



YAMAHA

2006

FJR1300A(V)

SERVICE MANUAL

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**FJR1300A(V) 2006
SERVICE MANUAL
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NOTICE

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

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

NOTE:

Designs and specifications are subject to change without notice.

IMPORTANT MANUAL INFORMATION

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



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



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

CAUTION:

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

NOTE:

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

HOW TO USE THIS MANUAL

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

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

1
↓
CLUTCH

CLUTCH

Removing the clutch cover

6

| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|---|
| | Right side cowl | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Engine oil | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| 1 | Clutch cover | 1 | |
| 2 | Clutch cover gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Damper cover | 1 | |
| 5 | Damper | 1 | |
| | | | For installation, reverse the removal procedure. |

5-41

CLUTCH

3. Fill:

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

Recommended fluid DOT 4

WARNING

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

CAUTION

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

NOTE:

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

4. Bleed:

- Clutch system

Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15.

5. Check:

- Clutch fluid level

Below the minimum level mark "a" → Add the recommended clutch fluid to the proper level. Refer to "CHECKING THE CLUTCH FLUID LEVEL" on page 3-15.

6. Check:

- Clutch lever operation

Soft or spongy feeling → Bleed the clutch system. Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15.

2

REMOVING THE CLUTCH RELEASE CYLINDER

1. Remove:

- Clutch hose union bolt "1"
- Copper washers "2"
- Clutch hose "3"

NOTE:

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

7

CHECKING THE CLUTCH RELEASE CYLINDER

1. Check:

- Clutch release cylinder body

Cracks/damage → Replace the clutch release cylinder.

2. Check:

- Clutch release cylinder "1"
- Clutch release cylinder piston "2"

Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.

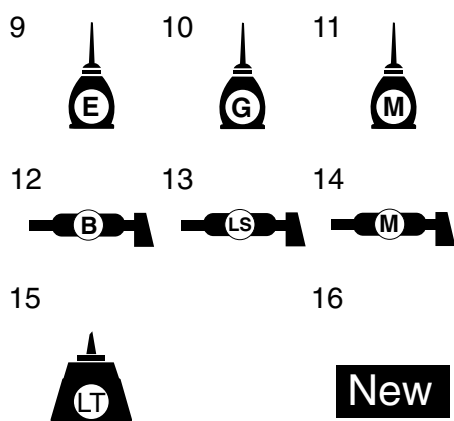
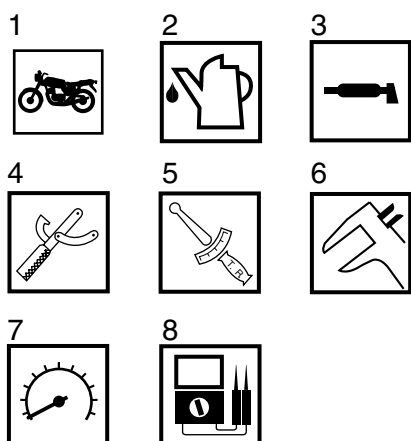
5-54

SYMBOLS

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

NOTE:

The following symbols are not relevant to every vehicle.



1. Serviceable with engine mounted
2. Filling fluid
3. Lubricant
4. Special tool
5. Tightening torque
6. Wear limit, clearance
7. Engine speed
8. Electrical data
9. Engine oil
10. Gear oil
11. Molybdenum-disulfide oil
12. Wheel-bearing grease
13. Lithium-soap-based grease
14. Molybdenum-disulfide grease
15. Apply locking agent (LOCTITE®)
16. Replace the part

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GENERAL INFORMATION

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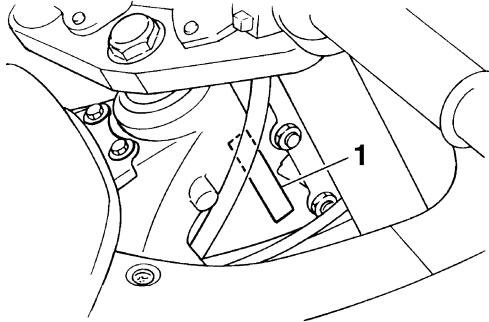
EAS20130

IDENTIFICATION

EAS20140

VEHICLE IDENTIFICATION NUMBER

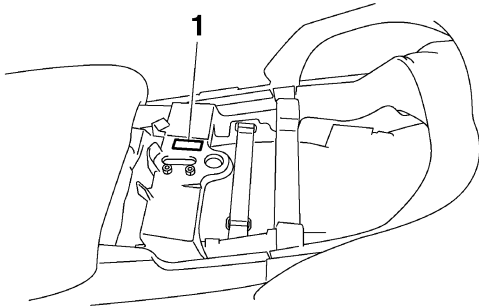
The vehicle identification number “1” is stamped into the right side of the steering head pipe.



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MODEL LABEL

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



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FEATURES

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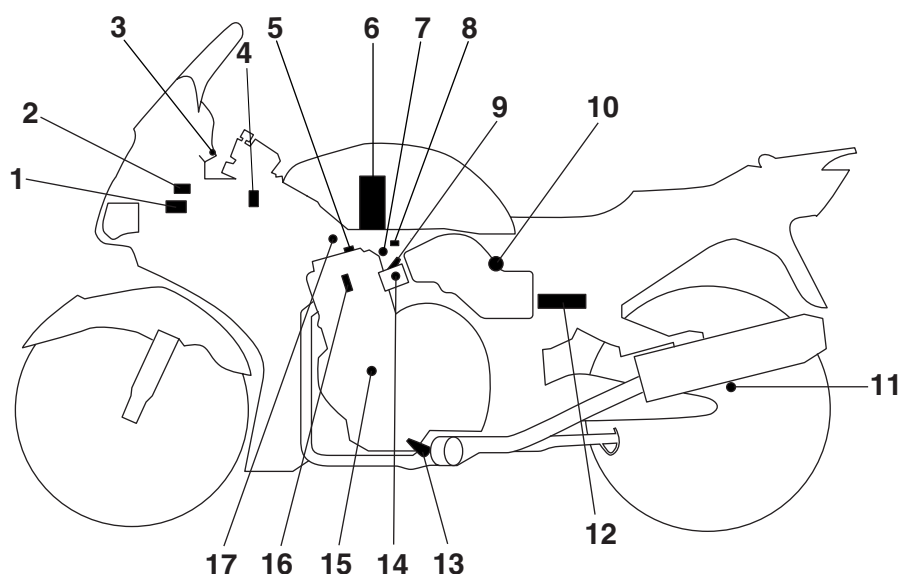
OUTLINE OF THE FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

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

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

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions. Furthermore, the air induction system (AI system) has been placed under computer control together with the FI system in order to realize cleaner exhaust gases.



1. Relay unit (fuel pump relay)
2. Lean angle sensor
3. Engine trouble warning light
4. Ignition coil
5. Cylinder identification sensor
6. Fuel pump
7. Air induction system solenoid
8. Intake air pressure sensor
9. Injector
10. Intake air temperature sensor

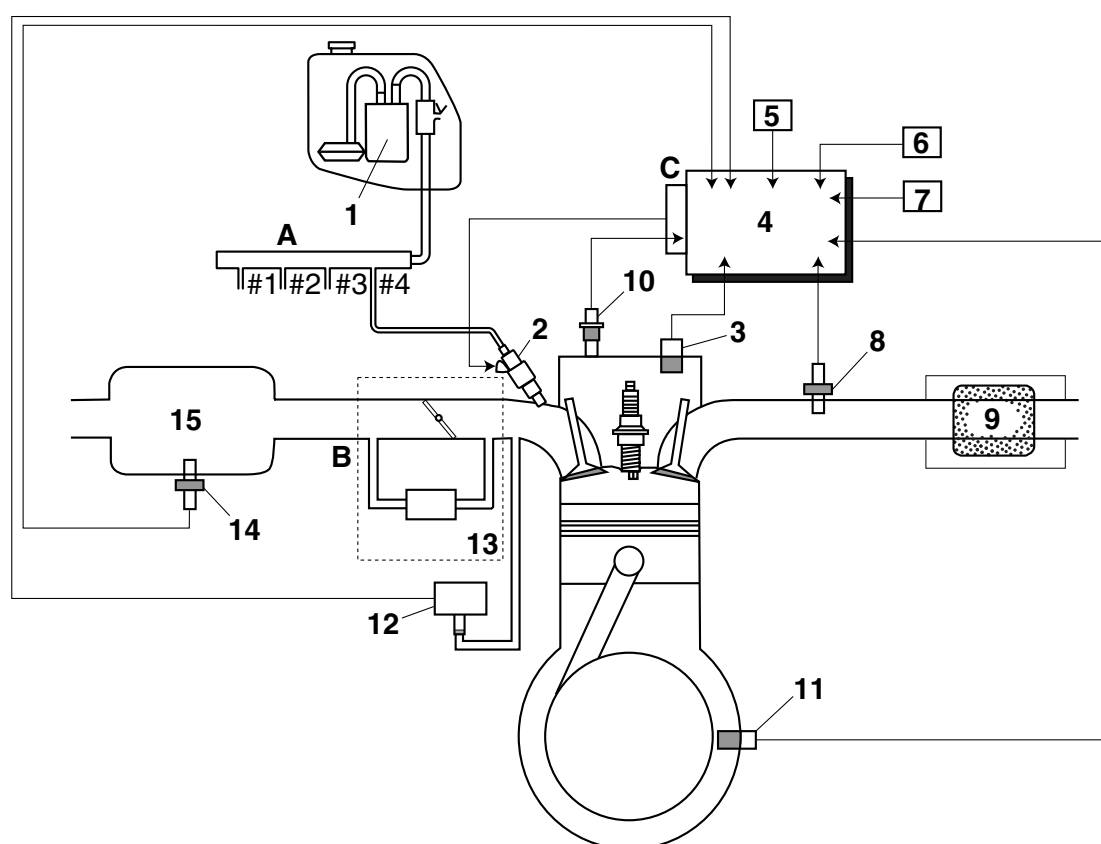
11. Rear wheel sensor
12. ECU (engine control unit)
13. O₂ sensor
14. Throttle position sensor
15. Crankshaft position sensor
16. Spark plug
17. Coolant temperature sensor

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FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kg/cm², 46.1 psi). Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, coolant temperature sensor, cylinder identification sensor, lean angle sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, rear wheel sensor and O₂ sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



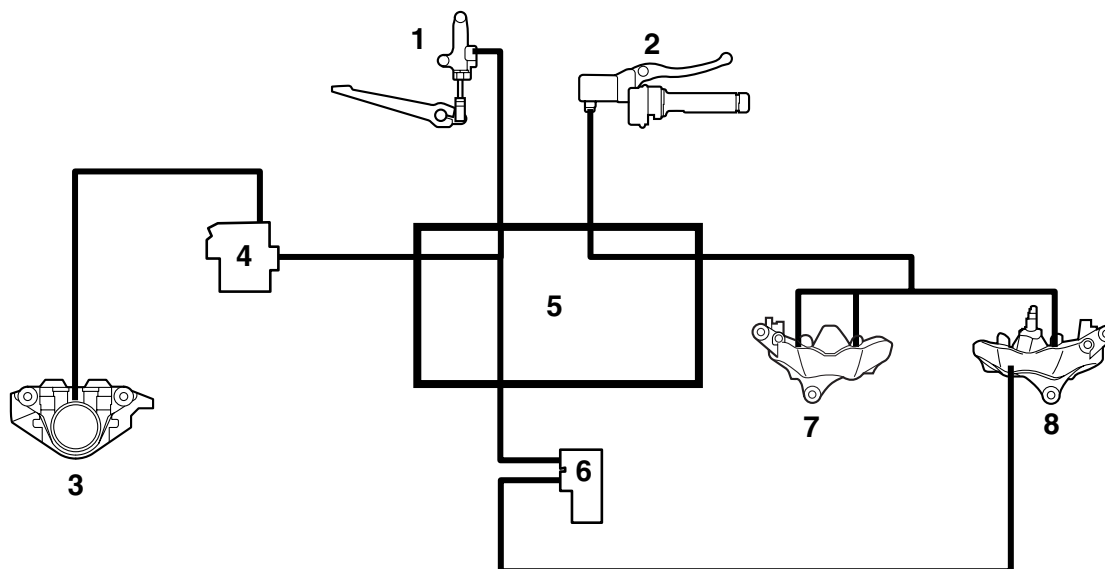
- | | |
|-----------------------------------|-----------------------------------|
| 1. Fuel pump | 14. Intake air temperature sensor |
| 2. Injector | 15. Air filter case |
| 3. Cylinder identification sensor | |
| 4. ECU (engine control unit) | A. Fuel system |
| 5. Throttle position sensor | B. Air system |
| 6. Rear wheel sensor | C. Control system |
| 7. Lean angle sensor | |
| 8. O ₂ sensor | |
| 9. Catalytic converter | |
| 10. Coolant temperature sensor | |
| 11. Crankshaft position sensor | |
| 12. Intake air pressure sensor | |
| 13. Throttle body | |

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OUTLINE OF THE UNIFIED BRAKE SYSTEM

The Yamaha unified brake system is a system that operates one set of pistons in the front brakes together with the rear brake when the brake pedal is depressed. Compared to conventional brake systems, the ability to slow the vehicle using the simple operation of the brake pedal is improved.

Unified brake system block diagram

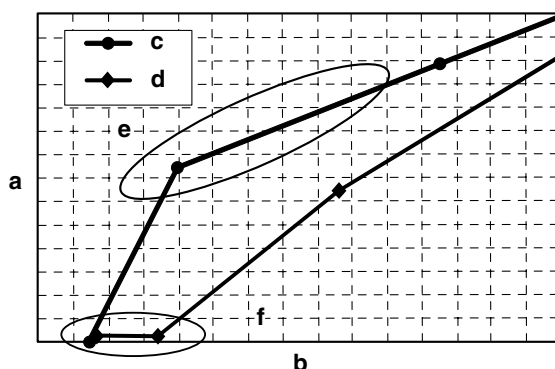


1. Rear brake master cylinder
2. Front brake master cylinder
3. Rear brake caliper
4. Proportioning valve
5. Hydraulic unit

6. Metering valve
7. Left front brake caliper
8. Right front brake caliper

When the brake lever is squeezed, both sets of pistons in the left front brake caliper are operated, but only one set of pistons in the right front brake caliper is operated. When the brake pedal is depressed, the rear brake caliper and one set of pistons in the right front brake caliper are operated. The brake line from the rear brake master cylinder is split at the hydraulic unit to transmit brake fluid pressure to both the rear brake caliper and part of the right front brake caliper in the unified brake system. The brake fluid pressure transmitted to the rear brake caliper and part of the right front brake caliper is controlled by the proportioning valve and metering valve respectively. The operation of these two valves ensures that the braking feeling of conventional brakes is maintained when a small amount of force is applied to the brake pedal, such as when making U-turns, and prevents early locking of the rear wheel when a large amount of force is applied.

Brake pedal input force and braking force at each wheel



- a. Brake force
- b. Brake pedal force
- c. Rear brake force
- d. Front brake force (unified brake system)
- e. Proportioning valve operation
- f. Metering valve operation

Metering valve

This valve prevents the brake fluid pressure that is transmitted to the right front brake caliper from increasing until the pressure exceeds a set level. Only the rear brake caliper is operated when there is an extremely low amount of brake pedal input.

Proportioning valve

This valve reduces the increase in brake fluid pressure that is transmitted to the rear brake caliper when the pressure exceeds a set level. The increase in brake fluid pressure to the rear brake caliper is controlled when there is a high amount of brake pedal input.

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CAUTION:

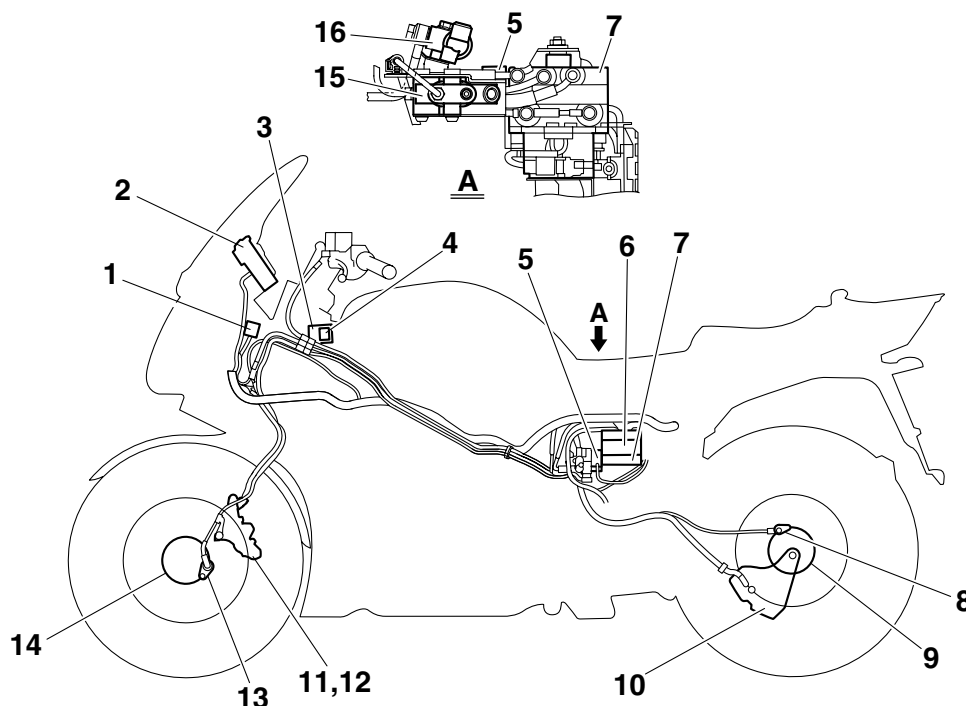
- The unified brake system is a system to assist the brake operation. However, both the brake lever and the brake pedal must be operated for maximum braking effect.
- Because the balance between the right front brake caliper and the rear brake caliper in the unified brake system is determined mechanically, be sure to use the specified brake pads.
- Each set of brake pads should be checked individually and replaced if necessary.

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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. However, one set of pistons in the right front brake caliper is operated together with the rear brake and this set of pistons is operated only if the force used to depress the brake pedal exceeds a preset level.
2. The ABS features a compact and lightweight design to help maintain the basic maneuverability of the vehicle.
3. The hydraulic unit, which is the main component of the ABS, is centrally located on the vehicle to increase mass centralization.

ABS layout



- | | |
|--------------------------------------|---|
| 1. ABS test coupler | 10. Rear brake caliper |
| 2. ABS warning light | 11. Left front brake caliper |
| 3. ABS ECU fuse | 12. Right front brake caliper (partially operated together with the rear brake) |
| 4. ABS motor fuse | 13. Front wheel sensor |
| 5. ABS motor relay | 14. Front wheel sensor rotor |
| 6. ABS ECU (electronic control unit) | 15. Proportioning valve |
| 7. Hydraulic unit (HU) | 16. Metering valve |
| 8. Rear wheel sensor | |
| 9. Rear wheel sensor rotor | |

ABS

The operation of the Yamaha ABS brakes is the same as conventional brakes on other vehicles, with a brake lever for operating the front brake and a brake pedal for operating the rear brake. However, part of the front brake is operated together with 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.

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

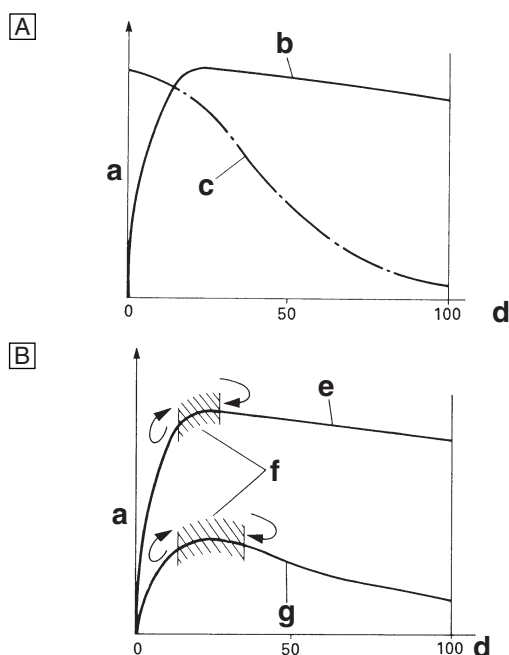
0%: There is no slipping between the wheel and the road surface. The chassis speed is equal to the wheel speed.

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

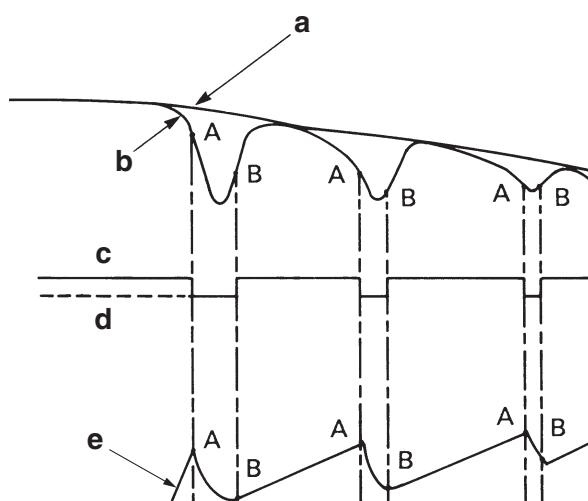
- e. Less slippery road surface
- f. Controlling zone
- g. Slippery road surface

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. The ABS ECU increases the pressure of the brake fluid in the brake caliper when the tendency to lock has diminished (point B in the following figure).



- a. Chassis speed
- b. Wheel speed
- c. Pressurized

- d. Depressurized
- e. Brake force

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 brake lever and brake pedal independently.

NOTE:

When the ABS is activated, a pulsating action may be felt at the brake lever or brake pedal, 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.

EW3P61003



WARNING

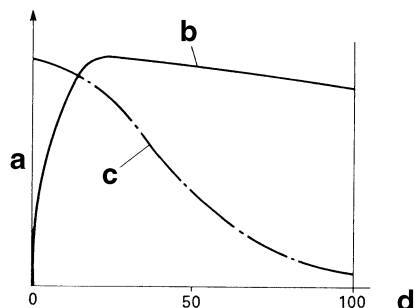
The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even in vehicles equipped with ABS, overturning of the vehicle cannot be prevented if it is braked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

EWA13870

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 | c. Side force |
| b. Brake force | d. Slip ratio (%) |

Electronic ABS features

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

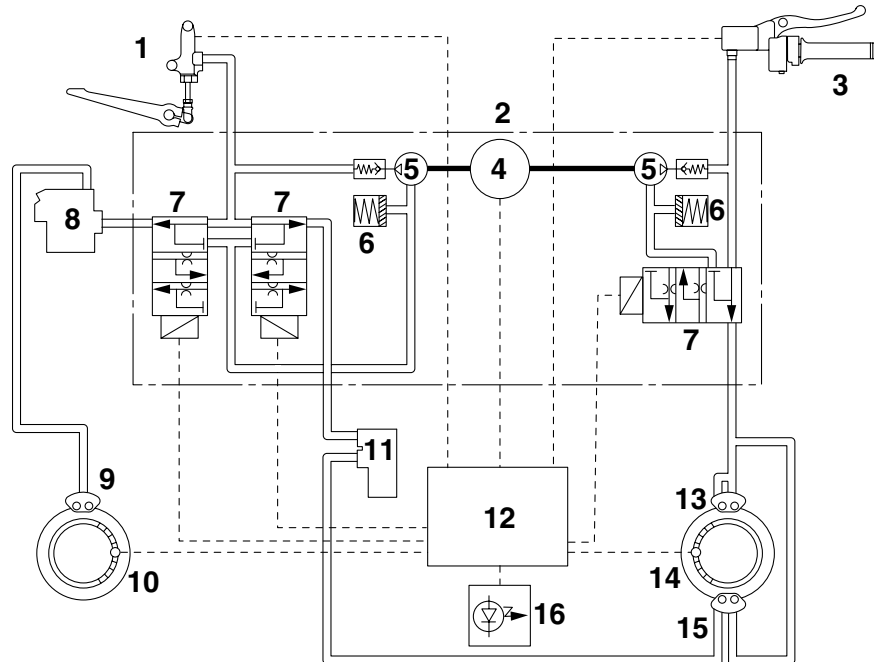
The ABS control is processed with good response under various vehicle travel conditions.

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 malfunction codes in the memory of the ABS ECU for easy problem identification and troubleshooting.

ABS block diagram



- | | |
|--------------------------------|-------------------------------|
| 1. Rear brake master cylinder | 10. Rear wheel sensor |
| 2. Hydraulic unit | 11. Metering valve |
| 3. Front brake master cylinder | 12. ABS ECU |
| 4. ABS motor | 13. Left front brake caliper |
| 5. Hydraulic pump | 14. Front wheel sensor |
| 6. Buffer chamber | 15. Right front brake caliper |
| 7. Hydraulic control valve | 16. ABS warning light |
| 8. Proportioning valve | |
| 9. Rear brake caliper | |

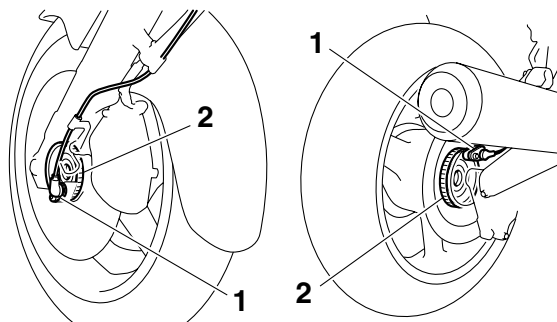
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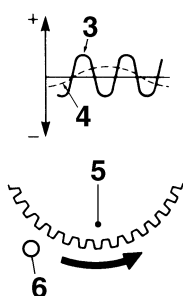
ABS COMPONENT FUNCTIONS

Wheel sensors and wheel sensor rotors

Wheel sensors “1” detect the wheel speed and transmit the rotation signal to the ABS ECU.

Each wheel sensor is composed of a permanent magnet and a coil. The wheel sensors are installed in the sensor housing for each wheel. Sensor rotors “2” are pressed in the inner side of the front and rear wheel hubs and rotate with the wheels. The wheel sensor rotors have 42 serrations inside and are installed close to the wheel sensors. As the distance changes between the top and bottom of the serrations with the rotation of the wheels, inductive electromotive force is generated in the wheel sensors. Wheel speed is detected based on the frequency of this alternating voltage.





- 3. At high speed
- 4. At low speed
- 5. Wheel sensor rotor

6. Wheel sensor

ABS warning light

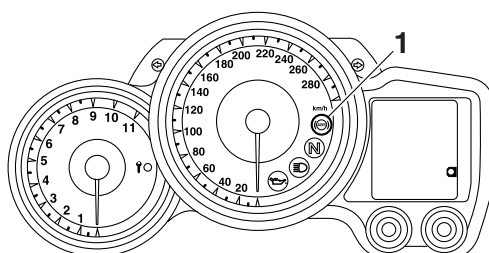
The ABS warning light “1” comes on to warn the rider if a malfunction in the ABS occurs.

When the main switch is turned to “ON”, the ABS warning light comes on for 2 seconds, then goes off, so that the rider can check if the ABS warning light is disconnected and check if the ABS is operating properly.

EC3P61009

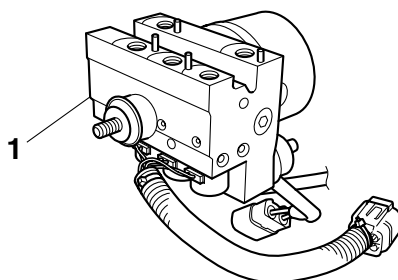
CAUTION:

If the rear wheel is raced with the vehicle on the centerstand, the ABS warning light may flash or come on. If this occurs, turn the main switch to “OFF”, then back to “ON”. The ABS operation is normal if the ABS warning light comes on for 2 seconds, then goes off.



Hydraulic unit

The hydraulic unit “1” is composed of three hydraulic control valves (each with a solenoid valve and flow control valve), two buffer chambers, two hydraulic pumps, and an ABS motor. 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.

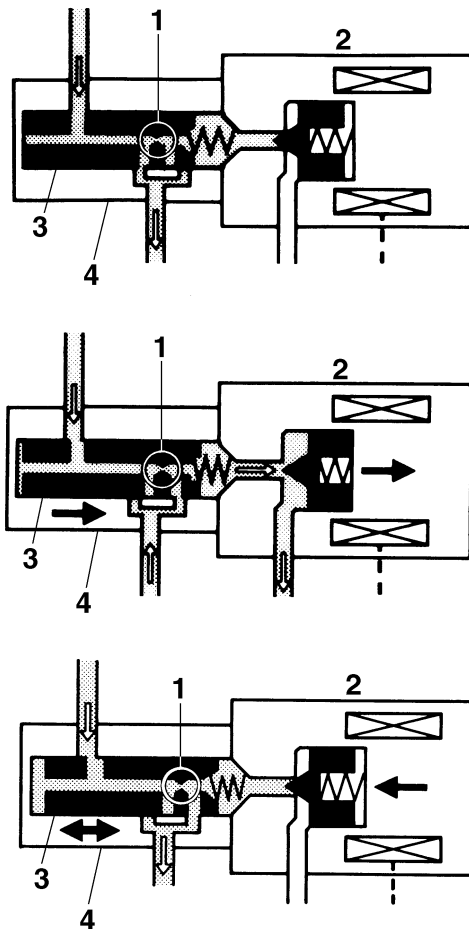


• Hydraulic control valve

The hydraulic control valve is composed of a flow control valve and solenoid valve.

When the ABS is activated, the flow control valve regulates the flow of brake fluid to the brake and the solenoid valve decreases and increases the brake fluid pressure.

1. When the brakes are operated normally, the solenoid valve "2" is closed, the spool "3" of the flow control valve does not move, and the hydraulic line between the brake master cylinder and brake caliper is open.
2. When the ABS is activated, the solenoid valve "2" is opened by the power supplied from the ABS ECU signals to decrease the brake fluid pressure and the spool "3" of the flow control valve is moved toward the solenoid valve.
3. When the ABS ECU stops transmitting signals to decrease the brake fluid pressure, the solenoid valve "2" closes and the brake fluid is pressurized again. Pressurizing the brake fluid again, while the ABS is activated, limits the flow of the brake fluid with the movement of the flow control valve spool "3" and provides a gradual pressure increase.

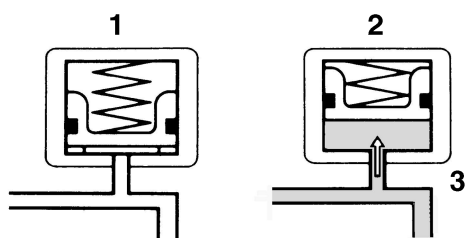


1. Orifice
2. Solenoid valve
3. Spool

4. Flow control valve

• Buffer chamber

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

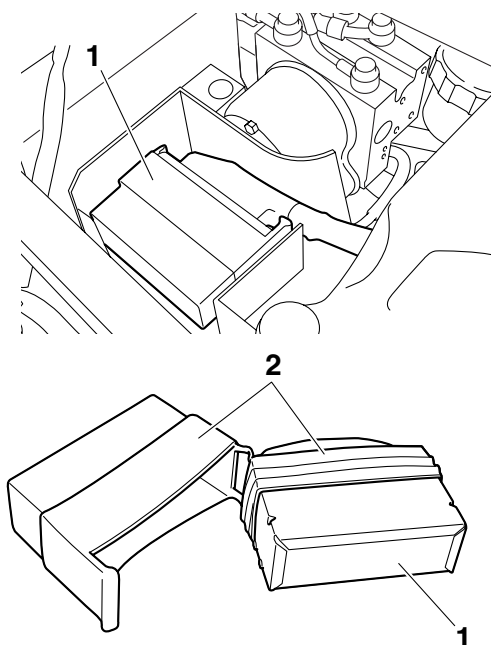


- 1. Buffer chamber (pressurized)
- 2. Buffer chamber (depressurized)

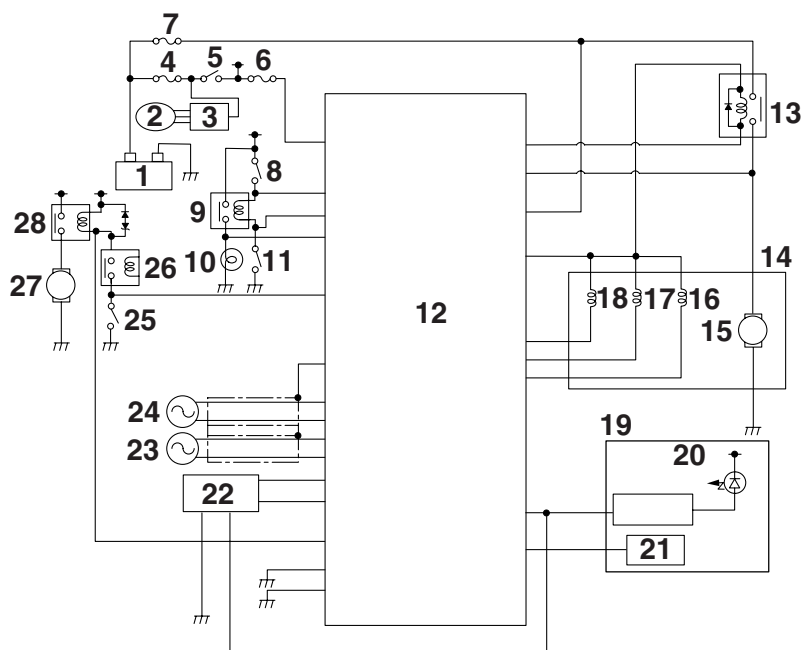
- 3. Raised piston

ABS ECU (electronic control unit)

The ABS ECU “1” controls the ABS and is installed under the storage compartment. To protect the ABS ECU from water damage, it is protected by a cover “2”.



As shown in the block following diagram, the ABS ECU receives wheel sensor signals from the front and rear wheels and also receives signals from other monitor circuits.



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

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

ABS control operation

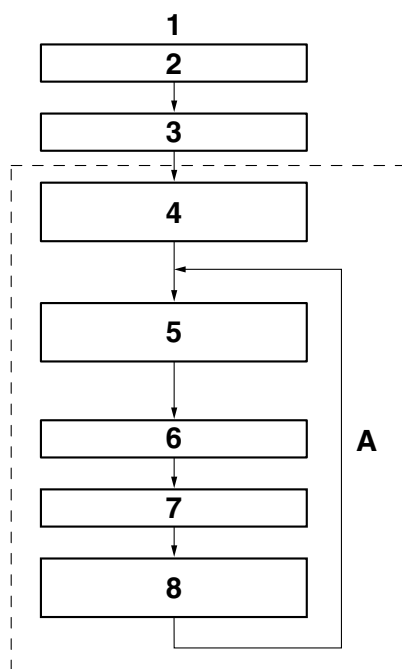
The ABS control operation performed in the ABS ECU is divided into the following two parts.

- Hydraulic control
- Self-diagnosis

These operations are performed once every 8/1000th of a second. When a malfunction is detected in the ABS, a malfunction code is stored in the memory of the ABS ECU for easy problem identification and troubleshooting.

NOTE:

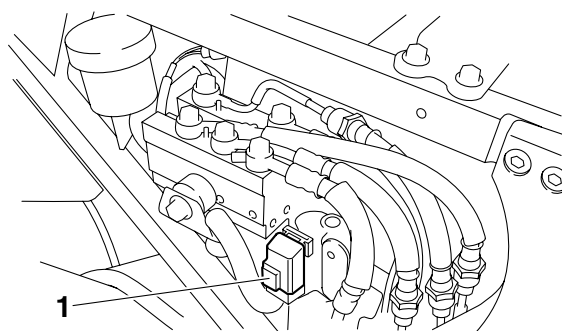
Some types of malfunctions are not recorded in the memory of the ABS ECU (e.g., a drop in battery voltage).



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
- A. 8/1000th of a second

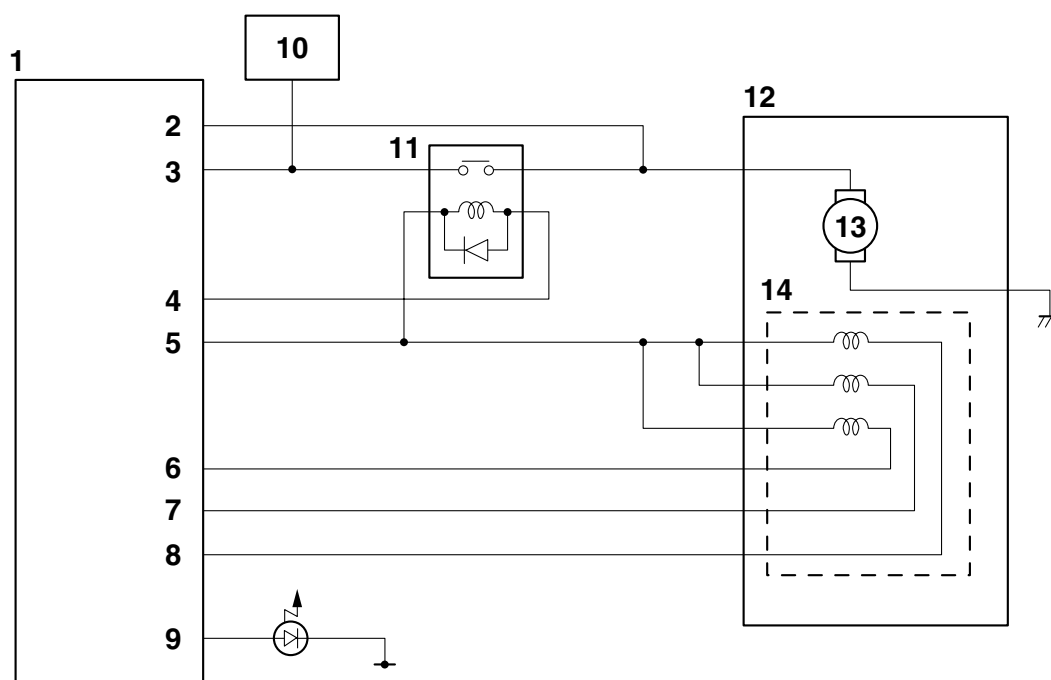
ABS motor relay

The ABS motor relay "1" controls the power supply of the hydraulic unit and is located beside the hydraulic unit.



Composition and operation

The ABS motor relay is activated by signals transmitted from the ABS ECU and the ABS motor operates when the ABS starts to reduce the hydraulic pressure of the brake fluid.



- 1. ABS ECU
- 2. Pump motor monitor
- 3. Power supply
- 4. Pump motor relay coil
- 5. Power supply
- 6. Front brake solenoid
- 7. Rear brake solenoid
- 8. Unified brake system solenoid

- 9. ABS warning light
- 10. Battery
- 11. ABS motor relay
- 12. Hydraulic unit
- 13. ABS motor
- 14. Solenoid valves

ET3P61052

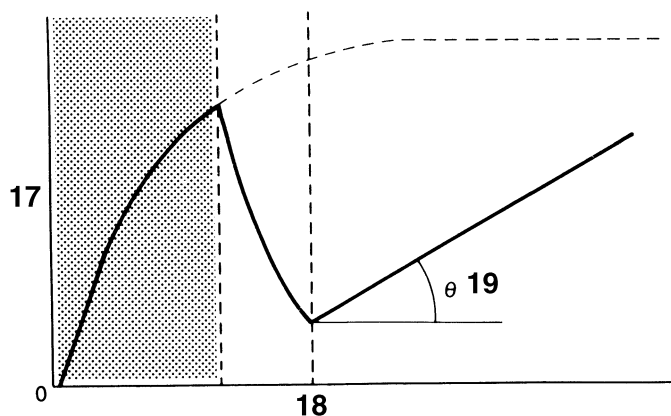
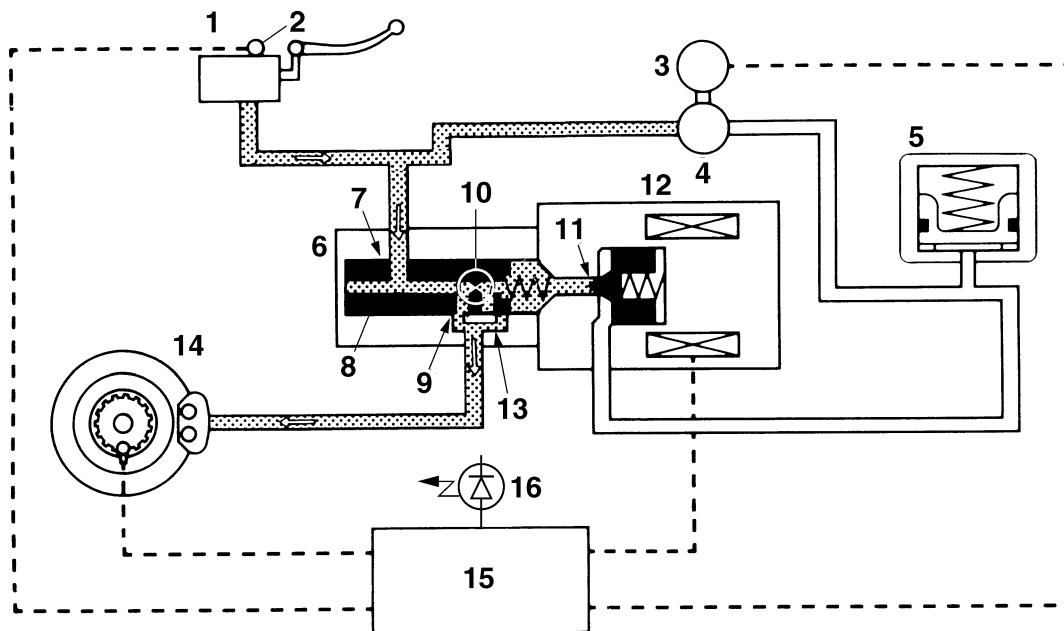
ABS OPERATION

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

Normal braking (ABS not activated)

When the ABS is not activated, port D “11” of the solenoid valve is closed because a control signal has not been transmitted from the ABS ECU and port A “7” and port B “9” of the flow control valve are open. 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 via port A and port B.

At this time, the inlet and outlet check valves of the hydraulic pump are closed, preventing the brake fluid from flowing through the pump. As a result, 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 via port A and port B.

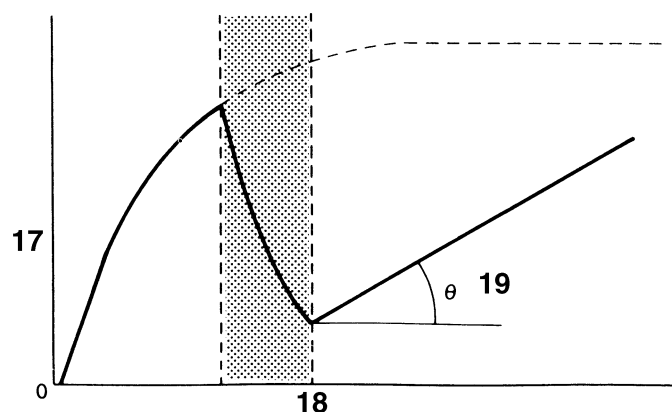
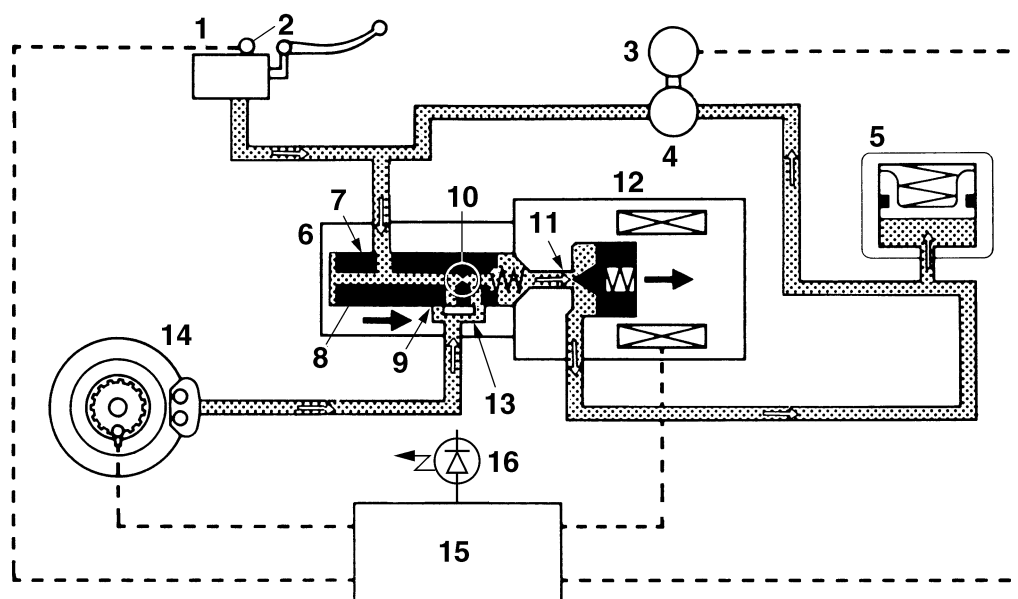


- | | |
|--------------------------|--------------------------|
| 1. Brake master cylinder | 13. Port C |
| 2. Brake light switch | 14. Brake caliper |
| 3. ABS motor | 15. ABS ECU |
| 4. Hydraulic pump | 16. ABS warning light |
| 5. Buffer chamber | 17. Brake fluid pressure |
| 6. Flow control valve | 18. Time |
| 7. Port A | 19. Repressurizing |
| 8. Spool | |
| 9. Port B | |
| 10. Orifice | |
| 11. Port D | |
| 12. Solenoid valve | |

Emergency braking (ABS activated)

1. Depressurized state

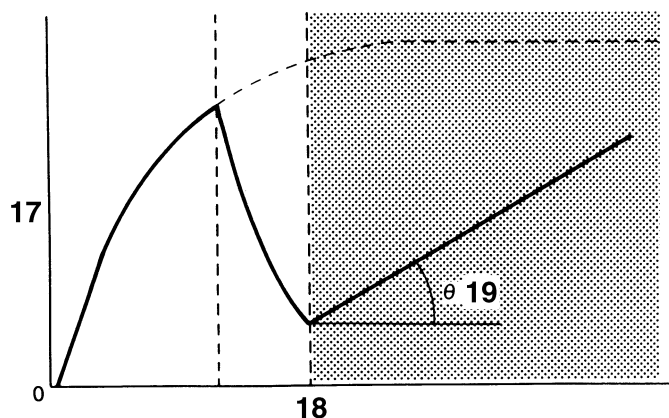
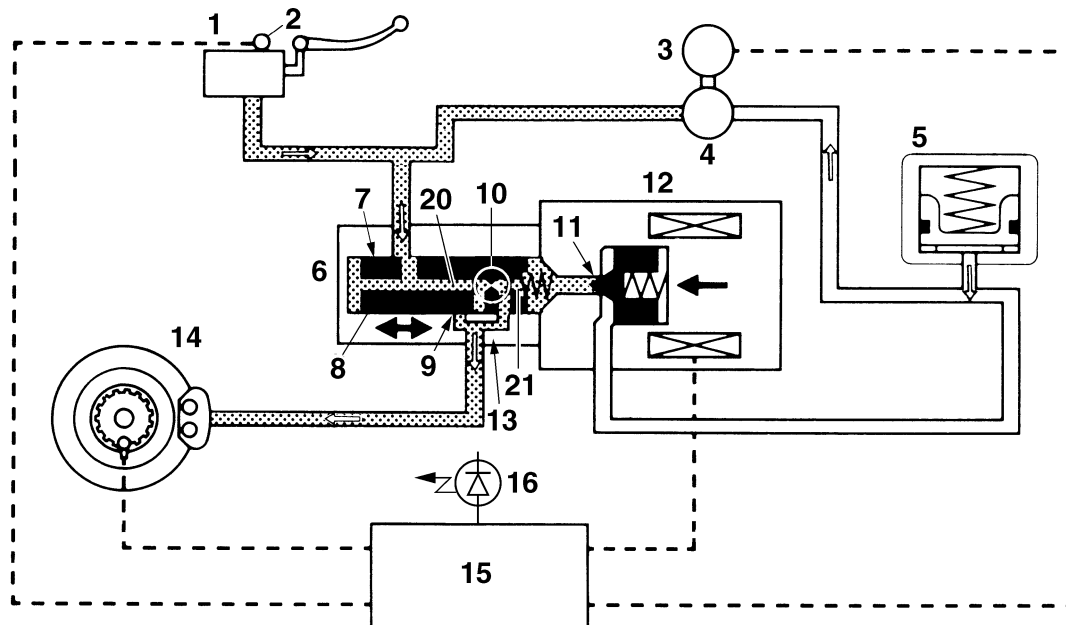
When the front wheel is about to lock, port D “11” of the solenoid valve is opened by the “depressurization” signal transmitted from the ABS ECU. When this occurs, the spool of the flow control valve compresses the return spring and closes port B “9”. Brake fluid that has entered through port A “7” is restricted by the orifice “10” and the brake fluid is sent to the brake caliper via port C “13” and to the buffer chamber via port D “11”. 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 | 15. ABS ECU |
| 2. Brake light switch | 16. ABS warning light |
| 3. ABS motor | 17. Brake fluid pressure |
| 4. Hydraulic pump | 18. Time |
| 5. Buffer chamber | 19. Repressurizing |
| 6. Flow control valve | |
| 7. Port A | |
| 8. Spool | |
| 9. Port B | |
| 10. Orifice | |
| 11. Port D | |
| 12. Solenoid valve | |
| 13. Port C | |
| 14. Brake caliper | |

2. Pressurized state

Port D “11” is closed by the “pressurization” signal transmitted from the ABS ECU. Before this occurs, the spool of the flow control valve has compressed the return spring and closed port B “9”. Brake fluid that has entered through port A “7” is further restricted by the orifice “10” and the brake fluid is sent to the brake caliper via port A “7” and port C “13”. At this time, the brake is pressurized at a constant rate regardless of the brake fluid pressure level since the restriction of port A “7” changes so that a constant pressure difference is maintained between chamber A “20” and chamber B “21” of the flow control valve.



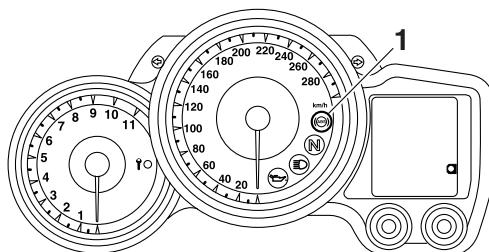
- | | |
|--------------------------|--------------------------|
| 1. Brake master cylinder | 14. Brake caliper |
| 2. Brake light switch | 15. ABS ECU |
| 3. ABS motor | 16. ABS warning light |
| 4. Hydraulic pump | 17. Brake fluid pressure |
| 5. Buffer chamber | 18. Time |
| 6. Flow control valve | 19. Repressurizing |
| 7. Port A | 20. Chamber A |
| 8. Spool | 21. Chamber B |
| 9. Port B | |
| 10. Orifice | |
| 11. Port D | |
| 12. Solenoid valve | |
| 13. Port C | |

ET3P61053

ABS SELF-DIAGNOSIS FUNCTION

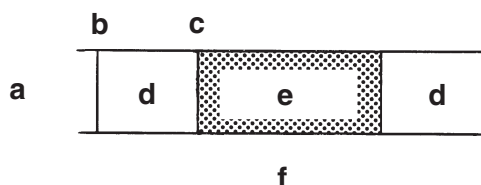
ABS warning light

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



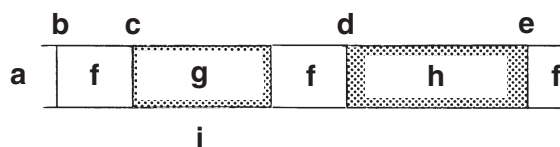
Instances when the ABS warning light comes on

1. The ABS warning light comes on when the main switch is turned to “ON”.
The ABS warning light comes on for 2 seconds while the ABS is performing a self-diagnosis, then goes off if there are no problems.



- | | |
|----------------------|---------------------------|
| a. ABS warning light | e. Comes on for 2 seconds |
| b. Main switch “OFF” | f. ABS self-diagnosis |
| c. Main switch “ON” | |
| d. Goes off | |

2. The ABS warning light comes on while the start switch is being pushed.
When the engine is being started, the ABS warning light comes on while the start switch is being pushed. (Refer to “ELECTRIC STARTING SYSTEM” on page 8-9.)



- | | |
|-----------------------|--|
| a. ABS warning light | f. Goes off |
| b. Main switch “OFF” | g. Comes on for 2 seconds |
| c. Main switch “ON” | h. Comes on while the start switch is being pushed |
| d. Start switch “ON” | i. ABS self-diagnosis |
| e. Start switch “OFF” | |

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.



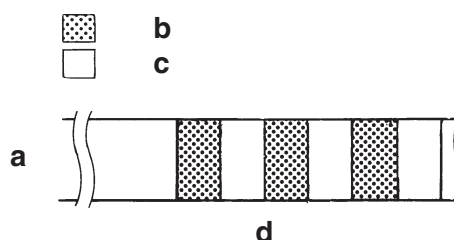
- a. ABS warning light
- b. Comes on

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 8-121.)

NOTE:

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 malfunction 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.

The ABS test coupler can be accessed by removing front cowling right inner panel 1.

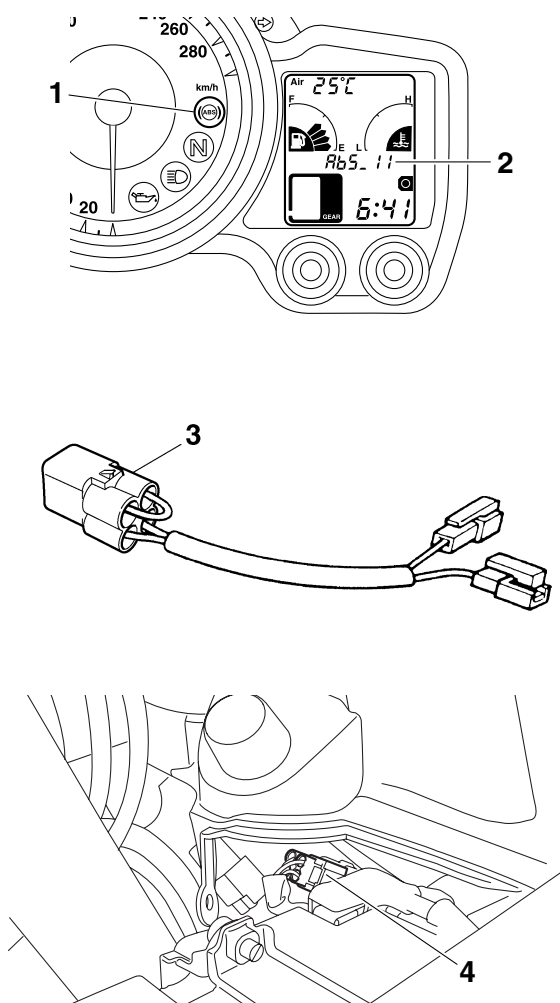
When the test coupler adapter is connected to the ABS test coupler, the ABS warning light starts flashing and the multi-function display indicates all the malfunction codes recorded in the ABS ECU.



Test coupler adapter
90890-03149

NOTE:

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



ET3P61054

ABS WARNING LIGHT AND OPERATION

ABS warning light

- When the main switch is turned to “ON”, the ABS warning light comes on for 2 seconds, then goes off.
- The ABS warning light comes on while the start switch is being pushed.
- If the ABS warning light comes on while riding, stop the vehicle, and then turn the main switch to “OFF”, then back to “ON”. The ABS operation is normal if the ABS warning light comes on for 2 seconds, then goes off.
- If the rear wheel is raced with the vehicle on the centerstand, the ABS warning light may flash or come on. If this occurs, turn the main switch to “OFF”, then back to “ON”. The ABS operation is normal if the ABS warning light comes on for 2 seconds, then goes off.
- The ABS operation is normal if the ABS warning light flashes.
- Even if the ABS warning light remains on and does not go off, or if it comes on after riding, conventional braking performance of the vehicle is maintained.

ABS function

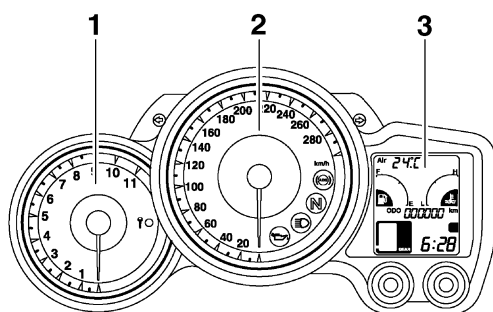
- When hydraulic control is performed by the ABS, the brake system alerts the rider that the wheels have a tendency to lock by generating a reaction-force pulsating action in the brake lever or brake pedal. When the ABS is activated, the grip between the road surface and tires is close to the limit. 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.
- 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 turned 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.

ET3P61043

INSTRUMENT FUNCTIONS

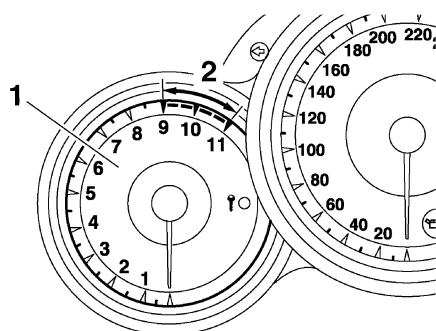
Speedometer



1. Tachometer
2. Speedometer
3. Multi-function display

The speedometer shows the riding speed. When the key is turned to "ON", the speedometer needle will sweep once across the speed range and then return to zero in order to test the electrical circuit.

Tachometer



1. Tachometer
2. Tachometer red zone

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

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

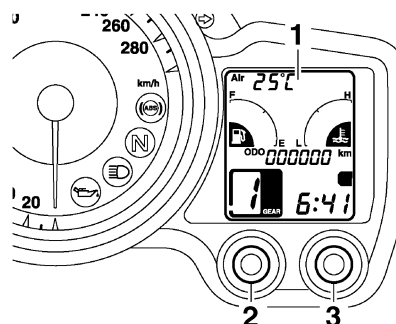
EC3P61039

CAUTION:

Do not operate the engine in the tachometer red zone.

Red zone: 9000 r/min and above

Multi-function display



1. Multi-function display
2. "SELECT" button
3. "RESET" button

EW3P61020

WARNING

Be sure to stop the vehicle before making any setting changes to the multi-function display.

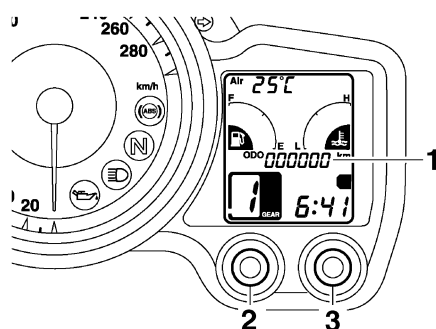
The multi-function display is equipped with the following:

- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled on the fuel reserve)
- a clock
- a fuel meter
- a coolant temperature meter
- a transmission gear display
- an ambient temperature display
- two fuel consumption displays (instantaneous and average)
- a self-diagnosis device

NOTE:

Be sure to turn the key to "ON" before using the "SELECT" and "RESET" buttons.

Odometer and tripmeter modes



1. Odometer/tripmeter/fuel reserve tripmeter
2. "SELECT" button
3. "RESET" button

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

ODO → TRIP 1 → TRIP 2 → ODO

NOTE:

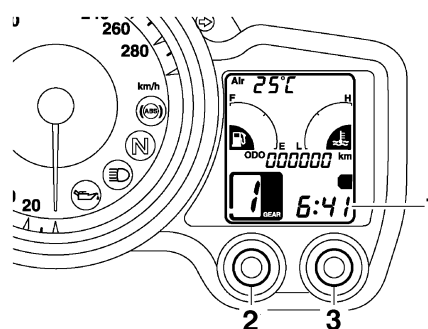
When selecting "TRIP 1" or "TRIP 2", the display flashes for five seconds.

When approximately 5.5 L (1.45 US gal) (1.21 Imp.gal) of fuel remains in the fuel tank, the display will automatically change to the fuel reserve tripmeter mode "F-TRIP" and start counting the distance traveled from that point. In that case, pushing the "SELECT" button switches the display between the various tripmeter and odometer modes in the following order:

F-TRIP → TRIP 1 → TRIP 2 → ODO → F-TRIP

To reset a tripmeter, select it by pushing the "SELECT" button, and then push the "SELECT" 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).

Clock

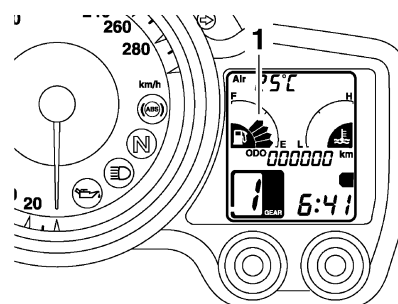


1. Clock
2. "SELECT" button
3. "RESET" button

To set the clock:

1. Push the "SELECT" button and "RESET" button together for at least two seconds.
2. When the hour digits start flashing, push the "RESET" button to set the hours.
3. Push the "SELECT" button, and the minute digits will start flashing.
4. Push the "RESET" button to set the minutes.
5. Push the "SELECT" button and then release it to start the clock.

Fuel meter



1. Fuel meter

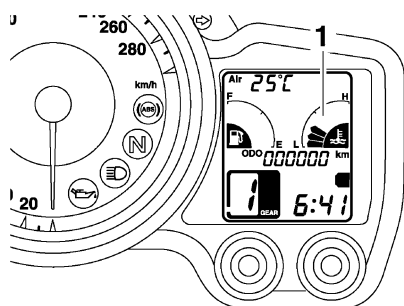
The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear towards "E" (Empty) as the fuel level decreases. When the last segment starts flashing, refuel as soon as possible. When the key is turned to "ON", all of the display segments of the fuel meter will appear one after the other and then disappear in order to test the electrical circuit.

NOTE:

This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, all the display segments will start flashing. If this occurs, check the electrical circuit.

Refer to "SIGNALING SYSTEM" on page 8-27.

Coolant temperature meter



1. Coolant temperature meter

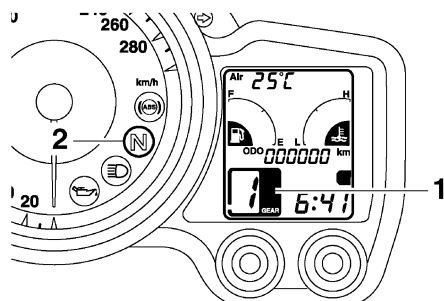
With the key in the “ON” position, the coolant temperature meter indicates the temperature of the coolant. When the key is turned to “ON”, all of the display segments of the coolant temperature meter will appear one after the other and then disappear in order to test the electrical circuit. The coolant temperature varies with changes in the weather and engine load. If the top segment flashes, stop the vehicle and let the engine cool.

EC3P61040

CAUTION:

Do not operate the engine if it is overheated.

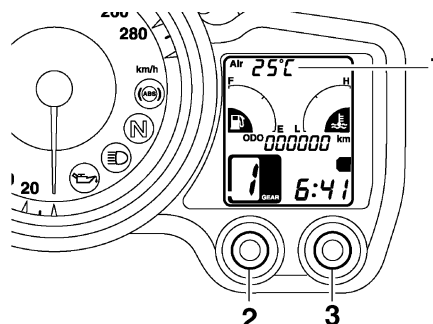
Transmission gear display



1. Transmission gear display
2. Neutral indicator light “N”

This display shows the selected gear. The neutral position, however, is not displayed, it is indicated by the neutral indicator light.

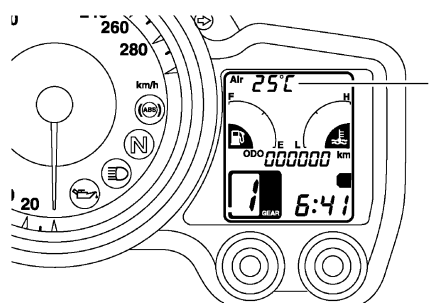
Ambient temperature, instantaneous fuel consumption and average fuel consumption modes (except for the UK)



1. Ambient temperature/instantaneous fuel consumption/average fuel consumption
2. “SELECT” button
3. “RESET” button

Push the “RESET” button to switch the display between the ambient temperature mode and the fuel consumption modes in the following order: Air (ambient temperature) → km/L or L/100 km (instantaneous fuel consumption) → AV__ km/L or AV__ L/100 km (average fuel consumption) → Air (ambient temperature)

Ambient temperature mode



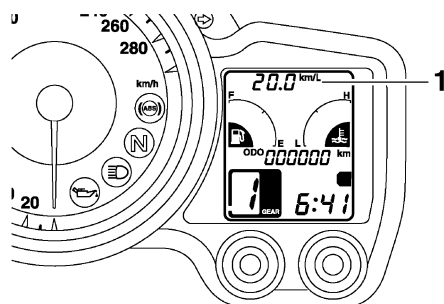
1. Ambient temperature

This display shows the ambient temperature from -9 °C to 50 °C in 1 °C increments. The temperature displayed may vary from the ambient temperature.

NOTE:

- If the ambient temperature falls below -9 °C, a lower temperature than -9 °C will not be displayed.
- If the ambient temperature climbs above 50 °C, a higher temperature than 50 °C will not be displayed.
- The accuracy of the temperature reading may be affected when riding slowly (approximately under 20 km/h) or when stopped at traffic signals, railroad crossings, etc.

Instantaneous fuel consumption mode



1. Instantaneous fuel consumption mode

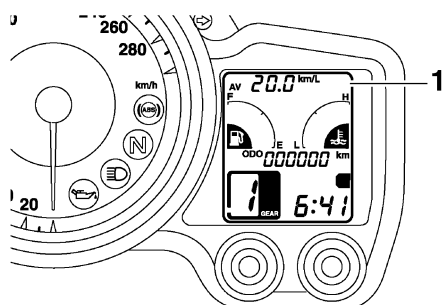
The instantaneous fuel consumption display can be set to either “km/L” or “L/100 km”.

- 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.

NOTE:

- To switch between the two instantaneous fuel consumption displays, push the “RESET” button for 1 second when either display is shown.
- If traveling at speeds under 10 km/h, “_ _” will be displayed.

Average fuel consumption mode



1. Average fuel consumption

This display shows the average fuel consumption since it was last reset.

The average fuel consumption display can be set to either “AV __ km/L” or “AV __ L/100 km”. When the average fuel consumption mode is selected, the display flashes for five seconds, and then, depending on the unit set, “AV __ km/L” (average distance that can be traveled using 1.0 L of fuel) or “AV __ L/100 km” (average amount of fuel necessary to travel 100 km) is displayed. To reset the average fuel consumption display, push the “RESET” button to select the mode again, and then push the “RESET” button for 1 second while the display is flashing.

NOTE:

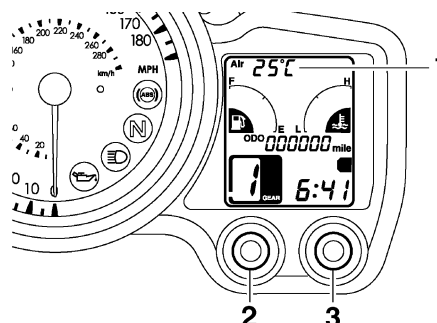
- To switch between the two average fuel consumption displays, push the “RESET” button for 1 second when either display is shown.
- After resetting an average fuel consumption display, “_ _” will be shown for that display until the vehicle has traveled 1 km.

EC3P61041

CAUTION:

If there is a malfunction, “_ _” will be displayed. Replace the meter assembly.

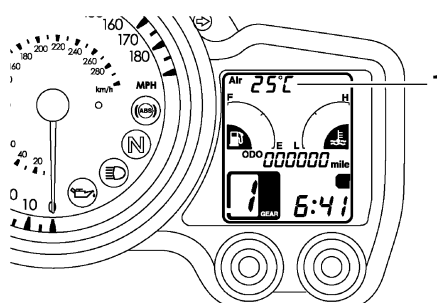
Ambient temperature, instantaneous fuel consumption and average fuel consumption modes (for the UK only)



1. Ambient temperature/instantaneous fuel consumption/average fuel consumption
2. “SELECT” button
3. “RESET” button

Push the “RESET” button to switch the display between the ambient temperature mode and the fuel consumption modes in the following order: Air (ambient temperature) → MPG (instantaneous fuel consumption) → AV __ MPG (average fuel consumption) → Air (ambient temperature)

Ambient temperature mode



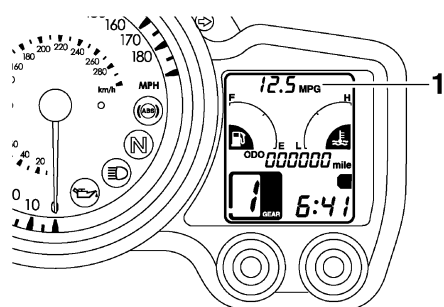
1. Ambient temperature

This display shows the ambient temperature from -9 °C to 50 °C in 1 °C increments. The temperature displayed may vary from the ambient temperature.

NOTE:

- If the ambient temperature falls below -9°C , a lower temperature than -9°C will not be displayed.
- If the ambient temperature climbs above 50°C , a higher temperature than 50°C will not be displayed.
- The accuracy of the temperature reading may be affected when riding slowly [approximately under 20 km/h (12.5 mi/h)] or when stopped at traffic signals, railroad crossings, etc.

Instantaneous fuel consumption mode



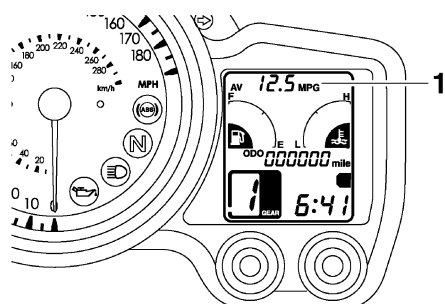
1. Instantaneous fuel consumption mode

This display shows the distance that can be traveled on 1.0 Imp.gal of fuel under the current riding conditions.

NOTE:

If traveling at speeds under 10 km/h (6.0 mi/h), “—” will be displayed.

Average fuel consumption mode



1. Average fuel consumption

This display shows the average fuel consumption since it was last reset.

When the average fuel consumption mode is selected, the display flashes for five seconds, and then “AV — MPG” (average distance that can be traveled using 1.0 Imp.gal of fuel) is displayed.

NOTE:

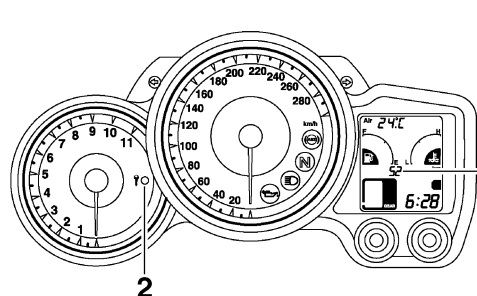
- To reset the average fuel consumption display, push the “RESET” button to select the mode again, and then push the “RESET” button for 1 second while the display is flashing.
- After resetting the average fuel consumption display, “—” will be shown for that display until the vehicle has traveled 1 km (0.6 mi).

EC3P61041

CAUTION:

If there is a malfunction, “—” will be displayed. Replace the meter assembly.

Self-diagnosis device



1. Fault code display
2. Immobilizer system indicator light

This model is equipped with a self-diagnosis device for various electrical circuits.

If any of those circuits are defective, the multi-function display will indicate a two-digit fault code (e.g., 11, 12, 13).

If the multi-function display indicates such a fault code, note the code number, and check the vehicle.

Refer to “FUEL INJECTION SYSTEM” on page 8-41.

EC3P61042

CAUTION:

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

This model is also equipped with a self-diagnosis device for the immobilizer system.

If any of the immobilizer system circuits are defective, the immobilizer system indicator light will flash, and then the multi-function display will indicate a two-digit fault code (e.g., 51, 52, 53) when the key is turned to “ON”.

NOTE: _____

If the multi-function display indicates fault code 52, this could be caused by transponder interference. If this fault code appears, try the following.

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

NOTE: _____

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, re-register the standard keys.

If the multi-function display indicates any fault codes, note the code number, and then check the vehicle.

Refer to “IMMOBILIZER SYSTEM” on page 8-99.

EAS20180

IMPORTANT INFORMATION

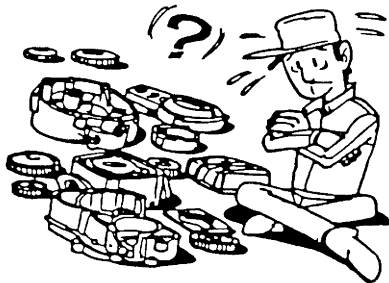
EAS20190

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 1-33.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.

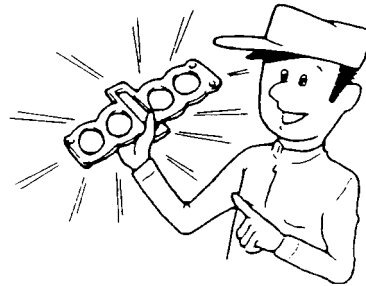


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200

REPLACEMENT PARTS

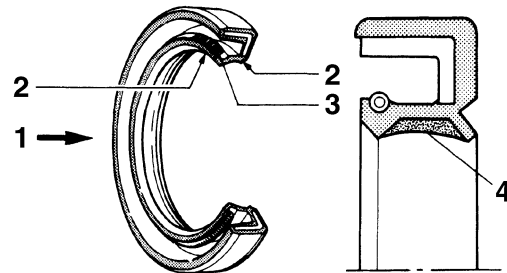
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

GASKETS, OIL SEALS AND O-RINGS

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

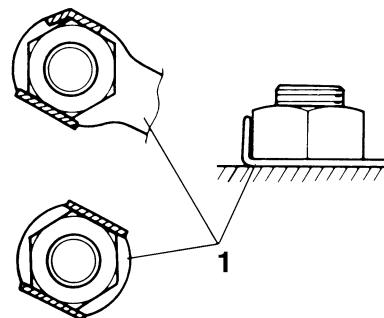


1. Oil
2. Lip
3. Spring
4. Grease

EAS20220

LOCK WASHERS/PLATES AND COTTER PINS

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



EAS20230

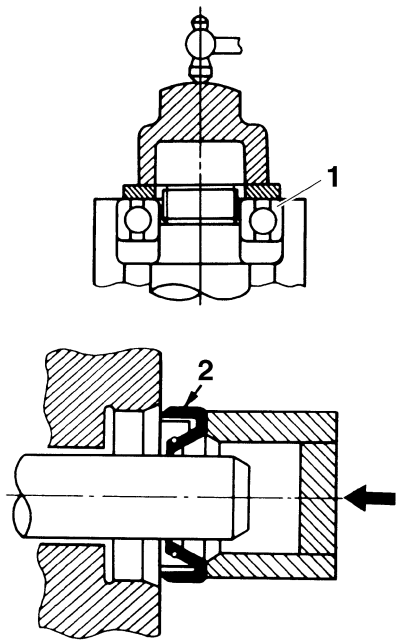
BEARINGS AND OIL SEALS

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

ECA13300

CAUTION:

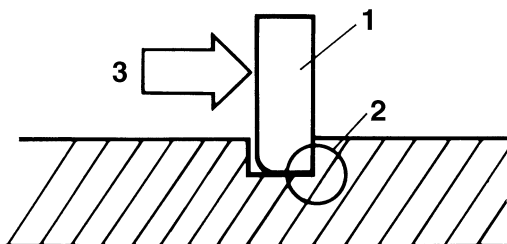
Do not spin the bearing with compressed air because this will damage the bearing surfaces.



EAS20240

CIRCLIPS

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



CHECKING THE CONNECTIONS

EAS20250

CHECKING THE CONNECTIONS

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

1. Disconnect:

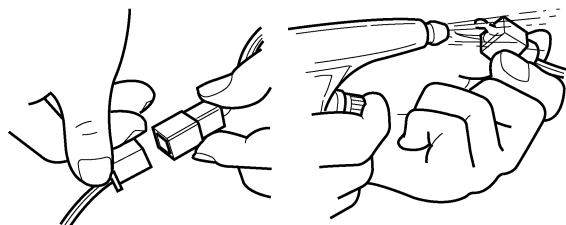
- Lead
- Coupler
- Connector

2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



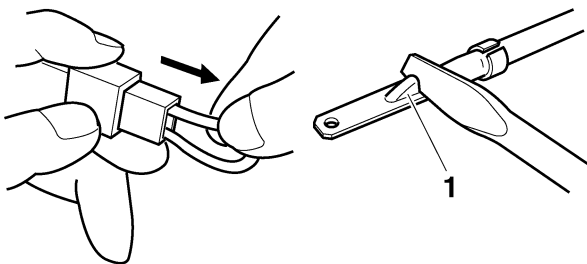
3. Check:

- All connections

Loose connection → Connect properly.

NOTE:

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



4. Connect:

- Lead
- Coupler
- Connector

NOTE:

Make sure all connections are tight.

5. Check:

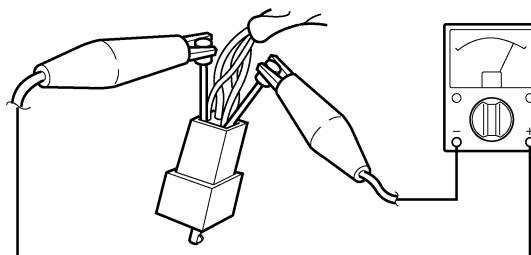
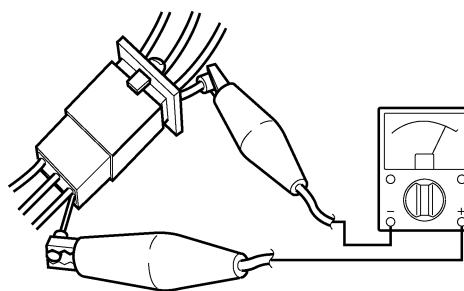
- Continuity
(with the pocket tester)



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

NOTE:

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




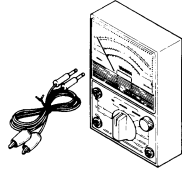

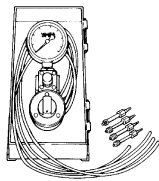

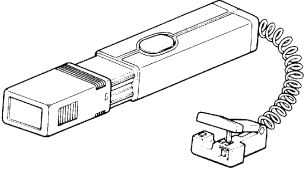
EAS20260

SPECIAL TOOLS

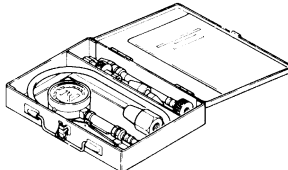
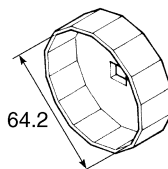
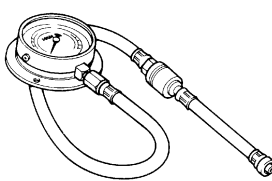
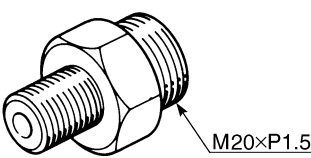
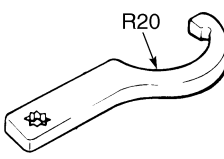
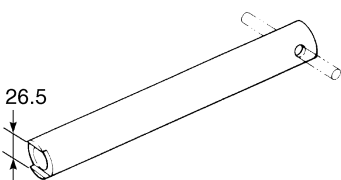
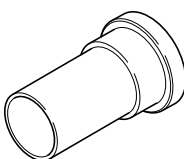
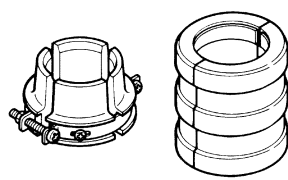
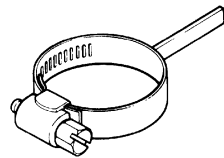
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

NOTE:

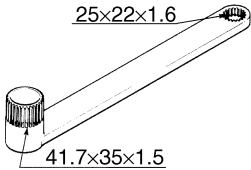
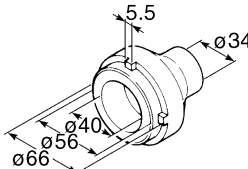

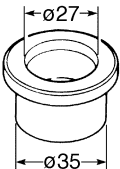
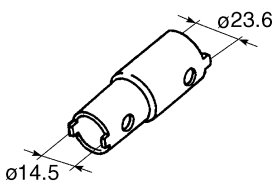
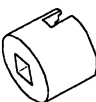
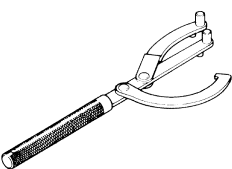
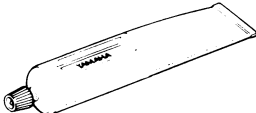
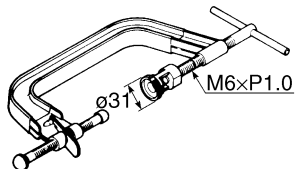
- For U.S.A. and Canada, use part number starting with "YM-", "YU-", or "ACC-".
- For others, use part number starting with "90890-".

| Tool name/Tool No. | Illustration | Reference pages |
|---|--|---|
| Test coupler adapter 90890-03149 |  | 1-21, 4-56, 4-58 |
| Pocket tester 90890-03112 Analog pocket tester YU-03112-C |  | 1-32, 4-16, 5-39, 8-120, 8-121, 8-143, 8-144, 8-151, 8-152, 8-153, 8-157, 8-159, 8-160, 8-161, 8-162, 8-163, 8-164, 8-165, 8-166, 8-167, 8-168, 8-169 |
| Valve lapper 90890-04101 Valve lapping tool YM-A8998 |  | 3-4 |
| Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456 | <div>90890-03094</div>  <div>YU-44456</div>  | 3-6 |
| Timing light 90890-03141 Inductive clamp timing light YU-03141 |  | 3-10 |

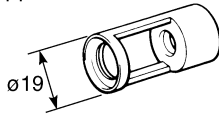
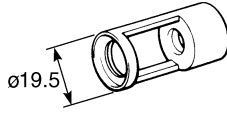
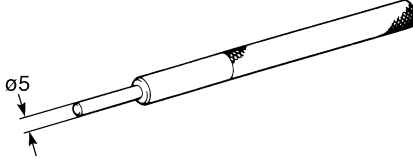

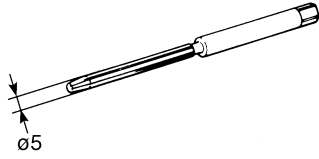
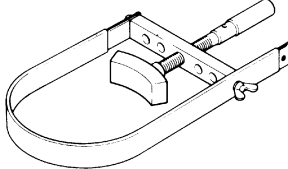
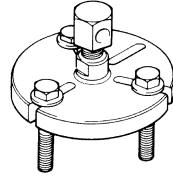
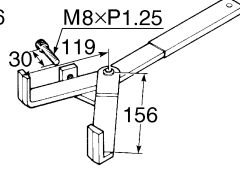
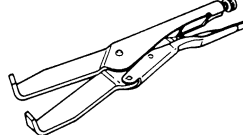
SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|---|--|-----------------|
| Compression gauge 90890-03081 Engine compression tester YU-33223 |  | 3-11 |
| Oil filter wrench 90890-01426 YU-38411 |  | 3-13 |
| Oil pressure gauge set 90890-03120 |  | 3-14 |
| Oil pressure adapter B 90890-03124 |  | 3-14 |
| Steering nut wrench 90890-01403 Spanner wrench YU-33975 |  | 3-26, 4-77 |
| Damper rod holder 90890-01447 YM-01447 |  | 4-69, 4-70 |
| Slide metal installer 90890-01508 |  | 4-71 |
| Fork seal driver 90890-01502 YM-A0948 |  | 4-71, 4-72 |
| Final gear backlash band 90890-01511 |  | 4-93 |

SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|---|--|------------------------------------|
| Coupling gear/middle shaft tool 90890-01229 Gear holder YM-01229 |  | 4-95, 4-98 |
| Bearing retainer wrench 90890-04050 Pinion bearing retainer & remover YM-04050 |  | 4-95, 4-98 |
| Fork seal driver weight 90890-01184 |  | 4-100 |
| Fork seal driver attachment 90890-01186 Replacement 27 mm YM-A9409-1 |  | 4-100 |
| Pivot shaft wrench 90890-01471 Frame spanner socket YM-01471 |  | 5-6, 5-7 |
| Pivot shaft wrench adapter 90890-01476 |  | 5-6, 5-7 |
| Rotor holding tool 90890-01235 Universal magneto & rotor holder YU-01235 |  | 5-11, 5-14 |
| Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®) |  | 5-16, 5-32, 5-35, 5-79, 6-13 |
| Valve spring compressor 90890-04019 YM-04019 |  | 5-22, 5-27 |

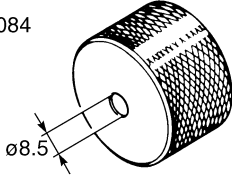
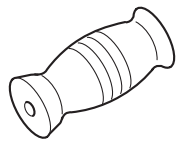
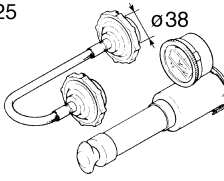
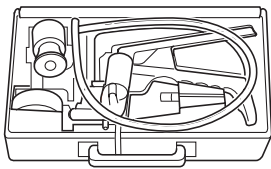
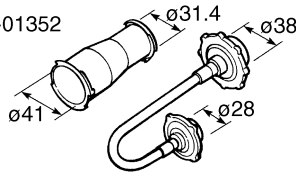
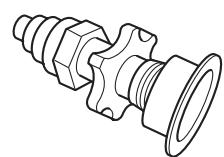
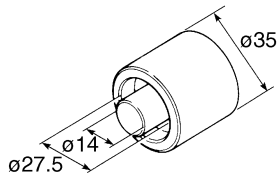
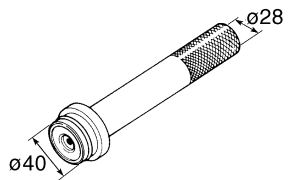
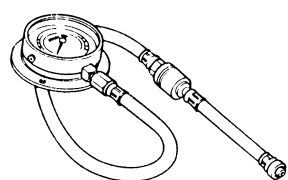
SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|--|--|---------------------|
| Valve spring compressor attachment 90890-04114 Valve spring compressor adapter 19.5 mm YM-04114 | <p>90890-04114</p>  <p>YM-04114</p>  | 5-22, 5-27 |
| Valve guide remover (ø5) 90890-04097 Valve guide remover (5.0 mm) YM-04097 |  | 5-23 |
| Valve guide installer (ø5) 90890-04098 Valve guide installer (5.0 mm) YM-04098 |  | 5-23 |
| Valve guide reamer (ø5) 90890-04099 Valve guide reamer (5.0 mm) YM-04099 |  | 5-23 |
| Sheave holder 90890-01701 Primary clutch holder YS-01880-A |  | 5-31, 5-32, 5-35 |
| Flywheel puller 90890-01362 Heavy duty puller YU-33270-B |  | 5-31 |
| Universal clutch holder 90890-04086 YM-91042 | <p>90890-04086</p>  <p>YM-91042</p>  | 5-48, 5-51 |

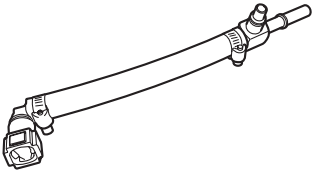
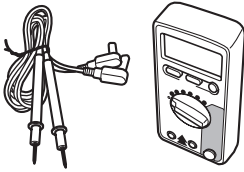
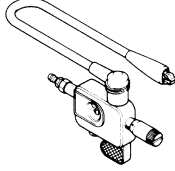
SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|--|--|-----------------|
| Thickness gauge 90890-03180 Feeler gauge set YU-26900-9 | | 5-49 |
| Bearing retainer wrench 90890-04137 Middle drive shaft bearing retainer wrench YM-04137 | | 5-67, 5-69 |
| Damper spring compressor 90890-04090 | | 5-67, 5-68 |
| Bearing retainer wrench 90890-04140 Middle drive shaft bearing retainer wrench YM-04140 | | 5-68 |
| Gear lash measurement tool 90890-01467 YM-01467 | | 5-71 |
| Piston pin puller set 90890-01304 Piston pin puller YU-01304 | <p>90890-01304</p> <p>M6xP1.0</p> <p>YU-01304</p> <p>M6xP1.0</p> | 5-83 |
| Piston ring compressor 90890-05158 YM-08037 | | 5-88 |
| Slide hammer bolt 90890-01083 Slide hammer bolt 6 mm YU-01083-1 | | 5-99 |

SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|--|--|-----------------|
| Weight 90890-01084 YU-01083-3 | <p>90890-01084</p>  <p>YU-01083-3</p>  | 5-99 |
| Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01 | <p>90890-01325</p>  <p>YU-24460-01</p>  | 6-3 |
| Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984 | <p>90890-01352</p>  <p>YU-33984</p>  | 6-3 |
| Mechanical seal installer 90890-04078 Water pump seal installer YM-33221-A |  | 6-13 |
| Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058 |  | 6-13 |
| Pressure gauge 90890-03153 YU-03153 |  | 7-7 |

SPECIAL TOOLS

| Tool name/Tool No. | Illustration | Reference pages |
|--|--|-----------------|
| Fuel pressure adapter 90890-03176 YM-03176 |  | 7-7 |
| Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927 |  | 7-8 |
| Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487 |  | 8-162 |

SPECIFICATIONS

| | |
|---|-------------|
| GENERAL SPECIFICATIONS | 2-1 |
| ENGINE SPECIFICATIONS | 2-2 |
| CHASSIS SPECIFICATIONS | 2-9 |
| ELECTRICAL SPECIFICATIONS | 2-12 |
| TIGHTENING TORQUES | 2-15 |
| GENERAL TIGHTENING TORQUE SPECIFICATIONS | 2-15 |
| ENGINE TIGHTENING TORQUES | 2-16 |
| CHASSIS TIGHTENING TORQUES | 2-20 |
| LUBRICATION POINTS AND LUBRICANT TYPES | 2-25 |
| ENGINE | 2-25 |
| CHASSIS | 2-27 |
| LUBRICATION SYSTEM CHART AND DIAGRAMS | 2-29 |
| ENGINE OIL LUBRICATION CHART | 2-29 |
| LUBRICATION DIAGRAMS | 2-31 |
| COOLING SYSTEM DIAGRAMS | 2-41 |
| CABLE ROUTING | 2-45 |

GENERAL SPECIFICATIONS

EAS20280

GENERAL SPECIFICATIONS

Model

| | |
|-------|---|
| Model | 3P61 (Europe except (B) and (F)) (ZA) 3P62 (B) (F) 3P63 (AUS) |
|-------|---|

Dimensions

| | |
|------------------------|--------------------|
| Overall length | 2230 mm (87.8 in) |
| Overall width | 750 mm (29.5 in) |
| Overall height | 1450 mm (57.1 in) |
| Seat height | 800 mm (31.5 in) |
| Wheelbase | 1545 mm (60.8 in) |
| Ground clearance | 130 mm (5.12 in) |
| Minimum turning radius | 3100 mm (122.0 in) |

Weight

| | |
|-------------------|-------------------|
| With oil and fuel | 291.0 kg (642 lb) |
| Maximum load | 212 kg (467 lb) |

ENGINE SPECIFICATIONS

EAS20290

ENGINE SPECIFICATIONS

Engine

| | |
|--|--|
| Engine type | Liquid cooled 4-stroke, DOHC |
| Displacement | 1298.0 cm ³ (79.20 cu.in) |
| Cylinder arrangement | Forward-inclined parallel 4-cylinder |
| Bore × stroke | 79.0 × 66.2 mm (3.11 × 2.61 in) |
| Compression ratio | 10.80 :1 |
| Standard compression pressure (at sea level) | 1600 kPa/400 r/min (228 psi/400 r/min) (16.0 kgf/cm ² /400 r/min) |
| Minimum–maximum | 1390–1790 kPa (198–255 psi) (13.9–17.9 kgf/cm ²) |
| Starting system | Electric starter |

Fuel

| | |
|---------------------|--|
| Recommended fuel | Regular unleaded gasoline only (Europe) (ZA) Unleaded gasoline only (AUS) |
| Fuel tank capacity | 25.0 L (6.61 US gal) (5.50 Imp.gal) |
| Fuel reserve amount | 5.5 L (1.45 US gal) (1.21 Imp.gal) |

Engine oil

| | |
|--|---|
| Lubrication system | Wet sump |
| Type | SAE20W40 |
| Recommended engine oil grade | API service SE, SF, SG type or higher |
| Engine oil quantity | |
| Total amount | 4.90 L (5.18 US qt) (4.31 Imp.qt) |
| Without oil filter cartridge replacement | 3.80 L (4.02 US qt) (3.34 Imp.qt) |
| With oil filter cartridge replacement | 4.00 L (4.23 US qt) (3.52 Imp.qt) |
| Oil pressure (hot) | 30.0 kPa/1000 r/min (4.4 psi/1000 r/min) (0.30 kgf/cm ² /1000 r/min) |

Final gear oil

| | |
|----------|---|
| Type | Shaft drive gear oil (Part No.: 9079E-SH001-00) |
| Quantity | 0.20 L (0.21 US qt) (0.18 Imp.qt) |

Oil pump

| | |
|---|--|
| Oil pump type | Trochoid |
| Inner-rotor-to-outer-rotor-tip clearance | Less than 0.12 mm (0.0047 in) |
| Limit | 0.20 mm (0.0079 in) |
| Outer-rotor-to-oil-pump-housing clearance | 0.09–0.15 mm (0.0035–0.0059 in) |
| Limit | 0.22 mm (0.0087 in) |
| Oil-pump-housing-to-inner-and-outer-rotor clearance | 0.03–0.08 mm (0.0012–0.0032 in) |
| Limit | 0.15 mm (0.0059 in) |
| Bypass valve opening pressure | 78.4–117.6 kPa (11.4–17.1 psi) (0.78–1.18 kgf/cm ²) |
| Relief valve operating pressure | 480.0–560.0 kPa (69.6–81.2 psi) (4.80–5.60 kgf/cm ²) |

Cooling system

| | |
|--|-----------------------------------|
| Radiator capacity (including all routes) | 2.60 L (2.75 US qt) (2.29 Imp.qt) |
| Radiator capacity | 0.65 L (0.69 US qt) (0.57 Imp.qt) |

ENGINE SPECIFICATIONS

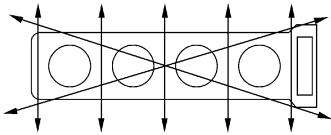
| | |
|---|---|
| Coolant reservoir capacity (up to the maximum level mark) | 0.25 L (0.26 US qt) (0.22 Imp.qt) |
| Radiator cap opening pressure | 93.3–122.7 kPa (13.5–17.8 psi) (0.93–1.23 kgf/cm ²) |
| Valve relief pressure | 4.9 kPa (0.7 psi) (0.05 kgf/cm ²) |
| Thermostat | |
| Model/manufacturer | 4FM/NIPPON 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 | 360.0 mm (14.17 in) |
| Height | 273.8 mm (10.78 in) |
| Depth | 22.0 mm (0.87 in) |
| Water pump | |
| Water pump type | Single suction centrifugal pump |
| Reduction ratio | 75/48 × 25/28 (1.395) |
| Impeller shaft tilt limit | 0.15 mm (0.006 in) |

Spark plug (s)

| | |
|--------------------|-----------------------------|
| Manufacturer/model | NGK/CR8E |
| Manufacturer/model | DENSO/U24ESR-N |
| Spark plug gap | 0.7–0.8 mm (0.028–0.031 in) |

Cylinder head

| | |
|---------------|---|
| Volume | 22.74–23.34 cm ³ (1.39–1.42 cu.in) |
| Warpage limit | 0.10 mm (0.0039 in) |



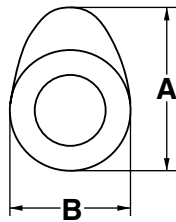
Camshaft

| | |
|--|-------------------------------------|
| Drive system | Chain drive (right) |
| Camshaft cap inside diameter | 24.500–24.521 mm (0.9646–0.9654 in) |
| Camshaft journal diameter | 24.459–24.472 mm (0.9630–0.9635 in) |
| Camshaft-journal-to-camshaft-cap clearance | 0.028–0.062 mm (0.0011–0.0024 in) |
| Camshaft lobe dimensions | |
| Intake A | 33.050–33.150 mm (1.3012–1.3051 in) |
| Limit | 32.050 mm (1.2618 in) |
| Intake B | 24.997–25.097 mm (0.9841–0.9881 in) |
| Limit | 23.997 mm (0.9448 in) |
| Exhaust A | 33.050–33.150 mm (1.3012–1.3051 in) |
| Limit | 32.950 mm (1.2972 in) |
| Exhaust B | 24.997–25.097 mm (0.9841–0.9881 in) |

ENGINE SPECIFICATIONS

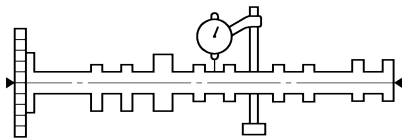
Limit

24.897 mm (0.9802 in)



Camshaft runout limit

0.030 mm (0.0012 in)



Timing chain

Model/number of links

92RH2015/136

Tensioning system

Automatic

Valve, valve seat, valve guide

Valve clearance (cold)

Intake

0.15–0.22 mm (0.0059–0.0087 in)

Exhaust

0.18–0.25 mm (0.0071–0.0098 in)

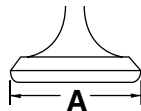
Valve dimensions

Valve head diameter A (intake)

29.90–30.10 mm (1.1772–1.1850 in)

Valve head diameter A (exhaust)

25.90–26.10 mm (1.0197–1.0276 in)

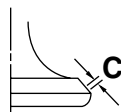


Valve seat width C (intake)

0.90–1.10 mm (0.0354–0.0433 in)

Valve seat width C (exhaust)

0.90–1.10 mm (0.0354–0.0433 in)

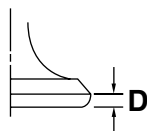


Valve margin thickness D (intake)

0.80–1.20 mm (0.0315–0.0472 in)

Valve margin thickness D (exhaust)

0.50–0.90 mm (0.0197–0.0354 in)



Valve stem diameter (intake)

4.975–4.990 mm (0.1959–0.1965 in)

Valve stem diameter (exhaust)

4.965–4.980 mm (0.1955–0.1960 in)

Valve guide inside diameter (intake)

5.000–5.012 mm (0.1969–0.1973 in)

Limit

5.050 mm (0.1988 in)

Valve guide inside diameter (exhaust)

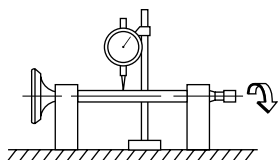
5.000–5.012 mm (0.1969–0.1973 in)

Limit

5.050 mm (0.1988 in)

ENGINE SPECIFICATIONS

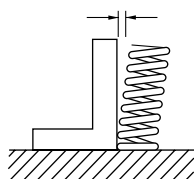
| | |
|---|-----------------------------------|
| Valve-stem-to-valve-guide clearance (intake) | 0.010–0.037 mm (0.0004–0.0015 in) |
| Limit | 0.080 mm (0.0032 in) |
| Valve-stem-to-valve-guide clearance (exhaust) | 0.020–0.047 mm (0.0008–0.0019 in) |
| Limit | 0.105 mm (0.0041 in) |
| Valve stem runout | 0.010 mm (0.0004 in) |



| | |
|--|---------------------------------|
| Cylinder head valve seat width (intake) | 0.90–1.10 mm (0.0354–0.0433 in) |
| Cylinder head valve seat width (exhaust) | 0.90–1.10 mm (0.0354–0.0433 in) |

Valve spring

| | |
|--|--|
| Free length (intake) | 39.73 mm (1.56 in) |
| Limit | 37.74 mm (1.49 in) |
| Free length (exhaust) | 39.73 mm (1.56 in) |
| Limit | 37.74 mm (1.49 in) |
| Installed length (intake) | 33.00 mm (1.30 in) |
| Installed length (exhaust) | 33.00 mm (1.30 in) |
| Spring rate K1 (intake) | 21.85 N/mm (124.76 lb/in) (2.23 kgf/mm) |
| Spring rate K2 (intake) | 28.34 N/mm (161.82 lb/in) (2.89 kgf/mm) |
| Spring rate K1 (exhaust) | 21.85 N/mm (124.76 lb/in) (2.23 kgf/mm) |
| Spring rate K2 (exhaust) | 28.34 N/mm (161.82 lb/in) (2.89 kgf/mm) |
| Installed compression spring force (intake) | 136.00–158.00 N (30.57–35.52 lb) (13.87–16.11 kgf) |
| Installed compression spring force (exhaust) | 136.00–158.00 N (30.57–35.52 lb) (13.87–16.11 kgf) |
| Spring tilt (intake) | 2.5°/1.7 mm (2.5°/0.067 in) |
| Spring tilt (exhaust) | 2.5°/1.7 mm (2.5°/0.067 in) |



| | |
|-----------------------------|-----------|
| Winding direction (intake) | Clockwise |
| Winding direction (exhaust) | Clockwise |

Cylinder

| | |
|--------------------|-------------------------------------|
| Bore | 79.000–79.010 mm (3.1102–3.1106 in) |
| Taper limit | 0.050 mm (0.0020 in) |
| Out of round limit | 0.050 mm (0.0020 in) |

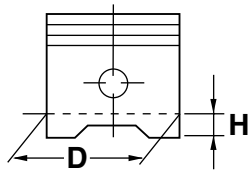
Piston

| | |
|------------------------------|-------------------------------------|
| Piston-to-cylinder clearance | 0.020–0.045 mm (0.0008–0.0018 in) |
| Limit | 0.12 mm (0.0047 in) |
| Diameter D | 78.965–78.980 mm (3.1089–3.1094 in) |

ENGINE SPECIFICATIONS

Height H

5.0 mm (0.20 in)



Offset

0.50 mm (0.0197 in)

Offset direction

Intake side

Piston pin bore inside diameter

19.004–19.015 mm (0.7482–0.7486 in)

Limit

19.045 mm (0.7498 in)

Piston pin outside diameter

18.991–19.000 mm (0.7477–0.7480 in)

Limit

18.971 mm (0.7469 in)

Piston-pin-to-piston-pin-bore clearance

0.004–0.024 mm (0.00016–0.00094 in)

Piston ring

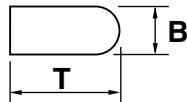
Top ring

Ring type

Barrel

Dimensions (B × T)

1.00 × 2.80 mm (0.04 × 0.11 in)



End gap (installed)

0.35–0.45 mm (0.0138–0.0177 in)

Limit

0.70 mm (0.0276 in)

Ring side clearance

0.030–0.070 mm (0.0012–0.0028 in)

Limit

0.120 mm (0.0047 in)

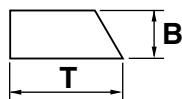
2nd ring

Ring type

Taper

Dimensions (B × T)

1.00 × 2.90 mm (0.04 × 0.11 in)



End gap (installed)

0.75–0.85 mm (0.0295–0.0335 in)

Limit

1.20 mm (0.0472 in)

Ring side clearance

0.020–0.060 mm (0.0008–0.0024 in)

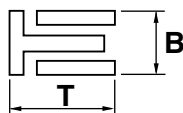
Limit

0.120 mm (0.0047 in)

Oil ring

Dimensions (B × T)

2.00 × 2.50 mm (0.08 × 0.10 in)



End gap (installed)

0.20–0.60 mm (0.0079–0.0236 in)

Ring side clearance

0.060–0.150 mm (0.0024–0.0059 in)

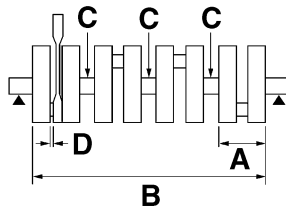
ENGINE SPECIFICATIONS

Connecting rod

| | |
|------------------------------------|--|
| Oil clearance (using plastigauge®) | 0.031–0.048 mm (0.0012–0.0019 in) |
| Bearing color code | 1.Blue 2.Black 3.Brown 4.Green 5.Yellow 6.Pink |
| Small end inside diameter | 19.005–19.018 mm (0.7482–0.7487 in) |

Crankshaft

| | |
|--------------------------|-----------------------------------|
| Width A | 61.60–63.20 mm (2.425–2.488 in) |
| Width B | 325.10–326.30 mm (12.80–12.85 in) |
| Runout limit C | 0.030 mm (0.0012 in) |
| Big end side clearance D | 0.160–0.262 mm (0.0063–0.0103 in) |



| | |
|--|---|
| Journal oil clearance (using plastigauge®) | 0.027–0.045 mm (0.0011–0.0018 in) |
| Bearing color code | 2.Black 3.Brown 4.Green 5.Yellow 6.Pink 7.Red 8.White |

Balancer

| | |
|-----------------------|------|
| Balancer drive method | Gear |
|-----------------------|------|

Clutch

| | |
|--------------------------|-------------------------------|
| Clutch type | Wet, multiple-disc |
| Clutch release method | Hydraulic inner push |
| Clutch lever free play | 1.9–20.7 mm (0.07–0.81 in) |
| Friction plate thickness | 2.90–3.10 mm (0.114–0.122 in) |
| Wear limit | 2.80 mm (0.110 in) |
| Plate quantity | 9 pcs |
| Clutch plate thickness | 1.90–2.10 mm (0.075–0.083 in) |
| Plate quantity | 8 pcs |
| Warpage limit | 0.10 mm (0.0039 in) |
| Clutch spring height | 6.78 mm (0.27 in) |
| Minimum height | 6.4 mm (0.25 in) |
| Spring quantity | 1 pc |

Transmission

| | |
|----------------------------|------------------------------|
| Transmission type | Constant mesh 5-speed |
| Primary reduction system | Spur gear |
| Primary reduction ratio | 75/48 (1.563) |
| Secondary reduction system | Shaft drive |
| Secondary reduction ratio | 35/37 × 21/27 × 33/9 (2.698) |
| Operation | Left foot operation |
| Gear ratio | |
| 1st | 43/17 (2.529) |
| 2nd | 39/22 (1.773) |
| 3rd | 31/23 (1.348) |
| 4th | 28/26 (1.077) |

ENGINE SPECIFICATIONS

| | |
|---|--|
| 5th | 26/28 (0.929) |
| Main axle runout limit | 0.08 mm (0.0032 in) |
| Drive axle runout limit | 0.08 mm (0.0032 in) |
| Shifting mechanism | |
| Shift mechanism type | Shift drum and guide bar |
| Shift fork guide bar bending limit | 0.100 mm (0.0039 in) |
| Air filter | |
| Air filter element | Dry element |
| Fuel pump | |
| Pump type | Electrical |
| Model/manufacturer | 5JW 21/DENSO |
| Maximum consumption amperage | 6.0 A |
| Output pressure | 324.0 kPa (47.0 psi) (3.24 kgf/cm ²) |
| Fuel injection | |
| Model/quantity | INP-151/4 |
| Manufacturer | NIPPON INJECTOR |
| Throttle body | |
| Type/quantity | 42EHS/4 |
| Manufacturer | MIKUNI |
| ID mark | 3P61 00 |
| Throttle position sensor | |
| Resistance | 4.0–6.0 k Ω |
| Output voltage (at idle) | 0.63–0.73 V |
| Fuel injection sensor | |
| Crankshaft position sensor resistance | 421–569 Ω at 20 °C (68 °F) |
| Cylinder identification sensor output voltage (ON) | More than 4.8 V |
| Cylinder identification sensor output voltage (OFF) | Less than 0.6 V |
| Intake air pressure sensor output voltage | 3.75–4.25 V |
| Coolant temperature sensor resistance | 290–354 Ω at 80 °C (176 °F) |
| Idling condition | |
| Engine idling speed | 1000–1100 r/min |
| Intake vacuum | 33.3 kPa (9.8 inHg) (250 mmHg) |
| Water temperature | 100.0–105.0 °C (212.00–221.00 °F) |
| Oil temperature | 80.0–90.0 °C (176.00–194.00 °F) |
| Throttle cable free play | 3.0–5.0 mm (0.12–0.20 in) |
| Air induction system | |
| Solenoid resistance | 19–25 Ω at 20 °C (68 °F) |
| Shaft drive | |
| Middle gear backlash | 0.10–0.20 mm (0.0039–0.0079 in) |
| Ring-gear-to-stopper-bolt clearance | 0.30–0.60 mm (0.0118–0.0236 in) |
| Ring-gear-to-thrust-washer clearance | 0.10–0.20 mm (0.0039–0.0079 in) |
| Final gear backlash | 0.22–0.45 mm (0.0087–0.0177 in) |

CHASSIS SPECIFICATIONS

EAS20300

CHASSIS SPECIFICATIONS

Chassis

| | |
|--------------|--------------------|
| Frame type | Diamond |
| Caster angle | 26.00° |
| Trail | 109.0 mm (4.29 in) |

Front wheel

| | |
|----------------------------|--------------------|
| Wheel type | Cast wheel |
| Rim size | 17M/C × MT3.50 |
| Rim material | Aluminum |
| Wheel travel | 135.0 mm (5.31 in) |
| Radial wheel runout limit | 1.0 mm (0.04 in) |
| Lateral wheel runout limit | 0.5 mm (0.02 in) |

Rear wheel

| | |
|----------------------------|--------------------|
| Wheel type | Cast wheel |
| Rim size | 17M/C × MT5.50 |
| Rim material | Aluminum |
| Wheel travel | 125.0 mm (4.92 in) |
| Radial wheel runout limit | 1.0 mm (0.04 in) |
| Lateral wheel runout limit | 0.5 mm (0.02 in) |

Front tire

| | |
|--------------------|----------------------|
| Type | Tubeless |
| Size | 120/70 ZR17M/C (58W) |
| Manufacturer/model | METZELER/Roadtec Z6G |
| Manufacturer/model | BRIDGESTONE/BT020F |
| Wear limit (front) | 1.6 mm (0.06 in) |

Rear tire

| | |
|--------------------|----------------------|
| Type | Tubeless |
| Size | 180/55 ZR17M/C (73W) |
| Manufacturer/model | METZELER/Roadtec Z6C |
| Manufacturer/model | BRIDGESTONE/BT020R |
| 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 | 270 kPa (39 psi) (2.70 kgf/cm ²) |
| Rear | 290 kPa (42 psi) (2.90 kgf/cm ²) |
| Loading condition | 90–212 kg (198–467 lb) |
| Front | 270 kPa (39 psi) (2.70 kgf/cm ²) |
| Rear | 290 kPa (42 psi) (2.90 kgf/cm ²) |
| High-speed riding | |
| Front | 270 kPa (39 psi) (2.70 kgf/cm ²) |
| Rear | 290 kPa (42 psi) (2.90 kgf/cm ²) |

Front brake

| | |
|-----------|----------------------|
| Type | Dual disc brake |
| Operation | Right hand operation |

CHASSIS SPECIFICATIONS

Front disc brake

| | |
|--|---|
| Disc outside diameter × thickness | 320.0 × 4.5 mm (12.60 × 0.18 in) |
| Brake disc thickness limit | 4.0 mm (0.16 in) |
| Brake disc deflection limit | 0.10 mm (0.0039 in) |
| Brake pad lining thickness (inner) | 5.5 mm (0.22 in) |
| Limit | 0.5 mm (0.02 in) |
| Brake pad lining thickness (outer) | 5.5 mm (0.22 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 × 4 (1.19 in × 4) |
| Caliper cylinder inside diameter (for unified brake) | 33.96 mm × 2, 22.65 mm × 2 (1.34 in × 2, 0.89 in × 2) |
| Recommended fluid | DOT 4 |

Rear brake

| | |
|------------------------------------|---|
| Type | Single disc brake |
| Operation | Right foot operation |
| Brake pedal position | 42.0 mm (1.65 in) (below the top of the rider footrest) |
| 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) | 6.3 mm (0.25 in) |
| Limit | 0.8 mm (0.03 in) |
| Brake pad lining thickness (outer) | 6.3 mm (0.25 in) |
| Limit | 0.8 mm (0.03 in) |
| Master cylinder inside diameter | 15.0 mm (0.59 in) |
| Caliper cylinder inside diameter | 41.30 mm (1.63 in) |
| Recommended fluid | DOT 4 |

Clutch

| | |
|----------------------------------|-------------------|
| Recommended fluid | DOT 4 |
| Master cylinder inside diameter | 14.0 mm (0.55 in) |
| Release cylinder inside diameter | 29.6 mm (1.17 in) |

Steering

| | |
|----------------------------|-----------------|
| Steering bearing type | Angular bearing |
| Lock to lock angle (left) | 34.0° |
| Lock to lock angle (right) | 34.0° |

Front suspension

| | |
|----------------------------|---------------------------------------|
| Type | Telescopic fork |
| Spring/shock absorber type | Coil spring/oil damper |
| Front fork travel | 135.0 mm (5.31 in) |
| Fork spring free length | 262.0 mm (10.31 in) |
| Limit | 257.0 mm (10.12 in) |
| Collar length | 149.5 mm (5.89 in) |
| Installed length | 251.0 mm (9.88 in) |
| Spring rate K1 | 8.30 N/mm (47.39 lb/in) (0.85 kgf/mm) |
| Spring stroke K1 | 0.0–135.0 mm (0.00–5.31 in) |
| Inner tube outer diameter | 48.0 mm (1.89 in) |
| Inner tube bending limit | 0.2 mm (0.01 in) |

CHASSIS SPECIFICATIONS

| | |
|---------------------------|--|
| Optional spring available | No |
| Recommended oil | Suspension oil M1 or ohlins R & T43 |
| Quantity | 696.0 cm ³ (23.53 US oz) (24.55 Imp.oz) |
| Level | 92.0 mm (3.62 in) |

Rear suspension

| | |
|-------------------------------------|--|
| Type | Swingarm (link suspension) |
| Spring/shock absorber type | Coil spring/gas-oil damper |
| Rear shock absorber assembly travel | 60.0 mm (2.36 in) |
| Spring free length | 154.6 mm (6.09 in) |
| Installed length | 136.2 mm (5.36 in) |
| Spring free length | 73.9 mm (2.91 in) |
| Installed length | 67.3 mm (2.65 in) |
| Soft | |
| Spring rate K1 | 91.00 N/mm (519.60 lb/in) (9.28 kgf/mm) |
| Spring rate K2 | 124.00 N/mm (708.04 lb/in) (12.64 kgf/mm) |
| Spring stroke K1 | 0.0–42.0 mm (0.00–1.65 in) |
| Spring stroke K2 | 42.0–60.0 mm (1.65–2.36 in) |
| Hard | |
| Spring rate K1 | 124.00 N/mm (708.04 lb/in) (12.64 kgf/mm) |
| Spring stroke K1 | 7.0–60.0 mm (0.28–2.36 in) |
| Optional spring available | No |
| Enclosed gas/air pressure (STD) | 1200 kPa (170.7 psi) (12.0 kgf/cm ²) |

ELECTRICAL SPECIFICATIONS

EAS20310

ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| Voltage | |
| System voltage | 12 V |
| Ignition system | |
| Ignition system | Transistorized coil ignition (digital) |
| Ignition timing (B.T.D.C.) | 5.0°/1050 r/min |
| Engine control unit | |
| Model/manufacturer | FUA0008/MITSUBISHI (Europe except (B) and (F)) (ZA) (AUS) FUA0009/MITSUBISHI (B) (F) |
| Ignition coil | |
| Model/manufacturer | JO383/DENSO |
| Minimum ignition spark gap | 6.0 mm (0.24 in) |
| Primary coil resistance | 1.53–2.07 Ω at 20 °C (68 °F) |
| Secondary coil resistance | 12–18 k Ω at 20 °C (68 °F) |
| Spark plug cap | |
| Material | Resin |
| Resistance | 10.0 k Ω |
| AC magneto | |
| Model/manufacturer | LNx07/DENSO |
| Standard output | 14.0 V 590 W 5000 r/min |
| Stator coil resistance | 0.13–0.19 Ω at 20 °C (68 °F) |
| Voltage regulator | |
| Rectifier/regulator | |
| Regulator type | Semi conductor-short circuit |
| Model/manufacturer | FH012AA/SHINDENGEN |
| Regulated voltage (DC) | 14.2–14.8 V |
| Rectifier capacity (DC) | 50.0 A |
| Withstand voltage | 40.0 V |
| Battery | |
| Model | GT14B-4 |
| Voltage, capacity | 12 V, 12.0 Ah |
| Manufacturer | GS YUASA |
| Ten hour rate amperage | 1.20 A |
| Headlight | |
| Bulb type | Halogen bulb |
| Bulb voltage, wattage × quantity | |
| Headlight | 12 V, 60 W/55.0 W × 2 |
| Auxiliary light | 12 V, 5.0 W × 2 |
| Tail/brake light | 12 V, 5.0 W/21.0 W × 2 |
| Front turn signal light | 12 V, 21.0 W × 2 |
| Rear turn signal light | 12 V, 21.0 W × 2 |

ELECTRICAL SPECIFICATIONS

| | |
|------------------------------------|---|
| License plate light | 12 V, 5.0 W × 1 |
| Meter lighting | LED |
| Indicator light | |
| Neutral indicator light | LED |
| Turn signal indicator light | LED |
| Oil level warning light | LED |
| High beam indicator light | LED |
| Engine trouble warning light | LED |
| ABS warning light | LED |
| Immobilizer system indicator light | LED |
| Electric starting system | |
| System type | Constant mesh |
| Starter motor | |
| Model/manufacturer | 3P6/YAMAHA |
| Power output | 0.80 kW |
| Armature coil resistance | 0.024–0.030 Ω at 20 °C (68 °F) |
| Brush overall length | 10.8 mm (0.43 in) |
| Limit | 3.65 mm (0.14 in) |
| Brush spring force | 5.28–7.92 N (19.01–28.51 oz) (538–808 gf) |
| Commutator diameter | 24.5 mm (0.96 in) |
| Limit | 23.5 mm (0.93 in) |
| Mica undercut (depth) | 1.50 mm (0.06 in) |
| Starter relay | |
| Model/manufacturer | MS5F-631/JIDECO |
| Amperage | 180.0 A |
| Horn | |
| Horn type | Plane |
| Quantity | 2 pcs |
| Model/manufacturer | HF-12/NIKKO |
| Maximum amperage | 3.0 A |
| Coil resistance | 1.01–1.11 Ω at 20 °C (68 °F) |
| Performance | 108–116 dB/2 m (6.6 ft) |
| Turn signal/hazard relay | |
| Relay type | Full transistor |
| Model/manufacturer | FE246BH/DENSO |
| Built-in, self-canceling device | No |
| Turn signal blinking frequency | 75.0–95.0 cycles/min |
| Wattage | 21 W × 2.0 |
| Oil level switch | |
| Model/manufacturer | 3P6/DENSO |
| Fuel gauge | |
| Model/manufacturer | 5JW/DENSO |
| Sender unit resistance (full) | 19.0–21.0 Ω |
| Sender unit resistance (empty) | 139.0–141.0 Ω |

ELECTRICAL SPECIFICATIONS

Starting circuit cut-off relay

| | |
|-------------------|------------------|
| Model/manufacture | G8R-30Y-V3/OMRON |
| Coil resistance | 180.0 Ω |

Headlight relay

| | |
|-------------------|-------------------------|
| Model/manufacture | ACM33211 M05/MATSUSHITA |
| Coil resistance | 96.0 Ω |

Radiator fan

| | |
|-------------------|------------|
| Model/manufacture | 3P6/DENSO |
| Running rpm | 4250 r/min |

Fan motor relay

| | |
|-------------------|-------------------------|
| Model/manufacture | ACM33211 M05/MATSUSHITA |
| Coil resistance | 96.0 Ω |

Thermo unit

| | |
|--------------------|----------------------|
| Model/manufacture | 25978/MITSUBISHI |
| Resistance at 80°C | 290.0–390.0 Ω |

Fuses

| | |
|----------------------------|-------------------|
| Main fuse | 50.0 A |
| Headlight fuse | 25.0 A |
| Signaling system fuse | 15.0 A |
| Ignition fuse | 10.0 A |
| Radiator fan fuse | 15.0 A \times 2 |
| Auxiliary DC jack fuse | 3.0 A |
| Hazard fuse | 10.0 A |
| Fuel injection system fuse | 15.0 A |
| ABS motor fuse | 30.0 A |
| ABS control unit fuse | 10.0 A |
| Backup fuse | 10.0 A |
| Reserve fuse | 30.0 A |
| Reserve fuse | 25.0 A |
| Reserve fuse | 15.0 A |
| Reserve fuse | 10.0 A |
| Reserve fuse | 3.0 A |

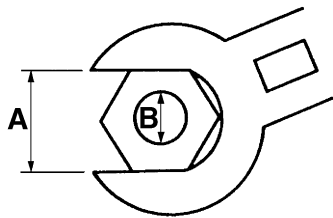
EAS20320

TIGHTENING TORQUES

EAS20330

GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

















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

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
















TIGHTENING TORQUES

EAS20340












ENGINE TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|--|-------------|------|------------------------------|---|
| Spark plug | M10 | 4 | 13 Nm (1.3 m·kg, 9.4 ft·lb) | |
| Cylinder head bolt | M10 | 10 | See NOTE. |  |
| Cylinder head bolt | M6 | 2 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Camshaft cap bolt | M6 | 20 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Cylinder head cover bolt | M6 | 8 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Engine oil check bolt | M8 | 1 | 20 Nm (2.0 m·kg, 14 ft·lb) | |
| Cylinder head stud bolt (exhaust pipe) | M8 | 8 | 15 Nm (1.5 m·kg, 11 ft·lb) | |
| Reed valve cover bolt | M6 | 6 | 14 Nm (1.4 m·kg, 10 ft·lb) |  |
| Connecting rod nut | M8 | 8 | See NOTE. |  |
| Generator rotor bolt | M12 | 1 | 130 Nm (13.0 m·kg, 94 ft·lb) |  |
| Pickup rotor bolt | M10 | 1 | 45 Nm (4.5 m·kg, 32 ft·lb) | |
| Front balancer lever bolt | M8 | 1 | 14 Nm (1.4 m·kg, 10 ft·lb) |  |
| Rear balancer lever bolt | M8 | 1 | 14 Nm (1.4 m·kg, 10 ft·lb) |  |
| Front balancer shaft pinch bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Rear balancer shaft pinch bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Timing chain tensioner bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Timing chain tensioner cap bolt | M6 | 1 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Camshaft sprocket bolt | M7 | 4 | 24 Nm (2.4 m·kg, 17 ft·lb) | |
| Water pump assembly bolt | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Water pump housing cover bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Coolant drain bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Water jacket joint bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Thermostat inlet pipe 1 bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Thermostat housing cover/radiator filler pipe bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Thermostat housing bolt | M6 | 1 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Oil cooler bolt | M6 | 4 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Engine oil drain bolt | M14 | 1 | 43 Nm (4.3 m·kg, 31 ft·lb) | |
| Oil strainer bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Oil pump assembly bolt | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Oil delivery pipe 2 bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Oil delivery pipe 3 bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Oil filter cartridge bolt | M20 | 1 | 70 Nm (7.0 m·kg, 50 ft·lb) | |
| Oil filter cartridge | M20 | 1 | 17 Nm (1.7 m·kg, 12 ft·lb) | |
| Oil pan bolt | M6 | 20 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Oil pump drive chain guide bolt | M6 | 2 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |

TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|---|-------------|------|-----------------------------|---|
| Oil pump housing cover bolt | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Oil level switch bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Throttle body joint clamp screw | M4 | 8 | 3 Nm (0.3 m·kg, 2.2 ft·lb) | |
| Air filter case joint clamp screw | M4 | 4 | 4 Nm (0.4 m·kg, 2.9 ft·lb) | |
| Air filter case and rear lower fuel tank bracket bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Intake air pressure sensor bolt | M5 | 2 | 4 Nm (0.4 m·kg, 2.9 ft·lb) | |
| Exhaust pipe assembly nut | M8 | 8 | 20 Nm (2.0 m·kg, 14 ft·lb) | |
| Muffler and exhaust pipe assembly bolt | M8 | 2 | 20 Nm (2.0 m·kg, 14 ft·lb) | |
| Exhaust pipe assembly bolt | M8 | 2 | 17 Nm (1.7 m·kg, 12 ft·lb) | |
| Muffler bolt | M10 | 2 | 25 Nm (2.5 m·kg, 18 ft·lb) | |
| Crankcase bolt | M9 | 10 | See NOTE. |  |
| Crankcase bolt | M6 | 2 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Crankcase bolt | M6 | 17 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Crankcase bolt | M8 | 2 | 24 Nm (2.4 m·kg, 17 ft·lb) |  |
| Crankcase blind plug | M10 | 1 | 20 Nm (2.0 m·kg, 14 ft·lb) | |
| Lower crankcase plug bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Generator cover bolt | M6 | 11 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Clutch cover bolt | M6 | 10 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Middle gear case cover bolt | M6 | 9 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Pickup rotor cover bolt | M6 | 8 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Rear balancer cover bolt | M6 | 4 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Oil baffle plate 1 bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Oil baffle plate 2 bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Timing mark accessing plug | M8 | 1 | 15 Nm (1.5 m·kg, 11 ft·lb) | |
| Oil guide plate bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Damper cover bolt (middle gear case cover) | M6 | 4 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Oil baffle plate 3 bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Upper crankcase plug bolt | M6 | 1 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Crankcase damper bolt | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Damper cover bolt (clutch cover) | M6 | 5 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  |
| Stator assembly lead holder bolt | M6 | 1 | 7 Nm (0.7 m·kg, 5.1 ft·lb) |  |
| Main gallery bolt | M20 | 1 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Starter clutch bolt | M8 | 3 | 32 Nm (3.2 m·kg, 23 ft·lb) |  |
| Clutch boss nut | M20 | 1 | 90 Nm (9.0 m·kg, 65 ft·lb) | Use a lock washer. |

TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|---|-------------|------|--------------------------------|--|
| Clutch spring bolt | M6 | 6 | 8 Nm (0.8 m·kg, 5.8 ft·lb) | |
| Clutch release cylinder bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Clutch hose union bolt | M10 | 1 | 30 Nm (3.0 m·kg, 22 ft·lb) | |
| Bleed screw (clutch release cylinder) | M8 | 1 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Main axle assembly screw | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) |  Stake |
| Middle drive pinion gear nut | M22 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) |  Use a lock washer. |
| Middle drive shaft bearing housing bolt | M6 | 3 | 12 Nm (1.2 m·kg, 8.7 ft·lb) | |
| Bearing retainer (middle drive shaft) | M8 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) | Stake |
| Middle driven pinion gear nut | M28 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) |  Stake |
| Bearing retainer (middle driven shaft) | M6 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) | Stake |
| Middle driven shaft end cover bolt | M8 | 3 | 25 Nm (2.5 m·kg, 18 ft·lb) |  |
| Shift drum retainer bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Shift shaft spring stopper bolt | M8 | 1 | 22 Nm (2.2 m·kg, 16 ft·lb) |  |
| Stator coil assembly bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Gear position switch bolt | M5 | 2 | 4 Nm (0.4 m·kg, 2.9 ft·lb) |  |
| Crankshaft position sensor bolt | M5 | 2 | 4 Nm (0.4 m·kg, 2.9 ft·lb) |  |
| O ₂ sensor | M18 | 1 | 45 Nm (4.5 m·kg, 32 ft·lb) | |
| Intake air temperature sensor | M12 | 1 | 18 Nm (1.8 m·kg, 13 ft·lb) | |
| Cylinder identification sensor bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) |  |
| Coolant temperature sensor | M12 | 1 | 18 Nm (1.8 m·kg, 13 ft·lb) | |
| Starter motor bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Throttle position sensor screw | M5 | 2 | 3.5 Nm (0.35 m·kg, 2.53 ft·lb) | |
| Radiator bolt | M6 | 3 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Radiator cover bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) |  |
| Radiator bracket bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Coolant reservoir bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Coolant reservoir bracket bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |

TIGHTENING TORQUES

NOTE:

Cylinder head bolt

Tighten the cylinder head bolts to 25 Nm (2.5 m·kg 18 ft·lb) in the proper tightening sequence, loosen and retighten the bolts to 25 Nm (2.5 m·kg 18 ft·lb) in the proper tightening sequence, and then tighten them further to reach the specified angle 175–185° in the proper tightening sequence.

NOTE:

Connecting rod nut

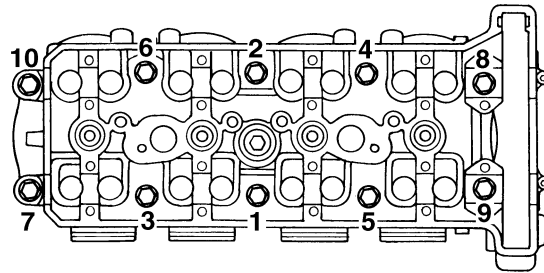
Tighten the connecting rod nuts to 20 Nm (2.0 m·kg 14 ft·lb), and then tighten them further to reach the specified angle 115–125°.

NOTE:

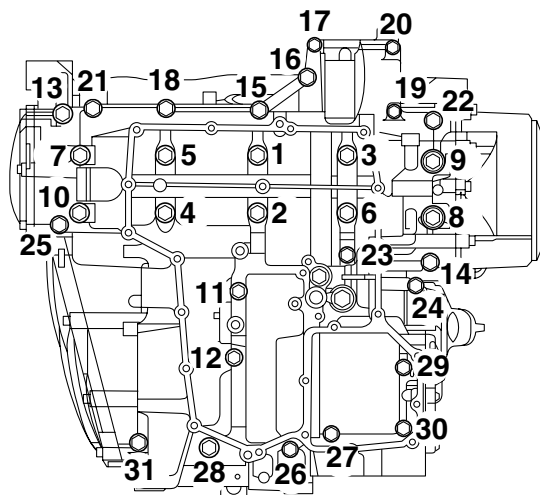
Crankcase bolt

Tighten the crankcase bolts to 20 Nm (2.0 m·kg 14 ft·lb) in the proper tightening sequence, loosen and retighten the bolts to 20 Nm (2.0 m·kg 14 ft·lb) in the proper tightening sequence, and then tighten them further to reach the specified angle 115–125° in the proper tightening sequence.

Cylinder head tightening sequence:






Crankcase tightening sequence:





TIGHTENING TORQUES

EAS20350








CHASSIS TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|---|-------------|------|------------------------------|---|
| Engine mounting bolts (right front lower side) | M12 | 1 | 49 Nm (4.9 m·kg, 35 ft·lb) | |
| Engine mounting bolts (right front upper side) | M12 | 1 | 49 Nm (4.9 m·kg, 35 ft·lb) | |
| Engine mounting bolts (left front lower side) | M12 | 1 | 49 Nm (4.9 m·kg, 35 ft·lb) | |
| Engine mounting bolts (left front upper side) | M12 | 1 | 49 Nm (4.9 m·kg, 35 ft·lb) | |
| Engine mounting nut (rear upper side) | M10 | 1 | 45 Nm (4.5 m·kg, 32 ft·lb) |  |
| Spacer bolt | M16 | 1 | 18 Nm (1.8 m·kg, 13 ft·lb) | |
| Engine mounting bolt (rear lower side) | M10 | 1 | 45 Nm (4.5 m·kg, 32 ft·lb) |  |
| Engine mounting bolt (left rear side) | M8 | 2 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Engine bracket bolt (left rear side) | M10 | 1 | 32 Nm (3.2 m·kg, 23 ft·lb) | |
| Engine bracket bolt (top) | M8 | 4 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Engine mounting bolt (top) | M10 | 2 | 37 Nm (3.7 m·kg, 27 ft·lb) | |
| Pinch bolt (front side) | M8 | 1 | 24 Nm (2.4 m·kg, 17 ft·lb) | |
| Pinch bolt (rear side) | M8 | 2 | 24 Nm (2.4 m·kg, 17 ft·lb) | |
| Pivot shaft | M28 | 1 | 23 Nm (2.3 m·kg, 17 ft·lb) |  |
| Pivot shaft nut | M18 | 1 | 125 Nm (12.5 m·kg, 90 ft·lb) | |
| Pivot shaft locknut | M28 | 1 | 115 Nm (11.5 m·kg, 85 ft·lb) | |
| Pivot shaft locknut retainer bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Relay arm and frame nut | M10 | 1 | 40 Nm (4.0 m·kg, 29 ft·lb) | |
| Connecting arm and relay arm nut | M10 | 1 | 48 Nm (4.8 m·kg, 35 ft·lb) | |
| Connecting arm and swingarm nut | M10 | 1 | 48 Nm (4.8 m·kg, 35 ft·lb) | |
| Rear shock absorber assembly upper nut | M12 | 1 | 64 Nm (6.4 m·kg, 46 ft·lb) | |
| Rear shock absorber assembly lower nut | M10 | 1 | 40 Nm (4.0 m·kg, 29 ft·lb) | |
| Rear shock absorber spring pre-load adjusting lever nut | M6 | 3 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Upper bracket pinch bolt | M8 | 2 | 26 Nm (2.6 m·kg, 19 ft·lb) | |
| Lower bracket pinch bolt | M8 | 4 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Steering stem nut | M28 | 1 | 115 Nm (11.5 m·kg, 85 ft·lb) | |
| Lower ring nut (initial tightening torque) | M30 | 1 | 52 Nm (5.2 m·kg, 37 ft·lb) | See NOTE. |



TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|--|-------------|------|-----------------------------|---|
| Lower ring nut (final tightening torque) | M30 | 1 | 18 Nm (1.8 m·kg, 13 ft·lb) | See NOTE. |
| Handlebar bolt | M8 | 2 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Handlebar nut | M12 | 2 | 65 Nm (6.5 m·kg, 47 ft·lb) | |
| Clutch master cylinder holder bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Front brake master cylinder holder bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Front fork cap bolt locknut | M10 | 1 | 25 Nm (2.5 m·kg, 18 ft·lb) | |
| Front fork damper rod assembly bolt | M10 | 1 | 35 Nm (3.5 m·kg, 25 ft·lb) |  |
| Front fork cap bolt | M45 | 1 | 25 Nm (2.5 m·kg, 18 ft·lb) |  |
| Front fender bolt | M6 | 4 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Brake hose joint bracket bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Lower bracket cover bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Front cowling stay and frame nut | M10 | 2 | 32 Nm (3.2 m·kg, 23 ft·lb) | |
| Front cowling assembly bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Windshield upper inner bracket and windshield lower inner bracket bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Windshield upper inner bracket and windshield drive unit bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Windshield lower inner bracket and windshield drive unit bolt | M6 | 4 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Rearview mirror nut | M6 | 4 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Windshield drive unit bolt | M6 | 4 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Windshield drive unit side rail bolt | M6 | 4 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Side cover bolt | M6 | 3 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Grab bar bolt | M8 | 5 | 21 Nm (2.1 m·kg, 15 ft·lb) | |
| Grab bar bolt | M6 | 1 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Fuel pump bolt | M5 | 6 | 4 Nm (0.4 m·kg, 2.9 ft·lb) | |
| Front fuel tank bracket and frame bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Fuel tank and front fuel tank bracket bolt | M8 | 2 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Fuel tank and rear upper fuel tank bracket bolt | M8 | 2 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Rear upper fuel tank bracket and rear lower fuel tank bracket nut | M8 | 1 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Rear lower fuel tank bracket and frame bolt | M6 | 4 | 8 Nm (0.8 m·kg, 5.8 ft·lb) | |
| Fuel tank cap bolt | M5 | 3 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Storage compartment bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |

TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|--|-------------|------|------------------------------|---|
| T-bar bolt | M10 | 3 | 37 Nm (3.7 m·kg, 27 ft·lb) | |
| Rear fender bolt | M6 | 3 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Rear fender nut | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Front wheel axle bolt | M14 | 1 | 91 Nm (9.1 m·kg, 66 ft·lb) | See NOTE. |
| Front wheel axle pinch bolt | M8 | 4 | 21 Nm (2.1 m·kg, 15 ft·lb) | |
| Front brake disc bolt | M6 | 12 | 18 Nm (1.8 m·kg, 13 ft·lb) |  |
| Front wheel sensor bolt | M8 | 1 | 30 Nm (3.0 m·kg, 22 ft·lb) | |
| Rear wheel axle nut | M18 | 1 | 125 Nm (12.5 m·kg, 90 ft·lb) | |
| Rear wheel axle pinch bolt | M8 | 1 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Rear brake disc bolt | M6 | 6 | 18 Nm (1.8 m·kg, 13 ft·lb) |  |
| Rear wheel sensor bolt | M8 | 1 | 30 Nm (3.0 m·kg, 22 ft·lb) | |
| Brake torque rod nut | M8 | 2 | 30 Nm (3.0 m·kg, 22 ft·lb) | |
| Rear wheel dust cover screw | M5 | 3 | 5 Nm (0.5 m·kg, 3.6 ft·lb) |  |
| Brake hose union bolt | M10 | 14 | 30 Nm (3.0 m·kg, 22 ft·lb) | |
| Brake pipe flare nut | M10 | 11 | 19 Nm (1.9 m·kg, 13 ft·lb) | |
| Front brake caliper bolt | M10 | 4 | 40 Nm (4.0 m·kg, 29 ft·lb) | |
| Front brake hose holder bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Front brake caliper bleed screw | M8 | 3 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Front brake pad bolt | M10 | 2 | 17 Nm (1.7 m·kg, 12 ft·lb) |  |
| Rear brake caliper bolt | M10 | 2 | 27 Nm (2.7 m·kg, 19 ft·lb) |  |
| Rear brake hose/rear wheel sensor lead holder bolt | M6 | 1 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Rear brake caliper bleed screw | M7 | 1 | 6 Nm (0.6 m·kg, 4.3 ft·lb) | |
| Hydraulic unit nut | M8 | 3 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Metering valve bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Proportioning valve bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Sidestand nut | M10 | 1 | 58 Nm (5.8 m·kg, 42 ft·lb) | |
| Sidestand switch screw | M5 | 2 | 4 Nm (0.4 m·kg, 2.9 ft·lb) |  |
| Centerstand nut | M10 | 4 | 55 Nm (5.5 m·kg, 40 ft·lb) | |
| Centerstand bracket nut | M10 | 2 | 55 Nm (5.5 m·kg, 40 ft·lb) | |
| Brake pedal bolt | M6 | 1 | 8 Nm (0.8 m·kg, 5.8 ft·lb) | |
| Right footrest bracket bolt | M8 | 2 | 28 Nm (2.8 m·kg, 20 ft·lb) | |
| Rear brake master cylinder bolt | M8 | 2 | 18 Nm (1.8 m·kg, 13 ft·lb) | |
| Rear brake master cylinder lock-nut | M8 | 1 | 16 Nm (1.6 m·kg, 11 ft·lb) | |
| Left footrest assembly bolt | M8 | 2 | 28 Nm (2.8 m·kg, 20 ft·lb) | |
| Left footrest assembly bolt | M10 | 1 | 49 Nm (4.9 m·kg, 35 ft·lb) | |
| Left footrest assembly/sidestand bolt | M10 | 2 | 65 Nm (6.5 m·kg, 47 ft·lb) |  |

TIGHTENING TORQUES

| Item | Thread size | Q'ty | Tightening torque | Remarks |
|--|-------------|------|------------------------------|--|
| Shift arm pinch bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Shift rod locknut | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Drive shaft dust cover bolt | M5 | 2 | 4 Nm (0.4 m·kg, 2.9 ft·lb) |  |
| Final gear oil drain bolt | M14 | 1 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Final gear oil filler bolt | M14 | 1 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Final drive assembly nut | M10 | 4 | 42 Nm (4.0 m·kg, 29 ft·lb) | |
| Final drive pinion gear bearing retainer | M65 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) | Left-hand thread |
| Coupling gear nut | M16 | 1 | 110 Nm (11.0 m·kg, 80 ft·lb) | Stake |
| Ring gear bearing housing bolt | M10 | 2 | 40 Nm (4.0 m·kg, 29 ft·lb) | |
| Ring gear bearing housing nut | M8 | 6 | 23 Nm (2.3 m·kg, 17 ft·lb) | |
| Final gear case stud bolt | M8 | 6 | 9 Nm (0.9 m·kg, 6.5 ft·lb) | |
| Ring gear bearing housing stopper bolt | M10 | 1 | 9 Nm (0.9 m·kg, 6.5 ft·lb) |  Left-hand thread |
| Battery box bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |
| Battery stay bolt | M6 | 2 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Battery holder bolt | M6 | 1 | 10 Nm (1.0 m·kg, 7.2 ft·lb) | |
| Horn bolt | M6 | 2 | 7 Nm (0.7 m·kg, 5.1 ft·lb) | |

NOTE:

Lower ring nut

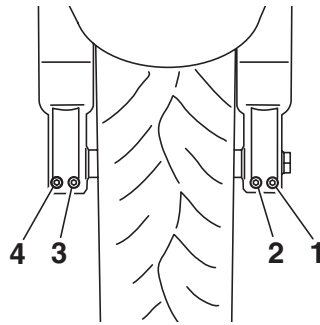
1. First, tighten the lower ring nut to approximately 52 Nm (5.2 m·kg, 37 ft·lb) with a torque wrench, then loosen the lower ring nut completely.
2. Retighten the lower ring nut to 18 Nm (1.8 m·kg, 13 ft·lb) with a torque wrench.

NOTE:

Front wheel axle pinch bolt

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

TIGHTENING TORQUES




































LUBRICATION POINTS AND LUBRICANT TYPES

EAS20360

LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370

ENGINE

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




LUBRICATION POINTS AND LUBRICANT TYPES

| Lubrication point | Lubricant |
|---|---|
| Cylinder head cover mating surface | Three Bond 1541 [®] |
| Cylinder head cover gasket | Yamaha bond No.1215 (Three Bond No.1215 [®]) |
| Crankcase mating surface | Yamaha bond No.1215 (Three Bond No.1215 [®]) |
| Crankshaft position sensor lead grommet | Yamaha bond No.1215 (Three Bond No.1215 [®]) |
| Stator coil assembly lead grommet | Yamaha bond No.1215 (Three Bond No.1215 [®]) |

LUBRICATION POINTS AND LUBRICANT TYPES

EAS20380

CHASSIS

| Lubrication point | Lubricant |
|---|---|
| Steering bearings and upper bearing cover lip |  |
| Lower bearing dust seal lip |  |
| Front wheel oil seal lips (right and left) |  |
| Rear wheel oil seal lips |  |
| Rear wheel drive hub oil seal |  |
| Rear wheel drive hub mating surface |  |
| Rear brake pedal pivoting point |  |
| Footrest assembly pivoting point |  |
| Shift pedal pivoting point |  |
| Centerstand pivoting point and metal-to-metal moving parts |  |
| Sidestand pivoting point and metal-to-metal moving parts |  |
| Tube guide (throttle grip) inner surface and throttle cables |  |
| Brake lever pivot bolt and metal-to-metal moving parts | Silicon grease |
| Clutch lever pivot bolt and metal-to-metal moving parts | Silicon grease |
| Rear shock absorber assembly oil seal |  |
| Rear shock absorber assembly bearing |  |
| Rear shock absorber assembly spacer |  |
| Pivot shaft and pivot shaft thread |  |
| Pivot shaft bearing |  |
| Pivot shaft oil seal lip |  |
| Relay arm bearing |  |
| Oil seals (rear shock absorber, relay arm and connecting arm) |  |
| Drive shaft spline (final drive pinion gear side) |  |
| Drive shaft spline (universal joint side) |  |
| Ring gear inner surface |  |
| Thrust washer (ring gear) |  |
| Bearing (ring gear) |  |
| Bearing (final drive pinion gear) |  |

LUBRICATION POINTS AND LUBRICANT TYPES

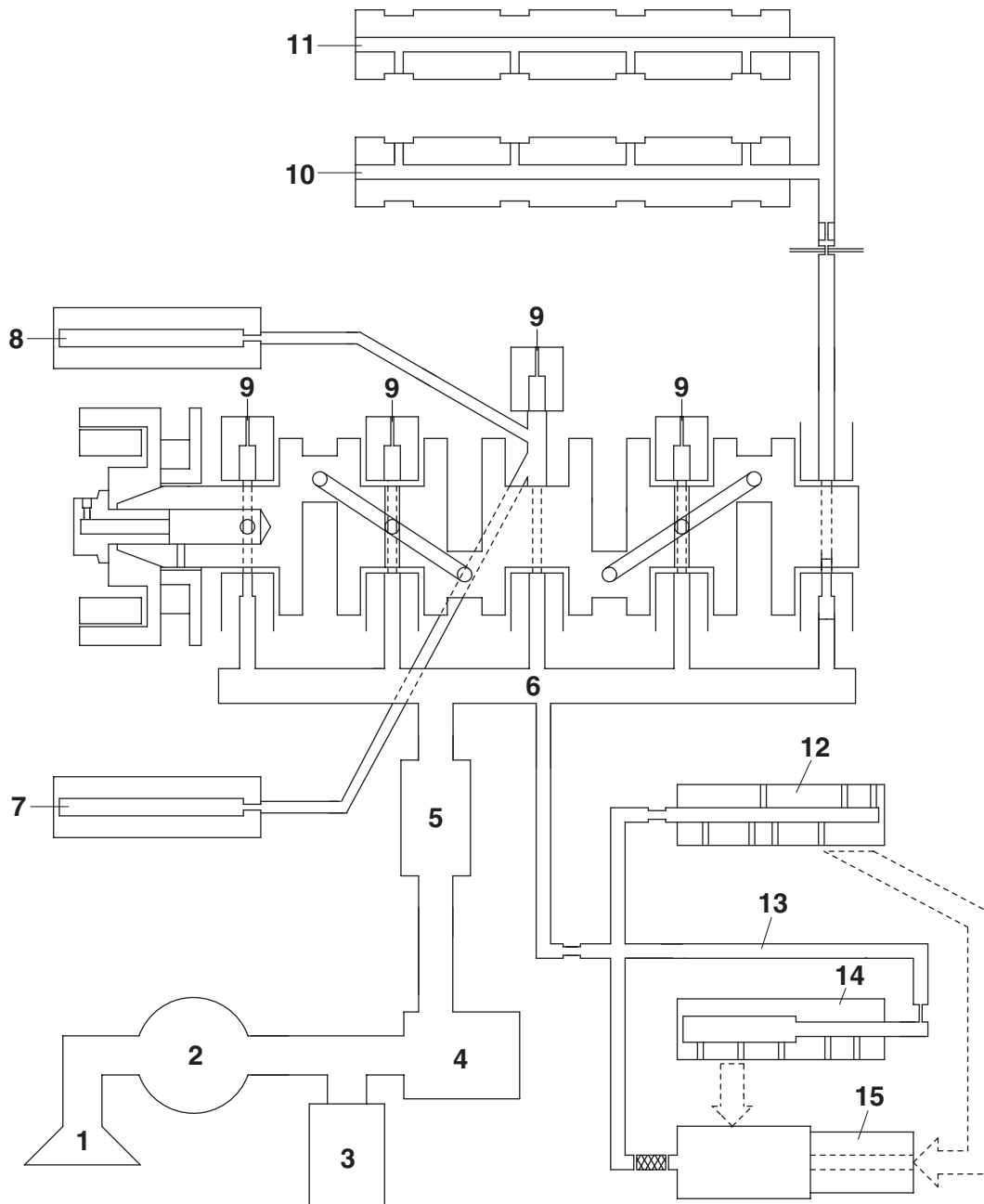
LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20390

LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20400

ENGINE OIL LUBRICATION CHART



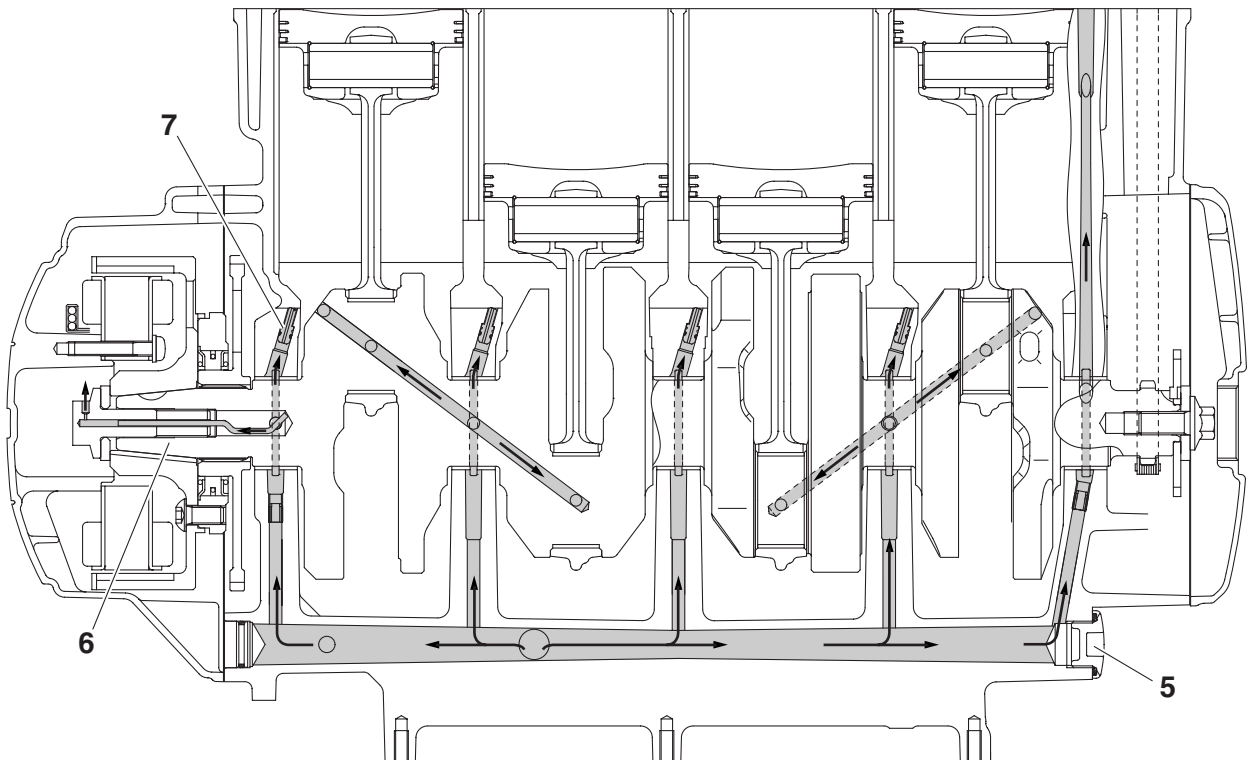
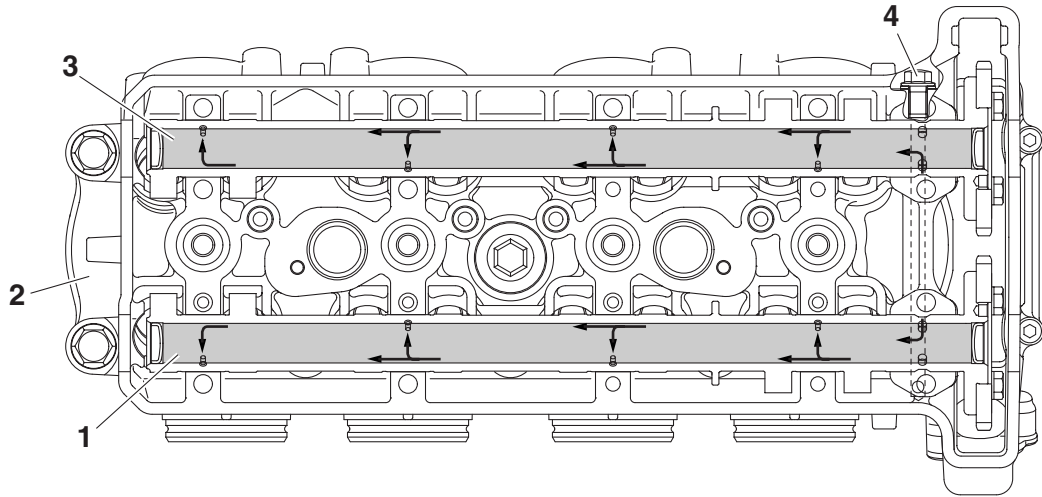
LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil strainer
2. Oil pump
3. Relief valve assembly
4. Oil filter
5. Oil cooler
6. Main gallery
7. Front balancer shaft
8. Rear balancer shaft
9. Oil nozzle
10. Intake camshaft
11. Exhaust camshaft
12. Main axle
13. Oil pipe
14. Drive axle
15. Middle drive shaft assembly

LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410

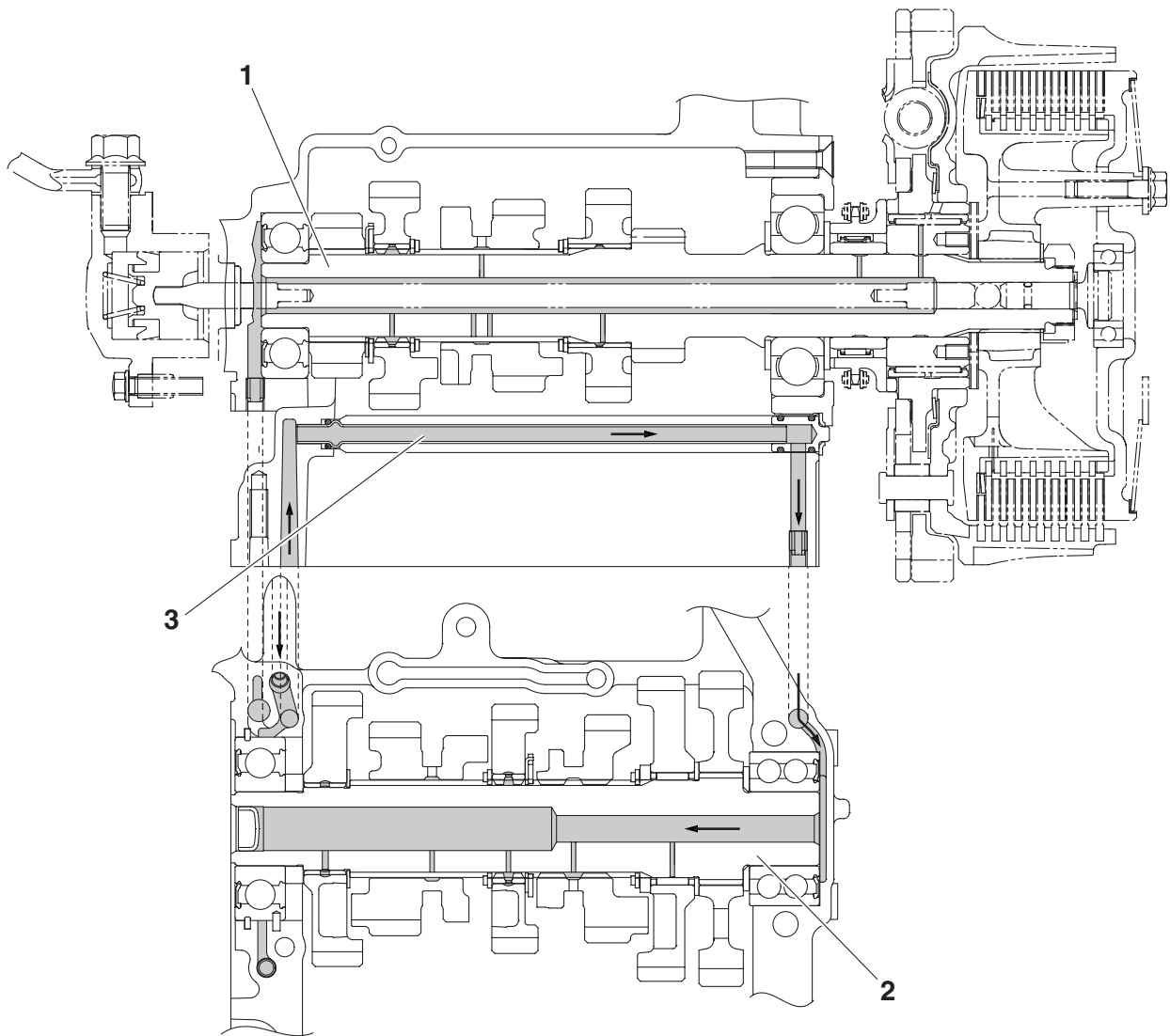
LUBRICATION DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Intake camshaft
2. Cylinder head
3. Exhaust camshaft
4. Oil check bolt
5. Main gallery bolt
6. Crankshaft
7. Oil nozzle

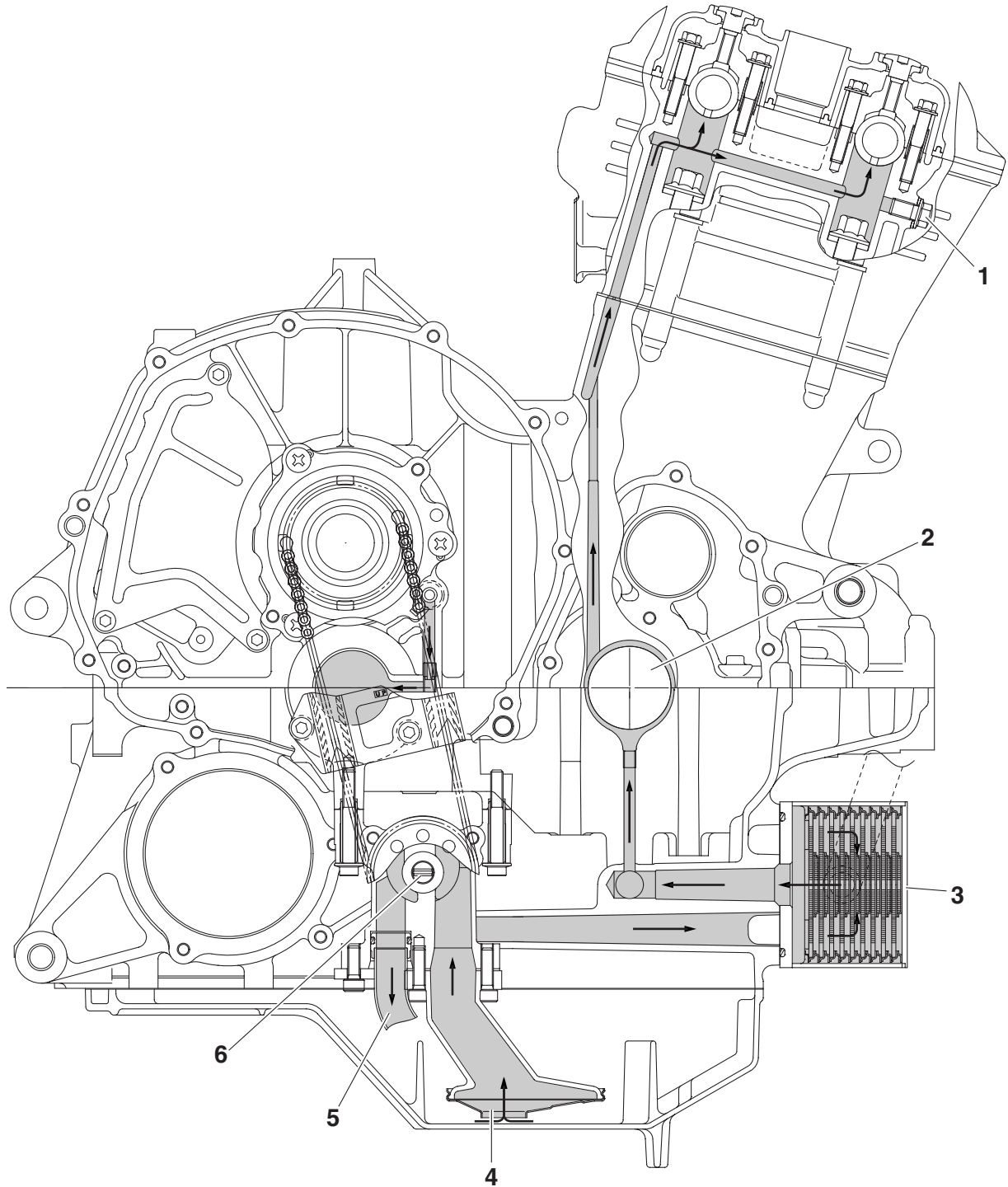
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

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

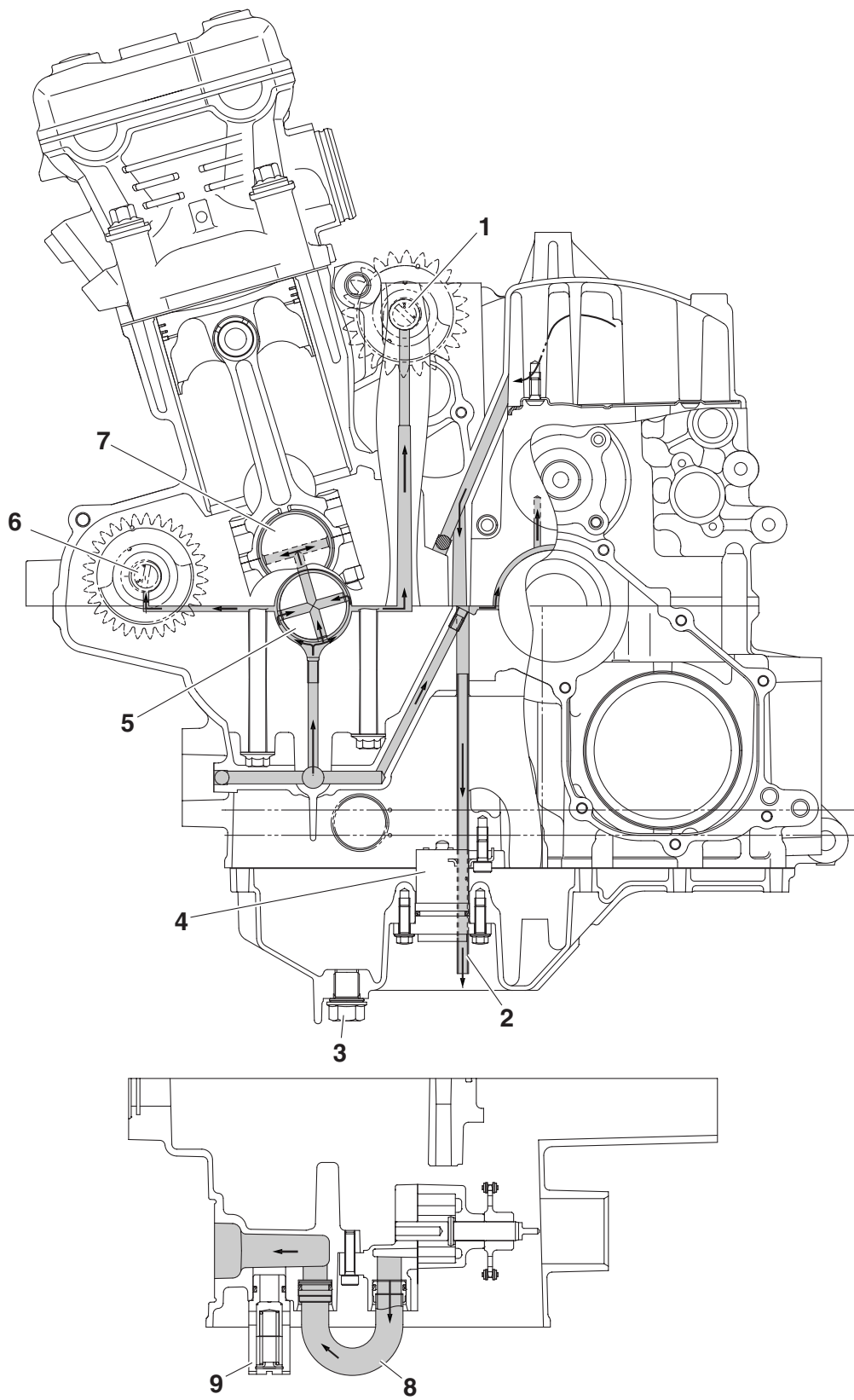
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil check bolt
2. Crankshaft
3. Oil cooler
4. Oil strainer
5. Oil delivery pipe 3
6. Oil pump

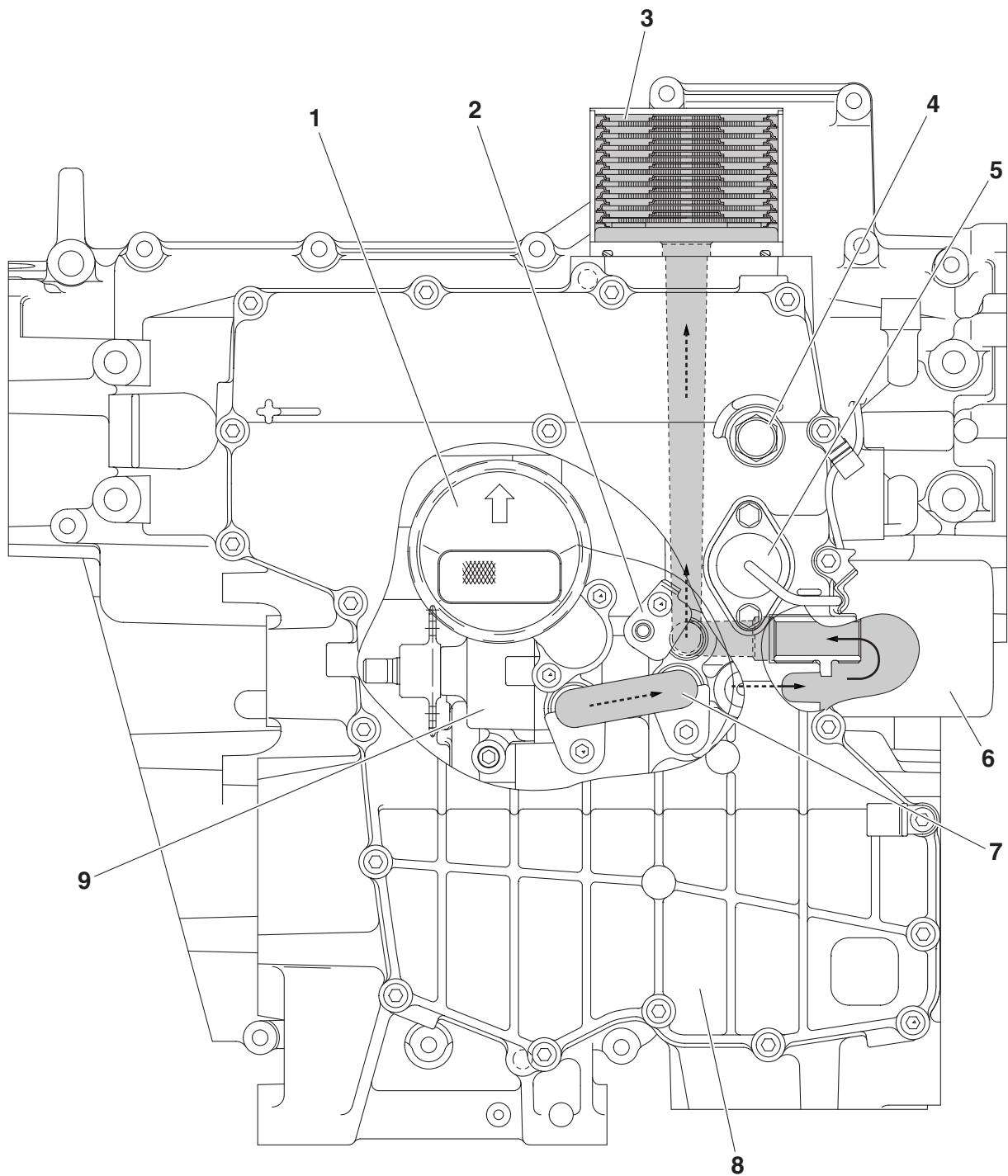
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Rear balancer
2. Oil delivery pipe 2
3. Engine oil drain bolt
4. Oil level switch
5. Crankshaft
6. Front balancer
7. Crank pin
8. Oil delivery pipe 3
9. Relief valve assembly

LUBRICATION SYSTEM CHART AND DIAGRAMS



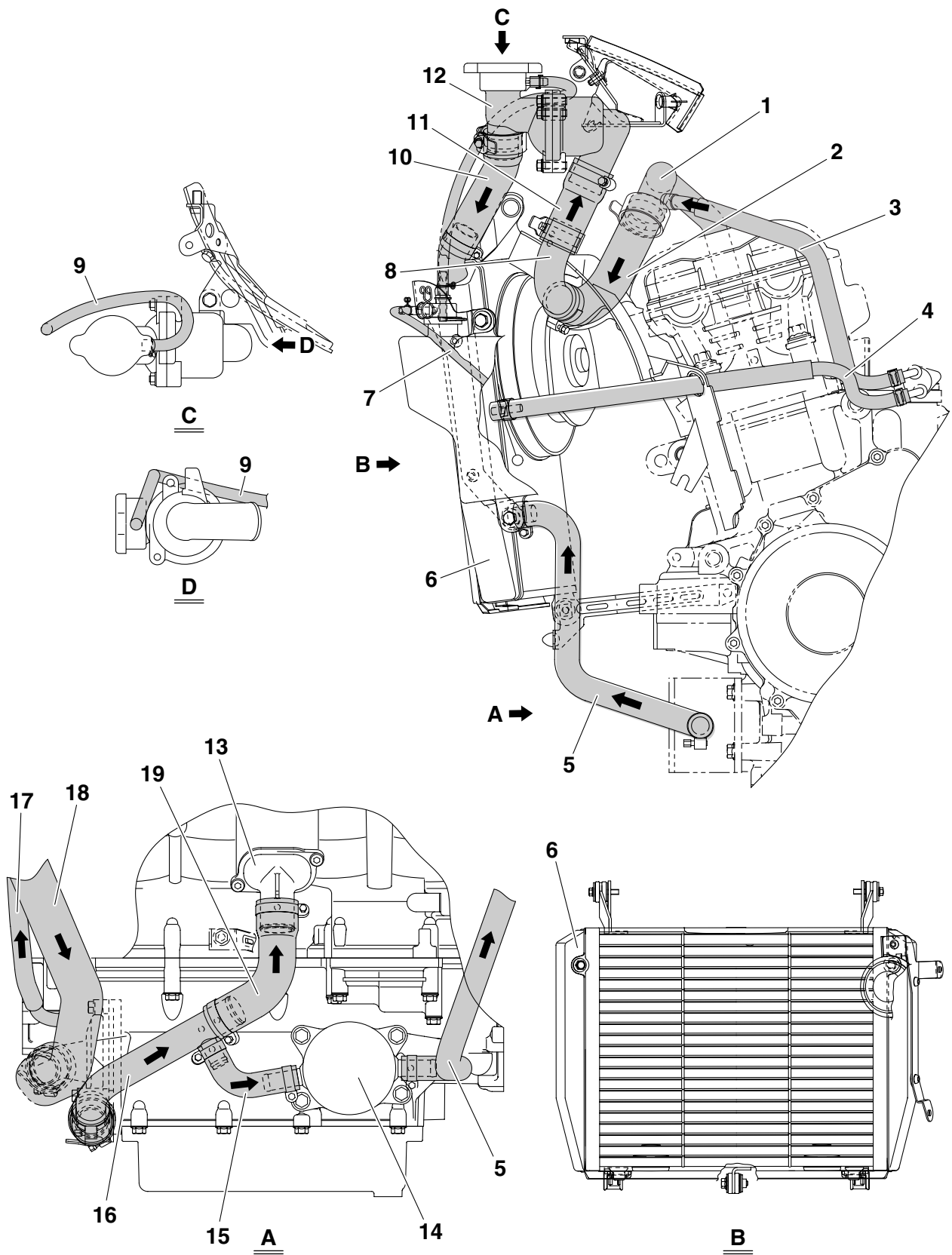
LUBRICATION SYSTEM CHART AND DIAGRAMS

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

COOLING SYSTEM DIAGRAMS

EAS20420

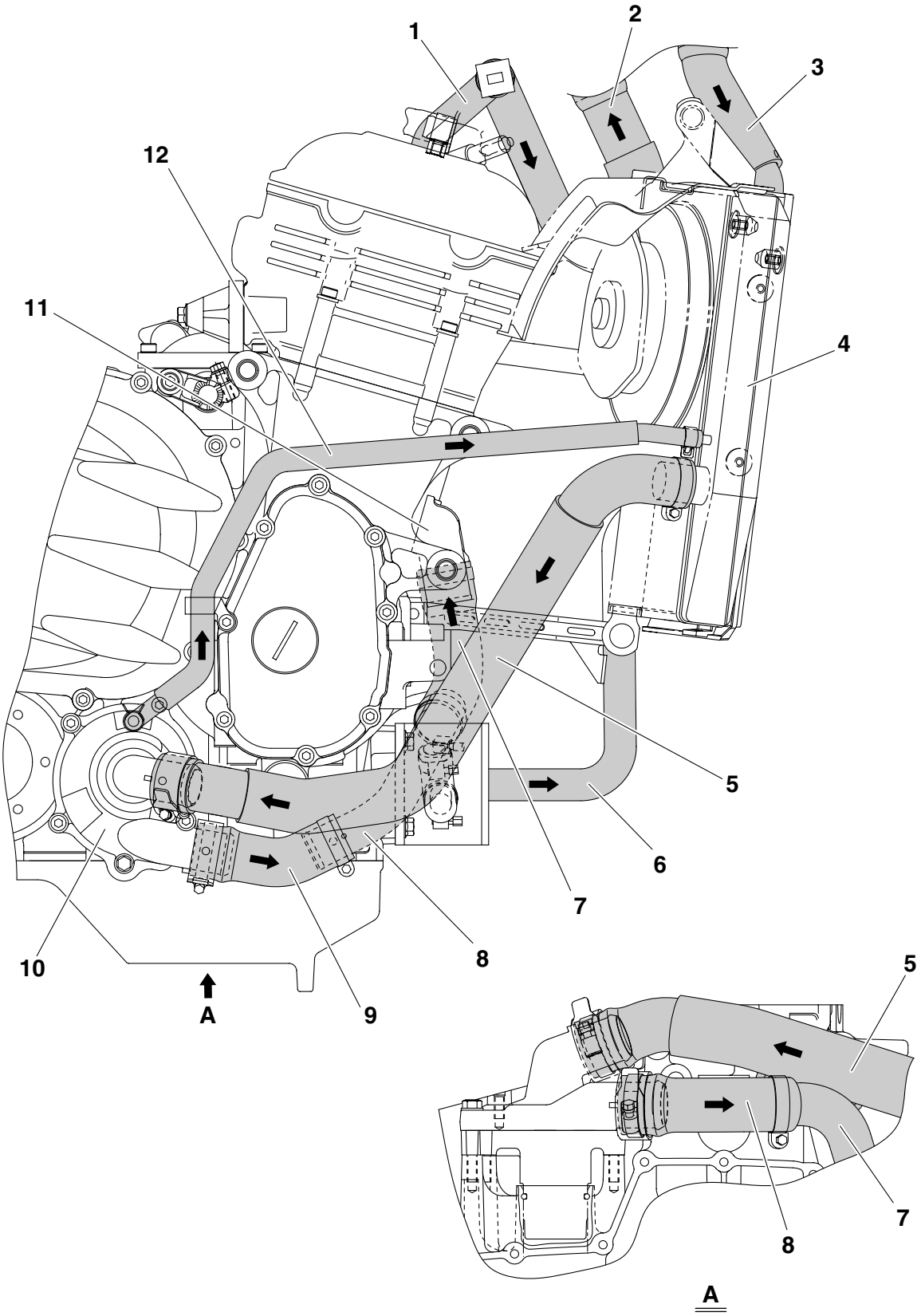
COOLING SYSTEM DIAGRAMS



COOLING SYSTEM DIAGRAMS

1. Thermostat inlet pipe 1
2. Thermostat inlet hose 1
3. Plunger control unit hose 1
4. Plunger control unit hose 2
5. Oil cooler outlet hose
6. Radiator
7. Coolant reservoir breather hose
8. Thermostat inlet pipe 2
9. Coolant reservoir hose
10. Radiator inlet hose
11. Thermostat inlet hose 2
12. Thermostat assembly
13. Water jacket joint
14. Oil cooler
15. Oil cooler inlet hose
16. Water pump outlet pipe
17. Water pump breather hose
18. Radiator outlet hose
19. Water jacket joint inlet hose

COOLING SYSTEM DIAGRAMS

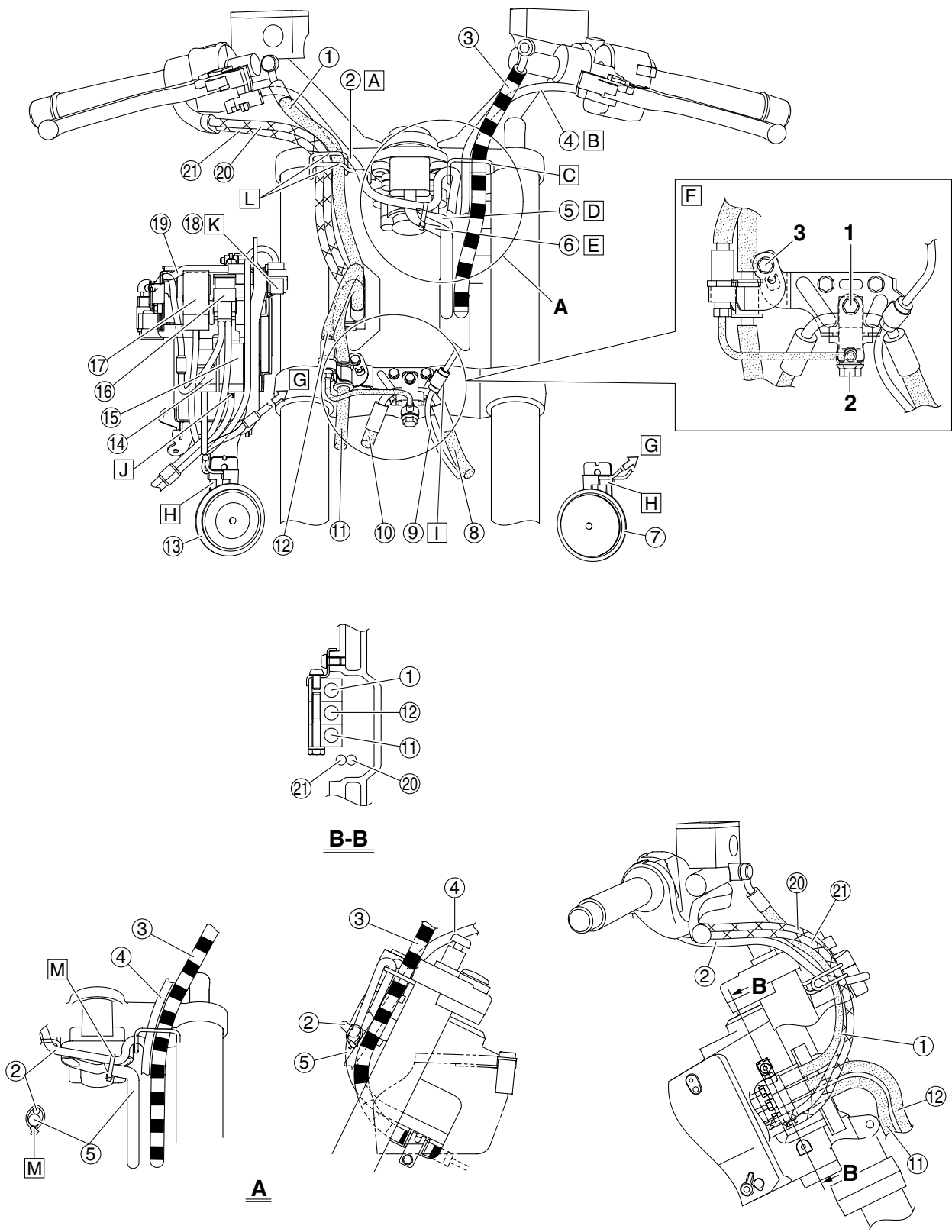


COOLING SYSTEM DIAGRAMS

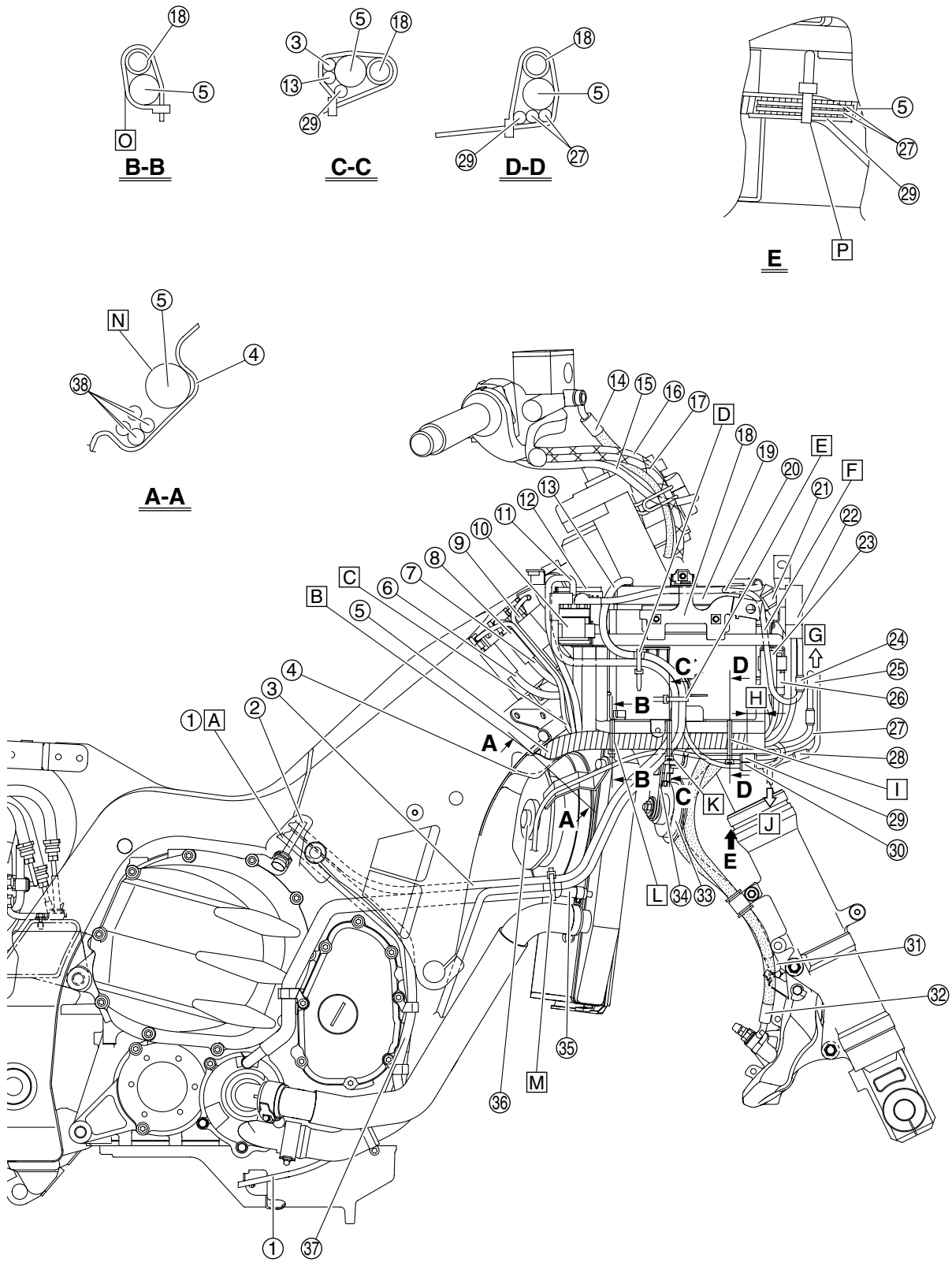
1. Thermostat inlet pipe 1
2. Thermostat inlet hose 2
3. Radiator inlet hose
4. Radiator
5. Radiator outlet hose
6. Oil cooler outlet hose
7. Water jacket joint inlet hose
8. Water pump outlet pipe
9. Water pump outlet hose
10. Water pump
11. Water jacket joint
12. Water pump breather hose

EAS20430

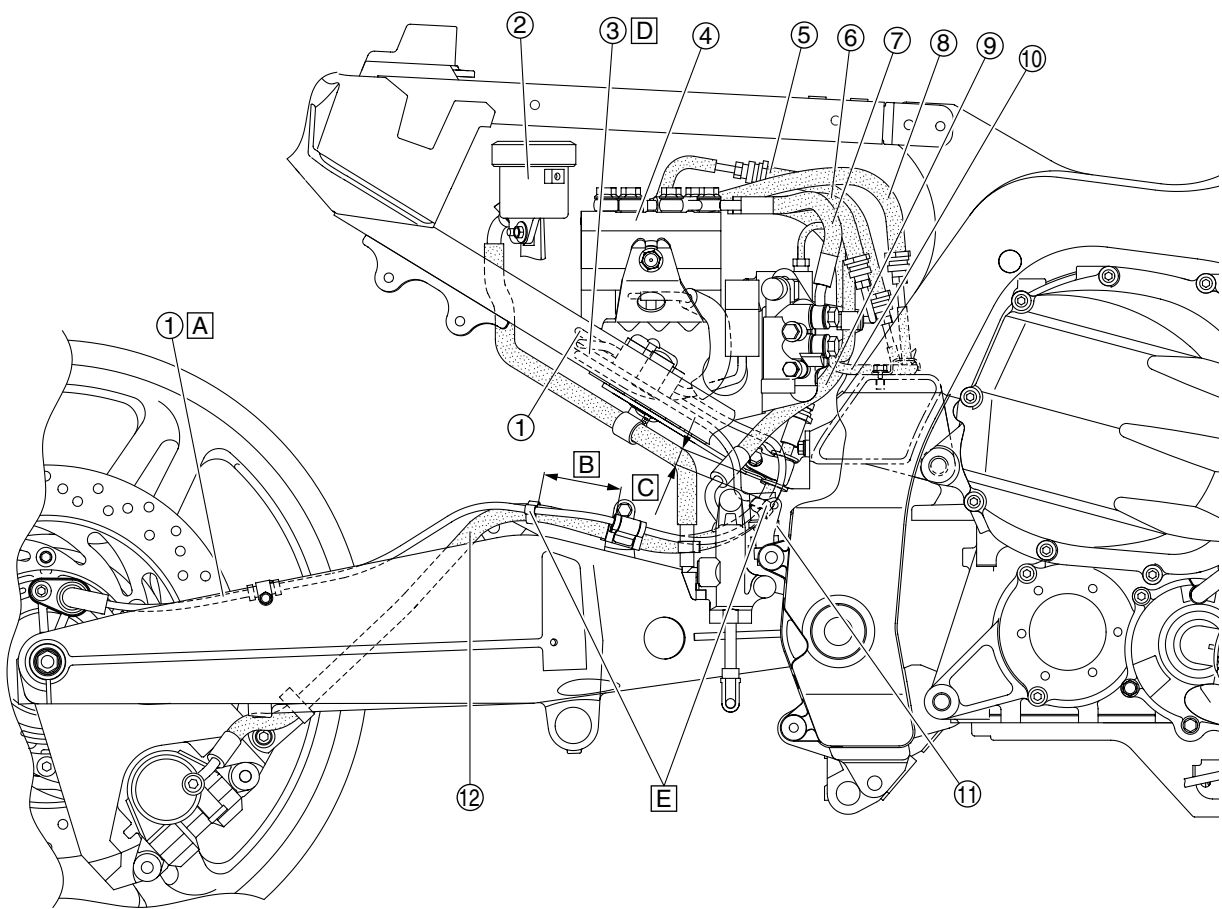
CABLE ROUTING



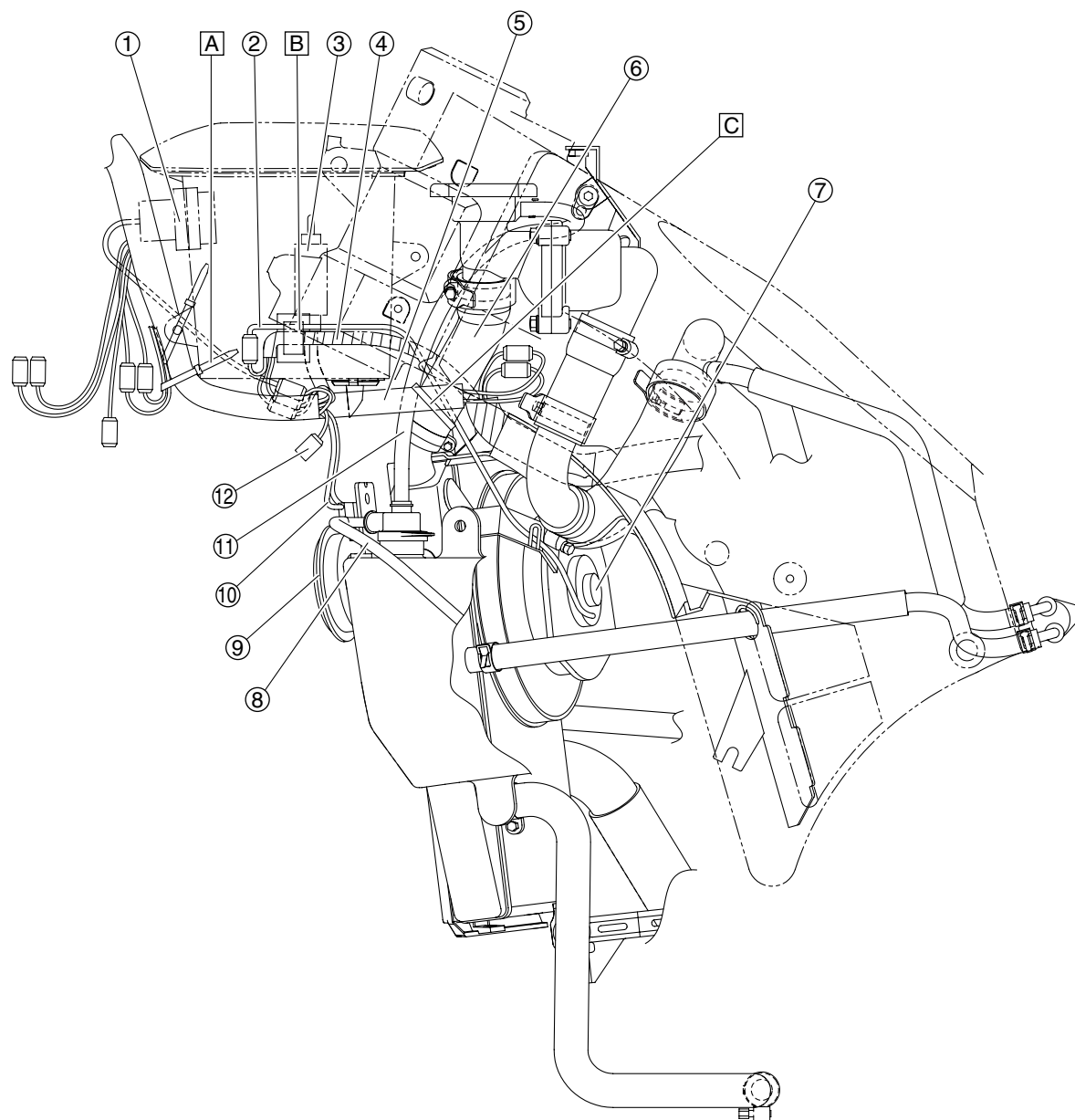
1. Brake hose (front brake master cylinder to hydraulic unit)
2. Right handlebar switch lead
3. Clutch hose
4. Left handlebar switch lead
5. Main switch lead
6. Immobilizer unit lead
7. Left horn (low)
8. Brake hose (hydraulic unit to left front brake caliper)
9. Front wheel sensor lead
10. Brake hose (hydraulic unit to right front brake caliper)
11. Brake hose (metering valve to right front brake caliper)
12. Brake hose (hydraulic unit to front brake calipers)
13. Right horn (high)
14. Headlight relay (on/off)
15. Radiator fan motor relay
16. Main fuse
17. Brake light relay
18. ABS test coupler
19. Positive battery lead
20. Throttle cable (accelerator cable)
21. Throttle cable (decelerator cable)
- A. Route the right handlebar switch lead under the handlebar.
- B. Route the left handlebar switch lead under the handlebar.
- C. Pass the clutch hose, right handlebar switch lead, and left handlebar switch lead through the guide.
- D. Route the main switch lead to the inside of the clutch hose.
- E. Route the immobilizer unit lead to the inside of the clutch hose.
- F. Temporarily tighten the brake hose joint bolt, union bolt, and brake hose holder bolt in the proper tightening sequence as shown. Then, tighten the bolts to the specified torques, making sure to tighten the brake hose joint bolt "1" last.
- G. To front cowl wire harness
- H. Install the horn L-shaped connectors so that the leads are routed outward.
- I. Fasten the grommet on the front wheel sensor lead with the holder.
- J. Connect the coupler that has blue tape wrapped around its leads to the radiator fan motor relay.
- K. Install the ABS test coupler completely onto the tab on the battery stay.
- L. Pass the brake hose (front brake master cylinder to hydraulic unit), right handlebar switch lead, and throttle cables through the guide as shown in the illustration.
- M. Fasten the main switch lead and right handlebar switch lead with a plastic locking tie at the location shown in the illustration. Position the buckle of the plastic locking tie under the leads, with the end facing inward, and then cut off the excess end of the tie.



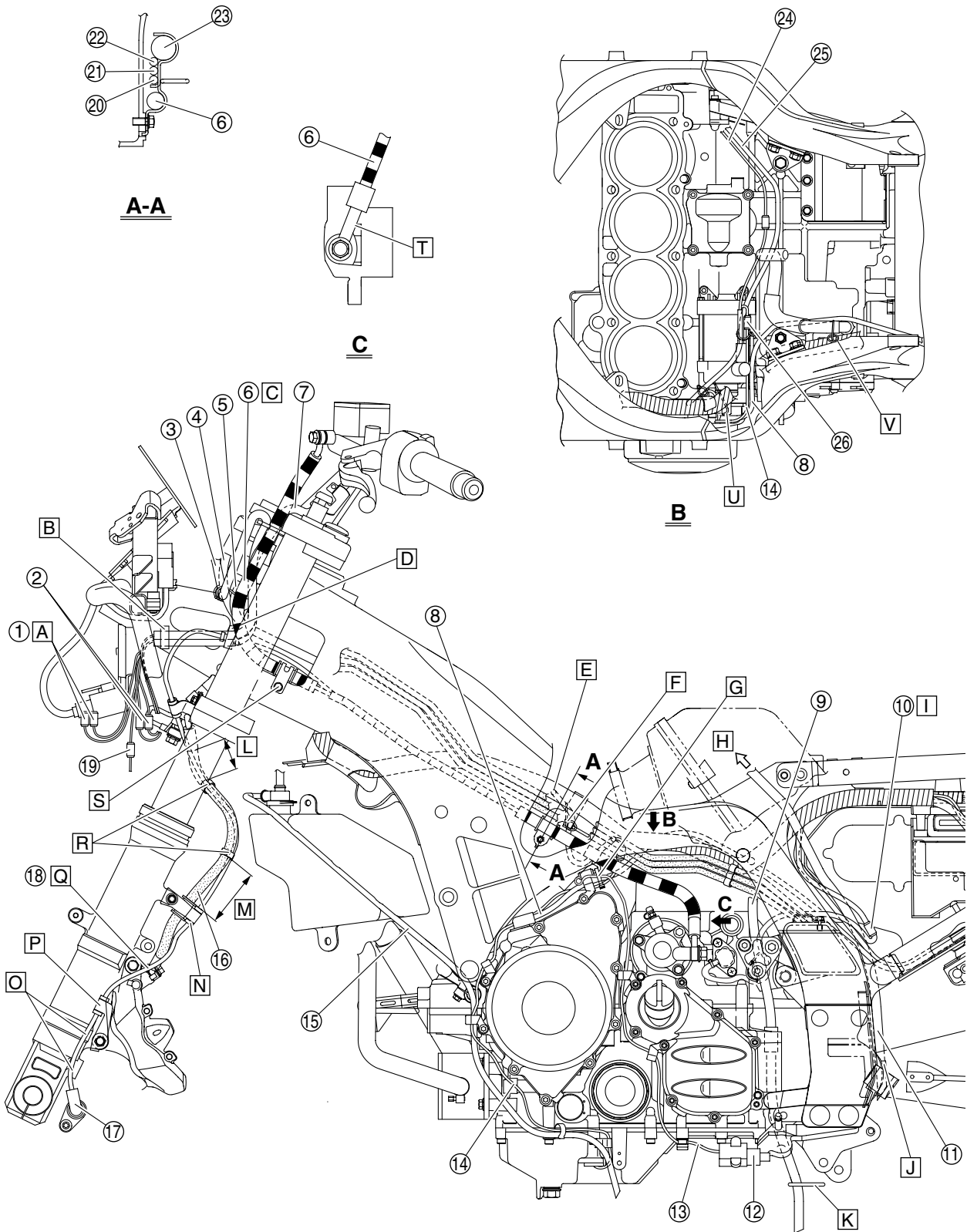
1. O₂ sensor lead
 2. Engine idling speed adjusting cable
 3. Starter motor lead
 4. Air deflector
 5. Wire harness
 6. Spark plug lead #4
 7. Spark plug lead #1
 8. Cylinders-#1/#4 ignition coil
 9. Cylinders-#2/#3 ignition coil
 10. Starter relay
 11. Starter relay lead
 12. Fuse box 2
 13. Negative battery lead
 14. Brake hose (front brake master cylinder to hydraulic unit)
 15. Right handlebar switch lead
 16. Throttle cable (accelerator cable)
 17. Throttle cable (decelerator cable)
 18. Battery stay
 19. Battery
 20. Positive battery lead
 21. Main fuse
 22. Brake light relay
 23. Headlight relay (on/off)
 24. Positive battery lead coupler
 25. Front cowl wire harness
 26. Radiator fan motor relay
 27. Right horn (high) leads
 28. Front right turn signal light lead
 29. Right radiator fan motor lead
 30. Ground lead coupler
 31. Brake hose (hydraulic unit to right front brake caliper)
 32. Brake hose (metering valve to right front brake caliper)
 33. Right horn (high)
 34. Right horn (high) connectors
 35. Water pump breather hose
 36. Right radiator fan
 37. Crankshaft position sensor lead
 38. Spark plug leads
- A. Route the O₂ sensor lead to the inside of the engine idling speed adjusting cable.
 - B. Make sure that the wire harness and spark plug leads are positioned in the indentation on the right side of the air deflector.
 - C. Route the spark plug leads to the inside of the battery stay pipe.
 - D. Fasten the negative battery lead at the blue tape and the starter motor lead to the battery box with a plastic locking tie. Face the end of the plastic locking tie downward. Do not cut off the excess end of the plastic locking tie.
 - E. Fasten the negative battery lead and starter motor lead to the battery box with a plastic locking tie. Face the end of the plastic locking tie rearward. Do not cut off the excess end of the plastic locking tie.
 - F. Route the positive battery lead between the battery stay and the battery box.
 - G. To front cowl wire harness
 - H. Align the rear end of the right radiator fan motor coupler with the tape on the wire harness as shown in the illustration.
 - I. Fasten the wire harness, right horn (high) leads, and right radiator fan motor lead with a plastic locking tie, making sure to install the tie on the fan motor lead's protective sleeve. Face the end of the plastic locking tie outward. Do not cut off the excess end of the plastic locking tie.
 - J. To front right turn signal light
 - K. Fasten the wire harness, right radiator fan motor lead, negative battery lead, and starter motor lead to the battery stay with a plastic locking tie, making sure to install the tie on the fan motor lead's protective sleeve and to position the tie in front of the air deflector. Face the end of the plastic locking tie outward, and then cut off the excess end of the tie.
 - L. Fasten the wire harness to the battery stay with a plastic locking tie. Face the end of the plastic locking tie downward, and then cut off the excess end of the tie.
 - M. Fasten the negative battery lead at the blue tape, starter motor lead, and water pump breather hose with a plastic locking tie, making sure to install the tie around the end of the hose's protective sleeve, and then cut off the excess end of the tie. Do not kink the water pump breather hose and do not face the end of the plastic locking tie downward.
 - N. Route the wire harness to the outside of the spark plug leads.
 - O. Make sure that the wire harness does not protrude to the outside of the battery stay.
 - P. Position the plastic locking tie to the rear of the bend in the battery stay.



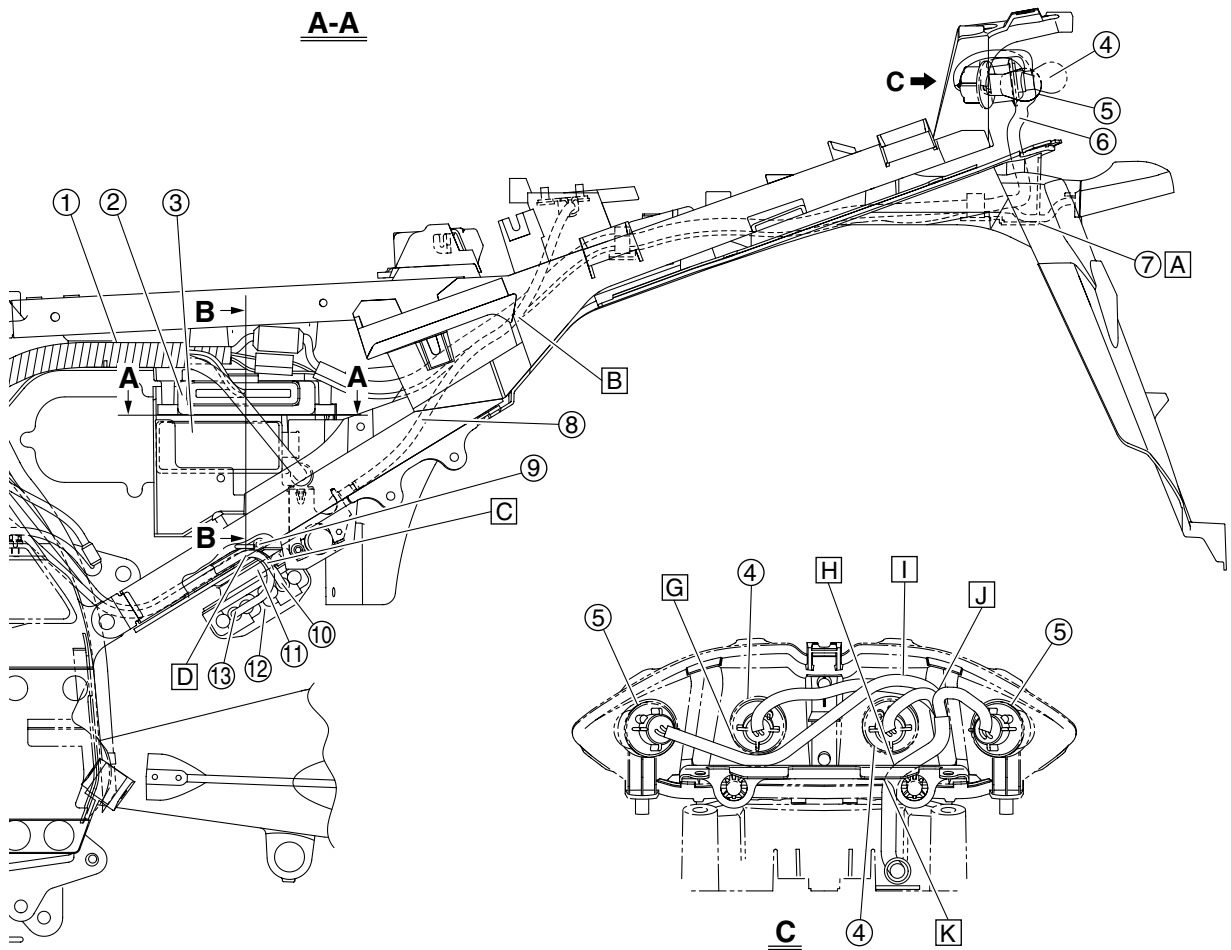
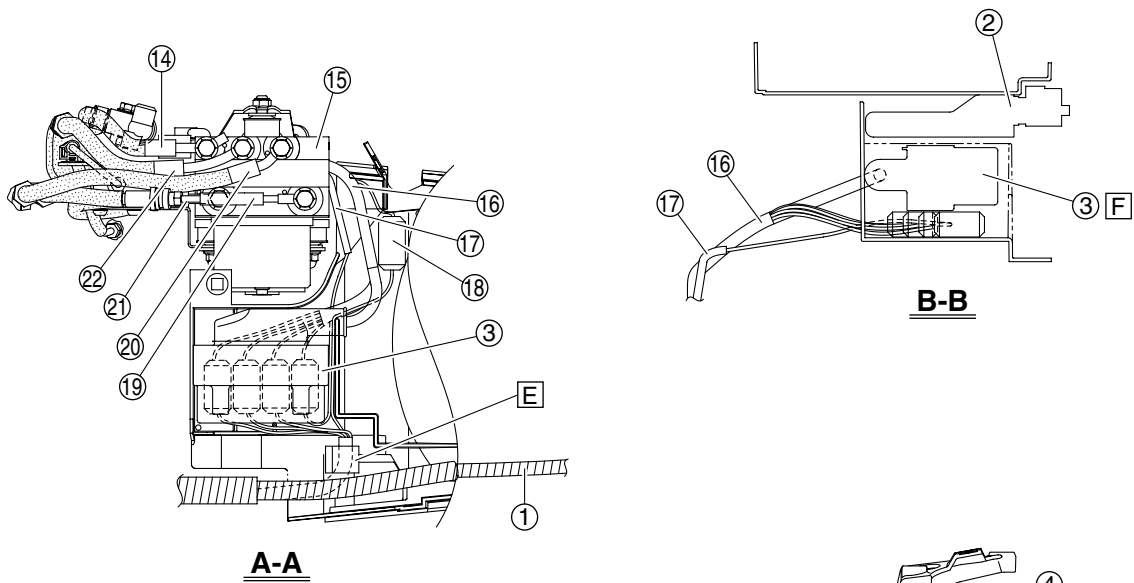
1. Rear wheel sensor lead
2. Rear brake fluid reservoir
3. Rear brake light switch lead
4. Hydraulic unit
5. Brake hose (front brake master cylinder to hydraulic unit)
6. Brake hose (hydraulic unit to proportioning valve)
7. Brake hose (hydraulic unit to metering valve)
8. Brake hose (hydraulic unit to front brake calipers)
9. Brake hose (rear brake master cylinder to hydraulic unit)
10. Brake pipe (metering valve to right front brake caliper)
11. Rear brake light switch
12. Brake hose (proportioning valve to rear brake caliper)
 - A. Route the rear wheel sensor lead to the inside of the swingarm, making sure that the lead does not protrude above the swingarm.
 - B. 45–55 mm (1.77–2.17 in)
 - C. 10–20 mm (0.39–0.79 in)
 - D. Route the rear brake light switch lead under the rear wheel sensor lead.
 - E. Fasten the rear wheel sensor lead to the brake hose (proportioning valve to rear brake caliper) with the two holders, making sure that the fastener of each holder faces inward.



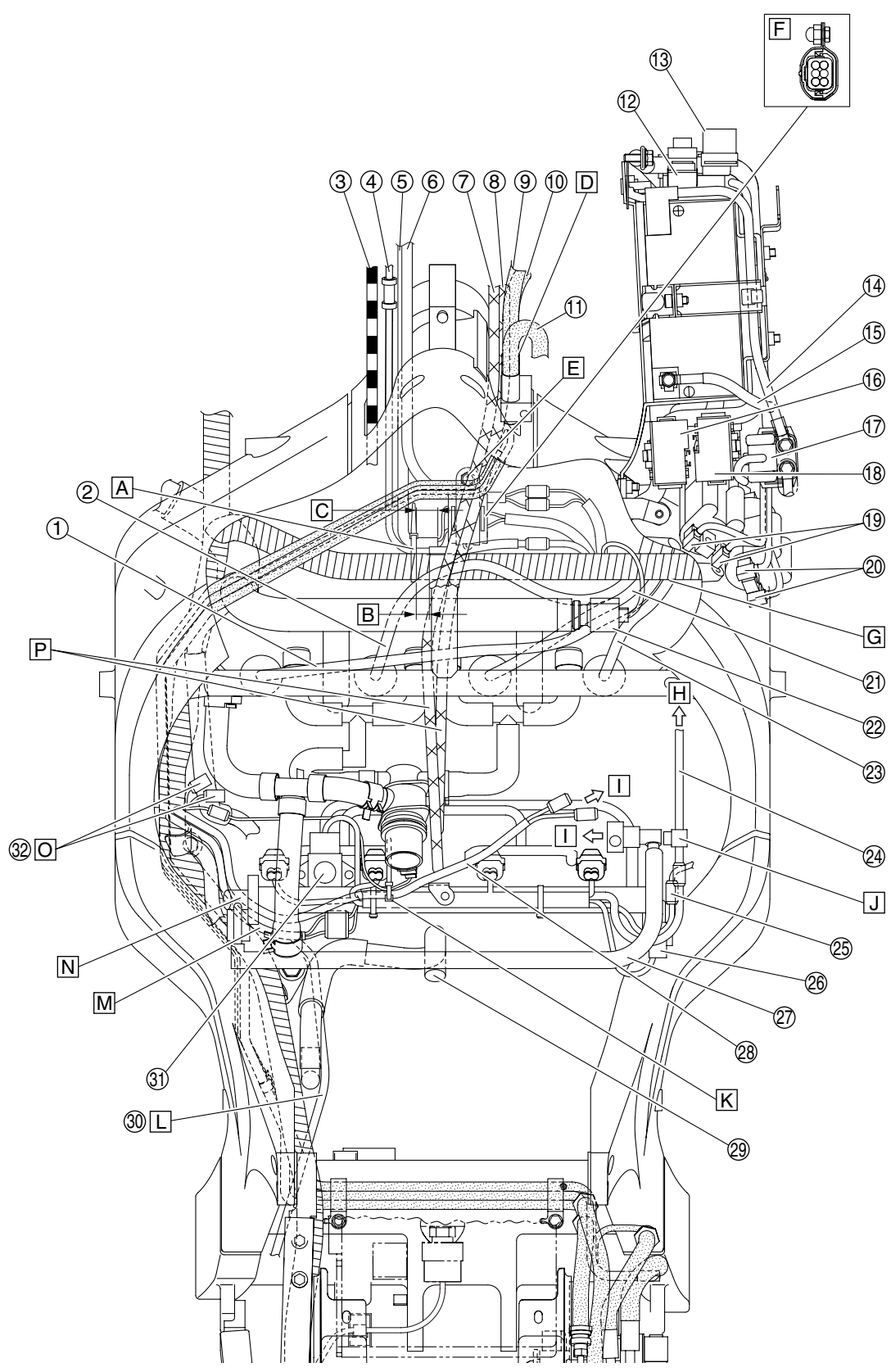
1. Auxiliary DC jack
2. Left radiator fan motor lead
3. Accessory box solenoid
4. Wire harness
5. Front cowling wire harness
6. Radiator inlet hose
7. Left radiator fan
8. Coolant reservoir breather hose
9. Left horn (low)
10. Left horn (low) leads
11. Thermostat assembly breather hose
12. Joint coupler
- A. Fasten the handlebar switch leads to the front cowling wire harness with a plastic locking tie. Face the end of the plastic locking tie rearward, along the side of the accessory box. Do not cut off the excess end of the plastic locking tie.
- B. Fasten the wire harness and left radiator fan motor lead with the holder.
- C. Fasten the front cowling wire harness to the radiator inlet hose with a plastic locking tie, making sure to install the tie on the harness' protective sleeve, and then cut off the excess end of the tie.



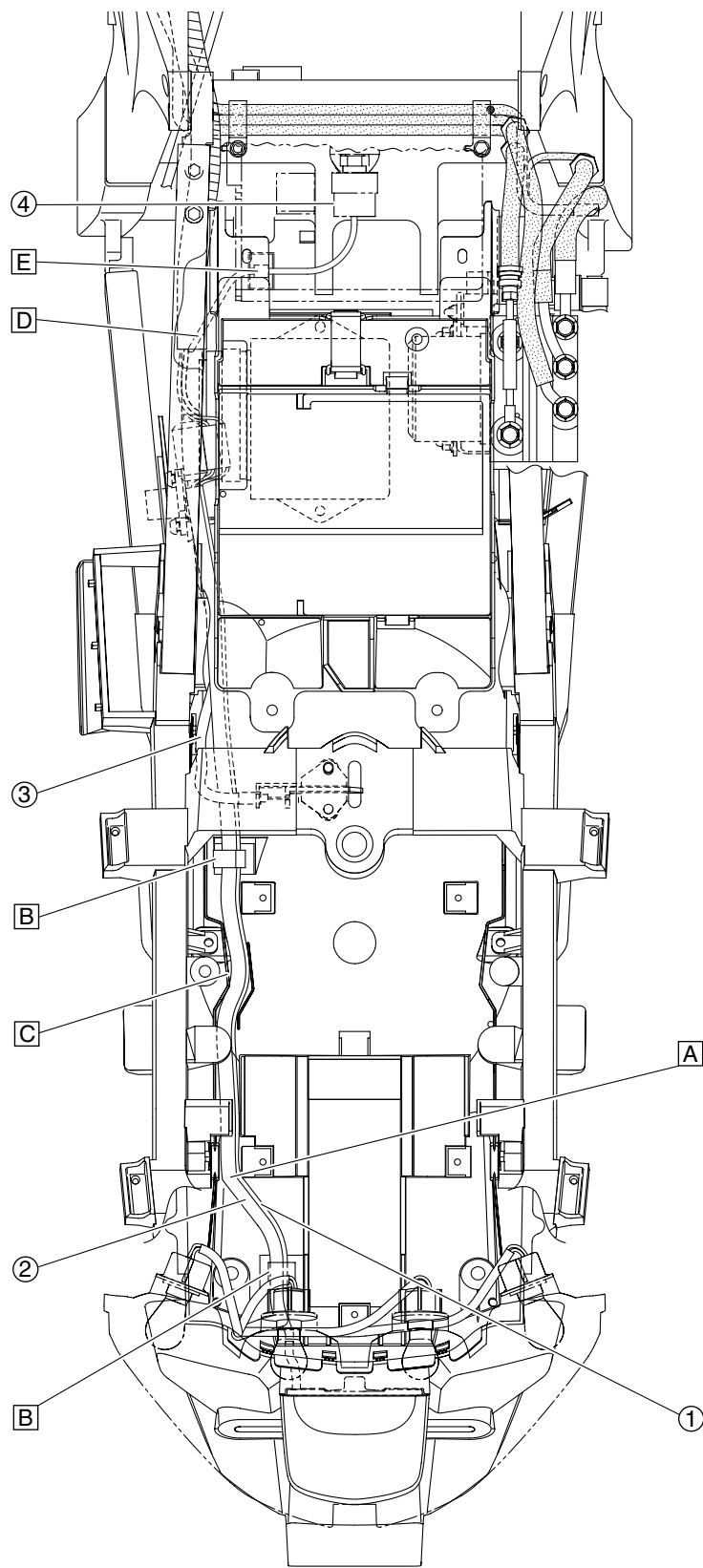
1. Grip warmer couplers (for optional grip warmers)
 2. Handlebar switch couplers
 3. Right handlebar switch lead
 4. Immobilizer unit lead
 5. Main switch lead
 6. Clutch hose
 7. Left handlebar switch lead
 8. Stator coil lead
 9. Air filter case breather hose
 10. Gear position switch lead
 11. Fuel tank breather/overflow hose
 12. Sidestand switch
 13. Sidestand switch lead
 14. Oil level switch lead
 15. Coolant reservoir breather hose
 16. Brake hose (hydraulic unit to left front brake caliper)
 17. Front wheel sensor
 18. Front wheel sensor lead
 19. Front left turn signal light lead
 20. Brake pipe (metering valve to right front brake caliper)
 21. Brake pipe (hydraulic unit to front brake calipers)
 22. Brake pipe (front brake master cylinder to hydraulic unit)
 23. Wire harness
 24. Crankshaft position sensor lead
 25. Starter motor lead
 26. Oil level switch coupler
- A. Do not connect the grip warmer couplers.
 - B. Secure the plastic band by inserting the projection on the band into the hole in the windshield drive unit/meter assembly stay, and then fasten the handlebar switch leads with the band, making sure that the end of the band faces down. Do not cut off the excess end of the plastic band.
 - C. Route the clutch hose in front of the front fork as shown in the illustration.
 - D. Secure the plastic band by inserting the projection on the band into the hole in the windshield drive unit/meter assembly stay, and then fasten the handlebar switch leads and front wheel sensor lead with the band, making sure that the end of the band faces down. Do not cut off the excess end of the plastic band.
 - E. To oil level switch
 - F. Fasten the leads (to oil level switch and crankshaft position sensor) that branch off from the wire harness to the guide on the holder with a plastic locking tie, making sure that the end of the tie faces upward. Do not cut off the excess end of the plastic locking tie.
 - G. Fasten the sidestand switch lead, stator coil lead, and oil level switch lead with a plastic locking tie, making sure to bundle and fasten the sidestand switch lead so that the coupler is positioned to the front of the tie. Face the end of the plastic locking tie outward. Do not cut off the excess end of the plastic locking tie.
 - H. To fuel tank
 - I. Route the gear position switch lead so that the coupler is positioned as shown in the illustration.
 - J. Pass the fuel tank breather/overflow hose through the guide on the universal joint dust cover.
 - K. Pass the air filter case breather hose through the guide on the muffler bracket.
 - L. 43–53 mm (1.69–2.09 in)
 - M. 60–70 mm (2.36–2.76 in)
 - N. Fasten the grommets on the front wheel sensor lead and the brake hose (hydraulic unit to left front brake caliper) with the holder.
 - O. Route the front wheel sensor lead to the outside of the left front brake caliper lower mounting boss and the boss for the left front fork compression damping force adjusting screw.
 - P. Fasten the grommet on the front wheel sensor lead with the holder.
 - Q. Route the front wheel sensor lead between the left front brake caliper and the brake hose (hydraulic unit to left front brake caliper).
 - R. Fasten the front wheel sensor lead to the brake hose (hydraulic unit to left front brake caliper) with the two holders, making sure to position the lead to the inside of the hose.
 - S. Fasten the clutch hose with the holder.
 - T. When installing the clutch hose onto the clutch release cylinder, make sure that the pipe section on the end of the hose contacts the stopper on the cylinder body.
 - U. To sidestand switch
 - V. Face the ends of the clamp to the left, making sure that the lower end contacts the wire harness.



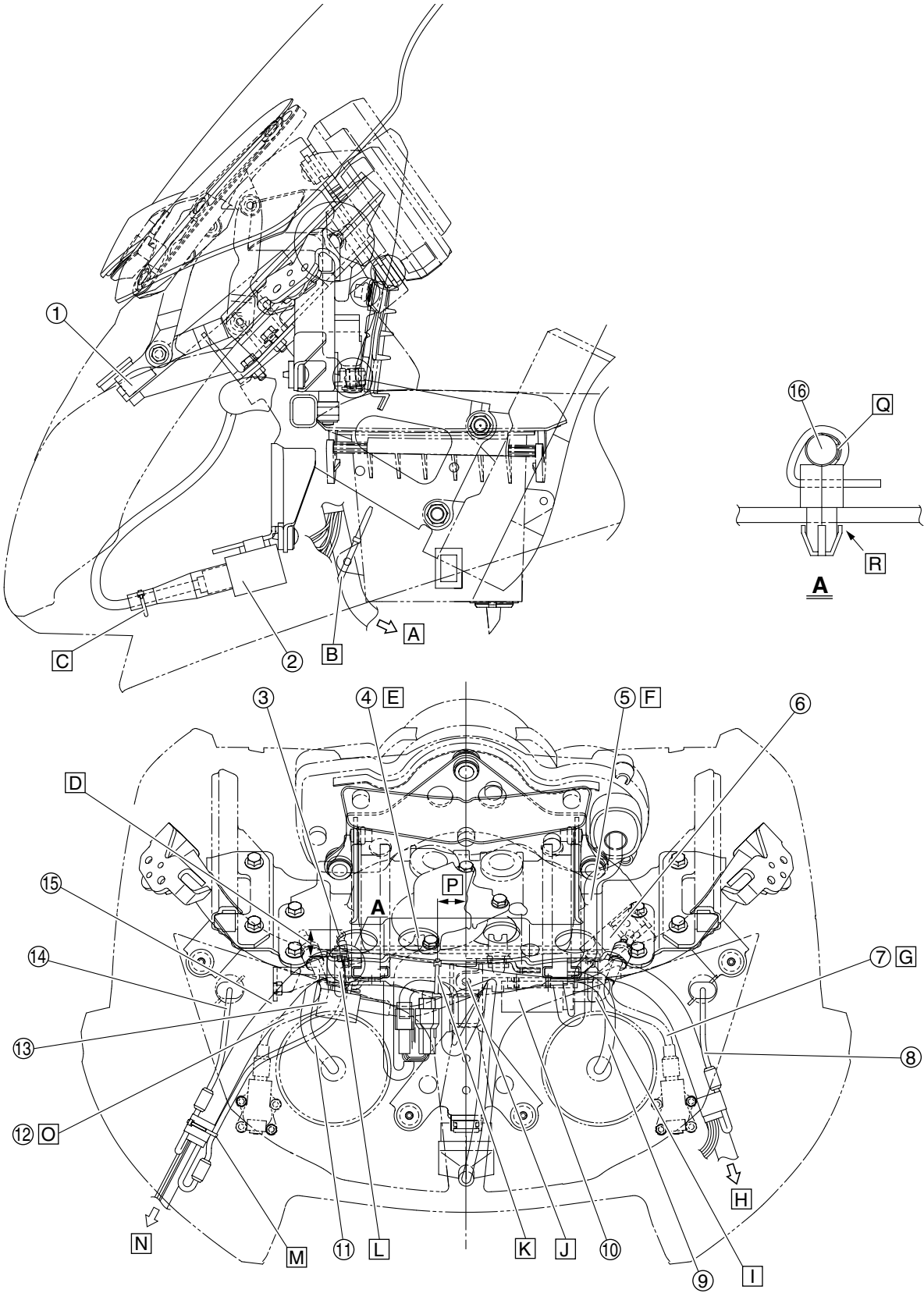
1. Wire harness
2. ECU (engine control unit)
3. ABS ECU (electronic control unit)
4. Tail/brake light
5. Rear turn signal light
6. Tail/brake light assembly lead
7. License plate light lead
8. Seat lock cable
9. Hydraulic unit breather hose
10. Stator coil lead
11. Rear shock absorber spring preload adjusting cable
12. Rectifier/regulator
13. Rectifier/regulator lead
14. Brake hose (hydraulic unit to metering valve)
15. Hydraulic unit
16. ABS wire harness
17. Rear wheel sensor lead
18. Rear brake light switch lead
19. Brake hose (front brake master cylinder to hydraulic unit)
20. Brake hose (hydraulic unit to front brake calipers)
21. Brake hose (rear brake master cylinder to hydraulic unit)
22. Brake hose (hydraulic unit to proportioning valve)
- A. Pass the license plate light lead through the hole in the rear fender.
- B. Route the wire harness to the inside of the seat lock cable.
- C. Route the stator coil lead and rectifier/regulator lead to the outside of the rear shock absorber spring preload adjusting cable and under the hydraulic unit breather hose.
- D. Pass the stator coil lead, rectifier/regulator lead, and hydraulic unit breather hose through the guide on the frame, making sure to route the hose to the outside of the leads.
- E. Fasten the leads (to ABS wire harness and rear brake light switch) that branch off from the wire harness with the holder.
- F. When installing the ABS ECU, be sure not to pinch the rear wheel sensor lead and ABS wire harness between the ABS ECU and the rear fender.
- G. Route the rear right turn signal light lead under the right tail/brake light bulb socket.
- H. Route the tail/brake light assembly lead between the left tail/brake light bulb socket and the mounting boss on the tail/brake light assembly.
- I. Route the rear right turn signal light lead and right tail/brake light lead over the left tail/brake light bulb socket.
- J. Route the leads between the left tail/brake light bulb socket and the rear left turn signal light bulb socket.
- K. Route the tail/brake light assembly lead between the tail/brake light assembly and its bracket.



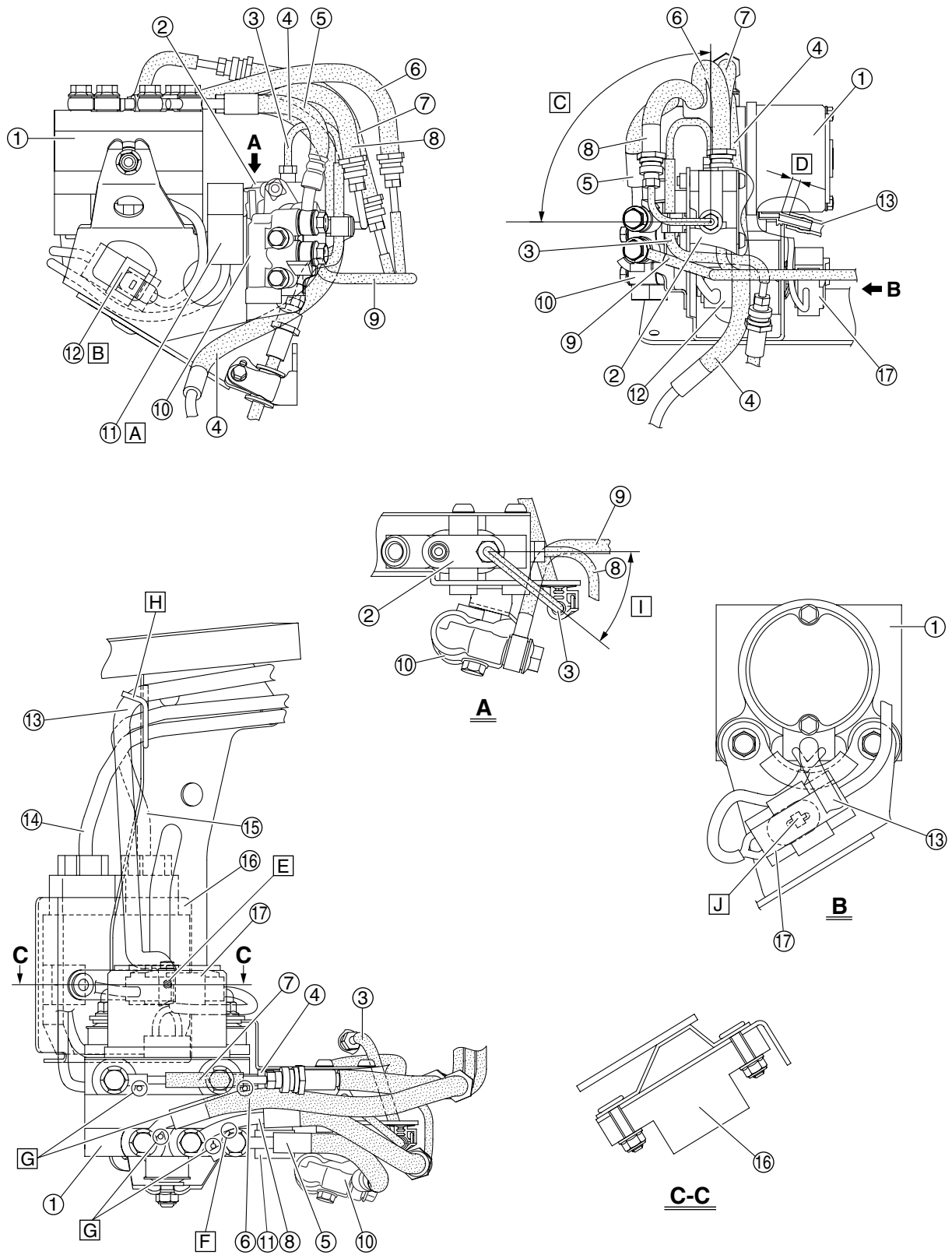
1. Spark plug lead #1
2. Spark plug lead #2
3. Clutch hose
4. Front wheel sensor lead
5. Immobilizer unit lead
6. Main switch lead
7. Throttle cable (accelerator cable)
8. Throttle cable (decelerator cable)
9. Brake hose (hydraulic unit to front brake calipers)
10. Brake hose (metering valve to right front brake caliper)
11. Brake hose (front brake master cylinder to hydraulic unit)
12. Main fuse
13. Brake light relay
14. Positive battery lead
15. Negative battery lead
16. Fuse box 1 (identified by blue tape on lead)
17. Starter relay
18. Fuse box 2
19. Cylinders-#2/#3 ignition coil connectors (white)
20. Cylinders-#1/#4 ignition coil connectors (black)
21. Spark plug lead #3
22. Coolant temperature sensor
23. Spark plug lead #4
24. Cylinder identification sensor lead
25. O₂ sensor coupler
26. Throttle position sensor
27. Fuel hose
28. Fuel pump/fuel sender lead
29. Crankcase breather hose
30. Stator coil lead
31. Intake air pressure sensor
32. Joint couplers
 - A. Fasten the immobilizer unit lead and front wheel sensor lead to the wire harness with a plastic locking tie, making sure to align the tie with the white tape on the harness. Face the end of the plastic locking tie forward. Do not cut off the excess end of the plastic locking tie.
 - B. Position the plastic locking tie 0–20 mm (0–0.79 in) from the end of the protective sleeve of the front wheel sensor lead.
 - C. Position the plastic locking tie 10–30 mm (0.39–1.18 in) from the end of the protective sleeve of the immobilizer unit lead.
 - D. Route the throttle cables and brake hoses through the right opening in the frame.
 - E. Install the immobilizer unit coupler holder so that the end with the bolt is facing forward.
 - F. Install the immobilizer unit coupler cover onto the coupler.
 - G. Route the wire harness over the spark plug leads.
 - H. To cylinder identification sensor
 - I. To fuel tank
 - J. Fasten the cylinder identification sensor lead with the holder on the throttle body.
 - K. Fasten the fuel pump/fuel sender lead and air induction system solenoid lead with a plastic locking tie, making sure that the end of the tie faces forward. Do not cut off the excess end of the plastic locking tie.
 - L. Route the stator coil lead to the inside of the engine bracket (top) and under the crankcase breather hose.
 - M. Route the wire harness (to sub-wire harness) under the fuel hose connector.
 - N. Route the fuel pump/fuel sender lead under the fuel hose connector.
 - O. Place the joint couplers in the area shown in the illustration, making sure that they do not protrude above the wire harness.
 - P. Route the throttle cables over the immobilizer unit lead, main switch lead, spark plug lead #2, and wire harness, and under spark plug lead #1.



1. License plate light lead
2. Tail/brake light assembly lead
3. Seat lock cable
4. Intake air temperature sensor
- A. Route the tail/brake light assembly lead and license plate light lead between the rib and the U-lock holder on the rear fender, making sure that the leads are not routed on top of the holder.
- B. Fasten the tail/brake light assembly lead and license plate light lead with the holder.
- C. Route the tail/brake light assembly lead and license plate light lead between the ribs on the rear fender.
- D. Route the intake air temperature sensor lead under the wire harness.
- E. Fasten the intake air temperature sensor lead to the air filter case with the holder.



1. Windshield drive unit
 2. Relay unit
 3. Thermistor
 4. Windshield drive unit lead
 5. Meter assembly lead
 6. Headlight relay (dimmer)
 7. Left headlight beam adjusting cable
 8. Left auxiliary light lead
 9. Left headlight lead
 10. Lean angle sensor
 11. Right headlight lead
 12. Right headlight beam adjusting cable
 13. Turn signal/hazard relay
 14. Right auxiliary light lead
 15. Front cowling wire harness
 16. Thermistor lead
- A. To wire harness
 - B. Fasten the front cowling wire harness to the stay on the accessory box with a plastic locking tie as shown in the illustration, making sure to position the tie below where the headlight leads branch off from the harness. Face the end of the plastic locking tie rearward, along the side of the accessory box. Do not cut off the excess end of the plastic locking tie.
 - C. Slide the boot over the relay unit coupler, and then fasten the boot with a plastic locking tie. Cut off the excess end of the plastic locking tie.
 - D. Less than 20 mm (0.79 in)
 - E. Pass the windshield drive unit lead through the hole in the windshield drive unit/meter assembly stay.
 - F. Route the meter assembly lead under the windshield drive unit.
 - G. Route the left headlight beam adjusting cable under the left headlight lead.
 - H. To wire harness
 - I. Secure the plastic band by inserting the projection on the band into the hole in the front of the windshield drive unit/meter assembly stay, and then fasten the front cowling wire harness with the band after the headlight lead branches off from the harness.
 - J. Secure the front cowling wire harness at the location shown in the illustration by inserting the projection on its holder into the hole in the windshield drive unit/meter assembly stay.
 - K. Fasten the leads (to windshield drive unit) that branch off from the front cowling wire harness to the harness with a plastic locking tie, making sure to position the tie 20 mm (0.79 in) from the drive unit couplers.
 - L. Secure the plastic band by inserting the projection on the band into the hole in the front of the windshield drive unit/meter assembly stay, and then fasten the front cowling wire harness with the band after the headlight lead branches off from the harness.
 - M. Fasten the thermistor lead to the front cowling wire harness with a plastic locking tie, making sure to align the tie with the tape used to fasten the front right turn signal light lead. The thermistor lead should not be taut.
 - N. To front right turn signal light, right horn (high), and wire harness
 - O. Route the right headlight beam adjusting cable between the right headlight lead and the thermistor lead.
 - P. Position the plastic locking tie 20–30 mm (0.79–1.18 in) to the right of the center of the front cowling as shown in the illustration.
 - Q. Fasten the thermistor lead with a plastic locking tie, and then cut off the excess end of the tie. Be sure to fold the protective sleeve against the lead to remove any space between the sleeve and the lead when fastening it.
 - R. Secure the plastic locking tie by inserting the projection on the tie into the hole in the rear of the windshield drive unit/meter assembly stay.



1. Hydraulic unit
2. Proportioning valve
3. Brake hose (proportioning valve to rear brake caliper)
4. Brake hose (rear brake master cylinder to hydraulic unit)
5. Brake hose (hydraulic unit to metering valve)
6. Brake hose (hydraulic unit to front brake calipers)
7. Brake hose (front brake master cylinder to hydraulic unit)
8. Brake hose (hydraulic unit to proportioning valve)
9. Brake hose (metering valve to right front brake caliper)
10. Metering valve
11. ABS motor relay
12. Hydraulic unit solenoid coupler
13. Hydraulic unit breather hose
14. Stator coil lead
15. Rectifier/regulator lead
16. Rectifier/regulator
17. ABS motor coupler
- A. Install the ABS motor relay completely onto the tab on the hydraulic unit bracket.
- B. Install the hydraulic unit solenoid coupler completely onto the tab on the hydraulic unit bracket.
- C. 87–93°
- D. 5–7 mm (0.20–0.28 in)
- E. Install the hydraulic unit breather hose so that the white paint mark on the hose is facing down.
- F. Make sure that the brake hose (hydraulic unit to proportioning valve) contacts the end of the brake hose (hydraulic unit to metering valve).
- G. Make sure that the brake hoses contact the stoppers on the hydraulic unit.
- H. Pass the hydraulic unit breather hose, stator coil lead, and rectifier/regulator lead through the guide.
- I. 36–42°
- J. Install the ABS motor coupler completely onto the tab on the hydraulic unit bracket.

PERIODIC CHECKS AND ADJUSTMENTS

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PERIODIC MAINTENANCE

EAS20450

PERIODIC MAINTENANCE

EAS20460

INTRODUCTION

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

EAU17705

PERIODIC MAINTENANCE AND LUBRICATION CHART

NOTE:

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

| NO. | ITEM | CHECK OR MAINTENANCE JOB | ODOMETER READING (× 1000 km) | | | | | ANNUAL CHECK |
|-----|-------------------------|--|------------------------------|----|----|----|----|--------------|
| | | | 1 | 10 | 20 | 30 | 40 | |
| 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 | | | | | |
| 4 | Air filter element | • Clean. | | √ | | √ | | |
| | | • Replace. | | | √ | | √ | |
| 5 | * Clutch | • Check operation, fluid level and vehicle for fluid leakage. | √ | √ | √ | √ | √ | |
| 6 | * Front brake | • Check operation, fluid level and vehicle for fluid leakage. | √ | √ | √ | √ | √ | √ |
| | | • Replace brake pads. | Whenever worn to the limit | | | | | |
| 7 | * Rear brake | • Check operation, fluid level and vehicle for fluid leakage. | √ | √ | √ | √ | √ | √ |
| | | • Replace brake pads. | Whenever worn to the limit | | | | | |
| 8 | * Brake hoses | • Check for cracks or damage. | | √ | √ | √ | √ | √ |
| | | • Replace. | Every 4 years | | | | | |
| 9 | * Wheels | • Check runout and for damage. | | √ | √ | √ | √ | |
| 10 | * Tires | • Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary. | | √ | √ | √ | √ | √ |
| 11 | * Wheel bearings | • Check bearing for looseness or damage. | | √ | √ | √ | √ | |
| 12 | * Swingarm | • Check operation and for excessive play. | | √ | √ | √ | √ | |
| | | • Lubricate with lithium-soap-based grease. | Every 50000 km | | | | | |
| 13 | * Steering bearings | • Check bearing play and steering for roughness. | √ | √ | √ | √ | √ | |
| | | • Lubricate with lithium-soap-based grease. | Every 20000 km | | | | | |
| 14 | * Chassis fasteners | • Make sure that all nuts, bolts and screws are properly tightened. | | √ | √ | √ | √ | √ |
| 15 | Sidestand, center-stand | • Check operation. • Lubricate. | | √ | √ | √ | √ | √ |
| 16 | * Sidestand switch | • Check operation. | √ | √ | √ | √ | √ | √ |
| 17 | * Front fork | • Check operation and for oil leakage. | | √ | √ | √ | √ | |

PERIODIC MAINTENANCE

| NO. | ITEM | CHECK OR MAINTENANCE JOB | ODOMETER READING (× 1000 km) | | | | | ANNUAL CHECK |
|-----|--|---|------------------------------|----|----|----|----|--------------|
| | | | 1 | 10 | 20 | 30 | 40 | |
| 18 | * Shock absorber assembly | • Check operation and shock absorber for oil leakage. | | √ | √ | √ | √ | |
| 19 | * Rear suspension relay arm and connecting arm pivoting points | • Check operation. | | √ | √ | √ | √ | |
| | | • Lubricate with lithium-soap-based grease. | | | √ | | √ | |
| 20 | * Fuel injection | • Adjust engine idling speed and synchronization. | √ | √ | √ | √ | √ | √ |
| 21 | Engine oil | • Change. • Check oil level and vehicle for oil leakage. | √ | √ | √ | √ | √ | √ |
| 22 | Engine oil filter cartridge | • Replace. | √ | | √ | | √ | |
| 23 | * Cooling system | • Check coolant level and vehicle for coolant leakage. | | √ | √ | √ | √ | √ |
| | | • Change. | Every 3 years | | | | | |
| 24 | Final gear oil | • Check oil level and vehicle for oil leakage. • Change. | √ | √ | √ | √ | √ | |
| 25 | * Front and rear brake switches | • Check operation. | √ | √ | √ | √ | √ | √ |
| 26 | Moving parts and cables | • Lubricate. | | √ | √ | √ | √ | √ |
| 27 | * Throttle grip housing and cable | • Check operation and free play. • Adjust the throttle cable free play if necessary. • Lubricate the throttle grip housing and cable. | | √ | √ | √ | √ | √ |
| 28 | * Muffler and exhaust pipe | • Check the screw clamp for looseness. | √ | √ | √ | √ | √ | |
| 29 | * Lights, signals and switches | • Check operation. • Adjust headlight beam. | √ | √ | √ | √ | √ | √ |

EAU17670

NOTE:

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

EAS20470

ENGINE

EAS20490

ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

NOTE:

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

1. Remove:

- Rider seat
- Right side cowling
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
Refer to "FUEL TANK" on page 7-1.
- T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
- Air cut-off valve
Refer to "AIR INDUCTION SYSTEM" on page 7-9.
- Thermostat inlet pipe 1
Refer to "THERMOSTAT" on page 6-6.

2. Disconnect:

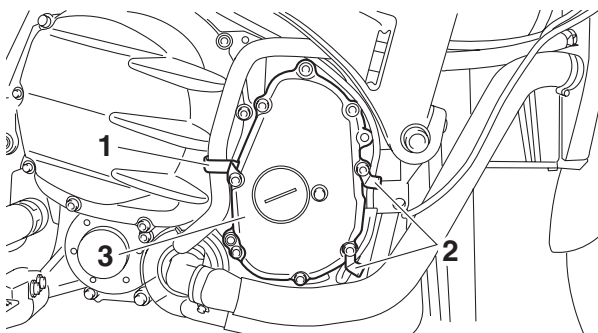
- Throttle cables

3. Remove:

- Spark plugs
- Cylinder head cover
- Cylinder head cover gasket
Refer to "CAMSHAFTS" on page 5-9.

4. Remove:

- Hose holder "1"
- Lead holders "2"
- Pickup rotor cover "3"



5. Measure:

- Valve clearance
Out of specification → Adjust.



Valve clearance (cold)

Intake

0.15–0.22 mm (0.0059–0.0087 in)

Exhaust

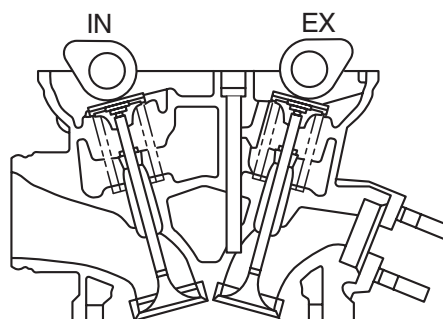
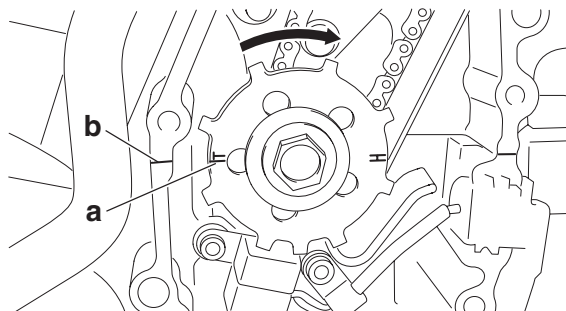
0.18–0.25 mm (0.0071–0.0098 in)

a. Turn the crankshaft clockwise.

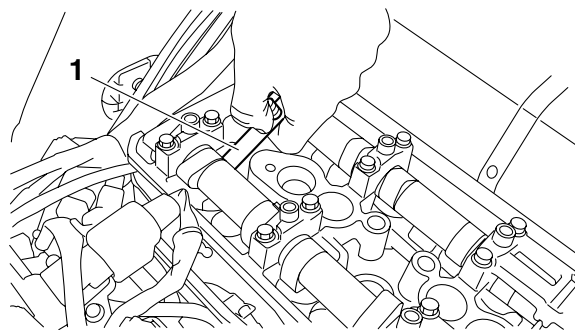
b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the pickup rotor with the crankcase mating surface "b".

NOTE:

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



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

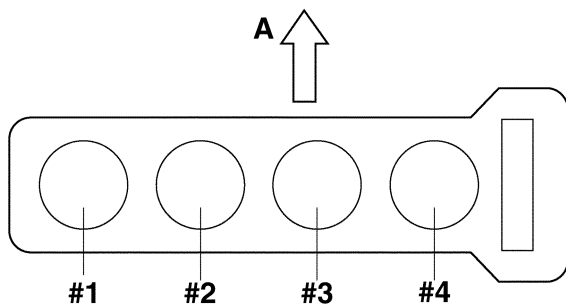


NOTE:

- If the valve clearance is incorrect, record the measured reading.

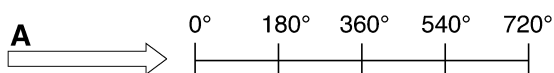
- Measure the valve clearance in the following sequence.

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



A. Front

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



| | | | | | |
|----------|----|----------|----------|----------|----------|
| B | #1 | C | | | |
| | #2 | | C | | |
| | #3 | | | | C |
| | #4 | | | C | |

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

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

- 6. Remove:
 - Camshafts

NOTE:

- Refer to “CAMSHAFTS” on page 5-9.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

7. Adjust:
- Valve clearance

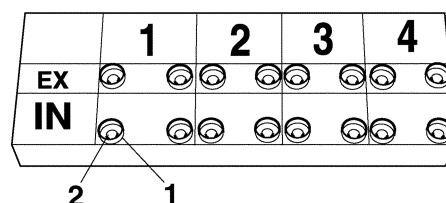
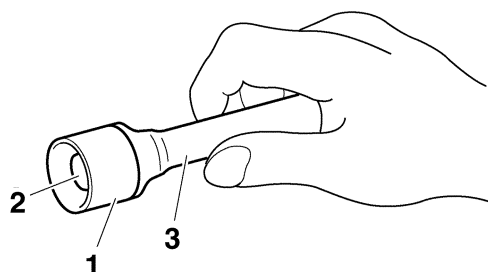
- a. Remove the valve lifter “1” and the valve pad “2” with a valve lapper “3”.



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

NOTE:

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



- b. Calculate the difference between the specified valve clearance and the measured valve clearance.

Example:

Specified valve clearance = 0.15–0.22 mm
(0.0059–0.0087 in)

Measured valve clearance = 0.25 mm
(0.0098 in)

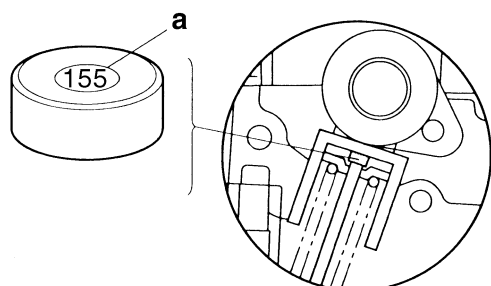
$$0.25 \text{ mm (0.0098 in)} - 0.22 \text{ mm (0.0087 in)} = 0.03 \text{ mm (0.001 in)}$$

- c. Check the thickness of the current valve pad.

NOTE:

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

If the valve pad is marked “155”, the pad thickness is 1.55 mm (0.061 in).



- 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 |

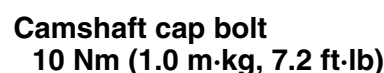
Refer to the following table for the available valve pads.

| | |
|----------------------|---|
| Valve pad range | Nos. 120–240 |
| Valve pad thickness | 1.20–2.40 mm (0.0472–0.0945 in) |
| Available valve pads | 25 thicknesses in 0.05 mm (0.002 in) increments |

NOTE:

- Lubricate the valve lifter with engine oil.
- The valve lifter must turn smoothly when rotated by hand.

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



- Refer to “CAMSHAFTS” on page 5-9.
- Lubricate the camshaft bearings, camshaft lobes and camshaft journals.
- 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.

[illegible]

8. Install:
- All removed parts

For installation, reverse the removal procedure.

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

FAS20570

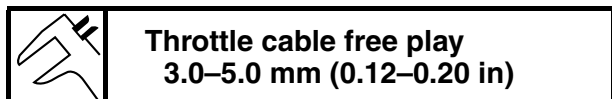
NOTE:

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

- NOTE:**

Place the vehicle on the centerstand.

9. Measure:
 - Engine idling speed
Out of specification → Adjust.
Make sure that the vacuum pressure is within specification.
10. Stop the engine and remove the measuring equipment.
11. Adjust:
 - Throttle cable free play
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-8.



12. Install:
 - Caps
13. Install:
 - T-bar
 - Rider seat
 Refer to “GENERAL CHASSIS” on page 4-1.

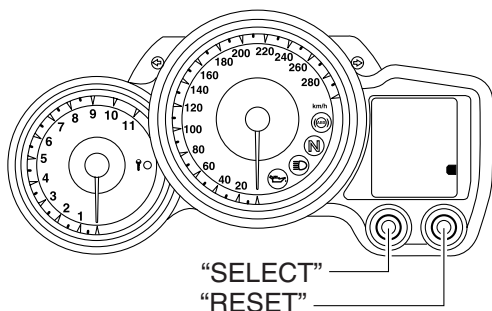
EAS20600

ADJUSTING THE EXHAUST GAS VOLUME

NOTE:

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

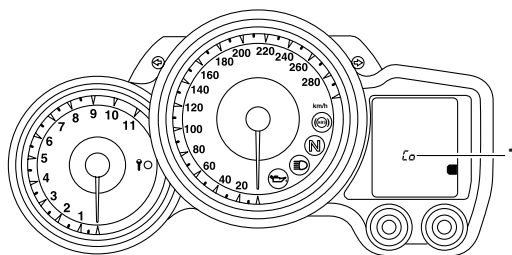
1. Turn the main switch to “OFF”.
2. Simultaneously press and hold the “SELECT” and “RESET” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.



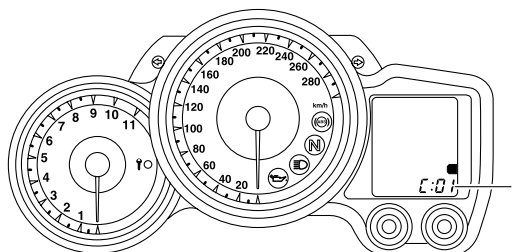
NOTE:

- All displays on the meter disappear except the odometer/tripmeter/fuel reserve tripmeter displays.
- “dIAG” appears on the odometer/tripmeter/fuel reserve tripmeter LCD.

3. Press the “SELECT” button to select the CO adjustment mode “Co” “1” or the diagnostic mode “dIAG”.



4. After selecting “CO”, simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to activate the selection.
5. Press the “SELECT” and “RESET” buttons to select a cylinder number “1”.

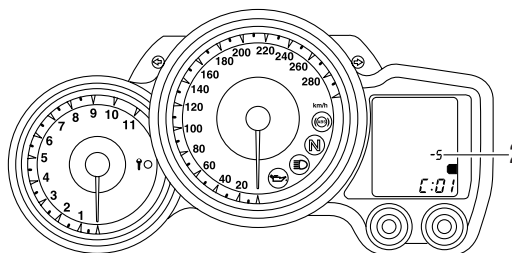


NOTE:

The selected cylinder number appears on the clock LCD.

- To decrease the selected cylinder number, press the “RESET” button.
- To increase the selected cylinder number, press the “SELECT” button.

6. After selecting the cylinder number, simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to activate the selection.
7. Change the CO adjustment volume “2” by pressing the “SELECT” and “RESET” buttons.



NOTE:

The CO adjustment volume appears on the odometer/tripmeter/fuel reserve tripmeter LCD.

- To decrease the CO adjustment volume, press the “RESET” button.
- To increase the CO adjustment volume, press the “SELECT” button.

8. Simultaneously press the “SELECT” and “RESET” buttons to return to the cylinder number selection (step 5).
9. Turn the main switch to “OFF” to cancel the mode.

EAS20610

ADJUSTING THE ENGINE IDLING SPEED

NOTE:

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:
 - Right side cowling
 - Rider seat
 Refer to “GENERAL CHASSIS” on page 4-1.
 - Fuel tank
 Refer to “FUEL TANK” on page 7-1.
 - T-bar
 Refer to “GENERAL CHASSIS” on page 4-1.
3. Install:
 - Digital tachometer
 (onto the spark plug lead of cylinder #1)
4. Install:
 - Fuel tank
 Refer to “FUEL TANK” on page 7-1.
5. Check:
 - Engine idling speed
 Out of specification → Adjust.



Engine idling speed
1000–1100 r/min

6. Adjust:
 - Engine idling speed

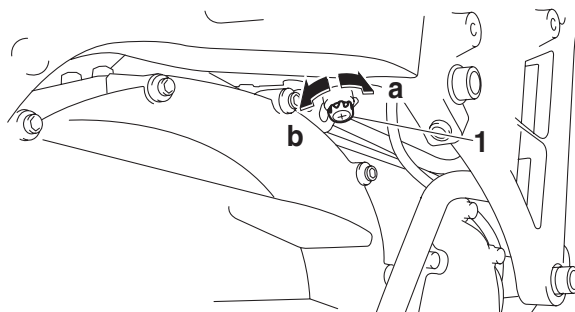
- a. Turn the engine idle speed adjustment screw “1” in direction “a” or “b” until the specified engine idling speed is obtained.

Direction “a”

Engine idling speed is increased.

Direction “b”

Engine idling speed is decreased.



7. Adjust:

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



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

8. Install:

- T-bar
 - Rider seat
 - Right side cowling
- Refer to “GENERAL CHASSIS” on page 4-1.

EAS20630

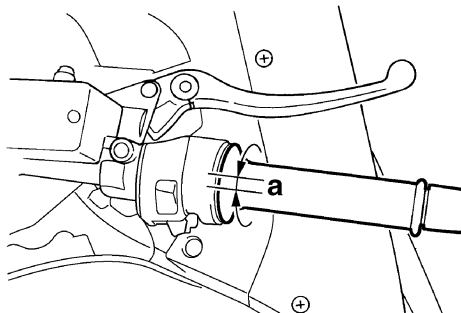
ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:

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

1. Check:

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



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

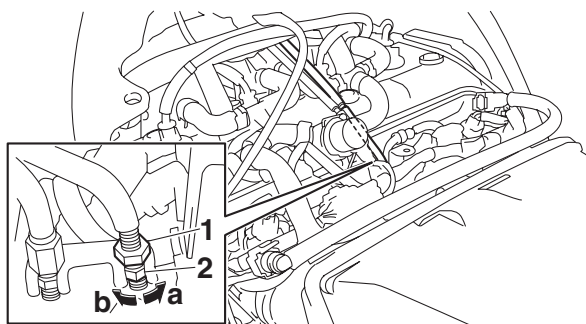
2. Remove:
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
3. Adjust:
 - Throttle cable free play

Throttle body side

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

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

- c. Tighten the locknut.



NOTE:

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

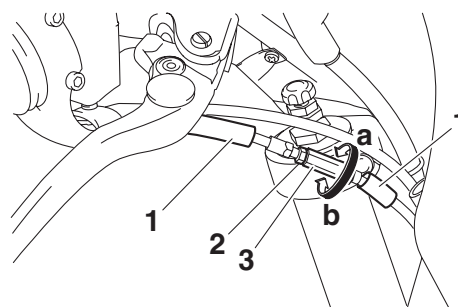
Handlebar side

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

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

- d. Tighten the locknut.

- e. Slide the rubber covers to its original position.



4. Install:

- T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
Refer to "FUEL TANK" on page 7-1.
- Rider seat
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:
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
 - Spark plug cap
3. Remove:
 - Spark plug

ECA13320

CAUTION:

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

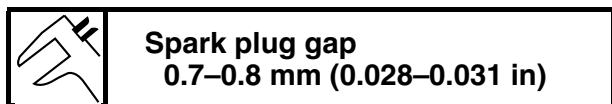
4. Check:
 - Spark plug type
Incorrect → Change.



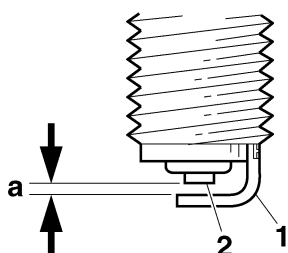
Manufacturer/model
NGK/CR8E
Manufacturer/model
DENSO/U24ESR-N

5. Check:
 - Electrode "1"
Damage/wear → Replace the spark plug.

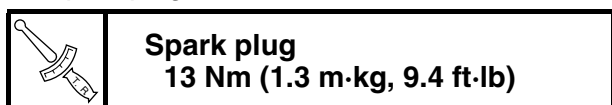
- Insulator “2”
Abnormal color → Replace the spark plug.
Normal color is medium-to-light tan.
- 6. Clean:
 - Spark plug
(with a spark plug cleaner or wire brush)
- 7. Measure:
 - Spark plug gap “a”
(with a wire thickness gauge)
Out of specification → Regap.



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



- 8. Install:
 - Spark plug



Spark plug
13 Nm (1.3 m·kg, 9.4 ft·lb)

NOTE: _____
Before installing the spark plug, clean the spark plug and gasket surface.

- 9. Connect:
 - Spark plug
- 10. Install:
 - T-bar
Refer to “GENERAL CHASSIS” on page 4-1.
 - Fuel tank
Refer to “FUEL TANK” on page 7-1.
 - Rider seat
Refer to “GENERAL CHASSIS” on page 4-1.

EAS20700

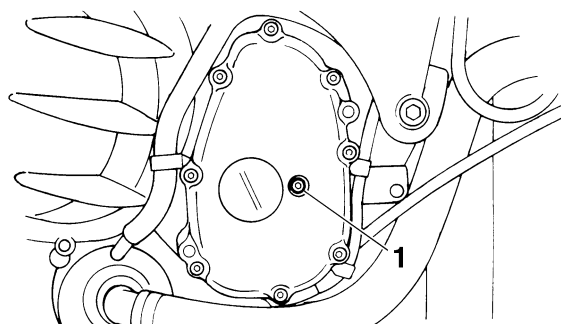
CHECKING THE IGNITION TIMING

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

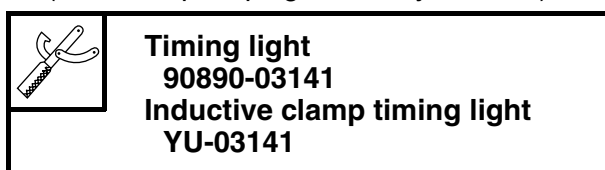
1. Stand the vehicle on a level surface.

NOTE: _____
Place the vehicle on the centerstand.

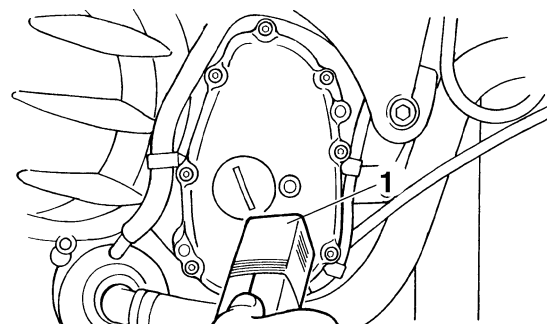
- 2. Remove:
 - Right side cowling
 - Rider seat
Refer to “GENERAL CHASSIS” on page 4-1.
 - Fuel tank
Refer to “FUEL TANK” on page 7-1.
 - T-bar
Refer to “GENERAL CHASSIS” on page 4-1.
- 3. Remove:
 - Timing mark accessing plug “1”
(along with the copper washer)



- 4. Connect:
 - Timing light “1”
(onto the spark plug lead of cylinder #1)
 - Digital tachometer
(onto the spark plug lead of cylinder #1)



Timing light
90890-03141
Inductive clamp timing light
YU-03141



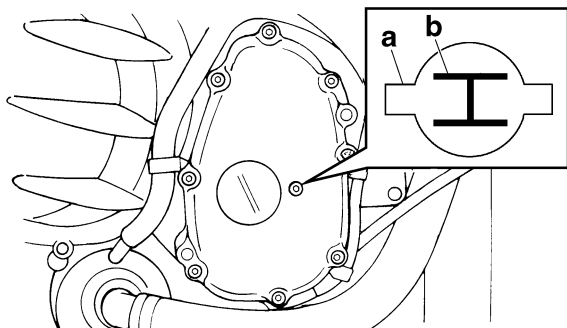
- 5. Install:
 - Fuel tank
Refer to “FUEL TANK” on page 7-1.
- 6. Check:
 - Ignition timing

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



Engine idling speed
1000–1100 r/min

- b. Check that pointer “a” on the pickup rotor cover is within the firing range “b” on the pickup rotor.
Incorrect firing range → Check the ignition system.



NOTE:

The ignition timing is not adjustable.

7. Tighten:

- Timing mark accessing plug
(along with the copper washer **New**)



Timing mark accessing plug
15 Nm (1.5 m·kg, 11 ft·lb)

8. Install:

- T-bar
 - Rider seat
 - Right side cowling
- Refer to “GENERAL CHASSIS” on page 4-1.

EAS20710

MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

NOTE:

Insufficient compression pressure will result in a loss of performance.

1. Measure:

- Valve clearance
Out of specification → Adjust.
Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-3.

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

3. Remove:

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

- T-bar

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

4. Disconnect the all spark plug caps.

5. Remove:

- Spark plug

ECA13340

CAUTION:

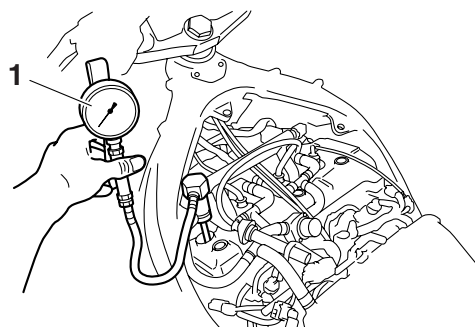
Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.

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).



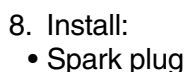
Standard compression pressure
(at sea level)
1600 kPa/400 r/min (228 psi/400
r/min) (16.0 kgf/cm²/400 r/min)
Minimum–maximum
1390–1790 kPa (198–255 psi)
(13.9–17.9 kgf/cm²)

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

NOTE:

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

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



9. Connect the all spark plug caps.
10. Install:
 - T-bar
Refer to “GENERAL CHASSIS” on page 4-1.
 - Fuel tank
Refer to “FUEL TANK” on page 7-1.
 - Rider seat
Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

NOTE: _____

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

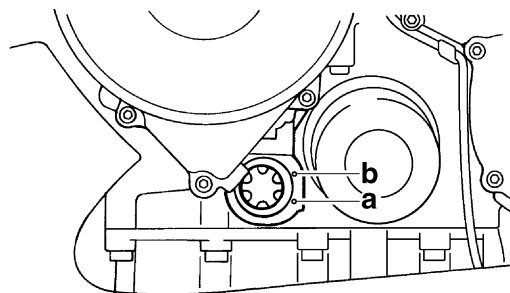
2. Start the engine, warm it up for several minutes, and then turn it off.

3. Check:

- Engine oil level

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

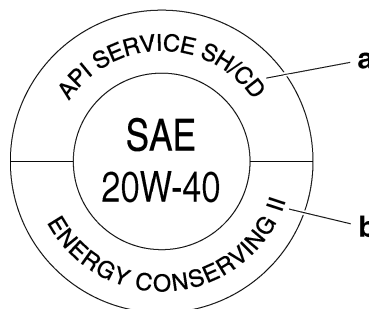
Below the minimum level mark → Add the recommended engine oil to the proper level.



Type
SAE20W40
Recommended engine oil grade
API service SE, SF, SG type or
higher
ACEA standard
G4 or G5

CAUTION:

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



NOTE: _____

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

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

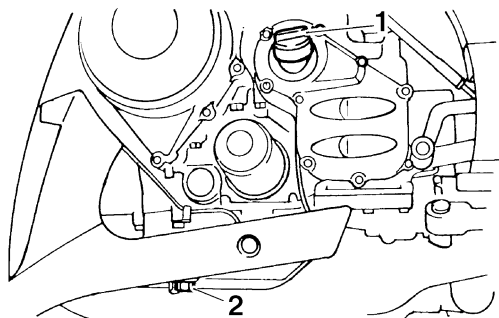
NOTE: _____

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

EAS20780

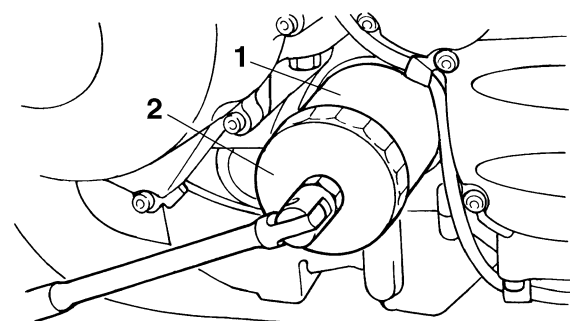
CHANGING THE ENGINE OIL

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”
 - Engine oil drain bolt “2” (along with the gasket)



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

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

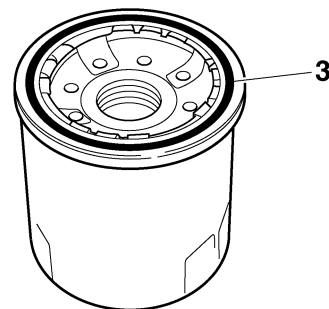


- b. Lubricate the O-ring “3” of the new oil filter cartridge with a thin coat of engine oil.

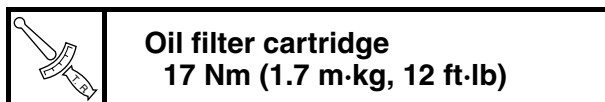
ECA13390

CAUTION:

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



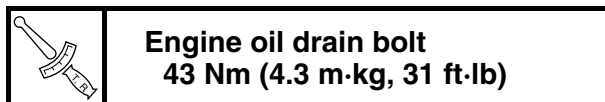
- c. Tighten the new oil filter cartridge to specification with an oil filter wrench.



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

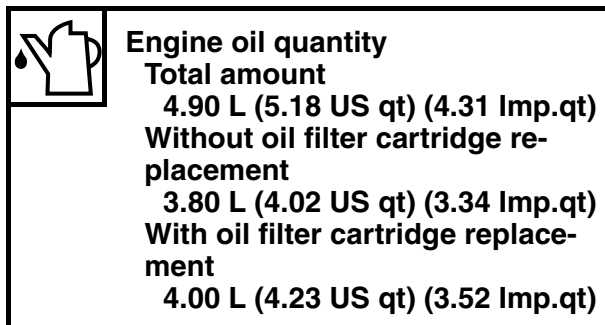


6. Install:
 - Engine oil drain bolt (along with the gasket **New**)



Engine oil drain bolt
43 Nm (4.3 m·kg, 31 ft·lb)

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

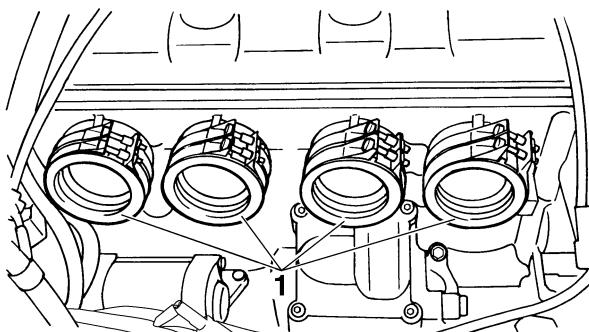


Engine oil quantity
Total amount
4.90 L (5.18 US qt) (4.31 Imp.qt)
Without oil filter cartridge replacement
3.80 L (4.02 US qt) (3.34 Imp.qt)
With oil filter cartridge replacement
4.00 L (4.23 US qt) (3.52 Imp.qt)

8. Install:
 - Engine oil filler cap
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 3-12.
12. Check:
 - Engine oil pressure



- a. Remove the right side cowling. Refer to “GENERAL CHASSIS” on page 4-1.



3. Install:

- Throttle body
Refer to "THROTTLE BODIES" on page 7-4.
- Air filter case
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
Refer to "FUEL TANK" on page 7-1.
- Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21030

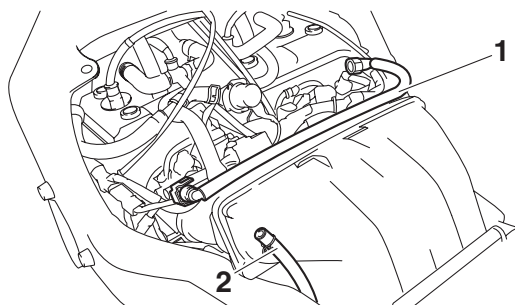
CHECKING THE FUEL LINE

1. Remove:
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
 - Fuel hose "1"
 - Fuel tank breather hose
 - Fuel tank overflow hose
 - Fuel tank breather/overflow hose "2"
Cracks/damage → Replace.
Loose connection → Connect properly.

EC3P61005

CAUTION:

Make sure the fuel tank breather/overflow hose is routed correctly.



3. Install:

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

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

EAS21070

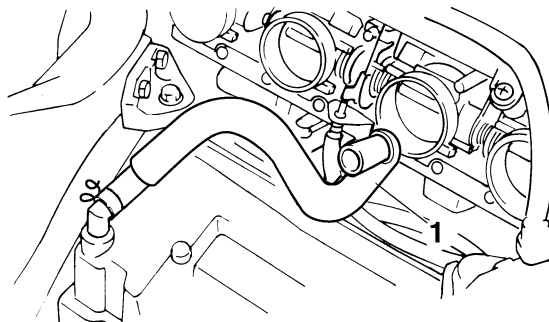
CHECKING THE CRANKCASE BREATHER HOSE

1. Remove:
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - T-bar
Refer to "GENERAL CHASSIS" on page 4-1.
 - Air filter case
Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
 - Crankcase breather hose "1"
Cracks/damage → Replace.
Loose connection → Connect properly.

ECA13450

CAUTION:

Make sure the crankcase breather hose is routed correctly.



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

EAS21080

CHECKING THE EXHAUST SYSTEM

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

1. Remove:
 - Side cowlings
Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
 - Exhaust pipe assembly "1"
 - Mufflers "2"
Cracks/damage → Replace.

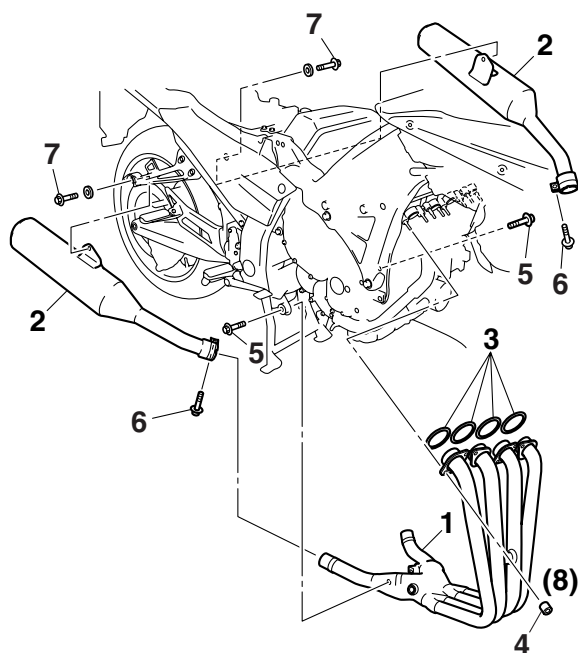
- Gasket “3”
Exhaust gas leaks → Replace.

3. Check:

- Tightening torque
- Exhaust pipe assembly nuts “4”
- Exhaust pipe assembly bolts “5”
- Exhaust pipe assembly and muffler bolts “6”
- Muffler bolts “7”



Exhaust pipe assembly nut
20 Nm (2.0 m·kg, 14 ft·lb)
Exhaust pipe assembly bolt
17 Nm (1.7 m·kg, 12 ft·lb)
Exhaust pipe assembly and muffler bolt
20 Nm (2.0 m·kg, 14 ft·lb)
Muffler bolt
25 Nm (2.5 m·kg, 18 ft·lb)



4. Install:

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

EAS21110

CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

NOTE:

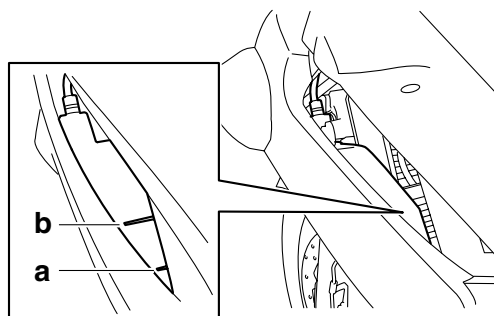
- Place the vehicle on the centerstand.
- Make sure the vehicle is upright.

2. Remove:

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

3. Check:

- Coolant level
The coolant level should be between the minimum level mark “a” and maximum level mark “b”.
Below the minimum level mark → Add the recommended coolant to the proper level.



ECA13470

CAUTION:

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

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

5. Check:

- Coolant level

NOTE:

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

6. Install:

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

EAS21120

CHECKING THE COOLING SYSTEM

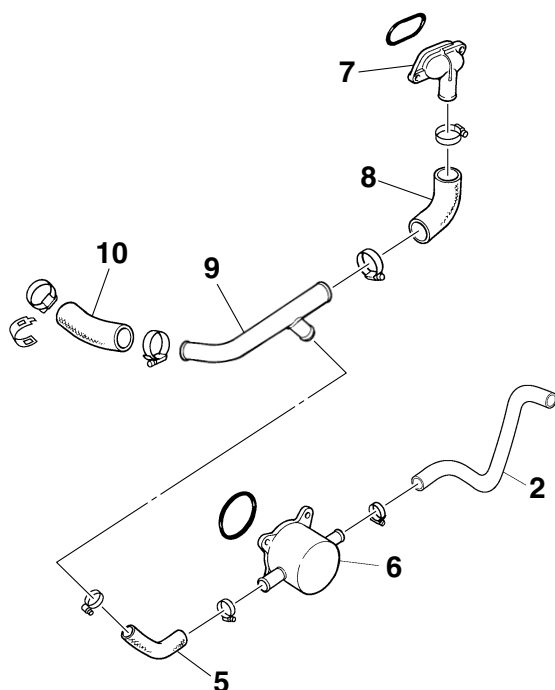
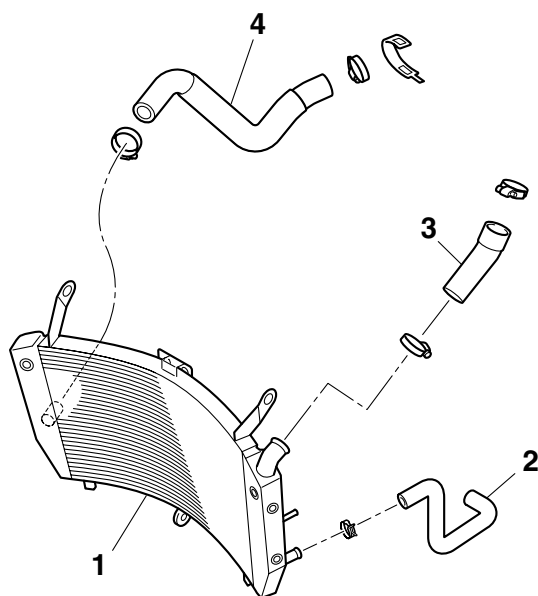
1. Remove:

- Exhaust pipe assembly
Refer to “ENGINE REMOVAL” on page 5-1.

2. Check:

- Radiator “1”
- Oil cooler outlet hose “2”
- Radiator inlet hose “3”
- Radiator outlet hose “4”
- Oil cooler inlet hose “5”
- Oil cooler “6”
- Water jacket joint “7”
- Water jacket joint inlet hose “8”
- Water pump outlet pipe “9”

- Water pump outlet hose “10”
Cracks/damage → Replace.
Refer to “RADIATOR” on page 6-1, “OIL COOLER” on page 6-4, “THERMOSTAT” on page 6-6 and “WATER PUMP” on page 6-10.

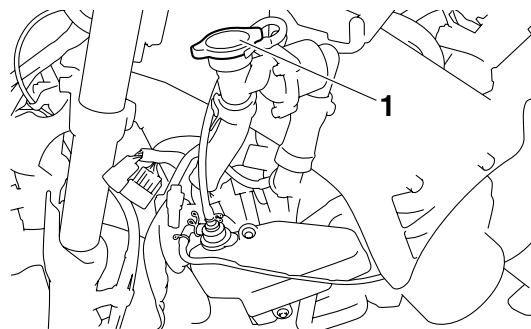


3. Install:
- Exhaust pipe assembly
Refer to “ENGINE REMOVAL” on page 5-1.

EAS21130

CHANGING THE COOLANT

1. Remove:
 - Front cowl
Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
 - Radiator cap “1”



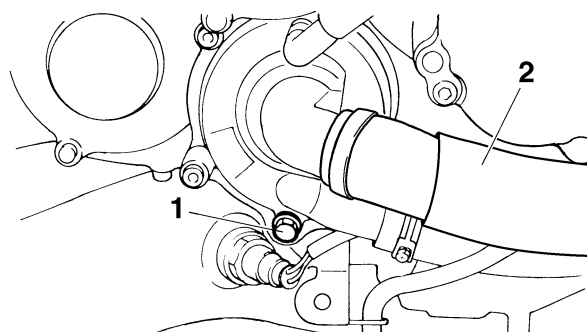
EWA13030

WARNING

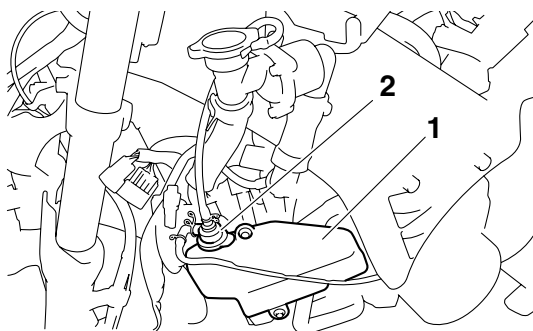
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:

Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

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



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



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



Coolant drain bolt (water pump)
10 Nm (1.0 m·kg, 7.2 ft·lb)

11. Fill:
 - Cooling system
(with the specified amount of the recommended coolant)



Recommended antifreeze
High-quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Radiator capacity (including all routes)
2.60 L (2.75 US qt) (2.29 Imp. qt)
Coolant reservoir capacity (up to the maximum level mark)
0.25 L (0.26 US qt) (0.22 Imp. qt)

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

EWA13040



WARNING

- If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.
- If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.

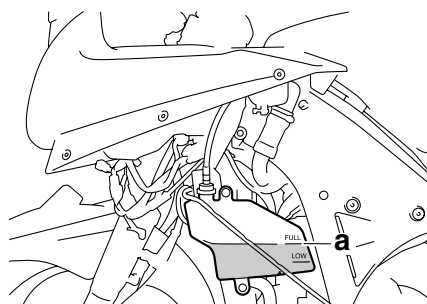
- If coolant is swallowed, induce vomiting and get immediate medical attention.

ECA13480

CAUTION:

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

12. Install:
 - Radiator cap
13. Fill:
 - Coolant reservoir
(with the recommended coolant to the maximum level mark "a")



14. Install:
 - Coolant reservoir cap
15. Start the engine, warm it up for several minutes, and then stop it.
16. Check:
 - Coolant level
Refer to "CHECKING THE COOLANT LEVEL" on page 3-18.

NOTE:

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

17. Install:
 - Front cowl assembly
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21140

CHASSIS

EAS21160

ADJUSTING THE FRONT DISC BRAKE

1. Adjust:

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



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

NOTE:

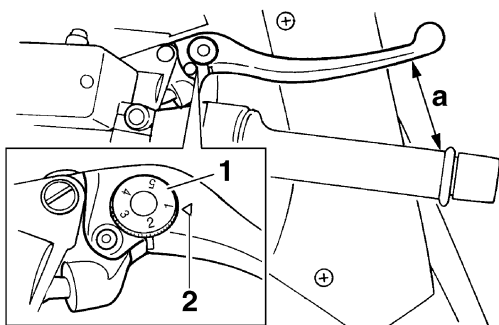
Be sure to align the setting on the adjusting dial with the arrow mark “2” on the brake lever.

Position #1

Distance “a” is the largest.

Position #5

Distance “a” is the smallest.



EWA13050

WARNING

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

ECA13490

CAUTION:

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



EAS21190

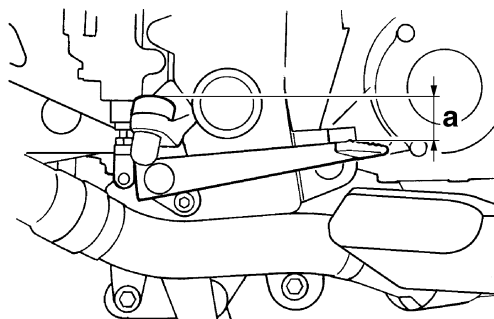
ADJUSTING THE REAR DISC BRAKE

1. Check:

- Brake pedal position
(distance “a” from the top of the rider footrest to the top of the brake pedal)
Out of specification → Adjust.



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



2. Adjust:

- Brake pedal position



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

Direction “a”

Brake pedal is raised.

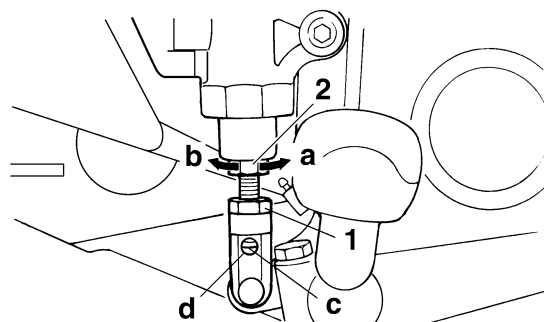
Direction “b”

Brake pedal is lowered.

EWA13070

WARNING

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



- Tighten the locknut “1” to specification.



Locknut
16 Nm (1.6 m·kg, 11 ft·lb)

EW3P61002

WARNING

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the

- 1st step: Front brake calipers
- 2nd step: Right front brake caliper (unified brake system)
- 3rd step: Rear brake caliper

EW3P61010

⚠ 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.

NOTE:

- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the 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. Remove:

- Right side cover

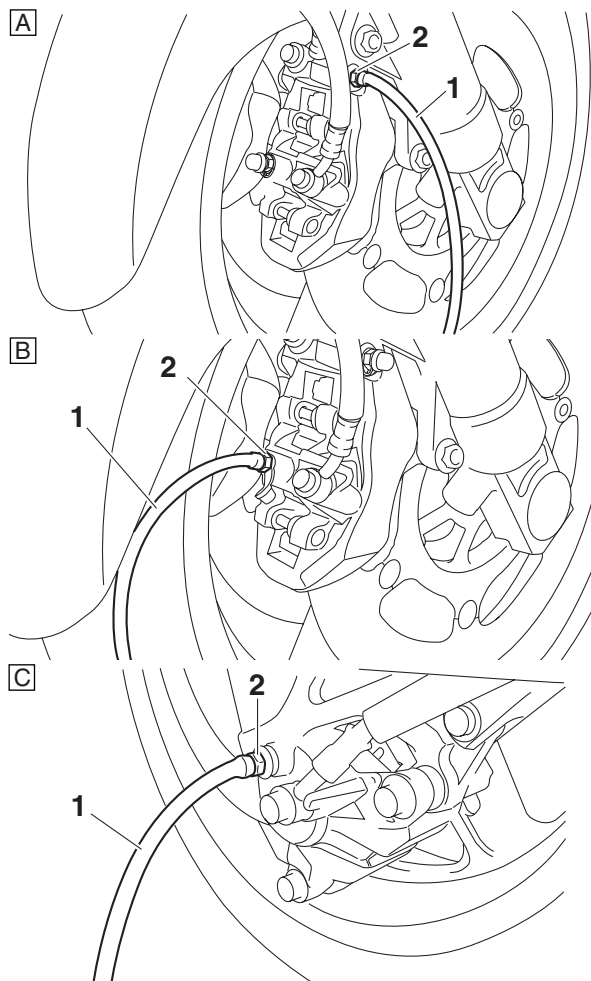
Refer to "GENERAL CHASSIS" on page 4-1.

2. Bleed:

- ABS



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



A. Front brake caliper

B. Right front brake caliper (unified brake system)

C. Rear brake caliper

- Place the other end of the hose into a container.
- Slowly apply the brake several times.
- Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
- Loosen the bleed screw.

NOTE:

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

- Tighten the bleed screw, and then release the brake lever or brake pedal.
- Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- Check the operation of the hydraulic unit. Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-56.

EC3P61029

CAUTION:

Make sure that the main switch is turned 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 or brake fluid reservoir to the proper level with the recommended brake fluid.
- l. Tighten the bleed screw to the specified torque.



Brake caliper bleed screw
6 Nm (0.6 m·kg, 4.3 ft·lb)

- m. Fill the brake master cylinder reservoir or brake fluid reservoir to the proper level with the recommended brake fluid.
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.

EWA14020

WARNING

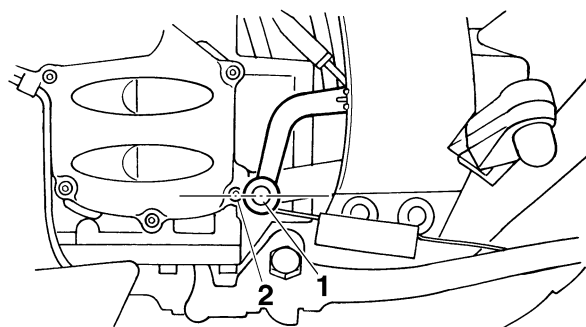
After bleeding the ABS, check the brake operation.



EAS21380

ADJUSTING THE SHIFT PEDAL

1. Check:
 - Shift pedal position
Check that the center of the shift pedal end "1" is aligned with the center of the middle gear case cover bolt "2" as shown in the illustration when viewed directly from the side.
Incorrect → Adjust.



2. Adjust:
 - Shift pedal position



- a. Loosen both locknuts "1".
- b. Turn the shift rod "2" in direction "a" or "b" to obtain the correct shift pedal position.

Direction "a"

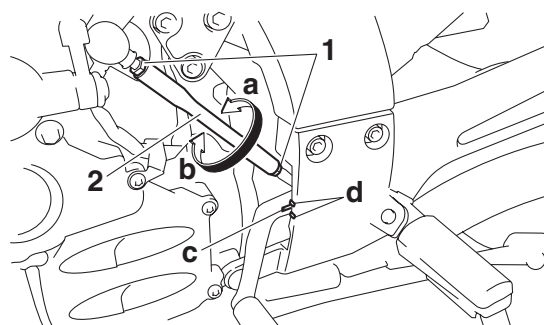
Shift pedal is raised.

Direction "b"

Shift pedal is lowered.

NOTE:

Check that the groove "c" in the shift pedal is between the projections "d" on the frame.



- c. Tighten both locknuts to specification.



Locknut
7 Nm (0.7 m·kg, 5.1 ft·lb)



EAS21460

CHECKING THE FINAL GEAR OIL LEVEL

1. Stand the vehicle on a level surface.

NOTE:

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

2. Remove:

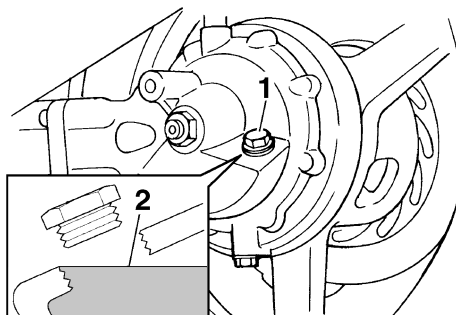
- Final gear oil filler bolt "1"

3. Check:

- Final gear oil level

The final gear oil level should be to the bottom brim "2" of the filler hole.

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



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

4. Install:

- Final gear oil filler bolt



Final gear oil filler bolt
23 Nm (2.3 m·kg, 17 ft·lb)

EAS21470

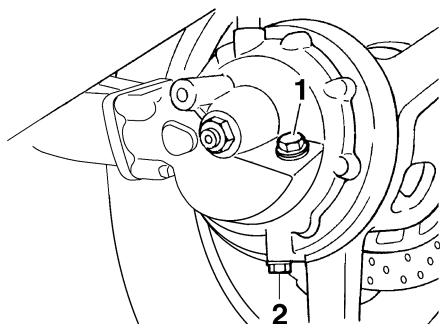
CHANGING THE FINAL GEAR OIL

1. Place a container under the final gear case.

2. Remove:

- Final gear oil filler bolt “1”
- Final gear oil drain bolt “2”

Completely drain the final gear case of its oil.



3. Check:

- Final gear oil drain bolt gasket
Damage → Replace.

4. Install:

- Final gear oil drain bolt
(along with the gasket **New**)



Final gear oil drain bolt
23 Nm (2.3 m·kg, 17 ft·lb)

5. Fill:

- Final gear case
(with the specified amount of the recommended final gear oil)



Quantity
0.20 L (0.21 US qt) (0.18 Imp.qt)

Refer to “CHECKING THE FINAL GEAR OIL LEVEL” on page 3-25.

EAS21510

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.

NOTE:

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.

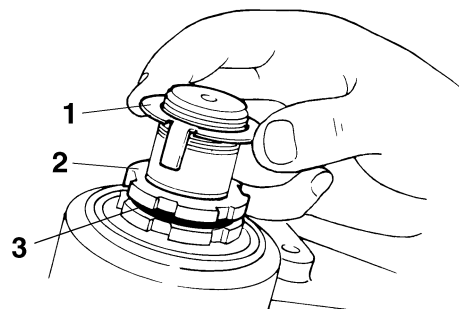
3. Remove:

- Upper bracket
Refer to “STEERING HEAD” on page 4-75.

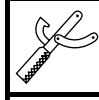
4. Adjust:

- Steering head

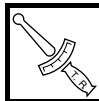
a. Remove the lock washer “1”, the upper ring nut “2”, and the rubber washer “3”.



b. Tighten the lower ring nut “4” with a steering nut wrench “5”.



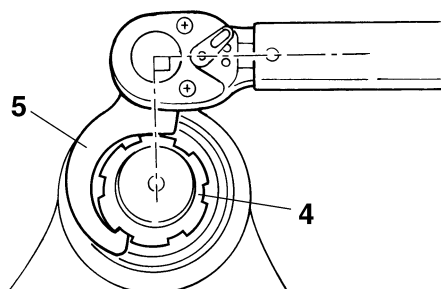
Steering nut wrench
90890-01403
Spanner wrench
YU-33975



Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kg, 37 ft·lb)

NOTE:

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



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

EWA13140

WARNING

Do not overtighten the lower ring nut.



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

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

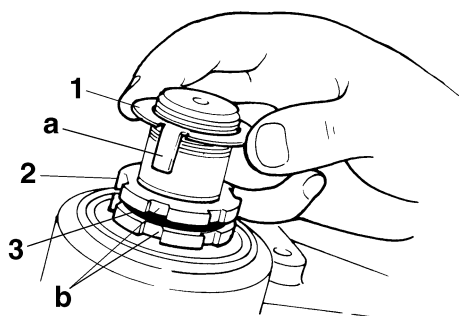
Refer to "STEERING HEAD" on page 4-75.

- e. Install the rubber washer "3".
f. Install the upper ring nut "2".
g. Finger tighten the upper ring nut, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

- h. Install the lock washer "1".

NOTE:

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



5. Install:

- Upper bracket

Refer to "STEERING HEAD" on page 4-75.

ET3P61034

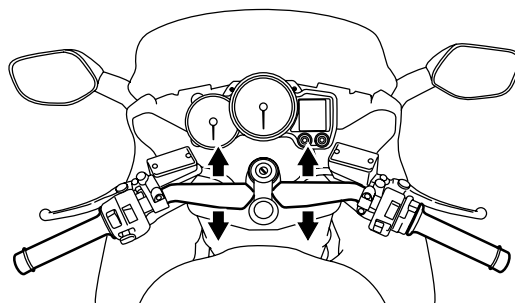
ADJUSTING THE HANDLEBAR POSITION

1. Check:

- Handlebar position

NOTE:

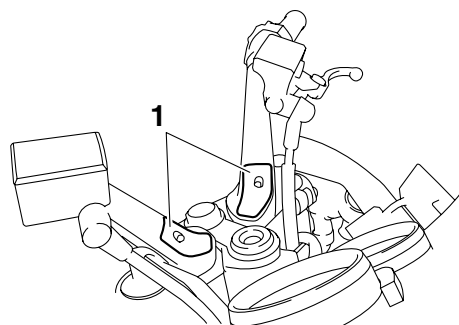
The handlebar position can be adjusted to one of three positions to suit the rider's preference.



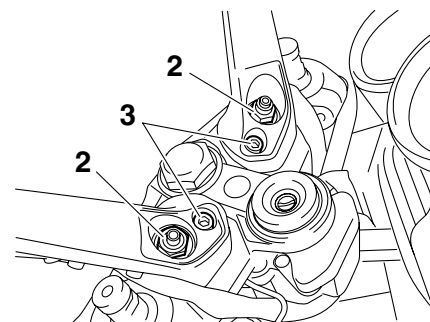
2. Adjust:

- Handlebar position

- a. Remove the plates "1".



- b. Remove the handlebar nuts "2" and bolts "3".

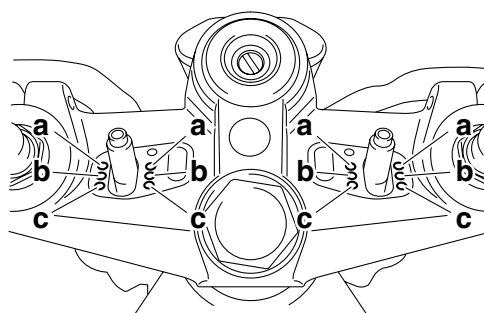


- c. Remove the handlebars.

- d. Install the handlebars in the desired position.

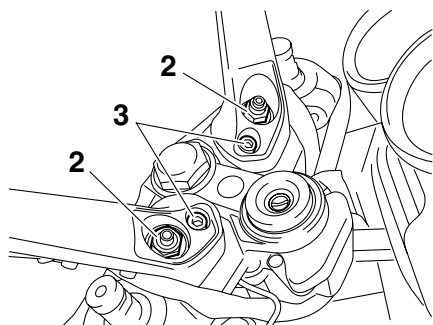
NOTE:

Fit the projections on each handlebar into the holes in the upper bracket, making sure that the handlebars are installed in the same position.



- a. Front position
b. Standard position
c. Rear position

- e. Install the handlebar bolts "3" and nuts "2" temporarily.



- f. Tighten the handlebar bolts and nuts.



Handlebar bolt
23 Nm (2.3 m·kg, 17 ft·lb)
Handlebar nut
65 Nm (6.5 m·kg, 47 ft·lb)

NOTE:

First tighten the bolts, then tighten the nuts.

EAS21530

CHECKING THE FRONT FORK

1. Stand the vehicle on a level surface.

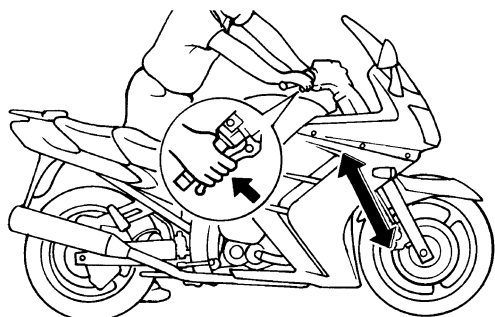
EWA13120



WARNING

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

2. Check:
- Inner tube
Damage/scratches → Replace.
 - Oil seal
Oil leakage → Replace.
3. Hold the vehicle upright and apply the front brake.
4. Check:
- Front fork operation
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
Rough movement → Repair.
Refer to "FRONT FORK" on page 4-65.



EAS21580

ADJUSTING THE FRONT FORK LEGS

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

EWA13150



WARNING

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

Spring preload

ECA13570

CAUTION:

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

1. Adjust:

- Spring preload

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

Direction "a"

Spring preload is increased (suspension is harder).

Direction "b"

Spring preload is decreased (suspension is softer).



Spring preload adjusting positions

Minimum

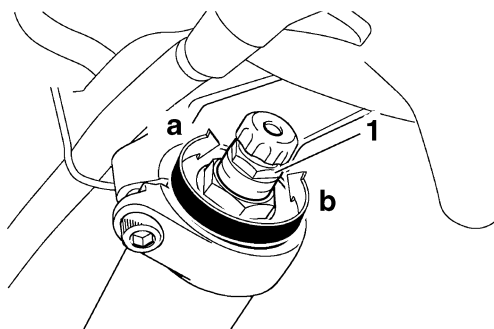
6

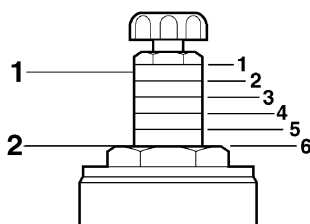
Standard

4

Maximum

1





2. Current setting

Rebound damping

ECA13590

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:

- Rebound damping

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

Direction "a"

Rebound damping is increased (suspension is harder).

Direction "b"

Rebound damping is decreased (suspension is softer).



Rebound damping adjusting positions

Minimum

17 click(s) out*

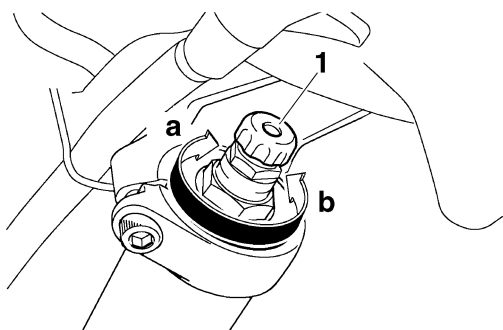
Standard

12 click(s) out*

Maximum

1 click(s) out*

* With the adjusting knob fully turned in



Compression damping

ECA13590

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:

- Compression damping

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

Direction "a"

Compression damping is increased (suspension is harder).

Direction "b"

Compression damping is decreased (suspension is softer).



Compression damping adjusting positions

Minimum

21 click(s) out*

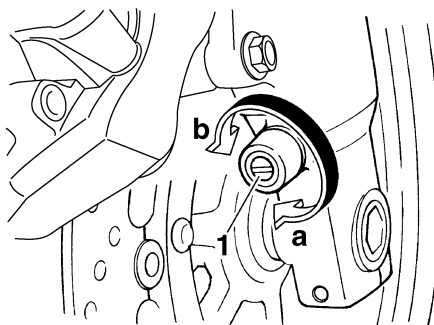
Standard

12 click(s) out*

Maximum

1 click(s) out*

* With the adjusting screw fully turned in



EAS21600

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

EWA13120

WARNING

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

Spring preload

ECA13590

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
 - Spring preload

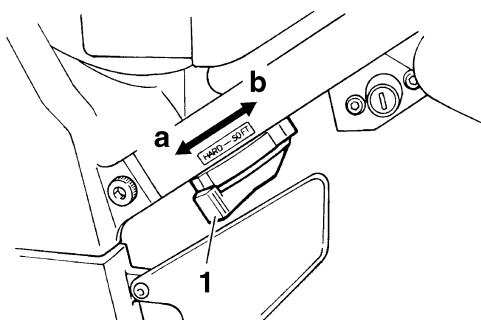
- Move the adjusting lever "1" in direction "a" or "b".
- Adjust the adjusting lever to "HARD" or "SOFT".

Direction "a"

Spring preload is increased (suspension is harder).

Direction "b"

Spring preload is decreased (suspension is softer).



Rebound damping

ECA13590

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

- Adjust:
 - Rebound damping

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

Direction "a"

Rebound damping is increased (suspension is harder).

Direction "b"

Rebound damping is decreased (suspension is softer).



Rebound damping adjusting positions

Minimum

20 click(s) out*

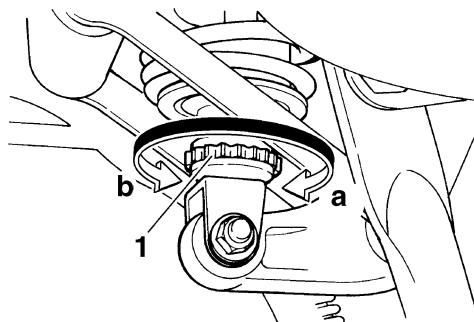
Standard

12 click(s) out*

Maximum

3 click(s) out*

* With the adjusting knob fully turned in



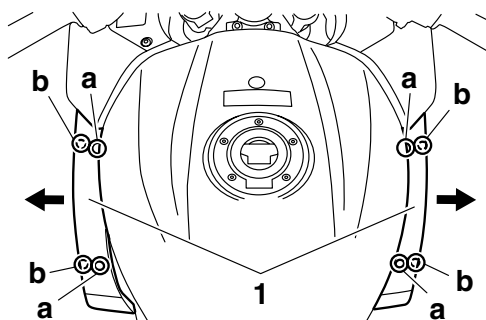
ET3P61035

ADJUSTING THE SIDE PANELS

- Adjust:
 - Side panel position

NOTE:

The side panels "1" can be tilted back 30 mm (1.18 in) for added ventilation to suit the riding conditions.

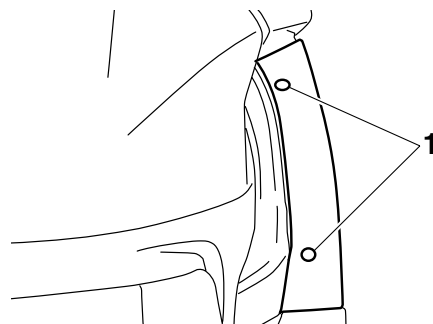


a. Closed position

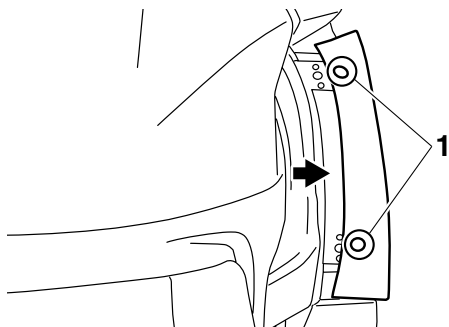
b. Open position

To open a side panel

- Remove the quick fastener screws "1".

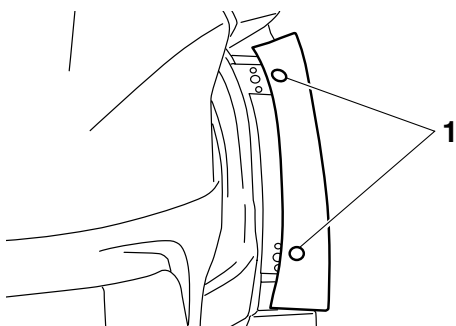


- Pull the side panel to the open position, and then install the quick fastener screws "1".

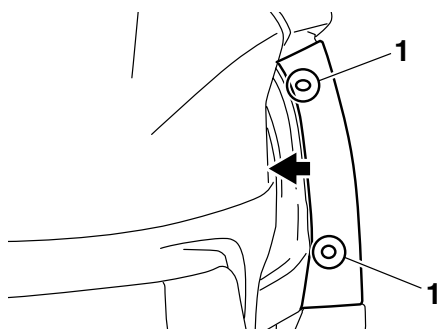


To close a side panel

- a. Remove the quick fastener screws "1".



- b. Push the side panel to the closed position, and then install the quick fastener screws "1".



NOTE:

Make sure that the side panel is properly installed.



ET3P61036

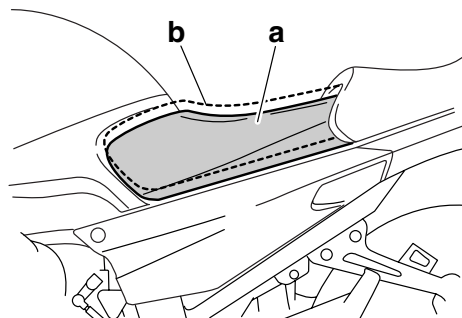
ADJUSTING THE RIDER SEAT HEIGHT

1. Check:

- Rider seat height

NOTE:

- The rider seat height can be adjusted to one of two positions to suit the rider's preference.
- The rider seat height was adjusted to the lower position at delivery.



- a. Low position
- b. High position

2. Remove:

- Passenger seat

- Rider seat

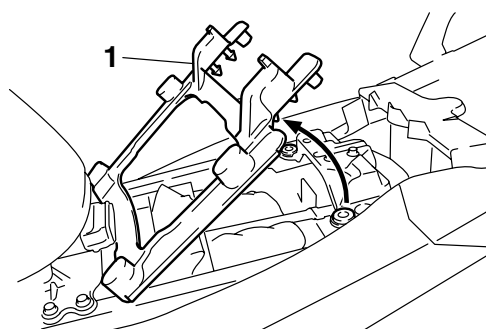
Refer to "GENERAL CHASSIS" on page 4-1.

3. Remove:

- Rider seat height position adjuster "1"

NOTE:

Remove the rider seat height position adjuster by pulling it upward.



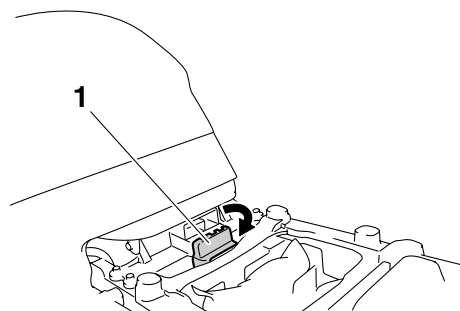
4. Adjust:

- Rider seat height

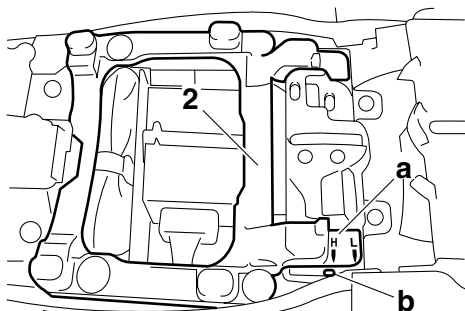


To change to the high position

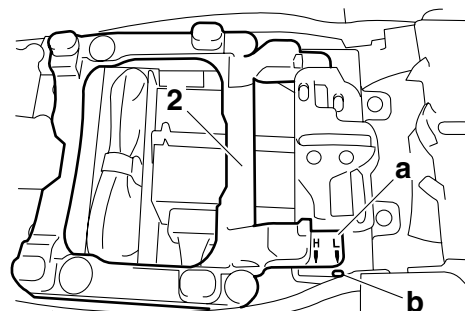
- a. Move the rider seat holder cover "1" to the lower position as shown.



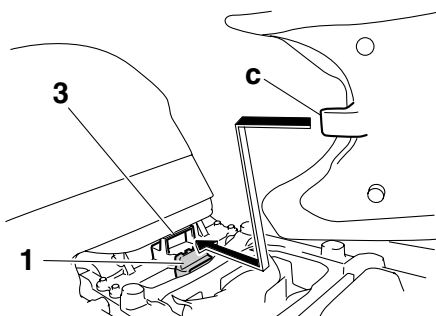
- b. Install the rider seat height position adjuster "2" so that the "H" mark "a" is aligned with the match mark "b".



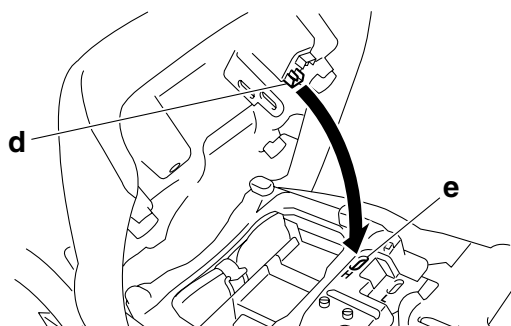
- b. Install the rider seat height position adjuster "2" so that the "L" mark "a" is aligned with the match mark "b".



- c. Insert the projection "c" on the front of the rider seat into seat holder (for high position) "3" as shown.

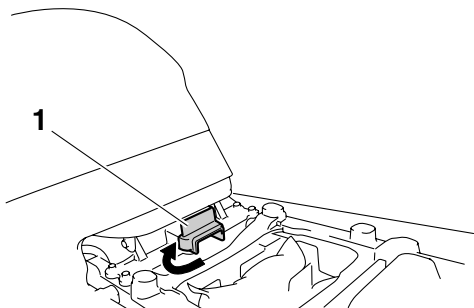


- d. Align the high position projection "d" on the bottom of the rider seat with the "H" position slot "e", and then push the rear of the seat down to lock it in place as shown.

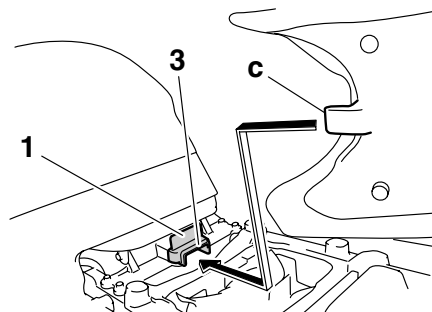


To change to the low position

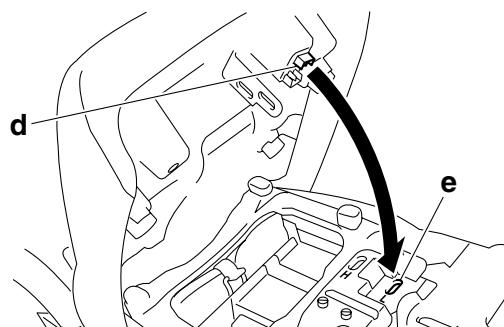
- a. Move the rider seat holder cover "1" to the upper position as shown.



- c. Insert the projection "c" on the front of the rider seat into seat holder (for low position) "3" as shown.



- d. Align the low position projection "d" on the bottom of the rider seat with the "L" position slot "e", and then push the rear of the seat down to lock it in place as shown.



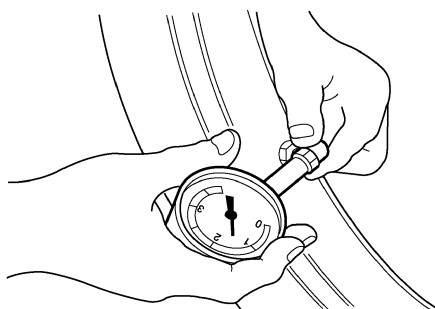
5. Install:
- Passenger seat
- Refer to "GENERAL CHASSIS" on page 4-1.

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

270 kPa (39 psi) (2.70 kgf/cm²)

Rear

290 kPa (42 psi) (2.90 kgf/cm²)

Loading condition

90–212 kg (198–467 lb)

Front

270 kPa (39 psi) (2.70 kgf/cm²)

Rear

290 kPa (42 psi) (2.90 kgf/cm²)

High-speed riding

Front

270 kPa (39 psi) (2.70 kgf/cm²)

Rear

290 kPa (42 psi) (2.90 kgf/cm²)

Maximum load

212 kg (467 lb)

* Total weight of rider, passenger, cargo and accessories

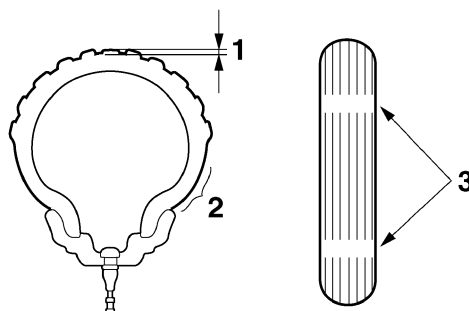
EWA13190

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)

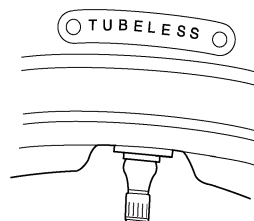
1.6 mm (0.06 in)

EWA14080

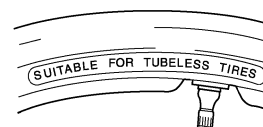
WARNING

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

A



B



- A. Tire
- B. Wheel

| | |
|----------------|-----------------------|
| Tube wheel | Tube tire only |
| Tubeless wheel | Tube or tubeless tire |

EWA14090

WARNING

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



Front tire Size

120/70 ZR17M/C (58W)

Manufacturer/model

METZELER/Roadtec Z6G

Manufacturer/model

BRIDGESTONE/BT020F



Rear tire Size

180/55 ZR17M/C (73W)

Manufacturer/model

METZELER/Roadtec Z6C

Manufacturer/model

BRIDGESTONE/BT020R

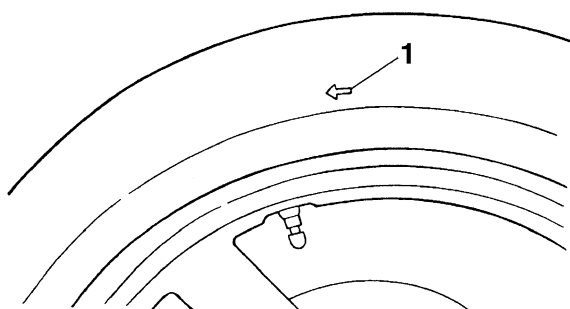
EWA13210

WARNING

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

NOTE:

For tires with a direction of rotation mark "1": Install the tire with the mark pointing in the direction of wheel rotation.



EAS21670

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

1. Check:

- Wheel

Damage/out-of-round → Replace.

EWA13260

WARNING

Never attempt to make any repairs to the wheel.

NOTE:

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

EAS21690

CHECKING AND LUBRICATING THE CABLES

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

EWA13270

WARNING

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

1. Check:

- Outer cable

Damage → Replace.

2. Check:

- Cable operation

Rough movement → Lubricate.



Recommended lubricant
Engine oil or a suitable cable lubricant

NOTE:

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

EAS21700

LUBRICATING THE LEVERS

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



Recommended lubricant
Lithium-soap-based grease

EAS21710

LUBRICATING THE PEDALS

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



EAS21720

LUBRICATING THE SIDESTAND

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



EAS21730

LUBRICATING THE CENTERSTAND

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



EAS21740

LUBRICATING THE REAR SUSPENSION

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



EAS21750

ELECTRICAL SYSTEM

EAS21760

CHECKING AND CHARGING THE BATTERY

Refer to "ELECTRICAL COMPONENTS" on page 8-145.

EAS21770

CHECKING THE FUSES

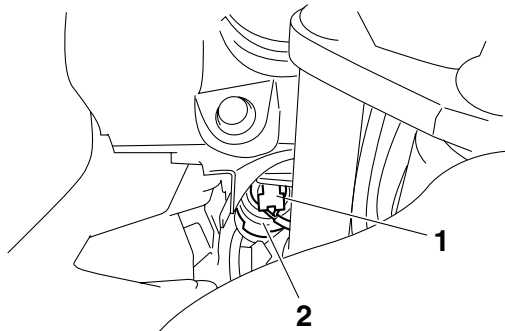
Refer to "ELECTRICAL COMPONENTS" on page 8-145.

EAS21790

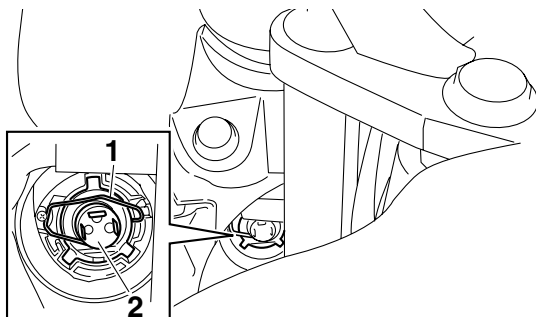
REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

1. Remove:
 - Front cowling left inner panel 1
 - Front cowling right inner panel 1
 Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
 - Headlight coupler "1"
3. Remove:
 - Headlight bulb cover "2"



4. Detach:
 - Headlight bulb holder "1"
5. Remove:
 - Headlight bulb "2"



EWA13320

WARNING

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

6. Install:

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

ECA13690

CAUTION:

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

7. Attach:
 - Headlight bulb holder
8. Install:
 - Headlight bulb cover
9. Connect:
 - Headlight coupler
10. Install:
 - Front cowling right inner panel 1
 - Front cowling left inner panel 1
 Refer to "GENERAL CHASSIS" on page 4-1.

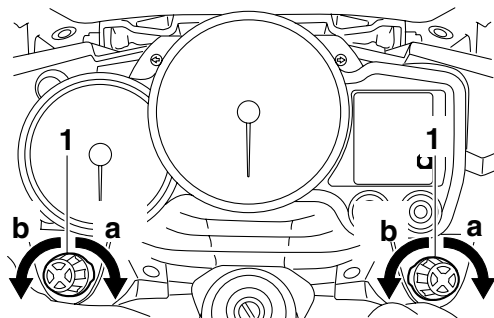
EAS21810

ADJUSTING THE HEADLIGHT BEAMS

1. Adjust:
 - Headlight beam (vertically)

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

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



2. Adjust:
 - Headlight beam (horizontally)

- a. Turn the adjusting screws "1" in direction "a" or "b".
Left headlight

Direction “a”

Headlight beam moves to the left.

Direction “b”

Headlight beam moves to the right.

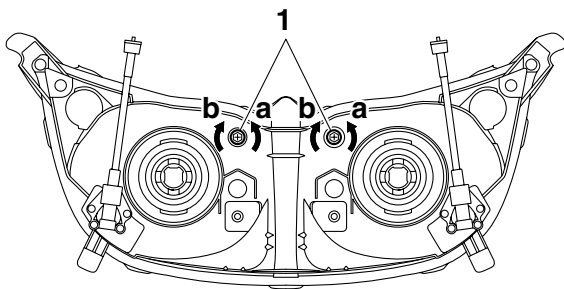
Right headlight

Direction “a”

Headlight beam moves to the right.

Direction “b”

Headlight beam moves to the left.



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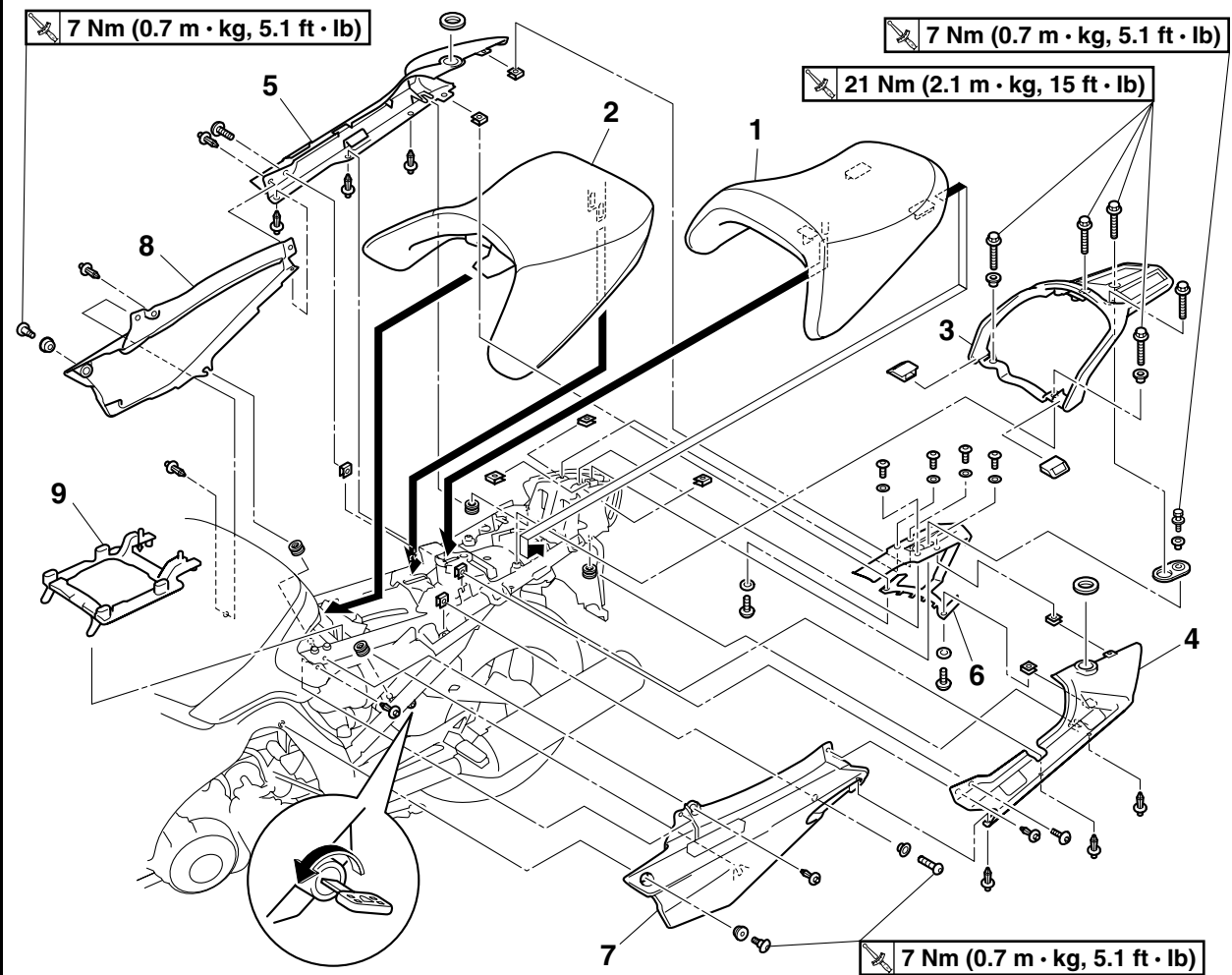
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EAS21830

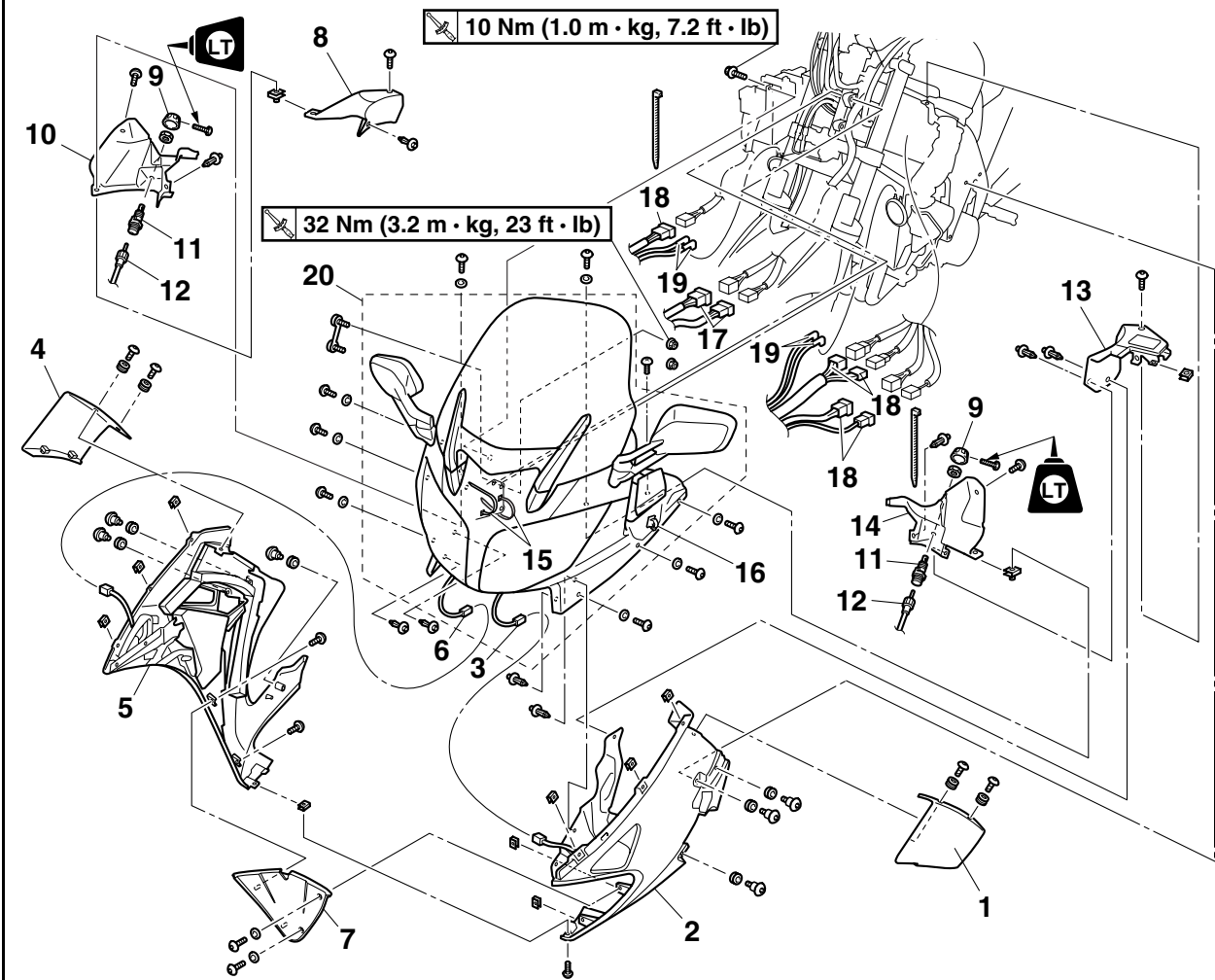
GENERAL CHASSIS

Removing the seats and covers



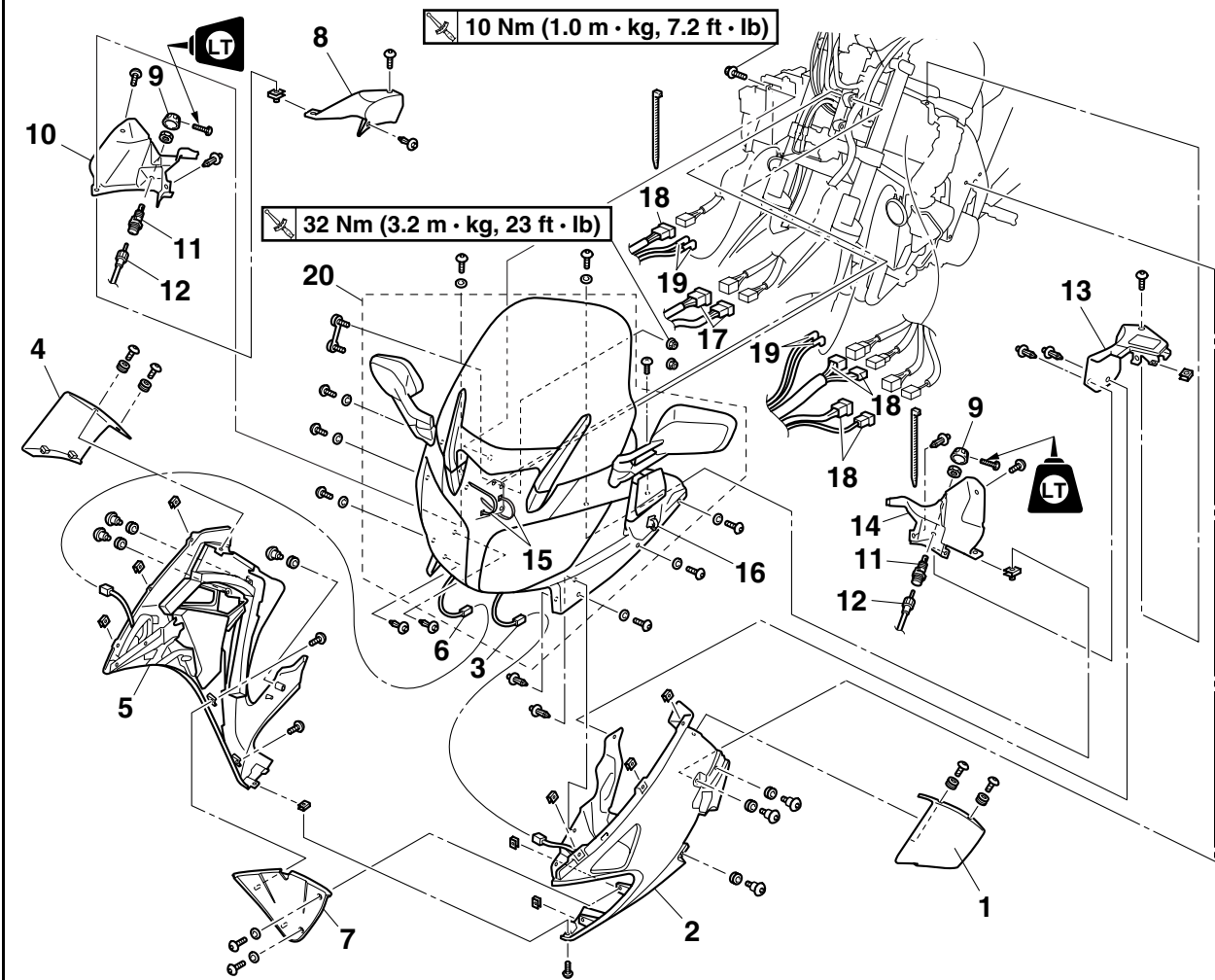
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------------------|------|--|
| 1 | Passenger seat | 1 | |
| 2 | Rider seat | 1 | |
| 3 | Grab bar | 1 | |
| 4 | Left rear cowling | 1 | |
| 5 | Right rear cowling | 1 | |
| 6 | Center rear cowling | 1 | |
| 7 | Left side cover | 1 | |
| 8 | Right side cover | 1 | |
| 9 | Rider seat height position adjuster | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the front cowling assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------------|------|-------------|
| | Open the accessory box lid. | | |
| 1 | Left side panel | 1 | |
| 2 | Left side cowling | 1 | |
| 3 | Front left turn signal light coupler | 1 | Disconnect. |
| 4 | Right side panel | 1 | |
| 5 | Right side cowling | 1 | |
| 6 | Front right turn signal light coupler | 1 | Disconnect. |
| 7 | Bottom cowling | 1 | |
| 8 | Front cowling right inner panel 1 | 1 | |
| 9 | Headlight beam adjusting knob | 2 | |
| 10 | Front cowling right inner panel 2 | 1 | |
| 11 | Adjusting knob shaft | 2 | |
| 12 | Headlight beam adjusting cable | 2 | Disconnect. |
| 13 | Front cowling left inner panel 1 | 1 | |
| 14 | Front cowling left inner panel 2 | 1 | |
| 15 | Plastic band | 2 | Disconnect. |
| 16 | Plastic holder | 1 | Disconnect. |

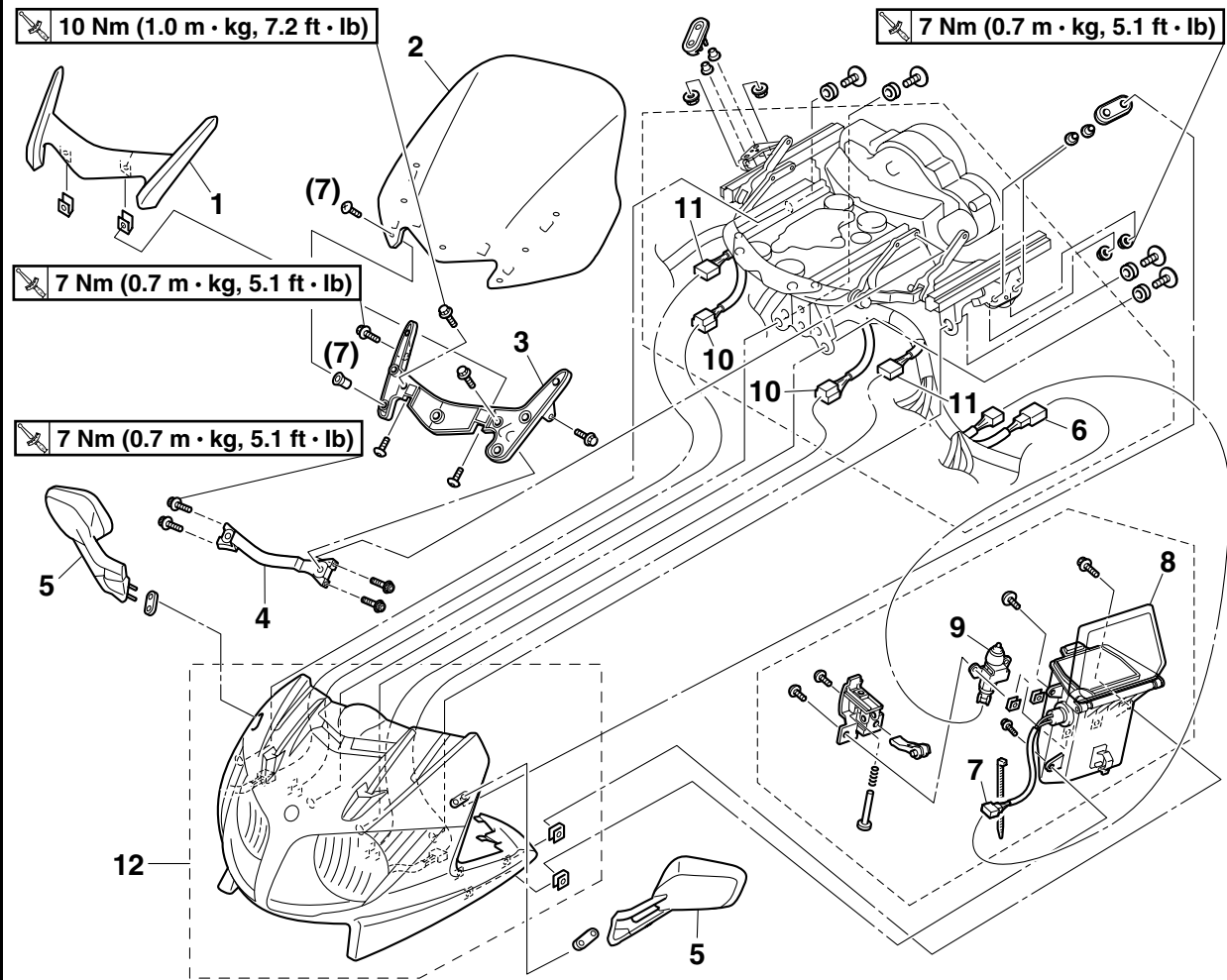
Removing the front cowling assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| 17 | Handlebar switch coupler | 2 | Disconnect. |
| 18 | Front cowling wire harness coupler | 5 | Disconnect. |
| 19 | Horn connector | 4 | Disconnect. |
| 20 | Front cowling assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

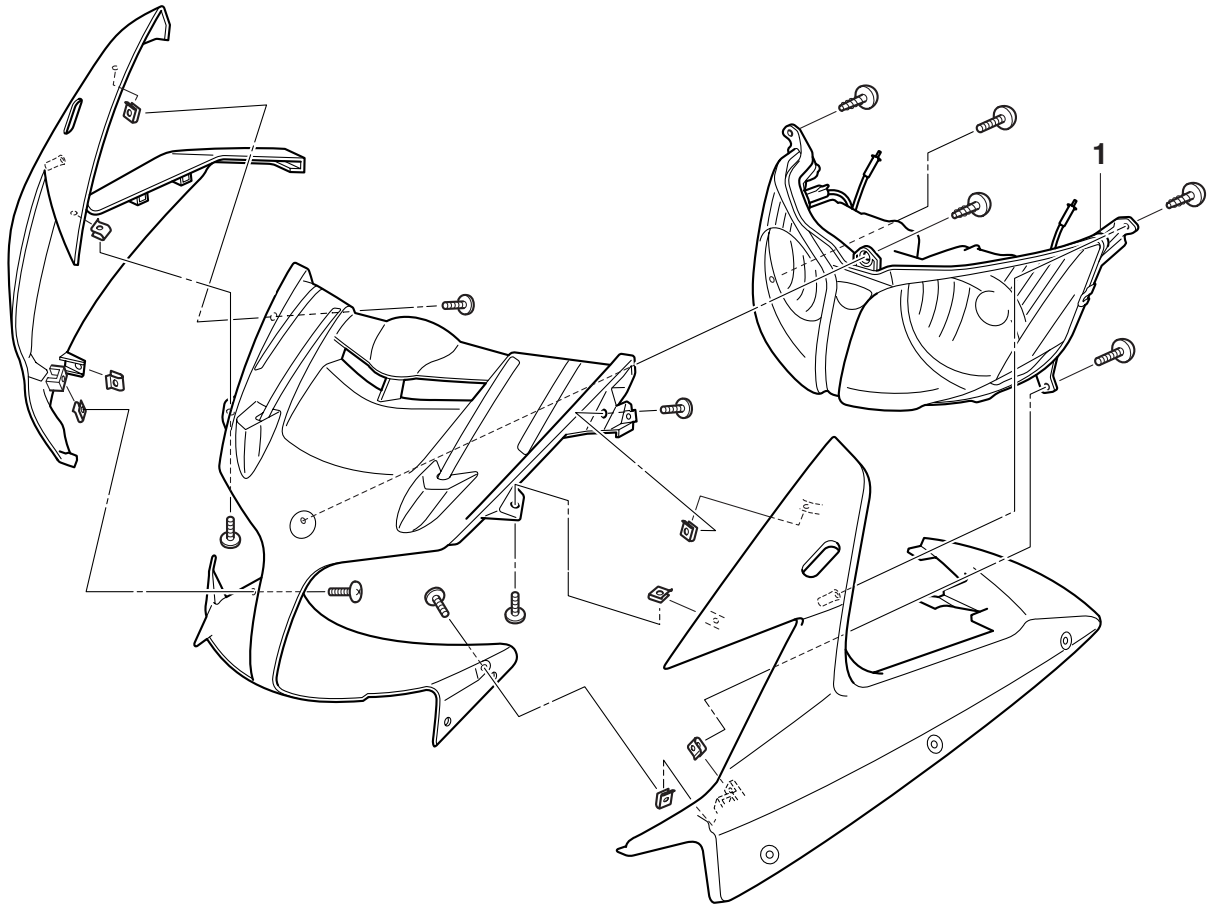
GENERAL CHASSIS

Disassembling the front cowling assembly



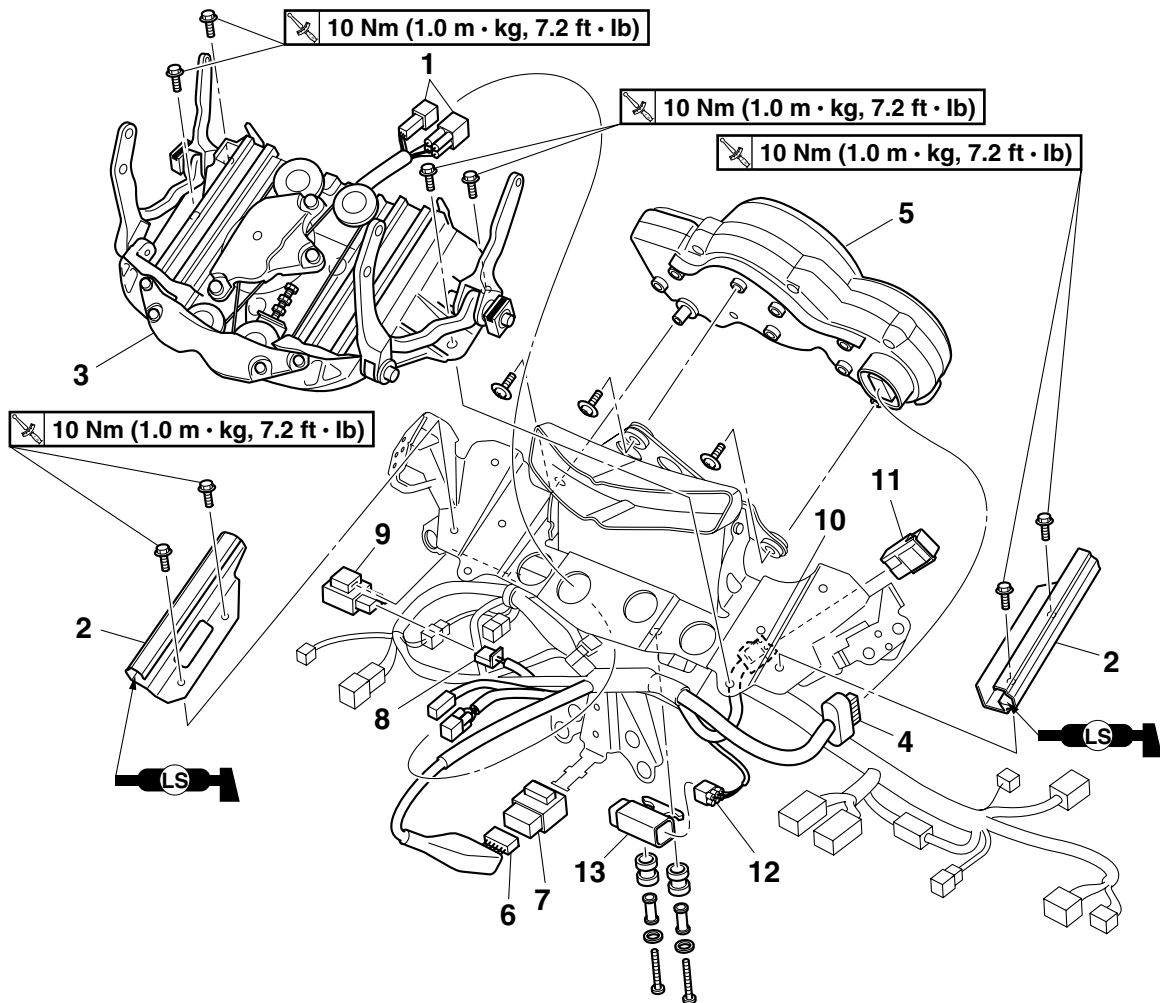
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------|------|--|
| | Front cowling assembly | | Refer to "Removing the front cowling assembly". |
| 1 | Windshield outer bracket | 1 | |
| 2 | Windshield | 1 | |
| 3 | Windshield upper inner bracket | 1 | |
| 4 | Windshield lower inner bracket | 1 | |
| 5 | Rearview mirror | 2 | |
| 6 | Accessory box solenoid coupler | 1 | Disconnect. |
| 7 | Auxiliary DC jack coupler | 1 | Disconnect. |
| 8 | Accessory box | 1 | |
| 9 | Accessory box solenoid | 1 | |
| 10 | Headlight coupler | 2 | Disconnect. |
| 11 | Auxiliary light coupler | 2 | Disconnect. |
| 12 | Front cowling | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

Removing the headlight assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| | Front cowling | | Refer to "Disassembling the front cowling assembly". |
| 1 | Headlight assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the windshield drive unit, meter assembly, and relays



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------------|------|--|
| | Front cowling stay | | Refer to "Disassembling the front cowling assembly". |
| 1 | Windshield drive unit coupler | 2 | Disconnect. |
| 2 | Windshield drive unit side rail | 2 | |
| 3 | Windshield drive unit | 1 | |
| 4 | Meter assembly coupler | 1 | Disconnect. |
| 5 | Meter assembly | 1 | |
| 6 | Relay unit coupler | 1 | Disconnect. |
| 7 | Relay unit | 1 | |
| 8 | Turn signal/hazard relay coupler | 1 | Disconnect. |
| 9 | Turn signal/hazard relay | 1 | |
| 10 | Headlight relay (dimmer) coupler | 1 | Disconnect. |
| 11 | Headlight relay (dimmer) | 1 | |
| 12 | Lean angle sensor coupler | 1 | Disconnect. |
| 13 | Lean angle sensor | 1 | |
| | | | For installation, reverse the removal procedure. |

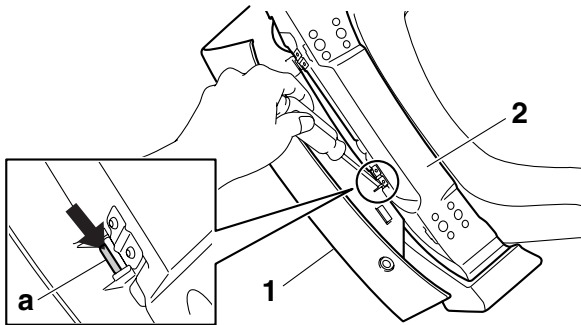
ET3P61037

REMOVING THE SIDE PANELS

1. Remove:
 - Side panel “1”

NOTE:

To release a pin on the side panel “1” from its corresponding hinge on the side cowling “2”, push the end “a” of the hinge with a flathead screwdriver.



ET3P61038

INSTALLING THE FRONT COWLING LEFT INNER PANEL 2

1. Install:
 - Front cowling left inner panel 2

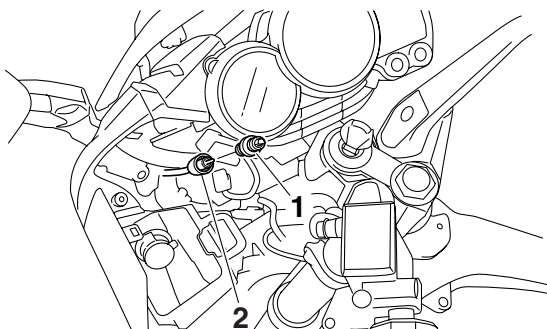


EC3P61038

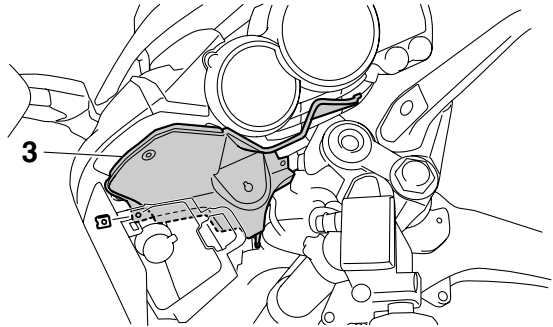
CAUTION:

When installing the panels onto the vehicle, be careful not to damage the panels or the vehicle itself.

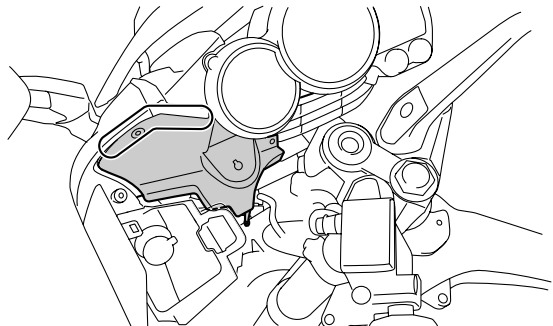
- a. Turn the main switch to “ON”, and then open the accessory box lid.
- b. Turn the handlebar completely to the left.
- c. Install the adjusting knob shaft “1” onto the left headlight beam adjusting cable “2”.



- d. Place front cowling left inner panel 2 “3” between the front cowling assembly and the steering stem.



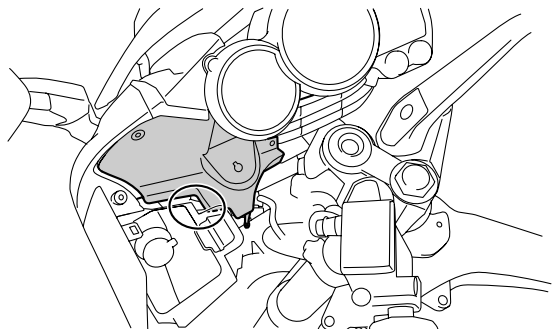
- e. Fit the top and side of inner panel 2 into the front cowling assembly to the left of the meter assembly.



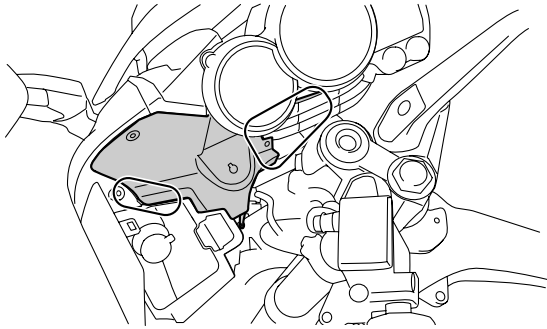
- f. Fit inner panel 2 under the right side of the accessory box.

NOTE:

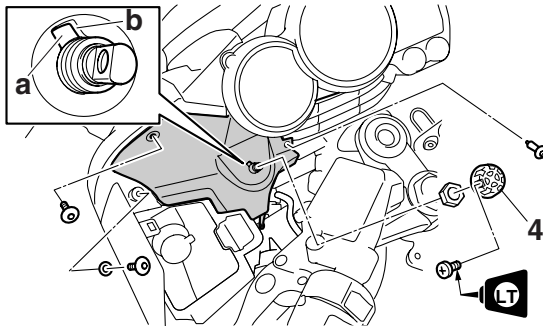
Pull the front cowling assembly outward when fitting the panel under the accessory box.



- g. Fit the lower left corner of inner panel 2 into the front cowling assembly in front of the accessory box, making sure to align the bolt hole in the panel with the bolt hole in the cowling.
- h. Push inner panel 2 inward, under the meter assembly.



- i. Insert the adjusting knob shaft into the hole in inner panel 2, making sure to align the projection "a" on the shaft's sleeve with the slot "b" in the panel, and then install the nut.
- j. Install the headlight beam adjusting knob "4".
- k. Install the hexagon socket bolts and the quick fastener.



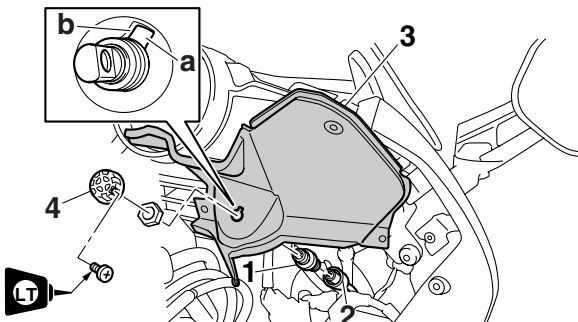
ET3P61039

INSTALLING THE FRONT COWLING RIGHT INNER PANEL 2

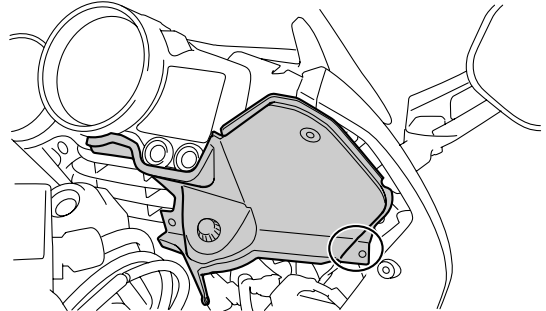
1. Install:

- Front cowling right inner panel 2

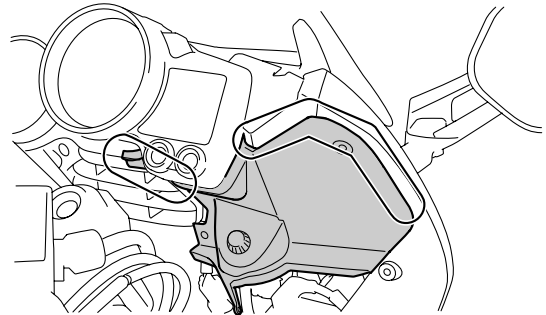
- a. Turn the handlebar completely to the right.
- b. Install the adjusting knob shaft "1" onto the right headlight beam adjusting cable "2".
- c. Insert the adjusting knob shaft into the hole in front cowling right inner panel 2 "3", making sure to align the projection "a" on the shaft's sleeve with the slot "b" in the panel, and then install the nut.
- d. Install the headlight beam adjusting knob "4".



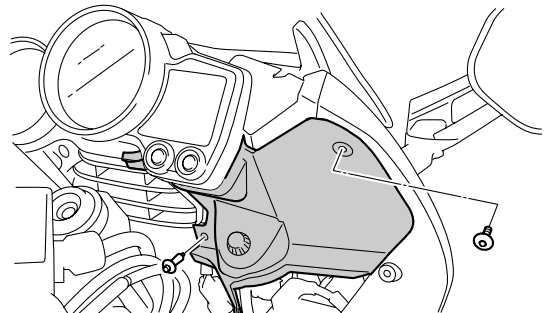
- e. Fit the lower right corner of inner panel 2 into the front cowling assembly, making sure to align the bolt hole in the panel with the bolt hole in the cowling.



- f. Fit the top and side of inner panel 2 into the front cowling assembly to the right of the meter assembly, and then push the panel inward, under the meter assembly.



- g. Install the hexagon socket bolt and the quick fastener.



ET3P61040

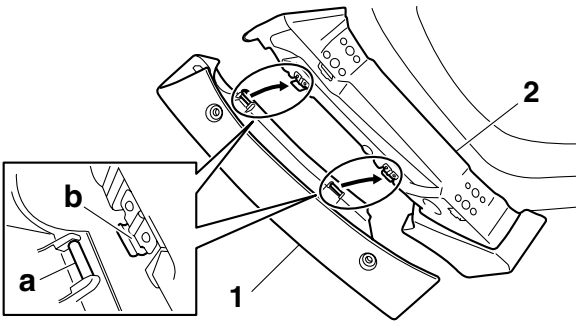
INSTALLING THE SIDE PANELS

1. Install:

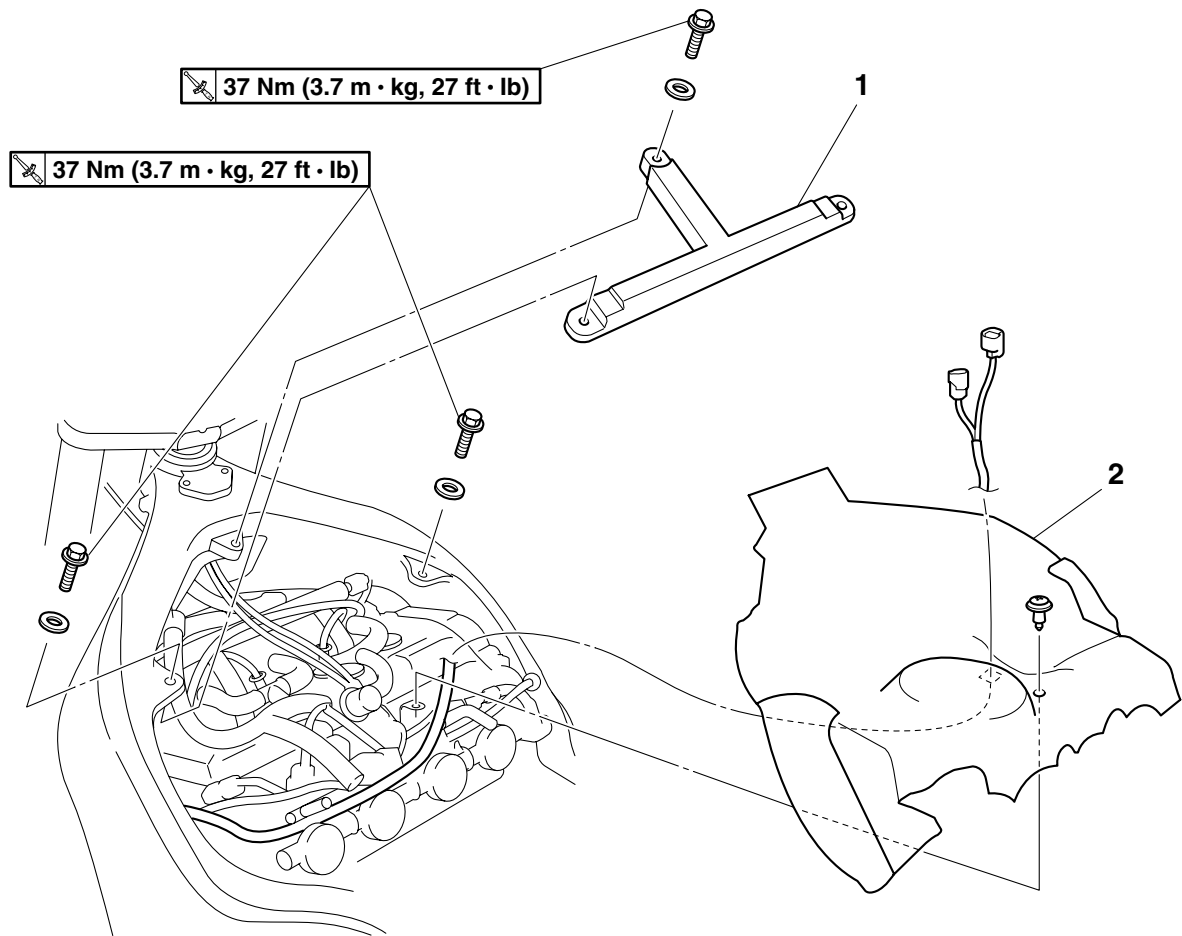
- Side panels "1"

NOTE:

Be sure to fit each pin "a" on the side panels "1" into the groove "b" in its corresponding hinge on the side cowlings "2".

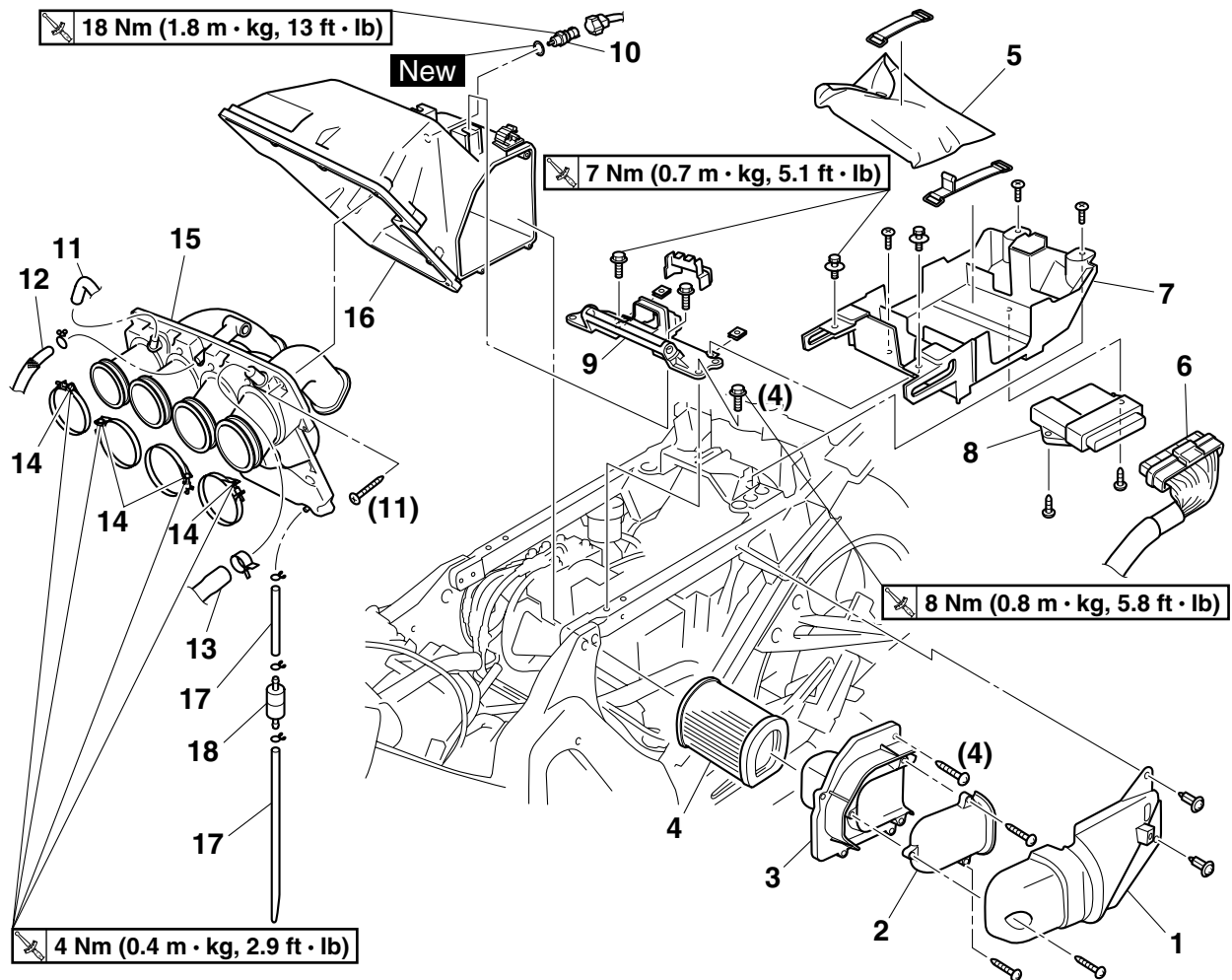


Removing the T-bar



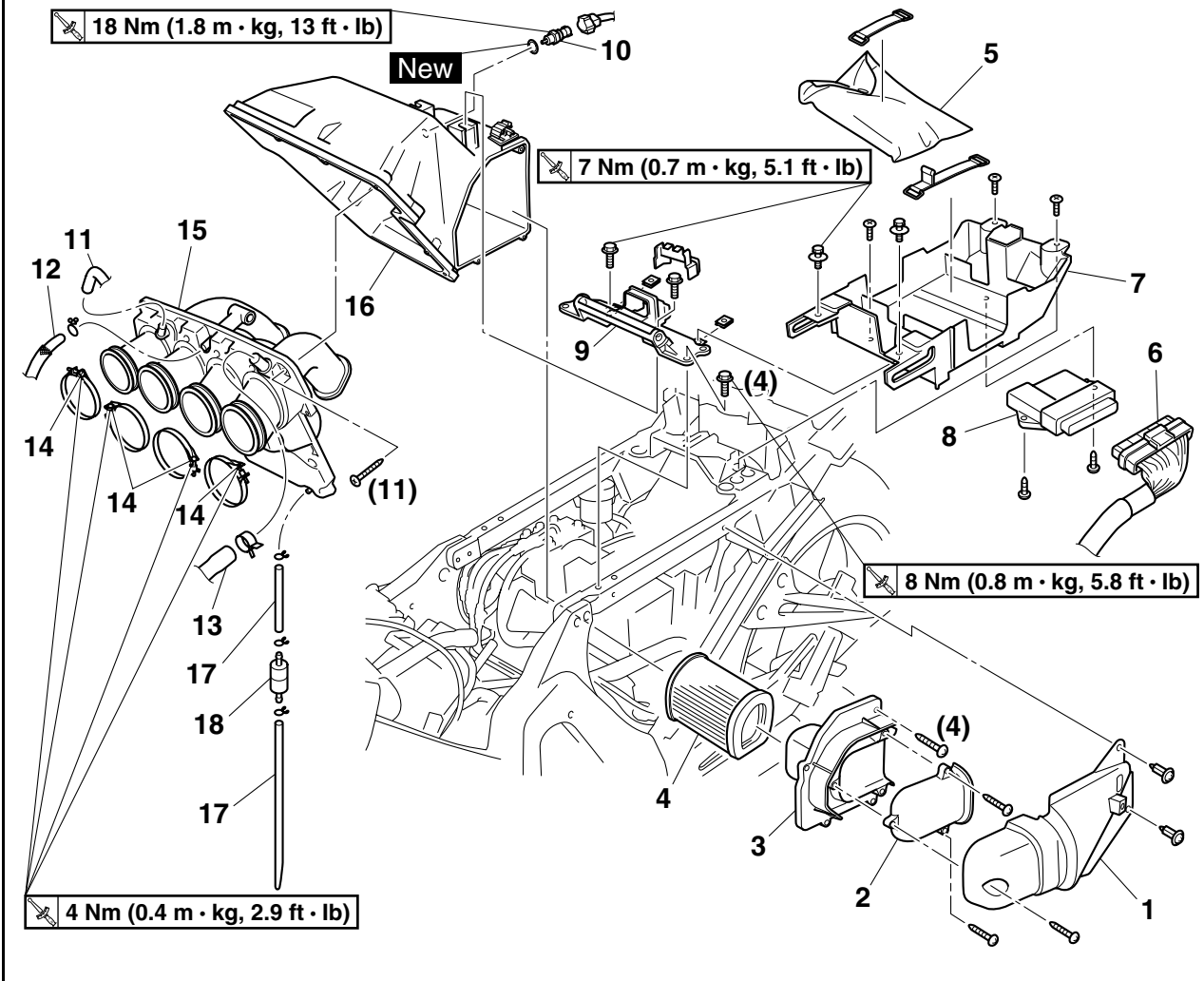
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| | Rider seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| 1 | T-bar | 1 | |
| 2 | Heat protector | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the air filter case



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---|------|---|
| | Left side cover/T-bar | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| 1 | Air shroud | 1 | |
| 2 | Air duct | 1 | |
| 3 | Air filter case cover | 1 | |
| 4 | Air filter element | 1 | |
| 5 | Tool kit | 1 | |
| 6 | ECU coupler | 1 | Disconnect. |
| 7 | Storage compartment | 1 | |
| 8 | ECU (engine control unit) | 1 | |
| 9 | Rear lower fuel tank bracket | 1 | |
| 10 | Intake air temperature sensor | 1 | |
| 11 | Bypass air unit inlet hose | 1 | Disconnect. |
| 12 | Crankcase breather hose | 1 | Disconnect. |
| 13 | Air induction system hose (air filter case joint assembly to 3-way joint) | 1 | Disconnect. |
| 14 | Air filter case joint clamp screw | 4 | Loosen. |

Removing the air filter case

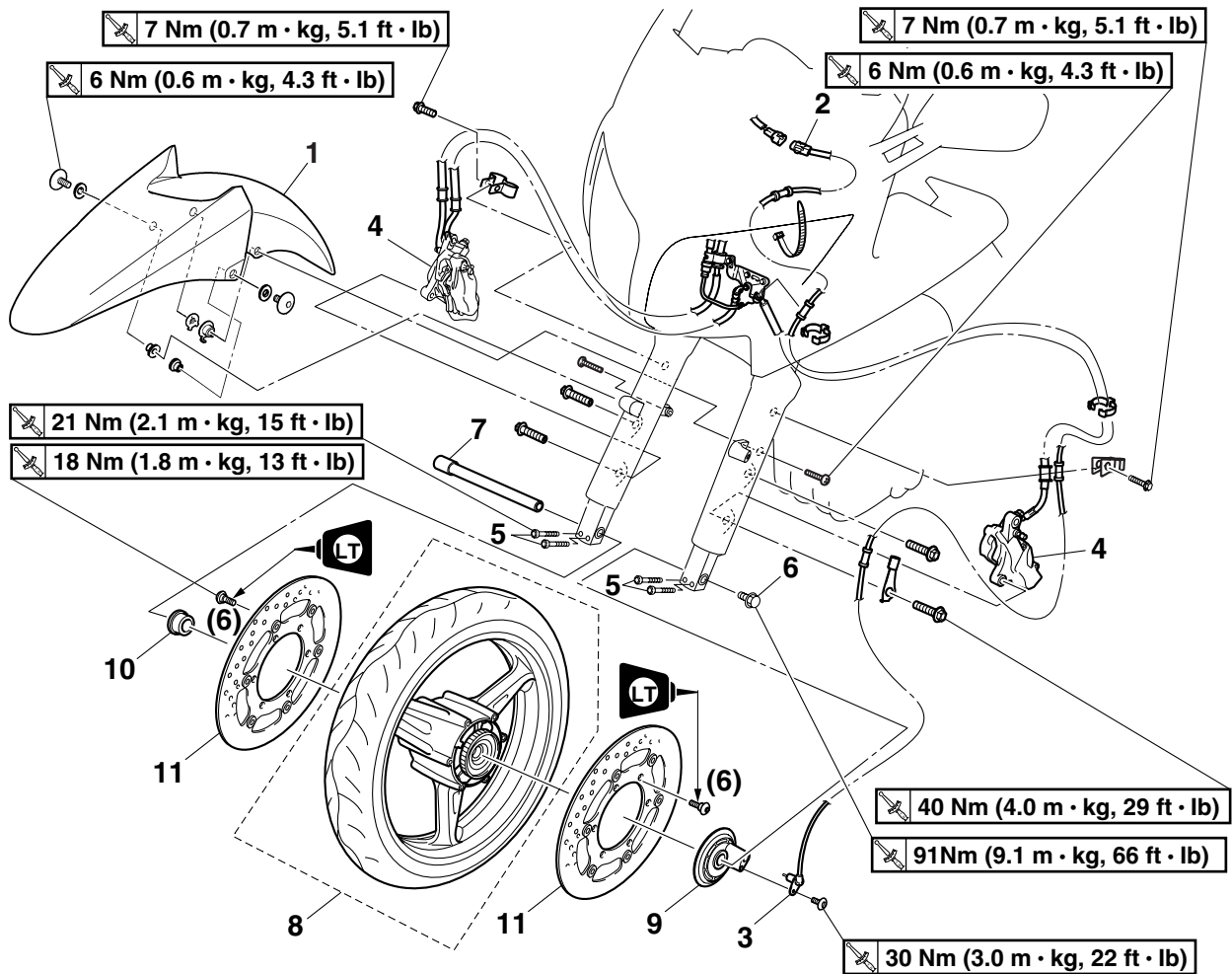


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------|------|--|
| 15 | Air filter case joint assembly | 1 | |
| 16 | Air filter case | 1 | |
| 17 | Air filter case breather hose | 2 | |
| 18 | Filter assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS21880

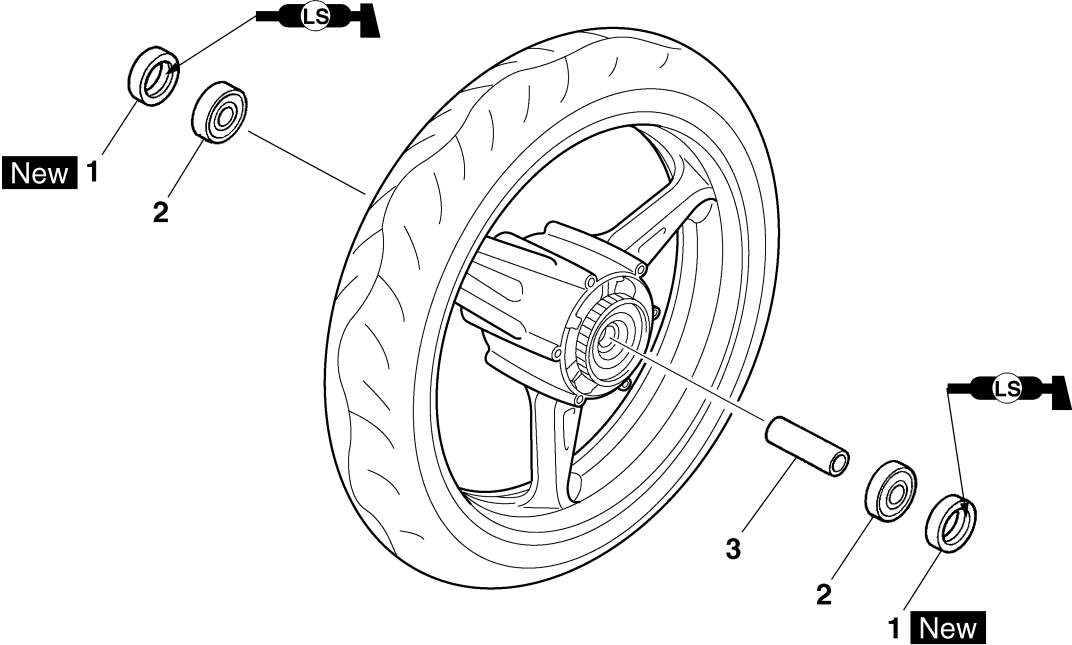
FRONT WHEEL

Removing the front wheel, brake discs, wheel sensor, and sensor housing



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------|------|--|
| | Rider seat/T-bar | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| 1 | Front fender | 1 | |
| 2 | Front wheel sensor coupler | 1 | Disconnect. |
| 3 | Front wheel sensor | 1 | |
| 4 | Front brake caliper | 2 | |
| 5 | Front wheel axle pinch bolt | 4 | Loosen. |
| 6 | Front wheel axle bolt | 1 | |
| 7 | Front wheel axle | 1 | |
| 8 | Front wheel | 1 | |
| 9 | Front wheel sensor housing | 1 | |
| 10 | Collar | 1 | |
| 11 | Front brake disc | 2 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the front wheel



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

EAS21900

REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Remove:
 - Front wheel sensor
 - Front brake calipers

EC3P61020

CAUTION:

- Be sure not to contact the sensor electrode to any metal part when removing the front wheel sensor from the sensor housing.
- Do not operate the brake lever and brake pedal when removing the brake calipers.

3. Elevate:
 - Front wheel

NOTE:

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

EAS21910

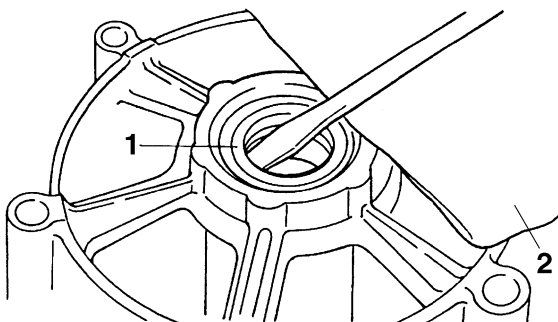
DISASSEMBLING THE FRONT WHEEL

1. Remove:
 - Oil seals
 - Wheel bearings

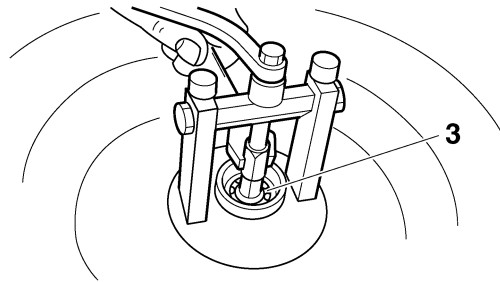
- a. Clean the outside of the front wheel hub.
- b. Remove the oil seals "1" with a flathead screwdriver.

NOTE:

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



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



EAS21920

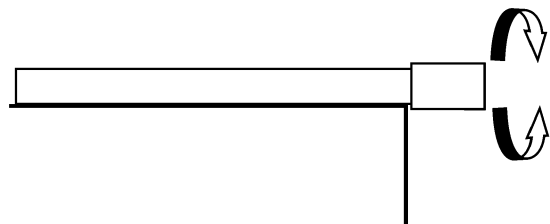
CHECKING THE FRONT WHEEL

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

EWA13460

WARNING

Do not attempt to straighten a bent wheel axle.



2. Check:
 - Tire
 - Front wheel
 - Damage/wear → Replace.
 - Refer to "CHECKING THE TIRES" on page 3-32 and "CHECKING THE WHEELS" on page 3-34.
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)

EAS21960

ASSEMBLING THE FRONT WHEEL

1. Install:

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

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

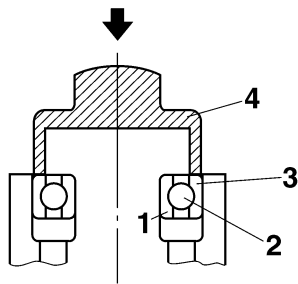
EC3P61021

CAUTION:

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

NOTE:

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



EAS21970

ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:

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

1. Remove:

- Balancing weight(s)

2. Find:

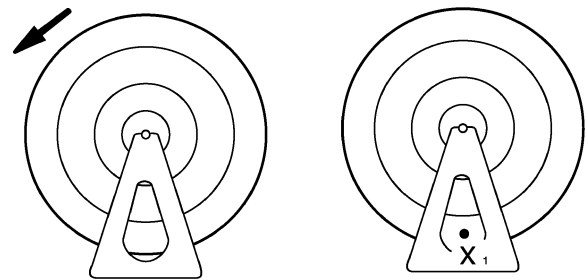
- Front wheel's heavy spot

NOTE:

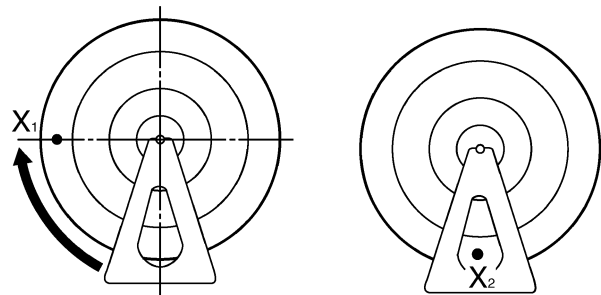
Place the front wheel on a suitable balancing stand.

a. Spin the front wheel.

b. When the front wheel stops, put an "X₁" mark at the bottom of the wheel.



- Turn the front wheel 90° so that the "X₁" mark is positioned as shown.
- Release the front wheel.
- When the wheel stops, put an "X₂" mark at the bottom of the wheel.



- Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.
- The spot where all the marks come to rest is the front wheel's heavy spot "X".

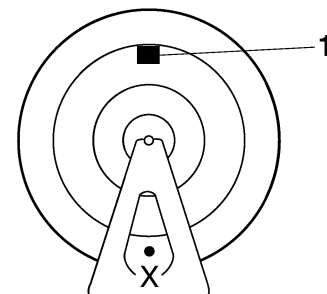
3. Adjust:

- Front wheel static balance

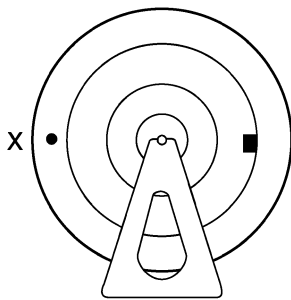
a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

NOTE:

Start with the lightest weight.



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



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

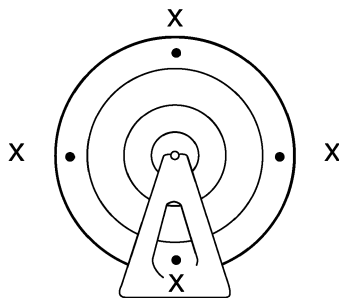


4. Check:

- Front wheel static balance



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



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



EAS22000

INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)

1. Install:

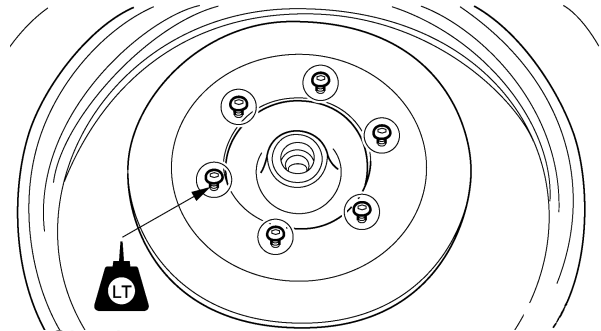
- Front brake discs



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

NOTE:

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



2. Check:

- Front brake discs
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-30.

3. Lubricate:

- Oil seal lips



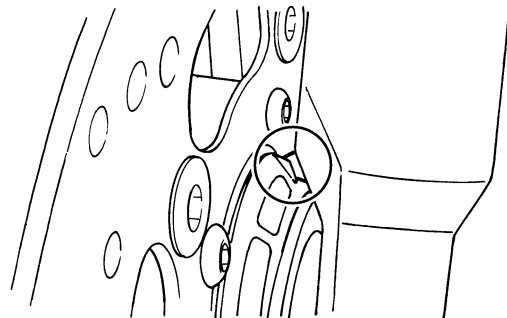
Recommended lubricant
Lithium-soap-based grease

4. Install:

- Collar
- Front wheel sensor housing
- Front wheel

NOTE:

Align the slot in the front wheel sensor housing with the projection of the front fork before assembly.



5. Install:

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



Front wheel axle bolt
91 Nm (9.1 m·kg, 66 ft·lb)
Front wheel axle pinch bolt
21 Nm (2.1 m·kg, 15 ft·lb)

EC3P61022

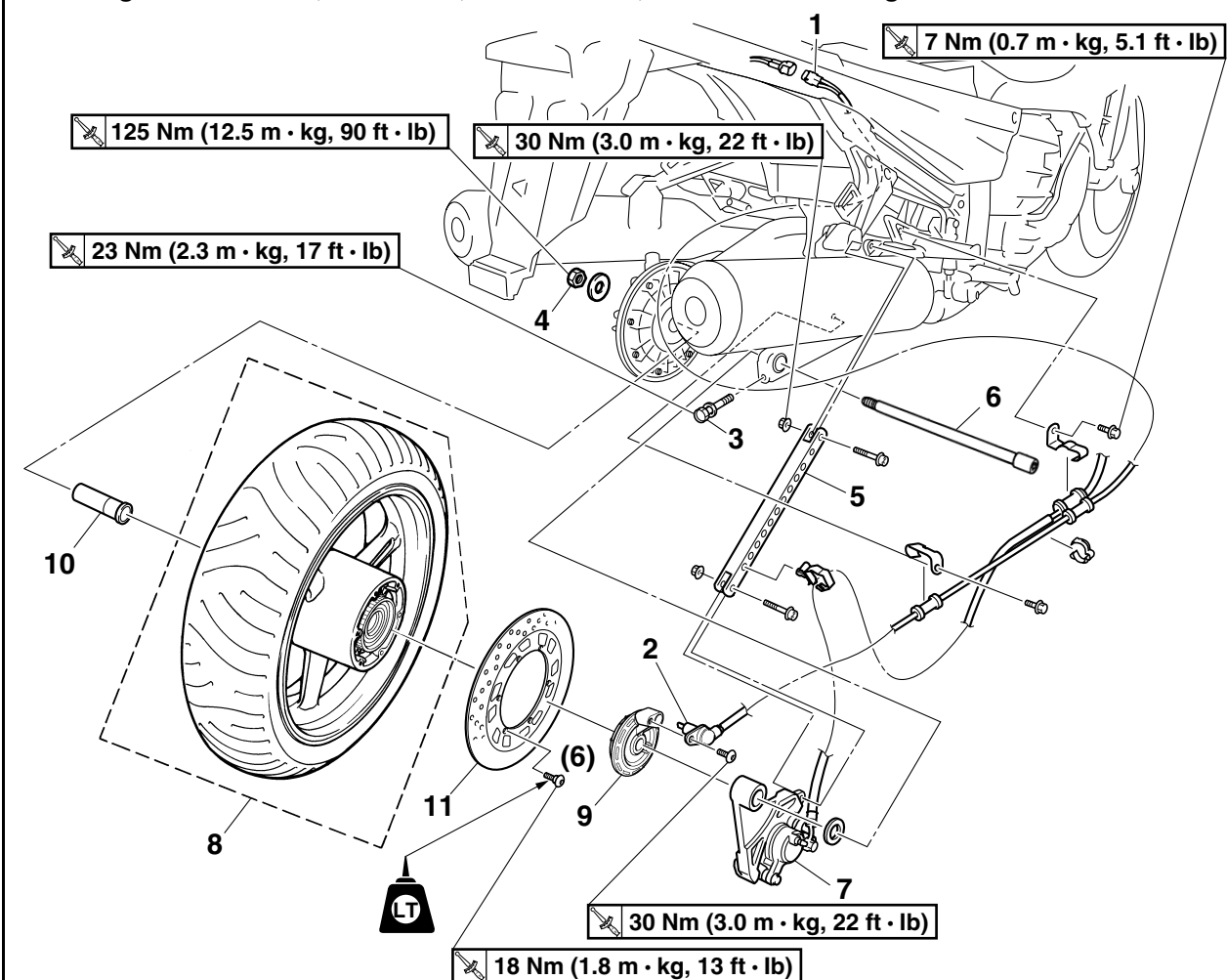
CAUTION:

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

EAS22030

REAR WHEEL

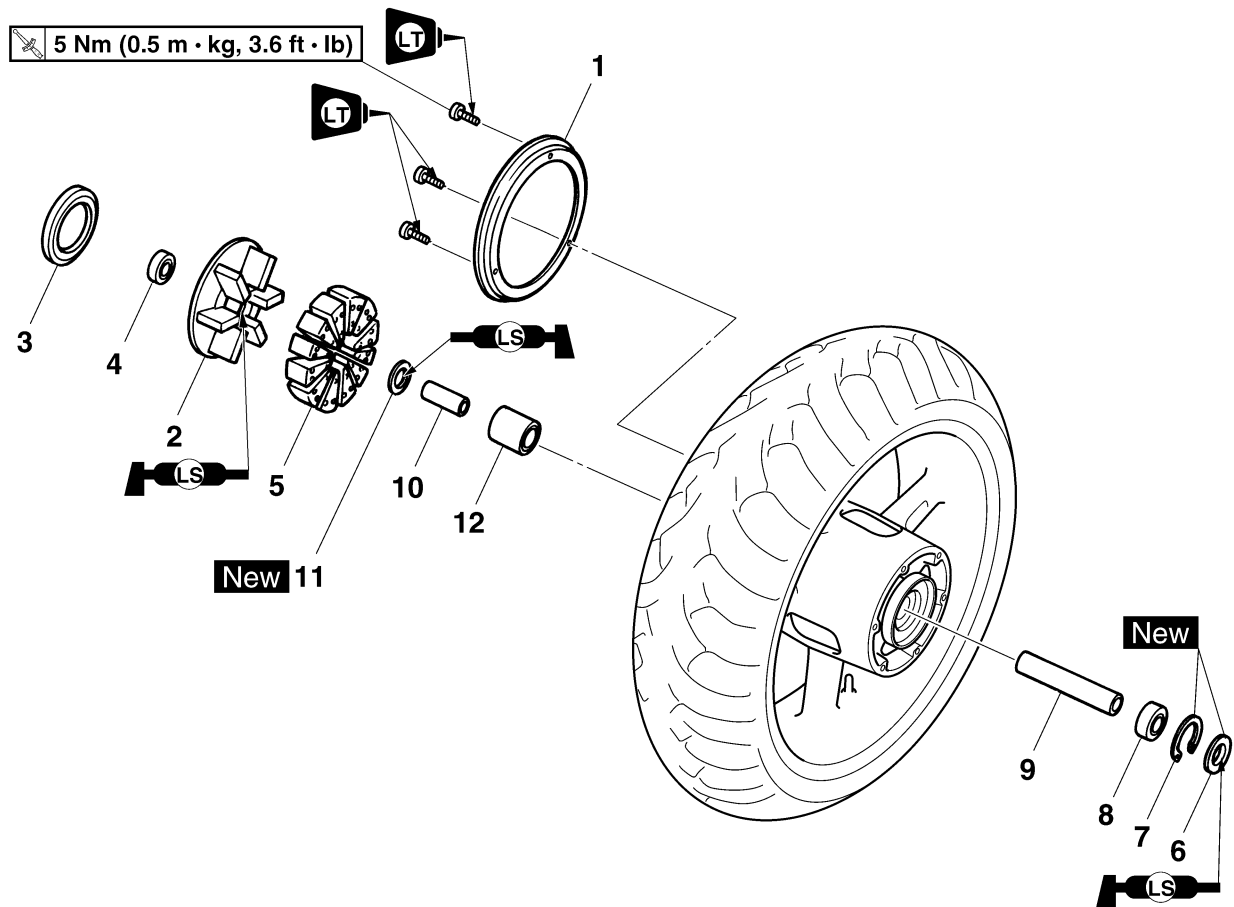
Removing the rear wheel, brake disc, wheel sensor, and sensor housing



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| | Storage compartment | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Rear wheel sensor coupler | 1 | Disconnect. |
| 2 | Rear wheel sensor | 1 | |
| 3 | Rear wheel axle pinch bolt | 1 | Loosen. |
| 4 | Rear wheel axle nut | 1 | |
| 5 | Brake torque rod | 1 | |
| 6 | Rear wheel axle | 1 | |
| 7 | Rear brake caliper | 1 | |
| 8 | Rear wheel | 1 | |
| 9 | Rear wheel sensor housing | 1 | |
| 10 | Collar | 1 | |
| 11 | Rear brake disc | 1 | |
| | | | For installation, reverse the removal procedure. |

REAR WHEEL

Disassembling the rear wheel



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------|------|--|
| 1 | Dust cover | 1 | |
| 2 | Rear wheel drive hub | 1 | |
| 3 | Dust seal | 1 | |
| 4 | Wheel bearing | 1 | |
| 5 | Rear wheel drive hub damper | 6 | |
| 6 | Oil seal | 1 | |
| 7 | Circlip | 1 | |
| 8 | Wheel bearing | 1 | |
| 9 | Spacer | 1 | |
| 10 | Spacer | 1 | |
| 11 | Oil seal | 1 | |
| 12 | Bearing | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS22050

REMOVING THE REAR WHEEL

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

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

2. Remove:

- Rear wheel sensor
- Rear wheel axle nut
- Brake torque rod
- Rear wheel axle
- Rear brake caliper
- Rear wheel
- Rear wheel sensor housing

EC3P61024

CAUTION:

- Be sure not to contact the sensor electrode to any metal part when removing the rear wheel sensor from the sensor housing.
- Do not operate the brake pedal when removing the brake caliper.

NOTE:

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

EAS22080

DISASSEMBLING THE REAR WHEEL

1. Remove:

- Oil seals
- Wheel bearings

Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-15.

EAS22090

CHECKING THE REAR WHEEL

1. Check:

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

Refer to "CHECKING THE FRONT WHEEL" on page 4-15.

2. Check:

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

Refer to "CHECKING THE TIRES" on page 3-32 and "CHECKING THE WHEELS" on page 3-34.

3. Measure:

- Radial wheel runout
- Lateral wheel runout

Refer to "CHECKING THE FRONT WHEEL" on page 4-15.



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

EAS22200

MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR

EC3P61032

CAUTION:

- 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.

1. Check:

- Rear wheel sensor
- Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16.

2. Measure:

- Rear wheel sensor resistance
- Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16.

3. Check:

- Rear wheel sensor rotor
- Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16.

EAS22140

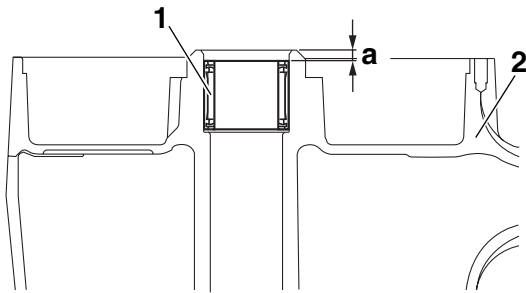
ASSEMBLING THE REAR WHEEL

1. Install:

- Bearing "1"



Installed depth of bearing "a"
3.5–4.5 mm (0.14–0.18 in)



2. Rear wheel

2. Install:

- Wheel bearings **New**
- Oil seals **New**
Refer to "ASSEMBLING THE FRONT WHEEL" on page 4-17.

EAS22150

ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:

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

1. Adjust:

- Rear wheel static balance
Refer to "ADJUSTING THE FRONT WHEEL STATIC BALANCE" on page 4-17.

EAS22170

INSTALLING THE REAR WHEEL (REAR BRAKE DISC)

1. Install:

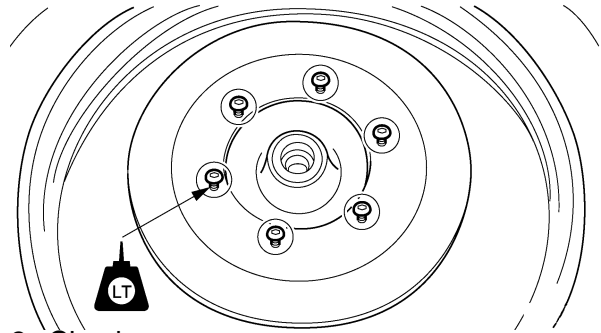
- Rear brake disc



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

NOTE:

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



2. Check:

- Rear brake disc
Refer to "CHECKING THE REAR BRAKE DISC" on page 4-43.

3. Lubricate:

- Oil seal lips



Recommended lubricant
Lithium-soap-based grease

4. Install:

- Rear wheel sensor housing
- Rear wheel
- Rear brake caliper
- Rear wheel axle
- Brake torque rod
- Rear wheel axle nut

NOTE:

- Align the slot "a" of the rear wheel sensor housing "1" with the projection "b" of the rear brake caliper bracket "2", and then assemble them.
- After assembling the rear wheel sensor housing and the rear brake caliper bracket, make sure that the projection "c" on the housing is aligned with the projection "d" on the bracket.

ECA14470

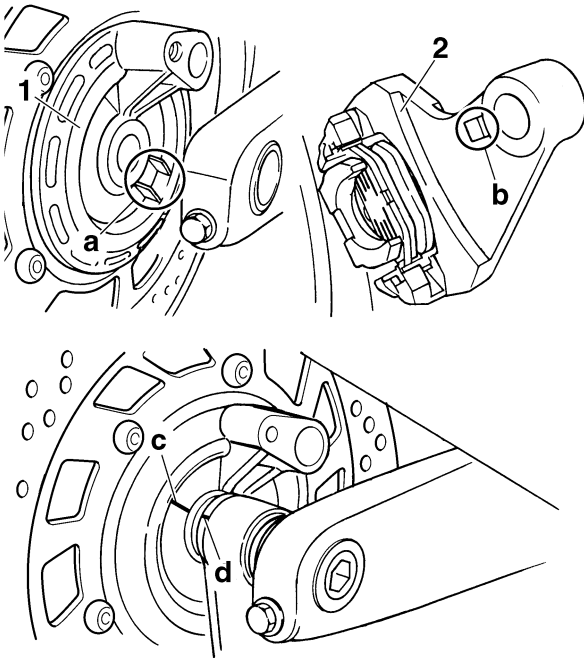
CAUTION:

Make sure there are no foreign materials in the wheel hub. Foreign materials cause damage to the inner sensor rotor and wheel sensor.

EWA13500

WARNING

Make sure the brake hose is routed properly.



5. Tighten:

- Brake torque rod nuts
- Rear wheel axle nut
- Rear wheel axle pinch bolt

| | |
|--|---|
| | Brake torque rod nut 30 Nm (3.0 m·kg, 22 ft·lb) Rear wheel axle nut 125 Nm (12.5 m·kg, 90 ft·lb) Rear wheel axle pinch bolt 23 Nm (2.3 m·kg, 17 ft·lb) |
|--|---|

6. Install:

- Rear wheel sensor

| | |
|--|--|
| | Rear wheel sensor bolt 30 Nm (3.0 m·kg, 22 ft·lb) |
|--|--|

ECA14500

CAUTION:

To route the rear wheel sensor lead, refer to “CABLE ROUTING” on page 2-45.

NOTE:

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

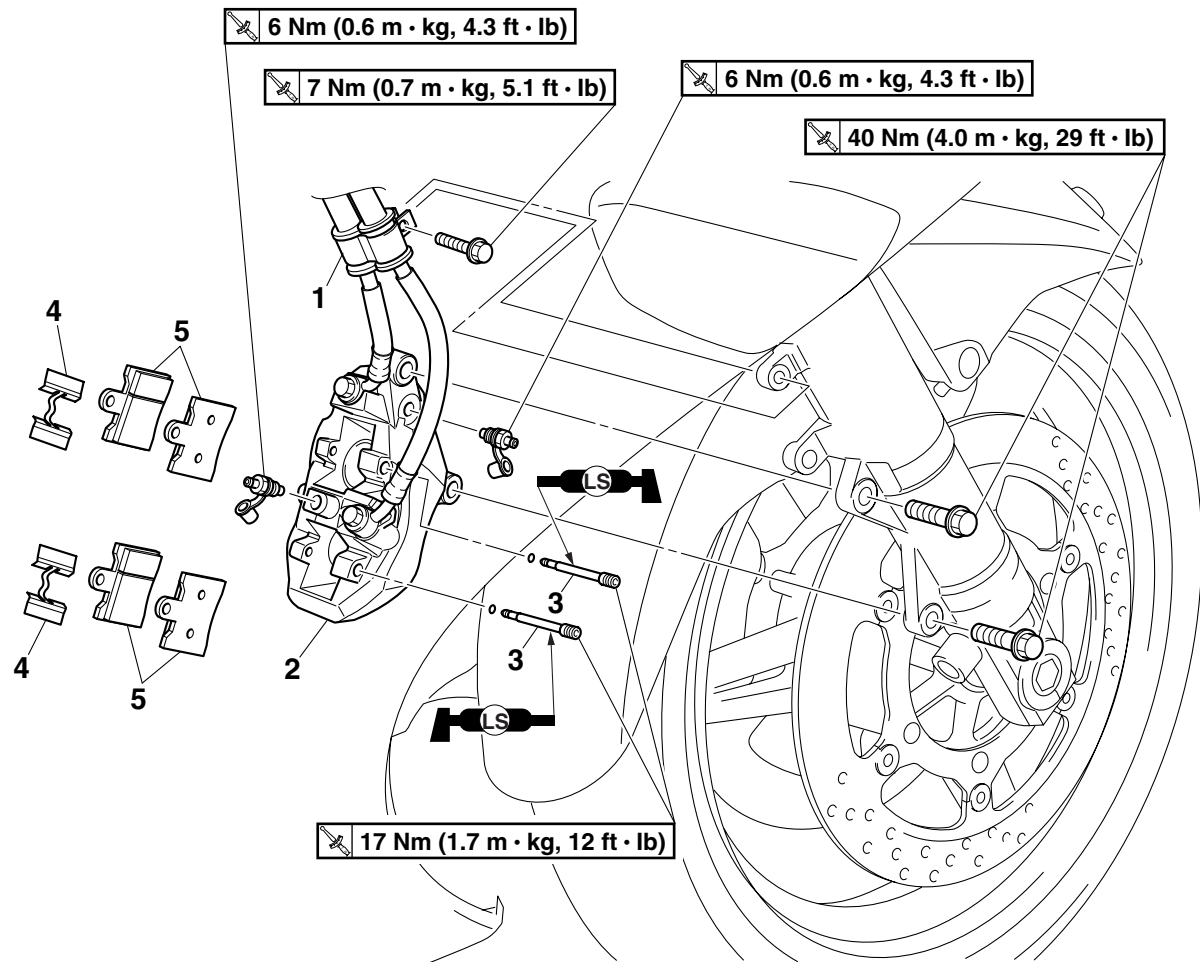
7. Check:

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

EAS22210

FRONT BRAKE

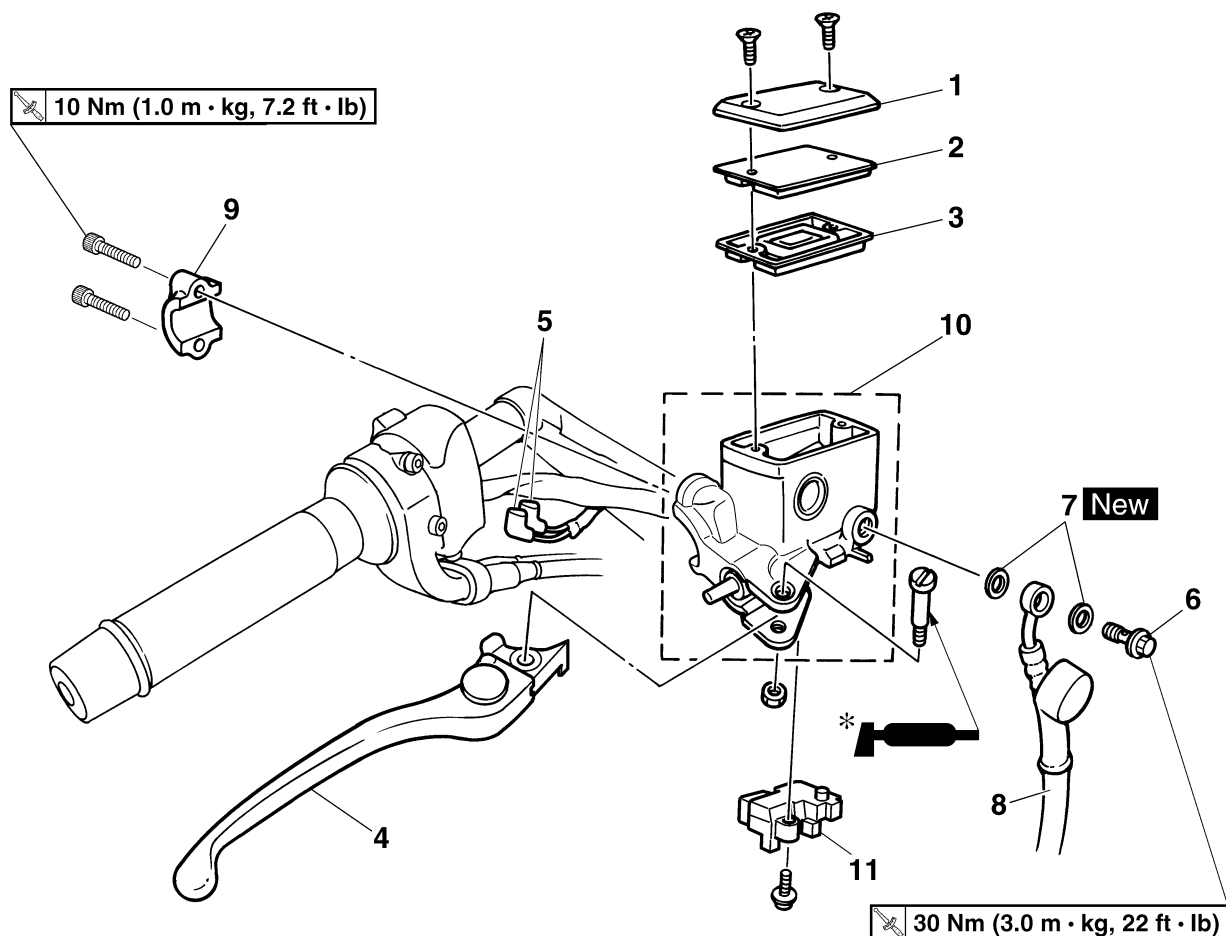
Removing the front brake pads



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

FRONT BRAKE

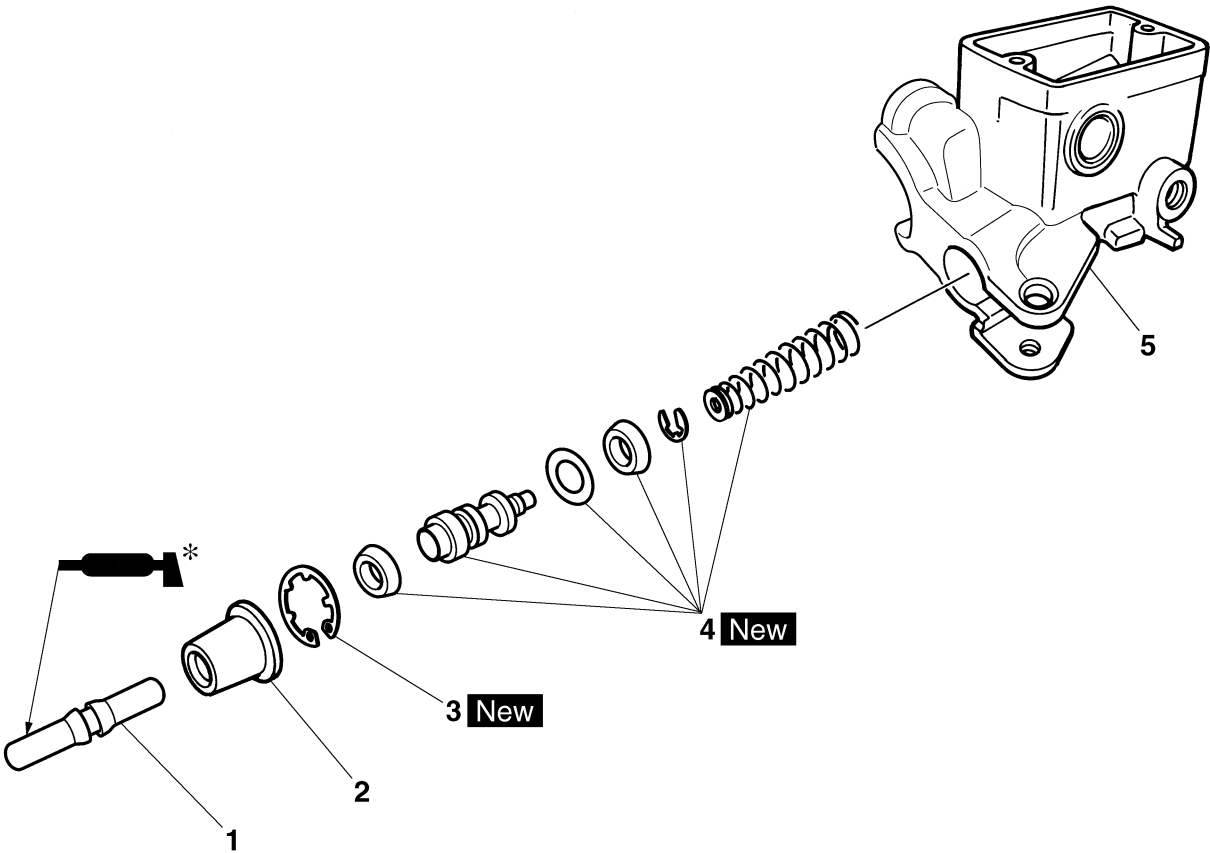
Removing the front brake master cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|--|
| | Brake fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23. |
| 1 | Brake master cylinder reservoir cap | 1 | |
| 2 | Brake master cylinder reservoir diaphragm holder | 1 | |
| 3 | Brake master cylinder reservoir diaphragm | 1 | |
| 4 | Brake lever | 1 | |
| 5 | Front brake light switch connector | 2 | Disconnect. |
| 6 | Brake hose union bolt | 1 | |
| 7 | Copper washer | 2 | |
| 8 | Brake hose (front brake master cylinder to hydraulic unit) | 1 | |
| 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. |

* Apply silicon grease

Disassembling the front brake master cylinder

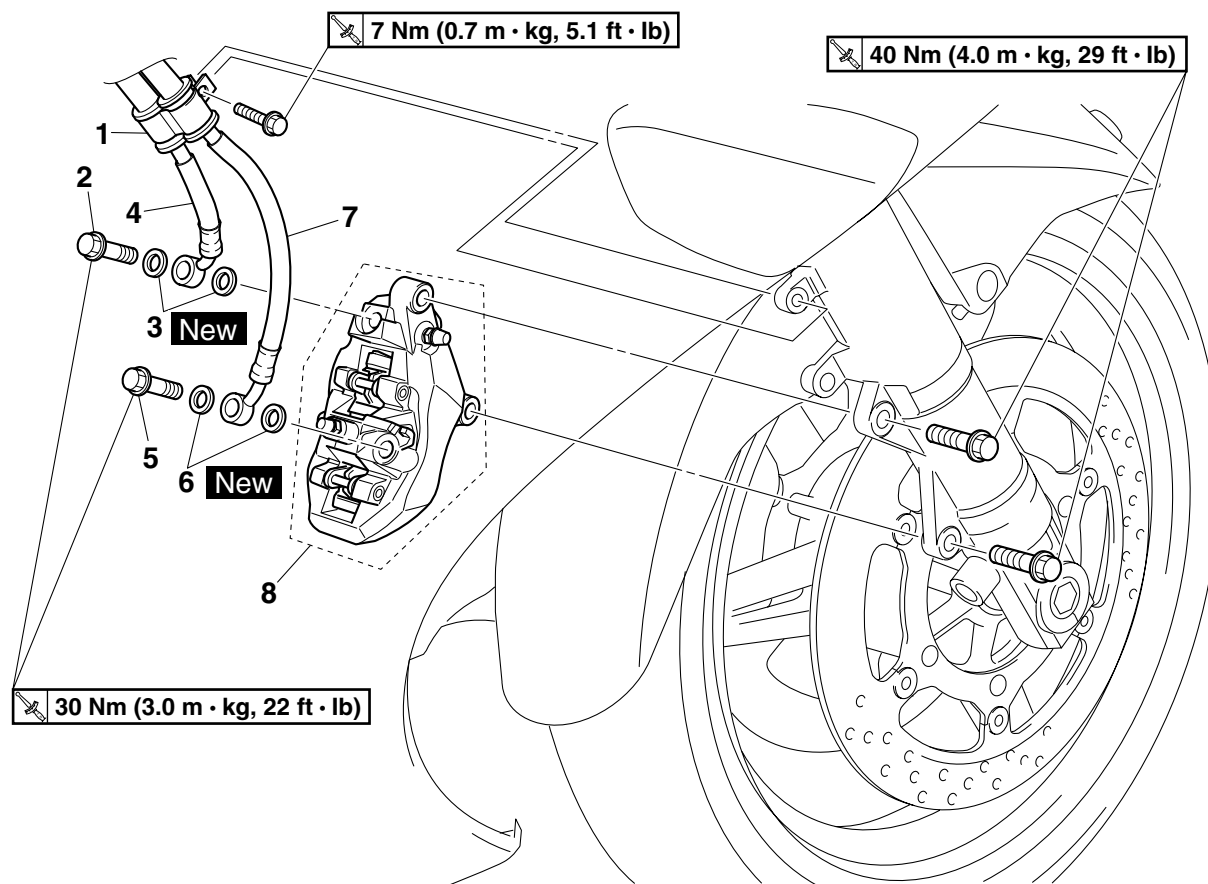


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------|------|--|
| 1 | Brake master cylinder push rod | 1 | |
| 2 | Dust boot | 1 | |
| 3 | Circlip | 1 | |
| 4 | Brake master cylinder kit | 1 | |
| 5 | Brake master cylinder body | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

* Apply silicon grease

FRONT BRAKE

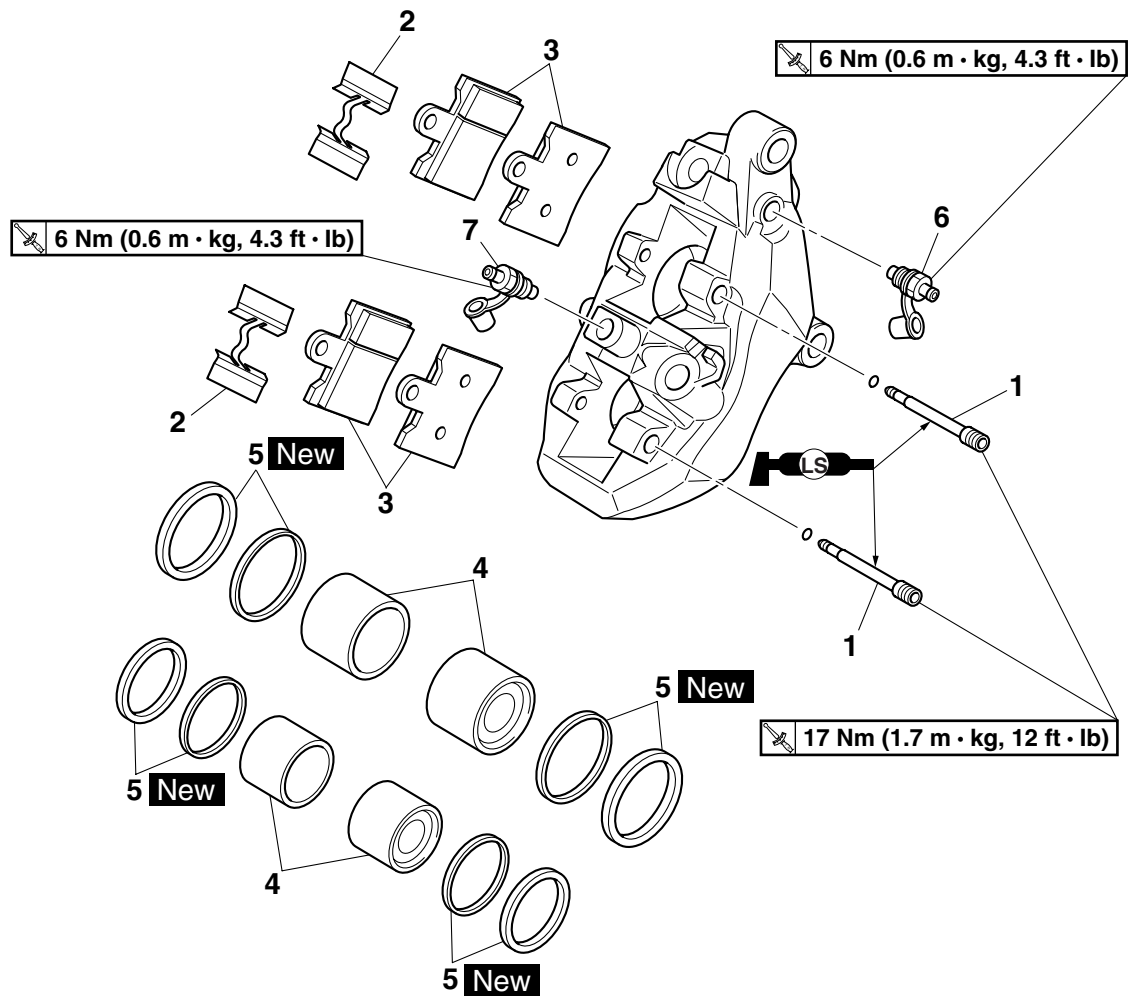
Removing the front brake calipers



| 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 3-23. |
| 1 | Brake hose holder | 1 | |
| 2 | Brake hose union bolt | 1 | |
| 3 | Copper washer | 2 | |
| 4 | Brake hose (hydraulic unit to front brake calipers) | 1 | |
| 5 | Brake hose union bolt (unified brake system) | 1 | Right side only. |
| 6 | Copper washer | 2 | Right side only. |
| 7 | Brake hose (metering valve to right front brake caliper) | 1 | Right side only. |
| 8 | Front brake caliper | 1 | |
| | | | For installation, reverse the removal procedure. |

FRONT BRAKE

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 bolt | 2 | |
| 2 | Brake pad spring | 2 | |
| 3 | Front brake pad | 4 | |
| 4 | Brake caliper piston | 4 | |
| 5 | Brake caliper piston seal | 8 | |
| 6 | Bleed screw | 1 | |
| 7 | Bleed screw | 1 | Right side only. |
| | | | For assembly, reverse the disassembly procedure. |

EAS22220

INTRODUCTION

EWA14100

WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

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

EAS22240

CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

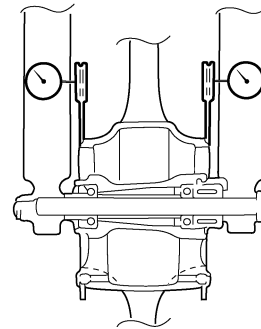
1. Remove:
 - Front wheel
Refer to "FRONT WHEEL" on page 4-13.
2. Check:
 - Brake disc
Damage/galling → Replace.
3. Measure:
 - Brake disc deflection
Out of specification → Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit
0.10 mm (0.0039 in)

- 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.

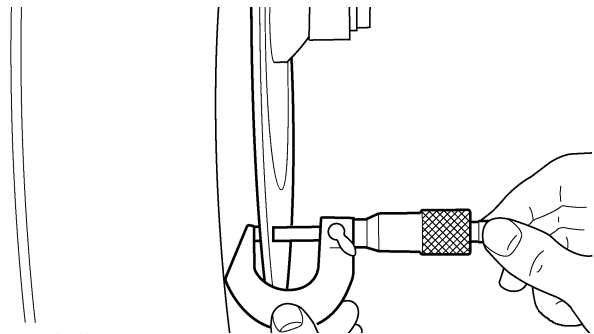
- e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.



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



Brake disc thickness limit
4.0 mm (0.16 in)



5. Adjust:
 - Brake disc deflection

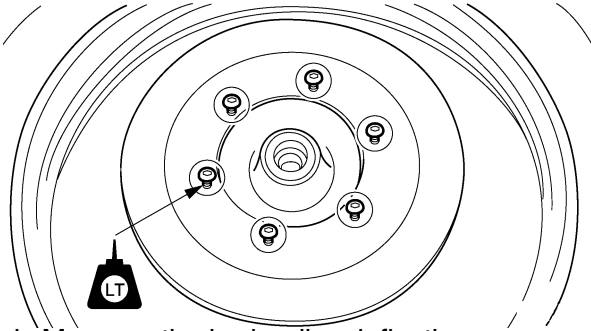
- a. Remove the brake disc.
- b. Rotate the brake disc by one bolt hole.
- c. Install the brake disc.



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

NOTE:

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



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



6. Install:
 - Front wheel
 Refer to "FRONT WHEEL" on page 4-13.

EAS22260

REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

NOTE:

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

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



Brake pad lining thickness (inner)

5.5 mm (0.22 in)

Limit

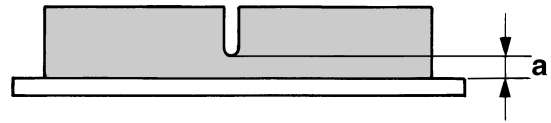
0.5 mm (0.02 in)

Brake pad lining thickness (outer)

5.5 mm (0.22 in)

Limit

0.5 mm (0.02 in)



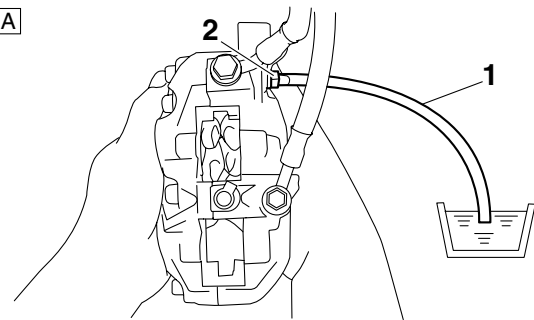
2. Install:
 - Brake pads
 - Brake pad spring

NOTE:

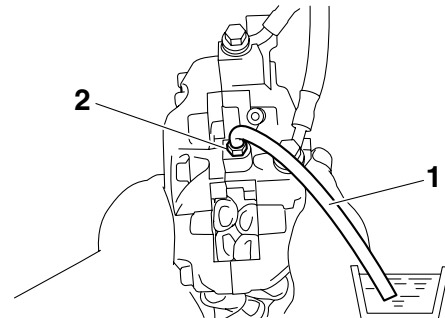
Always install new brake pads and a new brake pad spring as a set.

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

A



B



- A. Front brake
- B. Unified brake system

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



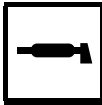
Bleed screw

6 Nm (0.6 m·kg, 4.3 ft·lb)

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



3. Lubricate:
- Brake pad bolts



Recommended lubricant
Lithium-soap-based grease

ECA14150

CAUTION:

- **Do not allow grease to contact the brake pads.**
- **Remove any excess grease.**

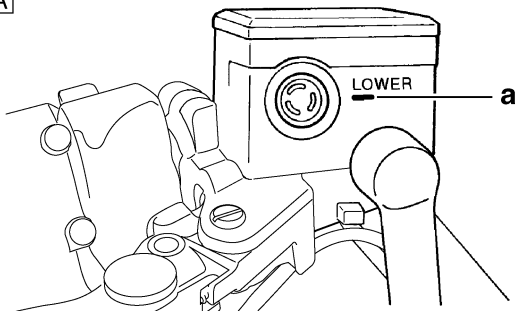
4. Install:
- Brake pad bolts
 - Brake caliper



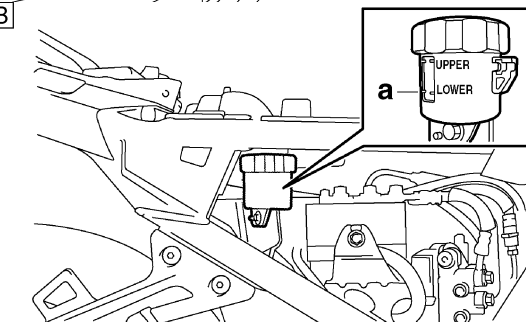
Brake pad bolt
17 Nm (1.7 m·kg, 12 ft·lb)
Brake caliper bolt
40 Nm (4.0 m·kg, 29 ft·lb)

5. Check:
- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.

A



B



- A. Front brake
B. Unified brake system

6. Check:
- Brake lever and brake pedal operation
Soft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-23.

EAS22300

REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

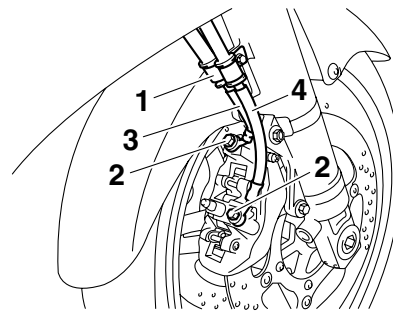
NOTE:

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

1. Remove:
- Brake hose holder “1”
 - Brake hose union bolts “2”
 - Copper washers
 - Brake hose (hydraulic unit to front brake calipers) “3”
 - Brake hose (metering valve to right front brake caliper) “4”

NOTE:

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

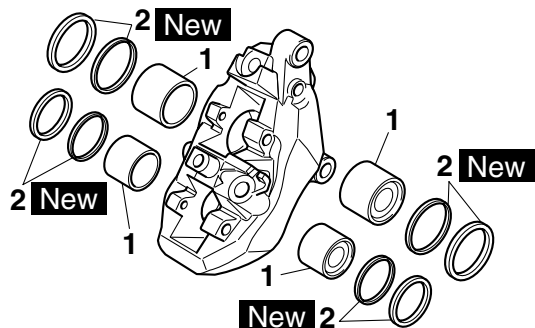


EAS22360

DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Remove:
- Brake caliper pistons “1”
 - Brake caliper piston seals “2”



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



EAS22390

EWA13600

EAS22410

EWA13620

EAS22440

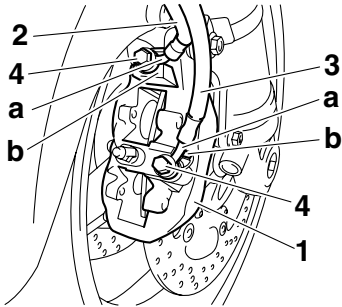
EWA13530

4-33

ECA14170

CAUTION:

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



2. Remove:

- Brake caliper

3. Install:

- Brake pads
- Brake pad springs
- Brake pad bolts
- Brake caliper
- Brake hose holder

Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-31.



Brake pad bolt
17 Nm (1.7 m·kg, 12 ft·lb)
Brake caliper bolt
40 Nm (4.0 m·kg, 29 ft·lb)
Brake hose holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

4. Fill:

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



Recommended fluid
DOT 4

EW3P61008

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

ECA13540

CAUTION:

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

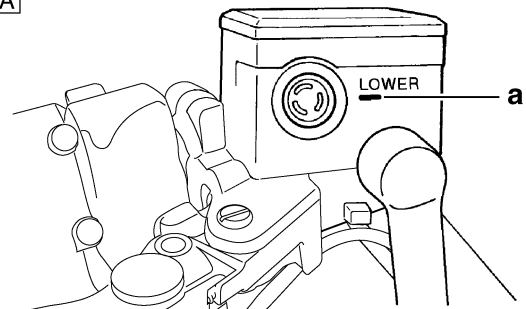
5. Bleed:

- Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

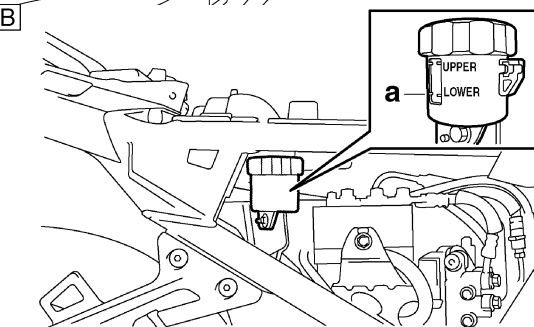
6. Check:

- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.

A



B



A. Front brake

B. Unified brake system

7. Check:

- Brake lever and brake pedal operation
Soft or spongy feeling → Bleed the brake system.
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

EAS22490

REMOVING THE FRONT BRAKE MASTER CYLINDER

NOTE:

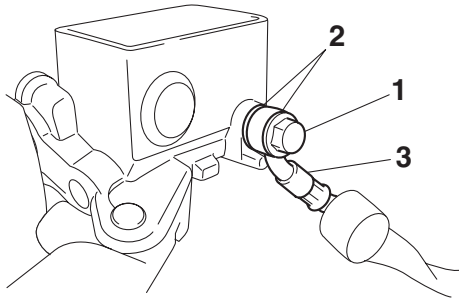
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:

- Brake hose union bolt "1"
- Copper washers "2"
- Brake hose (front brake master cylinder to hydraulic unit) "3"

NOTE:

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
Cracks/damage → Replace.
- Brake master cylinder reservoir diaphragm
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.



**Recommended fluid
DOT 4**

EAS22530

INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:

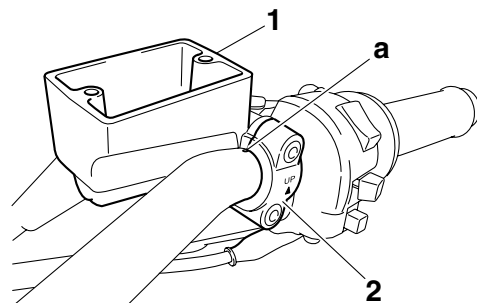
- Brake master cylinder "1"
- Brake master cylinder holder "2"



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

NOTE:

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



2. Install:

- Copper washers **New**
- Brake hose (front brake master cylinder to hydraulic unit)
- Brake hose union bolt



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

EWA13530

⚠ WARNING

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

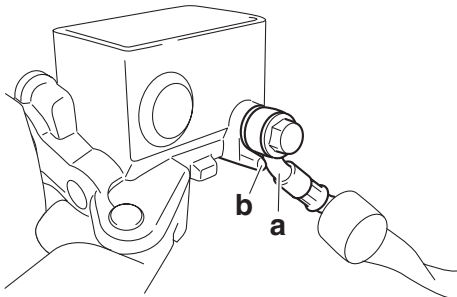
EC3P61025

CAUTION:

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

NOTE:

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



**Recommended fluid
DOT 4**

EW3P61008

⚠ 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 and brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

CAUTION:

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

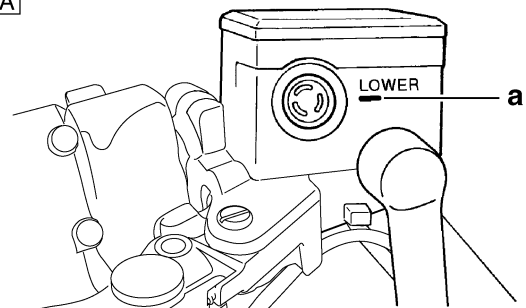
4. Bleed:

- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-23.

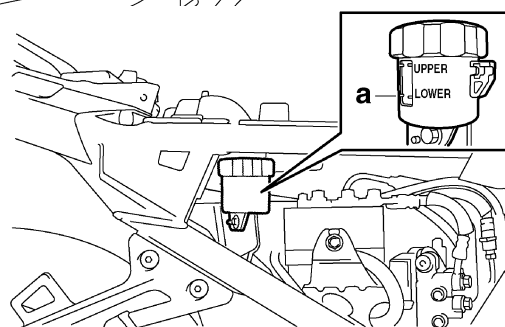
5. Check:

- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.

A



B



A. Front brake

B. Unified brake system

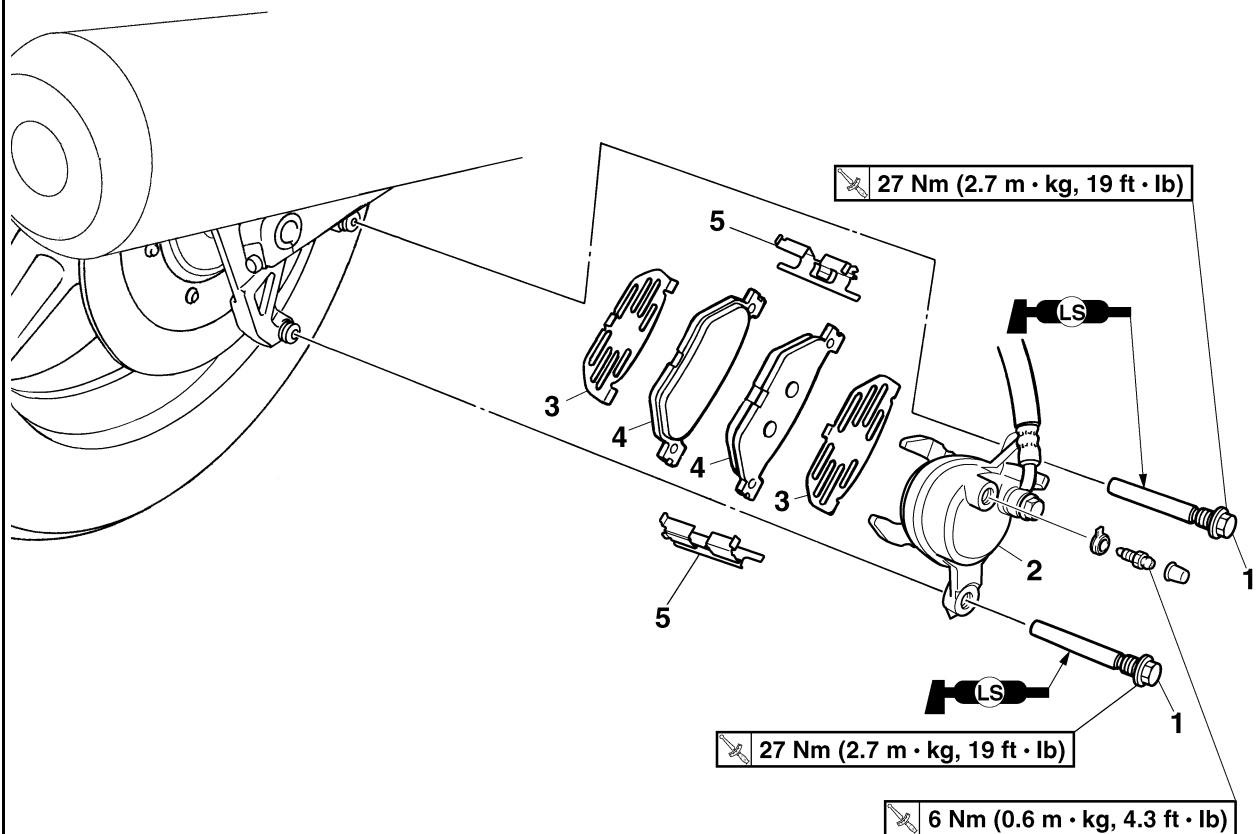
6. Check:

- Brake lever and brake pedal operation
Soft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-23.

EAS22550

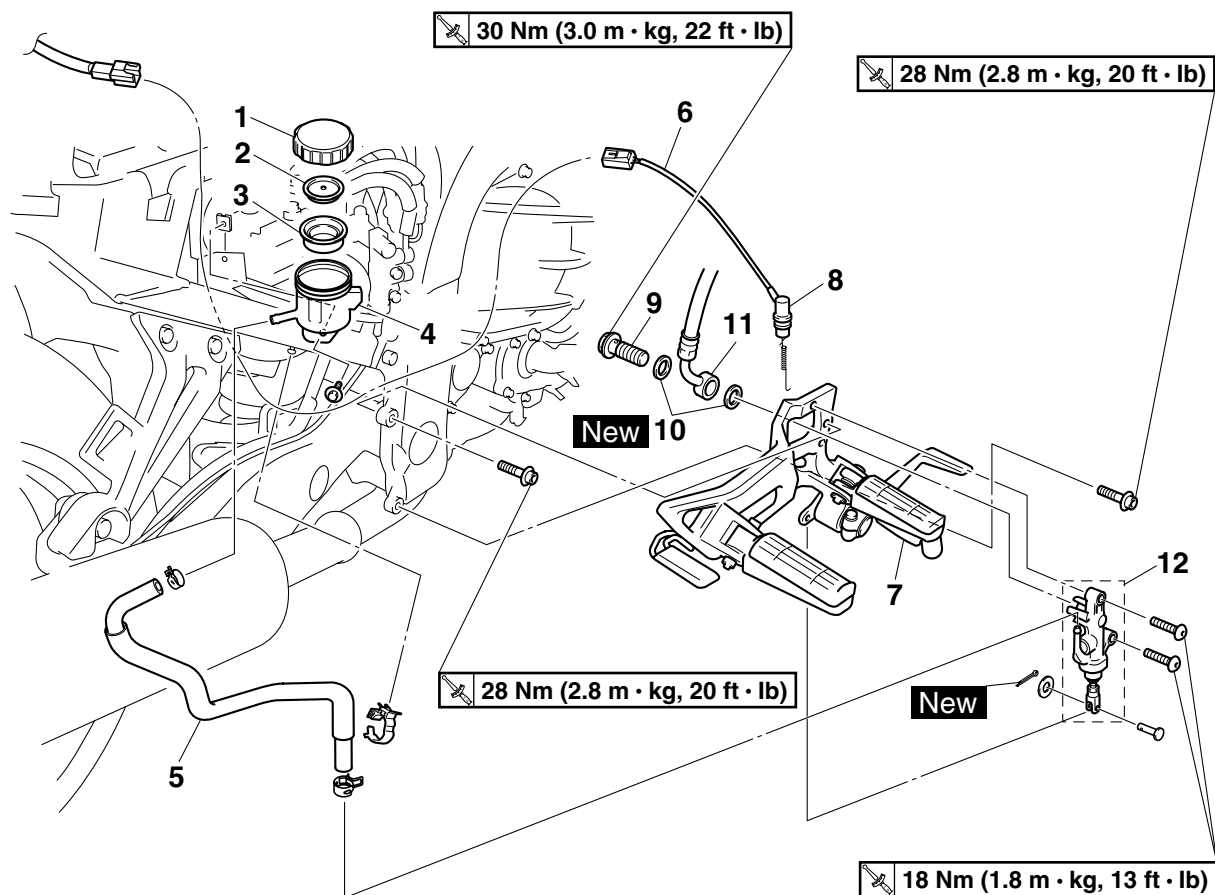
REAR BRAKE

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 | Brake pad shim | 2 | |
| 4 | Rear brake pad | 2 | |
| 5 | Brake pad spring | 2 | |
| | | | For installation, reverse the removal procedure. |

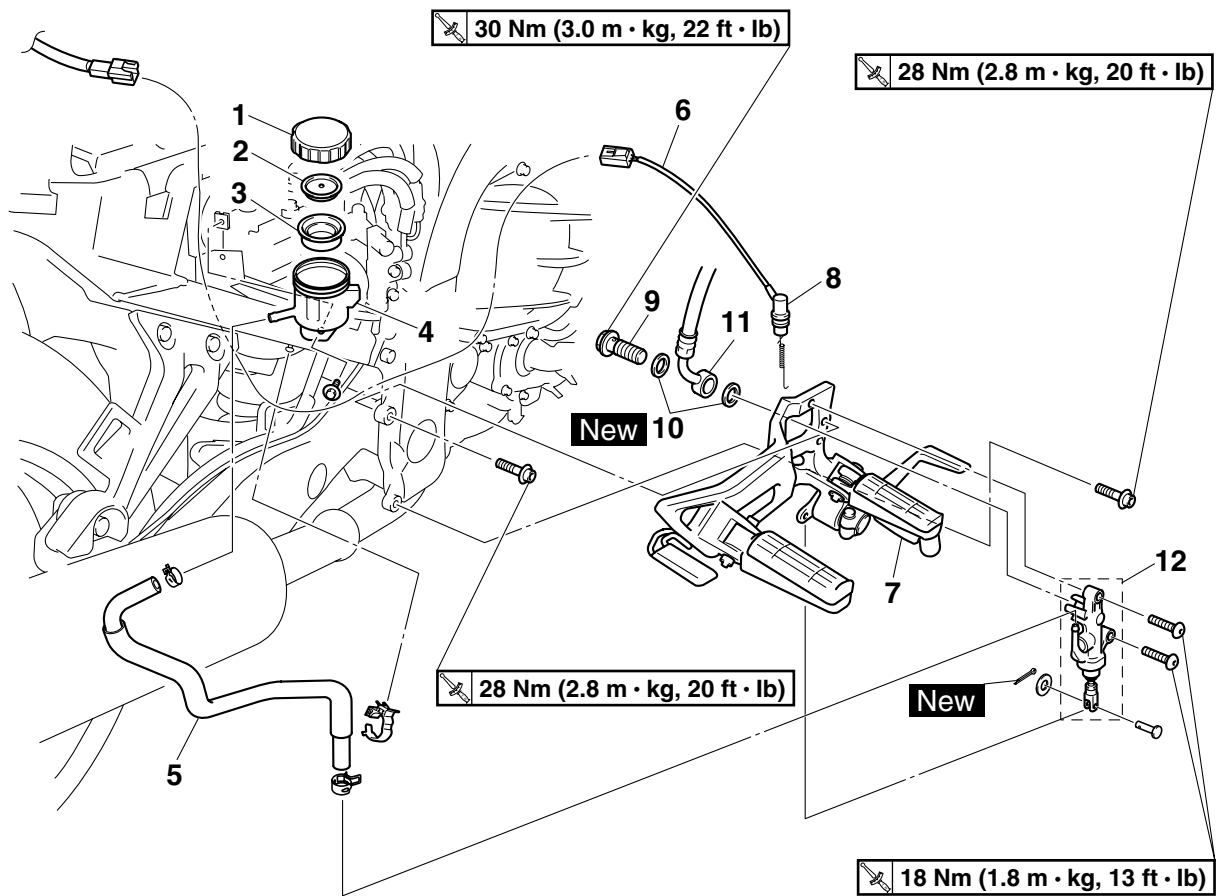
Removing the rear brake master cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---|------|--|
| | Brake fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23. |
| | Right side cover/Storage compartment | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Brake fluid reservoir cap | 1 | |
| 2 | Brake fluid reservoir diaphragm holder | 1 | |
| 3 | Brake fluid reservoir diaphragm | 1 | |
| 4 | Brake fluid reservoir | 1 | |
| 5 | Brake fluid reservoir hose | 1 | |
| 6 | Rear brake light switch coupler | 1 | Disconnect. |
| 7 | Right footrest assembly | 1 | |
| 8 | Rear brake light switch | 1 | |
| 9 | Brake hose union bolt | 1 | |
| 10 | Copper washer | 2 | |
| 11 | Brake hose (rear brake master cylinder to hydraulic unit) | 1 | Disconnect. |

REAR BRAKE

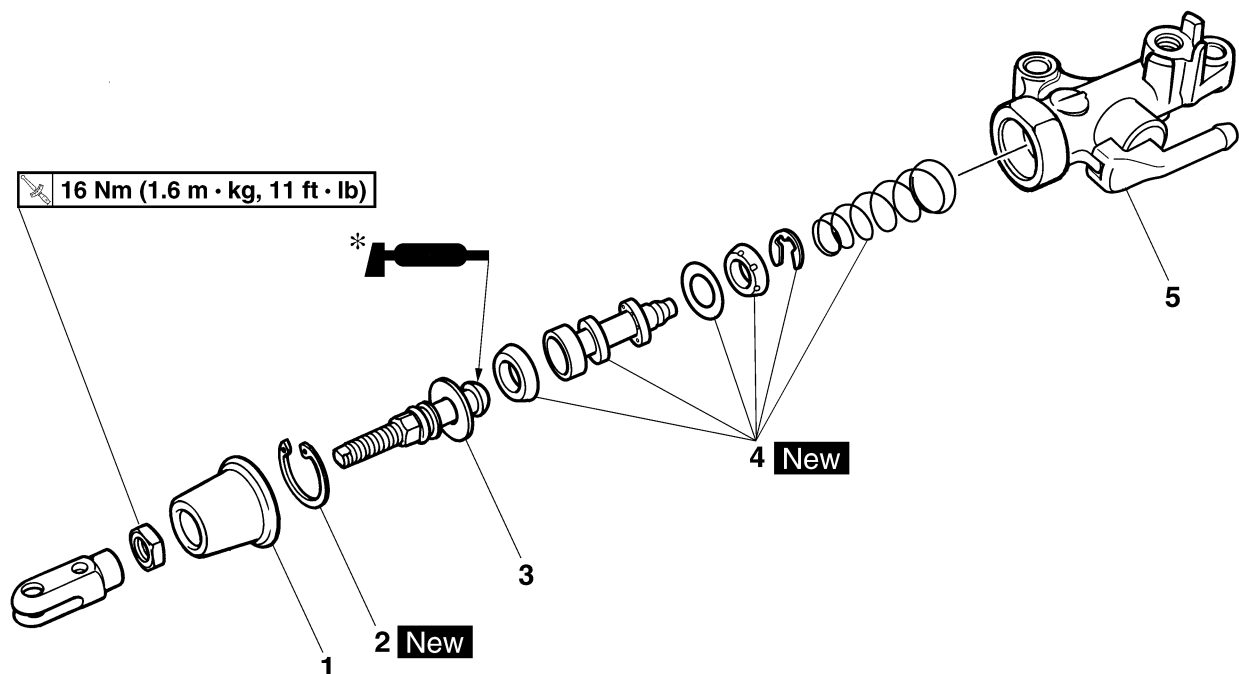
Removing the rear brake master cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| 12 | Rear brake master cylinder | 1 | |
| | | | For installation, reverse the removal procedure. |

REAR BRAKE

Disassembling the rear brake master cylinder

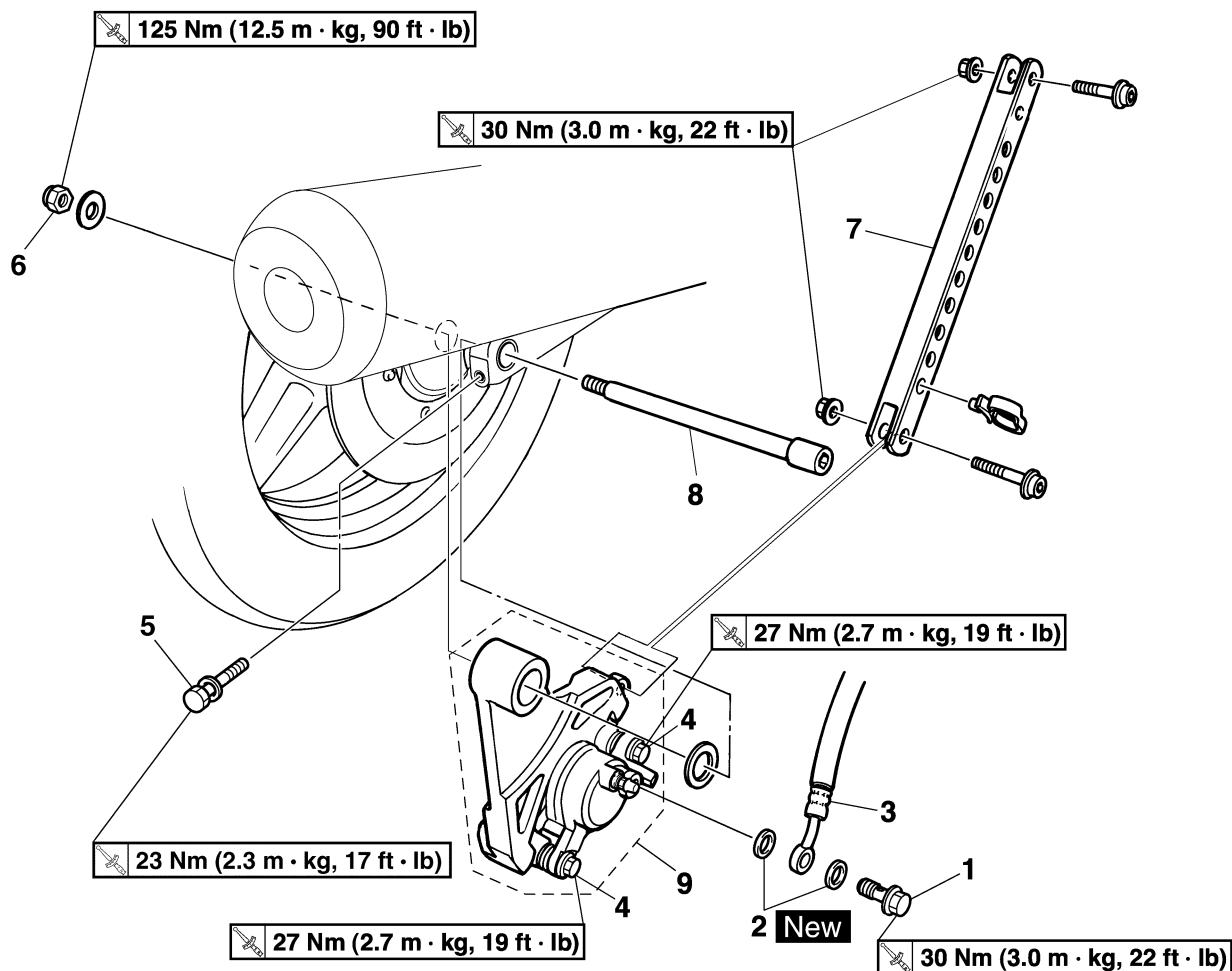


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------|------|--|
| 1 | Dust boot | 1 | |
| 2 | Circlip | 1 | |
| 3 | Brake master cylinder push rod | 1 | |
| 4 | Brake master cylinder kit | 1 | |
| 5 | Brake master cylinder body | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

* Apply silicon grease

REAR BRAKE

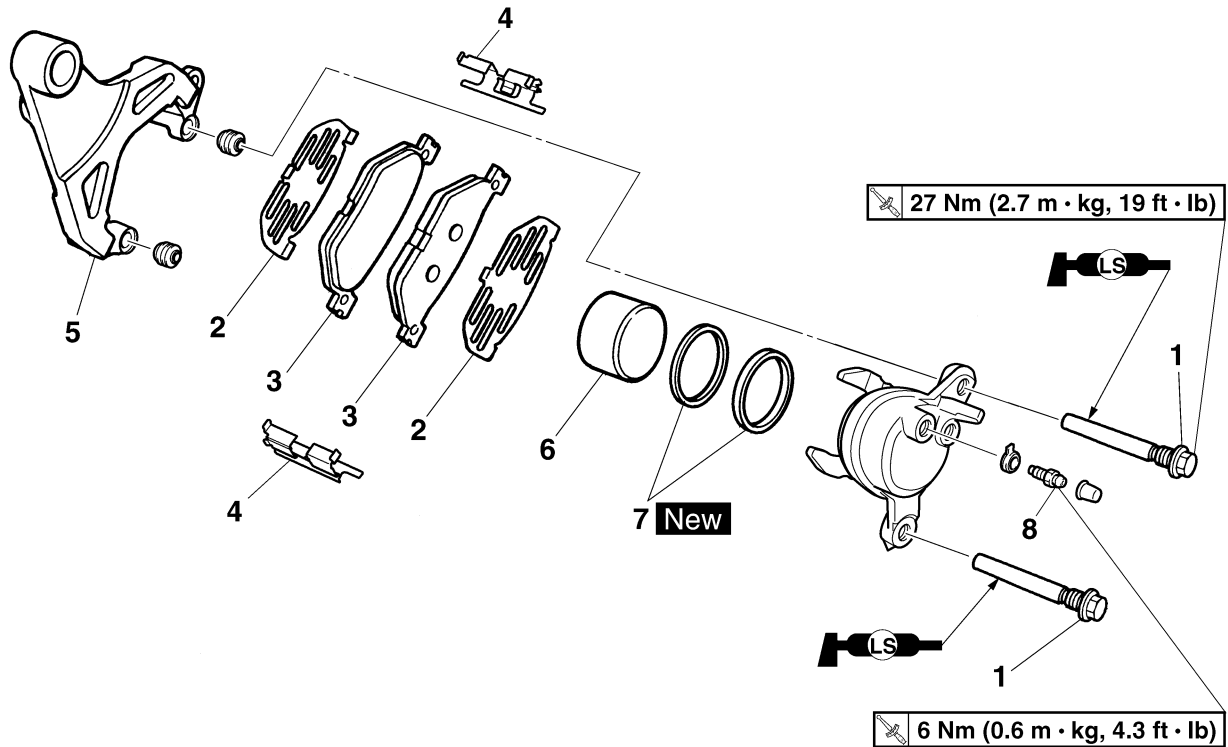
Removing the rear brake caliper



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|--|
| | Brake fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23. |
| 1 | Brake hose union bolt | 1 | |
| 2 | Copper washer | 2 | |
| 3 | Brake hose (proportioning valve to rear brake caliper) | 1 | |
| 4 | Rear brake caliper bolt | 2 | Loosen. |
| 5 | Rear wheel axle pinch bolt | 1 | Loosen. |
| 6 | Rear wheel axle nut | 1 | |
| 7 | Brake torque rod | 1 | |
| 8 | Rear wheel axle | 1 | |
| 9 | Rear brake caliper assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

REAR BRAKE

Disassembling the rear brake caliper



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| 1 | Rear brake caliper bolt | 2 | |
| 2 | Brake pad shim | 2 | |
| 3 | Rear brake pad | 2 | |
| 4 | Brake pad spring | 2 | |
| 5 | Rear brake caliper bracket | 1 | |
| 6 | Brake caliper piston | 1 | |
| 7 | Brake caliper piston seal | 2 | |
| 8 | Bleed screw | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS22560

INTRODUCTION

EWA14100

WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

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

EAS22570

CHECKING THE REAR BRAKE DISC

1. Remove:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-20.
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 4-30.



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 4-30.



Brake disc thickness limit
4.5 mm (0.18 in)

5. Adjust:
 - Brake disc deflection
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-30.



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

6. Install:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-20.

EAS22580

REPLACING THE REAR BRAKE PADS

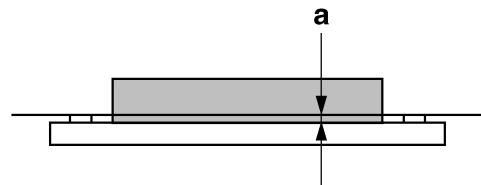
NOTE:

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

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



Brake pad lining thickness (inner)
6.3 mm (0.25 in)
Limit
0.8 mm (0.03 in)
Brake pad lining thickness (outer)
6.3 mm (0.25 in)
Limit
0.8 mm (0.03 in)



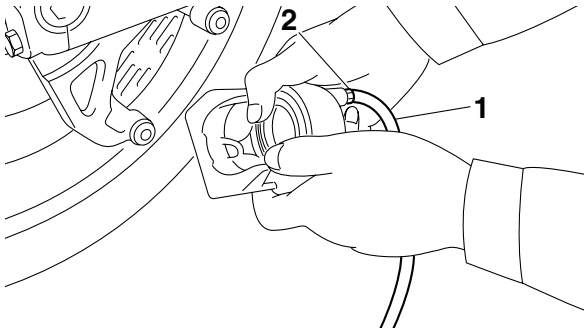
2. Install:
 - Brake pad springs
 - Brake pad shims
(onto the brake pads)
 - Brake pads

REAR BRAKE

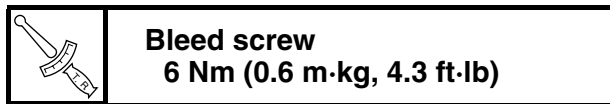
NOTE:

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

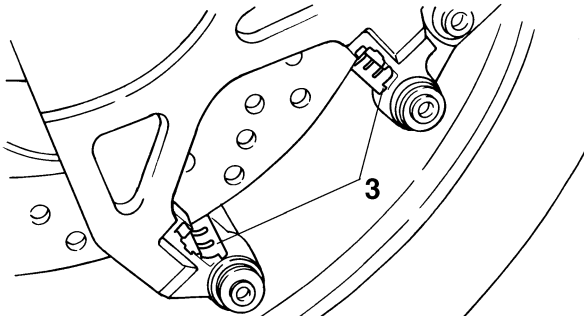
- a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
- b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.



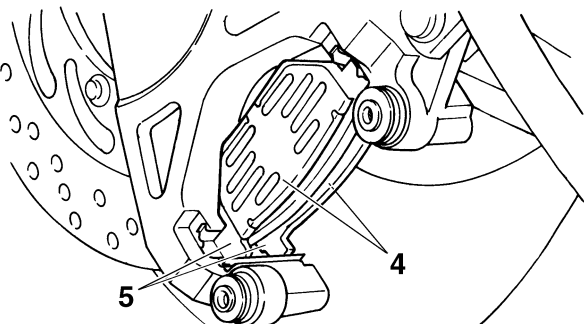
- c. Tighten the bleed screw.



- d. Install new brake pad springs "3".



- e. Install a new brake pad shim "4" onto each new brake pad "5".



- f. Install new brake pads.

3. Install:

- Rear brake caliper

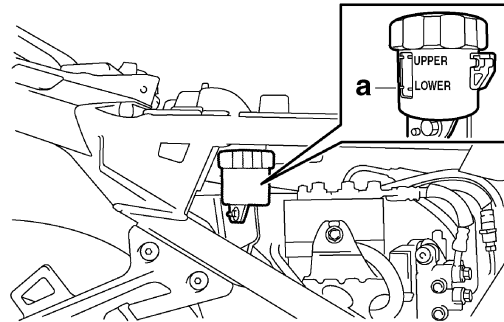


Rear brake caliper bolt
27 Nm (2.7 m·kg, 19 ft·lb)

4. Check:

- Brake fluid level

Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.



5. Check:

- Brake pedal operation

Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

EAS22590

REMOVING THE REAR BRAKE CALIPER

NOTE:

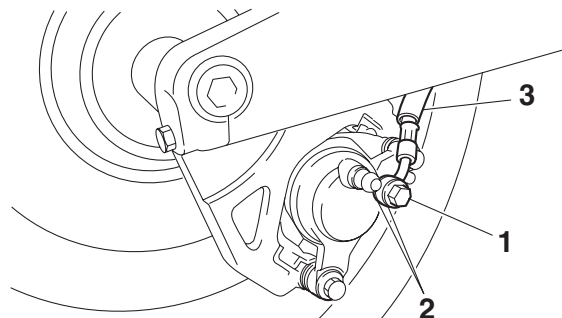
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:

- Brake hose union bolt "1"
- Copper washers "2"
- Brake hose (proportioning valve to rear brake caliper) "3"

NOTE:

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



REAR BRAKE

- Rear wheel axle nut

NOTE:

- Do not install the brake pads, brake pad shims, and brake pad springs.
- Align the slot “a” of the rear wheel sensor housing “1” with the projection “b” of the rear brake caliper bracket “2”, and then assemble them.
- After assembling the rear wheel sensor housing and the rear brake caliper bracket, make sure that the projection “c” on the housing is aligned with the projection “d” on the bracket.

ECA14470

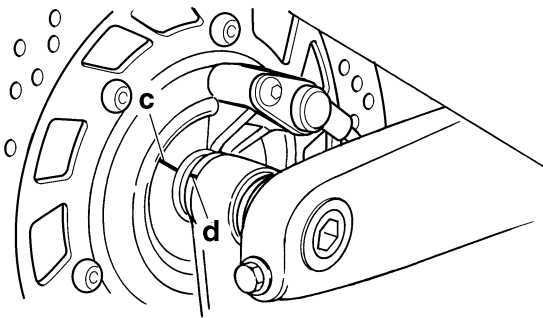
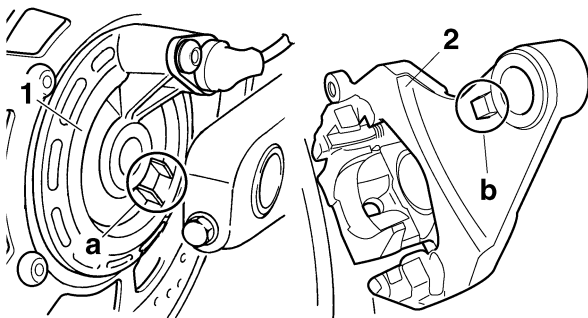
CAUTION:

Make sure there are no foreign materials in the wheel hub. Foreign materials cause damage to the inner sensor rotor and wheel sensor.

EWA13500

WARNING

Make sure the brake hose is routed properly.



2. Tighten:

- Brake torque rod nuts
- Rear wheel axle nut
- Rear wheel axle pinch bolt



Brake torque rod nut
30 Nm (3.0 m·kg, 22 ft·lb)
Rear wheel axle nut
125 Nm (12.5 m·kg, 90 ft·lb)
Rear wheel axle pinch bolt
23 Nm (2.3 m·kg, 17 ft·lb)

3. Install:

- Copper washers **New**
- Brake hose (proportioning valve to rear brake caliper) “1”
- Brake hose union bolt “2”



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

EWA13530

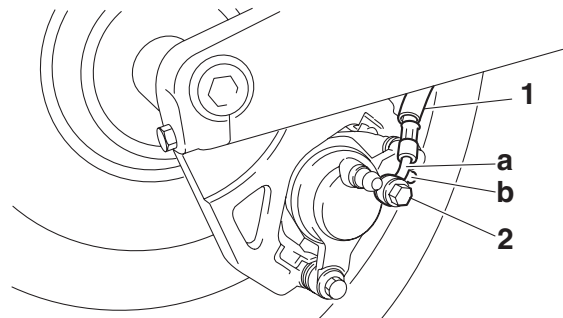
WARNING

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

EC3P61044

CAUTION:

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



4. Remove:

- Rear brake caliper bolts
- Rear brake caliper

5. Install:

- Brake pad springs
 - Rear brake pads
 - Brake pad shims
 - Rear brake caliper bolts
 - Rear brake caliper
- Refer to “REPLACING THE REAR BRAKE PADS” on page 4-43.



Rear brake caliper bolt
27 Nm (2.7 m·kg, 19 ft·lb)

6. Fill:

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



Recommended fluid
DOT 4

EWA13090

⚠ WARNING

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

ECA13540

CAUTION:

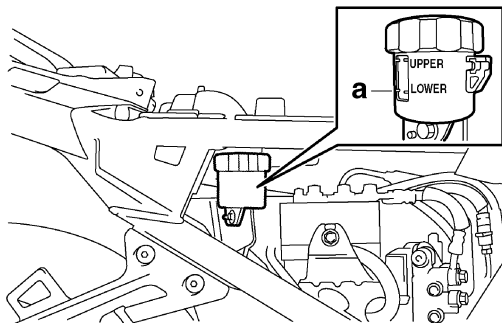
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilled brake fluid immediately.

7. Bleed:

- Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

8. Check:

- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.



9. Check:

- Brake pedal operation
Soft or spongy feeling → Bleed the brake system.
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

EAS22700

REMOVING THE REAR BRAKE MASTER CYLINDER

NOTE:

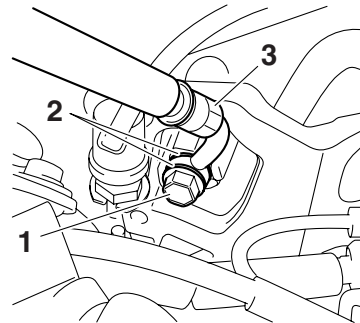
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:

- Brake hose union bolt "1"
- Copper washers "2"
- Brake hose (rear brake master cylinder to hydraulic unit) "3"

NOTE:

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



EAS22720

CHECKING THE REAR BRAKE MASTER CYLINDER

1. Check:

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

2. Check:

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

3. Check:

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

4. Check:

- 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.



Recommended fluid
DOT 4

EAS22740

INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:

- Copper washers **New**
- Brake hose (rear brake master cylinder to hydraulic unit) "1"
- Rear brake hose union bolt "2"



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

EWA13530

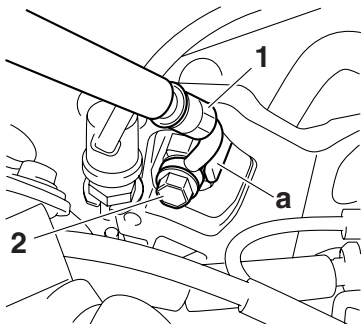
⚠ WARNING

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

ECA14160

CAUTION:

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

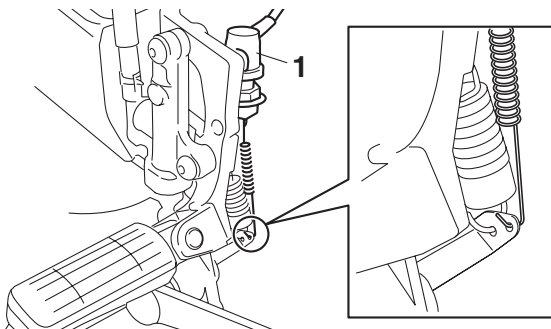


2. Install:

- Rear brake light switch "1"

NOTE:

Install the rear brake light switch spring as shown in the illustration.



3. Fill:

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



Recommended fluid
DOT 4

EWA13090

⚠ WARNING

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

ECA13540

CAUTION:

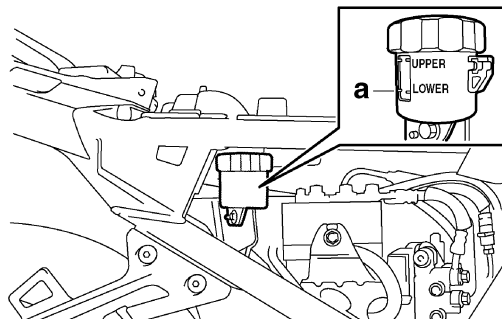
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:

- Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

5. Check:

- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.



6. Check:

- Brake pedal operation
Soft or spongy feeling → Bleed the brake system.
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.

7. Adjust:
 - Brake pedal position
Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-21.
8. Adjust:
 - Rear brake light operation timing
Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-23.

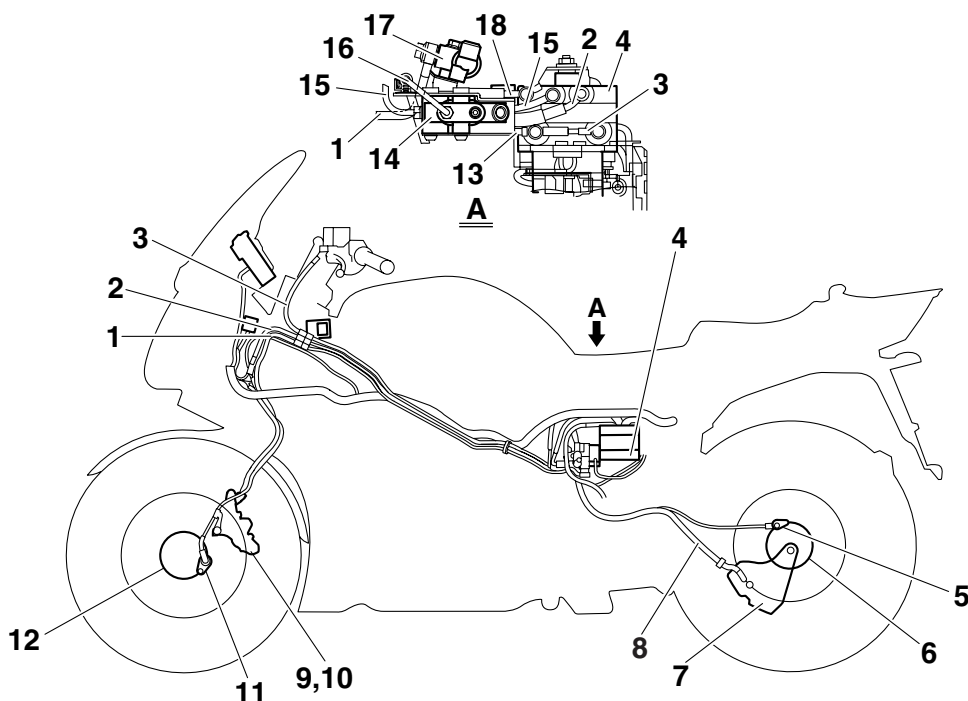
ABS (ANTI-LOCK BRAKE SYSTEM)

EAS22760

ABS (ANTI-LOCK BRAKE SYSTEM)

ET3P61060

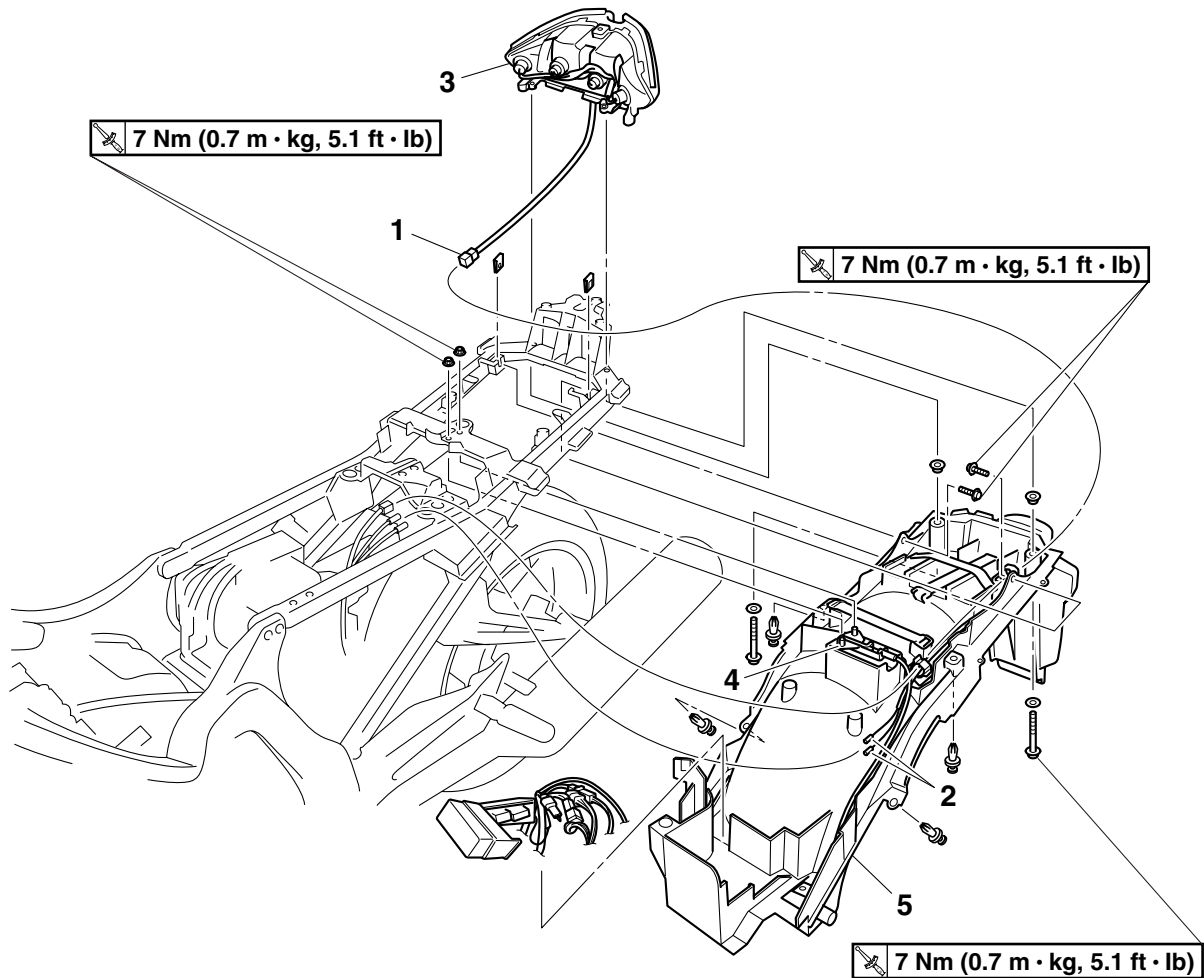
ABS COMPONENTS CHART



1. Brake hose (metering valve to right front brake caliper)
2. Brake hose (hydraulic unit to front brake calipers)
3. Brake hose (front brake master cylinder to hydraulic unit)
4. Hydraulic unit (HU)
5. Rear wheel sensor rotor
6. Rear wheel sensor
7. Rear brake caliper
8. Brake hose (proportioning valve to rear brake caliper)
9. Left front brake caliper
10. Right front brake caliper (partially operated together with the rear brake)
11. Front wheel sensor
12. Front wheel sensor rotor
13. Brake hose (rear brake master cylinder to hydraulic unit)
14. Proportioning valve
15. Brake hose (hydraulic unit to proportioning valve)
16. Brake hose (proportioning valve to rear brake caliper)
17. Metering valve
18. Brake hose (hydraulic unit to metering valve)

ABS (ANTI-LOCK BRAKE SYSTEM)

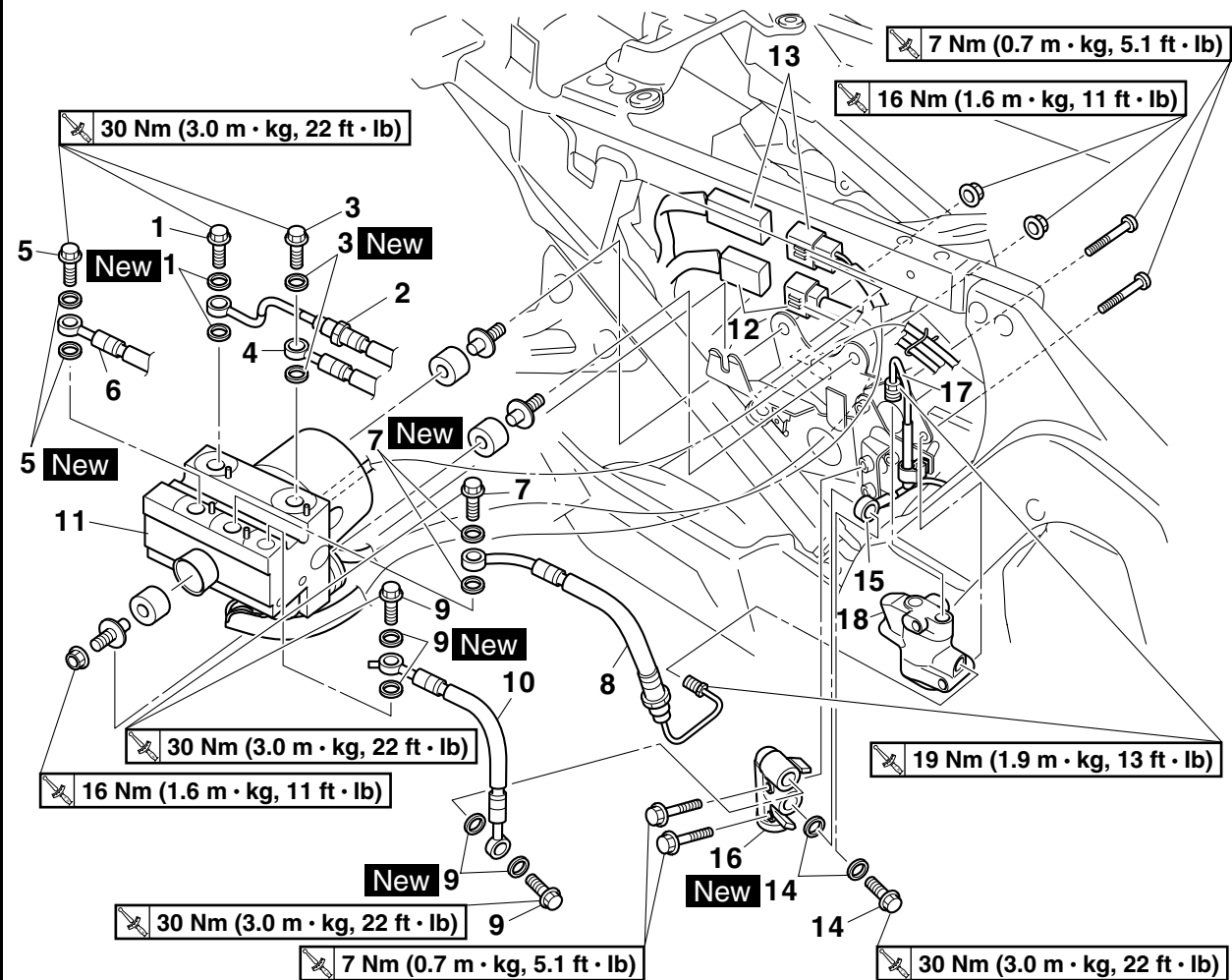
Removing the rear fender assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------------|------|--|
| | Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | ABS ECU/ABS motor relay | | Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 8-111. |
| | Brake fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23. |
| | Brake fluid reservoir | | Refer to "REAR BRAKE" on page 4-37. |
| 1 | Tail/brake light assembly coupler | 1 | Disconnect. |
| 2 | License plate light connector | 2 | Disconnect. |
| 3 | Tail/brake light assembly | 1 | |
| 4 | Seat lock cable assembly | 1 | |
| 5 | Rear fender assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

ABS (ANTI-LOCK BRAKE SYSTEM)

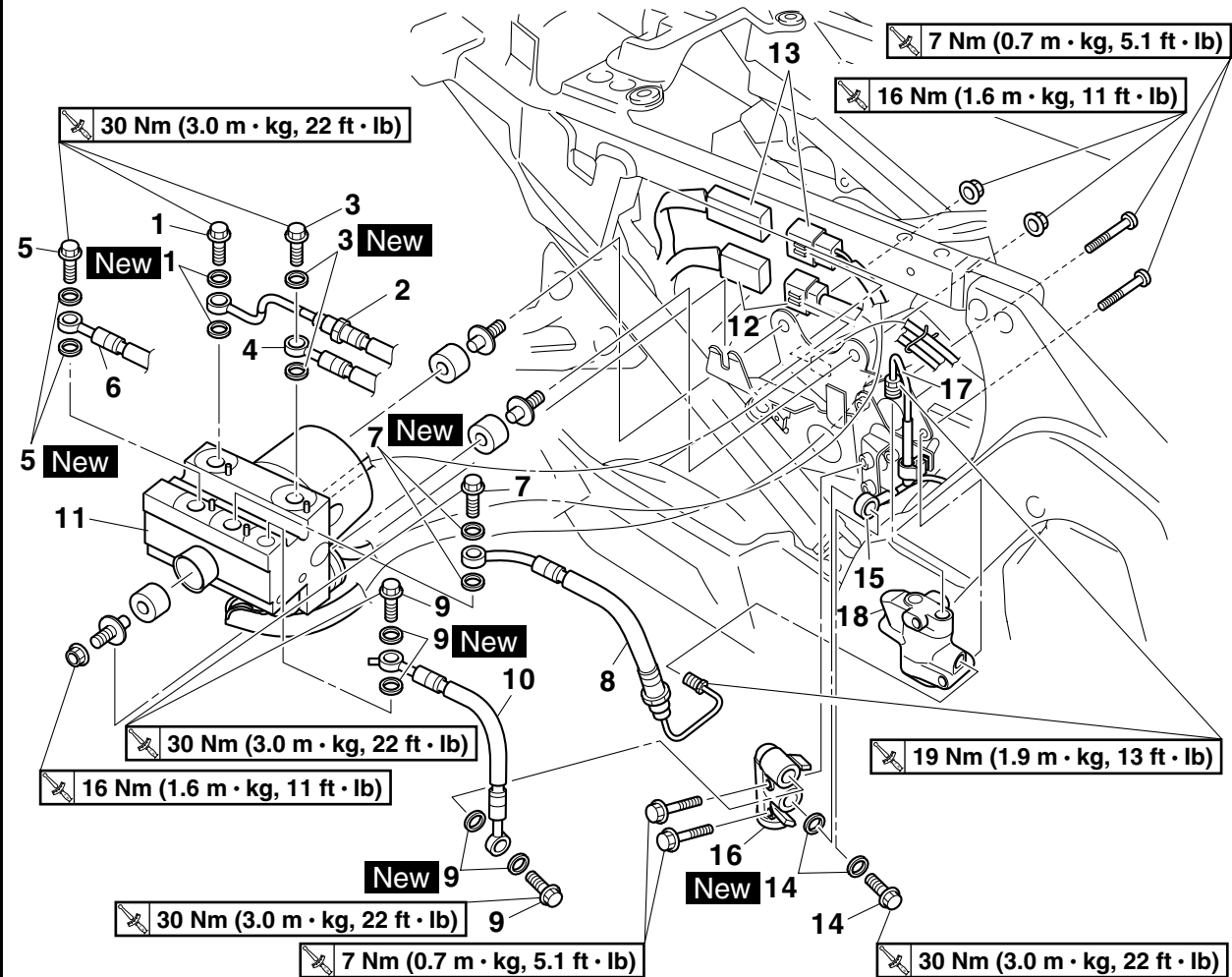
Removing the hydraulic unit



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|-------------|
| 1 | Brake hose union bolt/Copper washer | 1/2 | |
| 2 | Brake hose (front brake master cylinder to hydraulic unit) | 1 | Disconnect. |
| 3 | Brake hose union bolt/Copper washer | 1/2 | |
| 4 | Brake hose (rear brake master cylinder to hydraulic unit) | 1 | Disconnect. |
| 5 | Brake hose union bolt/Copper washer | 1/2 | |
| 6 | Brake hose (hydraulic unit to front brake calipers) | 1 | Disconnect. |
| 7 | Brake hose union bolt/Copper washer | 1/2 | |
| 8 | Brake hose (hydraulic unit to proportioning valve) | 1 | |
| 9 | Brake hose union bolt/Copper washer | 2/4 | |
| 10 | Brake hose (hydraulic unit to metering valve) | 1 | |
| 11 | Hydraulic unit | 1 | |
| 12 | Hydraulic unit solenoid coupler | 1 | Disconnect. |
| 13 | ABS motor coupler | 1 | Disconnect. |
| 14 | Brake hose union bolt/Copper washer | 1/2 | |

ABS (ANTI-LOCK BRAKE SYSTEM)

Removing the hydraulic unit



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|--|
| 15 | Brake hose (metering valve to right front brake caliper) | 1 | Disconnect. |
| 16 | Metering valve | 1 | |
| 17 | Brake hose (proportioning valve to rear brake caliper) | 1 | |
| 18 | Proportioning valve | 1 | |
| | | | For installation, reverse the removal procedure. |

ABS (ANTI-LOCK BRAKE SYSTEM)

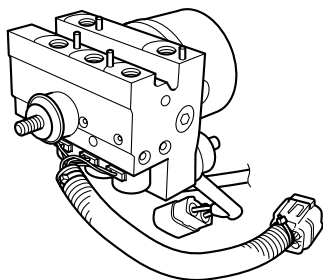
ET3P61055

REMOVING THE HYDRAULIC UNIT

ECA14510

CAUTION:

Do not remove the hydraulic unit to check the resistance of the solenoid valves and the ABS motor for continuity.



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.

EC3P61010

CAUTION:

- 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 wheel sensors cannot be disassembled. Do not attempt to disassemble the sensors. If faulty, replace with new sensors.
- Do not turn the main switch to "ON" when removing the hydraulic unit.
- 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 union bolts for the hydraulic unit have been removed, be sure to tighten them to the specified torque and bleed the brake system.

1. Remove:

- Brake hose "1" (front brake master cylinder to hydraulic unit)
- Brake hose "2" (rear brake master cylinder to hydraulic unit)

- Brake hose "3" (hydraulic unit to front brake calipers)
- Brake hose "4" (hydraulic unit to proportioning valve)
- Brake hose "5" (hydraulic unit to metering valve)

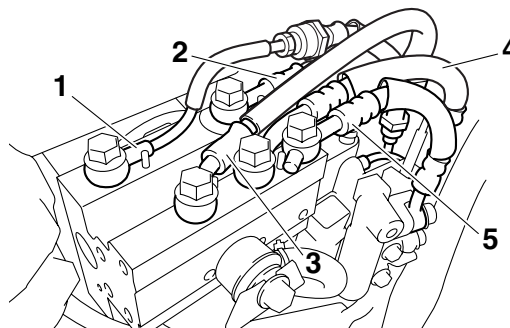
NOTE:

Do not operate the brake lever and brake pedal while removing the brake hoses.

ECA14530

CAUTION:

When removing the brake hoses, cover the area around the hydraulic unit to catch any spilt brake fluid. Do not allow the brake fluid to contact other parts.

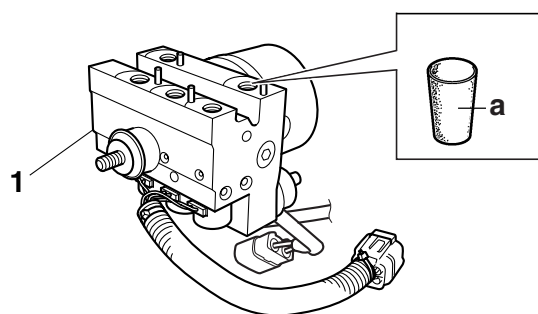


2. Remove:

- Hydraulic unit "1"

NOTE:

To avoid brake fluid leakage and to prevent foreign materials from entering the hydraulic unit, insert a rubber plug "a" or a bolt (M10 × 1.25) into each union bolt hole.



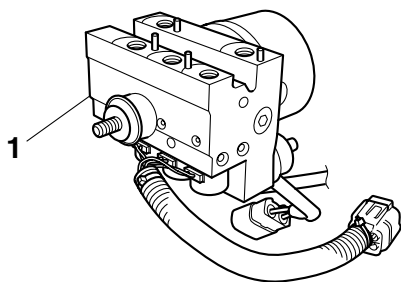
ET3P61056

CHECKING THE HYDRAULIC UNIT

1. Check:

- Hydraulic unit "1"
Cracks/damage → Replace the hydraulic unit.

ABS (ANTI-LOCK BRAKE SYSTEM)



ET3P61057

CHECKING THE PROPORTIONING VALVE AND METERING VALVE

1. Check:

- Proportioning valve
Cracks/damage → Replace the proportioning valve.
- Metering valve
Cracks/damage → Replace the metering valve

ET3P61058

INSTALLING THE HYDRAULIC UNIT

Proceed in the reverse order of removal. Pay attention to the following items.

1. Install:

- Hydraulic unit

NOTE:

Do not allow any foreign materials to enter the hydraulic unit or the brake hoses when installing the hydraulic unit.

ECA14750

CAUTION:

Do not remove the rubber plugs or bolts (M10 × 1.25) installed in the union bolt holes before installing the hydraulic unit.

2. Remove:

- Rubber plugs or bolts (M10 × 1.25)

3. Install:

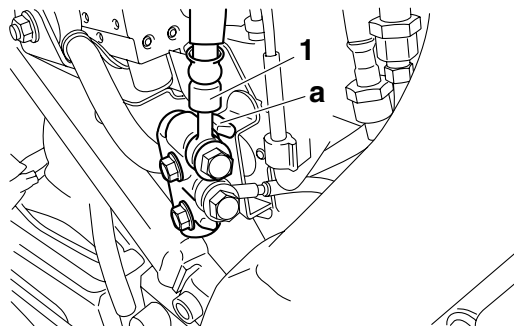
- Copper washer **New**
- Brake hose (hydraulic unit to metering valve)
"1"
(to the metering valve)
- Brake hose union bolt



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

NOTE:

The brake hose "1" contacts the stopper "a" on the metering valve.



4. Install:

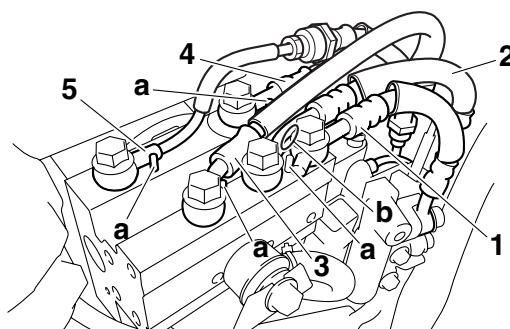
- Copper washers **New**
- Brake hose "1" (hydraulic unit to metering valve)
- Brake hose "2" (hydraulic unit to proportioning valve)
- Brake hose "3" (hydraulic unit to front brake calipers)
- Brake hose "4" (rear brake master cylinder to hydraulic unit)
- Brake hose "5" (front brake master cylinder to hydraulic unit)
- Brake hose union bolts



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

NOTE:

- Make sure that the brake hoses "1", "3", "4", and "5" contact the stoppers "a" on the hydraulic unit.
- Make sure that the brake hose "2" contacts the end "b" of the brake hose "1".



EW3P61009



WARNING

Be sure to connect each brake hose to the correct union bolt hole.

EC3P61011

CAUTION:

To route the brake hoses, refer to "CABLE ROUTING" on page 2-45.

5. Fill:

- Brake master cylinder reservoir

ABS (ANTI-LOCK BRAKE SYSTEM)

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



**Recommended fluid
DOT 4**

EWA13090

WARNING

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

ECA13540

CAUTION:

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

6. Bleed:
 - Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-23.
7. Check the operation of the hydraulic unit according to the brake lever and the brake pedal response. (Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-56.)

ECA14770

CAUTION:

Always check the operation of the hydraulic unit according to the brake lever and the brake pedal response.

8. Delete the malfunction codes. (Refer to "[D-1] DELETING THE MALFUNCTION CODES" on page 8-142.)
9. Perform a trial run. (Refer to "TRIAL RUN" on page 4-59.)

EAS22800

HYDRAULIC UNIT OPERATION TESTS

The reaction-force pulsating action generated in the brake lever and brake pedal 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 lever and brake pedal when the ABS is activated.

Hydraulic unit operation test 1

EWA13120

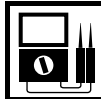
WARNING

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

NOTE:

Two people are necessary to perform hydraulic unit operation test 1.

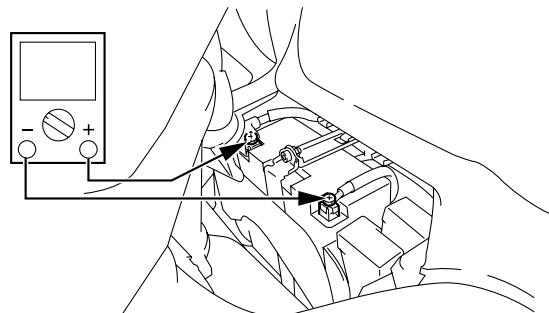
1. Place the vehicle on the centerstand.
2. Turn the main switch to "OFF".
3. Remove:
 - Front cowling right inner panel 1
Refer to "GENERAL CHASSIS" on page 4-1.
4. Check:
 - Battery voltage
Lower than 12.8 V → Charge or replace the battery.



**Battery voltage
Higher than 12.8 V**

NOTE:

- 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 warning light comes on and the ABS does not operate.

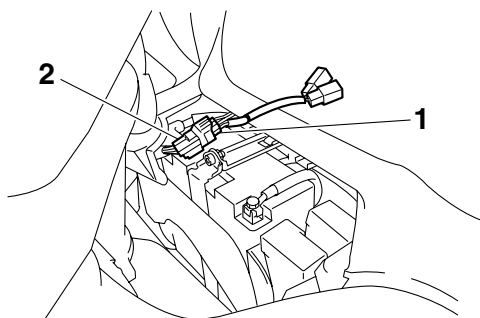


5. Connect the test coupler adapter "1" to the ABS test coupler "2".



**Test coupler adapter
90890-03149**

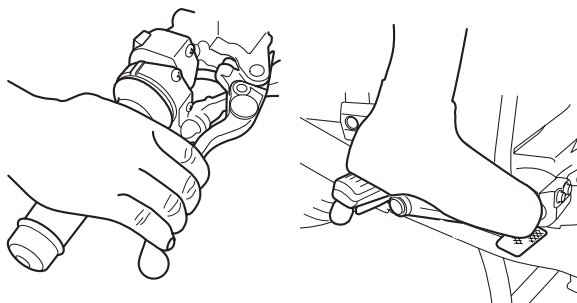
ABS (ANTI-LOCK BRAKE SYSTEM)



6. Turn the main switch to “ON” while operating the brake lever and the brake pedal simultaneously.

NOTE:

This check cannot be performed unless both the brake lever and the brake pedal are operated simultaneously when the main switch is turned to “ON”.



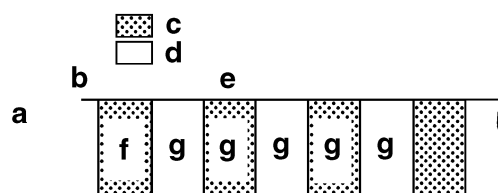
7. Check:

• Hydraulic unit operation

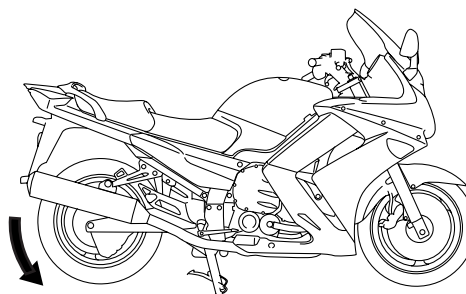
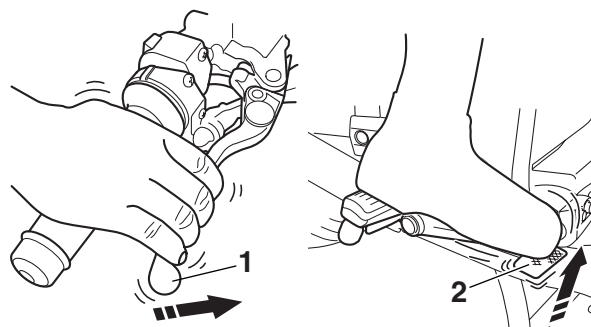
When the main switch is turned to “ON”, the ABS warning light comes on for 2 seconds, goes off for 0.5 second, and then starts flashing. When the ABS warning light starts flashing, a single pulse will be generated in the brake lever “1”. After the pulse is generated in the brake lever, it is generated in the brake pedal “2” twice.

NOTE:

A single pulse will be felt in the brake lever once, then in the brake pedal twice. The second person should confirm that the rear brake force is released during the second pulse in the brake pedal, third pulse overall, by manually applying force to rotate the rear wheel. If the rear brake force is released during the second pulse in the brake pedal, the second person will be able to rotate the rear wheel for 0.1 second.



- a. ABS warning light
b. Main switch “ON”
c. Comes on
d. Goes off
e. Flashes
f. 2.0 seconds
g. 0.5 second



EC3P61013

CAUTION:

- Check that the pulse is felt in the brake lever once, and then in the brake pedal twice.
- If the pulse is felt in the brake pedal before it is felt in the brake lever, check that the brake hoses are connected correctly to the hydraulic unit.
- If the rear brake force is not released during the second pulse in the brake pedal, but during the pulse in the brake lever or during the first pulse in the brake pedal, check that the brake hoses are connected correctly to the hydraulic unit.

ABS (ANTI-LOCK BRAKE SYSTEM)

- If the pulse is hardly felt in either the brake lever or brake pedal, check that the brake hoses are connected correctly to the hydraulic unit.

- If the operation of the hydraulic unit is normal, delete all of the malfunction codes.

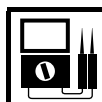
Hydraulic unit operation test 2

EWA13120

WARNING

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

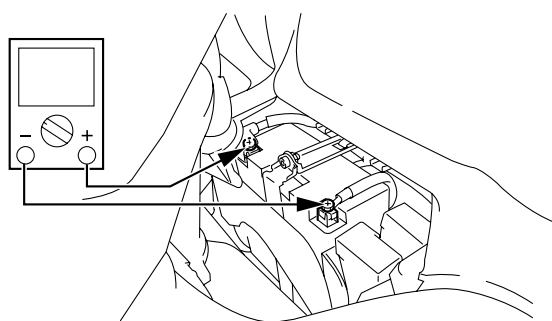
1. Place the vehicle on the centerstand.
2. Turn the main switch to "OFF".
3. Remove:
 - Front cowling right inner panel 1
Refer to "GENERAL CHASSIS" on page 4-1.
4. Check:
 - Battery voltage
Lower than 12.8 V → Charge or replace the battery.



**Battery voltage
Higher than 12.8 V**

NOTE:

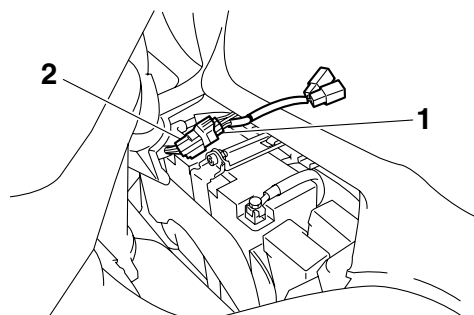
- If the battery voltage is lower than 12.8 V, charge the battery, and then perform hydraulic unit operation test 2.
- If the battery voltage is lower than 10 V, the ABS warning light comes on and the ABS does not operate.



5. Connect the test coupler adapter "1" to the ABS test coupler "2".



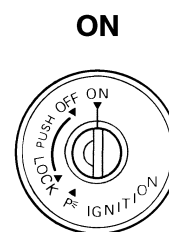
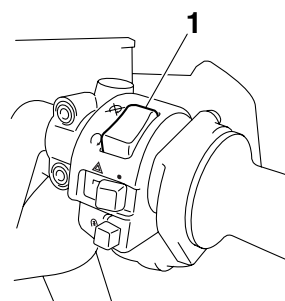
**Test coupler adapter
90890-03149**



6. Set the engine stop switch "1" to "OFF".
7. Turn the main switch to "ON".

NOTE:

After turning the main switch to "ON", wait approximately 2 seconds until the ABS warning light goes off.

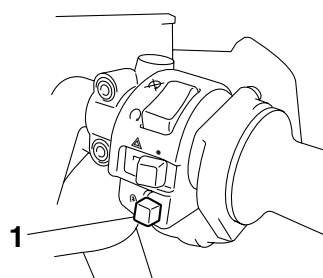


8. Push the start switch "1" for at least 4 seconds.

ECA14790

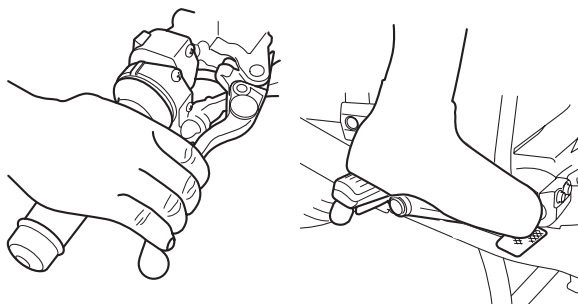
CAUTION:

Do not operate the brake lever or the brake pedal.



ABS (ANTI-LOCK BRAKE SYSTEM)

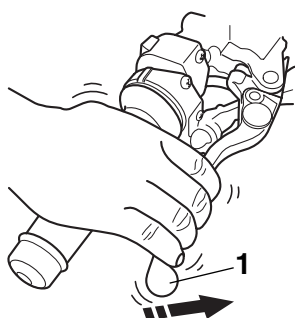
9. After releasing the start switch, operate the brake lever and the brake pedal simultaneously.



10. A reaction-force pulsating action is generated in the brake lever "1" 0.5 second after the brake lever and the brake pedal are operated simultaneously and continues for approximately 2 seconds.

NOTE:

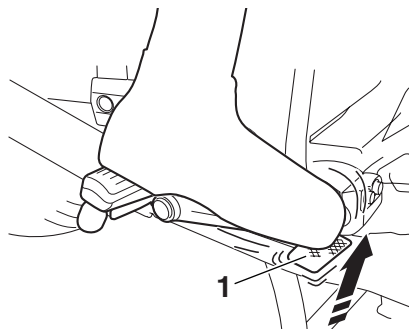
- The reaction-force pulsating action consists of two series of quick pulses.
- Be sure to continue operating the brake lever and brake pedal even after the pulsating action has stopped.



11. After the pulsating action has stopped in the brake lever, it is generated in the brake pedal "1" 0.5 second later and continues for approximately 2 seconds.

NOTE:

- The reaction-force pulsating action consists of two series of quick pulses.
- Be sure to continue operating the brake lever and brake pedal even after the pulsating action has stopped.



12. After the pulsating action has stopped in the brake pedal, it is generated in the brake lever 0.5 second later and continues for approximately 2 seconds.

NOTE:

The reaction-force pulsating action consists of two series of quick pulses.

EC3P61018

CAUTION:

- Check that the pulsating action is felt in the brake lever, brake pedal, and again in the brake lever, in this order.
- If the pulsating action is felt in the brake pedal before it is felt in the brake lever, check that the brake hoses are connected correctly to the hydraulic unit.
- If the pulsating action is hardly felt in either the brake lever or brake pedal, check that the brake hoses are connected correctly to the hydraulic unit.

13. Turn the main switch to "OFF".

14. Remove the test coupler adapter from the ABS test coupler.

15. Turn the main switch to "ON".

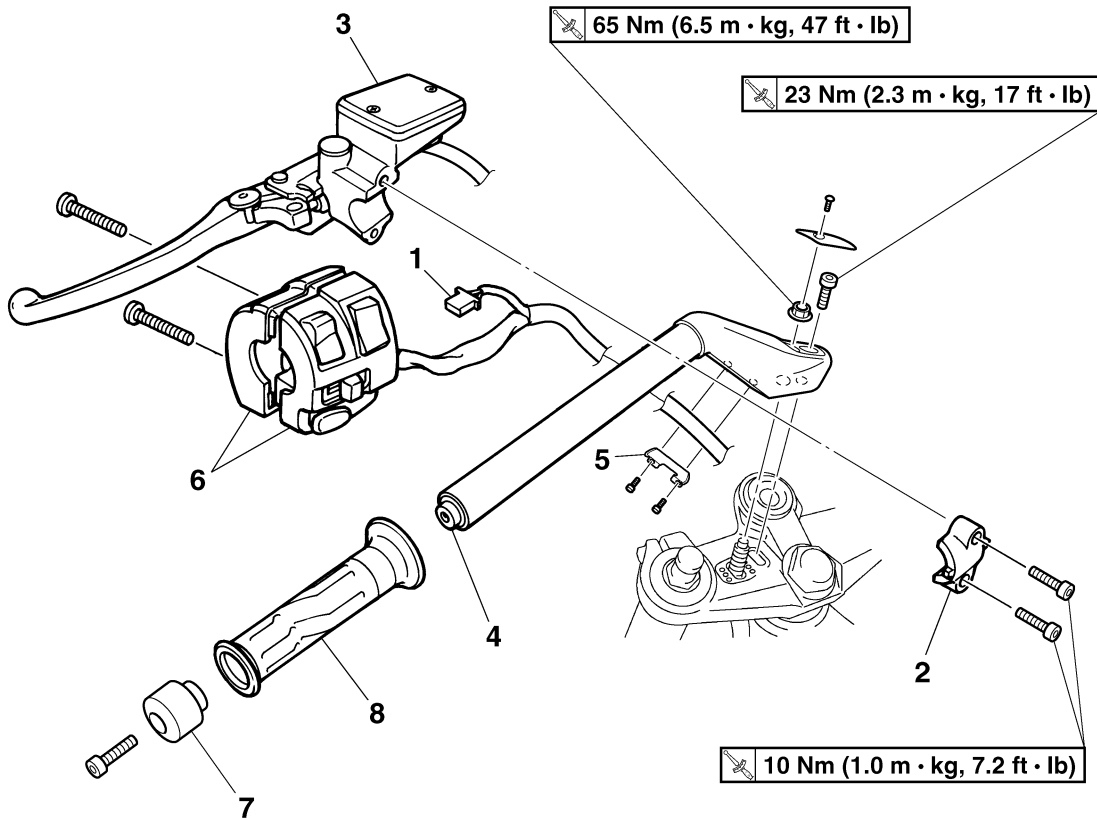
16. Set the engine stop switch to "○".

EAS22820

TRIAL RUN

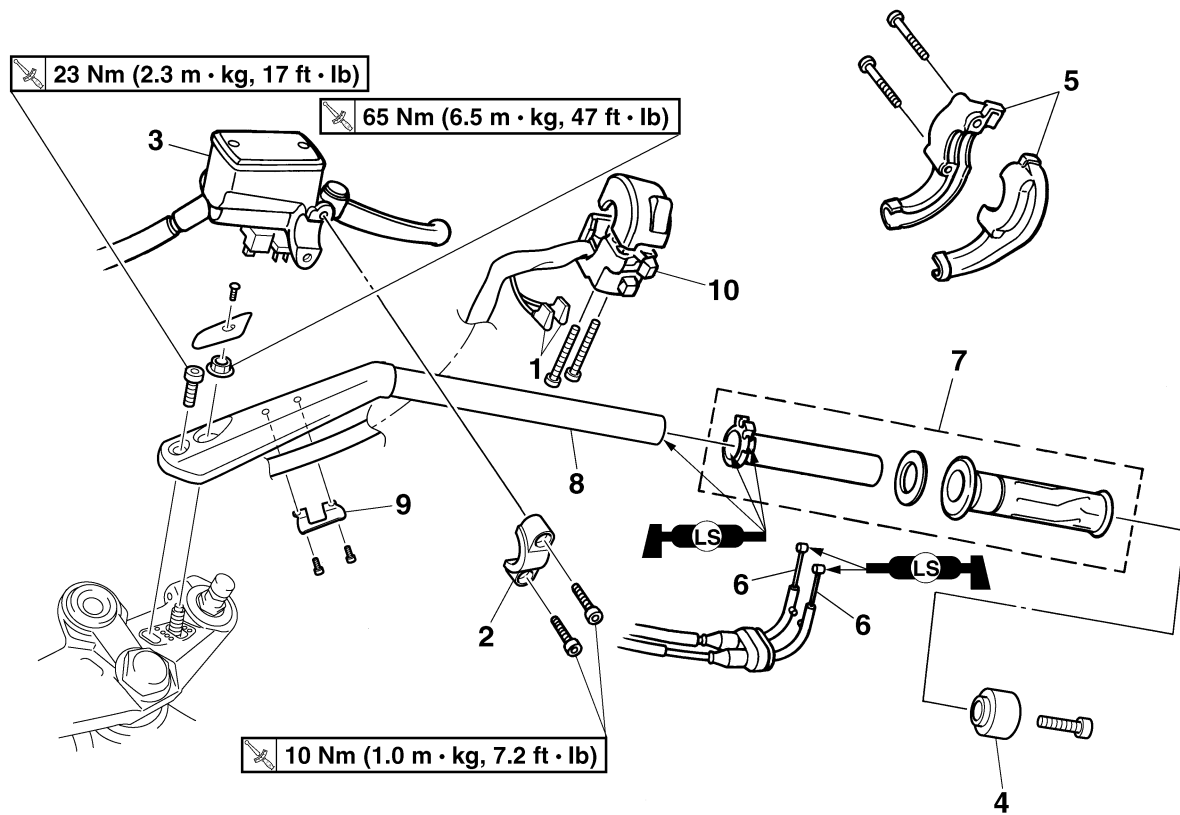
After all checks and servicing are completed, always ensure the vehicle has no problems by performing a trial run at a speed of faster than 10 km/h.

EAS22850

HANDLEBARS**Removing the left handlebar**

| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|--|
| 1 | Clutch switch coupler | 1 | Disconnect. |
| 2 | Clutch master cylinder holder | 1 | |
| 3 | Clutch master cylinder assembly | 1 | |
| 4 | Left handlebar | 1 | |
| 5 | Lead holder | 1 | |
| 6 | Left handlebar switch | 1 | |
| 7 | Grip end | 1 | |
| 8 | Handlebar grip | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the right handlebar



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------------|------|--|
| 1 | Front brake light switch connector | 2 | Disconnect. |
| 2 | Front brake master cylinder holder | 1 | |
| 3 | Front brake master cylinder assembly | 1 | |
| 4 | Grip end | 1 | |
| 5 | Throttle cable housing | 2 | |
| 6 | Throttle cable | 2 | Disconnect. |
| 7 | Throttle grip | 1 | |
| 8 | Right handlebar | 1 | |
| 9 | Lead holder | 1 | |
| 10 | Right handlebar switch | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS22870

REMOVING THE HANDLEBARS

1. Stand the vehicle on a level surface.

EWA13120

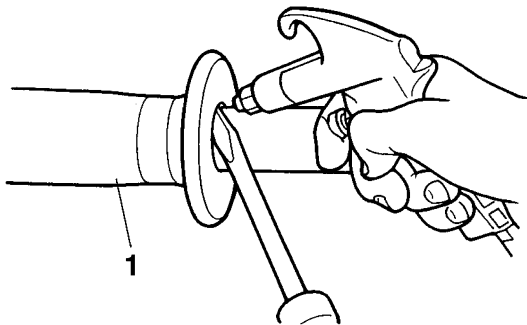
WARNING

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

2. Remove:
 - Handlebar grip "1"

NOTE:

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



EAS22890

CHECKING THE HANDLEBARS

1. Check:
 - Left handlebar
 - Right handlebar

Bends/cracks/damage → Replace.

EWA13690

WARNING

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

EAS22900

INSTALLING THE HANDLEBARS

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Install:
 - Handlebar grip
 - Grip end "1"

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

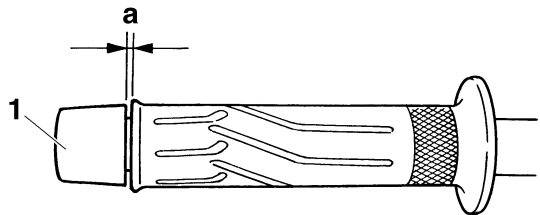
EWA13700

WARNING

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

NOTE:

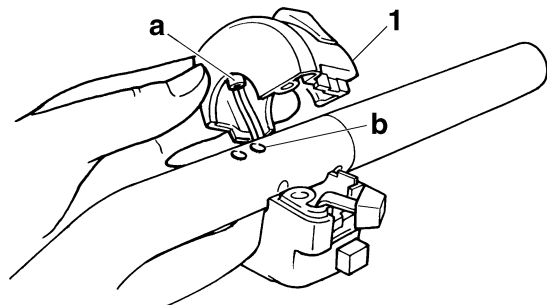
There should be 1–3 mm (0.04–0.12 in) of clearance "a" between the handlebar grip and the grip end.



3. Install:
 - Right handlebar switch "1"

NOTE:

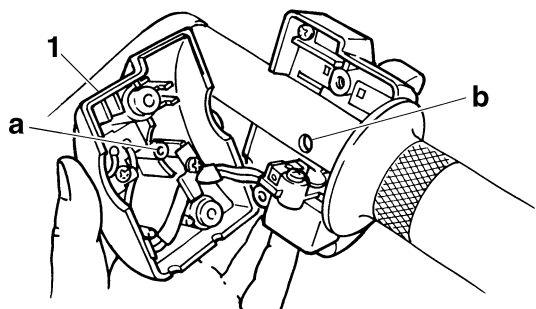
Align the projection "a" on the right handlebar switch with the hole "b" on the right handlebar.



4. Install:
 - Left handlebar switch "1"

NOTE:

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



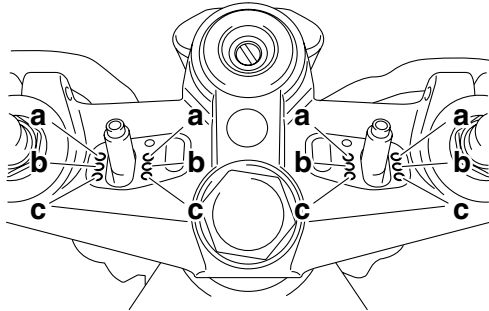
5. Install:
 - Right handlebar

HANDLEBARS

- Left handlebar

NOTE:

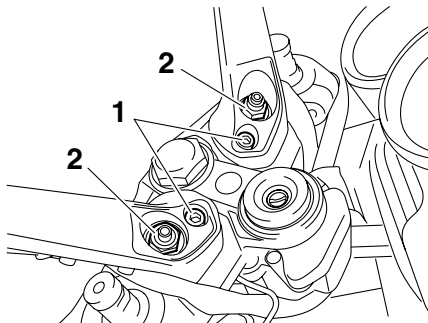
Fit the projections on each handlebar into the holes in the upper bracket, making sure that the handlebars are installed in the same position.



- a. Front position
- b. Standard position
- c. Rear position

6. Install:

- Handlebar bolts “1” (temporarily)
- Handlebar nuts “2” (temporarily)



7. Tighten:

- Handlebar bolts
- Handlebar nuts



Handlebar bolt
23 Nm (2.3 m·kg, 17 ft·lb)
Handlebar nut
65 Nm (6.5 m·kg, 47 ft·lb)

NOTE:

First tighten the bolts, then tighten the nuts.

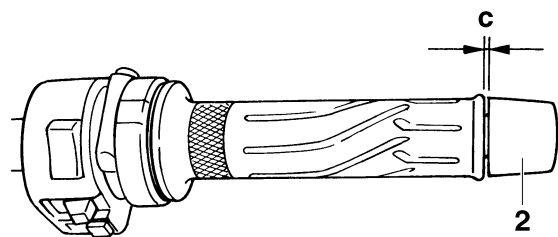
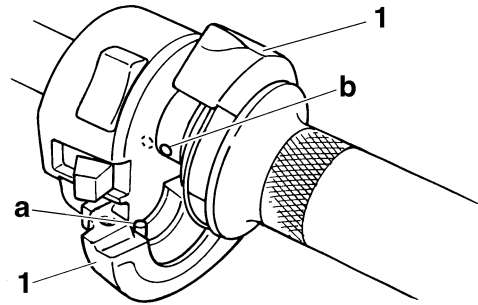
8. Install:

- Throttle grip
- Throttle cables
- Throttle cable housing “1”
- Grip end “2”

NOTE:

- Align the projection “a” on the throttle cable housing with the hole “b” in the right handlebar.

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



9. Install:

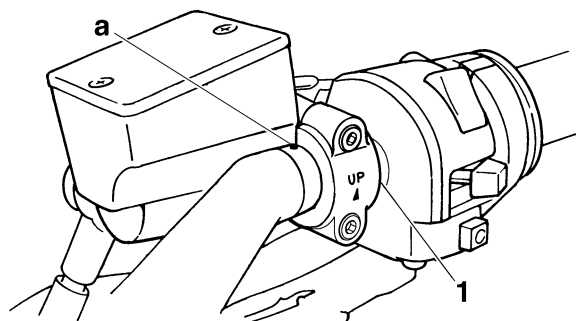
- Front brake master cylinder assembly
- Front brake master cylinder holder “1”



Front brake master cylinder holder bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

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



10. Install:

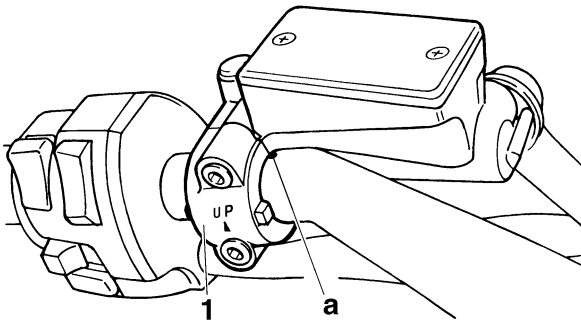
- Clutch master cylinder assembly
- Clutch master cylinder holder “1”



**Clutch master cylinder holder
bolt**
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- Install the clutch master cylinder holder with the “UP” mark facing up
- Align the mating surfaces of the clutch master cylinder holder with the punch mark “a” on the left handlebar.
- First, tighten the upper bolt, then the lower bolt.



11.Adjust:

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

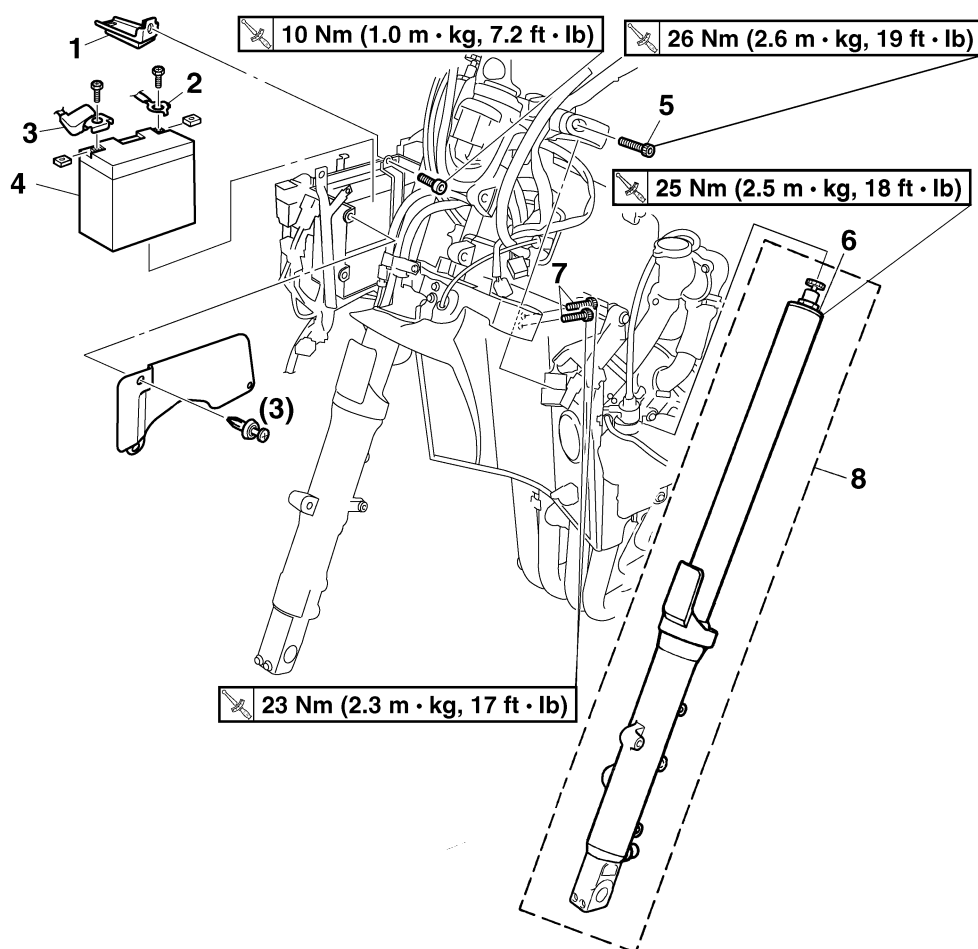


Throttle cable free play
3.0–5.0 mm (0.12–0.20 in)

EAS22950

FRONT FORK

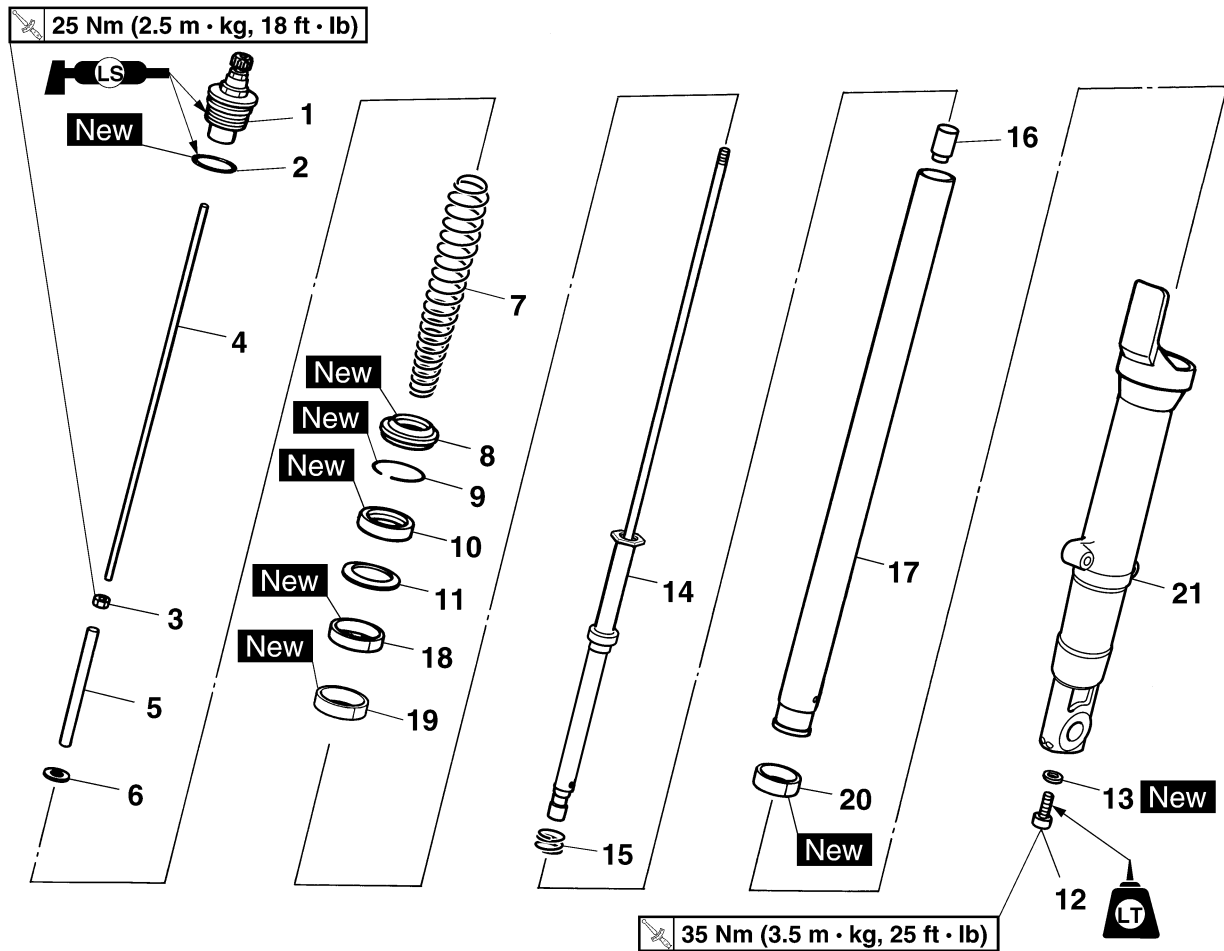
Removing the front fork legs



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------|------|---|
| | | | The following procedure applies to both of the front fork legs. |
| | Front cowling assembly | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Front wheel | | Refer to "FRONT WHEEL" on page 4-13. |
| 1 | Battery holder | 1 | |
| 2 | Negative battery lead | 1 | Disconnect. |
| 3 | Positive battery lead | 1 | Disconnect. |
| 4 | Battery | 1 | |
| 5 | Upper bracket pinch bolt | 1 | Loosen. |
| 6 | Cap bolt | 1 | Loosen. |
| 7 | Lower bracket pinch bolt | 2 | Loosen. |
| 8 | Front fork leg | 1 | |
| | | | For installation, reverse the removal procedure. |

FRONT FORK

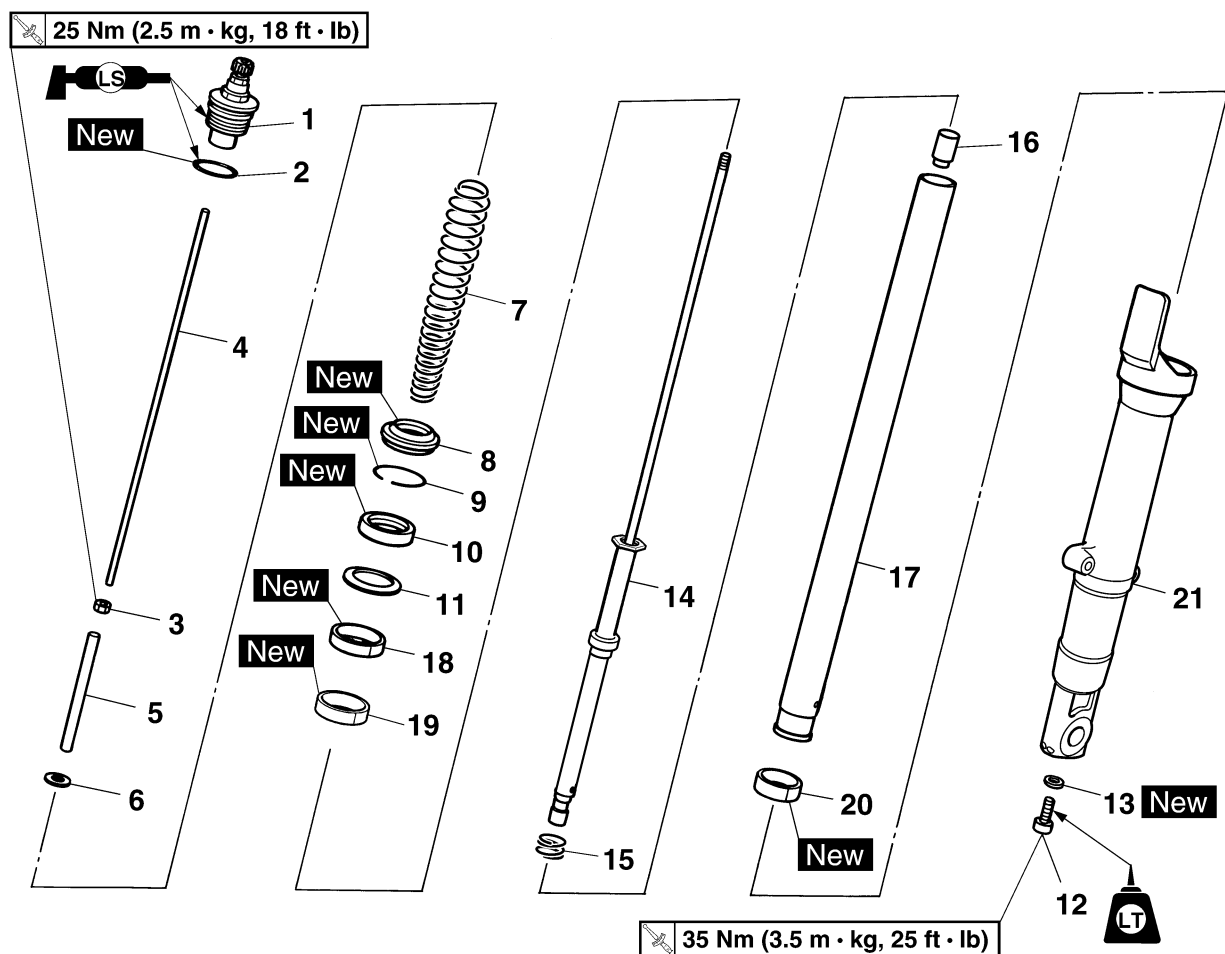
Disassembling the front fork legs



| 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 | Nut | 1 | |
| 4 | Damper adjusting rod | 1 | |
| 5 | Spacer | 1 | |
| 6 | Washer | 1 | |
| 7 | Fork spring | 1 | |
| 8 | Dust seal | 1 | |
| 9 | Oil seal clip | 1 | |
| 10 | Oil seal | 1 | |
| 11 | Washer | 1 | |
| 12 | Damper rod assembly bolt | 1 | |
| 13 | Copper washer | 1 | |
| 14 | Damper rod assembly | 1 | |
| 15 | Spring | 1 | |
| 16 | Oil flow stopper | 1 | |

FRONT FORK

Disassembling the front fork legs



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------|------|--|
| 17 | Inner tube | 1 | |
| 18 | Outer tube bushing 1 | 1 | D = 52 mm (2.05 in), l = 12 mm (0.47 in) |
| 19 | Outer tube bushing 2 | 1 | D = 51 mm (2.01 in), l = 15 mm (0.59 in) |
| 20 | Inner tube bushing | 1 | |
| 21 | 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.

NOTE:

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

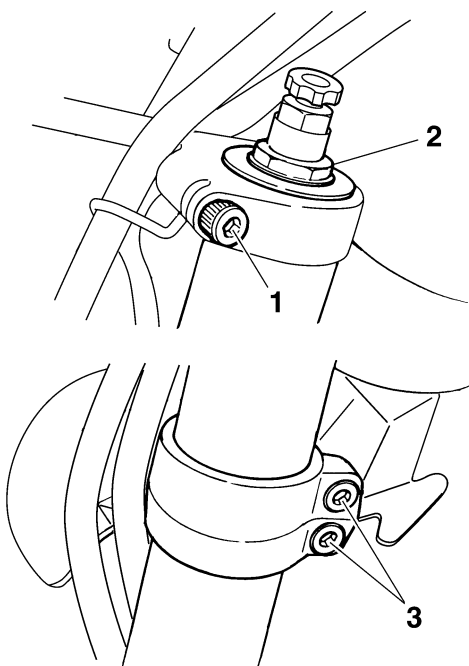
2. Loosen:

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

EWA13640

WARNING

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

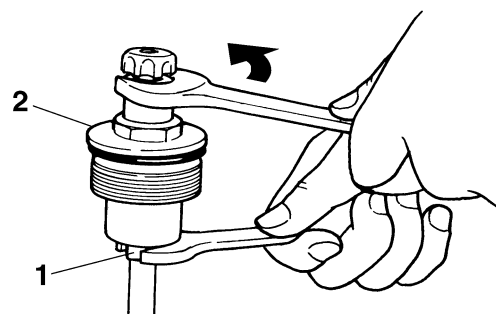


EAS22980

DISASSEMBLING THE FRONT FORK LEGS

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

1. Hold the nut "1" and loosen the cap bolt "2".

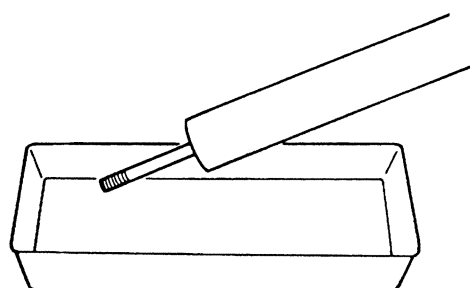


2. Drain:

- Fork oil

NOTE:

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



3. Remove:

- Dust seal "1"
 - Oil seal clip "2"
- (with a flat-head screwdriver)

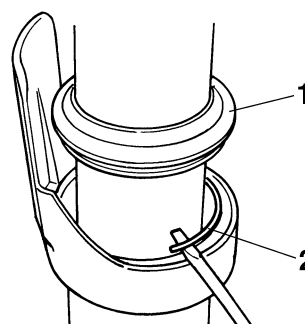
ECA14180

CAUTION:

Do not scratch the inner tube.

NOTE:

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



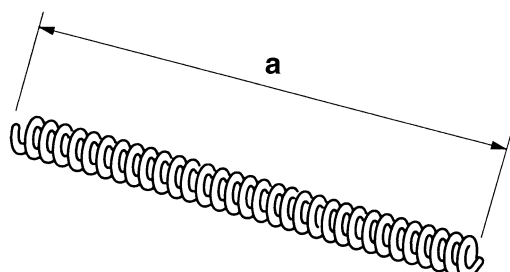
4. Remove:

- Oil seal
- Washer

FRONT FORK



Fork spring free length
262.0 mm (10.31 in)
Limit
257.0 mm (10.12 in)



3. Check:

- Damper rod assembly
Damage/wear → Replace.
Obstruction → Blow out all of the oil passages with compressed air.
- Oil flow stopper
Damage → Replace.

ECA14200

CAUTION:

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

4. Check:

- Cap bolt O-ring
Damage/wear → Replace.

EAS23030

ASSEMBLING THE FRONT FORK LEGS

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

EWA13660



WARNING

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

NOTE:

- When assembling the front fork leg, be sure to replace the following parts:
 - Inner tube bushing
 - Outer tube bushing 1
 - Outer tube bushing 2
 - Oil seal
 - Dust seal

- Before assembling the front fork leg, make sure all of the components are clean.

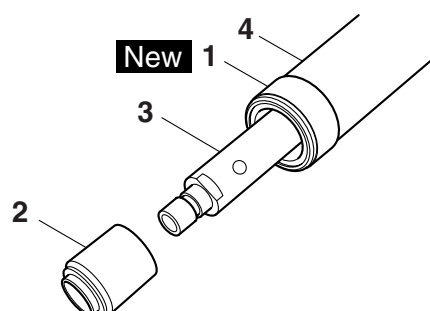
1. Install:

- Inner tube bushing “1” **New**
- Oil flow stopper “2”
- Spring
- Damper rod assembly “3”

EC3P61028

CAUTION:

Allow the damper rod assembly to slide slowly down the inner tube “4” until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Lubricate:

- Inner tube's outer surface



Recommended oil
Suspension oil M1 or ohlins R & T43

3. Tighten:

- Damper rod assembly bolt



Damper rod assembly bolt
35 Nm (3.5 m·kg, 25 ft·lb)
LOCTITE®

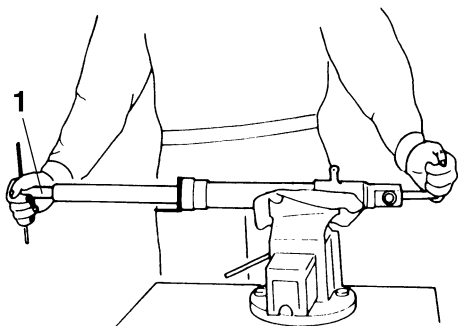
NOTE:

While holding the damper rod assembly with the damper rod holder “1”, tighten the damper rod assembly bolt.



Damper rod holder
90890-01447
YM-01447

FRONT FORK

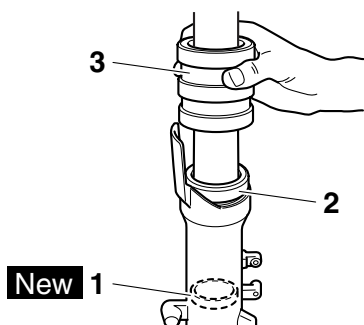


4. Install:

- Outer tube bushing 2 (D = 51 mm (2.01 in), l = 15 mm (0.59 in)) "1" **New**
(with the slide metal installer "2" and fork seal driver "3")



Slide metal installer
90890-01508
Fork seal driver
90890-01502
YM-A0948

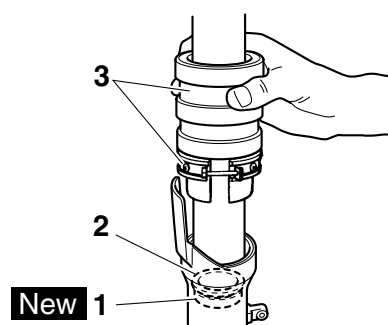


5. Install:

- Outer tube bushing 1 (D = 52 mm (2.05 in), l = 12 mm (0.47 in)) "1" **New**
- Washer "2"
- (with the fork seal driver "3")



Fork seal driver
90890-01502
YM-A0948



6. Install:

- Oil seal "1" **New**
(with the fork seal driver "2")



Fork seal driver
90890-01502
YM-A0948

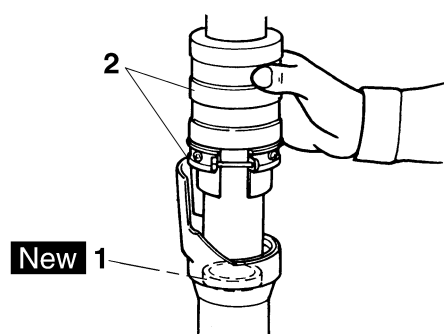
ECA14220

CAUTION:

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

NOTE:

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

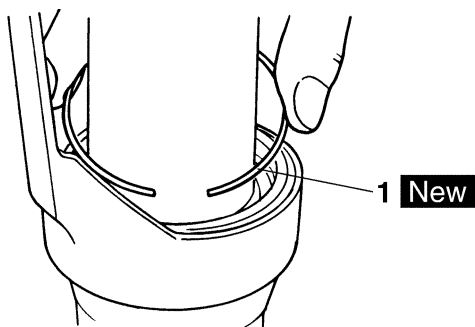


7. Install:

- Oil seal clip "1" **New**

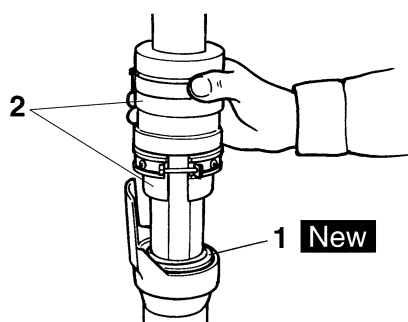
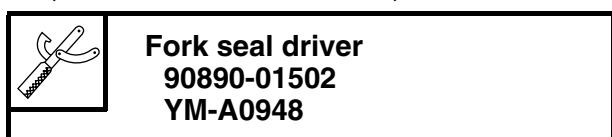
NOTE:

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



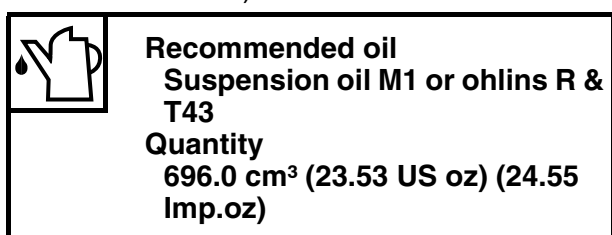
8. Install:

- Dust seal "1" **New**
(with the fork seal driver "2")



9. Fill:

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



ECA14230

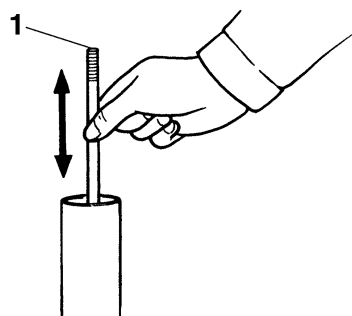
CAUTION:

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

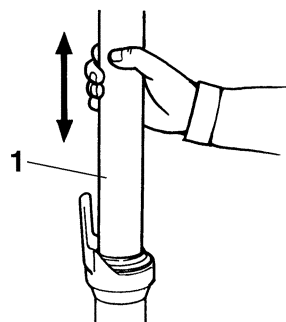
10. After filling the front fork leg, slowly stroke the damper rod assembly "1" up and down (at least ten times) to distribute the fork oil.

NOTE:

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



11. Slowly stroke the inner tube "1" up and down.



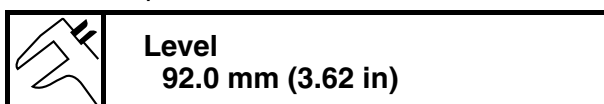
12. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

NOTE:

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

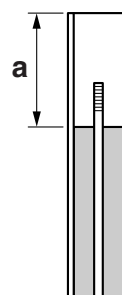
13. Measure:

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



NOTE:

- While filling the front fork leg, keep it upright.
- After filling, slowly pump the front fork leg up and down to distribute the fork oil.



14. Install:

- Fork spring

FRONT FORK

NOTE:

Install the fork spring so that the end "A" shown in the illustration is facing up.



A ←

15. Install:

- Nut "1"
- Damper adjusting rod "2"
- Cap bolt "3"

- Install the nut "1" and finger tighten it.
- Install the damper adjusting rod "2".
- Install the cap bolt "3" and finger tighten it.

EWA13670



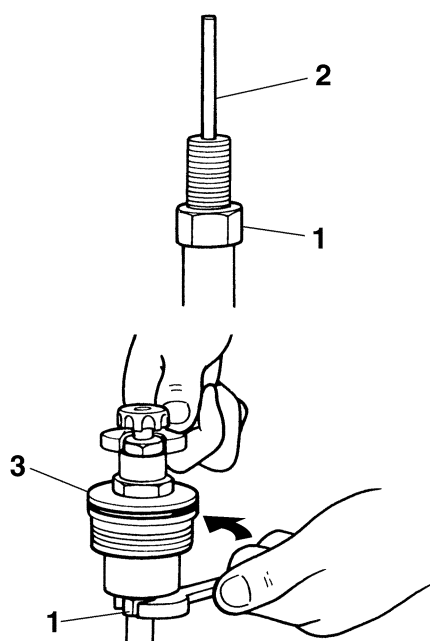
WARNING

Always use a new cap bolt O-ring.

- Hold the cap bolt and tighten the nut "1" to specification.



Nut
25 Nm (2.5 m·kg, 18 ft·lb)



16. Install:

- Cap bolt
(to the outer tube)

NOTE:

Temporarily tighten the cap bolt.

EAS23050

INSTALLING THE FRONT FORK LEGS

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

1. Install:

- Front fork leg
Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:

Make sure the inner tube is flush with the top of the upper bracket.

2. Tighten:

- Lower bracket pinch bolts "1"



Lower bracket pinch bolt
23 Nm (2.3 m·kg, 17 ft·lb)

- Cap bolt "2"



Cap bolt
25 Nm (2.5 m·kg, 18 ft·lb)

- Upper bracket pinch bolt "3"



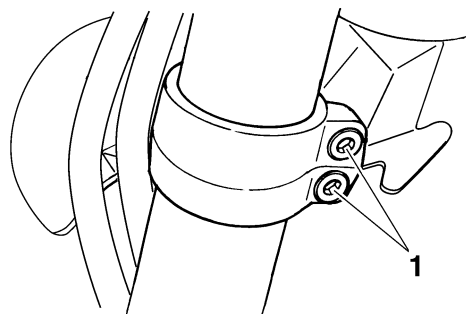
Upper bracket pinch bolt
26 Nm (2.6 m·kg, 19 ft·lb)

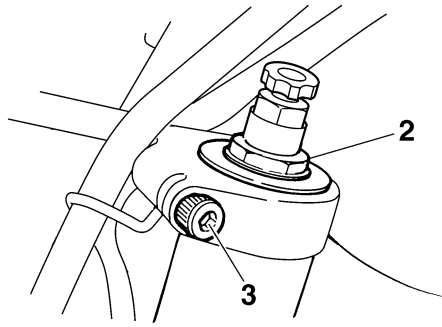
EWA13680



WARNING

Make sure the brake hoses are routed properly.





3. Adjust:

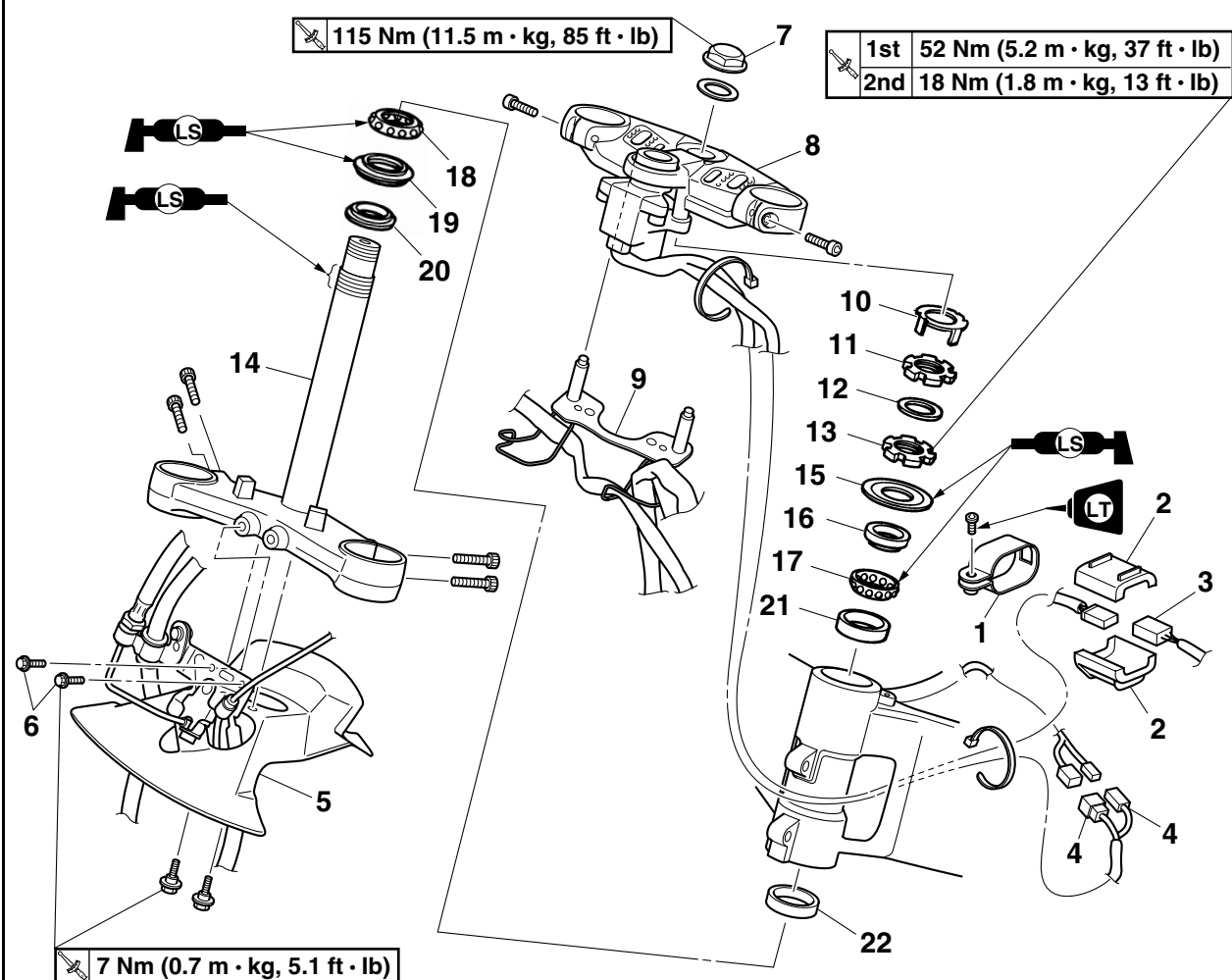
- Spring preload
- Rebound damping
- Compression damping

Refer to “ADJUSTING THE FRONT FORK LEGS” on page 3-28.

EAS23090

STEERING HEAD

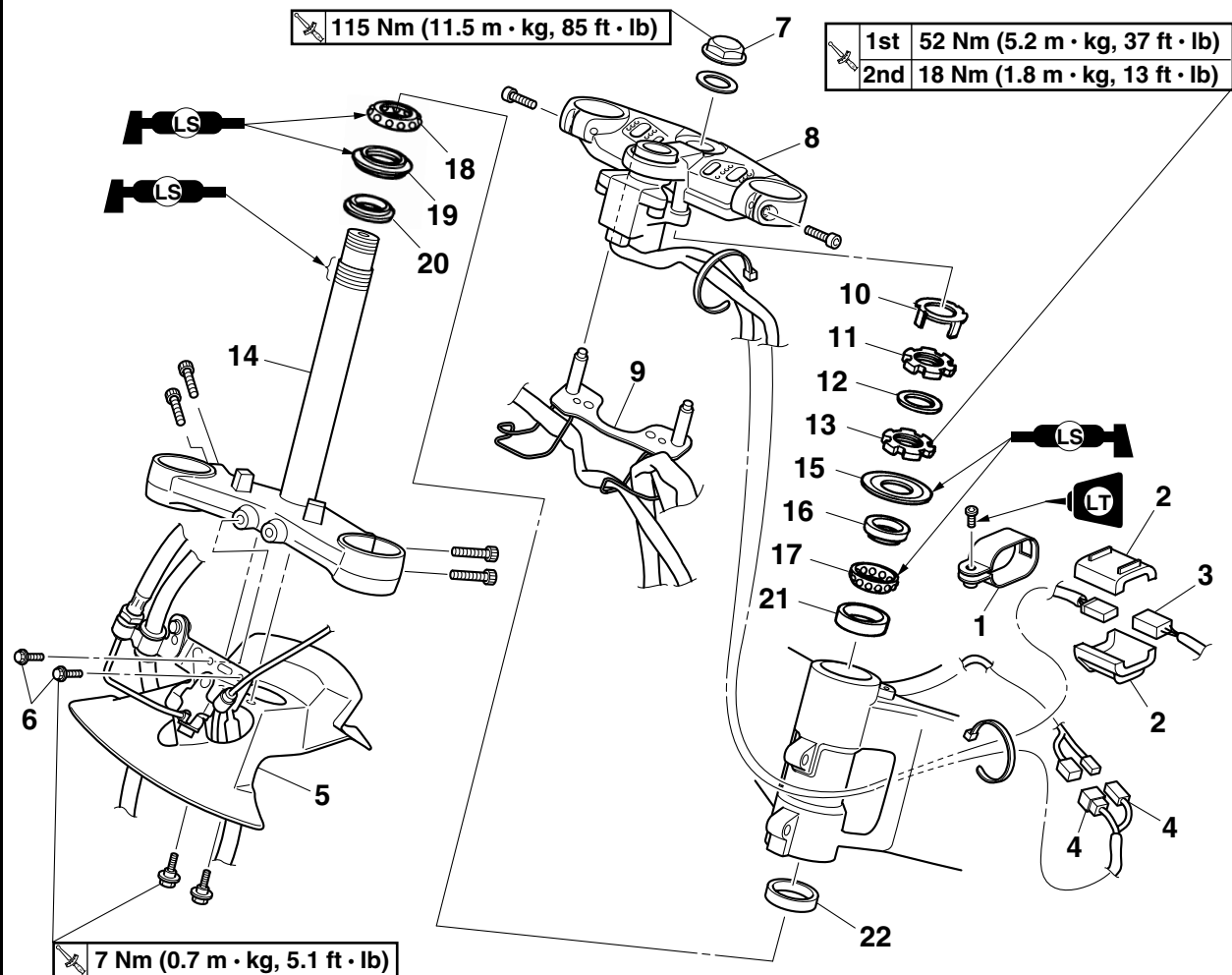
Removing the lower bracket



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------------|------|---|
| | Rider seat/T-bar | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Handlebars | | Refer to "HANDLEBARS" on page 4-60. |
| | Front fork legs | | Refer to "FRONT FORK" on page 4-65. |
| 1 | Immobilizer unit coupler cover holder | 1 | |
| 2 | Immobilizer unit coupler cover | 2 | |
| 3 | Immobilizer unit coupler | 1 | Disconnect. |
| 4 | Main switch coupler | 2 | Disconnect. |
| 5 | Lower bracket cover | 1 | |
| 6 | Brake hose joint bracket bolt | 2 | |
| 7 | Steering stem nut | 1 | |
| 8 | Upper bracket | 1 | |
| 9 | Handlebar bracket | 1 | |
| 10 | Lock washer | 1 | |
| 11 | Upper ring nut | 1 | |

STEERING HEAD

Removing the lower bracket



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------|------|--|
| 12 | Rubber washer | 1 | |
| 13 | Lower ring nut | 1 | |
| 14 | Lower bracket | 1 | |
| 15 | Upper bearing cover | 1 | |
| 16 | Upper bearing inner race | 1 | |
| 17 | Upper bearing | 1 | |
| 18 | Lower bearing | 1 | |
| 19 | Dust seal | 1 | |
| 20 | Lower bearing inner race | 1 | |
| 21 | Upper bearing outer race | 1 | |
| 22 | Lower bearing outer race | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS23110

REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Remove:

- Upper ring nut
- Rubber washer
- Lower ring nut "1"
- Lower bracket

EWA13730

WARNING

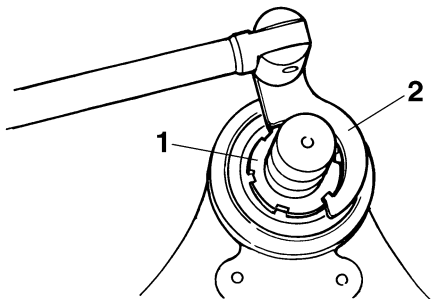
Securely support the lower bracket so that there is no danger of it falling.

NOTE:

Remove the lower ring nut with the steering nut wrench "2".



Steering nut wrench
90890-01403
Spanner wrench
YU-33975



EAS23120

CHECKING THE STEERING HEAD

1. Wash:

- Bearings
- Bearing races



Recommended cleaning solvent
Kerosene

2. Check:

- Bearings
 - Bearing races
- Damage/pitting → Replace.

3. Replace:

- Bearings
- Bearing races

a. Remove the bearing 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 new bearing races.

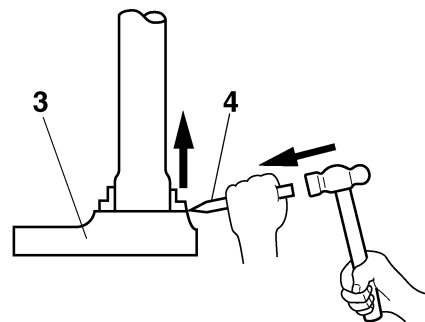
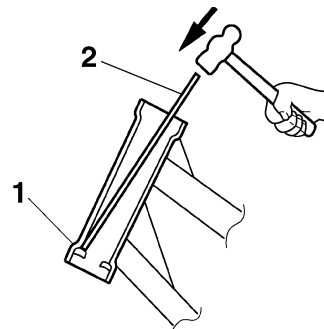
ECA14270

CAUTION:

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

NOTE:

Always replace the bearings and bearing races as a set.



4. Check:

- Upper bracket
 - Lower bracket
- (along with the steering stem)
Bends/cracks/damage → Replace.

EAS23140

INSTALLING THE STEERING HEAD

1. Lubricate:

- Upper bearing
- Lower bearing
- Bearing races

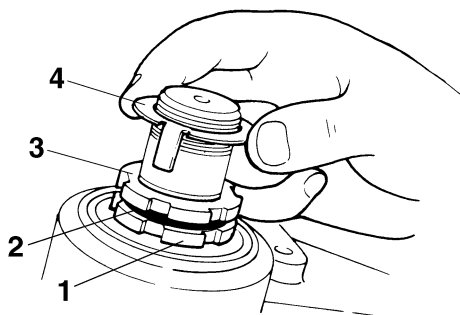


Recommended lubricant
Lithium-soap-based grease

2. Install:

- Lower ring nut "1"
- Rubber washer "2"
- Upper ring nut "3"

- Lock washer "4"
- Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" on page 3-26.



3. Install:
- Upper bracket
 - Steering stem nut

NOTE:

Temporarily tighten the steering stem nut.

4. Install:
- Front fork legs
- Refer to "FRONT FORK" on page 4-65.

NOTE:

Temporarily tighten the upper and lower bracket pinch bolts.

5. Tighten:
- Steering stem nut



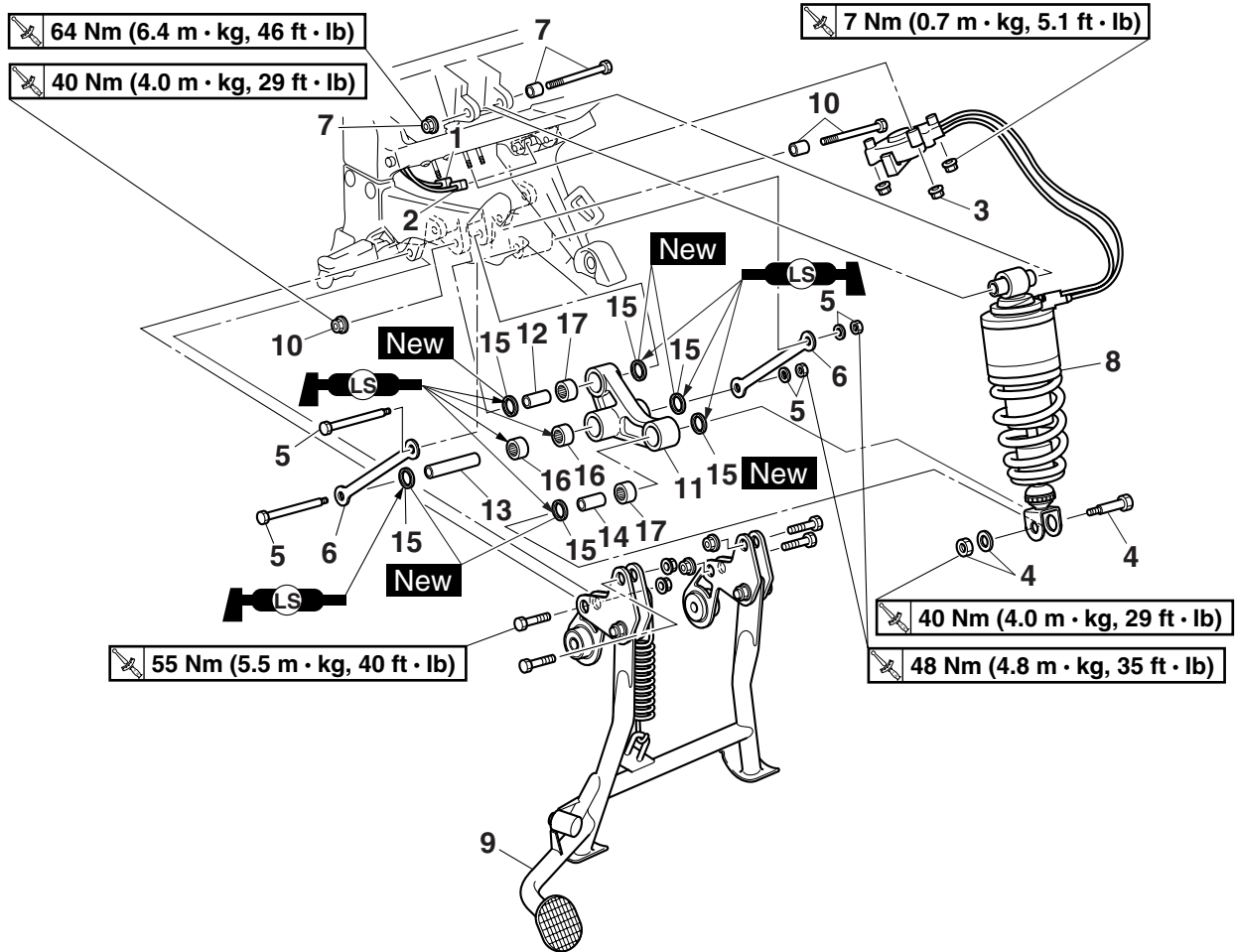
Steering stem nut
115 Nm (11.5 m·kg, 85 ft·lb)

REAR SHOCK ABSORBER ASSEMBLY

EAS23160

REAR SHOCK ABSORBER ASSEMBLY

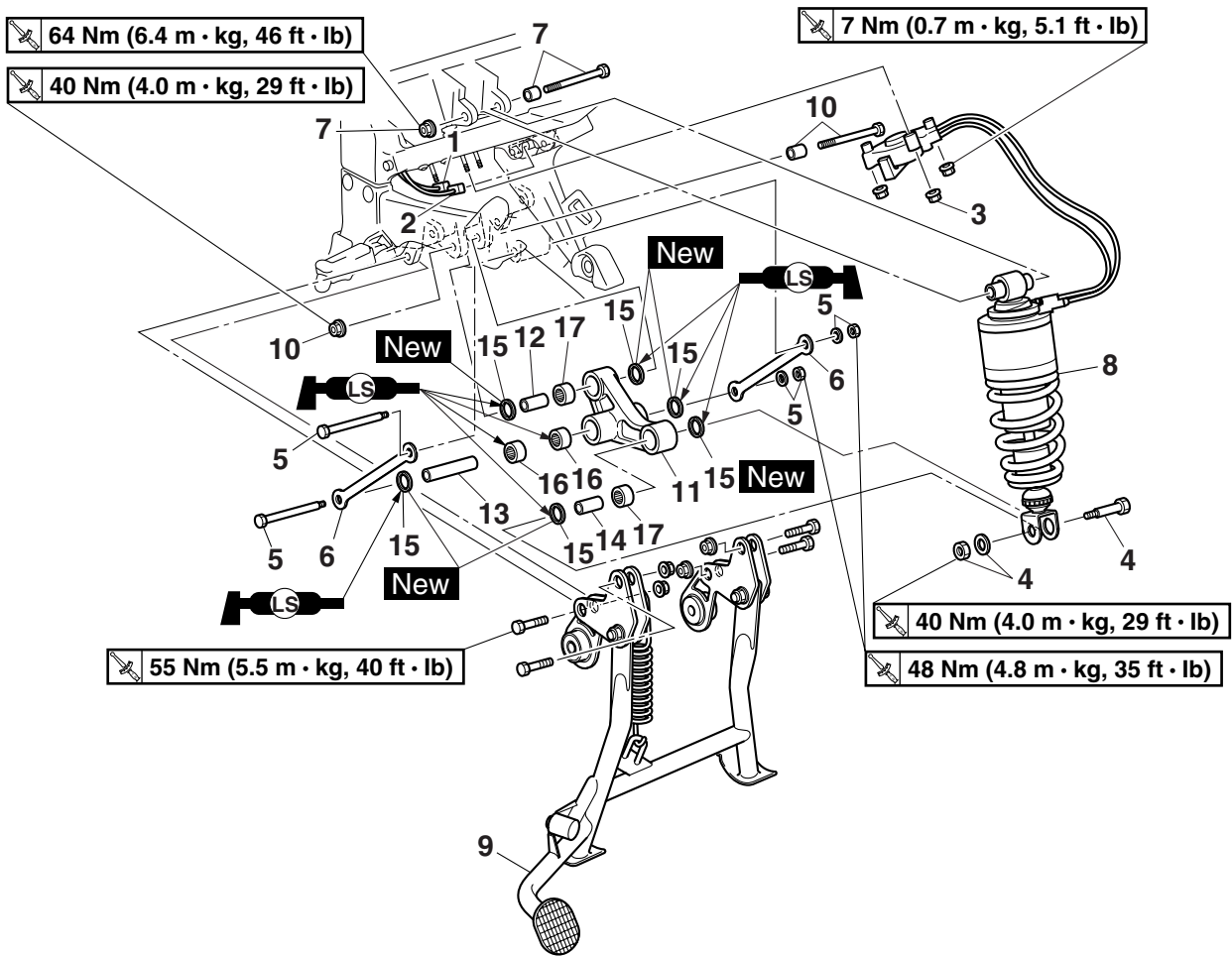
Removing the rear shock absorber assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|-------|---|
| | Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Rear wheel | | Refer to "REAR WHEEL" on page 4-20. |
| | Mufflers/Exhaust pipe assembly | | Refer to "ENGINE REMOVAL" on page 5-1. |
| 1 | Rectifier/regulator coupler | 1 | Disconnect. |
| 2 | Stator coil coupler | 1 | Disconnect. |
| 3 | Rear shock absorber spring preload adjusting lever nut | 3 | |
| 4 | Rear shock absorber assembly lower nut/Washer/Bolt | 1/1/1 | |
| 5 | Connecting arm nut/Washer/Bolt | 2/2/2 | |
| 6 | Connecting arm | 2 | |
| 7 | Rear shock absorber assembly upper nut/Bolt/Spacer | 1/1/1 | |
| 8 | Rear shock absorber assembly | 1 | |
| 9 | Centerstand | 1 | |
| 10 | Relay arm nut/Bolt/Spacer | 1/1/1 | |

REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 11 | Relay arm | 1 | |
| 12 | Spacer | 1 | |
| 13 | Spacer | 1 | |
| 14 | Spacer | 1 | |
| 15 | Oil seal | 6 | |
| 16 | Bearing | 2 | |
| 17 | Bearing | 2 | |
| | | | For installation, reverse the removal procedure. |

REAR SHOCK ABSORBER ASSEMBLY

EAS23180

HANDLING THE REAR SHOCK ABSORBER

EWA13740

WARNING

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

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

EAS23190

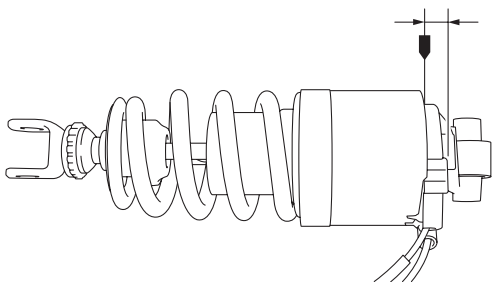
DISPOSING OF A REAR SHOCK ABSORBER

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

EWA13760

WARNING

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



EAS23230

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

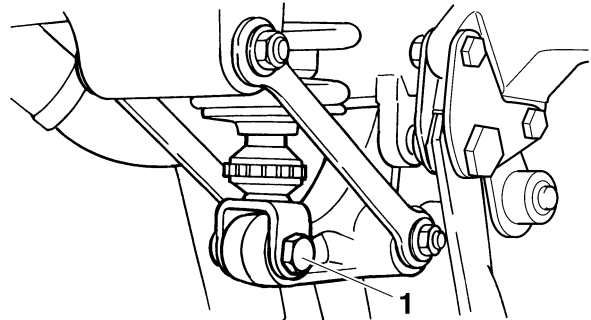
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Rear shock absorber assembly lower bolt “1”
- Connecting arms

NOTE:

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

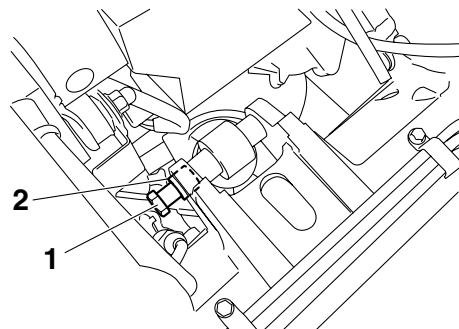


3. Remove:

- Rear shock absorber assembly upper bolt “1”
- Spacer “2”
- Rear shock absorber assembly

NOTE:

- Partially pull out the rear shock absorber assembly upper bolt, slide the spacer “1” towards the bolt head to create some clearance between the bolt and the frame, and then remove the bolt completely.
- Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm and relay arm.



EAS23240

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:

- Rear shock absorber rod
Bends/damage → Replace the rear shock absorber assembly.

REAR SHOCK ABSORBER ASSEMBLY

- Rear shock absorber
Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- Spring
Damage/wear → Replace the rear shock absorber assembly.
- Bushing
Damage/wear → Replace the rear shock absorber assembly.
- Spacer
Damage/scratches → Replace.
- Bolts
Bends/damage/wear → Replace.

EAS23260

CHECKING THE CONNECTING ARM AND RELAY ARM

1. Check:
 - Connecting arms
 - Relay arm
Damage/wear → Replace.
2. Check:
 - Bearings
 - Oil seals
Damage/pitting → Replace.
3. Check:
 - Spacers
Damage/scratches → Replace.

EAS23270

INSTALLING THE RELAY ARM

1. Lubricate:
 - Spacer
 - Bearings

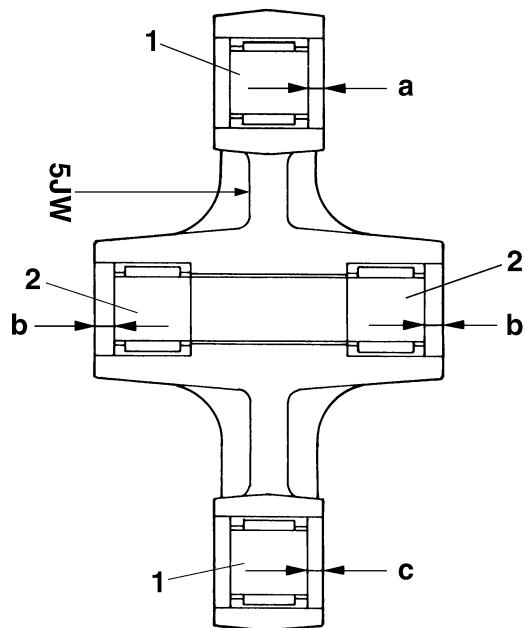


Recommended lubricant
Lithium-soap-based grease

2. Install:
 - Bearing “1”, “2”
(to the relay arm)



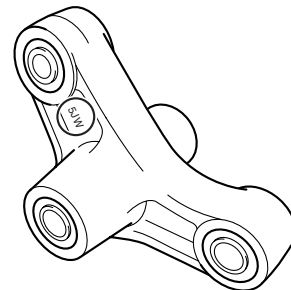
Installed depth “a”
4.5 mm (0.18 in)
Installed depth “b”
3.5–4.5 mm (0.14–0.18 in)
Installed depth “c”
4.0 mm (0.16 in)



3. Install:
 - Relay arm

NOTE:

Make sure that the embossed mark “5JW” on the relay arm faces to the left.



EAS23310

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
 - Rear shock absorber assembly

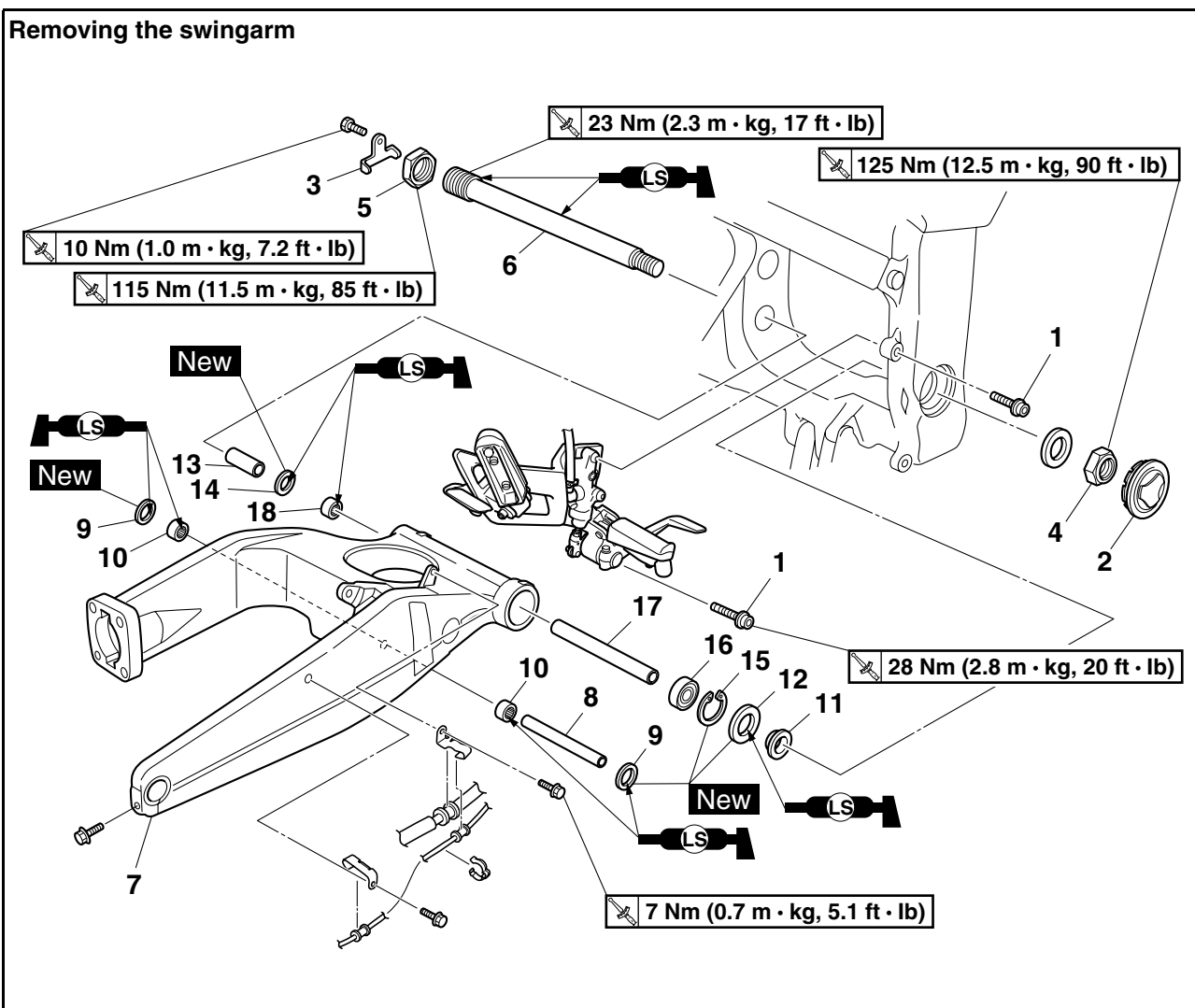
NOTE:

- Make sure that the warning label on the rear shock absorber assembly faces to the right.
- When installing the rear shock absorber assembly, lift up the swingarm.

EAS23330

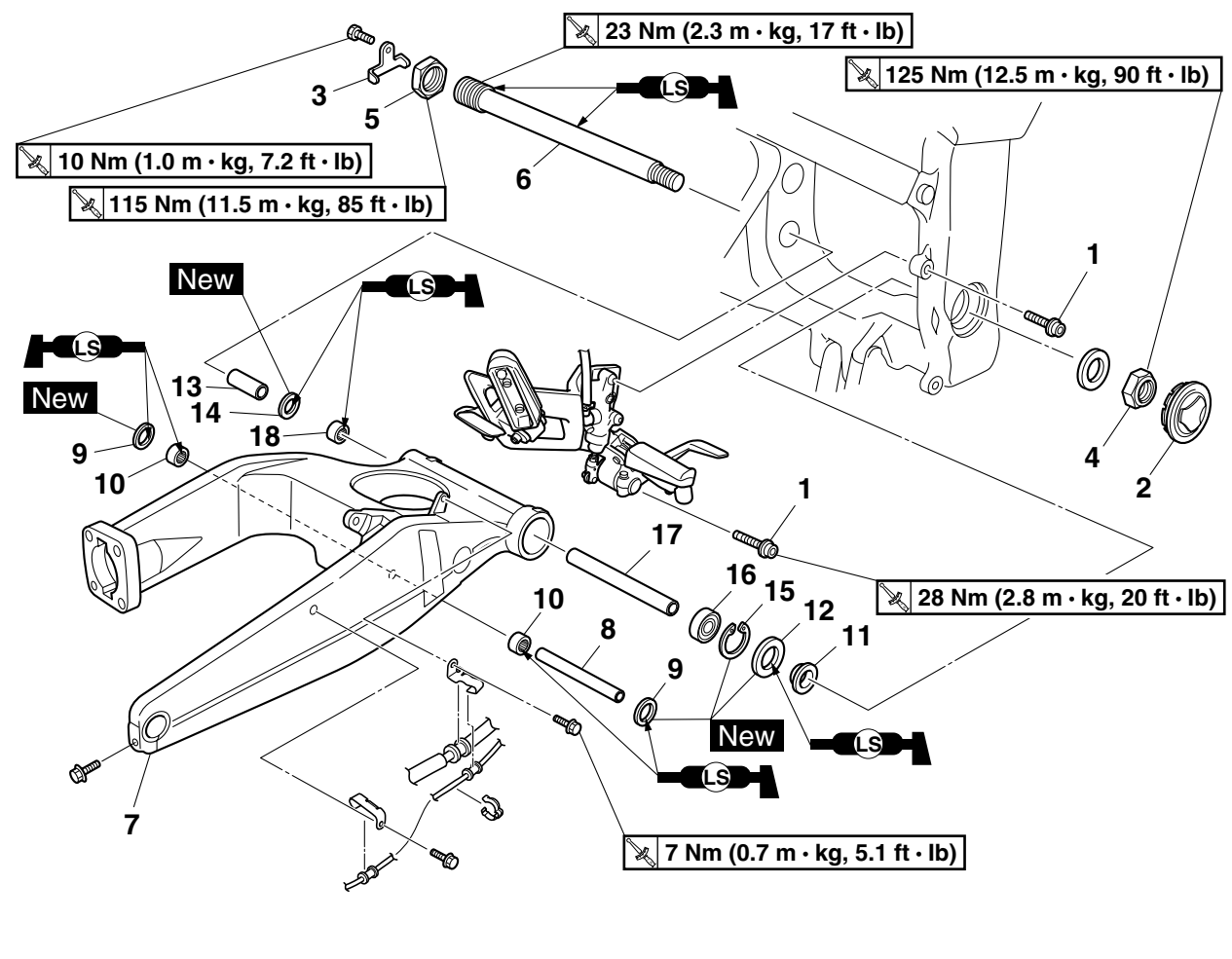
SWINGARM

Removing the swingarm



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|---|
| | Rear wheel | | Refer to "REAR WHEEL" on page 4-20. |
| | Rear shock absorber assembly/Connecting arms | | Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-79. |
| | Final drive assembly/Universal joint | | Refer to "SHAFT DRIVE" on page 4-87. |
| 1 | Right footrest bracket bolt | 2 | |
| 2 | Pivot shaft end cover | 1 | |
| 3 | Pivot shaft locknut retainer | 1 | |
| 4 | Pivot shaft nut | 1 | |
| 5 | Pivot shaft locknut | 1 | |
| 6 | Pivot shaft | 1 | |
| 7 | Swingarm | 1 | |
| 8 | Spacer | 1 | |
| 9 | Oil seal | 2 | |
| 10 | Bearing | 2 | |
| 11 | Collar | 1 | |
| 12 | Oil seal | 1 | |

Removing the swingarm



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 13 | Spacer | 1 | |
| 14 | Oil seal | 1 | |
| 15 | Circlip | 1 | |
| 16 | Bearing | 1 | |
| 17 | Spacer | 1 | |
| 18 | Bearing | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS23350

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.

NOTE:

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

2. Measure:

- Swingarm side play
- Swingarm vertical movement

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



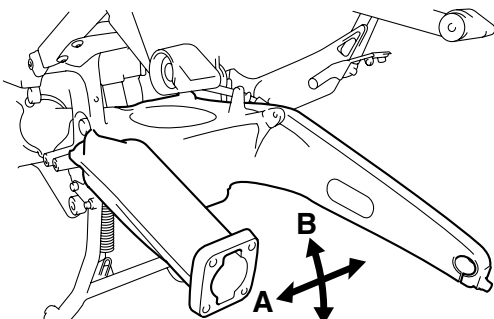
Pivot shaft
23 Nm (2.3 m·kg, 17 ft·lb)
Pivot shaft nut
125 Nm (12.5 m·kg, 90 ft·lb)
Pivot shaft locknut
115 Nm (11.5 m·kg, 85 ft·lb)

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



Swingarm side play (at the end of the swingarm)
0 mm (0 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 spacers, bearings, washers, and dust covers.



EAS23360

CHECKING THE SWINGARM

1. Check:

- Swingarm
Bends/cracks/damage → Replace.

2. Check:

- Pivot shaft
Roll the pivot shaft on a flat surface.
Bends → Replace.

EWA13770

WARNING

Do not attempt to straighten a bent pivot shaft.

3. Wash:

- Pivot shaft
- Spacers
- Washer
- Bearings
- Collar



Recommended cleaning solvent
Kerosene

4. Check:

- Spacers
- Washer
- Collar
- Oil seals
Damage/wear → Replace.
- Bearings
Damage/pitting → Replace.

EAS23390

INSTALLING THE SWINGARM

1. Lubricate:

- Bearings
- Oil seals
- Pivot shaft



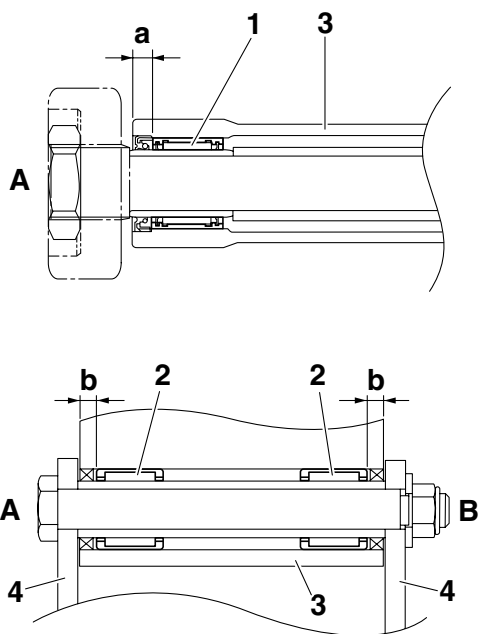
Recommended lubricant
Lithium-soap-based grease

2. Install:

- Bearing "1"
- Bearings "2"




Installed depth "a"
7.0 mm (0.28 in)
Installed depth "b"
4.0 mm (0.16 in)




- 3. Swingarm
- 4. Connecting arm
- A. Left side
- B. Right side

3. Tighten:
- Pivot shaft

| | |
|---|---|
|  | Pivot shaft 23 Nm (2.3 m·kg, 17 ft·lb) |
|---|---|

- Pivot shaft locknut

| | |
|---|---|
|  | Pivot shaft locknut 115 Nm (11.5 m·kg, 85 ft·lb) |
|---|---|

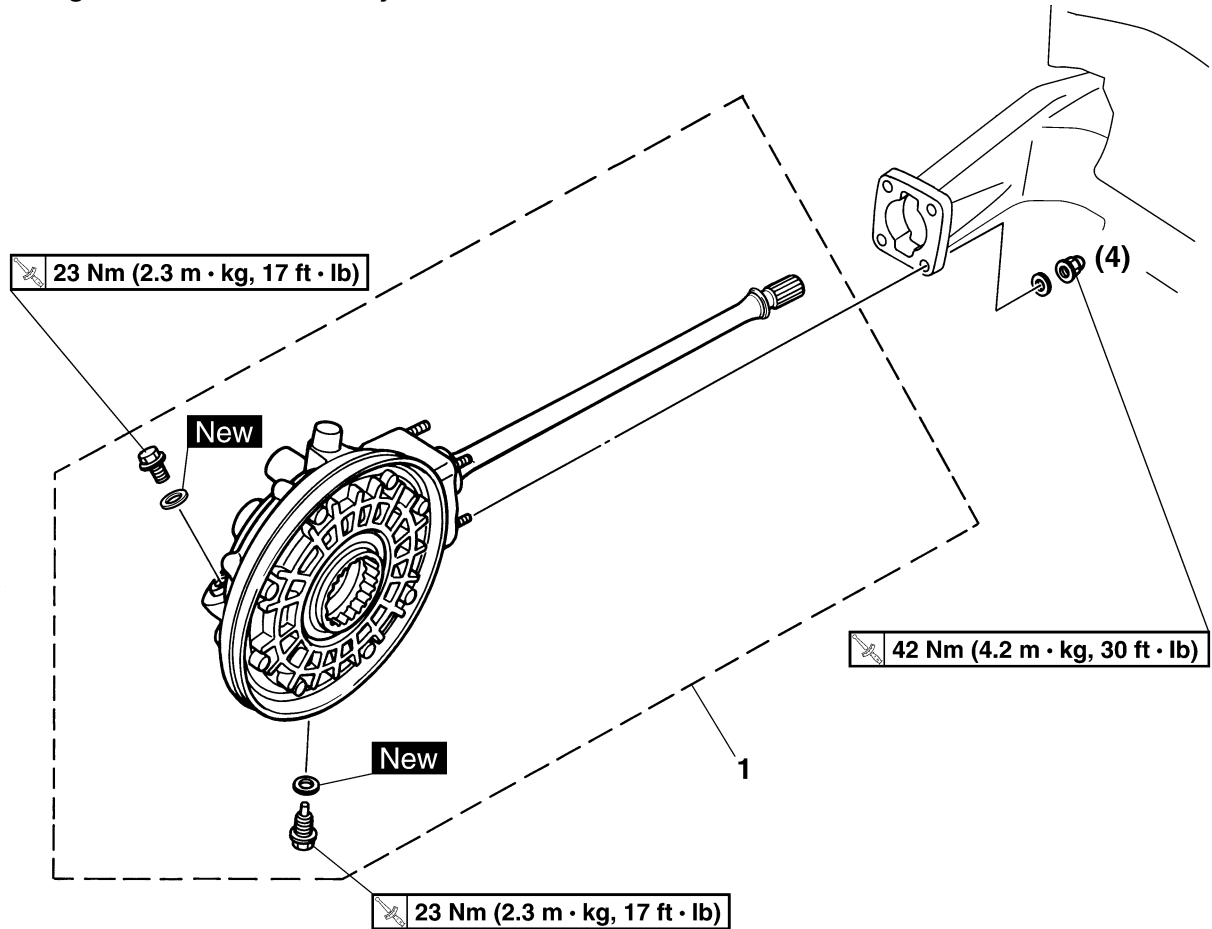
- Pivot shaft nut

| | |
|---|---|
|  | Pivot shaft nut 125 Nm (12.5 m·kg, 90 ft·lb) |
|---|---|

EAS23550

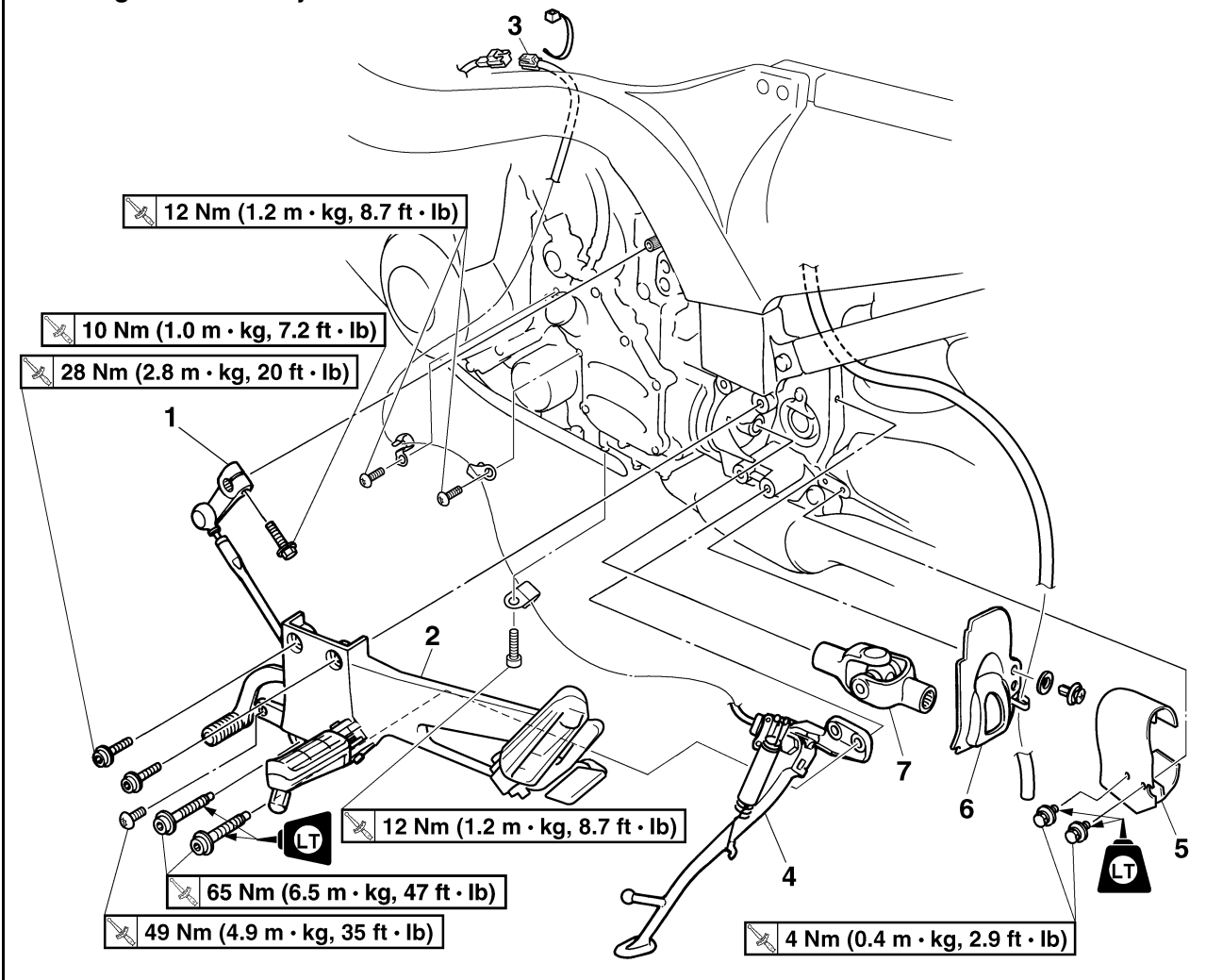
SHAFT DRIVE

Removing the final drive assembly



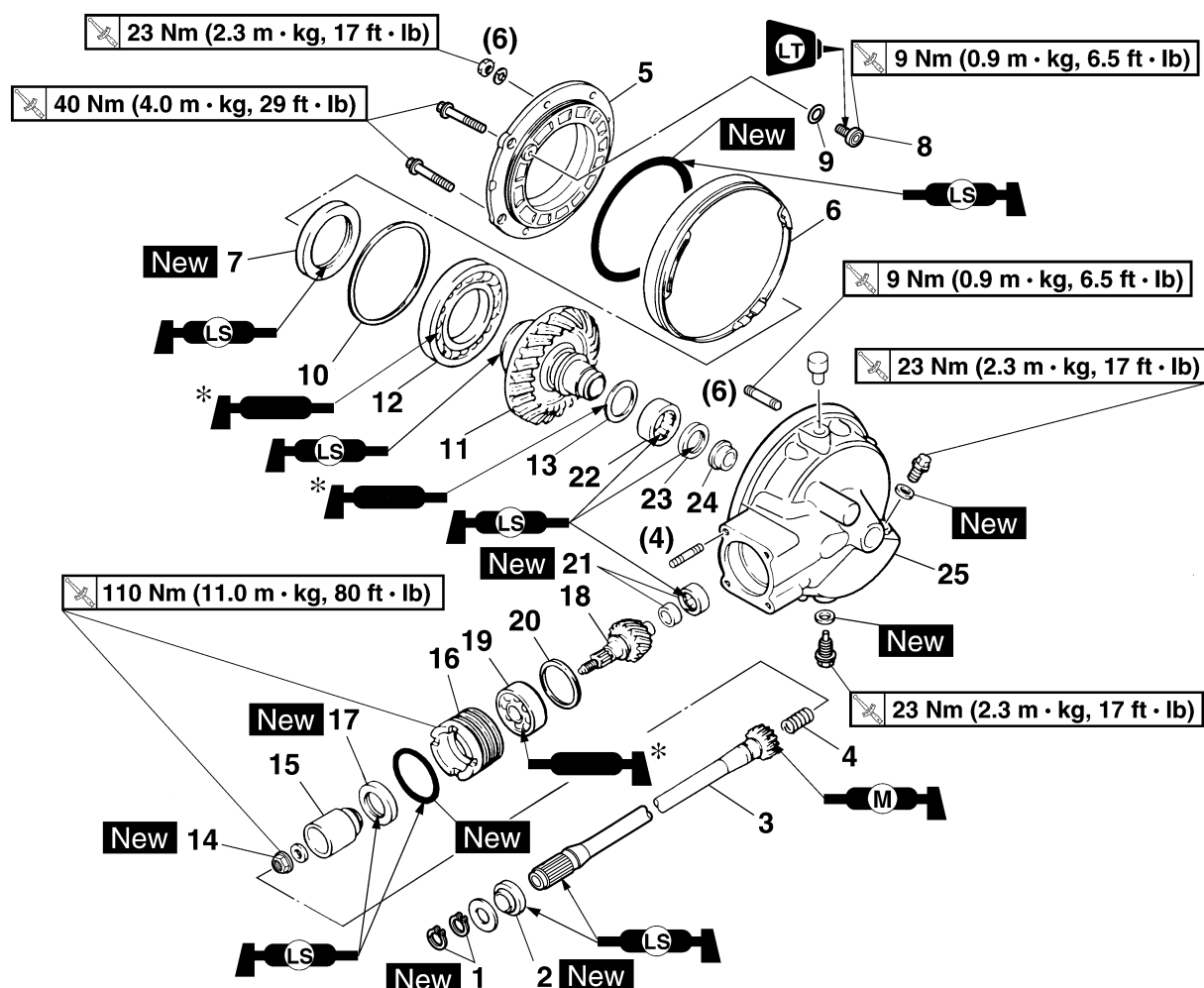
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------|------|--|
| | Final gear oil | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Rear wheel | | Refer to "REAR WHEEL" on page 4-20. |
| 1 | Final drive assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the universal joint



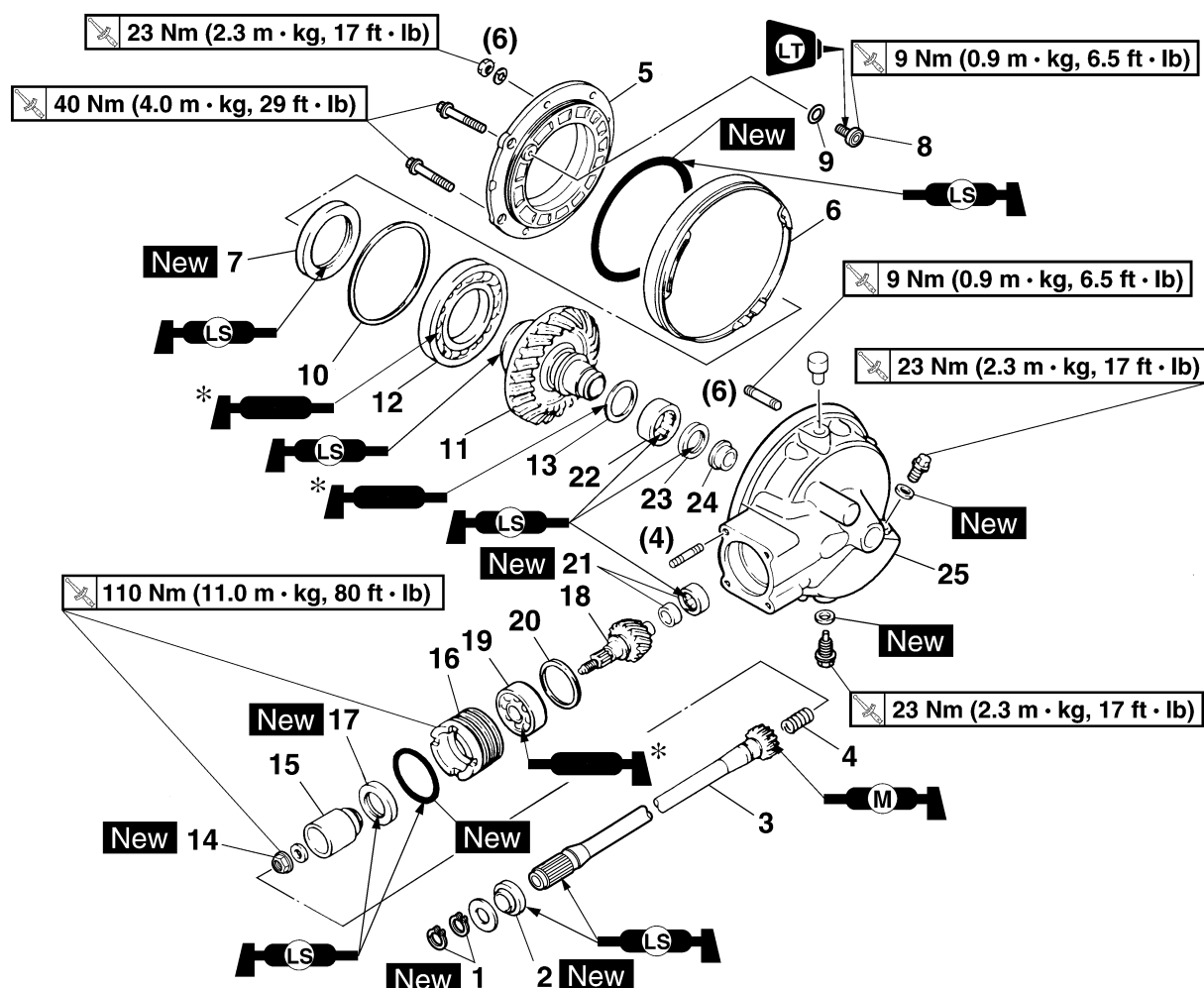
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| 1 | Shift arm | 1 | |
| 2 | Left footrest assembly | 1 | |
| 3 | Sidestand switch coupler | 1 | Disconnect. |
| 4 | Sidestand | 1 | |
| 5 | Drive shaft dust cover | 1 | |
| 6 | Universal joint dust cover | 1 | |
| 7 | Universal joint | 1 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the final drive assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------|------|-------------------|
| 1 | Circlip | 2 | |
| 2 | Oil seal | 1 | |
| 3 | Drive shaft | 1 | |
| 4 | Spring | 1 | |
| 5 | Ring gear bearing housing | 1 | |
| 6 | Dust cover | 1 | |
| 7 | Oil seal | 1 | |
| 8 | Stopper bolt | 1 | Left-hand threads |
| 9 | Stopper bolt shim(s) | | |
| 10 | Ring gear shim(s) | | |
| 11 | Ring gear | 1 | |
| 12 | Bearing | 1 | |
| 13 | Thrust washer | 1 | |
| 14 | Coupling gear nut | 1 | |
| 15 | Coupling gear | 1 | |
| 16 | Bearing retainer | 1 | Left-hand threads |
| 17 | Oil seal | 1 | |

Disassembling the final drive assembly



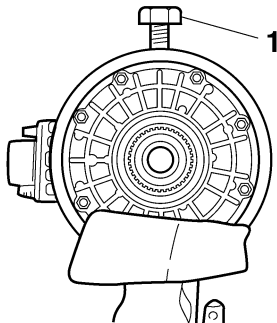
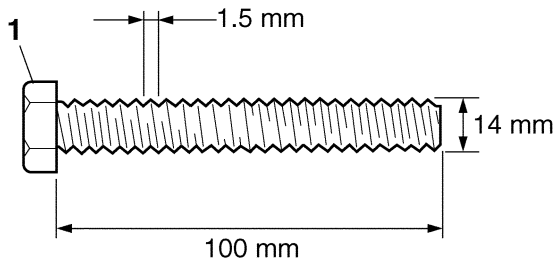
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|--|
| 18 | Final drive pinion gear | 1 | |
| 19 | Bearing | 1 | |
| 20 | Final drive pinion gear shim(s) | | |
| 21 | Final drive pinion gear bearing | 1 | |
| 22 | Ring gear bearing | 1 | |
| 23 | Oil seal | 1 | |
| 24 | Collar | 1 | |
| 25 | Final gear case | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

* Apply shaft drive gear oil (Part No.: 9079E-SH001-00)



Final gear backlash 0.22–0.45 mm (0.0087–0.0177 in)

- a. Install a bolt “1” of the specified size, into the final gear oil drain hole.



- b. Finger tighten the bolt until it stops the ring gear from moving.

NOTE:

Do not overtighten the bolt.

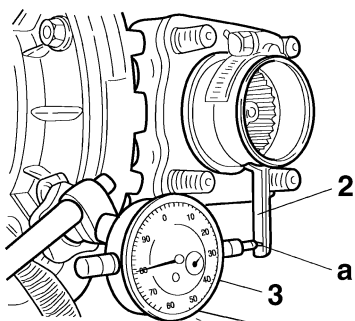
- c. Install the final gear backlash band “2” and dial gauge “3”.

NOTE:

Make sure that the dial gauge plunger contacts the groove “a” in the final gear backlash band as shown in the illustration.



Final gear backlash band 90890-01511



- d. Gently rotate the coupling gear from engagement to engagement.
e. Record the reading on the dial gauge.

- f. Remove the dial gauge, final gear backlash band, and bolt.
g. Rotate the final drive pinion gear 90°.
h. Reinstall the bolt, final gear backlash band, and dial gauge.
i. Repeat steps (d) to (h) three more times (for a total of four measurements).
j. If any of the readings are over specification, adjust the final gear backlash.

EAS23590

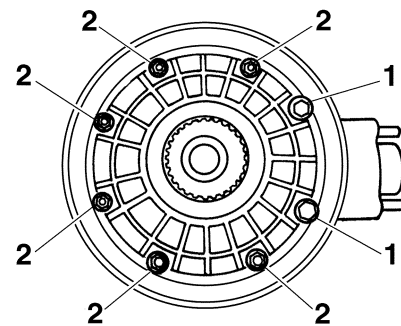
ADJUSTING THE FINAL GEAR BACKLASH

1. Remove:

- Ring gear bearing housing bolts “1”
- Ring gear bearing housing nuts “2”

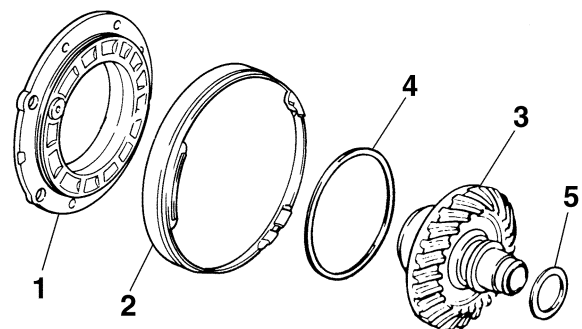
NOTE:

Working in a crisscross pattern, loosen each bolt and nut 1/4 of a turn. After all of the bolts and nuts are fully loosened, remove them.



2. Remove:

- Ring gear bearing housing “1”
- Dust cover “2”
- Ring gear “3”
- Ring gear shim(s) “4”
- Thrust washer “5”




3. Adjust:


- Final gear backlash

- a. Select the suitable shim(s) and thrust washer with the following chart.

| | |
|--------------|-----------------------------------|
| Thinner shim | Final gear backlash is increased. |
| Thicker shim | Final gear backlash is decreased. |

- b. If it is necessary to increase the final gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
- c. If it is necessary to reduce the final gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

| | |
|---|---|
|  | Ring gear shims Thickness (mm) 0.25 0.30 0.40 0.50 |
|---|---|


| | |
|---|--|
|  | Thrust washers Thickness (mm) 1.2 1.4 1.6 1.8 2.0 |
|---|--|

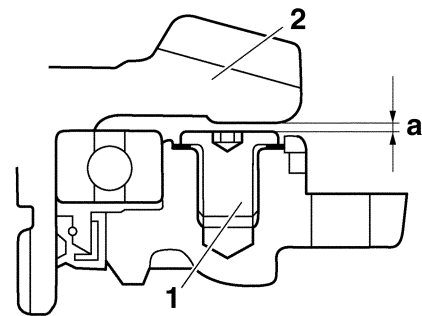
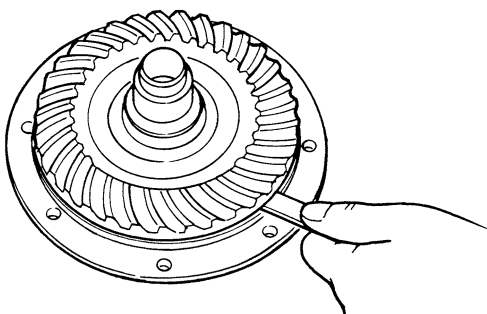


EAS23600

MEASURING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE

1. Remove:
 - Ring gear bearing housing (along with the ring gear)
 Refer to "ADJUSTING THE FINAL GEAR BACKLASH" on page 4-93.
2. Measure:
 - Ring-gear-to-stopper-bolt clearance "a"
 Out of specification → Adjust.

| | |
|---|---|
|  | Ring-gear-to-stopper-bolt clearance 0.30–0.60 mm (0.0118–0.0236 in) |
|---|---|



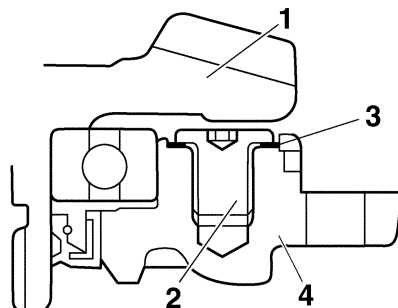
1. Stopper bolt
2. Ring gear

3. Install:
 - Ring gear bearing housing (along with the ring gear)


EAS23610

ADJUSTING THE RING-GEAR-TO-STOPPER-BOLT CLEARANCE


1. Remove:
 - Ring gear "1"
 - Stopper bolt "2"
 - Stopper bolt shim(s) "3"
 - Ring gear bearing housing "4"



2. Select:
 - Stopper bolt shim(s)

| | |
|---|--|
|  | Stopper bolt shims Thickness (mm) 0.15 0.20 |
|---|--|

3. Install:
 - Ring gear bearing housing "1"
 - Stopper bolt shim(s) "2"
 - Stopper bolt "3"
 - Ring gear "4"

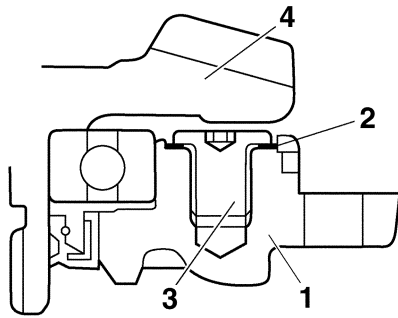
| | |
|---|---|
|  | Stopper bolt 9 Nm (0.9 m·kg, 6.5 ft·lb) |
|---|---|

ECA14320

CAUTION:

- The stopper bolt has left-hand threads. To tighten the stopper bolt, turn it counter-clockwise.

- Apply LOCTITE® onto the stopper bolt.



4. Measure:
- Ring-gear-to-stopper-bolt clearance



Ring-gear-to-stopper-bolt clearance
0.30–0.60 mm (0.0118–0.0236 in)

NOTE:

If the ring-gear-to-stopper-bolt clearance is out of specification, repeat the above procedure.

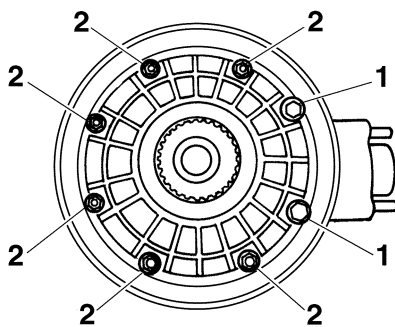
EAS23620

DISASSEMBLING THE FINAL DRIVE ASSEMBLY

1. Remove:
- Ring gear bearing housing bolts “1”
 - Ring gear bearing housing nuts “2”

NOTE:

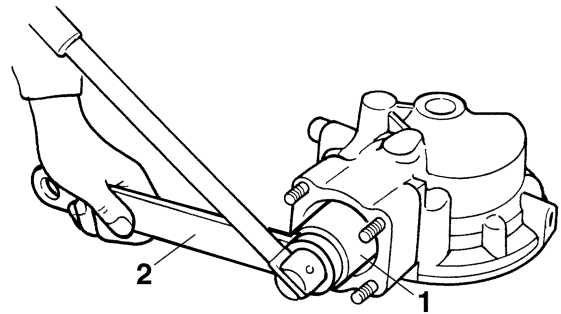
Working in a crisscross pattern, loosen each bolt and nut 1/4 of a turn. After all of the bolts and nuts are fully loosened, remove them.



2. Remove:
- Coupling gear nut
 - Coupling gear “1”
- (with the coupling gear/middle shaft tool “2”)



Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229



3. Remove:
- Bearing retainer
(with the bearing retainer wrench “1”)

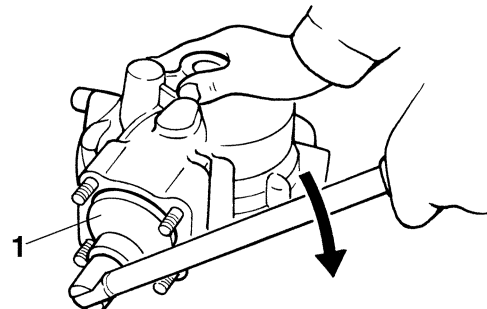


Bearing retainer wrench
90890-04050
Pinion bearing retainer & remover
YM-04050

ECA14330

CAUTION:

The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.



4. Remove:
- Final drive pinion gear

EWA13800

WARNING

Always use new bearings.

ECA14340

CAUTION:

The final drive pinion gear should only be removed if ring gear replacement is necessary.

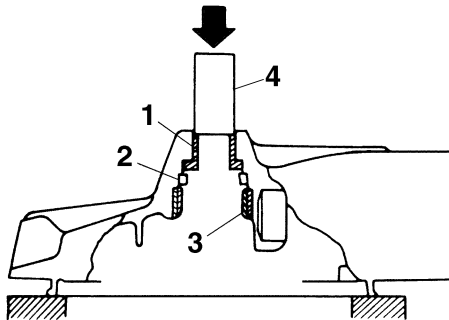
NOTE:

Lightly tap on the end of the final drive pinion gear with a soft hammer.

EAS23630

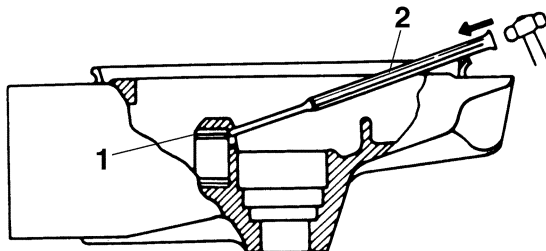
REMOVING AND INSTALLING THE BEARINGS

1. Check:
 - Bearings
Damage → Replace.
2. Remove:
 - Collar “1”
 - Oil seal “2”
 - Bearing “3”
(with an appropriate press tool “4” and an appropriate support for the final gear case)



3. Remove:
 - Bearing “1”

- a. Heat the final gear case to approximately 150 °C (302 °F).
- b. Remove the bearing outer races with an appropriately shaped punch “2”.



- c. Remove the inner race from the final drive pinion gear.

NOTE:

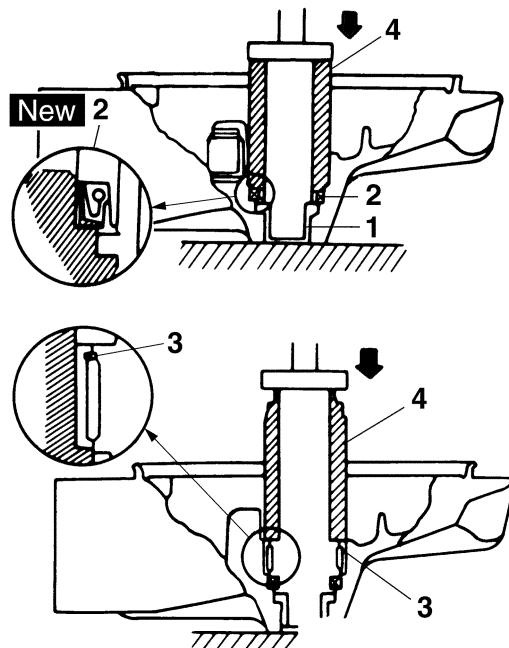
The removal of the bearing is a difficult procedure and is rarely necessary.

- c. Install the inner race onto the final drive pinion gear.

5. Install:
 - Collar “1”
 - Oil seal “2” **New**
 - Bearing “3”
(with an appropriate press tool “4” and press)

NOTE:

The bearing can be reused, but Yamaha recommends installing a new one.



EAS23640

ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR

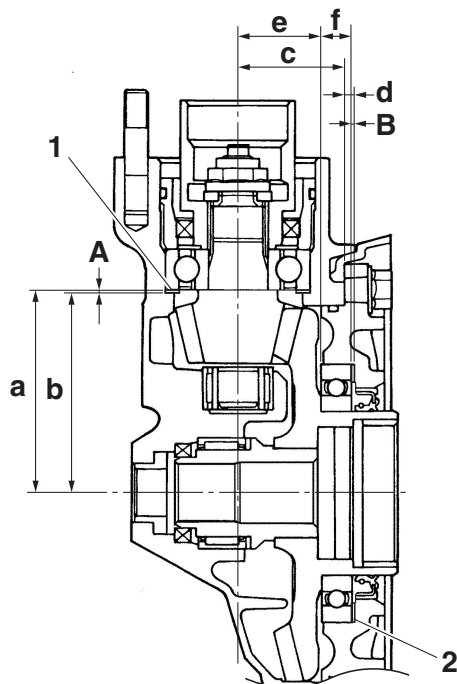
NOTE:

Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:

- Final gear case
- Ring gear bearing housing
- Any bearing

1. Select:
 - Final drive pinion gear shim(s)
 - Ring gear shim(s)

- a. Position the final drive pinion gear shim(s) “1” and the ring gear with shim(s) “2”. Calculate the respective thicknesses from information marked on the final gear case and the final drive pinion gear.



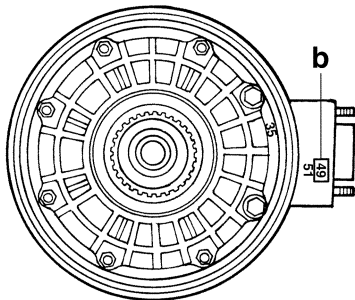
- b. To find final drive pinion gear shim thickness "A", use the following formula:

$$\text{Final drive pinion gear shim thickness} \\ A = (84 + a/100) - (83 + b/100)$$

Where:

a = 84

b = a numeral on the final gear case, to be divided by 100 and added to "83".



Example:

If the final drive pinion gear is marked "+01" and the final gear case is marked "50":

$$\begin{aligned} A &= 84 - (83 + 50/100) \\ &= 84 - (83 + 0.50) \\ &= 84 - 83.50 \\ &= 0.50 \end{aligned}$$

Therefore, the calculated final drive pinion gear shim thickness is 0.50 mm. Shim sizes are supplied in the following thicknesses.



Final drive pinion gear shims
Thickness (mm)
0.30 0.40 0.50

Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

| Hundredth | Rounded value |
|---------------|---------------|
| 0, 1, 2 | 0 |
| 3, 4, 5, 6, 7 | 5 |
| 8, 9 | 10 |

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm final drive pinion gear shim.

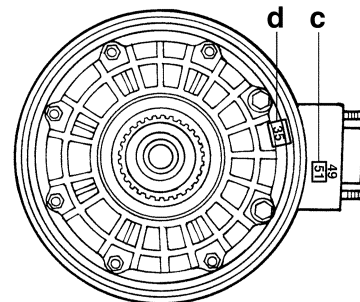
- c. To find ring gear shim thickness "B", use the following formula:

$$\text{Ring gear shim thickness} \\ B = (45 + c/100) + (3 + d/100) - [(35.40 - e/100) + f]$$

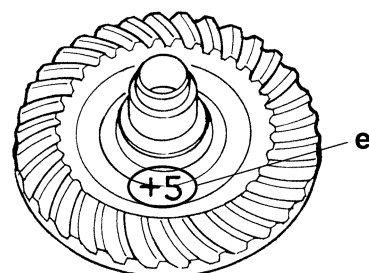
Where:

c = a numeral on the final gear case, to be divided by 100 and added to "45".

d = a numeral usually on the outside of the ring gear bearing housing, to be divided by 100 and added to "3".



e = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to "35.40".



f = the ring gear bearing thickness constant.



Ring gear bearing thickness
13.00 mm (0.51 in)

Example:

If the final gear case is marked "51", the ring gear bearing housing is marked "35", the ring gear is marked "- 05", and "f" is 13.00:

$$\begin{aligned}
 B &= (45 + 51/100) + (3 + 35/100) - [(35.40 + 5/100) + 13] \\
 &= (45 + 0.51) + (3 + 0.35) - [(35.40 + 0.05) + 13] \\
 &= 45.51 + 3.35 - [(35.40 + 0.05) + 13] \\
 &= 48.86 - [35.45 + 13] \\
 &= 48.86 - 48.45 \\
 &= 0.41
 \end{aligned}$$

Therefore, the calculated ring gear shim thickness is 0.41 mm.

Shim sizes are supplied in the following thicknesses.



Ring gear shims
Thickness (mm)
0.25 0.30 0.40 0.50

Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

| Hundredth | Rounded value |
|---------------|---------------|
| 0, 1, 2 | 0 |
| 3, 4, 5, 6, 7 | 5 |
| 8, 9 | 10 |

In the example above, the calculated ring gear shim thickness is 0.41 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.40 mm ring gear shim.



2. Install:

- Shims (as calculated)
- Final drive pinion gear
- Bearing retainer
(with the bearing retainer wrench "1")



Bearing retainer
110 Nm (11.0 m·kg, 72 ft·lb)

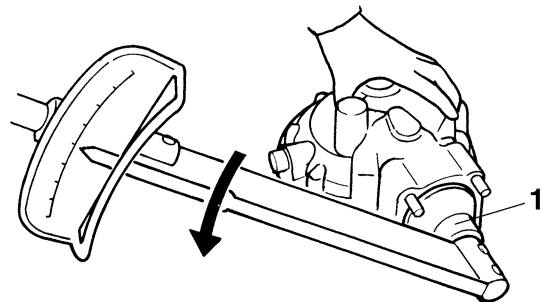
ECA14350

CAUTION:

The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counterclockwise.



Bearing retainer wrench
90890-04050
Pinion bearing retainer & remover
YM-04050



3. Install:

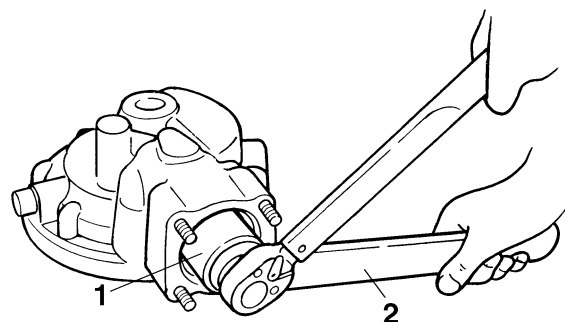
- Coupling gear "1"
- Coupling gear nut
(with the coupling gear/middle shaft tool "2")



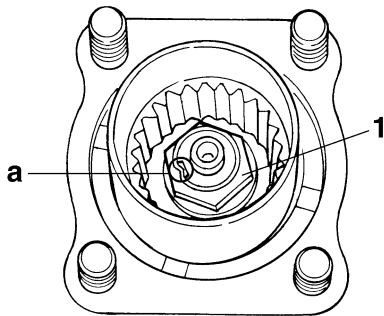
Coupling gear nut
110 Nm (11.0 m·kg, 80 ft·lb)



Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229



4. Stake the coupling gear nut "1" at a cutout "a" in the final drive pinion gear.



5. Install:
 - Ring gear bearing housing (along with the ring gear, but without the thrust washer)
6. Adjust:
 - Final gear backlash
Refer to "MEASURING THE FINAL GEAR BACKLASH" on page 4-92 and "ADJUSTING THE FINAL GEAR BACKLASH" on page 4-93.
7. Measure:
 - Ring-gear-to-thrust-washer clearance

- a. Remove the ring gear bearing housing (along with the ring gear).
- b. Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
- c. Install the ring gear bearing housing and tighten the bolts and nuts to specification.

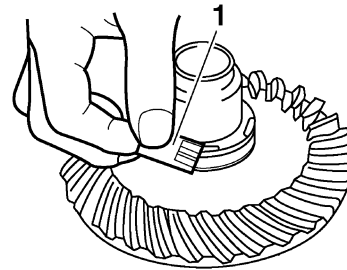


Ring gear bearing housing bolt
40 Nm (4.0 m·kg, 29 ft·lb)
Ring gear bearing housing nut
23 Nm (2.3 m·kg, 17 ft·lb)

NOTE:

Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrust-washer clearance with Plastigauge®.

- d. Remove the ring gear bearing housing.
- e. Measure the width of the flattened Plastigauge® "1".



Ring-gear-to-thrust-washer clearance

0.10–0.20 mm (0.0039–0.0079 in)

- f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).
- g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
- h. Select the suitable thrust washer from the following chart.



Thrust washers

Thickness (mm)

1.2 1.4 1.6 1.8 2.0

- i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.



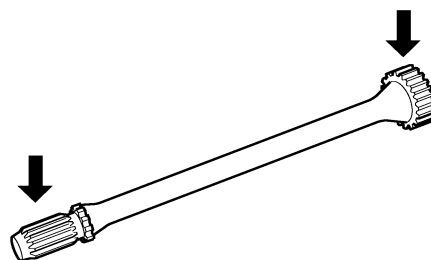
Ring-gear-to-thrust-washer clearance

0.10–0.20 mm (0.0039–0.0079 in)

EAS23650

CHECKING THE DRIVE SHAFT

1. Check:
 - Drive shaft splines
Damage/wear → Replace the drive shaft.



EAS23660

INSTALLING THE DRIVE SHAFT AND FINAL DRIVE ASSEMBLY

1. Lubricate:

- Drive shaft spline (final drive pinion gear side)



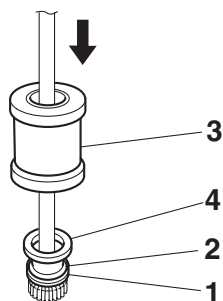
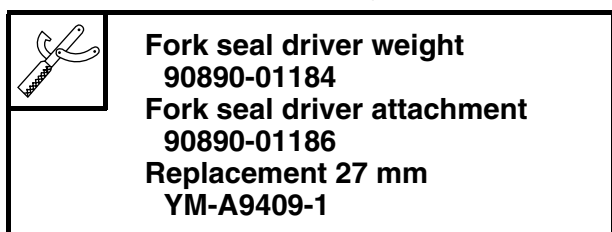
2. Lubricate:

- Drive shaft spline (universal joint side)



3. Install:

- Oil seal "1"
- Washer "2"
- (with the fork seal driver weight "3" and fork seal driver attachment "4")



4. Install:

- Drive shaft
(to the final drive pinion gear)

5. Install:

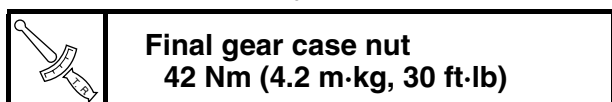
- Universal joint
- Final drive assembly

NOTE:

Align the drive shaft splines with the driven yoke of the universal joint.

6. Tighten:

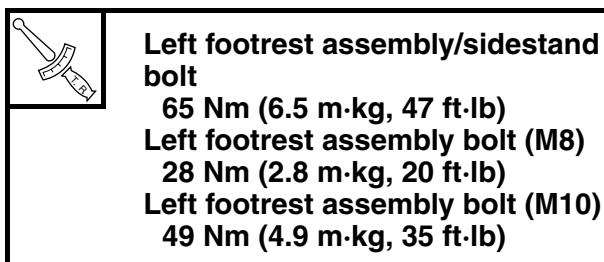
- Final drive assembly nuts



7. Install:

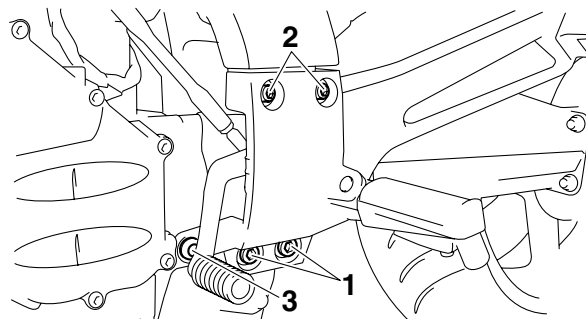
- Sidestand

• Left footrest assembly



NOTE:

Install the left footrest assembly/sidestand bolts "1", left footrest assembly bolts (M8) "2" and left footrest assembly bolt (M10) "3" temporarily and then tighten them to the specified torques in the proper tightening sequence as shown.

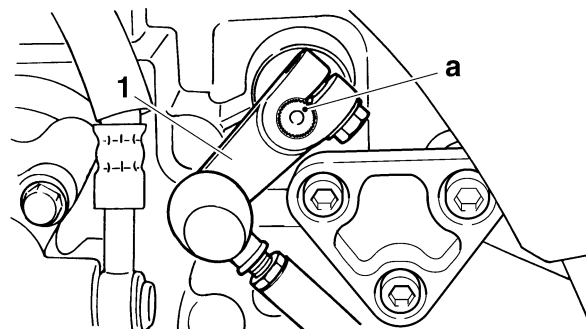


8. Install:

- Shift arm "1"

NOTE:

Align the punch mark "a" in the shift shaft with the slot in the shift arm.



9. Install:

- Rear wheel
Refer to "REAR WHEEL" on page 4-20.

10.Fill:

- Final gear case
Refer to "CHECKING THE FINAL GEAR OIL LEVEL" on page 3-25.

11.Check:

- Shift pedal position
Refer to "ADJUSTING THE SHIFT PEDAL" on page 3-25.

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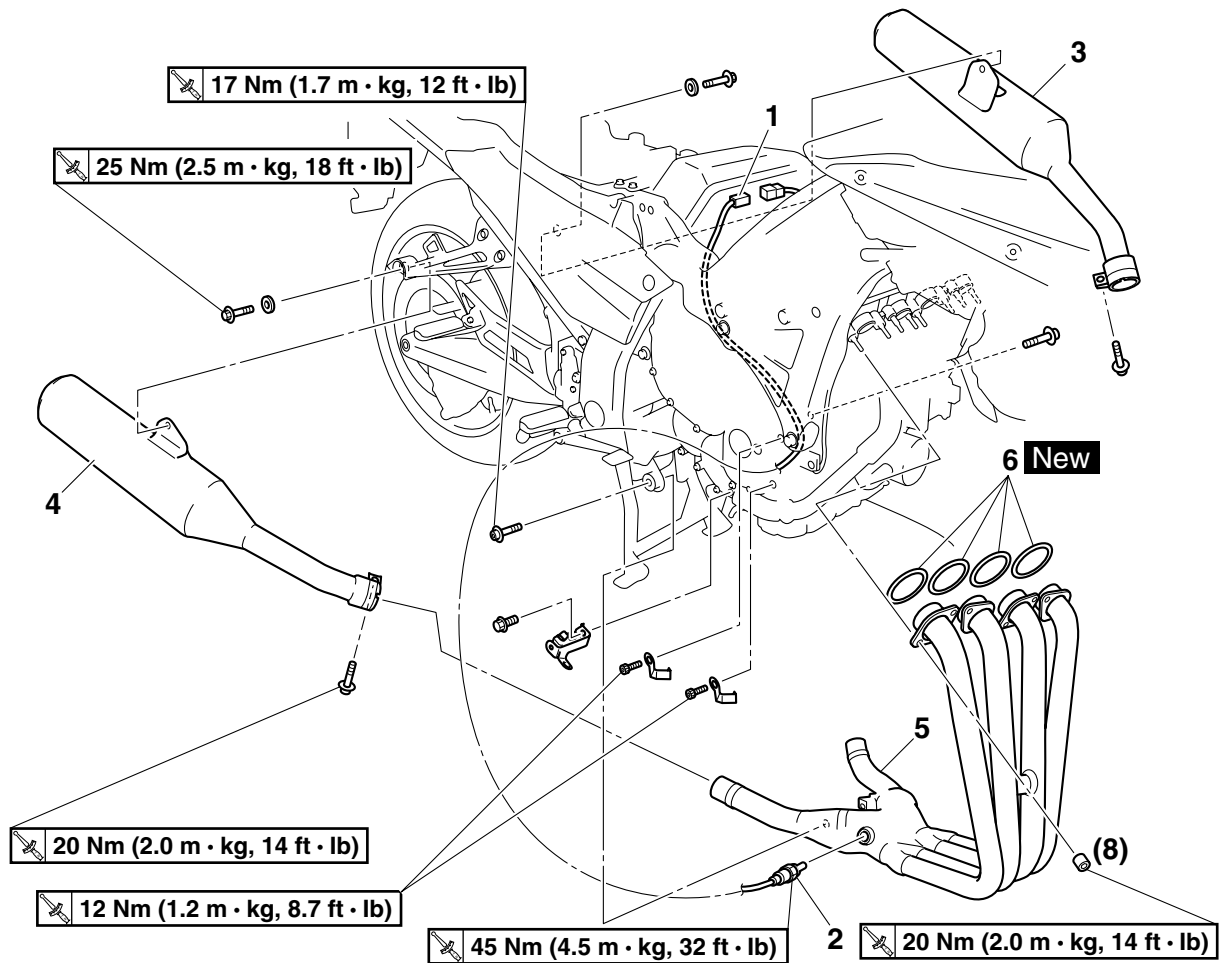
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EAS23710

ENGINE REMOVAL

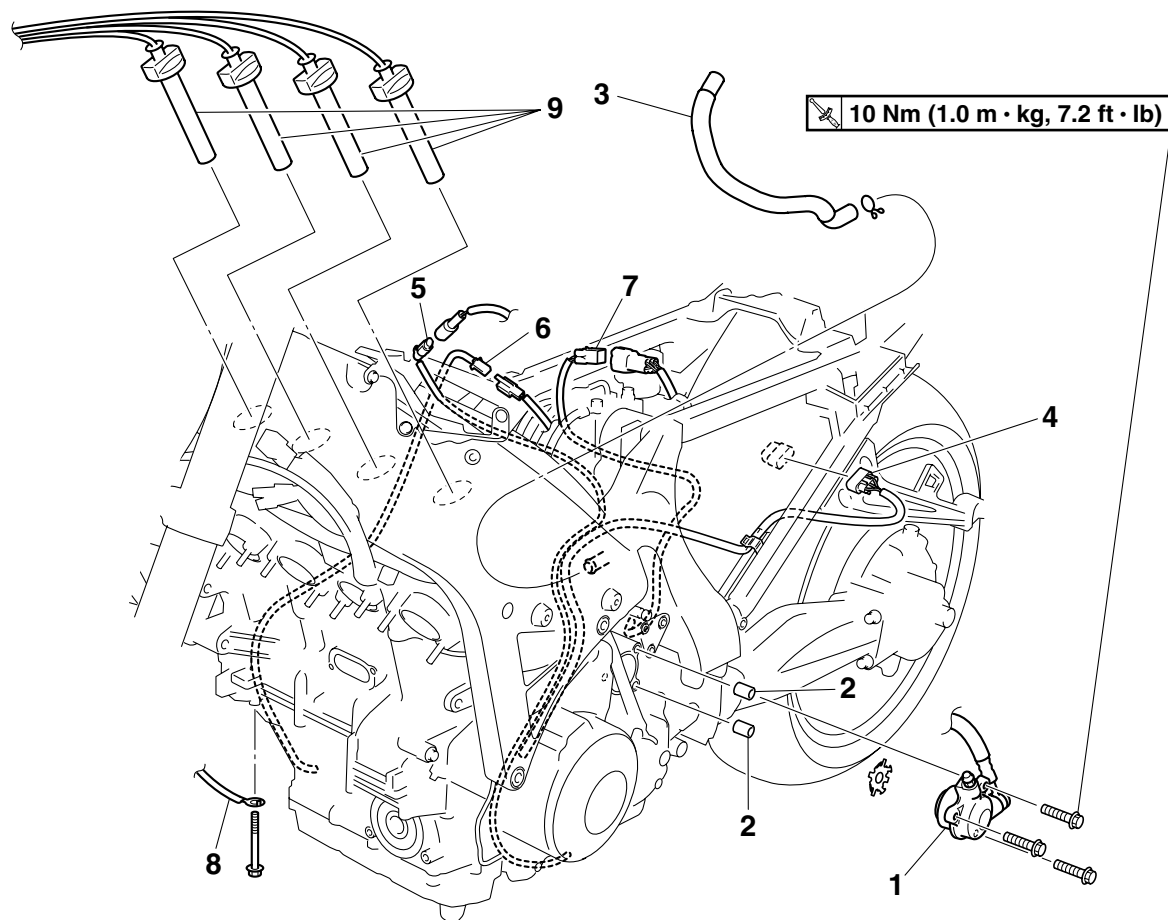
Removing the exhaust pipe assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|---|
| | Left side cowling/Right side cowling/T-bar | | 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 3-19. |
| | Radiator | | Refer to "RADIATOR" on page 6-1. |
| 1 | O ₂ sensor coupler | 1 | Disconnect. |
| 2 | O ₂ sensor | 1 | |
| 3 | Left muffler | 1 | |
| 4 | Right muffler | 1 | |
| 5 | Exhaust pipe assembly | 1 | |
| 6 | Gasket | 4 | |
| | | | For installation, reverse the removal procedure. |

ENGINE REMOVAL

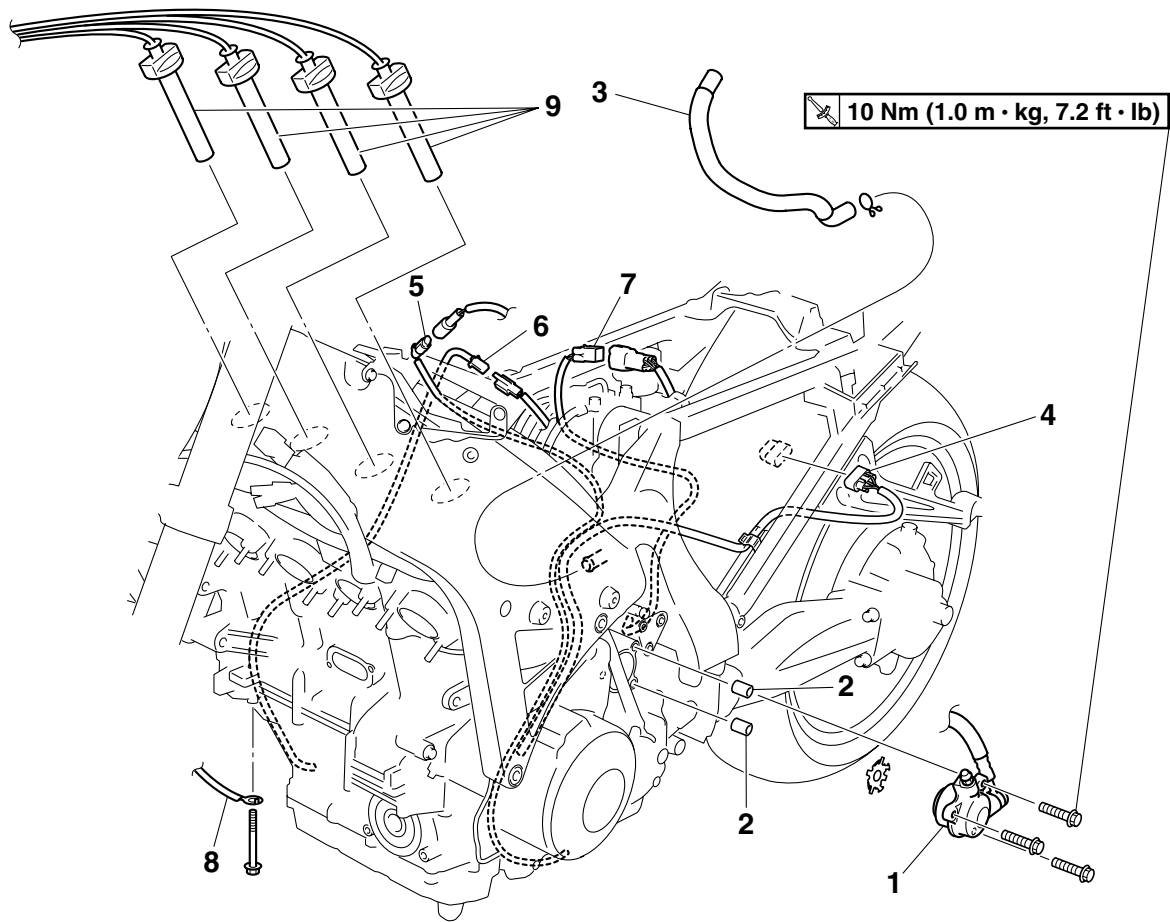
Disconnecting the leads and hoses



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| | Front fender | | Refer to "FRONT WHEEL" on page 4-13. |
| | Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| | Air cut-off valve/Reed valves | | Refer to "AIR INDUCTION SYSTEM" on page 7-9. |
| | Thermostat/Thermostat inlet pipe 1 | | Refer to "THERMOSTAT" on page 6-6. |
| | Engine oil/Oil filter cartridge | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Oil cooler | | Refer to "OIL COOLER" on page 6-4. |
| | Water pump | | Refer to "WATER PUMP" on page 6-10. |
| | Starter motor | | Refer to "ELECTRIC STARTER" on page 5-37. |
| | Left footrest assembly/Sidestand | | Refer to "SHAFT DRIVE" on page 4-87. |
| 1 | Clutch release cylinder | 1 | |
| 2 | Dowel pin | 2 | |
| 3 | Crankcase breather hose | 1 | |
| 4 | Stator coil coupler | 1 | Disconnect. |

ENGINE REMOVAL

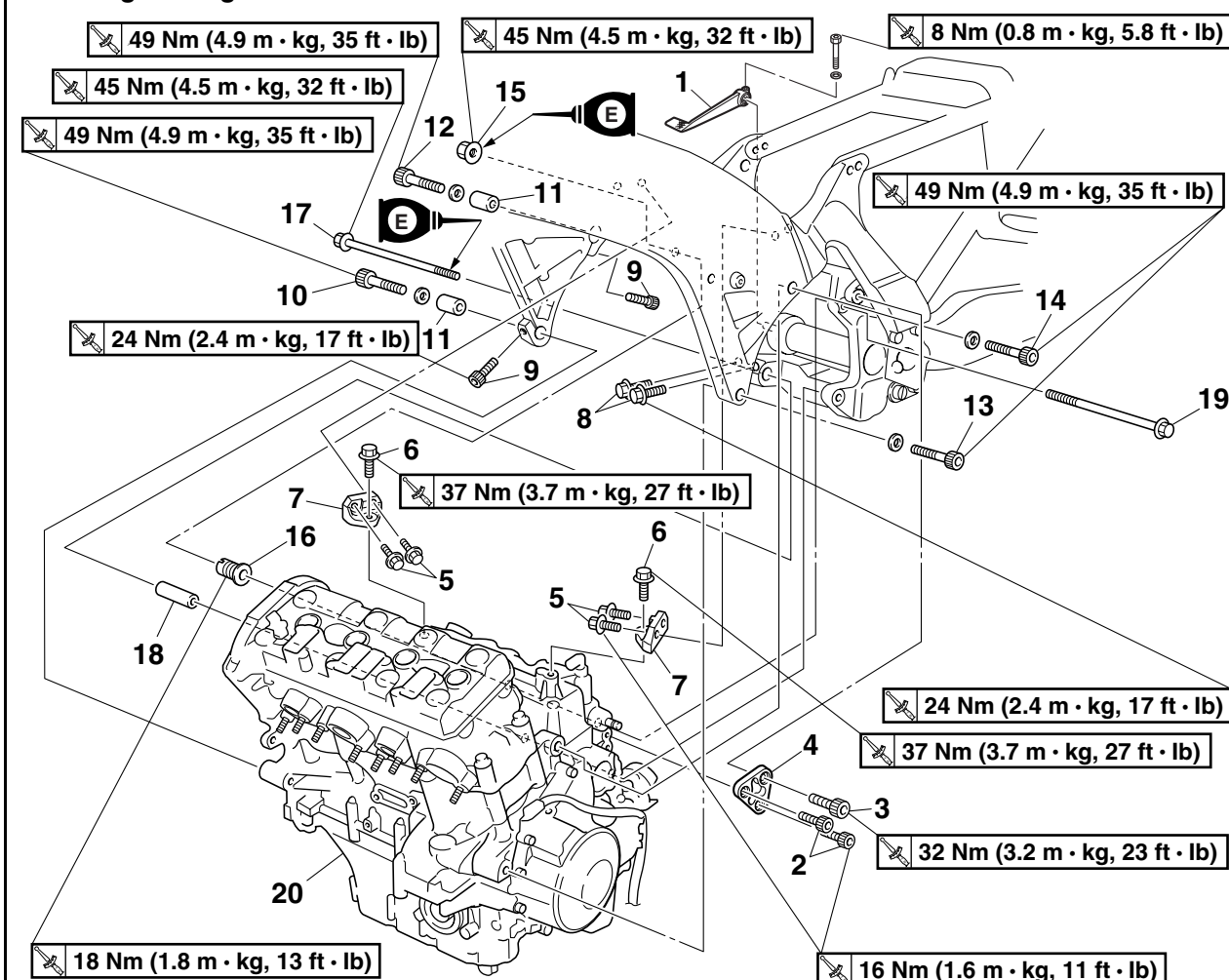
Disconnecting the leads and hoses



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| 5 | Oil level switch coupler | 1 | Disconnect. |
| 6 | Crankshaft position sensor coupler | 1 | Disconnect. |
| 7 | Gear position switch coupler | 1 | Disconnect. |
| 8 | Ground lead | 1 | Disconnect. |
| 9 | Spark plug cap | 4 | |
| | | | For installation, reverse the removal procedure. |

ENGINE REMOVAL

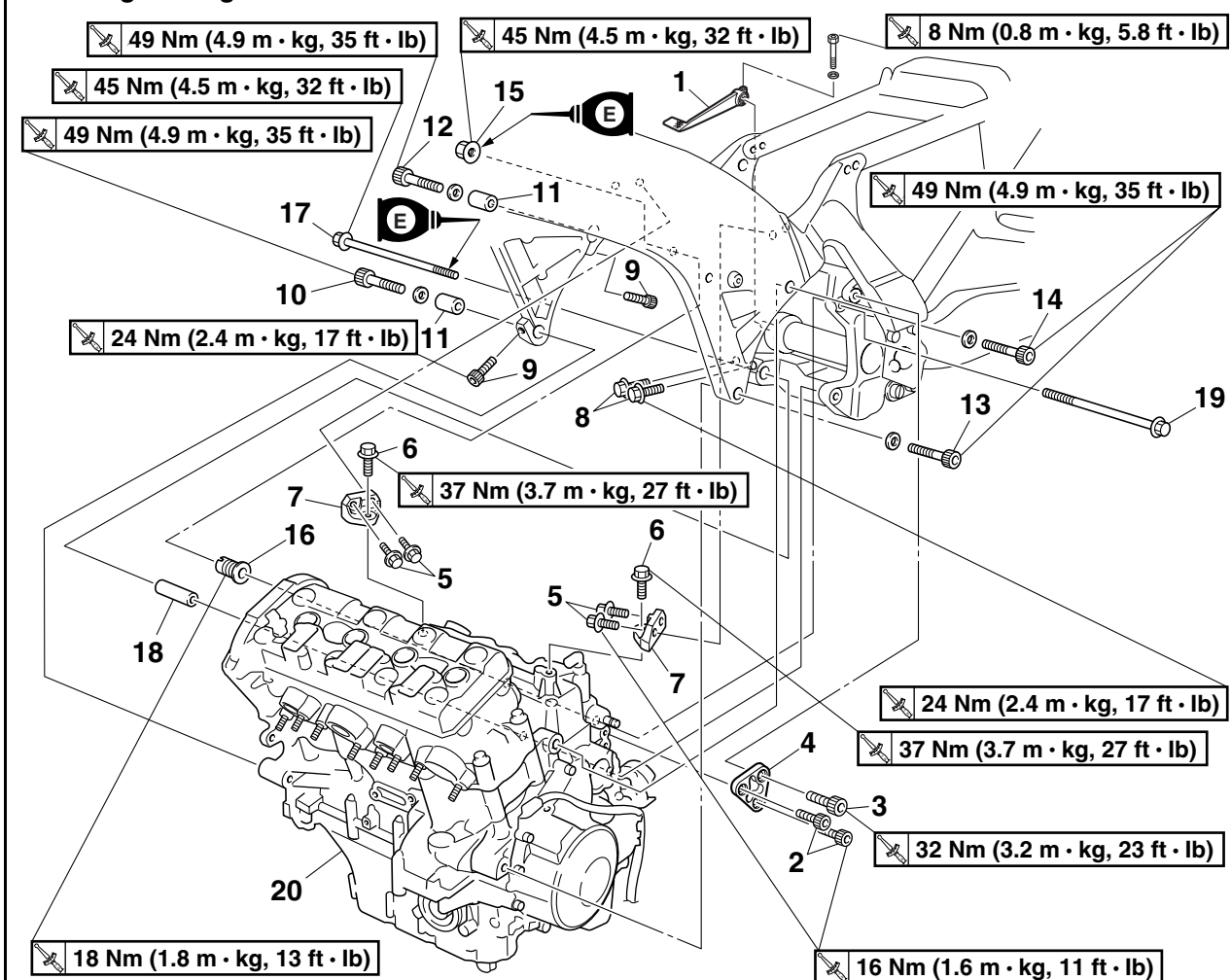
Removing the engine



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---|------|--|
| | | | NOTE: _____ Place a suitable stand under the engine. |
| 1 | Brake pedal | 1 | |
| 2 | Engine mounting bolt (left rear side) | 2 | |
| 3 | Engine bracket bolt (left rear side) | 1 | |
| 4 | Engine bracket (left rear side) | 1 | |
| 5 | Engine bracket bolt (top) | 4 | |
| 6 | Engine mounting bolt (top) | 2 | |
| 7 | Engine bracket (top) | 2 | |
| 8 | Pinch bolt (rear side) | 2 | |
| 9 | Pinch bolt (front side) | 2 | |
| 10 | Engine mounting bolt (right front lower side) | 1 | |
| 11 | Spacer | 2 | |
| 12 | Engine mounting bolt (right front upper side) | 1 | |
| 13 | Engine mounting bolt (left front lower side) | 1 | |
| 14 | Engine mounting bolt (left front upper side) | 1 | |
| 15 | Engine mounting nut (rear upper side) | 1 | |

ENGINE REMOVAL

Removing the engine



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|--|
| 16 | Spacer bolt | 1 | Loosen. |
| 17 | Engine mounting bolt (rear lower side) | 1 | |
| 18 | Spacer | 1 | |
| 19 | Engine mounting bolt (rear upper side) | 1 | |
| 20 | Engine | 1 | |
| | | | For installation, reverse the removal procedure. |

ENGINE REMOVAL

ET3P61023

REMOVING THE ENGINE

1. Loosen:

- Spacer bolt

NOTE:

Loosen the spacer bolt with the pivot shaft wrench "1" and pivot shaft wrench adapter "2".



Pivot shaft wrench

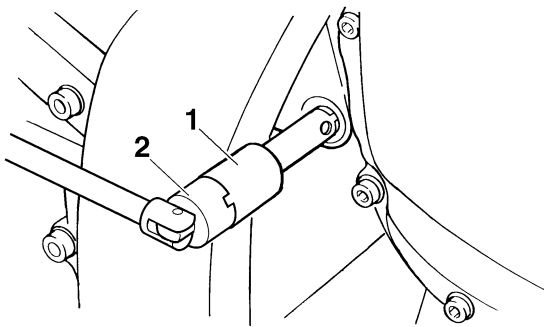
90890-01471

Frame spanner socket

YM-01471

Pivot shaft wrench adapter

90890-01476



EAS23720

INSTALLING THE ENGINE

1. Install:

- Engine

NOTE:

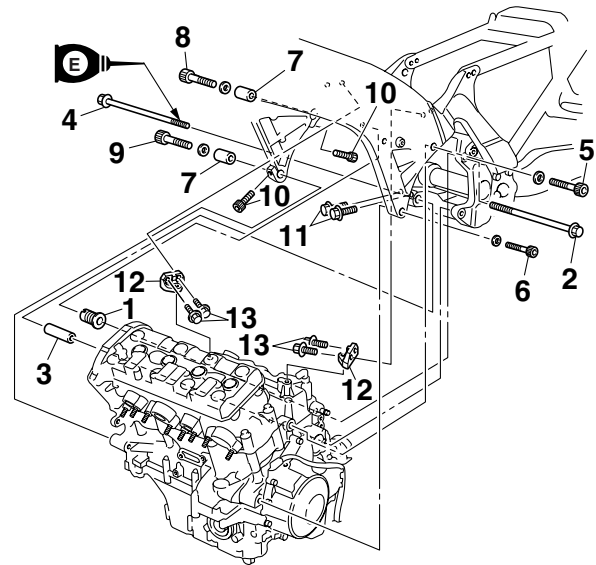
When mounting the engine to the frame, be sure to align the splines on the middle driven shaft with the splines on the universal joint.

2. Install:

- Spacer bolt "1"
- Engine mounting bolt (rear upper side) "2"
- Spacer "3"
- Engine mounting bolt (rear lower side) "4"
- Engine mounting bolt (left front upper side) "5"
- Engine mounting bolt (left front lower side) "6"
- Spacers "7"
- Engine mounting bolt (right front upper side) "8"
- Engine mounting bolt (right front lower side) "9"
- Pinch bolts (front side) "10"
- Pinch bolts (rear side) "11"
- Engine brackets (top) "12"
- Engine bracket bolts (top) "13"

NOTE:

- Lubricate the engine mounting bolt (rear lower side) threads with engine oil.
- Do not fully tighten the bolts.



3. Tighten:

- Engine mounting bolt (left front upper side) "5"



Engine mounting bolt (left front upper side)

49 Nm (4.9 m·kg, 35 ft·lb)

4. Tighten:

- Engine mounting bolt (rear lower side) "4"



Engine mounting bolt (rear lower side)

45 Nm (4.5 m·kg, 32 ft·lb)

5. Tighten:

- Spacer bolt "1"



Spacer bolt

18 Nm (1.8 m·kg, 13 ft·lb)

NOTE:

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

ENGINE REMOVAL



Pivot shaft wrench
90890-01471
Frame spanner socket
YM-01471
Pivot shaft wrench adapter
90890-01476

6. Tighten:

- Engine mounting nut (rear upper side) “14”



Engine mounting nut (rear upper side)
45 Nm (4.5 m·kg, 32 ft·lb)

NOTE:

Lubricate the engine mounting nut (rear upper side) threads with engine oil.

7. Tighten:

- Engine mounting bolt (left front lower side) “6”
- Engine mounting bolt (right front upper side) “8”
- Engine mounting bolt (right front lower side) “9”



Engine mounting bolt (left front lower side)
49 Nm (4.9 m·kg, 35 ft·lb)
Engine mounting bolt (right front upper side)
49 Nm (4.9 m·kg, 35 ft·lb)
Engine mounting bolt (right front lower side)
49 Nm (4.9 m·kg, 35 ft·lb)

8. Install:

- Engine mounting bolts (top) “15”

9. Tighten:

- Pinch bolts (front side) “10”



Pinch bolt (front side)
24 Nm (2.4 m·kg, 17 ft·lb)

10. Tighten:

- Pinch bolts (rear side) “11”



Pinch bolt (rear side)
24 Nm (2.4 m·kg, 17 ft·lb)

NOTE:

Tighten the pinch bolts (rear side) one at a time, making sure to tighten the first bolt again after tightening the second bolt.

11. Tighten:

- Engine mounting bolts (top) “15” (temporarily tighten)
- Engine bracket bolts (top) “13” (temporarily tighten)

NOTE:

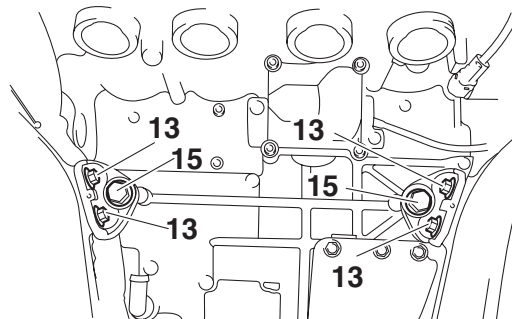
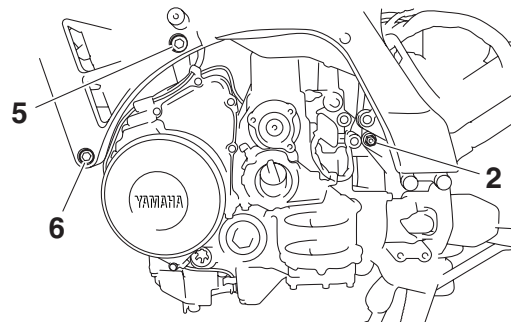
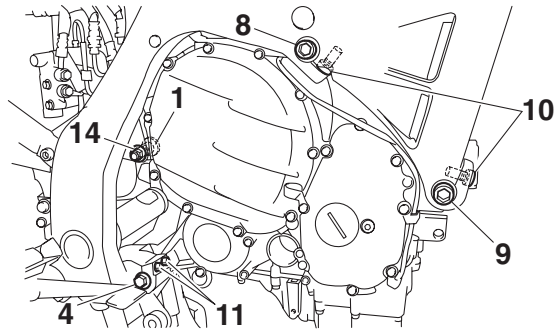
When temporarily tightened, the bolts “15” and “13” should be flat against the engine and frame surface.

12. Tighten:

- Engine mounting bolts (top) “15”
- Engine bracket bolts (top) “13”



Engine mounting bolt (top)
37 Nm (3.7 m·kg, 27 ft·lb)
Engine bracket bolt (top)
16 Nm (1.6 m·kg, 11 ft·lb)



13. Install:

- Engine bracket (left rear side) “1”
- Engine bracket bolt (left rear side) “2”
- Engine mounting bolts (left rear side) “3”

ENGINE REMOVAL

NOTE: _____

Do not fully tighten the bolts.

14. Tighten:

- Engine bracket bolt (left rear side) “2”



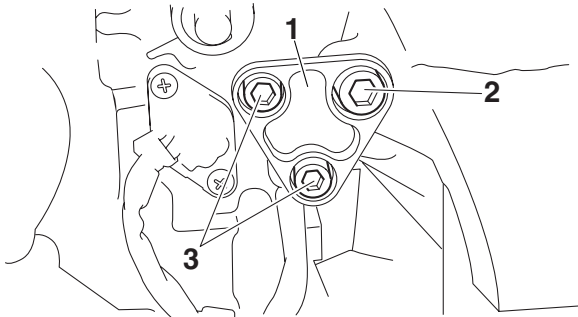
Engine bracket bolt (left rear side)
32 Nm (3.2 m·kg, 23 ft·lb)

15. Tighten:

- Engine mounting bolts (left rear side) “3”



Engine mounting bolt (left rear side)
16 Nm (1.6 m·kg, 11 ft·lb)



16. Install:

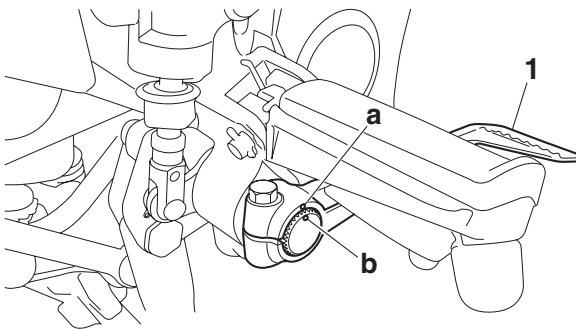
- Brake pedal “1”



Brake pedal pinch bolt
8 Nm (0.8 m·kg, 5.8 ft·lb)

NOTE: _____

Align the punch mark “a” on the brake pedal with the punch mark “b” on the brake pedal pivot shaft.



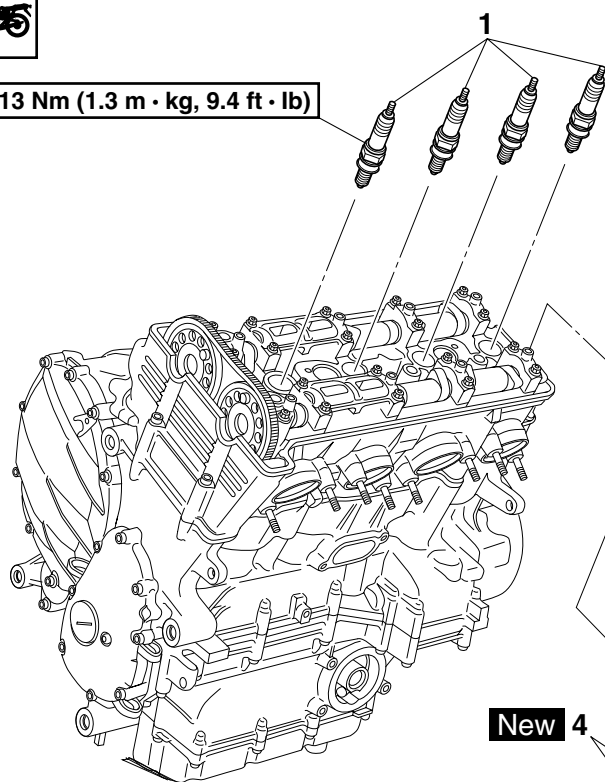
EAS23760

CAMSHAFTS

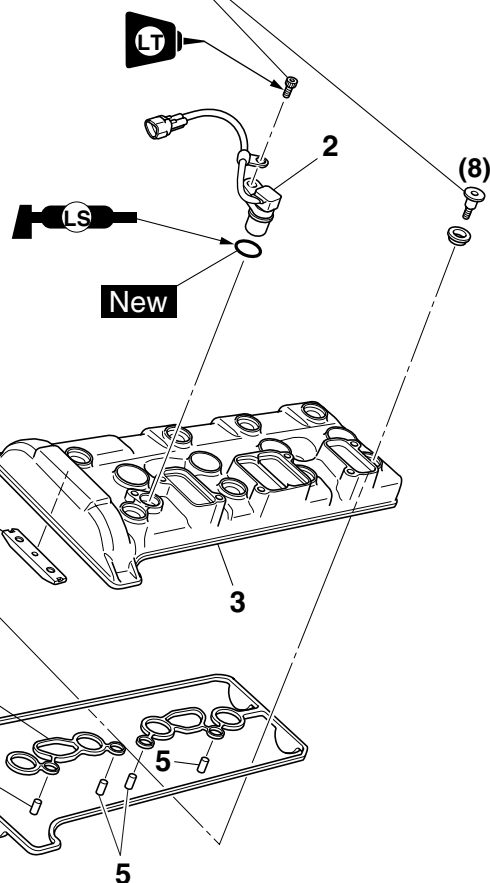
Removing the cylinder head cover



13 Nm (1.3 m · kg, 9.4 ft · lb)

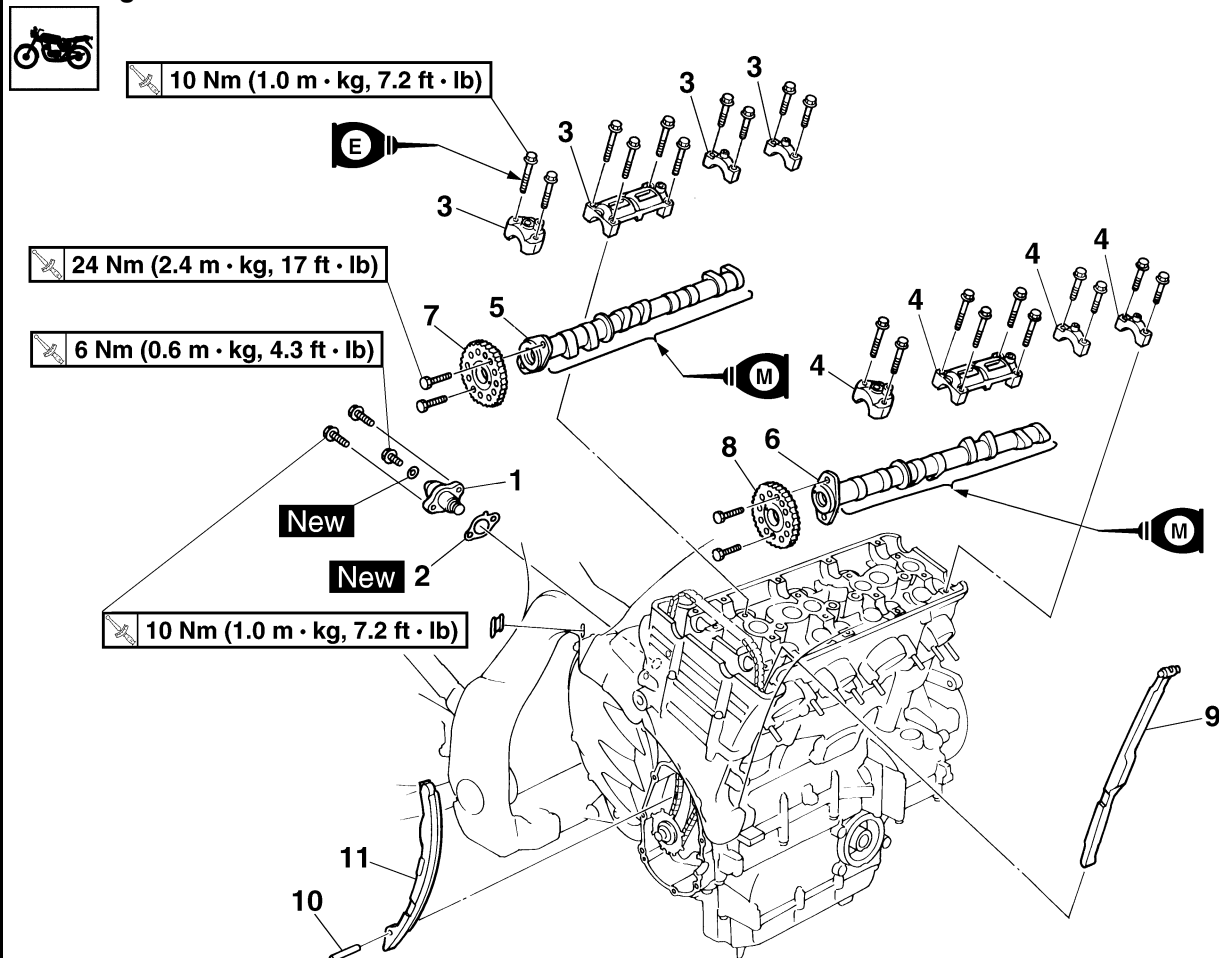


10 Nm (1.0 m · kg, 7.2 ft · lb)



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|--|
| | Right side cowling | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air cut-off valve/Reed valves | | Refer to "AIR INDUCTION SYSTEM" on page 7-9. |
| 1 | Spark plug | 4 | |
| 2 | Cylinder identification sensor | 1 | |
| 3 | Cylinder head cover | 1 | |
| 4 | Cylinder head cover gasket | 1 | |
| 5 | Dowel pin | 4 | |
| 6 | Timing chain guide (upper side) | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the camshafts



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------------|------|--|
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| | Pickup rotor cover | | Refer to "PICKUP ROTOR" on page 5-34. |
| 1 | Timing chain tensioner | 1 | |
| 2 | Timing chain tensioner gasket | 1 | |
| 3 | Intake camshaft cap | 4 | |
| 4 | Exhaust camshaft cap | 4 | |
| 5 | Intake camshaft | 1 | |
| 6 | Exhaust camshaft | 1 | |
| 7 | Intake camshaft sprocket | 1 | |
| 8 | Exhaust camshaft sprocket | 1 | |
| 9 | Timing chain guide (exhaust side) | 1 | |
| 10 | Pin | 1 | |
| 11 | Timing chain guide (intake side) | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS23810

REMOVING THE CAMSHAFTS

1. Align:

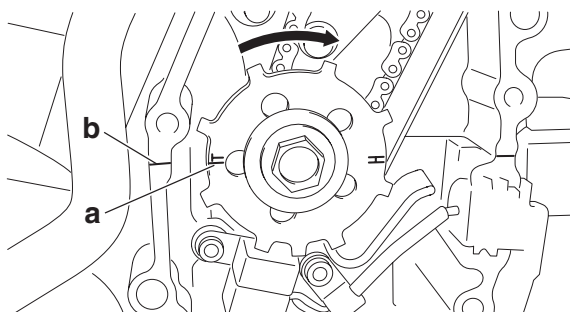
- “T” mark on the pickup rotor
(with the crankcase mating surface)



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

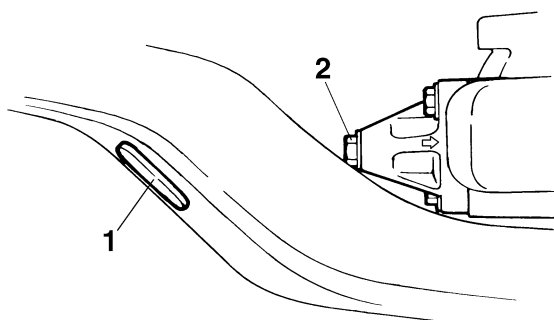
NOTE:

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



2. Remove:

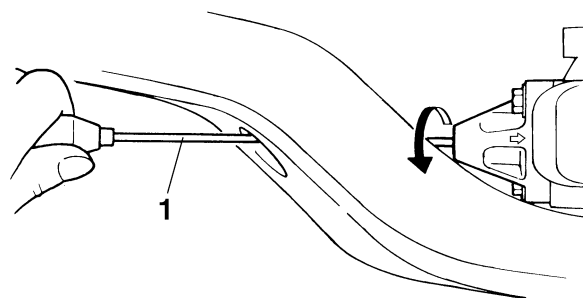
- Rubber cap “1”
- Timing chain tensioner cap bolt “2”
- Washer



- Turn the timing chain tensioner rod fully clockwise with a thin screwdriver “1”.

NOTE:

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



4. Remove:

- Timing chain tensioner
- Timing chain tensioner gasket

5. Remove:

- Camshaft caps
- Dowel pins

ECA13720

CAUTION:

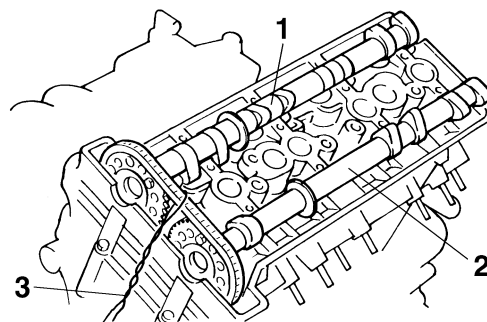
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

6. Remove:

- Intake camshaft “1”
- Exhaust camshaft “2”

NOTE:

To prevent the timing chain from falling into the crankcase, fasten it with a wire “3”.

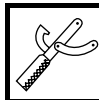


7. Remove:

- Intake camshaft sprocket
- Exhaust camshaft sprocket

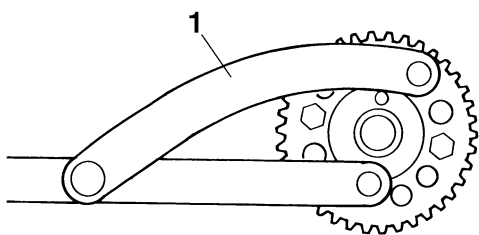
NOTE:

While holding the camshaft sprockets with the rotor holding tool “1”, loosen the camshaft sprocket bolts.



Rotor holding tool
90890-01235

Universal magneto & rotor holder
YU-01235



EAS23850

CHECKING THE CAMSHAFTS

1. Check:

- Camshaft lobes
Blue discoloration/pitting/scratches → Replace the camshaft.

2. Measure:

- Camshaft lobe dimensions “a” and “b”
Out of specification → Replace the camshaft.



Camshaft lobe dimensions

Intake A

33.050–33.150 mm (1.3012–1.3051 in)

Limit

32.050 mm (1.2618 in)

Intake B

24.997–25.097 mm (0.9841–0.9881 in)

Limit

23.997 mm (0.9448 in)

Exhaust A

33.050–33.150 mm (1.3012–1.3051 in)

Limit

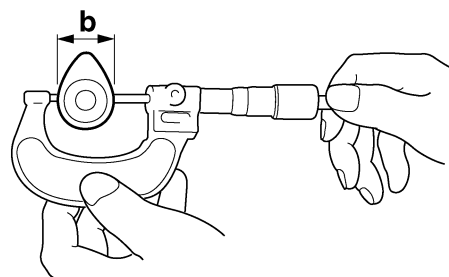
32.950 mm (1.2972 in)

Exhaust B

24.997–25.097 mm (0.9841–0.9881 in)

Limit

24.897 mm (0.9802 in)

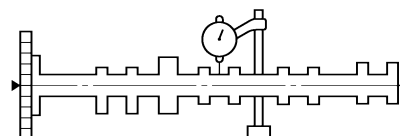


3. Measure:

- Camshaft runout
Out of specification → Replace.



Camshaft runout limit
0.030 mm (0.0012 in)

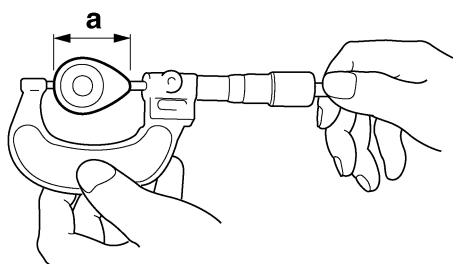


4. Measure:

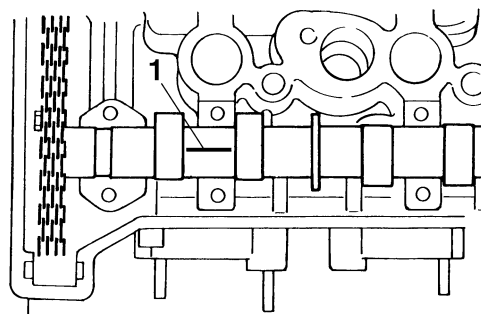
- Camshaft-journal-to-camshaft-cap clearance
Out of specification → Measure the camshaft journal diameter.



Camshaft-journal-to-camshaft-cap clearance
0.028–0.062 mm (0.0011–0.0024 in)



- Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
- Position a strip of Plastigauge® “1” onto the camshaft journal as shown.



- Install the dowel pins and camshaft caps.

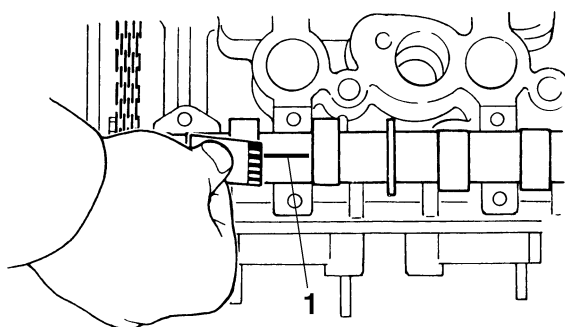
NOTE:

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.



Camshaft cap bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

- d. Remove the camshaft caps and then measure the width of the Plastigauge® “1”.

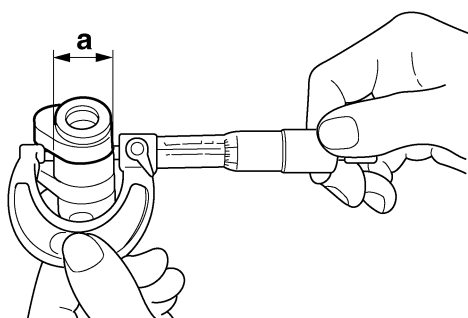


5. Measure:

- Camshaft journal diameter “a”
Out of specification → Replace the camshaft.
Within specification → Replace the cylinder head and the camshaft caps as a set.



Camshaft journal diameter
24.459–24.472 mm (0.9630–0.9635 in)

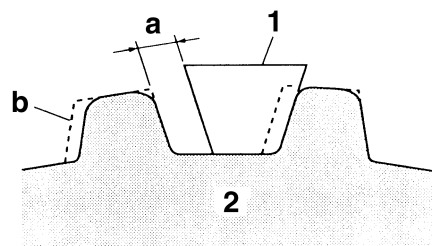


EAS23870

CHECKING THE CAMSHAFT SPROCKETS

1. Check:

- Camshaft sprockets
More than 1/4 tooth wear “a” → Replace the camshaft sprockets, timing chain, and crankshaft as a set.



- a. 1/4 tooth
b. Correct
1. Timing chain roller
2. Camshaft sprocket

EAS23950

CHECKING THE TIMING CHAIN GUIDES

1. Check:

- Timing chain guide (exhaust side)
- Timing chain guide (intake side)
- Timing chain guide (upper side)
Damage/wear → Replace the defective part(s).

EAS23970

CHECKING THE TIMING CHAIN TENSIONER

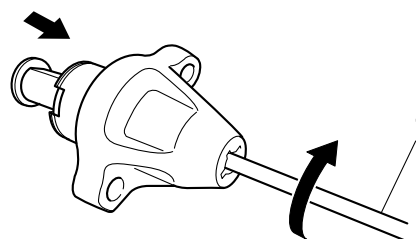
1. Check:

- Timing chain tensioner
Cracks/damage/rough movement → Replace.

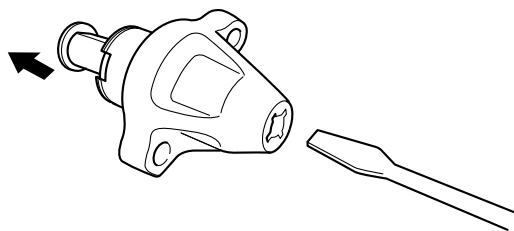
- a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

NOTE:

While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver “1” until it stops.



- b. Remove the screwdriver and slowly release the timing chain tensioner rod.
c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



EAS24010

INSTALLING THE CAMSHAFTS

1. Install:

- Exhaust camshaft sprocket
- Intake camshaft sprocket



Camshaft sprocket bolt
24 Nm (2.4 m·kg, 17 ft·lb)

NOTE:

- While holding the camshaft sprockets with the rotor holding tool "1", tighten the camshaft sprocket bolts.
- Make sure that the holes "a" in the cylinder-#4 cam and match marks "b" and "c" on the camshaft sprockets are in the position shown in the illustration.

2: Exhaust camshaft sprocket

3: Intake camshaft sprocket

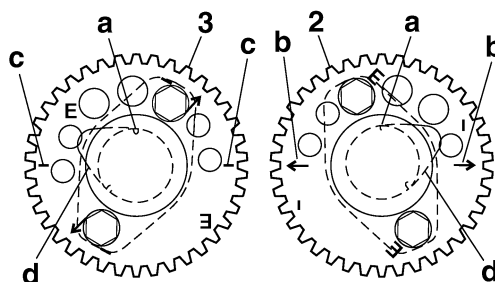
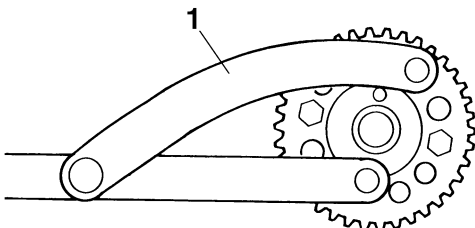
b: Exhaust side "→"

c: Intake side "—"

d: Cylinder-#1 cam



Rotor holding tool
90890-01235
Universal magneto & rotor holder
YU-01235



2. Install:

- Timing chain "1"
 - Exhaust camshaft "2"
 - Intake camshaft "3"
- (with the camshaft sprockets)

ECA13740

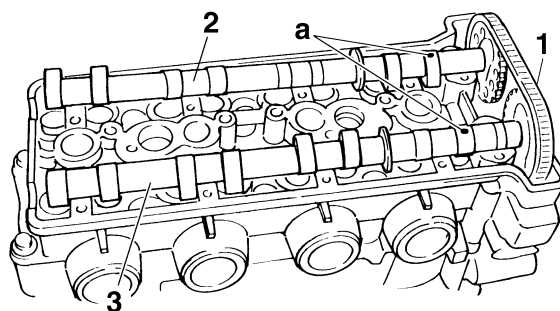
CAUTION:

Do not turn the crankshaft when installing the camshaft(s) to avoid damage or improper valve timing.

- a. Install the timing chain onto both camshaft sprockets, and then install the camshafts.

NOTE:

- Make sure the holes "a" on each camshaft faces up.
 - When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
 - Make sure the match marks "b" and "c" on the camshaft sprockets are aligned with the cylinder head edge.
- b: Exhaust side "→"
- c: Intake side "—"



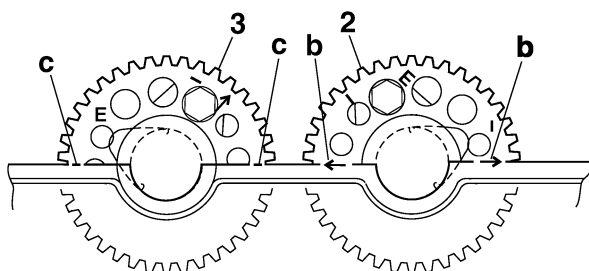
ECA13730

CAUTION:

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

NOTE:

Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

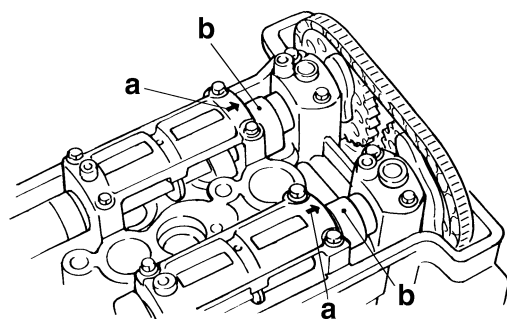
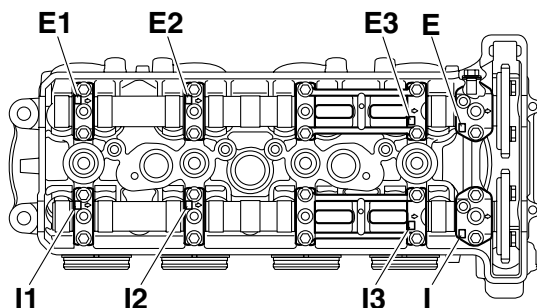


3. Install:

- Exhaust camshaft caps
- Intake camshaft caps

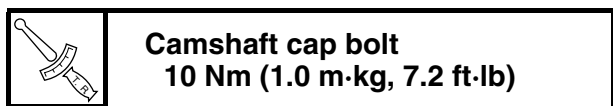
NOTE:

- Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
“E”, “E1”, “E2”, “E3”: Exhaust
“I”, “I1”, “I2”, “I3”: Intake
- Make sure the arrow mark “a” on each camshaft points towards the right side of the engine.
- Make sure the holes “b” in the camshafts are aligned with arrow mark “a” on the camshaft caps.



4. Install:

- Camshaft cap bolts

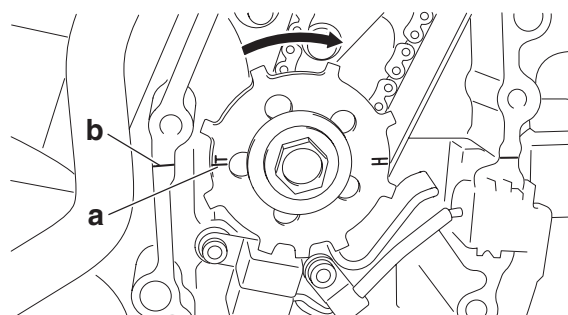


5. Align:

- “T” mark on the pickup rotor (with the crankcase mating surface)



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



6. Install:

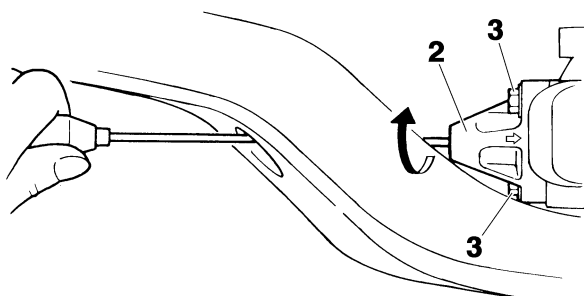
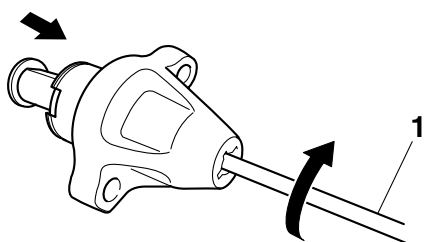
- Timing chain tensioner
- Timing chain tensioner gasket **New**



- While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver “1”.
- With the timing chain tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the gasket and the timing chain tensioner “2” onto the cylinder block.
- Tighten the timing chain tensioner bolts “3” to the specified torque.



Timing chain tensioner bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)



- d. Remove the screwdriver, make sure the timing chain tensioner rod releases, and then tighten the cap bolt to the specified torque.



Timing chain tensioner cap bolt
6 Nm (0.6 m·kg, 4.3 ft·lb)



7. Turn:

- Crankshaft
(several turns clockwise)

8. Check:

- “T” mark

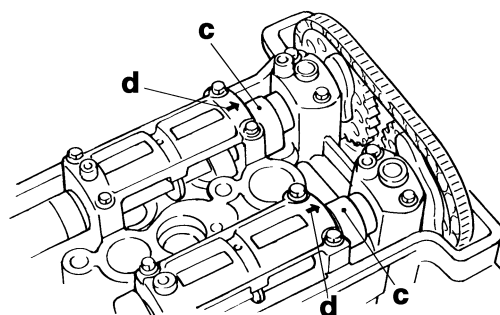
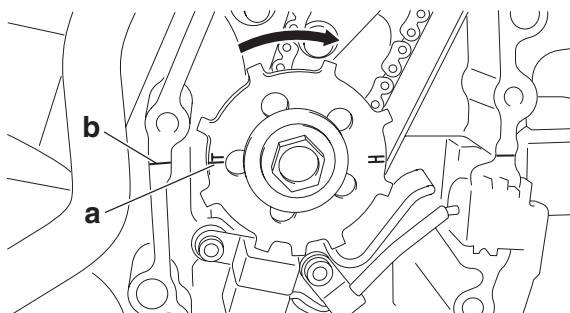
Make sure the “T” mark “a” on the pickup rotor is aligned with the crankcase mating surface “b”.

- Camshaft holes

Make sure the holes “c” in the camshafts are aligned with the arrow marks “d” on the camshaft caps.

Out of alignment → Adjust.

Refer to the installation steps above.



9. Measure:

- Valve clearance

Out of specification → Adjust.

Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-3.

10. Install:

- Cylinder head cover gasket **New**
- Cylinder head cover



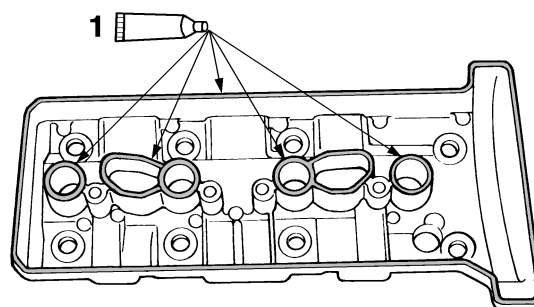
Cylinder head cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

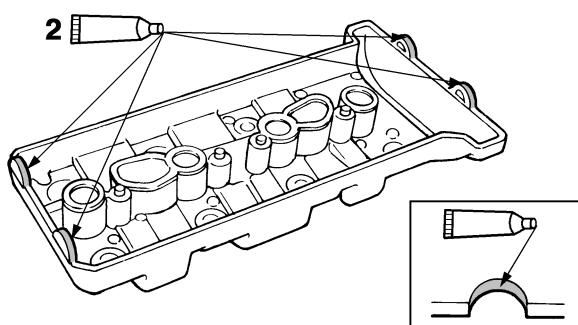
NOTE:

- Apply Three Bond 1514® “1” onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply Yamaha bond No.1215 “2” onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

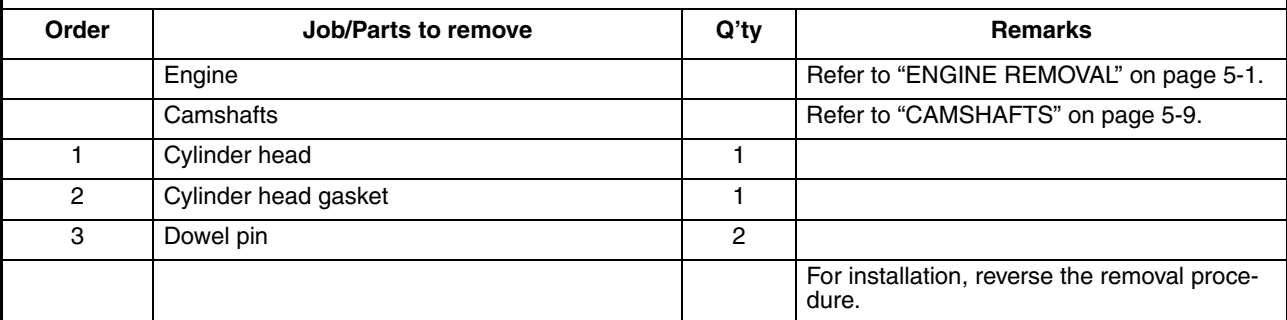


Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)





Removing the cylinder head



CYLINDER HEAD

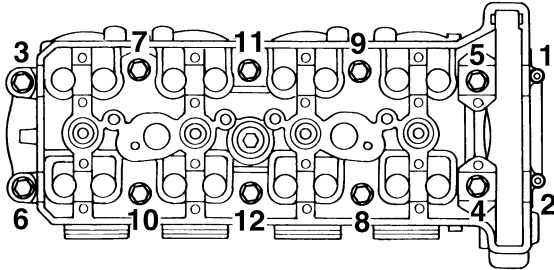
EAS24120

REMOVING THE CYLINDER HEAD

1. Remove:
 - Cylinder head bolts

NOTE:

- Loosen the bolts in the proper sequence as shown.
- Loosen each bolt 1/2 of a turn at a time. After all of the bolts are fully loosened, remove them.



EAS24160

CHECKING THE CYLINDER HEAD

1. Eliminate:
 - Combustion chamber carbon deposits (with a rounded scraper)

NOTE:

Do not use a sharp instrument to avoid damaging or scratching:

- Spark plug bore threads
- Valve seats

2. Check:

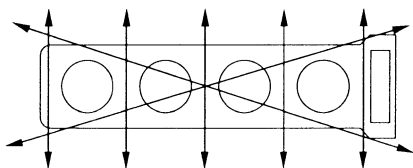
- Cylinder head
Damage/scratches → Replace.
- Cylinder head water jacket
Mineral deposits/rust → Eliminate.

3. Measure:

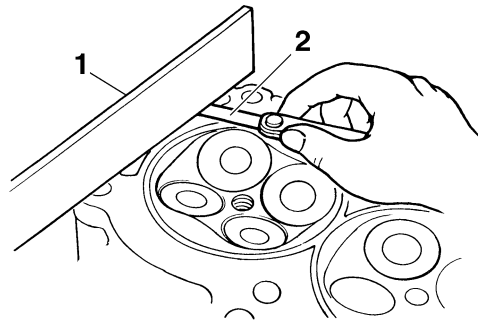
- Cylinder head warpage
Out of specification → Resurface the cylinder head.



Warpage limit
0.10 mm (0.0039 in)



- a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



- b. Measure the warpage.
- c. If the limit is exceeded, resurface the cylinder head as follows.
- d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

NOTE:

To ensure an even surface, rotate the cylinder head several times.

EAS24240

INSTALLING THE CYLINDER HEAD

1. Install:
 - Cylinder head

NOTE:

Pass the timing chain through the timing chain cavity.

2. Tighten:

- Cylinder head bolts (M10) "1"–"10" **New**
- Cylinder head bolts (M6) "11", "12"

EW3P61013



WARNING

Replace the bolts with new ones.

NOTE:

Tighten the bolts using the following procedure.

- a. Lubricate the cylinder head bolts and washers with engine oil.
- b. Install the washers and cylinder head bolts.
- c. Tighten the cylinder head bolts (M10) in the proper tightening sequence as shown.



Cylinder head bolt (M10)
1st
25 Nm (2.5 m·kg, 18 ft·lb)

- d. Loosen and retighten the cylinder head bolts in the proper tightening sequence as shown.

CYLINDER HEAD

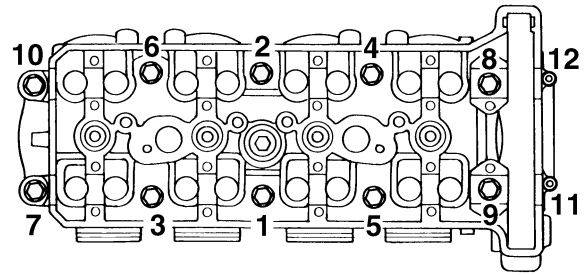


Cylinder head bolt (M10)
2nd
25 Nm (2.5 m·kg, 18 ft·lb)

- e. Tighten the cylinder head bolts further to reach the specified angle 175–185° in the proper tightening sequence as shown.



Cylinder head bolt (M10)
Final
Specified angle 175–185°



EW3P61014

WARNING

If the bolt is tightened more than the specified angle, do not loosen the bolt and then re-tighten it. Instead, replace the bolt with a new one and perform the procedure again.

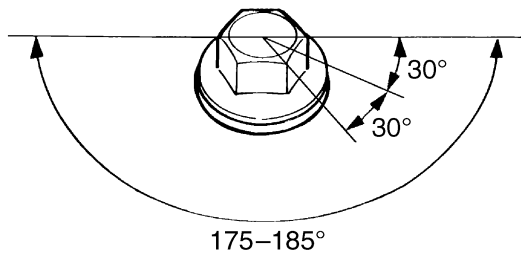
EC3P61033

CAUTION:

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is at the specified angle.

NOTE:

On a hexagonal bolt, note that the angle from one corner to another is 60°.



- f. Tighten the cylinder head bolts (M6) in proper tightening sequence as shown.



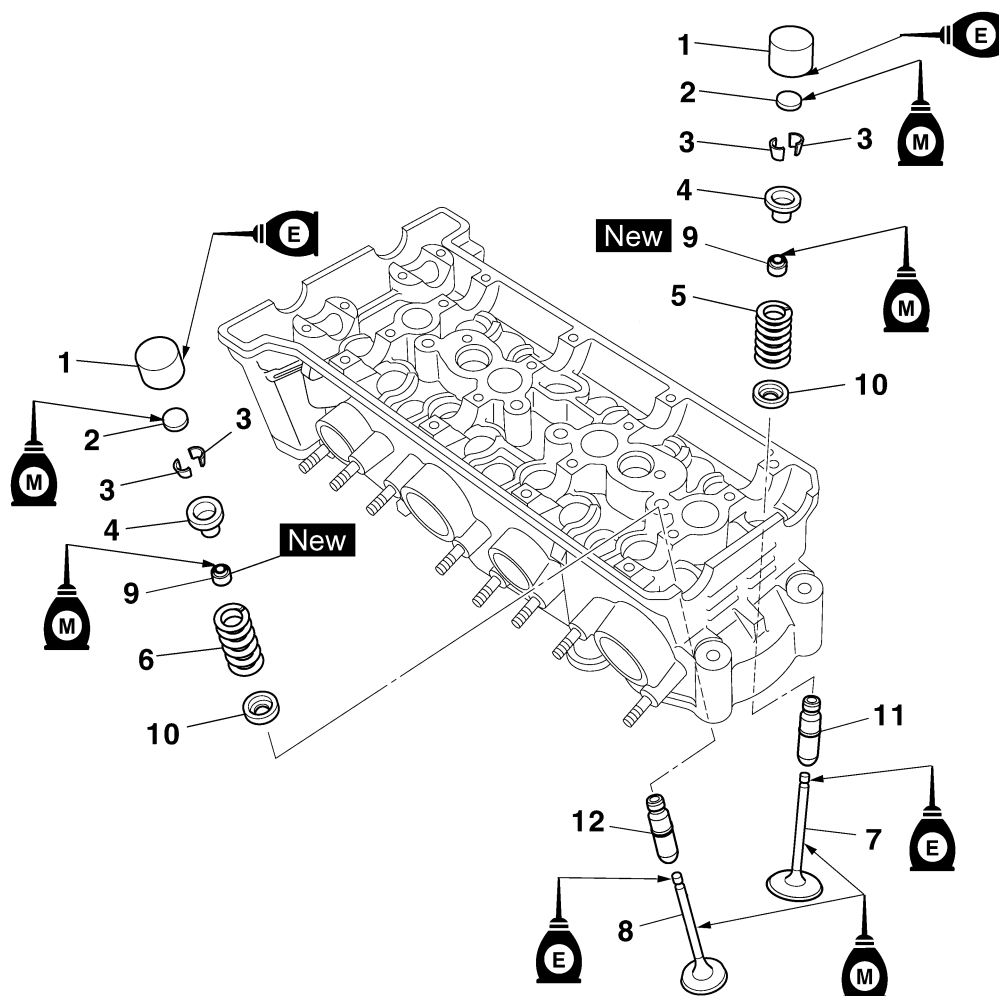
Cylinder head bolt (M6)
12 Nm (1.2 m·kg, 8.7 ft·lb)

VALVES AND VALVE SPRINGS

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 | 16 | |
| 2 | Valve pad | 16 | |
| 3 | Valve cotter | 32 | |
| 4 | Upper spring seat | 16 | |
| 5 | Intake valve spring | 8 | |
| 6 | Exhaust valve spring | 8 | |
| 7 | Intake valve | 8 | |
| 8 | Exhaust valve | 8 | |
| 9 | Valve stem seal | 16 | |
| 10 | Lower spring seat | 16 | |
| 11 | Intake valve guide | 8 | |
| 12 | Exhaust valve guide | 8 | |
| | | | For installation, reverse the removal procedure. |

VALVES AND VALVE SPRINGS

EAS24280

REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

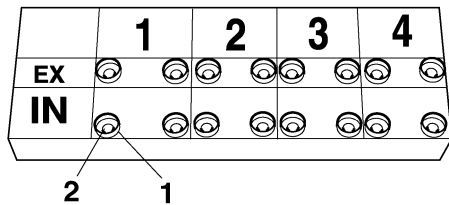
NOTE:

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Remove:
 - Valve lifter "1"
 - Valve pad "2"

NOTE:

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



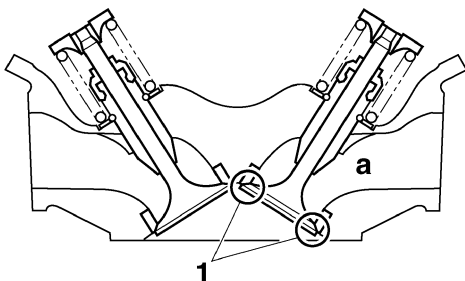
2. Check:
 - Valve sealing

Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
Refer to "CHECKING THE VALVE SEATS" on page 5-24.

- a. Pour a clean solvent "a" into the intake and exhaust ports.
- b. Check that the valves properly seal.

NOTE:

There should be no leakage at the valve seat "1".



3. Remove:
 - Valve cotters

NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



Valve spring compressor

90890-04019

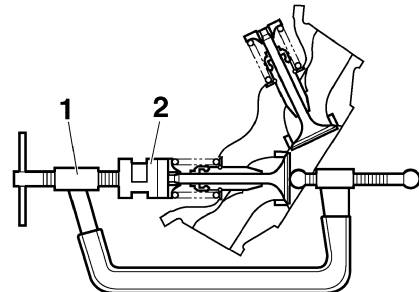
YM-04019

Valve spring compressor attachment

90890-04114

Valve spring compressor adapter 19.5 mm

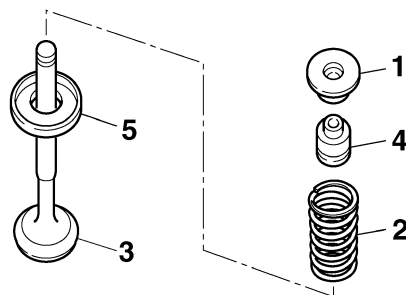
YM-04114



4. Remove:
 - Upper spring seat "1"
 - Valve spring "2"
 - Valve "3"
 - Valve stem seal "4"
 - Lower spring seat "5"

NOTE:

Identify the position of each part very carefully so that it can be reinstalled in its original place.



EAS24290

CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.

VALVES AND VALVE SPRINGS

3. Eliminate:

- Carbon deposits
(from the valve face and valve seat)

4. Check:

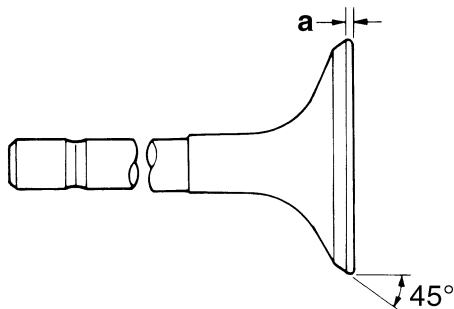
- Valve face
Pitting/wear → Grind the valve face.
- Valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

5. Measure:

- Valve margin thickness D “a”
Out of specification → Replace the valve.



Valve margin thickness D (intake)
0.80–1.20 mm (0.0315–0.0472 in)
Valve margin thickness D (exhaust)
0.50–0.90 mm (0.0197–0.0354 in)



6. Measure:

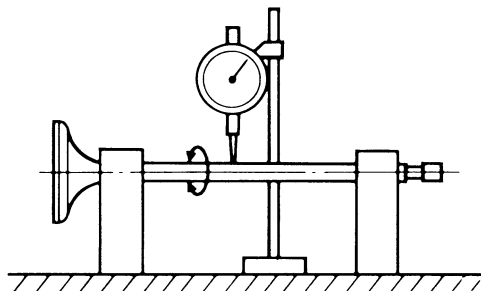
- Valve stem runout
Out of specification → Replace the valve.

NOTE:

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.



Valve stem runout
0.010 mm (0.0004 in)



EAS24300

CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:

- Carbon deposits
(from the valve face and valve seat)

2. Check:

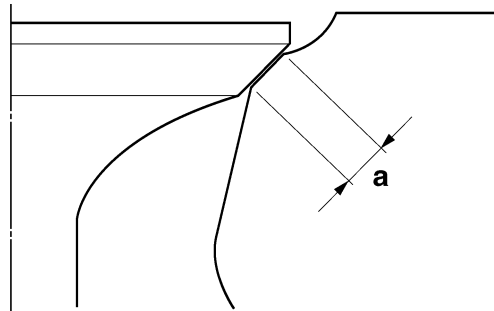
- Valve seat
Pitting/wear → Replace the cylinder head.

3. Measure:

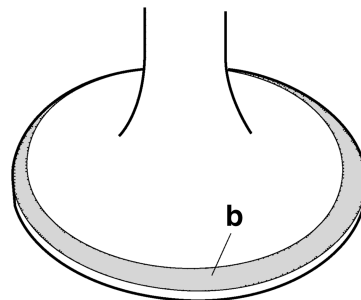
- Valve seat width C “a”
Out of specification → Replace the cylinder head.



Valve seat width C (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)



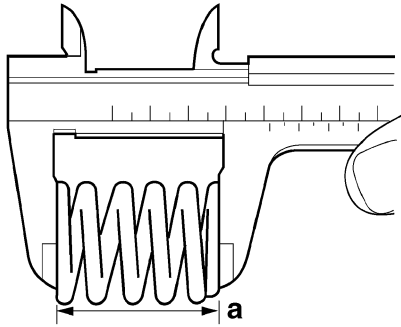
- a. Apply Mechanic's blueing dye (Dykem) “b” onto the valve face.



- b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

NOTE:

Where the valve seat and valve face contacted one another, the blueing will have been removed.

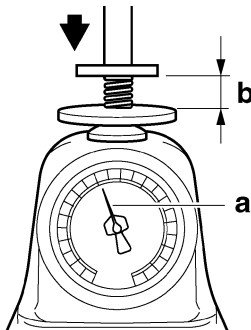


2. Measure:

- Compressed valve spring force "a"
Out of specification → Replace the valve spring.



Installed compression spring force (intake)
136.00–158.00 N (30.57–35.52 lb)
(13.87–16.11 kgf)
Installed compression spring force (exhaust)
136.00–158.00 N (30.57–35.52 lb)
(13.87–16.11 kgf)
Installed length (intake)
33.00 mm (1.30 in)
Installed length (exhaust)
33.00 mm (1.30 in)



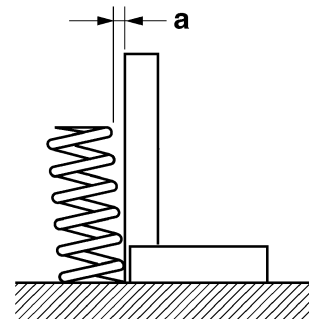
b. Installed length

3. Measure:

- Valve spring tilt "a"
Out of specification → Replace the valve spring.



Spring tilt (intake)
2.5°/1.7 mm (2.5°/0.067 in)
Spring tilt (exhaust)
2.5°/1.7 mm (2.5°/0.067 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.

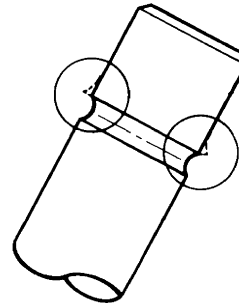
EAS24340

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

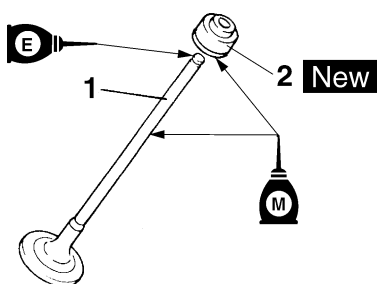
3. Lubricate:

- Valve stem end
(with the recommended lubricant)



Recommended lubricant
Engine oil

VALVES AND VALVE SPRINGS

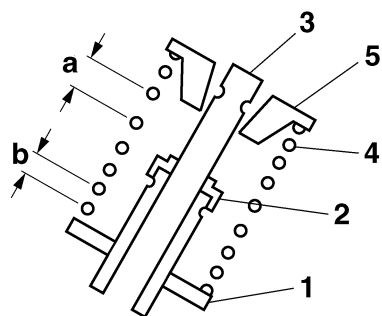
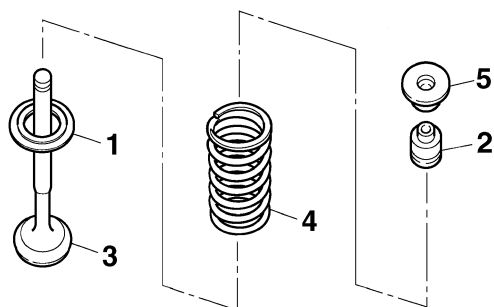


4. Install:

- Lower spring seat "1"
 - Valve stem seal "2" **New**
 - Valve "3"
 - Valve spring "4"
 - Upper spring seat "5"
- (into the cylinder head)

NOTE:

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.



b. Smaller pitch

5. Install:

- Valve cotters

NOTE:

Install the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



Valve spring compressor

90890-04019

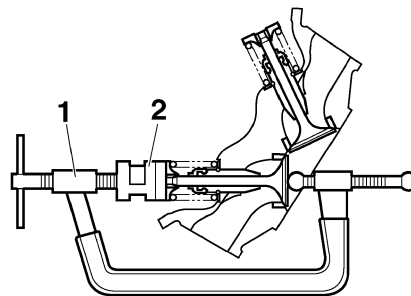
YM-04019

Valve spring compressor attachment

90890-04114

Valve spring compressor adapter 19.5 mm

YM-04114

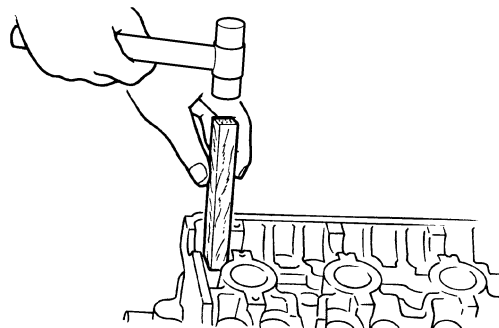


6. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

CAUTION:

Hitting the valve tip with excessive force could damage the valve.



7. Lubricate:

- Valve lifter
- (with the recommended lubricant)



Recommended lubricant
Engine oil

8. Install:

- Valve pad
- Valve lifter

NOTE:

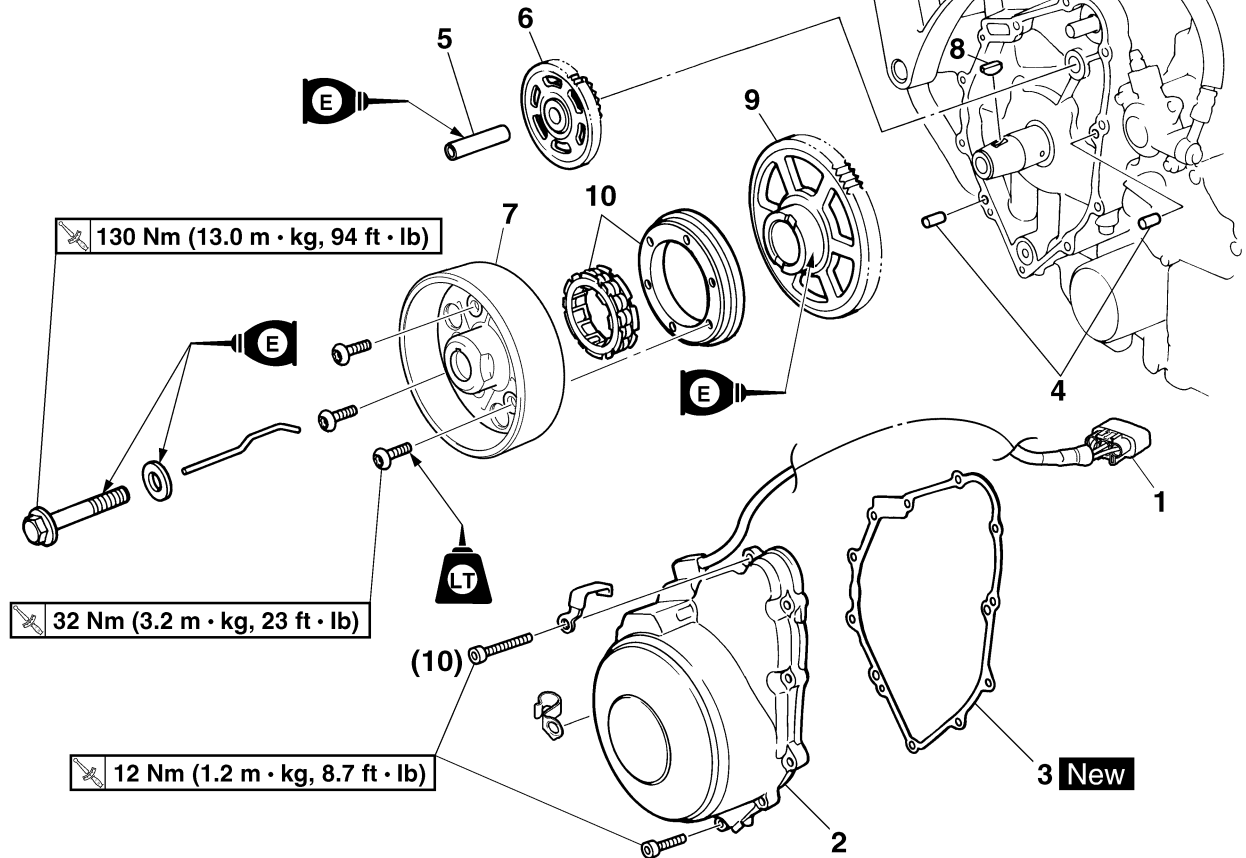
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

GENERATOR AND STARTER CLUTCH

EAS24480

GENERATOR AND STARTER CLUTCH

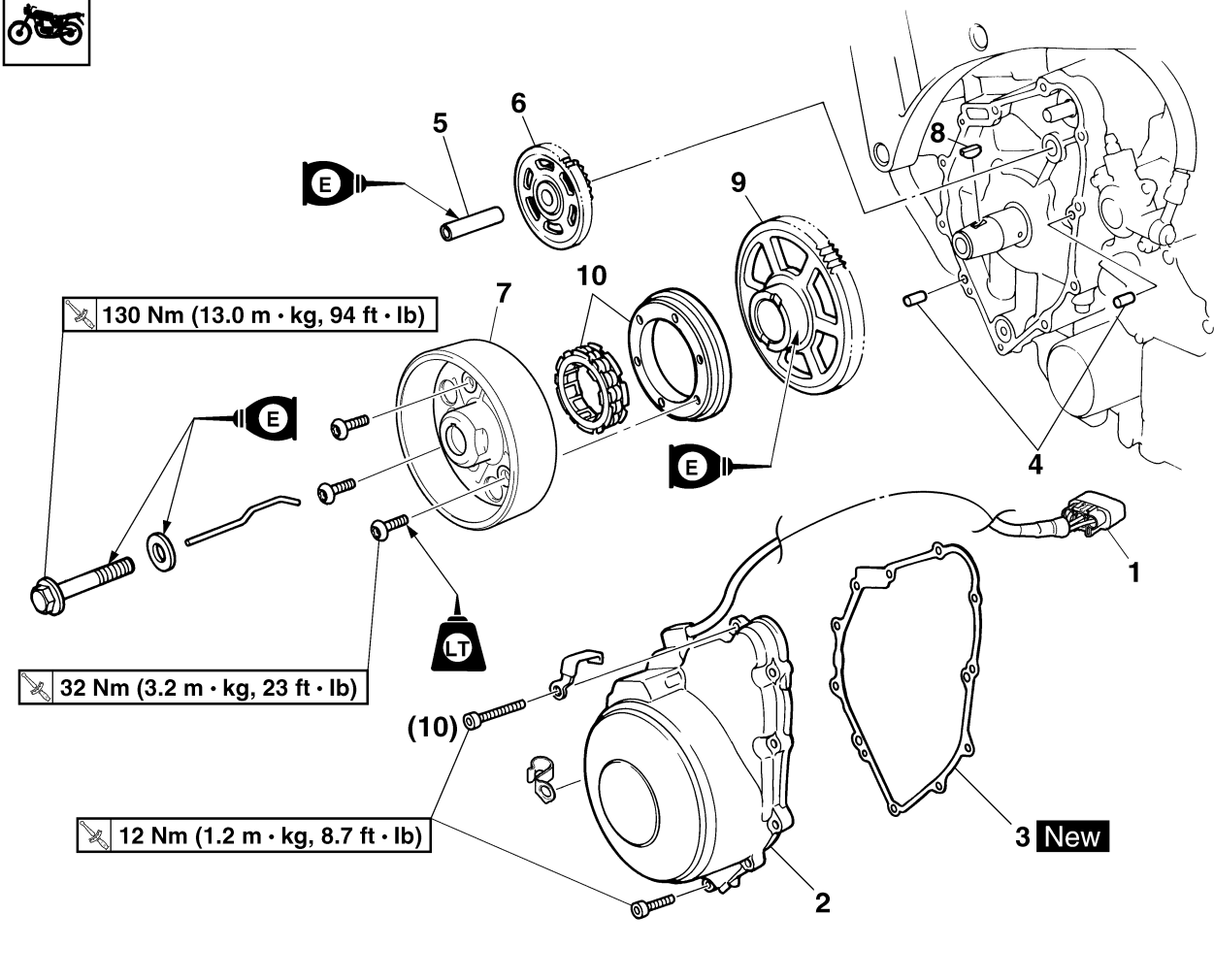
Removing the generator rotor and starter clutch



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------------|------|--|
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Engine oil | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| 1 | Stator coil coupler | 1 | Disconnect. |
| 2 | Generator cover | 1 | |
| 3 | Generator cover gasket | 1 | |
| 4 | Dowel pin | 2 | |
| 5 | Starter clutch idle gear shaft | 1 | |
| 6 | Starter clutch idle gear | 1 | |
| 7 | Generator rotor | 1 | |
| 8 | Woodruff key | 1 | |
| 9 | Starter clutch gear | 1 | |

GENERATOR AND STARTER CLUTCH

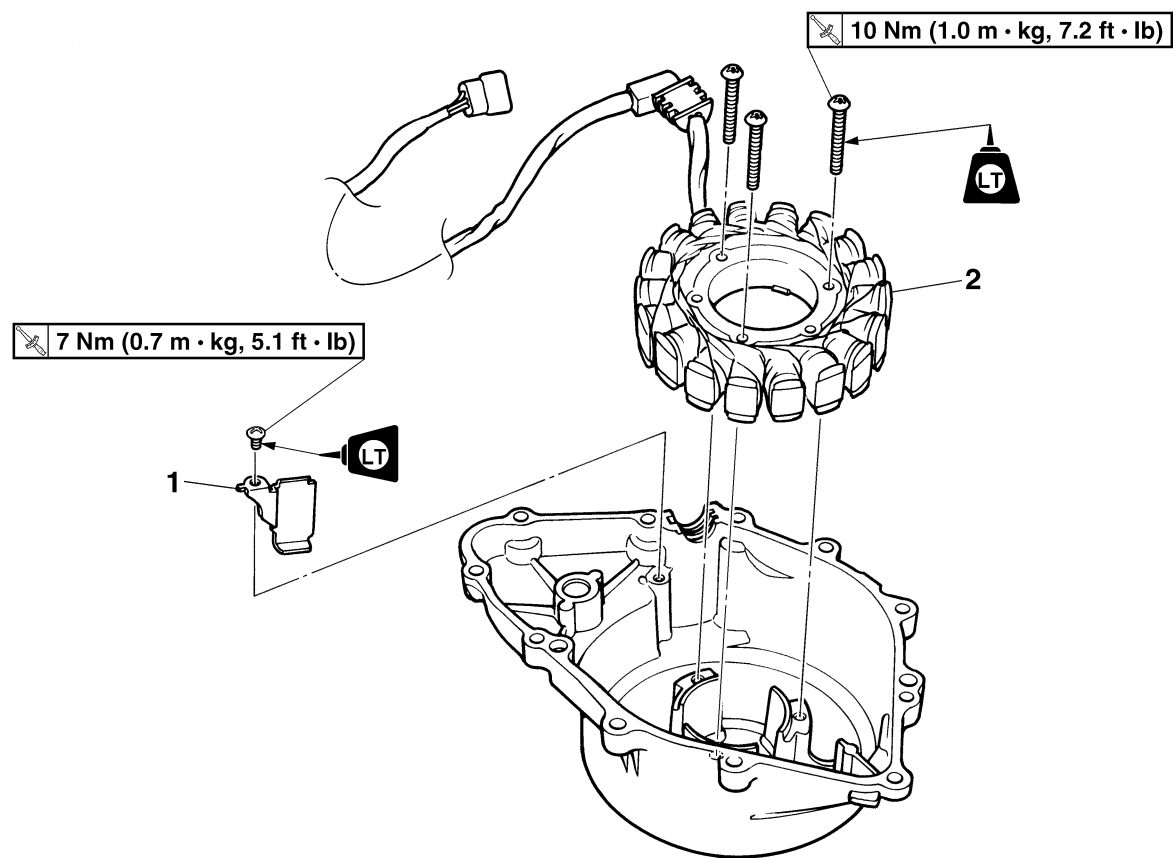
Removing the generator rotor and starter clutch



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 10 | Starter clutch | 1 | |
| | | | For installation, reverse the removal procedure. |

GENERATOR AND STARTER CLUTCH

Removing the stator coil assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------------|------|--|
| 1 | Stator coil assembly lead holder | 1 | |
| 2 | Stator coil assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

GENERATOR AND STARTER CLUTCH

EAS24490

REMOVING THE GENERATOR

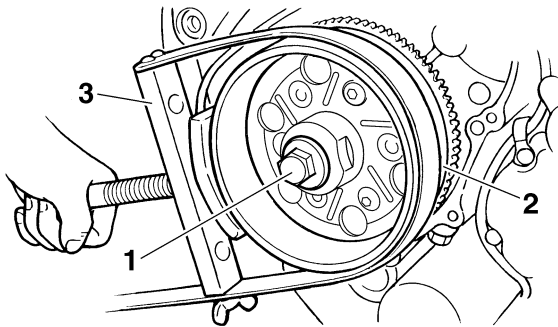
1. Remove:
 - Generator rotor bolt “1”
 - Washer

NOTE:

While holding the generator rotor “2” with the sheave holder “3”, loosen the generator rotor bolt.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



2. Remove:
 - Generator rotor “1”
(with the flywheel puller “2”)
 - Woodruff key

ECA13880

CAUTION:

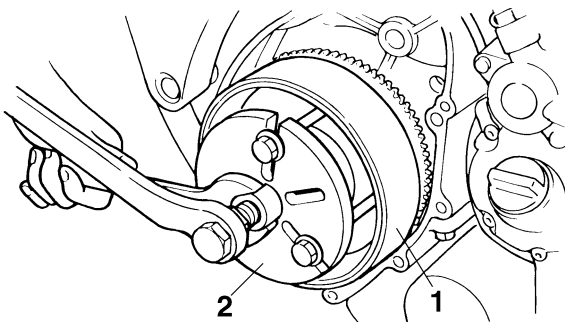
To protect the end of the crankshaft, place an appropriate sized socket between the fly-wheel puller set's center bolt and the crankshaft.

NOTE:

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

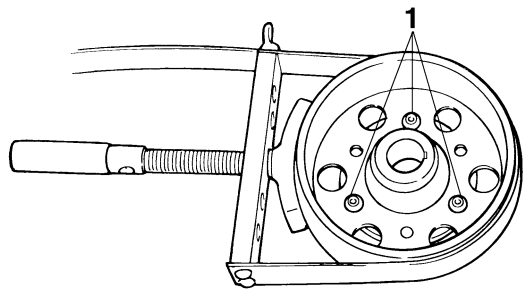
1. Remove:
 - Starter clutch bolts “1”

NOTE:

While holding the generator rotor with the sheave holder, remove the starter clutch bolts.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



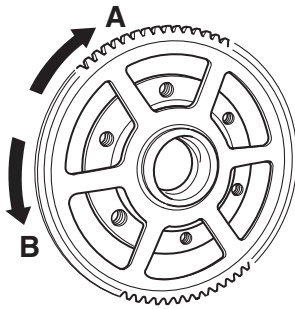
EAS24570

CHECKING THE STARTER CLUTCH

1. Check:
 - Starter clutch rollers
Damage/wear → Replace.
2. Check:
 - Starter clutch idle gear
 - Starter clutch gear
Burrs/chips/roughness/wear → Replace the defective part(s).
3. Check:
 - Starter clutch gear's contacting surfaces
Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
 - Starter clutch operation

- a. Install the starter clutch gear onto the starter clutch and hold the starter clutch.
- b. When turning the starter clutch gear clockwise "A", the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
- c. When turning the starter clutch gear counter-clockwise "B", it should turn freely, otherwise the starter clutch is faulty and must be replaced.

GENERATOR AND STARTER CLUTCH



EAS24600

INSTALLING THE STARTER CLUTCH

1. Install:

- Starter clutch
- Starter clutch bolts "1"



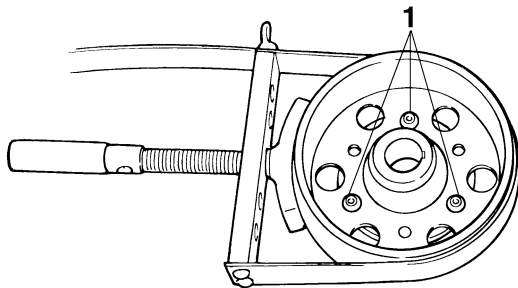
Starter clutch bolt
32 Nm (3.2 m·kg, 23 ft·lb)
LOCTITE®

NOTE:

While holding the generator rotor with the sheave holder, tighten the starter clutch bolts.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS24500

INSTALLING THE GENERATOR

1. Install:

- Woodruff key
- Generator rotor
- Washer
- Generator rotor bolt

NOTE:

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.

- Lubricate the generator rotor bolt threads and washer mating surfaces with engine oil.

2. Tighten:

- Generator rotor bolt "1"



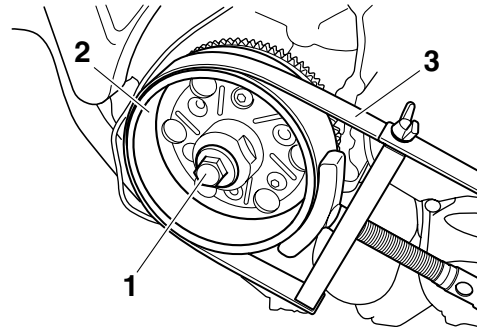
Generator rotor bolt
130 Nm (13.0 m·kg, 94 ft·lb)

NOTE:

While holding the generator rotor "2" with the sheave holder "3", tighten the generator rotor bolt.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

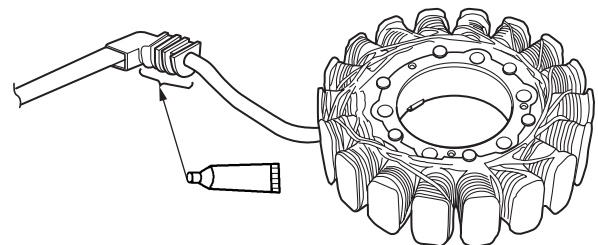


3. Apply:

- Sealant
(onto the stator coil assembly lead grommet)



Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)



4. Install:

- Generator cover gasket **New**
- Generator cover



Generator cover bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)

GENERATOR AND STARTER CLUTCH

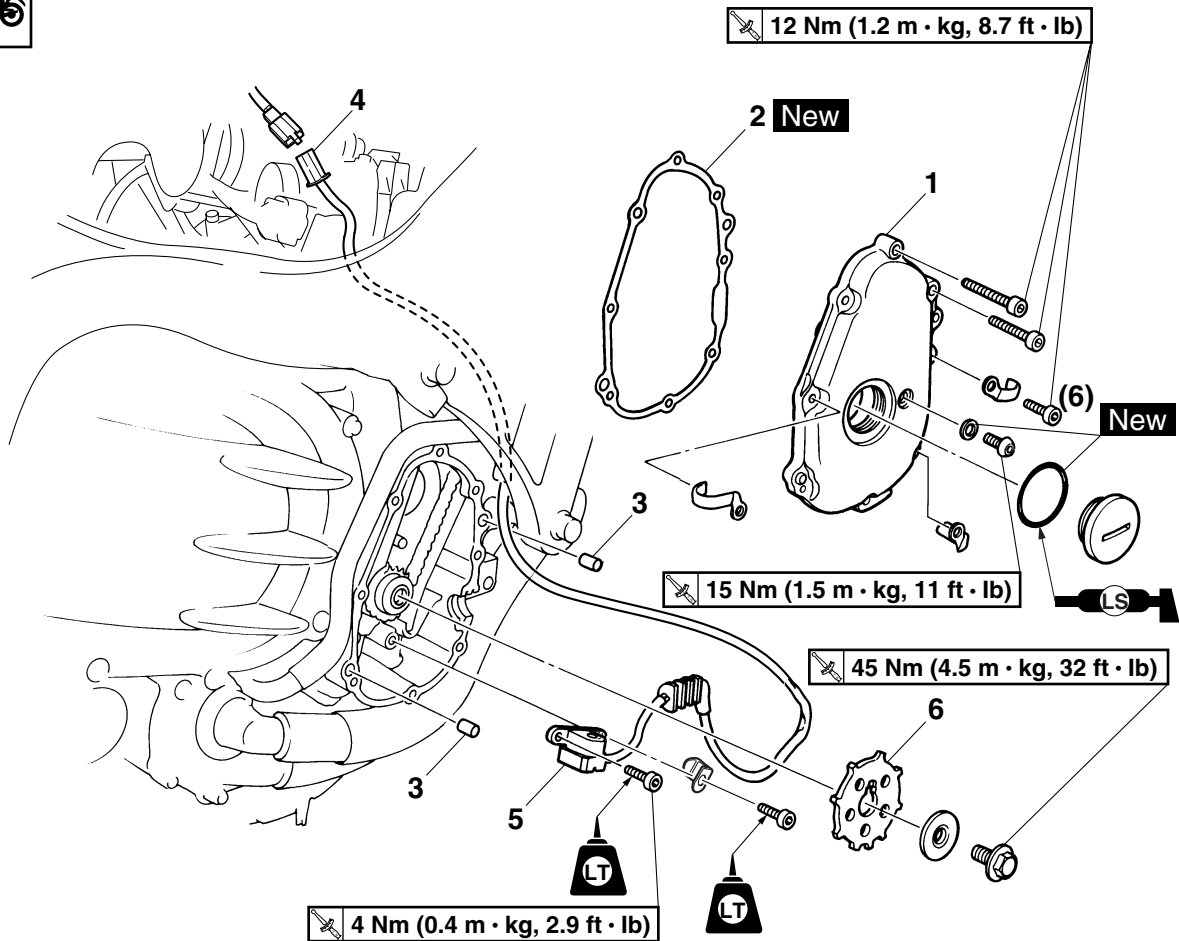
NOTE: _____

Tighten the generator cover bolts in stages and in a crisscross pattern.

EAS24520

PICKUP ROTOR

Removing the pickup rotor



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|---|
| | Side cowlings/Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Generator cover | | Refer to "GENERATOR AND STARTER CLUTCH" on page 5-28. |
| 1 | Pickup rotor cover | 1 | |
| 2 | Pickup rotor cover gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Crankshaft position sensor coupler | 1 | Disconnect. |
| 5 | Crankshaft position sensor | 1 | |
| 6 | Pickup rotor | 1 | |
| | | | For installation, reverse the removal procedure. |

PICKUP ROTOR

EAS24530

REMOVING THE PICKUP ROTOR

1. Remove:

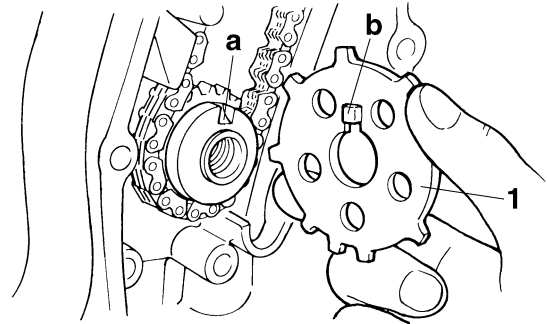
- Pickup rotor bolt "1"
- Washer "2"
- Pickup rotor "3"

NOTE:

While holding the generator rotor "4" with the sheave holder "5", loosen the pickup rotor bolt.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



2. Tighten:

- Pickup rotor bolt "1"



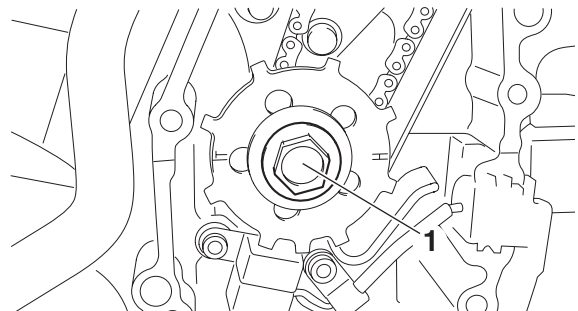
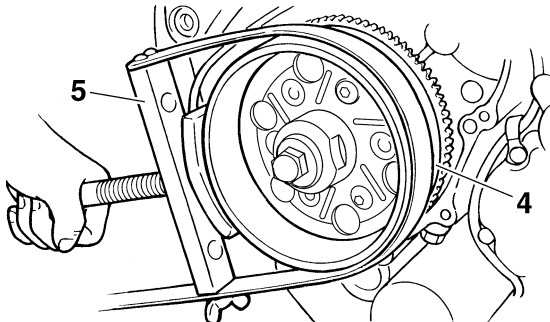
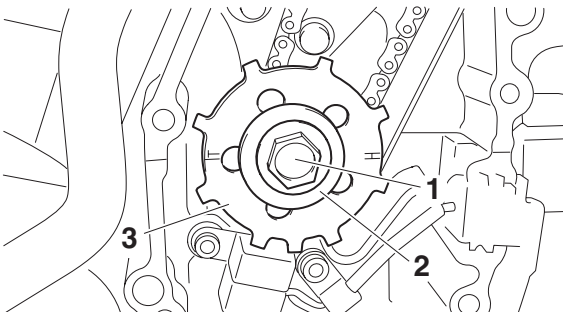
Pickup rotor bolt
45 Nm (4.5 m·kg, 32 ft·lb)

NOTE:

While holding the generator rotor "2" with the sheave holder "3", tighten the pickup rotor bolt.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS24540

INSTALLING THE PICKUP ROTOR

1. Install:

- Pickup rotor "1"
- Washer
- Pickup rotor bolt

NOTE:

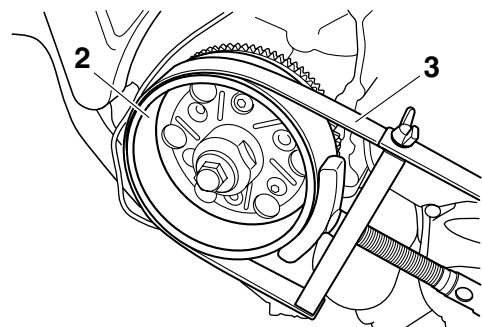
When installing the pickup rotor, align the groove "a" in the crankshaft sprocket with the projection "b" in the pickup rotor.

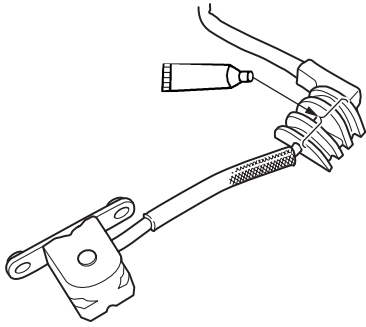
3. Apply:

- Sealant
(onto the crankshaft position sensor lead grommet)



Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)





4. Install:

- Pickup rotor cover gasket **New**
- Pickup rotor cover



Pickup rotor cover bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)

NOTE: _____

Tighten the pickup rotor cover bolts in stages
and in a crisscross pattern.

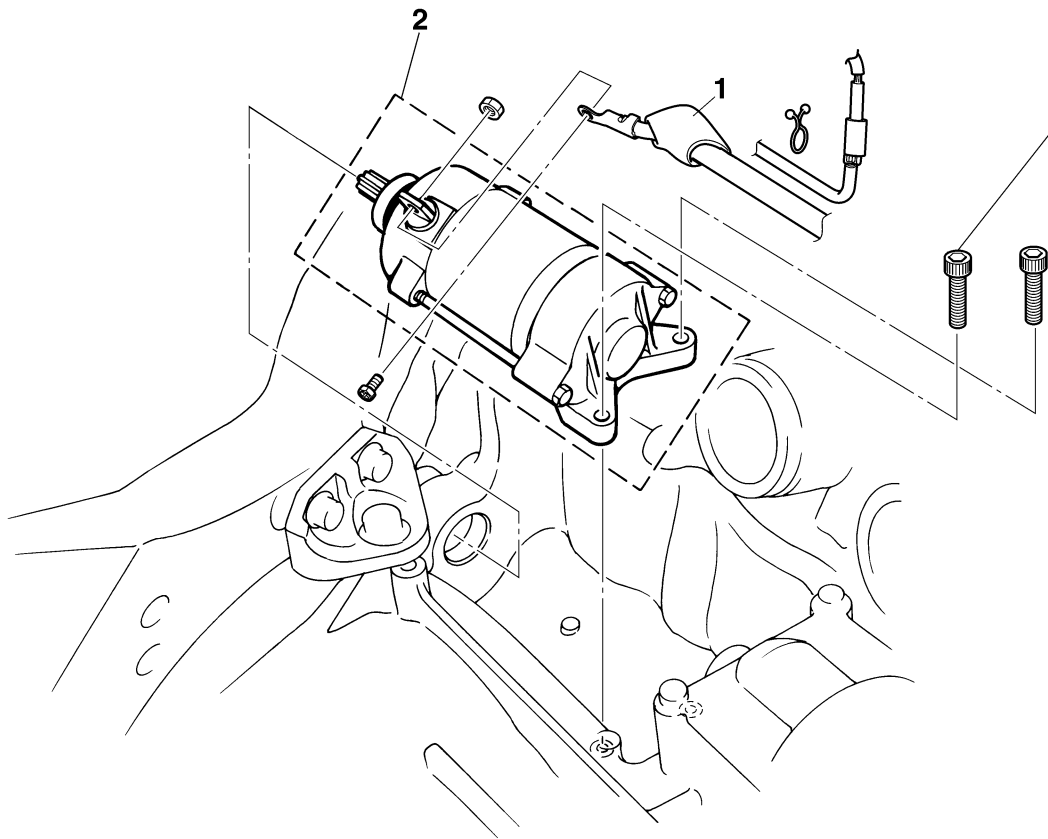
EAS24780

ELECTRIC STARTER

Removing the starter motor



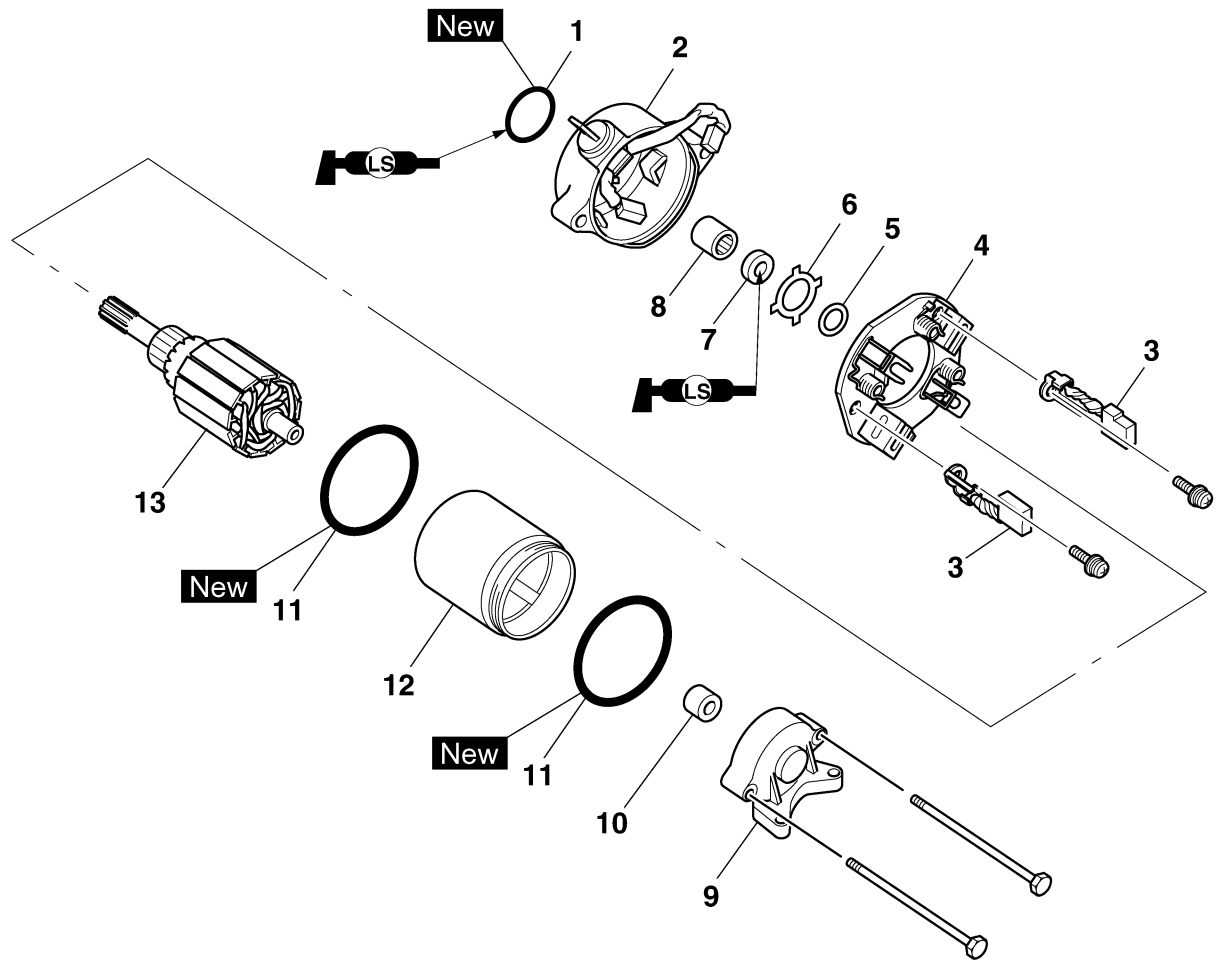
10 Nm (1.0 m · kg, 7.2 ft · lb)



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------|------|--|
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| 1 | Starter motor lead | 1 | Disconnect. |
| 2 | Starter motor assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

ELECTRIC STARTER

Disassembling the starter motor



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|--|
| 1 | O-ring | 1 | |
| 2 | Starter motor front cover | 1 | |
| 3 | Brush | 2 | |
| 4 | Brush seat (along with brushes) | 1 | |
| 5 | Washer | 1 | |
| 6 | Lock washer | 1 | |
| 7 | Oil seal | 1 | |
| 8 | Bearing | 1 | |
| 9 | Starter motor rear cover | 1 | |
| 10 | Collar | 1 | |
| 11 | O-ring | 2 | |
| 12 | Starter motor yoke | 1 | |
| 13 | Armature assembly | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

ELECTRIC STARTER

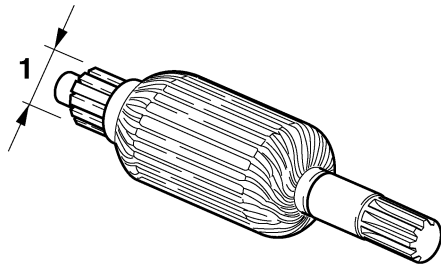
EAS24790

CHECKING THE STARTER MOTOR

1. Check:
 - Commutator
Dirt → Clean with 600 grit sandpaper.
2. Measure:
 - Commutator diameter "1"
Out of specification → Replace the starter motor.



Limit
23.5 mm (0.93 in)



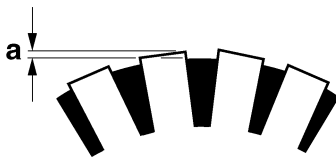
3. Measure:
 - Mica undercut "a"
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



Mica undercut (depth)
1.50 mm (0.06 in)

NOTE:

The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
 - Armature assembly resistances (commutator and insulation)
Out of specification → Replace the starter motor.

- a. Measure the armature assembly resistances with the pocket tester.

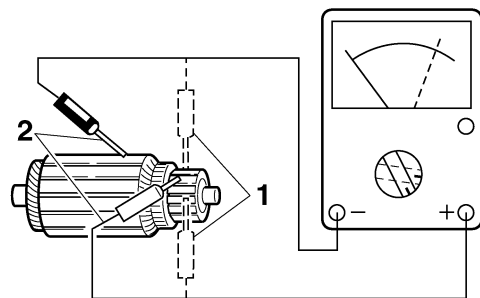


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



Armature coil
Commutator resistance "1"
0.024–0.030 Ω at 20 °C (68 °F)
Insulation resistance "2"
Above 1 M Ω at 20 °C (68 °F)

- b. If any resistance is out of specification, replace the starter motor.

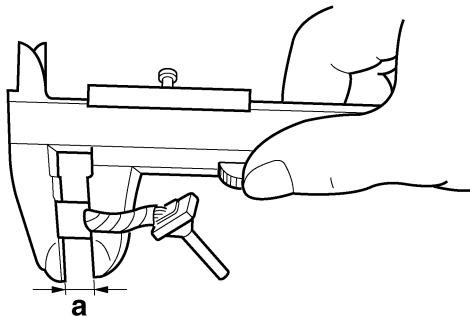


5. Measure:

- Brush length "a"
Out of specification → Replace the brushes as a set.



Limit
3.65 mm (0.14 in)

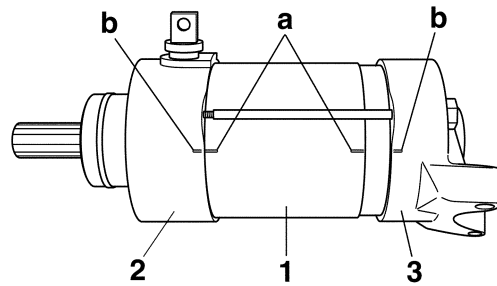
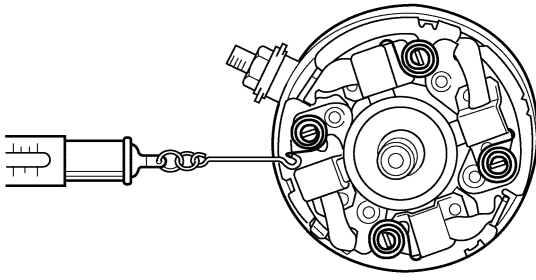


6. Measure:

- Brush spring force
Out of specification → Replace the brush springs as a set.



Brush spring force
5.28–7.92 N (19.01–28.51 oz)
(538–808 gf)



7. Check:
- Gear teeth
Damage/wear → Replace the gear.
8. Check:
- Bearing
 - Oil seal
Damage/wear → Replace the defective part(s).

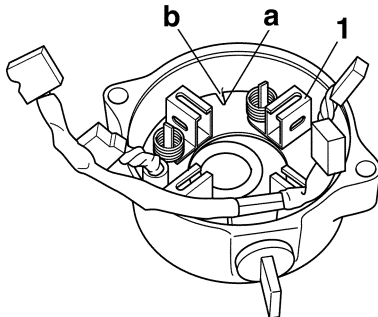
EAS24800

ASSEMBLING THE STARTER MOTOR

1. Install:
- Brush seat “1”

NOTE:

Align the slot “a” on the brush seat with the tab “b” in the starter motor front cover.



2. Install:
- Starter motor yoke “1”
 - Starter motor front cover “2”
 - Starter motor rear cover “3”

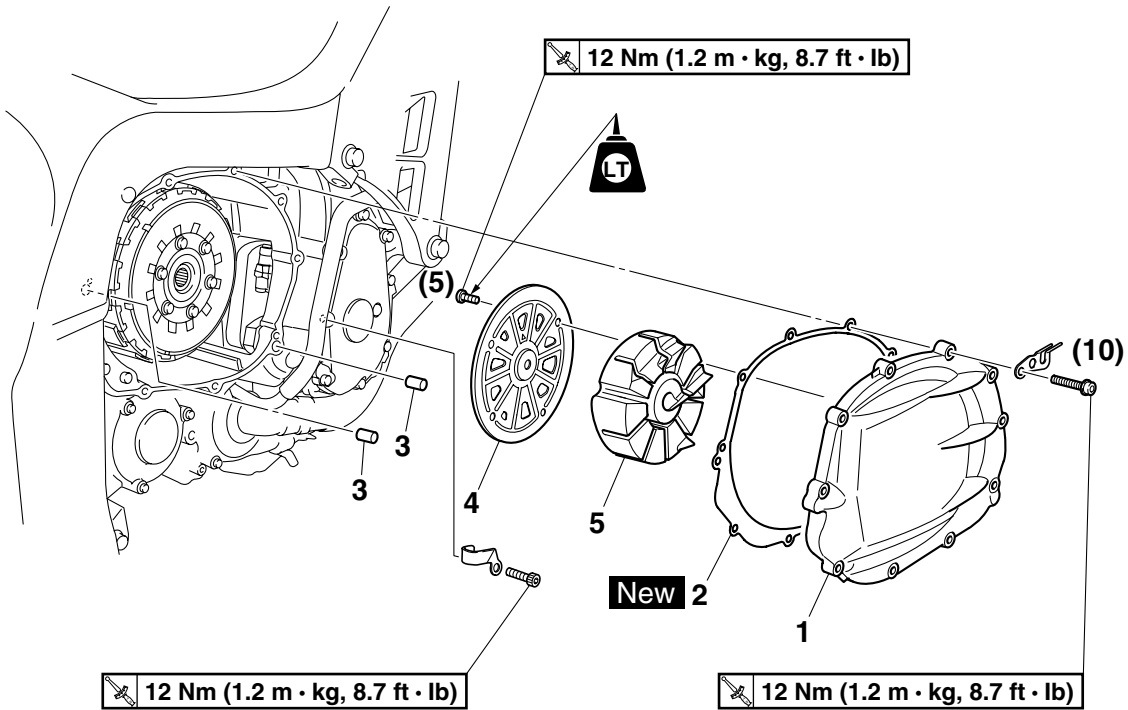
NOTE:

Align the match marks “a” on the starter motor yoke with the match marks “b” on the starter motor front and rear covers.

EAS25060

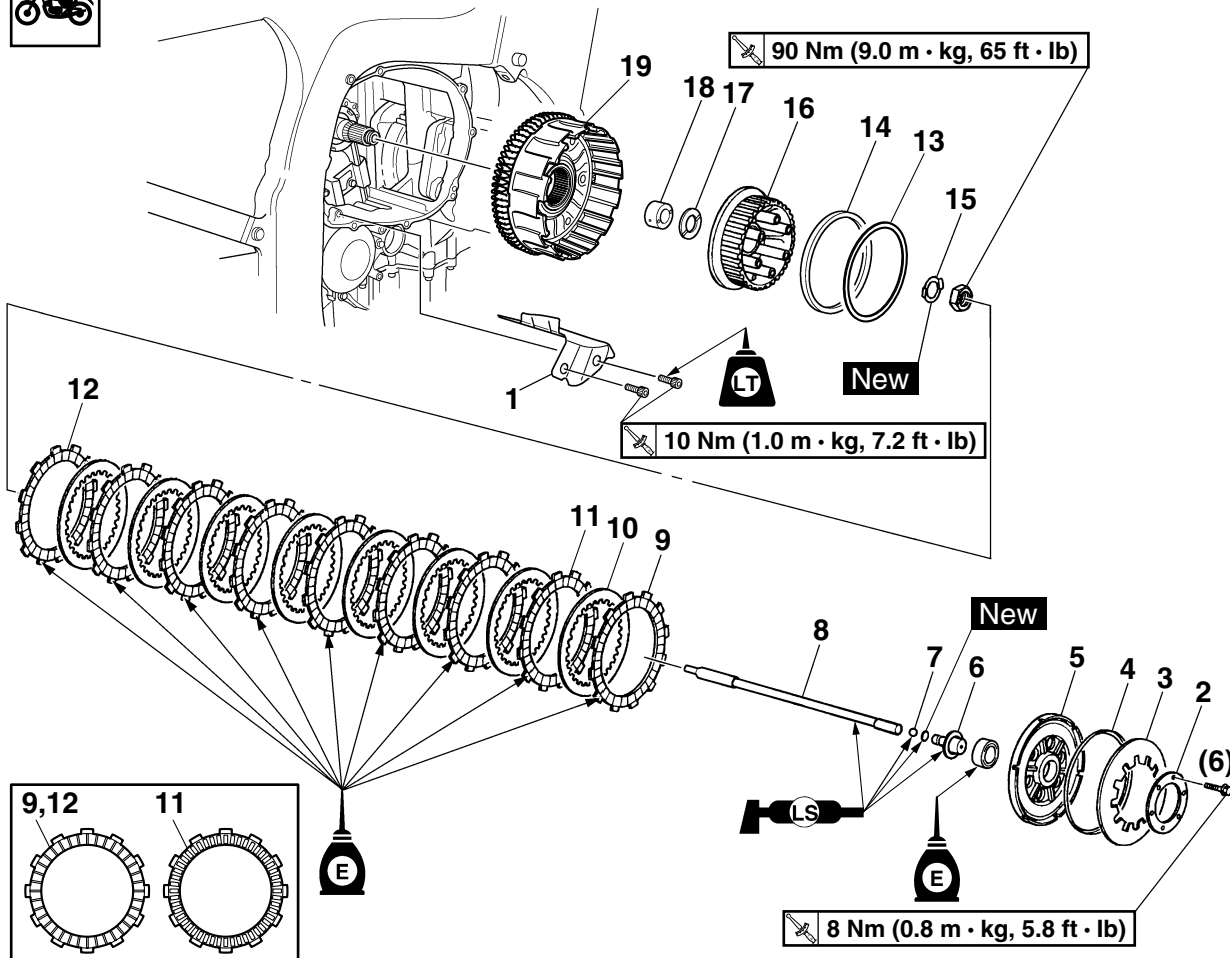
CLUTCH

Removing the clutch cover



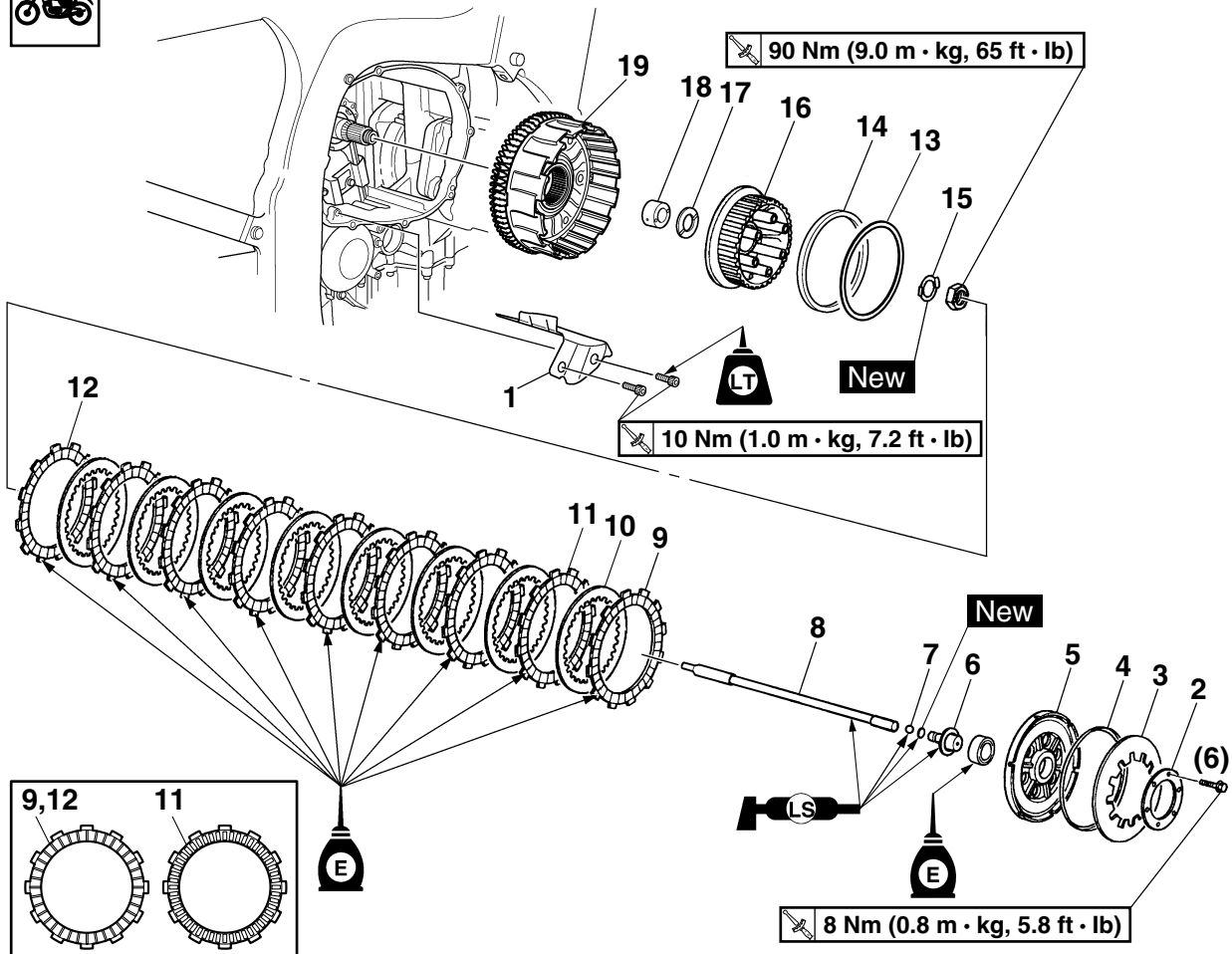
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| | Right side cowling | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Engine oil | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| 1 | Clutch cover | 1 | |
| 2 | Clutch cover gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Damper cover | 1 | |
| 5 | Damper | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the clutch



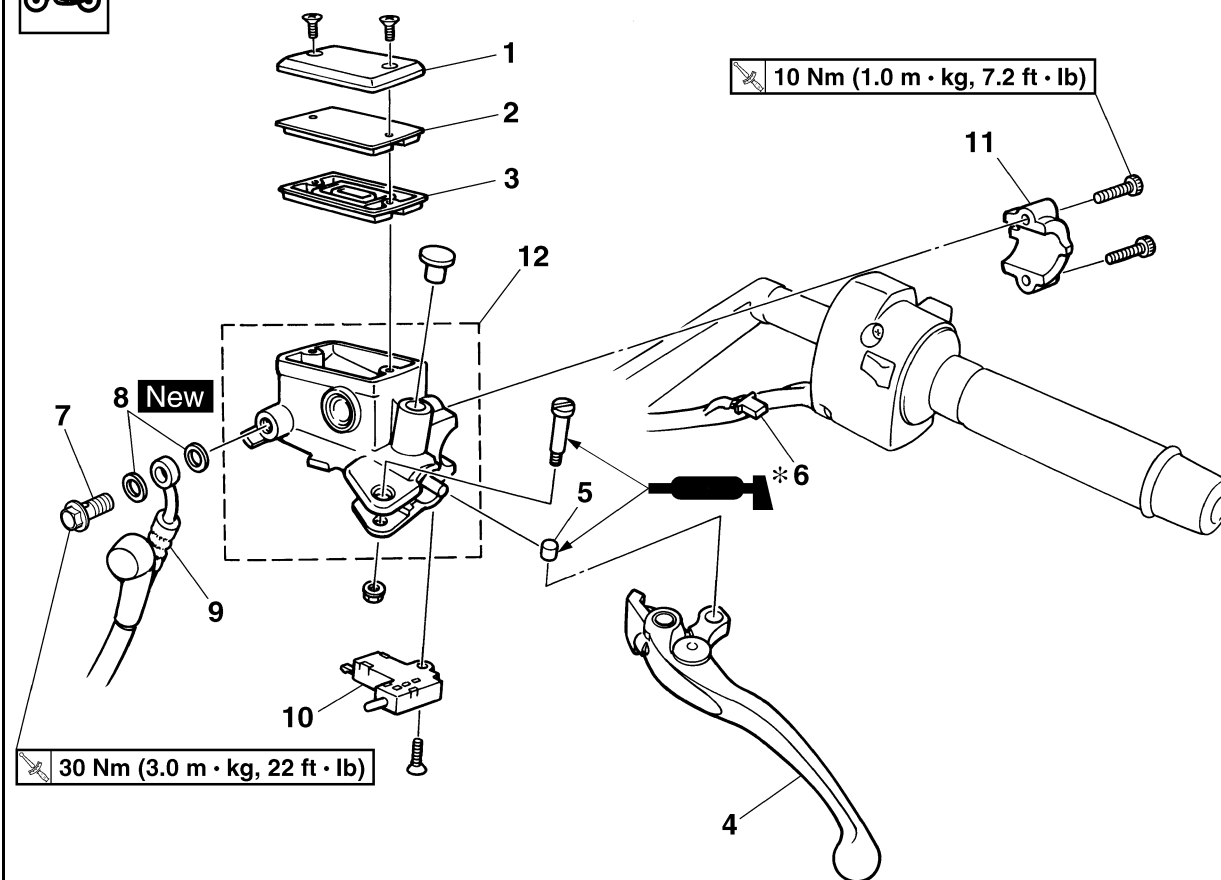
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------|------|-------------------------------------|
| | Rear balancer | | Refer to "BALANCERS" on page 5-103. |
| 1 | Oil guide plate | 1 | |
| 2 | Clutch spring plate retainer | 1 | |
| 3 | Clutch spring plate | 1 | |
| 4 | Clutch spring plate seat | 1 | |
| 5 | Pressure plate | 1 | |
| 6 | Short clutch push rod | 1 | |
| 7 | Ball | 1 | |
| 8 | Long clutch push rod | 1 | |
| 9 | Friction plate 1 | 1 | Inside diameter: 124 mm (4.88 in) |
| 10 | Clutch plate | 8 | |
| 11 | Friction plate 2 | 7 | Inside diameter: 124 mm (4.88 in) |
| 12 | Friction plate 3 | 1 | Inside diameter: 135 mm (5.31 in) |
| 13 | Clutch damper spring | 1 | |
| 14 | Clutch damper spring seat | 1 | |
| 15 | Lock washer | 1 | |
| 16 | Clutch boss | 1 | |

Removing the clutch



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 17 | Thrust washer | 1 | |
| 18 | Spacer | 1 | |
| 19 | Clutch housing | 1 | |
| | | | For installation, reverse the removal procedure. |

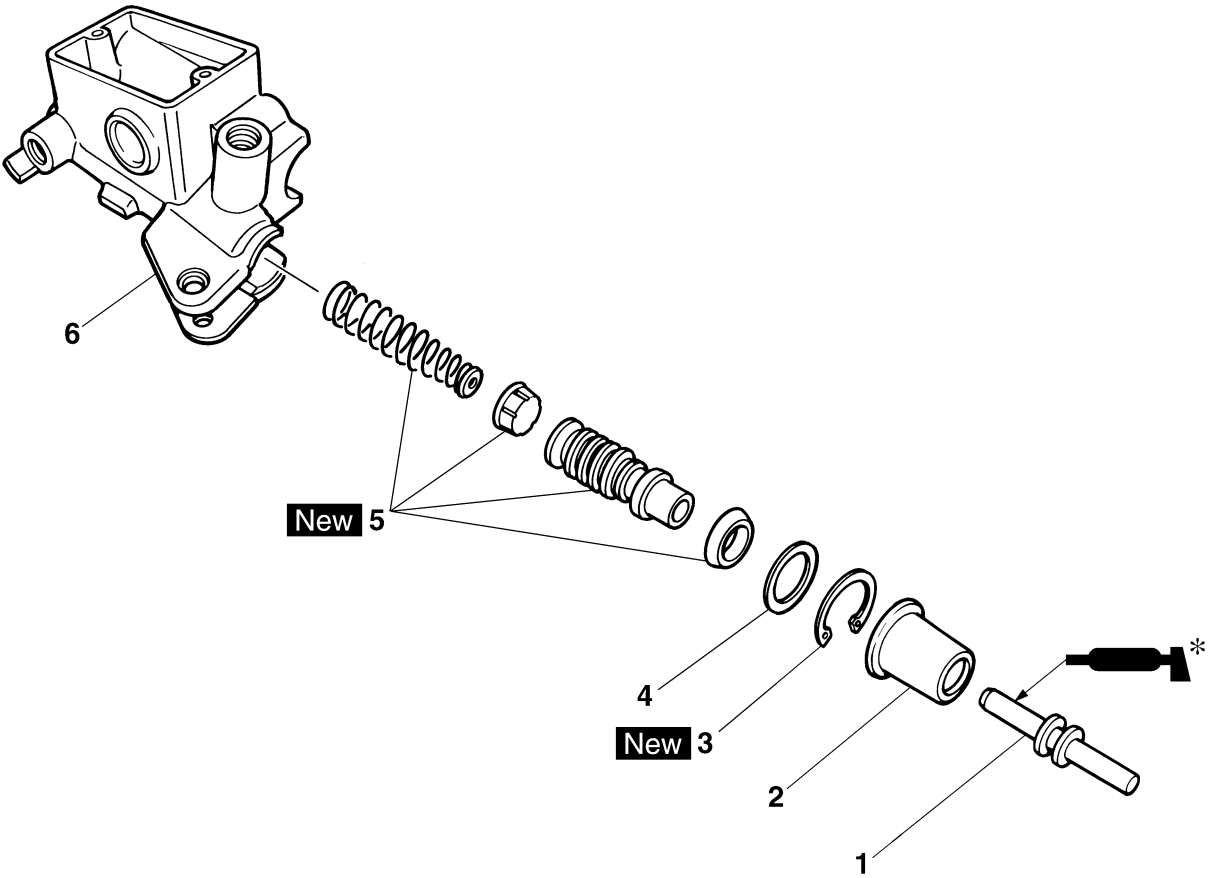
Removing the clutch master cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---|------|---|
| | Clutch fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15. |
| 1 | Clutch master cylinder reservoir cap | 1 | |
| 2 | Clutch master cylinder reservoir diaphragm holder | 1 | |
| 3 | Clutch master cylinder reservoir diaphragm | 1 | |
| 4 | Clutch lever | 1 | |
| 5 | Clutch master cylinder push rod pin | 1 | |
| 6 | Clutch switch coupler | 1 | Disconnect. |
| 7 | Clutch hose union bolt | 1 | |
| 8 | Copper washer | 2 | |
| 9 | Clutch hose | 1 | Disconnect. |
| 10 | Clutch switch | 1 | |
| 11 | Clutch master cylinder holder | 1 | |
| 12 | Clutch master cylinder | 1 | |
| | | | For installation, reverse the removal procedure. |

* Apply silicon grease

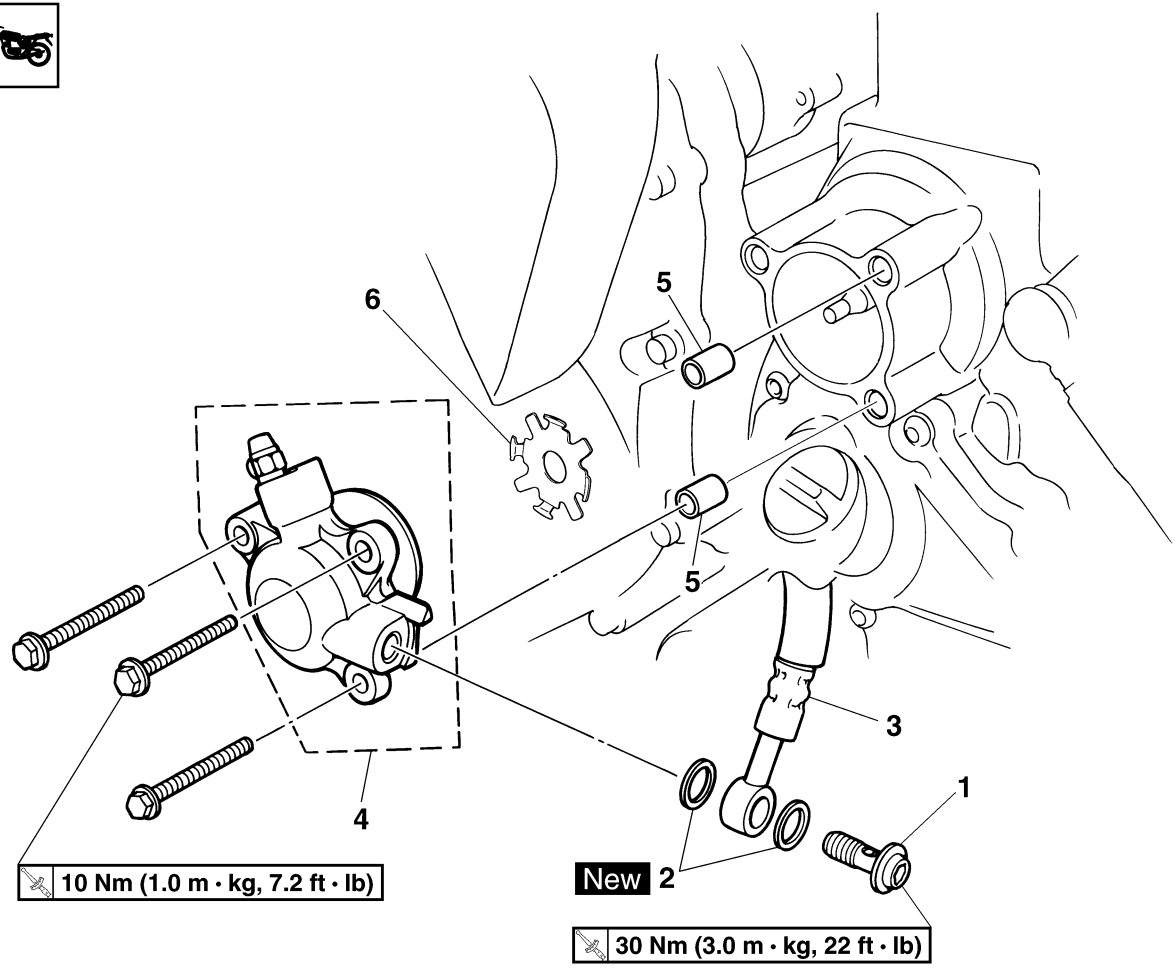
Disassembling the clutch master cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|--|
| 1 | Clutch master cylinder push rod | 1 | |
| 2 | Dust boot | 1 | |
| 3 | Circlip | 1 | |
| 4 | Washer | 1 | |
| 5 | Clutch master cylinder kit | 1 | |
| 6 | Clutch master cylinder body | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

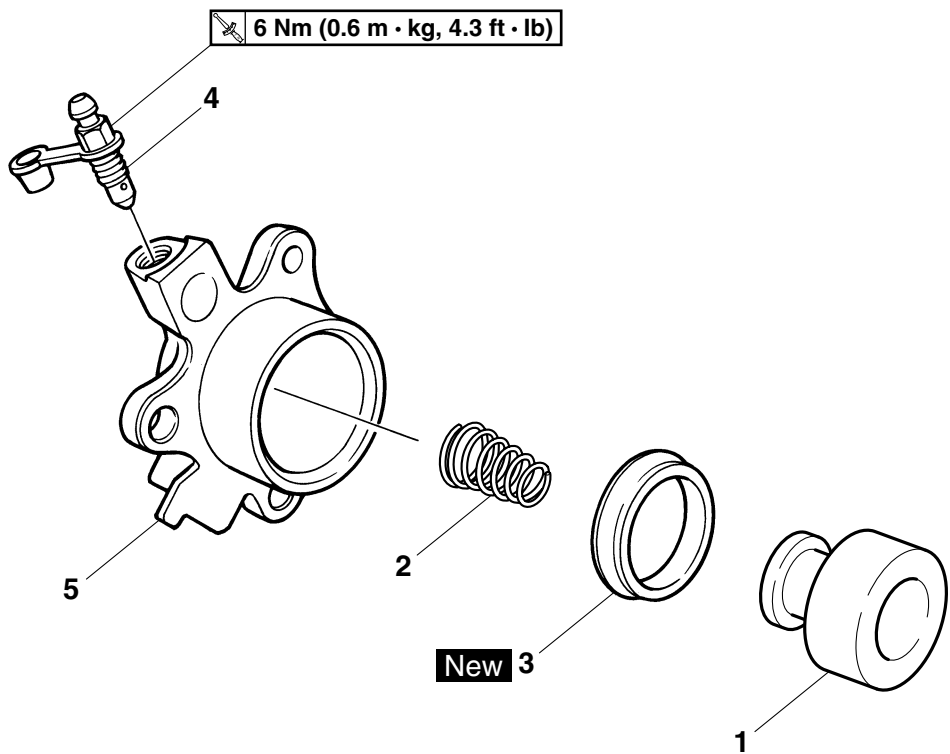
* Apply silicon grease

Removing the clutch release cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------|------|---|
| | Clutch fluid | | Drain. Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15. |
| 1 | Clutch hose union bolt | 1 | |
| 2 | Copper washer | 2 | |
| 3 | Clutch hose | 1 | Disconnect. |
| 4 | Clutch release cylinder | 1 | |
| 5 | Dowel pin | 2 | |
| 6 | Plate | 1 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the clutch release cylinder



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------------------|------|--|
| 1 | Clutch release cylinder piston | 1 | |
| 2 | Clutch release cylinder spring | 1 | |
| 3 | Clutch release cylinder piston seal | 1 | |
| 4 | Bleed screw | 1 | |
| 5 | Clutch release cylinder body | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

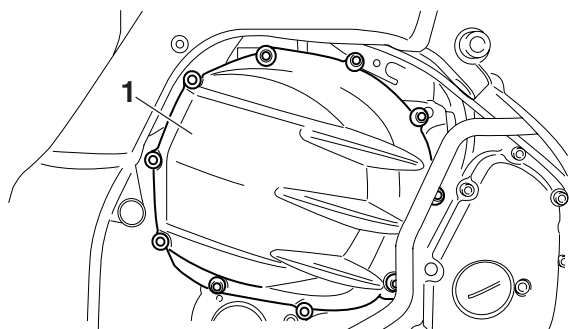
EAS25080

REMOVING THE CLUTCH

1. Remove:
 - Clutch cover "1"

NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



2. Remove:
 - Rear balancer weight
Refer to "BALANCERS" on page 5-103.
3. Remove:
 - Clutch spring bolt

NOTE:

Loosen the clutch spring bolts in stages and in a crisscross pattern.

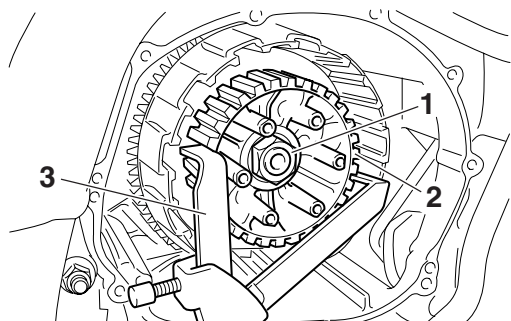
4. Straighten the lock washer tab.
5. Loosen:
 - Clutch boss nut "1"

NOTE:

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



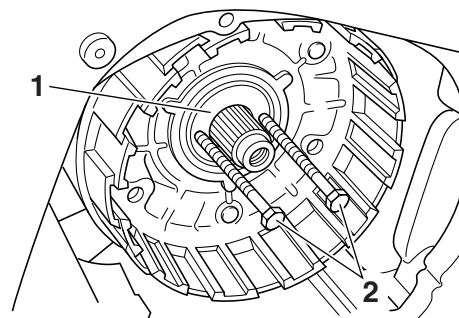
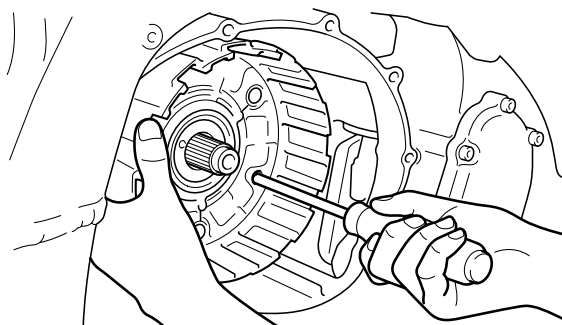
Universal clutch holder
90890-04086
YM-91042



6. Remove:
 - Spacer "1"
 - Clutch housing

NOTE:

- Insert a cross-headed screwdriver into one of the holes of the clutch housing and primary driven gear, and then rotate the inner primary driven gear until both primary drive gears are aligned. The teeth of both primary driven gears must be aligned for installation.
- Insert two 5 mm bolts "2" into the spacer and then remove the spacer by pulling on the bolts.



EAS25100

CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

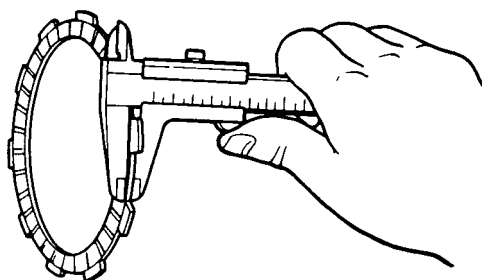
1. Check:
 - Friction plate
Damage/wear → Replace the friction plates as a set.
2. Measure:
 - Friction plate thickness
Out of specification → Replace the friction plates as a set.

NOTE:

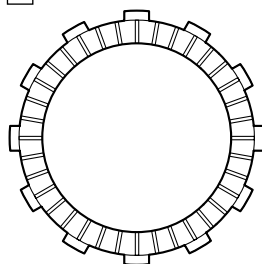
Measure the friction plate at four places.



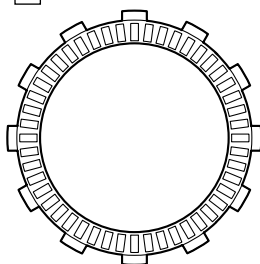
Friction plate thickness
2.90–3.10 mm (0.114–0.122 in)
Wear limit
2.80 mm (0.110 in)



A



B



A. Friction plate 1, 3

B. Friction plate 2

EAS25110

CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

1. Check:

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

2. Measure:

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



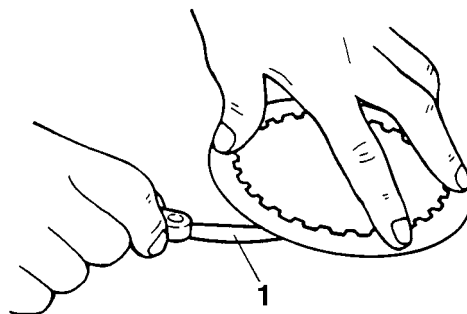
Thickness gauge
90890-03180

Feeler gauge set
YU-26900-9



Clutch plate thickness
1.90–2.10 mm (0.075–0.083 in)

Warpage limit
0.10 mm (0.0039 in)



EAS25130

CHECKING THE CLUTCH SPRING PLATE

1. Check:

- Clutch spring plate
Damage → Replace.

2. Check:

- Clutch spring plate seat
Damage → Replace.

EAS25150

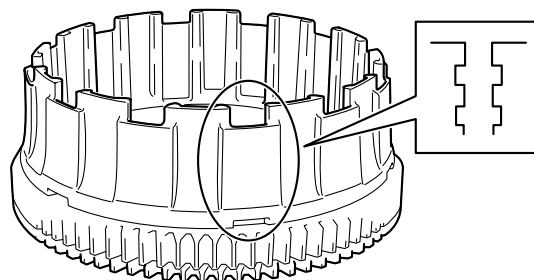
CHECKING THE CLUTCH HOUSING

1. Check:

- Clutch housing dogs
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:

Pitting on the clutch housing dogs will cause erratic clutch operation.



2. Check:

- Bearing
Damage/wear → Replace the bearing and clutch housing.

EAS25160

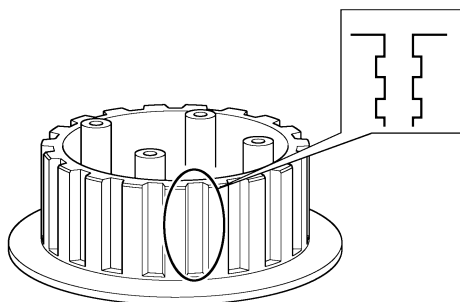
CHECKING THE CLUTCH BOSS

1. Check:

- Clutch boss splines
Damage/pitting/wear → Replace the clutch boss.

NOTE:

Pitting on the clutch boss splines will cause erratic clutch operation.



EAS25170

CHECKING THE PRESSURE PLATE

1. Check:

- Pressure plate
Cracks/damage → Replace.
- Bearing
Damage/wear → Replace.

EAS25190

CHECKING THE CLUTCH PUSH RODS

1. Check:

- O-ring
- Short clutch push rod
- Long clutch push rod
- Ball

Cracks/damage/wear → Replace the defective part(s).

2. Measure:

- Long clutch push rod bending limit
Out of specification → Replace the long clutch push rod.



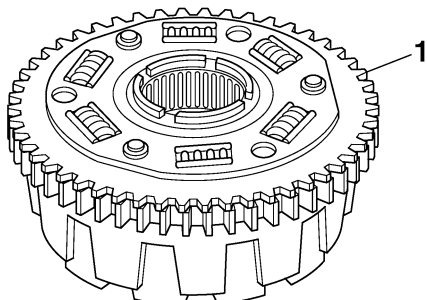
Long clutch push rod bending limit
0.37 mm (0.015 in)

EAS25210

CHECKING THE PRIMARY DRIVEN GEAR

1. Check:

- Primary driven gear "1"
Damage/wear → Replace the primary drive and primary driven gears as a set.
Excessive noise during operation → Replace the clutch housing and crankshaft as a set.



EAS25250

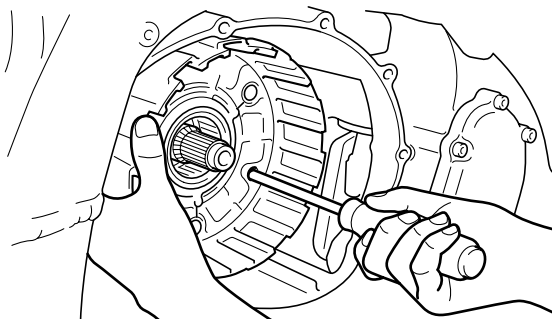
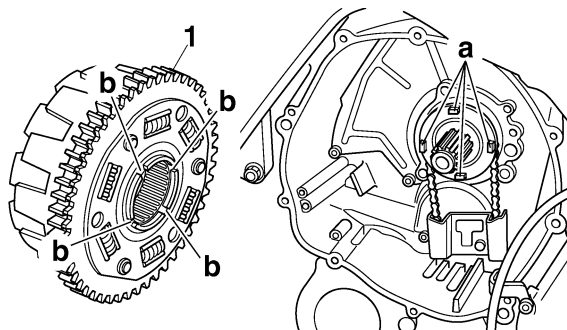
INSTALLING THE CLUTCH

1. Install:

- Clutch housing "1"

NOTE:

- Make sure that the projections "a" in the clutch housing align with the slots "b" in the oil pump drive sprocket.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- Insert a cross-headed screwdriver into one of the holes of the clutch housing and primary driven gear, and then rotate the inner primary driven gear until both primary drive gears are aligned. The teeth of both primary driven gears must be aligned for installation.

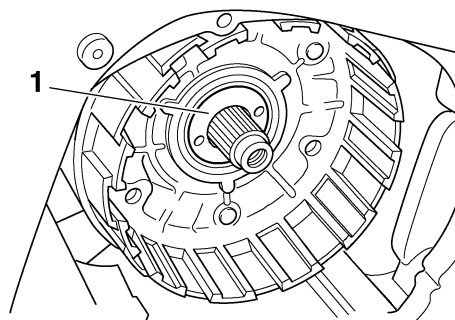


2. Install:

- Spacer "1"

NOTE:

Install the spacer with the two screw holes facing towards the clutch boss.



3. Install:

- Clutch boss "1"

- Lock washer “2” **New**
- Clutch boss nut “3”



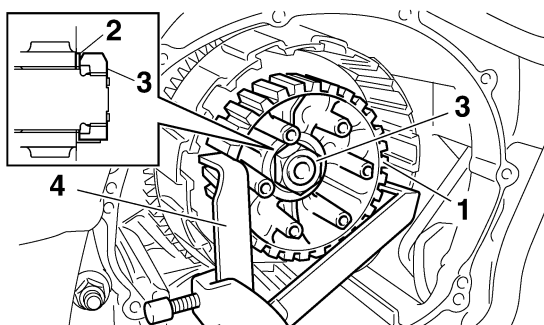
Clutch boss nut
90 Nm (9.0 m·kg, 65 ft·lb)

NOTE:

- Install the clutch boss nut with its large inner diameter side facing inward as shown in the illustration.
- While holding the clutch boss with the universal clutch holder “4”, tighten the clutch boss nut.



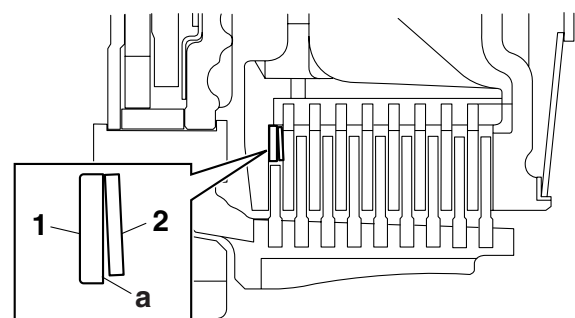
Universal clutch holder
90890-04086
YM-91042



4. Bend the lock washer tab along a flat side of the nut.
5. Install:
 - Clutch damper spring seat “1”
 - Clutch damper spring “2”

NOTE:

- Install the clutch damper spring seat with the white paint mark and the sharp edge “a” facing outward.
- Install the clutch damper spring as shown in the illustration.



6. Lubricate:
 - Friction plates
 - Clutch plates
 (with the recommended lubricant)



Recommended lubricant
Engine oil

7. Install:
 - Friction plates
 - Clutch plates

NOTE:

First, install a friction plate and then alternate between a clutch plate and a friction plate.

8. Install:
 - Clutch spring bolts



Clutch spring bolt
8 Nm (0.8 m·kg, 5.8 ft·lb)

NOTE:

Tighten the clutch spring bolts in stages and in a crisscross pattern.

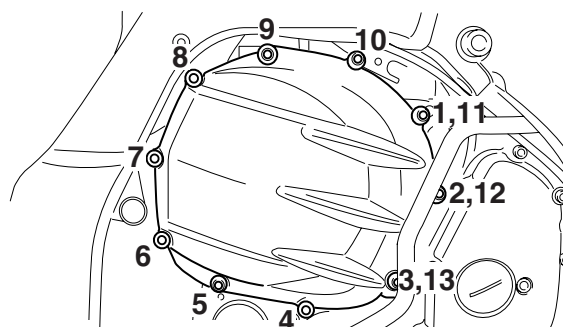
9. Install:
 - Rear balancer weight
 Refer to “BALANCERS” on page 5-103.
10. Install:
 - Clutch cover



Clutch cover bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)

NOTE:

Tighten the clutch cover bolts in the proper tightening sequence as shown.



EAS25280

DISASSEMBLING THE CLUTCH MASTER CYLINDER

ECA13840

CAUTION:

- Clutch components rarely require disassembly.
- Therefore, always follow these preventive measures:
- Never disassemble clutch components unless absolutely necessary.

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

NOTE:

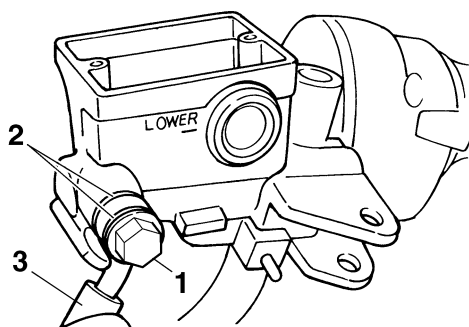
Before disassembling the clutch master cylinder, drain the clutch fluid from the entire clutch system.

1. Remove:

- Clutch hose union bolt "1"
- Copper washers "2"
- Clutch hose "3"

NOTE:

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



EAS25290

CHECKING THE CLUTCH MASTER CYLINDER

| Recommended clutch component replacement schedule | |
|---|---|
| Piston seal | Every two years |
| Clutch hose | Every four years |
| Clutch fluid | Every two years and whenever the clutch is disassembled |

1. Check:

- Clutch master cylinder body
Cracks/damage → Replace the clutch master cylinder.
- Clutch fluid delivery passage (clutch master cylinder body)
Obstruction → Blow out with compressed air.

2. Check:

- Clutch master cylinder
- Clutch master cylinder kit
Rust/scratches/wear → Replace the clutch master cylinder and clutch master cylinder kit as a set.

3. Check:

- Clutch master cylinder reservoir
Cracks/damage → Replace.
- Clutch master cylinder reservoir diaphragm
Damage/wear → Replace.

4. Check:

- Clutch hose
Cracks/damage/wear → Replace.

EAS25300

ASSEMBLING THE CLUTCH MASTER CYLINDER

EW3P61015



WARNING

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



**Recommended fluid
DOT 4**

EAS25310

INSTALLING THE CLUTCH MASTER CYLINDER

1. Install:

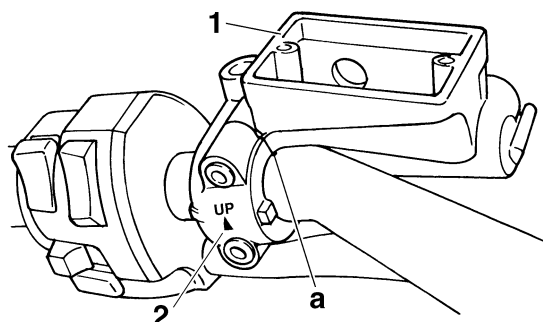
- Clutch master cylinder "1"
- Clutch master cylinder holder "2"

EW3P61016



WARNING

- Install the clutch lever holder with the "UP" mark facing up.
- Align the end of the clutch lever holder with the punch mark "a" on the left handlebar.
- First, tighten the upper bolt, then the lower bolt.



2. Install:

- Copper washers "1" **New**
- Clutch hose "2"
- Clutch hose union bolt "3"



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

EW3P61017



WARNING

Proper clutch hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-45.

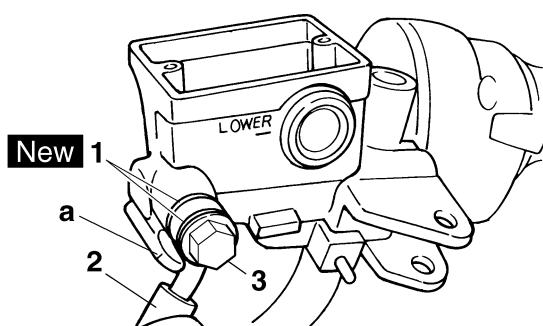
EC3P61034

CAUTION:

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

NOTE:

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



3. Fill:

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



Recommended fluid
DOT 4

EWA13370



WARNING

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

ECA13420

CAUTION:

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

NOTE:

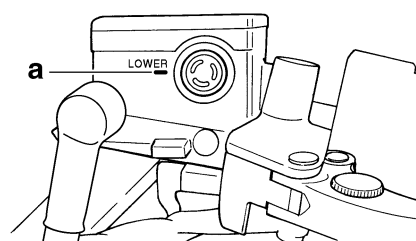
In order to ensure a correct reading of the clutch fluid level, make sure the top of the reservoir is horizontal.

4. Bleed:

- Clutch system
Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15.

5. Check:

- Clutch fluid level
Below the minimum level mark "a" → Add the recommended clutch fluid to the proper level. Refer to "CHECKING THE CLUTCH FLUID LEVEL" on page 3-15.



6. Check:

- Clutch lever operation
Soft or spongy feeling → Bleed the clutch system.
Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" on page 3-15.

ET3P61024

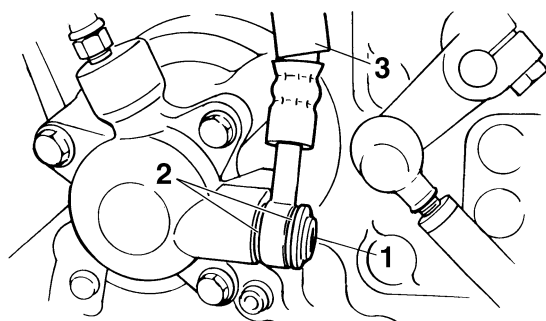
REMOVING THE CLUTCH RELEASE CYLINDER

1. Remove:

- Clutch hose union bolt "1"
- Copper washers "2"
- Clutch hose "3"

NOTE:

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



EAS25330

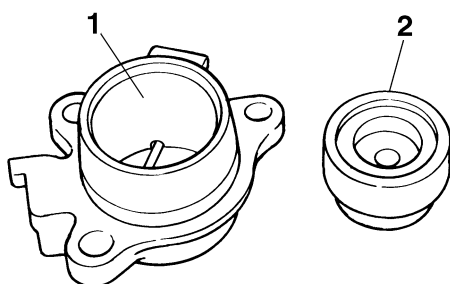
CHECKING THE CLUTCH RELEASE CYLINDER

1. Check:

- Clutch release cylinder body
Cracks/damage → Replace the clutch release cylinder.

2. Check:

- Clutch release cylinder "1"
- Clutch release cylinder piston "2"
Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.



EAS25340

ASSEMBLING THE CLUTCH RELEASE CYLINDER

EW3P61018

WARNING

- Before installation, all internal clutch components must be cleaned and lubricated with clean or new clutch fluid.

- Never use solvents on internal clutch components as they will cause the piston seal to swell and distort.
- Whenever a clutch release cylinder is disassembled, replace the piston seal.



Recommended fluid
DOT 4

EAS25350

INSTALLING THE CLUTCH RELEASE CYLINDER

1. Check:

- Copper washers "1" **New**
- Clutch hose "2"
- Clutch hose union bolt "3"



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

EW3P61017

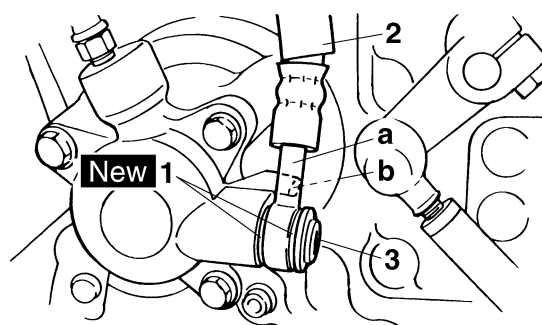
WARNING

Proper clutch hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-45.

EC3P61035

CAUTION:

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



2. Fill:

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



Recommended fluid
DOT 4

EWA13370

⚠ WARNING

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

ECA13420

CAUTION:

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

NOTE:

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

3. Bleed:

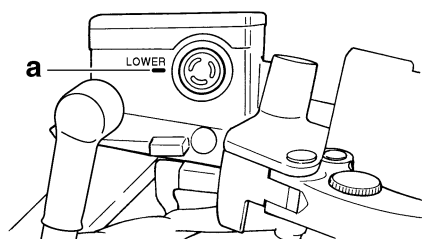
- Clutch system

Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-15.

4. Check:

- Clutch fluid level

Below the minimum level mark “a” → Add the recommended clutch fluid to the proper level.
Refer to “CHECKING THE CLUTCH FLUID LEVEL” on page 3-15.



5. Check:

- Clutch lever operation

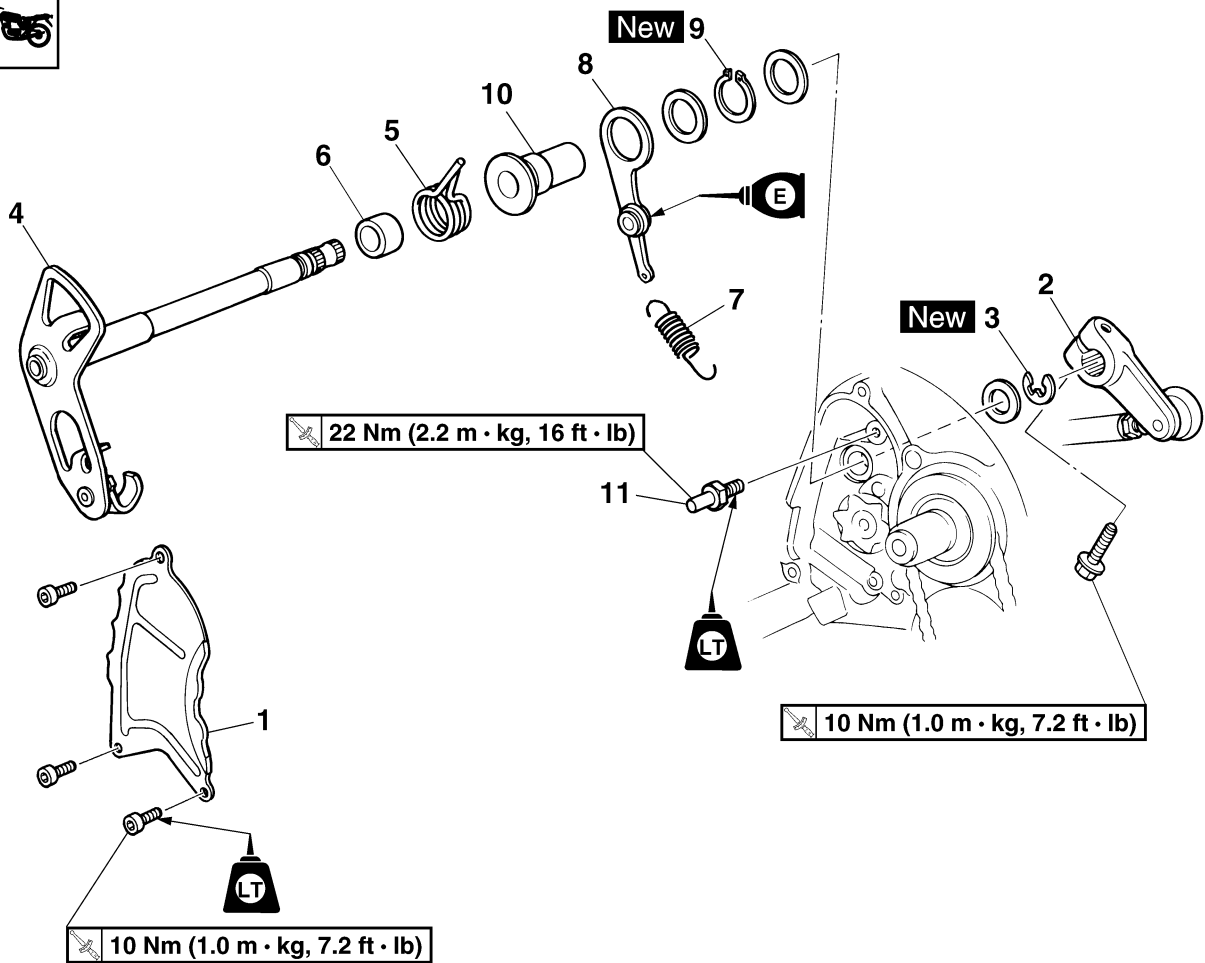
Soft or spongy feeling → Bleed the clutch system.

Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-15.

EAS25410

SHIFT SHAFT

Removing the shift shaft and stopper lever



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| | Clutch housing | | Refer to "CLUTCH" on page 5-41. |
| 1 | Oil baffle plate 1 | 1 | |
| 2 | Shift arm | 1 | |
| 3 | Circlip | 1 | |
| 4 | Shift shaft | 1 | |
| 5 | Shift shaft spring | 1 | |
| 6 | Spacer | 1 | |
| 7 | Stopper lever spring | 1 | |
| 8 | Stopper lever | 1 | |
| 9 | Circlip | 1 | |
| 10 | Collar | 1 | |
| 11 | Shift shaft spring stopper | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS25420

CHECKING THE SHIFT SHAFT

1. Check:
 - Shift shaft
Bends/damage/wear → Replace.
 - Shift shaft spring
Damage/wear → Replace.

EAS25430

CHECKING THE STOPPER LEVER

1. Check:
 - Stopper lever
Bends/damage → Replace.
Roller turns roughly → Replace the stopper lever.
 - Shift lever spring
Damage/wear → Replace.

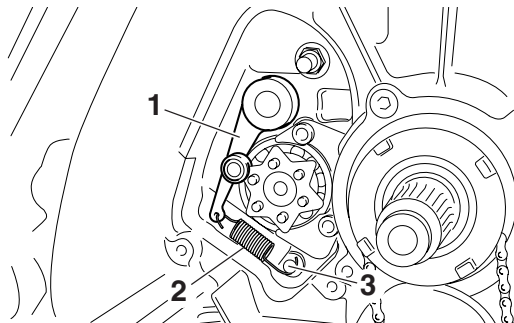
EAS25450

INSTALLING THE SHIFT SHAFT

1. Install:
 - Stopper lever “1”
 - Stopper lever spring “2”

NOTE:

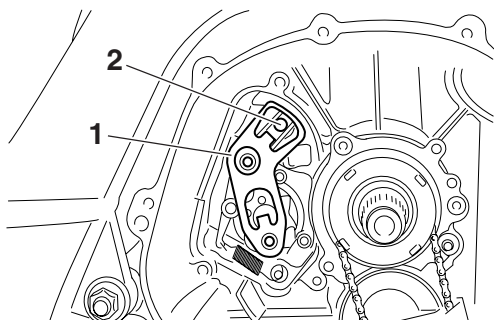
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss “3”.
- Mesh the stopper lever with the shift drum segment assembly.



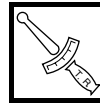
2. Install:
 - Shift shaft “1”

NOTE:

Hook the end of the shift shaft spring onto the shift shaft spring stopper “2”.



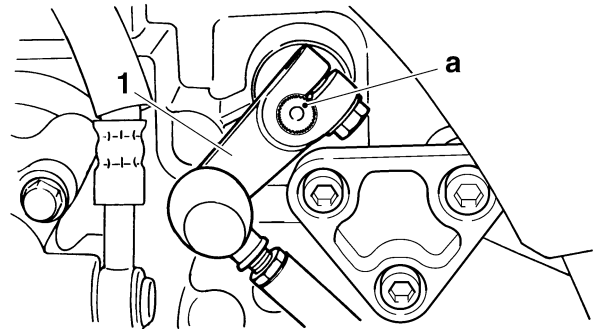
3. Install:
 - Shift arm “1”



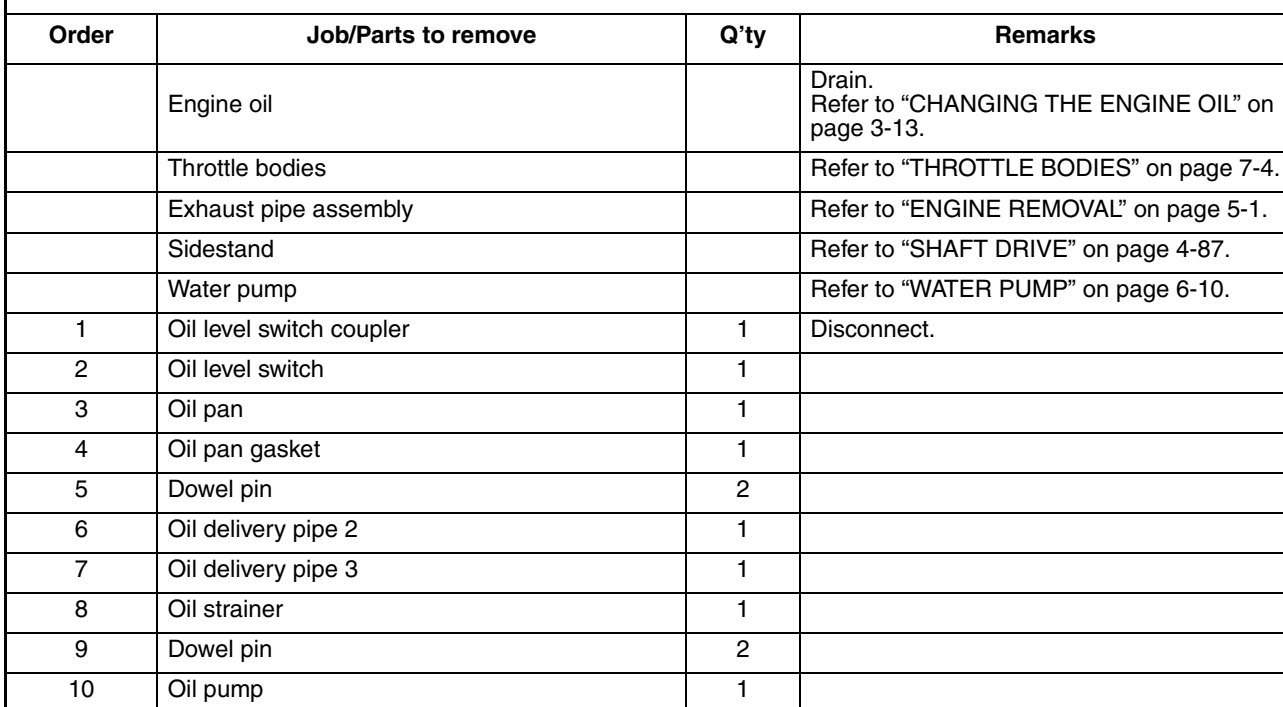
Shift arm bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

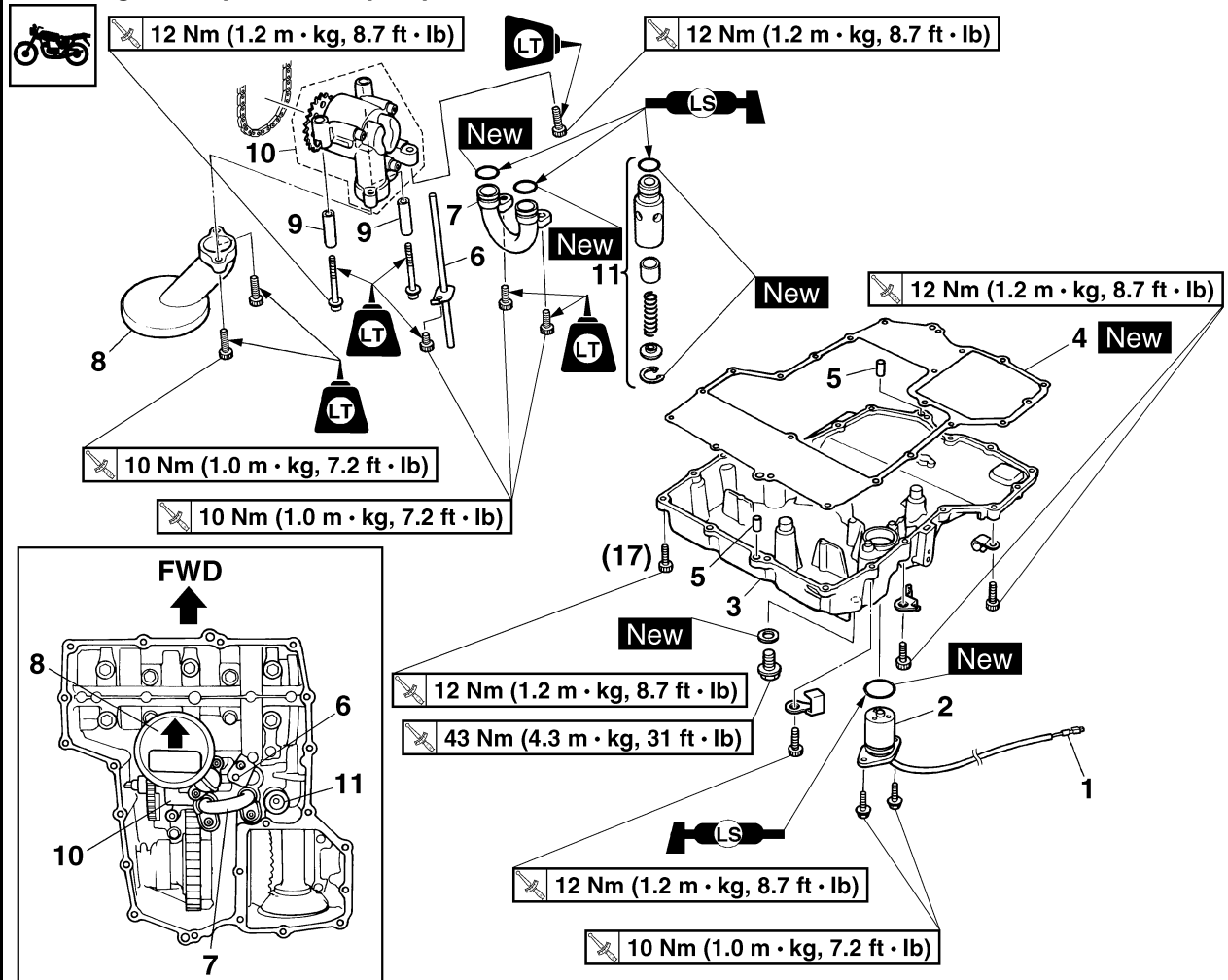
Align the punch mark “a” in the shift shaft with the slot in the shift arm.



Removing the oil pan and oil pump

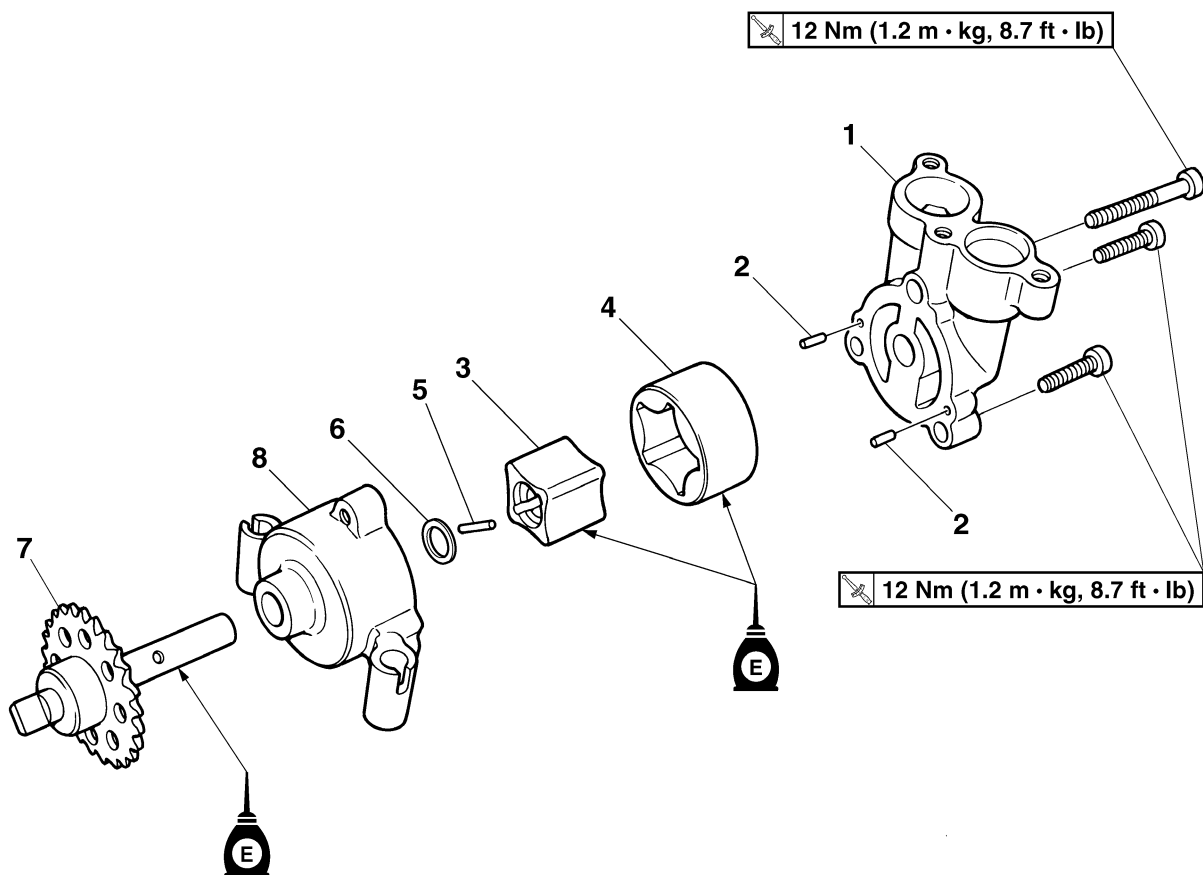


Removing the oil pan and oil pump



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------|------|--|
| 11 | Relief valve assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the oil pump



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------|------|--|
| 1 | Oil pump housing cover | 1 | |
| 2 | Pin | 2 | |
| 3 | Oil pump inner rotor | 1 | |
| 4 | Oil pump outer rotor | 1 | |
| 5 | Pin | 1 | |
| 6 | Washer | 1 | |
| 7 | Oil pump driven sprocket | 1 | |
| 8 | Oil pump housing | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS24960

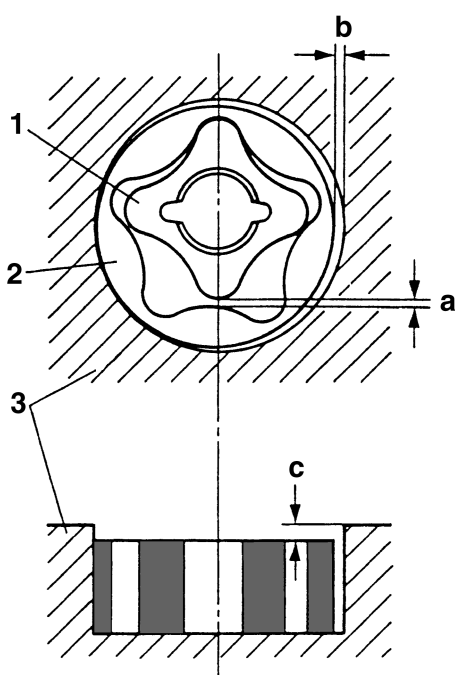
CHECKING THE OIL PUMP

1. Check:

- Oil pump driven sprocket
 - Oil pump housing
 - Oil pump housing cover
- Cracks/damage/wear → Replace the defective part(s).

2. Measure:

- Inner-rotor-to-outer-rotor-tip clearance "a"
 - Outer-rotor-to-oil-pump-housing clearance "b"
 - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance "c"
- Out of specification → Replace the oil pump.



1. Inner rotor
2. Outer rotor
3. Oil pump housing



Inner-rotor-to-outer-rotor-tip clearance

Less than 0.12 mm (0.0047 in)

Limit

0.20 mm (0.0079 in)

Outer-rotor-to-oil-pump-housing clearance

0.09–0.15 mm (0.0035–0.0059 in)

Limit

0.22 mm (0.0087 in)

Oil-pump-housing-to-inner-and-outer-rotor clearance

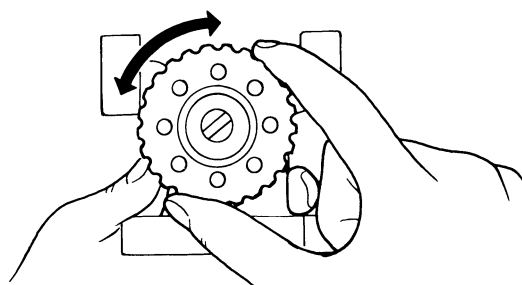
0.03–0.08 mm (0.0012–0.0032 in)

Limit

0.15 mm (0.0059 in)

3. Check:

- Oil pump operation
- Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



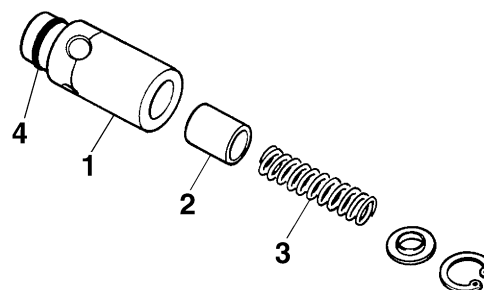
EAS24970

CHECKING THE RELIEF VALVE

1. Check:

- Relief valve body "1"
- Relief valve "2"
- Spring "3"
- O-ring "4"

Damage/wear → Replace the defective part(s).



EAS24980

CHECKING THE OIL DELIVERY PIPES

The following procedure applies to all of the oil delivery pipes.

1. Check:
 - Oil delivery pipes
Damage → Replace.
Obstruction → Wash and blow out with compressed air.

EAS24990

CHECKING THE OIL STRAINER

1. Check:
 - Oil strainer
Damage → Replace.
Contaminants → Clean with solvent.

EAS25010

ASSEMBLING THE OIL PUMP

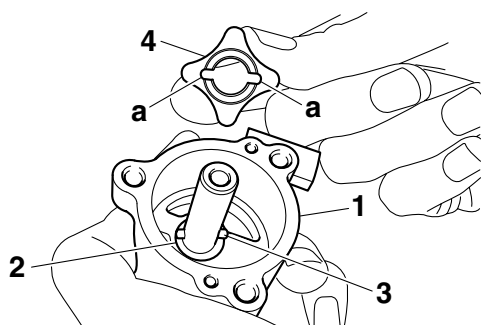
1. Lubricate:
 - Inner rotor
 - Outer rotor
 - Oil pump shaft
(with the recommended lubricant)

| | |
|---|---|
|  | Recommended lubricant Engine oil |
|---|---|

2. Install:
 - Oil pump driven sprocket
 - Oil pump housing “1”
 - Washer “2”
 - Pin “3”
 - Oil pump inner rotor “4”
 - Oil pump outer rotor

NOTE: _____

When installing the inner rotor, align the pin “3” in the oil pump shaft with the groove “a” in the inner rotor “4”.



3. Check:
 - Oil pump operation
Refer to “CHECKING THE OIL PUMP” on page 5-61.

EAS25050

INSTALLING THE OIL PAN

1. Install:
 - Oil pan gasket **New**

- Oil pan



Oil pan bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)

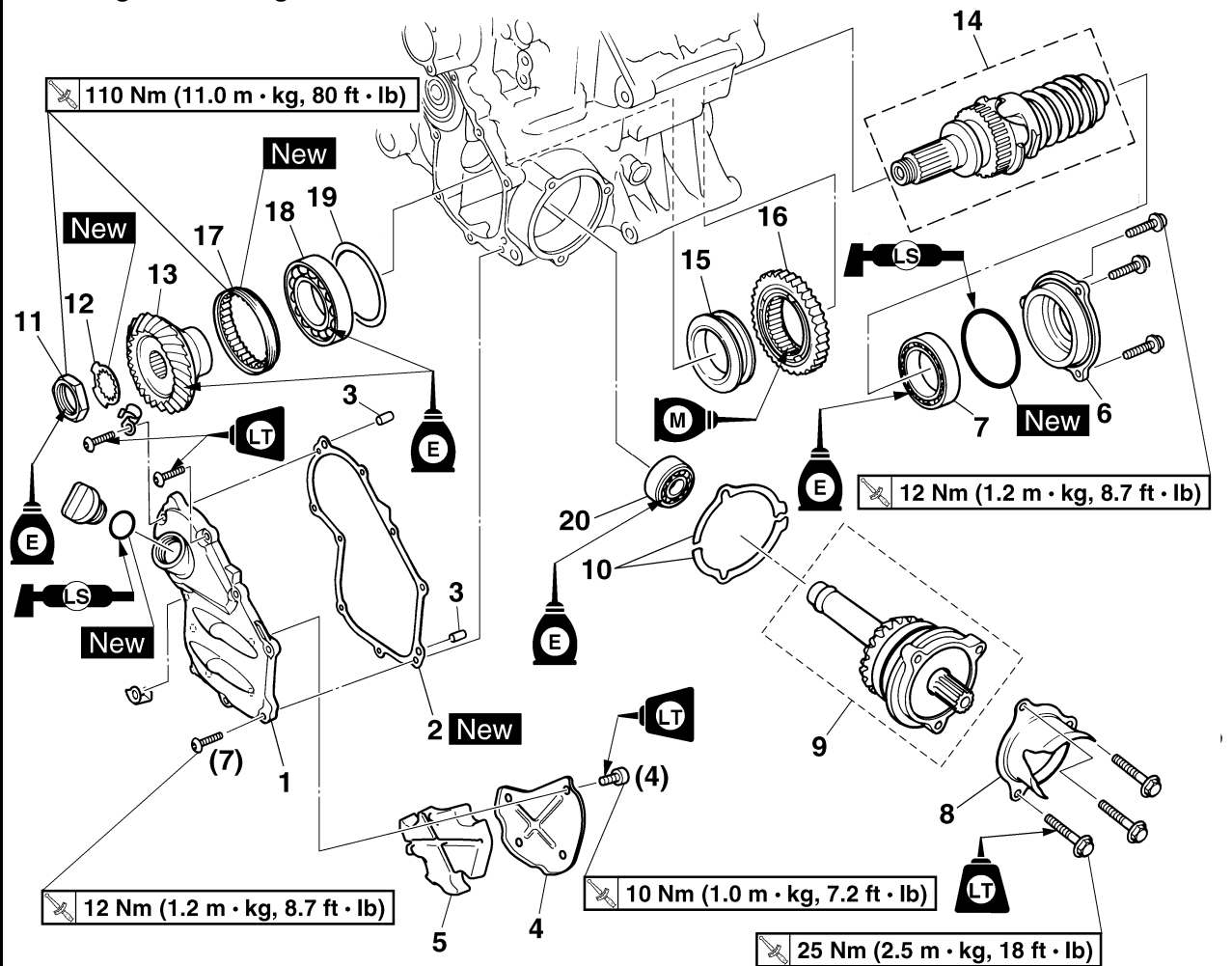
NOTE: _____

Tighten the oil pan bolts in stages and in a criss-cross pattern.

EAS25710

MIDDLE GEAR

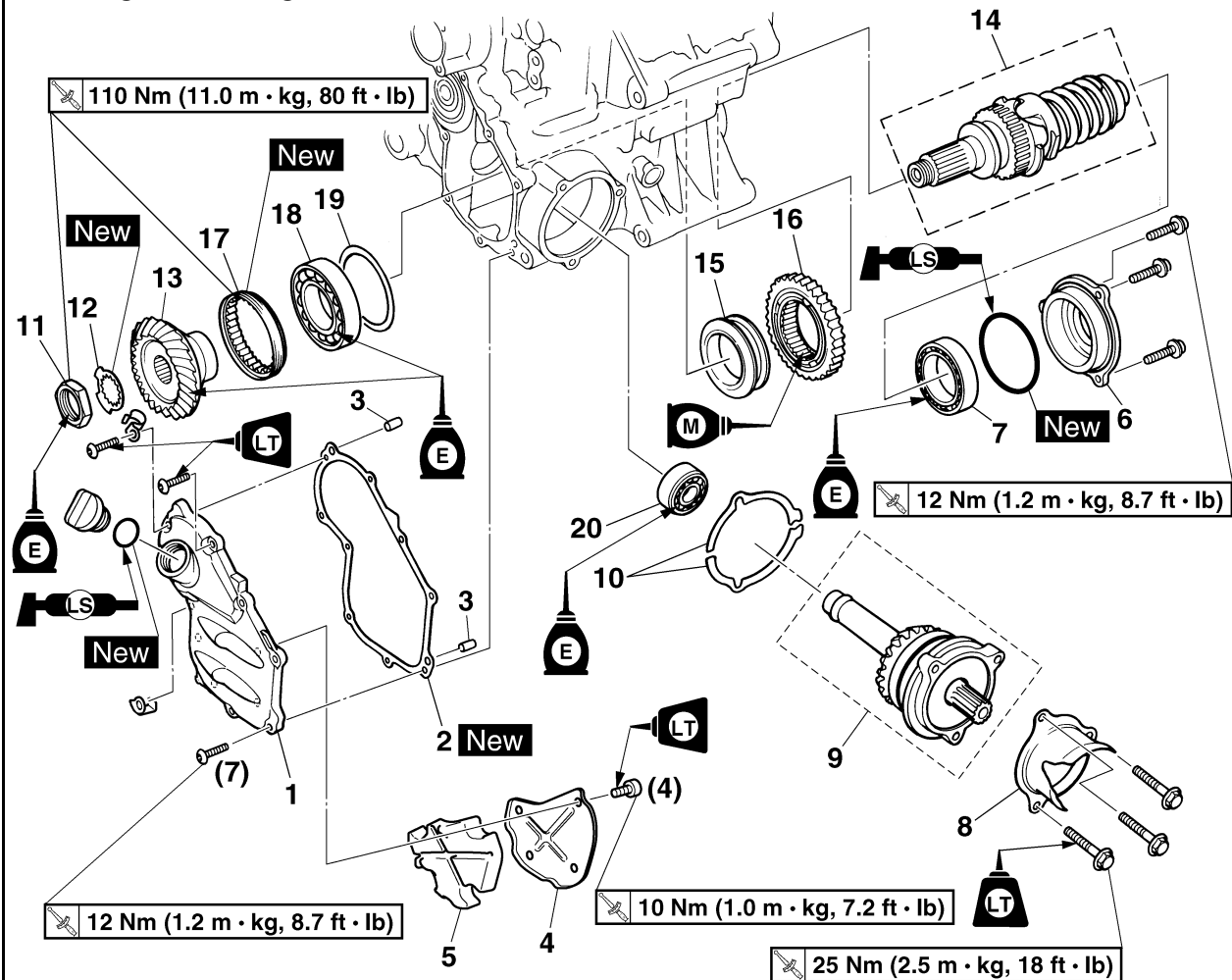
Removing the middle gear



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| | Engine | | Refer to "ENGINE REMOVAL" on page 5-1. |
| | Oil pan/Oil pump | | Refer to "OIL PUMP" on page 5-58. |
| 1 | Middle gear case cover | 1 | |
| 2 | Middle gear case cover gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Damper cover | 1 | |
| 5 | Damper | 1 | |
| 6 | Middle drive shaft bearing housing | 1 | |
| 7 | Bearing | 1 | |
| 8 | Middle driven shaft end cover | 1 | |
| 9 | Middle driven shaft assembly | 1 | |
| 10 | Middle driven pinion gear shim | | |
| 11 | Middle drive pinion gear nut | 1 | |
| 12 | Lock washer | 1 | |
| 13 | Middle drive pinion gear | 1 | |
| 14 | Middle drive shaft assembly | 1 | |

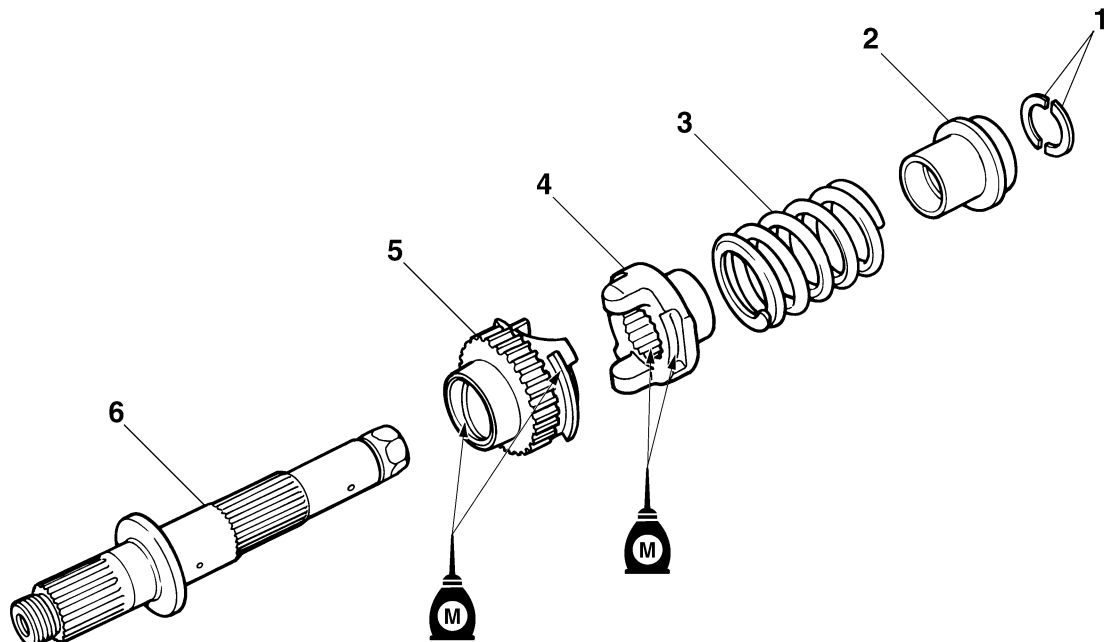
MIDDLE GEAR

Removing the middle gear



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------------|------|--|
| 15 | Spacer | 1 | |
| 16 | Middle driven gear | 1 | |
| 17 | Bearing retainer | 1 | |
| 18 | Bearing | 1 | |
| 19 | Middle drive pinion gear shim | | |
| 20 | Bearing | 1 | |
| | | | For installation, reverse the removal procedure. |

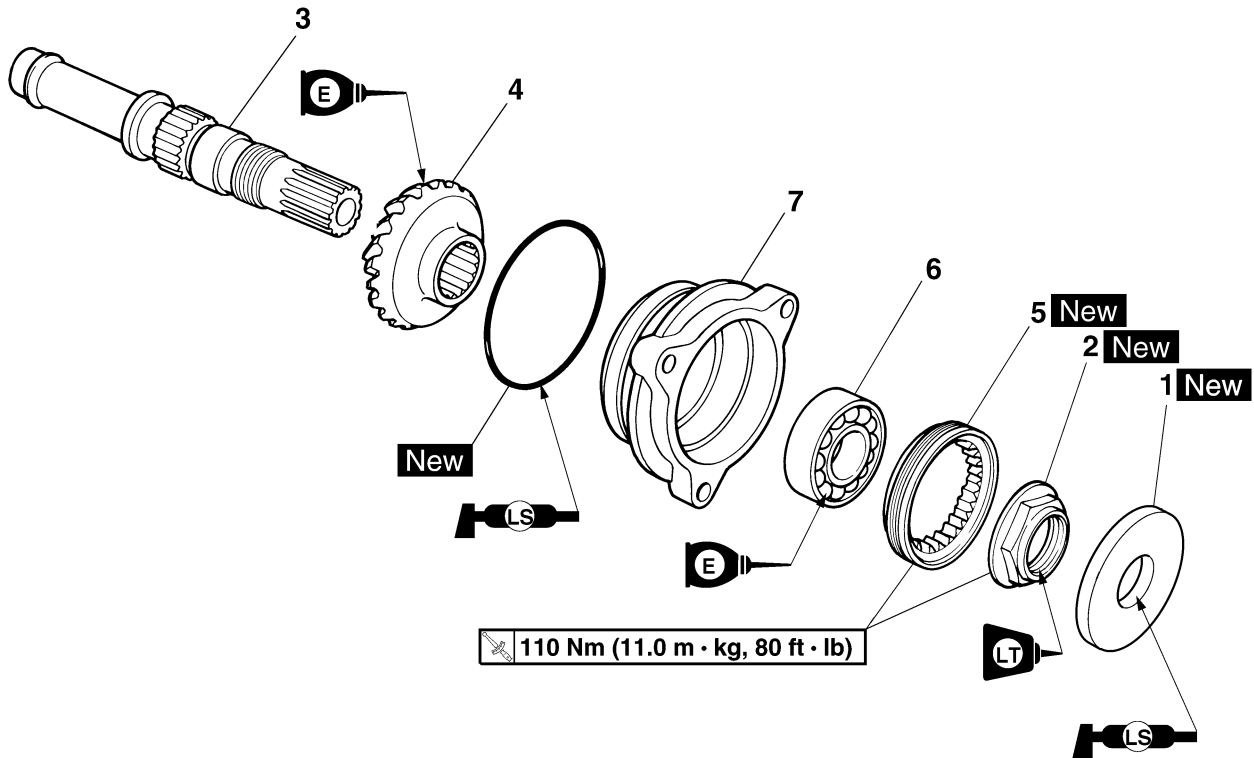
Disassembling the middle drive shaft assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 1 | Spring retainer | 2 | |
| 2 | Spring seat | 1 | |
| 3 | Damper spring | 1 | |
| 4 | Damper driven cam | 1 | |
| 5 | Damper drive cam | 1 | |
| 6 | Middle drive shaft | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

MIDDLE GEAR

Disassembling the middle driven shaft assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------------------|------|--|
| 1 | Oil seal | 1 | |
| 2 | Middle driven pinion gear nut | 1 | |
| 3 | Middle driven shaft | 1 | |
| 4 | Middle driven pinion gear | 1 | |
| 5 | Bearing retainer | 1 | |
| 6 | Bearing | 1 | |
| 7 | Middle driven shaft bearing housing | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS25730

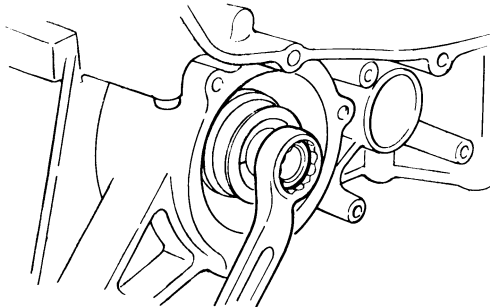
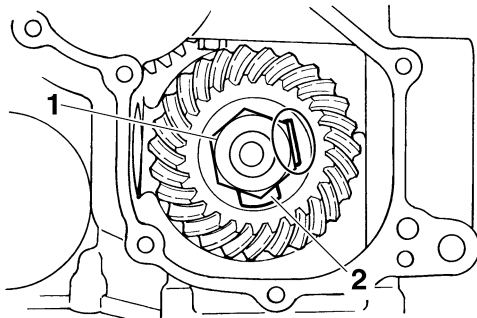
REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Remove:
 - Middle drive pinion gear nut "1"
 - Lock washer "2"

- a. Straighten the lock washer tab.
- b. Loosen the middle drive pinion gear nut.

NOTE:

While holding the middle drive shaft.



- c. Remove the middle drive pinion gear nut and lock washer.

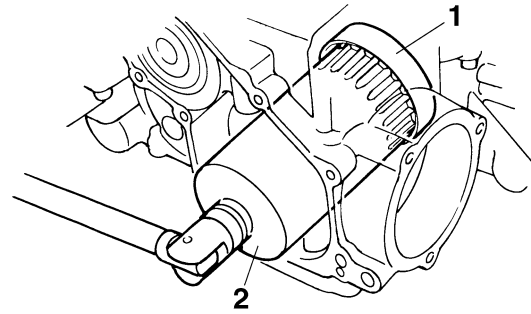
2. Remove:
 - Bearing retainer "1"

- a. Straighten the thread on the bearing retainer.
- b. Attach the bearing retainer wrench "2".



Bearing retainer wrench
90890-04137
Middle drive shaft bearing retainer wrench
YM-04137

- c. Loosen the bearing retainer.



- d. Remove the bearing retainer.

EAS25750

DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

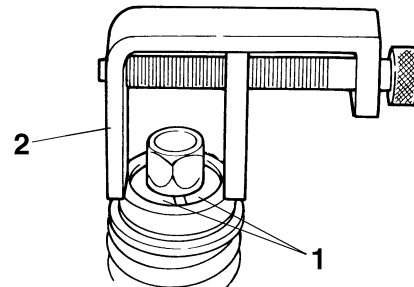
1. Remove:
 - Spring retainers "1"

NOTE:

While compressing the spring with the damper spring compressor "2", remove the spring retainers.



Damper spring compressor
90890-04090



EAS25770

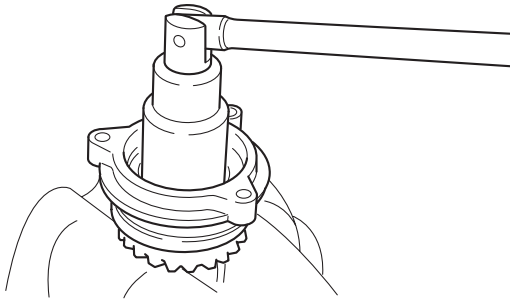
DISASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

1. Remove:
 - Middle driven pinion gear nut

- a. Straighten the thread on the middle driven pinion gear nut.
- b. Loosen the middle driven pinion gear nut.

NOTE:

Secure the middle driven shaft in a vise, making sure to tighten the vise jaws onto the flat sections of the shaft.



c. Remove the middle driven pinion gear nut.



2. Remove:
- Bearing retainer

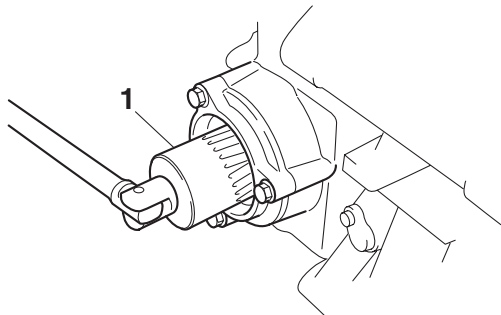


- a. Temporarily install the middle driven shaft bearing housing onto the lower crankcase.
b. Straighten the thread on the bearing retainer.
c. Attach the bearing retainer wrench "1".



Bearing retainer wrench
90890-04140
Middle drive shaft bearing retain-
er wrench
YM-04140

d. Loosen the bearing retainer.



e. Remove the bearing retainer.



EAS25780

CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Check:
 - Middle drive pinion gear
Galling/pitting/wear → Replace.
2. Check:
 - Damper drive cam surface
 - Damper driven cam surface
Scratches/wear → Replace.
3. Check:
 - Damper spring
Cracks/damage → Replace.

4. Check:
 - Bearings
Damage/pitting → Replace.

EAS25790

CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY

1. Check:
 - Middle driven pinion gear
Galling/pitting/wear → Replace.
2. Check:
 - Bearings
Damage/pitting → Replace.

EAS25800

ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

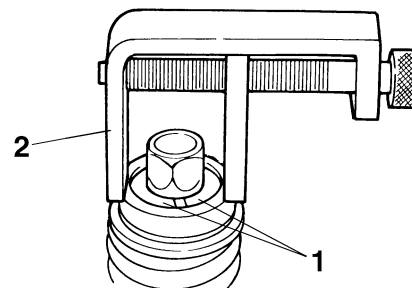
1. Install:
 - Spring retainers "1"

NOTE:

While compressing the spring with the damper spring compressor "2", install the spring retainers.



Damper spring compressor
90890-04090



EAS25820

ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

1. Tighten:
 - Bearing retainer **New**



- a. Temporarily install the middle driven shaft bearing housing onto the lower crankcase.
b. Attach the bearing retainer wrench "1".

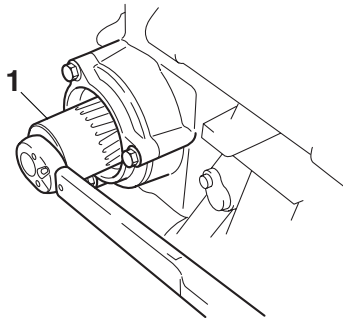


Bearing retainer wrench
90890-04140
Middle drive shaft bearing retain-
er wrench
YM-04140

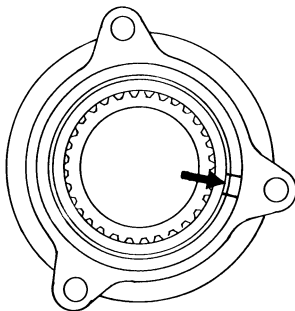
c. Tighten the bearing retainer to specification.



Bearing retainer
110 Nm (11.0 m·kg, 80 ft·lb)



d. Lock the threads with a drift punch.



2. Tighten:

- Middle driven pinion gear nut **New**

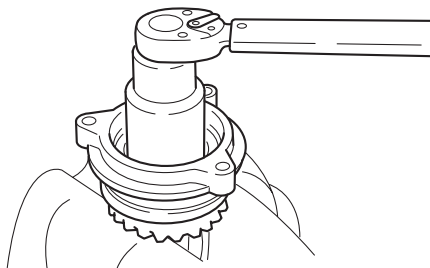
a. Tighten the middle driven pinion gear nut to specification.



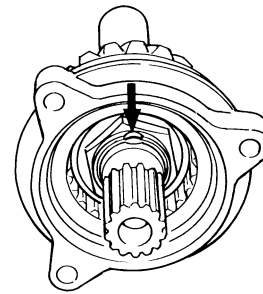
Middle driven pinion gear nut
110 Nm (11.0 m·kg, 80 ft·lb)
LOCTITE®

NOTE:

Secure the middle driven shaft in a vise, making sure to tighten the vise jaws onto the flat sections of the shaft.



b. Lock the threads with a drift punch.



EAS25860

INSTALLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Tighten:

- Bearing retainer "1" **New**

a. Attach the bearing retainer wrench "2".

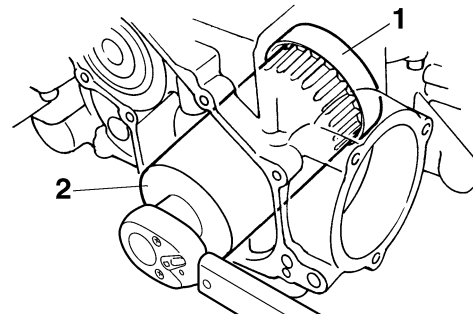


Bearing retainer wrench
90890-04137
Middle drive shaft bearing retainer wrench
YM-04137

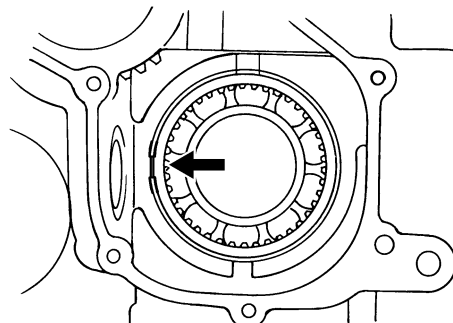
b. Tighten the bearing retainer to specification.



Bearing retainer
110 Nm (11.0 m·kg, 80 ft·lb)



c. Lock the threads with a drift punch.



2. Install:

- Lock washer "1" **New**
- Middle drive pinion gear nut "2"

EAS25880

MEASURING THE MIDDLE GEAR BACKLASH

1. Measure:
 - Middle gear backlash
 Out of specification → Refer to “ADJUSTING THE MIDDLE GEAR BACKLASH” on page 5-71.

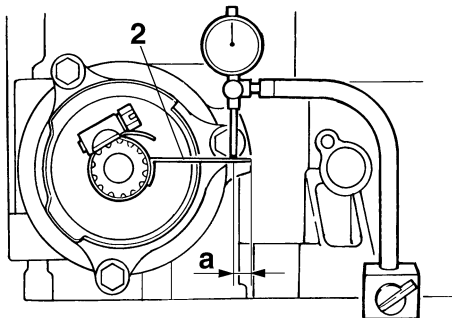
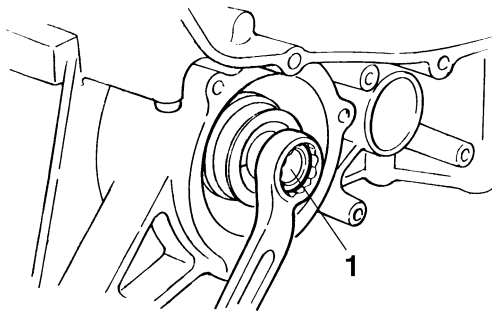


Middle gear backlash
0.10–0.20 mm (0.0039–0.0079 in)

- a. Hold the middle drive shaft “1”.
- b. Install the gear lash measurement tool “2” as shown.
- c. Make sure the dial gauge plunger contacts the measuring point “a” on the gear lash measurement tool as shown.



Gear lash measurement tool
90890-01467
YM-01467



a. 14 mm (0.55 in)

- d. While gently turning the middle driven shaft back and forth, measure the middle gear backlash.

NOTE:

Measure the middle gear backlash at four positions. Rotate the middle driven shaft 90° each time and observe the reading on the dial gauge.

EAS25900

ADJUSTING THE MIDDLE GEAR BACKLASH

1. Loosen:
 - Middle driven shaft bearing housing bolts
2. Remove:
 - Middle driven pinion gear shim(s)
3. Tighten:
 - Middle driven shaft bearing housing bolts



Middle driven shaft bearing housing bolt
25 Nm (2.5 m·kg, 18 ft·lb)

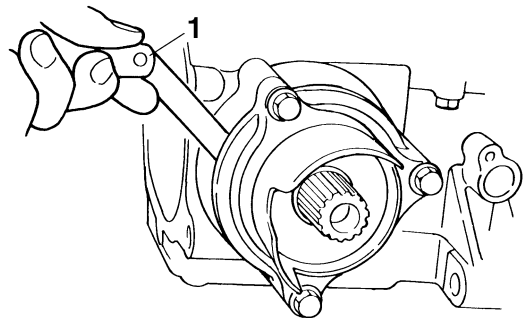
ECA14050

CAUTION:

Do not overtighten the middle driven shaft bearing housing bolts or you may obtain too little middle gear backlash and damage the middle gears. If the bolts are overtightened, loosen them until the crankcase-to-middle-driven-shaft-bearing-housing clearance is within specification, as stated below. Then, repeat all of the previous steps.

NOTE:

- Tighten the middle driven shaft bearing housing bolts carefully, one thread turn at a time only. Push in the middle driven shaft bearing housing and then tighten the bolts to specification.
- After tightening the middle driven shaft bearing housing bolts, loosen them until the clearance between the crankcase and the housing is approximately 2 mm (0.08 in), when measured with a thickness gauge “1”.



4. Hold the middle drive shaft.
5. Turn:
 - Middle driven shaft

NOTE:

While carefully tightening the middle driven shaft bearing housing bolts in stages and in a criss-cross pattern, turn the middle driven shaft back and forth until the dial gauge reads 0.10–0.20 mm (0.0039–0.0079 in).

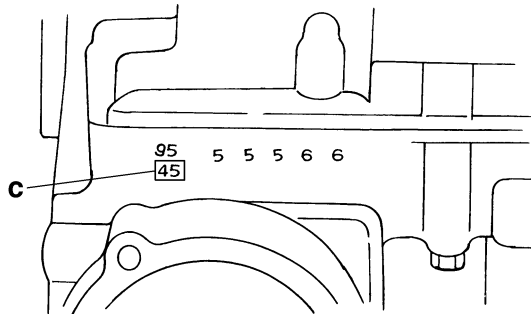
Middle drive pinion gear shim thickness

$$A = c - a - b$$

"a" = 65.00

"b" = 18.94

"c" = a numeral on the lower crankcase, to be divided by 100 and added to "84"



Example:

"a" is 65.00

"b" is 18.94

If the lower crankcase is marked "45"

"c" is 84.45 (i.e., $84.00 + 0.45 = 84.45$)

"A" = $84.45 - 65.00 - 18.94 = 0.51$

Round off to the hundredths digit and select the appropriate shim(s).

NOTE:

In the above example, the calculated number is 0.51. The chart instructs you to round off the 1 to 0. Thus, the shim thickness is 0.50 mm.

| Hundredth | Rounded value |
|---------------|---------------|
| 0, 1, 2 | 0 |
| 3, 4, 5, 6, 7 | 5 |
| 8, 9 | 10 |

Shims are supplied in the following thicknesses.



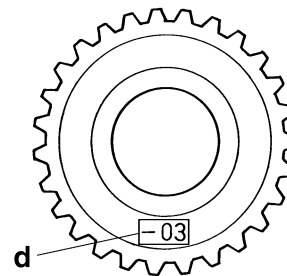
Middle drive pinion gear shim Thickness (mm)
0.15 0.30 0.50

c. To find middle driven pinion gear shim thickness "B", use the following formula.

Middle driven pinion gear shim thickness

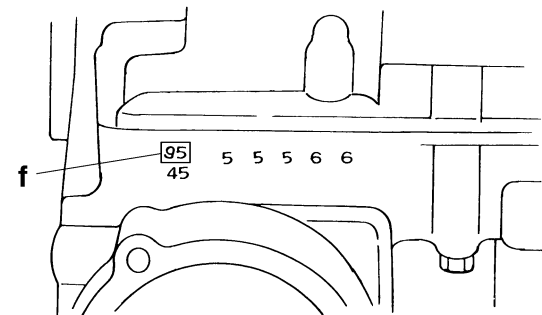
$$B = d + e - f$$

"d" = a numeral on the middle driven pinion gear, to be divided by 100 and either added to or subtracted from "84"



"e" = Measured value

"f" = a numeral on the lower crankcase, to be divided by 100 and added to "87".



Example:

If the middle driven pinion gear is marked "- 03"

"d" is 33.97 (i.e., $34.00 + (- 0.03) = 33.97$)

"e" is 54.49

If the lower crankcase is marked "95"

"f" is 87.95 (i.e., $87.00 + 0.95 = 87.95$)

"B" = $33.97 + 54.49 - 87.95 = 0.51$

Round off to the hundredths digit and select the appropriate shim(s).

NOTE:

In the above example, the calculated number is 0.51. The chart instructs you to round off the 1 to 0. Thus, the shim thickness is 0.50 mm.

| Hundredth | Rounded value |
|---------------|---------------|
| 0, 1, 2 | 0 |
| 3, 4, 5, 6, 7 | 5 |
| 8, 9 | 10 |

Shims are supplied in the following thicknesses.



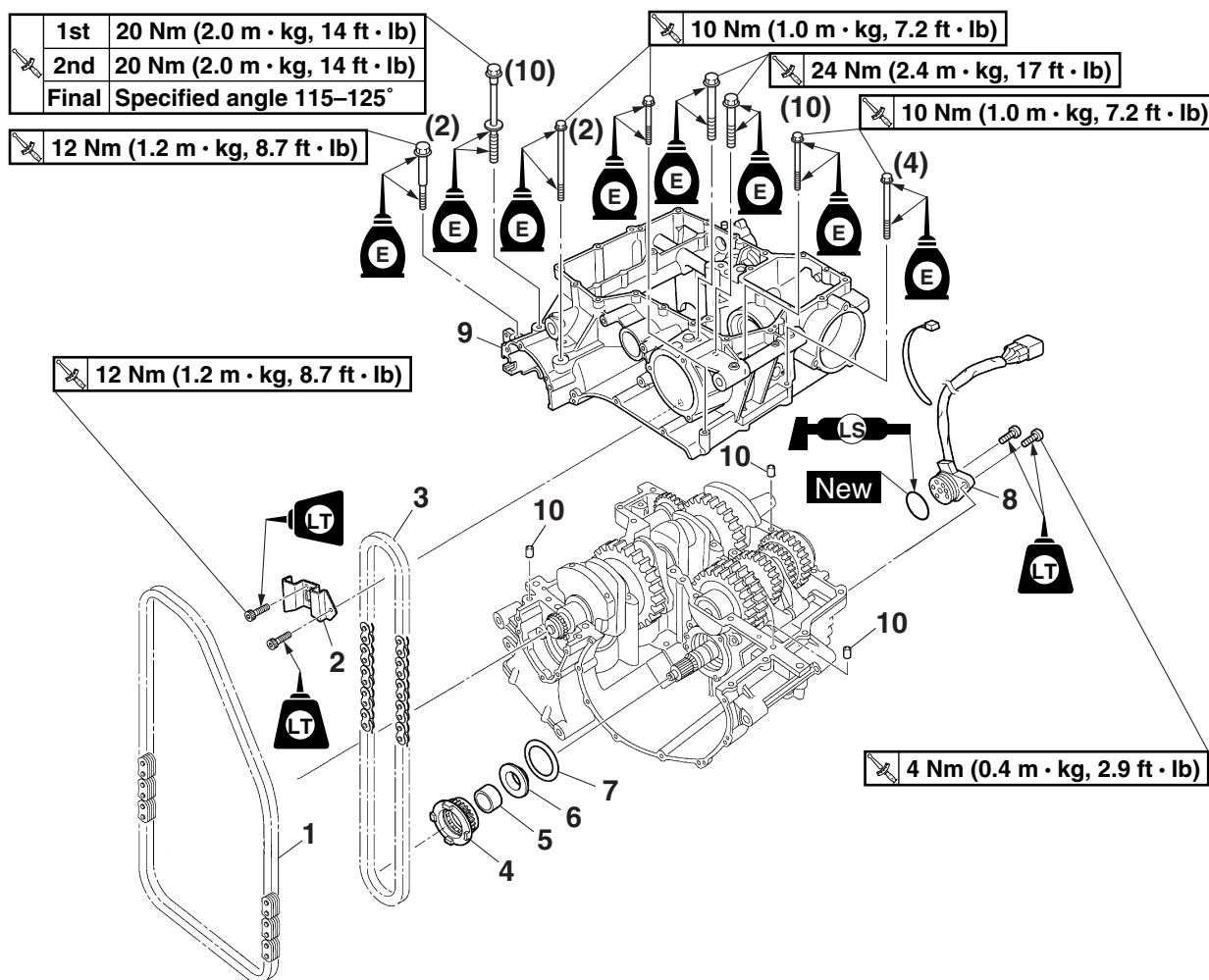
Middle driven pinion gear shim Thickness (mm)
0.10 0.15 0.20 0.30 0.40 0.50



EAS25540

CRANKCASE


Separating the crankcase


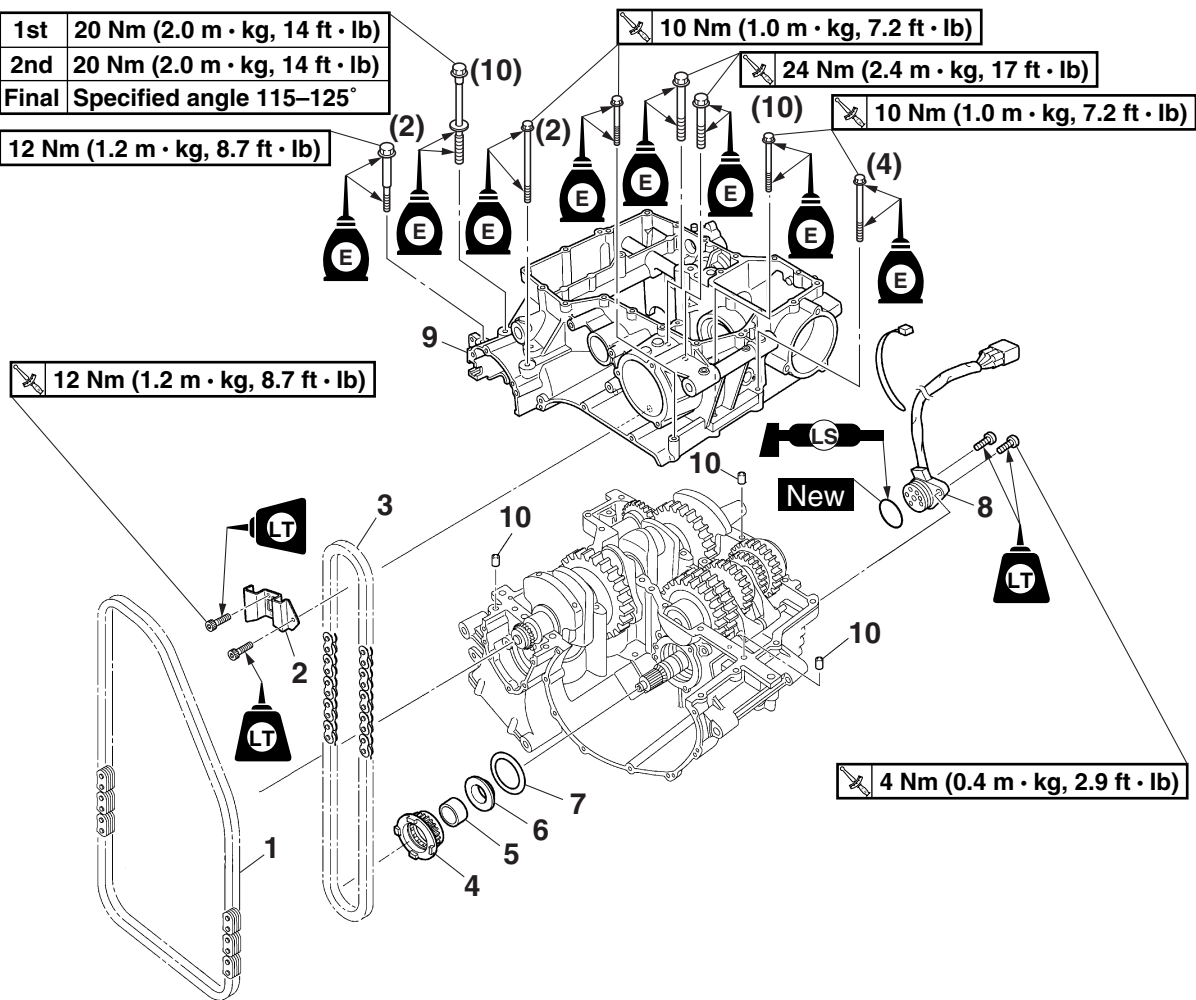


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------|------|---|
| | Engine | | Refer to "ENGINE REMOVAL" on page 5-1. |
| | Cylinder head | | Refer to "CYLINDER HEAD" on page 5-18. |
| | Starter clutch | | Refer to "GENERATOR AND STARTER CLUTCH" on page 5-28. |
| | Pickup rotor | | Refer to "PICKUP ROTOR" on page 5-34. |
| | Oil pump | | Refer to "OIL PUMP" on page 5-58. |
| | Middle drive shaft assembly | | Refer to "MIDDLE GEAR" on page 5-63. |
| | Clutch housing | | Refer to "CLUTCH" on page 5-41. |
| 1 | Timing chain | 1 | |
| 2 | Oil pump drive chain guide | 1 | |
| 3 | Oil pump drive chain | 1 | |
| 4 | Oil pump drive sprocket | 1 | |
| 5 | Spacer | 1 | |
| 6 | Collar | 1 | |
| 7 | Spring washer | 1 | |
| 8 | Gear position switch | 1 | |

CRANKCASE

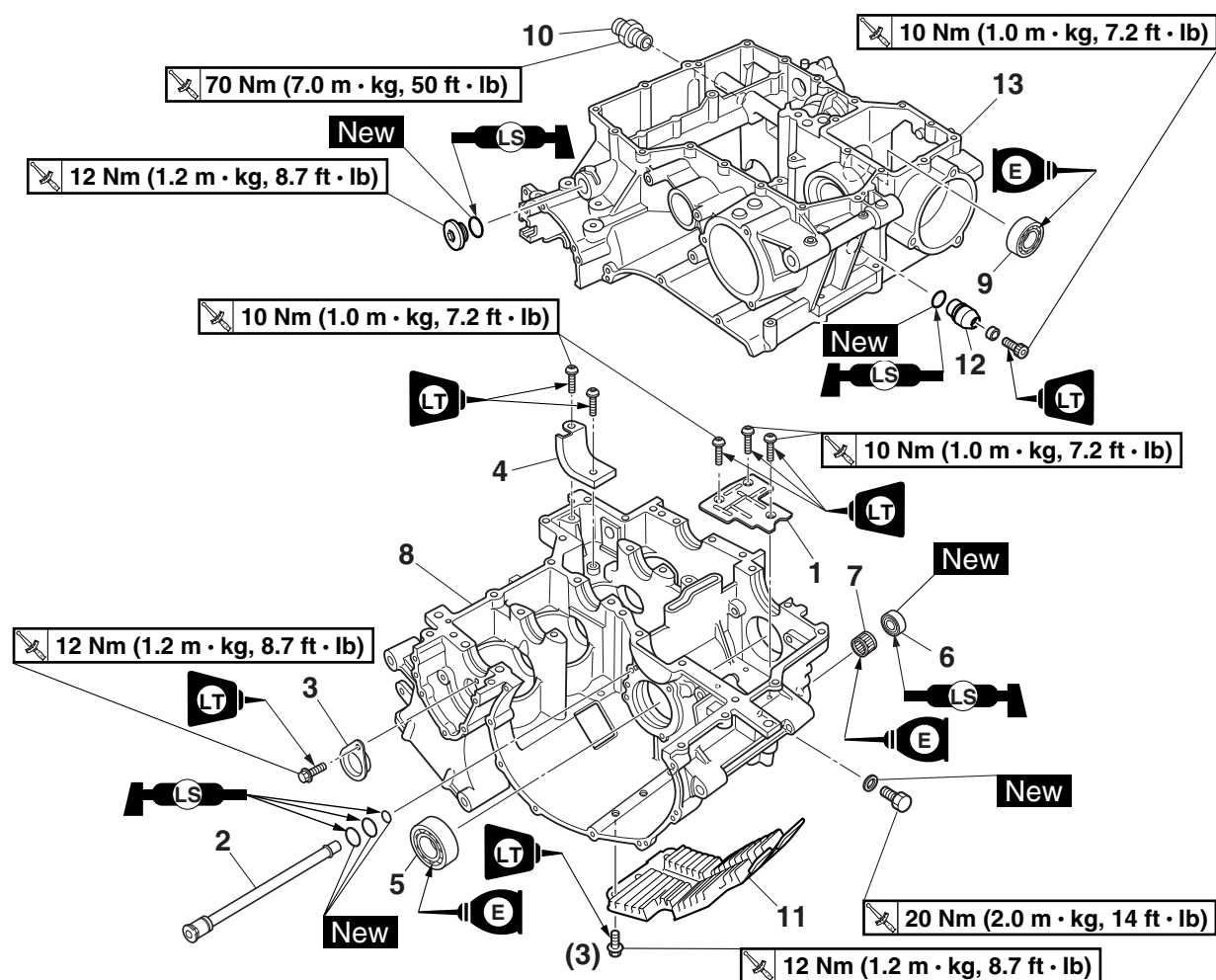
Separating the crankcase

| | | |
|---|--------------|---------------------------------------|
|  | 1st | 20 Nm (2.0 m · kg, 14 ft · lb) |
| | 2nd | 20 Nm (2.0 m · kg, 14 ft · lb) |
| | Final | Specified angle 115–125° |

 **12 Nm (1.2 m · kg, 8.7 ft · lb)**

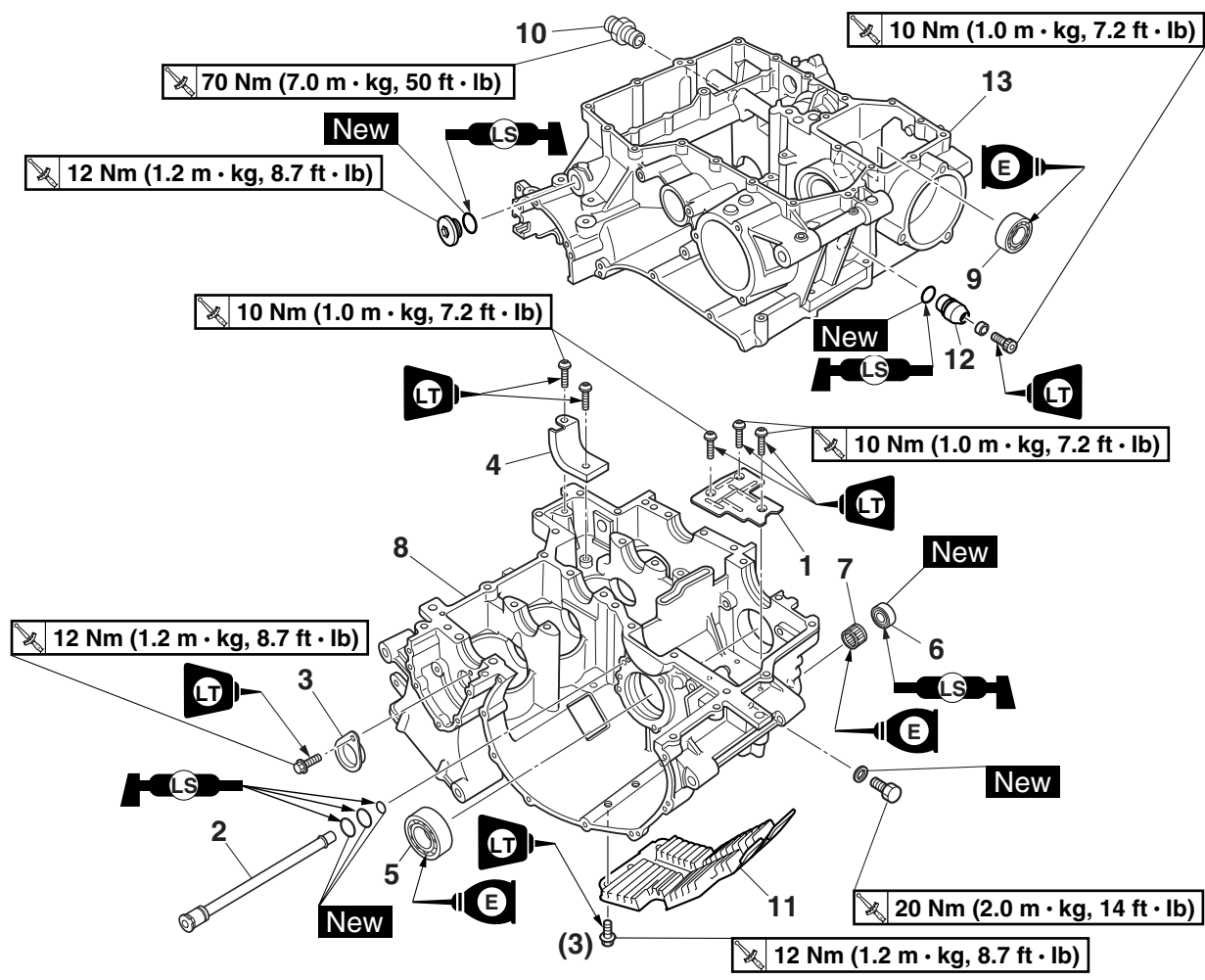
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 9 | Lower crankcase | 1 | |
| 10 | Dowel pin | 3 | |
| | | | For installation, reverse the removal procedure. |

Removing the oil baffle plate and bearings



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|--|
| | Connecting rod | | Refer to "CONNECTING RODS AND PISTONS" on page 5-82. |
| | Crankshaft/Crankshaft journal bearings | | Refer to "CRANKSHAFT" on page 5-90. |
| | Transmission | | Refer to "TRANSMISSION" on page 5-94. |
| 1 | Oil baffle plate 2 | 1 | |
| 2 | Oil delivery pipe 1 | 1 | |
| 3 | Plate | 1 | |
| 4 | Oil baffle plate 3 | 1 | |
| 5 | Bearing | 1 | |
| 6 | Oil seal | 1 | |
| 7 | Bearing | 1 | |
| 8 | Upper crankcase | 1 | |
| 9 | Bearing | 1 | |
| 10 | Oil filter cartridge bolt | 1 | |
| 11 | Upper crankcase damper | 1 | |
| 12 | Crankcase plug | 1 | |

Removing the oil baffle plate and bearings



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 13 | Lower crankcase | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS25550

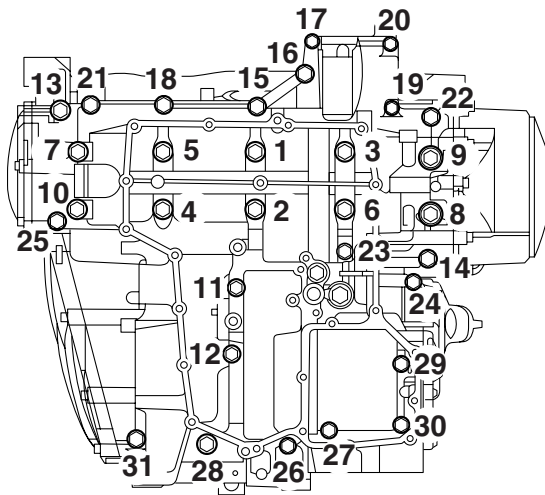
DISASSEMBLING THE CRANKCASE

1. Place the engine upside down.
2. Remove:
 - Crankcase bolts

NOTE:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

- M9 × 115 mm bolts: “1”–“10”
- M8 × 65 mm bolt: “11”
- M8 × 50 mm bolt: “12”
- M6 × 80 mm bolts: “23”, “25”
- M6 × 65 mm shoulder bolts: “13”, “14”
- M6 × 65 mm bolts: “19”, “22”, “24”, “26”
- M6 × 55 mm bolts: “15”–“18”, “20”, “21”, “27”–“30”
- M6 × 45 mm bolt: “31”



3. Remove:
 - Lower crankcase

ECA13900

CAUTION:

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

EAS25580

CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
 - Crankcase
Cracks/damage → Replace.
 - Oil delivery passages
Obstruction → Blow out with compressed air.

EAS25600

CHECKING THE OIL DELIVERY PIPES

The following procedure applies to all of the oil delivery pipes.

1. Check:
 - Oil delivery pipe
Damage → Replace.
Obstruction → Wash and blow out with compressed air.

ET3P61026

CHECKING THE BEARINGS AND OIL SEAL

1. Check:
 - Bearings
Clean and lubricate the bearings, then rotate the inner race with your finger.
Rough movement → Replace.
 - Oil seal
Damage/wear → Replace.

EAS25620

CHECKING THE TIMING CHAIN AND OIL PUMP DRIVE CHAIN

1. Check:
 - Timing chain
Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.
 - Oil pump drive chain
Damage/stiffness → Replace the oil pump drive chain, oil pump drive sprocket and oil pump shaft as a set.
2. Check:
 - Oil pump drive sprocket
Cracks/damage/wear → Replace the oil pump drive sprocket and the oil pump drive chain as a set.

EAS25680

ASSEMBLING THE CRANKCASE

1. Lubricate:
 - Crankshaft journal bearings
(with the recommended lubricant)

Recommended lubricant

Engine oil

2. Apply:
- Sealant
(onto the crankcase mating surfaces and oil baffle plate 2)

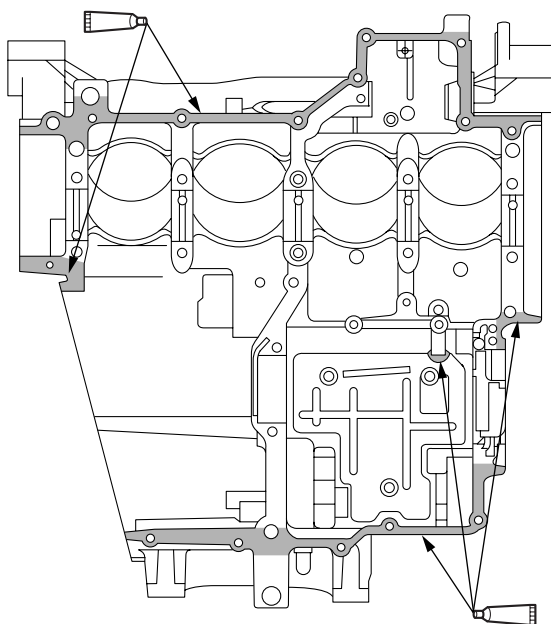
Yamaha bond No. 1215

90890-85505

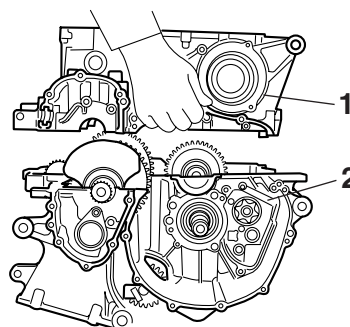
(Three Bond No.1215®)

NOTE:

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2–3 mm (0.08–0.12 in) of the crankshaft journal bearings.



3. Install:
- Dowel pins
4. Set the shift drum assembly and transmission gears in the neutral position.
5. Install:
- Lower crankcase “1”
(onto the upper crankcase “2”)



ECA13980

CAUTION:

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

6. Install:
- Crankcase bolts

NOTE:

- Lubricate the bolts “1”–“10” thread and washers with engine oil.
- Lubricate the bolts “11”–“31” thread part and mating surface with engine oil.
- Apply locking agent (LOCTITE®) to the threads of the bolt “16”.
- Finger tighten the crankcase bolts.

- M9 × 115 mm bolts: “1”–“10” **New**
- M8 × 65 mm bolt: “11”
- M8 × 50 mm bolt: “12”
- M6 × 80 mm bolts: “23”, “25”
- M6 × 65 mm shoulder bolts: “13”, “14”
- M6 × 65 mm bolts: “19”, “22”, “24”, “26”
- M6 × 55 mm bolts: “15”–“18”, “20”, “21”, “27”–“30”
- M6 × 45 mm bolt: “31”

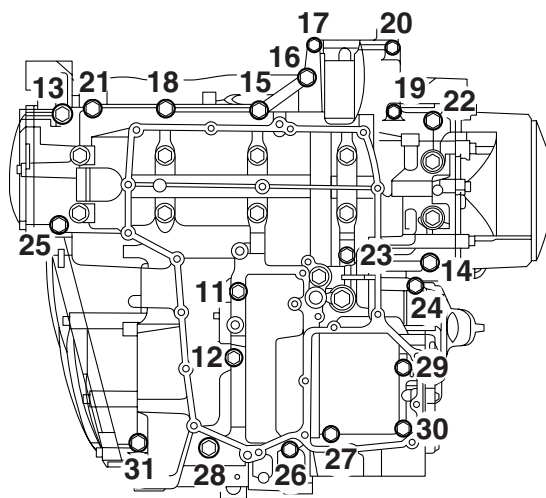
CRANKCASE



Crankcase bolt “11”, “12”
24 Nm (2.4 m·kg, 17 ft·lb)
Crankcase bolt “13”, “14”
12 Nm (1.2 m·kg, 8.7 ft·lb)
Crankcase bolt “15”–“31”
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Tighten the crankcase bolts in the proper tightening sequence as shown.

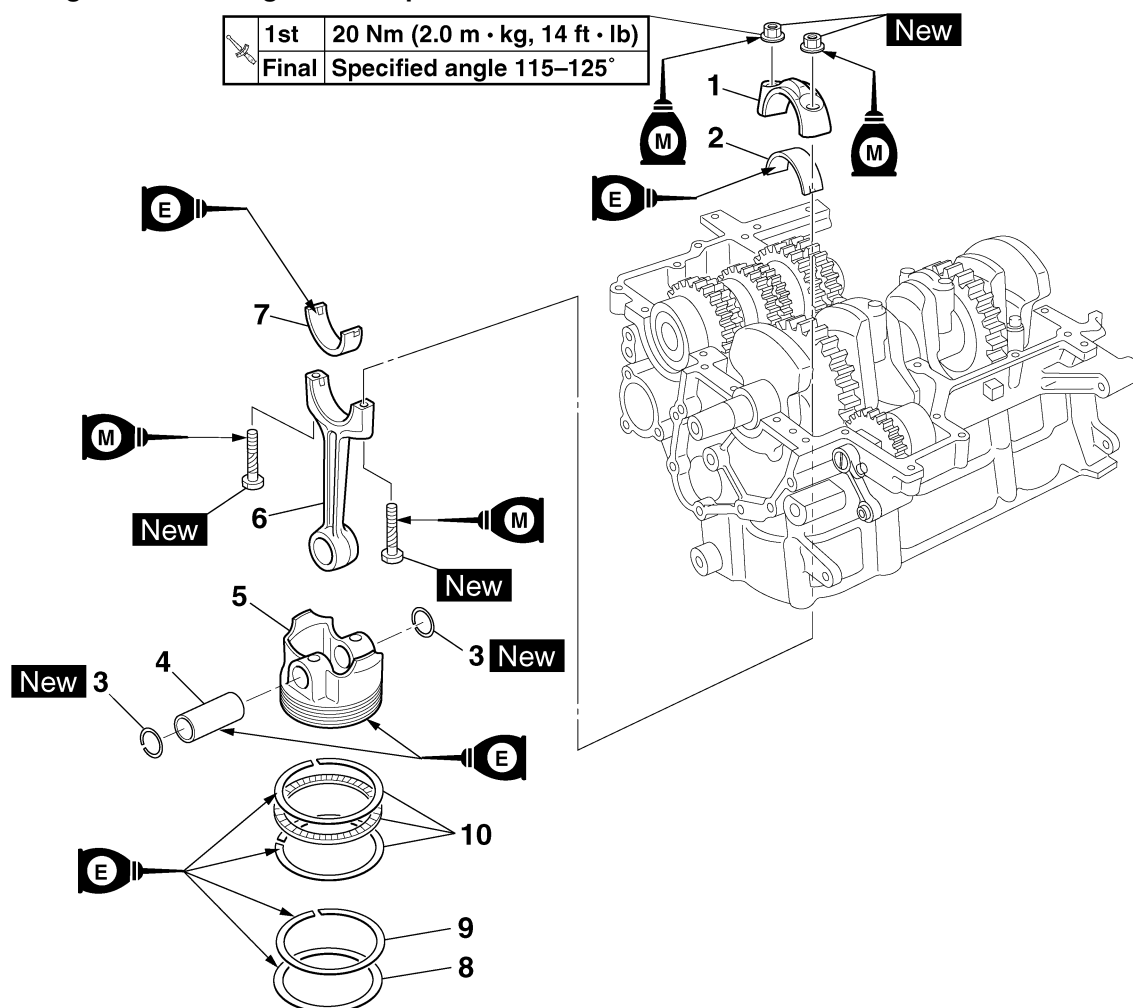


CONNECTING RODS AND PISTONS

ET3P61027

CONNECTING RODS AND PISTONS

Removing the connecting rods and pistons



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------|------|--|
| | Crankcase | | Separate. Refer to "CRANKCASE" on page 5-74. |
| 1 | Connecting rod cap | 4 | |
| 2 | Big end lower bearing | 4 | |
| 3 | Piston pin clip | 8 | |
| 4 | Piston pin | 4 | |
| 5 | Piston | 4 | |
| 6 | Connecting rod | 4 | |
| 7 | Big end upper bearing | 4 | |
| 8 | Top ring | 4 | |
| 9 | 2nd ring | 4 | |
| 10 | Oil ring | 4 | |
| | | | For installation, reverse the removal procedure. |

CONNECTING RODS AND PISTONS

EAS26030

REMOVING THE CONNECTING RODS AND PISTONS

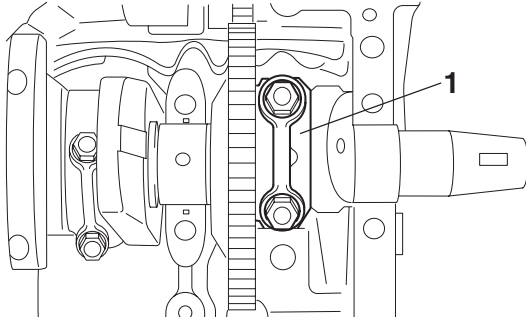
The following procedure applies to all of the connecting rods and pistons.

1. Remove:

- Connecting rod cap “1”

NOTE:

Identify the position of each connecting rod so that it can be reinstalled in its original place.



2. Remove:

- Big end bearings
(from the connecting rods and connecting rod caps)

NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.

3. Remove:

- Piston pin clips “1”
- Piston pin “2”
- Piston “3”
- Connecting rod “4”

ECA13810

CAUTION:

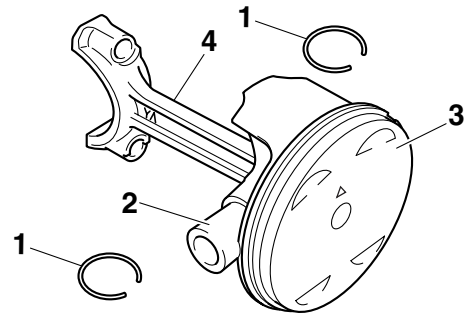
Do not use a hammer to drive the piston pin out.

NOTE:

- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “5”.



Piston pin puller set
90890-01304
Piston pin puller
YU-01304

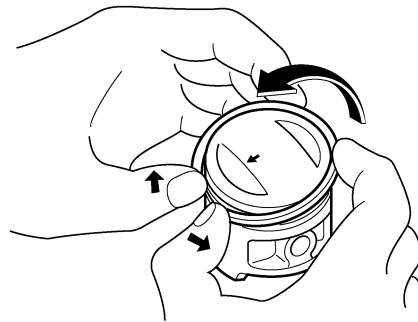


4. Remove:

- Top ring
- 2nd ring
- Oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24410

CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:

- Piston wall
- Cylinder wall

Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:

- Piston-to-cylinder clearance

a. Measure cylinder bore “C” with the cylinder bore gauge.

CONNECTING RODS AND PISTONS

NOTE:

Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

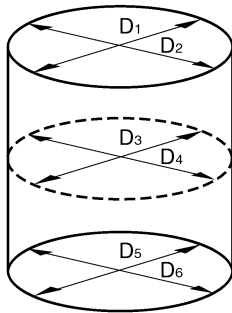


Bore
79.000–79.010 mm (3.1102–3.1106 in)
Taper limit
0.050 mm (0.0020 in)
Out of round limit
0.050 mm (0.0020 in)

"C" = maximum of D_1 – D_6

"T" = maximum of D_1 or D_2 - maximum of D_5 or D_6

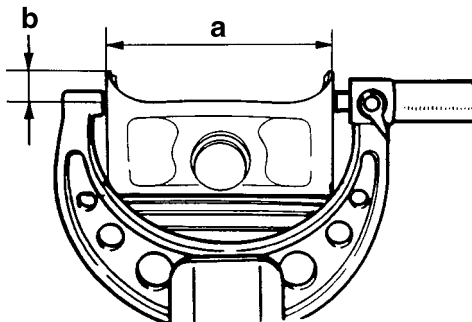
"R" = maximum of D_1 , D_3 or D_5 - minimum of D_2 , D_4 or D_6



- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- Measure piston skirt diameter "D" "a" with the micrometer.



Piston Diameter D
78.965–78.980 mm (3.1089–3.1094 in)



- 5 mm (0.20 in) from the bottom edge of the piston

- If out of specification, replace the piston and piston rings as a set.
- Calculate the piston-to-cylinder clearance with the following formula.

• Piston-to-cylinder clearance =
Cylinder bore "C" -
Piston skirt diameter "D"



Piston-to-cylinder clearance
0.020–0.045 mm (0.0008–0.0018 in)
Limit
0.12 mm (0.0047 in)

- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.



EAS24430

CHECKING THE PISTON RINGS

- Measure:

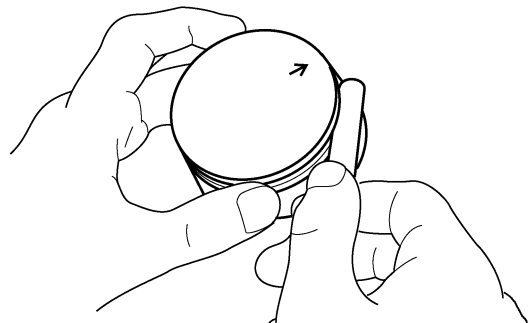
- Piston ring side clearance
Out of specification → Replace the piston and piston rings as a set.

NOTE:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



Piston ring
Top ring
Ring side clearance
0.030–0.070 mm (0.0012–0.0028 in)
Limit
0.120 mm (0.0047 in)
2nd ring
Ring side clearance
0.020–0.060 mm (0.0008–0.0024 in)
Limit
0.120 mm (0.0047 in)



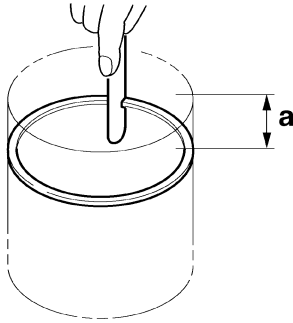
CONNECTING RODS AND PISTONS

2. Install:

- Piston ring
(into the cylinder)

NOTE:

Level the piston ring into the cylinder with the piston crown.



a. 5 mm (0.20 in)

3. Measure:

- Piston ring end gap
Out of specification → Replace the piston ring.

NOTE:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.



Piston ring

Top ring

End gap (installed)
0.35–0.45 mm (0.0138–0.0177 in)

Limit
0.70 mm (0.0276 in)

2nd ring

End gap (installed)
0.75–0.85 mm (0.0295–0.0335 in)

Limit
1.20 mm (0.0472 in)

Oil ring

End gap (installed)
0.20–0.60 mm (0.0079–0.0236 in)

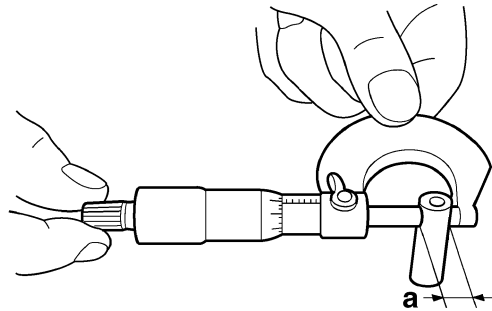
2. Measure:

- Piston pin outside diameter "a"
Out of specification → Replace the piston pin.



Piston pin outside diameter
18.991–19.000 mm (0.7477–0.7480 in)

Limit
18.971 mm (0.7469 in)



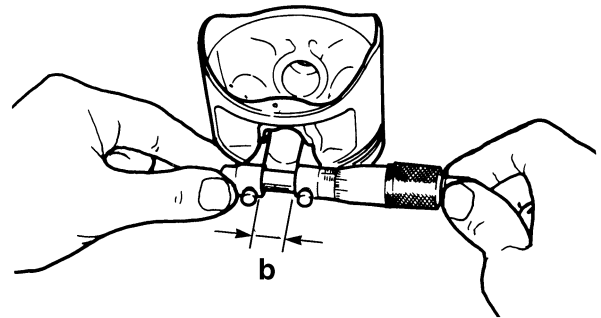
3. Measure:

- Piston pin bore diameter "b"
Out of specification → Replace the piston.



Piston pin bore inside diameter
19.004–19.015 mm (0.7482–0.7486 in)

Limit
19.045 mm (0.7498 in)



4. Calculate:

- Piston-pin-to-piston-pin-bore clearance
Out of specification → Replace the piston pin and piston as a set.

• Piston-pin-to-piston-pin-bore clearance =
Piston pin bore diameter "b" -
Piston pin outside diameter "a"



Piston-pin-to-piston-pin-bore clearance

0.004–0.024 mm (0.00016–0.00094 in)

EAS24440

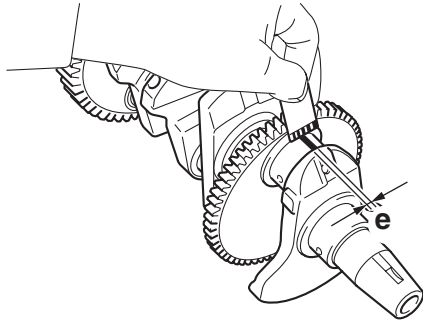
CHECKING THE PISTON PIN

The following procedure applies to all of the piston pins.

1. Check:

- Piston pin
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

CONNECTING RODS AND PISTONS

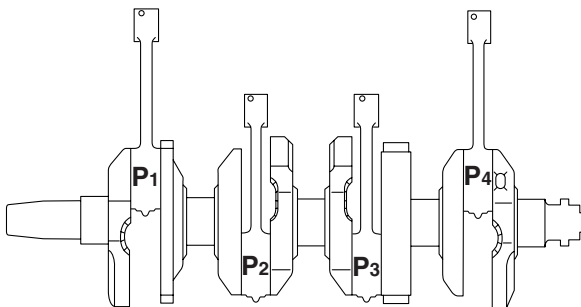


2. Select:

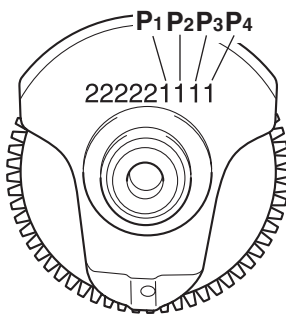
- Big end bearings (P_1 – P_4)

NOTE:

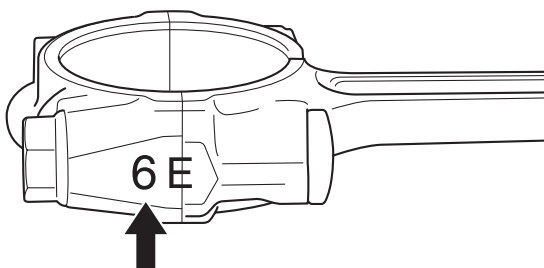
- The numbers “A” stamped into the crankshaft web and the numbers “B” on the connecting rods are used to determine the replacement big end bearing sizes.
- P_1 – P_4 refer to the bearings shown in the crankshaft illustration.



A



B



For example, if the connecting rod P_1 and the crankshaft web P_1 numbers are 6 and 1 respectively, then the bearing size for P_1 is:

$$\begin{aligned} &P_1 \text{ (connecting rod)} - P_1 \text{ (crankshaft)} \\ &= \\ &6 - 1 = 5 \text{ (yellow)} \end{aligned}$$



Bearing color code

1.Blue 2.Black 3.Brown 4.Green
5.Yellow 6.Pink

EAS26170

INSTALLING THE CONNECTING RODS AND PISTONS

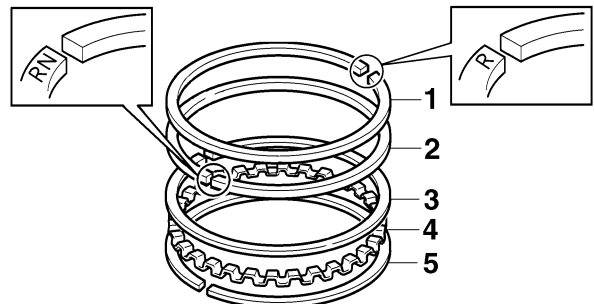
The following procedure applies to all of the pistons and connecting rods.

1. Install:

- Top ring “1”
- 2nd ring “2”
- Upper oil ring rail “3”
- Oil ring expander “4”
- Lower oil ring rail “5”

NOTE:

Be sure to install the piston rings so that the manufacturer’s marks face up.



2. Install:

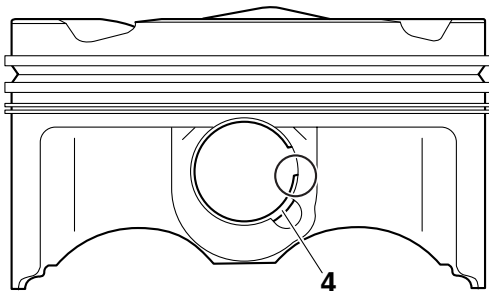
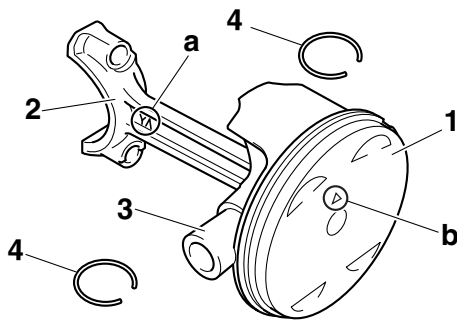
- Piston “1”
(onto the respective connecting rod “2”)
- Piston pin “3”
- Piston pin clips “4” **New**

NOTE:

- Apply engine oil onto the piston pin.
- Make sure that the “Y” mark “a” on the connecting rod is facing to the left when the punch mark “b” on the piston is pointing up. Refer to the illustration.
- When installing a piston pin clip, make sure that the clip ends are positioned away from the cutout in the piston as shown in the illustration.

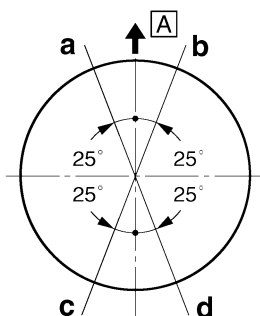
CONNECTING RODS AND PISTONS

- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #4).



3. Offset:

- Piston ring end gaps



- a. Top ring
- b. Lower oil ring rail
- c. Upper oil ring rail
- d. 2nd ring
- A. Intake side

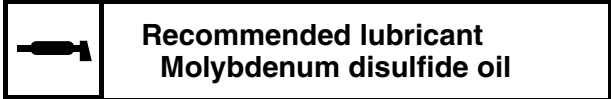
4. Lubricate:

- Piston
 - Piston rings
 - Cylinder
- (with the recommended lubricant)



5. Lubricate:

- Bolt threads
 - Nut seats
- (with the recommended lubricant)



6. Lubricate:

- Crankshaft pins
 - Big end bearings
 - Connecting rod inner surface
- (with the recommended lubricant)

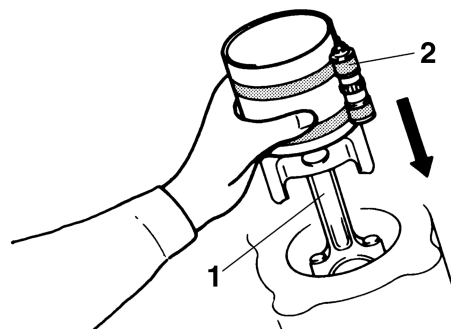


7. Install:

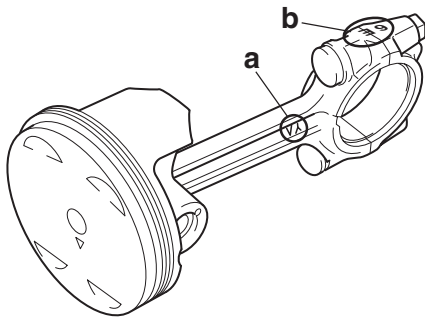
- Big end bearings
- Connecting rod assembly "1" (into the cylinder and onto the crankshaft pin)
- Connecting rod cap (onto the crankshaft pin)

NOTE:

- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- While compressing the piston rings with piston ring compressor "2", install the connecting rod assembly "1" into the cylinder with the other hand.
- Make sure the "Y" marks "a" on the connecting rods face towards the left side of the crankshaft.
- Make sure the characters "b" on both the connecting rod and connecting rod cap are aligned.



CONNECTING RODS AND PISTONS



8. Tighten:

- Connecting rod nuts "1"

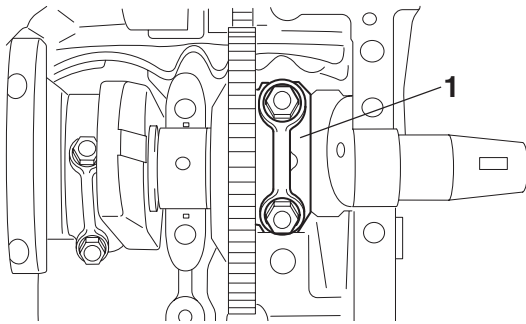
EW3P61019

WARNING

Replace the connecting rod bolts and nuts with new ones.

NOTE:

Tighten the connecting rod nuts using the following procedure.

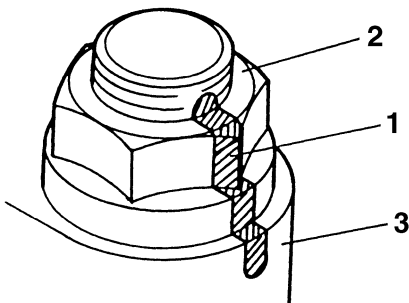


- a. Tighten the connecting rod nuts with a torque wrench.



Connecting rod nut (1st)
20 Nm (2.0 m·kg, 14 ft·lb)

- b. Put a mark "1" on the corner of the connecting rod nut "2" and the connecting rod "3".



- c. Tighten the connecting rod nuts further to reach the specified angle 115–125°.



Connecting rod nut (final)
Specified angle 115–125°

EWA13400

WARNING

If the connecting rod nut is tightened more than the specified angle, do not loosen the nut and then retighten it. Instead, replace the connecting rod bolt and nut with a new one and perform the procedure again.

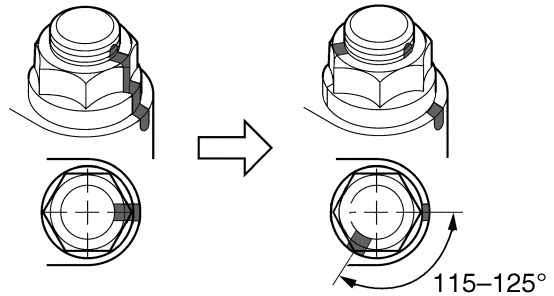
ECA13950

CAUTION:

Do not use a torque wrench to tighten the connecting rod nut to the specified angle.

NOTE:

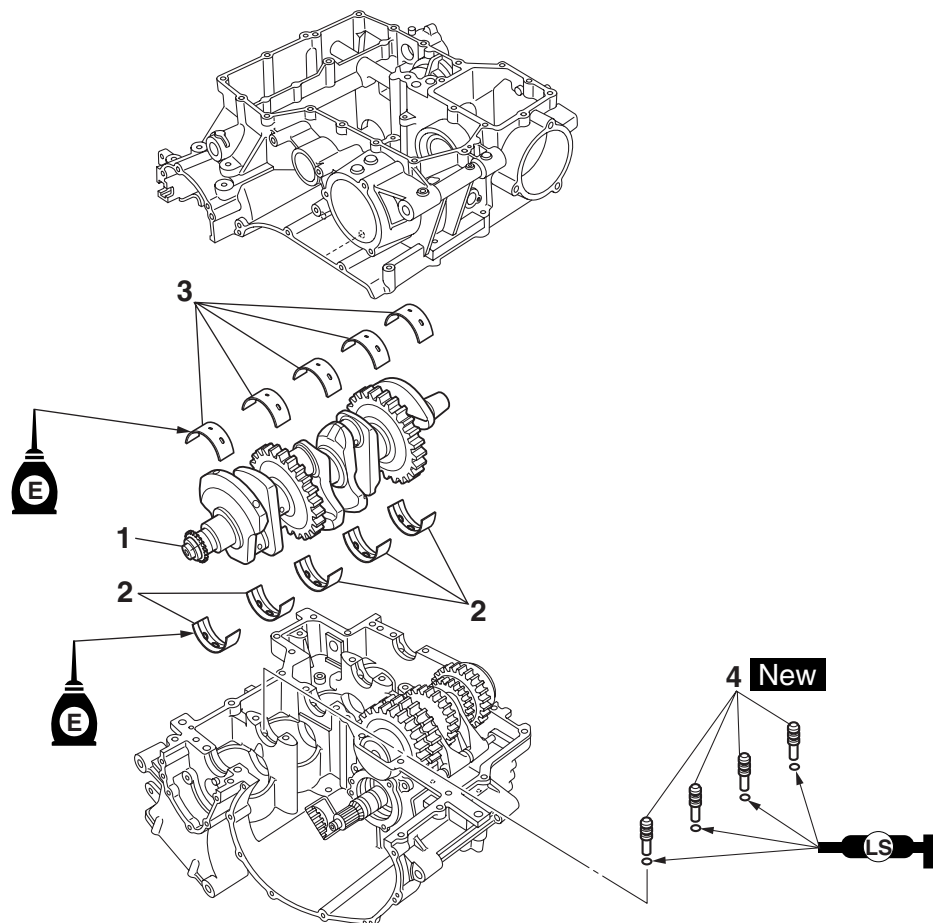
On a hexagonal nut, note that the angle from one corner to another is 60°.



EAS25950

CRANKSHAFT

Removing the crankshaft



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------------|------|--|
| | Crankcase | | Separate. Refer to "CRANKCASE" on page 5-74. |
| | Front balancer weight | | Refer to "BALANCERS" on page 5-103. |
| | Connecting rod caps | | Refer to "CONNECTING RODS AND PISTONS" on page 5-82. |
| 1 | Crankshaft | 1 | |
| 2 | Crankshaft journal upper bearing | 5 | |
| 3 | Crankshaft journal lower bearing | 5 | |
| 4 | Oil nozzle | 4 | |
| | | | For installation, reverse the removal procedure. |

EAS26040

REMOVING THE CRANKSHAFT JOURNAL BEARINGS

1. Remove:
 - Crankshaft journal upper bearings (from the upper crankcase)
 - Crankshaft journal lower bearings (from the lower crankcase)

NOTE:

Identify the position of each crankshaft journal bearing so that it can be reinstalled in its original place.

ET3P61029

CHECKING THE OIL NOZZLES

The following procedure applies to all of the oil nozzles.

1. Check:
 - Oil nozzle
Damage/wear → Replace the oil nozzle.
 - Oil passage
Obstruction → Blow out with compressed air.

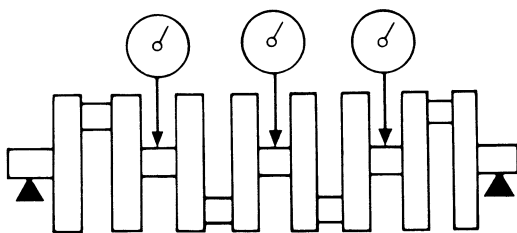
EAS26070

CHECKING THE CRANKSHAFT

1. Measure:
 - Crankshaft runout
Out of specification → Replace the crankshaft.



Runout limit C
0.030 mm (0.0012 in)



2. Check:
 - Crankshaft journal surfaces
 - Crankshaft pin surfaces
 - Bearing surfaces
Scratches/wear → Replace the crankshaft.
3. Measure:
 - Crankshaft-journal-to-crankshaft-journal-bearing clearance
Out of specification → Replace the crankshaft journal bearings.



Journal oil clearance (using plastigauge®)
0.027–0.045 mm (0.0011–0.0018 in)

ECA13920

CAUTION:

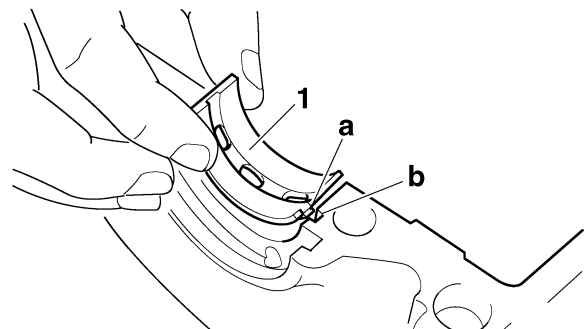
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.



- a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
- b. Place the upper crankcase upside down on a bench.
- c. Install the crankshaft journal upper bearings "1" and the crankshaft into the upper crankcase.

NOTE:

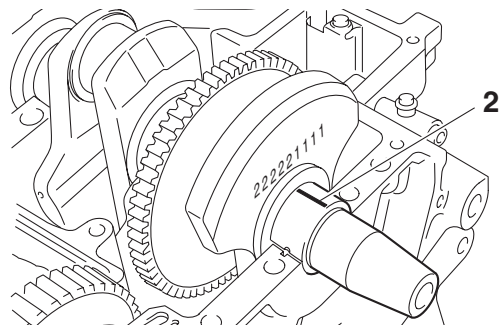
Align the projections "a" on the crankshaft journal upper bearings with the notches "b" in the upper crankcase.



- d. Put a piece of Plastigauge® "2" on each crankshaft journal.

NOTE:

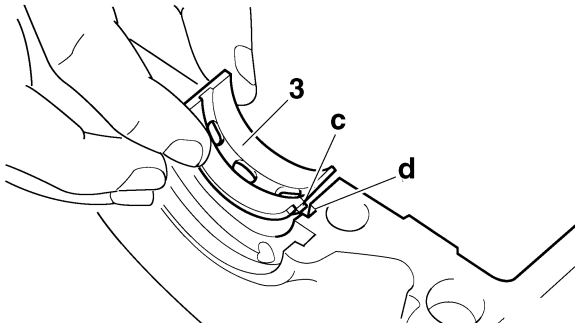
Do not put the Plastigauge® over the oil hole in the crankshaft journal.



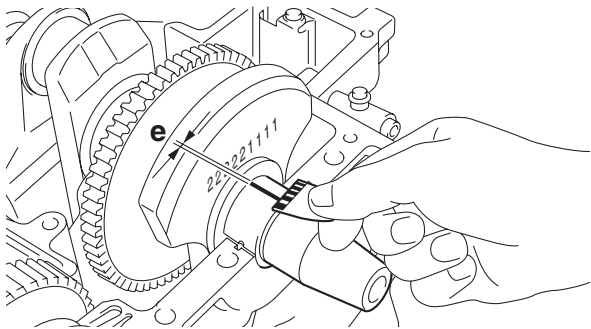
- e. Install the crankshaft journal lower bearings "3" into the lower crankcase and assemble the crankcase halves.

NOTE:

- Align the projections "c" of the crankshaft journal lower bearings with the notches "d" in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.



- f. Tighten the bolts to specification in the tightening sequence cast on the crankcase. Refer to "CRANKCASE" on page 5-74.
- g. Remove the lower crankcase and the crankshaft journal lower bearings.
- h. Measure the compressed Plastigauge® width "e" on each crankshaft journal. If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.



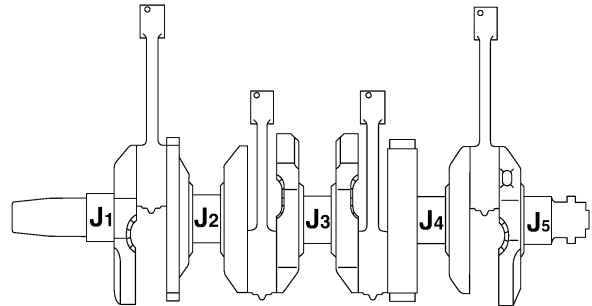
4. Select:

- Crankshaft journal bearings (J₁-J₅)

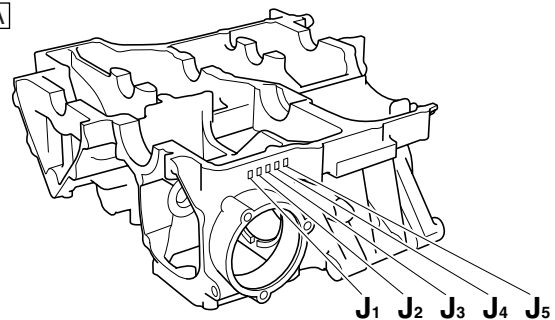
NOTE:

- The numbers "A" stamped into the lower crankcase and the numbers "B" stamped into the crankshaft web are used to determine the replacement crankshaft journal bearing sizes.
- J₁-J₅ refer to the bearings shown in the lower crankcase and crankshaft web illustration.

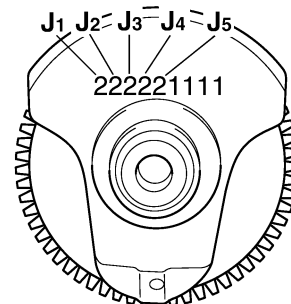
- If J₁-J₅ are the same, use the same size for all of the bearings.



A



B



For example, if the lower crankcase J₁ and crankshaft web J₁ numbers are 6 and 2 respectively, then the bearing size for J₁ is:

$$\begin{aligned} &J_1 \text{ (crankcase)} - J_1 \text{ (crankshaft web)} + 2 \\ &= \\ &6 - 2 + 2 = 6 \text{ (pink)} \end{aligned}$$



Bearing color code
2.Black 3.Brown 4.Green 5.Yellow 6.Pink 7.Red 8.White

EAS26200

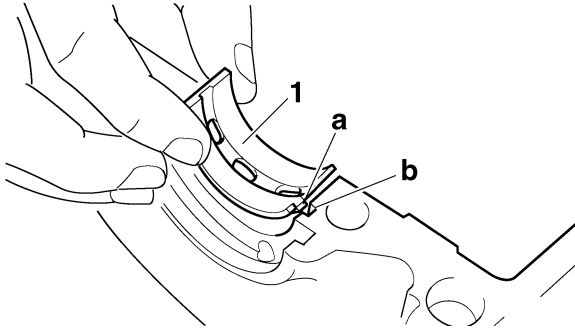
INSTALLING THE CRANKSHAFT

1. Install:

- Crankshaft journal upper bearings (into the upper crankcase)
- Crankshaft journal lower bearings (into the lower crankcase)

NOTE: _____

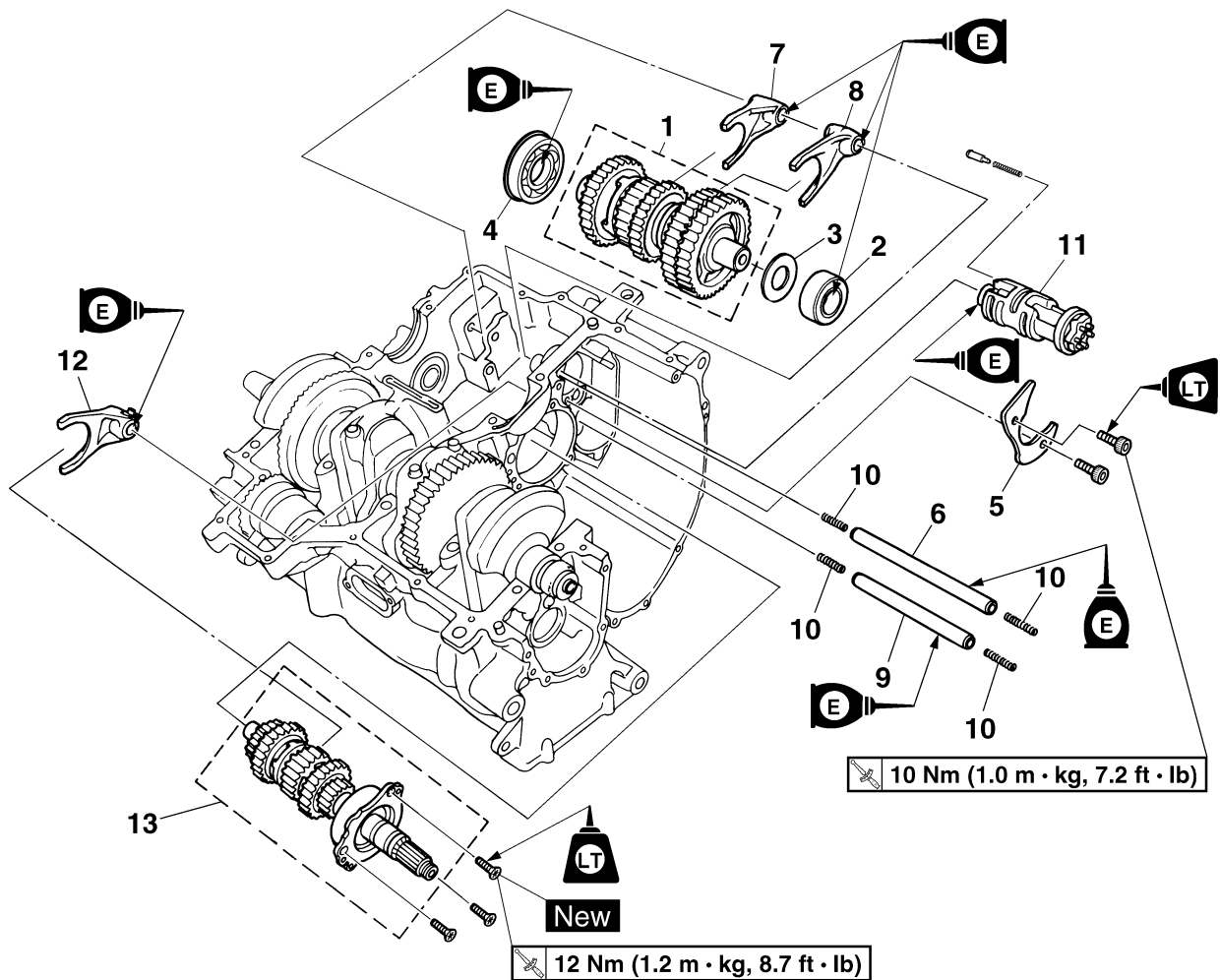
- Align the projections “a” on the crankshaft journal bearings “1” with the notches “b” in the crankcases.
 - Be sure to install each crankshaft journal bearing in its original place.
-



EAS26240

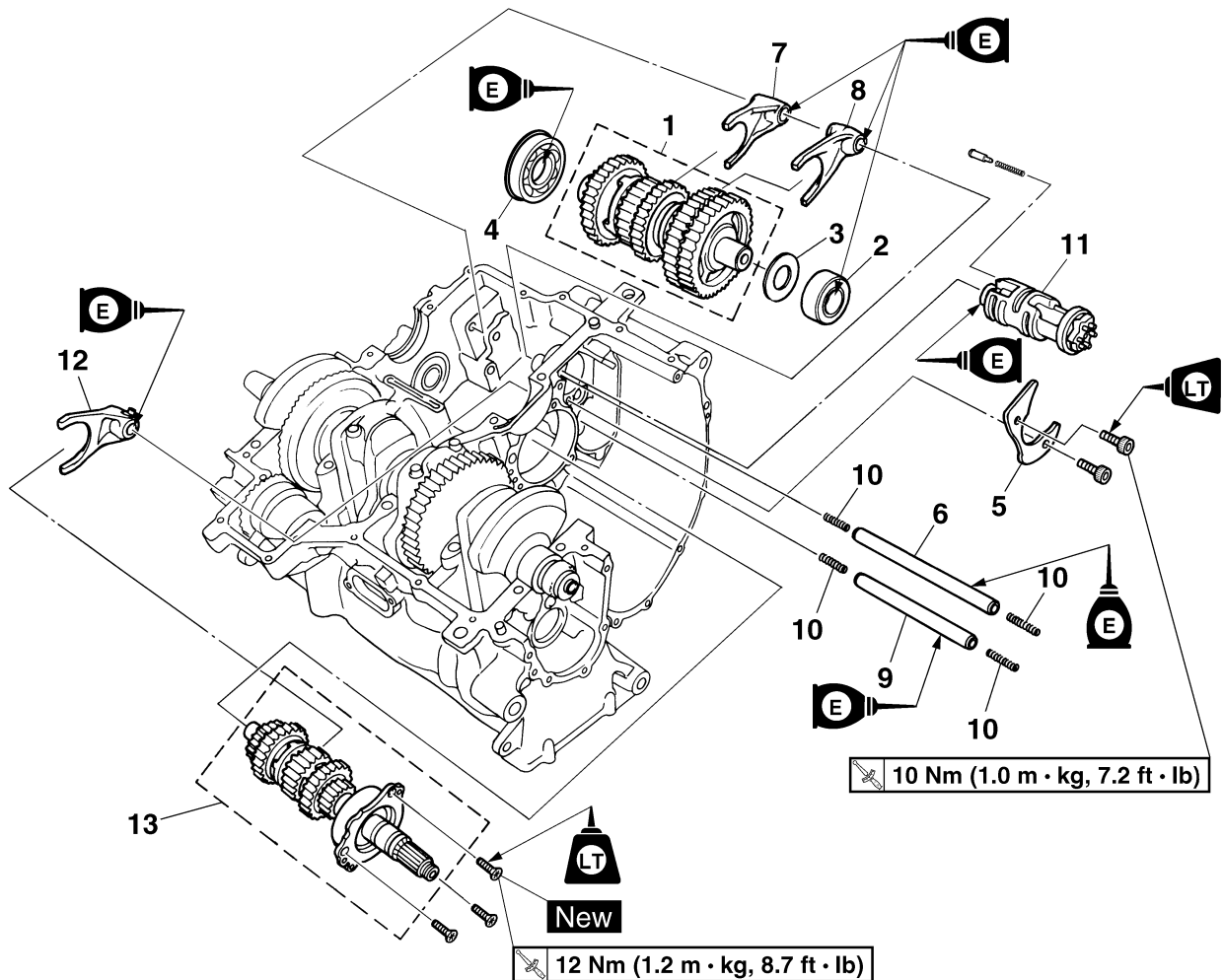
TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks



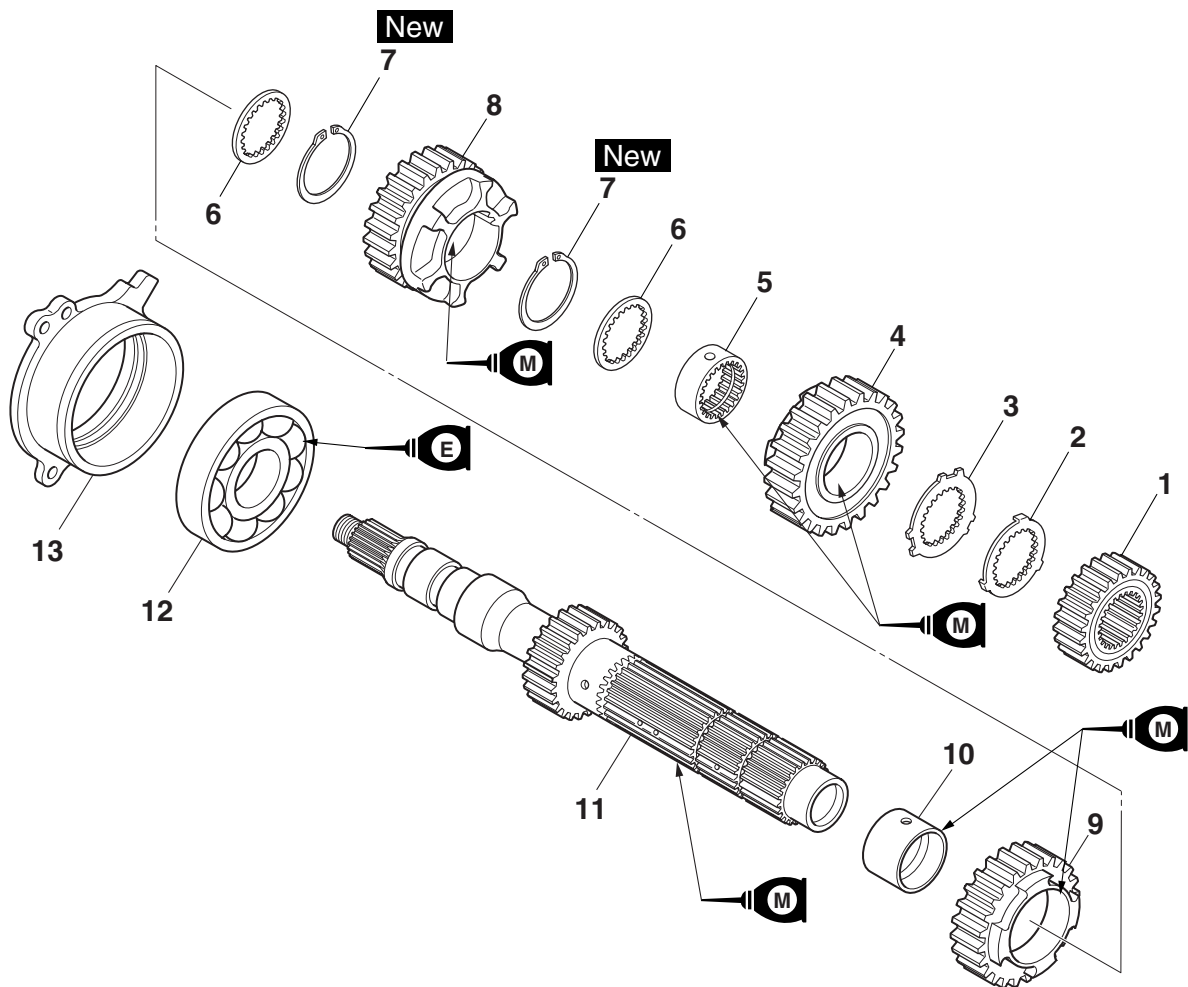
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|---|
| | Crankcase | | Separate. Refer to "CRANKCASE" on page 5-74. |
| | Stopper lever | | Refer to "SHIFT SHAFT" on page 5-56. |
| 1 | Drive axle assembly | 1 | |
| 2 | Bearing | 1 | |
| 3 | Washer | 1 | |
| 4 | Bearing | 1 | |
| 5 | Shift drum retainer | 1 | |
| 6 | Long shift fork guide bar | 1 | |
| 7 | Shift fork-L | 1 | |
| 8 | Shift fork-R | 1 | |
| 9 | Short shift fork guide bar | 1 | |
| 10 | Spring | 4 | |
| 11 | Shift drum assembly | 1 | |
| 12 | Shift fork-C | 1 | |

Removing the transmission, shift drum assembly, and shift forks



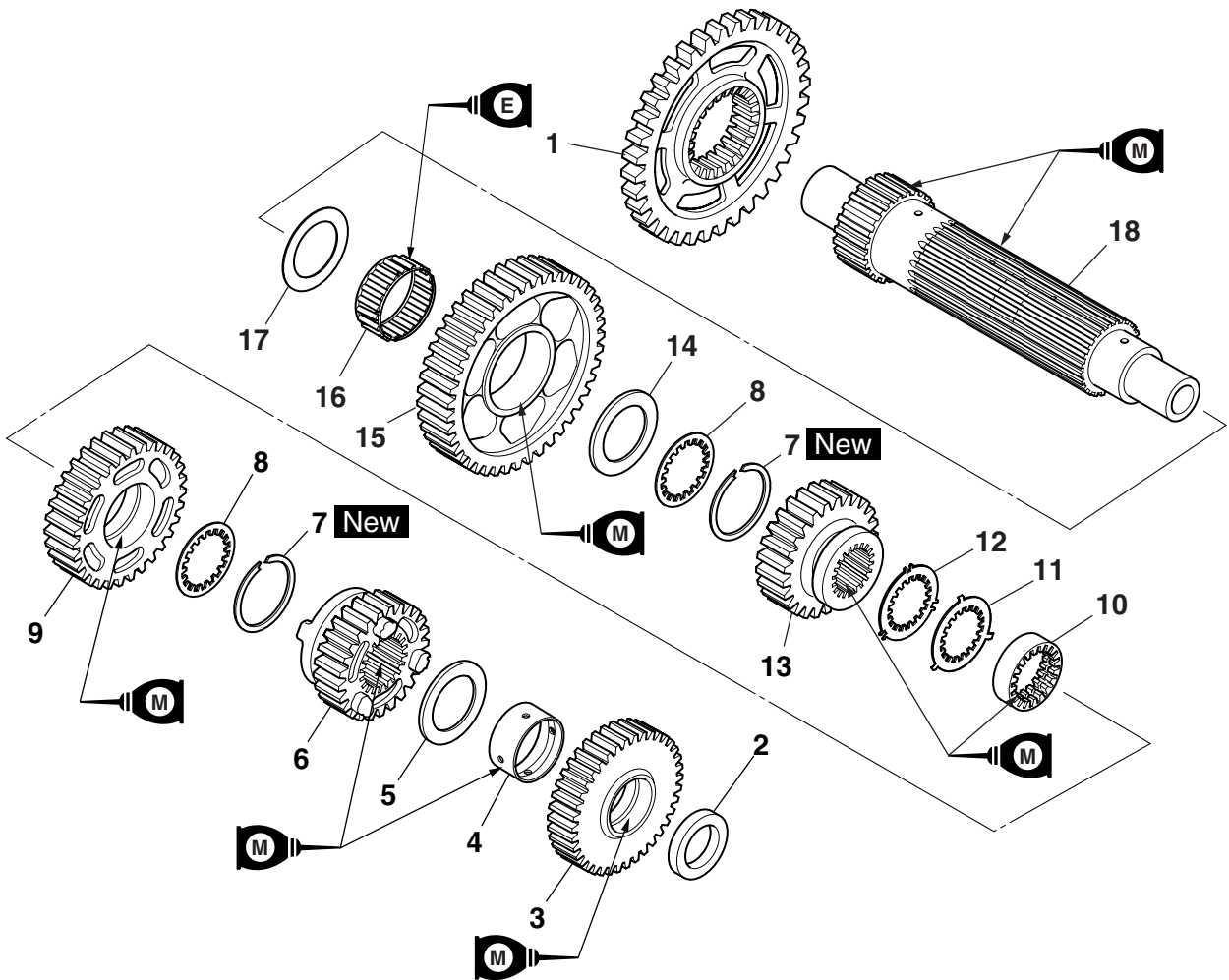
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 13 | Main axle assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the main axle assembly



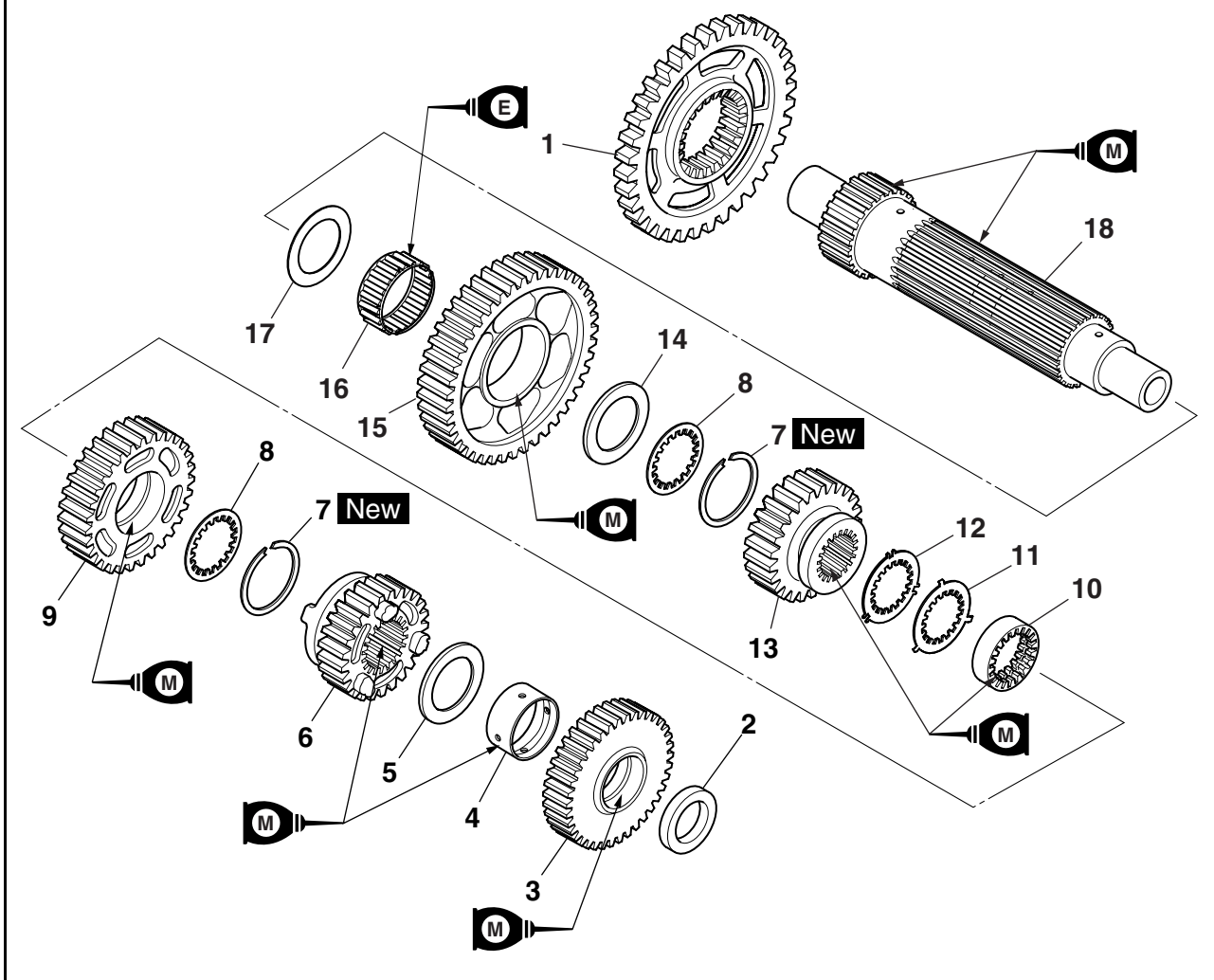
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------|------|--|
| 1 | 2nd pinion gear | 1 | |
| 2 | Toothed lock washer | 1 | |
| 3 | Toothed lock washer retainer | 1 | |
| 4 | 5th pinion gear | 1 | |
| 5 | Toothed spacer | 1 | |
| 6 | Toothed washer | 2 | |
| 7 | Circlip | 2 | |
| 8 | 3rd pinion gear | 1 | |
| 9 | 4th pinion gear | 1 | |
| 10 | Collar | 1 | |
| 11 | Main axle/1st pinion gear | 1 | |
| 12 | Bearing | 1 | |
| 13 | Main axle bearing housing | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

Disassembling the drive axle assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------|------|---------|
| 1 | Middle drive gear | 1 | |
| 2 | Washer | 1 | |
| 3 | 2nd wheel gear | 1 | |
| 4 | Collar | 1 | |
| 5 | Washer | 1 | |
| 6 | 5th wheel gear | 1 | |
| 7 | Circlip | 2 | |
| 8 | Toothed washer | 2 | |
| 9 | 3rd wheel gear | 1 | |
| 10 | Toothed spacer | 1 | |
| 11 | Toothed lock washer | 1 | |
| 12 | Toothed lock washer retainer | 1 | |
| 13 | 4th wheel gear | 1 | |
| 14 | Washer | 1 | |
| 15 | 1st wheel gear | 1 | |
| 16 | Bearing | 1 | |
| 17 | Washer | 1 | |

Disassembling the drive axle assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|--|
| 18 | Drive axle | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS26250

REMOVING THE TRANSMISSION

1. Remove:

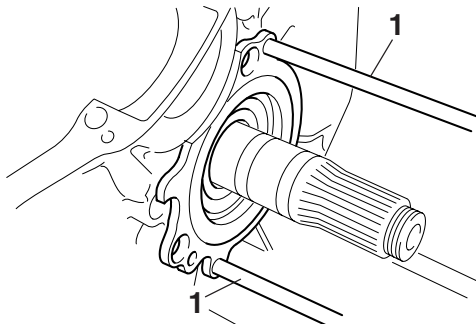
- Main axle assembly

NOTE:

Remove the main axle assembly with the slide hammer bolts "1" and weight.



Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1
Weight
90890-01084
YU-01083-3



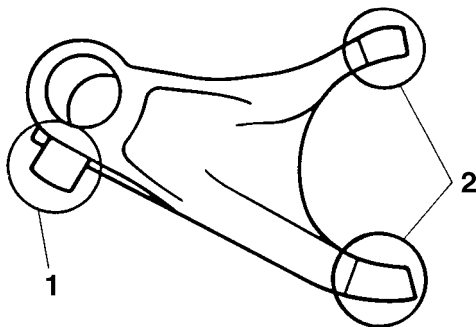
EAS26260

CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

1. Check:

- Shift fork cam follower "1"
 - Shift fork pawl "2"
- Bends/damage/scoring/wear → Replace the shift fork.



2. Check:

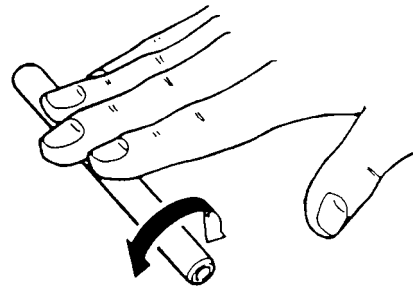
- Shift fork guide bar
- Roll the shift fork guide bar on a flat surface.
Bends → Replace.

EWA12840



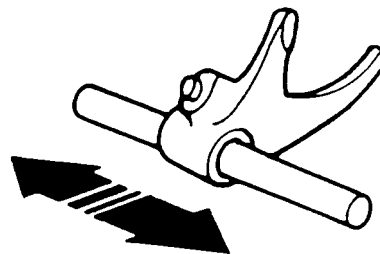
WARNING

Do not attempt to straighten a bent shift fork guide bar.



3. Check:

- Shift fork movement
(along the shift fork guide bar)
Rough movement → Replace the shift forks and shift fork guide bar as a set.

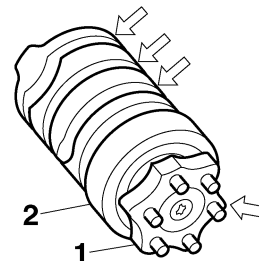


EAS26270

CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:

- Shift drum groove
Damage/scratches/wear → Replace the shift drum assembly.
- Shift drum segment "1"
Damage/wear → Replace the shift drum assembly.
- Shift drum bearing "2"
Damage/pitting → Replace the shift drum assembly.



EAS26300

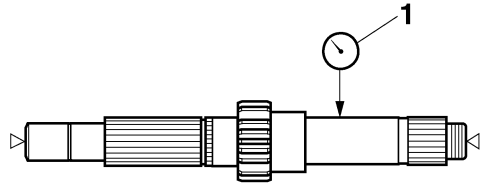
CHECKING THE TRANSMISSION

1. Measure:

- Main axle runout
(with a centering device and dial gauge "1")
Out of specification → Replace the main axle.



Main axle runout limit
0.08 mm (0.0032 in)

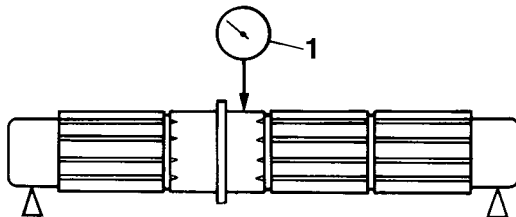


2. Measure:

- Drive axle runout
(with a centering device and dial gauge "1")
Out of specification → Replace the drive axle.

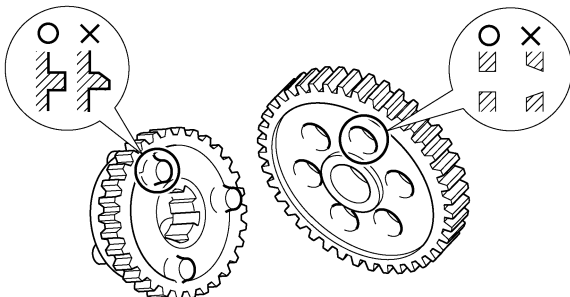


Drive axle runout limit
0.08 mm (0.0032 in)



3. Check:

- Transmission gears
Blue discoloration/pitting/wear → Replace the defective gear(s).
- Transmission gear dogs
Cracks/damage/rounded edges → Replace the defective gear(s).



4. Check:

- Transmission gear engagement
(each pinion gear to its respective wheel gear)
Incorrect → Reassemble the transmission axle assemblies.

5. Check:

- Transmission gear movement
Rough movement → Replace the defective part(s).

6. Check:

- Circlips
Bends/damage/looseness → Replace.

ET3P61030

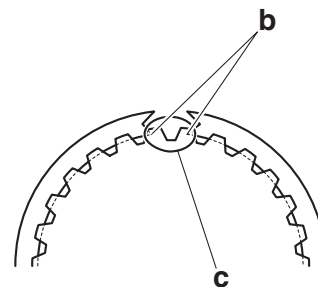
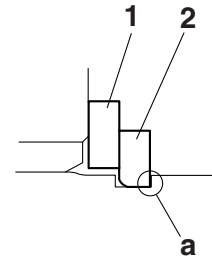
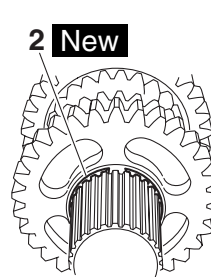
ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

1. Install:

- Toothed washer "1"
- Circlip "2" **New**

NOTE:

- Be sure the circlip sharp-edged corner "a" is positioned opposite side to the toothed washer and gear. (For main axle)
- Install the circlip so that both ends "b" rest on the sides of a spline "c" with both axles aligned.



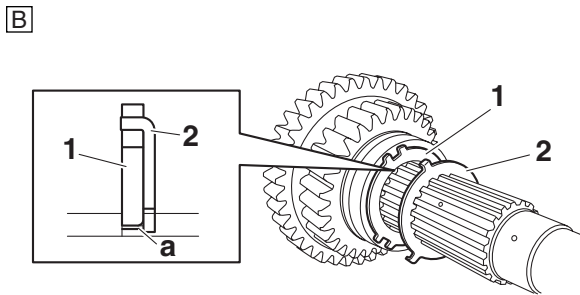
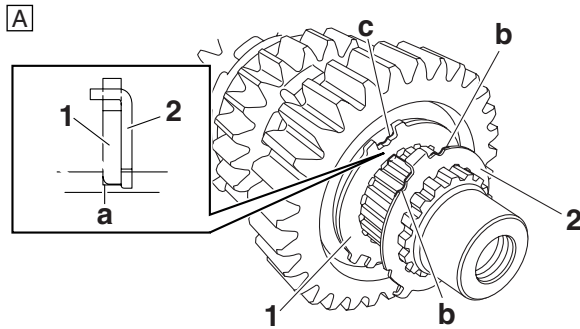
2. Install:

- Toothed lock washer retainer "1"
- Toothed lock washer "2"

NOTE:

- With the toothed lock washer retainer "1" in the groove "a" in the axle, align the projection on the retainer with an axle spline, and then install the toothed lock washer "2".
- Be sure to align the projection on the toothed lock washer that is between the alignment marks "b" with the alignment mark "c" on the retainer.

TRANSMISSION



A. Main axle

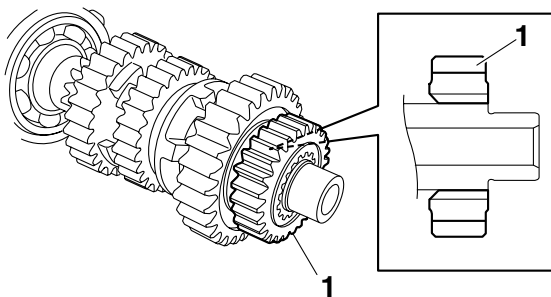
B. Drive axle

3. Install:

- 2nd pinion gear "1"

NOTE:

Install the 2nd pinion gear with its chamfered side facing inward as shown in the illustration.



EAS26350

INSTALLING THE TRANSMISSION

1. Install:

- Main axle assembly "1"
- Main axle bearing housing bolts

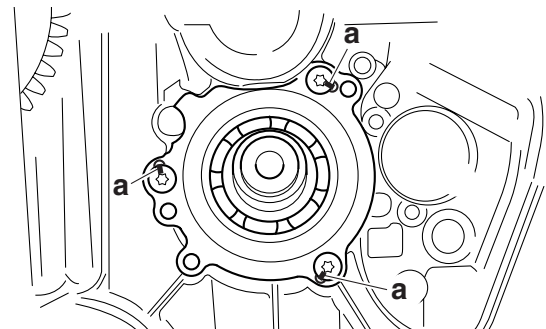
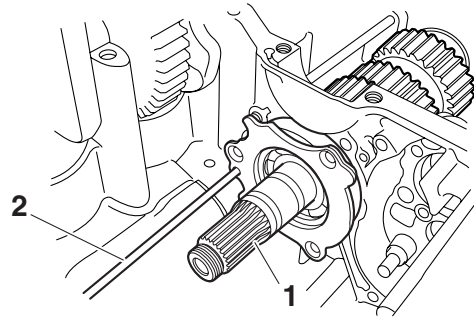


Main axle bearing housing bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE®

NOTE:

- When installing the main axle assembly, use a pin "2" to align the bearing housing hole with the corresponding hole in the upper crankcase.

- Stake the main axle bearing housing bolts at a cutout "a" in the main axle bearing housing.



2. Install:

- Shift fork-C
- Shift drum assembly
- Springs
- Short shift fork guide bar
- Shift fork-R
- Shift fork-L
- Long shift fork guide bar

NOTE:

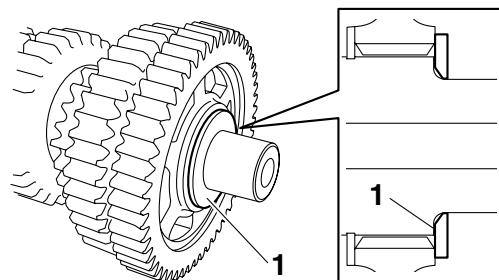
The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C", "L".

3. Install:

- Washer "1"

NOTE:

Install the washer with its chamfered side facing towards the drive axle assembly as shown in the illustration.

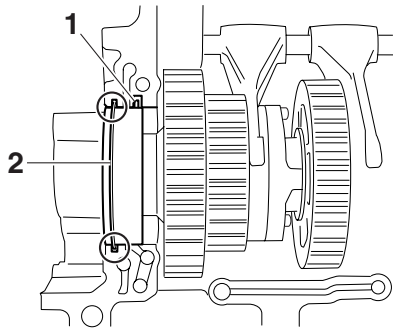


4. Install:

- Drive axle assembly

NOTE: _____

- The bearing pin “1” must face towards the rear of the upper crankcase.
 - Make sure the bearing circlip “2” is inserted into the groove in the upper crankcase.
-



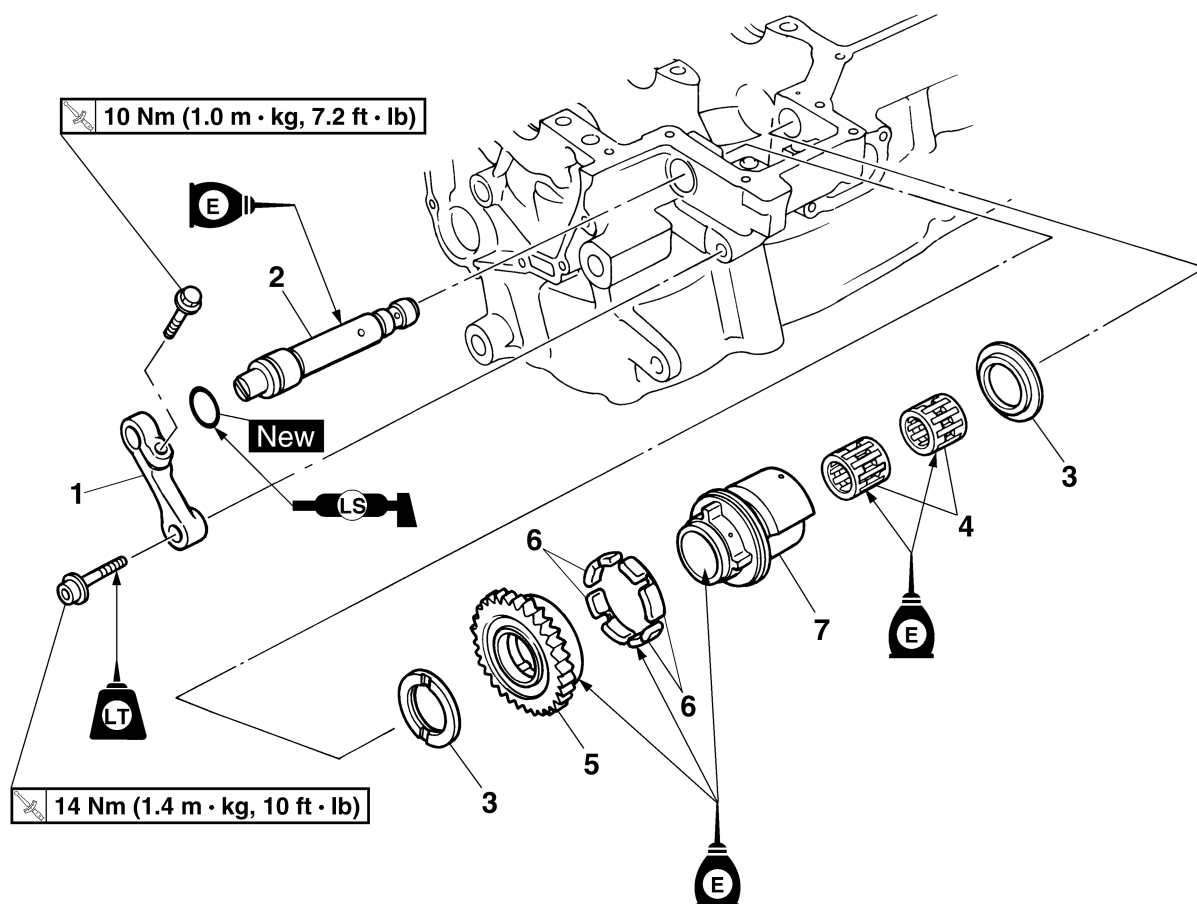
5. Check:

- Transmission
Rough movement → Repair.

NOTE: _____

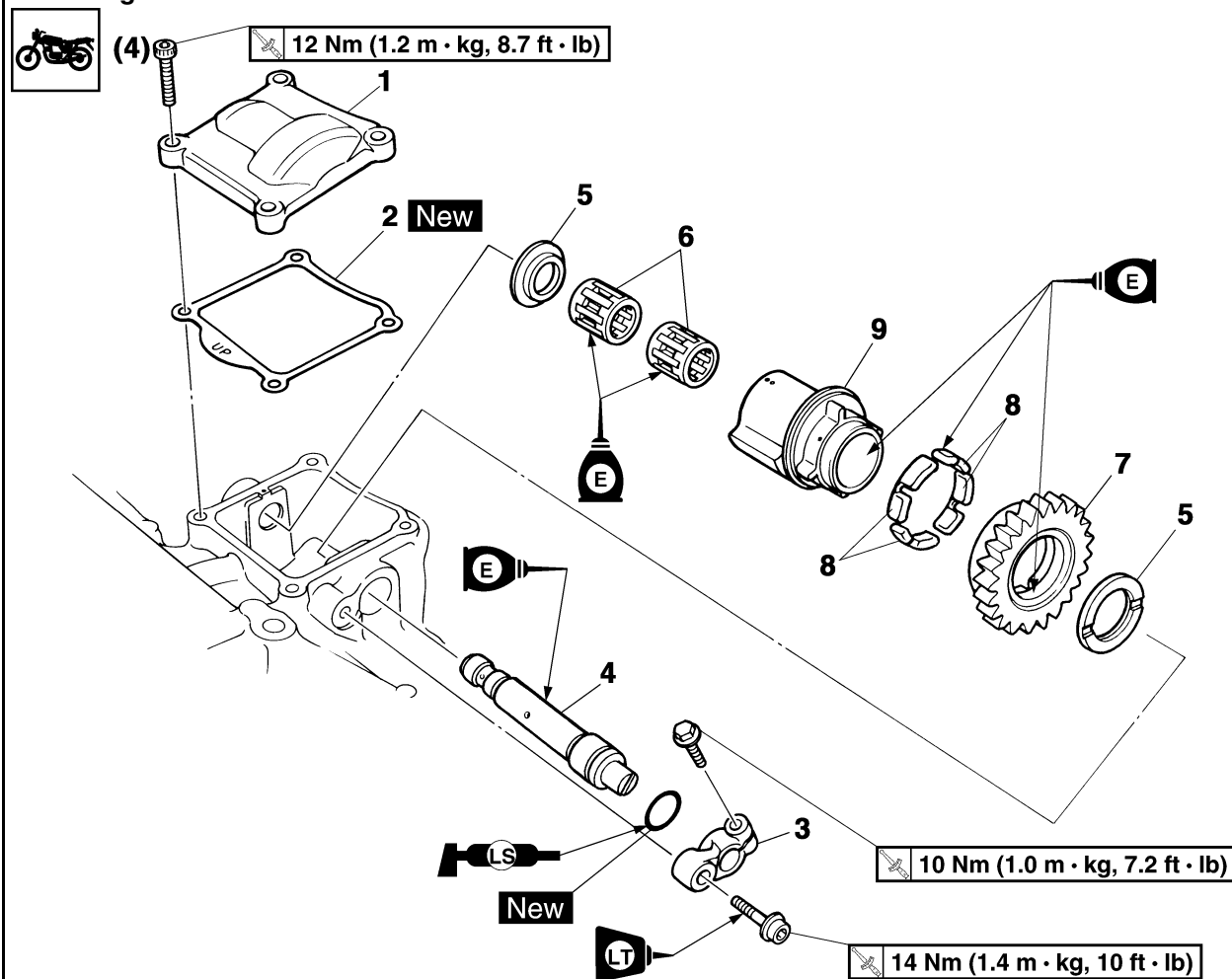
Oil each gear, shaft, and bearing thoroughly.

ET3P61031

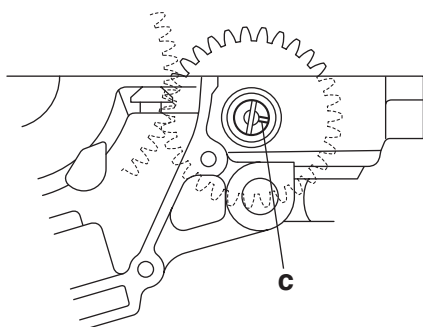
BALANCERS**Removing the front balancer**

| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------|------|--|
| | Crankcase | | Separate. Refer to "CRANKCASE" on page 5-74. |
| 1 | Front balancer lever | 1 | |
| 2 | Front balancer shaft | 1 | |
| 3 | Washer | 2 | |
| 4 | Bearing | 2 | |
| 5 | Front balancer gear | 1 | |
| 6 | Damper | 4 | |
| 7 | Front balancer weight | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the rear balancer



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------|------|--|
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| | Pickup rotor cover | | Refer to "PICKUP ROTOR" on page 5-34. |
| | Clutch cover | | Refer to "CLUTCH" on page 5-41. |
| 1 | Rear balancer cover | 1 | |
| 2 | Rear balancer cover gasket | 1 | |
| 3 | Rear balancer lever | 1 | |
| 4 | Rear balancer shaft | 1 | |
| 5 | Washer | 2 | |
| 6 | Bearing | 2 | |
| 7 | Rear balancer gear | 1 | |
| 8 | Damper | 4 | |
| 9 | Rear balancer weight | 1 | |
| | | | For installation, reverse the removal procedure. |

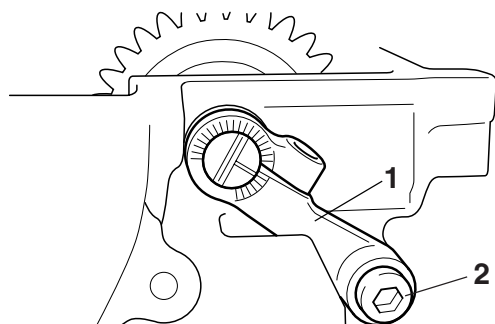


4. Install:

- Front balancer lever "1"
- Front balancer lever bolt "2"

NOTE:

- Apply locking agent (LOCTITE®) to the threads of the balancer lever bolt.
- Temporarily tighten the balancer lever bolt.



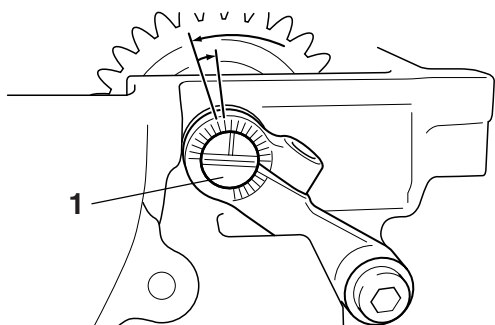
5. Tighten:

- Front balancer shaft "1"

Front balancer shaft
0.4 Nm (0.04 m·kg, 0.29 ft·lb)

NOTE:

Tighten the balancer shaft to the specified torque by turning it counterclockwise, and then turn it one mark back on the balancer lever scale.



6. Tighten:

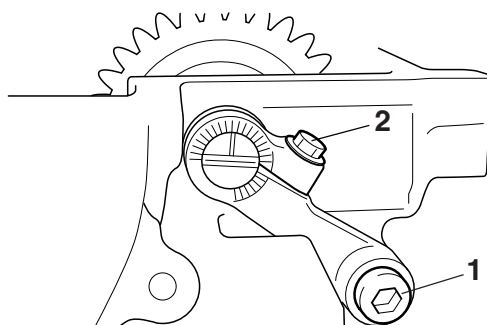
- Front balancer lever bolt "1"
- Front balancer shaft pinch bolt "2"



Front balancer lever bolt
14 Nm (1.4 m·kg, 10 ft·lb)
Front balancer shaft pinch bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Make sure that the balancer shaft does not rotate.



7. Start the engine and check that there is no abnormal noise coming from the balancer gear. If noise is abnormal, adjust the gear lash by turning the balancer shaft.

NOTE:

With each adjustment, turn the balancer shaft one scale.

| | |
|------------------|---------------------|
| Clockwise | Gear lash decreased |
| Counterclockwise | Gear lash increased |

ET3P61033

INSTALLING THE REAR BALANCER

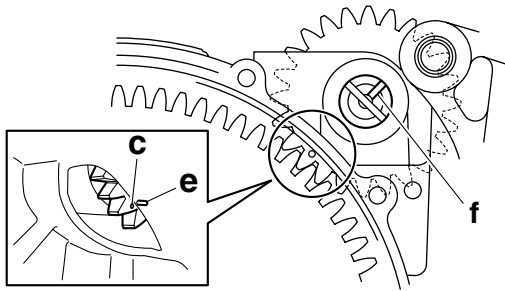
1. Install:

- Rear balancer gear "1"
- Dampers "2"
- Rear balancer weight "3"
- Bearings
- Washers

NOTE:

- Install the dampers onto the balancer gear so that the middle section "a" of each damper is positioned to the outside of the gear projections as shown in the illustration.
- Align the punch mark "b" in the balancer weight with the mark "c" in the balancer gear.

BALANCERS



Rear balancer lever bolt
14 Nm (1.4 m·kg, 10 ft·lb)
Rear balancer shaft pinch bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

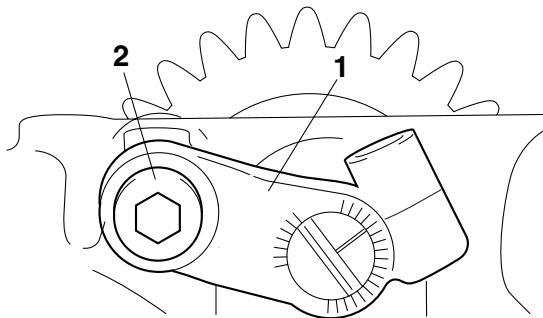
Make sure that the balancer shaft does not rotate.

4. Install:

- Rear balancer lever “1”
- Rear balancer lever bolt “2”

NOTE:

- Apply locking agent (LOCTITE®) to the threads of the balancer lever bolt.
- Temporarily tighten the balancer lever bolt.



5. Tighten:

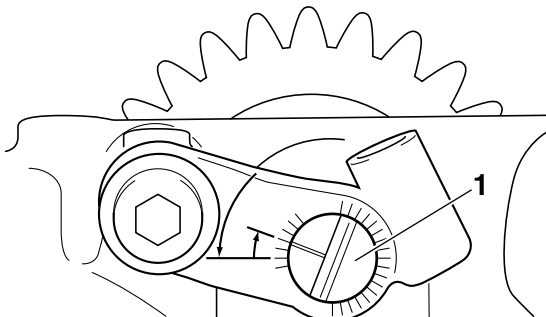
- Rear balancer shaft “1”



Rear balancer shaft
0.4 Nm (0.04 m·kg, 0.29 ft·lb)

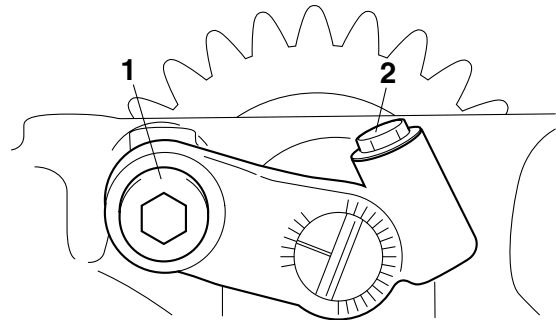
NOTE:

Tighten the balancer shaft to the specified torque by turning it counterclockwise, and then turn it two marks back on the balancer lever scale.



6. Tighten:

- Rear balancer lever bolt “1”
- Rear balancer shaft pinch bolt “2”



7. Start the engine and check that there is no abnormal noise coming from the balancer gear. If noise is abnormal, adjust the gear lash by turning the balancer shaft.

NOTE:

With each adjustment, turn the balancer shaft one scale.

| | |
|------------------|---------------------|
| Clockwise | Gear lash decreased |
| Counterclockwise | Gear lash increased |

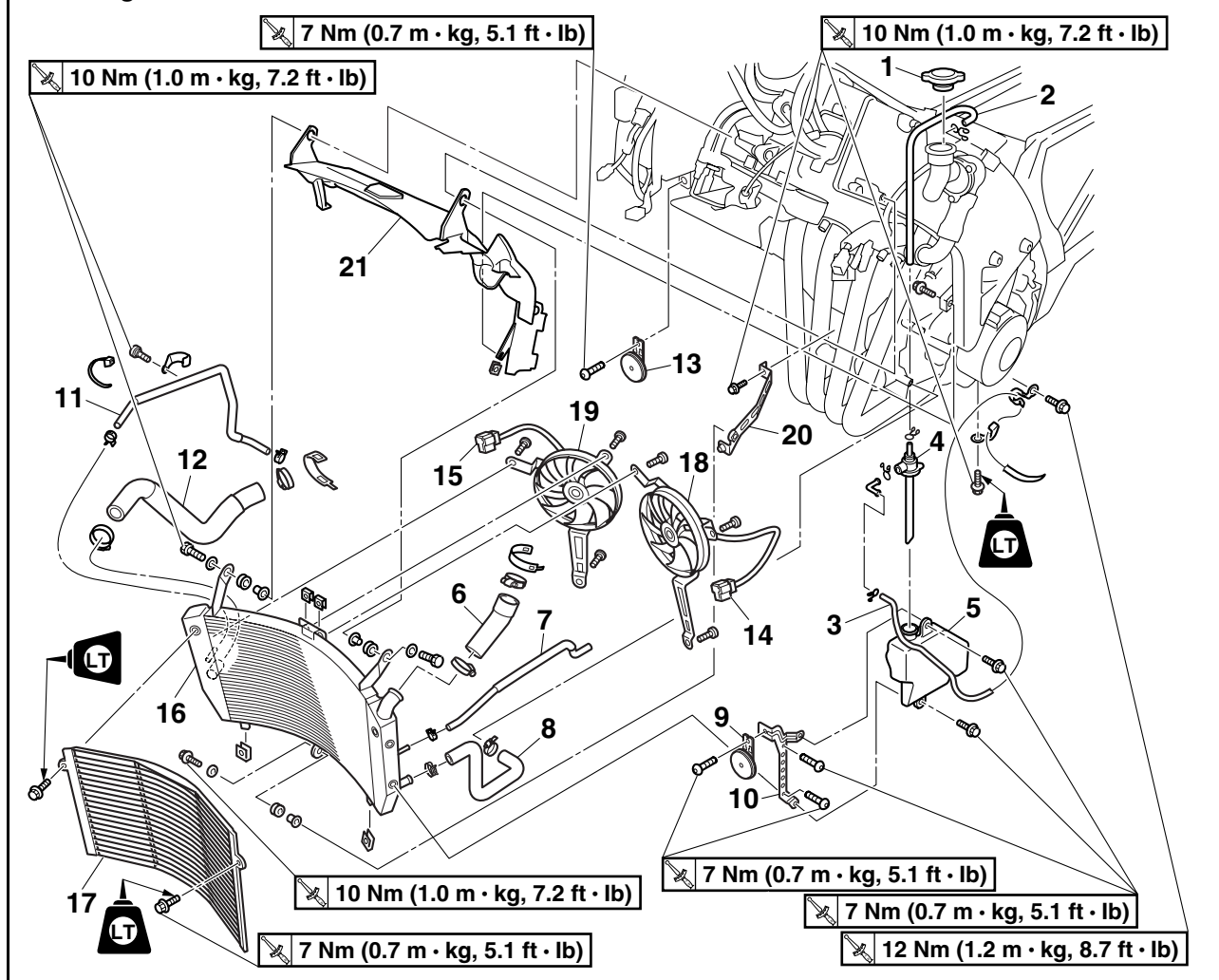
COOLING SYSTEM

| | |
|--|------|
| RADIATOR | 6-1 |
| CHECKING THE RADIATOR..... | 6-3 |
| INSTALLING THE RADIATOR..... | 6-3 |
| OIL COOLER | 6-4 |
| CHECKING THE OIL COOLER | 6-5 |
| INSTALLING THE OIL COOLER | 6-5 |
| THERMOSTAT | 6-6 |
| CHECKING THE THERMOSTAT..... | 6-8 |
| INSTALLING THE THERMOSTAT ASSEMBLY | 6-8 |
| WATER PUMP | 6-10 |
| DISASSEMBLING THE WATER PUMP..... | 6-12 |
| CHECKING THE WATER PUMP | 6-12 |
| ASSEMBLING THE WATER PUMP..... | 6-12 |
| INSTALLING THE WATER PUMP | 6-13 |

EAS26380

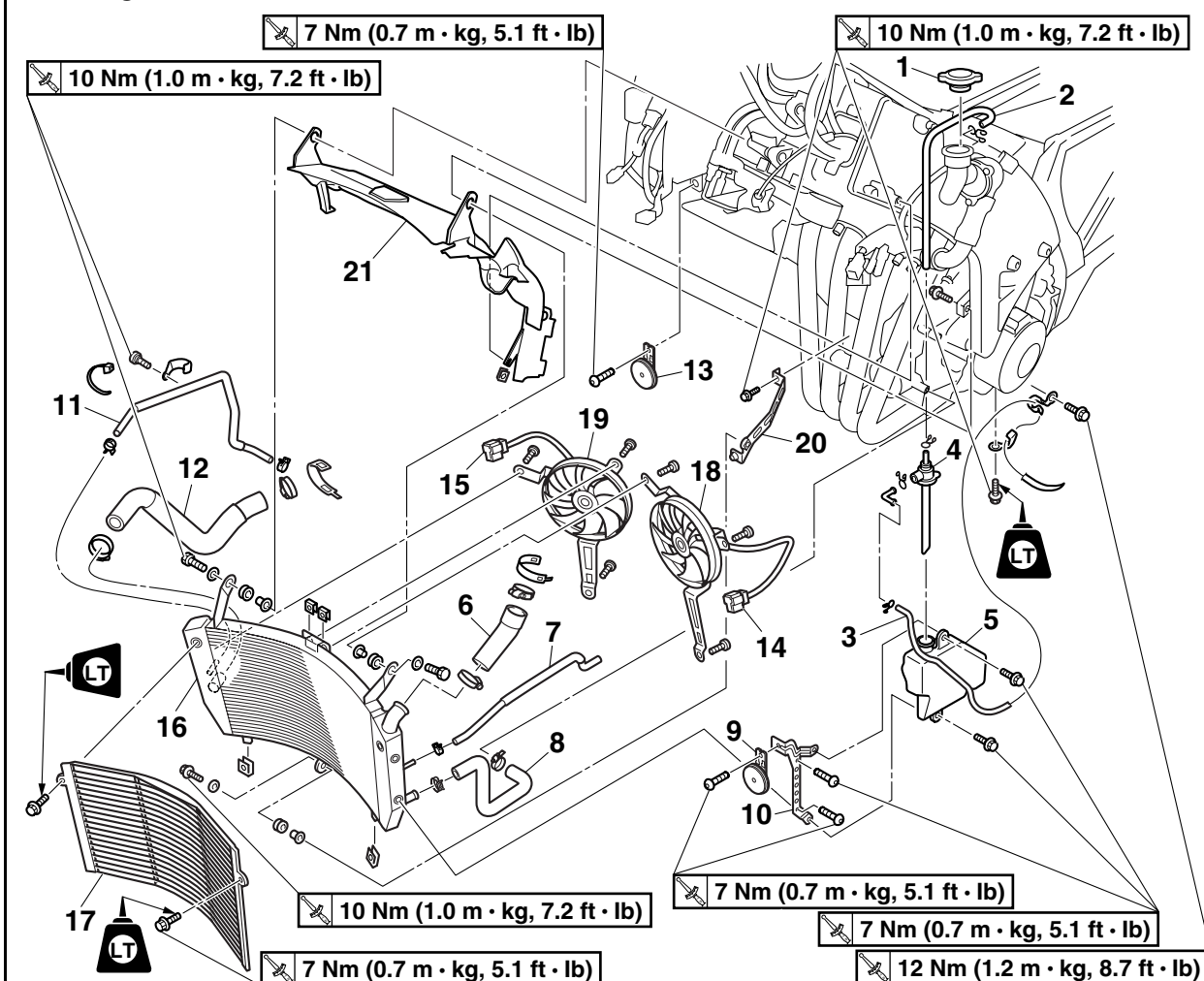
RADIATOR

Removing the radiator



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------|------|---|
| | Coolant | | Drain. Refer to "CHANGING THE COOLANT" on page 3-19. |
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| 1 | Radiator cap | 1 | |
| 2 | Coolant reservoir hose | 1 | |
| 3 | Coolant reservoir breather hose | 1 | |
| 4 | Coolant reservoir cap | 1 | |
| 5 | Coolant reservoir | 1 | |
| 6 | Radiator inlet hose | 1 | |
| 7 | Plunger control unit hose 2 | 1 | |
| 8 | Oil cooler outlet hose | 1 | |
| 9 | Left horn (low) | 1 | |
| 10 | Coolant reservoir bracket | 1 | |
| 11 | Water pump breather hose | 1 | |
| 12 | Radiator outlet hose | 1 | |
| 13 | Right horn (high) | 1 | |

Removing the radiator

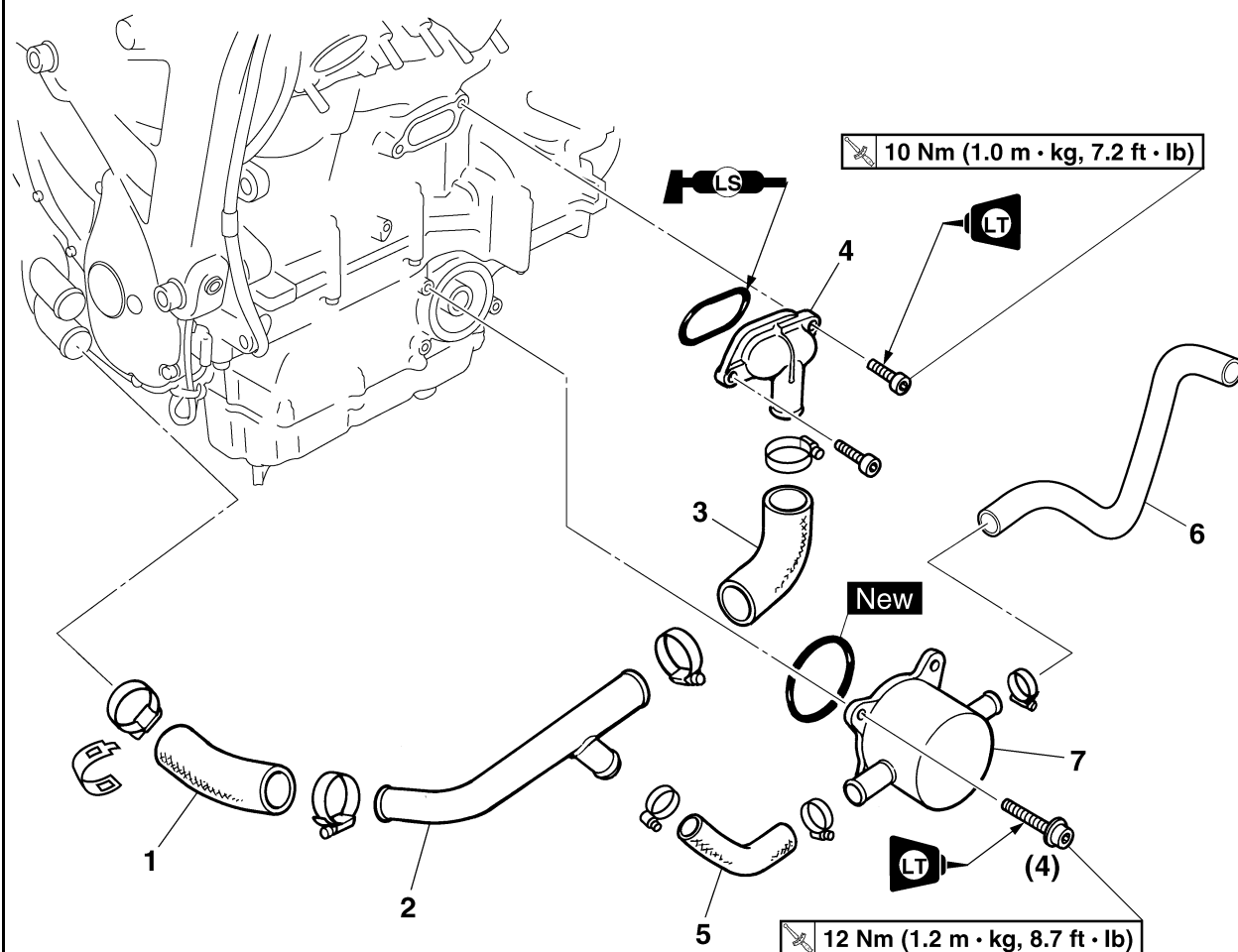


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|----------------------------------|------|--|
| 14 | Left radiator fan motor coupler | 1 | Disconnect. |
| 15 | Right radiator fan motor coupler | 1 | Disconnect. |
| 16 | Radiator | 1 | |
| 17 | Radiator cover | 1 | |
| 18 | Left radiator fan motor | 1 | |
| 19 | Right radiator fan motor | 1 | |
| 20 | Radiator bracket | 1 | |
| 21 | Air deflector | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS26410

OIL COOLER

Removing the oil cooler



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------------|------|--|
| | Engine oil | | Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Coolant | | Drain. Refer to "CHANGING THE COOLANT" on page 3-19. |
| | Radiator | | Refer to "RADIATOR" on page 6-1. |
| | Exhaust pipe assembly | | Refer to "ENGINE REMOVAL" on page 5-1. |
| 1 | Water pump outlet hose | 1 | |
| 2 | Water pump outlet pipe | 1 | |
| 3 | Water jacket joint inlet hose | 1 | |
| 4 | Water jacket joint | 1 | |
| 5 | Oil cooler inlet hose | 1 | |
| 6 | Oil cooler outlet hose | 1 | |
| 7 | Oil cooler | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS26420

CHECKING THE OIL COOLER

1. Check:
 - Oil cooler
Cracks/damage → Replace.
2. Check:
 - Oil cooler inlet hose
 - Oil cooler outlet hose
 - Water pump outlet hose
 - Water pump outlet pipe
 - Water jacket joint inlet 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



Oil cooler bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE®

NOTE:

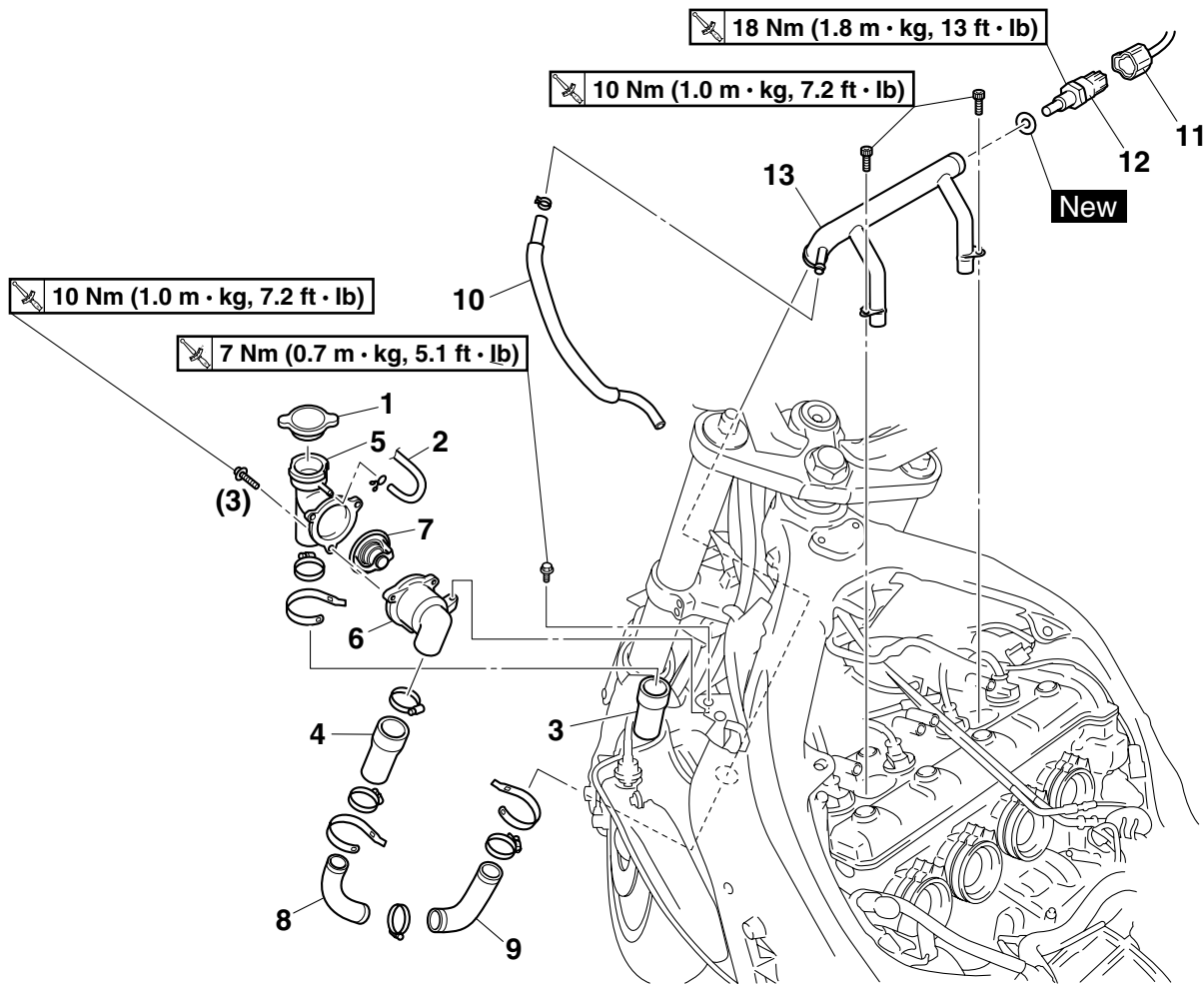
Make sure the O-ring is positioned properly.

3. Fill:
 - Cooling system
(with the specified amount of the recommended coolant)
Refer to “CHANGING THE COOLANT” on page 3-19.
 - Crankcase
(with the specified amount of the recommended engine oil)
Refer to “CHANGING THE ENGINE OIL” on page 3-13.
4. Check:
 - Cooling system
Leaks → Repair or replace any faulty part.
5. Measure:
 - Radiator cap opening pressure
Below the specified pressure → Replace the radiator cap.
Refer to “CHECKING THE RADIATOR” on page 6-3.

EAS26440

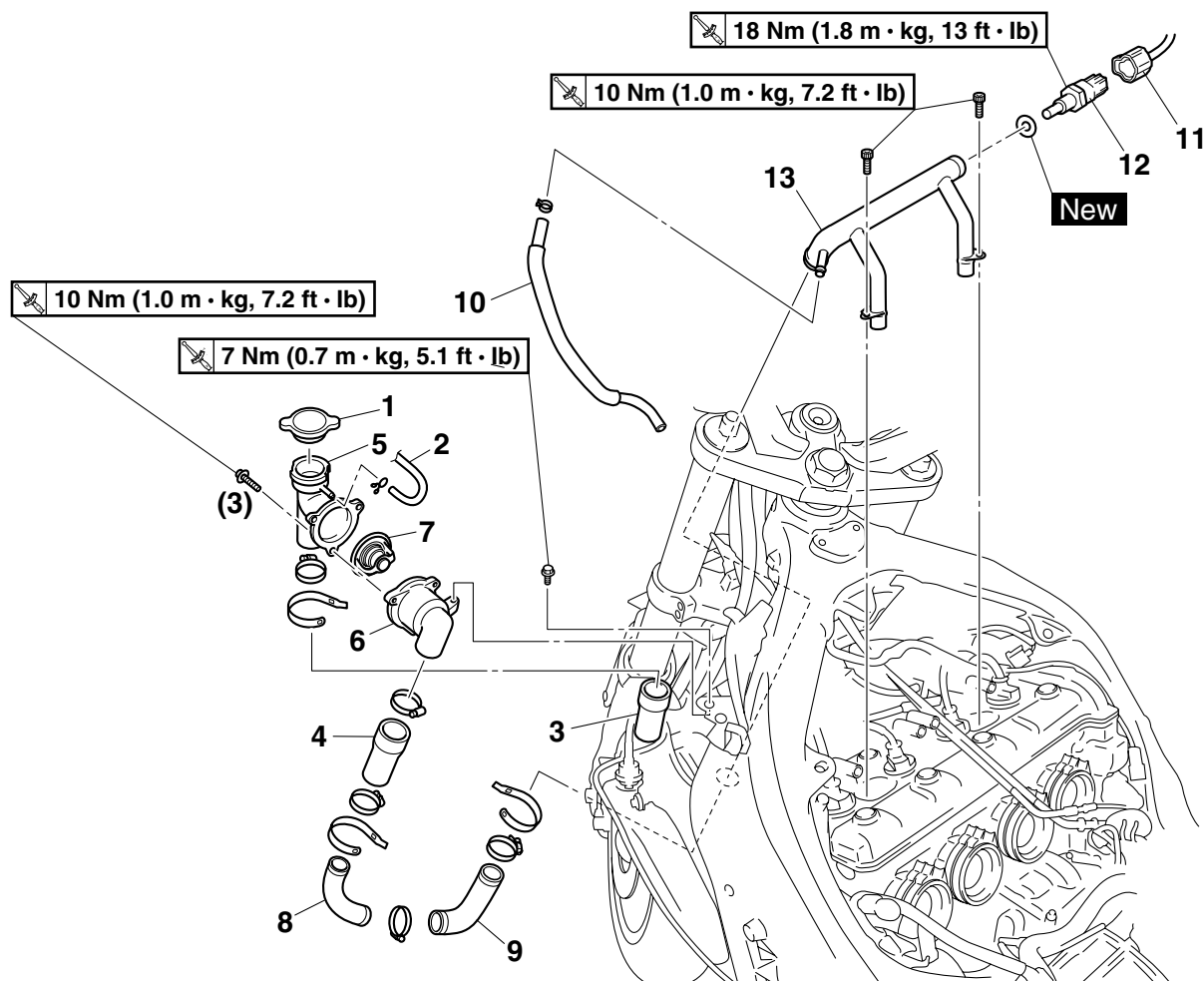
THERMOSTAT

Removing the thermostat assembly



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------------------------|------|---|
| | Coolant | | Drain. Refer to "CHANGING THE COOLANT" on page 3-19. |
| | Throttle bodies | | Refer to "THROTTLE BODIES" on page 7-4. |
| 1 | Radiator cap | 1 | |
| 2 | Coolant reservoir hose | 1 | Disconnect. |
| 3 | Radiator inlet hose | 1 | Disconnect. |
| 4 | Thermostat inlet hose 2 | 1 | |
| 5 | Thermostat cover/radiator filler pipe | 1 | |
| 6 | Thermostat housing | 1 | |
| 7 | Thermostat | 1 | |
| 8 | Thermostat inlet pipe 2 | 1 | |
| 9 | Thermostat inlet hose 1 | 1 | |
| 10 | Plunger control unit hose 1 | 1 | |
| 11 | Coolant temperature sensor coupler | 1 | Disconnect. |
| 12 | Coolant temperature sensor | 1 | |

Removing the thermostat assembly

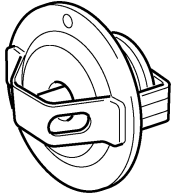


| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------|------|--|
| 13 | Thermostat inlet pipe 1 | 1 | |
| | | | For installation, reverse the removal procedure. |

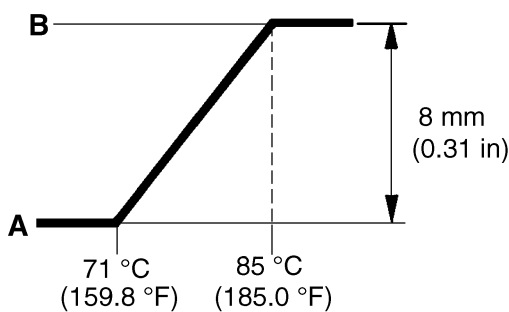
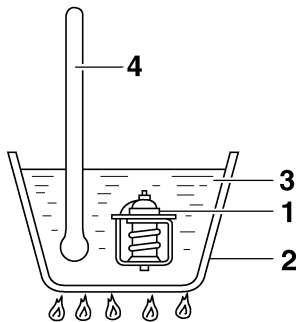
EAS26450

CHECKING THE THERMOSTAT

1. Check:
 - Thermostat
 Does not open at 71–85 °C (159.8–185.0 °F)
 → Replace.



- 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

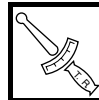
NOTE: _____
 If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:
 - Thermostat housing
 Cracks/damage → Replace.
3. Check:
 - Thermostat hoses
 - Thermostat pipes
 - Radiator inlet hose
 - Thermostat cover/radiator filler pipe
 - Plunger control unit hose 1
 Cracks/damage/wear → Replace.

EAS26490

INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
 - Copper washer **New**
 - Coolant temperature sensor



Coolant temperature sensor
18 Nm (1.8 m·kg, 13 ft·lb)

EC3P61019

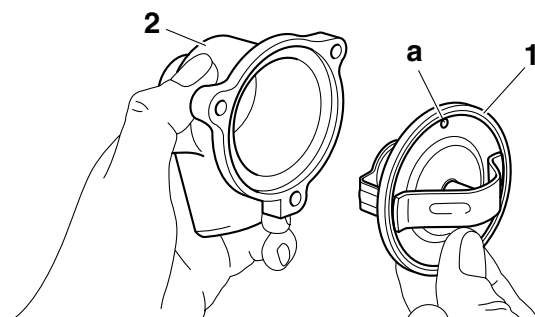
CAUTION:

Use extreme care when handling the coolant temperature sensor. Replace any part that was dropped or subjected to a strong impact.

2. Install:
 - Thermostat “1”
 - Thermostat housing “2”

NOTE:

Install the thermostat with its breather hole “a” facing up.



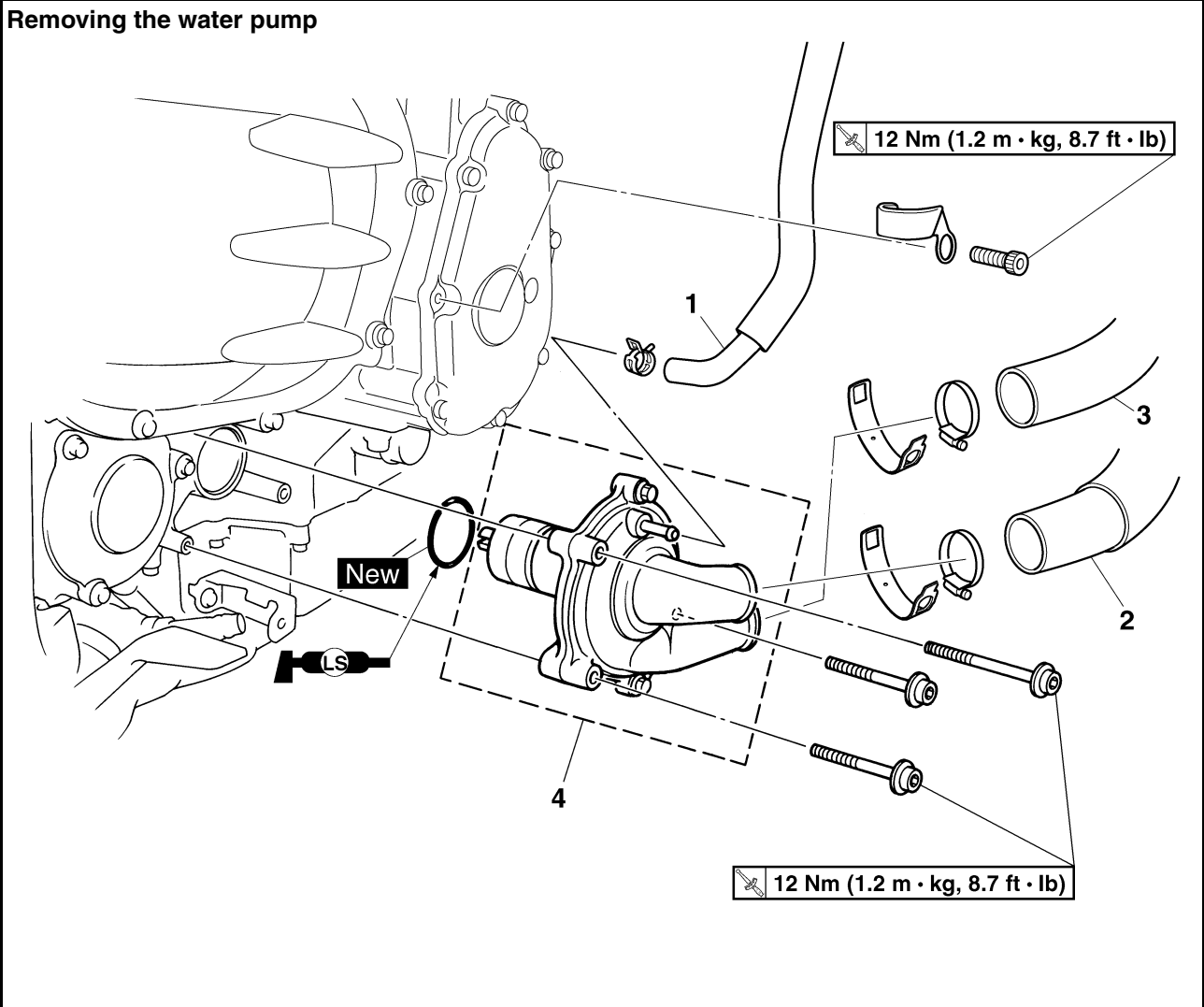
3. Fill:
 - Cooling system
 (with the specified amount of the recommended coolant)
 Refer to “CHANGING THE COOLANT” on page 3-19.
4. Check:
 - Cooling system
 Leaks → Repair or replace any faulty part.

5. Measure:
- Radiator cap opening pressure
Below the specified pressure → Replace the radiator cap.
Refer to “CHECKING THE RADIATOR” on page 6-3.

EAS26500

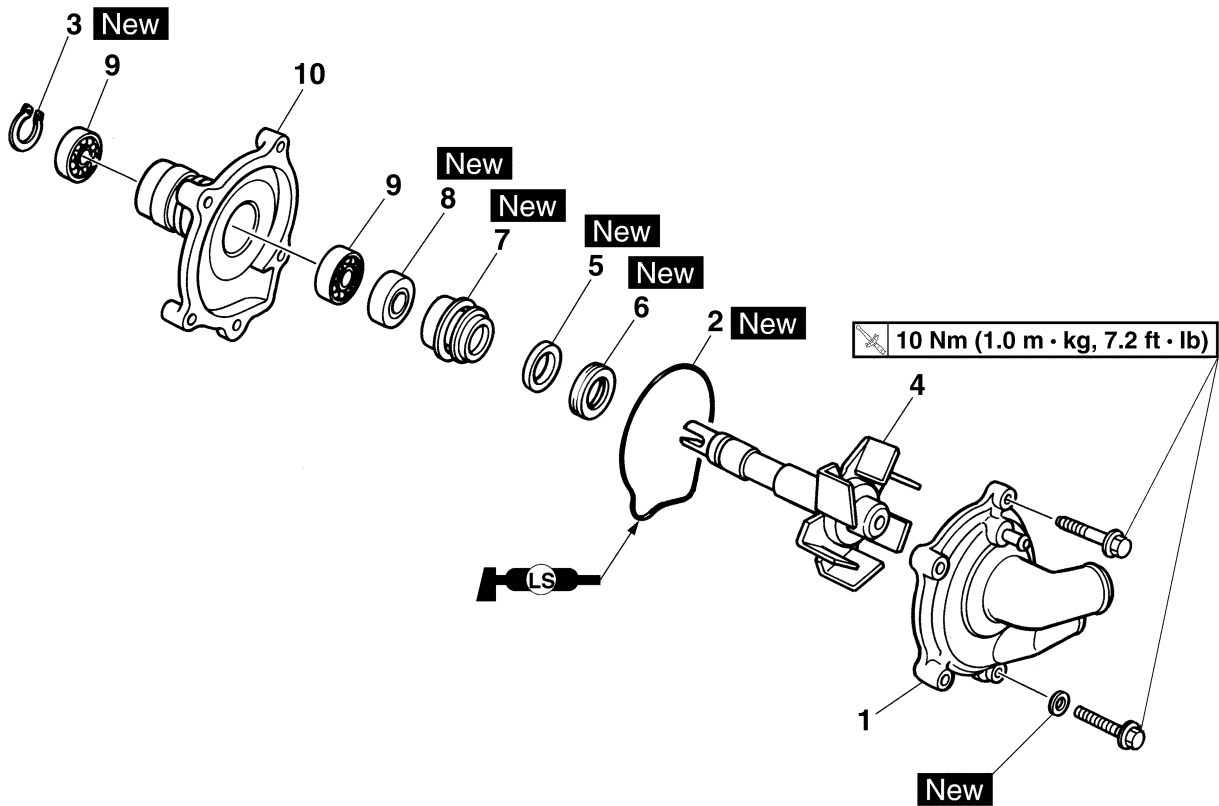
WATER PUMP

Removing the water pump



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------|------|--|
| | | | It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil. |
| | Right side cowling | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Coolant | | Drain. Refer to "CHANGING THE COOLANT" on page 3-19. |
| 1 | Water pump breather hose | 1 | Disconnect. |
| 2 | Radiator outlet hose | 1 | Disconnect. |
| 3 | Water pump outlet hose | 1 | Disconnect. |
| 4 | Water pump assembly | 1 | |
| | | | For installation, reverse the removal procedure. |

Disassembling the water pump



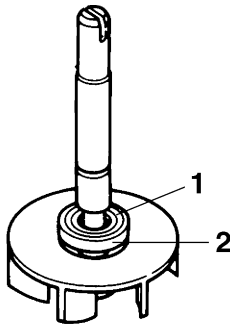
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--------------------------|------|--|
| 1 | Water pump housing cover | 1 | |
| 2 | O-ring | 1 | |
| 3 | Circlip | 1 | |
| 4 | Impeller shaft | 1 | |
| 5 | Rubber damper holder | 1 | |
| 6 | Rubber damper | 1 | |
| 7 | Water pump seal | 1 | |
| 8 | Oil seal | 1 | |
| 9 | Bearing | 2 | |
| 10 | Water pump housing | 1 | |
| | | | For assembly, reverse the disassembly procedure. |

EAS26510

DISASSEMBLING THE WATER PUMP

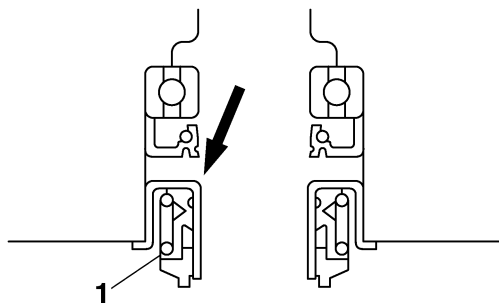
- Remove:
 - Rubber damper holder "1"
 - Rubber damper "2"
 (from the impeller, with a thin, flat-head screwdriver)

NOTE: _____
Do not scratch the impeller shaft.



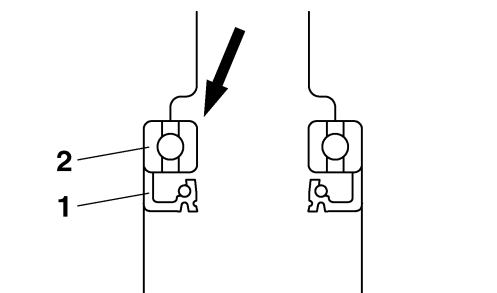
- Remove:
 - Water pump seal "1"

NOTE: _____
Remove the water pump seal from the inside of the water pump housing.



- Remove:
 - Oil seal "1"
 - Bearing "2"

NOTE: _____
Remove the bearing and oil seal from the inside of the water pump housing.



EAS26540

CHECKING THE WATER PUMP

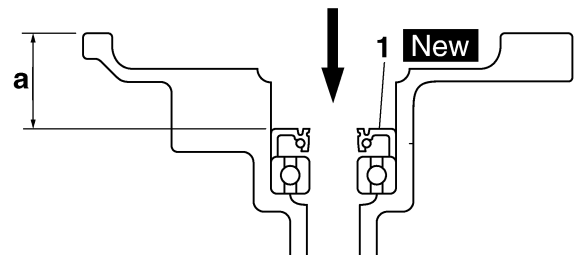
- Check:
 - Water pump housing cover
 - Water pump housing
 - Impeller shaft
 Cracks/damage/wear → Replace.
- Check:
 - Bearing
 Rough movement → Replace.

EAS26560

ASSEMBLING THE WATER PUMP

- Install:
 - Oil seal "1" **New**
 (into the water pump housing)

NOTE: _____
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:
 - Water pump seal "1" **New**

ECA14080

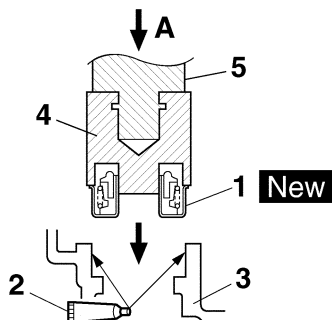
CAUTION: _____
Never lubricate the water pump seal surface with oil or grease.

NOTE: _____
Install the water pump seal with the special tools.
Before installing the water pump seal, apply Yamaha bond No.1215 (Three Bond No.1215®) "2" to the water pump housing "3".

WATER PUMP



Mechanical seal installer
90890-04078
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Bearing driver 40 mm
YM-04058
Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)



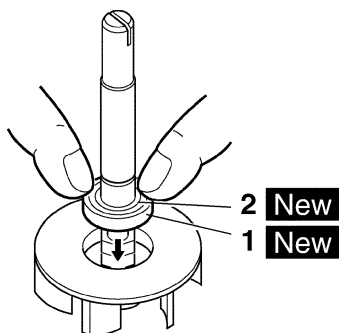
- A. Push down
4. Mechanical seal installer
5. Middle driven shaft bearing driver

3. Install:

- Rubber damper "1" **New**
- Rubber damper holder "2" **New**

NOTE:

Before installing the rubber damper, apply tap water or coolant onto its outer surface.



4. Measure:

- Impeller shaft tilt
Out of specification → Repeat steps (3) and (4).

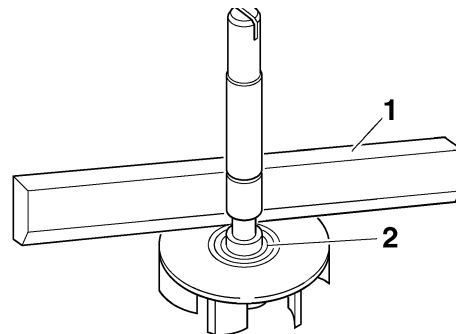
ECA14090

CAUTION:

Make sure the rubber damper and rubber damper holder are flush with the impeller.



Impeller shaft tilt limit
0.15 mm (0.006 in)



1. Straightedge
2. Impeller

5. Install:

- Impeller "1"
- Circlip **New**

NOTE:

After installation, check that the impeller shaft rotates smoothly.



EAS26580

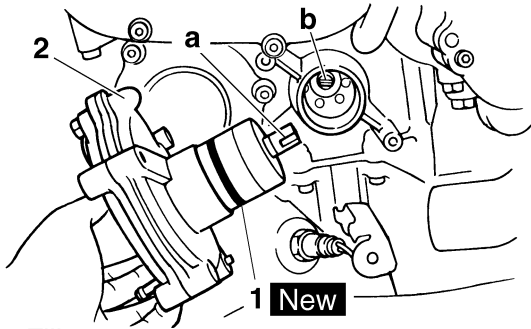
INSTALLING THE WATER PUMP

1. Install:

- O-ring "1" **New**
- Water pump assembly "2"

NOTE:

- Align the slit "a" on the impeller shaft with the projection "b" on the oil pump driven sprocket.
- Lubricate the O-ring with a thin coat of lithium soap base grease.



2. Fill:

- Cooling system
(with the specified amount of the recommended coolant)
Refer to "CHANGING THE COOLANT" on page 3-19.

3. Check:

- Cooling system
Leaks → Repair or replace any faulty part.

4. Measure:

- Radiator cap opening pressure
Below the specified pressure → Replace the radiator cap.
Refer to "CHECKING THE RADIATOR" on page 6-3.

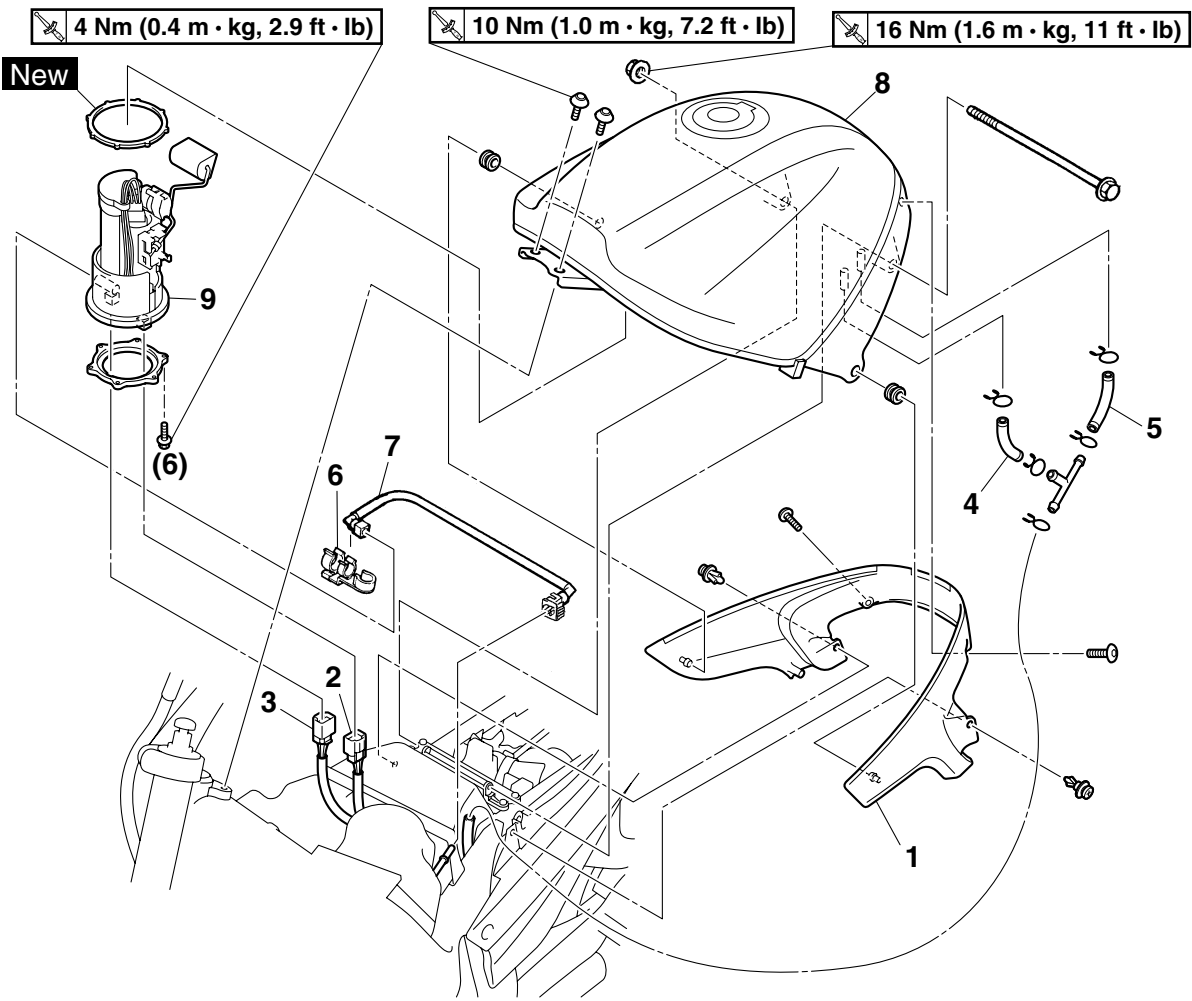
FUEL SYSTEM

| | |
|---|------|
| FUEL TANK | 7-1 |
| REMOVING THE FUEL TANK..... | 7-2 |
| REMOVING THE FUEL PUMP..... | 7-2 |
| CHECKING THE FUEL PUMP BODY..... | 7-2 |
| INSTALLING THE FUEL PUMP..... | 7-2 |
| INSTALLING THE FUEL TANK..... | 7-2 |
| THROTTLE BODIES | 7-4 |
| CHECKING THE INJECTORS..... | 7-7 |
| CHECKING THE THROTTLE BODIES..... | 7-7 |
| CHECKING THE FUEL PRESSURE..... | 7-7 |
| ADJUSTING THE THROTTLE POSITION SENSOR..... | 7-7 |
| AIR INDUCTION SYSTEM | 7-9 |
| CHECKING THE PRESSURE REGULATOR..... | 7-13 |
| CHECKING THE AIR INDUCTION SYSTEM..... | 7-13 |
| INSTALLING THE AIR INDUCTION SYSTEM..... | 7-13 |

EAS26620

FUEL TANK

Removing the fuel tank



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------|------|--|
| | Rider seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Fuel tank panel | 1 | |
| 2 | Fuel sender coupler | 1 | Disconnect. |
| 3 | Fuel pump coupler | 1 | Disconnect. |
| 4 | Fuel tank breather hose | 1 | |
| 5 | Fuel tank overflow hose | 1 | |
| 6 | Fuel hose holder | 1 | |
| 7 | Fuel hose | 1 | |
| 8 | Fuel tank | 1 | |
| 9 | Fuel pump | 1 | |
| | | | For installation, reverse the removal procedure. |

EAS26630

REMOVING THE FUEL TANK

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

EW3P61012

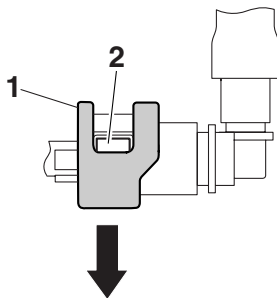


WARNING

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

NOTE:

- To remove the fuel hose from the fuel rail, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then remove the hose.
- Remove the fuel hose manually without using any tools.
- Before removing the hose, place a few rags in the area under where it will be removed.



3. Remove:
 - Fuel tank

NOTE:

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank against a wall or the like.

EAS26640

REMOVING THE FUEL PUMP

1. Remove:
 - Fuel pump

ECA14720

CAUTION:

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

EAS26670

CHECKING THE FUEL PUMP BODY

1. Check:
 - Fuel pump body
Obstruction → Clean.
Cracks/damage → Replace fuel pump assembly.

EAS26700

INSTALLING THE FUEL PUMP

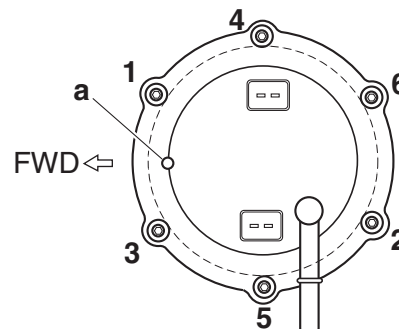
1. Install:
 - Fuel pump



**Fuel pump bolts
4 Nm (0.4 m·kg, 2.9 ft·lb)**

NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align the projection “a” on the fuel pump with the slot in the fuel pump bracket.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



ET3P61018

INSTALLING THE FUEL TANK

1. Install:
 - Fuel hose (fuel rail side)

EC3P61007

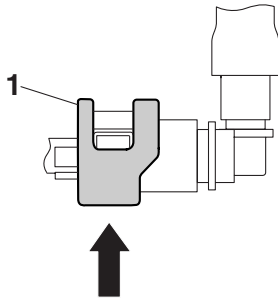
CAUTION:

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

NOTE:

- Install the fuel hose securely onto the fuel 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.



2. Install:

- Fuel hose (fuel pump side)
- Fuel hose holder

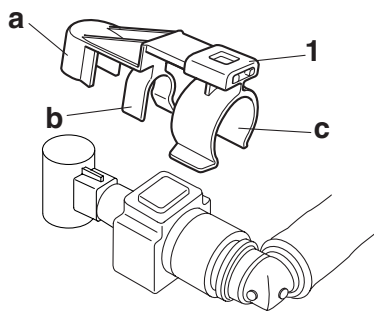
EC3P61008

CAUTION:

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

NOTE:

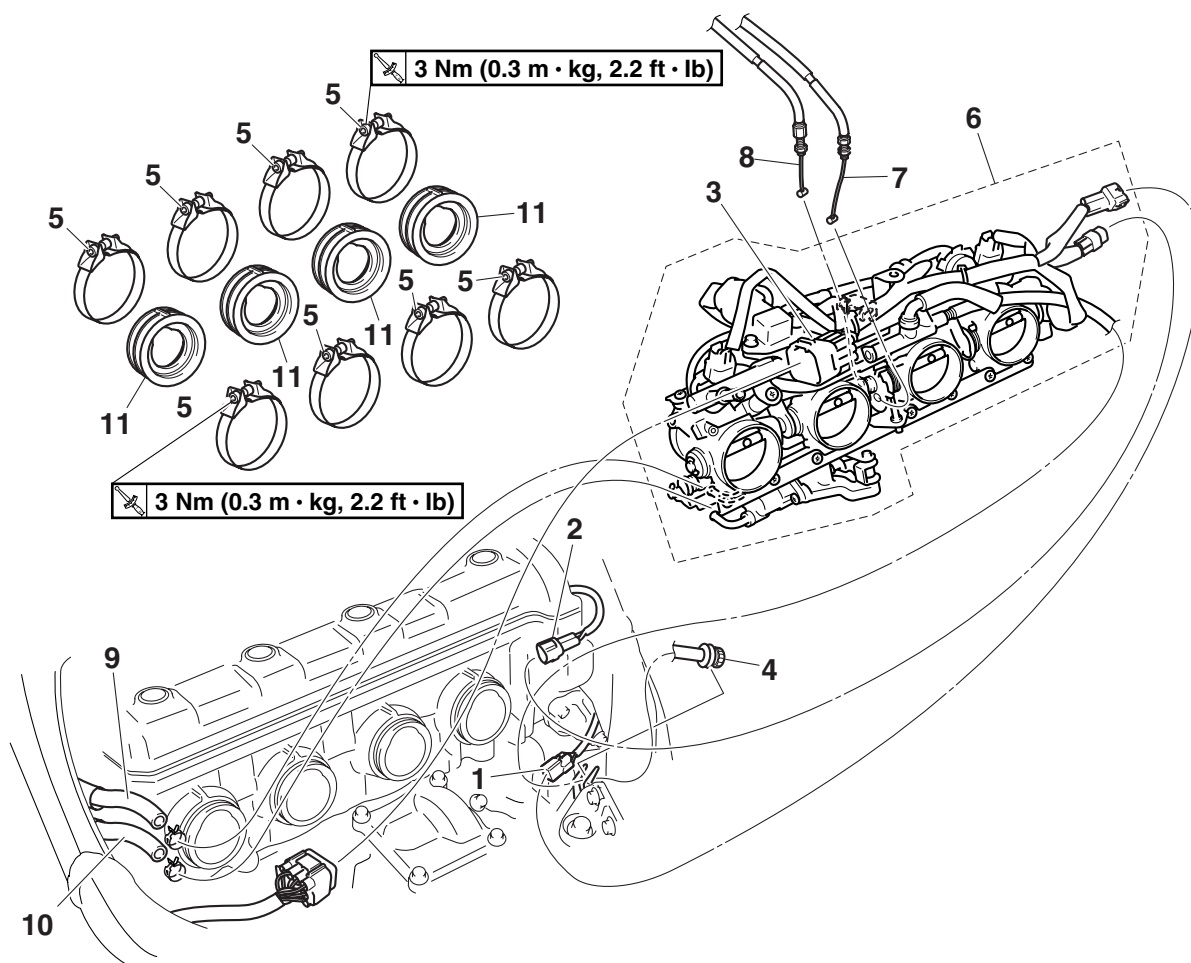
- Install the fuel hose connector securely onto the fuel tank until a distinct “click” is heard, and then make sure that it does not come loose.
- After installing the fuel hose holder “1”, make sure that the sections “a”, “b”, and “c” of the holder are installed securely.



EAS26970

THROTTLE BODIES

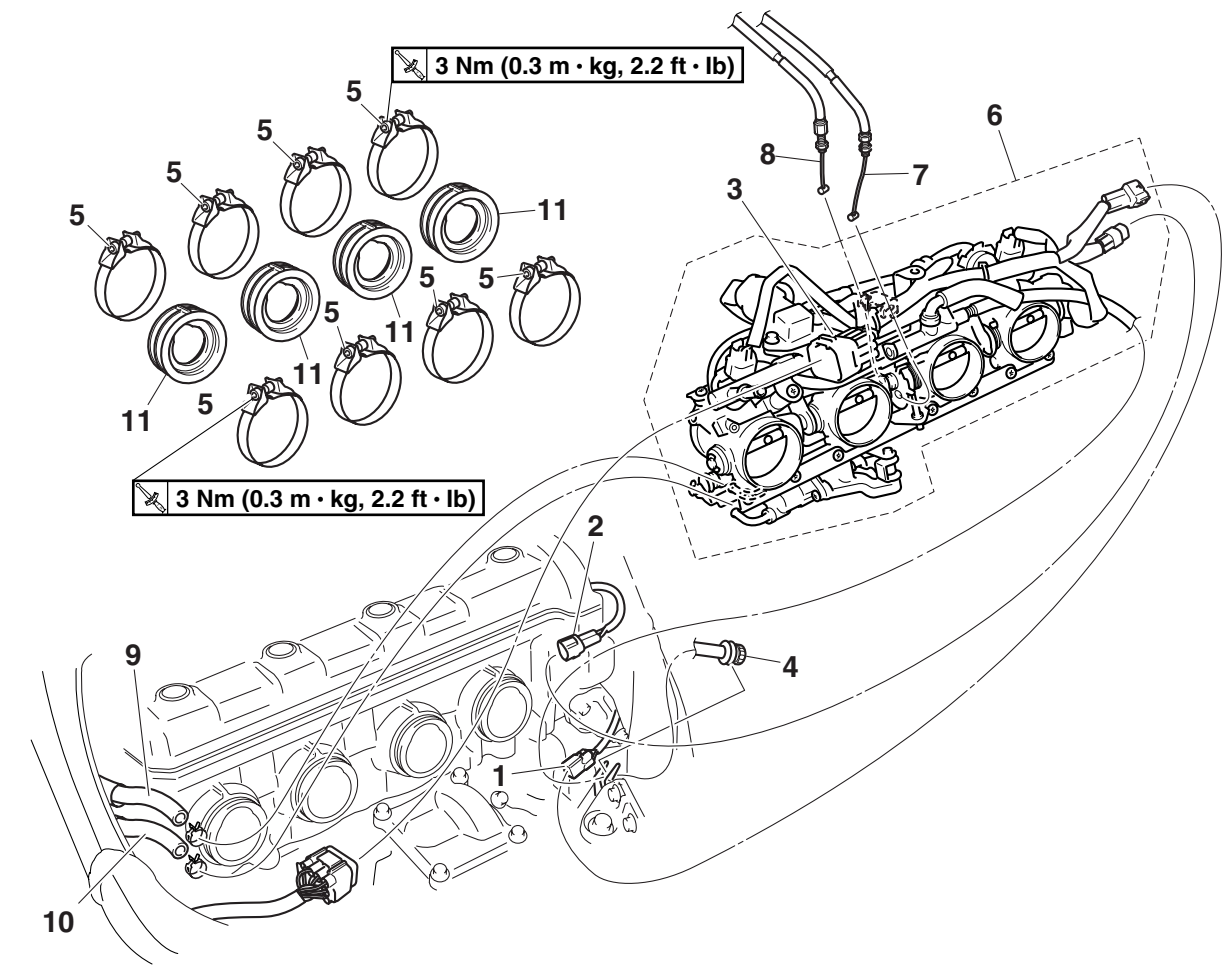
Removing the throttle bodies



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|--|------|---|
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | T-bar/Air filter case | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air cut-off valve | | Refer to "AIR INDUCTION SYSTEM" on page 7-9. |
| | Coolant | | Drain. Refer to "CHANGING THE COOLANT" on page 3-19. |
| 1 | O ₂ sensor coupler | 1 | Disconnect. |
| 2 | Cylinder identification sensor coupler | 1 | Disconnect. |
| 3 | Sub-wire harness coupler | 1 | Disconnect. |
| 4 | Engine idle speed adjusting screw | 1 | Disconnect. |
| 5 | Throttle body joint clamp screw | 8 | Loosen. |
| 6 | Throttle bodies | 1 | |
| 7 | Throttle cable (accelerator cable) | 1 | Disconnect. |
| 8 | Throttle cable (decelerator cable) | 1 | Disconnect. |
| 9 | Plunger control unit hose 1 | 1 | Disconnect. |

THROTTLE BODIES

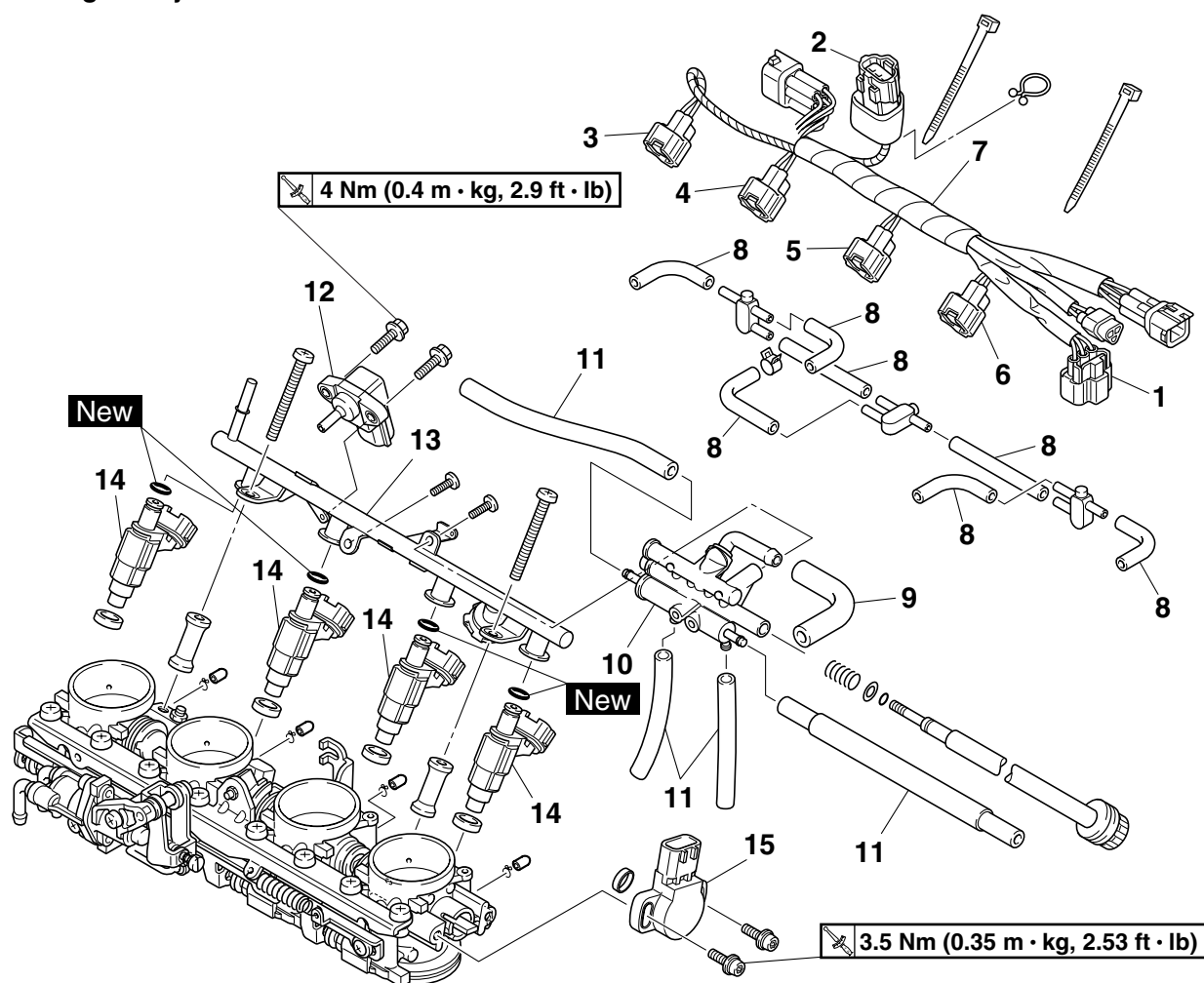
Removing the throttle bodies



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-----------------------------|------|--|
| 10 | Plunger control unit hose 2 | 1 | Disconnect. |
| 11 | Throttle body joint | 4 | |
| | | | For installation, reverse the removal procedure. |

THROTTLE BODIES

Removing the injectors



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| 1 | Throttle position sensor coupler | 1 | Disconnect. |
| 2 | Intake air pressure sensor coupler | 1 | Disconnect. |
| 3 | Cylinder-#1 injector coupler | 1 | Disconnect. |
| 4 | Cylinder-#2 injector coupler | 1 | Disconnect. |
| 5 | Cylinder-#3 injector coupler | 1 | Disconnect. |
| 6 | Cylinder-#4 injector coupler | 1 | Disconnect. |
| 7 | Sub-wire harness | 1 | |
| 8 | Negative pressure hose | 7 | |
| 9 | Bypass air unit inlet hose | 1 | |
| 10 | Bypass air unit | 1 | |
| 11 | Bypass air unit outlet hose | 4 | |
| 12 | Intake air pressure sensor | 1 | |
| 13 | Fuel rail | 1 | |
| 14 | Injector | 4 | |
| 15 | Throttle position sensor | 1 | |
| | | | For installation, reverse the removal procedure. |



Digital circuit tester
90890-03174
Model 88 Multimeter with ta-
chometer
YU-A1927

- c. Turn the main switch to "ON".
- d. Measure the throttle position sensor voltage.
- e. Adjust the throttle position sensor angle so that the voltage is within the specified range.

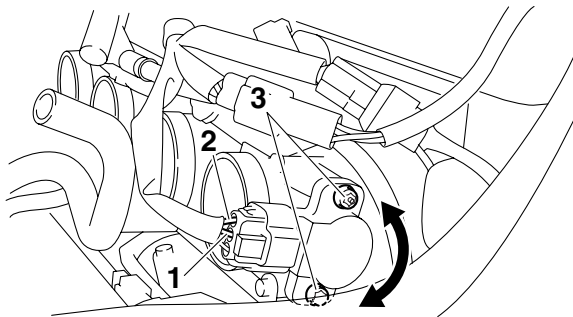


Output voltage (at idle)
0.63–0.73 V

- f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws "3" to specification.

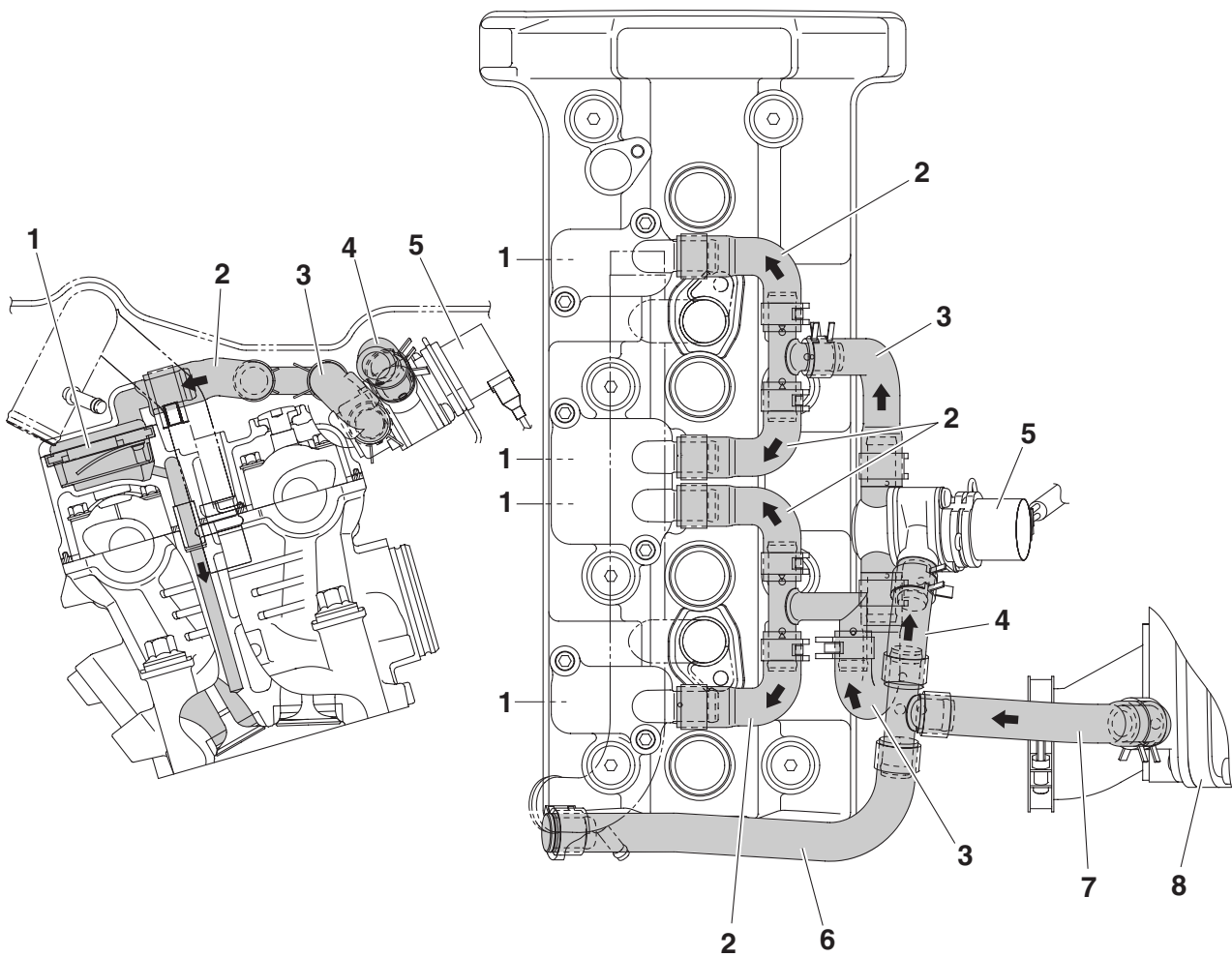


Throttle position sensor screw
3.5 Nm (0.35 m·kg, 2.53 ft·lb)



EAS27040

AIR INDUCTION SYSTEM

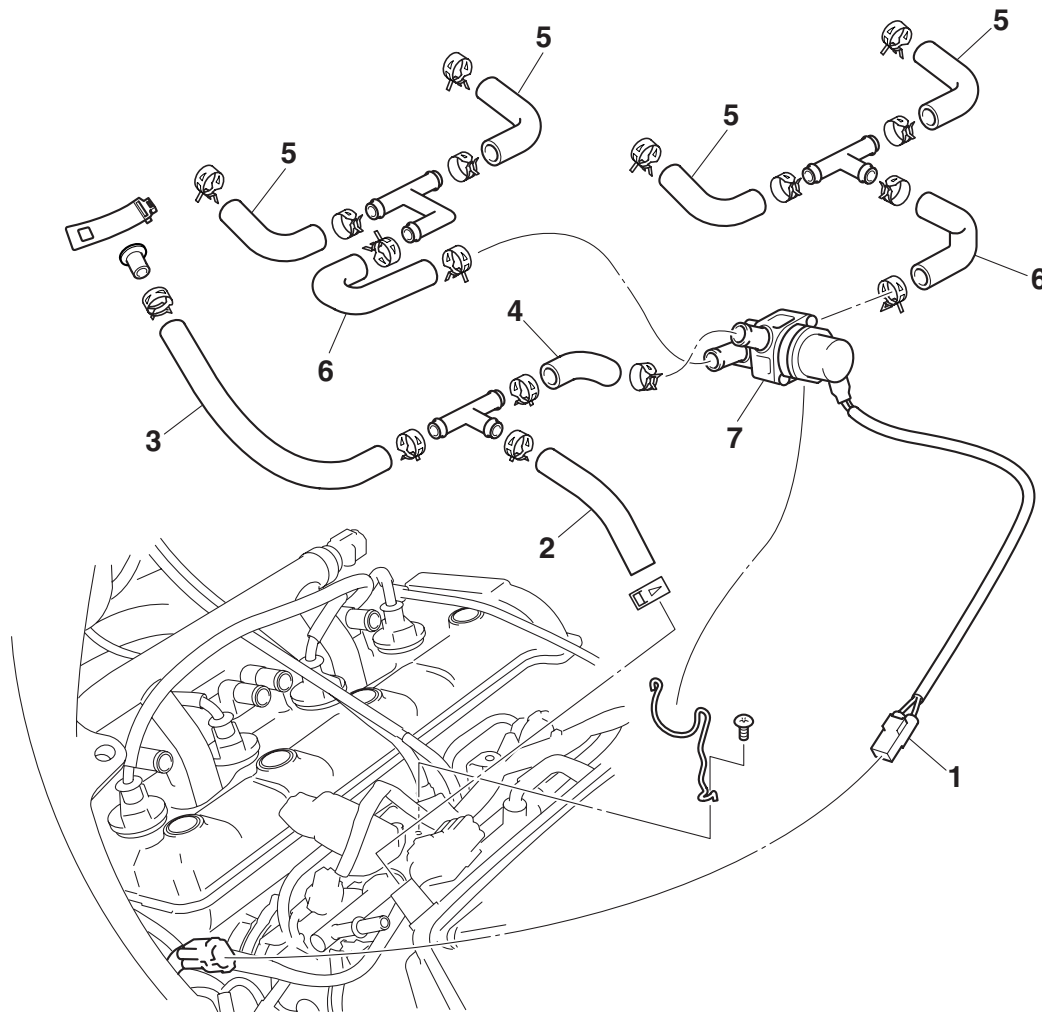


AIR INDUCTION SYSTEM

1. Reed valve assembly
2. Air induction system hose (3-way joint to reed valve cover)
3. Air induction system hose (air cut-off valve to 3-way joint)
4. Air induction system hose (3-way joint to air cut-off valve)
5. Air cut-off valve
6. Air induction system hose (3-way joint to hose plug)
7. Air induction system hose (air filter case joint assembly to 3-way joint)
8. Air filter case joint assembly

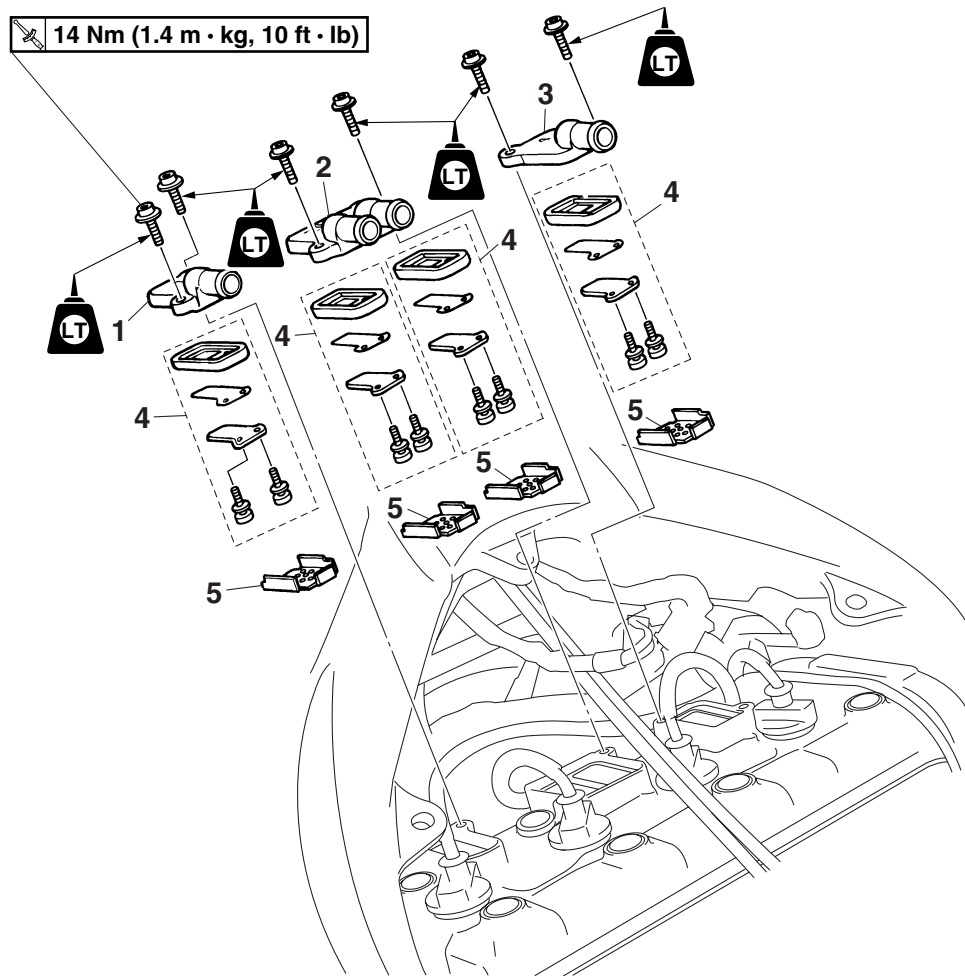
AIR INDUCTION SYSTEM

Removing the air cut-off valve



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---|------|--|
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | T-bar | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Air induction system solenoid coupler | 1 | Disconnect. |
| 2 | Air induction system hose (air filter case joint assembly to 3-way joint) | 1 | |
| 3 | Air induction system hose (3-way joint to hose plug) | 1 | |
| 4 | Air induction system hose (3-way joint to air cut-off valve) | 1 | |
| 5 | Air induction system hose (3-way joint to reed valve cover) | 4 | |
| 6 | Air induction system hose (air cut-off valve to 3-way joint) | 2 | |
| 7 | Air cut-off valve | 1 | |
| | | | For installation, reverse the removal procedure. |

Removing the reed valves



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|------------------------------------|------|--|
| | Thermostat inlet pipe 1 | | Refer to "THERMOSTAT" on page 6-6. |
| 1 | Reed valve cover (cylinder-#1) | 1 | |
| 2 | Reed valve cover (cylinders-#2/#3) | 1 | |
| 3 | Reed valve cover (cylinder-#4) | 1 | |
| 4 | Reed valve assembly | 4 | |
| 5 | Reed valve plate | 4 | |
| | | | For installation, reverse the removal procedure. |

EAS27050

CHECKING THE PRESSURE REGULATOR

1. Check:

- Pressure regulator
Damage → Replace.

EAS27060

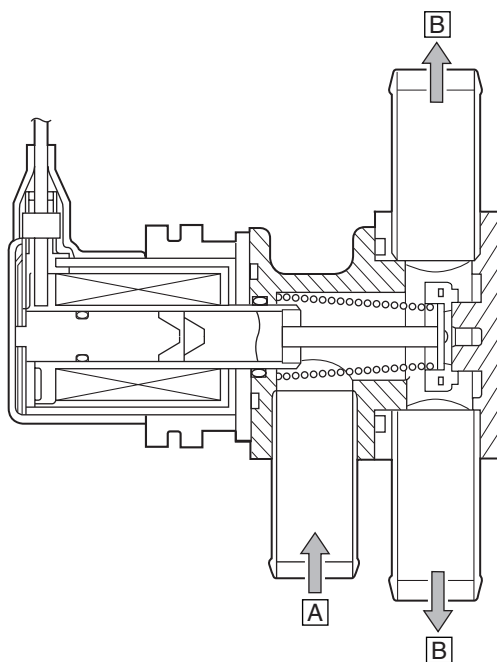
CHECKING THE AIR INDUCTION SYSTEM

Air injection

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C (1112 to 1292 °F).

Air cut-off valve

The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the vehicle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.



- A. From the air filter case
- B. To the reed valve

1. Check:

- Hoses
Loose connections → Connect properly.
Cracks/damage → Replace.
- Pipes
Cracks/damage → Replace.

2. Check:

- Reed valve
- Reed valve stopper
- Reed valve seat
Cracks/damage → Replace the reed valve.

3. Check:

- Air cut-off valve
Cracks/damage → Replace.

4. Check:

- Air induction system solenoid
Refer to "CHECKING THE AIR INDUCTION SYSTEM SOLENOID" on page 8-168.

EAS27070

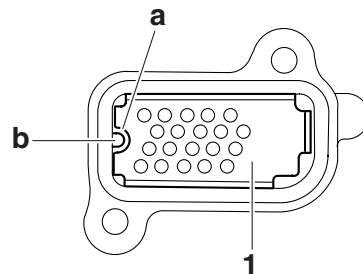
INSTALLING THE AIR INDUCTION SYSTEM

1. Install:

- Reed valve plate "1"

NOTE:

Align the notch "a" in each plate with the projection "b" of each reed valve seat on the cylinder head cover.



ELECTRICAL SYSTEM

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EAS27090

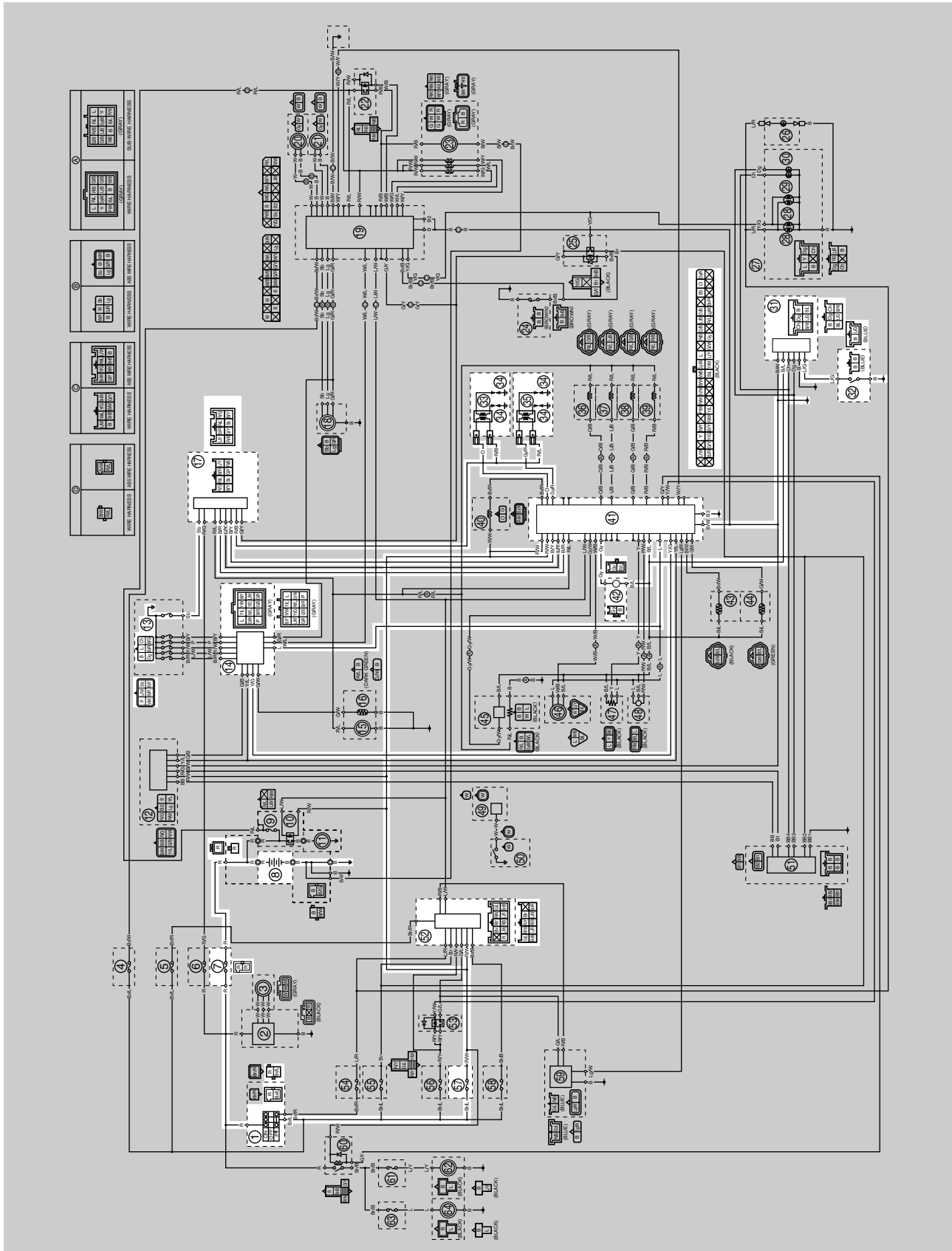
IGNITION SYSTEM

IGNITION SYSTEM

EAS27110

CIRCUIT DIAGRAM (1/2)

CIRCUIT DIAGRAM (1/2)

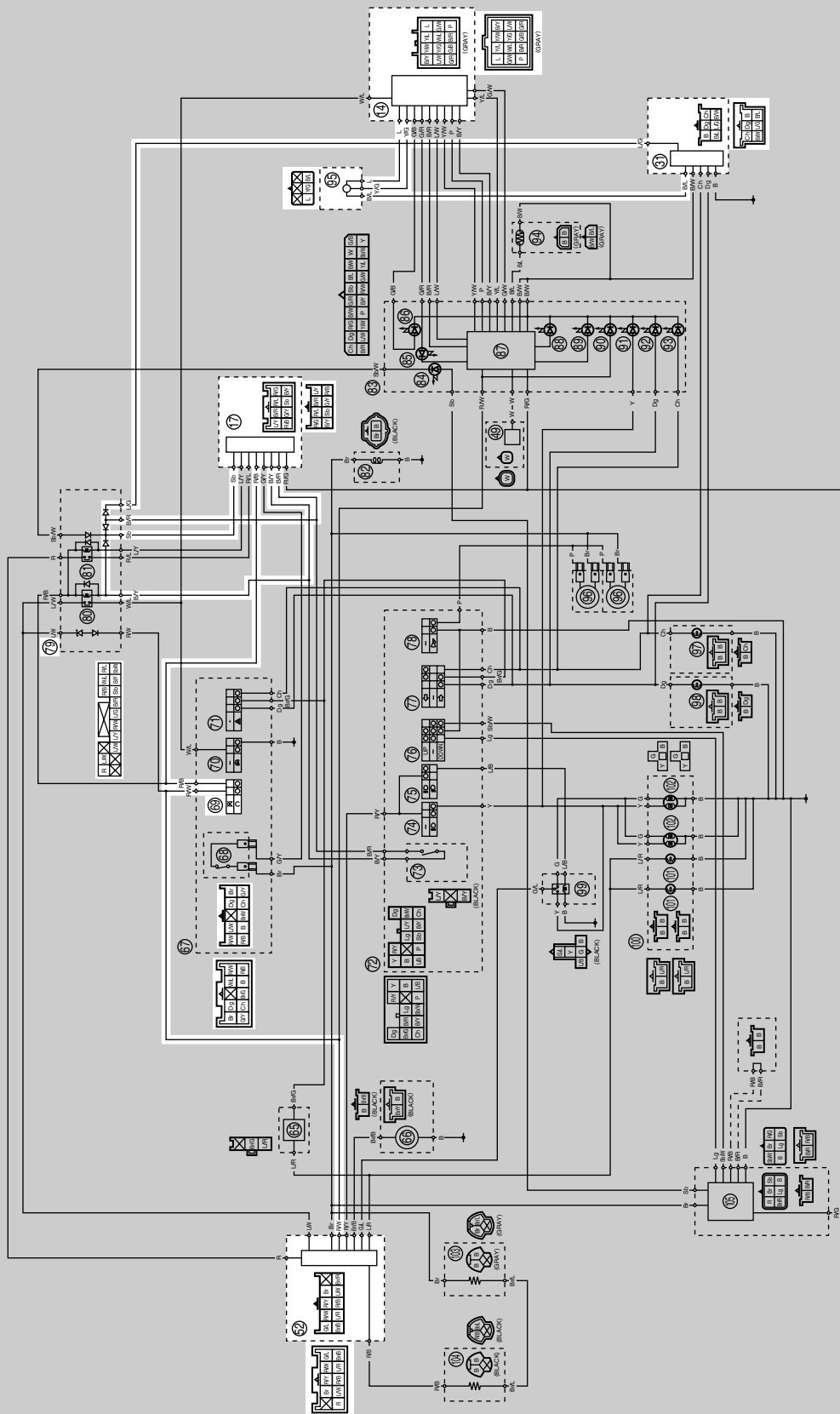


- 1. Main switch
- 7. Main fuse
- 8. Battery
- 13. Gear position switch
- 14. Coupler 1 (wire harness—front cowling wire harness)
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 32. Sidestand switch
- 33. Cylinders-#1/#4 ignition coil
- 34. Spark plug
- 35. Cylinders-#2/#3 ignition coil
- 41. ECU (engine control unit)
- 42. Crankshaft position sensor
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 57. Ignition fuse

ET3P61001

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



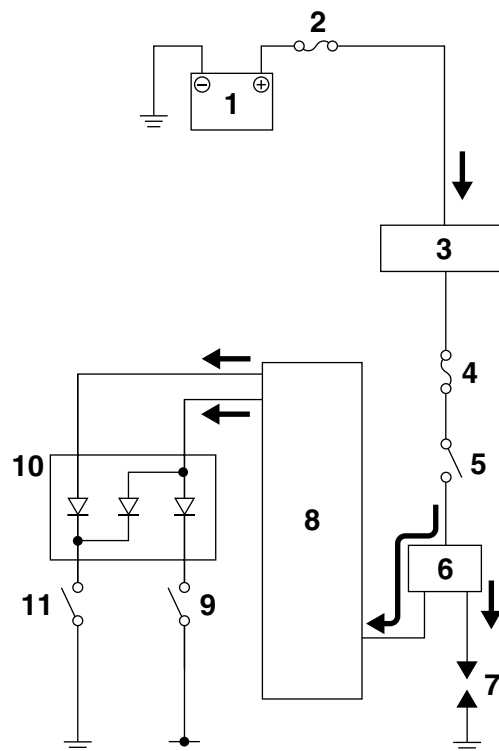
- 14.Coupler 1 (front cowling wire harness–wire harness)
- 17.Coupler 2 (front cowling wire harness–wire harness)
- 31.Coupler 3 (front cowling wire harness–wire harness)
- 52.Coupler 5 (front cowling wire harness–wire harness)
- 69.Engine stop switch
- 79.Relay unit
- 95.Lean angle sensor

ET3P61002

ENGINE STOPPING DUE TO SIDESTAND OPERATION

When the engine is running and the transmission is in gear, the engine will stop if the sidestand is moved down. This is because the electric current from the ignition coils does not flow to the ECU when both the gear position switch (neutral circuit) and sidestand switch are set to “OFF”, thereby preventing the spark plugs from producing a spark. However, the engine continues to run under the following conditions:

- The transmission is in gear (the neutral circuit of the gear position switch is open) and the sidestand is up (the sidestand switch circuit is closed).
- The transmission is in neutral (the neutral circuit of the gear position switch is closed) and the sidestand is down (the sidestand switch circuit is open).



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Ignition coil
7. Spark plug
8. ECU (engine control unit)
9. Sidestand switch
10. Relay unit (diode)
11. Gear position switch (neutral circuit)

EAS27140

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

NOTE:

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar
4. Throttle bodies

| | | |
|---|------|--|
| 1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the spark plugs. Refer to "CHECKING THE SPARK PLUGS" on page 3-9. | NG → | Re-gap or replace the spark plug(s). |
| OK ↓ | | |
| 4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-162. | OK → | Ignition system is OK. |
| NG ↓ | | |
| 5. Check the spark plug caps. Refer to "CHECKING THE SPARK PLUG CAPS" on page 8-161. | NG → | Replace the spark plug cap(s). |
| OK ↓ | | |
| 6. Check the ignition coils. Refer to "CHECKING THE IGNITION COILS" on page 8-161. | NG → | Replace the ignition coil(s). |
| OK ↓ | | |
| 7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-162. | NG → | Replace the crankshaft position sensor. |
| OK ↓ | | |

IGNITION SYSTEM

| | | |
|---|------|--|
| 8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the right handlebar switch. |
| OK ↓ | | |
| 10. Check the gear position switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the gear position switch. |
| OK ↓ | | |
| 11. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the sidestand switch. |
| OK ↓ | | |
| 12. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-160. | NG → | Replace the relay unit. |
| OK ↓ | | |
| 13. Check the lean angle sensor. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-163. | NG → | Replace the lean angle sensor. |
| OK ↓ | | |
| 14. Check the entire ignition system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-1 and "CIRCUIT DIAGRAM (2/2)" on page 8-3. | NG → | Properly connect or repair the ignition system wiring. |
| OK ↓ | | |
| Replace the ECU. | | |

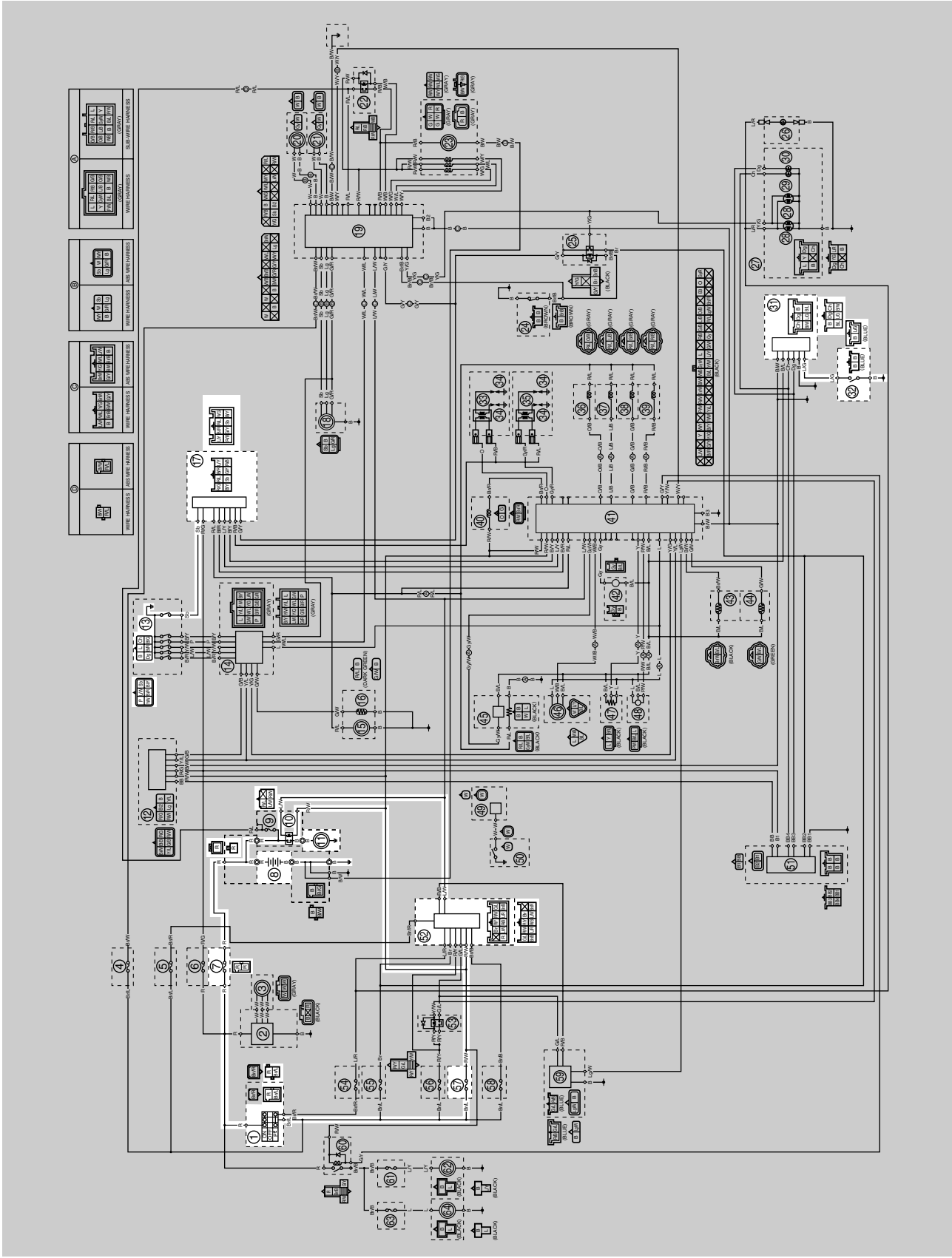
ELECTRIC STARTING SYSTEM

EAS27160

ELECTRIC STARTING SYSTEM

EAS27170

CIRCUIT DIAGRAM (1/2)



ELECTRIC STARTING SYSTEM

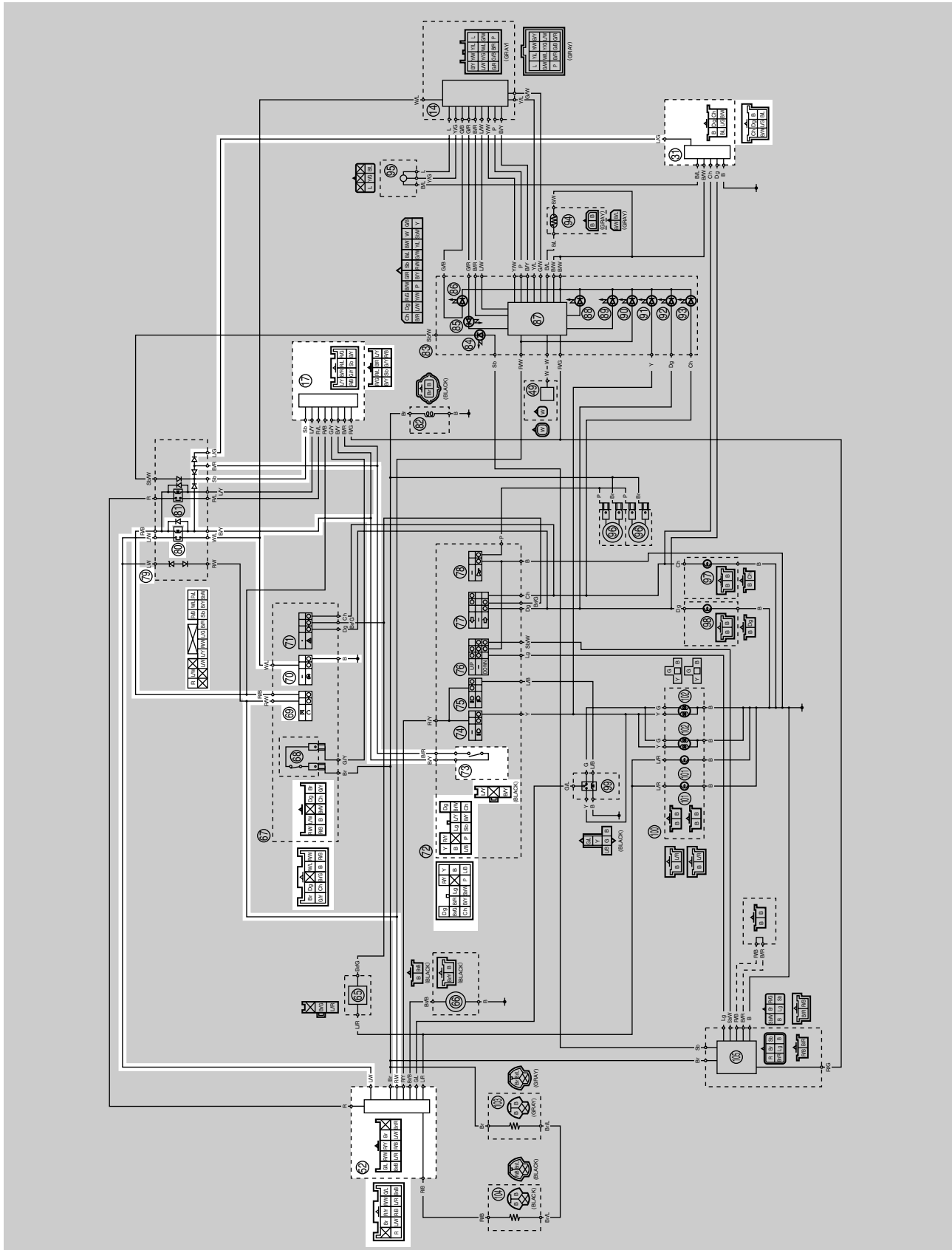
- 1. Main switch
- 7. Main fuse
- 8. Battery
- 10. Starter relay
- 11. Starter motor
- 13. Gear position switch
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 32. Sidestand switch
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 57. Ignition fuse

ELECTRIC STARTING SYSTEM

ET3P61003

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



ELECTRIC STARTING SYSTEM

- 17. Coupler 2 (front cowling wire harness—wire harness)
- 31. Coupler 3 (front cowling wire harness—wire harness)
- 52. Coupler 5 (front cowling wire harness—wire harness)
- 69. Engine stop switch
- 70. Start switch
- 73. Clutch switch
- 79. Relay unit
- 80. Starting circuit cut-off relay

ELECTRIC STARTING SYSTEM

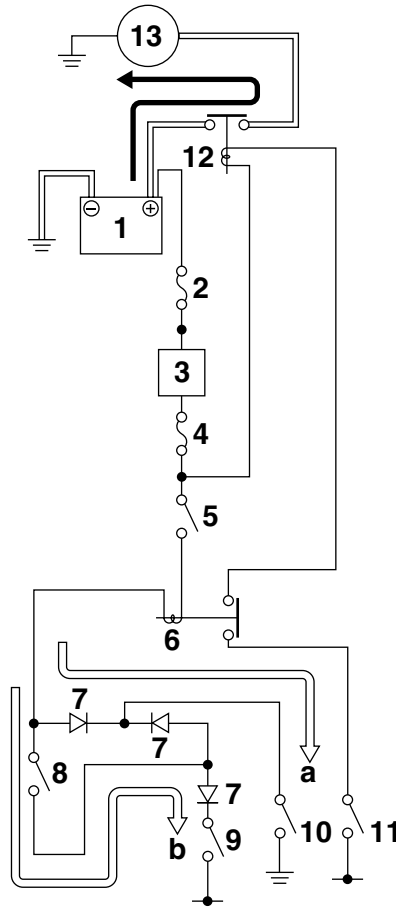
EAS27180

STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is turned “ON” (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral circuit of the gear position switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch circuit is closed) and the sidestand is up (the sidestand switch circuit is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay stays open so current cannot reach the starter motor. When at least one of the above conditions has been met, the starting circuit cut-off relay is closed and the engine can be started by pushing the start switch “⊗”.



- a. WHEN THE TRANSMISSION IS IN NEUTRAL
- b. WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

- 1. Battery
- 2. Main fuse
- 3. Main switch
- 4. Ignition fuse
- 5. Engine stop switch
- 6. Starting circuit cut-off relay
- 7. Relay unit (diode)

- 8. Clutch switch
- 9. Sidestand switch
- 10. Gear position switch
- 11. Start switch
- 12. Starter relay
- 13. Starter motor

EAS27190

TROUBLESHOOTING

The starter motor fails to turn.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar
4. Throttle bodies

| | | |
|--|------|--|
| 1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • 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 8-163. | 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 5-39. | NG → | Repair or replace the starter motor. |
| OK ↓ | | |
| 5. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-157. | NG → | Replace the relay unit. |
| OK ↓ | | |
| 6. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-160. | NG → | Replace the relay unit. |
| OK ↓ | | |
| 7. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-157. | NG → | Replace the starter relay. |
| OK ↓ | | |

ELECTRIC STARTING SYSTEM

| | | |
|--|------|--|
| 8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the right handlebar switch. |
| OK ↓ | | |
| 10. Check the gear position switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the gear position switch. |
| OK ↓ | | |
| 11. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the sidestand switch. |
| OK ↓ | | |
| 12. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the clutch switch. |
| OK ↓ | | |
| 13. Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the right handlebar switch. |
| OK ↓ | | |
| 14. Check the entire starting system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-9 and "CIRCUIT DIAGRAM (2/2)" on page 8-11. | NG → | Properly connect or repair the starting system wiring. |
| OK ↓ | | |
| The starting system circuit is OK. | | |

ELECTRIC STARTING SYSTEM

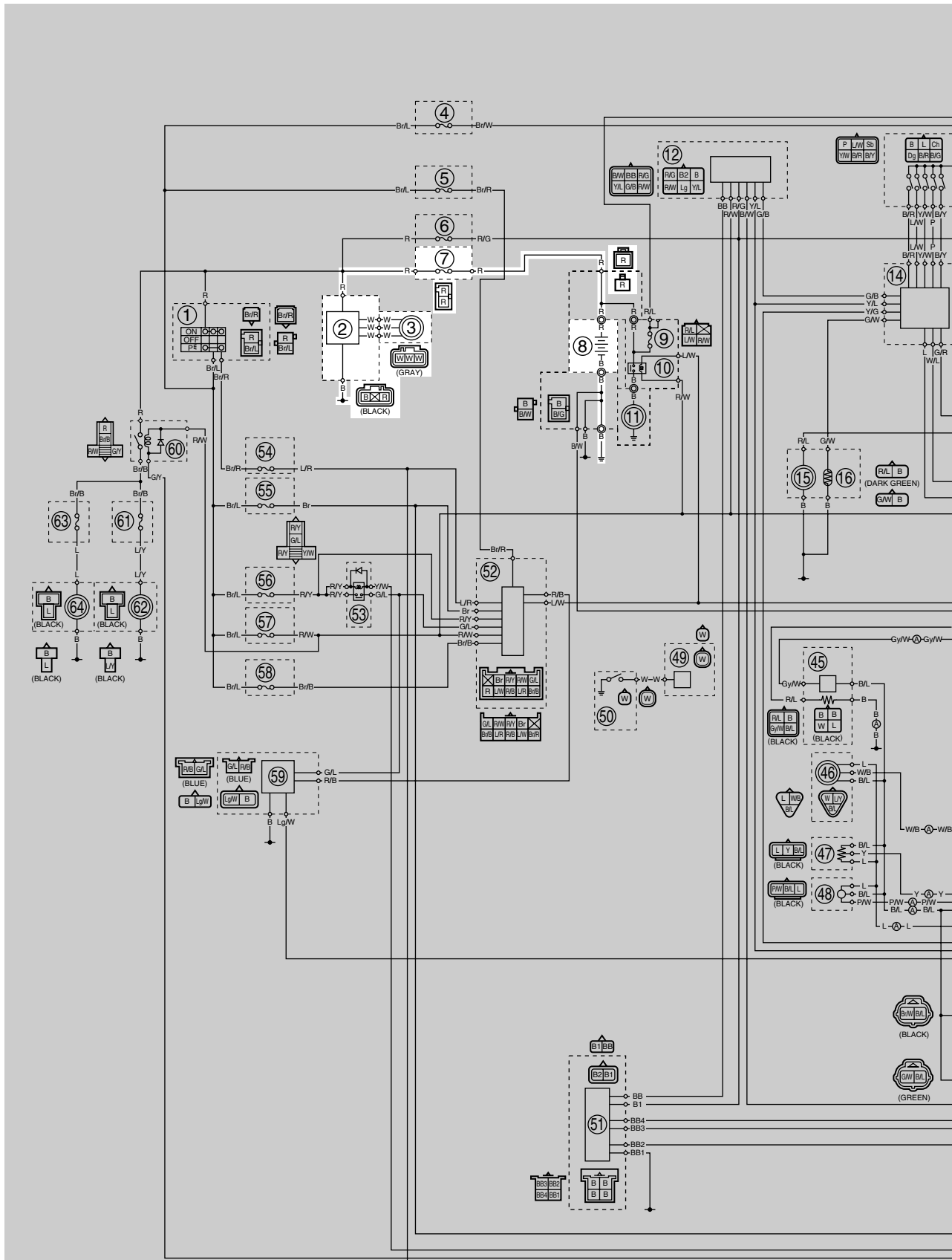
CHARGING SYSTEM

EAS27200

CHARGING SYSTEM

EAS27210

CIRCUIT DIAGRAM



CHARGING SYSTEM

2. Rectifier/regulator
3. AC magneto
7. Main fuse
8. Battery

EAS27230

TROUBLESHOOTING

The battery is not being charged.

NOTE:

- Before troubleshooting, remove the following part(s):
1. Front cowling right inner panel 1

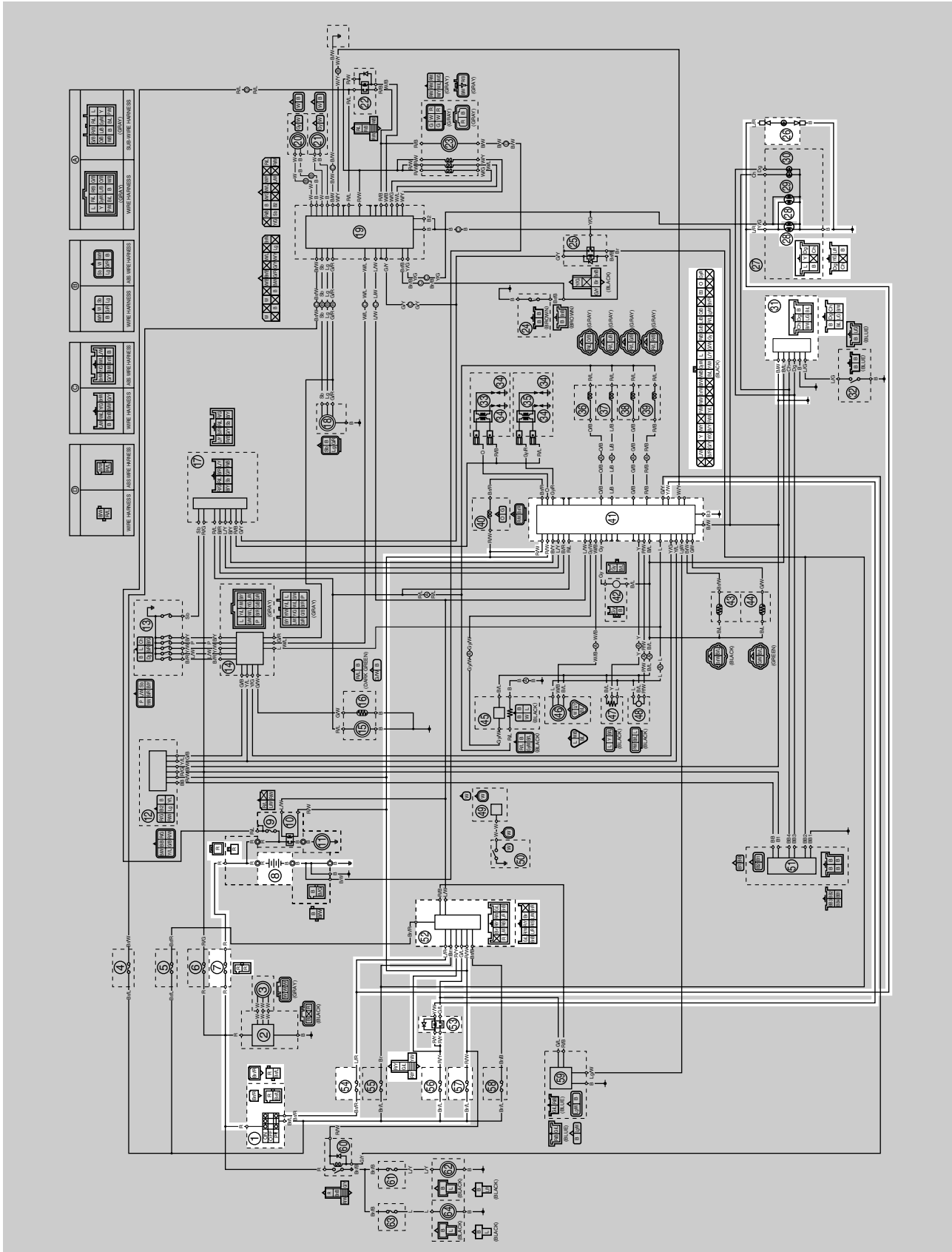
| | | |
|---|------|--|
| 1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse. |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-164. | NG → | Replace the stator coil. |
| OK ↓ | | |
| 4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-164. | NG → | Replace the rectifier/regulator. |
| OK ↓ | | |
| 5. Check the entire charging system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-17. | NG → | Properly connect or repair the charging system wiring. |
| OK ↓ | | |
| The charging system circuit is OK. | | |

EAS27240

LIGHTING SYSTEM

EAS27250

CIRCUIT DIAGRAM (1/2)

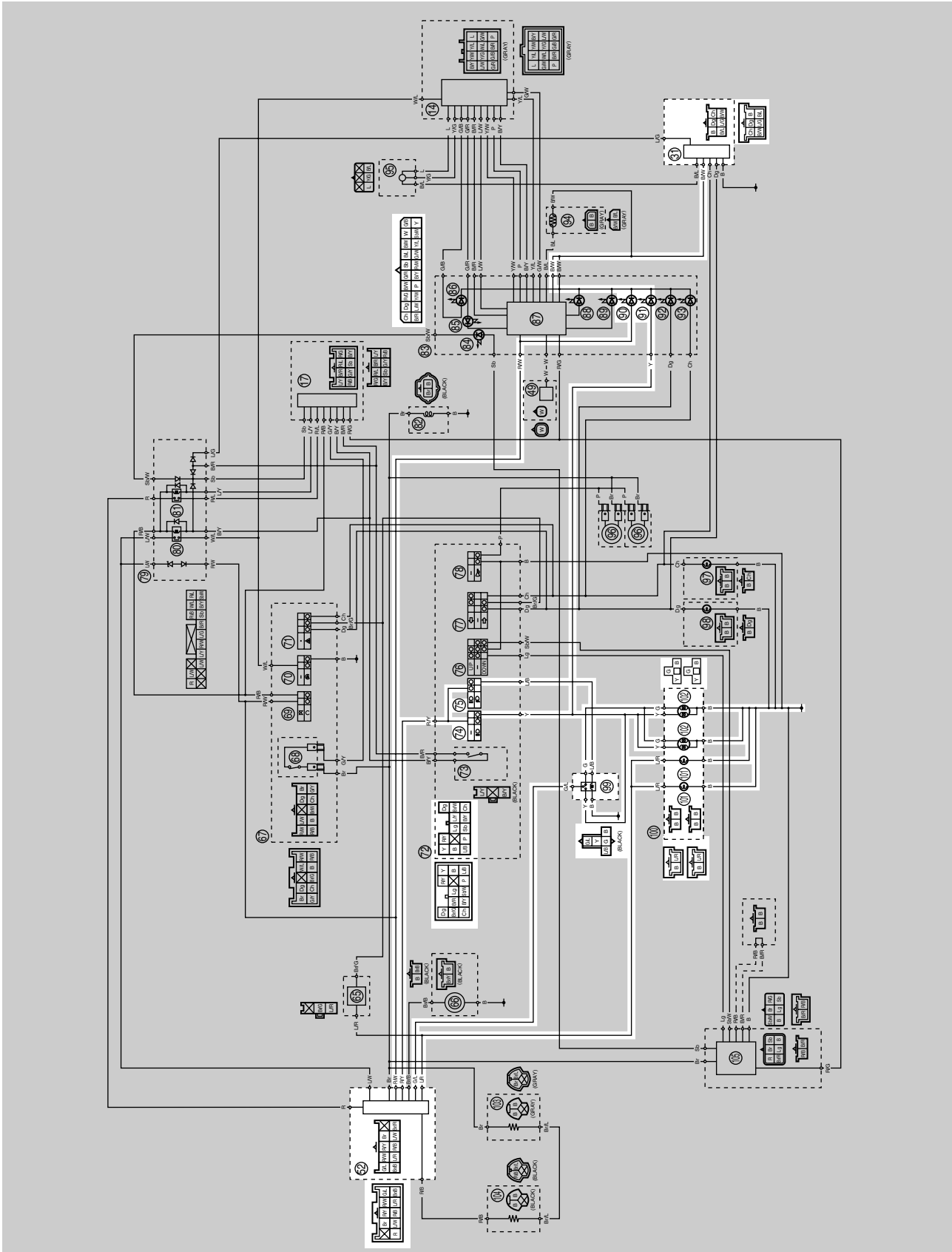


- 1. Main switch
- 7. Main fuse
- 8. Battery
- 26. License plate light
- 28. Tail/brake light
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 41. ECU (engine control unit)
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 53. Headlight relay (on/off)
- 54. Hazard lighting fuse
- 56. Headlight fuse
- 57. Ignition fuse

ET3P61004

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



- 31.Coupler 3 (front cowling wire harness—wire harness)
- 52.Coupler 5 (front cowling wire harness—wire harness)
- 74.Pass switch
- 75.Dimmer switch
- 90.Meter light
- 91.High beam indicator light
- 99.Headlight relay (dimmer)
- 101.Auxiliary light
- 102.Headlight

EAS27260

TROUBLESHOOTING

Any of the following fail to light: headlights, high beam indicator light, taillight, license plate light, auxiliary lights or meter light.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar

| | | |
|--|------|--|
| 1. Check the condition of each bulb and bulb socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-152. | NG → | Replace the bulb(s) and bulb socket(s). |
| OK ↓ | | |
| 2. Check the fuses. (Main, headlights, ignition, and hazard lighting) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the left handlebar switch. |
| OK ↓ | | |
| 6. Check the pass switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the left handlebar switch. |
| OK ↓ | | |
| 7. Check the headlight relay (on/off). Refer to "CHECKING THE RELAYS" on page 8-157. | NG → | Replace the headlight relay (on/off). |
| OK ↓ | | |

LIGHTING SYSTEM

8. Check the headlight relay (dimmer).
Refer to "CHECKING THE RELAYS" on page 8-157.

NG →

Replace the headlight relay (dimmer).

OK ↓

9. Check the entire lighting system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-21 and "CIRCUIT DIAGRAM (2/2)" on page 8-23.

NG →

Properly connect or repair the lighting system wiring.

OK ↓

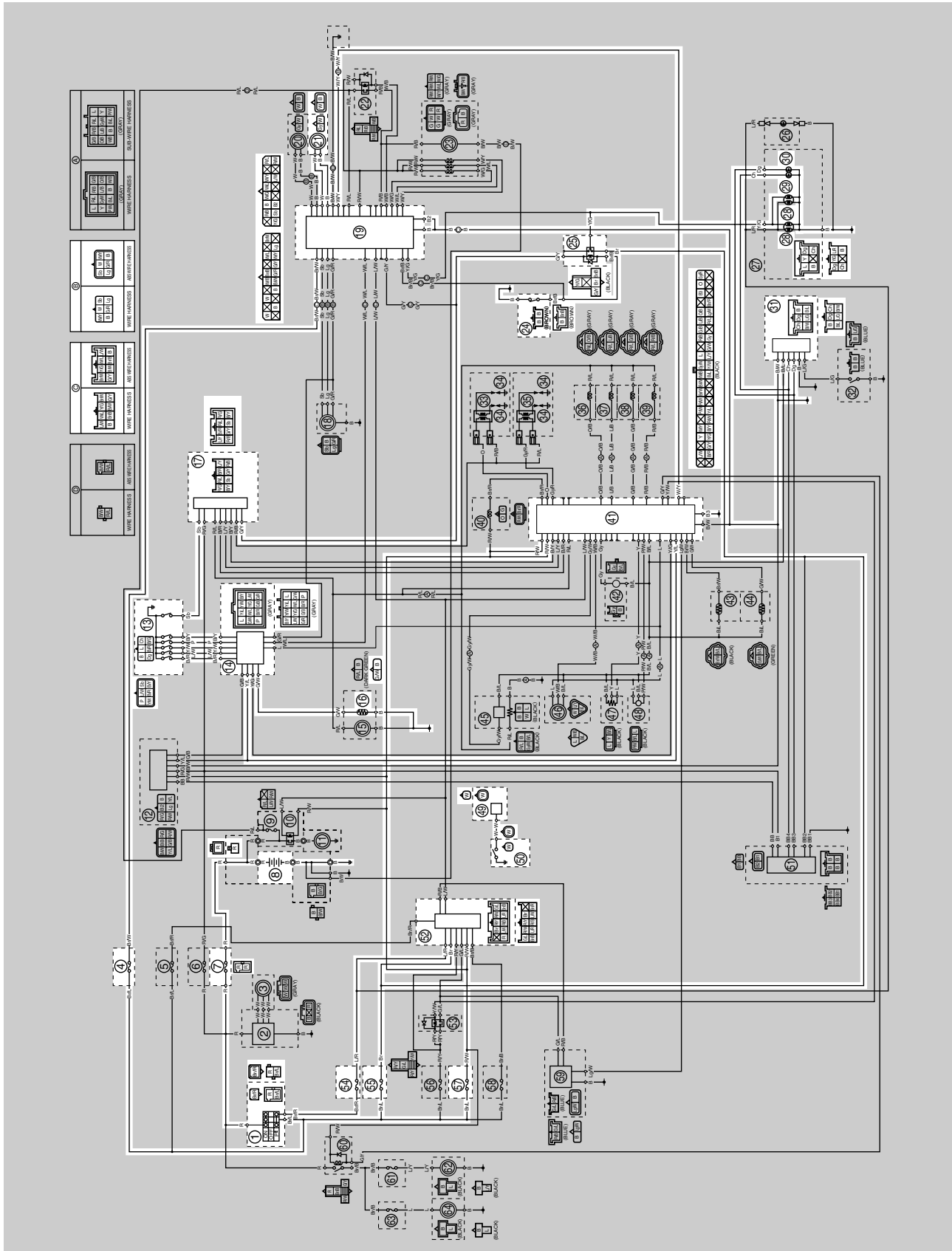
Replace the ECU.

EAS27270

SIGNALING SYSTEM

EAS27280

CIRCUIT DIAGRAM (1/2)

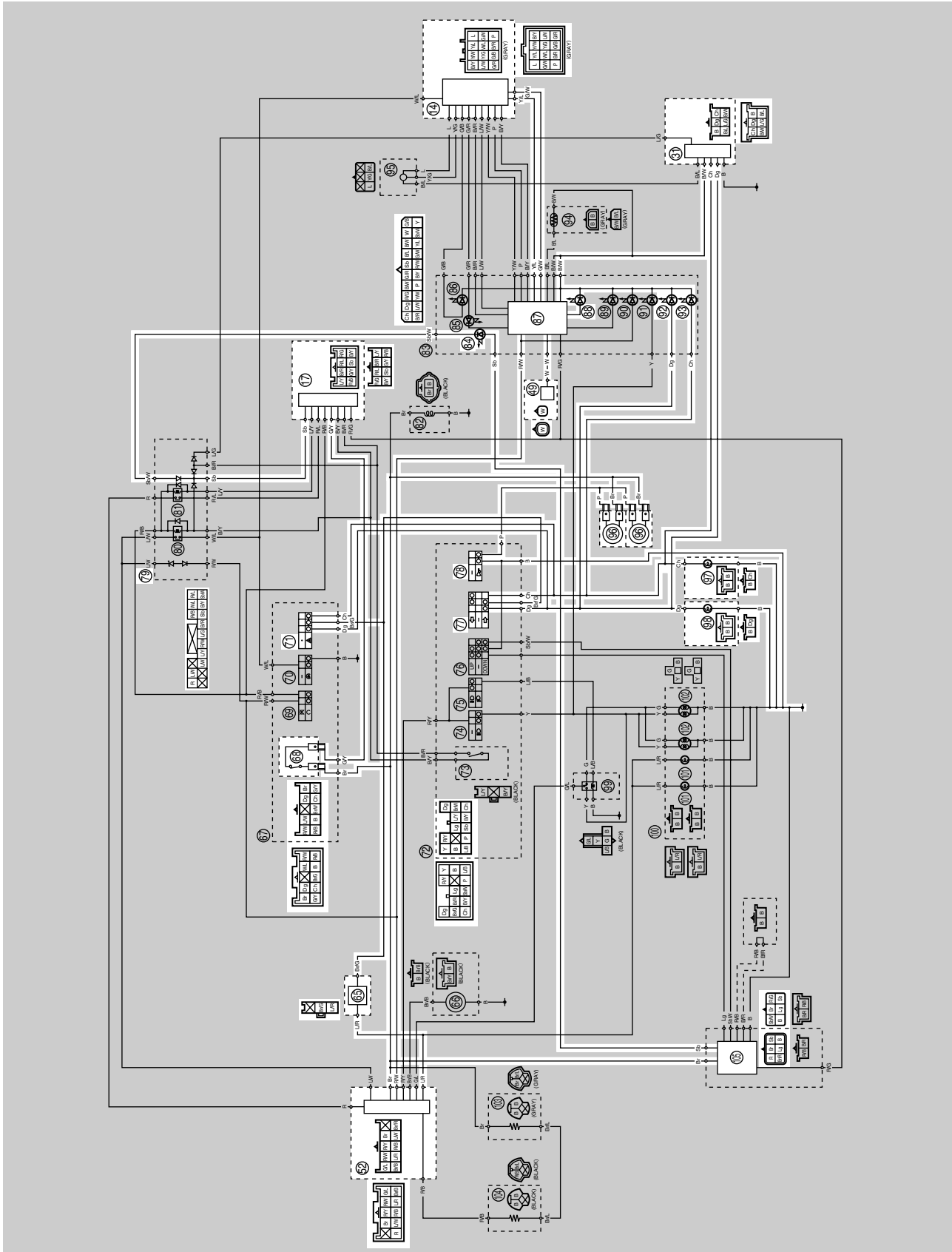


- 1. Main switch
- 4. ABS ECU fuse
- 7. Main fuse
- 8. Battery
- 13. Gear position switch
- 14. Coupler 1 (wire harness—front cowling wire harness)
- 16. Fuel sender
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 19. ABS ECU (electronic control unit)
- 21. Rear wheel sensor
- 24. Rear brake light switch
- 25. Brake light relay
- 28. Tail/brake light
- 29. Rear left turn signal light
- 30. Rear right turn signal light
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 41. ECU (engine control unit)
- 49. Coupler 4 (wire harness—front cowling wire harness)
- 50. Oil level switch
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 54. Hazard lighting fuse
- 55. Signaling system fuse
- 57. Ignition fuse

ET3P61005

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



- 14.Coupler 1 (front cowling wire harness—wire harness)
- 17.Coupler 2 (front cowling wire harness—wire harness)
- 31.Coupler 3 (front cowling wire harness—wire harness)
- 49.Coupler 4 (front cowling wire harness—wire harness)
- 52.Coupler 5 (front cowling wire harness—wire harness)
- 65.Turn signal/hazard relay
- 68.Front brake light switch
- 71.Hazard switch
- 77.Turn signal switch
- 78.Horn switch
- 79.Relay unit
- 84.Neutral indicator light
- 87.Multi-function meter
- 88.Oil level warning light
- 92.Right turn signal indicator light
- 93.Left turn signal indicator light
- 96.Horn
- 97.Front left turn signal light
- 98.Front right turn signal light
- 105.Windshield drive unit

EAS27290

TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or indicator light.
- The horn fails to sound.
- The fuel meter fails to come on.
- The speedometer fails to operate.

NOTE:

- Before troubleshooting, remove the following part(s):
1. Front cowl assembly
 2. Fuel tank
 3. T-bar
 4. Throttle bodies

| | | |
|---|------|--|
| 1. Check the fuses. (Main, ignition, signaling system, hazard lighting, backup, and ABS ECU) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 4. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29. | NG → | Properly connect or repair the signaling system wiring. |
| OK ↓ | | |
| Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system". | | |

Checking the signaling system

The horn fails to sound.

| | | |
|--|------|------------------------------------|
| 1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the left handlebar switch. |
| OK ↓ | | |

SIGNALING SYSTEM

2. Check the horns.
Refer to "CHECKING THE HORNS" on page 8-165.

NG →

Replace the horn(s).

OK ↓

3. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

The tail/brake light fails to come on.

1. Check the tail/brake light bulbs and sockets.
Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-152.

NG →

Replace the tail/brake light bulb, socket or both.

OK ↓

2. Check the front brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the front brake light switch.

OK ↓

3. Check the rear brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the rear brake light switch.

OK ↓

4. Check the brake light relay.
Refer to "CHECKING THE RELAYS" on page 8-157.

NG →

Replace the brake light relay.

OK ↓

5. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

SIGNALING SYSTEM

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulbs and sockets.
Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-152.

NG →

Replace the turn signal light bulb, socket or both.

OK ↓

2. Check the turn signal switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the left handlebar switch.

OK ↓

3. Check the hazard switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the left handlebar switch.

OK ↓

4. Check the turn signal/hazard relay.
Refer to "CHECKING THE TURN SIGNAL/HAZARD RELAY" on page 8-160.

NG →

Replace the turn signal/hazard relay.

OK ↓

5. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

The neutral indicator light fails to come on.

1. Check the gear position switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the gear position switch.

OK ↓

2. Check the relay unit (diode).
Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-160.

NG →

Replace the relay unit.

OK ↓

SIGNALING SYSTEM

3. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

Replace the windshield drive unit.

The shift indicator fails to come on.

1. Check the gear position switch.
Refer to "CHECKING THE SWITCHES" on page 8-149.

NG →

Replace the gear position switch.

OK ↓

2. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly.

The oil level warning light fails to come on.

1. Check the oil level switch.
Refer to "CHECKING THE OIL LEVEL SWITCH" on page 8-165.

NG →

Replace the oil level switch.

OK ↓

2. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly.

The fuel meter fails to come on.

1. Check the fuel sender.
Refer to "CHECKING THE FUEL SENDER" on page 8-166.

NG →

Replace the fuel pump.

OK ↓

SIGNALING SYSTEM

2. Check the entire signaling system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-27 and "CIRCUIT DIAGRAM (2/2)" on page 8-29.

NG →

Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly.

The speedometer fails to operate.

1. Check the rear wheel sensor.
Refer to "MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR" on page 4-22.

NG →

Replace the rear wheel sensor.

OK ↓

2. Check the entire speed sensor wiring.
Refer to NOTE.

NG →

Properly connect or repair the speed sensor wiring.

OK ↓

Replace the ABS ECU, ECU or meter assembly.

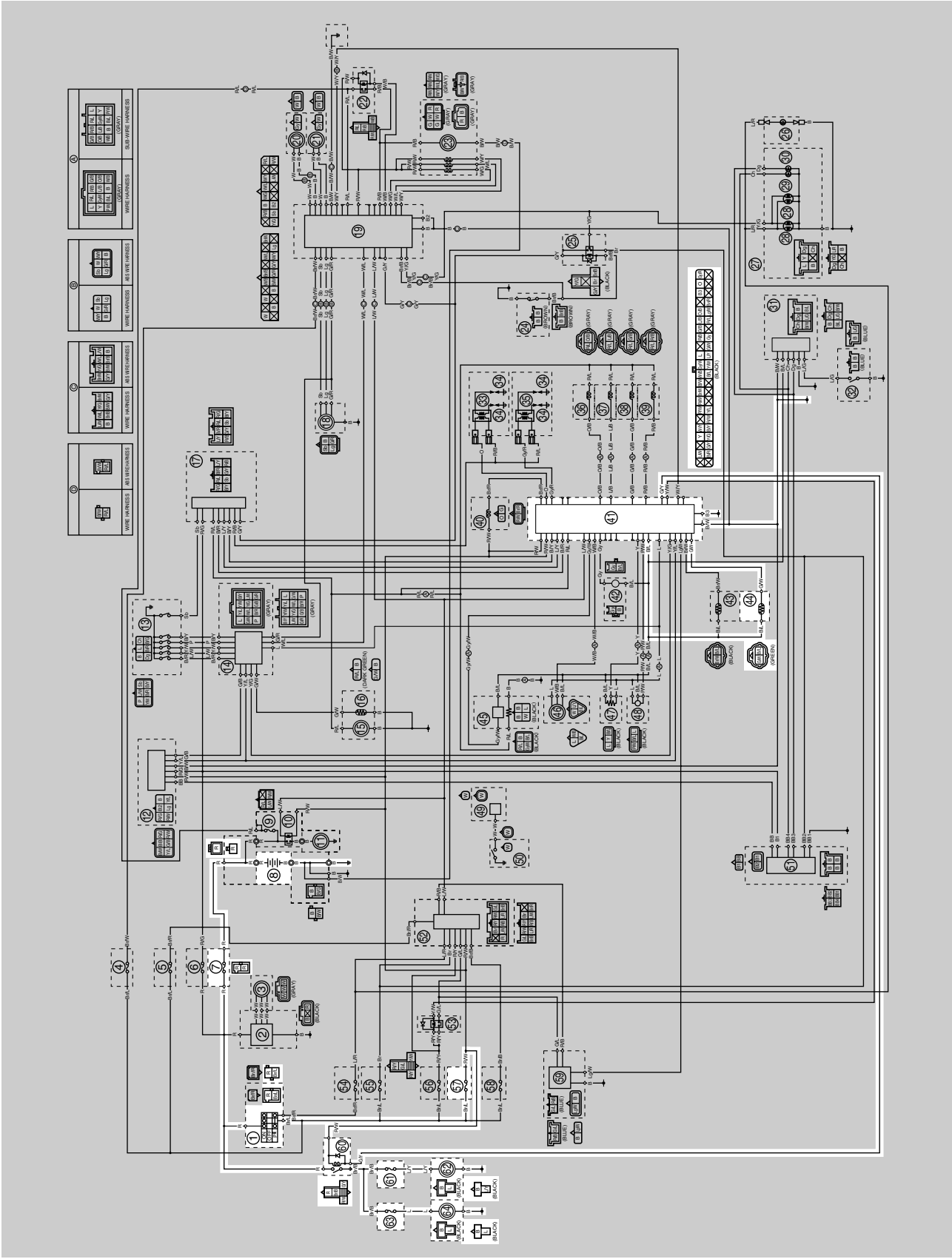
NOTE:

Repair or replace if there is an open or short circuit.

- Between rear wheel sensor and ABS ECU coupler.
(white–white)
(black–black)
- Between ABS ECU coupler and ECU coupler.
(white/yellow–white/yellow)
- Between ECU coupler and meter assembly.
(yellow/blue–yellow/blue)

EAS27300
COOLING SYSTEM

EAS27310
CIRCUIT DIAGRAM



- 1. Main switch
- 7. Main fuse
- 8. Battery
- 41. ECU (engine control unit)
- 44. Coolant temperature sensor
- 57. Ignition fuse
- 60. Radiator fan motor relay
- 61. Left radiator fan motor fuse
- 62. Left radiator fan motor
- 63. Right radiator fan motor fuse
- 64. Right radiator fan motor

EAS27320

TROUBLESHOOTING

The radiator fan motor fails to turn.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar

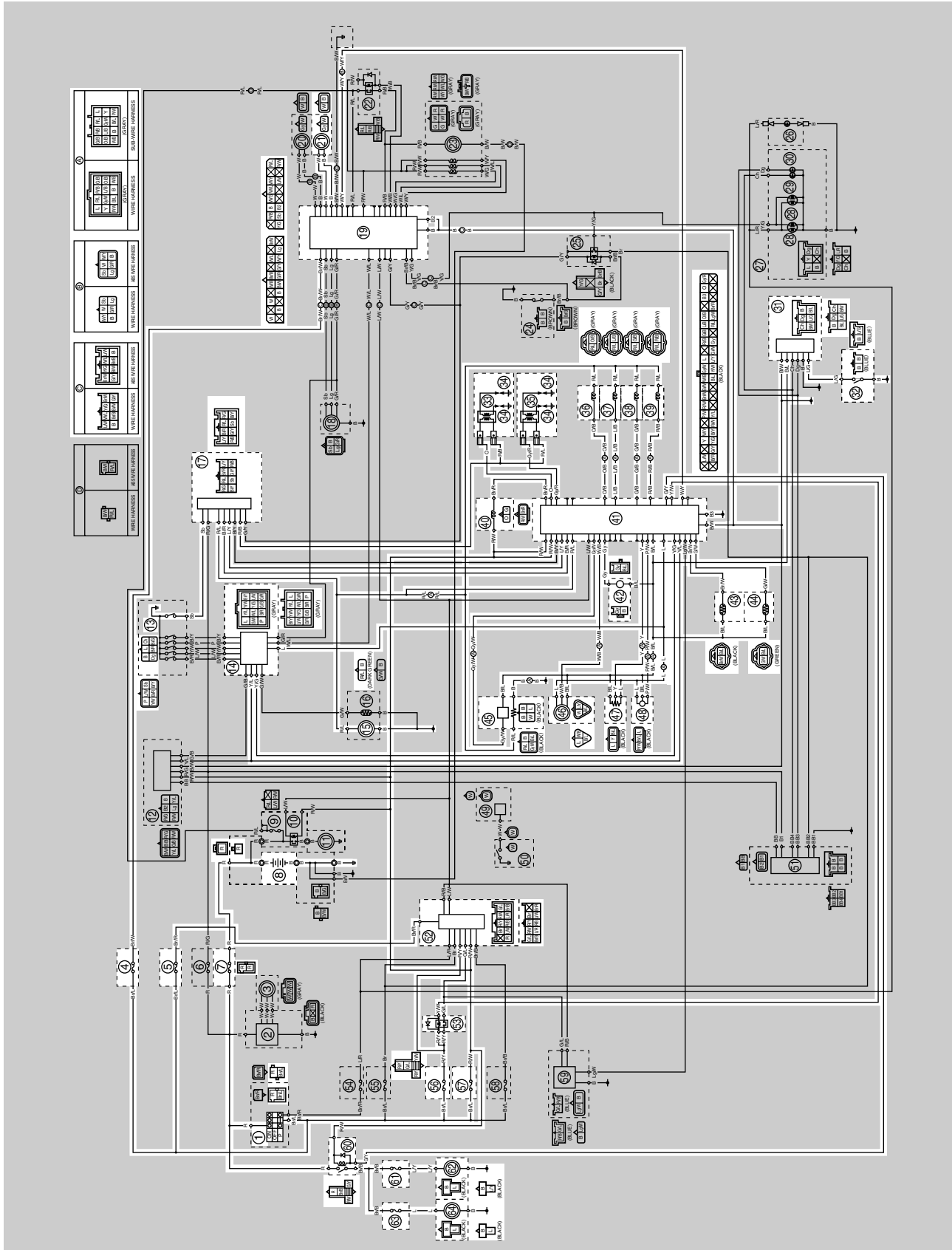
| | | |
|--|------|--|
| 1. Check the fuses. (Main, ignition, left radiator fan motor, and right radiator fan motor) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 4. Check the radiator fan motors. Refer to "CHECKING THE RADIATOR FAN MOTORS" on page 8-166. | NG → | Replace the radiator fan motor(s). |
| OK ↓ | | |
| 5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-157. | NG → | Replace the radiator fan motor relay. |
| OK ↓ | | |
| 6. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-167. | NG → | Replace the coolant temperature sensor. |
| OK ↓ | | |
| 7. Check the entire cooling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-37. | NG → | Properly connect or repair the cooling system wiring. |
| OK ↓ | | |
| Replace the ECU. | | |

EAS27330

FUEL INJECTION SYSTEM

EAS27340

CIRCUIT DIAGRAM (1/2)

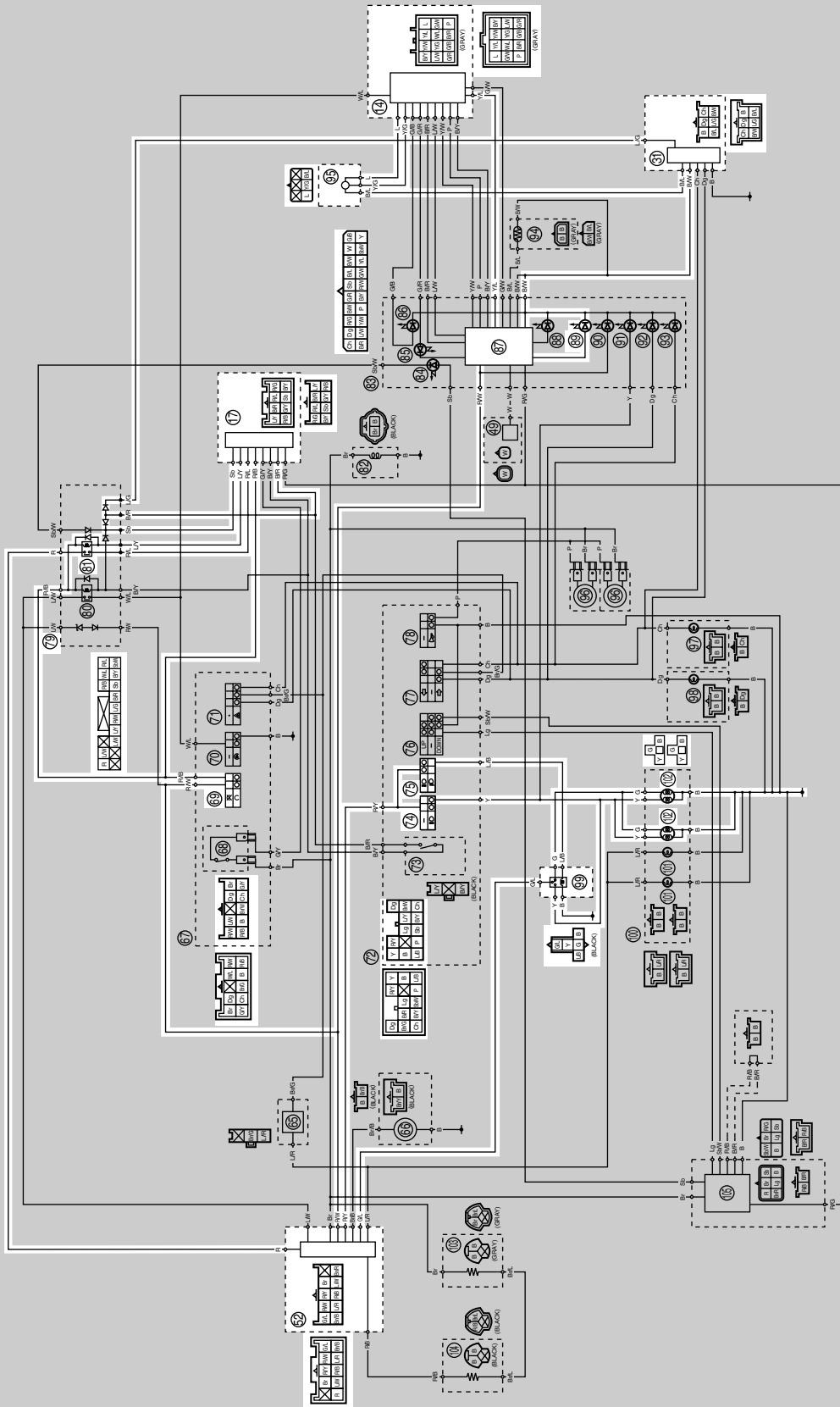


1. Main switch
4. ABS ECU fuse
5. Fuel injection system fuse
7. Main fuse
8. Battery
13. Gear position switch
14. Coupler 1 (wire harness—front cowling wire harness)
15. Fuel pump
17. Coupler 2 (wire harness—front cowling wire harness)
19. ABS ECU (electronic control unit)
21. Rear wheel sensor
31. Coupler 3 (wire harness—front cowling wire harness)
32. Sidestand switch
33. Cylinders-#1/#4 ignition coil
34. Spark plug
35. Cylinders-#2/#3 ignition coil
36. Injector #4
37. Injector #3
38. Injector #2
39. Injector #1
40. Air induction system solenoid
41. ECU (engine control unit)
42. Crankshaft position sensor
43. Intake air temperature sensor
44. Coolant temperature sensor
45. O₂ sensor
46. Cylinder identification sensor
47. Throttle position sensor
48. Intake air pressure sensor
52. Coupler 5 (wire harness—front cowling wire harness)
53. Headlight relay (on/off)
56. Headlight fuse
57. Ignition fuse
60. Radiator fan motor relay
61. Left radiator fan motor fuse
62. Left radiator fan motor
63. Right radiator fan motor fuse
64. Right radiator fan motor

ET3P61006

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



- 14.Coupler 1 (front cowling wire harness—wire harness)
- 17.Coupler 2 (front cowling wire harness—wire harness)
- 31.Coupler 3 (front cowling wire harness—wire harness)
- 52.Coupler 5 (front cowling wire harness—wire harness)
- 69.Engine stop switch
- 74.Pass switch
- 75.Dimmer switch
- 79.Relay unit
- 81.Fuel pump relay
- 87.Multi-function meter
- 89.Engine trouble warning light
- 95.Lean angle sensor
- 99.Headlight relay (dimmer)
- 102.Headlight

EAS27350

ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the odometer/tripmeter/fuel reserve tripmeter LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

Engine trouble warning light indication and fuel injection system operation

| Warning light indication | ECU operation | Fuel injection operation | Vehicle operation |
|--------------------------|--|--|---|
| Flashing* | Warning provided when unable to start engine | Operation stopped | Cannot be operated |
| Remains on | Malfunction detected | Operated with substitute characteristics in accordance with the description of the malfunction | Can or cannot be operated depending on the fault code |

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

| | | | |
|-----|---|-----|---|
| 11: | Cylinder identification sensor | 33: | Cylinders-#1/#4 ignition coil (faulty ignition) |
| 12: | Crankshaft position sensor | 34: | Cylinders-#2/#3 ignition coil (faulty ignition) |
| 19: | Black/red ECU lead (broken or disconnected) | 41: | Lean angle sensor (open or short-circuit) |
| 30: | Lean angle sensor (latch up detected) | 50: | ECU internal malfunction (memory check error) |

Checking the engine trouble warning light

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and it comes on while the start switch is being pushed. If the warning light does not come on under these conditions, the warning light (LED) may be defective.



- a. Main switch "OFF"
- b. Main switch "ON"
- c. Engine trouble warning light off
- d. Engine trouble warning light on for 1.4 seconds

EAS27380

SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

Self-Diagnostic Function table

| Fault code No. | Item | Symptom | Able / unable to start | Able / unable to drive |
|----------------|--|---|------------------------|------------------------|
| 11 | Cylinder identification sensor | No normal signals are received from the cylinder identification sensor. | Unable | Unable |
| 12 | Crankshaft position sensor | No normal signals are received from the crankshaft position sensor. | Unable | Unable |
| 13 | Intake air pressure sensor (open or short circuit) | Intake air pressure sensor: open or short circuit detected. | Able | Able |
| 14 | Intake air pressure sensor (hose line) | Intake air pressure sensor: hose system malfunction (clogged or detached hose). | Able | Able |
| 15 | Throttle position sensor (open or short circuit) | Throttle position sensor: open or short circuit detected. | Able | Able |
| 16 | Throttle position sensor (stuck) | Stuck throttle position sensor is detected. | Able | Able |
| 19 | Black/red ECU lead (broken or disconnected) | A break or disconnection of the black/red lead of the ECU is detected. | Unable | Unable |
| 21 | Coolant temperature sensor | Coolant temperature sensor: open or short circuit detected. | Able | Able |

FUEL INJECTION SYSTEM

| Fault code No. | Item | Symptom | Able / unable to start | Able / unable to drive |
|----------------|---|---|--|--|
| 22 | Intake air temperature sensor (open or short circuit) | Intake air temperature sensor: open or short circuit detected. | Able | Able |
| 24 | O ₂ sensor (inactive) | No normal signal is received from the O ₂ sensor. | Able | Able |
| 30 | Lean angle sensor | Latch up detected. No normal signal is received from the lean angle sensor. | Unable | Unable |
| 31 | O ₂ sensor (compensation stuck to upper limit) | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio). | Able | Able |
| 32 | O ₂ sensor (compensation stuck to lower limit) | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio). | Able | Able |
| 33 | Cylinders-#1/#4 ignition coil (faulty ignition) | Malfunction detected in the primary wire of the cylinders-#1/#4 ignition coil. | Able (depending on the number of faulty cylinders) | Able (depending on the number of faulty cylinders) |
| 34 | Cylinders-#2/#3 ignition coil (faulty ignition) | Malfunction detected in the primary wire of the cylinders-#2/#3 ignition coil. | Able (depending on the number of faulty cylinders) | Able (depending on the number of faulty cylinders) |
| 41 | Lean angle sensor (open or short circuit) | Lean angle sensor: open or short circuit detected. | Unable | Unable |
| 42 | Rear wheel sensor | No normal signals are received from the rear wheel sensor. | Able | Able |
| | Gear position switch (neutral circuit) | Open or short circuit is detected in the neutral circuit of the gear position switch. | | |
| 43 | Fuel system voltage (monitoring voltage) | The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU). | Able | Able |
| 44 | Error in writing the amount of CO adjustment on EEPROM | An error is detected while reading or writing on EEPROM (CO adjustment value). | Able | Able |
| 46 | Vehicle system power supply (monitoring voltage) | Power supply to the fuel injection system is not normal. | Able | Able |

FUEL INJECTION SYSTEM

5. Erase the malfunction history in the diagnostic mode. Refer to "Sensor operation table (Diagnostic code No. 62)".

NOTE:

Turning the main switch to "OFF" will not erase the malfunction history.

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to "Sensor operation table" and "Actuator operation table".

| |
|---|
| 01: Throttle position sensor (throttle angle) |
| 30: Cylinders-#1/#4 ignition coil |
| 31: Cylinders-#2/#3 ignition coil |
| 36: Injector #1 |
| 37: Injector #2 |
| 38: Injector #3 |
| 39: Injector #4 |
| 48: Air induction system solenoid |

If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.

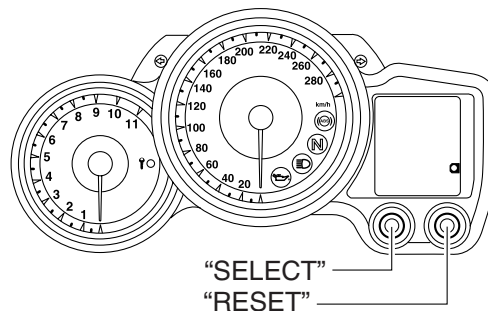
If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

EAS27410

DIAGNOSTIC MODE

Setting the diagnostic mode

1. Turn the main switch to "OFF".
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the "SELECT" and "RESET" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.



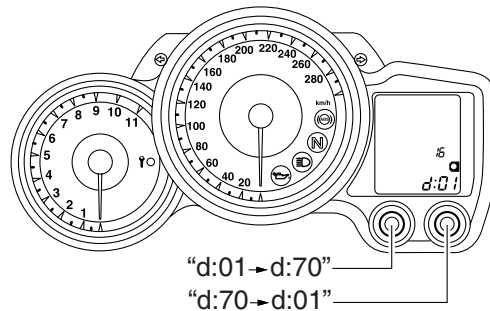
NOTE:

- All displays on the meter disappear except the odometer/tripmeter/fuel reserve tripmeter displays.
- "dIAG" appears on the odometer/tripmeter/fuel reserve tripmeter LCD.

4. Press the "SELECT" button to select the CO adjustment mode "Co" or the diagnostic mode "dIAG".
5. After selecting "dIAG", simultaneously press the "SELECT" and "RESET" buttons for 2 seconds or more to activate the diagnostic mode. The diagnostic code number "d:01" appears on the clock LCD.
6. Select the diagnostic code number corresponding to the fault code number by pressing the "SELECT" and "RESET" buttons.

NOTE:

- To decrease the selected diagnostic code number, press the "RESET" button. Press the "RESET" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "SELECT" button. Press the "SELECT" button for 1 second or longer to automatically increase the diagnostic code numbers.



7. Verify the operation of the sensor or actuator.

- Sensor operation

The data representing the operating conditions of the sensor appears on the trip LCD.

- Actuator operation

Set the engine stop switch to “○” to operate the actuator.

NOTE:

If the engine stop switch is set to “○”, set it to “✕”, and then set it to “○” again.

8. Turn the main switch to “OFF” to cancel the diagnostic mode.

Fault code table

| Fault code No. | Symptom | Probable cause of malfunction | Diagnostic code No. |
|----------------|---|--|---------------------|
| 11 | No normal signals are received from the cylinder identification sensor. | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in wire harness. • Defective cylinder identification sensor. • Malfunction in ECU. • Improperly installed cylinder identification sensor. | — |
| 12 | No normal signals are received from the crankshaft position sensor. | <ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective crankshaft position sensor. • Malfunction in pickup rotor. • Malfunction in ECU. • Improperly installed crankshaft position sensor. | — |
| 13 | Intake air pressure sensor: open or short circuit detected. | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in wire harness. • Defective intake air pressure sensor. • Malfunction in ECU. | 03 |
| 14 | Intake air pressure sensor: hose system malfunction (clogged or detached hose). | <ul style="list-style-type: none"> • Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU. | 03 |
| 15 | Throttle position sensor: open or short circuit detected. | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU. • Improperly installed throttle position sensor. | 01 |
| 16 | Stuck throttle position sensor is detected. | <ul style="list-style-type: none"> • Stuck throttle position sensor • Malfunction in ECU. | 01 |

FUEL INJECTION SYSTEM

| Fault code No. | Symptom | Probable cause of malfunction | Diagnostic code No. |
|----------------|---|--|---------------------|
| 19 | A break or disconnection of the black/red lead of the ECU is detected. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in ECU. • Defective relay unit (diode). | 20 |
| 21 | Coolant temperature sensor: open or short circuit detected. | <ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective coolant temperature sensor. • Malfunction in ECU. • Improperly installed coolant temperature sensor. | 06 |
| 22 | Intake air temperature sensor: open or short circuit detected. | <ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective intake temperature sensor. • Malfunction in ECU. • Improperly installed intake air temperature sensor. | 05 |
| 24 | No normal signal is received from the O ₂ sensor. | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Defective O₂ sensor. • Malfunction in ECU. • Improperly installed O₂ sensor. | — |
| 30 | Latch up detected. No normal signal is received from the lean angle sensor. | <ul style="list-style-type: none"> • The vehicle has overturned. • Defective lean angle sensor. • Malfunction in ECU. • Improperly installed lean angle sensor. | 08 |
| 31 | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio). | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Fuel pressure too low. • Clogged injectors. • Defective O₂ sensor (unable to output a rich signal). • Malfunction in ECU. • Malfunction in other areas of the fuel system. | 01 |
| 32 | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio). | <ul style="list-style-type: none"> • Open or short circuit in sub-wire harness. • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Fuel pressure too high. • Faulty injectors (excessive injection volume). • Defective O₂ sensor (unable to output a lean signal). • Malfunction in ECU. • Malfunction in other areas of the fuel system. | 01 |

FUEL INJECTION SYSTEM

| Fault code No. | Symptom | Probable cause of malfunction | Diagnostic code No. |
|----------------|---|--|---------------------|
| 33 | Malfunction detected in the primary wire of the cylinders-#1/#4 ignition coil. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in cylinders-#1/#4 ignition coil. • Malfunction in ECU. | 30 |
| 34 | Malfunction detected in the primary wire of the cylinders-#2/#3 ignition coil. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in cylinders-#2/#3 ignition coil. • Malfunction in ECU. | 31 |
| 41 | Lean angle sensor: open or short circuit detected. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU. | 08 |
| 42 | No normal signals are received from the rear wheel sensor. Open or short circuit is detected in the neutral circuit of the gear position switch. | <ul style="list-style-type: none"> • Open or short circuit in ABS wire harness. • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Defective rear wheel sensor. • Malfunction in rear wheel sensor detected. • Defective gear position switch. • Malfunction in the engine side of the gear position switch. • Malfunction in ECU. • Malfunction in ABS ECU. | 07 21 |
| 43 | The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU). | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in ECU. | 09 |
| 44 | An error is detected while reading or writing on EEPROM (CO adjustment value). | <ul style="list-style-type: none"> • Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory). | 60 |
| 46 | Power supply to the fuel injection system is not normal. | Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 8-17. | — |
| 50 | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.) | <ul style="list-style-type: none"> • Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.) | — |
| Er-1 | No signals are received from the ECU. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in meter assembly. • Malfunction in ECU. • Defective wire connection of the ECU coupler. | — |

FUEL INJECTION SYSTEM

| Fault code No. | Symptom | Probable cause of malfunction | Diagnostic code No. |
|----------------|---|---|---------------------|
| Er-2 | No signals are received from the ECU within the specified duration. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in meter assembly. • Malfunction in ECU. | — |
| Er-3 | Data from the ECU cannot be received correctly. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in meter assembly. • Malfunction in ECU. | — |
| Er-4 | Non-registered data has been received from the meter. | <ul style="list-style-type: none"> • Open or short circuit in front cowling wire harness. • Open or short circuit in wire harness. • Malfunction in meter assembly. • Malfunction in ECU. | — |

Sensor operation table

| Diagnostic code No. | Item | Meter display | Checking method |
|---------------------|---|--------------------------------------|---|
| 01 | Throttle angle <ul style="list-style-type: none"> • Fully closed position • Fully opened position | 15–17 97–100 | Check with throttle fully closed. Check with throttle fully open. |
| 03 | Pressure difference (atmospheric pressure and 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.) |
| 05 | Intake air temperature | Displays the intake air temperature. | Compare the actually measured intake air temperature with the meter display value. (*1) |
| 06 | Coolant temperature | Displays the coolant temperature. | Compare the actually measured coolant temperature with the meter display value. |
| 07 | Vehicle speed pulse | 0–999 | Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped. |

FUEL INJECTION SYSTEM

| Diagnostic code No. | Item | Meter display | Checking method |
|---------------------|---|--|--|
| 08 | Lean angle sensor <ul style="list-style-type: none"> • Upright • Overturned | 0.4–1.4 3.7–4.4 | Remove the lean angle sensor and incline it more than 65 degrees. |
| 09 | Fuel system voltage (battery voltage) | Approximately 12.0 | Set the engine stop switch to “○”, and then compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.) |
| 20 | Sidestand switch <ul style="list-style-type: none"> • Stand retracted • Stand extended | ON OFF | Set on/off the Sidestand switch. (with the transmission in gear.) |
| 21 | Gear position switch <ul style="list-style-type: none"> • Neutral • In gear | ON OFF | Shift the transmission. |
| 60 | EEPROM fault code display <ul style="list-style-type: none"> • No history • History exists | 00 01–04 (Cylinder fault code) <ul style="list-style-type: none"> • (If more than one cylinder is defective, the display alternates every two seconds to show all the detected cylinder numbers. When all cylinder numbers are shown, the display repeats the same process.) | — |
| 61 | Malfunction history code display <ul style="list-style-type: none"> • No history • History exists | 00 Fault codes 11-50 <ul style="list-style-type: none"> • (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.) | — |

FUEL INJECTION SYSTEM

| Diagnostic code No. | Item | Meter display | Checking method |
|---------------------|--|--|--|
| 62 | Malfunction history code erasure • No history • History exists | 0 • 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 "○". |
| 70 | Control number | 0–255 | — |

*1 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Actuator operation table

| Diagnostic code No. | Item | Actuation | Checking method |
|---------------------|-------------------------------|---|---|
| 30 | Cylinders-#1/#4 ignition coil | Actuates the cylinders-#1/#4 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light. | Check the spark five times. • Connect an ignition checker. |
| 31 | Cylinders-#2/#3 ignition coil | Actuates the cylinders-#2/#3 ignition coil five times at one-second intervals. Illuminates the engine trouble warning light. | Check the spark five times. • Connect an ignition checker. |
| 36 | Injector #1 | Actuates the injector #1 five times at one-second intervals. Illuminates the engine trouble warning light. | Check the operating sound of the injector #1 five times. |
| 37 | Injector #2 | Actuates the injector #2 five times at one-second intervals. Illuminates the engine trouble warning light. | Check the operating sound of the injector #2 five times. |
| 38 | Injector #3 | Actuates the injector #3 five times at one-second intervals. Illuminates the engine trouble warning light. | Check the operating sound of the injector #3 five times. |

FUEL INJECTION SYSTEM

| Diagnostic code No. | Item | Actuation | Checking method |
|---------------------|-------------------------------|--|--|
| 39 | Injector #4 | Actuates the injector #4 five times at one-second intervals. Illuminates the engine trouble warning light. | Check the operating sound of the injector #4 five times. |
| 48 | Air induction system solenoid | Actuates the air induction system solenoid five times at one-second intervals. Illuminates the engine trouble warning light. | Check the operating sound of the air induction system solenoid five times. |
| 50 | Fuel pump relay | Actuates the fuel pump relay five times at one-second intervals. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF). | Check the operating sound of the fuel pump relay five times. |
| 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 and rotates the radiator fan motors. | Check the operating sound of the radiator fan motor relay five times. |
| 52 | Headlight relay (on/off) | Actuates the headlight relay (on/off) for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light and headlight. | Check the operating sound of the headlight relay (on/off) five times. |
| 57 | Grip warmer (OPTION) | Illuminates the engine trouble warning light. | Disconnect the grip warmer control unit coupler from the control unit, if equipped, and then connect a pocket tester to the terminals (light green/white-black) of the coupler (wire harness side) and check for continuity. |

EAS27450

TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given. After the check and service of the malfunctioning part has been completed, reset the meter display according to the reinstatement method.

FUEL INJECTION SYSTEM

Fault code No.:

Code number displayed on the meter when the engine failed to work normally. Refer to "Self-Diagnostic Function table".

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-49.

| | | | | |
|----------------------------|--|----------------|--|---|
| Fault code No. | 11 | Symptom | No normal signals are received from the cylinder identification sensor. | |
| Diagnostic code No. | — | — | | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Installed condition of cylinder identification sensor. | | Check for looseness or pinching. | Starting the engine and operating it at idle. |
| 2 | Connections <ul style="list-style-type: none"> • Cylinder identification sensor coupler • Wire harness ECU coupler • Sub-wire harness coupler | | <ul style="list-style-type: none"> • 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. | |
| 3 | Open or short circuit in wire harness and/or sub-wire harness. | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between cylinder identification sensor coupler and ECU coupler. (blue—blue) (white/black—white/black) (black/blue—black/blue) | |
| 4 | Defective cylinder identification sensor. | | <ul style="list-style-type: none"> • Replace if defective. Refer to "CHECKING THE CYLINDER IDENTIFICATION SENSOR" on page 8-168. | |

FUEL INJECTION SYSTEM

| | | | | |
|----------------------------|--|----------------|---|-----------------------------|
| Fault code No. | 12 | Symptom | No normal signals are received from the crankshaft position sensor. | |
| Diagnostic code No. | — | — | | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Installed condition of crankshaft position sensor | | Check for looseness or pinching. | Cranking the engine. |
| 2 | Connections <ul style="list-style-type: none"> • Crankshaft position sensor coupler • Wire harness ECU coupler | | <ul style="list-style-type: none"> • 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. | |
| 3 | Open or short circuit in wire harness. | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU coupler. (gray–gray) (black/blue–black/blue) | |
| 4 | Defective crankshaft position sensor. | | <ul style="list-style-type: none"> • Replace if defective. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-162. | |

FUEL INJECTION SYSTEM

| | | | | |
|----------------------------|--|----------------|---|----------------------------------|
| Fault code No. | 13 | Symptom | Intake air pressure sensor: open or short circuit detected. | |
| Diagnostic code No. | | 03 | Intake air pressure sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Intake air pressure sensor coupler• Wire harness ECU coupler• Sub-wire harness coupler | | <ul style="list-style-type: none">• 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. | Turning the main switch to “ON”. |
| 2 | Open or short circuit in wire harness and/or sub-wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between intake air pressure sensor coupler and ECU coupler. (black/blue–black/blue) (pink/white–pink/white) (blue–blue) | |
| 3 | Defective intake air pressure sensor | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.03)• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-168. | |

| | | | | |
|----------------------------|--|----------------|---|---|
| Fault code No. | 14 | Symptom | Intake air pressure sensor: hose system malfunction (clogged or detached hose). | |
| Diagnostic code No. | | 03 | Intake air pressure sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Intake air pressure sensor hose | | <ul style="list-style-type: none">• Check the intake air pressure sensor hose condition.• Repair or replace the sensor hose. | Starting the engine and operating it at idle. |
| 2 | Intake air pressure sensor malfunction at intermediate electrical potential. | | <ul style="list-style-type: none">• Check and repair the connection.• Replace it if there is a malfunction. | |
| 3 | Connections <ul style="list-style-type: none">• Intake air pressure sensor coupler• Wire harness ECU coupler• Sub-wire harness coupler | | <ul style="list-style-type: none">• 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. | |

FUEL INJECTION SYSTEM

| | | | | | |
|---------------------|--|---------|---|----------------|----------------------------------|
| Fault code No. | 15 | Symptom | Throttle position sensor: open or short circuit detected. | | |
| Diagnostic code No. | | 01 | Throttle position sensor | | |
| Order | Item/components and probable cause | | Check or maintenance job | | Reinstatement method |
| 1 | Installed condition of throttle position sensor. | | Check for looseness or pinching. | | Turning the main switch to “ON”. |
| 2 | Connections <ul style="list-style-type: none">• Throttle position sensor coupler• Wire harness ECU coupler• Sub-wire harness coupler | | <ul style="list-style-type: none">• 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. | | |
| 3 | Open or short circuit in wire harness and/or sub-wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between throttle position sensor coupler and ECU coupler. (black/blue–black/blue) (yellow–yellow) (blue–blue) | | |
| 4 | Throttle position sensor lead wire open circuit output voltage check. | | <ul style="list-style-type: none">• Check for open circuit and replace the throttle position sensor. (black/blue–yellow) | | |
| | | | Open circuit item | Output voltage | |
| | | | Ground wire open circuit | 5 V | |
| | | | Output wire open circuit | 0 V | |
| | | | Power supply wire open circuit | 0 V | |
| 5 | Defective throttle position sensor. | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.01)• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-167. | | |

FUEL INJECTION SYSTEM

| | | | | | |
|---------------------|--|---------|---|----------------|--|
| Fault code No. | 16 | Symptom | Stuck throttle position sensor is detected. | | |
| Diagnostic code No. | | 01 | Throttle position sensor | | |
| Order | Item/components and probable cause | | Check or maintenance job | | Reinstatement method |
| 1 | Installed condition of throttle position sensor. | | Check for looseness or pinching. | | Starting the engine and operating it at idle, and then by racing it. |
| 2 | Connections <ul style="list-style-type: none">• Throttle position sensor coupler• Wire harness ECU coupler• Sub-wire harness coupler | | <ul style="list-style-type: none">• 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. | | |
| 3 | Throttle position sensor lead wire open circuit output voltage check. | | <ul style="list-style-type: none">• Check for open circuit and replace the throttle position sensor. (black/blue–yellow) | | |
| | | | Open circuit item | Output voltage | |
| | | | Ground wire open circuit | 5 V | |
| | | | Output wire open circuit | 0 V | |
| | | | Power supply wire open circuit | 0 V | |
| 4 | Defective throttle position sensor. | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.01)• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-167. | | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|---|---------|---|--|
| Fault code No. | 19 | Symptom | A break or disconnection of the black/red lead of the ECU is detected. | |
| Diagnostic code No. | | 20 | Sidestand switch | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Wire harness ECU coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.20)• 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. | If the transmission is in gear, retracting the sidestand. If the transmission is in neutral, reconnecting the wiring. |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between ECU and black/red lead. | |
| 3 | Defective sidestand switch | | <ul style="list-style-type: none">• Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-149. | |
| 4 | Defective relay unit (diode) | | <ul style="list-style-type: none">• Replace if defective. Refer to “CHECKING THE RELAYS” on page 8-157. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|---|---------|---|----------------------------------|
| Fault code No. | 21 | Symptom | Coolant temperature sensor: open or short circuit detected. | |
| Diagnostic code No. | | 06 | Coolant temperature sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Installed condition of coolant temperature sensor | | Check for looseness or pinching. | Turning the main switch to “ON”. |
| 2 | Connections <ul style="list-style-type: none">• Coolant temperature sensor coupler• Wire harness ECU coupler | | <ul style="list-style-type: none">• 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. | |
| 3 | Open or short circuit in wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between coolant temperature sensor coupler and ECU coupler. (black/blue–black/blue) (green/white–green/white) | |
| 4 | Defective coolant temperature sensor. | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.06)• Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-167. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|--|---------|---|----------------------------------|
| Fault code No. | 22 | Symptom | Intake air temperature sensor: open or short circuit detected. | |
| Diagnostic code No. | | 05 | Intake air temperature sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Installed condition of intake air temperature sensor | | Check for looseness or pinching. | Turning the main switch to "ON". |
| 2 | Connections <ul style="list-style-type: none">• Intake air temperature sensor coupler• Wire harness ECU coupler | | <ul style="list-style-type: none">• 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. | |
| 3 | Open or short circuit in wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between intake air temperature sensor coupler and ECU coupler. (black/blue–black/blue) (brown/white–brown/white) | |
| 4 | Defective intake air temperature sensor. | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.05)• Replace if defective. Refer to "CHECKING THE INTAKE AIR TEMPERATURE SENSOR" on page 8-169. | |

FUEL INJECTION SYSTEM

| | | | | |
|----------------------------|--|----------------|--|--|
| Fault code No. | 24 | Symptom | No normal signal is received from the O₂ sensor. | |
| Diagnostic code No. | — | — | | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Installed condition of O ₂ sensor | | Check for looseness or pinching. | Starting the engine, warming it up until the coolant temperature is 60 °C or more, and then running it between 2000–3000 r/min until the engine trouble warning light turns off. |
| 2 | Connections <ul style="list-style-type: none"> • O₂ sensor coupler • Relay unit coupler • Wire harness ECU coupler • Sub-wire harness coupler • Front cowling wire harness coupler | | <ul style="list-style-type: none"> • 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. | |
| 3 | Open or short circuit in wire harness, sub-wire harness, and/or front cowling wire harness. | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between O₂ sensor coupler and ECU coupler. (black/blue–black/blue) (gray/white–gray/white) • Between O₂ sensor coupler and relay unit coupler. (red/blue–red/blue) • Between O₂ sensor coupler and sub-wire harness coupler. (black–black) | |
| 4 | Check fuel pressure. | | Refer to “CHECKING THE FUEL PRESSURE” on page 7-7. | |
| 5 | Defective O ₂ sensor | | Replace if defective. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|--|---------|---|---|
| Fault code No. | 30 | Symptom | Latch up detected. No normal signal is received from the lean angle sensor. | |
| Diagnostic code No. | | 08 | Lean angle sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | The vehicle has overturned. | | Raise the vehicle upright. | Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned “OFF”). |
| 2 | Installed condition of lean angle sensor | | Check the installed direction and condition of the sensor. | |
| 3 | Connections <ul style="list-style-type: none">• Lean angle sensor coupler• Wire harness ECU coupler | | <ul style="list-style-type: none">• 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. | |
| 4 | Defective lean angle sensor | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.08)• Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-163. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|--|---------|---|--|
| Fault code No. | 31 | Symptom | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio). | |
| Diagnostic code No. | | 01 | Throttle position sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• O₂ sensor coupler• Relay unit coupler• Wire harness ECU coupler• Sub-wire harness coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Starting the engine, warming it up until the coolant temperature is 60 °C or more, and then running it between 2000–3000 r/min until the engine trouble warning light turns off. |
| 2 | Open or short circuit in wire harness, sub-wire harness, and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between O₂ sensor coupler and ECU coupler. (black/blue–black/blue) (gray/white–gray/white)• Between O₂ sensor coupler and relay unit coupler. (red/blue–red/blue)• Between O₂ sensor coupler and sub-wire harness coupler. (black–black) | |
| 3 | Defective O ₂ sensor | | Replace if defective. (Unable to output a rich signal) | |
| 4 | Clogged injector | | <ul style="list-style-type: none">• Replace if defective. Refer to “CHECKING THE INJECTORS” on page 7-7. | |

FUEL INJECTION SYSTEM

| | | | | | |
|---------------------|------------------------------------|----|---------|--|----------------------|
| Fault code No. | | 31 | Symptom | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio). | |
| Diagnostic code No. | | | 01 | Throttle position sensor | |
| Order | Item/components and probable cause | | | Check or maintenance job | Reinstatement method |
| 5 | The fuel pressure is too low. | | | <ul style="list-style-type: none">• Compare the fuel pressures at idle and with throttle open.• About the same → Normal• Too low → Refer to the following table. | |
| | | | | <ul style="list-style-type: none">• Check the fuel pump.• Replace if defective. Refer to “CHECKING THE FUEL PUMP BODY” on page 7-2. | |
| | | | | <ul style="list-style-type: none">• Check the delivery hose for pinching or kinking.• Repair or replace if there is a malfunction. | |
| | | | | <ul style="list-style-type: none">• Check the pressure regulator.• Replace if defective. Refer to “CHECKING THE FUEL PRESSURE” on page 7-7. | |
| | | | | <ul style="list-style-type: none">• Check the throttle position sensor.• Execute the diagnostic mode. (Code No.01)• Replace if defective. | |
| | | | | <ul style="list-style-type: none">• Check the fuel system (disconnection, etc.).• Repair or replace if there is a malfunction. | |
| | | | | <ul style="list-style-type: none">• Check the intake system (improper sealing, etc.).• Repair or replace if there is a malfunction. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|--|---------|---|--|
| Fault code No. | 32 | Symptom | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio). | |
| Diagnostic code No. | | 01 | Throttle position sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• O₂ sensor coupler• Relay unit coupler• Wire harness ECU coupler• Sub-wire harness coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Starting the engine, warming it up until the coolant temperature is 60 °C or more, and then running it between 2000–3000 r/min until the engine trouble warning light turns off. |
| 2 | Open or short circuit in wire harness, sub-wire harness and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between O₂ sensor coupler and ECU coupler. (black/blue–black/blue) (gray/white–gray/white)• Between O₂ sensor coupler and relay unit coupler. (red/blue–red/blue)• Between O₂ sensor coupler and sub-wire harness coupler. (black–black) | |
| 3 | Defective O ₂ sensor | | Replace if defective. (Unable to output a rich signal) | |
| 4 | Excessive volume of fuel injected by injector. | | <ul style="list-style-type: none">• Check the injector.• Check the fuel pressure. Refer to “CHECKING THE FUEL PRESSURE” on page 7-7. | |

FUEL INJECTION SYSTEM

| | | | | | | |
|---------------------|------------------------------------|----|--------------------------|---|----------------------|--|
| Fault code No. | | 32 | Symptom | The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio). | | |
| Diagnostic code No. | | 01 | Throttle position sensor | | | |
| Order | Item/components and probable cause | | | Check or maintenance job | Reinstatement method | |
| 5 | The fuel pressure is too high. | | | <ul style="list-style-type: none">• Compare the fuel pressures at idle and with throttle open. About the same → Normal Too high → Refer to the following table. | | |
| | | | | <ul style="list-style-type: none">• Checking the pressure regulator.• Replace if defective. Refer to “CHECKING THE FUEL PRESSURE” on page 7-7. | | |
| | | | | <ul style="list-style-type: none">• Checking the throttle position sensor.• Execute the diagnostic mode. (Code No.01)• Replace if defective. | | |
| | | | | <ul style="list-style-type: none">• Checking the fuel system (clogging, etc.).• Repair or replace if there is a malfunction. | | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|---|---------|--|---|
| Fault code No. | 33 | Symptom | Malfunction detected in the primary wire of the cylinders-#1/#4 ignition coil. | |
| Diagnostic code No. | | 30 | Cylinders-#1/#4 ignition coil | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Cylinders-#1/#4 ignition coil connector (primary coil side)• Wire harness ECU coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Starting the engine and operating it at idle. |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between cylinders-#1/#4 ignition coil connector and ECU coupler. (orange—orange)• Between cylinders-#1/#4 ignition coil connector and right handlebar switch coupler. (red/black—red/black) | |
| 3 | Defective cylinders-#1/#4 ignition coil | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.30)• Test the primary and secondary coils for continuity.• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-161. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|---|---------|---|---|
| Fault code No. | 34 | Symptom | Malfunction detected in the primary wire of the cylinders-#2/#3 ignition coil. | |
| Diagnostic code No. | | 31 | Cylinders-#2/#3 ignition coil | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Cylinders-#2/#3 ignition coil connector (primary coil side)• Wire harness ECU coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Starting the engine and operating it at idle. |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between cylinders-#2/#3 ignition coil connector and ECU coupler. (gray/red-gray/red)• Between cylinders-#2/#3 ignition coil connector and right handlebar switch coupler. (red/blue-red/black) | |
| 3 | Defective cylinders-#2/#3 ignition coil | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.31)• Test the primary and secondary coils for continuity.• Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-161. | |

FUEL INJECTION SYSTEM

| | | | | |
|----------------------------|---|----------------|--|----------------------------------|
| Fault code No. | 41 | Symptom | Lean angle sensor: open or short circuit detected. | |
| Diagnostic code No. | | 08 | Lean angle sensor | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Lean angle sensor coupler• Wire harness ECU coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Turning the main switch to "ON". |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between lean angle sensor coupler and ECU coupler. (black/blue–black/blue) (yellow/green–yellow/green) (blue–blue) | |
| 3 | Defective lean angle sensor | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.08)• Replace if defective. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-163. | |

FUEL INJECTION SYSTEM

| Fault code No. | | 42 | Symptom | | A. No normal signals are received from the rear wheel sensor. B. Open or short circuit is detected in the neutral circuit of the gear position switch. | |
|---------------------|--|----|---------|----|---|---|
| Diagnostic code No. | | | A | 07 | Rear wheel sensor | |
| | | | B | 21 | Gear position switch (neutral circuit) | |
| Order | Item/components and probable cause | | | | Check or maintenance job | Reinstatement method |
| A-1 | Connections <ul style="list-style-type: none"> • Rear wheel sensor coupler • Wire harness ECU coupler • ABS ECU coupler • ABS wire harness coupler | | | | <ul style="list-style-type: none"> • 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. | Starting the engine, and inputting the vehicle speed signals by operating the vehicle at a 20 to 30 km/h. |
| A-2 | Open or short circuit in wire harness and/or ABS wire harness. | | | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between rear wheel sensor coupler and ABS ECU coupler. (white–white) (black–black) • Between ABS ECU coupler and ECU coupler. (white/yellow–white/yellow) | |
| A-3 | Sensor rotor for detecting vehicle speed has broken. | | | | <ul style="list-style-type: none"> • Replace the rear wheel. Refer to “REAR WHEEL” on page 4-20. | |
| A-4 | Defective rear wheel sensor | | | | <ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No.07) • Replace if defective. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22. | |

FUEL INJECTION SYSTEM

| | | | | | | |
|---------------------|--|----|---------|----|--|---|
| Fault code No. | | 42 | Symptom | | A. No normal signals are received from the rear wheel sensor. B. Open or short circuit is detected in the neutral circuit of the gear position switch. | |
| Diagnostic code No. | | | A | 07 | Rear wheel sensor | |
| | | | B | 21 | Gear position switch (neutral circuit) | |
| Order | Item/components and probable cause | | | | Check or maintenance job | Reinstatement method |
| B-1 | Connections <ul style="list-style-type: none">• Gear position switch coupler• Wire harness ECU coupler• Front cowling wire harness coupler | | | | <ul style="list-style-type: none">• 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. | Starting the engine, and inputting the vehicle speed signals by operating the vehicle at a 20 to 30 km/h. |
| B-2 | Open or short circuit in wire harness and/or front cowling wire harness. | | | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between gear position switch coupler and relay unit coupler. (sky blue–sky blue)• Between relay unit coupler and ECU coupler. (black/yellow–black/yellow) | |
| B-3 | Faulty shift drum (neutral detection area) | | | | <ul style="list-style-type: none">• Replace if defective. Refer to “TRANSMISSION” on page 5-94. | |
| B-4 | Defective gear position switch (neutral circuit) | | | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No.21)• Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-149. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|---|---------|---|---|
| Fault code No. | 43 | Symptom | The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU). | |
| Diagnostic code No. | | 09 | Fuel system voltage | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none">• Relay unit coupler• Main wire harness ECU coupler• Front cowling wire harness coupler | | <ul style="list-style-type: none">• 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. | Starting the engine and operating it at idle. |
| 2 | Open or short circuit in the wire harness and/or sub-wire harness. | | <ul style="list-style-type: none">• Repair or replace if there is an open or short circuit.• Between relay unit coupler and ECU coupler. (blue/yellow–blue/yellow) (red/blue–red/blue)• Between relay unit coupler and main switch coupler. (red–brown/blue)• Between relay unit coupler and engine stop switch coupler. (red/black–red/black) | |
| 3 | Malfunction or open circuit in fuel pump relay. | | <ul style="list-style-type: none">• Execute the diagnostic mode. (Code No. 09)• Replace if defective.• If there is no malfunction with the fuel pump relay, replace the ECU. | |

FUEL INJECTION SYSTEM

| | | | | |
|---------------------|------------------------------------|---------|--|---|
| Fault code No. | 44 | Symptom | An error is detected while reading or writing on EEPROM (CO adjustment value). | |
| Diagnostic code No. | | 60 | EEPROM fault cylinder No. | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Malfunction in ECU. | | <ul style="list-style-type: none">Set the faulty cylinder's exhaust gas volume.<ol style="list-style-type: none">Execute the diagnostic mode (Code No. 60) to check the faulty cylinder number. (If multiple cylinders are defective, the numbers of the faulty cylinders are displayed alternately at 2-second intervals.)Execute the CO adjustment mode and set the exhaust gas volume of the faulty cylinder to "0". Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-7.Replace ECU if it does not recover from the malfunction. | Turning the main switch to "ON". (Readjust the exhaust gas volume after it is reinstated.) |

FUEL INJECTION SYSTEM

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|----------------------------|---|----------------|---|---|
| Fault code No. | 46 | Symptom | Power supply to the fuel injection system is not normal. | |
| Diagnostic code No. | — | — | | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections • Wire harness ECU coupler | | <ul style="list-style-type: none"> • 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. | Starting the engine and operating it at idle. |
| 2 | Faulty battery. | | <ul style="list-style-type: none"> • Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-154. | |
| 3 | Malfunction in rectifier/regulator | | <ul style="list-style-type: none"> • Replace if defective. Refer to “CHARGING SYSTEM” on page 8-17. | |
| 4 | Open or short circuit in wire harness. | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between battery and main switch coupler. (red–red) • Between main switch coupler and ignition fuse. (brown/blue–brown/blue) • Between ignition fuse and ECU coupler. (red/white–red/white) | |

| | | | | |
|----------------------------|---|----------------|--|----------------------------------|
| Fault code No. | 50 | Symptom | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.) | |
| Diagnostic code No. | — | — | | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Malfunction in ECU. | | Replace the ECU. NOTE: _____ Do not perform this procedure with the main switch turned to “ON”. _____ | Turning the main switch to “ON”. |

FUEL INJECTION SYSTEM

| Fault code No. | Er-1 | Symptom | No signals are received from the ECU. | |
|---------------------|--|---------|---|----------------------------------|
| Diagnostic code No. | | — | — | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none"> • Meter assembly coupler • Wire harness ECU coupler • Front cowling wire harness coupler | | <ul style="list-style-type: none"> • 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. | Turning the main switch to "ON". |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) | |
| 3 | Malfunction in meter assembly | | Replace the meter assembly. | |
| 4 | Malfunction in ECU | | Replace the ECU. | |

| Fault code No. | Er-2 | Symptom | No signals are received from the ECU within the specified duration. | |
|---------------------|--|---------|---|----------------------------------|
| Diagnostic code No. | | — | — | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none"> • Meter assembly coupler • Wire harness ECU coupler • Front cowling wire harness coupler | | <ul style="list-style-type: none"> • 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. | Turning the main switch to "ON". |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) | |
| 3 | Malfunction in meter assembly | | Replace the meter assembly. | |
| 4 | Malfunction in ECU | | Replace the ECU. | |

FUEL INJECTION SYSTEM

| Fault code No. | Er-3 | Symptom | Data from the ECU cannot be received correctly. | |
|---------------------|--|---------|---|----------------------------------|
| Diagnostic code No. | | — | — | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none"> • Meter assembly coupler • Wire harness ECU coupler • Front cowling wire harness coupler | | <ul style="list-style-type: none"> • 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. | Turning the main switch to "ON". |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) | |
| 3 | Malfunction in meter assembly | | Replace the meter assembly. | |
| 4 | Malfunction in ECU | | Replace the ECU. | |

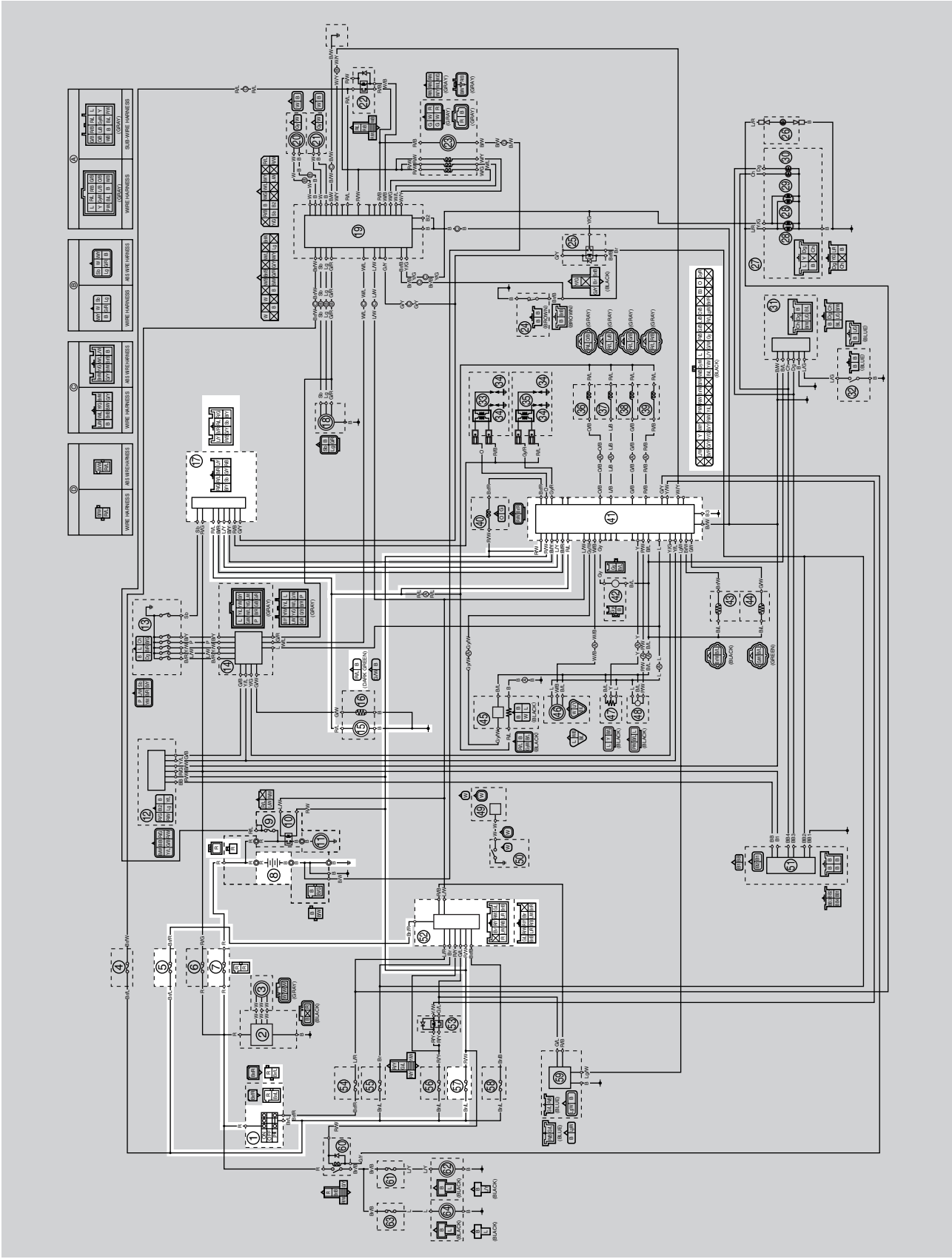
| Fault code No. | Er-4 | Symptom | Non-registered data has been received from the meter. | |
|---------------------|--|---------|---|----------------------------------|
| Diagnostic code No. | | — | — | |
| Order | Item/components and probable cause | | Check or maintenance job | Reinstatement method |
| 1 | Connections <ul style="list-style-type: none"> • Meter assembly coupler • Wire harness ECU coupler • Front cowling wire harness coupler | | <ul style="list-style-type: none"> • 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. | Turning the main switch to "ON". |
| 2 | Open or short circuit in wire harness and/or front cowling wire harness | | <ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) | |
| 3 | Malfunction in meter assembly | | Replace the meter assembly. | |
| 4 | Malfunction in ECU | | Replace the ECU. | |

EAS27550

FUEL PUMP SYSTEM

EAS27560

CIRCUIT DIAGRAM (1/2)

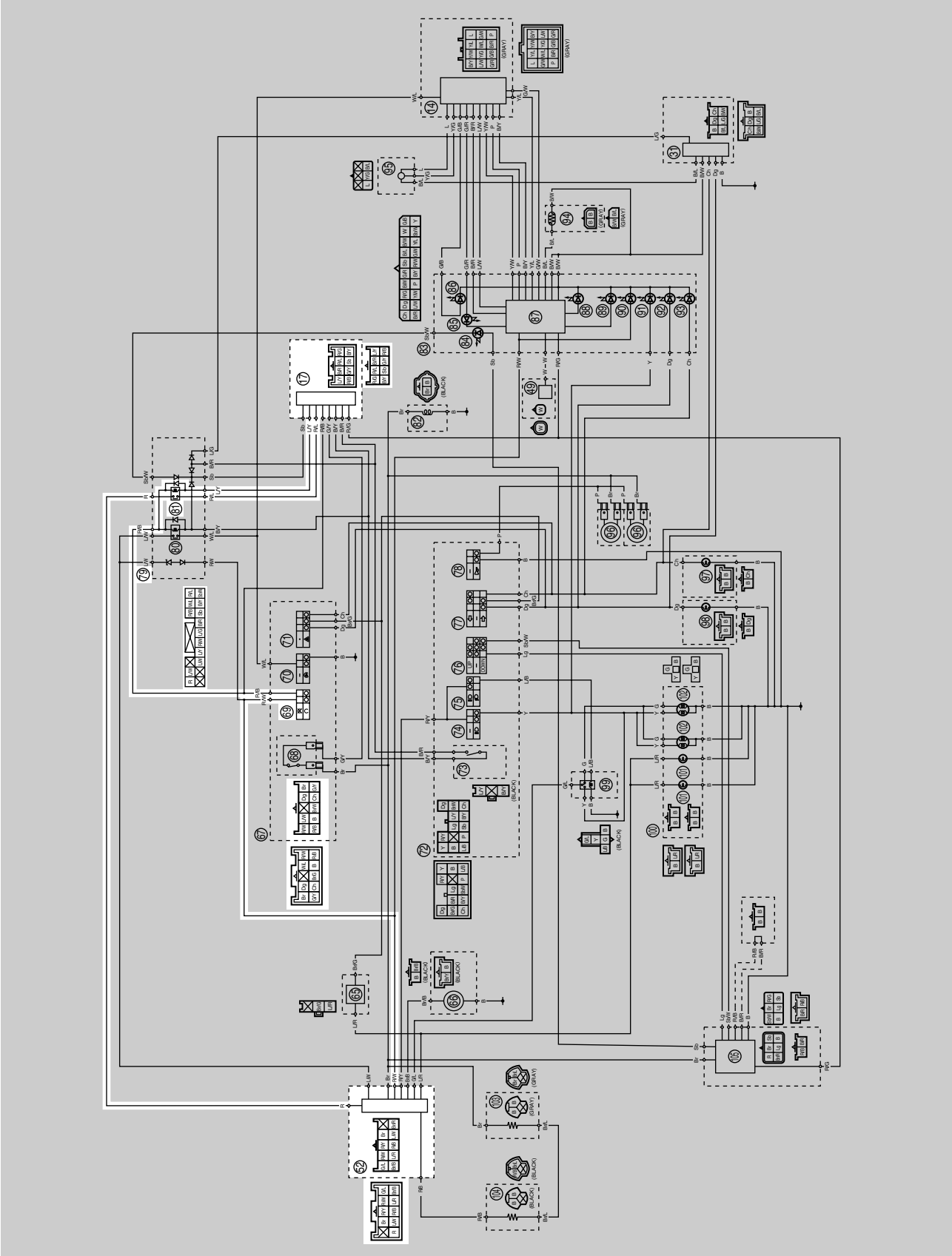


- 1. Main switch
- 5. Fuel injection system fuse
- 7. Main fuse
- 8. Battery
- 15. Fuel pump
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 41. ECU (engine control unit)
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 57. Ignition fuse

ET3P61007

CIRCUIT DIAGRAM (2/2)

Front cowl wire harness



- 17. Coupler 2 (front cowling wire harness—wire harness)
- 52. Coupler 5 (front cowling wire harness—wire harness)
- 69. Engine stop switch
- 79. Relay unit
- 81. Fuel pump relay

EAS27570

TROUBLESHOOTING

If the fuel pump fails to operate.

NOTE:

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar

| | | |
|---|------|--|
| 1. Check the fuses. (Main, ignition, and fuel injection system) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the right handlebar switch. |
| OK ↓ | | |
| 5. Check the relay unit (fuel pump relay). Refer to "CHECKING THE RELAYS" on page 8-157. | NG → | Replace the relay unit. |
| OK ↓ | | |
| 6. Check the fuel pump. Refer to "CHECKING THE FUEL PUMP BODY" on page 7-2. | NG → | Replace the fuel pump assembly. |
| OK ↓ | | |
| 7. Check the entire fuel pump system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-81 and "CIRCUIT DIAGRAM (2/2)" on page 8-83. | NG → | Properly connect or repair the fuel pump system wiring. |
| OK ↓ | | |
| Replace the ECU. | | |

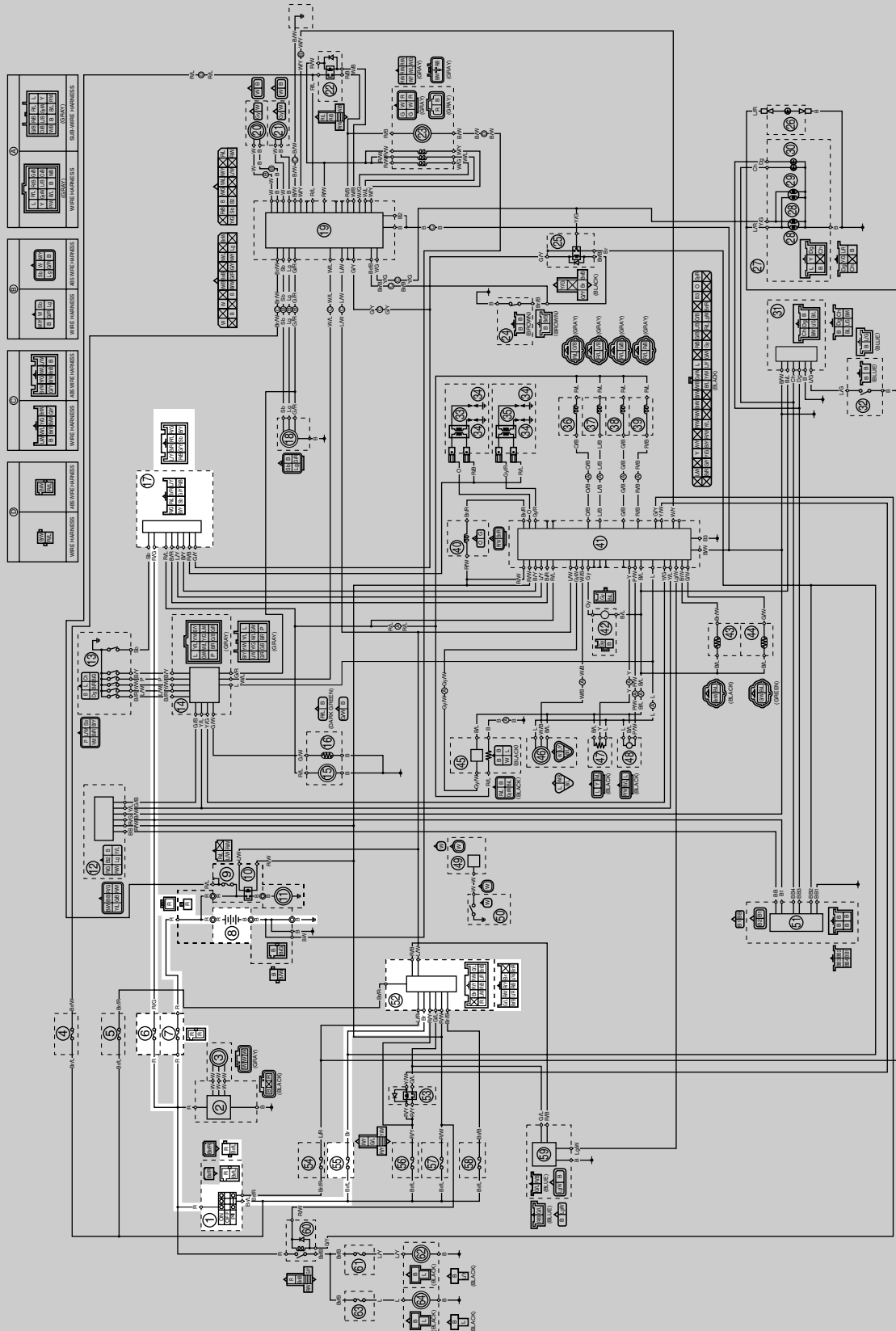
WINDSHIELD DRIVE SYSTEM

EAS27610

WINDSHIELD DRIVE SYSTEM

EAS27620

CIRCUIT DIAGRAM (1/2)



WINDSHIELD DRIVE SYSTEM

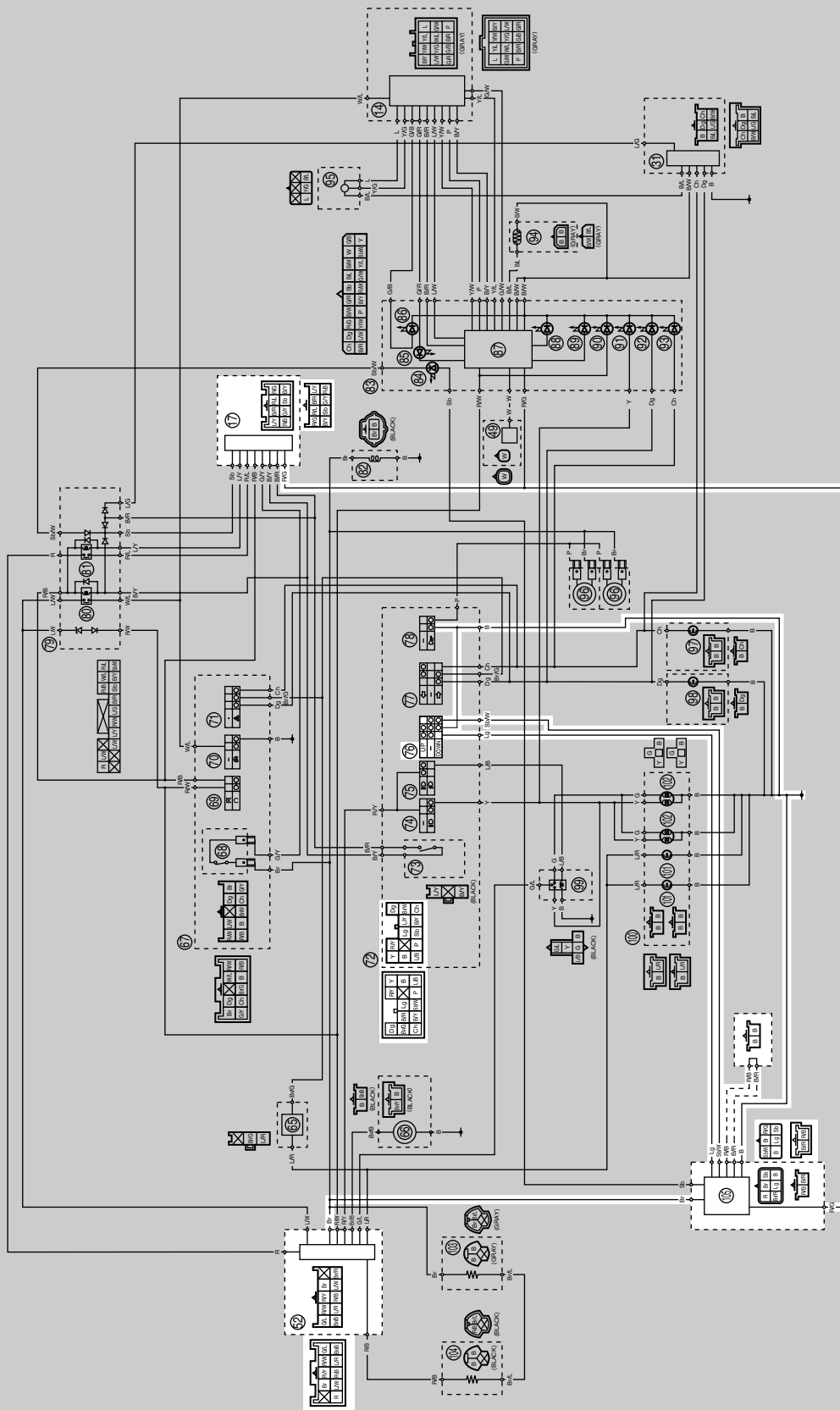
- 1. Main switch
- 6. Backup fuse (odometer, clock, immobilizer system, and windshield drive system)
- 7. Main fuse
- 8. Battery
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 55. Signaling system fuse

WINDSHIELD DRIVE SYSTEM

ET3P61008

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



WINDSHIELD DRIVE SYSTEM

- 17.Coupler 2 (front cowling wire harness—wire harness)
- 52.Coupler 5 (front cowling wire harness—wire harness)
- 76.Windshield position switch
- 105.Windshield drive unit

EAS27630

TROUBLESHOOTING

The windshield fails to operate.

NOTE:

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Fuel tank
3. T-bar

| | | |
|--|------|--|
| 1. Check the fuses. (Main, signaling system, and back-up) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 4. Check the windshield position switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the left handlebar switch. |
| OK ↓ | | |
| 5. Check the entire windshield drive system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-87 and "CIRCUIT DIAGRAM (2/2)" on page 8-89. | NG → | Properly connect or repair the windshield drive system wiring. |
| OK ↓ | | |
| Replace the windshield drive unit. | | |

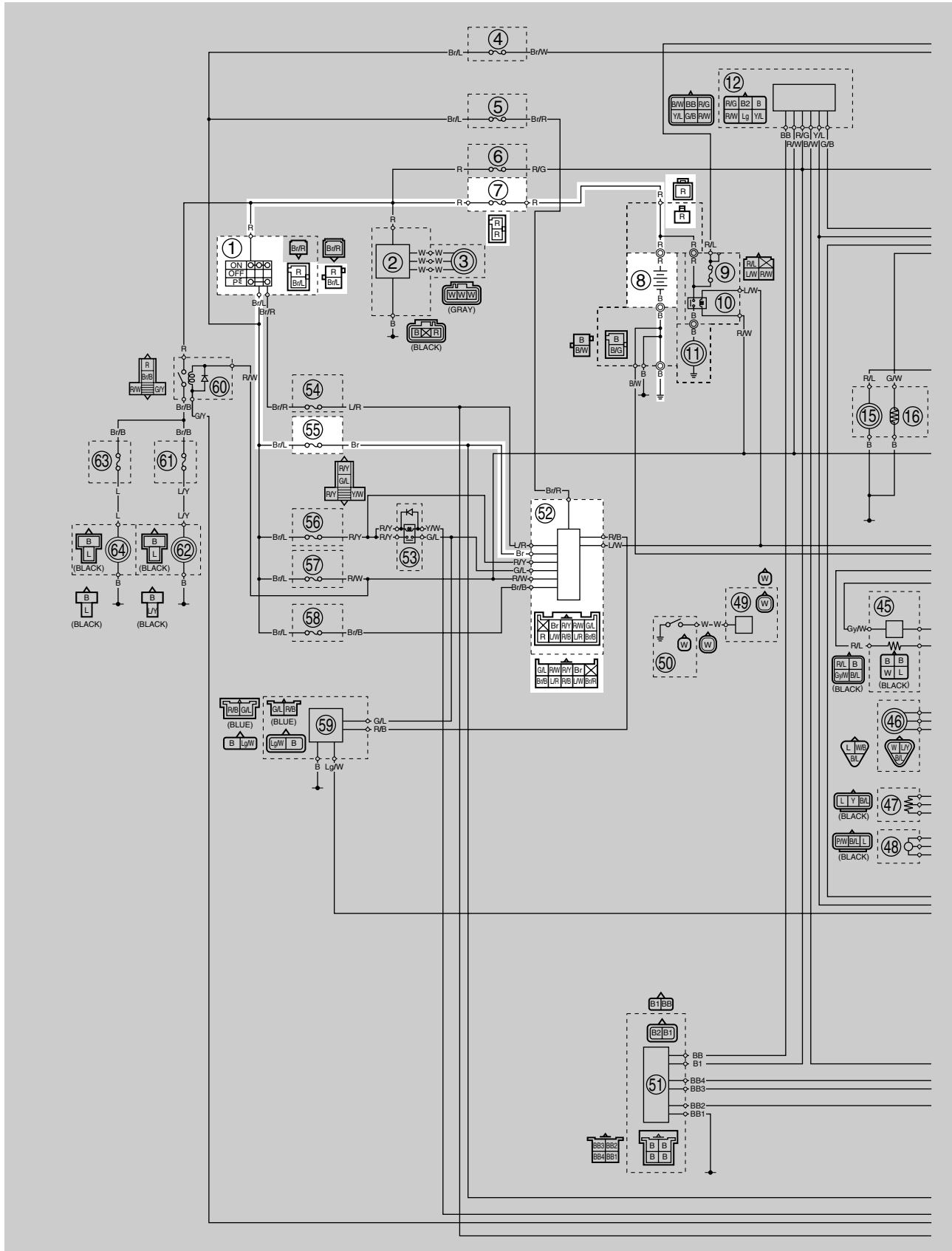
ACCESSORY BOX SYSTEM

ET3P61009

ACCESSORY BOX SYSTEM

ET3P61010

CIRCUIT DIAGRAM (1/2)



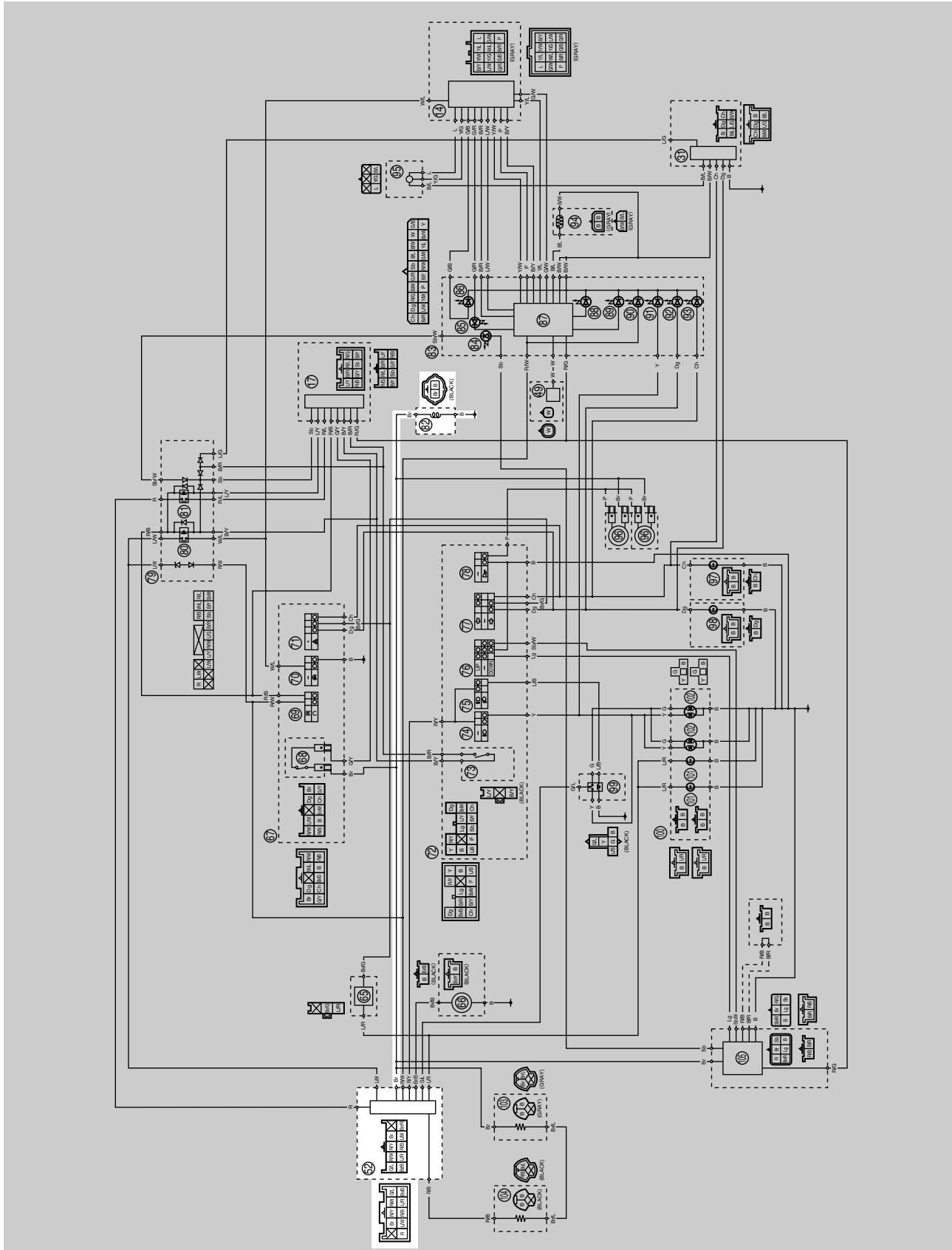
ACCESSORY BOX SYSTEM

- 1. Main switch
- 7. Main fuse
- 8. Battery
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 55. Signaling system fuse

ET3P61011

CIRCUIT DIAGRAM (2/2)

Front cowling wire harness



ACCESSORY BOX SYSTEM

- 52.Coupler 5 (front cowling wire harness—wire harness)
- 82.Accessory box solenoid

ET3P61012

TROUBLESHOOTING

The accessory box fails to operate.

NOTE:

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly

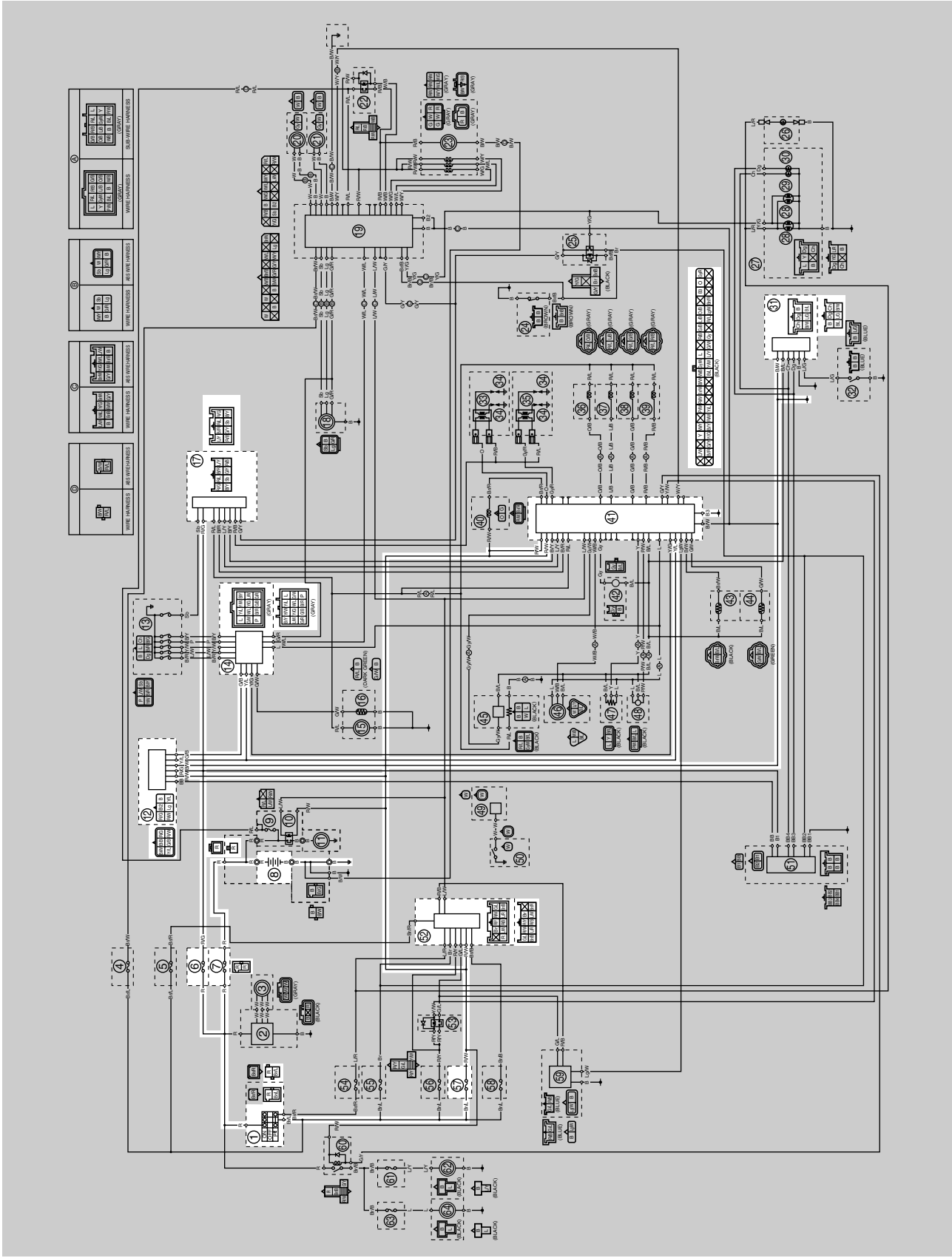
| | | |
|---|-------------|--|
| <p>1. Check the fuses. (Main and signaling system) Refer to "CHECKING THE FUSES" on page 8-153.</p> | <p>NG →</p> | <p>Replace the fuse(s).</p> |
| <p>OK ↓</p> | | |
| <p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154.</p> | <p>NG →</p> | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| <p>OK ↓</p> | | |
| <p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149.</p> | <p>NG →</p> | <p>Replace the main switch/immobilizer unit.</p> |
| <p>OK ↓</p> | | |
| <p>4. Check the accessory box solenoid. Refer to "CHECKING THE ACCESSORY BOX SOLENOID" on page 8-169.</p> | <p>NG →</p> | <p>Replace the accessory box solenoid.</p> |
| <p>OK ↓</p> | | |
| <p>5. Check the entire accessory box system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-87 and "CIRCUIT DIAGRAM (2/2)" on page 8-89.</p> | <p>NG →</p> | <p>Properly connect or repair the accessory box system wiring.</p> |
| <p>OK ↓</p> | | |
| <p>This accessory box system circuit is OK.</p> | | |

EAS27640

IMMOBILIZER SYSTEM

EAS27650

CIRCUIT DIAGRAM (1/2)

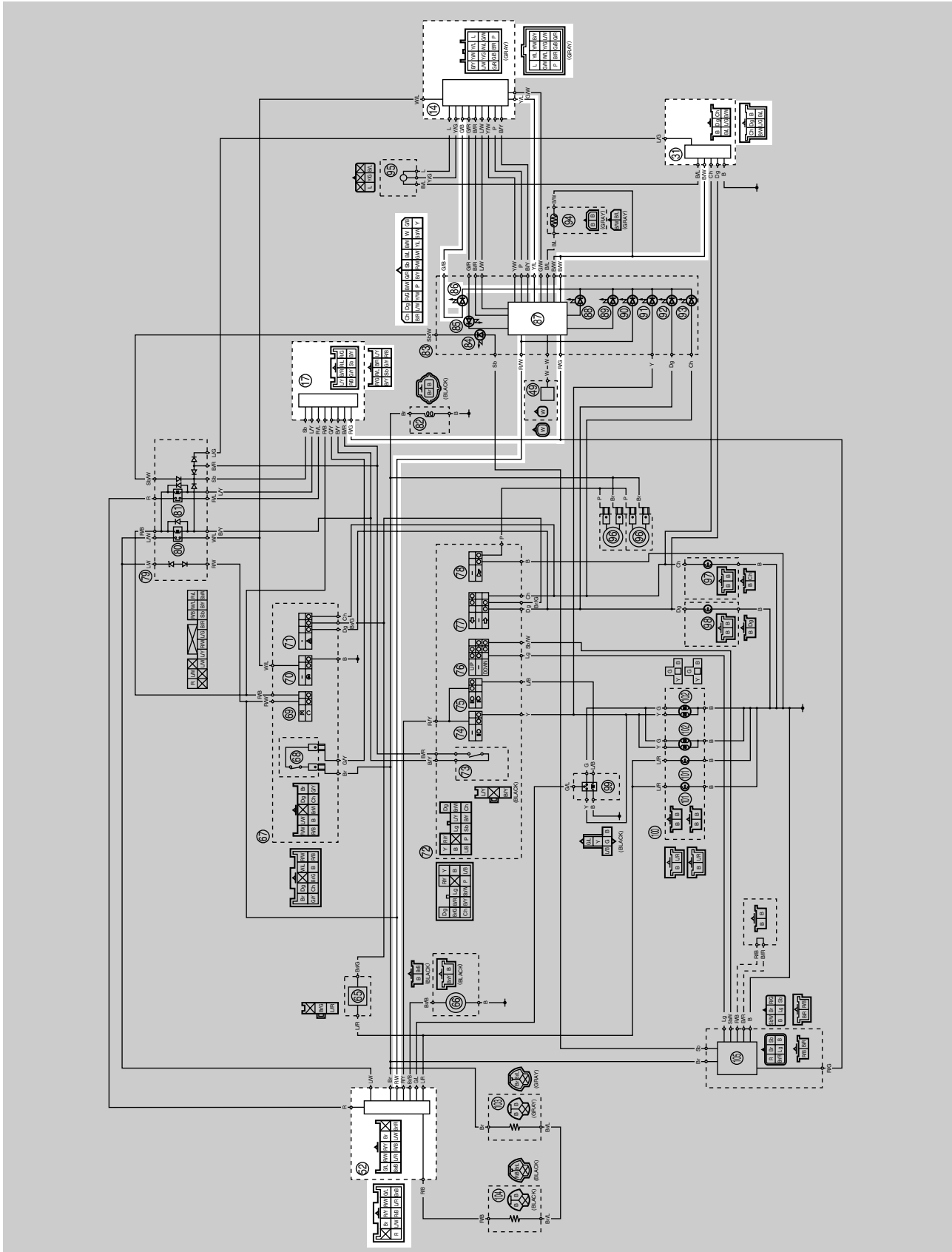


- 1. Main switch
- 6. Backup fuse (odometer, clock, immobilizer system, and windshield drive system)
- 7. Main fuse
- 8. Battery
- 12. Immobilizer unit
- 14. Coupler 1 (wire harness—front cowling wire harness)
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 41. ECU (engine control unit)
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 57. Ignition fuse

ET3P61013

CIRCUIT DIAGRAM (2/2)

Front cowl wire harness



- 14.Coupler 1 (front cowling wire harness–wire harness)
- 17.Coupler 2 (front cowling wire harness–wire harness)
- 31.Coupler 3 (front cowling wire harness–wire harness)
- 52.Coupler 5 (front cowling wire harness–wire harness)
- 86.Immoblizer system indicator light
- 87.Multi-function meter

EAS27670

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 is 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. (See caution below.)

NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

EC3P61001

CAUTION:

- **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 submerge 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.

EAS27690

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.

NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

IMMOBILIZER SYSTEM

| | 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. Turn the main switch to "ON" with the code re-registering key.

NOTE:

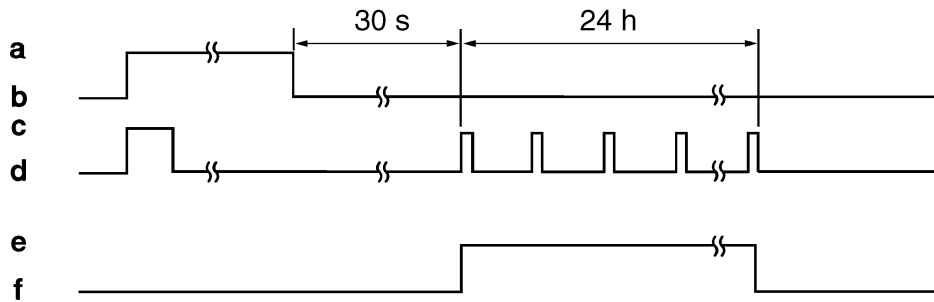
Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

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, turn 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.

NOTE:

Do not start the engine with a standard key that has not been registered. If the main switch is turned "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 8-107.)

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, turn 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 turn the key to "ON" within 5 seconds to activate the key registration mode.

NOTE:

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, turn the main switch to "OFF", remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.

NOTE:

If the 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.

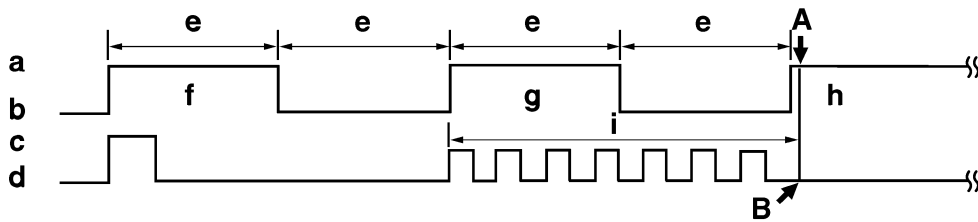
5. Turn the main switch to "ON".

NOTE:

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

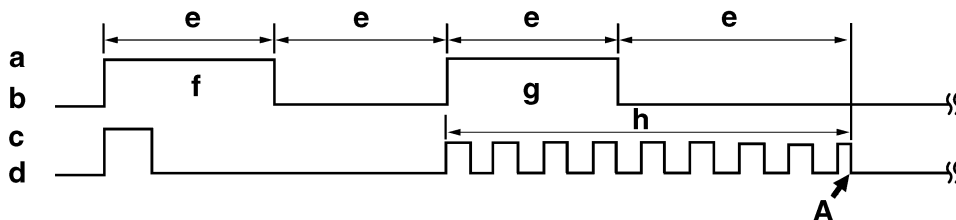


- a. Main switch "ON"
- b. Main switch "OFF"
- c. LED on
- d. LED off
- e. Less than 5.0 s
- f. Code re-registering key
- g. First standard key
- h. Second standard key
- i. Registration mode
- A. Registration of the second standard key is complete.
- B. Immobilizer system indicator light stops flashing 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.

EAS27700

TROUBLESHOOTING

When the main switch is turned to "ON", the immobilizer system indicator light does not come on nor flashes.

IMMOBILIZER SYSTEM

| | | |
|--|------|--|
| 1. Check the fuses. (Main, ignition, and backup) Refer to "CHECKING THE FUSES" on page 8-153. | NG → | Replace the fuse(s). |
| OK ↓ | | |
| 2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154. | NG → | <ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery. |
| OK ↓ | | |
| 3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-149. | NG → | Replace the main switch/immobilizer unit. |
| OK ↓ | | |
| 4. Check the entire immobilizer system wiring. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-99 and "CIRCUIT DIAGRAM (2/2)" on page 8-101. | NG → | Properly connect or repair the immobilizer system wiring. |
| OK ↓ | | |
| <ul style="list-style-type: none"> • Check the condition each of the immobilizer system circuits. • Refer to "SELF-DIAGNOSIS FAULT CODE INDICATION" on page 8-107. | | |

EAS27720

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 antenna. 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. |

IMMOBILIZER SYSTEM

| Fault code | Part | Symptom | Cause | Action |
|------------|------------------|--|---|---|
| 52 | IMMOBILIZER UNIT | Codes between the key and immobilizer unit do not match. | <ol style="list-style-type: none"> 1. Signal received from other transponder (failed to recognize code after ten consecutive attempts). 2. Signal received from unregistered standard key. | <ol style="list-style-type: none"> 1. Place the immobilizer unit at least 50 mm away from the transponder of other vehicles. 2. Register the standard key. |
| 53 | IMMOBILIZER UNIT | Codes cannot be transmitted between the ECU and the immobilizer unit. | <p>Noise interference or disconnected lead/cable.</p> <ol style="list-style-type: none"> 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU malfunction. | <ol style="list-style-type: none"> 1. Check the wire harness and connector. 2. Replace the main switch/immobilizer unit. 3. Replace the ECU. |
| 54 | IMMOBILIZER UNIT | Codes transmitted between the ECU and the immobilizer unit do not match. | <p>Noise interference or disconnected lead/cable.</p> <ol style="list-style-type: none"> 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU failure. (The ECU or immobilizer unit was replaced with a used unit from another vehicle.) | <ol style="list-style-type: none"> 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. |
| 55 | IMMOBILIZER UNIT | Key code registration malfunction. | Same standard key was attempted to be registered two consecutive times. | Register another standard key. |
| 56 | ECU | Unidentified code is received. | Noise interference or disconnected lead/cable. | <ol style="list-style-type: none"> 1. Check the wire harness and connector. 2. Replace the main switch/immobilizer unit. 3. Replace the ECU. |

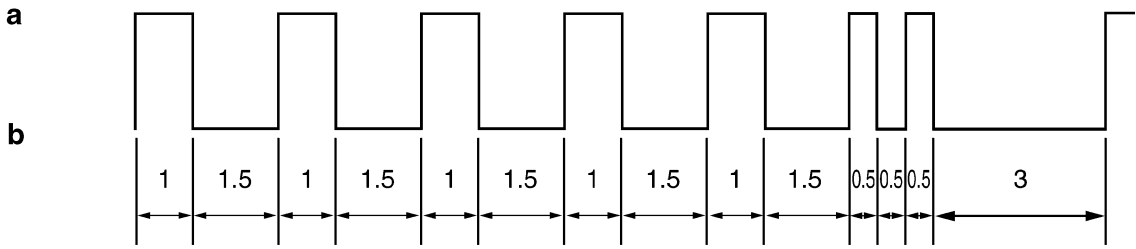
Immobilizer system indicator light fault code indication

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

IMMOBILIZER SYSTEM



- a. Light on
- b. Light off

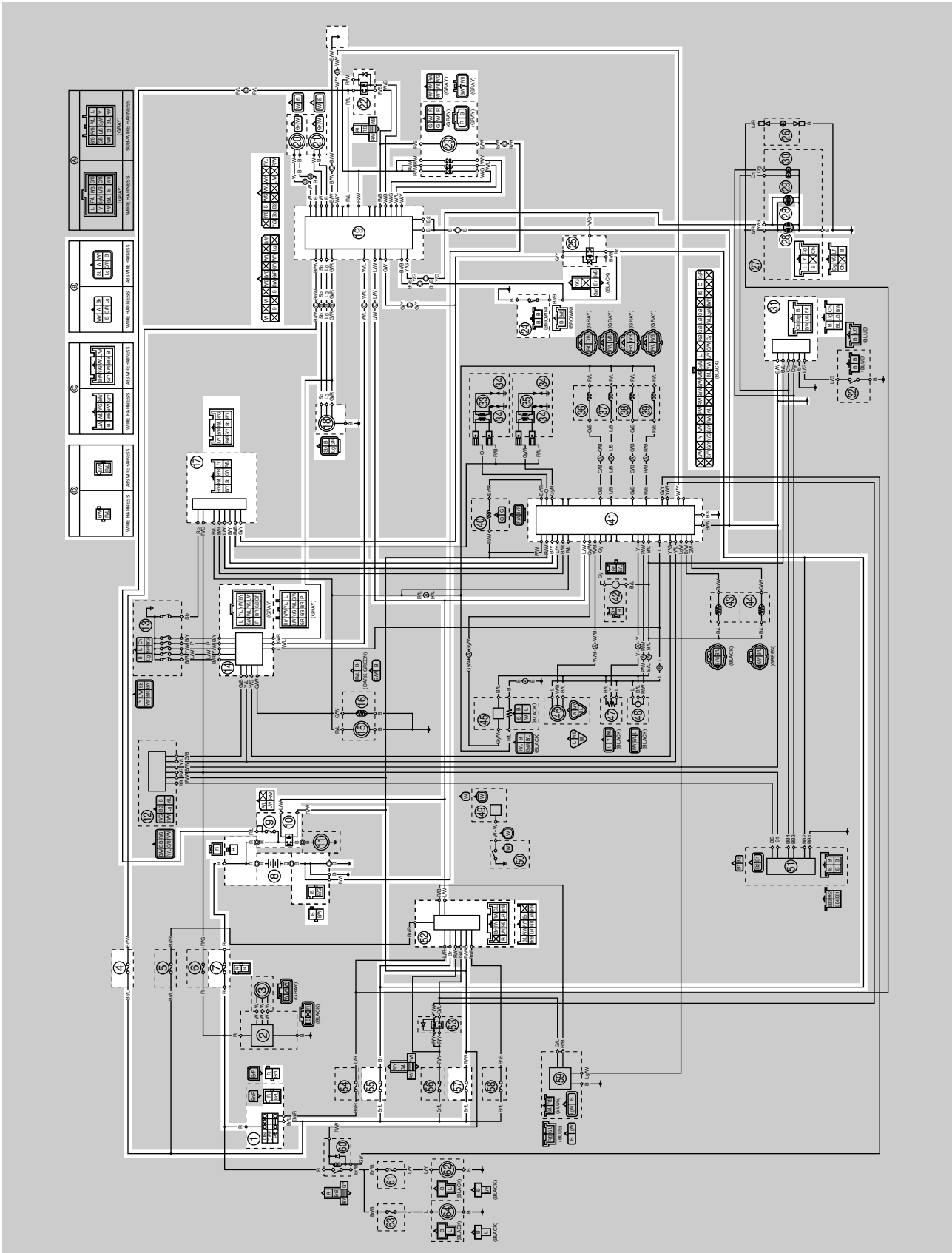
ABS (ANTI-LOCK BRAKE SYSTEM)

EAS28790

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27730

CIRCUIT DIAGRAM (1/2)



ABS (ANTI-LOCK BRAKE SYSTEM)

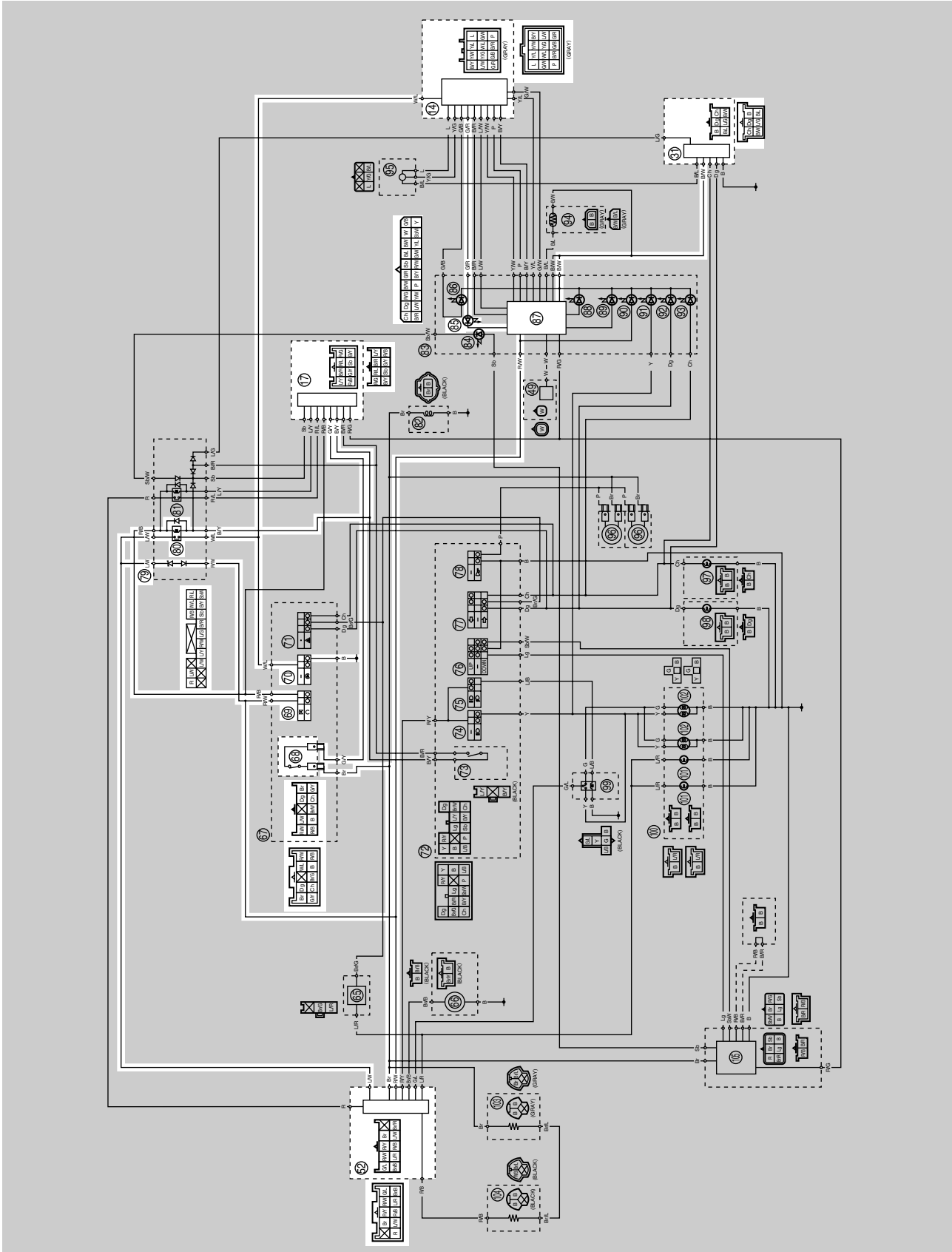
- 1. Main switch
- 4. ABS ECU fuse
- 7. Main fuse
- 8. Battery
- 9. ABS motor fuse
- 10. Starter relay
- 14. Coupler 1 (wire harness—front cowling wire harness)
- 17. Coupler 2 (wire harness—front cowling wire harness)
- 18. ABS test coupler
- 19. ABS ECU (electronic control unit)
- 20. Front wheel sensor
- 21. Rear wheel sensor
- 22. ABS motor relay
- 23. Hydraulic unit
- 24. Rear brake light switch
- 25. Brake light relay
- 28. Tail/brake light
- 31. Coupler 3 (wire harness—front cowling wire harness)
- 41. ECU (engine control unit)
- 52. Coupler 5 (wire harness—front cowling wire harness)
- 55. Signaling system fuse
- 57. Ignition fuse

ABS (ANTI-LOCK BRAKE SYSTEM)

ET3P61021

CIRCUIT DIAGRAM (2/2)

Front cowl wire harness



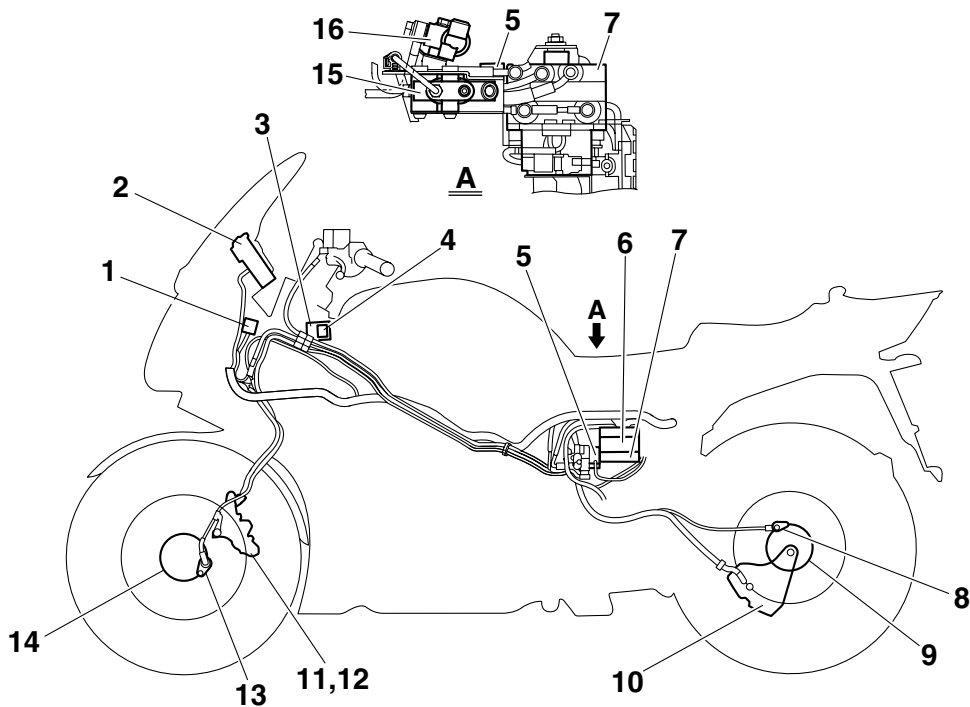
ABS (ANTI-LOCK BRAKE SYSTEM)

- 14. Coupler 1 (front cowling wire harness—wire harness)
- 17. Coupler 2 (front cowling wire harness—wire harness)
- 31. Coupler 3 (front cowling wire harness—wire harness)
- 52. Coupler 5 (front cowling wire harness—wire harness)
- 68. Front brake light switch
- 69. Engine stop switch
- 70. Start switch
- 79. Relay unit
- 80. Starting circuit cut-off relay
- 85. ABS warning light
- 87. Multi-function meter

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27740

ABS COMPONENTS CHART



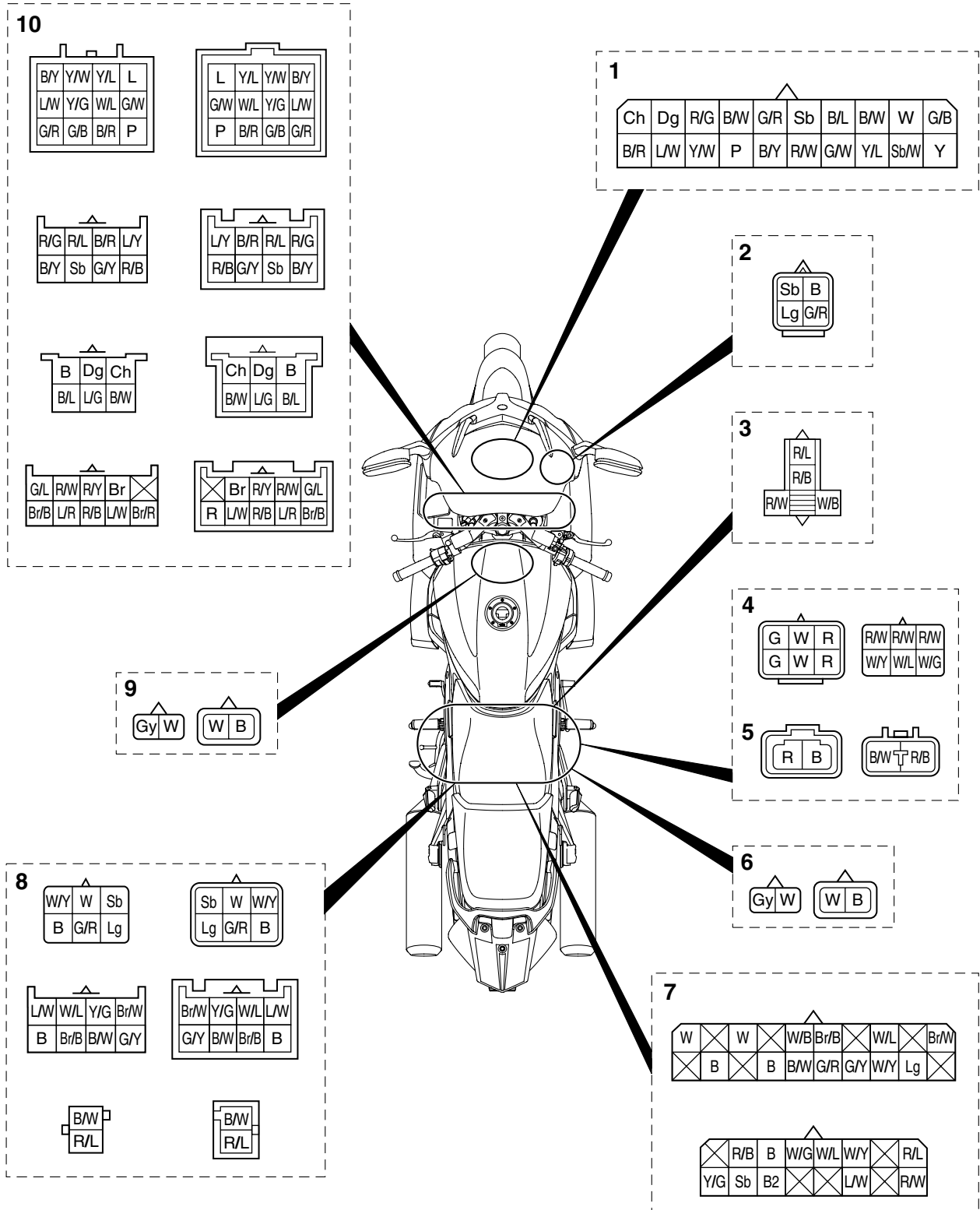
1. ABS test coupler
2. ABS warning light
3. ABS ECU fuse
4. ABS motor fuse
5. ABS motor relay
6. ABS ECU (electronic control unit)
7. Hydraulic unit (HU)
8. Rear wheel sensor
9. Rear wheel sensor rotor
10. Rear brake caliper
11. Left front brake caliper
12. Right front brake caliper (partially operated together with the rear brake)
13. Front wheel sensor
14. Front wheel sensor rotor
15. Proportioning valve
16. Metering valve

ABS (ANTI-LOCK BRAKE SYSTEM)

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27750

ABS COUPLER LOCATION CHART



ABS (ANTI-LOCK BRAKE SYSTEM)

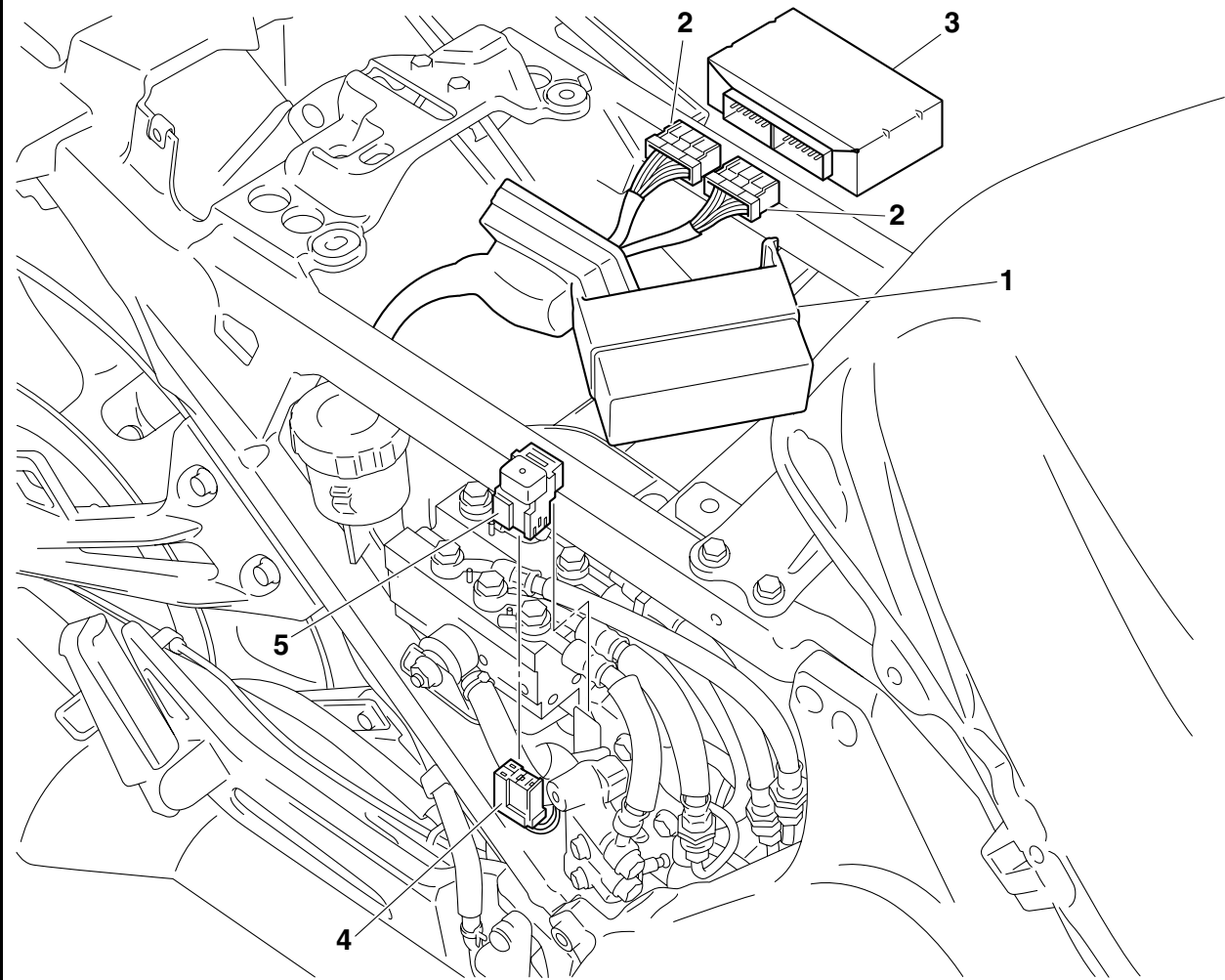
1. Meter assembly coupler
2. ABS test coupler
3. ABS motor relay coupler
4. Hydraulic unit solenoid coupler
5. ABS motor coupler
6. Rear wheel sensor coupler
7. ABS ECU coupler
8. Wire harness–ABS wire harness coupler
9. Front wheel sensor coupler
10. Wire harness–front cowling wire harness coupler

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27760

ABS ECU AND ABS MOTOR RELAY

Removing the ABS ECU and ABS motor relay



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|-------------------------|------|--|
| | Rear side cover | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Storage compartment | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | ABS ECU cover | 1 | |
| 2 | ABS ECU coupler | 2 | Disconnect. |
| 3 | ABS ECU | 1 | |
| 4 | ABS motor relay coupler | 1 | Disconnect. |
| 5 | ABS motor relay | 1 | |
| | | | For installation, reverse the removal procedure. |

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27770

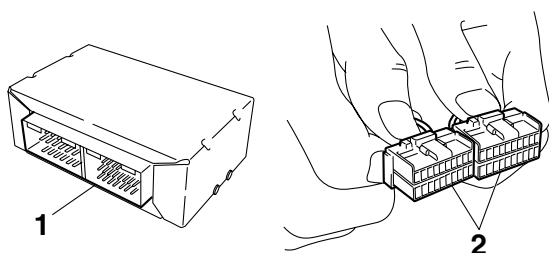
MAINTENANCE OF THE ABS ECU

Checking the ABS ECU

1. Check:
 - Terminals “1” of the ABS ECU
Cracks/damages → Replace the ABS ECU.
 - Terminals “2” of the ABS ECU couplers
Connection defective, contaminated, come-off → Correct or clean.

NOTE:

If the ABS ECU couplers are clogged with mud or dirt, clean with compressed air.



FAS27780

MAINTENANCE OF THE ABS MOTOR RELAY

Checking the ABS motor relay

1. Check:
 - ABS motor relay
Refer to "CHECKING THE ABS MOTOR RELAY" on page 8-159.

FAS22770

EAS22770

MAINTENANCE OF THE HYDRAULIC UNIT

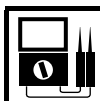
Checking the hydraulic unit (solenoid valve resistance and ABS motor continuity)

EC3P61016

CAUTION:

When checking the hydraulic unit solenoid valves and ABS motor, do not remove the brake hoses.

1. Check:
 - Solenoid valve resistance
Out of specification → Replace the hydraulic unit.



Solenoid valve resistance
2.96–3.20 Ω at 20 °C (68 °F)

NOTE:

Measure the resistance of the front brake, rear brake, and unified brake system solenoid valves.

- a. Connect the pocket tester ($\Omega \times 1$) to the solenoid valve terminals as shown.



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

Rear brake solenoid valve

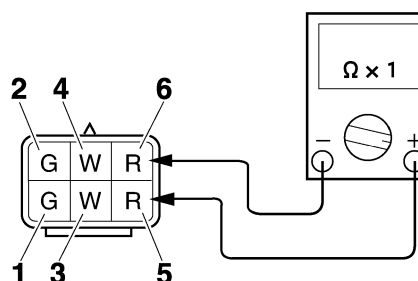
- Positive tester probe → terminal "1"
- Negative tester probe → terminal "2"

Front brake solenoid valve

- Positive tester probe → terminal "3"
- Negative tester probe → terminal "4"

Unified brake system solenoid valve

- Positive tester probe → terminal "5"
- Negative tester probe → terminal "6"



- b. Measure the solenoid valve resistance.

2. Check:
- Solenoid valve insulation
- Continuity → Replace the hydraulic unit.

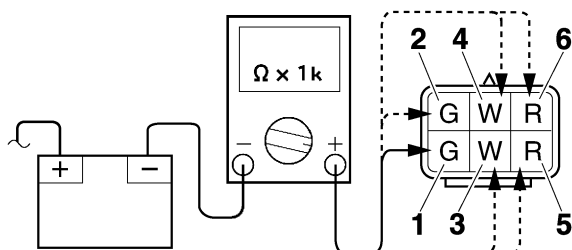
- a. Connect the pocket tester ($\Omega \times 1k$) to the solenoid terminal and negative battery terminal.



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

ABS (ANTI-LOCK BRAKE SYSTEM)

- Positive tester probe → terminals "1", "2", "3", "4", "5", and "6"
- Negative tester probe → negative battery terminal



b. Check the solenoid valve insulation.



3. Check:

- ABS motor continuity
- No continuity → Replace the hydraulic unit.

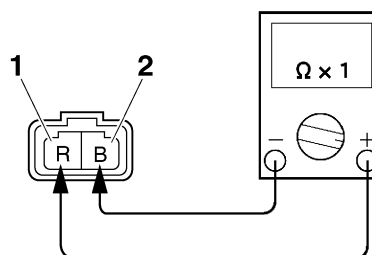


a. Connect the pocket tester ($\Omega \times 1$) to the ABS motor coupler as shown.



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

- Positive tester probe → terminal "1"
- Negative tester probe → terminal "2"



b. Check the ABS motor for continuity.



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.

EW3P61011



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 "[D-3] FINAL CHECK" on page 8-144.)

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.
2. The ABS warning light comes on, and then goes off when starting the engine → ABS operation is normal.
 - The ABS warning light comes on for 2 seconds, and then goes off every time the main switch is turned to "ON".
 - The ABS warning light comes on while the start switch is being pushed.
3. The ABS warning light flashes → ABS operation is normal.
 - The front or rear brake light switch is defective or improperly adjusted.
 - The rear wheel is racing.
 - The vehicle is continuously ridden on extremely uneven roads.

ABS (ANTI-LOCK BRAKE SYSTEM)

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.

In case malfunctions are detected:

The light cannot be used to recall the malfunction codes from the memory of the ABS ECU if the ABS warning light is already on. Connect the test coupler adapter to the ABS test coupler, and then connect a pocket tester to the light green terminal of the adapter and the positive battery terminal to determine the malfunction codes by the movement of the pocket tester needle.

In case any malfunctions are not detected:

The multi-function display indicates all the malfunction codes recorded in the ABS ECU.

You can also recall the malfunction codes by using a pocket tester. Note all of the indicated malfunction codes if more than two malfunction codes are stored in the memory.

Deleting the malfunction code(s):

When the service is finished, check the normal operation of the vehicle, and then delete the malfunction code(s). (Refer to "[D-3] FINAL CHECK" on page 8-144.) By deleting the malfunction codes stored in the ABS ECU memory, it is possible to pursue the cause correctly if another malfunction occurs.

Self-diagnosis using the ABS ECU

The ABS ECU performs a static check of the entire system when the main switch is turned 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 using a pocket tester or 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

EC3P61030

CAUTION:

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, hydraulic unit, wheel sensors, and ABS motor relay are united assemblies and cannot be disassembled.
- The malfunction history is stored in the memory of the ABS ECU. Delete the malfunction codes when the service is finished. (This is because the past malfunction codes will be displayed again if another malfunction occurs.)

EAS27800

BASIC INSTRUCTIONS FOR TROUBLESHOOTING

EW3P61004

WARNING

- **Perform the troubleshooting [A] → [B] → [C] → [D] 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] Detailed check of the malfunction

The results of the self-diagnosis by the ABS ECU can be displayed using the multi-function display or a pocket tester.

[C] Supposing the malfunction cause and position

Find the malfunction cause by reasoning the place and situation where it occurred.

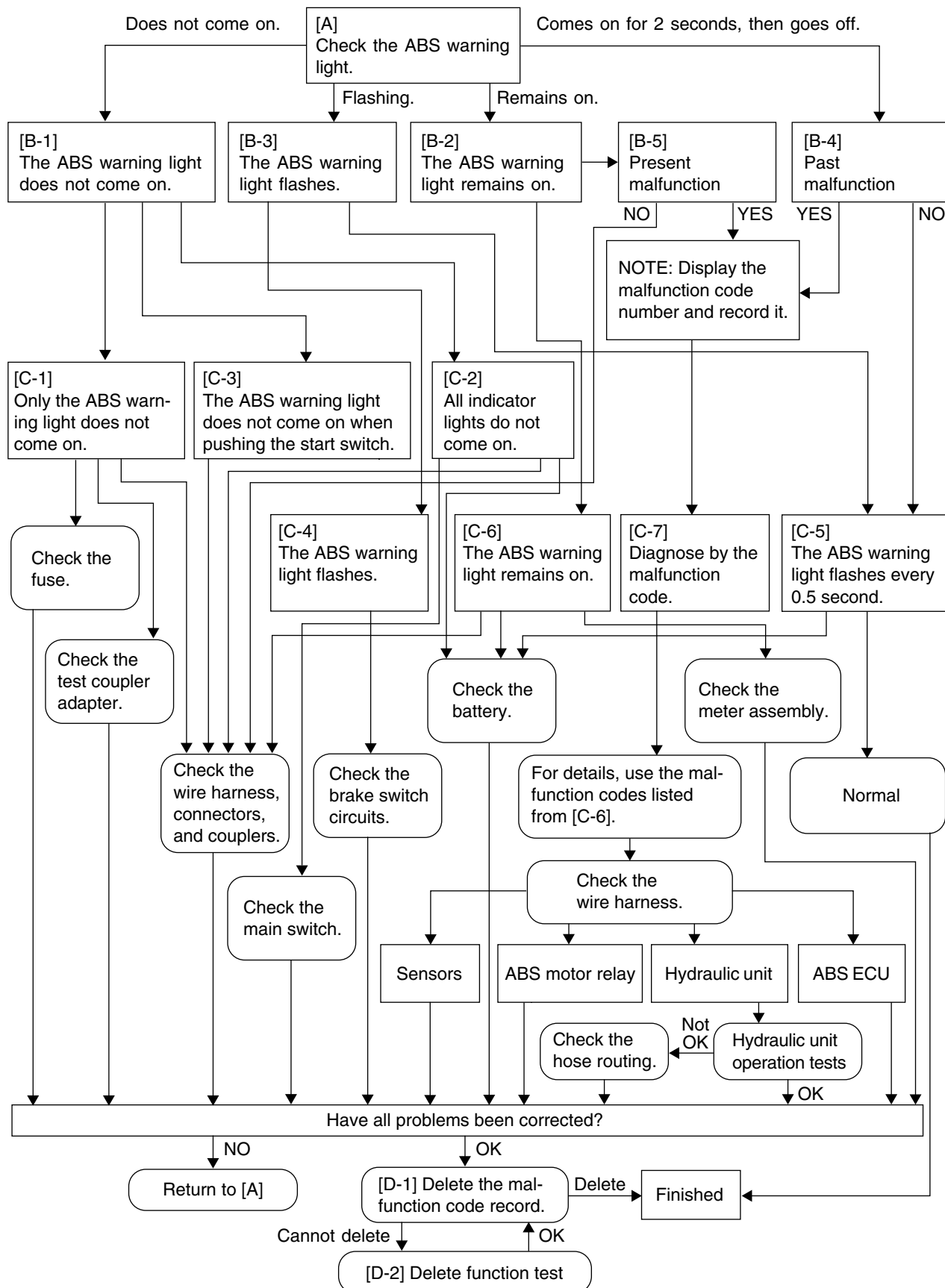
[D] Servicing the ABS

Execute the final check after disassembly and assembly.

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27810

BASIC PROCESS FOR TROUBLESHOOTING



ABS (ANTI-LOCK BRAKE SYSTEM)

NOTE:

Do not delete the malfunction codes during the troubleshooting procedures. Be sure to delete the codes when the service is finished.

EW3P61011



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 “[D-3] FINAL CHECK” on page 8-144.)

EAS27830

[A] CHECKING THE ABS WARNING LIGHT

Turn the main switch to “ON”. (Do not start the engine.)

1. The ABS warning light does not come on. [B-1]
2. The ABS warning light remains on. [B-2]
3. The ABS warning light flashes. [B-3]
4. The ABS warning light comes on for 2 seconds, then goes off. [B-4]

ET3P61061

[B-1] THE ABS WARNING LIGHT DOES NOT COME ON

1. Only the ABS warning light fails to come on when the main switch is turned to “ON”. [C-1]
2. The ABS warning light and all other indicator lights fail to come on. [C-2]
3. The ABS warning light fails to come on while the start switch is being pushed. [C-3]

ET3P61062

[B-2] THE ABS WARNING LIGHT REMAINS ON

1. A present malfunction is detected. [B-5]
2. The ABS warning light remains on. [C-6]

ET3P61063

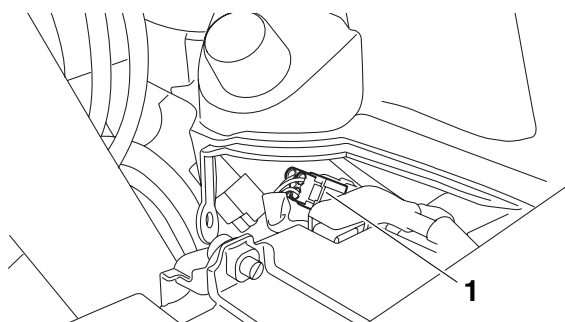
[B-3] THE ABS WARNING LIGHT FLASHES

1. The ABS warning light flashes. [C-4]
2. The ABS warning light flashes every 0.5 second. [C-5]

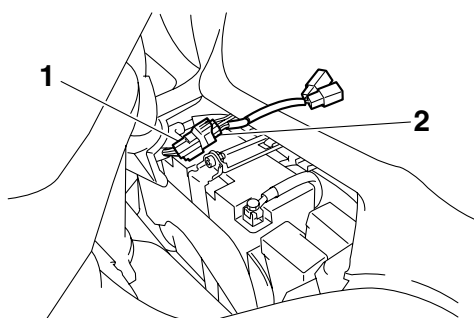
EAS27860

[B-4] MALFUNCTION CHECK BY THE ABS SELF-DIAGNOSIS (PAST MALFUNCTION)

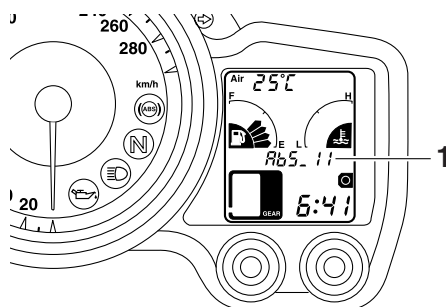
Remove front cowling right inner panel 1 to access the ABS test coupler “1”. Remove the protective cap from the ABS test coupler, and then connect the test coupler adapter “2” to the coupler. The T/C terminal (sky blue) is now grounded.



ABS (ANTI-LOCK BRAKE SYSTEM)



1. The malfunction code “1” is displayed on the multi-function display (example: malfunction code 11).



2. The ABS warning light flashes every 0.5 second for more than 6 seconds.
The ABS warning light flashes every 0.5 second if a malfunction code for a past malfunction is not stored in the memory of the ABS ECU. The ABS warning light flashes quicker if a malfunction code is displayed on the multi-function display. If no malfunction 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.

NOTE:

- The ABS malfunction 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 malfunction 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 malfunction codes. If the adapter is not connected, the ABS warning light will come on or flash, but no malfunction codes will be displayed.

EAS27870

[B-5] MALFUNCTION CHECK BY THE ABS SELF-DIAGNOSIS (PRESENT MALFUNCTION)

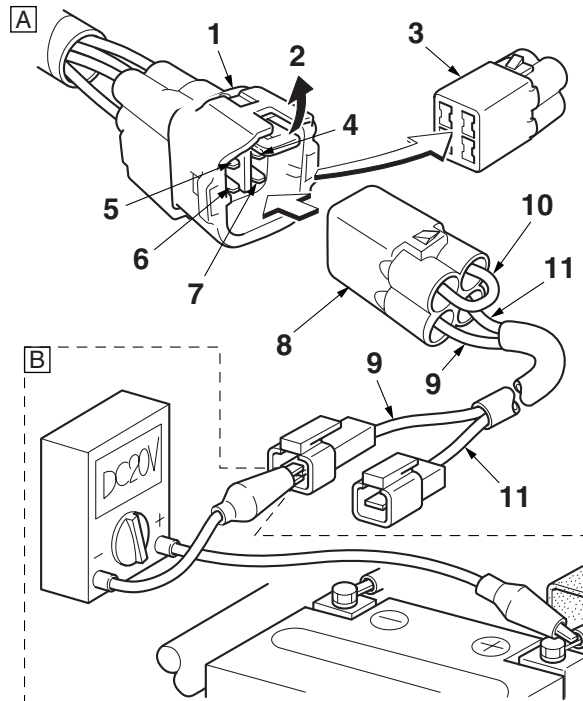
Remove front cowling right inner panel 1 to access the ABS test coupler. Connect the test coupler adapter to the ABS test coupler in order to ground the T/C terminal (sky blue). (Figure A)

Because malfunction codes for present malfunctions are not displayed on the multi-function display, check the malfunction codes as follows.

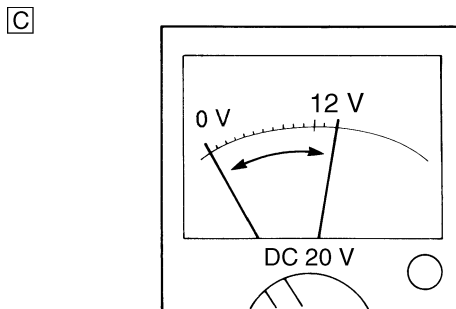
Set the range of the pocket tester to DC 20 V. Connect the negative tester probe to the T/F terminal (light green) and the positive tester probe to the positive battery terminal. (Figure B)

Determine the malfunction code according to the movement of the pocket tester needle. (Figure C)

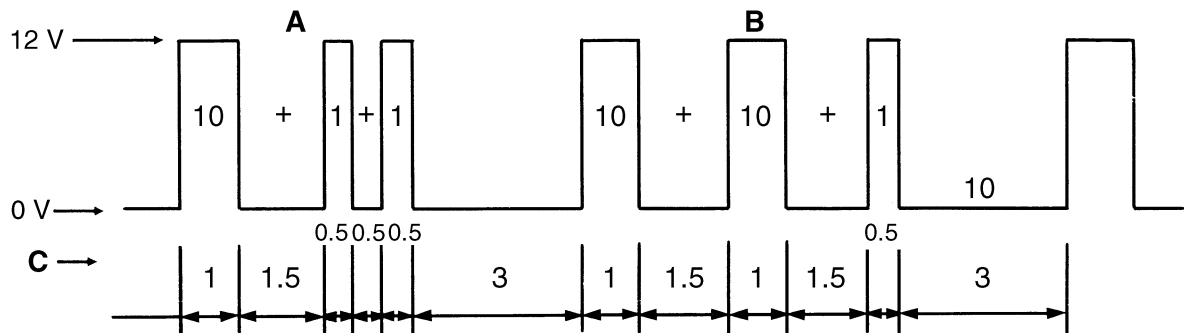
ABS (ANTI-LOCK BRAKE SYSTEM)



- 1. ABS test coupler
- 2. Lock plate
- 3. Protective cap
- 4. Ground terminal (black)
- 5. T/C terminal (sky blue)
- 6. T/F terminal (light green)
- 7. ABS warning light terminal (green/red)
- 8. Test coupler adapter
- 9. Light green lead
- 10. Black lead
- 11. White/red lead



As an example, a “10 digits/1 digit pattern” of the tester reading is shown below.



- A. This example is the pattern for malfunction code 12.
- B. This example is the pattern for malfunction code 21.

C. Time (seconds)

ABS (ANTI-LOCK BRAKE SYSTEM)

EAS27840

[C-1] ONLY THE ABS WARNING LIGHT FAILS TO COME ON WHEN THE MAIN SWITCH IS TURNED TO "ON"

Disconnect the ABS ECU couplers and meter assembly coupler, and then connect the test coupler adapter to the ABS test coupler.

1. Check for continuity between the white/red terminal of the test coupler adapter and the ground.
 - If there is continuity, ABS wire harness, front cowling wire harness or the wire harness is defective. Properly repair or replace the defective harness.
2. Disconnect the ABS ECU couplers and check that the ABS warning light comes on when the main switch is turned to "ON".
 - If the ABS warning light comes on, the ABS ECU is defective. Replace the ABS ECU.
 - 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.

ET3P61064

[C-2] THE ABS WARNING LIGHT AND ALL OTHER INDICATOR LIGHTS FAIL TO COME ON

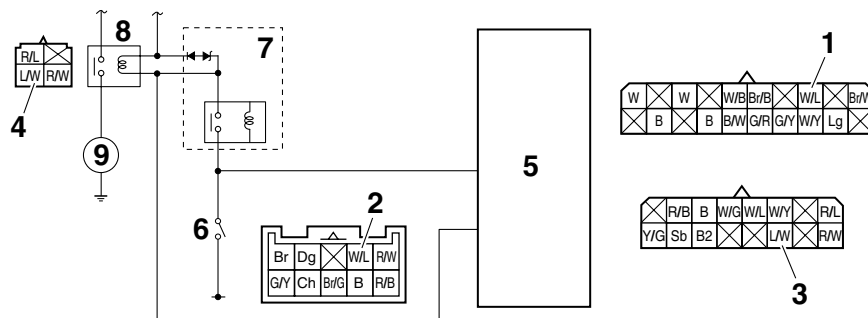
1. Main switch
 - Check the main switch for continuity.
Refer to "CHECKING THE SWITCHES" on page 8-149.
 - If there is no continuity, replace the main switch/immobilizer unit.
2. Battery
 - Check the condition of the battery.
Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-154.
 - If the battery is defective, clean the battery terminals and recharge it, or replace the battery.
3. Main fuse
 - Check the main fuse for continuity.
Refer to "CHECKING THE FUSES" on page 8-153.
 - If the main fuse is blown, replace the fuse.
4. Wiring
 - Check the entire multi-function meter wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.
 - If the wiring is defective, properly connect or repair the multi-function meter wiring.
 - If the wiring is good, check the condition of each multi-function meter circuit.

ET3P61065

[C-3] THE ABS WARNING LIGHT FAIL TO COME ON WHILE THE START SWITCH IS BEING PUSHED

1. Wire harness, ABS wire harness, and front cowling wire harness
 - Check the white/blue lead for continuity between "1" and "2" of the start switch monitor circuit.
 - If there is no continuity, the wire harness, ABS wire harness, or front cowling wire harness is defective. Properly repair or replace the defective harness.
2. Wire harness and ABS wire harness
 - Check the blue/white lead for continuity between "3" and "4" of the starter motor monitor circuit.
 - If there is no continuity, the wire harness or ABS wire harness is defective. Properly repair or replace the defective harness.

ABS (ANTI-LOCK BRAKE SYSTEM)



- 5. ABS ECU
- 6. Start switch
- 7. Relay unit (starting circuit cut-off relay)
- 8. Starter relay
- 9. Starter motor

ET3P61066

[C-4] THE ABS WARNING LIGHT FLASHES

With the engine off, check the front and rear brake light switches.

Check that the rear brake light switch is adjusted properly, and then check if the brake light comes on when the front or rear brake is applied.

1. The brake light does not come on for only one brake.
 - The corresponding brake light switch connector or coupler is disconnected. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.
 - The corresponding brake light switch is defective.
2. The brake light does not come on for either brake.
 - The wire harness and front cowling wire harness may be disconnected or the fuse may be blown. Check the fuse and make sure that the wire harness (brown or brown/black lead) is connected to the power source end of the brake light switch. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.
3. The brake light comes on.
 - The ABS wire harness, front cowling wire harness, and the wire harness couplers may be disconnected. Refer to "ABS COUPLER LOCATION CHART" on page 8-117.

ET3P61067

[C-5] THE ABS WARNING LIGHT FLASHES EVERY 0.5 SECOND

The ABS warning light flashes every 0.5 second if a malfunction code for a past malfunction is not stored in the memory of the ABS ECU. The ABS warning light flashes quicker if a malfunction code is displayed on the multi-function display. If no malfunction 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.

1. ABS warning light flashes

The following are probable causes to explain why the ABS warning light flashed while riding, and then stopped flashing, or stopped flashing when the main switch was turned to "OFF", then back to "ON".

 - The rear wheel was rotated with the vehicle on the centerstand.
The system is normal.
 - The rear wheel raced.
The system is normal.
 - The vehicle was ridden on the rear wheel with the front wheel elevated.
The system is normal.
 - The vehicle was continuously ridden on extremely uneven roads.
The system is normal.
 - The front or rear brake light switch is defective or improperly adjusted.
Replace or adjust.

ABS (ANTI-LOCK BRAKE SYSTEM)

ET3P61068

[C-6] 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 8-154.
 - If the battery voltage is low, clean the battery terminals and recharge it, or replace the battery.
2. A present malfunction is detected.
 - Connect the test coupler adapter to the ABS test coupler and utilize the ABS self-diagnosis function to check the present malfunctions.
 - Perform the troubleshooting according to the detected malfunction codes.
Refer to “[C-7] DIAGNOSIS BY THE MALFUNCTION CODE” on page 8-129.
3. ABS is stopped by the ABS ECU
The ABS ECU may stop the ABS operation if it is exposed to extremely strong electromagnetic waves or static electricity.
When the ABS ECU is no longer exposed to the electromagnetic waves or static electricity, and the ABS warning light is not flashing, the ABS will operate again. Explain to the customer that the ABS will operate normally.
4. ABS ECU fuse
 - Check the ABS ECU fuse for continuity.
Refer to “CHECKING THE FUSES” on page 8-153.
 - If the ABS ECU fuse is blown, replace the fuse.
5. ABS ECU couplers, ABS wire harness, front cowling wire harness, and wire harness
 - Check the ABS ECU couplers and wire harness couplers for continuity.
 - Check the ABS wire harness, front cowling wire harness, and wire harness for continuity.
Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.
 - If the anti-lock brake system wiring is defective, properly connect or replace the ABS ECU couplers, ABS wire harness, front cowling wire harness and wire harness.
6. Check the connection of the ABS wire harness to the ABS ECU.
 - Check that the ABS wire harness is securely connected to the ABS ECU. (Refer to “ABS COUPLER LOCATION CHART” on page 8-117.)
7. The ABS ECU, ABS wire harness, front cowling wire harness or wire harness couplers are disconnected.
 - Connect the couplers if they are disconnected.
8. There is a break or disconnection in the wire harness, ABS wire harness, front cowling wire harness between the ABS ECU and the meter assembly (ABS warning light).
 - Check for continuity between the green/red terminal of the ABS ECU coupler and the green/red terminal of the meter assembly coupler.
 - If there is no continuity, ABS wire harness, front cowling wire harness or the wire harness is defective. Properly repair or replace the defective harness.
9. The meter assembly circuit is defective.
 - Disconnect the ABS ECU couplers, and then connect the test coupler adapter to the ABS test coupler.
 - Ground the white/red lead of the test coupler adapter.
 - Turn the main switch to “ON”, and then check that the ABS warning light goes off.
 - If the ABS warning light does not go off, the meter assembly is defective. Replace the meter assembly.
 - If the ABS warning light goes off, the ABS ECU is defective. Replace the ABS ECU.

EAS27880

[C-7] DIAGNOSIS BY THE MALFUNCTION CODE









Connect the test coupler adapter to the ABS test coupler, and then connect a pocket tester to the light green terminal of the adapter and the positive battery terminal to determine the malfunction code by the movement of the pocket tester needle.

ABS (ANTI-LOCK BRAKE SYSTEM)








Information for the malfunction codes from the ABS ECU, for both past and present malfunctions, is contained in the following table. Refer to the following table for troubleshooting.

NOTE:





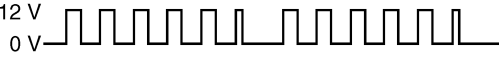

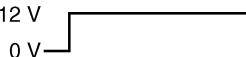
Record all of the malfunction codes displayed and inspect the check points.

| Malfunction code | Problem | Check point | Reference |
|------------------|--|---|---|
| 11* | Front wheel sensor signal is not received properly. 12 V 0 V  | <ul style="list-style-type: none"> • Installation of the front wheel sensor • Front wheel sensor lead and coupler • Wire harness and ABS wire harness (front wheel sensor circuit) • Front wheel sensor rotor | Malfunction code 11 (See page 8-133.) |
| 12 | Rear wheel sensor signal is not received properly. 12 V 0 V  | <ul style="list-style-type: none"> • Installation of the rear wheel sensor • Rear wheel sensor lead and coupler • ABS wire harness (rear wheel sensor circuit) • Rear wheel sensor rotor | Malfunction code 12 (See page 8-133.) |
| 13/26, 14/27 | <p>Incorrect signal from the front (13/26) or rear (14/27) wheel sensor is detected.</p> <p>13 12 V 0 V </p> <p>14 12 V 0 V </p> <p>26 12 V 0 V </p> <p>27 12 V 0 V </p> | <ul style="list-style-type: none"> • Installation of the wheel sensors • Wheel sensor housings • Wheel sensor rotors | Malfunction codes 13, 14, 26 and 27 (See page 8-134.) |
| 15/16 | <p>No continuity in the front or rear wheel sensor circuits.</p> <p>15 12 V 0 V </p> <p>16 12 V 0 V </p> | <ul style="list-style-type: none"> • Continuity of the sensor circuits • Wire harness and ABS wire harness (ABS circuit) • Connection of the wheel sensor couplers | Malfunction codes 15 and 16 (See page 8-135.) |

ABS (ANTI-LOCK BRAKE SYSTEM)

| Malfunction code | Problem | Check point | Reference |
|------------------|---|--|---------------------------------------|
| 21 | Hydraulic unit solenoid circuit is broken or short-circuited.  | <ul style="list-style-type: none"> • ABS wire harness (ABS circuit) • Hydraulic unit solenoid coupler • Hydraulic unit solenoids | Malfunction code 21 (See page 8-135.) |
| 23 | Front or rear brake light switch is defective.  | <ul style="list-style-type: none"> • Improper adjustment of the rear brake light switch • Brake light switches • Brake light relay • Wire harness, ABS wire harness, and front cowl wire harness (ABS circuit) | Malfunction code 23 (See page 8-136.) |
| 24 | Brake light is defective.  | <ul style="list-style-type: none"> • Brake light relay • Brake light bulbs • Wire harness and ABS wire harness (brake light circuit) | Malfunction code 24 (See page 8-137.) |
| 25 | No signal is received from the front wheel sensor when the vehicle starts moving.  | <ul style="list-style-type: none"> • Rear wheel was rotated when the vehicle was on the centerstand • Slippage of the rear wheel • The vehicle wheelies • Installation of the front wheel sensor • Wire harness and ABS wire harness (front wheel sensor circuit) | Malfunction code 25 (See page 8-137.) |
| 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 (when the battery voltage is normal). 41  | <ul style="list-style-type: none"> • Brake dragging • Hydraulic unit operation tests • Front wheel brake lines | Malfunction code 41 (See page 8-137.) |
| 42 | 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 (when the battery voltage is normal). 42  | <ul style="list-style-type: none"> • Brake dragging • Hydraulic unit operation tests • Rear wheel brake lines | Malfunction code 42 (See page 8-139.) |
| 31 | Disconnection is detected in the battery and ABS ECU circuit.  | <ul style="list-style-type: none"> • ABS motor fuse • Wire harness and ABS wire harness (battery and ABS ECU circuit) • ABS ECU couplers | Malfunction code 31 (See page 8-140.) |

ABS (ANTI-LOCK BRAKE SYSTEM)

| Malfunction code | Problem | Check point | Reference |
|---|--|--|--|
| 32 | <p>ABS ECU circuit is broken or short-circuited.</p>  | <ul style="list-style-type: none"> • Wire harness and ABS wire harness (ABS circuit) • ABS ECU | Malfunction code 32 (See page 8-140.) |
| 33 | <p>ABS motor is defective (ABS motor stops and will not rotate).</p>  | <ul style="list-style-type: none"> • ABS motor fuse • Wire harness and ABS wire harness (ABS circuit) • ABS motor coupler • ABS motor relay • ABS motor circuit | Malfunction code 33 (See page 8-140.) |
| 34 | <p>ABS motor is defective (ABS motor keeps rotating and will not stop).</p>  | <ul style="list-style-type: none"> • ABS motor relay • Wire harness and ABS wire harness (ABS circuit) • ABS motor circuit | Malfunction code 34 (See page 8-141.) |
| 35 | <p>Disconnection is detected in the ABS ECU and hydraulic unit solenoid circuit.</p>  | <ul style="list-style-type: none"> • ABS wire harness (ABS ECU and hydraulic unit solenoid circuit) • Hydraulic unit solenoid coupler | Malfunction code 35 (See page 8-141.) |
| 51 | <p>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 (when the battery voltage is low).</p>  | <ul style="list-style-type: none"> • Brake dragging • Hydraulic unit operation tests • Front wheel brake line • Battery voltage | Malfunction code 51 (See page 8-142.) |
| 52 | <p>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 (when the battery voltage is low).</p>  | <ul style="list-style-type: none"> • Brake dragging • Hydraulic unit operation tests • Rear wheel brake line • Battery voltage | Malfunction code 52 (See page 8-142.) |
| Present malfunction (pocket tester always indicates 12 V) | <p>ABS ECU may be malfunctioning.</p>  | <ul style="list-style-type: none"> • Wire harness and ABS wire harness (ABS test coupler circuit) • Wire harness, ABS wire harness, front cowl wire harness (ABS warning light circuit) • ABS ECU (replace) | Maintenance of the ABS ECU (See page 8-120.) |

* Malfunction code 11 is indicated if the rear wheel rotates for longer than about 20 seconds with the front wheel stopped (e.g., when the vehicle is on the centerstand).

ABS (ANTI-LOCK BRAKE SYSTEM)

NOTE:

Malfunction codes 15 (front wheel) and 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.

Malfunction code 11 (Front wheel sensor signal is not received properly.)

Turn the main switch to “OFF”, then back to “ON” after removing the test coupler adapter.

1. The ABS warning light remains on.
 - Defective connection is detected in the front wheel sensor circuit.
 - Front wheel sensor coupler is disconnected.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16 and “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18.
 - Front wheel sensor or lead is broken.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16 and “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18.
 - Front wheel sensor circuit is disconnected.
Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.
 - ABS ECU coupler terminal is disconnected.
Refer to “MAINTENANCE OF THE ABS ECU” on page 8-120.
2. The ABS warning light comes on for 2.0 seconds, then goes off.
 - a. With the front wheel stopped, the rear wheel was rotated for longer than about 20 seconds. This is not a malfunction.
 - b. No signal is generated at the front wheel sensor.
 - Front wheel sensor is not installed properly.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16 and “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18.
 - Front wheel sensor rotor is defective.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16 and “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18.
 - c. Front wheel sensor circuit is short-circuited.
 - Front wheel sensor or lead is short-circuited.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16 and “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18.
 - ABS wire harness and wire harness are short-circuited.
Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.
 - d. Front wheel sensor output drops.
 - Sensor signal output may drop due to failure of the bearings, wheel axle, wheel, or sensor housing of the front wheel. Check these components, without removing them, for looseness, distortion, and bends.

Malfunction code 12 (Rear wheel sensor signal is not received properly.)

Turn the main switch to “OFF”, then back to “ON”.

1. The ABS warning light remains on.
 - Defective connection is detected in the rear wheel sensor circuit.
 - Rear wheel sensor coupler is disconnected.
Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - Rear wheel sensor or lead is broken.
Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - Rear wheel sensor circuit is disconnected.
Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.

ABS (ANTI-LOCK BRAKE SYSTEM)

- ABS ECU coupler terminal is disconnected.
Refer to “MAINTENANCE OF THE ABS ECU” on page 8-120.
- 2. The ABS warning light comes on for 2.0 seconds, then goes off.
 - a. With the rear wheel stopped, the front wheel was rotated at a speed faster than about 11 km/h.
This is not a malfunction.
 - b. No signal is generated at the rear wheel sensor.
 - Rear wheel sensor is not installed properly.
Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - Rear wheel sensor rotor is defective.
Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - c. Rear wheel sensor circuit is short-circuited.
 - Rear wheel sensor or lead is short-circuited.
Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - ABS wire harness is short-circuited.
Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.
 - d. Rear wheel sensor output drops.
 - Sensor signal output may drop due to failure of the bearings, wheel axle, wheel, or sensor housing of the rear wheel. Check these components, without removing them, for looseness, distortion, and bends.

NOTE:

If the vehicle is continuously ridden on extremely uneven roads, the ABS warning light may flash and malfunction code 11 or 12 may be recorded depending on the condition.

Malfunction codes 13/26 (front wheel) and 14/27 (rear wheel) (Incorrect signal from the front (13/26) or rear (14/27) wheel sensor is detected.)

1. The wheel sensors or sensor rotors are not properly installed.
 - a. Installation of the front or rear wheel sensor
 - Check that the wheel sensor is properly installed in the housing.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - Check if there is looseness between the housing and wheel.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - b. Installation of the front or rear wheel sensor rotor
 - Check that the sensor rotor is correctly pressed in the wheel.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.
 - Check the rotor and inside the rotor housing for foreign materials.
Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.

ABS (ANTI-LOCK BRAKE SYSTEM)

2. Teeth surfaces of the sensor rotors are defective.

- Check if there are flaws on the surfaces of the sensor rotor teeth. Also, check for any foreign materials.

Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.

3. Sensor output has dropped.

- Sensor signal output may drop due to failure of the bearings, wheel axle, wheel, or sensor housing of the front or rear wheel. Check these components, without removing them, for looseness, distortion, and bends.

Malfunction codes 15 (front wheel) and 16 (rear wheel) (No continuity in the front or rear wheel sensor circuit.)

Broken front or rear wheel sensor circuit is detected.

- Front or rear wheel sensor coupler is disconnected.

Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.

- Front or rear wheel sensor or lead is broken.

Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-16, “INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)” on page 4-18, “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-22, and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-23.

- Front or rear wheel sensor circuit is broken.

Refer to “CIRCUIT DIAGRAM (1/2)” on page 8-111 and “CIRCUIT DIAGRAM (2/2)” on page 8-113.

- ABS wire harness is disconnected from the ABS ECU coupler terminal.

Refer to “MAINTENANCE OF THE ABS ECU” on page 8-120.

NOTE:

- Check that both the front and rear wheel sensor couplers are connected securely.
 - If the vehicle is ridden after malfunction code 15 (front wheel) or 16 (rear wheel) is displayed, the malfunction code will be overwritten from 15 to 11 (front wheel) or from 16 to 12 (rear wheel).
-

Malfunction code 21 (Hydraulic unit solenoid circuit is broken or short-circuited.)

1. Hydraulic unit solenoid coupler

- Check if a hydraulic unit solenoid coupler terminal is disconnected.

Refer to “ABS COUPLER LOCATION CHART” on page 8-117.

2. Hydraulic unit solenoids

- Check the solenoids (front brake, rear brake, and unified brake system) for continuity.

Refer to “MAINTENANCE OF THE HYDRAULIC UNIT” on page 8-120.

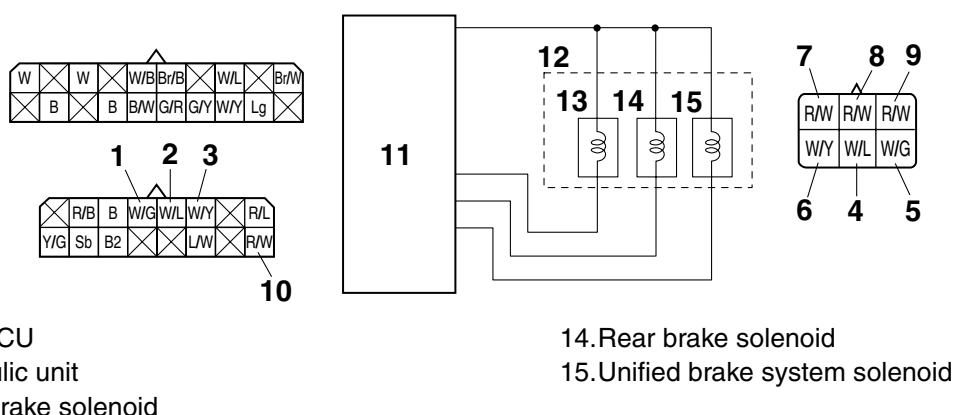
- Check the insulation between each solenoid terminal and the negative battery terminal.

Refer to “MAINTENANCE OF THE HYDRAULIC UNIT” on page 8-120.

3. ABS wire harness

- Check the white/green lead for continuity between “1” and “5” of the hydraulic unit solenoid circuit.
- Check the white/blue lead for continuity between “2” and “4” of the hydraulic unit solenoid circuit.
- Check the white/yellow lead for continuity between “3” and “6” of the hydraulic unit solenoid circuit.
- Check the red/white leads for continuity between “7” and “10”, between “8” and “10”, and between “9” and “10” of the hydraulic unit solenoid circuit.

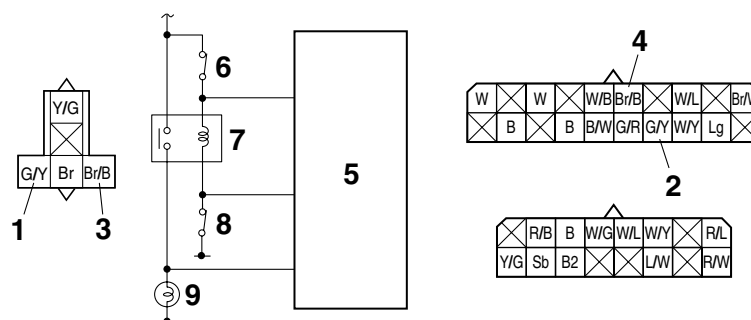
ABS (ANTI-LOCK BRAKE SYSTEM)



- Check the insulation of the hydraulic unit solenoid circuits and the negative battery terminal.

Malfunction code 23 (Front or rear brake light switch is defective.)

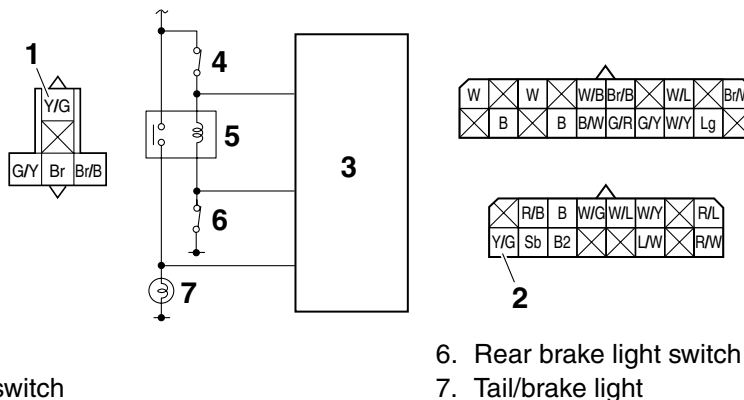
- Wire harness, ABS wire harness, and front cowling wire harness
 - Check the entire anti-lock brake system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.
- Brake light relay
 - Check the brake light relay.
Refer to "CHECKING THE RELAYS" on page 8-157.
- Brake light switches (front and rear)
 - Check the brake light switches (front and rear).
Refer to "CHECKING THE SWITCHES" on page 8-149.
- Rear brake light switch
 - Check that the rear brake light switch is adjusted properly.
Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" on page 3-23.
- Wire harness, ABS wire harness, and front cowling wire harness
 - Check the front and rear brake light switch monitor circuits.
 - Check the green/yellow lead for continuity between "1" and "2" of the front brake light switch monitor circuit.
 - Check the brown/black lead for continuity between "3" and "4" of the rear brake light switch monitor circuit.



ABS (ANTI-LOCK BRAKE SYSTEM)

Malfunction code 24 (Brake light is defective.)

1. Wire harness and ABS wire harness
 - Check the entire anti-lock brake system wiring.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.
2. Brake light relay
 - Check the brake light relay.
Refer to "CHECKING THE RELAYS" on page 8-157.
3. Wire harness and ABS wire harness
 - Check the brake light monitor circuit.
 - Check the yellow/green lead for continuity between "1" and "2" of the brake light monitor circuit.



Malfunction code 25 (No signal is received from the front wheel sensor when the vehicle starts moving.)

1. If any of the following conditions have occurred, malfunction codes (past malfunctions) will be stored in the memory of the ABS ECU, but the ABS has not malfunctioned. Delete the malfunction codes.
 - The rear wheel was rotated with the vehicle on the centerstand.
 - The rear wheel raced.
 - The vehicle was ridden on the rear wheel with the front wheel elevated.
2. The front wheel sensor is not properly installed.
 - Check that the front wheel sensor is properly installed in the housing.
Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16 and "INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)" on page 4-18.
 - Check if there is looseness between the housing and the wheel.
Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16 and "INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)" on page 4-18.
3. Front wheel sensor circuit is short-circuited.
 - Front wheel sensor or lead is short-circuited.
Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-16 and "INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)" on page 4-18.
 - ABS wire harness and wire harness are short-circuited.
Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.

Malfunction code 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 (when the battery voltage is normal).)

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.

ABS (ANTI-LOCK BRAKE SYSTEM)

2. Brake master cylinder and brake caliper

- Check that the brake fluid pressure is correctly transmitted to the brake calipers when the 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 and the brake fluid reservoir for water, foreign materials, solidification, and contamination.
- Check for air in the brake hose lines.

4. Brake hose lines

- Check the brake hose lines for kinks and deterioration.

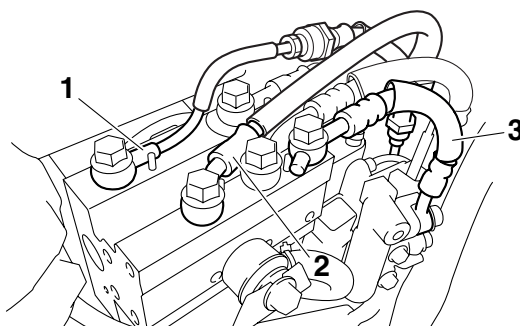
EW3P61005



WARNING

Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake hose lines.

- Check that the connections of the brake hose lines from the brake master cylinder to the hydraulic unit and from the hydraulic unit to the front brake calipers and the metering valve are correct.



EW3P61006



WARNING

The front brakes will not function properly if the connections are incorrect.

- **Brake hose “1” inlet:** from the front brake master cylinder to the hydraulic unit
- **Brake hose “2” outlet:** from the hydraulic unit to the front brake calipers
- **Brake hose “3” outlet:** from the hydraulic unit to the metering valve

NOTE:

- If the brake hose inlet and outlet connections are incorrect on the hydraulic unit, the 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 “[D-3] FINAL CHECK” on page 8-144 is performed.
- If the front and rear brake hose connections are reversed on the hydraulic unit, the pulsating action in the brake lever and brake pedal will be performed in the reverse order when the final check on page “[D-3] FINAL CHECK” on page 8-144 is performed.
- If the brake hoses (to the proportioning valve and the metering valve) are switched during assembly, the brakes will continue to operate as normal. However, the reduction of the hydraulic pressure for the rear brake and part of the right front brake will be reversed during the ABS operation when the final check on page “[D-3] FINAL CHECK” on page 8-144 is performed.

5. Hydraulic unit solenoid coupler terminals

- Check if the front brake, rear brake, and unified brake system solenoid coupler terminals (hydraulic unit and ABS wire harness) are connected correctly.

| | Terminal color | |
|----------------------|----------------|-------------------------|
| | Solenoid | ABS wire harness |
| Front brake | white, white | red/white, white/blue |
| Rear brake | green, green | red/white, white/green |
| Unified brake system | red, red | red/white, white/yellow |

ABS (ANTI-LOCK BRAKE SYSTEM)

6. Hydraulic unit

If the malfunction is not corrected after checking items (1) to (5), replace the hydraulic unit. Be sure to connect the brake hoses and couplers correctly and securely. Check the hydraulic unit operation. Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-56.

Malfunction code 42 (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 (when the battery voltage is normal).)

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.

2. Brake master cylinder and brake caliper

- Check that the brake fluid pressure is correctly transmitted to the brake caliper when the brake pedal is operated and that the pressure decreases when the pedal is released.

3. Brake fluid

- Visually check the brake fluid in the brake fluid reservoir for water, foreign materials, solidification, and contamination.
- Check for air in the brake hose lines.

4. Brake hose lines

- Check the brake hose lines for kinks and deterioration (particularly between the hydraulic unit and the rear brake caliper).

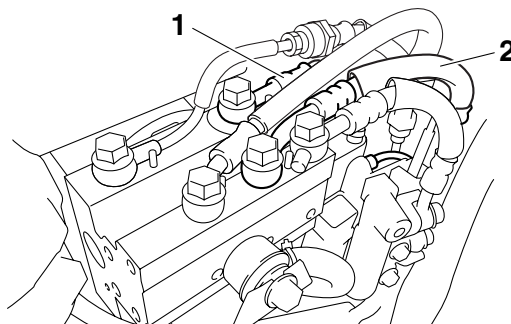
EW3P61005



WARNING

Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake hose lines.

- Check that the connections of the brake hose lines from the brake master cylinder to the hydraulic unit and from the hydraulic unit to the proportioning valve are correct.



EW3P61007



WARNING

The rear brake will not function properly if the connections are reversed.

- **Brake hose "1" inlet: from the rear brake master cylinder to the hydraulic unit**
- **Brake hose "2" outlet: from the hydraulic unit to the proportioning valve**

NOTE:

- If the rear brake hose inlet and outlet connections are reversed on the hydraulic unit, the brake pedal will be pressed down to its full-stroke position without responding, and then it will be pushed back slowly without pulsating when the final check on page "[D-3] FINAL CHECK" on page 8-144 is performed.
- If the front and rear brake hose connections are reversed on the hydraulic unit, the pulsating action in the brake lever and brake pedal will be performed in the reverse order when the final check on page "[D-3] FINAL CHECK" on page 8-144 is performed.

ABS (ANTI-LOCK BRAKE SYSTEM)

- If the brake hoses (to the proportioning valve and the metering valve) are switched during assembly, the brakes will continue to operate as normal. However, the reduction of the hydraulic pressure for the rear brake and part of the right front brake will be reversed during the ABS operation when the final check on page "[D-3] FINAL CHECK" on page 8-144 is performed.

5. Hydraulic unit solenoid coupler terminals

- Check if the front brake, rear brake, and unified brake system solenoid coupler terminals (hydraulic unit and ABS wire harness) are connected correctly.

| | Terminal color | |
|----------------------|----------------|-------------------------|
| | Solenoid | ABS wire harness |
| Front brake | white, white | red/white, white/blue |
| Rear brake | green, green | red/white, white/green |
| Unified brake system | red, red | red/white, white/yellow |

6. Hydraulic unit

If the malfunction is not corrected after checking items (1) to (5), replace the hydraulic unit. Be sure to connect the brake hoses and couplers correctly and securely. Check the hydraulic unit operation. Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-56.

Malfunction code 31 (Disconnection is detected in the battery and ABS ECU circuit.)

1. ABS motor fuse

- Check if the ABS motor fuse in the starter relay is blown.

2. Coupler between the battery and the ABS ECU

- Check if the coupler is connected properly.

3. Wire harness and ABS wire harness

- Turn the main switch to "OFF" and disconnect the ABS ECU coupler and battery leads.
- Check for continuity between the positive battery terminal and the red/blue terminal of the ABS ECU coupler.

Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.

4. ABS ECU

- If the malfunction is not corrected after checking items (1) to (3), replace the ABS ECU.

Malfunction code 32 (ABS ECU circuit is broken or short-circuited.)

1. ABS ECU circuit (positive battery terminal to red/white terminal of the ABS ECU coupler)

- Turn the main switch to "OFF" and disconnect the ABS ECU coupler and battery leads.
- Check for continuity between the positive battery terminal and the red/white terminal of the ABS ECU coupler.

Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113. If there is continuity, repair or replace the defective harness.

2. ABS ECU circuit (brown/white terminal to red/white terminal of the ABS ECU coupler)

- Turn the main switch to "OFF" and disconnect the ABS ECU coupler.
- Check for continuity between the brown/white and the red/white terminals of the ABS ECU coupler. Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113. If there is continuity, repair or replace the defective harness.

3. ABS ECU

- If the malfunction is not corrected after checking items (1) to (2), replace the ABS ECU.

Malfunction code 33 (ABS motor is defective (ABS motor stops and will not rotate).)

1. ABS motor fuse

- Check if the ABS motor fuse in the starter relay is blown.

ABS (ANTI-LOCK BRAKE SYSTEM)

2. ABS motor relay

- Check if the ABS motor relay operates correctly.

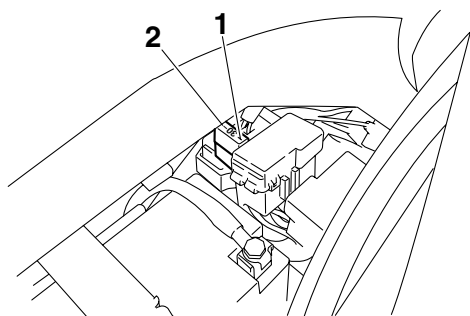
Refer to "MAINTENANCE OF THE ABS MOTOR RELAY" on page 8-120.

3. Wire harness and ABS wire harness

- Remove the ABS motor relay and ABS motor fuse, and then check for continuity between the red/blue terminal of ABS wire harness and the starter relay ABS motor fuse terminal "1" (ABS wire harness side) shown in the illustration.

Refer to "CIRCUIT DIAGRAM (1/2)" on page 8-111 and "CIRCUIT DIAGRAM (2/2)" on page 8-113.

- Check for continuity between the positive battery terminal and the ABS motor fuse terminal "2" (battery side) shown in the illustration.
- Disconnect the ABS ECU and ABS motor relay from ABS wire harness, and then check for continuity between the white/black terminals, between the red/white terminals, between the red/black terminals, and between the red/blue terminals.



Malfunction code 34 (ABS motor is defective (ABS motor keeps rotating and will not stop).)

1. ABS motor

- Check if the ABS motor coupler located under the hydraulic unit is connected properly.
- Check the ABS motor for continuity.

Refer to "MAINTENANCE OF THE HYDRAULIC UNIT" on page 8-120.

2. ABS wire harness

- Disconnect the ABS motor coupler, and then check for continuity between the black/white terminal of the ABS motor coupler of ABS wire harness and the negative battery terminal.
- Disconnect the ABS ECU couplers, and then check for continuity between the red/black terminal of the ABS ECU coupler and the red/black terminal of the ABS motor coupler.

Refer to "MAINTENANCE OF THE ABS ECU" on page 8-120.

- Remove the ABS motor relay and check for continuity between the red/white terminal of the ABS motor coupler of the ABS wire harness and positive battery terminal.

3. ABS motor relay

- Check if the ABS motor relay operates correctly.

Refer to "MAINTENANCE OF THE ABS MOTOR RELAY" on page 8-120.

Malfunction code 35 (Disconnection is detected in the ABS ECU and hydraulic unit solenoid circuit.)

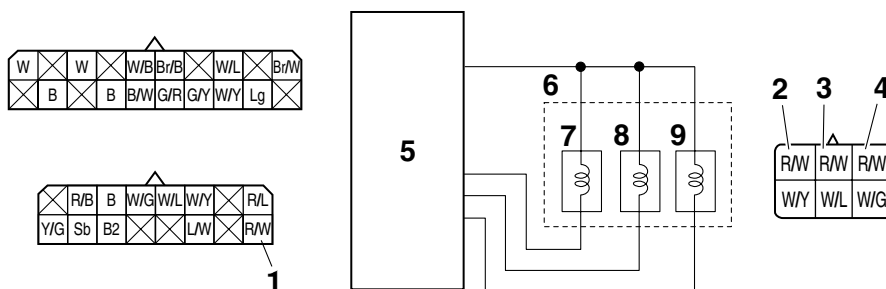
1. Coupler between the battery and the hydraulic unit (solenoid)

- Check if the coupler is connected properly.

2. ABS wire harness

- Check the red/white leads for continuity between "1" and "2", between "1" and "3", and between "1" and "4" of the hydraulic unit solenoid circuit.

ABS (ANTI-LOCK BRAKE SYSTEM)



- 5. ABS ECU
- 6. Hydraulic unit
- 7. Front brake solenoid
- 8. Rear brake solenoid
- 9. Unified brake system solenoid

3. ABS ECU

- If the malfunction is not corrected after checking items (1) to (2), replace the ABS ECU.

Malfunction code 51 (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 (when the battery voltage is low).)

1. Refer to malfunction codes 26 and 41.
2. Battery voltage
Measure the battery output voltage.

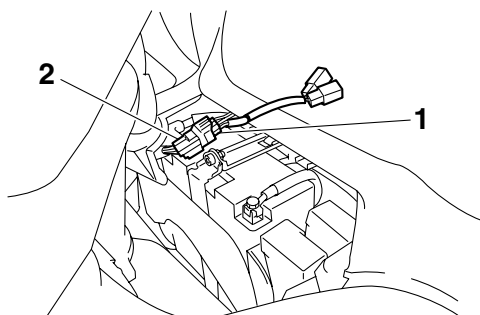
Malfunction code 52 (Rear wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ABS ECU to release the hydraulic pressure (when the battery voltage is low).)

1. Refer to malfunction codes 27 and 42.
2. Battery voltage
Measure the battery output voltage.

EAS22830

[D-1] DELETING THE MALFUNCTION CODES

1. Connect the test coupler adapter "1" to the ABS test coupler "2". Refer to "[B-5] MALFUNCTION CHECK BY THE ABS SELF-DIAGNOSIS (PRESENT MALFUNCTION)" on page 8-125.



2. Turn the main switch to "ON".
Previously recorded malfunction codes will be displayed in the multi-function display.

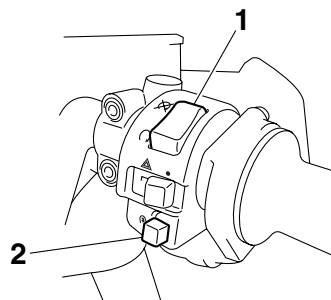
3. Set the engine stop switch "1" to "X".

EC3P61014

CAUTION:

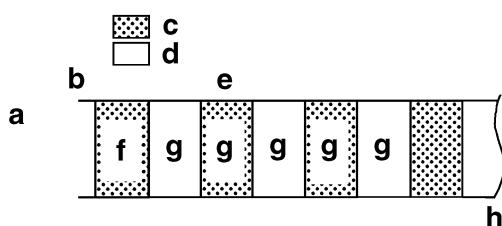
If the start switch is pushed without setting the engine stop switch to "X", the starter motor gears or other parts may be damaged.

4. Push the start switch "2" at least 10 times in 4 seconds to delete the malfunction codes.



ABS (ANTI-LOCK BRAKE SYSTEM)

5. The multi-function display switches to the odometer/tripmeter/fuel reserve tripmeter display and the ABS warning light flashes in 0.5 second-intervals while the malfunction codes are being deleted.
6. Turn the main switch to "OFF".
7. Turn the main switch to "ON" again.
Check that the ABS warning light comes on for 2 seconds, goes off for 0.5 second, and then starts flashing.



- a. ABS warning light
- b. Main switch "ON"
- c. Comes on
- d. Goes off
- e. Flashes
- f. 2.0 seconds
- g. 0.5 second
- h. Repeats

8. Turn 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 malfunction codes is now finished.

NOTE:

Do not forget to install the protective cap onto the ABS test coupler.

EC3P61015

CAUTION:

Since the malfunction codes remain in the memory of the ABS ECU until they are deleted, always delete the malfunction codes after the service has been completed.

ET3P61020

[D-2] DELETE FUNCTION TEST

1. Place the vehicle on the centerstand.
2. Turn the main switch to "OFF".
3. Connect the test coupler adapter to the ABS test coupler.
4. Turn the main switch to "ON".
5. Check:
 - ABS ECU voltage
Lower than 12.8 V → Charge or replace the battery.



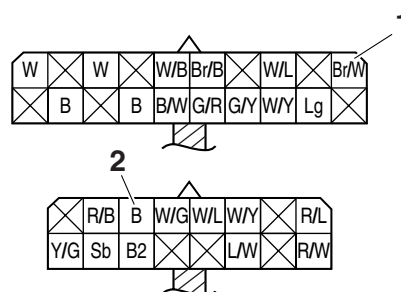
Battery voltage
Higher than 12.8 V

- a. Connect the pocket tester (DC 20 V) to the ABS ECU couplers.



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

- Positive tester probe → brown/white "1"
- Negative tester probe → black "2"



- b. Measure the ABS ECU voltage.

6. Check:
 - ABS-ECU-to-start-switch-lead continuity
No continuity → Replace or repair the wire harness, ABS wire harness and front cowl wire harness.

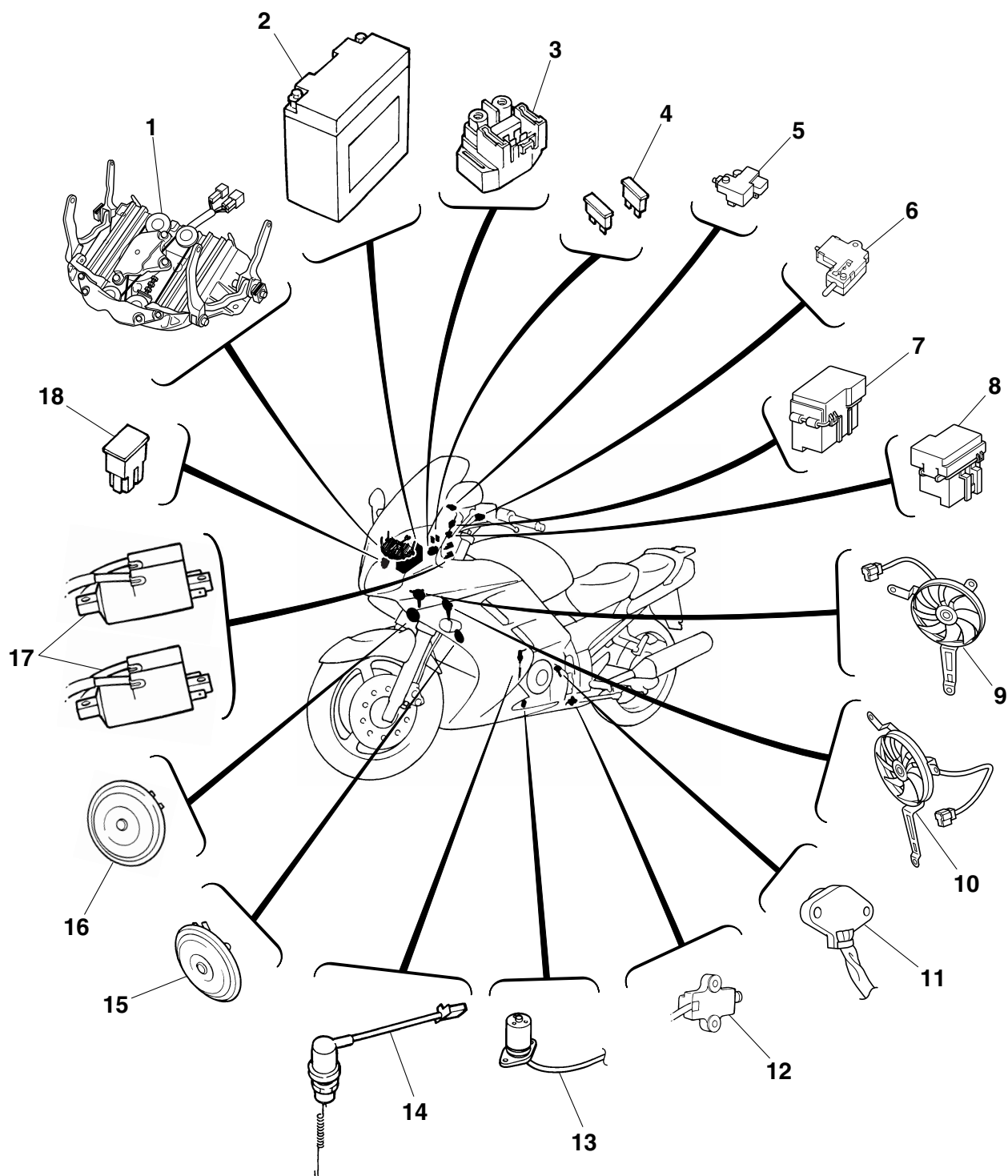


Continuity is all right.

- a. Connect the pocket tester ($\Omega \times 1$) to the ABS ECU coupler and right handlebar switch coupler.

EAS27970

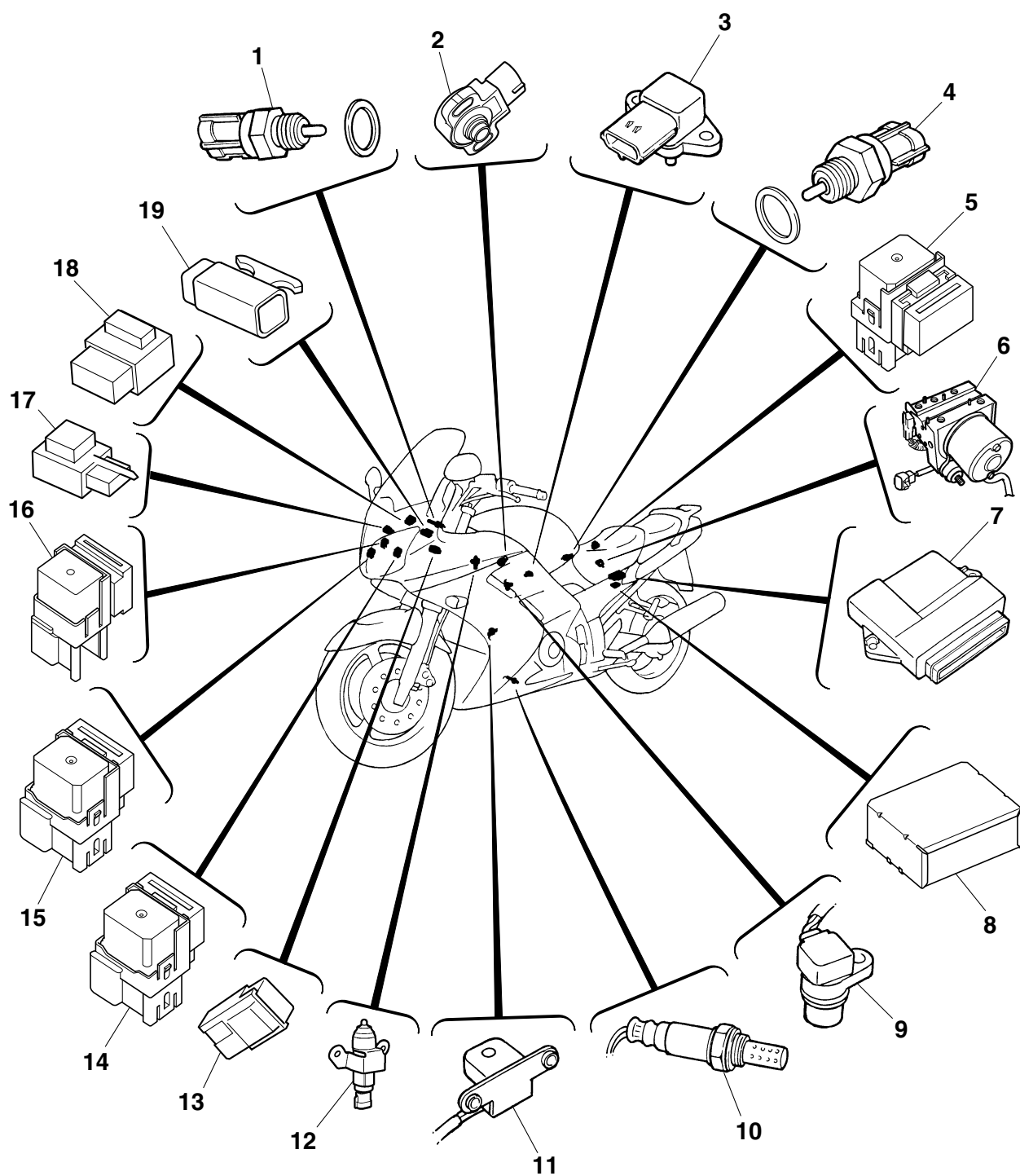
ELECTRICAL COMPONENTS



ELECTRICAL COMPONENTS

1. Windshield drive unit
2. Battery
3. Starter relay
4. ABS motor fuse
5. Front brake light switch
6. Clutch switch
7. Fuse box 2
8. Fuse box 1
9. Right radiator fan motor
10. Left radiator fan motor
11. Gear position switch
12. Sidestand switch
13. Oil level switch
14. Rear brake light switch
15. Left horn (low)
16. Right horn (high)
17. Ignition coil
18. Main fuse

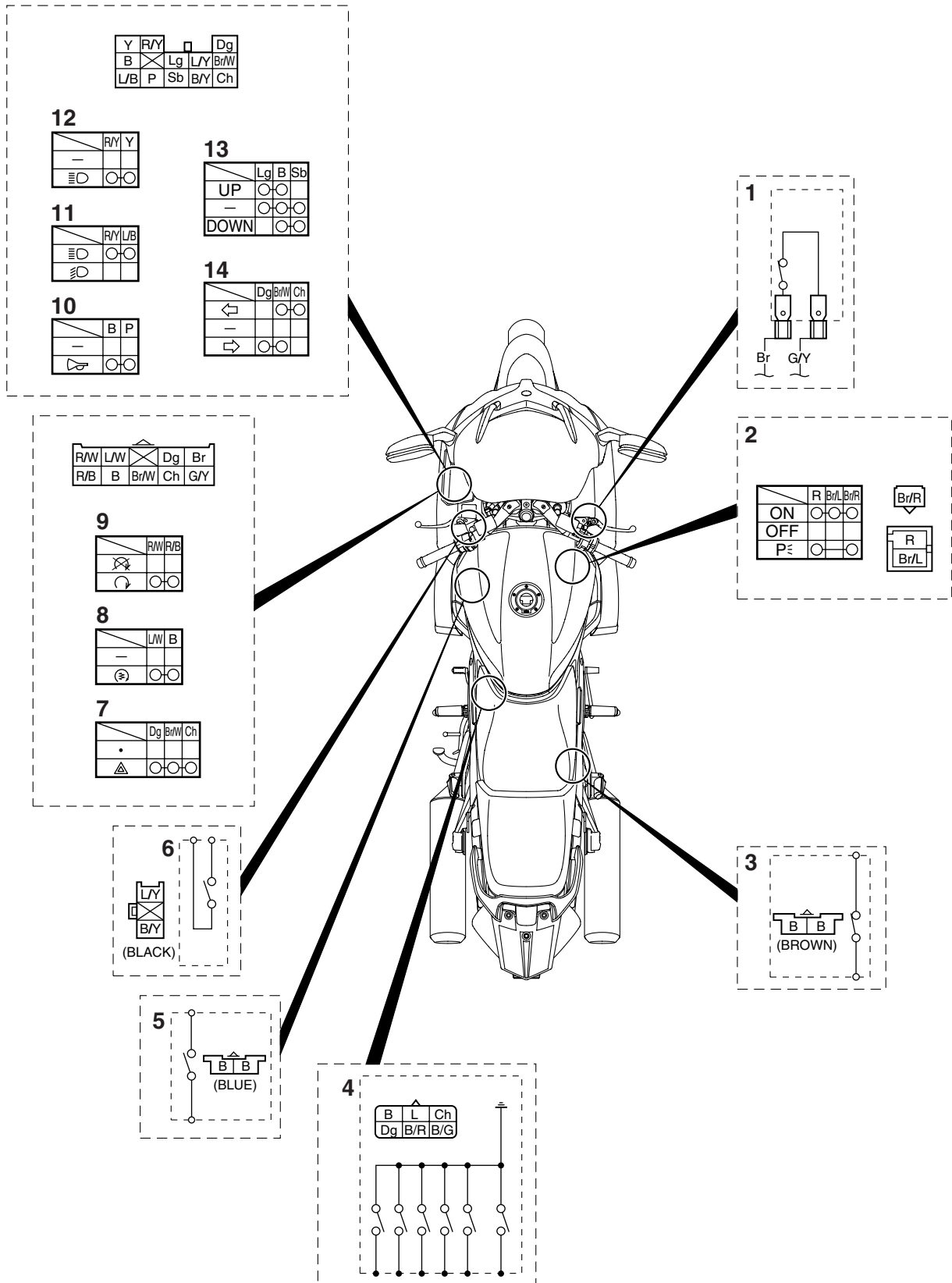
ELECTRICAL COMPONENTS



1. Coolant temperature sensor
2. Throttle position sensor
3. Intake air pressure sensor
4. Intake air temperature sensor
5. ABS motor relay
6. Hydraulic unit
7. ECU (engine control unit)
8. ABS (ECU)
9. Cylinder identification sensor
10. O₂ sensor
11. Crankshaft position sensor
12. Accessory box solenoid
13. Headlight relay (dimmer)
14. Radiator fan motor relay
15. Headlight relay (on/off)
16. Brake light relay
17. Turn signal/hazard relay
18. Relay unit
19. Lean angle sensor

EAS27980

CHECKING THE SWITCHES



ELECTRICAL COMPONENTS

1. Front brake light switch
2. Main switch
3. Rear brake light switch
4. Gear position switch
5. Sidestand switch
6. Clutch switch
7. Hazard switch
8. Start switch
9. Engine stop switch
10. Horn switch
11. Dimmer switch
12. Pass switch
13. Windshield position switch
14. Turn signal switch

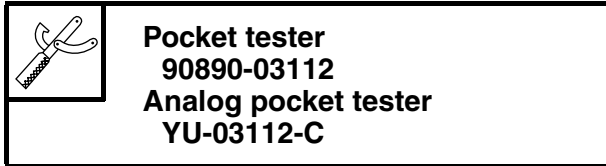
ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

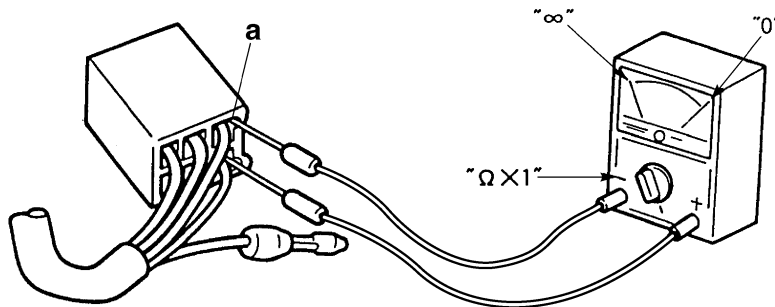
CAUTION:

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



NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.

The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "○—○". There is continuity between red, brown/blue, and brown/red when the switch is set to "ON" and between red and brown/red when the switch is set to "P≤".

| a | b | | |
|-----|-----|------|------|
| | R | Br/L | Br/R |
| ON | ○—○ | ○—○ | ○—○ |
| OFF | ○ | | |
| P≤ | ○ | | ○ |

| | |
|------|------|
| R | Br/L |
| Br/R | |

EWA13310

WARNING

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

4. Install:

- Front cowling right inner panel 1
Refer to “GENERAL CHASSIS” on page 4-1.

EAS28030

EAS28030

CHECKING AND CHARGING THE BATTERY

FWA13290

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.**

EC3P61004

CAUTION:

- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**

- **Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

NOTE:

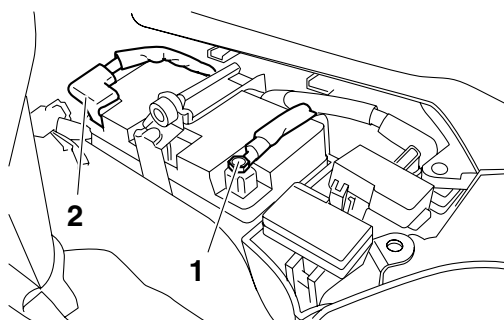
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
 - Front cowling right inner panel 1
Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
 - Battery leads
(from the battery terminals)

ECA13640

CAUTION:

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



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

- a. Connect a pocket tester to the battery terminals.

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

NOTE:

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

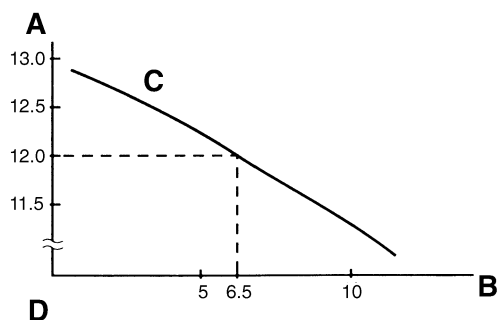
b. Check the charge of the battery, as shown in the charts and the following example.

Example

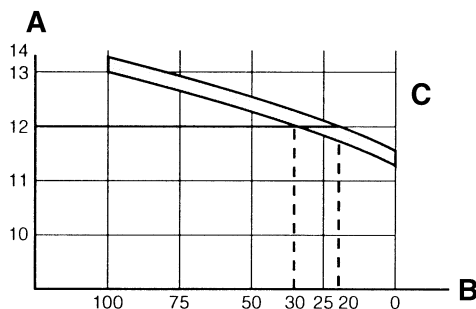
Open-circuit voltage = 12.0 V

Charging time = 6.5 hours

Charge of the battery = 20–30%



- A. Open-circuit voltage (V)
 B. Charging time (hours)
 C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
 D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



- A. Open-circuit voltage (V)
 B. Charging condition of the battery (%)
 C. Ambient temperature 20 °C (68 °F)

5. Charge:
- Battery
- (refer to the appropriate charging method)

EWA13300



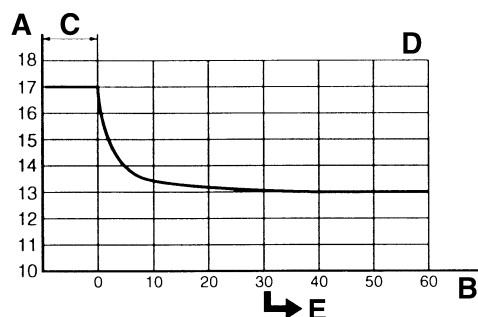
WARNING

Do not quick charge a battery.

ECA13670

CAUTION:

- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**



- A. Open-circuit voltage (V)
 B. Time (minutes)
 C. Charging
 D. Ambient temperature 20 °C (68 °F)
 E. Check the open-circuit voltage.

Charging method using a variable-current (voltage) charger

- Measure the open-circuit voltage prior to charging.

NOTE:

Voltage should be measured 30 minutes after the engine is stopped.

- Connect a charger and ammeter to the battery and start charging.

NOTE:

Set the charging voltage at 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

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

NOTE:

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Standard charging current is reached
Battery is good.
- Standard charging current is not reached
Replace the battery.

- Adjust the voltage so that the current is at the standard charging level.
- Set the time according to the charging time suitable for the open-circuit voltage.
- If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
- Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

Charging method using a constant voltage charger

- Measure the open-circuit voltage prior to charging.

NOTE:

Voltage should be measured 30 minutes after the engine is stopped.

- Connect a charger and ammeter to the battery and start charging.
- Make sure that the current is higher than the standard charging current written on the battery.

NOTE:

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

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

NOTE:

Set the charging time at 20 hours (maximum).

- Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

6. Install:

- Battery

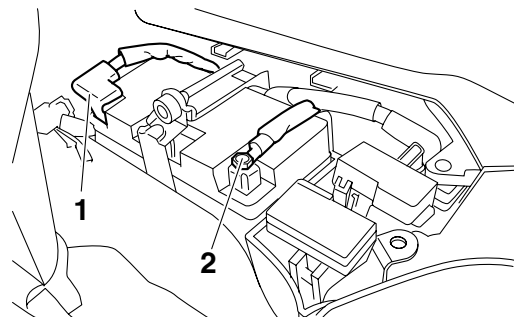
7. Connect:

- Battery leads
(to the battery terminals)

ECA13630

CAUTION:

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



8. Check:

- Battery terminals
Dirt → Clean with a wire brush.
Loose connection → Connect properly.

9. Lubricate:

- Battery terminals

Recommended lubricant
Dielectric grease

10. Install:

- Front cowling right inner panel 1
- Refer to "GENERAL CHASSIS" on page 4-1.

EAS28040

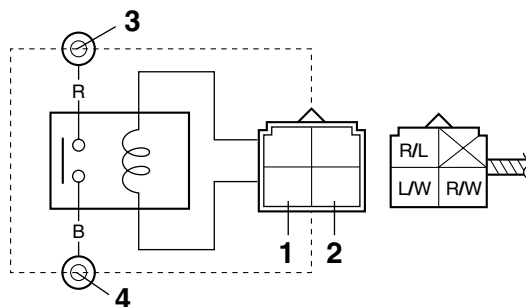
CHECKING THE RELAYS

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 terminals as shown. Check the relay operation. Out of specification → Replace.

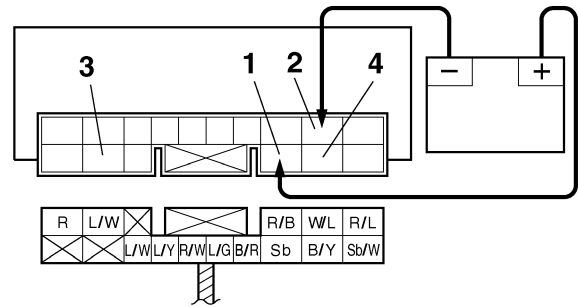
Starter relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

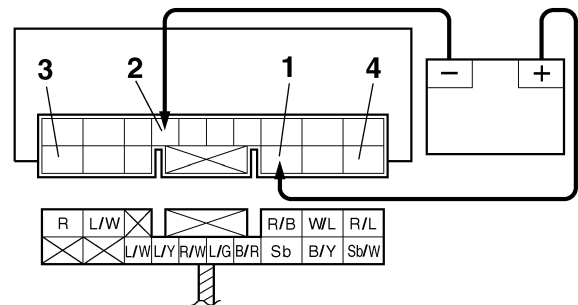
Relay unit (starting circuit cut-off relay)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

Relay unit (fuel pump relay)

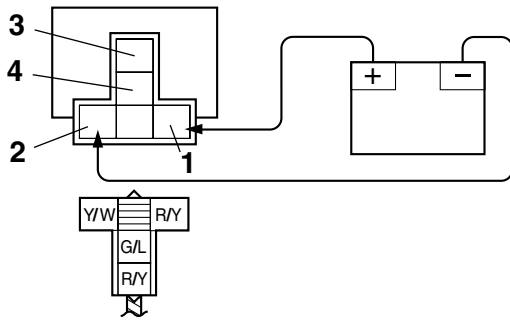


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity

ELECTRICAL COMPONENTS

Headlight relay (on/off)

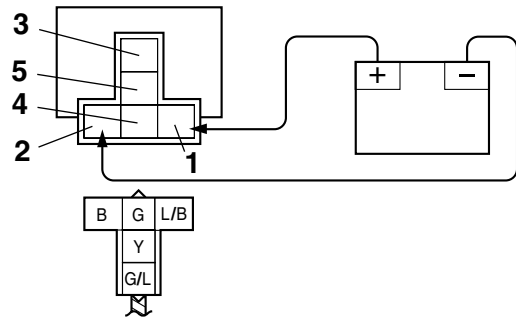


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Result
Continuity
(between "3" and "4")

Second step:



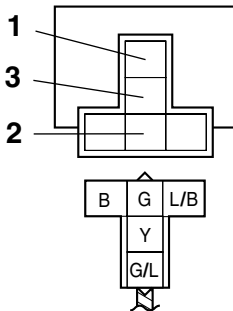
1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe



Result
No continuity
(between "3" and "4")
Continuity
(between "3" and "5")

Headlight relay (dimmer)

First step:



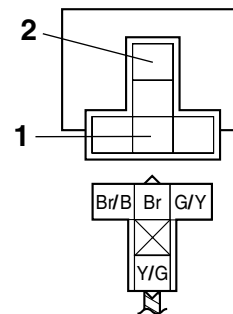
1. Positive tester probe
2. Negative tester probe
3. Negative tester probe



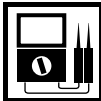
Result
Continuity
(between "1" and "2")
No continuity
(between "1" and "3")

Brake light relay

First step:

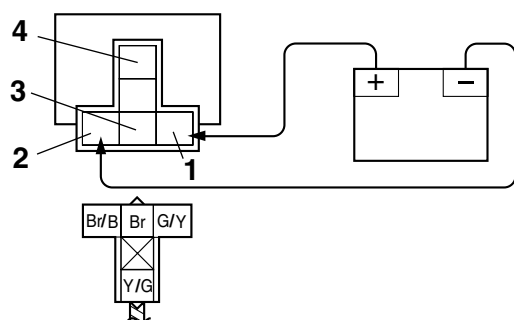


1. Positive tester probe
2. Negative tester probe

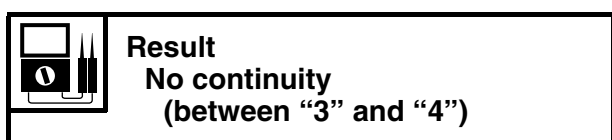


Result
Continuity
(between "1" and "2")

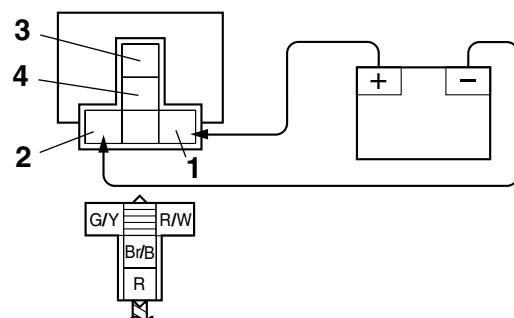
Second step:



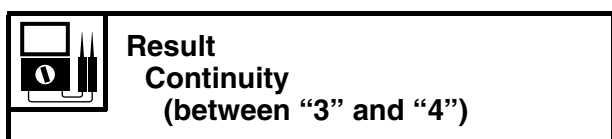
1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Radiator fan motor relay



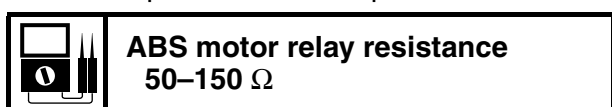
1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



ET3P61059

CHECKING THE ABS MOTOR RELAY

1. Remove:
 - ABS motor relay
2. Check:
 - ABS motor relay resistance
 Out of specification → Replace.

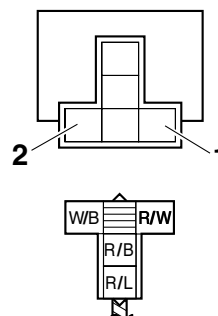


- a. Connect the pocket tester ($\Omega \times 1$) to the ABS motor relay terminal as shown.



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

- Positive tester probe → red/white "1"
- Negative tester probe → white/black "2"



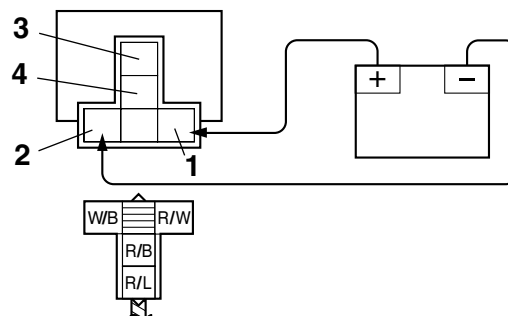
3. Check:

- ABS motor relay continuity
- No continuity → Replace.

- a. Connect the pocket tester ($\Omega \times 1$) to the ABS motor relay terminal as shown.



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



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Continuity

Positive tester probe → sky blue “1”

Negative tester probe → black/yellow “2”

No continuity

Positive tester probe → black/yellow “2”

Negative tester probe → sky blue “1”

Continuity

Positive tester probe → sky blue “1”

Negative tester probe → black/red “3”

No continuity

Positive tester probe → black/red “3”

Negative tester probe → sky blue “1”

Continuity

Positive tester probe → sky blue “1”

Negative tester probe → sky blue/white “4”

No continuity

Positive tester probe → sky blue/white “4”

Negative tester probe → sky blue “1”

Continuity

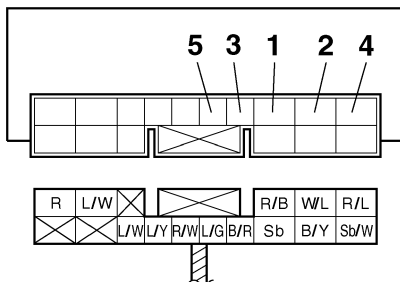
Positive tester probe → blue/green “5”

Negative tester probe → black/red “3”

No continuity

Positive tester probe → black/red “3”

Negative tester probe → blue/green “5”



- Disconnect the relay unit coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the relay unit terminal as shown.

- Check the relay unit (diode) for continuity.
- Check the relay unit (diode) for no continuity.

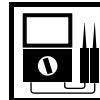
EAS28070

CHECKING THE SPARK PLUG CAPS

The following procedure applies to all of the spark plug caps.

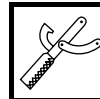
1. Check:

- Spark plug cap resistance
- Out of specification → Replace.

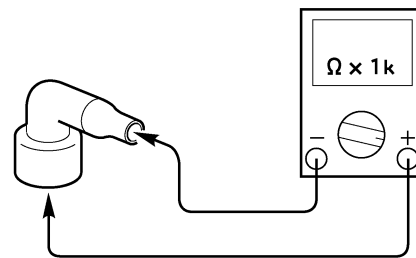


Resistance
10.0 k Ω

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap as shown.



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



- Measure the spark plug cap resistance.

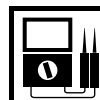
EAS28100

CHECKING THE IGNITION COILS

The following procedure applies to both of the ignition coils.

1. Check:

- Primary coil resistance
- Out of specification → Replace.



Primary coil resistance
1.53–2.07 Ω at 20 °C (68 °F)

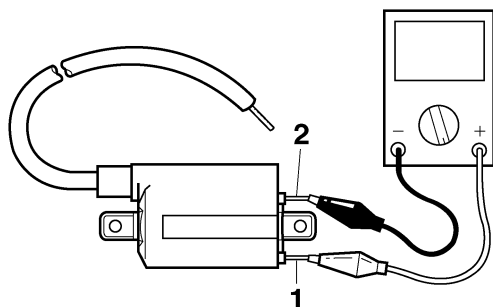
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ($\Omega \times 1$) to the ignition coil as shown.

ELECTRICAL COMPONENTS



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

- Positive tester probe → red/black or red/blue “1”
- Negative tester probe → orange or gray/red “2”



c. Measure the primary coil resistance.

2. Check:

- Secondary coil resistance
Out of specification → Replace.



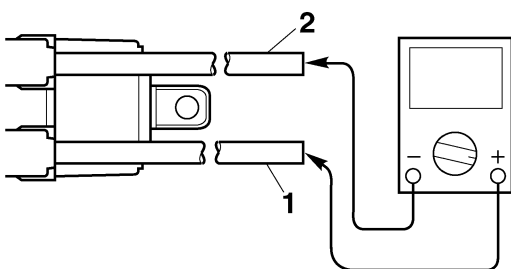
Secondary coil resistance
12–18 k Ω at 20 °C (68 °F)

- Disconnect the spark plug cap from the ignition coil.
- Connect the pocket tester ($\Omega \times 1k$) 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.

ET3P61015

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 8-6.



Minimum ignition spark gap
6.0 mm (0.24 in)

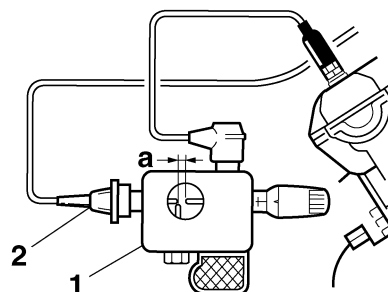
NOTE:

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker “1” as shown.



Ignition checker
90890-06754
Opama pet-4000 spark checker
YM-34487



2. Spark plug cap

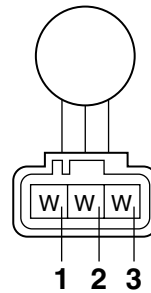
- Turn the main switch to “ON” and engine stop switch to “○”.
- Measure the ignition spark gap “a”.
- Crank the engine by pushing the start switch “⊗” and gradually increase the spark gap until a misfire occurs.

EAS28120

CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:

- Crankshaft position sensor coupler (from the wire harness)



b. Measure the stator coil resistance.

EAS28170

1. Check:

- Charging voltage
Out of specification → Replace the rectifier/regulator.



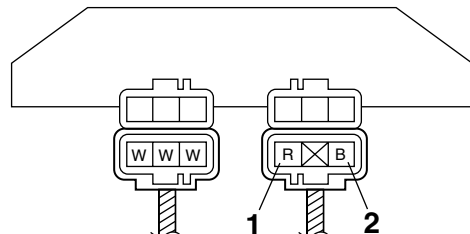
a. Set the engine tachometer to the spark plug



- Positive tester probe → red "1"
- Negative tester probe → black "2"

-
- | Year | Percentage |
|------|------------|
| 1975 | 65% |
| 1980 | 70% |
| 1985 | 75% |
| 1990 | 75% |
| 1995 | 75% |
| 2000 | 75% |
| 2005 | 75% |
| 2010 | 75% |

-

[illegible]

EAS28180


CHECKING THE HORNS

The following procedure applies to both of the horns.

1. Check:

- Horn resistance


Out of specification → Replace.



Coil resistance
1.01–1.11 Ω at 20 °C (68 °F)

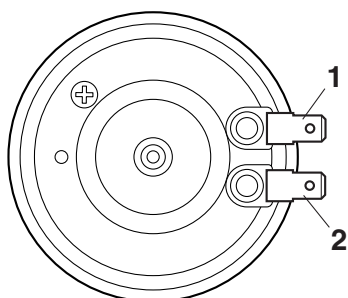


- Disconnect the horn connectors from the horn terminals.
- Connect the pocket tester ($\Omega \times 1$) to the horn terminals.



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

- Positive tester probe → horn terminal “1”
- Negative tester probe → horn terminal “2”



- Measure the horn resistance.



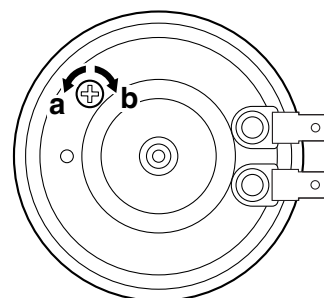
2. Check:

- Horn sound

Faulty sound → Adjust or replace.



- Connect a battery (12 V) to the horn.
- Turn the adjusting screw in direction “a” or “b” until the horn sound is obtained.



EAS28190

CHECKING THE OIL LEVEL SWITCH

1. Drain:

- Engine oil


2. Remove:

- Oil level switch (from the oil pan)

3. Check:

- Oil level switch continuity


Out of specification → Replace.



Oil level switch resistance
Minimum level position
No continuity
Maximum level position
Continuity



- Connect the pocket tester ($\Omega \times 1$) to the oil level switch terminal as shown.



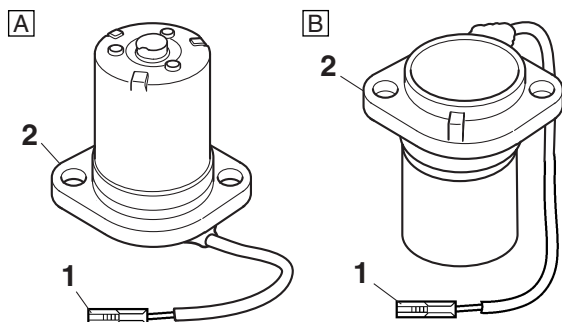
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

Minimum level position “A”

- Positive tester probe → white “1”
- Negative tester probe → body ground “2”

Maximum level position “B”

- Positive tester probe → white “1”
- Negative tester probe → body ground “2”



b. Measure the oil level switch resistance.



EAS28220

CHECKING THE FUEL SENDER

1. Disconnect:
 - Fuel pump coupler
 - Fuel sender coupler (from the wire harness)
2. Remove:
 - Fuel tank
3. Remove:
 - Fuel pump (from the fuel tank)
4. Check:
 - Fuel sender resistance

Out of specification → Replace the fuel pump assembly.



Fuel sender
Sender unit resistance (full)
 19.0–21.0 Ω
Sender unit resistance (empty)
 139.0–141.0 Ω

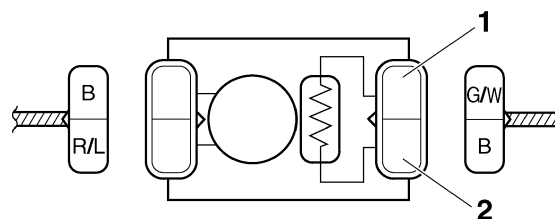


- a. Connect the pocket tester ($\Omega \times 10$) to the fuel sender terminals as shown.

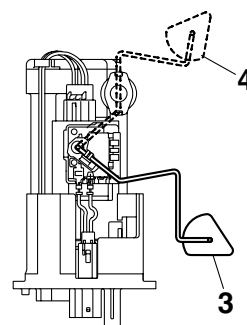


Pocket tester
 90890-03112
Analog pocket tester
 YU-03112-C

- Positive tester probe → green/white “1”
- Negative tester probe → black “2”



- b. Move the fuel sender float to minimum “3” and maximum “4” level position.



- c. Measure the fuel sender resistance.



EAS28250

CHECKING THE RADIATOR FAN MOTORS

The following procedure applies to both of the radiator fan motors.

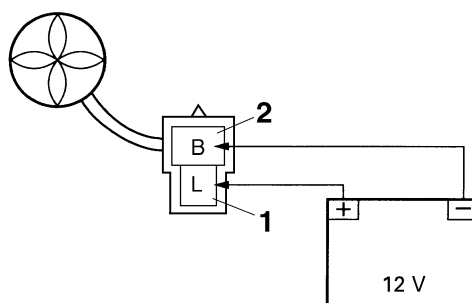
1. Check:
 - Radiator fan motor

Faulty/rough movement → Replace.



- a. Disconnect the radiator fan motor coupler from the wire harness.
- b. Connect the battery (DC 12 V) as shown.

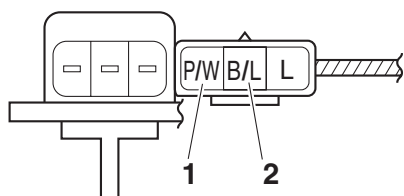
- Positive battery terminal → blue “1”
- Negative battery terminal → black “2”



- c. Measure the radiator fan motor movement.



- Positive tester probe → pink/white “1”
- Negative tester probe → black/blue “2”



- Turn the main switch to “ON”.
- Measure the intake air pressure sensor output voltage.

EAS28420

CHECKING THE INTAKE AIR TEMPERATURE SENSOR

- 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.

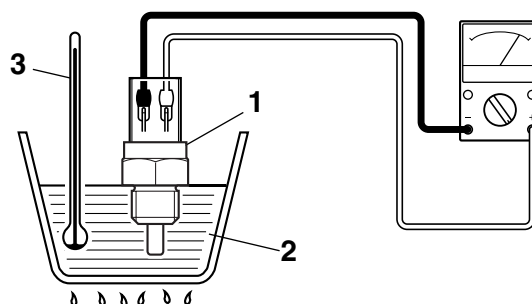
- Check:
 - Intake air temperature sensor resistance
Out of specification → Replace.

Intake air temperature sensor resistance

290–390 Ω at 80 °C (176 °F)

- Connect the pocket tester ($\Omega \times 100$) to the intake air temperature sensor terminals as shown.

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



- Immerse the intake air temperature sensor “1” in a container filled with water “2”.

NOTE:

Make sure that the intake air temperature sensor terminals do not get wet.

- Place a thermometer “3” in the water.
- Slowly heat the water, then let it cool down to the specified temperature.
- Measure the intake air temperature sensor resistance.

ET3P61017

CHECKING THE ACCESSORY BOX SOLENOID

- Check:
 - Accessory box solenoid resistance
Out of specification → Replace.

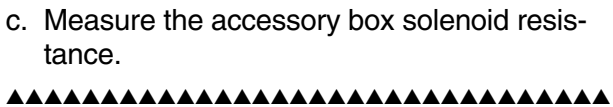
Accessory box solenoid resistance

19–21 Ω at 20 °C (68 °F)

- Disconnect the accessory box solenoid coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 10$) to the accessory box solenoid terminals as shown.

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

- Positive tester probe → brown “1”
- Negative tester probe → black “2”



TROUBLESHOOTING

| | |
|--|-----|
| TROUBLESHOOTING | 9-1 |
| GENERAL INFORMATION | 9-1 |
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| INCORRECT ENGINE IDLING SPEED | 9-1 |
| POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE | 9-2 |
| FAULTY GEAR SHIFTING..... | 9-2 |
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EAS28450

TROUBLESHOOTING

EAS28460

GENERAL INFORMATION

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470

STARTING FAILURES

Engine

1. Cylinder(s) and cylinder head
 - Loose spark plug
 - Loose cylinder head
 - Damaged cylinder head gasket
 - Worn or damaged cylinder
 - Incorrect valve clearance
 - Improperly sealed valve
 - Incorrect valve-to-valve-seat contact
 - Incorrect valve timing
 - Faulty valve spring
 - Seized valve
2. Piston(s) and piston ring(s)
 - Improperly installed piston ring
 - Damaged, worn or fatigued piston ring
 - Seized piston ring
 - Seized or damaged piston
3. Air filter
 - Improperly installed air filter
 - Clogged air filter element
4. Crankcase and crankshaft
 - Improperly assembled crankcase
 - Seized crankshaft

Fuel system

1. Fuel tank
 - Empty fuel tank
 - Clogged fuel tank overflow hose
 - Deteriorated or contaminated fuel
2. Fuel pump
 - Faulty fuel pump
 - Faulty fuel pump relay
3. Throttle body(-ies)
 - Deteriorated or contaminated fuel
 - Sucked-in air

Electrical system

1. Battery
 - Discharged battery
 - Faulty battery
2. Fuse(s)
 - Blown, damaged or incorrect fuse
 - Improperly installed fuse
3. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
4. Ignition coil(s)
 - Cracked or broken ignition coil body
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
5. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Faulty cylinder identification sensor
 - Broken generator rotor woodruff key
6. Switches and wiring
 - Faulty main switch
 - Faulty engine stop switch
 - Broken or shorted wiring
 - Faulty gear position switch (neutral circuit)
 - Faulty start switch
 - Faulty sidestand switch
 - Faulty clutch switch
 - Improperly grounded circuit
 - Loose connections
7. Starting system
 - Faulty starter motor
 - Faulty starter relay
 - Faulty starting circuit cut-off relay
 - Faulty starter clutch

EAS28490

INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder(s) and cylinder head
 - Incorrect valve clearance
 - Damaged valve train components
2. Air filter
 - Clogged air filter element

Fuel system

1. Throttle body(-ies)
 - Damaged or loose throttle body joint
 - Improperly synchronized throttle bodies

- Improperly adjusted engine idling speed (throttle stop screw)
- Improper throttle cable free play
- Flooded throttle body
- Faulty air induction system

Electrical system

1. Battery
 - Discharged battery
 - Faulty battery
2. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
3. Ignition coil(s)
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
 - Cracked or broken ignition coil
4. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Faulty cylinder identification sensor
 - Broken generator rotor woodruff key

EAS28510

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURES" on page 9-1.

Engine

1. Air filter
 - Clogged air filter element

Fuel system

1. Fuel pump
 - Faulty fuel pump

EAS28530

FAULTY GEAR SHIFTING

Shifting is difficult

Refer to "Clutch drags".

EAS28540

SHIFT PEDAL DOES NOT MOVE

Shift shaft

- Improperly adjusted shift rod
- Bent shift shaft

Shift drum and shift forks

- Foreign object in a shift drum groove

- Seized shift fork
- Bent shift fork guide bar

Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

EAS28550

JUMPS OUT OF GEAR

Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

Shift forks

- Worn shift fork

Shift drum

- Incorrect axial play
- Worn shift drum groove

Transmission

- Worn gear dog

EAS28570

FAULTY CLUTCH

Clutch slips

1. Clutch
 - Improperly assembled clutch
 - Improperly assembled clutch master cylinder
 - Improperly assembled clutch release cylinder
 - Incorrect clutch fluid level
 - Damaged clutch hose
 - Loose or fatigued clutch spring plate
 - Loose union bolt
 - Worn friction plate
 - Worn clutch plate
 - Damaged clutch release cylinder
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (low)
 - Deteriorated oil

Clutch drags

1. Clutch
 - Air in hydraulic clutch system
 - Warped pressure plate
 - Bent clutch plate
 - Swollen friction plate
 - Bent clutch push rod
 - Damaged clutch boss
 - Burnt primary driven gear bushing
 - Damaged clutch release cylinder

- Match marks not aligned
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (high)
 - Deteriorated oil

EAS28600

OVERHEATING

Engine

1. Clogged coolant passages
 - Cylinder head and piston(s)
 - Heavy carbon buildup
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity
 - Inferior oil quality

Cooling system

1. Coolant
 - Low coolant level
2. Radiator
 - Damaged or leaking radiator
 - Faulty radiator cap
 - Bent or damaged radiator fin
3. Water pump
 - Damaged or faulty water pump
4. Thermostat
 - Thermostat stays closed
5. Oil cooler
 - Clogged or damaged oil cooler
6. Hose(s) and pipe(s)
 - Damaged hose
 - Improperly connected hose
 - Damaged pipe
 - Improperly connected pipe

Fuel system

1. Throttle body(-ies)
 - Damaged or loose throttle body joint
2. Air filter
 - Clogged air filter element

Chassis

1. Brake(s)
 - Dragging brake

Electrical system

1. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
2. Ignition system
 - Faulty ECU

EAS28610

OVERCOOLING

Cooling system

1. Thermostat
 - Thermostat stays open

EAS28620

POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28660

FAULTY FRONT FORK LEGS

Leaking oil

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28680

UNSTABLE HANDLING

Handlebars

- Bent or improperly installed right handlebar
 - Bent or improperly installed left handlebar
1. Steering head components
 - Improperly installed upper bracket
 - Improperly installed lower bracket (improperly tightened ring nut)
 - Bent steering stem

- Damaged ball bearing or bearing race
2. Front fork leg(s)
- Uneven oil levels (both front fork legs)
 - Unevenly tensioned fork spring (both front fork legs)
 - Broken fork spring
 - Bent or damaged inner tube
 - Bent or damaged outer tube
3. Swingarm
- Worn bearing or bushing
 - Bent or damaged swingarm

Rear shock absorber assembly

- Faulty rear shock absorber spring
- Leaking oil or gas

Tire(s)

- Uneven tire pressures (front and rear)
- Incorrect tire pressure
- Uneven tire wear

Wheel(s)

- Incorrect wheel balance
- Deformed cast wheel
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame

- Bent frame
- Damaged steering head pipe
- Improperly installed bearing race

EAS28710

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main switch)
- Burnt-out headlight bulb

Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

Tail/brake light does not come on

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out

- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

Turn signal does not come on

- Faulty turn signal switch
- Faulty turn signal/hazard relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

Turn signal flashes slowly

- Faulty turn signal/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 flashes 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

WIRING DIAGRAM

FJR1300A(V) 2006

1. Main switch
2. Rectifier/regulator
3. AC magneto
4. ABS ECU fuse
5. Fuel injection system fuse
6. Backup fuse (odometer, clock, immobilizer system, and windshield drive system)
7. Main fuse
8. Battery
9. ABS motor fuse
10. Starter relay
11. Starter motor
12. Immobilizer unit
13. Gear position switch
14. Coupler 1 (wire harness—front cowling wire harness)
15. Fuel pump
16. Fuel sender
17. Coupler 2 (wire harness—front cowling wire harness)
18. ABS test coupler
19. ABS ECU (electronic control unit)
20. Front wheel sensor
21. Rear wheel sensor
22. ABS motor relay
23. Hydraulic unit
24. Rear brake light switch
25. Brake light relay
26. License plate light
27. Taillight assembly
28. Tail/brake light
29. Rear left turn signal light
30. Rear right turn signal light
31. Coupler 3 (wire harness—front cowling wire harness)
32. Sidestand switch
33. Cylinders-#1/#4 ignition coil
34. Spark plug
35. Cylinders-#2/#3 ignition coil
36. Injector #4
37. Injector #3
38. Injector #2
39. Injector #1
40. Air induction system solenoid
41. ECU (engine control unit)
42. Crankshaft position sensor
43. Intake air temperature sensor
44. Coolant temperature sensor
45. O₂ sensor
46. Cylinder identification sensor
47. Throttle position sensor
48. Intake air pressure sensor
49. Coupler 4 (wire harness—front cowling wire harness)
50. Oil level switch

51. Anti-theft alarm (OPTION)
52. Coupler 5 (wire harness—front cowling wire harness)
53. Headlight relay (on/off)
54. Hazard lighting fuse
55. Signaling system fuse
56. Headlight fuse
57. Ignition fuse
58. Auxiliary DC jack fuse
59. Grip warmer control unit (OPTION)
60. Radiator fan motor relay
61. Left radiator fan motor fuse
62. Left radiator fan motor
63. Right radiator fan motor fuse
64. Right radiator fan motor
65. Turn signal/hazard relay
66. Auxiliary DC jack
67. Right handlebar switch
68. Front brake light switch
69. Engine stop switch
70. Start switch
71. Hazard switch
72. Left handlebar switch
73. Clutch switch
74. Pass switch
75. Dimmer switch
76. Windshield position switch
77. Turn signal switch
78. Horn switch
79. Relay unit
80. Starting circuit cut-off relay
81. Fuel pump relay
82. Accessory box solenoid
83. Meter assembly
84. Neutral indicator light
85. ABS warning light
86. Immobilizer system indicator light
87. Multi-function meter
88. Oil level warning light
89. Engine trouble warning light
90. Meter light
91. High beam indicator light
92. Right turn signal indicator light
93. Left turn signal indicator light
94. Thermistor
95. Lean angle sensor
96. Horn
97. Front left turn signal light
98. Front right turn signal light
99. Headlight relay (dimmer)
100. Headlight assembly
101. Auxiliary light
102. Headlight
103. Right grip warmer (OPTION)
104. Left grip warmer (OPTION)
105. Windshield drive unit

COLOR CODE

| | |
|------|-------------------|
| B | Black |
| Br | Brown |
| Ch | Chocolate |
| Dg | Dark green |
| G | Green |
| Gy | Gray |
| L | Blue |
| Lg | Light green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky blue |
| W | White |
| Y | Yellow |
| B/G | Black/Green |
| B/L | Black/Blue |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/B | Brown/Black |
| Br/G | Brown/Green |
| Br/L | Brown/Blue |
| Br/R | Brown/Red |
| Br/W | Brown/White |
| Br/Y | Brown/Yellow |
| G/B | Green/Black |
| G/L | Green/Blue |
| G/R | Green/Red |
| G/W | Green/White |
| G/Y | Green/Yellow |
| Gy/R | Gray/Red |
| Gy/W | Gray/White |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| L/Y | Blue/Yellow |
| Lg/W | Light green/white |
| O/B | Orange/Black |
| P/W | Pink/White |
| R/B | Red/Black |
| R/G | Red/Green |
| R/L | Red/Blue |
| R/W | Red/White |
| R/Y | Red/Yellow |
| Sb/W | Sky blue/White |
| W/B | White/Black |
| W/G | White/Green |
| W/L | White/Blue |
| W/Y | White/Yellow |
| Y/G | Yellow/Green |
| Y/L | Yellow/Blue |
| Y/W | Yellow/White |



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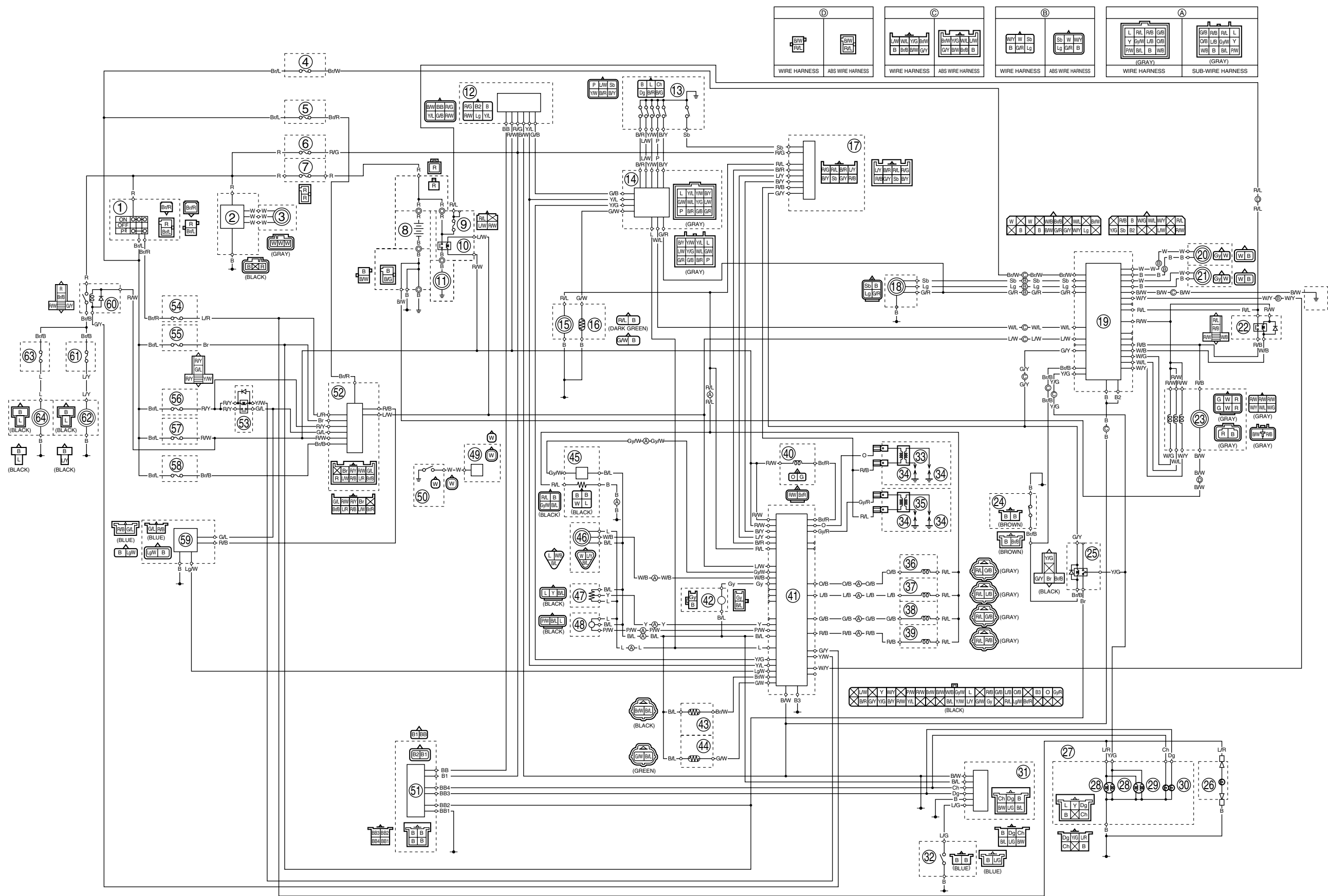
FJR1300A(V) 2006
WIRING DIAGRAM (1/2)

FJR1300A(V) 2006
SCHÉMA DE CÂBLAGE (1/2)

FJR1300A(V) 2006
SCHALTPLAN (1/2)

FJR1300A(V) 2006
SCHEMA ELETTRICO (1/2)

FJR1300A(V) 2006
DIAGRAMA ELÉCTRICO (1/2)



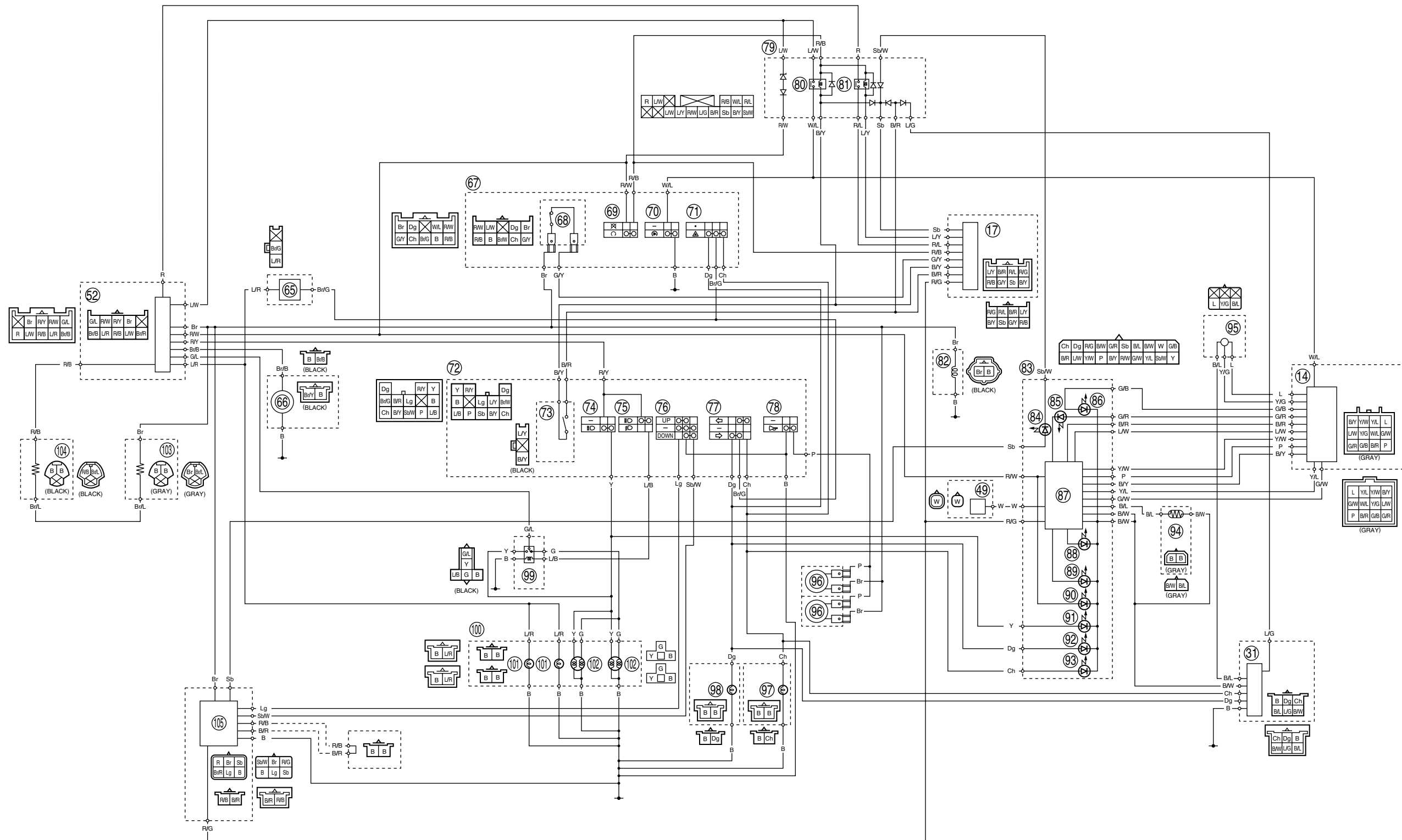
FJR1300A(V) 2006 WIRING DIAGRAM (2/2) Front cowlng wire harness

FJR1300A(V) 2006
SCHÉMA DE CÂBLAGE (2/2)
Faisceau de fils au carénage avant

**FJR1300A(V) 2006
SCHALTPLAN (2/2)
Frontverkleidungs-Kabelbaum**

FJR1300A(V) 2006
SCHEMA ELETTRICO (2/2)
Cablaggio elettrico del cupolino

FJR1300A(V) 2006
DIAGRAMA ELÉCTRICO (2/2)
Mazo de cables del carenado delantero



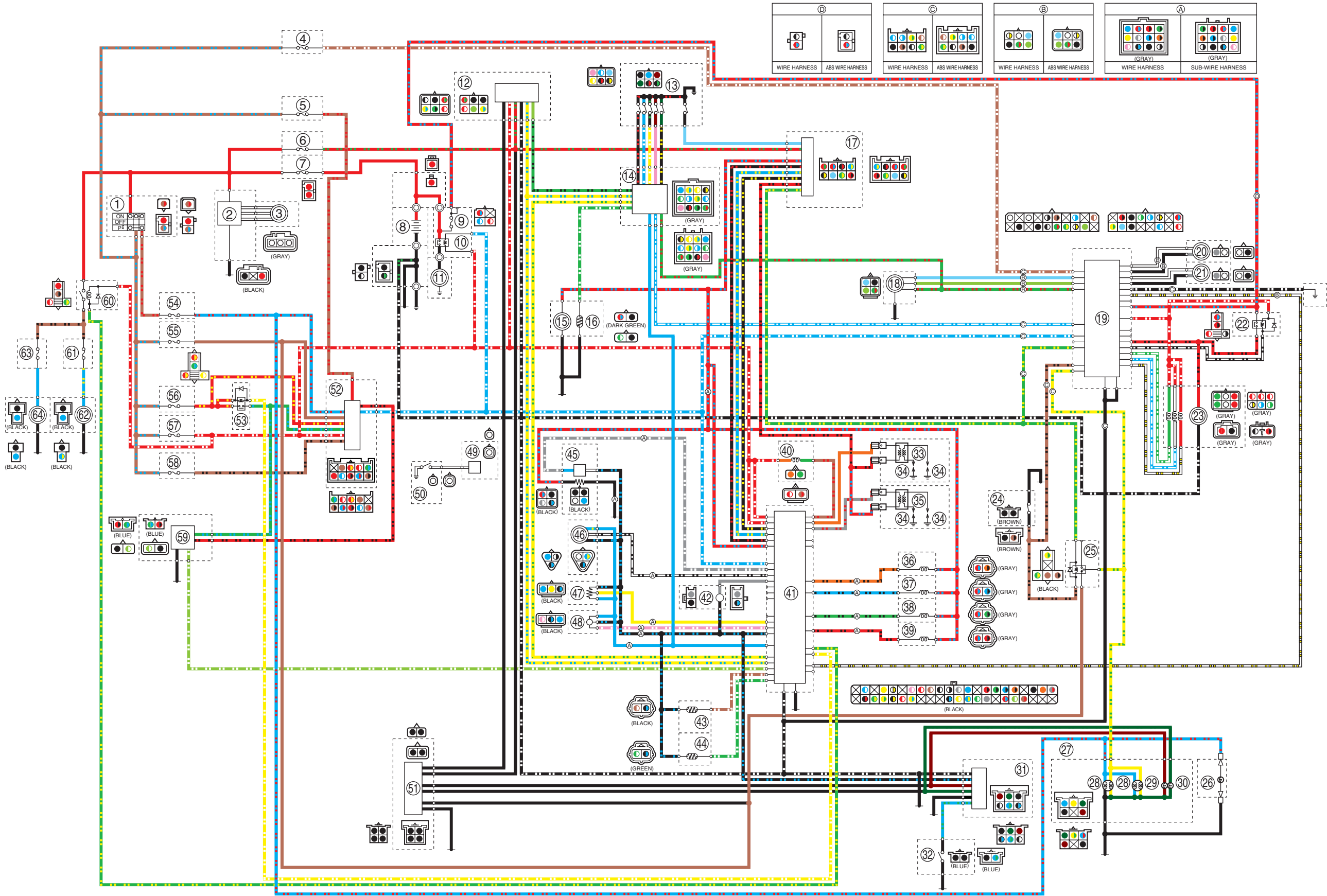
FJR1300A(V) 2006
WIRING DIAGRAM (1/2)

FJR1300A(V) 2006
SCHÉMA DE CÂBLAGE (1/2)

FJR1300A(V) 2006
SCHALTPLAN (1/2)

FJR1300A(V) 2006
SCHEMA ELETTRICO (1/2)

FJR1300A(V) 2006
DIAGRAMA ELÉCTRICO (1/2)



FJR1300A(V) 2006
WIRING DIAGRAM (2/2)
Front cowling wire harness

FJR1300A(V) 2006
SCHÉMA DE CÂBLAGE (2/2)
Faisceau de fils au carénage avant

FJR1300A(V) 2006
SCHALTPLAN (2/2)
Frontverkleidungs-Kabelbaum

FJR1300A(V) 2006
SCHEMA ELETTRICO (2/2)
Cablaggio elettrico del cupolino

FJR1300A(V) 2006
DIAGRAMA ELÉCTRICO (2/2)
Mazo de cables del carenado delantero

