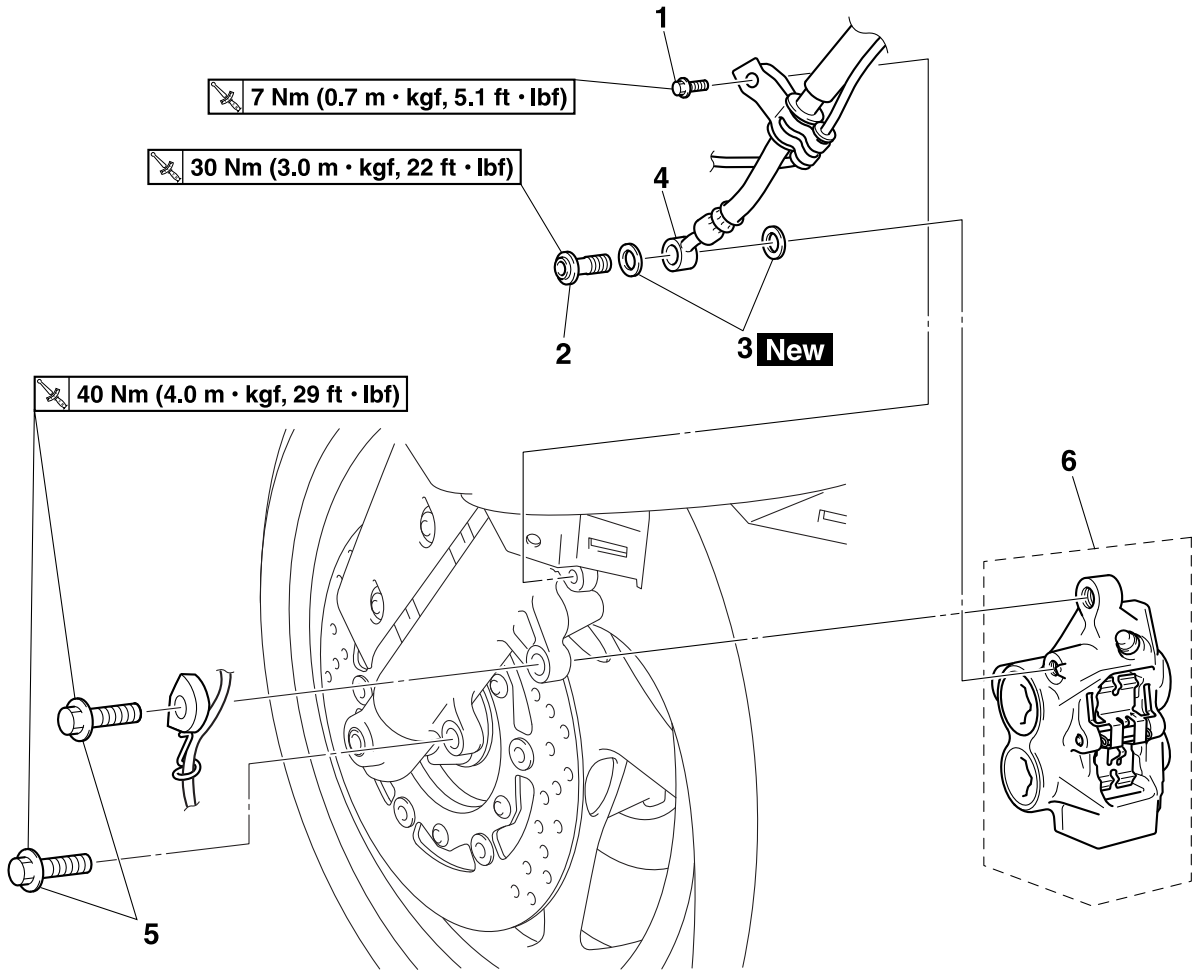
Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "HANDLEBAR" on page 4-76.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Front brake lever	1	
5	Front brake light switch connector	2	Disconnect.
6	Brake hose union bolt	1	
7	Front brake hose	1	
8	Brake hose gasket	2	
9	Front brake master cylinder holder	1	
10	Front brake master cylinder	1	
11	Front brake light switch	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



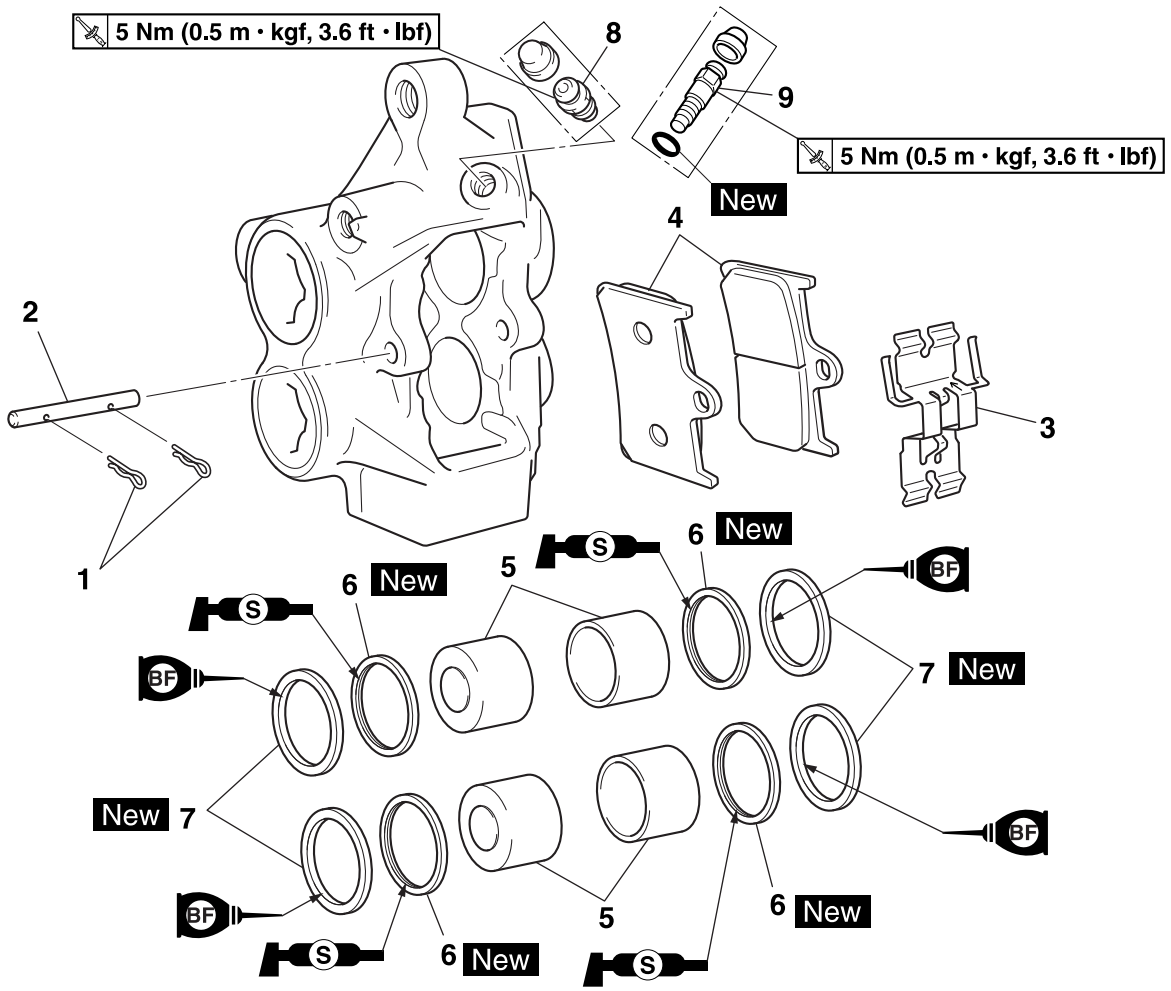
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

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 (ABS)" on page 3-16.
1	Front brake hose holder bolt	1	
2	Brake hose union bolt	1	
3	Brake hose gasket	2	
4	Front brake hose	1	
5	Front brake caliper bolt	2	
6	Front brake caliper	1	
			For installation, reverse the removal procedure.

Disassembling the front brake calipers



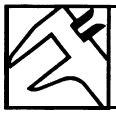
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Front brake pad	2	
5	Brake caliper piston	4	
6	Brake caliper piston dust seal	4	
7	Brake caliper piston seal	4	
8	Bleed screw	1	Left brake caliper side
9	Bleed screw	1	Right brake caliper side
			For assembly, reverse the disassembly procedure.

EAS22221
INTRODUCTION
EWA14101
⚠ 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.**

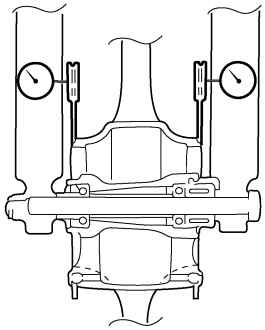
EAS22240
CHECKING THE FRONT BRAKE DISCS
The following procedure applies to both brake discs.
1. Remove:
   - Front wheel
     Refer to "FRONT WHEEL" on page 4-18.
2. Check:
   - Brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit
0.15 mm (0.0059 in)

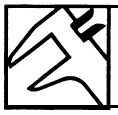
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a. Place the vehicle on a suitable stand so that the front wheel is elevated.
b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc surface.
e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.

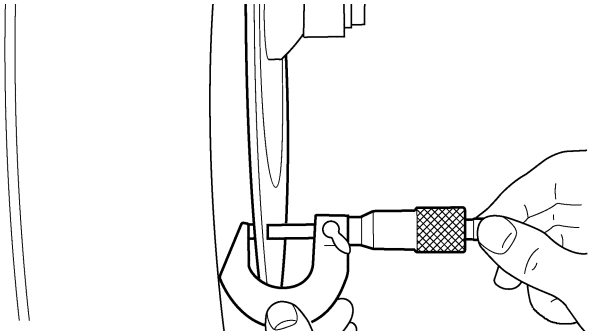


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4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.



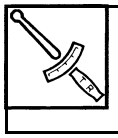
Brake disc thickness limit
3.5 mm (0.14 in)



5. Adjust:
   - Brake disc deflection

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a. Remove the brake disc.
b. Rotate the brake disc by two bolt hole.
c. Install the brake disc and new brake disc bolts.

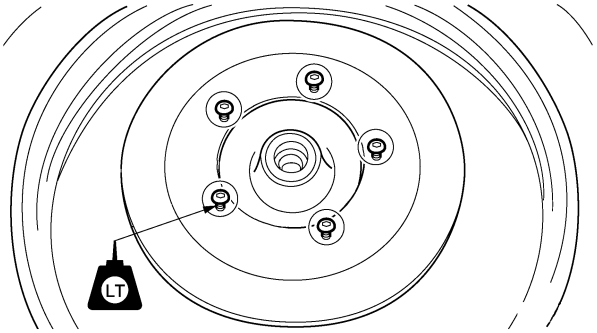


Front brake disc bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)
LOCTITE®

ECA59C1401
NOTICE

Replace the brake disc bolts with new ones.

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



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

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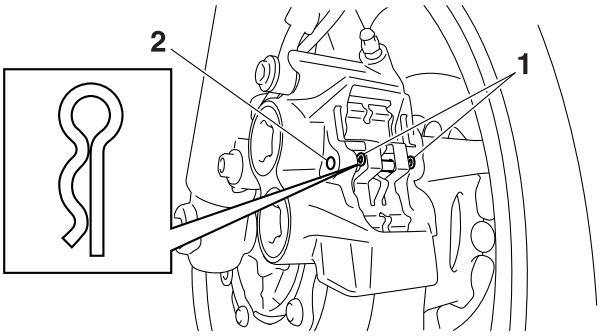
6. Install:
   • Front wheel
   Refer to "FRONT WHEEL" on page 4-18.

EAS22271
REPLACING THE FRONT BRAKE PADS

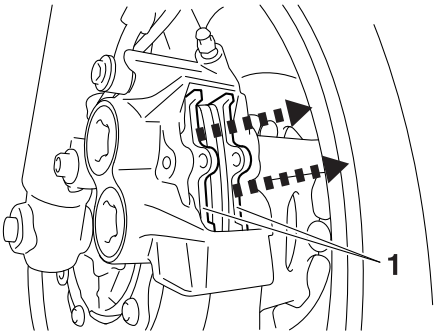
The following procedure applies to both brake calipers.

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

1. Remove:
   • Brake hose holder
   • Front brake caliper
   • Brake pad clips "1"
   • Brake pad pin "2"
   • Brake pad spring

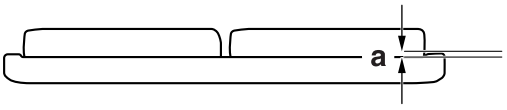


2. Remove:
   • Brake pads "1"



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

Brake pad lining thickness (inner)
4.0 mm (0.16 in)
Limit
0.5 mm (0.02 in)
Brake pad lining thickness (outer)
4.0 mm (0.16 in)
Limit
0.5 mm (0.02 in)

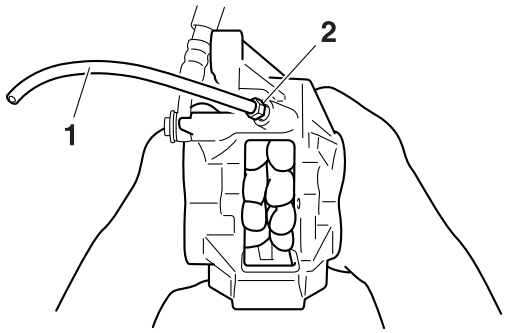


4. Install:
   • Brake pads
   • Brake pad spring

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

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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.



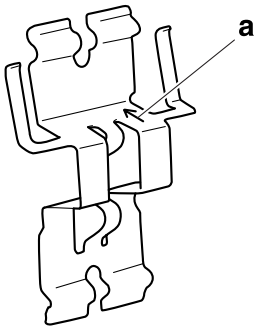
c. Tighten the bleed screw.

	Bleed screw **5 Nm (0.5 m·kgf, 3.6 ft·lbf)**

d. Install a brake pads and brake pad spring.

TIP

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

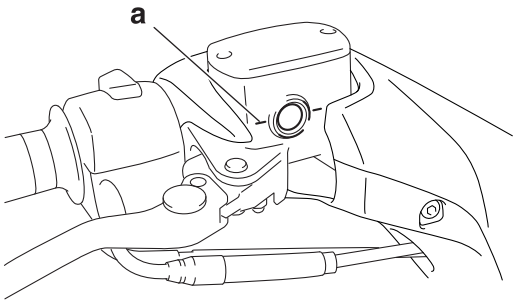


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5. Install:
   - Brake pad pin
   - Brake pad clips
   - Front brake caliper

	Front brake caliper bolt **40 Nm (4.0 m·kgf, 29 ft·lbf)**

6. Check:
   - Brake fluid level
     Below the minimum level mark "a"→ Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.



7. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.

EAS22300

REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

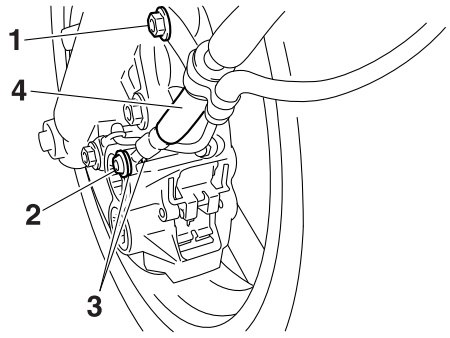
TIP

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

1. Remove:
   - Front brake hose holder bolt "1"
   - Brake hose union bolt "2"
   - Brake hose gaskets "3"
   - Front brake hose "4"

TIP

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

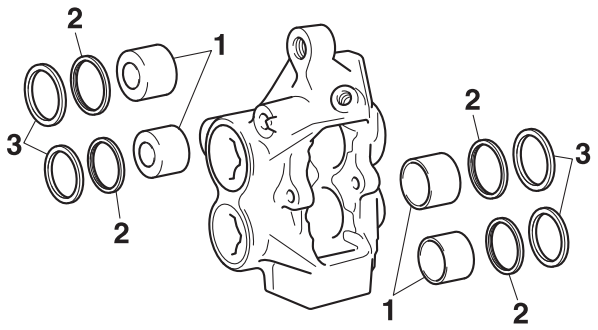


EAS22351

DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Remove:
   - Brake caliper pistons "1"
   - Brake caliper piston dust seals "2"
   - Brake caliper piston seals "3"



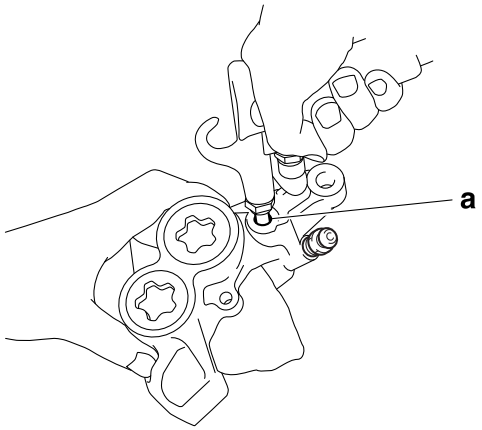
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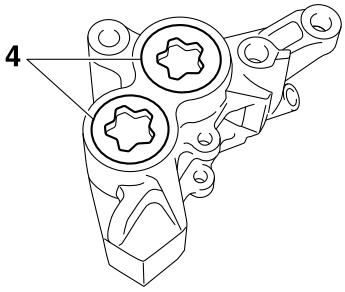
a. Blow compressed air into the brake hose joint opening "a" to force out the pistons from the brake caliper.

EWA13560

⚠ WARNING

- **Cover the brake caliper pistons with a rag. Be careful not to get injured when the pistons are expelled from the brake caliper.**
- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts "4".**





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

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EAS22391

CHECKING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

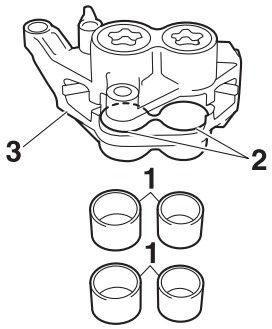
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Piston dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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.

EWA13611

⚠ WARNING

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



EAS22411

ASSEMBLING THE FRONT BRAKE CALIPERS

EWA13621

⚠ 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 brake caliper piston dust seals and brake caliper piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.**

Specified brake fluid
DOT 4

EAS22440
INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:
   - Front brake caliper "1" (temporarily)
   - Brake hose gaskets New
   - Front brake hose "2"
   - Brake hose union bolt "3"

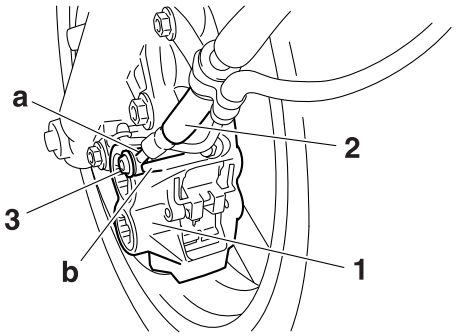
Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13530
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-39.

ECA14170
NOTICE

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:
   - Brake pads
   - Brake pad spring
   - Brake pad pin
   - Brake pad clips
   - Front brake caliper
   - Front brake hose holder

Front brake caliper bolt
40 Nm (4.0 m·kgf, 29 ft·lbf)
Front brake hose holder bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-43.

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

Specified brake fluid
DOT 4

EWA59C2401
⚠ WARNING

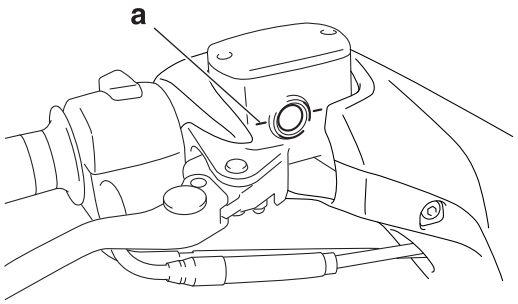
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540
NOTICE

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 (ABS)" on page 3-16.

6. Check:
   • Brake fluid level
   Below the minimum level mark "a"→ Add the specified brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.



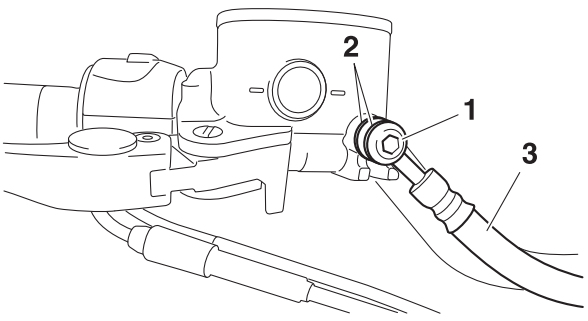
7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.

EAS22490
REMOVING THE FRONT BRAKE MASTER CYLINDER

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

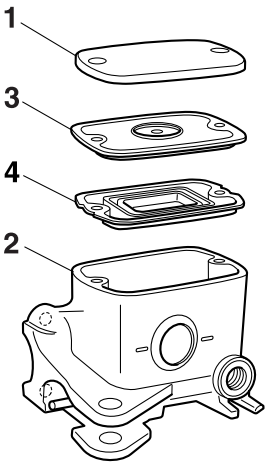
1. Disconnect:
   • Brake light switch connectors (from the front brake light switch)
2. Remove:
   • Brake hose union bolt "1"
   • Brake hose gaskets "2"
   • Front brake hose "3"

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



EAS22500
CHECKING THE FRONT 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 master cylinder reservoir cap "1"
   • Brake master cylinder reservoir "2"
   • Brake master cylinder reservoir diaphragm holder "3"
   Cracks/damage → Replace.
   • Brake master cylinder reservoir diaphragm "4"
   Damage/wear → Replace.



4. Check:
   • Brake 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.**

	Specified brake fluid **DOT 4**

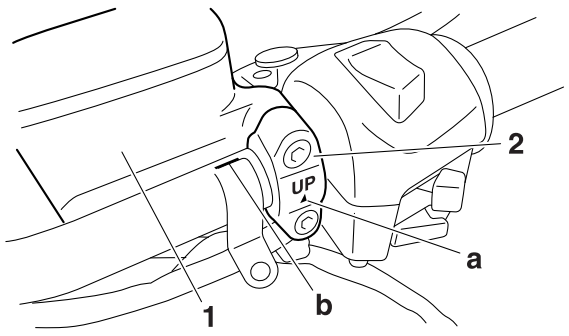
EAS22530
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - Brake master cylinder "1"
   - Brake master cylinder holder "2"

	Brake master cylinder holder bolt **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

TIP

- Install the brake master cylinder holder with the " △ " mark "a" facing up.
- Align the end of the brake master cylinder holder with the welding line "b" on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



2. Install:
   - Brake hose gaskets "1" New
   - Front brake hose "2"
   - Brake hose union bolt "3"

	Brake hose union bolt **30 Nm (3.0 m·kgf, 22 ft·lbf)**

EWA13530

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-39.

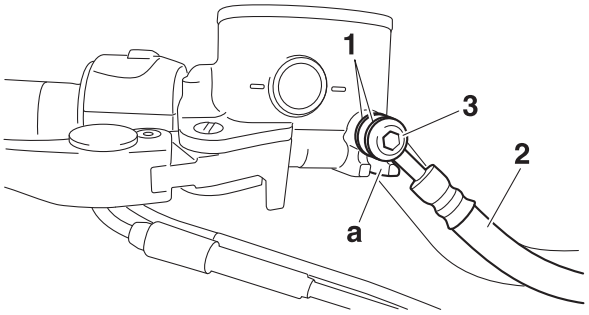
ECA14160

NOTICE

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

TIP

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



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

	Specified brake fluid **DOT 4**

EWA13540

⚠ WARNING

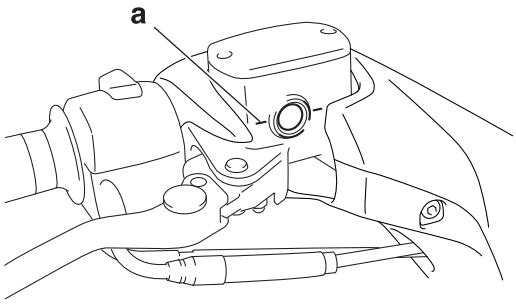
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540

NOTICE

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

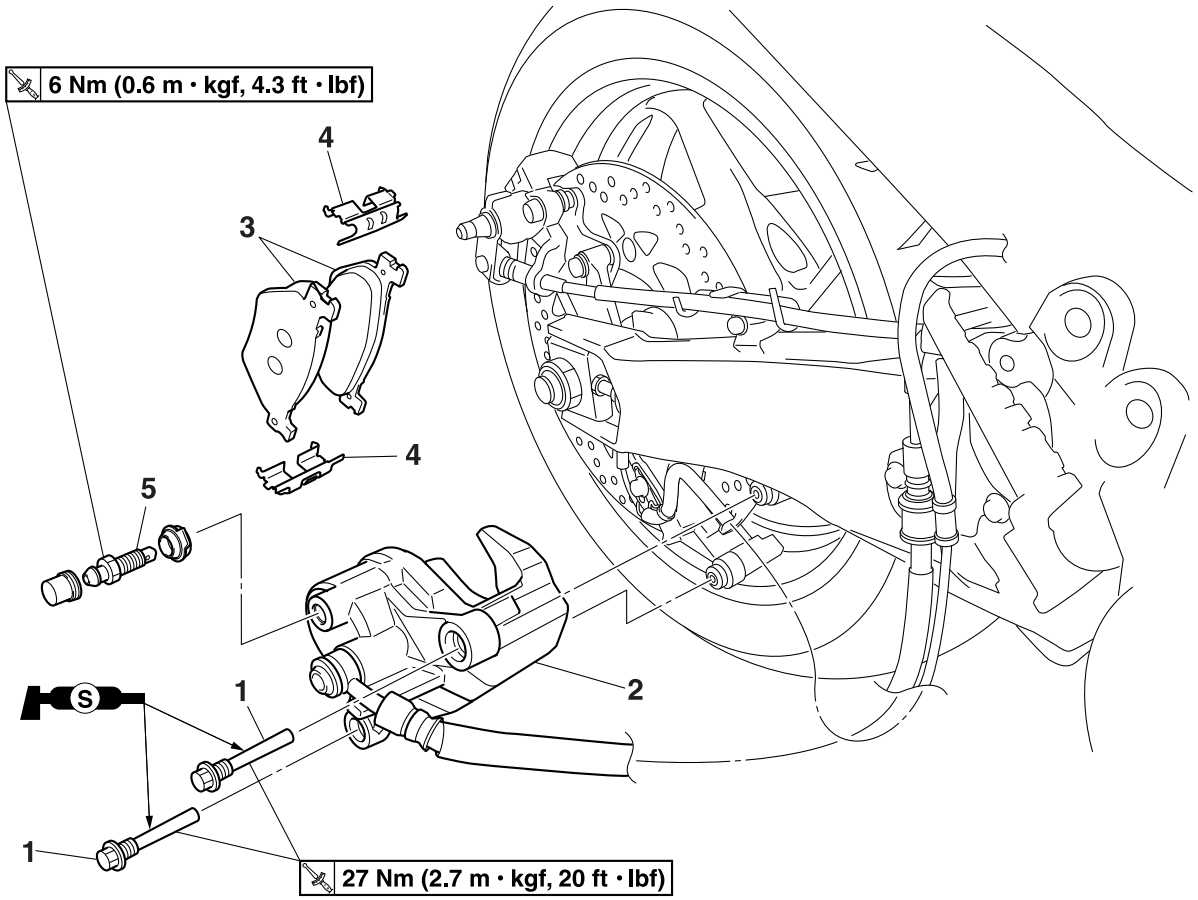
4. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
5. Check:
   - Brake fluid level
     Below the minimum level mark "a"→ Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.



6. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-16.

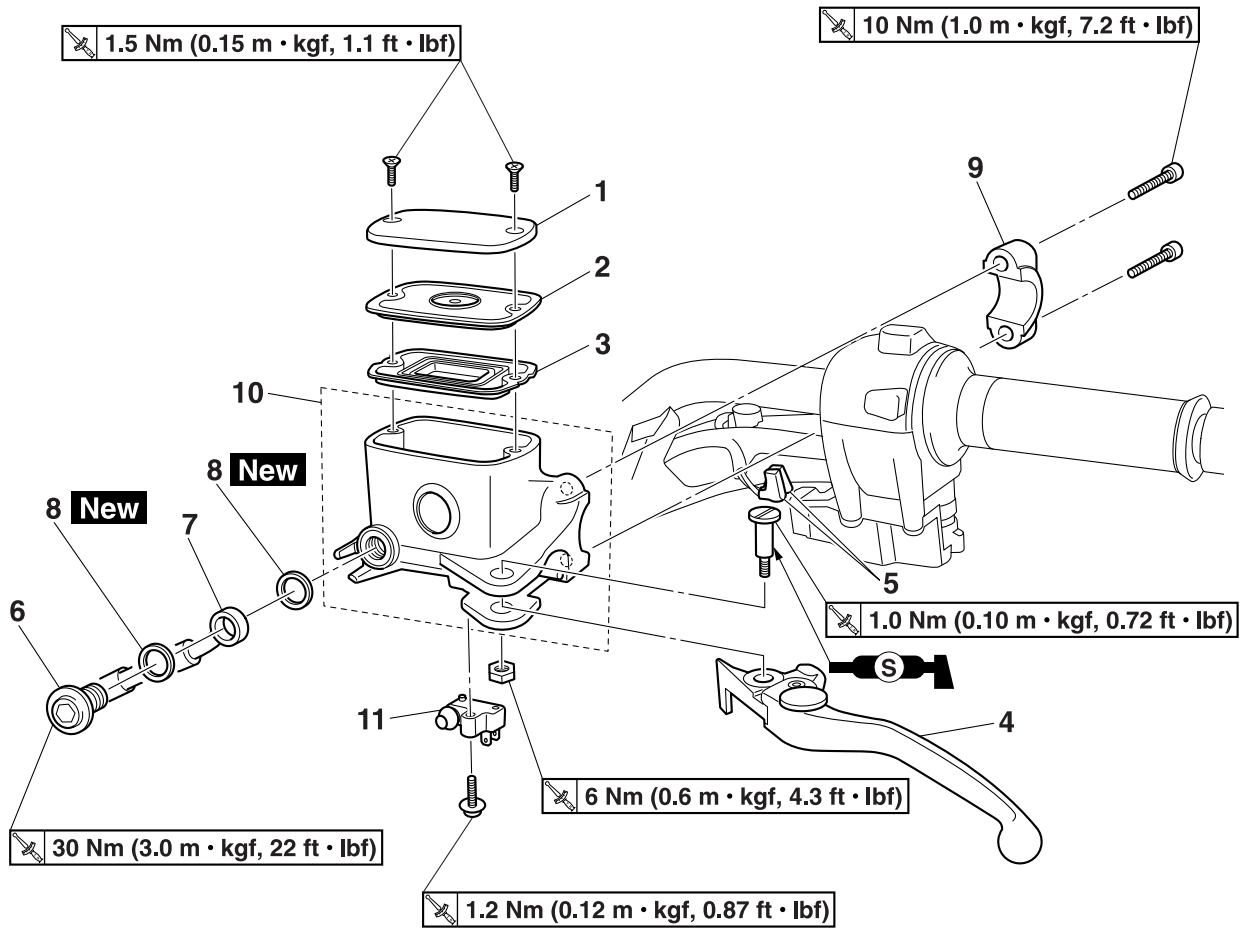
EAS22550
REAR BRAKE

Removing the rear brake pads



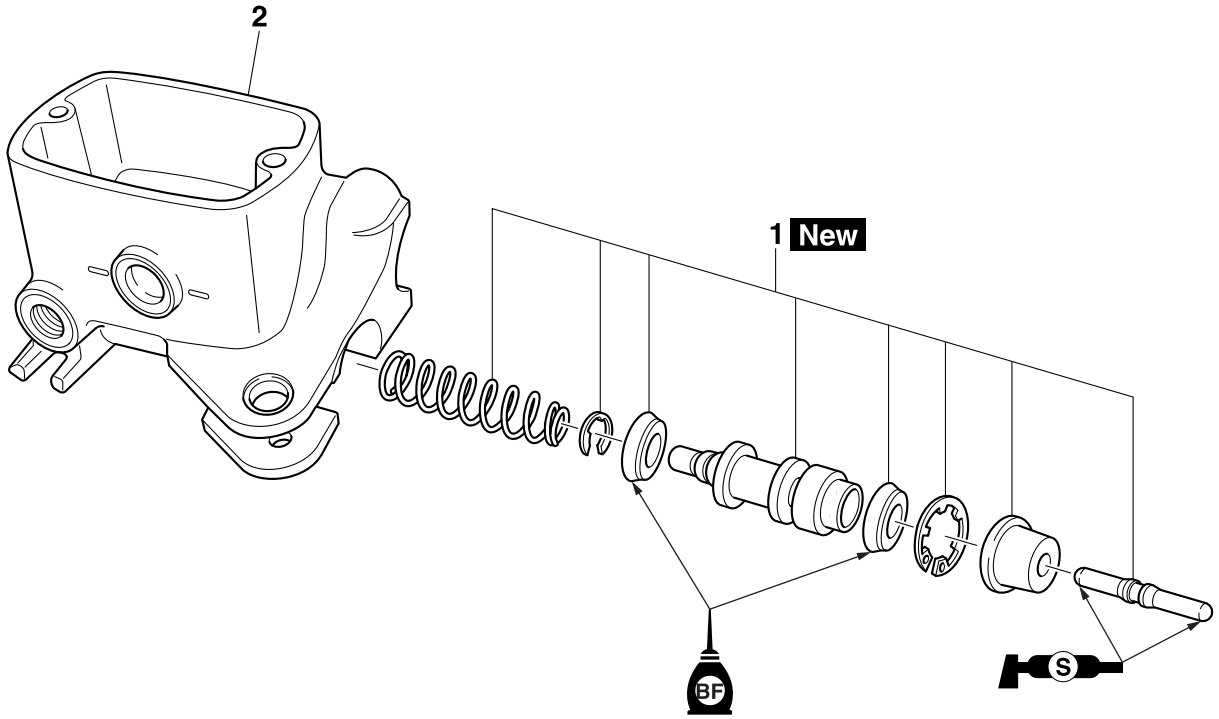
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake caliper bolt	2	
2	Rear brake caliper	1	
3	Rear brake pad	2	
4	Brake pad support	2	
5	Bleed screw	1	
			For installation, reverse the removal procedure.

Removing the rear brake master cylinder



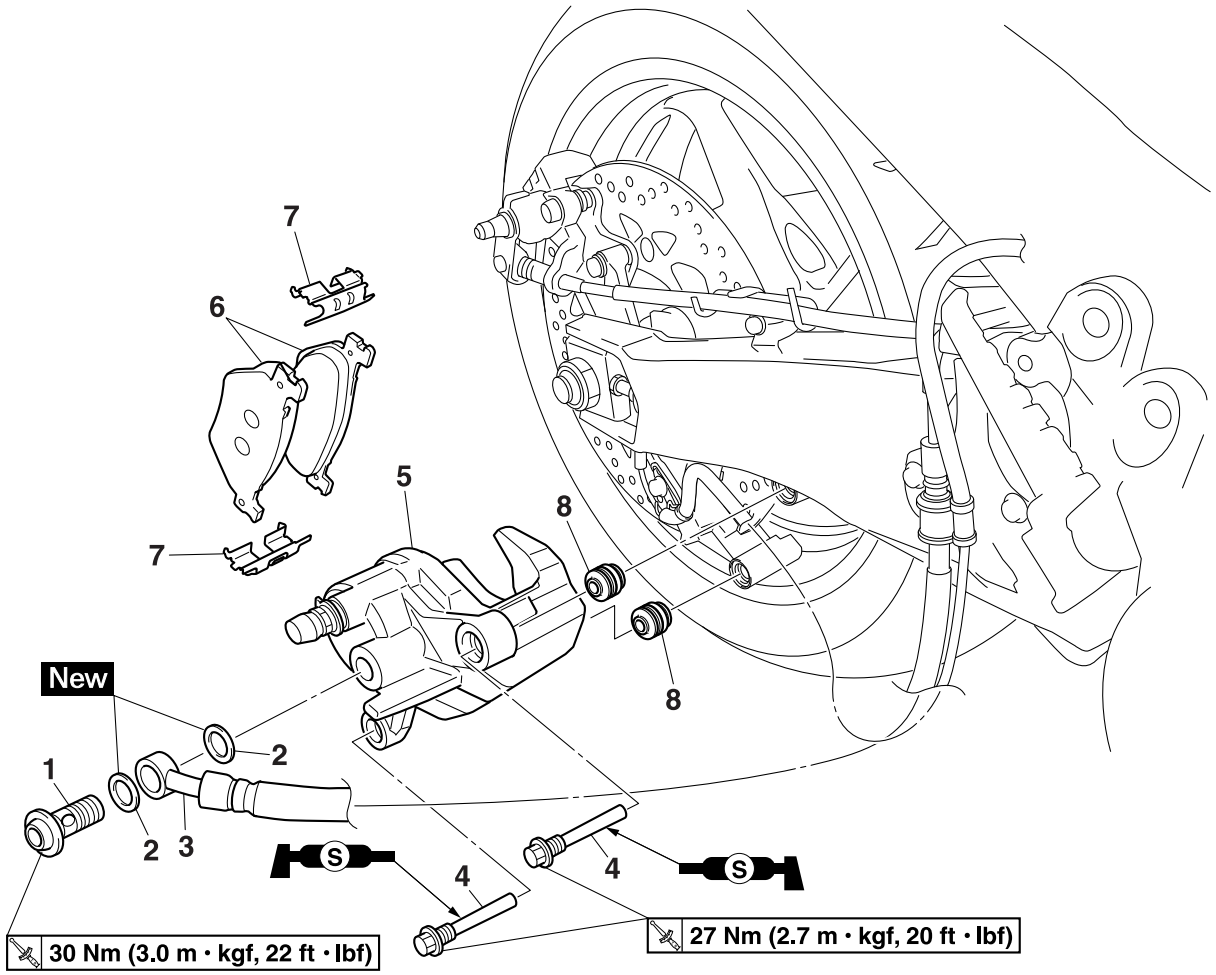
Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "HANDLEBAR" on page 4-76.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Rear brake lever	1	
5	Rear brake light switch connector	2	Disconnect.
6	Brake hose union bolt	1	
7	Rear brake hose	1	
8	Brake hose gasket	2	
9	Rear brake master cylinder holder	1	
10	Rear brake master cylinder	1	
11	Rear brake light switch	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake master cylinder



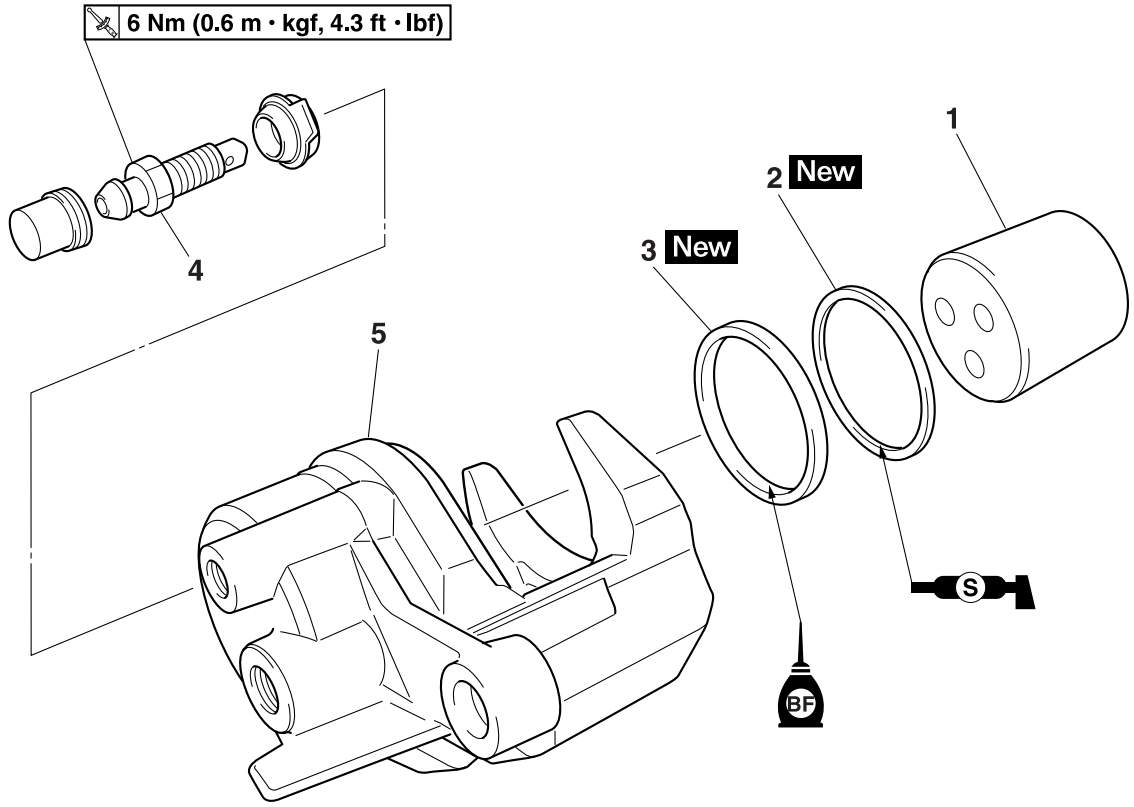
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the rear brake caliper



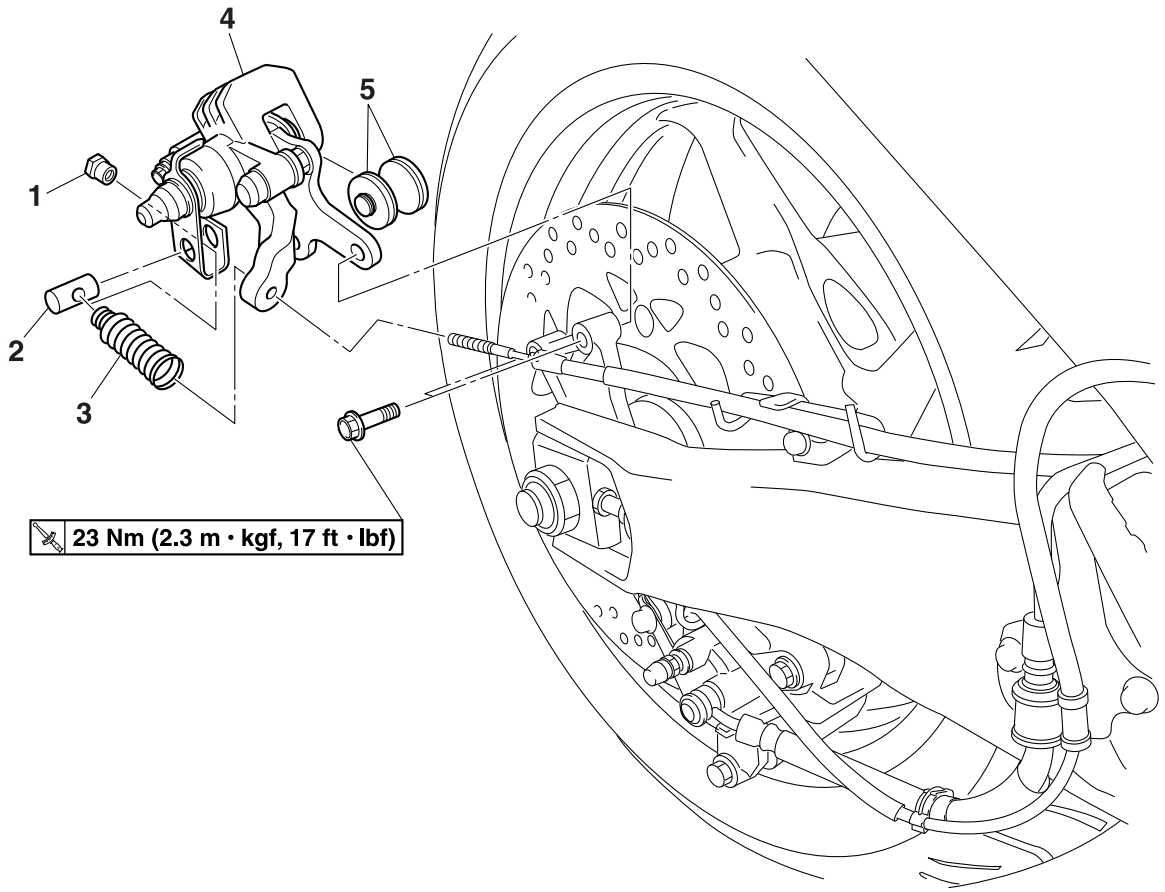
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
1	Brake hose union bolt	1	
2	Brake hose gasket	2	
3	Rear brake hose	1	
4	Rear brake caliper bolt	2	
5	Rear brake caliper	1	
6	Rear brake pad	2	
7	Brake pad support	2	
8	Caliper bolt boot	2	
			For installation, reverse the removal procedure.

Disassembling the rear brake caliper



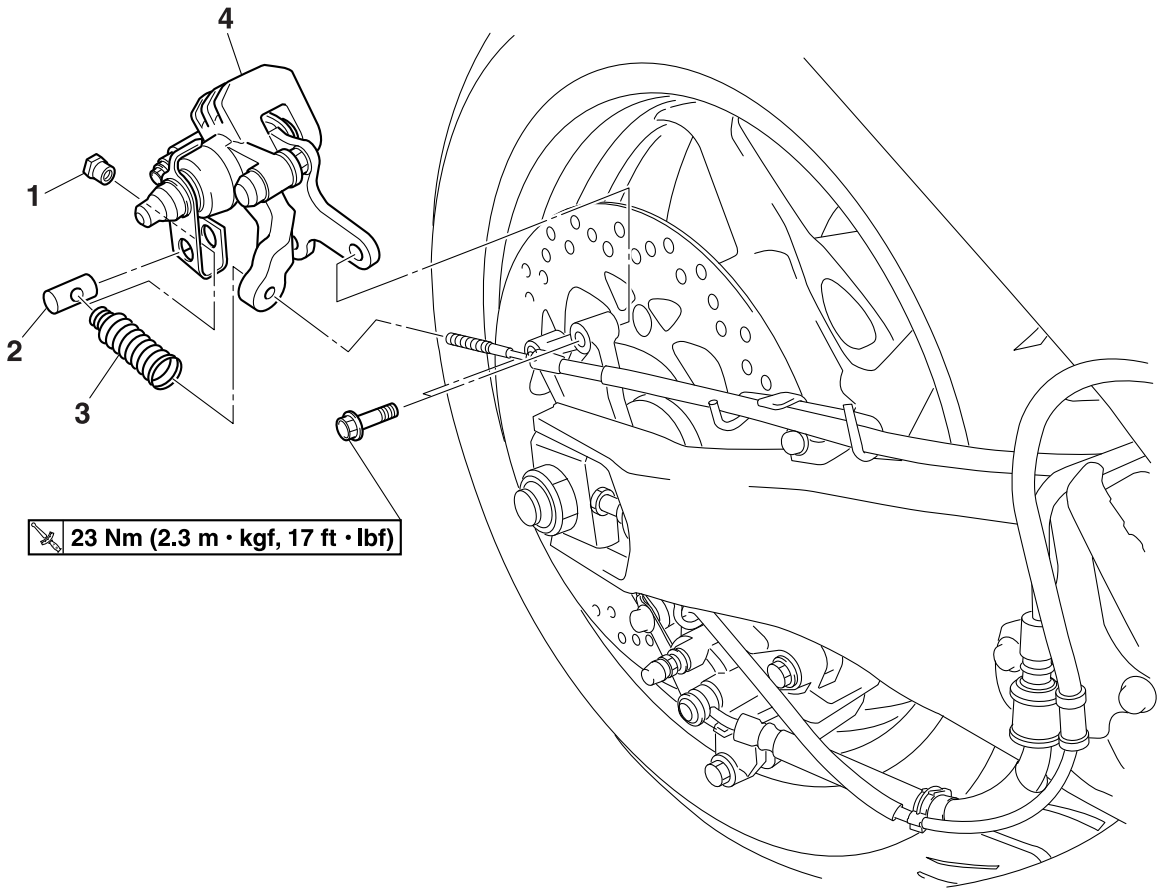
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake caliper piston	1	
2	Brake caliper piston dust seal	1	
3	Brake caliper piston seal	1	
4	Bleed screw	1	
5	Brake caliper body	1	
			For assembly, reverse the disassembly procedure.

Removing the rear brake lock pads



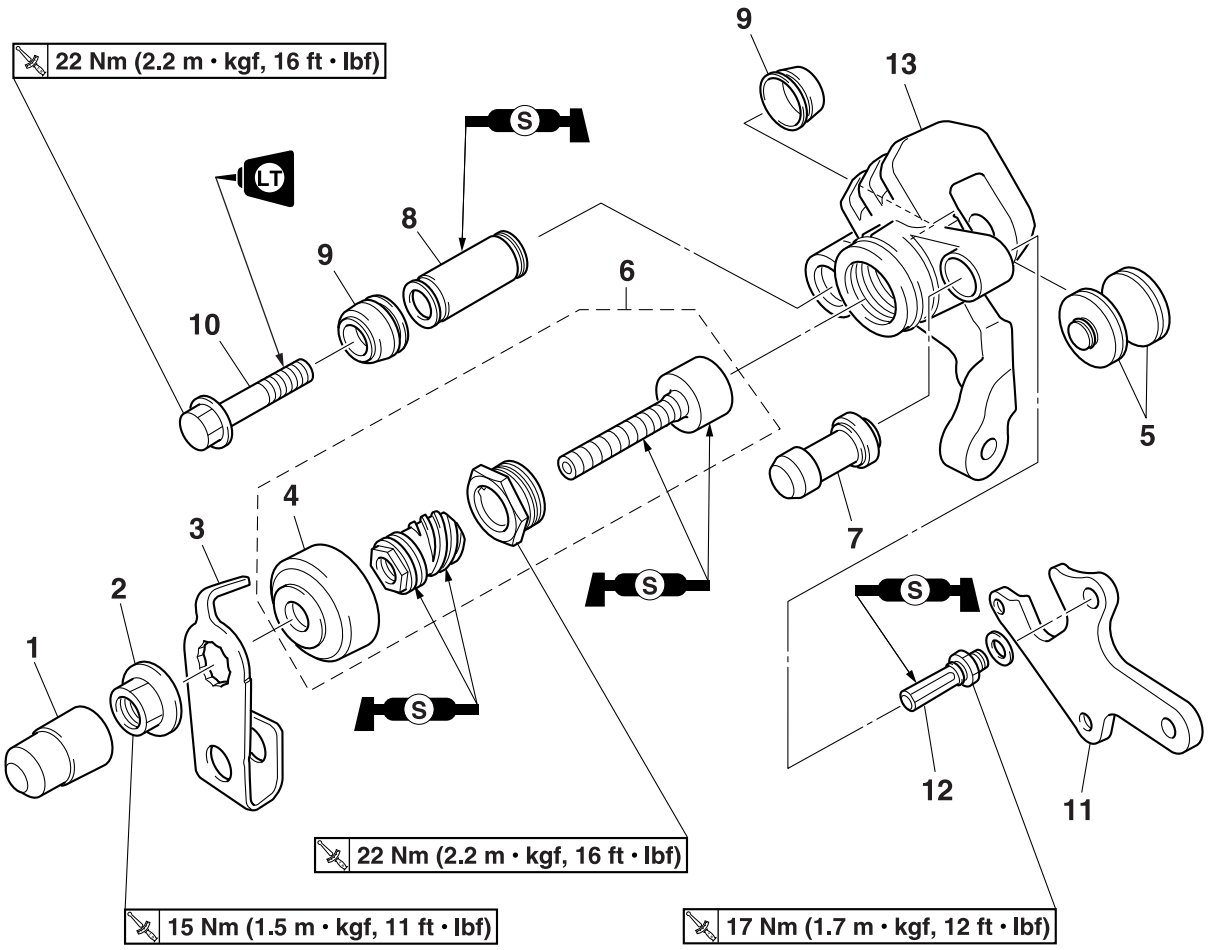
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake lock cable adjusting nut	1	
2	Pin	1	
3	Rear brake lock spring	1	
4	Rear brake lock caliper	1	
5	Rear brake lock pad	2	
			For installation, reverse the removal procedure.

Removing the rear brake lock caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake lock cable adjusting nut	1	
2	Pin	1	
3	Rear brake lock spring	1	
4	Rear brake lock caliper	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake lock caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Cap	1	
2	Rear brake lock adjusting nut	1	
3	Rear brake lock caliper arm	1	
4	Boot	1	
5	Rear brake lock pad	2	
6	Caliper piston assembly	1	
7	Boot	1	
8	Sleeve	1	
9	Boot	2	
10	Rear brake lock caliper bracket bolt	1	
11	Rear brake lock caliper bracket	1	
12	Slide pin bolt	1	
13	Rear brake lock caliper	1	
			For assembly, reverse the disassembly procedure.

EAS22561
INTRODUCTION
EWA14101
⚠ 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 4-27.
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 4-42.

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 4-42.

Brake disc thickness limit
4.5 mm (0.18 in)

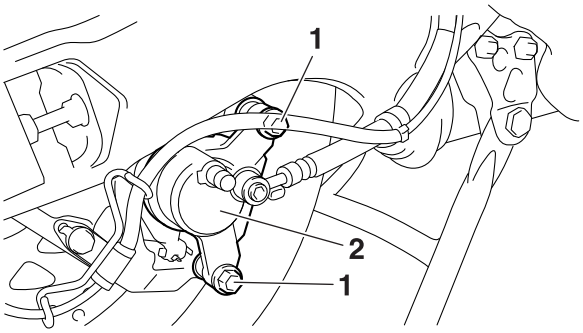
5. Adjust:
   - Brake disc deflection
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-42.

Rear brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

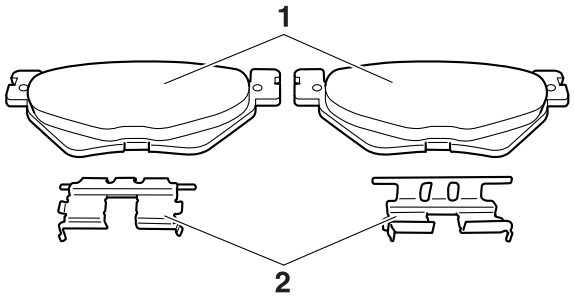
6. Install:
   - Rear wheel
     Refer to "REAR WHEEL" on page 4-27.

EAS22581
REPLACING THE REAR BRAKE PADS
TIP
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

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

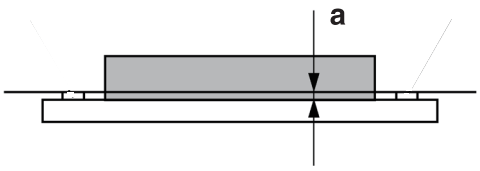


2. Remove:
   - Rear brake pads "1"
   - Brake pad supports "2"



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

Brake pad lining thickness (inner)
8.0 mm (0.31 in)
Limit
0.8 mm (0.03 in)
Brake pad lining thickness (outer)
8.0 mm (0.31 in)
Limit
0.8 mm (0.03 in)

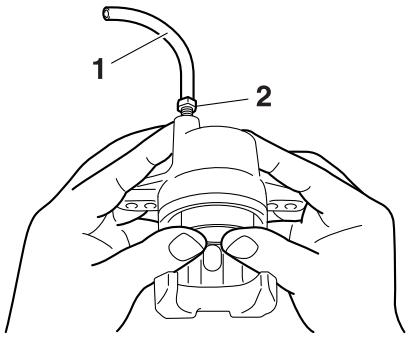


4. Install:
   - Brake pad supports
   - Rear brake pads

TIP
Always install new brake pads, brake pad supports as a set.

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a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.



b. Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.
c. Tighten the bleed screw.

Bleed screw
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

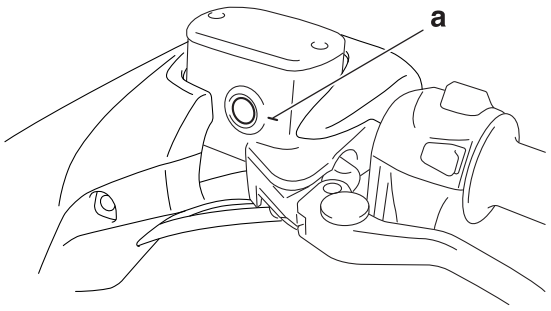
d. Install brake pad supports and brake pads.

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5. Install:
   - Rear brake caliper
   - Rear brake caliper bolts

Rear brake caliper bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)

6. Check:
   - Brake fluid level
     Below the minimum level mark "a"→ Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.



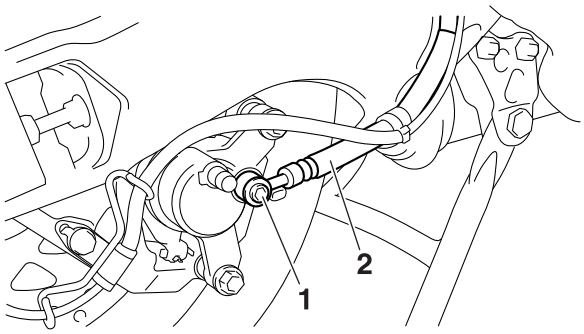
7. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.

EAS22590
REMOVING THE REAR BRAKE CALIPER

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

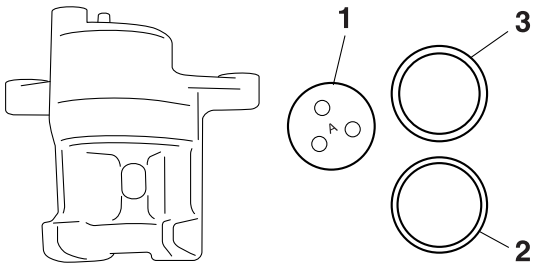
1. Remove:
   - Brake hose union bolt "1"
   - Brake hose gaskets
   - Rear brake hose "2"

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



EAS22601
DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
   - Brake caliper piston “1”
   - Brake caliper piston dust seal “2”
   - Brake caliper piston seal “3”



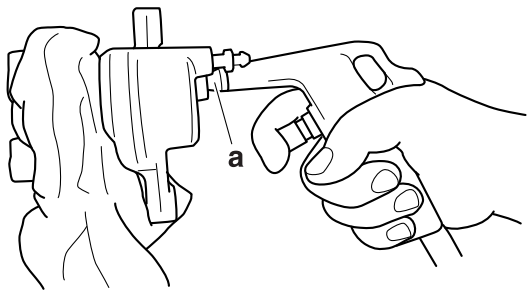
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a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

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 dust seal and brake caliper piston seal.

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EAS22642
CHECKING THE REAR BRAKE CALIPER

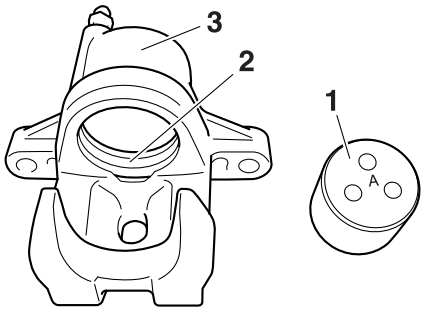
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seal	Every two years
Piston dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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

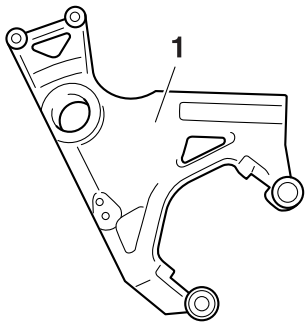
EWA59C1403

⚠ WARNING

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



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



EAS22651
ASSEMBLING THE REAR BRAKE CALIPER
EWA59C1404

⚠ 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 brake caliper piston dust seal and brake caliper piston seal to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston dust seal and brake caliper piston seal.**

Specified brake fluid
DOT 4

EAS22670
INSTALLING THE REAR BRAKE CALIPER
1. Install:
   - Rear brake caliper "1" (temporarily)
   - Brake hose gaskets New
   - Rear brake hose "2"
   - Brake hose union bolt "3"

Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13530

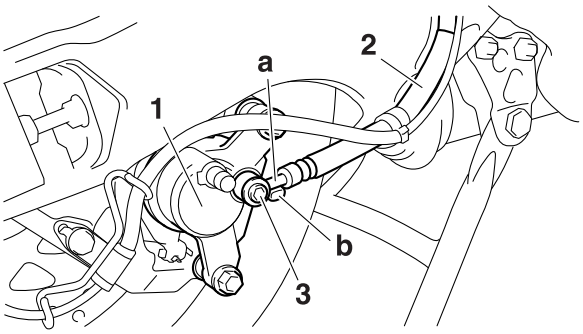
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-39.

ECA14170

NOTICE

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:
   - Brake pad supports
   - Rear brake pads
   - Rear brake caliper
   - Rear brake caliper bolt
   Refer to "REPLACING THE REAR BRAKE PADS" on page 4-58.

Rear brake caliper bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)

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

Specified brake fluid
DOT 4

EWA4B51011

⚠ WARNING

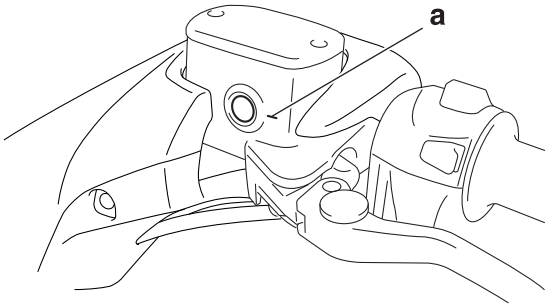
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540

NOTICE

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 (ABS)” on page 3-16.
6. Check:
   • Brake fluid level
   Below the minimum level mark “a”→ Add the specified brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.



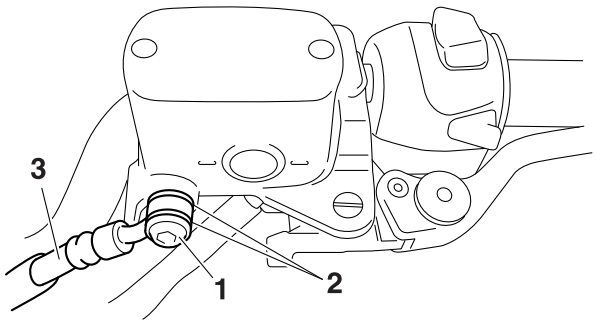
7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-16.

EAS22700
REMOVING THE REAR BRAKE MASTER CYLINDER

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

1. Remove:
   • Brake hose union bolt “1”
   • Brake hose gaskets “2”
   • Rear brake hose “3”

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



EAS22710
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 master cylinder reservoir cap
   • Brake master cylinder reservoir
   • Brake master cylinder reservoir diaphragm holder
   Cracks/damage → Replace.
4. Check:
   • Brake 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.**

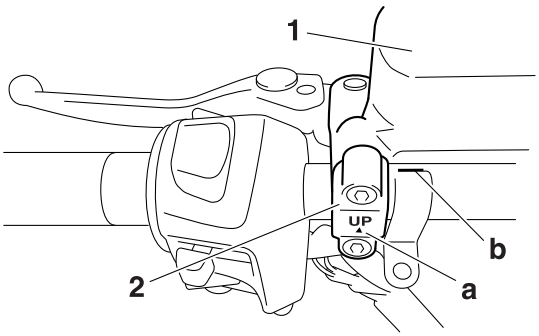
Specified brake fluid
DOT 4

EAS22750
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   • Brake master cylinder “1”
   • Brake master cylinder holder “2”

Brake master cylinder holder bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP
- Install the brake master cylinder holder with the " △ " mark "a" facing up.
- Align the end of the brake master cylinder holder with the welding line "b" on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



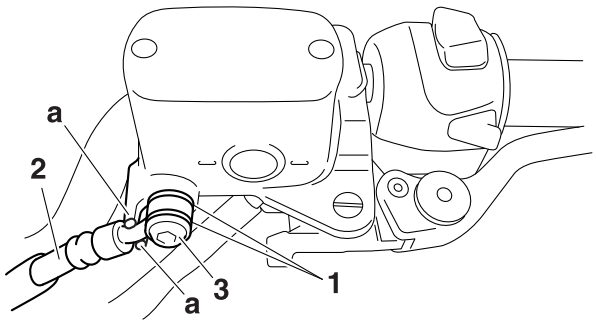
2. Install:
   - Brake hose gaskets "1" New
   - Rear brake hose "2"
   - Brake hose union bolt "3"

Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13530
WARNING
Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-39.

ECA59C1406
NOTICE
When installing the brake hose onto the brake master cylinder, make sure the brake pipe passes between the projections "a" as shown.

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



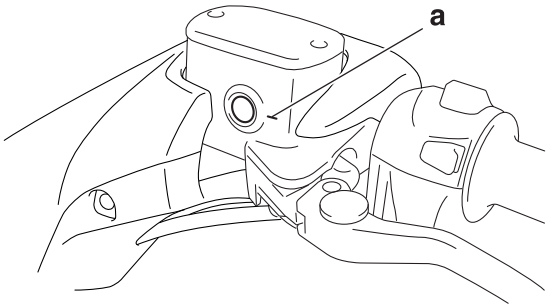
3. Fill:
   - Brake master cylinder reservoir (with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

EWA4B51011
WARNING
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA13540
NOTICE
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

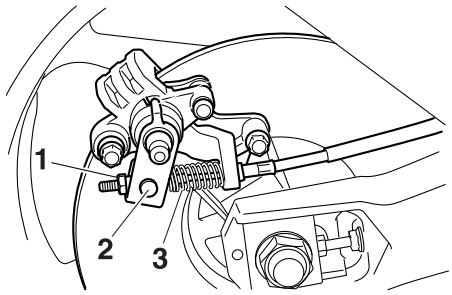
4. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
5. Check:
   - Brake fluid level
     Below the minimum level mark "a"→ Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.



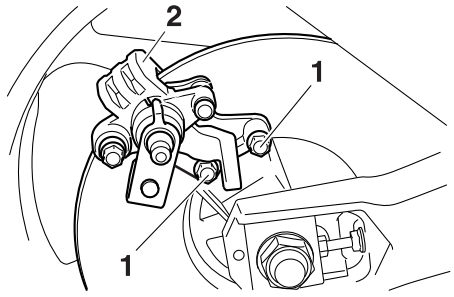
6. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.

EAS59C1401
REPLACING THE REAR BRAKE LOCK PADS

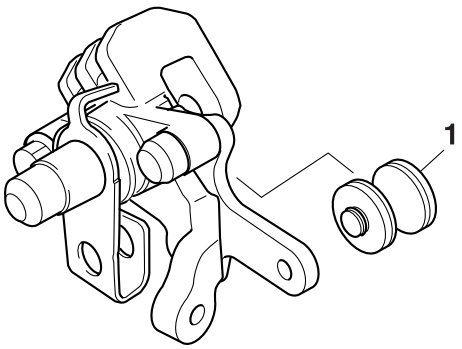
1. Remove:
   • Rear brake lock cable adjusting nut "1"
   • Pin "2"
   • Rear brake lock spring "3"



2. Remove:
   • Rear brake lock caliper bolts "1"
   • Rear brake lock caliper "2"

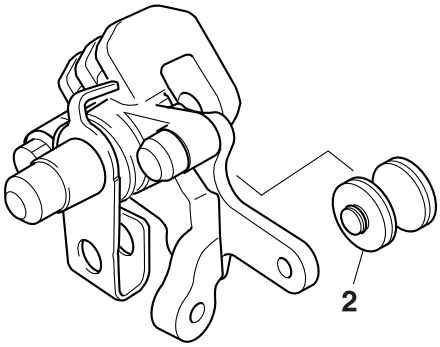


3. Remove:
   • Rear brake lock pad (left side) "1"



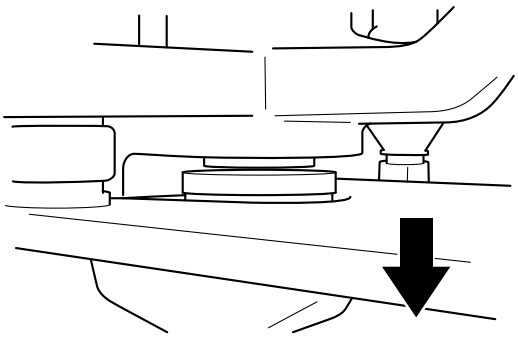
TIP
Push on the back of the pad using a rod with a round end.

4. Remove:
   • Rear brake lock pad (right side) "2"



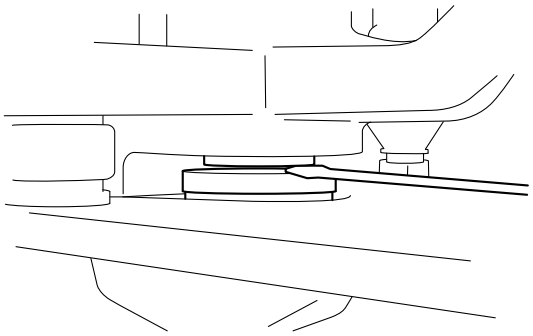
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a. Slide the rear brake lock caliper bracket.



b. Insert a flathead screwdriver in between the piston adjusting bolt and rear brake lock pad and then remove the rear brake lock pad.

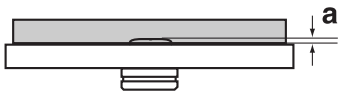
ECA59C1404
NOTICE
Avoid scratching the dust seal on the side of the piston adjusting bolt carefully.



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5. Measure:
   • Rear brake lock pads wear limit “a”
   Out of specification → Replace the rear brake lock pads.

Brake pad lining thickness
3.0 mm (0.12 in)
Limit
0.8 mm (0.03 in)



6. Remove:
   • Cap
   • Rear brake lock adjusting nut
   • Rear brake lock caliper arm
7. Adjust:
   • Piston adjusting bolt
   Refer to “ASSEMBLING THE REAR BRAKE LOCK CALIPER” on page 4-66.
8. Install:
   • Rear brake lock caliper arm
   • Rear brake lock adjusting nut
   • Cap
   • Rear brake lock pads
   Refer to “ASSEMBLING THE REAR BRAKE LOCK CALIPER” on page 4-66.
9. Install:
   • Rear brake lock caliper
   • Rear brake lock caliper bolts
   • Rear brake lock spring
   • Pin
   • Rear brake lock cable adjusting nut

Rear brake lock caliper bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

10. Adjust:
    • Rear brake lock cable length
    Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.

EAS59C1431
REPLACING THE REAR BRAKE LOCK CABLE

1. Remove:
   • Rear brake lock cable
2. Check:
   • Rear brake lock cable
   Cracks/damage/wear → Replace the rear brake lock cable.
3. Install:
   • Rear brake lock cable

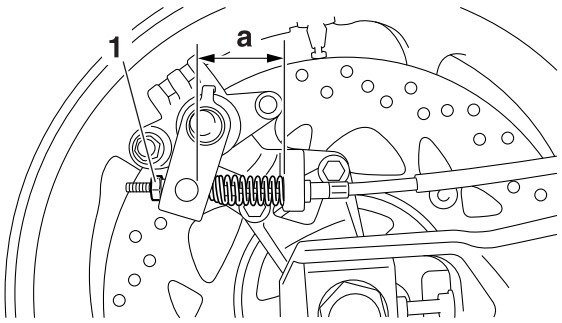
EWA59C1405
⚠ WARNING

Proper brake lock cable routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-39.

4. Adjust:
   • Rear brake lock cable length

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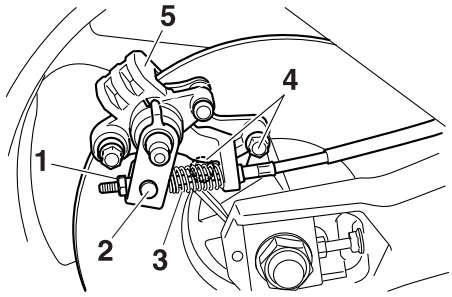
a. Adjust the clearance for the rear brake lock pad.
   Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.
b. Activate the rear brake lock cable 10 times.
c. Carry out adjustment using rear brake lock cable adjusting nut “1” so that dimension “a” is 43–45 mm (1.69–1.77 in).
d. Repeat steps (a) to (c) until dimension “a” is 43–45 mm (1.69–1.77 in).



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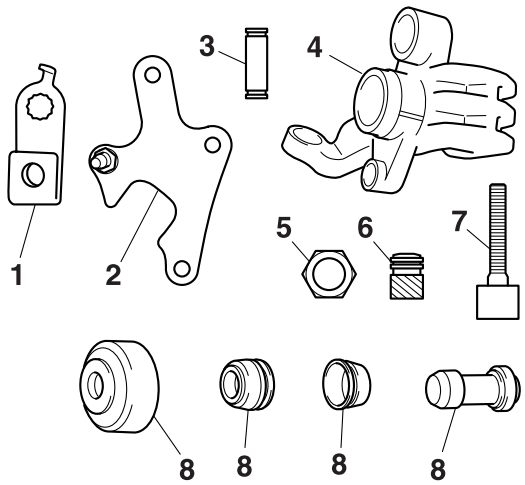
EAS59C1402
REMOVING THE REAR BRAKE LOCK CALIPER

1. Remove:
   - Rear brake lock cable adjusting nut “1”
   - Pin “2”
   - Rear brake lock spring “3”
   - Rear brake lock caliper bolts “4”
   - Rear brake lock caliper “5”



EAS59C1404
CHECKING THE REAR BRAKE LOCK CALIPER

1. Check:
   - Rear brake lock caliper arm “1”
   - Rear brake lock caliper bracket “2”
   - Sleeve “3”
   - Rear brake lock caliper “4”
   - Locknut “5”
   - Shaft L “6”
   - Piston adjusting bolt “7”
   - Boots “8”
     Cracks/damage → Replace.

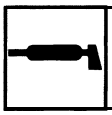


EAS59C1405
ASSEMBLING THE REAR BRAKE LOCK CALIPER

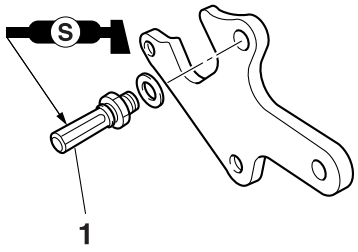
1. Install:
   - Slide pin bolt “1”
     (to the rear brake lock caliper bracket)



Slide pin bolt
17 Nm (1.7 m·kgf, 12 ft·lbf)



Recommended lubricant
Silicone grease

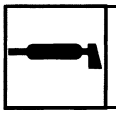


2. Install:
   - Rear brake lock caliper bracket

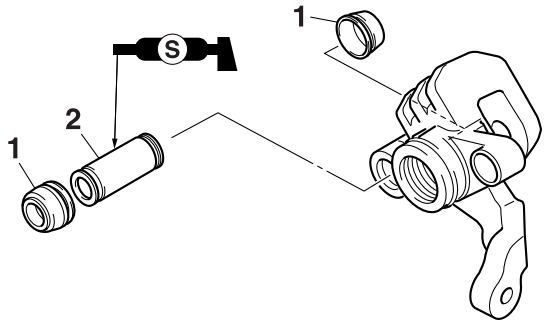


Rear brake lock caliper bracket bolt
22 Nm (2.2 m·kgf, 16 ft·lbf)
LOCTITE®

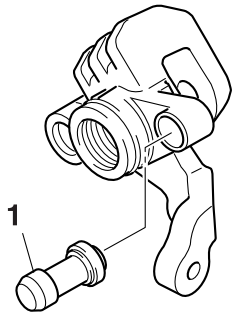
3. Install:
   - Boots “1”
   - Sleeve “2”



Recommended lubricant
Silicone grease



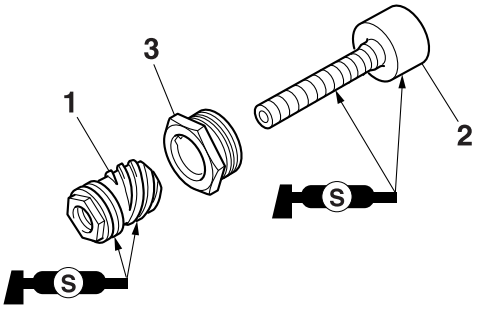
4. Install:
   - Boot “1”



5. Install:
   - Shaft L “1”
   - Piston adjusting bolt “2”
   - Locknut “3”

Recommended lubricant
Silicone grease

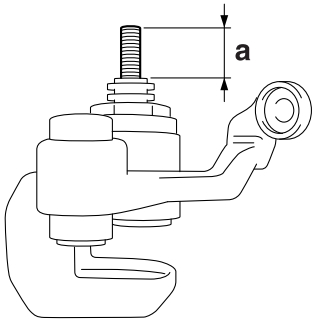
Locknut
22 Nm (2.2 m·kgf, 16 ft·lbf)
Left-hand thread



6. Adjust:
   - Piston adjusting bolt

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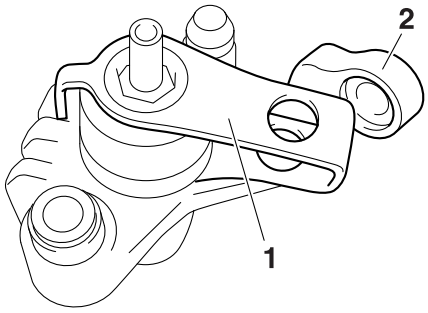
a. Tighten shaft L manually until it touches the locknut.
b. With shaft L fastened, turn and adjust the piston adjusting bolt so that the length “a” between the end of shaft L and the end of the piston adjusting bolt is changed to 19 mm (0.75 in).



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7. Install:
   - Boot
   - Rear brake lock caliper arm

TIP
- Check that the boot is installed correctly.
- Install rear brake lock caliper arm “1” in the position closest to cable holder “2”.



8. Install:
   - Rear brake lock adjusting nut
   - Cap

Rear brake lock adjusting nut
15 Nm (1.5 m·kgf, 11 ft·lbf)

9. Install:
   - Rear brake lock pads

ECA59C1405

NOTICE

After installing the rear brake lock pad to the caliper, check that the pad rotates smoothly.

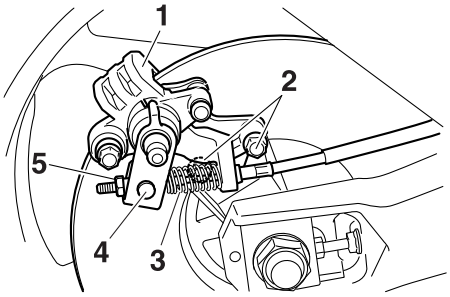
EAS59C1406

INSTALLING THE REAR BRAKE LOCK CALIPER

1. Install:
   - Rear brake lock caliper “1”
   - Rear brake lock caliper bolts “2”

Rear brake lock caliper bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

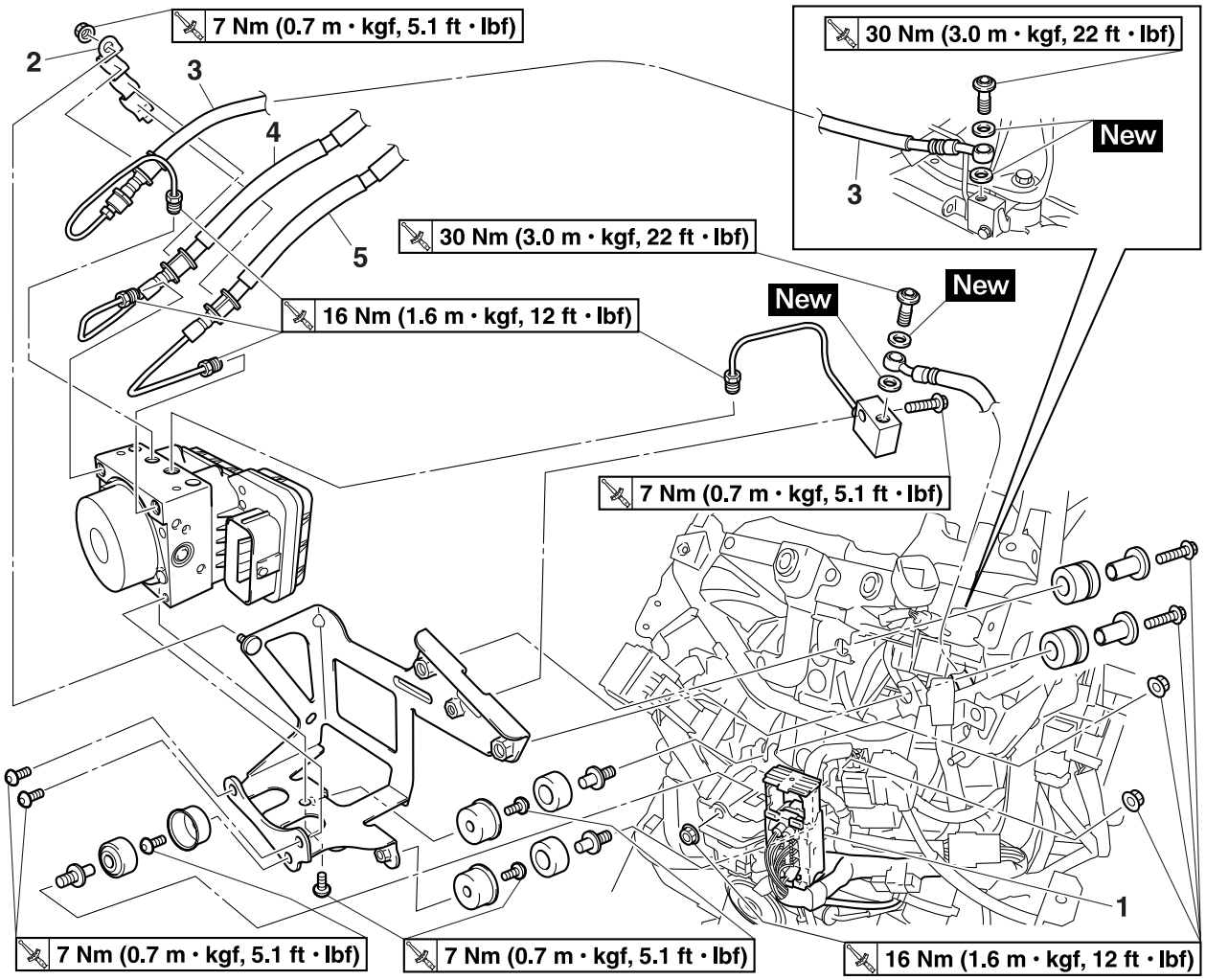
   - Rear brake lock spring “3”
   - Pin “4”
   - Rear brake lock cable adjusting nut “5”



2. Adjust:
   - Rear brake lock cable length
     Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.

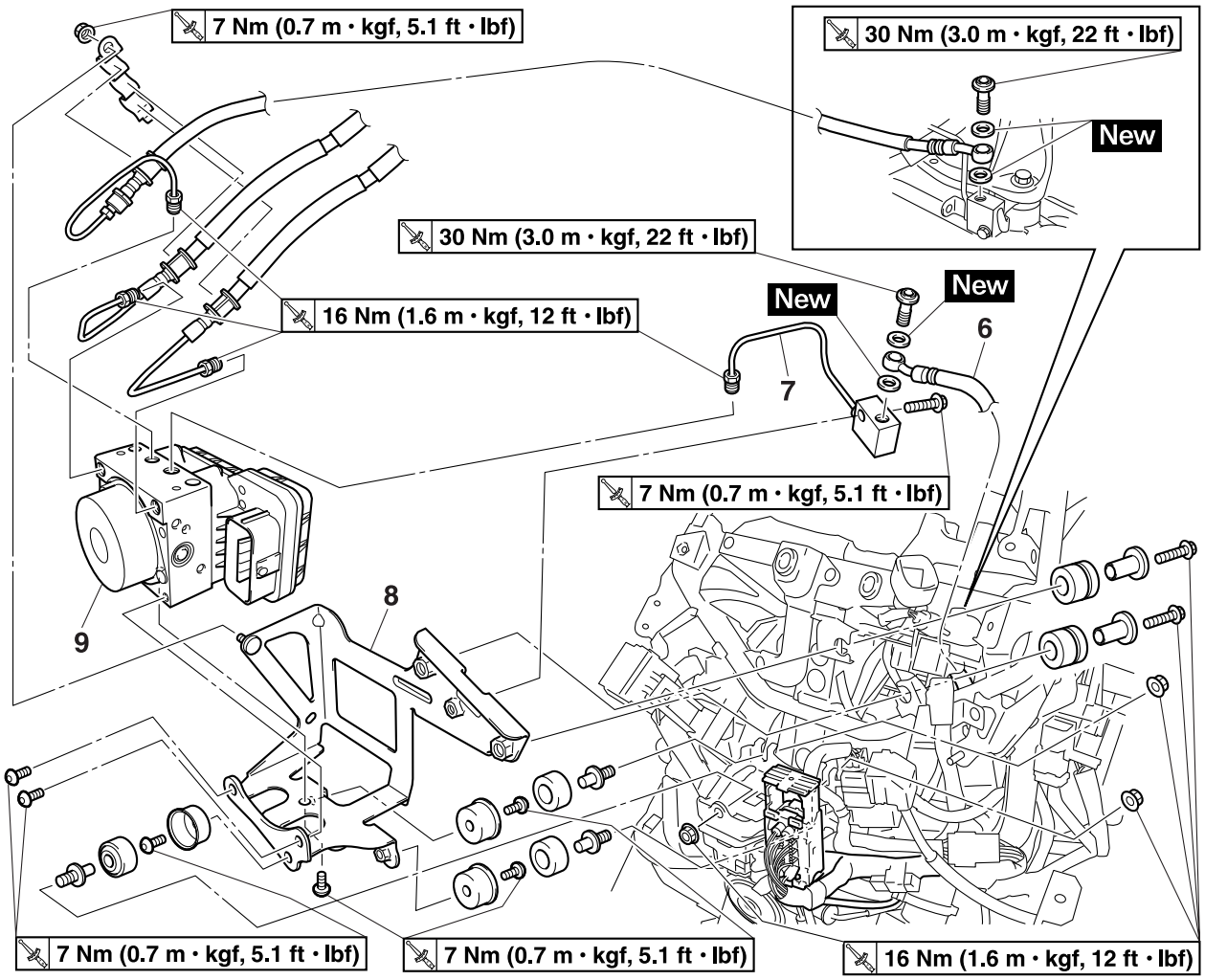
EAS22760
ABS (ANTI-LOCK BRAKE SYSTEM)

Removing the hydraulic unit assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Battery negative lead		Refer to "GENERAL CHASSIS" on page 4-1.
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
	Front brake hose (front brake master cylinder side)		Disconnect. Refer to "FRONT BRAKE" on page 4-37.
	Rear brake hose (rear brake master cylinder side)		Disconnect. Refer to "REAR BRAKE" on page 4-50.
1	ABS ECU coupler	1	Disconnect.
2	Brake hose holder	1	
3	Front brake hose (hydraulic unit to front brake hose joint)	1	
4	Front brake hose (front brake master cylinder to hydraulic unit)	1	
5	Rear brake hose (rear brake master cylinder to hydraulic unit)	1	

Removing the hydraulic unit assembly



Order	Job/Parts to remove	Q'ty	Remarks
6	Rear brake hose (rear brake pipe/joint assembly to rear brake caliper)	1	Disconnect.
7	Rear brake pipe/joint assembly (hydraulic unit to rear brake hose)	1	
8	Hydraulic unit assembly bracket	1	
9	Hydraulic unit assembly	1	
			For installation, reverse the removal procedure.

EAS59C2401
REMOVING THE HYDRAULIC UNIT ASSEMBLY

ECA4B56013
NOTICE

Unless necessary, avoid removing and installing the brake pipes of the hydraulic unit assembly.

EWA13930
⚠ WARNING

Refill with the same type of brake fluid that is already in the system. Mixing fluids may result in a harmful chemical reaction, leading to poor braking performance.

ECA4B56014
NOTICE

- **Handle the ABS components with care, since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.**
- **Do not set the main switch to "ON" when removing the hydraulic unit assembly.**
- **Do not clean with compressed air.**
- **Do not reuse the brake fluid.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Do not allow any brake fluid to contact the couplers. Brake fluid may damage the couplers and cause bad contacts.**
- **If the brake hose flare nuts and union bolts for the hydraulic unit assembly have been removed, be sure to tighten them to the specified torque and bleed the brake system.**

1. Remove:
   - Brake hoses
   - Rear brake pipe/joint assembly

TIP

Do not operate the brake levers while removing the brake hoses and rear brake pipe/joint assembly.

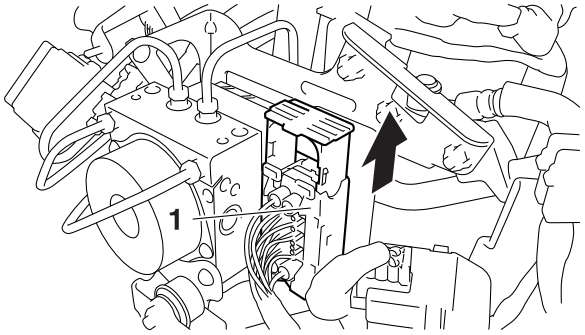
ECA59C2412
NOTICE

When removing the brake hoses and rear brake pipe/joint assembly, cover the area around the hydraulic unit assembly to catch any spilt brake fluid. Do not allow the brake fluid to contact other parts.

2. Disconnect:
   - ABS ECU coupler "1"

TIP

Pull up the coupler ejection slider to disconnect the ABS ECU coupler.



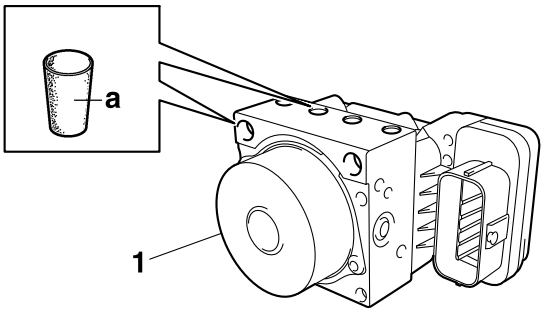
3. Remove:
   - Hydraulic unit assembly "1"

TIP

To avoid brake fluid leakage and to prevent foreign materials from entering the hydraulic unit assembly, insert a rubber plug "a" or a bolt (M10 × 1.0) into each flare nut hole.

ECA17300
NOTICE

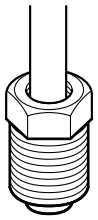
When using a bolt, do not tighten the bolt until the bolt head touches the hydraulic unit. Otherwise, the brake pipe seating surface could be deformed.



EAS59C2402
CHECKING THE HYDRAULIC UNIT ASSEMBLY

1. Check:
   - Hydraulic unit assembly
     Cracks/damage → Replace the hydraulic unit assembly and the brake pipes that are connected to the assembly as a set.

EAS59C2403
CHECKING THE BRAKE PIPES
The following procedure applies to all of the brake pipes.
1. Check:
   - Brake pipe end (flare nut)
     Damage → Replace the hydraulic unit, brake pipes, and related parts as a set.



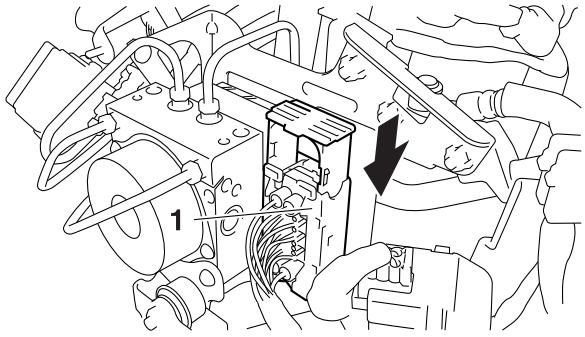
EAS59C2404
INSTALLING THE HYDRAULIC UNIT ASSEMBLY
1. Install:
   - Hydraulic unit assembly

ECA4B56016
NOTICE
Do not remove the rubber plugs or bolts (M10 × 1.0) installed in the flare nut holes before installing the hydraulic unit assembly.

TIP
Do not allow any foreign materials to enter the hydraulic unit assembly or the brake hoses or brake pipes when installing the hydraulic unit assembly.

2. Remove:
   - Rubber plugs or bolts (M10 × 1.0)
3. Connect:
   - ABS ECU coupler “1”

TIP
Push down the coupler ejection slider until a click is heard, making sure that is installed securely.



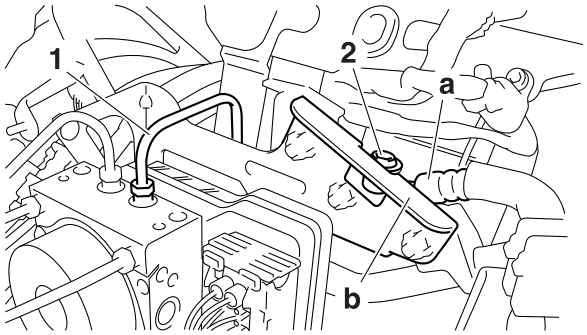
4. Install:
   - Rear brake pipe/joint assembly “1”
   - Rear brake pipe/joint assembly bolt
   - Brake hose gaskets New
   - Brake hose union bolt “2”



Rear brake pipe/joint assembly flare nut
16 Nm (1.6 m·kgf, 12 ft·lbf)
Rear brake pipe/joint assembly bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

ECA59C2401
NOTICE
If the brake pipe flare nut does not turn easily, replace the hydraulic unit, brake pipes, and related parts as a set.

TIP
- When installing the rear brake pipe/joint assembly (hydraulic unit to rear brake hose), temporarily tighten the flare nut and rear brake pipe/joint assembly bolt first. After that, tighten the flare nut and then the rear brake pipe/joint assembly bolt to the specified torque.
- When tightening the brake hose union bolt “2”, make sure that the metal part “a” of the brake hose touches the hydraulic unit assembly bracket “b”.



5. Install:
   - Rear brake hose (rear brake master cylinder to hydraulic unit) “1”
   - Front brake hose (front brake master cylinder to hydraulic unit) “2”
   - Front brake hose (hydraulic unit to front brake hose joint) “3”
   - Brake hose gaskets New
   - Brake hose union bolts

Rear brake hose flare nut
16 Nm (1.6 m·kgf, 12 ft·lbf)
Front brake hose flare nut
16 Nm (1.6 m·kgf, 12 ft·lbf)
Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

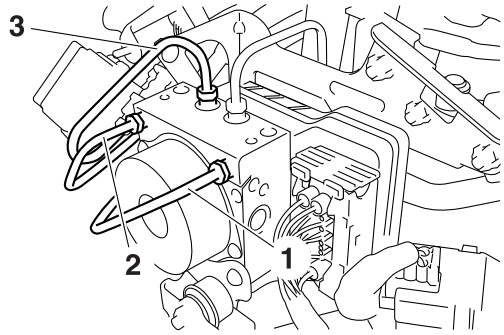
ECA59C2413

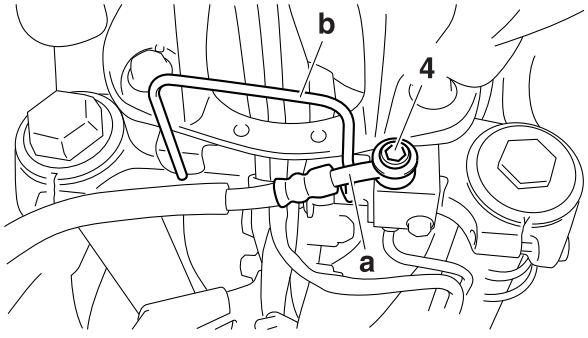
NOTICE

If the brake hose flare nut does not turn easily, replace the hydraulic unit, brake pipes, and related parts as a set.

TIP

- When installing the front brake hose (hydraulic unit to front brake hose joint), front brake hose (front brake master cylinder to hydraulic unit), and rear brake hose (rear brake master cylinder to hydraulic unit), temporarily tighten each flare nut and brake hose holder nut first. After that, tighten the flare nuts and then the brake hose holder nut to the specified torque.
- When tightening the brake hose union bolt "4", make sure that the metal part "a" of the brake hose touches the brake hose bracket "b".





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

Specified brake fluid
DOT 4

EWA59C2401

WARNING

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

ECA13540

NOTICE

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

7. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
8. Check the operation of the hydraulic unit according to the response at both brake levers. (Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-72.)

ECA59C2402

NOTICE

Always check the operation of the hydraulic unit according to the response at both brake levers.

9. Delete the fault codes. (Refer to "[C-1] DELETING THE FAULT CODES" on page 8-115.)
10. Perform a trial run. (Refer to "CHECKING THE ABS WARNING LIGHT" on page 4-75.)

EAS59C2405

HYDRAULIC UNIT OPERATION TESTS

The reaction-force pulsating action generated in the brake levers when the ABS is activated can be tested when the vehicle is stopped. The hydraulic unit operation can be tested using the following two methods.

- Hydraulic unit operation test 1: this test checks the function of the ABS after the system was disassembled, adjusted, or serviced.
- Hydraulic unit operation test 2: this test generates the same reaction-force pulsating action that is generated in the brake levers when the ABS is activated.

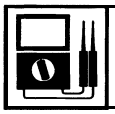
Hydraulic unit operation test 1

EWA13120

WARNING

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

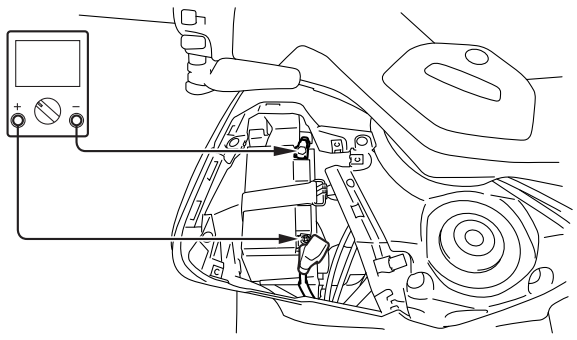
1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Remove:
   - Front left storage box
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Check:
   - Battery voltage
     Lower than 12.8 V → Charge or replace the battery.



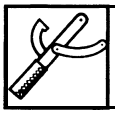
Battery voltage
Higher than 12.8 V

TIP

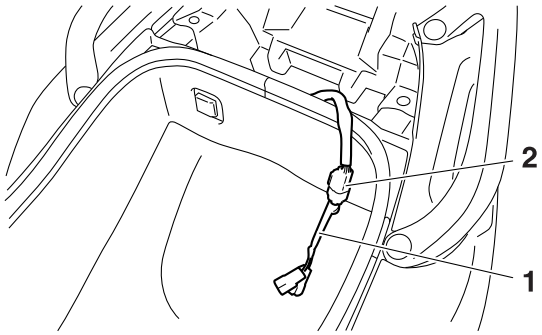
- If the battery voltage is lower than 12.8 V, charge the battery, and then perform hydraulic unit operation test 1.
- If the battery voltage is lower than 10 V, the ABS does not operate.



5. Connect the test coupler adapter "1" to the ABS test coupler "2".



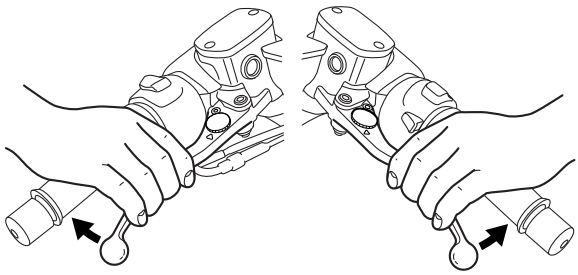
Test coupler adapter
90890-03149



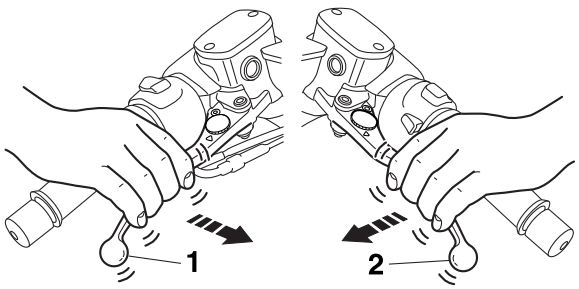
6. Set the main switch to "ON" while operating the front brake lever and the rear brake lever simultaneously.

TIP

Do not push the start switch when setting the main switch to "ON", otherwise the operation test will not begin.



7. Check:
   - Hydraulic unit operation
     When the main switch is set to "ON", a single pulse will be generated in the front brake lever "1", rear brake lever "2", and again in the front brake lever, in this order.



ECA59C2403

NOTICE

- **Check that the pulse is felt in the front brake lever, rear brake lever, and again in the front brake lever, in this order.**

- **If the pulse is felt in the rear brake lever before it is felt in the front brake lever, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**
- **If the pulse is hardly felt in either the brake levers, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**

  - If the operation of the hydraulic unit is normal, delete all of the fault codes.

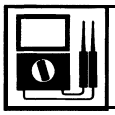
Hydraulic unit operation test 2

EWA13120

WARNING

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

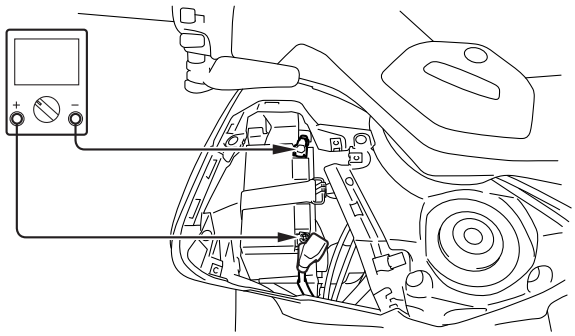
1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Remove:
   - Front left storage box
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Check:
   - Battery voltage
     Lower than 12.8 V → Charge or replace the battery.



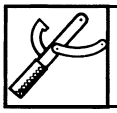
Battery voltage
Higher than 12.8 V

TIP

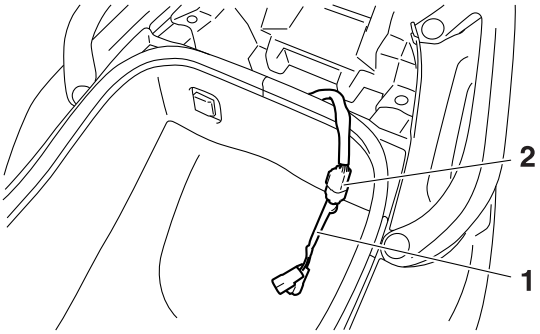
- If the battery voltage is lower than 12.8 V, charge the battery, and then perform hydraulic unit operation test 2.
- If the battery voltage is lower than 10 V, the ABS does not operate.



5. Connect the test coupler adapter "1" to the ABS test coupler "2".



Test coupler adapter
90890-03149

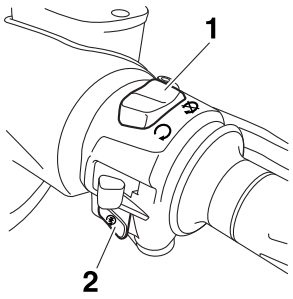


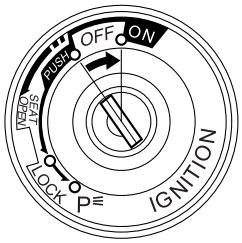
6. Set the engine stop switch "1" to "⊗".
7. Set the main switch to "ON".
8. Push the start switch "2" for at least 4 seconds.

ECA59C2404

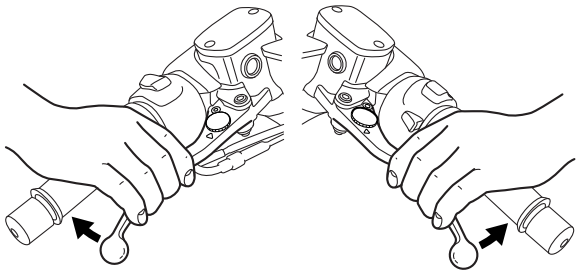
NOTICE

Do not operate the brake levers.



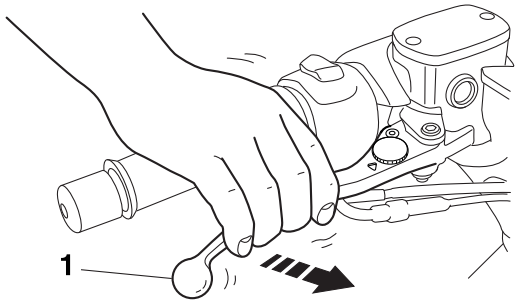


9. After releasing the start switch, operate the front brake lever and the rear brake lever simultaneously.



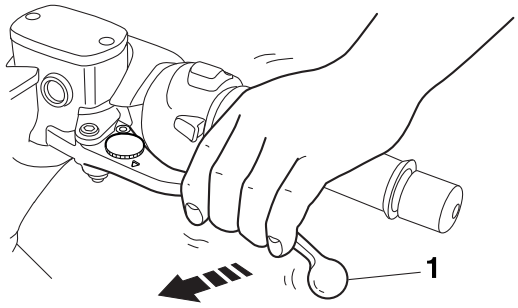
10. A reaction-force pulsating action is generated in the front brake lever “1” 0.5 second after the brake levers are operated simultaneously and continues for approximately 1.5 seconds.

TIP
- The reaction-force pulsating action consists of quick pulses.
- Be sure to continue operating the brake levers even after the pulsating action has stopped.



11. After the pulsating action has stopped in the front brake lever, it is generated in the rear brake lever “1” 0.5 second later and continues for approximately 2 seconds.

TIP
- The reaction-force pulsating action consists of quick pulses.
- Be sure to continue operating the brake levers even after the pulsating action has stopped.



12. After the pulsating action has stopped in the rear brake lever, it is generated in the front brake lever 0.5 second later and continues for approximately 1.5 seconds.

TIP
The reaction-force pulsating action consists of quick pulses.

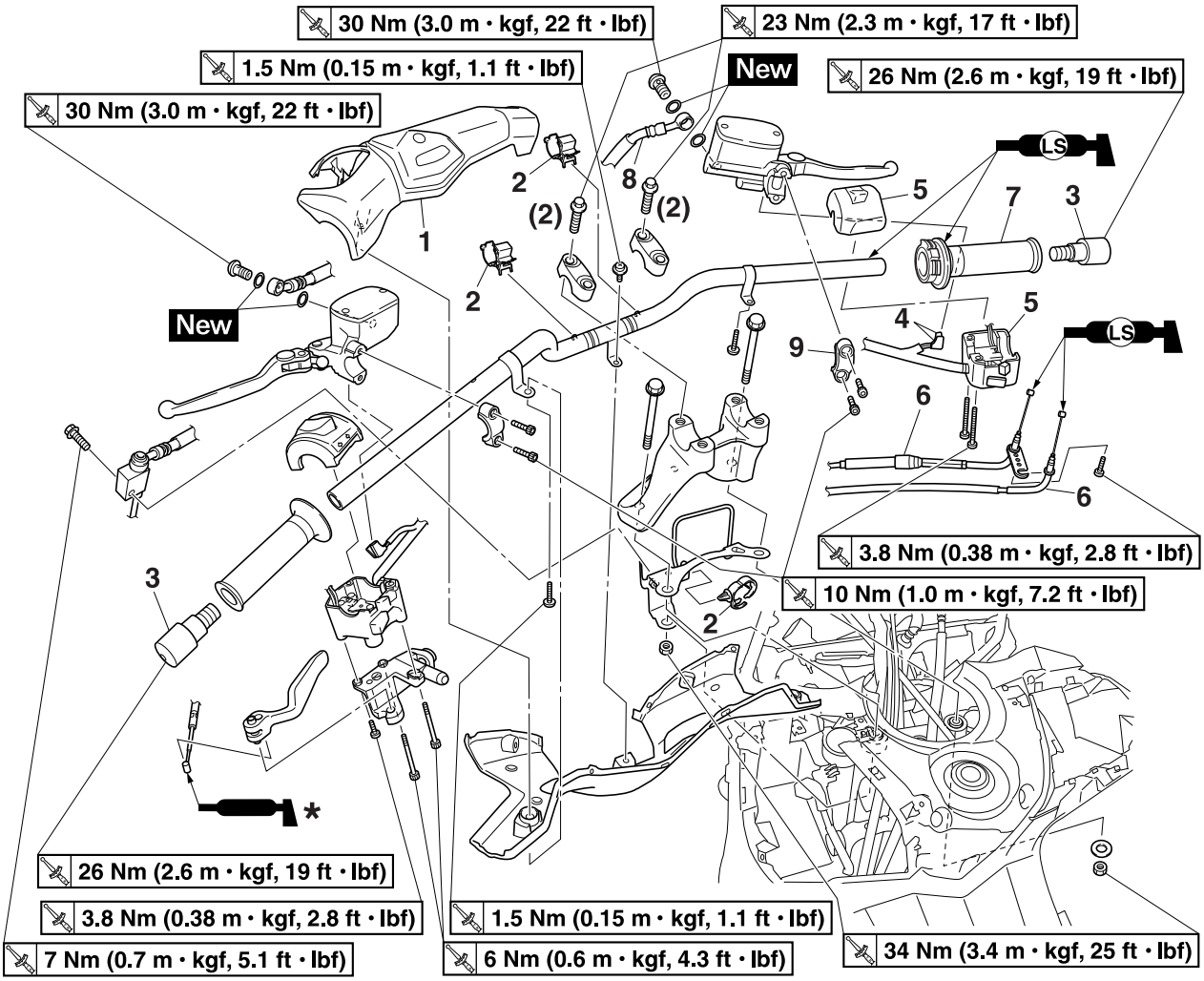
ECA59C2403
NOTICE
- **Check that the pulse is felt in the front brake lever, rear brake lever, and again in the front brake lever, in this order.**
- **If the pulse is felt in the rear brake lever before it is felt in the front brake lever, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**
- **If the pulse is hardly felt in either the brake levers, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**

13. Set the main switch to “OFF”.
14. Remove the test coupler adapter from the ABS test coupler.
15. Set the main switch to “ON”.
16. Set the engine stop switch to “ ”.
17. Check for brake fluid leakage around the hydraulic unit.
    Brake fluid leakage → Replace the hydraulic unit, brake pipes, and related parts as a set.

EAS59C2406
CHECKING THE ABS WARNING LIGHT
After all checks and servicing are completed, ensure that the ABS warning light goes off by walking the vehicle at a speed of faster than 7 km/h (4.4 mi/h) or performing a trial run.

EAS22840
HANDLEBAR

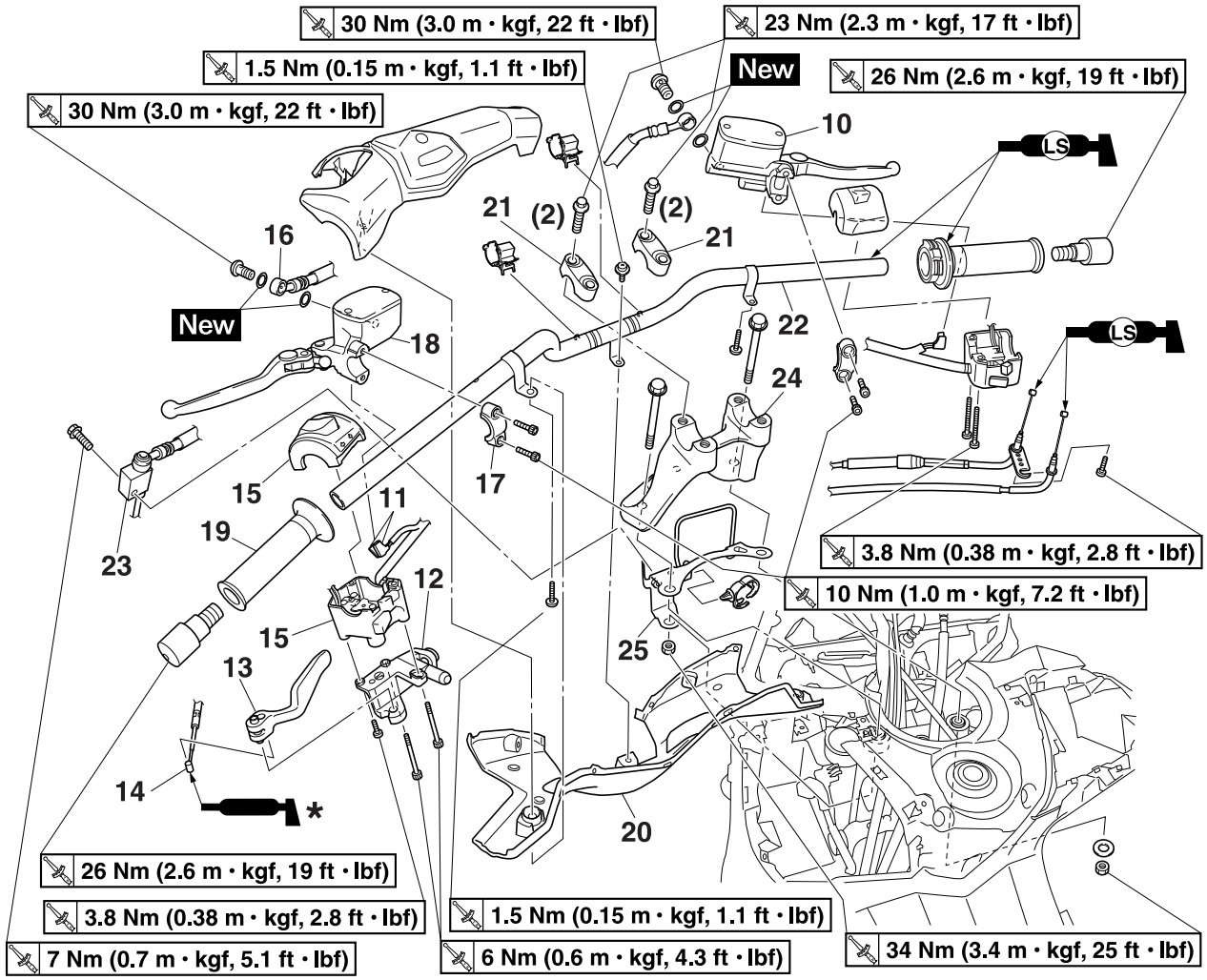
Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
	Rear brake lock cable adjusting nut		Loosen. Refer to "REAR BRAKE" on page 4-50.
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Meter assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-16.
1	Upper handlebar cover	1	
2	Holder	3	
3	Grip end	2	
4	Front brake light switch connector	2	Disconnect.
5	Right handlebar switch	1	
6	Throttle cable	2	Disconnect.
7	Throttle grip	1	
8	Front brake hose	1	Disconnect.
9	Front brake master cylinder holder	1	

* YAMAHA GREASE "F"

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
10	Front brake master cylinder assembly	1	
11	Rear brake light switch connector	2	Disconnect.
12	Rear brake lock holder	1	
13	Rear brake lock lever	1	
14	Rear brake lock cable	1	Disconnect.
15	Left handlebar switch	1	
16	Rear brake hose	1	Disconnect.
17	Rear brake master cylinder holder	1	
18	Rear brake master cylinder assembly	1	
19	Handlebar grip	1	
20	Lower handlebar cover	1	
21	Upper handlebar holder	2	
22	Handlebar	1	
23	Front brake pipe/joint assembly	1	
24	Lower handlebar holder	1	
25	Brake hose bracket	1	
			For installation, reverse the removal procedure.

* YAMAHA GREASE "F"

EAS22860
REMOVING THE HANDLEBAR
1. Stand the vehicle on a level surface.

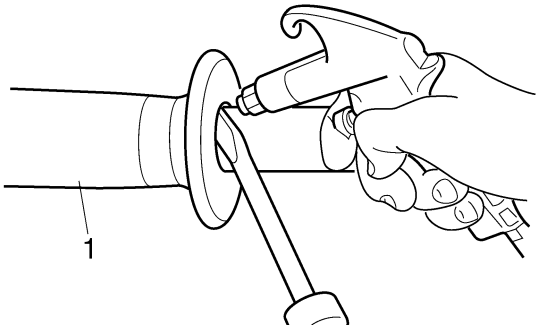
EWA13120
⚠ WARNING

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

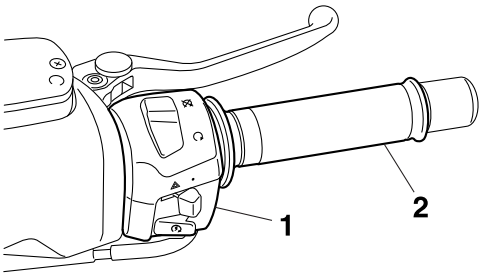
2. Remove:
   - Handlebar grip "1"

TIP

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



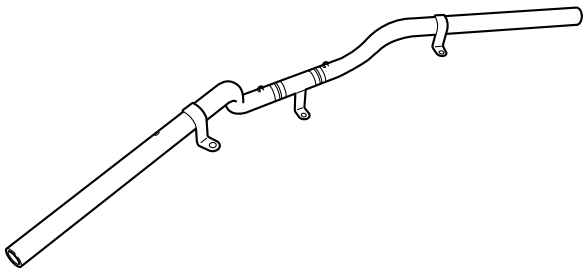
3. Remove:
   - Right handlebar switch "1"
   - Throttle grip "2"



EAS22880
CHECKING THE HANDLEBAR
1. Check:
   - Handlebar
     Bends/cracks/damage → Replace.

EWA13690
⚠ WARNING

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



EAS22931
INSTALLING THE HANDLEBAR
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. Install:
   - Brake hose bracket
   - Lower handlebar holder
   - Front brake pipe/joint assembly

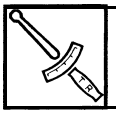


Lower handlebar holder nut
34 Nm (3.4 m·kgf, 25 ft·lbf)
Front brake pipe/joint assembly bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

3. Install:
   - Handlebar
   - Upper handlebar holder

TIP

- Align the punch mark on the handlebar to the end of the lower handlebar holder.
- First, tighten the bolts on the front side of the upper handlebar holder, and then on the rear side.



Upper handlebar holder bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

4. Install:
   - Lower handlebar cover
5. Install:
   - Handlebar grip

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

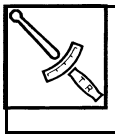
EWA13700

⚠ WARNING

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

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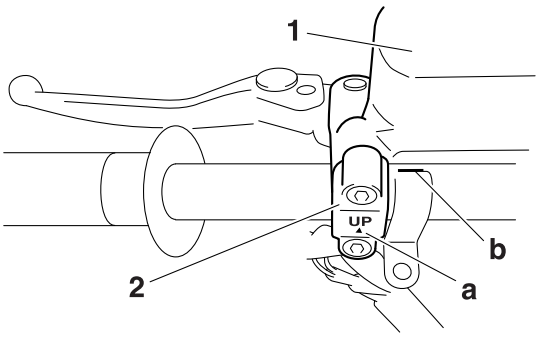
6. Install:
   - Rear brake master cylinder assembly “1”
   - Rear brake master cylinder holder “2”



Brake master cylinder holder bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

- Install the rear brake master cylinder holder with the “ △ ” mark “a” facing up.
- Align the end of the brake master cylinder holder with the welding line “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



7. Connect:
   - Rear brake lock cable (to rear brake lock lever)

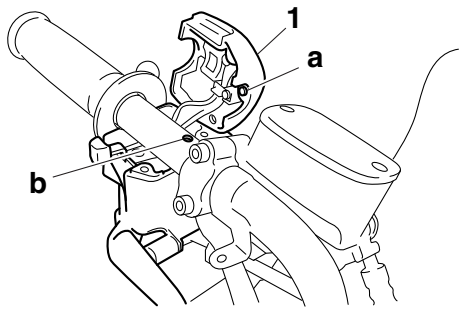
TIP

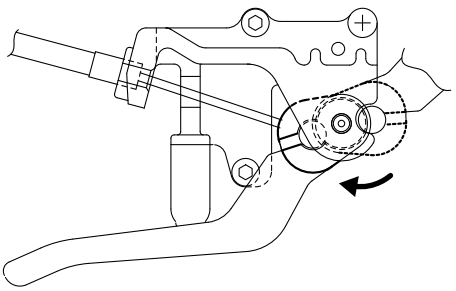
Lubricate the rear brake lock cable end with YAMAHA GREASE “F”.

8. Install:
   - Left handlebar switch “1”
   - Rear brake lock lever
   - Rear brake lock lever holder

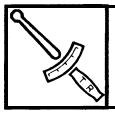
TIP

- Align the projection “a” on the left handlebar switch with the hole “b” in the handlebar.
- Install the rear brake lock cable after rotating the lever to the position shown in the illustration.





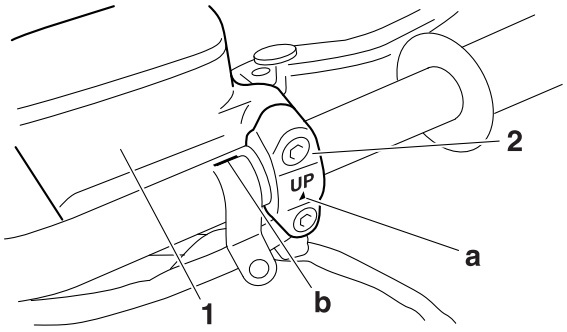
9. Connect:
   - Rear brake light switch connector
10. Install:
   - Front brake master cylinder assembly “1”
   - Front brake master cylinder holder “2”



Brake master cylinder holder
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

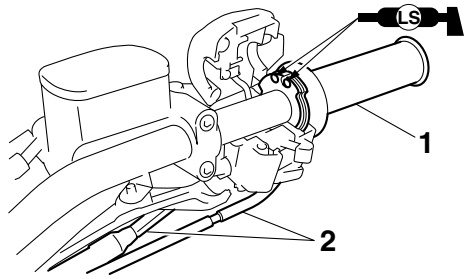
- Install the front brake master cylinder holder with the “ △ ” mark “a” facing up.
- Align the end of the brake master cylinder holder with the welding line “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



11. Install:
   - Throttle grip “1”
   - Throttle cables “2”

TIP

Lubricate the inside of the throttle grip with a thin coat of lithium-soap-based grease and install it onto the handlebar.



12. Install:
    - Right handlebar switch “1”

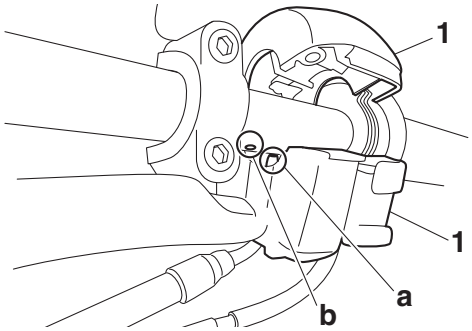
EWA13720

⚠ WARNING

Make sure the throttle grip operates smoothly.

TIP

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



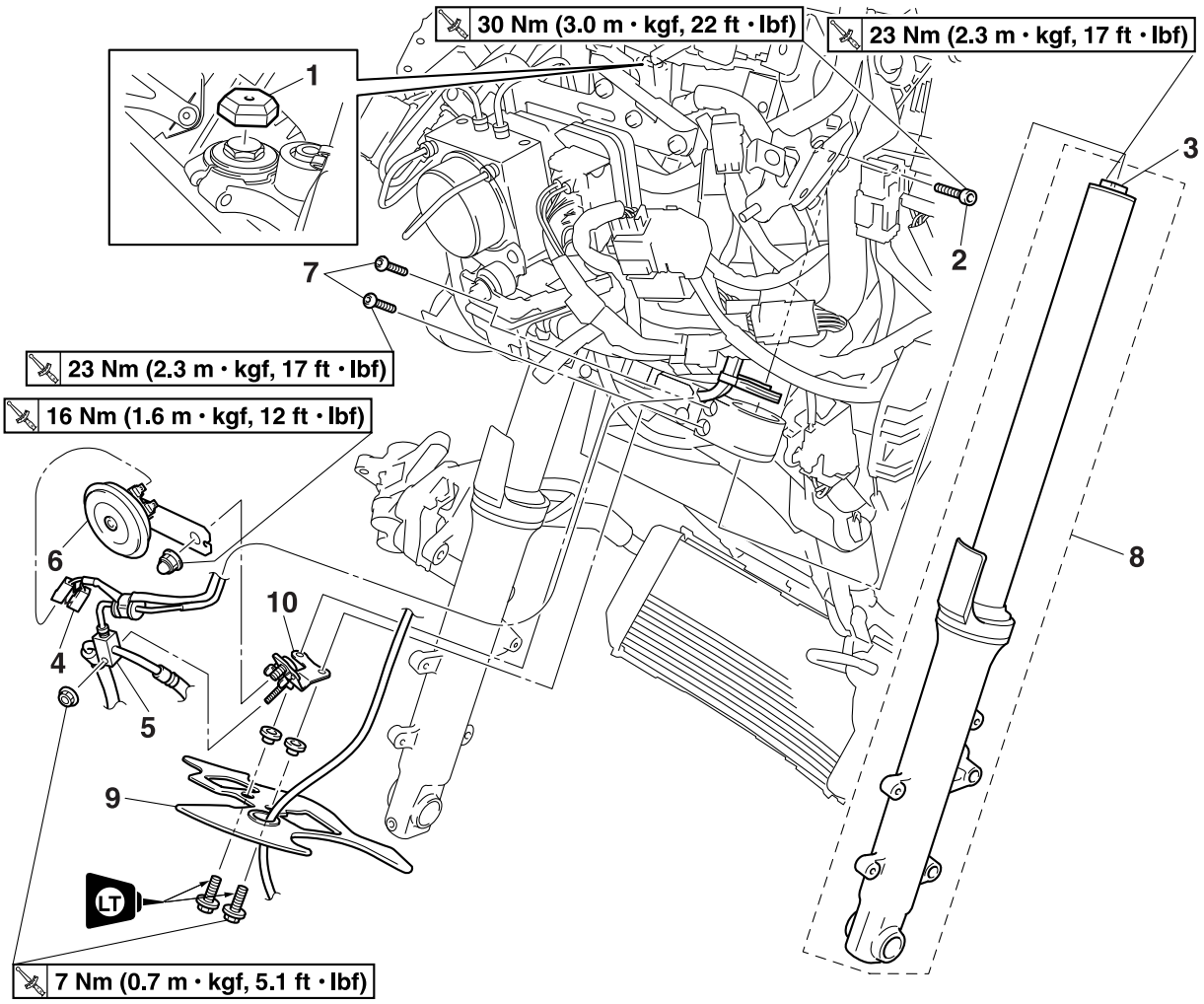
13. Connect:
    - Front brake light switch connector
14. Adjust:
    - Throttle grip free play
      Refer to “CHECKING THE THROTTLE GRIP” on page 3-32.

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

15. Adjust:
    - Rear brake lock cable length
      Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-17.
16. Install:
    - Grip end
    - Holder
    - Upper handlebar cover

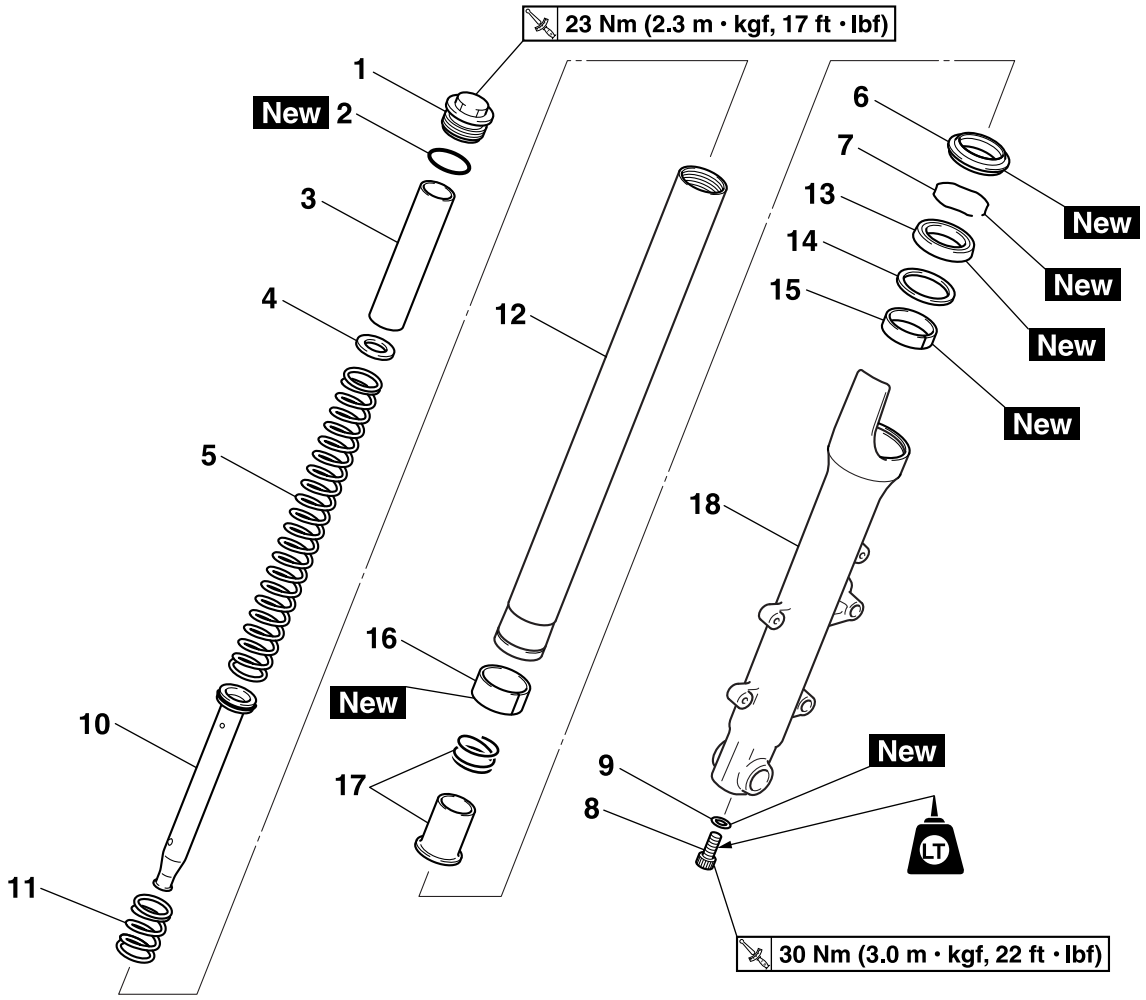
EAS22950
FRONT FORK

Removing the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Meter assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Storage compartment		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel/Front fender		Refer to "FRONT WHEEL" on page 4-18.
1	Cap bolt cover	1	Right front fork side
2	Upper bracket pinch bolt	1	Loosen.
3	Cap bolt	1	Loosen.
4	Horn lead coupler	1	Disconnect.
5	Brake pipe joint	1	
6	Horn	1	
7	Lower bracket pinch bolt	2	Loosen.
8	Front fork leg	1	
9	Lower bracket cover	1	
10	Horn bracket	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	Spacer	1	
4	Fork spring seat	1	
5	Fork spring	1	
6	Dust seal	1	
7	Oil seal clip	1	
8	Damper rod bolt	1	
9	Copper washer	1	
10	Damper rod	1	
11	Rebound spring	1	
12	Inner tube	1	
13	Oil seal	1	
14	Washer	1	
15	Outer tube bushing	1	
16	Inner tube bushing	1	
17	Oil flow stopper	1	
18	Outer tube	1	
			For assembly, reverse the disassembly procedure.

EAS22960
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

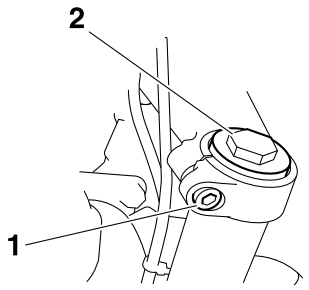
Securely support the vehicle so that there is no danger of it falling over.

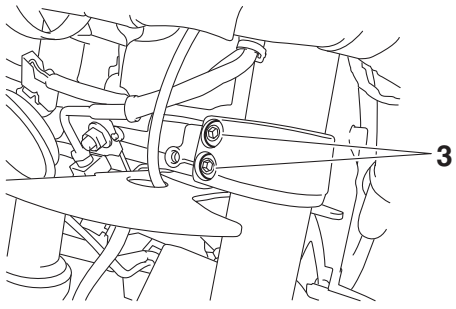
TIP
Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Remove:
   - Cap bolt cover (right front fork side)
3. Loosen:
   - Upper bracket pinch bolt "1"
   - Cap bolt "2"
   - Lower bracket pinch bolts "3"

EWA13640
⚠ WARNING

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

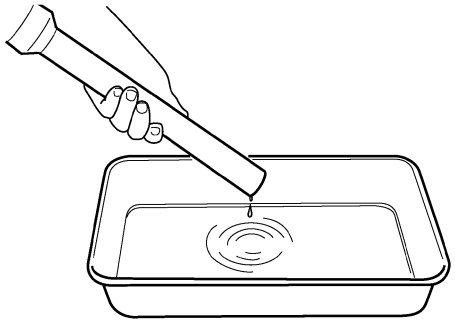




4. Remove:
   - Front fork leg

EAS22980
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Remove:
   - Cap bolt
   - Spacer
   - Fork spring seat
   - Fork spring
2. Drain:
   - Fork oil

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

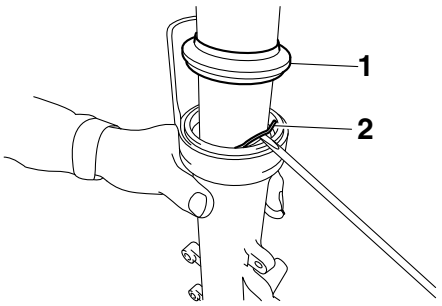


3. Remove:
   - Dust seal "1"
   - Oil seal clip "2" (with a flathead screwdriver)

ECA14180
NOTICE

Do not scratch the inner tube.

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



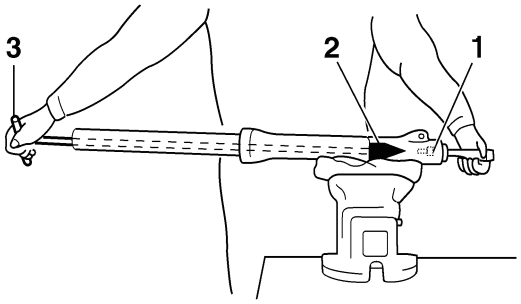
4. Remove:
   - Damper rod bolt "1"
   - Copper washer

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, loosen the damper rod bolt.



Damper rod holder
90890-01460
T-handle
90890-01326
T-handle 3/8" drive 60 cm long
YM-01326



5. Remove:
   • Inner tube

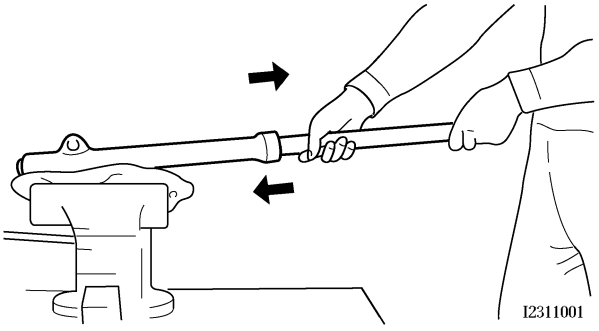
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a. Hold the front fork leg horizontally.
b. Securely clamp the brake caliper bracket in a vise with soft jaws.
c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.

ECA14190

NOTICE

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



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EAS23011

CHECKING THE FRONT FORK LEGS

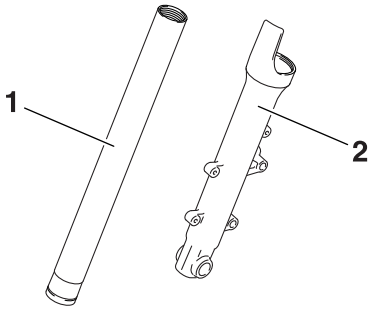
The following procedure applies to both of the front fork legs.

1. Check:
   • Inner tube “1”
   • Outer tube “2”
   Bends/damage/scratches → Replace.

EWA13650

⚠ WARNING

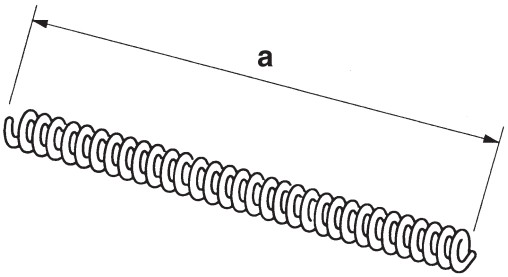
Do not attempt to straighten a bent inner tube as this may dangerously weaken it.



2. Measure:
   • Spring free length “a”
   Out of specification → Replace.



Fork spring free length
303.9 mm (11.96 in)
Limit
297.8 mm (11.72 in)

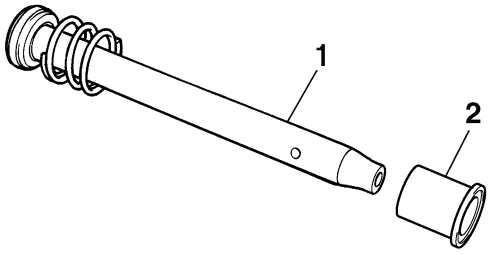


3. Check:
   • Damper rod “1”
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
   • Oil flow stopper “2”
   Damage → Replace.

ECA14200

NOTICE

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



EAS23031
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.**

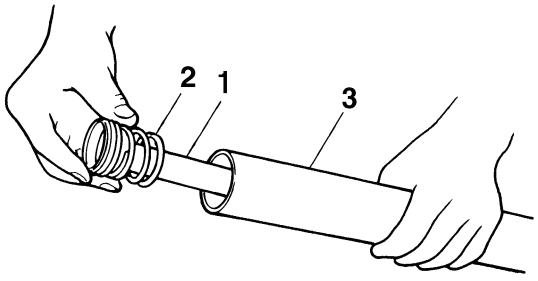
TIP

- When assembling the front fork leg, be sure to replace the following parts:
  - Inner tube bushing
  - Outer tube bushing
  - Oil seal
  - Dust seal
  - Oil seal clip
  - O-ring
- Before assembling the front fork leg, make sure all of the components are clean.

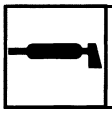
1. Install:
   - Damper rod “1”
   - Rebound spring “2”

ECA14210
NOTICE

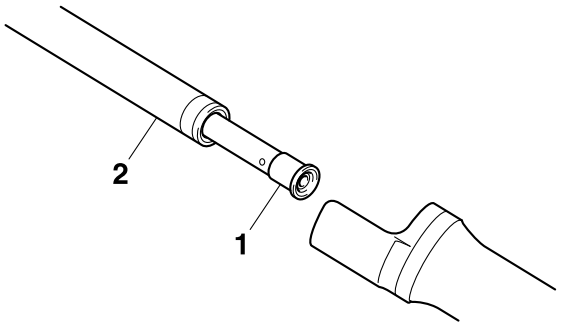
Allow the damper rod assembly to slide slowly down the inner tube “3” until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Install:
   - Oil flow stopper “1”
3. Lubricate:
   - Inner tube’s outer surface “2”



Recommended oil
Fork oil 10W or equivalent



4. Install:
   - Inner tube (into the outer tube)
   - Copper washer New
   - Damper rod bolt
5. Tighten:
   - Damper rod bolt “1”



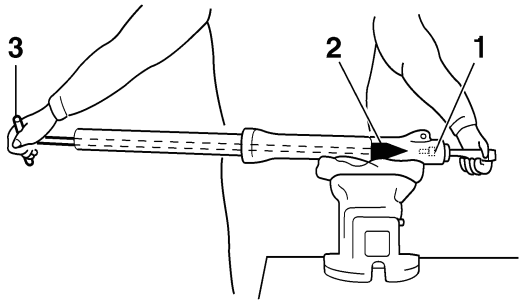
Damper rod bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3” tighten the damper rod bolt.



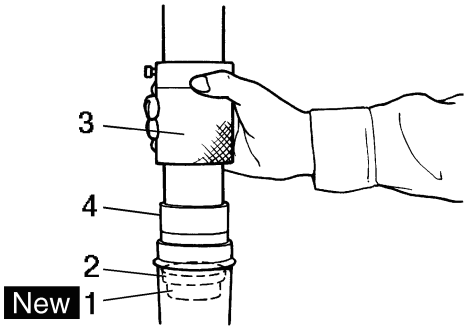
Damper rod holder
90890-01460
T-handle
90890-01326
T-handle 3/8" drive 60 cm long
YM-01326



6. Install:
   - Outer tube bushing “1” New
   - Washer “2”
     (with the fork seal driver weight “3” and fork seal driver attachment “4”)



Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7
Fork seal driver attachment (ø43)
90890-01374
Replacement 43 mm
YM-A5142-3



7. Install:
   - Oil seal “1” New
     (with the fork seal driver weight “2” and fork seal driver attachment “3”)

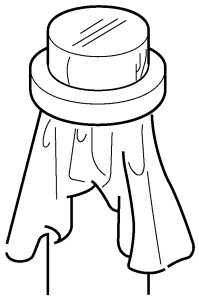
ECA14220

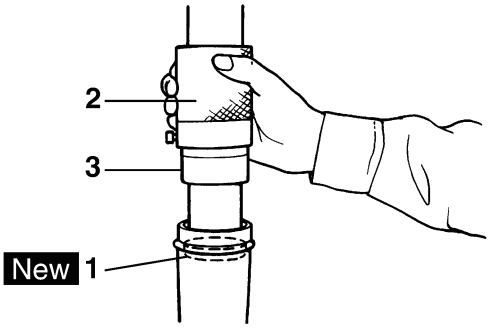
NOTICE

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

TIP

- 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.

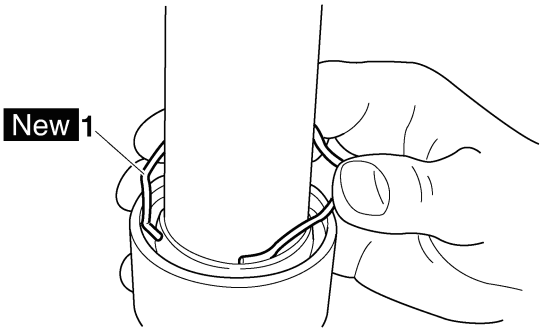




8. Install:
   - Oil seal clip “1” New

TIP

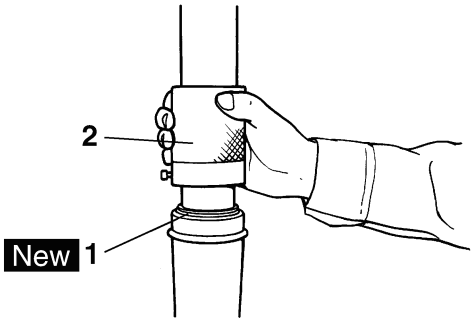
Adjust the oil seal clip so that it fits into the outer tube’s groove.



9. Install:
   - Dust seal “1” New
     (with the fork seal driver weight “2”)



Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7



10. Fill:
    - Front fork leg
      (with the specified amount of the recommended fork oil)

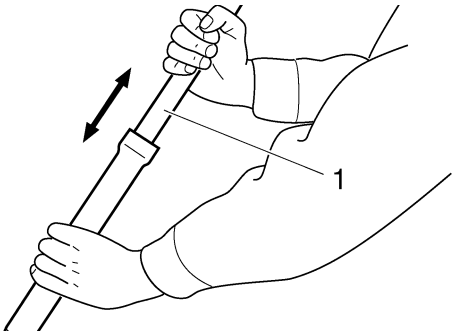
Recommended oil
Fork oil 10W or equivalent
Quantity
517.0 cm³ (17.48 US oz, 18.23 Imp.oz)

ECA14230
NOTICE

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

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

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

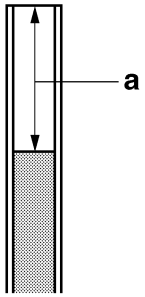


12. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

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

13. Measure:
    - Front fork leg oil level "a"
      Out of specification → Correct.

Level
87.0 mm (3.43 in)



14. Install:
    - Fork spring
    - Fork spring seat
    - Spacer
    - Cap bolt
      (along with the O-ring New)

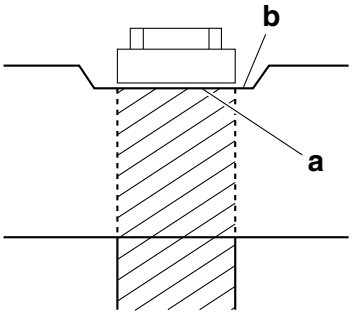
TIP
Temporarily tighten the cap bolt.

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.

TIP
Make sure the inner tube end "a" is flush with the lower edge "b" of the upper bracket.



2. Tighten:
    - Lower bracket pinch bolts "1"

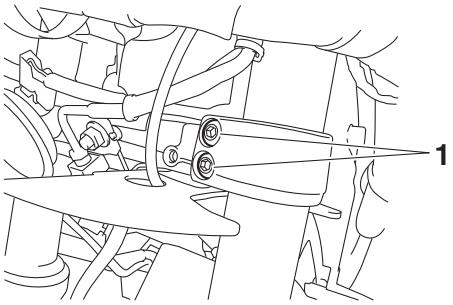
Lower bracket pinch bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

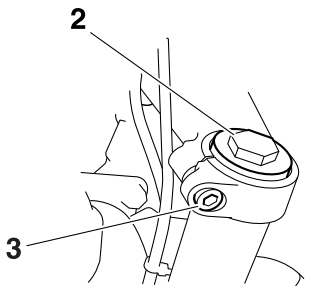
    - Cap bolt "2"

Cap bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

    - Upper bracket pinch bolt "3"

	Upper bracket pinch bolt **30 Nm (3.0 m·kgf, 22 ft·lbf)**

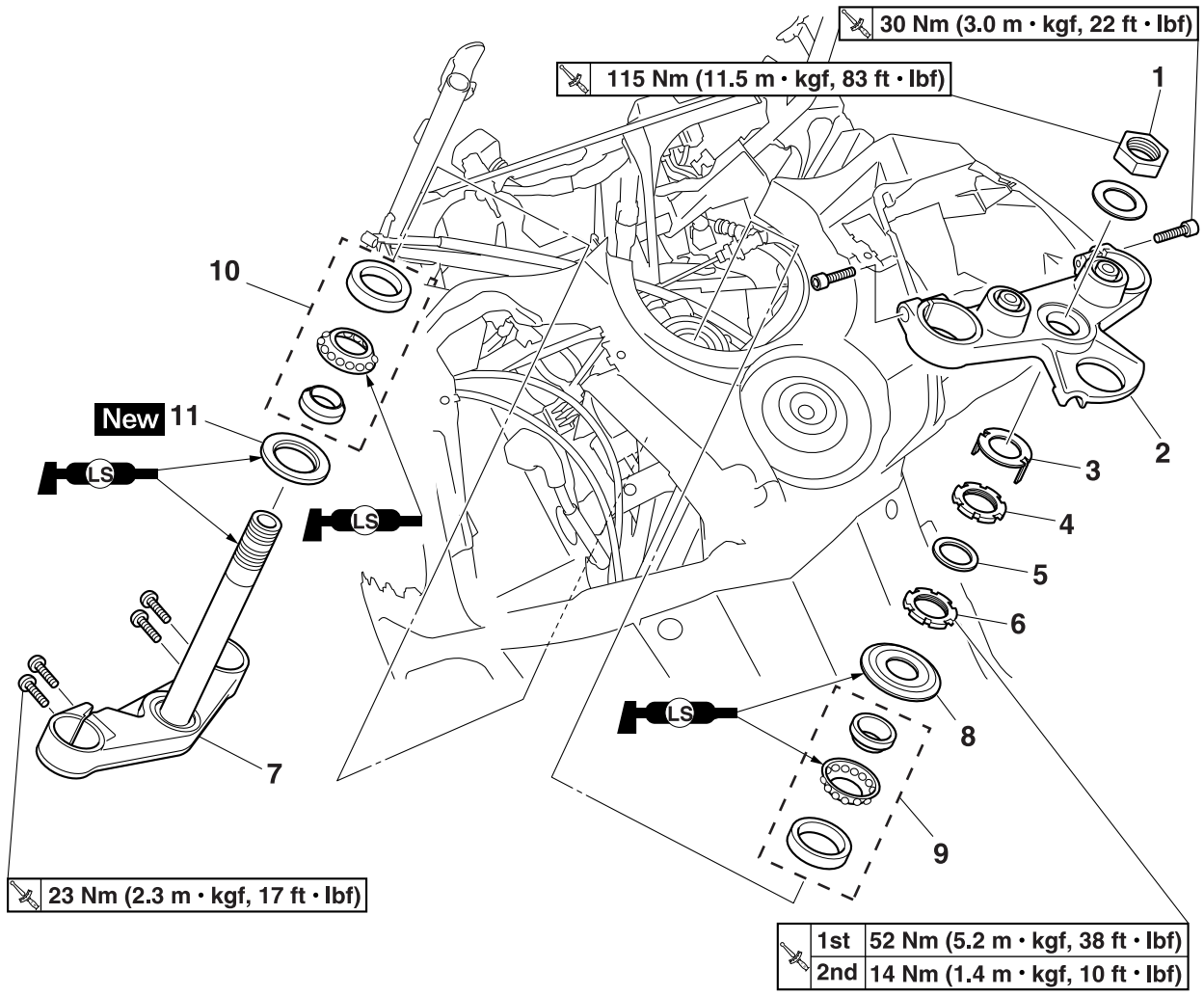




3. Install:
   - Cap bolt cover
     (right front fork side)

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.
	Meter assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-18.
	Handlebar		Refer to "HANDLEBAR" on page 4-76.
	Front fork legs		Refer to "FRONT FORK" on page 4-81.
1	Steering stem nut	1	
2	Upper bracket	1	
3	Lock washer	1	
4	Upper ring nut	1	
5	Rubber washer	1	
6	Lower ring nut	1	
7	Lower bracket	1	
8	Upper bearing cover	1	
9	Upper bearing	1	
10	Lower bearing	1	
11	Dust seal	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
   - Rubber washer
   - Lower ring nut “1”
   - Lower bracket

TIP

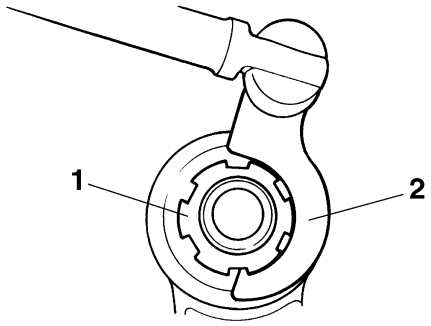
Remove the upper ring nut and lower ring nut with the steering nut wrench “2”.

EWA13730
⚠ WARNING

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

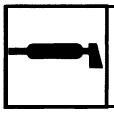


Steering nut wrench
90890-01403
Exhaust flange nut wrench
YU-A9472



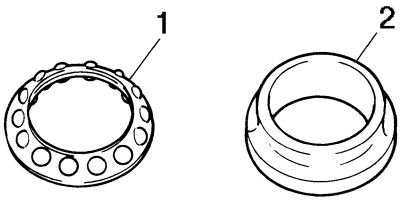
EAS23120
CHECKING THE STEERING HEAD

1. Wash:
   - Bearings
   - Bearing races



Recommended cleaning solvent
Kerosene

2. Check:
   - Bearings “1”
   - Bearing races “2”
     Damage/pitting → Replace.



3. Replace:
   - Bearings
   - Bearing races

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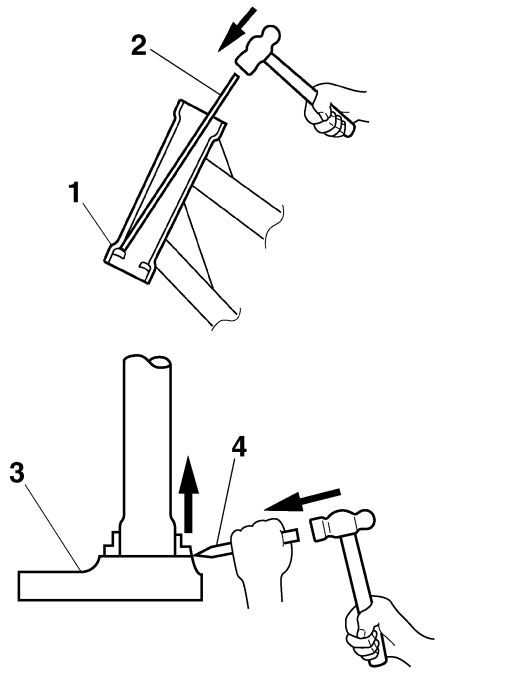
a. Remove the bearing races from the steering head pipe “1” with a long rod “2” and hammer.
b. Remove the bearing race from the lower bracket “3” with a floor chisel “4” and hammer.
c. Install a new rubber seal and new bearing races.

ECA14270
NOTICE

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

TIP

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



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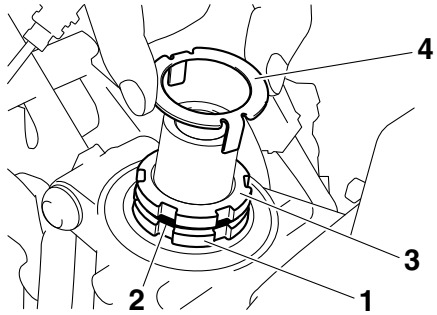
4. Check:
   • Upper bracket
   • Lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

EAS23140
INSTALLING THE STEERING HEAD

1. Lubricate:
   • Upper bearing
   • Lower bearing

	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 3-23.



3. Install:
   • Upper bracket
   • Washer
   • Steering stem nut

TIP
Temporarily tighten the steering stem nut.

4. Install:
   • Front fork legs
   Refer to “FRONT FORK” on page 4-81.

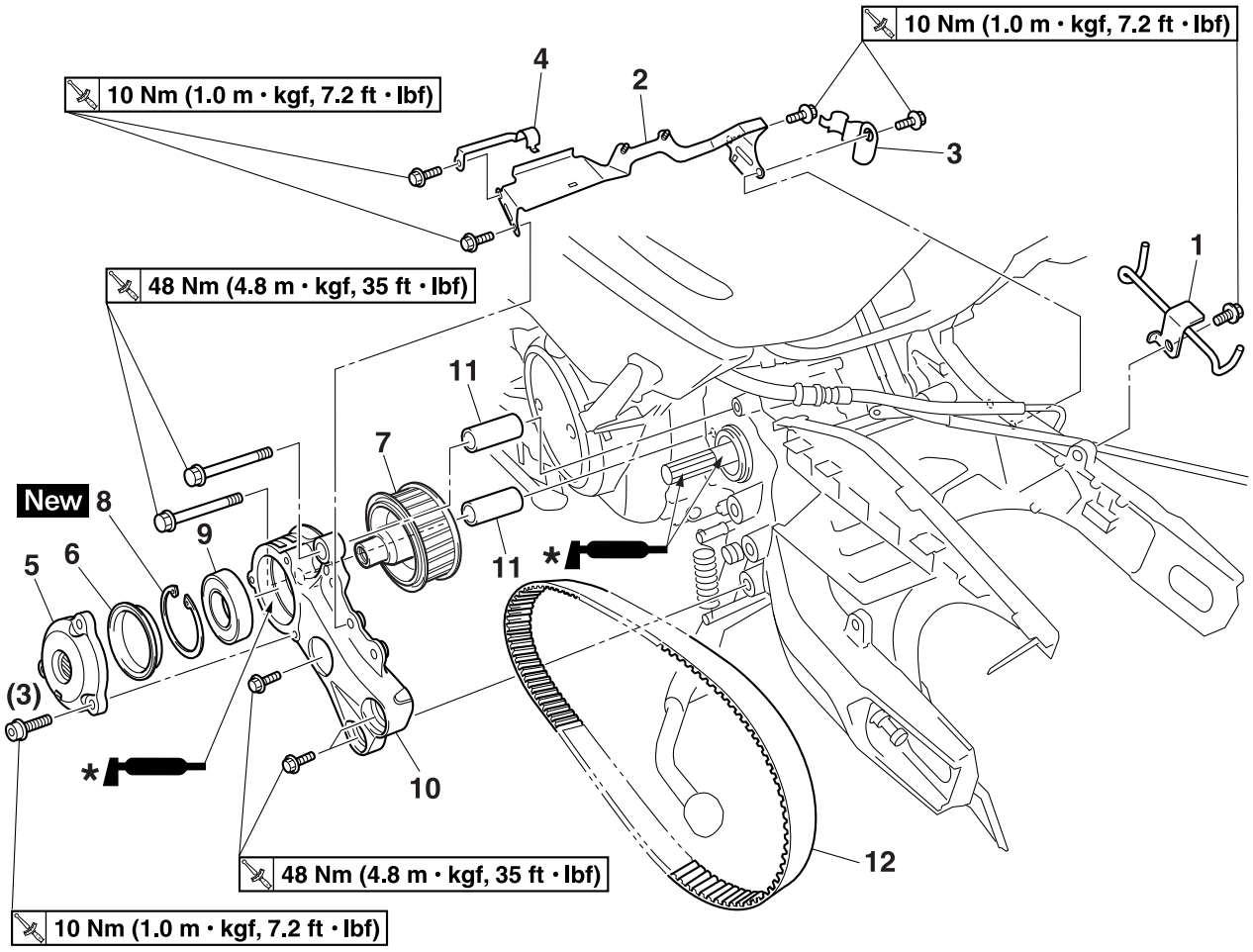
TIP
Temporarily tighten the upper and lower bracket pinch bolts.

5. Tighten:
   • Steering stem nut

	Steering stem nut **115 Nm (11.5 m·kgf, 83 ft·lbf)**

EAS23510
BELT DRIVE

Removing the drive belt



Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REAR WHEEL" on page 4-27.
1	Rear brake lock cable holder (swingarm)	1	
2	Rear brake hose bracket	1	
3	Rear brake hose holder (right)	1	
4	Rear brake hose holder (left)	1	
5	Drive pulley cover	1	
6	Dust cover	1	
7	Drive pulley	1	
8	Circlip	1	
9	Bearing	1	
10	Holder	1	
11	Collar	2	
12	Drive belt	1	
			For installation, reverse the removal procedure.

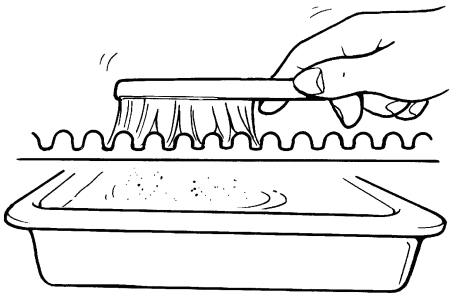
* Filling the YAMAHA GREASE "H" or Polyurea Grease®.

EAS23530
CHECKING THE DRIVE BELT

1. Clean:
   • Drive belt

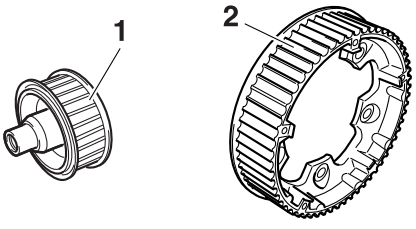
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a. Wipe the drive belt with a clean cloth.
b. Put the drive belt in a mixture of mild detergent and water. Then, remove any dirt from the drive belt.
c. Remove the drive belt from the mixture and rinse it off with clean water. Then, let the drive belt thoroughly dry.

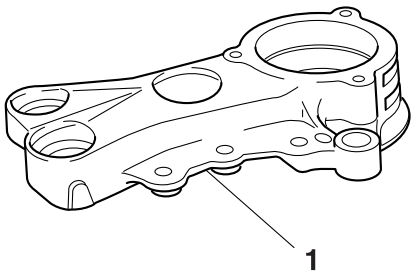


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2. Check:
   • Drive belt
   Refer to “CHECKING THE DRIVE BELT” on page 3-20.
3. Check:
   • Drive pulley “1”
   • Rear wheel pulley “2”
   Bent teeth → Replace the drive belt and pulleys as a set.



4. Check:
   • Holder “1”
   Cracks/damage → Replace.

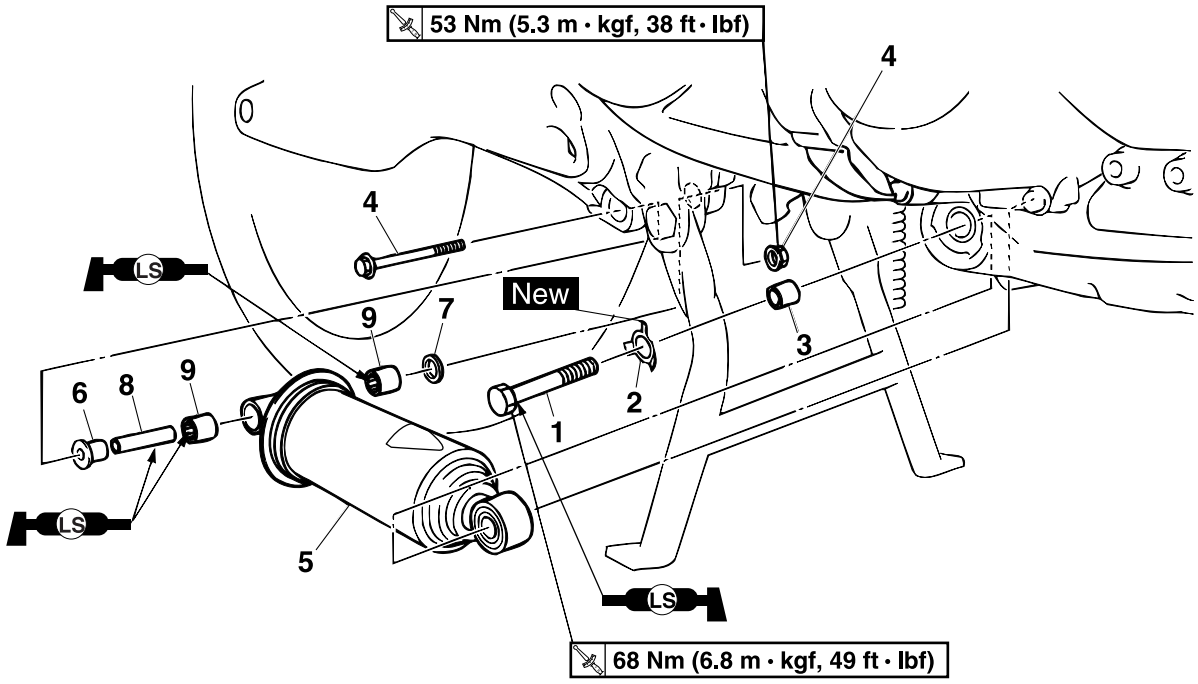


EAS23540
INSTALLING THE DRIVE BELT

1. Install:
   • Drive belt
2. Adjust:
   • Drive belt slack
   Refer to “ADJUSTING THE DRIVE BELT SLACK” on page 3-21.

EAS23160
REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-3.
1	Rear shock absorber assembly front bolt	1	
2	Lock washer	1	
3	Collar	1	
4	Rear shock absorber assembly rear nut/bolt	1/1	
5	Rear shock absorber assembly	1	
6	Collar	1	
7	Washer	1	
8	Spacer	1	
9	Bearing	2	
			For installation, reverse the removal procedure.

EAS23180
HANDLING THE REAR SHOCK ABSORBER
EWA13740

⚠ WARNING

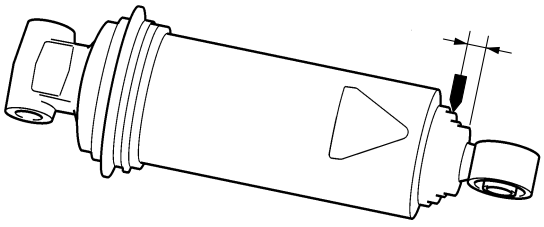
This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear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

EWA13760

⚠ WARNING

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



EAS23210
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY
1. Stand the vehicle on a level surface.

EWA13120

⚠ WARNING

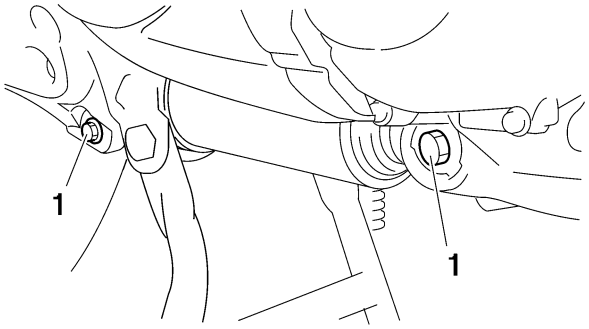
Securely support the vehicle so that there is no danger of it falling over.

TIP

Place the vehicle on the centerstand so that the rear wheel is elevated.

2. Remove:
   - Rear shock absorber assembly bolts “1”

TIP
- Straighten the lock washer tab.
- When removing the rear shock absorber assembly bolts “1”, hold the swingarm so that it does not drop down.



3. Remove:
   - Rear shock absorber assembly

EAS23240
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY
1. Check:
   - Rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - Spring
     Damage/wear → Replace the rear shock absorber assembly.
   - Bearing
     Damage/wear → Replace.
   - Spacer
     Damage/wear → Replace.
   - Bolts
     Bends/damage/wear → Replace.

EAS23301
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY
1. Lubricate:
   - Spacer
   - Bearings
   - Rear shock absorber assembly front bolt

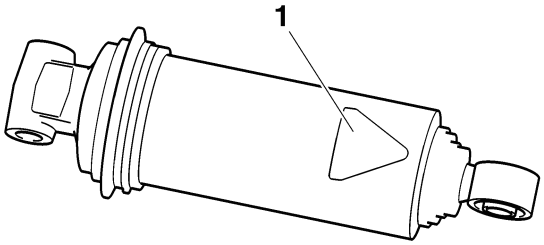
TIP

Lubricate the rear shock absorber assembly front bolt seats with lithium-soap-based grease.

Recommended lubricant
Lithium-soap-based grease

2. Install:
   • Rear shock absorber assembly

TIP
- Make sure that the warning label “1” on the rear shock absorber assembly faces up.
- When installing the rear shock absorber assembly, lift up the swingarm.



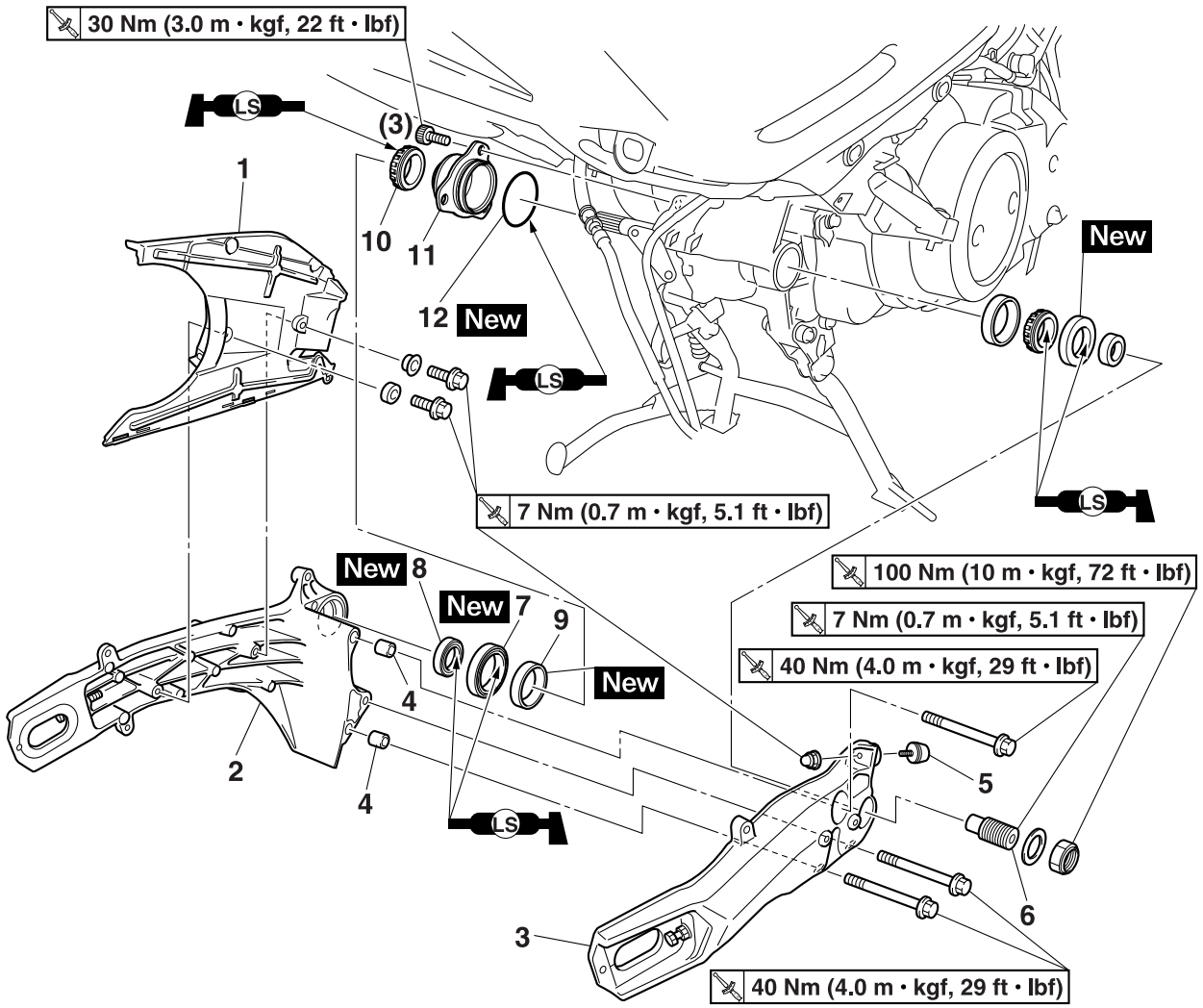
3. Tighten:
   • Rear shock absorber assembly rear nut
   • Rear shock absorber assembly front bolt

Rear shock absorber assembly rear nut
53 Nm (5.3 m·kgf, 38 ft·lbf)
Rear shock absorber assembly front bolt
68 Nm (6.8 m·kgf, 49 ft·lbf)

TIP
- With the swingarm and rear wheel lowered by own weight, tighten the rear shock absorber assembly front bolt and rear shock absorber assembly rear nut.
- After tightening the rear shock absorber assembly front bolt, align the wide claw with the bolt head and bent it.

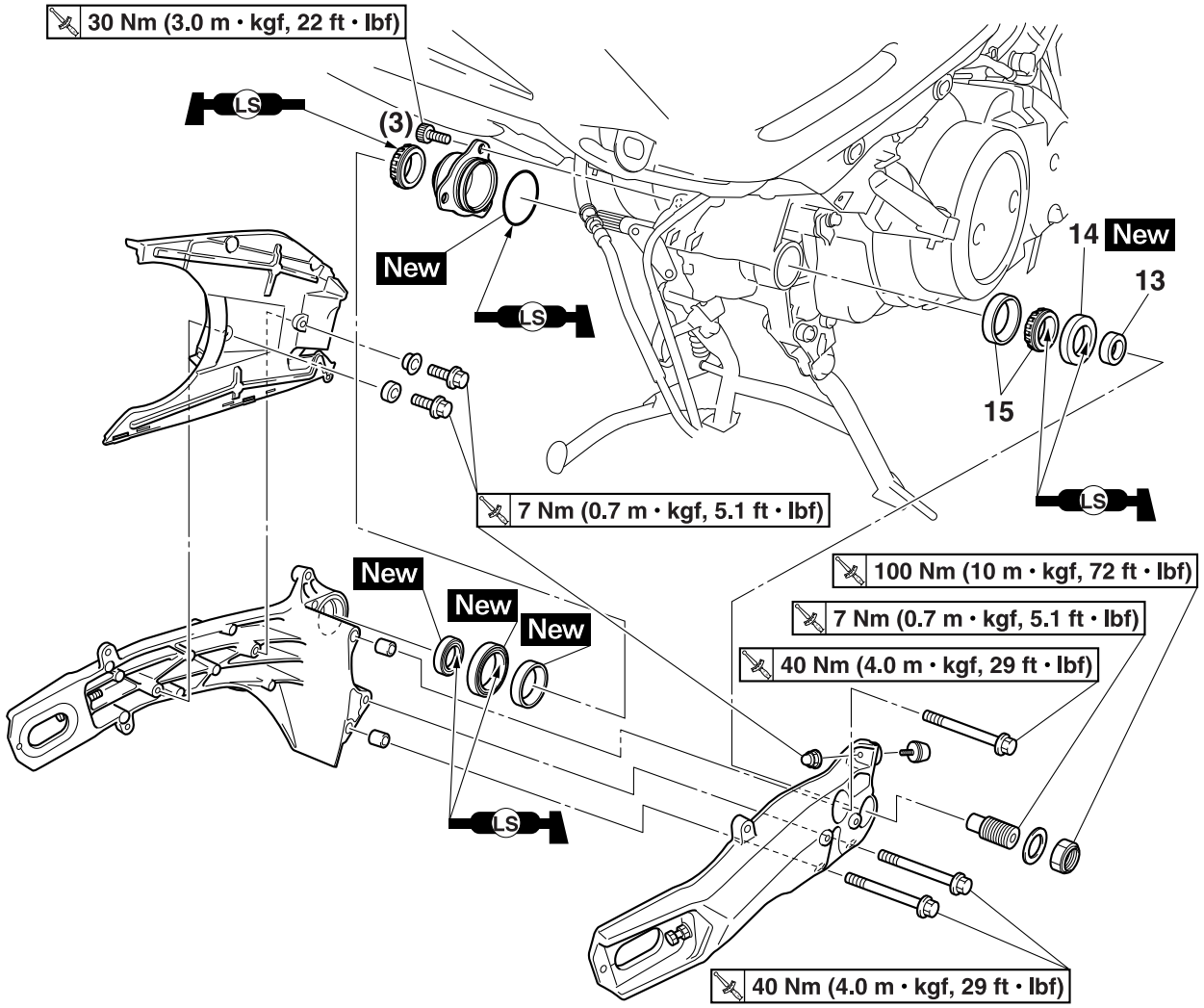
EAS23330
SWINGARM

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-94.
	Drive belt		Refer to "BELT DRIVE" on page 4-92.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-3.
1	Drive belt inner guard	1	Non-disassemble
2	Left swingarm	1	
3	Right swingarm	1	
4	Dowel pin	2	
5	Swingarm stopper	1	
6	Pivot shaft	1	
7	Oil seal	1	
8	Oil seal	1	
9	Outer race	1	
10	Bearing	1	
11	Bearing housing	1	
12	O-ring	1	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
13	Collar	1	
14	Oil seal	1	
15	Bearing	1	
			For installation, reverse the removal procedure.

EAS23340
REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

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

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

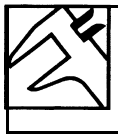
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a. Measure the tightening torque of the drive pulley assembly bolts, swingarm bolts and pivot shaft nut.



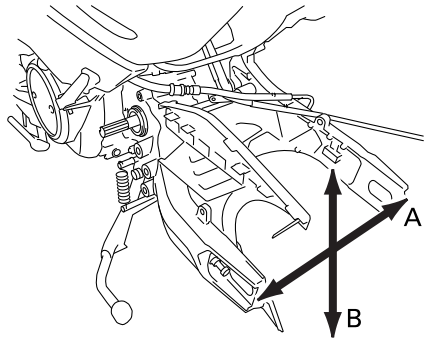
Drive pulley assembly bolt
48 Nm (4.8 m·kgf, 35 ft·lbf)
Swingarm bolt
40 Nm (4.0 m·kgf, 29 ft·lbf)
Pivot shaft
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Pivot shaft nut
100 Nm (10 m·kgf, 72 ft·lbf)

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 bearings.



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 bearings.

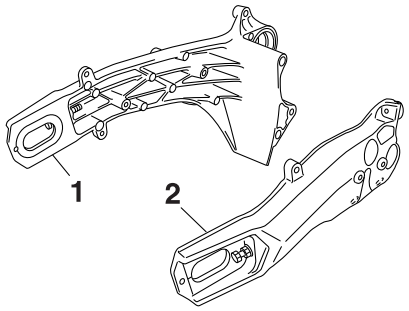


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3. Remove:
   - Drive belt
   Refer to “BELT DRIVE” on page 4-92.
4. Remove:
   - Drive pulley assembly bolt
   - Swingarm bolt
   - Pivot shaft nut

EAS23371
CHECKING THE SWINGARM

1. Check:
   - Left swingarm “1”
   - Right swingarm “2”
   Bends/cracks/damage → Replace.

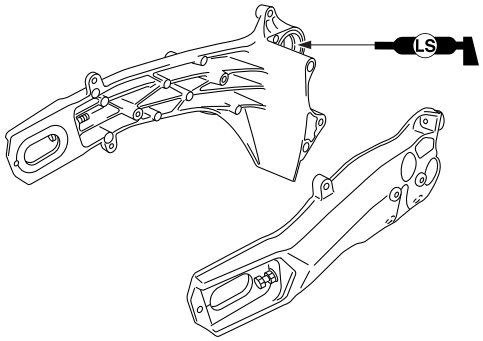


2. Check:
   - Drive pulley assembly bolts
   - Swingarm bolts
   Damage/wear → Replace.

EAS28780
INSTALLING THE SWINGARM

1. Lubricate:
   - Taper roller bearing

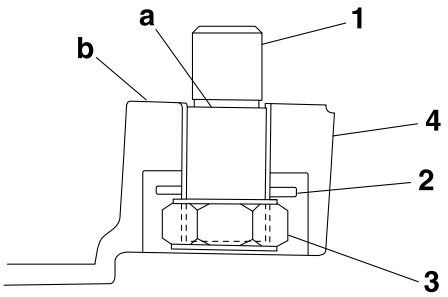
TIP
Lubricate the space in the swingarm with lithium-soap-based grease before installing the taper roller bearing.



2. Install:
   - Pivot shaft “1”
   - Washer “2”
   - Pivot shaft nut “3”

TIP

Install the parts to the swingarm “4” temporarily, making sure that the portion “a” of the pivot shaft does not protrude past the swingarm surface “b”.



3. Install:
   - Dowel pins
   - Swingarm
   - Swingarm bolts
   - Drive pulley assembly
   - Drive pulley assembly bolt



Swingarm bolt
40 Nm (4.0 m·kgf, 29 ft·lbf)
Drive pulley assembly bolt
48 Nm (4.8 m·kgf, 35 ft·lbf)

4. Tighten:
   - Pivot shaft
   - Pivot shaft nut



Pivot shaft
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Pivot shaft nut
100 Nm (10 m·kgf, 72 ft·lbf)

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a. With your fingers, screw in the pivot shaft until it touches the collar, and then tighten the pivot shaft to the specified torque.
b. Tighten the pivot shaft nut to the specified torque.

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ENGINE

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EAS59C1501
ENGINE INSPECTION

EAS59C1502
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

TIP

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 3-5.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
   - Radiator cover
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Disconnect:
   - Spark plug caps
5. Remove:
   - Spark plugs

ECA13340

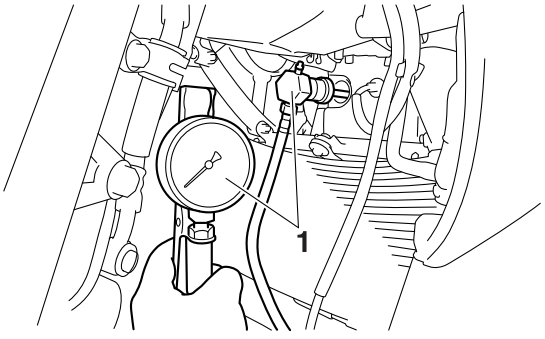
NOTICE

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

6. Install:
   - Compression gauge "1"



Compression gauge
90890-03081
Engine compression tester
YU-33223



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



Standard compression pressure (at sea level)
1950 kPa/470 r/min (19.5 kgf/cm²/470 r/min, 282.8 psi/470 r/min)
Minimum–maximum
1700–2180 kPa/470 r/min (17.0–21.8 kgf/cm²/470 r/min, 246.1–316.8 psi/470 r/min)

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

TIP

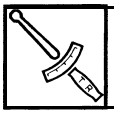
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kgf/cm², 14 psi).

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 → Replace.
Same as without oil	Piston, valves or cylinder head gasket possibly defective → Replace.

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8. Install:
   - Spark plugs

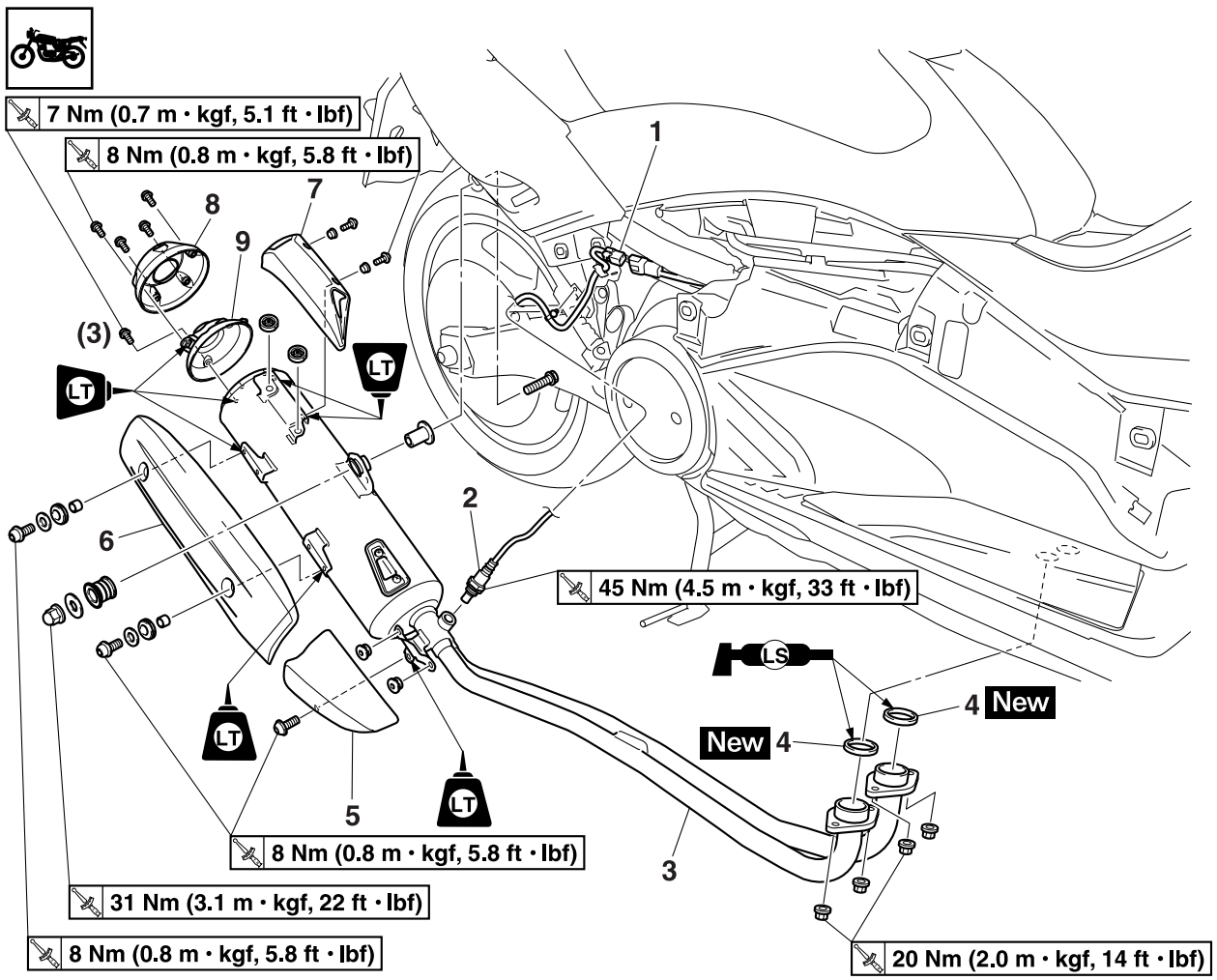


Spark plug
13 Nm (1.3 m·kgf, 9.4 ft·lbf)

9. Connect:
   - Spark plug caps
10. Install:
   - Radiator cover
     Refer to “GENERAL CHASSIS” on page 4-1.

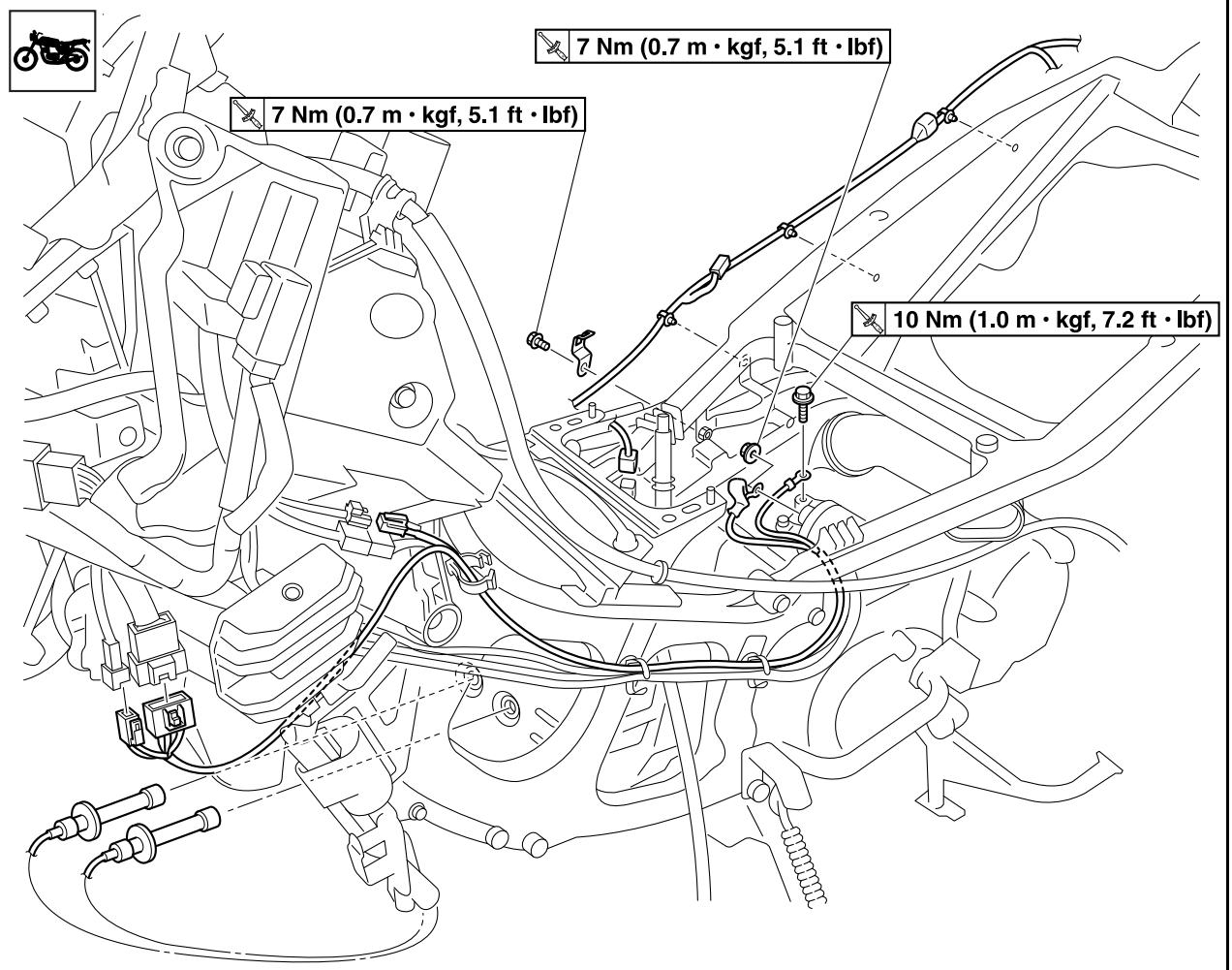
EAS23711
ENGINE REMOVAL

Removing the exhaust assembly



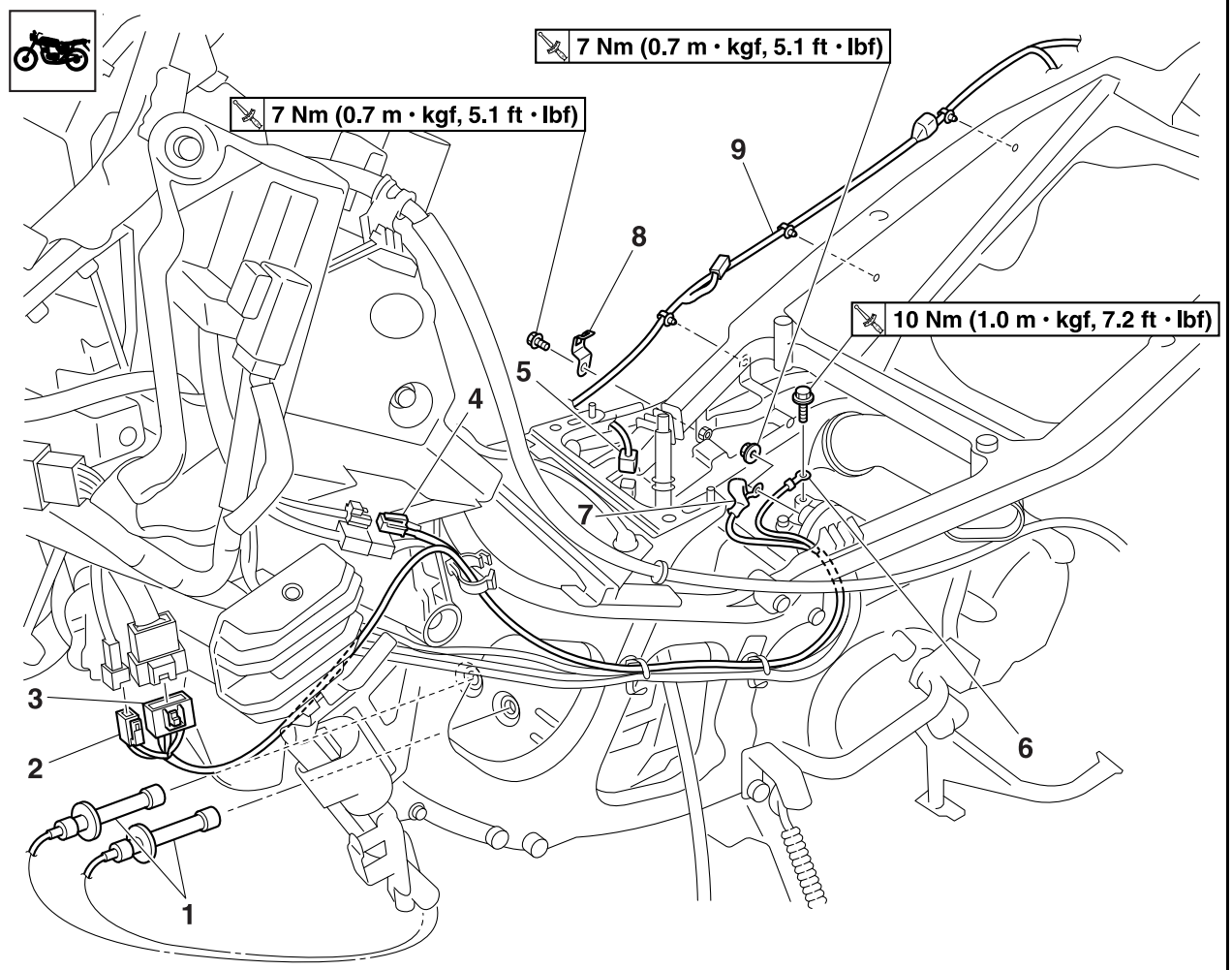
Order	Job/Parts to remove	Q'ty	Remarks
	Side cover (right)		Refer to "GENERAL CHASSIS" on page 4-1.
1	O_2 sensor coupler	1	Disconnect.
2	O_2 sensor	1	
3	Exhaust assembly	1	
4	Gasket	2	
5	Front muffler protector	1	
6	Center muffler protector	1	
7	Upper muffler protector	1	
8	Muffler end	1	**TIP** When installing the muffler end, face the dummy bolt to the upper side of the muffler. It is not required to remove the dummy bolt.
9	Muffler end bracket	1	
			For installation, reverse the removal procedure.

Disconnecting the leads



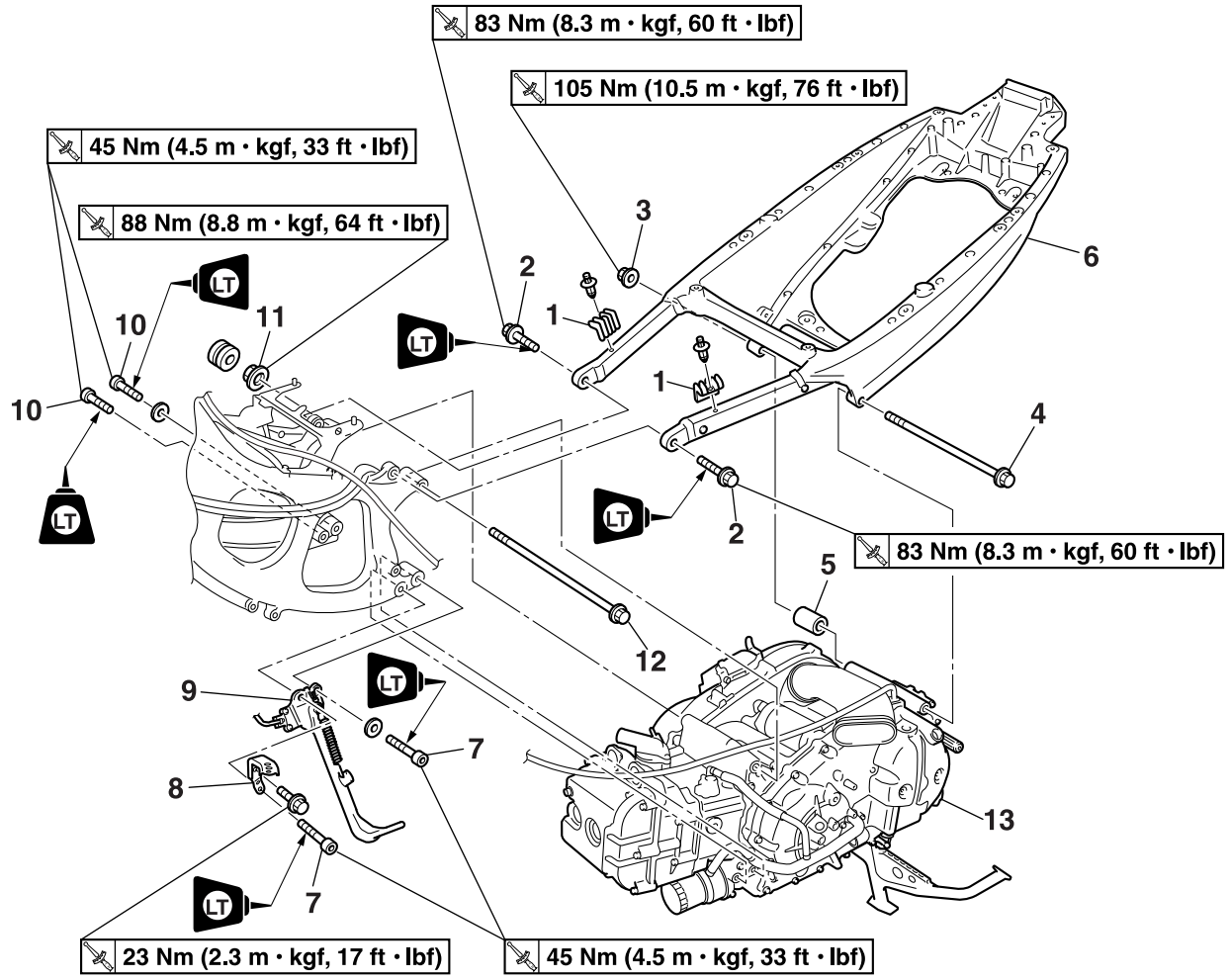
Order	Job/Parts to remove	Q'ty	Remarks
	Battery		Refer to "GENERAL CHASSIS" on page 4-1.
	Front cowling assembly/Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-26.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Front wheel/Front fender		Refer to "FRONT WHEEL" on page 4-18
	Intake manifold		Refer to "THROTTLE BODY" on page 7-5.
	Radiator bracket		Refer to "RADIATOR" on page 6-1.
	Water pump inlet pipe		Refer to "WATER PUMP" on page 6-9.
	Oil cooler outlet hose		Refer to "OIL COOLER" on page 6-5.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Rear wheel		Refer to "REAR WHEEL" on page 4-27.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-94.
	Swingarm		Refer to "SWINGARM" on page 4-97.

Disconnecting the leads



Order	Job/Parts to remove	Q'ty	Remarks
1	Spark plug cap	2	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Stator coil coupler	1	Disconnect.
4	Sidestand switch coupler	1	Disconnect.
5	Coolant temperature sensor coupler	1	Disconnect.
6	Ground lead	1	Disconnect.
7	Starter motor lead	1	Disconnect.
8	Rear brake lock cable holder (crankcase)	1	
9	Wire harness	1	Disconnect.
			For installation, reverse the removal procedure.

Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
	Right passenger footrest		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.
1	Damper	2	
2	Rear frame bolt	2	
3	Engine mounting nut (rear side)	1	
4	Engine mounting bolt (rear side)	1	
5	Spacer	1	
6	Rear frame	1	
7	Engine mounting bolt (front left lower side)	2	
8	Left footboard bracket	1	
9	Sidestand	1	
10	Engine mounting bolt (front right lower side)	2	
11	Engine mounting nut (front upper side)	1	
12	Engine mounting bolt (front upper side)	1	
13	Engine	1	
			For installation, reverse the removal procedure.

EAS23720
INSTALLING THE ENGINE

1. Install:
   - All removed parts

TIP

- Apply locking agent (LOCTITE®) to engine mounting bolts (front right lower side) “2”, engine mounting bolts (front left lower side) “3”, and rear frame bolts “5”.
- For installation, reverse the removal procedure.
- Do not fully tighten the bolts and nuts.

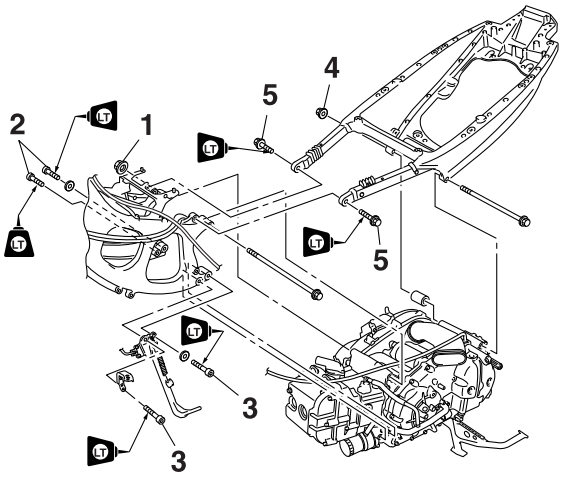
2. Tighten:
   - Engine mounting nut (front upper side) “1”
   - Engine mounting bolts (front right lower side) “2”
   - Engine mounting bolts (front left lower side) “3”
   - Engine mounting nut (rear side) “4”
   - Rear frame bolts “5”

TIP

When tightening the engine mounting nuts and engine mounting bolts, do not apply an upward load to the frame, such as supporting the area around steering head of the frame upwards. Also, do not apply an upward or downward load on the rear frame, such as supporting the rear end of the rear frame upwards or pushing it downwards.

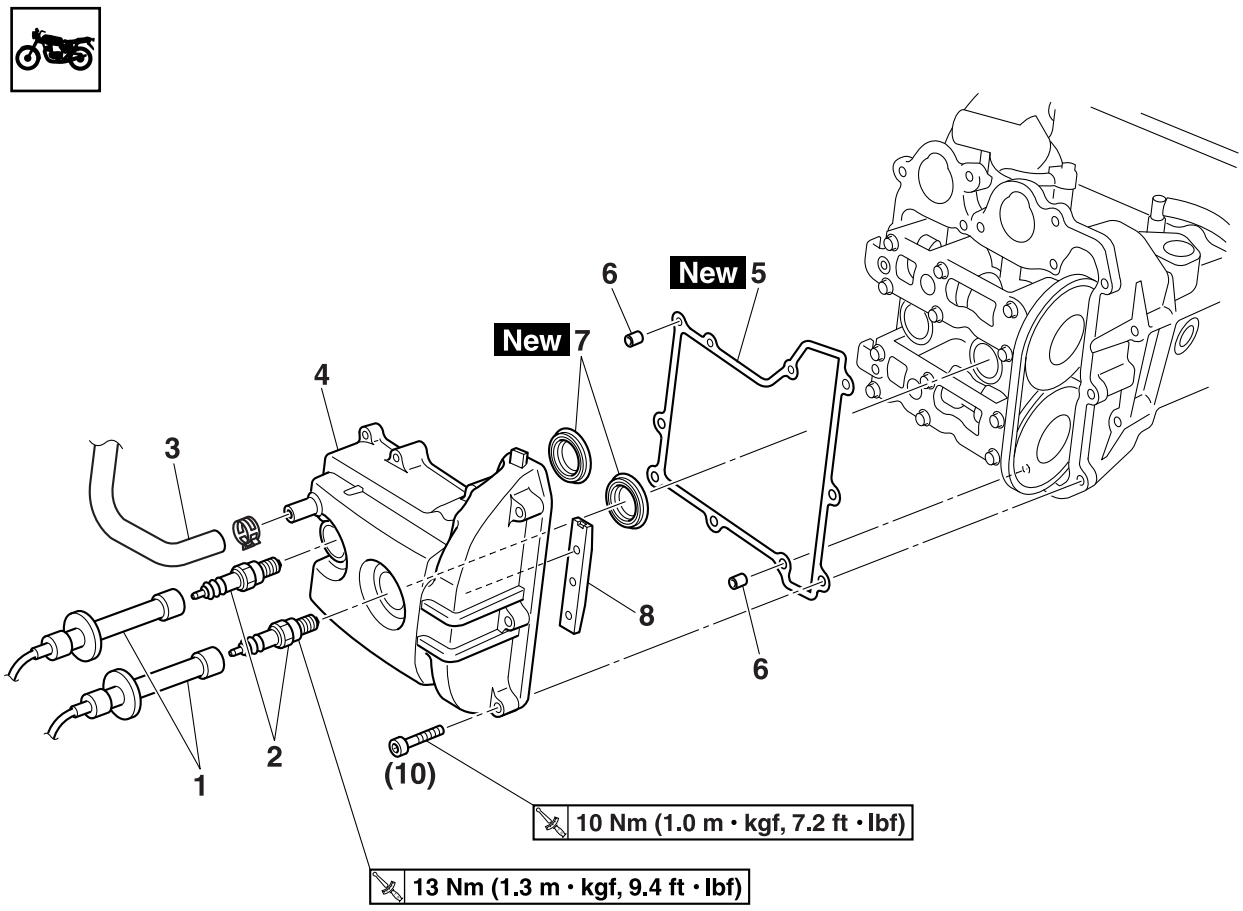


Engine mounting nut (front upper side)
88 Nm (8.8 m·kgf, 64 ft·lbf)
Engine mounting bolt (front right lower side)
45 Nm (4.5 m·kgf, 33 ft·lbf)
LOCTITE®
Engine mounting bolt (front left lower side)
45 Nm (4.5 m·kgf, 33 ft·lbf)
LOCTITE®
Engine mounting nut (rear side)
105 Nm (10.5 m·kgf, 76 ft·lbf)
Rear frame bolt
83 Nm (8.3 m·kgf, 60 ft·lbf)
LOCTITE®



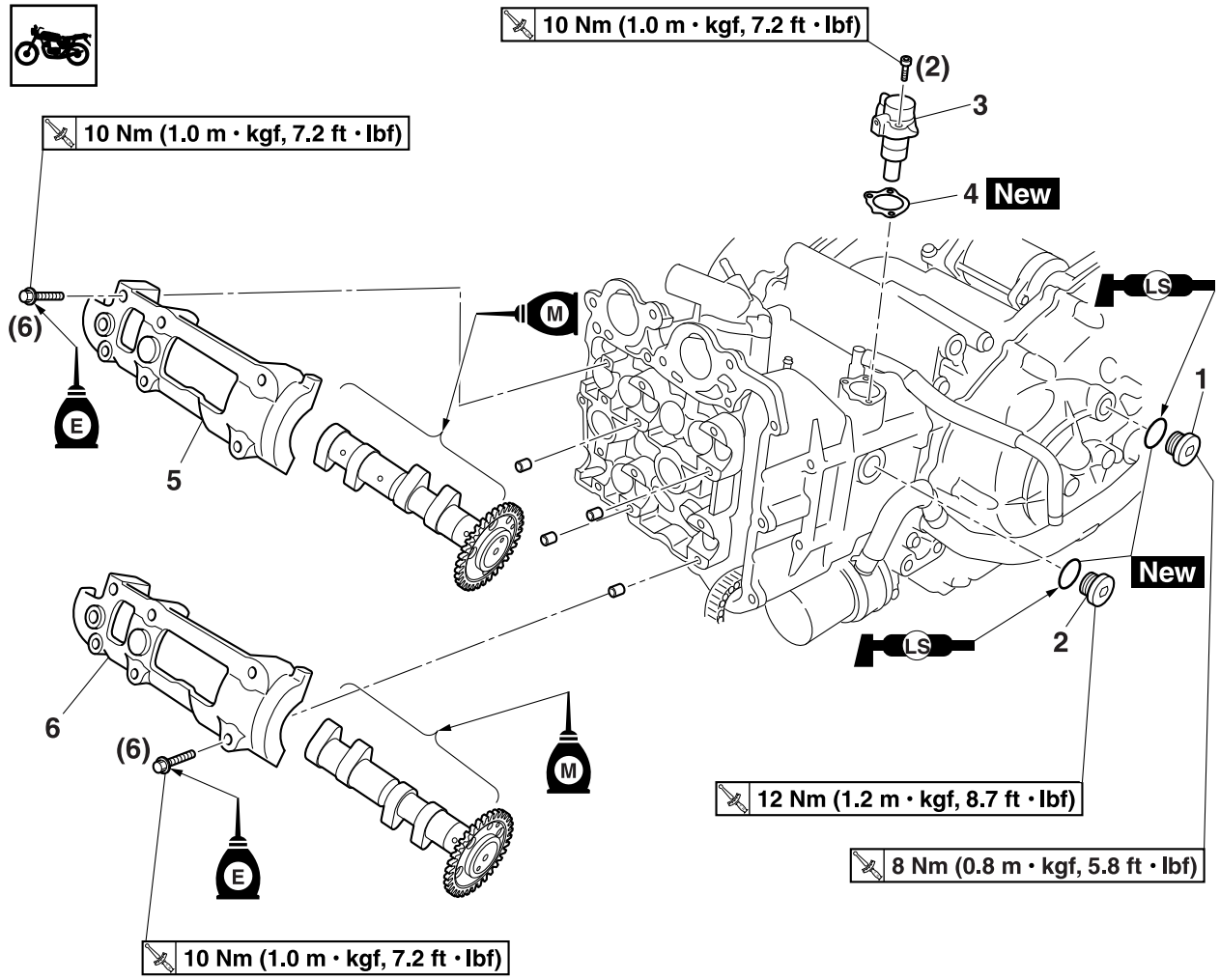
EAS23760
CAMSHAFTS

Removing the cylinder head cover



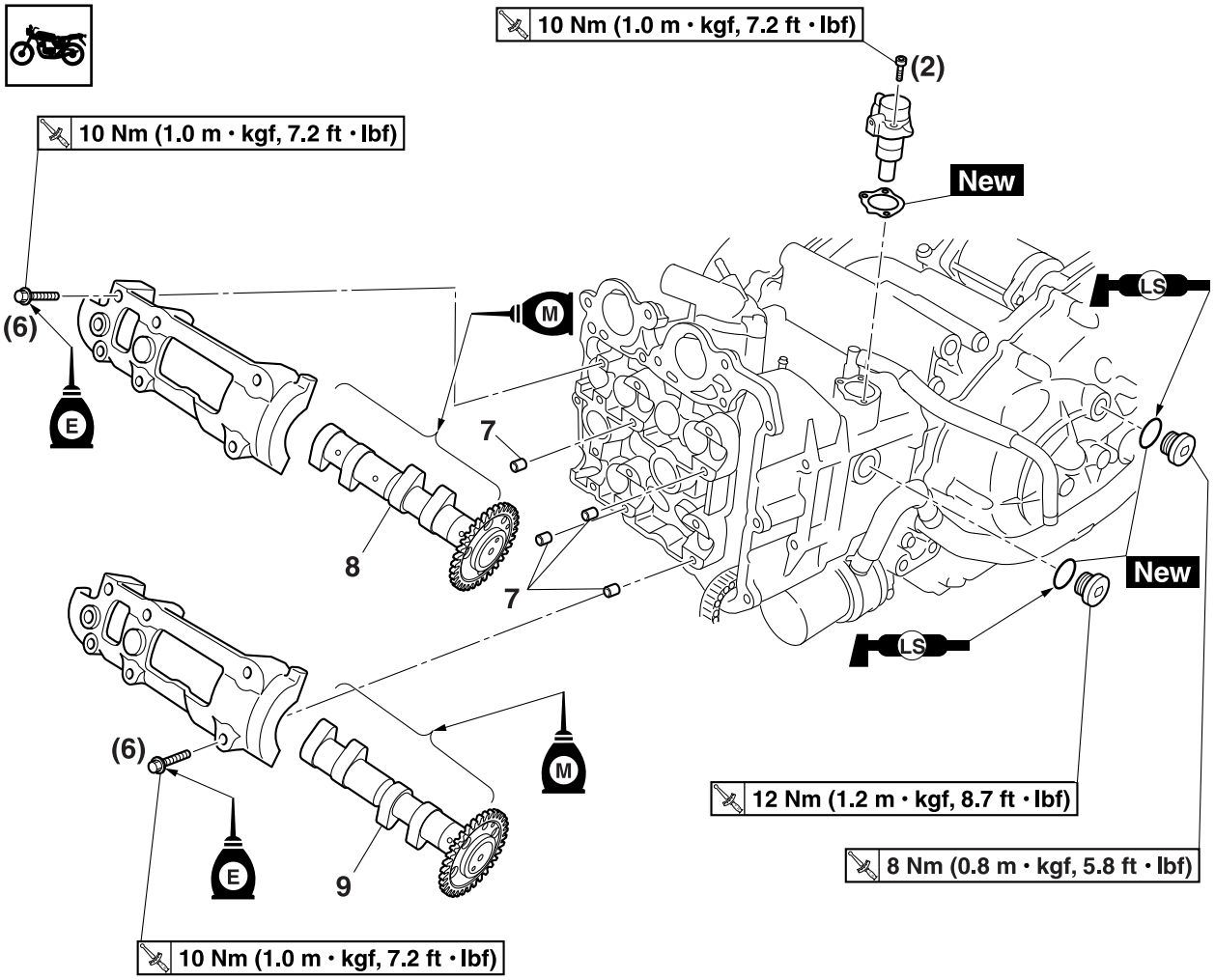
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-26.
	Air filter case		Refer to "THROTTLE BODY" on page 7-5.
1	Spark plug cap	2	Disconnect.
2	Spark plug	2	
3	Cylinder head breather hose	1	Disconnect.
4	Cylinder head cover	1	
5	Cylinder head cover gasket	1	
6	Dowel pin	2	
7	Gasket	2	
8	Timing chain guide (upper side)	1	
			For installation, reverse the removal procedure.

Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
	Crankshaft end access cover		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Intake manifold		Refer to "THROTTLE BODY" on page 7-5.
	Cylinder head cover		Refer to "CAMSHAFTS" on page 5-8.
1	Timing mark accessing plug	1	
2	Timing chain tensioner rod accessing plug	1	
3	Timing chain tensioner	1	
4	Timing chain tensioner gasket	1	
5	Intake camshaft cap	1	
6	Exhaust camshaft cap	1	

Removing the camshafts



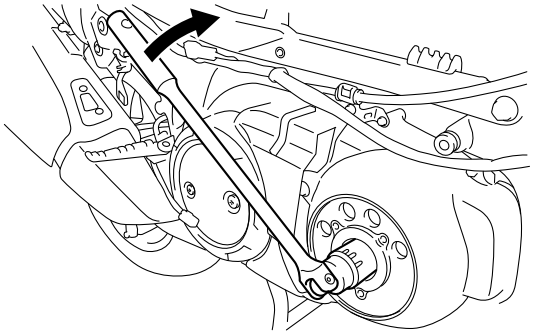
Order	Job/Parts to remove	Q'ty	Remarks
7	Dowel pin	4	**TIP** During removal, the dowel pins may still be connected to the camshaft caps.
8	Intake camshaft	1	
9	Exhaust camshaft	1	
			For installation, reverse the removal procedure.

EAS23810
REMOVING THE CAMSHAFTS

1. Align:
   - "I" mark "a" on the generator rotor (with the stationary pointer "b" on the generator cover)

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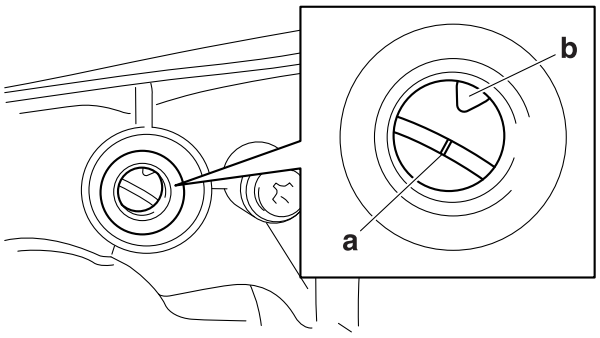
a. Turn the crankshaft clockwise.

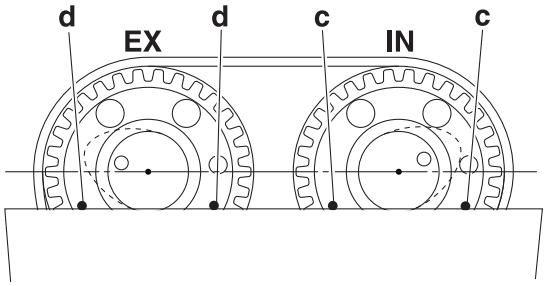


b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the stationary pointer "b" on the generator cover.

TIP

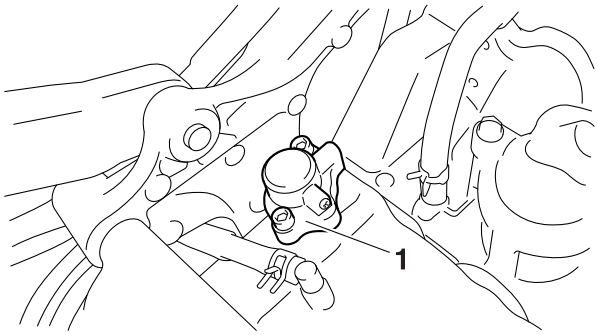
- TDC on the compression stroke can be found when the cylinder #1 camshaft lobes are turned away from each other.
- In order to be sure that the piston is at TDC, the alignment marks "c" on the intake camshaft sprocket and the alignment marks "d" on the exhaust camshaft sprocket must align with the cylinder head mating surface as shown in the illustration.





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2. Remove:
   - Timing chain tensioner "1"
   - Timing chain tensioner gasket

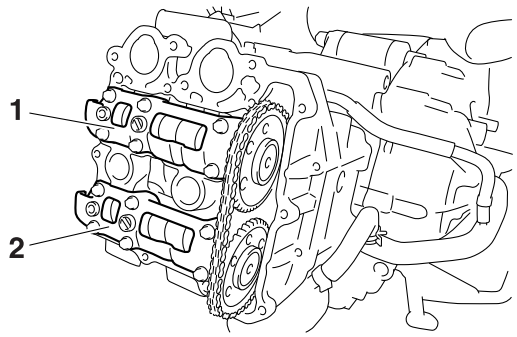


3. Remove:
   - Intake camshaft cap "1"
   - Exhaust camshaft cap "2"
   - Dowel pins

ECA13720

NOTICE

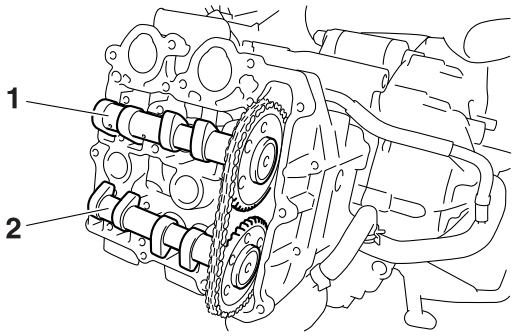
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

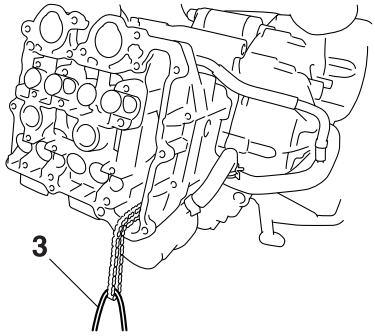


4. Remove:
   - Intake camshaft "1"
   - Exhaust camshaft "2"

TIP

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

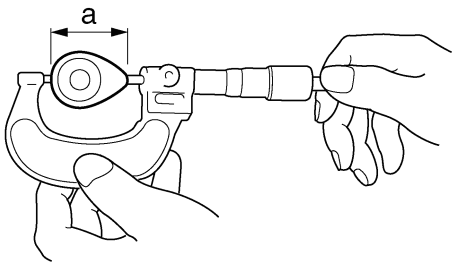


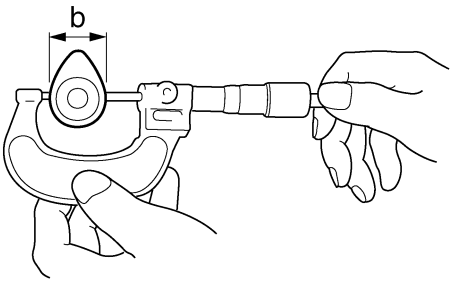


EAS23850
CHECKING THE CAMSHAFTS

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.

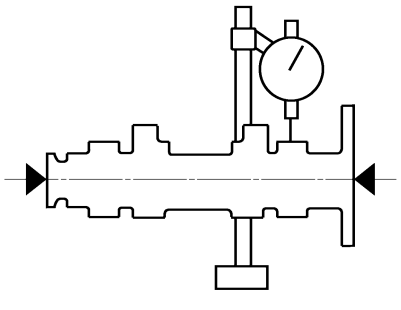
Camshaft lobe dimensions
Intake A
32.490–32.590 mm (1.2791–1.2831 in)
Limit
32.390 mm (1.2752 in)
Intake B
24.950–25.050 mm (0.9823–0.9862 in)
Limit
24.850 mm (0.9783 in)
Exhaust A
32.690–32.790 mm (1.2870–1.2909 in)
Limit
32.590 mm (1.2831 in)
Exhaust B
24.950–25.050 mm (0.9823–0.9862 in)
Limit
24.850 mm (0.9783 in)





3. Measure:
   - Camshaft runout
     Out of specification → Replace.

Camshaft runout limit
0.030 mm (0.0012 in)

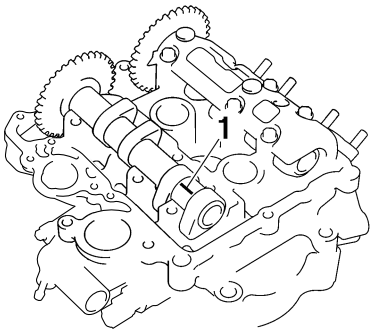


4. Measure:
   • Camshaft-journal-to-camshaft-cap clearance
   Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.028–0.062 mm (0.0011–0.0024 in)
Limit
0.08 mm (0.0031 in)

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a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position a strip of Plastigauge® "1" onto the camshaft journal as shown.



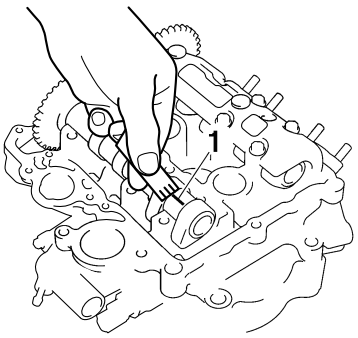
c. Install the dowel pins and camshaft caps.

TIP

- When tightening the camshaft cap, tighten the four bolts on the both ends of the cap temporarily to lower the entire cap, while paying attention not to twist the dowel pins and camshaft journal. After the camshaft cap touches the cylinder head, tighten the two bolts in the middle to the specified torque and then the remaining four bolts to the specified torque.
- To prevent the camshaft cap from cracking, tighten the camshaft cap carefully by tapping the camshaft using a soft-face hammer (both for temporary and final tightening).
- 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·kgf, 7.2 ft·lbf)

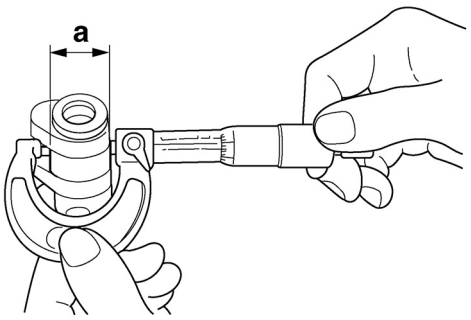
d. Remove the camshaft caps and then measure the width of the Plastigauge® "1".



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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.

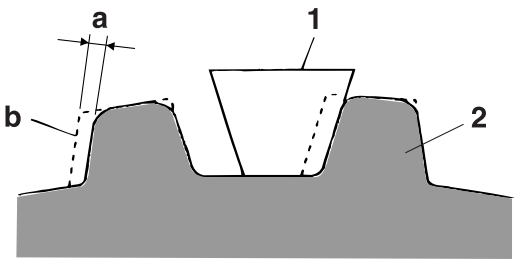
Camshaft journal diameter
22.959–22.972 mm (0.9039–0.9044 in)



EAS4B51035
CHECKING THE CAMSHAFT SPROCKETS

The following procedure applies to both of the camshaft sprockets.

1. Check:
   • Camshaft sprocket
   More than 1/4 tooth wear "a"→ Replace the camshafts and the timing chain as a set.

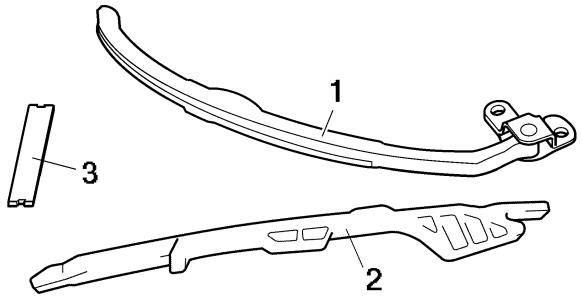


a. 1/4 tooth
b. Correct

1. Timing chain
2. Camshaft sprocket

EAS23950
CHECKING THE TIMING CHAIN GUIDES

1. Check:
   - Timing chain guide (intake side) “1”
   - Timing chain guide (exhaust side) “2”
   - Timing chain guide (upper side) “3”
     Damage/wear → Replace the defective part(s).



EAS23960
CHECKING THE TIMING CHAIN TENSIONER

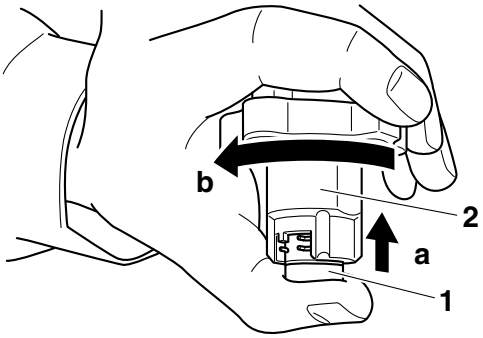
1. Check:
   - Timing chain tensioner
     Cracks/damage → Replace.

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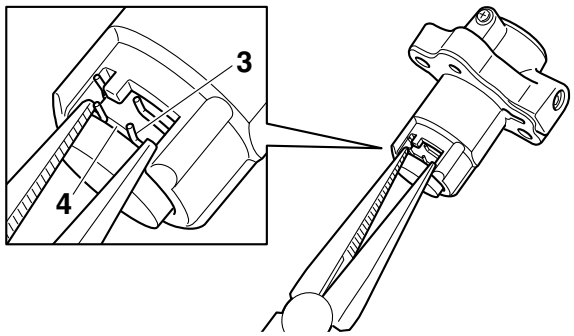
a. Push the timing chain tensioner rod “1” into the timing chain tensioner housing by hand.

TIP

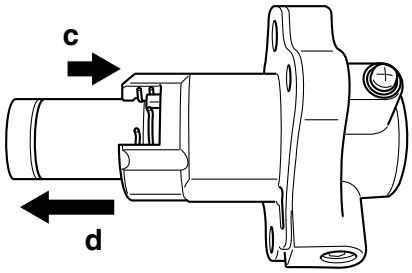
While pushing the timing chain tensioner rod “a”, turn it clockwise “b” with the timing chain tensioner body “2” until if stops.



b. Lock the timing chain tensioner rod by setting the circlip “3” to groove “4” while pushing the timing chain tensioner rod.



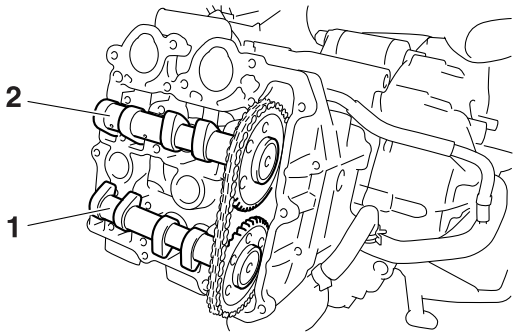
c. Push the timing chain tensioner rod “c”.
d. Make sure that the timing chain tensioner rod comes out “d” of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



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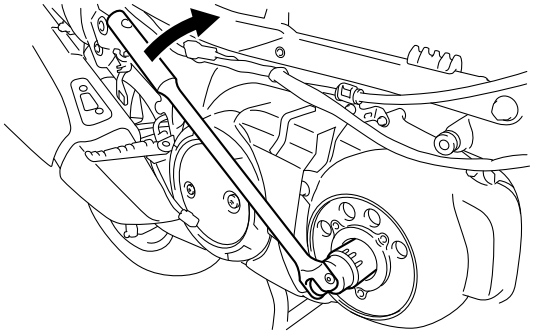
EAS24000
INSTALLING THE CAMSHAFTS

1. Install:
   - Exhaust camshaft “1”
   - Intake camshaft “2”

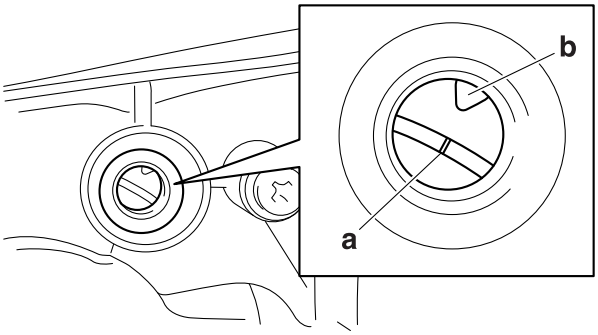


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a. Turn the crankshaft clockwise.



b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the stationary pointer "b" on the generator cover.



c. Install the timing chain onto both camshaft sprockets, and then install the camshafts onto the cylinder head.

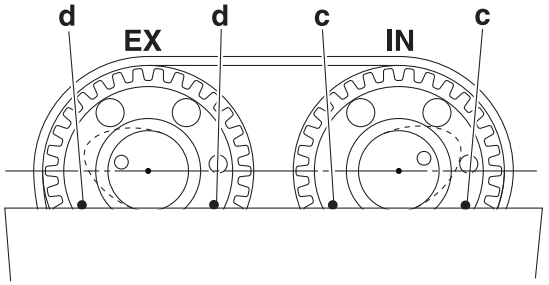
TIP

- Lubricate the camshaft journal with the molybdenum disulfide oil.
- When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
- The camshafts should be installed onto the cylinder head so that the alignment marks "c" on the intake camshaft sprocket and the alignment marks "d" on the exhaust camshaft sprocket align with the cylinder head mating surface, as shown in the illustration.

ECA4B51015

NOTICE

Do not turn the crankshaft when installing the camshafts to avoid damage or improper valve timing.

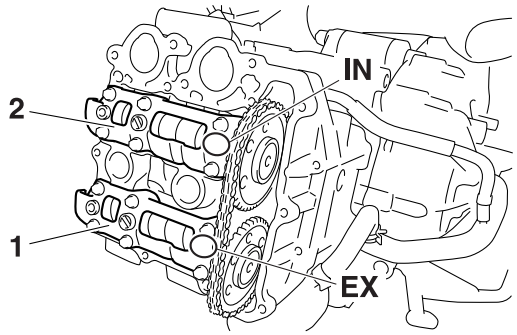


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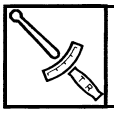
2. Install:
   - Dowel pins
   - Exhaust camshaft cap "1"
   - Intake camshaft cap "2"

TIP

Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
"IN": Intake
"EX": Exhaust



3. Install:
   - Camshaft cap bolts

	**Camshaft cap bolt** **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

ECA13730

NOTICE

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

TIP

- Lubricate the camshaft cap bolt seats with the engine oil.
- When tightening the camshaft cap, tighten the four bolts on the both ends of the cap temporarily to lower the entire cap, while paying attention not to twist the dowel pins and camshaft journal. After the camshaft cap touches the cylinder head, tighten the two bolts in the middle to the specified torque and then the remaining four bolts to the specified torque.
- To prevent the camshaft cap from cracking, tighten the camshaft cap carefully by tapping the camshaft using a soft-face hammer (both for temporary and final tightening).

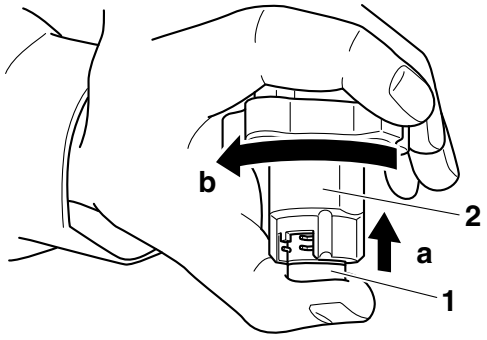
4. Install:
   - Timing chain tensioner gasket New
   - Timing chain tensioner

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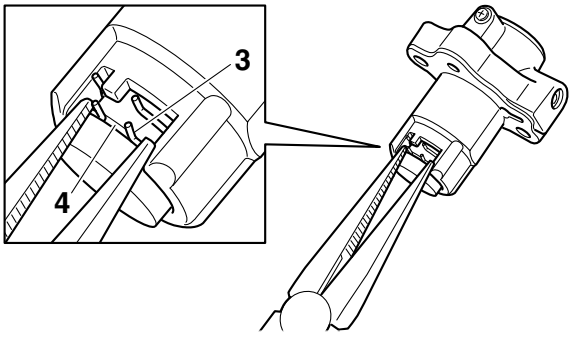
a. Push the timing chain tensioner rod "1" into the timing chain tensioner housing by hand.

TIP

While pushing the timing chain tensioner rod "a", turn it clockwise "b" with the timing chain tensioner body "2" until if stops.



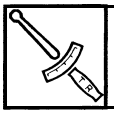
b. Lock the timing chain tensioner rod by setting the circlip "3" into groove "4" while pushing the timing chain tensioner rod.



c. Install the timing chain tensioner to the cylinder block.

TIP

Always use a new gasket.

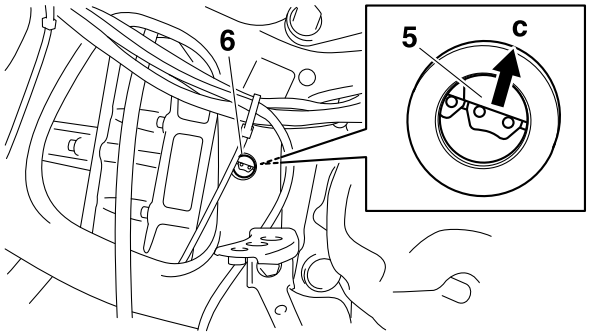
	**Timing chain tensioner bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

d. Release the timing chain tensioner rod by pushing up the timing chain guide "5" from the hole "6".

ECA4B51014

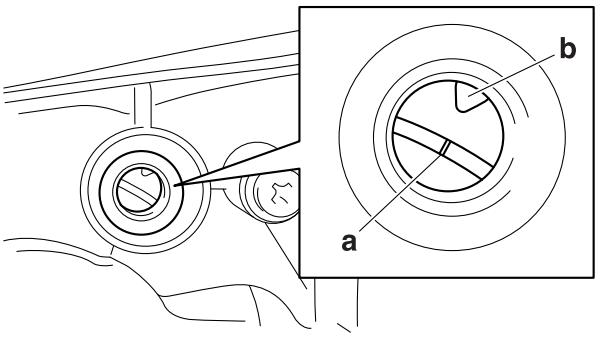
NOTICE

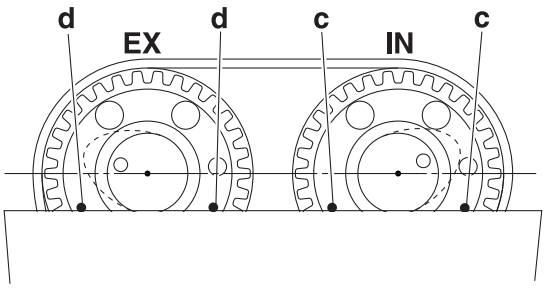
Do not push up the timing chain. Push up "c" the timing chain guide "5".



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5. Turn:
   - Crankshaft
     (several turns clockwise)
6. Check:
   - "I" mark "a"
     Make sure that the "I" mark is aligned with the stationary pointer "b" on the generator cover.
   - Camshaft sprocket alignment marks "c" and "d".
     Make sure that the camshaft sprocket alignment marks are aligned with the cylinder head mating surface.
     Out of alignment → Correct.
     Refer to the installation steps above.

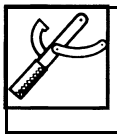




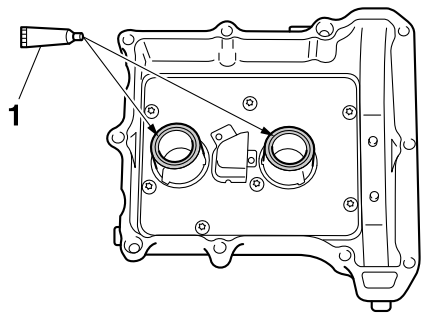
7. Measure:
   - Valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-5.
8. Install:
   - Timing chain guide (upper side)
   - Gaskets New
     (to the cylinder head cover)

TIP

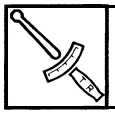
Apply Yamaha bond No.1215 "1" onto the mating surfaces of the cylinder head cover and gaskets.



Yamaha bond No.1215
90890-85505
(Three bond No.1215®)



9. Install:
   - Cylinder head cover gasket New
   - Cylinder head cover



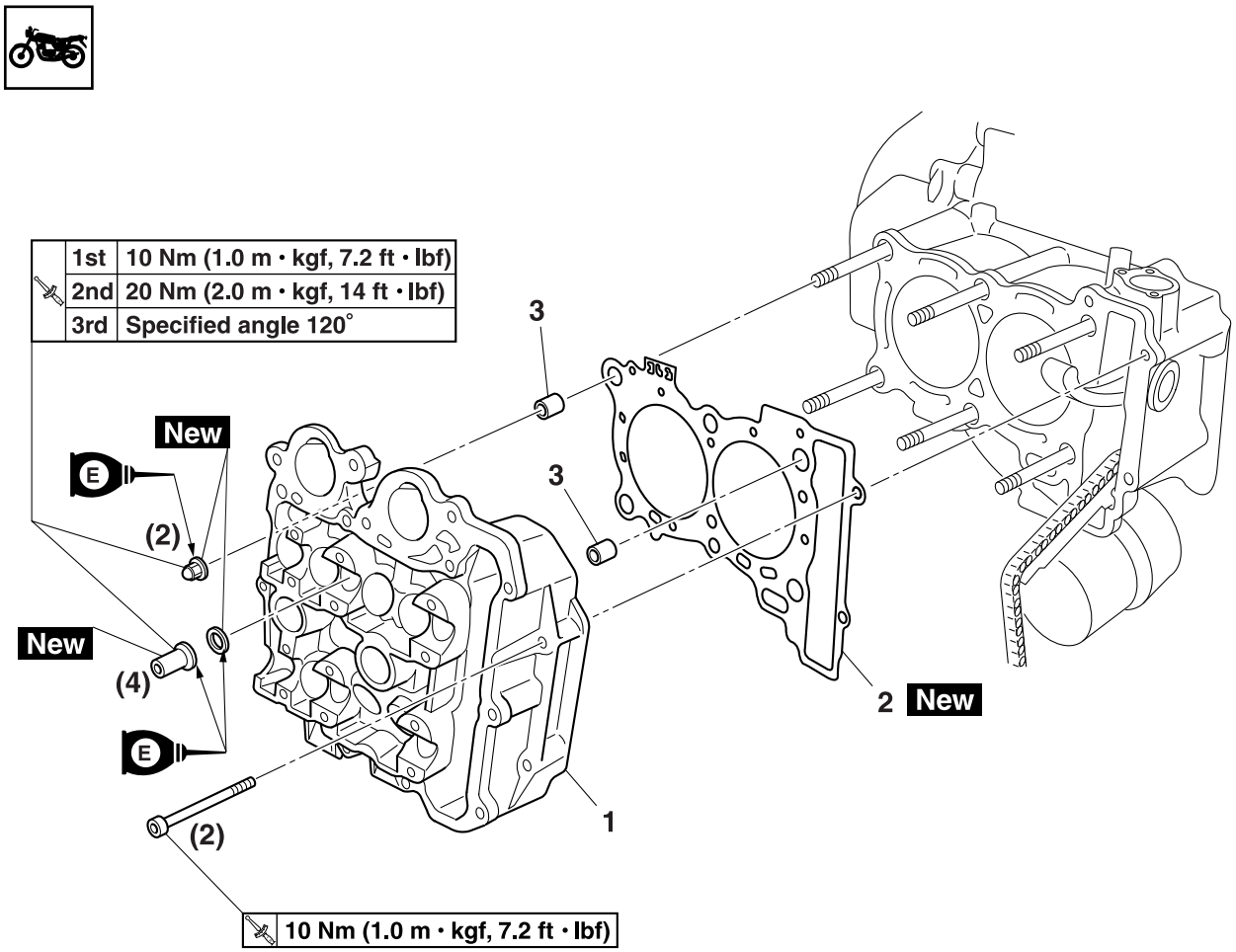
Cylinder head cover bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

EAS24100
CYLINDER HEAD

Removing the cylinder head



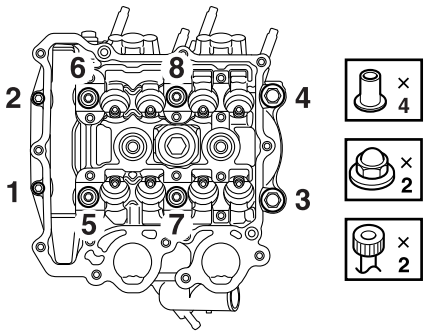
Order	Job/Parts to remove	Q'ty	Remarks
	Camshafts		Refer to "CAMSHAFTS" on page 5-8.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Thermostat/Coolant temperature sensor		Refer to "THERMOSTAT" on page 6-7.
	Radiator bracket		Refer to "RADIATOR" on page 6-1.
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.

EAS24120
REMOVING THE CYLINDER HEAD

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

TIP

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



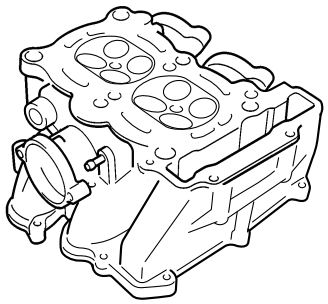
EAS24160
CHECKING THE CYLINDER HEAD

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

TIP

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

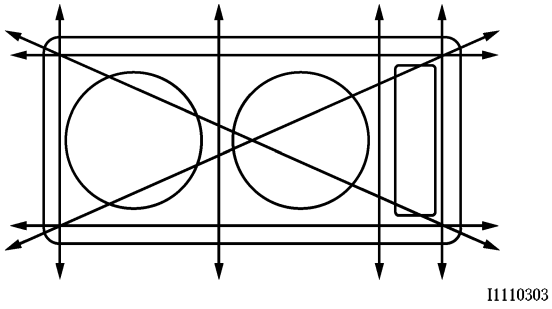
- Spark plug bore threads
- Valve seats



2. Check:
   - Cylinder head
     Damage/scratches → Replace.
   - Cylinder head water jacket
     Mineral deposits/rust → Eliminate.

3. Measure:
   - Cylinder head warpage
     Out of specification → Resurface the cylinder head.

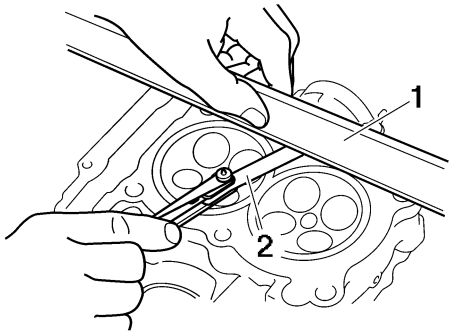
Warpage limit
0.03 mm (0.0012 in)



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a. Place a straightedge “1” and a thickness gauge “2” across the cylinder head.

Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9



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

TIP

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

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EAS24240
INSTALLING THE CYLINDER HEAD

1. Install:
   - Dowel pins
   - Cylinder head gasket New

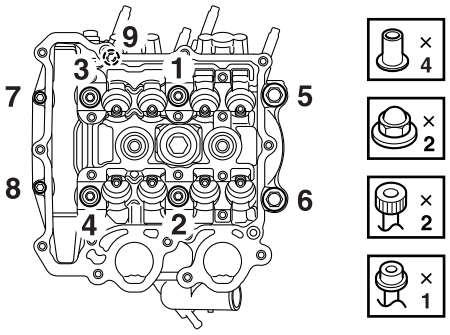
2. Install:
   - Cylinder head
   - Washers New
   - Cylinder head nuts New
   - Cylinder head bolts

TIP
- Pass the timing chain through the timing chain cavity.
- Lubricate the cylinder head nuts and washers with engine oil.

3. Tighten:
   - Cylinder head nuts "1"–"6"
   - Cylinder head bolts "7", "8"
   - Cylinder bolt "9"

Cylinder head nut
1st: 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
2nd: 20 Nm (2.0 m·kgf, 14 ft·lbf)
3rd: 120°
Cylinder head bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
Cylinder bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

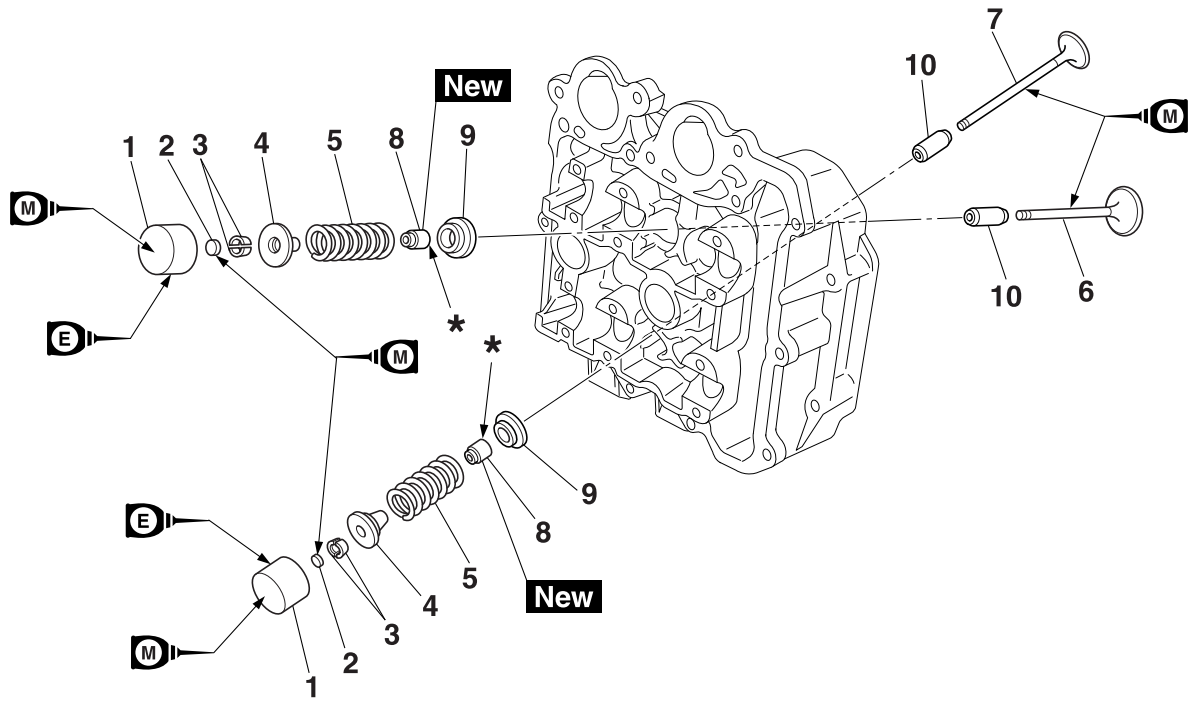
TIP
- Using the indicated tightening sequence, tighten the cylinder head nuts, cylinder head bolts, and cylinder bolt when the cylinder head and cylinder are cold.
- Use three steps to tighten the cylinder head nuts.



4. Install:
   - Exhaust camshaft
   - Intake camshaft
   Refer to "INSTALLING THE CAMSHAFTS" on page 5-14.

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 5-18.
1	Valve lifter	8	
2	Valve pad	8	
3	Valve cotter	16	
4	Valve spring retainer	8	
5	Valve spring	8	
6	Intake valve	4	
7	Exhaust valve	4	
8	Valve stem seal	8	
9	Valve spring seat	8	
10	Valve guide	8	
			For installation, reverse the removal procedure.

* Silicone fluid

EAS24280
REMOVING THE VALVES

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

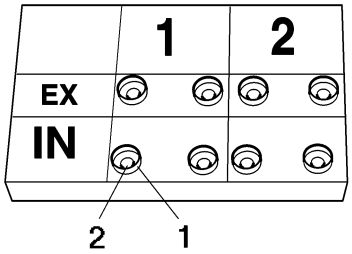
TIP

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"

TIP

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



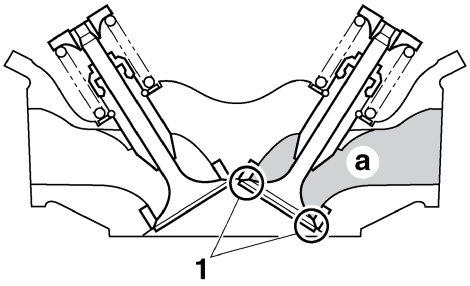
2. Check:
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS" on page 5-24.

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

TIP

There should be no leakage at the valve seat "1".



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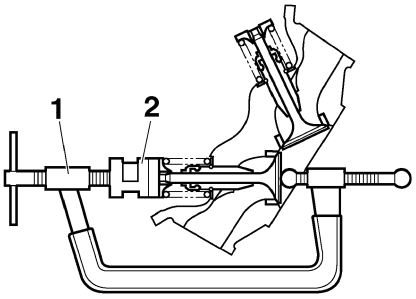
3. Remove:
   - Valve cotters

TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



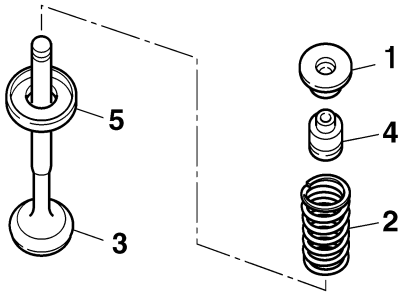
Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-04114
Valve spring compressor adapter 19.5 mm
YM-04114



4. Remove:
   - Valve spring retainer "1"
   - Valve spring "2"
   - Valve "3"
   - Valve stem seal "4"
   - Valve spring seat "5"

TIP

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



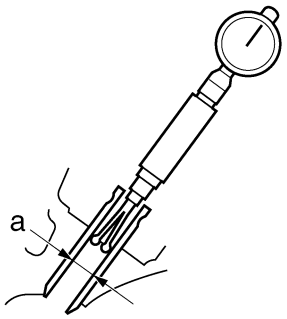
EAS24290
CHECKING THE VALVES AND VALVE GUIDES

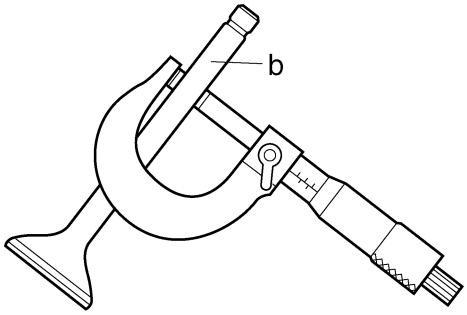
The following procedure applies to all of the valves and valve guides.

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
0.100 mm (0.0039 in)



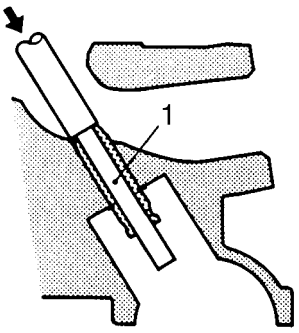


2. Replace:
   - Valve guide

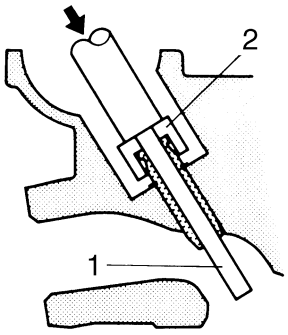
TIP
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

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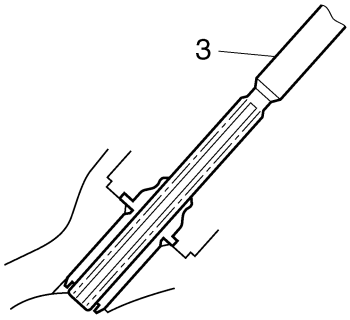
a. Remove the valve guide with the valve guide remover "1".



b. Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



c. After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.



TIP

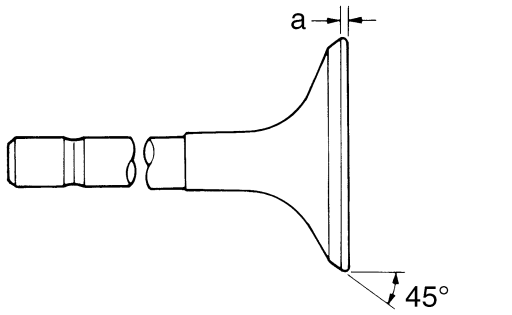
After replacing the valve guide, reface the valve seat.

Valve guide remover (ø4)
90890-04111
Valve guide remover (4.0 mm)
YM-04111
Valve guide installer (ø4)
90890-04112
Valve guide installer (4.0 mm)
YM-04112
Valve guide reamer (ø4)
90890-04113
Valve guide reamer (4.0 mm)
YM-04113

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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 “a”
     Out of specification → Replace the valve.

Valve margin thickness (intake)
0.50–0.90 mm (0.0197–0.0354 in)
Valve margin thickness (exhaust)
0.50–0.90 mm (0.0197–0.0354 in)

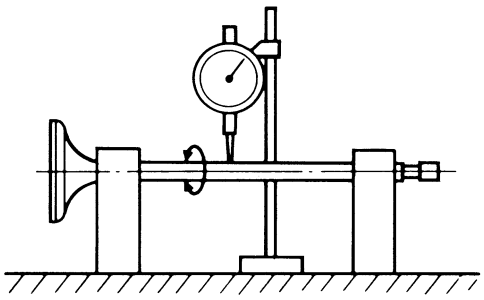


6. Measure:
   - Valve stem runout
     Out of specification → Replace the valve.

TIP

- 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)

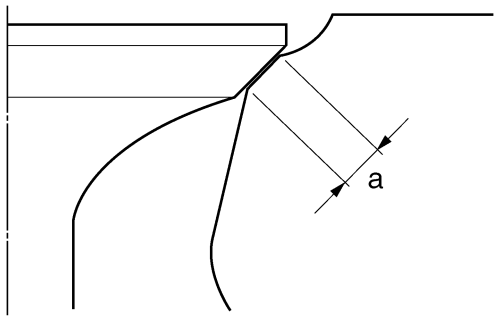


EAS24300
CHECKING THE VALVE SEATS

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

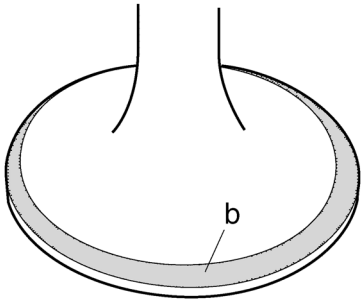
1. Eliminate:
   - Carbon deposits
     (from the valve face and valve seat)
2. Check:
   - Valve seat
     Pitting/wear → Replace the cylinder head.
3. Measure:
   - Valve seat width “a”
     Out of specification → Replace the cylinder head.

Valve seat width (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Limit
1.6 mm (0.06 in)
Valve seat width (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)
Limit
1.6 mm (0.06 in)



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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.

TIP
Where the valve seat and valve face contacted one another, the blueing will have been removed.

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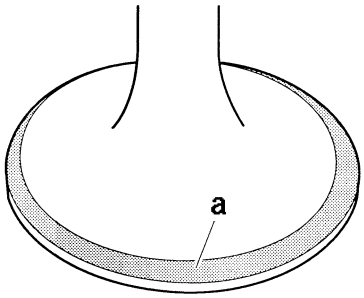
4. Lap:
   - Valve face
   - Valve seat

TIP
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

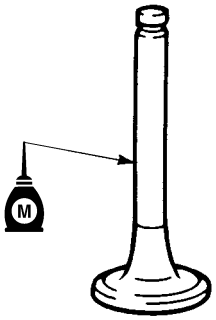
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a. Apply a coarse lapping compound "a" to the valve face.

ECA13790
NOTICE
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

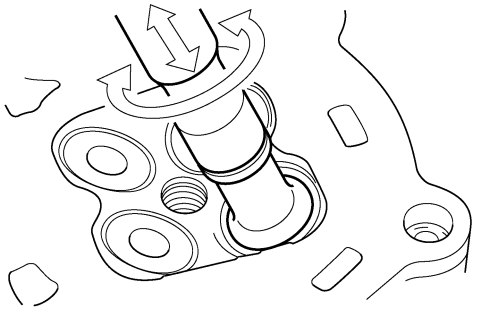


b. Apply molybdenum disulfide oil onto the valve stem.



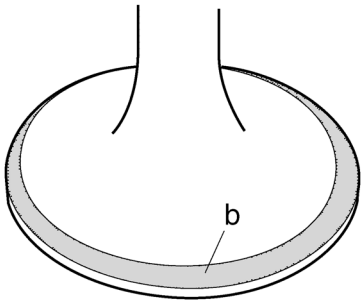
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

TIP
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

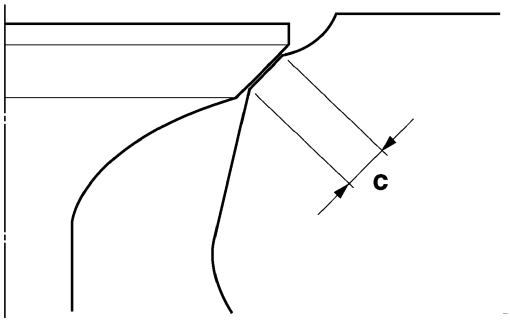


e. Apply a fine lapping compound to the valve face and repeat the above steps.

f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply Mechanic's blueing dye (Dykem) "b" onto the valve face.



h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat width "c" again. If the valve seat width is out of specification, reface and lap the valve seat.



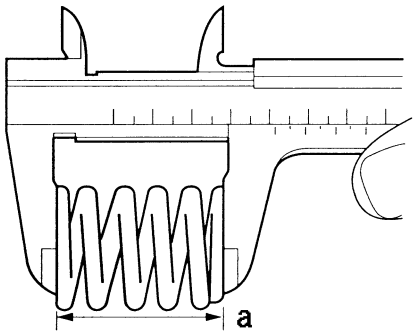
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EAS24310
CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

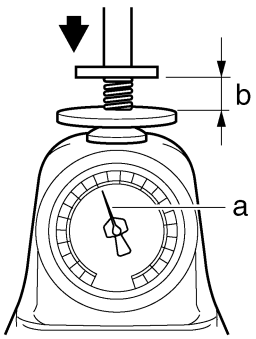
1. Measure:
   • Valve spring free length "a"
   Out of specification → Replace the valve spring.

Free length (intake)
36.73 mm (1.45 in)
Limit
34.89 mm (1.37 in)
Free length (exhaust)
36.73 mm (1.45 in)
Limit
34.89 mm (1.37 in)



2. Measure:
   • Compressed valve spring force "a"
   Out of specification → Replace the valve spring.

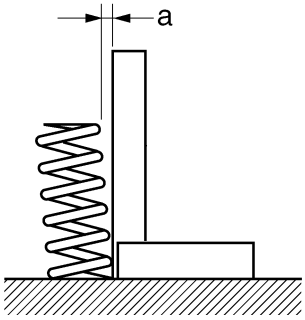
Installed compression spring force (intake)
96.6–111.2 N (9.85–11.34 kgf, 21.72–25.00 lbf)
Installed compression spring force (exhaust)
96.6–111.2 N (9.85–11.34 kgf, 21.72–25.00 lbf)
Installed length (intake)
30.60 mm (1.20 in)
Installed length (exhaust)
30.60 mm (1.20 in)



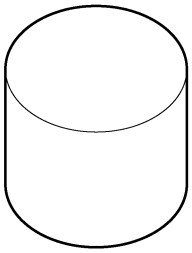
b. Installed length

3. Measure:
   • Valve spring tilt "a"
   Out of specification → Replace the valve spring.

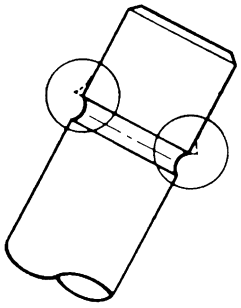
Spring tilt (intake)
1.6 mm (0.06 in)
Spring tilt (exhaust)
1.6 mm (0.06 in)



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.

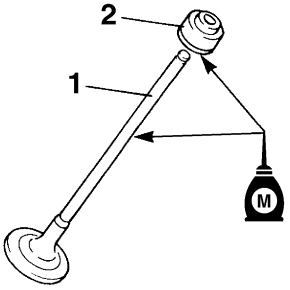


EAS24340
INSTALLING THE VALVES
The following procedure applies to all of the valves and related components.
1. Deburr:
   - Valve stem end
     (with an oil stone)



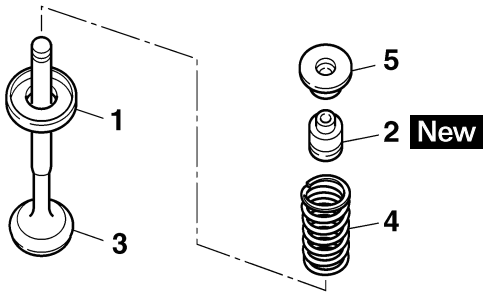
2. Lubricate:
   - Valve stem "1"
   - Valve stem seal "2"
     (with the recommended lubricant)

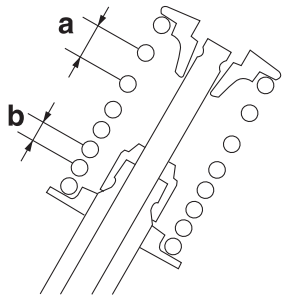
	Recommended lubricant **Molybdenum disulfide oil**



3. Install:
   - Valve spring seat "1"
   - Valve stem seal "2" New
   - Valve "3"
   - Valve spring "4"
   - Valve spring retainer "5"
     (into the cylinder head)

TIP
- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.





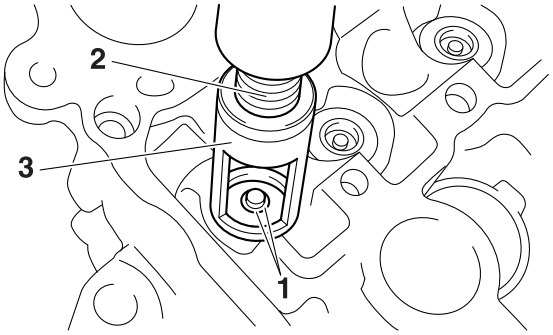
b. Smaller pitch

4. Install:
   - Valve cotters "1"

TIP
Install the valve cotters by compressing the valve spring with the valve spring compressor

"2" and the valve spring compressor attachment "3".

Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-04114
Valve spring compressor adapter 19.5 mm
YM-04114

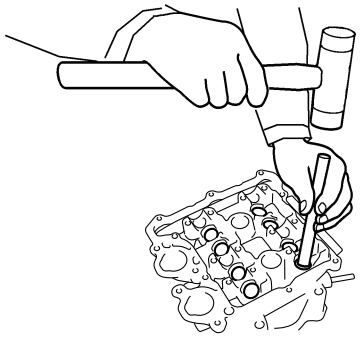


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

NOTICE

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



6. Lubricate:
   - Valve pad
   (with the recommended lubricant)

Recommended lubricant
Molybdenum disulfide oil

7. Lubricate:
   - Valve lifter
   (with the recommended lubricant)

Recommended lubricant
Engine oil

8. Install:
   - Valve pad
   - Valve lifter

ECA4B51016

NOTICE

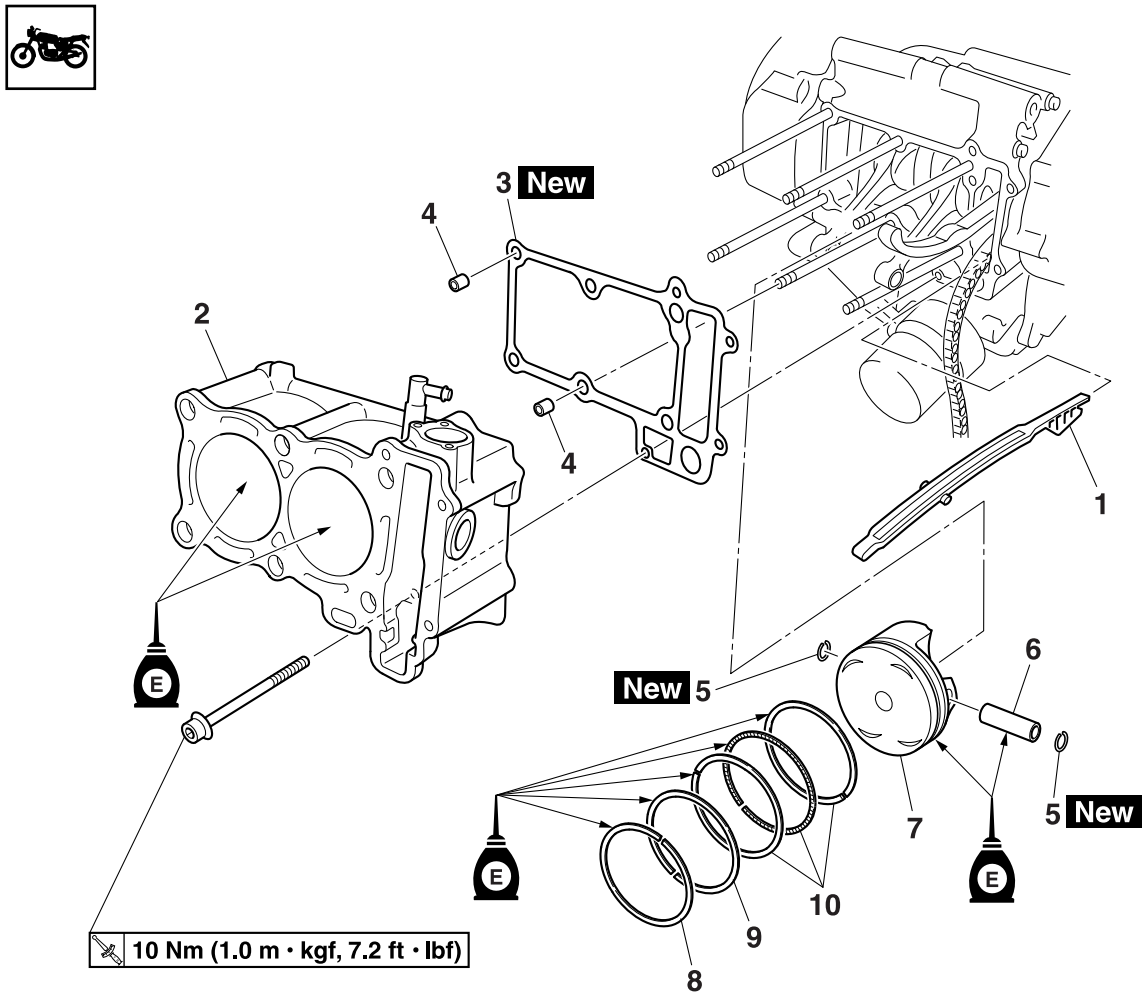
After making sure that the valve pads are fully inserted, install the valve lifter taking care so that the pads do not fall.

TIP

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

EAS24370
CYLINDER AND PISTONS

Removing the cylinder and pistons



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-18.
	Coolant hose		Refer to "WATER PUMP" on page 6-9.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	4	
6	Piston pin	2	
7	Piston	2	
8	Top ring	2	
9	2nd ring	2	
10	Oil ring	2	
			For installation, reverse the removal procedure.

EAS24380
REMOVING THE PISTONS

The following procedure applies to all of the piston.

1. Remove:
   - Piston pin clips “1”
   - Piston pin “2”
   - Piston “3”

ECA13810

NOTICE

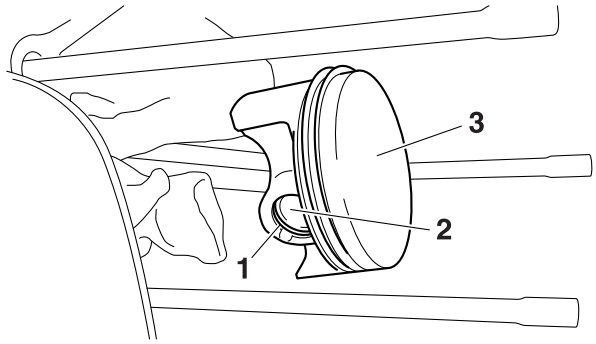
Do not use a hammer to drive the piston pin out.

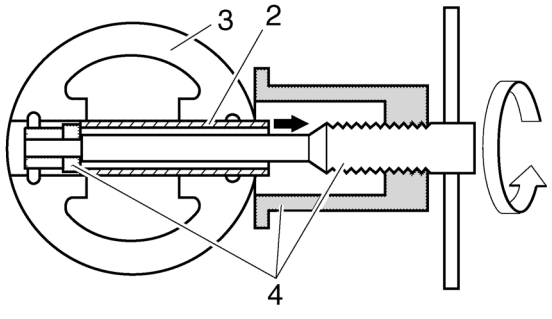
TIP

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip’s groove and the piston’s pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “4”.



Piston pin puller set
90890-01304
Piston pin puller
YU-01304

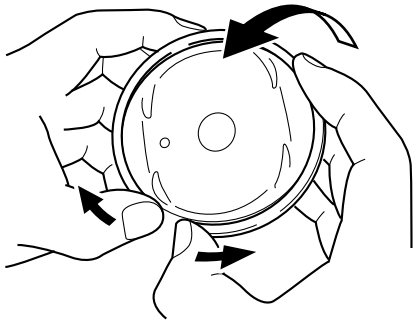




2. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

TIP

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24400
CHECKING THE CYLINDERS AND PISTONS

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

1. Check:
   - Piston wall
   - Cylinder wall
     Vertical scratches → Replace the cylinder, piston and piston rings as a set.
2. Measure:
   - Piston-to-cylinder clearance

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a. Measure cylinder bore with the cylinder bore gauge.

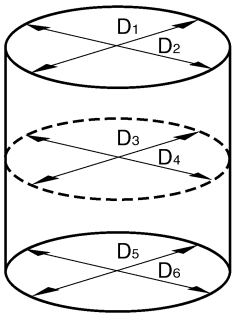
TIP

Measure cylinder bore by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

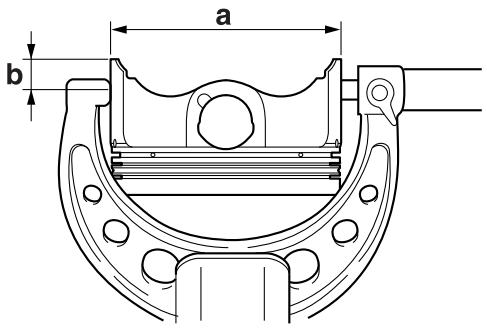


Bore
68.000–68.010 mm (2.6772–2.6776 in)
Wear limit
68.100 mm (2.6811 in)
Taper limit
0.050 mm (0.0020 in)
Out of round limit
0.050 mm (0.0020 in)

Bore = maximum of D_1–D_2
Taper limit = maximum of D_1 or D_2 - maximum of D_5 or D_6
Out of round limit = maximum of D_1, D_3 or D_5 - minimum of D_2, D_4 or D_6



b. If out of specification, replace the cylinder, piston and piston rings as a set.
c. Measure piston skirt diameter “a” with the micrometer.



b. 9.0 mm (0.35 in) from the bottom edge of the piston

Piston
Diameter
67.975–67.990 mm (2.6762–2.6768 in)

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

• Piston-to-cylinder clearance = Cylinder bore - Piston skirt diameter

Piston-to-cylinder clearance
0.010–0.035 mm (0.0004–0.0014 in)
Limit
0.15 mm (0.0059 in)

f. If out of specification, replace the cylinder, piston and piston rings as a set.

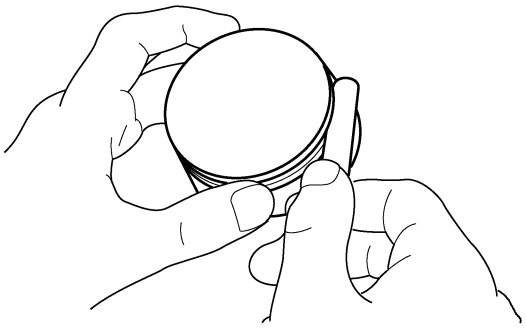
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EAS24430
CHECKING THE PISTON RINGS

1. Measure:
   • Piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

TIP
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring
Top ring
Ring side clearance
0.030–0.065 mm (0.0012–0.0026 in)
Limit
0.100 mm (0.0039 in)
2nd ring
Ring side clearance
0.020–0.055 mm (0.0008–0.0022 in)
Limit
0.100 mm (0.0039 in)



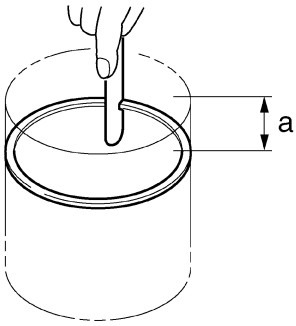
2. Install:
   • Piston ring
   (into the cylinder)

TIP
Level the piston ring into the cylinder with the piston crown.

3. Measure:
   • Piston ring end gap
   Out of specification → Replace the piston ring set.

TIP
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.

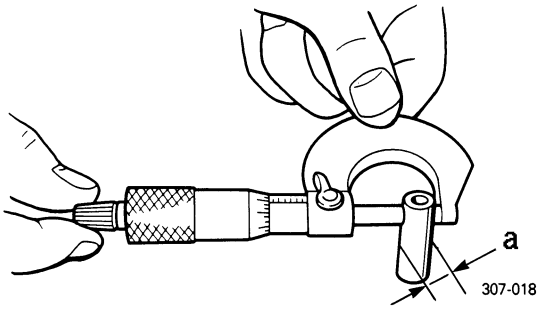
Piston ring
Top ring
End gap (installed)
0.25–0.35 mm (0.0098–0.0138 in)
Limit
0.60 mm (0.0236 in)
2nd ring
End gap (installed)
0.35–0.50 mm (0.0138–0.0197 in)
Limit
0.75 mm (0.0295 in)
Oil ring
End gap (installed)
0.10–0.35 mm (0.0039–0.0138 in)



a. 40 mm (1.57 in)

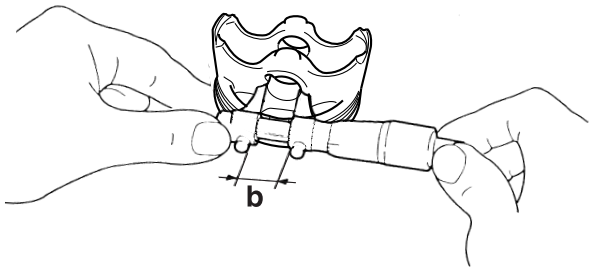
EAS24440
CHECKING THE PISTON PINS
The following procedure applies to both of the piston pins.
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter "a"
   Out of specification → Replace the piston pin.

Piston pin outside diameter
15.991–16.000 mm (0.6296–0.6299 in)
Limit
15.971 mm (0.6288 in)



3. Measure:
   • Piston pin bore inside diameter "b"
   Out of specification → Replace the piston.

Piston pin bore inside diameter
16.002–16.013 mm (0.6300–0.6304 in)
Limit
16.043 mm (0.6316 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 inside diameter - Piston pin outside diameter

Piston-pin-to-piston-pin-bore clearance
0.002–0.022 mm (0.0001–0.0009 in)

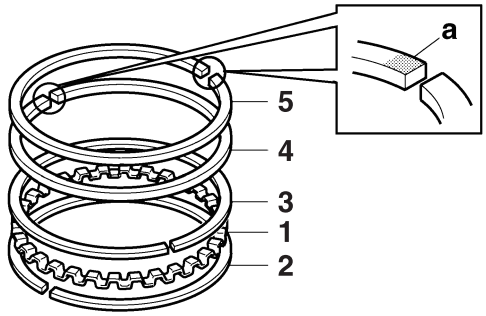
EAS24470
INSTALLING THE PISTONS AND CYLINDER

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

1. Install:
   - Oil ring expander “1”
   - Lower oil ring rail “2”
   - Upper oil ring rail “3”
   - 2nd ring “4”
   - Top ring “5”
     (into the piston)

TIP

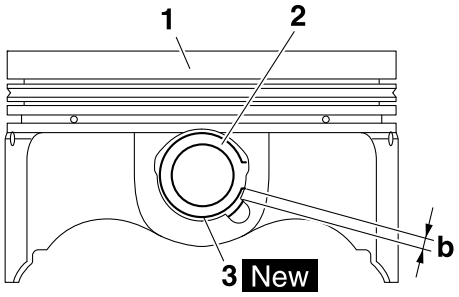
Be sure to install the top and 2nd rings so that the manufacturer marks or numbers “a” face up.

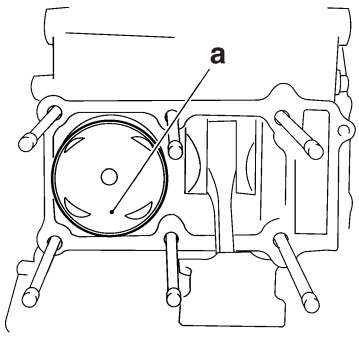


2. Install:
   - Piston “1”
   - Piston pin “2”
   - Piston pin clips “3” New

TIP

- Apply engine oil onto the piston pin.
- Make sure the mark “a” on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Install the piston pin clips so that the clip ends are 3 mm (0.12 in) “b” or more from the cutout in the piston.
- Reinstall each piston into its original cylinder.

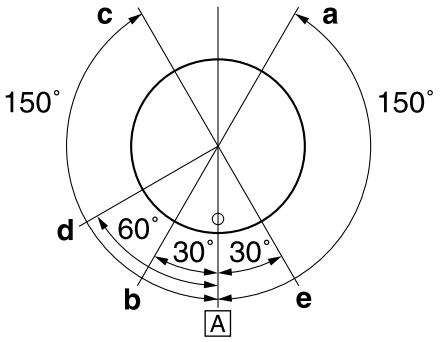




3. Install:
   - Dowel pins
   - Cylinder gasket New
4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

5. Offset:
   - Piston ring end gaps



a. Top ring
b. 2nd ring
c. Upper oil ring rail
d. Oil ring expander
e. Lower oil ring rail

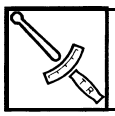
A. Exhaust side

6. Install:
   - Cylinder
   - Cylinder bolt

TIP

- While compressing the piston rings, install the cylinder.
- Pass the timing chain and timing chain guide (intake side) through the timing chain cavity.

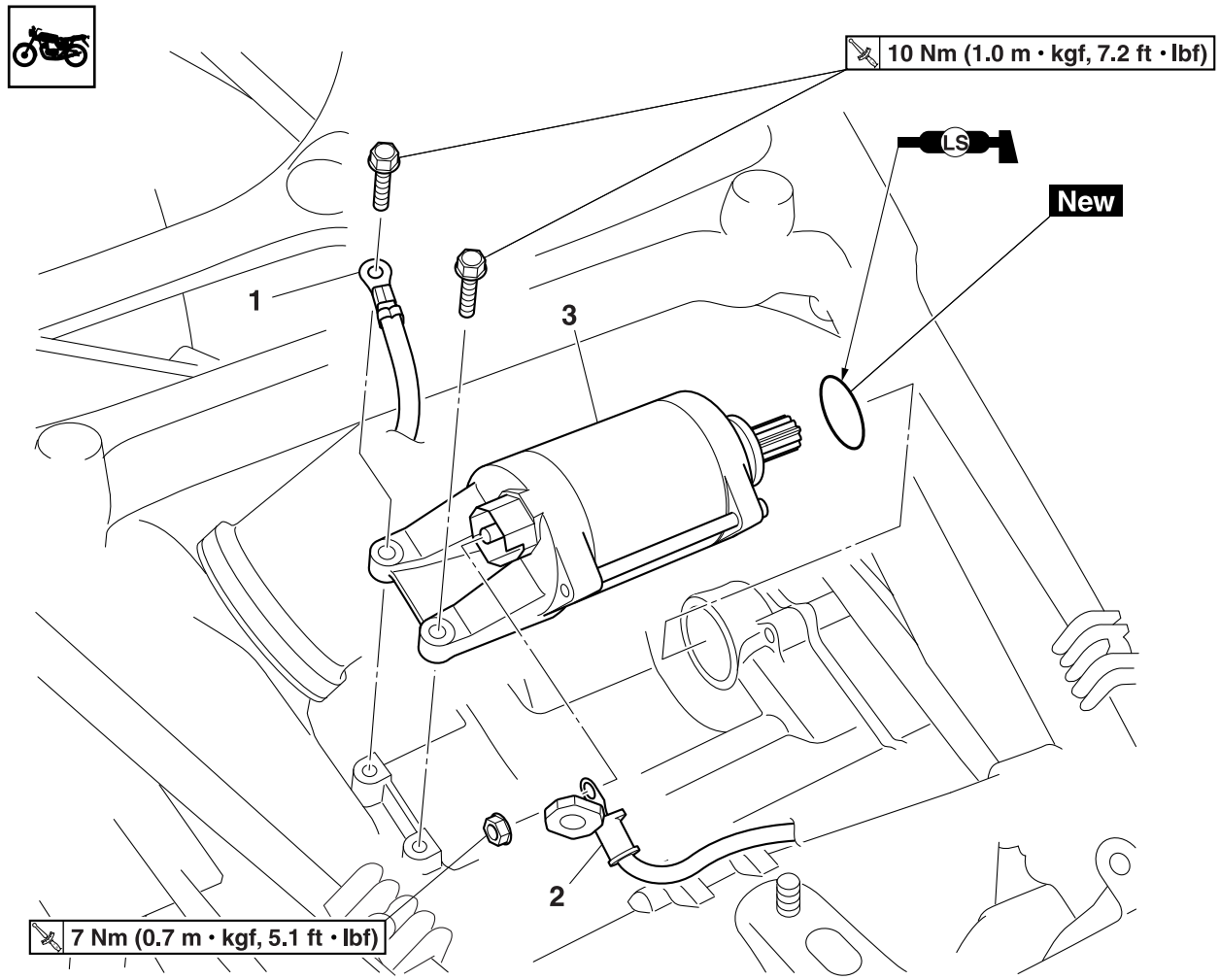
7. Tighten:
   - Cylinder bolt



Cylinder bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

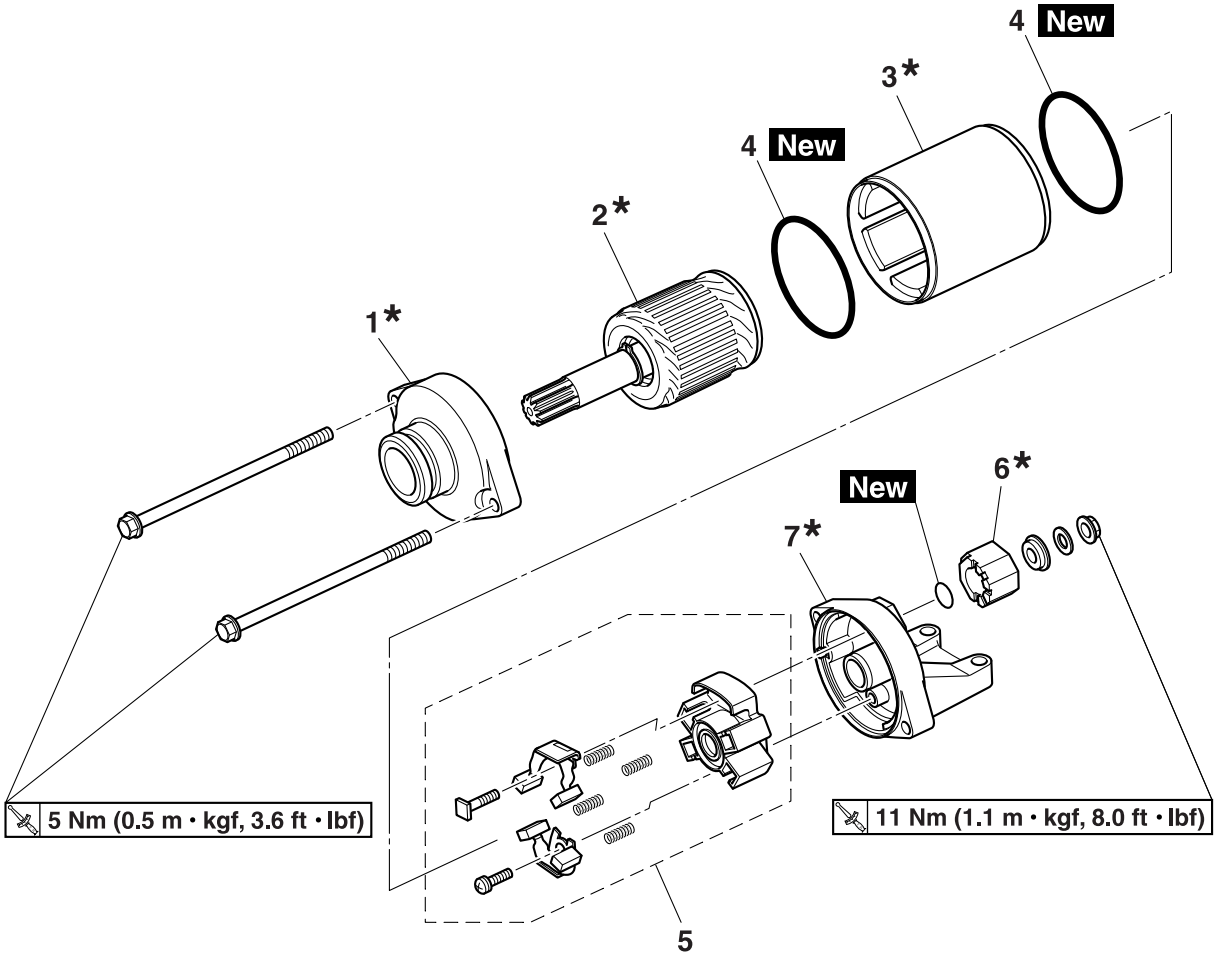
EAS24780
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Ground lead	1	Disconnect.
2	Starter motor lead	1	Disconnect.
3	Starter motor assembly	1	
			For installation, reverse the removal procedure.

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Starter motor front cover	1	
2	Armature assembly	1	
3	Starter motor yoke	1	
4	O-ring	2	
5	Brush holder set	1	
6	Insulator	1	
7	Starter motor rear cover	1	
			For assembly, reverse the disassembly procedure.

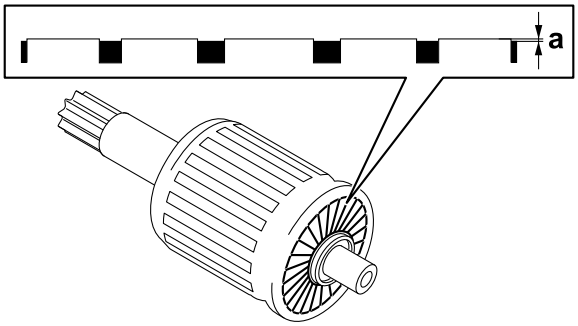
* When replacing any of the starter motor front cover, armature assembly, starter motor yoke, insulator, and starter motor rear cover, replace the starter motor assembly.

EAS24791
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. 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)

TIP
The mica of the commutator must be undercut to ensure proper operation of the commutator.



3. Measure:
   • Armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

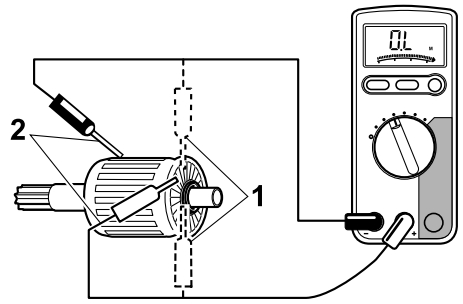
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a. Measure the armature assembly resistances with the digital circuit tester.

Digital circuit tester
90890-03189
Model 88 Multimeter with tachometer
YU-A1927

Armature coil
Commutator resistance
Continuity (0.0100–0.0200 Ω)
Insulation resistance
No continuity (Above 1 MΩ)

b. If any resistance is out of specification, replace the starter motor assembly.

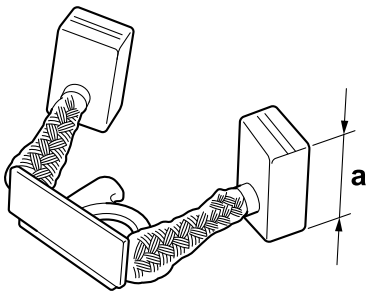


1. Commutator resistance
2. Insulation resistance

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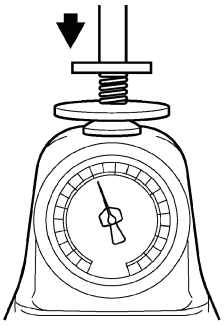
4. Measure:
   • Brush length “a”
   Out of specification → Replace the brush holder set.

Brush overall length
12.0 mm (0.47 in)
Limit
6.50 mm (0.26 in)



5. Measure:
   • Brush spring force
   Out of specification → Replace the brush holder set.

Brush spring force
6.02–6.51 N (614–664 gf, 21.65–23.41 oz)



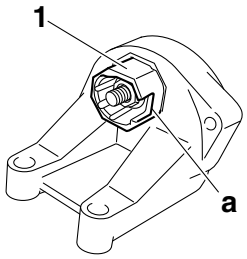
6. Check:
   - Gear teeth
     Damage/wear → Replace the starter motor assembly.
7. Check:
   - Bearing
     Damage/pitting → Replace the starter motor assembly.

EAS24800
ASSEMBLING THE STARTER MOTOR

1. Install:
   - Insulator “1”

TIP

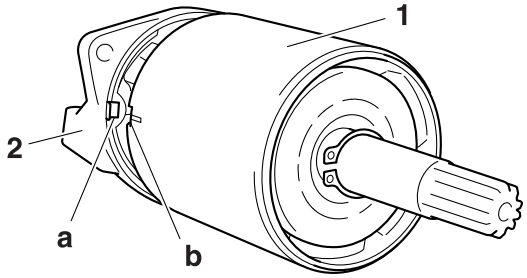
Install the insulator so that the slot “a” is positioned as shown in the illustration.

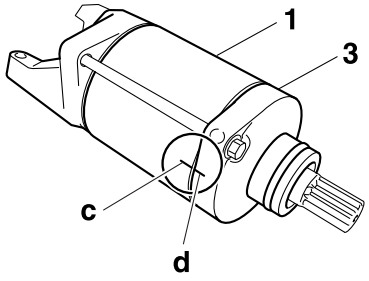


2. Install:
   - Starter motor yoke “1”
   - Starter motor rear cover “2”
   - Starter motor front cover “3”

TIP

- Align tab “a” of the starter motor rear cover with notch “b” of the starter motor yoke.
- Align the match mark “c” on the starter motor yoke with the match mark “d” on the starter motor front cover.



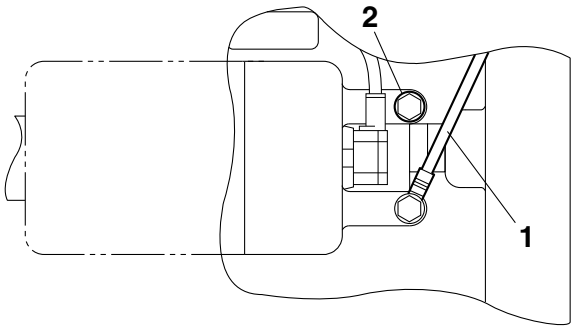


EAS24810
INSTALLING THE STARTER MOTOR

1. Connect:
   - Battery negative lead “1”

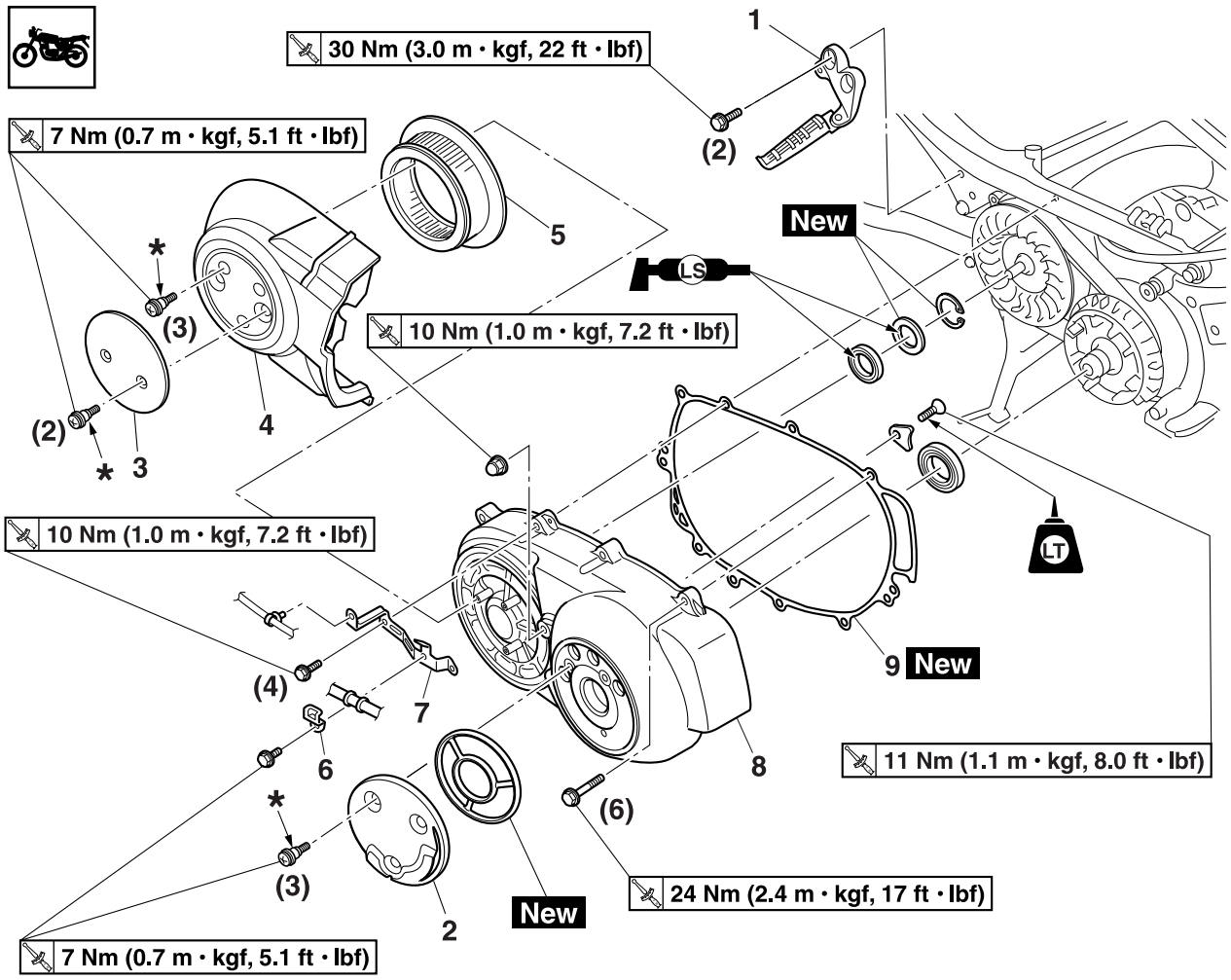
TIP

Make sure that the battery negative lead “1” does not touch the starter motor bolt “2”.



EAS24610
V-BELT AUTOMATIC TRANSMISSION

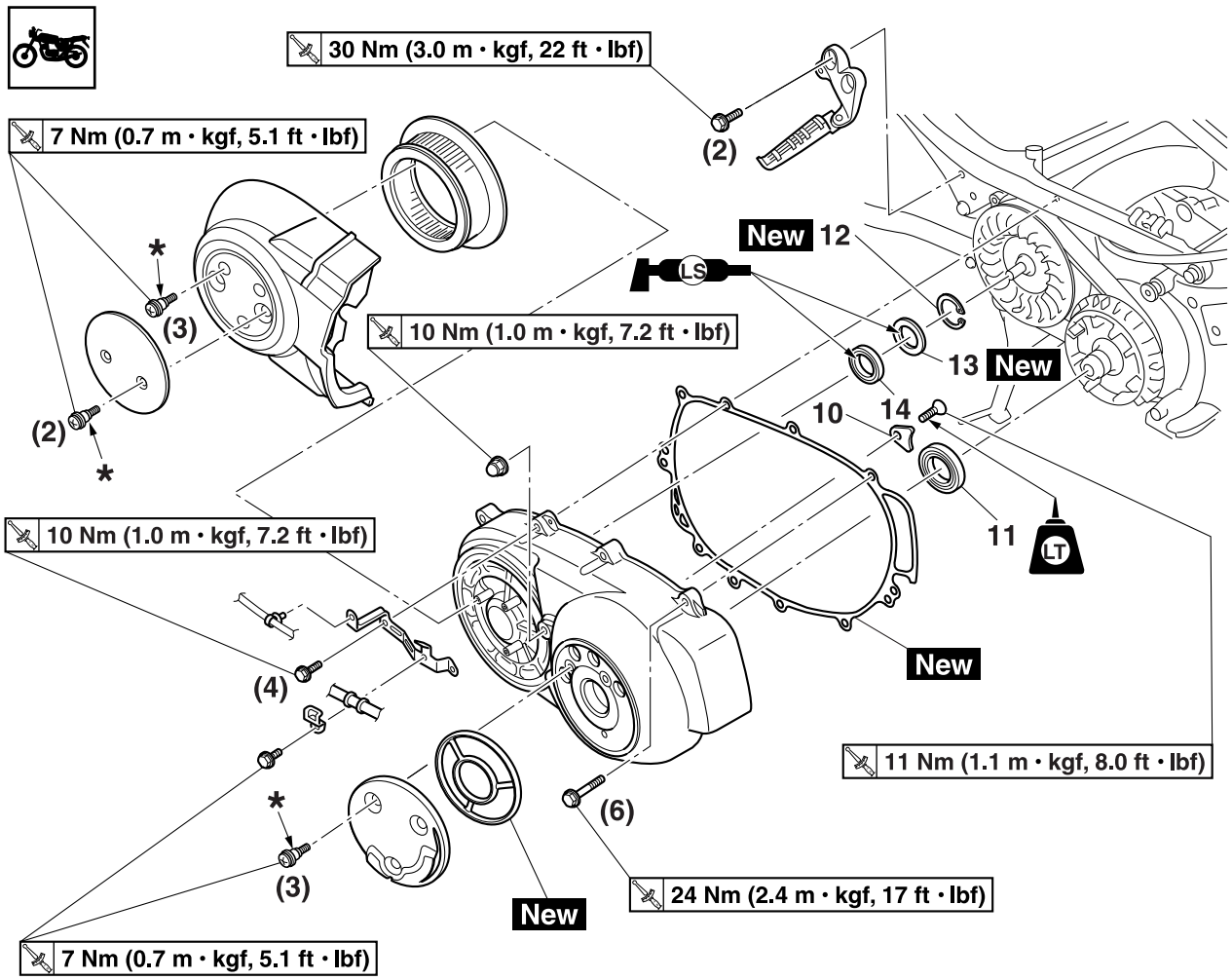
Removing the V-belt case cover



Order	Job/Parts to remove	Q'ty	Remarks
	Footboard (right)		Refer to "GENERAL CHASSIS" on page 4-1.
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	V-belt case air filter element (left)		Refer to "WATER PUMP" on page 6-9.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-3.
1	Right passenger footrest	1	
2	Crankshaft end access cover	1	
3	V-belt case air filter case cover	1	
4	V-belt case air filter case	1	
5	V-belt case air filter element (right)	1	
6	Rear brake lock cable holder (crankcase)	1	
7	Rear brake lock cable holder bracket	1	
8	Outer V-belt case	1	
9	Outer V-belt case gasket	1	

* Water

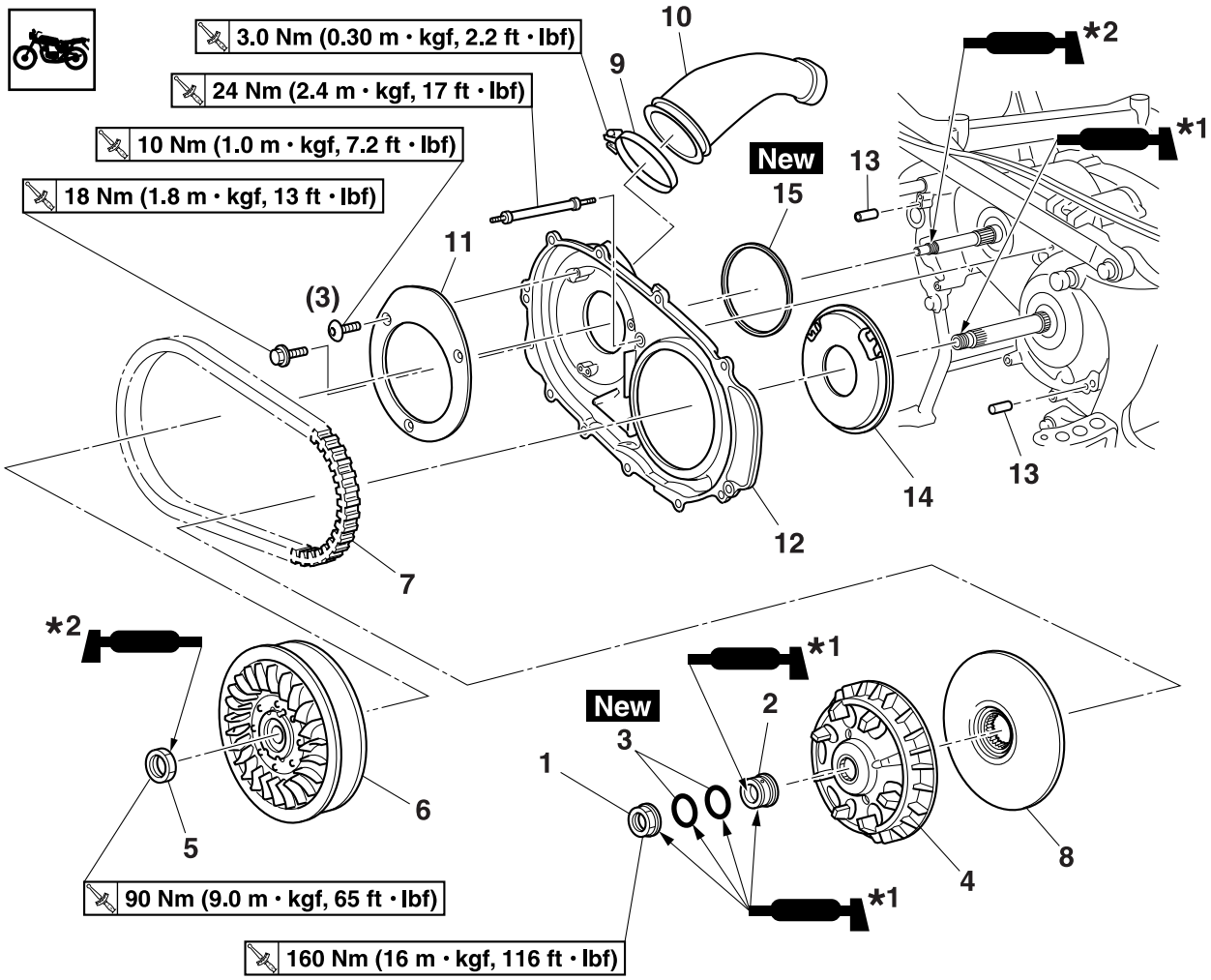
Removing the V-belt case cover



Order	Job/Parts to remove	Q'ty	Remarks
10	Bearing retainer	1	
11	Bearing	1	
12	Circlip	1	
13	Oil seal	1	
14	Bearing	1	
			For installation, reverse the removal procedure.

* Water

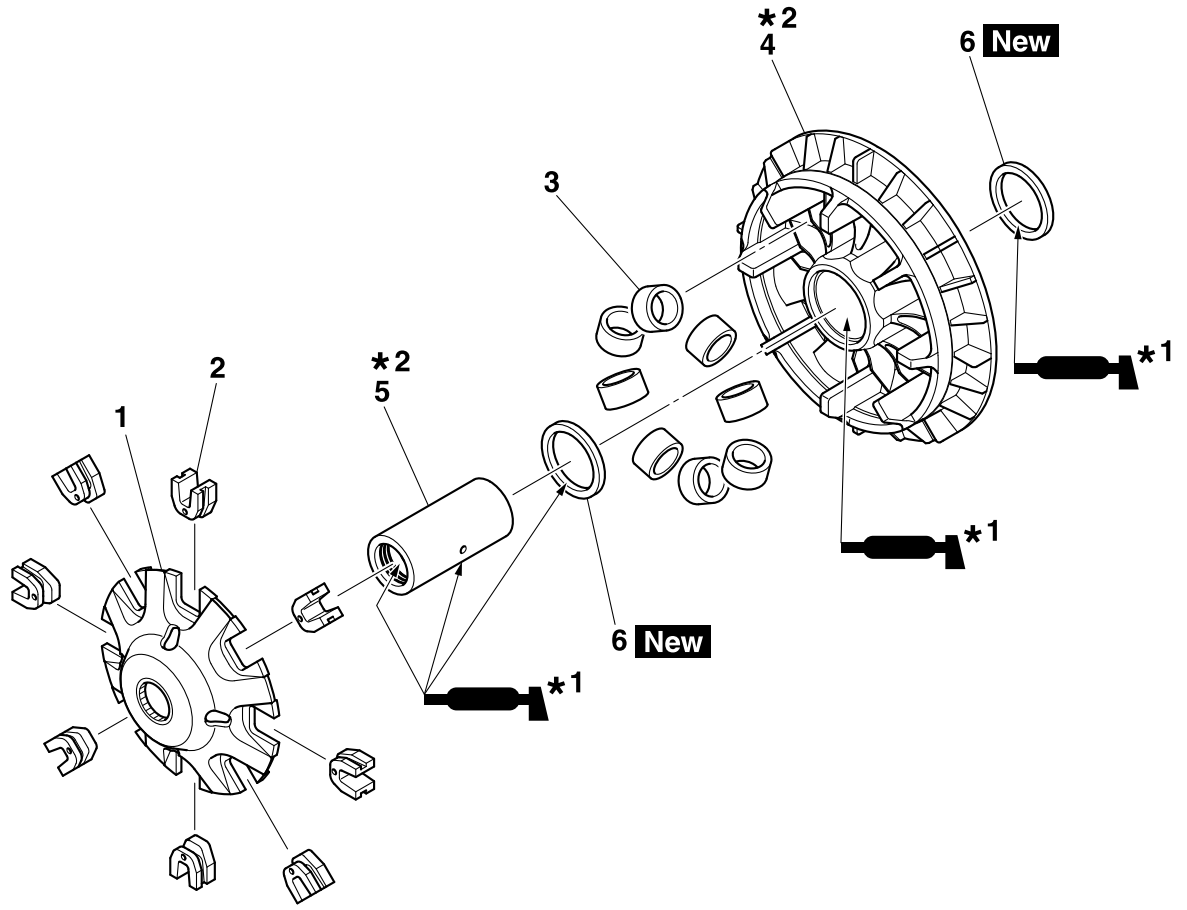
Removing the V-belt and primary/secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Primary sheave nut	1	
2	Spacer	1	
3	O-ring	2	
4	Primary sheave assembly	1	
5	Secondary sheave nut	1	
6	Secondary sheave assembly	1	
7	V-belt	1	
8	Primary fixed sheave	1	
9	V-belt case air duct joint clamp	1	Loosen.
10	V-belt case air duct	1	
11	Inner V-belt case plate	1	
12	Inner V-belt case	1	
13	Dowel pin	2	
14	Plate	1	
15	Inner V-belt case seal	1	
			For installation, reverse the removal procedure.

*1 Apply Shell Sunlight Grease 3®.
*2 Apply YAMAHA GREASE "H" or Polyurea Grease®.

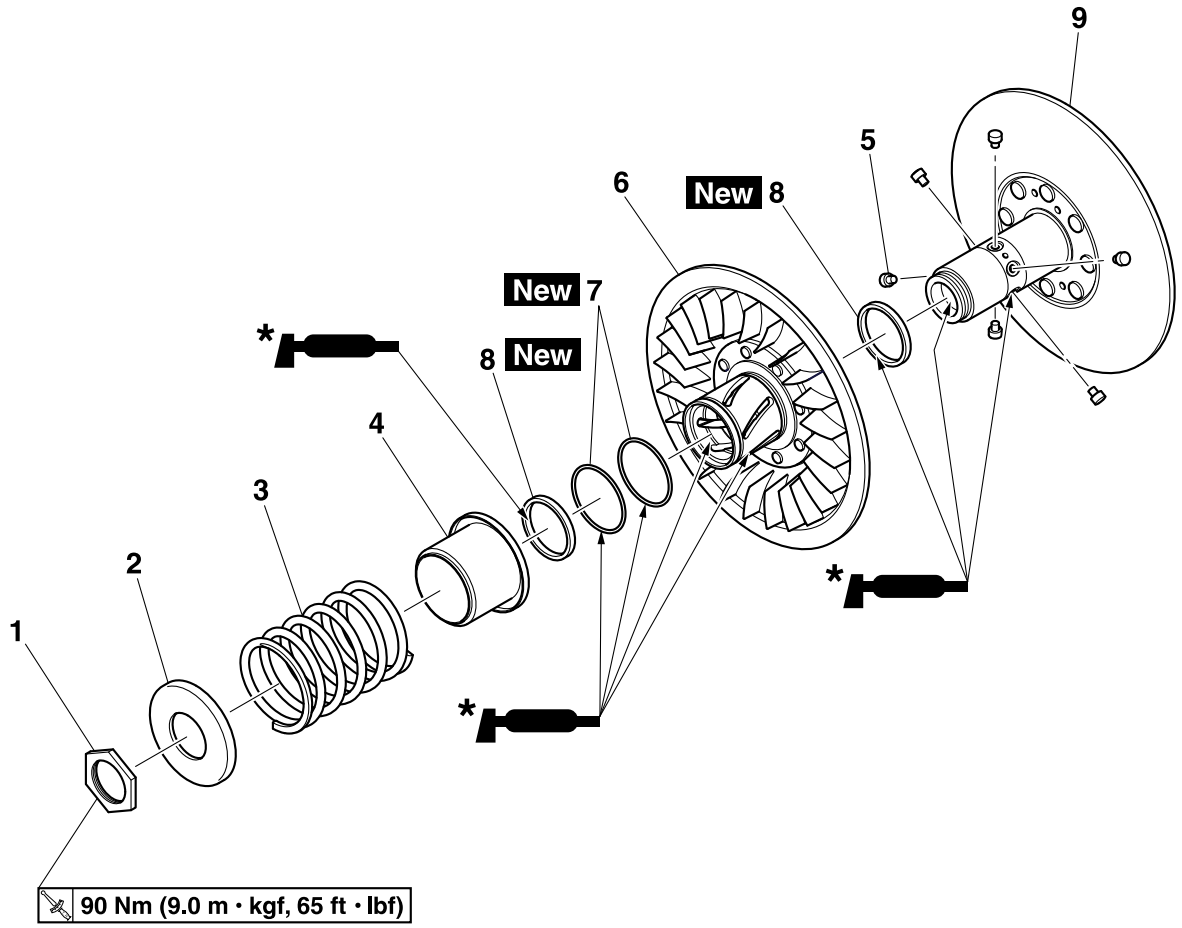
Disassembling the primary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Cam	1	
2	Slider	8	
3	Primary sheave weight	8	
4	Primary sliding sheave	1	
5	Collar	1	
6	Oil seal	2	
			For assembly, reverse the disassembly procedure.

*1 Apply YAMAHA GREASE "H" or Polyurea Grease®.
*2 When replacing the primary sliding sheave or collar, replace them as a set.

Disassembling the secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Secondary sheave spring seat nut	1	
2	Upper spring seat	1	
3	Secondary sheave compression spring	1	
4	Spring seat	1	
5	Guide pin	6	
6	Secondary sliding sheave	1	
7	O-ring	2	
8	Oil seal	2	
9	Secondary fixed sheave	1	
			For assembly, reverse the disassembly procedure.

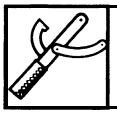
* Apply YAMAHA GREASE "H" or Polyurea Grease®.

EAS4B51022
REMOVING THE PRIMARY SHEAVE AND SECONDARY SHEAVE

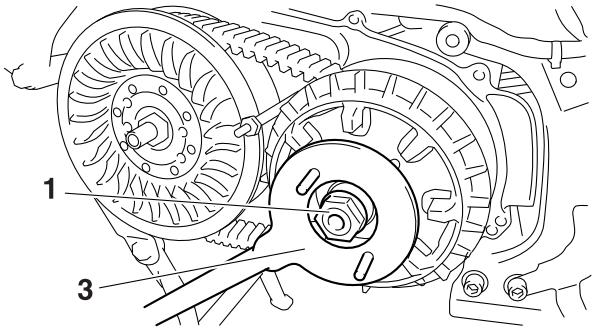
1. Remove:
   - Primary sheave nut “1”
   - Secondary sheave nut “2”

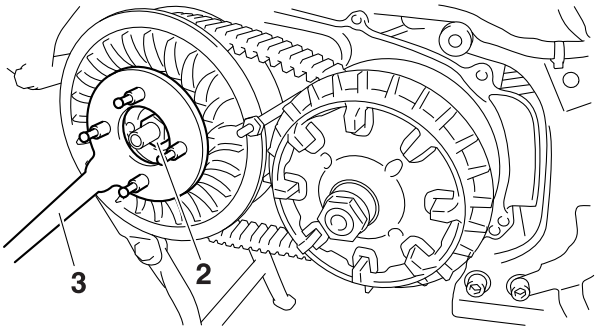
TIP

While holding the primary and secondary sheave with the sheave holder “3”, loosen the nut.



Sheave holder
90890-01481

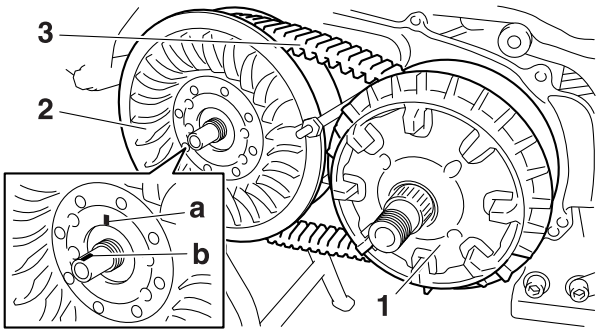




2. Remove:
   - Primary sheave assembly “1”
   - Secondary sheave assembly “2”
   - V-belt “3”

TIP

- Before removal, put alignment marks “a” and “b” as shown.
- Align these marks during reassembly.



EAS24640
DISASSEMBLING THE SECONDARY SHEAVE

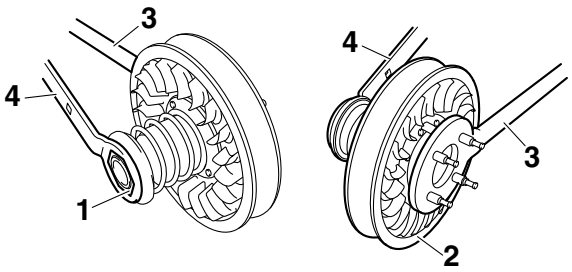
1. Loosen:
   - Secondary sheave spring seat nut “1”

TIP

- While holding the secondary fixed sheave “2” with the sheave holder “3”, loosen the secondary sheave spring seat nut with the locknut wrench “4”.
- Do not loosen the secondary sheave spring seat nut “1” more than 1/4 turn.



Sheave holder
90890-01481
Locknut wrench
90890-01348
YM-01348



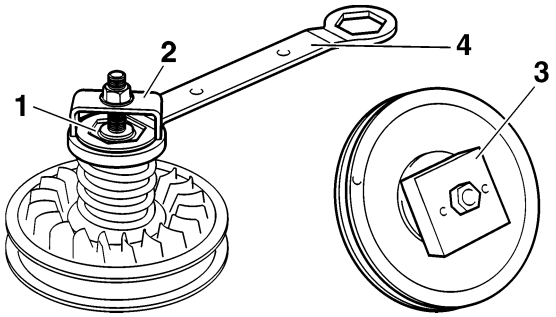
2. Remove:
   - Secondary sheave spring seat nut “1”

TIP

Install the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave assembly as shown. Then, compress the spring, and remove the secondary sheave spring seat nut with locknut wrench “4”.



Sheave spring compressor
90890-04134
YM-04134
Locknut wrench
90890-01348
YM-01348
Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135



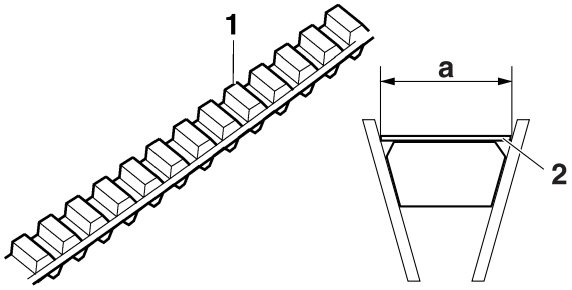
EAS24670
CHECKING THE V-BELT

1. Check:
   - V-belt "1"
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheave.
2. Measure:
   - V-belt width "a"
     Out of specification → Replace.

TIP
Place plate "2" on the upper of the belt and measure the width of the upper end of the belt.



V-belt width
32.9 mm (1.30 in)
Limit
31.4 mm (1.24 in)



EAS24680
CHECKING THE PRIMARY SHEAVE

1. Check:
   - Primary sliding sheave
   - Primary fixed sheave
     Cracks/damage/wear → Replace the primary sliding sheave and primary fixed sheave as a set.

EAS4B51023
CHECKING THE V-BELT CASE AIR DUCT

1. Check
   - V-belt case air duct
     Cracks/damage → Replace.

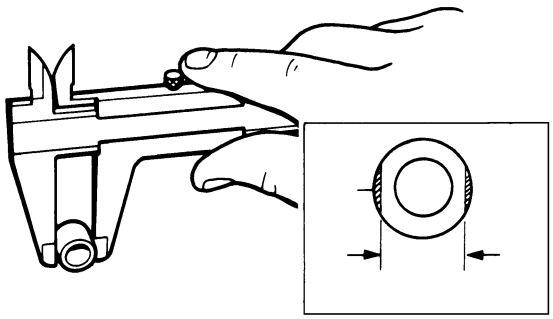
EAS24690
CHECKING THE PRIMARY SHEAVE WEIGHTS

The following procedure applies to all of the primary sheave weights.

1. Check:
   - Primary sheave weight
     Cracks/damage/wear → Replace.
2. Measure:
   - Primary sheave weight outside diameter
     Out of specification → Replace.



Primary sheave weight outside diameter
24.9–25.1 mm (0.98–0.99 in)
Limit
24.4 mm (0.96 in)

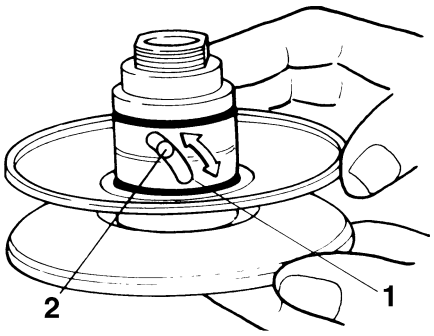


EAS24700
CHECKING THE SLIDERS

The following procedure applies to all of the sliders.

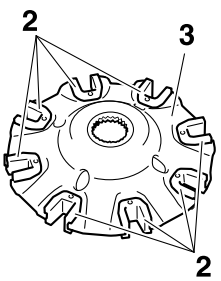
1. Check:
   - Slider
     Cracks/damage/wear → Replace.

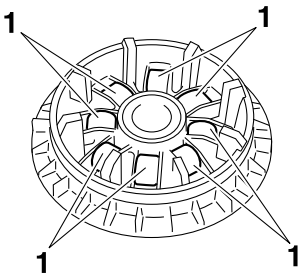
EAS24710
CHECKING THE SECONDARY SHEAVE
1. Check:
   - Secondary fixed sheave
   - Secondary sliding sheave
     Cracks/damage/wear → Replace the secondary fixed and sliding sheaves as a set.
2. Check:
   - Torque cam groove “1”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.
3. Check:
   - Guide pin “2”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.



EAS24720
ASSEMBLING THE PRIMARY SHEAVE
1. Clean:
   - Primary fixed sheave
   - Primary sliding sheave
   - Collar
   - Cam
   - Primary sheave weights
2. Install:
   - Primary sheave weights “1”
   - Sliders “2”
   - Cam “3”

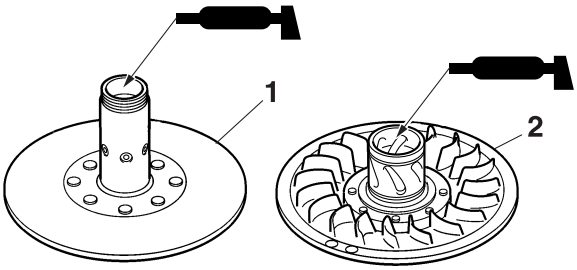
TIP
Do not apply the grease inside of the primary sheave.





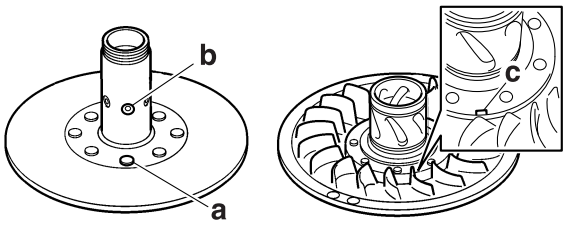
EAS24730
ASSEMBLING THE SECONDARY SHEAVE
1. Lubricate:
   - Secondary fixed sheave inner surface “1”
   - Secondary sliding sheave inner surface “2”
   - Oil seals New
     (with the recommended lubricant)

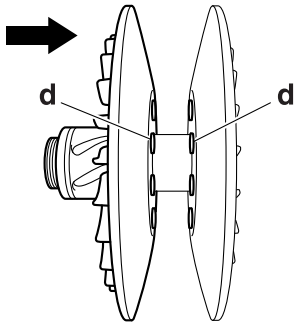
Recommended lubricant
YAMAHA GREASE “H” or Polyurea Grease®



2. Install:
   - Guide pins

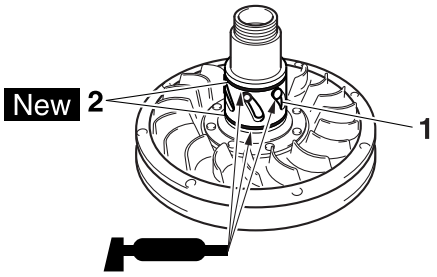
TIP
Before installing the guide pin, align the position (where fixed sheave rivet head “a” and guide pin hole “b” are in alignment with each other) with alignment mark “c” of the sliding sheave. Install the guide pin. Then, make sure that the sliding sheave slides to the LOW side without an interference of rivet head “d”.





3. Lubricate:
   - Guide pin groove “1”
   - O-rings “2” New
     (with the recommended lubricant)

Recommended lubricant
YAMAHA GREASE “H” or Polyurea Grease®

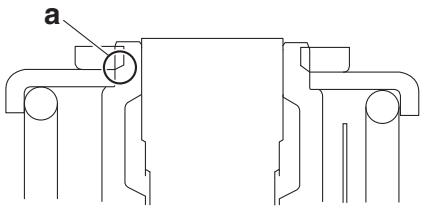


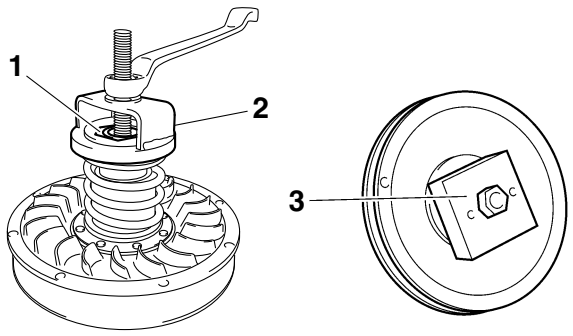
4. Install:
   - Secondary sheave spring seat nut “1”

TIP

- Install the secondary sheave spring seat nut with its beveled side “a” facing the spring seat.
- Attach the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave as shown.
  Then compress the spring, and temporarily tighten the secondary sheave spring seat nut.

Sheave spring compressor
90890-04134
YM-04134
Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135





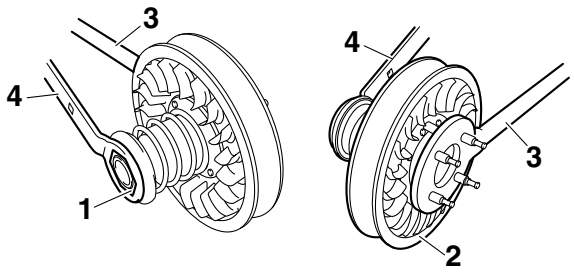
5. Tighten:
   - Secondary sheave spring seat nut “1”

TIP

While holding the secondary fixed sheave “2” with the sheave holder “3”, tighten the secondary sheave spring seat nut “1” with the locknut wrench “4”.

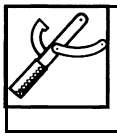
Sheave holder
90890-01481
Locknut wrench
90890-01348
YM-01348

Secondary sheave spring seat nut
90 Nm (9.0 m·kgf, 65 ft·lbf)

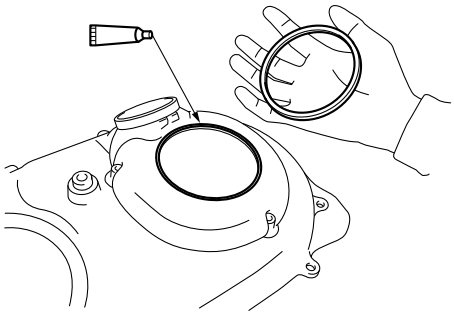


EAS4B51024
INSTALLING THE PRIMARY SHEAVE ASSEMBLY, SECONDARY SHEAVE ASSEMBLY AND V-BELT

1. Apply:
   - Sealant
     (onto the inner V-belt case seal)

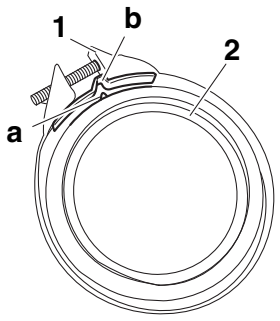


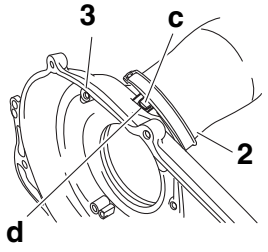
Yamaha bond No.1215
90890-85505
(Three bond No.1215®)



2. Install:
   - V-belt case air duct joint clamp “1”
   - V-belt case air duct “2”

TIP
- Align the projection “a” in the V-belt case air duct “2” with the slot “b” on the V-belt case air duct joint clamp “1”.
- Align the projection “c” in the V-belt case air duct “2” with the slot “d” in the inner V-belt case “3”.

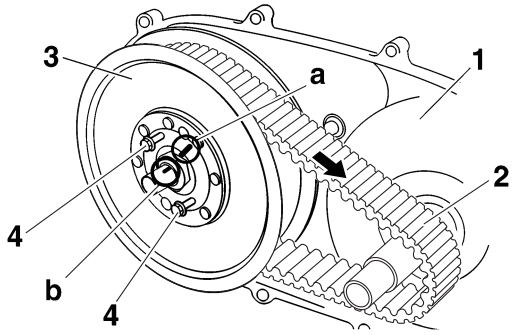




3. Install:
   - Primary fixed sheave “1”
   - V-belt “2”
   - Secondary sheave assembly “3”

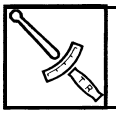
ECA4B51017
NOTICE
Do not allow grease to contact the V-belt, primary and secondary sheave.

TIP
- When installing the belt, screw M6 (more than 45 mm (1.77 in)) bolts “4” to spread apart the secondary sheave and then install the V-belt. Make sure to install the V-belt with the arrow facing in the direction shown.
- Install the V-belt and secondary sheave assembly then pass the V-belt the primary sheave side.
- Align the “a” and “b” during reassembly.

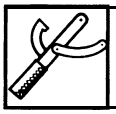


4. Tighten:
   - Secondary sheave nut “1”

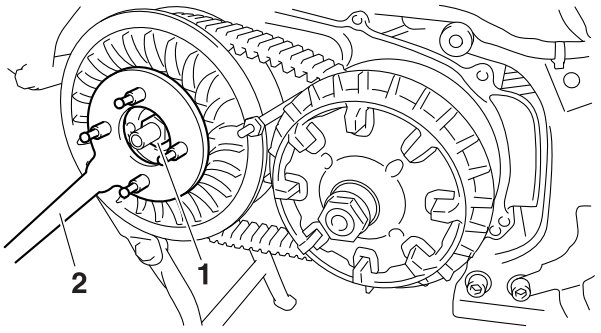
TIP
While holding the secondary sheave with the sheave holder “2”, tighten the secondary sheave nut.



Secondary sheave nut
90 Nm (9.0 m·kgf, 65 ft·lbf)



Sheave holder
90890-01481



5. Tighten:
   - Primary sheave nut “1”

ECA4B51022
NOTICE
- **Before tightening the nut to remount the primary sheave, make sure that the serra-**

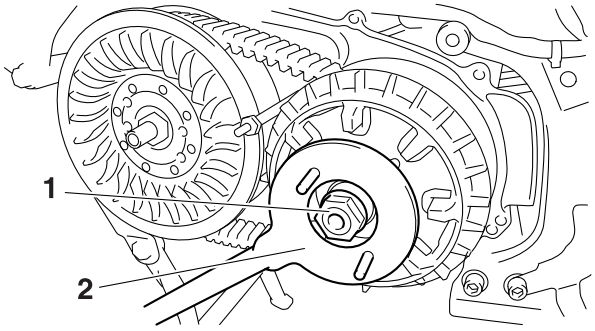
tions of the cam are fitted firmly into the serrations of the crankshaft.
- **Also, make sure that cam is properly seated.**
- **Apply grease to the thread and seat of the primary sheave nut.**

Recommended lubricant
Shell Sunlight Grease 3®

TIP
While holding the primary sheave with the sheave holder "2", tighten the primary sheave nut.

Primary sheave nut
160 Nm (16 m·kgf, 116 ft·lbf)

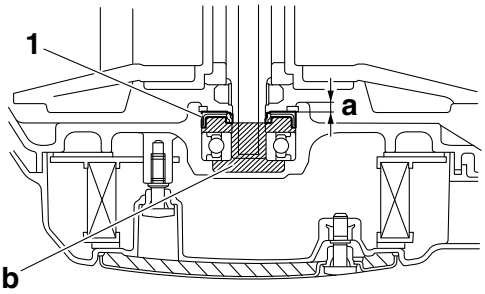
Sheave holder
90890-01481



EAS4B51025
INSTALLING THE V-BELT CASE
1. Install:
   - Oil seal "1"
     (into outer V-belt case)

Installed depth of oil seal "a"
4.0–4.3 mm (0.16–0.17 in)

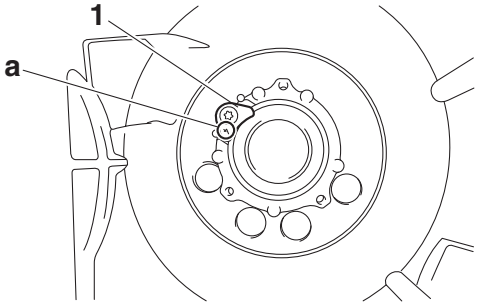
2. Fill the space "b" shown in the illustration with 10 g (0.35 oz) or more of lithium-soap-based grease.



3. Install:
   - Bearing retainer "1"

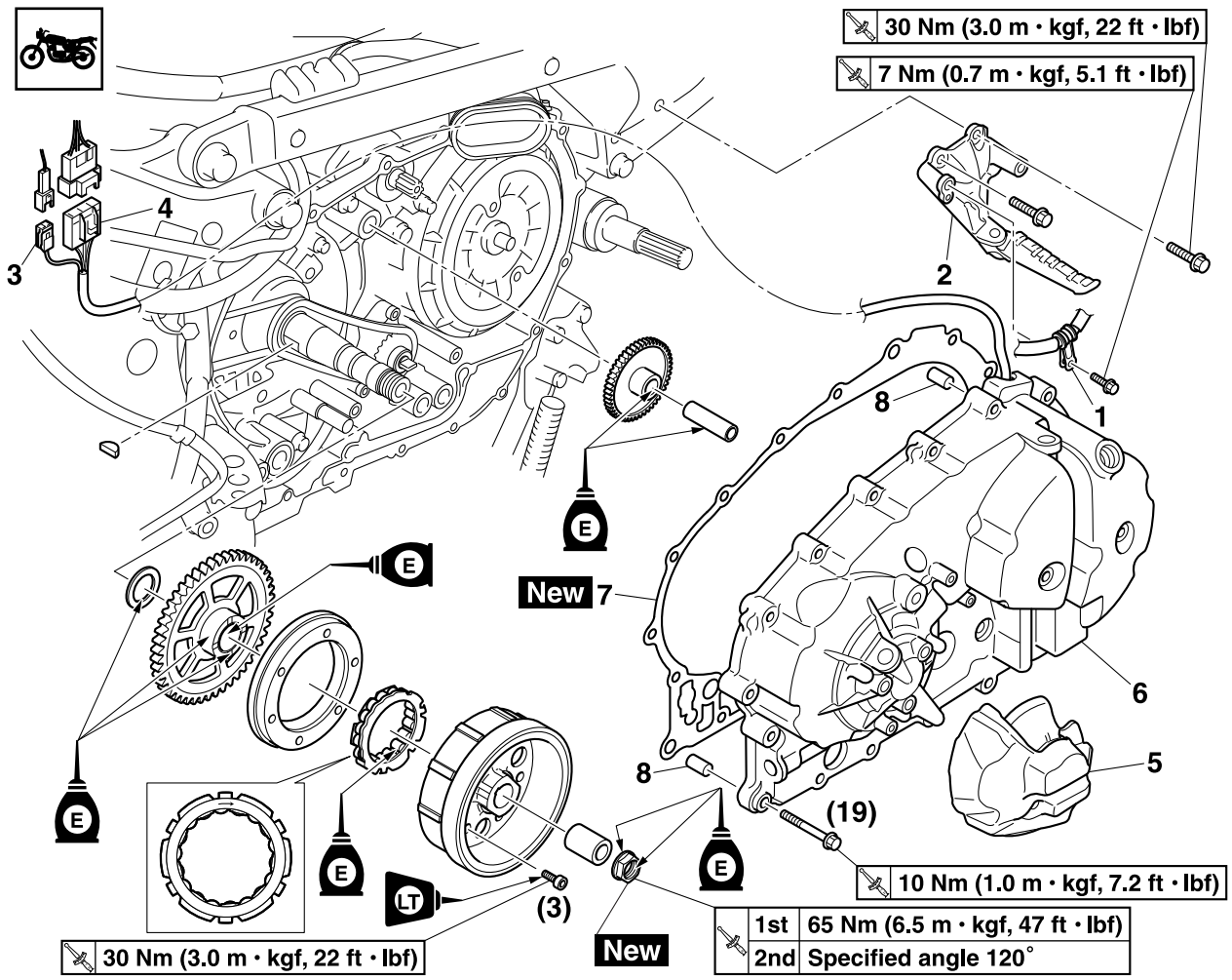
TIP
- Install the bearing retainer "1" with its mark "a" facing outward.
- Apply locking agent (LOCTITE®) to the threads of the bearing retainer bolt.

Bearing retainer bolt
11 Nm (1.1 m·kgf, 8.0 ft·lbf)
LOCTITE®



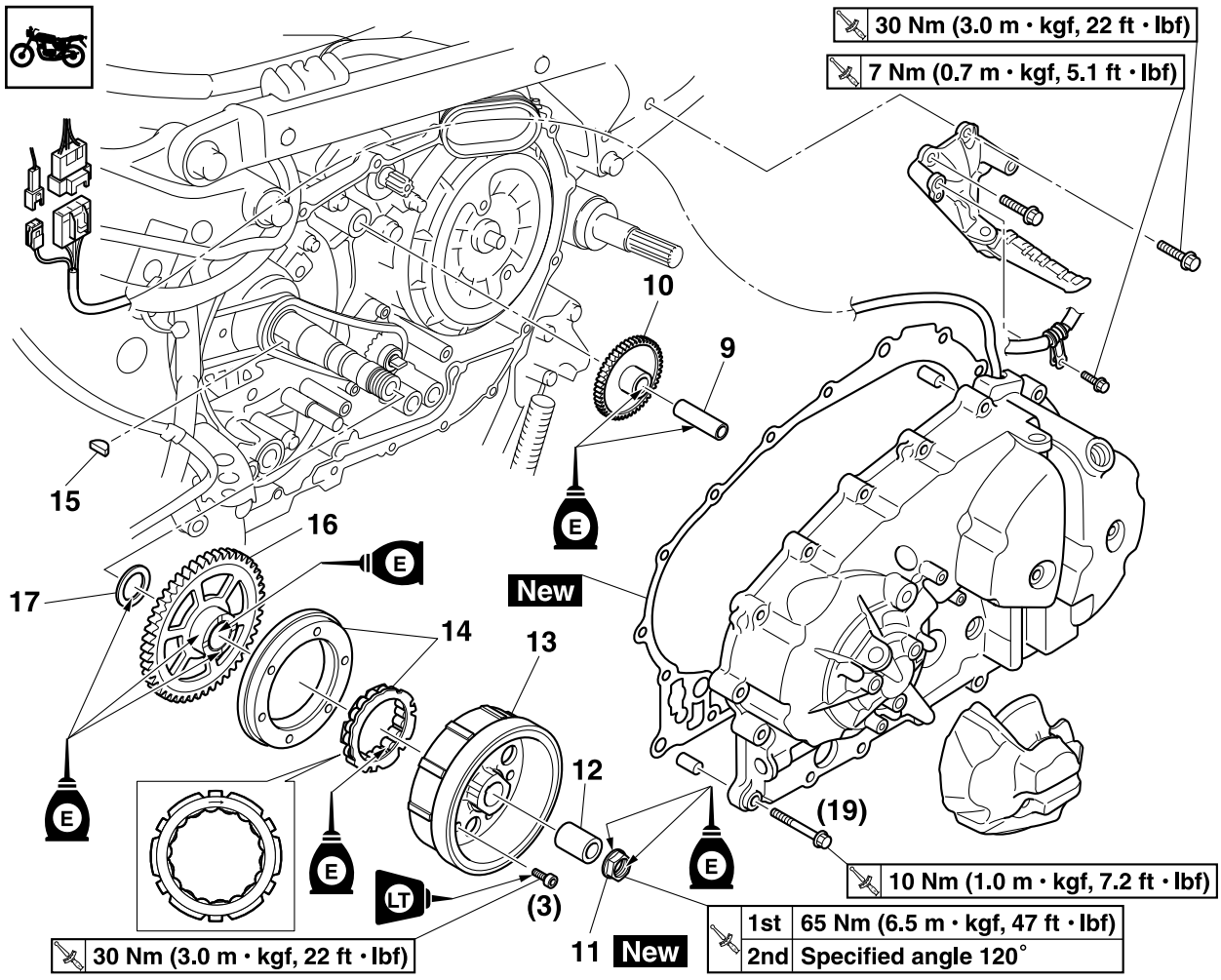
EAS59C1503
GENERATOR AND STARTER CLUTCH

Removing the generator rotor and starter clutch



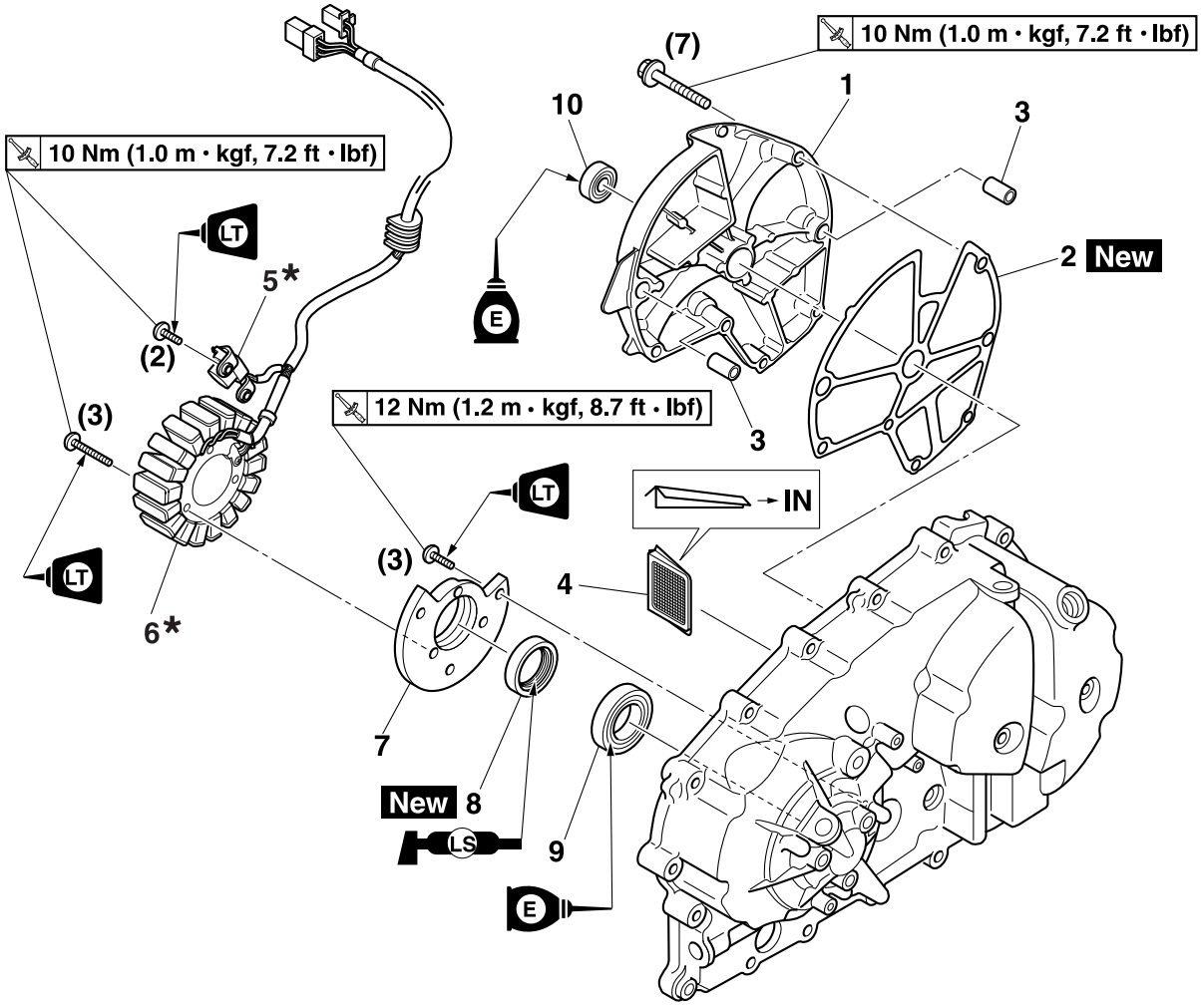
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-26.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
	Front cowling assembly/Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Water pump assembly		Refer to "WATER PUMP" on page 6-9.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	V-belt case air duct		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.
1	Rear brake hose holder	1	
2	Left passenger footrest	1	
3	Crankshaft position sensor coupler	1	Disconnect.
4	Stator coil coupler	1	Disconnect.
5	Generator cover insulator	1	
6	Generator cover	1	
7	Generator cover gasket	1	
8	Dowel pin	2	

Removing the generator rotor and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
9	Starter clutch idle gear shaft	1	
10	Starter clutch idle gear	1	
11	Generator rotor nut	1	
12	Spacer	1	
13	Generator rotor	1	
14	Starter clutch	1	
15	Woodruff key	1	
16	Starter clutch gear	1	
17	Washer	1	
			For installation, reverse the removal procedure.

Removing the stator coil and oil tank



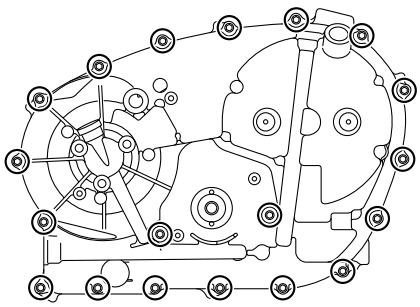
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil tank	1	
2	Oil tank gasket	1	
3	Dowel pin	2	
4	Oil strainer	1	
5	Crankshaft position sensor	1	
6	Stator coil	1	
7	Bearing cover	1	
8	Oil seal	1	
9	Bearing	1	
10	Bearing	1	
			For installation, reverse the removal procedure.

* When replacing the crankshaft position sensor or stator coil, replace them as a set.

EAS24490
REMOVING THE GENERATOR

1. Remove:
   • Generator cover

TIP
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.

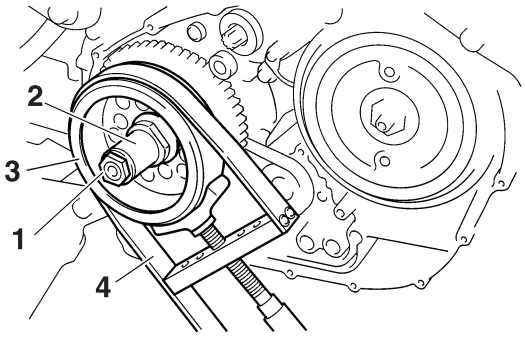


2. Remove:
   • Generator rotor nut “1”
   • Spacer “2”

TIP
- While holding the generator rotor “3” with the sheave holder “4”, loosen the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

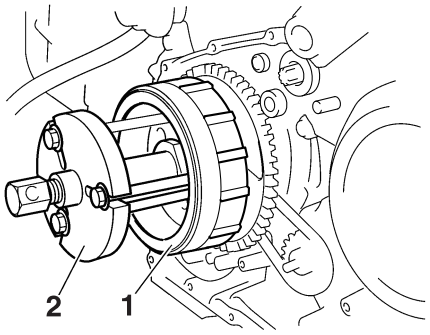


3. Remove:
   • Generator rotor “1”
   (with the flywheel puller “2”)
   • Woodruff key

TIP
Make sure the flywheel puller is centered over the generator rotor.



Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B



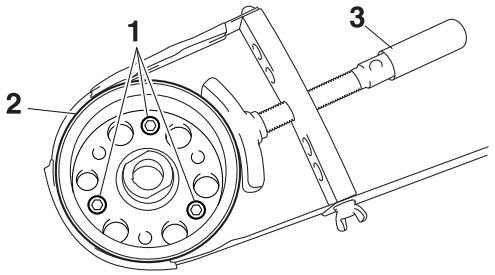
EAS24560
REMOVING THE STARTER CLUTCH

1. Remove:
   • Starter clutch bolts “1”
   • Starter clutch

TIP
- While holding the generator rotor “2” with the sheave holder “3”, remove the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the generator rotor.

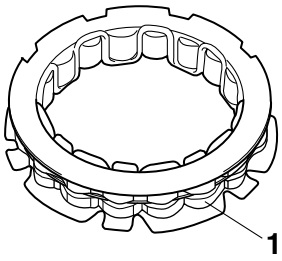


Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

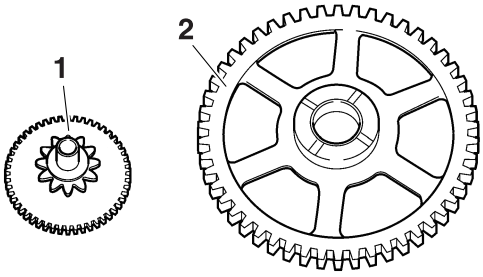


EAS24570
CHECKING THE STARTER CLUTCH

1. Check:
   • Starter clutch rollers “1”
   Damage/wear → Replace.



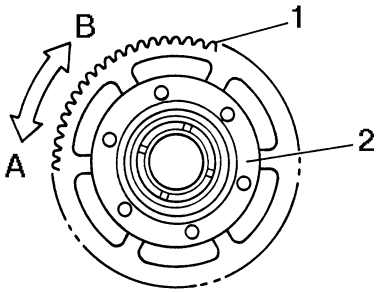
2. Check:
   - Starter clutch idle gear “1”
   - Starter clutch gear “2”
     Burrs/chips/roughness/wear → Replace the defective part(s).



3. Check:
   - Starter clutch gear contacting surfaces
     Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   - Starter clutch operation

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a. Install the starter clutch gear “1” onto the starter clutch “2” and hold the starter clutch.
b. When turning the starter clutch gear counterclockwise “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 clockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.



▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

EAS24990
CHECKING THE OIL STRAINER

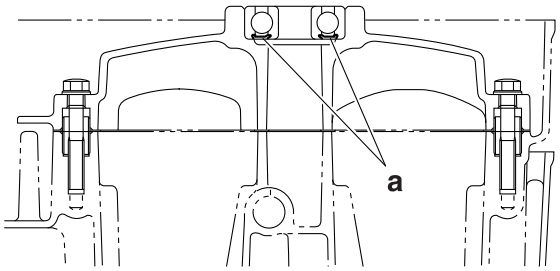
1. Check:
   - Oil strainer
     Damage → Replace.
     Contaminants → Clean with solvent.

EAS59C1505
ASSEMBLING THE OIL TANK

1. Install:
   - Bearing

TIP

Seal “a” is adhered only on one side of the bearing. Note the press-in orientation.



EAS24600
INSTALLING THE STARTER CLUTCH

1. Install:
   - Starter clutch
   - Starter clutch bolts “1”

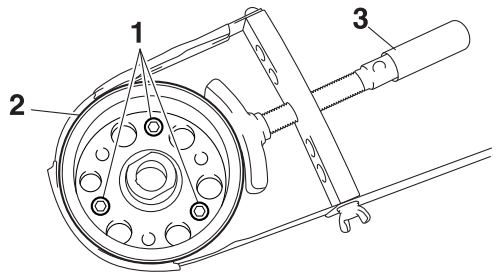


Starter clutch bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

TIP

- While holding the generator rotor “2” with the sheave holder “3”, tighten the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the generator rotor.

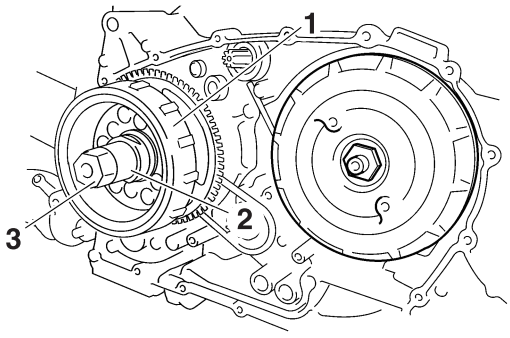
Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS24500
INSTALLING THE GENERATOR

1. Install:
   - Woodruff key
   - Generator rotor “1”
   - Spacer “2”
   - Generator rotor nut “3” New

TIP
- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly sealed in the keyway of the crankshaft.
- Lubricate the generator rotor nut seats and threads with engine oil.

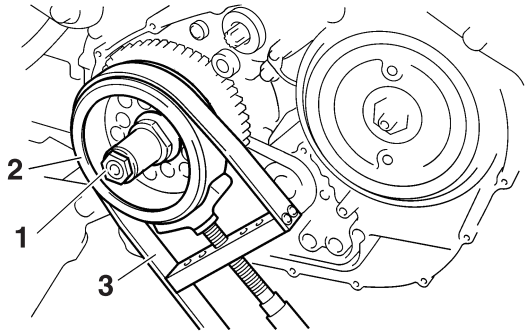


2. Tighten:
   - Generator rotor nut “1”

Generator rotor nut (1st)
65 Nm (6.5 m·kgf, 47 ft·lbf)

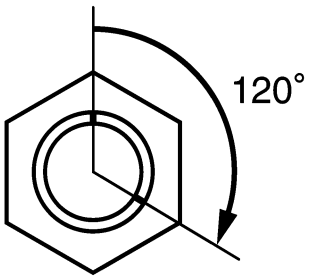
TIP
- While holding the generator rotor “2” with the sheave holder “3”, tighten the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



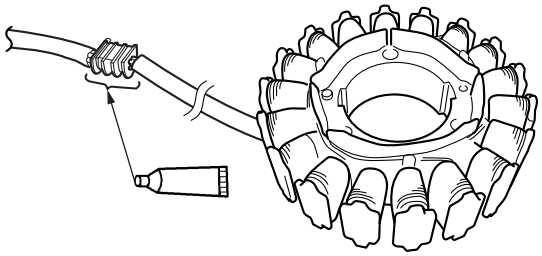
Generator rotor nut (2nd)
Specified angle 120°

ECA4B51018
NOTICE
- **When tightening the generator rotor nut, be sure to use a beam type torque wrench.**
- **Tighten the nut until it is at the specified angle.**



3. Apply:
   - Sealant
     (onto the crankshaft position sensor/stator lead grommet)

Yamaha bond No.1215
90890-85505
(Three bond No.1215®)



4. Install:
   • Generator cover

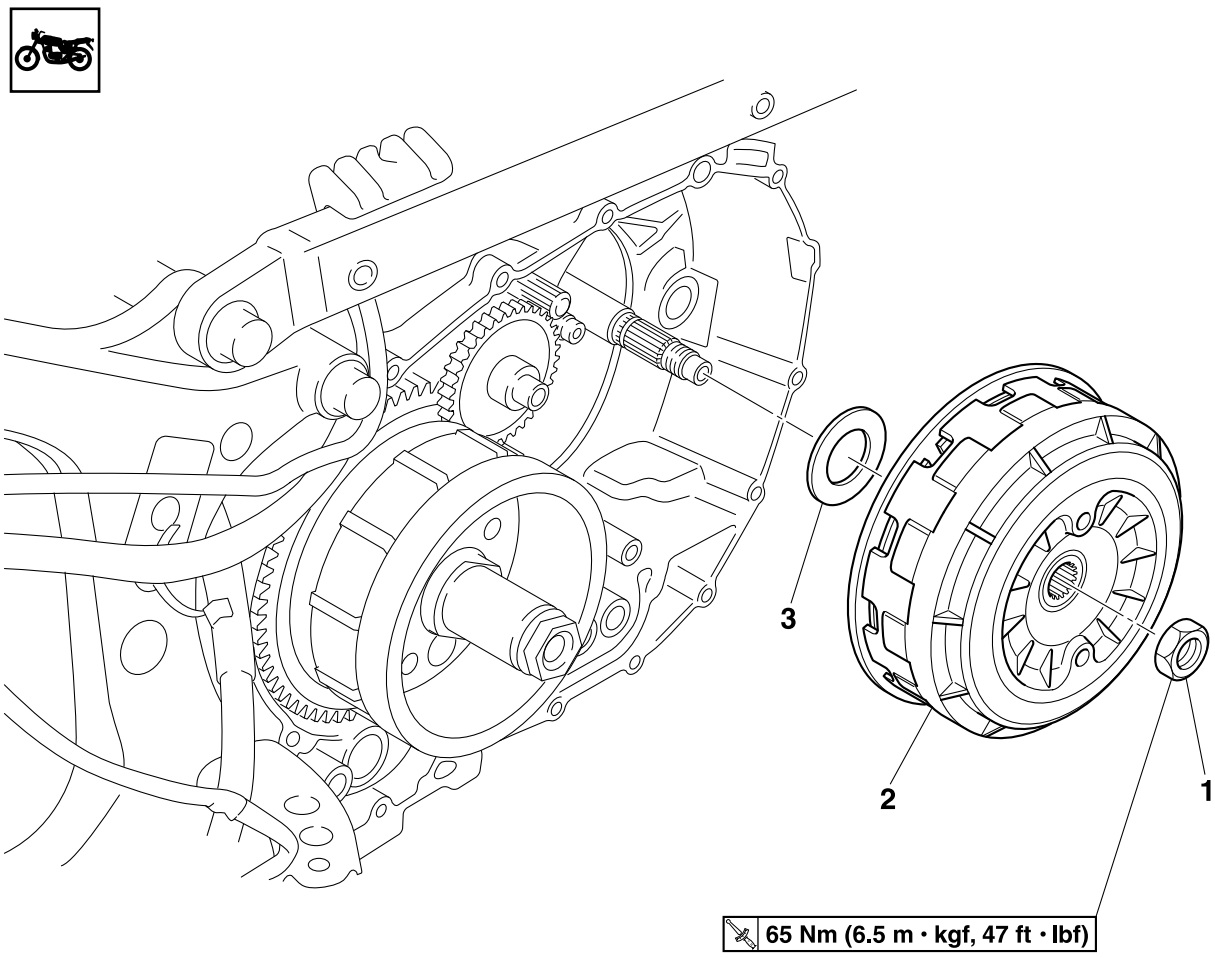
	Generator cover bolt **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

TIP

Tighten the generator cover bolts in stages and in a crisscross pattern.

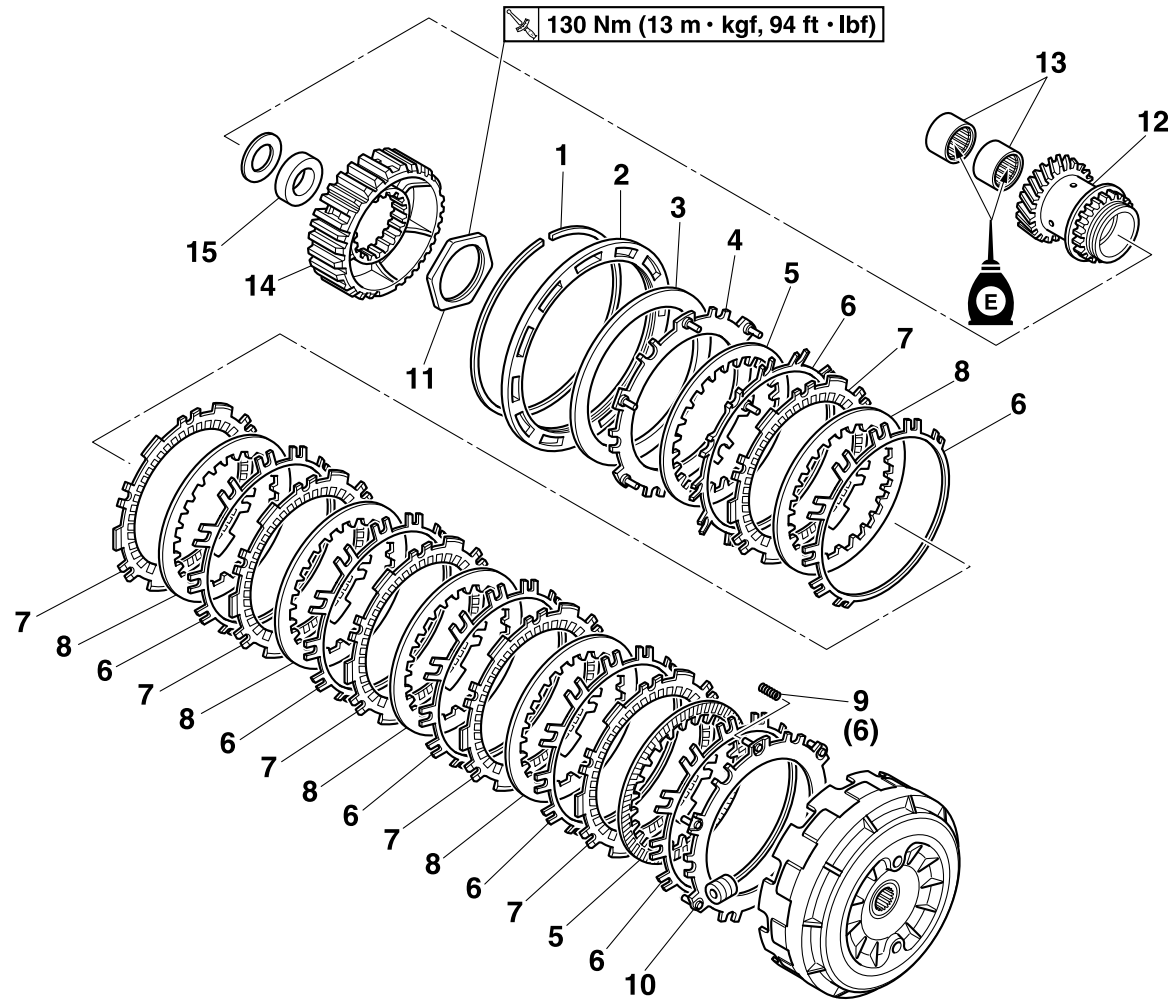
EAS25061
CLUTCH

Removing the clutch



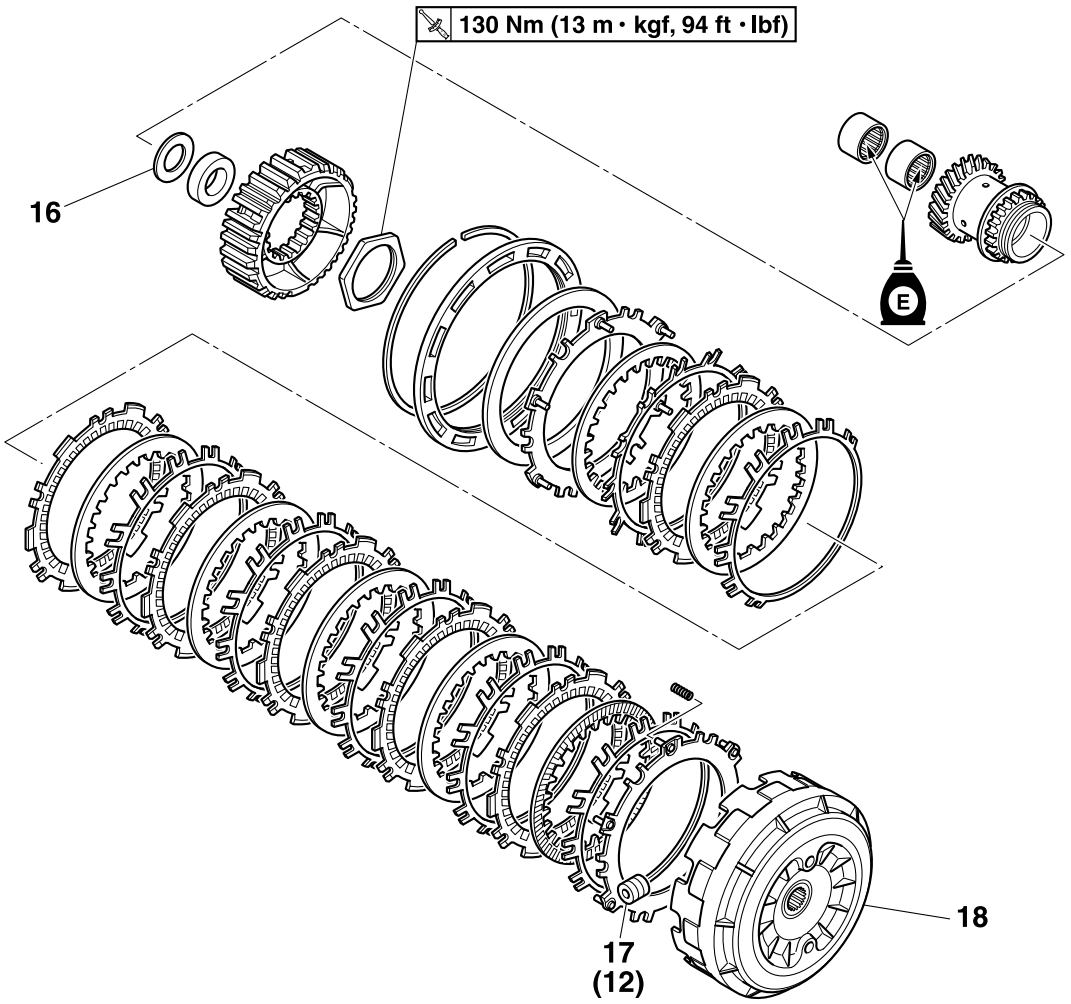
Order	Job/Parts to remove	Q'ty	Remarks
	Generator cover		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-50.
1	Clutch assembly nut	1	
2	Clutch assembly	1	
3	Washer	1	
			For installation, reverse the removal procedure.

Disassembling the clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Clip	1	
2	Spring stopper plate	1	
3	Clutch spring plate	1	
4	Pressure plate	1	
5	Clutch plate 2	2	
6	Clutch damper spring	7	
7	Friction plate	6	
8	Clutch plate 1	5	
9	Clutch spring	6	
10	Thrust plate	1	
11	Clutch boss nut	1	
12	Primary drive gear	1	
13	Bearing	2	
14	Clutch boss	1	
15	Collar	1	

Disassembling the clutch



Order	Job/Parts to remove	Q'ty	Remarks
16	Thrust plate	1	
17	Clutch weight	12	
18	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

EAS25070
REMOVING THE CLUTCH

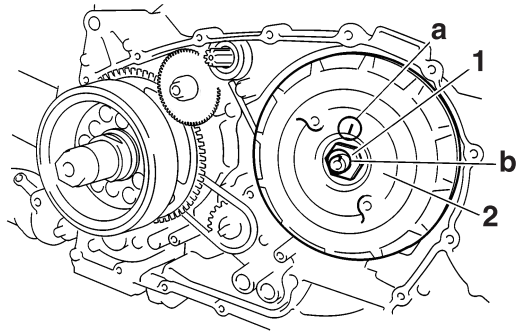
1. Remove:
   - Clutch assembly nut “1”
   - Clutch assembly “2”

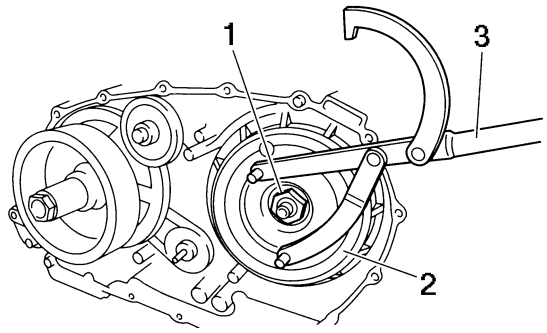
TIP

- Before removal, put alignment marks “a” and “b” as shown.
- While holding the clutch assembly with the rotor holding tool “3”, loosen the clutch assembly nut.
- Align these marks during reassembly.



Rotor holding tool
90890-01235
Universal magneto & rotor holder
YU-01235



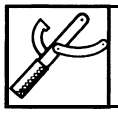


EAS4B51026
DISASSEMBLING THE CLUTCH

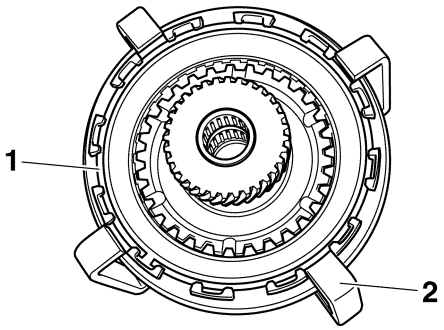
1. Remove:
   - Clip “1”

TIP

While compressing the clutch springs with the clutch spring compressor “2”, remove the clip.



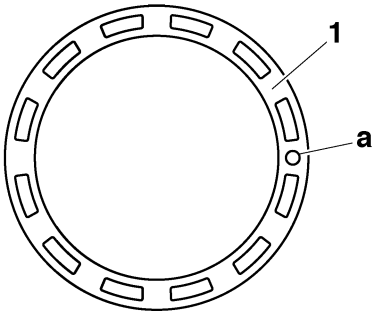
Clutch spring compressor
90890-01482



2. Remove:
   - Spring stopper plate “1”

TIP

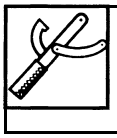
To ensure proper balance of the clutch assembly, one to three holes “a”, or no hole at all, may have been drilled in the spring stopper plate. Before removing the spring stopper plate, make alignment marks on both the plate and the clutch housing so that the plate can be reinstalled in its original position.



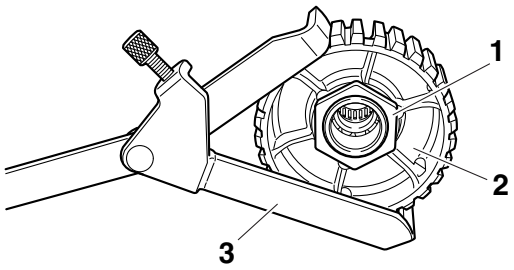
3. Loosen:
   - Clutch boss nut “1”

TIP

While holding the clutch boss “2” with the universal clutch holder “3”, loosen the clutch boss nut.



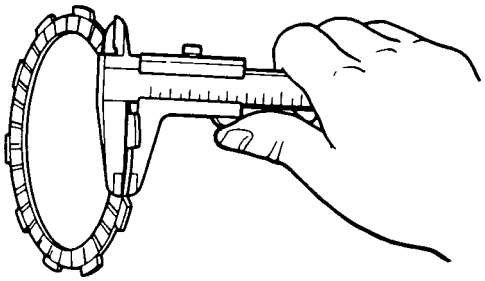
Universal clutch holder
90890-04086
YM-91042



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.

TIP
Measure the friction plate at four places.

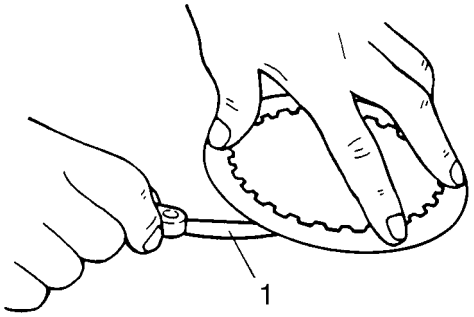
Friction plate thickness
2.92–3.08 mm (0.115–0.121 in)
Wear limit
2.82 mm (0.1110 in)



EAS25111
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.

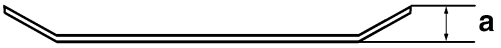
Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9

Warpage limit
Clutch plate 1
0.10 mm (0.0039 in)
Clutch plate 2
0.20 mm (0.0079 in)



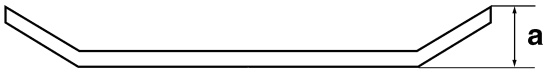
EAS4B51027
CHECKING THE CLUTCH DAMPER SPRINGS
The following procedure applies to all of the clutch damper springs.
1. Check:
   - Clutch damper spring
     Damage → Replace.
2. Measure:
   - Clutch damper spring free height “a”
     Out of specification → Replace the clutch damper springs as a set.

Clutch damper spring height
3.50 mm (0.14 in)
Minimum height
3.10 mm (0.12 in)



EAS25130
CHECKING THE CLUTCH SPRING PLATE
1. Check:
   - Clutch spring plate
     Damage → Replace.
2. Measure:
   - Clutch spring plate free height “a”
     Out of specification → Replace the clutch spring plate.

Clutch spring plate height
4.70 mm (0.19 in)
Minimum height
4.40 mm (0.17 in)

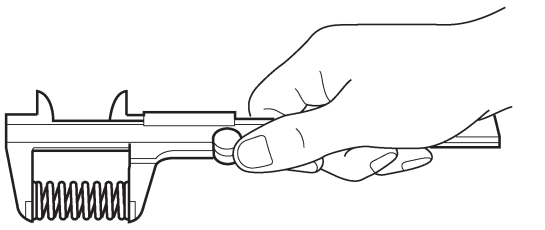


EAS25140
CHECKING THE CLUTCH SPRINGS

The following procedure applies to all of the clutch springs.

1. Check:
   - Clutch spring
     Damage → Replace the clutch springs as a set.
2. Measure:
   - Clutch spring free length
     Out of specification → Replace the clutch springs as a set.

Clutch spring free length
31.90 mm (1.26 in)
Limit
24.80 mm (0.98 in)

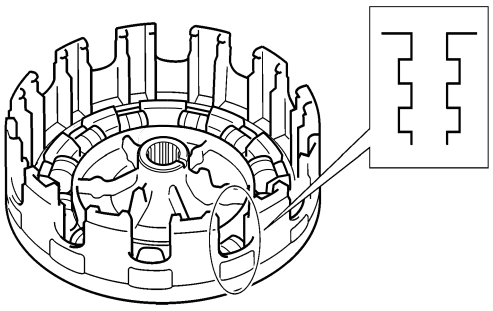


I1412901

EAS25150
CHECKING THE CLUTCH HOUSING

1. Check:
   - Clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

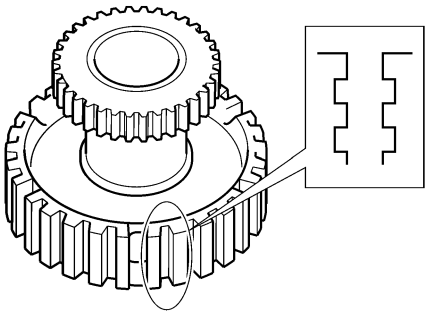
TIP
Pitting on the clutch housing dogs will cause erratic clutch operation.



EAS25160
CHECKING THE CLUTCH BOSS

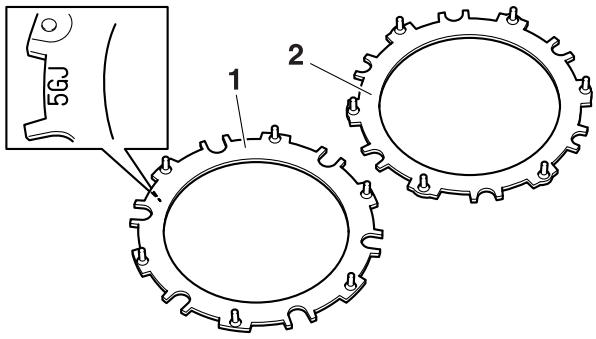
1. Check:
   - Clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

TIP
Pitting on the clutch boss splines will cause erratic clutch operation.



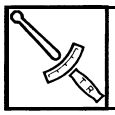
EAS59C1504
CHECKING THE PRESSURE PLATE AND THRUST PLATE

1. Check:
   - Pressure plate “1”
   - Thrust plate “2”
     Cracks/damage → Replace.



EAS4B51029
ASSEMBLING THE CLUTCH

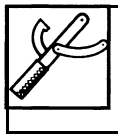
1. Install:
   - Clutch boss
   - Primary drive gear
   - Clutch boss nut
2. Tighten:
   - Clutch boss nut “1”



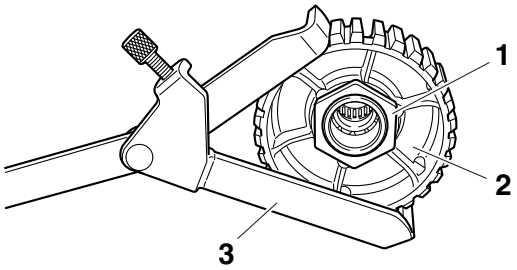
Clutch boss nut
130 Nm (13 m·kgf, 94 ft·lbf)

TIP

While holding the clutch boss “2” with the universal clutch holder “3”, tighten the clutch boss nut.



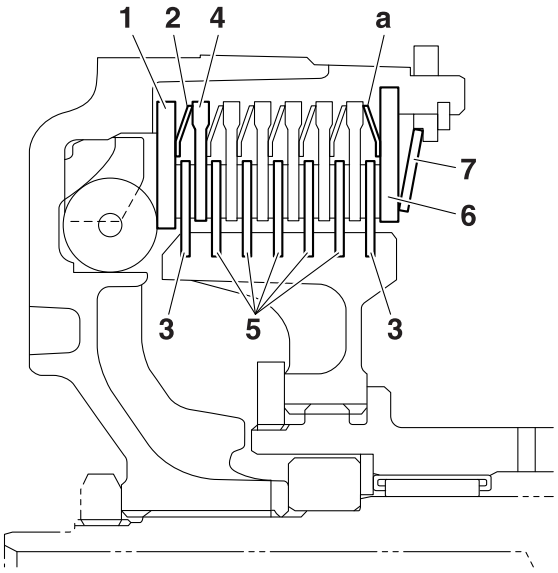
Universal clutch holder
90890-04086
YM-91042

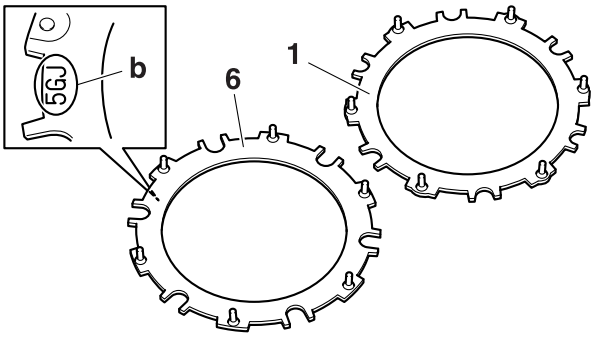


3. Install:
   - Clutch weights
   - Thrust plate “1”
   - Clutch springs
   - Clutch damper springs “2”
   - Clutch plates 2 “3”
   - Friction plates “4”
   - Clutch plates 1 “5”
   - Pressure plate “6”
   - Clutch spring plate “7”

TIP

- Clutch damper spring “a” installed at the end must be installed backwards.
- The pressure plate “6” and thrust plate “1” can be identified by punch mark “b” on the pressure plate.

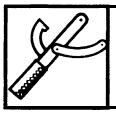




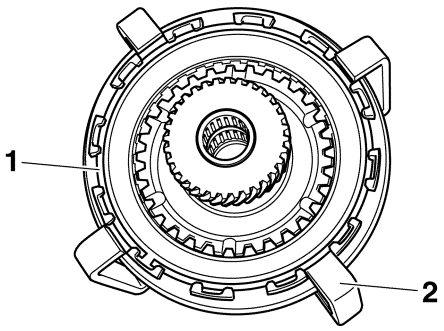
4. Install:
   - Clip “1”

TIP

While compressing the clutch springs with the clutch spring compressor “2”, install the clip.

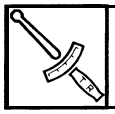


Clutch spring compressor
90890-01482



EAS25240
INSTALLING THE CLUTCH

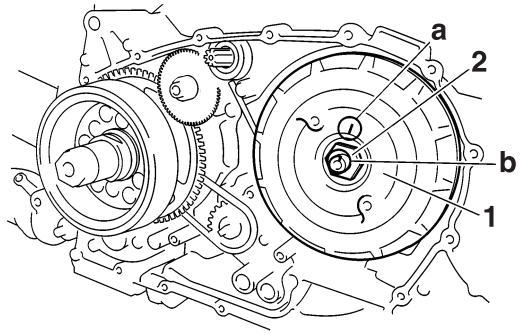
1. Install:
   - Clutch assembly “1”
   - Clutch assembly nut “2”

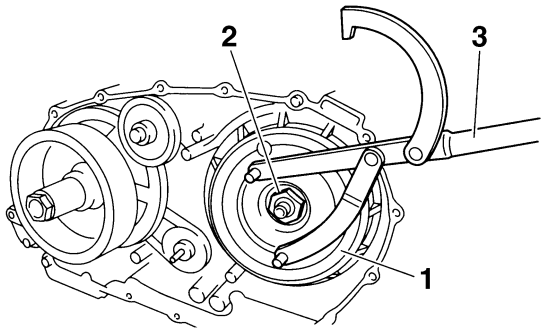
	**Clutch assembly nut** **65 Nm (6.5 m·kgf, 47 ft·lbf)**

TIP

- Align the “a” and “b” during reassembly.
- While holding the clutch assembly with the rotor holding tool “3”, tighten the clutch assembly nut.

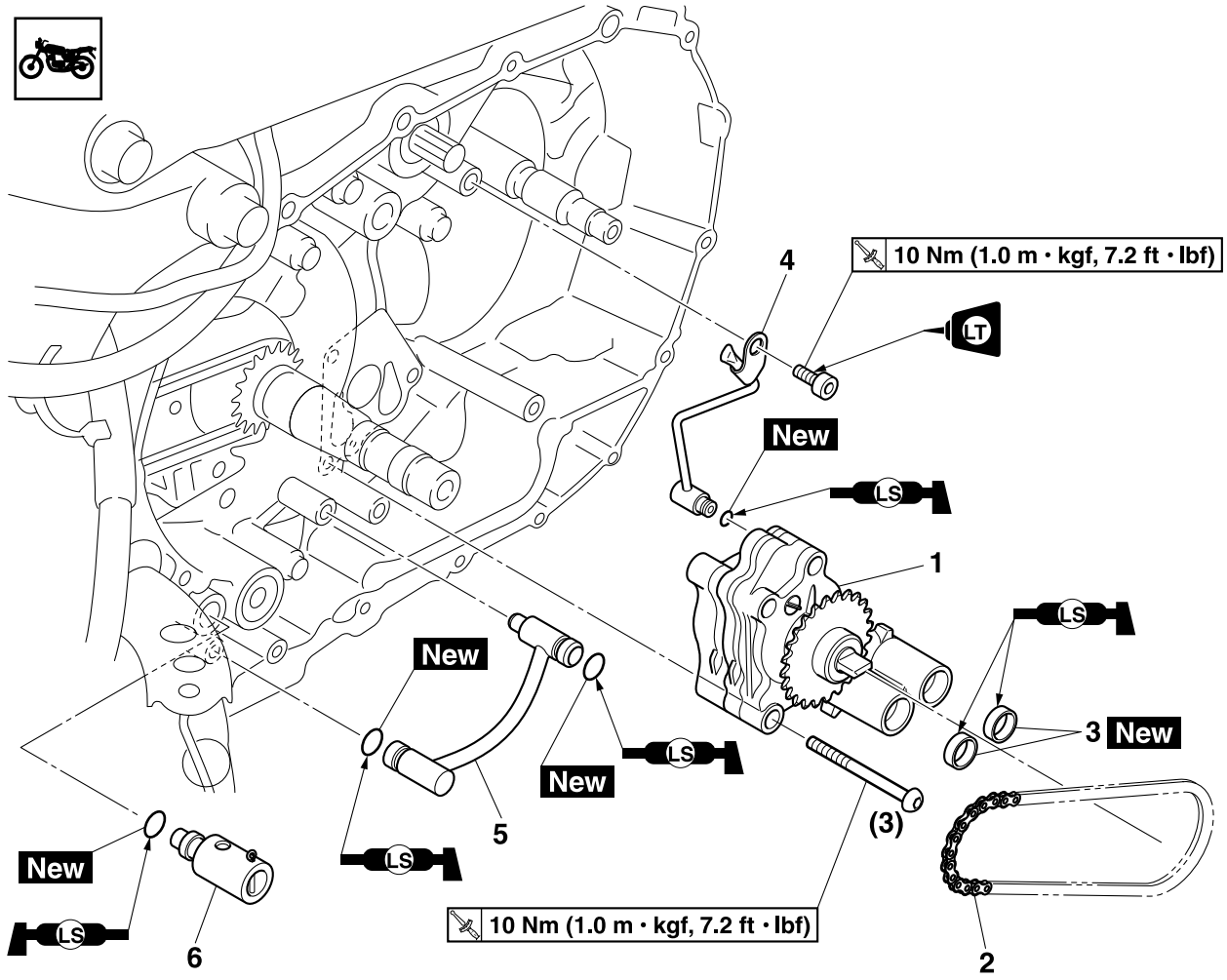
	**Rotor holding tool** **90890-01235** **Universal magneto & rotor holder** **YU-01235**





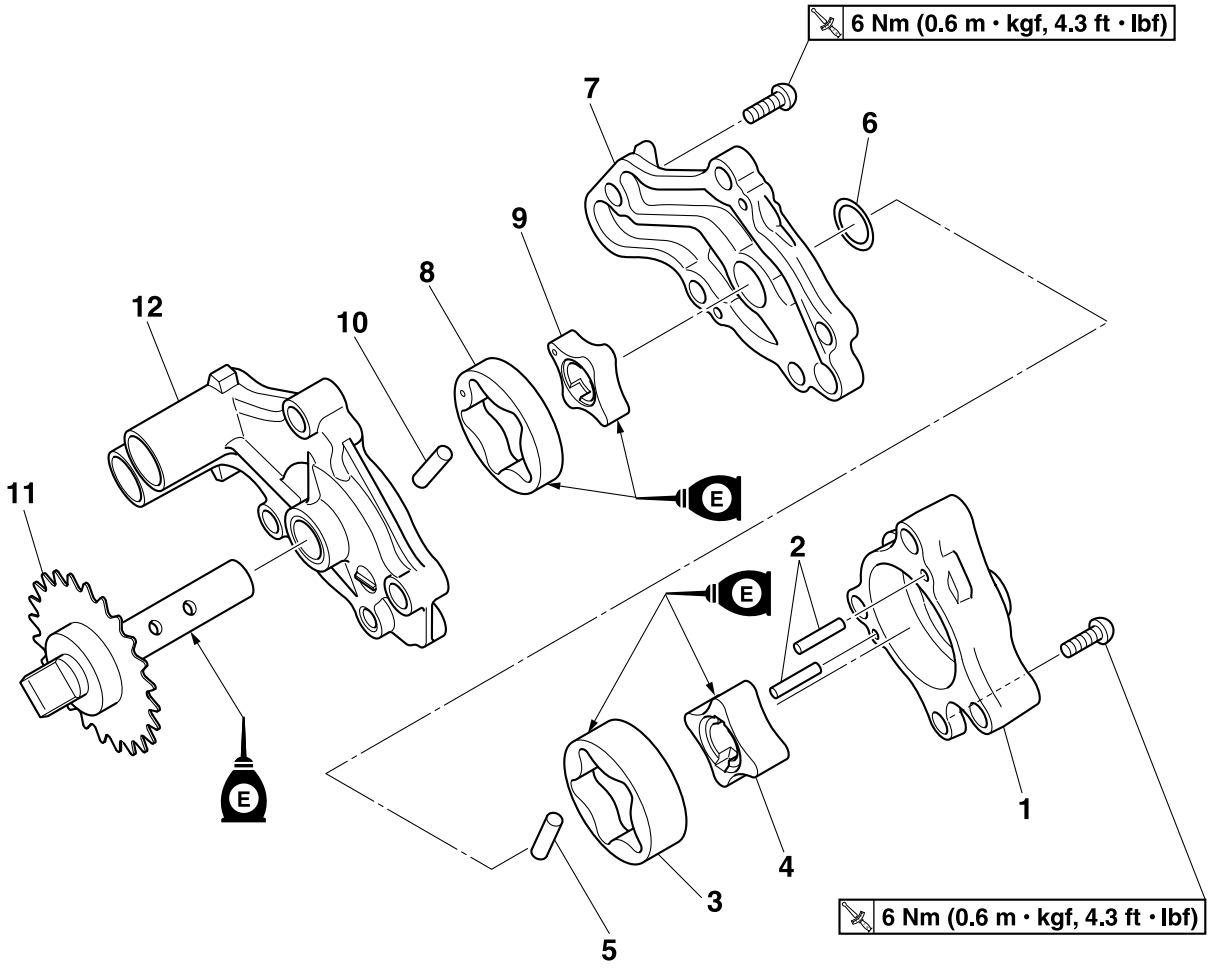
EAS24901
OIL PUMP

Removing the oil pump assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Starter clutch gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-50.
1	Oil pump assembly	1	
2	Oil pump drive chain	1	
3	Gasket	2	
4	Oil delivery pipe	1	
5	Oil pipe	1	
6	Relief valve assembly	1	
			For installation, reverse the removal procedure.

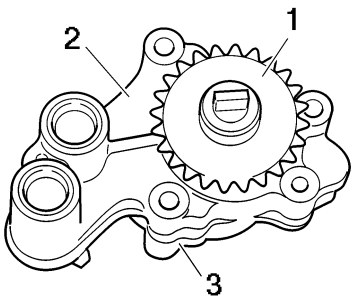
Disassembling the oil pump assembly



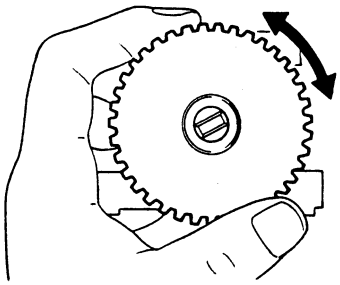
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing 1	1	
2	Dowel pin	2	
3	Oil pump outer rotor 1	1	
4	Oil pump inner rotor 1	1	
5	Pin	1	
6	Washer	1	
7	Oil pump housing center	1	
8	Oil pump outer rotor 2	1	
9	Oil pump inner rotor 2	1	
10	Pin	1	
11	Oil pump driven gear	1	
12	Oil pump housing 2	1	
			For assembly, reverse the disassembly procedure.

* When replacing any of the part, replace the oil pump assembly.

EAS24960
CHECKING THE OIL PUMP
1. Check:
   - Oil pump driven gear “1”
   - Oil pump housing 2 “2”
   - Oil pump housing 1 “3”
     Cracks/damage/wear → Replace the oil pump assembly.



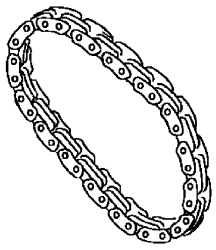
2. Check:
   - Oil pump operation
     Rough movement → Repeat steps (1) and (2) or replace the oil pump assembly.



EAS24971
CHECKING THE RELIEF VALVE
1. Check:
   - Relief valve body
     Damage/wear → Replace.

EAS4B51030
CHECKING THE OIL PIPES
1. Check:
   - Oil pipe
   - Oil delivery pipe
     Damage → Replace.
     Obstruction → Wash and blow out with compressed air.

EAS4B51031
CHECKING THE OIL PUMP DRIVE CHAIN
1. Check:
   - Oil pump drive chain
     Cracks/stiffness → Replace the oil pump chain and oil pump assembly as a set.

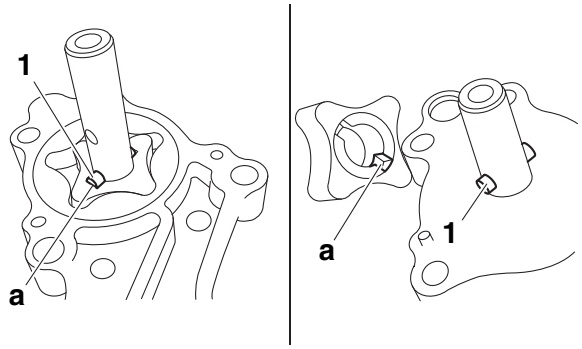


EAS25000
ASSEMBLING THE OIL PUMP
1. Lubricate:
   - Inner rotor
   - Outer rotor
   - Oil pump shaft
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

2. Install:
   - Inner rotors

TIP
When installing the inner rotor, align the pins “1” in the oil pump shaft with the grooves “a” in the inner rotor.



3. Check:
   - Oil pump operation
     Refer to “CHECKING THE OIL PUMP” on page 5-67.

EAS25020
INSTALLING THE OIL PUMP
1. Install:
   - Oil pump assembly

	Oil pump bolt **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

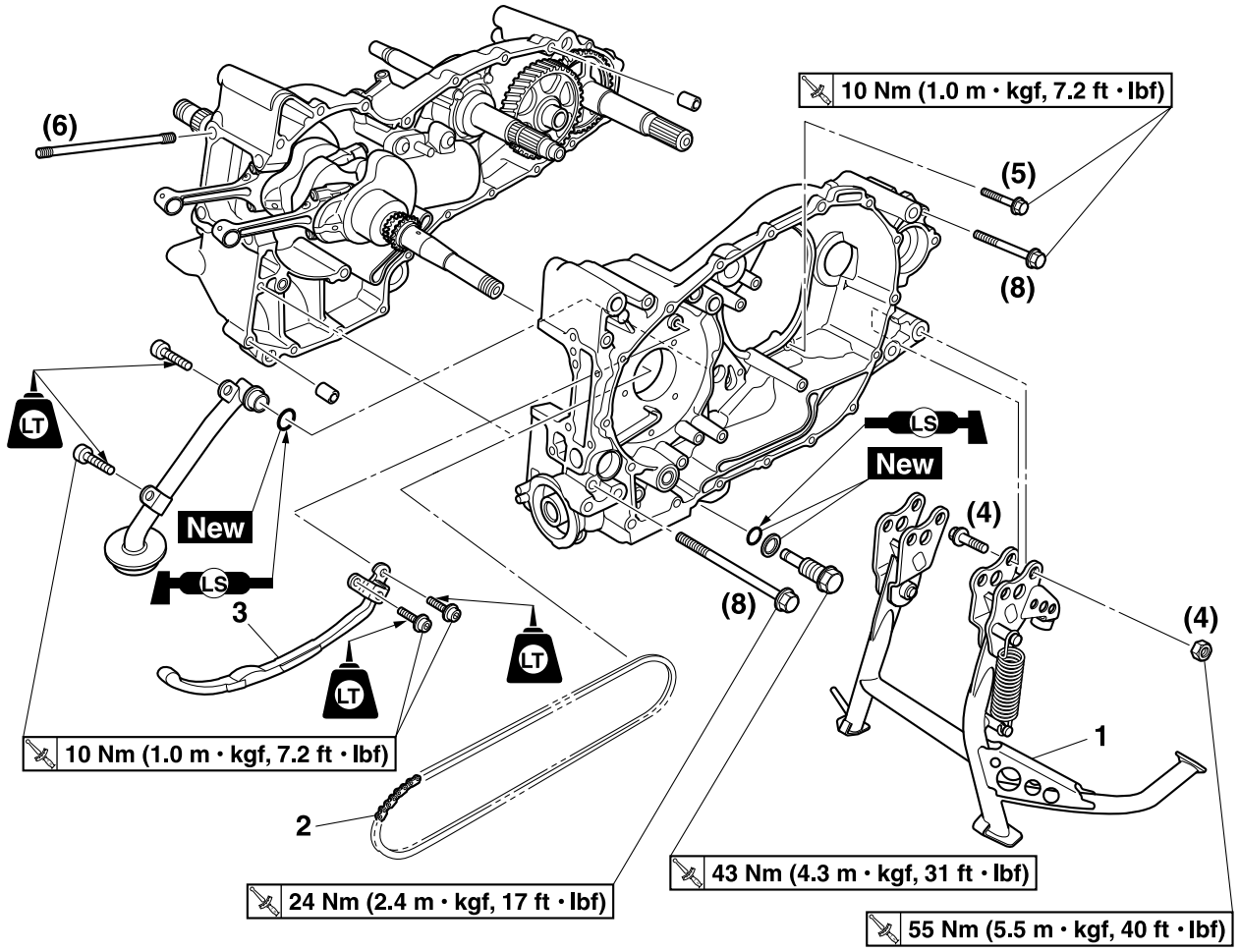
ECA13890

NOTICE

After tightening the bolts, make sure the oil pump turns smoothly.

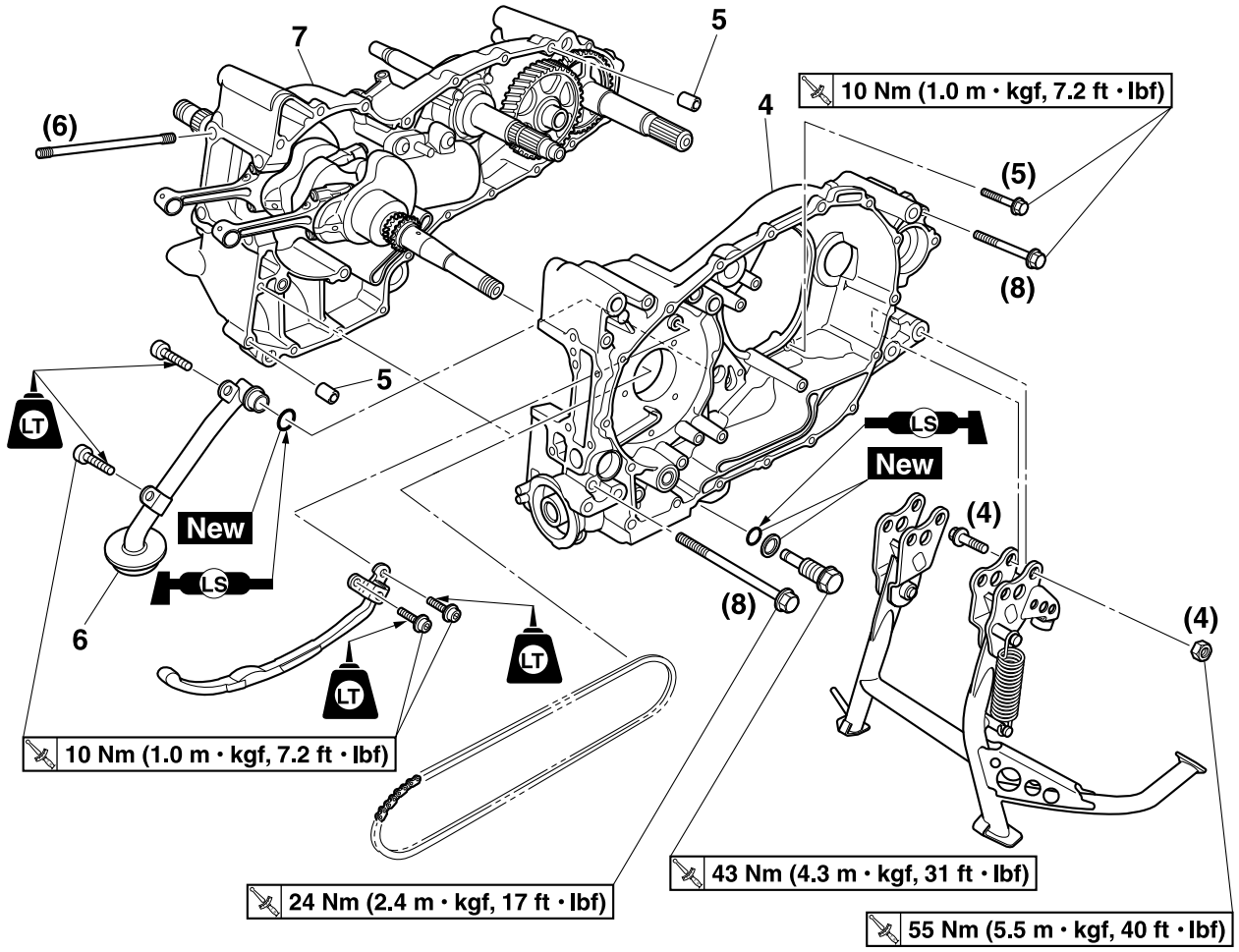
EAS25540
CRANKCASE

Separating the crankcase



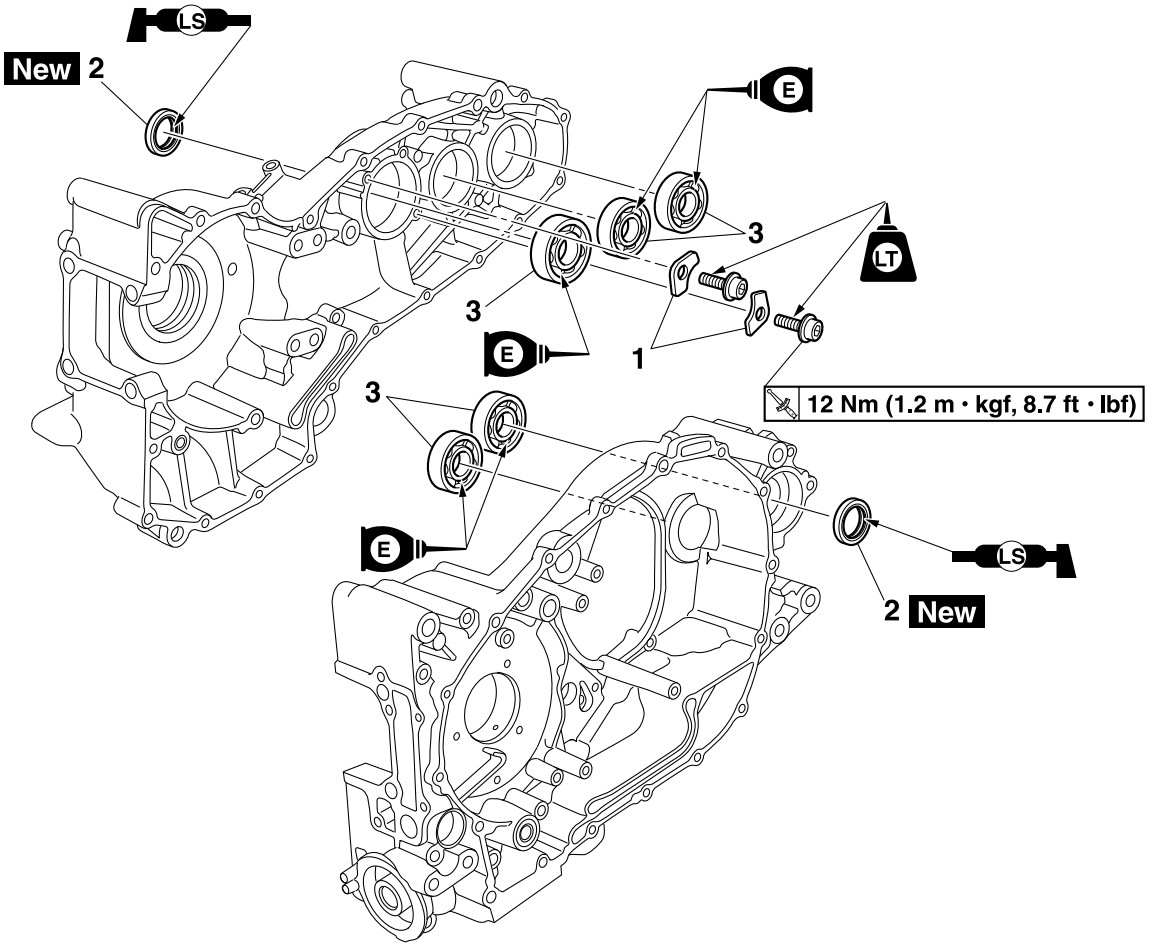
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-3.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-18.
	Cylinder/Pistons		Refer to "CYLINDER AND PISTONS" on page 5-29.
	Oil cooler		Refer to "OIL COOLER" on page 6-5.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-35.
	Starter clutch gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-50.
	Clutch assembly		Refer to "CLUTCH" on page 5-57.
	Oil pump assembly		Refer to "OIL PUMP" on page 5-65.
	Inner V-belt case		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-39.
	Bearing housing		Refer to "SWINGARM" on page 4-97.
1	Centerstand assembly	1	
2	Timing chain	1	
3	Timing chain guide (intake side)	1	

Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
4	Left crankcase	1	
5	Dowel pin	2	
6	Oil strainer	1	
7	Right crankcase	1	
			For installation, reverse the removal procedure.

Removing the oil seals and bearings



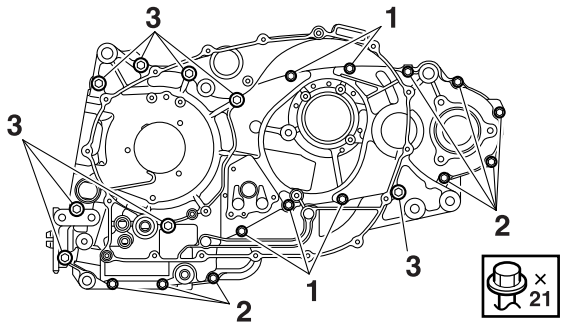
Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft assembly		Refer to "CRANKSHAFT" on page 5-74.
	Transmission		Refer to "TRANSMISSION" on page 5-83.
1	Bearing retainer	2	
2	Oil seal	2	
3	Bearing	5	
			For installation, reverse the removal procedure.

EAS25560
DISASSEMBLING THE CRANKCASE

1. Remove:
   • Crankcase bolts

TIP
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.

   • M6 × 35 mm (1.38 in) bolts “1”
   • M6 × 50 mm (1.97 in) bolts “2”
   • M8 × 110 mm (4.33 in) bolts “3”



2. Remove:
   • Left crankcase

ECA13900
NOTICE
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.

EAS4B51032
CHECKING THE TIMING CHAIN

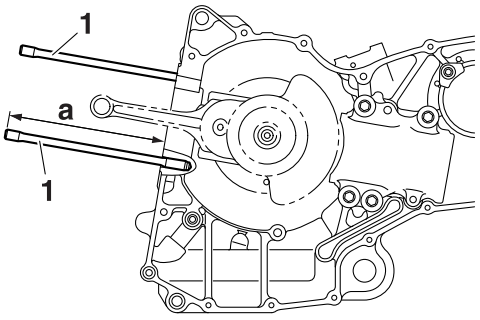
1. Check:
   • Timing chain
     Damage/stiffness → Replace the timing chain, camshafts and crankshaft assembly as a set.

EAS25700
ASSEMBLING THE CRANKCASE

1. Install:
   • Cylinder stud bolts “1”

TIP
For the cylinder stud bolt, embedded height “a” is the standard value and the tightening torque is the reference value.

Cylinder stud bolt
13 Nm (1.3 m·kgf, 9.4 ft·lbf)

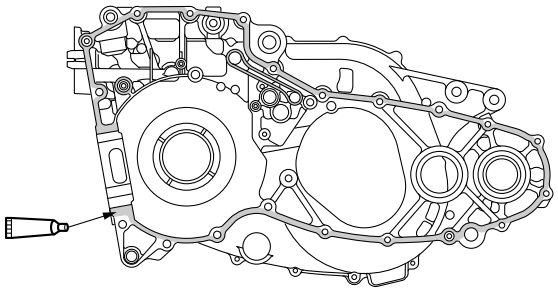


a. 150.2–152.2 mm (5.91–5.99 in)

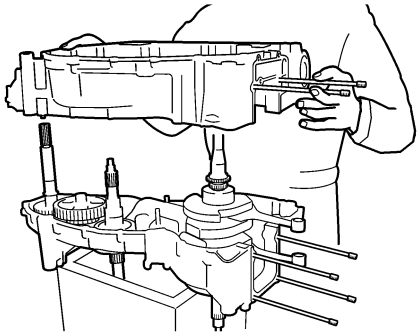
2. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
3. Apply:
   • Sealant
     (onto the crankcase mating surfaces)

Yamaha bond No.1215
90890-85505
(Three bond No.1215®)

TIP
Do not allow any sealant to come into contact with the oil gallery.



4. Install:
   • Dowel pins
   • Left crankcase

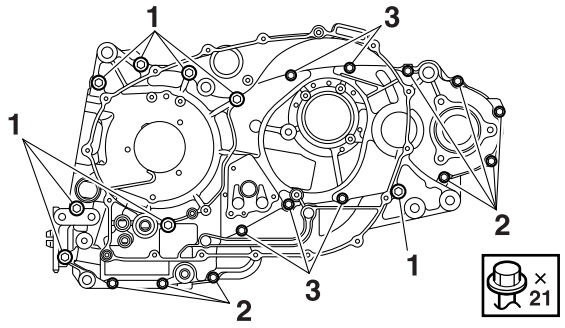


5. Install:
   - Crankcase bolts (M8)
   - Crankcase bolts (M6)

Crankcase bolt (M8)
24 Nm (2.4 m·kgf, 17 ft·lbf)
Crankcase bolt (M6)
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP
Tighten each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.

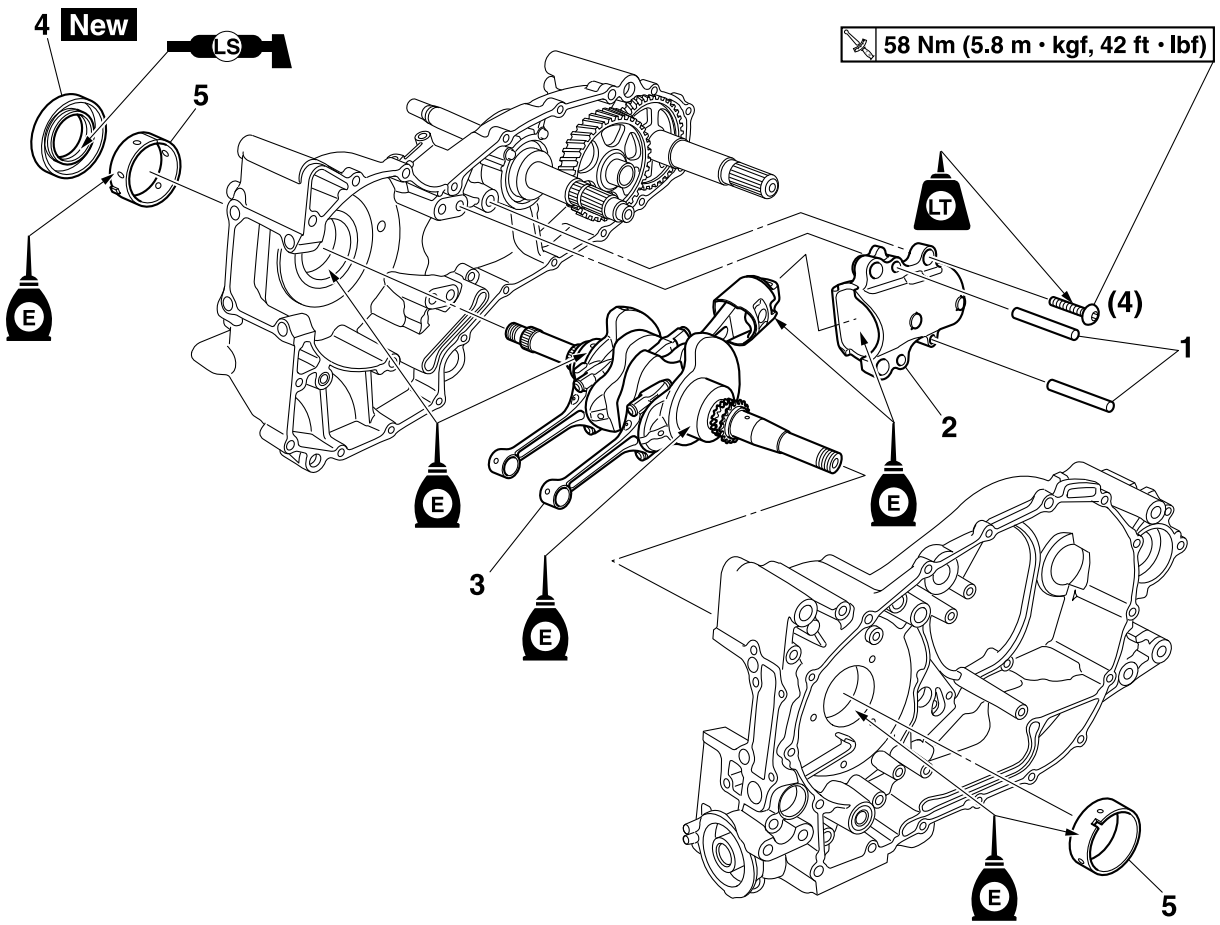
- M8 × 110 mm (4.33 in) bolts "1"
- M6 × 50 mm (1.97 in) bolts "2"
- M6 × 35 mm (1.38 in) bolts "3"



6. Check:
   - Crankshaft and transmission operation
     Rough movement → Repair.

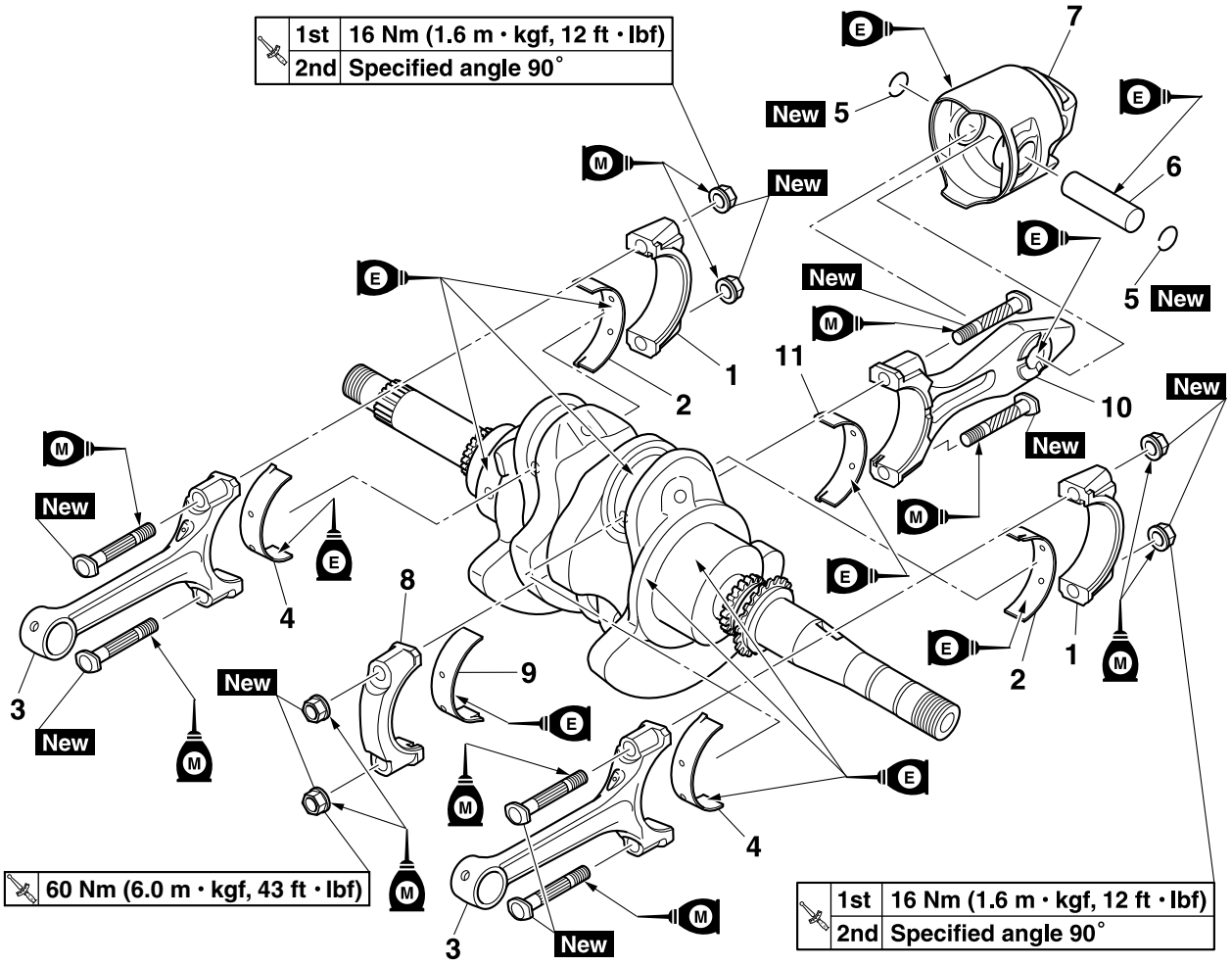
EAS25960
CRANKSHAFT

Removing the crankshaft assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-69.
1	Dowel pin	2	
2	Balancer cylinder	1	
3	Crankshaft assembly	1	
4	Oil seal	1	
5	Crankshaft journal bearing	2	
			For installation, reverse the removal procedure.

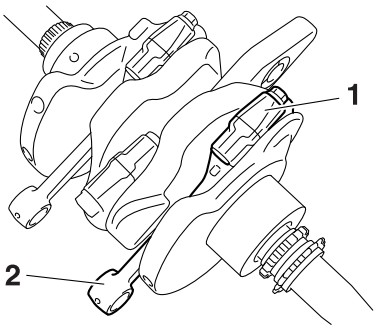
Removing the connecting rods



Order	Job/Parts to remove	Q'ty	Remarks
1	Connecting rod cap	2	
2	Big end lower bearing	2	
3	Connecting rod	2	
4	Big end upper bearing	2	
5	Circlip	2	
6	Balancer piston pin	1	
7	Balancer piston	1	
8	Balancer connecting rod cap	1	
9	Balancer big end lower bearing	1	
10	Balancer connecting rod	1	
11	Balancer big end upper bearing	1	
			For installation, reverse the removal procedure.

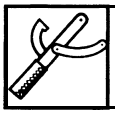
EAS26010
REMOVING THE CONNECTING RODS
The following procedure applies to all of the connecting rods.
1. Remove:
   - Connecting rod cap “1”
   - Connecting rod “2”
   - Big end bearings

TIP
Identify the position of each big end bearing so that it can be reinstalled in its original place.

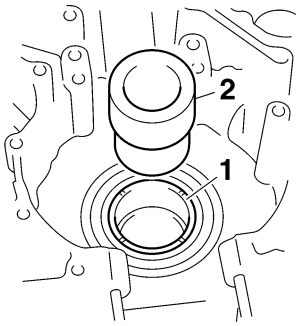


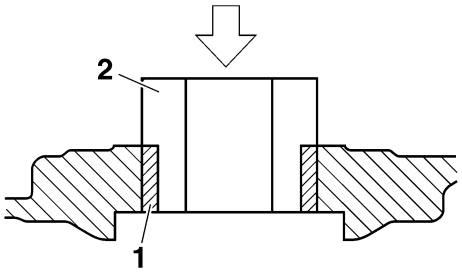
EAS26050
REMOVING THE CRANKSHAFT JOURNAL BEARINGS
The following procedure applies to both of the crankshaft journal bearings.
1. Remove:
   - Crankshaft assembly
   - Crankshaft journal bearing “1”

TIP
Remove the crankshaft journal bearing using the plane bearing installer “2”.



Plane bearing installer
90890-04139



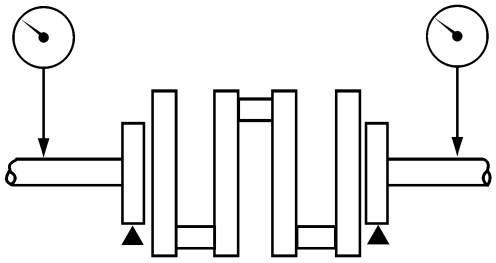


TIP
Identify the position of each crankshaft journal bearing so that it can be reinstalled in its original place.

EAS26090
CHECKING THE CRANKSHAFT AND CONNECTING RODS
1. Measure:
   - Crankshaft runout
     Out of specification → Replace the crankshaft.



Runout limit
0.05 mm (0.0020 in)



2. Check:
   - Crankshaft journal surfaces
   - Crankshaft pin surfaces
   - Bearing surfaces
     Scratches/wear → Replace the crankshaft.

3. Measure:
   • Crankshaft-pin-to-big-end-bearing clearance
   Out of specification → Replace the big end bearings.

Oil clearance (using plastigauge®)
Connecting rod
0.040–0.064 mm (0.0016–0.0025 in)
Balancer connecting rod
0.036–0.060 mm (0.0014–0.0024 in)

The following procedure applies to all of the connecting rods and balancer connecting rod.

ECA13930

NOTICE

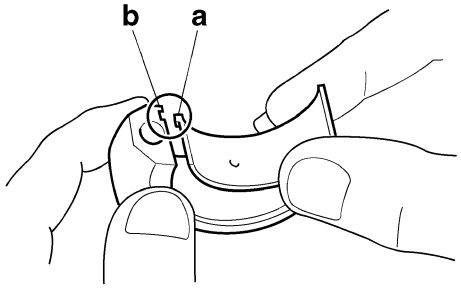
Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

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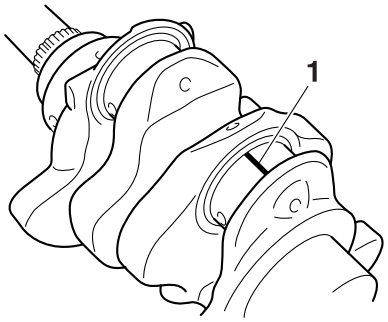
a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

TIP

Align the projections “a” on the big end bearings with the notches “b” in the connecting rod and connecting rod cap.



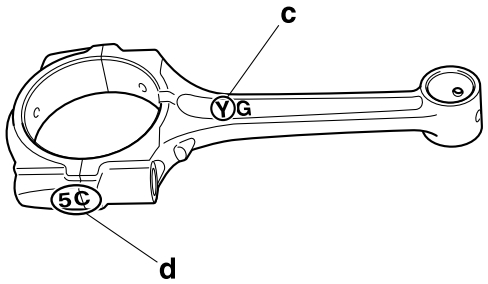
c. Put a piece of Plastigauge® “1” on the crankshaft pin.



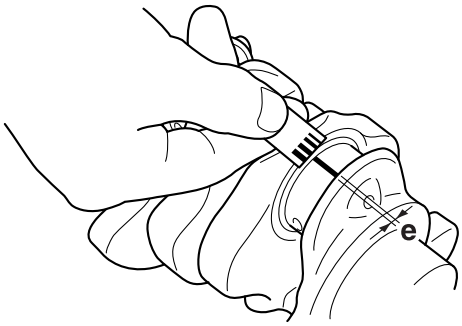
d. Assemble the connecting rod halves.

TIP

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the “Y” mark “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” on page 5-80.
f. Remove the connecting rod and big end bearings.
   Refer to “REMOVING THE CONNECTING RODS” on page 5-76.
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.

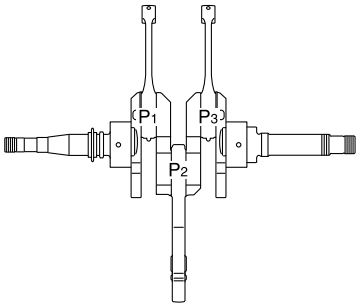


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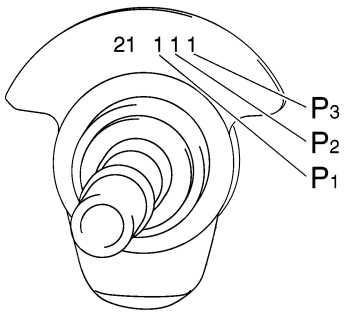
4. Select:
   • Big end bearings (P_1–P_3)

TIP

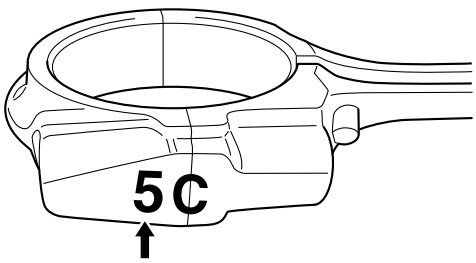
- The numbers "A" stamped into the crankshaft web and the numbers "B" on the connecting rods are used to determine the replacement big end bearing sizes.
- P_1–P_3 refer to the bearings shown in the crankshaft illustration.



A



B



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 (connecting rod) - P_1 (crankshaft)
=
5 - 1 = 4 (green)

Bearing color code
1.Blue 2.Black 3.Brown 4.Green

5. Measure:
   • Crankshaft-journal-to-crankshaft-journal bearing clearance.
   Out of specification → Replace the crankshaft journal bearings.

Journal oil clearance
0.040–0.082 mm (0.0016–0.0032 in)

The following procedure applies to all of the crankshaft journal bearings.

ECA13920

NOTICE

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.

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ECA4B51026

NOTICE

On the journal, the larger value is used as a basis for calculation of the oil clearance, and on the journal bearing, the smaller value is used.

a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Check the bearing surface. If the bearing surface is worn or scratched, both bearings should be replaced.

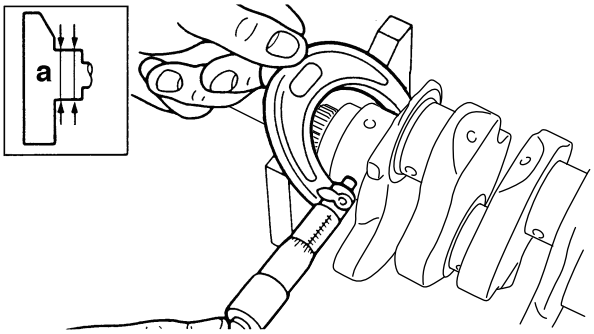
TIP

If either of the right or left journal bearing is worn or scratched, both bearings should be replaced as a set.

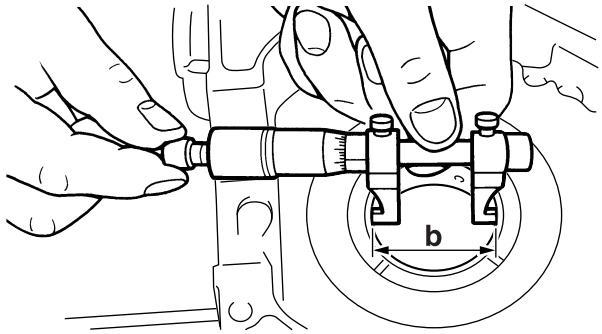
c. Measure the crankshaft journal diameter "a" of each crankshaft journal at two

places. If it is out of specification, replace the crankshaft.

Crankshaft journal diameter
54.984–55.000 mm (2.1647–2.1654 in)



d. Measure the crankshaft journal bearing inside diameter “b” of each crankshaft journal bearing at two places.



e. If crankshaft journal bearing inside diameter is “55.03” and crankshaft journal diameter is “54.98”, then the journal oil clearance is:

Journal oil clearance:
Crankshaft journal bearing inside diameter - Crankshaft journal diameter
=
55.03 - 54.98 = 0.05 mm

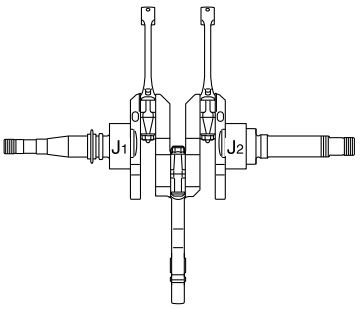
If the oil clearance is out of specification, select replacement bearings.

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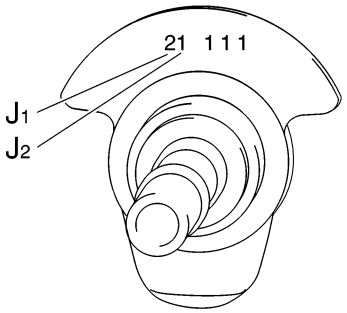
6. Select:
   • Crankshaft journal bearings (J_1–J_2)

TIP

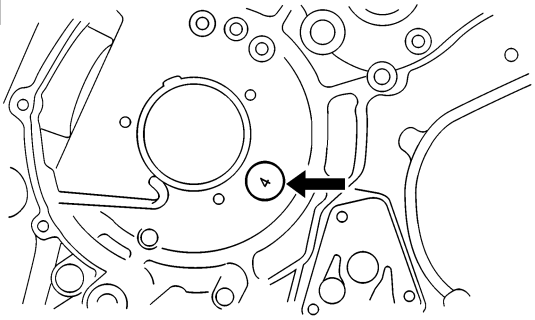
- The numbers “A” stamped into the crankshaft web and the numbers “B” on the crankcase are used to determine the replacement crankshaft journal bearing size.
- J_1–J_2 refer to the bearings shown in the crankshaft illustration.



A



B



For example, if the crankcase J_1 and the crankshaft web J_1 numbers are 4 and 2 respectively, then the bearing size for J_1 is:

J_1 (crankcase) - J_1 (crankshaft web) =
4 - 2 = 2 (black)

Bearing color code
1.Blue 2.Black 3.Brown 4.Green
Bearing thickness
Blue: 2.495–2.508 mm (0.0982–0.0987 in)
Black: 2.491–2.504 mm (0.0981–0.0986 in)
Brown: 2.487–2.500 mm (0.0979–0.0984 in)
Green: 2.483–2.496 mm (0.0978–0.0983 in)

EAS25630
INSTALLING THE CRANKSHAFT JOURNAL BEARINGS

The following procedure applies to both of the crankshaft journal bearings.

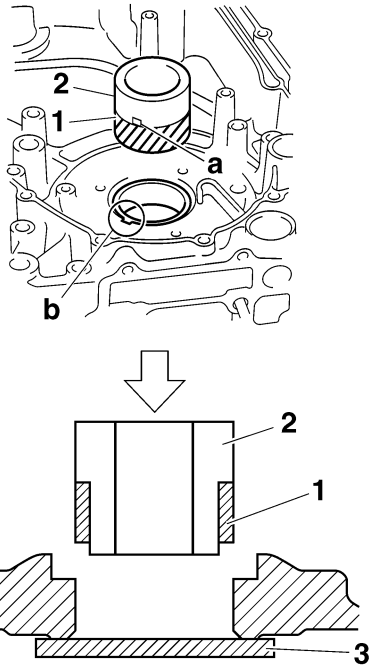
1. Attach:
   - Crankshaft journal bearing "1"

TIP
Attach the crankshaft journal bearing to the plane bearing installer "2".

Plane bearing installer
90890-04139

2. Install:
   - Crankshaft journal bearing

TIP
- Align the projection "a" on the bearing with the projection "b" on the crankcase.
- Place an iron plate "3" beneath the crankcase and press fit until the end of the plain bearing installer touches the iron plate.



EAS26150
INSTALLING THE CONNECTING RODS

1. Lubricate:
   - Bolt threads New
   - Nut seats New
   (with the recommended lubricant)

Recommended lubricant
Molybdenum disulfide oil

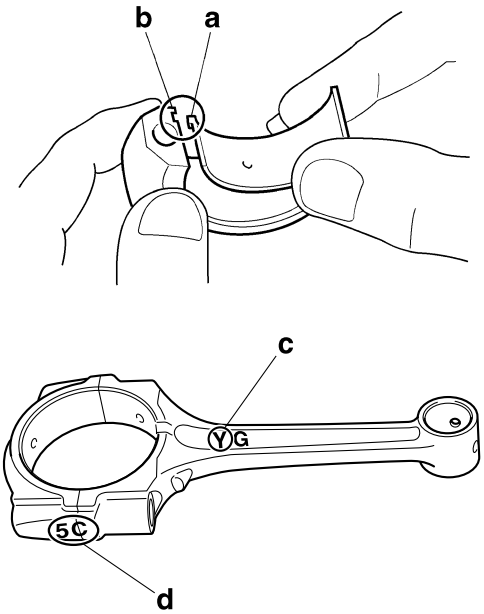
2. Lubricate:
   - Crankshaft pins
   - Big end bearings inner surface
   - Balancer big end bearings inner surface
   (with the recommended lubricant)

Recommended lubricant
Engine oil

3. Install:
   - Big end bearings
   - Connecting rods
   - Connecting rod caps
   (onto the crankshaft pins)

TIP
- Align the projections "a" on the big end bearings with the notches "b" in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the "Y" marks "c" on the connecting rods face towards the left side of the crankshaft.

• Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.



4. Tighten:
   • Connecting rod nuts

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EWA59C1502

⚠ WARNING

Replace the connecting rod bolts and nuts with new ones.

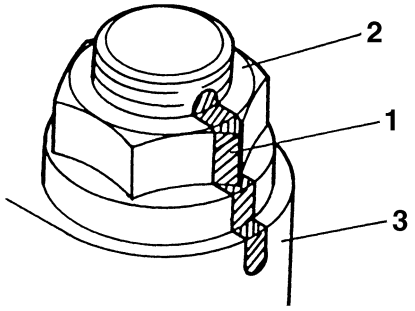
TIP

Tighten the connecting rod nuts using the following procedure.

a. Tighten the connecting rod nuts with a torque wrench.

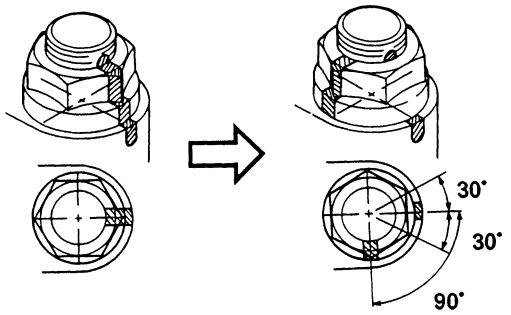
Connecting rod nut (1st)
16 Nm (1.6 m·kgf, 12 ft·lbf)

b. Put a mark “1” on the corner of the connecting rod nut “2” and the connecting rod cap “3”.



c. Tighten the connecting rod nuts further to reach the specified angle 90°.

Connecting rod nut (2nd)
Specified angle 90°



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.

ECA4B51019

NOTICE

- **Do not use a torque wrench to tighten the connecting rod nut to the specified angle.**
- **Tighten the nut until it is at the specified angle.**

TIP

On a hexagonal nut, note that the angle from one corner to another is 60°.

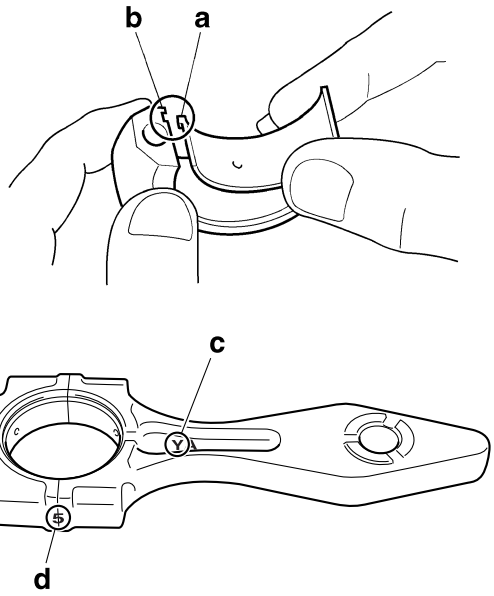
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5. Install:
   • Balancer big end bearings
   • Balancer connecting rod
   • Balancer connecting rod cap (onto the crankshaft pin)

TIP

- Align the projections “a” on the balancer big end bearings with the notches “b” in the balancer connecting rod and balancer connecting rod cap.
- Be sure to reinstall each balancer big end bearing in its original place.
- Make sure the “Y” marks “c” on the balancer connecting rod face towards the left side of the crankshaft.

• Make sure the characters “d” on both the balancer connecting rod and balancer connecting rod cap are aligned.



6. Tighten:
   • Balancer connecting rod nuts

	Balancer connecting rod nut 60 Nm (6.0 m·kgf, 43 ft·lbf)

ECA4B51020

NOTICE

• When tightening the nuts, be sure to use a beam type torque wrench.
• Tighten the nuts to the specified torque. Apply continuous torque between 30 Nm (3.0 m·kgf, 22 ft·lbf) and 60 Nm (6.0 m·kgf, 43 ft·lbf) without pausing. After reaching 30 Nm (3.0 m·kgf, 22 ft·lbf), DO NOT STOP TIGHTENING until the specified torque is achieved. If the tightening is interrupted between 30 Nm (3.0 m·kgf, 22 ft·lbf) and 60 Nm (6.0 m·kgf, 43 ft·lbf), loosen the nut to less than 30 Nm (3.0 m·kgf, 22 ft·lbf) and start again.

EAS4B51033

INSTALLING THE CRANKSHAFT ASSEMBLY

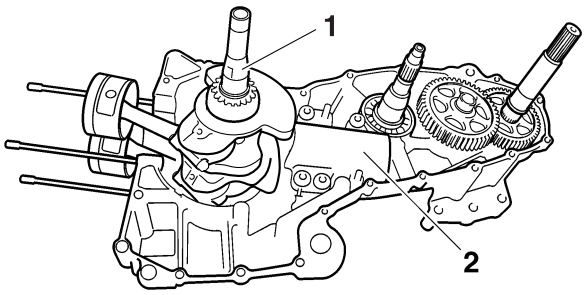
1. Install:
   • Crankshaft assembly “1”
   • Balancer cylinder “2”

	Balancer cylinder bolt 58 Nm (5.8 m·kgf, 42 ft·lbf) LOCTITE®

ECA4B51023

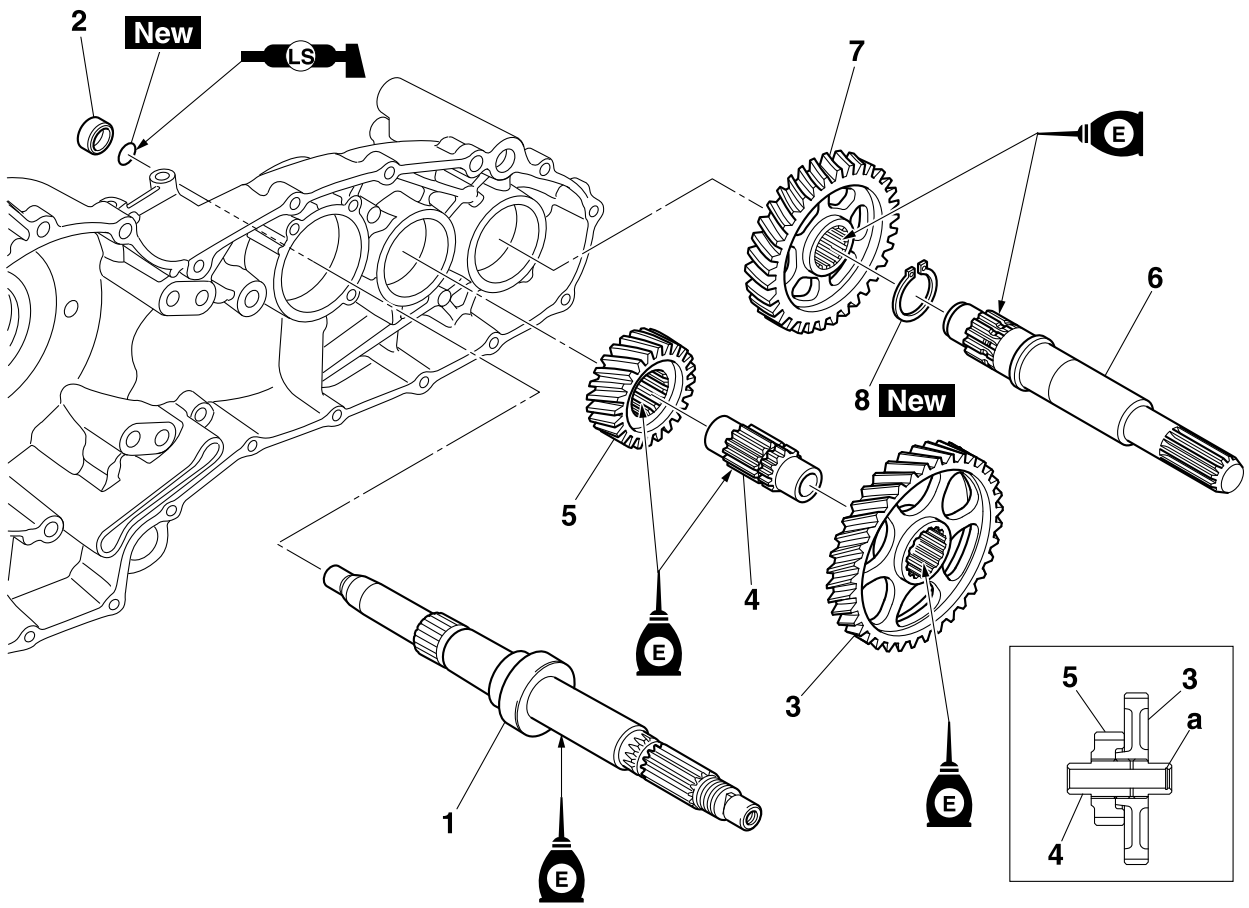
NOTICE

To avoid scratching the crankshaft and to ease the installation procedure, apply grease onto the oil seal lips and apply engine oil onto each bearing.



EAS26241
TRANSMISSION

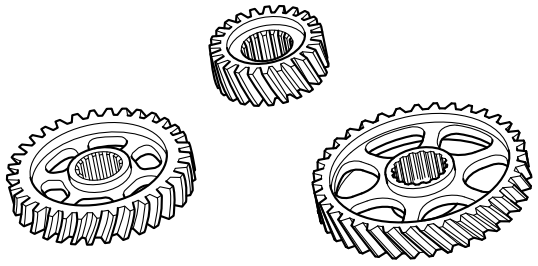
Removing the transmission

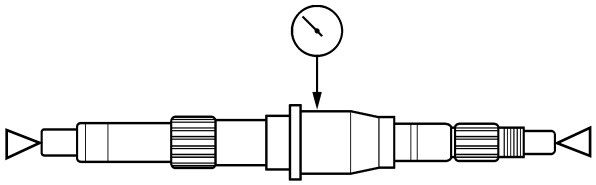


Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-69.
1	Secondary shaft	1	
2	Collar	1	
3	Primary driven gear	1	
4	Main axle	1	**TIP** When installing main axle, install the main axle with groove "a" facing to the primary driven gear.
5	1st pinion gear	1	
6	Drive axle	1	
7	1st wheel gear	1	
8	Circlip	1	
			For installation, reverse the removal procedure.

EAS31560
CHECKING THE TRANSMISSION

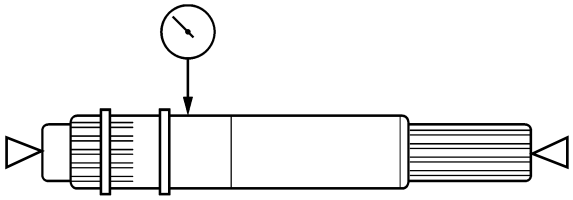
1. Check:
   - Transmission gears
     Blue discoloration/pitting/wear → Replace.





2. Check:
   - Transmission gear movement
     Rough movement → Replace the defective part(s).
3. Check:
   - Main axle
     Cracks/damage/wear → Replace the main axle.
4. Measure:
   - Drive axle runout
     (with a centering device and dial gauge)
     Out of specification → Replace the drive axle.

Drive axle runout limit
0.100 mm (0.0039 in)



5. Measure:
   - Secondary shaft runout
     (with a centering device and dial gauge)
     Out of specification → Replace the secondary shaft.

Secondary shaft runout limit
0.120 mm (0.0047 in)

COOLING SYSTEM

RADIATOR 6-1
CHECKING THE RADIATOR 6-3
INSTALLING THE RADIATOR 6-3

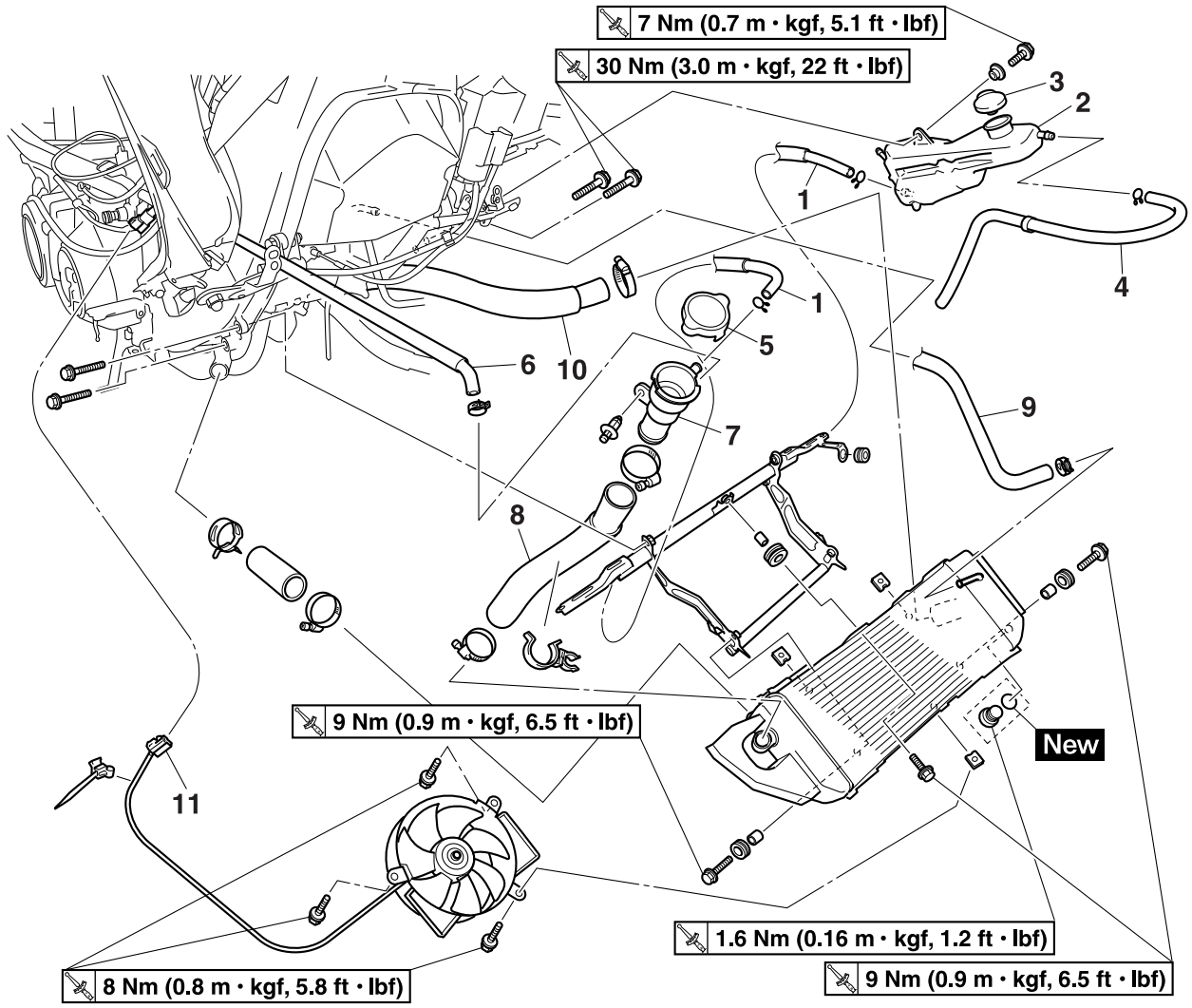
OIL COOLER 6-5
CHECKING THE OIL COOLER 6-6
INSTALLING THE OIL COOLER 6-6

THERMOSTAT 6-7
CHECKING THE THERMOSTAT 6-8
INSTALLING THE THERMOSTAT ASSEMBLY 6-8

WATER PUMP 6-9
DISASSEMBLING THE WATER PUMP 6-11
CHECKING THE WATER PUMP 6-11
ASSEMBLING THE WATER PUMP 6-11
INSTALLING THE WATER PUMP 6-12

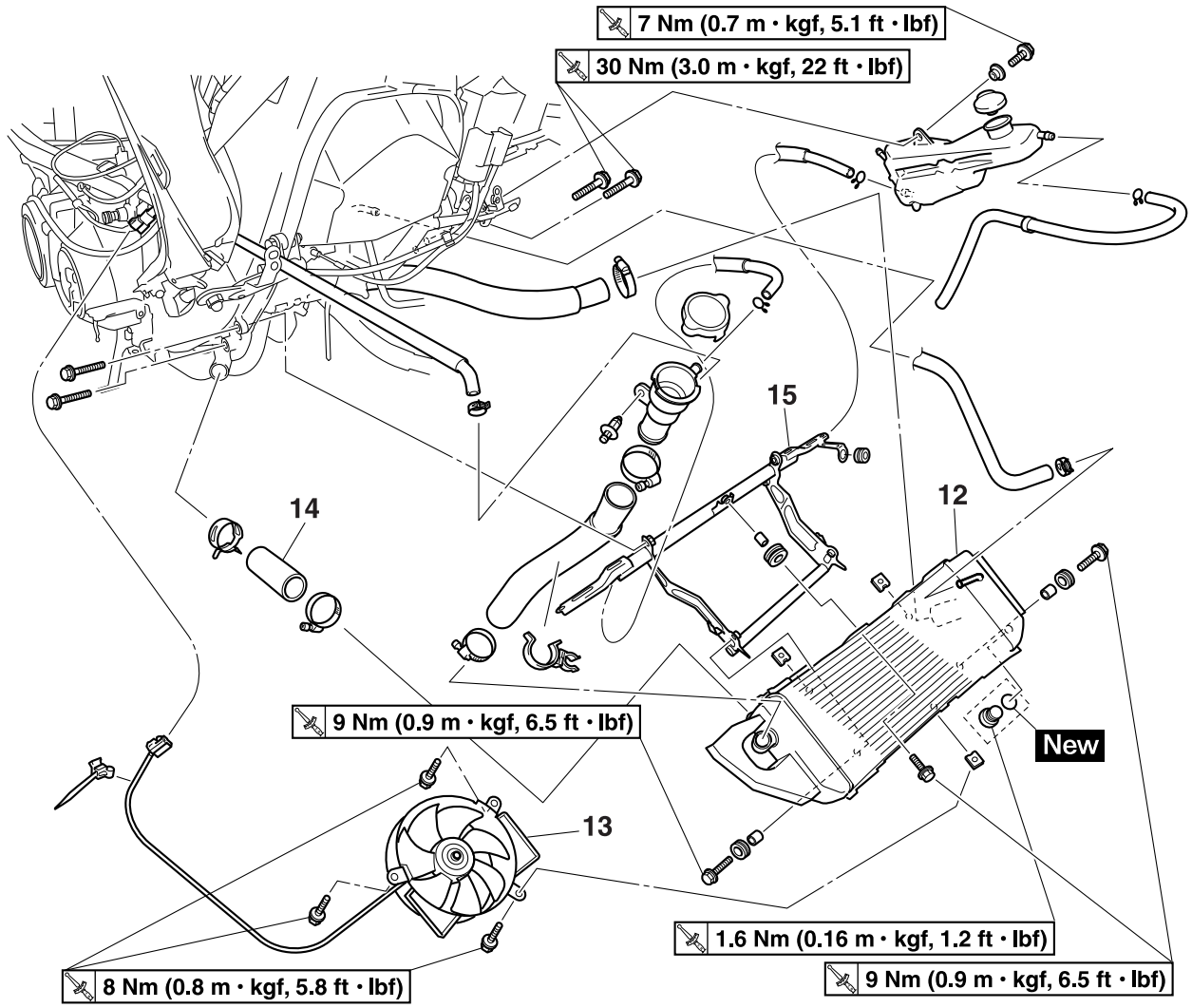
EAS26380
RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Footboards		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
1	Coolant reservoir hose	1	
2	Coolant reservoir	1	
3	Coolant reservoir cap	1	
4	Coolant reservoir breather hose	1	
5	Radiator cap	1	**TIP** Remove/Install it with the radiator filler pipe held.
6	Cooling system air bleed hose	1	Disconnect.
7	Radiator filler pipe	1	
8	Radiator filler hose	1	
9	Fast idle plunger outlet coolant hose	1	Disconnect.
10	Radiator outlet hose	1	Disconnect.
11	Radiator fan motor coupler	1	Disconnect.

Removing the radiator

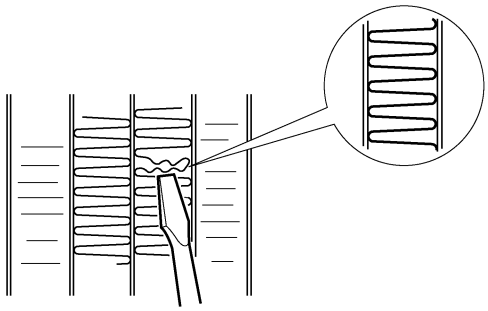


Order	Job/Parts to remove	Q'ty	Remarks
12	Radiator	1	
13	Radiator fan	1	
14	Radiator inlet hose	1	
15	Radiator bracket	1	
			For installation, reverse the removal procedure.

EAS26390
CHECKING THE RADIATOR

1. Check:
   - Radiator fins
     Obstruction → Clean.
     Apply compressed air to the rear of the radiator.
     Damage → Repair or replace.

TIP
Straighten any flattened fins with a thin, flat-head screwdriver.



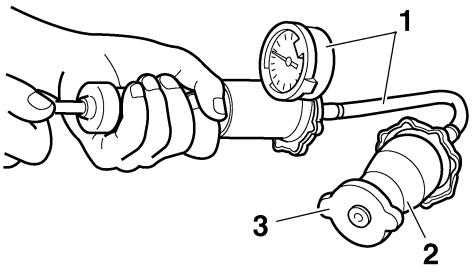
2. Check:
   - Radiator hoses
   - Radiator pipes
     Cracks/damage → Replace.
3. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
107.9–137.3 kPa (1.08–1.37 kgf/cm², 15.7–19.9 psi)

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a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.

Radiator cap tester
90890-01325
Mityvac cooling system tester kit
YU-24460-A
Radiator cap tester adapter
90890-01352
Pressure tester adapter
YU-33984



b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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4. Check:
   - Radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” on page 8-25.

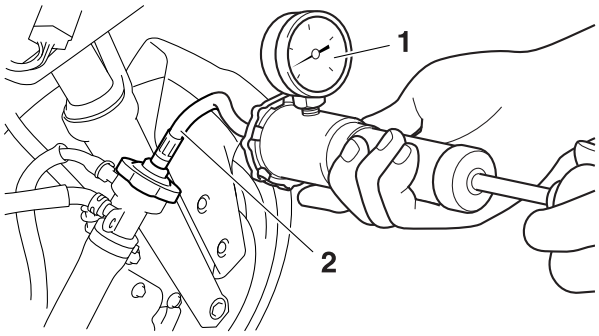
EAS26400
INSTALLING THE RADIATOR

1. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-30.
2. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.

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a. Attach the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator.

Radiator cap tester
90890-01325
Mityvac cooling system tester kit
YU-24460-A
Radiator cap tester adapter
90890-01352
Pressure tester adapter
YU-33984

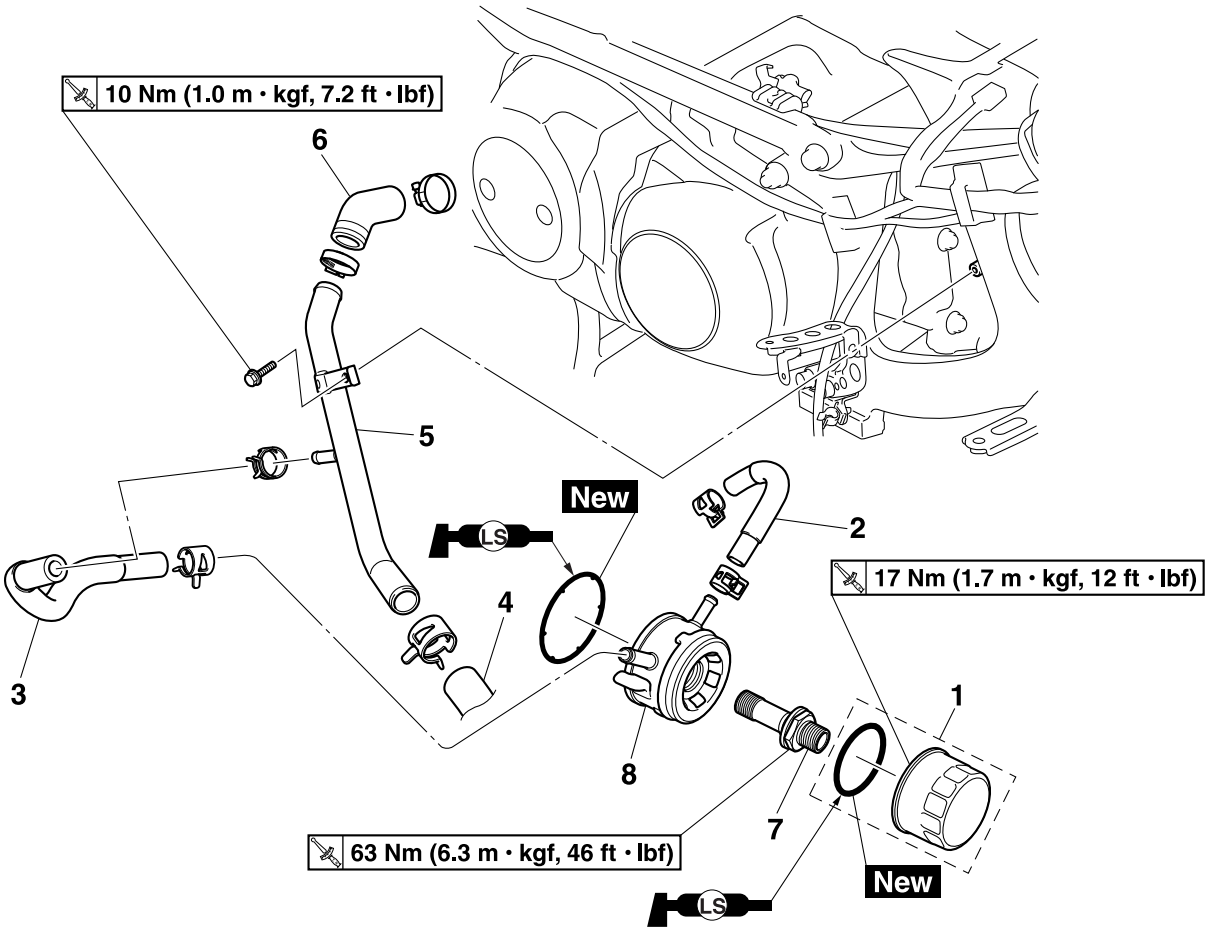


b. Apply 137.3 kPa (1.37 kgf/cm^2, 19.9 psi) of pressure.
c. Measure the indicated pressure with the gauge.

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EAS26410
OIL COOLER

Removing the oil cooler



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-26.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
1	Oil filter cartridge	1	
2	Oil cooler inlet hose	1	
3	Oil cooler outlet hose	1	
4	Radiator inlet hose	1	Disconnect.
5	Coolant pipe	1	
6	Thermostat outlet hose	1	
7	Oil filter cartridge union bolt	1	
8	Oil cooler	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
     Cracks/damage/wear → Replace.

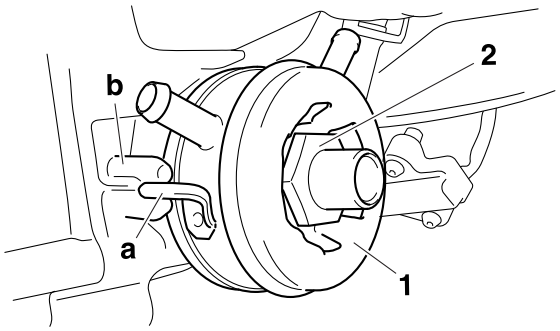
EAS26430
INSTALLING THE OIL COOLER

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"
   - Oil filter cartridge union bolt "2"

	Oil filter cartridge union bolt **63 Nm (6.3 m·kgf, 46 ft·lbf)**

TIP

- Make sure that the O-ring is positioned properly.
- Align the projection "a" on the oil cooler with the slot "b" in the crankcase.



3. Install:
   - Oil filter cartridge

	Oil filter wrench **90890-01469** **YM-01469**

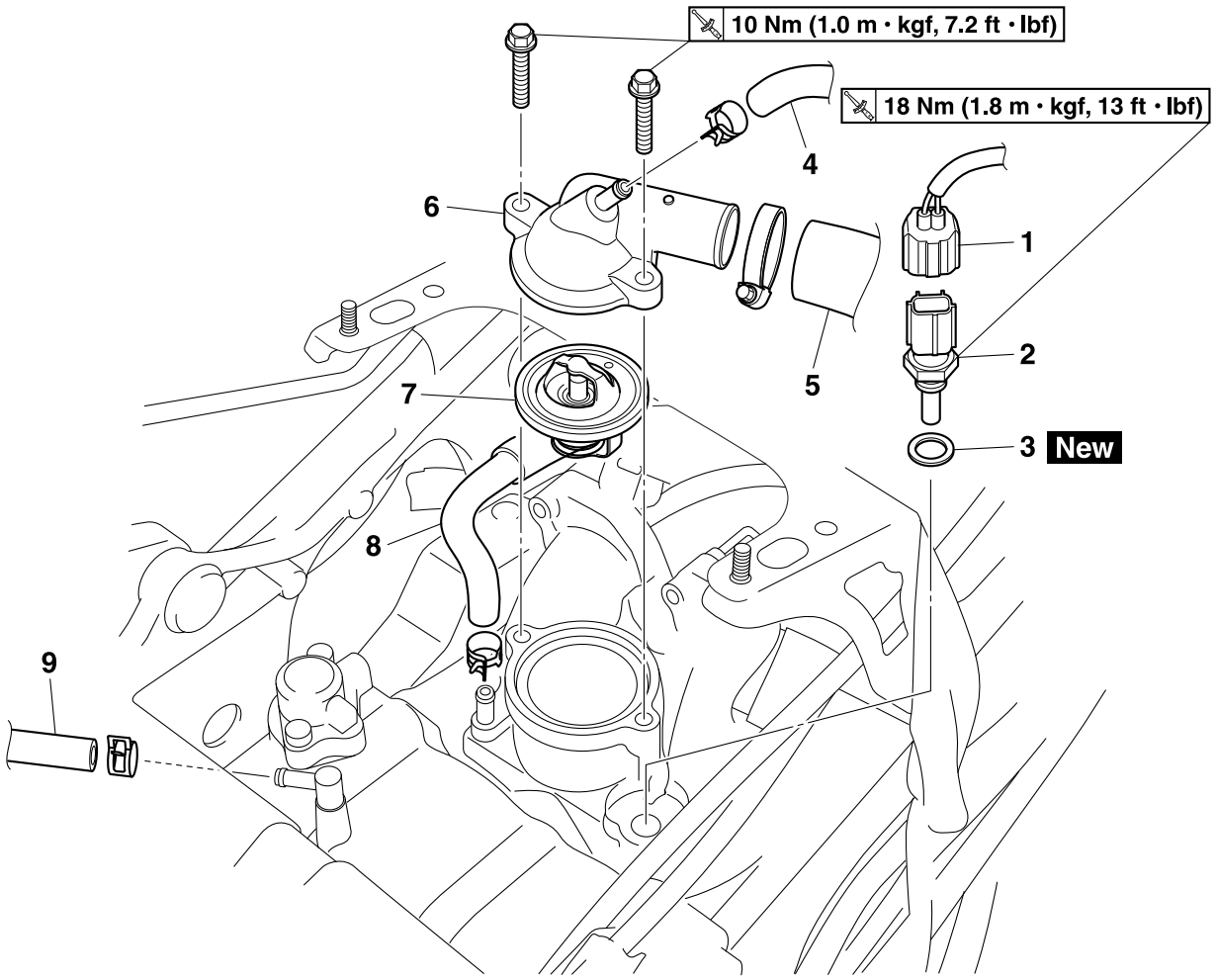
	Oil filter cartridge **17 Nm (1.7 m·kgf, 12 ft·lbf)**

Refer to "CHANGING THE ENGINE OIL" on page 3-26.

4. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-30.
   - Crankcase
     (with the specified amount of the recommended engine oil)
   Refer to "CHANGING THE ENGINE OIL" on page 3-26.
5. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
     Refer to "INSTALLING THE RADIATOR" on page 6-3.
6. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR" on page 6-3.

EAS26440
THERMOSTAT

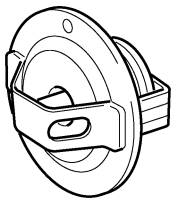
Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
1	Coolant temperature sensor coupler	1	Disconnect.
2	Coolant temperature sensor	1	
3	Copper washer	1	
4	Cooling system air bleed hose	1	Disconnect.
5	Thermostat outlet hose	1	Disconnect.
6	Thermostat cover	1	
7	Thermostat	1	
8	Fast idle plunger inlet coolant hose	1	Disconnect.
9	Coolant hose	1	Disconnect.
			For installation, reverse the removal procedure.

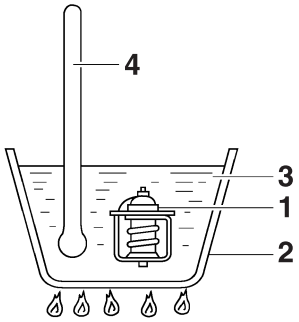
EAS26450
CHECKING THE THERMOSTAT

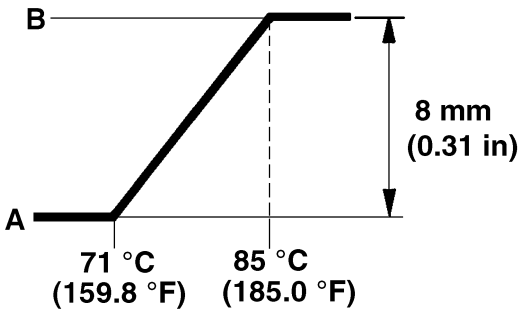
1. Check:
   - Thermostat
     Does not open at 71–85 °C (159.8–185.0 °F) → Replace.



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a. Suspend the thermostat “1” in a container “2” filled with water.
b. Slowly heat the water “3”.
c. Place a thermometer “4” in the water.
d. While stirring the water, observe the thermostat and thermometer’s indicated temperature.





A. Fully closed
B. Fully open

TIP
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

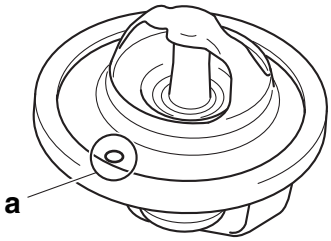
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2. Check:
   - Thermostat cover
     Cracks/damage → Replace.

EAS26480
INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
   - Thermostat

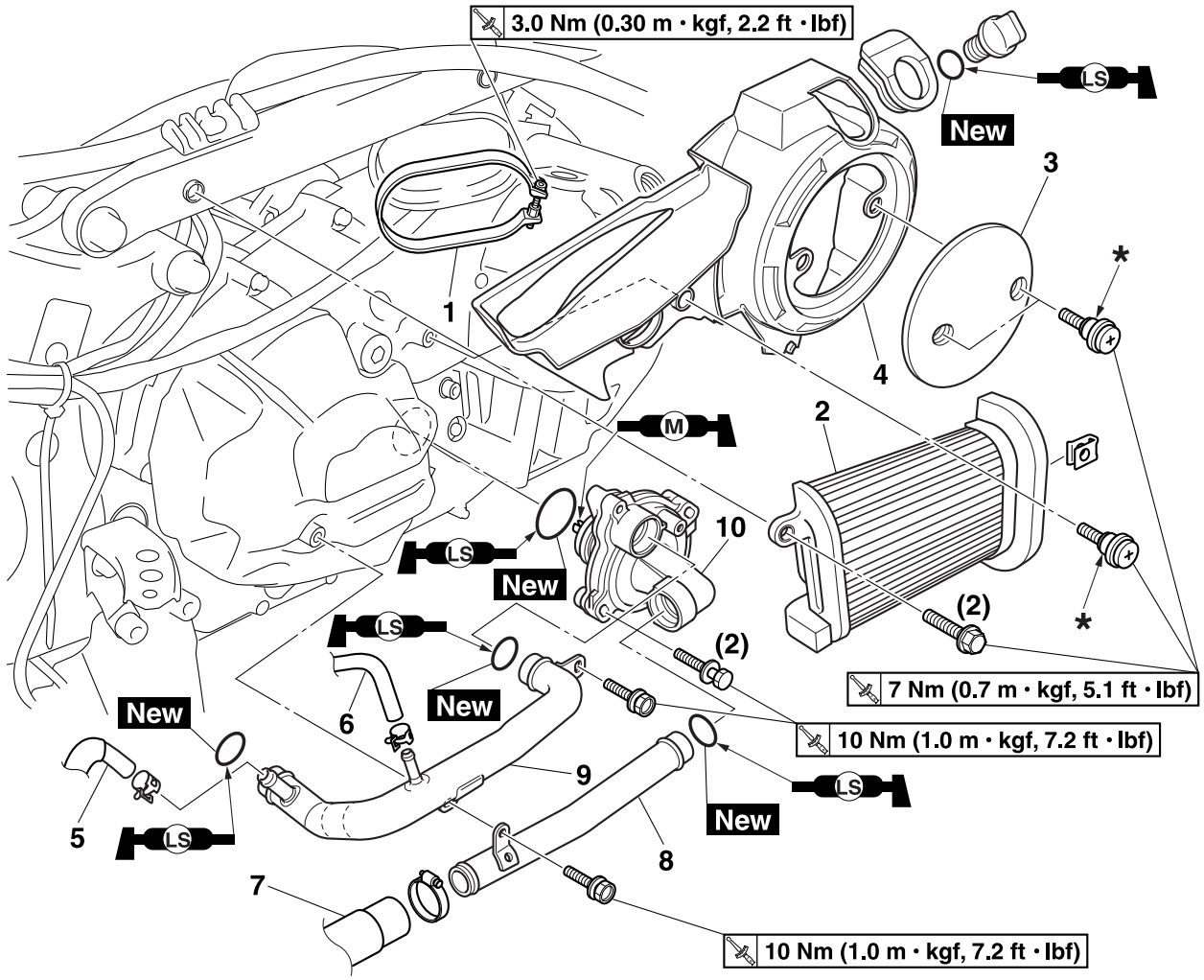
TIP
Install the thermostat with its breather hole “a” facing forward.



2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-30.
3. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
     Refer to “INSTALLING THE RADIATOR” on page 6-3.
4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.

EAS26500
WATER PUMP

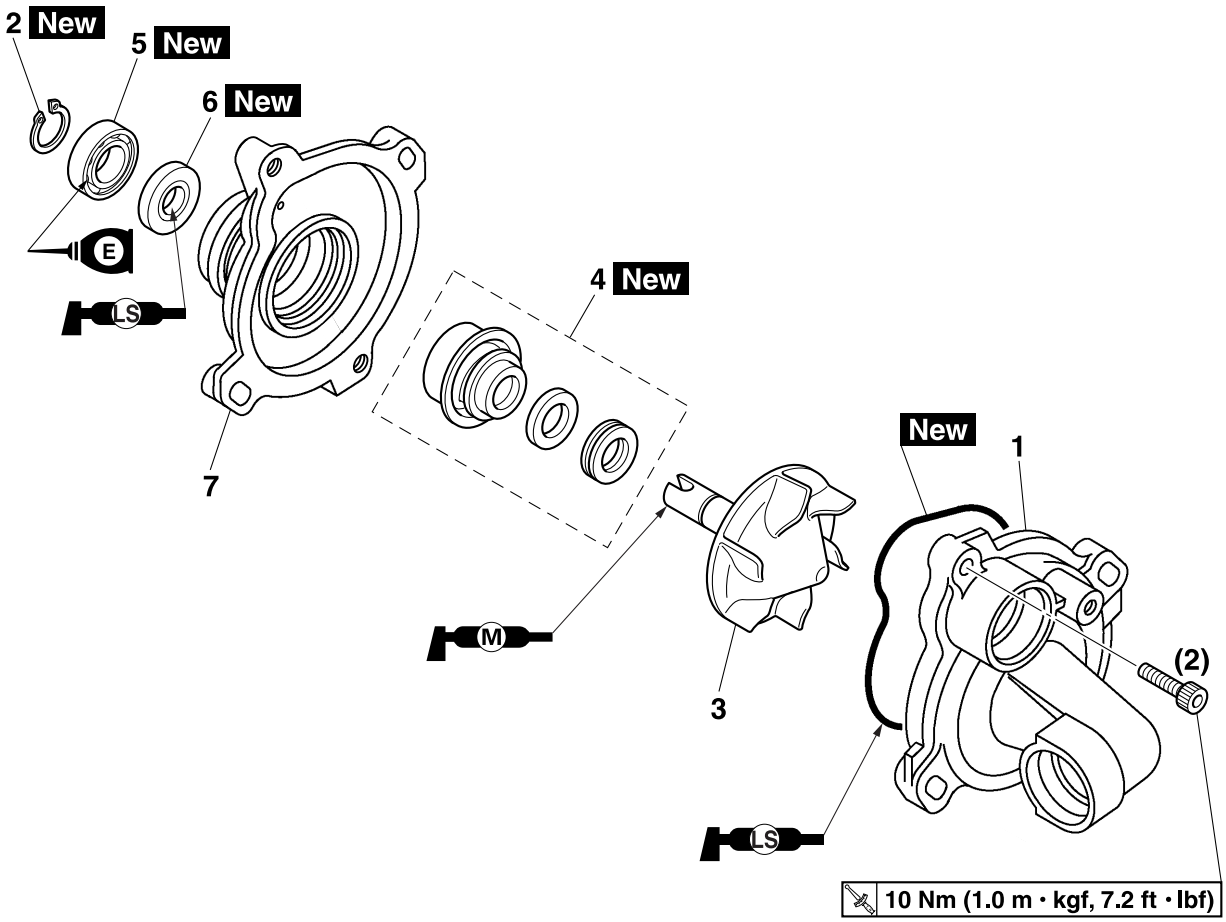
Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Footboard (left)		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
1	V-belt case air filter element joint clamp	1	Loosen.
2	V-belt case air filter element (left)	1	
3	Generator cover protector cover	1	
4	Generator cover protector	1	
5	Oil cooler inlet hose	1	Disconnect.
6	Coolant hose	1	Disconnect.
7	Radiator outlet hose	1	Disconnect.
8	Water pump inlet pipe	1	
9	Water pump outlet pipe	1	
10	Water pump assembly	1	
			For installation, reverse the removal procedure.

* Water or silicone fluid

Disassembling the water pump

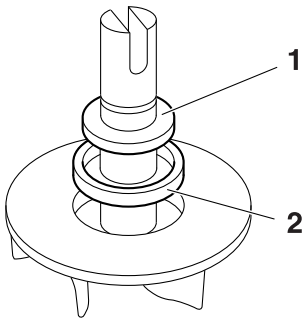


Order	Job/Parts to remove	Q'ty	Remarks
1	Water pump housing cover	1	
2	Circlip	1	
3	Impeller shaft	1	
4	Water pump seal	1	
5	Bearing	1	
6	Oil seal	1	
7	Water pump housing	1	
			For assembly, reverse the disassembly procedure.

EAS26510
DISASSEMBLING THE WATER PUMP

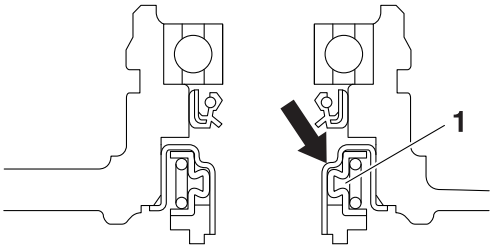
1. Remove:
   - Rubber damper holder “1”
   - Rubber damper “2”
     (from the impeller, with a thin, flathead screwdriver)

TIP
Do not scratch the impeller shaft.



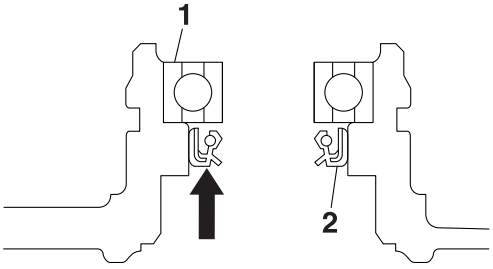
2. Remove:
   - Water pump seal “1”

TIP
Remove the water pump seal from the inside of the water pump housing.



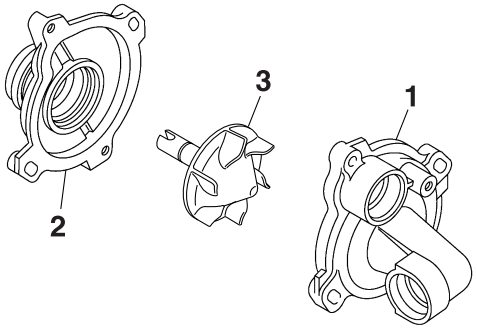
3. Remove:
   - Bearing “1”
   - Oil seal “2”

TIP
Remove the bearing and oil seal from the outside of the water pump housing.



EAS26541
CHECKING THE WATER PUMP

1. Check:
   - Water pump housing cover “1”
   - Water pump housing “2”
   - Impeller shaft “3”
     Cracks/damage/wear → Replace.

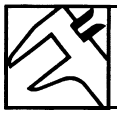


2. Check:
   - Water pump inlet pipe
   - Water pump outlet pipe
     Cracks/damage/wear → Replace.

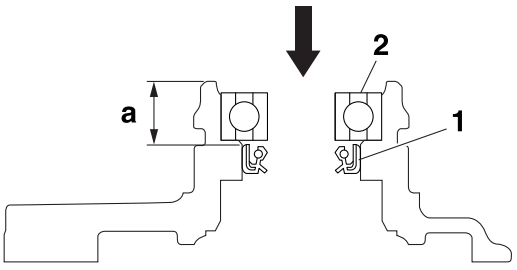
EAS26560
ASSEMBLING THE WATER PUMP

1. Install:
   - Oil seal “1” New
   - Bearing “2” New
     (into the water pump housing)

TIP
- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket that matches its outside diameter.
- Install the oil seal from the inside of the water pump housing.



Installed depth of oil seal “a”
11.5 mm (0.45 in)



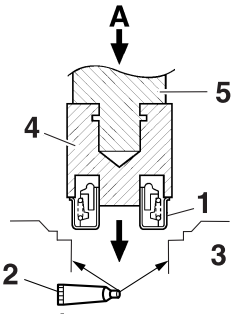
2. Install:
   - Water pump seal “1” New

ECA14080
NOTICE
Never lubricate the water pump seal surface with oil or grease.

TIP
- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 “2” to the water pump housing “3”.



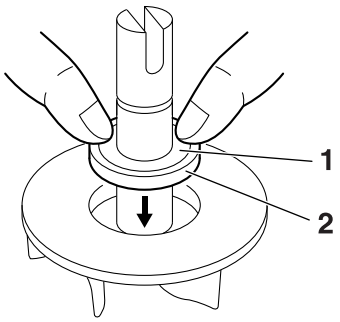
Mechanical seal installer
90890-04132
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Middle drive bearing installer 40 & 50 mm
YM-04058
Yamaha bond No.1215
90890-85505
(Three bond No.1215®)



A. Push down
4. Mechanical seal installer
5. Middle driven shaft bearing driver

3. Install:
   - Rubber damper holder “1” New
   - Rubber damper “2” New

TIP
Before installing the rubber damper, apply tap water or coolant onto its outer surface.

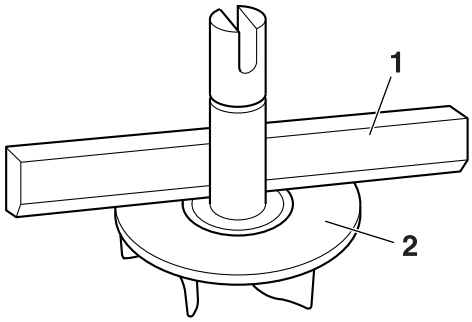


4. Measure:
   - Impeller shaft tilt
     Out of specification → Repeat step (3) and (4).

ECA14090
NOTICE
Make sure the rubber damper and rubber damper holder are flush with the impeller.



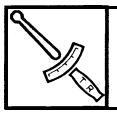
Impeller shaft tilt limit
0.15 mm (0.0059 in)



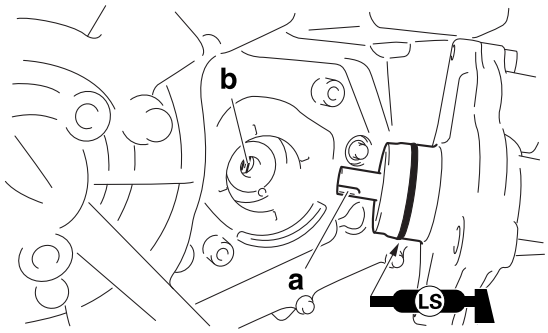
1. Straightedge
2. Impeller shaft

EAS26590
INSTALLING THE WATER PUMP
1. Install:
   - O-ring New
   - Water pump assembly

TIP
- 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.



Water pump assembly bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)



2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-30.
3. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
     Refer to “INSTALLING THE RADIATOR” on page 6-3.
4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.

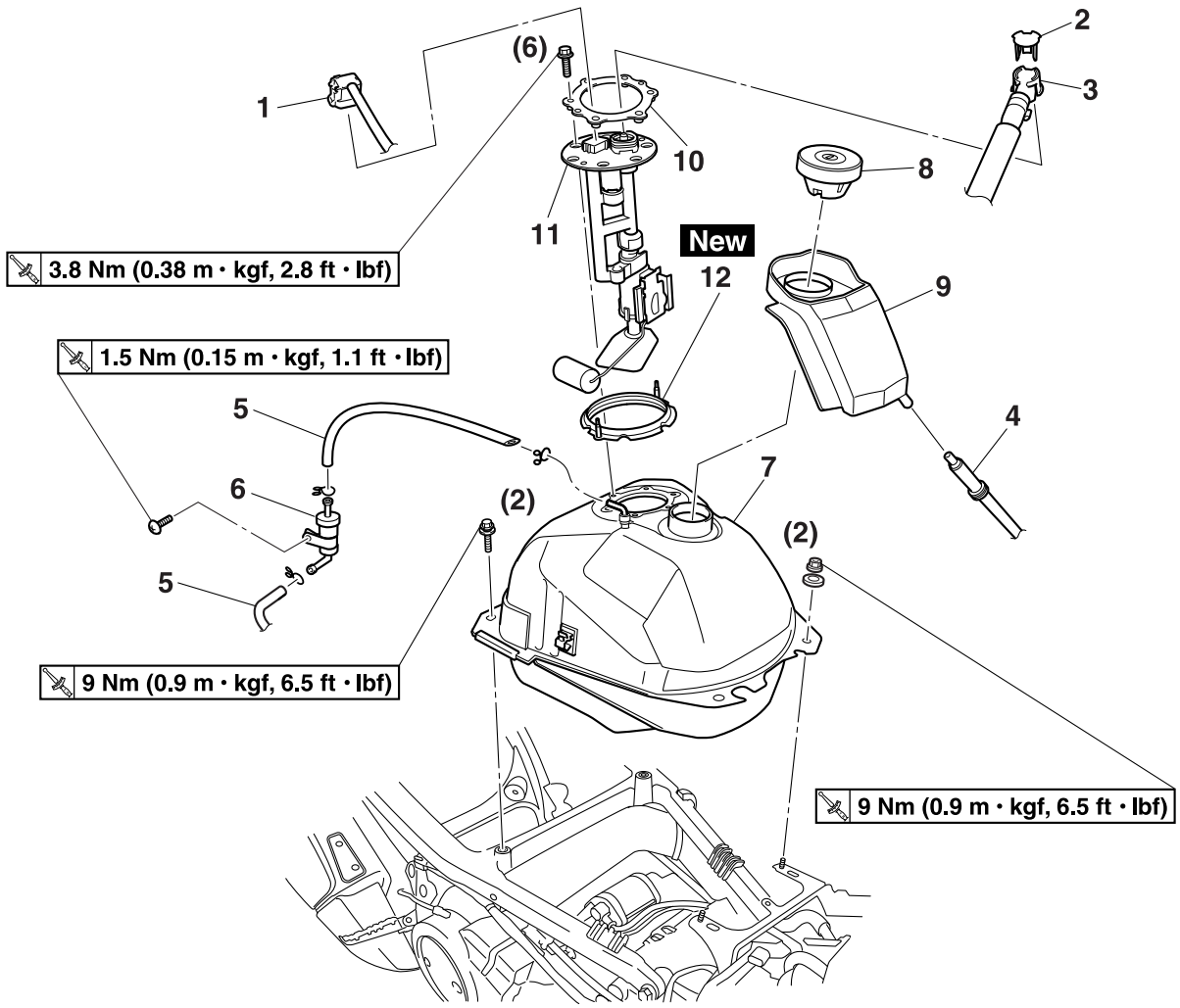
FUEL SYSTEM

FUEL TANK 7-1
REMOVING THE FUEL HOSE 7-2
REMOVING THE FUEL TANK 7-2
REMOVING THE FUEL PUMP 7-2
CHECKING THE FUEL PUMP BODY 7-2
CHECKING THE FUEL PUMP OPERATION 7-2
CHECKING THE ROLLOVER VALVE 7-2
INSTALLING THE FUEL PUMP 7-3
INSTALLING THE FUEL TANK 7-3
INSTALLING THE FUEL HOSE 7-3
CHECKING THE FUEL PRESSURE 7-3

THROTTLE BODY 7-5
REMOVING THE FUEL HOSE (INJECTOR SIDE) 7-8
CHECKING THE INJECTORS 7-8
CHECKING THE THROTTLE BODY 7-8
INSTALLING THE INJECTORS 7-8
INSTALLING THE FUEL HOSE (INJECTOR SIDE) 7-9
ADJUSTING THE THROTTLE POSITION SENSOR 7-9

EAS26620
FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel pump coupler	1	Disconnect.
2	Fuel hose connector cover	1	
3	Fuel hose	1	Disconnect.
4	Fuel tank overflow hose	1	
5	Fuel tank breather hose	2	
6	Rollover valve	1	
7	Fuel tank	1	
8	Fuel tank cap	1	
9	Filler cover	1	
10	Fuel pump bracket	1	
11	Fuel pump	1	
12	Fuel pump gasket	1	
			For installation, reverse the removal procedure.

EAS59C1701
REMOVING THE FUEL HOSE

1. Remove:
   • Fuel hose connector cover “1”
2. Disconnect:
   • Fuel hose “2”

EWA15910
⚠ WARNING

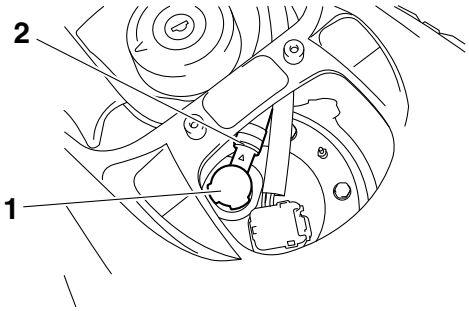
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

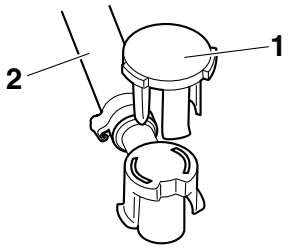
ECA59C1701
NOTICE

- **Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**
- **Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.**
- **Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.**

TIP

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





EAS26631
REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   • Fuel tank overflow hose
   • Fuel tank breather hoses
   • Rollover valve
3. Disconnect:
   • Fuel pump coupler
4. Remove:
   • Fuel tank

EAS26640
REMOVING THE FUEL PUMP

1. Remove:
   • Fuel pump bracket
   • Fuel pump
   • Fuel pump gasket

ECA14720
NOTICE

- **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 the fuel pump assembly.

EAS26690
CHECKING THE FUEL PUMP OPERATION

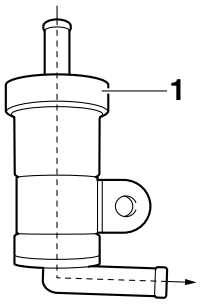
1. Check:
   • Fuel pump operation
   Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.

EAS59C1702
CHECKING THE ROLLOVER VALVE

1. Check:
   • Rollover valve “1”
   Damage/faulty → Replace.

TIP

- 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.



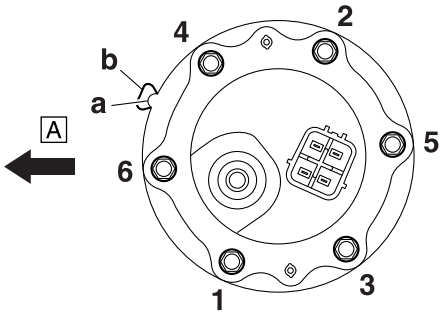
EAS59C1703
INSTALLING THE FUEL PUMP

1. Install:
   - Fuel pump gasket New
   - Fuel pump
   - Fuel pump bracket

	Fuel pump bolt **3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)**

TIP

- 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 projection “a” on the fuel pump with point “b” of the fuel tank.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



A. Forward

EAS59C1708
INSTALLING THE FUEL TANK

1. Install:
   - Fuel tank

	Fuel tank nut **9 Nm (0.9 m·kgf, 6.5 ft·lbf)** **Fuel tank bolt** **9 Nm (0.9 m·kgf, 6.5 ft·lbf)**

2. Connect:
   - Fuel pump coupler
3. Install:
   - Fuel tank overflow hose
   - Fuel tank breather hoses
   - Rollover valve

EAS59C1704
INSTALLING THE FUEL HOSE

1. Connect:
   - Fuel hose
2. Install:
   - Fuel hose connector cover

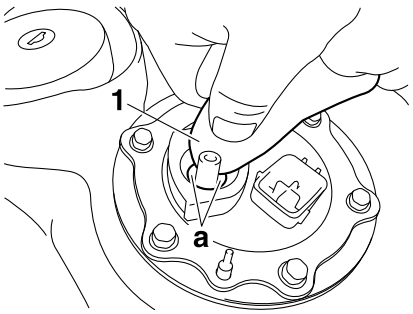
ECA59C1702

NOTICE

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

TIP

- Wipe up any fuel remaining in the recess “a” in the fuel pump with a dry rag “1”.
- After installing the fuel hose connector cover, make sure that it is installed securely.



EAS31950
CHECKING THE FUEL PRESSURE

1. Check:
   - Fuel pressure

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a. Remove the fuel hose connector cover “1” and disconnect the fuel hose “2” from the fuel pump.

EWA15910

⚠ 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 hose.

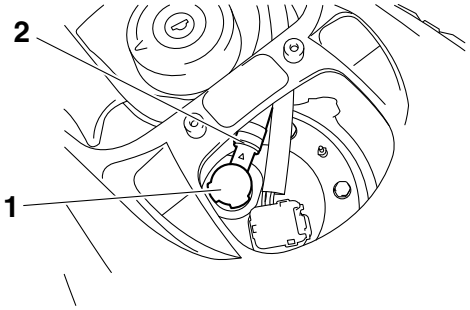
ECA59C17001

NOTICE

- **Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**
- **Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.**
- **Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.**

TIP

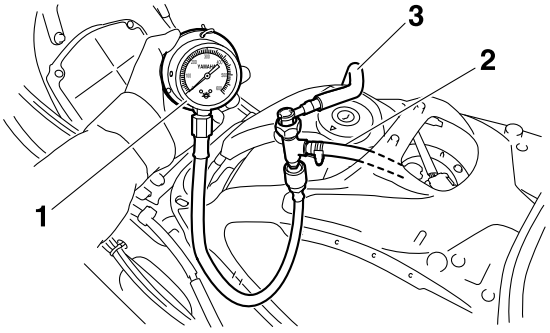
Before removing the hose, place a few rags in the area under where it will be removed.



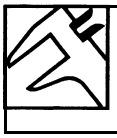
b. Connect the pressure gauge “1” and fuel pressure adapter “2” to the fuel pump and the fuel hose “3”.



Pressure gauge
90890-03153
YU-03153
Fuel pressure adapter
90890-03181
YM-03181



c. Start the engine.
d. Measure the fuel pressure.
Faulty → Replace the fuel pump.



Fuel line pressure (at idle)
220–300 kPa (2.20–3.00 kgf/cm², 31.3–42.7 psi)

e. Set the main switch to “OFF”.
f. Remove the pressure gauge and fuel pressure adapter.

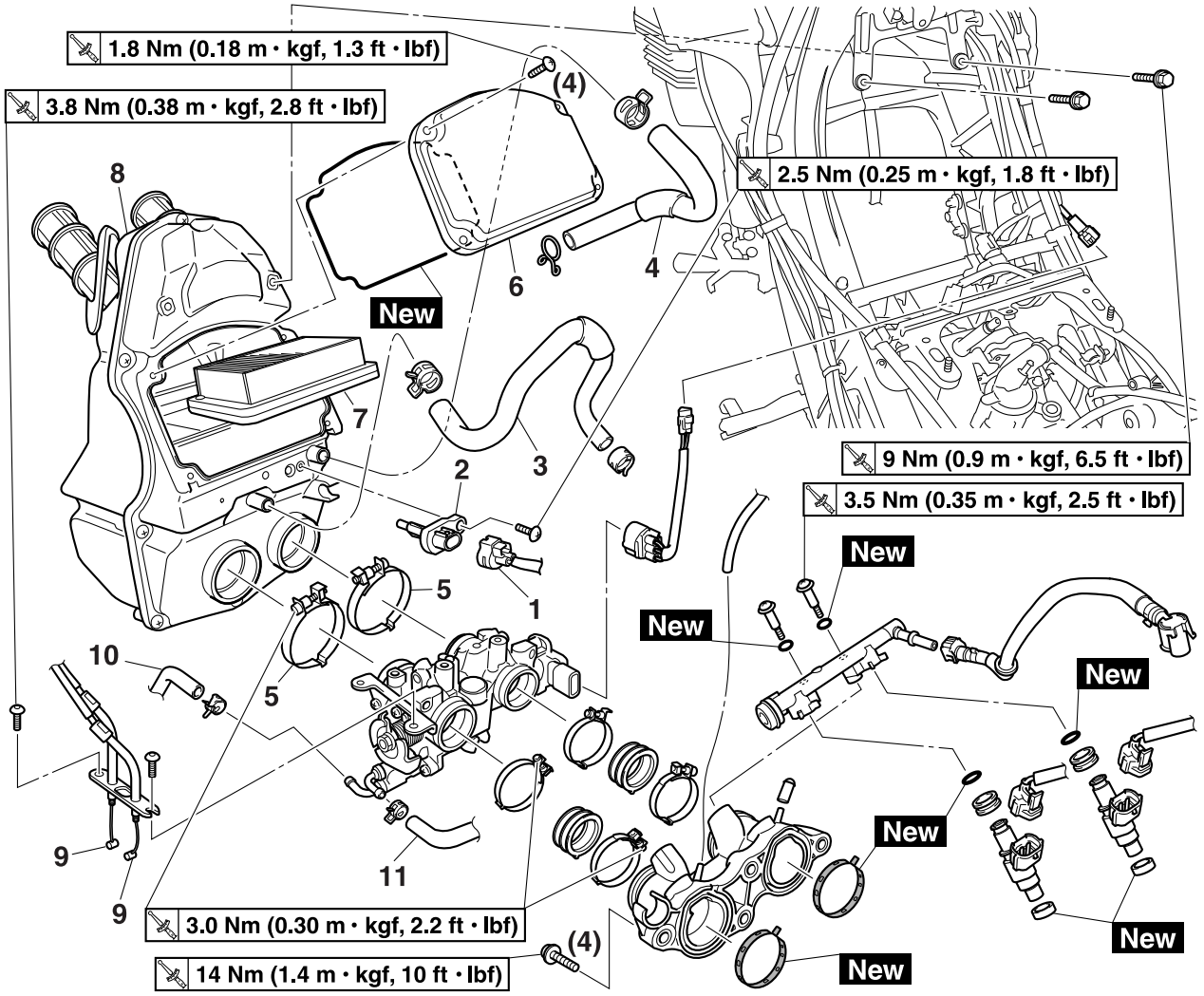
TIP

Before removing the special tools, place a few rags in the area under where they will be removed.

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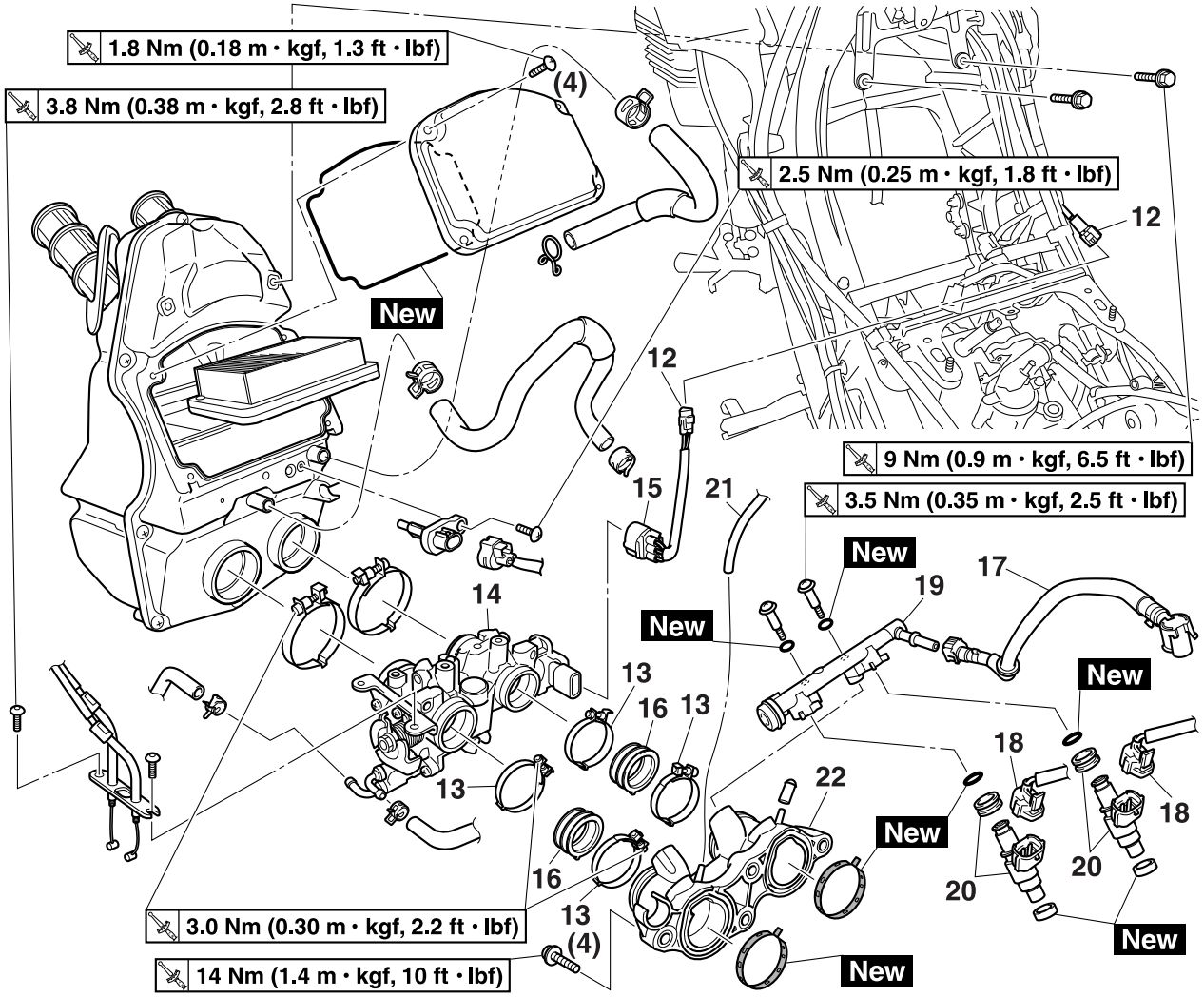
EAS26970
THROTTLE BODY

Removing the throttle body



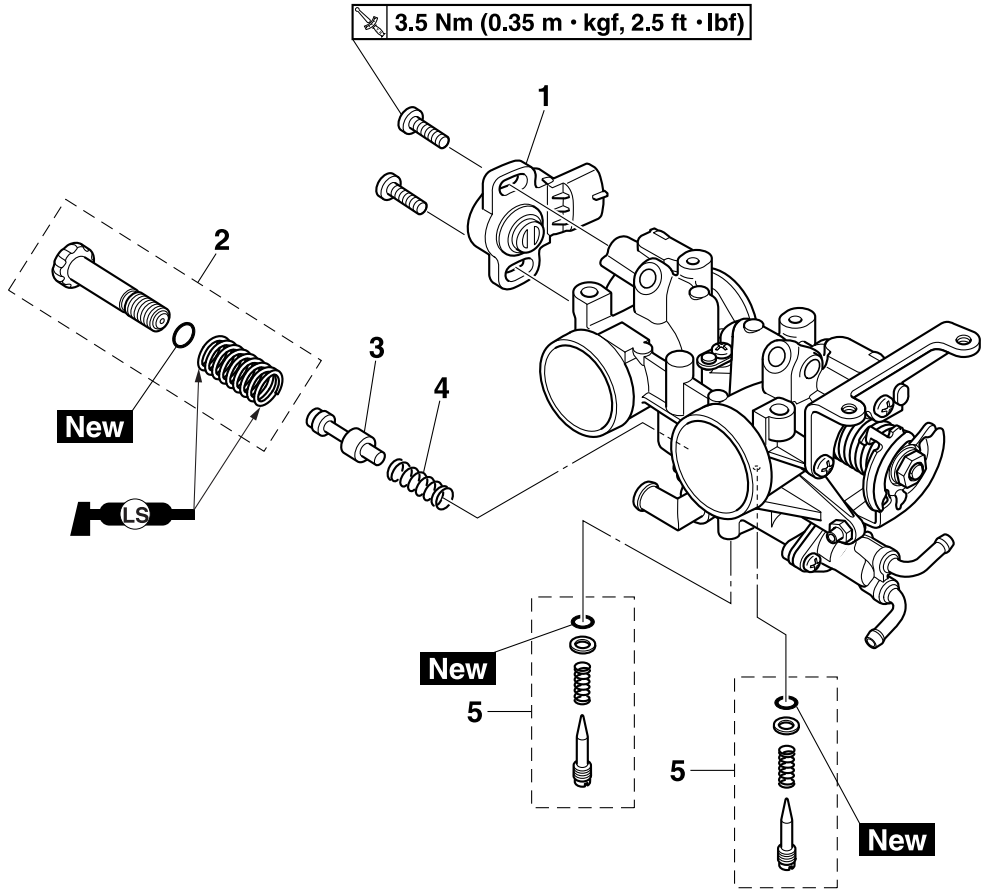
Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-30.
1	Intake air temperature sensor coupler	1	Disconnect.
2	Intake air temperature sensor	1	
3	Cylinder head breather hose	1	
4	Fast idle plunger intake hose	1	
5	Air filter case joint clamp	2	Loosen.
6	Air filter case cover	1	
7	Air filter element	1	
8	Air filter case	1	
9	Throttle cable	2	Disconnect.
10	Fast idle plunger outlet coolant hose	1	Disconnect.
11	Fast idle plunger inlet coolant hose	1	Disconnect.

Removing the throttle body



Order	Job/Parts to remove	Q'ty	Remarks
12	Throttle position sensor sub-wire harness coupler	1	Disconnect.
13	Throttle body joint clamp	4	Loosen.
14	Throttle body assembly	1	
15	Throttle position sensor sub-wire harness	1	
16	Throttle body joint	2	
17	Fuel hose	1	
18	Fuel injector coupler	2	Disconnect.
19	Fuel rail	1	
20	Fuel injector	2	
21	Intake air pressure sensor hose	1	Disconnect.
22	Intake manifold	1	
			For installation, reverse the removal procedure.

Disassembling the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
			TIP Before disassembling the throttle body assembly, make sure to note the number of times the air screw is turned out from the seated position to its set position.
1	Throttle position sensor	1	
2	Idling speed adjusting screw set	1	
3	Plunger	1	
4	Plunger spring	1	
5	Air screw set	2	
			For assembly, reverse the disassembly procedure.

EAS59C1705
REMOVING THE FUEL HOSE (INJECTOR SIDE)

1. Disconnect:
   - Fuel hose (injector side)

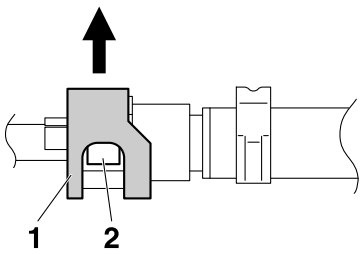
EWA15910
⚠ WARNING

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 hose.

ECA17490
NOTICE

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.

TIP
- To remove the fuel hose from the 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.
- Before removing the hose, place a few rags in the area under where it will be removed.



EAS26981
CHECKING THE INJECTORS

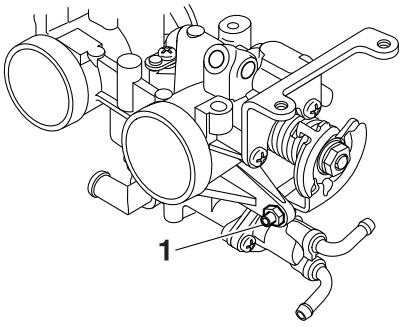
1. Check:
   - Injectors
     Obstruction → Replace and check the fuel pump/fuel supply system.
     Deposit → Replace.
     Damage → Replace.
2. Check:
   - Injector resistance
     Refer to "CHECKING THE FUEL INJECTORS" on page 8-141.

EAS26990
CHECKING THE THROTTLE BODY

1. Check:
   - Throttle body
     Cracks/damage → Replace.
2. Check:
   - Fuel passages
     Obstructions → Clean.

ECA59C1703
NOTICE

Do not adjust the stop screw "1".



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a. Wash the throttle body in a petroleum-based solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages with compressed air.

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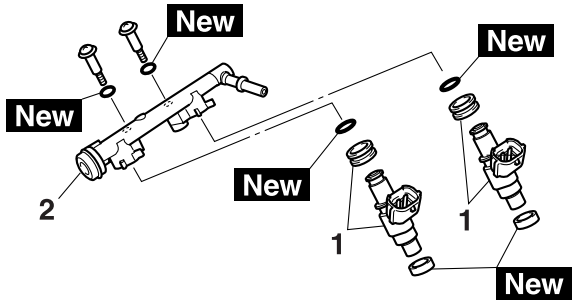
EAS31930
INSTALLING THE INJECTORS

ECA59C1704
NOTICE

- **Always use new gaskets, seals, and O-rings.**
- **When installing the injectors, do not allow any foreign material to enter or adhere to the injectors, fuel rail, seals or O-rings.**
- **Be careful not to twist or pinch the O-rings when installing the injectors.**
- **When installing the injector, install it at the same position as the removed cylinder.**
- **If an injector is subject to strong shocks or excessive force, replace it.**
- **If installing the original fuel rail and bolts, remove the white paint marks using a cleaning solvent. Otherwise, paint chips on the bolt seats could prevent the bolts from being tightened to the specified torque.**

1. Install a new O-ring onto the end of each injector.
2. Install the injectors "1" to the fuel rail "2", making sure to install them in the correct direction.

3. Install a new seal onto the end of each injector.



4. Install the injector assembly to the intake manifold with the screws and new gaskets.

	Fuel rail screw **3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)**

5. Check the fuel pressure.
   Refer to "CHECKING THE FUEL PRESSURE" on page 7-3.

EAS59C1707
INSTALLING THE FUEL HOSE (INJECTOR SIDE)

1. Connect:
   - Fuel hose (injector side)

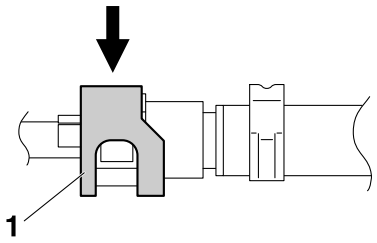
ECA59C1706

NOTICE

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.

TIP

- Install the fuel hose securely onto the fuel rail until a distinct "click" is heard.
- To install the fuel hose onto the fuel rail, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown.
- It is prohibited to wear the cotton work gloves or equivalent coverings.



EAS59C1706
ADJUSTING THE THROTTLE POSITION SENSOR

EWA59C1701

⚠ WARNING

- **Handle the throttle position sensor with special care.**
- **Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.**

TIP

Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

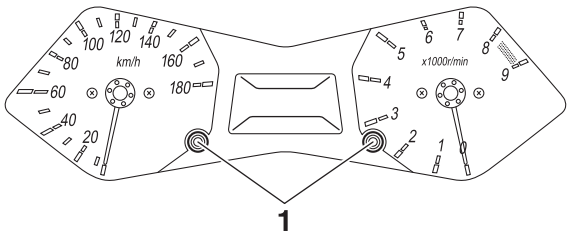
1. Check:
   - Throttle position sensor
     Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-139.
2. Adjust:
   - Throttle position sensor angle

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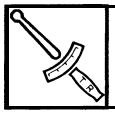
a. Temporary tighten the throttle position sensor.
b. Check that the throttle grip is fully closed.
c. Connect the throttle position sensor to the wire harness.
d. Set the main switch to "OFF" and set the engine stop switch to "⌒".
e. Simultaneously press and hold the left set and right set buttons "1", set the main switch to "ON", and continue to press the buttons for 8 seconds more.

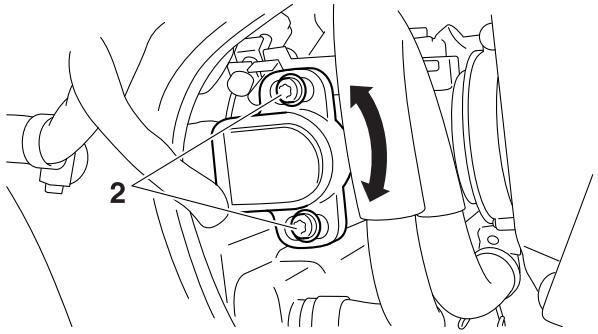
TIP

"dIAG" appears on the odometer LCD.



f. Diagnostic code number "d:01" is selected.
g. Adjust the position of the throttle position sensor angle so that 14–20 can appear in the meter.
h. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws "2".

	**Throttle position sensor screw** **3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)**



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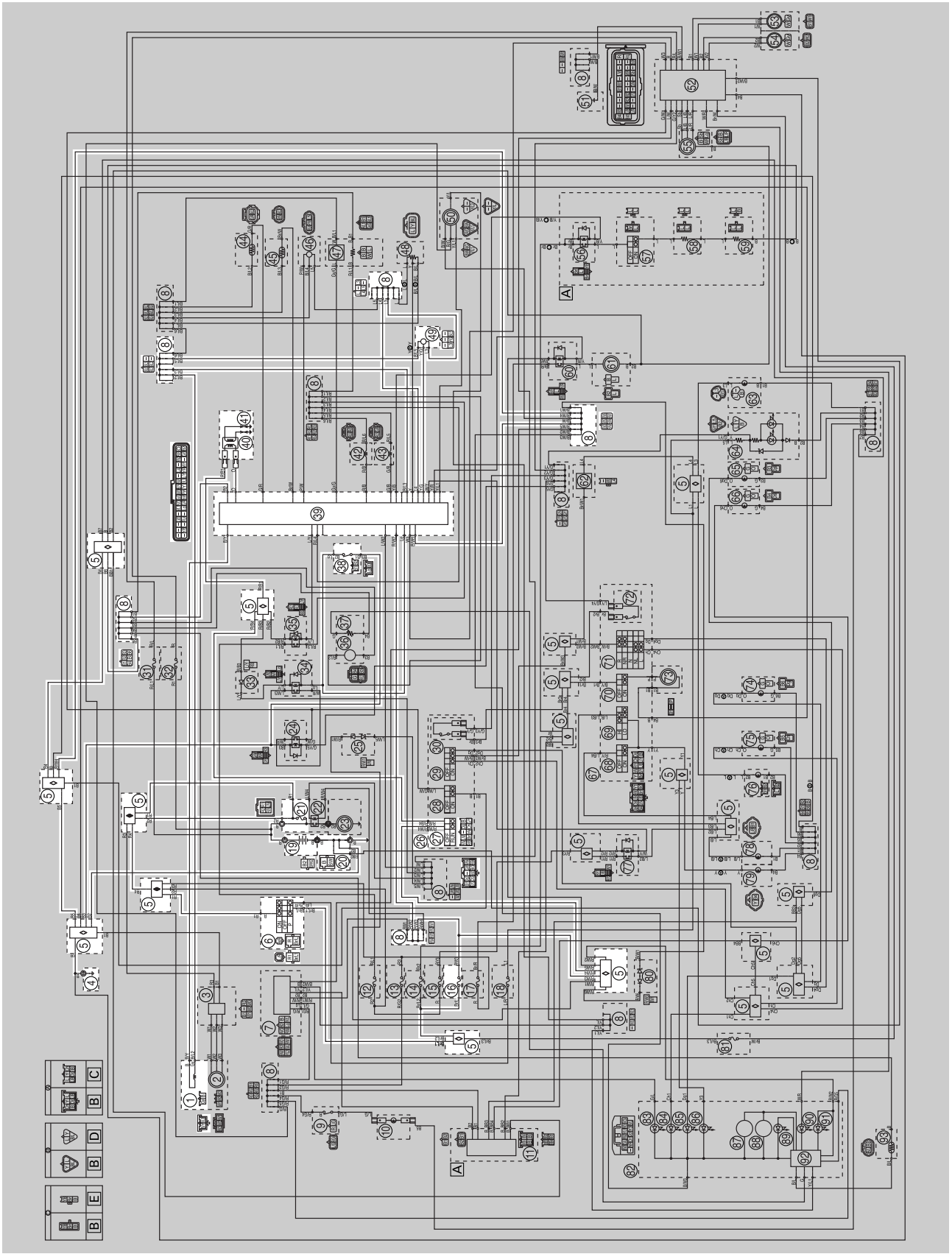
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EAS27090
IGNITION SYSTEM

EAS27110
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
26. Right handlebar switch
27. Engine stop switch
38. Sidestand switch
39. ECU (engine control unit)
40. Ignition coil
41. Spark plug
49. Lean angle sensor

EAS27140
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

TIP

- Before troubleshooting, remove the following part(s):

1. Footboards
2. Front cowling assembly

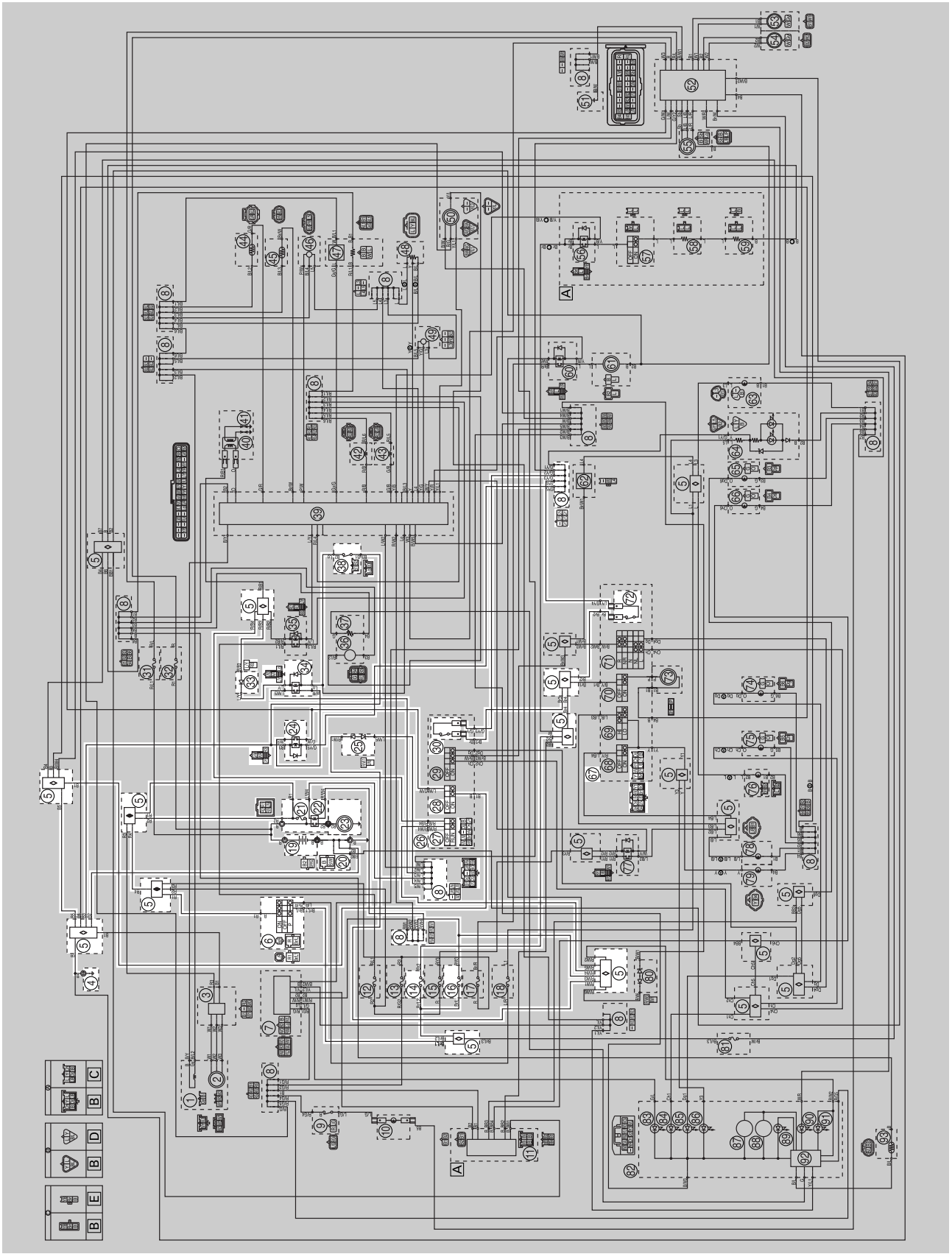
1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-127.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the spark plugs. Refer to "CHECKING THE SPARK PLUGS" on page 3-4.	NG→	Re-gap or replace the spark plugs.
OK↓		
4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-135.	OK→	Ignition system is OK.
NG↓		
5. Check the spark plug caps. Refer to "CHECKING THE SPARK PLUG CAPS" on page 8-134.	NG→	Replace the spark plug caps.
OK↓		
6. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 8-134.	NG→	Replace the ignition coil.
OK↓		
7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-135.	NG→	Replace the crankshaft position sensor/stator assembly.
OK↓		

8. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 8-123.
   NG→ Replace the main switch/immobilizer unit.
   OK↓
9. Check the engine stop switch.
   Refer to “CHECKING THE SWITCHES” on page 8-123.
   NG→ The engine stop switch is faulty. Replace the right handlebar switch.
   OK↓
10. Check the sidestand switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ Replace the sidestand switch.
    OK↓
11. Check the lean angle sensor.
    Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-135.
    NG→ Replace the lean angle sensor.
    OK↓
12. 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 (engine control unit).

EAS27160
ELECTRIC STARTING SYSTEM

EAS27170
CIRCUIT DIAGRAM



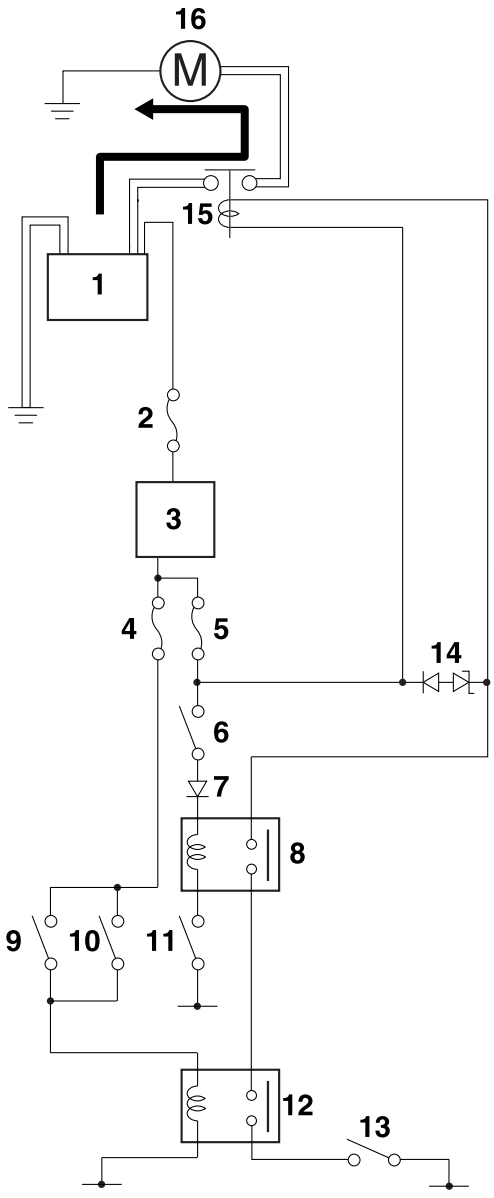
4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
14. Signaling system fuse
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
22. Starter relay
23. Starter motor
24. Starting circuit cut-off relay 2
25. Diode 1
26. Right handlebar switch
27. Engine stop switch
28. Start switch
30. Front brake light switch
33. Diode 2
34. Starting circuit cut-off relay 1
38. Sidestand switch
67. Left handlebar switch
72. Rear brake light switch

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 front brake lever is pulled to the handlebar (the front brake light switch is closed) and the sidestand is up (the sidestand switch is closed).
- The rear brake lever is pulled to the handlebar (the rear brake light switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relays 1 and 2 prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relays 1 and 2 are open so current cannot reach the starter motor. When at least one of the above conditions has been met, the starting circuit cut-off relays 1 and 2 are closed and the engine can be started by pressing the start switch "⊜".



1. Battery
2. Main fuse
3. Main switch
4. Signaling system fuse
5. Ignition fuse
6. Engine stop switch
7. Diode 2
8. Starting circuit cut-off relay 1
9. Front brake light switch
10. Rear brake light switch
11. Sidestand switch
12. Starting circuit cut-off relay 2
13. Start switch
14. Diode 1
15. Starter relay
16. Starter motor

EAS27190
TROUBLESHOOTING

The starter motor fails to turn.

TIP

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box
3. Fuel tank

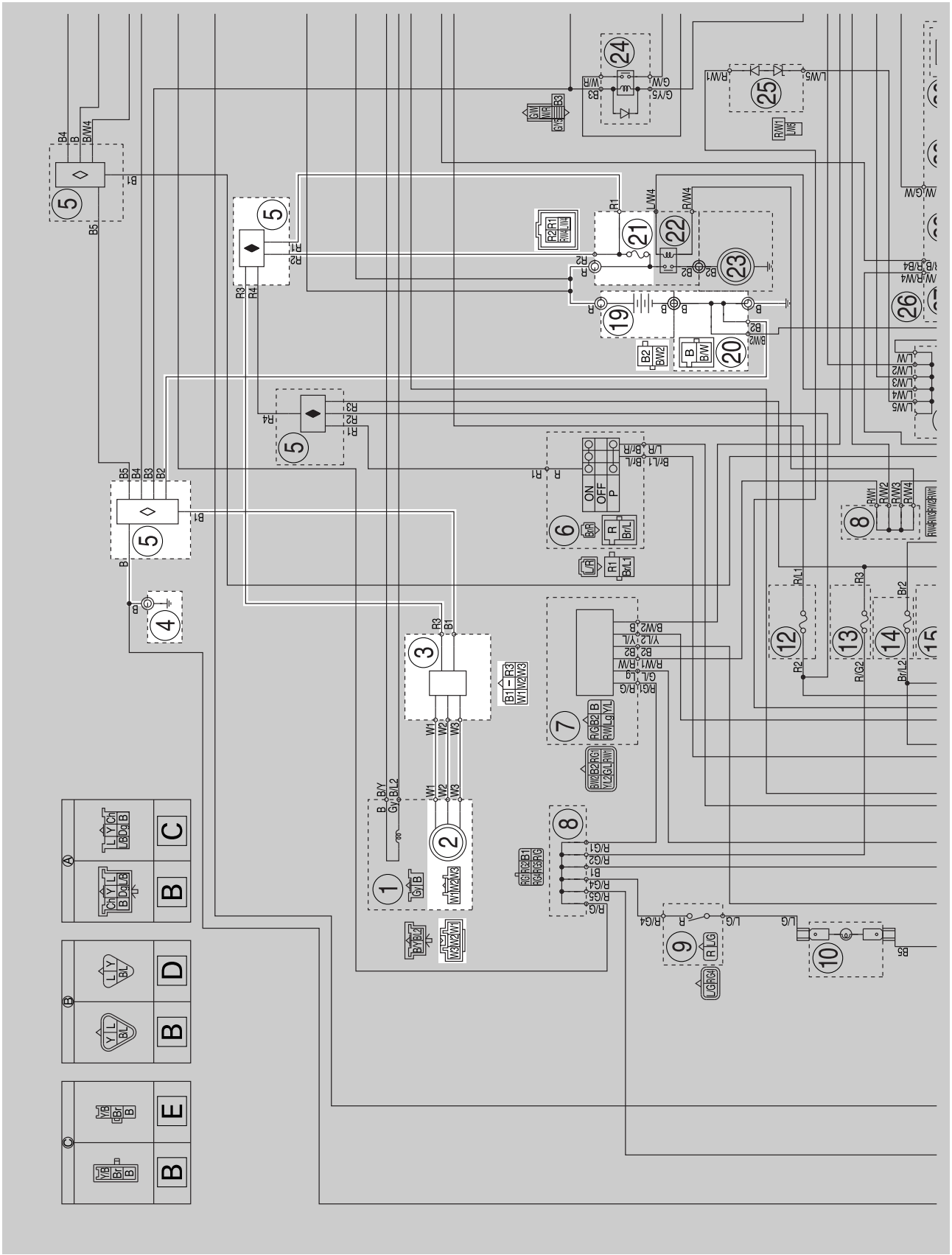
1. Check the fuses. (Main, ignition and signaling system) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the starter motor operation. Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 8-136.	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 5-37.	NG→	Repair or replace the starter motor.
OK↓		
5. Check the diode 2. Refer to “CHECKING THE DIODE” on page 8-133.	NG→	Replace the diode 2.
OK↓		
6. Check the starting circuit cut-off relay 1. Refer to “CHECKING THE RELAYS” on page 8-131.	NG→	Replace the starting circuit cut-off relay 1.
OK↓		
7. Check the starting circuit cut-off relay 2. Refer to “CHECKING THE RELAYS” on page 8-131.	NG→	Replace the starting circuit cut-off relay 2.
OK↓		

8. Check the starter relay.
   Refer to “CHECKING THE RELAYS” on page 8-131.
   NG→ Replace the starter relay.
   OK↓
9. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 8-123.
   NG→ Replace the main switch/immobilizer unit.
   OK↓
10. Check the engine stop switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ The engine stop switch is faulty. Replace the right handlebar switch.
    OK↓
11. Check the sidestand switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ Replace the sidestand switch.
    OK↓
12. Check the front brake light switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ Replace the front brake light switch.
    OK↓
13. Check the rear brake light switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ Replace the rear brake light switch.
    OK↓
14. Check the start switch.
    Refer to “CHECKING THE SWITCHES” on page 8-123.
    NG→ The start switch is faulty. Replace the right handlebar switch.
    OK↓
15. Check the entire starting system’s wiring.
    Refer to “CIRCUIT DIAGRAM” on page 8-5.
    NG→ Properly connect or repair the starting system’s wiring.
    OK↓

The starting system circuit is OK.

EAS27200
CHARGING SYSTEM

EAS27210
CIRCUIT DIAGRAM



2. AC magneto
3. Rectifier/regulator
4. Frame ground
5. Joint
19. Battery
20. Negative lead
21. Main fuse

EAS27220
TROUBLESHOOTING

The battery is not being charged.

TIP

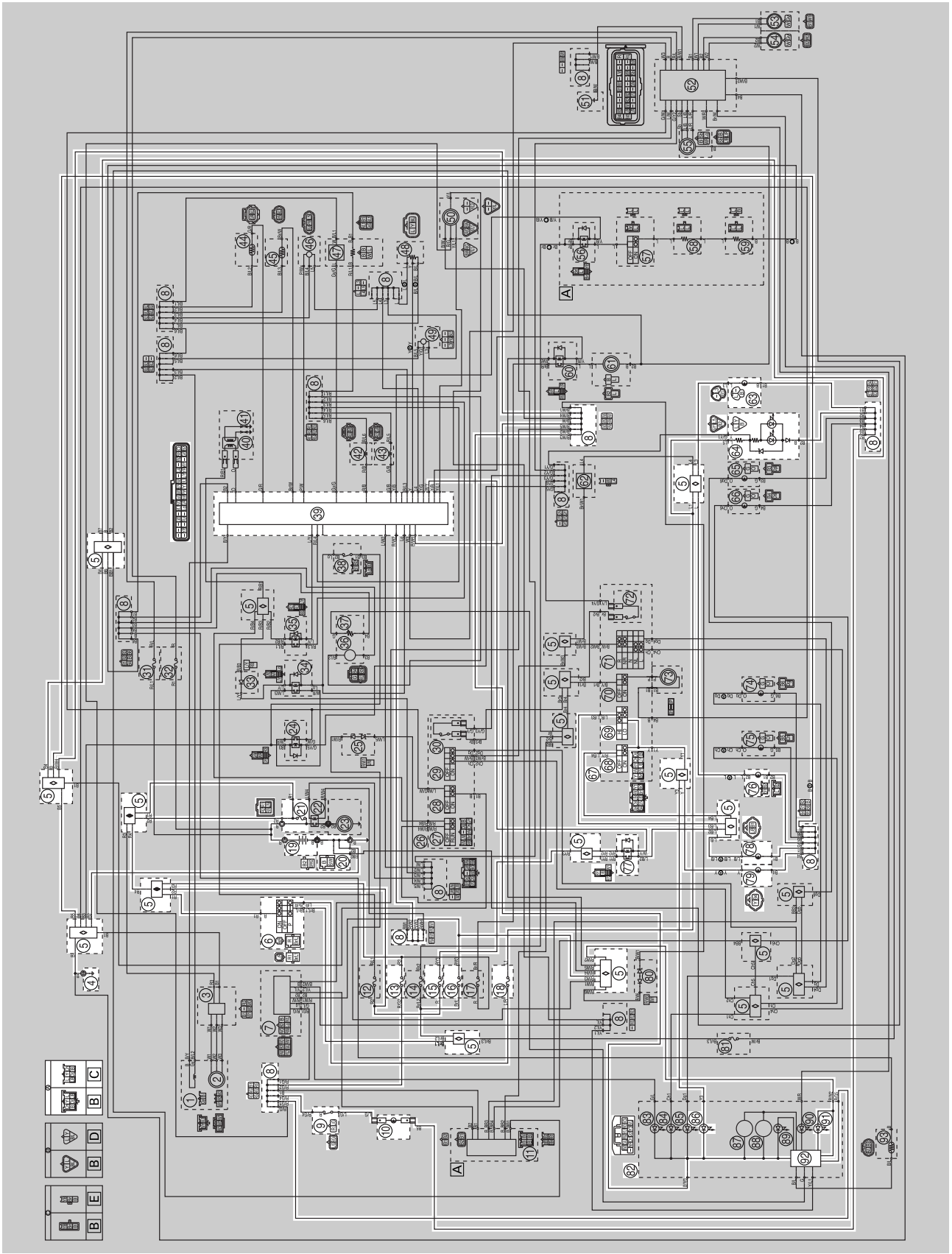
- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box

1. Check the fuse. (Main) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the stator coil. Refer to “CHECKING THE STATOR COIL” on page 8-136.	NG→	Replace the crankshaft position sensor/stator assembly.
OK↓		
4. Check the rectifier/regulator. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 8-137.	NG→	Replace the rectifier/regulator.
OK↓		
5. Check the entire charging system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-11.	NG→	Properly connect or repair the charging system’s wiring.
OK↓		
This circuit is OK.		

EAS27240
LIGHTING SYSTEM

EAS27250
CIRCUIT DIAGRAM



4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
9. Storage box light switch
10. Storage box light
13. Backup fuse
15. Headlight fuse
16. Ignition fuse
18. Parking lighting fuse
19. Battery
20. Negative lead
21. Main fuse
39. ECU (engine control unit)
63. License plate light
64. Tail/brake light
67. Left handlebar switch
68. Pass switch
69. Dimmer switch
76. Auxiliary light
77. Headlight relay
78. Headlight (low beam)
79. Headlight (high beam)
82. Meter assembly
86. High beam indicator light
91. Meter light
92. Multi-function meter

B. Wire harness
C. Headlight sub-wire harness

EAS27260
TROUBLESHOOTING

Any of the following fail to light: headlight, auxiliary light, high beam indicator light, taillight, license plate light, meter light or storage box light.

TIP

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Mudguard

1. Check the each bulbs and bulb sockets condition. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-126.	NG→	Replace the bulb(s) and bulb socket(s).
OK↓		
2. Check the fuses. (Main, headlight, ignition, parking lighting and backup) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse(s).
OK↓		
3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
4. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	Replace the main switch/immobilizer unit.
OK↓		
5. Check the dimmer switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	The dimmer switch is faulty. Replace the left handlebar switch.
OK↓		
6. Check the pass switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	The pass switch is faulty. Replace the left handlebar switch.
OK↓		
7. Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 8-131.	NG→	Replace the headlight relay.
OK↓		

8. Check the storage box light switch.
   Refer to “CHECKING THE SWITCHES” on page 8-123.

NG→ Replace the storage box light switch.

OK↓

9. Check the entire lighting system’s wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-15.

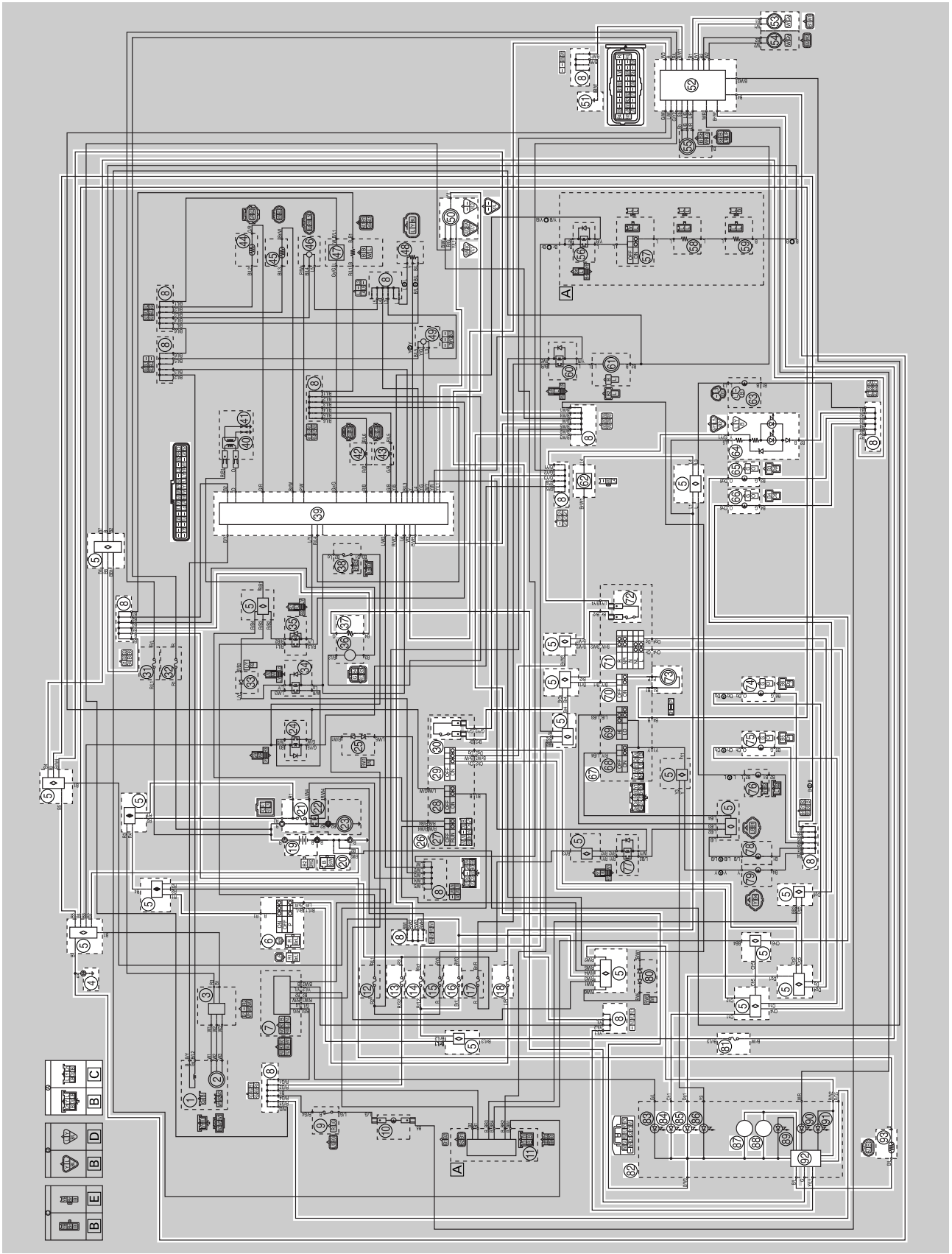
NG→ Properly connect or repair the lighting system’s wiring.

OK↓

Replace the ECU (engine control unit) or meter assembly.

EAS27270
SIGNALING SYSTEM

EAS27280
CIRCUIT DIAGRAM



4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
13. Backup fuse
14. Signaling system fuse
16. Ignition fuse
18. Parking lighting fuse
19. Battery
20. Negative lead
21. Main fuse
26. Right handlebar switch
29. Hazard switch
30. Front brake light switch
37. Fuel sender
39. ECU (engine control unit)
50. Diagnostic tool coupler
51. Wheel sensor shield ground
52. ABS ECU (electronic control unit)
53. Front wheel sensor
62. Turn signal/hazard relay
64. Tail/brake light
65. Rear right turn signal light
66. Rear left turn signal light
67. Left handlebar switch
70. Horn switch
71. Turn signal switch
72. Rear brake light switch
73. Horn
74. Front right turn signal light
75. Front left turn signal light
81. ABS ECU fuse
82. Meter assembly
84. Left turn signal indicator light
85. Right turn signal indicator light
87. Speedometer
88. Tachometer
92. Multi-function meter
93. Ambient temperature sensor

B. Wire harness
C. Headlight sub-wire harness

EAS27290
TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.
- The fuel meter fails to operate.
- The speedometer fails to operate.

TIP

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box

1. Check the fuses. (Main, ignition, signaling system, ABS ECU, parking lighting and backup) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG→	Properly connect or repair the signaling system’s wiring.
OK↓		
This circuit is OK.		

Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	The horn switch is faulty. Replace the left handlebar switch.
OK↓		
2. Check the horn. Refer to “CHECKING THE HORN” on page 8-137.	NG→	Replace the horn.
OK↓		

3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The tail/brake light fails to come on.

1. Check the front brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-123.	NG→	Replace the front brake light switch.

OK↓

2. Check the rear brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-123.	NG→	Replace the rear brake light switch.

OK↓

3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulb and socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-126.	NG→	Replace the turn signal light bulb, socket or both.

OK↓

2. Check the turn signal switch. Refer to "CHECKING THE SWITCHES" on page 8-123.	NG→	The turn signal switch is faulty. Replace the left handlebar switch.

OK↓

3. Check the hazard switch. Refer to "CHECKING THE SWITCHES" on page 8-123.	NG→	The hazard switch is faulty. Replace the right handlebar switch.

OK↓

4. Check the turn signal/hazard relay. Refer to "CHECKING THE RELAYS" on page 8-131.	NG→	Replace the turn signal/hazard relay.

OK↓

5. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

Replace the meter assembly.

The fuel meter fails to operate.

1. Check the fuel sender. Refer to "CHECKING THE FUEL SENDER" on page 8-138.	NG→	Replace the fuel pump assembly.

OK↓

2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

Replace the meter assembly.

The speedometer/V-belt replacement indicator/oil change indicator fails to operate.

1. Check the front wheel sensor. Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-21.	NG→	Replace the front wheel sensor.

OK↓

2. Check the entire wheel sensor wiring. Refer to TIP.	NG→	Properly connect or repair the wheel sensor wiring.

OK↓

Replace the hydraulic unit assembly, ECU (engine control unit) or meter assembly.

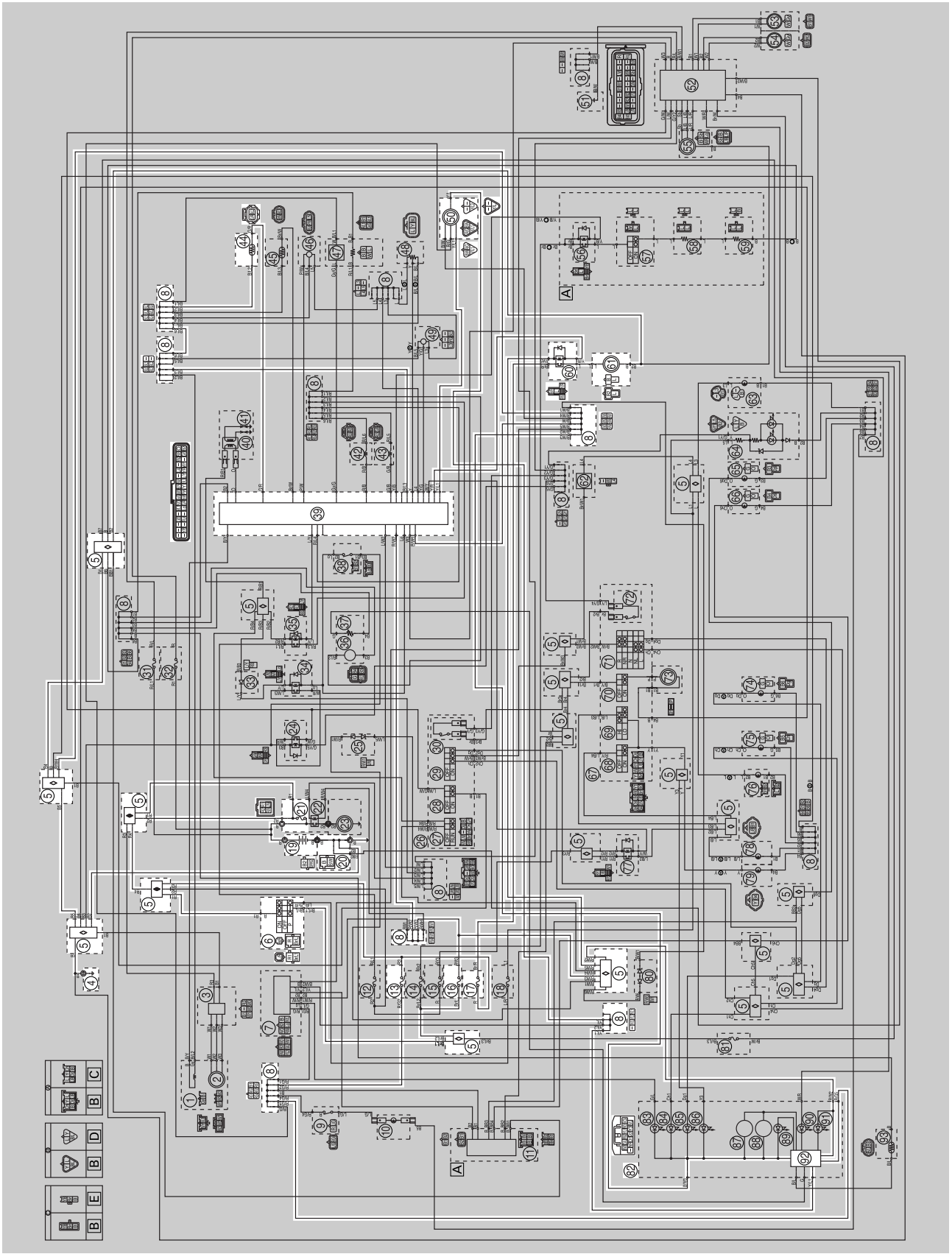
TIP

Repair or replace if there is an open or short circuit.

- Between front wheel sensor coupler and ABS ECU coupler.
  (White–White)
  (Black–Black)
- Between ABS ECU coupler and ECU (engine control unit) coupler.
  (White–White)
- Between ECU coupler and meter assembly coupler.
  (Yellow/blue–Yellow/blue)

EAS27300
COOLING SYSTEM

EAS27310
CIRCUIT DIAGRAM



4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
13. Backup fuse
16. Ignition fuse
17. Radiator fan fuse
19. Battery
20. Negative lead
21. Main fuse
39. ECU (engine control unit)
44. Coolant temperature sensor
50. Diagnostic tool coupler
60. Radiator fan motor relay
61. Radiator fan motor
82. Meter assembly
92. Multi-function meter

EAS27320
TROUBLESHOOTING

TIP

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box
3. Fuel tank

1. Check the fuses. (Main, ignition, radiator fan and backup) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the radiator fan motor. Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 8-138.	NG→	Replace the radiator fan motor.
OK↓		
5. Check the radiator fan motor relay. Refer to “CHECKING THE RELAYS” on page 8-131.	NG→	Replace the radiator fan motor relay.
OK↓		
6. Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-139.	NG→	Replace the coolant temperature sensor.
OK↓		

7. Check the entire cooling system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-25.

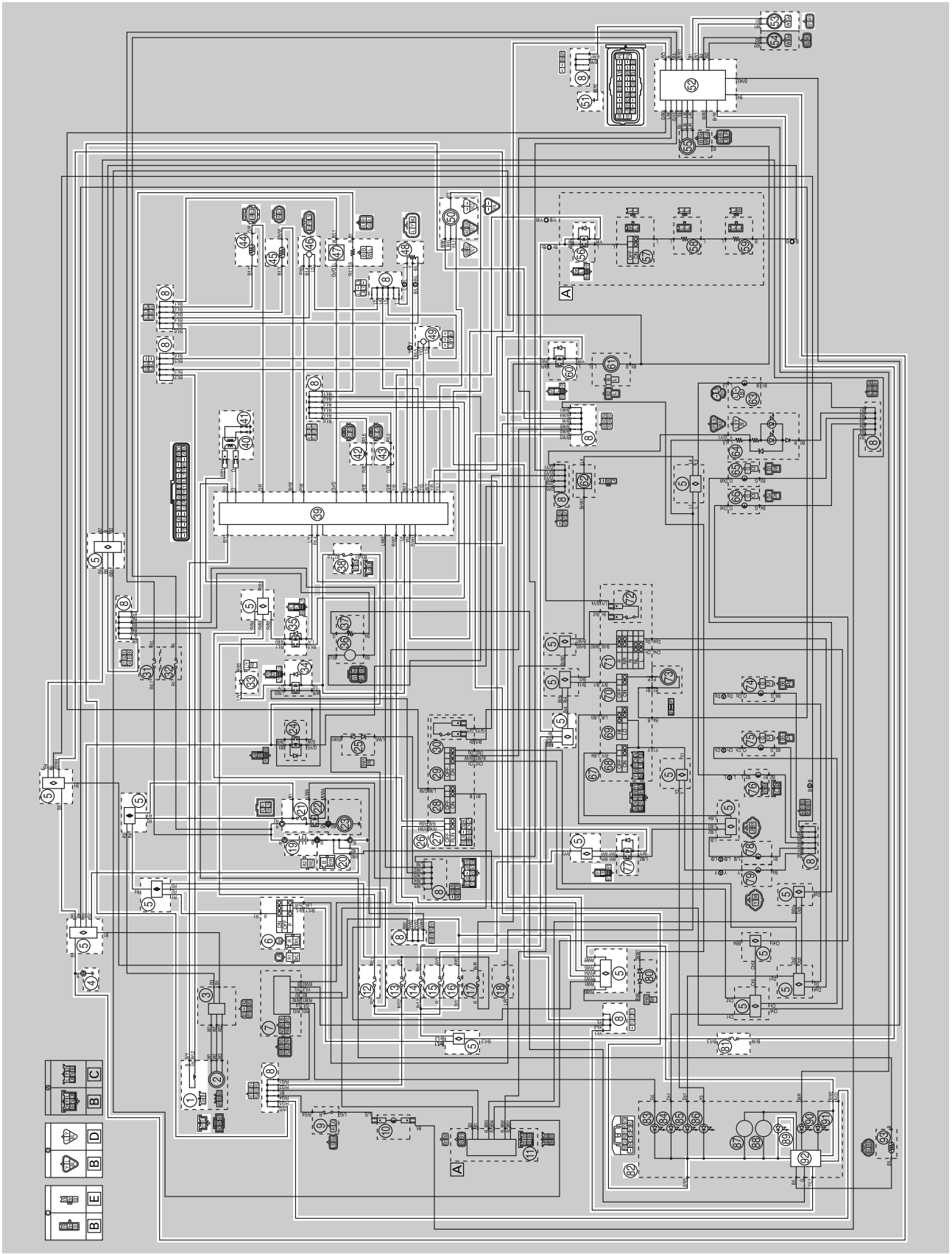
NG→ Properly connect or repair the cooling system's wiring.

OK↓

Replace the ECU (engine control unit) or meter assembly.

EAS27331
FUEL INJECTION SYSTEM

EAS27340
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
12. Fuel injection system fuse
13. Backup fuse
14. Signaling system fuse
15. Headlight fuse
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
26. Right handlebar switch
27. Engine stop switch
33. Diode 2
34. Starting circuit cut-off relay 1
35. Fuel injection system relay
38. Sidestand switch
39. ECU (engine control unit)
40. Ignition coil
41. Spark plug
42. Fuel injector #1
43. Fuel injector #2
44. Coolant temperature sensor
45. Intake air temperature sensor
46. Intake air pressure sensor
47. O_2 sensor
48. Throttle position sensor
49. Lean angle sensor
50. Diagnostic tool coupler
51. Wheel sensor shield ground
52. ABS ECU (electronic control unit)
53. Front wheel sensor
56. Grip warmer relay
60. Radiator fan motor relay
77. Headlight relay
81. ABS ECU fuse
82. Meter assembly
89. Engine trouble warning light
92. Multi-function meter

A. OPTION
B. Wire harness
D. Throttle position sensor sub-wire harness
E. Grip warmer sub-wire harness

EAS27351
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 number 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 while 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 LCD. This number 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 following conditions is present and the start switch is pushed:

12: Crankshaft position sensor

19: Sidestand switch (open circuit in the wire to the ECU)

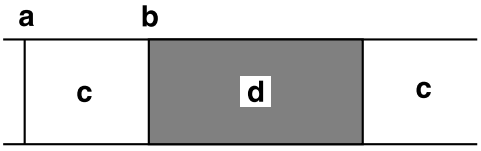
30: Lean angle sensor (latch up detected)

41: Lean angle sensor (open or short circuit)

50: ECU internal malfunction (faulty ECU memory)

Checking the engine trouble warning light

The engine trouble warning light comes on for 1.4 seconds after the main switch has been set 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

ECU detects an abnormal signal from a sensor

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 operating or stop operating, depending on the conditions.

EAS27402
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 number.
c. Identify the probable cause of the malfunction.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

2. Check and repair the probable cause of the malfunction.

Fault code No.	No fault code No.
Check and repair. Refer to “TROUBLESHOOTING DETAILS” on page 8-37. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “TROUBLESHOOTING DETAILS” on page 8-37.	Check and repair.

3. Perform the reinstatement action for the fuel injection system.
   Refer to “Reinstatement method” in the appropriate table in “TROUBLESHOOTING DETAILS” on page 8-37.
4. Set the main switch to “OFF”, then to “ON” again, and then check that no fault code number is displayed.

TIP

If another fault code number is displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to “TROUBLESHOOTING DETAILS” on page 8-37.

TIP

Setting 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 the following sensors and actuators in the diagnostic mode. Refer to “TROUBLESHOOTING DETAILS” on page 8-37.

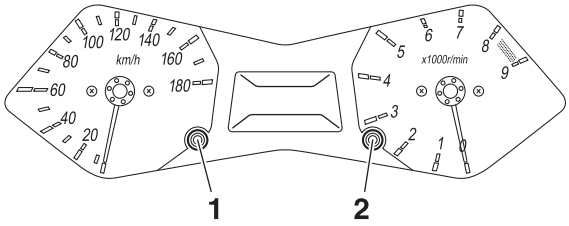
d:01: Throttle position sensor (throttle angle)
d:03: Intake air pressure sensor
d:05: Intake air temperature sensor
d:06: Coolant temperature sensor
d:07: Front wheel sensor
d:08: Lean angle sensor
d:30: Ignition coil
d:36: Injector #1
d:37: Injector #2

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 the inner parts of the engine.

EAS27431
DIAGNOSTIC MODE

Setting the diagnostic mode

1. Set the main switch to “OFF” and set the engine stop switch to “ ”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the left set button “1” and right set button “2”, set the main switch to “ON”, and continue to press the buttons for 8 seconds or more.



TIP

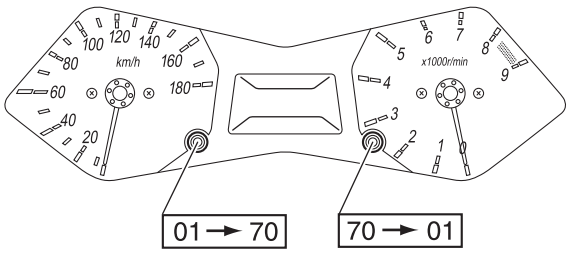
- All displays on the meter disappear except the odometer displays.
- “dIAG” appears on the odometer LCD.

4. Press the left set button to select the CO adjustment mode “Co” or the diagnostic monitoring mode “dIAG”.
5. After selecting “dIAG”, simultaneously press the left set and right set buttons for 2 seconds or more to execute the selection.
6. Set the engine stop switch to “ ”.
7. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the left set and right set buttons.

TIP

The diagnostic code number appears on the clock LCD (d:01–d:70).

- To decrease the selected diagnostic code number, press the right set button. Press the right set button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the left set button. Press the left set button for 1 second or longer to automatically increase the diagnostic code numbers.



8. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating conditions of the sensor appears on the odometer LCD.
   - Actuator operation
     Set the engine stop switch to “ ” to operate the actuator.

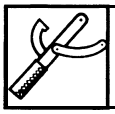
TIP

If the engine stop switch is set to “ ”, set it to “ ”, and then set it to “ ” again.

9. Set the main switch to “OFF” to cancel the diagnostic mode.

EAS59C1803
YAMAHA DIAGNOSTIC TOOL

This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



Yamaha diagnostic tool
90890-03215

Features of the Yamaha diagnostic tool

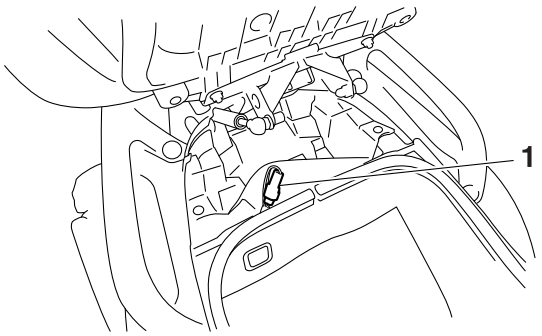
You can use the Yamaha diagnostic tool to identify malfunctions quicker than with conventional methods.
By connecting the adapter interface, which is connected to the USB port of a computer, to a vehicle's ECU using the communication cable, you can display information that is necessary for identifying malfunctions and for maintenance to display on the computer. The displayed information includes the sensor output data and information recorded in the ECU.

Functions of the Yamaha diagnostic tool

Fault diagnosis mode:	Error codes recorded on the ECU are read, and the contents are displayed.
Function diagnostic mode:	Check the operation of the output value of each sensor and actuator.
Inspection mode:	Determine whether each sensor or actuator is functioning properly.
CO adjustment mode:	Adjust the concentration of CO admissions during idling.
Monitoring mode:	Displays a graph of sensor output values for actual operating conditions.
Logging mode:	Records and saves the sensor output value in actual driving conditions.
View log:	Displays the logging data.
ECU rewrite:	If necessary, the ECU is rewritten using ECU rewrite data provided by Yamaha. Ignition timing adjustment, etc. cannot be changed from the vehicle's original state.

However, the diagnostic tool cannot be used to freely change the basic vehicle functions, such as adjusting the ignition timing.

Connecting the Yamaha diagnostic tool
Disconnect the coupler (Yellow/blue, Red/green, Black/white) “1”, and then connect the Yamaha diagnostic tool to the coupler.



TIP
When the Yamaha diagnostic tool is connected to the vehicle, the operation of the multi-function meter and indicators will be different from the normal operation.

EAS27462
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 have been completed, reset the meter display according to the reinstatement method.
Fault code No.:
Fault code number displayed on the meter when the engine failed to work normally.
Diagnostic code No.:
Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-34.

Fault code No.	**12**
Item	**Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of crankshaft position sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Crank the engine, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Crank the engine, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Black/yellow–Black/yellow Black/blue–Black/blue	Crank the engine, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Sensor installation status - Check the mounting section for loose or pinched mounting.	Incorrect installation → Reinstall or repair the sensor.	Crank the engine, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**12**
Item	**Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
5	Crankshaft position sensor malfunction	Sensor inspection procedure Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-135. Replace if defective.	Crank the engine, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

Fault code No.	**13**
Item	**Intake air pressure sensor: open or short circuit detected. (no normal signals are received from the intake air pressure sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:03**
Meter display	**Displays the intake air pressure.**
Procedure	**Set the engine stop switch to “○”, and then operate the throttle while pushing the start switch “≋”. (If the display value changes, the performance is OK.)**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of intake air pressure sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**13**
Item	**Intake air pressure sensor: open or short circuit detected. (no normal signals are received from the intake air pressure sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:03**
Meter display	**Displays the intake air pressure.**
Procedure	**Set the engine stop switch to "∩", and then operate the throttle while pushing the start switch "⊜". (If the display value changes, the performance is OK.)**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Black/blue–Black/blue Pink/white–Pink/white Blue–Blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Sensor installation status Check the mounting section for loose or pinched mounting.	Incorrect installation → Reinstall or repair the sensor.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**13**
Item	**Intake air pressure sensor: open or short circuit detected. (no normal signals are received from the intake air pressure sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:03**
Meter display	**Displays the intake air pressure.**
Procedure	**Set the engine stop switch to "○", and then operate the throttle while pushing the start switch "≋". (If the display value changes, the performance is OK.)**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
5	Intake air pressure sensor malfunction	Check in the diagnostic mode (Code No. d:03). When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m (0 ft) above sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. Incorrect indication → Sensor malfunction → Replace the intake air pressure sensor. Sensor inspection procedure Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-140.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

TIP

If fault codes 13 and 14 are indicated simultaneously, take the actions specified for fault code 13 first.

Fault code No.	**14**
Item	**Intake air pressure sensor: hose system malfunction (clogged or detached hose). Intake system malfunction (the pressure is not supplied to the intake air pressure sensor in a stable condition).**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:03**
Meter display	**Displays the intake air pressure.**
Procedure	**Set the engine stop switch to "○", and then operate the throttle while pushing the start switch "≋". (If the display value changes, the performance is OK.)**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	The intake air pressure sensor hose is damaged, disconnected, clogged, twisted or bent.	Repair or replace the sensor hose.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**14**
Item	**Intake air pressure sensor: hose system malfunction (clogged or detached hose). Intake system malfunction (the pressure is not supplied to the intake air pressure sensor in a stable condition).**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:03**
Meter display	**Displays the intake air pressure.**
Procedure	**Set the engine stop switch to "○", and then operate the throttle while pushing the start switch "≋". (If the display value changes, the performance is OK.)**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
2	Intake air pressure sensor malfunction	Check in the diagnostic mode (Code No. d:03). When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m (0 ft) above sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Replace the intake air pressure sensor. Sensor inspection procedure Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-140.	

TIP

If fault codes 13 and 14 are indicated simultaneously, take the actions specified for fault code 13 first.

Fault code No.	**15**
Item	**Throttle position sensor: open or short circuit detected. (no normal signals are received from the throttle position sensor.)**
Fail-safe system	**Under certain conditions**
	Under certain conditions
Diagnostic code No.	**d:01**
Meter display	**Throttle position sensor** **• 14–20 (fully closed position)** **• 97–107 (fully open position)**
Procedure	**• Check with throttle valves fully closed.** **• Check with throttle valves fully open.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of throttle position sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of throttle position sensor sub-wire harness coupler Check the connection of the coupler is secure. Disconnect the coupler and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Replace the wire harness. Black/blue–Black/blue Yellow–Yellow Blue–Blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Sensor installation status	Check for loose mounting, pinched mounting, or hard mounting. Make sure that the mounting position is correct. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**15**
Item	**Throttle position sensor: open or short circuit detected. (no normal signals are received from the throttle position sensor.)**
Fail-safe system	**Under certain conditions**
	Under certain conditions
Diagnostic code No.	**d:01**
Meter display	**Throttle position sensor** **• 14–20 (fully closed position)** **• 97–107 (fully open position)**
Procedure	**• Check with throttle valves fully closed.** **• Check with throttle valves fully open.**

	Item/components and probable cause	Check or maintenance job		Sensor inspection procedure
6	Supply voltage of throttle position sensor lead	Check the supply voltage. Black/blue–Yellow Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-139.		Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
		Line disconnection points	Output voltage	
		Disconnection of ground lead	5 V	
		Disconnection of output line	0 V	
		Disconnection of power supply line	0 V	
7	Throttle position sensor malfunction	Check in the diagnostic mode (Code No. d:01). When throttle is fully closed: A value of 14–20 is indicated. When throttle is fully open: A value of 97–107 is indicated. If the indication is outside of range → Replace the throttle position sensor.		Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
8	ECU malfunction	Replace the ECU.		

TIP

If fault codes 15 and 16 are indicated simultaneously, take the actions specified for fault code 15 first.

Fault code No.	**16**
Item	**Throttle position sensor: stuck throttle position sensor detected. (signal from throttle position sensor will not change.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:01**
Meter display	**Throttle position sensor** **• 14–20 (fully closed position)** **• 97–107 (fully open position)**
Procedure	**• Check with throttle valves fully closed.** **• Check with throttle valves fully open.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Sensor installation status	Check for loose mounting, pinched mounting, or hard mounting. Make sure that the mounting position is correct. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.	Place the main switch to the ON position, and then open and close the throttle. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Throttle position sensor malfunction	Check in the diagnostic mode (Code No. d:01). When throttle is fully closed: A value of 14–20 is indicated. When throttle is fully open: A value of 97–107 is indicated. If the indication is outside of range → Replace the throttle position sensor.	Place the main switch to the ON position, and then open and close the throttle. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	ECU malfunction	Replace the ECU.	

TIP

- If fault codes 15 and 16 are indicated simultaneously, take the actions specified for fault code 15 first.
- If fault codes 16 and 37 are indicated simultaneously, take the actions specified for fault code 16 first.

Fault code No.	**19**
Item	**Sidestand switch: a break or disconnection of the light green lead of the ECU is detected. (no normal signals are received from the sidestand switch.)**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:20**
Meter display	**Sidestand switch** **• ON (sidestand retracted)** **• OFF (sidestand extended)**
Procedure	**Extend and retract the sidestand.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of sidestand switch coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication when the sidestand is retracted and extended. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication when the sidestand is retracted and extended. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Light green–Light green Black–Black	Place the main switch to the ON position, and check the fault code indication when the sidestand is retracted and extended. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Sidestand switch malfunction	Check in the diagnostic mode (Code No. d:20). Sidestand retracted: ON indication Sidestand extended: OFF indication Indication is incorrect. → Replace the sidestand switch.	Place the main switch to the ON position, and check the fault code indication when the sidestand is retracted and extended. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	ECU malfunction	Replace the ECU.	

Fault code No.	**21**
Item	**Coolant temperature sensor: open or short circuit detected. (no normal signals are received from the coolant temperature sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:06**
Meter display	**Displays the coolant temperature.**
Procedure	**Compare the actually measured coolant temperature with the meter display value.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of coolant temperature sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness Black/blue–Black/blue Green/red–Green/red	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Installation status of coolant temperature sensor Check the mounting section for a loose or pinched mounting.	Make sure that the mounting position is correct.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Coolant temperature sensor malfunction	Check in the diagnostic mode (Code No. d:06). During cold starting: A temperature close to the ambient temperature is indicated. Indication is incorrect. → Replace the coolant temperature sensor. Sensor inspection procedure. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-139.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**21**		
Item	**Coolant temperature sensor: open or short circuit detected. (no normal signals are received from the coolant temperature sensor.)**		
Fail-safe system	**Able to start engine**		
	Able to drive vehicle		
Diagnostic code No.	**d:06**		
Meter display	**Displays the coolant temperature.**		
Procedure	**Compare the actually measured coolant temperature with the meter display value.**		
	Item/components and probable cause	**Check or maintenance job**	**Sensor inspection procedure**
6	ECU malfunction	Replace the ECU.	

TIP

Work in a complete cold-engine condition.

Fault code No.	**22**		
Item	**Intake air temperature sensor: open or short circuit detected. (no normal signals are received from the intake air temperature sensor.)**		
Fail-safe system	**Able to start engine**		
	Able to drive vehicle		
Diagnostic code No.	**d:05**		
Meter display	**Displays the intake air temperature.**		
Procedure	**Compare the actually measured intake air temperature with the meter display value.**		
	Item/components and probable cause	**Check or maintenance job**	**Sensor inspection procedure**
1	Connection of intake air temperature sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Black/blue–Black/blue Brown/white–Brown/white	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**22**
Item	**Intake air temperature sensor: open or short circuit detected. (no normal signals are received from the intake air temperature sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:05**
Meter display	**Displays the intake air temperature.**
Procedure	**Compare the actually measured intake air temperature with the meter display value.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
4	Installation status of intake air temperature sensor Check the mounting section for a loose or pinched mounting.	Make sure that the mounting position is correct.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Intake air temperature sensor malfunction	Check in the diagnostic mode (Code No. d:05). Sensor inspection procedure Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-140. During cold starting: A temperature close to the ambient temperature is indicated. Indication is incorrect. → Replace the intake air temperature sensor.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU	

TIP

Work in a complete cold-engine condition.

Fault code No.	**24**
Item	**O_2 sensor: Not activated. (no normal signals are received from the O_2 sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	O_2 sensor installation status	Check the sensor for a loose mounting or a pinch	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of O_2 sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Connect it securely, or repair/replace the wire harness. Black/blue–Black/blue Gray/green–Gray/green Red/blue–Red/blue Black–Black	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Check the fuel pressure.	Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**24**
Item	**O_2 sensor: Not activated. (no normal signals are received from the O_2 sensor.)**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
6	O_2 sensor malfunction	Check the O_2 sensor for an abnormality. Refer to "ENGINE REMOVAL" on page 5-3. O_2 sensor malfunction → Replace the O_2 sensor.	Either start and warm up the engine, and then racing it, or reset it with diagnostic code No. d:63. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
7	ECU malfunction	Replace the ECU.	

Fault code No.	**30**
Item	**Latch up detected.** **No normal signals are received from the lean angle sensor.**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:08**
Meter display	**Lean angle sensor output voltage** **• 0.4–1.4 (upright)** **• 3.7–4.4 (overturned)**
Procedure	**Remove the lean angle sensor and incline it more than 45 degrees.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Turnover of vehicle	Raise the vehicle to the upright position	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**30**
Item	**Latch up detected.** **No normal signals are received from the lean angle sensor.**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:08**
Meter display	**Lean angle sensor output voltage** **• 0.4–1.4 (upright)** **• 3.7–4.4 (overturned)**
Procedure	**Remove the lean angle sensor and incline it more than 45 degrees.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
2	Sensor installation status	Check for a loose mounting, pinched mounting, or sensor mounting direction (up or down). Make sure that the mounting position is correct.	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Lean angle sensor malfunction	Check in the diagnostic mode (Code No. d:08). Sensor inspection procedure Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-135. In vertical position: 0.4–1.4 V When turned over: 3.7–4.4 V Indication is incorrect. → Replace the lean angle sensor.	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	ECU malfunction	Replace the ECU.	

Fault code No.	**33**
Item	**Ignition coil: open or short circuit detected in the primary lead of the ignition coil. (no normal signals are received from the ignition system.)**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:30**
Actuation	**Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.**
Procedure	**Check that a spark is generated five times.** **• Connect an ignition checker.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of ignition coil connectors Check the connection of the connectors is secure. Disconnect the connectors, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely or replace the wire harness.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely or replace the wire harness.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Orange–Orange	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Ignition coil installation status Check the mounting section for a loose or pinched mounting.	Make sure that the mounting position is correct.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**33**
Item	**Ignition coil: open or short circuit detected in the primary lead of the ignition coil. (no normal signals are received from the ignition system.)**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:30**
Actuation	**Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.**
Procedure	**Check that a spark is generated five times.** **• Connect an ignition checker.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
5	Ignition coil malfunction (Check the continuity of primary coil.)	Ignition coil inspection method Refer to “CHECKING THE IGNITION COIL” on page 8-134.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Check in the diagnostic mode (Code No. d:30). If not ignited, replace the defective ECU.	

Fault code No.	**37**
Item	**Engine speed is high when the engine is idling.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Incorrect front wheel sensor signal.	Check the front wheel sensor. Check in the diagnostic mode (Code No. d:07). Front wheel stop: The pulse integrated value should be constant. Rotate the front wheel a few turns manually and enter the speed pulse: The pulse integrated value will be added. Indication is incorrect. → Refer to Fault code No. 42	Start and idle the engine for approximately 10 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**37**
Item	**Engine speed is high when the engine is idling.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
2	Throttle valve does not fully close.	• Check the throttle body. Refer to "THROTTLE BODY" on page 7-5. • Check the throttle cables. Refer to "CHECKING THE THROTTLE GRIP" on page 3-32.	Start and idle the engine for approximately 10 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Stuck fast idle plunger detected.	• Check the throttle body. Refer to "THROTTLE BODY" on page 7-5.	Start and idle the engine for several minutes. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	ECU malfunction	Replace the ECU.	

TIP

- Do not remove the fast idle plunger.
- If fault codes 16 and 37 are indicated simultaneously, take the actions specified for fault code 16 first.
- If fault codes 37 and 42 are indicated simultaneously, take the actions specified for fault code 42 first.
- If fault codes 37 and 46 are indicated simultaneously, take the actions specified for fault code 46 first.

Fault code No.	**41**
Item	**Lean angle sensor: open or short circuit detected. (no normal signals are received from the lean angle sensor.)**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:08**
Meter display	**Lean angle sensor output voltage** **• 0.4–1.4 (upright)** **• 3.7–4.4 (overturned)**
Procedure	**Remove the lean angle sensor and incline it more than 45 degrees.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of lean angle sensor coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the harness.	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness	Open or short circuit → Replace the wire harness. Black/blue–Black/blue Yellow/green–Yellow/green Blue–Blue	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**41**
Item	**Lean angle sensor: open or short circuit detected. (no normal signals are received from the lean angle sensor.)**
Fail-safe system	**Unable to start engine**
	Unable to drive vehicle
Diagnostic code No.	**d:08**
Meter display	**Lean angle sensor output voltage** **• 0.4–1.4 (upright)** **• 3.7–4.4 (overturned)**
Procedure	**Remove the lean angle sensor and incline it more than 45 degrees.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
4	Lean angle sensor malfunction	Check in the diagnostic mode (Code No. d:08). Sensor inspection procedure Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-135. In vertical position: 0.4–1.4 V When turned over: 3.7–4.4 V Indication is incorrect. → Replace the lean angle sensor.	Rotate the main switch to the OFF position first, and then rotate it to the ON position again. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	ECU malfunction	Replace the ECU.	

Fault code No.	**42**
Item	**No normal signals are received from the front wheel sensor.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:07**
Meter display	**Vehicle speed pulses: 0–999**
Procedure	**Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of front wheel sensor (meter) coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the “ON” position and then rotate the front wheel a few turns manually to enter the speed pulse. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**42**
Item	**No normal signals are received from the front wheel sensor.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:07**
Meter display	**Vehicle speed pulses: 0–999**
Procedure	**Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
2	Connection of wire harness ABS ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the "ON" position and then rotate the front wheel a few turns manually to enter the speed pulse. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the "ON" position and then rotate the front wheel a few turns manually to enter the speed pulse. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Replace the wire harness. • Between front wheel sensor coupler and ABS ECU coupler. (White–White) (Black–Black) • Between ABS ECU coupler and ECU coupler. (White–White)	Place the main switch to the "ON" position and then rotate the front wheel a few turns manually to enter the speed pulse. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.	**42**
Item	**No normal signals are received from the front wheel sensor.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**d:07**
Meter display	**Vehicle speed pulses: 0–999**
Procedure	**Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
5	Front wheel sensor malfunction	Check the front wheel sensor. Check in the diagnostic mode (Code No. d:07). Front wheel stop: The pulse integrated value should be constant. Rotate the front wheel a few turns manually and enter the speed pulse: The pulse integrated value will be added. Indication is incorrect. → Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-21	Place the main switch to the "ON" position and then rotate the front wheel a few turns manually to enter the speed pulse. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU or ABS ECU malfunction	Replace the ECU or ABS ECU.	

TIP

If fault codes 37 and 42 are indicated simultaneously, take the actions specified for fault code 42 first.

Fault code No.		**43**
Item		**Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.**
Fail-safe system		**Able to start engine**
		Able to drive vehicle
Diagnostic code No.		**d:09, d:50**
d:09	**Meter display**	**Fuel system voltage (battery voltage) Approximately 12.0**
	Procedure	**Set the engine stop switch to "∩", and then compare the actually measured battery voltage with the meter display value. (If the actually measured battery voltage is low, recharge the battery.)**
d:50	**Actuation**	**Actuates the fuel injection system relay five times at one-second intervals. Illuminates the engine trouble warning light.**
	Procedure	**Check that the fuel injection system relay is actuated five times by listening for the operating sound.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of fuel injection system relay coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Continuity of wire harness between the battery, main fuse, fuel injection system fuse, fuel injection system relay and ECU	Open or short circuit → Replace the wire harness. Red–Red Red/blue–Red/blue	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Fuel injection system relay malfunction	Check in the diagnostic mode (Code No. d:50). No operation sound of fuel injection system relay is heard. → Replace the fuel injection system relay.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.

Fault code No.		**43**
Item		**Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.**
Fail-safe system		**Able to start engine**
		Able to drive vehicle
Diagnostic code No.		**d:09, d:50**
d:09	**Meter display**	**Fuel system voltage (battery voltage) Approximately 12.0**
	Procedure	**Set the engine stop switch to "○", and then compare the actually measured battery voltage with the meter display value. (If the actually measured battery voltage is low, recharge the battery.)**
d:50	**Actuation**	**Actuates the fuel injection system relay five times at one-second intervals. Illuminates the engine trouble warning light.**
	Procedure	**Check that the fuel injection system relay is actuated five times by listening for the operating sound.**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
5	Fuel injection system relay malfunction	Check in the diagnostic mode (Code No. d:09) Fuel-related voltage: 3 V or less → Replace the fuel injection system relay.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

Fault code No.		**44**
Item		**Error is detected while reading or writing on EEPROM (CO adjustment value).**
Fail-safe system		**Under certain conditions**
		Under certain conditions
Diagnostic code No.		**d:60**
Meter display		**EEPROM fault code display • 00 (no history) • 01 or 02: Cylinder fault code number (history exists) If both cylinders are defective, the display alternates every two seconds.**
Procedure		**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Locate the malfunction.	Check in the diagnostic mode (Code No. d:60) 00 indication: Check number 4. 01 indication: Check number 2. 02 indication: Check number 3.	—

Fault code No.	**44**
Item	**Error is detected while reading or writing on EEPROM (CO adjustment value).**
Fail-safe system	**Under certain conditions**
	Under certain conditions
Diagnostic code No.	**d:60**
Meter display	**EEPROM fault code display** **• 00 (no history)** **• 01 or 02: Cylinder fault code number (history exists)** **If both cylinders are defective, the display alternates every two seconds.**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
2	"01" is indicated in Diagnostic mode (Code No. d:60) EEPROM data error for adjustment of CO concentration of cylinder #1	Change the CO concentration of cylinder #1, and rewrite in EEPROM. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-11. After this adjustment is made, the main switch is set to OFF.	Place the main switch to the ON position. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Return to Step 1 to carry out the check again. If the condition persists, proceed to Step 4.
3	"02" is indicated in Diagnostic mode (Code No. d:60) EEPROM data error for adjustment of CO concentration of cylinder #2	Change the CO concentration of cylinder #2, and rewrite in EEPROM. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-11. After this adjustment is made, the main switch is set to OFF.	Place the main switch to the ON position. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Return to Step 1 to carry out the check again. If the condition persists, proceed to Step 4.
4	ECU malfunction	Replace the ECU	

Fault code No.	**46**		
Item	**Incorrect voltage is supplied to the ECU.**		
Fail-safe system	**Able to start engine**		
	Able to drive vehicle		
Diagnostic code No.	**—**		
Meter display	**—**		
Procedure	**—**		
	Item/components and probable cause	**Check or maintenance job**	**Sensor inspection procedure**
1	Charging system malfunction	Check the charging system. Refer to “CHARGING SYSTEM” on page 8-11. Check the rectifier/regulator, AC magneto and wire harness. → Replace if defective.	Start and idle the engine for approximately 5 seconds. Then, check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Recheck.

TIP

If fault codes 37 and 46 are indicated simultaneously, take the actions specified for fault code 46 first.

Fault code No.	**50**		
Item	**Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)**		
Fail-safe system	**Unable to start engine**		
	Unable to drive vehicle		
Diagnostic code No.	**—**		
Meter display	**—**		
Procedure	**—**		
	Item/components and probable cause	**Check or maintenance job**	**Sensor inspection procedure**
1	ECU malfunction	Replace the ECU.	Place the main switch to the ON position. Then, check that no fault code indicated.

Fault code No.	**Er-1**
Item	**ECU internal malfunction (output signal error): no signals are received from the ECU.**
Fail-safe system	**Able to start engine (Unable if ECU Failure)**
	Able to drive vehicle (Unable if ECU Failure)
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of meter coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of diagnostic tool coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Connect it securely, or repair/replace the wire harness. Yellow/blue–Yellow/blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Abnormal meter unit operation	Replace the meter assembly.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

Fault code No.	**Er-2**
Item	**ECU internal malfunction (output signal error): no signals are received from the ECU within the specified duration.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of meter coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of diagnostic tool coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Connect it securely, or repair/replace the wire harness. Yellow/blue–Yellow/blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Abnormal meter unit operation	Replace the meter assembly.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

Fault code No.	**Er-3**
Item	**ECU internal malfunction (output signal error): data from the ECU cannot be received correctly.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of meter coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of diagnostic tool coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Connect it securely, or repair/replace the wire harness. Yellow/blue–Yellow/blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Abnormal meter unit operation	Replace the meter assembly.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

Fault code No.	**Er-4**
Item	**ECU internal malfunction (input signal error): non-registered data has been received from the meter.**
Fail-safe system	**Able to start engine**
	Able to drive vehicle
Diagnostic code No.	**—**
Meter display	**—**
Procedure	**—**

	Item/components and probable cause	Check or maintenance job	Sensor inspection procedure
1	Connection of meter coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
2	Connection of wire harness ECU coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
3	Connection of diagnostic tool coupler Check the connection of the coupler is secure. Disconnect the coupler, and check each pin (for bending, wear, or locking).	Poor connection → Connect it securely, or repair/replace the wire harness.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
4	Continuity of wire harness	Open or short circuit → Connect it securely, or repair/replace the wire harness. Yellow/blue–Yellow/blue	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
5	Abnormal meter unit operation	Replace the meter assembly.	Place the main switch to the ON position, and check the fault code indication. No fault code indicated. → Recovered. Fault code indicated. → Check the next step.
6	ECU malfunction	Replace the ECU.	

EAS30660
DIAGNOSTIC CODE TABLE

TIP
The following tables contain information about diagnostic code numbers that do not have a corresponding fault code number. (These items are not listed in “TROUBLESHOOTING DETAILS”.)

Diagnostic code No.	Item	Meter display/Actuation	Procedure
d:36	Fuel injector #1	Actuates the fuel injector #1 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the fuel injector #1 five times. ECA59C1801 ***NOTICE*** **Disconnect the fuel pump coupler.**
d:37	Fuel injector #2	Actuates the fuel injector #2 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the fuel injector #2 five times. ECA59C1801 ***NOTICE*** **Disconnect the fuel pump coupler.**
d:51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the radiator fan motor relay five times.
d:52	Headlight relay	Actuates the headlight relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.
d:57	Grip warmer relay	Actuates the grip warmer relay. Illuminates the engine trouble warning light. (The light is off when the relay is off, and the light is on when the relay is on.)	Touch the grip warmer to check the temperature change.

Diagnostic code No.	Item	Meter display/Actuation	Procedure
d:61	Malfunction history code display • No history • History exists	 00 Fault code Nos. 12–50 • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
d:62	Malfunction history code erasure • No history • History exists	 00 • 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.)	 — To erase the history, set the engine stop switch from “⊠” to “○”.
d:63	Malfunction code reinstatement (for fault code No. 24) • No malfunction code • Malfunction code exists	 00 Fault code No. 24	 — To reinstate, set the engine stop switch from “⊠” to “○”.
d:70	Control number	0–254 [-]	—

Set the main switch to “OFF” to cancel the diagnostic mode.

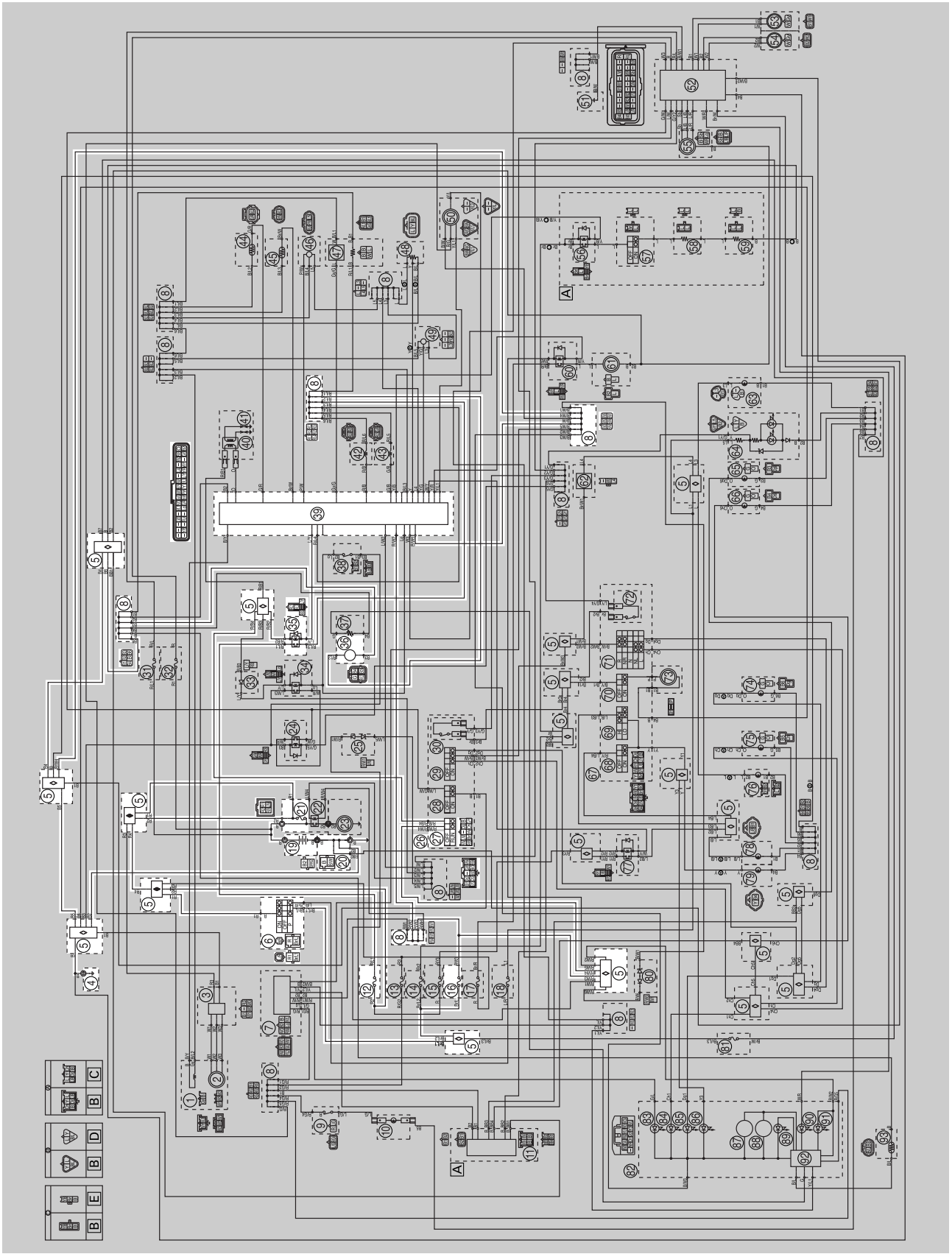
TIP

Information about each diagnostic code No. is organized in this manual as follows:

- If a diagnostic code No. has a corresponding fault code No., the information is shown in TROUBLESHOOTING DETAILS. (Refer to “TROUBLESHOOTING DETAILS” on page 8-37)
- If a diagnostic code No. does not have a corresponding fault code No., the information is shown in DIAGNOSTIC CODE TABLE. (Refer to “DIAGNOSTIC CODE TABLE” on page 8-68)

EAS27550
FUEL PUMP SYSTEM

EAS27560
CIRCUIT DIAGRAM



4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
12. Fuel injection system fuse
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
26. Right handlebar switch
27. Engine stop switch
35. Fuel injection system relay
36. Fuel pump
39. ECU (engine control unit)

EAS27570
TROUBLESHOOTING

If the fuel pump fails to operate.

TIP

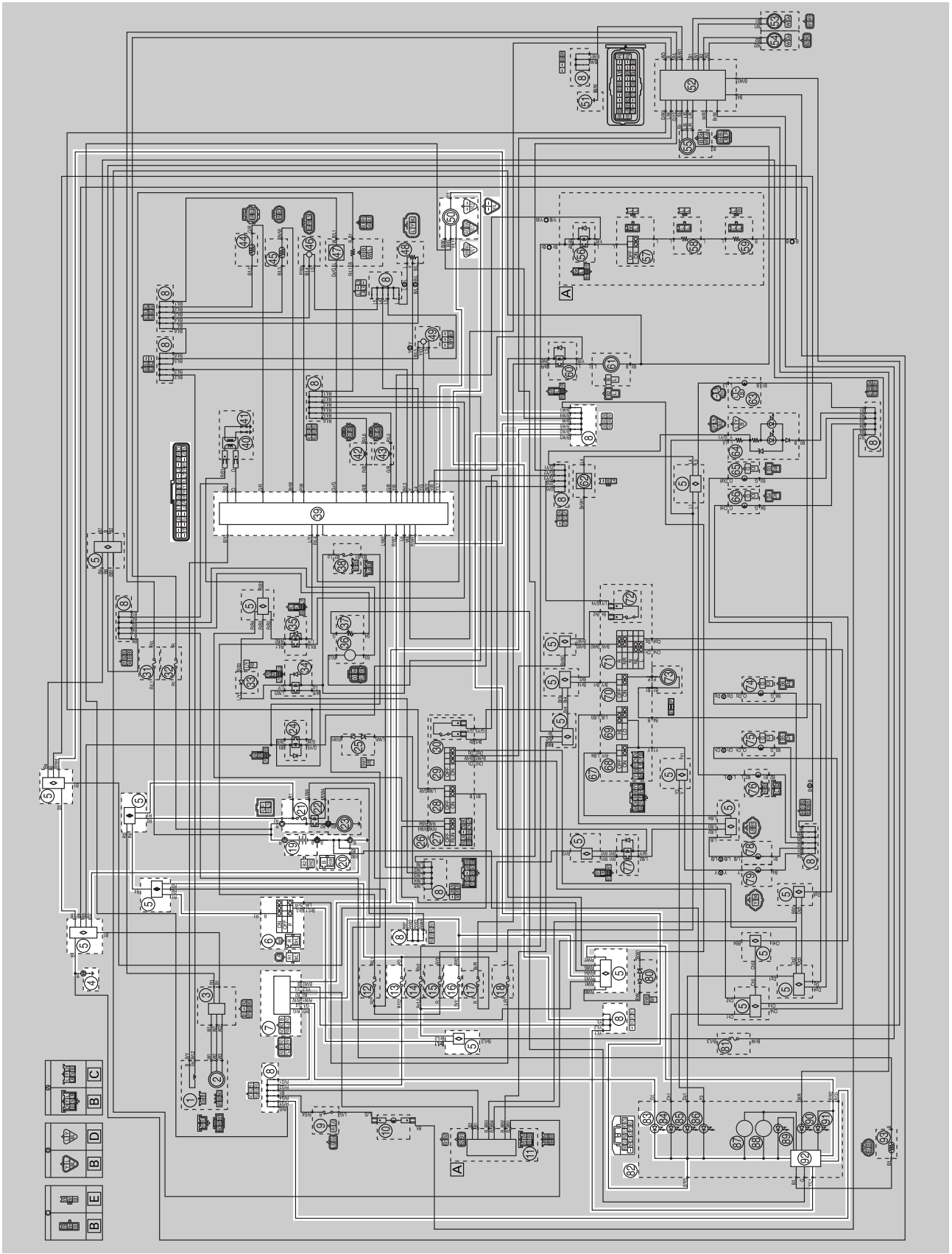
- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box

1. Check the fuses. (Main, ignition and fuel injection system) Refer to “CHECKING THE FUSES” on page 8-127.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-123.	NG→	The engine stop switch is faulty. Replace the right handlebar switch.
OK↓		
5. Check the fuel injection system relay. Refer to “CHECKING THE RELAYS” on page 8-131.	NG→	Replace the fuel injection system relay.
OK↓		
6. Check the fuel pump. Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.	NG→	Replace the fuel pump assembly.
OK↓		
7. Check the entire fuel pump system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-71.	NG→	Properly connect or repair the fuel pump system’s wiring.
OK↓		
Replace the ECU (engine control unit).		

EAS27640
IMMOBILIZER SYSTEM

EAS27650
CIRCUIT DIAGRAM



4. Frame ground
5. Joint
6. Main switch
7. Immobilizer unit
8. Joint coupler
13. Backup fuse
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
39. ECU (engine control unit)
50. Diagnostic tool coupler
82. Meter assembly
83. Immobilizer system indicator light
92. Multi-function meter

EAS27671
GENERAL INFORMATION

This vehicle is equipped with an immobilizer system to help prevent theft by re-registering codes in the standard keys. This system consists of the following:
- A code re-registering key (with a red bow)
- Two standard keys (with a black bow) that can be re-registered with new codes
- A transponder (installed in the red key bow)
- An immobilizer unit
- The ECU
- An immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.
Therefore, always use a standard key for driving. (Refer to NOTICE below.)

TIP
Each standard key is registered during production, therefore re-registering at purchase is not necessary.

ECA14971
NOTICE
- **DO NOT LOSE THE CODE RE-REGISTERING KEY! If the code re-registering key is lost, registering new codes in the standard keys is impossible. The standard keys can still be used to start the vehicle. However, if code re-registering is required (e.g., if a new standard key is made or all keys are lost) the entire immobilizer system must be replaced. Therefore, it is highly recommended to use either standard key for driving, and to keep the code re-registering key in a safe place.**
- **Do not submerse the keys in water.**
- **Do not expose the keys to excessively high temperatures.**
- **Do not place the keys close to magnets (this includes, but is not limited to, products such as speakers, etc.).**
- **Do not place heavy items on the keys.**
- **Do not grind the keys or alter their shape.**
- **Do not disassemble the key bows.**
- **Do not put two keys of any immobilizer system on the same key ring.**
- **Keep the standard keys as well as other immobilizer system keys away from the code re-registering key.**
- **Keep other immobilizer system keys away from the main switch as they may cause signal interference.**

EAS27691
PART REPLACEMENT AND KEY CODE REGISTRATION REQUIREMENTS

In the course of use, you may encounter the following cases where replacement of parts and registration of code re-registering/standard keys are required.

TIP

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

	Parts to be replaced					Key registration requirement
	Main switch/immobilizer unit		Standard key	ECU	Accessory lock* and key	
	Main switch	Immobilizer unit				
Standard key is lost			√			New standard key
All keys have been lost (including code re-registering key)	√		√	√	√	Code re-registering key and standard keys
ECU is defective				√		Code re-registering key and standard keys
Immobilizer unit is defective		√				Code re-registering key and standard keys
Main switch is defective	√		√	√	√	Code re-registering key and standard keys
Accessory lock* is defective					√	Not required

* Accessory locks mean the seat lock and fuel tank cap.

Code re-registering key registration:

When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.

To register a code re-registering key:

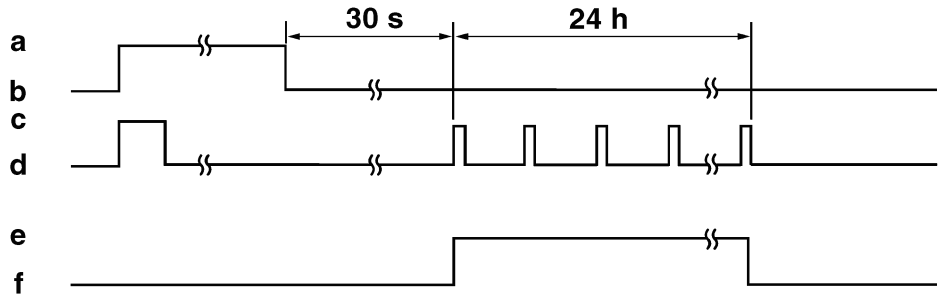
1. Set the main switch to “ON” with the code re-registering key.

TIP

Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

2. Check that the engine can be started.
3. Register the standard key, following the instructions in the section below.

Standby mode:
To enable the immobilizer system, set the ignition key to “OFF”. 30 seconds later, the indicator light will start flashing continuously in the standby flashing mode pattern for up to 24 hours. After that time, the indicator light will stop flashing, but the immobilizer system is still enabled.
Standby mode



a. Main switch “ON”
b. Main switch “OFF”
c. LED on
d. LED off
e. Standby mode on
f. Standby mode off

Standard key registration:
Standard key registration is required when a standard key is lost and needs to be replaced, or when the code re-registering key is re-registered after the immobilizer unit or ECU are replaced.

TIP
Do not start the engine with a standard key that has not been registered. If the main switch is set to “ON” with a standard key that has not been registered, the immobilizer system indicator light flashes to indicate fault code “52”. (Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-82).

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, set the main switch to “ON”, then “OFF”, and then remove the key within 5 seconds.
3. Insert the first standard key to be registered into the main switch, then set the key to “ON” within 5 seconds to activate the key registration mode.

TIP
The existing standard key code is erased from the memory when the key registration mode is activated. When the key registration mode is activated, the immobilizer system indicator light flashes rapidly.

4. While the indicator light is flashing, set the main switch to “OFF”, remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.

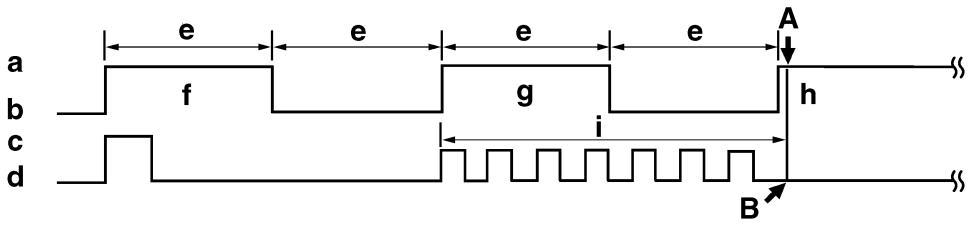
TIP
If he immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.

5. Set the main switch to “ON”.

TIP
When the indicator light goes off, the registration is complete.

6. Check that the engine can be started with the two registered standard keys.

Standard key registration

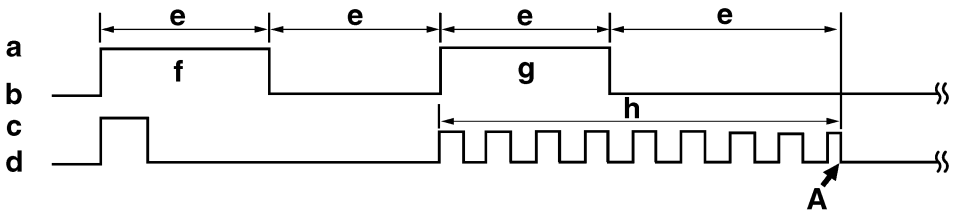


a. Main switch “ON”
b. Main switch “OFF”
c. LED on
d. LED off
e. Less than 5.0 s
f. Code re-registering key
g. First standard key
h. Second standard key
i. Registration mode

A. Registration of the second standard key is complete.
B. Immobilizer system indicator light stops flashing when the registration of the second standard key is complete.

Voiding the standard key code:
If a standard key has been lost, it is possible to disable its use by re-registering the remaining standard key. Standard key registration erases the stored standard key code from the memory, thus disabling the lost standard key. To re-register, refer to “Standard key registration”.

Standard key code voiding method



a. Main switch “ON”
b. Main switch “OFF”
c. LED on
d. LED off
e. Less than 5.0 s
f. Code re-registering key
g. Remaining standard key
h. Registration mode

A. If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the second standard key cannot be registered.

EAS27701
TROUBLESHOOTING

When the main switch is set to “ON”, the immobilizer system indicator light does not come on nor flashes.

1. Check the fuses.
   (Main, ignition and backup)
   Refer to “CHECKING THE FUSES” on page 8-127.

NG→ Replace the fuse(s).

OK↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.

NG→
- Clean the battery terminals.
- Recharge or replace the battery.

OK↓

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 8-123.

NG→ Replace the main switch/immobilizer unit.

OK↓

4. Check the entire immobilizer system’s wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-75.

NG→ Properly connect or repair the immobilizer system’s wiring.

OK↓

- Check the condition of the each immobilizer system circuits.
- Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-82.

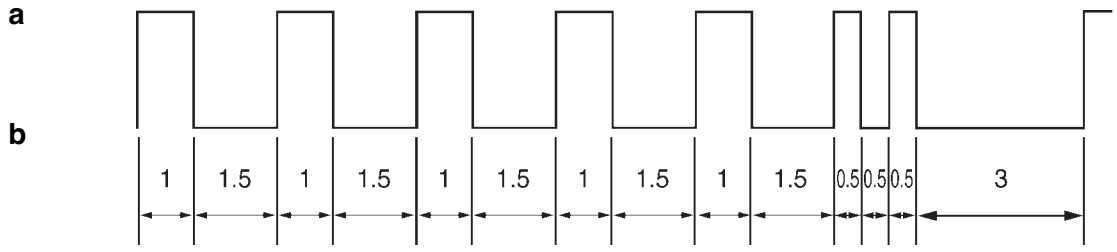
EAS27721
SELF-DIAGNOSIS FAULT CODE INDICATION

When a system malfunction occurs, the fault code number is indicated in the LCD display of the meter assembly and the immobilizer system indicator light flashes at the same time. The pattern of flashing also shows the fault code.

Fault code	Part	Symptom	Cause	Action
51	IMMOBILIZER UNIT	Code cannot be transmitted between the key and the immobilizer unit.	1. Radio wave interference caused by objects around the keys and antennas. 2. Immobilizer unit malfunction. 3. Key malfunction.	1. Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas. 2. Replace the main switch/ immobilizer unit. 3. Replace the key.
52	IMMOBILIZER UNIT	Codes between the key and immobilizer unit do not match.	1. Signal received from other transponder (failed to recognize code after ten consecutive attempts). 2. Signal received from unregistered standard key.	1. Place the immobilizer unit at least 50 mm (1.97 in) away from the transponder of other vehicles. 2. Register the standard key.
53	IMMOBILIZER UNIT	Codes cannot be transmitted between the ECU (engine control unit) and the immobilizer unit.	Noise interference or disconnected lead/cable. 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU (engine control unit) malfunction.	1. Check the wire harness and connector. 2. Replace the main switch/ immobilizer unit. 3. Replace the ECU (engine control unit).

Fault code	Part	Symptom	Cause	Action
54	IMMOBILIZER UNIT	Codes transmitted between the ECU (engine control unit) and the immobilizer unit do not match.	Noise interference or disconnected lead/cable. 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU (engine control unit) failure. (The ECU (engine control unit) or immobilizer unit was replaced with a used unit from another vehicle.)	1. Register the code re-registering key. 2. Check the wire harness and connector. 3. Replace the main switch/ immobilizer unit. 4. Replace the ECU (engine control unit).
55	IMMOBILIZER UNIT	Key code registration malfunction.	Same standard key was attempted to be registered two consecutive times.	Register another standard key.
56	ECU (engine control unit)	Unidentified code is received.	Noise interference or disconnected lead/cable.	1. Check the wire harness and connector. 2. Replace the main switch/ immobilizer unit. 3. Replace the ECU (engine control unit).

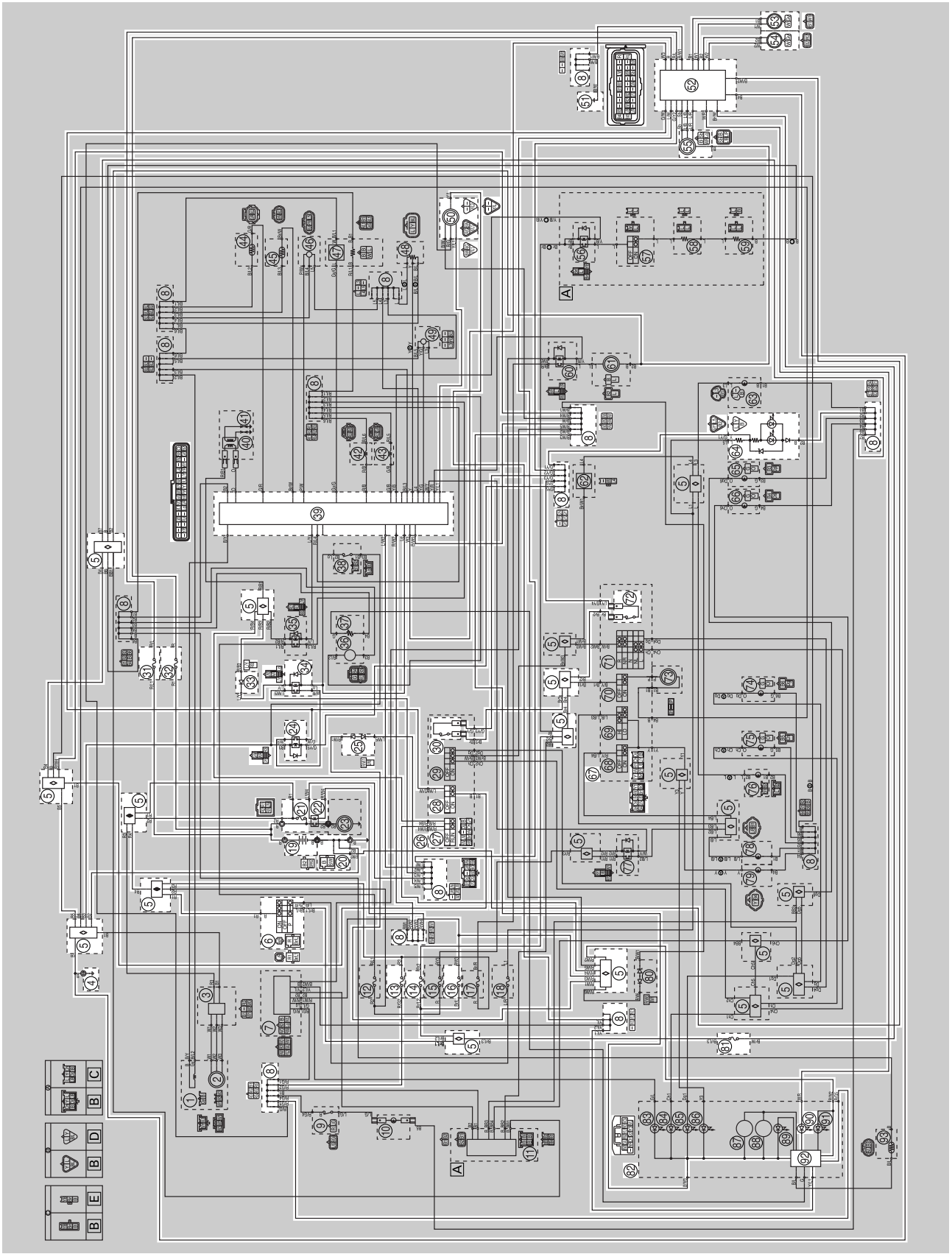
Immobilizer system indicator light fault code indication
Units of 10: Cycles of on for 1 second and off for 1.5 seconds.
Units of 1: Cycles of on for 0.5 second and off for 0.5 second.
Example: fault code 52



a. Light on
b. Light off

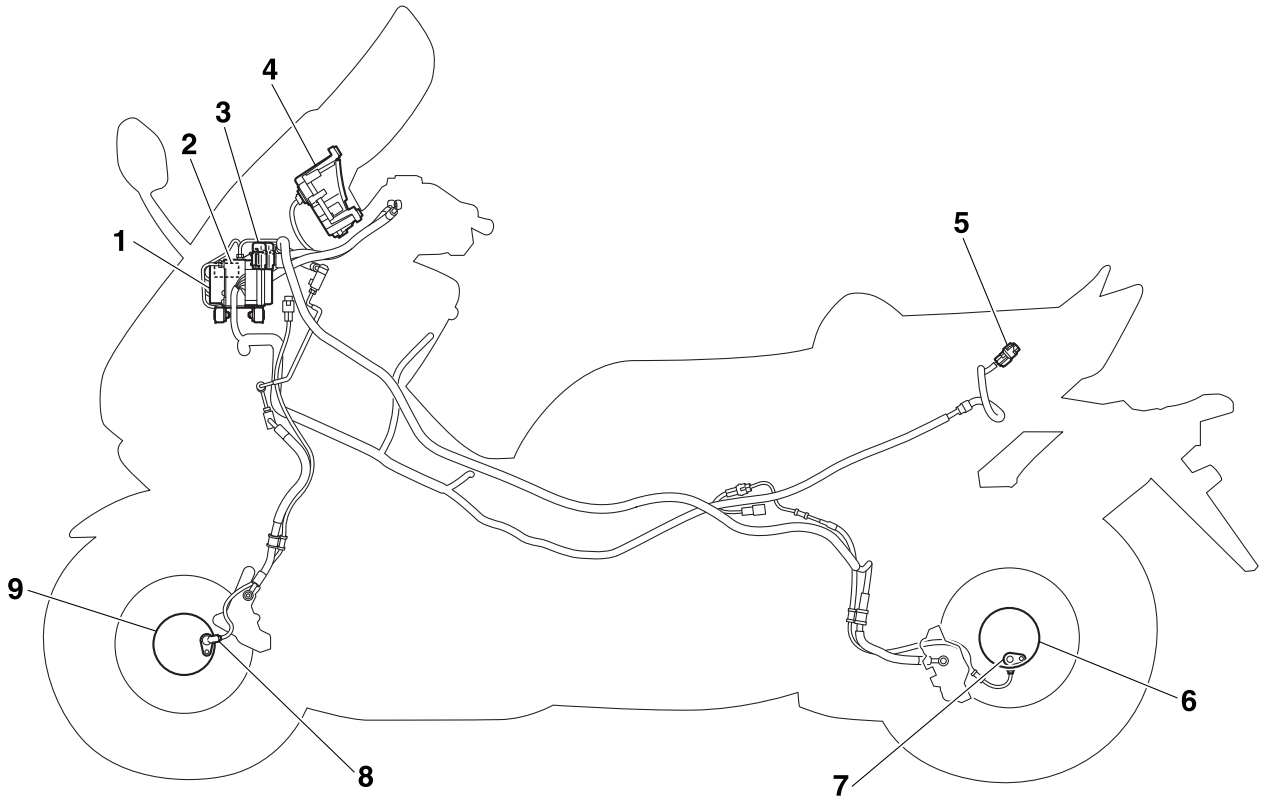
EAS28790
ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27730
CIRCUIT DIAGRAM



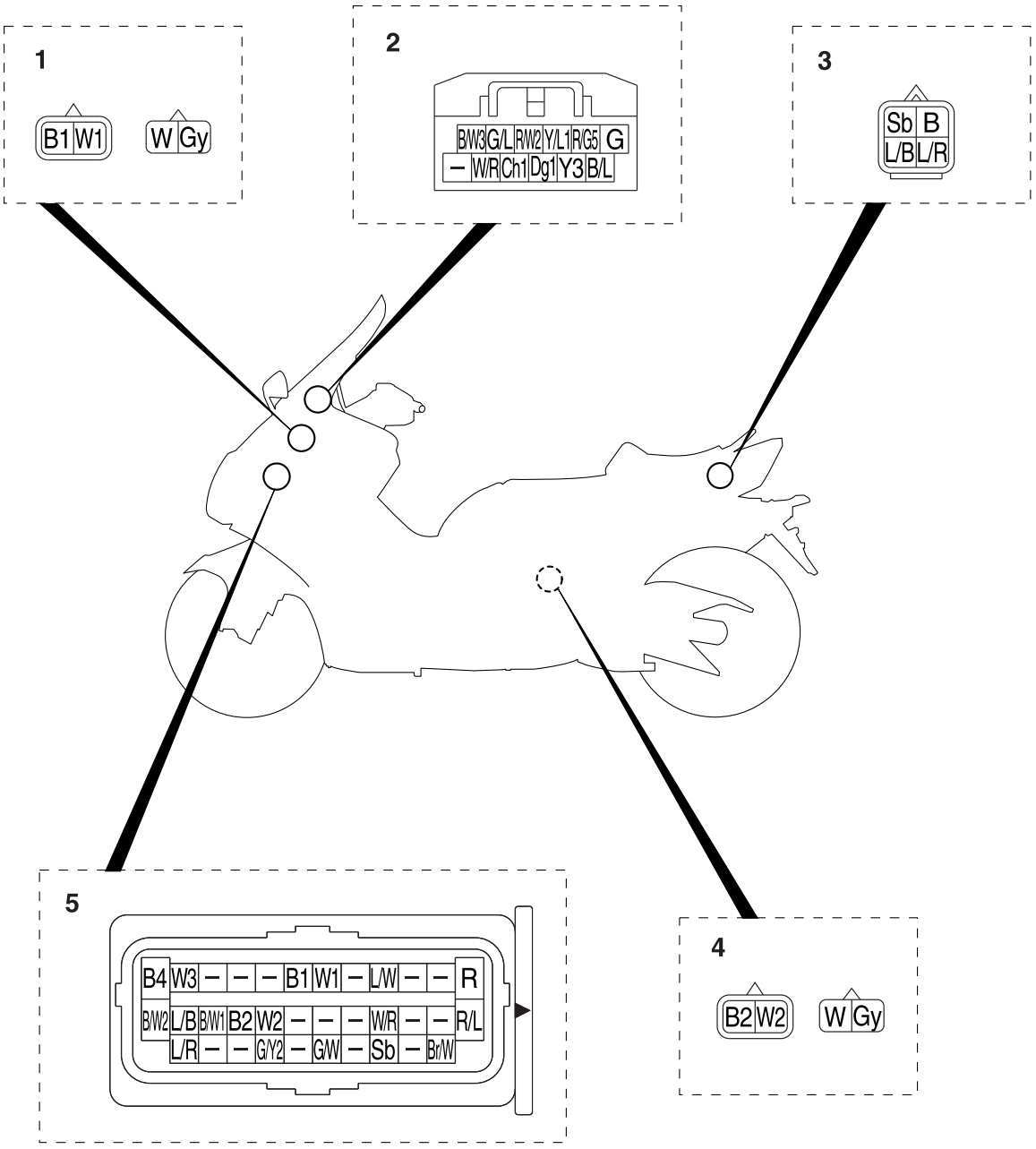
4. Frame ground
5. Joint
6. Main switch
8. Joint coupler
13. Backup fuse
14. Signaling system fuse
16. Ignition fuse
19. Battery
20. Negative lead
21. Main fuse
22. Starter relay
24. Starting circuit cut-off relay 2
25. Diode 1
26. Right handlebar switch
27. Engine stop switch
28. Start switch
30. Front brake light switch
31. ABS motor fuse
32. ABS solenoid fuse
33. Diode 2
34. Starting circuit cut-off relay 1
39. ECU (engine control unit)
50. Diagnostic tool coupler
51. Wheel sensor shield ground
52. ABS ECU (electronic control unit)
53. Front wheel sensor
54. Rear wheel sensor
55. ABS test coupler
64. Tail/brake light
67. Left handlebar switch
72. Rear brake light switch
81. ABS ECU fuse
82. Meter assembly
90. ABS warning light
92. Multi-function meter

EAS27740
ABS COMPONENTS CHART



1. Hydraulic unit assembly (ABS ECU)
2. Fuse box (right)
3. Fuse box (left)
4. ABS warning light
5. ABS test coupler
6. Rear wheel sensor rotor
7. Rear wheel sensor
8. Front wheel sensor
9. Front wheel sensor rotor

EAS27750
ABS COUPLER LOCATION CHART

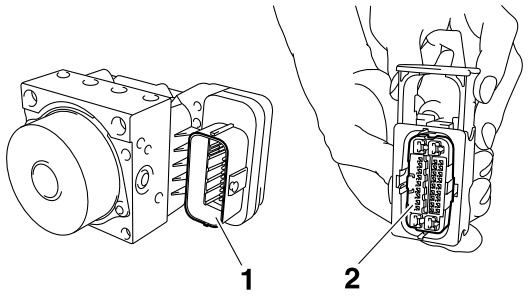


1. Front wheel sensor coupler
2. Meter assembly coupler
3. ABS test coupler
4. Rear wheel sensor coupler
5. ABS ECU coupler

EAS27770
MAINTENANCE OF THE ABS ECU

Checking the ABS ECU
1. Check:
   - Terminals “1” of the ABS ECU
     Cracks/damages → Replace the hydraulic unit assembly and the brake pipes that are connected to the assembly as a set.
   - Terminals “2” of the ABS ECU coupler
     Connection defective, contaminated, come-off → Correct or clean.

TIP
If the ABS ECU coupler is clogged with mud or dirt, clean with compressed air.



EAS27790
ABS TROUBLESHOOTING OUTLINE
This section describes the troubleshooting for the ABS in detail. Read this service manual carefully and make sure you fully understand the information provided before repairing any malfunctions or performing service.
The ABS ECU (electronic control unit) has a self-diagnosis function. When failures occur in the system, the ABS warning light on the meter assembly indicates a malfunction.
The following troubleshooting describes the problem identification and service method according to the indications by the multi-function display. For troubleshooting items other than the following items, follow the normal service method.
EWA59C2801
⚠ WARNING
When maintenance or checks have been performed on components related to the ABS, be sure to perform a final check before delivering the vehicle to the customer. (Refer to “[C-3] FINAL CHECK” on page 8-117.)

ABS operation when the ABS warning light comes on
1. The ABS warning light remains on → ABS operates as a normal brake system.
   - A malfunction was detected using the ABS self-diagnosis function.
   - The ABS self-diagnosis test is not completed.
     The self-diagnosis test begins when the vehicle starts up for the first time after the main switch was set to “ON”, and is completed when the vehicle is operated at a speed of about 10 km/h (6.3 mi/h). (Refer to “ABS warning light” on page 1-17.)
2. The ABS warning light comes on when the engine is started, and goes off when the vehicle is operated (at a speed of about 10 km/h [6.3 mi/h]: refer to “ABS warning light” on page 1-17.) → ABS operation is normal.
   - The ABS warning light comes on while the start switch is being pushed.
3. The ABS warning light flashes → ABS operation is normal.
   - Refer to “BASIC INSTRUCTIONS FOR TROUBLESHOOTING” on page 8-92.

Self-diagnosis and servicing
The ABS ECU has a self-diagnosis function. By utilizing this function, quick problem identification and service are possible. Previous malfunctions can be checked since the ABS ECU also stores the malfunction history.
The multi-function display indicates all the fault codes recorded in the ABS ECU.
Note all of the indicated fault codes if fault codes are stored in the memory. When the service is finished, check the normal operation of the vehicle, and then delete the fault code(s). (Refer to "[C-3] FINAL CHECK" on page 8-117.) By deleting the fault codes stored in the ABS ECU memory, it is possible to pursue the cause correctly if another malfunction occurs.

TIP
The ABS performs a self-diagnosis test for a few seconds each time the vehicle starts up for the first time after the main switch was set to "ON". During this test, a "clicking" noise can be heard from front side of the vehicle, and if the front brake lever or rear brake lever are even slightly applied, a vibration can be felt at the levers, but these do not indicate a malfunction.

Self-diagnosis using the ABS ECU
The ABS ECU performs a static check of the entire system when the main switch is set to "ON". It also checks for malfunctions while the vehicle is ridden. Since all malfunctions are recorded after they are detected, it is possible to check the recorded malfunction data by utilizing the multi-function display when the ABS ECU has entered the self-diagnosis mode.

Special precautions for handling and servicing a vehicle equipped with ABS
ECA59C2801

NOTICE

Care should be taken not to damage components by subjecting them to shocks or pulling on them with too much force since the ABS components are precisely adjusted.

- The ABS ECU and hydraulic unit are united assemblies and cannot be disassembled.
- The malfunction history is stored in the memory of the ABS ECU. Delete the fault codes when the service is finished. (This is because the past fault codes will be displayed again if another malfunction occurs.)

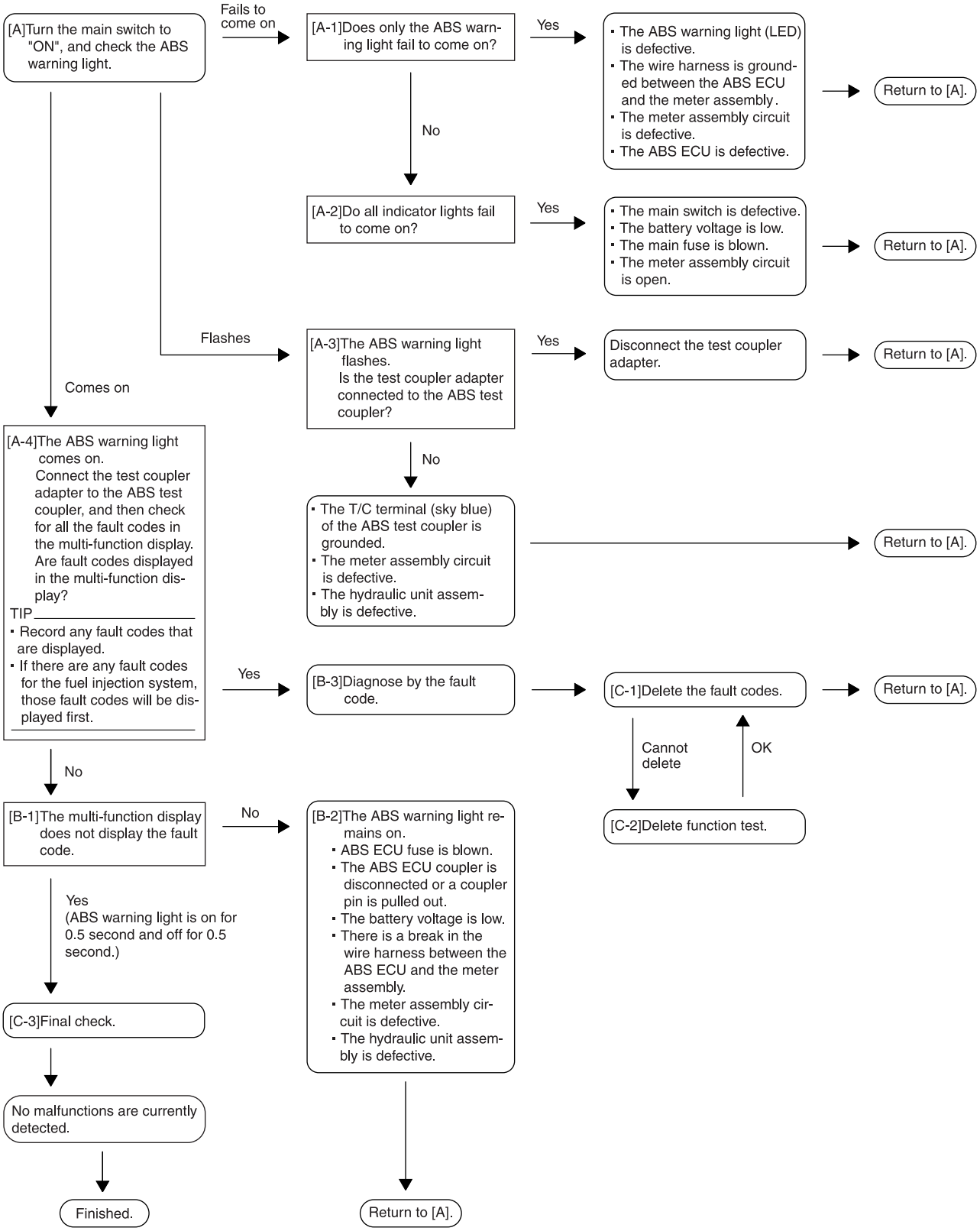
EAS27800
BASIC INSTRUCTIONS FOR TROUBLESHOOTING
EWA59C2802

⚠ WARNING

- **Perform the troubleshooting [A] → [B] → [C] in order. Be sure to follow the order since a wrong diagnosis could result if the steps are followed in a different order or omitted.**
- **Use sufficiently charged regular batteries only.**

[A] Malfunction check using the ABS warning light
[B] Determining the cause and location of the malfunction from the recorded fault code by using the test coupler adapter
Determine the cause of the malfunction from the condition and place where the malfunction occurred.
[C] Servicing the ABS
Execute the final check after disassembly and assembly.

EAS27810
BASIC PROCESS FOR TROUBLESHOOTING



EWA59C2803

⚠ WARNING

When maintenance or checks have been performed on components related to the ABS, be sure to perform a final check before delivering the vehicle to the customer. (Refer to "[C-3] FINAL CHECK" on page 8-117.)

EAS27830

[A] CHECKING THE ABS WARNING LIGHT

Set the main switch to "ON". (Do not start the engine.)

1. The ABS warning light does not come on.
   - Only the ABS warning light fails to come on. [A-1]
   - The ABS warning light and all other indicator lights fail to come on. [A-2]
2. The ABS warning light flashes. [A-3]
3. The ABS warning light comes on. [A-4]

EAS59C2801

[A-1] ONLY THE ABS WARNING LIGHT FAILS TO COME ON

1. Check for a short circuit to the ground between the White/Red terminal of the ABS ECU coupler and White/Red terminal of the meter assembly.
   - If there is short circuit to the ground, the wire harness is defective. Properly repair or replace the defective harness.
2. Disconnect the ABS ECU coupler and check that the ABS warning light comes on when the main switch is set to "ON".
   - If the ABS warning light does not come on, the meter assembly circuit (including the ABS warning light [LED]) is defective. Replace the meter assembly.
   - If the ABS warning light comes on, the ABS ECU is defective. Replace the hydraulic unit assembly.

EAS59C2802

[A-2] THE ABS WARNING LIGHT AND ALL OTHER INDICATOR LIGHTS FAIL TO COME ON

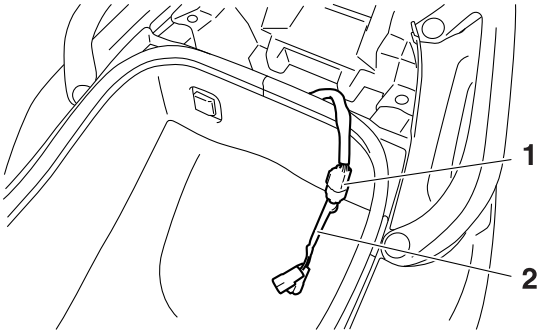
1. Main switch
   - Check the main switch for continuity.
     Refer to "CHECKING THE SWITCHES" on page 8-123.
   - If there is no continuity, replace the main switch/immobilizer unit.
2. Battery
   - Check the condition of the battery.
     Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-127.
   - If the battery is defective, clean the battery terminals and recharge it, or replace the battery.
3. Main fuse
   - Check the fuse for continuity.
     Refer to "CHECKING THE FUSES" on page 8-127.
   - If the main fuse is blown, replace the fuse.
4. Circuit
   - Check the meter assembly circuit.
     Refer to "CIRCUIT DIAGRAM" on page 8-85.
   - If the meter assembly circuit is open, properly repair or replace the wire harness.

EAS59C2803
[A-3] THE ABS WARNING LIGHT FLASHES

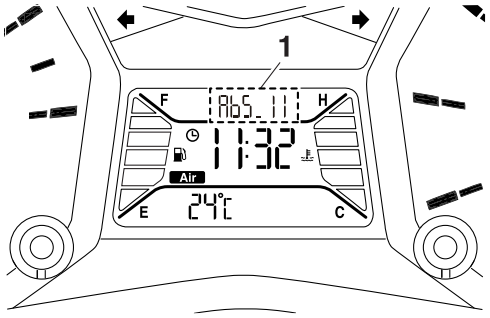
1. Checking the test coupler adapter
   - Check if the test coupler adapter is connected to the ABS test coupler.
   - If the test coupler adapter is connected, disconnect it, install the protective cap onto the ABS test coupler and then start over from the beginning.
2. If the test coupler adapter is not connected
   - Check whether the T/C terminal (sky blue) of the ABS test coupler is short-circuited to the ground when the test coupler adapter is removed.
   - If the T/C terminal is short-circuited to the ground, the wire harness is defective. Properly repair or replace the wire harness.
   - If the T/C terminal is not short-circuited to the ground, check the internal circuit of the meter assembly.
     - Set the main switch to “OFF”.
     - Disconnect the ABS ECU coupler.
     - Set the main switch to “ON”, and then check the ABS warning light.
     - If the ABS warning light flashes, the internal circuit of the meter assembly is defective. Replace the meter assembly.
     - If the ABS warning light comes on, the ABS ECU is defective. Replace the hydraulic unit assembly.

EAS59C2804
[A-4] THE ABS WARNING LIGHT COMES ON

Set the main switch to “OFF”.
Remove the protective cap from the ABS test coupler “1”, and then connect the test coupler adapter “2” to the coupler. The T/C terminal (sky blue) is now grounded.
Set the main switch to “ON”, and then check the multi-function meter.



1. The multi-function display does not display the fault code “1”. [B-1]
2. The fault code “1” is displayed on the multi-function display (example: fault code ABS_11). [B-3]



EAS59C2805
[B-1] THE MULTI-FUNCTION DISPLAY DOES NOT DISPLAY THE FAULT CODE

1. A malfunction that keeps the ABS warning light on is detected. [B-2]
2. The ABS warning light flashes every 0.5 second for more than 6 seconds.
   No malfunction is detected.
   The ABS warning light flashes every 0.5 second if a fault code for a past malfunction is not stored in the memory of the ABS ECU. The ABS warning light flashes quicker if a fault code is displayed on the multi-function display. If no fault code is displayed, make sure that the customer understands the possible conditions that may cause the ABS warning light to come on or flash even if the system is normal.

TIP

- The ABS fault codes will not be displayed if a fault code for the fuel injection system is displayed on the multi-function display. To display the ABS fault codes, delete the fuel injection system fault codes, and then start the check again.
- The test coupler adapter must be connected to the ABS test coupler to display the fault codes. If the adapter is not connected, the ABS warning light will come on or flash, but no fault codes will be displayed.

EAS59C2806
[B-2] THE ABS WARNING LIGHT REMAINS ON

1. The battery voltage is low.
   - Check the condition of the battery.
     Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.
   - If the battery voltage is low, clean the battery terminals and recharge it, or replace the battery.
2. ABS ECU fuse
   - Check the ABS ECU fuse for continuity.
     Refer to “CHECKING THE FUSES” on page 8-127.
   - If the ABS ECU fuse is blown, replace the fuse.
3. ABS ECU coupler
   - Check that the ABS ECU coupler is connected properly.
   - Connect the couplers properly if necessary.
4. There is a break in the wire harness between the main switch and the ABS ECU or between the ABS ECU and the ground.
   - Check for continuity between the Brown/Blue terminal of the main switch coupler and Brown/Blue terminal of the ABS ECU fuse.
   - Check for continuity between the Brown/White terminal of the ABS ECU fuse and the Brown/White terminal of the ABS ECU coupler.
   - If there is no continuity, the wire harness is defective. Properly repair or replace the wire harness.
   - Check for continuity between the Black/White terminal of the ABS ECU coupler and the ground.
   - If there is no continuity, the wire harness is defective. Properly repair or replace the wire harness.
5. There is a break in the wire harness between the ABS ECU and the meter assembly (ABS warning light).
   - Check for continuity between the White/Red terminal of the ABS ECU coupler and the White/Red terminal of the meter assembly coupler.
   - If there is no continuity, the wire harness is defective. Properly repair or replace the defective harness.

6. The meter assembly circuit is defective.
   - Disconnect the ABS ECU coupler.
   - The White/Red terminal of the ABS ECU coupler is short-circuited to the ground.
   - Set the main switch to “ON”, and then check the ABS warning light.
   - If the ABS warning light is on, the internal circuit of the meter assembly is defective. Replace the meter assembly.
   - If the ABS warning light does not come on, the ABS ECU is defective. Replace the hydraulic unit assembly.
7. The hydraulic unit assembly is defective.

EAS59C2807
[B-3] DIAGNOSIS USING THE FAULT CODES

After turning the main switch to “OFF”, connect the test coupler adapter to the ABS test coupler, and then set the main switch to “ON”.
Information for the fault codes from the ABS ECU is contained in the following table. Refer to this table for troubleshooting.

TIP
Record all of the fault codes displayed and inspect the check points.

Fault code table

Fault code No.	Symptom	Check point
ABS_11* ABS_25*	Front wheel sensor signal is not received properly.	• Installation of the front wheel sensor • Front wheel • Front wheel sensor housing • Front wheel sensor rotor
ABS_12	Rear wheel sensor signal is not received properly.	• Installation of the rear wheel sensor • Rear wheel • Rear wheel sensor housing • Rear wheel sensor rotor
ABS_13 ABS_26	Incorrect signal from the front wheel sensor is detected.	• Installation of the front wheel sensor • Front wheel • Front wheel sensor housing • Front wheel sensor rotor • Hydraulic unit assembly
ABS_14 ABS_27	Incorrect signal from the rear wheel sensor is detected.	• Installation of the rear wheel sensor • Rear wheel • Rear wheel sensor housing • Rear wheel sensor rotor • Hydraulic unit assembly
ABS_15	No continuity in the front wheel sensor circuit.	• Continuity of the front wheel sensor circuit • Wire harness (ABS circuit) • Connection of the front wheel sensor coupler and ABS ECU coupler • Front wheel sensor
ABS_16	No continuity in the rear wheel sensor circuit.	• Continuity of the rear wheel sensor circuit • Wire harness (ABS circuit) • Connection of the rear wheel sensor coupler and ABS ECU coupler • Rear wheel sensor

Fault code No.	Symptom	Check point
ABS_17 ABS_45	Missing pulses detected in the front wheel sensor signal.	• Front wheel sensor rotor • Front wheel sensor housing • Front wheel
ABS_18 ABS_46	Missing pulses detected in the rear wheel sensor signal.	• Rear wheel sensor rotor • Rear wheel sensor housing • Rear wheel
ABS_21	Hydraulic unit solenoid circuit is open or short-circuited.	• Hydraulic unit assembly
ABS_22	Start switch signal is not received properly (start switch circuit or start switch monitor circuit).	• Wire harness • Connection of the starting circuit cut-off relay couplers and ABS ECU coupler.
ABS_24	Brake light signal is not received properly while vehicle is traveling (brake light circuit, or front or rear brake light switch circuit).	• Brake light bulbs • Wire harness (brake light circuit) • Brake light system couplers and connectors
ABS_31	Solenoid relay is defective. Power is not supplied to the solenoid relay.	• ABS solenoid fuse • Wire harness (battery and ABS ECU circuit) • Connection of the ABS ECU coupler • Hydraulic unit assembly
ABS_32	Hydraulic unit solenoid relay is short-circuited.	• Hydraulic unit assembly
ABS_33	ABS motor is defective. Power is not supplied to the ABS motor.	• Battery voltage • ABS motor fuse • Wire harness (ABS circuit) • Connection of the ABS ECU coupler and starter relay coupler • Hydraulic unit assembly
ABS_34	Hydraulic unit ABS motor relay is short-circuited.	• Hydraulic unit assembly
ABS_41	Front wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ABS ECU to release the hydraulic pressure.	• Brake dragging • Brake fluid • Hydraulic unit operation tests • Front wheel brake lines • Hydraulic unit assembly
ABS_42 ABS_47	Rear wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ABS ECU to release the hydraulic pressure.	• Brake dragging • Brake fluid • Hydraulic unit operation tests • Rear wheel brake lines • Hydraulic unit assembly
ABS_43	Incorrect signal from the front wheel sensor is detected.	• Installation of the front wheel sensor • Front wheel sensor housing • Front wheel sensor rotor
ABS_44	Incorrect signal from the rear wheel sensor is detected.	• Installation of the rear wheel sensor • Rear wheel sensor housing • Rear wheel sensor rotor
ABS_51 ABS_52	Power voltage is too high.	• Battery voltage • Battery terminal • Refer to “CHARGING SYSTEM” on page 8-11.

Fault code No.	Symptom	Check point
ABS_53	Power voltage is too low.	• Battery voltage • Connection of the ABS ECU coupler • Wire harness • Refer to “CHARGING SYSTEM” on page 8-11.
ABS_54	Power voltage is too low.	• Battery voltage • Connection of the ABS ECU coupler and starter relay coupler • Wire harness • Refer to “CHARGING SYSTEM” on page 8-11.
ABS_56	Hydraulic unit sensor power monitor circuit is abnormal.	• Hydraulic unit assembly
ABS_63	Front wheel sensor power is abnormal.	• Front wheel sensor lead • Wire harness • Hydraulic unit assembly
ABS_64	Rear wheel sensor power is abnormal.	• Rear wheel sensor lead • Wire harness • Hydraulic unit assembly

* A fault code is indicated if the rear wheel rotates for longer than about 20 seconds (fault code No. ABS_11) or for longer than about 2 seconds (fault code No. ABS_25) with the front wheel stopped (e.g., when the vehicle is on the suitable stand).

TIP

Fault codes Nos. ABS_15 (front wheel) and ABS_16 (rear wheel) are indicated if a defective connection is detected in the front or rear wheel sensor when the vehicle is not being ridden.

Fault code No.	**ABS_11 ABS_25**	**Symptom**	**Front wheel sensor signal is not received properly.**
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-20.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-21.

Fault code No.	ABS_11 ABS_25	Symptom	Front wheel sensor signal is not received properly.
Order	**Item/components and probable cause**		**Check or maintenance job**
4	Defective sensor rotor.		Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-21.

TIP

With front wheel stopped, rear wheel was rotated for longer than about 20 seconds (fault code No. ABS_11) or for longer than about 2 seconds (fault code No. ABS_25).

Fault code No.	ABS_12	Symptom	Rear wheel sensor signal is not received properly.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-32.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-33.
4	Defective sensor rotor.		Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-33.

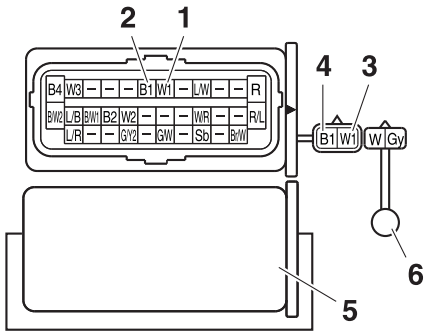
Fault code No.	ABS_13 ABS_26	Symptom	Incorrect signal from the front wheel sensor is detected.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-20.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-21.

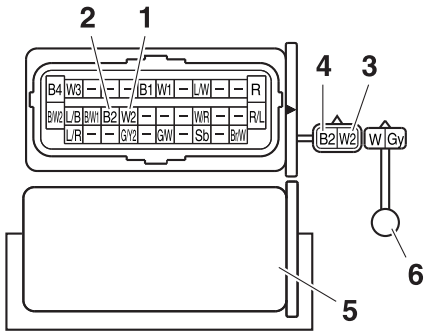
Fault code No.	ABS_13 ABS_26	Symptom	Incorrect signal from the front wheel sensor is detected.
Order	**Item/components and probable cause**		**Check or maintenance job**
4	Defective sensor rotor.		Check the surface of the sensor rotor for damage. If there is visible damage, replace the sensor rotor. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-21.
5	Hydraulic unit assembly internal malfunction.		Replace the hydraulic unit assembly.

TIP
Vehicle possibly ridden on uneven roads.

Fault code No.	ABS_14 ABS_27	Symptom	Incorrect signal from the rear wheel sensor is detected.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-32.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-33.
4	Defective sensor rotor.		Check the surface of the sensor rotor for damage. If there is visible damage, replace the sensor rotor. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-33.
5	Hydraulic unit assembly internal malfunction.		Replace the hydraulic unit assembly.

TIP
Vehicle possibly ridden on uneven roads.

Fault code No.	ABS_15	Symptom	No continuity in the front wheel sensor circuit.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Connections • Front wheel sensor coupler • ABS ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to “OFF” before disconnecting or connecting a coupler.
2	Wire harness continuity.		• Check for continuity between the white terminal “1” and the white terminal “3” and between the black terminal “2” and the black terminal “4”. • If there is no continuity, the wire harness is defective. Properly repair or replace the wire harness. • Check that there is no continuity between the ground and the white terminal “1” or white terminal “3” and between the ground and the black terminal “2” or black terminal “4”. • If there is continuity, the wire harness is defective. Properly repair or replace the wire harness. • Check that there is no continuity between the white terminal “1” and the black terminal “2” and between the white terminal “3” and the black terminal “4”. • If there is continuity, the wire harness is defective. Properly repair or replace the wire harness.  5. ABS ECU 6. Front wheel sensor
3	Defective wheel sensor.		If the above items were performed and no malfunctions were found, connect the ABS ECU coupler and front wheel sensor coupler, and then delete the fault codes. If fault code No. ABS_15 could not be deleted, the front wheel sensor is defective. Replace the front wheel sensor. **TIP** Before deleting the fault codes, record all of the fault codes and perform the related checks and maintenance.

Fault code No.	ABS_16	Symptom	No continuity in the rear wheel sensor circuit.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Connections • Rear wheel sensor coupler • ABS ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to "OFF" before disconnecting or connecting a coupler.
2	Wire harness continuity.		• Check for continuity between the white terminal "1" and the white terminal "3" and between the black terminal "2" and the black terminal "4". • If there is no continuity, the wire harness is defective. Properly repair or replace the wire harness. • Check that there is no continuity between the ground and the white terminal "1" or white terminal "3" and between the ground and the black terminal "2" or black terminal "4". • If there is continuity, the wire harness is defective. Properly repair or replace the wire harness. • Check that there is no continuity between the white terminal "1" and the black terminal "2" and between the white terminal "3" and the black terminal "4". • If there is continuity, the wire harness is defective. Properly repair or replace the wire harness.  5. ABS ECU 6. Rear wheel sensor
3	Defective wheel sensor.		If the above items were performed and no malfunctions were found, connect the ABS ECU coupler and rear wheel sensor coupler, and then delete the fault codes. If fault code No. ABS_16 could not be deleted, the rear wheel sensor is defective. Replace the rear wheel sensor. **TIP** Before deleting the fault codes, record all of the fault codes and perform the related checks and maintenance.

Fault code No.	ABS_17 ABS_45	Symptom	Missing pulses detected in the front wheel sensor signal.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-20.
2	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-21.
3	Defective sensor rotor.		• Check the surface of the sensor rotor for damage. • If there is visible damage, replace the sensor rotor.

Fault code No.	ABS_18 ABS_46	Symptom	Missing pulses detected in the rear wheel sensor signal.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-32.
2	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-33.
3	Defective sensor rotor.		• Check the surface of the sensor rotor for damage. • If there is visible damage, replace the sensor rotor.

Fault code No.	ABS_21	Symptom	Hydraulic unit solenoid circuit is open or short-circuited.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Open or short circuit in solenoid circuit.		Replace the hydraulic unit assembly.

Fault code No.	ABS_22	Symptom	Start switch signal is not received properly (start switch circuit or start switch monitor circuit).
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Engine startability.		Check the electric starting system. Refer to “ELECTRIC STARTING SYSTEM” on page 8-5.

Fault code No.	ABS_22	Symptom	Start switch signal is not received properly (start switch circuit or start switch monitor circuit).
Order	**Item/components and probable cause**		**Check or maintenance job**
2	Connections • Starter relay coupler • ABS ECU coupler • Right handlebar switch coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to "OFF" before disconnecting or connecting a coupler.
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ABS ECU coupler and starter relay coupler. (Blue/white–Blue/white) • Between ABS ECU coupler and right handlebar switch (start switch) coupler. (Green/white–Green/white)

Fault code No.	ABS_24	Symptom	Brake light signal is not received properly while vehicle is traveling (brake light circuit, or front or rear brake light switch circuit).
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Brake light operation. • Defective tail/brake light		• Check the tail/brake light. Repair or replace the tail/brake light if necessary. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-126.
2	Connections • ABS ECU coupler • Front brake light switch connectors • Rear brake light switch connectors		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to "OFF" before disconnecting or connecting a coupler.
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between rear brake light switch connector and ABS ECU coupler. (Green/yellow–Green/yellow) • Between front brake light switch connector and ABS ECU coupler. (Green/yellow–Green/yellow)
4	Water inside switch.		Use compressed air to blow out the water.

Fault code No.	ABS_31	Symptom	Solenoid relay is defective. Power is not supplied to the solenoid relay.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Battery voltage		Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.
2	Blown ABS solenoid fuse.		Check the ABS solenoid fuse. If the ABS solenoid fuse is blown, replace the fuse and check the wire harness. Refer to “CHECKING THE FUSES” on page 8-127.
3	Connections • ABS ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to “OFF” before disconnecting or connecting a coupler.
4	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ABS ECU coupler and ABS solenoid fuse. (Red–Red) • Between ABS ECU coupler and ground. (Black–Black)
5	Hydraulic unit assembly internal malfunction.		Replace the hydraulic unit assembly.

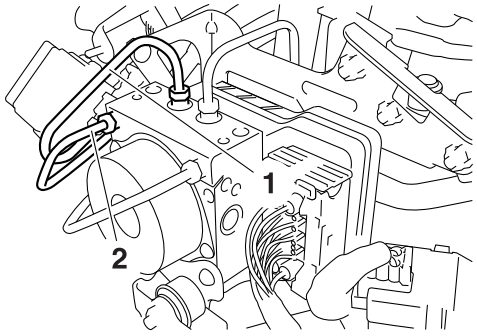
Fault code No.	ABS_32	Symptom	Hydraulic unit solenoid relay is short-circuited.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Short circuit in solenoid relay.		Replace the hydraulic unit assembly.
2	Hydraulic unit assembly internal malfunction.		Replace the hydraulic unit assembly.

Fault code No.	ABS_33	Symptom	ABS motor is defective. Power is not supplied to the ABS motor.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Battery voltage		Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.
2	Blown ABS motor fuse.		Check the ABS motor fuse. If the ABS motor fuse is blown, replace the fuse and check the wire harness. Refer to “CHECKING THE FUSES” on page 8-127.

Fault code No.	ABS_33	Symptom	ABS motor is defective. Power is not supplied to the ABS motor.
Order	**Item/components and probable cause**		**Check or maintenance job**
3	Connections • ABS ECU coupler • Starter relay coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to "OFF" before disconnecting or connecting a coupler.
4	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ABS ECU coupler and ABS motor fuse. (Red/blue–Red/blue) • Between ABS ECU coupler and ground. (Black/white–Black/white)
5	Hydraulic unit assembly internal malfunction.		Replace the hydraulic unit assembly.

Fault code No.	ABS_34	Symptom	Hydraulic unit ABS motor relay is short-circuited.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Short circuit in ABS motor relay.		Replace the hydraulic unit assembly.

Fault code No.	ABS_41	Symptom	Front wheel will not recover from wheel lock even though the signal is continuously transmitted from the ABS ECU and the hydraulic pressure has been released (when the battery voltage is normal).
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Rotation of wheel		• Check that there is no brake disc drag on the front wheel and make sure that it rotates smoothly. • Check the front wheel axle for loose bearings and bends, and the brake discs for distortion. Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-42.
2	Brake master cylinder and brake caliper		• Check that the brake fluid pressure is correctly transmitted to the brake calipers when the front brake lever is operated and that the pressure decreases when the lever is released.
3	Brake fluid		• Visually check the brake fluid in the brake master cylinder reservoir for water, foreign materials, solidification, and contamination. • Check for air in the brake lines.

Fault code No.	ABS_41	Symptom	Front wheel will not recover from wheel lock even though the signal is continuously transmitted from the ABS ECU and the hydraulic pressure has been released (when the battery voltage is normal).
Order	**Item/components and probable cause**		**Check or maintenance job**
4	Brake lines		• Check the brake lines for kinks and deterioration. EWA59C2804 **⚠ WARNING** **Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake lines.** • Check that the connections of the brake lines from the brake master cylinder to the hydraulic unit and from the hydraulic unit to the front brake calipers are correct.  See WARNING and TIP.
5	Hydraulic unit assembly		If the malfunction is not corrected after checking items (1) to (4), replace the hydraulic unit assembly. Be sure to connect the brake pipes and coupler correctly and securely. Check the hydraulic unit operation. Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-72.

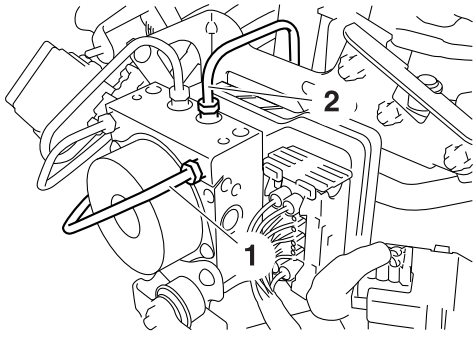
EWA59C2805

⚠ WARNING

The front brakes will not function properly if the connections are reversed.
- **Front brake hose (hydraulic unit to front brake hose joint) “1”: to the front brake calipers**
- **Front brake hose (front brake master cylinder to hydraulic unit) “2”: from the front brake master cylinder**

TIP
- If the brake pipe inlet and outlet connections are incorrect on the hydraulic unit, the front brake lever will be pulled to its full-stroke position without responding, and then it will be pushed back slowly without pulsating when the final check on page “[C-3] FINAL CHECK” on page 8-117 is performed.
- If the front and rear brake pipe connections are reversed on the hydraulic unit, the pulsating action in the front brake lever and rear brake lever will be performed in the reverse order when the final check on page “[C-3] FINAL CHECK” on page 8-117 is performed.

Fault code No.	ABS_42 ABS_47	Symptom	**Rear wheel will not recover from wheel lock even though the signal is continuously transmitted from the ABS ECU and the hydraulic pressure has been released.**

Order	Item/components and probable cause	Check or maintenance job
1	Rotation of wheel	• Check that there is no brake disc drag on the rear wheel and make sure that it rotates smoothly. • Check for brake disc distortion. Refer to “CHECKING THE REAR BRAKE DISC” on page 4-58.
2	Brake master cylinder and brake caliper	• Check that the brake fluid pressure is correctly transmitted to the brake caliper when the rear brake lever is operated and that the pressure decreases when the lever is released.
3	Brake fluid	• Visually check the brake fluid in the brake master cylinder reservoir for water, foreign materials, solidification, and contamination. • Check for air in the brake lines.
4	Brake lines	• Check the brake lines for kinks and deterioration (particularly between the hydraulic unit and the rear brake caliper). EWA59C2804 **⚠ WARNING** **Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake lines.** • Check that the connections of the brake lines from the brake master cylinder to the hydraulic unit are correct.  See WARNING and TIP.
5	Hydraulic unit assembly	If the malfunction is not corrected after checking items (1) to (4), replace the hydraulic unit assembly. Be sure to connect the brake hose, brake pipe, and coupler correctly and securely. Check the hydraulic unit operation. Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-72.

EWA59C2806

⚠ WARNING

The rear brake will not function properly if the connections are reversed.

- **Rear brake hose (rear brake master cylinder to hydraulic unit) "1": from the rear brake master cylinder**
- **Rear brake pipe/joint assembly (hydraulic unit to rear brake hose) "2": to the rear brake caliper**

TIP

- If the brake pipe inlet and outlet connections are reversed on the hydraulic unit, the rear brake lever will be pulled to its full-stroke position without responding, and then it will be pushed back slowly without pulsating when the final check on page "[C-3] FINAL CHECK" on page 8-117 is performed.
- If the front and rear brake pipe connections are reversed on the hydraulic unit, the pulsating action in the front brake lever and rear brake lever will be performed in the reverse order when the final check on page "[C-3] FINAL CHECK" on page 8-117 is performed.

Fault code No.	**ABS_43**	**Symptom**	**Incorrect signal from the front wheel sensor is detected.**
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to "CHECKING THE FRONT WHEEL" on page 4-20.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-21.
4	Defective sensor rotor.		• Check the surface of the sensor rotor for damage. • If there is visible damage, replace the sensor rotor.

Fault code No.	**ABS_44**	**Symptom**	**Incorrect signal from the rear wheel sensor is detected.**
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Installed condition of wheel sensor.		Check for looseness. Repair or replace the wheel sensor if necessary.
2	Installed condition of wheel bearings, axle, sensor housing, and sensor rotor.		Check the components for looseness, distortion, and bends. Refer to "CHECKING THE REAR WHEEL" on page 4-32.
3	Foreign material inside sensor housing.		Check the interior of the sensor housing and the surface of the sensor rotor for foreign material, such as metal particles. Clean the sensor housing and sensor rotor if necessary. Refer to "MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR" on page 4-33.

Fault code No.	ABS_44	Symptom	Incorrect signal from the rear wheel sensor is detected.
Order	**Item/components and probable cause**		**Check or maintenance job**
4	Defective sensor rotor.		• Check the surface of the sensor rotor for damage. • If there is visible damage, replace the sensor rotor.

Fault code No.	ABS_51 ABS_52	Symptom	Power voltage is too high.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Battery voltage		Replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.
2	Disconnected battery terminal (fault code No. ABS_52).		Check the connection. Replace or reconnect the terminal if necessary.
3	Charging system		Check the charging system. Refer to “CHARGING SYSTEM” on page 8-11.

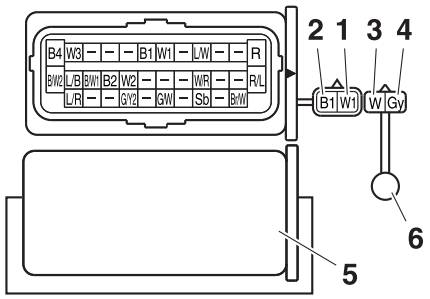
Fault code No.	ABS_53	Symptom	Power voltage is too low.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Battery voltage		Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.
2	Connections • ABS ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to “OFF” before disconnecting or connecting a coupler.
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ABS ECU coupler and ABS ECU fuse. (Brown/white–Brown/white)
4	Charging system		Check the charging system. Refer to “CHARGING SYSTEM” on page 8-11.

Fault code No.	ABS_54	Symptom	Power voltage is too low.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Battery voltage		Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-127.

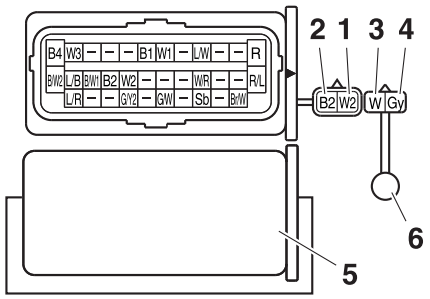
Fault code No.	ABS_54	Symptom	Power voltage is too low.
Order	**Item/components and probable cause**		**Check or maintenance job**
2	Connections • ABS ECU coupler • Starter relay coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Set the main switch to “OFF” before disconnecting or connecting a coupler.
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ABS ECU coupler and ABS ECU fuse. (Brown/white–Brown/white) • Between ABS ECU coupler and ABS solenoid fuse. (Red–Red) • Between ABS ECU coupler and ABS motor fuse. (Red/blue–Red/blue)
4	Charging system		Check the charging system. Refer to “CHARGING SYSTEM” on page 8-11.

Fault code No.	ABS_56	Symptom	Hydraulic unit sensor power monitor circuit is abnormal.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Defective internal monitor circuit (sensor power).		Replace the hydraulic unit assembly.

Fault code No.	ABS_63	Symptom	Front wheel sensor power is abnormal.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Short circuit in wire harness.		• Check that there is no short circuit between the white terminal “1” and the black terminal “2”. • Check that there is no short circuit between the frame ground and the black terminal “2”. • If there is a short circuit, the wire harness is defective. Properly repair or replace the wire harness. **TIP** Disconnect the ABS ECU coupler before checking the wire harness.

Fault code No.	ABS_63	Symptom	Front wheel sensor power is abnormal.
Order	**Item/components and probable cause**		**Check or maintenance job**
2	Short circuit in front wheel sensor lead.		• Check that there is no short circuit between the white terminal “3” and the gray terminal “4”. • Check that there is no short circuit between the frame ground and the white terminal “3”. • If there is a short circuit, the front wheel sensor is defective. Properly repair or replace the front wheel sensor.  5. ABS ECU 6. Front wheel sensor
3	Hydraulic unit internal malfunction.		Replace the hydraulic unit assembly.

Fault code No.	ABS_64	Symptom	Rear wheel sensor power is abnormal.
Order	**Item/components and probable cause**		**Check or maintenance job**
1	Short circuit in wire harness.		• Check that there is no short circuit between the white terminal “1” and the black terminal “2”. • Check that there is no short circuit between the frame ground and the black terminal “2”. • If there is a short circuit, the wire harness is defective. Properly repair or replace the wire harness. **TIP** Disconnect the ABS ECU coupler before checking the wire harness.

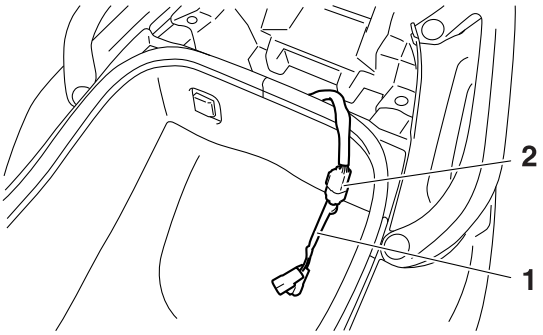
Fault code No.	ABS_64	Symptom	Rear wheel sensor power is abnormal.
Order	**Item/components and probable cause**		**Check or maintenance job**
2	Short circuit in rear wheel sensor lead.		• Check that there is no short circuit between the white terminal “3” and the gray terminal “4”. • Check that there is no short circuit between the frame ground and the white terminal “3”. • If there is a short circuit, the rear wheel sensor is defective. Properly repair or replace the rear wheel sensor.  5. ABS ECU 6. Rear wheel sensor
3	Hydraulic unit internal malfunction.		Replace the hydraulic unit assembly.

EAS59C2808
[C-1] DELETING THE FAULT CODES
ECA59C2802

NOTICE

Since the fault codes remain in the memory of the ABS ECU until they are deleted, always delete the fault codes after the service has been completed.

1. Connect the test coupler adapter "1" to the ABS test coupler "2".



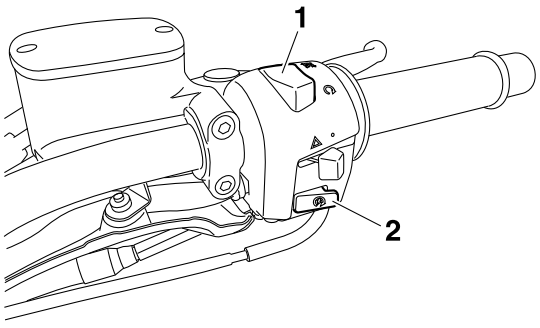
2. Set the main switch to "ON".
   Fault codes will be displayed in the multi-function display.
3. Set the engine stop switch "1" to "⊗".

ECA59C2803

NOTICE

If the start switch is pushed without setting the engine stop switch to "⊗", the starter motor gears or other parts may be damaged.

4. Without operating the brake lever, push the start switch "2" at least 10 times in 4 seconds to delete the fault codes.



5. The multi-function display switches to the odometer display and the ABS warning light flashes in 0.5 second-intervals while the fault codes are being deleted.
6. Set the main switch to "OFF".
7. Set the main switch to "ON" again.

TIP

If fault codes are still displayed in the multi-function display, the malfunctions have not been repaired. Diagnose the malfunctions using the fault codes.

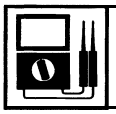
8. Set the main switch to "OFF".
9. Disconnect the test coupler adapter from the ABS test coupler, and then install the protective cap onto the ABS test coupler. Deleting the fault codes is now finished.

TIP

Do not forget to install the protective cap onto the ABS test coupler.

EAS59C2809
[C-2] DELETE FUNCTION TEST

1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Connect the test coupler adapter to the ABS test coupler.
4. Set the main switch to "ON".
5. Check:
   - ABS ECU voltage
     Lower than 12.8 V → Charge or replace the battery.



Battery voltage
Higher than 12.8 V

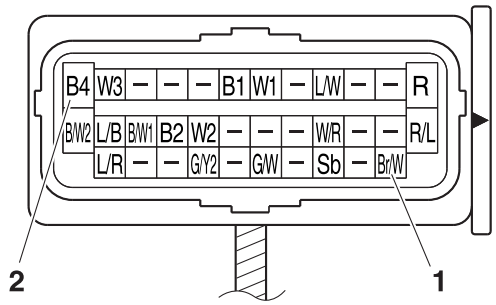
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a. Connect the digital circuit tester (DC 20 V) to the ABS ECU coupler.



Digital circuit tester
90890-03189
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe → Brown/white "1"
- Negative tester probe → Black "2"



b. Measure the ABS ECU voltage.

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6. Check:
   - ABS-ECU-to-start-switch-lead continuity
     No continuity → Replace or repair the wire harness.

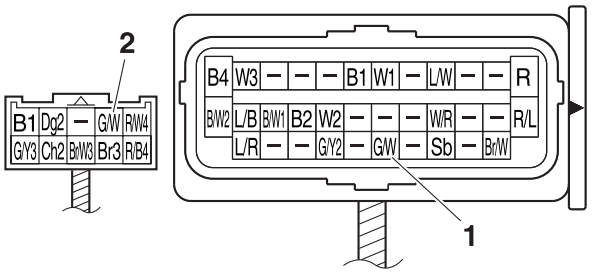
	Continuity is all right.

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a. Connect the digital circuit tester to the ABS ECU coupler and right handlebar switch coupler.

	Digital circuit tester **90890-03189** **Model 88 Multimeter with tachometer** **YU-A1927**

• Positive tester probe → Green/white “1” (ABS ECU) • Negative tester probe → Green/white “2” (right handlebar switch)



b. Check for continuity between the ABS ECU and the start switch lead.

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7. Check:
   - ABS ECU voltage
     Out of specification → Replace the right handlebar switch.

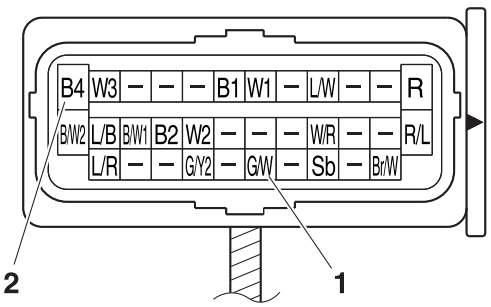
	Start switch “ON”: less than 1 V **Start switch “OFF”: more than 12 V**

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a. Connect the digital circuit tester (DC 12 V) to the ABS ECU coupler.

	Digital circuit tester **90890-03189** **Model 88 Multimeter with tachometer** **YU-A1927**

• Positive tester probe → Green/white “1” • Negative tester probe → Black “2”



b. Push the start switch.
c. Measure the ABS ECU voltage.

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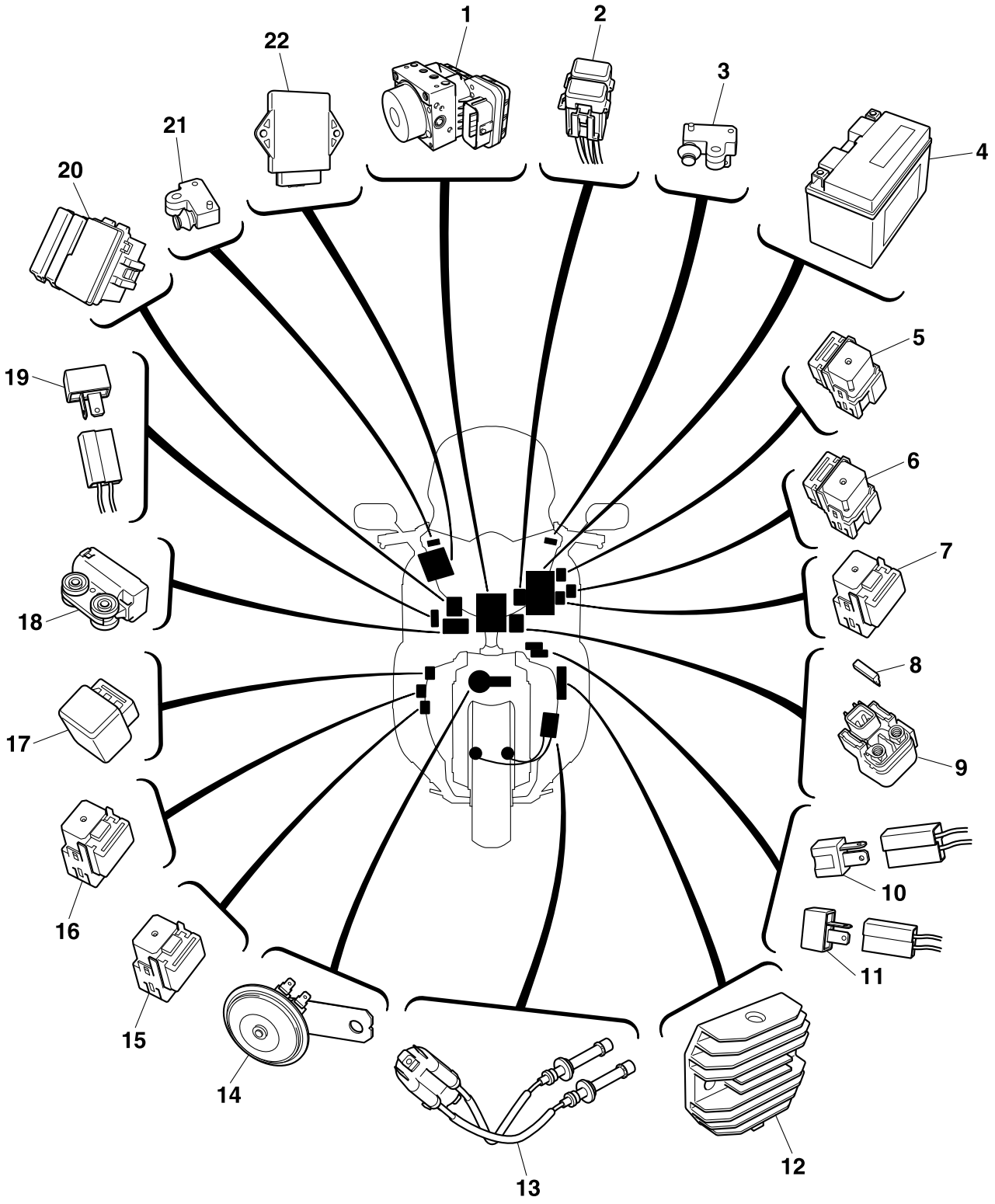
8. If the above-mentioned checks are within specification, replace the hydraulic unit assembly.

EAS59C2810
[C-3] FINAL CHECK

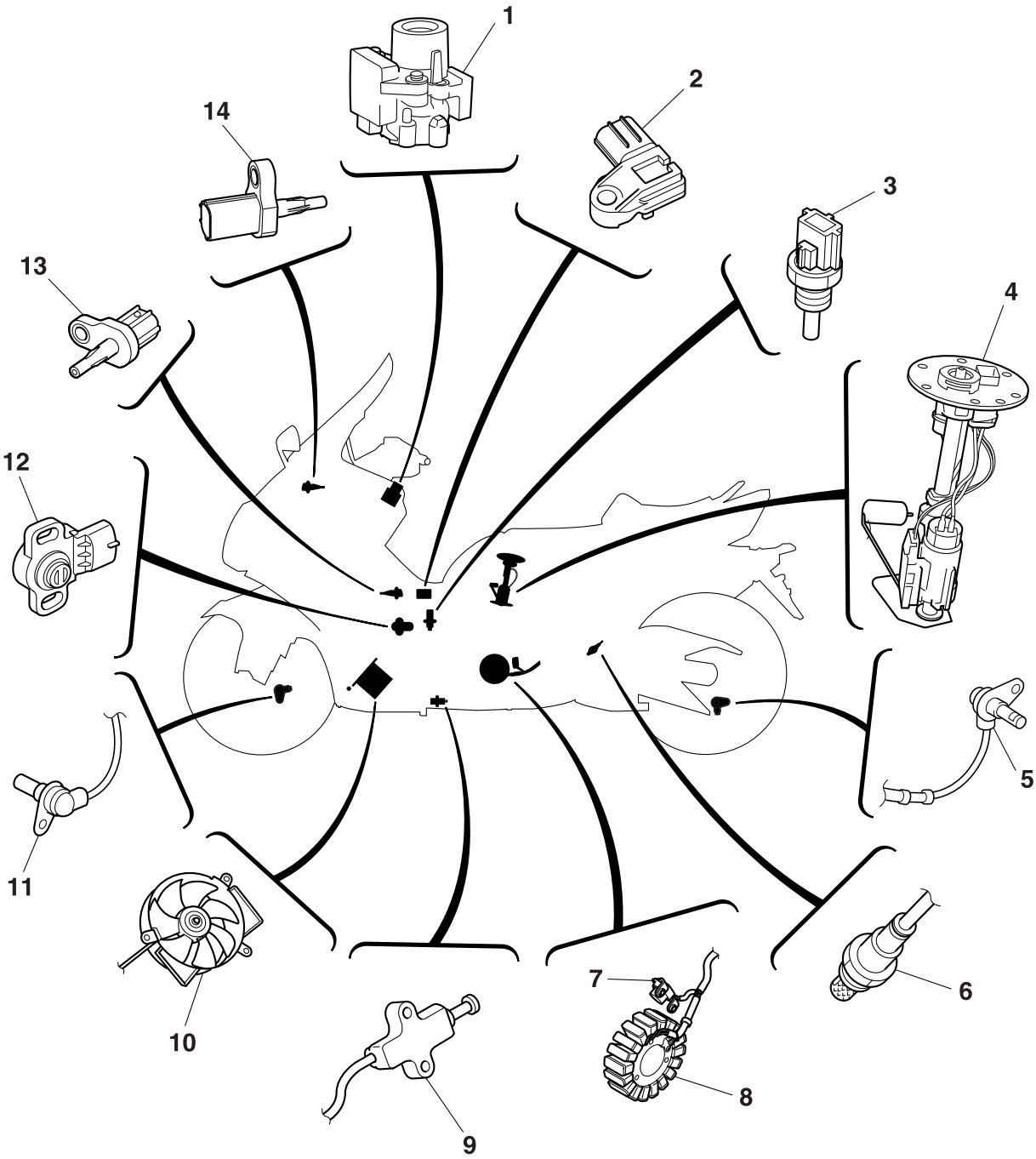
Checking procedures

1. Check the brake fluid level in the brake master cylinder reservoir.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.
2. Check the wheel sensor housings and wheel sensors for proper installation.
   Refer to “INSTALLING THE FRONT WHEEL (DISCS)” on page 4-24.
3. Perform hydraulic unit operation test 1 or 2.
   Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-72.
4. Delete the fault codes.
   Refer to “[C-1] DELETING THE FAULT CODES” on page 8-115.
5. Checking the ABS warning light.
   Ensure that the ABS warning light goes off by walking the vehicle at a speed of faster than 7 km/h (4.4 mi/h) or performing a trial run.

EAS27973
ELECTRICAL COMPONENTS

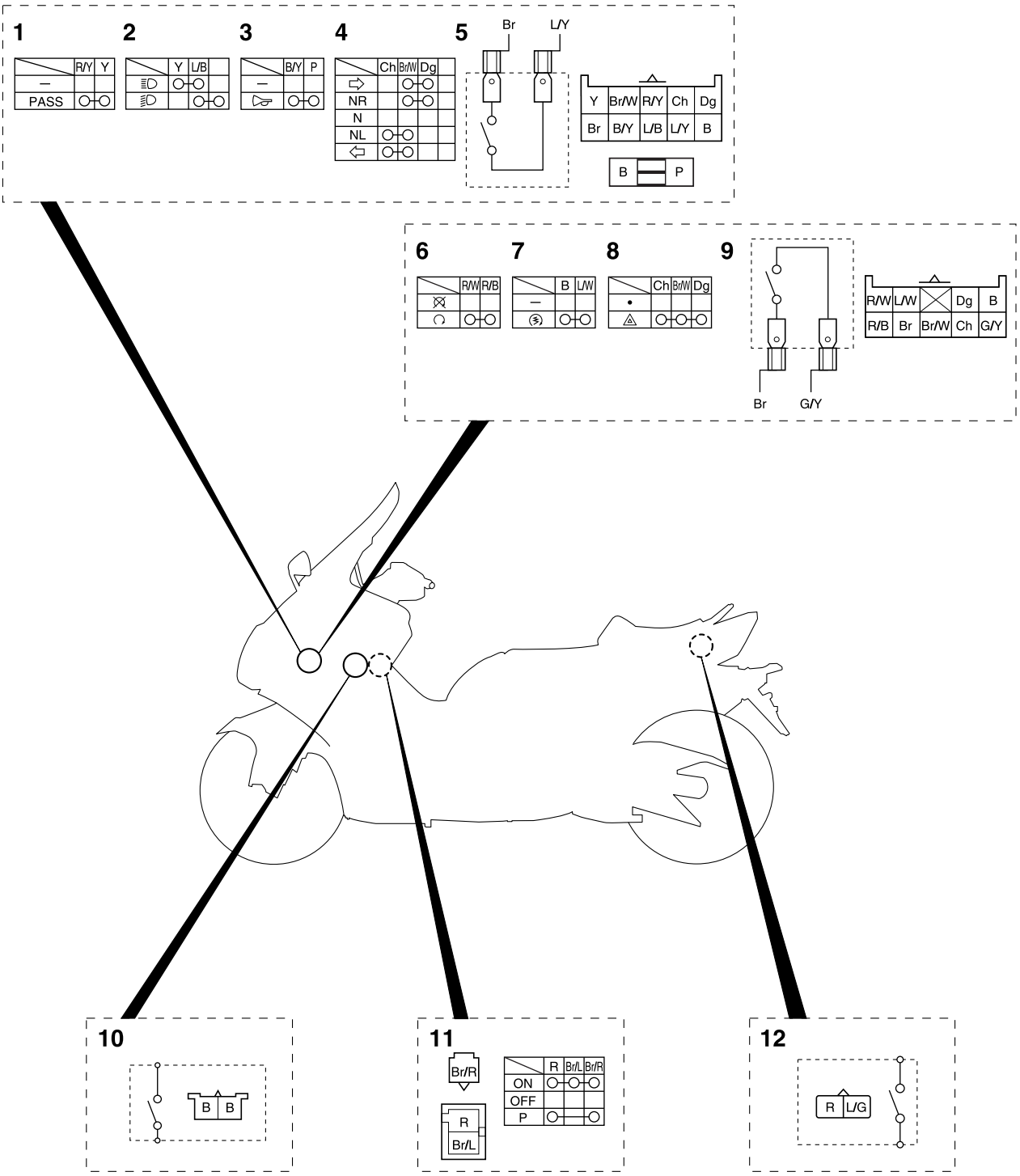


1. Hydraulic unit assembly
2. Fuse box (left)
3. Rear brake light switch
4. Battery
5. Fuel injection system relay
6. Starting circuit cut-off relay 1
7. Starting circuit cut-off relay 2
8. Main fuse
9. Starter relay
10. Diode 2
11. Diode 1
12. Rectifier/regulator
13. Ignition coil
14. Horn
15. Radiator fan motor relay
16. Headlight relay
17. Turn signal/hazard relay
18. Lean angle sensor
19. Diode 3
20. Fuse box (right)
21. Front brake light switch
22. ECU (engine control unit)


1
2
3
4
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6
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11
12
13
14

1. Main switch/immobilizer unit
2. Intake air pressure sensor
3. Coolant temperature sensor
4. Fuel pump
5. Rear wheel sensor
6. O_2 sensor
7. Crankshaft position sensor
8. Stator coil
9. Sidestand switch
10. Radiator fan
11. Front wheel sensor
12. Throttle position sensor
13. Intake air temperature sensor
14. Ambient temperature sensor

EAS27981
CHECKING THE SWITCHES



1. Pass switch
2. Dimmer switch
3. Horn switch
4. Turn signal switch
5. Rear brake light switch
6. Engine stop switch
7. Start switch
8. Hazard switch
9. Front brake light switch
10. Sidestand switch
11. Main switch
12. Storage box 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

NOTICE

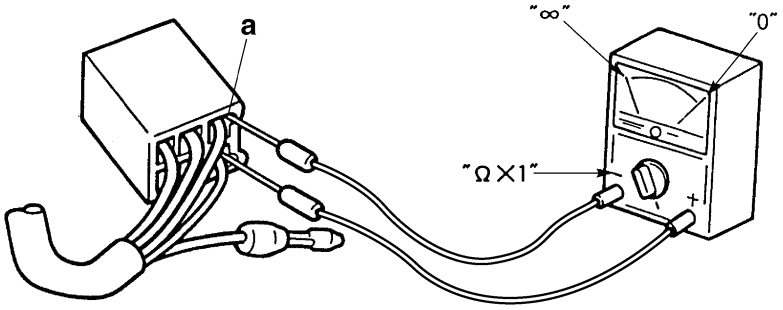
Never insert the tester probes into the coupler terminal slots "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



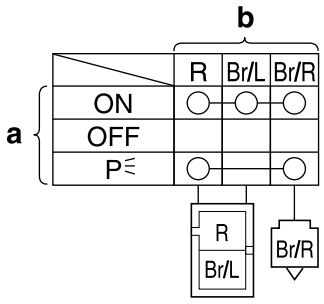
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The 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 indicated by " ○——○ ".
There is continuity between red, brown/blue and brown/red when the switch is set to "ON".
There is continuity between red and brown/red when the switch is set to "P≦".

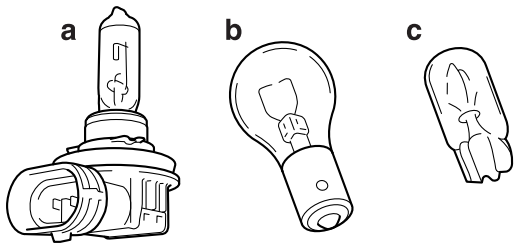


EAS27990
CHECKING THE BULBS AND BULB SOCKETS

TIP
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 → 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 illustration.
- Bulbs "a" are used for the headlights. The bulb and socket can be removed as a set by turning the bulb socket counterclockwise.
- Bulbs "b" are used for turn signal lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs "c" are used for auxiliary, license plate and storage box 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

EWA4B51012
WARNING
Since the headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.

ECA4B51010
NOTICE
- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - Bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.



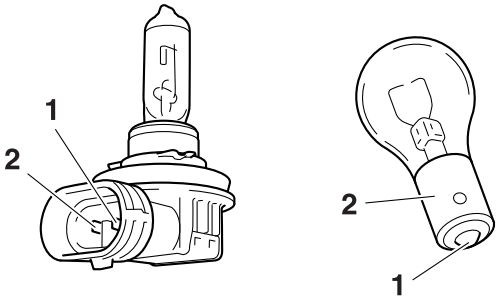
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP
Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
b. If reading indicate no continuity, replace the bulb.

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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

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section, however, note the following.

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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.

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EAS28000
CHECKING THE FUSES
The following procedure applies to all of the fuses.
ECA13680
NOTICE
To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   • Front cover
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Fuse

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

TIP
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.

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3. Replace:
   • Blown fuse

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

Fuses	Amperage rating	Q'ty
Main	40 A	1
Headlight	20 A	1
Signaling system	15 A	1
Ignition	7.5 A	1
Radiator fan	15 A	1
Parking lighting	10 A	1
Fuel injection system	7.5 A	1
ABS motor	30 A	1
ABS control unit	5 A	1
ABS solenoid	20 A	1
Backup	7.5 A	1
Spare	40 A	1
Spare	30 A	1
Spare	20 A	1
Spare	15 A	1
Spare	10 A	1
Spare	7.5 A	1
Spare	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.

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4. Install:
   • Front cover
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS28031
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.**

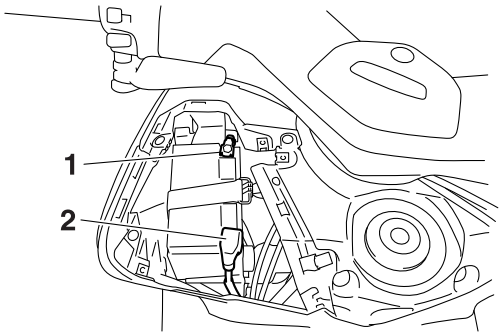
INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

ECA13661
NOTICE
- **This is a VRLA (Valve Regulated Lead Acid) 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 a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

TIP
Since VRLA (Valve Regulated Lead Acid) 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:
   - Front left storage box
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
   - Battery leads
     (from the battery terminals)

ECA13640
NOTICE
First, disconnect the battery negative lead “1”, and then battery positive lead “2”.



3. Remove:
   - Battery
     Refer to “GENERAL CHASSIS” on page 4-1.
4. Check:
   - Battery charge

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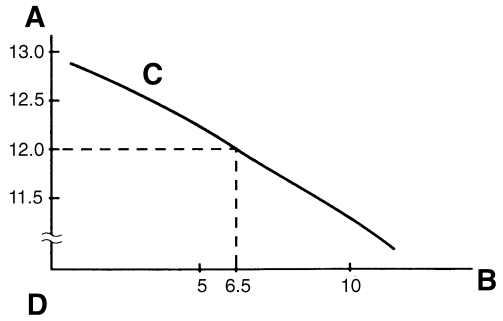
a. Connect a pocket tester to the battery terminals.

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

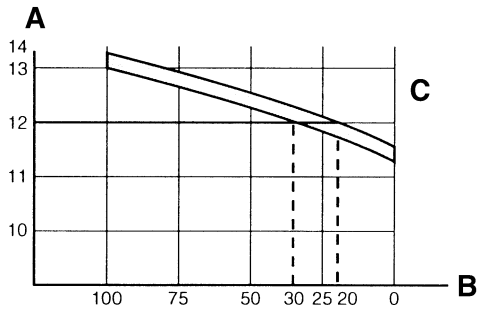
TIP
- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

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)

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

EWA13300

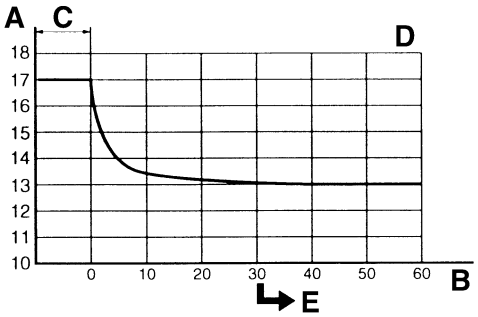
⚠ WARNING

Do not quick charge a battery.

ECA13671

NOTICE

- **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 battery negative 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 a VRLA (Valve Regulated Lead Acid) 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.

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Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

TIP
Set the charging voltage to 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

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

TIP
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.

d. Adjust the voltage so that the current is at the standard charging level.
e. Set the time according to the charging time suitable for the open-circuit voltage.
f. 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.
g. 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.

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Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP
Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.
c. Make sure that the current is higher than the standard charging current written on the battery.

TIP
If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

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

TIP
Set the charging time at 20 hours (maximum).

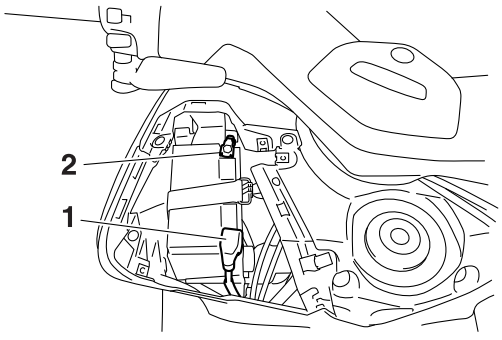
e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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6. Install:
   - Battery
     Refer to "GENERAL CHASSIS" on page 4-1.
7. Connect:
   - Battery leads
     (to the battery terminals)

ECA13630
NOTICE
First, connect the battery positive lead "1", and then the battery negative lead "2".



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

Recommended lubricant
Dielectric grease

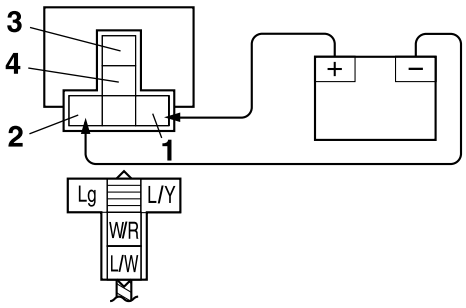
10. Install:
    - Front left storage box
      Refer to “GENERAL CHASSIS” on page 4-1.

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.

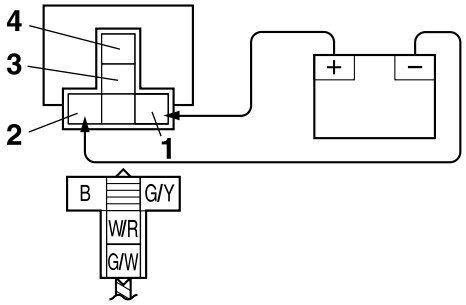
Starting circuit cut-off relay 1



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

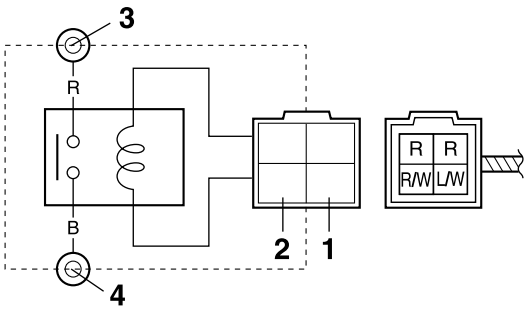
Starting circuit cut-off relay 2



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

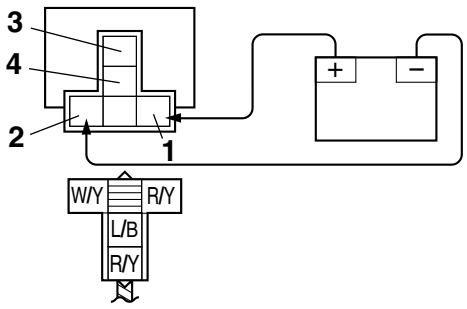
Starter relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

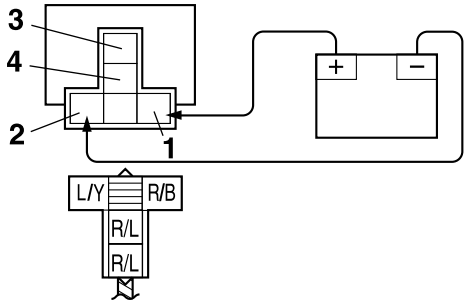
Headlight relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

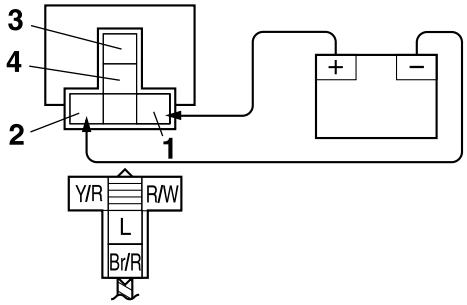
Fuel injection system relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

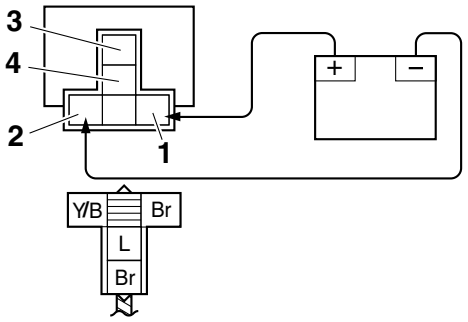
Radiator fan motor relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

Grip warmer relay (OPTION)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

EAS4B51020
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.

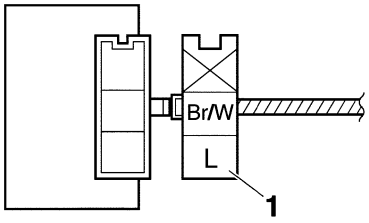
Turn signal/hazard relay input voltage
DC 12 V

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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 → Blue "1"
- Negative tester probe → Ground



b. Set the main switch to "ON".
c. Measure the turn signal/hazard relay input voltage.

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2. Check:
   - Turn signal/hazard relay output voltage
     Out of specification → Replace.

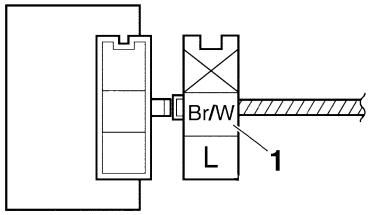
Turn signal/hazard relay output voltage
DC 12 V

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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. Set the main switch to "ON".
c. Measure the turn signal/hazard relay output voltage.

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EAS28050
CHECKING THE DIODE

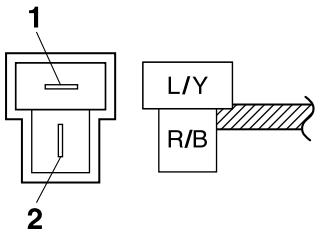
1. Check:
   - Diode 2
     Out of specification → Replace.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

The pocket tester or the analog pocket tester reading are shown in the following table.

Continuity
Positive tester probe → Blue/yellow "1"
Negative tester probe → Red/black "2"
No continuity
Positive tester probe → Red/black "2"
Negative tester probe → Blue/yellow "1"



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a. Disconnect the diode 2 from the wire harness.
b. Connect the pocket tester ($\Omega \times 1$) to the diode 2 terminals as shown.

c. Check the diode 2 for continuity.
d. Check the diode 2 for no continuity.

TIP
When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

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EAS28070
CHECKING THE SPARK PLUG CAPS

The following procedure applies to all of the spark plug caps.

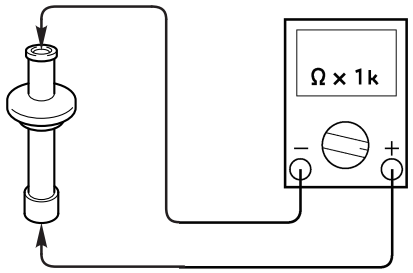
1. Check:
   - Spark plug cap resistance
     Out of specification → Replace.

Resistance
7.5–12.5 kΩ

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a. Remove the spark plug cap from the spark plug lead.
b. Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



c. Measure the spark plug cap resistance.

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EAS28080
CHECKING THE IGNITION COIL

1. Check:
   - Primary coil resistance
     Out of specification → Replace.

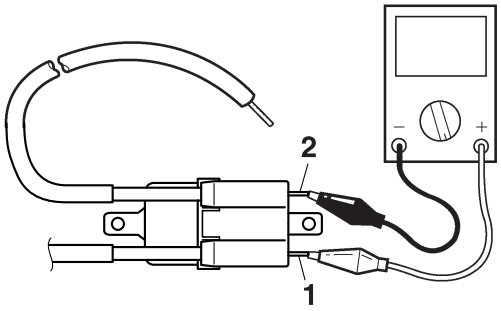
Primary coil resistance
1.87–2.53 Ω

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a. Disconnect the ignition coil connectors from the ignition coil terminals.
b. Connect the pocket tester (Ω × 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 “2”



c. Measure the primary coil resistance.

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2. Check:
   - Secondary coil resistance
     Out of specification → Replace.

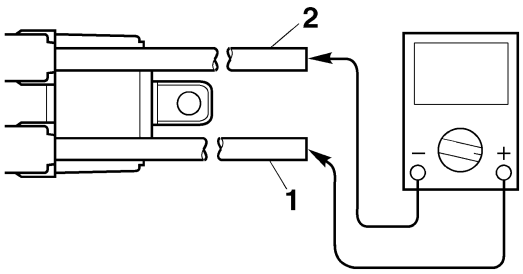
Secondary coil resistance
12.00–18.00 kΩ

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a. Disconnect the spark plug cap from the ignition coil.
b. Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe →
  Spark plug lead “1”
- Negative tester probe →
  Spark plug lead “2”

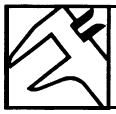


c. Measure the secondary coil resistance.

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EAS28930
CHECKING THE IGNITION SPARK GAP

1. Check:
   - Ignition spark gap
     Out of specification → Perform the ignition system troubleshooting, starting with step 5.
     Refer to "TROUBLESHOOTING" on page 8-3.



Minimum ignition spark gap
6.0 mm (0.24 in)

TIP
If the ignition spark gap is within specification, the ignition system circuit is operating normally.

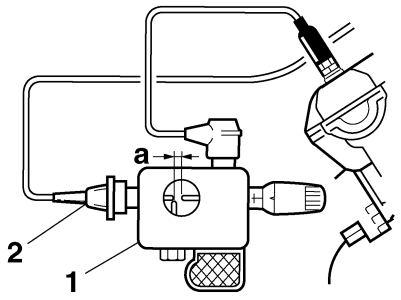
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a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker "1" as shown.



Ignition checker
90890-06754
Oppama pet-4000 spark checker
YM-34487

c. Set the main switch to "ON" and the engine stop switch to "○".
d. Measure the ignition spark gap "a".



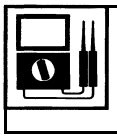
2. Spark plug cap

e. Crank the engine by pushing the start switch "≋" and gradually increase the spark gap until a misfire occurs.

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EAS28120
CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
   - Crankshaft position sensor coupler (from the wire harness)
2. Check:
   - Crankshaft position sensor resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.



Crankshaft position sensor resistance
248–372 Ω

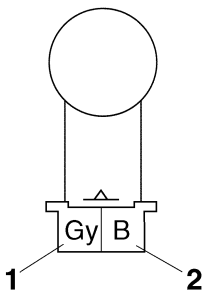
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a. Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.



Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe → Gray "1"
- Negative tester probe → Black "2"



b. Measure the crankshaft position sensor resistance.

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EAS28131
CHECKING THE LEAN ANGLE SENSOR

1. Remove:
   - Lean angle sensor (from the bracket.)

2. Check:
   • Lean angle sensor output voltage
   Out of specification → Replace.

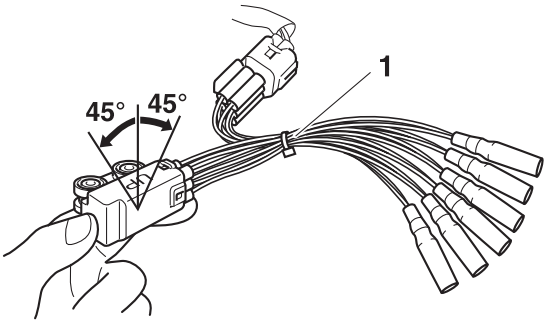
Lean angle sensor output voltage
Less than 45°: 0.4–1.4 V
More than 45°: 3.7–4.4 V

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a. Connect the test harness-lean angle sensor (6P) "1" to the lean angle sensor and wire harness as shown.
b. Connect the pocket tester (DC 20 V) to the test harness-lean angle sensor (6P).

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C
Test harness- lean angle sensor (6P)
90890-03209
YU-03209

• Positive tester probe →
Yellow/green (wire harness color)
• Negative tester probe →
Black/blue (wire harness color)



c. Set the main switch to "ON".
d. When turn the lean angle sensor to 45°.
e. Measure the lean angle sensor output voltage.

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EAS28940
CHECKING THE STARTER MOTOR OPERATION

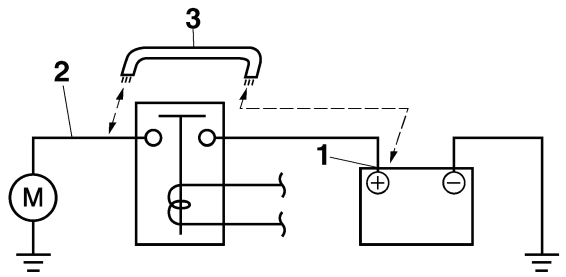
1. Check:
   • Starter motor operation
   Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
   Refer to "TROUBLESHOOTING" on page 8-9.

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a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

EWA13810
⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.**



b. Check the starter motor operation.

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EAS28150
CHECKING THE STATOR COIL

1. Disconnect:
   • Stator coil coupler
   (from the wire harness)
2. Check:
   • Stator coil resistance
   Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.224–0.336 Ω

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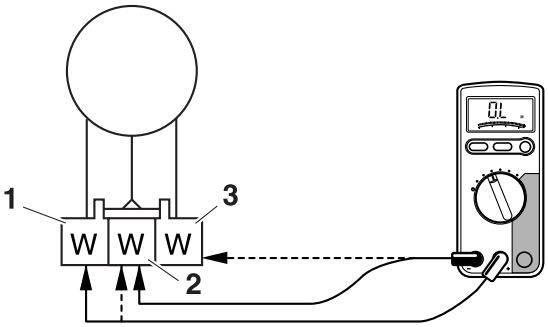
a. Connect the digital circuit tester (Ω × 1) to the stator coil coupler as shown.

Digital circuit tester
90890-03189
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe → White “1”
- Negative tester probe → White “2”

- Positive tester probe → White “1”
- Negative tester probe → White “3”

- Positive tester probe → White “2”
- Negative tester probe → White “3”



b. Measure the stator coil resistance.

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EAS28170
CHECKING THE RECTIFIER/REGULATOR

1. Check:
   - Battery charging voltage
     Out of specification → Check the stator coil condition. If the stator coil does not have a problem, replace the rectifier/regulator.
     Refer to “CHECKING THE STATOR COIL” on page 8-136.

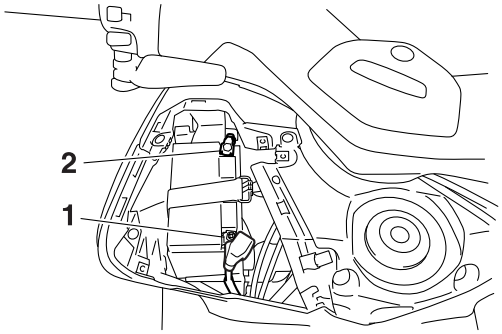
Battery charging voltage
above 14 V at 5000 r/min

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a. Set the engine tachometer to the spark plug lead of cylinder #1.
b. Connect the pocket tester (AC 20 V) to the battery terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe → Battery positive terminal “1”
- Negative tester probe → Battery negative terminal “2”



c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the rectifier/regulator input voltage.

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EAS28180
CHECKING THE HORN

1. Check:
   - Horn resistance
     Out of specification → Replace.

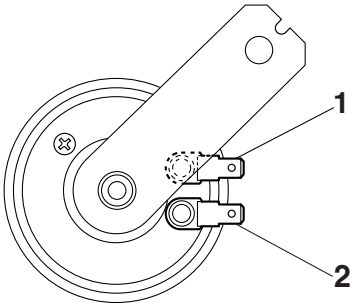
Coil resistance
1.06–1.11 Ω

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a. Disconnect the horn leads from the horn terminals.
b. Connect the digital circuit tester to the horn terminals.

Digital circuit tester
90890-03189
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe → Horn terminal “1”
- Negative tester probe → Horn terminal “2”



c. Measure the horn resistance.

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2. Check:
   - Horn sound
     Faulty sound → Replace.

EAS28230
CHECKING THE FUEL SENDER

1. Remove:
   - Fuel pump
     (from the fuel tank)
     Refer to "FUEL TANK" on page 7-1.
2. Check:
   - Fuel sender resistance
     Out of specification → Replace the fuel pump.

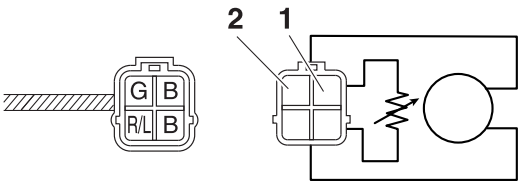
Sender unit resistance (full)
4.0–10.0 Ω
Sender unit resistance (empty)
93.0–100.0 Ω

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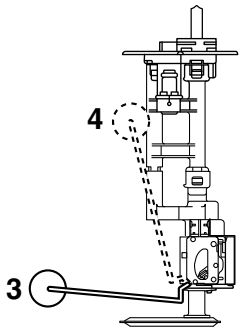
a. Connect the pocket tester (Ω × 1) to the fuel pump terminals as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe → Green "1"
- Negative tester probe → Black "2"



b. Move the fuel sender float to empty fuel tank position "3" and full fuel tank position "4" level position.



c. Measure the fuel sender resistance.

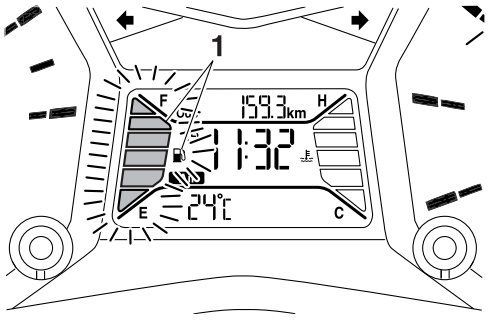
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3. Install:
   - Fuel pump
     Refer to "FUEL TANK" on page 7-1.

EAS59C1802
CHECKING THE FUEL METER/FUEL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the fuel level detection circuit.

1. Check:
   - Fuel meter/fuel level warning light "1"
     (Set the main switch to "ON".)
     Fuel meter/fuel level warning light comes on for a few seconds, then goes off → Fuel meter/fuel level warning light is OK.
     Fuel meter/fuel level warning light does not come on → Replace the meter assembly.
     Fuel meter/fuel level warning light flashes eight times, then goes off for 3 seconds in a repeated cycle (malfunction detected in fuel sender) → Replace the fuel pump assembly.



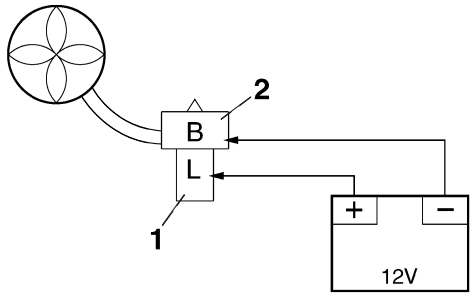
EAS28250
CHECKING THE RADIATOR FAN MOTOR

1. Check:
   - Radiator fan motor
     Faulty/rough movement → Replace.

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a. Disconnect the radiator fan motor coupler from the wire harness.
b. Connect the battery (DC 12 V) as shown.

- Positive battery terminal → Blue "1"
- Negative battery terminal → Black "2"



c. Measure the radiator fan motor movement.

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EAS28260
CHECKING THE COOLANT TEMPERATURE SENSOR

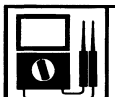
1. Remove:
   - Coolant temperature sensor
     Refer to "THERMOSTAT" on page 6-7.

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.



Coolant temperature sensor resistance
2.32–2.59 kΩ at 20 °C (68 °F)
310.0–326.0 Ω at 80 °C (176 °F)

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a. Connect the pocket tester (Ω × 100/ × 1k) to the coolant temperature sensor terminals as shown.



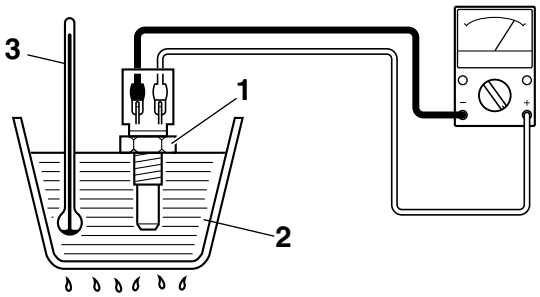
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

TIP

Make sure the coolant temperature sensor terminals do not get wet.

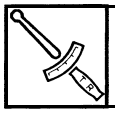
c. Place a thermometer "3" in the coolant.



d. Heat the coolant or let it cool down to the specified temperature.
e. Measure the coolant temperature sensor resistance.

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3. Install:
   - Coolant temperature sensor



Coolant temperature sensor
18 Nm (1.8 m·kgf, 13 ft·lbf)

EAS28300
CHECKING THE THROTTLE POSITION SENSOR

1. Remove:
   - Throttle position sensor
     (from the throttle body)
2. Check:
   - Throttle position sensor

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a. Connect the pocket tester (Ω × 1 k) to the throttle position sensor as shown.



Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

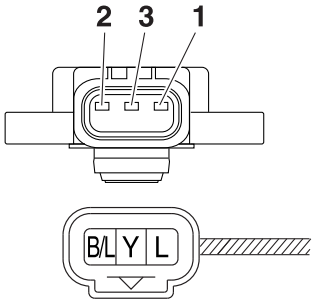
- Positive tester probe → Blue "1"
- Negative tester probe → Black/blue "2"

b. Measure the throttle position sensor maximum resistance.
   Out of specification → Replace the throttle position sensor.

Throttle position sensor maximum resistance
2.64–6.16 kΩ

c. Connect the pocket tester (Ω × 1 k) to the throttle position sensor as shown.

- Positive tester probe → Yellow "3"
- Negative tester probe → Black/blue "2"



d. While slowly turning the throttle position sensor shaft, check that the throttle position sensor resistance is within the specified range.
The resistance does not change or it changes abruptly → Replace the throttle position sensor.

Throttle position sensor resistance
0–6.16 kΩ

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3. Install:
   - Throttle position sensor

TIP
When installing the throttle position sensor, adjust its angle properly. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR" on page 7-9.

EAS28411
CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
   - Intake air pressure sensor output voltage
     Out of specification → Replace.

Intake air pressure output voltage
3.57–3.71 V at 101.32 kPa

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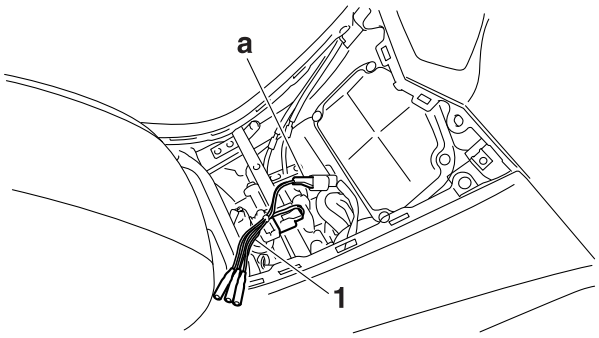
a. Connect the test harness S- pressure sensor (3P) "1" to the intake air pressure sensor and wire harness as shown.

ECA16730
NOTICE
Pay attention to the installing direction of the test harness S- pressure sensor (3P) coupler "a".

b. Connect the digital circuit tester (DCV) to the test harness S- pressure sensor (3P).

Digital circuit tester
90890-03189
Model 88 Multimeter with tachometer
YU-A1927
Test harness S- pressure sensor (3P)
90890-03207
YU-03207

- Positive tester probe → Pink/white (wire harness color)
- Negative tester probe → Black/blue (wire harness color)



c. Set the main switch to "ON".
d. Measure the intake air pressure sensor output voltage.

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EAS28421
CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
   - Intake air temperature sensor (from the air filter case.)

EWA14110
⚠ WARNING
- **Handle the intake air temperature sensor with special care.**

• Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. Check:
   • Intake air temperature sensor resistance
   Out of specification → Replace.



Intake air temperature sensor resistance
5.4–6.6 kΩ at 0 °C (32 °F)
290–390 Ω at 80 °C (176 °F)

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a. Connect the pocket tester (Ω × 1k/ × 100) to the intake air temperature sensor terminal as shown.



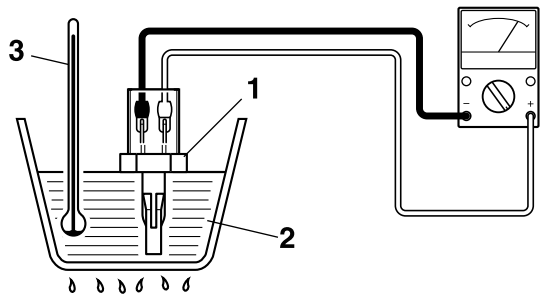
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Immerse the intake air temperature sensor "1" in a container filled with water "2".

TIP

Make sure that the intake air temperature sensor terminals do not get wet.

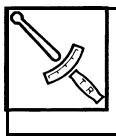
c. Place a thermometer "3" in the water.



d. Heat the water or let it cool down to the specified temperatures.
e. Measure the intake air temperature sensor resistance.

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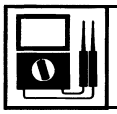
3. Install:
   • Intake air temperature sensor



Intake air temperature sensor bolt
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

EAS59C1801
CHECKING THE FUEL INJECTORS

1. Check:
   • Fuel injector resistance
   Out of specification → Replace the fuel injector.



Fuel injector resistance
12.0 Ω

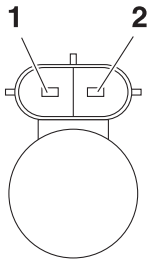
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a. Disconnect the fuel injector coupler from wire harness.
b. Connect the pocket tester (Ω × 1) to the fuel injector coupler.



Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe → Injector terminal "1"
• Negative tester probe → Injector terminal "2"



c. Measure the fuel injector resistance.

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TROUBLESHOOTING

TROUBLESHOOTING 9-1
GENERAL INFORMATION 9-1
STARTING FAILURE/HARD STARTING 9-1
POOR ENGINE IDLING SPEED PERFORMANCE 9-1
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE 9-2
FAULTY CLUTCH 9-2
OVERHEATING 9-2
OVERCOOLING 9-3
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FAULTY FRONT FORK LEGS 9-3
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FAULTY LIGHTING OR SIGNALING SYSTEM 9-4
TROUBLESHOOTING AT THE ABS WARNING LIGHT 9-4

SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE 9-5

EAS28451
TROUBLESHOOTING

EAS28460
GENERAL INFORMATION

TIP

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.

EAS30420
STARTING FAILURE/HARD STARTING

Engine

1. Cylinder(s) and cylinder head
   - Loose spark plug
   - Loose cylinder head or cylinder
   - Damaged cylinder head gasket
   - Damaged cylinder gasket
   - Worn or damaged cylinder
   - Incorrect valve clearance
   - Improperly sealed valve
   - Incorrect valve-to-valve-seat contact
   - Incorrect valve timing
   - Faulty valve spring
   - Seized valve
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 rollover valve
   - Clogged fuel tank breather hose
   - Deteriorated or contaminated fuel
   - Clogged or damaged fuel hose
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel injection system relay
   - Damaged vacuum hose
   - Improperly routed hose
3. Throttle body
   - 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
   - Faulty spark plug cap
4. Ignition coil
   - Cracked or broken ignition coil body
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
5. Ignition system
   - Faulty ECU (engine control unit)
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty engine stop switch
   - Broken or shorted wiring
   - Faulty front, rear or both brake light switches
   - Faulty start switch
   - Faulty sidestand switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty starting circuit cut-off relay
   - Faulty starter clutch

EAS30440
POOR ENGINE IDLING SPEED PERFORMANCE

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
   - Damaged or loose throttle body joint
   - Improperly synchronized throttle body
   - Improperly adjusted engine idling speed (idle adjusting screw)
   - Improper throttle grip free play
   - Flooded throttle body

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
   - Faulty spark plug cap
3. Ignition coil
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
   - Cracked or broken ignition coil
4. Ignition system
   - Faulty ECU (engine control unit)
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key

EAS30450
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING” on page 9-1.

Engine
1. Air filter
   - Clogged air filter element

Fuel system
1. Throttle body
   - Faulty throttle body
2. Fuel pump
   - Faulty fuel pump

EAS28580
FAULTY CLUTCH

Engine operates but scooter will not move
1. V-belt
   - Bent, damaged or worn V-belt
   - Slipping V-belt
2. Primary pulley cam and primary pulley slider
   - Damaged or worn primary pulley cam
   - Damaged or worn primary pulley slider
3. Clutch spring(s)
   - Damaged clutch spring
4. Transmission gear(s)
   - Damaged transmission gear

Clutch slips
1. Clutch
   - Improperly assembled clutch
   - Fatigued clutch spring
   - Worn clutch weight
   - Worn friction plate
   - Worn clutch plate
2. Engine oil
   - Incorrect oil level
   - Incorrect oil viscosity (low)
   - Deteriorated oil
3. Primary sliding sheave
   - Seized primary sliding sheave

Poor starting performance
1. V-belt
   - V-belt slips
   - Oil or grease on the V-belt
2. Primary sliding sheave
   - Faulty operation
   - Worn pin groove
   - Worn pin

Poor speed performance
1. V-belt
   - Oil or grease on the V-belt
2. Primary pulley weight(s)
   - Faulty operation
   - Worn primary pulley weight
3. Primary fixed sheave
   - Worn primary fixed sheave
4. Primary sliding sheave
   - Worn primary sliding sheave
5. Secondary fixed sheave
   - Worn secondary fixed sheave
6. Secondary sliding sheave
   - Worn secondary sliding sheave

EAS30480
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
   - 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

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 bolt
- Damaged damper rod bolt copper washer
- Cracked or damaged cap bolt O-ring

Malfunction
- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28670
UNSTABLE HANDLING
1. Handlebar
   - Bent or improperly installed handlebar
2. Steering head components
   - Improperly installed upper bracket
   - Improperly installed lower bracket (improperly tightened ring nut)
   - Bent steering stem
   - Damaged ball bearing or bearing race
3. 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
4. Swingarm
   - Worn bearing or bushing
   - Bent or damaged swingarm
5. Rear shock absorber assembly
   - Faulty rear shock absorber spring
   - Leaking oil or gas

6. Tire(s)
   - Uneven tire pressures (front and rear)
   - Incorrect tire pressure
   - Uneven tire wear
7. Wheel(s)
   - Incorrect wheel balance
   - Deformed cast wheel
   - Damaged wheel bearing
   - Bent or loose wheel axle
   - Excessive wheel runout
8. 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 or dimmer switch)
- Burnt-out headlight bulb

Headlight bulb burnt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty dimmer switch
- Headlight bulb life expired

Tail/brake light does not come on
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out
- Wrong tail/brake light bulb
- Faulty battery
- Tail/brake light bulb 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 blinks slowly
- Faulty turn signal/hazard relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

Turn signal remains lit
- Faulty turn signal/hazard relay
- Burnt-out turn signal bulb

Turn signal blinks quickly
- Incorrect turn signal bulb
- Faulty turn signal/hazard 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

EAS59C2901
TROUBLESHOOTING AT THE ABS WARNING LIGHT

Refer to “BASIC PROCESS FOR TROUBLESHOOTING” on page 8-93.

EAS59C1001
SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

Self-Diagnostic function table

Fault code No.	Item	Reference pages	Fault code No.	Item	Reference pages
12	Crankshaft position sensor	8-37	30	Lean angle sensor (turnover of vehicle)	8-51
13	Intake air pressure sensor (open or short circuit)	8-38	33	Ignition coil (faulty ignition)	8-53
14	Intake air pressure sensor hose line (piping system)	8-41	37	Fast idle plunger (stuck fully open)	8-54
15	Throttle position sensor (open or short circuit)	8-43	41	Lean angle sensor (open or short circuit)	8-56
16	Throttle position sensor (stuck)	8-45	42	Front wheel sensor	8-57
19	Sidestand switch (open circuit wire harness to ECU)	8-46	43	Fuel system voltage (monitor voltage)	8-60
21	Coolant temperature sensor (open or short circuit)	8-47	44	Error in writing the amount of CO adjustment on EEPROM	8-61
22	Intake air temperature sensor (open or short circuit)	8-48	46	Vehicle system power supply	8-63
24	O_2 sensor (Not activated)	8-50	50	ECU internal malfunction (memory check error)	8-63

Communication error with the meter

Fault code No.	Item	Reference pages	Fault code No.	Item	Reference pages
Er-1	ECU internal malfunction (output signal error)	8-64	Er-3	ECU internal malfunction (output signal error)	8-66
Er-2	ECU internal malfunction (output signal error)	8-65	Er-4	ECU internal malfunction (input signal error)	8-67

Diagnostic code: sensor operation table

Diagnostic code No.	Item	Meter display	Checking method
d:01	Throttle position sensor signal • Fully closed position • Fully opened position	 14–20 97–107	 Check with throttle valves fully closed. Check with throttle valves fully open.
d:03	Intake air pressure	Displays the intake air pressure.	Set the engine stop switch to "○", and then push the start switch "⊜". (If the display value changes, the performance is OK.)
d:05	Intake air temperature	When engine is cold: Displays temperature closer to air temperature When engine is hot: Air temperature + approx. 20°C (68 °F)	Compare the actually measured intake air temperature with the meter display value.
d:06	Coolant temperature	When engine is cold: Displays temperature closer to air temperature When engine is hot: Displays current coolant temperature	Compare the actually measured coolant temperature with the meter display value.
d:07	Vehicle speed pulse	0–999	Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
d:08	Lean angle sensor • Upright • Overturned	 0.4–1.4 3.7–4.4	Remove the lean angle sensor and incline it more than 45 degrees.

Diagnostic code No.	Item	Meter display	Checking method
d: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, perform recharging.)
d:20	Sidestand switch • Stand retracted • Stand extended	 ON OFF	Set on/off the sidestand switch.
d:60	EEPROM fault code display • No history • History exists	 00 01 or 02 (Cylinder fault code) • (If both cylinders are defective, the display alternates every two seconds.)	—
d:61	Malfunction history code display • No history • History exists	 00 Fault code Nos. 12–50 • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
d:62	Malfunction history code erasure • No history • History exists	 00 • 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.)	 — To erase the history, set the engine stop switch from "⊗" to "○".
d:63	Malfunction code reinstatement (for fault code No. 24) • No malfunction code • Malfunction code exists	 00 Fault code No. 24	 — To reinstate, set the engine stop switch from "⊗" to "○".
d:70	Control number	0–254 [-]	—

Diagnostic code: actuator operation table

Diagnostic code No.	Item	Actuation	Checking method
d:30	Ignition coil	Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. • Connect an ignition checker.
d:36	Fuel injector #1	Actuates the fuel injector #1 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the fuel injector #1 five times. ECA59C1801 ***NOTICE*** **Disconnect the fuel pump coupler.**
d:37	Fuel injector #2	Actuates the fuel injector #2 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the fuel injector #2 five times. ECA59C1801 ***NOTICE*** **Disconnect the fuel pump coupler.**
d:50	Fuel injection system relay	Actuates the fuel injection system relay five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the fuel injection system relay five times.
d:51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the radiator fan motor relay five times.
d:52	Headlight relay	Actuates the headlight relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.
d:57	Grip warmer relay	Actuates the grip warmer relay. Illuminates the engine trouble warning light. (The light is off when the relay is off, and the light is on when the relay is on.)	Touch the grip warmer to check the temperature change.

EAS28740

WIRING DIAGRAM

XP500A 2012

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Frame ground
5. Joint
6. Main switch
7. Immobilizer unit
8. Joint coupler
9. Storage box light switch
10. Storage box light
11. Anti-theft alarm
12. Fuel injection system fuse
13. Backup fuse
14. Signaling system fuse
15. Headlight fuse
16. Ignition fuse
17. Radiator fan fuse
18. Parking lighting fuse
19. Battery
20. Negative lead
21. Main fuse
22. Starter relay
23. Starter motor
24. Starting circuit cut-off relay 2
25. Diode 1
26. Right handlebar switch
27. Engine stop switch
28. Start switch
29. Hazard switch
30. Front brake light switch
31. ABS motor fuse
32. ABS solenoid fuse
33. Diode 2
34. Starting circuit cut-off relay 1
35. Fuel injection system relay
36. Fuel pump
37. Fuel sender
38. Sidestand switch
39. ECU (engine control unit)
40. Ignition coil
41. Spark plug
42. Fuel injector #1
43. Fuel injector #2
44. Coolant temperature sensor
45. Intake air temperature sensor
46. Intake air pressure sensor
47. O_2 sensor
48. Throttle position sensor
49. Lean angle sensor
50. Diagnostic tool coupler
51. Wheel sensor shield ground
52. ABS ECU (electronic control unit)
53. Front wheel sensor
54. Rear wheel sensor
55. ABS test coupler
56. Grip warmer relay
57. Grip warmer switch
58. Left grip warmer
59. Right grip warmer
60. Radiator fan motor relay
61. Radiator fan motor
62. Turn signal/hazard relay
63. License plate light
64. Tail/brake light
65. Rear right turn signal light
66. Rear left turn signal light
67. Left handlebar switch
68. Pass switch
69. Dimmer switch
70. Horn switch
71. Turn signal switch
72. Rear brake light switch
73. Horn
74. Front right turn signal light
75. Front left turn signal light
76. Auxiliary light
77. Headlight relay
78. Headlight (low beam)
79. Headlight (high beam)
80. Diode 3
81. ABS ECU fuse
82. Meter assembly
83. Immobilizer system indicator light
84. Left turn signal indicator light
85. Right turn signal indicator light
86. High beam indicator light
87. Speedometer
88. Tachometer
89. Engine trouble warning light
90. ABS warning light
91. Meter light
92. Multi-function meter
93. Ambient temperature sensor

A. OPTION
B. Wire harness
C. Headlight sub-wire harness
D. Throttle position sensor sub-wire harness
E. Grip warmer sub-wire harness

EAS28750

COLOR CODE

B	Black
Br	Brown
Ch	Chocolate
Dg	Dark green
G	Green
Gy	Gray
L	Blue
Lg	Light green
O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow
B/L	Black/Blue
B/W	Black/White
B/Y	Black/Yellow
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
G/B	Green/Black
G/L	Green/Blue
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
L/B	Blue/Black
L/G	Blue/Green
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
W/R	White/Red
W/Y	White/Yellow
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red



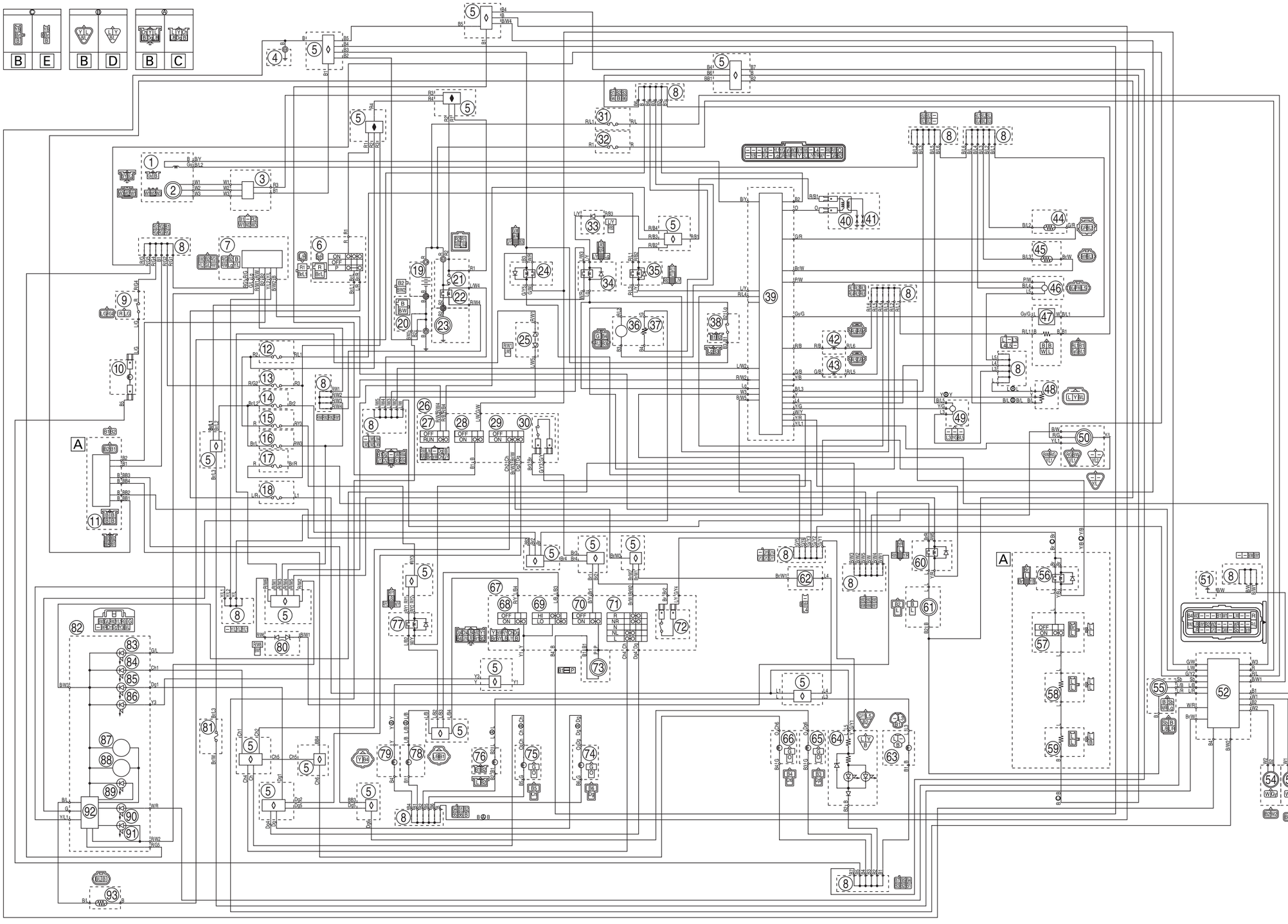
WIRING DIAGRAM
XP500A

SCHEMA DE CABLAGE
XP500A

SCHALTPLAN
XP500A

SCHEMA ELETTRICO
XP500A

DIAGRAMA DE CONEXIONES
DE XP500A



WIRING DIAGRAM
XP500A

SCHEMA DE CABLAGE
XP500A

SCHALTPLAN
XP500A

SCHEMA ELETTRICO
XP500A

DIAGRAMA DE CONEXIONES
DE XP500A

