YAMAHA 2017

SERVICE MANUAL

MT09TRA
MT09TRAH

TRACER

2SC-28197-E0

EAS20002

MT09TRA/MT09TRAH
SERVICE MANUAL
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EAS20003

IMPORTANT

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

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

TIP

Designs and specifications are subject to change without notice.

EAS30001

IMPORTANT MANUAL INFORMATION

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

⚠	**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**

⚠ WARNING	**A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

NOTICE	**A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.**

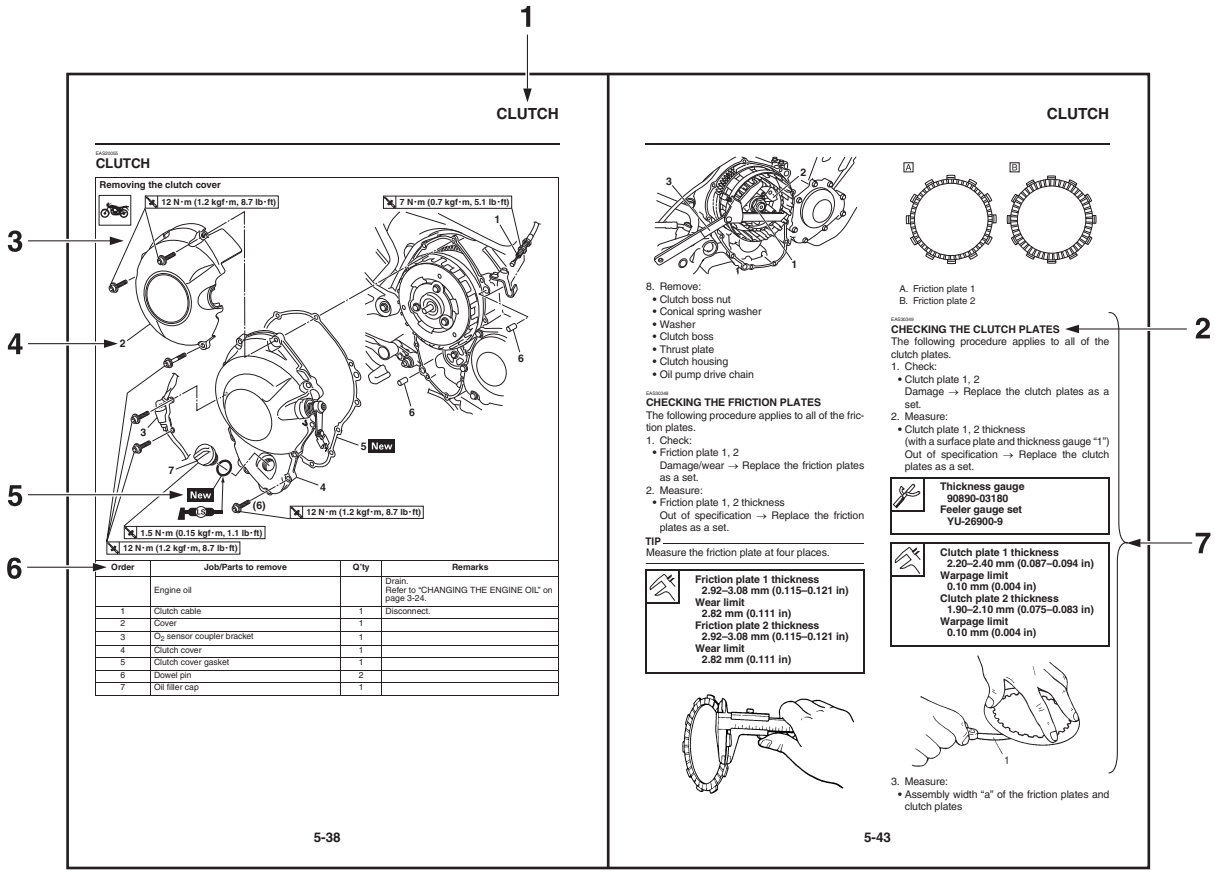
TIP	A TIP provides key information to make procedures easier or clearer.

EAS20004

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. This step explains removal and disassembly procedure only. For installation and assembly procedure, reverse the steps.
- Jobs "7" requiring more information (such as special tools and technical data) are described sequentially.



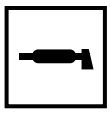
EAS20005

SYMBOLS

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

TIP

The following symbols are not relevant to every vehicle.

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

EAS10003

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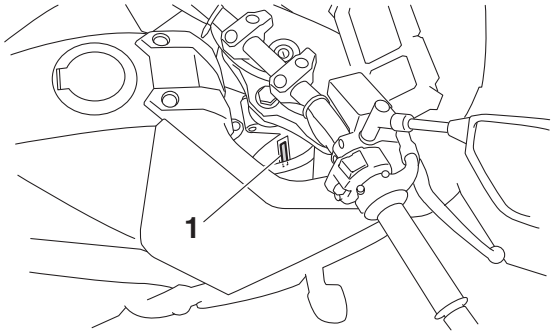
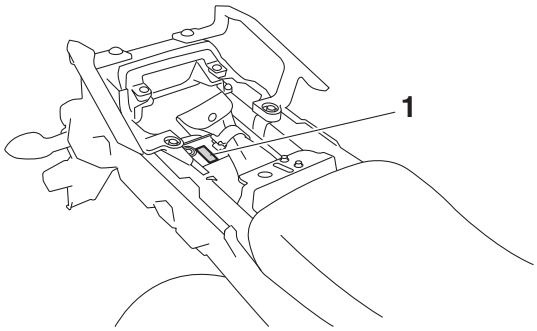
EAS20007
IDENTIFICATION

EAS30002
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the steering head pipe.

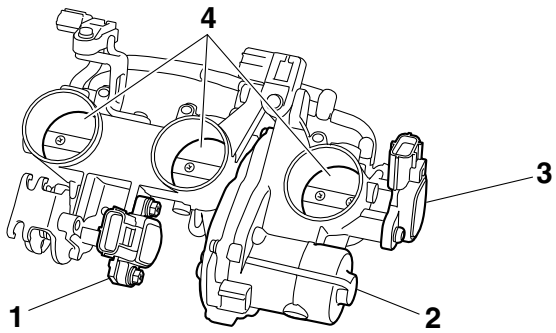


EAS30003
MODEL LABEL
The model label “1” is affixed to the battery box under the passenger seat. This information will be needed to order spare parts.



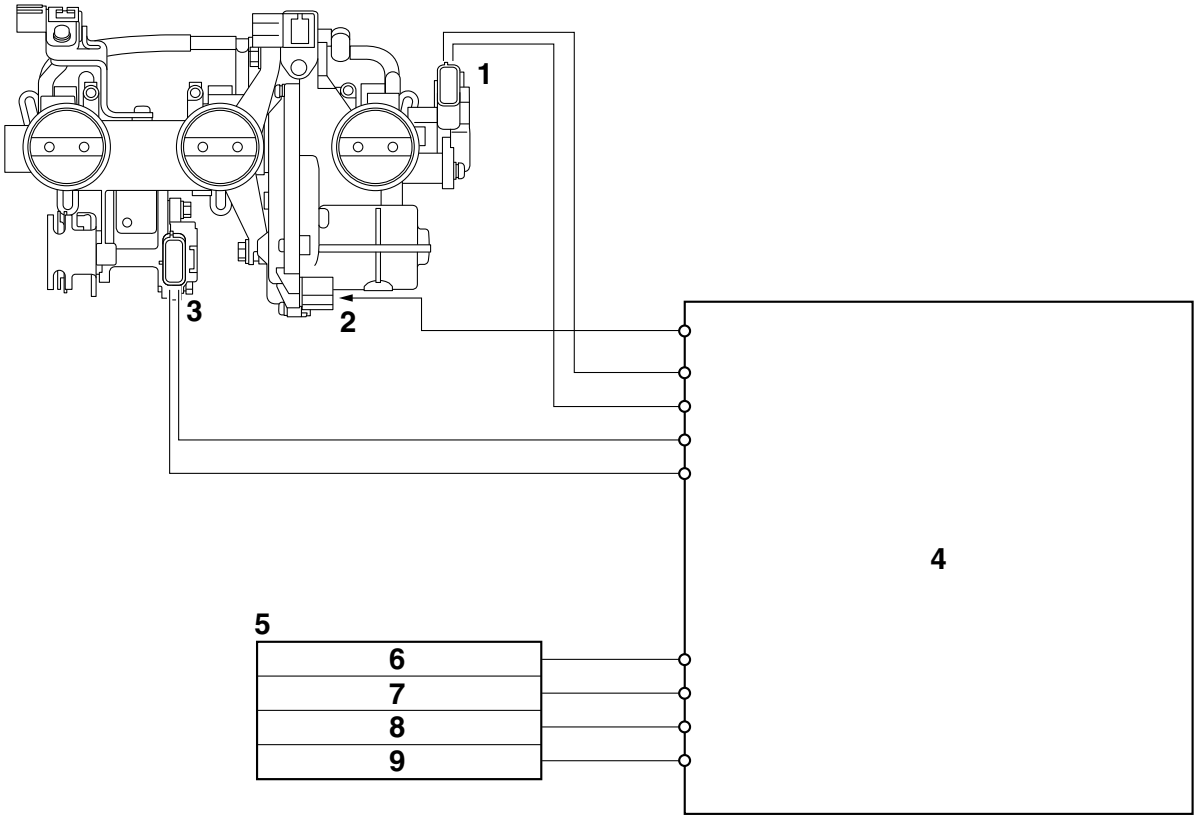
EAS20008
FEATURES

EAS30852
YCC-T (Yamaha Chip Controlled Throttle)
Mechanism characteristics
Yamaha developed the YCC-T system employing the most advanced electronic control technologies. Electronic control throttle systems have been used on automobiles, but Yamaha has developed a faster, more compact system specifically for the needs of a sports motorcycle. The Yamaha-developed system has a high-speed calculating capacity that produces computations of running conditions every 1/1000th of a second.
The YCC-T system is designed to respond to the throttle action of the rider by having the ECU instantaneously calculate the ideal throttle valve opening and generate signals to operate the motor-driven throttle valves and thus actively control the intake air volume.
The ECU contains two CPUs with a capacity about five times that of conventional units, making it possible for the system to respond extremely quickly to the slightest adjustments made by the rider. In particular, optimized control of the throttle valve opening provides the optimum volume of intake air for easy-to-use torque, even in a high-revving engine.
Aims and advantages of using YCC-T
- Increased engine power
  By shortening the air intake path, higher engine speed is possible → Increased engine power.
- Improved driveability
  Air intake volume is controlled according to the operating conditions → Improved throttle response to meet engine requirement.
  Driving force is controlled at the optimal level according to the transmission gear position and engine speed → Improved throttle control.
- Engine braking control
  Due to the throttle control, optimal engine braking is made possible.
- Simplified idle speed control (ISC) mechanism
  The bypass mechanism and ISC actuator are eliminated → A simple mechanism is used to maintain a steady idle speed.
- Reduced weight
  Compared to using a sub-throttle mechanism, weight is reduced.



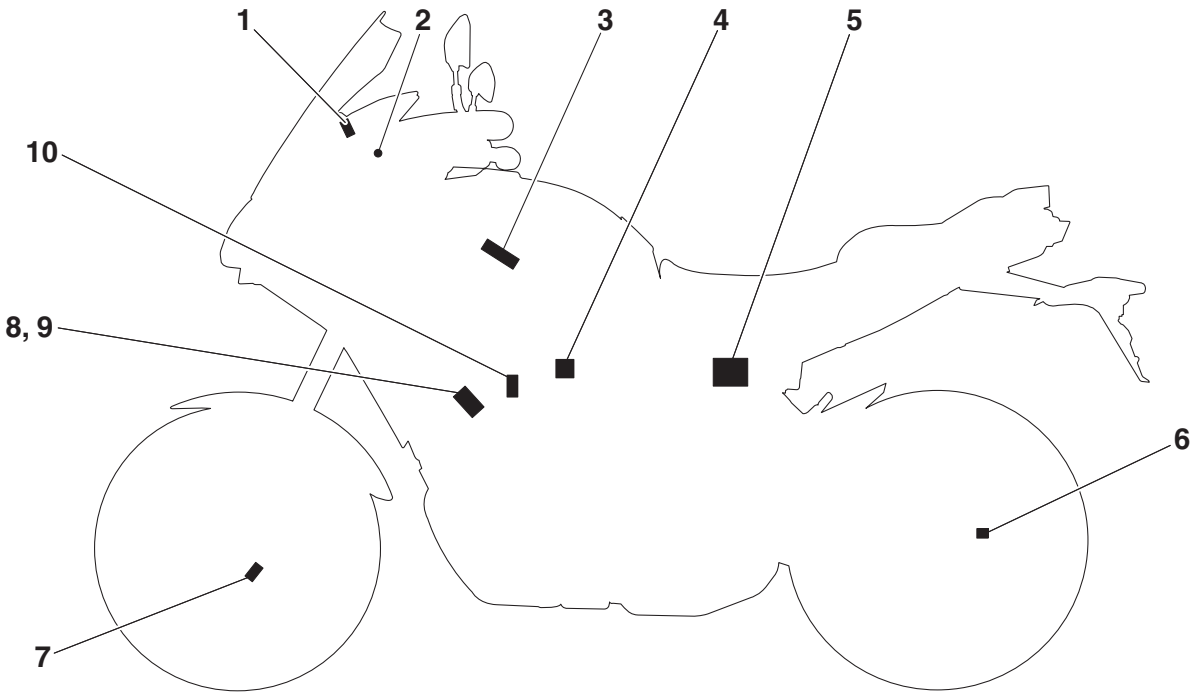
1. Accelerator position sensor
2. Throttle servo motor
3. Throttle position sensor
4. Throttle valves

YCC-T system outline



1. Throttle position sensor
2. Throttle servo motor
3. Accelerator position sensor
4. ECU (Engine Control Unit)
5. Sensor input
6. Gear position switch
7. Crankshaft position sensor
8. Rear wheel sensor
9. Coolant temperature sensor

EAS30855
OUTLINE OF THE TCS (Traction Control System)
The traction control system controls excessive spinning (slipping) of the rear wheel when accelerating on slippery surfaces, such as unpaved or wet roads.
The ECU monitors the front and rear wheel speeds using the signals from the front and rear wheel sensors, and detects rear wheel slipping according to the difference between the wheel speeds. If the slipping exceeds the preset value, the ECU controls the slipping using integrated control of the ignition timing, fuel cut-off, and throttle valve opening of the YCC-T system.
The traction control system can be set to one of two operation modes or turned off.
TCS (Traction control system) layout

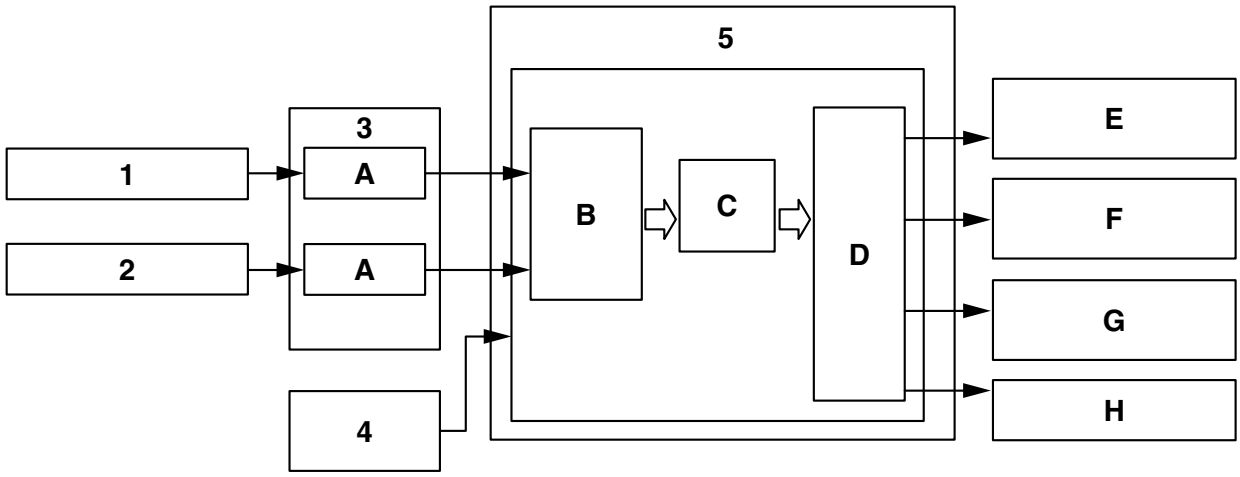


1. “TCS” button
2. Traction control system indicator light
3. ECU (Engine Control Unit)
4. Throttle servo motor
5. ABS ECU
6. Rear wheel sensor
7. Front wheel sensor
8. Ignition coil
9. Spark plug
10. Fuel injector

TCS (Traction control system) block diagram

The signals from the front and rear wheel sensors are sent to the ECU through the ABS ECU, and the ECU calculates the amount of slip according to the difference between the detected front and rear wheel speeds.

If the amount of slip exceeds the preset value, the ECU controls the ignition timing, fuel cut-off, and throttle valve opening of the YCC-T system so that the amount of slip is less than the preset value. The traction control system indicator light in the meter assembly flashes when the traction control system has activated.



1. Front wheel sensor
2. Rear wheel sensor
3. ABS ECU
4. “TCS” button
5. ECU (Engine Control Unit)

A. Signal conversion
B. Slip amount calculation
C. Exceeds preset value
D. Actuator control
E. Fuel cut-off
F. Ignition timing (retarded)
G. Traction control system indicator light (flashes)
H. YCC-T motor throttle valve opening (decreased)

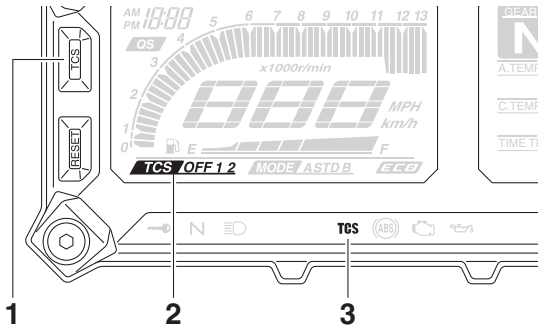
Traction control system

The traction control system (TCS) helps maintain traction when accelerating on slippery surfaces, such as unpaved or wet roads. If sensors detect that the rear wheel is starting to slip (uncontrolled spinning), the traction control system assists by regulating engine power as needed until traction is restored.

EWA15433

⚠ WARNING

The traction control system is not a substitute for riding appropriately for the conditions. Traction control cannot prevent loss of traction due to excessive speed when entering turns, when accelerating hard at a sharp lean angle, or while braking, and cannot prevent front wheel slipping. As with any vehicle, approach surfaces that may be slippery with caution and avoid especially slippery surfaces.



1. "TCS" button
2. TCS display
3. Traction control system indicator light "TCS"

The "TCS" indicator light flashes when traction control has engaged. You may notice slight changes in engine and exhaust sounds when the system has engaged.
When the traction control system has been set to "OFF", the "TCS" indicator light will come on.
The TCS display indicates the current TCS setting. There are three settings.

TCS "OFF"

TCS "OFF" turns the traction control system off.

TCS "1"

TCS "1" minimizes traction control system assist.

TCS "2"

TCS "2" maximizes traction control assist; wheel spin is most strongly controlled.

TIP

- When the key is turned to "ON", traction control is turned on and set to "1" or "2" (whichever was last selected).
- Turn the traction control system off to help free the rear wheel if the vehicle gets stuck in mud, sand, or other soft surfaces.

ECA19650

NOTICE

Use only the specified tires. Using different sized tires will prevent the traction control system from controlling tire rotation accurately.

Setting the traction control system

EWA15441

⚠ WARNING

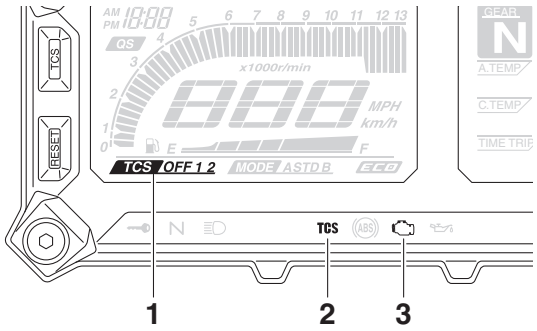
Be sure to stop the vehicle before making any setting changes to the traction control system. Changing settings while riding can distract the operator and increase the risk of an accident.

TCS settings can be changed only when the vehicle is stopped and the throttle closed.
• Push the “TCS” button to change between TCS settings “1” and “2”.
• Push the button for two seconds to turn the traction control system off.
• Push the button again to turn traction control back on (TCS will return to the previous setting).

Resetting the traction control system

The traction control system will automatically disable when:
• the front wheel or rear wheel comes off the ground while riding.
• excessive rear wheel spin is detected while riding.
• either wheel is rotated with the key turned to “ON” (such as when performing maintenance).

If the traction control system is disabled, both the “TCS” indicator light and the “” warning light will come on.



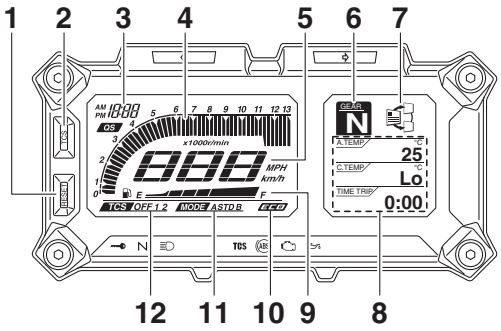
1. TCS display
2. Traction control system indicator light “TCS”
3. Engine trouble warning light “”

Should this occur, try resetting the system as follows.
1. Stop the vehicle and turn the key to “OFF”.
2. Wait a few seconds and then turn the key back to “ON”.
3. The “TCS” indicator light should turn off and the system be enabled.
4. Check the vehicle and turn off the “” warning light.

TIP

If the “TCS” indicator light or the “” warning light remains on after resetting, check the fuel injection system (Refer to “FUEL INJECTION SYSTEM” on page 8-31).

EAS30682
INSTRUMENT FUNCTIONS
Multi-function meter unit



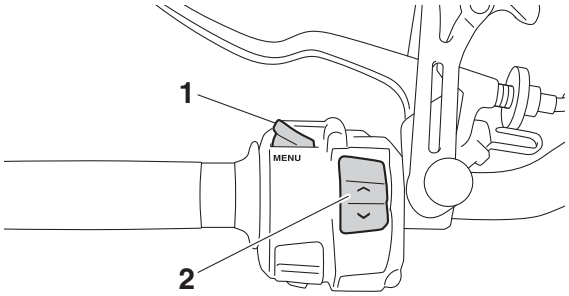
1. "RESET" button
2. "TCS" button
3. Clock
4. Tachometer
5. Speedometer
6. Transmission gear display
7. Information display selection function
8. Information display
9. Fuel meter
10. Eco indicator "ECO"
11. Drive mode display
12. TCS display

The multi-function meter unit is equipped with the following:
- a speedometer
- a tachometer
- a clock
- a fuel meter
- an eco indicator
- a transmission gear display
- a drive mode display
- a TCS display
- an information display
- a setting mode display

EWA12423
⚠ WARNING

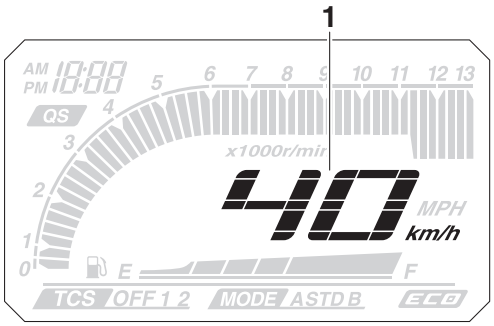
Be sure to stop the vehicle before making any setting changes to the multi-function meter unit. Changing settings while riding can distract the operator and increase the risk of an accident.

TIP
- The select switch "∧/∨" and the menu switch "MENU" are located on the left handlebar. These switches allow you to control or change the settings of the multi-function meter unit.
- QS requires an accessory part and cannot be selected.
- The key must be turned to "ON" before you can use the handlebar switches and buttons.



1. Menu switch "MENU"
2. Select switch "∧/∨"

Speedometer

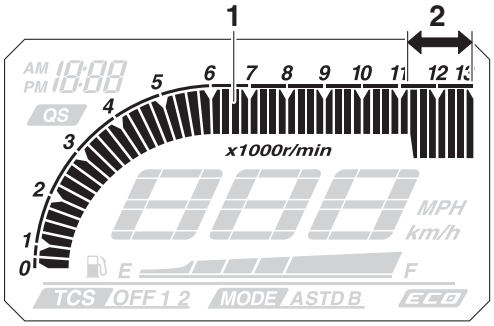


1. Speedometer

The speedometer shows the vehicle's traveling speed.

TIP
To switch between kilometers and miles, refer to "Selecting the units".

Tachometer



1. Tachometer
2. High-rpm zone

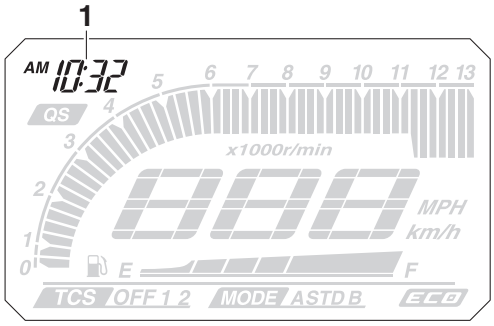
The tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.
When the key is turned to "ON", the tachometer will sweep across the r/min range and then return to zero in order to test the electrical circuit.

ECA20410

NOTICE

Do not operate the engine in the tachometer high-rpm zone.

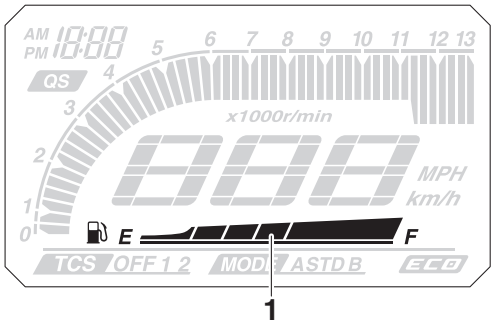
Clock



1. Clock

The clock displays time in 12-hour format. To set the clock, refer to “Setting the clock”.

Fuel meter



1. Fuel meter

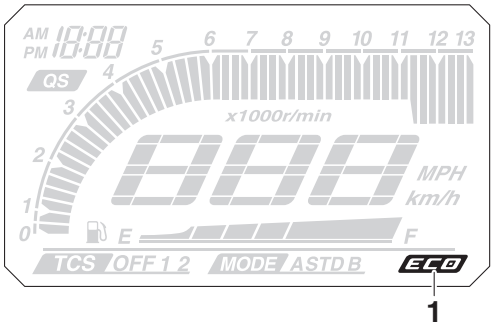
The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear from “F” (full) towards “E” (empty) as the fuel level decreases. When the last segment of the fuel meter starts flashing, refuel as soon as possible.

TIP

- When the key is first turned to “ON”, all of the display segments of the fuel meter will appear for a few seconds before the fuel meter shows the actual fuel level.
- If a problem is detected in the fuel meter electrical circuit, the fuel meter will flash repeatedly.

Refer to “CHECKING THE FUEL METER/FUEL LEVEL WARNING LIGHT” on page 8-168.

Eco indicator



1. Eco indicator “ECO”

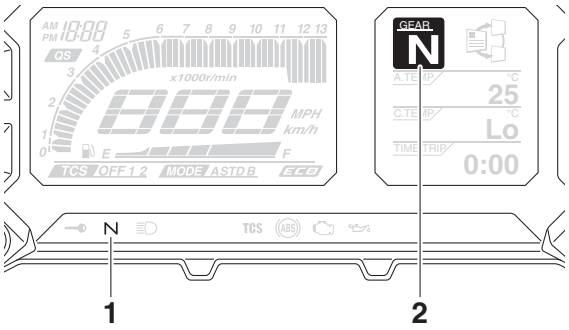
The eco indicator comes on when the vehicle is being operated in an environmentally friendly, fuel-efficient manner. The indicator goes off when the vehicle is stopped.

TIP

Consider the following tips to reduce fuel consumption:

- Avoid high engine speeds during acceleration.
- Travel at a constant speed.
- Select the transmission gear that is appropriate for the vehicle speed.

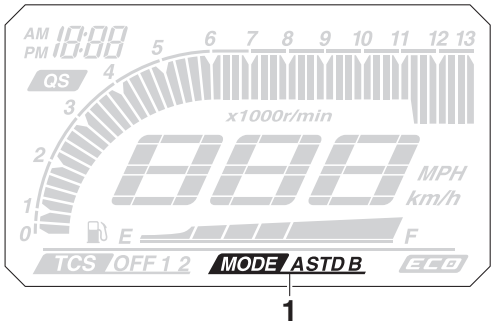
Transmission gear display



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

This transmission gear display shows the selected gear. This model is equipped with 6 gears. The neutral position is indicated by the neutral indicator light “**N**” and by the transmission gear display “**N**”.

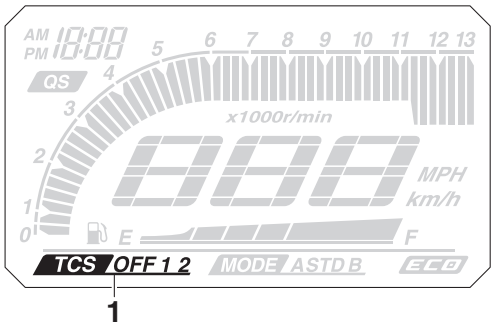
Drive mode display



1. Drive mode display

The drive mode display indicates which drive mode has been selected: “STD”, “A” or “B”. For more details on the modes and on how to select them, refer to “D-mode (drive mode)” on page 1-16.

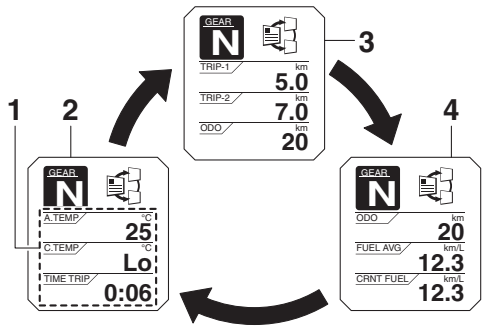
TCS display



1. TCS display

This display indicates which traction control system setting has been selected: “1”, “2” or “OFF”. For more details on the TCS settings and on how to select them, refer to “OUTLINE OF THE TCS (Traction Control System)” on page 1-4.

Information display



1. Information display
2. Display–1
3. Display–2
4. Display–3

There are 3 information displays. Push the select switch “∧/∨” to change the selected information display.

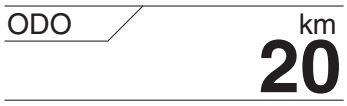
The following items are shown in the information displays:

- an odometer display
- tripmeter displays
- a fuel reserve tripmeter display
- an elapsed time display
- an air temperature display
- a coolant temperature display
- an average fuel consumption display
- an instantaneous fuel consumption display

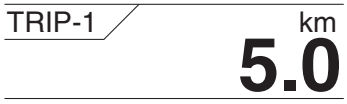
TIP

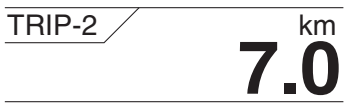
You can select which items are shown in each information display. Refer to “Setting mode” on page 1-12.

Odometer and tripmeters



The odometer shows the total distance traveled by the vehicle.





The tripmeters “TRIP-1” and “TRIP-2” show the distance traveled since they were last set.

To reset a tripmeter, use the select switch to display the tripmeter you want to reset. Then push the "RESET" button briefly so that the tripmeter flashes, and then push the "RESET" button again for two seconds.

TIP

- The odometer will lock at 999999.
- The tripmeters will reset and continue counting after 9999.9 is reached.

Fuel reserve tripmeter

When approximately 2.6 L (0.69 US gal, 0.57 Imp.gal) of fuel remains in the fuel tank, the last segment of the fuel meter starts flashing. The display will change to the fuel reserve tripmeter mode "TRIP-F" and start counting the distance traveled from that point.

In this case, push the select switch to switch the display in the following order;

TRIP-F → Display–1 → Display–2 → Display–3 → TRIP-F

After refueling, you can manually reset the fuel reserve tripmeter immediately, or allow it to reset automatically after traveling 5 km (3 mi). When the fuel reserve tripmeter is reset, it will disappear from the display.

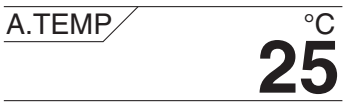
Elapsed time

This timer shows the time that has elapsed since the key was turned to "ON". The timer automatically resets when the key is turned to "OFF".

TIP

There are also "TIME–2" and "TIME–3" elapsed time displays, but they cannot be set to the information display. Refer to "Setting mode" on page 1-12.

Air temperature



This shows the air temperature from –9 °C to 93 °C in 1 °C increments. The temperature displayed may vary from the ambient temperature.

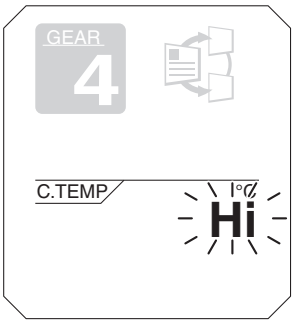
TIP

- –9 °C will be displayed even if the ambient temperature falls below –9 °C.
- The accuracy of the temperature reading may be affected when riding slowly (under 20 km/h [13 mi/h]) or when stopped at traffic signals, railroad crossings, etc.

Coolant temperature

This shows the temperature of the coolant. The coolant temperature varies with changes in the weather and engine load.

If the message "Hi" flashes, stop the vehicle, then stop the engine, and let it cool.



TIP
The selected information display cannot be switched while the message “Hi” is flashing.

ECA10022
NOTICE
Do not continue to operate the engine if it is overheating.

Average fuel consumption

This function calculates the average fuel consumption (fuel economy) of the vehicle since it was last reset. The average fuel consumption display can be set to “km/L” or “L/100km”; or when miles is selected “MPG” will be displayed.
- The “km/L” display shows the average distance that can be traveled on 1.0 L of fuel.
- The “L/100km” display shows the average amount of fuel necessary to travel 100 km.
- The “MPG” display shows the average distance that can be traveled on 1.0 Imp.gal of fuel.

To reset the average fuel consumption display, use the select switch to select the information display that contains the average fuel consumption display. Push the “RESET” button briefly so that the average fuel consumption display flashes, and then push the “RESET” button again for 2 seconds while the display is flashing.

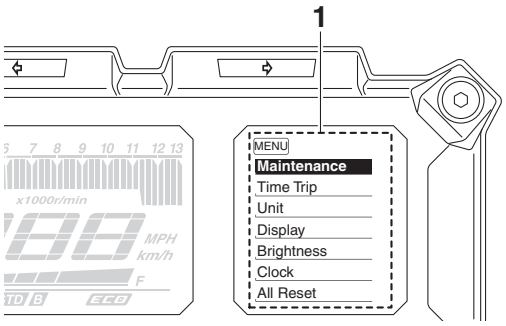
TIP
After resetting the average fuel consumption display, “_ _._” will be shown until the vehicle has traveled 1 km (0.6 mi).

Instantaneous fuel consumption

This function calculates the instantaneous fuel consumption (fuel economy) under current riding conditions. The instantaneous fuel consumption display can be set to “km/L” or “L/100km”; or when miles is selected “MPG” will be displayed.
- The “km/L” display shows the distance that can be traveled on 1.0 L of fuel.
- The “L/100km” display shows the amount of fuel necessary to travel 100 km.
- The “MPG” display shows the distance that can be traveled on 1.0 Imp.gal of fuel.

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

Setting mode



1. Setting mode display

This mode allows you to set, select, or reset the items shown in the information display.

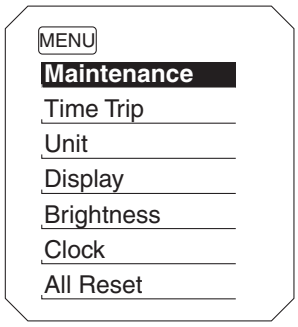
TIP
- The transmission must be in neutral and the vehicle must be stopped to change settings in this mode.
- Shifting the transmission into gear or turning the key to “OFF” will exit the setting mode and all changes will be saved.

Push and hold the menu switch “MENU” for 2 seconds to enter the setting mode. To exit the setting mode and return to the normal display, push and hold the menu switch again for 2 seconds.

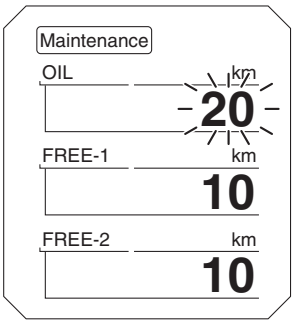
Display	Description
“Maintenance”	This function allows you to check and reset the “OIL” oil change interval (distance traveled), and the “FREE-1” and “FREE-2” maintenance intervals.
“Time Trip”	This function allows you to check and reset the “TIME–2” and “TIME–3” functions. These time trips show the total elapsed time that the key has been in the “ON” position. When the key is turned to “OFF”, the time trips stop counting but are not reset. The maximum time that can be shown is 99:59. When the time trips reach 100 hours, they automatically reset to 0:00 and continue counting.
“Unit”	This function allows you to switch the display units between kilometers and miles. When kilometers are selected, the fuel consumption units can be switched between “L/100km” and “km/L”.
“Display”	This function allows you to change the items shown in 3 information displays.
“Brightness”	This function allows you to adjust the brightness of the multi-function meter unit panel.
“Clock”	This function allows you to set the clock.
“All Reset”	This function allows you to reset all items, except the odometer and the clock.

Resetting the maintenance counters

1. Use the select switch to highlight “Maintenance”.



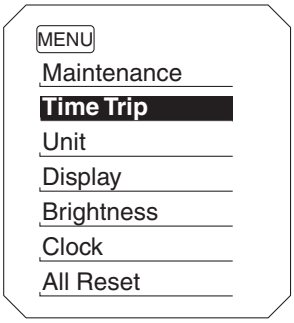
2. Push the menu switch, and then push the “RESET” button to select the item to reset.



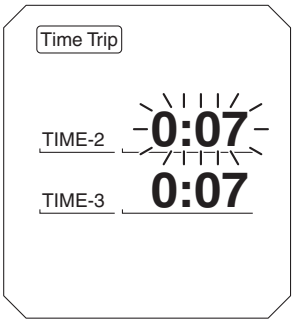
3. While the selected item is flashing, push the “RESET” button for 2 seconds.
4. Push the menu switch to return to the setting mode menu.

Checking and resetting “TIME–2” and “TIME–3”

1. Use the select switch to highlight “Time Trip”.



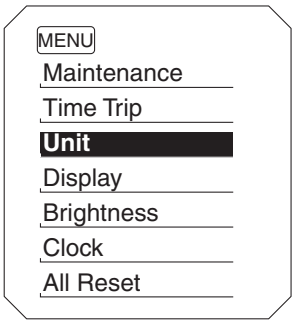
2. Push the menu switch to display “TIME–2” and “TIME–3”. To reset a time trip, push the “RESET” button to select the item to reset.



3. While the selected item is flashing, push the “RESET” button for 2 seconds.
4. Push the menu switch to return to the setting mode menu.

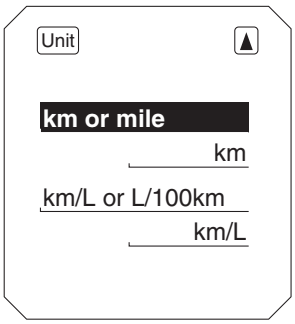
Selecting the units

1. Use the select switch to highlight “Unit”.



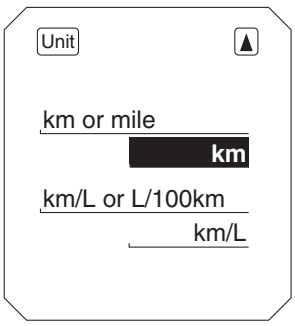
2. Push the menu switch. The unit setting display will be shown.

TIP
- When kilometers are already selected, “km/L or L/100km” will flash in the display.
- When miles are already selected, “km or mile” will flash in the display.



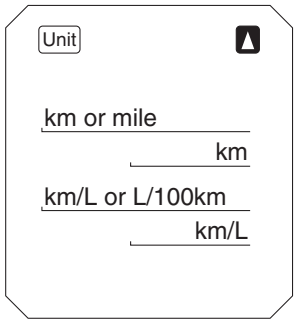
TIP
- Keep kilometers selected: Skip to step 5.
- Select miles or kilometers: Continue with step 3.

3. Push the menu switch, then use the select switch to toggle between “km” or “mile”, and then push the menu switch to confirm the selection.



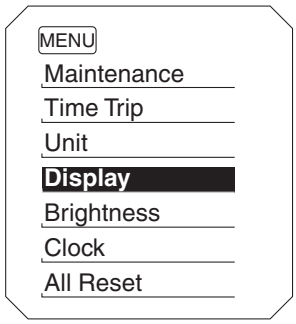
TIP
- When kilometers are selected, “L/100km” or “km/L” can be set as the fuel consumption display units. Continue with step 4.
- When miles are selected, the fuel consumption display units will be set to “MPG”. Skip to step 6.

4. Use the select switch to move from “km or mile” to “km/L or L/100km”.
5. Push the menu switch, then use the select switch to toggle between “km/L” and “L/100km”, and then push the menu switch to confirm the selection.
6. Use the select switch to highlight “▲”, and then push the menu switch to return to the setting mode menu.

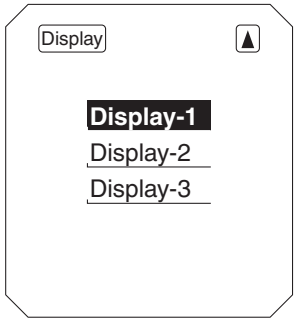


Selecting the display items

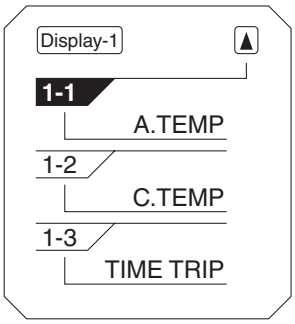
1. Use the select switch to highlight “Display”.



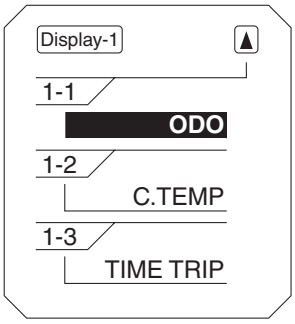
2. Push the menu switch, then use the select switch to highlight the display to change, and then push the menu switch again.



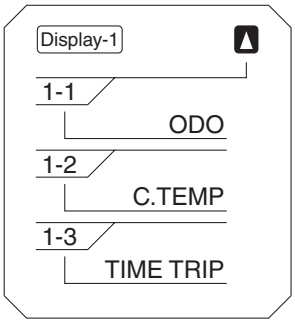
3. Use the select switch to highlight the item to change, and then push the menu switch.



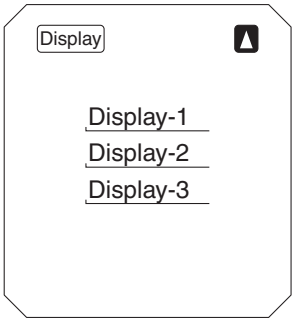
4. Use the select switch to select the item you want to display, and then push the menu switch.



5. When you are finished changing the settings, use the select switch to highlight "▲", and then push the menu switch to return to the previous display.

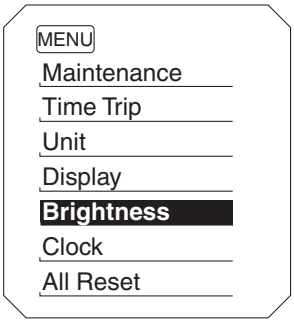


6. Use the select switch to highlight "▲", and then push the menu switch to return to the setting mode menu.

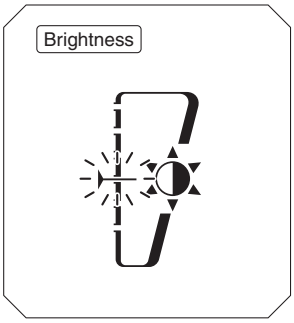


Adjusting the meter panel brightness

1. Use the select switch to highlight "Brightness".

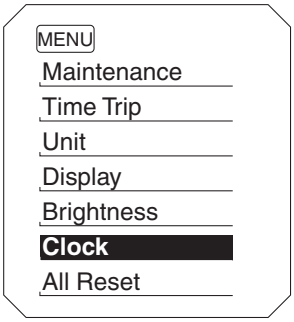


2. Push the menu switch.
3. Use the select switch to select the desired brightness level, and then push the menu switch to return to the setting mode menu.

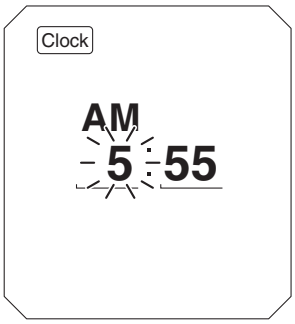


Setting the clock

1. Use the select switch to highlight "Clock".



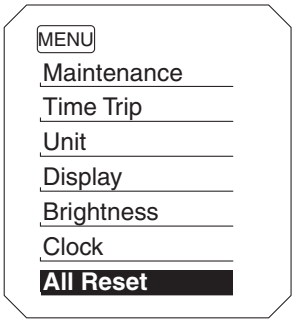
2. Push the menu switch.
3. When the hour digits start flashing, use the select switch to set the hours.



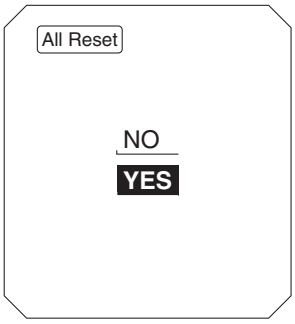
4. Push the menu switch, and the minute digits start flashing.
5. Use the select switch to set the minutes.
6. Push the menu switch to return to the setting mode menu.

Resetting all of the display items

1. Use the select switch to highlight “All Reset”.



2. Push the menu switch.
3. Use the select switch to highlight “YES”, and then push the menu switch.



TIP

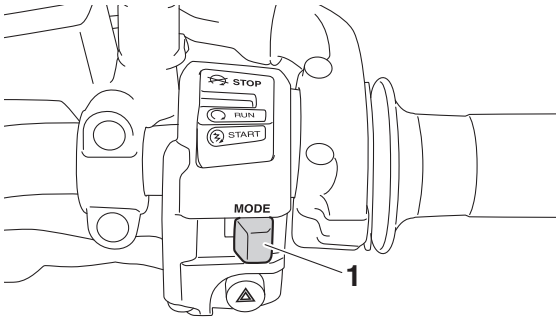
The odometer and the clock cannot be reset.

EAS31049

D-mode (drive mode)

D-mode is an electronically controlled engine performance system with three mode selections (“STD”, “A”, and “B”).

Push the drive mode switch “MODE” to switch between modes.



1. Drive mode switch “MODE”

TIP

Before using D-mode, make sure you understand its operation along with the operation of the drive mode switch.

Mode “STD”

Mode “STD” is suitable for various riding conditions.

This mode allows the rider to enjoy smooth and sporty drivability from the low-speed range to the high-speed range.

Mode “A”

Mode “A” offers a sportier engine response in the low- to mid-speed range compared to mode “STD”.

Mode “B”

Mode “B” offers response that is somewhat less sharp compared to mode “STD” for riding situations that require especially sensitive throttle operation.

EWA15341

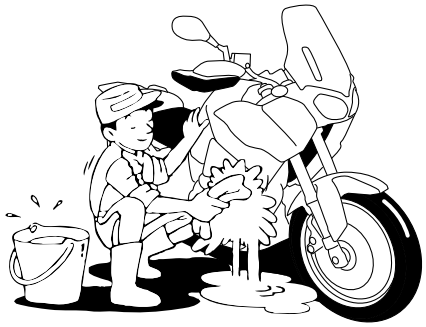
WARNING

Do not change the D-mode while the vehicle is moving.

EAS20009
IMPORTANT INFORMATION

EAS30006
PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.

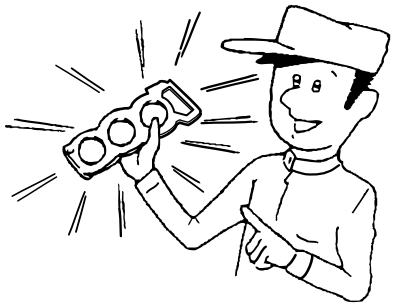


2. Use only the proper tools and cleaning equipment.
   Refer to "SPECIAL TOOLS" on page 1-24.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as 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.

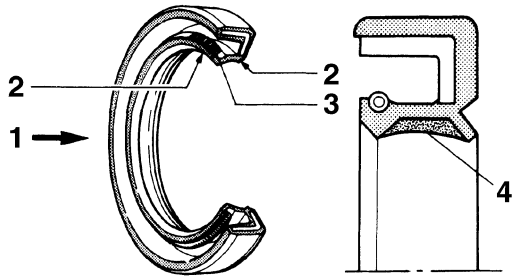
EAS30007
REPLACEMENT PARTS

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.



EAS30008
GASKETS, OIL SEALS AND O-RINGS

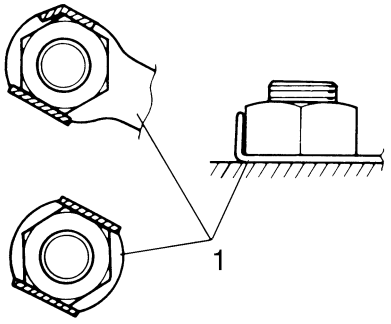
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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

EAS30009
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.



EAS30010
BEARINGS AND OIL SEALS

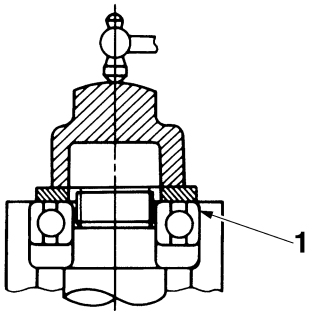
Install bearings "1" and oil seals "2" so that the manufacturer marks or numbers are visible.

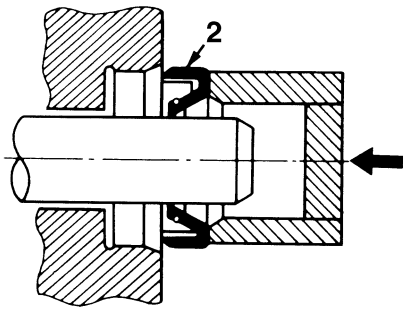
When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

ECA13300

NOTICE

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

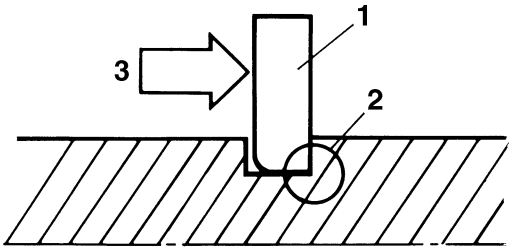




EAS30011

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.



EAS30012

RUBBER PARTS

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

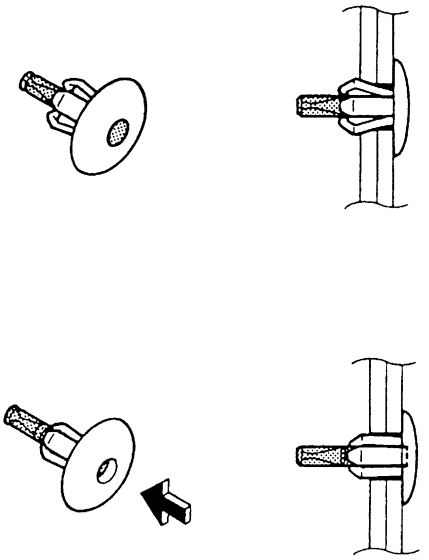
EAS20010
BASIC SERVICE INFORMATION

EAS30013
QUICK FASTENERS

Rivet type

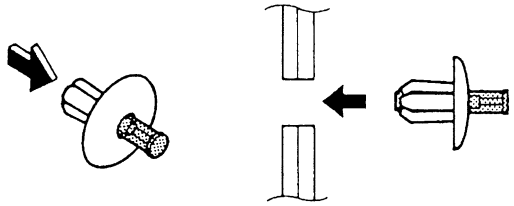
1. Remove:
   • Quick fastener

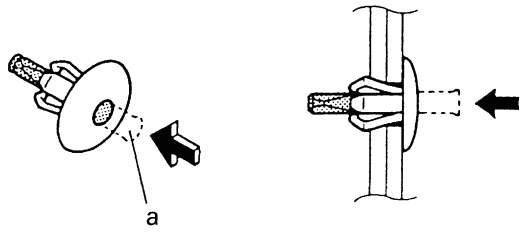
TIP
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.



2. Install:
   • Quick fastener

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

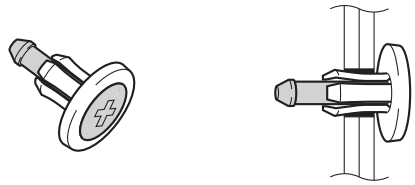


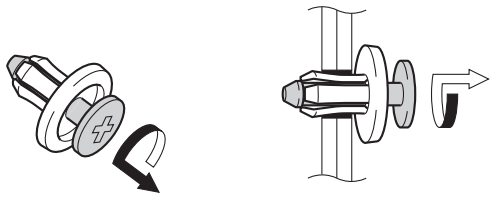


Screw type

1. Remove:
   • Quick fastener

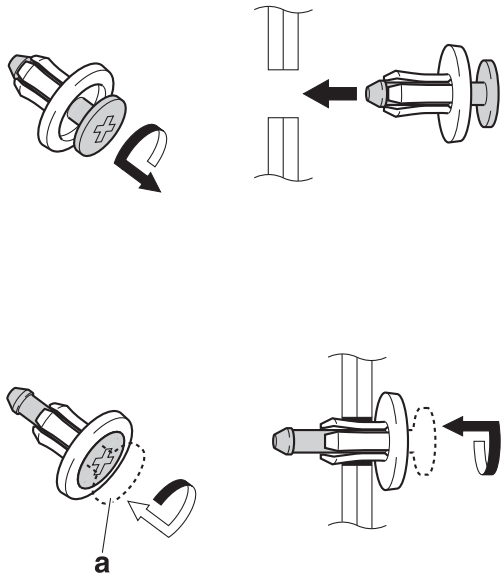
TIP
To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.



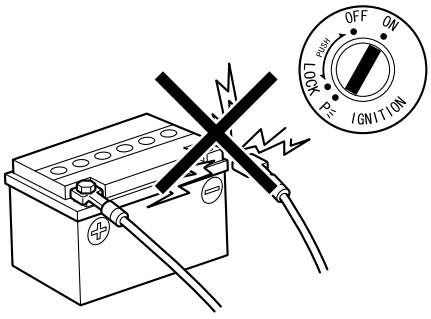


2. Install:
   • Quick fastener

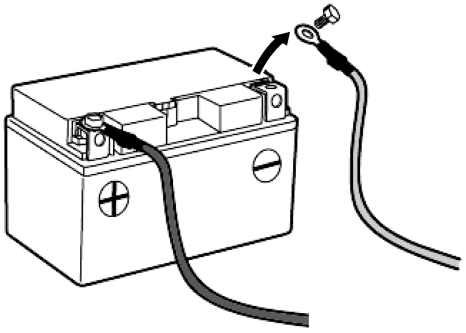
TIP
To install the quick fastener, insert the fastener into the part to be secured and tighten the screw “a”.



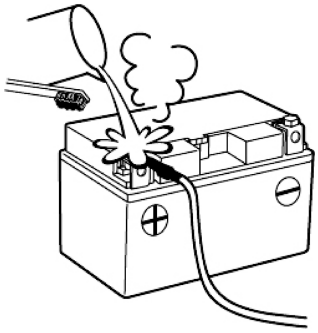
EAS30014
ELECTRICAL SYSTEM
Electrical parts handling
ECA16600
NOTICE
Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.



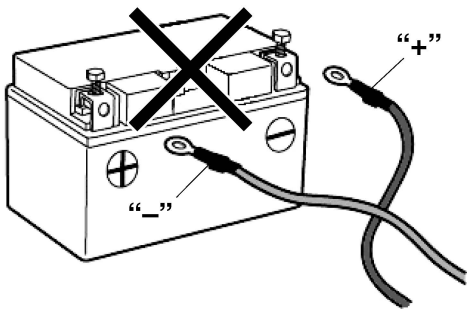
ECA16751
NOTICE
When disconnecting the battery leads from the battery, be sure to disconnect the negative battery lead first, then the positive battery lead. If the positive battery lead is disconnected first and a tool or similar item contacts the vehicle, a spark could be generated, which is extremely dangerous.



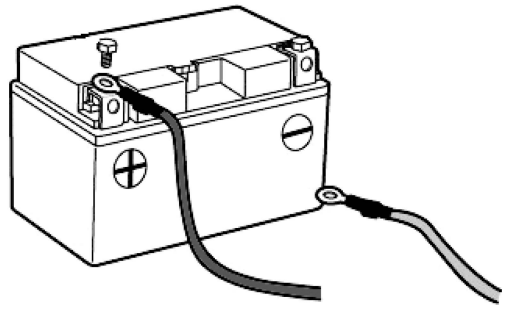
TIP
If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.



ECA16760
NOTICE
Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.



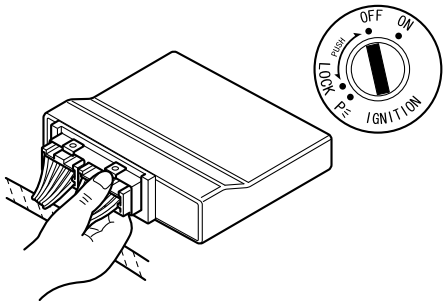
ECA16771
NOTICE
When connecting the battery leads to the battery, be sure to connect the positive battery lead first, then the negative battery lead. If the negative battery lead is connected first and a tool or similar item contacts the vehicle while the positive battery lead is being connected, a spark could be generated, which is extremely dangerous.



ECA16610

NOTICE

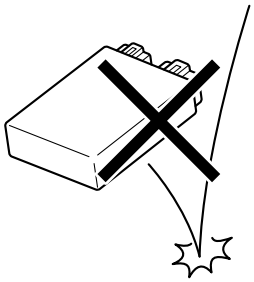
Turn the main switch to "OFF" before disconnecting or connecting an electrical component.



ECA16620

NOTICE

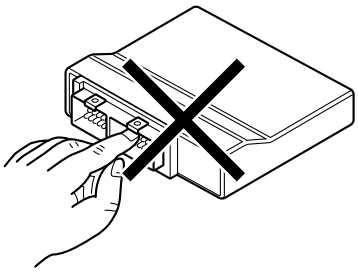
Handle electrical components with special care, and do not subject them to strong shocks.



ECA16630

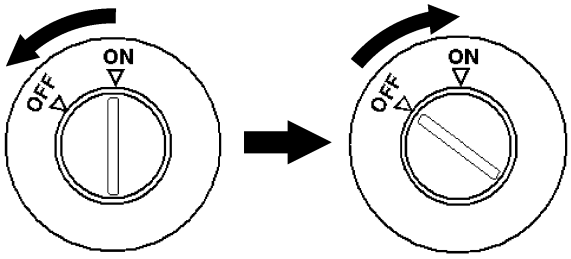
NOTICE

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



TIP

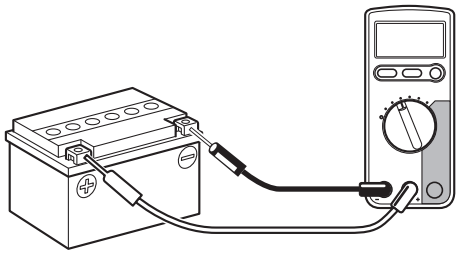
When resetting the ECU by turning the main switch to "OFF", be sure to wait approximately 5 seconds before turning the main switch back to "ON".



Checking the electrical system

TIP

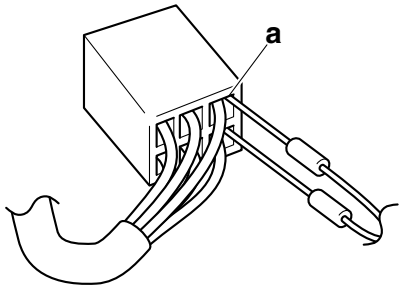
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECA14371

NOTICE

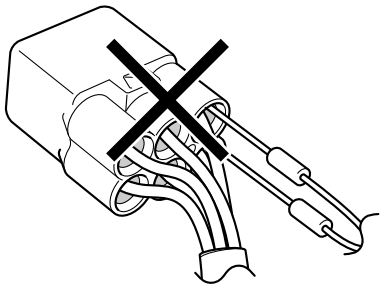
Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.



ECA16640

NOTICE

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



Checking the connections

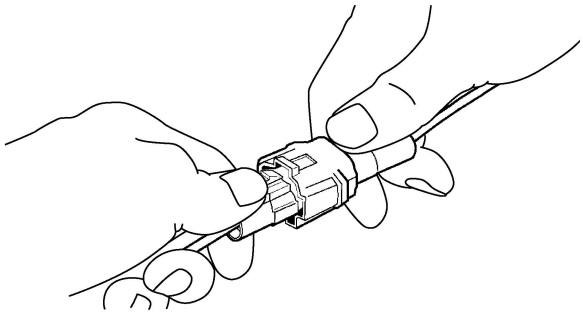
Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Lead
   - Coupler
   - Connector

ECA16780

NOTICE

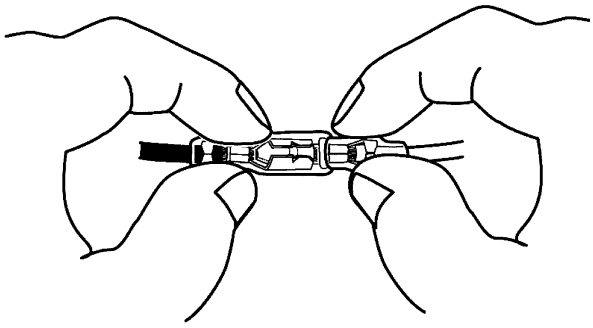
- **When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.**
- **There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.**



ECA16790

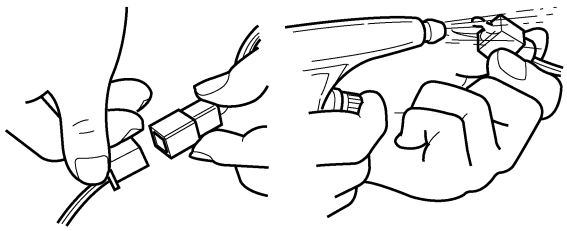
NOTICE

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



2. Check:
   - Lead
   - Coupler
   - Connector

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

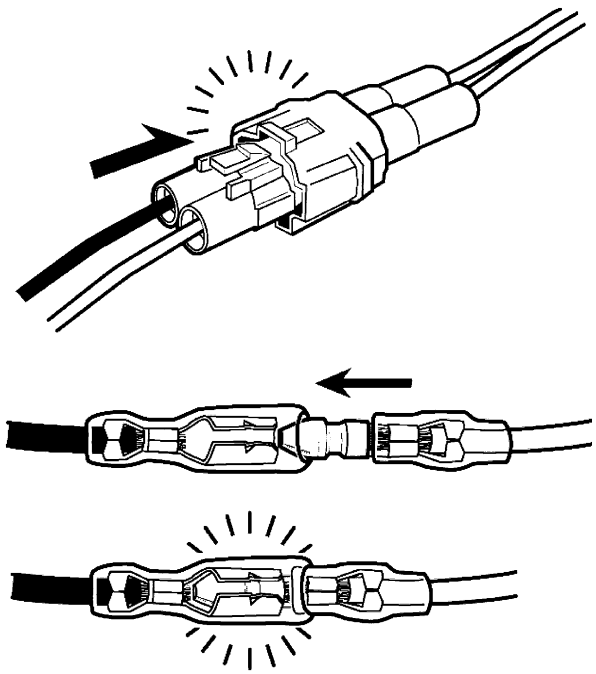


3. Connect:
   - Lead
   - Coupler
   - Connector

TIP

- When connecting a coupler or connector, push both sections of the coupler or connector together until they are connected securely.

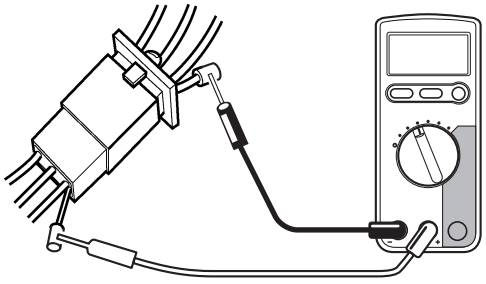
• Make sure all connections are tight.

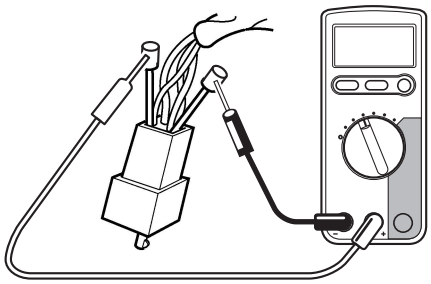


4. Check:
   • Continuity
   (with the digital circuit tester)

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

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



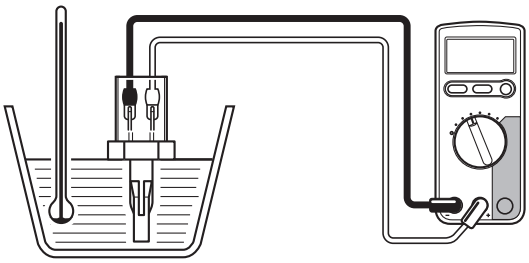


5. Check:
   • Resistance

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

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

Intake air temperature sensor resistance
5400–6600 Ω at 0 °C (5400–6600 Ω at 32 °F)
Intake air temperature sensor resistance
290–390 Ω at 80 °C (290–390 Ω at 176 °F)

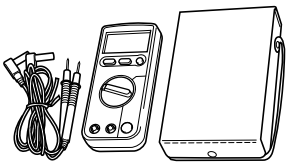
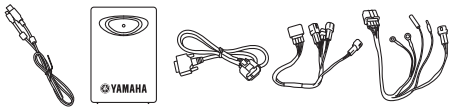
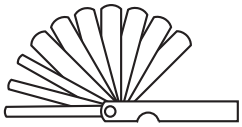
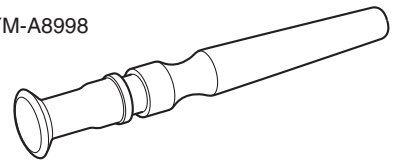


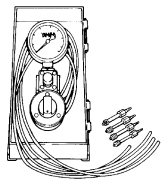
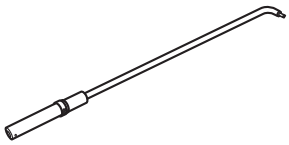
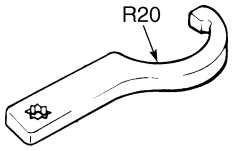
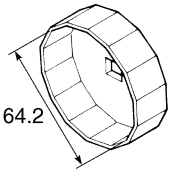
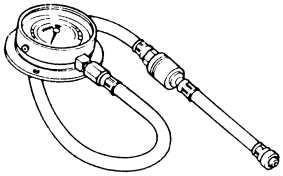
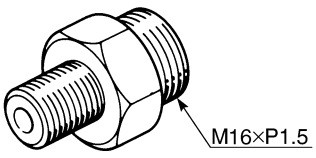
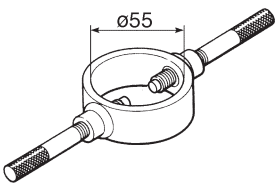
EAS20012
SPECIAL TOOLS

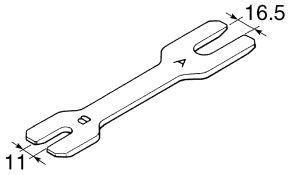
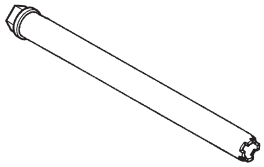
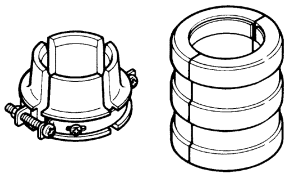
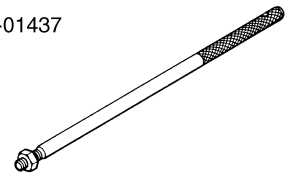
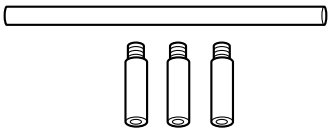
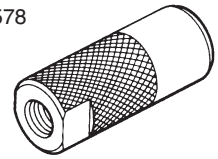
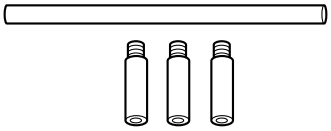
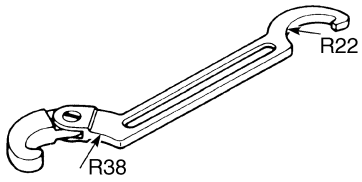
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

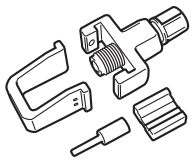
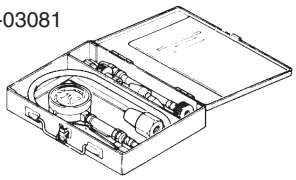
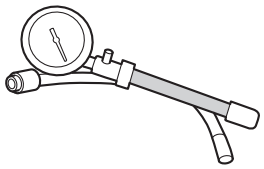
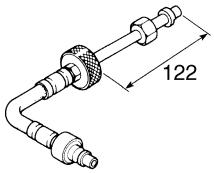
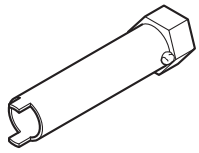
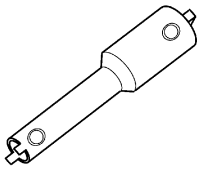
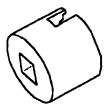
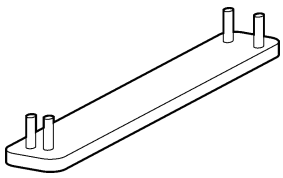
TIP

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

Tool name/Tool No.	Illustration	Reference pages
Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927		1-23, 5-36, 8-155, 8-156, 8-157, 8-161, 8-162, 8-163, 8-164, 8-165, 8-166, 8-167, 8-168, 8-170, 8-171, 8-172, 8-173, 8-174
Yamaha diagnostic tool USB 90890-03250		3-4, 3-11, 4-65, 4-67, 8-34, 8-127, 8-147
Yamaha diagnostic tool (A/I) 90890-03252		3-4, 3-11, 4-65, 4-67, 8-34, 8-127, 8-147
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-6, 4-26, 4-34, 5-20, 5-43
Valve lapper 90890-04101 Valve lapping tool YM-A8998	90890-04101 YM-A8998 	3-7

Tool name/Tool No.	Illustration	Reference pages
Vacuum gauge 90890-03094 Vacuummate YU-44456	90890-03094  YU-44456 	3-9
Carburetor angle driver 2 90890-03173		3-10
Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472		3-20, 4-89
Oil filter wrench 90890-01426 Oil filter wrench YU-38411		3-25
Pressure gauge 90890-03153 Pressure gauge YU-03153		3-26, 7-11
Oil pressure adapter H 90890-03139		3-26
Fork spring compressor 90890-01441 Fork spring compressor YM-01441		4-79, 4-84, 4-85

Tool name/Tool No.	Illustration	Reference pages
Rod holder 90890-01434 Damper rod holder double ended YM-01434		4-79, 4-84, 4-85
Damper rod holder (ø27) 90890-01582 Damper rod holder YM-01582		4-80, 4-82
Fork seal driver 90890-01442 Adjustable fork seal driver (36–46 mm) YM-01442		4-82, 4-83
Rod puller 90890-01437 Universal damping rod bleeding tool set YM-A8703	90890-01437  YM-A8703 	4-83, 4-84, 4-85
Rod puller attachment (M10 long) 90890-01578 Universal damping rod bleeding tool set YM-A8703	90890-01578  YM-A8703 	4-83, 4-84, 4-85
Ring nut wrench 90890-01268 Spanner wrench YU-01268		4-89

Tool name/Tool No.	Illustration	Reference pages
Drive chain cut & rivet tool 90890-01550 Drive chain cut & rivet tool YM-01550		4-99, 4-101
Compression gauge 90890-03081 Engine compression tester YU-33223	90890-03081  YU-33223 	5-1
Extension 90890-04136		5-1
Pivot shaft wrench 90890-01485 Frame mount insert wrench YM-01485		5-7
Pivot shaft wrench 90890-01518 Frame spanner socket YM-01518		5-7, 5-8
Pivot shaft wrench adapter 90890-01476		5-7, 5-8
Camshaft wrench 90890-04162 Camshaft wrench YM-04162		5-12, 5-14

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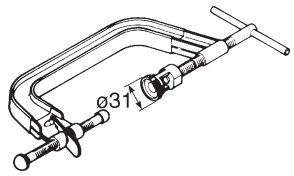
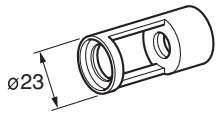
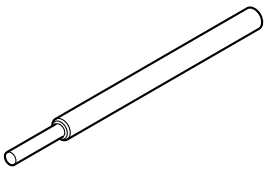
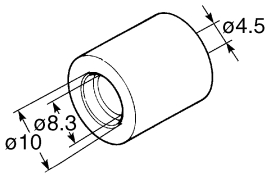
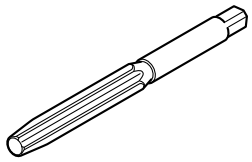
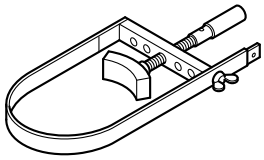
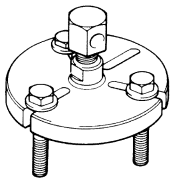
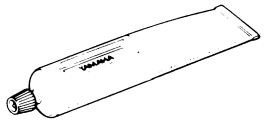
Valve spring compressor 90890-04019 Valve spring compressor YM-04019		5-23, 5-28
Valve spring compressor attachment 90890-04179 Valve spring compressor adapter 23 mm YM-04179		5-23, 5-28
Valve guide remover (ø4.5) 90890-04116 Valve guide remover (4.5 mm) YM-04116		5-25
Valve guide installer (ø4.5) 90890-04117 Valve guide installer (4.5 mm) YM-04117		5-25
Valve guide reamer (ø4.5) 90890-04118 Valve guide reamer (4.5 mm) YM-04118		5-25
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-31, 5-32
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-31
Yamaha bond No. 1215 90890-85505 (Three bond No.1215®)		5-33, 5-58

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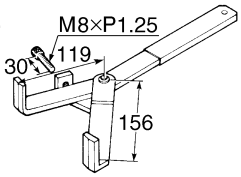
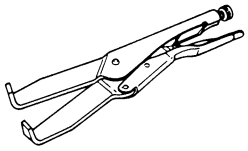
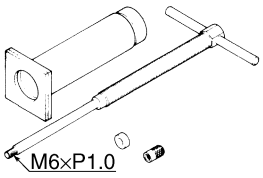
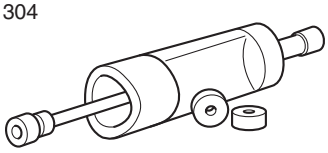
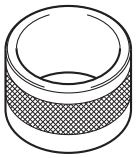
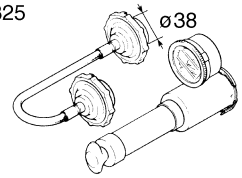
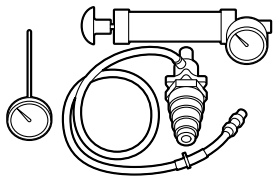
Universal clutch holder 90890-04086 Universal clutch holder YM-91042	90890-04086  YM-91042 	5-42, 5-46
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-62
Piston installing tool 90890-04161 Piston installing tool YM-04161		5-69
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	90890-01325  YU-24460-A 	6-2

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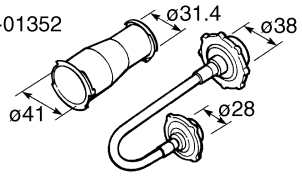
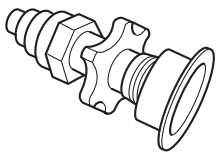
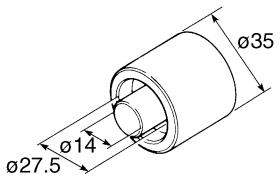
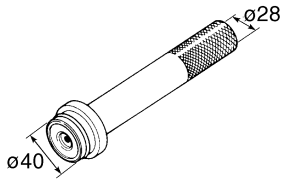
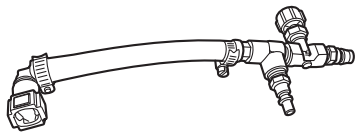
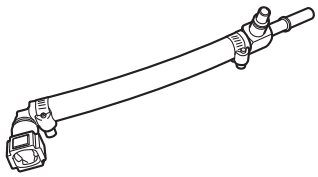
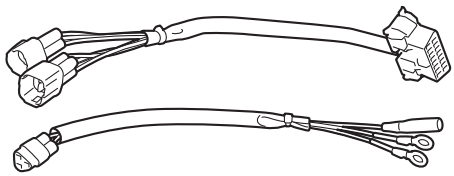
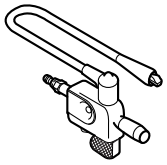
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	90890-01352  YU-33984 	6-2
Mechanical seal installer 90890-04078 Water pump seal installer YM-33221-A	 	6-11
Middle driven shaft bearing driver 90890-04058 Middle drive bearing installer 40 & 50 mm YM-04058	 	6-11
Fuel injector pressure adapter 90890-03210 Fuel injector pressure adapter YU-03210		7-11
Fuel pressure adapter 90890-03176 Fuel pressure adapter YM-03176		7-11
OBD/ GST Leadwire kit 90890-03249		8-34
Ignition checker 90890-06754 Oppama pet–4000 spark checker YM-34487		8-164

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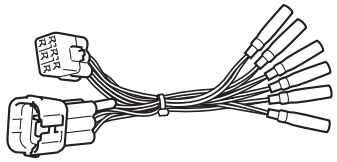
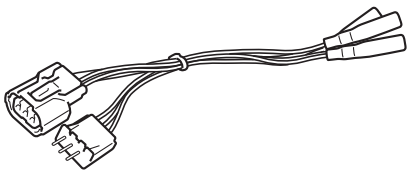
Test harness– lean angle sensor (6P) 90890-03209 Test harness– lean angle sensor (6P) YU-03209		8-165
Test harness S– pressure sensor (3P) 90890-03207 Test harness S– pressure sensor (3P) YU-03207		8-172

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EAS20013
GENERAL SPECIFICATIONS

Model	
Model	2SCL (MT09TRA_EUR/HRV/TUR/ZAF) 2SCM (MT09TRAH) 2SCT (MT09TRA_RUS)
Dimensions	
Overall length	2160 mm (85.0 in)
Overall width	950 mm (37.4 in)
Overall height	1345/1375 mm (53.0/54.1 in)
Seat height	845/860 mm (33.3/33.9 in)
Wheelbase	1440 mm (56.7 in)
Ground clearance	135 mm (5.31 in)
Minimum turning radius	3.0 m (9.84 ft)
Weight	
Curb weight	210 kg (463 lb)
Loading	
Maximum load	180 kg (397 lb)
Riding capacity	2 person

EAS20014
ENGINE SPECIFICATIONS

Engine	
Combustion cycle	4-stroke
Cooling system	Liquid cooled
Valve train	DOHC
Displacement	847 cm³
Cylinder arrangement	Inline
Number of cylinders	3-cylinder
Bore × stroke	78.0 × 59.1 mm (3.07 × 2.33 in)
Compression ratio	11.5 : 1
Compression pressure	1331–1713 kPa/680 r/min (13.3–17.1 kgf/cm²/680 r/min, 189.3–243.7 psi/680 r/min)
Starting system	Electric starter
Fuel	
Recommended fuel	Premium unleaded gasoline (Gasohol [E10] acceptable) (MT09TRA_EUR/HRV/TUR/ZAF, MT09TRAH) Unleaded gasoline only. Minimum research octane number 95 (MT09TRA_RUS)
Fuel tank capacity	18 L (4.8 US gal, 4.0 Imp.gal)
Fuel reserve amount	2.6 L (0.69 US gal, 0.57 Imp.gal)
Engine oil	
Recommended brand	YAMALUBE
SAE viscosity grades	10W-40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Lubrication system	Wet sump
Engine oil quantity	
Oil change	2.40 L (2.54 US qt, 2.11 Imp.qt)
With oil filter removal	2.70 L (2.85 US qt, 2.38 Imp.qt)
Quantity (disassembled)	3.40 L (3.59 US qt, 2.99 Imp.qt)
Oil filter	
Oil filter type	Cartridge
Oil pump	
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.120 mm (0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.09–0.19 mm (0.0035–0.0075 in)
Limit	0.21 mm (0.0083 in)
Oil pressure	230.0 kPa/5000 r/min (2.30 kgf/cm²/5000 r/min, 33.4 psi/5000 r/min)
Relief valve operating pressure	740.0 kPa (7.40 kgf/cm², 107.3 psi)
Cooling system	
Coolant quantity	
Radiator (including all routes)	1.93 L (2.04 US qt, 1.70 Imp.qt)
Coolant reservoir (up to the maximum level mark)	0.25 L (0.26 US qt, 0.22 Imp.qt)
Radiator cap valve opening pressure	93.3–122.7 kPa (0.93–1.23 kgf/cm², 13.5–17.8 psi)

Water pump	
Water pump type	Single suction centrifugal pump
Impeller shaft tilt limit	0.15 mm (0.006 in)
Spark plug(s)	
Manufacturer/model	NGK/CPR9EA9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)
Cylinder head	
Warpage limit	0.10 mm (0.0039 in)
Camshaft	
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)
Limit	0.080 mm (0.0032 in)
Camshaft lobe dimensions	
Lobe height (Intake)	36.290–36.390 mm (1.4287–1.4327 in)
Limit	36.190 mm (1.4248 in)
Lobe height (Exhaust)	35.720–35.820 mm (1.4063–1.4102 in)
Limit	35.620 mm (1.4024 in)
Camshaft runout limit	0.030 mm (0.0012 in)
Valve, valve seat, valve guide	
Valve clearance (cold)	
Intake	0.11–0.20 mm (0.0043–0.0079 in)
Exhaust	0.26–0.30 mm (0.0102–0.0118 in)
Valve dimensions	
Valve seat contact width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.60 mm (0.06 in)
Valve seat contact width (exhaust)	1.10–1.30 mm (0.0433–0.0512 in)
Limit	1.80 mm (0.07 in)
Valve stem diameter (intake)	4.475–4.490 mm (0.1762–0.1768 in)
Limit	4.445 mm (0.1750 in)
Valve stem diameter (exhaust)	4.460–4.475 mm (0.1756–0.1762 in)
Limit	4.430 mm (0.1744 in)
Valve guide inside diameter (intake)	4.500–4.512 mm (0.1772–0.1776 in)
Valve guide inside diameter (exhaust)	4.500–4.512 mm (0.1772–0.1776 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)
Valve spring	
Free length (intake)	39.31 mm (1.55 in)
Limit	37.34 mm (1.47 in)
Free length (exhaust)	37.78 mm (1.49 in)
Limit	35.89 mm (1.41 in)
Spring tilt (intake)	1.7 mm (0.07 in)
Spring tilt (exhaust)	1.6 mm (0.06 in)
Cylinder	
Bore	78.000–78.010 mm (3.0709–3.0713 in)

Wear limit	78.060 mm (3.0732 in)
Piston	
Diameter	77.975–77.990 mm (3.0699–3.0705 in)
Measuring point (from piston skirt bottom)	12.0 mm (0.47 in)
Piston-to-cylinder clearance	0.010–0.035 mm (0.0004–0.0014 in)
Piston pin bore inside diameter	17.002–17.013 mm (0.6694–0.6698 in)
Limit	17.043 mm (0.6710 in)
Piston pin outside diameter	16.990–16.995 mm (0.6689–0.6691 in)
Limit	16.970 mm (0.6681 in)
Piston-pin-to-piston-pin-bore clearance	0.007–0.023 mm (0.0003–0.0009 in)
Piston ring	
Top ring	
Ring type	Barrel
End gap (installed)	0.15–0.25 mm (0.0059–0.0098 in)
End gap limit	0.50 mm (0.0197 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)
Side clearance limit	0.115 mm (0.0045 in)
2nd ring	
Ring type	Taper
End gap (installed)	0.30–0.45 mm (0.0118–0.0177 in)
End gap limit	0.80 mm (0.0315 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Side clearance limit	0.115 mm (0.0045 in)
Connecting rod	
Oil clearance	0.027–0.051 mm (0.0011–0.0020 in)
Bearing color code	
Code 1	Blue
Code 2	Black
Code 3	Brown
Code 4	Green
Crankshaft	
Runout limit	0.030 mm (0.0012 in)
Journal oil clearance	0.014–0.038 mm (0.0006–0.0015 in)
Bearing color code	
Code 0	White
Code 1	Blue
Code 2	Black
Code 3	Brown
Code 4	Green
Balancer	
Balancer shaft runout limit	0.030 mm (0.0012 in)
Bearing color code	
Code 1	Blue
Code 2	Black
Code 3	Brown
Code 4	Green
Code 5	Yellow
Balancer shaft journal to balancer shaft bearing clearance	0.024–0.048 mm (0.0009–0.0019 in)

Clutch	
Clutch type	Wet, multiple-disc
Clutch lever free play	10.0–15.0 mm (0.39–0.59 in)
Friction plate 1 thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.111 in)
Plate quantity	3 pcs
Friction plate 2 thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.111 in)
Plate quantity	6 pcs
Clutch plate 1 thickness	2.20–2.40 mm (0.087–0.094 in)
Plate quantity	1 pcs
Warpage limit	0.10 mm (0.004 in)
Clutch plate 2 thickness	1.90–2.10 mm (0.075–0.083 in)
Plate quantity	7 pcs
Warpage limit	0.10 mm (0.004 in)
Clutch spring free length	45.23 mm (1.78 in)
Limit	42.97 mm (1.69 in)
Spring quantity	3 pcs
Drivetrain	
Primary reduction ratio	1.681 (79/47)
Transmission type	Constant mesh 6-speed
Gear ratio	
1st	2.667 (40/15)
2nd	2.000 (38/19)
3rd	1.619 (34/21)
4th	1.381 (29/21)
5th	1.190 (25/21)
6th	1.037 (28/27)
Main axle runout limit	0.08 mm (0.0032 in)
Drive axle runout limit	0.08 mm (0.0032 in)
Secondary reduction ratio	2.813 (45/16)
Final drive	Chain
Shifting mechanism	
Installed shift rod length	256.9–258.9 mm (10.11–10.19 in)
Air filter	
Air filter element	Oil-coated paper element
Fuel pump	
Pump type	Electrical
Maximum consumption amperage	3.3 A
Fuel injector	
Resistance	12.0 Ω
Throttle body	
ID mark	B901 00
Throttle position sensor	
Resistance	1.20–2.80 kΩ
Output voltage (at idle)	0.63–0.73 V
Accelerator position sensor	
Resistance	1.08–2.52 kΩ
Output voltage	0.63–0.73 V

Idling condition	
Engine idling speed	1100–1300 r/min
AI system	Inactive
O_2 feedback control	Inactive
Exhaust gas sampling point	Sampling port on the exhaust pipe
To be measured	Coolant temperature
Temperature	90–110 °C (194–230 °F)
CO%	1.5–3.5 %
Difference in vacuum pressure between the cylinders	1.3 kPa (10 mmHg, 0.4 inHg)
Fuel line pressure (at idle)	300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi)
Throttle grip free play	3.0–5.0 mm (0.12–0.20 in)
Air induction system	
Solenoid resistance	20–24 Ω

EAS20015
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Diamond
Caster angle	24.0 °
Trail	100 mm (3.9 in)
Front wheel	
Wheel type	Cast wheel
Rim size	17M/C x MT3.50
Rim material	Aluminum
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 x MT5.50
Rim material	Aluminum
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	120/70ZR17 M/C (58W)
Manufacturer/model	DUNLOP/D222F
Rear tire	
Type	Tubeless
Size	180/55ZR17 M/C (73W)
Manufacturer/model	DUNLOP/D222
Tire air pressure (measured on cold tires)	
1 person	
Front	250 kPa (2.50 kgf/cm², 36 psi)
Rear	290 kPa (2.90 kgf/cm², 42 psi)
2 persons	
Front	250 kPa (2.50 kgf/cm², 36 psi)
Rear	290 kPa (2.90 kgf/cm², 42 psi)
Front brake	
Type	Hydraulic dual disc brake
Disc outside diameter × thickness	298.0 × 4.5 mm (11.73 × 0.18 in)
Brake disc thickness limit	4.0 mm (0.16 in)
Brake disc runout limit (as measured on wheel)	0.10 mm (0.0039 in)
Brake pad lining thickness	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	15.00 mm (0.59 in)
Caliper cylinder inside diameter (Left)	30.23 mm, 27.00 mm (1.19 in, 1.06 in)
Caliper cylinder inside diameter (Right)	30.23 mm, 27.00 mm (1.19 in, 1.06 in)
Specified brake fluid	DOT 4
Rear brake	
Type	Hydraulic single disc brake
Disc outside diameter × thickness	245.0 × 5.0 mm (9.65 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)

Brake disc runout limit (as measured on wheel)	0.15 mm (0.0059 in)
Brake pad lining thickness	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	38.18 mm (1.50 in)
Specified brake fluid	DOT 4
Front suspension	
Type	Telescopic fork
Spring	Coil spring
Shock absorber	Hydraulic damper
Wheel travel	137 mm (5.4 in)
Fork spring free length	305.3 mm (12.02 in)
Limit	299.1 mm (11.78 in)
Inner tube bending limit	0.2 mm (0.01 in)
Recommended oil	Yamaha Suspension Oil 01
Quantity (left)	444.0 cm³ (15.01 US oz, 15.66 Imp.oz)
Quantity (right)	431.0 cm³ (14.57 US oz, 15.20 Imp.oz)
Level (left)	174 mm (6.9 in)
Level (right)	175 mm (6.9 in)
Spring preload	
Adjusting system	Mechanical adjustable type
Adjustment value (Soft)	19.0 mm (0.75 in)
Adjustment value (STD)	16.0 mm (0.63 in)
Adjustment value (Hard)	4.0 mm (0.16 in)
Rebound damping	
Adjusting system	Mechanical adjustable type
Unit for adjustment	Click
Adjustment value from the start position (Soft)	12
Adjustment value from the start position (STD)	7
Adjustment value from the start position (Hard)	1
Rear suspension	
Type	Swingarm (link suspension)
Spring	Coil spring
Shock absorber	Gas-hydraulic damper
Wheel travel	130 mm (5.1 in)
Spring preload	
Adjusting system	Mechanical adjustable type
Unit for adjustment	Cam position
Adjustment value (Soft)	1
Adjustment value (STD)	4
Adjustment value (Hard)	7
Rebound damping	
Adjusting system	Mechanical adjustable type
Unit for adjustment	Turn
Adjustment value from the start position (Soft)	3
Adjustment value from the start position (STD)	1+1/2

Adjustment value from the start position (Hard)	0
Drive chain	
Size	DID525V10
Chain type	Sealed type
Number of links	110
Drive chain slack	5.0–15.0 mm (0.20–0.59 in)
15-link length limit	239.3 mm (9.42 in)

EAS20016
ELECTRICAL SPECIFICATIONS

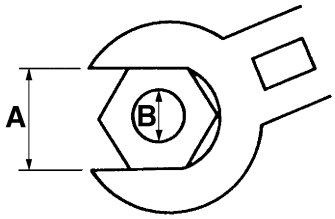
Voltage	
System voltage	12 V
Ignition system	
Ignition system	TCI
Advancer type	Digital
Ignition timing (B.T.D.C.)	5.0 °/1200 r/min
Engine control unit	
Model	TBDF0C (MT09TRAH) TBDFZ7 (MT09TRA)
Ignition coil	
Primary coil resistance	1.19–1.61 Ω
Secondary coil resistance	9.35–12.65 kΩ
Lean angle sensor output voltage	
Operating angle	65 °
Output voltage up to operating angle	0.4–1.4 V
Output voltage over operating angle	3.7–4.4 V
Charging system	
Charging system	AC magneto
Standard output	14.0 V, 29.6 A at 5000 r/min
Standard output	14.0 V, 415 W at 5000 r/min
Stator coil resistance	0.152–0.228 Ω
Rectifier/regulator	
Regulator type	Three-phase
Regulated voltage (DC)	14.3–14.7 V
Rectifier capacity (DC)	50.0 A
Battery	
Model	YTZ10S
Voltage, capacity	12 V, 8.6 Ah (10 HR)
Bulb wattage	
Headlight	LED
Brake/tail light	LED
Front turn signal light	10.0 W
Rear turn signal light	10.0 W
Auxiliary light	LED
License plate light	5.0 W
Meter lighting	LED
Indicator light	
Neutral indicator light	LED
High beam indicator light	LED
Oil level warning light	LED
Turn signal indicator light	LED
Engine trouble warning light	LED
ABS warning light	LED
Immobilizer system indicator light	LED
Traction control system indicator/warning light	LED

Starter motor	
Power output	0.70 kW
Armature coil resistance	0.0050–0.0150 Ω
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.03–6.52 N (615–665 gf, 21.71–23.47 oz)
Mica undercut (depth)	0.70 mm (0.03 in)
Oil level switch	
Oil level switch resistance (maximum level position)	484.0–536.0 Ω
Oil level switch resistance (minimum level position)	114.0–126.0 Ω
Fuel sender unit	
Sender unit resistance (full)	9.0–11.0 Ω
Sender unit resistance (empty)	213.0–219.0 Ω
Fuel injection sensor	
Crankshaft position sensor resistance	228–342 Ω
Intake air temperature sensor resistance	5400–6600 Ω at 0 °C (5400–6600 Ω at 32 °F)
Intake air temperature sensor resistance	290–390 Ω at 80 °C (290–390 Ω at 176 °F)
Coolant temperature sensor resistance	2512–2777 Ω at 20 °C (2512–2777 Ω at 68 °F)
Coolant temperature sensor resistance	210–221 Ω at 100 °C (210–221 Ω at 212 °F)
Fuse(s)	
Main fuse	50.0 A
Headlight fuse	7.5 A
Signaling system fuse	7.5 A
Ignition fuse	15.0 A
Parking lighting fuse	7.5 A
Radiator fan motor fuse	15.0 A
Fuel injection system fuse	20.0 A
ABS control unit fuse	7.5 A
ABS motor fuse	30.0 A
ABS solenoid fuse	15.0 A
Auxiliary fuse 1	2.0 A
Auxiliary fuse 2	2.0 A
Terminal fuse 1	2.0 A
Terminal fuse 2	2.0 A
Backup fuse	7.5 A
Electronic throttle valve fuse	7.5 A

EAS20017
TIGHTENING TORQUES

EAS30015
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		
		N·m	kgf·m	lb·ft
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	94

EAS30016
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Exhaust pipe nut	M8	6	20 N·m (2.0 kgf·m, 14 lb·ft)	
Muffler protector bolt	M6	3	10 N·m (1.0 kgf·m, 7.2 lb·ft)	
Spark plug	M10	3	13 N·m (1.3 kgf·m, 9.4 lb·ft)	
Cylinder head cover bolt	M6	4	10 N·m (1.0 kgf·m, 7.2 lb·ft)	
Generator rotor bolt	M12	1	75 N·m (7.5 kgf·m, 54 lb·ft)	E
Generator cover bolt	M6	2	12 N·m (1.2 kgf·m, 8.7 lb·ft)	LT
Generator cover bolt	M6	8	12 N·m (1.2 kgf·m, 8.7 lb·ft)	
Clutch boss nut	M20	1	125 N·m (12.5 kgf·m, 90 lb·ft)	Stake. LT
Clutch spring bolt	M6	3	10 N·m (1.0 kgf·m, 7.2 lb·ft)	
Clutch cover bolt	M6	11	12 N·m (1.2 kgf·m, 8.7 lb·ft)	
Oil filter cartridge	M20	1	17 N·m (1.7 kgf·m, 12 lb·ft)	
Oil filter cartridge union bolt	M20	1	70 N·m (7.0 kgf·m, 51 lb·ft)	E
Water pump drain bolt	M6	1	10 N·m (1.0 kgf·m, 7.2 lb·ft)	
Engine oil drain bolt	M14	1	43 N·m (4.3 kgf·m, 31 lb·ft)	

EAS30017
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Front wheel axle	M16	1	65 N·m (6.5 kgf·m, 47 lb·ft)	
Front wheel axle pinch bolt	M8	1	23 N·m (2.3 kgf·m, 17 lb·ft)	
Rear wheel sprocket nut	M10	6	80 N·m (8.0 kgf·m, 58 lb·ft)	
Rear wheel axle nut	M18	1	150 N·m (15 kgf·m, 108 lb·ft)	
Rear brake caliper bolt (front)	M12	1	27 N·m (2.7 kgf·m, 20 lb·ft)	S
Rear brake caliper bolt (rear)	M8	1	22 N·m (2.2 kgf·m, 16 lb·ft)	S and LT
Brake caliper bleed screw	M8	3	5 N·m (0.5 kgf·m, 3.6 lb·ft)	
Front brake caliper bolt	M10	4	35 N·m (3.5 kgf·m, 25 lb·ft)	
Upper handlebar holder bolt	M8	4	22 N·m (2.2 kgf·m, 16 lb·ft)	
Lower handlebar holder nut	M10	2	40 N·m (4.0 kgf·m, 29 lb·ft)	
Clutch cable locknut	M8	1	7 N·m (0.7 kgf·m, 5.1 lb·ft)	
Lower bracket pinch bolt	M8	4	23 N·m (2.3 kgf·m, 17 lb·ft)	
Upper bracket pinch bolt	M8	2	26 N·m (2.6 kgf·m, 19 lb·ft)	
Lower ring nut	M25	1	See TIP.	

Item	Thread size	Q'ty	Tightening torque	Remarks
Drive sprocket nut	M22	1	95 N·m (9.5 kgf·m, 69 lb·ft)	Stake. E

TIP

Lower ring nut

1. Tighten the ring nut to approximately 52 N·m (5.2 kgf·m, 38 lb·ft) with a torque wrench, then loosen the lower ring nut completely.
2. Tighten the lower ring nut to 18 N·m (1.8 kgf·m, 13 lb·ft).

EAS20018
LUBRICATION POINTS AND LUBRICANT TYPES

EAS30018
ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Coolant hose insertion part	Water or S
Bearing	E
Cylinder head cover bolt gasket and timing chain bolt gasket	S
Camshaft lobes and journals (intake and exhaust)	M
Valve stem seals (intake and exhaust)	S
Valve lifter outer surface (intake and exhaust)	E
Valve stems and stem ends (intake and exhaust)	M
Crankshaft big ends	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts	M
Crankshaft journals	E
Balancer shaft journals	E
Generator rotor assembly	E
Water pump impeller shaft	E
Oil pump rotors (inner and outer)	LS
Oil pump assembly	E
Oil filter cartridge union bolt	E
Oil nozzle O-rings	LS or E
Main gallery bolt O-ring	LS or S
Oil cooler sub gallery O-ring	LS or S
Drive axle sub gallery O-ring	LS or S
Balancer journal bolt O-rings	E
Idler gear inner surface and end	E
Starter clutch outer assembly	E
Starter clutch gear	E
Primary driven gear end	E
Crankcase cover and clutch pull rod	LS
Clutch housing spacer	E

Lubrication point	Lubricant
Clutch boss conical washer	E
Transmission gears inner surface	M
Transmission collar	M
Transmission gears outer surface (shift fork contact parts)	M
Drive sprocket washer	E
Shift drum moving surface	E
Shift fork pin	E
Shift forks guide bar outer surface	E
Shift shaft washer	E
Shift shaft moving surface	E
Crankcase mating surface	Yamaha bond No. 1215 (Three bond No. 1215®)
Stator coil assembly lead grommet	Yamaha bond No. 1215 (Three bond No. 1215®)
Cylinder head cover mating surface	Three Bond No. 1541C®

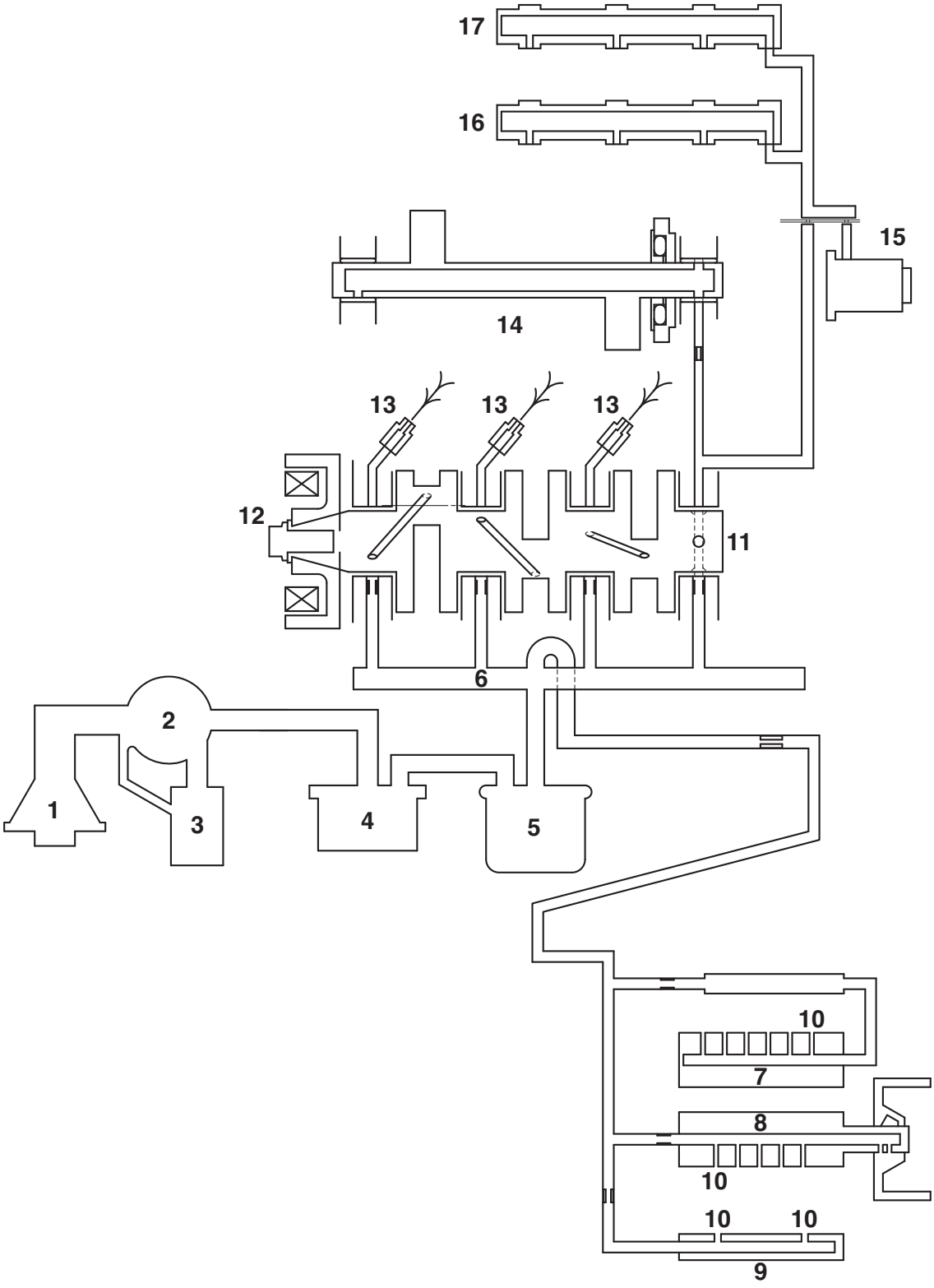
EAS30019
CHASSIS

Lubrication point	Lubricant
Steering bearings, seal lip and ball race lip	LS
Tube guide (throttle grip) inner surface and throttle cables	LS
Brake lever pivot bolt and metal-to-metal moving parts	S
Clutch lever pivot bolt, metal-to-metal moving parts and clutch cable end	LS
Swingarm collar outer surface, oil seal lip	LS
Pivot shaft	LS
Swingarm pivot bush outer surface, oil seal lip	LS
Swingarm pivot thrust cover inner surface	LS
Relay arm collar outer surface, oil seal inner lip	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Sidestand switch contact point	LS
Sidestand hook and spring contact point	LS
Centerstand pivoting point and metal-to-metal moving parts	LS
Centerstand hose inner surface and outer surface	LS
Shift pedal pivoting parts	LS
Passenger footrest ball and metal-to-metal moving parts	LS
Shift shaft joint rod moving parts	LS

Lubrication point	Lubricant
Front wheel oil seal (left and right)	LS
Rear wheel oil seal	LS
Rear wheel drive hub oil seal	LS
Rear wheel drive hub mating surface	LS
Brake caliper piston seal	BF
Master cylinder inside	BF
Brake caliper piston dust seal	S
Brake caliper bolts	S

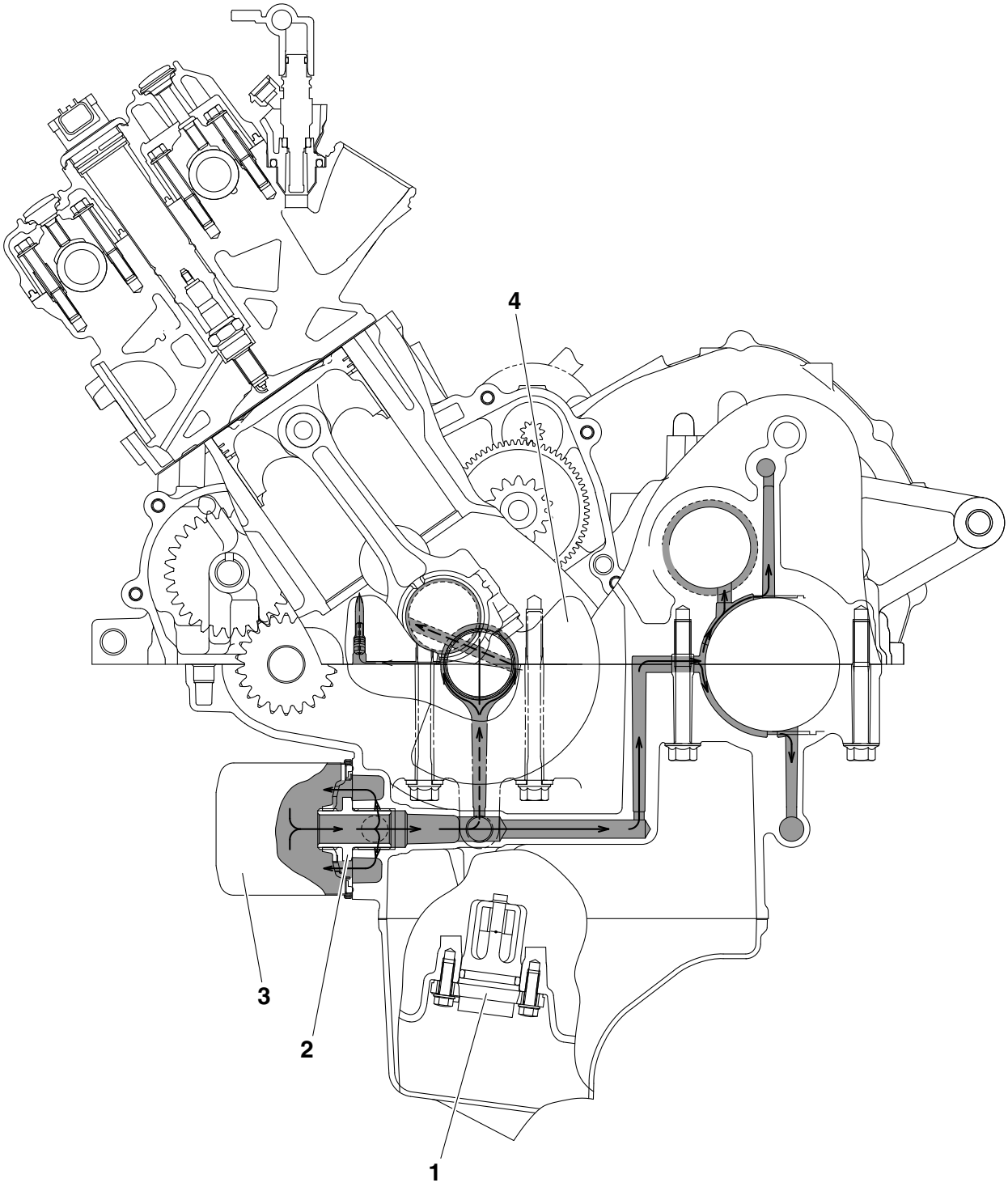
EAS20019
LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS30020
ENGINE OIL LUBRICATION CHART

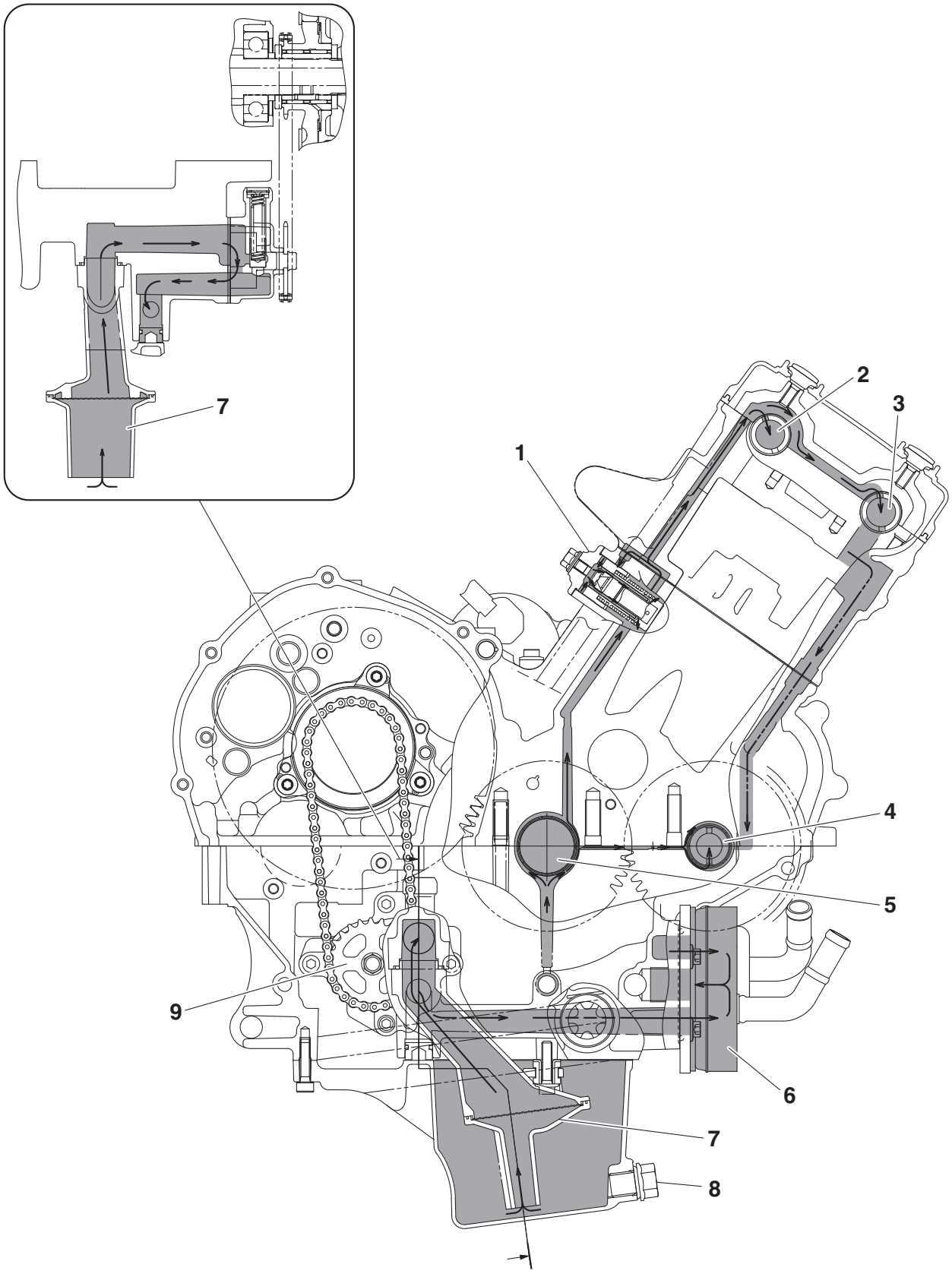


1. Oil strainer
2. Oil pump
3. Relief valve
4. Oil cooler
5. Oil filter cartridge
6. Main gallery
7. Drive axle
8. Main axle
9. Shift fork (upper)
10. Mission shower
11. Crankshaft
12. AC magneto
13. Oil nozzle
14. Balancer shaft
15. Timing chain tensioner
16. Intake camshaft
17. Exhaust camshaft

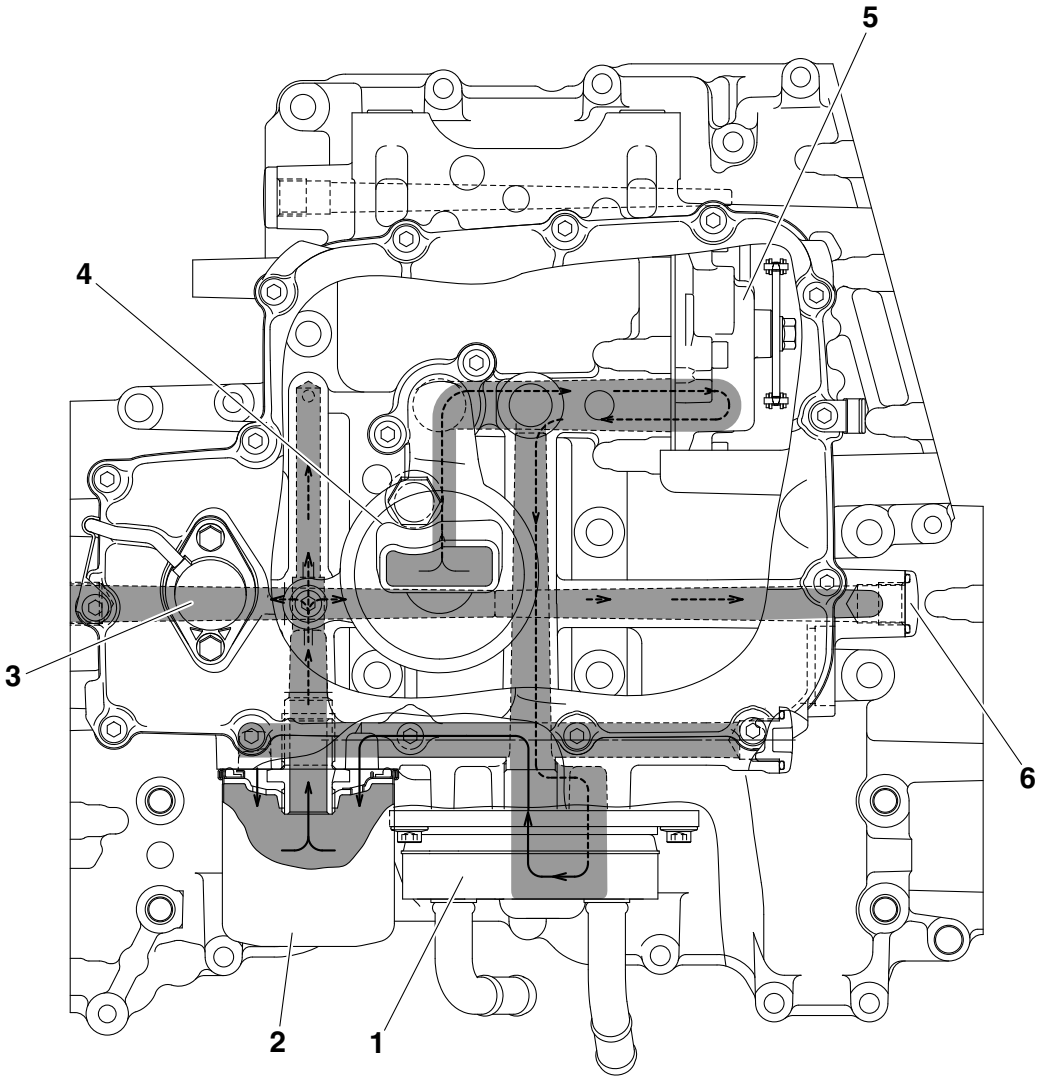
EAS30021
LUBRICATION DIAGRAMS



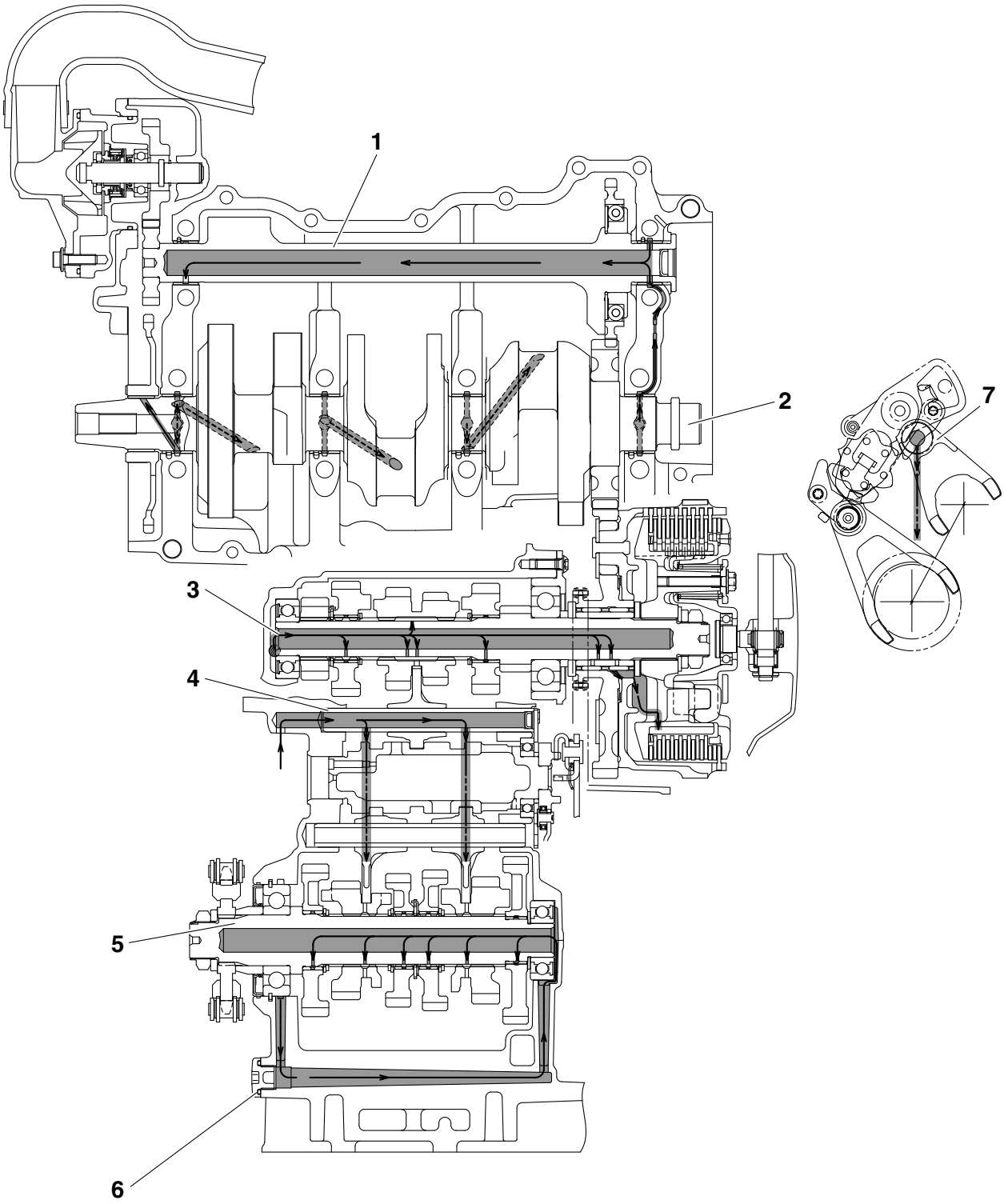
1. Oil level switch
2. Oil filter cartridge union bolt
3. Oil filter cartridge
4. Crankshaft


7
2
3
1
4
5
9
6
7
8

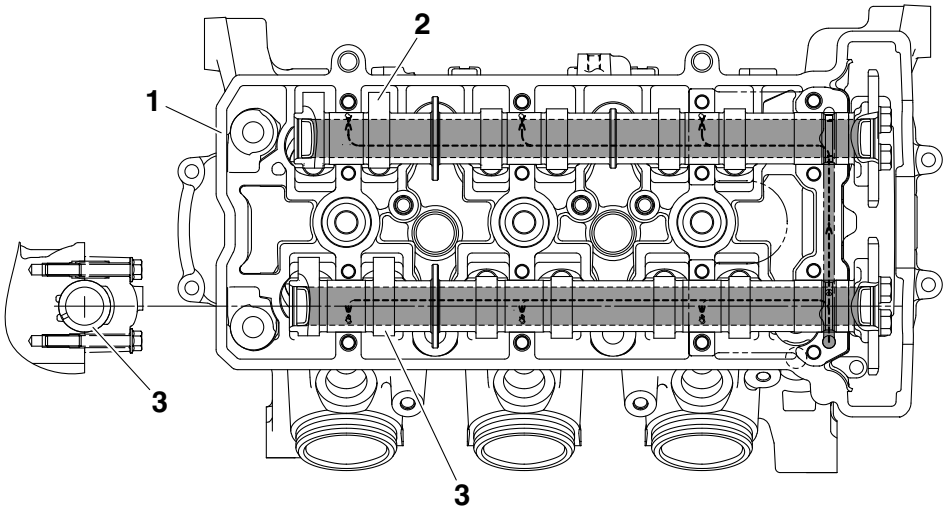
1. Timing chain tensioner
2. Intake camshaft
3. Exhaust camshaft
4. Balancer shaft
5. Crankshaft
6. Oil cooler
7. Oil strainer
8. Oil drain bolt
9. Oil pump driven sprocket

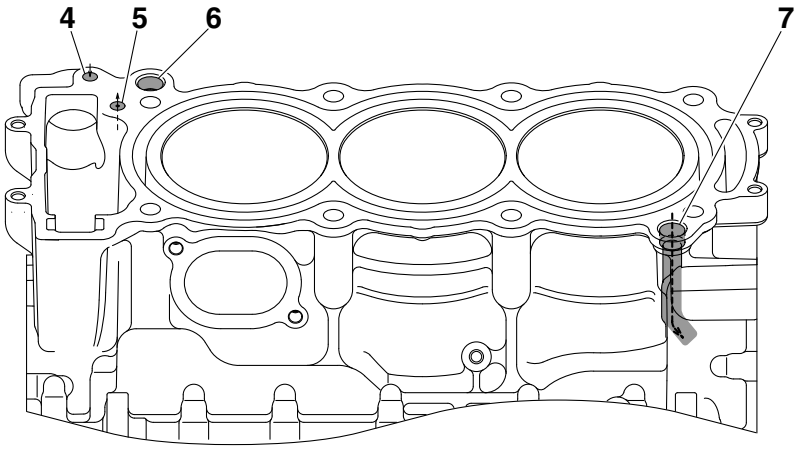

5
4
3
6
2
1

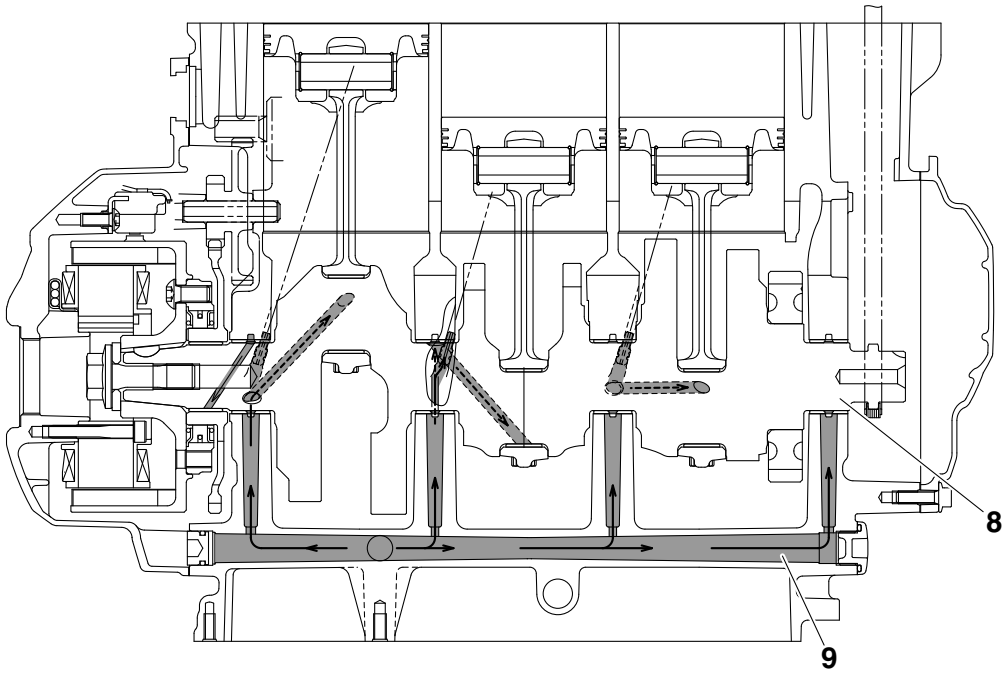
1. Oil cooler
2. Oil filter cartridge
3. Oil level switch
4. Oil strainer
5. Oil pump
6. Main gallery bolt


1
2
7
3
4
5
6

1. Balancer shaft
2. Crankshaft
3. Main axle
4. Shift fork guide bar (shift fork-C side)
5. Drive axle
6. Sub gallery bolt
7. Shift fork

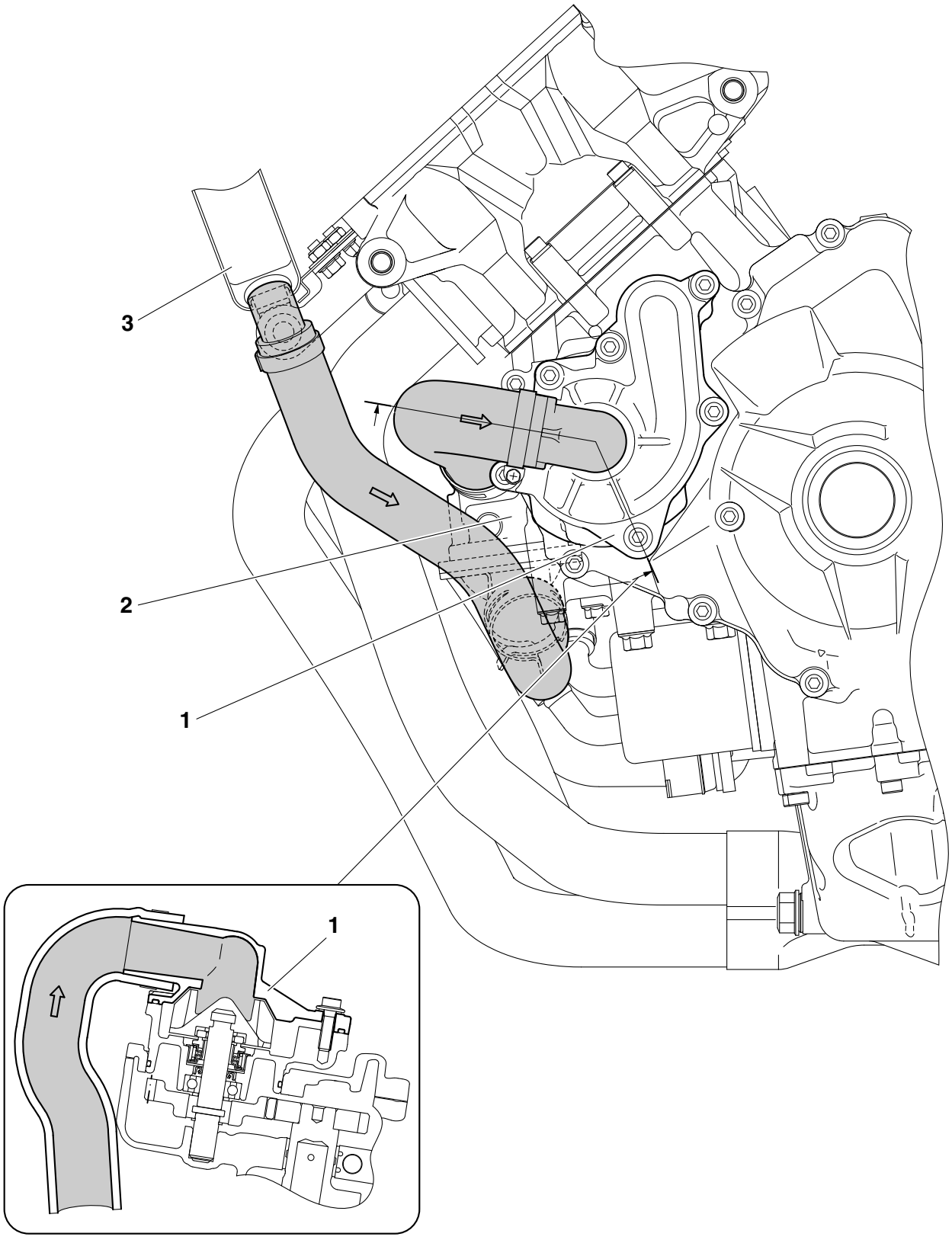

1
2
3
3


4
5
6
7

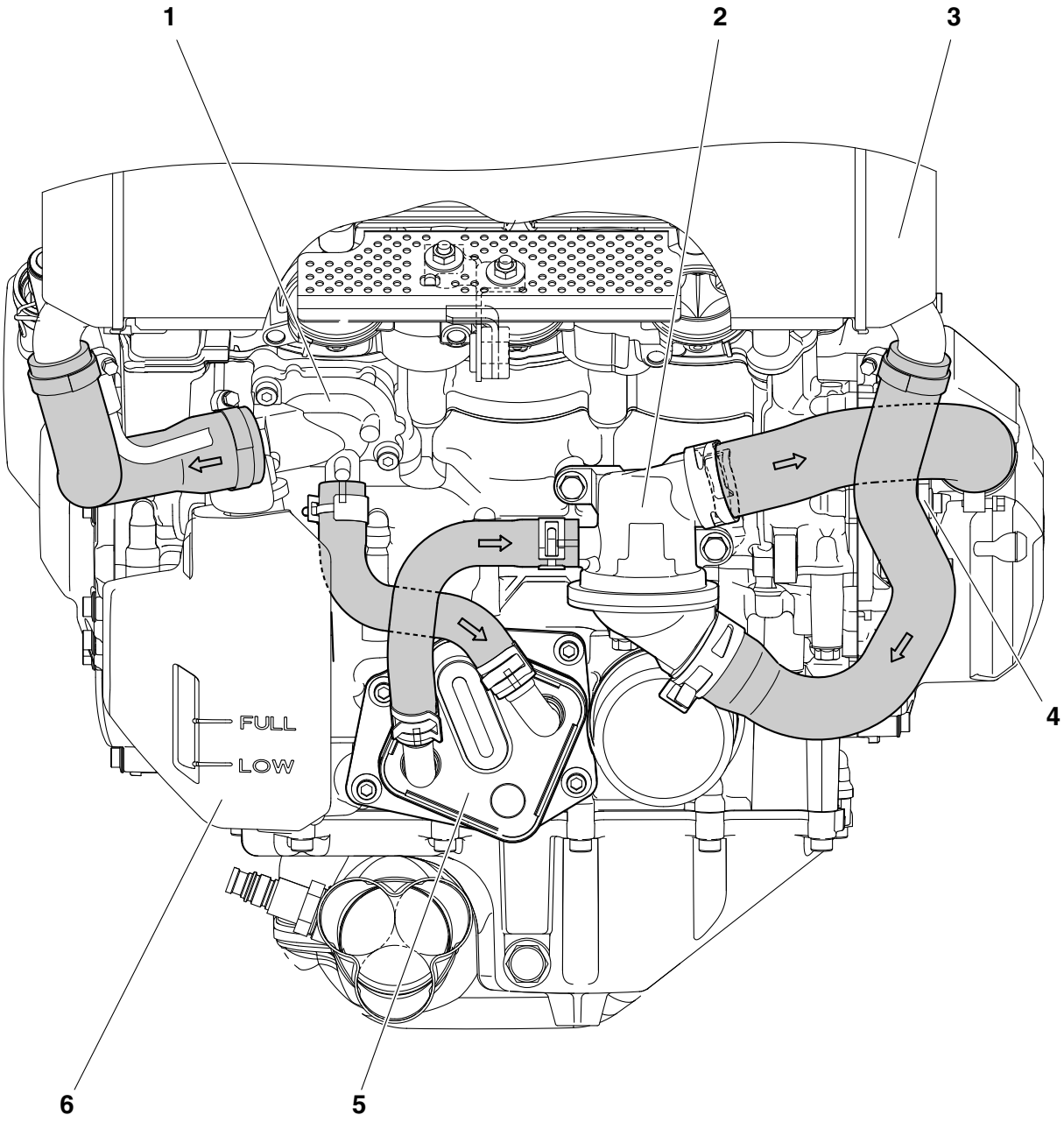

8
9

1. Cylinder head
2. Exhaust camshaft
3. Intake camshaft
4. Oil passage to the timing chain tensioner
5. Oil passage to the cylinder head
6. Oil passage to the clutch chamber
7. Oil return passage from the cylinder head
8. Crankshaft
9. Main gallery

EAS20020
COOLING SYSTEM DIAGRAMS



1. Water pump
2. Thermostat
3. Radiator

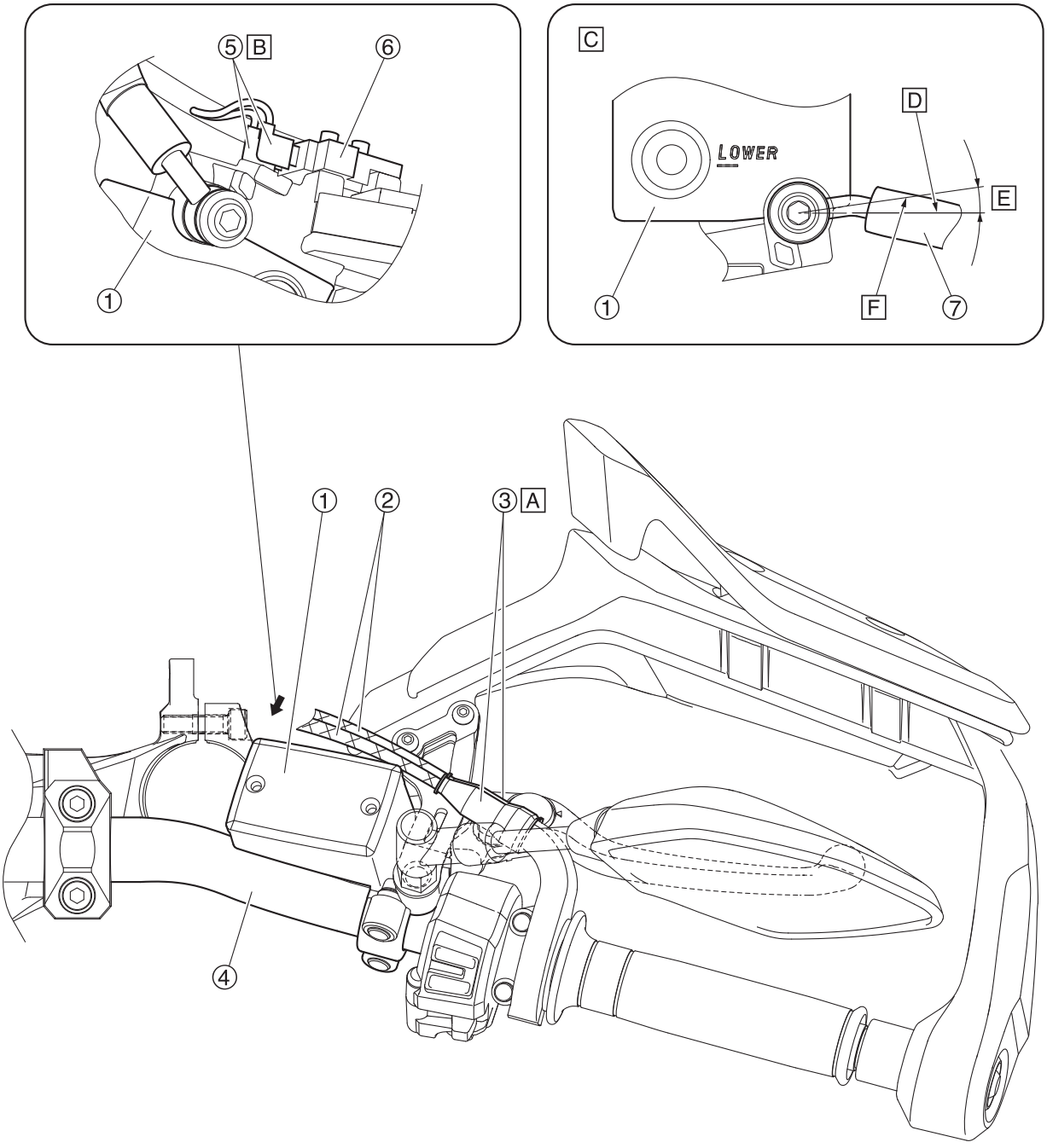

1
2
3
4
5
6
FULL
LOW

1. Water jacket
2. Thermostat
3. Radiator
4. Water pump
5. Oil cooler
6. Coolant reservoir

EAS20021

CABLE ROUTING

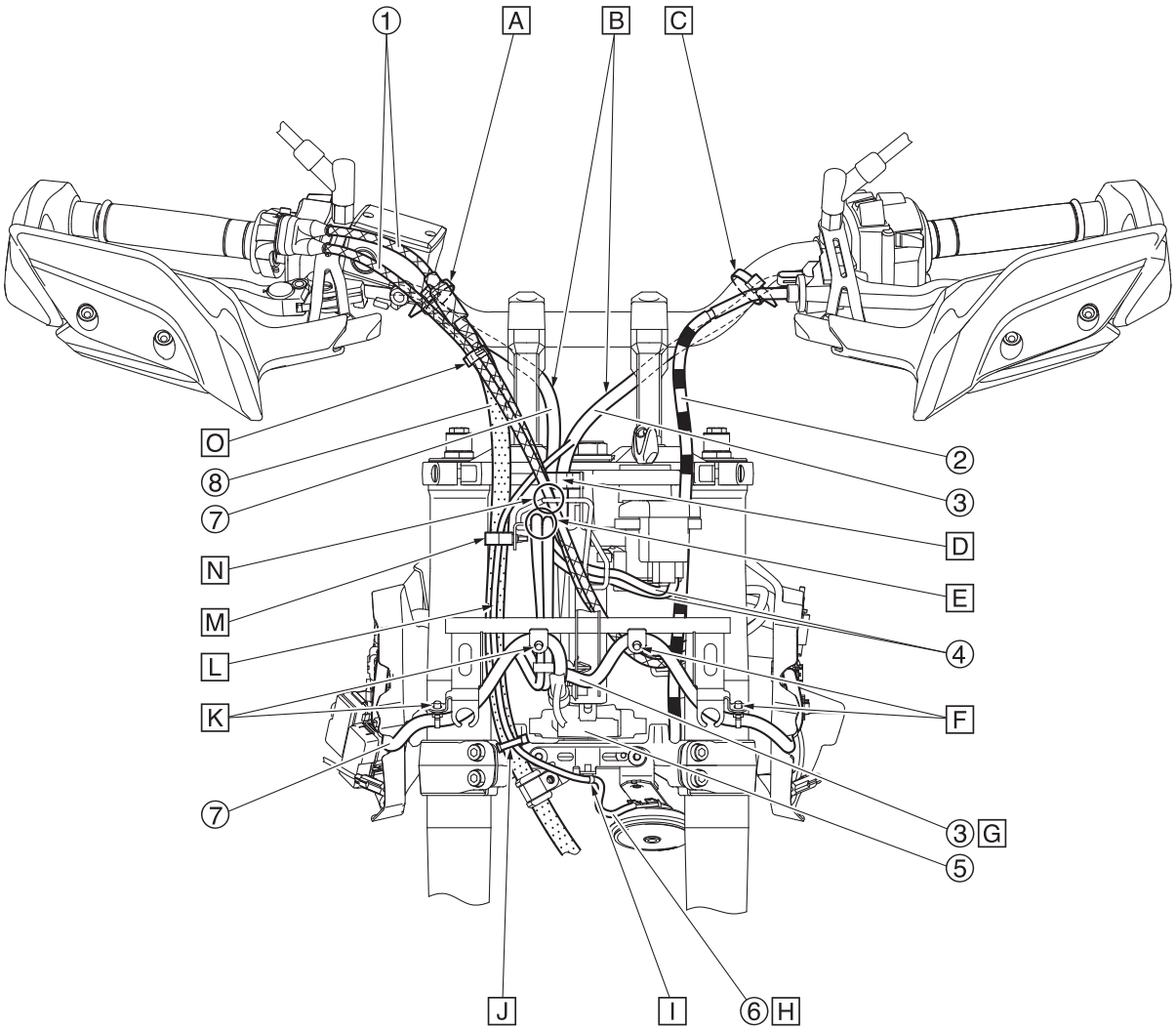
Handlebar (top view)



1. Front brake master cylinder
2. Throttle cable
3. Rubber cover
4. Handlebar
5. Front brake light switch connector
6. Front brake light switch
7. Front brake hose

A. When installing the rubber cover, silicone water or soapy water may be applied to the inside of the rubber cover.
B. Connect the front brake light switch connector onto the front brake light switch.
C. Detailed drawing of around the front brake master cylinder
D. Straight line parallel to the front brake master cylinder reservoir cap
E. 3–13°
F. Center of the metal fitting for the front brake hose

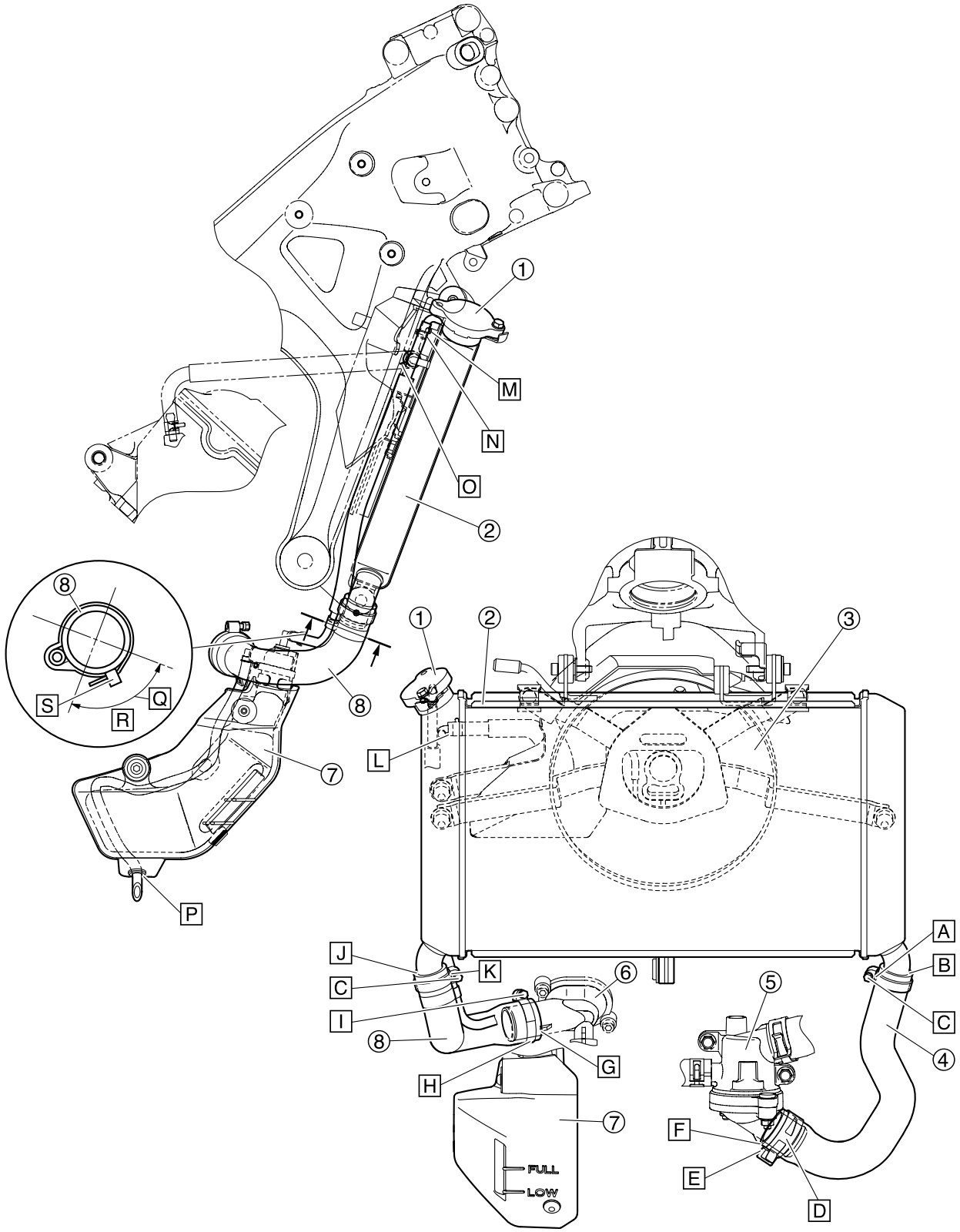
Handlebar (front view)



1. Throttle cable
2. Clutch cable
3. Handlebar switch lead (left)
4. Main switch lead/Immobilizer lead
5. Steering stopper
6. Horn lead
7. Handlebar switch lead (right)
8. Front brake hose

A. Fasten the handlebar switch lead (right) onto the handlebar with the clamp.
Face the catch of the clamp forward (and upward) with the end pointing downward.
B. Pass the handlebar switch lead (right) and handlebar switch lead (left) through between the handlebar holders from the rear to the front.
C. Fasten the handlebar switch lead (left) onto the handlebar with the clamp.
Face the catch of the clamp forward (and upward) with the end pointing downward.
D. Fasten the handlebar switch lead (left) and handlebar switch lead (right) with the clamp.
Face the opening of the clamp forward.
E. Route the main switch lead/immobilizer lead over the guide from the rear of the vehicle.
Position the main switch lead/immobilizer lead to the right of the throttle cables.
F. Insert the clamp of the handlebar switch lead (left) into the hole in the headlight stay.
G. Route the handlebar switch lead (left) over the wire harness.
H. Let the horn lead sag between them.
I. Fasten the horn lead to the bracket with the clamp so that the mating section faces downward.
Route the horn lead on the front side from the hole in the clamp.
J. Fasten the horn lead and the protector of the front brake hose with the clamp. Align the position of the clamp with the steering stopper with its opening facing rearward.
K. Insert the clamp of the handlebar switch lead (right) into the hole in the headlight stay.
L. Route the horn lead along with the front portion of the brake hoses between the clamps shown.
M. Fasten the horn lead and the front brake hose with the clamp and insert the clamp into the bracket.
Engage the clamp by at least three notches.
Face the opening of the clamp rearward.
N. Pass the throttle cables through the guide.
O. Fasten the protector of the throttle cable with the clamp.
Face the opening of the clamp rearward.

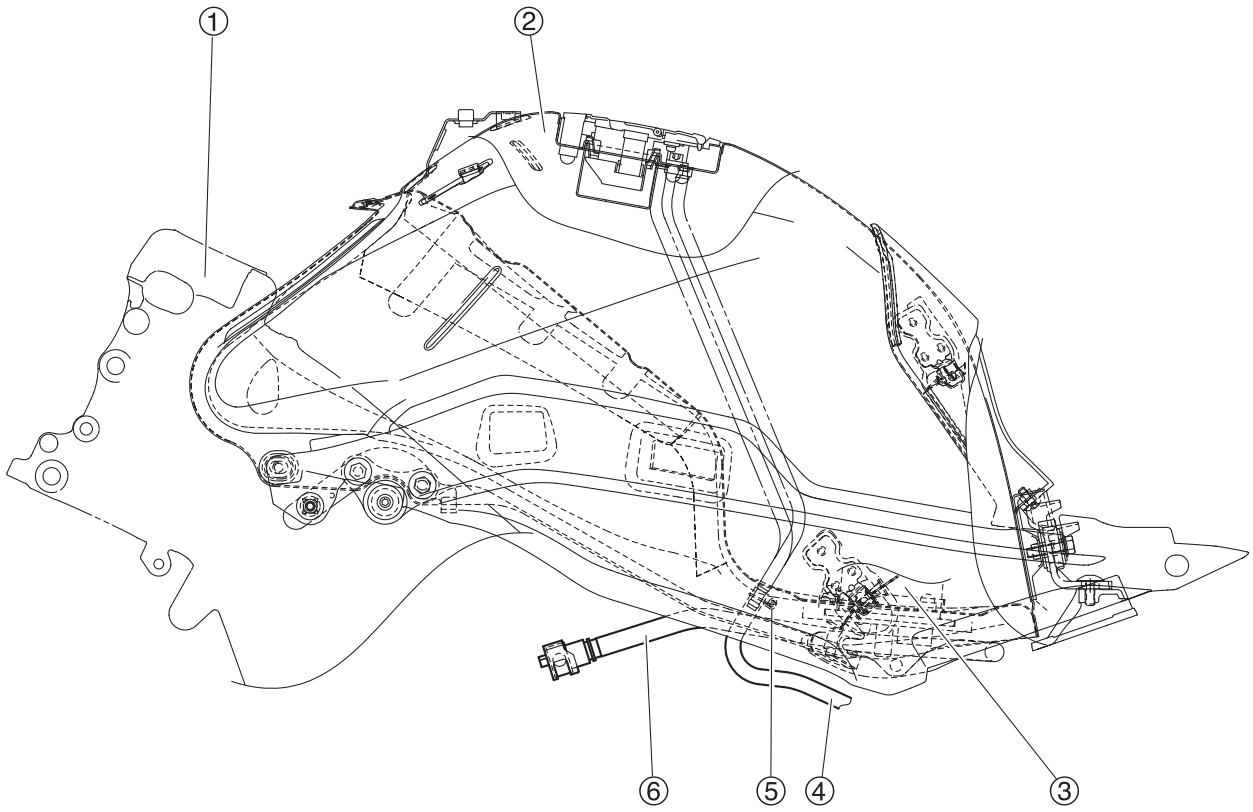
Radiator (front side view and right side view)

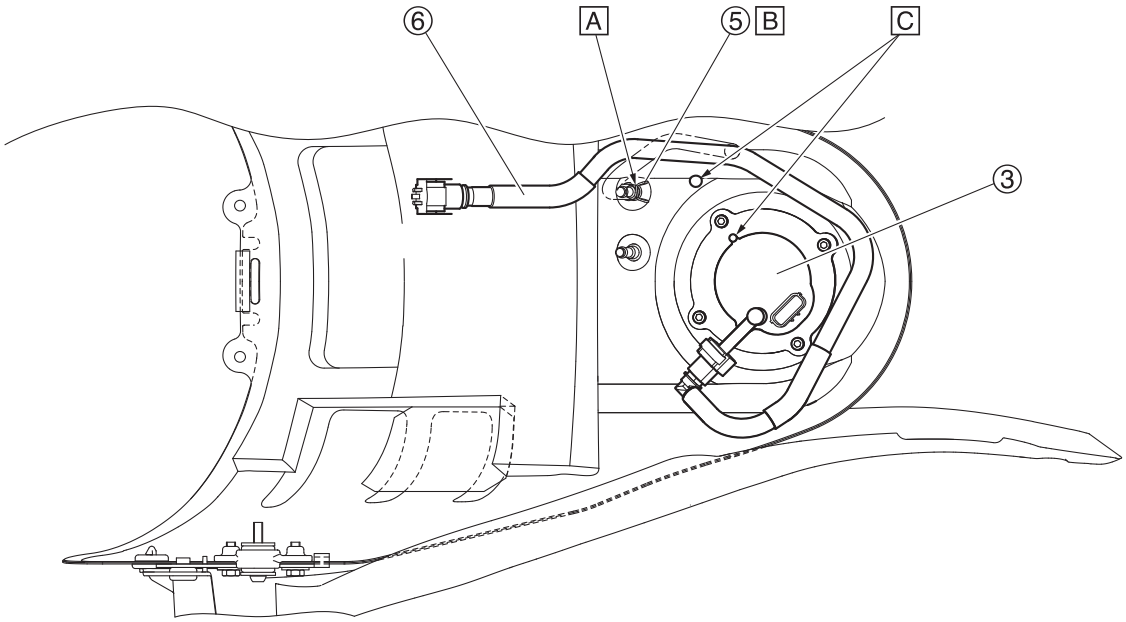


1. Radiator cap
2. Radiator
3. Radiator fan
4. Radiator outlet hose
5. Thermostat assembly
6. Water jacket joint
7. Coolant reservoir
8. Radiator inlet hose

A. Install the radiator outlet hose with its white paint mark facing inward.
B. Install the radiator outlet hose up to the base of the bend in the radiator pipe.
C. Point the hose clamp installation bolt inward.
D. Point the end of the hose clip downward.
E. Align the yellow paint mark of the radiator outlet hose with the rib of the thermostat assembly, and then install it.
F. Install the radiator outlet hose so that the tip of the hose contacts the rib of the thermostat assembly.
G. Install the radiator inlet hose so that the tip of the hose contacts the rib of the water jacket joint.
H. Install the radiator inlet hose with its yellow paint mark facing downward.
I. Point the hose clamp installation bolt upward.
J. Install the radiator inlet hose up to the base of the bend in the radiator pipe.
K. Install the radiator inlet hose with its white paint mark facing inward.
L. Install the radiator hose up to the base of the bend in the radiator pipe.
M. Point the end of the clip outward.
N. Install the coolant reservoir hose up to the base of the bend in the radiator pipe.
O. Point the end of the clip rearward.
P. Install the grommet on the coolant reservoir drain hose to the hole in the coolant reservoir cover.
Q. Place the lock of the hose clamp within the area shown in the illustration, placing as close to the center as possible.
R. 90°
S. Point the tip of the clamp rearward.

Fuel tank (left and bottom view)

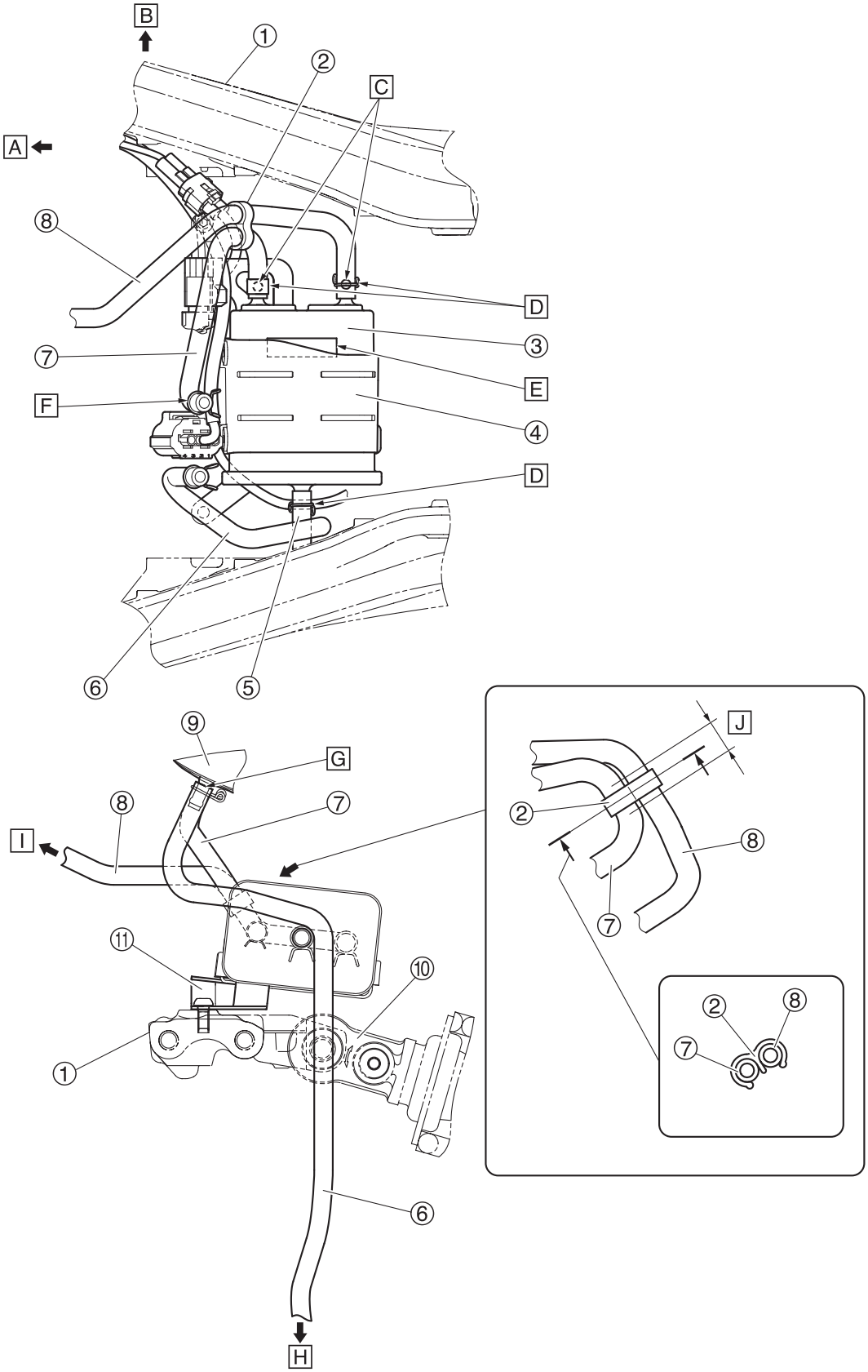




1. Frame
2. Fuel tank
3. Fuel pump
4. Fuel tank drain hose
5. Clip
6. Fuel hose assembly

A. Insert the fuel tank drain hose up to the section where the fuel tank pipe increases in diameter. Install it so that the white paint mark faces the rearward.
Position the hose so that its paint mark is visible from the rear of the vehicle. (Within ±45°)
B. Install the clip so that the end is on the paint mark. Do not put it on the clip spool (guard). Point the end to the rear, and store it inside to the hose.
C. Align the fuel pump positioning to the inner panel marking (visual guide during installation).

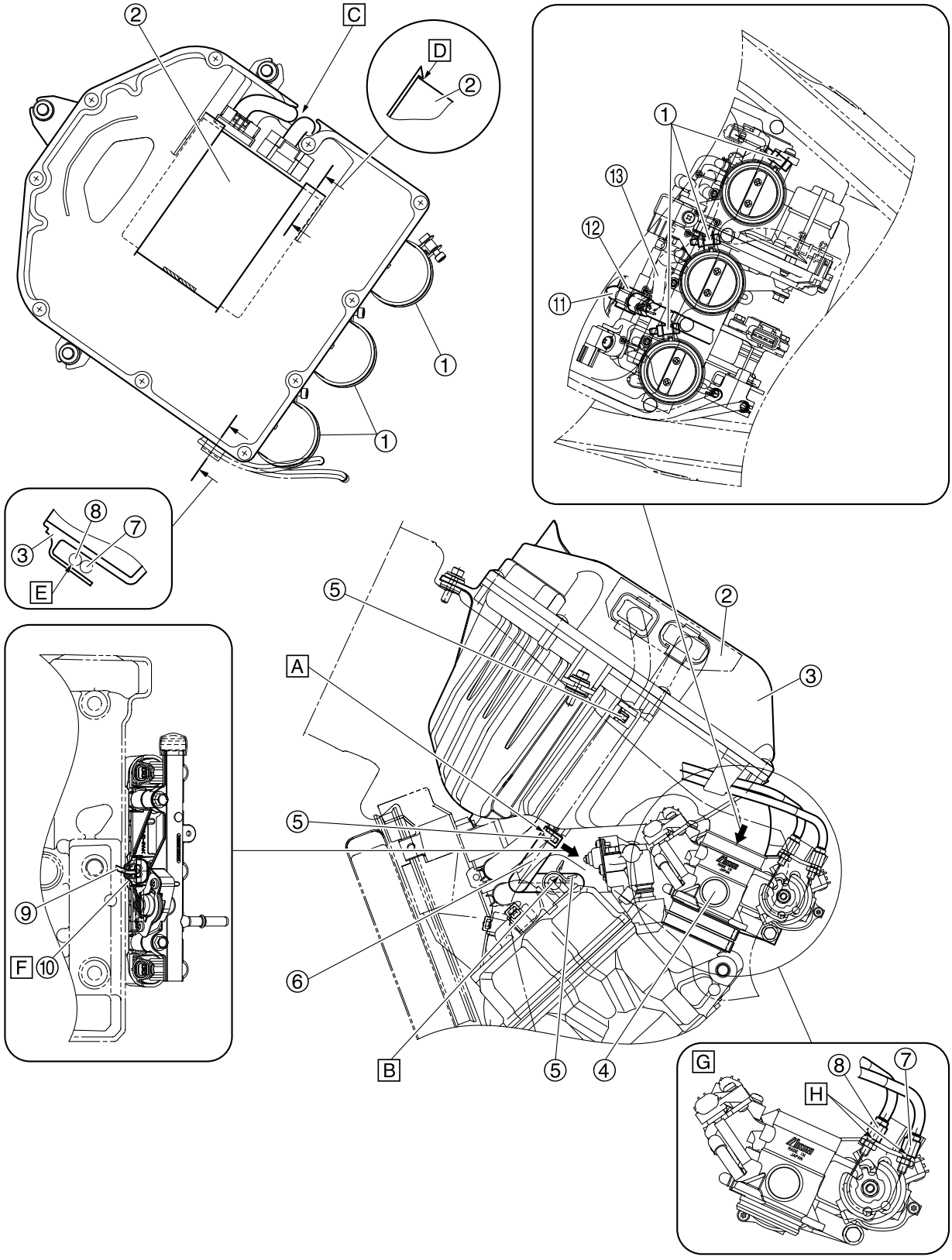
Canister (top view and left side view)



1. Frame
2. Clamp
3. Canister
4. Canister holder
5. Canister breather hose
6. Fuel tank drain hose
7. Fuel tank breather hose
8. Canister purge hose
9. Fuel tank
10. Rear shock absorber assembly
11. Canister bracket

A. Front side of the vehicle
B. Right side of the vehicle
C. Face the white paint mark on the hose upward.
D. Point the end of the clip downward
E. Install the canister with its stamped mark facing upward.
F. The tip of the clip and the yellow paint mark on the hose should face backward. Position the hose so that its paint mark is visible from the rear of the vehicle. (Within ±45°)
G. Insert the hose up to the section where the fuel tank pipe increases in diameter.
H. Atmosphere
I. To throttle body
J. Place the clamp on the straight portion of the fuel tank breather hose.

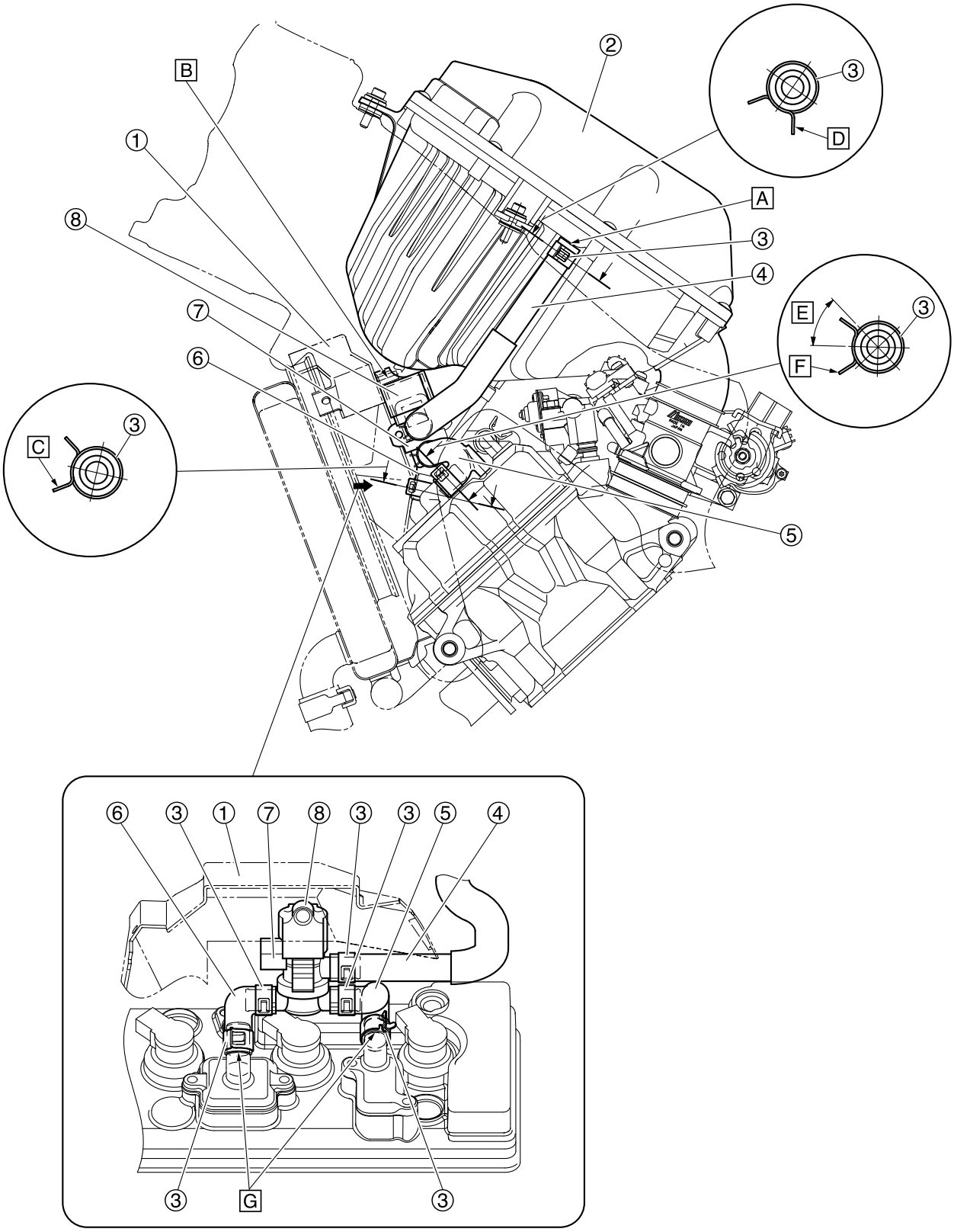
Air filter case and throttle body (top view and left side view)



1. Air filter case joint clamp
2. ECU (Engine Control Unit)
3. Air filter case
4. Throttle body
5. Clip
6. Cylinder head breather hose
7. Throttle cable (decelerator cable) (white plating)
8. Throttle cable (accelerator cable) (black plating)
9. Injector lead
10. Injector coupler
11. Fuel rail
12. Fuel hose (black side)
13. Canister purge hose

A. Install the breather hose on the yellow paint mark side to the air filter case, with its yellow paint mark facing toward left side of the vehicle.
   Point the end of the clip toward left.
B. Install the breather hose so that the tip touches the pipe of the cylinder head.
   Install the breather hose on the white paint mark side to the engine.
   Install the breather hose so that the white paint mark is in the rear of the vehicle and parallel to the cylinder head mating surfaces.
   Install the clip so that the end is in the rear of the vehicle and parallel to the cylinder head mating surfaces.
C. Install the ECU harness by storing it in the recess in the air filter case.
D. Install the ECU so that the hooks on the air filter case go over the ECU edges.
E. Store the throttle cables on the protrusion of the air filter case.
F. Insert the injector coupler all the way in.
G. Instructive drawing for assembling the throttle cables
H. Install the throttle cable so that the nut of the throttle cable touches the stay.

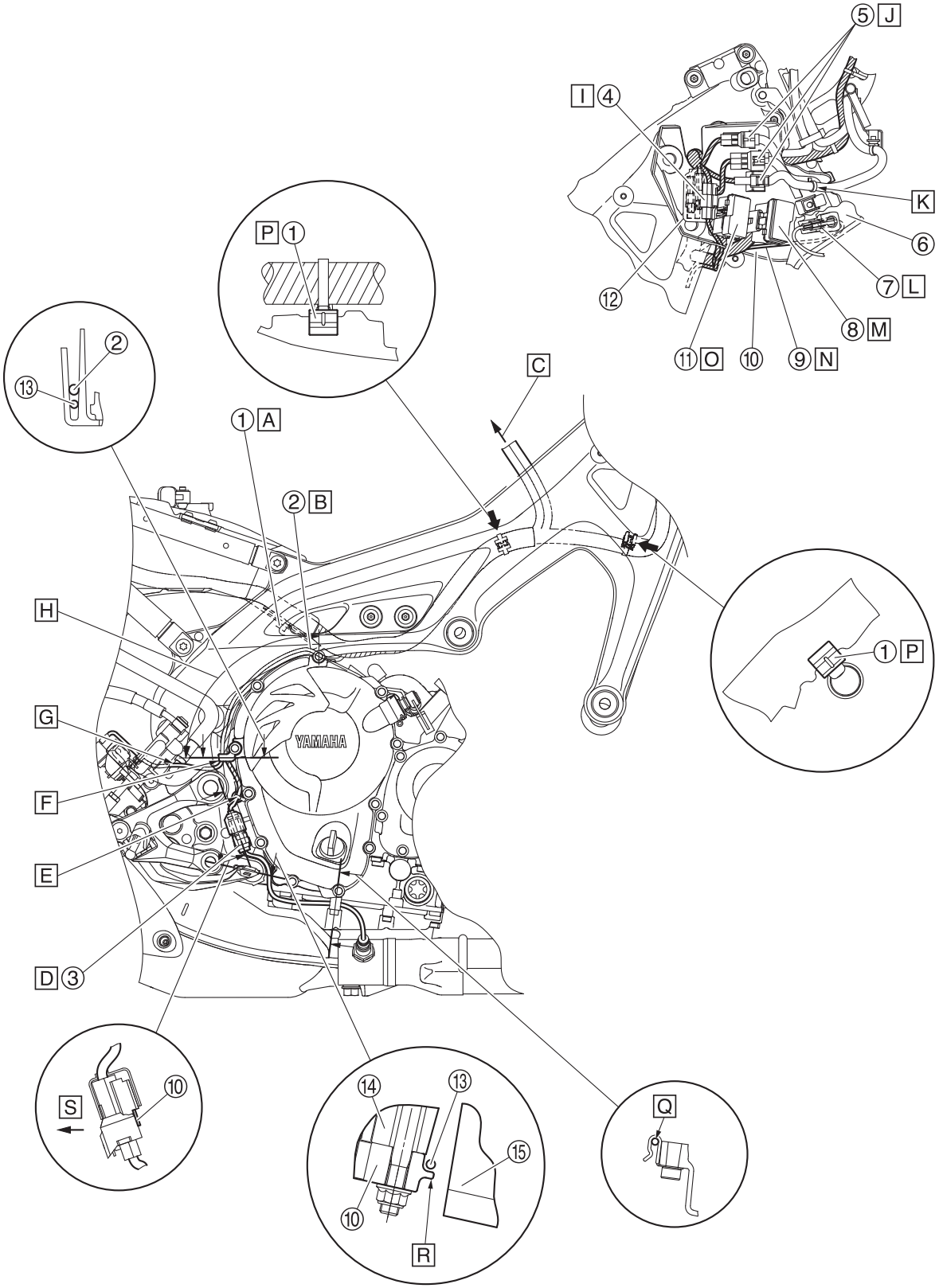
Air cut-off valve (left side view)



1. Radiator fan cover
2. Air filter case
3. Clip
4. Air induction system hose (air filter case to air cut-off valve)
5. Air induction system hose (air cut-off valve to reed valve cover #1)
6. Air induction system hose (air cut-off valve to reed valve cover #2/#3)
7. Air cut-off valve
8. Air cut-off valve holder

A. Install the air induction system hose (air filter case to air cut-off valve) so that the tip of the hose contacts the air filter case.
B. Insert the protrusion on the radiator fan cover into the hole in the air cut-off valve holder.
C. Point the end of the clip for the air induction system hose (air cut-off valve to reed valve cover #2/#3) forward.
D. Point the end of the clip for the air induction system hose (air filter case to air cut-off valve) to the left.
E. 45°
F. Point the end of the clip for the air induction system hose (air cut-off valve to reed valve cover #1) diagonally left forward.
G. Install the hose so that the tip of the hose touches the protrusion of the pipe.

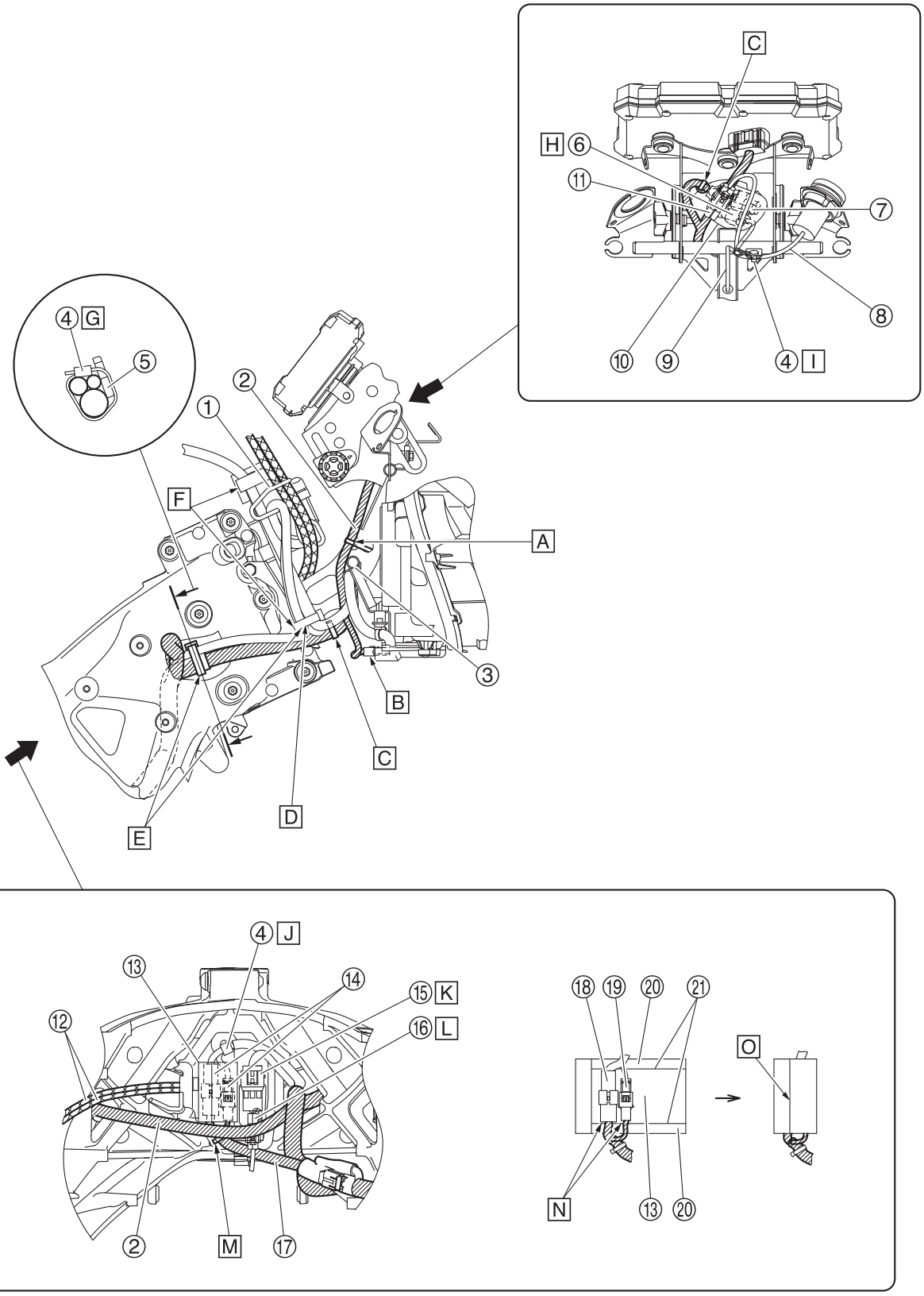
Frame and engine (right side view)



1. Clamp
2. Rear brake light switch lead
3. O_2 sensor coupler
4. Radiator fan motor coupler
5. Handlebar switch coupler (right)
6. Inner panel
7. Front right turn signal light coupler
8. Fuse box 1
9. Front turn signal light lead (right)
10. Bracket
11. Fuse box 2
12. Coupler cover
13. O_2 sensor lead
14. Frame
15. Engine

A. Insert the clamp into the long hole in the battery box.
B. Route the rear brake light switch lead outside the wire harness branch to the O_2 sensor lead.
C. To the ECU coupler
D. Connect the O_2 sensor coupler, and then fasten to the bracket. Make sure that the top of the coupler does not protrude. It is okay if the cover is deformed.
E. Fasten the O_2 sensor lead with the clamp, and then install it on the bracket.
F. Route the O_2 sensor lead and the rear brake light switch lead through the bracket guide.
G. Route the rear brake light switch lead outside brake fluid reservoir hose.
H. It does not matter whether the O_2 sensor lead or the rear brake light switch lead is on top (bottom) in the area shown in the illustration.
I. Connect the radiator fan motor coupler and then position it in front of the connector cover.
J. Insert the handlebar switch coupler (right) into the bracket.
K. Insert the clamp of the handlebar switch lead (right) into the hole in the bracket.
L. Insert the front right turn signal light coupler into the inner panel.
M. Insert fuse box 1 into the bracket.
N. Route the front turn signal light lead (right) under fuse box 1.
O. Insert fuse box 2 into the bracket.
P. Insert the clamp so that it touches the rim of the frame.
Q. Fasten the O_2 sensor lead with the holder.
R. Route O_2 sensor lead inside to the protrusion of the bracket.
S. Inside vehicle

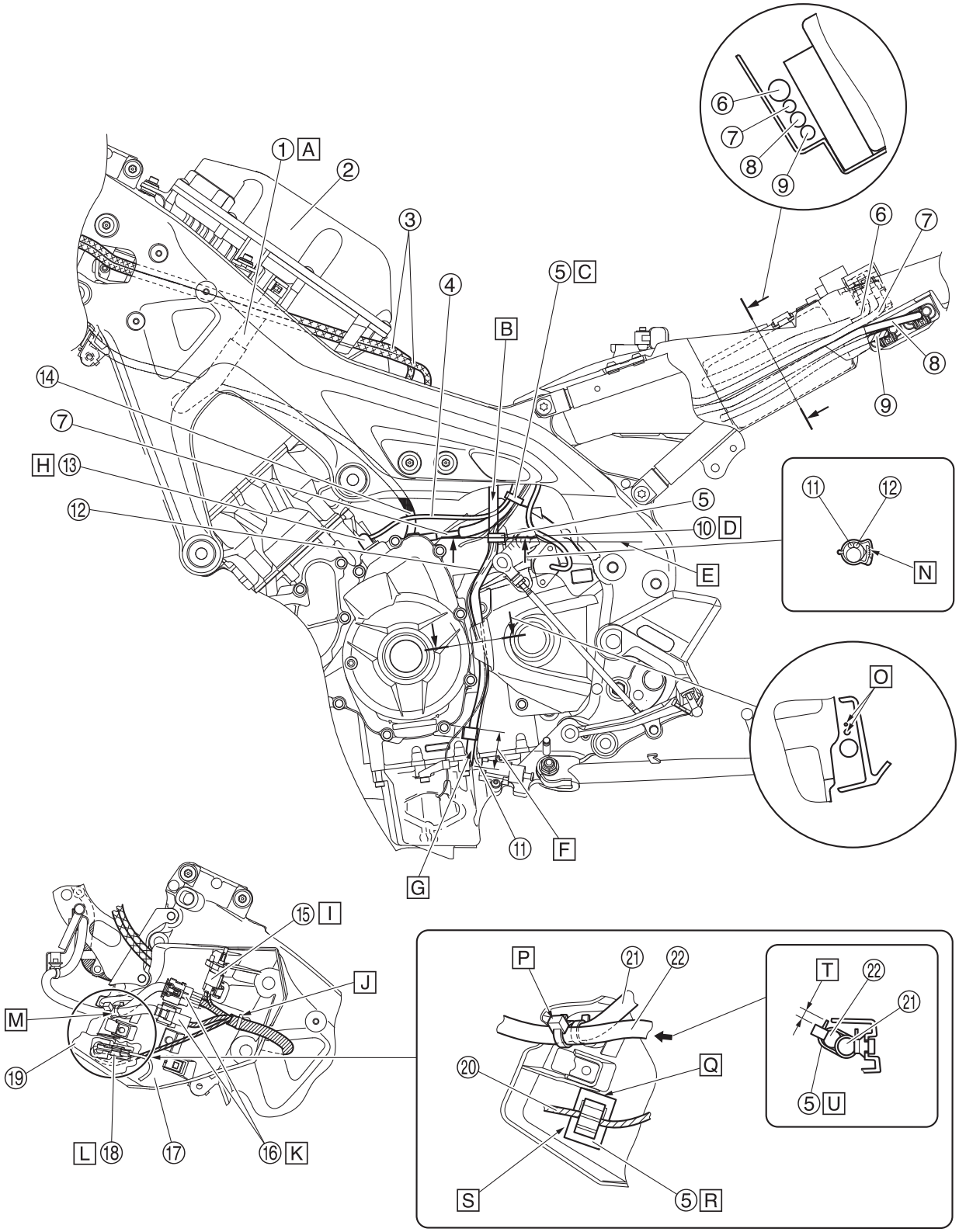
Frame and engine (right side view)



1. Guide
2. Wire harness
3. Pipe (headlight stay)
4. Clamp
5. Frame
6. Auxiliary DC jack coupler (color: natural)
7. Auxiliary DC jack coupler (color: black)
8. Auxiliary DC jack lead
9. Auxiliary light lead
10. Coupler cover
11. Auxiliary light coupler
12. Throttle cable
13. Wire harness protector
14. Main switch coupler
15. Immobilizer coupler
16. Front wheel sensor coupler
17. Main switch lead
18. Main switch coupler 1
19. Main switch coupler 2
20. Sponge
21. Sponge edge

A. Bring the wire harness into contact with the pipe (headlight stay), fasten them with the clamp and then insert the clamp into the hole in the headlight stay.
Make sure that the end of the clamp faces forward when inserting it into the hole in the headlight stay. It is not necessary to insert the end of the clamp further into the hole opposite to the hole in which it has been inserted.
B. Connect the coupler to the headlight unit.
C. Insert the clamp of the wire harness into the hole in the headlight stay.
D. Fasten the main switch lead, immobilizer lead and handlebar switch leads with the clamp.
Make sure that the main switch lead and immobilizer lead are positioned backward and the handlebar switch leads positioned forward. Then, insert the clamp into the hole in the headlight stay.
Align the clamp with the tapes (red to the left and blue to the right) on the handlebar switch lead and face the end of the clamp forward.
E. Make sure that there is no slack in the main switch lead and immobilizer lead between the clamps shown.
F. Make sure that the main switch lead, immobilizer lead and handlebar switch leads are not twisted between the clamps shown.
G. Fasten the wire harness, main switch lead, and immobilizer lead with the clamp.
The wire harness, main switch lead, and immobilizer lead should be fastened with the clamp at the white tape.
Point the tip of the clamp outward, and then cut it.
H. Connect the auxiliary DC jack to the auxiliary DC jack coupler (color: natural) on the wire harness.
I. Fasten the auxiliary light lead and auxiliary DC jack lead with the clamp and then insert the clamp into the hole in the headlight stay.
J. Fasten the main switch lead to the coupler cover with the clamp.
K. The positions for the leads on the immobilizer unit side do not matter regarding the main switch lead.
L. Route the front wheel sensor lead rear side of the vehicle respect to the main switch lead.
M. Install the clamp to the hole in the bottom of the coupler cover.
N. Make sure that the main switch coupler does not protrude from the sponge edge.
O. Align the wire harness protector with the edge of the Velcro tape and wrap it. However, the tape surface may protrude somewhat.

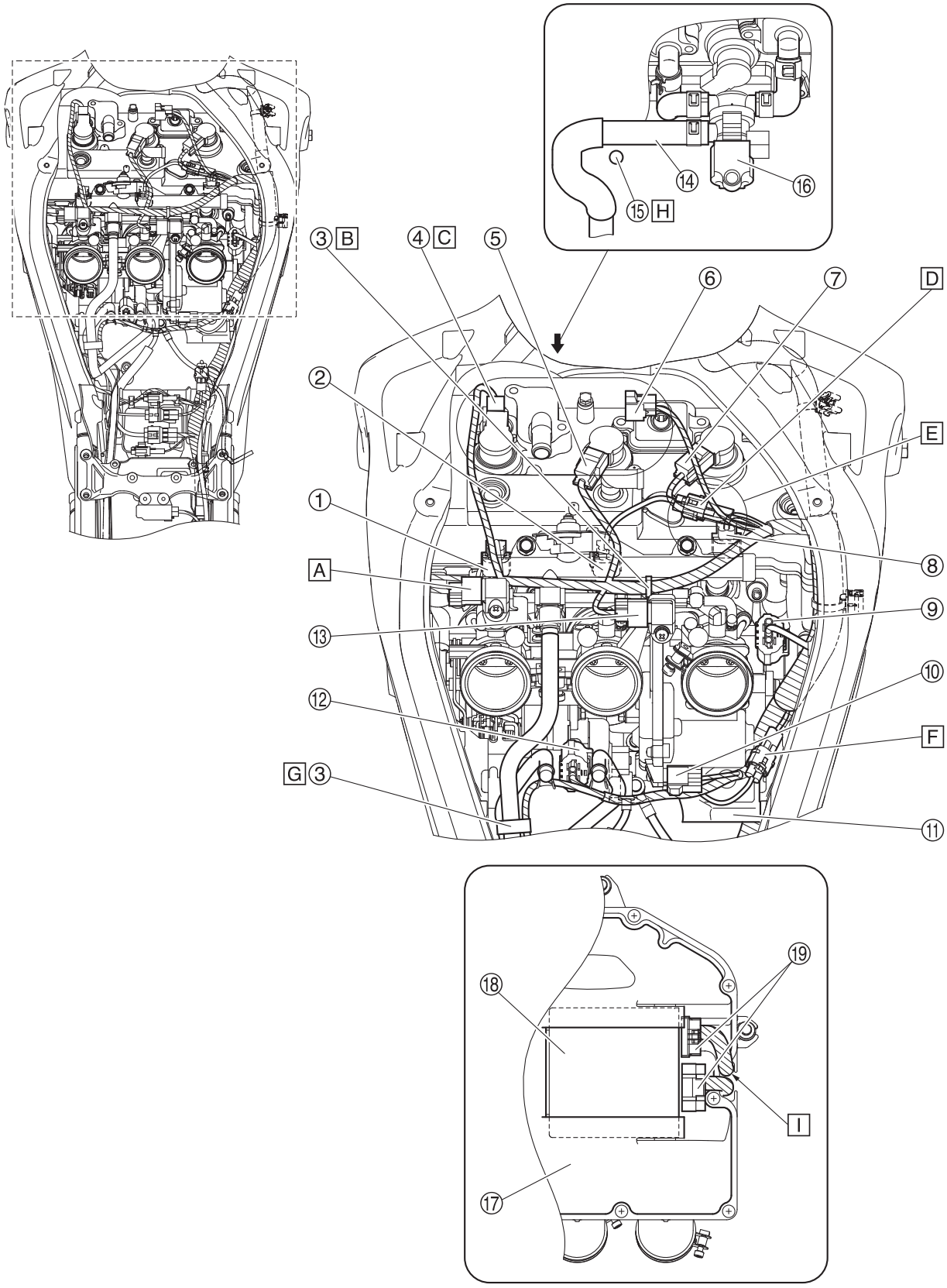
Frame and engine (left side view)



1. Air induction system hose (air filter case to air cut-off valve)
2. Air filter case
3. Throttle cables
4. Stator coil assembly lead
5. Clamp
6. Positive battery lead
7. Starter motor lead
8. Stator coil lead
9. Wire harness (to rectifier/regulator)
10. Gear position switch lead
11. Sidestand switch lead
12. Oil level switch lead
13. Boots
14. Clutch cable
15. Intake air temperature sensor coupler
16. Handlebar switch coupler (left)
17. Bracket
18. Front left turn signal light coupler
19. Inner panel
20. Front turn signal light lead (left)
21. Handlebar switch lead 2 (left)
22. Handlebar switch lead 1 (left)

A. Route the air induction system hose (air filter case to air cut-off valve) inside the throttle cable.
B. Route the fuel tank drain hose outside to the wire harnesses.
Route them inside to the brake hose.
C. Fasten the sidestand switch lead, stator coil assembly lead, starter motor lead and oil level switch lead with the clamp. The order of the leads does not matter. Align the clamp with the tape on the starter motor lead. Do not cut off the clamp end and point it forward. Pull the oil level switch lead when fastening.
D. Route the gear position switch lead inside to the shift arm.
E. Hose bending edge
F. 30–50 mm (1.18–1.97 in)
G. Point the tips of fuel tank drain hose as shown in the illustration.
H. Place the stator coil assembly lead so that bare copper wires do not protrude from the boots.
I. Install the intake air temperature sensor coupler on the rib of the bracket.
J. Insert the clamp of the wire harness into the hole in the bracket.
K. Insert the handlebar switch coupler (left) into the bracket.
L. Insert the front left turn signal light coupler into the inner panel.
M. Insert the clamp of the handlebar switch lead (left) into the hole in the bracket.
N. Align each rounded end of the sidestand switch lead, oil level switch lead and drain hose, and clamp them. The opening of the clamp should face toward the rear side of the vehicle.
O. It does not matter whether the oil level switch lead or the sidestand switch lead is on top.
P. Install the clamp to the handlebar switch lead 1 (left) so that it is against the front side of the clamp on the handlebar switch lead 2 (left) as shown in the illustration.
Q. Install the clamp so that the end of clamp is aligned with the rib of the bracket as shown in the illustration.
R. Face the clamp opening upward.
S. Install the clamp so that the end of clamp is aligned with the center of the spring nut as shown in the illustration.
T. Cut off the excess end of the tie to 5 mm (0.2 in).
U. Route the handlebar switch lead 1 (left) above the handlebar switch lead 2 (left), and then fasten with the clamp. Point the end of the clamp upward and cut off the excess end.

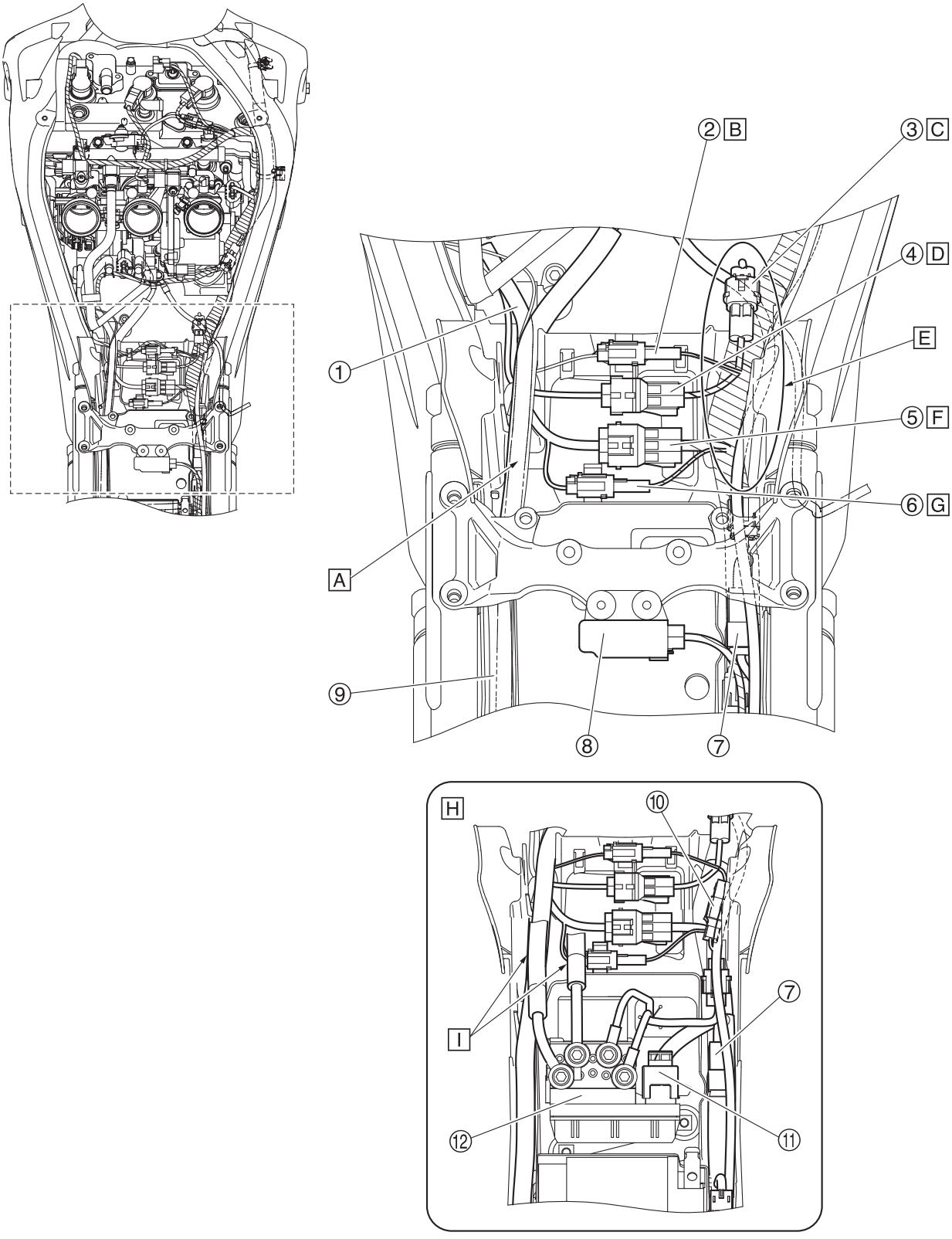
Frame (top view)



1. Injector #1 coupler
2. Injector #2 coupler
3. Clamp
4. Ignition coil #1 coupler
5. Ignition coil #2 coupler
6. Air cut-off valve coupler
7. Ignition coil #3 coupler
8. Injector #3 coupler
9. Throttle position sensor coupler
10. Throttle servo motor coupler
11. Cross tube
12. Accelerator position sensor coupler
13. Intake air pressure sensor coupler
14. Air induction system hose (air filter case to air cut-off valve)
15. Clutch cable
16. Air cut-off valve
17. Air filter case
18. ECU (Engine Control Unit)
19. ECU (engine control unit) coupler

A. Fold back the intake air pressure sensor lead by the coupler, and then fasten it with tape.
B. Insert the clamp into the fuel rail hole.
C. Fold back the injector lead #1 by the coupler, and then fasten it with tape.
D. Connect the sub-lead to the injector #2 coupler. Fasten the injector coupler on the wire harness side with tape.
E. For the air cut-off valve lead, ignition coil lead #3, and fuel injector lead #3, it does not matter which is routed above the others.
F. Route the coolant temperature sensor sub-lead between the cross tube and the wire harness.
Fasten the coolant temperature sensor coupler on the wire harness side with tape.
G. Fasten the fuel hose at the mark and the wire harness at the positioning tape with the clamp. The opening of the clamp can face either way.
H. Route the clutch cable above to the air induction system hose (air filter case to air cut-off valve).
I. Route the ECU lead for the front of the vehicle through the rib of the air filter case.

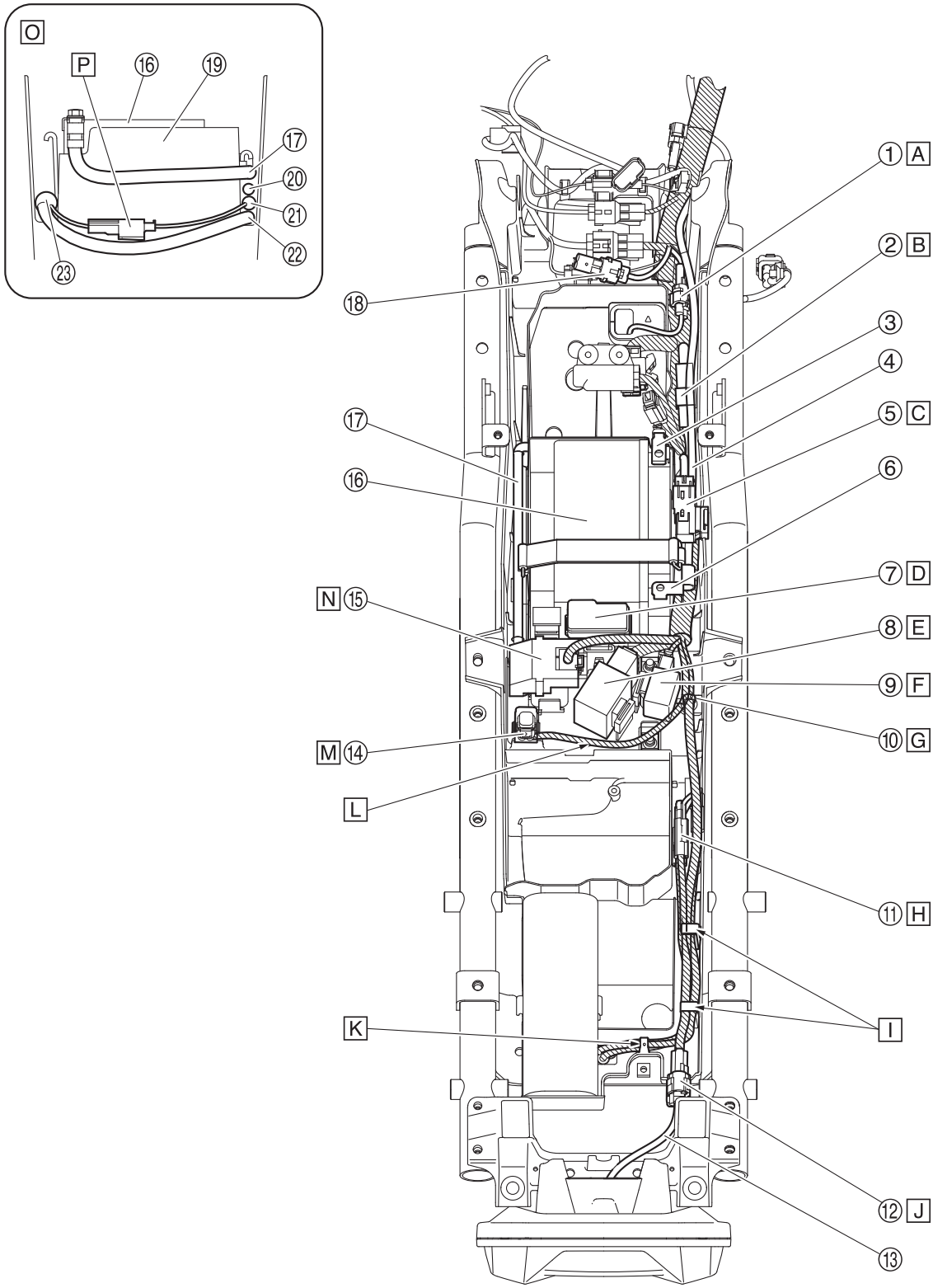
Frame (top view)



1. Stator coil assembly lead
2. Oil level switch coupler
3. Rear brake light switch coupler
4. Sidestand switch coupler
5. Gear position switch coupler 1
6. Gear position switch coupler 2
7. Negative battery lead coupler
8. Lean angle sensor
9. Starter motor lead
10. Negative battery lead 2 coupler
11. ABS ECU coupler
12. Hydraulic unit

A. Leads on the front of the battery box are, from the top of the vehicle, in the following order: starter motor lead, stator coil assembly lead. The orders for other leads do not matter.
B. Fasten the wire harness side of the oil level switch coupler to the battery box.
C. Fasten the rear brake light switch coupler of the wire harness with tape.
D. Fasten the sidestand switch coupler of the wire harness to the battery box.
E. Route the negative battery lead inside to the branch of the O_2 sensor lead and the rear brake light switch lead, and through between the wire harness and the frame. For rear side of the vehicle, route it above the wire harness.
F. Fasten the wire harness side of gear position switch coupler 1 to the battery box.
G. Fasten the wire harness side of gear position switch coupler 2 to the battery box.
H. Details around the hydraulic unit
I. Route the brake hose above all the other leads.

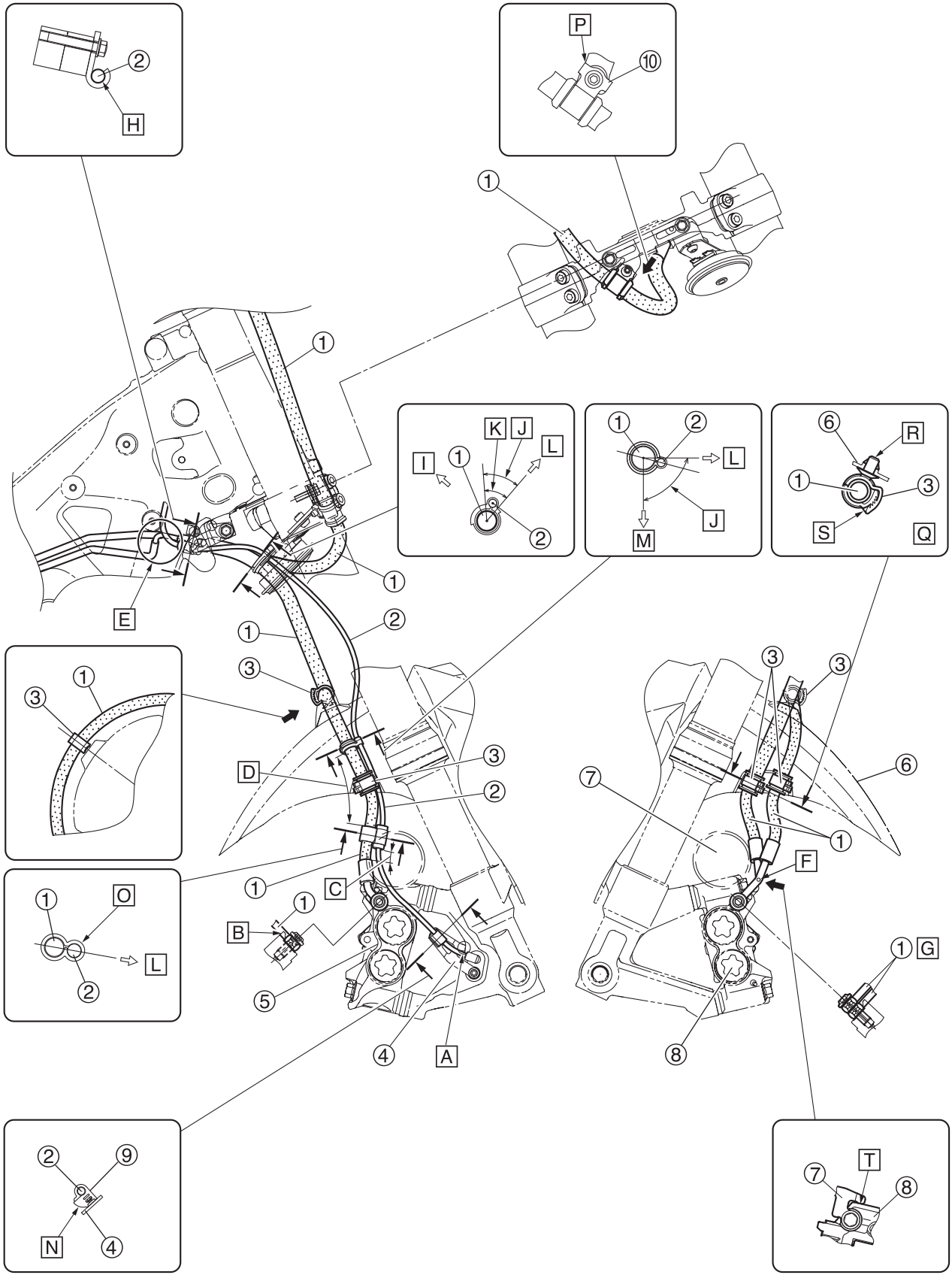
Frame (top view)



1. Rear wheel sensor coupler
2. Negative battery lead coupler
3. Positive battery terminal
4. Negative battery lead
5. Radiator fan motor relay
6. Negative battery terminal
7. Fuse box
8. Relay unit
9. Turn signal/hazard relay
10. Clamp
11. Rear turn signal light coupler (left/right)
12. Tail/brake light coupler
13. Tail/brake light lead
14. Yamaha diagnostic tool coupler
15. Starter relay
16. Battery
17. Positive battery lead
18. Shift switch coupler (option)
19. Battery box
20. Starter motor lead
21. Stator coil lead
22. Wire harness (to rectifier/regulator)
23. Wire harness

A. Position the rear wheel sensor coupler under the negative battery lead.
B. Position the negative battery lead coupler under the negative battery lead.
C. Install the rubber bracket of the radiator fan motor relay in the battery box. Make sure to route the lead under the relay.
D. Fasten the fuse box onto the battery box.
E. Install the rubber bracket of the relay unit in the battery box.
F. Install the rubber bracket of the turn signal/hazard relay in the battery box.
G. Install the clamp into the hole in the battery box.
H. Connect each rear turn signal coupler to the coupler with the same color. After connecting the license plate light coupler, store the rear turn signal light coupler (left/right) furthest to the bottom of the vehicle. After connecting the other couplers, store them below the tail/brake light lead.
I. Route the tail/brake light lead, turn signal light lead, and license plate light lead through the cutout of the battery box. The order of the leads does not matter.
J. Fasten the wire harness side of the tail/brake light coupler to the battery box.
K. Route the turn signal light lead, and license plate light lead through the cutout of the battery box. The order of the leads does not matter.
L. Route the Yamaha diagnostic tool coupler lead at the bottom of the battery box.
M. Insert the Yamaha diagnostic tool coupler to the battery box.
N. Install the rubber bracket of the starter relay in the battery box.
O. Instructional drawing for routes in the front of the battery
P. Fasten the crankshaft position sensor coupler of the wire harness with tape.

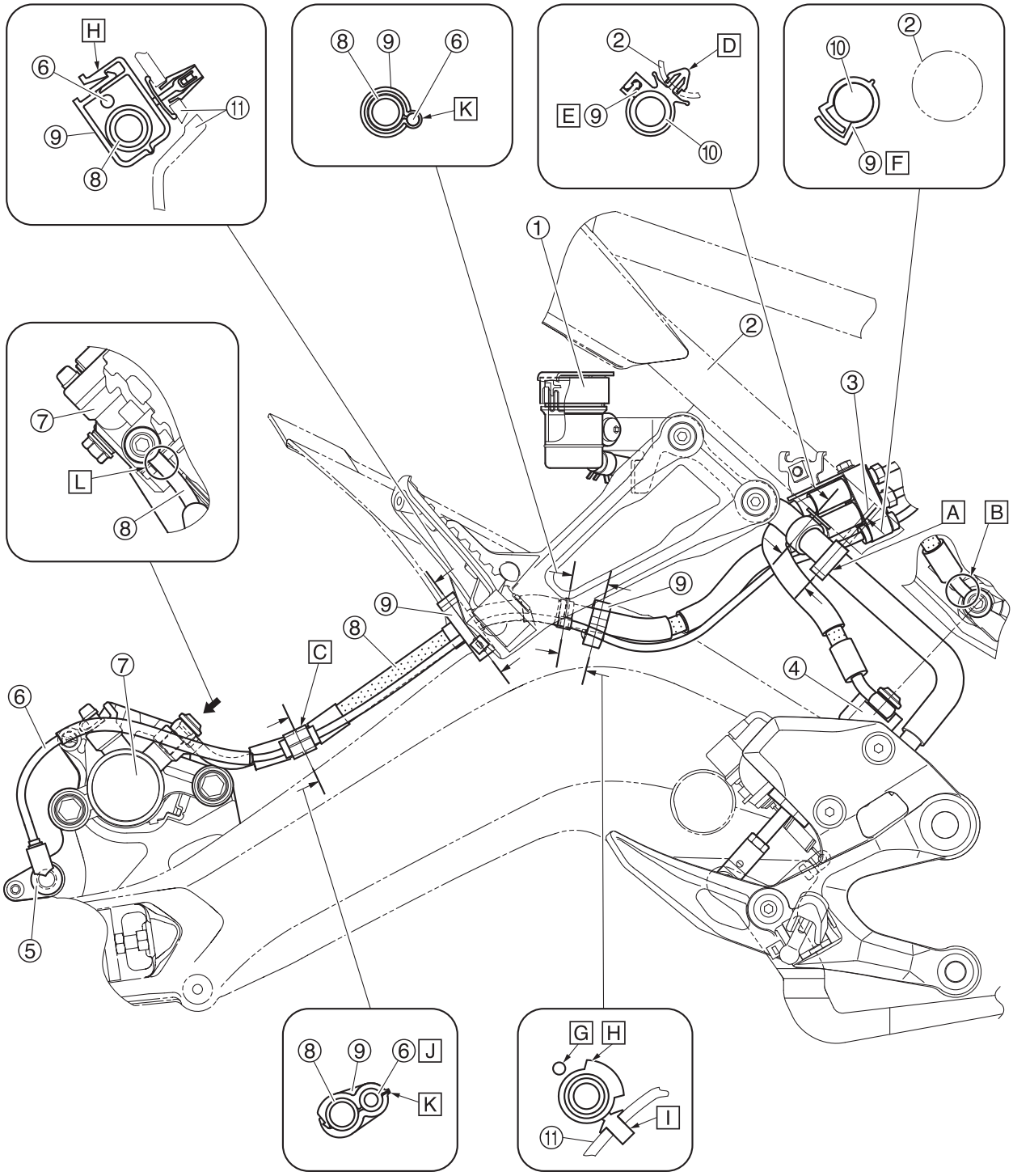
Front brake (right side view and left side view)



1. Front brake hose assembly 1
2. Front wheel sensor lead
3. Clamp
4. Bracket
5. Brake caliper (right)
6. Front fender
7. Reflector (left and right)
8. Brake caliper (left)
9. Clamp
10. Clamp

A. Make sure that the bracket has contact with the axle bracket, and install it.
B. Install the brake pipe so that it contacts the projection on the brake caliper.
C. Install the clamp at the position where the distance between the upper end of the metal fittings of the brake hose and bottom side of the clamp is 25–45 mm (0.98–1.77 in).
D. Route the front wheel sensor lead along the front brake hose as shown in the illustration.
E. Route the front wheel sensor lead through the right side of the vehicle along the brake hose.
F. The blue paint should face to the outside of the vehicle.
G. Install the brake hose from the hydraulic unit so that the brake pipe touches the projection on the brake caliper.
Install the brake hose to the brake caliper (right) so that it aligned with the direction of the brake pipe from the hydraulic unit.
H. Insert the grommet of the front wheel sensor.
I. Right side of the vehicle
J. Route the front wheel sensor lead in front of the vehicle along the brake hose, and clamp the white tape portion. The center line should be within this area.
K. 45°
L. Vehicle forward direction
M. Inside of the vehicle
N. Insert the clamp into the T-stud of the bracket.
O. Route the front wheel sensor lead in front of the vehicle against the brake hose.
P. Make sure that the clamp has contact with the bracket in the right rotation direction as shown in the illustration, and install it.
Q. Same for four clamps
R. Insert the clamp securely.
S. Make sure the clamp is engaged by 3 or more notches.
Engage the claws so that they face toward the rear side of the vehicle.
T. When installing the reflector, make sure that the reflector (left and right) contacts the brake caliper.

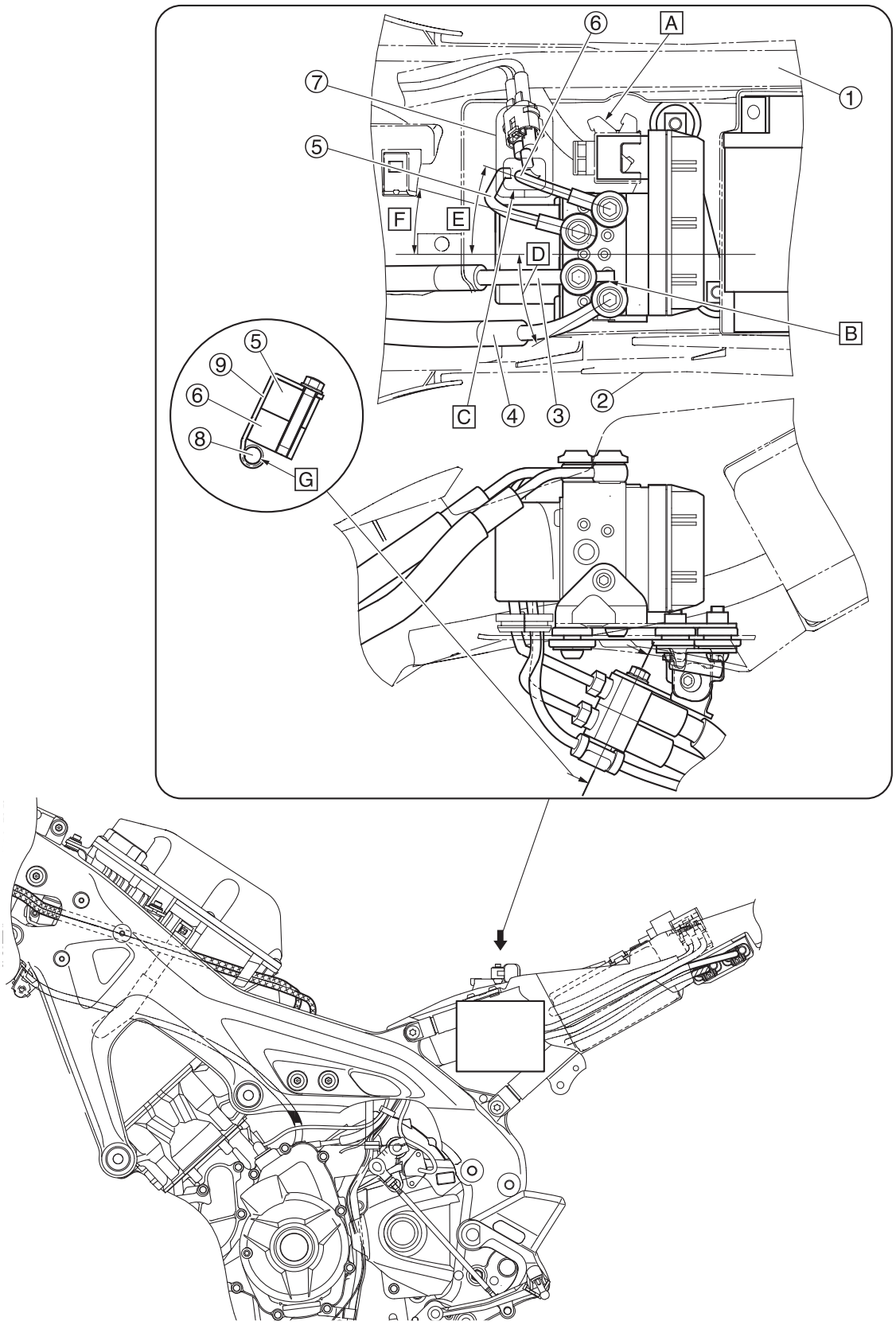
Rear brake



1. Brake fluid reservoir
2. Rear frame
3. Rear frame (welded portion)
4. Rear brake master cylinder
5. Rear wheel sensor
6. Rear wheel sensor lead
7. Rear brake caliper
8. Rear brake hose
9. Clamp
10. Brake fluid reservoir hose
11. Swingarm assembly

A. Install the clamp on the brake fluid reservoir hose by aligning it with the position of the welded portion of the rear frame.
B. Install the brake pipe so that it contact with the protrusion on the master cylinder at outside vehicle.
C. Fasten the rear wheel sensor lead and the brake pipe with the clamp. Make sure that the clamp touches the end of the brake pipe.
D. Make sure to install the clamp all the way in the rear frame.
E. Install the clamp facing the direction in the illustration.
F. Face the engaging section (catch) of the clamp downward.
G. Do not clamp the rear wheel sensor lead.
H. Fasten the protector of the brake hose with the clamp.
Face the engaging section (catch) of the clamp upward.
I. Make sure to install the clamp all the way in the swingarm assembly.
J. Fasten the grommet on the rear wheel sensor lead with the clamp.
K. Position the rear wheel sensor lead outside the brake hose.
L. Install the brake pipe so that it aligned with the cutout in the caliper.

Hydraulic unit (top view and left side view)



1. Wire harness
2. Battery box
3. Brake hose (front brake master cylinder to hydraulic unit)
4. Brake hose (hydraulic unit to front brake calipers)
5. Brake hose (rear brake master cylinder to hydraulic unit)
6. Brake hose (hydraulic unit to rear brake caliper)
7. Plug
8. Rear wheel sensor lead
9. Bracket

A. Make sure to insert the ABS ECU coupler all the way in.
B. Install the brake hose (front brake master cylinder to hydraulic unit) so that the protrusion contact to the brake hose (hydraulic unit to front brake calipers).
C. In the plug hole, install the brake hose (rear brake master cylinder to hydraulic unit), the brake hose (hydraulic unit to rear brake caliper) and rear wheel sensor lead.
D. 28–34°
E. 17–21°
F. 13–17°
G. When installing the rear wheel sensor lead, silicone water or soapy water may be applied.

PERIODIC CHECKS AND ADJUSTMENTS

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EAS20022
PERIODIC MAINTENANCE

EAS30022
INTRODUCTION
This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

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

EAS30614
PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
1	*	Fuel line	• Check fuel hoses for cracks or damage. • Replace if necessary.		√	√	√	√	√
2	*	Spark plugs	• Check condition. • Adjust gap and clean.		√		√		
			• Replace.			√		√	
3	*	Valve clearance	• Check and adjust.	Every 40000 km (24000 mi)					
4	*	Fuel injection	• Check engine idle speed.	√	√	√	√	√	√
			• Check and adjust synchronization.		√	√	√	√	√
5	*	Exhaust system	• Check for leakage. • Tighten if necessary. • Replace gaskets if necessary.	√	√	√	√	√	
6	*	Evaporative emission control system	• Check control system for damage. • Replace if necessary.			√		√	
7	*	Air induction system	• Check the air cut-off valve, reed valve, and hose for damage. • Replace any damaged parts if necessary.		√	√	√	√	√

EAS30615
GENERAL MAINTENANCE AND LUBRICATION CHART

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
1	*	Diagnostic system check	• Perform dynamic inspection using Yamaha diagnostic tool. • Check the fault codes.	√	√	√	√	√	√
2	*	Air filter element	• Replace.	Every 40000 km (24000 mi)					
3		Clutch	• Check operation. • Adjust.	√	√	√	√	√	

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
4	*	**Front brake**	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√
5	*	**Rear brake**	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√
6	*	**Brake hoses**	• Check for cracks or damage.		√	√	√	√	√
			• Replace.	Every 4 years					
7	*	**Brake fluid**	• Change.	Every 2 years					
8	*	**Wheels**	• Check runout and for damage. • Replace if necessary.		√	√	√	√	
9	*	**Tires**	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√
10	*	**Wheel bearings**	• Check bearing for looseness or damage.		√	√	√	√	
11	*	**Swingarm pivot bearings**	• Check operation and for excessive play.		√	√	√	√	
			• Lubricate with lithium-soap-based grease.	Every 50000 km (30000 mi)					
12		**Drive chain**	• Check chain slack, alignment and condition. • Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.	Every 1000 km (600 mi) and after washing the motorcycle, riding in the rain or riding in wet areas					
13	*	**Steering bearings**	• Check bearing assemblies for looseness.	√	√		√		
			• Moderately repack with lithium-soap-based grease.			√		√	
14	*	**Chassis fasteners**	• Make sure that all nuts, bolts and screws are properly tightened.		√	√	√	√	√
15		**Brake lever pivot shaft**	• Lubricate with silicone grease.		√	√	√	√	√
16		**Brake pedal pivot shaft**	• Lubricate with lithium-soap-based grease.		√	√	√	√	√
17		**Clutch lever pivot shaft**	• Lubricate with lithium-soap-based grease.		√	√	√	√	√
18		**Shift pedal pivot shaft**	• Lubricate with lithium-soap-based grease.		√	√	√	√	√
19		**Sidestand, centerstand**	• Check operation. • Lubricate with lithium-soap-based grease.		√	√	√	√	√
20	*	**Sidestand switch**	• Check operation and replace if necessary.	√	√	√	√	√	√
21	*	**Front fork**	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	
22	*	**Shock absorber assembly**	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	

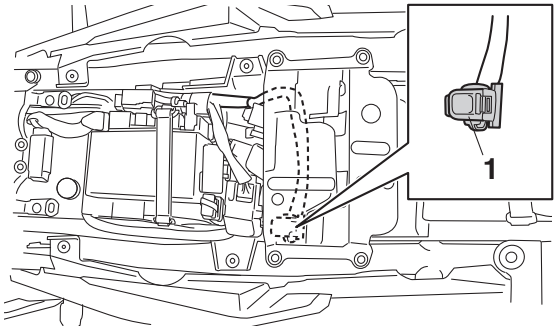
NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
23	*	**Rear suspension relay arm and connecting arm pivoting points**	• Check operation.		√	√	√	√	
24		**Engine oil**	• Change (warm engine before draining). • Check oil level and vehicle for oil leakage.	√	√	√	√	√	√
25		**Engine oil filter cartridge**	• Replace.	√		√		√	
26	*	**Cooling system**	• Check coolant level and vehicle for coolant leakage.		√	√	√	√	√
			• Change.	Every 3 years					
27	*	**Front and rear brake switches**	• Check operation.	√	√	√	√	√	√
28	*	**Moving parts and cables**	• Lubricate.		√	√	√	√	√
29	*	**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.		√	√	√	√	√
30	*	**Lights, signals and switches**	• Check operation. • Adjust headlight beam.	√	√	√	√	√	√

TIP

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

EAS32024
CHECKING THE VEHICLE USING THE YAMAHA DIAGNOSTIC TOOL
Use the Yamaha diagnostic tool and check the vehicle according to the following procedure.
1. Remove:
   • Rider seat/Passenger seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
2. Remove the protective cap "1", and then connect the Yamaha diagnostic tool to the coupler.

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252



3. Check:
   • Fault codes

TIP
Use the "Diagnosis of malfunction" function of the Yamaha diagnostic tool to check the fault codes. For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.

Fault code number is displayed → Check and repair the probable cause of the malfunction. Refer to "TROUBLESHOOTING DETAILS (FAULT CODE)" on page 8-35.
4. Perform:
   • Dynamic inspection

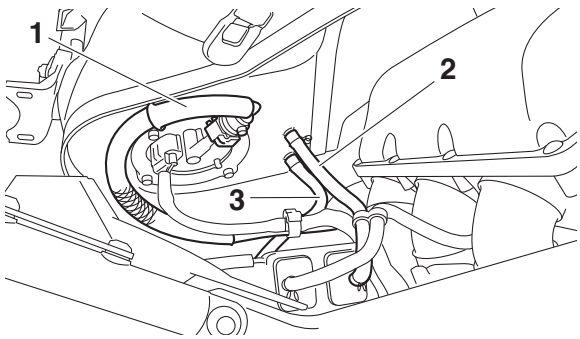
TIP
Use the "Dynamic inspection" function of the Yamaha diagnostic tool version 3.0 and after to perform the dynamic inspection. For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.

5. Install:
   • Rider seat/Passenger seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.

EAS30619
CHECKING THE FUEL LINE
The following procedure applies to all of the fuel, drain and breather hoses.
1. Remove:
   • Fuel tank front cover/Front side panel/Front side cowling
   Refer to "GENERAL CHASSIS (2)" on page 4-6.
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
   • Fuel tank cover
   Refer to "GENERAL CHASSIS (3)" on page 4-13.
   • Fuel tank
   Refer to "FUEL TANK" on page 7-1.
2. Check:
   • Fuel hose "1"
   • Fuel tank breather hose "2"
   • Fuel tank drain hose "3"
   Cracks/damage → Replace.
   Loose connection → Connect properly.

ECA14940
NOTICE
Make sure the fuel tank breather hose is routed correctly.

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



3. Install:
   • Fuel tank
   Refer to "FUEL TANK" on page 7-1.
   • Fuel tank cover
   Refer to "GENERAL CHASSIS (3)" on page 4-13.
   • Rider seat/Passenger seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
   • Front side cowling/Front side panel/Fuel tank front cover
   Refer to "GENERAL CHASSIS (2)" on page

4-6.

EAS30620
CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling
     Refer to "GENERAL CHASSIS (2)" on page 4-6.
   - Passenger seat/Rider seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Air filter case
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Air cut-off valve
     Refer to "AIR INDUCTION SYSTEM" on page 7-15.
2. Remove:
   - Ignition coils
   - Spark plugs

ECA13320
NOTICE

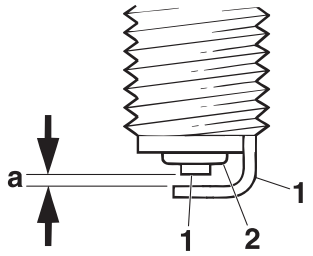
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

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

	Manufacturer/model **NGK/CPR9EA9**

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

	Spark plug gap **0.8–0.9 mm (0.031–0.035 in)**



7. Install:
   - Spark plugs
   - Ignition coils

	Spark plug **13 N·m (1.3 kgf·m, 9.4 lb·ft)**

TIP

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

8. Install:
   - Air cut-off valve
     Refer to "AIR INDUCTION SYSTEM" on page 7-15.
   - Air filter case
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Rider seat/Passenger seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Front side cowling/Front side panel/Fuel tank front cover
     Refer to "GENERAL CHASSIS (2)" on page 4-6.

EAS30622
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

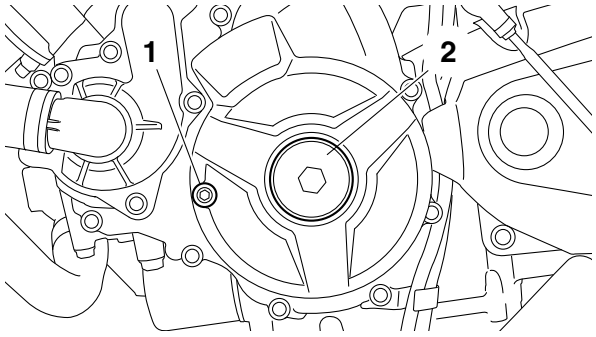
TIP

Valve clearance adjustment should be made on a cold engine, at room temperature.

1. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling

Refer to “GENERAL CHASSIS (2)” on page 4-6.
- Passenger seat/Rider seat
  Refer to “GENERAL CHASSIS (1)” on page 4-1.
- Fuel tank cover
  Refer to “GENERAL CHASSIS (3)” on page 4-13.
- Fuel tank
  Refer to “FUEL TANK” on page 7-1.
- Air filter case
  Refer to “GENERAL CHASSIS (3)” on page 4-13.
- Air cut-off valve
  Refer to “AIR INDUCTION SYSTEM” on page 7-15.
- Radiator
  Refer to “RADIATOR” on page 6-1.

2. Remove:
   - Ignition coils
   - Spark plugs
   - Cylinder head cover
   - Cylinder head cover gasket
   Refer to “CAMSHAFTS” on page 5-9.
3. Remove:
   - Timing mark accessing bolt “1”
   - Crankshaft end cover “2”

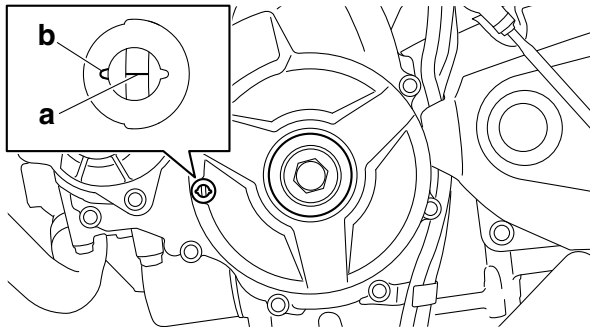


4. Measure:
   - Valve clearance
   Out of specification → Adjust.

Valve clearance (cold)
Intake
0.11–0.20 mm (0.0043–0.0079 in)
Exhaust
0.26–0.30 mm (0.0102–0.0118 in)

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

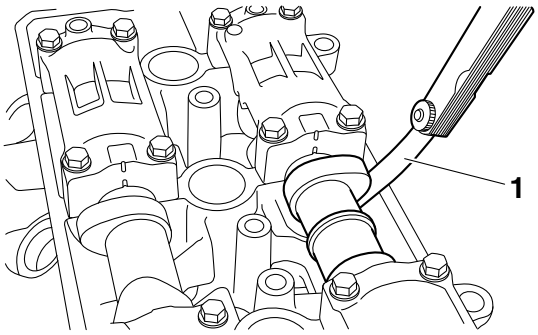
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the TDC mark “a” on the generator rotor with the generator rotor cover mark “b”.



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

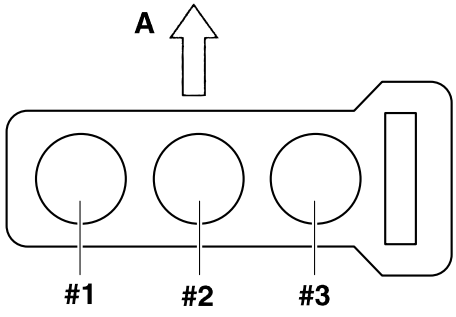
c. Measure the valve clearance with a thickness gauge “1”.

Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9



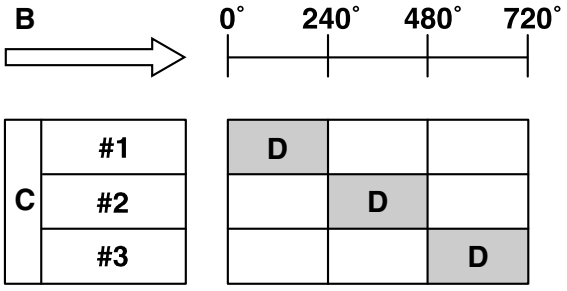
TIP
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

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



A. Front

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



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

Cylinder #2	240°
Cylinder #3	480°

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

5. Remove:
   • Camshaft

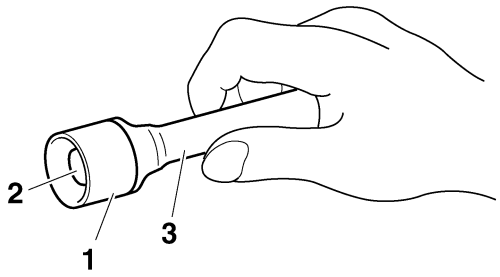
TIP

• 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.

6. Adjust:
   • Valve clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

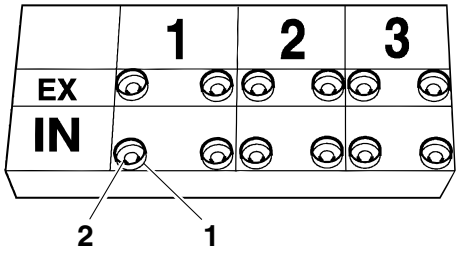
a. Remove the valve lifter "1" and the valve pad "2" with a valve lapper "3".



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

TIP

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

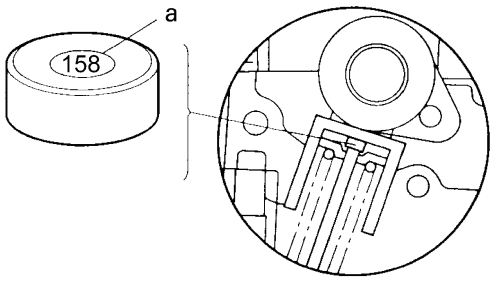


b. Calculate the difference between the specified valve clearance and the measured valve clearance.
   Example:
   Specified valve clearance = 0.11–0.20 mm (0.004–0.008 in)
   Measured valve clearance = 0.25 mm (0.010 in)
   0.25 mm (0.010 in)–0.20 mm (0.008 in) = 0.05 mm (0.002 in)
c. Check the thickness of the current valve pad.

TIP

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

   Example:
   If the valve pad is marked "158", the pad thickness is 1.58 mm (0.062 in).



d. Calculate the sum of the values obtained in steps (b) and (c) to determine the required valve pad thickness and the valve pad number.
   Example:
   1.58 mm (0.062 in) + 0.05 mm (0.002 in) = 1.63 mm (0.064 in)
   The valve pad number is 163.
e. Round off the valve pad number according to

the following table, and then select the suitable valve pad.

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

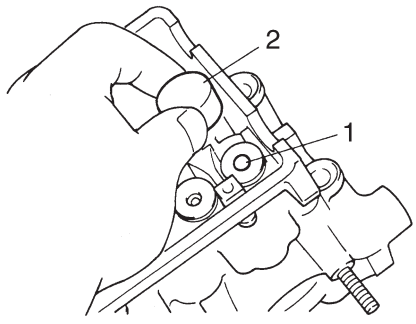
TIP
Refer to the following table for the available valve pads.

Valve pad range	Nos. 150–240
Valve pad thickness	1.50–2.40 mm (0.0590–0.0944 in)
Available valve pads	25 thicknesses in 0.05 mm (0.002 in) increments

Example:
Valve pad number = 163
Rounded value = 165
New valve pad number = 165

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

TIP
- Lubricate the valve pad with molybdenum disulfide oil.
- Lubricate the valve lifter (Top side) with molybdenum disulfide oil.
- Lubricate the valve lifter (Outer side) with engine oil.
- Install the valve lifter and the valve pad in the correct place.
- The valve lifter must turn smoothly when rotated by hand.



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

Camshaft cap bolt
10 N·m (1.0 kgf·m, 7.2 lb·ft)

TIP
- Refer to "CAMSHAFTS" on page 5-9.
- Lubricate the camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshafts marks with the camshaft cap marks.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

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

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7. Install:
   - All removed parts

TIP
For installation, reverse the removal procedure.

EAS31017
CHECKING THE ENGINE IDLING SPEED

TIP
Prior to checking 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. Check:
   - Engine idling speed
     Out of specification → Go to next step.

Engine idling speed
1100–1300 r/min

3. Check:
   - ISC (idle speed control) learning value
     "00" or "01" → Check the intake system.
     "02" → Clean the throttle bodies.
     Refer to "CHECKING AND CLEANING THE THROTTLE BODIES" on page 7-8.

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a. Connect the Yamaha diagnostic tool.
   Use the diagnostic code number "67".
   Refer to "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.
b. Check the ISC (idle speed control) leaning value.

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EAS30797
SYNCHRONIZING THE THROTTLE BODIES

TIP

Before synchronizing the throttle bodies, check the following items:
- Valve clearance
- Spark plugs
- Air filter element
- Throttle body joints
- Fuel hose
- Exhaust system
- Breather hoses

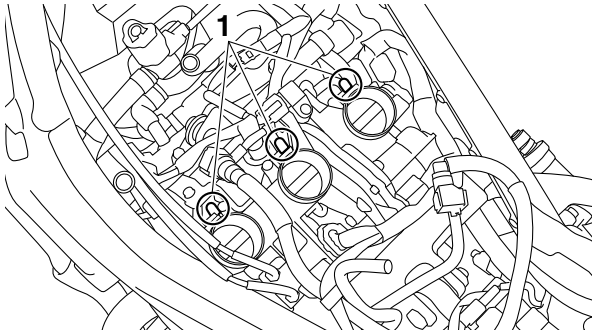
Checking the throttle body synchronization

1. Stand the vehicle on a level surface.

TIP

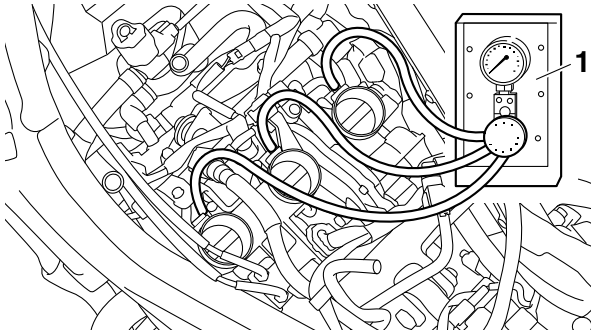
Place the vehicle on the centerstand.

2. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling
     Refer to "GENERAL CHASSIS (2)" on page 4-6.
   - Passenger seat/Rider seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Air filter case
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
3. Remove:
   - Caps "1"



4. Install:
   - Vacuum gauge "1"

Vacuum gauge
90890-03094
Vacuummate
YU-44456



5. Install:
   - Air filter case
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
6. Check:
   - Throttle body synchronization

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

Engine idling speed
1100–1300 r/min

b. Check the vacuum pressure.

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

If out of specification → Adjust the throttle body synchronization.

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Adjusting the throttle body synchronization

1. Adjust:
   - Throttle body synchronization

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

Engine idling speed
1100–1300 r/min

b. Using the throttle body that has the bypass air screw "1" with a white paint mark as the standard, adjust the other throttle bodies by turning its bypass air screw in or out.

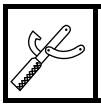
ECA21300

NOTICE

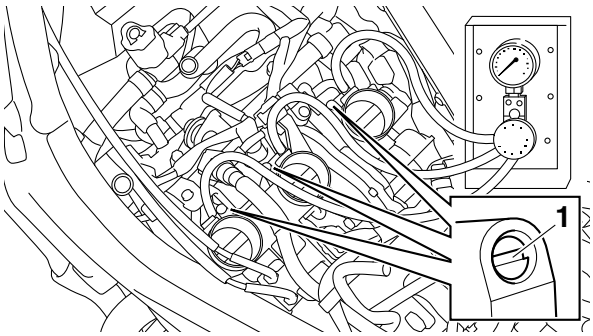
Do not turn the bypass air screw (white paint mark) of the throttle body that is the stan-

dard. Otherwise, the engine may run roughly at idle and the throttle bodies may not operate properly.

TIP
- Turn the bypass air screw using the carburetor angle driver.
- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If a bypass air screw was removed, turn the screw in fully and be sure to synchronize the throttle bodies.
- If the throttle body synchronization can not be adjusted using the bypass air screw, clean or replace the throttle bodies.
- The difference in vacuum pressure between the throttle bodies should not exceed 1.33 kPa (10 mmHg).



Carburetor angle driver 2
90890-03173



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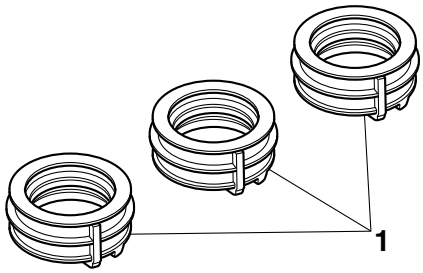
2. Stop the engine and remove the measuring equipment.
3. Install:
   - Caps
4. Install:
   - Air filter case
     Refer to “GENERAL CHASSIS (3)” on page 4-13.
   - Fuel tank
     Refer to “FUEL TANK” on page 7-1.
   - Fuel tank cover
     Refer to “GENERAL CHASSIS (3)” on page 4-13.
   - Rider seat/Passenger seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   - Front side cowling/Front side panel/Fuel tank front cover
     Refer to “GENERAL CHASSIS (2)” on page 4-6.
5. Adjust:
   - Throttle grip free play
     Refer to “CHECKING THE THROTTLE GRIP” on page 3-29.

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

EAS30798
CHECKING THE THROTTLE BODY JOINTS
1. Remove:
   - Throttle bodies
     Refer to “THROTTLE BODIES” on page 7-5.
2. Check:
   - Throttle body joints “1”
     Cracks/damage → Replace.



3. Install:
   - Throttle bodies
     Refer to “THROTTLE BODIES” on page 7-5.

EAS31922
CHECKING THE CANISTER
1. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling
     Refer to “GENERAL CHASSIS (2)” on page 4-6.
   - Passenger seat/Rider seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   - Fuel tank cover
     Refer to “GENERAL CHASSIS (3)” on page 4-13.
   - Fuel tank
     Refer to “FUEL TANK” on page 7-1.
2. Check:
   - Canister
   - Canister purge hose
   - Fuel tank breather hose
   - Canister breather hose
     Cracks/damage → Replace.

3. Install:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Fuel tank cover
   Refer to “GENERAL CHASSIS (3)” on page 4-13.
   • Rider seat/Passenger seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Front side cowling/Front side panel/Fuel tank front cover
   Refer to “GENERAL CHASSIS (2)” on page 4-6.

EAS30799
ADJUSTING THE EXHAUST GAS VOLUME

TIP
- Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.
- To adjust the exhaust gas volume, use the CO adjustment mode of the Yamaha diagnostic tool. For more information, refer to the operation manual of the Yamaha diagnostic tool.

1. Connect the Yamaha diagnostic tool to the coupler. For information about connecting the Yamaha diagnostic tool, refer to “YAMAHA DIAGNOSTIC TOOL” on page 8-34.

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252

EAS30627
CHECKING THE AIR INDUCTION SYSTEM

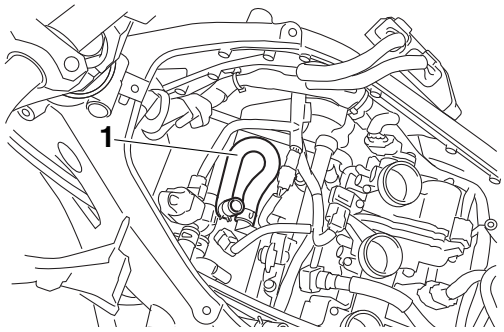
Refer to “CHECKING THE AIR INDUCTION SYSTEM” on page 7-19.

EAS30623
CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
   • Air filter case
   Refer to “GENERAL CHASSIS (3)” on page 4-13.
2. Check:
   • Cylinder head breather hose “1”
   Cracks/damage → Replace.
   Loose connection → Connect properly.

ECA14920
NOTICE

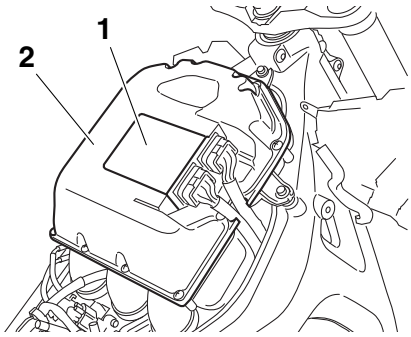
Make sure the cylinder head breather hose is routed correctly.



3. Install:
   • Air filter case
   Refer to “GENERAL CHASSIS (3)” on page 4-13.

EAS30628
REPLACING THE AIR FILTER ELEMENT

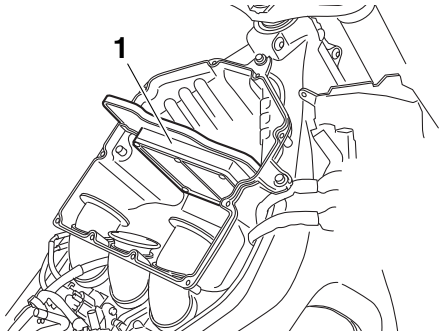
1. Remove:
   • Fuel tank front cover/Front side panel/Front side cowling
   Refer to “GENERAL CHASSIS (2)” on page 4-6.
   • Passenger seat/Rider seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Fuel tank cover
   Refer to “GENERAL CHASSIS (3)” on page 4-13.
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
2. Remove:
   • ECU (Engine Control Unit) “1”
   • Air filter case cover “2”
   Refer to “GENERAL CHASSIS (3)” on page 4-13.



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

TIP
- Replace the air filter element every 40000 km (24000 mi) of operation.
- The air filter needs more frequent service if you

are riding in unusually wet or dusty areas.



4. Install:
   • Air filter element
   • Air filter case cover
   • ECU (Engine Control Unit)

ECA20710

NOTICE

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

TIP

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

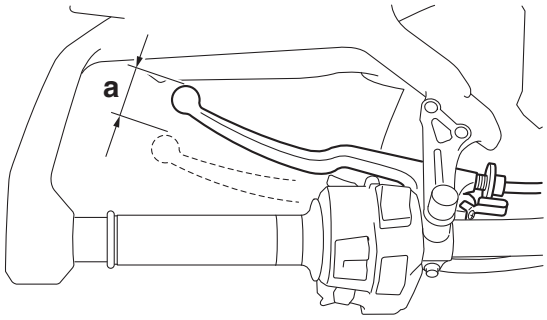
5. Install:
   • Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   • Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   • Rider seat/Passenger seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   • Front side cowling/Front side panel/Fuel tank front cover
     Refer to "GENERAL CHASSIS (2)" on page 4-6.

EAS30629

ADJUSTING THE CLUTCH LEVER FREE PLAY

1. Check:
   • Clutch lever free play "a"
     Out of specification → Adjust.

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



2. Adjust:
   • Clutch lever free play

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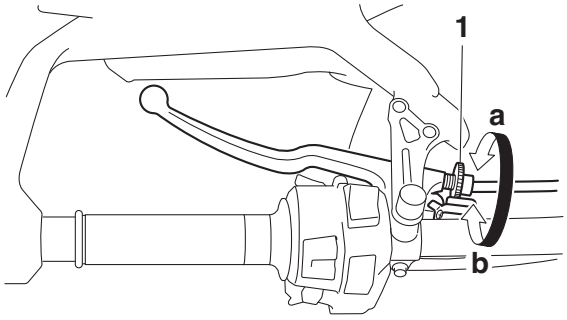
Handlebar side

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

Direction "a"
Clutch lever free play is increased.
Direction "b"
Clutch lever free play is decreased.



TIP

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

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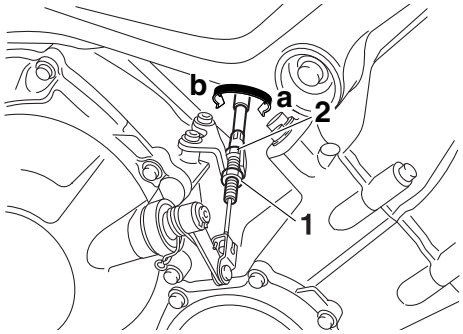
Engine side

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

Direction "a"
Clutch lever free play is increased.
Direction "b"
Clutch lever free play is decreased.

c. Tighten the locknut "1".

Clutch cable locknut
7 N·m (0.7 kgf·m, 5.1 lb·ft)



EAS30801
CHECKING THE BRAKE OPERATION

1. Check:
   • Brake operation
   Brake not working properly → Check the brake system.
   Refer to "FRONT BRAKE" on page 4-35 and "REAR BRAKE" on page 4-48.

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

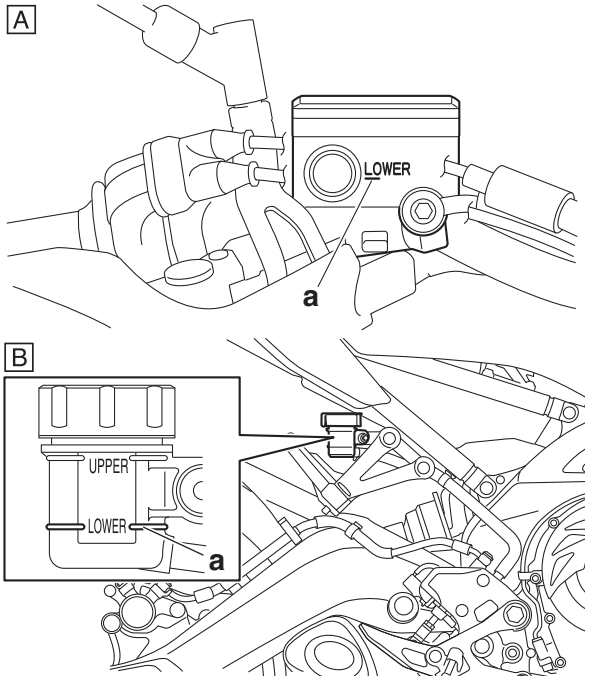
EAS30632
CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

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

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

Front brake
Specified brake fluid
DOT 4
Rear brake
Specified brake fluid
DOT 4



A. Front brake
B. Rear brake

EWA13090
WARNING
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

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

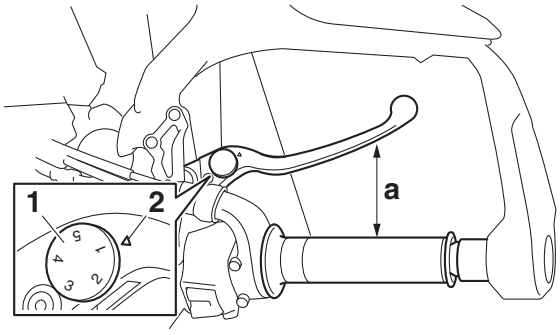
TIP
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

EAS30630
ADJUSTING THE FRONT DISC BRAKE

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

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

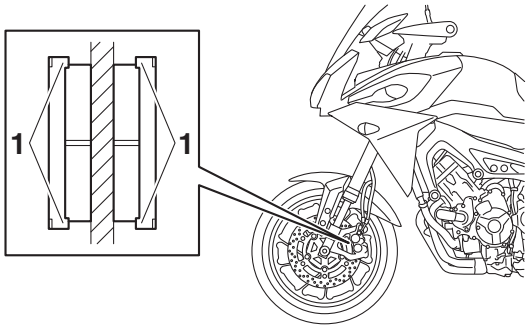
Position #1
Distance "a" is the largest.
Position #5
Distance "a" is the smallest.



EWA17050
WARNING
- **After adjusting the brake lever position, make sure the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.**
- **A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce brake performance resulting in loss of control and possibly cause an accident. Therefore, check and if necessary, bleed the brake system.**

ECA13490
NOTICE
After adjusting the brake lever position, make sure there is no brake drag.

EAS30633
CHECKING THE FRONT BRAKE PADS
The following procedure applies to all of the brake pads.
1. Operate the brake.
2. Check:
   - Front brake pad
     Wear indicators "1" almost touch the brake disc → Replace the brake pads as a set.
     Refer to "FRONT BRAKE" on page 4-35.



EAS30631
ADJUSTING THE REAR DISC BRAKE
1. Adjust:
   - Brake pedal position

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

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

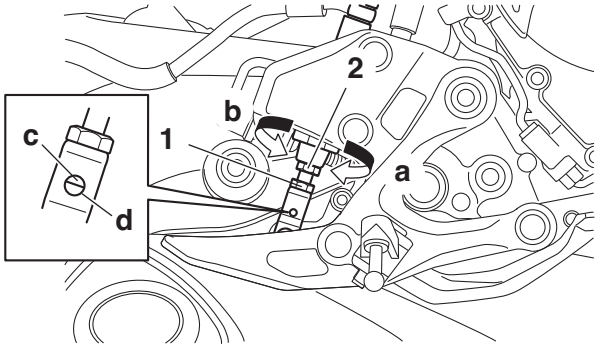
EWA13070
WARNING
After adjusting the brake pedal position, check that the end of the adjusting bolt "c" is visible through the hole "d".

c. Tighten the locknut "1" to specification.

Rear brake master cylinder lock nut
18 N·m (1.8 kgf·m, 13 lb·ft)

EWA17030
WARNING
A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.

ECA13510
NOTICE
After adjusting the brake pedal position, make sure there is no brake drag.



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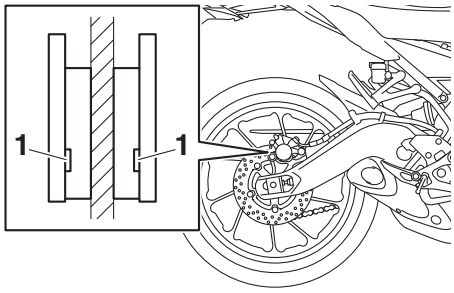
2. Adjust:
   • Rear brake light switch
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" on page 3-29.

EAS30634
CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the brake pads.
1. Operate the brake.
2. Check:
   • Rear brake pad
   Wear indicator grooves "1" almost disappeared → Replace the brake pads as a set.
   Refer to "REAR BRAKE" on page 4-48.



EAS30635
CHECKING THE FRONT BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose holders.
1. Check:
   • Brake hose
   Cracks/damage/wear → Replace.
2. Check:
   • Brake hose holder
   Loose → Tighten the holder bolt.
3. Hold the vehicle upright and apply the brake several times.
4. Check:
   • Brake hose
   Brake fluid leakage → Replace the damaged hose.
   Refer to "FRONT BRAKE" on page 4-35.

EAS30636
CHECKING THE REAR BRAKE HOSE
1. Check:
   • Brake hose
   Cracks/damage/wear → Replace.
2. Check:
   • Brake hose holder
   Loose Connection → Tighten the holder bolt.
3. Hold the vehicle upright and apply the rear brake several times.
4. Check:
   • Brake hose
   Brake fluid leakage → Replace the damaged hose.
   Refer to "REAR BRAKE" on page 4-48.

EAS30893
BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)
EWA14000
⚠ WARNING

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

ECA18050
NOTICE

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

EWA16530
⚠ WARNING

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

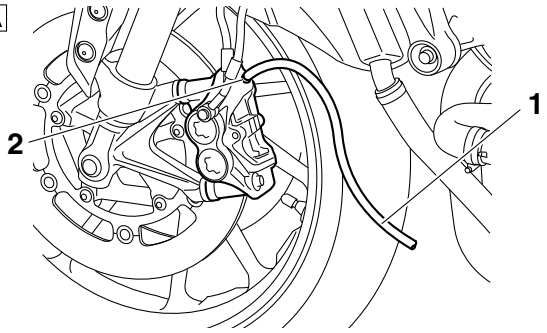
TIP
- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the ABS, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the ABS, considerably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

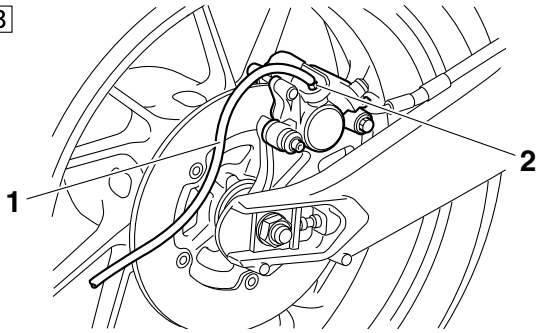
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

A



B



A. Front
B. Rear

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

TIP

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

h. Tighten the bleed screw and then release the brake lever or brake pedal.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Check the operation of the hydraulic unit.
Refer to "HYDRAULIC UNIT OPERATION TESTS" on page 4-65.

ECA17061

NOTICE

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 specified brake fluid.
l. Tighten the bleed screw to specification.

	Brake caliper bleed screw **5 N·m (0.5 kgf·m, 3.6 lb·ft)**

m. Fill the brake master cylinder reservoir or brake fluid reservoir to the proper level with the specified brake fluid.
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.

EWA13110

WARNING

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

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

EAS30638

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

EWA13260

WARNING

Never attempt to make any repairs to the wheel.

TIP

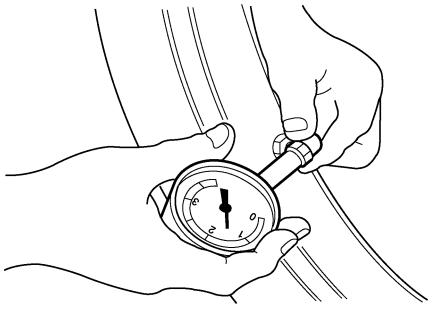
After a tire or wheel has been changed or replaced, always balance the wheel.

EAS30640

CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Check:
   • Tire pressure
   Out of specification → Regulate.



EWA13181

⚠ 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.

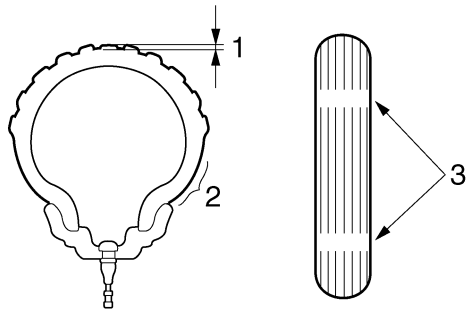
Tire air pressure (measured on cold tires)
1 person
Front
250 kPa (2.50 kgf/cm², 36 psi)
Rear
290 kPa (2.90 kgf/cm², 42 psi)
2 persons
Front
250 kPa (2.50 kgf/cm², 36 psi)
Rear
290 kPa (2.90 kgf/cm², 42 psi)
Maximum load
180 kg (397 lb)
***Total weight of rider, passenger, cargo and accessories**

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

EWA13190

⚠ WARNING

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



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

Wear limit (front)
1.5 mm (0.06 in) (AUS)
1.6 mm (0.06 in) (EUR)(RUS)
Wear limit (rear)
1.5 mm (0.06 in) (AUS)
1.6 mm (0.06 in) (EUR)(RUS)

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
120/70ZR17 M/C (58W)
Manufacturer/model
DUNLOP/D222F

Rear tire
Size
180/55ZR17 M/C (73W)
Manufacturer/model
DUNLOP/D222

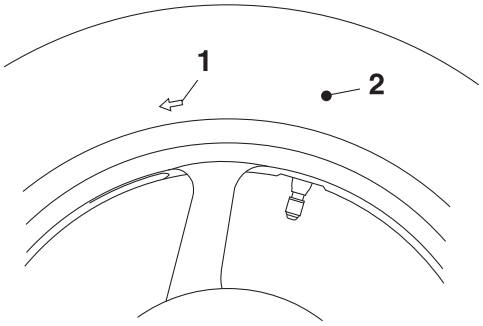
EWA13210

⚠ WARNING

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

TIP

For tires with a direction of rotation mark "1":
- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark "2" with the valve installation point.



EAS30641
CHECKING THE WHEEL BEARINGS
The following procedure applies to all of the wheel bearings.
1. Check:
   • Wheel bearings
   Refer to "CHECKING THE FRONT WHEEL" on page 4-21 and "CHECKING THE REAR WHEEL" on page 4-31.

EAS30802
CHECKING THE SWINGARM OPERATION
1. Check:
   • Swingarm operation
   Swingarm not working properly → Check the swingarm.
   Refer to "SWINGARM" on page 4-95.
2. Check:
   • Swingarm excessive play
   Refer to "SWINGARM" on page 4-95.

EAS30643
LUBRICATING THE SWINGARM PIVOT
1. Lubricate:
   • Oil seals
   • Collars

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

Refer to "INSTALLING THE SWINGARM" on page 4-97.

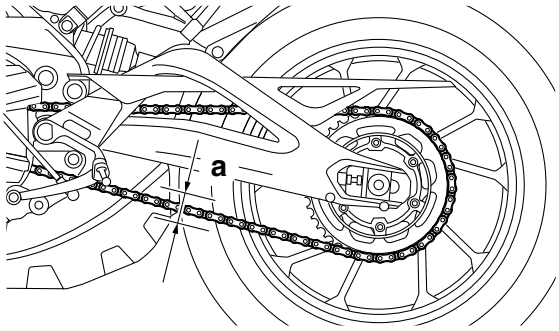
EAS31923
DRIVE CHAIN SLACK
Checking the drive chain slack
ECA13550
NOTICE
A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING
Securely support the vehicle so that there is no danger of it falling over.

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

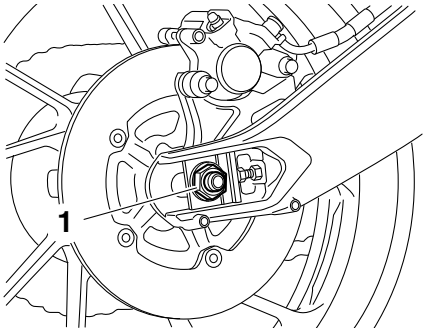
2. Shift the transmission into the neutral position.
3. Check:
   • Drive chain slack "a"
   Out of specification → Adjust.



	Drive chain slack **5.0–15.0 mm (0.20–0.59 in)**

ECA20870
NOTICE
Improper drive chain slack will overload the engine as well as other vital parts of the motorcycle and can lead to chain slippage or breakage. If the drive chain slack is more than the specified limit, the chain can damage the frame, swingarm, and other parts. To prevent this from occurring, keep the drive chain slack within the specified limits.

Adjusting the drive chain slack
1. Loosen:
   • Wheel axle nut "1"



2. Adjust:
   • Drive chain slack

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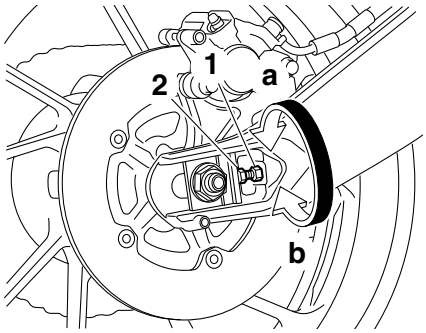
a. Loosen both locknuts "1".
b. Turn both adjusting bolts "2" in direction "a" or "b" until the specified drive chain slack is obtained.

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



TIP
- To maintain the proper wheel alignment, adjust both sides evenly.
- There should be no clearance between the adjusting block and adjusting bolt.

c. Tighten the wheel axle nut to specification.

	Rear wheel axle nut **150 N·m (15 kgf·m, 108 lb·ft)**

d. Tighten the locknuts to specification.

	Chain puller adjusting bolt locknut **16 N·m (1.6 kgf·m, 12 lb·ft)**

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EAS30803
LUBRICATING THE DRIVE CHAIN
The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the vehicle is used in dusty areas.
This vehicle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.

	Recommended lubricant **Chain lubricant suitable for O-ring chains**

EAS30645
CHECKING AND ADJUSTING THE STEERING HEAD
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

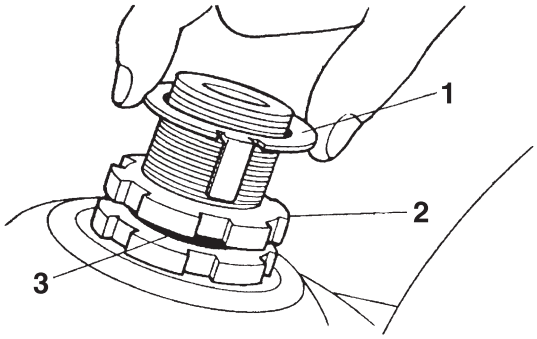
Securely support the vehicle so that there is no danger of it falling over.

TIP
Place the vehicle on a maintenance 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.
     Blinding/looseness → Adjust the steering head.
3. Remove:
   - Upper bracket
4. Adjust:
   - Steering head

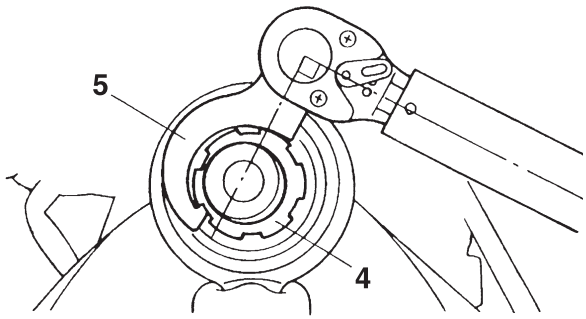
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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



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

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



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

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

c. Loosen the lower ring nut "6" completely, then tighten it to specification.

EWA13140

⚠ WARNING

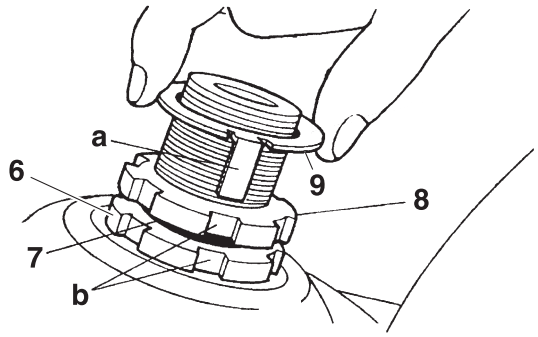
Do not overtighten the lower ring nut.

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

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 4-87.
e. Install the rubber washer "7".
f. Install the upper ring nut "8".
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 "9".

TIP

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



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5. Install:
   • Upper bracket
   Refer to "HANDLEBAR" on page 4-69.

EAS30646

LUBRICATING THE STEERING HEAD

1. Lubricate:
   • Upper bearing
   • Lower bearing
   • Bearing race

Recommended lubricant
Lithium-soap-based grease

EAS31186

CHECKING THE CHASSIS FASTENERS

Make sure that all nuts, bolts, and screws are properly tightened.
Refer to "CHASSIS TIGHTENING TORQUES" on page 2-13.

EAS30804

LUBRICATING THE BRAKE LEVER

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

Recommended lubricant
Silicone grease

EAS30805

LUBRICATING THE CLUTCH LEVER

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

Recommended lubricant
Lithium-soap-based grease

EAS30649

LUBRICATING THE PEDAL

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

Recommended lubricant
Lithium-soap-based grease

EAS30851

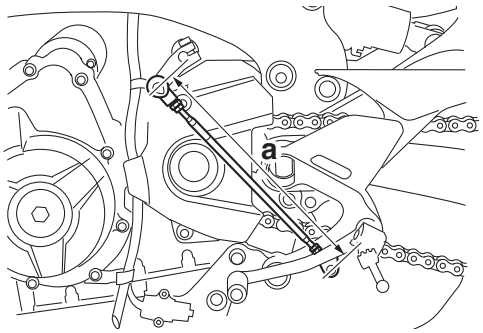
ADJUSTING THE SHIFT PEDAL

TIP

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

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

Installed shift rod length
256.9–258.9 mm (10.11–10.19 in)



2. Adjust:
   • Installed shift rod length

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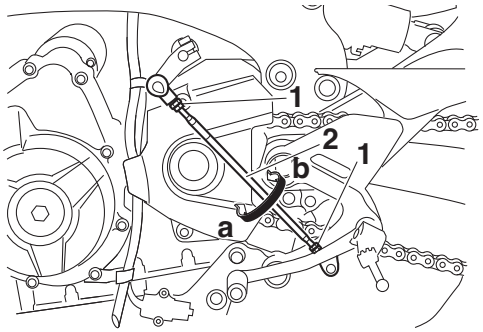
a. Loosen both locknuts "1".
b. Turn the shift rod "2" in direction "a" or "b" to obtain the correct shift pedal position.

Direction "a"
Installed shift rod length increases.
Direction "b"
Installed shift rod length decreases.



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

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EAS30650
CHECKING THE SIDESTAND
1. Check:
   • Sidestand operation
   Check that the sidestand moves smoothly.
   Rough movement → Repair or replace.

EAS30651
LUBRICATING THE SIDESTAND
Lubricate the pivoting point, metal-to-metal moving parts and spring contact point of the sidestand.

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

EAS30856
CHECKING THE CENTERSTAND
1. Check:
   • Centerstand operation
   Check that the centerstand moves smoothly.
   Rough movement → Repair or replace.

EAS30857
LUBRICATING THE CENTERSTAND
Lubricate the pivoting point and metal-to-metal moving parts of the centerstand.

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

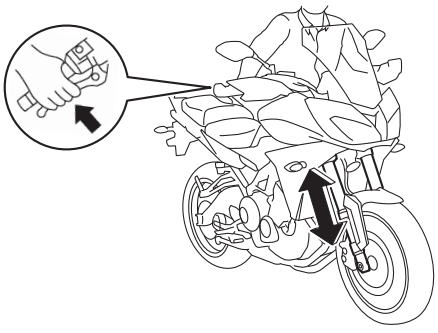
EAS30652
CHECKING THE SIDESTAND SWITCH
Refer to "ELECTRICAL COMPONENTS" on page 8-149.

EAS30653
CHECKING THE FRONT FORK
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

2. Check:
   • Inner tube
   Damage/scratches → Replace.
   • Front fork leg
   Oil leaks between inner tube and outer tube → Replace the oil seal.
3. Hold the vehicle upright and apply the front brake.
4. Check:
   • Front fork operation
   Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
   Rough movement → Repair.
   Refer to "FRONT FORK" on page 4-76.



EAS30806
ADJUSTING THE FRONT FORK LEGS
The following procedure applies to both of the

front fork legs.

EWA13120

⚠ WARNING

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

Spring preload

EWA17040

⚠ WARNING

Always adjust both front fork legs evenly. Uneven adjustment can result in poor handling and loss of stability.

ECA13590

NOTICE

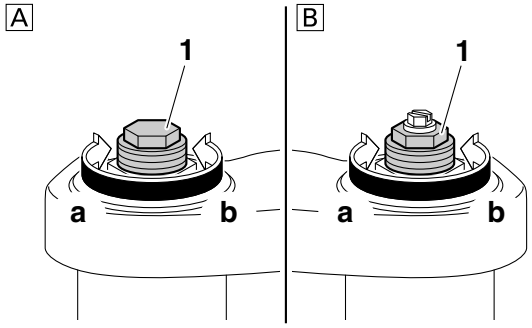
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • Spring preload

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

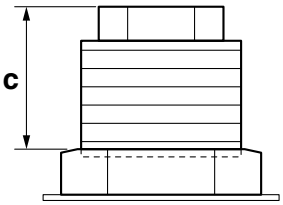
Direction "a"
Spring preload is increased (suspension is harder).
Direction "b"
Spring preload is decreased (suspension is softer).



A. Left side
B. Right side

TIP

The spring preload setting is determined by measuring the distance "c" shown in the illustration. The shorter distance "c" is, the higher the spring preload; the longer distance "c" is, the lower the spring preload.



Spring preload
Minimum
19 mm (0.75 in)
Standard
16 mm (0.63 in)
Maximum
4 mm (0.16 in)

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Rebound damping (right side only)

ECA13590

NOTICE

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • Rebound damping

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

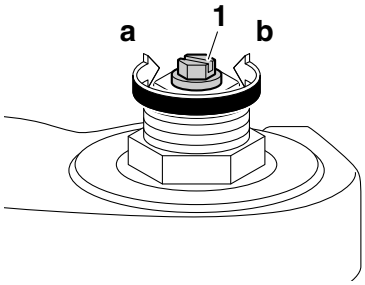
Direction "a"
Rebound damping is increased (suspension is harder).
Direction "b"
Rebound damping is decreased (suspension is softer).

Rebound damping
Minimum (soft)
12 click(s) in direction "b"*
Standard
7 click(s) in direction "b"*
Maximum (hard)
1 click(s) in direction "b"*
*** With the adjusting screw fully turned in direction "a"**

TIP

Although the total number of clicks of a damping force adjusting mechanism may not exactly match the above specifications due to small differences in production, the actual number of clicks always represents the entire adjusting

range. To obtain a precise adjustment, it would be advisable to check the number of clicks of each damping force adjusting mechanism and to modify the specifications as necessary.



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EAS30808

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

Refer to "CHECKING THE REAR SHOCK ABSORBER ASSEMBLY" on page 4-92.

EAS30655

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

NOTICE

Never go beyond the maximum or minimum adjustment positions.

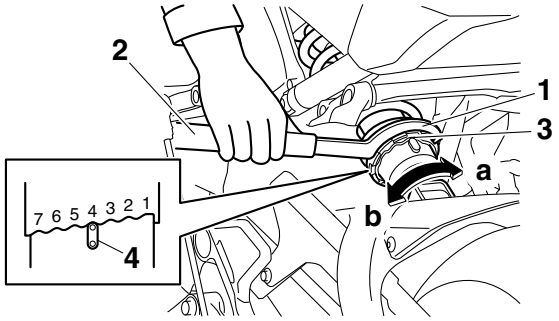
1. Adjust:
   • Spring preload

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Adjust the spring preload with the special wrench "1" and extension bar "2" included in the owner's tool kit.
b. Turn the adjusting ring "3" in direction "a" or "b".
c. Align the desired position on the adjusting ring with the stopper "4".

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

Spring preload
Adjustment value (Soft)
1
Adjustment value (STD)
4
Adjustment value (Hard)
7



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Rebound damping

ECA13590

NOTICE

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • Rebound damping

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

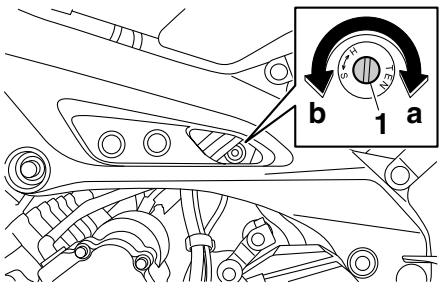
Direction "a"
Rebound damping is increased (suspension is harder).
Direction "b"
Rebound damping is decreased (suspension is softer).

Rebound damping
Minimum (soft)
3 turn(s) in direction "b"*
Standard
1+1/2 turn(s) in direction "b"*
Maximum (hard)
Adjusting screw fully turned in direction "a"
*** With the adjusting screw fully turned in direction "a"**

TIP

To obtain a precise adjustment, it is advisable to check the actual total number of turns of the damping force adjusting mechanism. This adjustment range may not exactly match the spec-

ifications listed due to small differences in production.



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EAS30809

CHECKING THE CONNECTING ARM AND RELAY ARM

Refer to "CHECKING THE CONNECTING ARM AND RELAY ARM" on page 4-92.

EAS30656

CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

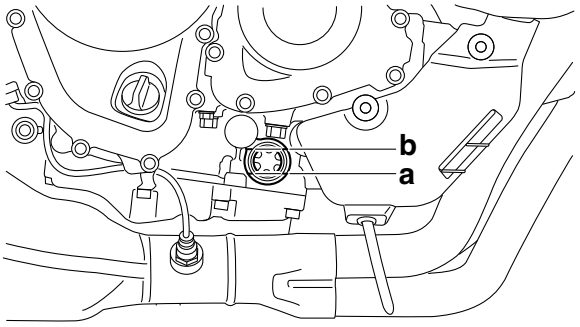
TIP

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

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

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

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



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

ECA13361

NOTICE

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

TIP

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

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

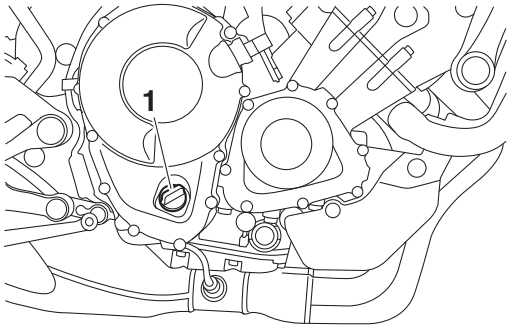
TIP

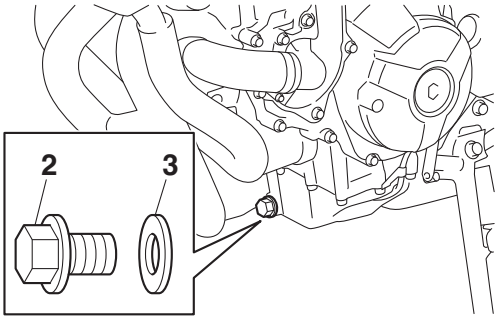
Before checking the engine oil level, wait a few minutes until the oil has settled.

EAS30657

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"
   - Gasket "3"





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

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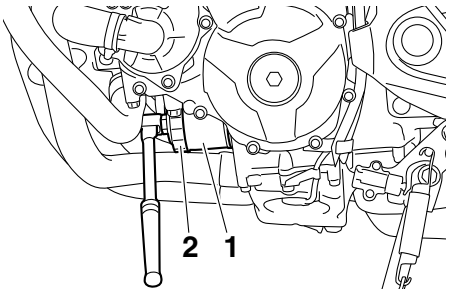
a. Remove the oil filter cartridge "1" with an oil filter wrench "2".

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

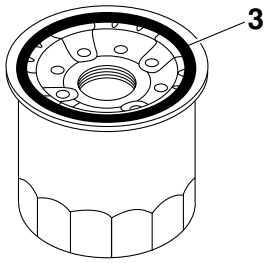


b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of engine oil.

ECA13390

NOTICE

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



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

Oil filter cartridge
17 N·m (1.7 kgf·m, 12 lb·ft)

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

Engine oil drain bolt
43 N·m (4.3 kgf·m, 31 lb·ft)

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

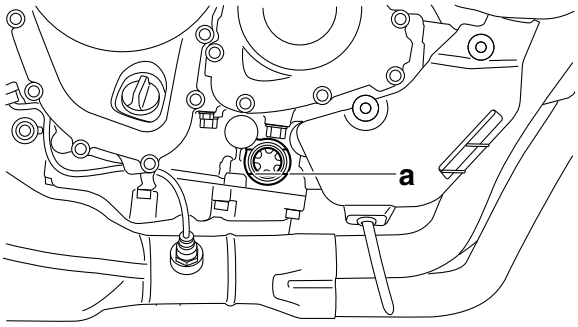
Engine oil quantity
Quantity (disassembled)
3.40 L (3.59 US qt, 2.99 Imp.qt)
Oil change
2.40 L (2.54 US qt, 2.11 Imp.qt)
With oil filter removal
2.70 L (2.85 US qt, 2.38 Imp.qt)

8. Install:
   • Engine oil filler cap
   (along with the O-ring New)
9. Start the engine, warm it up for several minutes, and then turn it off.
10. Check:
    • Engine
    (for engine oil leaks)
11. Check:
    • Engine oil level
    Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-24.

EAS30810

MEASURING THE ENGINE OIL PRESSURE

1. Check:
   • Engine oil level
   Below the minimum level mark "a" → Add the recommended engine oil to the proper level.



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

ECA13410

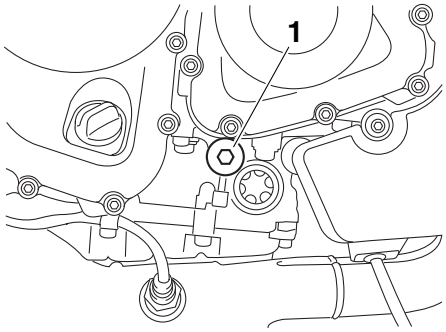
NOTICE

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

3. Remove:
   • Main gallery bolt "1"

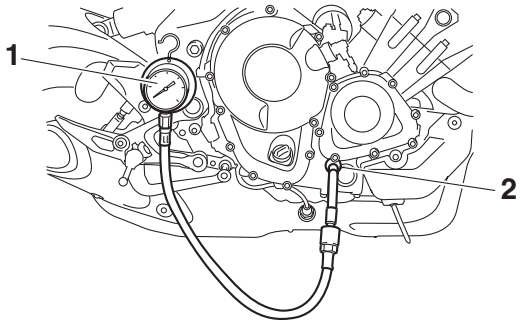
EWA12980
⚠ WARNING

The engine, muffler and engine oil are extremely hot.



4. Install:
   • Pressure gauge “1”
   • Oil pressure adapter H “2”

Pressure gauge
90890-03153
Pressure gauge
YU-03153
Oil pressure adapter H
90890-03139



5. Measure:
   • Oil pressure
   (at the following conditions)

Oil pressure
230.0 kPa/5000 r/min (2.30 kgf/cm²/5000 r/min, 33.4 psi/5000 r/min)

Out of specification → Check.

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

6. Install:
   • Main gallery bolt

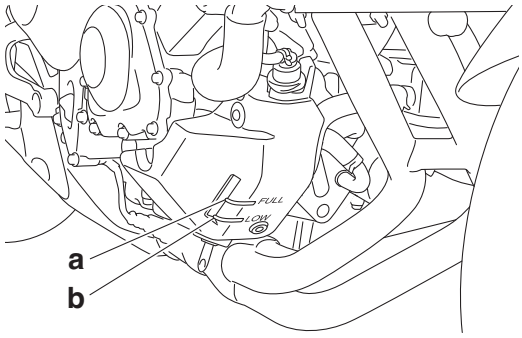
Main gallery bolt
8 N·m (0.8 kgf·m, 5.8 lb·ft)

EAS30811
CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

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

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



ECA21281
NOTICE

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

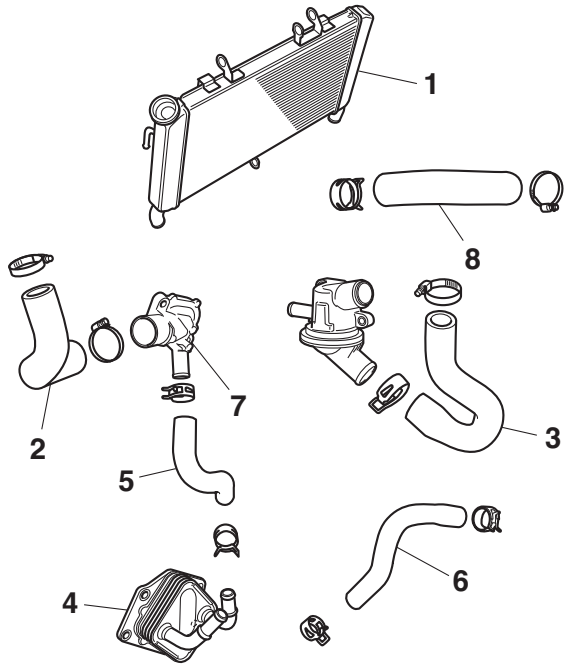
3. Start the engine, warm it up for several minutes, and then turn it off.
4. Check:
   • Coolant level

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

EAS30812
CHECKING THE COOLING SYSTEM

1. Check:
   • Radiator “1”
   • Radiator inlet hose “2”
   • Radiator outlet hose “3”

- Oil cooler “4”
- Oil cooler inlet hose “5”
- Oil cooler outlet hose “6”
- Water jacket joint “7”
- Water pump inlet hose “8”
  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 6-8.

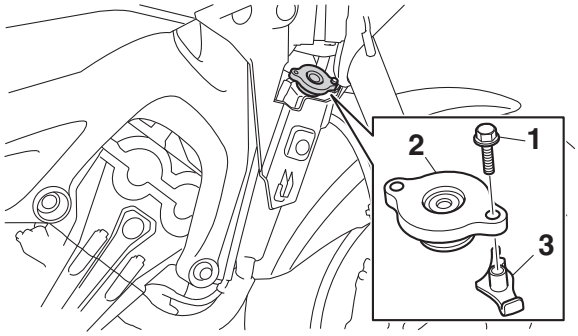


EAS30813
CHANGING THE COOLANT

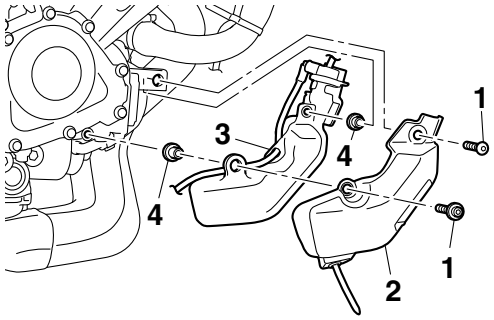
1. Remove:
   - Front side panel (right)
     Refer to “GENERAL CHASSIS (2)” on page 4-6.
   - Radiator cap bolt “1”
   - Radiator cap “2”
   - Radiator cap stopper “3”

EWA13030
⚠ WARNING

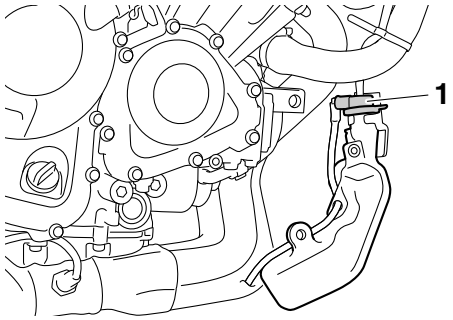
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly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



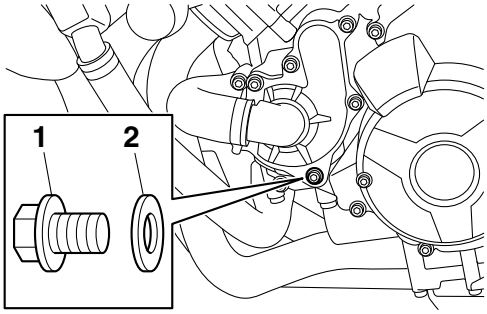
2. Remove:
   - Coolant reservoir bolt “1”
   - Coolant reservoir cover “2”
   - Coolant reservoir “3”
   - Collars “4”



3. Remove:
   - Coolant reservoir cap “1”



4. Drain:
   - Coolant
     (from the coolant reservoir)
5. Remove:
   - Water pump drain bolt “1”
   - Copper washer “2”



6. Drain:
   • Coolant
   (from the engine and radiator)
7. Install:
   • Water pump drain bolt
   • Copper washer New

	Water pump drain bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

8. Install:
   • Collars
   • Coolant reservoir
   • Coolant reservoir cover
   • Coolant reservoir bolt

	Coolant reservoir bolt (M5) **0.5 N·m (0.05 kgf·m, 0.36 lb·ft)** **Coolant reservoir bolt (M6)** **9 N·m (0.9 kgf·m, 6.5 lb·ft)**

9. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)

	Recommended antifreeze **High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines** **Mixing ratio** **1:1 (antifreeze: water)** **Radiator (including all routes)** **1.93 L (2.04 US qt, 1.70 Imp.qt)** **Coolant reservoir (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.**

ECA21291

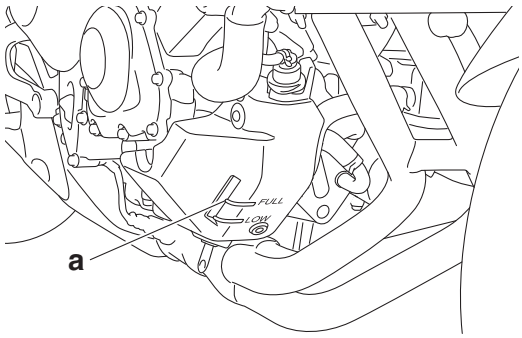
NOTICE

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

10. Install:
    • Radiator cap stopper
    • Radiator cap
    • Radiator cap bolt

	Radiator cap bolt **5 N·m (0.5 kgf·m, 3.6 lb·ft)**

    • Front side panel (right)
    Refer to “GENERAL CHASSIS (2)” on page 4-6.
11. Fill:
    • Coolant reservoir
    (with the recommended coolant to the maximum level mark “a”)



12. Install:
    • Coolant reservoir cap
13. Start the engine, warm it up for several minutes, and then turn it off.
14. Check:
    • Coolant level
    Refer to “CHECKING THE COOLANT LEVEL” on page 3-26.

TIP

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

EAS30814

CHECKING THE FRONT BRAKE LIGHT SWITCH

Refer to “ELECTRICAL COMPONENTS” on page 8-149.

EAS30659
ADJUSTING THE REAR BRAKE LIGHT SWITCH

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

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

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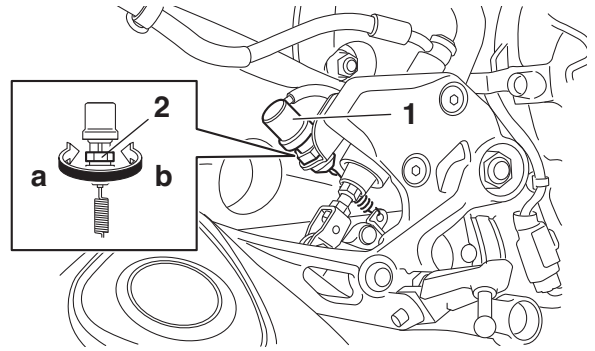
a. Hold the main body "1" of the rear brake light switch so that it does not rotate and turn the adjusting nut "2" in direction "a" or "b" until the rear brake light comes on at the proper time.

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



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EAS30660
CHECKING AND LUBRICATING THE CABLES

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

EWA13270
⚠ WARNING

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

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

Recommended lubricant
Engine oil or a suitable cable lubricant

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

EAS30815
CHECKING THE THROTTLE GRIP

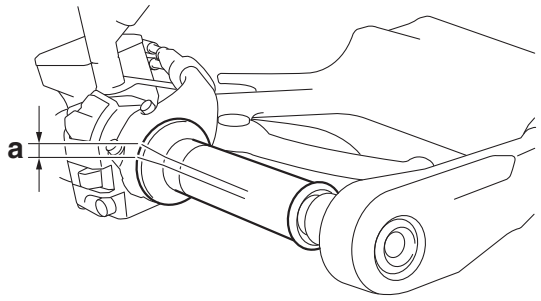
1. Check:
   • Throttle cables
   Damage/deterioration → Replace.
   • Throttle cable installation
   Incorrect → Reinstall the throttle cables.
   Refer to "HANDLEBAR" on page 4-69.
2. Check:
   • Throttle grip movement
   Rough movement → Lubricate or replace the defective part(s).

Recommended lubricant
Suitable cable lubricant

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

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

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



4. Adjust:
   • Throttle grip free play

TIP
Prior to adjusting the throttle grip free play, throt-

tle body synchronization should be adjusted properly.

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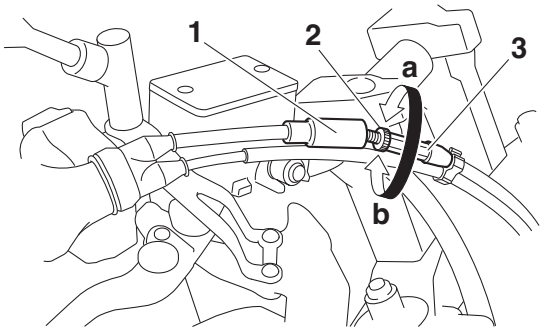
a. Slide back the rubber cover "1".
b. Loosen the locknut "2".
c. Turn the adjusting nut "3" in direction "a" or "b" until the specified throttle grip free play is obtained.

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



d. Tighten the locknut.
e. Slide the rubber cover to its original position.

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

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EAS30816
CHECKING AND CHARGING THE BATTERY
Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.

EAS30662
CHECKING THE FUSES
Refer to "CHECKING THE FUSES" on page 8-157.

EAS30664
ADJUSTING THE HEADLIGHT BEAMS
1. Adjust:
   • Headlight beam (vertically)

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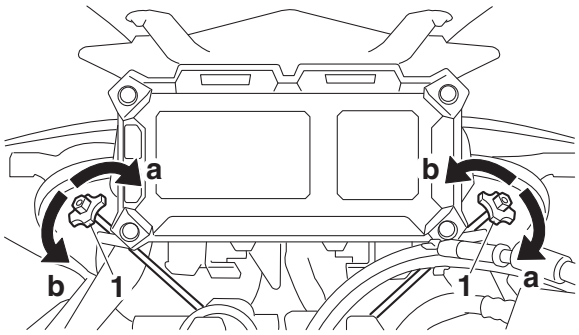
a. Turn the adjusting knobs "1" in direction "a" or "b".

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



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2. Adjust:
   • Headlight beam (horizontally)

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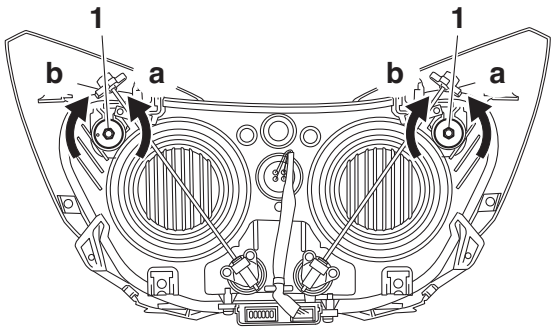
a. Turn the adjusting screws "1" in direction "a" or "b".
   Headlight (left)

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

   Headlight (right)

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



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CHASSIS

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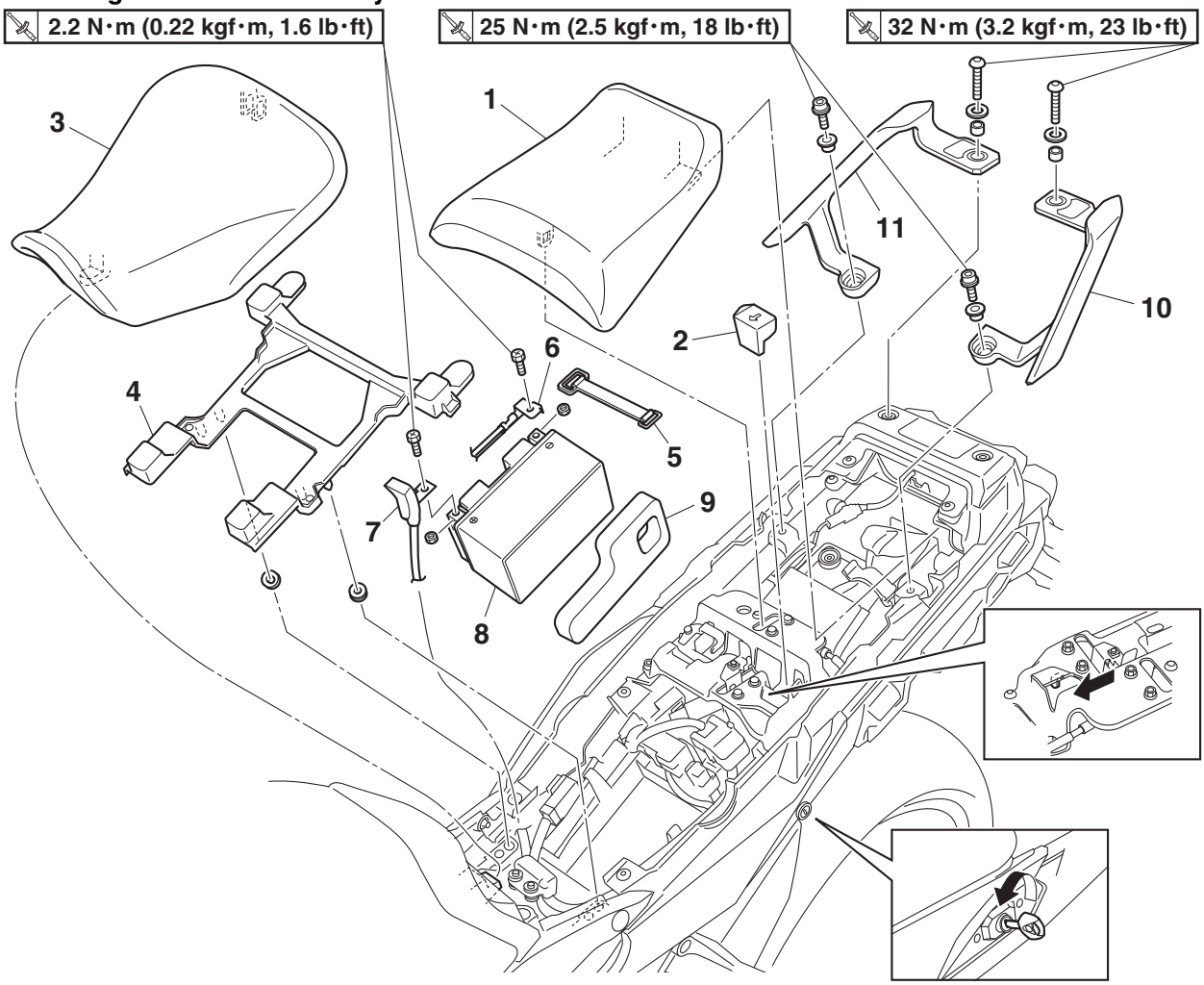
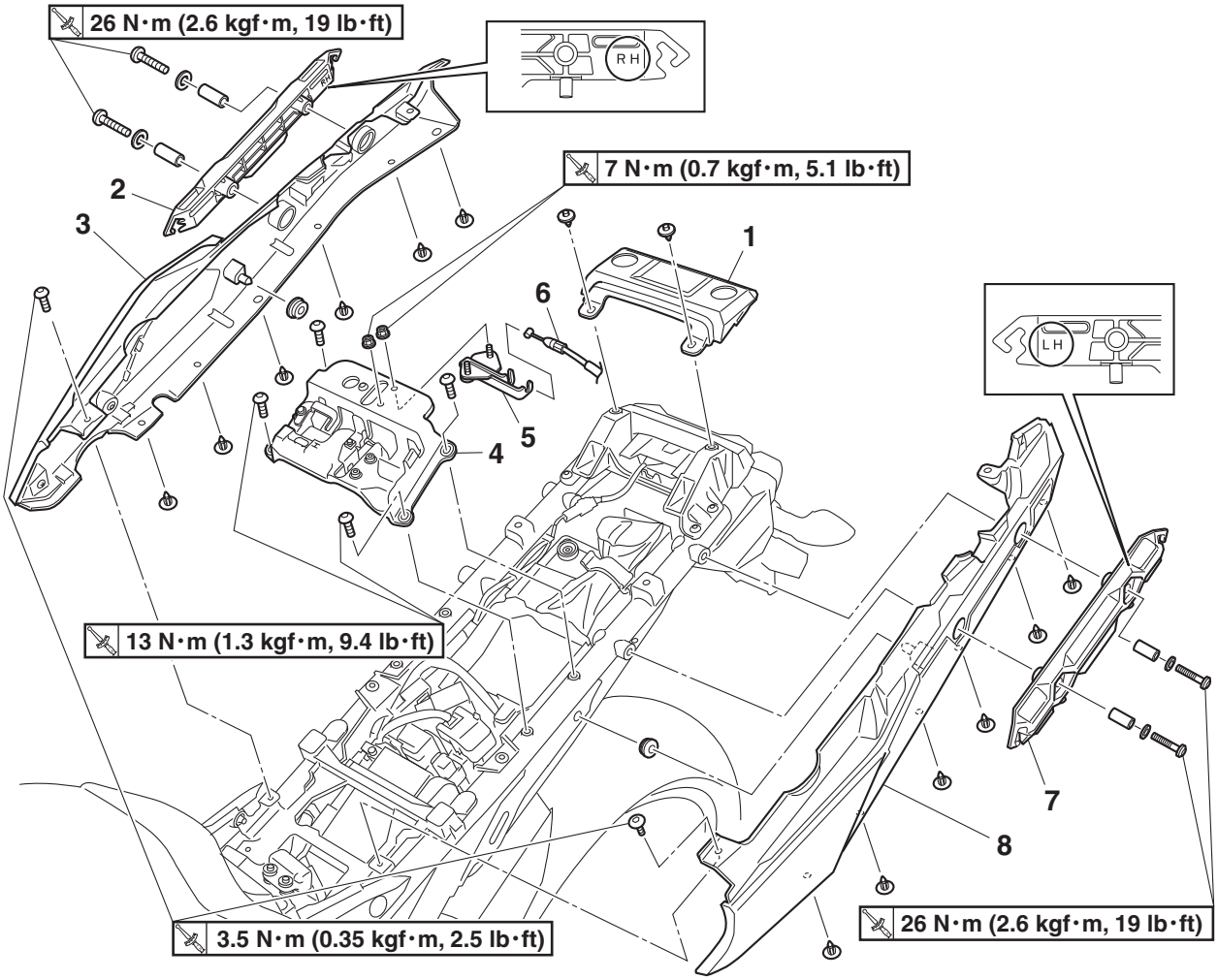
EAS20026
GENERAL CHASSIS (1)

Removing the seats and battery



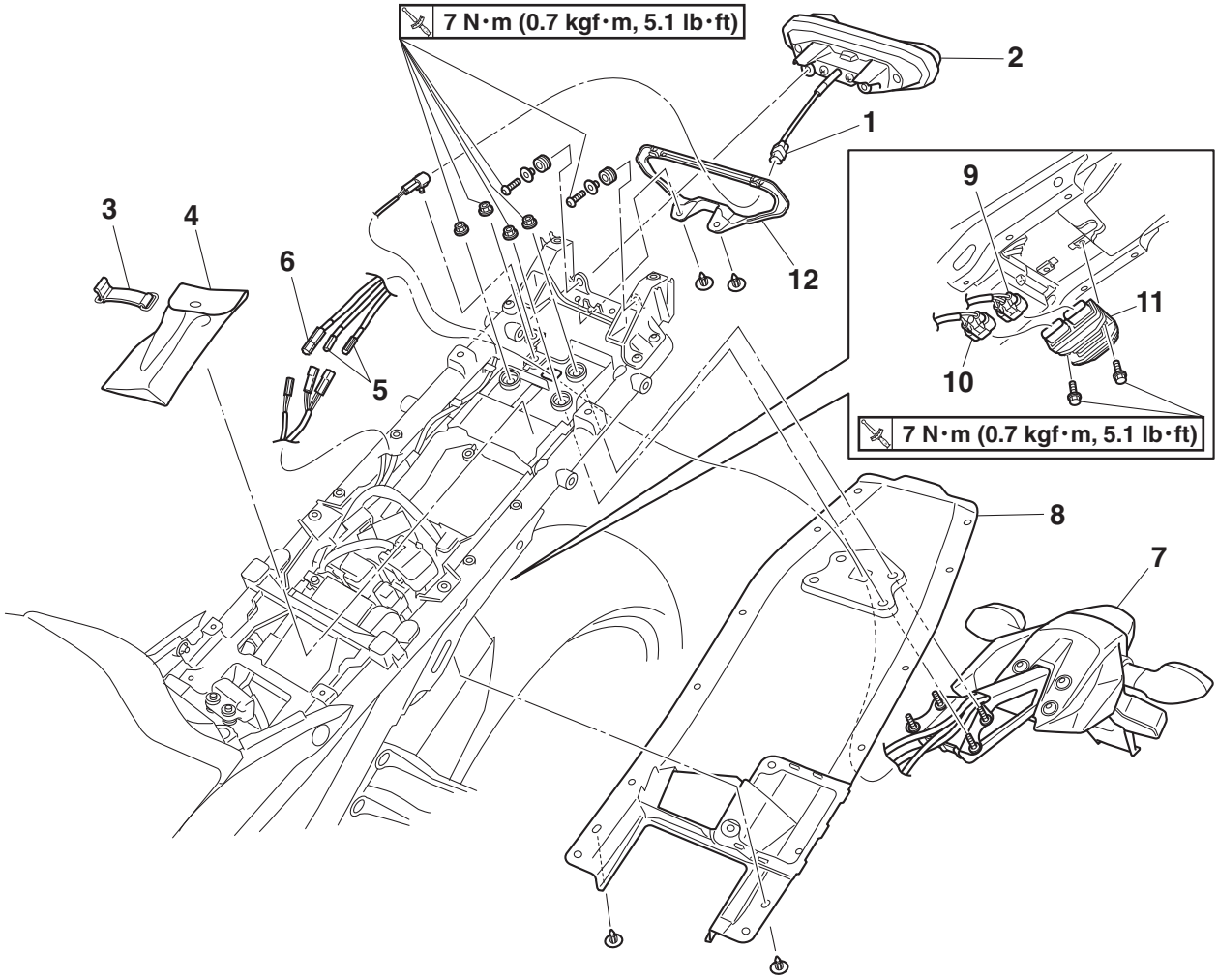
Order	Job/Parts to remove	Q'ty	Remarks
1	Passenger seat	1	
2	Cap	1	
3	Rider seat	1	
4	Rider seat height position adjuster	1	
5	Battery band	1	
6	Negative battery lead	1	Disconnect.
7	Positive battery lead	1	Disconnect.
8	Battery	1	
9	Spacer	1	
10	Grab bar (left)	1	
11	Grab bar (right)	1	

Removing the rear side covers



Order	Job/Parts to remove	Q'ty	Remarks
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Grab bar		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Top cover	1	
2	Stay (right)	1	
3	Rear side cover (right)	1	
4	Seat lock bracket	1	
5	Seat lock assembly	1	
6	Seat lock cable	1	Disconnect.
7	Stay (left)	1	
8	Rear side cover (left)	1	

Removing the tail/brake light and mudguard assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Grab bar		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Rear side cover		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Tail/brake light coupler	1	Disconnect.
2	Tail/brake light	1	
3	Owner's tool kit band	1	
4	Owner's tool kit	1	
5	Rear turn signal light coupler	2	Disconnect.
6	License plate light coupler	1	Disconnect.
7	Mudguard assembly	1	
8	Lower tail cover	1	
9	Stator coil coupler	1	Disconnect.
10	Rectifier/regulator coupler	1	Disconnect.
11	Rectifier/regulator	1	
12	Tail/brake light cover	1	

EAS30125
INSTALLING THE SEATS

1. Install:
   - Rider seat height position adjuster “1”
   - Rider seat “2”

TIP
The rider seat height can be adjusted to one of two positions to suit the rider’s preference.

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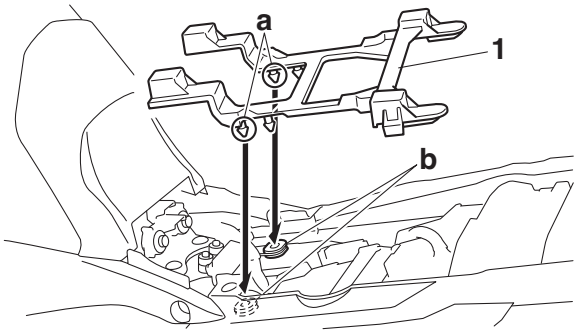
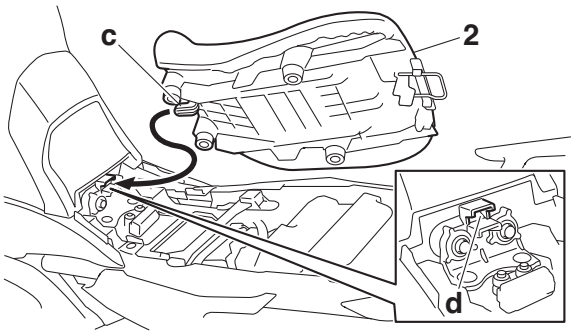
To install the rider seat in the high position

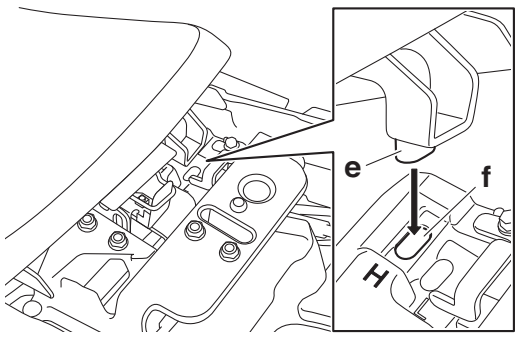
a. Insert the projection “a” on the rider seat height position adjuster into the grommet “b”.



b. Insert the projection “c” on the front of the rider seat into the seat holder “d”.



c. Align the projection “e” on the bottom of the rider seat with the “H” position slot “f”, and then push the rear of the seat down to lock it in place as shown.



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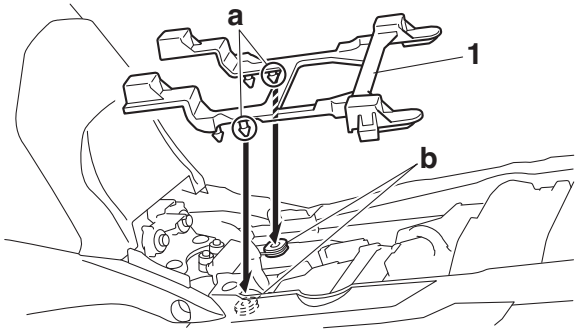
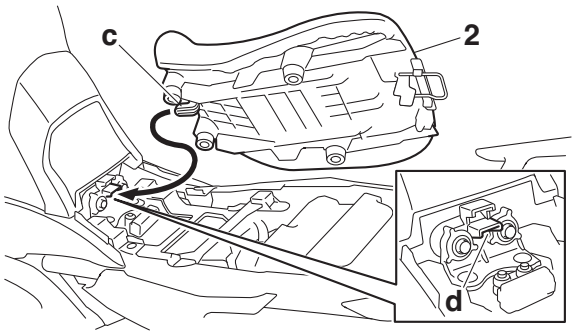
To install the rider seat in the low position

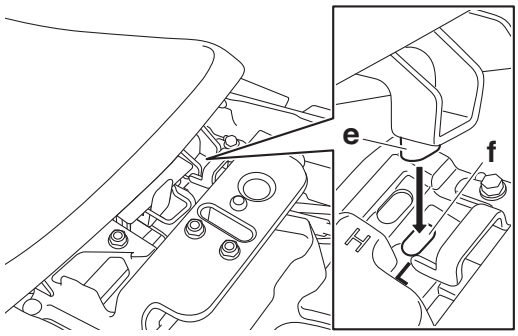
a. Insert the projection “a” on the rider seat height position adjuster into the grommet “b”.



b. Insert the projection “c” on the front of the rider seat into the seat holder “d”.



c. Align the projection “e” on the bottom of the rider seat with the “L” position slot “f”, and then push the rear of the seat down to lock it in place as shown.



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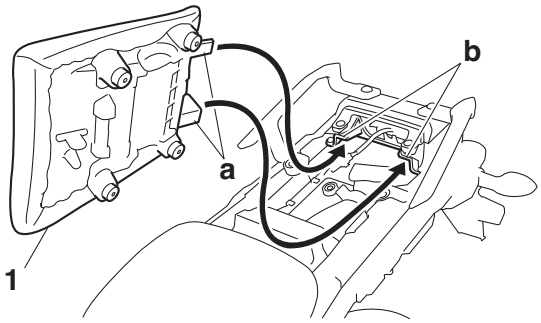
2. Install:
   - Cap
   - Passenger seat “1”

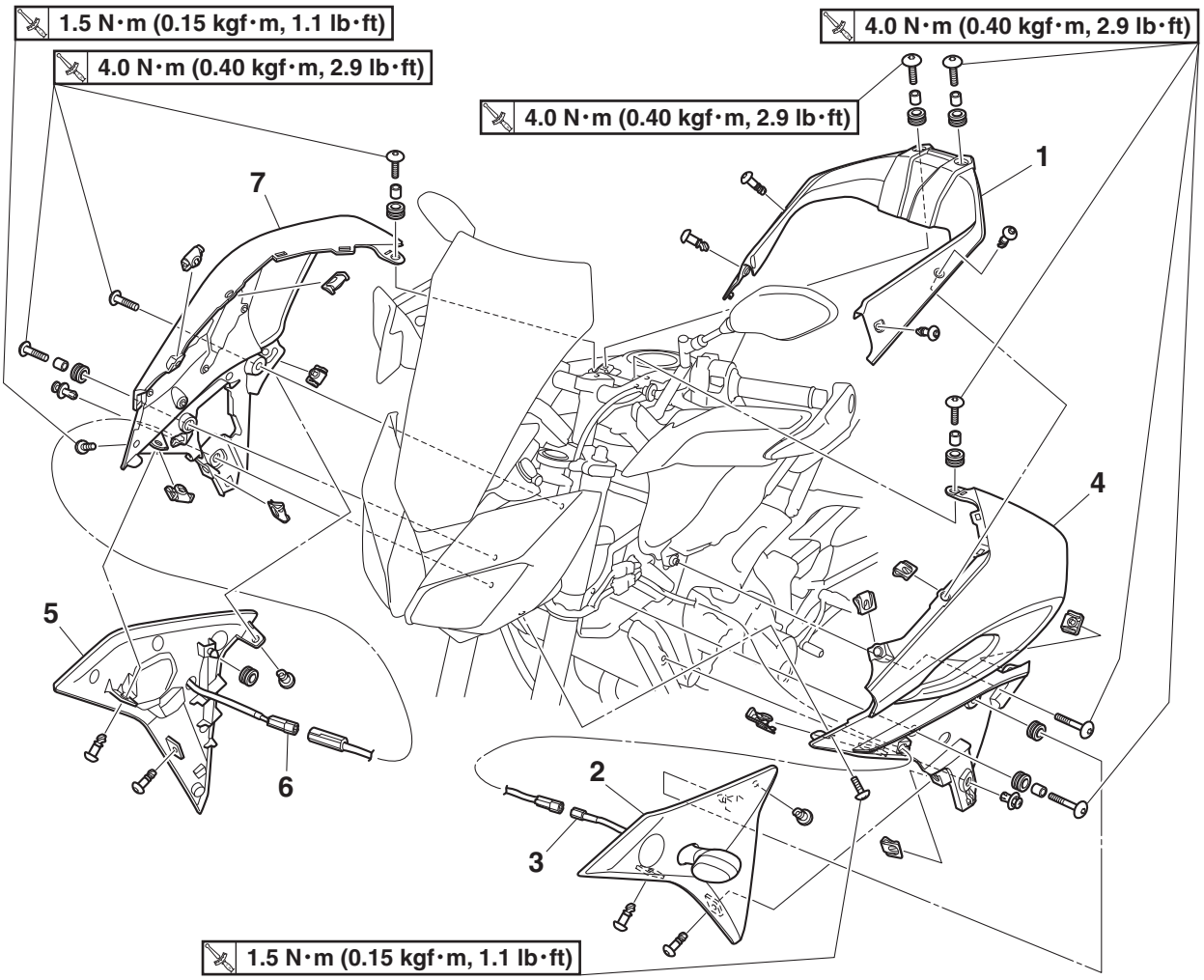
TIP
Insert the parts “a” on the rear of the passenger seat into the seat holders “b” and then push the front of the seat down to lock it in place.


b
a
1

EAS20155

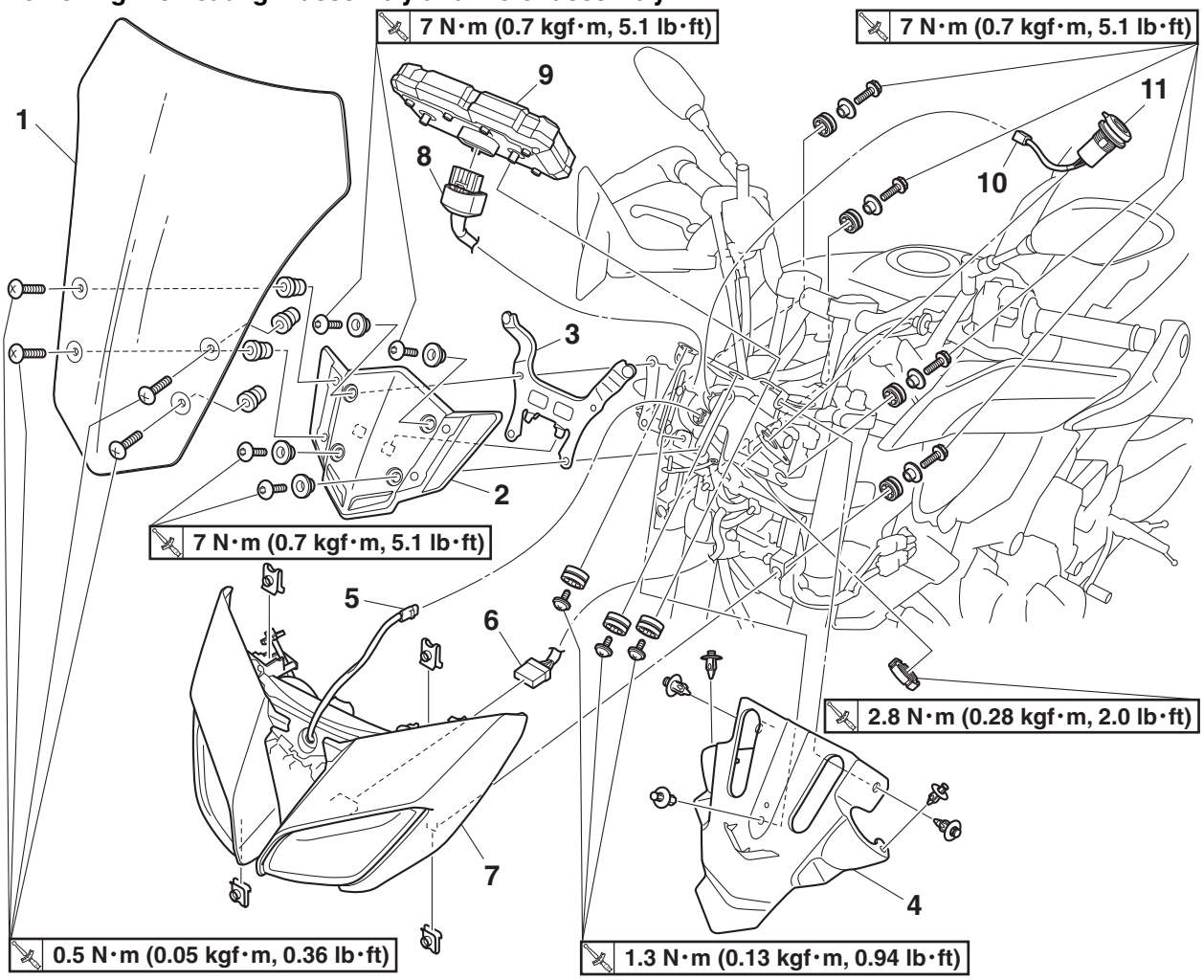
GENERAL CHASSIS (2)

Removing the fuel tank front cover, front side panels and front side cowlings



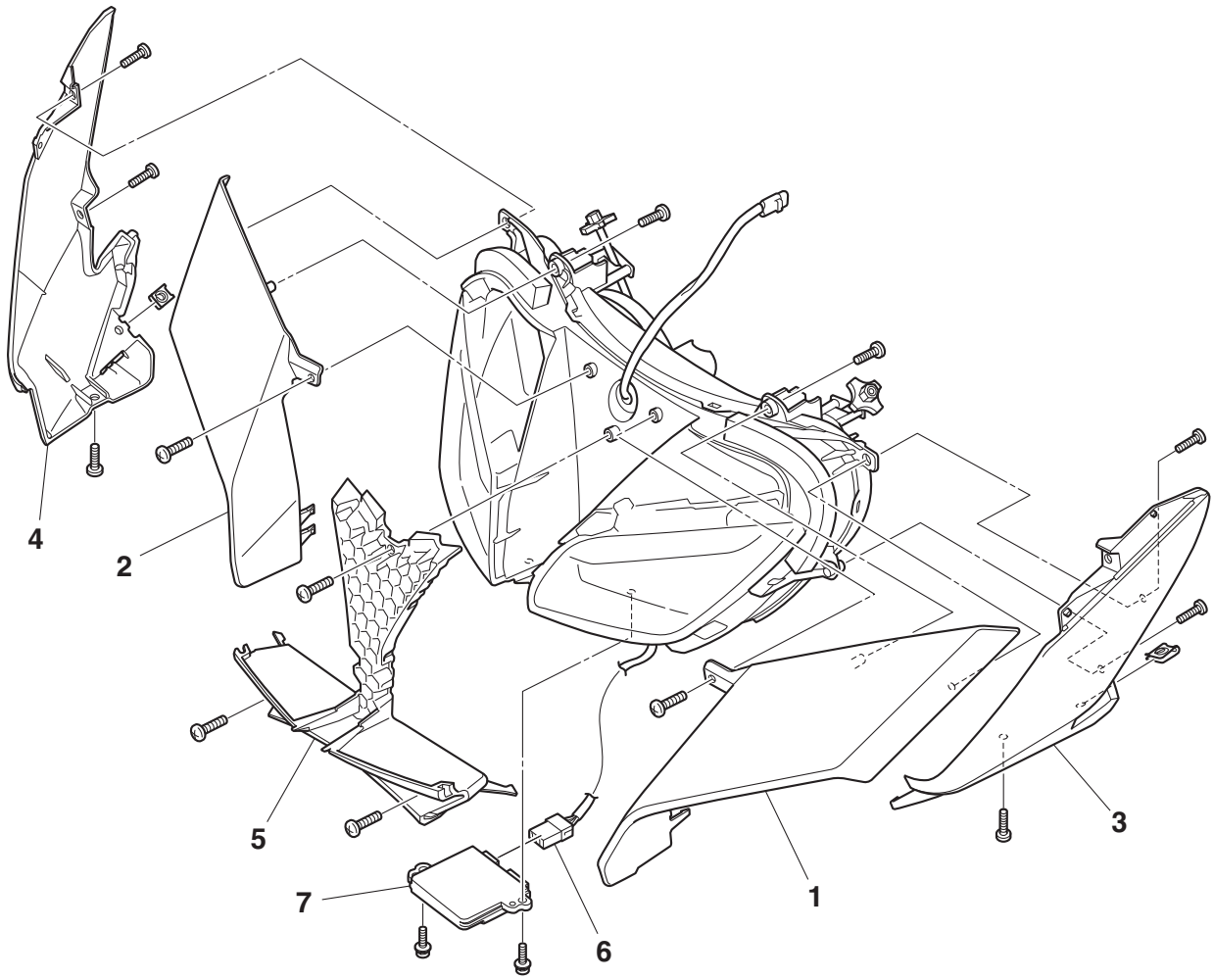
Order	Job/Parts to remove	Q'ty	Remarks
1	Fuel tank front cover	1	
2	Front side panel (left)	1	
3	Turn signal light coupler (left)	1	Disconnect.
4	Front side cowling (left)	1	
5	Front side panel (right)	1	
6	Turn signal light coupler (right)	1	Disconnect.
7	Front side cowling (right)	1	

Removing the headlight assembly and meter assembly



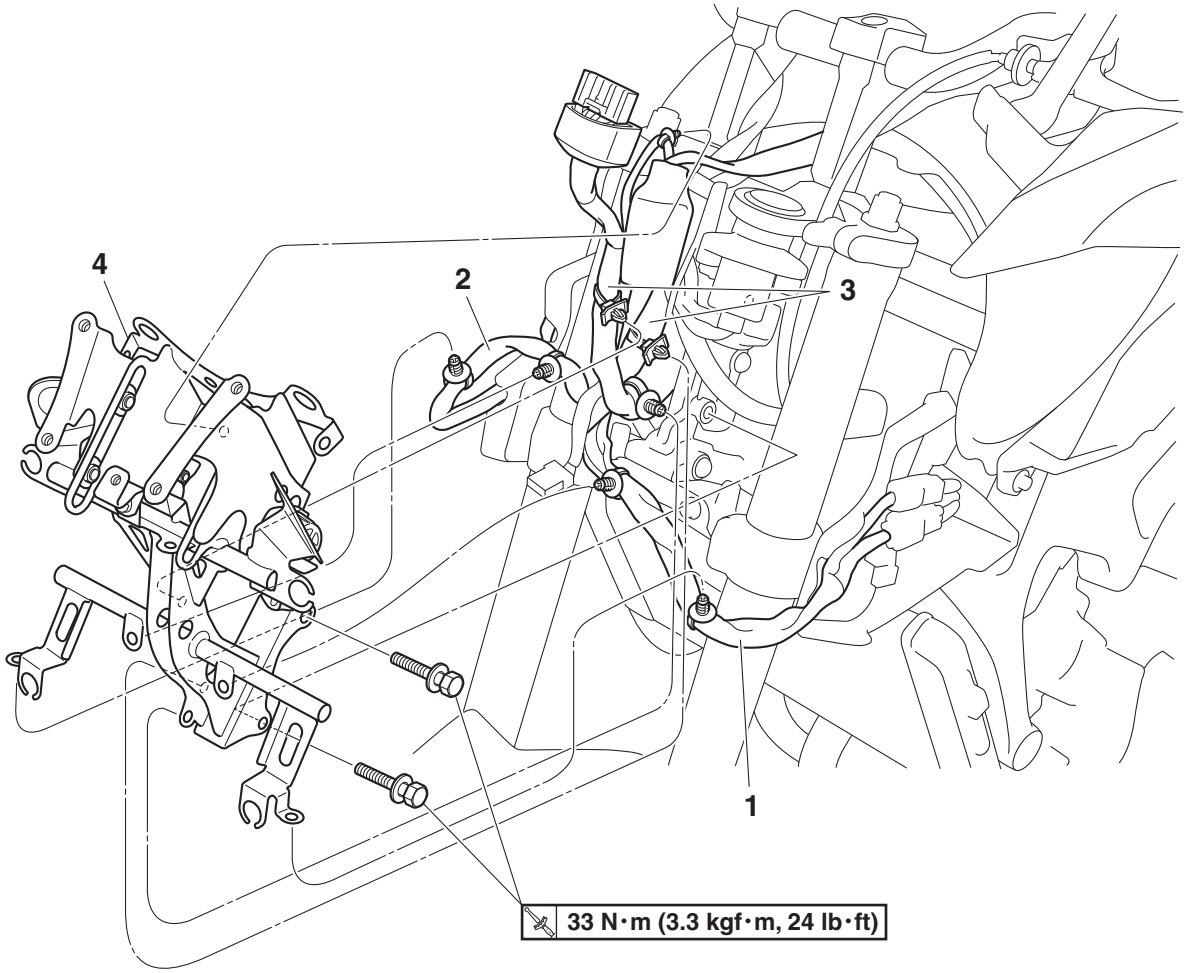
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
1	Windshield	1	
2	Front cover	1	
3	Support stay	1	
4	Inner panel	1	
5	Auxiliary light coupler	1	Disconnect.
6	Headlight coupler	1	Disconnect.
7	Headlight assembly	1	
8	Meter assembly coupler	1	Disconnect.
9	Meter assembly	1	
10	Auxiliary DC jack coupler	1	Disconnect.
11	Auxiliary DC jack	1	

Disassembling the headlight assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Headlight top cover (left)	1	
2	Headlight top cover (right)	1	
3	Headlight side cover (left)	1	
4	Headlight side cover (right)	1	
5	Center cover	1	
6	Headlight control unit coupler	1	Disconnect.
7	Headlight control unit	1	

Removing the headlight stay



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Headlight assembly		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Meter assembly		Refer to "GENERAL CHASSIS (2)" on page 4-6.
1	Handlebar switch lead (left)	1	
2	Handlebar switch lead (right)	1	
3	Wire harness	2	
4	Headlight stay	1	

EAS31379
REMOVING THE FUEL TANK FRONT COVER
1. Remove:
   • Fuel tank front cover “1”

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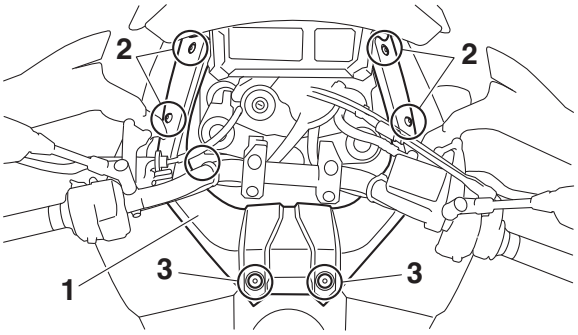
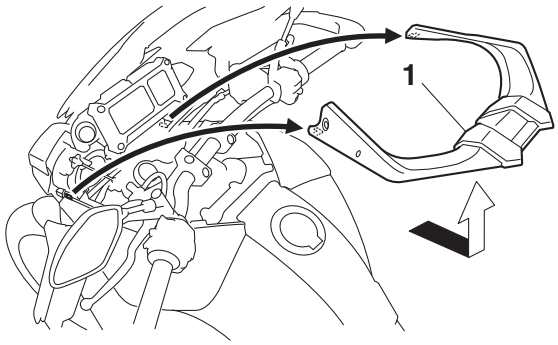
a. Remove the quick fastener screws “2” and fuel tank front cover bolts “3”.



b. Remove the fuel tank front cover “1” by sliding it rearward.



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EAS31380
INSTALLING THE FUEL TANK FRONT COVER
1. Install:
   • Fuel tank front cover “1”

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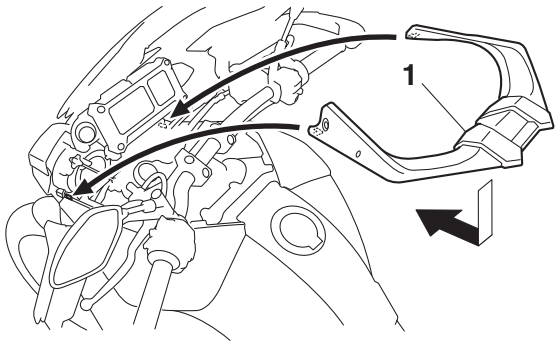
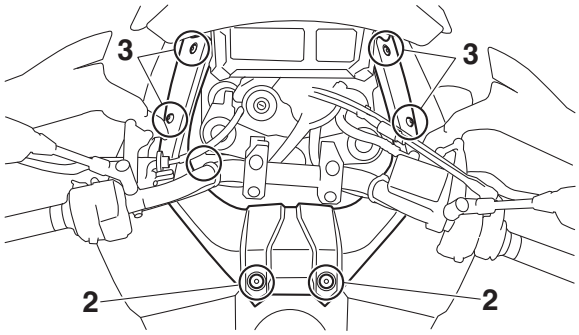
a. Install the fuel tank front cover “1” by sliding it forward.



b. Install the fuel tank front cover bolts “2” and quick fastener screws “3”, and then tighten the bolts to specification.

	Fuel tank front cover bolt 4.0 N·m (0.40 kgf·m, 2.9 lb·ft)



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EAS31381
REMOVING THE FRONT SIDE COWLINGS
1. Remove:
   • Fuel tank front cover
   • Front side panel
2. Remove:
   • Front side cowling (left) “1”

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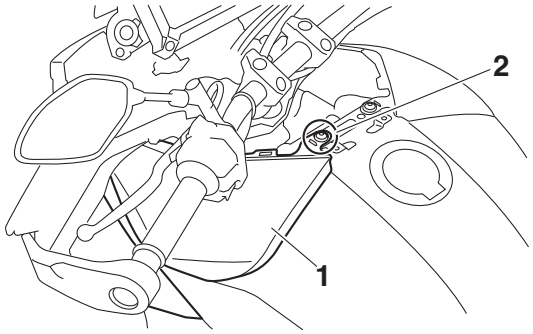
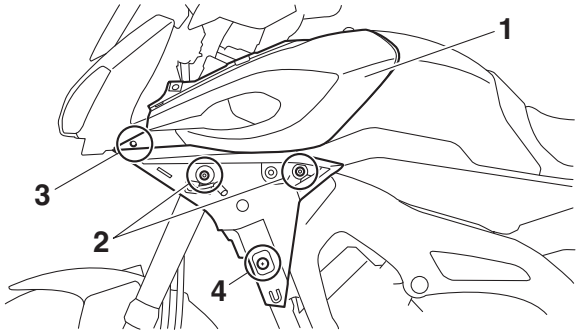
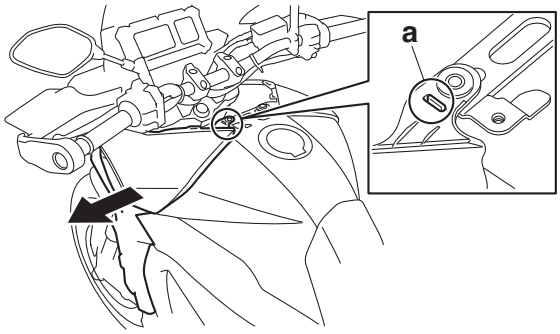
a. Remove the front side cowling bolts “2”, front side cowling screw “3” and quick fastener screw “4”.





b. Disengage portion “a”, and then remove the front side cowling by sliding it in the direction shown in the illustration.



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3. Remove:
   • Front side cowling (right) “1”

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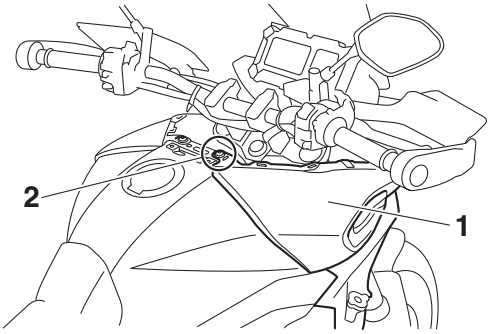
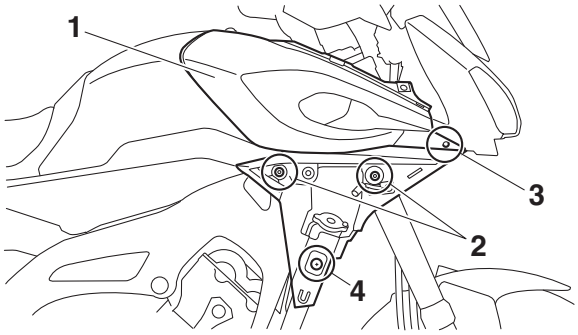
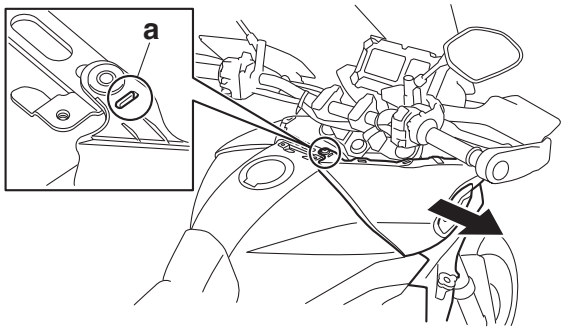
a. Remove the front side cowling bolts “2”, front side cowling screw “3” and quick fastener screw “4”.





b. Disengage portion “a”, and then remove the front side cowling by sliding it in the direction shown in the illustration.



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EAS31382

INSTALLING THE FRONT SIDE COWLINGS

1. Install:
   • Front side cowling (left) “1”

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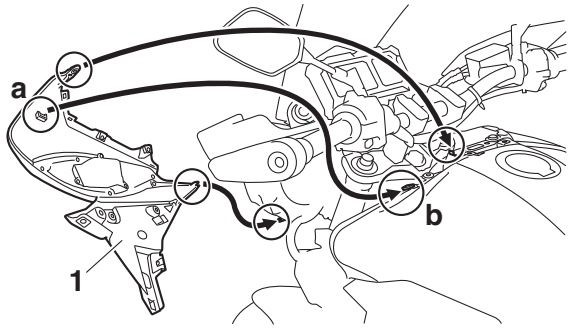
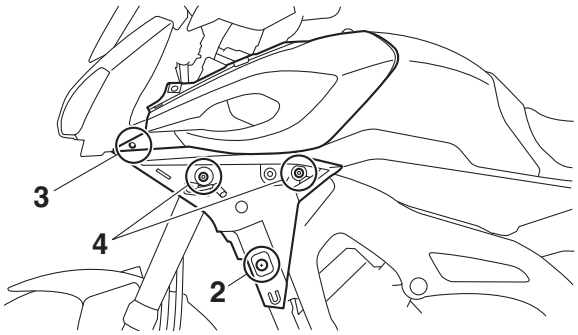
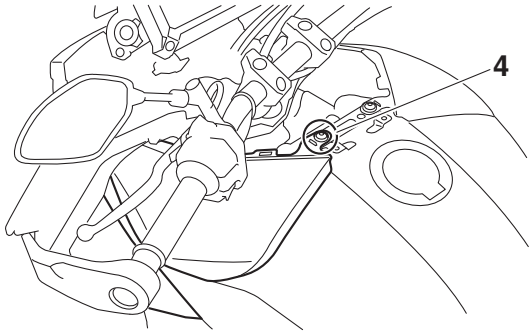
a. Insert the slot “a” into the projection “b”, and then install the front side cowling as shown in the illustration.



b. Install the quick fastener screw “2”, front side cowling screw “3” and front side cowling bolts “4”, and then tighten the screw and bolts to specification.

Front side cowling screw
1.5 N·m (0.15 kgf·m, 1.1 lb·ft)
Front side cowling bolt
4.0 N·m (0.40 kgf·m, 2.9 lb·ft)





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2. Install:
   • Front side cowling (right) “1”

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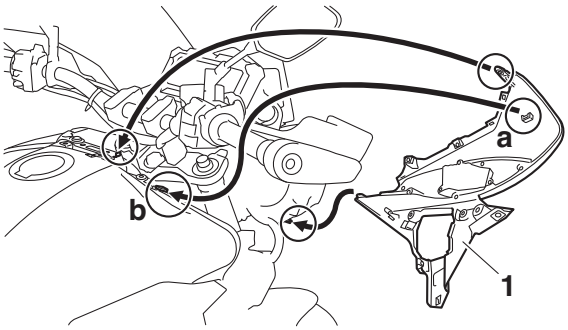
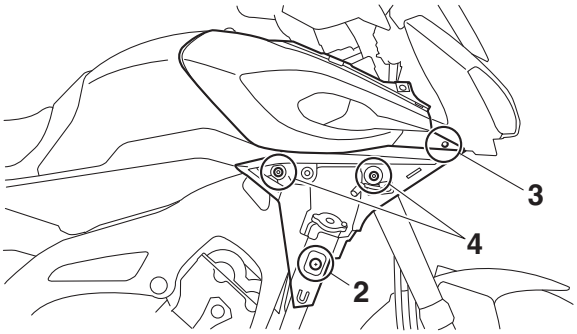
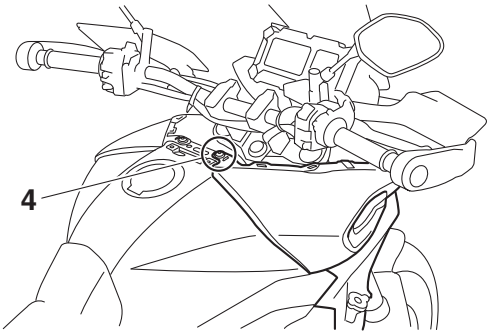
a. Insert the slot “a” into the projection “b”, and then install the front side cowling as shown in the illustration.



b. Install the quick fastener screw “2”, front side cowling screw “3” and front side cowling bolts “4”, and then tighten the screw and bolts to specification.

Front side cowling screw
1.5 N·m (0.15 kgf·m, 1.1 lb·ft)
Front side cowling bolt
4.0 N·m (0.40 kgf·m, 2.9 lb·ft)





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3. Install:
   • Front side panel
   • Fuel tank front cover

EAS31383
ADJUSTING THE WINDSHIELD HEIGHT

1. Adjust:
   • Windshield height position

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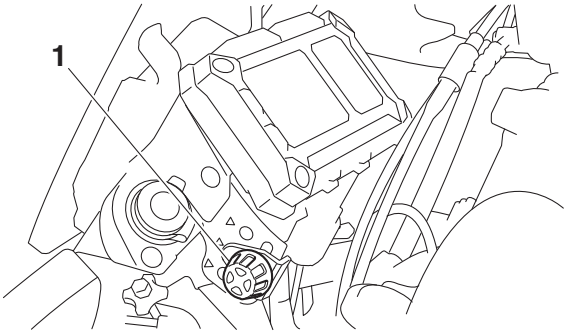
a. Loosen the windshield height position adjusting knob “1” on each side of the windshield until resistance is felt.

ECA20430
NOTICE

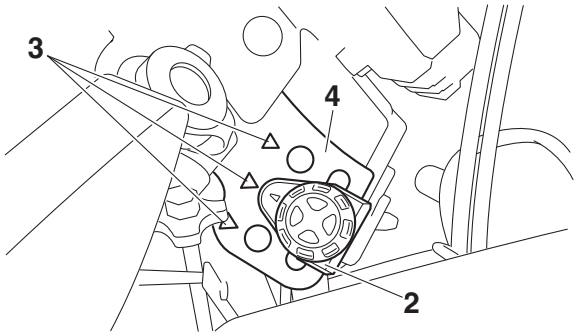
Do not continue turning the knob after resistance is felt. Otherwise, the knob could be damaged.



b. Align the slide plate holder “2” with the match marks “3” at the desired position.

TIP

Make sure that the projection on plate holder fits into the corresponding hole in the slide plate “4”.



c. Tighten the adjusting knobs.

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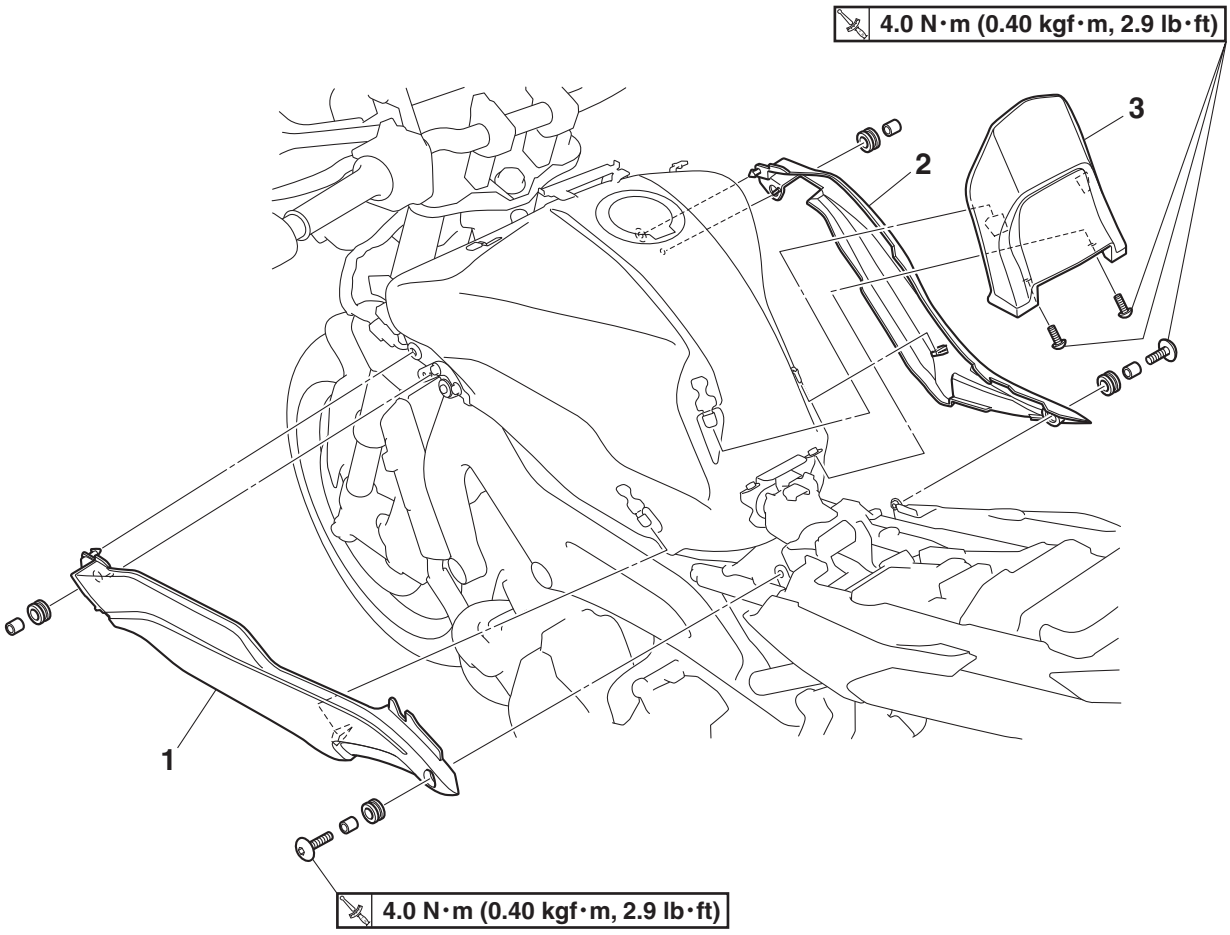
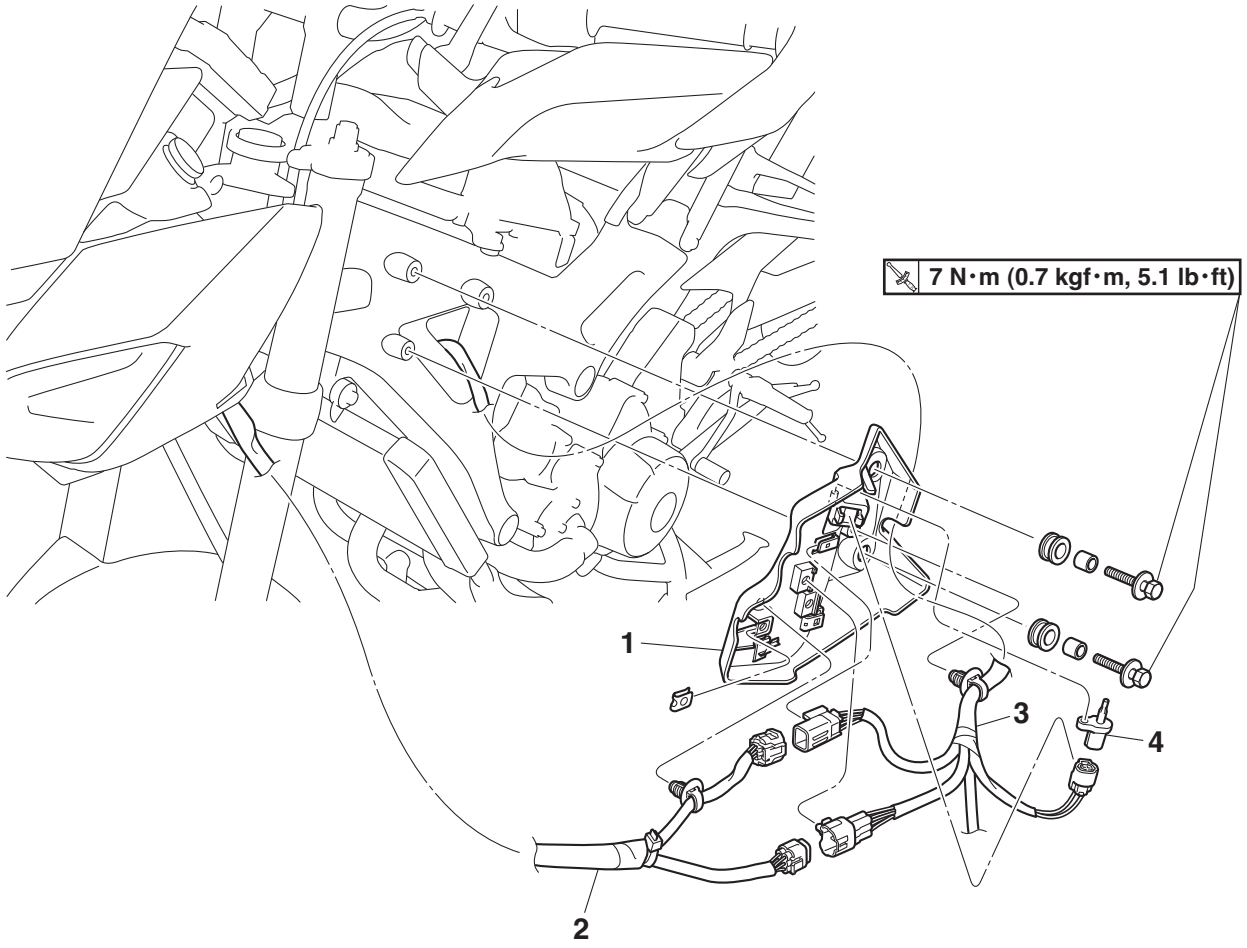
EAS20156
GENERAL CHASSIS (3)

Removing the fuel tank covers and fuel tank protector



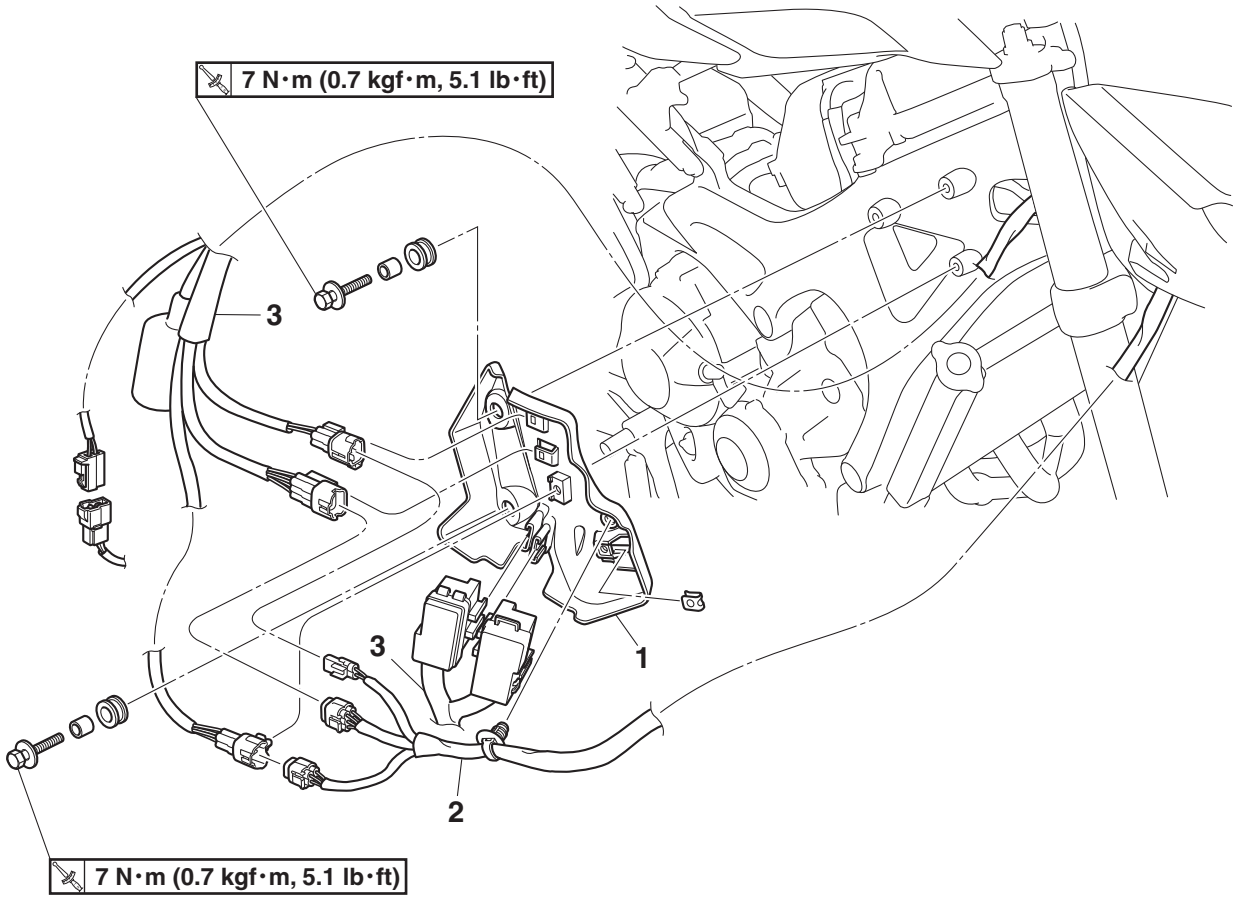
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Rider seat height position adjuster		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Fuel tank cover (left)	1	
2	Fuel tank cover (right)	1	
3	Fuel tank protector	1	

Removing the electrical components tray (left)



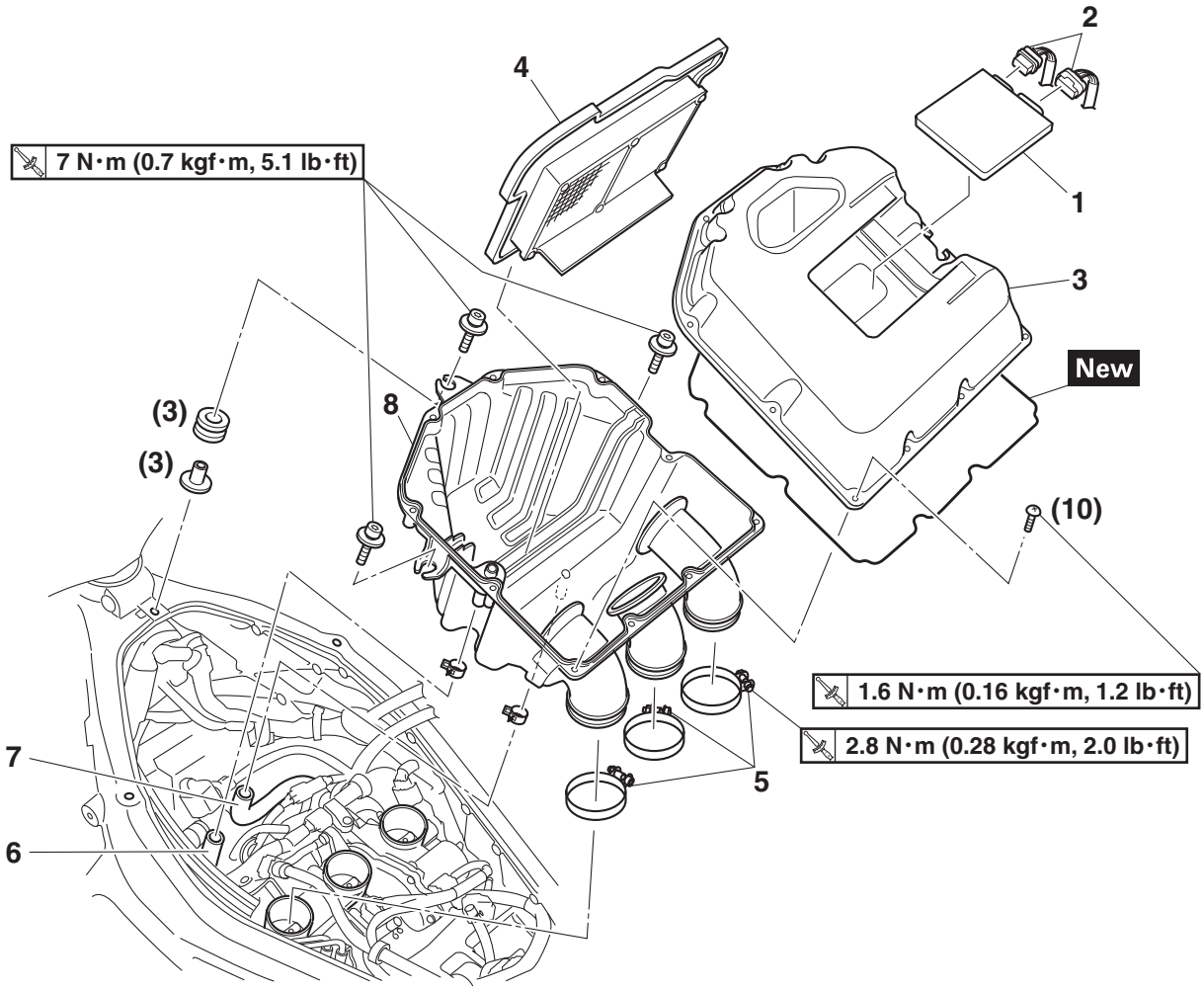
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Electrical components tray (left)	1	
2	Handlebar switch lead (left)	1	
3	Wire harness	1	
4	Intake air temperature sensor	1	

Removing the electrical components tray (right)



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Electrical components tray (right)	1	
2	Handlebar switch lead (right)	1	
3	Wire harness	1	

Removing the air filter case



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	ECU (Engine Control Unit)	1	
2	ECU coupler	2	Disconnect.
3	Air filter case cover	1	
4	Air filter element	1	
5	Air filter case joint clamp screw	3	Loosen.
6	Air induction system hose	1	Disconnect.
7	Cylinder head breather hose	1	Disconnect.
8	Air filter case	1	

EAS31384
REMOVING THE FUEL TANK COVERS

1. Remove:
   • Fuel tank front cover
   • Front side panel
   • Front side cowling
2. Remove:
   • Passenger seat
   • Rider seat
3. Remove:
   • Fuel tank cover (left) “1”

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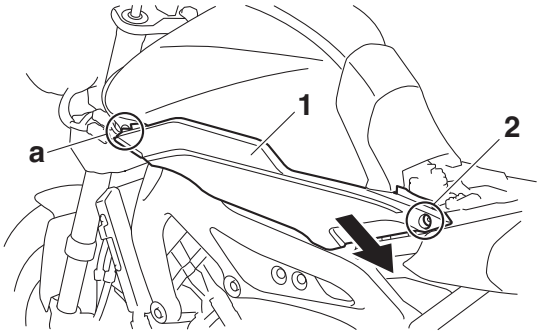
a. Remove the fuel tank cover bolt “2”
b. Disengage portion “a”, and then remove the fuel tank cover by sliding it in the direction shown in the illustration.



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4. Remove:
   • Fuel tank cover (right) “1”

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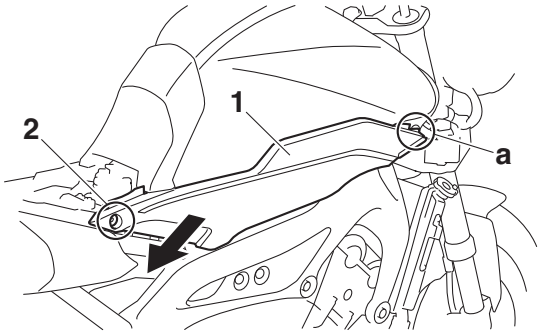
a. Remove the fuel tank cover bolt “2”
b. Disengage portion “a”, and then remove the fuel tank cover by sliding it in the direction shown in the illustration.



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EAS31385
INSTALLING THE FUEL TANK COVERS

1. Install:
   • Fuel tank cover (left) “1”

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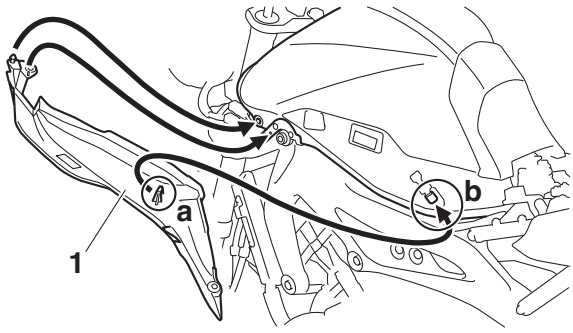
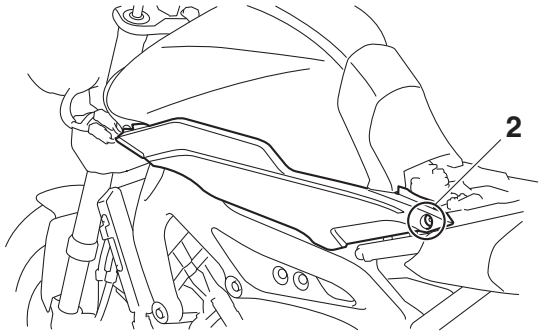
a. Insert the slot “a” into the projection “b”, and then install the fuel tank cover as shown in the illustration.



b. Install the fuel tank cover bolt “2”, and then tighten the bolt to specification.

	Fuel tank cover bolt **4.0 N·m (0.40 kgf·m, 2.9 lb·ft)**



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2. Install:
   • Fuel tank cover (right) “1”

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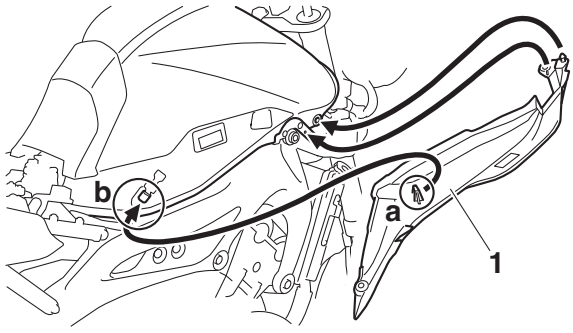
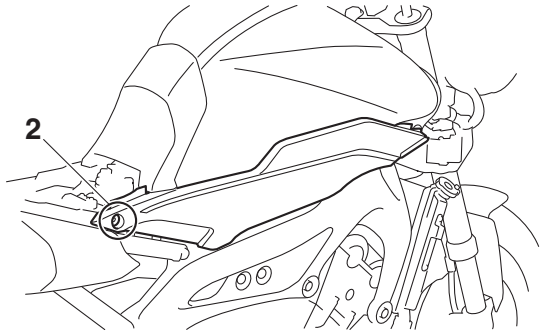
a. Insert the slot “a” into the projection “b”, and then install the fuel tank cover as shown in the illustration.



b. Install the fuel tank cover bolt “2”, and then tighten the bolt to specification.

	Fuel tank cover bolt **4.0 N·m (0.40 kgf·m, 2.9 lb·ft)**



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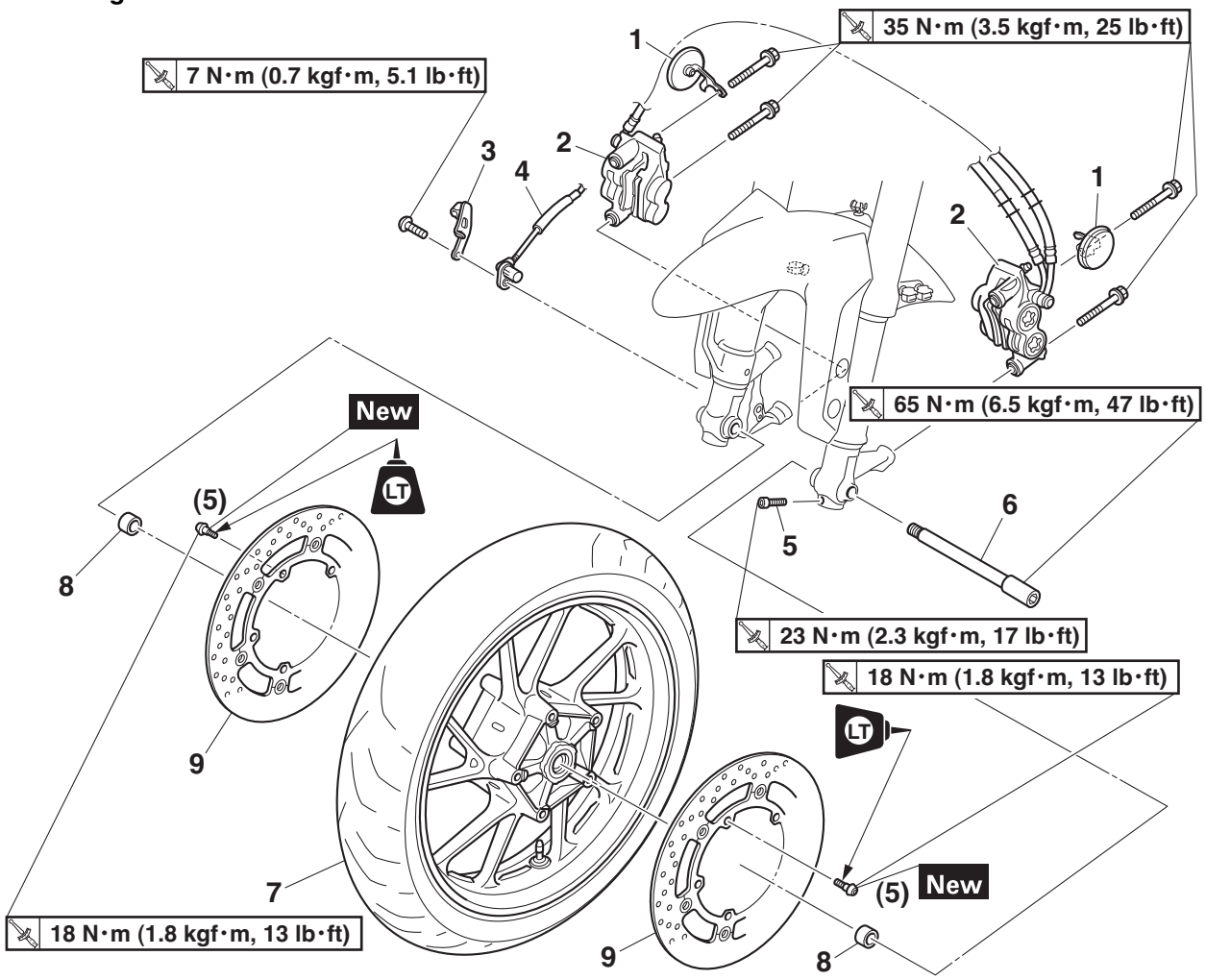
3. Install:
   • Rider seat
   • Passenger seat
4. Install:
   • Front side cowling
   • Front side panel
   • Fuel tank front cover

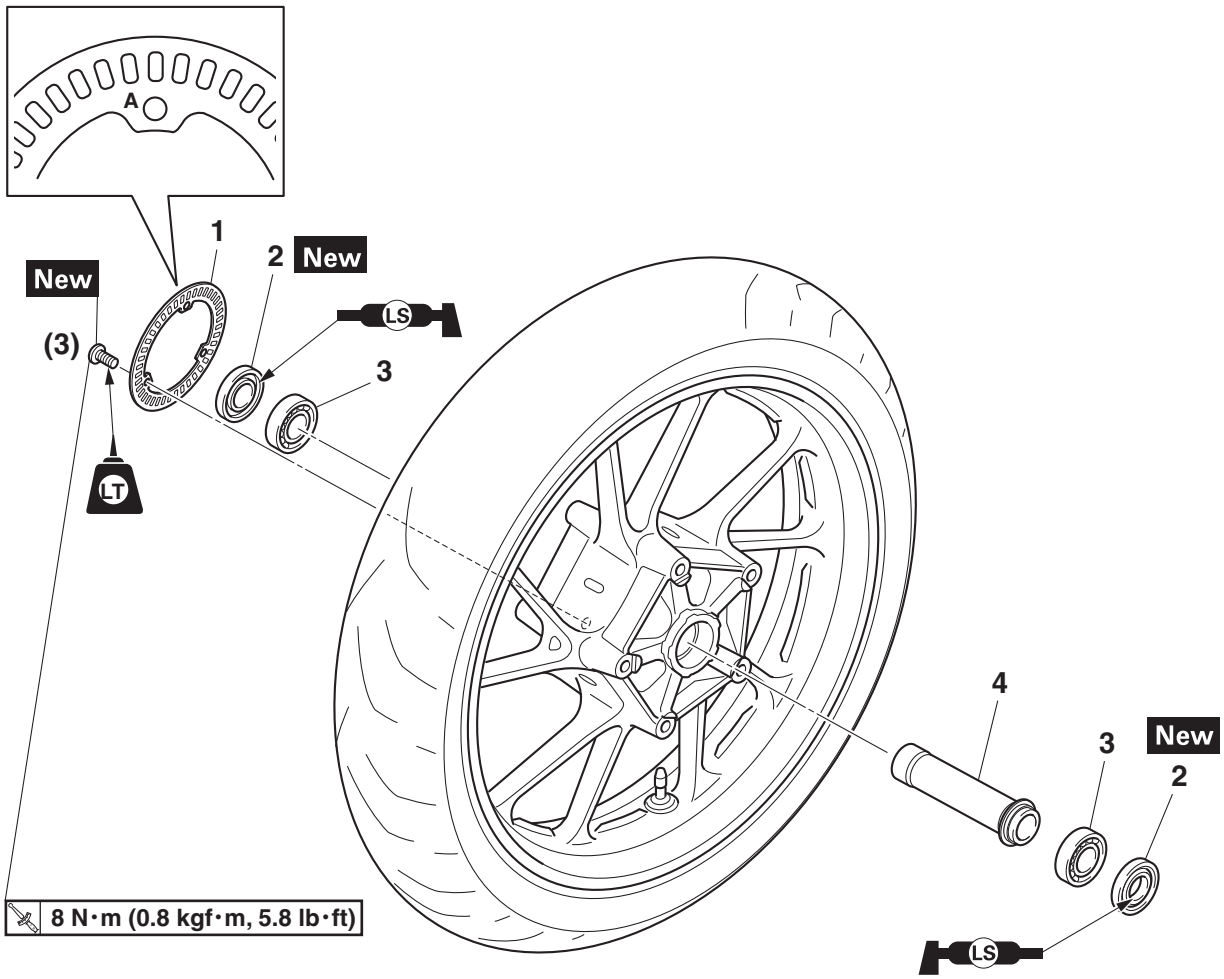
EAS20028
FRONT WHEEL

Removing the front wheel and brake discs



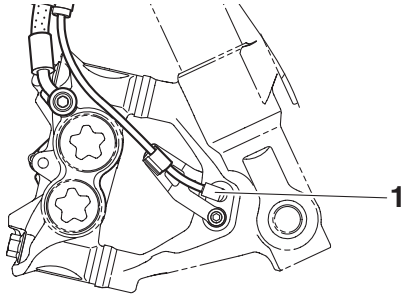
Order	Job/Parts to remove	Q'ty	Remarks
1	Reflector	2	
2	Front brake caliper	2	
3	Front wheel sensor bracket	1	
4	Front wheel sensor	1	
5	Wheel axle pinch bolt	1	Loosen.
6	Wheel axle	1	
7	Front wheel	1	
8	Collar	2	
9	Front brake disc	2	

Disassembling the front wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Front wheel sensor rotor	1	
2	Oil seal	2	
3	Wheel bearing	2	
4	Spacer	1	

EAS30145
REMOVING THE FRONT WHEEL
ECA21380
NOTICE
Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the front wheel sensor "1", otherwise the wheel sensor may be damaged, resulting in improper performance of the ABS.



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 brake caliper (left)
   - Front brake caliper (right)
   - Front wheel sensor

ECA21440
NOTICE
- **Do not apply the brake lever when removing the brake calipers.**
- **Be sure not to contact the sensor electrode to any metal part when removing the front wheel sensor from the sensor housing.**

3. Elevate:
   - Front wheel

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

4. Loosen:
   - Wheel axle pinch bolt
5. Remove:
   - Wheel axle
   - Front wheel

EAS30146
DISASSEMBLING THE FRONT WHEEL
ECA21340
NOTICE
- **Do not drop the wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the wheel sensor rotor, wipe it off immediately.**

1. Remove:
   - Oil seals
   - Wheel bearings

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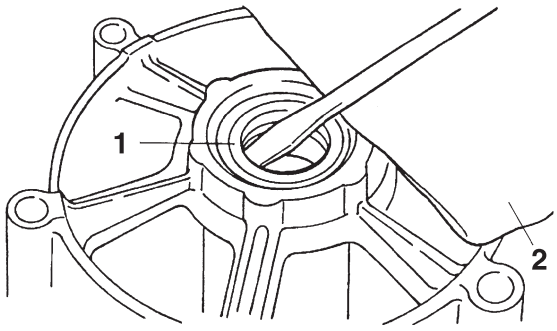
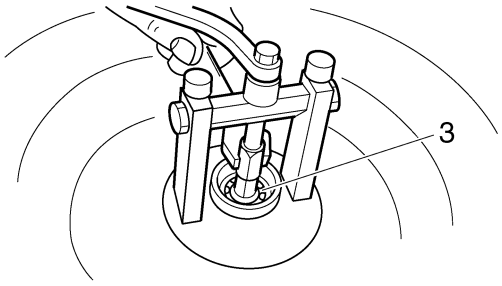
a. Clean the surface of the front wheel hub.
b. Remove the oil seals "1" with a flat-head screwdriver.

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



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



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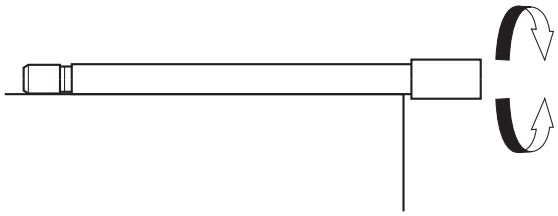
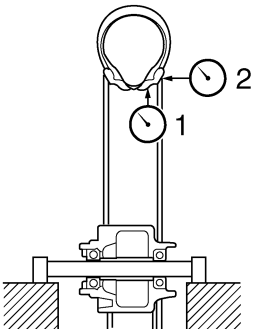
EAS30147
CHECKING THE FRONT WHEEL
1. Check:
   - Wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

EWA13460
⚠ WARNING
Do not attempt to straighten a bent wheel axle.

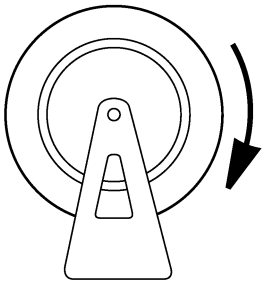


2. Check:
   • Tire
   • Front wheel
   Damage/wear → Replace.
   Refer to "CHECKING THE TIRES" on page 3-16 and "CHECKING THE WHEELS" on page 3-16.
3. Measure:
   • Radial wheel runout "1"
   • Lateral wheel runout "2"
   Over the specified limits → Replace.

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



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



EAS30151
ASSEMBLING THE FRONT WHEEL

ECA21340
NOTICE
- **Do not drop the wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the wheel sensor rotor, wipe it off immediately.**

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

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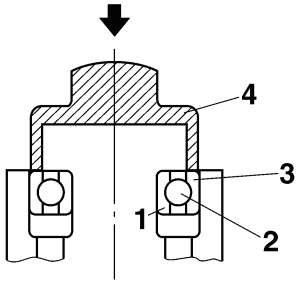
a. Install the new wheel bearing (right side).

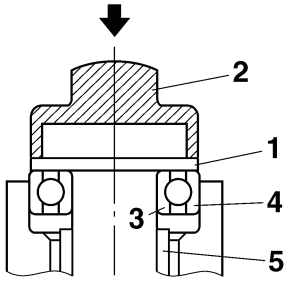
ECA18110
NOTICE
Do not contact the wheel bearing inner race "1" or balls "2". Contact should be made only with the outer race "3".

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



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

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



d. Install the new oil seals.

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2. Install:
   • Front wheel sensor rotor

	Wheel sensor rotor bolt **8 N·m (0.8 kgf·m, 5.8 lb·ft)** **LOCTITE®**

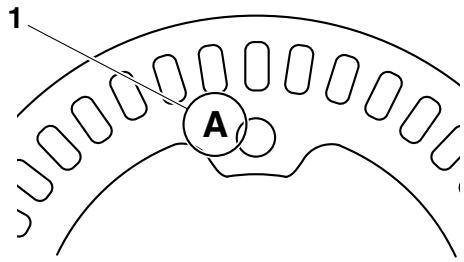
ECA17200

NOTICE

Replace the wheel sensor rotor bolts with new ones.

TIP

Install the wheel sensor rotor with the stamped mark "1" facing outward.



3. Measure:
   • Wheel sensor rotor runout
   Out of specification → Correct the wheel sensor rotor runout or replace the wheel sensor rotor.
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-23.

	Wheel sensor rotor runout limit **0.25 mm (0.01 in)**

EAS30155

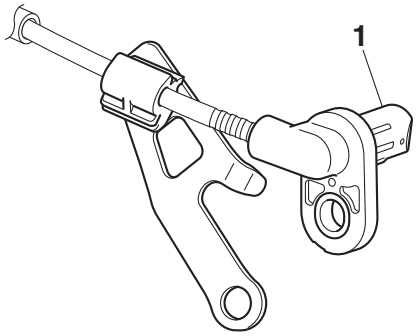
MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR

ECA21070

NOTICE

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

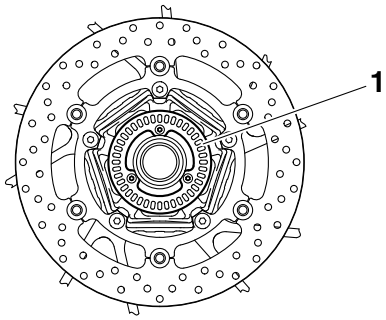
1. Check:
   • Front wheel sensor "1"
   Cracks/bends/distortion → Replace.
   Iron powder/dust → Clean.



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

TIP

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



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

	Wheel sensor rotor runout limit **0.25 mm (0.01 in)**

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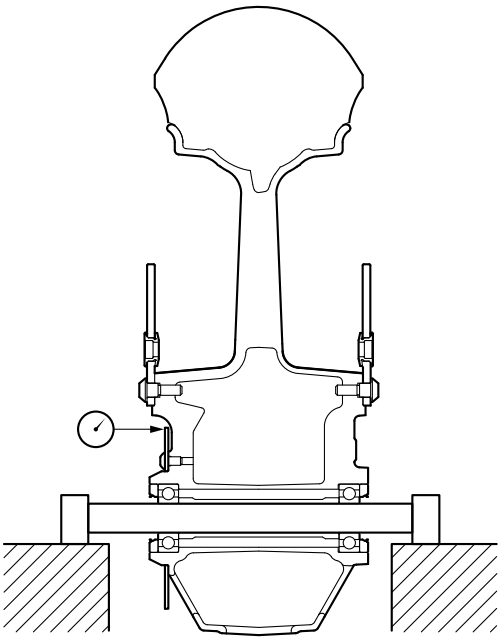
a. Hold the dial gauge at a right angle against the wheel sensor rotor surface.
b. Measure the wheel sensor rotor runout.



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

	Wheel sensor rotor bolt **8 N·m (0.8 kgf·m, 5.8 lb·ft)** **LOCTITE®**

ECA17200

NOTICE

Replace the wheel sensor rotor bolts with new ones.

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

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EAS30152

ADJUSTING THE FRONT WHEEL STATIC BALANCE

TIP

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

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

TIP

Place the front wheel on a suitable balancing stand.

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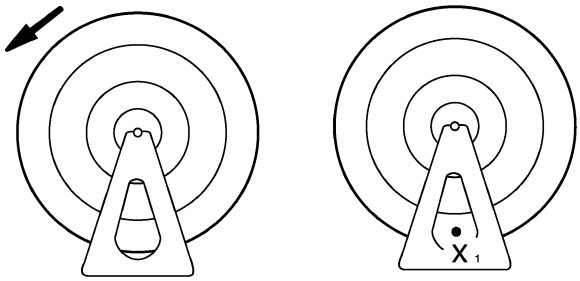
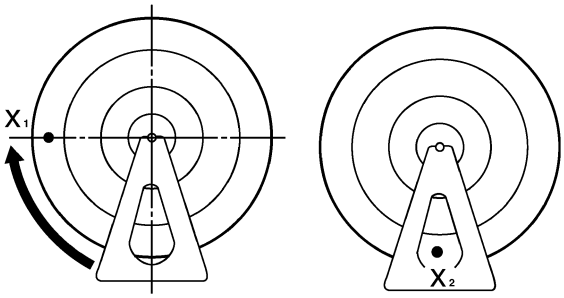
a. Spin the front wheel.

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



c. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an "X_2" mark at the bottom of the wheel.



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

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3. Adjust:
   - Front wheel static balance

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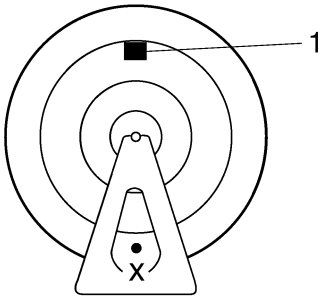
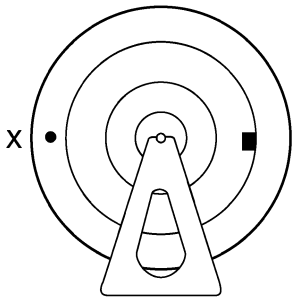
a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

TIP

Start with the lightest weight.



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



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

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4. Check:
   • Front wheel static balance

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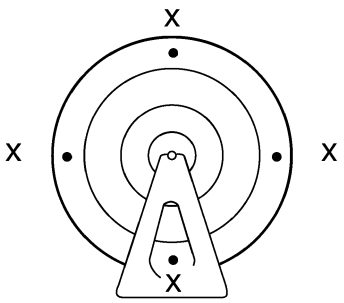
a. Turn the front wheel and make sure it stays at each position shown.



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

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EAS30154
INSTALLING THE FRONT WHEEL (DISC BRAKE)

1. Install:
   • Front brake discs

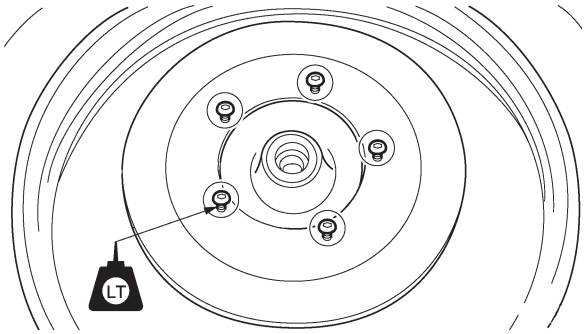
	Front brake disc bolt **18 N·m (1.8 kgf·m, 13 lb·ft)** **LOCTITE®**

ECA19150
NOTICE

Replace the brake disc bolts with new ones.

TIP

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



2. Check:
   • Front brake discs
   Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-40.
3. Lubricate:
   • Oil seal lips

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

4. Install:
   • Collars
   • Front wheel
   • Front wheel axle
5. Tighten:
   • Front wheel axle
   • Front wheel axle pinch bolt

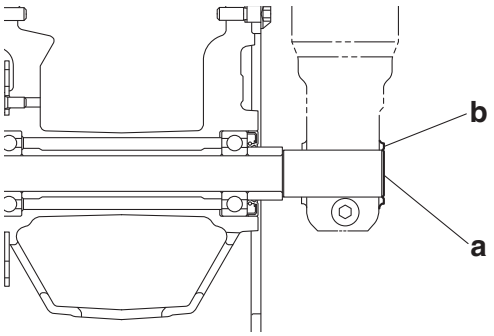
	Front wheel axle **65 N·m (6.5 kgf·m, 47 lb·ft)** **Front wheel axle pinch bolt** **23 N·m (2.3 kgf·m, 17 lb·ft)**

ECA19760
NOTICE

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

TIP

Check that wheel axle end "a" is flush with front folk surface "b" and then tighten the wheel axle pinch bolt. If end "a" is not flush with surface "b", align the ends manually or with a plastic hammer.



6. Install:
   • Front wheel sensor
   • Front wheel sensor bracket

	Front wheel sensor bolt **7 N·m (0.7 kgf·m, 5.1 lb·ft)**

ECA21020

NOTICE

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

TIP

When installing the front wheel sensor, check the front wheel sensor lead for twists.

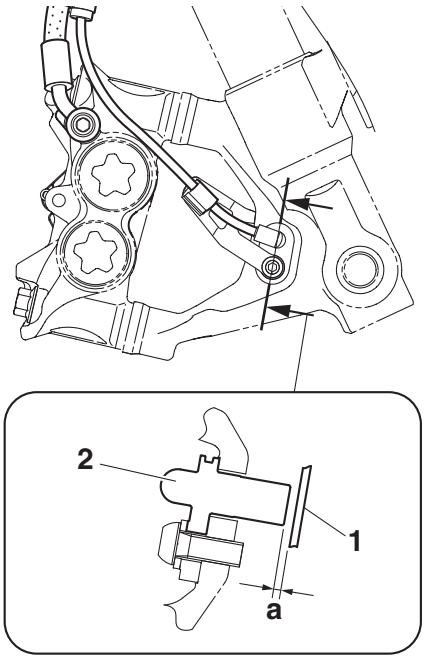
7. Measure:
   • Distance "a"
   (between the wheel sensor rotor "1" and front wheel sensor "2")
   Out of specification → Check the wheel bearing for looseness, and the front wheel sensor and sensor rotor installation conditions (warpage caused by overtorque, wrong installation direction, rotor decentering, LOCTITE® on the mounting surface of the rotor, deformation caused by an impact during service and caught foreign materials). If there is any defective part, repair or replace the defective part.

	Distance "a" (between the front wheel sensor rotor and front wheel sensor) **1.0–1.8 mm (0.04–0.07 in)**

TIP

Measure the distance between the front wheel sensor rotor and front wheel sensor in several places in one rotation of the front wheel. Do not turn the front wheel while the thickness gauge is installed. This may damage the front wheel sensor rotor and the front wheel sensor.

	Thickness gauge **90890-03180** **Feeler gauge set** **YU-26900-9**



8. Install:
   • Front brake calipers

	Front brake caliper bolt **35 N·m (3.5 kgf·m, 25 lb·ft)**

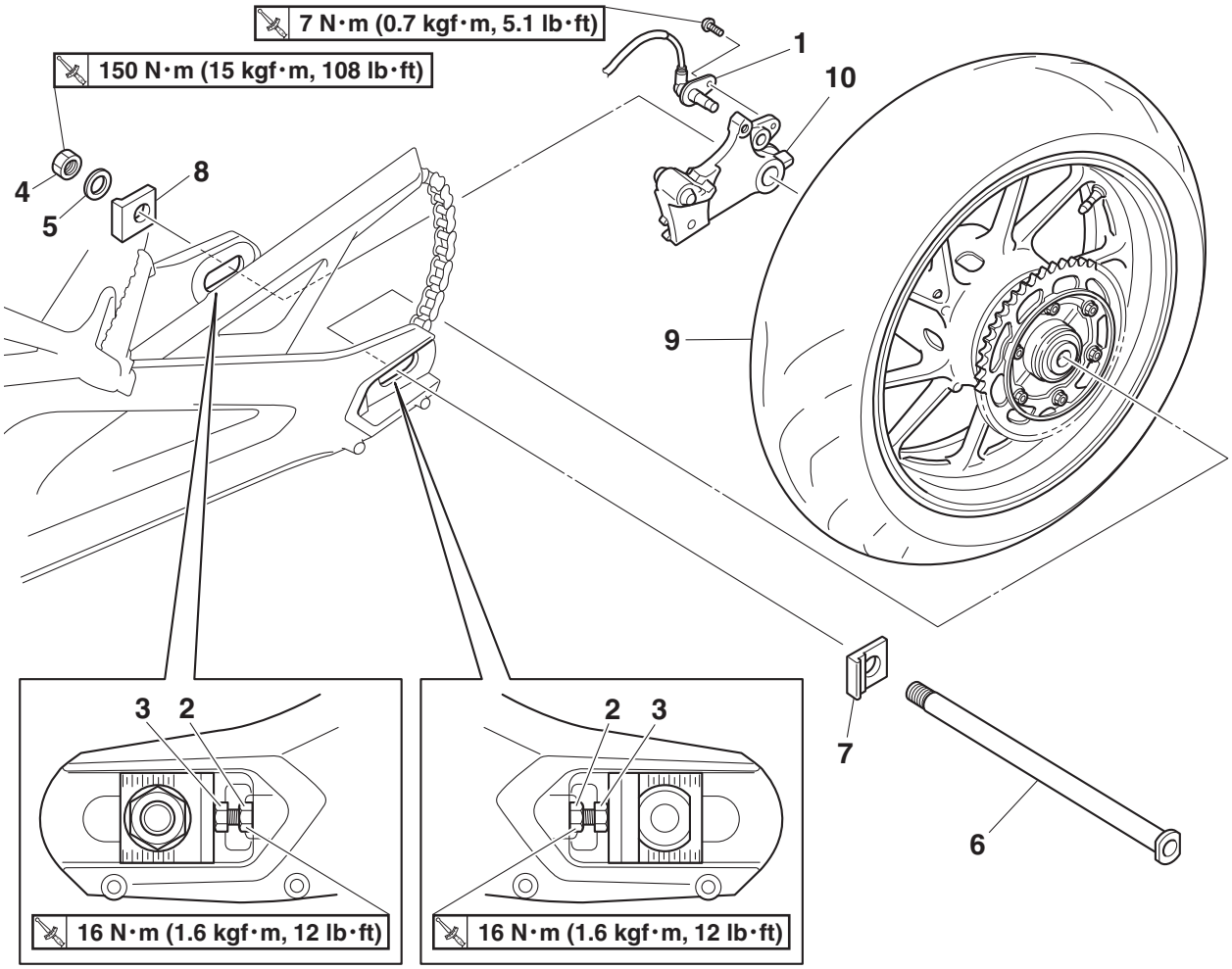
EWA13500

⚠ WARNING

Make sure the brake hose is routed properly.

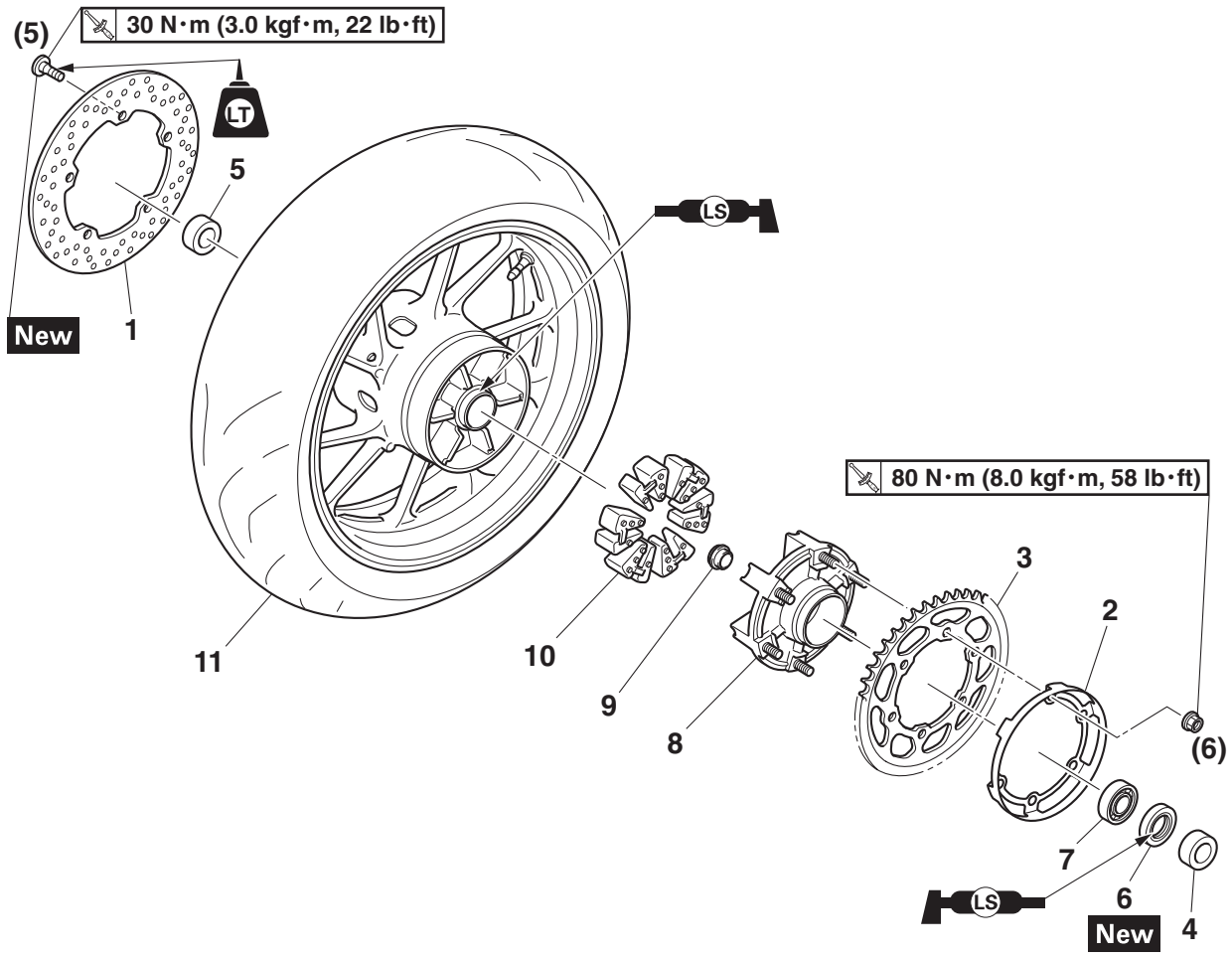
EAS20029
REAR WHEEL

Removing the rear wheel



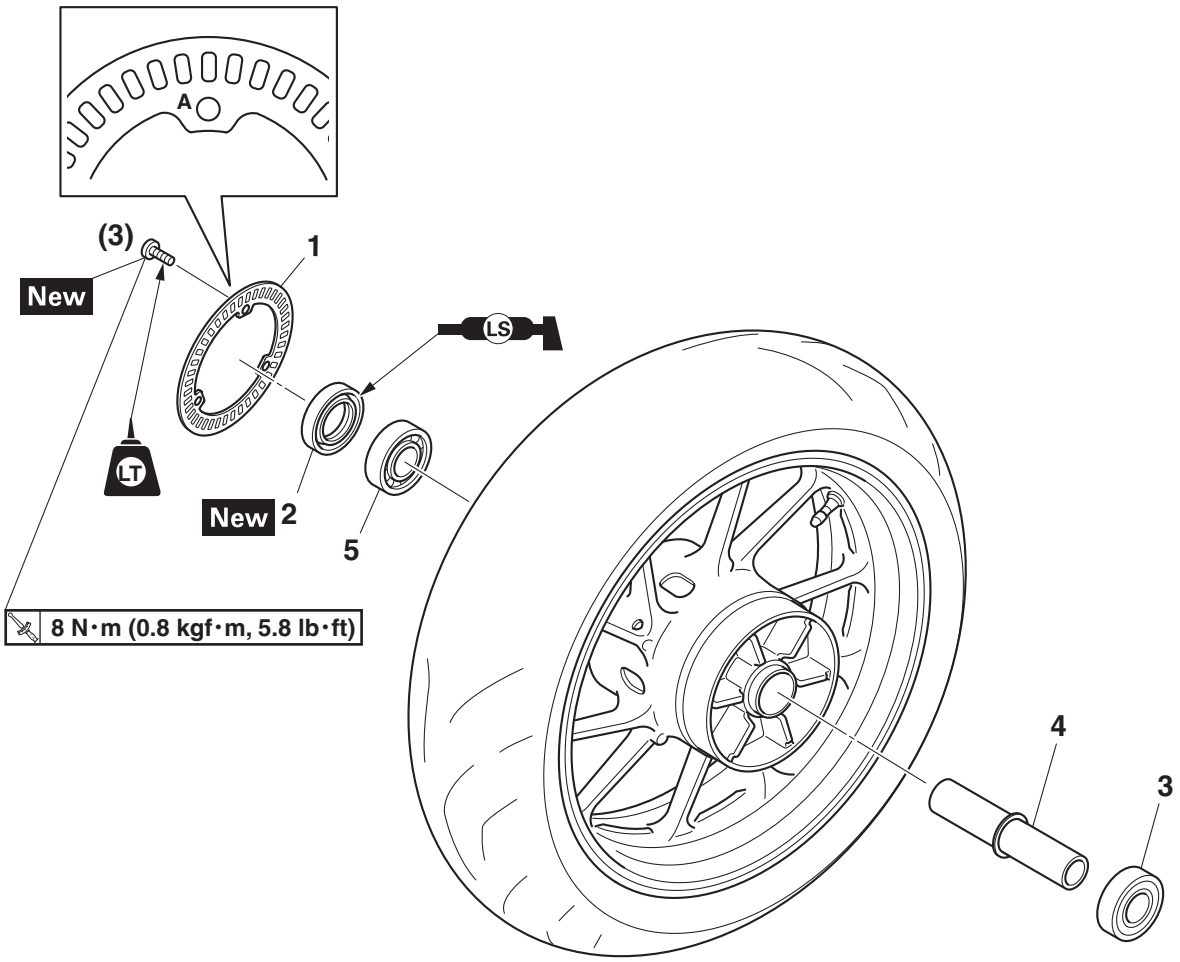
Order	Job/Parts to remove	Q'ty	Remarks
	Rear brake caliper		Refer to "REAR BRAKE" on page 4-48.
1	Rear wheel sensor	1	
2	Locknut	2	Loosen.
3	Adjusting bolt	2	Loosen.
4	Wheel axle nut	1	
5	Washer	1	
6	Wheel axle	1	
7	Adjusting block (left)	1	
8	Adjusting block (right)	1	
9	Rear wheel	1	
10	Brake caliper bracket	1	

Removing the brake disc and rear wheel sprocket



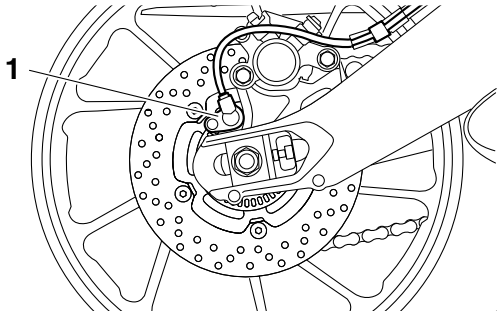
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake disc	1	
2	Bracket	1	
3	Rear wheel sprocket	1	
4	Collar	1	
5	Collar	1	
6	Oil seal	1	
7	Bearing	1	
8	Rear wheel drive hub	1	
9	Collar	1	
10	Rear wheel drive hub damper	6	
11	Rear wheel	1	

Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear wheel sensor rotor	1	
2	Oil seal	1	
3	Wheel bearing	1	
4	Spacer	1	
5	Wheel bearing	1	

EAS30156
REMOVING THE REAR WHEEL
ECA21390
NOTICE
Keep magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the rear wheel sensor "1", otherwise the wheel sensor may be damaged, resulting in improper performance of the ABS.



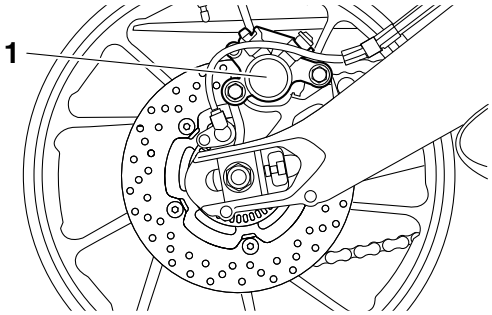
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING
Securely support the vehicle so that there is no danger of it falling over.

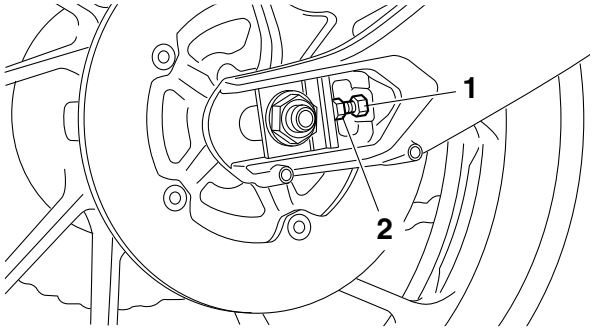
TIP
Place the vehicle on the centerstand so that the rear wheel is elevated.

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

ECA21040
NOTICE
- **Do not depress the brake pedal when removing the brake caliper.**
- **Be sure not to contact the sensor electrode to any metal part when removing the rear wheel sensor from the rear brake caliper bracket.**



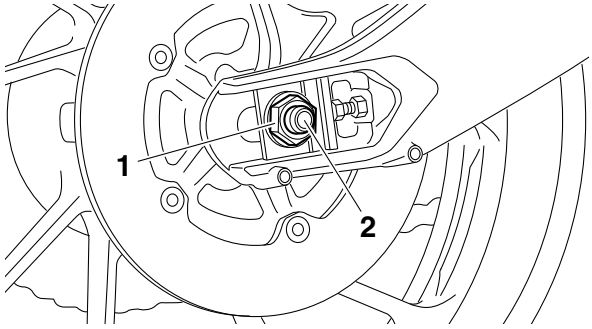
3. Loosen:
   - Locknuts "1"
   - Adjusting bolts "2"



4. Remove:
   - Wheel axle nut "1"
   - Washer
   - Wheel axle "2"
   - Rear wheel
   - Brake caliper bracket

ECA21400
NOTICE
Be sure to remove the rear wheel sensor before removing the brake caliper bracket, otherwise the sensor could be damaged.

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



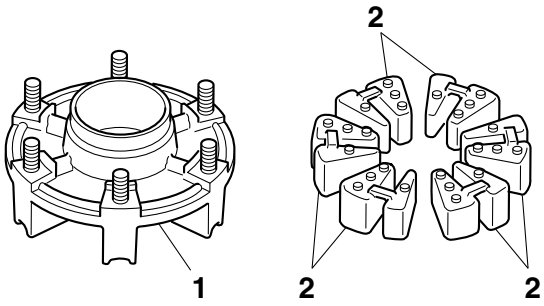
EAS30158
DISASSEMBLING THE REAR WHEEL
ECA21340
NOTICE
- **Do not drop the wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the wheel sensor rotor, wipe it off immediately.**

1. Remove:
   - Oil seal
   - Wheel bearings

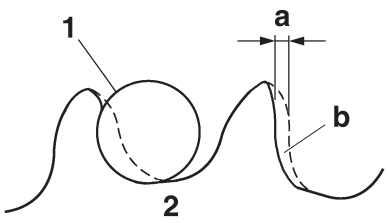
   Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-21.

EAS30159
CHECKING THE REAR WHEEL
1. Check:
   • Wheel axle
   • Wheel bearings
   • Oil seals
   Refer to "CHECKING THE FRONT WHEEL" on page 4-21.
2. Check:
   • Tire
   • Rear wheel
   Damage/wear → Replace.
   Refer to "CHECKING THE TIRES" on page 3-16 and "CHECKING THE WHEELS" on page 3-16.
3. Measure:
   • Radial wheel runout
   • Lateral wheel runout
   Refer to "CHECKING THE FRONT WHEEL" on page 4-21.

EAS30160
CHECKING THE REAR WHEEL DRIVE HUB
1. Check:
   • Rear wheel drive hub "1"
   Cracks/damage → Replace.
   • Rear wheel drive hub dampers "2"
   Damage/wear → Replace.



EAS30161
CHECKING AND REPLACING THE REAR WHEEL SPROCKET
1. Check:
   • Rear wheel sprocket
   More than 1/4 tooth "a" wear → Replace the drive sprocket, the rear wheel sprocket and the drive chain as a set.
   Bent teeth → Replace the drive sprocket, the rear wheel sprocket and the drive chain as a set.



b. Correct

1. Drive chain roller
2. Rear wheel sprocket

2. Replace:
   • Rear wheel sprocket

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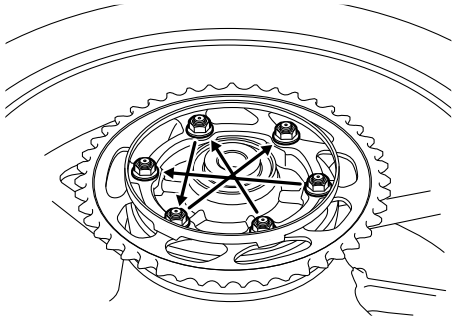
a. Remove the rear wheel sprocket nuts and the rear wheel sprocket.
b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
c. Install the new rear wheel sprocket.

	Rear wheel sprocket nut **80 N·m (8.0 kgf·m, 58 lb·ft)**

TIP
Tighten the rear wheel sprocket nuts in stages and in a crisscross pattern.



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EAS30163
ASSEMBLING THE REAR WHEEL
ECA21340
NOTICE
• Do not drop the wheel sensor rotor or subject it to shocks.
• If any solvent gets on the wheel sensor rotor, wipe it off immediately.

1. Install:
   • Wheel bearings New
   • Oil seal New
   Refer to "ASSEMBLING THE FRONT WHEEL" on page 4-22.

EAS30167
MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR

ECA21060
NOTICE

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

1. Check:
   • Rear wheel sensor
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-23.
2. Check:
   • Rear wheel sensor rotor
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-23.
3. Measure:
   • Wheel sensor rotor runout
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-23.

EAS30164
ADJUSTING THE REAR WHEEL STATIC BALANCE

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

1. Adjust:
   • Rear wheel static balance
   Refer to "ADJUSTING THE FRONT WHEEL STATIC BALANCE" on page 4-24.

EAS30165
INSTALLING THE REAR WHEEL (DISC BRAKE)

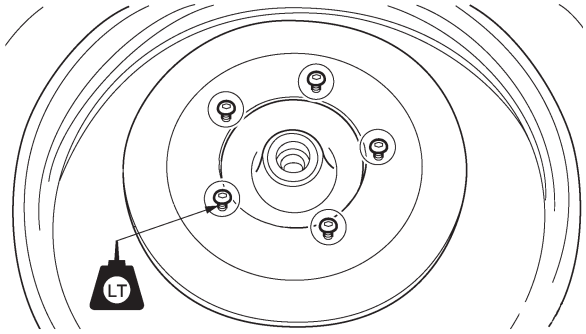
1. Install:
   • Rear brake disc

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

ECA19150
NOTICE

Replace the brake disc bolts with new ones.

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

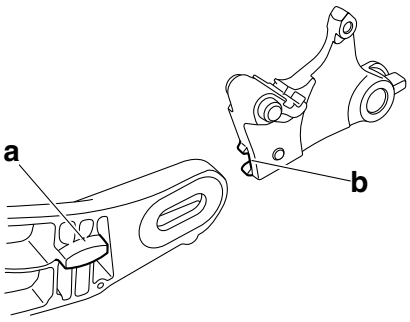


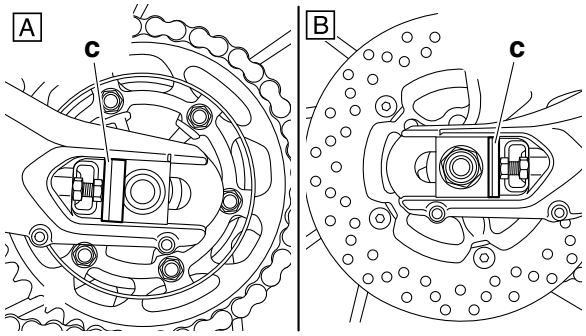
2. Check:
   • Rear brake disc
   Refer to "CHECKING THE REAR BRAKE DISC" on page 4-54.
3. Lubricate:
   • Oil seal lips

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

4. Install:
   • Collars
   • Brake caliper bracket
   • Rear wheel
   • Adjusting blocks
   • Wheel axle
   • Washer
   • Wheel axle nut

TIP
• Do not install the brake caliper.
• Align the projection "a" in the swingarm with the slot "b" of the brake caliper bracket.
• Install the adjusting block so that projection "c" faces to the front of the vehicle.





A. Left side
B. Right side

5. Install:
   • Rear brake caliper
   • Rear brake caliper bolts
6. Adjust:
   • Drive chain slack
   Refer to "DRIVE CHAIN SLACK" on page 3-18.

Drive chain slack
5.0–15.0 mm (0.20–0.59 in)

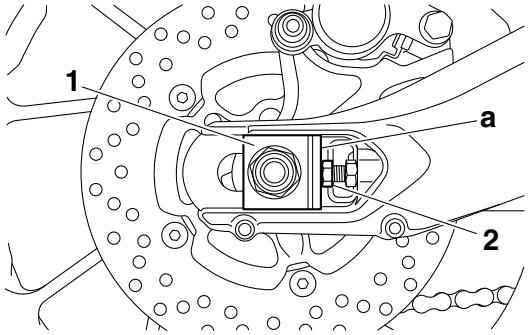
7. Tighten:
   • Wheel axle nut
   • Rear brake caliper bolts

Rear wheel axle nut
150 N·m (15 kgf·m, 108 lb·ft)
Rear brake caliper bolt (front)
27 N·m (2.7 kgf·m, 20 lb·ft)
Rear brake caliper bolt (rear)
22 N·m (2.2 kgf·m, 16 lb·ft)
LOCTITE®

EWA13500
⚠ WARNING

Make sure the brake hose is routed properly.

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



8. Install:
   • Rear wheel sensor

Rear wheel sensor bolt
7 N·m (0.7 kgf·m, 5.1 lb·ft)

ECA21080
NOTICE

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

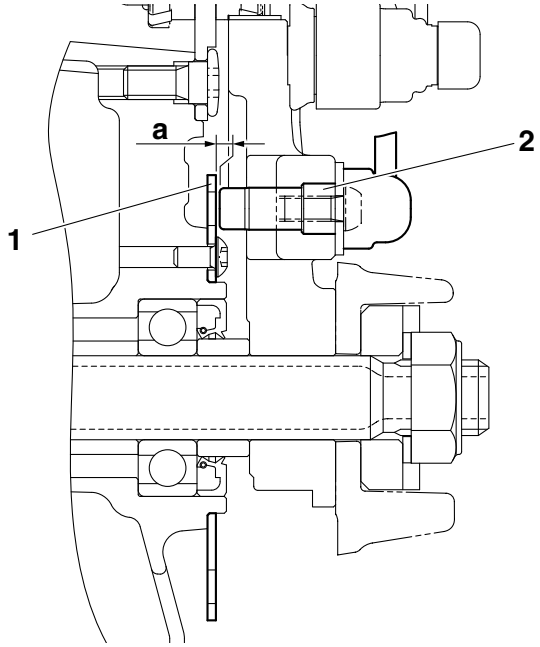
TIP
When installing the rear wheel sensor, check the rear wheel sensor lead for twists.

9. Measure:
   • Distance "a"
   (between the wheel sensor rotor "1" and rear wheel sensor "2")
   Out of specification → Check the wheel bearing for looseness, and the rear wheel sensor and sensor rotor installation conditions (warpage caused by overtorque, wrong installation direction, rotor decentering, LOCTITE® on the mounting surface of the rotor, deformation caused by an impact during service and caught foreign materials). If there is any defective part, repair or replace the defective part.

Distance "a" (between the rear wheel sensor rotor and rear wheel sensor)
0.7–1.4 mm (0.03–0.05 in)

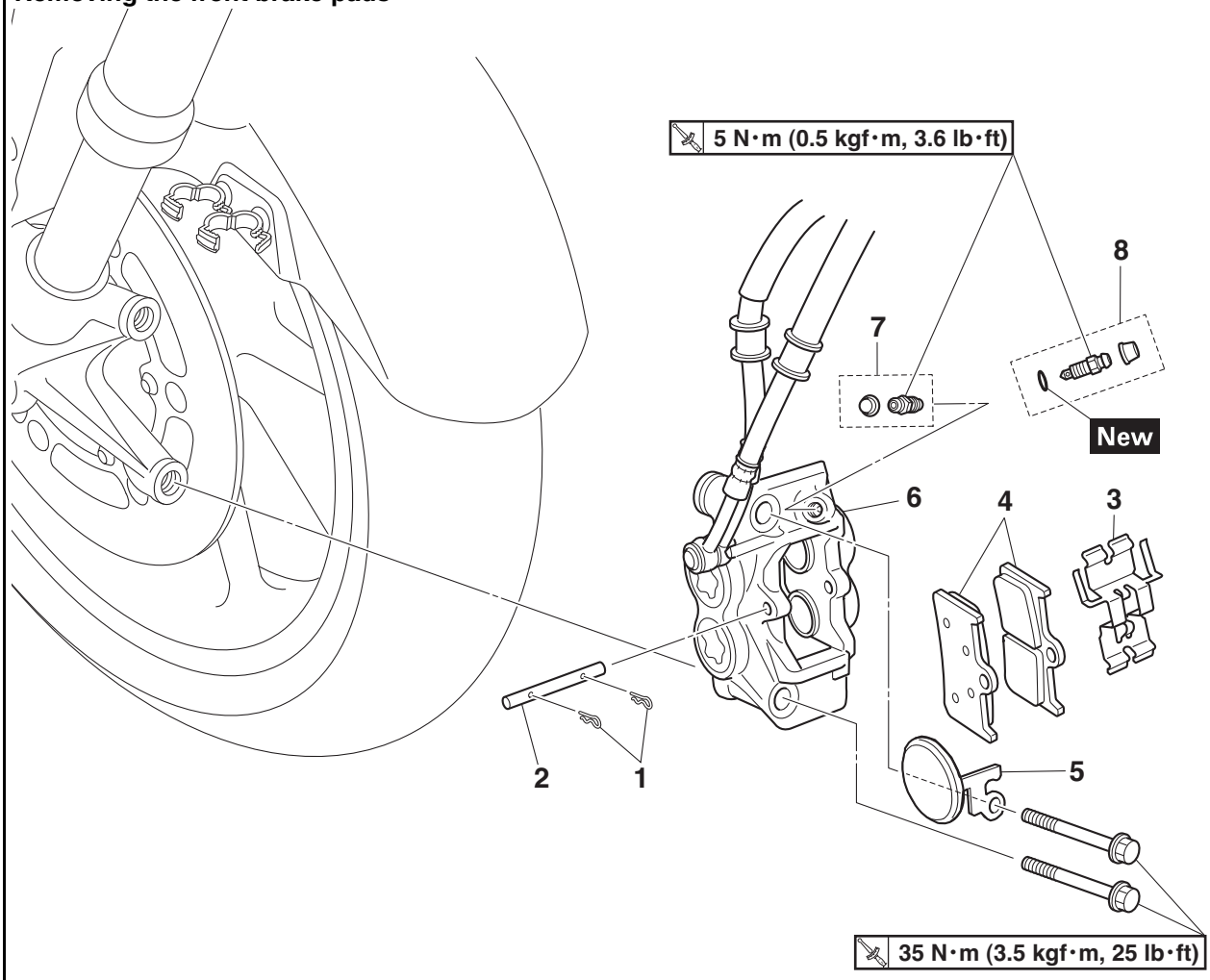
TIP
Measure the distance between the rear wheel sensor rotor and rear wheel sensor in several places in one rotation of the rear wheel. Do not turn the rear wheel while the thickness gauge is installed. This may damage the rear wheel sensor rotor and the rear wheel sensor.

Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9



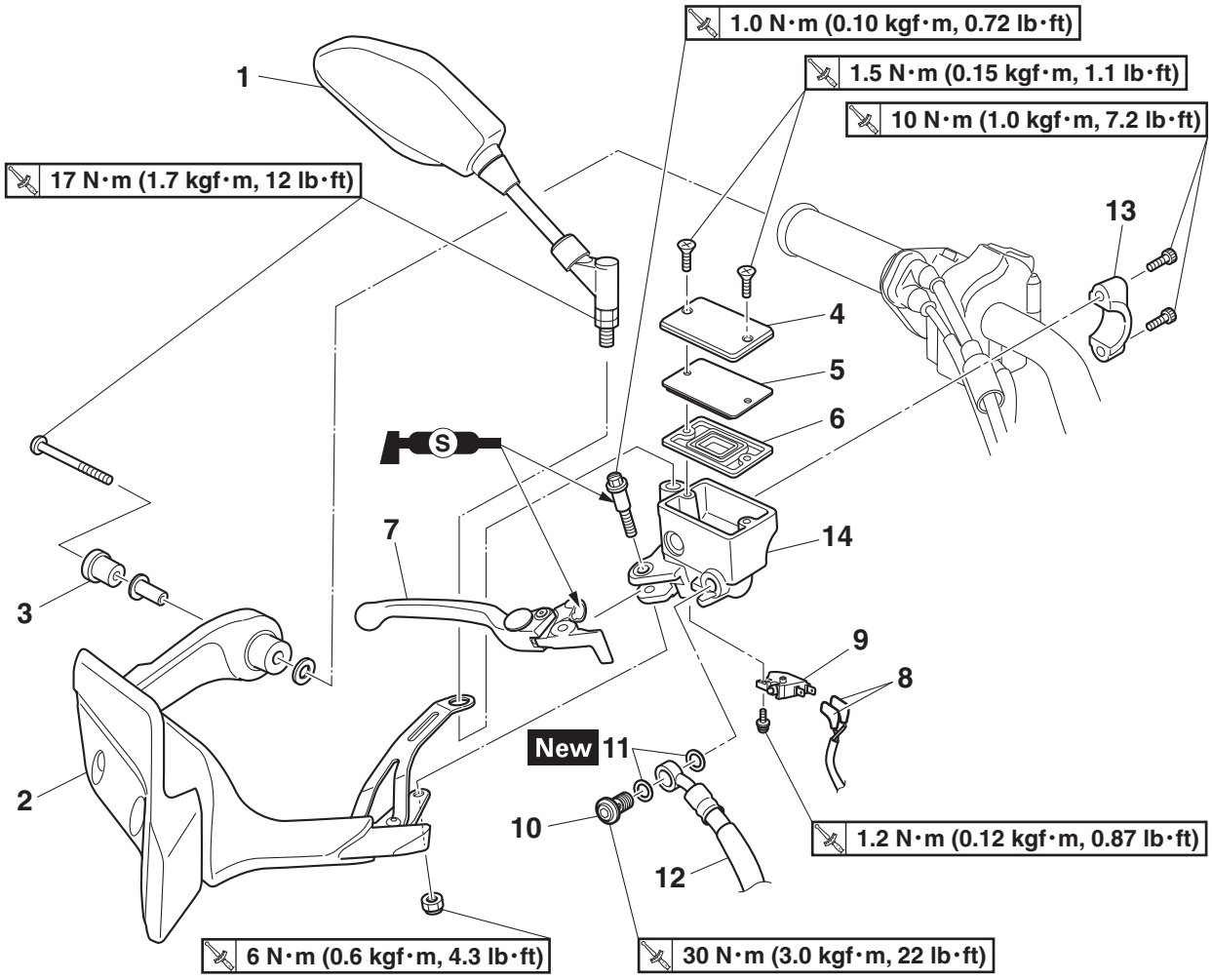
EAS20030
FRONT BRAKE

Removing the front brake pads



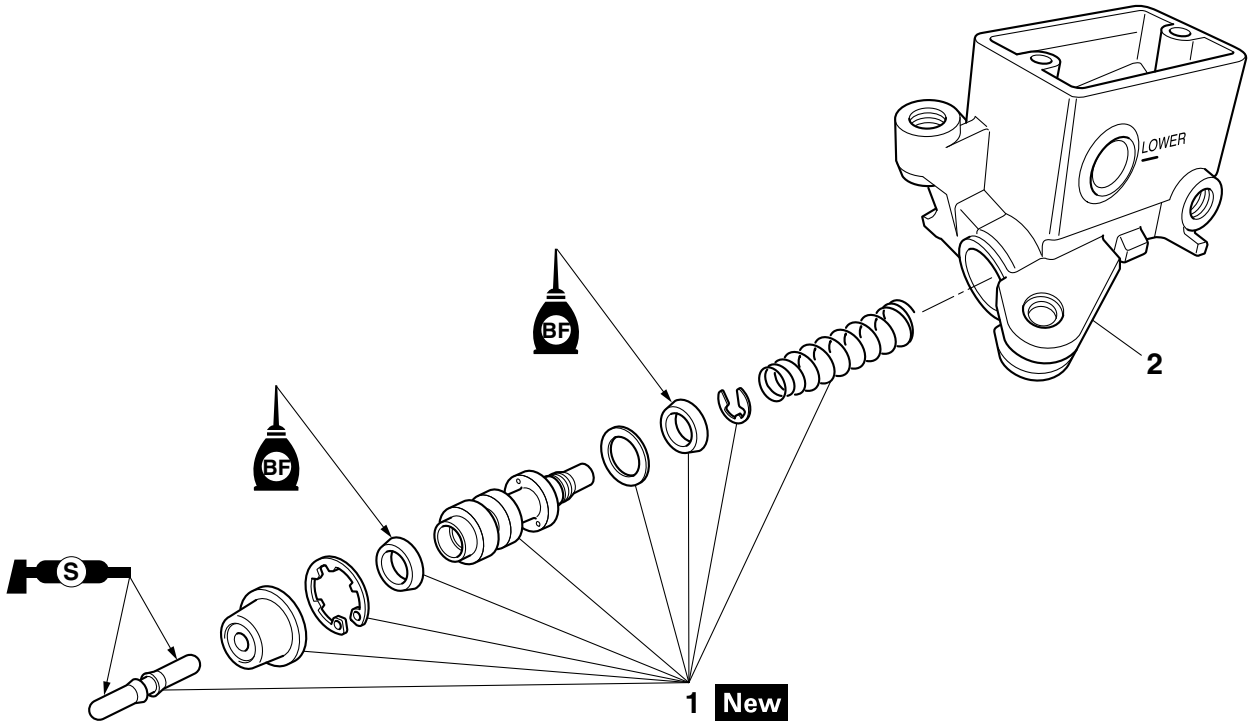
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Brake pad	2	
5	Reflector	1	
6	Front brake caliper	1	
7	Bleed screw	1	
8	Bleed screw	1	Right brake caliper side.

Removing the front brake master cylinder



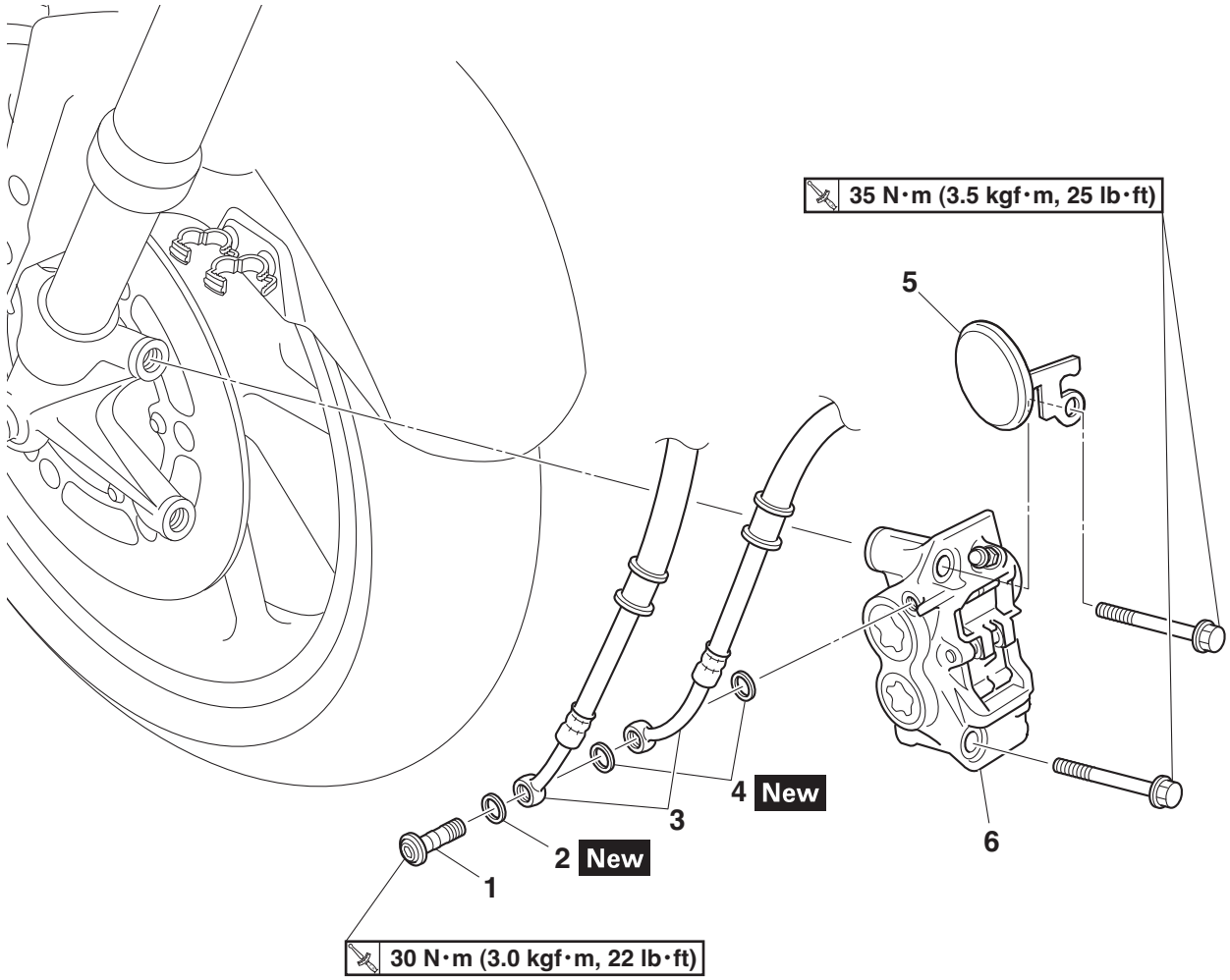
Order	Job/Parts to remove	Q'ty	Remarks
	Windshield		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
1	Rearview mirror	1	
2	Handguard	1	
3	Grip end 2	1	
4	Brake master cylinder reservoir cap	1	
5	Brake master cylinder reservoir diaphragm holder	1	
6	Brake master cylinder reservoir diaphragm	1	
7	Brake lever	1	
8	Front brake light switch lead connector	2	Disconnect.
9	Front brake light switch	1	
10	Brake hose union bolt	1	
11	Brake hose gasket	2	
12	Brake hose	1	
13	Front brake master cylinder holder	1	
14	Front brake master cylinder	1	

Disassembling the front brake master cylinder



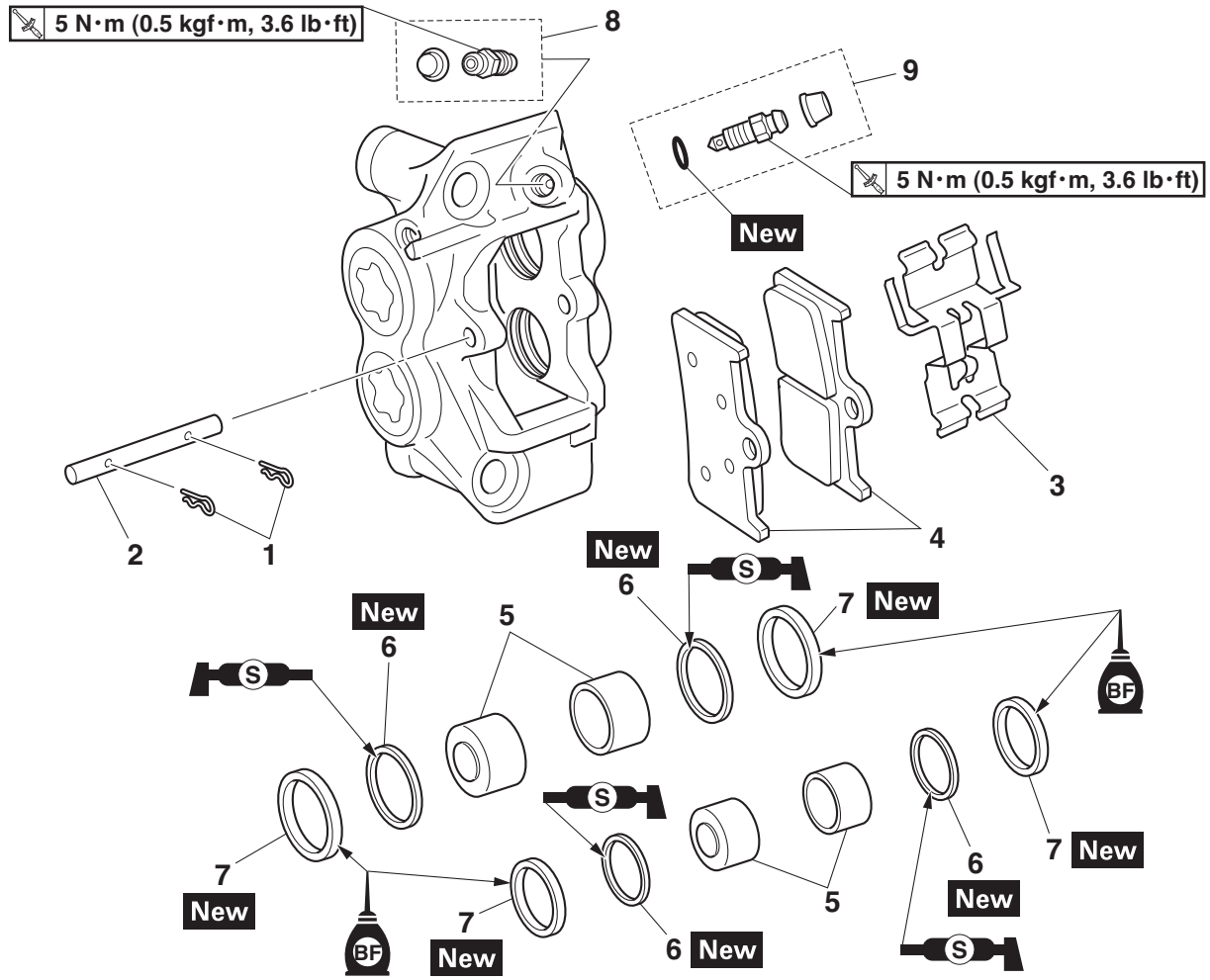
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	

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 3-15.
1	Brake hose union bolt	1	
2	Brake hose gasket	1	
3	Brake hose	2	
4	Brake hose gasket	2	
5	Reflector	1	
6	Front brake caliper	1	

Disassembling the front brake calipers



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

EAS30168
INTRODUCTION
EWA14101
⚠ WARNING

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

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

EAS30169
CHECKING THE FRONT BRAKE DISCS
The following procedure applies to both brake discs.
1. Remove:
   - Front wheel
   Refer to "FRONT WHEEL" on page 4-19.
2. Check:
   - Front brake disc
   Damage/galling → Replace.
3. Measure:
   - Brake disc runout
   Out of specification → Correct the brake disc runout or replace the brake disc.

Brake disc runout limit (as measured on wheel)
0.10 mm (0.0039 in)

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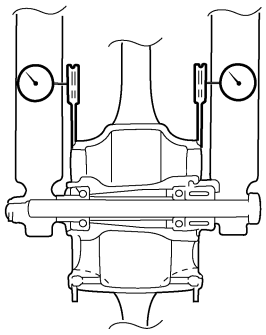
a. Place the vehicle on a maintenance stand so that the front wheel is elevated.
b. Before measuring the brake disc runout, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc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



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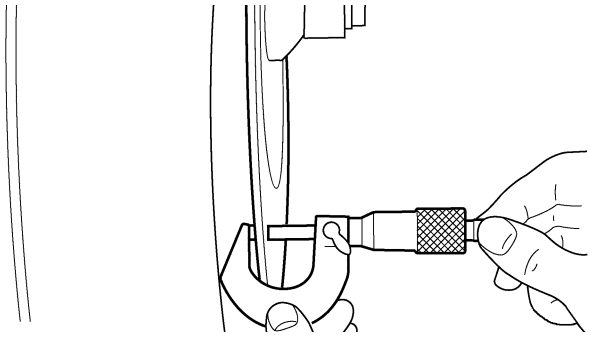
4. Measure:
   - Brake disc thickness
   Measure the brake disc thickness at a few different locations.
   Out of specification → Replace.

Brake disc thickness limit
4.0 mm (0.16 in)



5. Adjust:
   - Brake disc runout

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

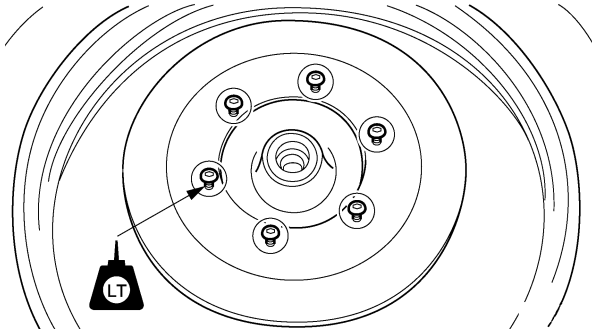
Front brake disc bolt
18 N·m (1.8 kgf·m, 13 lb·ft)
LOCTITE®

ECA19150
NOTICE

Replace the brake disc bolts with new ones.

TIP

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



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

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6. Install:
   • Front wheel
   Refer to "FRONT WHEEL" on page 4-19.

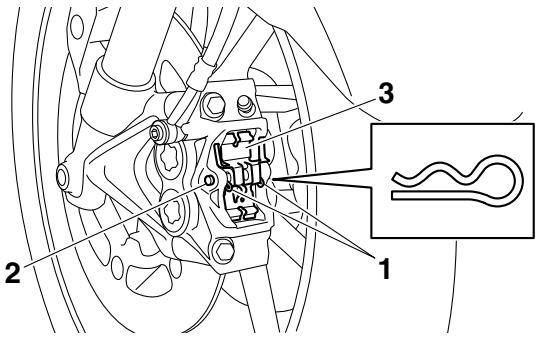
EAS30170
REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

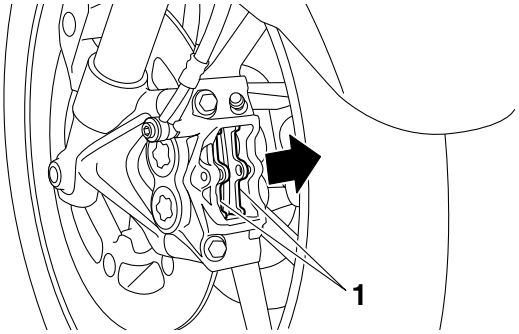
TIP

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

1. Remove:
   • Brake pad clips "1"
   • Brake pad pin "2"
   • Brake pad spring "3"

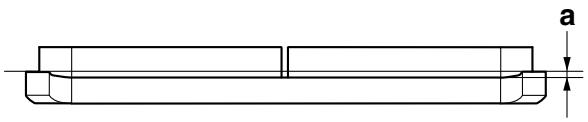


2. Remove:
   • Brake pads "1"



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

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



4. Remove:
   • Brake caliper bolts
5. Install:
   • Brake pads
   • Brake pad spring

TIP

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

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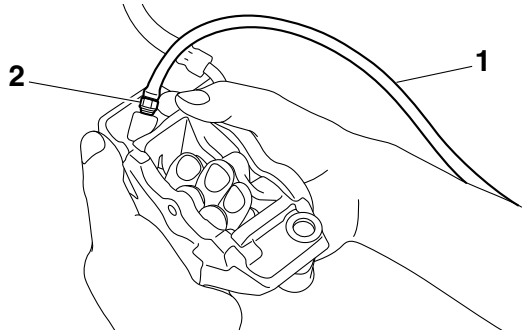
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.



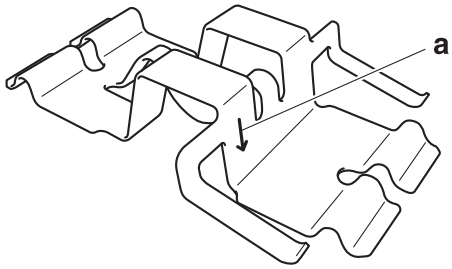
c. Tighten the bleed screw.

	Brake caliper bleed screw **5 N·m (0.5 kgf·m, 3.6 lb·ft)**

d. Install the brake pads and brake pad spring.

TIP

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



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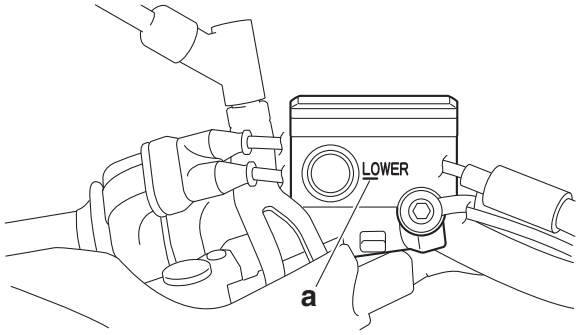
6. Install:
   - Brake pad pin
   - Brake pad clips
   - Front brake caliper

	Front brake caliper bolt **35 N·m (3.5 kgf·m, 25 lb·ft)**

7. Check:
   - Brake fluid level
     Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.



8. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.

EAS30724

REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

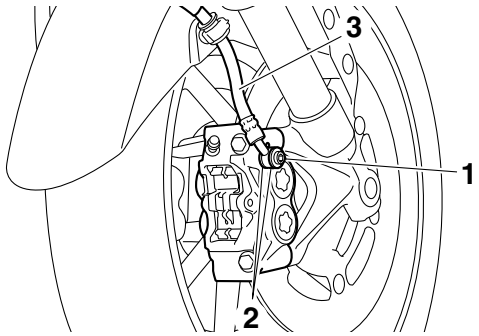
TIP

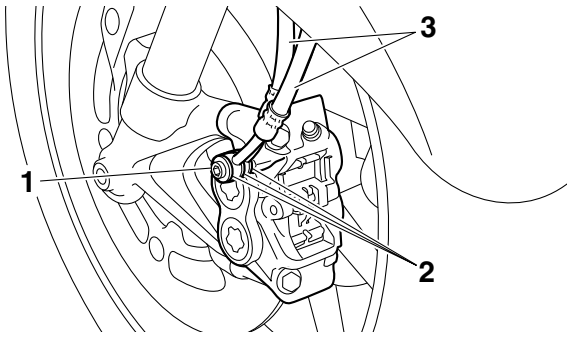
Before removing the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   - Brake hose union bolts "1"
   - Brake hose gaskets "2"
   - Brake hoses "3"

TIP

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

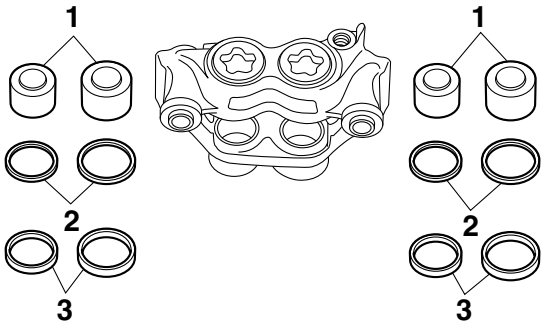




EAS30172
DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

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



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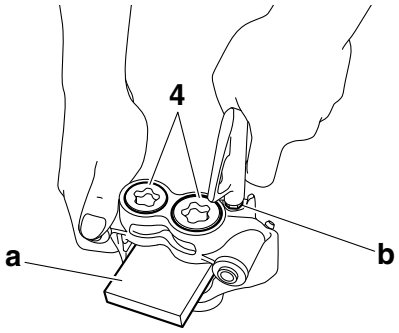
a. Secure the right side brake caliper pistons with a piece of wood "a".
b. Blow compressed air into the brake hose joint opening "b" to force out the left side pistons from the brake caliper.

EWA17060
⚠ WARNING

• Never try to pry out the brake caliper pistons.
• Do not loosen the bolts "4".



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

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EAS30173
CHECKING THE FRONT BRAKE CALIPERS

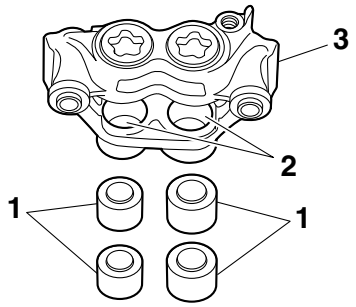
The following procedure applies to both of the brake calipers.

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

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

EWA13611
⚠ WARNING

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



EAS30174
ASSEMBLING THE FRONT BRAKE CALIPERS

EWA16560
⚠ WARNING

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

replace the brake caliper piston dust seals and brake caliper piston seals.

Specified brake fluid
DOT 4

EAS30175
INSTALLING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake calipers.
1. Install:
   - Front brake caliper "1" (temporarily)
   - Brake hose gaskets New
   - Brake hoses "2"
   - Brake hose union bolts "3"

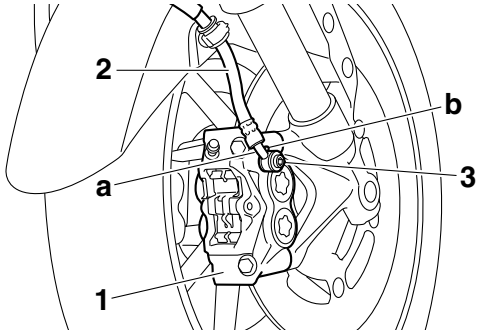
Front brake hose union bolt
30 N·m (3.0 kgf·m, 22 lb·ft)

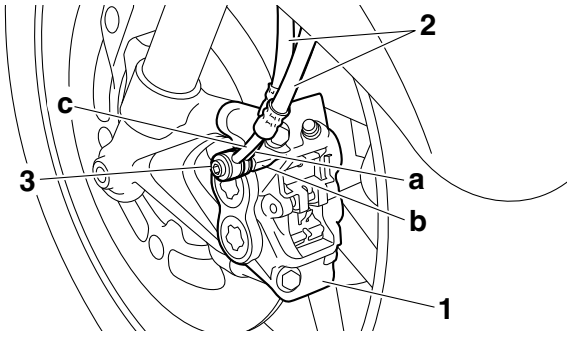
EWA13531
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation.

ECA21410
NOTICE

- **When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.**
- **Install the brake pipe "c" so that it is aligned with the brake pipe "a".**





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

Front brake caliper bolt
35 N·m (3.5 kgf·m, 25 lb·ft)

Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-41.
4. Fill:
   - Brake master cylinder reservoir (with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

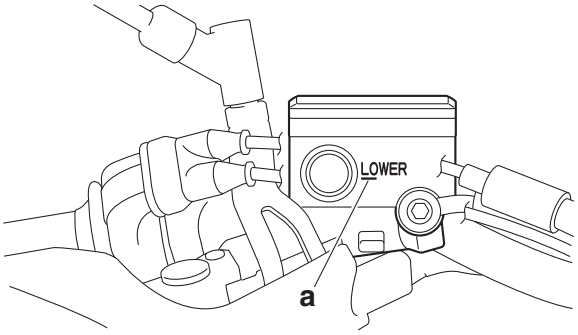
EWA13090
⚠ WARNING

- **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
NOTICE

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

5. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
6. Check:
   - Brake fluid level
     Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.



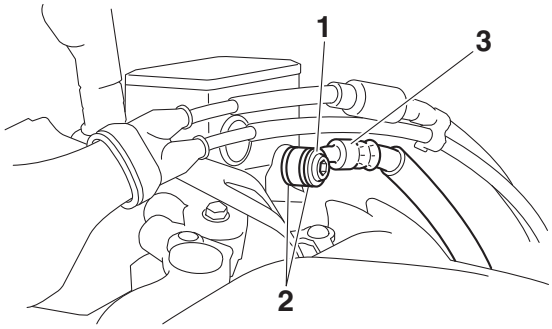
7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.

EAS30179
REMOVING THE FRONT BRAKE MASTER CYLINDER

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

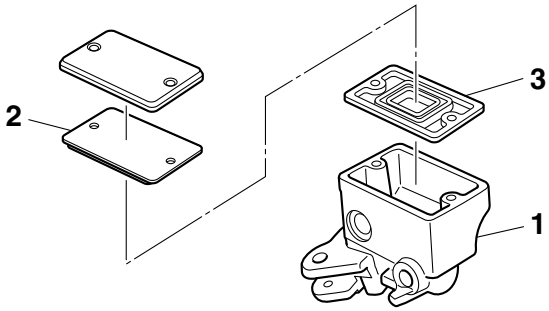
1. Disconnect:
   • Brake light switch connectors (from the front brake light switch)
2. Remove:
   • Brake hose union bolt "1"
   • Brake hose gaskets "2"
   • Brake hose "3"

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



EAS30725
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 "1"
   • Brake master cylinder reservoir diaphragm holder "2"
   Cracks/damage → Replace.
   • Brake master cylinder reservoir diaphragm "3"
   Damage/wear → Replace.



4. Check:
   • Brake hoses
   Cracks/damage/wear → Replace.

EAS30181
ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520
⚠ WARNING
- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**

Specified brake fluid
DOT 4

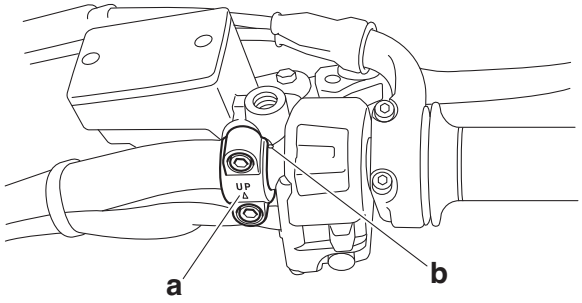
EAS30182
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   • Front brake master cylinder
   • Front brake master cylinder holder

Front brake master cylinder holder bolt
10 N·m (1.0 kgf·m, 7.2 lb·ft)

TIP
- Install the front brake master cylinder holder with the "UP" mark "a" facing up.

- Align the end of the front brake master cylinder holder with the punch mark “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.
- There should be more than 11 mm (0.43 in) for clearance between the handlebar switch (right) and the front brake master cylinder holder. Also, the punch mark should be seen.



2. Install:
   - Brake hose gaskets New
   - Brake hose
   - Brake hose union bolt

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

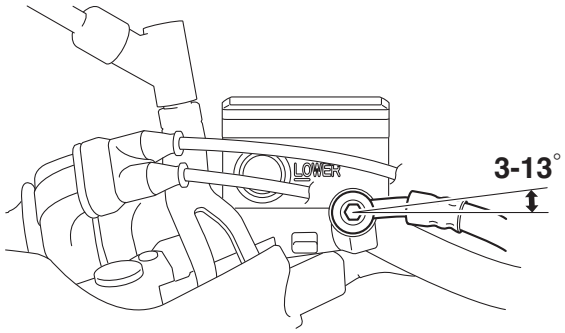
EWA13531

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation.

TIP

- Attach the brake hose so that its angle is 3° to 13° against the straight line in parallel with the ceiling plane of the master cylinder.
- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



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

	Specified brake fluid **DOT 4**

EWA13540

⚠ WARNING

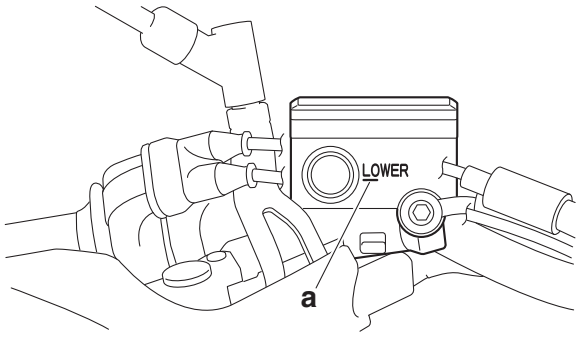
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540

NOTICE

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

4. Bleed:
   - Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-15.
5. Check:
   - Brake fluid level
     Below the minimum level mark “a” → Add the specified brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-13.

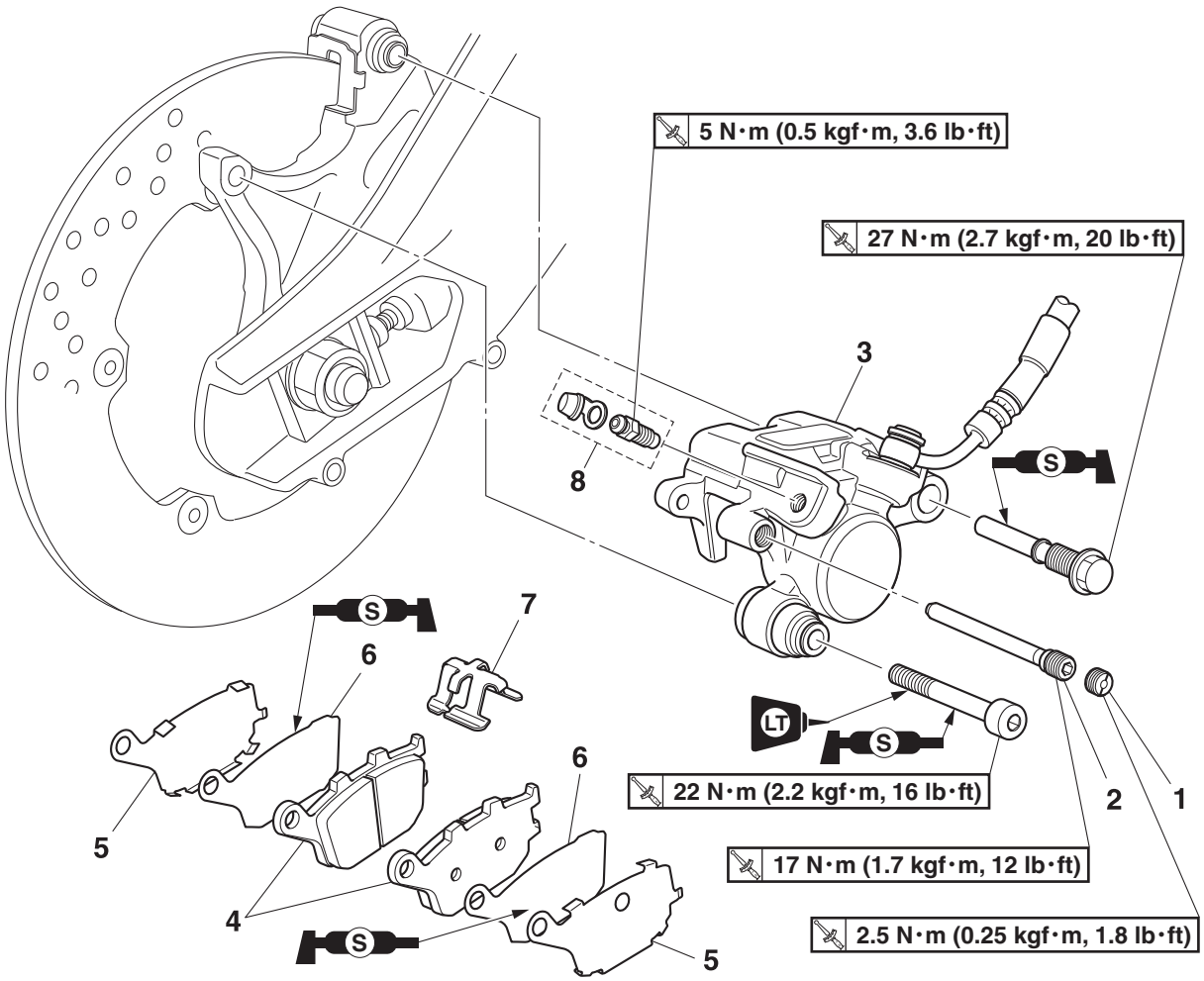


6. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC

BRAKE SYSTEM (ABS)" on page 3-15.

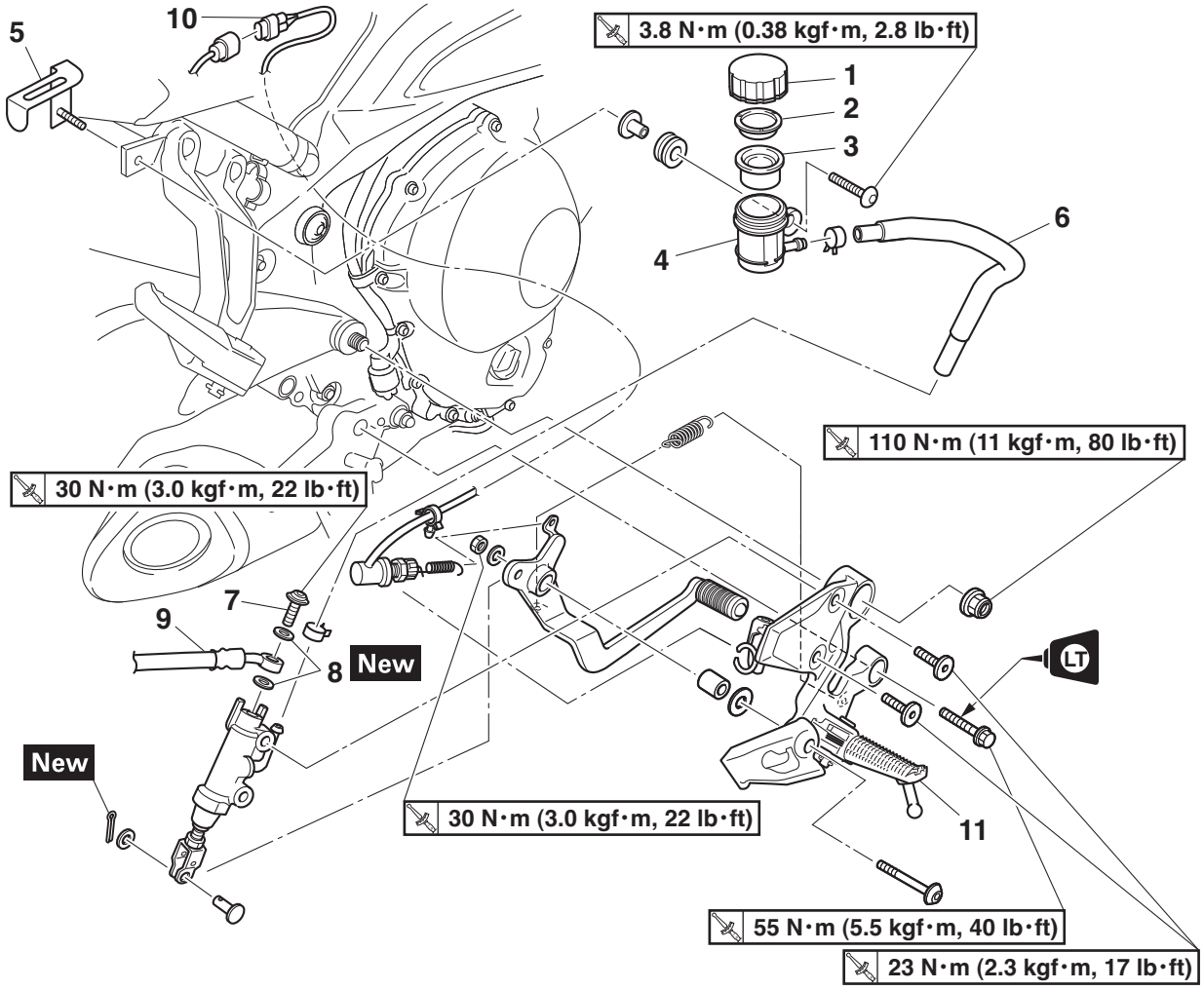
EAS20031
REAR BRAKE

Removing the rear brake pads



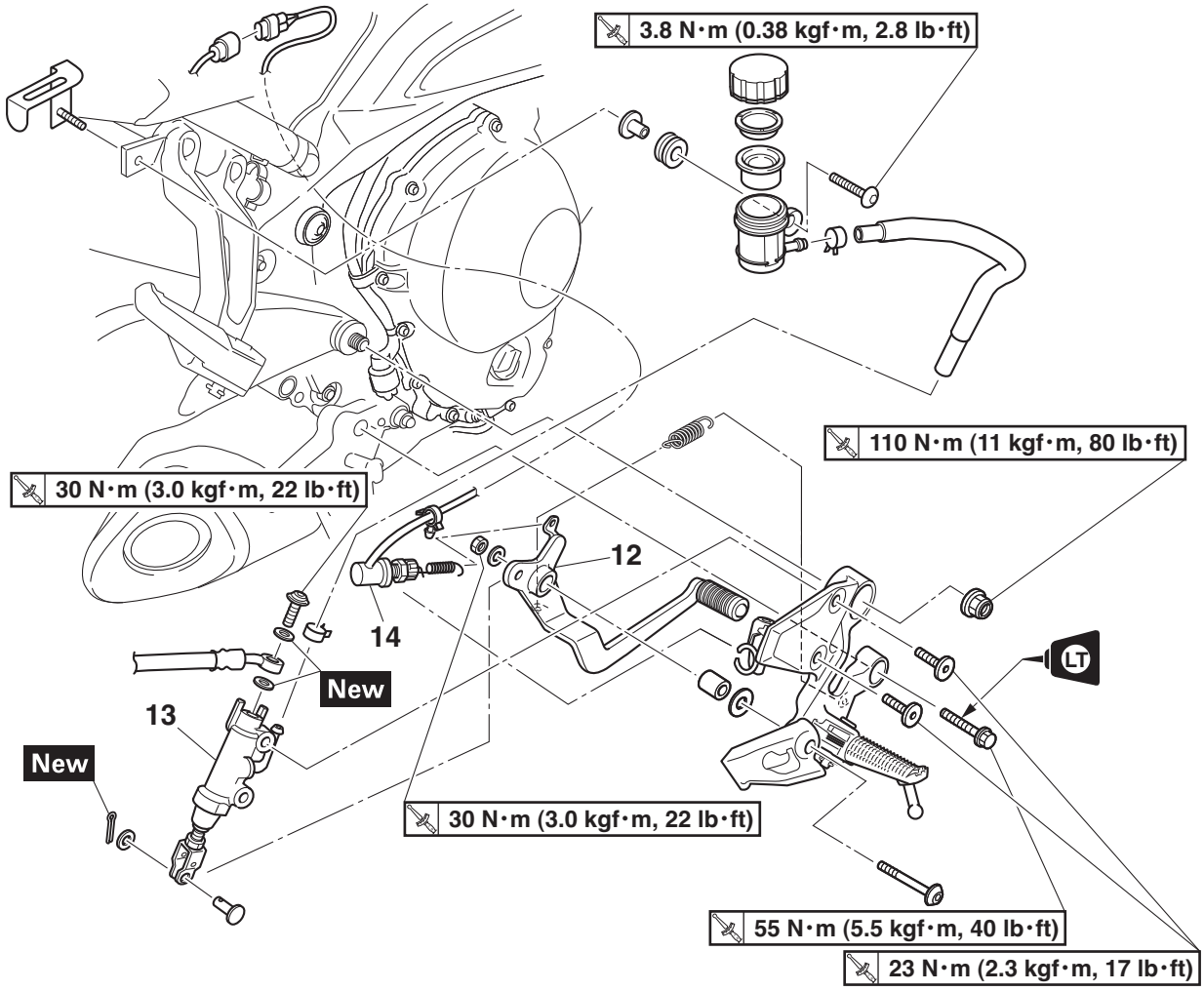
Order	Job/Parts to remove	Q'ty	Remarks
1	Screw plug	1	
2	Brake pad retaining bolt	1	
3	Rear brake caliper	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Brake pad insulator	2	
7	Brake pad spring	1	
8	Bleed screw	1	

Removing the rear brake master cylinder



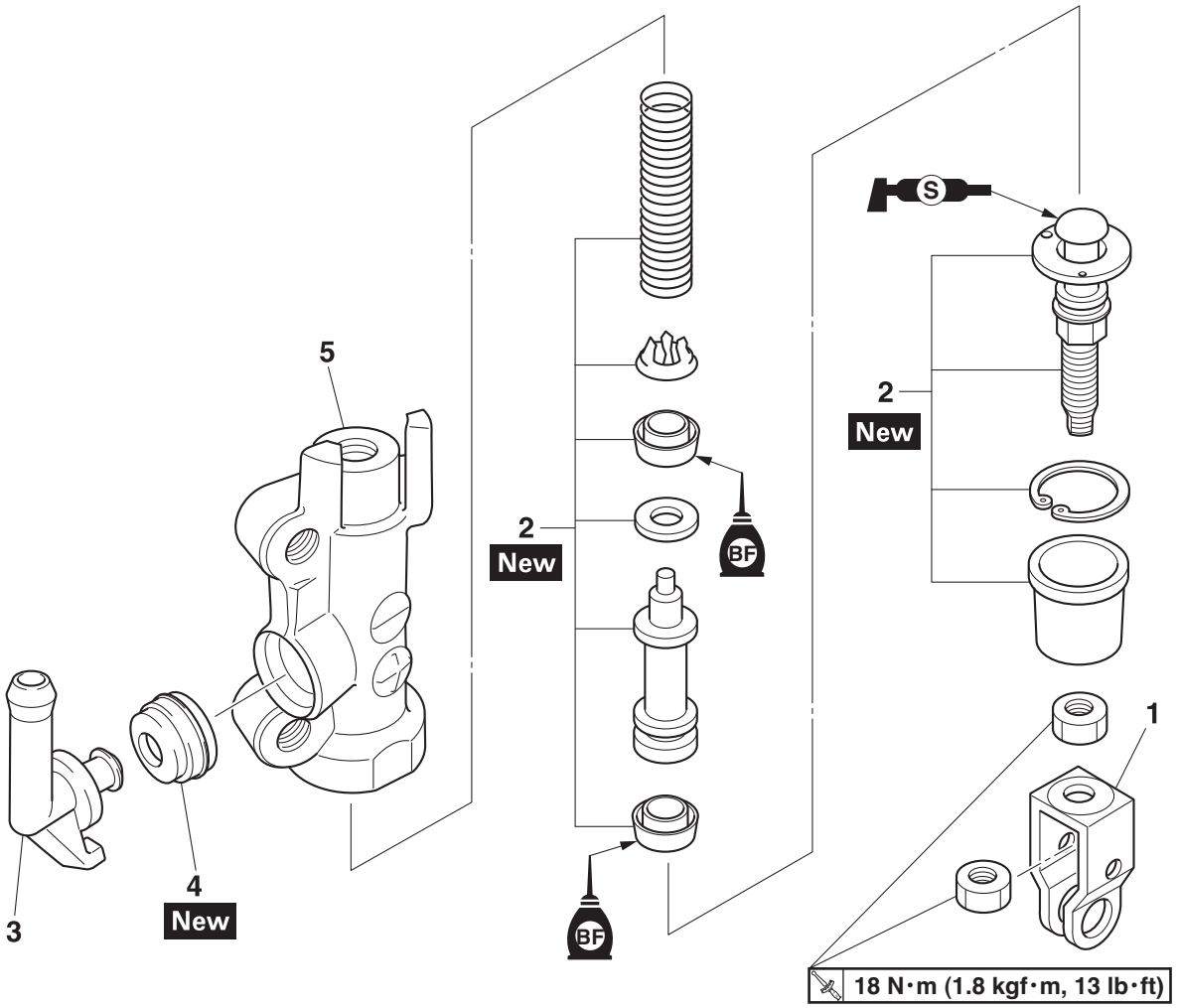
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
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 holder	1	
6	Brake fluid reservoir hose	1	
7	Brake hose union bolt	1	
8	Brake hose gasket	2	
9	Brake hose	1	
10	Rear brake light switch coupler	1	Disconnect.
11	Footrest assembly (right)	1	

Removing the rear brake master cylinder



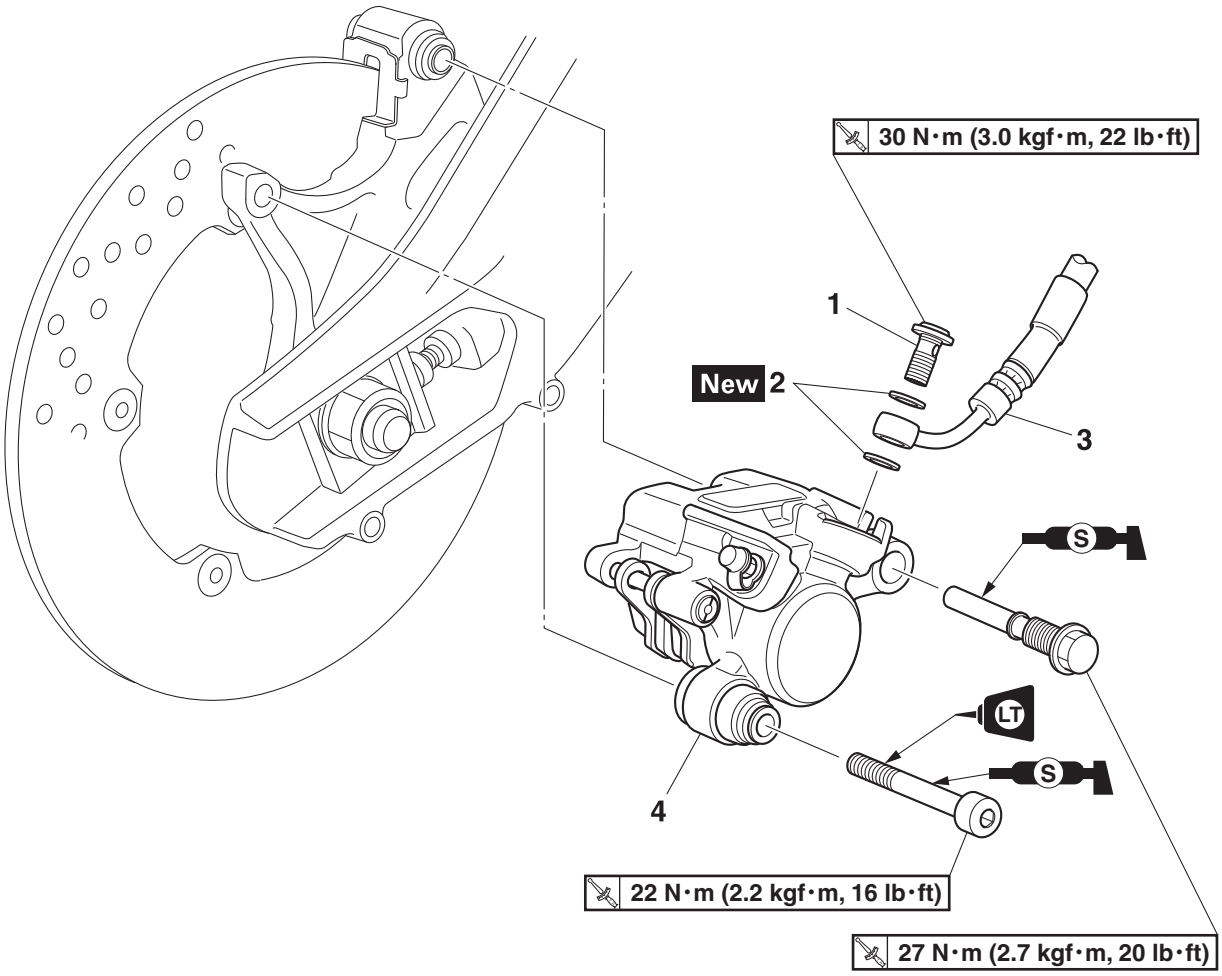
Order	Job/Parts to remove	Q'ty	Remarks
12	Brake pedal	1	
13	Rear brake master cylinder assembly	1	
14	Rear brake light switch	1	

Disassembling the rear brake master cylinder



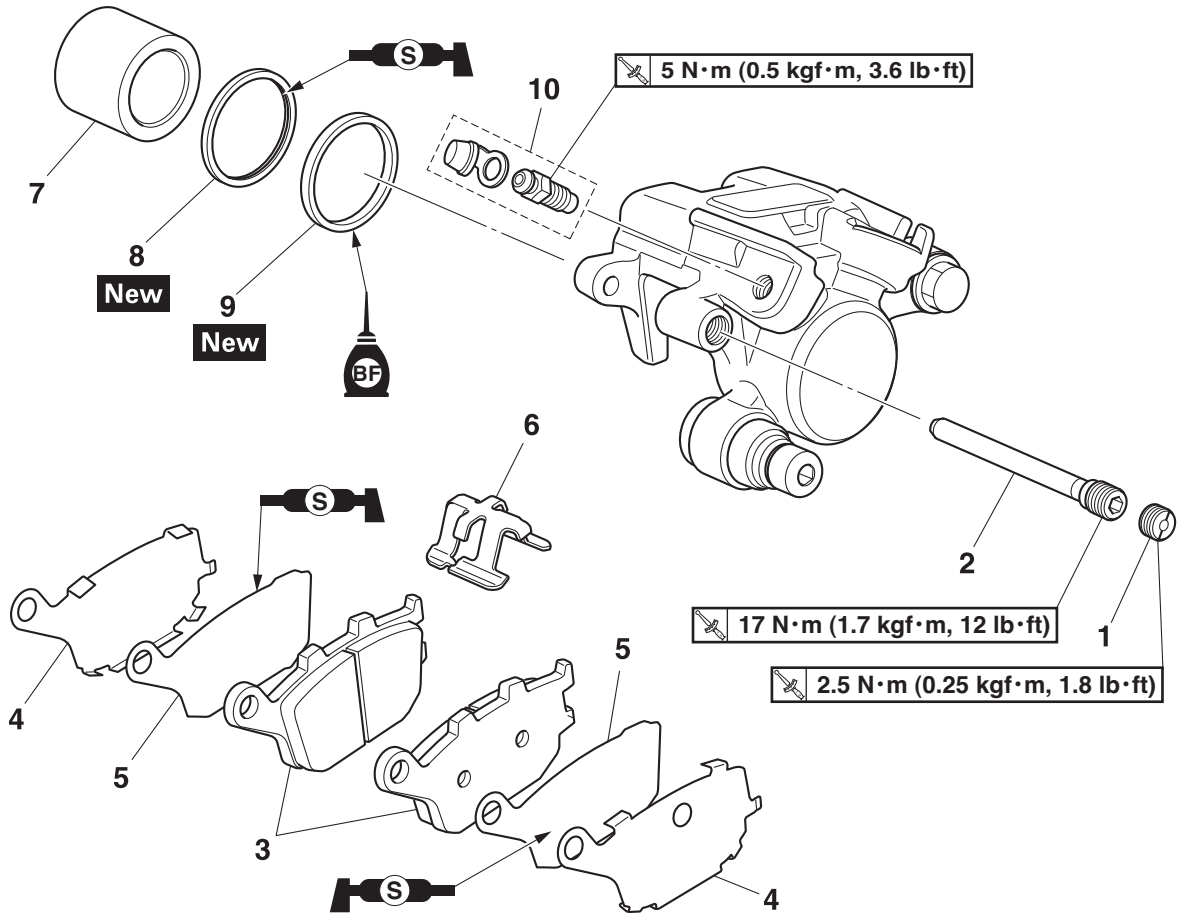
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder yoke	1	
2	Brake master cylinder kit	1	
3	Hose joint	1	
4	Bushing	1	
5	Brake master cylinder body	1	

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 3-15.
1	Brake hose union bolt	1	
2	Brake hose gasket	2	
3	Brake hose	1	
4	Rear brake caliper	1	

Disassembling the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Screw plug	1	
2	Brake pad retaining bolt	1	
3	Brake pad	2	
4	Brake pad shim	2	
5	Brake pad insulator	2	
6	Brake pad spring	1	
7	Brake caliper piston	1	
8	Brake caliper piston dust seal	1	
9	Brake caliper piston seal	1	
10	Bleed screw	1	

EAS30183
INTRODUCTION
EWA14101
WARNING

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

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

EAS30184
CHECKING THE REAR BRAKE DISC
1. Remove:
   - Rear wheel
     Refer to "REAR WHEEL" on page 4-27.
2. Check:
   - Rear brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc runout
     Out of specification → Correct the brake disc runout or replace the brake disc.
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-40.

Brake disc runout limit (as measured on wheel)
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 4-40.

Brake disc thickness limit
4.5 mm (0.18 in)

5. Adjust:
   - Brake disc runout
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-40.

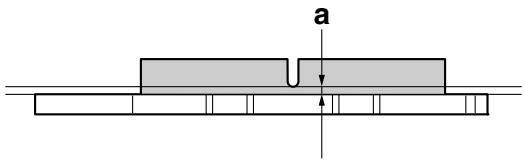
Rear brake disc bolt
30 N·m (3.0 kgf·m, 22 lb·ft)
LOCTITE®

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

EAS30185
REPLACING THE REAR BRAKE PADS
TIP
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

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

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



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

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

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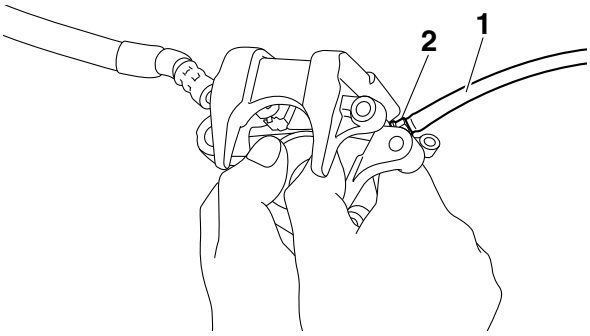
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.



c. Tighten the bleed screw.

Brake caliper bleed screw
5 N·m (0.5 kgf·m, 3.6 lb·ft)

d. Install the brake pad insulators and brake pad shims onto each brake pads.

TIP

Apply silicone grease between the brake pad insulator and brake pad shim.

ECA14150

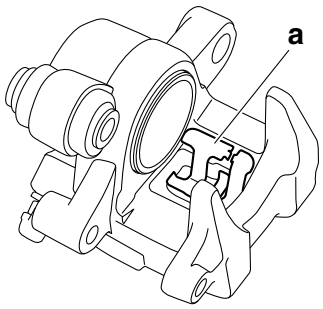
NOTICE

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

e. Install the brake pads and brake pad spring.

TIP

The longer tangs "a" of the brake pad spring must point in the direction of the brake caliper piston.



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3. Lubricate:
   - Rear brake caliper bolts

Recommended lubricant
Silicone grease

ECA14150

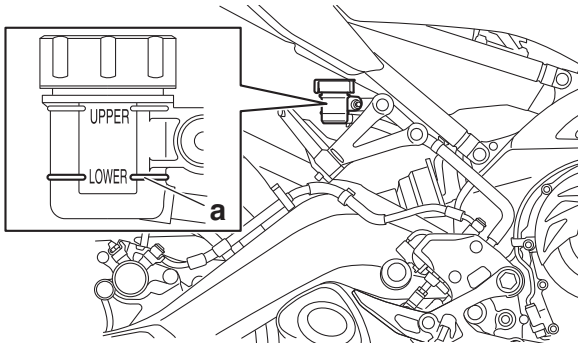
NOTICE

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

4. Install:
   - Rear brake caliper
   - Brake pad retaining bolts
   - Screw plug

Rear brake caliper bolt (front)
27 N·m (2.7 kgf·m, 20 lb·ft)
Rear brake caliper bolt (rear)
22 N·m (2.2 kgf·m, 16 lb·ft)
LOCTITE®
Rear brake pad retaining bolt
17 N·m (1.7 kgf·m, 12 lb·ft)
Rear brake caliper screw plug
2.5 N·m (0.25 kgf·m, 1.8 lb·ft)

5. Check:
   - Brake fluid level
     Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.



6. Check:
   - Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.

EAS30186

REMOVING THE REAR BRAKE CALIPER

TIP

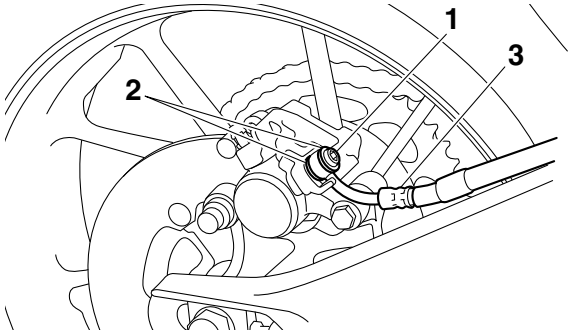
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   - Brake hose union bolt "1"

• Brake hose gaskets “2”
• Brake hose “3”

TIP

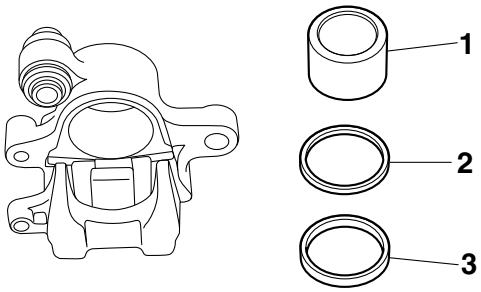
Put the end of the brake hose into a container and pump out the brake fluid carefully.



EAS30187

DISASSEMBLING THE REAR BRAKE CALIPER

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



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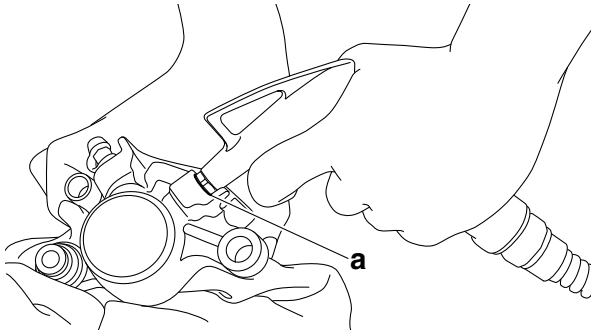
a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA13550

⚠ WARNING

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



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

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EAS30188

CHECKING THE REAR BRAKE CALIPER

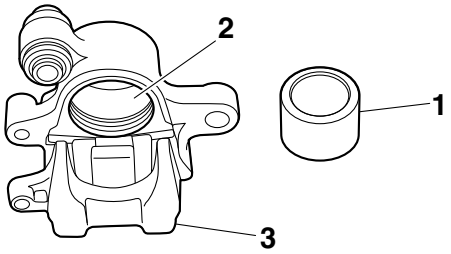
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seal	Every two years
Piston dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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

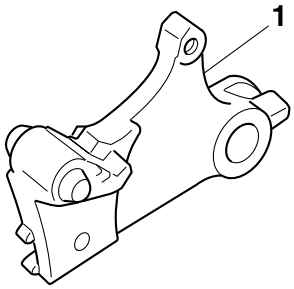
EWA13601

⚠ WARNING

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



2. Check:
   • Rear brake caliper bracket “1”
   Cracks/damage → Replace.
   Refer to “REAR WHEEL” on page 4-27.



EAS30189
ASSEMBLING THE REAR BRAKE CALIPER

EWA17080
⚠ WARNING

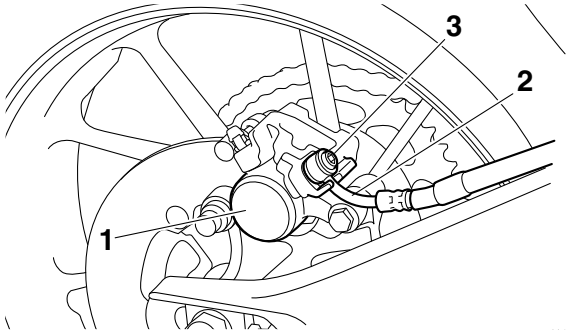
- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the brake caliper piston dust seal and brake caliper piston seal to swell and distort.**
- **Whenever a brake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

	Specified brake fluid **DOT 4**

EAS30190
INSTALLING THE REAR BRAKE CALIPER

1. Install:
   • Rear brake caliper “1”
   (temporarily)
   • Brake hose gaskets New
   • Brake hose “2”
   • Brake hose union bolt “3”

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

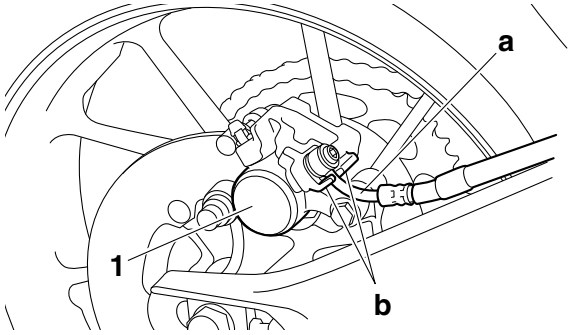


EWA13531
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation.

ECA19080
NOTICE

When installing the brake hose onto the brake caliper “1”, make sure the brake pipe “a” passes between the projections “b” on the brake caliper.



2. Remove:
   • Rear brake caliper
3. Install:
   • Brake pad insulators
   • Brake pad shims
   (onto the brake pads)
   • Brake pad spring
   (into the rear brake caliper)
   • Brake pads
   • Rear brake caliper
   Refer to “REPLACING THE REAR BRAKE PADS” on page 4-54.

	Rear brake caliper bolt (front) **27 N·m (2.7 kgf·m, 20 lb·ft)** **Rear brake caliper bolt (rear)** **22 N·m (2.2 kgf·m, 16 lb·ft)** **LOCTITE®** **Rear brake pad retaining bolt** **17 N·m (1.7 kgf·m, 12 lb·ft)** **Rear brake caliper screw plug** **2.5 N·m (0.25 kgf·m, 1.8 lb·ft)**

4. Fill:

• Brake fluid reservoir
(with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

EWA13090

⚠ WARNING

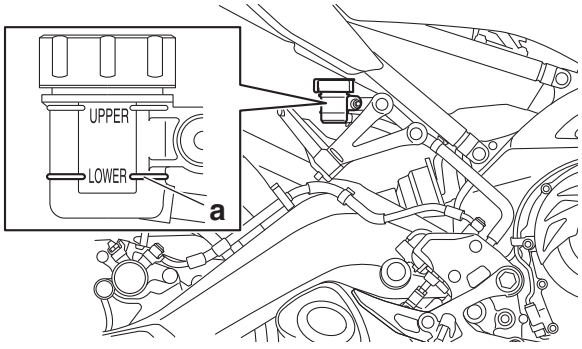
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

NOTICE

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

5. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
6. Check:
   • Brake fluid level
   Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.



7. Check:
   • Brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.

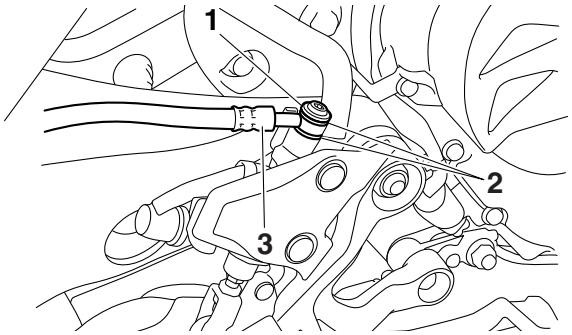
EAS30193

REMOVING THE REAR BRAKE MASTER CYLINDER

1. Remove:
   • Brake hose union bolt "1"
   • Brake hose gaskets "2"
   • Brake hose "3"

TIP

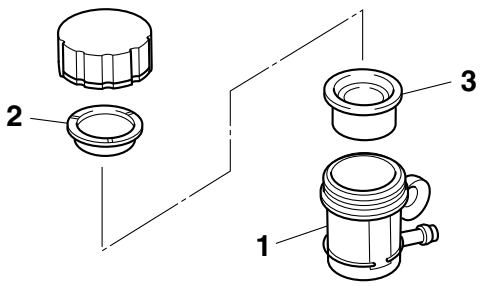
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.



EAS30194

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 "1"
   • Brake fluid reservoir diaphragm holder "2"
   Cracks/damage → Replace.
   • Brake fluid reservoir diaphragm "3"
   Damage/wear → Replace.



4. Check:
   • Brake hose
   • Brake fluid reservoir hose
   Cracks/damage/wear → Replace.

EAS30195
ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520
WARNING

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

Specified brake fluid
DOT 4

1. Install:
   • Brake master cylinder kit New

EAS30196
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   • Brake hose gaskets New
   • Brake hose
   • Brake fluid reservoir hose
   • Brake hose union bolt

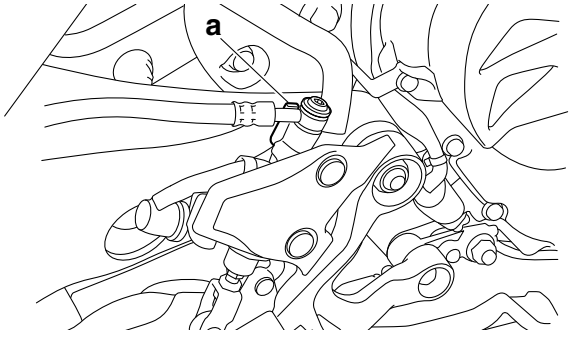
Rear brake hose union bolt
30 N·m (3.0 kgf·m, 22 lb·ft)

EWA13531
WARNING

Proper brake hose routing is essential to insure safe vehicle operation.

ECA14160
NOTICE

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



2. Fill:
   • Brake fluid reservoir
   (with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

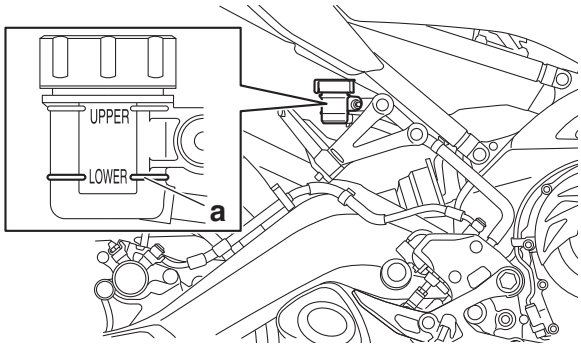
EWA13090
WARNING

• 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
NOTICE

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

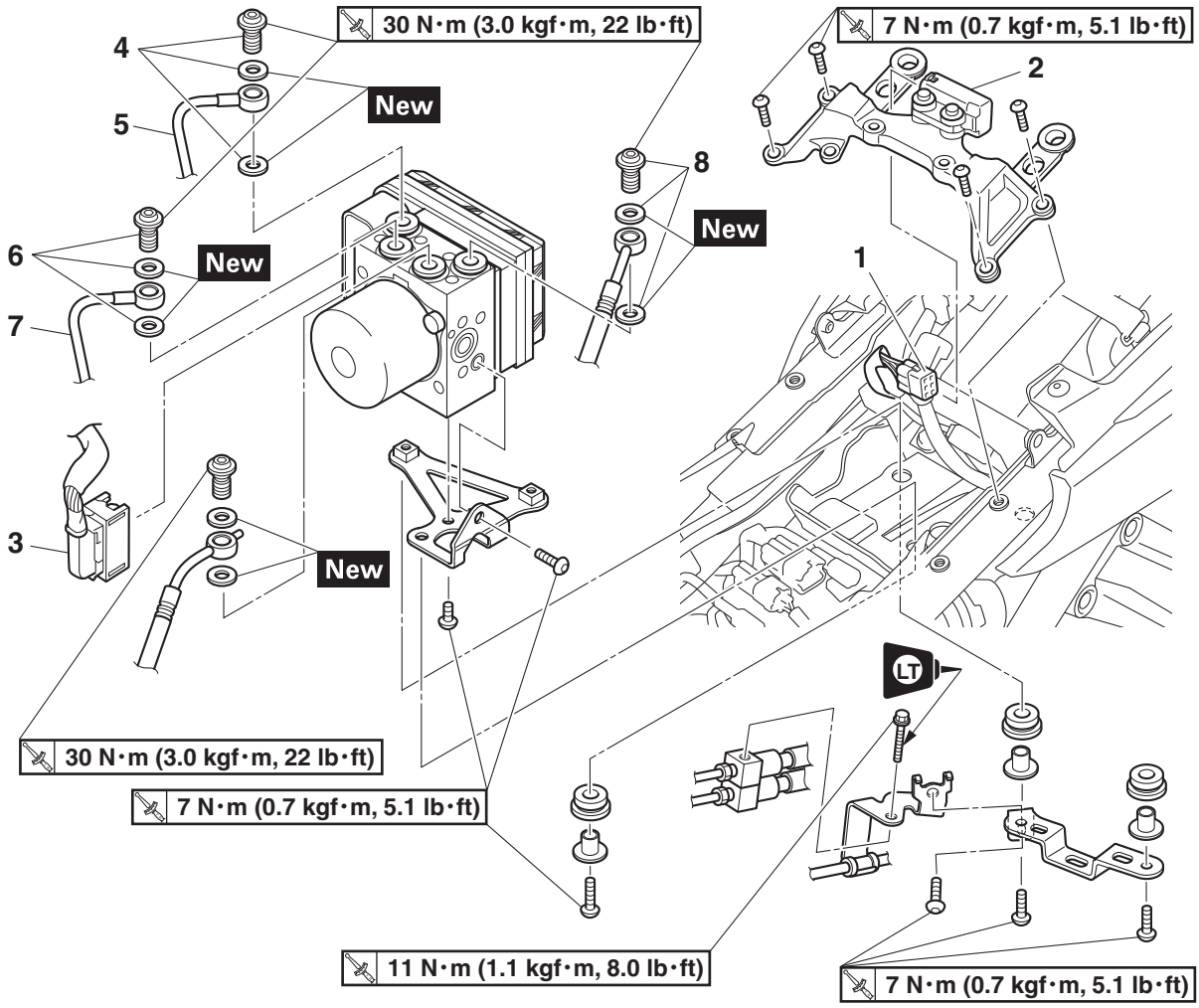
3. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
4. Check:
   • Brake fluid level
   Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-13.



5. Adjust:
   • Brake pedal position
   Refer to "ADJUSTING THE REAR DISC BRAKE" on page 3-14.
6. Adjust:
   • Rear brake light operation timing
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" on page 3-29.

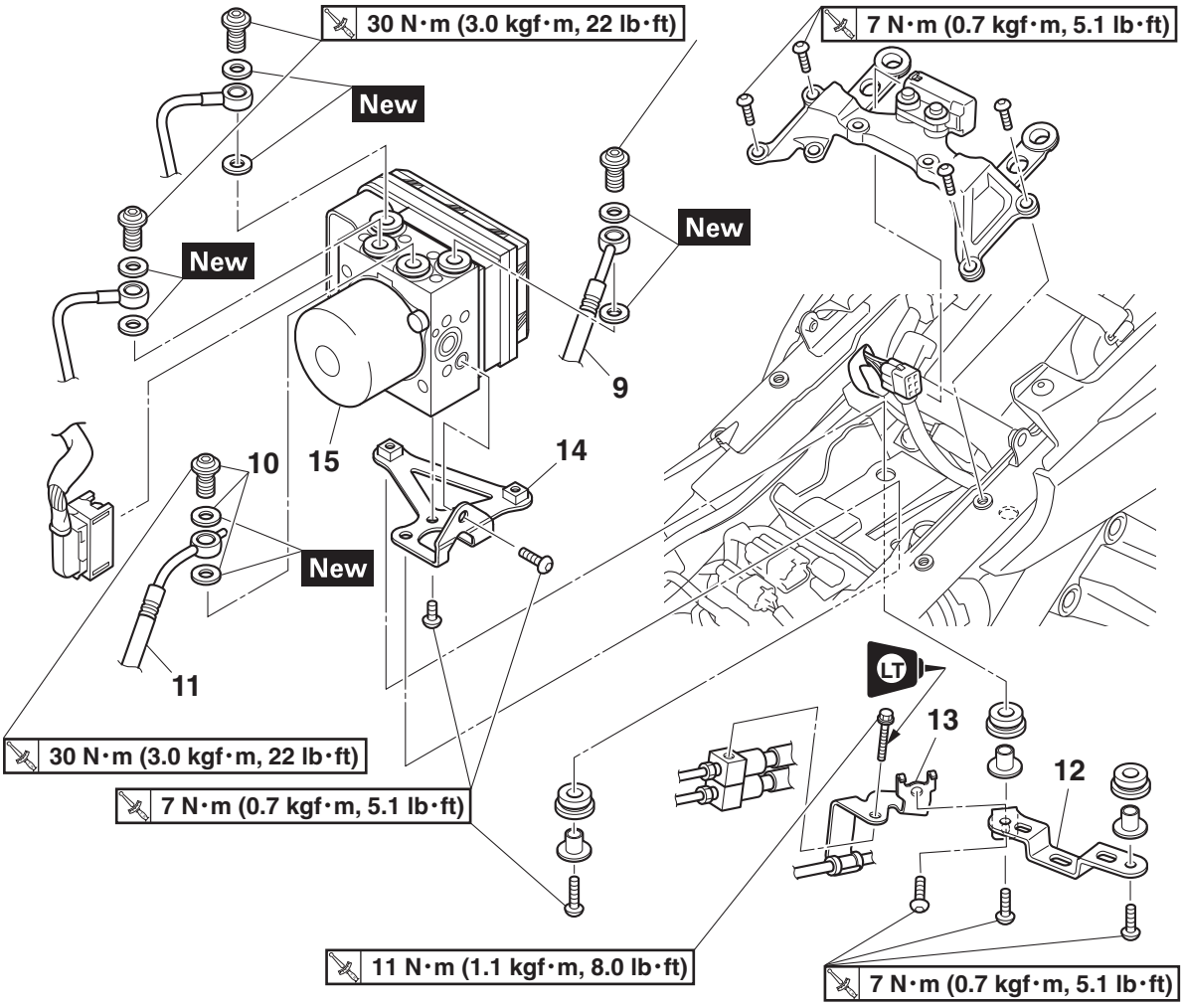
EAS20032
ABS (ANTI-LOCK BRAKE SYSTEM)

Removing the hydraulic unit assembly



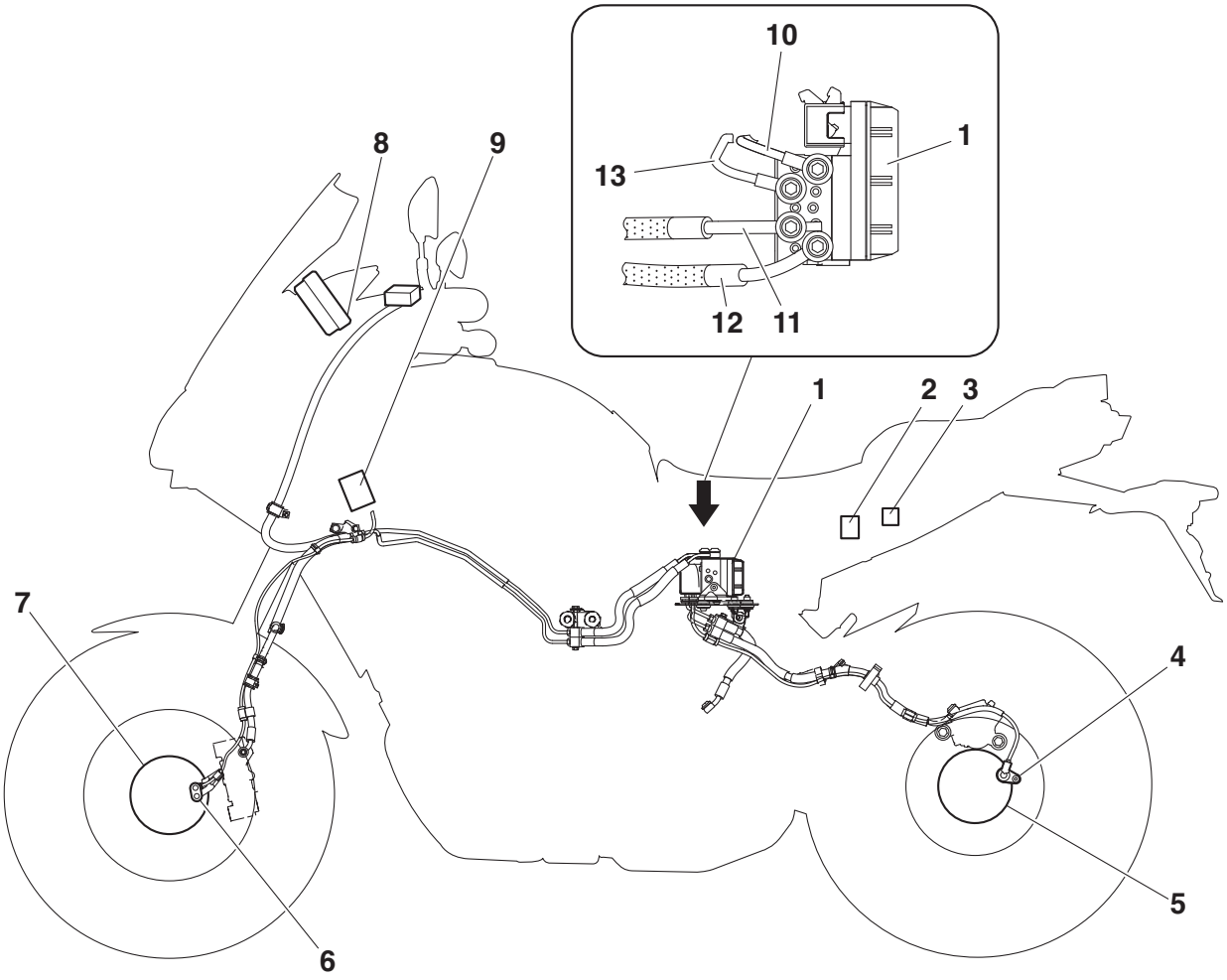
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-15.
1	Lean angle sensor coupler	1	Disconnect.
2	Fuel tank bracket assembly	1	
3	ABS ECU coupler	1	Disconnect.
4	Brake hose union bolt/Gasket	1/2	
5	Rear brake hose (hydraulic unit to rear brake caliper)	1	Disconnect.
6	Brake hose union bolt/Gasket	1/2	
7	Rear brake hose (rear brake master cylinder to hydraulic unit)	1	Disconnect.
8	Brake hose union bolt/Gasket	1/2	

Removing the hydraulic unit assembly



Order	Job/Parts to remove	Q'ty	Remarks
9	Front brake hose (hydraulic unit to front brake caliper)	1	Disconnect.
10	Brake hose union bolt/Gasket	1/2	
11	Front brake hose (front brake master cylinder to hydraulic unit)	1	Disconnect.
12	Bracket	1	
13	Rear brake hose bracket	1	
14	Hydraulic unit bracket	1	
15	Hydraulic unit	1	

EAS30728
ABS COMPONENTS CHART



1. Hydraulic unit assembly
2. Fuse box 3
3. Yamaha diagnostic tool coupler
4. Rear wheel sensor
5. Rear wheel sensor rotor
6. Front wheel sensor
7. Front wheel sensor rotor
8. ABS warning light
9. Fuse box 2
10. Rear brake hose (hydraulic unit to rear brake caliper)
11. Front brake hose (front brake master cylinder to hydraulic unit)
12. Front brake hose (hydraulic unit to front brake caliper)
13. Rear brake hose (rear brake master cylinder to hydraulic unit)

EAS30197
REMOVING THE HYDRAULIC UNIT ASSEMBLY

ECA21091
NOTICE

Unless necessary, avoid removing and installing the brake hoses of the hydraulic unit assembly.

EWA13930
WARNING

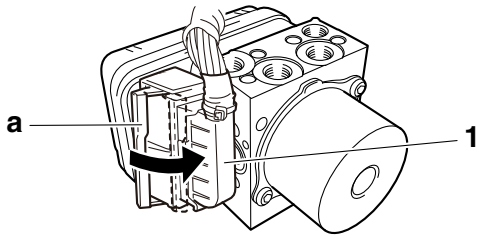
Refill with the same type of brake fluid that is already in the system. Mixing fluids may result in a harmful chemical reaction, leading to poor braking performance.

ECA18241
NOTICE

- **Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.**
- **Do not turn the main switch to "ON" when removing the hydraulic unit assembly.**
- **Do not clean with compressed air.**
- **Do not reuse the brake fluid.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Do not allow any brake fluid to contact the couplers. Brake fluid may damage the couplers and cause bad contacts.**
- **If the union bolts for the hydraulic unit assembly have been removed, be sure to tighten them to the specified torque and bleed the brake system.**

1. Disconnect:
   - ABS ECU coupler "1"

TIP
Pull the lock lever "a" of the ABS ECU coupler in the direction of the arrow shown, and then disconnect the coupler.



2. Remove:
   - Brake hoses

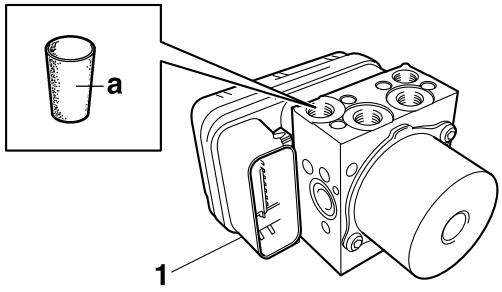
TIP
Do not operate the brake lever and brake pedal while removing the brake hoses.

ECA18251
NOTICE

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

3. Remove:
   - Hydraulic unit assembly "1"

TIP
- To avoid brake fluid leakage and to prevent foreign materials from entering the hydraulic unit assembly, insert a rubber plug "a" or a bolt (M10 × 1.0) into each brake hose union bolt hole.
- When using a bolt, do not tighten the bolt until the bolt head touches the hydraulic unit. Otherwise, the brake hose union bolt seating surface could be deformed.



EAS30198
CHECKING THE HYDRAULIC UNIT ASSEMBLY

1. Check:
   - Hydraulic unit assembly
     Cracks/damage → Replace the hydraulic unit assembly and the brake pipes that are connected to the assembly as a set.

EAS30200
INSTALLING THE HYDRAULIC UNIT ASSEMBLY

1. Install:
   - Hydraulic unit assembly

ECA21371
NOTICE

Do not remove the rubber plugs or bolts (M10 × 1.0) installed in the brake hose union bolt holes before installing the hydraulic unit assembly.

TIP

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

2. Remove:
   - Rubber plugs or bolts (M10 × 1.0)
3. Install:
   - Front brake hose (front brake master cylinder to hydraulic unit) "1"
   - Front brake hose (hydraulic unit to front brake caliper) "2"
   - Rear brake hose (rear brake master cylinder to hydraulic unit) "3"
   - Rear brake hose (hydraulic unit to rear brake caliper) "4"
   - Gaskets New
   - Brake hose union bolts

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

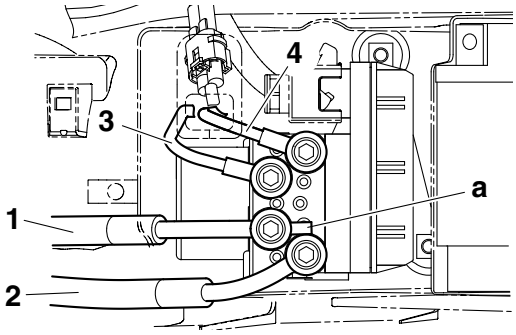
ECA21121

NOTICE

If the brake hose union bolt does not turn easily, replace the hydraulic unit assembly, brake hoses, and related parts as a set.

TIP

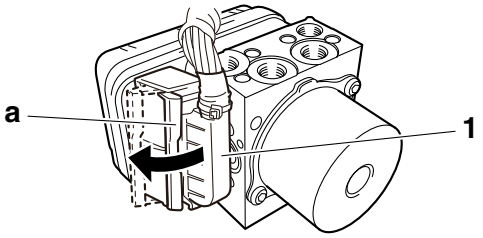
When installing the brake hose (front brake master cylinder to hydraulic unit), make sure that the stopper "a" on the hose contacts the brake hose (hydraulic unit to front brake caliper).

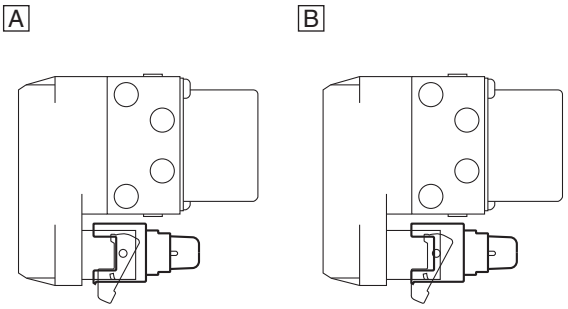


4. Connect:
   - ABS ECU coupler "1"

TIP

- Connect the ABS ECU coupler, and then push the lock lever "a" of the coupler in the direction of the arrow shown.
- Make sure that the ABS ECU coupler is connected in the correct position as shown in illustration "A".





A. The ABS ECU coupler is connected correctly.
B. The ABS ECU coupler is not connected.

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

	Specified brake 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

NOTICE

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 3-15.
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 4-65.)

ECA14770

NOTICE

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

8. Delete the fault codes. (Refer to "[B-3] DELETING THE FAULT CODES" on page 8-147.)
9. Perform a trial run. (Refer to "CHECKING THE ABS WARNING LIGHT" on page 4-68.)

EAS30930

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.

- Brake line routing confirmation: this test checks the function of the ABS after the system was disassembled, adjusted, or serviced.
- ABS reaction-force confirmation: this test generates the same reaction-force pulsating action that is generated in the brake lever and brake pedal when the ABS is activated.

Brake line routing confirmation

EWA13120

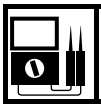
⚠ WARNING

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

TIP

- For the brake line routing confirmation, use the diagnosis of function of the Yamaha diagnostic tool.
- Before performing the brake line routing confirmation, make sure that no malfunctions have been detected in the ABS ECU and that the wheels are not rotating.

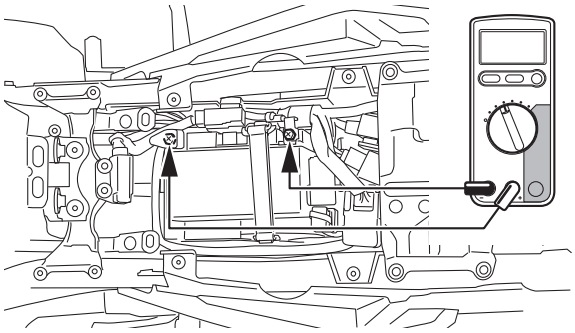
1. Place the vehicle on the centerstand.
2. Turn the main switch to "OFF".
3. Remove:
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
4. Check:
   • Battery voltage
   Lower than 12.8 V → Charge or replace the battery.



Battery voltage
Higher than 12.8 V

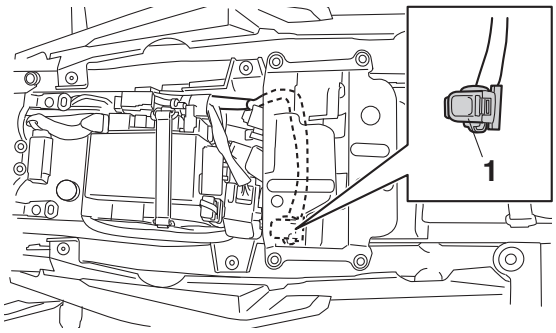
TIP

If the battery voltage is lower than 12.8 V, charge the battery, and then perform brake line routing confirmation.



5. Removing the protective cap "1", and then connect the Yamaha diagnostic tool to the Yamaha diagnostic tool coupler (4P).

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252

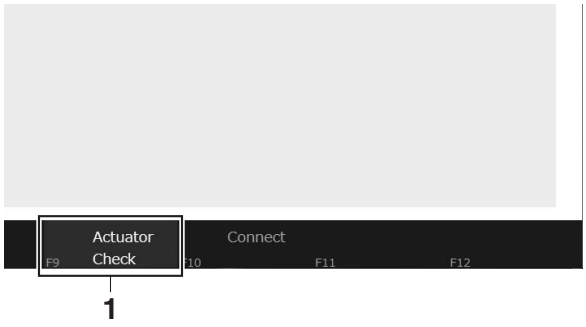


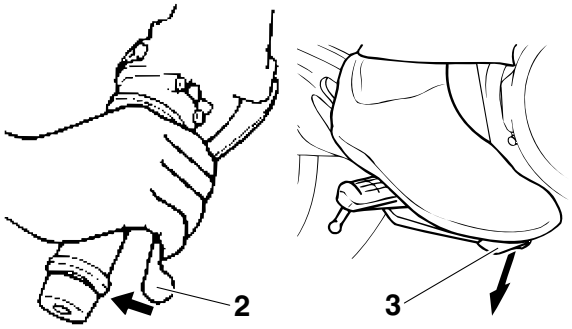
6. Start the Yamaha diagnostic tool and display the diagnosis of function screen.
7. Select code No. 2, "Brake line routing confirmation".
8. Click "Actuator Check" "1", and then operate the brake lever "2" and brake pedal "3" simultaneously.

TIP

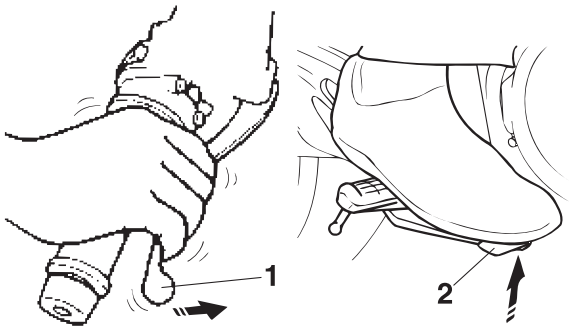
- The hydraulic unit operates 1 second after the brake lever and brake pedal are operated simultaneously and continues for approximately 5 seconds.

• The operation of the hydraulic unit can be confirmed using the indicator.
On: The hydraulic unit is operating.
Flashing: The conditions for operating the hydraulic unit have not been met.
Off: The brake lever and brake pedal are not being operated.





9. Check:
   • Hydraulic unit operation
   Click "Actuator Check", a single pulse will be generated in the brake lever "1", brake pedal "2", and again in the brake lever "1", in this order.



TIP
"ON" and "OFF" on the tool screen indicate when the brakes are being applied and released respectively.

ECA17371
NOTICE
- **Check that the pulse is felt in the brake lever, brake pedal, and again in the brake lever, in this order.**
- **If the pulse is felt in the brake pedal before it is felt in the brake lever, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**
- **If the pulse is hardly felt in either the brake lever or brake pedal, check that the brake hoses and brake pipes are connected correctly to the hydraulic unit assembly.**

10. If the operation of the hydraulic unit is normal, delete all of the fault codes.

ABS reaction-force confirmation

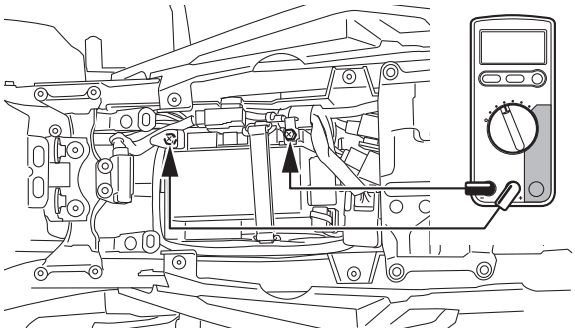
EWA13120
WARNING
Securely support the vehicle so that there is no danger of it falling over.

TIP
- For the ABS reaction-force confirmation, use the diagnosis of function of the Yamaha diagnostic tool. For more information, refer to the operation manual of the Yamaha diagnostic tool.
- Before performing the ABS reaction-force confirmation, make sure that no malfunctions have been detected in the ABS ECU and that the wheels are not rotating.

1. Place the vehicle on the centerstand.
2. Turn the main switch to "OFF".
3. Remove:
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
4. Check:
   • Battery voltage
   Lower than 12.8 V → Charge or replace the battery.

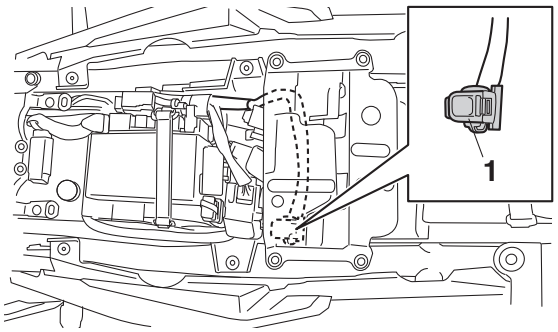
	Battery voltage **Higher than 12.8 V**

TIP
If the battery voltage is lower than 12.8 V, charge the battery, and then perform ABS reaction-force confirmation.



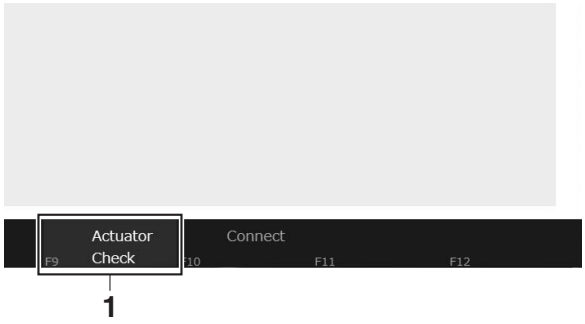
5. Removing the protective cap “1”, and then connect the Yamaha diagnostic tool to the Yamaha diagnostic tool coupler (4P).

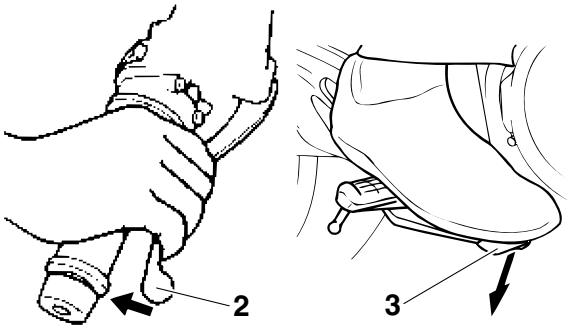
Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252



6. Start the Yamaha diagnostic tool and display the diagnosis of function screen.
7. Select code No. 1, “ABS reaction-force confirmation”.
8. Click “Actuator Check” “1”, and then operate the brake lever “2” and brake pedal “3” simultaneously.

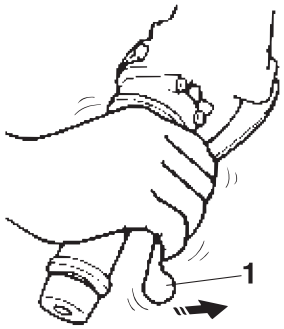
TIP
- The hydraulic unit operates 1 second after the brake lever and brake pedal are operated simultaneously and continues for approximately 5 seconds.
- The operation of the hydraulic unit can be confirmed using the indicator.
  On: The hydraulic unit is operating.
  Flashing: The conditions for operating the hydraulic unit have not been met.
  Off: The brake lever and brake pedal are not being operated.





9. A reaction-force pulsating action is generated in the brake lever “1” and continues for a few seconds.

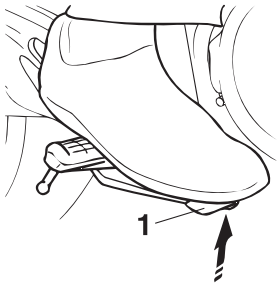
TIP
- The reaction-force pulsating action consists of quick pulses.
- Be sure to continue operating the brake lever and brake pedal even after the pulsating action has stopped.
- “ON” and “OFF” on the tool screen indicate when the brakes are being applied and released respectively.



10. After the pulsating action has stopped in the brake lever, it is generated in the brake pedal “1” and continues for a few seconds.

TIP
- The reaction-force pulsating action consists of quick pulses.
- Be sure to continue operating the brake lever and brake pedal even after the pulsating action has stopped.
- “ON” and “OFF” on the tool screen indicate

when the brakes are being applied and released respectively.



11. After the pulsating action has stopped in the brake pedal, it is generated in the brake lever and continues for a few seconds.

TIP

- The reaction-force pulsating action consists of quick pulses.
- "ON" and "OFF" on the tool screen indicate when the brakes are being applied and released respectively.

ECA17371

NOTICE

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

12. Turn the main switch to "OFF".
13. Remove the Yamaha diagnostic tool from the Yamaha diagnostic tool coupler, and then install the protective cap.
14. Turn the main switch to "ON".
15. Set the start/engine stop switch to "◠".
16. Check for brake fluid leakage around the hydraulic unit.
    Brake fluid leakage → Replace the hydraulic unit, brake pipes, and related parts as a set.
17. If the operation of the hydraulic unit is normal, delete all of the fault codes.

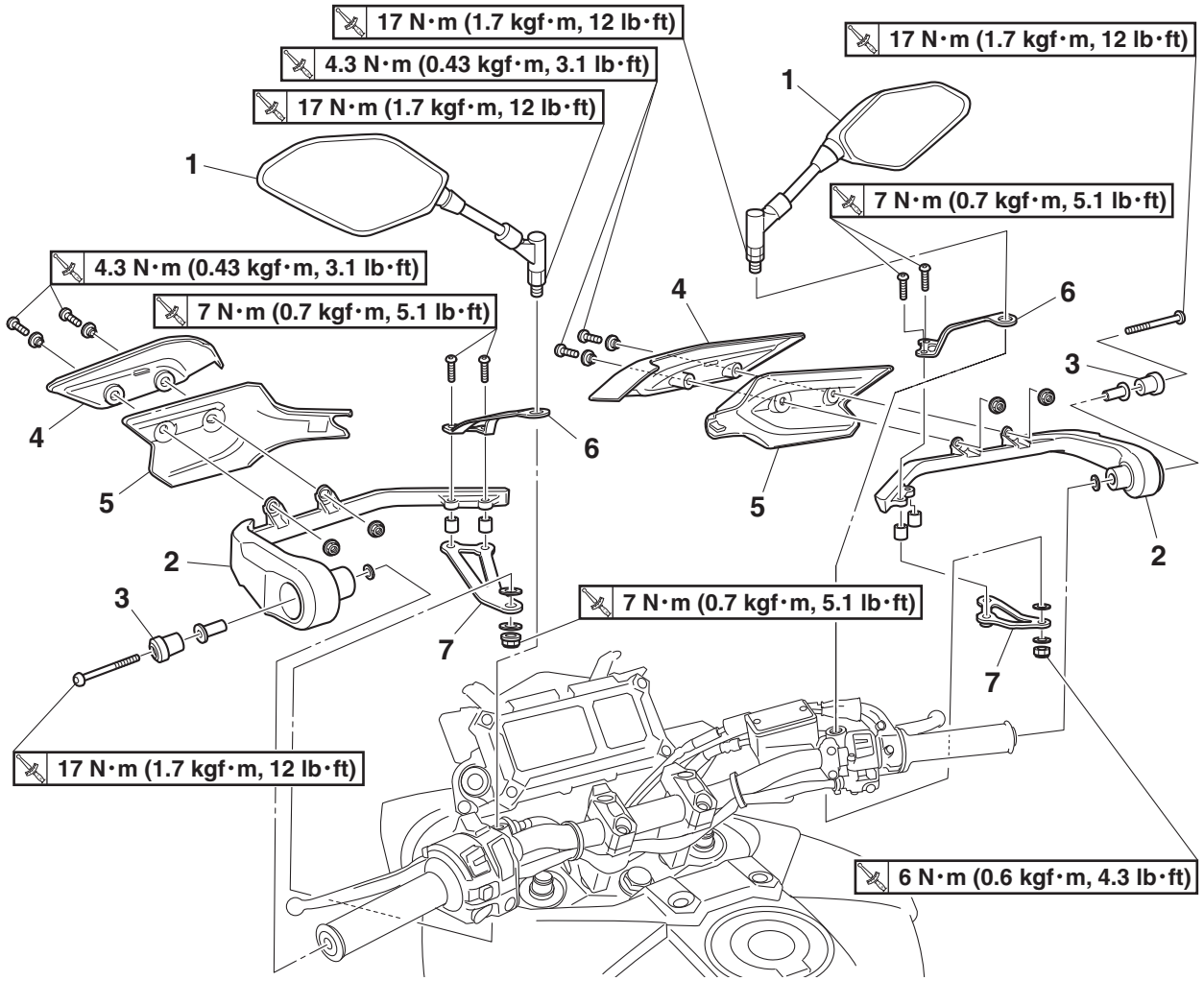
EAS30202

CHECKING THE ABS WARNING LIGHT

After all checks and servicing are completed, ensure that the ABS warning light goes off by walking the vehicle at a speed of faster than 7 km/h (4.4 mi/h) or performing a trial run.

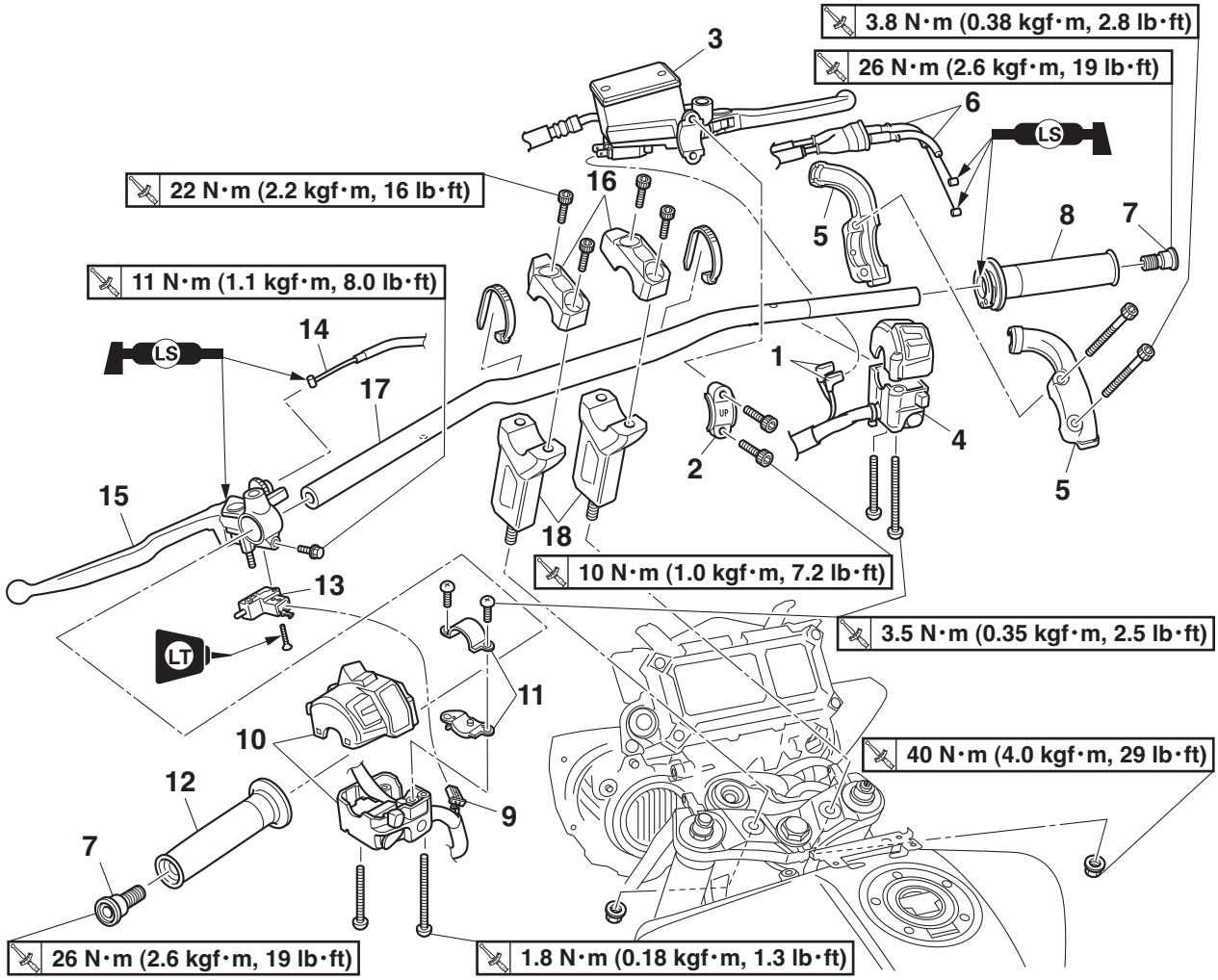
EAS20033
HANDLEBAR

Removing the handlebar 1/2



Order	Job/Parts to remove	Q'ty	Remarks
	Windshield		Refer to "GENERAL CHASSIS (2)" on page 4-6.
1	Rearview mirror	2	
2	Handguard	2	
3	Grip end 2	2	
4	Handlebar cover	2	
5	Lever cover	2	
6	Upper handguard bracket	2	
7	Lower handguard bracket	2	

Removing the handlebar 2/2

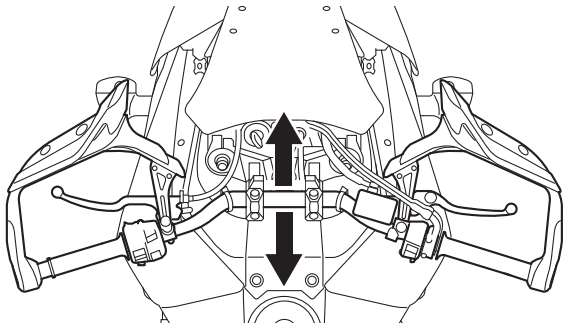


Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
1	Front brake light switch connector	2	Disconnect.
2	Front brake master cylinder holder	1	
3	Front brake master cylinder assembly	1	
4	Handlebar switch (right)	1	
5	Throttle cable housing	2	
6	Throttle cable	2	Disconnect.
7	Grip end	2	
8	Throttle grip	1	
9	Clutch switch coupler	1	Disconnect.
10	Handlebar switch (left)	1	
11	Handlebar switch holder	2	
12	Handlebar grip	1	
13	Clutch switch	1	
14	Clutch cable	1	Disconnect.
15	Clutch lever holder	1	
16	Upper handlebar holder	2	
17	Handlebar	1	
18	Lower handlebar holder	2	

EAS31396
ADJUSTING THE HANDLEBAR POSITION

1. Check:
   • Handlebar position

TIP
The handlebar position can be adjusted in two positions to suit the rider's preference.



2. Remove:
   • Fuel tank front cover
   • Front side panel
   • Front side cowling
   Refer to "GENERAL CHASSIS (2)" on page 4-6.
3. Adjust:
   • Handlebar position

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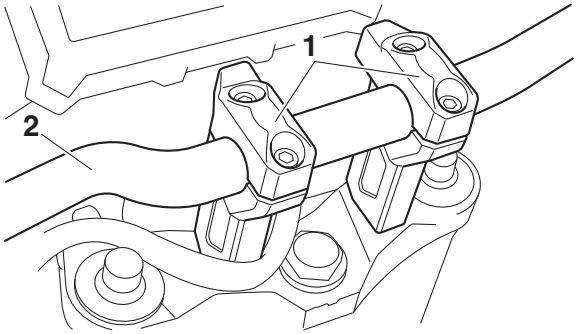
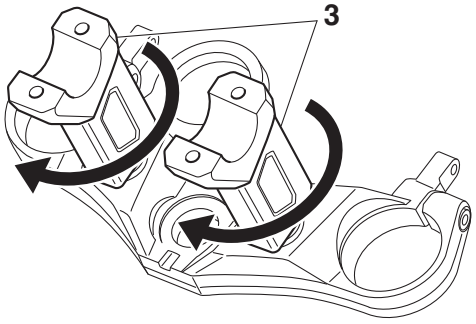
a. Remove the upper handlebar holders "1" and handlebar "2".



b. Loosen the lower handlebar holder nuts.
c. Adjust the handlebar position by rotating both of the lower handlebar holders "3" in 180°.



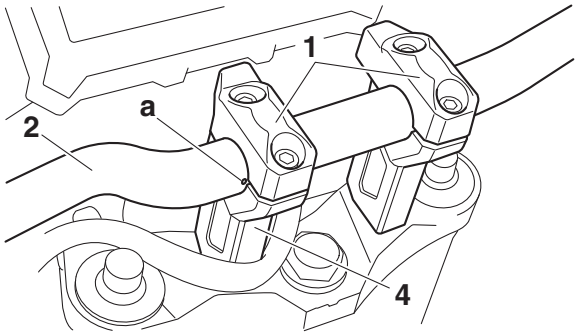
d. Install the handlebar "2" and upper handlebar holders "1".

	Upper handlebar holder bolt 22 N·m (2.2 kgf·m, 16 lb·ft)

ECA19130
NOTICE

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

TIP
Align the punch mark "a" on the handlebar with the left side upper surface of the lower handlebar holder (left) "4".



e. Tighten the lower handlebar holder nuts.

	Lower handlebar holder nut 40 N·m (4.0 kgf·m, 29 lb·ft)

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4. Install:
   • Front side cowling
   • Front side panel
   • Fuel tank front cover
   Refer to "GENERAL CHASSIS (2)" on page 4-6.

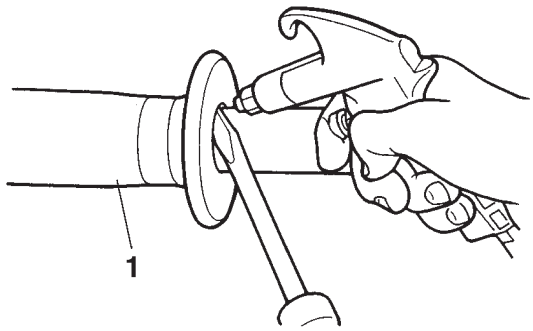
EAS30203
REMOVING THE HANDLEBAR
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

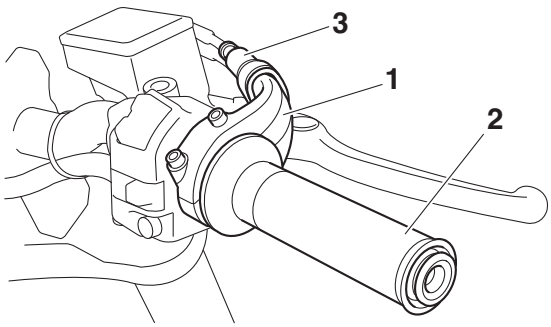
2. Remove:
   • Handlebar grip “1”

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



3. Remove:
   • Throttle cable housings “1”
   • Throttle grip “2”

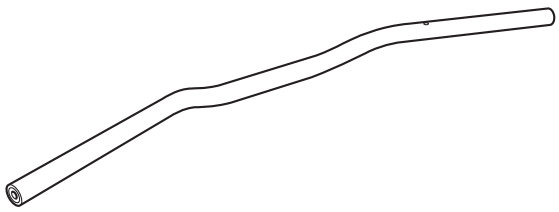
TIP
While removing the throttle cable housing, pull back the rubber cover “3”.



EAS30204
CHECKING THE HANDLEBAR
1. Check:
   • Handlebar
     Bends/cracks/damage → Replace.

EWA13690
⚠ WARNING

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



EAS30205
INSTALLING THE HANDLEBAR
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

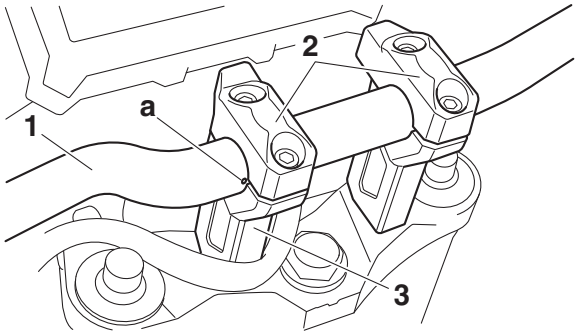
2. Install:
   • Lower handlebar holders (temporarily)
   • Handlebar “1”
   • Upper handlebar holders “2”

	Upper handlebar holder bolt 22 N·m (2.2 kgf·m, 16 lb·ft)

ECA19130
NOTICE

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

TIP
Align the punch mark “a” on the handlebar with the left side upper surface of the lower handlebar holder (left) “3”.



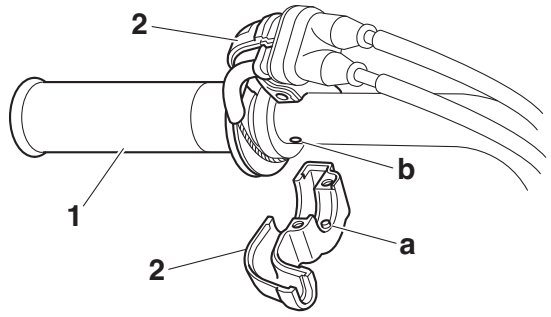
3. Tighten:
   • Lower handlebar holder nuts

	Lower handlebar holder nut **40 N·m (4.0 kgf·m, 29 lb·ft)**

4. Install:
   • Throttle grip “1”
   • Throttle cables
   • Throttle cable housings “2”
   • Grip end

	Throttle cable housing bolt **3.8 N·m (0.38 kgf·m, 2.8 lb·ft)** **Grip end** **26 N·m (2.6 kgf·m, 19 lb·ft)**

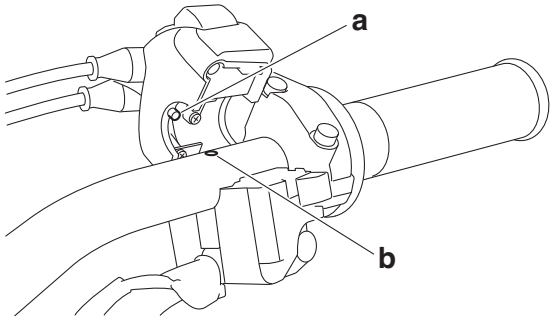
TIP
Align the projection “a” on the throttle cable housing with the hole “b” in the handlebar.



5. Install:
   • Handlebar switch screw (right)

	Handlebar switch screw **3.5 N·m (0.35 kgf·m, 2.5 lb·ft)**

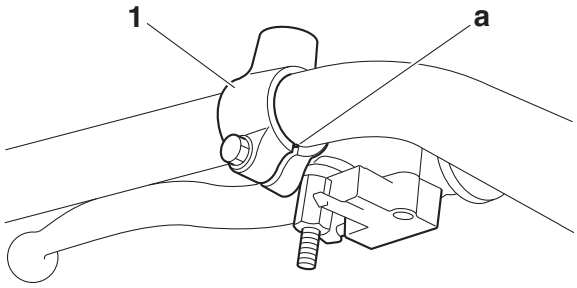
TIP
Align the projection “a” on the handlebar switch (right) with the hole “b” in the handlebar.



6. Install:
   • Front brake master cylinder assembly
   Refer to “INSTALLING THE FRONT BRAKE MASTER CYLINDER” on page 4-45.
7. Install:
   • Clutch lever holder “1”
   • Clutch cable

	Clutch lever holder pinch bolt **11 N·m (1.1 kgf·m, 8.0 lb·ft)**

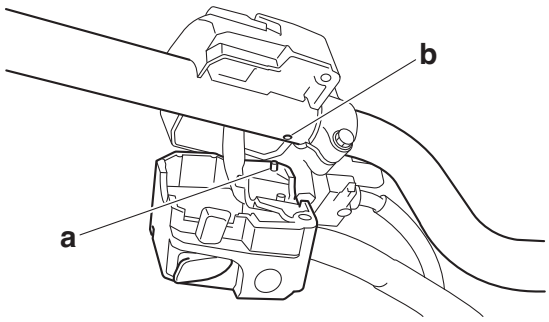
TIP
Align the center of slit on the clutch lever holder with the punch mark “a” on the handlebar.



8. Install:
   • Handlebar switch screw (left)

	Handlebar switch screw **1.8 N·m (0.18 kgf·m, 1.3 lb·ft)**

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



9. Install:
   • Handlebar grip “1”
   • Grip end “2”

	Grip end **26 N·m (2.6 kgf·m, 19 lb·ft)**

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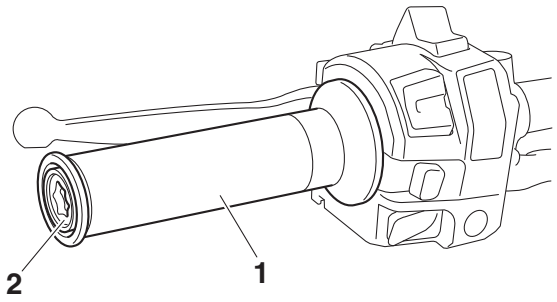
a. Apply a thin coat of rubber adhesive onto the end of the handlebar (left).
b. Side the handlebar grip over the end of the handlebar (left).
c. Wipe off any excess rubber adhesive with a clean rag.

EWA13700
⚠ WARNING

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



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10.Adjust:
- Throttle grip free play
  Refer to "CHECKING THE THROTTLE GRIP" on page 3-29.

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

11.Adjust:
- Clutch lever free play
  Refer to "ADJUSTING THE CLUTCH LEVER FREE PLAY" on page 3-12.

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

EAS31386
INSTALLING THE REARVIEW MIRRORS AND HANDGUARDS

1. Install:
   - Handguard (left) "1"
   - Rearview mirror (left) "2"

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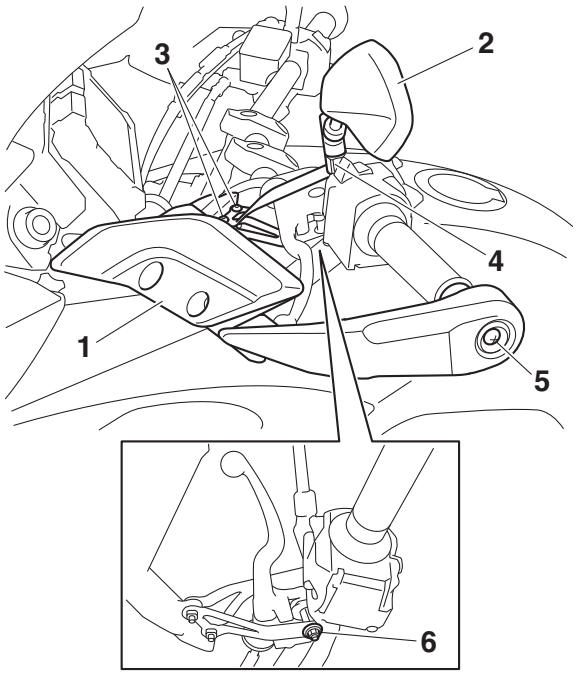
a. Install the handguard and rearview mirror.

TIP

Temporarily tighten the handguard bracket bolts "3", rearview mirror locknut "4", handguard bolt "5" and handguard bracket nut "6".



b. Tighten the handguard bracket bolts "3" to specification.

	Handguard bracket bolt **7 N·m (0.7 kgf·m, 5.1 lb·ft)**

c. Tighten the rearview mirror locknut "4" to specification.

	Rearview mirror locknut **17 N·m (1.7 kgf·m, 12 lb·ft)**

d. Tighten the handguard bolt "5" to specification.

	Handguard bolt **17 N·m (1.7 kgf·m, 12 lb·ft)**

e. Tighten the handguard bracket nut "6" to specification.

	Handguard bracket nut (left) **7 N·m (0.7 kgf·m, 5.1 lb·ft)**

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2. Install:
   - Handguard (right) "1"
   - Rearview mirror (right) "2"

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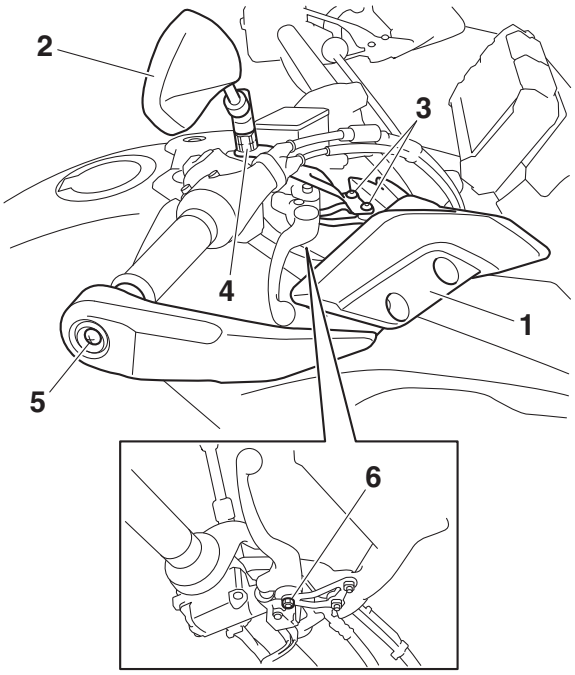
a. Install the handguard and rearview mirror.

TIP

Temporarily tighten the handguard bracket bolts "3", rearview mirror locknut "4", handguard bolt "5" and handguard bracket nut "6".



b. Tighten the handguard bracket bolts “3” to specification.

	Handguard bracket bolt **7 N·m (0.7 kgf·m, 5.1 lb·ft)**

c. Tighten the rearview mirror locknut “4” to specification.

	Rearview mirror locknut **17 N·m (1.7 kgf·m, 12 lb·ft)**

d. Tighten the handguard bolt “5” to specification.

	Handguard bolt **17 N·m (1.7 kgf·m, 12 lb·ft)**

e. Tighten the handguard bracket nut “6” to specification.

	Handguard bracket nut (right) **6 N·m (0.6 kgf·m, 4.3 lb·ft)**

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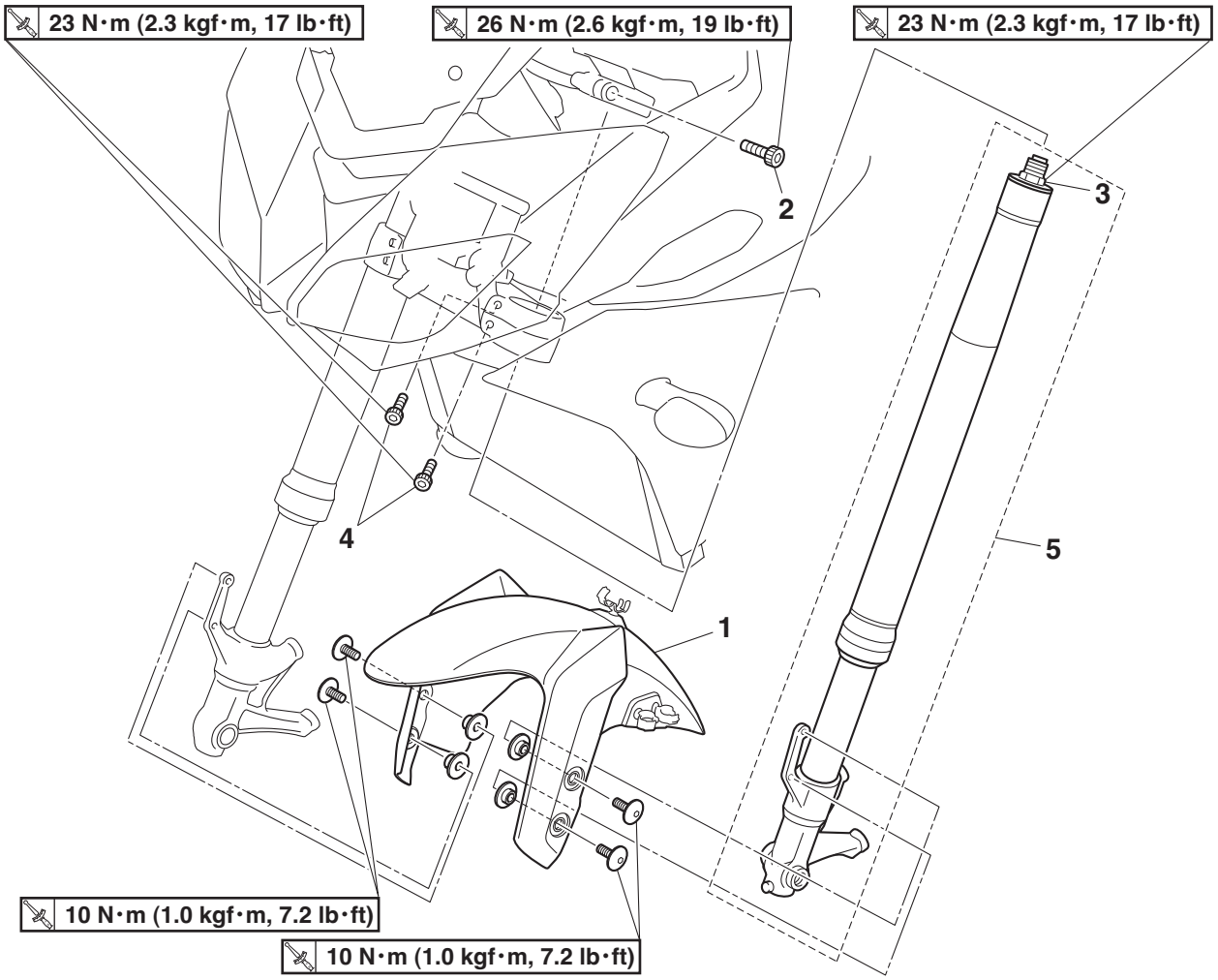
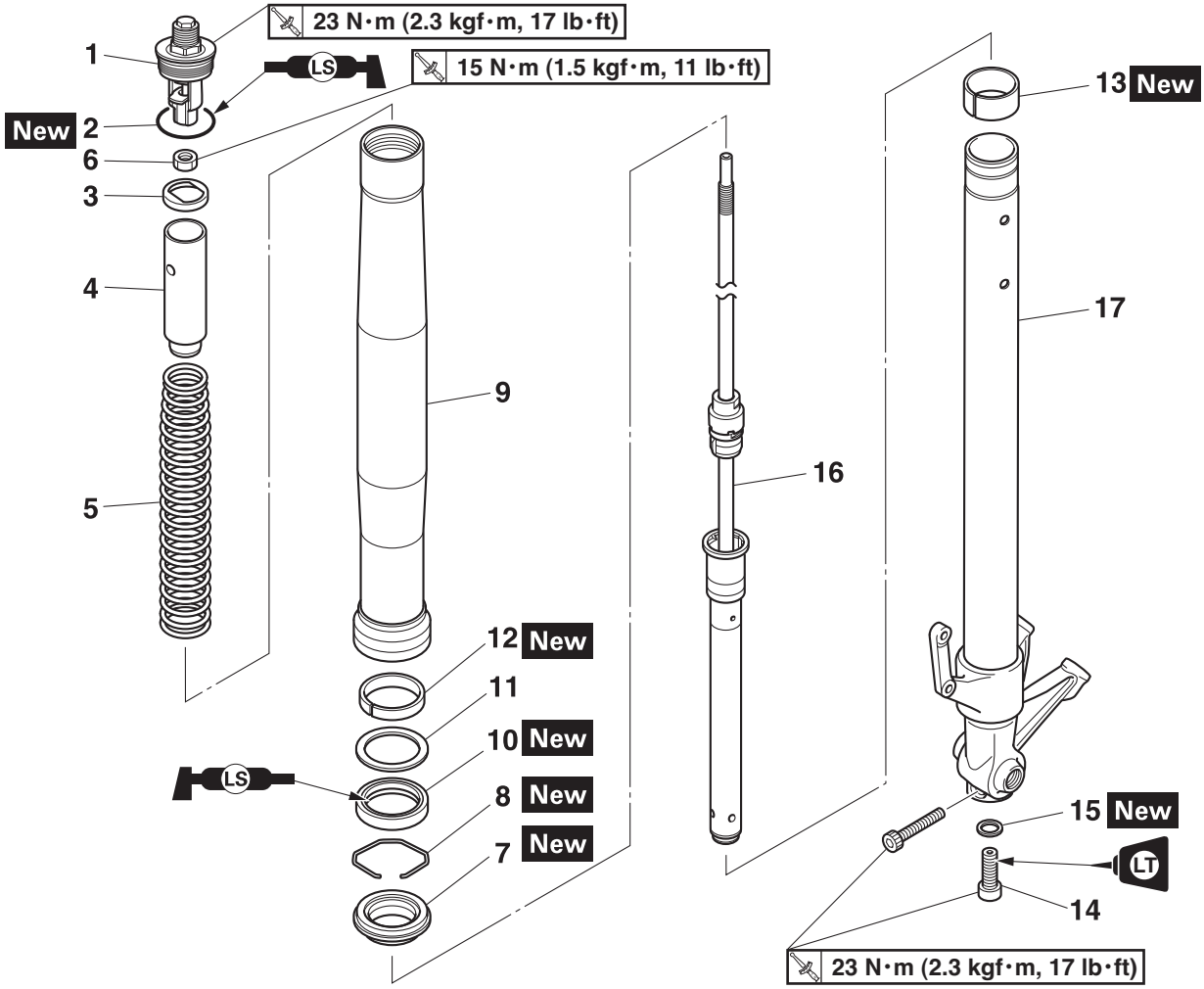
EAS20034
FRONT FORK

Removing the front fork legs



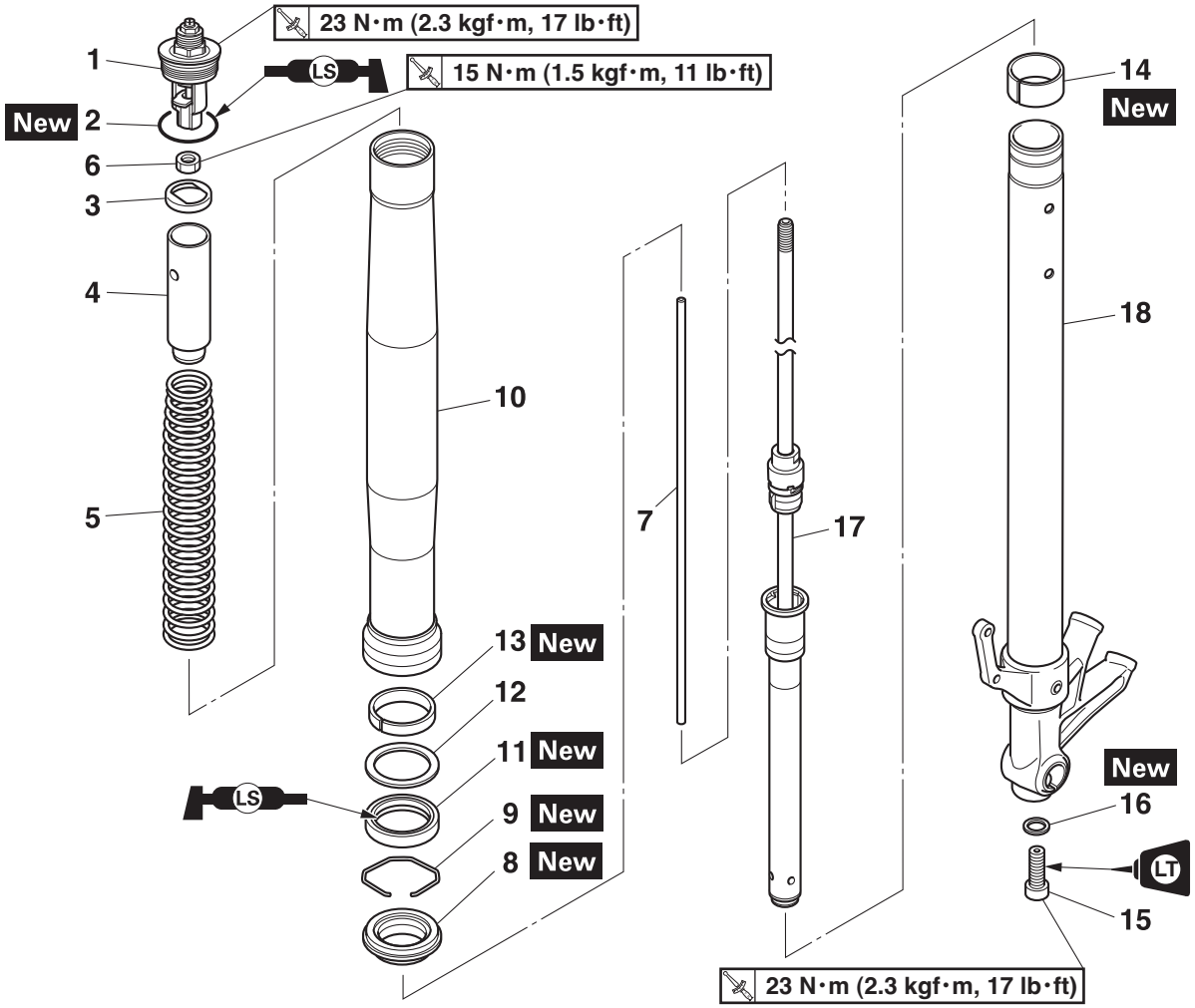
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Front wheel		Refer to "FRONT WHEEL" on page 4-19.
1	Front fender	1	
2	Upper bracket pinch bolt	1	Loosen.
3	Cap bolt	1	Loosen.
4	Lower bracket pinch bolt	2	Loosen.
5	Front fork leg	1	

Disassembling the left front fork leg



Order	Job/Parts to remove	Q'ty	Remarks
1	Cap bolt	1	
2	O-ring	1	
3	Washer	1	
4	Spacer	1	
5	Fork spring	1	
6	Locknut	1	
7	Dust seal	1	
8	Oil seal clip	1	
9	Outer tube	1	
10	Oil seal	1	
11	Washer	1	
12	Outer tube bushing	1	
13	Inner tube bushing	1	
14	Damper rod assembly bolt	1	
15	Copper washer	1	
16	Damper rod assembly	1	
17	Inner tube	1	

Disassembling the right front fork leg



Order	Job/Parts to remove	Q'ty	Remarks
1	Cap bolt	1	
2	O-ring	1	
3	Washer	1	
4	Spacer	1	
5	Fork spring	1	
6	Locknut	1	
7	Damper adjusting rod	1	
8	Dust seal	1	
9	Oil seal clip	1	
10	Outer tube	1	
11	Oil seal	1	
12	Washer	1	
13	Outer tube bushing	1	
14	Inner tube bushing	1	
15	Damper rod assembly bolt	1	
16	Copper washer	1	
17	Damper rod assembly	1	
18	Inner tube	1	

EAS30206
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.

TIP
Each front fork leg is equipped with a spring preload adjusting bolt, the right fork leg is equipped with a rebound damping force adjusting screw. Pay attention not to mistake the right and left.

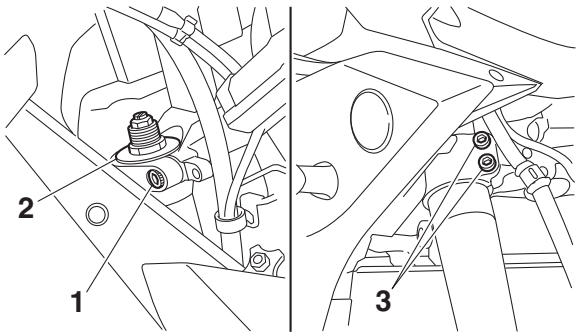
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING
Securely support the vehicle so that there is no danger of it falling over.

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

2. Remove:
   - Front brake caliper
     Refer to "FRONT BRAKE" on page 4-35.
   - Front wheel
     Refer to "FRONT WHEEL" on page 4-19.
3. Loosen:
   - Upper bracket pinch bolt "1"
   - Cap bolt "2"
   - Lower bracket pinch bolts "3"

EWA13640
⚠ WARNING
Before loosening the upper and lower bracket pinch bolts, support the front fork leg.



4. Remove:
   - Front fork leg

EAS30207
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Remove:
   - Cap bolt "1"
     (from the damper rod assembly)
   - Washer "2"
   - Spacer "3"
   - Locknut "4"

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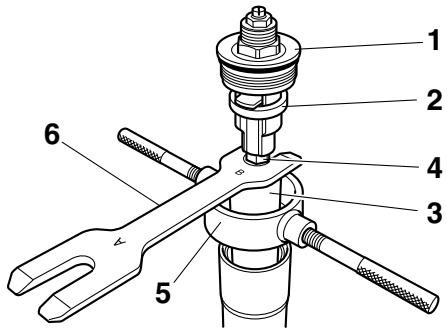
a. Press down on the spacer with the fork spring compressor "5".
b. Install the rod holder "6" between the locknut "4" and the spacer "3".

Fork spring compressor
90890-01441
Fork spring compressor
YM-01441
Rod holder
90890-01434
Damper rod holder double ended
YM-01434

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



c. Hold the cap bolt and loosen the locknut.
d. Remove the cap bolt and washer.
e. Remove the rod holder and fork spring compressor.
f. Remove the spacer and locknut.

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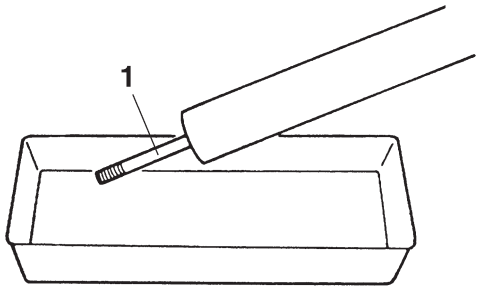
2. Drain:
   - Fork oil

TIP
Stroke the damper rod assembly "1" several times while draining the fork oil.



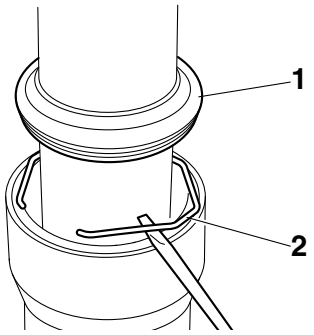
3. Remove:
   - Dust seal "1"

• Oil seal clip “2”
(with a flat-head screwdriver)

ECA19100

NOTICE

Do not scratch the outer tube.



4. Remove:
• Outer tube

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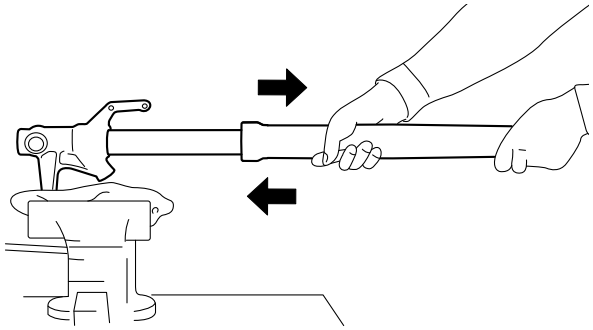
a. Hold the front fork leg horizontally.
b. Securely clamp the brake caliper bracket in a vise with soft jaws.
c. Separate the outer tube from the inner tube by pulling the outer tube forcefully but carefully.

ECA19680

NOTICE

Excessive force will damage the bushings. Damaged bushings must be replaced.



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5. Remove:
• Damper rod assembly bolt
• Damper rod assembly

ECA21330

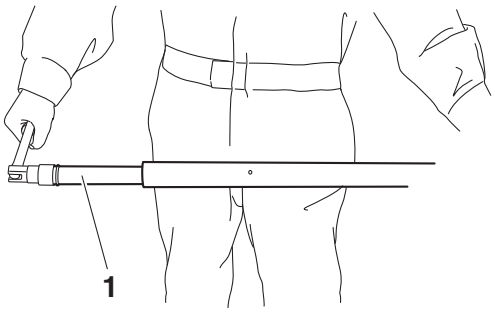
NOTICE

For the damper rod assembly, the right side is used for the rebound operation. Pay attention not to mistake the right and left.

TIP

While holding the damper rod with the damper rod holder “1”, loosen the damper rod assembly bolt.

Damper rod holder (ø27)
90890-01582
Damper rod holder
YM-01582



EAS30208

CHECKING THE FRONT FORK LEGS

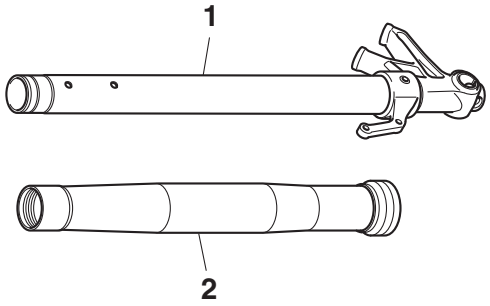
The following procedure applies to both of the front fork legs.

1. Check:
• Inner tube “1”
• Outer tube “2”
Bends/damage/scratches → Replace.

EWA13650

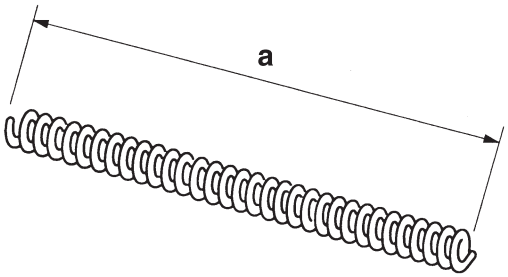
⚠ WARNING

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



2. Measure:
• Spring free length “a”
Out of specification → Replace.

Fork spring free length
305.3 mm (12.02 in)
Limit
299.1 mm (11.78 in)

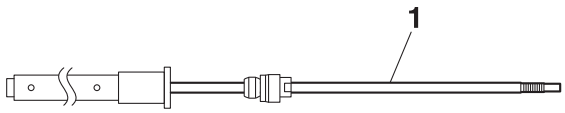


3. Check:
   • Damper rod "1"
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.

ECA19110

NOTICE

• The front fork leg has 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.



EAS30209

ASSEMBLING THE FRONT FORK LEGS

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

EWA17090

⚠ WARNING

• Note that the amount of the fork oil is different in the left and right front fork legs. Make sure to fill each of the left and right front fork legs with the specified amount of the fork oil.
• If both front fork legs are not filled with the specified amount of the fork oil, it may cause poor handling and a loss of stability.

TIP

• When assembling the front fork leg, be sure to replace the following parts:
  – Inner tube bushing
  – Outer tube bushing
  – Oil seal
  – Oil seal clip
  – Dust seal
  – Copper washer
  – O-ring
• Before assembling the front fork leg, make sure all of the components are clean.

1. Install:
   • Damper rod assembly "1"

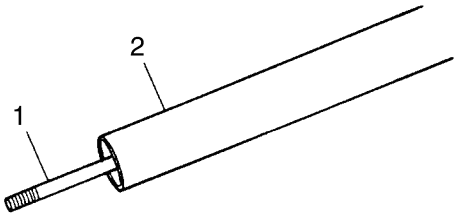
ECA19120

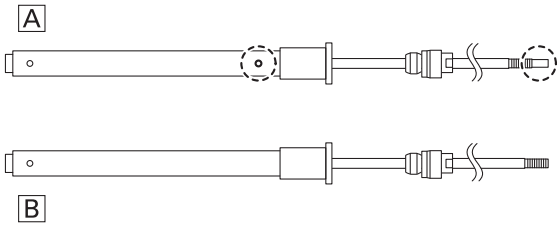
NOTICE

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

TIP

The left side damper rod assembly has the two holes of oil path, unlike the right side.





A. Left side
B. Right side

2. Tighten:
   • Damper rod assembly bolt
   (along with the copper washer New)

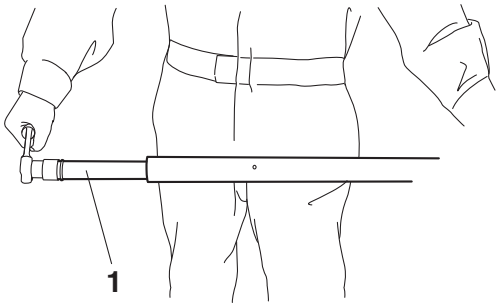
	Front fork damper rod assembly bolt **23 N·m (2.3 kgf·m, 17 lb·ft)** **LOCTITE®**

TIP

While holding the damper rod assembly with the

damper rod holder “1”, tighten the damper rod assembly bolt.

Damper rod holder (ø27)
90890-01582
Damper rod holder
YM-01582



3. Lubricate:
   • Inner tube’s outer surface

Recommended oil
Yamaha Suspension Oil 01

4. Install:
   • Dust seal “1” New
   • Oil seal clip “2” New
   • Oil seal “3” New
   • Washer “4”
   • Outer tube bushing “5” New
   • Inner tube bushing “6” New

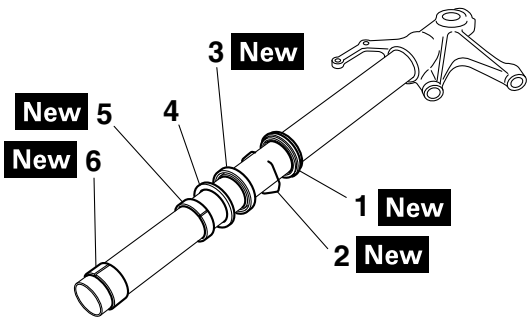
ECA19170

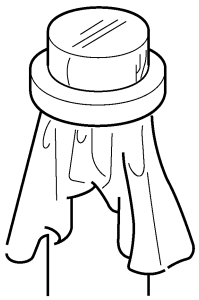
NOTICE

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

TIP

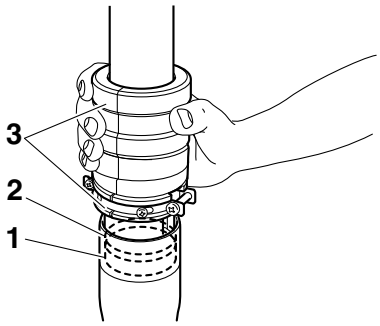
- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag to protect the oil seal during installation.





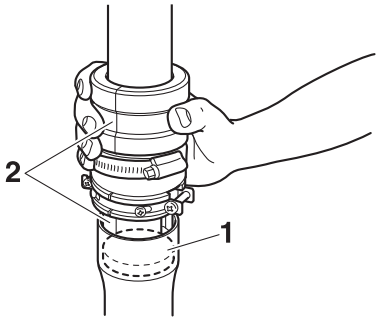
5. Install:
   • Outer tube
   (to the inner tube)
6. Install:
   • Outer tube bushing “1”
   • Washer “2”
   (with the fork seal driver “3”)

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



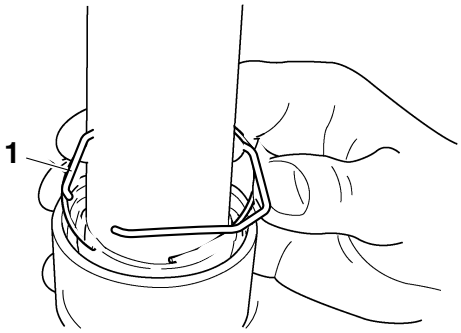
7. Install:
   • Oil seal “1”
   (with the fork seal driver “2”)

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



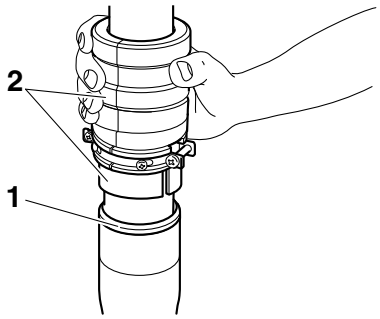
8. Install:
   • Oil seal clip “1”

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



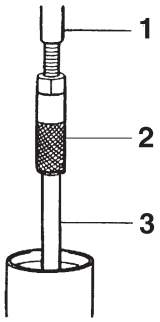
9. Install:
   • Dust seal “1”
   (with the fork seal driver “2”)

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



10. Install:
   • Rod puller “1”
   • Rod puller attachment (M10 long) “2”
   (onto the damper rod “3”)

Rod puller
90890-01437
Universal damping rod bleeding tool set
YM-A8703
Rod puller attachment (M10 long)
90890-01578
Universal damping rod bleeding tool set
YM-A8703



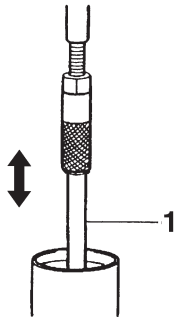
11. Fill:
   • Front fork leg
   (with the specified amount of the recommended fork oil)

Recommended oil
Yamaha Suspension Oil 01
Quantity (left)
444.0 cm³ (15.01 US oz, 15.66 Imp.oz)
Quantity (right)
431.0 cm³ (14.57 US oz, 15.20 Imp.oz)

ECA14230
NOTICE
- **Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

12. After filling the front fork leg, slowly stroke the damper rod “1” up and down (at least ten times) to distribute the fork oil.

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

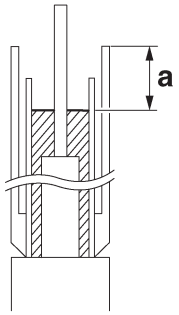


13. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

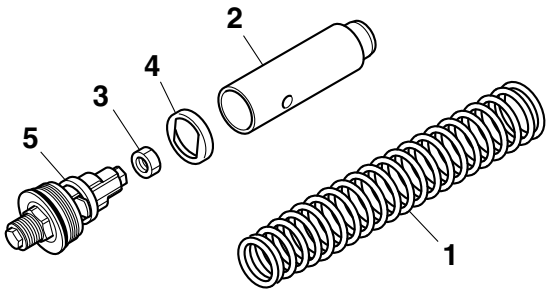
TIP
Be sure to bleed the front fork leg of any residual air.

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

Level (left)
174 mm (6.9 in)
Level (right)
175 mm (6.9 in)



15.Install:
- Fork spring (left side) "1"
- Spacer (left side) "2"
- Locknut (left side) "3"
- Washer (left side) "4"
- Cap bolt (left side) "5"
  (along with the O-ring New)



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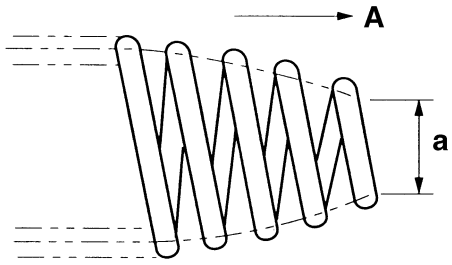
a. Remove the rod puller and rod puller attachment.
b. Install the fork spring.

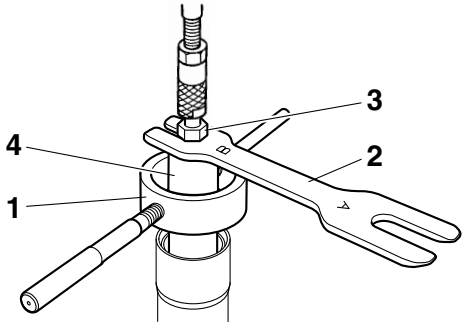
TIP
Install the fork spring with the smaller diameter "a" facing up "A".



c. Install the locknut all the way onto the damper rod assembly.
d. Install the rod puller and rod puller attachment.
e. Install the spacer.
f. Install the fork spring compressor.
g. Press down on the spacer with the fork spring compressor "1".
h. Pull up the rod puller and install the rod holder "2" between the locknut "3" and the spacer "4".

Rod puller
90890-01437
Universal damping rod bleeding tool set
YM-A8703
Rod puller attachment (M10 long)
90890-01578
Universal damping rod bleeding tool set
YM-A8703
Fork spring compressor
90890-01441
Fork spring compressor
YM-01441
Rod holder
90890-01434
Damper rod holder double ended
YM-01434

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



i. Remove the rod puller and rod puller attach-

ment.

j. Install the washer and cap bolt, and then finger tighten the cap bolt.

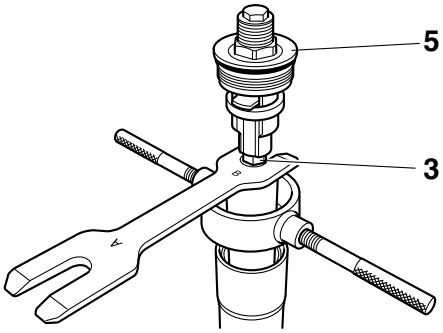
EWA13670

⚠ WARNING

Always use a new cap bolt O-ring.

k. Hold the cap bolt "5" and tighten the locknut "3" to specification.

	Front fork cap bolt locknut 15 N·m (1.5 kgf·m, 11 lb·ft)



l. Remove the rod holder and fork spring compressor.

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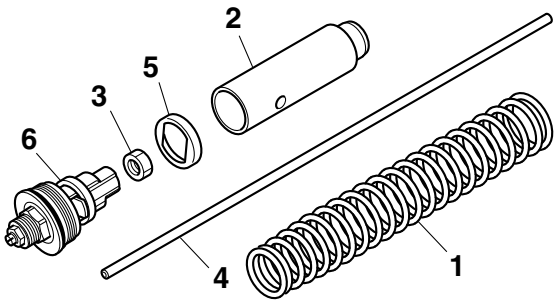
16.Install:

- Fork spring (right side) "1"
- Spacer (right side) "2"
- Locknut (right side) "3"
- Damper adjusting rod "4"
- Washer (right side) "5"
- Cap bolt (right side) "6" (along with the O-ring New)



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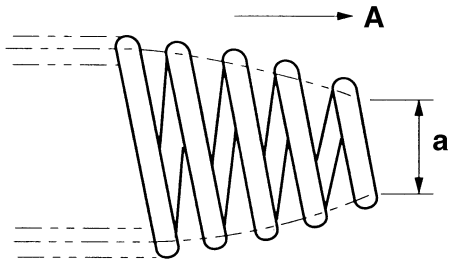
a. Remove the rod puller and rod puller attachment.

b. Install the fork spring.

TIP

Install the fork spring with the smaller diameter "a" facing up "A".



c. Install the locknut all the way onto the damper rod assembly.

d. Install the rod puller and rod puller attachment.

e. Install the spacer.

f. Install the fork spring compressor.

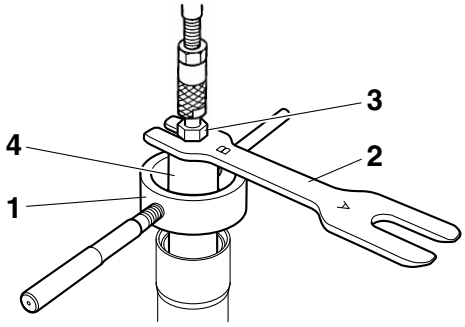
g. Press down on the spacer with the fork spring compressor "1".

h. Pull up the rod puller and install the rod holder "2" between the locknut "3" and the spacer "4".

	Rod puller **90890-01437** **Universal damping rod bleeding tool set** **YM-A8703** **Rod puller attachment (M10 long)** **90890-01578** **Universal damping rod bleeding tool set** **YM-A8703** **Fork spring compressor** **90890-01441** **Fork spring compressor** **YM-01441** **Rod holder** **90890-01434** **Damper rod holder double ended** **YM-01434**

TIP

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

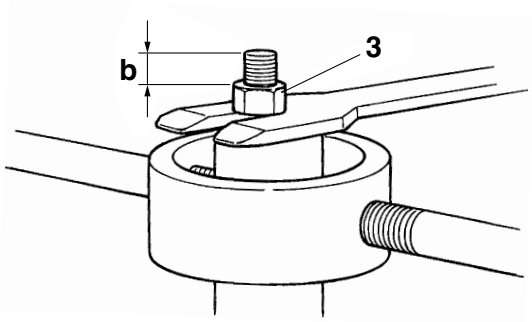


i. Remove the rod puller and rod puller attach-

ment.

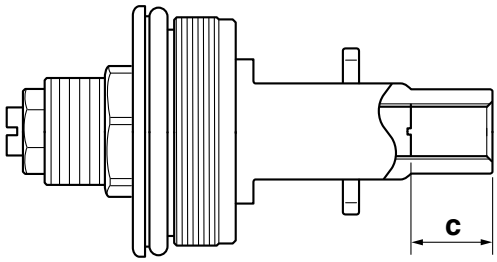
j. Position the locknut “3” as specified “b”.

	Distance “b” **12 mm (0.47 in)**



k. Set the cap bolt distance “c” to specification.

	Distance “c” **13 mm (0.51 in)**



l. Install the damper adjusting rod, washer and cap bolt, and then finger tighten the cap bolt.

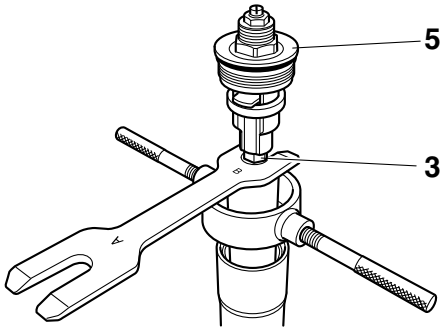
EWA13670

⚠ WARNING

Always use a new cap bolt O-ring.

m. Hold the cap bolt “5” and tighten the locknut “3” to specification.

	Front fork cap bolt locknut **15 N·m (1.5 kgf·m, 11 lb·ft)**



n. Remove the rod holder and fork spring compressor.

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17. Install:
- Cap bolt
  (to the outer tube)

TIP

- Temporarily tighten the cap bolt.
- When to tighten the cap bolt to the specified torque is after installing the front fork leg to the vehicle and tightening the lower bracket pinch bolts.

EAS30210

INSTALLING THE FRONT FORK LEGS

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

1. Install:
- Front fork leg
  Temporarily tighten the upper and lower bracket pinch bolts.

TIP

Make sure the outer tube is flush with the top of the upper bracket.

2. Tighten:
- Lower bracket pinch bolts “1”

	Lower bracket pinch bolt **23 N·m (2.3 kgf·m, 17 lb·ft)**

- Cap bolt “2”

	Front fork cap bolt **23 N·m (2.3 kgf·m, 17 lb·ft)**

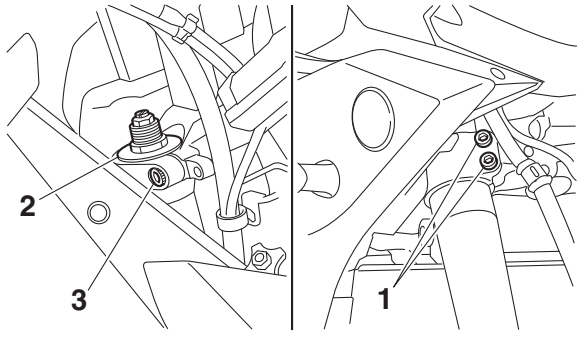
- Upper bracket pinch bolt “3”

	Upper bracket pinch bolt **26 N·m (2.6 kgf·m, 19 lb·ft)**

EWA13680

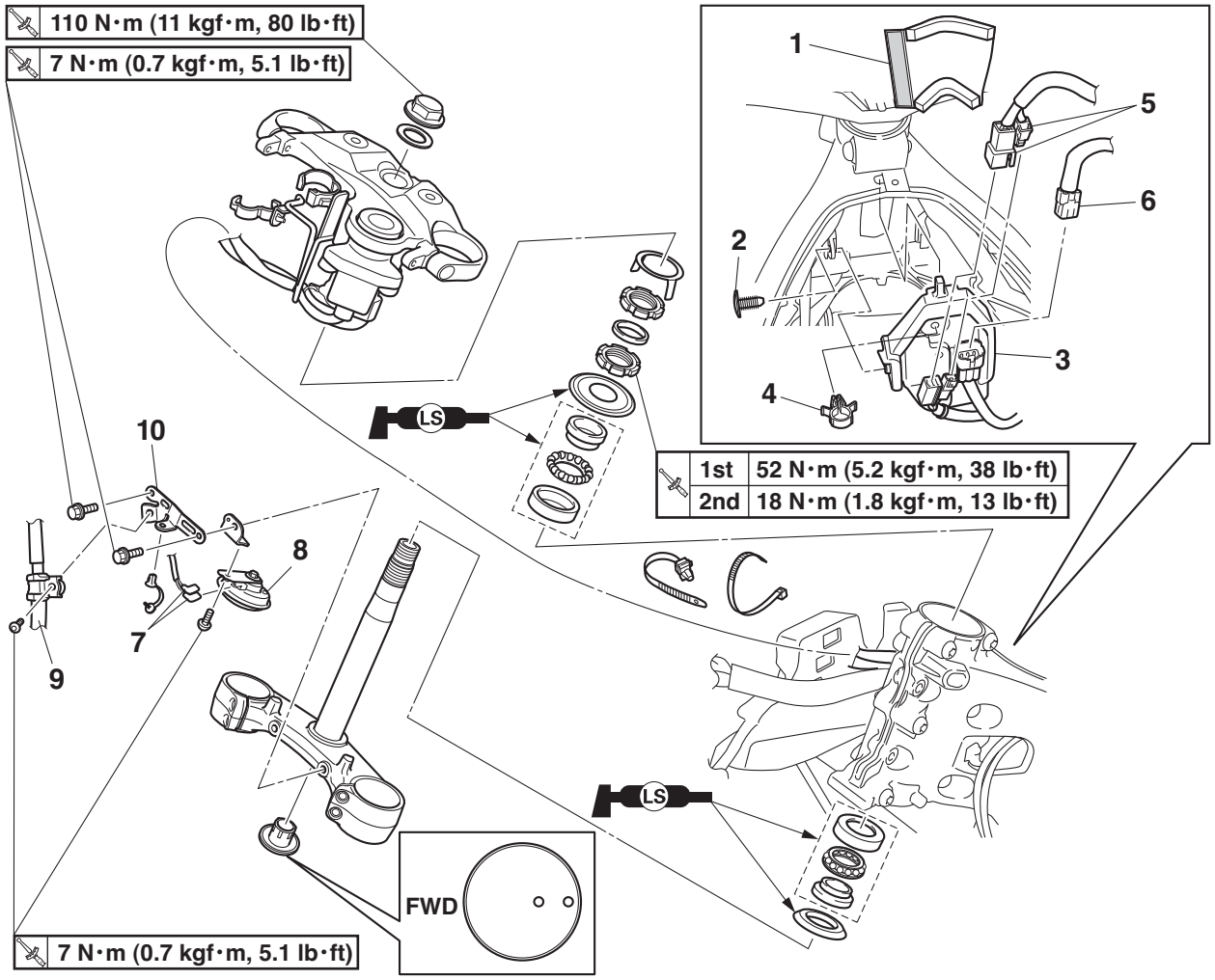
⚠ WARNING

Make sure the brake hoses are routed properly.



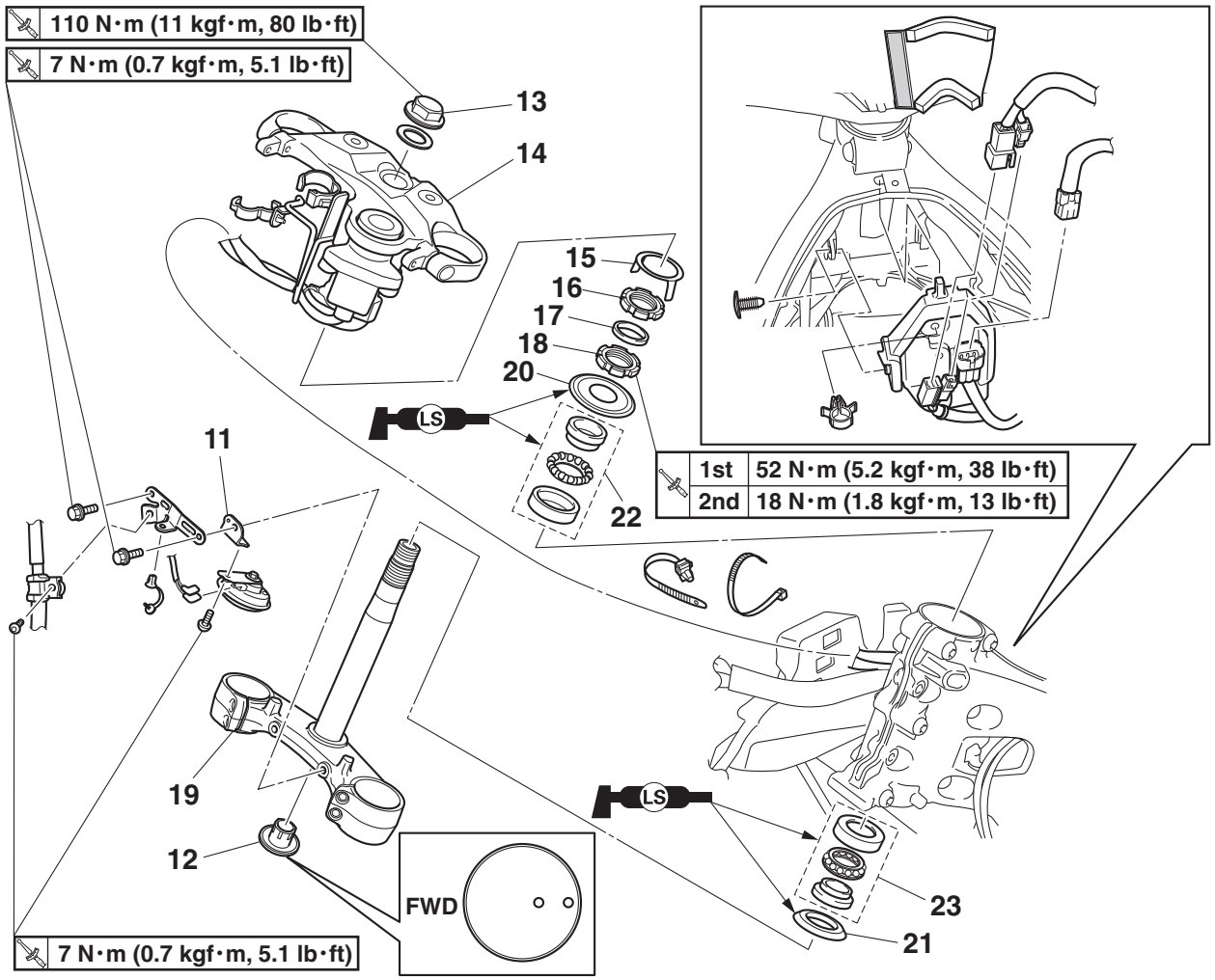
EAS20035
STEERING HEAD

Removing the lower bracket



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 (3)" on page 4-13.
	Headlight assembly		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Meter assembly		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Handlebar		Refer to "HANDLEBAR" on page 4-69.
	Front fork legs		Refer to "FRONT FORK" on page 4-76.
1	Protector	1	
2	Rivet	1	
3	Coupler cover assembly	1	
4	Clamp	1	
5	Main switch coupler	2	Disconnect.
6	Immobilizer coupler	1	Disconnect.
7	Horn lead connector	2	Disconnect.
8	Horn	1	
9	Front brake hose	1	
10	Front brake hose bracket	1	

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
11	Horn bracket	1	
12	Lower bracket cap	1	
13	Steering stem nut	1	
14	Upper bracket	1	
15	Lock washer	1	
16	Upper ring nut	1	
17	Rubber washer	1	
18	Lower ring nut	1	
19	Lower bracket	1	
20	Bearing cover	1	
21	Lower bearing dust seal	1	
22	Upper bearing	1	
23	Lower bearing	1	

EAS30213
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.

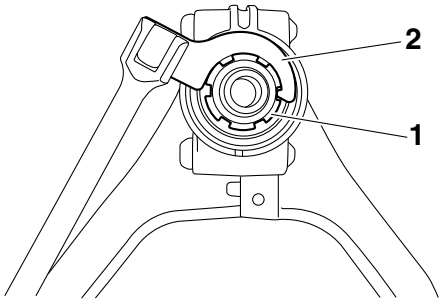
2. Remove:
   - Upper ring nut
   - Rubber washer
   - Lower ring nut "1"
   - Lower bracket

EWA13730
⚠ WARNING

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

TIP
- Hold the lower ring nut with steering nut wrench, and then remove the upper ring nut with the ring nut wrench.
- Remove the lower ring nut with the steering nut wrench "2".

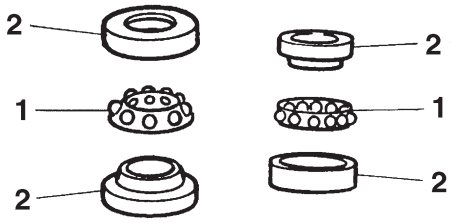
Ring nut wrench
90890-01268
Spanner wrench
YU-01268
Steering nut wrench
90890-01403
Exhaust flange nut wrench
YU-A9472



EAS30214
CHECKING THE STEERING HEAD
1. Wash:
   - Bearing
   - Bearing race

Recommended cleaning solvent
Kerosene

2. Check:
   - Bearing "1"
   - Bearing race "2"
     Damage/pitting → Replace the bearings and bearing races as a set.



3. Replace:
   - Bearing
   - Bearing race

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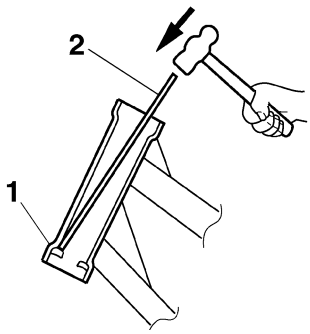
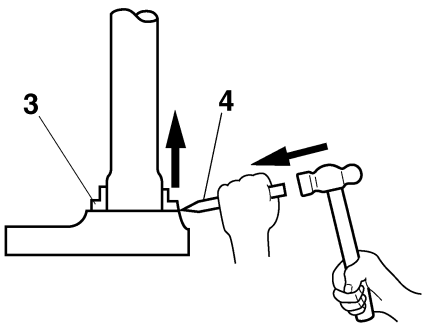
a. Remove the bearing races from the steering head pipe "1" with a long rod "2" and hammer.
b. Remove the bearing race "3" from the lower bracket with a floor chisel "4" and hammer.
c. Install a new dust seal and new bearing races.

ECA14270
NOTICE

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

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





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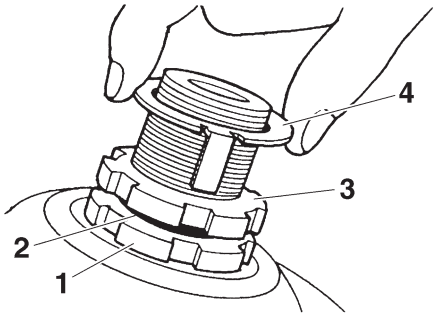
4. Check:
   • Upper bracket
   • Lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

EAS30216
INSTALLING THE STEERING HEAD

1. Lubricate:
   • Upper bearing
   • Lower bearing

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

2. Install:
   • Lower ring nut “1”
   • Rubber washer “2”
   • Upper ring nut “3”
   • Lock washer “4”
   Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-19.



3. Install:
   • Upper bracket
   • Steering stem nut

TIP
Temporarily tighten the steering stem nut.

4. Install:
   • Front fork legs
   Refer to “FRONT FORK” on page 4-76.

TIP
Temporarily tighten the upper and lower bracket pinch bolts.

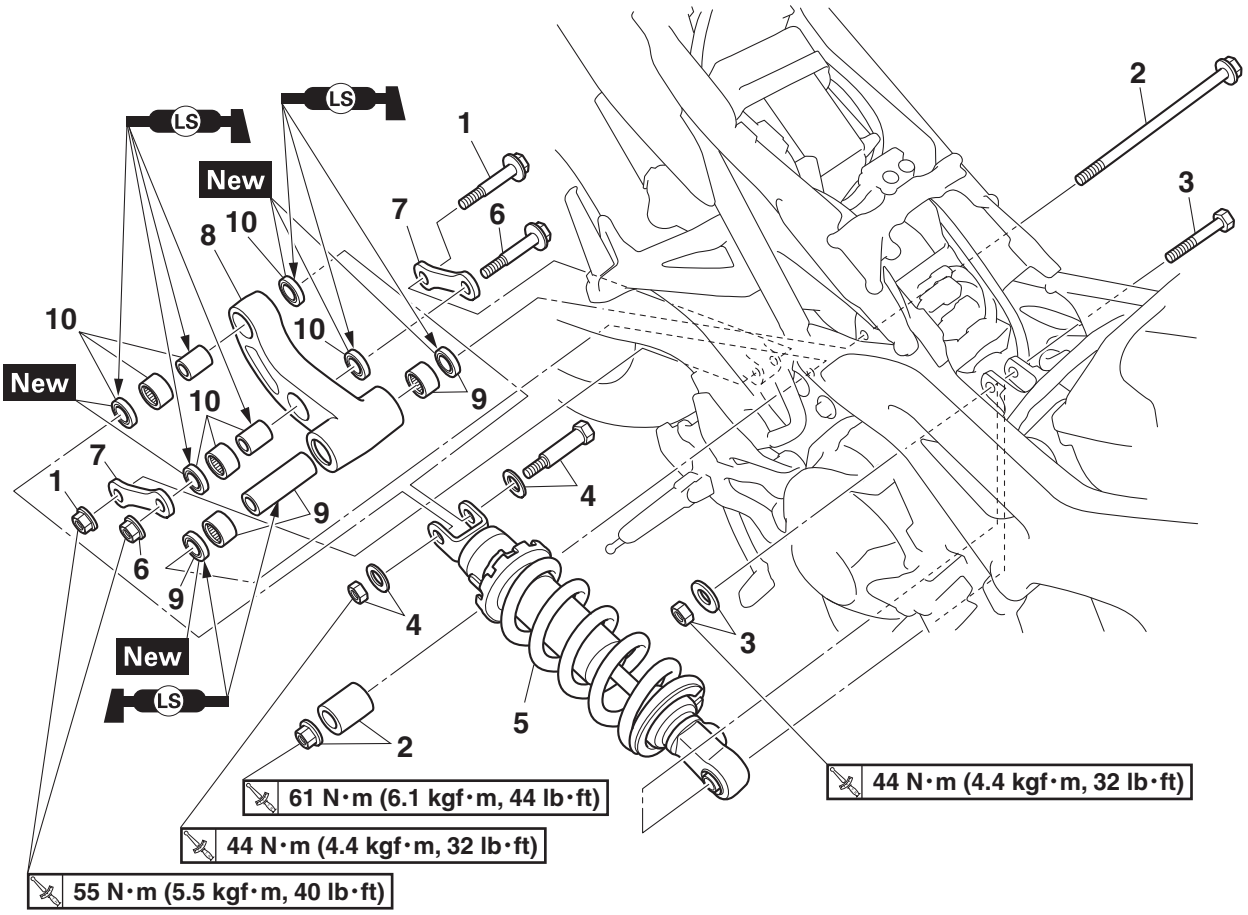
5. Tighten:
   • Steering stem nut

	Steering stem nut **110 N·m (11 kgf·m, 80 lb·ft)**

EAS20036

REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank/Canister		Refer to "FUEL TANK" on page 7-1.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
1	Connecting arm lower nut/Bolt	1/1	
2	Relay arm nut/Collar/Bolt	1/1/1	
3	Rear shock absorber assembly upper nut/Washer/Bolt	1/1/1	
4	Rear shock absorber assembly lower nut/Washer/Bolt	1/2/1	
5	Rear shock absorber assembly	1	
6	Connecting arm upper nut/Bolt	1/1	
7	Connecting arm	2	
8	Relay arm	1	
9	Collar/Oil seal/Bearing	1/2/2	
10	Collar/Oil seal/Bearing	2/4/2	

EAS30826
HANDLING THE REAR SHOCK ABSORBER

EWA13740
⚠ WARNING

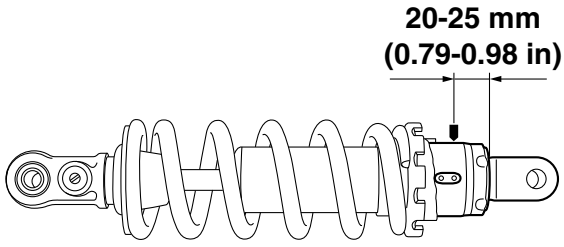
This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear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

EAS30729
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 20–25 mm (0.79–0.98 in) from its end as shown.

EWA13760
⚠ WARNING

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



EAS30219
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

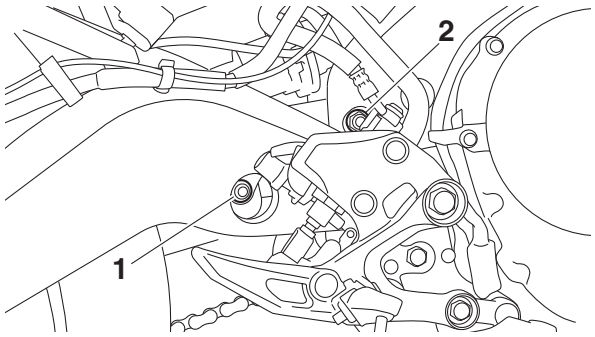
EWA13120
⚠ WARNING

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

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

2. Remove:
   - Connecting arm lower nut “1”
   - Connecting arm lower bolt
   - Relay arm nut “2”
   - Relay arm bolt

TIP
When removing the bolt, hold the swingarm so that it does not drop down.



3. Remove:
   - Rear shock absorber assembly upper nut
   - Rear shock absorber assembly upper bolt
   - Rear shock absorber assembly

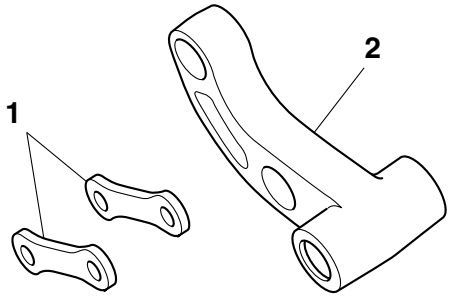
TIP
Remove the rear shock absorber assembly from between the swingarm and frame.

EAS30220
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:
   - Rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - Rear shock absorber assembly
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - Spring
   - Bushings
     Damage/wear → Replace the rear shock absorber assembly.
   - Bolts
     Bends/damage/wear → Replace.

EAS30221
CHECKING THE CONNECTING ARM AND RELAY ARM

1. Check:
   - Connecting arms “1”
   - Relay arm “2”
     Damage/wear → Replace.



2. Check:
   • Bearings
   • Oil seals
   Damage/pitting → Replace.
3. Check:
   • Collars
   Damage/scratches → Replace.

EAS30222
INSTALLING THE RELAY ARM

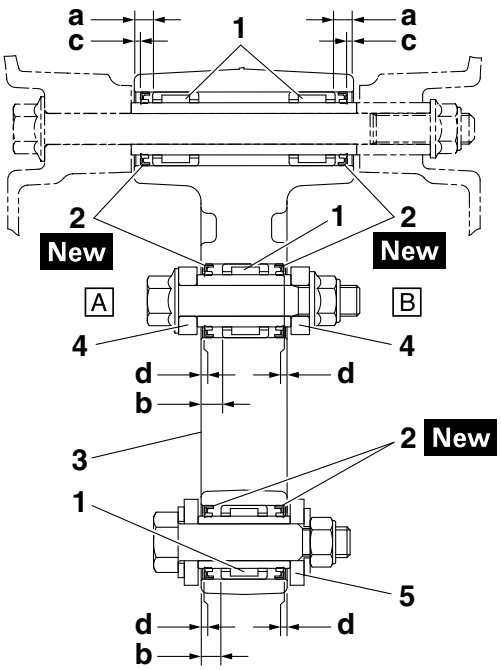
1. Lubricate:
   • Collars
   • Oil seals

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

2. Install:
   • Bearings "1"
   (to the relay arm)
   • Oil seals "2" New
   (to the relay arm)

	Installed depth "a" **6.0 mm (0.24 in)** **Installed depth "b"** **7.0 mm (0.28 in)** **Installed depth "c"** **1.5–2.5 mm (0.06–0.10 in)** **Installed depth "d"** **1.0–2.0 mm (0.04–0.08 in)**

TIP
- When installing the oil seals "2" to the relay arm, face the character stamp of the oil seals outside.
- When installing the connecting arms "4" to the relay arm, face the 1RC mark of the connecting arms outside.



3. Relay arm
4. Connecting arm
5. Rear shock absorber assembly
A. Left side
B. Right side

EAS30225
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
   • Rear shock absorber assembly
   • Rear shock absorber assembly upper bolt
   • Rear shock absorber assembly upper nut
   • Relay arm bolt
   • Relay arm nut
   • Connecting arm lower bolt
   • Connecting arm lower nut

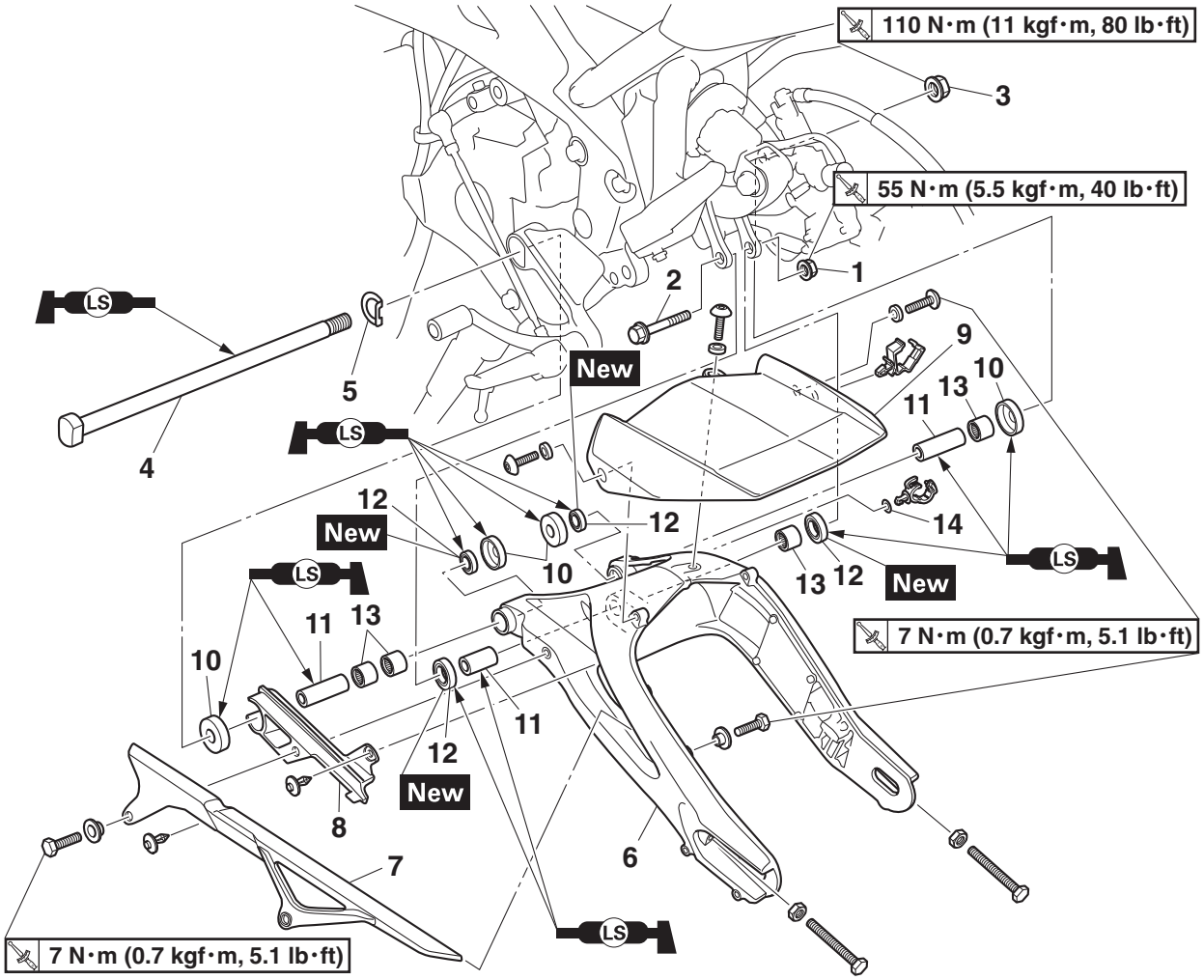
TIP
- Install the rear shock absorber assembly upper bolt, relay arm bolt and connecting arm lower bolt from the left.
- When installing the rear shock absorber assembly, lift up the swingarm.
- Install the rear shock absorber assembly with the rebound damping adjusting screw facing the left side of the vehicle.

2. Tighten:
   • Rear shock absorber assembly upper nut
   • Relay arm nut
   • Connecting arm lower nut

Rear shock absorber assembly nut (upper)
44 N·m (4.4 kgf·m, 32 lb·ft)
Relay arm nut
61 N·m (6.1 kgf·m, 44 lb·ft)
Connecting arm lower nut
55 N·m (5.5 kgf·m, 40 lb·ft)

EAS20037
SWINGARM

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Rear brake caliper		Refer to "REAR BRAKE" on page 4-48.
	Rear wheel		Refer to "REAR WHEEL" on page 4-27.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Drive chain		Refer to "CHAIN DRIVE" on page 4-98.
1	Connecting arm lower nut	1	
2	Connecting arm lower bolt	1	
3	Pivot shaft nut	1	
4	Pivot shaft	1	
5	Washer	1	
6	Swingarm	1	
7	Drive chain guard	1	
8	Drive chain guide	1	
9	Rear fender	1	
10	Dust cover	4	
11	Collar	3	
12	Oil seal	4	
13	Bearing	4	
14	Washer	1	

EAS30226
REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

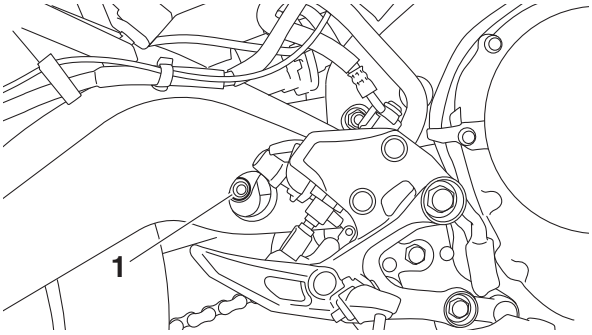
EWA13120
⚠ WARNING

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

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

2. Remove:
   - Connecting arm lower nut "1"
   - Connecting arm lower bolt

TIP
When removing the bolt, hold the swingarm so that it does not drop down.



3. Measure:
   - Swingarm side play
   - Swingarm vertical movement

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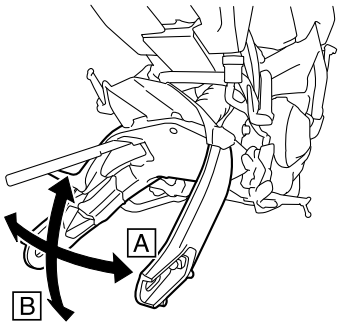
a. Measure the tightening torque of the pivot shaft nut.

	Pivot shaft nut **110 N·m (11 kgf·m, 80 lb·ft)**

b. Check the swingarm side play "A" by moving the swingarm from side to side.
   If the swingarm has side-to-side play, check the collars, bearings, and dust covers.
c. Check the swingarm vertical movement "B" by moving the swingarm up and down.
   If the swingarm vertical movement is not smooth or if there is binding, check the pivot shaft, collars, bearings, and dust covers.



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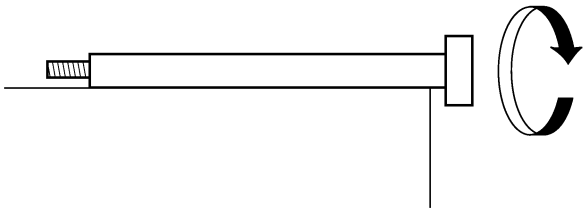
4. Remove:
   - Drive chain
     Refer to "REMOVING THE DRIVE CHAIN" on page 4-99.
   - Swingarm

EAS30227
CHECKING THE SWINGARM

1. Check:
   - Swingarm
     Bends/cracks/damage → Replace.
2. Check:
   - Pivot shaft
     Roll the pivot shaft on a flat surface.
     Bends → Replace.

EWA13770
⚠ WARNING

Do not attempt to straighten a bent pivot shaft.

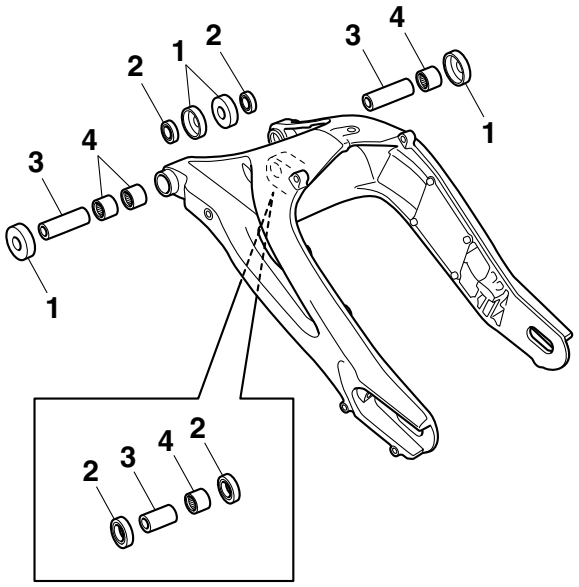


3. Wash:
   - Pivot shaft
   - Dust covers
   - Collars
   - Washer

	Recommended cleaning solvent **Kerosene**

4. Check:
   - Dust covers "1"
   - Oil seals "2"
     Damage/wear → Replace.

- Collars “3”
  Damage/scratches → Replace.
- Bearings “4”
  Damage/pitting → Replace.



EAS30228
INSTALLING THE SWINGARM

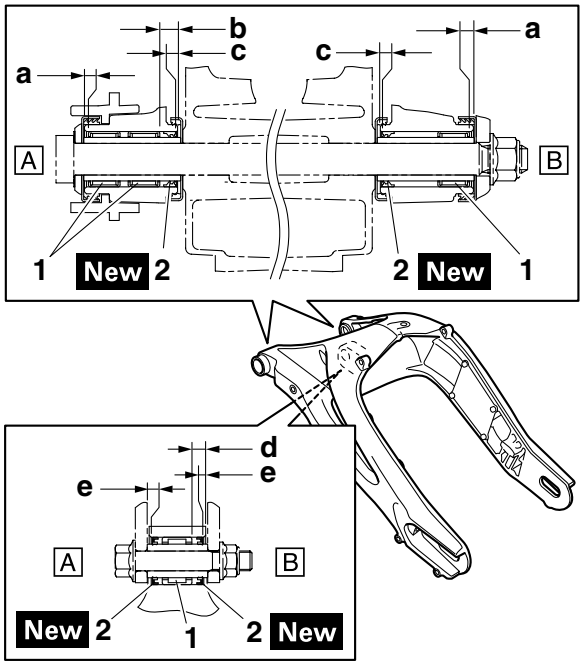
1. Lubricate:
   - Dust covers
   - Pivot shaft
   - Oil seals
   - Collars

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

2. Install:
   - Bearings “1”
     (to the swingarm)
   - Oil seals “2” New
     (to the swingarm)

	Installed depth “a” **2.0 mm (0.08 in)** **Installed depth “b”** **9.0 mm (0.35 in)** **Installed depth “c”** **0.5–1.5 mm (0.02–0.06 in)** **Installed depth “d”** **7.0 mm (0.28 in)** **Installed depth “e”** **1.5–2.5 mm (0.06–0.10 in)**

TIP
When installing the oil seals to the swingarm, face the character stamp of the oil seals outside.



A. Left side
B. Right side

3. Install:
   - Swingarm
   - Pivot shaft

	Pivot shaft nut **110 N·m (11 kgf·m, 80 lb·ft)**

4. Install:
   - Drive chain
     Refer to “INSTALLING THE DRIVE CHAIN” on page 4-101.
   - Connecting arm lower bolt
   - Connecting arm lower nut

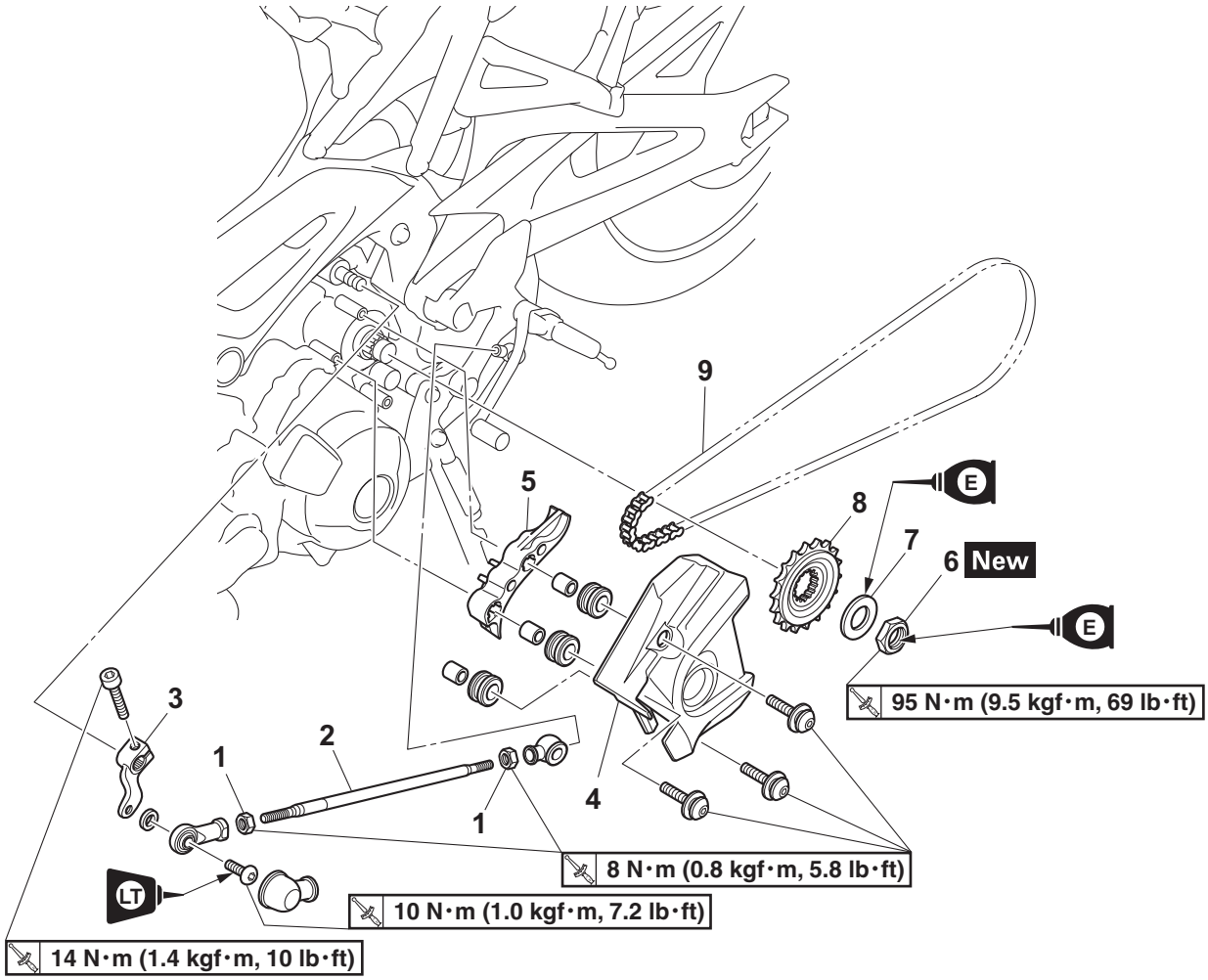
	Connecting arm lower nut **55 N·m (5.5 kgf·m, 40 lb·ft)**

   - Rear wheel
     Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-91 and “REAR WHEEL” on page 4-27.
5. Adjust:
   - Drive chain slack
     Refer to “DRIVE CHAIN SLACK” on page 3-18.

	Drive chain slack **5.0–15.0 mm (0.20–0.59 in)**

EAS20038
CHAIN DRIVE

Removing the drive chain



Order	Job/Parts to remove	Q'ty	Remarks
1	Locknut	2	
2	Shift rod	1	
3	Shift arm	1	
4	Drive sprocket cover	1	
5	Drive chain guide	1	
6	Drive sprocket nut	1	
7	Washer	1	
8	Drive sprocket	1	
9	Drive chain	1	

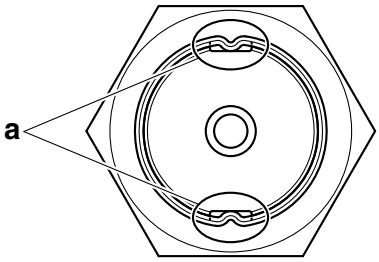
EAS30229
REMOVING THE DRIVE CHAIN
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

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

2. Straighten the drive sprocket nut rib "a".



3. Remove:
   • Drive chain

ECA17410
NOTICE

Be sure to put on safety goggles when working.

TIP
Cut the drive chain with the drive chain cut & rivet tool.

	Drive chain cut & rivet tool **90890-01550** **Drive chain cut & rivet tool** **YM-01550**

EAS30230
CHECKING THE DRIVE CHAIN
1. Measure:
   • 15-link section "a" of the drive chain
   Out of specification → Replace the drive chain.

	15-link length limit **239.3 mm (9.42 in)**

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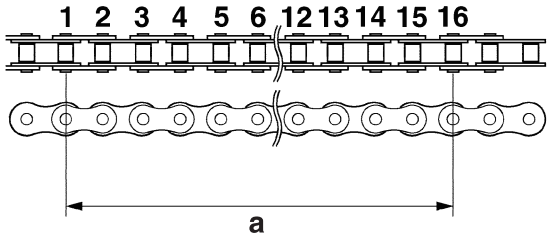
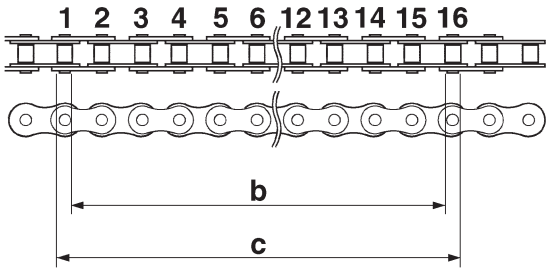
a. Measure the length "b" between the inner sides of the pins and the length "c" between the outer sides of the pins on a 15-link section of the drive chain as shown in the illustration.
b. Calculate the length "a" of the 15-link section of the drive chain using the following formula.

Drive chain 15-link section length "a" = (length "b" between pin inner sides + length "c" between pin outer sides)/2

TIP
- When measuring a 15-link section of the drive chain, make sure that the drive chain is taut.
- Perform this procedure 2–3 times, at a different location each time.





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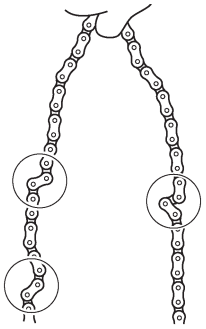
2. Check:
   • Drive chain
   Stiffness → Clean and lubricate or replace.



3. Clean:
   • Drive chain

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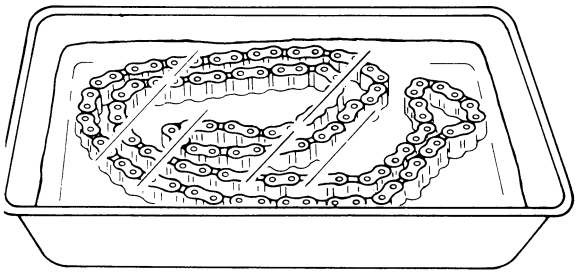
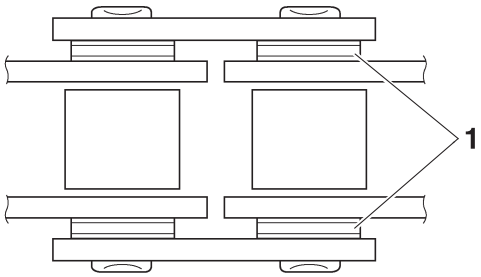
a. Wipe the drive chain with a clean cloth.
b. Put the drive chain in kerosene and remove any remaining dirt.
c. Remove the drive chain from the kerosene and completely dry it.

ECA19090

NOTICE

- **This vehicle has a drive chain with small rubber O-rings "1" between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosene to clean the drive chain.**
- **Do not soak the drive chain in kerosene for more than ten minutes, otherwise the O-rings can be damaged.**





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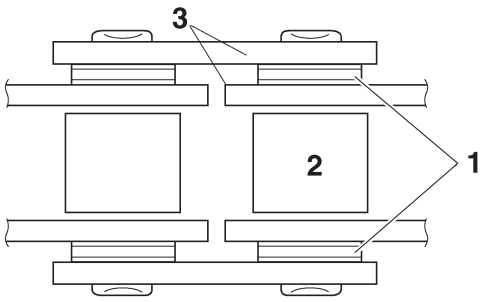
4. Check:
   - O-rings "1"
     Damage → Replace the drive chain.
   - Drive chain rollers "2"
     Damage/wear → Replace the drive chain.
   - Drive chain side plates "3"
     Damage/wear/cracks → Replace the drive chain.



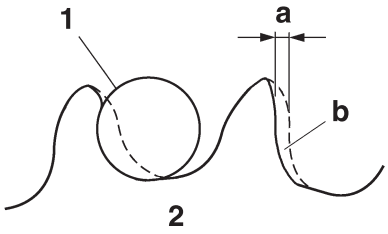
5. Lubricate:
   - Drive chain

	Recommended lubricant **Chain lubricant suitable for O-ring chains**

EAS30231

CHECKING THE DRIVE SPROCKET

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



b. Correct

1. Drive chain roller
2. Drive sprocket

EAS30232

CHECKING THE REAR WHEEL SPROCKET

Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-31.

EAS30233

CHECKING THE REAR WHEEL DRIVE HUB

Refer to "CHECKING THE REAR WHEEL DRIVE HUB" on page 4-31.

EAS30234
INSTALLING THE DRIVE CHAIN

1. Install:
   • Drive chain

ECA17410
NOTICE

Be sure to put on safety goggles when working.

TIP
Install the drive chain joint with the drive chain cut & rivet tool.

	Drive chain cut & rivet tool **90890-01550** **Drive chain cut & rivet tool** **YM-01550**

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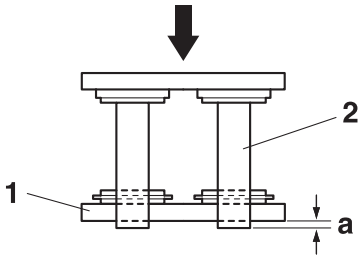
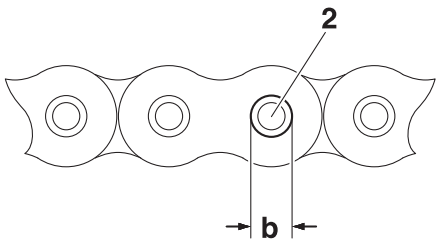
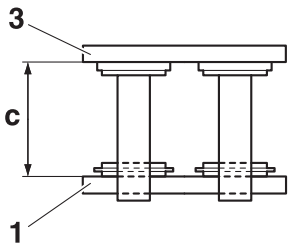
a. When press fitting the connecting plate "1", make sure the space "a" between the end of the connecting pin "2" and the connecting plate is 1.2–1.4 mm (0.05–0.06 in).



b. After riveting, make sure the diameter between the edges "b" of the connecting pin "2" is 5.5–5.8 mm (0.22–0.23 in).



c. After riveting, make sure the space "c", which is inside of the connecting link "3" and inside of the connecting plate "1", is 14.1–14.3 mm (0.56–0.65 in).



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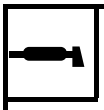
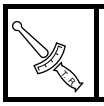
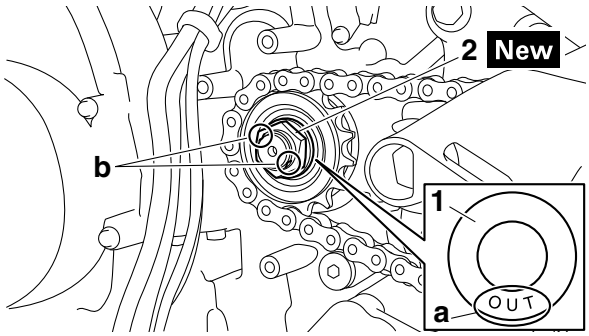
2. Lubricate:
   • Drive chain

	**Recommended lubricant** **Chain lubricant suitable for O-ring chains**

3. Install:
   • Drive sprocket
   • Washer "1"
   • Drive sprocket nut "2" New

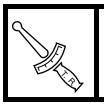
	**Drive sprocket nut** **95 N·m (9.5 kgf·m, 69 lb·ft)**

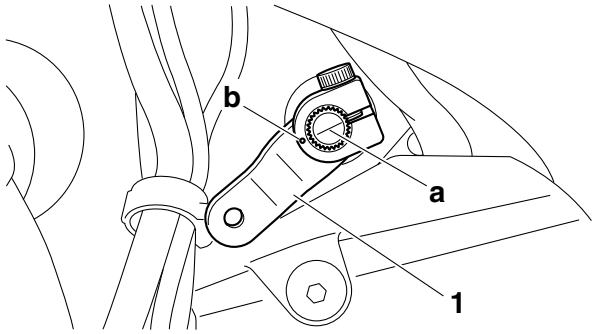
TIP
- While applying the rear brake, tighten the drive sprocket nut.
- Install washer "1" with the "OUT" mark "a" facing out.
- Stake the drive sprocket nut "2" at cutouts "b" in the drive axle.



4. Install:
   • Shift arm "1"

TIP
Before installing, make sure to align the mark "a" of the shift shaft with the punch mark "b" of the shift arm.

	**Shift arm bolt** **14 N·m (1.4 kgf·m, 10 lb·ft)**



5. Adjust:
   • Drive chain slack
   Refer to "DRIVE CHAIN SLACK" on page 3-18.

	Drive chain slack **5.0–15.0 mm (0.20–0.59 in)**

ECA13550

NOTICE

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

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EAS20041
ENGINE INSPECTION

EAS30249
MEASURE THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

TIP

Insufficient compression pressure will result in a loss of performance.

1. Measure:
   - Valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-5.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling
     Refer to "GENERAL CHASSIS (2)" on page 4-6.
   - Passenger seat/Rider seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Air filter case
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
   - Air cut-off valve
     Refer to "AIR INDUCTION SYSTEM" on page 7-15.
   - Ignition coils
   - Spark plugs
     Refer to "CAMSHAFTS" on page 5-9.

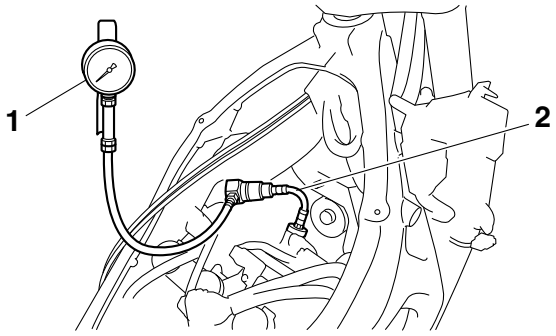
ECA13340

NOTICE

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

4. Install:
   - Compression gauge "1"
   - Extension "2"

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



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

Compression pressure
1331–1713 kPa/680 r/min (13.3–17.1 kgf/cm²/680 r/min, 189.3–243.7 psi/680 r/min)

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

EWA17100

⚠ WARNING

To prevent sparking the plug, remove all ignition coil couplers and fuel injector couplers before cranking the engine.

TIP

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 15 psi).

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

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

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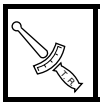
6. Install:
   • Spark plugs

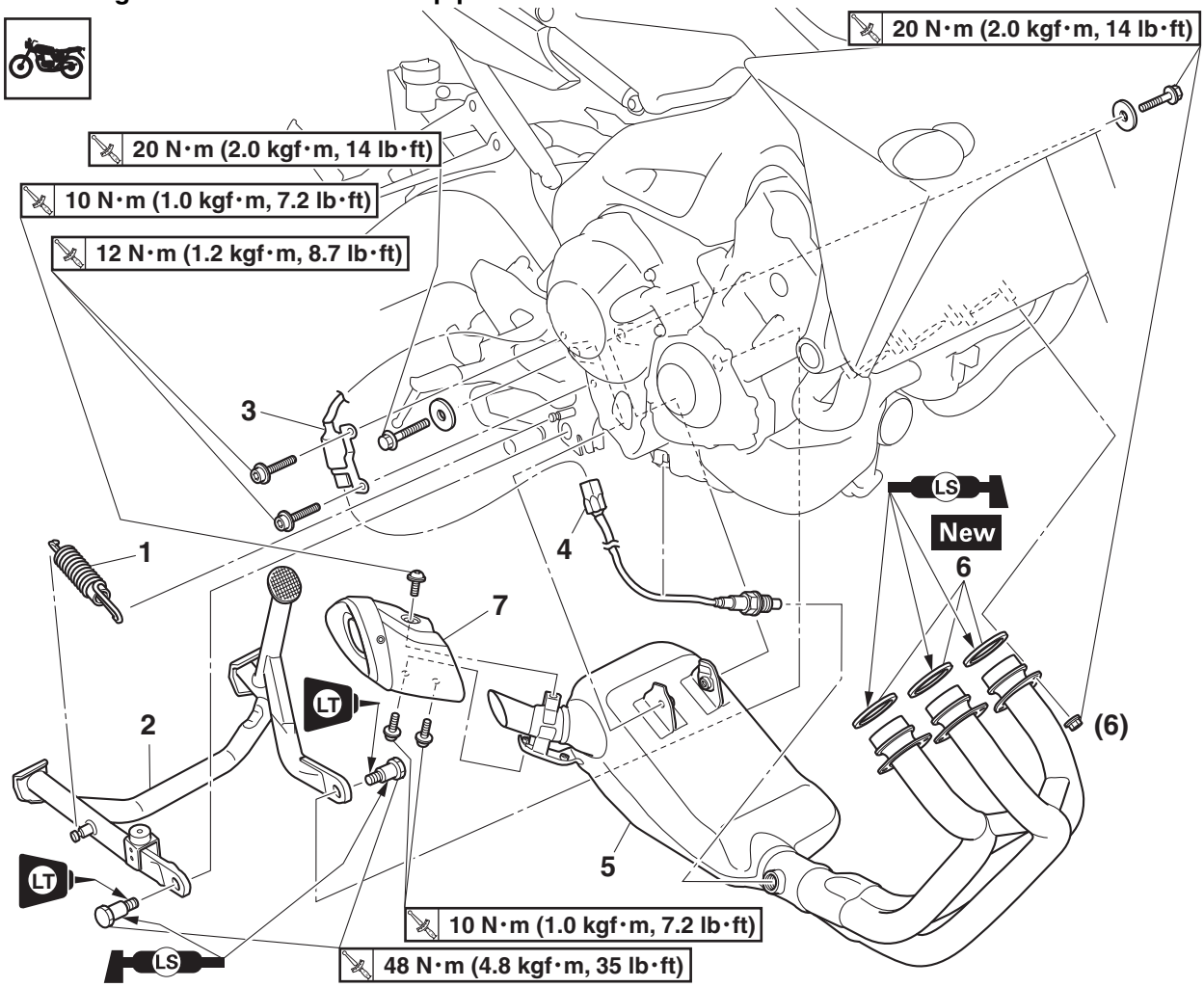


Spark plug
13 N·m (1.3 kgf·m, 9.4 lb·ft)

7. Install:
   • Ignition coils
   Refer to “CAMSHAFTS” on page 5-9.
   • Air cut-off valve
   Refer to “AIR INDUCTION SYSTEM” on page 7-15.
   • Air filter case
   Refer to “GENERAL CHASSIS (3)” on page 4-13.
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Fuel tank cover
   Refer to “GENERAL CHASSIS (3)” on page 4-13.
   • Rider seat/Passenger seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Front side cowling/Front side panel/Fuel tank front cover
   Refer to “GENERAL CHASSIS (2)” on page 4-6.

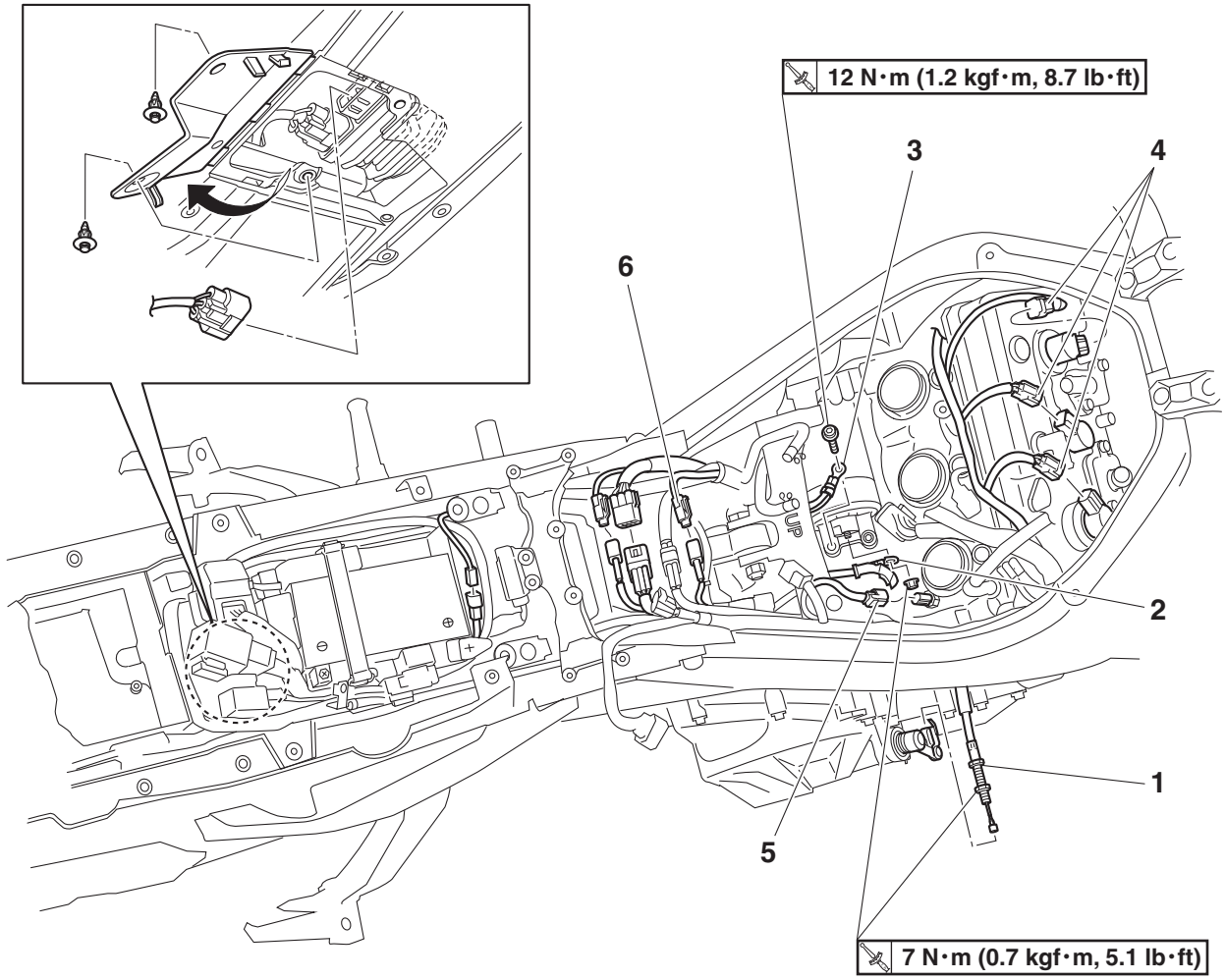
EAS20042
ENGINE REMOVAL

Removing the muffler and exhaust pipe



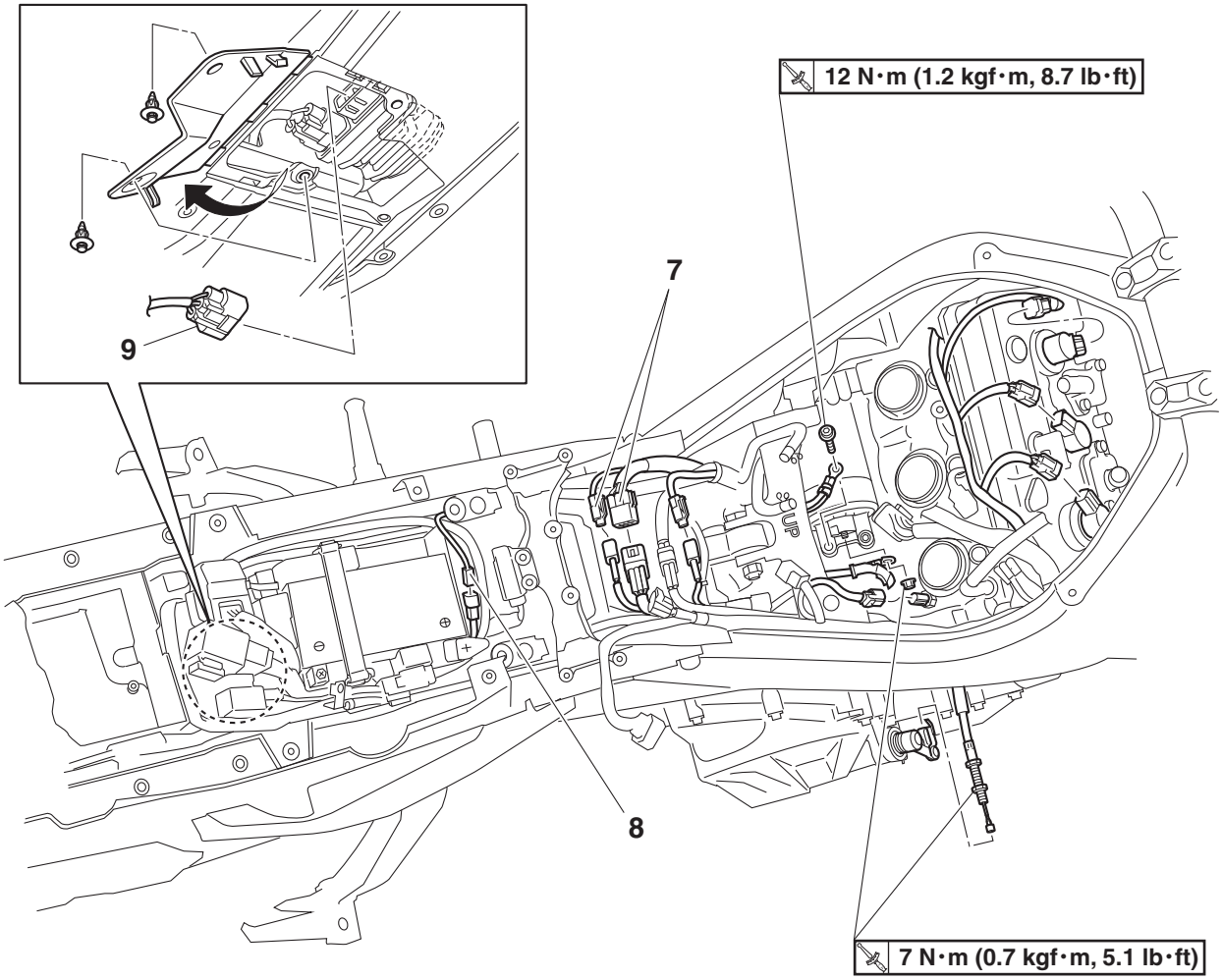
Order	Job/Parts to remove	Q'ty	Remarks
1	Spring	1	
2	Centerstand	1	
3	O_2 sensor coupler bracket	1	
4	O_2 sensor coupler	1	Disconnect.
5	Muffler assembly	1	
6	Exhaust gasket	3	
7	Muffler protector	1	

Disconnecting the leads and hoses



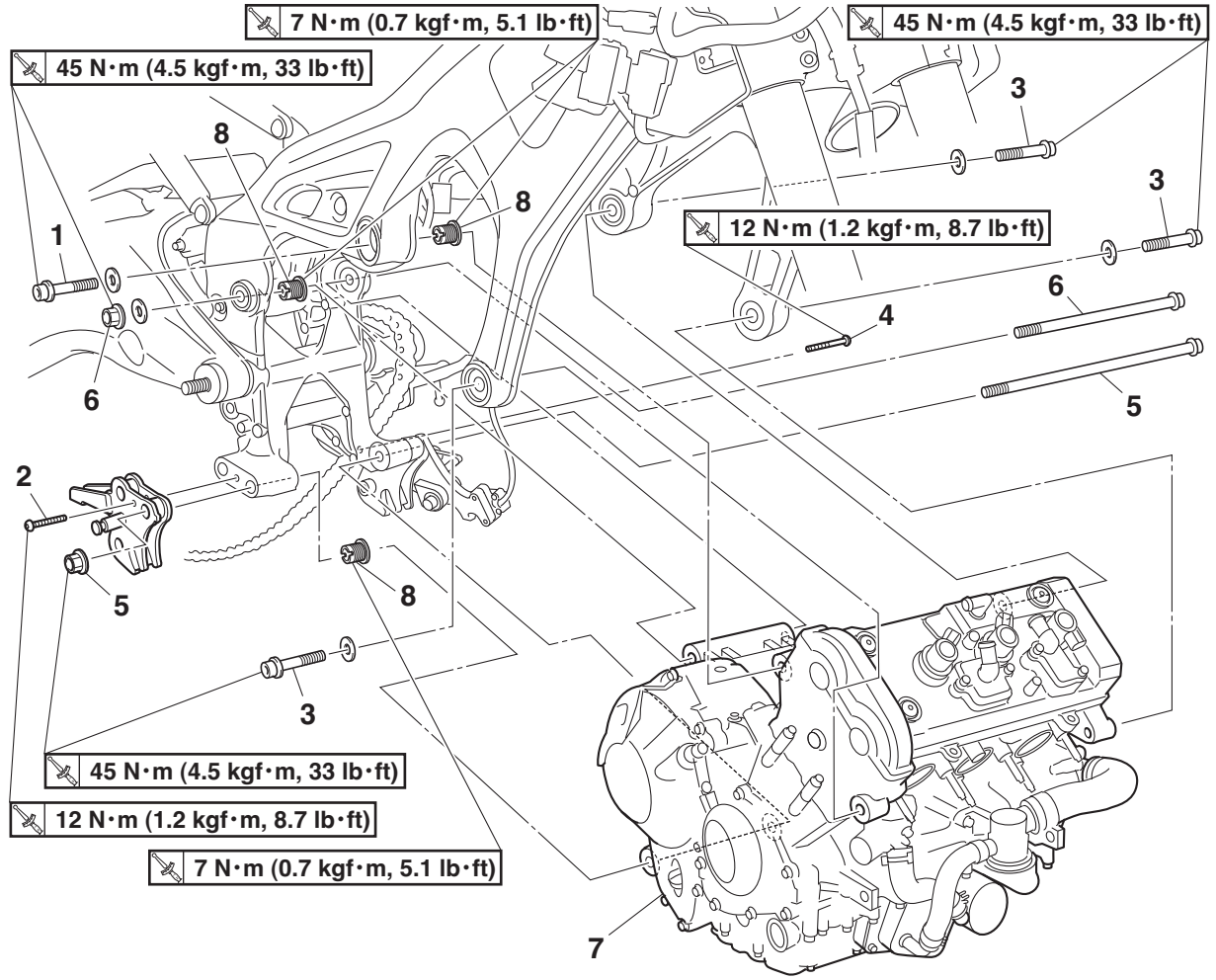
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat/Rear side cover (left)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank/Canister		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Throttle bodies		Refer to "THROTTLE BODIES" on page 7-5.
	Fuel rail		Refer to "THROTTLE BODIES" on page 7-5.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Air cut-off valve		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
	Footrest assembly (right)		Refer to "REAR BRAKE" on page 4-48.
	Drive sprocket		Refer to "CHAIN DRIVE" on page 4-98.
1	Clutch cable	1	Disconnect.
2	Starter motor lead	1	Disconnect.
3	Negative battery lead	1	Disconnect.
4	Ignition coil coupler	3	Disconnect.
5	Coolant temperature sensor coupler	1	Disconnect.
6	Oil level switch coupler	1	Disconnect.

Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
7	Gear position switch coupler	2	Disconnect.
8	Crankshaft position sensor coupler	1	Disconnect.
9	Stator coil coupler	1	Disconnect.

Removing the engine



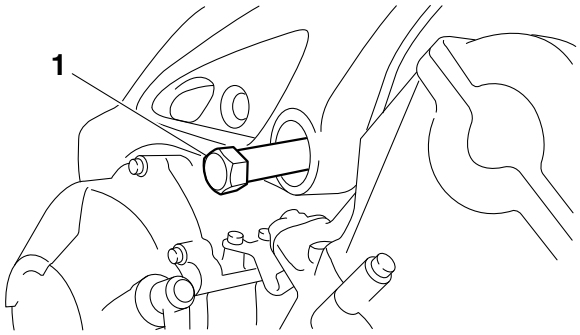
Order	Job/Parts to remove	Q'ty	Remarks
1	Engine mounting bolt (right front upper side)	1	
2	Centerstand bracket bolt (right)	1	
3	Engine mounting bolt (right front lower side) /Engine mounting bolt (left front lower side) /Engine mounting bolt (left front upper side)	1/1/1	
4	Centerstand bracket bolt (left)	1	
5	Engine mounting bolt (rear lower side)/Engine mounting nut (rear lower side)	1/1	
6	Engine mounting bolt (rear upper side)/Engine mounting nut (rear upper side)	1/1	
7	Engine	1	
8	Engine mounting adjust bolt	3	

EAS30250
REMOVING THE ENGINE

1. Loosen:
   • Engine mounting adjust bolt (front)

TIP
Loosen the engine mounting adjust bolt with the pivot shaft wrench "1".

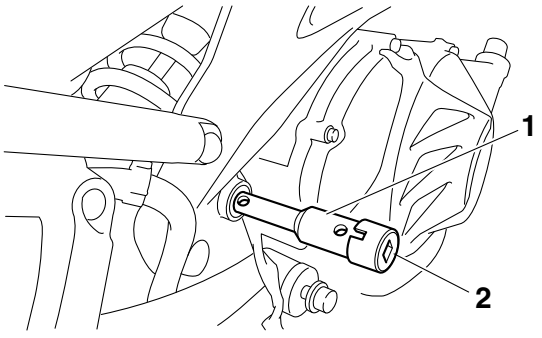
Pivot shaft wrench
90890-01485
Frame mount insert wrench
YM-01485

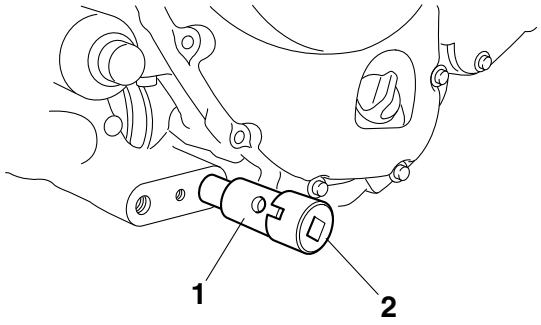


2. Loosen:
   • Engine mounting adjust bolt (rear)

TIP
Loosen the engine mounting adjust bolts with the pivot shaft wrench "1" and pivot shaft wrench adapter "2".

Pivot shaft wrench
90890-01518
Frame spanner socket
YM-01518
Pivot shaft wrench adapter
90890-01476





EAS30251
INSTALLING THE ENGINE

1. Install:
   • Engine mounting adjust bolt (front) "1" (temporarily tighten)
   • Engine mounting adjust bolt (rear) "2" (temporarily tighten)
2. Install:
   • Engine
3. Install:
   • Engine mounting bolt (rear upper side) "3"
   • Engine mounting bolt (rear lower side) "4"
4. Install:
   • Centerstand bracket bolt (left) "5" (temporarily tighten)
5. Install:
   • Engine mounting bolt (left front upper side) "6"
   • Engine mounting bolt (left front lower side) "7"
   • Engine mounting bolt (right front lower side) "8"

TIP
Temporarily tighten the engine mounting bolts "6"–"8".

6. Tighten:
   • Engine mounting adjust bolt (front) "1"

TIP
- Tighten the engine mounting adjust bolt to specification with the pivot shaft wrench.
- Make sure that the flange on the engine mounting adjust bolt contacts the engine.

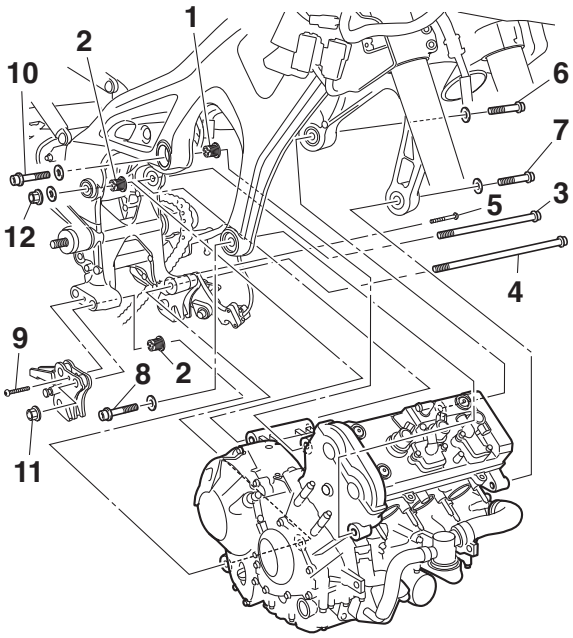
Engine mounting adjust bolt (front)
7 N·m (0.7 kgf·m, 5.1 lb·ft)

Pivot shaft wrench
90890-01485
Frame mount insert wrench
YM-01485

7. Tighten:
   • Engine mounting adjust bolt (rear) “2”

TIP

- Tighten the engine mounting adjust bolts to specification with the pivot shaft wrench and pivot shaft wrench adapter.
- Make sure that the flange on the engine mounting adjust bolt contacts the engine.



Engine mounting adjust bolt (rear)
7 N·m (0.7 kgf·m, 5.1 lb·ft)

Pivot shaft wrench
90890-01518
Frame spanner socket
YM-01518
Pivot shaft wrench adapter
90890-01476

8. Install:
   • Centerstand bracket bolt (right) “9” (temporarily tighten)
9. Install:
   • Engine mounting bolt (right front upper side) “10”
10. Tighten:
   • Engine mounting nut (rear lower side) “11”
   • Engine mounting nut (rear upper side) “12”

Engine mounting nut (rear lower)
45 N·m (4.5 kgf·m, 33 lb·ft)
Engine mounting nut (rear upper)
45 N·m (4.5 kgf·m, 33 lb·ft)

11. Tighten:
   • Engine mounting bolt (right front upper side) “10”
   • Engine mounting bolt (left front upper side) “6”
   • Engine mounting bolt (left front lower side) “7”
   • Engine mounting bolt (right front lower side) “8”

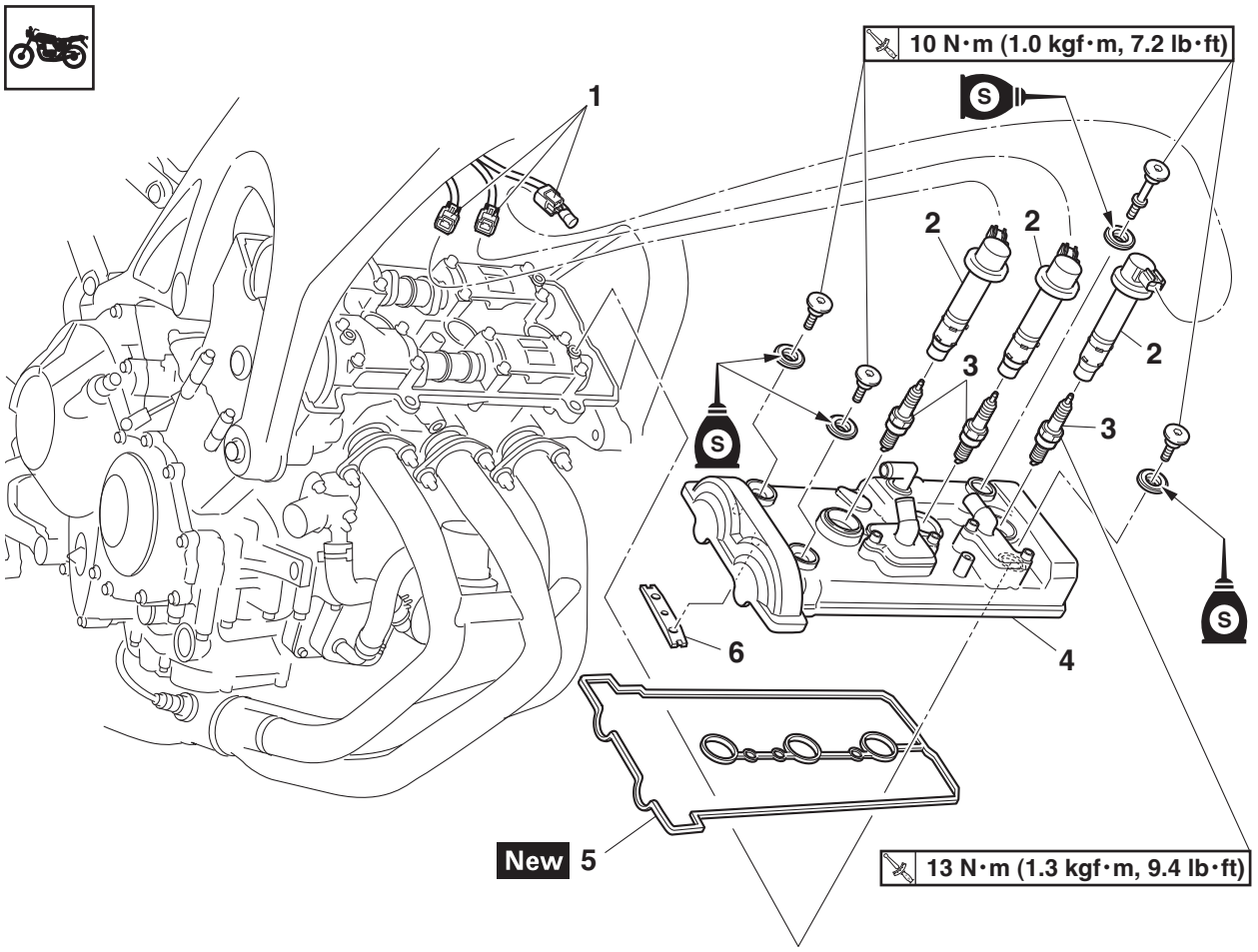
Engine mounting bolt (front upper and front lower)
45 N·m (4.5 kgf·m, 33 lb·ft)

12. Tighten:
   • Centerstand bracket bolt (left) “5”
   • Centerstand bracket bolt (right) “9”

Centerstand bracket bolt
12 N·m (1.2 kgf·m, 8.7 lb·ft)

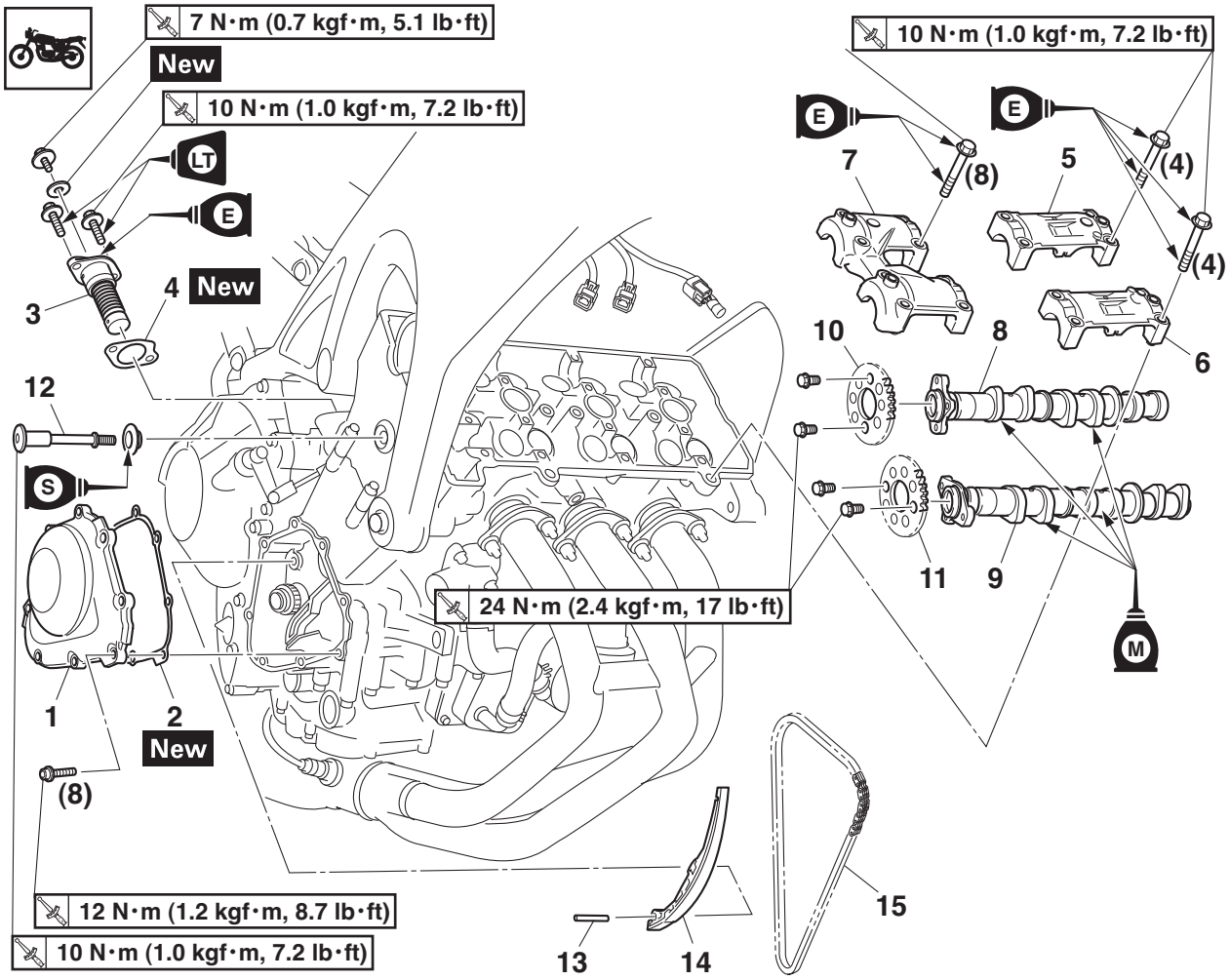
EAS20043
CAMSHAFTS

Removing the cylinder head cover



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Air cut-off valve		Refer to "AIR INDUCTION SYSTEM" on page 7-15.
1	Ignition coil coupler	3	Disconnect.
2	Ignition coil	3	
3	Spark plug	3	
4	Cylinder head cover	1	
5	Cylinder head cover gasket	1	
6	Timing chain guide (top side)	1	

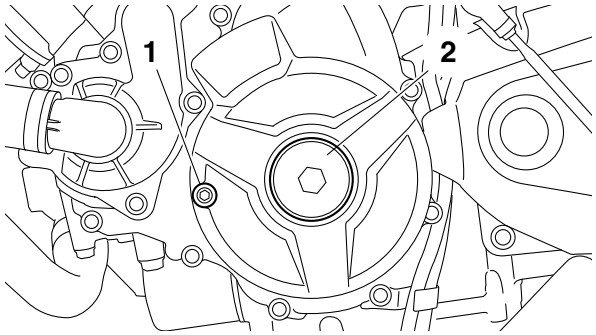
Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft end cover/Timing mark accessing bolt		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-29.
1	Timing chain cover	1	
2	Timing chain cover gasket	1	
3	Timing chain tensioner	1	
4	Timing chain tensioner gasket	1	
5	Intake camshaft cap	1	
6	Exhaust camshaft cap	1	
7	Camshaft cap	1	
8	Intake camshaft	1	
9	Exhaust camshaft	1	
10	Intake camshaft sprocket	1	
11	Exhaust camshaft sprocket	1	
12	Timing chain bolt	1	
13	Dowel pin	1	
14	Timing chain guide (intake side)	1	
15	Timing chain	1	

EAS30256
REMOVING THE CAMSHAFTS

1. Remove:
   • Timing mark accessing bolt “1”
   • Crankshaft end cover “2”



2. Align:
   • Mark “a” on the generator rotor (with the generator rotor cover mark “b”)

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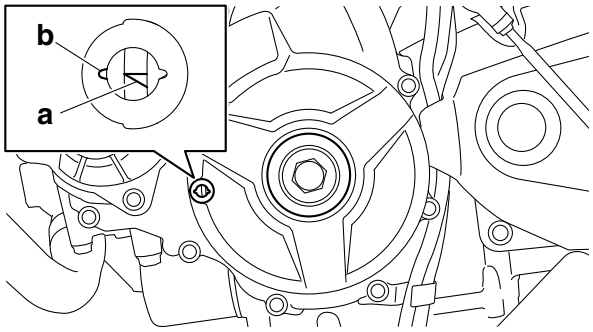
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at BTDC125° on the compression stroke, align the BTDC125° mark “a” on the generator rotor with the generator rotor cover mark “b”.

TIP

BTDC125° on the compression stroke can be found when the camshaft lobes are turned away from each other.



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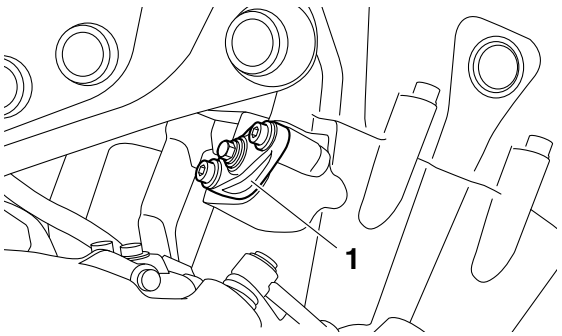
3. Remove:
   • Timing chain tensioner “1”
   • Timing chain tensioner gasket

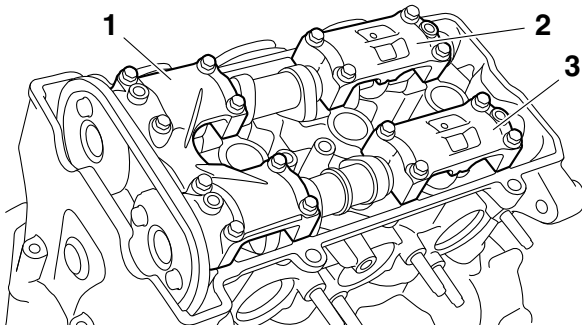


4. Remove:
   • Camshaft cap “1”
   • Intake camshaft cap “2”
   • Exhaust camshaft cap “3”

ECA13720

NOTICE

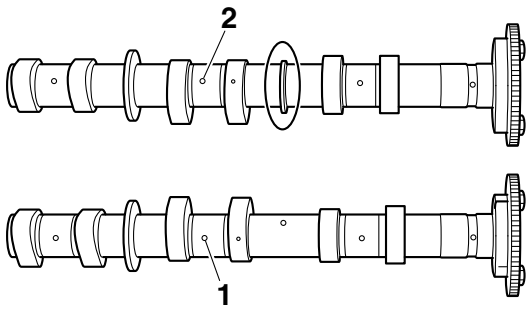
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

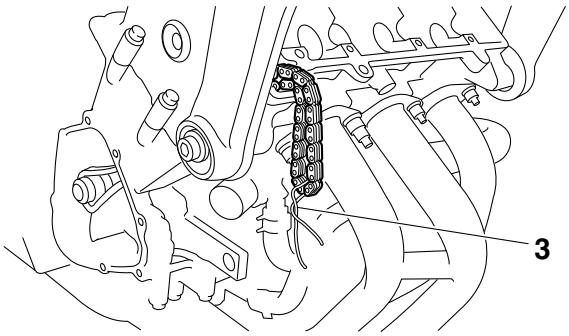


5. Remove:
   • Intake camshaft “1”
   • Exhaust camshaft “2”

TIP

To prevent the timing chain from falling into the crankcase, fasten it with a wire “3”.



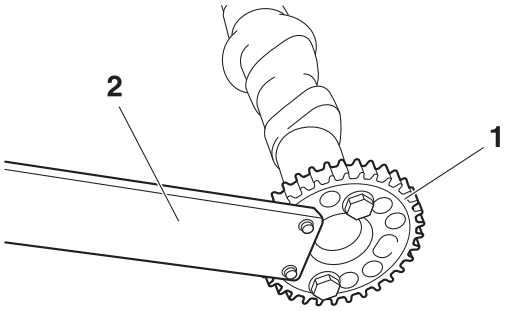


6. Remove:
   • Camshaft sprocket “1”

TIP

Use the camshaft wrench “2” and loosen the camshaft sprocket bolt.

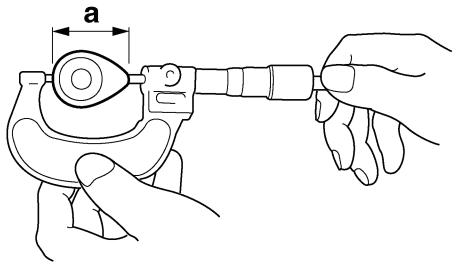
Camshaft wrench
90890-04162
Camshaft wrench
YM-04162



EAS30257
CHECKING THE CAMSHAFTS

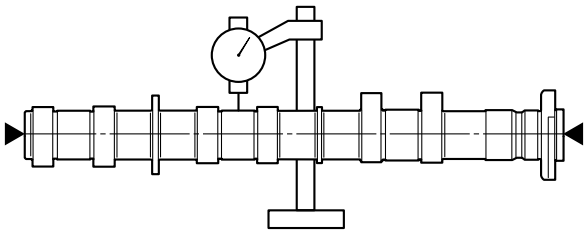
1. Check:
   • Camshaft lobes
   Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   • Camshaft lobe dimensions “a”
   Out of specification → Replace the camshaft.

Camshaft lobe dimensions
Lobe height (Intake)
36.290–36.390 mm (1.4287–1.4327 in)
Limit
36.190 mm (1.4248 in)
Lobe height (Exhaust)
35.720–35.820 mm (1.4063–1.4102 in)
Limit
35.620 mm (1.4024 in)



3. Measure:
   • Camshaft runout
   Out of specification → Replace.

Camshaft runout limit
0.030 mm (0.0012 in)



4. Measure:
   • Camshaft-journal-to-camshaft-cap clearance
   Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.028–0.062 mm (0.0011–0.0024 in)
Limit
0.080 mm (0.0032 in)

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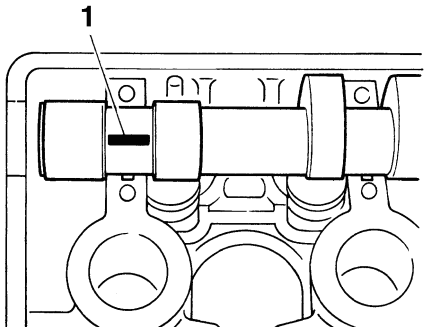
a. Install the camshaft into the cylinder head (without the camshaft caps).
b. Position strip of Plastigauge® “1” onto the camshaft journal as shown.

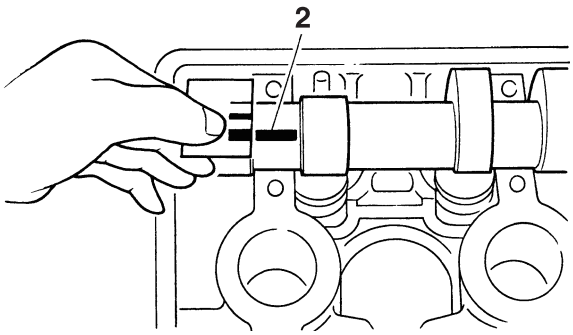


c. Install the dowel pins and camshaft caps.

TIP
- 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 N·m (1.0 kgf·m, 7.2 lb·ft)

d. Remove the camshaft caps and then measure the width of the Plastigauge® “2”.



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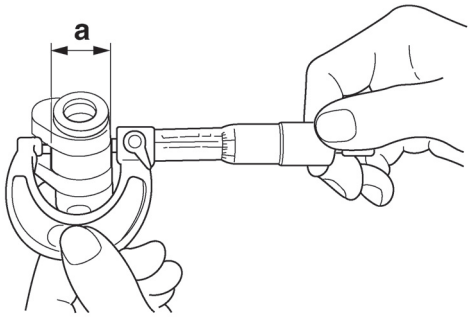
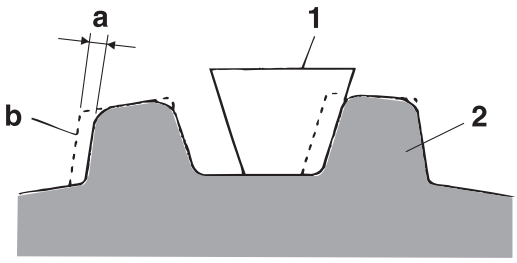
5. Measure:
   • Camshaft journal diameter “a”
   Out of specification → Replace the camshaft.
   Within specification → Replace the cylinder head and the camshaft caps as a set.

Camshaft journal diameter
24.459–24.472 mm (0.9630–0.9635 in)



EAS30258
CHECKING THE TIMING CHAIN AND CAMSHAFT SPROCKET

1. Check:
   • Timing chain
   Damage/stiffness → Replace the timing chain and camshaft and camshaft sprocket as a set.
2. Check:
   • Camshaft sprocket
   More than 1/4 tooth wear “a” → Replace the camshaft sprockets and the timing chain as a set.



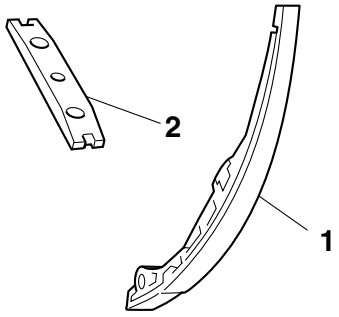
a. 1/4 tooth
b. Correct

1. Timing chain
2. Camshaft sprocket

EAS30265
CHECKING THE TIMING CHAIN GUIDES

The following procedure applies to all of the camshaft sprockets and timing chain guides.

1. Check:
   • Timing chain guide (intake side) “1”
   • Timing chain guide (top side) “2”
   Damage/wear → Replace the defective part(s).



EAS30266
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   • Timing chain tensioner
   Cracks/damage/rough movement → Replace.

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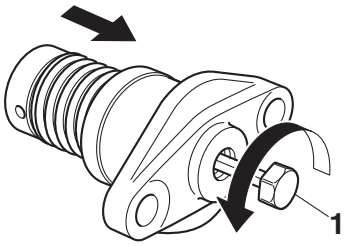
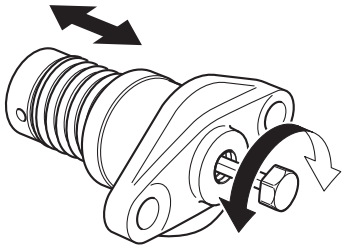
a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

TIP

While pressing the timing chain tensioner rod, wind it counterclockwise with a hexagon wrench “1” (Parts No.: 1RC-12228-00) until it stops.



b. Make sure that the timing chain tensioner rod moves in and out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



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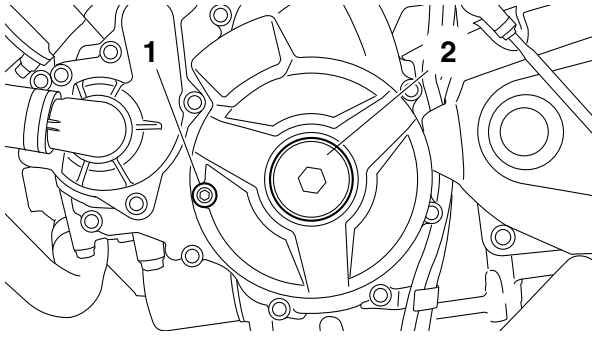
EAS30269
INSTALLING THE CAMSHAFTS

1. Remove:
   - Timing mark accessing bolt “1”
   - Crankshaft end cover “2”



2. Align:
   - Mark “a” on the generator rotor (with the generator rotor cover mark “b”)

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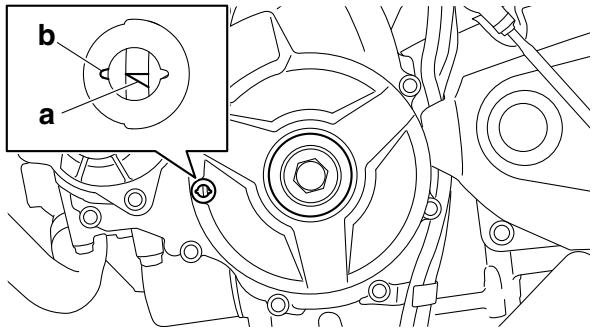
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at BTDC125°, align the mark “a” on the generator rotor with the generator rotor cover mark “b”.



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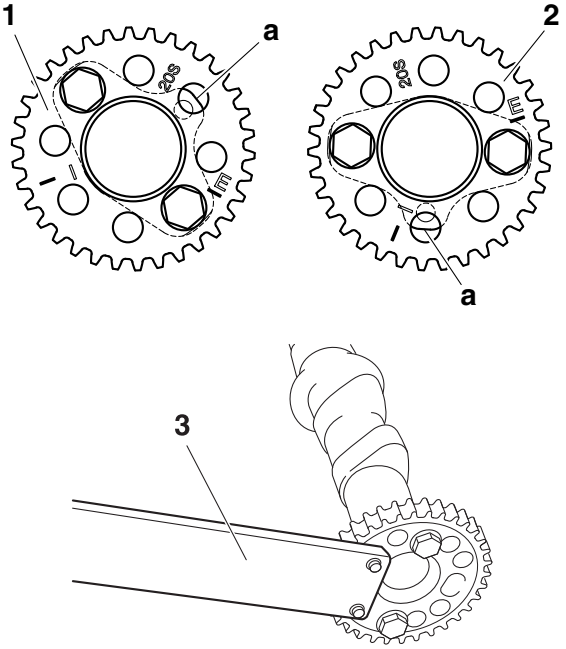
3. Install:
   - Intake camshaft sprocket “1”
   - Exhaust camshaft sprocket “2”

	Camshaft sprocket bolt **24 N·m (2.4 kgf·m, 17 lb·ft)**

TIP
- Install the camshaft projection “a” at the position shown in the illustration.
- Tighten the camshaft sprocket bolt with the camshaft wrench “3”.

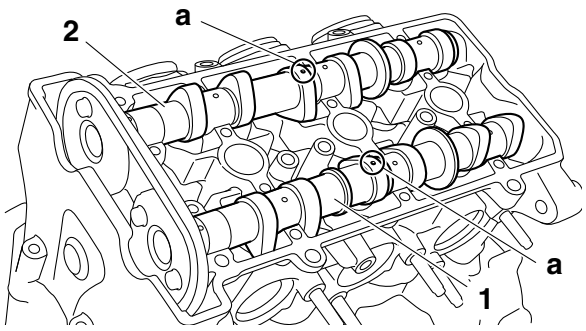
	Camshaft wrench **90890-04162** **Camshaft wrench** **YM-04162**

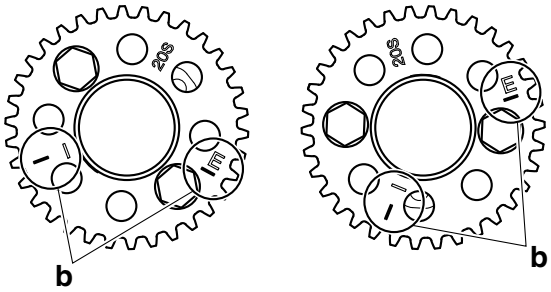


4. Install:
   - Exhaust camshaft “1”
   - Intake camshaft “2”

TIP
- Make sure the punch mark “a” on each cam-

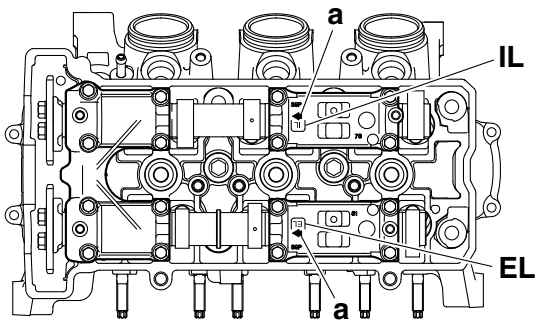
shaft faces up.
• When installing the camshaft, no need to align the mark “b” on the camshaft sprocket.





5. Install:
• Camshaft cap
• Intake camshaft cap
• Exhaust camshaft cap

TIP
• Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
“IL”: Intake left side camshaft cap mark
“EL”: Exhaust left side camshaft cap mark
• Make sure the arrow mark “a” on each camshaft points toward the right side of the engine.

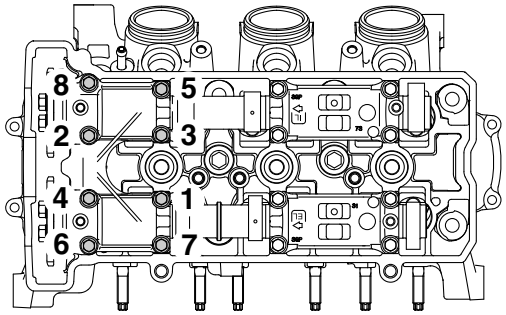


6. Tighten:
• Camshaft cap bolts

	Camshaft cap bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

TIP
Tighten the camshaft cap bolts in the tightening sequence as shown.

ECA17430
NOTICE
- **Lubricate the camshaft cap bolts with the engine oil.**
- **The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.**
- **Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.**

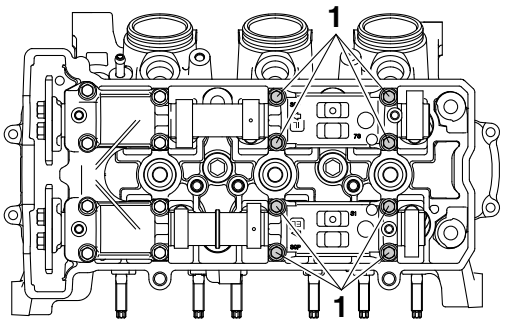


7. Tighten:
• Camshaft cap bolts “1”

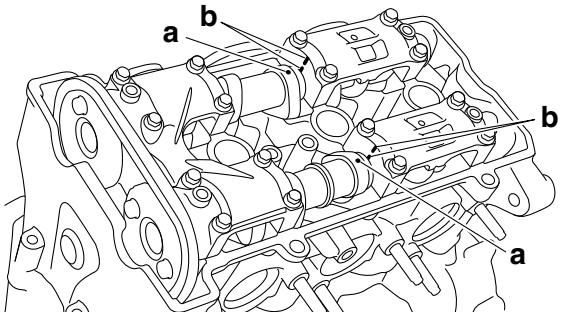
	Camshaft cap bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

TIP
Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

ECA17430
NOTICE
- **Lubricate the camshaft cap bolts with the engine oil.**
- **The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.**
- **Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.**



8. Check:
   • Camshaft punch mark “a”
   Make sure the camshaft punch mark “a” on the camshaft is aligned with the camshaft cap alignment mark “b”.



9. Install:
   • Timing chain tensioner
   • Timing chain tensioner gasket New

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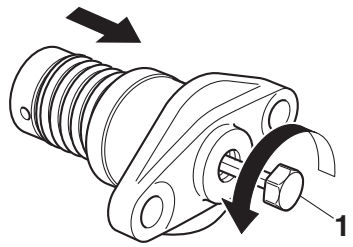
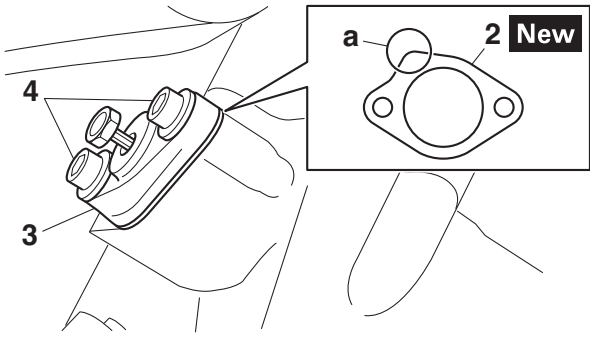
a. While lightly pressing the timing chain tensioner rod by hand, turn the timing chain tensioner rod fully counterclockwise with a hexagon wrench “1” (Parts No.: 1RC-12228-00).



b. Install the timing chain tensioner gasket “2”, the timing chain tensioner “3”, and the timing chain tensioner bolts “4” on the cylinder block.

TIP
Face the section “a” of the gasket inward.

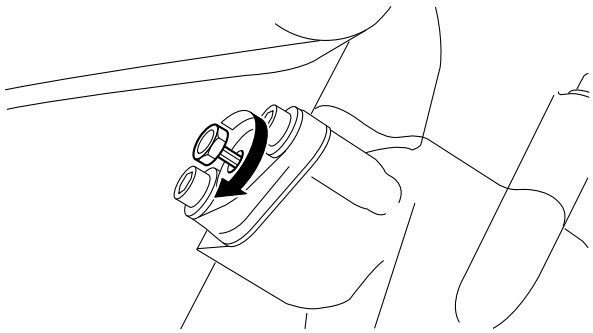


c. Tighten the timing chain tensioner bolts to the specified torque.

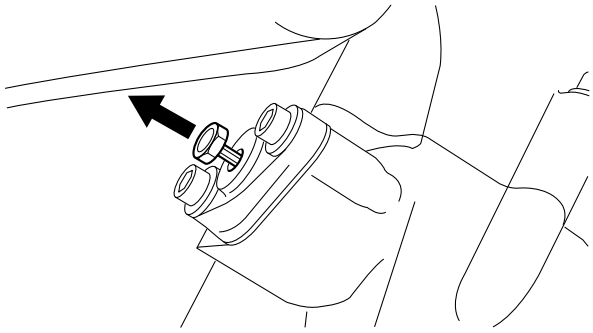
	Timing chain tensioner bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)** **LOCTITE®**

d. Screw the hexagon wrench by hand until the timing chain tensioner rod touches the timing chain guide, and then tighten 1/4 turn by tool.

TIP
The timing chain tensioner rod is extended by turning the hexagon wrench clockwise.



e. Remove the hexagon wrench, and check the timing chain tension.



f. Install the timing chain tensioner cap bolt and gasket, and then tighten the timing chain tensioner cap bolt to the specified torque.

	Timing chain tensioner cap bolt **7 N·m (0.7 kgf·m, 5.1 lb·ft)**

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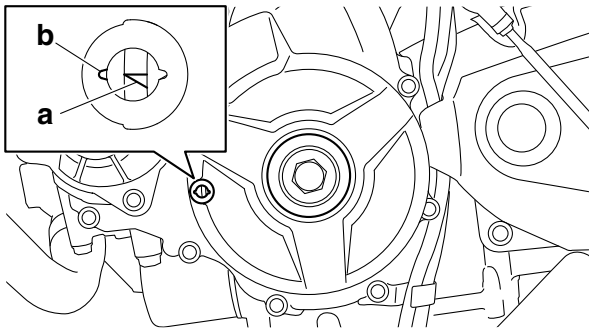
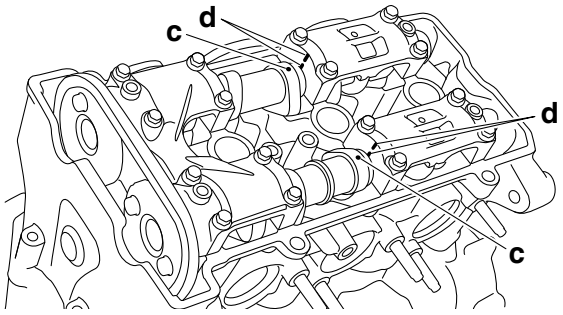
10.Turn:
- Crankshaft
  (several turns counterclockwise)

11.Check:
- Mark “a”
  Make sure the mark “a” on the generator rotor is aligned with the generator rotor cover mark “b”.
- Camshaft punch mark “c”
  Make sure the camshaft punch mark “c” on the camshaft is aligned with the camshaft cap alignment mark “d”.
  Out of alignment → Adjust.
  Refer to the installation steps above.





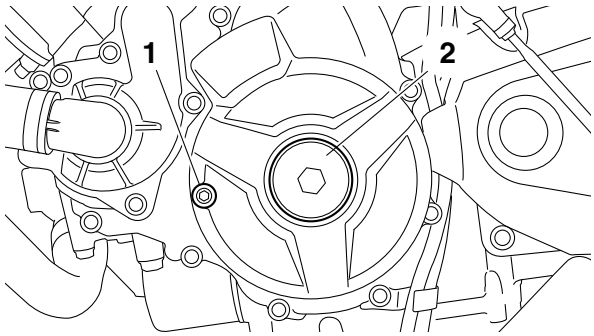
12.Measure:
- Valve clearance
  Out of specification → Adjust.
  Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-5.

13.Install:
- Timing mark accessing bolt “1”

	Timing mark accessing bolt **15 N·m (1.5 kgf·m, 11 lb·ft)**

- Crankshaft end cover “2”

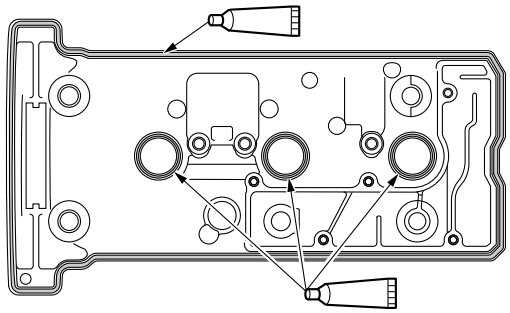
	Crankshaft end cover **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

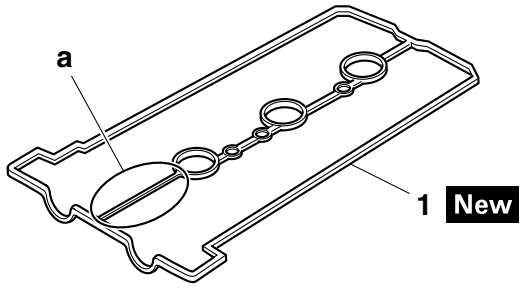


14.Install:
- Timing chain guide (top side)
- Cylinder head cover gasket “1” New
- Cylinder head cover

	Cylinder head cover bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

TIP
- Apply Three Bond No.1541C® onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- After installing the cylinder head cover gasket “1” to the cylinder head cover, cut off the “a” section.



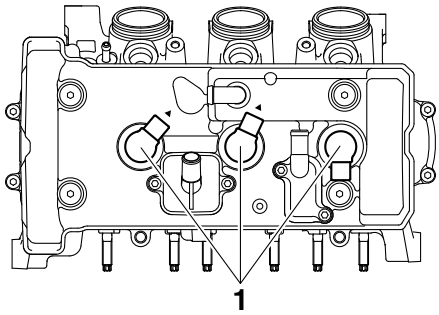


15.Install:
- Spark plugs
- Ignition coils “1”

	Spark plug **13 N·m (1.3 kgf·m, 9.4 lb·ft)**

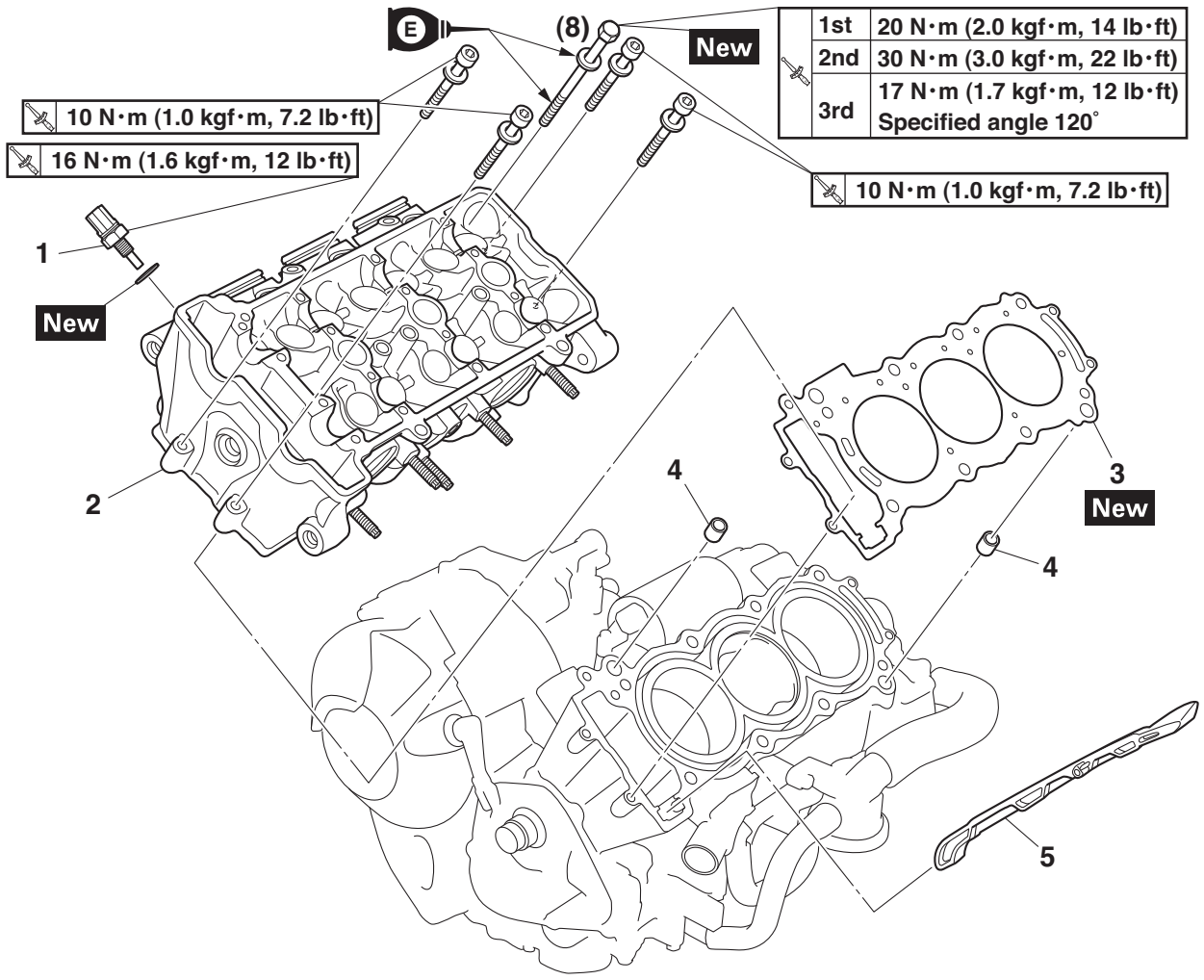
TIP

Install the ignition coils “1” in the direction shown in the illustration.



EAS20044
CYLINDER HEAD

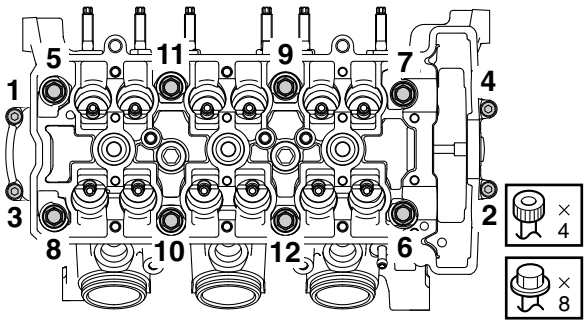
Removing the cylinder head



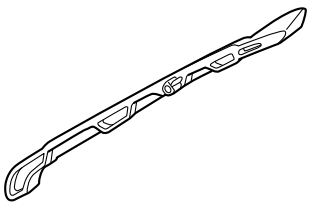
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-3.
	Intake camshaft		Refer to "CAMSHAFTS" on page 5-9.
	Exhaust camshaft		Refer to "CAMSHAFTS" on page 5-9.
1	Coolant temperature sensor	1	
2	Cylinder head	1	
3	Cylinder head gasket	1	
4	Dowel pin	2	
5	Timing chain guide (exhaust side)	1	

EAS30276
REMOVING THE CYLINDER HEAD
1. Remove:
   • Intake camshaft
   • Exhaust camshaft
   Refer to "REMOVING THE CAMSHAFTS" on page 5-11.
2. Remove:
   • Cylinder head bolt (M6) (×4)
   • Cylinder head bolt (M9) (×8)

TIP
- 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.



EAS30278
CHECKING THE TIMING CHAIN GUIDE (EXHAUST SIDE)
1. Check:
   • Timing chain guide (exhaust side)
   Damage/wear → Replace.

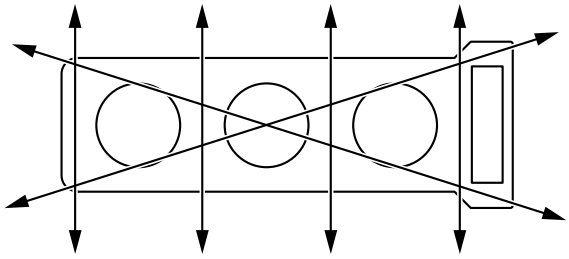


EAS30277
CHECKING THE CYLINDER HEAD
1. Eliminate:
   • Combustion chamber carbon deposits (with a rounded scraper)

TIP
Do not use a sharp instrument to avoid damaging or scratching:
- Spark plug bore threads
- Valve seats

2. Check:
   • Cylinder head
   Damage/scratches → Replace.
   • Cylinder head water jacket
   Mineral deposits/rust → Eliminate.
3. Measure:
   • Cylinder head warpage
   Out of specification → Resurface the cylinder head.

	Warpage limit **0.10 mm (0.0039 in)**



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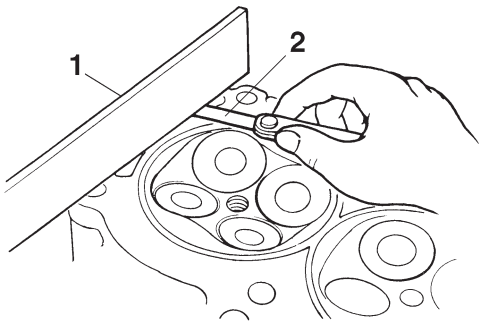
a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.

	Thickness gauge **90890-03180** **Feeler gauge set** **YU-26900-9**



b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

TIP
To ensure an even surface, rotate the cylinder head several times.

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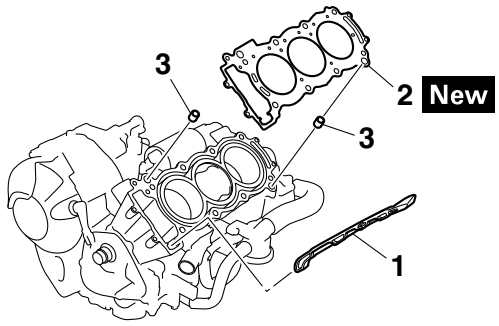
EAS30282
INSTALLING THE CYLINDER HEAD

1. Install:
   - Timing chain guide (exhaust side) “1”
   - Cylinder head gasket “2” New
   - Dowel pins “3”



2. Install:
   - Cylinder head
   - Cylinder head bolt (M6) (×4)
   - Cylinder head bolt (M9) (×8) New

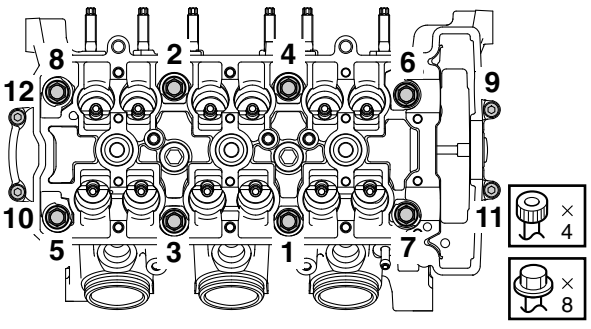
TIP
- Pass the timing chain through the timing chain cavity.
- Lubricate the cylinder head bolt (M9) thread and mating surface with engine oil.

3. Tighten:
   - Cylinder head bolts “1”–“8”
   - Cylinder head bolts “9”–“12”

Cylinder head bolt “1”–“8”
1st: 20 N·m (2.0 kgf·m, 14 lb·ft)
2nd: 30 N·m (3.0 kgf·m, 22 lb·ft)
***3rd: 17 N·m (1.7 kgf·m, 12 lb·ft)**
+120°
Cylinder head bolt “9”–“12”
10 N·m (1.0 kgf·m, 7.2 lb·ft)

* Following the tightening order, loosen the bolt one by one and then retighten it to the specific torque and the specific angle.

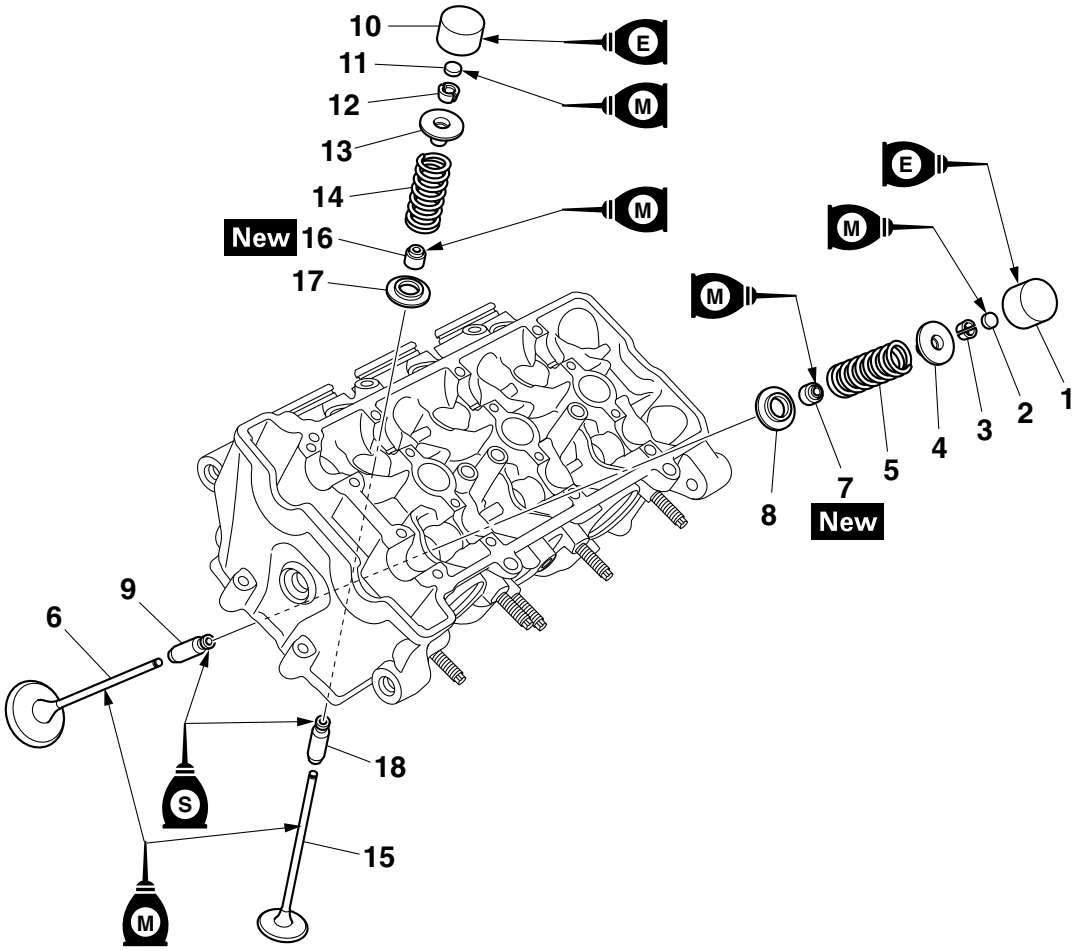
TIP
Tighten the cylinder head bolts “1”–“8” in the tightening sequence as shown and torque them in 3 stages.



4. Install:
   - Exhaust camshaft
   - Intake camshaft
   Refer to “INSTALLING THE CAMSHAFTS” on page 5-14.

EAS20045
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 5-19.
1	Intake valve lifter	6	
2	Intake valve pad	6	
3	Intake valve cotter	12	
4	Intake valve spring retainer	6	
5	Intake valve spring	6	
6	Intake valve	6	
7	Intake valve stem seal	6	
8	Intake valve spring seat	6	
9	Intake valve guide	6	
10	Exhaust valve lifter	6	
11	Exhaust valve pad	6	
12	Exhaust valve cotter	12	
13	Exhaust valve spring retainer	6	
14	Exhaust valve spring	6	
15	Exhaust valve	6	
16	Exhaust valve stem seal	6	
17	Exhaust valve spring seat	6	
18	Exhaust valve guide	6	

EAS30283
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

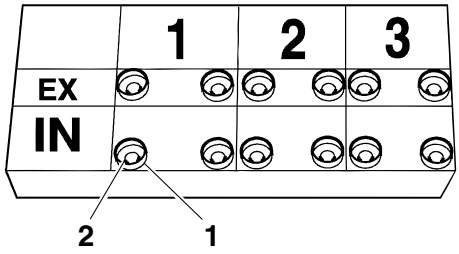
TIP

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Remove:
   - Valve lifter "1"
   - Valve pad "2"

TIP

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



2. Check:
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS" on page 5-25.

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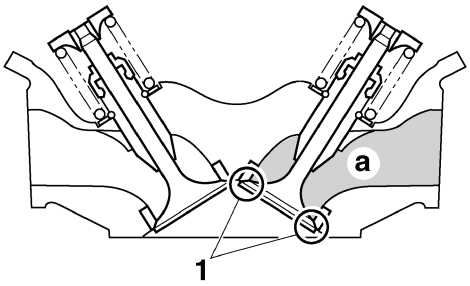
a. Pour a clean solvent "a" into the intake and exhaust ports.
b. Check that the valves properly seal.

TIP

There should be no leakage at the valve seat "1".



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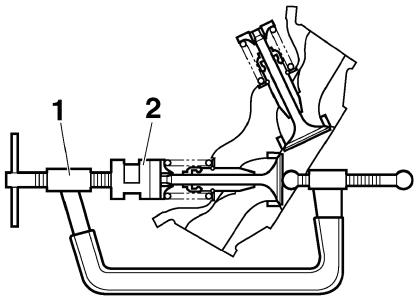
3. Remove:
   - Valve cotters

TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".

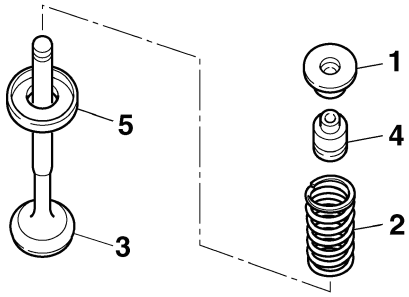
Valve spring compressor
90890-04019
Valve spring compressor
YM-04019
Valve spring compressor attachment
90890-04179
Valve spring compressor adapter 23 mm
YM-04179



4. Remove:
   - Valve spring retainer "1"
   - Valve spring "2"
   - Valve "3"
   - Valve stem seal "4"
   - Valve spring seat "5"

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



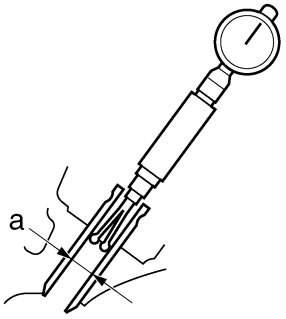
EAS30284
CHECKING THE VALVES AND VALVE GUIDES

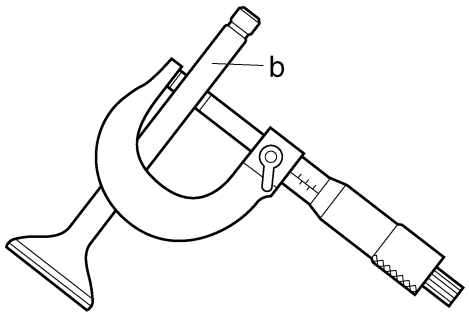
The following procedure applies to all of the valves and valve guides.

1. Measure:
   • Valve-stem-to-valve-guide clearance
   Out of specification → Replace the valve guide.

• Valve-stem-to-valve-guide clearance = Valve guide inside diameter "a" - Valve stem diameter "b"

Valve-stem-to-valve-guide clearance (intake)
0.010–0.037 mm (0.0004–0.0015 in)
Limit
0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)
0.025–0.052 mm (0.0010–0.0020 in)
Limit
0.100 mm (0.0039 in)





2. Replace:
   • Valve guide

TIP
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

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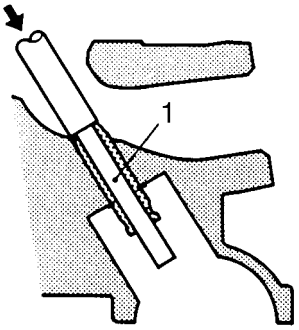
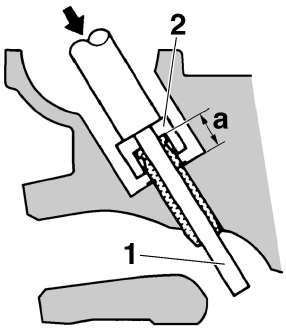
a. Remove the valve guide with the valve guide remover "1".



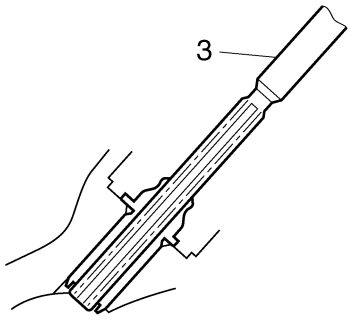
b. Install the new valve guide with the valve guide installer "2" and valve guide remover "1".

Valve guide position
13.3–13.7 mm (0.52–0.54 in)



a. Valve guide position

c. After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.



TIP
After replacing the valve guide, reface the valve seat.

Valve guide remover (ø4.5)
90890-04116
Valve guide remover (4.5 mm)
YM-04116
Valve guide installer (ø4.5)
90890-04117
Valve guide installer (4.5 mm)
YM-04117
Valve guide reamer (ø4.5)
90890-04118
Valve guide reamer (4.5 mm)
YM-04118

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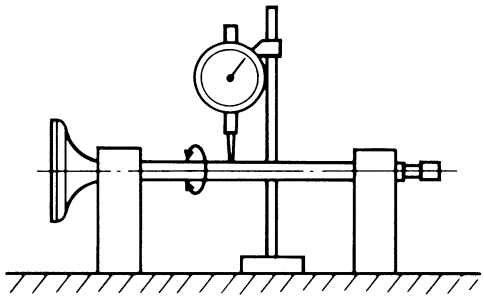
3. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
4. Check:
   • Valve face
   Pitting/wear → Grind the valve face.
   • Valve stem end
   Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   • Valve stem runout
   Out of specification → Replace the valve.

TIP
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

Valve stem runout
0.010 mm (0.0004 in)

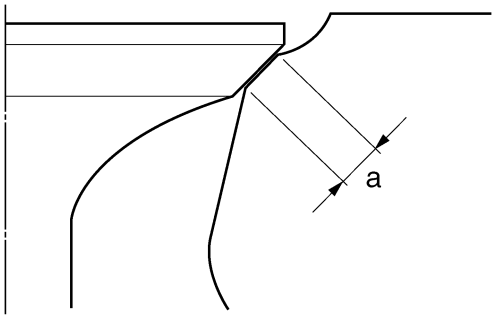


EAS30285
CHECKING THE VALVE SEATS

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 contact width "a"
   Out of specification → Replace the cylinder head.

Valve seat contact width (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Limit
1.60 mm (0.06 in)
Valve seat contact width (exhaust)
1.10–1.30 mm (0.0433–0.0512 in)
Limit
1.80 mm (0.07 in)



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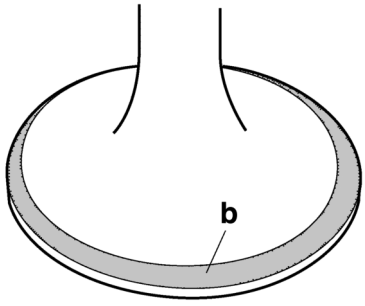
a. Apply blue layout fluid "b" onto the valve face.



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 contact width.

TIP
Where the valve seat and valve face contacted one another, the blue layout fluid will have been removed.

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4. Lap:
   • Valve face
   • Valve seat

TIP
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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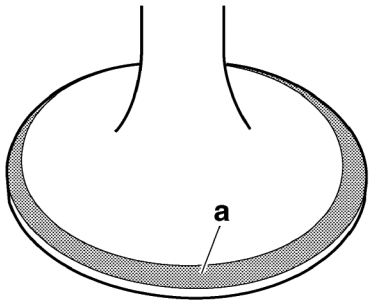
a. Apply a coarse lapping compound “a” to the valve face.

ECA13790

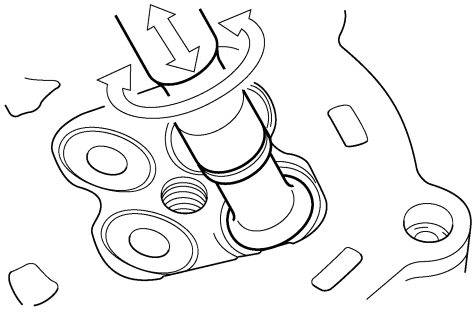
NOTICE

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

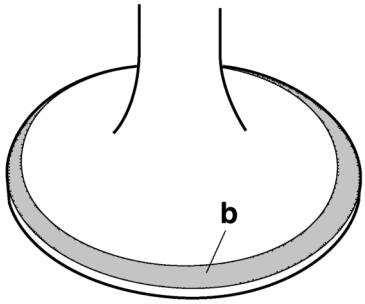


b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

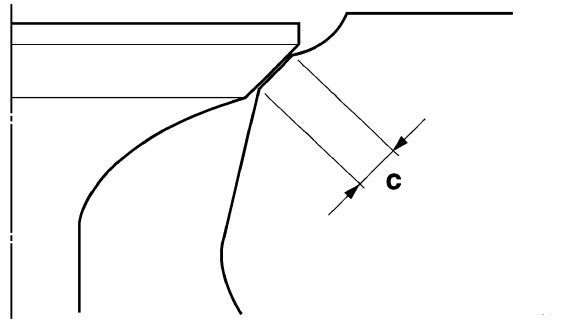
TIP
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply blue layout fluid “b” onto the valve face.



h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat contact width “c” again. If the valve seat contact width is out of specification, reface and lap the valve seat.



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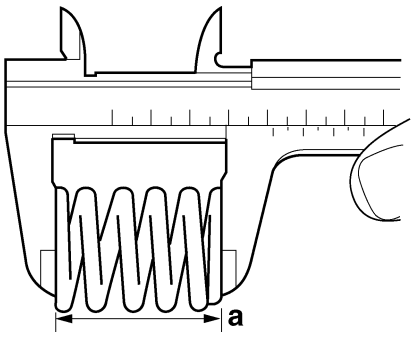
EAS30286

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

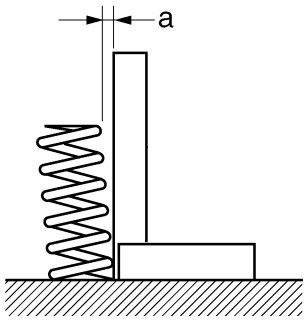
1. Measure:
   • Valve spring free length “a”
   Out of specification → Replace the valve spring.

Free length (intake)
39.31 mm (1.55 in)
Limit
37.34 mm (1.47 in)
Free length (exhaust)
37.78 mm (1.49 in)
Limit
35.89 mm (1.41 in)

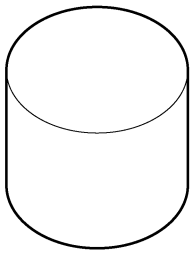


2. Measure:
   • Valve spring tilt “a”
   Out of specification → Replace the valve spring.

	Spring tilt (intake) **1.7 mm (0.07 in)** **Spring tilt (exhaust)** **1.6 mm (0.06 in)**

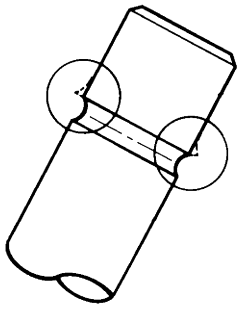


EAS30287
CHECKING THE VALVE LIFTERS
The following procedure applies to all of the valve lifters.
1. Check:
   • Valve lifter
   Damage/scratches → Replace the valve lifters and cylinder head.



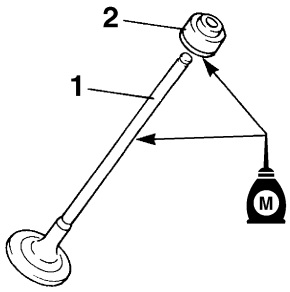
EAS30288
INSTALLING THE VALVES
The following procedure applies to all of the valves and related components.

1. Deburr:
   • Valve stem end
   (with an oil stone)



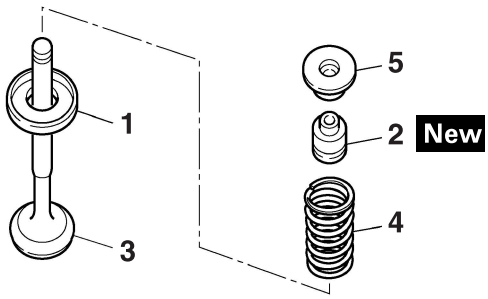
2. Lubricate:
   • Valve stem “1”
   • Valve stem seal “2”
   (with the recommended lubricant)

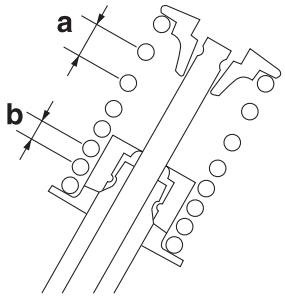
	Recommended lubricant **Molybdenum disulfide oil**



3. Install:
   • Valve spring seat “1”
   • Valve stem seal “2” New
   • Valve “3”
   • Valve spring “4”
   • Valve spring retainer “5”
   (into the cylinder head)

TIP
- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch “a” facing up.



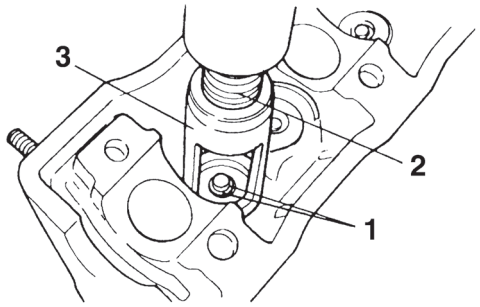


b. Smaller pitch

4. Install:
   • Valve cotters “1”

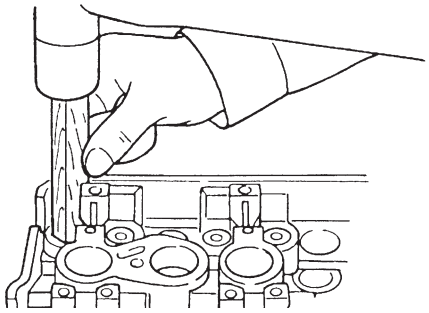
TIP
Install the valve cotters by compressing the valve spring with the valve spring compressor “2” and the valve spring compressor attachment “3”.

	Valve spring compressor **90890-04019** **Valve spring compressor** **YM-04019** **Valve spring compressor attachment** **90890-04179** **Valve spring compressor adapter 23 mm** **YM-04179**



5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800
NOTICE
Hitting the valve tip with excessive force could damage the valve.



6. Lubricate:
   • Valve pad
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

   • Valve lifter
   (with the recommended lubricant)

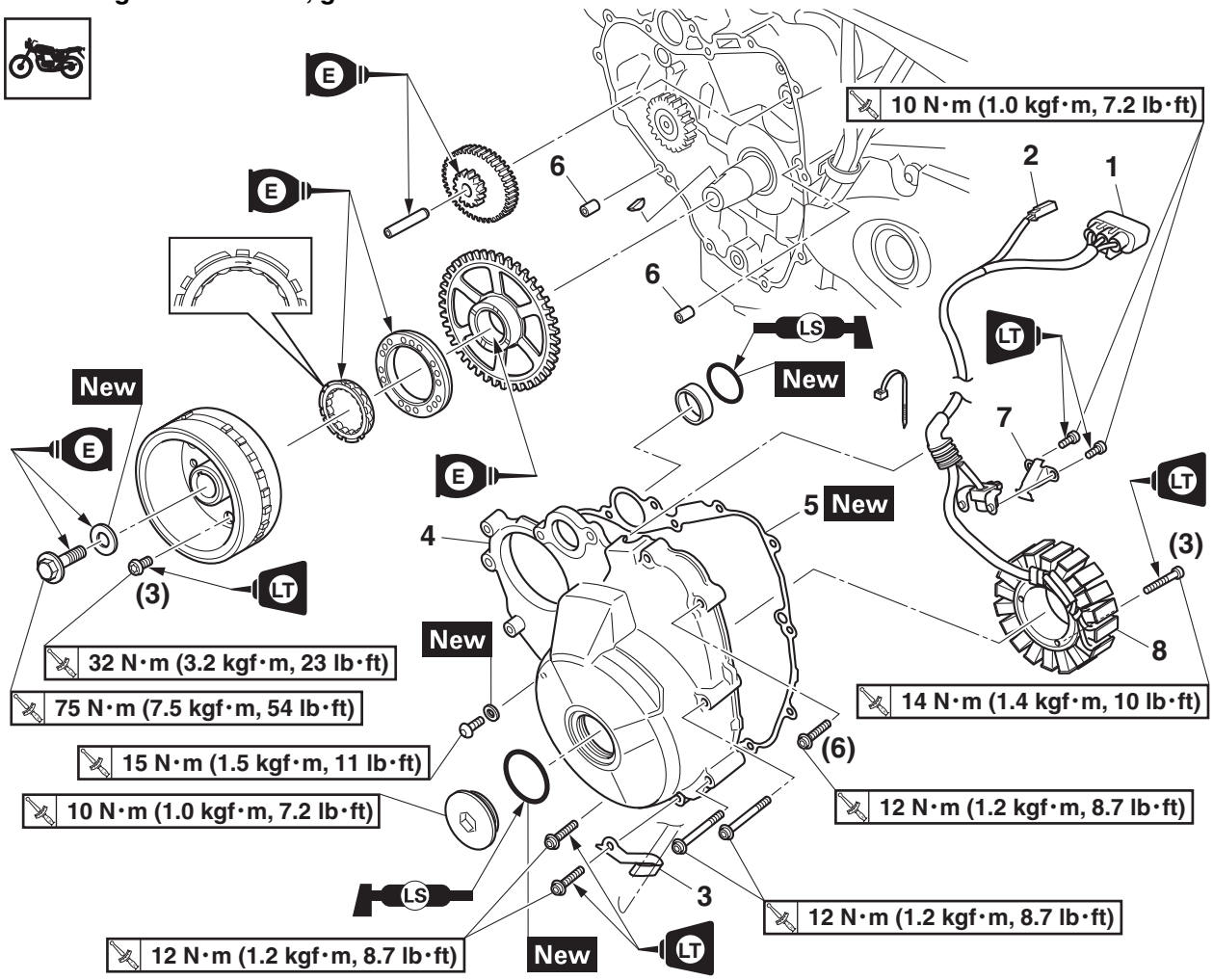
	Recommended lubricant **Engine oil**

7. Install:
   • Valve pad
   • Valve lifter

TIP
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

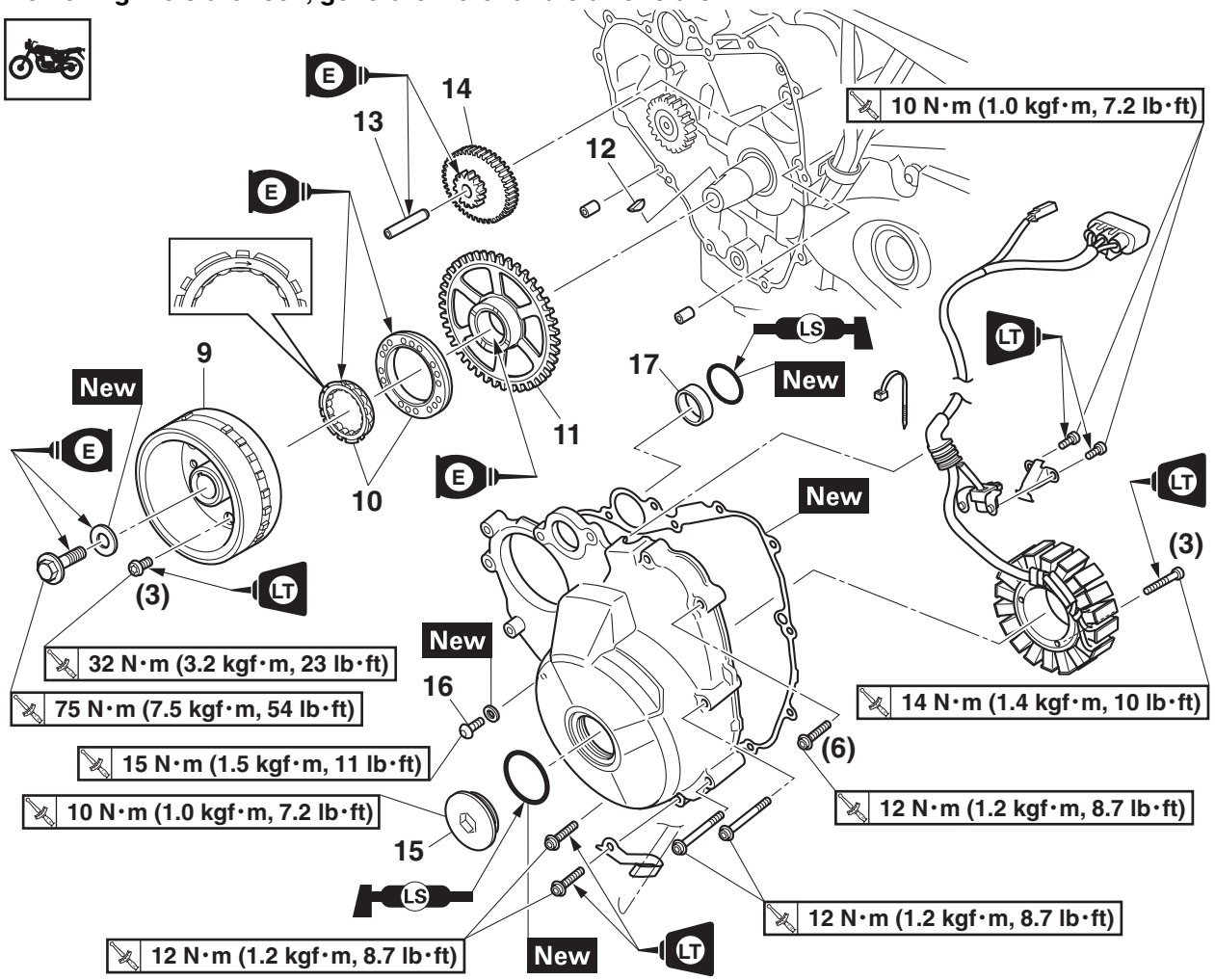
EAS20140
GENERATOR AND STARTER CLUTCH

Removing the stator coil, generator rotor and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat/Rear side cover (left)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Water pump		Refer to "WATER PUMP" on page 6-8.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
1	Stator coil coupler	1	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Holder (fuel tank overflow hose)	1	
4	Generator cover	1	
5	Generator cover gasket	1	
6	Dowel pin	2	
7	Stator coil lead holder	1	
8	Stator coil assembly (stator coil/crankshaft position sensor)	1	

Removing the stator coil, generator rotor and starter clutch

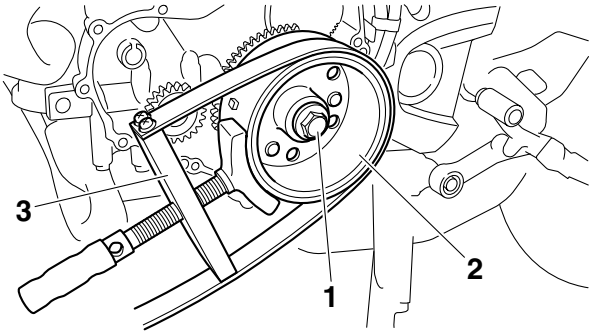


Order	Job/Parts to remove	Q'ty	Remarks
9	Generator rotor	1	
10	Starter clutch	1	
11	Starter clutch gear	1	
12	Woodruff key	1	
13	Starter clutch idle gear shaft	1	
14	Starter clutch idle gear	1	
15	Crankshaft end cover	1	
16	Timing mark accessing bolt	1	
17	Water pump outlet pipe	1	

EAS30867
REMOVING THE GENERATOR
1. Remove:
   • Generator rotor bolt “1”
   • Washer

TIP
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

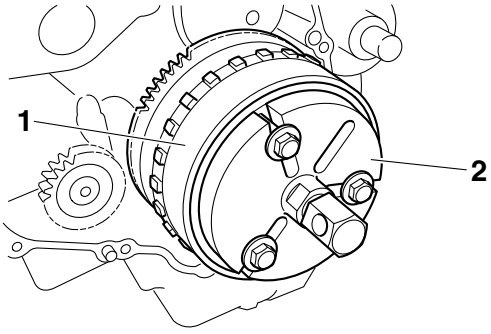


2. Remove:
   • Generator rotor “1”
   (with the flywheel puller “2”)
   • Woodruff key

ECA13880
NOTICE
To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

TIP
• Install the flywheel puller bolts to the threaded holes of the starter clutch.
• Make sure the flywheel puller is centered over the generator rotor.

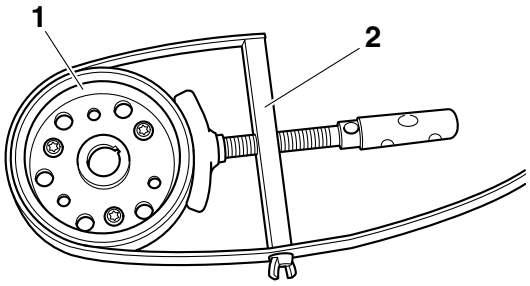
Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B



EAS30868
REMOVING THE STARTER CLUTCH
1. Remove:
   • Starter clutch bolts
   • Starter clutch

TIP
While holding the generator rotor “1” with the sheave holder “2”, loosen the starter clutch bolts.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS30869
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 contact surfaces
   Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   • Starter clutch operation

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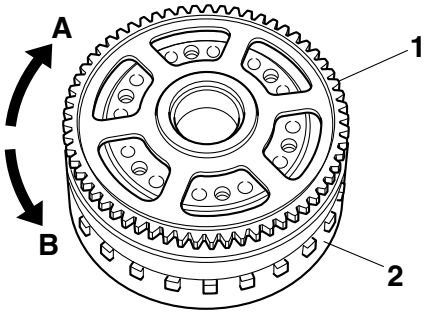
a. Install the starter clutch gear “1” onto the gen-

erator rotor “2” and hold the generator rotor.
b. When turning the starter clutch gear clockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch gear counterclockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.



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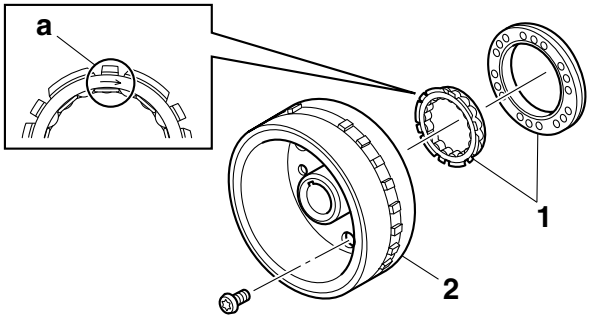
EAS30871
INSTALLING THE STARTER CLUTCH

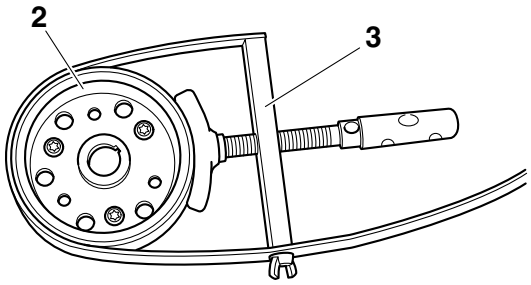
1. Install:
   • Starter clutch “1”

Starter clutch bolt
32 N·m (3.2 kgf·m, 23 lb·ft)
LOCTITE®

TIP
- Install the starter clutch so that the side of the starter clutch roller assembly with the arrow mark “a” is toward the generator rotor “2”.
- While holding the generator rotor with the sheave holder “3”, tighten the starter clutch bolts.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A





EAS30872
INSTALLING THE GENERATOR

1. Install:
   • Woodruff key
   • Generator rotor
   • Washer New
   • Generator rotor bolt

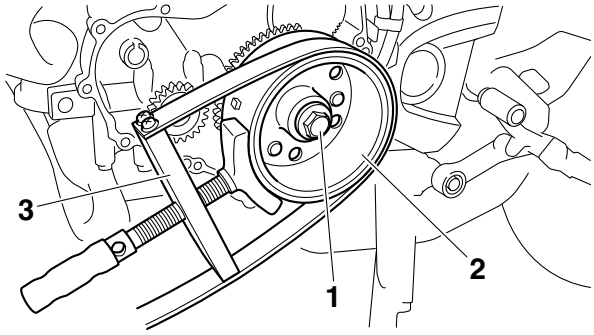
TIP
- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.
- Lubricate the washer with engine oil.
- Lubricate the generator rotor bolt threads and washer mating surfaces with engine oil.

2. Tighten:
   • Generator rotor bolt “1”

Generator rotor bolt
75 N·m (7.5 kgf·m, 54 lb·ft)

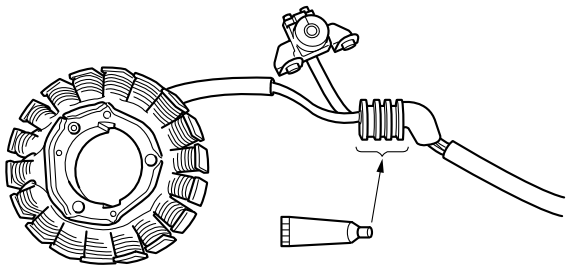
TIP
While holding the generator rotor “2” with the sheave holder “3”, tighten the generator rotor bolt.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



3. Apply:
   • Sealant
   (onto the stator coil assembly lead grommet)

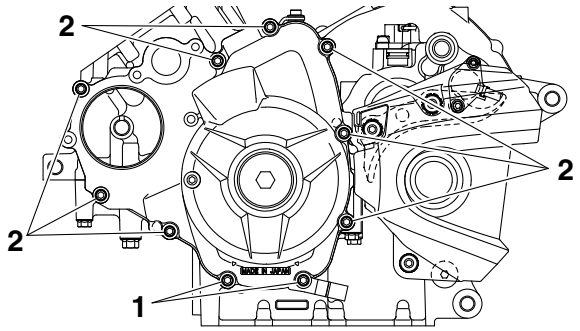
Yamaha bond No. 1215
90890-85505
(Three bond No.1215®)



4. Install:
   • Generator cover gasket New
   • Generator cover

Generator cover bolt "1"
12 N·m (1.2 kgf·m, 8.7 lb·ft)
LOCTITE®
Generator cover bolt "2"
12 N·m (1.2 kgf·m, 8.7 lb·ft)

TIP
Tighten the generator cover bolts in stages and in a crisscross pattern.

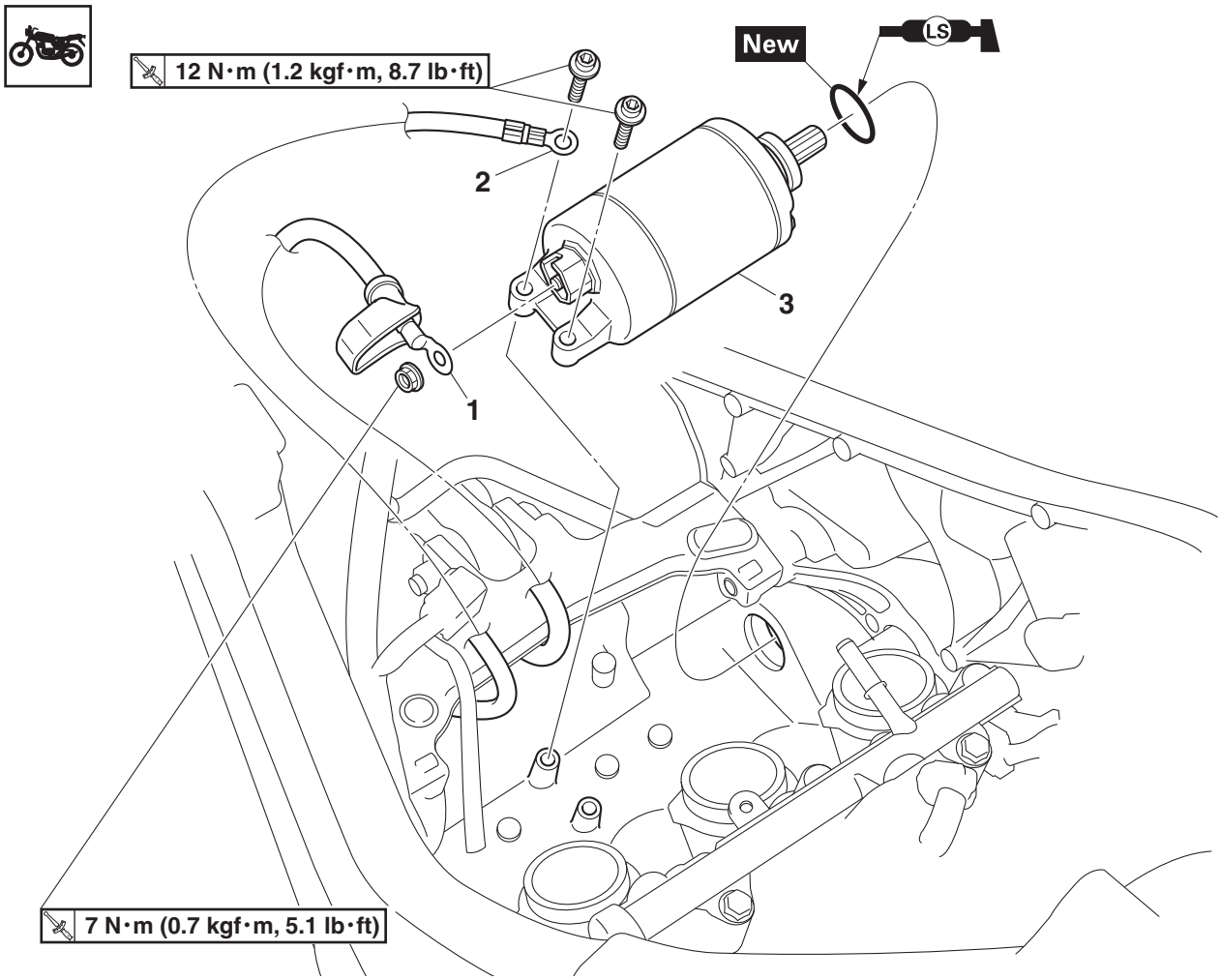


5. Connect:
   • Stator coil coupler
   • Crankshaft position sensor coupler

TIP
To route the stator coil lead, refer to "CABLE ROUTING" on page 2-35.

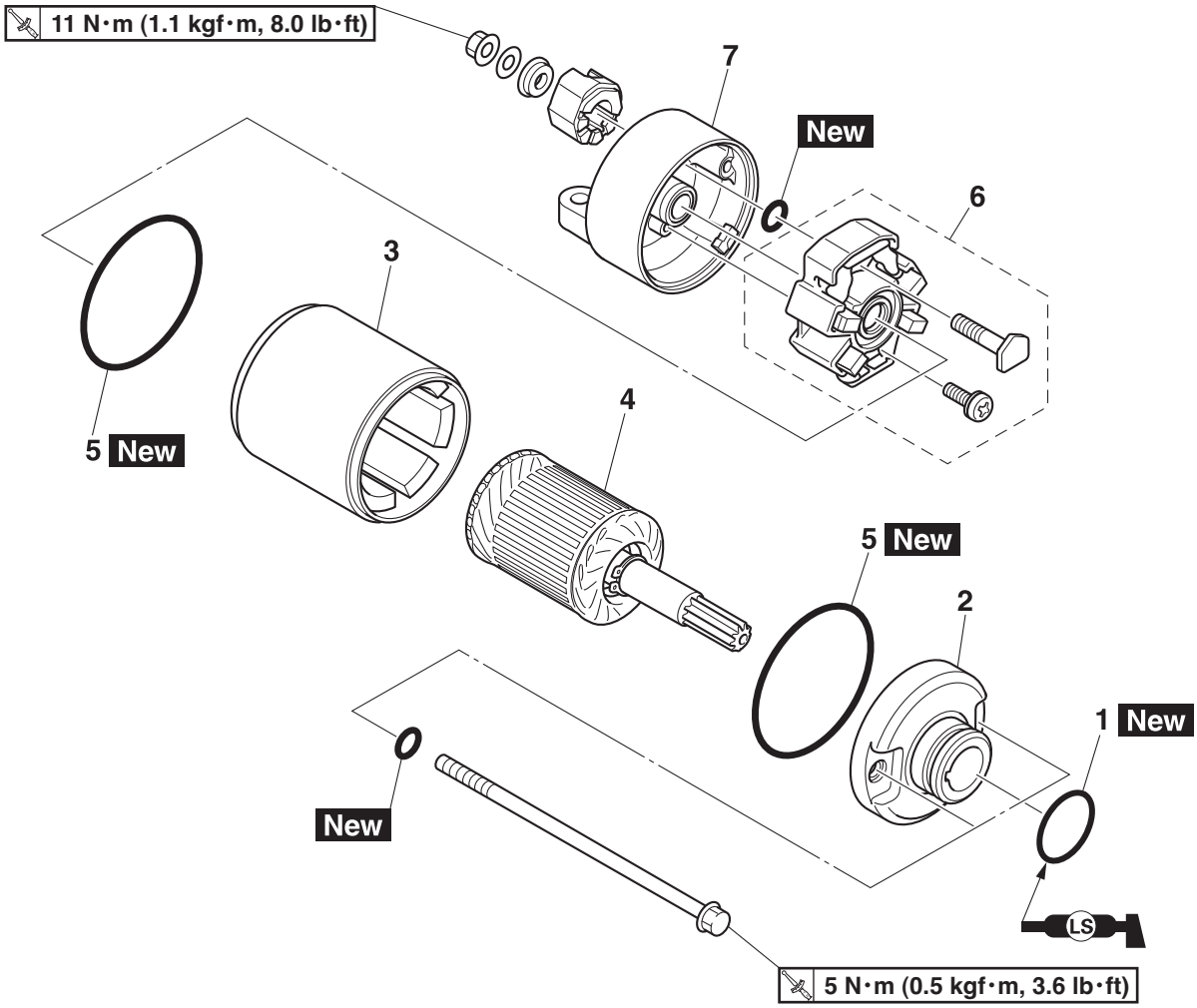
EAS20052
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Canister		Refer to "FUEL TANK" on page 7-1.
	Throttle bodies		Refer to "THROTTLE BODIES" on page 7-5.
1	Starter motor lead	1	Disconnect.
2	Negative battery lead	1	Disconnect.
3	Starter motor	1	

Disassembling the starter motor



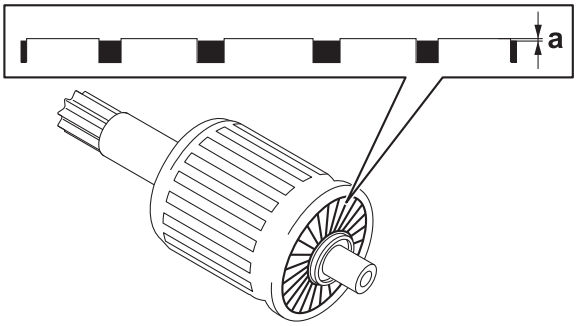
Order	Job/Parts to remove	Q'ty	Remarks
1	O-ring	1	
2	Starter motor front cover	1	
3	Starter motor yoke	1	
4	Armature assembly	1	
5	Gasket	2	
6	Brush holder set	1	
7	Starter motor rear cover	1	

EAS30325
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   • Mica undercut “a”
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut (depth)
0.70 mm (0.03 in)

TIP
The mica of the commutator must be undercut to ensure proper operation of the commutator.



3. Measure:
   • Armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

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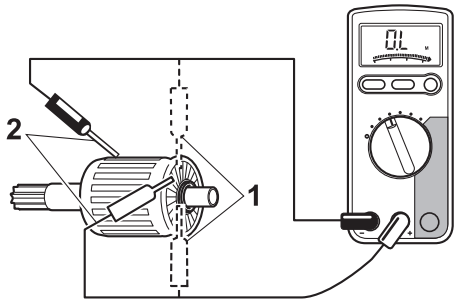
a. Measure the armature assembly resistances with the digital circuit tester.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

Armature coil resistance
0.0050–0.0150 Ω
Insulation resistance
Above 1 MΩ at 20 °C (68 °F)

b. If any resistance is out of specification, replace the starter motor.



1. Commutator resistance
2. Insulation resistance

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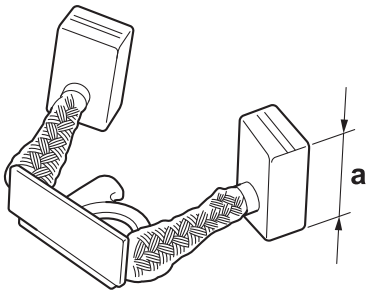
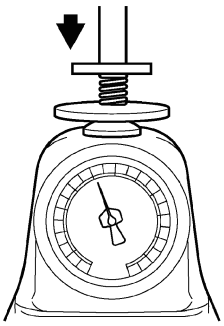
4. Measure:
   • Brush length “a”
   Out of specification → Replace the brush holder set.

Brush overall length
12.0 mm (0.47 in)
Limit
6.50 mm (0.26 in)



5. Measure:
   • Brush spring force
   Out of specification → Replace the brush holder set.

Brush spring force
6.03–6.52 N (615–665 gf, 21.71–23.47 oz)

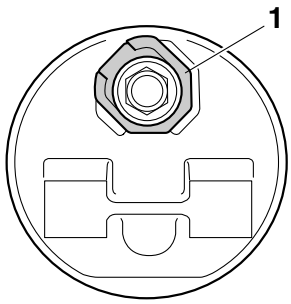


6. Check:
   • Gear teeth
   Damage/wear → Replace the starter motor.
7. Check:
   • Bearing
   • Oil seal
   Damage/wear → Replace the starter motor.

EAS30326
ASSEMBLING THE STARTER MOTOR

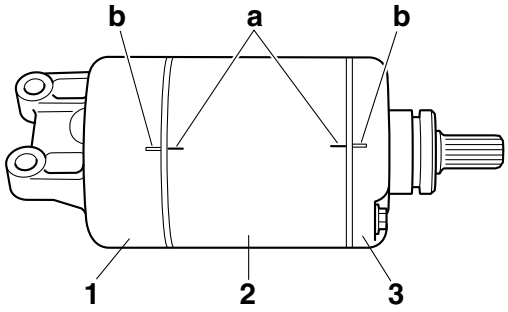
1. Install:
   • Brush holder set
   • Insulator “1”

TIP
Install the insulator as shown in the illustration.



2. Install:
   • Starter motor rear cover “1”
   • Starter motor yoke “2”
   • Starter motor front cover “3”

TIP
Align the match marks “a” on the starter motor yoke with the match marks “b” on the front and rear cover.



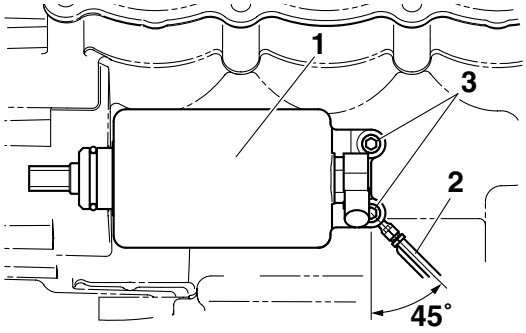
EAS30327
INSTALLING THE STARTER MOTOR

1. Install:
   • Starter motor “1”
   • Negative battery lead “2”
   • Starter motor bolts “3”

TIP
Install the negative battery lead as shown in the illustration.

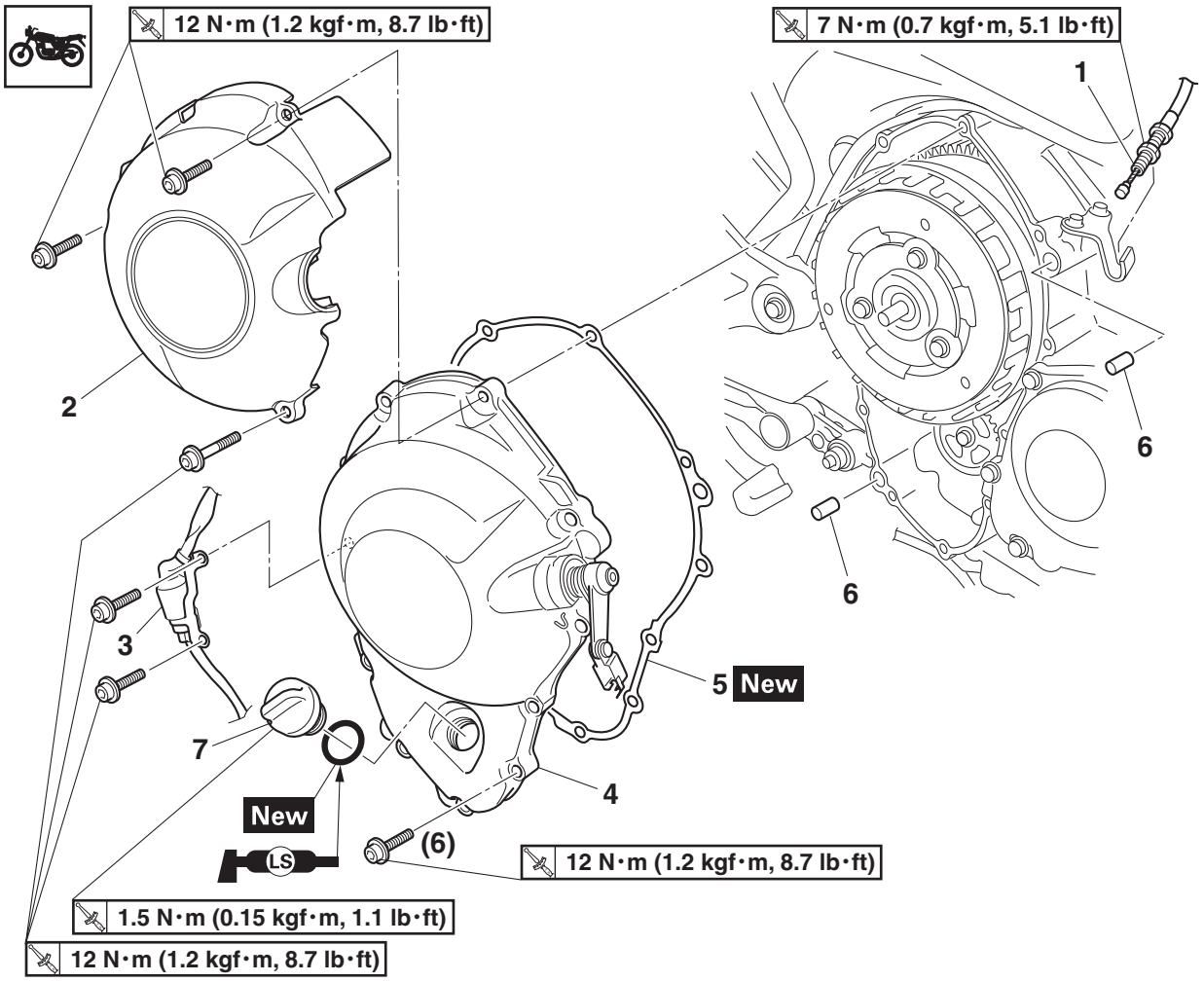
	Starter motor bolt **12 N·m (1.2 kgf·m, 8.7 lb·ft)**

2. Connect:
   • Starter motor lead



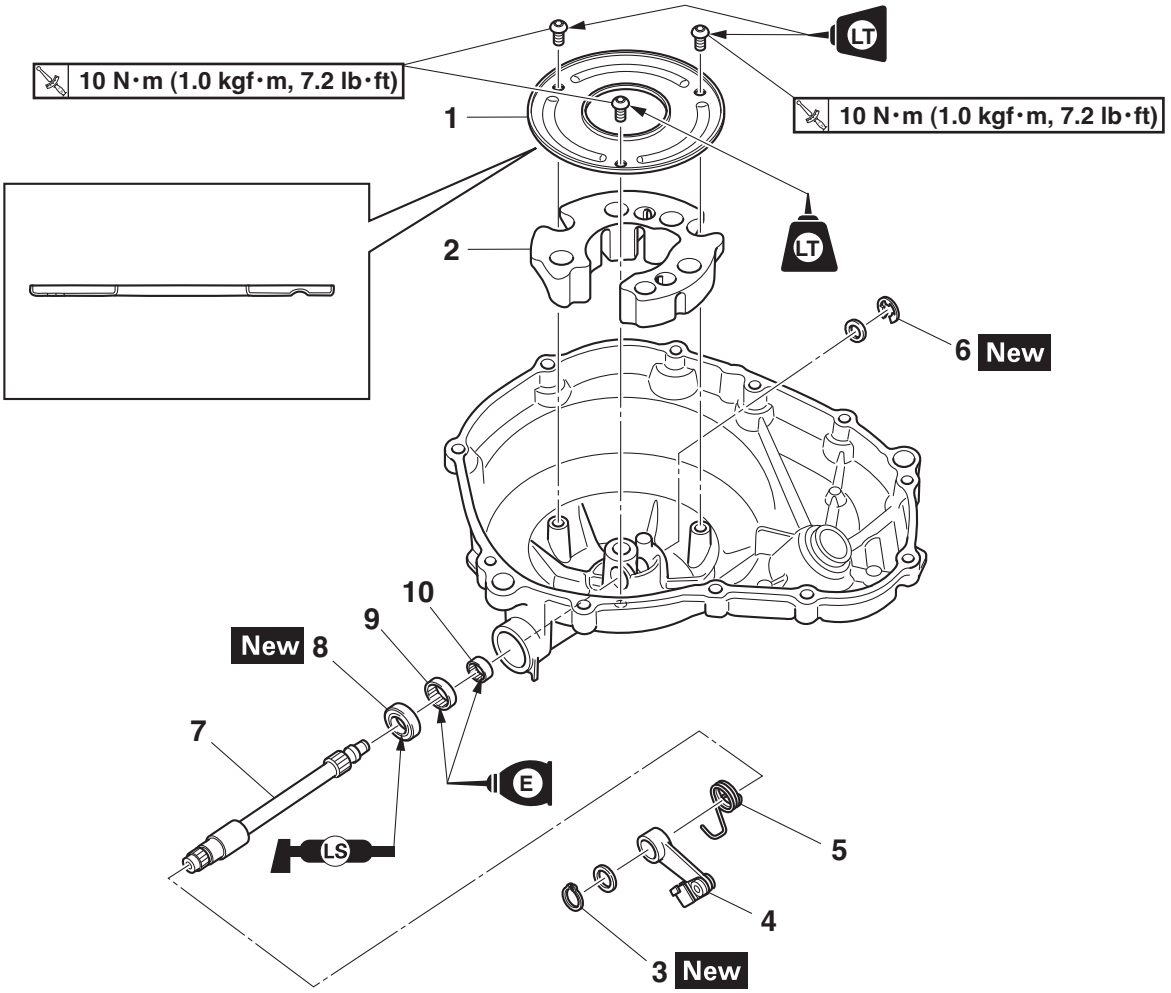
EAS20055
CLUTCH

Removing the clutch cover



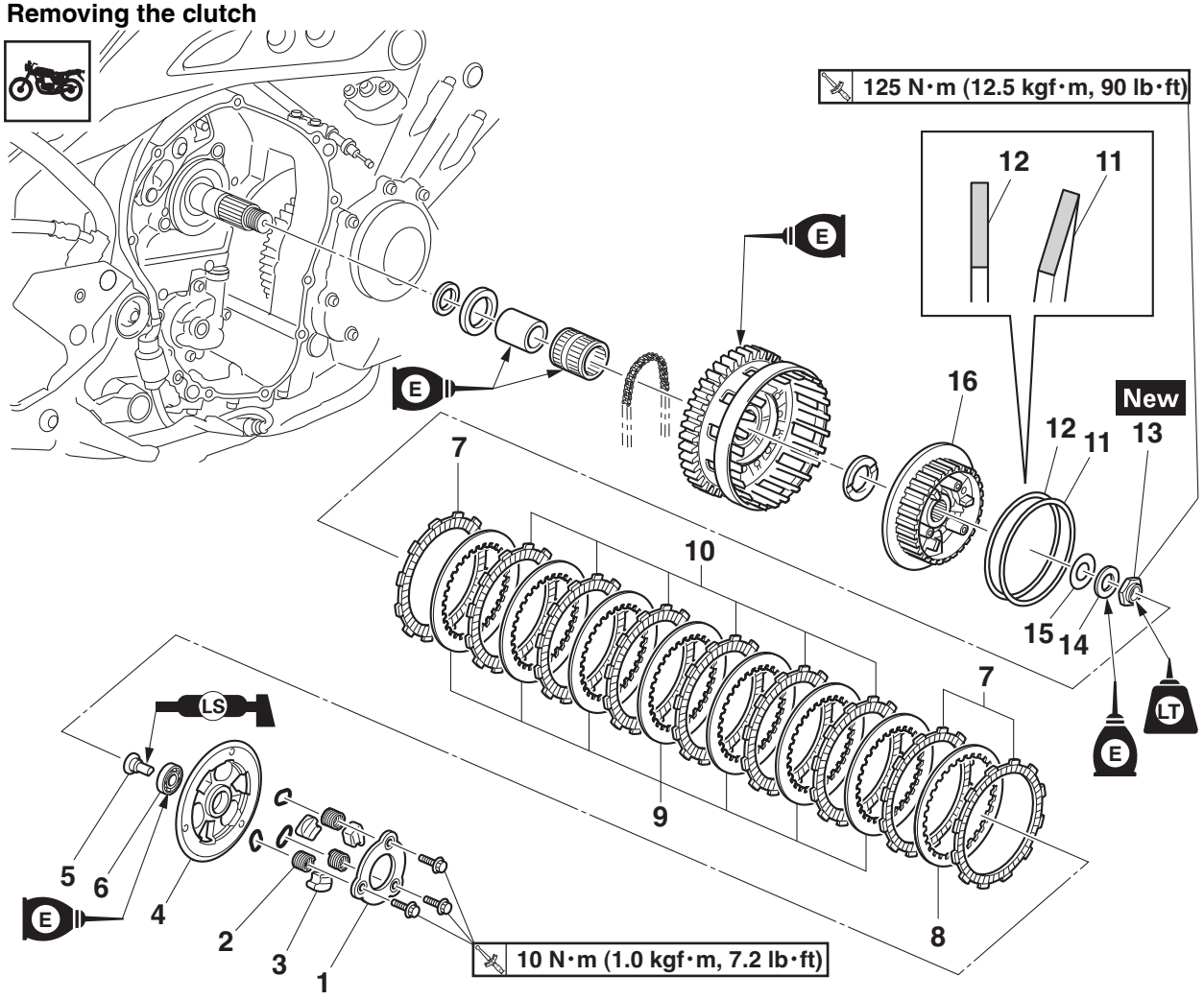
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
1	Clutch cable	1	Disconnect.
2	Cover	1	
3	O_2 sensor coupler bracket	1	
4	Clutch cover	1	
5	Clutch cover gasket	1	
6	Dowel pin	2	
7	Oil filler cap	1	

Removing the pull lever shaft



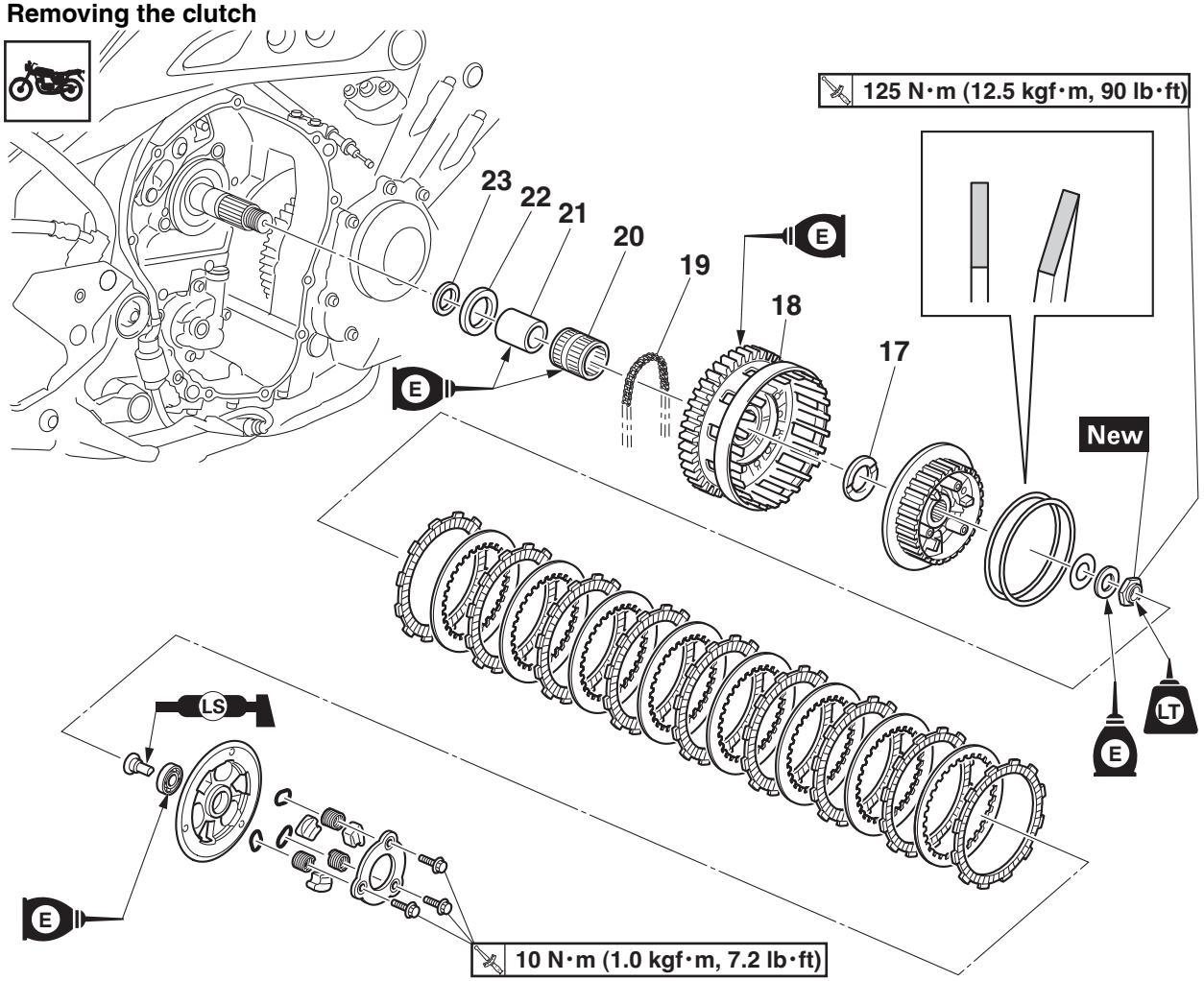
Order	Job/Parts to remove	Q'ty	Remarks
1	Clutch cover damper plate	1	Install the clutch cover damper plate with its folded-up side facing upward.
2	Clutch cover damper	1	
3	Circlip	1	
4	Pull lever	1	
5	Pull lever spring	1	
6	Circlip	1	
7	Pull lever shaft	1	
8	Oil seal	1	
9	Bearing	1	
10	Bearing	1	

Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Oil pump driven sprocket		Refer to "OIL PUMP" on page 5-51.
1	Pressure plate 1	1	
2	Clutch spring	3	
3	Absorber	3	
4	Pressure plate 2	1	
5	Pull rod	1	
6	Bearing	1	
7	Friction plate 1	3	Inside diameter: 126 mm (4.96 in)
8	Clutch plate 1	1	Inside diameter: 116 mm (4.57 in)
9	Clutch plate 2	7	Inside diameter: 105 mm (4.13 in)
10	Friction plate 2	6	Inside diameter: 119 mm (4.69 in)
11	Clutch damper spring	1	
12	Clutch damper spring seat	1	
13	Clutch boss nut	1	
14	Conical spring washer	1	
15	Washer	1	
16	Clutch boss	1	

Removing the clutch

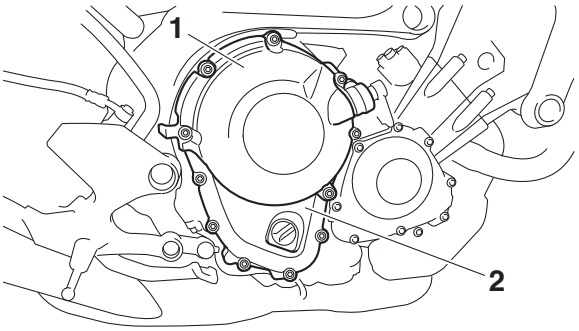


Order	Job/Parts to remove	Q'ty	Remarks
17	Thrust plate	1	
18	Clutch housing	1	
19	Oil pump drive chain	1	
20	Bearing	1	
21	Spacer	1	
22	Thrust plate	1	
23	Thrust plate	1	

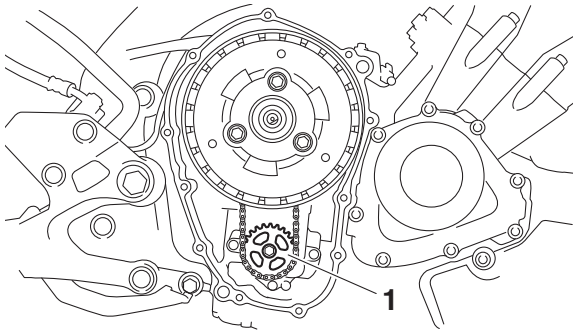
EAS30346
REMOVING THE CLUTCH

1. Remove:
   • Cover “1”
   • Clutch cover “2”
   • Gasket

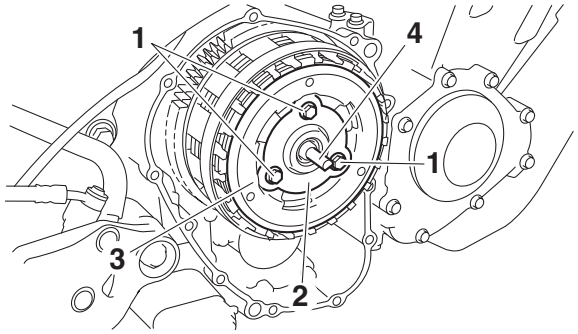
TIP
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.



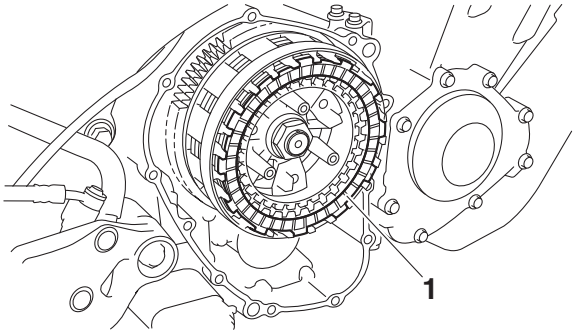
2. Remove:
   • Oil pump driven sprocket “1”
   Refer to “OIL PUMP” on page 5-51.



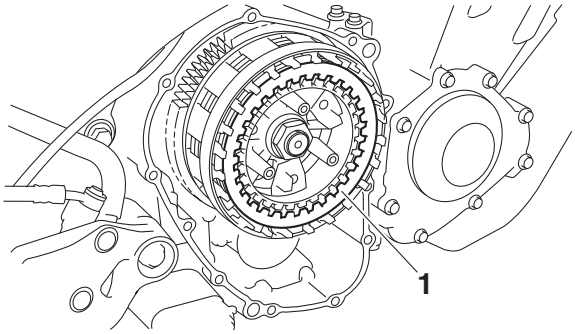
3. Remove:
   • Clutch spring bolts “1”
   • Pressure plate 1 “2”
   • Clutch springs
   • Pressure plate 2 “3”
   • Pull rod “4”



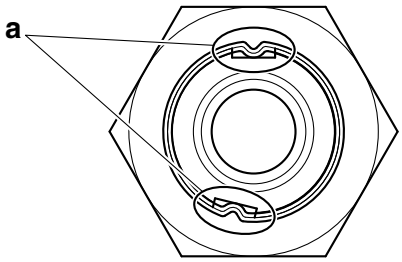
4. Remove:
   • Friction plates 1 “1”



5. Remove:
   • Clutch plate 1 “1”
   • Clutch plates 2
   • Friction plates 2
   • Clutch damper spring
   • Clutch damper spring seat



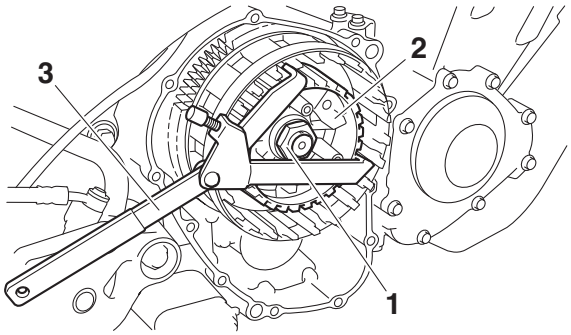
6. Straighten the clutch boss nut rib “a”.



7. Loosen:
   • Clutch boss nut “1”

TIP
While holding the clutch boss “2” with the universal clutch holder “3”, loosen the clutch boss nut.

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



8. Remove:
   - Clutch boss nut
   - Conical spring washer
   - Washer
   - Clutch boss
   - Thrust plate
   - Clutch housing
   - Oil pump drive chain

EAS30348
CHECKING THE FRICTION PLATES

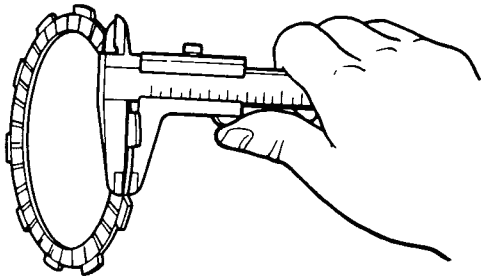
The following procedure applies to all of the friction plates.

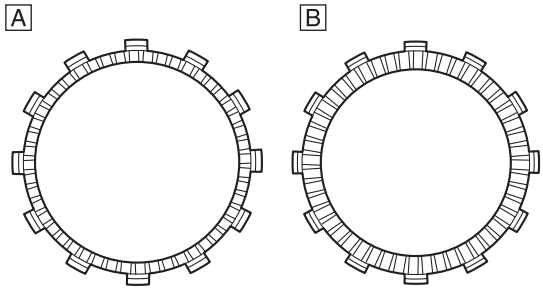
1. Check:
   - Friction plate 1, 2
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   - Friction plate 1, 2 thickness
     Out of specification → Replace the friction plates as a set.

TIP

Measure the friction plate at four places.

Friction plate 1 thickness
2.92–3.08 mm (0.115–0.121 in)
Wear limit
2.82 mm (0.111 in)
Friction plate 2 thickness
2.92–3.08 mm (0.115–0.121 in)
Wear limit
2.82 mm (0.111 in)





A. Friction plate 1
B. Friction plate 2

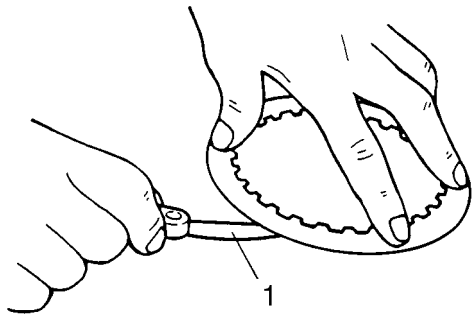
EAS30349
CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

1. Check:
   - Clutch plate 1, 2
     Damage → Replace the clutch plates as a set.
2. Measure:
   - Clutch plate 1, 2 thickness
     (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 1 thickness
2.20–2.40 mm (0.087–0.094 in)
Warpage limit
0.10 mm (0.004 in)
Clutch plate 2 thickness
1.90–2.10 mm (0.075–0.083 in)
Warpage limit
0.10 mm (0.004 in)

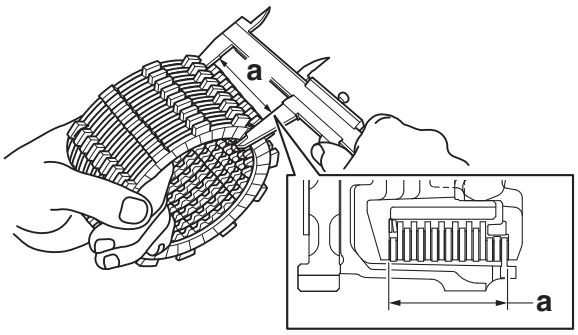


3. Measure:
   - Assembly width “a” of the friction plates and clutch plates

Out of specification → Adjust.

	Assembly width **42.7–43.5 mm (1.68–1.71 in)**

TIP
- Perform the thickness measurement without applying the oil.
- This step should be performed only if the friction plates and clutch plates were replaced.
- To measure the total width of the friction plates and clutch plates, combine 9 friction plates and 8 clutch plates as shown.



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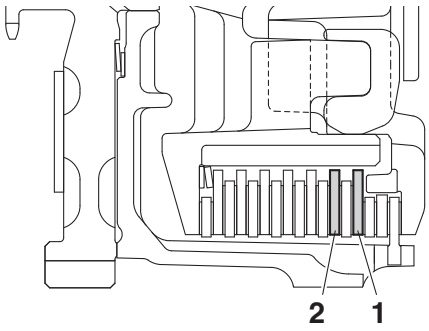
a. Assembly width adjusted by clutch plate "1" and "2".
b. Select the clutch plate from the following table.

Clutch plate "1"		
4B1-16324-00	1.6 mm (0.063 in)	
5VY-16325-00	2.0 mm (0.079 in)	STD
4B1-16325-00	2.3 mm (0.091 in)	

Clutch plate "2"		
4B1-16324-00	1.6 mm (0.063 in)	
5VY-16325-00	2.0 mm (0.079 in)	STD
4B1-16325-00	2.3 mm (0.091 in)	

TIP
When adjusting the clutch assembly width [by replacing the clutch plate(s)], be sure to replace the clutch plate "1" fast.
After replacing the clutch plate "1", if specifications cannot be met, replace the clutch plate "2".



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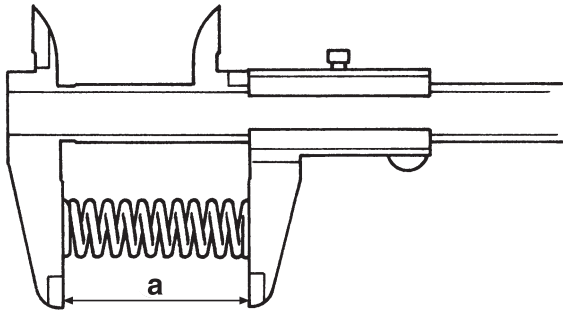
EAS30351
CHECKING THE CLUTCH SPRINGS

The following procedure applies to all of the clutch springs.
1. Check:
   - Clutch spring
     Damage → Replace the clutch springs as a set.
2. Measure:
   - Clutch spring free length "a"
     Out of specification → Replace the clutch springs as a set.

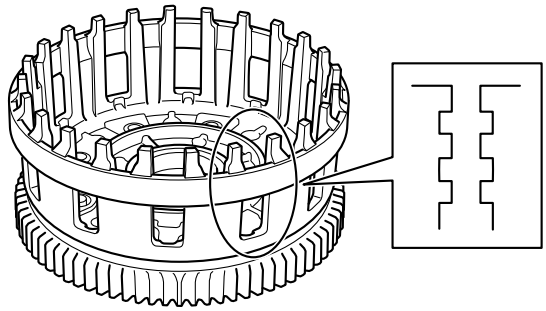
	Clutch spring free length **45.23 mm (1.78 in)** **Limit** **42.97 mm (1.69 in)**



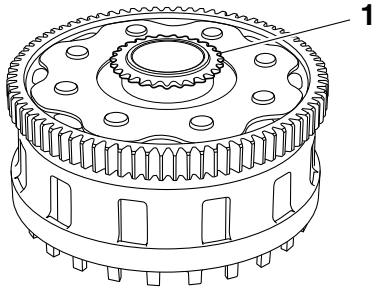
EAS30352
CHECKING THE CLUTCH HOUSING

1. Check:
   - Clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

TIP
Pitting on the clutch housing dogs will cause erratic clutch operation.



2. Check:
   • Oil pump drive sprocket “1”
   Cracks/damage/wear → Replace.

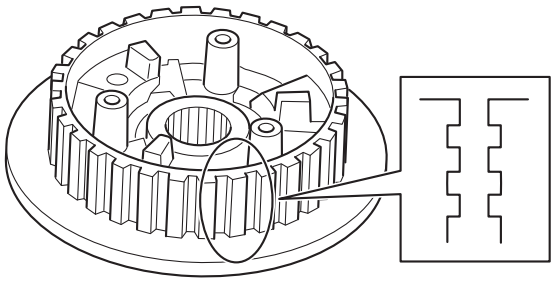


3. Check:
   • Bearing
   Damage/wear → Replace the bearing and clutch housing.

EAS30353
CHECKING THE CLUTCH BOSS

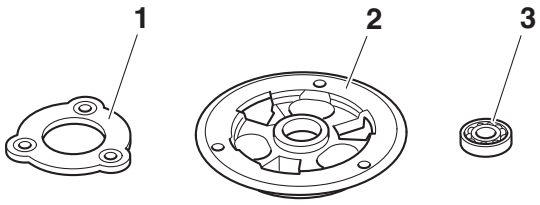
1. Check:
   • Clutch boss splines
   Damage/pitting/wear → Replace the clutch boss.

TIP
Pitting on the clutch boss splines will cause erratic clutch operation.



EAS30354
CHECKING THE PRESSURE PLATE

1. Check:
   • Pressure plate 1 “1”
   • Pressure plate 2 “2”
   Cracks/damage → Replace.
   • Bearing “3”
   Damage/wear → Replace.

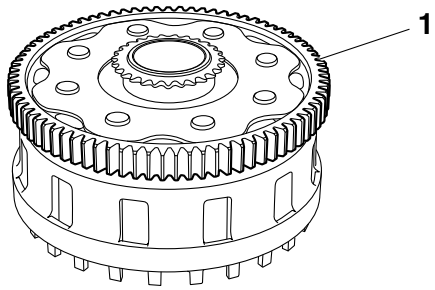


EAS30356
CHECKING THE PRIMARY DRIVE GEAR

1. Check:
   • Primary drive gear
   Damage/wear → Replace the crankshaft and clutch housing as a set.
   Excessive noise during operation → Replace the crankshaft and clutch housing as a set.

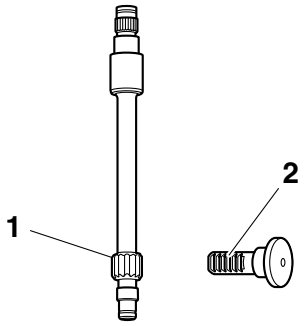
EAS30357
CHECKING THE PRIMARY DRIVEN GEAR

1. Check:
   • Primary driven gear “1”
   Damage/wear → Replace the clutch housing and crankshaft as a set.
   Excessive noise during operation → Replace the clutch housing and crankshaft as a set.



EAS30358
CHECKING THE PULL LEVER SHAFT AND PULL ROD

1. Check:
   • Pull lever shaft pinion gear teeth “1”
   • Pull rod teeth “2”
   Damage/wear → Replace the pull rod and pull lever shaft as a set.

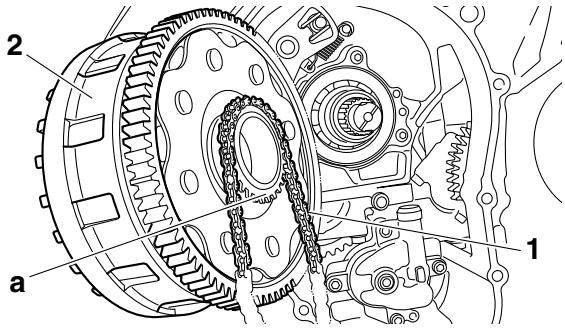


2. Check:
   • Pull rod bearing
     Damage/wear → Replace.

EAS30363
INSTALLING THE CLUTCH

1. Install:
   • Oil pump drive chain “1”
   • Clutch housing “2”

TIP
Install the oil pump drive chain onto the oil pump drive sprocket “a”.

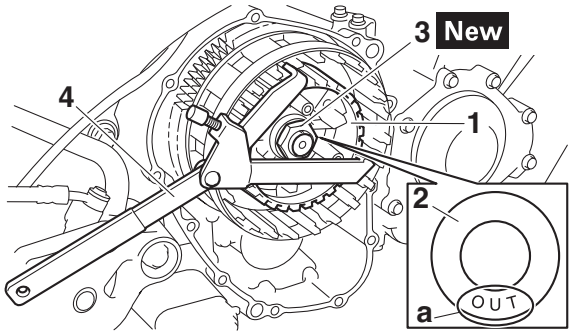


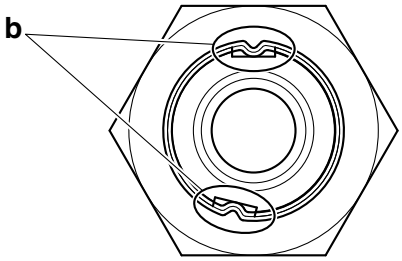
2. Install:
   • Thrust plate
   • Clutch boss “1”
   • Washer
   • Conical spring washer “2”
   • Clutch boss nut “3” New

Clutch boss nut
125 N·m (12.5 kgf·m, 90 lb·ft)
LOCTITE®

TIP
- Install the conical spring washer on the main axle with the “OUT” mark “a” facing away from the vehicle.
- While holding the clutch boss “1” with the universal clutch holder “4”, tighten the clutch boss nut.
- Stake the clutch boss nut at cutouts “b” in the main axle.

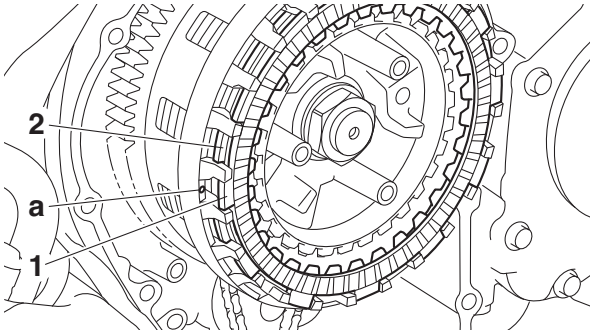
Universal clutch holder
90890-04086
Universal clutch holder
YM-91042





3. Install:
   • Clutch damper spring seat
   • Clutch damper spring
   • Friction plates 1
   • Clutch plates 2
   • Friction plates 2
   • Clutch plate 1

TIP
- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Install the last friction plate “1” offset from the other friction plates “2”, making sure to align a projection on the friction plate with the punch mark “a” on the clutch housing.



4. Install:
   • Pull rod
   • Pressure plate 2

- Clutch springs
- Pressure plate 1
- Clutch spring bolts “1”

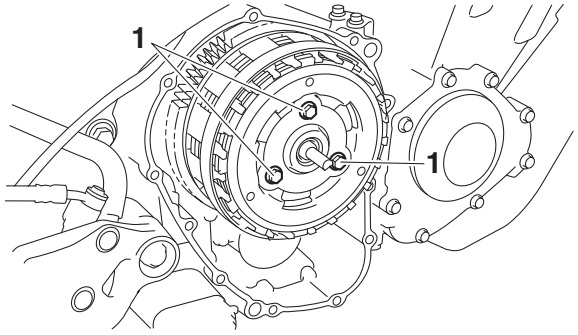
	Clutch spring bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

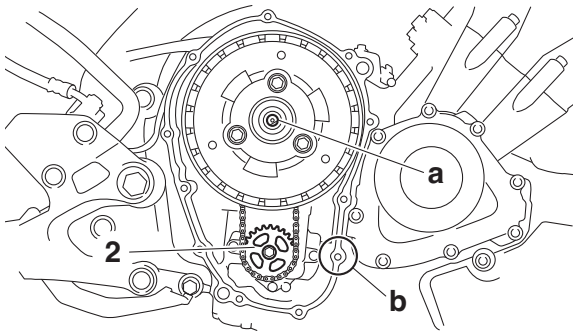
- Oil pump driven sprocket “2”

	Oil pump driven sprocket bolt **15 N·m (1.5 kgf·m, 11 lb·ft)** **LOCTITE®**

TIP

- Tighten the clutch spring bolts in stages and in a crisscross pattern.
- Apply lithium-soap-based grease onto the pull rod.
- Position the pull rod so that the teeth “a” face towards the hole “b”. Then, install the clutch cover.





5. Install:
   - Dowel pins
   - Clutch cover gasket New
   - Clutch cover
   - Cover

	Clutch cover bolt **12 N·m (1.2 kgf·m, 8.7 lb·ft)**

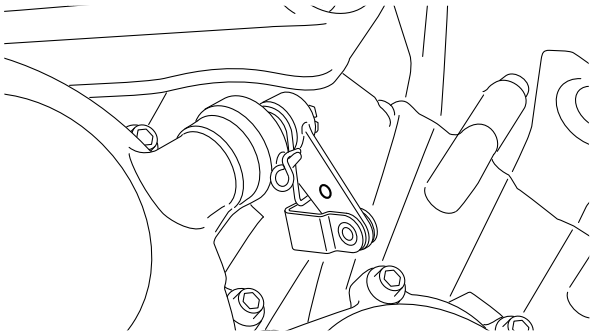
TIP

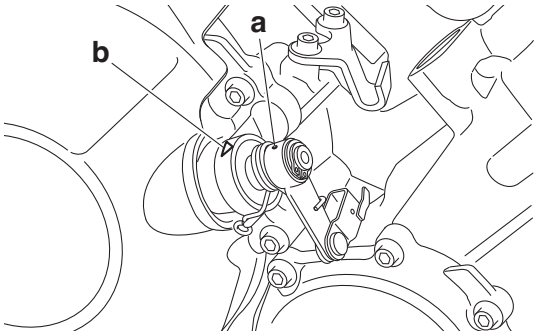
- Apply engine oil onto the bearing.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

6. Install:
   - Pull lever

TIP

- Install the pull lever with the “O” mark facing toward lower side.
- When installing the pull lever, push the pull lever and check that the punch mark “a” on the pull lever aligns with the mark “b” on the clutch cover. Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.

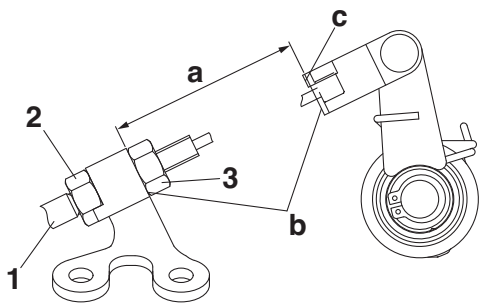




7. Connect:
   - Clutch cable “1”

TIP

- For the clutch cable “1”, turn the nut “2” in fully and then adjust the length “a” by using the nut “3” so that the cable length is 47.1–54.8 mm (1.85–2.16 in).
- Measure the length while keeping the measuring surface “b” parallel.
- After installing the clutch cable, bend the projection “c” on the pull lever.

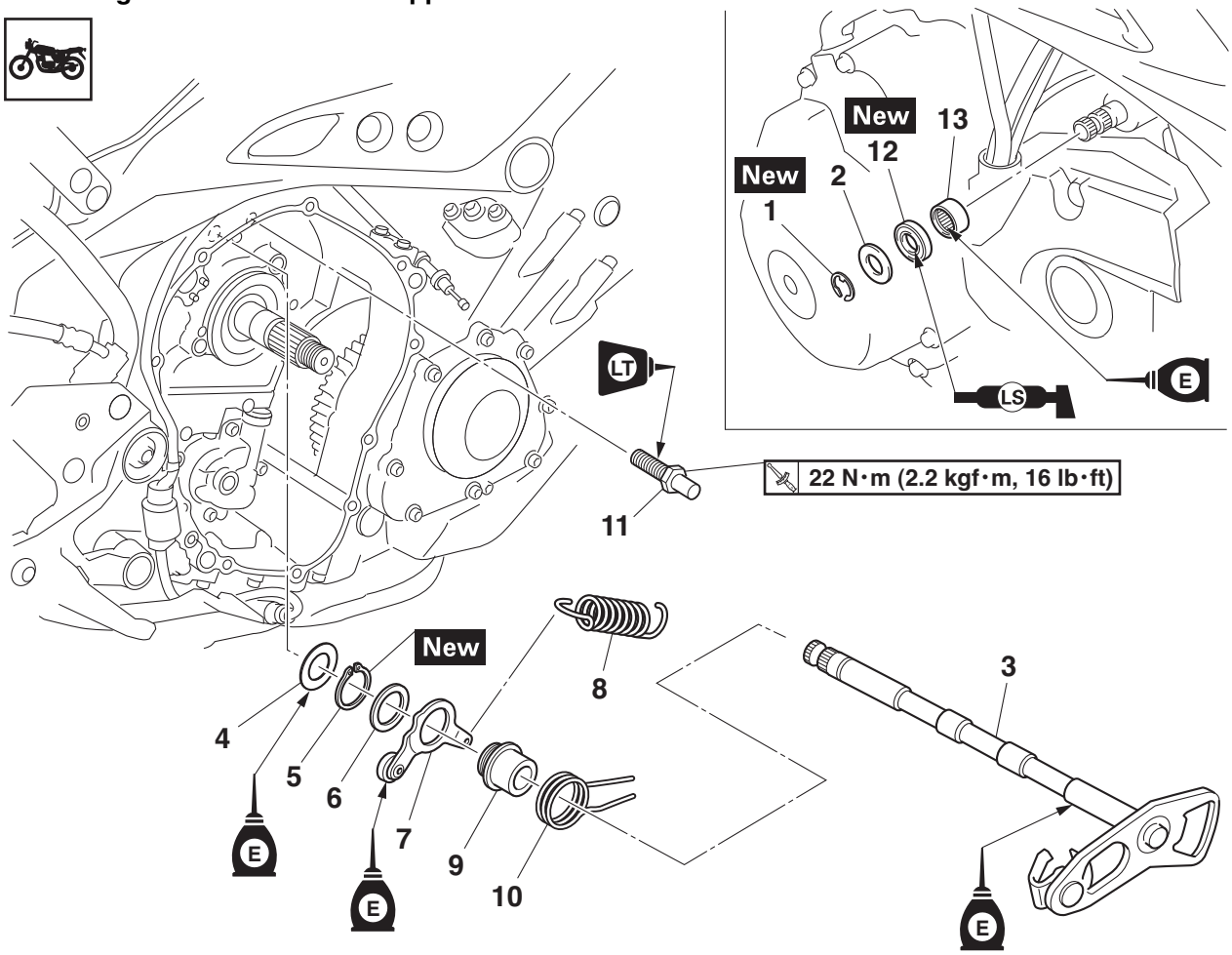


8. Adjust:
   • Clutch lever free play
   Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-12.

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

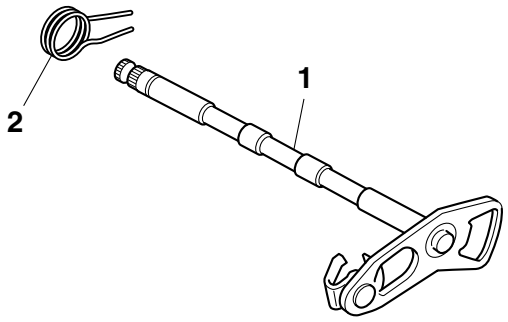
EAS20057
SHIFT SHAFT

Removing the shift shaft and stopper lever

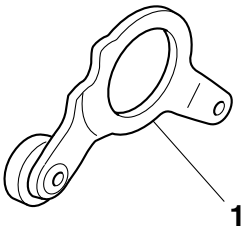


Order	Job/Parts to remove	Q'ty	Remarks
	Clutch assembly		Refer to "CLUTCH" on page 5-38.
	Shift arm		Refer to "CHAIN DRIVE" on page 4-98.
1	Circlip	1	
2	Washer	1	
3	Shift shaft	1	
4	Washer	1	
5	Circlip	1	
6	Washer	1	
7	Stopper lever	1	
8	Stopper lever spring	1	
9	Collar	1	
10	Shift shaft spring	1	
11	Shift shaft spring stopper	1	
12	Oil seal	1	
13	Bearing	1	

EAS30377
CHECKING THE SHIFT SHAFT
1. Check:
   - Shift shaft “1”
     Bends/damage/wear → Replace.
   - Shift shaft spring “2”
   - Collar
     Damage/wear → Replace.



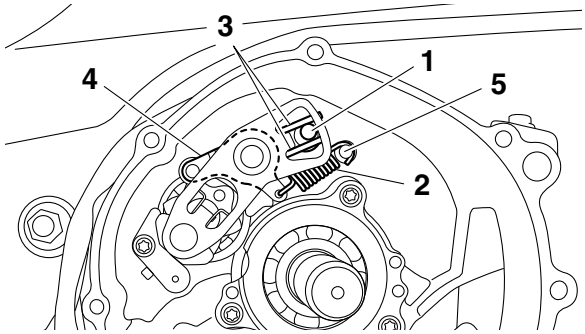
EAS30378
CHECKING THE STOPPER LEVER
1. Check:
   - Stopper lever “1”
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



EAS30381
INSTALLING THE SHIFT SHAFT
1. Install:
   - Shift shaft spring stopper “1”
   - Shift shaft assembly
   - Stopper lever spring “2”

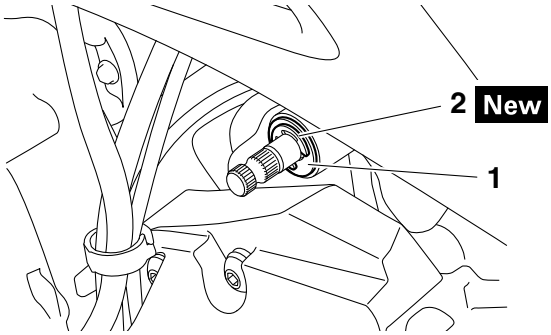
	Shift shaft spring stopper **22 N·m (2.2 kgf·m, 16 lb·ft)** **LOCTITE®**

TIP
- Hook the end of the shift shaft spring “3” onto the shift shaft spring stopper “1”.
- Hook the ends of the stopper lever spring “2” onto the stopper lever “4” and the crankcase boss “5”.
- Mesh the stopper lever with the shift drum segment assembly.



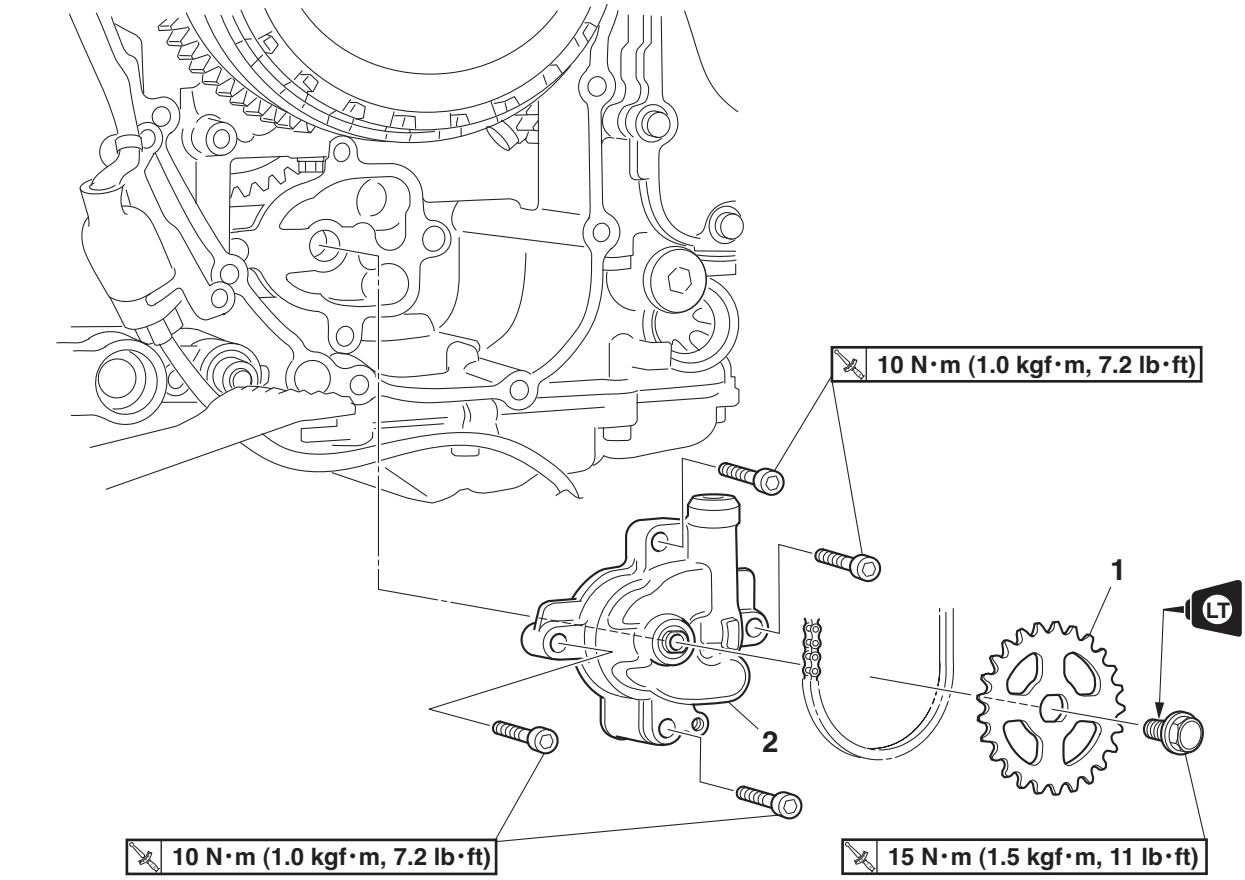
2. Install:
   - Bearing
   - Oil seal New
   - Washer “1”
   - Circlip “2” New

TIP
- Lubricate the oil seal lips with lithium-soap-based grease.
- Lubricate the outer periphery of the oil seal with the silicone fluid.



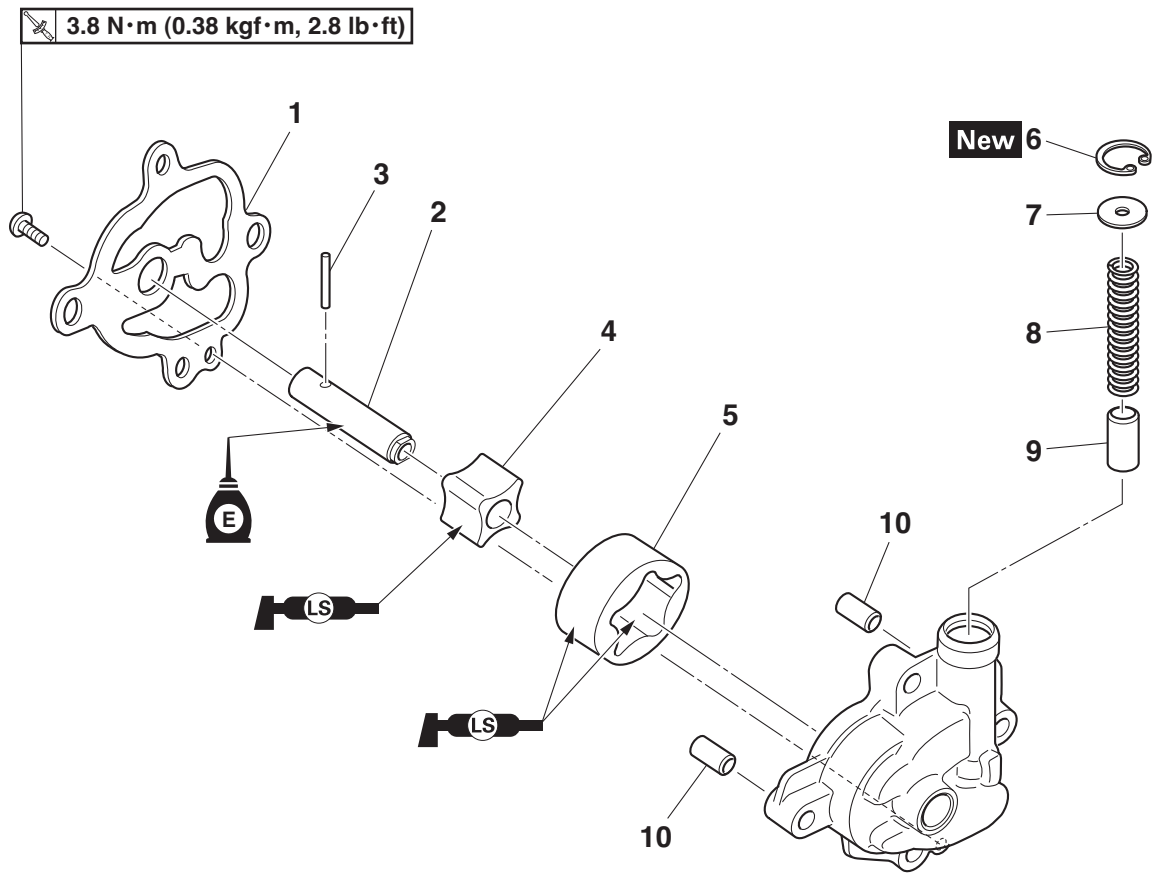
EAS20054
OIL PUMP

Removing the oil pump



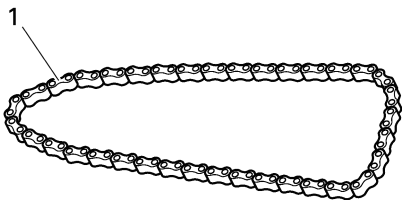
Order	Job/Parts to remove	Q'ty	Remarks
	Clutch cover		Refer to "CLUTCH" on page 5-38.
1	Oil pump driven sprocket	1	
2	Oil pump assembly	1	

Disassembling the oil pump

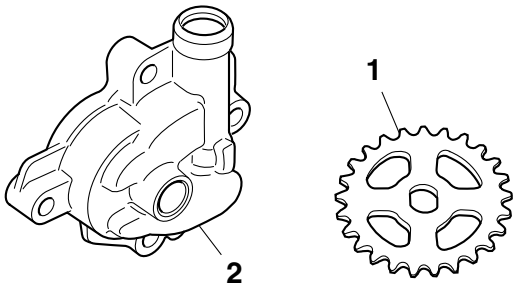


Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump cover	1	
2	Oil pump shaft	1	
3	Pin	1	
4	Oil pump inner rotor	1	
5	Oil pump outer rotor	1	
6	Circlip	1	Hold down the washer when removing the circlip.
7	Washer	1	
8	Spring	1	
9	Relief valve	1	
10	Dowel pin	2	

EAS30336
CHECKING THE SPROCKET AND CHAIN
1. Check:
   • Oil pump drive sprocket
   Refer to "CHECKING THE CLUTCH HOUSING" on page 5-44.
2. Check:
   • Oil pump drive chain "1"
   Damage/stiffness → Replace the oil pump drive chain and oil pump drive sprocket (clutch housing) as a set.

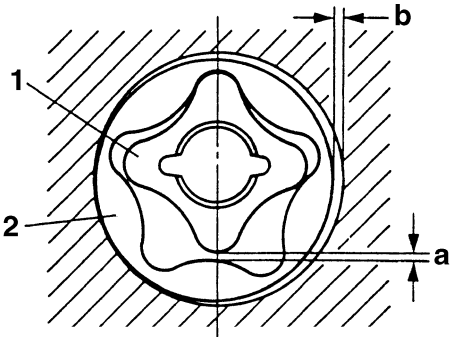


EAS30337
CHECKING THE OIL PUMP
1. Check:
   • Oil pump driven sprocket "1"
   • Oil pump housing "2"
   Cracks/damage/wear → Replace the defective part(s).



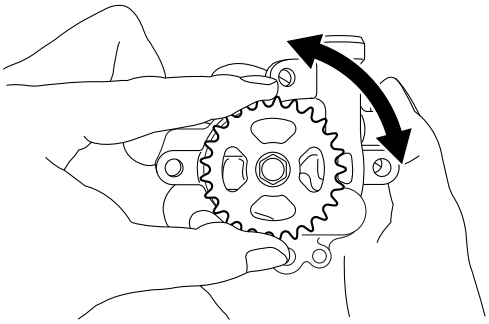
2. Measure:
   • Inner-rotor-to-outer-rotor-tip clearance "a"
   • Outer-rotor-to-oil-pump-housing clearance "b"
   Out of specification → Replace the defective part(s).

Inner-rotor-to-outer-rotor-tip clearance
Less than 0.120 mm (0.0047 in)
Limit
0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance
0.09–0.19 mm (0.0035–0.0075 in)
Limit
0.21 mm (0.0083 in)

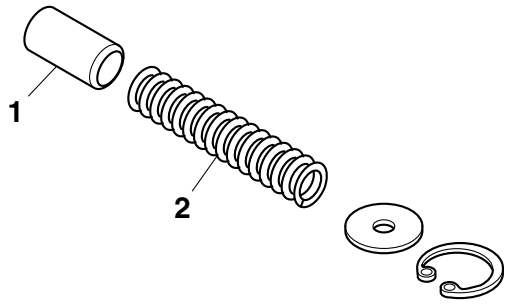


1. Inner rotor
2. Outer rotor

3. Check:
   • Oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS30338
CHECKING THE RELIEF VALVE
1. Check:
   • Relief valve "1"
   • Spring "2"
   Damage/wear → Replace the oil pump assembly.



EAS30342
ASSEMBLING THE OIL PUMP

1. Lubricate:
   - Inner rotor
   - Outer rotor
   - Oil pump shaft
     (with the recommended lubricant)

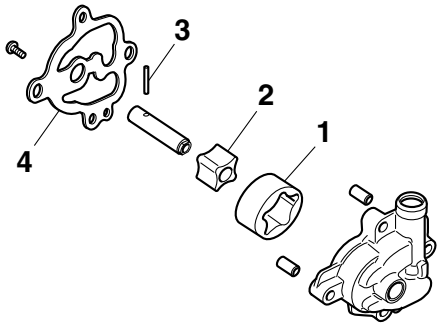
	Recommended lubricant **Engine oil**

2. Install:
   - Outer rotor “1”
   - Inner rotor “2”
   - Pin “3”
   - Oil pump cover “4”
   - Oil pump cover screw

	Oil pump cover screw **3.8 N·m (0.38 kgf·m, 2.8 lb·ft)**

TIP

Align the pin “3” in the oil pump shaft with the groove in the inner rotor “2”.



3. Check:
   - Oil pump operation
     Refer to “CHECKING THE OIL PUMP” on page 5-53.

EAS30343
INSTALLING THE OIL PUMP

1. Install:
   - Oil pump “1”
   - Oil pump bolts “2”

	Oil pump bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

   - Oil pump driven sprocket “3”

	Oil pump driven sprocket bolt **15 N·m (1.5 kgf·m, 11 lb·ft)** **LOCTITE®**

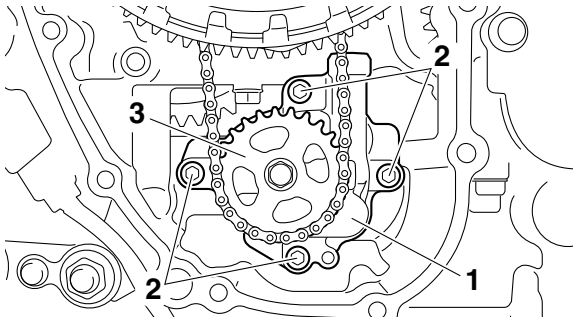
ECA20940

NOTICE

After installing the oil pump drive chain and driven sprocket, make sure the oil pump turns smoothly.

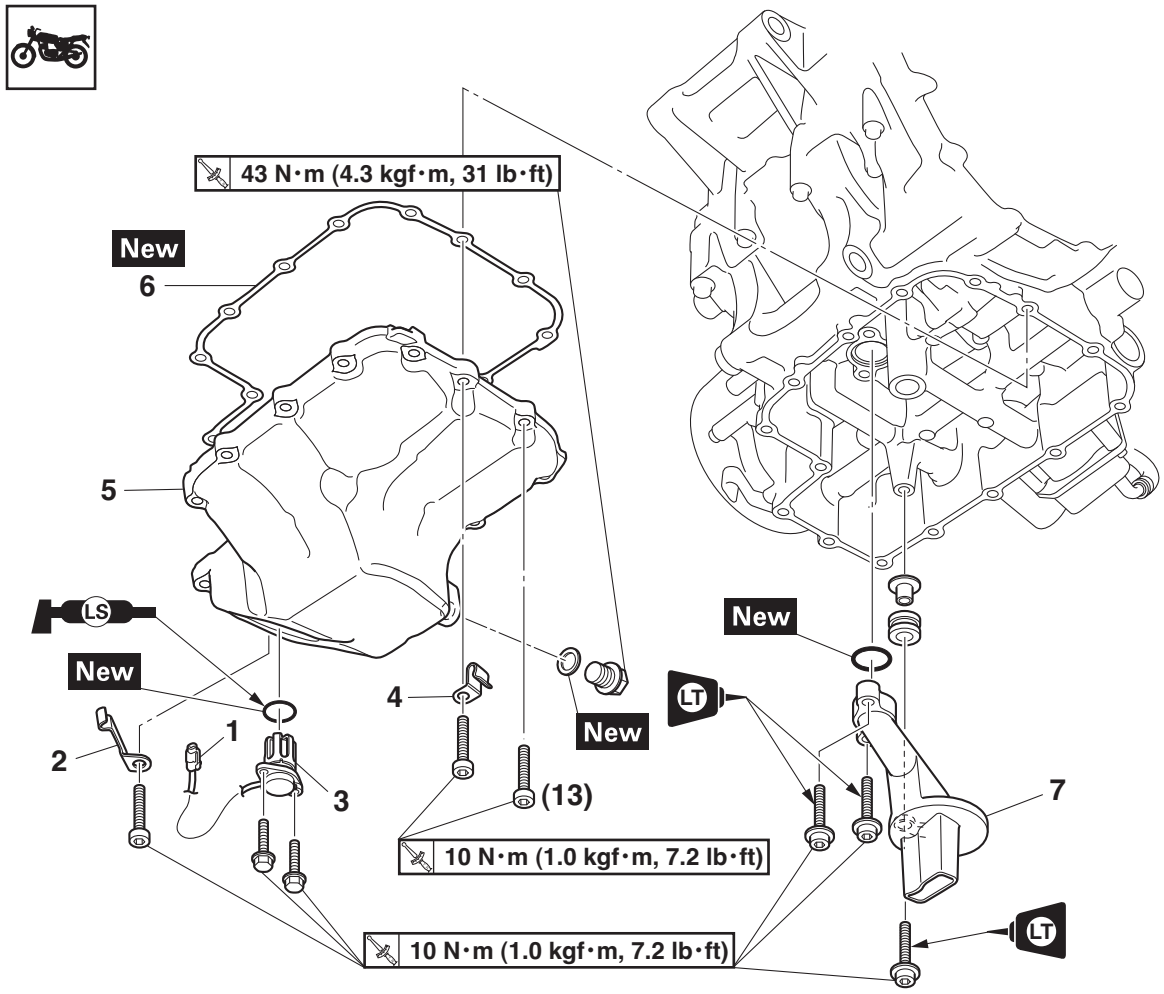
TIP

- 1RC mark of the oil pump driven sprocket is installed at oil pump side.
- Install the oil pump drive chain onto the oil pump driven sprocket.



EAS20177
OIL PAN

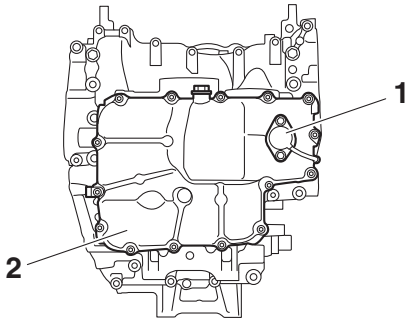
Removing the oil pan



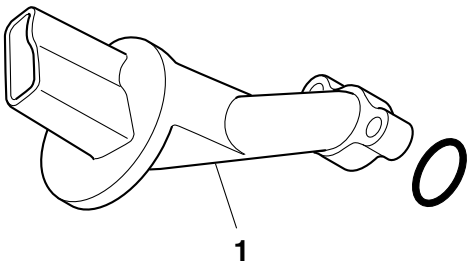
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
1	Oil level switch coupler	1	Disconnect.
2	Oil level switch lead holder	1	
3	Oil level switch	1	
4	O_2 sensor lead holder	1	
5	Oil pan	1	
6	Oil pan gasket	1	
7	Oil strainer	1	

EAS31068
REMOVING THE OIL PAN
1. Remove:
   • Oil level switch “1”
   • Oil pan “2”
   • Oil pan gasket

TIP
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



EAS31069
CHECKING THE OIL STRAINER
1. Check:
   • Oil strainer “1”
   Damage → Replace.
   Contaminants → Clean with solvent.



EAS31070
INSTALLING THE OIL PAN
1. Install:
   • Oil pan gasket New
   • Oil pan “1”

	Oil pan bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

   • Oil level switch “2”

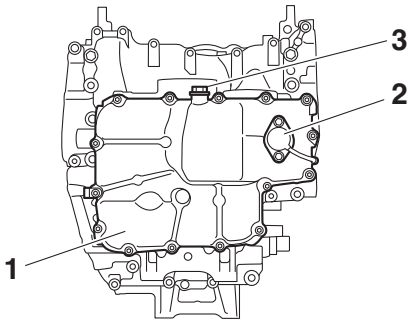
	Oil level switch bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

   • Engine oil drain bolt “3”

	Engine oil drain bolt **43 N·m (4.3 kgf·m, 31 lb·ft)**

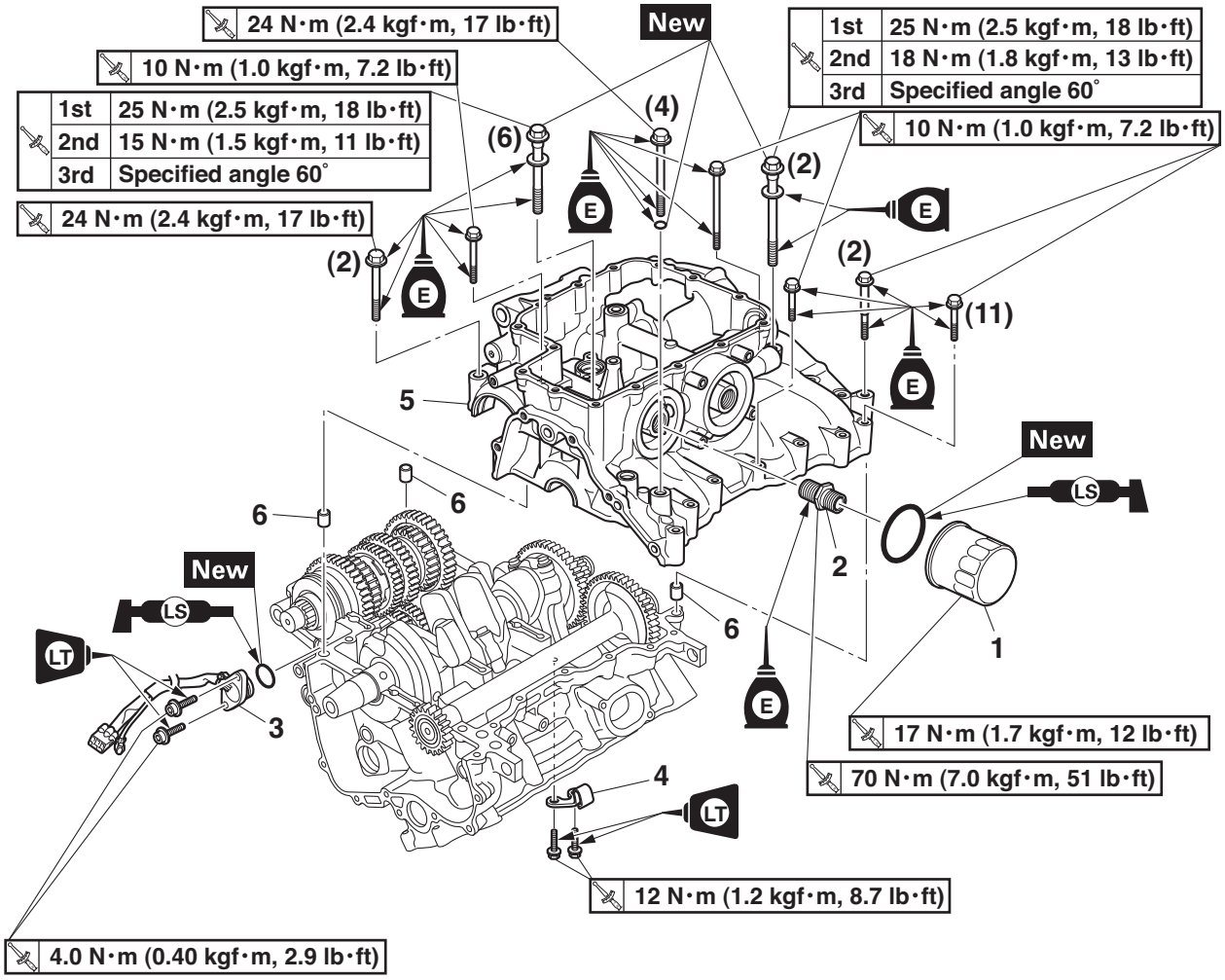
EWA12820
WARNING
Always use new copper washers.

TIP
- Tighten the oil pan bolts in stages and in a crisscross pattern.
- Lubricate the oil level switch O-ring with lithium-soap-based grease.



EAS20059
CRANKCASE

Separating the crankcase



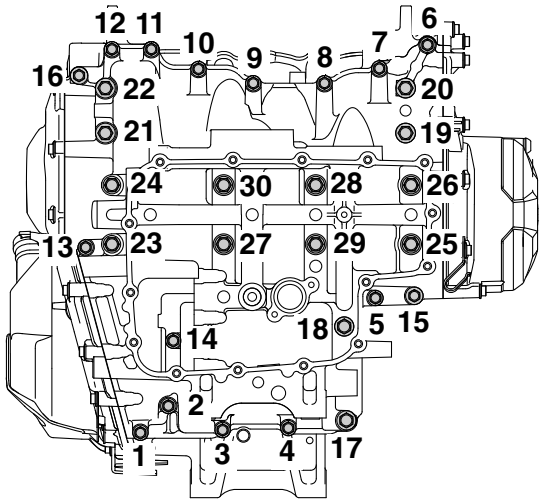
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-3.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-19.
	Water pump		Refer to "WATER PUMP" on page 6-8.
	Starter clutch		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-29.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-34.
	Clutch housing		Refer to "CLUTCH" on page 5-38.
	Oil strainer		Refer to "OIL PAN" on page 5-55.
1	Oil filter cartridge	1	
2	Oil filter cartridge union bolt	1	
3	Gear position switch	1	
4	Clutch cable holder	1	
5	Lower crankcase	1	
6	Dowel pin	3	

EAS30389
DISASSEMBLING THE CRANKCASE

1. Place the engine upside down.
2. Remove:
   • Crankcase bolt (×30)

TIP

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in the proper sequence as shown.
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.



3. Remove:
   • Lower crankcase

ECA13900

NOTICE

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

4. Remove:
   • Dowel pins
5. Remove:
   • Crankshaft journal lower bearing
   • Balancer shaft journal bearing
   (from the lower crankcase)

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.

EAS30390
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.

EAS30397
ASSEMBLING THE CRANKCASE

1. Lubricate:
   • Crankshaft journal bearing inner surface
   (with the recommended lubricant)

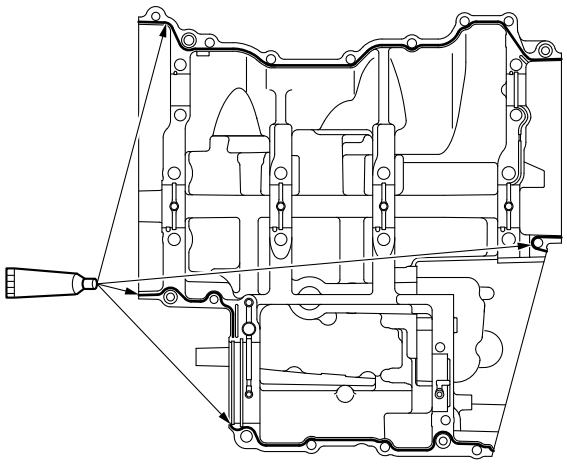
	Recommended lubricant **Engine oil**

2. Apply:
   • Sealant
   (onto the crankcase mating surfaces)

	Yamaha bond No. 1215 **90890-85505** **(Three bond No.1215®)**

TIP

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings, or balancer shaft journal bearings.



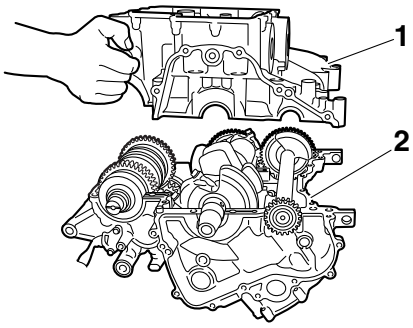
3. Install:
   • Dowel pins

4. Set the shift drum assembly and transmission gears in the neutral position.
5. Install:
   • Lower crankcase “1”
   (onto the upper crankcase “2”)

ECA13980

NOTICE

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

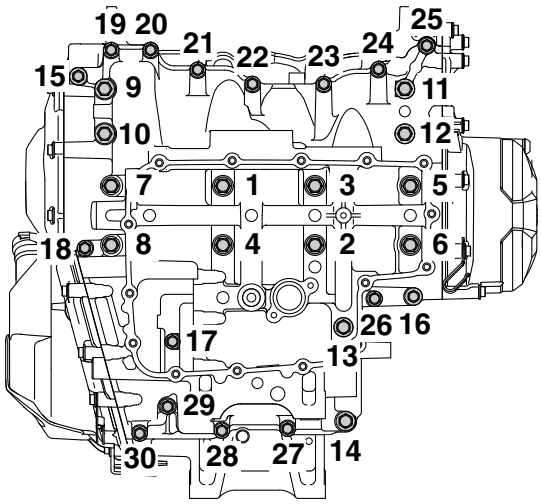


6. Install:
   • Crankcase bolt (×30)

TIP

- Lubricate the bolts “1”–“8” thread, mating surfaces and washers with engine oil.
- Lubricate the bolts “9”–“12” thread, mating surfaces and O-rings with engine oil.
- Lubricate the bolts “13”–“30” thread and mating surfaces with engine oil.

- M8 × 100 mm (3.94 in) bolts with washers: “7”, “8” New
- M8 × 85 mm (3.35 in) bolts with washers: “1”–“6” New
- M8 × 78 mm (3.07 in) bolts with new O-rings: “9”–“12”
- M8 × 60 mm (2.36 in) bolts: “13”, “14”
- M6 × 85 mm (3.35 in) bolt: “18”
- M6 × 65 mm (2.56 in) bolts: “15”, “16”
- M6 × 65 mm (2.56 in) bolt: “26”
- M6 × 50 mm (1.97 in) bolts: “17”, “19”–“21”, “23”–“25”, “27”–“30”
- M6 × 40 mm (1.57 in) bolt: “22”



7. Tighten:
   • Crankcase bolts “1”–“8”

Crankcase bolts “1”–“6”
1st: 25 N·m (2.5 kgf·m, 18 lb·ft)
***2nd: 15 N·m (1.5 kgf·m, 11 lb·ft)**
3rd: +60°
Crankcase bolts “7”–“8”
1st: 25 N·m (2.5 kgf·m, 18 lb·ft)
***2nd: 18 N·m (1.8 kgf·m, 13 lb·ft)**
3rd: +60°

* Following the tightening order, loosen the bolt one by one and then retighten it to the specific torque.

EWA16610

⚠ WARNING

If the bolt is tightened more than the specified angle, do not loosen the bolt and then retighten it. Instead, replace the bolt with a new one and perform the procedure again.

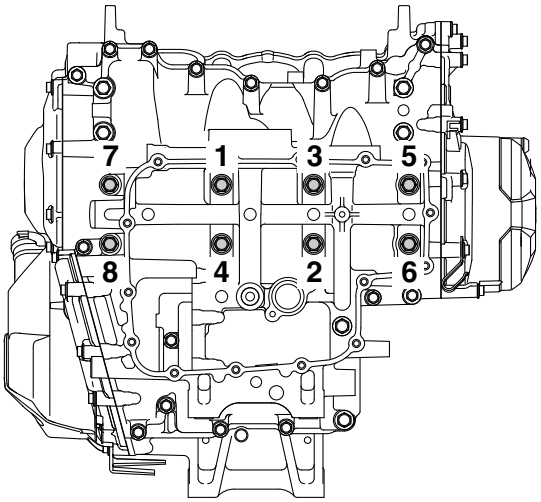
ECA20890

NOTICE

Do not use a torque wrench to tighten the bolt to the specified angle.

TIP

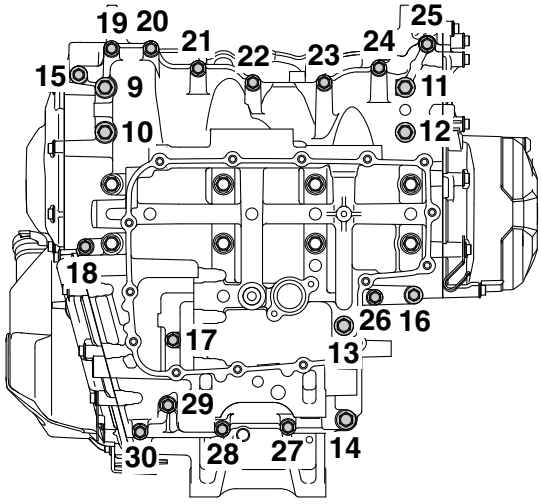
Tighten the bolts in the tightening sequence cast on the crankcase.



8. Tighten:
   • Crankcase bolts “9”–“30”

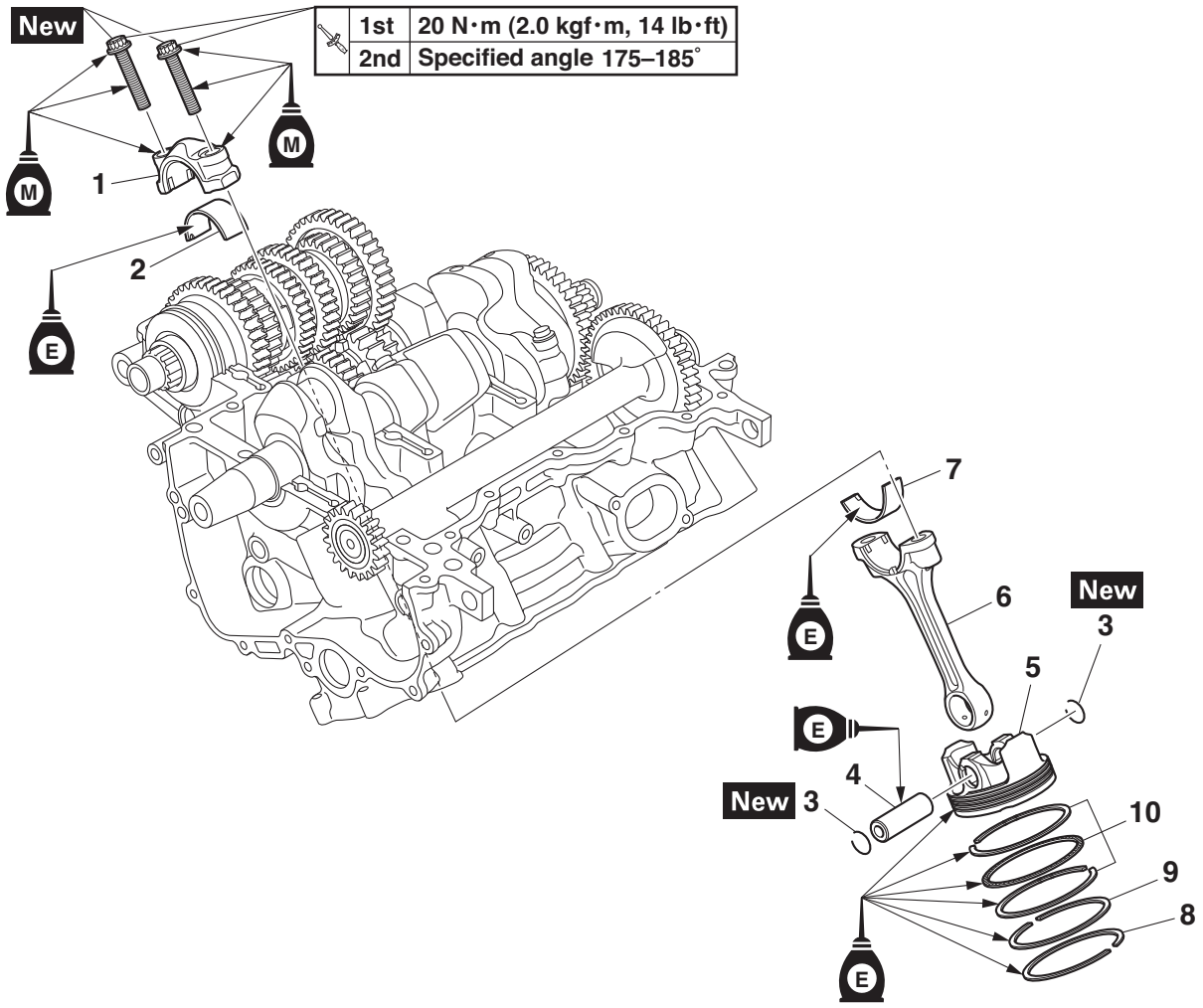
	Crankcase bolts “9”–“14” **24 N·m (2.4 kgf·m, 17 lb·ft)** **Crankcase bolts “15”–“30”** **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

TIP
Tighten the bolts in the tightening sequence cast on the crankcase.



EAS20132
CONNECTING RODS AND PISTONS

Removing the connecting rods and pistons



Order	Job/Parts to remove	Q'ty	Remarks
	Lower crankcase		Refer to "CRANKCASE" on page 5-57.
1	Connecting rod cap	3	
2	Big end lower bearing	3	
3	Piston pin clip	6	
4	Piston pin	3	
5	Piston	3	
6	Connecting rod	3	
7	Big end upper bearing	3	
8	Top ring	3	
9	2nd ring	3	
10	Oil ring	3	

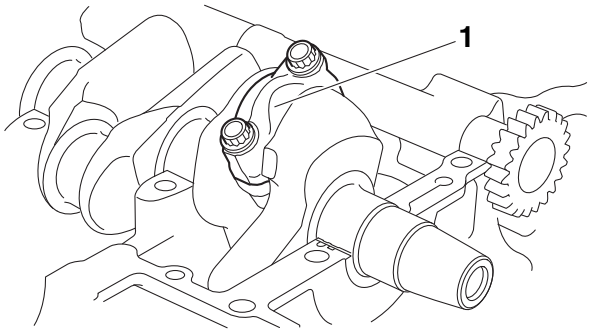
EAS30745
REMOVING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the connecting rods and pistons.

1. Remove:
   - Connecting rod cap "1"
   - Connecting rod
   - Big end bearings

TIP

- Identify the position of each big end bearing so that it can be reinstalled in its original place.
- After removing the connecting rods and connecting rod caps, care should be taken not to damage the mating surfaces of the connecting rods and connecting rod caps.



2. Remove:
   - Piston pin clips "1"
   - Piston pin "2"
   - Piston "3"

ECA13810

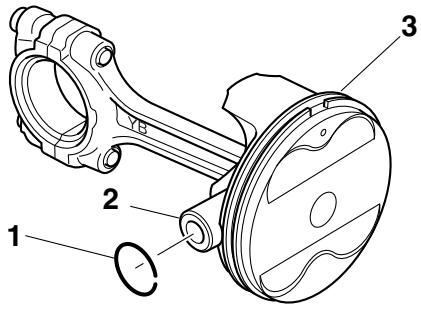
NOTICE

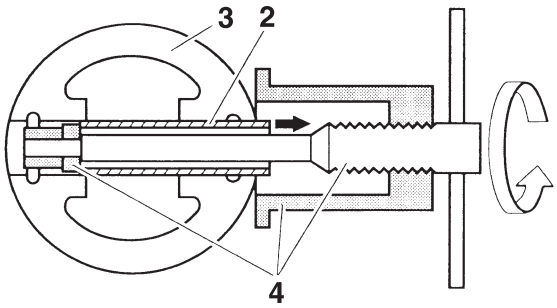
Do not use a hammer to drive the piston pin out.

TIP

- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip groove and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "4".

Piston pin puller set
90890-01304
Piston pin puller
YU-01304

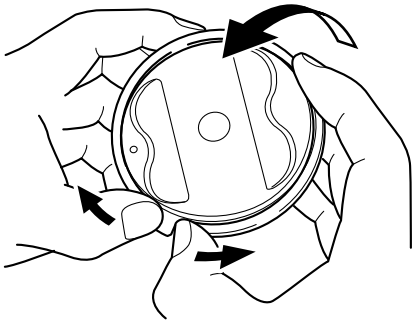




3. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

TIP

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS30747
CHECKING THE CYLINDER AND PISTON

1. Check:
   - Piston wall
   - Cylinder wall
     Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - Piston-to-cylinder clearance

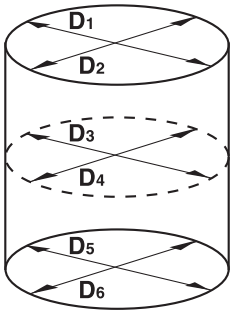
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Measure cylinder bore "C" with the cylinder bore gauge.

TIP
Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder.

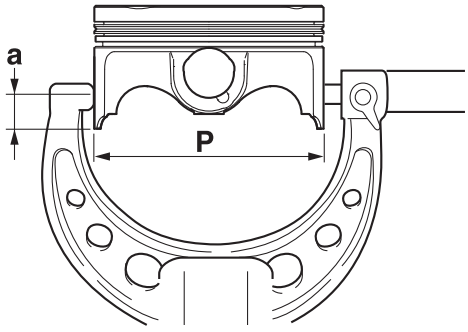
Bore
78.000–78.010 mm (3.0709–3.0713 in)
Wear limit
78.060 mm (3.0732 in)

"C" = maximum of D_1, D_2, D_3, D_4, D_5, D_6



b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.
c. Measure piston skirt diameter "P" with the micrometer.

Piston
Diameter
77.975–77.990 mm (3.0699–3.0705 in)



a. 12.0 mm (0.47 in) from the bottom edge of the piston

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance = Cylinder bore "C" - Piston skirt diameter "P"

Piston-to-cylinder clearance
0.010–0.035 mm (0.0004–0.0014 in)

f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

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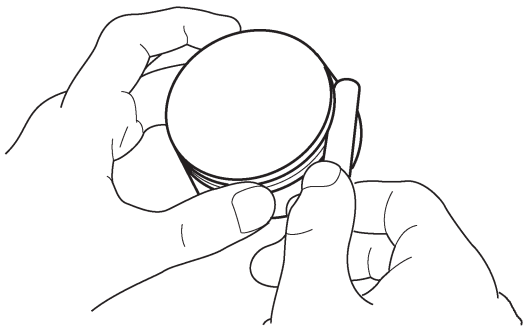
EAS30748
CHECKING THE PISTON RINGS

1. Measure:
   • Piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

TIP
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring
Top ring
Ring side clearance
0.030–0.065 mm (0.0012–0.0026 in)
Side clearance limit
0.115 mm (0.0045 in)
2nd ring
Ring side clearance
0.020–0.055 mm (0.0008–0.0022 in)
Side clearance limit
0.115 mm (0.0045 in)



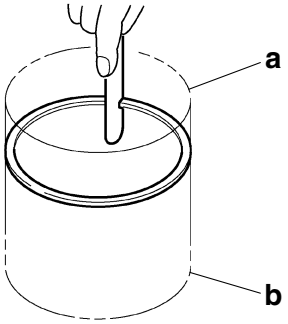
2. Install:
   • Piston ring
   (into the cylinder)

TIP
Use the piston crown to level the piston ring near bottom of cylinder "a", where cylinder wear is lowest.

3. Measure:
   • Piston ring end gap
   Out of specification → Replace the piston ring.

TIP
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

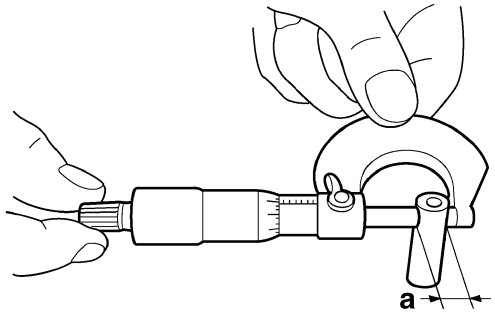
Top ring
End gap (installed)
0.15–0.25 mm (0.0059–0.0098 in)
End gap limit
0.50 mm (0.0197 in)
2nd ring
End gap (installed)
0.30–0.45 mm (0.0118–0.0177 in)
End gap limit
0.80 mm (0.0315 in)



b. Upper of cylinder

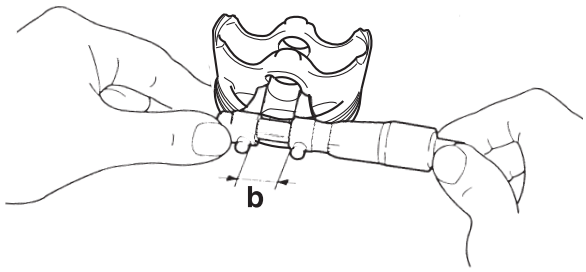
EAS30749
CHECKING THE PISTON PIN
The following procedure applies to all of the piston pins.
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter "a"
   Out of specification → Replace the piston pin.

Piston pin outside diameter
16.990–16.995 mm (0.6689–0.6691 in)
Limit
16.970 mm (0.6681 in)



3. Measure:
   • Piston pin bore inside diameter "b"
   Out of specification → Replace the piston.

Piston pin bore inside diameter
17.002–17.013 mm (0.6694–0.6698 in)
Limit
17.043 mm (0.6710 in)



4. Calculate:
   • Piston-pin-to-piston-pin-bore clearance
   Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston-pin-bore clearance = Piston pin bore inside diameter "b" - Piston pin outside diameter "a"

Piston-pin-to-piston-pin-bore clearance
0.007–0.023 mm (0.0003–0.0009 in)

EAS30750
CHECKING THE CONNECTING RODS
1. Measure:
   • Crankshaft-pin-to-big-end-bearing clearance
   Out of specification → Replace the big end bearings.

Oil clearance
0.027–0.051 mm (0.0011–0.0020 in)

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The following procedure applies to all of the connecting rods.

ECA13930

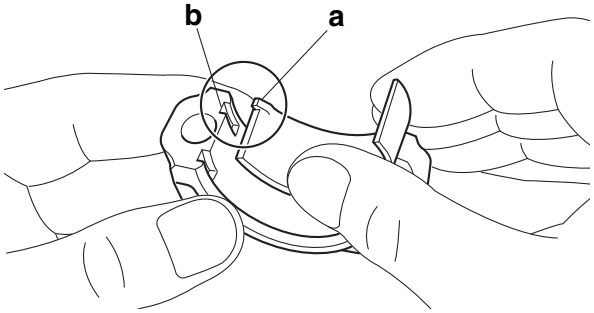
NOTICE

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

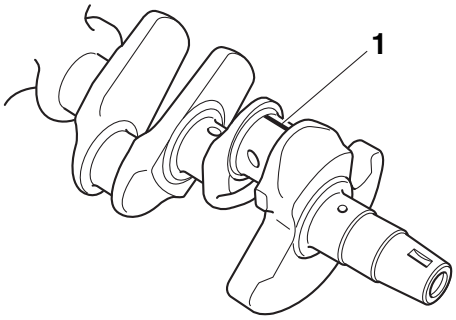
a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rods halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

TIP

Align the projections "a" on the big end bearings with the notches "b" in the connecting rod and connecting rod cap.



c. Put a piece of Plastigauge® "1" on the crankshaft pin.



d. Assemble the connecting rod halves.

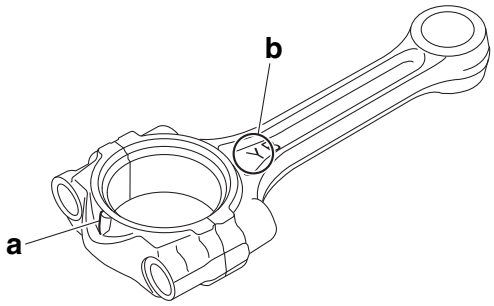
ECA18390

NOTICE

Tighten the connecting rod bolts using the plastic-region tightening angle method. Always install new bolts.

TIP

- Clean the connecting rod bolts and lubricate the bolt threads and seats with molybdenum disulfide oil.
- Make sure that the projection "a" on the connecting rod cap faces the same direction as the "Y" mark "b" on the connecting rod.
- After installing the big end bearing, assemble the connecting rod and connecting rod cap without installing them onto the crankshaft.



TIP

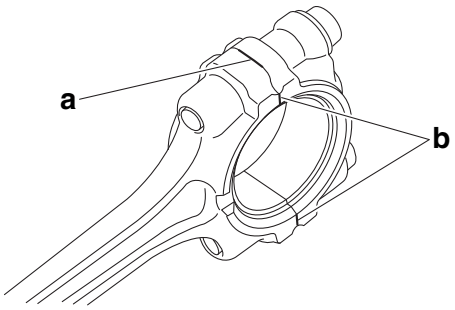
Install by carrying out the following procedures in order to assemble in the most suitable condition.

e. Tighten the connecting rod bolt while checking that the sections shown "a" and "b" are flush with each other by touching the surface.

	Connecting rod bolt **30 N·m (3.0 kgf·m, 22 lb·ft)**

TIP

To install the big end bearing, care should be taken not to install it at an angle and the position should not be out of alignment.



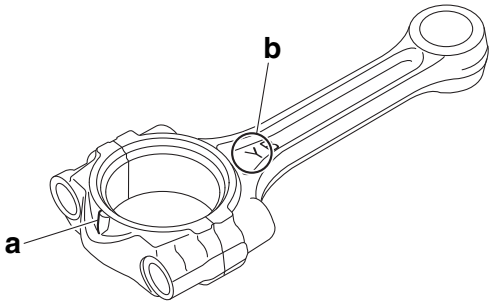
a. Side machined face
b. Thrusting faces

f. Loosen the connecting rod bolt, remove the connecting rod and connecting rod cap and install these parts to the crankshaft with the big end bearing kept in the current condition.

TIP

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Make sure that the projection "a" on the con-

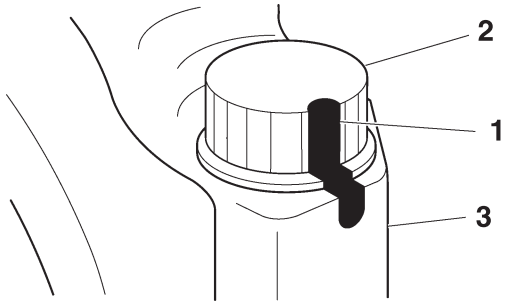
necting rod cap faces the same direction as the "Y" mark "b" on the connecting rod.
- Make sure the "Y" marks "b" on the connecting rods face towards the left side of the crankshaft.



g. Tighten the connecting rod bolts with a torque wrench.

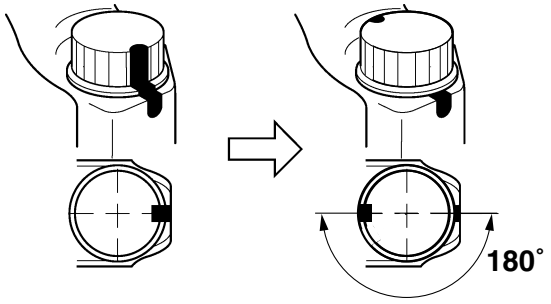
	Connecting rod bolt (1st) **20 N·m (2.0 kgf·m, 14 lb·ft)**

h. Put a mark "1" on the corner of the connecting rod bolt "2" and the connecting rod cap "3".



i. Tighten the connecting rod bolts further to reach the specified angle 175°–185°.

	Connecting rod bolt (final) **Specified angle 175°–185°**



EWA16610

WARNING

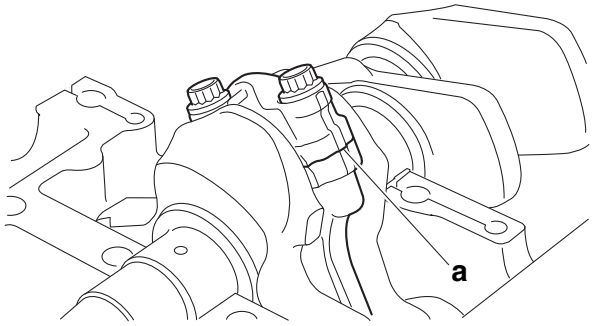
If the bolt is tightened more than the specified angle, do not loosen the bolt and then retighten it. Instead, replace the bolt with a new one and perform the procedure again.

ECA20890

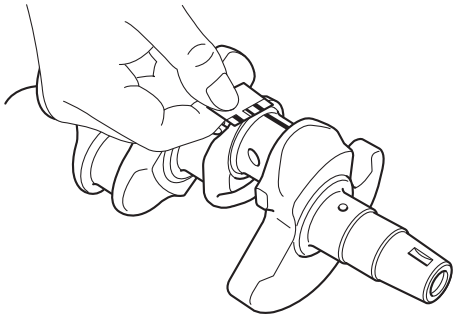
NOTICE

Do not use a torque wrench to tighten the bolt to the specified angle.

j. After the installation, check that the section shown "a" is flush with each other by touching the surface.



k. Remove the connecting rod and big end bearings.
l. Measure the compressed Plastigauge® width on the crankshaft pin. If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.



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2. Select:
   - Big end bearings (P_1–P_3)

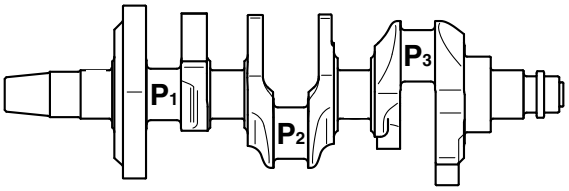
TIP

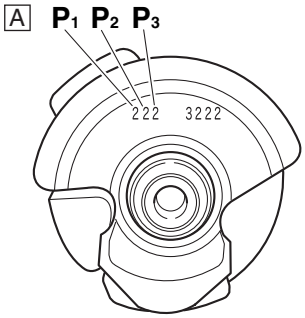
- The numbers "A" stamped into the crankshaft web and the numbers "1" on the connecting rods are used to determine the replacement big end bearings sizes.
- "P_1"–"P_3" refer to the bearings shown in the crankshaft illustration.

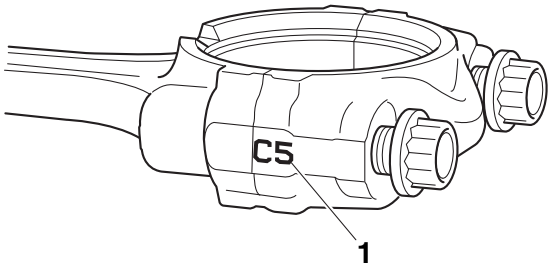
For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are 5 and 2 respectively, then the bearing size for "P_1" is:

"P_1" (connecting rod) - "P_1" (crankshaft) = 5 - 2 = 3 (brown)

Bearing color code
Code 1
Blue
Code 2
Black
Code 3
Brown
Code 4
Green







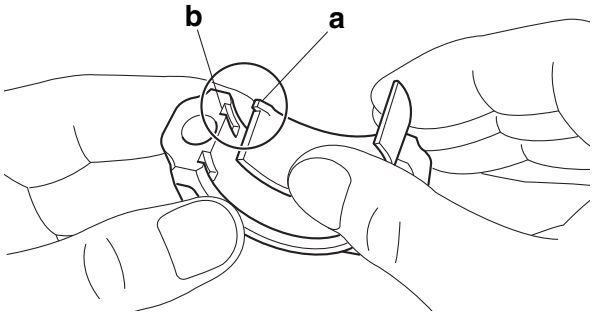
EAS30751
INSTALLING THE CONNECTING ROD AND PISTON

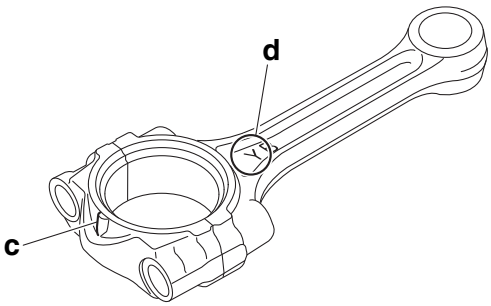
The following procedure applies to all of the connecting rods and pistons.

1. Install:
   - Big end bearings
   - Connecting rod cap
     (onto the connecting rod)

TIP

- Be sure to reinstall each big end bearing in its original place.
- Align the projections “a” on the big end bearings with the notches “b” in the connecting rods and connecting rod caps.
- Make sure that the projection “c” on the connecting rod cap faces the same direction as the “Y” mark “d” on the connecting rod.





2. Tighten:
   - Connecting rod bolts New

ECA18390

NOTICE

Tighten the connecting rod bolts using the plastic-region tightening angle method. Always install new bolts.

TIP

Install by carrying out the following procedures in order to assemble in the most suitable condition.

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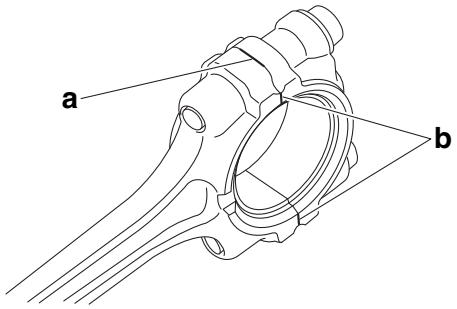
a. Replace the connecting rod bolts with new ones.
b. Clean the connecting rod bolts and lubricate the bolt threads and seats with molybdenum disulfide oil.
c. After installing the big end bearing, assemble the connecting rod and connecting rod cap without installing them onto the crankshaft.
d. Tighten the connecting rod bolt while checking that the sections shown “a” and “b” are flush with each other by touching the surface.

Connecting rod bolt
30 N·m (3.0 kgf·m, 22 lb·ft)

TIP
To install the big end bearing, care should be taken not to install it at an angle and the position should not be out of alignment.



a. Side machined face
b. Thrusting faces

e. Loosen the connecting rod bolt, remove the connecting rod and connecting rod cap and install these parts to the crankshaft with the big end bearing kept in the current condition.

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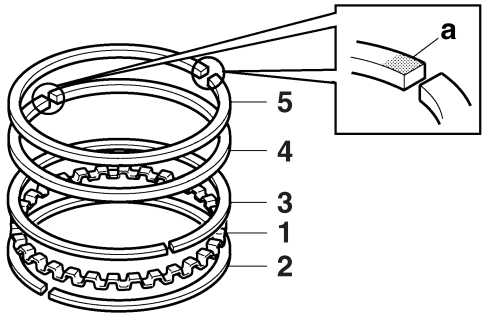
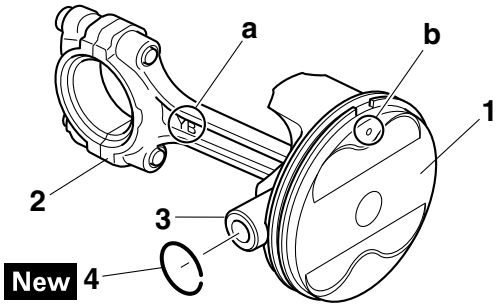
3. Install:
   • Oil ring expander "1"
   • Lower oil ring rail "2"
   • Upper oil ring rail "3"
   • 2nd ring "4"
   • Top ring "5"
   (into the piston)

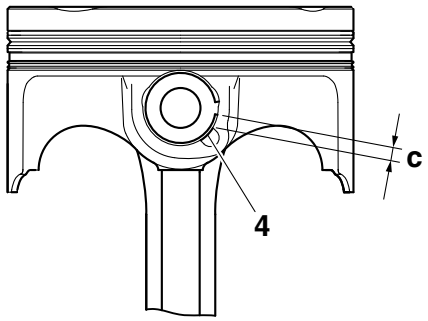
TIP
Be sure to install the piston rings so that the manufacturer's marks or numbers "a" face up.



4. Install:
   • Piston "1"
   (onto the respective connecting rod "2")
   • Piston pin "3"
   • Piston pin clips "4" New

TIP
• Apply engine oil onto the piston pin.
• Make sure that the "Y" mark "a" on the connecting rod faces left when the punch mark "b" on the piston is pointing up as shown.
• Install the piston pin clips, so that the clip ends are 3 mm (0.12 in) "c" or more from the cutout in the piston.
• Reinstall each piston into its original cylinder.

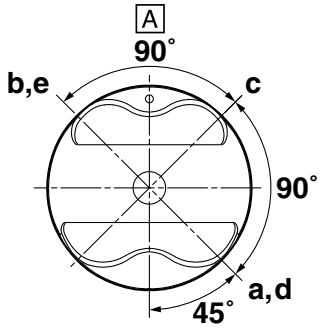




5. Lubricate:
   • Piston
   • Piston rings
   • Cylinder
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

6. Offset:
   • Piston ring end gaps



a. Top ring
b. 2nd ring
c. Upper oil ring rail
d. Oil ring expander
e. Lower oil ring rail

A. Exhaust side

7. Lubricate:
   • Crankshaft pins
   • Connecting rod big end bearing inner surface (with the recommended lubricant)

	Recommended lubricant **Engine oil**

8. Install:
   • Piston assemblies “1”
   (into the cylinder “2” and onto the crankshaft pin)

	Piston installing tool **90890-04161** **Piston installing tool** **YM-04161**

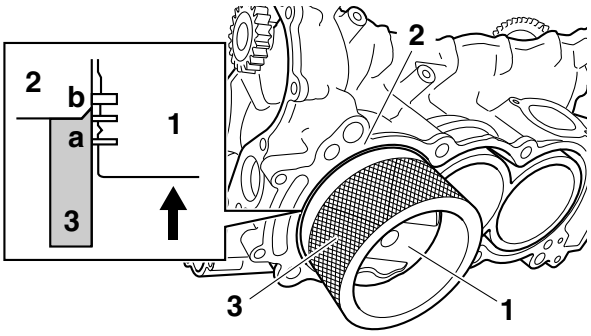
ECA21490

NOTICE

If the projection “a” of the piston installing tool damages, you cannot use it. Please handle with care.

TIP

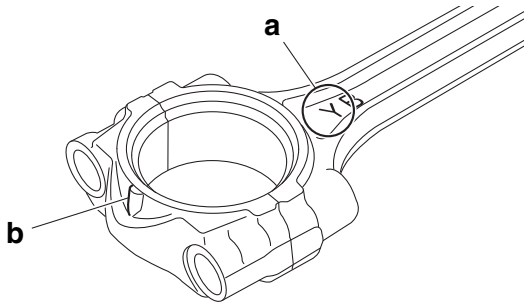
Fit the projection “a” of the piston installing tool “3” and blunt-edged part “b” of the cylinder, fix the position of the piston installing tool, and then push the piston up to the cylinder.



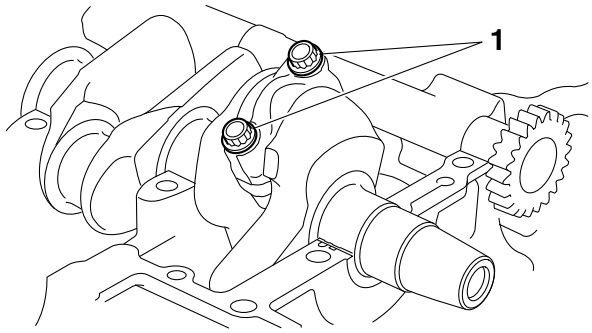
9. Install:
   • Connecting rod caps
   • Connecting rod bolts

TIP

- Make sure the “Y” marks “a” on the connecting rods face towards the left side of the crankshaft.
- Make sure that the projection “b” on the connecting rod cap faces the same direction as the “Y” mark “a” on the connecting rod.
- Apply Molybdenum disulfide oil to the bolt threads and seats.



10. Tighten:
   • Connecting rod bolts “1”



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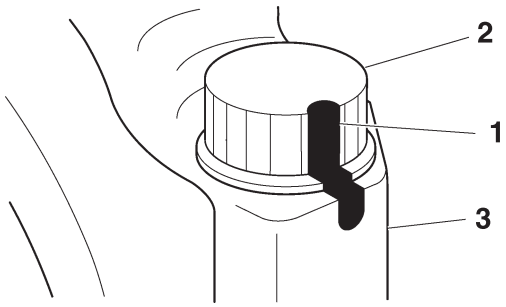
TIP

Tighten the connecting rod bolts using the following procedure.

a. Tighten the connecting rod bolts with a torque wrench.

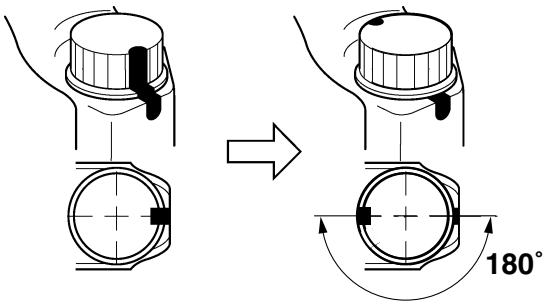
	Connecting rod bolt (1st) **20 N·m (2.0 kgf·m, 14 lb·ft)**

b. Put a mark “1” on the corner of the connecting rod bolt “2” and the connecting rod cap “3”.



c. Tighten the connecting rod bolts further to reach the specified angle 175°–185°.

	Connecting rod bolt (final) **Specified angle 175°–185°**



EWA16610

⚠ WARNING

If the bolt is tightened more than the specified angle, do not loosen the bolt and then retighten it. Instead, replace the bolt with a new one and perform the procedure again.

ECA20890

NOTICE

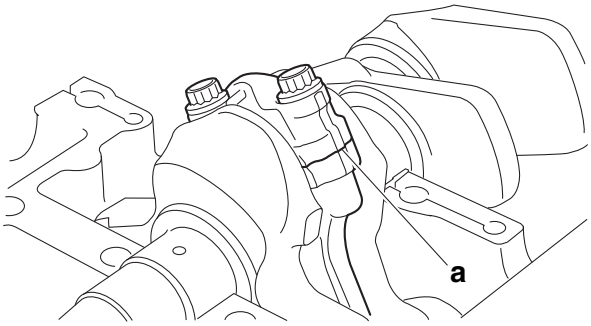
Do not use a torque wrench to tighten the bolt to the specified angle.

d. After the installation, check that the section shown “a” is flush with each other by touching the surface.

EWA17120

⚠ WARNING

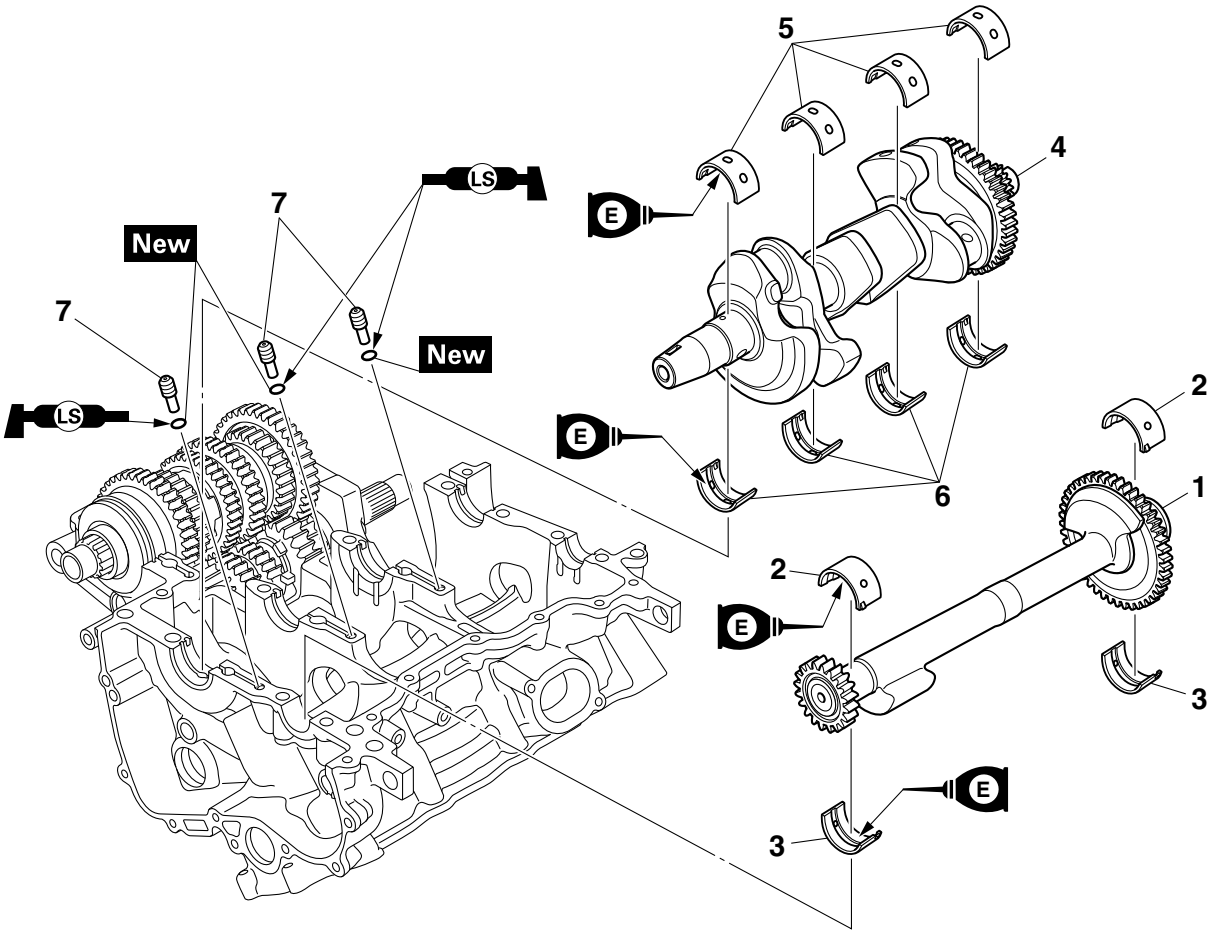
If the connecting rod and cap are not flush with each other, remove the connecting rod bolts and big end bearing and restart from step (1). In this case, make sure to replace the connecting rod bolts.



EAS20178

CRANKSHAFT AND BALANCER SHAFT

Removing the crankshaft and balancer shaft

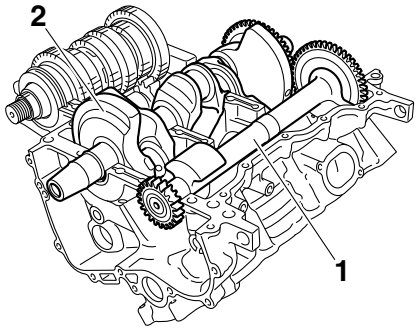


Order	Job/Parts to remove	Q'ty	Remarks
	Lower crankcase		Refer to "CRANKCASE" on page 5-57.
	Connecting rod		Refer to "REMOVING THE CONNECTING RODS AND PISTONS" on page 5-62.
1	Balancer shaft	1	
2	Balancer shaft journal lower bearing	2	
3	Balancer shaft journal upper bearing	2	
4	Crankshaft	1	
5	Crankshaft journal lower bearing	4	
6	Crankshaft journal upper bearing	4	
7	Oil nozzle	3	

EAS31171
REMOVING THE CRANKSHAFT AND BALANCER SHAFT

1. Remove:
   - Balancer shaft “1”
   - Balancer shaft journal bearing
   - Crankshaft assembly “2”
   - Crankshaft journal bearings

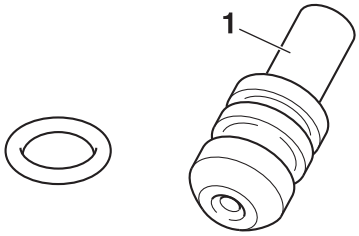
TIP
Identify the position of each balancer shaft journal bearings and crankshaft journal bearings so that it can be reinstalled in its original place.



EAS31174
CHECKING THE OIL NOZZLES

The following procedure applies to all of the oil nozzles.

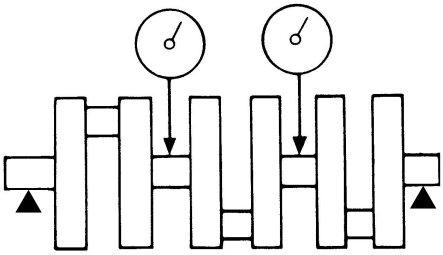
1. Check:
   - Oil nozzle “1”
     Damage/wear → Replace the oil nozzle.
   - Oil passage
     Obstruction → Blow out with compressed air.



EAS31075
CHECKING THE CRANKSHAFT

1. Measure:
   - Crankshaft runout
     Out of specification → Replace the crankshaft.

	Runout limit **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 **0.014–0.038 mm (0.0006–0.0015 in)**

ECA13920
NOTICE

Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

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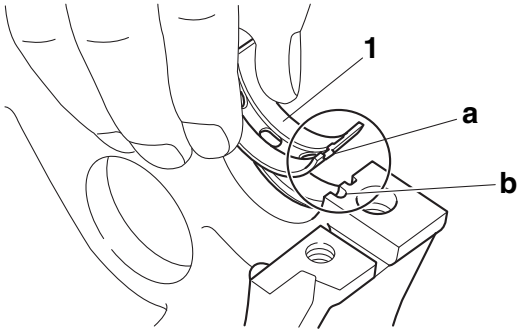
a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.
c. Install the crankshaft journal upper bearings “1” and the crankshaft into the upper crankcase.

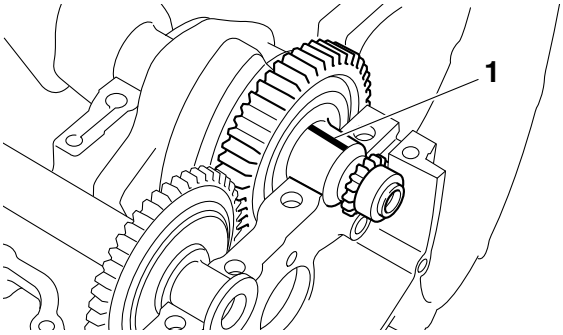
TIP
Align the projections “a” on the crankshaft journal upper bearings with the notches “b” in the upper crankcase.



d. Put a piece of Plastigauge® "1" on each crankshaft journal.

TIP

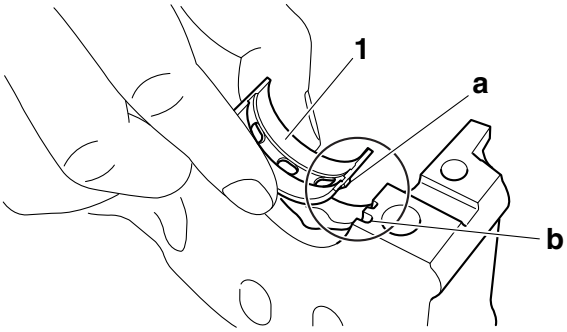
Do not put the Plastigauge® over the oil hole in the crankshaft journal.



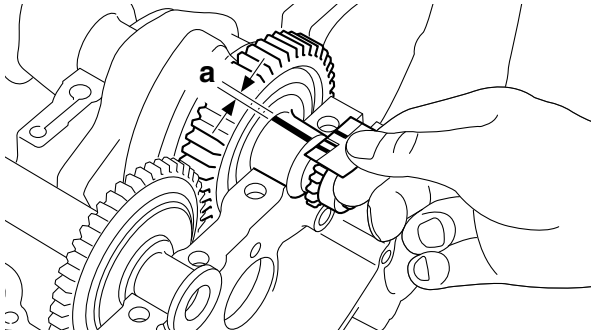
e. Install the crankshaft journal lower bearings "1" into the lower crankcase and assemble the crankcase halves.

TIP

- Align the projections "a" of the crankshaft journal lower bearings with the notches "b" in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.



f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.
Refer to "CRANKCASE" on page 5-57.
g. Remove the lower crankcase and the crankshaft journal lower bearings.
h. Measure the compressed Plastigauge® width "a" on each crankshaft journal.
If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.



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4. Select:
   - Crankshaft journal bearings (J_1–J_4)

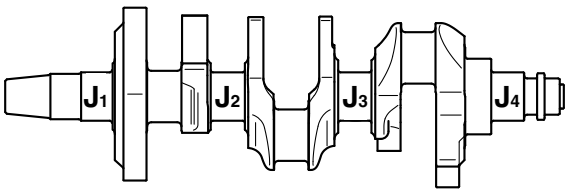
TIP

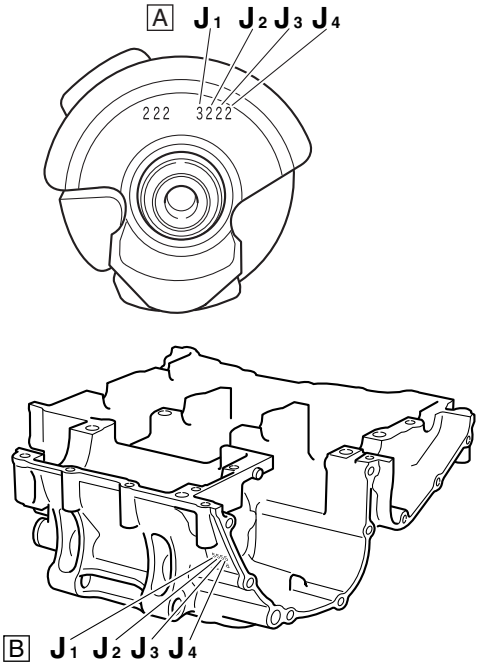
- The numbers "A" stamped into the crankshaft web and the numbers "B" stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J_1"–"J_4" refer to the bearings shown in the crankshaft and lower crankcase illustration.

For example, if the crankcase "J_1" and crankshaft web "J_1" numbers are 7 and 2 respectively, then the bearing size for "J_1" is:

"J_1" (crankcase) - "J_1" (crankshaft web) -1 = 7 - 2 - 1 = 4 (green)

Bearing color code
Code 0
White
Code 1
Blue
Code 2
Black
Code 3
Brown
Code 4
Green



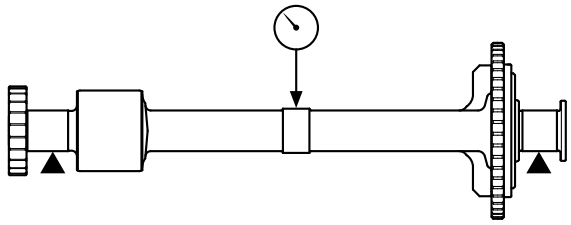


EAS31076

CHECKING THE BALANCER SHAFT

1. Measure:
   • Balancer shaft runout
   Out of specification → Replace the balancer shaft.

	Balancer shaft runout limit 0.030 mm (0.0012 in)



2. Check:
   • Balancer shaft journal surfaces
   • Bearing surfaces
   Scratches/wear → Replace the balancer shaft.
3. Measure:
   • Balancer shaft journal-to-balancer shaft bearing clearance
   Out of specification → Replace the balancer shaft journal bearings.

	Balancer shaft journal to balancer shaft bearing clearance 0.024–0.048 mm (0.0009–0.0019 in)

ECA18400

NOTICE

Do not interchange the balancer shaft journal bearings. To obtain the correct balancer shaft-journal-to-balancer shaft-journal-bearing clearance and prevent engine damage, the balancer shaft journal bearings must be installed in their original positions.

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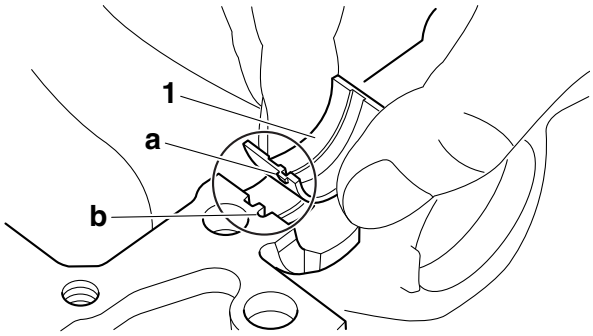
a. Clean the balancer shaft journal bearings, balancer shaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.
c. Install the balancer shaft journal upper bearings “1” and the balancer shaft into the upper crankcase.

TIP

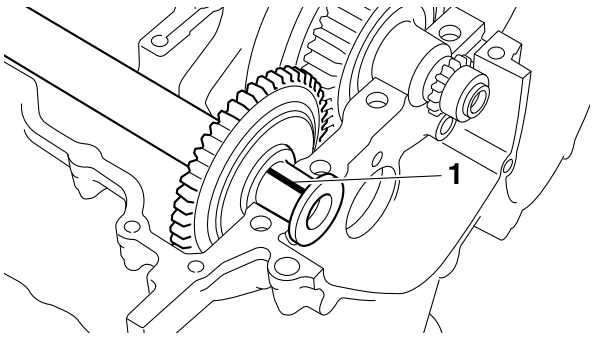
Align the projections “a” on the balancer shaft journal upper bearings with the notches “b” in the upper crankcase.



d. Put a piece of Plastigauge® “1” on each balancer shaft journal.

TIP

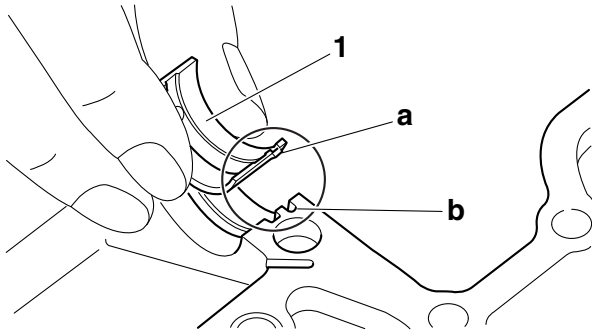
Do not put the Plastigauge® over the oil hole in the balancer shaft journal.



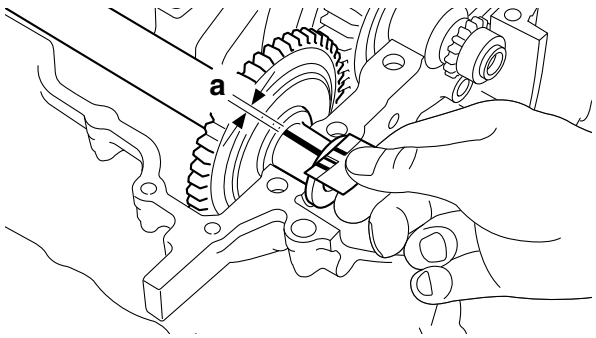
e. Install the balancer shaft journal lower bearings "1" into the lower crankcase and assemble the crankcase halves.

TIP

- Align the projections "a" of the balancer shaft journal lower bearings with the notches "b" in the crankcase.
- Do not move the balancer shaft 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 5-57.
g. Remove the lower crankcase and the balancer shaft journal lower bearings.
h. Measure the compressed Plastigauge® width "a" on each balancer shaft journal. If the balancer shaft-journal-to-balancer shaft-journal-bearing clearance is out of specification, select replacement balancer shaft journal bearings.



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4. Select:
   - Balancer shaft journal bearing (J_1–J_2)

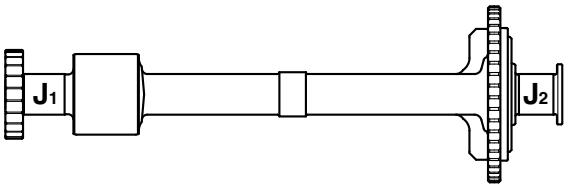
TIP

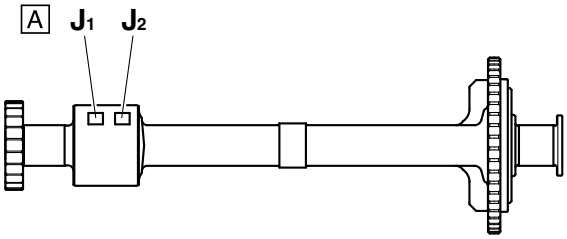
- The numbers "A" stamped into the balancer shaft web and the numbers "B" stamped into the lower crankcase are used to determine the replacement balancer shaft journal bearing sizes.
- "J_1"–"J_2" refer to the bearings shown in the balancer shaft and lower crankcase illustration.

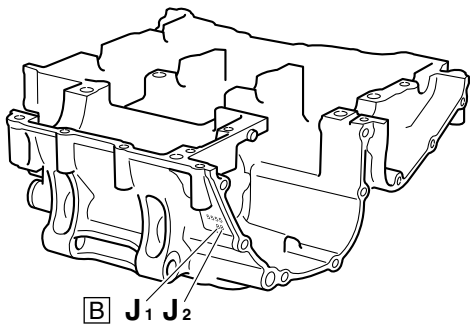
For example, if the crankcase "J_1" and balancer shaft web "J_1" numbers are 5 and 2 respectively, then the bearing size for "J_1" is:

"J_1" (crankcase) - "J_1" (balancer shaft web) =
5 - 2 = 3 (brown)

Bearing color code
Code 1
Blue
Code 2
Black
Code 3
Brown
Code 4
Green
Code 5
Yellow







EAS31077

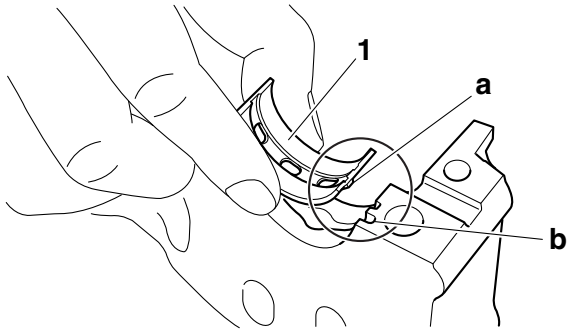
INSTALLING THE CRANKSHAFT

1. Install:
   - Crankshaft journal upper bearings (into the upper crankcase)

• Crankshaft journal lower bearings (into the lower crankcase)
• Crankshaft

TIP

• Align the projections “a” on the crankshaft journal bearings “1” with the notches “b” in the crankcase.
• Be sure to install each crankshaft journal bearings in its original place.



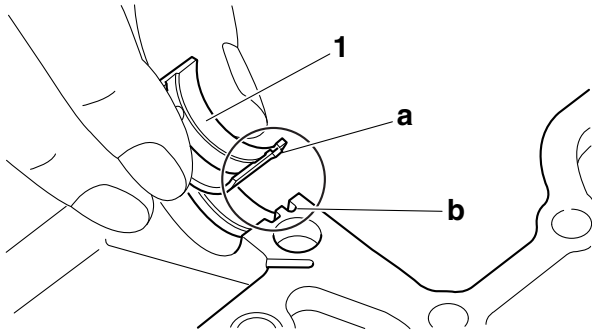
EAS31172

INSTALLING THE BALANCER ASSEMBLY

1. Install:
   • Balancer shaft journal upper bearings (into the upper crankcase)
   • Balancer shaft journal lower bearings (into the lower crankcase)

TIP

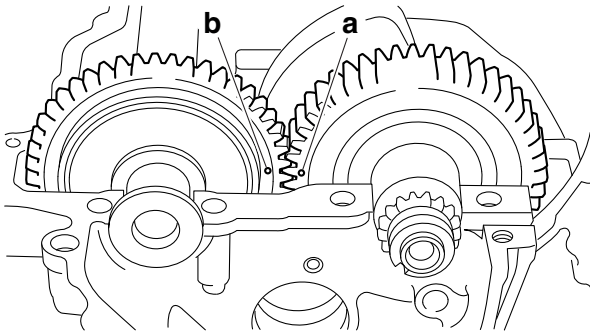
• Align the projections “a” on the balancer shaft journal bearings “1” with the notches “b” in the crankcases.
• Be sure to install each balancer shaft journal bearing in its original place.



2. Install:
   • Balancer shaft

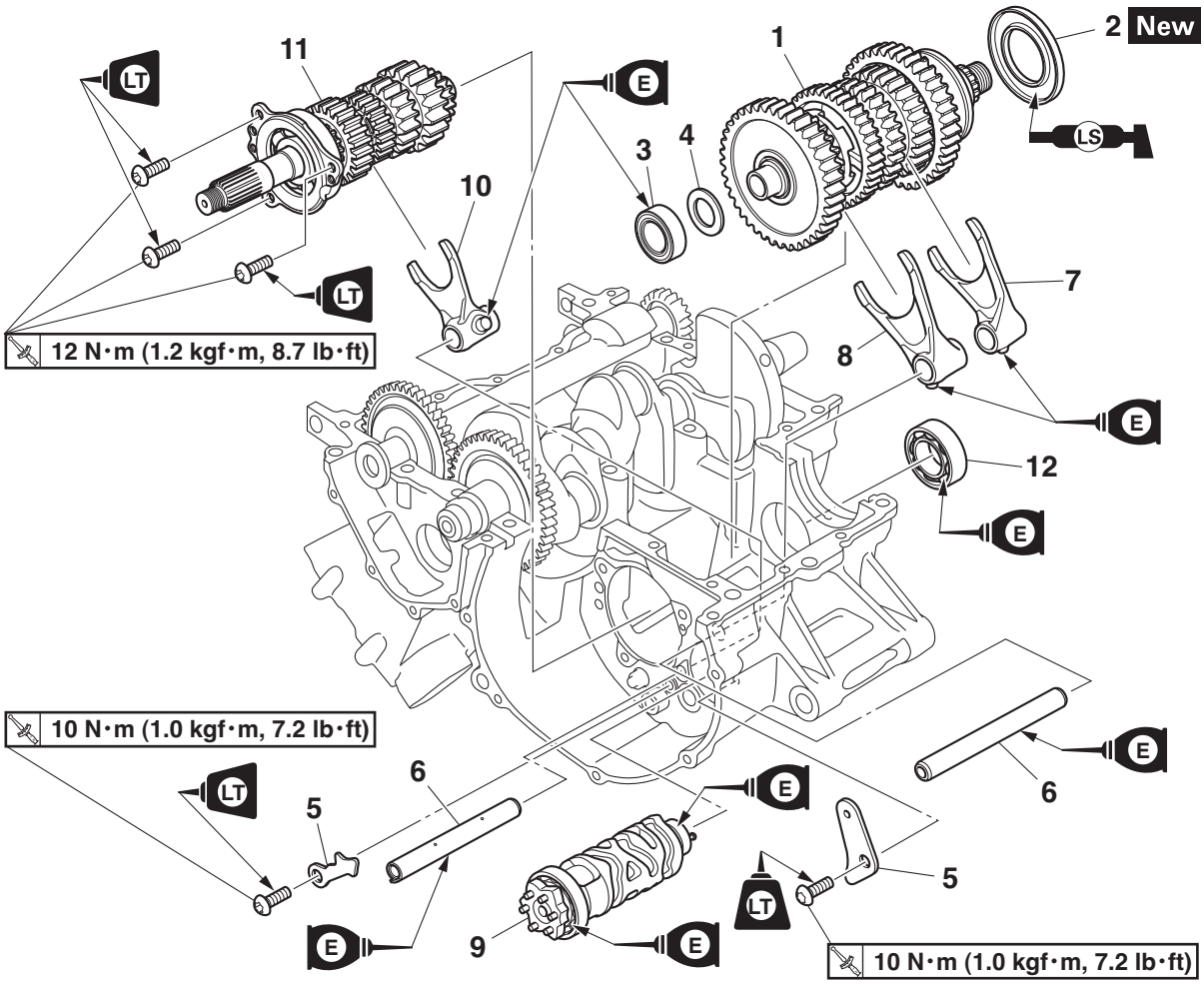
TIP

Install by aligning the crankshaft match mark “a” and the balancer shaft match mark “b”.



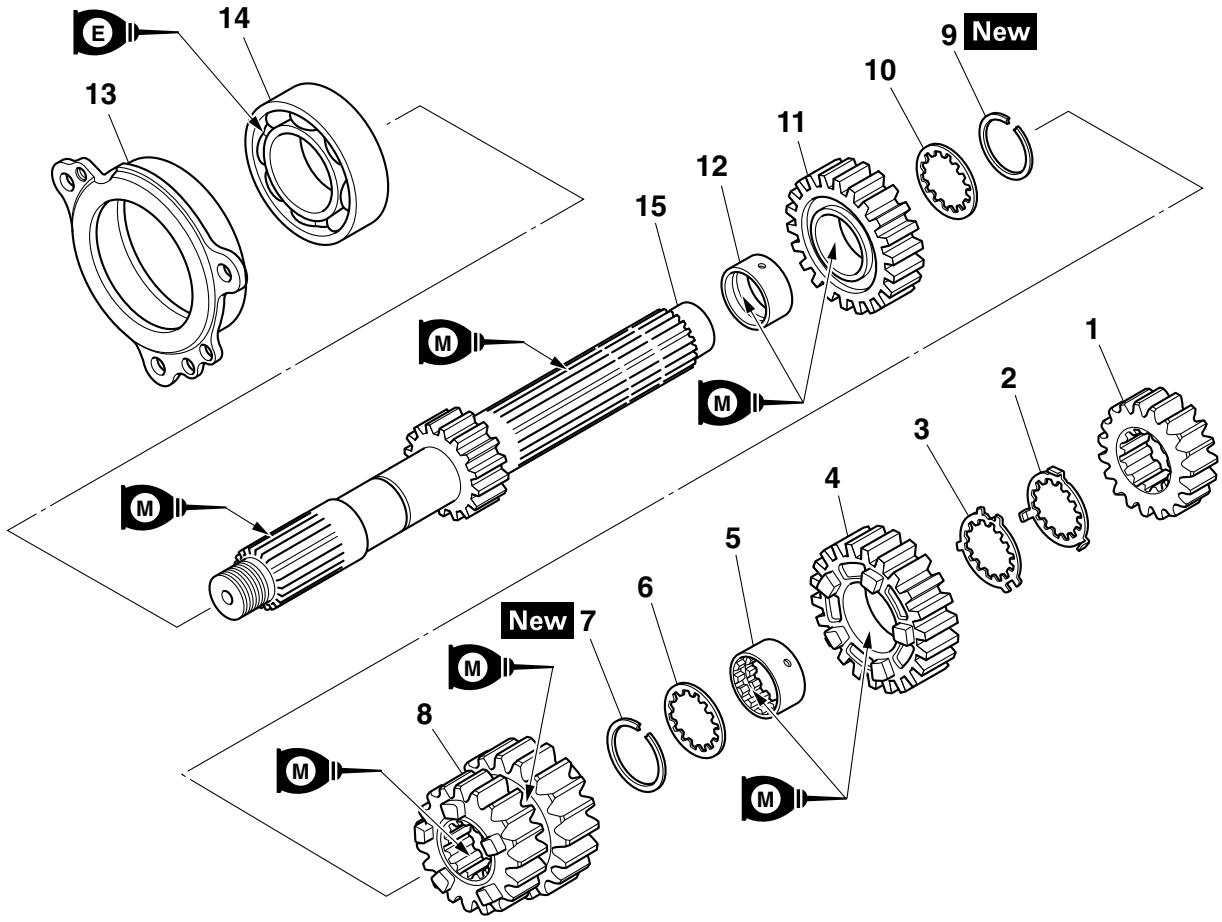
EAS20062
TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks



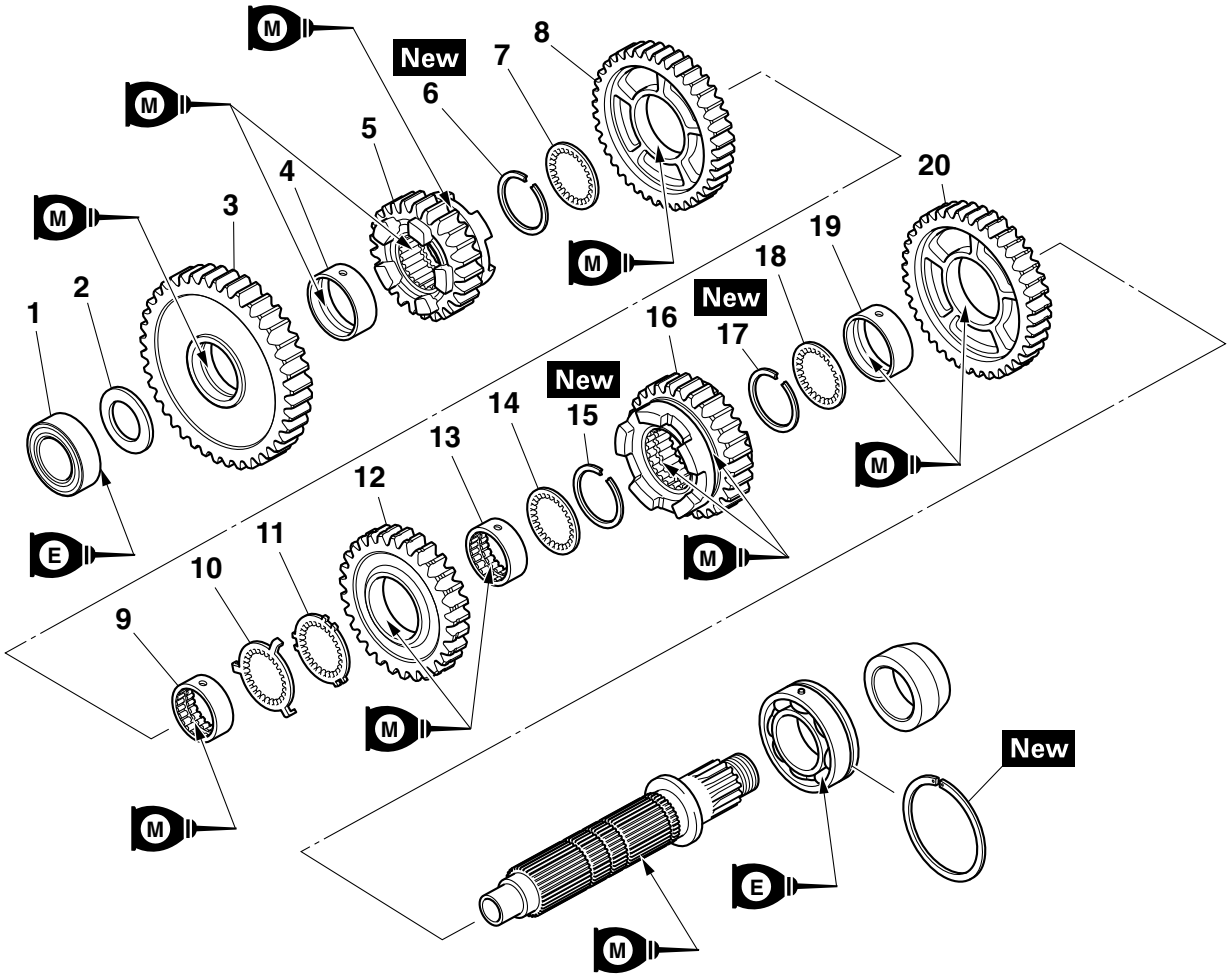
Order	Job/Parts to remove	Q'ty	Remarks
	Lower crankcase		Refer to "CRANKCASE" on page 5-57.
1	Drive axle assembly	1	
2	Oil seal	1	
3	Bearing	1	
4	Washer	1	
5	Shift drum retainer	2	
6	Shift fork guide bar	2	
7	Shift fork-L	1	
8	Shift fork-R	1	
9	Shift drum assembly	1	
10	Shift fork-C	1	
11	Main axle assembly	1	
12	Bearing	1	

Disassembling the main axle assembly



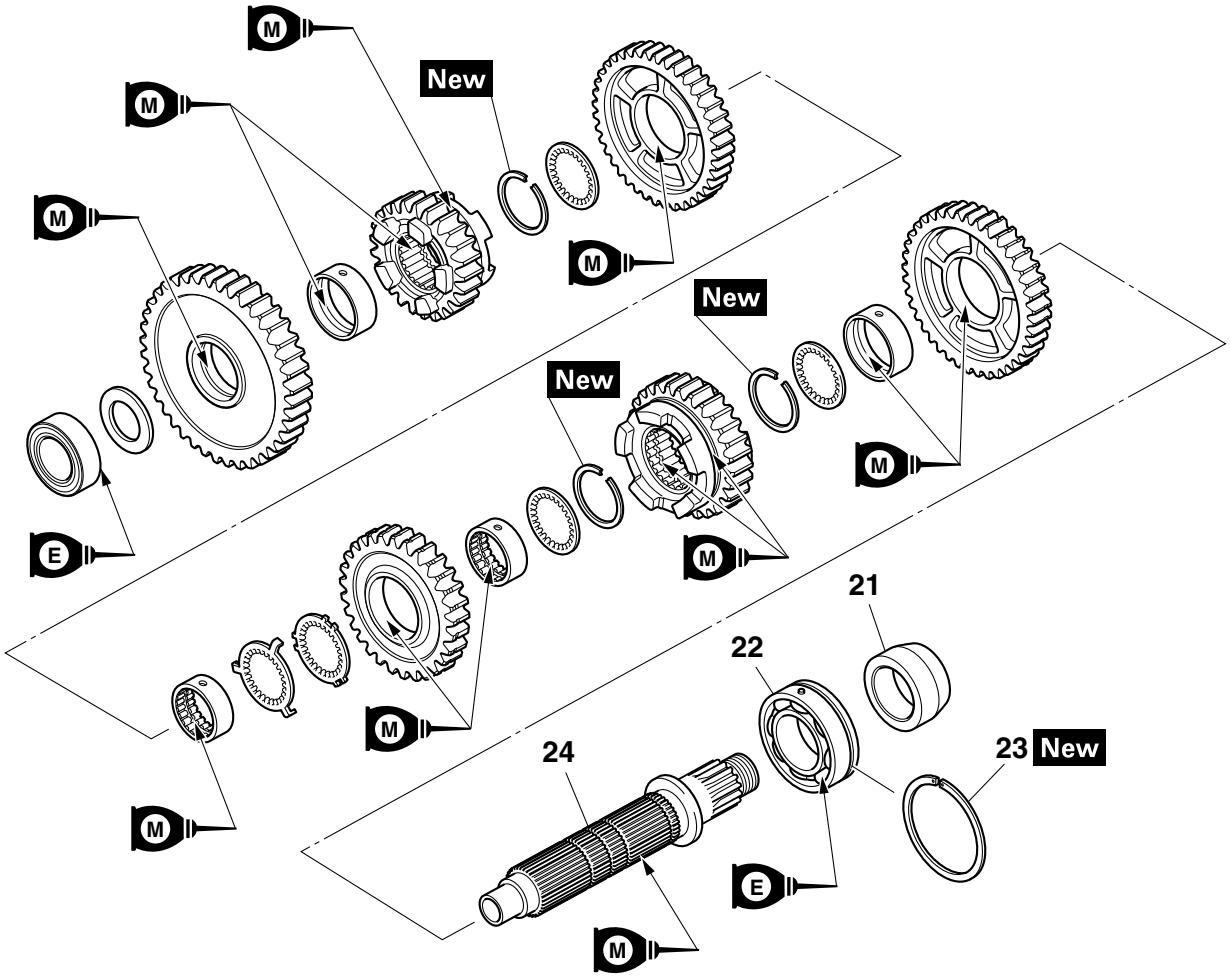
Order	Job/Parts to remove	Q'ty	Remarks
1	2nd pinion gear	1	
2	Toothed lock washer	1	
3	Toothed lock washer retainer	1	
4	6th pinion gear	1	
5	Collar	1	
6	Washer	1	
7	Circlip	1	
8	3rd pinion gear	1	
9	Circlip	1	
10	Washer	1	
11	5th pinion gear	1	
12	Collar	1	
13	Bearing housing	1	
14	Bearing	1	
15	Main axle	1	

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Bearing	1	
2	Washer	1	
3	1st wheel gear	1	
4	Collar	1	
5	5th wheel gear	1	
6	Circlip	1	
7	Washer	1	
8	3rd wheel gear	1	
9	Collar	1	
10	Toothed lock washer	1	
11	Toothed lock washer retainer	1	
12	4th wheel gear	1	
13	Collar	1	
14	Washer	1	
15	Circlip	1	
16	6th wheel gear	1	
17	Circlip	1	
18	Washer	1	
19	Collar	1	
20	2nd wheel gear	1	

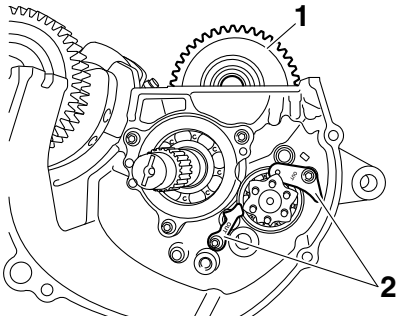
Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
21	Collar	1	
22	Bearing	1	
23	Circlip	1	
24	Drive axle	1	

EAS30430
REMOVING THE TRANSMISSION

1. Remove:
   - Drive axle assembly “1”
   - Shift drum retainers “2”
   - Shift fork guide bars
   - Shift fork-L
   - Shift fork-R
   - Shift drum assembly
   - Shift fork-C



2. Remove:
   - Bearing housing “1”
   - Main axle assembly “2”

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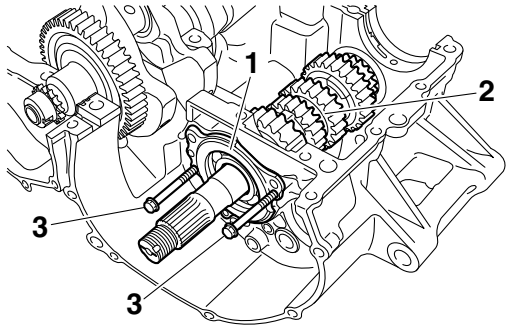
a. Insert two bolts “3” of the proper size, as shown in the illustration, into the main axle assembly bearing housing.



b. Tighten the bolts until they contact the crankcase surface.
c. Continue tightening the bolts until the main axle assembly comes free from the upper crankcase.

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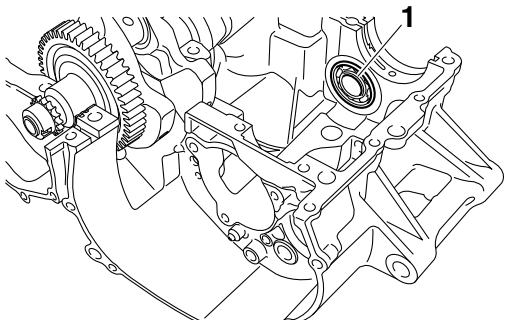
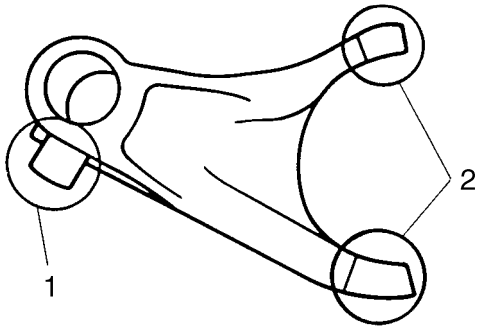
3. Remove:
   - Bearing “1”



EAS30431
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.

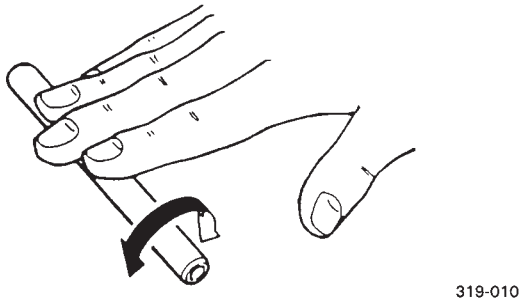


2. Check:
   - Shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

EWA12840

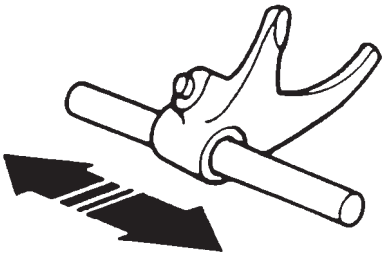
⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.



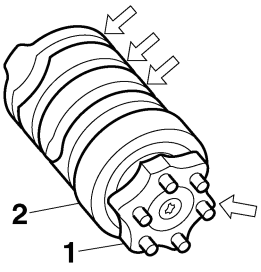
319-010

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.



EAS30432
CHECKING THE SHIFT DRUM ASSEMBLY

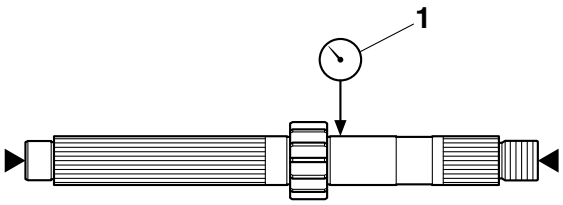
1. Check:
   - Shift drum groove
     Damage/scratches/wear → Replace the shift drum assembly.
   - Shift drum segment "1"
     Damage/wear → Replace the shift drum assembly.
   - Shift drum bearing "2"
     Damage/pitting → Replace the shift drum assembly.



EAS30433
CHECKING THE TRANSMISSION

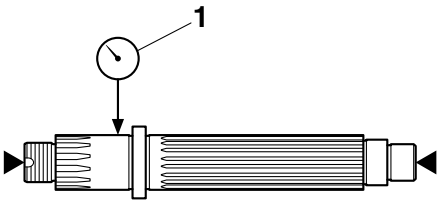
1. Measure:
   - Main axle runout
     (with a centering device and dial gauge "1")
     Out of specification → Replace the main axle.

	Main axle runout limit **0.08 mm (0.0032 in)**

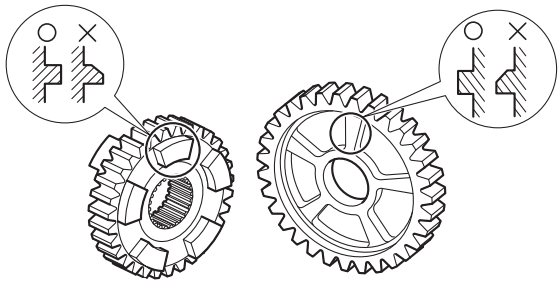


2. Measure:
   - Drive axle runout
     (with a centering device and dial gauge "1")
     Out of specification → Replace the drive axle.

	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.

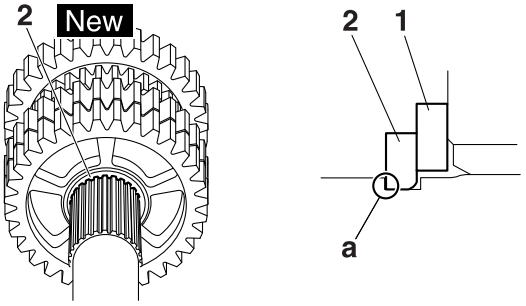
EAS30435
ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

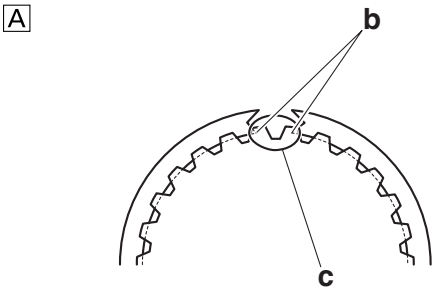
1. Install:
   - Toothed washer "1"
   - Circlip "2" New

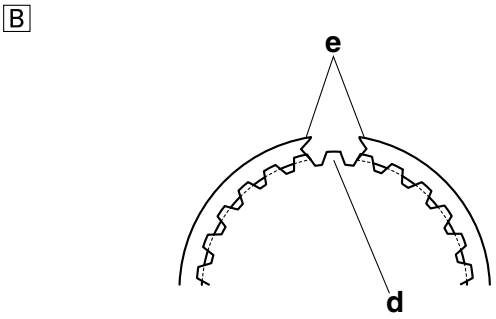
TIP

- Be sure the circlip sharp-edged corner "a" is

positioned opposite side to the toothed washer and gear.
- Align the opening between the ends “b” of the circlip with a groove “c” in the axle.
- Install the circlip so that a spline “d” is in the center of the gap between the circlip ends “e” as shown.





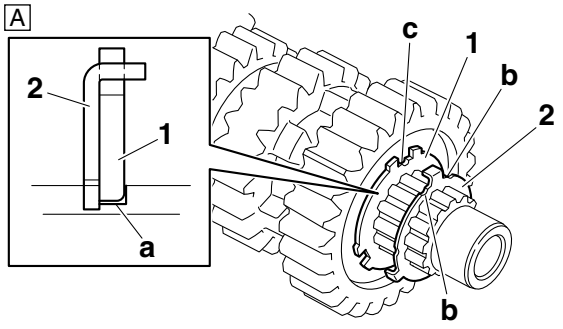


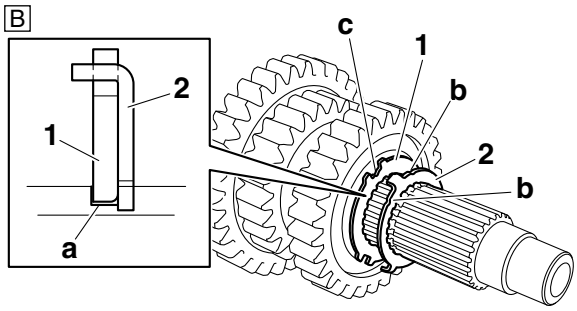
A. Main axle
B. Drive axle

2. Install:
   - Toothed lock washer retainer “1”
   - Toothed lock washer “2”

TIP

- With the toothed lock washer retainer in the groove “a” in the axle, align the projection on the retainer with an axle spline, and then install the toothed lock washer.
- 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.





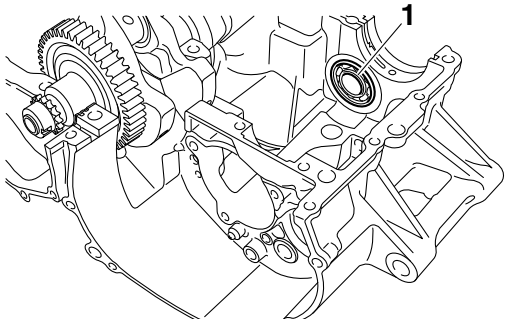
A. Main axle
B. Drive axle

EAS30438
INSTALLING THE TRANSMISSION

1. Install:
   - Bearing “1”

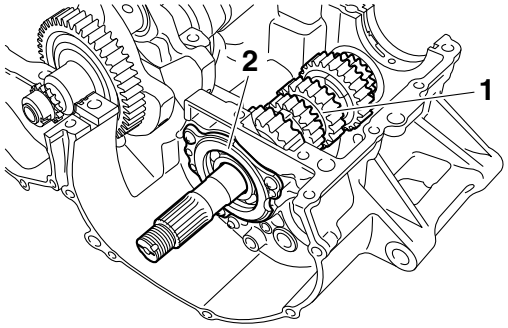
TIP

Face the seal side of bearing to the outside.



2. Install:
   - Main axle assembly “1”
   - Bearing housing “2”

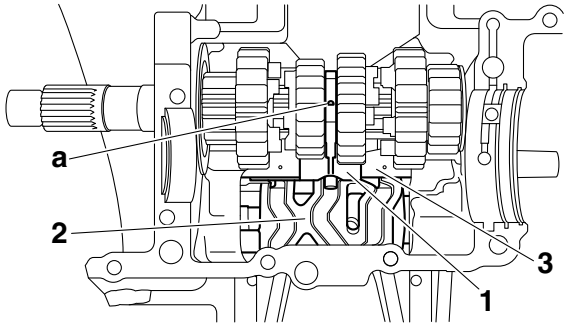
	Main axle bearing housing bolt **12 N·m (1.2 kgf·m, 8.7 lb·ft)** **LOCTITE®**



3. Install:
   • Shift fork-C “1”
   • Shift drum assembly “2”
   • Shift fork guide bar “3”

TIP

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: “R”, “C”, “L”.
- Carefully position the shift forks so that they are installed correctly into the transmission gears.
- Install shift fork-C into the groove “a” in the 3rd and 4th pinion gear on the main axle.

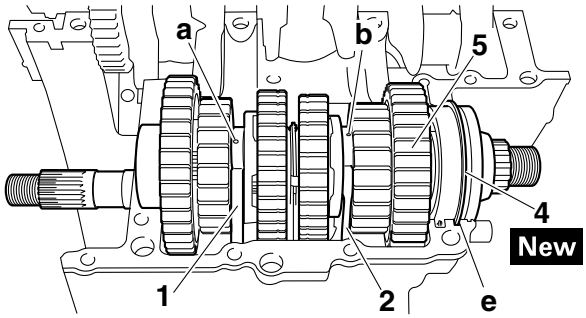


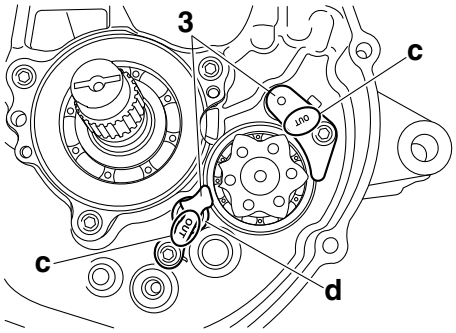
4. Install:
   • Shift fork-R “1”
   • Shift fork-L “2”
   • Shift fork guide bar
   • Shift drum retainers “3”
   • Bearing
   • Oil seal New
   • Circlip “4” New
   • Drive axle assembly “5”

Shift drum retainer bolt
10 N·m (1.0 kgf·m, 7.2 lb·ft)
LOCTITE®

TIP

- Install shift fork-R into the groove “a” in the 5th wheel gear and shift fork-L into the groove “b” in the 6th wheel gear on the drive axle.
- Install the shift drum retainer with its “OUT” mark “c” facing outward.
- Touch the protrusion “d” on the shift fork guide bar to the side of the shift drum retainer.
- Make sure that the drive axle bearing circlip “4” is inserted into the grooves “e” in the upper crankcase.





5. Check:
   • Transmission
     Rough movement → Repair.

TIP

Oil each gear, shaft, and bearing thoroughly.

COOLING SYSTEM

RADIATOR.....6-1
CHECKING THE RADIATOR.....6-2
INSTALLING THE RADIATOR.....6-2

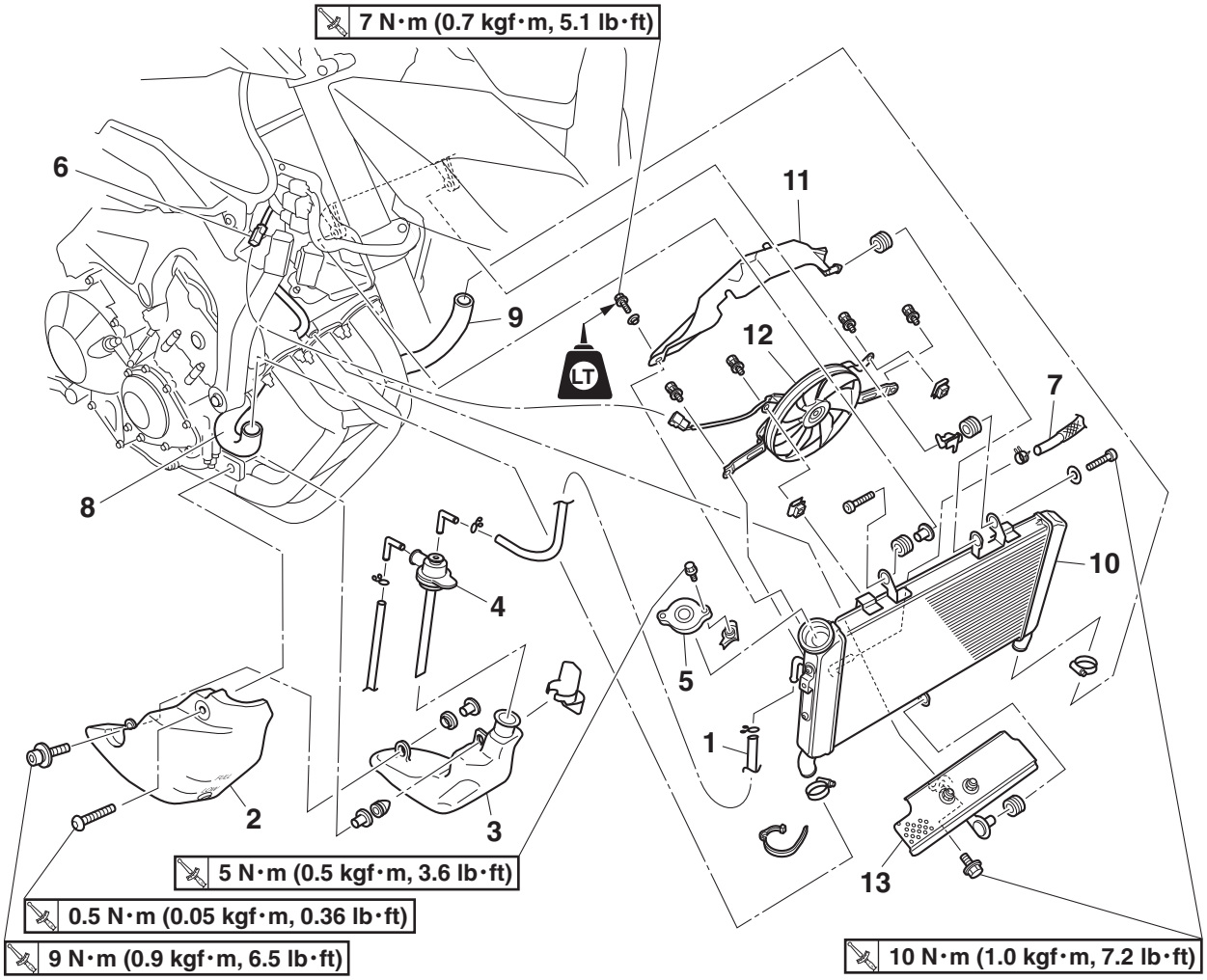
OIL COOLER.....6-4
CHECKING THE OIL COOLER 6-5
INSTALLING THE OIL COOLER 6-5

THERMOSTAT.....6-6
CHECKING THE THERMOSTAT.....6-7
INSTALLING THE THERMOSTAT ASSEMBLY 6-7

WATER PUMP 6-8
DISASSEMBLING THE WATER PUMP.....6-10
CHECKING THE WATER PUMP 6-10
ASSEMBLING THE WATER PUMP.....6-10

EAS20063
RADIATOR

Removing the radiator

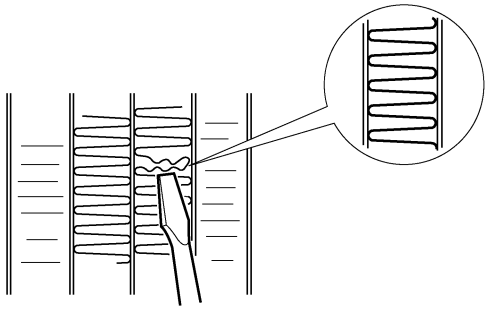


Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-27.
1	Coolant reservoir hose	1	Disconnect.
2	Coolant reservoir cover	1	
3	Coolant reservoir	1	
4	Coolant reservoir cap	1	
5	Radiator cap	1	
6	Radiator fan motor coupler	1	Disconnect.
7	Radiator hose (cylinder head to radiator)	1	Disconnect.
8	Radiator inlet hose	1	Disconnect.
9	Radiator outlet hose	1	Disconnect.
10	Radiator	1	
11	Radiator fan cover	1	
12	Radiator fan	1	
13	Radiator stay	1	

EAS30439
CHECKING THE RADIATOR

1. Check:
   • Radiator fins
   Obstruction → Clean.
   Apply compressed air to the rear of the radiator.
   Damage → Repair or replace.

TIP
Straighten any flattened fins with a thin, flat-head screwdriver.



2. Check:
   • Radiator hoses
   • Radiator pipes
   Cracks/damage → Replace.
3. Measure:
   • Radiator cap valve opening pressure
   Below the specified pressure → Replace the radiator cap.

Radiator cap valve opening pressure
93.3–122.7 kPa (0.93–1.23 kgf/cm², 13.5–17.8 psi)

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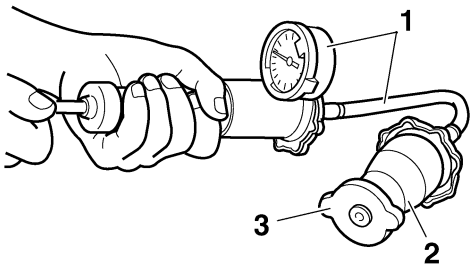
a. Install the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator cap "3".

Radiator cap tester
90890-01325
Mityvac cooling system tester kit
YU-24460-A
Radiator cap tester adapter
90890-01352
Pressure tester adapter
YU-33984



b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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4. Check:
   • Radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to "COOLING SYSTEM" on page 8-27.

EAS30440
INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-27.
2. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.

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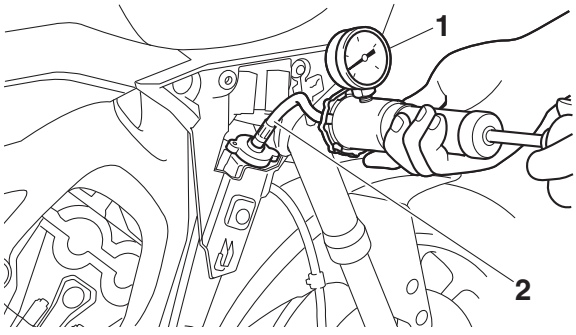
a. Attach the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator.

Radiator cap tester
90890-01325
Mityvac cooling system tester kit
YU-24460-A
Radiator cap tester adapter
90890-01352
Pressure tester adapter
YU-33984



b. Apply 122.7 kPa (1.23 kgf/cm², 17.8 psi) of

pressure.
c. Measure the indicated pressure with the gauge.

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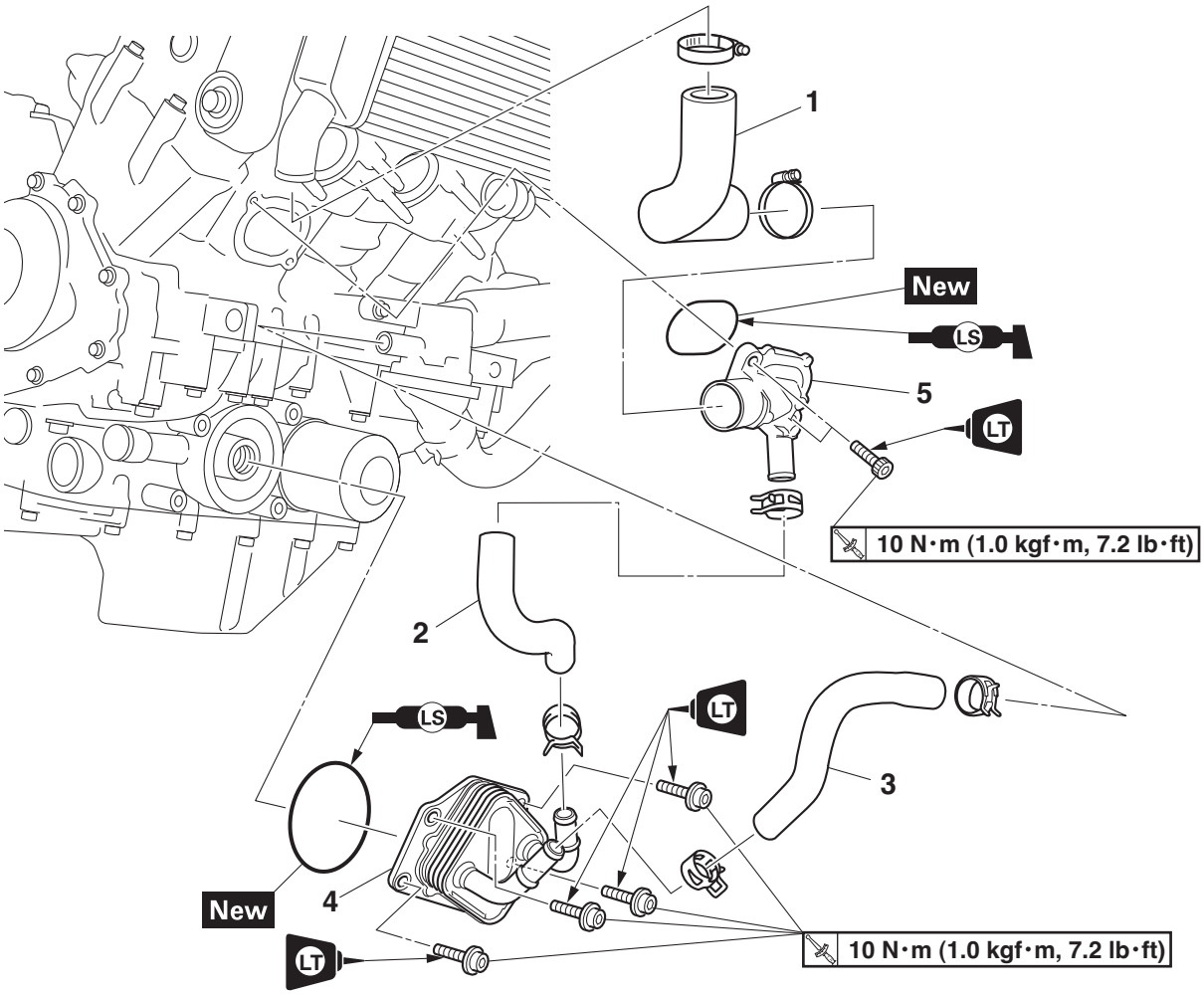
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to “CHECKING THE RADIATOR” on page 6-2.

EAS20064
OIL COOLER

Removing the oil cooler



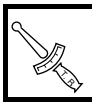
Order	Job/Parts to remove	Q'ty	Remarks
	Coolant reservoir		Refer to "RADIATOR" on page 6-1.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-27.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
1	Radiator inlet hose	1	
2	Oil cooler inlet hose	1	
3	Oil cooler outlet hose	1	
4	Oil cooler	1	
5	Water jacket joint	1	

EAS30441
CHECKING THE OIL COOLER

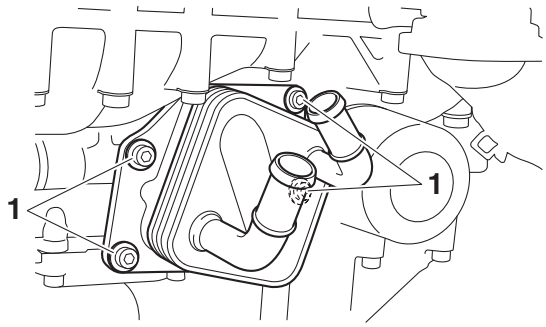
1. Check:
   • Oil cooler
   Cracks/damage → Replace.
2. Check:
   • Oil cooler inlet hose
   • Oil cooler outlet hose
   Cracks/damage/wear → Replace.

EAS30442
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 3 “1”

	**Oil cooler bolt** **10 N·m (1.0 kgf·m, 7.2 lb·ft)**

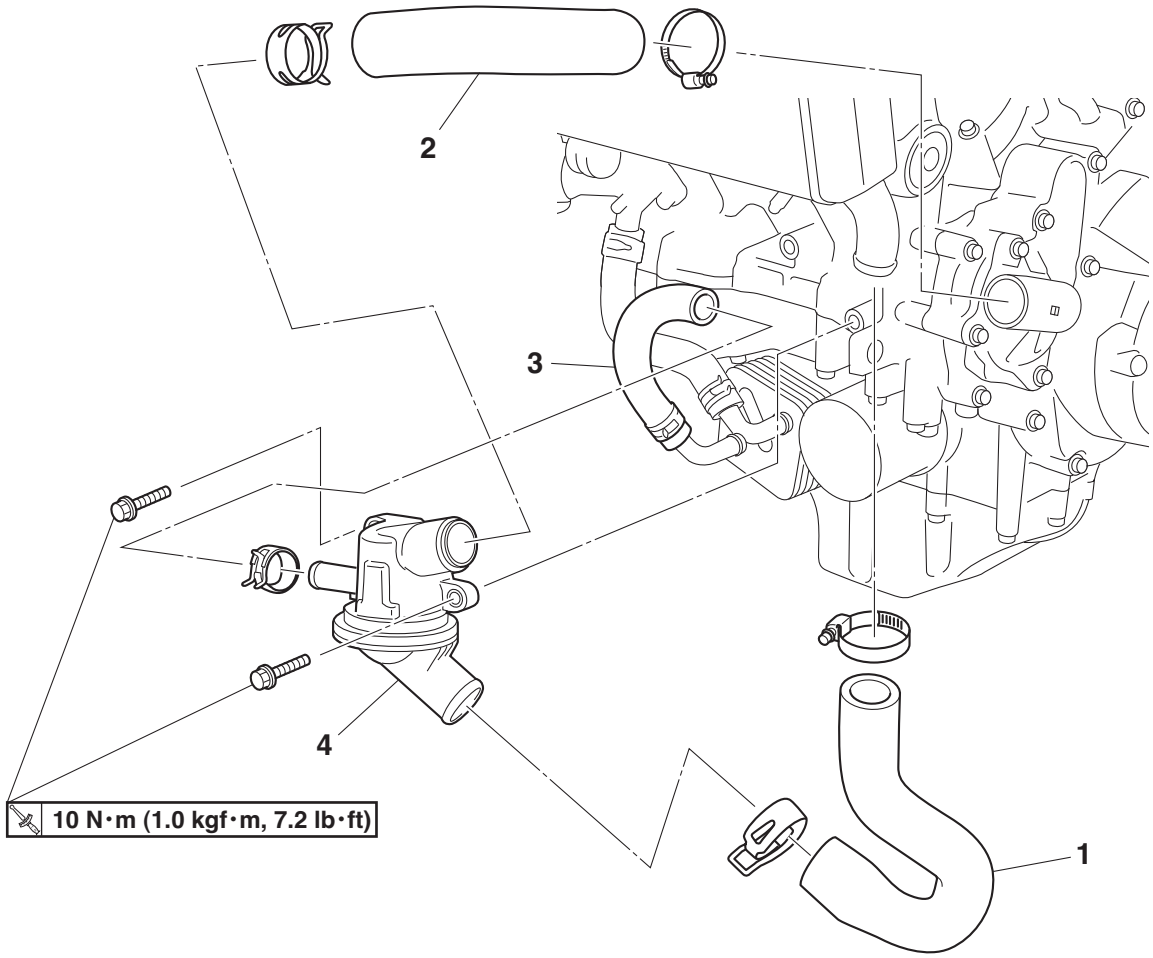
TIP
- Before installing the oil cooler, apply lithium-soap-based grease to the O-ring.
- Make sure the O-ring is positioned properly.



3. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to “CHANGING THE COOLANT” on page 3-27.
   • Crankcase
   (with the specified amount of the recommended engine oil)
   Refer to “CHANGING THE ENGINE OIL” on page 3-24.
4. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
   Refer to “INSTALLING THE RADIATOR” on page 6-2.
5. Measure:
   • Radiator cap valve opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to “CHECKING THE RADIATOR” on page 6-2.

EAS20065
THERMOSTAT

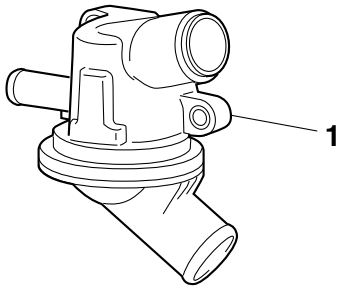
Removing the thermostat assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-27.
1	Radiator outlet hose	1	
2	Water pump inlet hose	1	
3	Oil cooler outlet hose	1	Disconnect.
4	Thermostat assembly	1	

EAS30443
CHECKING THE THERMOSTAT

1. Check:
   - Thermostat assembly “1”
     Cracks/damage → Replace.

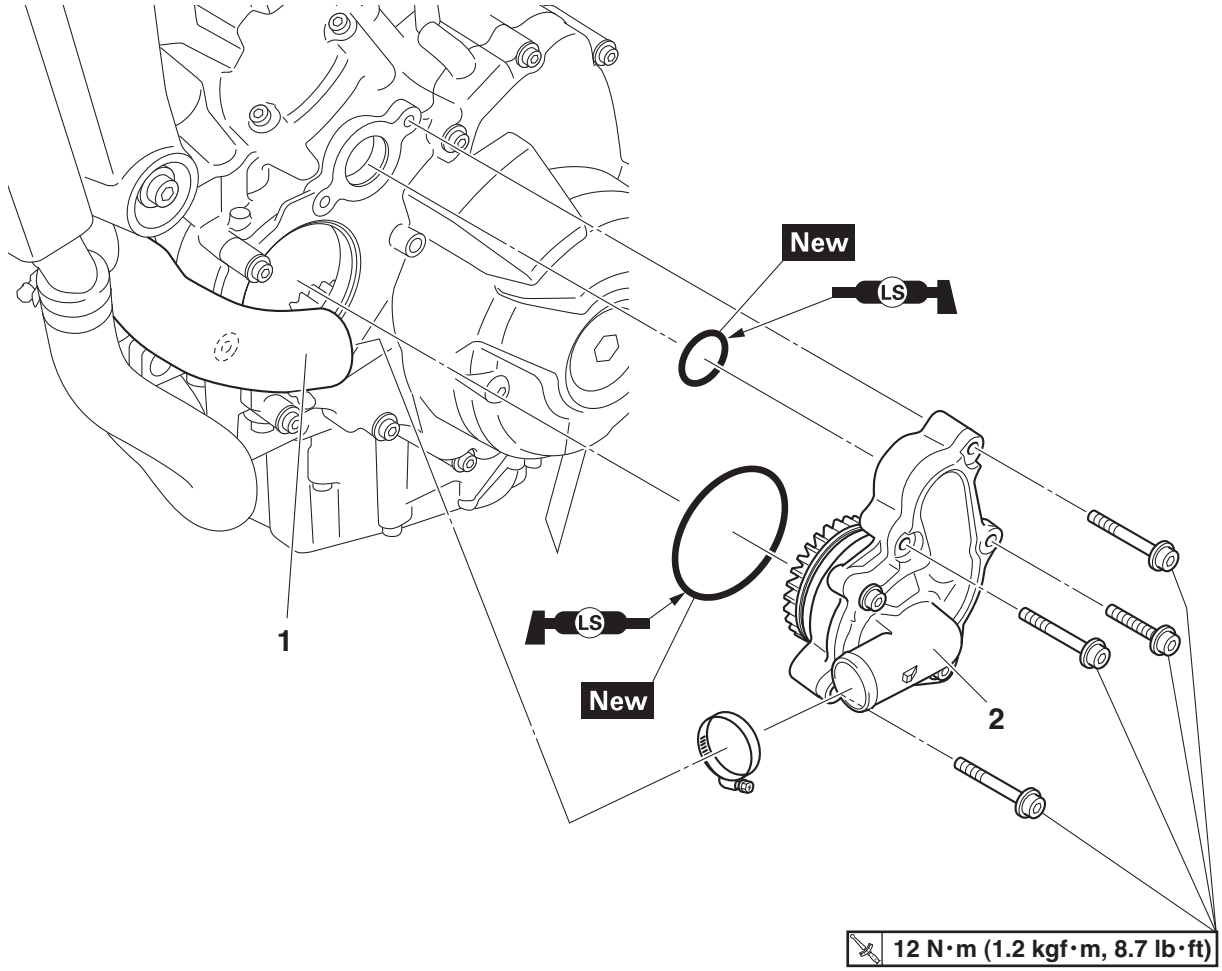


EAS30445
INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
   - Thermostat assembly
2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-27.
3. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
     Refer to “INSTALLING THE RADIATOR” on page 6-2.
4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-2.

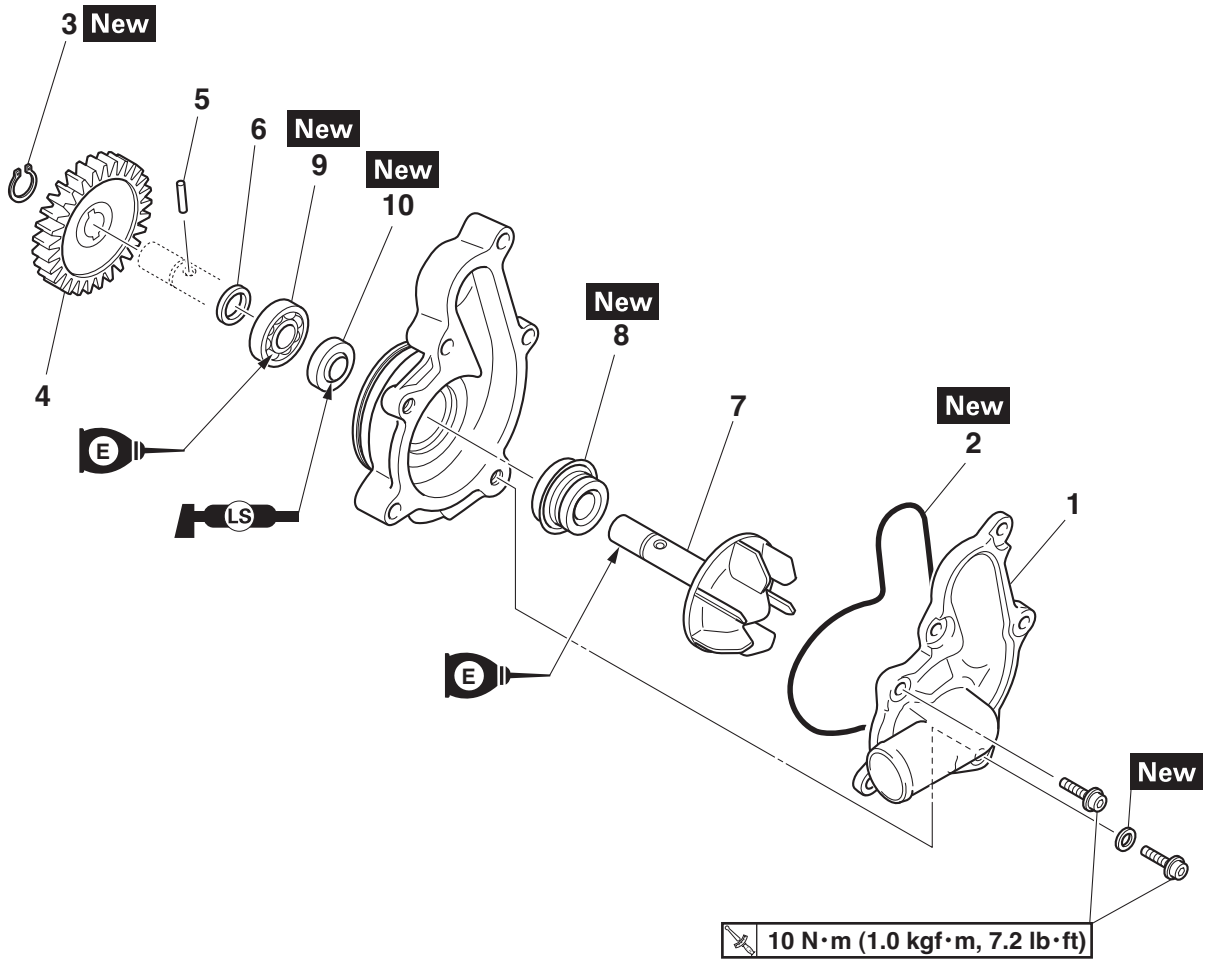
EAS20066
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-27.
1	Water pump inlet hose	1	Disconnect.
2	Water pump assembly	1	

Disassembling the water pump

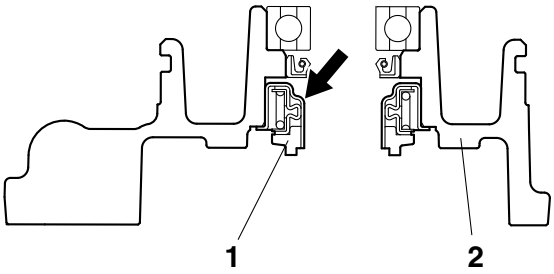


Order	Job/Parts to remove	Q'ty	Remarks
1	Water pump housing cover	1	
2	O-ring	1	
3	Circlip	1	
4	Water pump driven gear	1	
5	Pin	1	
6	Washer	1	
7	Impeller shaft	1	
8	Mechanical seal	1	
9	Bearing	1	
10	Oil seal	1	

EAS30446
DISASSEMBLING THE WATER PUMP

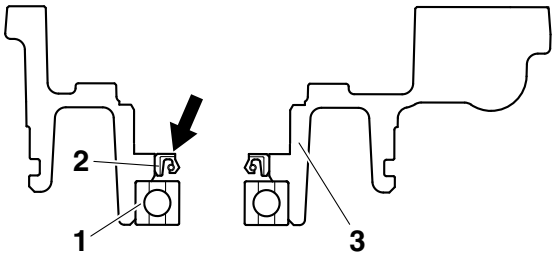
1. Remove:
   • Mechanical seal (housing side) “1”

TIP
Remove the mechanical seal (housing side) from the inside of the water pump housing “2”.



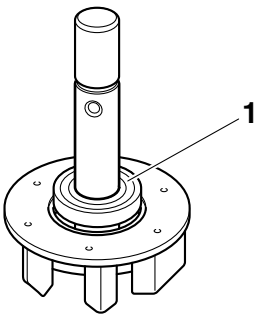
2. Remove:
   • Bearing “1”
   • Oil seal “2”

TIP
Remove the oil seal and bearing from the outside of the water pump housing “3”.



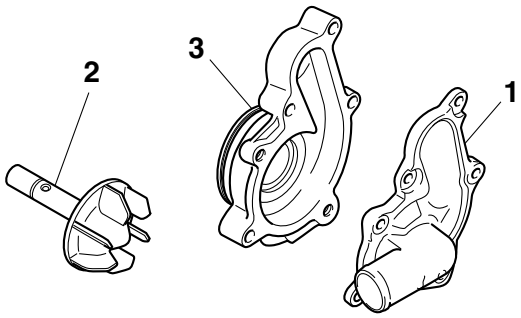
3. Remove:
   • Mechanical seal (impeller side) “1”
   (from the impeller, with a thin, flat-head screwdriver)

TIP
Do not scratch the impeller shaft.



EAS30447
CHECKING THE WATER PUMP

1. Check:
   • Water pump housing cover “1”
   • Impeller shaft “2”
   Cracks/damage/wear → Replace.
   • Water pump housing “3”
   Cracks/damage/wear → Replace the water pump assembly.



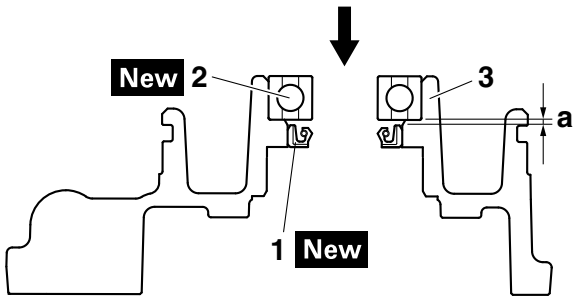
2. Check:
   • Bearing
   Rough movement → Replace.
3. Check:
   • Water pump inlet hose
   Cracks/damage/wear → Replace.

EAS30448
ASSEMBLING THE WATER PUMP

1. Install:
   • Oil seal “1” New
   • Bearing “2” New
   (into the water pump housing “3”)

	Installed depth “a” **0.5–1.0 mm (0.02–0.04 in)**

TIP
Install the oil seal with a socket that matches its outside diameter.



2. Install:
   • Mechanical seal (housing side) “1” New

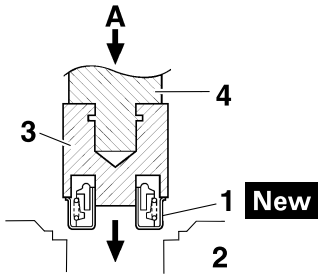
ECA20330
NOTICE
Never lubricate the mechanical seal (hous-

ing side) surface with oil or grease.

TIP

Use the special tools and a press to press the mechanical seal (housing side) straight in until it touches the water pump housing.

Mechanical seal installer
90890-04078
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Middle drive bearing installer 40 & 50 mm
YM-04058



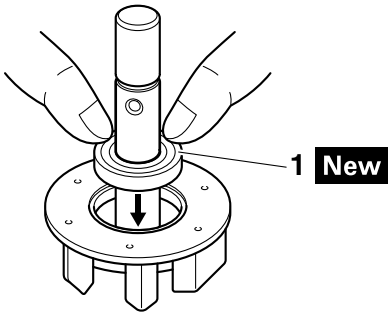
2. Water pump housing
3. Mechanical seal installer
4. Middle driven shaft bearing driver

A. Push down

3. Install:
   • Mechanical seal (impeller side) "1" New

TIP

- Before installing the mechanical seal (impeller side), apply tap water or coolant onto its outer surface.
- If the top of the mechanical seal is dirty, clean it.



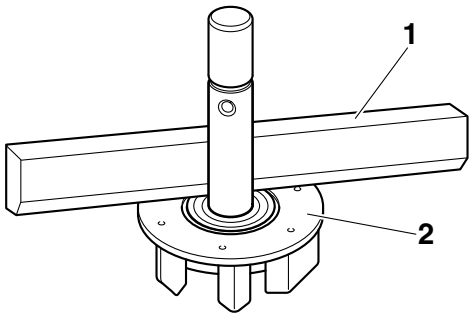
4. Measure:
   • Impeller shaft tilt
   Out of specification → Repeat steps (3) and (4).

ECA20340

NOTICE

Make sure the mechanical seal (impeller side) is flush with the impeller.

Impeller shaft tilt limit
0.15 mm (0.006 in)



1. Straightedge
2. Impeller

FUEL SYSTEM

FUEL TANK 7-1
REMOVING THE FUEL TANK 7-3
REMOVING THE FUEL PUMP 7-3
CHECKING THE FUEL PUMP BODY 7-3
CHECKING THE FUEL PUMP OPERATION 7-3
INSTALLING THE FUEL PUMP 7-4
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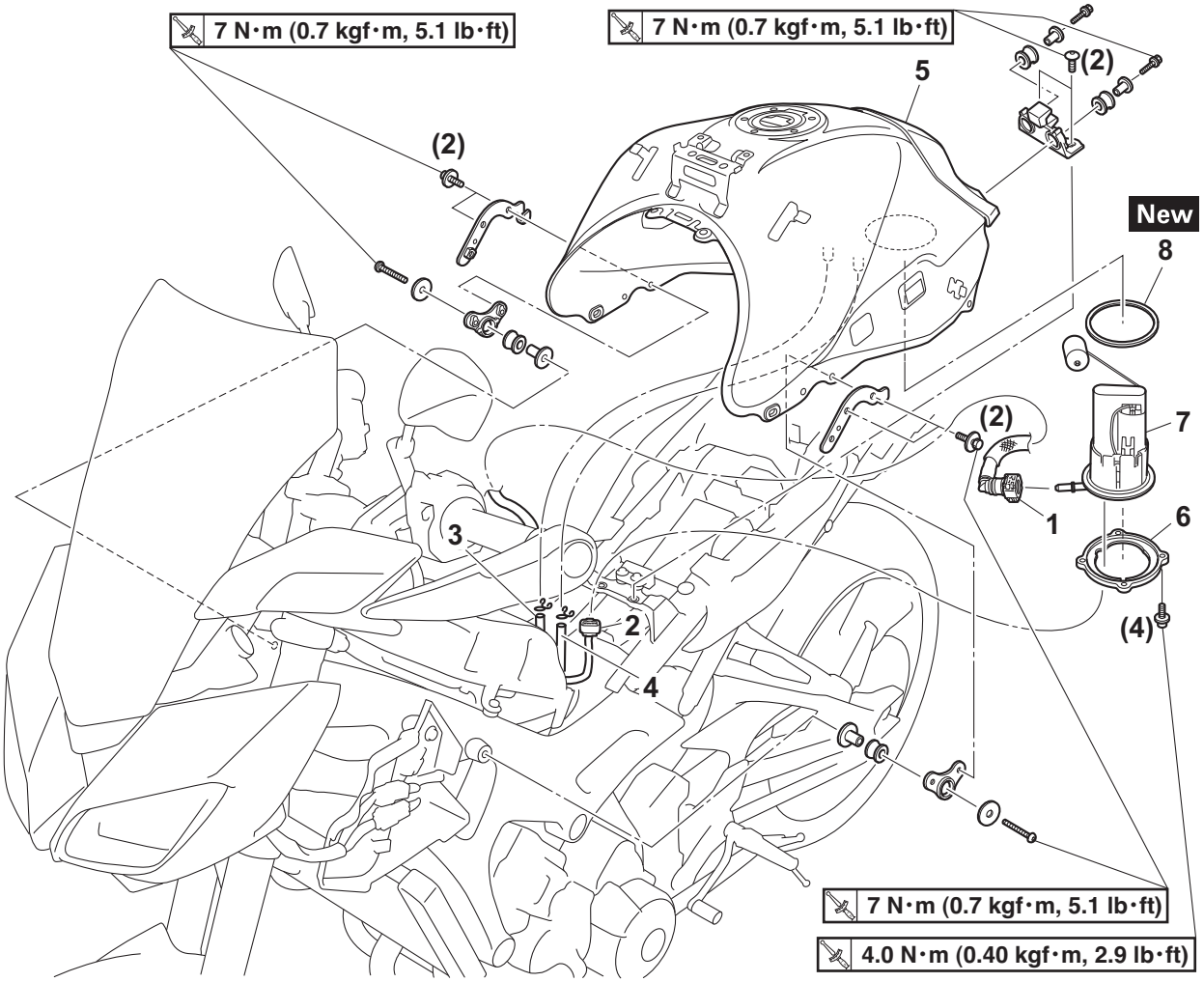
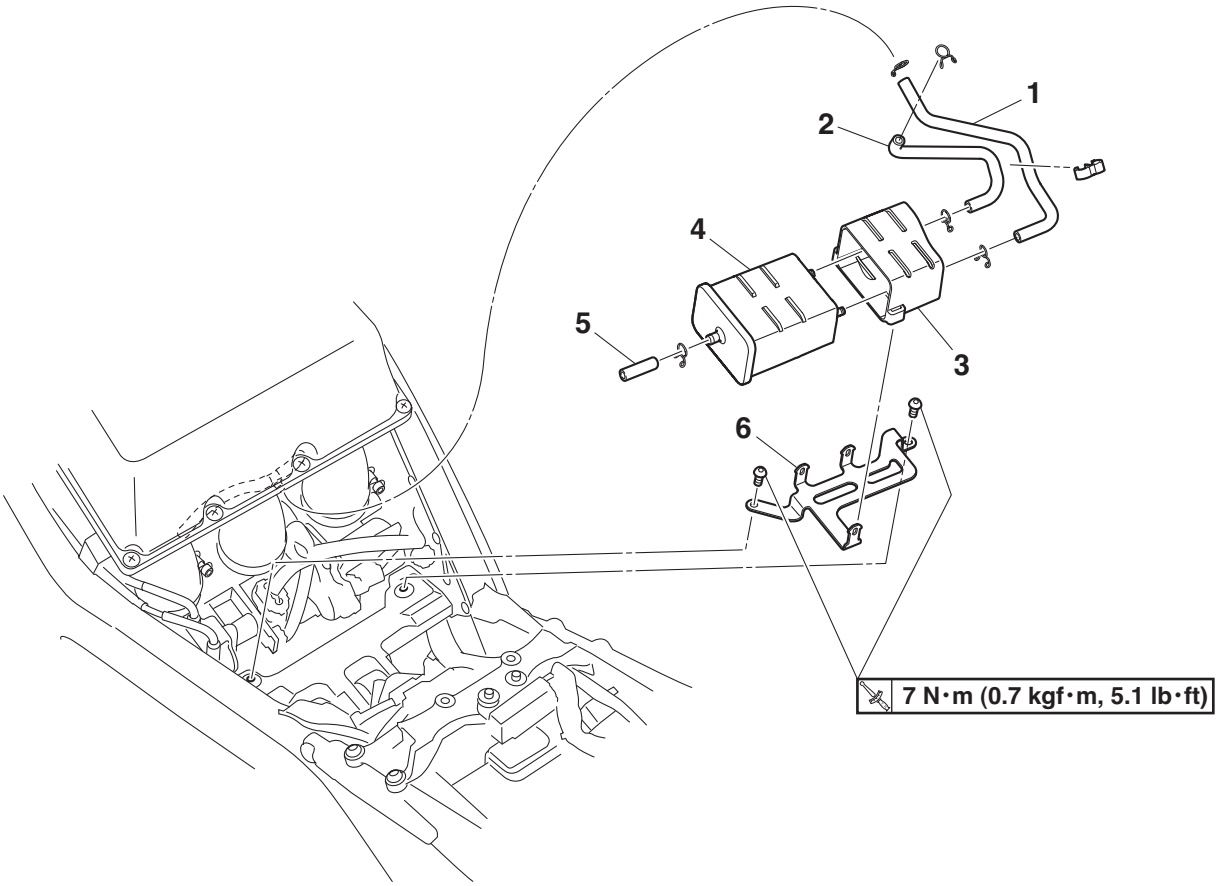
EAS20067
FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
1	Fuel hose connector	1	Disconnect.
2	Fuel pump coupler	1	Disconnect.
3	Fuel tank breather hose	1	Disconnect.
4	Fuel tank drain hose	1	Disconnect.
5	Fuel tank	1	
6	Fuel pump bracket	1	
7	Fuel pump	1	
8	Fuel pump gasket	1	

Removing the canister



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Canister purge hose (hose joint to canister)	1	
2	Fuel tank breather hose (fuel tank to canister)	1	
3	Canister holder	1	
4	Canister	1	
5	Canister breather hose	1	
6	Canister bracket	1	

EAS30450
REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   - Fuel tank front cover/Front side panel/Front side cowling
     Refer to "GENERAL CHASSIS (2)" on page 4-6.
   - Passenger seat/Rider seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank cover
     Refer to "GENERAL CHASSIS (3)" on page 4-13.
3. Disconnect:
   - Fuel hose (fuel tank side)
   - Fuel pump coupler
   - Fuel tank drain hose
   - Fuel tank breather hose

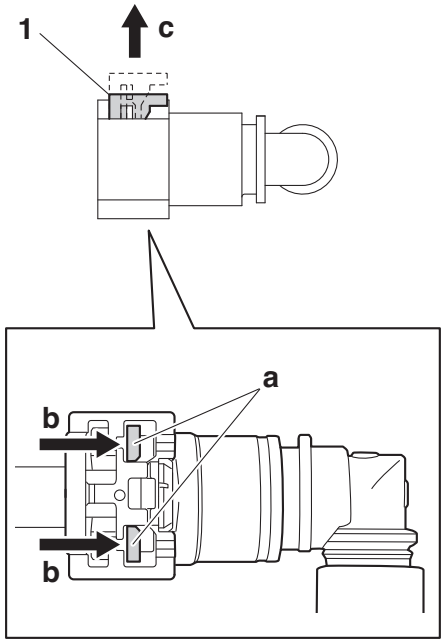
EWA17320
WARNING

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

ECA17490
NOTICE

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.

TIP
- While pushing the ends "a" of the fuel hose connector cover "1" in direction "b", slide the fuel hose connector cover in direction "c", and then remove the hose from the fuel pump.
- Before removing the hose, place a few rags in the area under where it will be removed.
- It is prohibited to wear the cotton work gloves or equivalent coverings.



4. Remove:
   - Fuel tank

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

EAS30451
REMOVING THE FUEL PUMP

1. Remove:
   - Fuel pump

ECA14721
NOTICE

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

EAS30454
CHECKING THE FUEL PUMP BODY

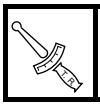
1. Check:
   - Fuel pump body
     Obstruction → Clean.
     Cracks/damage → Replace fuel pump assembly.

EAS30455
CHECKING THE FUEL PUMP OPERATION

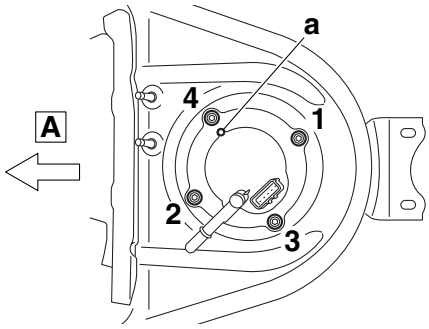
1. Check:
   - Fuel pump operation
     Refer to "CHECKING THE FUEL PRESSURE" on page 7-11.

EAS30456
INSTALLING THE FUEL PUMP

1. Install:
   - Fuel pump gasket **New**
   - Fuel pump
   - Fuel pump bracket
   - Fuel pump bolts

	**Fuel pump bolt** **4.0 N·m (0.40 kgf·m, 2.9 lb·ft)**

TIP
- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump gasket so that the lip side turns to the inside of the fuel tank.
- 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.



A. Forward

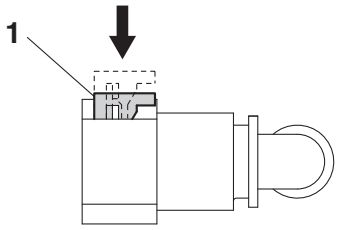
EAS30457
INSTALLING THE FUEL TANK

1. Connect:
   - Fuel hose (fuel tank side)

ECA17500
NOTICE

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

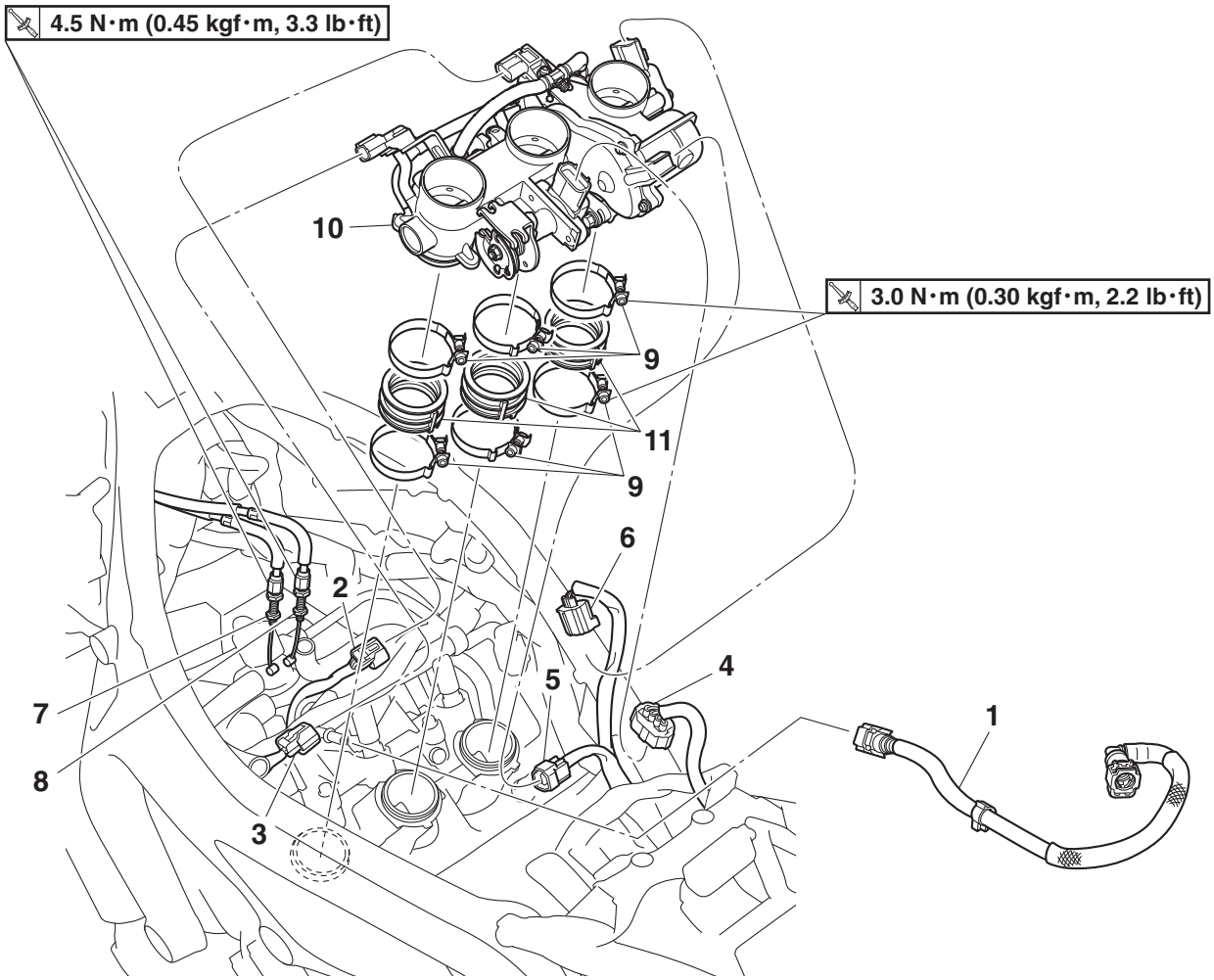
TIP
- Install the fuel hose onto the fuel pump securely, and slide the fuel hose connector cover “1” in the direction shown in the illustration.
- It is prohibited to wear the cotton work gloves or equivalent coverings.



2. Connect:
   - Fuel tank breather hose
   - Fuel tank drain hose
   - Fuel pump coupler

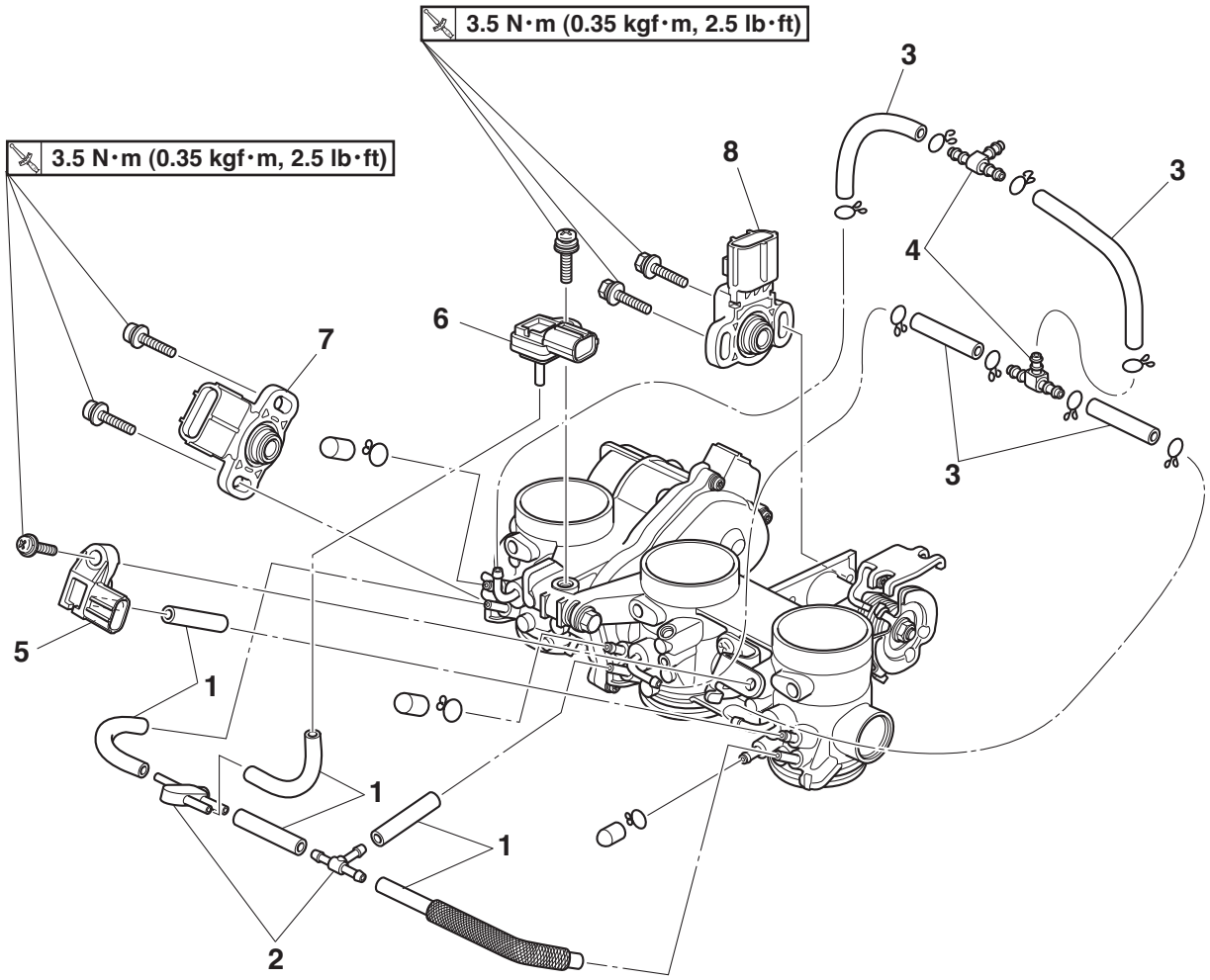
EAS20070
THROTTLE BODIES

Removing the throttle bodies



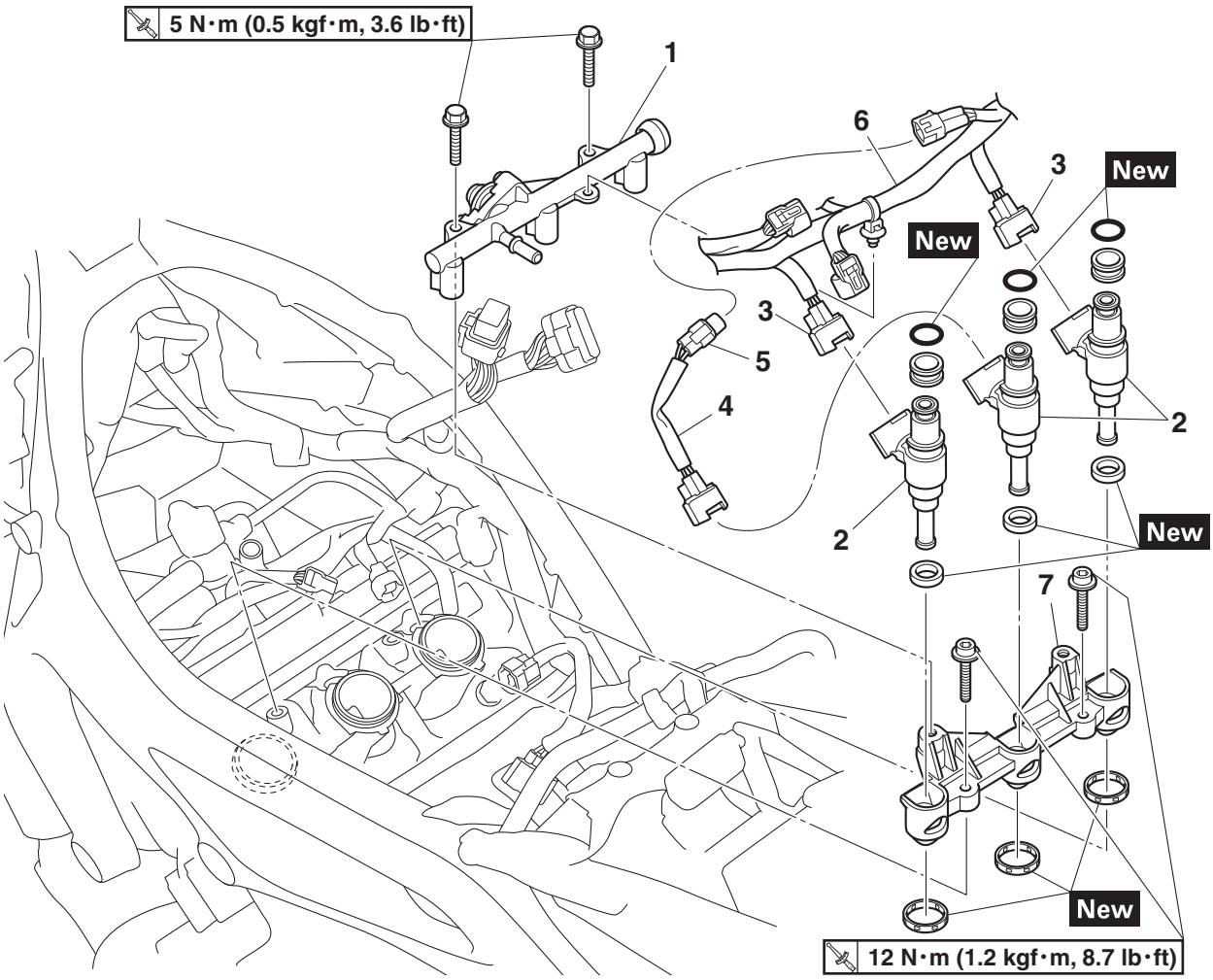
Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank/Canister		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "GENERAL CHASSIS (3)" on page 4-13.
1	Fuel hose	1	
2	Intake air pressure sensor 1 coupler	1	Disconnect.
3	Intake air pressure sensor 2 coupler	1	Disconnect.
4	Accelerator position sensor coupler	1	Disconnect.
5	Throttle servo motor coupler	1	Disconnect.
6	Throttle position sensor coupler	1	Disconnect.
7	Throttle cable (accelerator cable)	1	Disconnect. (Black)
8	Throttle cable (decelerator cable)	1	Disconnect.
9	Throttle body joint clamp screw	6	Loosen.
10	Throttle body assembly	1	
11	Throttle body joint	3	

Removing the sensors



Order	Job/Parts to remove	Q'ty	Remarks
1	Negative pressure hose	6	
2	Hose joint	2	
3	Canister purge hose	4	
4	Hose joint	2	
5	Intake air pressure sensor 2	1	
6	Intake air pressure sensor 1	1	
7	Throttle position sensor	1	
8	Accelerator position sensor	1	

Removing the injectors



Order	Job/Parts to remove	Q'ty	Remarks
	Throttle bodies/Throttle body joint		Refer to "THROTTLE BODIES" on page 7-5.
1	Fuel rail	1	
2	Injector	3	
3	Injector coupler	2	Disconnect.
4	Injector lead	1	
5	Injector lead coupler	1	Disconnect.
6	Wire harness	1	
7	Adapter	1	

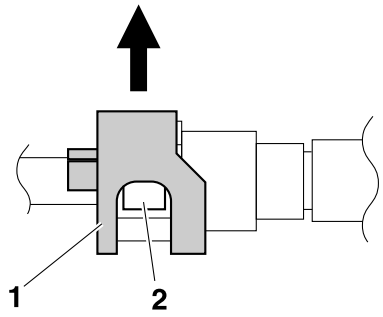
EAS30475
CHECKING THE INJECTORS (BEFORE REMOVING)
1. Check:
   • Injectors
   Use the diagnostic code numbers "36"–"38".
   Refer to "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.

EAS31158
REMOVING THE FUEL HOSE (FUEL RAIL SIDE)
1. Remove:
   • Fuel tank
   Refer to "REMOVING THE FUEL TANK" on page 7-3.
2. Remove:
   • Fuel hose (fuel rail side)

ECA17490
NOTICE

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.

TIP
- To remove the fuel hose from the fuel rail joint, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.
- It is prohibited to wear the cotton work gloves or equivalent coverings.



EAS30476
REMOVING THE INJECTORS
EWA17330
⚠ WARNING

- **Check the injectors in a well-ventilated area free of combustible materials. Make sure that there is no smoking or use of electric tools in the vicinity of the injectors.**
- **Be careful when disconnecting the fuel hose. Any remaining pressure in the fuel hose may cause the fuel to spray out. Place a container or rag under the hose to catch any fuel that spills. Always clean up any spilt fuel immediately.**
- **Turn the main switch to "OFF" and disconnect the negative battery lead from the battery terminal before removing the injectors.**

1. Remove:
   • Throttle bodies
   • Fuel rail "1"

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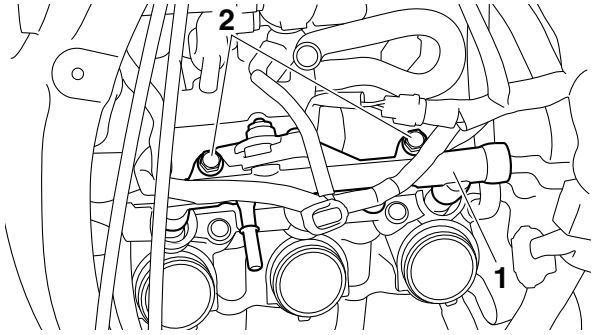
a. Remove the fuel rail bolts "2" as shown.



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EAS30477
CHECKING THE INJECTORS
1. Check:
   • Injectors
   Obstruction → Replace and check the fuel pump/fuel supply system.
   Deposit → Replace.
   Damage → Replace.
2. Check:
   • Injector resistance
   Refer to "CHECKING THE FUEL INJECTORS" on page 8-174.

EAS30769
CHECKING AND CLEANING THE THROTTLE BODIES
TIP

Clean the throttle bodies only if they cannot be synchronized using the bypass air screws. Before cleaning the throttle bodies, check the following items:
- Valve clearance
- Spark plugs
- Air filter element
- Throttle body joints
- Fuel hose
- Exhaust system
- Cylinder head breather hose

EWA17340

⚠ WARNING

If the throttle bodies are subjected to strong shocks or dropped during cleaning, replace them as a set.

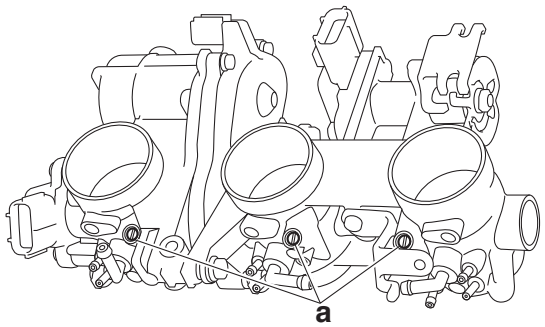
1. Check:
   - Throttle bodies
     Cracks/damage → Replace the throttle bodies as a set.
2. Clean:
   - Throttle bodies

ECA21540

NOTICE

- **Observe the following precautions; otherwise, the throttle bodies may not operate properly.**
- **Do not subject the throttle bodies to excessive force.**
- **Clean the throttle bodies in the recommended cleaning solvent.**
- **Do not use any caustic carburetor cleaning solution.**
- **Do not apply cleaning solvent directly to any plastic parts, sensors, or seals.**
- **Be careful not to remove the white paint mark that identifies the standard throttle body.**
- **Do not turn the bypass air screws "a"; otherwise, the throttle body synchronization will be affected.**

	Recommended cleaning solvent **Yamaha Oil & Brake Cleaner**



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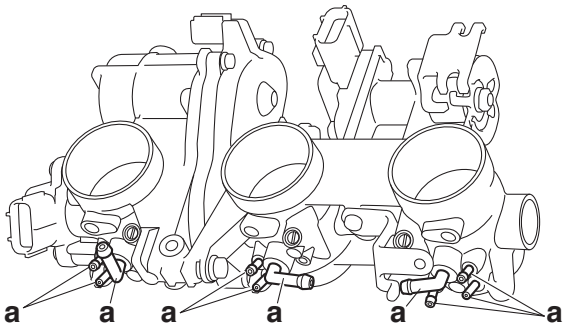
a. Place the throttle bodies on a flat surface with the air filter case side facing up.
b. Install the caps (895-14169-00) onto the hose fittings "a".



c. Hold the throttle valves in the open position.

EWA15940

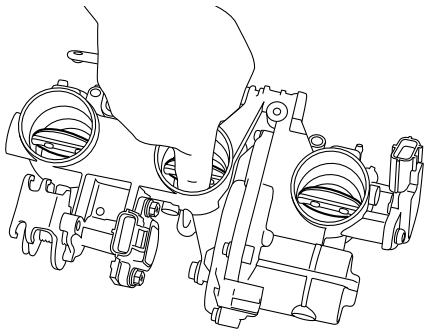
⚠ WARNING

When cleaning the throttle bodies, be careful not to injure yourself on the throttle valves or other components of the throttle bodies.

ECA20380

NOTICE

- **Do not open the throttle valves by supplying electrical power to the throttle bodies.**
- **Do not use tools to open the throttle valves or to keep them in the open position.**
- **Do not open the throttle valves quickly.**



d. Apply the recommended cleaning solvent to the throttle valves and the inside of the throttle bodies to remove any carbon deposits.

TIP

- Do not allow any cleaning solvent to enter the opening for the injectors.
- Do not apply any cleaning solvent to the portions of the throttle valve shafts between the throttle bodies.

e. Remove the carbon deposits from the inside of each throttle body in a downward direction, from the air filter case side of the throttle body to the engine side.

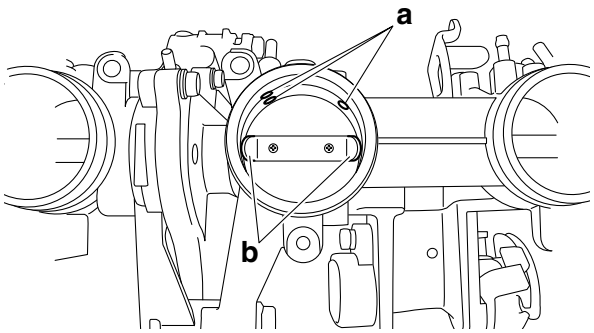
ECA17590

NOTICE

- **Do not use a tool, such as a wire brush, to remove the carbon deposits; otherwise, the inside of the throttle bodies may be damaged.**

• Do not allow carbon deposits or other foreign materials to enter any of the passages in each throttle body or in the space between the throttle valve shaft and the throttle body.

f. After removing the carbon deposits, clean the inside of the throttle bodies with the recommended cleaning solvent, and then dry the throttle bodies using compressed air.
g. Make sure that there are no carbon deposits or other foreign materials in any of the passages "a" in each throttle body or in the space "b" between the throttle valve shaft and the throttle body.



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3. Install the throttle bodies.
4. Reset:
   • ISC (idle speed control) learning values
   Use the diagnostic code number "67".
   Refer to "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.
5. Adjust:
   • Throttle bodies synchronizing
   Out of specification → Replace the throttle bodies.
   Refer to "SYNCHRONIZING THE THROTTLE BODIES" on page 3-9.

EAS31160
REPLACING THE THROTTLE BODIES

1. Remove the throttle bodies from the vehicle.
2. Install a new throttle bodies to the vehicle.
3. Reset:
   • ISC (idle speed control) learning values
   Use the diagnostic code number "67".
   Refer to "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.
4. Adjust:
   • Throttle bodies synchronizing
   Refer to "SYNCHRONIZING THE THROTTLE BODIES" on page 3-9.
5. Place the vehicle on the centerstand so that the rear wheel is elevated.
6. Check:
   • Engine idling speed
   Start the engine, warm it up, and then measure the engine idling speed.

	Engine idling speed **1100–1300 r/min**

EAS30480
INSTALLING THE INJECTORS

ECA21550
NOTICE

• Always use new O-rings.
• When installing the injectors, do not allow any foreign material to enter or adhere to the injectors, fuel rails, or O-rings.
• Be careful not to twist or pinch the O-rings when installing the injectors.
• When installing the injector, install it at the same position as the removed cylinder.
• If an injector is subject to strong shocks or excessive force, replace it.
• If installing the original fuel rail and bolts, remove the white paint marks using a cleaning solvent. Otherwise, paint chips on the bolt seats could prevent the bolts from being tightened to the specified torque.

1. Install a new seal onto the end of each injector.
2. Install the injectors to the fuel rail, making sure to install them in the correct direction.
3. Install the injector assemblies to the adapter.

	Fuel rail bolt **5 N·m (0.5 kgf·m, 3.6 lb·ft)**

4. Check the injector pressure after the injectors are installed.
   Refer to "CHECKING THE INJECTOR PRESSURE" on page 7-10.

EAS30481
CHECKING THE INJECTOR PRESSURE

TIP

• After installing the injectors, perform the following steps to check the injector pressure.
• Do not allow any foreign materials to enter the fuel lines.

1. Check:
   • Injector pressure

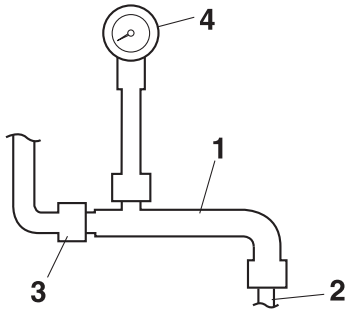
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Connect the fuel injector pressure adapter "1"

to the fuel rail joint "2", and then connect an air compressor "3" to the adapter.

b. Connect the pressure gauge "4" to the fuel injector pressure adapter "1".

Pressure gauge
90890-03153
Pressure gauge
YU-03153
Fuel injector pressure adapter
90890-03210
Fuel injector pressure adapter
YU-03210



c. Close the valve on the fuel injector pressure adapter.
d. Apply air pressure with the air compressor.
e. Open the valve on the fuel injector pressure adapter until the specified air pressure is reached.

Specified air pressure
490 kPa (5.0 kgf/cm², 71.1 psi)

ECA17600

NOTICE

Never exceed the specified air pressure or damage could occur.

f. Close the valve on the fuel injector pressure adapter.
g. Check that the specified air pressure is held at least one minute.
   Pressure drops → Check the pressure gauge and adapter.
   Check the seals and O-rings and then reinstall.
   Out of specification → Replace the fuel injectors.

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EAS30482

CHECKING THE FUEL PRESSURE

1. Remove:
   • Fuel tank front cover/Front side panel/Front side cowling
   Refer to "GENERAL CHASSIS (2)" on page 4-6.
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
   • Fuel tank cover
   Refer to "GENERAL CHASSIS (3)" on page 4-13.
2. Check:
   • Fuel pressure

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a. Remove the fuel tank bolts and hold up the fuel tank.
b. Disconnect the fuel hose "1" from the fuel pump.
   Refer to "FUEL TANK" on page 7-1.

EWA17320

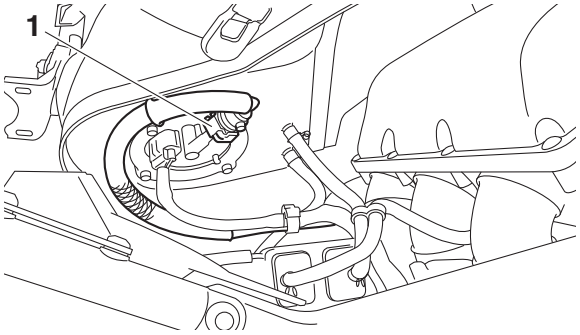
WARNING

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

ECA17490

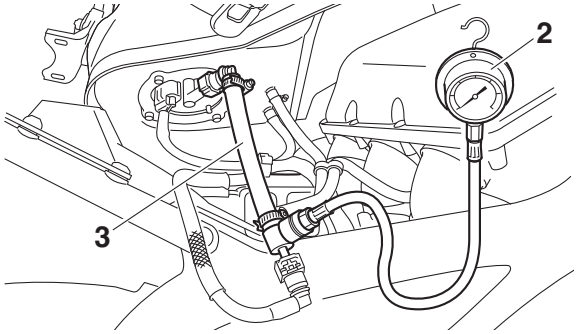
NOTICE

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.



c. Connect the pressure gauge "2" and fuel pressure adapter "3" to the fuel hose.

Pressure gauge
90890-03153
Pressure gauge
YU-03153
Fuel pressure adapter
90890-03176
Fuel pressure adapter
YM-03176



d. Start the engine.
e. Measure the fuel line pressure.
Faulty → Replace the fuel pump.

Fuel line pressure (at idle)
300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi)

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3. Install:
- Fuel tank
Refer to "FUEL TANK" on page 7-1.
- Fuel tank cover
Refer to "GENERAL CHASSIS (3)" on page 4-13.
- Rider seat/Passenger seat
Refer to "GENERAL CHASSIS (1)" on page 4-1.
- Front side cowling/Front side panel/Fuel tank front cover
Refer to "GENERAL CHASSIS (2)" on page 4-6.

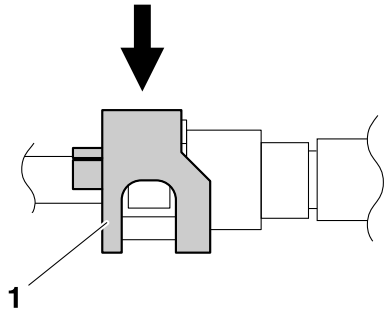
EAS31159
INSTALLING THE FUEL HOSE (FUEL RAIL SIDE)

1. Connect:
- Fuel hose (fuel rail side)

ECA17500
NOTICE

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

TIP
- Install the fuel hose securely onto the fuel rail joint until a distinct "click" is heard.
- To install the fuel hose onto the fuel rail joint, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown.
- It is prohibited to wear the cotton work gloves or equivalent coverings.



EAS30485
ADJUSTING THE THROTTLE POSITION SENSOR

ECA17540
NOTICE

- **Handle the throttle position sensor with special care.**
- **Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.**

1. Check:
- Throttle position sensor
Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-170.
2. Adjust:
- Throttle position sensor angle

TIP
Before adjusting the throttle position sensor, the throttle bodies must be removed.

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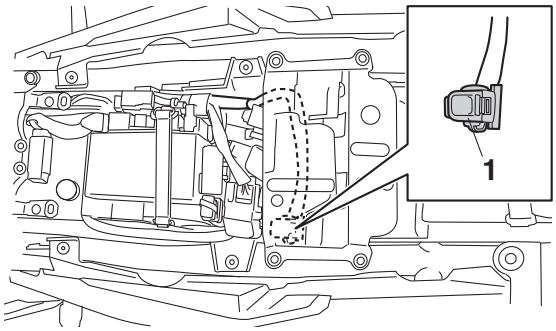
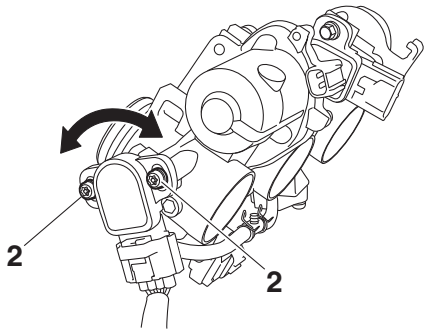
a. Temporary tighten the throttle position sensor screws.
b. Check that the throttle valves are fully closed.
c. Connect the throttle position sensor to the wire harness.
d. Remove the protective cap "1", and then connect the Yamaha diagnostic tool to coupler.

TIP
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



e. Diagnostic code number “01” is selected.
f. Adjust the position of the throttle position sensor angle so that 11–21 can appear in the Yamaha diagnostic tool screen.
g. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “2”.

	Throttle position sensor screw 3.5 N·m (0.35 kgf·m, 2.5 lb·ft)



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EAS30486

ADJUSTING THE ACCELERATOR POSITION SENSOR

EWA15960

⚠ WARNING

- **Handle the accelerator position sensor with special care.**
- **Never subject the accelerator position sensor to strong shocks. If the accelerator position sensor is dropped, replace it.**

1. Check:
   - Accelerator position sensor
   Refer to “CHECKING THE ACCELERATOR POSITION SENSOR” on page 8-170.
2. Adjust:
   - Accelerator position sensor angle

TIP

Before adjusting the accelerator position sensor, the throttle bodies must be removed.

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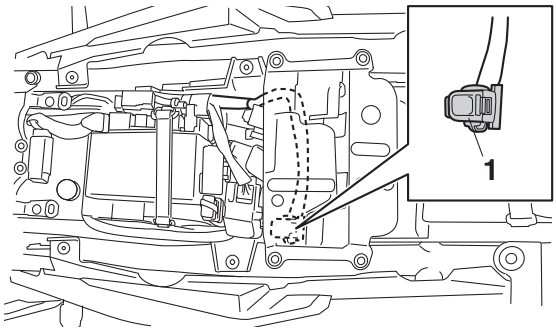
a. Temporary tighten the accelerator position sensor bolts.
b. Check that the throttle valves are fully closed.
c. Connect the accelerator position sensor to the wire harness.
d. Connect the throttle cables to the throttle bodies.
e. Remove the protective cap “1”, and then connect the Yamaha diagnostic tool to coupler.

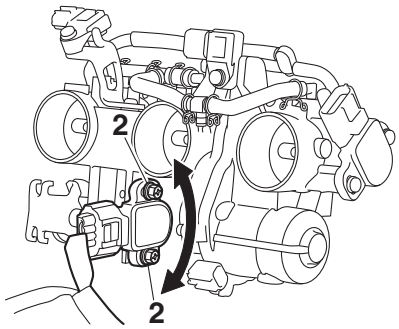
TIP

For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



f. Diagnostic code number “14” is selected.
g. Turn the throttle grip to the fully closed position.
h. Adjust the position of the accelerator position sensor angle so that 12–22 can appear in the Yamaha diagnostic tool screen.
i. After adjusting the accelerator position sensor angle, tighten the accelerator position sensor bolts “2”.

	Accelerator position sensor bolt 3.5 N·m (0.35 kgf·m, 2.5 lb·ft)



j. Turn the throttle grip to the fully open position.
k. Check the Yamaha diagnostic tool screen value. If the Yamaha diagnostic tool screen value is not 97–107, adjust the accelerator position sensor angle.

l. Select the diagnostic code number “15”.
m. Turn the throttle grip to the fully closed position.
n. Check the Yamaha diagnostic tool screen value. If the Yamaha diagnostic tool screen value is not 10–24, adjust the accelerator position sensor angle.
o. Turn the throttle grip to the fully open position.
p. Check the Yamaha diagnostic tool screen value. If the Yamaha diagnostic tool screen value is not 95–109, adjust the accelerator position sensor angle.
q. Repeat steps (f) to (p) until the Yamaha diagnostic tool screen values are within the specified ranges.
r. If the Yamaha diagnostic tool screen values are not within the specified ranges after repeating steps (f) to (p) several times, replace the accelerator position sensor.

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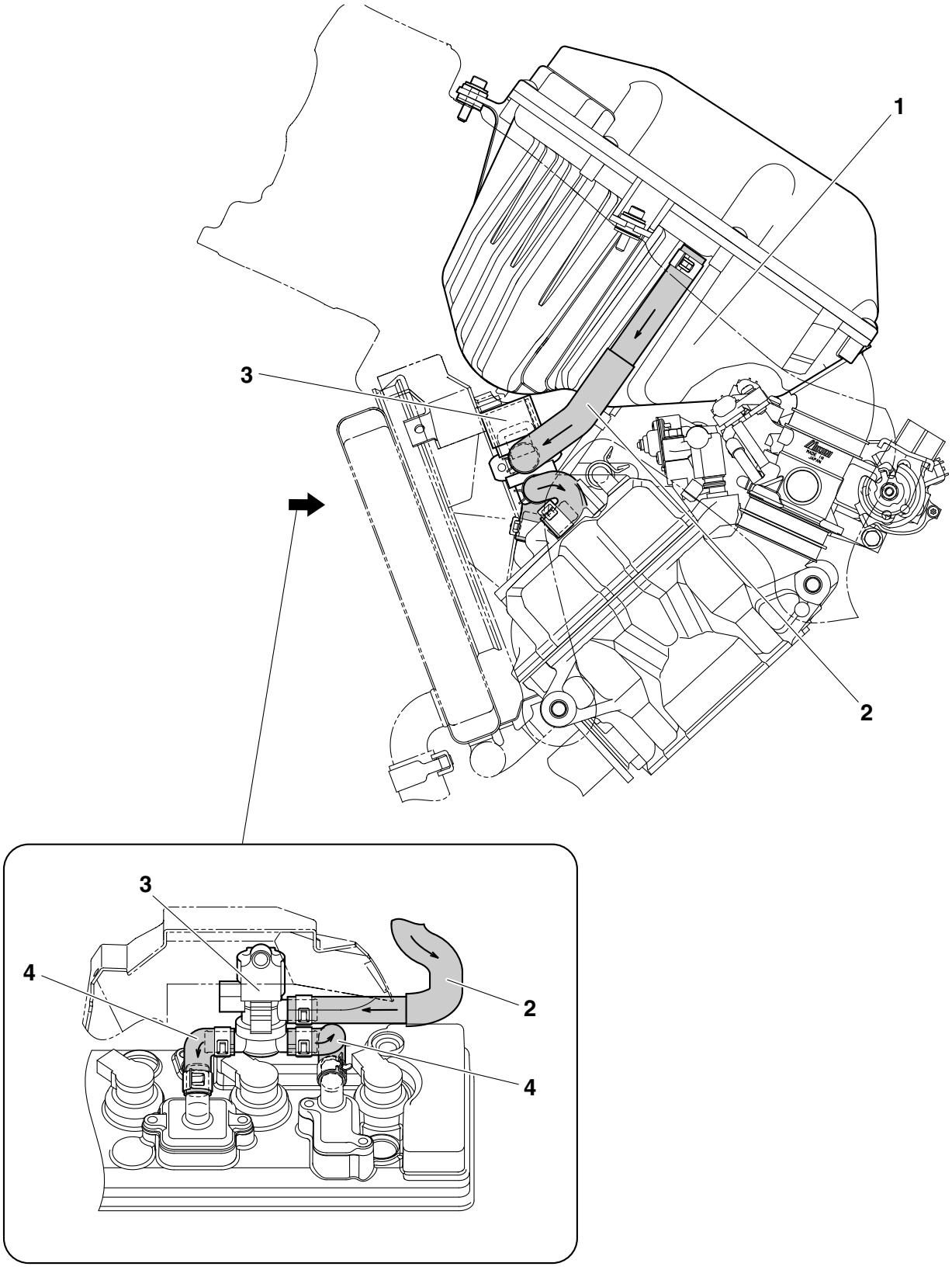
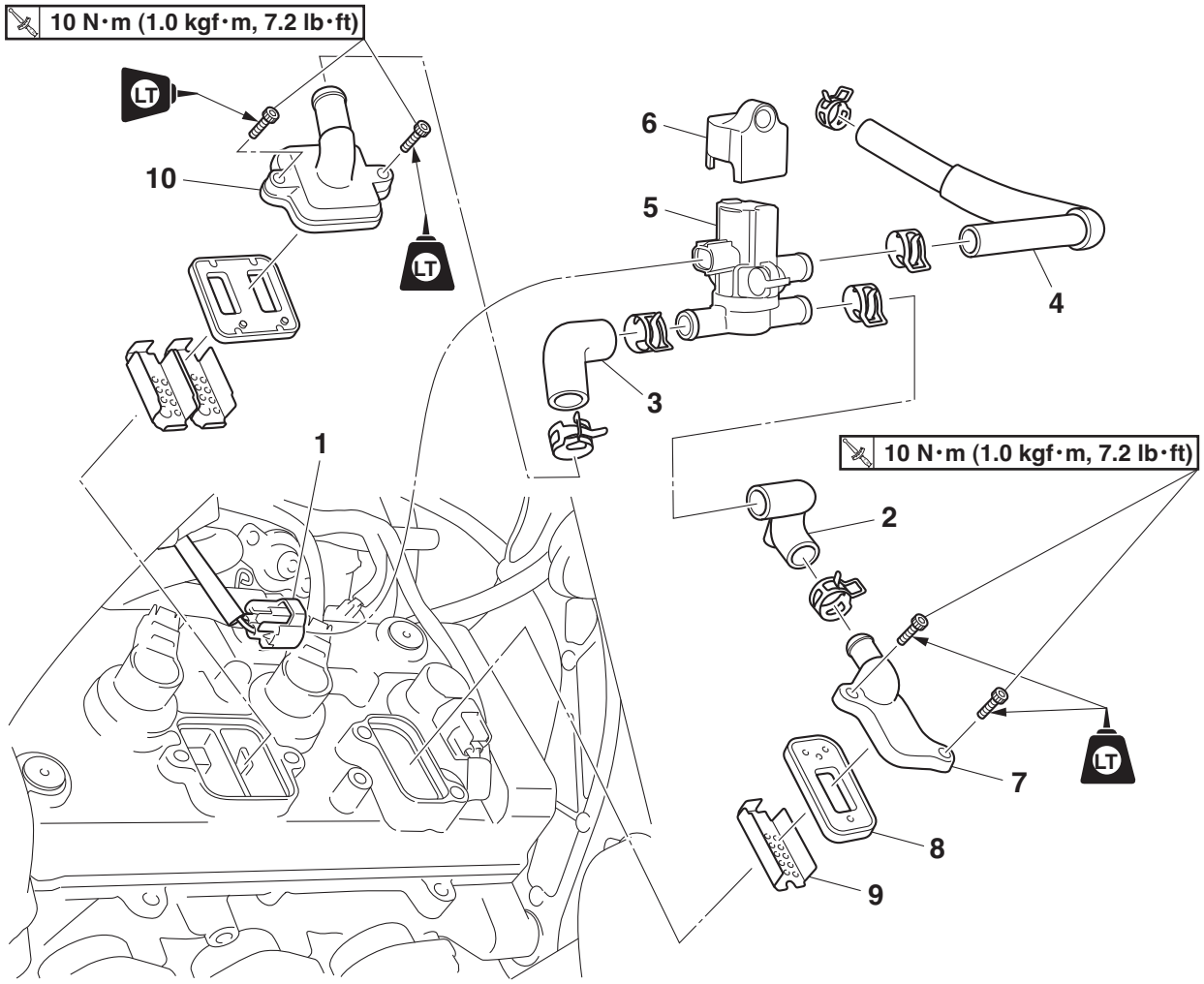
EAS20071
AIR INDUCTION SYSTEM

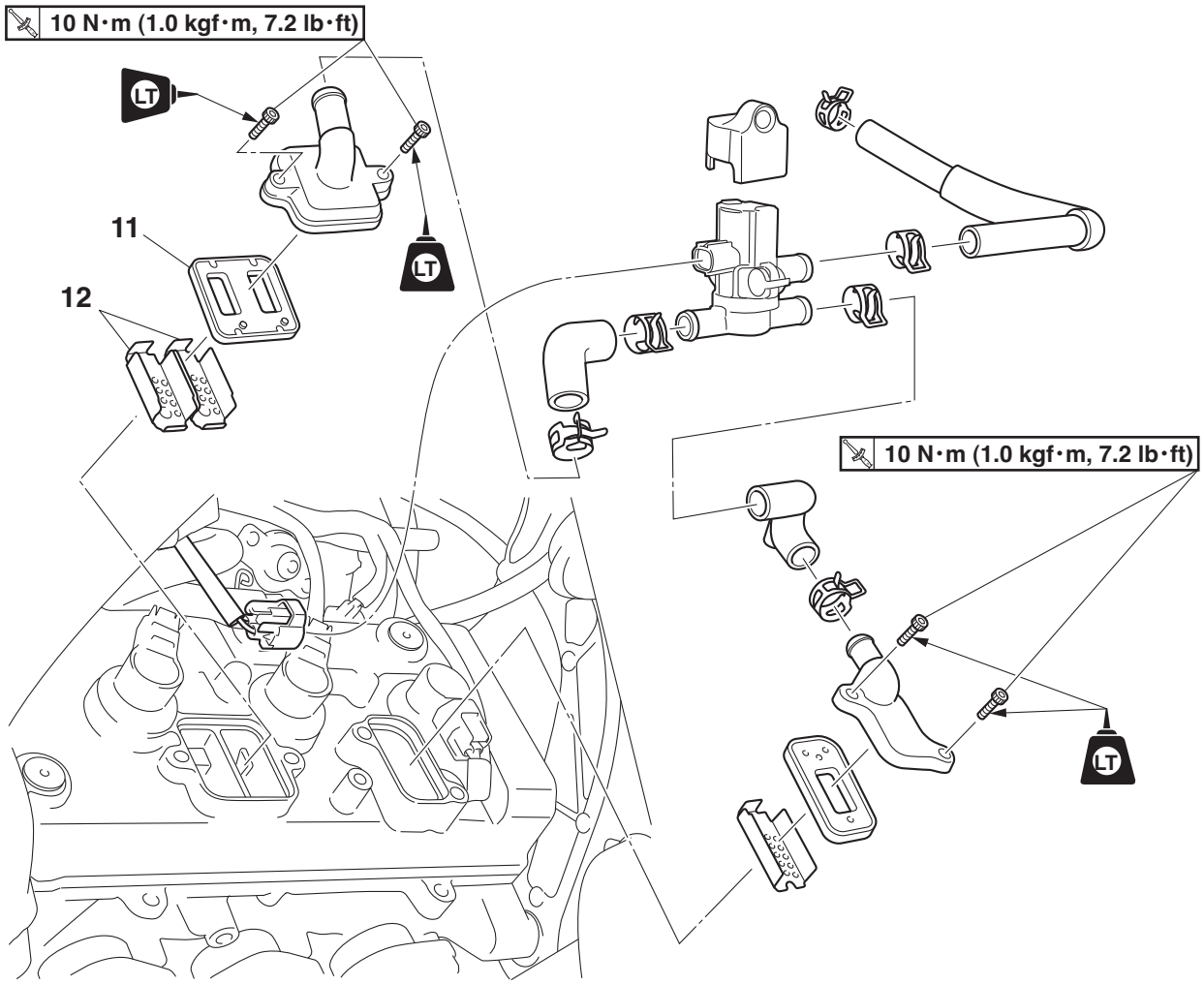


1. Air filter case
2. Air induction system hose (air filter case to air cut-off valve)
3. Air cut-off valve
4. Air induction system hose (air cut-off valve to reed valve cover)

Removing the air cut-off valve assembly and reed valves

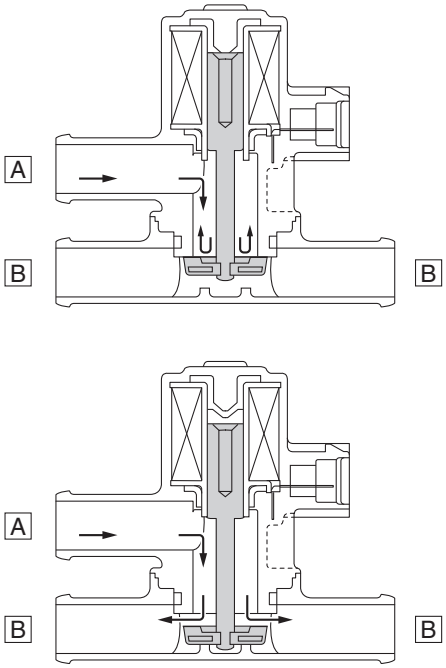


Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank front cover/Front side panel/Front side cowling		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Passenger seat/Rider seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "GENERAL CHASSIS (3)" on page 4-13.
	Radiator		Refer to "RADIATOR" on page 6-1.
1	Air cut-off valve coupler	1	Disconnect.
2	Air induction system hose (air cut-off valve to reed valve cover)	1	
3	Air induction system hose (air cut-off valve to reed valve cover)	1	
4	Air induction system hose (air filter case to air cut-off valve)	1	
5	Air cut-off valve	1	
6	Air cut-off valve holder	1	
7	Reed valve cover	1	
8	Reed valve assembly 1	1	
9	Reed valve plate	1	
10	Reed valve cover	1	



Order	Job/Parts to remove	Q'ty	Remarks
11	Reed valve assembly 2	1	
12	Reed valve plate	2	

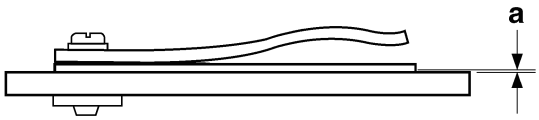
EAS30488
CHECKING THE AIR INDUCTION SYSTEM
Air injection
The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary 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 cylinder head

1. Check:
   • Hoses
   Loose connections → Connect properly.
   Cracks/damage → Replace.
2. Check:
   • Reed valve
   • Reed valve stopper
   • Reed valve seat
   Cracks/damage → Replace the reed valve assembly.
3. Measure:
   • Reed valve bending limit “a”
   Out of specification → Replace the reed valve assembly.

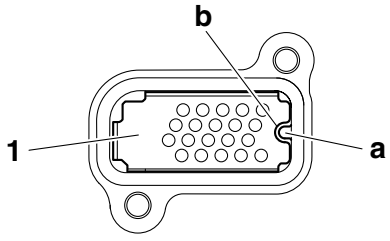
	Reed valve bending limit **0.4 mm (0.02 in)**

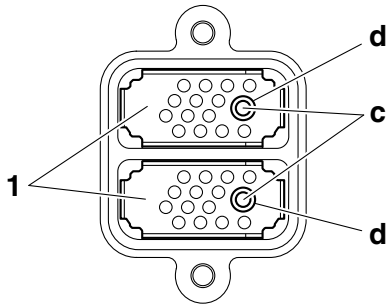


4. Check:
   • Air cut-off valve
   Cracks/damage → Replace.
5. Check
   • Air induction system solenoid
   Refer to “CHECKING THE AIR INDUCTION SYSTEM SOLENOID” on page 8-171.

EAS30489
INSTALLING THE AIR INDUCTION SYSTEM
1. Install:
   • Reed valve plate “1”

TIP
- Align the projection “a” on the cylinder head cover with the notch “b” in the reed valve plate “1”.
- Align the projection “c” on the cylinder head cover with the hole “d” in the reed valve plate “1”.





2. Install:
   • Reed valve assembly 1
   • Reed valve assembly 2

TIP

- Install the reed valve assembly 1 so that the open side turns to the exhaust side of the engine.
- Install the reed valve assembly 2 so that the open side turns to the intake side of the engine.

A

B

A. Reed valve assembly 1
B. Reed valve assembly 2
C. Exhaust side

3. Install:
   • Reed valve cover

	Reed valve cover bolt **10 N·m (1.0 kgf·m, 7.2 lb·ft)** **LOCTITE®**

ELECTRICAL SYSTEM

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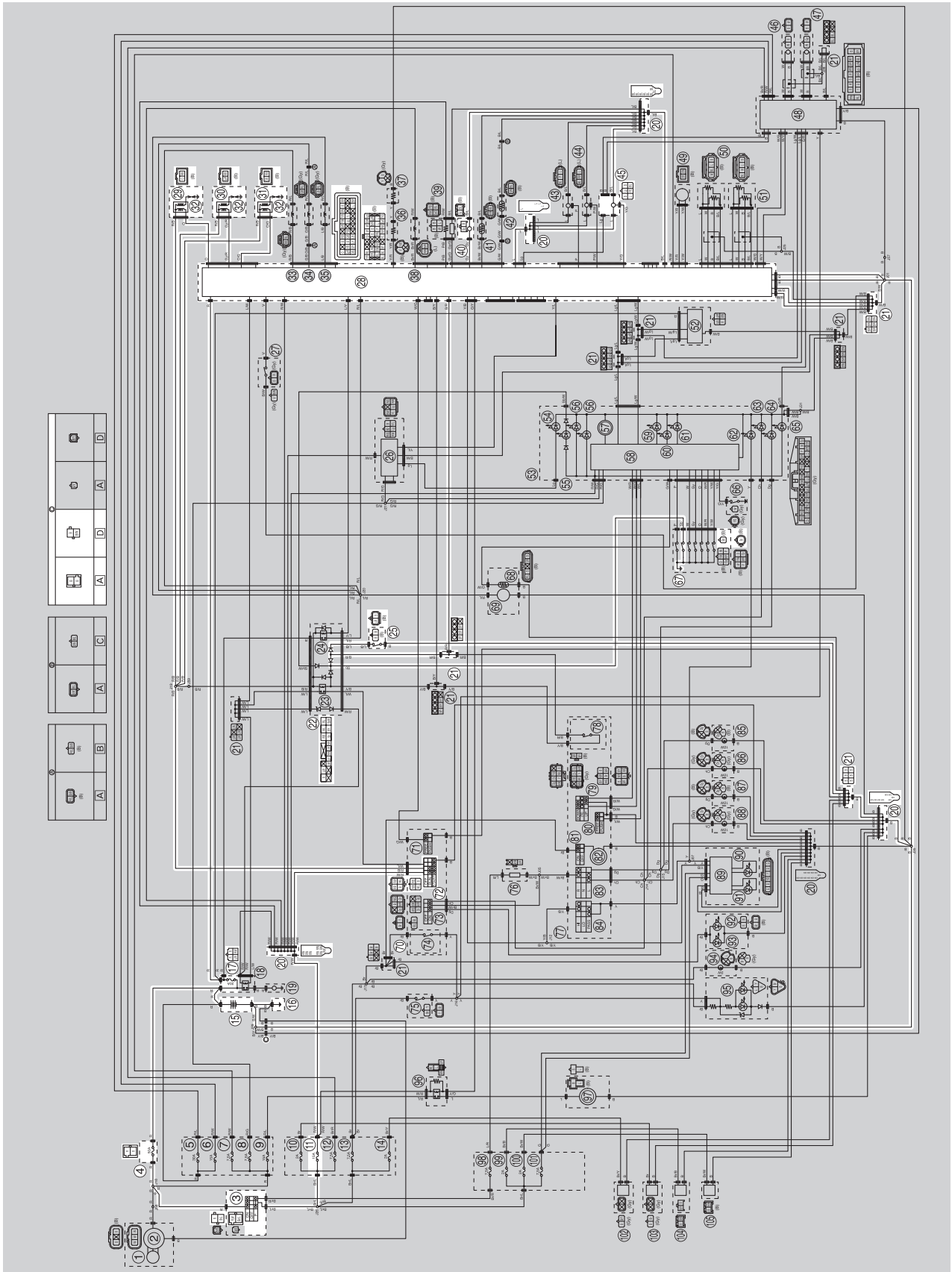
EAS20072
IGNITION SYSTEM

EAS30490
CIRCUIT DIAGRAM



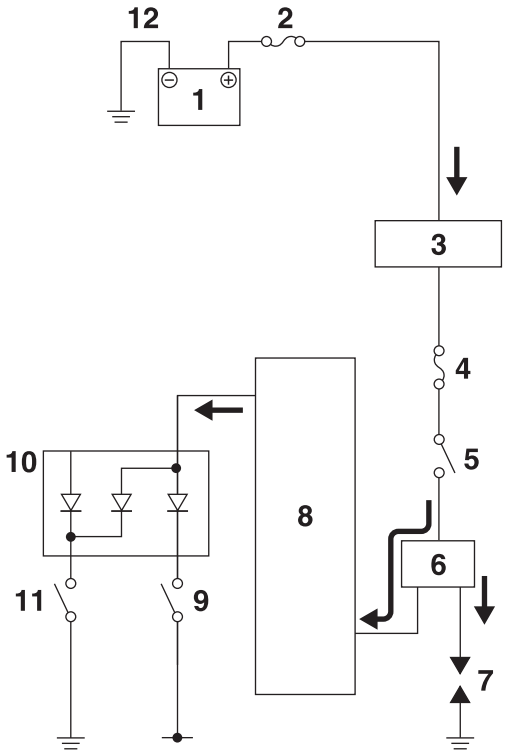
3. Main switch
4. Main fuse
11. Ignition fuse
15. Battery
16. Engine ground
17. Fuel injection system fuse
20. Joint connector
21. Joint coupler
22. Relay unit
25. Sidestand switch
28. ECU (Engine Control Unit)
29. Ignition coil #1
30. Ignition coil #2
31. Ignition coil #3
32. Spark plug
40. Crankshaft position sensor
45. Lean angle sensor
67. Gear position switch
70. Handlebar switch (right)
72. Start/engine stop switch

A. Wire harness
D. Negative battery sub-wire harness

EAS30491
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. Start/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)
12. Battery negative lead

EAS30492
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

TIP

• Before troubleshooting, remove the following part(s):
1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank
5. Air filter case

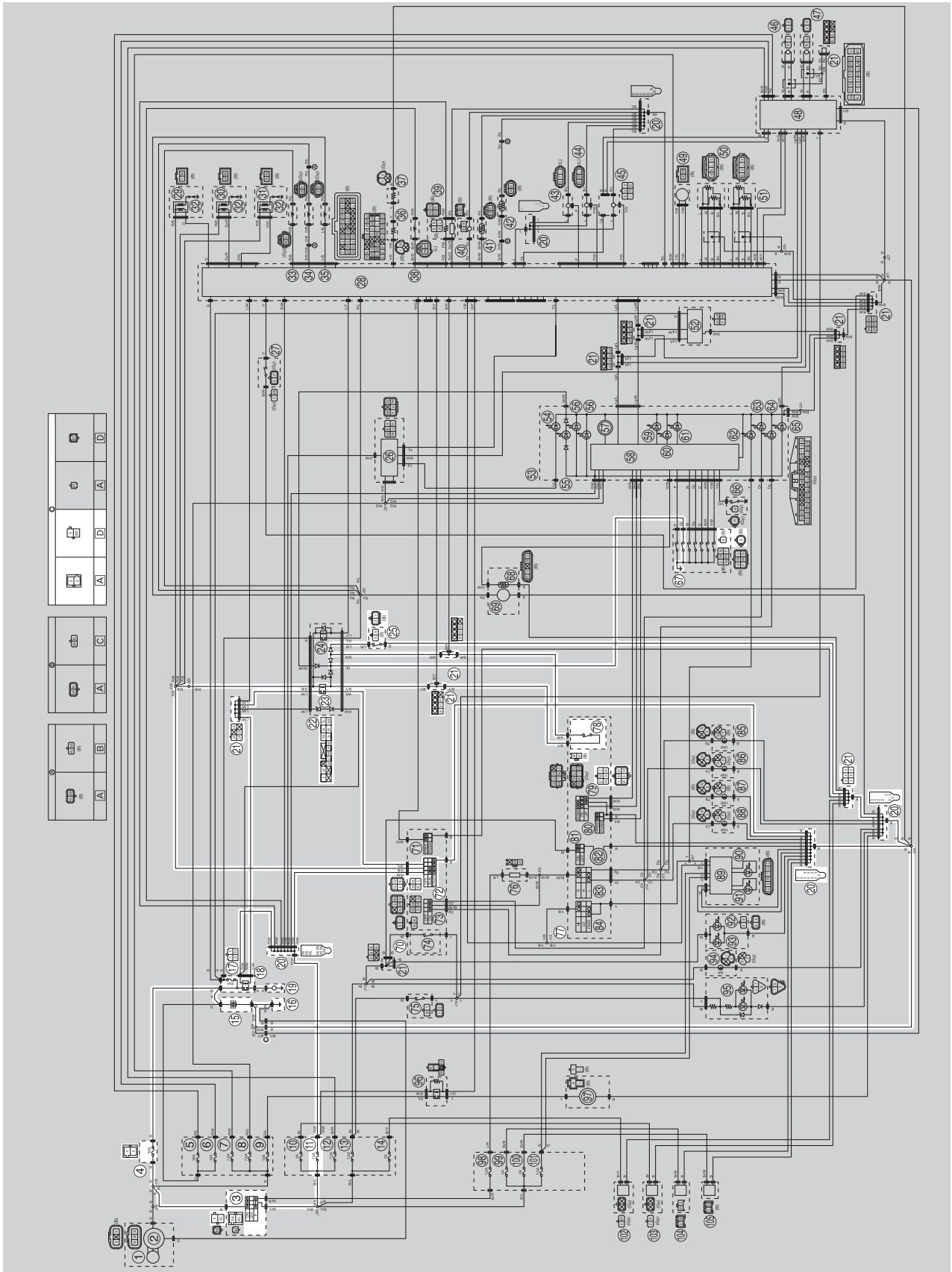
1. Check the fuses. (Main, ignition and fuel injection system) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the spark plugs. Refer to "CHECKING THE SPARK PLUGS" on page 3-5.	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 8-164.	OK→	Ignition system is OK.
NG↓		
5. Check the ignition coils. Refer to "CHECKING THE IGNITION COILS" on page 8-163.	NG→	Replace the ignition coil(s).
OK↓		
6. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-164.	NG→	Replace the crankshaft position sensor.
OK↓		
7. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
8. Check the start/engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the handlebar switch (right).
OK↓		

9. Check the gear position switch.
   Refer to "CHECKING THE GEAR POSITION SWITCH" on page 8-173.
   NG→ Replace the gear position switch.
   OK↓
10. Check the sidestand switch.
   Refer to "CHECKING THE SWITCHES" on page 8-153.
   NG→ Replace the sidestand switch.
   OK↓
11. Check the relay unit (diode).
   Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-163.
   NG→ Replace the relay unit.
   OK↓
12. Check the lean angle sensor.
   Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-165.
   NG→ Replace the lean angle sensor.
   OK↓
13. Check the entire ignition system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-1.
   NG→ Properly connect or repair the ignition system's wiring.
   OK↓

Replace the ECU.
Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.

EAS20073
ELECTRIC STARTING SYSTEM

EAS30493
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
11. Ignition fuse
15. Battery
16. Engine ground
17. Fuel injection system fuse
18. Starter relay
19. Starter motor
20. Joint connector
21. Joint coupler
22. Relay unit
23. Starting circuit cut-off relay
25. Sidestand switch
67. Gear position switch
70. Handlebar switch (right)
72. Start/engine stop switch
77. Handlebar switch (left)
78. Clutch switch

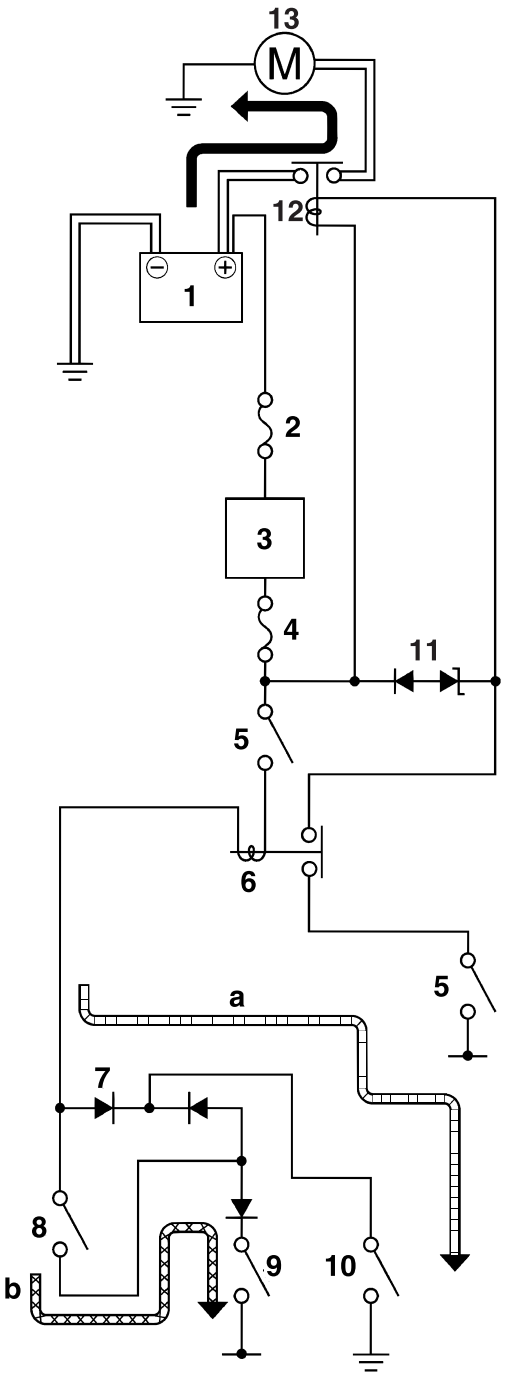
A. Wire harness
D. Negative battery sub-wire harness

EAS30494
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the main switch is turned to "ON" and the "" side of the start/engine stop switch is pushed, 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 is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pushing the "" side of the start/engine stop 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. Start/engine stop switch
6. Starting circuit cut-off relay
7. Diode
8. Clutch switch
9. Sidestand switch
10. Gear position switch (neutral circuit)
11. Diode
12. Starter relay
13. Starter motor

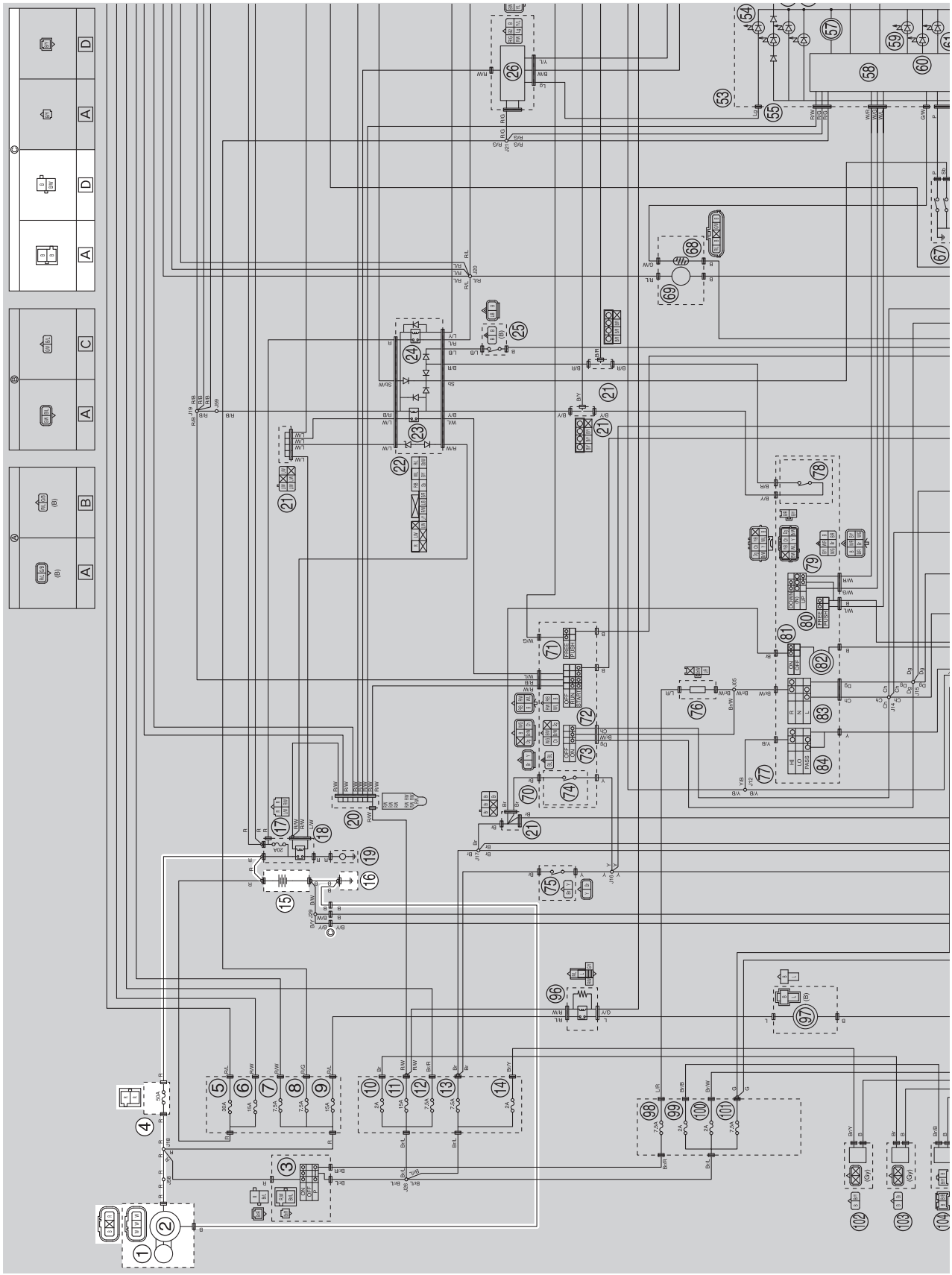
EAS30495
TROUBLESHOOTING
The starter motor fails to turn.
TIP
• Before troubleshooting, remove the following part(s):
1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank
5. Air filter case
6. Throttle bodies

1. Check the fuses. (Main, ignition and fuel injection system) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-165.	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 5-36.	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 8-161.	NG→	Replace the relay unit.
OK↓		
6. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-163.	NG→	Replace the relay unit.
OK↓		
7. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-161.	NG→	Replace the starter relay.
OK↓		
8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		

9. Check the gear position switch. Refer to “CHECKING THE GEAR POSITION SWITCH” on page 8-173.	NG→	Replace the gear position switch.
OK↓		
10. Check the sidestand switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the sidestand switch.
OK↓		
11. Check the clutch switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the clutch switch.
OK↓		
12. Check the start/engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the handlebar switch (right).
OK↓		
13. Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-7.	NG→	Properly connect or repair the starting system’s wiring.
OK↓		
The starting system circuit is OK.		

EAS20074
CHARGING SYSTEM

EAS30496
CIRCUIT DIAGRAM



1. AC magneto
2. Rectifier/regulator
4. Main fuse
15. Battery
16. Engine ground

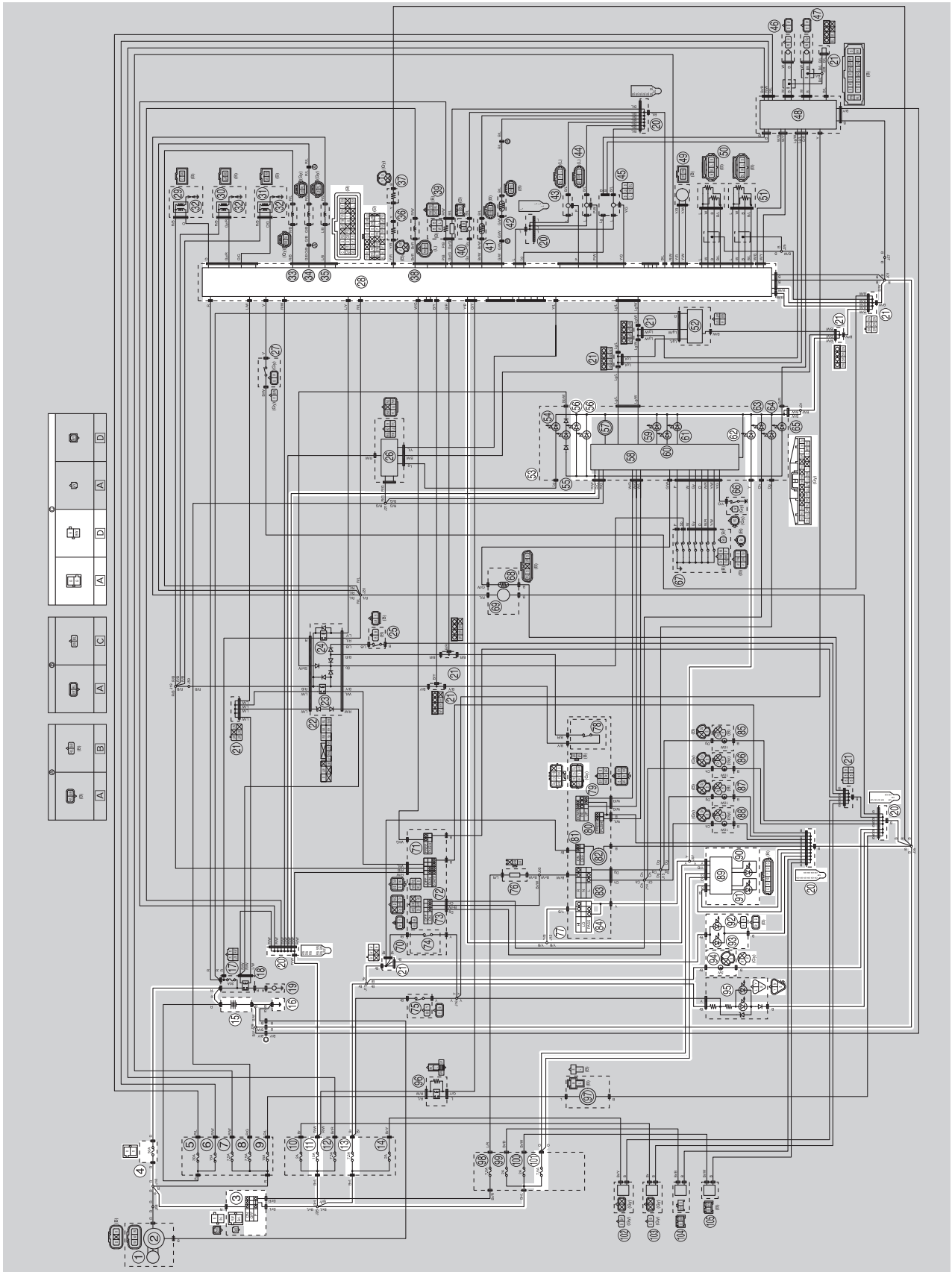
A. Wire harness
D. Negative battery sub-wire harness

EAS30497
TROUBLESHOOTING
The battery is not being charged.
TIP
• Before troubleshooting, remove the following part(s):
1. Passenger seat/Rider seat
2. Rear side cover (left)/Lower tail cover

1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-166.	NG→	Replace the stator coil assembly.
OK↓		
4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-166.	NG→	Replace the rectifier/regulator.
OK↓		
5. Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-13.	NG→	Properly connect or repair the charging system's wiring.
OK↓		
The charging system circuit is OK.		

EAS20075
LIGHTING SYSTEM

EAS30498
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
11. Ignition fuse
13. Signaling system fuse
15. Battery
16. Engine ground
20. Joint connector
21. Joint coupler
28. ECU (Engine Control Unit)
53. Meter assembly
56. Meter light
62. High beam indicator light
77. Handlebar switch (left)
84. Dimmer/pass switch
89. Headlight control unit
90. Headlight (high beam)
91. Headlight (low beam)
92. Auxiliary light (right)
93. Auxiliary light (left)
94. License plate light
95. Tail/brake light
101. Headlight fuse

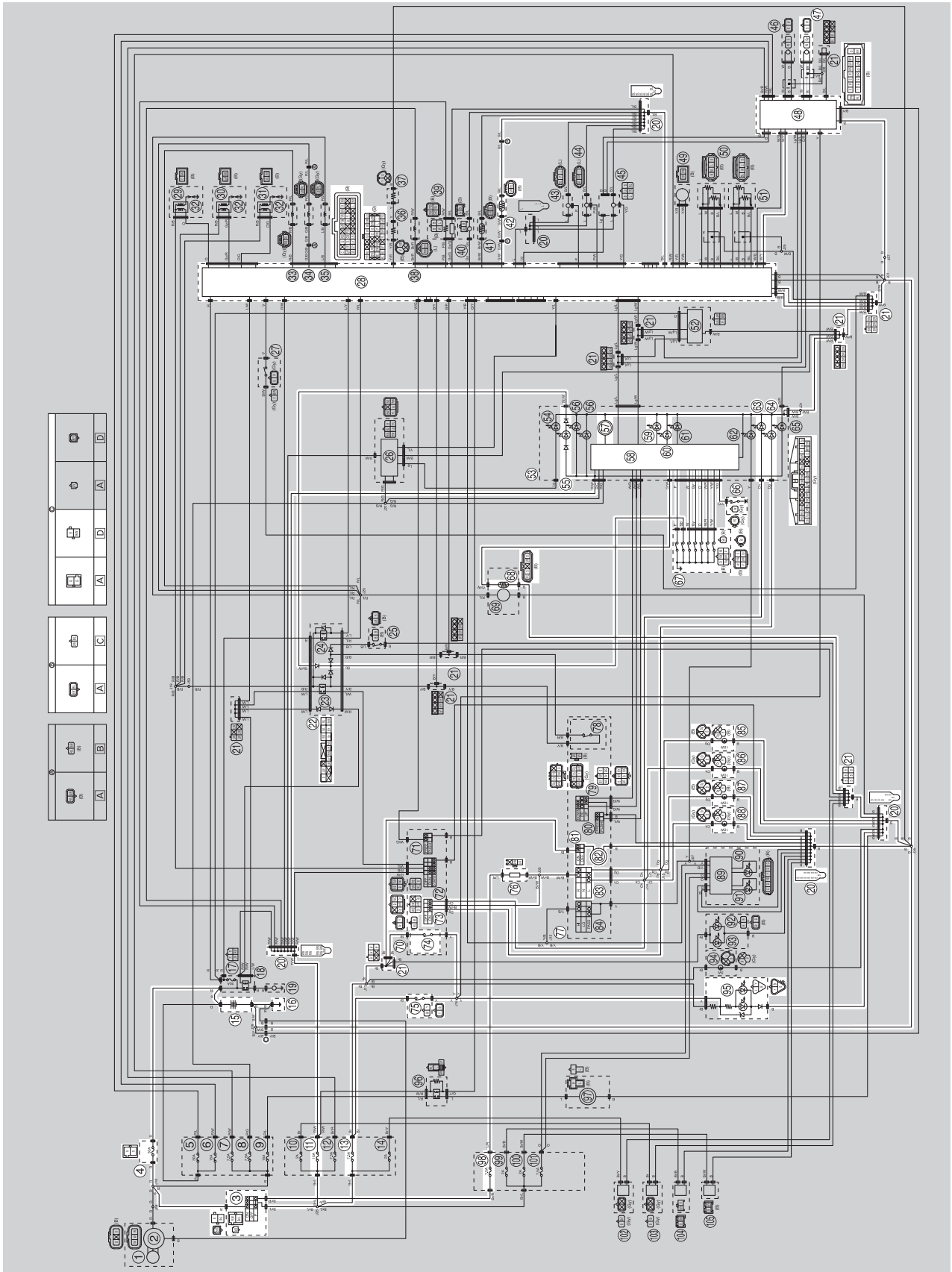
A. Wire harness
D. Negative battery sub-wire harness

EAS30499
TROUBLESHOOTING
Any of the following fail to light: headlight, high beam indicator light, taillight, license light or meter light.
TIP
• Before troubleshooting, remove the following part(s):
1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank
5. Rear side cover
6. Headlight assembly

1. Check the each bulbs and bulb sockets condition. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-156.	NG→	Replace the bulb(s) and bulb socket(s).
OK↓		
2. Check the fuses. (Main, headlight, ignition and signaling system) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse(s).
OK↓		
3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
5. Check the dimmer/pass switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	The dimmer/pass switch is faulty. Replace the handlebar switch (left).
OK↓		
6. Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-17.	NG→	Properly connect or repair the lighting system's wiring.
OK↓		
Replace the ECU, meter assembly, headlight assembly or tail/brake light. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.		

EAS20076
SIGNALING SYSTEM

EAS30500
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
11. Ignition fuse
13. Signaling system fuse
15. Battery
16. Engine ground
20. Joint connector
21. Joint coupler
22. Relay unit
28. ECU (Engine Control Unit)
42. Coolant temperature sensor
47. Rear wheel sensor
48. ABS ECU (electronic control unit)
53. Meter assembly
55. Neutral indicator light
57. Tachometer
58. Multi-function meter
59. Oil level warning light
60. Engine trouble warning light
63. Turn signal indicator light (left)
64. Turn signal indicator light (right)
66. Oil level switch
67. Gear position switch
68. Fuel sender
70. Handlebar switch (right)
73. Hazard switch
74. Front brake light switch
75. Rear brake light switch
76. Turn signal/hazard relay
77. Handlebar switch (left)
81. Horn switch
82. Horn
83. Turn signal switch
85. Rear turn signal light (right)
86. Rear turn signal light (left)
87. Front turn signal light (right)
88. Front turn signal light (left)
95. Tail/brake light
98. Parking lighting fuse

A. Wire harness
C. Sub-wire harness (Coolant temperature sensor)
D. Negative battery sub-wire harness

EAS30501
TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.
- The fuel meter fails to comeon.
- The speedometer fails to operate.

TIP

- Before troubleshooting, remove the following part(s):

1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank
5. Air filter case
6. Headlight assembly

1. Check the fuses. (Main, ignition, signaling system and parking lighting) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
This circuit is OK.		

Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the handlebar switch (left).
OK↓		
2. Check the horn. Refer to "CHECKING THE HORN" on page 8-167.	NG→	Replace the horn.
OK↓		

3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The tail/brake light fails to come on.

1. Check the front brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the front brake light switch.

OK↓

2. Check the rear brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the rear brake light switch.

OK↓

3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG→	Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulb and socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-156.	NG→	Replace the turn signal light bulb(s), socket(s) or both.

OK↓

2. Check the turn signal switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the handlebar switch (left).

OK↓

3. Check the hazard switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the handlebar switch (right).

OK↓

4. Check the turn signal/hazard relay. Refer to "CHECKING THE TURN SIGNAL/HAZARD RELAY" on page 8-162.	NG→	Replace the turn signal/hazard relay.

OK↓

5. Check the entire signaling system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-21.
   NG→ Properly connect or repair the signaling system's wiring.
   OK↓
Replace the meter assembly.

The neutral indicator light fails to come on.

1. Check the gear position switch.
   Refer to "CHECKING THE GEAR POSITION SWITCH" on page 8-173.
   NG→ Replace the gear position switch.
   OK↓
2. Check the relay unit (diode).
   Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-163.
   NG→ Replace the relay unit.
   OK↓
3. Check the entire signaling system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-21.
   NG→ Properly connect or repair the signaling system's wiring.
   OK↓

Replace the meter assembly.

The oil level warning light fails to come on.

1. Check the oil level switch.
   Refer to "CHECKING THE SWITCHES" on page 8-153.
   NG→ Replace the oil level switch.
   OK↓
2. Check the entire signaling system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-21.
   NG→ Properly connect or repair the signaling system's wiring.
   OK↓

Replace the meter assembly.

The fuel meter, fuel level warning light, or both fail to come on.

1. Check the fuel sender.
   Refer to "CHECKING THE FUEL SENDER" on page 8-168.
   NG→ Replace the fuel pump assembly.
   OK↓

2. Check the entire signaling system's wiring.
   Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG→ Properly connect or repair the signaling system's wiring.

OK↓

Replace the ECU or meter assembly.
Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.

The speedometer fails to operate.

1. Check the rear wheel sensor.
   Refer to "MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR" on page 4-32.

NG→ Replace the rear wheel sensor.

OK↓

2. Check the entire wheel sensor wiring.
   Refer to TIP.

NG→ Properly connect or repair the wheel sensor wiring.

OK↓

Replace the hydraulic unit assembly, ECU, meter assembly.
Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.

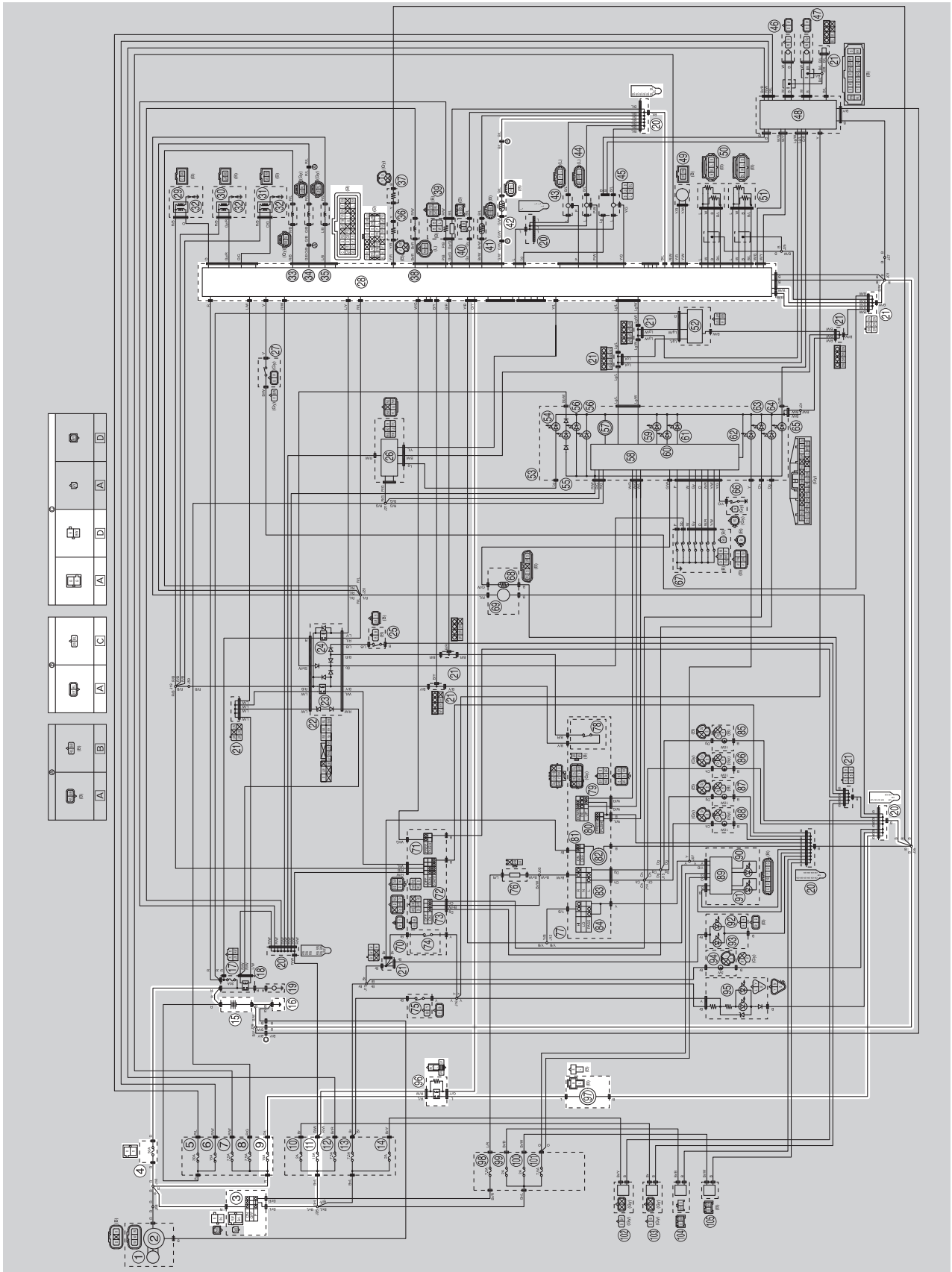
TIP

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/green–white/green)
  (white/yellow–white/yellow)
- Between ECU coupler and meter assembly.
  (light green/blue–light green/blue)
  (light green/white–light green/white)

EAS20077
COOLING SYSTEM

EAS30502
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
9. Radiator fan motor fuse
11. Ignition fuse
15. Battery
16. Engine ground
20. Joint connector
21. Joint coupler
28. ECU (Engine Control Unit)
42. Coolant temperature sensor
96. Radiator fan motor relay
97. Radiator fan motor

A. Wire harness
C. Sub-wire harness (Coolant temperature sensor)
D. Negative battery sub-wire harness

EAS30503
TROUBLESHOOTING

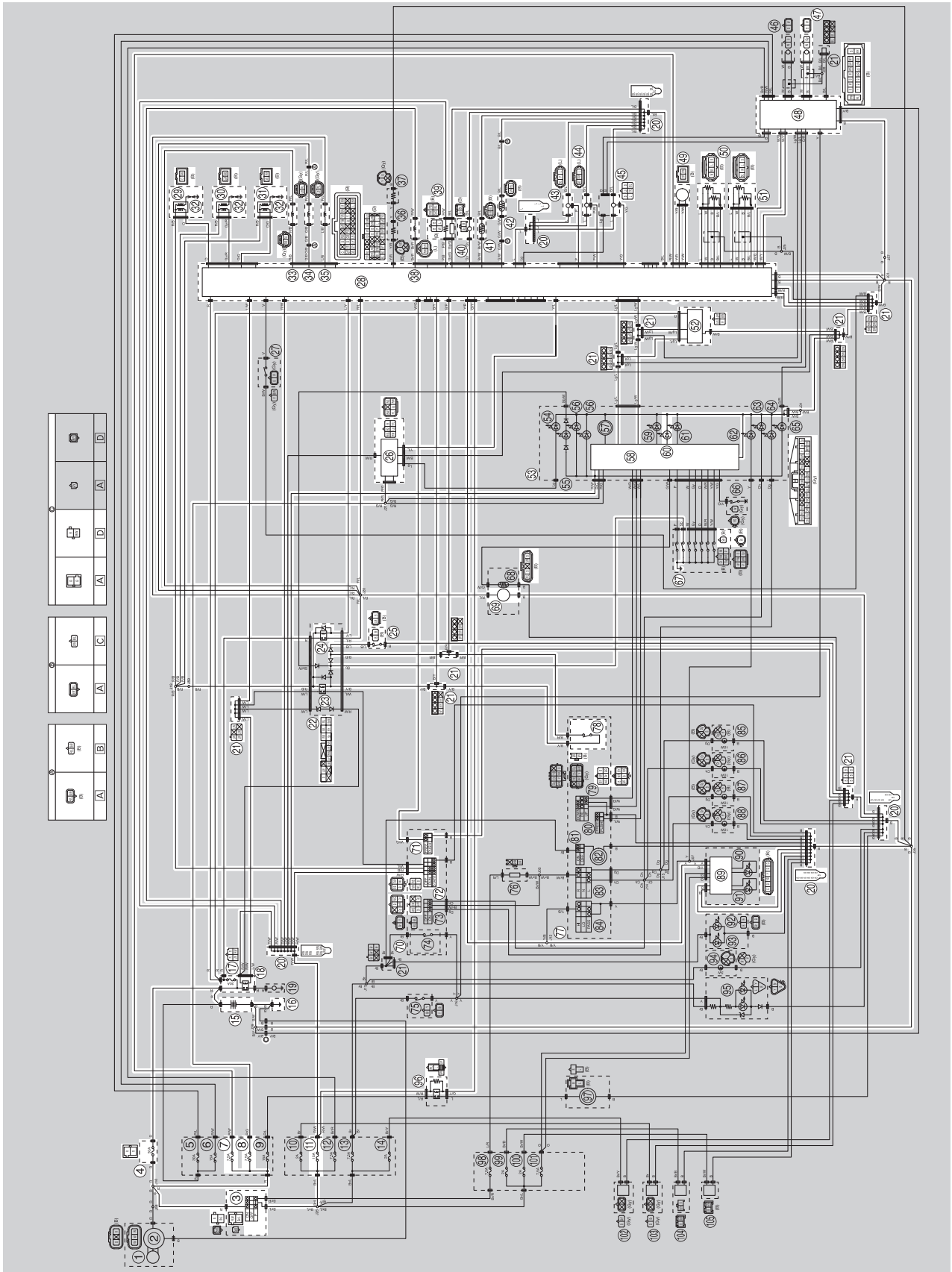
TIP

• Before troubleshooting, remove the following part(s):
1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank
5. Air filter case
6. Canister
7. Throttle bodies

1. Check the fuses. (Main, ignition and radiator fan motor) Refer to "CHECKING THE FUSES" on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 8-169.	NG→	Replace the radiator fan motor.
OK↓		
5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-161.	NG→	Replace the radiator fan motor relay.
OK↓		
6. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-169.	NG→	Replace the coolant temperature sensor.
OK↓		
7. Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-27.	NG→	Properly connect or repair the cooling system's wiring.
OK↓		
Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.		

EAS20078
FUEL INJECTION SYSTEM

EAS30504
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
7. Electronic throttle valve fuse
8. Backup fuse
11. Ignition fuse
15. Battery
16. Engine ground
17. Fuel injection system fuse
18. Starter relay
20. Joint connector
21. Joint coupler
22. Relay unit
23. Starting circuit cut-off relay
24. Fuel pump relay
25. Sidestand switch
26. Immobilizer unit
28. ECU (Engine Control Unit)
29. Ignition coil #1
30. Ignition coil #2
31. Ignition coil #3
32. Spark plug
33. Injector #1
34. Injector #2
35. Injector #3
38. Air induction system solenoid
39. O_2 sensor
40. Crankshaft position sensor
41. Intake air temperature sensor
42. Coolant temperature sensor
43. Intake air pressure sensor 1
44. Intake air pressure sensor 2
45. Lean angle sensor
47. Rear wheel sensor
48. ABS ECU (electronic control unit)
49. Throttle servo motor
50. Accelerator position sensor
51. Throttle position sensor
52. Yamaha diagnostic tool coupler
53. Meter assembly
58. Multi-function meter
60. Engine trouble warning light
67. Gear position switch
69. Fuel pump
70. Handlebar switch (right)
71. Drive mode switch
72. Start/engine stop switch
77. Handlebar switch (left)
78. Clutch switch
89. Headlight control unit
96. Radiator fan motor relay

A. Wire harness
B. Sub-wire harness (Injector #2)
C. Sub-wire harness (Coolant temperature sensor)
D. Negative battery sub-wire harness

EAS30505
ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code number is stored in the memory of the ECU.

Checking the engine trouble warning light

The engine trouble warning light comes on for around 2 seconds after the main switch has been set to "ON". If the warning light does not come on, the warning light (LED) may be defective.

ECU detects an abnormal signal from a sensor

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue operating or stop operating, depending on the conditions.

EAS30506
TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
   • Fault code number

▼▼▼

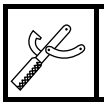
01: Throttle position sensor signal 1
(throttle angle)
13: Throttle position sensor signal 2
(throttle angle)
14: Accelerator position sensor signal 1
(throttle angle)
15: Accelerator position sensor signal 2
(throttle angle)
30: Cylinder-#1 ignition coil
31: Cylinder-#2 ignition coil
32: Cylinder-#3 ignition coil
36: Injector #1
37: Injector #2
38: Injector #3
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 the inner parts of the engine.

EAS30951
YAMAHA DIAGNOSTIC TOOL
This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252

TIP
A generic scan tool can also be used to identify malfunctions.



OBD/ GST Leadwire kit
90890-03249

Features of the Yamaha diagnostic tool
You can use the Yamaha diagnostic tool to identify malfunctions quicker than with conventional methods.
By connecting the adapter interface, which is connected to the USB port of a computer, to a vehicle's ECU using the communication cable, you can display information that is necessary for identifying malfunctions and for maintenance to display on the computer. The displayed information includes the sensor output data and information recorded in the ECU.

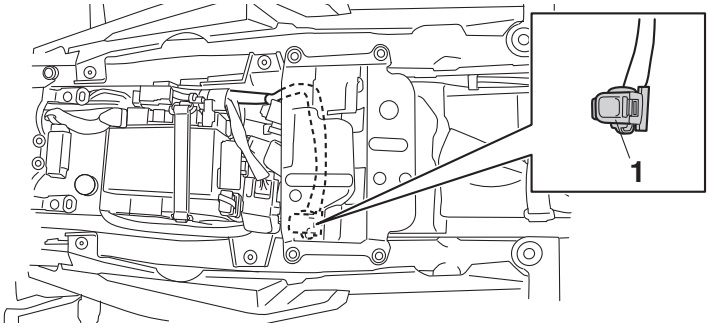
Functions of the Yamaha diagnostic tool

Diagnosis of malfunction:	Fault codes recorded on the ECU are read, and the contents are displayed. The freeze frame data (FFD) is the operation data when a malfunction was detected. This data can be used to identify when the malfunction occurred and check the engine conditions and running conditions when it occurred.
Diagnosis of function:	Check the operation of the output value of each sensor and actuator.
Dynamic inspection:	Check the electric component condition automatically.
Active test:	Manually adjust injection duration and/or switch some actuators for troubleshooting.
Maintenance record:	Store the inspection history into the Yamaha diagnostic tool application.
Recall search:	Search the recall campaign information.
Monitoring:	Displays a graph of sensor output values for actual operating conditions.
Logging:	Records and saves the sensor output value in actual driving conditions.
CO adjustment:	Adjust the concentration of CO admissions during idling.
Reprogram ECU:	If necessary, the ECU is rewritten using ECU rewrite data provided by Yamaha. Ignition timing adjustment, etc. cannot be changed from the vehicle's original state.
Writing VIN/frame number:	Write the VIN/frame number in the ECU.
View logs:	Displays the logging data.

However, the Yamaha diagnostic tool cannot be used to freely change the basic vehicle functions, such as adjusting the ignition timing.

Connecting the Yamaha diagnostic tool

Remove the protective cap "1", and then connect the Yamaha diagnostic tool to the coupler.



EAS31791

TROUBLESHOOTING DETAILS (FAULT CODE)

This section describes the measures per fault code number displayed on the Yamaha diagnostic tool. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part have been completed, delete the fault codes displayed on the Yamaha diagnostic tool according to the reinstatement method.

Fault code No.:

Fault code number displayed on the Yamaha diagnostic tool when the engine failed to work normally.

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.

Parts connected to the ECU

The following parts are connected to the ECU.
When checking for a power short circuit, the couplers must be disconnected from all of the following parts beforehand.

- Crankshaft position sensor
- Fuel injector #1
- Fuel injector #2
- Fuel injector #3
- Ignition coil #1
- Ignition coil #2
- Ignition coil #3
- Throttle position sensor
- Accelerator position sensor
- Intake air pressure sensor 1
- Intake air pressure sensor 2
- Coolant temperature sensor
- Intake air temperature sensor
- O_2 sensor
- Lean angle sensor
- ABS ECU (electronic control unit)
- Air induction system solenoid
- Throttle servo motor
- Relay unit
- Headlight assembly
- Radiator fan motor relay
- Meter assembly
- Immobilizer unit
- Shift switch (OPTION)

Fault code No. P0030

TIP

- If fault code numbers “P0030” and “P0112” are both indicated, take the actions specified for fault code number “P0112” first.
- If fault code numbers “P0030” and “P0113” are both indicated, take the actions specified for fault code number “P0113” first.
- If fault code numbers “P0030” and “P0122” are both indicated, take the actions specified for fault code number “P0122” first.
- If fault code numbers “P0030” and “P0123” are both indicated, take the actions specified for fault code number “P0123” first.
- If fault code numbers “P0030” and “P0222” are both indicated, take the actions specified for fault code number “P0222” first.
- If fault code numbers “P0030” and “P0223” are both indicated, take the actions specified for fault code number “P0223” first.
- If fault code numbers “P0030” and “P2135” are both indicated, take the actions specified for fault code number “P2135” first.

Fault code No.	**P0030**
Item	**O_2 sensor heater: defective heater controller detected.**
Fail-safe system	Able to start engine
	Able to drive vehicle
Diagnostic code No.	—
Tool display	—
Procedure	—

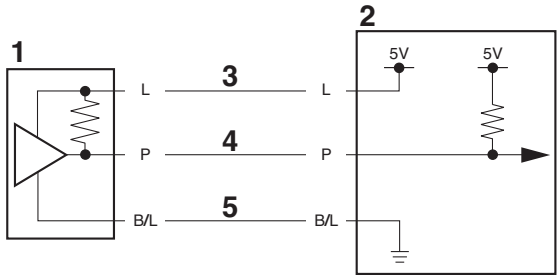
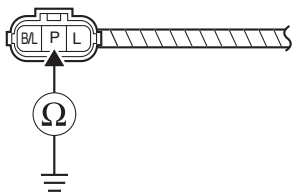
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion

Fault code No.		P0030	
Item		O_2 sensor heater: defective heater controller detected.	
1	Connection of O_2 sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine, and then check the condition of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 2. **TIP** For this check, also set the start/engine stop switch to "ON".
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine, and then check the condition of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 3. **TIP** For this check, also set the start/engine stop switch to "ON".
3	Wire harness continuity.	Open or short circuit → Properly connect or replace the wire harness. Between O_2 sensor coupler and ECU coupler. pink/black–pink/black Between O_2 sensor coupler and joint connector. red/white–red/white Between main switch and ignition fuse. brown/blue–brown/blue Between ignition fuse and joint connector. red/white–red/white	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine, and then check the condition of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 4. **TIP** For this check, also set the start/engine stop switch to "ON".

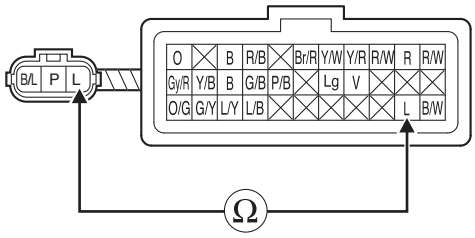
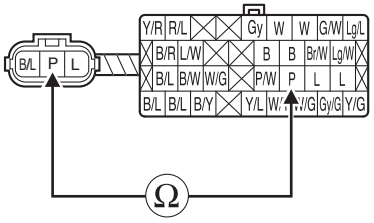
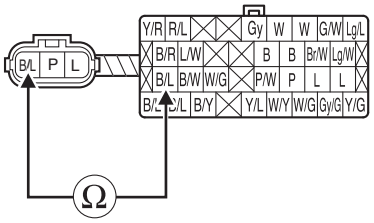
Fault code No.		P0030	
Item		**O_2 sensor heater: defective heater controller detected.**	
4	Defective O_2 sensor heater.	Replace the O_2 sensor.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine, and then check the condition of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 5. **TIP** For this check, also set the start/engine stop switch to "ON".
5	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.
6	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

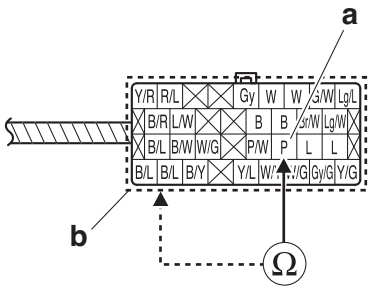
Fault code No. P0107, P0108

Fault code No.		P0107, P0108	
Item		**[P0107] Intake air pressure sensor 1: ground short circuit detected. [P0108] Intake air pressure sensor 1: open or power short circuit detected.**	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		03	
Tool display		Displays the intake air pressure 1.	
Procedure		Operate the throttle while pushing the "(≋)" side of the start/engine stop switch. (If the display value changes, the performance is OK.)	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of intake air pressure sensor 1 coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.

Fault code No.		P0107, P0108	
Item		[P0107] Intake air pressure sensor 1: ground short circuit detected. [P0108] Intake air pressure sensor 1: open or power short circuit detected.	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
3-1	 1. Intake air pressure sensor 1 2. ECU 3. Sensor input lead 4. Sensor output lead 5. Sensor ground lead		
3-2	Disconnect the ECU coupler from the ECU. Disconnect the intake air pressure sensor 1 coupler from the intake air pressure sensor 1.		
3-3	[For P0107] Ground short circuit Between intake air pressure sensor 1 coupler and ground: pink–ground If there is continuity, replace the wire harness. 		

Fault code No.	P0107, P0108
Item	[P0107] Intake air pressure sensor 1: ground short circuit detected. [P0108] Intake air pressure sensor 1: open or power short circuit detected.

3-4	[For P0108] Open circuit Between intake air pressure sensor 1 coupler and ECU coupler: blue–blue If there is no continuity, replace the wire harness. 
3-5	[For P0108] Open circuit Between intake air pressure sensor 1 coupler and ECU coupler: pink–pink If there is no continuity, replace the wire harness. 
3-6	[For P0108] Open circuit Between intake air pressure sensor 1 coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness. 
3-7	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.

Fault code No.		P0107, P0108	
Item		[P0107] Intake air pressure sensor 1: ground short circuit detected. [P0108] Intake air pressure sensor 1: open or power short circuit detected.	
3-8	[For P0107/P0108] Short circuit Between intake air pressure sensor 1 output terminal (pink) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness. 		
4	Installed condition of intake air pressure sensor 1.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective intake air pressure sensor 1.	Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Check the intake air pressure sensor 1. Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-172.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.

Fault code No.		P0107, P0108	
Item		[P0107] Intake air pressure sensor 1: ground short circuit detected. [P0108] Intake air pressure sensor 1: open or power short circuit detected.	
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0112, P0113

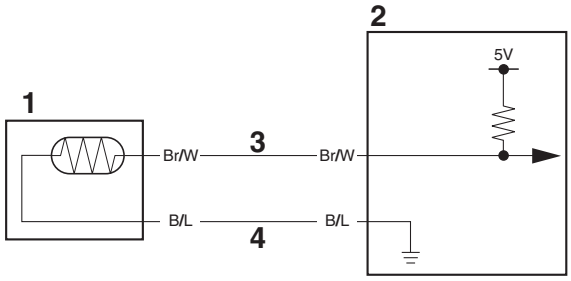
TIP

Perform this procedure when the engine is cold.

Fault code No.		P0112, P0113	
Item		[P0112] Intake air temperature sensor: ground short circuit detected. [P0113] Intake air temperature sensor: open or power short circuit detected.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		05	
Tool display		Displays the air temperature.	
Procedure		Compare the actually measured air temperature with the tool display value.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of intake air temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.

Fault code No.	P0112, P0113
Item	**[P0112] Intake air temperature sensor: ground short circuit detected.** **[P0113] Intake air temperature sensor: open or power short circuit detected.**

3-1



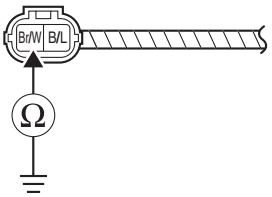
1. Intake air temperature sensor
2. ECU
3. Sensor output lead
4. Sensor ground lead

3-2

Disconnect the ECU coupler from the ECU.
Disconnect the intake air temperature sensor coupler from the intake air temperature sensor.

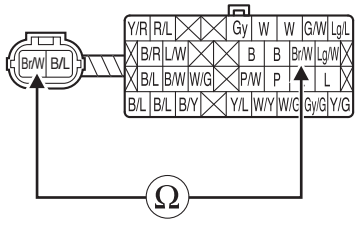
3-3

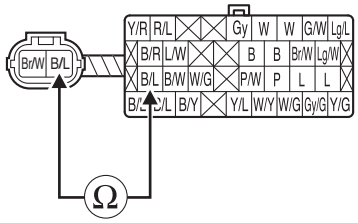
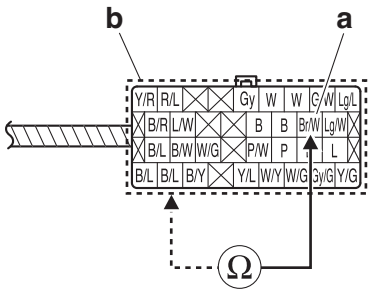
[For P0112] Ground short circuit
Between intake air temperature sensor coupler and ground: brown/white–ground
If there is continuity, replace the wire harness.



3-4

[For P0113] Open circuit
Between intake air temperature sensor coupler and ECU coupler: brown/white–brown/white
If there is no continuity, replace the wire harness.



Fault code No.		P0112, P0113	
Item		**[P0112] Intake air temperature sensor: ground short circuit detected.** **[P0113] Intake air temperature sensor: open or power short circuit detected.**	
3-5	[For P0113] Open circuit Between intake air temperature sensor coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness.  		
3-6	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.		
3-7	[For P0112/P0113] Short circuit Between intake air temperature sensor output terminal (brown/white) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness.  		
4	Installed condition of intake air temperature sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective intake air temperature sensor.	Execute the diagnostic mode. (Code No. 05) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature. → Check the intake air temperature sensor. Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-172.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.

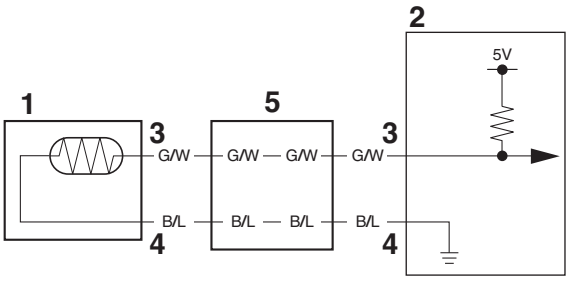
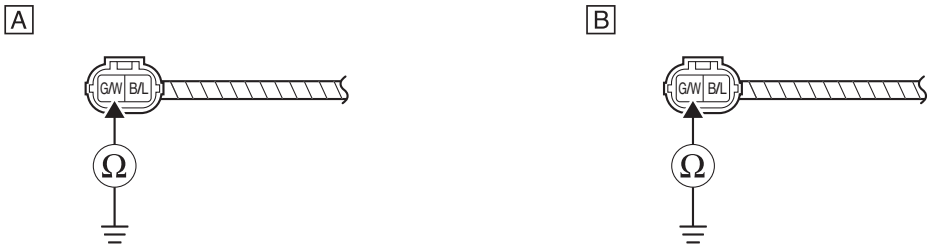
Fault code No.		P0112, P0113	
Item		[P0112] Intake air temperature sensor: ground short circuit detected. [P0113] Intake air temperature sensor: open or power short circuit detected.	
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0117, P0118

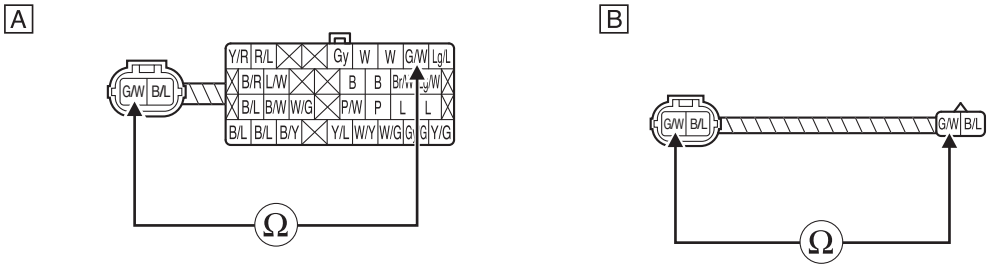
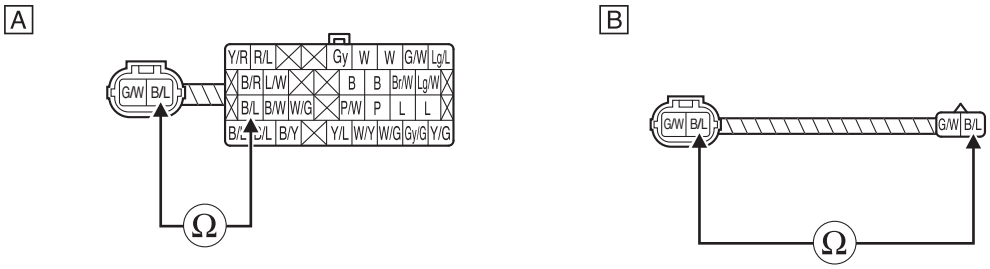
TIP

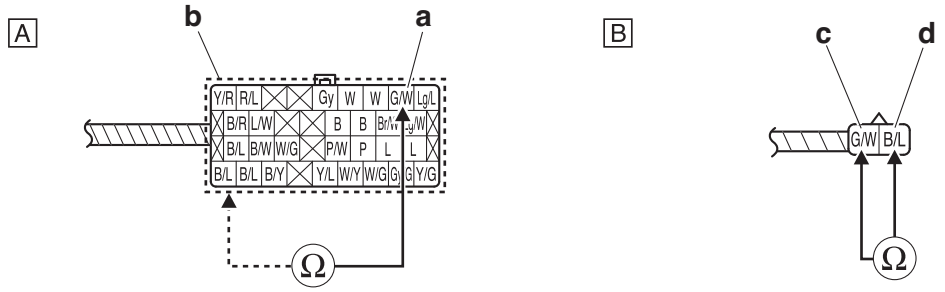
Perform this procedure when the engine is cold.

Fault code No.		P0117, P0118	
Item		[P0117] Coolant temperature sensor: ground short circuit detected. [P0118] Coolant temperature sensor: open or power short circuit detected.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		06	
Tool display		When engine is cold: Displays temperature closer to air temperature. When engine is hot: Displays current coolant temperature.	
Procedure		Compare the actually measured coolant temperature with the tool display value.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of coolant temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.

Fault code No.		P0117, P0118	
Item		[P0117] Coolant temperature sensor: ground short circuit detected. [P0118] Coolant temperature sensor: open or power short circuit detected.	
3	Wire harness and/or sub-wire harness continuity.	Open or short circuit → Replace the wire harness and/or sub-wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
3-1	 1. Coolant temperature sensor 2. ECU 3. Sensor output lead 4. Sensor ground lead 5. Sub-wire harness		
3-2	Disconnect the ECU coupler from the ECU. Disconnect the coolant temperature sensor coupler from the coolant temperature sensor.		
3-3	[For P0117] Ground short circuit Between wire harness coupler (ECU side) and ground: green/white–ground Between sub-wire harness coupler (coolant temperature sensor side) and ground: green/white–ground If there is continuity, replace the wire harness and/or sub-wire harness.  A. Wire harness coupler (White: ECU side) B. Sub-wire harness coupler (Black: coolant temperature sensor side)		

Fault code No.	P0117, P0118
Item	[P0117] Coolant temperature sensor: ground short circuit detected. [P0118] Coolant temperature sensor: open or power short circuit detected.

3-4	[For P0118] Open circuit Between wire harness coupler (ECU side) and ECU coupler: green/white–green/white Between sub-wire harness coupler (coolant temperature sensor side) and coolant temperature sensor coupler: green/white–green/white If there is no continuity, replace the wire harness and/or sub-wire harness.  A. Wire harness coupler (ECU side) B. Sub-wire harness coupler (coolant temperature sensor side)
3-5	[For P0118] Open circuit Between wire harness coupler (ECU side) and ECU coupler: black/blue–black/blue Between sub-wire harness coupler (coolant temperature sensor side) and coolant temperature sensor coupler: black/blue–black/blue If there is no continuity, replace the wire harness and/or sub-wire harness.  A. Wire harness coupler (ECU side) B. Sub-wire harness coupler (coolant temperature sensor side)
3-6	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.

Fault code No.	P0117, P0118		
Item	**[P0117] Coolant temperature sensor: ground short circuit detected. [P0118] Coolant temperature sensor: open or power short circuit detected.**		
3-7	[For P0117/P0118] Short circuit Between wire harness (ECU side) output terminal (green/white) “a” of ECU coupler and any other ECU coupler terminal “b”. Between sub-wire harness (coolant temperature sensor side) output terminal (green/white) “c” and output terminal (black/blue) “d”. If there is continuity, replace the wire harness and/or sub-wire harness.  A. Wire harness coupler (ECU side) B. Sub-wire harness coupler (coolant temperature sensor side)		
4	Installed condition of coolant temperature sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective coolant temperature sensor.	Execute the diagnostic mode. (Code No. 06) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature → Check the coolant temperature sensor. Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-169.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0122, P0123, P0222, P0223, P2135

TIP

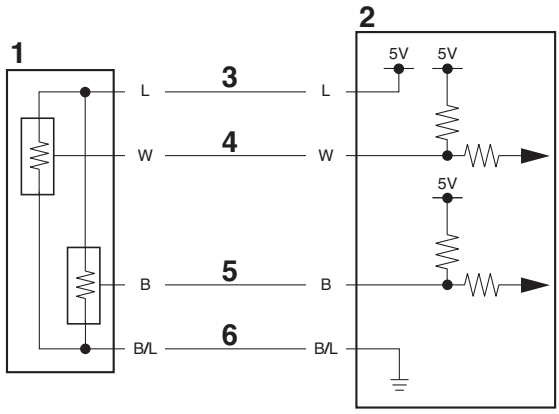
If a fault code other than No. P2135 (P0122/P0123/P0222/P0223) is detected, perform troubleshooting first.

Fault code No.		**P0122, P0123, P0222, P0223, P2135**
Item		**[P0122] Throttle position sensor: ground short circuit detected.** **[P0123] Throttle position sensor: open or power short circuit detected.** **[P0222] Throttle position sensor: ground short circuit detected.** **[P0223] Throttle position sensor: open or power short circuit detected.** **[P2135] Throttle position sensor: output voltage deviation error.**
Fail-safe system		Able/Unable to start engine
		Able/Unable to drive vehicle
Diagnostic code No.		01, 13
01	**Tool display**	Throttle position sensor signal 1 • 11–21 (fully closed position) • 96–106 (fully open position)
	Procedure	• Check with throttle valves fully closed. • Check with throttle valves fully open.
13	**Tool display**	Throttle position sensor signal 2 • 9–23 (fully closed position) • 94–108 (fully open position)
	Procedure	• Check with throttle valves fully closed. • Check with throttle valves fully open.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of throttle position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 4.

Fault code No.	P0122, P0123, P0222, P0223, P2135
Item	[P0122] Throttle position sensor: ground short circuit detected. [P0123] Throttle position sensor: open or power short circuit detected. [P0222] Throttle position sensor: ground short circuit detected. [P0223] Throttle position sensor: open or power short circuit detected. [P2135] Throttle position sensor: output voltage deviation error.

3-1



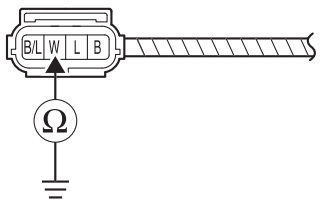
1. Throttle position sensor
2. ECU
3. Sensor input lead
4. Sensor output lead 1
5. Sensor output lead 2
6. Sensor ground lead

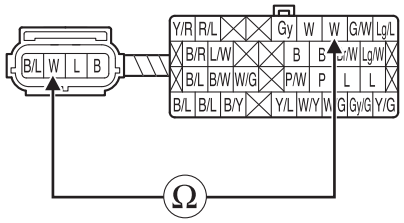
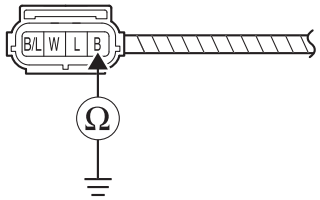
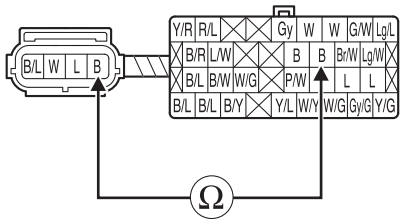
3-2

Disconnect the ECU coupler from the ECU.
Disconnect the throttle position sensor coupler from the throttle position sensor.

3-3

[For P0122] Ground short circuit
Between throttle position sensor coupler and ground: white–ground
If there is continuity, replace the wire harness.

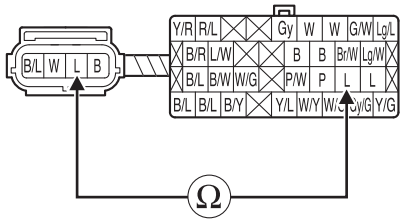


Fault code No.	P0122, P0123, P0222, P0223, P2135
Item	**[P0122] Throttle position sensor: ground short circuit detected.** **[P0123] Throttle position sensor: open or power short circuit detected.** **[P0222] Throttle position sensor: ground short circuit detected.** **[P0223] Throttle position sensor: open or power short circuit detected.** **[P2135] Throttle position sensor: output voltage deviation error.**
3-4	[For P0123] Open circuit Between throttle position sensor coupler and ECU coupler: white–white If there is no continuity, replace the wire harness. 
3-5	[For P0222] Ground short circuit Between throttle position sensor coupler and ground: black–ground If there is continuity, replace the wire harness. 
3-6	[For P0223] Open circuit Between throttle position sensor coupler and ECU coupler: black–black If there is no continuity, replace the wire harness. 

Fault code No.	P0122, P0123, P0222, P0223, P2135
Item	**[P0122] Throttle position sensor: ground short circuit detected.** **[P0123] Throttle position sensor: open or power short circuit detected.** **[P0222] Throttle position sensor: ground short circuit detected.** **[P0223] Throttle position sensor: open or power short circuit detected.** **[P2135] Throttle position sensor: output voltage deviation error.**

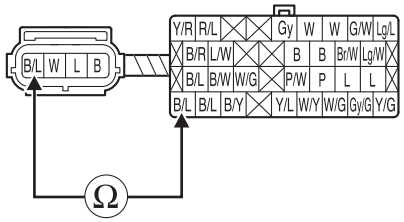
3-7

[For P0123/P0223] Open circuit
Between throttle position sensor coupler and ECU coupler: blue–blue
If there is no continuity, replace the wire harness.



3-8

[For P0123/P0223] Open circuit
Between throttle position sensor coupler and ECU coupler: black/blue–black/blue
If there is no continuity, replace the wire harness.

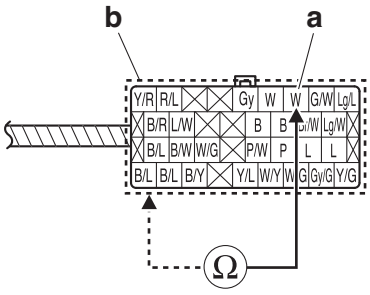


3-9

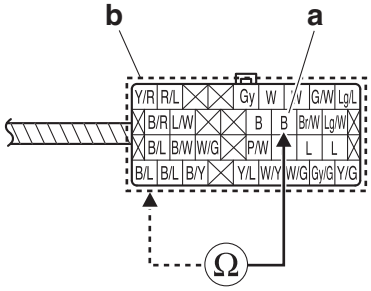
Disconnect the couplers from the parts that are connected to the ECU.
Refer to “Parts connected to the ECU” on page 8-36.

3-10

[For P0122/P0123] Short circuit
Between throttle position sensor output terminal (white) “a” of ECU coupler and any other ECU coupler terminal “b”.
If there is continuity, replace the wire harness.



Fault code No.	P0122, P0123, P0222, P0223, P2135
Item	**[P0122] Throttle position sensor: ground short circuit detected.** **[P0123] Throttle position sensor: open or power short circuit detected.** **[P0222] Throttle position sensor: ground short circuit detected.** **[P0223] Throttle position sensor: open or power short circuit detected.** **[P2135] Throttle position sensor: output voltage deviation error.**

3-11	[For P0222/P0223] Short circuit Between throttle position sensor output terminal (black) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness.  		
4	Installed condition of throttle position sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-12.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 5.
5	Throttle position sensor resistance.	Measure the throttle position sensor resistance. black/blue–blue Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-170.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 6.

Fault code No.		P0122, P0123, P0222, P0223, P2135	
Item		[P0122] Throttle position sensor: ground short circuit detected. [P0123] Throttle position sensor: open or power short circuit detected. [P0222] Throttle position sensor: ground short circuit detected. [P0223] Throttle position sensor: open or power short circuit detected. [P2135] Throttle position sensor: output voltage deviation error.	
6	Defective throttle position sensor.	Check throttle position sensor signal 1. Execute the diagnostic mode. (Code No. 01) When the throttle valves are fully closed: A value of 11–21 is indicated. When throttle valves are fully open: A value of 96–106 is indicated. Check throttle position sensor signal 2. Execute the diagnostic mode. (Code No. 13) When the throttle valves are fully closed: A value of 9–23 is indicated. When the throttle valves are fully open: A value of 94–108 is indicated. An indicated value is out of the specified range → Replace the throttle position sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 7.
7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
8	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0132

Fault code No.		P0132	
Item		O_2 sensor: short circuit detected (power short circuit).	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		—	
Tool display		—	
Procedure		—	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**

Fault code No.		P0132	
Item		O_2 sensor: short circuit detected (power short circuit).	
1	Installed condition of O_2 sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.
2	Connection of O_2 sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 3.
3	Connection of wire harness ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 4.
4	Wire harness continuity.	Open or short circuit → Properly connect or replace the wire harness. Between O_2 sensor coupler and joint connector. black/blue–black/blue Between joint connector and ECU coupler. black/blue–black/blue Between O_2 sensor coupler and ECU coupler. gray/green–gray/green	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 5.
5	Defective O_2 sensor.	Check the O_2 sensor. Defective → Replace the O_2 sensor. Refer to "ENGINE REMOVAL" on page 5-3.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0201

Fault code No.	**P0201**
Item	**Fuel injector #1: malfunction in fuel injector #1.**
Fail-safe system	Able to start engine (depending on the number of faulty cylinders)
	Able to drive vehicle (depending on the number of faulty cylinders)
Diagnostic code No.	36
Actuation	Actuates fuel injector #1 five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen comes on each time the fuel injector is actuated.
Procedure	Disconnect the fuel pump coupler. Check that fuel injector #1 is actuated five times by listening for the operating sound.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of fuel injector #1 coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 2.
2	Defective fuel injector #1.	Measure the fuel injector resistance. Replace if out of specification. Refer to “CHECKING THE FUEL INJECTORS” on page 8-174.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 3.
3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 4.
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between fuel injector coupler and ECU coupler. red/black–red/black Between fuel injector coupler and relay unit coupler. red/blue–red/blue	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 5.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	
6	Delete the fault code and check that the engine trouble warning light goes off.	Start the engine and let it idle for approximately 5 seconds. Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0202

Fault code No.	**P0202**
Item	**Fuel injector #2: malfunction in fuel injector #2.**
Fail-safe system	Able to start engine (depending on the number of faulty cylinders)
	Able to drive vehicle (depending on the number of faulty cylinders)
Diagnostic code No.	37
Actuation	Actuates fuel injector #2 five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen comes on each time the fuel injector is actuated.
Procedure	Disconnect the fuel pump coupler. Check that fuel injector #2 is actuated five times by listening for the operating sound.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of fuel injector #2 coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 37) Operating sound → Go to item 7. No operating sound → Go to item 2.
2	Defective fuel injector #2.	Measure the fuel injector resistance. Replace if out of specification. Refer to "CHECKING THE FUEL INJECTORS" on page 8-174.	Execute the diagnostic mode. (Code No. 37) Operating sound → Go to item 7. No operating sound → Go to item 3.
3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 37) Operating sound → Go to item 7. No operating sound → Go to item 4.
4	Connection of sub-wire harness coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the sub-wire harness.	Execute the diagnostic mode. (Code No. 37) Operating sound → Go to item 7. No operating sound → Go to item 5.
5	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between fuel injector coupler and sub-wire harness coupler. green/black–green/black red/blue–red/blue Between sub-wire harness coupler and ECU coupler. green/black–green/black Between sub-wire harness coupler and relay unit coupler. red/blue–red/blue	Execute the diagnostic mode. (Code No. 37) Operating sound → Go to item 7. No operating sound → Go to item 6.

Fault code No.		P0202	
Item		**Fuel injector #2: malfunction in fuel injector #2.**	
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	
7	Delete the fault code and check that the engine trouble warning light goes off.	Start the engine and let it idle for approximately 5 seconds. Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0203

Fault code No.	P0203
Item	**Fuel injector #3: malfunction in fuel injector #3.**
Fail-safe system	Able to start engine (depending on the number of faulty cylinders)
	Able to drive vehicle (depending on the number of faulty cylinders)
Diagnostic code No.	38
Actuation	Actuates fuel injector #3 five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen comes on each time the fuel injector is actuated.
Procedure	Disconnect the fuel pump coupler. Check that fuel injector #3 is actuated five times by listening for the operating sound.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of Fuel injector #3 coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 38) Operating sound → Go to item 6. No operating sound → Go to item 2.
2	Defective Fuel injector #3.	Measure the fuel injector resistance. Replace if out of specification. Refer to “CHECKING THE FUEL INJECTORS” on page 8-174.	Execute the diagnostic mode. (Code No. 38) Operating sound → Go to item 6. No operating sound → Go to item 3.
3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 38) Operating sound → Go to item 6. No operating sound → Go to item 4.

Fault code No.		P0203	
Item		**Fuel injector #3: malfunction in fuel injector #3.**	
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between fuel injector coupler and ECU coupler. blue/black–blue/black Between fuel injector coupler and relay unit coupler. red/blue–red/blue	Execute the diagnostic mode. (Code No. 38) Operating sound → Go to item 6. No operating sound → Go to item 5.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	
6	Delete the fault code and check that the engine trouble warning light goes off.	Start the engine and let it idle for approximately 5 seconds. Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0335

Fault code No.	P0335
Item	**Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.**
Fail-safe system	Unable to start engine
	Unable to drive vehicle
Diagnostic code No.	—
Tool display	—
Procedure	—

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of crankshaft position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.

Fault code No.		P0335	
Item		Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.	
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between crankshaft position sensor coupler and ECU coupler. gray–gray Between crankshaft position sensor coupler and joint connector. black/blue–black/blue Between joint connector and ECU coupler. black/blue–black/blue	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
4	Installed condition of crankshaft position sensor. Check for looseness or pinching. Check the gap (0.85 mm (0.0335 in)) between the crankshaft position sensor and the generator rotor.	Improperly installed sensor → Reinstall or replace the sensor. Refer to “GENERATOR AND STARTER CLUTCH” on page 5-29.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective crankshaft position sensor.	Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-164. Replace if defective.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0351

Fault code No.	**P0351**
Item	**Cylinder-#1 ignition coil: open or short circuit detected in the primary lead of the cylinder-#1 ignition coil.**
Fail-safe system	Able to start engine (depending on the number of faulty cylinders)
	Able to drive vehicle (depending on the number of faulty cylinders)
Diagnostic code No.	30
Actuation	Actuates the cylinder-#1 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen comes on each time the ignition coil is actuated.
Procedure	Check that a spark is generated five times. • Connect an ignition checker.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of cylinder-#1 ignition coil coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between cylinder-#1 ignition coil coupler and ECU coupler. orange–orange Between cylinder-#1 ignition coil coupler and handlebar switch coupler (right). red/black–red/black	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 4.
4	Installed condition of cylinder-#1 ignition coil.	Check for looseness or pinching. Improperly installed ignition coil → Reinstall or replace the ignition coil.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 5.

Fault code No.		P0351	
Item		**Cylinder-#1 ignition coil: open or short circuit detected in the primary lead of the cylinder-#1 ignition coil.**	
5	Defective cylinder-#1 ignition coil.	Measure the primary coil resistance of the cylinder-#1 ignition coil. Replace if out of specification. Refer to "CHECKING THE IGNITION COILS" on page 8-163.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 6.
6	Malfunction in ECU.	Execute the diagnostic mode. (Code No. 30) No spark → Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0352

Fault code No.		P0352	
Item		**Cylinder-#2 ignition coil: open or short circuit detected in the primary lead of the cylinder-#2 ignition coil.**	
Fail-safe system		Able to start engine (depending on the number of faulty cylinders)	
		Able to drive vehicle (depending on the number of faulty cylinders)	
Diagnostic code No.		31	
Actuation		Actuates the cylinder-#2 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen comes on each time the ignition coil is actuated.	
Procedure		Check that a spark is generated five times. • Connect an ignition checker.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of cylinder-#2 ignition coil coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.

Fault code No.		P0352	
Item		Cylinder-#2 ignition coil: open or short circuit detected in the primary lead of the cylinder-#2 ignition coil.	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between cylinder-#2 ignition coil coupler and ECU coupler. gray/red–gray/red Between cylinder-#2 ignition coil coupler and handlebar switch coupler (right). red/black–red/black	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
4	Installed condition of cylinder-#2 ignition coil.	Check for looseness or pinching. Improperly installed ignition coil → Reinstall or replace the ignition coil.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective cylinder-#2 ignition coil.	Measure the primary coil resistance of the cylinder-#2 ignition coil. Replace if out of specification. Refer to “CHECKING THE IGNITION COILS” on page 8-163.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Execute the diagnostic mode. (Code No. 31) No spark → Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0353

Fault code No.	**P0353**
Item	**Cylinder-#3 ignition coil: open or short circuit detected in the primary lead of the cylinder-#3 ignition coil.**
Fail-safe system	Able to start engine (depending on the number of faulty cylinders)
	Able to drive vehicle (depending on the number of faulty cylinders)
Diagnostic code No.	32
Actuation	Actuates the cylinder-#3 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen comes on each time the ignition coil is actuated.
Procedure	Check that a spark is generated five times. • Connect an ignition checker.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of cylinder-#3 ignition coil coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between cylinder-#3 ignition coil coupler and ECU coupler. orange/green–orange/green Between cylinder-#3 ignition coil coupler and handlebar switch coupler (right). red/black–red/black	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 4.
4	Installed condition of cylinder-#3 ignition coil.	Check for looseness or pinching. Improperly installed ignition coil → Reinstall or replace the ignition coil.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 5.

Fault code No.		P0353	
Item		Cylinder-#3 ignition coil: open or short circuit detected in the primary lead of the cylinder-#3 ignition coil.	
5	Defective cylinder-#3 ignition coil.	Measure the primary coil resistance of the cylinder-#3 ignition coil. Replace if out of specification. Refer to "CHECKING THE IGNITION COILS" on page 8-163.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 6.
6	Malfunction in ECU.	Execute the diagnostic mode. (Code No. 32) No spark → Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0500, P1500

TIP

In case "P0500" is detected, or both "P0500" and "P1500" are detected, proceed from item A-1.

Fault code No.		P0500, P1500	
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.
		B	Neutral switch: open or short circuit is detected.
		C	Clutch switch: open or short circuit is detected.
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		07	
Tool display		Rear wheel speed pulse 0–999	
Procedure		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.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
A-1	Locate the malfunction.		(Fault code No. P0500 or P0500 and P1500 detected.) Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases.	Value does not increase → Go to item A-2.
			(Fault code No. P1500 detected.) Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: “ON” When the transmission is in gear with the clutch lever released: “OFF”	Incorrect indication → Go to item B-2 for the neutral switch.
			When the transmission is in gear with the clutch lever squeezed and the sidestand retracted: “ON”	Incorrect indication → Go to item C-2 for the clutch switch.
A-2	Connection of rear wheel sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value increases → Go to item A-8. Value does not increase → Go to item A-3.
A-3	Connection of ABS ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value increases → Go to item A-8. Value does not increase → Go to item A-4.
A-4	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value increases → Go to item A-8. Value does not increase → Go to item A-5.

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
A-5	Rear wheel sensor lead continuity, or defective rear wheel sensor.		Open or short circuit, or defective sensor → Replace the rear wheel sensor. Between rear wheel sensor coupler and ABS ECU coupler. black–black white–white Between ABS ECU coupler and ECU coupler. white/yellow–white/yellow	Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value increases → Go to item A-8. Value does not increase → Go to item A-6.
A-6	Malfunction in ECU.		Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value increases → Go to item A-8. Value does not increase → Go to item A-7.
A-7	Malfunction in ABS ECU.		Replace the ABS ECU.	Go to item A-8.
A-8	Delete the fault code and check that the engine trouble warning light goes off.		Turn the main switch to “ON”, and then rotate the rear wheel by hand. Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code. Delete this fault code even if it has a condition of “Detected”.	

Fault code No.	**P0500, P1500**	
Item	**A**	**Rear wheel sensor: no normal signals are received from the rear wheel sensor.**
	B	**Neutral switch: open or short circuit is detected.**
	C	**Clutch switch: open or short circuit is detected.**
Fail-safe system	Able to start engine	
	Able to drive vehicle	
Diagnostic code No.	21	
Tool display	Neutral switch • "ON" (when the transmission is in neutral) • "OFF" (when the transmission is in gear with the clutch lever released)	
Procedure	Operate the transmission and clutch lever.	

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
B-1	Locate the malfunction.	(Fault code No. P0500 or P0500 and P1500 detected.) Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases.	Value does not increase → Go to item A-2 for the rear wheel sensor.
		(Fault code No. P1500 detected.) Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF"	Incorrect indication → Go to item B-2.
		When the transmission is in gear with the clutch lever squeezed and the sidestand is retracted: "ON"	Incorrect indication → Go to item C-2 for the clutch switch.
B-2	Connection of neutral switch coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-3.

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
B-3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-4.
B-4	Wire harness continuity.		Open or short circuit → Replace the wire harness. Between relay unit coupler and ECU coupler. black/yellow–black/yellow Between relay unit coupler and neutral switch coupler. sky blue–sky blue	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-5.
B-5	Defective relay unit.		Check the relay unit. Replace if defective. Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-163.	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-6.
B-6	Defective neutral switch.		Check the neutral switch. Replace if defective. Refer to "CHECKING THE SWITCHES" on page 8-153.	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-7.
B-7	Faulty shift drum (neutral detection area).		Malfunction → Replace the shift drum. Refer to "TRANSMISSION" on page 5-77.	Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: "ON" When the transmission is in gear with the clutch lever released: "OFF" Correct indication → Go to item B-9. Incorrect indication → Go to item B-8.

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
B-8	Malfunction in ECU.		Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
B-9	Delete the fault code and check that the engine trouble warning light goes off.		Turn the main switch to “ON”, and then rotate the rear wheel by hand. Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code. Delete this fault code even if it has a condition of “Detected”.	

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
Fail-safe system		Able to start engine		
		Able to drive vehicle		
Diagnostic code No.		21		
Tool display		Clutch switch • “ON” (when the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted) • “OFF” (when the clutch lever is squeezed with the transmission in gear and when the sidestand is extended)		
Procedure		Operate the transmission, clutch lever, and sidestand.		
Item	**Probable cause of malfunction and check**		**Maintenance job**	**Confirmation of service completion**

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
C-1	Locate the malfunction.		(Fault code No. P0500 or P0500 and P1500 detected.) Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases.	Value does not increase → Go to item A-2 for the rear wheel sensor.
			(Fault code No. P1500 detected.) Execute the diagnostic mode. (Code No. 21) When the transmission is in neutral: “ON” When the transmission is in gear with the clutch lever released: “OFF”	Incorrect indication → Go to item B-2 for the neutral switch.
			When the transmission is in gear with the clutch lever squeezed and the sidestand retracted: “ON”	Incorrect indication → Go to item C-2.
C-2	Clutch lever adjustment.		Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-12.	Execute the diagnostic mode. (Code No. 21) When the clutch lever is released with the transmission in gear and when the sidestand is retracted: “OFF” When the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted: “ON” Correct indication→ Go to item C-8. Incorrect indication → Go to item C-3.
C-3	Connection of clutch switch coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 21) When the clutch lever is released with the transmission in gear and when the sidestand is retracted: “OFF” When the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted: “ON” Correct indication→ Go to item C-8. Incorrect indication → Go to item C-4.

Fault code No.		P0500, P1500		
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.	
		B	Neutral switch: open or short circuit is detected.	
		C	Clutch switch: open or short circuit is detected.	
C-4	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).		Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 21) When the clutch lever is released with the transmission in gear and when the sidestand is retracted: “OFF” When the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted: “ON” Correct indication→ Go to item C-8. Incorrect indication → Go to item C-5.
C-5	Wire harness continuity.		Open or short circuit → Replace the wire harness. Between ECU coupler and joint coupler. black/yellow–black/yellow black/red–black/red Between joint coupler and relay unit coupler. black/yellow–black/yellow black/red–black/red Between clutch switch coupler and joint coupler. black/yellow–black/yellow black/red–black/red	Execute the diagnostic mode. (Code No. 21) When the clutch lever is released with the transmission in gear and when the sidestand is retracted: “OFF” When the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted: “ON” Correct indication→ Go to item C-8. Incorrect indication → Go to item C-6.
C-6	Defective clutch switch.		Check the clutch switch. Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-153.	Execute the diagnostic mode. (Code No. 21) When the clutch lever is released with the transmission in gear and when the sidestand is retracted: “OFF” When the clutch lever is squeezed with the transmission in gear and when the sidestand is retracted: “ON” Correct indication→ Go to item C-8. Incorrect indication → Go to item C-7.
C-7	Malfunction in ECU.		Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.

Fault code No.		P0500, P1500	
Item		A	Rear wheel sensor: no normal signals are received from the rear wheel sensor.
		B	Neutral switch: open or short circuit is detected.
		C	Clutch switch: open or short circuit is detected.
C-8	Delete the fault code and check that the engine trouble warning light goes off.	Turn the main switch to “ON”, and then rotate the rear wheel by hand. Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code. Delete this fault code even if it has a condition of “Detected”.	

Fault code No. P0560

Fault code No.	P0560
Item	Charging voltage is abnormal.
Fail-safe system	Able to start engine
	Able to drive vehicle
Diagnostic code No.	—
Tool display	—
Procedure	—

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Malfunction in charging system.	Check the charging system. Refer to “CHARGING SYSTEM” on page 8-13. Defective rectifier/regulator or AC magneto → Replace. Defective connection in the charging system circuit → Properly connect or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 2 and finish the service. Condition is “Detected” → Repeat item 1.
2	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0601, P0606

Fault code No.	**P0601, P0606**
Item	**Internal malfunction in ECU. (When this malfunction is detected in the ECU, the fault code number might not appear on the tool display.)**
Fail-safe system	Able/Unable to start engine
	Able/Unable to drive vehicle
Diagnostic code No.	—
Tool display	—
Procedure	—

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Turn the main switch to “ON”. Check that the engine trouble warning light does not come on.

Fault code No. P062F

Fault code No.	**P062F**
Item	**EEPROM fault code number: an error is detected while reading or writing on EEPROM.**
Fail-safe system	Able/Unable to start engine
	Able/Unable to drive vehicle
Diagnostic code No.	60
Tool display	00 • No malfunctions detected (If the self-diagnosis fault code P062F is indicated, the ECU is defective.) 01–03 (CO adjustment value) • (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.) 11 (Data error for ISC (idle speed control) learning values) 12 (O_2 feedback learning value) 13 (OBD memory value)
Procedure	—

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Locate the malfunction	Execute the diagnostic mode. (Code No. 60) 00: Go to item 7. 01: Go to item 2. 02: Go to item 3. 03: Go to item 4. 11–13: go to item 5.	

Fault code No.		P062F	
Item		EEPROM fault code number: an error is detected while reading or writing on EEPROM.	
2	"01" is indicated in diagnostic mode (Code No. 60). EEPROM data error for adjustment of CO concentration of cylinder #1.	Change the CO concentration of cylinder #1, and rewrite in EEPROM. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-11. After this adjustment is made, turn the main switch to "OFF".	Set the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Repeat item 1. If the same number is indicated, go to item 6.
3	"02" is indicated in diagnostic mode (Code No. 60). EEPROM data error for adjustment of CO concentration of cylinder #2.	Change the CO concentration of cylinder #2, and rewrite in EEPROM. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-11. After this adjustment is made, turn the main switch to "OFF".	Set the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Repeat item 1. If the same number is indicated, go to item 6.
4	"03" is indicated in diagnostic mode (Code No. 60). EEPROM data error for adjustment of CO concentration of cylinder #3.	Change the CO concentration of cylinder #3, and rewrite in EEPROM. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-11. After this adjustment is made, turn the main switch to "OFF".	Set the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Repeat item 1. If the same number is indicated, go to item 6.
5	"11" is indicated in diagnostic mode (Code No. 60). EEPROM data error for ISC (idle speed control) learning values. "12" is indicated in the diagnostic mode (Code No. 60). EEPROM data error for O_2 feedback learning values. "13" is indicated in the diagnostic mode (Code No. 60). EEPROM data error for OBD memory values.	Turn the main switch to "OFF".	Set the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Repeat item 1. If the same number is indicated, go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0638

Fault code No.	**P0638**
Item	**YCC-T drive system: malfunction detected.**
Fail-safe system	Able/Unable to start engine
	Able/Unable to drive vehicle
Diagnostic code No.	—
Tool display	—
Procedure	—

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of throttle servo motor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of wire harness ECU coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 3.
3	Check the electronic throttle valve fuse.	Blown fuse → Replace the electronic throttle valve fuse.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 4.
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between throttle servo motor coupler and ECU coupler. yellow/red–yellow/red yellow/white–yellow/white Between ECU coupler and fuse box (electronic throttle valve fuse). red/white–red/white	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective throttle servo motor.	Check the throttle servo motor. Replace the throttle bodies if defective. Refer to “CHECKING THE THROTTLE SERVO MOTOR” on page 8-171.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 6.

Fault code No.		P0638	
Item		**YCC-T drive system: malfunction detected.**	
6	Defective throttle bodies.	Check the throttle bodies. Replace if defective. Refer to “CHECKING THE THROTTLE SERVO MOTOR” on page 8-171.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 7.
7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
8	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0657

Fault code No.		P0657	
Item		**Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.**	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		09, 50	
09	**Tool display**	Fuel system voltage (battery voltage) Approximately 12.0	
	Procedure	Set the start/engine stop switch to “◯”, and then compare the actually measured battery voltage with the tool display value. (If the actually measured battery voltage is low, recharge the battery.)	
50	**Actuation**	Actuates the relay unit five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the relay is actuated.	
	Procedure	Check that the relay unit is actuated five times by listening for the operating sound.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of relay unit coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.

Fault code No.		P0657	
Item		Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between battery and starter relay (fuel injection system fuse) . red–red Between starter relay (fuel injection system fuse) and relay unit coupler. red–red Between relay unit coupler and ECU coupler. red/blue–red/blue blue/yellow–blue/yellow	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
4	Defective relay unit.	Execute the diagnostic mode. (Code No. 50) No operating sound → Replace the relay unit.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective relay unit.	Execute the diagnostic mode. (Code No. 09) Fuel system voltage is below 3 V → Replace the relay unit.	Start the engine and let it idle for approximately 5 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P1004

Fault code No.		**P1004**
Item		**Intake air pressure sensor 1 or intake air pressure sensor 2: when the main switch is turned to "ON", the intake air pressure sensor 1 voltage and intake air pressure sensor 2 voltage differ greatly.**
Fail-safe system		Able to start engine
		Able to drive vehicle
Diagnostic code No.		03, 04
03	**Tool display**	Displays the intake air pressure 1.
	Procedure	Operate the throttle while pushing the "(≋)" side of the start/engine stop switch. (If the display value changes, the performance is OK.)
04	**Tool display**	Displays the intake air pressure 2.
	Procedure	Operate the throttle while pushing the "(≋)" side of the start/engine stop switch. (If the display value changes, the performance is OK.)

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Defective intake air pressure sensor 1.	Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m above sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) Displayed value is incorrect → Check the intake air pressure sensor 1. Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-172.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 4 and finish the service. Condition is "Detected" → Go to item 2.
2	Defective intake air pressure sensor 2.	Execute the diagnostic mode. (Code No. 04) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m above sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) Displayed value is incorrect → Check the intake air pressure sensor 2. Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-172.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 4 and finish the service. Condition is "Detected" → Go to item 3.

Fault code No.		P1004	
Item		Intake air pressure sensor 1 or intake air pressure sensor 2: when the main switch is turned to “ON”, the intake air pressure sensor 1 voltage and intake air pressure sensor 2 voltage differ greatly.	
3	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
4	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P1400

Fault code No.		P1400	
Item		Air induction system solenoid: open or short circuit detected.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		48	
48	Actuation	Actuates the air induction system solenoid five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the air induction system solenoid is actuated.	
	Procedure	Check that the air induction system solenoid is actuated five times by listening for the operating sound.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of air induction system solenoid coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Start the engine and check the status of the fault code. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 2. **TIP** Check that the start/engine stop switch is turned to “ON” then.

Fault code No.		P1400	
Item		Air induction system solenoid: open or short circuit detected.	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine and check the status of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 3. **TIP** Check that the start/engine stop switch is turned to "ON" then.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between air induction system solenoid coupler and ECU coupler. brown/red–brown/red Between air induction system solenoid coupler and joint connector. red/white–red/white Between joint connector and fuse box. red/white–red/white	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine and check the status of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 4. **TIP** Check that the start/engine stop switch is turned to "ON" then.
4	Defective air induction system solenoid.	Refer to "CHECKING THE AIR INDUCTION SYSTEM SOLENOID" on page 8-171.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Start the engine and check the status of the fault code. Condition is "Recovered" → Go to item 6 and finish the service. Condition is "Detected" → Go to item 5. **TIP** Check that the start/engine stop switch is turned to "ON" then.
5	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.

Fault code No.		P1400	
Item		Air induction system solenoid: open or short circuit detected.	
6	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P1601

Fault code No.	P1601
Item	Sidestand switch: open or short circuit of the black/red lead of the ECU is detected.
Fail-safe system	Unable to start engine
	Unable to drive vehicle
Diagnostic code No.	20
Tool display	Sidestand switch • “ON” (sidestand retracted) • “OFF” (sidestand extended)
Procedure	Extend and retract the sidestand (with the transmission in gear).

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of sidestand switch coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then extend and retract the sidestand. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then extend and retract the sidestand. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Connection of relay unit coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then extend and retract the sidestand. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.

Fault code No.		P1601	
Item		Sidestand switch: open or short circuit of the black/red lead of the ECU is detected.	
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between relay unit coupler and ECU coupler. black/red–black/red Between relay unit coupler and sidestand switch coupler. blue/black–blue/black	Turn the main switch to "ON", and then extend and retract the sidestand. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 5.
5	Defective sidestand switch.	Execute the diagnostic mode. (Code No. 20) Shift the transmission into gear. Sidestand retracted: "ON" Sidestand extended: "OFF" Replace if defective.	Turn the main switch to "ON", and then extend and retract the sidestand. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P1602

Fault code No.		P1602	
Item		Malfunction in ECU internal circuit (malfunction of ECU power cut-off function).	
Fail-safe system		Able/Unable to start engine	
		Able/Unable to drive vehicle	
Diagnostic code No.		—	
Tool display		—	
Procedure		—	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Installed condition of battery leads. Check the installed condition of the battery and battery leads (loose bolts).	Improperly installed battery or battery leads → Reinstall or replace the battery leads.	Turn the main switch to "ON", and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 7 and finish the service. Condition is "Detected" → Go to item 2.

Fault code No.		P1602	
Item		Malfunction in ECU internal circuit (malfunction of ECU power cut-off function).	
2	Connection of starter relay coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.
3	Check the fuel injection system fuse.	Blown fuse → Replace the fuse.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
4	Wire harness continuity between starter relay and ECU coupler.	Open or short circuit → Replace the wire harness. Between starter relay and ECU coupler. red–red	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Wire harness continuity between starter relay and battery.	Open or short circuit → Replace the wire harness. Between battery terminal and starter relay. red–red	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU.	Service is finished.
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

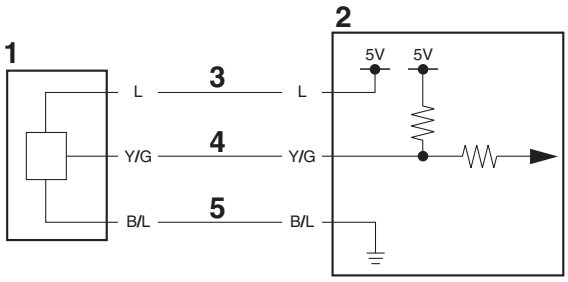
Fault code No. P1604, P1605

Fault code No.	**P1604, P1605**
Item	**[P1604] Lean angle sensor: ground short circuit detected.** **[P1605] Lean angle sensor: open or power short circuit.**
Fail-safe system	Unable to start engine
	Unable to drive vehicle
Diagnostic code No.	08
Tool display	Lean angle sensor output voltage • 0.4–1.4 (upright) • 3.7–4.4 (overturned)
Procedure	Remove the lean angle sensor and incline it more than 65 degrees.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of lean angle sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 4.

Fault code No.	P1604, P1605
Item	[P1604] Lean angle sensor: ground short circuit detected. [P1605] Lean angle sensor: open or power short circuit.

3-1



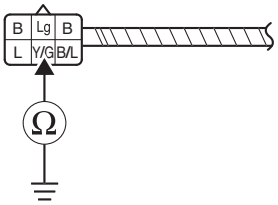
1. Lean angle sensor
2. ECU
3. Sensor input lead
4. Sensor output lead
5. Sensor ground lead

3-2

Disconnect the ECU coupler from the ECU.
Disconnect the lean angle sensor coupler from the lean angle sensor.

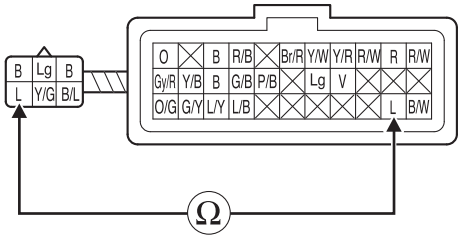
3-3

[For P1604] Ground short circuit
Between lean angle sensor coupler and ground: yellow/green–ground
If there is continuity, replace the wire harness.

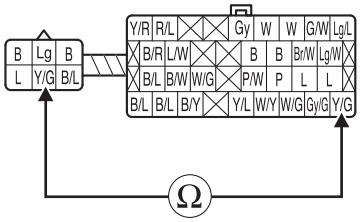
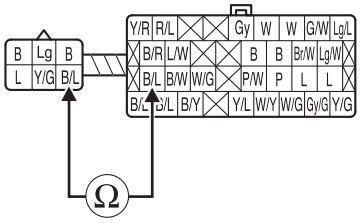
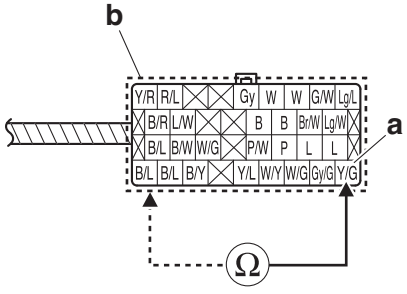


3-4

[For P1605] Open circuit
Between lean angle sensor coupler and ECU coupler: blue–blue
If there is no continuity, replace the wire harness.



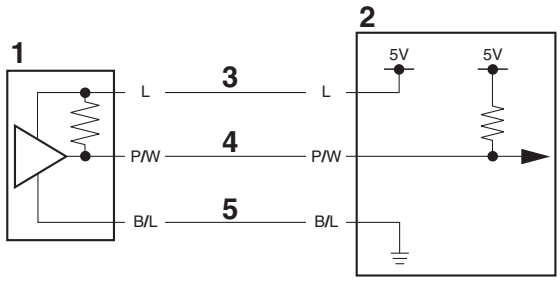
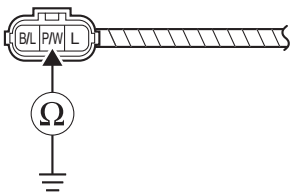
Fault code No.	P1604, P1605
Item	[P1604] Lean angle sensor: ground short circuit detected. [P1605] Lean angle sensor: open or power short circuit.

3-5	[For P1605] Open circuit Between lean angle sensor coupler and ECU coupler: yellow/green–yellow/green If there is no continuity, replace the wire harness. 
3-6	[For P1605] Open circuit Between lean angle sensor coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness. 
3-7	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.
3-8	[For P1604/P1605] Short circuit Between lean angle sensor output terminal (yellow/green) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness. 

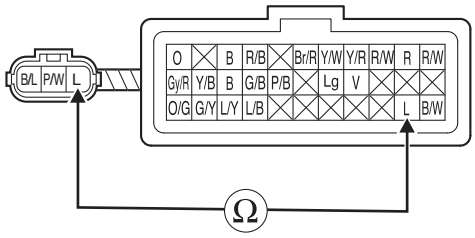
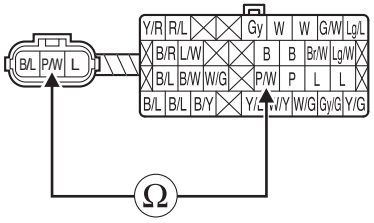
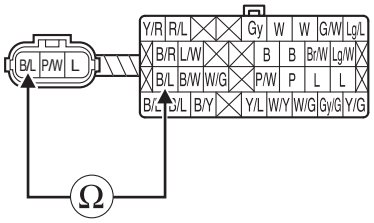
Fault code No.		P1604, P1605	
Item		[P1604] Lean angle sensor: ground short circuit detected. [P1605] Lean angle sensor: open or power short circuit.	
4	Defective lean angle sensor.	Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-165.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 5.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
6	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

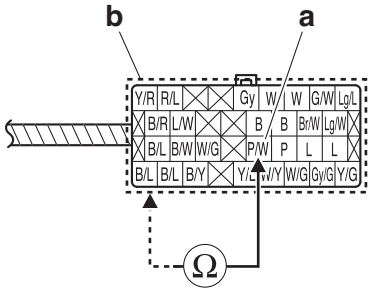
Fault code No. P1606, P1607

Fault code No.		P1606, P1607	
Item		[P1606] Intake air pressure sensor 2: ground short circuit detected. [P1607] Intake air pressure sensor 2: open or power short circuit detected.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		04	
Tool display		Displays the intake air pressure 2.	
Procedure		Operate the throttle while pushing the “(≋)” side of the start/engine stop switch. (If the display value changes, the performance is OK.)	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of Intake air pressure sensor 2 coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 3.

Fault code No.		P1606, P1607	
Item		[P1606] Intake air pressure sensor 2: ground short circuit detected. [P1607] Intake air pressure sensor 2: open or power short circuit detected.	
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 4.
3-1	 1. Intake air pressure sensor 2. ECU 3. Sensor input lead 4. Sensor output lead 5. Sensor ground lead		
3-2	Disconnect the ECU coupler from the ECU. Disconnect the Intake air pressure sensor 2 coupler from the Intake air pressure sensor 2.		
3-3	[For P1606] Ground short circuit Between Intake air pressure sensor 2 coupler and ground: pink/white–ground If there is continuity, replace the wire harness. 		

Fault code No.	P1606, P1607
Item	[P1606] Intake air pressure sensor 2: ground short circuit detected. [P1607] Intake air pressure sensor 2: open or power short circuit detected.

3-4	[For P1607] Open circuit Between Intake air pressure sensor 2 coupler and ECU coupler: blue–blue If there is no continuity, replace the wire harness. 
3-5	[For P1607] Open circuit Between Intake air pressure sensor 2 coupler and ECU coupler: pink/white–pink/white If there is no continuity, replace the wire harness. 
3-6	[For P1607] Open circuit Between Intake air pressure sensor 2 coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness. 
3-7	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.

Fault code No.	P1606, P1607		
Item	**[P1606] Intake air pressure sensor 2: ground short circuit detected. [P1607] Intake air pressure sensor 2: open or power short circuit detected.**		
3-8	[For P1606/P1607] Short circuit Between Intake air pressure sensor 2 output terminal (pink/white) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness.  		
4	Installed condition of Intake air pressure sensor 2.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 5.
5	Defective Intake air pressure sensor 2.	Execute the diagnostic mode. (Code No. 04) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Check the Intake air pressure sensor 2. Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-172.	Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 7 and finish the service. Condition is “Detected” → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.

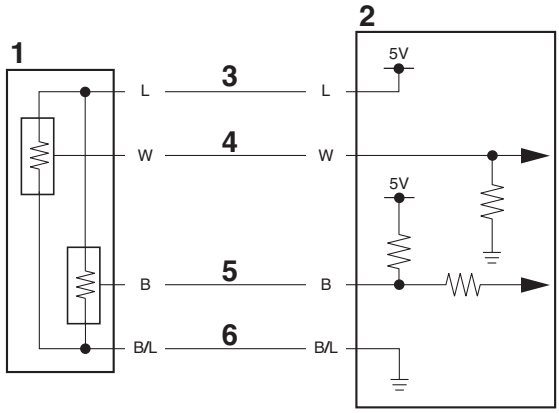
Fault code No.		P1606, P1607	
Item		[P1606] Intake air pressure sensor 2: ground short circuit detected. [P1607] Intake air pressure sensor 2: open or power short circuit detected.	
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P2122, P2123, P2127, P2128, P2138

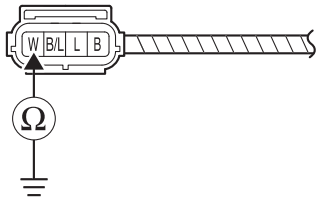
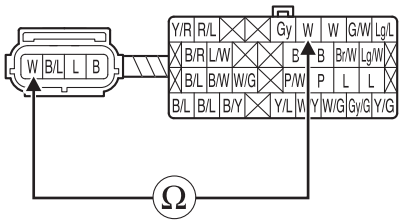
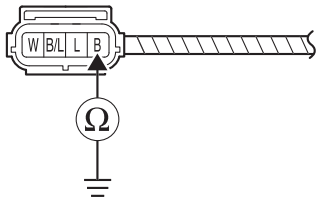
TIP

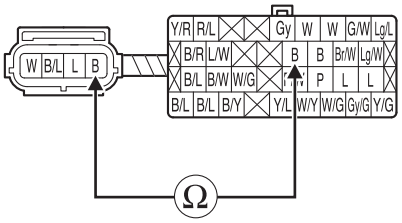
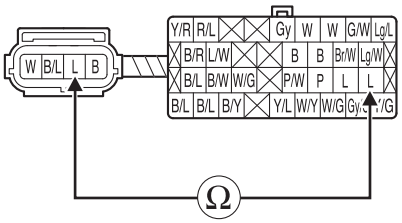
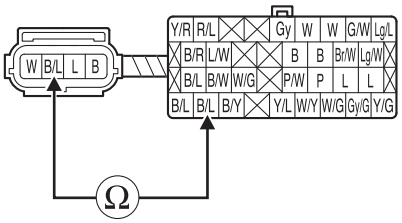
If a fault code other than No. P2138 (P2122/P2123/P2127/P2128) is detected, perform troubleshooting first.

Fault code No.		P2122, P2123, P2127, P2128, P2138	
Item		[P2122] Accelerator position sensor: open or ground short circuit detected. [P2123] Accelerator position sensor: power short circuit detected. [P2127] Accelerator position sensor: ground short circuit detected. [P2128] Accelerator position sensor: open or power short circuit detected. [P2138] Accelerator position sensor: output voltage deviation error.	
Fail-safe system		Able/Unable to start engine	
		Able/Unable to drive vehicle	
Diagnostic code No.		14, 15	
14	Tool display	Accelerator position sensor signal 1 • 12–22 (fully closed position) • 97–107 (fully open position)	
	Procedure	• Check with throttle grip in fully closed position. • Check with throttle grip in fully open position.	
15	Tool display	Accelerator position sensor signal 2 • 10–24 (fully closed position) • 95–109 (fully open position)	
	Procedure	• Check with throttle grip in fully closed position. • Check with throttle grip in fully open position.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of accelerator position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 2.

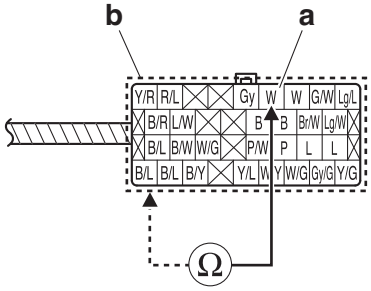
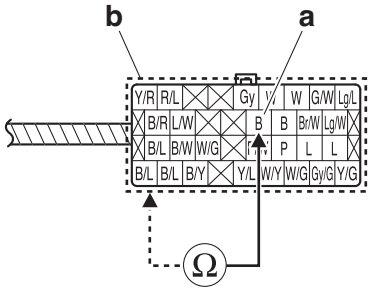
Fault code No.		P2122, P2123, P2127, P2128, P2138	
Item		**[P2122] Accelerator position sensor: open or ground short circuit detected.** **[P2123] Accelerator position sensor: power short circuit detected.** **[P2127] Accelerator position sensor: ground short circuit detected.** **[P2128] Accelerator position sensor: open or power short circuit detected.** **[P2138] Accelerator position sensor: output voltage deviation error.**	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 4.
3-1	 1. Accelerator position sensor 2. ECU 3. Sensor input lead 4. Sensor output lead 1 5. Sensor output lead 2 6. Sensor ground lead		
3-2	Disconnect the ECU coupler from the ECU. Disconnect the accelerator position sensor coupler from the accelerator position sensor.		

Fault code No.	P2122, P2123, P2127, P2128, P2138
Item	**[P2122] Accelerator position sensor: open or ground short circuit detected.** **[P2123] Accelerator position sensor: power short circuit detected.** **[P2127] Accelerator position sensor: ground short circuit detected.** **[P2128] Accelerator position sensor: open or power short circuit detected.** **[P2138] Accelerator position sensor: output voltage deviation error.**

3-3	[For P2122] Ground short circuit Between accelerator position sensor coupler and ground: white–ground If there is continuity, replace the wire harness. 
3-4	[For P2122] Open circuit Between accelerator position sensor coupler and ECU coupler: white–white If there is no continuity, replace the wire harness. 
3-5	[For P2127] Ground short circuit Between accelerator position sensor coupler and ground: black–ground If there is continuity, replace the wire harness. 

Fault code No.	P2122, P2123, P2127, P2128, P2138
Item	**[P2122] Accelerator position sensor: open or ground short circuit detected.** **[P2123] Accelerator position sensor: power short circuit detected.** **[P2127] Accelerator position sensor: ground short circuit detected.** **[P2128] Accelerator position sensor: open or power short circuit detected.** **[P2138] Accelerator position sensor: output voltage deviation error.**
3-6	[For P2128] Open circuit Between accelerator position sensor coupler and ECU coupler: black–black If there is no continuity, replace the wire harness. 
3-7	[For P2122/P2128] Open circuit Between accelerator position sensor coupler and ECU coupler: blue–blue If there is no continuity, replace the wire harness. 
3-8	[For P2122/P2128] Open circuit Between accelerator position sensor coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness. 
3-9	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-36.

Fault code No.	P2122, P2123, P2127, P2128, P2138
Item	**[P2122] Accelerator position sensor: open or ground short circuit detected.** **[P2123] Accelerator position sensor: power short circuit detected.** **[P2127] Accelerator position sensor: ground short circuit detected.** **[P2128] Accelerator position sensor: open or power short circuit detected.** **[P2138] Accelerator position sensor: output voltage deviation error.**

3-10	[For P2122/P2123] Short circuit Between accelerator position sensor output terminal (white) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness. 		
3-11	[For P2127/P2128] Short circuit Between accelerator position sensor output terminal (black) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness. 		
4	Installed condition of accelerator position sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE ACCELERATOR POSITION SENSOR” on page 7-13.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 5.
5	Accelerator position sensor resistance.	Measure the accelerator position sensor resistance. black/blue–blue Refer to “CHECKING THE ACCELERATOR POSITION SENSOR” on page 8-170.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 6.

Fault code No.		P2122, P2123, P2127, P2128, P2138	
Item		**[P2122] Accelerator position sensor: open or ground short circuit detected.** **[P2123] Accelerator position sensor: power short circuit detected.** **[P2127] Accelerator position sensor: ground short circuit detected.** **[P2128] Accelerator position sensor: open or power short circuit detected.** **[P2138] Accelerator position sensor: output voltage deviation error.**	
6	Defective accelerator position sensor.	Check accelerator position sensor signal 1. Execute the diagnostic mode. (Code No. 14) When the throttle grip is fully closed: A value of 12–22 is indicated. When throttle grip is are fully open: A value of 97–107 is indicated. Check accelerator position sensor signal 2. Execute the diagnostic mode. (Code No. 15) When the throttle grip is fully closed: A value of 10–24 is indicated. When the throttle grip is fully open: A value of 95–109 is indicated. An indicated value is out of the specified range → Replace the accelerator position sensor.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 7.
7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
8	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P2158

Fault code No.		P2158	
Item		**Front wheel sensor: no normal signals are received from the front wheel sensor.**	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		16	
Tool display		Front wheel speed pulse 0–999	
Procedure		Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**

Fault code No.		P2158	
Item		Front wheel sensor: no normal signals are received from the front wheel sensor.	
1	Locate the malfunction.	If the ABS warning light is on, refer to “BASIC INSTRUCTIONS FOR TROUBLESHOOTING” on page 8-124. If the ABS warning light is off, perform the following procedure. Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 2.	
2	Connection of front wheel sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 3.
3	Connection of ABS ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 4.
4	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 5.
5	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between front wheel sensor coupler and ABS ECU coupler. black–black white–white Between ABS ECU coupler and ECU coupler. white/green–white/green	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 6.

Fault code No.		P2158	
Item		Front wheel sensor: no normal signals are received from the front wheel sensor.	
6	Defective front wheel sensor.	Improperly installed sensor → Reinstall or replace the sensor.	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 7.
7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Execute the diagnostic mode. (Code No. 16) Rotate the front wheel by hand and check that the indicated value increases. Value increases → Go to item 9 and finish the service. Value does not increase → Go to item 8.
8	Malfunction in ABS ECU.	Replace the ABS ECU.	Go to item 9.
9	Delete the fault code and check that the engine trouble warning light goes off.	Turn the main switch to “ON”, and then rotate the front wheel by hand. Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Confirm that the fault code has a condition of “Recovered” using the malfunction mode of the Yamaha diagnostic tool, and then delete the fault code. Delete this fault code even if it has a condition of “Detected”.	

Fault code No. P2195

TIP

If fault code numbers “P2195” and “P0030” are both indicated, take the actions specified for fault code number “P0030” first.

Fault code No.		P2195	
Item		O_2 sensor: open circuit detected.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		—	
Tool display		—	
Procedure		—	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**

Fault code No.		P2195	
Item		O_2 sensor: open circuit detected.	
1	Installed condition of O_2 sensor.	Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 8 and finish the service. Condition is "Detected" → Go to item 2. Also, delete this fault code, which has a condition of "Detected".
2	Connection of O_2 sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 8 and finish the service. Condition is "Detected" → Go to item 3. Also, delete this fault code, which has a condition of "Detected".
3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 8 and finish the service. Condition is "Detected" → Go to item 4. Also, delete this fault code, which has a condition of "Detected".
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between O_2 sensor coupler and ECU coupler. gray/green–gray/green pink/black–pink/black Between O_2 sensor coupler and joint connector. black/blue–black/blue red/white–red/white Between joint connector and ECU coupler. black/blue–black/blue red/white–red/white Between joint connector and ignition fuse. red/white–red/white	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is "Recovered" → Go to item 8 and finish the service. Condition is "Detected" → Go to item 5. Also, delete this fault code, which has a condition of "Detected".

Fault code No.		P2195	
Item		O_2 sensor: open circuit detected.	
5	Check fuel pressure.	Refer to “CHECKING THE FUEL PRESSURE” on page 7-11.	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 6. Also, delete this fault code, which has a condition of “Detected”.
6	Defective O_2 sensor.	Check the O_2 sensor. Replace if defective. Refer to “ENGINE REMOVAL” on page 5-3.	Start the engine and let it idle for approximately 10 seconds. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 8 and finish the service. Condition is “Detected” → Go to item 7. Also, delete this fault code, which has a condition of “Detected”.
7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
8	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Event code No. U0155 or “Err”

TIP

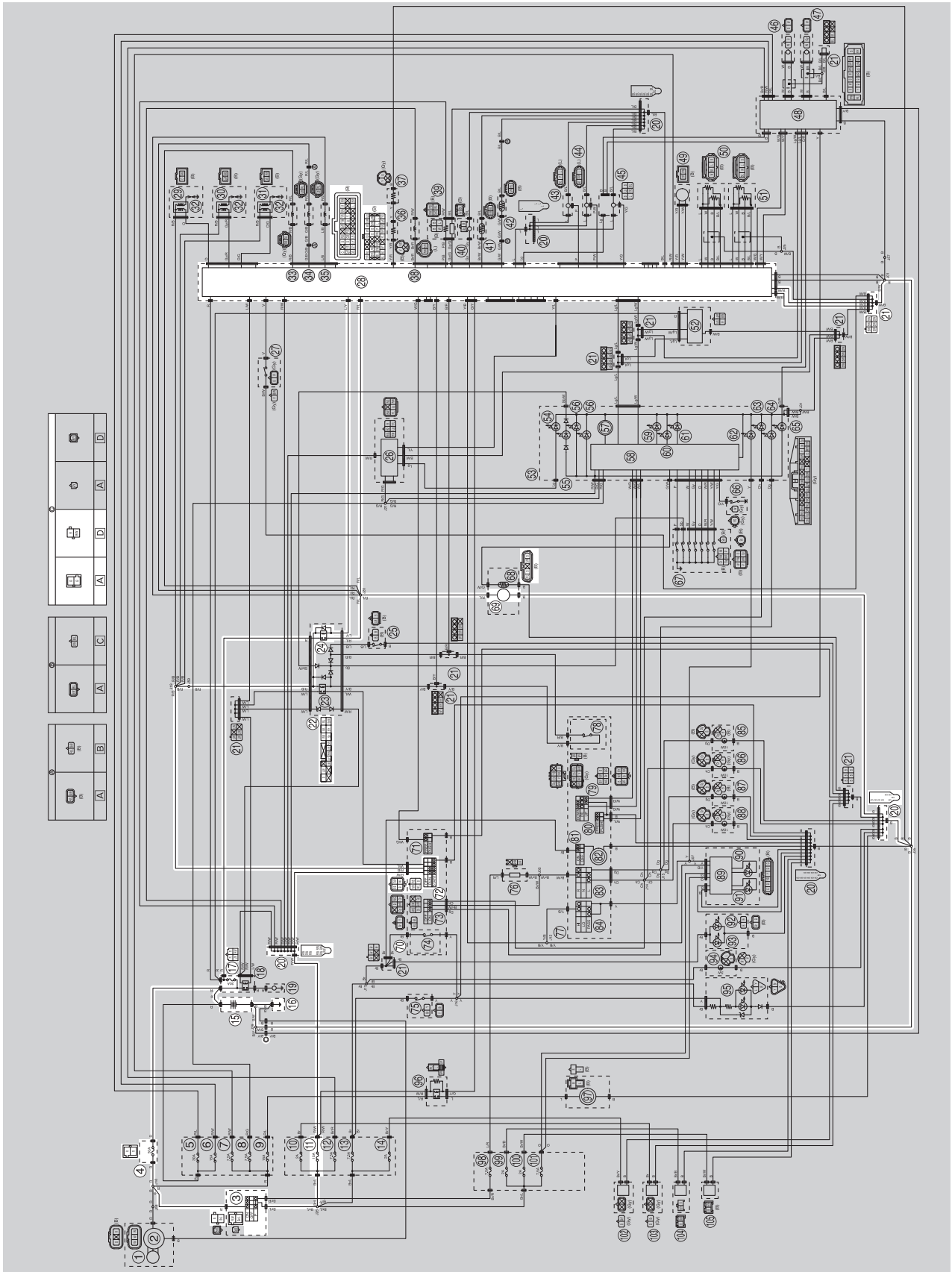
“Err” is displayed on the clock display of the multi-function meter, but the engine trouble warning light does not come on.

Event code No.		U0155 or “Err”	
Item		Multi-function meter: signals cannot be transmitted between the ECU and the multi-function meter.	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 2.

Event code No.		U0155 or “Err”	
Item		Multi-function meter: signals cannot be transmitted between the ECU and the multi-function meter.	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between meter assembly coupler and joint coupler. light green/blue–light green/blue light green/white–light green/white Between joint coupler and ECU coupler. light green/blue–light green/blue light green/white–light green/white	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 4.
4	Defective meter assembly.	Replace the meter assembly.	Turn the main switch to “ON”, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item 6 and finish the service. Condition is “Detected” → Go to item 5.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.
6	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

EAS20081
FUEL PUMP SYSTEM

EAS30513
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
11. Ignition fuse
15. Battery
16. Engine ground
17. Fuel injection system fuse
20. Joint connector
21. Joint coupler
22. Relay unit
24. Fuel pump relay
28. ECU (Engine Control Unit)
69. Fuel pump
70. Handlebar switch (right)
72. Start/engine stop switch

A. Wire harness
D. Negative battery sub-wire harness

EAS30514
TROUBLESHOOTING

If the fuel pump fails to operate.

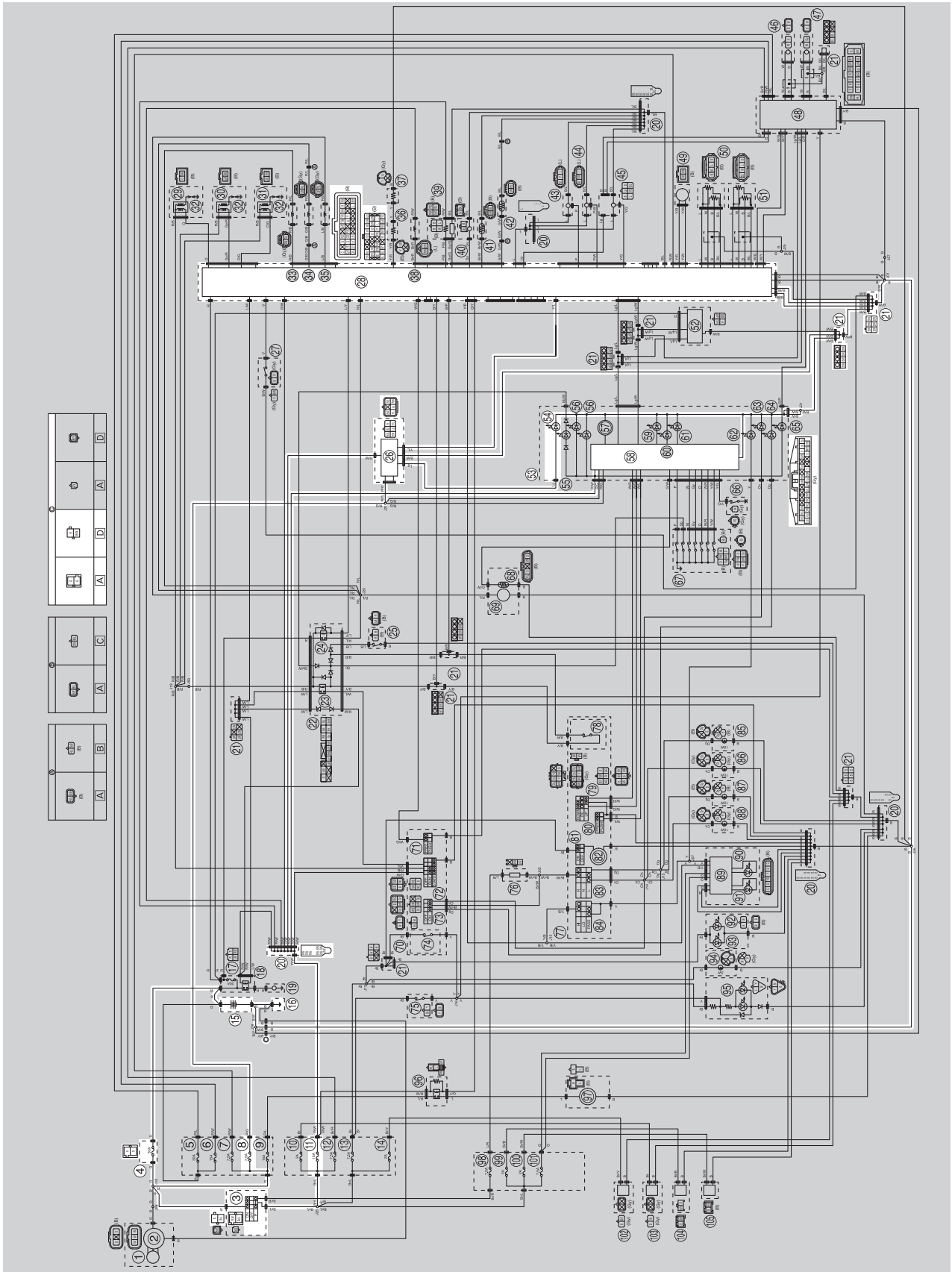
TIP

• Before troubleshooting, remove the following part(s):
1. Fuel tank front cover/Front side panel/Front side cowling
2. Passenger seat/Rider seat
3. Fuel tank cover
4. Fuel tank

1. Check the fuses. (Main, ignition and fuel injection system) Refer to “CHECKING THE FUSES” on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the start/engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the handlebar switch (right).
OK↓		
5. Check the relay unit (fuel pump relay). Refer to “CHECKING THE RELAYS” on page 8-161.	NG→	Replace the relay unit.
OK↓		
6. Check the fuel pump. Refer to “CHECKING THE FUEL PUMP OPERATION” on page 7-3.	NG→	Replace the fuel pump.
OK↓		
7. Check the entire fuel pump system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 8-103.	NG→	Properly connect or repair the fuel pump system’s wiring.
OK↓		
Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.		

EAS20084
IMMOBILIZER SYSTEM

EAS30519
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
8. Backup fuse
11. Ignition fuse
15. Battery
16. Engine ground
20. Joint connector
21. Joint coupler
26. Immobilizer unit
28. ECU (Engine Control Unit)
53. Meter assembly
54. Immobilizer system indicator light
58. Multi-function meter

A. Wire harness
D. Negative battery sub-wire harness

EAS30520
GENERAL INFORMATION
This vehicle is equipped with an immobilizer system to help prevent theft by re-registering codes in the standard keys. This system consists of the following:
- A code re-registering key (with a red bow)
- Two standard keys (with a black bow) that can be re-registered with new codes
- A transponder (installed in the red key bow)
- An immobilizer unit
- The ECU
- An immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.
Therefore, always use a standard key for driving. (See NOTICE.)

TIP
Each standard key is registered during production, therefore re-registering at purchase is not necessary.

ECA14971
NOTICE
- **DO NOT LOSE THE CODE RE-REGISTERING KEY! If the code re-registering key is lost, registering new codes in the standard keys is impossible. The standard keys can still be used to start the vehicle. However, if code re-registering is required (e.g., if a new standard key is made or all keys are lost) the entire immobilizer system must be replaced. Therefore, it is highly recommended to use either standard key for driving, and to keep the code re-registering key in a safe place.**
- **Do not submerse the keys in water.**
- **Do not expose the keys to excessively high temperatures.**
- **Do not place the keys close to magnets (this includes, but is not limited to, products such as speakers, etc.).**
- **Do not place heavy items on the keys.**
- **Do not grind the keys or alter their shape.**
- **Do not disassemble the key bows.**
- **Do not put two keys of any immobilizer system on the same key ring.**
- **Keep the standard keys as well as other immobilizer system keys away from the code re-registering key.**
- **Keep other immobilizer system keys away from the main switch as they may cause signal interference.**

EAS30521
PARTS REPLACEMENT AND KEY CODE REGISTRATION REQUIREMENTS
In the course of use, you may encounter the following cases where replacement of parts and registration of code re-registering/standard keys are required.

TIP
Each standard key is registered during production, therefore re-registering at purchase is not necessary.

	Parts to be replaced					Key registration requirement
	Main switch/ immobilizer unit		Standard key	ECU	Acces-sory lock* and key	
	Main switch	Immobi-lizer unit				
Standard key is lost			√			New standard key
All keys have been lost (including code re-reg-istering 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.

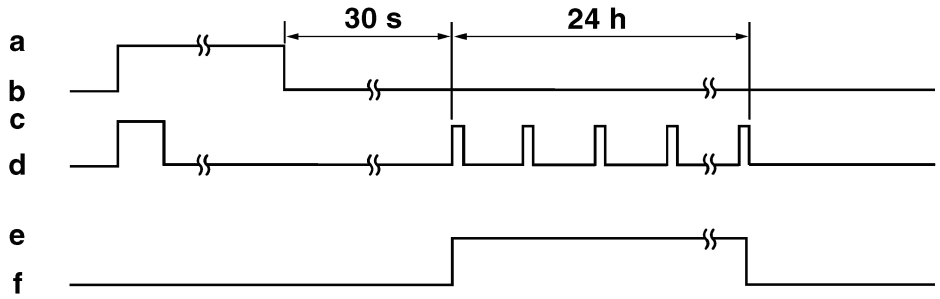
Code re-registering key registration:
When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.
To register a code re-registering key:
1. Turn the main switch to “ON” with the code re-registering key.

TIP
Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

2. Check that the engine can be started.
3. Register the standard key, following the instructions in the section below.

Standby mode:
To enable the immobilizer system, 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.

TIP
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 8-114).

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.

TIP
The existing standard key code is erased from the memory when the key registration mode is activated. When the key registration mode is activated, the immobilizer system indicator light flashes rapidly.

4. While the indicator light is flashing, 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.

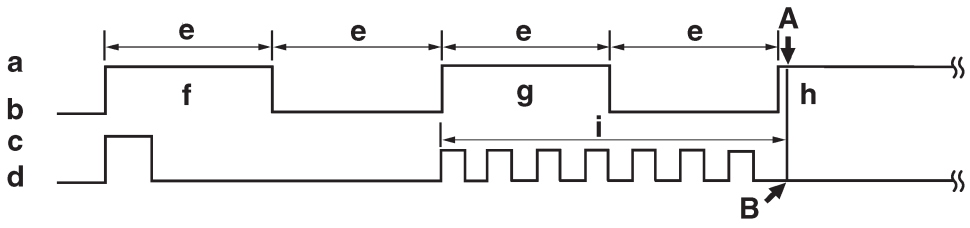
TIP
If he immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.

5. Turn the main switch to "ON".

TIP
When the indicator light goes off, the registration is complete.

6. Check that the engine can be started with the two registered standard keys.

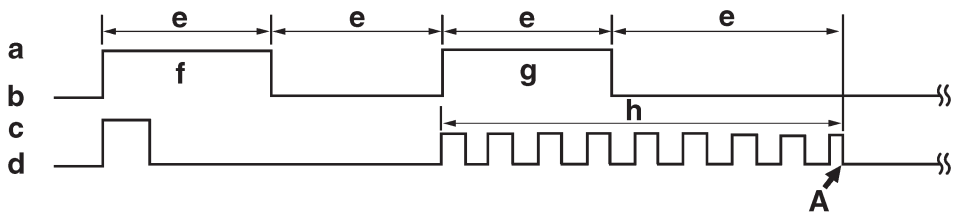
Standard key registration



a. Main switch "ON"
b. Main switch "OFF"
c. LED on
d. LED off
e. Less than 5.0 s
f. Code re-registering key
g. First standard key
h. Second standard key
i. Registration mode
A. Registration of the second standard key is complete.
B. Immobilizer system indicator light stops flashing when the registration of the second standard key is complete.

Voiding the standard key code:
If a standard key has been lost, it is possible to disable its use by re-registering the remaining standard key. Standard key registration erases the stored standard key code from the memory, thus disabling the lost standard key. To re-register, refer to "Standard key registration".

Standard key code voiding method



a. Main switch “ON”
b. Main switch “OFF”
c. LED on
d. LED off
e. Less than 5.0 s
f. Code re-registering key
g. Remaining standard key
h. Registration mode

A. If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the second standard key cannot be registered.

EAS30522
TROUBLESHOOTING

When the main switch is turned to “ON”, the immobilizer system indicator light does not come on nor flashes.

1. Check the fuses. (Main, ignition, and backup) Refer to “CHECKING THE FUSES” on page 8-157.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-158.	NG→	• Clean the battery terminals. • Recharge or replace the battery.
OK↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG→	Replace the main switch/immobilizer unit.
OK↓		
4. Check the entire immobilizer system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-107.	NG→	Properly connect or repair the immobilizer system wiring.
OK↓		
• Check the condition of the each immobilizer system circuits. • Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-114.		

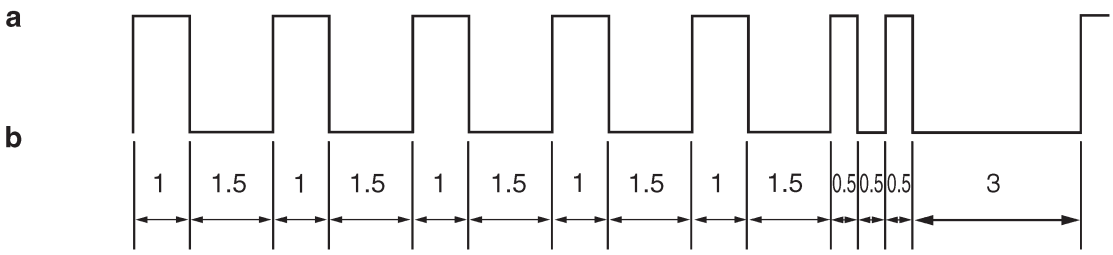
EAS30523
SELF-DIAGNOSIS FAULT CODE INDICATION

When a system failure occurs, the immobilizer system indicator light blinks. The pattern of blinking shows the fault code.

Fault code	Part	Symptom	Cause	Action
51	IMMOBILIZER UNIT	Code cannot be transmitted between the key and the immobilizer unit.	1. Radio wave interference caused by objects around the keys and antennas. 2. Immobilizer unit malfunction. 3. Key malfunction.	1. Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas. 2. Replace the main switch/immobilizer unit. 3. Replace the key.
52	IMMOBILIZER UNIT	Codes between the key and immobilizer unit do not match.	1. Signal received from other transponder (failed to recognize code after ten consecutive attempts). 2. Signal received from unregistered standard key.	1. Place the immobilizer unit at least 50 mm 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.	Noise interference or disconnected lead/cable. 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU malfunction.	1. Check the wire harness and connector. 2. Replace the main switch/immobilizer unit. 3. Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.
54	IMMOBILIZER UNIT	Codes transmitted between the ECU and the immobilizer unit do not match.	Noise interference or disconnected lead/cable. 1. Interference due to radio wave noise. 2. Disconnected communication harness. 3. Immobilizer unit malfunction. 4. ECU failure. (The ECU or immobilizer unit was replaced with a used unit from another vehicle.)	1. Register the code re-registering key. 2. Check the wire harness and connector. 3. Replace the main switch/immobilizer unit. 4. Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.
55	IMMOBILIZER UNIT	Key code registration malfunction.	Same standard key was attempted to be registered two consecutive times.	Register another standard key.

Fault code	Part	Symptom	Cause	Action
56	ECU	Unidentified code is received.	Noise interference or disconnected lead/cable.	1. Check the wire harness and connector. 2. Replace the main switch/immobilizer unit. 3. Replace the ECU. Refer to "REPLACING THE ECU (Engine Control Unit)" on page 8-157.

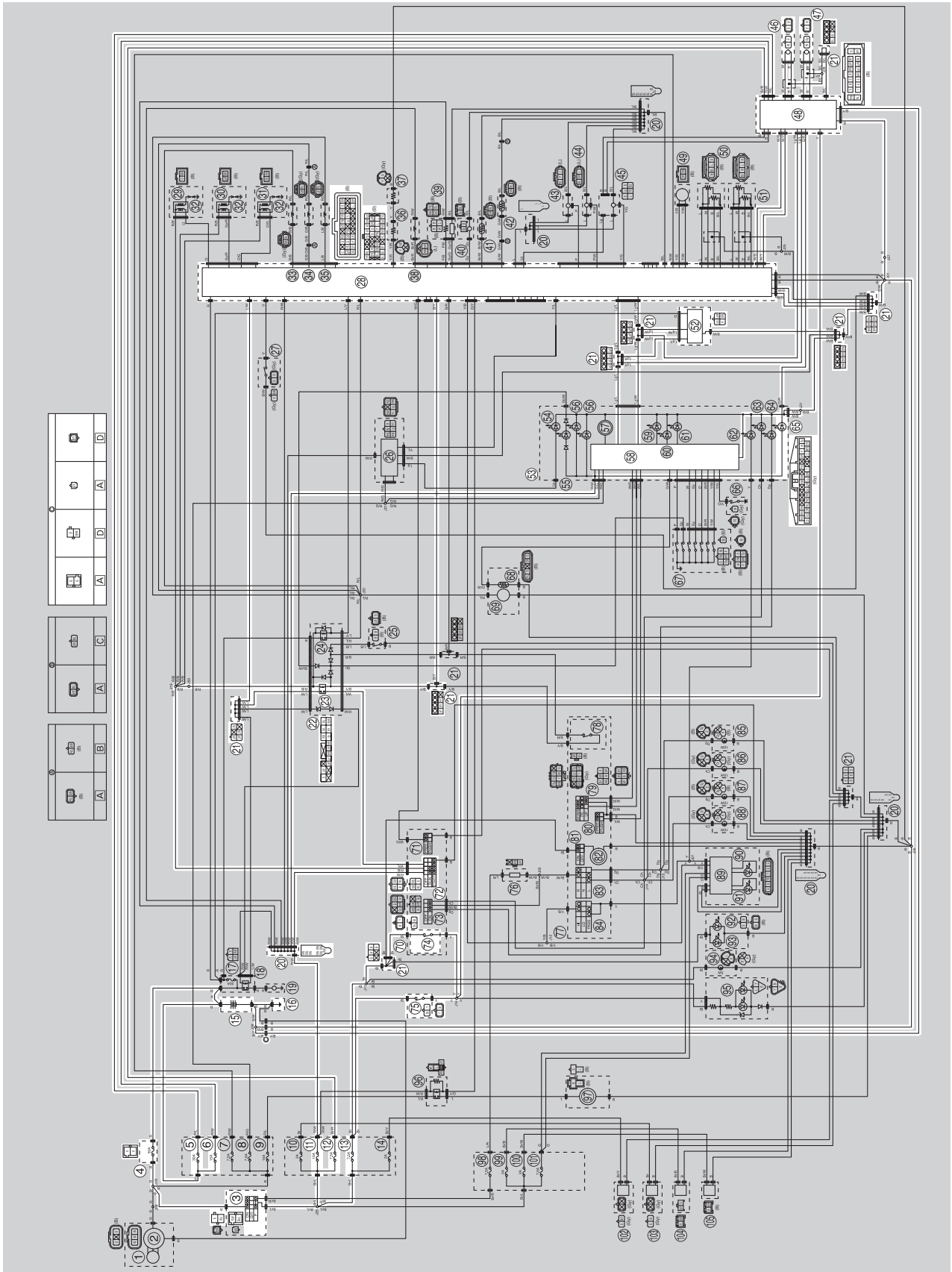
Immobilizer system indicator light fault code indication
Digit of 10 : Cycles of 1 sec. ON and 1.5 sec. OFF.
Digit of 1 : Cycles of 0.5 sec. ON and 0.5 sec. OFF.
Example: fault code 52



a. Light on
b. Light off

EAS20085
ABS (ANTI-LOCK BRAKE SYSTEM)

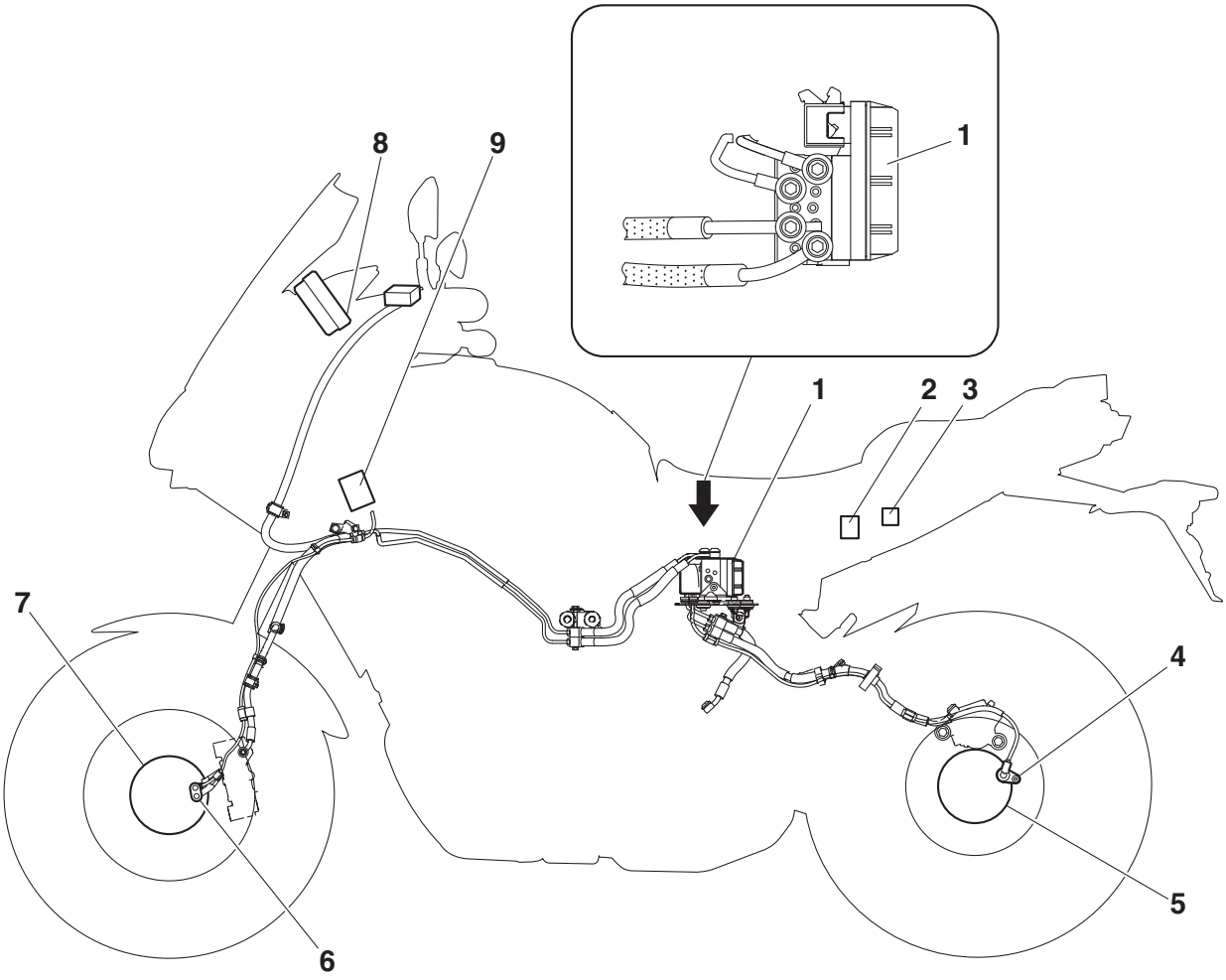
EAS30843
CIRCUIT DIAGRAM



3. Main switch
4. Main fuse
5. ABS motor fuse
6. ABS solenoid fuse
11. Ignition fuse
12. ABS control unit fuse
13. Signaling system fuse
15. Battery
16. Engine ground
20. Joint connector
21. Joint coupler
22. Relay unit
23. Starting circuit cut-off relay
28. ECU (Engine Control Unit)
46. Front wheel sensor
47. Rear wheel sensor
48. ABS ECU (electronic control unit)
52. Yamaha diagnostic tool coupler
53. Meter assembly
58. Multi-function meter
65. ABS warning light
70. Handlebar switch (right)
72. Start/engine stop switch
74. Front brake light switch
75. Rear brake light switch

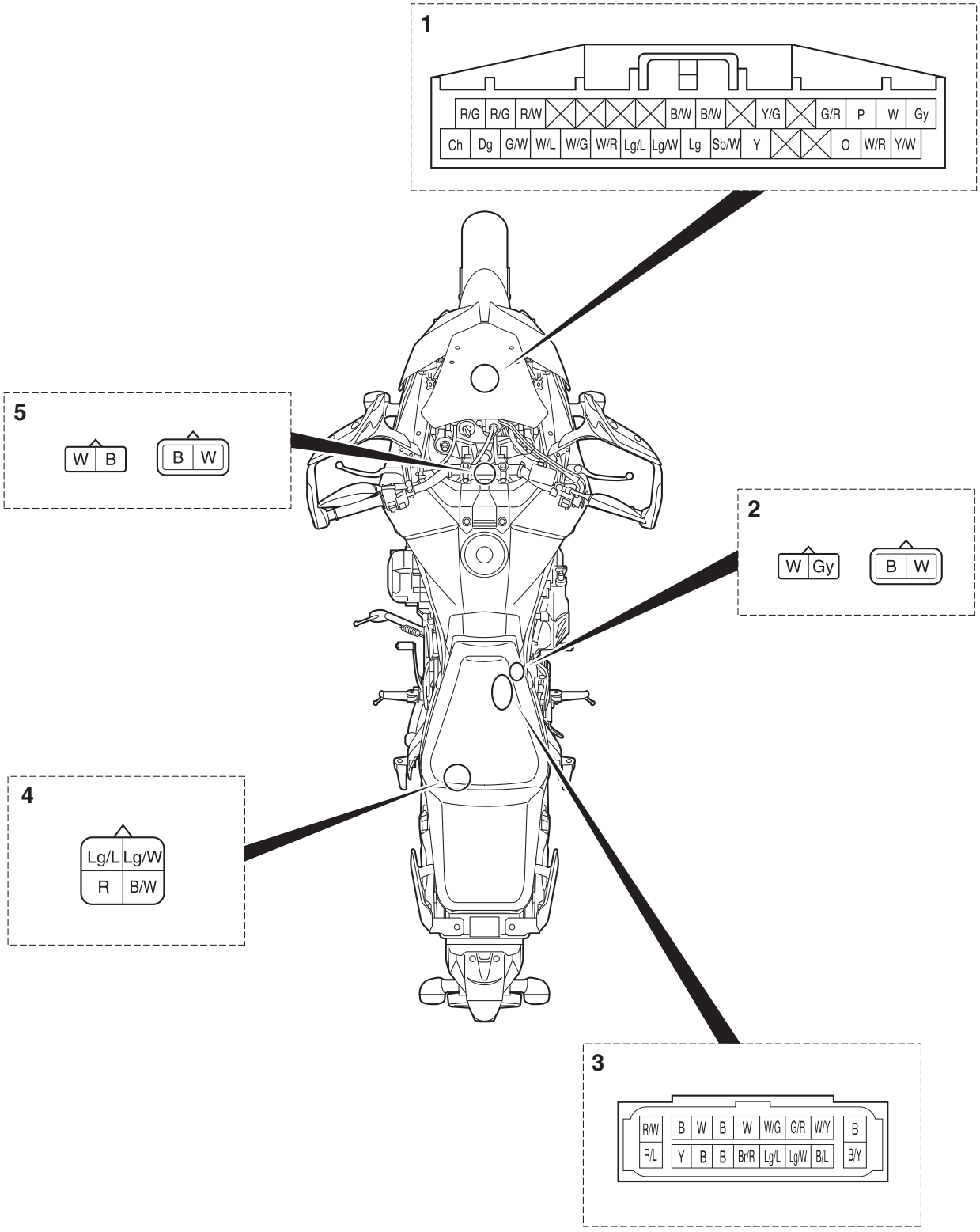
A. Wire harness
D. Negative battery sub-wire harness

EAS30525
ABS COMPONENTS CHART



1. Hydraulic unit assembly
2. Fuse box 3
3. Yamaha diagnostic tool coupler
4. Rear wheel sensor
5. Rear wheel sensor rotor
6. Front wheel sensor
7. Front wheel sensor rotor
8. ABS warning light
9. Fuse box 2

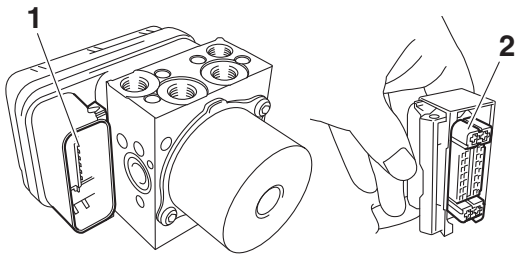
EAS30844
ABS COUPLER LOCATION CHART



1. Meter assembly coupler
2. Rear wheel sensor coupler
3. ABS ECU coupler
4. Yamaha diagnostic tool coupler
5. Front wheel sensor coupler

EAS30845
MAINTENANCE OF THE ABS ECU
Checking the ABS ECU
1. Check:
   - Terminals “1” of the ABS ECU
     Cracks/damages → Replace the hydraulic unit assembly, brake hoses, and brake pipes that are connected to the assembly as a set.
   - Terminals “2” of the ABS ECU coupler
     Connection defective, contaminated, come-off → Correct or clean.

TIP
If the ABS ECU coupler is clogged with mud or dirt, clean with compressed air.



EAS30528
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 using the Yamaha diagnostic tool. For information about using the Yamaha diagnostic tool, refer to “[B-2] DIAGNOSIS USING THE FAULT CODES” on page 8-127. For troubleshooting items other than the following items, follow the normal service method.

EWA16710
⚠ 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.

TIP
To final check, refer to “[C-1] FINAL CHECK” on page 8-147.

ABS operation when the ABS warning light comes on
1. The ABS warning light remains on → ABS operates as a normal brake system.
   - A malfunction was detected using the ABS self-diagnosis function.
   - The ABS self-diagnosis has not been completed.
     The ABS self-diagnosis starts when the main switch is turned to “ON” and finishes when the vehicle has traveled at a speed of approximately 10 km/h (6 mi/h).
2. The ABS warning light comes on after the engine starts, and then goes off when the vehicle starts moving (traveling at a speed of approximately 10 km/h (6 mi/h)). → ABS operation is normal.
3. The ABS warning light flashes → ABS operation is normal.
   - Refer to “BASIC INSTRUCTIONS FOR TROUBLESHOOTING” on page 8-124.

Self-diagnosis and servicing
The ABS ECU has a self-diagnosis function. By utilizing this function, quick problem identification and service are possible. Previous malfunctions can be checked since the ABS ECU also stores the malfunction history.
The fault codes recorded in the ABS ECU can be checked using the Yamaha diagnostic tool. When the service is finished, check the normal operation of the vehicle, and then delete the fault code(s). For information about deleting the fault codes, refer to "[B-3] DELETING THE FAULT CODES" on page 8-147. By deleting the fault codes stored in the ABS ECU memory, it is possible to pursue the cause correctly if another malfunction occurs.

TIP
The ABS performs a self-diagnosis test for a few seconds each time the vehicle first starts off after the main switch was turned to "ON". During this test, a "clicking" noise can be heard from under the seat, and if the brake lever or brake pedal are even slightly applied, a vibration can be felt at the lever and pedal, but these do not indicate a malfunction.

Self-diagnosis using the ABS ECU
The ABS ECU performs a static check of the entire system when the main switch is 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 utilizing the Yamaha diagnostic tool when the ABS ECU has entered the self-diagnosis mode.

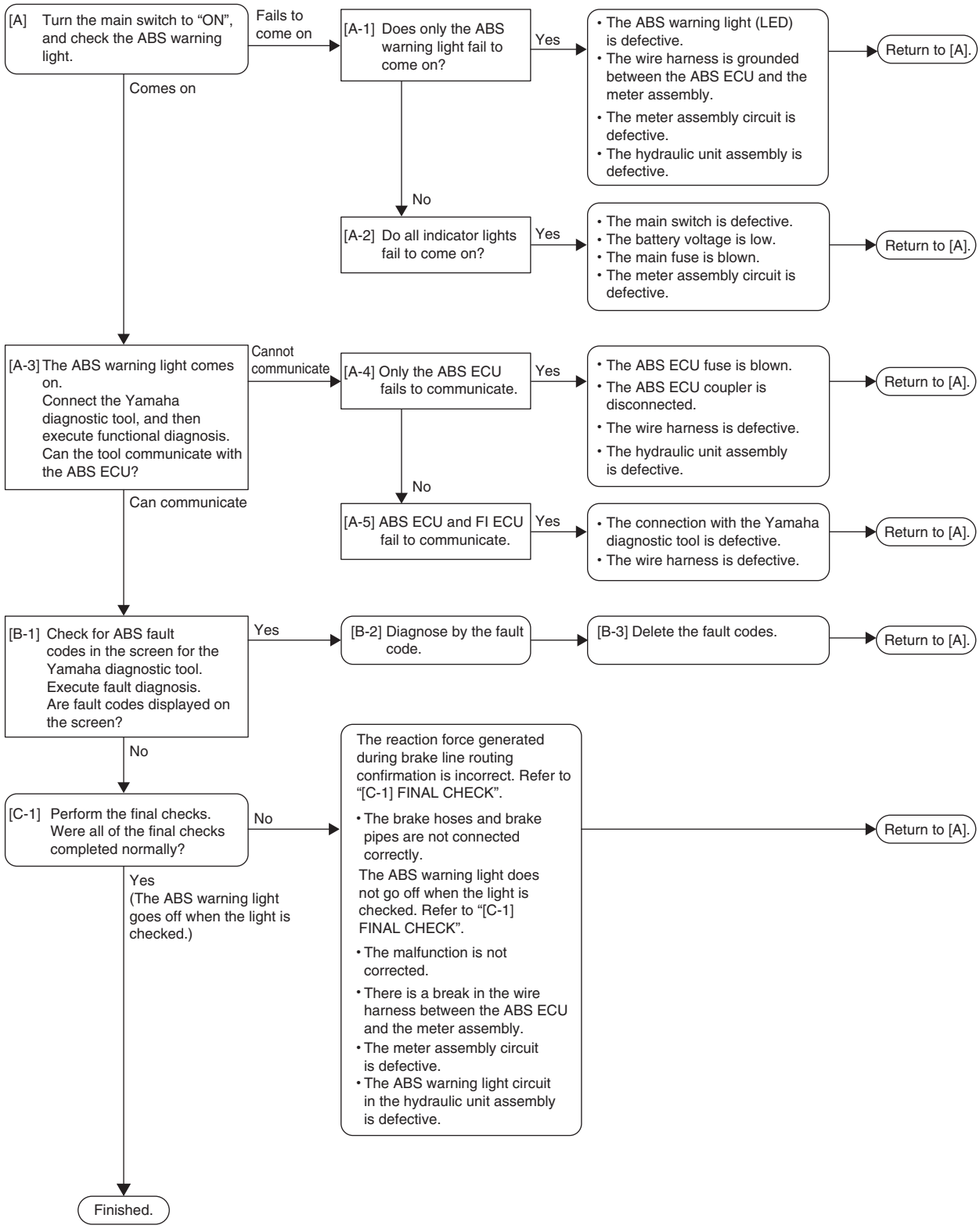
Special precautions for handling and servicing a vehicle equipped with ABS
ECA17620
NOTICE
Care should be taken not to damage components by subjecting them to shocks or pulling on them with too much force since the ABS components are precisely adjusted.

- The ABS ECU and hydraulic unit are united assemblies and cannot be disassembled.
- The malfunction history is stored in the memory of the ABS ECU. Delete the fault codes when the service is finished. (This is because the past fault codes will be displayed again if another malfunction occurs.)

EAS30529
BASIC INSTRUCTIONS FOR TROUBLESHOOTING
EWA17420
⚠ WARNING
- **Perform the troubleshooting [A]→[B]→[C] in order. Be sure to follow the order since a wrong diagnosis could result if the steps are followed in a different order or omitted.**
- **Use sufficiently charged regular batteries only.**

[A] Malfunction check using the ABS warning light
[B] Use the Yamaha diagnostic tool and determine the location of the malfunction and the cause from the recorded fault code.
Determine the cause of the malfunction from the condition and place where the malfunction occurred.
[C] Servicing the ABS
Execute the final check after disassembly and assembly.

EAS30530
BASIC PROCESS FOR TROUBLESHOOTING



EWA16710

⚠ 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.

TIP

To final check, refer to "[C-1] FINAL CHECK" on page 8-147.

EAS30531

[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.
   - Only the ABS warning light fails to come on. [A-1]
   - The ABS warning light and all other indicator lights fail to come on. [A-2]
2. The ABS warning light comes on. [A-3]

EAS30532

[A-1] ONLY THE ABS WARNING LIGHT FAILS TO COME ON

1. Check for a short circuit to the ground between the green/red terminal of the ABS ECU coupler and green/red terminal of the meter assembly.
   - If there is short circuit to the ground, the wire harness is defective. Replace the wire harness.
2. Disconnect the ABS ECU coupler and check that the ABS warning light comes on when the main switch is turned to "ON".
   - If the ABS warning light does not come on, the meter assembly circuit (including the ABS warning light [LED]) is defective. Replace the meter assembly.
   - If the ABS warning light comes on, the ABS ECU is defective. Replace the hydraulic unit assembly.

EAS30533

[A-2] THE ABS WARNING LIGHT AND OTHER INDICATOR LIGHTS FAIL TO COME ON

1. Main switch
   - Check the main switch for continuity.
     Refer to "CHECKING THE SWITCHES" on page 8-153.
   - 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 8-158.
   - If the battery is defective, clean the battery terminals and recharge it, or replace the battery.
3. Main fuse
   - Check the fuse for continuity.
     Refer to "CHECKING THE FUSES" on page 8-157.
   - If the main fuse is blown, replace the fuse.
4. Circuit
   - Check the meter assembly circuit.
     Refer to "CIRCUIT DIAGRAM" on page 8-117.
   - If the meter assembly circuit is open, replace the wire harness.

EAS31162

[A-3] THE ABS WARNING LIGHT COMES ON

Connect the Yamaha diagnostic tool to the Yamaha diagnostic tool coupler and execute functional diagnosis. (For information about how to execute functional diagnosis, refer to the operation manual that is included with the tool.)

Check that communication with the ABS ECU is possible.

- Only the ABS ECU fails to communicate. [A-4]
- ABS ECU and FI ECU fail to communicate. [A-5]
- Communication is possible with the ABS ECU. [B-1] (The ABS is displayed on the select unit screen.)

EAS31163
[A-4] ONLY THE ABS ECU FAILS TO COMMUNICATE
1. ABS ECU fuse
   • Check the ABS ECU fuse for continuity.
   Refer to “CHECKING THE FUSES” on page 8-157.
   • If the ABS ECU fuse is blown, replace the fuse.
2. ABS ECU coupler
   • Check that the ABS ECU coupler is connected properly.
   For information about connecting the ABS ECU coupler properly, refer to “INSTALLING THE HYDRAULIC UNIT ASSEMBLY” on page 4-63.
3. Wire harness
   • Open circuit between the main switch and the ABS ECU, or between the ABS ECU and the ground.
   Check for continuity between brown/blue terminal of the main switch coupler and brown/red terminal of the ABS ECU coupler.
   Check for continuity between black/yellow terminal of the ABS ECU coupler and the ground.
   If there is no continuity, the wire harness is defective. Replace the wire harness.
   • Open circuit in the wire harness between the ABS ECU coupler and the Yamaha diagnostic tool coupler.
   Check for continuity between light green/blue terminal of the ABS ECU coupler and light green/blue terminal of the Yamaha diagnostic tool coupler. (CANH)
   Check for continuity between light green/white terminal of the ABS ECU coupler and light green/white terminal of the Yamaha diagnostic tool coupler. (CANL)
4. ABS ECU malfunction
   Replace the hydraulic unit assembly.

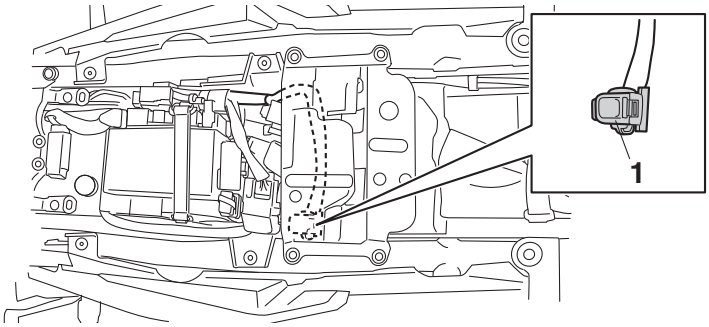
EAS31164
[A-5] ABS ECU AND FI ECU FAIL TO COMMUNICATE
1. Yamaha diagnostic tool
   Check that the Yamaha diagnostic tool is properly connected.
2. Wire harness
   • Open circuit in the wire harness between the ABS ECU coupler and the Yamaha diagnostic tool coupler.
   Check for continuity between light green/blue terminal of the ABS ECU coupler and light green/blue terminal of the Yamaha diagnostic tool coupler. (CANH)
   Check for continuity between light green/white terminal of the ABS ECU coupler and light green/white terminal of the Yamaha diagnostic tool coupler. (CANL)

EAS31165
[B-1] MALFUNCTION ARE CURRENTLY DETECTED
When the Yamaha diagnostic tool is connected to the Yamaha diagnostic tool coupler, the fault codes will be displayed on the computer screen.
• A fault code is displayed. [B-2]
• A fault code is not displayed. [C-1]

EAS31166
[B-2] DIAGNOSIS USING THE FAULT CODES
This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252

Connecting the Yamaha diagnostic tool
Removing the rider seat. Refer to “GENERAL CHASSIS (1)” on page 4-1.
Removing the protective cap “1”, and then connect the Yamaha diagnostic tool to the coupler.



Details about the displayed fault codes are shown in the following chart. Refer to this chart and check the vehicle.
Once all the work is complete, delete the fault codes. [B-3]

TIP
Check the inspection points after terminating the connection with the Yamaha diagnostic tool and turning the main switch off.

Fault code table

TIP
Record all of the fault codes displayed and inspect the check points.

Fault code No.	Item	Symptom	Check point
11* 25*	Front wheel sensor (intermittent pulses or no pulses)	Front wheel sensor signal is not received properly. (Pulses are not received or are received intermittently while the vehicle is traveling.)	• Foreign material adhered around the front wheel sensor • Incorrect installation of the front wheel • Defective sensor rotor or incorrect installation of the rotor • Defective front wheel sensor or incorrect installation of the sensor
12	Rear wheel sensor (intermittent pulses or no pulses)	Rear wheel sensor signal is not received properly. (Pulses are not received or are received intermittently while the vehicle is traveling.)	• Foreign material adhered around the rear wheel sensor • Incorrect installation of the rear wheel • Defective sensor rotor or incorrect installation of the rotor • Defective rear wheel sensor or incorrect installation of the sensor
13* 26*	Front wheel sensor (abnormal pulse period)	Front wheel sensor signal is not received properly. (The pulse period is abnormal while the vehicle is traveling.)	• Foreign material adhered around the front wheel sensor • Incorrect installation of the front wheel • Defective sensor rotor or incorrect installation of the rotor • Defective front wheel sensor or incorrect installation of the sensor

Fault code No.	Item	Symptom	Check point
14* 27*	Rear wheel sensor (abnormal pulse period)	Rear wheel sensor signal is not received properly. (The pulse period is abnormal while the vehicle is traveling.)	• Foreign material adhered around the rear wheel sensor • Incorrect installation of the rear wheel • Defective sensor rotor or incorrect installation of the rotor • Defective rear wheel sensor or incorrect installation of the sensor
15	Front wheel sensor (open or short circuit)	Open or short circuit is detected in the front wheel sensor.	• Defective coupler between the front wheel sensor and the hydraulic unit assembly • Open or short circuit in the wire harness between the front wheel sensor and the hydraulic unit assembly • Defective front wheel sensor or hydraulic unit assembly
16	Rear wheel sensor (open or short circuit)	Open or short circuit is detected in the rear wheel sensor.	• Defective coupler between the rear wheel sensor and the hydraulic unit assembly • Open or short circuit in the wire harness between the rear wheel sensor and the hydraulic unit assembly • Defective rear wheel sensor or hydraulic unit assembly
17* 45*	Front wheel sensor (missing pulses)	Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)	• Foreign material adhered around the front wheel sensor • Incorrect installation of the front wheel • Defective sensor rotor or incorrect installation of the rotor • Defective front wheel sensor or incorrect installation of the sensor
18* 46*	Rear wheel sensor (missing pulses)	Rear wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)	• Foreign material adhered around the rear wheel sensor • Incorrect installation of the rear wheel • Defective sensor rotor or incorrect installation of the rotor • Defective rear wheel sensor or incorrect installation of the sensor
21	Hydraulic unit assembly (defective solenoid drive circuit)	Solenoid drive circuit in the hydraulic unit assembly is open or short-circuited.	• Defective hydraulic unit assembly

Fault code No.	Item	Symptom	Check point
24	Brake light switch or tail/brake light	Brake light signal is not received properly while the vehicle is traveling. (Brake light circuit, or front or rear brake light switch circuit.)	• Defective signaling system (tail/brake light or brake light switch) • Defective coupler between the signaling system (tail/brake light or brake light switch) and the hydraulic unit assembly • Open or short circuit in the wire harness between the signaling system (tail/brake light or brake light switch) and the hydraulic unit assembly • Defective hydraulic unit assembly
31	Hydraulic unit assembly (abnormal ABS solenoid power supply)	Power is not supplied to the solenoid circuit in the hydraulic unit assembly.	• Blown ABS solenoid fuse • Defective coupler between the battery and the hydraulic unit assembly • Open or short circuit in the wire harness between the battery and the hydraulic unit assembly • Defective hydraulic unit assembly
32	Hydraulic unit assembly (short circuit in ABS solenoid power supply circuit)	Short circuit is detected in the solenoid power supply circuit in the hydraulic unit assembly.	• Defective hydraulic unit assembly
33	Hydraulic unit assembly (abnormal ABS motor power supply)	Power is not supplied to the motor circuit in the hydraulic unit assembly.	• Blown ABS motor fuse • Defective coupler between the battery and the hydraulic unit assembly • Open or short circuit in the wire harness between the battery and the hydraulic unit assembly • Defective hydraulic unit assembly
34	Hydraulic unit assembly (short circuit in ABS motor power supply circuit)	Short circuit is detected in the motor power supply circuit in the hydraulic unit assembly.	• Defective hydraulic unit assembly
41	Front wheel ABS (intermittent wheel speed pulses or incorrect depressurization)	• Pulses from the front wheel sensor are received intermittently while the vehicle is traveling. • Front wheel will not recover from the locking tendency even though the signal is transmitted from the ABS ECU to reduce the hydraulic pressure.	• Incorrect installation of the front wheel sensor • Incorrect rotation of the front wheel • Front brake dragging • Defective hydraulic unit assembly

Fault code No.	Item	Symptom	Check point
42 47	Rear wheel ABS (intermittent wheel speed pulses or incorrect depressurization)	• Pulses from the rear wheel sensor are received intermittently while the vehicle is traveling. (for fault code No. 42) • Rear wheel will not recover from the locking tendency even though the signal is transmitted from the ABS ECU to reduce the hydraulic pressure.	• Incorrect installation of the rear wheel sensor (for fault code No. 42) • Incorrect rotation of the rear wheel • Rear brake dragging • Defective hydraulic unit assembly
43	Front wheel sensor (missing pulses)	Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)	• Foreign material adhered around the front wheel sensor • Incorrect installation of the front wheel • Defective sensor rotor or incorrect installation of the rotor • Defective front wheel sensor or incorrect installation of the sensor
44	Rear wheel sensor (missing pulses)	Rear wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)	• Foreign material adhered around the rear wheel sensor • Incorrect installation of the rear wheel • Defective sensor rotor or incorrect installation of the rotor • Defective rear wheel sensor or incorrect installation of the sensor
51 52	• Vehicle system power supply (voltage of ABS ECU power supply is high) (for fault code No. 51) • Vehicle system power supply (voltage of wheel sensor power supply is high) (for fault code No. 52)	• Power voltage supplied to the ABS ECU in the hydraulic unit assembly is too high. (for fault code No. 51) • Power voltage supplied to the wheel sensor is too high. (for fault code No. 52)	• Defective battery • Disconnected battery terminal • Defective charging system
53	Vehicle system power supply (voltage of ABS ECU power supply is low)	Power voltage supplied to the ABS ECU in the hydraulic unit assembly is too low.	• Defective battery • Defective coupler between the battery and the hydraulic unit assembly • Open or short circuit in the wire harness between the battery and the hydraulic unit assembly • Defective charging system
54	Hydraulic unit assembly (defective ABS solenoid and ABS motor power supply circuits)	Abnormality is detected in the solenoid or motor power supply circuit in the hydraulic unit assembly.	• Defective battery • Defective coupler between the battery and the hydraulic unit assembly • Open or short circuit in the wire harness between the battery and the hydraulic unit assembly • Defective charging system • Defective hydraulic unit assembly

Fault code No.	Item	Symptom	Check point
55	Hydraulic unit assembly (defective ABS ECU)	Abnormal data is detected in the hydraulic unit assembly.	• Defective hydraulic unit assembly
56	Hydraulic unit assembly (abnormal internal power supply)	Abnormality is detected in the power supply circuit in the hydraulic unit assembly.	• Defective hydraulic unit assembly
63	Front wheel sensor power supply (voltage of power supply is low)	Power voltage supplied from the ABS ECU to the front wheel sensor is too low.	• Short circuit in the wire harness between the front wheel sensor and the hydraulic unit assembly • Defective front wheel sensor • Defective hydraulic unit assembly
64	Rear wheel sensor power supply (voltage of power supply is low)	Power voltage supplied from the ABS ECU to the rear wheel sensor is too low.	• Short circuit in the wire harness between the rear wheel sensor and the hydraulic unit assembly • Defective rear wheel sensor • Defective hydraulic unit assembly

* The fault code number varies according to the vehicle conditions. For details, refer to the “Troubleshooting details”.

Troubleshooting details

Fault code No. 11, 25

Fault code No.	**11 25**
Item	**Front wheel sensor (intermittent pulses or no pulses)**
Symptom	**Front wheel sensor signal is not received properly. (Pulses are not received or are received intermittently while the vehicle is traveling.)**

Order	Item/components and probable cause	Check or maintenance job
1	Foreign material adhered around the front wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the front wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-21.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.
4	Defective front wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.

TIP
With the front wheel stopped, the rear wheel was rotated for longer than about 20 seconds (fault code No. 11) or for longer than about 2 seconds (fault code No. 25).

Fault code No. 12

Fault code No.	**12**
Item	**Rear wheel sensor (intermittent pulses or no pulses)**
Symptom	**Rear wheel sensor signal is not received properly. (Pulses are not received or are received intermittently while the vehicle is traveling.)**

Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.
4	Defective rear wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.

Fault code No. 13, 26

Fault code No.	**13** **26**
Item	**Front wheel sensor (abnormal pulse period)**
Symptom	**Front wheel sensor signal is not received properly. (The pulse period is abnormal while the vehicle is traveling.)**

Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the front wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the front wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-21.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.
4	Defective front wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.

TIP
- If the front brake ABS operates continuously for 20 seconds or more, fault code No. 26 will be recorded. If the front brake ABS operates continuously for 36 seconds or more, fault code No. 13 will be recorded.
- Vehicle possibly ridden on uneven roads.

Fault code No. 14, 27

Fault code No.	**14 27**
Item	**Rear wheel sensor (abnormal pulse period)**
Symptom	**Rear wheel sensor signal is not received properly. (The pulse period is abnormal while the vehicle is traveling.)**

Order	Item/components and probable cause	Check or maintenance job
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.
4	Defective rear wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.

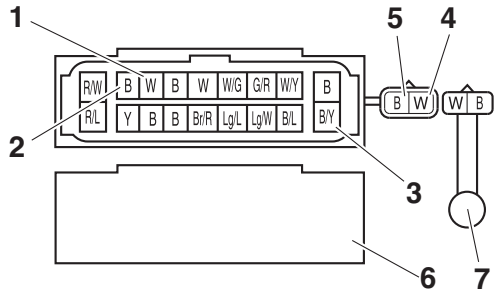
TIP
- If the rear brake ABS operates continuously for 20 seconds or more, fault code No. 27 will be recorded. If the rear brake ABS operates continuously for 36 seconds or more, fault code No. 14 will be recorded.
- Vehicle possibly ridden on uneven roads.

Fault code No. 15

Fault code No.	**15**
Item	**Front wheel sensor (open or short circuit)**
Symptom	**Open or short circuit is detected in the front wheel sensor.**

Order	Item/components and probable cause	Check or maintenance job
1	Defective coupler between the front wheel sensor and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to “OFF” before disconnecting or connecting a coupler.

Fault code No.	15
Item	Front wheel sensor (open or short circuit)
Symptom	Open or short circuit is detected in the front wheel sensor.

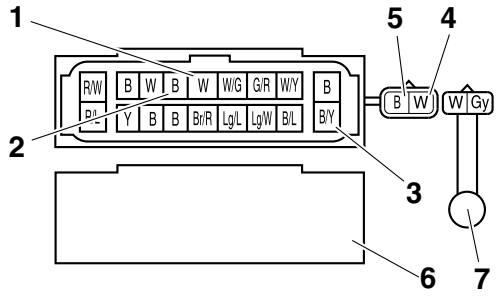
Order	Item/components and probable cause	Check or maintenance job
2	Open or short circuit in the wire harness between the front wheel sensor and the hydraulic unit assembly	• Check for continuity between the white terminal “1” and the white terminal “4” and between the black terminal “2” and the black terminal “5”. • If there is no continuity, the wire harness is defective. Replace the wire harness. • Check that there is no short circuit between the white terminal “1” and the black terminal “2” and between the white terminal “4” and the black terminal “5”. • If there is short circuit, the wire harness is defective. Replace the wire harness. • Check that there is no short circuit between the black/yellow terminal “3” and the white terminal “4” and between the black/yellow terminal “3” and the black terminal “5”. • If there is short circuit, the wire harness is defective. Replace the wire harness.  6. ABS ECU 7. Wheel sensor
3	Defective front wheel sensor or hydraulic unit assembly	If the above items were performed and no malfunctions were found, the wheel sensor or hydraulic unit assembly is defective. Replace the wheel sensor or hydraulic unit assembly. Refer to “FRONT WHEEL” on page 4-19 and “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 16

Fault code No.	16
Item	Rear wheel sensor (open or short circuit)
Symptom	Open or short circuit is detected in the rear wheel sensor.

Order	Item/components and probable cause	Check or maintenance job
1	Defective coupler between the rear wheel sensor and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to “OFF” before disconnecting or connecting a coupler.

Fault code No.	16
Item	Rear wheel sensor (open or short circuit)
Symptom	Open or short circuit is detected in the rear wheel sensor.

Order	Item/components and probable cause	Check or maintenance job
2	Open or short circuit in the wire harness between the rear wheel sensor and the hydraulic unit assembly	• Check for continuity between the white terminal “1” and the white terminal “4” and between the black terminal “2” and the black terminal “5”. • If there is no continuity, the wire harness is defective. Replace the wire harness. • Check that there is no short circuit between the white terminal “1” and the black terminal “2” and between the white terminal “4” and the black terminal “5”. • If there is short circuit, the wire harness is defective. Replace the wire harness. • Check that there is no short circuit between the black/yellow terminal “3” and the white terminal “4” and between the black/yellow terminal “3” and the black terminal “5”. • If there is short circuit, the wire harness is defective. Replace the wire harness.  6. ABS ECU 7. Wheel sensor
3	Defective rear wheel sensor or hydraulic unit assembly	If the above items were performed and no malfunctions were found, the wheel sensor or hydraulic unit assembly is defective. Replace the wheel sensor or hydraulic unit assembly. Refer to “REAR WHEEL” on page 4-27 and “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 17, 45

Fault code No.	17 45
Item	Front wheel sensor (missing pulses)
Symptom	Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)

Order	Item/components and probable cause	Check or maintenance job
1	Foreign material adhered around the front wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the front wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-21.

Fault code No.	**17 45**	
Item	**Front wheel sensor (missing pulses)**	
Symptom	**Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**	
Order	**Item/components and probable cause**	**Check or maintenance job**
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.
4	Defective front wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.

TIP

If pulse gaps are detected when the vehicle is traveling at a speed of 30 km/h (19 mi/h) or more, fault code No. 17 will be recorded. If the vehicle is traveling at a speed of 29 km/h (18 mi/h) or less, fault code No. 45 will be recorded first and fault code No. 17 will be recorded if the condition continues.

Fault code No. 18, 46

Fault code No.	**18 46**	
Item	**Rear wheel sensor (missing pulses)**	
Symptom	**Rear wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**	
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.
4	Defective rear wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.

TIP

If pulse gaps are detected when the vehicle is traveling at a speed of 30 km/h (19 mi/h) or more, fault code No. 18 will be recorded. If the vehicle is traveling at a speed of 29 km/h (18 mi/h) or less, fault code No. 46 will be recorded first and fault code No. 18 will be recorded if the condition continues.

Fault code No. 21

Fault code No.	**21**	
Item	**Hydraulic unit assembly (defective solenoid drive circuit)**	
Symptom	**Solenoid drive circuit in the hydraulic unit assembly is open or short-circuited.**	
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 24

Fault code No.	**24**	
Item	**Brake light switch or tail/brake light**	
Symptom	**Brake light signal is not received properly while the vehicle is traveling (Brake light circuit, or front or rear brake light switch circuit).**	
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective signaling system (tail/brake light or brake light switch)	Check the tail/brake light and brake light switches. Refer to “CHECKING THE SWITCHES” on page 8-153.
2	Defective coupler between the signaling system (tail/brake light or brake light switch) and the hydraulic unit assembly	• 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 the wire harness between the signaling system (tail/brake light or brake light switch) and the hydraulic unit assembly	• Between ABS ECU coupler and front brake light switch coupler. (yellow–yellow) • Between ABS ECU coupler and rear brake light switch coupler. (yellow–yellow)
4	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 31

Fault code No.	**31**	
Item	**Hydraulic unit assembly (abnormal ABS solenoid power supply)**	
Symptom	**Power is not supplied to the solenoid circuit in the hydraulic unit assembly.**	
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Blown ABS solenoid fuse	Check the ABS solenoid fuse. If the ABS solenoid fuse is blown, replace the fuse and check the wire harness. Refer to “CHECKING THE FUSES” on page 8-157.

Fault code No.		31
Item		Hydraulic unit assembly (abnormal ABS solenoid power supply)
Symptom		Power is not supplied to the solenoid circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
2	Defective coupler between the battery and the hydraulic unit assembly	• Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to "OFF" before disconnecting or connecting a coupler.
3	Open or short circuit in the wire harness between the battery and the hydraulic unit assembly	• Replace if there is an open or short circuit. • Between ABS ECU coupler and ABS solenoid fuse. (red/white–red/white)
4	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-60.

Fault code No. 32

Fault code No.		32
Item		Hydraulic unit assembly (short circuit in ABS solenoid power supply circuit)
Symptom		Short circuit is detected in the solenoid power supply circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-60.

Fault code No. 33

Fault code No.		33
Item		Hydraulic unit assembly (abnormal ABS motor power supply)
Symptom		Power is not supplied to the motor circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Blown ABS motor fuse	Check the ABS motor fuse. If the ABS motor fuse is blown, replace the fuse and check the wire harness. Refer to "CHECKING THE FUSES" on page 8-157.
2	Defective coupler between the battery and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to "OFF" before disconnecting or connecting a coupler.

Fault code No.		33
Item		Hydraulic unit assembly (abnormal ABS motor power supply)
Symptom		Power is not supplied to the motor circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
3	Open or short circuit in the wire harness between the battery and the hydraulic unit assembly	• Replace if there is an open or short circuit. • Between ABS ECU coupler and starter relay coupler (ABS motor fuse). (red/blue–red/blue) • Between ABS ECU coupler and ground. (black–black)
4	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 34

Fault code No.		34
Item		Hydraulic unit assembly (short circuit in ABS motor power supply circuit)
Symptom		Short circuit is detected in the motor power supply circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 41

Fault code No.		41
Item		Front wheel ABS (intermittent wheel speed pulses or incorrect depressurization)
Symptom		• Pulses from the front wheel sensor are received intermittently while the vehicle is traveling. • Front wheel will not recover from the locking tendency even though the signal is transmitted from the ABS ECU to reduce the hydraulic pressure.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Incorrect installation of the front wheel sensor	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-21.
2	Incorrect rotation of the front wheel	Check that there is no brake disc drag on the front wheel and make sure that it rotates smoothly. Refer to “CHECKING THE FRONT WHEEL” on page 4-21 and “CHECKING THE FRONT BRAKE DISCS” on page 4-40.

Fault code No.		41
Item		Front wheel ABS (intermittent wheel speed pulses or incorrect depressurization)
Symptom		• Pulses from the front wheel sensor are received intermittently while the vehicle is traveling. • Front wheel will not recover from the locking tendency even though the signal is transmitted from the ABS ECU to reduce the hydraulic pressure.
Order	**Item/components and probable cause**	**Check or maintenance job**
3	Front brake dragging	Check that the brake fluid pressure is correctly transmitted to the brake caliper when the brake lever is operated and that the pressure decreases when the lever is released. Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-40.
4	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 42, 47

Fault code No.		42 47
Item		Rear wheel ABS (intermittent wheel speed pulses or incorrect depressurization)
Symptom		• Pulses from the rear wheel sensor are received intermittently while the vehicle is traveling. (for fault code No. 42) • Rear wheel will not recover from the locking tendency even though the signal is transmitted from the ABS ECU to reduce the hydraulic pressure.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Incorrect installation of the rear wheel sensor (for fault code No. 42)	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
2	Incorrect rotation of the rear wheel	Check that there is no brake disc drag on the wheel and make sure that it rotates smoothly. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
3	Rear brake dragging	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. Refer to “CHECKING THE REAR BRAKE DISC” on page 4-54.
4	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 43

Fault code No.		**43**
Item		**Front wheel sensor (missing pulses)**
Symptom		**Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the front wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the front wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-21.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.
4	Defective front wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-23.

Fault code No. 44

Fault code No.		**44**
Item		**Rear wheel sensor (missing pulses)**
Symptom		**Rear wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-31.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.
4	Defective rear wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-32.

Fault code No. 51, 52

Fault code No.	**51** **52**
Item	**• Vehicle system power supply (voltage of ABS ECU power supply is high) (for fault code No. 51)** **• Vehicle system power supply (voltage of wheel sensor power supply is high) (for fault code No. 52)**
Symptom	**• Power voltage supplied to the ABS ECU in the hydraulic unit assembly is too high. (for fault code No. 51)** **• Power voltage supplied to the wheel sensor is too high. (for fault code No. 52)**

Order	Item/components and probable cause	Check or maintenance job
1	Defective battery	Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-158.
2	Disconnected battery terminal	Check the connection. Replace or reconnect the terminal if necessary.
3	Defective charging system	Check the charging system. Refer to “CHARGING SYSTEM” on page 8-13.

Fault code No. 53

Fault code No.	**53**
Item	**Vehicle system power supply (voltage of ABS ECU power supply is low)**
Symptom	**Power voltage supplied to the ABS ECU in the hydraulic unit assembly is too low.**

Order	Item/components and probable cause	Check or maintenance job
1	Defective battery	Recharge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-158.
2	Defective coupler between the battery and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to “OFF” before disconnecting or connecting a coupler.
3	Open or short circuit in the wire harness between the battery and the hydraulic unit assembly	• Replace if there is an open or short circuit. • Between ABS ECU coupler and ABS ECU fuse. (brown/red–brown/red)
4	Defective charging system	Check the charging system. Refer to “CHARGING SYSTEM” on page 8-13.

Fault code No. 54

Fault code No.	**54**
Item	**Hydraulic unit assembly (defective ABS solenoid and ABS motor power supply circuits)**
Symptom	**Abnormality is detected in the solenoid or motor power supply circuit in the hydraulic unit assembly.**

Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective battery	Recharge or replace the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-158.
2	Defective coupler between the battery and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. **TIP** Turn the main switch to "OFF" before disconnecting or connecting a coupler.
3	Open or short circuit in the wire harness between the battery and the hydraulic unit assembly	• Replace if there is an open or short circuit. • Between ABS ECU coupler and starter relay coupler (ABS motor fuse). (red/blue–red/blue) • Between ABS ECU coupler and ABS solenoid fuse. (red/white–red/white)
4	Defective charging system	Check the charging system. Refer to "CHARGING SYSTEM" on page 8-13.
5	Defective hydraulic unit assembly	If the above items were performed and no malfunctions were found, replace the hydraulic unit assembly. Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-60.

Fault code No. 55

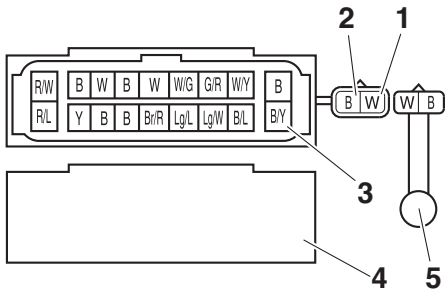
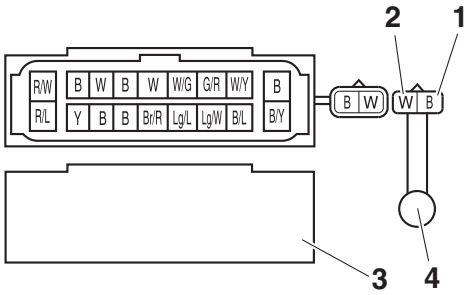
Fault code No.	**55**
Item	**Hydraulic unit assembly (defective ABS ECU)**
Symptom	**Abnormal data is detected in the hydraulic unit assembly.**

Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-60.

Fault code No. 56

Fault code No.		56
Item		Hydraulic unit assembly (abnormal internal power supply)
Symptom		Abnormality is detected in the power supply circuit in the hydraulic unit assembly.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 63

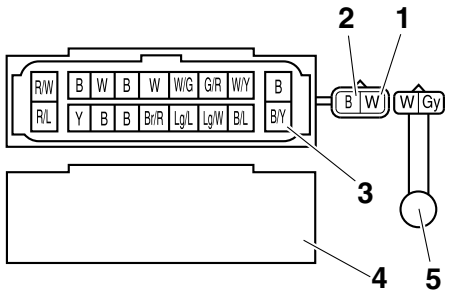
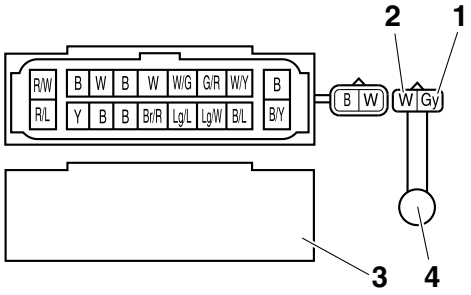
Fault code No.		63
Item		Front wheel sensor power supply (voltage of power supply is low)
Symptom		Power voltage supplied from the ABS ECU to the front wheel sensor is too low.
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Short circuit in the wire harness between the front wheel sensor and the hydraulic unit assembly	• Check that there is no short circuit between the white terminal “1” and the black terminal “2”. • Check that there is no short circuit between the black/yellow terminal “3” and the white terminal “1”. • If there is a short circuit, the wire harness is defective. Replace the wire harness.  4. ABS ECU 5. Wheel sensor
2	Defective front wheel sensor	• Check that there is no short circuit between the black terminal “1” and the white terminal “2”. • If there is a short circuit, the wheel sensor is defective. Repair or replace the wheel sensor.  3. ABS ECU 4. Wheel sensor

Fault code No.	63
Item	Front wheel sensor power supply (voltage of power supply is low)
Symptom	Power voltage supplied from the ABS ECU to the front wheel sensor is too low.

Order	Item/components and probable cause	Check or maintenance job
3	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

Fault code No. 64

Fault code No.	64
Item	Rear wheel sensor power supply (voltage of power supply is low)
Symptom	Power voltage supplied from the ABS ECU to the rear wheel sensor is too low.

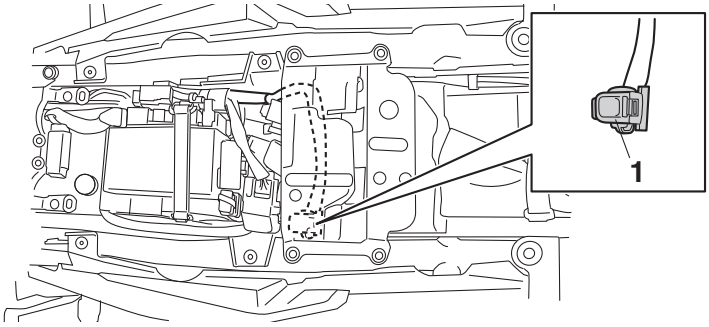
Order	Item/components and probable cause	Check or maintenance job
1	Short circuit in the wire harness between the rear wheel sensor and the hydraulic unit assembly	• Check that there is no short circuit between the white terminal “1” and the black terminal “2”. • Check that there is no short circuit between the black/yellow terminal “3” and the white terminal “1”. • If there is a short circuit, the wire harness is defective. Replace the wire harness.  4. ABS ECU 5. Wheel sensor
2	Defective rear wheel sensor	• Check that there is no short circuit between the gray terminal “1” and the white terminal “2”. • If there is a short circuit, the wheel sensor is defective. Repair or replace the wheel sensor.  3. ABS ECU 4. Wheel sensor

Fault code No.		64
Item		Rear wheel sensor power supply (voltage of power supply is low)
Symptom		Power voltage supplied from the ABS ECU to the rear wheel sensor is too low.
Order	**Item/components and probable cause**	**Check or maintenance job**
3	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-60.

EAS31167
[B-3] DELETING THE FAULT CODES
To delete the fault codes, use the Yamaha diagnostic tool. For information about deleting the fault codes, refer to the operation manual of the Yamaha diagnostic tool.
Check that all the displayed fault codes are deleted.

Yamaha diagnostic tool USB
90890-03250
Yamaha diagnostic tool (A/I)
90890-03252

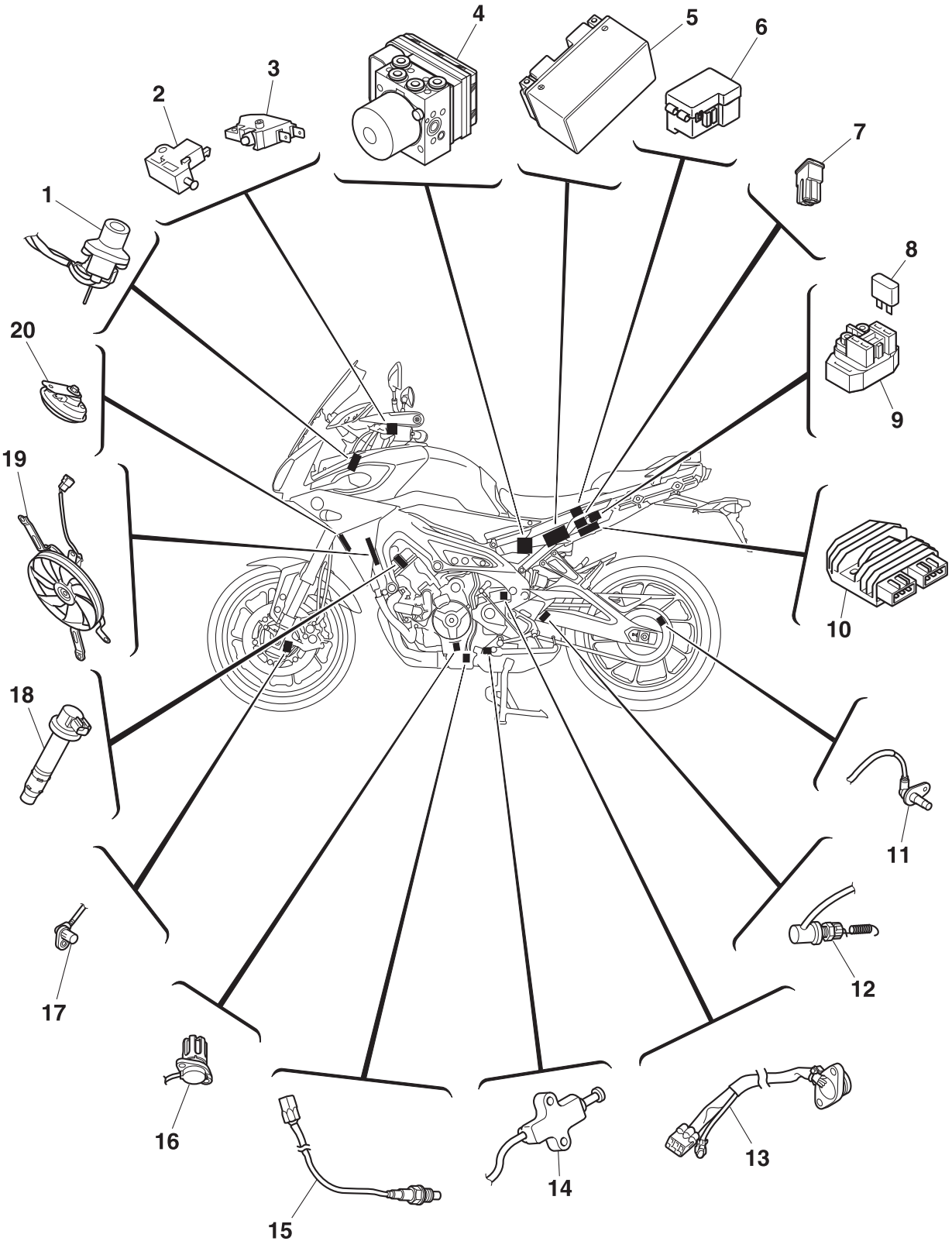
Connecting the Yamaha diagnostic tool
Remove the protective cap “1”, and then connect the Yamaha diagnostic tool to the coupler.



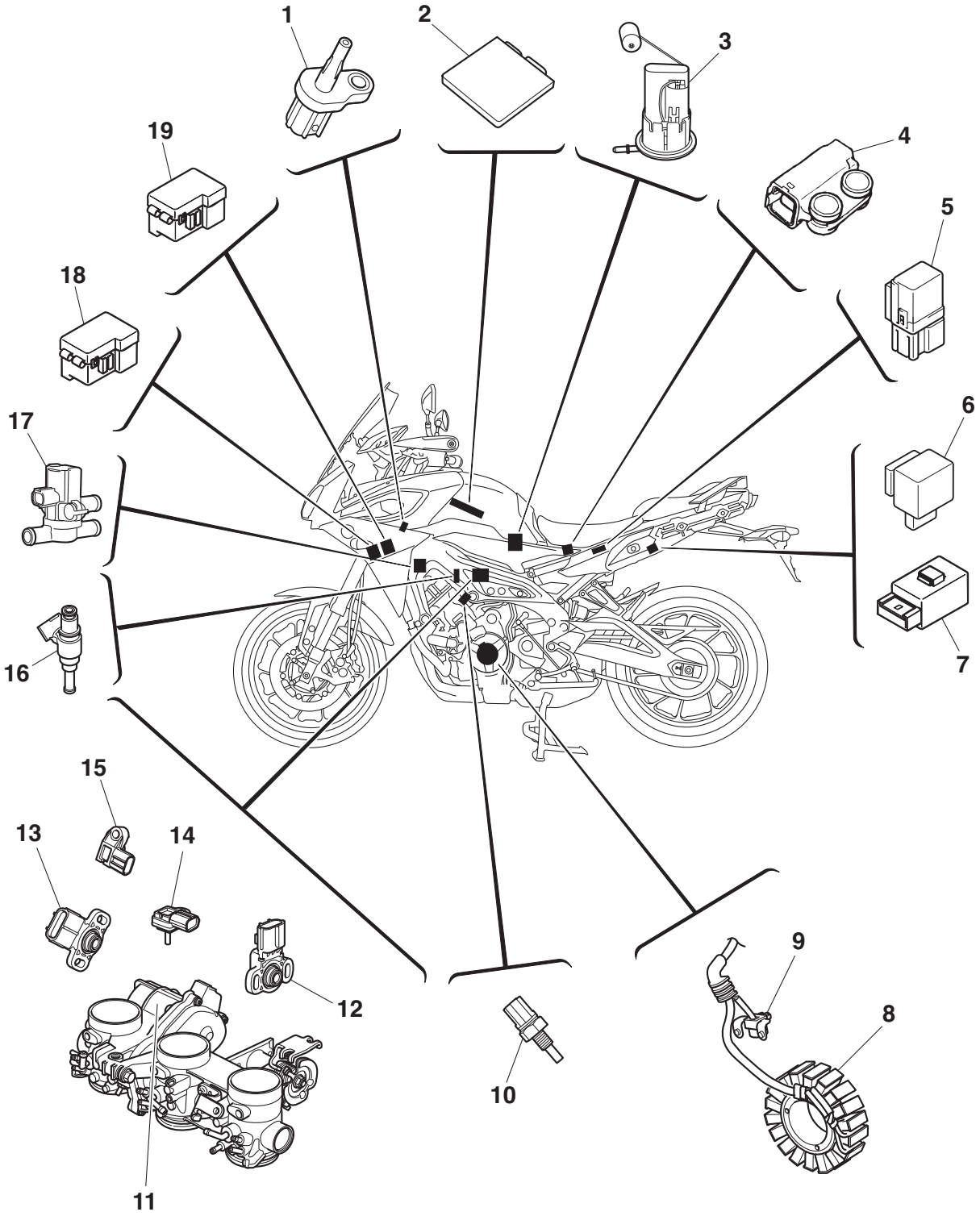
EAS31168
[C-1] FINAL CHECK
Check all the following items to complete the inspection.
If the process is not completed properly, start again from the beginning.
Checking procedures
1. Check the brake fluid level in the brake master cylinder reservoir and brake fluid reservoir.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-13.
2. Check the wheel sensors for proper installation.
   Refer to “INSTALLING THE FRONT WHEEL (DISC BRAKE)” on page 4-25 and “INSTALLING THE REAR WHEEL (DISC BRAKE)” on page 4-32.
3. Perform brake line routing confirmation.
   Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-65.
   If it does not have reaction-force properly, the brake hose is not properly routed or connected.
4. Delete the fault codes.
   Refer to “[B-3] DELETING THE FAULT CODES” on page 8-147.
5. Checking the ABS warning light.
   Refer to “CHECKING THE ABS WARNING LIGHT” on page 4-68.
   If the ABS warning light does not turn off, the possible causes are following:
   - The problem is not solved.
   - Open circuit between the ABS ECU and the meter assembly.

Check for continuity between green/red terminal of the ABS ECU coupler and green/red terminal of the meter assembly coupler.
- Malfunction in the meter assembly circuit.
- Malfunction in the ABS warning light circuit in the hydraulic unit assembly.

EAS20089
ELECTRICAL COMPONENTS



1. Main switch/Immobilizer unit
2. Clutch switch
3. Front brake light switch
4. Hydraulic unit assembly
5. Battery
6. Fuse box 3
7. Main fuse
8. Fuel injection system fuse
9. Starter relay
10. Rectifier/regulator
11. Rear wheel sensor
12. Rear brake light switch
13. Gear position switch
14. Sidestand switch
15. O_2 sensor
16. Oil level switch
17. Front wheel sensor
18. Ignition coil
19. Radiator fan motor
20. Horn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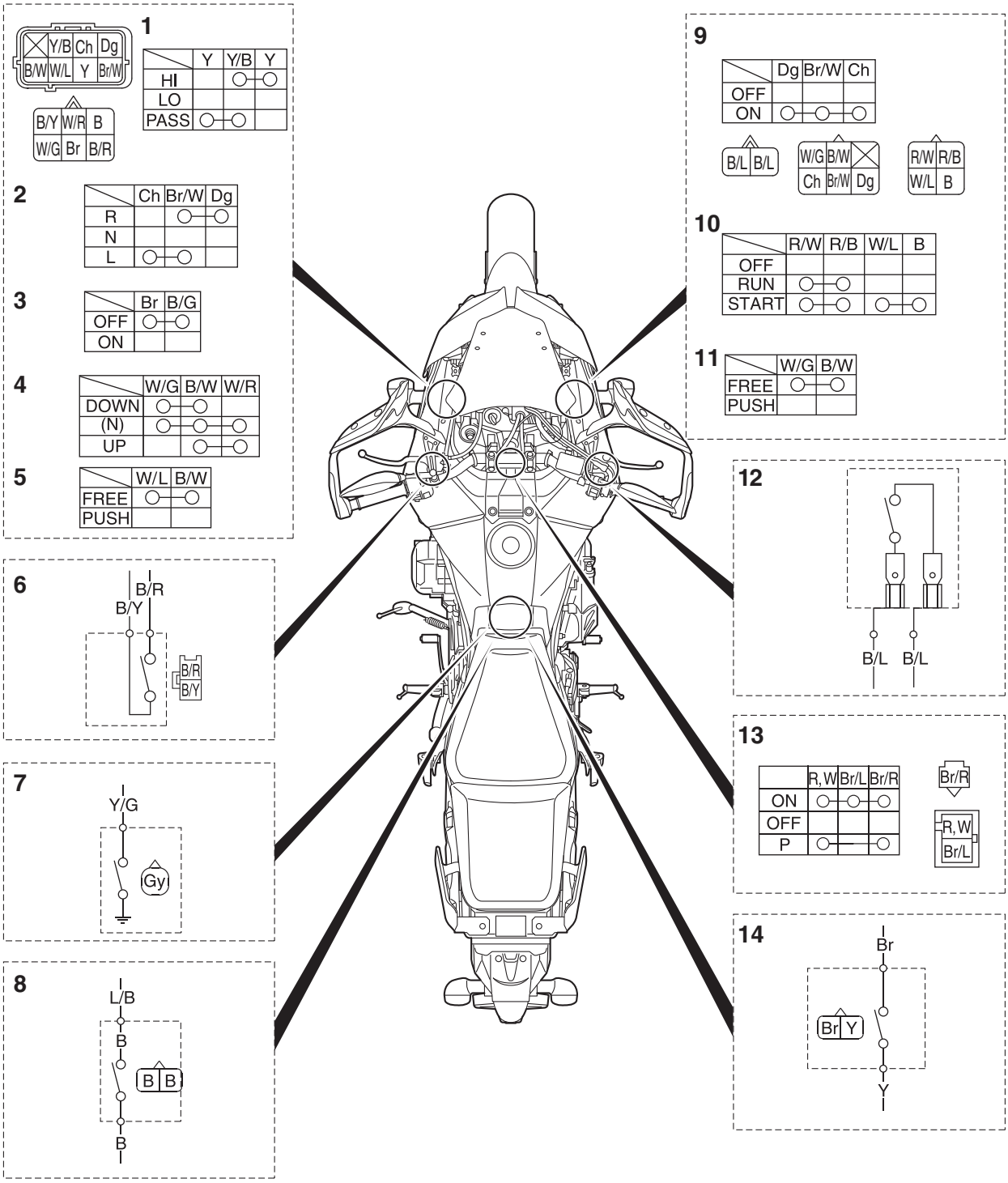
1. Intake air temperature sensor
2. ECU (Engine Control Unit)
3. Fuel pump
4. Lean angle sensor
5. Radiator fan motor relay
6. Turn signal/hazard relay
7. Relay unit
8. Stator coil
9. Crankshaft position sensor
10. Coolant temperature sensor
11. Throttle servo motor
12. Accelerator position sensor
13. Throttle position sensor
14. Intake air pressure sensor 1
15. Intake air pressure sensor 2
16. Injector
17. Air induction system solenoid
18. Fuse box 1
19. Fuse box 2

EAS30549
CHECKING THE SWITCHES



1. Dimmer/pass switch
2. Turn signal switch
3. Horn switch
4. Select switch
5. Menu switch
6. Clutch switch
7. Oil level switch
8. Sidestand switch
9. Hazard switch
10. Start/engine stop switch
11. Drive mode switch
12. Front brake light switch
13. Main switch
14. Rear brake light switch

Check each switch for continuity with the digital curcuit tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14371

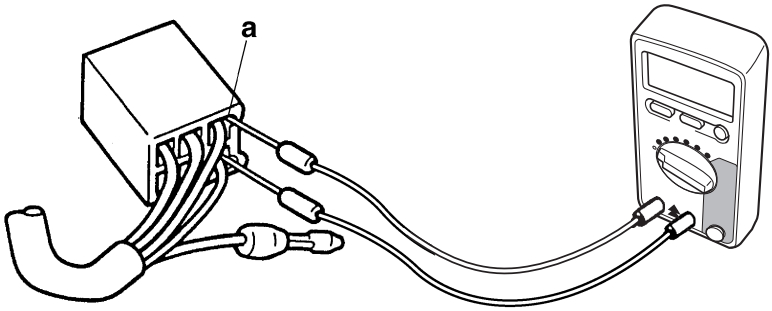
NOTICE

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

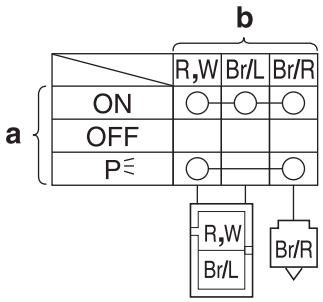
Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

TIP

- Before checking for continuity, set the digital curcuit tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.
The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.
The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "○——○".
There is continuity between red-white, brown/blue and brown/red when the switch is set to "ON".
There is continuity between red-white and brown/red when the switch is set to "P".



EAS30550
CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs

The bulbs used on this vehicle are shown in the illustration.
- Bulbs "a" are used for turn signal lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulb "b" is used for license plate light and can be removed from the socket by carefully pulling them out.

a

b

Checking the condition of the bulbs

The following procedure applies to all of the bulbs.
1. Remove:
   - Bulb
2. Check:
   - Bulb (for continuity)
     (with the digital circuit tester)
     No continuity → Replace.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

TIP
Before checking for continuity, set the digital circuit tester to the " Ω " range.

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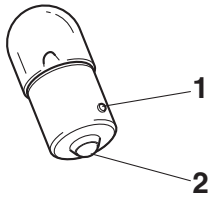
a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
b. If either of the readings indicate no continuity, replace the bulb.



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Checking the condition of the bulb sockets

The following procedure applies to all of the bulb sockets.
1. Check:
   - Bulb socket (for continuity)
     (with the digital circuit tester)
     No continuity → Replace.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the digital circuit tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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EAS30551
CHECKING THE FUSES
The following procedure applies to all of the fuses.
ECA13680
NOTICE
To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
2. Check:
   • Fuse

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a. Connect the digital circuit tester to the fuse and check the continuity.

TIP
Set the digital circuit tester selector to " Ω ".

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

b. If the digital circuit tester indicates "O.L", replace the fuse.

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3. Replace:
   • Blown fuse

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

Fuses	Amperage rating	Q'ty
Main	50 A	1
Headlight	7.5 A	1
Signaling system	7.5 A	1
Ignition	15 A	1
Radiator fan motor	15 A	1
Parking lighting	7.5 A	1
Fuel injection system	20 A	1
ABS motor	30 A	1
ABS control unit	7.5 A	1
ABS solenoid	15 A	1
Auxiliary 1	2 A	1
Auxiliary 2	2 A	1
Auxiliary DC jack 1	2 A	1
Auxiliary DC jack 2	2 A	1
Backup	7.5 A	1
Electronic throttle valve	7.5 A	1
Spare	30 A	1
Spare	20 A	1
Spare	15 A	1
Spare	7.5 A	1
Spare	2 A	1

EWA13310
⚠ WARNING
Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

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4. Install:
   • Rider seat/Passenger seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.

EAS31006
REPLACING THE ECU (Engine Control Unit)
1. Turn the main switch to "OFF".
2. Replace the ECU (Engine Control Unit).
3. Clean the throttle bodies and reset the ISC (idle speed control) learning value.

Refer to "CHECKING AND CLEANING THE THROTTLE BODIES" on page 7-8.

4. Check:
   • Engine idling speed
   Start the engine, warm it up, and then measure the engine idling speed.

	Engine idling speed 1100–1300 r/min

EAS30552

CHECKING AND CHARGING THE BATTERY

EWA13290

⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL

- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL

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

ECA13661

NOTICE

- **This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

TIP

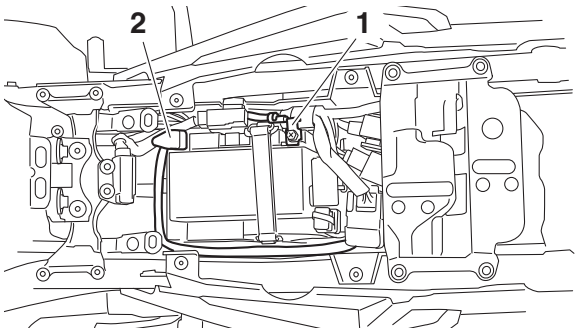
Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   • Passenger seat/Rider seat
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
2. Disconnect:
   • Battery leads
   (from the battery terminals)

ECA13640

NOTICE

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



3. Remove:
   • Battery
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
4. Check:
   • Battery charge

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a. Connect a digital circuit tester to the battery terminals.

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

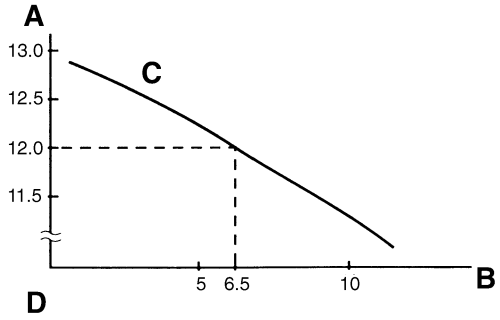
TIP

- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is discon-

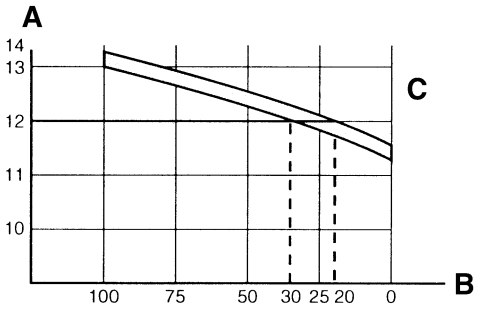
nected).
• No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

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

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30 %



A. Open-circuit voltage (V)
B. Charging time (hours)
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



A. Open-circuit voltage (V)
B. Charging condition of the battery (%)
C. Ambient temperature 20 °C (68 °F)

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

EWA13300

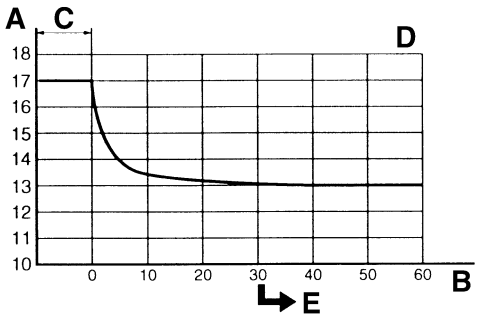
⚠ WARNING

Do not quick charge a battery.

ECA13671

NOTICE

• Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
• If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
• When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the 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 a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.



A. Open-circuit voltage (V)
B. Time (minutes)
C. Charging
D. Ambient temperature 20 °C (68 °F)
E. Check the open-circuit voltage.

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Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to

charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

TIP

Set the charging voltage to 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

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

TIP

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Standard charging current is reached
  Battery is good.
- Standard charging current is not reached
  Replace the battery.

d. Adjust the voltage so that the current is at the standard charging level.
e. Set the time according to the charging time suitable for the open-circuit voltage.
f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.
c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

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

TIP

Set the charging time at 20 hours (maximum).

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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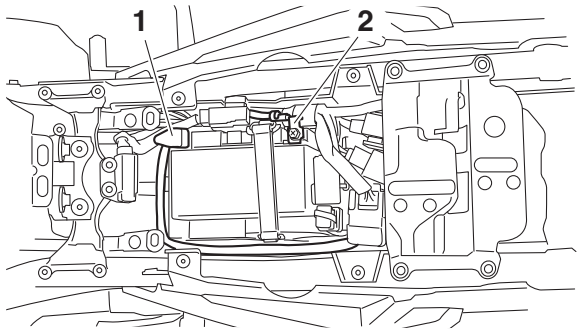
6. Install:
   • Battery
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
7. Connect:
   • Battery leads
   (to the battery terminals)

ECA13630

NOTICE

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**

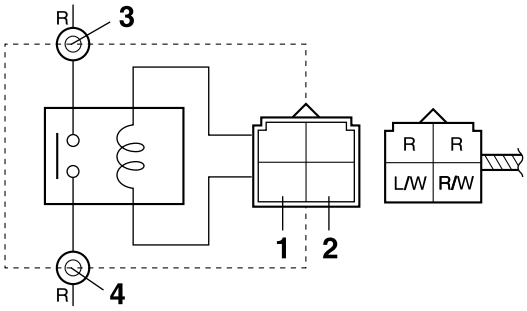
10.Install:
- Rider seat/Passenger seat
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

EAS30553
CHECKING THE RELAYS
Check each switch for continuity with the digital circuit tester. If the continuity reading is incorrect, replace the relay.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

1. Disconnect the relay from the wire harness.
2. Connect the digital circuit tester (Ω) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

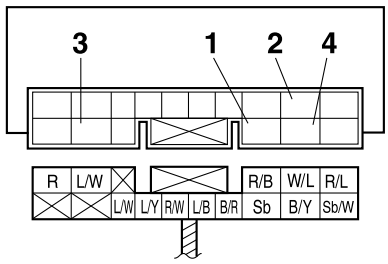
Starter relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Relay operation
Continuity
(between “3” and “4”)

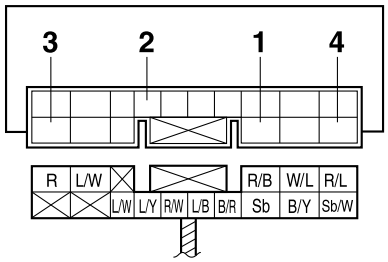
Relay unit (starting circuit cut-off relay)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

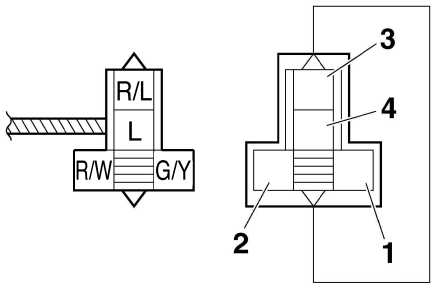
Relay unit (fuel pump relay)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

Radiator fan motor relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

EAS30794
CHECKING THE TURN SIGNAL/HAZARD RELAY

1. Check:
   • Turn signal/hazard relay input voltage
   Out of specification → The wiring circuit from the main switch to the turn signal/hazard relay coupler is faulty and must be repaired.

Turn signal/hazard relay input voltage
DC 12 V

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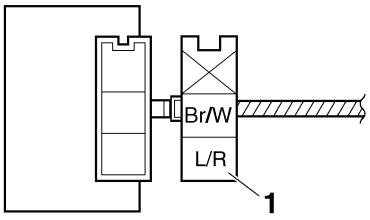
a. Connect the digital circuit tester (DC V) to the turn signal/hazard relay terminal as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe
blue/red "1"
• Negative tester probe
Ground



b. Turn the main switch to "ON".
c. Measure the turn signal/hazard relay input voltage.

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2. Check:
   • Turn signal/hazard relay output voltage
   Out of specification → Replace.

Turn signal/hazard relay output voltage
DC 12 V

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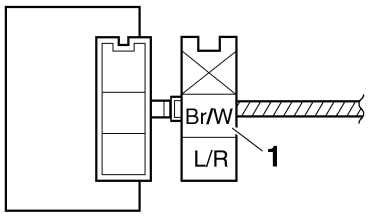
a. Connect the digital circuit tester (DC V) to the turn signal/hazard relay terminal as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe
brown/white "1"
• Negative tester probe
Ground



b. Turn the main switch to "ON".
c. Measure the turn signal/hazard relay output voltage.

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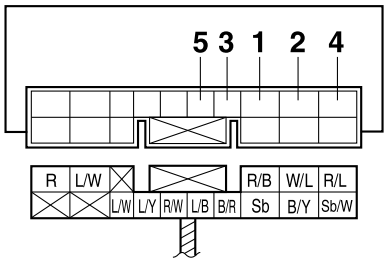
EAS30795
CHECKING THE RELAY UNIT (DIODE)

1. Check:
   • Relay unit (diode)
   Out of specification → Replace.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

TIP
The digital circuit tester readings are shown in the following table.

Continuity
Positive tester probe
sky blue "1"
Negative tester probe
black/yellow "2"
No continuity
Positive tester probe
black/yellow "2"
Negative tester probe
sky blue "1"
Continuity
Positive tester probe
sky blue "1"
Negative tester probe
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/black "5"
Negative tester probe
black/red "3"
No continuity
Positive tester probe
black/red "3"
Negative tester probe
blue/black "5"



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a. Disconnect the relay unit coupler from the wire harness.
b. Connect the digital circuit tester (Ω) to the relay unit terminal as shown.
c. Check the relay unit (diode) for continuity.
d. Check the relay unit (diode) for no continuity.

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EAS30558
CHECKING THE IGNITION COILS

The following procedure applies to all of the ignition coils.

1. Check:
   • Primary coil resistance
   Out of specification → Replace.

Primary coil resistance
1.19–1.61 Ω

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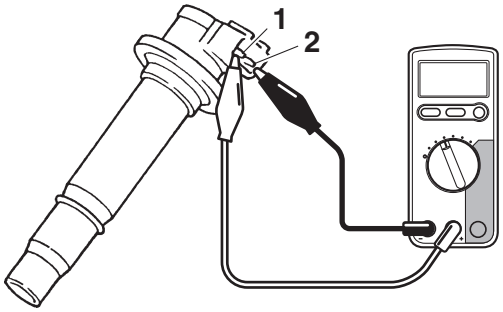
a. Remove the ignition coil from the spark plug.
b. Connect the digital circuit tester (Ω) to the ignition coil as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe →
red/black "1"
• Negative tester probe →
Cylinder-#1 ignition coil
orange "2"
Cylinder-#2 ignition coil
gray/red "2"
Cylinder-#3 ignition coil
orange/green "2"



c. Measure the primary coil resistance.

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2. Check:
   • Secondary coil resistance
   Out of specification → Replace.

Secondary coil resistance
9.35–12.65 kΩ

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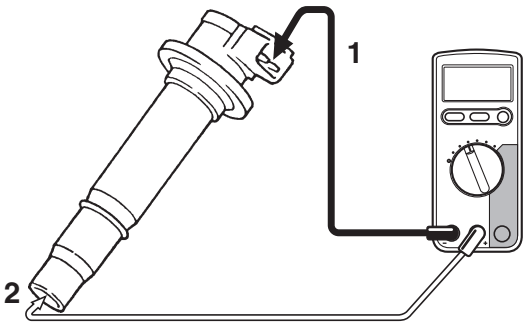
a. Connect the digital circuit tester (Ω) to the ignition coil as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Negative tester probe → red/black "1"
• Positive tester probe → spark plug terminal "2"



b. Measure the secondary coil resistance.

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EAS30556

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 8-4.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP
If the ignition spark gap is within specification, the ignition system circuit is operating normally.

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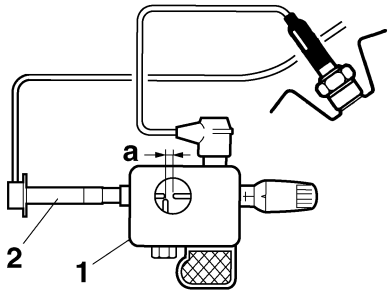
a. Remove the ignition coil from the spark plug.
b. Connect the ignition checker "1" as shown.

Ignition checker
90890-06754
Oppama pet–4000 spark checker
YM-34487



2. Ignition coil

c. Turn the main switch to "ON".
d. Measure the ignition spark gap "a".
e. Crank the engine by pushing the "≋" side of the start/engine stop switch and gradually increase the spark gap until a misfire occurs.

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EAS30560

CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
   • Crankshaft position sensor coupler (from the wire harness)
2. Check:
   • Crankshaft position sensor resistance
   Out of specification → Replace the crankshaft position sensor.

Crankshaft position sensor resistance
228–342 Ω

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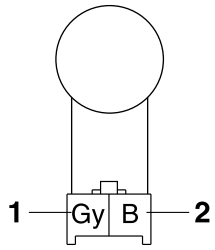
a. Connect the digital circuit tester (Ω) to the crankshaft position sensor coupler as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe
  gray “1”
- Negative tester probe
  black “2”



b. Measure the crankshaft position sensor resistance.

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EAS30561

CHECKING THE LEAN ANGLE SENSOR

1. Remove:
   - Lean angle sensor
     (from the fuel tank bracket)
2. Check:
   - Lean angle sensor output voltage
     Out of specification → Replace.

Lean angle sensor output voltage
Less than 65°
0.4–1.4 V
More than 65°
3.7–4.4 V

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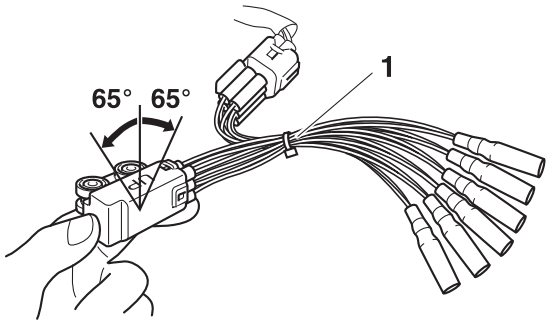
a. Connect the test harness– lean angle sensor (6P) “1” to the lean angle sensor and wire harness as shown.
b. Connect the digital circuit tester (DC V) to the test harness– lean angle sensor (6P).

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927
Test harness– lean angle sensor (6P)
90890-03209
Test harness– lean angle sensor (6P)
YU-03209

- Positive tester probe
  yellow/green (wire harness color)
- Negative tester probe
  black/blue (wire harness color)



c. Set the main switch to “ON”.
d. Turn the lean angle sensor to 65°.
e. Measure the lean angle sensor output voltage.

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EAS30562

CHECKING THE STARTER MOTOR OPERATION

1. Check:
   - Starter motor operation
     Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
     Refer to “TROUBLESHOOTING” on page 8-11.

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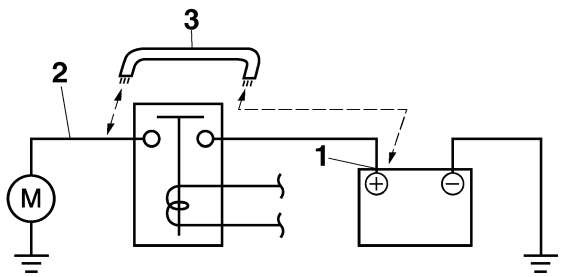
a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.

EWA13810

⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore, make sure no flammable gas or**

fluid is in the vicinity.



b. Check the starter motor operation.

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EAS30566

CHECKING THE STATOR COIL

1. Disconnect:
   - Stator coil coupler (from the wire harness)
2. Check:
   - Stator coil resistance
     Out of specification → Replace the stator coil.

Stator coil resistance
0.152–0.228 Ω

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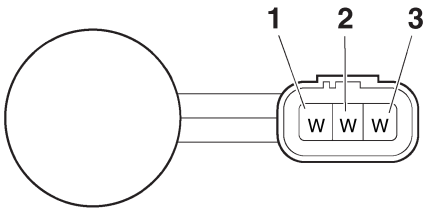
a. Connect the digital circuit tester to the stator coil coupler as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe	white “1”
• Negative tester probe	white “2”

• Positive tester probe	white “1”
• Negative tester probe	white “3”

• Positive tester probe	white “2”
• Negative tester probe	white “3”



b. Measure the stator coil resistance.

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EAS30680

CHECKING THE RECTIFIER/REGULATOR

1. Check:
   - Rectifier/regulator input voltage
     Out of specification → Correct the stator coil condition.
     Refer to “CHECKING THE STATOR COIL” on page 8-166.

Rectifier/regulator input voltage
above 14 V at 5000 r/min

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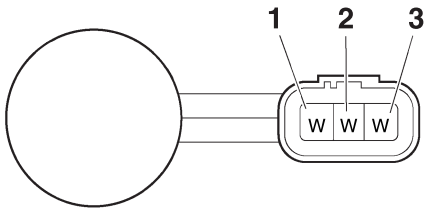
a. Set the engine tachometer to the ignition coil of cylinder #1.
b. Connect the digital circuit tester (AC V) to the rectifier/regulator coupler as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe	white “1”
• Negative tester probe	white “2”

• Positive tester probe	white “1”
• Negative tester probe	white “3”

• Positive tester probe	white “2”
• Negative tester probe	white “3”



c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the rectifier/regulator input voltage.

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2. Check:
   • Rectifier/regulator output voltage
   Out of specification → Replace the rectifier/regulator.

Regulated voltage (DC)
14.3–14.7 V

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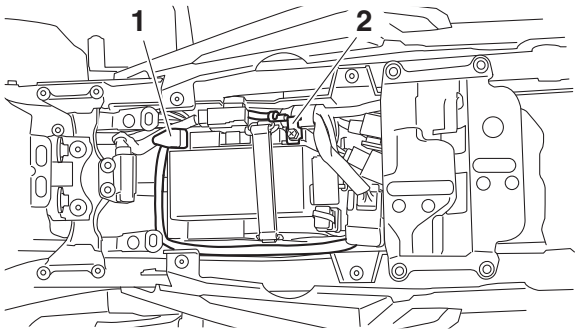
a. Set the engine tachometer to the ignition coil of cylinder #1.
b. Connect the digital circuit tester (DC V) to the battery as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe → positive battery terminal “1”
• Negative tester probe → negative battery terminal “2”



c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the charging voltage.

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EAS30569
CHECKING THE HORN

1. Check:
   • Horn resistance
   Out of specification → Replace.

Horn
Coil resistance
1.07–1.11 Ω

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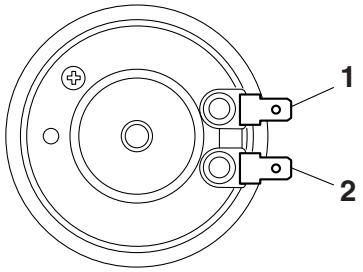
a. Disconnect the horn leads from the horn terminals.
b. Connect the digital circuit tester to the horn terminals.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe
Horn terminal “1”
• Negative tester probe
Horn terminal “2”



c. Measure the horn resistance.

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2. Check:
   • Horn sound
   Faulty sound → Replace.

EAS30846
CHECKING THE ENGINE OIL LEVEL SWITCH

1. Drain:
   • Engine oil
2. Remove:
   • Oil level switch
   (from the oil pan)
3. Check:
   • Oil level switch resistance

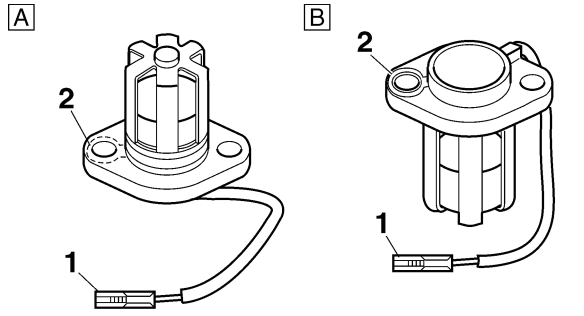
Oil level switch
Oil level switch resistance (maximum level position)
484.0–536.0 Ω
Oil level switch resistance (minimum level position)
114.0–126.0 Ω

a. Connect the digital circuit tester (Ω) to the oil level switch terminal as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

Minimum level position "A"
- Positive tester probe
  Coupler (gray) "1"
- Negative tester probe
  Body earth "2"

Maximum level position "B"
- Positive tester probe
  Coupler (gray) "1"
- Negative tester probe
  Body earth "2"



b. Measure the oil level switch resistance.

EAS30573
CHECKING THE FUEL SENDER

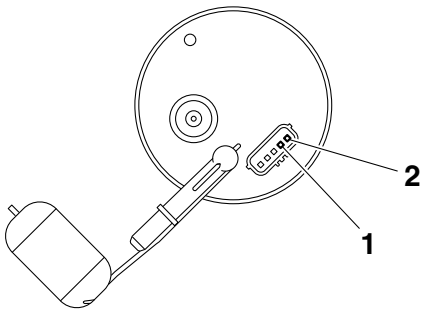
1. Disconnect:
   - Fuel pump coupler
     (from the fuel pump)
2. Remove:
   - Fuel tank
3. Remove:
   - Fuel pump
     (from the fuel tank)
4. Check:
   - Fuel sender resistance
     Out of specification → Replace the fuel pump assembly.

Sender unit resistance (full)
9.0–11.0 Ω
Sender unit resistance (empty)
213.0–219.0 Ω

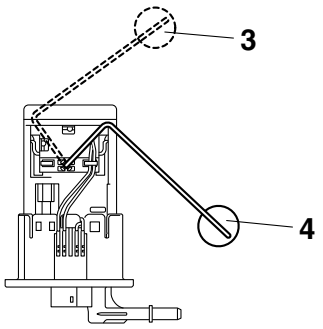
a. Connect the digital circuit tester (Ω) to the fuel sender terminals as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe →
  Fuel sender terminal "1"
- Negative tester probe →
  Fuel sender terminal "2"



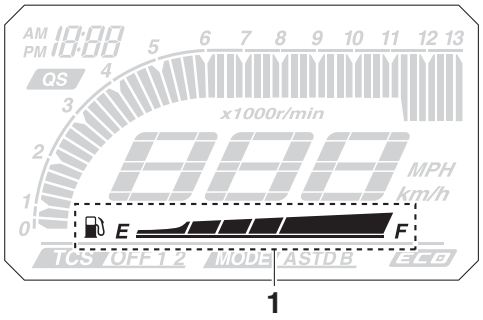
b. Move the fuel sender float to maximum "3" and minimum "4" level position.



EAS30938
CHECKING THE FUEL METER/FUEL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the fuel level detection circuit.

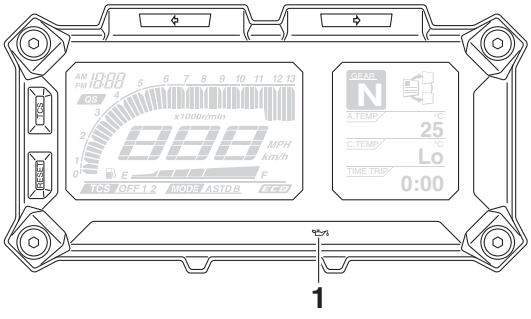
1. Check:
   • Fuel meter/fuel level warning light “1”
   (Turn the main switch to “ON”.)
   Warning light comes on for a few seconds, then goes off → Warning light is OK.
   Warning light does not come on → Replace the meter assembly.
   Warning light flashes eight times, then goes off for 3 seconds in a repeated cycle (malfunction detected in fuel sender) → Replace the fuel pump assembly.



EAS30575
CHECKING THE OIL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the oil level detection circuit.

1. Check:
   • Oil level warning light “1”
   (Turn the main switch to “ON”.)
   Warning light comes on for a few seconds, then goes off → Warning light is OK.
   Warning light does not come on → Replace the meter assembly.
   Warning light flashes ten times, then goes off for 2.5 seconds in a repeated cycle (malfunction detected in oil level switch) → Replace the oil level switch.



EAS30577
CHECKING THE RADIATOR FAN MOTOR

1. Check:
   • Radiator fan motor
   Faulty/rough movement → Replace.

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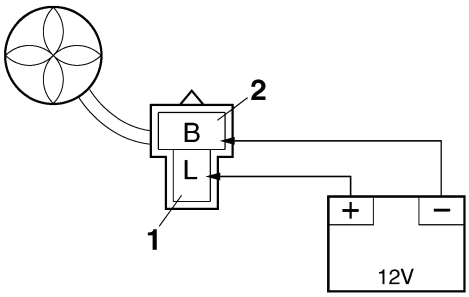
a. Disconnect the radiator fan motor coupler from the wire harness.
b. Connect the battery (DC 12 V) as shown.

• Positive tester probe blue “1” • Negative tester probe black “2”



c. Measure the radiator fan motor movement.

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EAS30578
CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
   • Coolant temperature sensor
   Refer to “CYLINDER HEAD” on page 5-19.

EWA14130
⚠ WARNING

- **Handle the coolant temperature sensor with special care.**
- **Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.**

2. Check:
   • Coolant temperature sensor resistance
   Out of specification → Replace.

Coolant temperature sensor resistance
2512–2777 Ω at 20 °C (2512–2777 Ω at 68 °F)
Coolant temperature sensor resistance
210–221 Ω at 100 °C (210–221 Ω at 212 °F)

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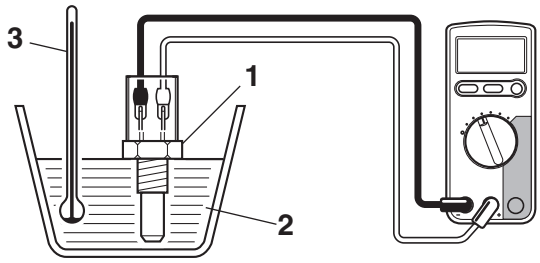
a. Connect the digital circuit tester (Ω) to the coolant temperature sensor as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

b. Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

TIP
Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the coolant.



d. Heat the coolant or let it cool down to the specified temperatures.
e. Measure the coolant temperature sensor resistance.

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3. Install:
• Coolant temperature sensor

Coolant temperature sensor
16 N·m (1.6 kgf·m, 12 lb·ft)

EAS30581
CHECKING THE THROTTLE POSITION SENSOR

1. Remove:
• Throttle position sensor
(from the throttle bodies)

ECA17540
NOTICE
- **Handle the throttle position sensor with special care.**
- **Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.**

2. Check:
• Throttle position sensor maximum resistance
Out of specification → Replace the throttle position sensor.

Resistance
1.20–2.80 kΩ

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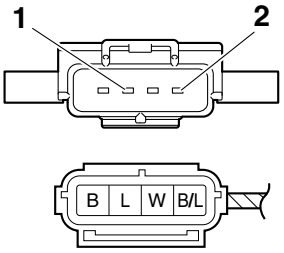
a. Connect the digital circuit tester (Ω) to the throttle position sensor terminals as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe → blue "1"
- Negative tester probe → black/blue "2"



b. Measure the throttle position sensor maximum resistance.

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3. Install:
• Throttle position sensor

TIP
When installing the throttle position sensor, adjust its angle properly. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR" on page 7-12.

EAS30582
CHECKING THE ACCELERATOR POSITION SENSOR

1. Remove:
• Accelerator position sensor
(from the throttle bodies)

EWA15960
⚠ WARNING
- **Handle the accelerator position sensor with special care.**
- **Never subject the accelerator position sensor to strong shocks. If the accelerator position sensor is dropped, replace it.**

2. Check:
• Accelerator position sensor maximum resis-

tance
Out of specification → Replace the accelerator position sensor.

	Resistance **1.08–2.52 kΩ**

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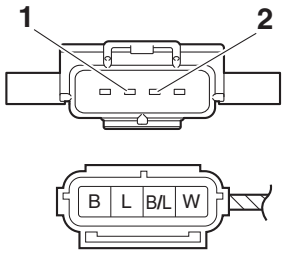
a. Connect the digital circuit tester (Ω) to the accelerator position sensor terminals as shown.

	Digital circuit tester (CD732) **90890-03243** **Model 88 Multimeter with tachometer** **YU-A1927**

• Positive tester probe → blue “1” • Negative tester probe → black/blue “2”



b. Measure the accelerator position sensor maximum resistance.

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3. Install:
   • Accelerator position sensor

TIP
When installing the accelerator position sensor, adjust its angle properly. Refer to “ADJUSTING THE ACCELERATOR POSITION SENSOR” on page 7-13.

EAS30592
CHECKING THE THROTTLE SERVO MOTOR

1. Remove:
   • Air filter case
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
2. Check:
   • Throttle valve operation
   Throttle valves do not fully close → Replace the throttle bodies.

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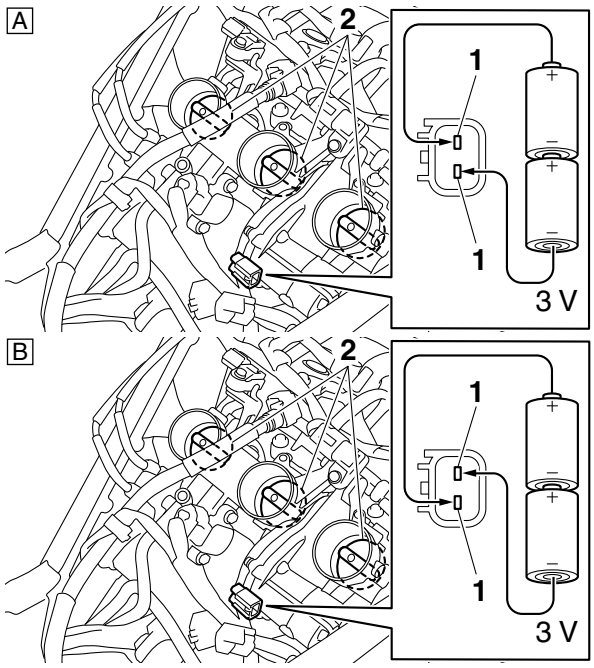
a. Connect two C-size batteries to the throttle servo motor terminals “1” as shown.

ECA17660
NOTICE
Do not use a 12 V battery to operate the throttle servo motor.

TIP
Do not use old batteries to operate the throttle servo motor.



A. Check that the throttle valves “2” open.
B. Check that the throttle valves “2” fully close.

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EAS30587
CHECKING THE AIR INDUCTION SYSTEM SOLENOID

1. Check:
   • Air induction system solenoid resistance
   Out of specification → Replace.

	Solenoid resistance **20–24 Ω**

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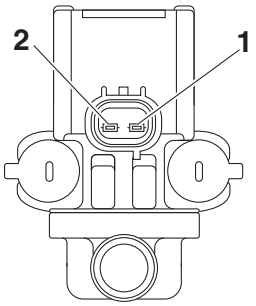
a. Remove the air induction system solenoid coupler from the air induction system solenoid.
b. Connect the digital circuit tester (Ω) to the air induction system solenoid terminal as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

- Positive tester probe → Air induction system solenoid terminal "1"
- Negative tester probe → Air induction system solenoid terminal "2"



c. Measure the air induction system solenoid resistance.

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EAS30593

CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
   - Intake air pressure sensor output voltage
     Out of specification → Replace.

Intake air pressure sensor output voltage
3.57–3.71 V at 101.3 kPa

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a. Connect the test harness S– pressure sensor (3P) "1" to the intake air pressure sensor and wire harness as shown.

ECA20920

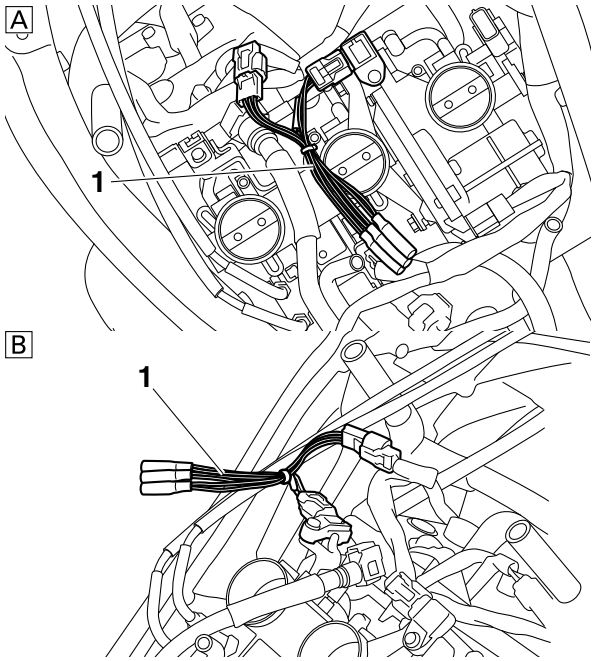
NOTICE

Pay attention to the installing direction of the test harness S– pressure sensor (3P) coupler.

b. Connect the digital circuit tester (DCV) to the test harness S– pressure sensor (3P).

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927
Test harness S– pressure sensor (3P)
90890-03207
Test harness S– pressure sensor (3P)
YU-03207

- Positive tester probe
  pink (wire harness color) (intake air pressure sensor 1)
  pink/white (wire harness color) (intake air pressure sensor 2)
- Negative tester probe
  black/blue (wire harness color)



A. Intake air pressure sensor 1
B. Intake air pressure sensor 2

c. Set the main switch to "ON".
d. Measure the intake air pressure sensor output voltage.

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EAS30594

CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
   - Intake air temperature sensor

EWA14110

⚠ WARNING

• Handle the intake air temperature sensor

with special care.
- **Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.**

2. Check:
   - Intake air temperature sensor resistance
     Out of specification → Replace.

Intake air temperature sensor resistance
5400–6600 Ω at 0 °C (5400–6600 Ω at 32 °F)
Intake air temperature sensor resistance
290–390 Ω at 80 °C (290–390 Ω at 176 °F)

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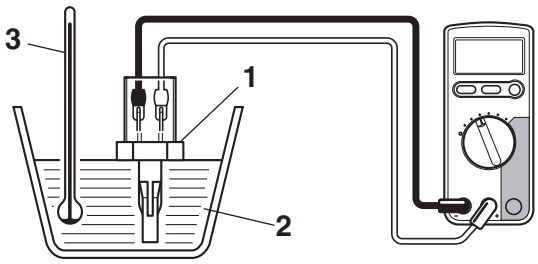
a. Connect the digital circuit tester (Ω) to the intake air temperature sensor terminal as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

b. Immerse the intake air temperature sensor "1" in a container filled with water "2".

TIP
Make sure that the intake air temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the water.



d. Slowly heat the water, then let it cool down to the specified temperature.
e. Measure the intake air temperature sensor resistance.

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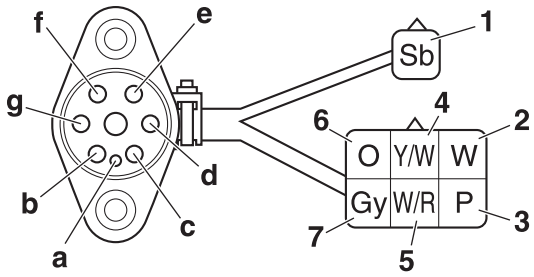
3. Install:
   - Intake air temperature sensor

EAS31088
CHECKING THE GEAR POSITION SWITCH

1. Remove:
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Gear position switch
     Refer to "CRANKCASE" on page 5-57.
2. Check:
   - Gear position switch
     Out of specification → Replace the gear position switch.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

Result
Neutral position
Continuity
Positive tester probe
sky blue “1”
Negative tester probe
Sensor terminal “a”
1st position
Continuity
Positive tester probe
white “2”
Negative tester probe
Sensor terminal “b”
2nd position
Continuity
Positive tester probe
pink “3”
Negative tester probe
Sensor terminal “c”
3rd position
Continuity
Positive tester probe
yellow/white “4”
Negative tester probe
Sensor terminal “d”
4th position
Continuity
Positive tester probe
white/red “5”
Negative tester probe
Sensor terminal “e”
5th position
Continuity
Positive tester probe
orange “6”
Negative tester probe
Sensor terminal “f”
6th position
Continuity
Positive tester probe
gray “7”
Negative tester probe
Sensor terminal “g”



EAS30681
CHECKING THE FUEL INJECTORS
The following procedure applies to all of the fuel injectors.
1. Remove:
   • Fuel injector
   Refer to “THROTTLE BODIES” on page 7-5.
2. Check:
   • Fuel injector resistance
   Out of specification → Replace the fuel injector.

Resistance
12.0 Ω

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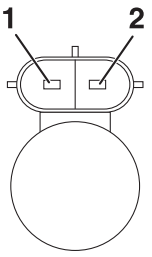
a. Disconnect the fuel injector coupler from the fuel injector.
b. Connect the digital circuit tester (Ω) to the fuel injector coupler as shown.

Digital circuit tester (CD732)
90890-03243
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe → Injector terminal “1”
• Negative tester probe → Injector terminal “2”



c. Measure the fuel injector resistance.

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TROUBLESHOOTING

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EAS20090
TROUBLESHOOTING

EAS30599
GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS30600
STARTING FAILURES

Engine

1. Cylinder(s) and cylinder head(s)
   - Loose spark plug
   - Loose cylinder head or cylinder
   - 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 cap breather hose
   - Deteriorated or contaminated fuel
   - Clogged or damaged fuel hose
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel pump relay
3. Throttle body (-ies)
   - Deteriorated or contaminated fuel
   - Sucked-in air

Electrical system

1. Battery
   - Discharged battery
   - Faulty battery
2. Fuse(s)
   - Blown, damaged or incorrect fuse
   - Improperly installed fuse
3. Spark plug(s)
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug
   - Worn or damaged electrode
   - Worn or damaged insulator
4. Ignition coil(s)
   - Cracked or broken ignition coil body
   - Broken or shorted primary or secondary coils
5. Ignition system
   - Faulty ECU
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty start/engine stop switch
   - Broken or shorted wiring
   - Faulty gear position 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

EAS30601
INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder(s) and cylinder head(s)
   - Incorrect valve clearance
   - Damaged valve train components
2. Air filter
   - Clogged air filter element

Fuel system

1. Throttle body (-ies)
   - Damaged or loose throttle body joint
   - Improperly synchronized throttle bodies
   - Improper throttle grip free play
   - Flooded throttle body
   - Faulty air induction system

Electrical system

1. Battery
   - Discharged battery
   - Faulty battery
2. Spark plug(s)
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug

- Worn or damaged electrode
- Worn or damaged insulator

3. Ignition coil(s)
   - Broken or shorted primary or secondary coils
   - Cracked or broken ignition coil
4. Ignition system
   - Faulty ECU
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key

EAS30602
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. Throttle body (-ies)
   - Faulty throttle body
2. Fuel pump
   - Faulty fuel pump

EAS30603
FAULTY GEAR SHIFTING

Shifting is difficult

Refer to “Clutch drags”.

EAS30604
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

EAS30605
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

EAS30849
FAULTY CLUTCH

Clutch slips

1. Clutch
   - Improperly assembled clutch
   - Improperly adjusted clutch cable
   - Loose or fatigued clutch spring
   - Worn friction plate
   - Worn clutch plate
2. Engine oil
   - Incorrect oil level
   - Incorrect oil viscosity (low)
   - Deteriorated oil

Clutch drags

1. Clutch
   - Unevenly tensioned clutch springs
   - Warped pressure plate
   - Bent clutch plate
   - Swollen friction plate
   - Bent clutch pull rod
   - Broken clutch boss
   - Burnt primary driven gear bushing
   - Match marks not aligned
2. Engine oil
   - Incorrect oil level
   - Incorrect oil viscosity (high)
   - Deteriorated oil

EAS30607
OVERHEATING

Engine

1. Clogged coolant passages
   - Cylinder head(s) 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

EAS30608

OVERCOOLING

Cooling system

1. Thermostat
   - Thermostat stays open

EAS30609

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

EAS30610

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

EAS30611

UNSTABLE HANDLING

Handlebar

- Bent or improperly installed handlebar

Steering head components

- Improperly installed upper bracket
- Improperly installed lower bracket (improperly tightened ring nut)
- Bent steering stem
- Damaged ball bearing or bearing race

Front fork leg(s)

- Uneven oil levels (both front fork legs)
- Unevenly tensioned fork spring (both front fork legs)
- Broken fork spring
- Bent or damaged inner tube
- Bent or damaged outer tube

Swingarm

- Worn bearing or bushing
- Bent or damaged swingarm

Rear shock absorber assembly

- 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

EAS30612

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on

- Faulty dimmer/pass switch
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Faulty headlight assembly

Tail/brake light does not come on

- Faulty brake light switch
- Too many electrical accessories

• Incorrect connection
• Faulty tail/brake light assembly

Turn signal does not come on
• Faulty turn signal switch
• Faulty turn signal/hazard relay
• Burnt-out turn signal bulb
• Incorrect connection
• Damaged or faulty wire harness
• Improperly grounded circuit
• Faulty battery
• Blown, damaged or incorrect fuse

Turn signal blinks slowly
• Faulty turn signal/hazard relay
• Faulty main switch
• Faulty turn signal switch
• Incorrect turn signal bulb

Turn signal remains lit
• Faulty turn signal/hazard relay
• Burnt-out turn signal bulb

Turn signal blinks quickly
• Incorrect turn signal bulb
• Faulty turn signal/hazard relay
• Burnt-out turn signal bulb

Horn does not sound
• Damaged or faulty horn
• Faulty main switch
• Faulty horn switch
• Faulty battery
• Blown, damaged or incorrect fuse
• Faulty wire harness

EAS30848
TROUBLESHOOTING AT THE ABS WARNING LIGHT

Refer to “BASIC PROCESS FOR TROUBLESHOOTING” on page 8-125.

EAS20116
SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

EAS31794
SELF-DIAGNOSTIC FUNCTION TABLE (FOR FUEL INJECTION SYSTEM)

TIP
For details of the fault code, refer to “TROUBLESHOOTING METHOD” on page 8-33.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0030	O_2 sensor heater (defective heater controller detected)	• Open or short circuit in wire harness. • Disconnected coupler. • Defective O_2 sensor heater controller. • Broken or disconnected lead in O_2 sensor heater.	(When the O_2 sensor does not operate because the exhaust temperature is low) Increased exhaust emissions. Fuel learning cannot be carried out.	Display only (If the O_2 sensor does not operate, O_2 feedback is not carried out.)
P0107 P0108	[P0107] Intake air pressure sensor 1 (ground short circuit detected) [P0108] Intake air pressure sensor 1 (open or power short circuit detected)	[P0107] Low voltage of the intake air pressure sensor 1 circuit (0.5 V or less) [P0108] High voltage of the intake air pressure sensor 1 circuit (4.8 V or more) • Defective coupler between intake air pressure sensor 1 and ECU. • Open or short circuit in wire harness between intake air pressure sensor 1 and ECU. • Defective intake air pressure sensor 1. • Malfunction in ECU.	Engine idling speed is unstable. Engine response is poor. Loss of engine power. Increased exhaust emissions.	Intake air pressure difference is fixed to 0 [kPa]. α–N is fixed. Fuel is not cut off due to the intake air pressure difference. Intake air pressure is fixed to 101.3 [kPa]. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.
P0112 P0113	[P0112] Intake air temperature sensor (ground short circuit detected) [P0113] Intake air temperature sensor (open or power short circuit detected)	[P0112] Low voltage of the intake air temperature sensor circuit (0.1 V or less) [P0113] High voltage of the intake air temperature sensor circuit (4.8 V or more) • Defective coupler between intake air temperature sensor and ECU. • Open or short circuit in wire harness between intake air temperature sensor and ECU. • Improperly installed intake air temperature sensor. • Defective intake air temperature sensor. • Malfunction in ECU.	Engine is difficult to start. Increased exhaust emissions. Engine idling speed is unstable.	The intake air temperature is fixed to 20 [°C]. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0117 P0118	[P0117] Coolant temperature sensor (ground short circuit detected) [P0118] Coolant temperature sensor (open or power short circuit detected)	[P0117] Low voltage of the coolant temperature sensor circuit (0.1 V or less) [P0118] High voltage of the coolant temperature sensor circuit (4.9 V or more) • Defective coupler between coolant temperature sensor and ECU. • Open or short circuit in wire harness between coolant temperature sensor and ECU. • Improperly installed coolant temperature sensor. • Defective coolant temperature sensor. • Malfunction in ECU.	Engine is difficult to start. Increased exhaust emissions. Engine idling speed is unstable.	The radiator fan motor relay is on only when the vehicle is traveling at low speeds. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out. The coolant temperature is fixed to 60 [°C].
P0122 P0123 P0222 P0223 P2135	[P0122] Throttle position sensor (ground short circuit detected) [P0123] Throttle position sensor (open or power short circuit detected) [P0222] Throttle position sensor (ground short circuit detected) [P0223] Throttle position sensor (open or power short circuit detected) [P2135] Throttle position sensor (output voltage deviation error)	[P0122, P0222] Low voltage of the throttle position sensor circuit (0.25 V or less) [P0123, P0223] High voltage of the throttle position sensor circuit (4.75 V or more) [P2135] Difference in output voltage 1 and output voltage 2 of the throttle position sensor • Defective coupler between throttle position sensor and ECU. • Open or short circuit in wire harness between throttle position sensor and ECU. • Improperly installed throttle position sensor. • Defective throttle position sensor. • Malfunction in ECU.	Engine idling speed is high. Engine idling speed is unstable. Engine response is poor. Loss of engine power. Deceleration is poor. Increased exhaust emissions. Vehicle cannot be driven.	Change in the throttle opening is 0 (transient control is not carried out). D–j is fixed. Throttle opening is fixed to 125[°]. Estimated atmospheric pressure is fixed to 101.3 [kPa]. O_2 feedback is not carried out. Fuel is not cut off due to the throttle opening. Output is restricted. Air induction system solenoid is turned on all the time (air induction system air cut off). ISC feedback is not carried out. ISC learning is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0132	O_2 sensor (short circuit detected (power short circuit))	[P0132] High voltage of the O_2 sensor circuit (4.8 V or more) • Improperly installed O_2 sensor. • Defective coupler between O_2 sensor and ECU. • Open or short circuit in wire harness between O_2 sensor and ECU. • Incorrect fuel pressure. • Defective O_2 sensor. • Malfunction in ECU.	Increased exhaust emissions.	O_2 feedback is not carried out. O_2 feedback learning is not carried out. Air induction system solenoid is turned on all the time (air induction system air cut off).
P0201 P0202 P0203	[P0201] Fuel injector #1 (malfunction in fuel injector #1) [P0202] Fuel injector #2 (malfunction in fuel injector #2) [P0203] Fuel injector #3 (malfunction in fuel injector #3)	• Defective coupler between injector and ECU. • Open or short circuit in wire harness between injector and ECU. • Defective injector. • Malfunction in ECU. • Improperly installed injector.	Loss of engine power. Engine is difficult to start. Engine cannot be started. Engine stops. Engine idling speed is unstable. Increased exhaust emissions.	O_2 feedback is not carried out. Air induction system solenoid is turned on all the time (air induction system air cut off). ISC feedback is not carried out. ISC learning is not carried out.
P0335	Crankshaft position sensor (no normal signals are received from the crankshaft position sensor)	• Defective coupler between crankshaft position sensor and ECU. • Open or short circuit in wire harness between crankshaft position sensor and ECU. • Improperly installed crankshaft position sensor. • Malfunction in generator rotor. • Defective crankshaft position sensor. • Malfunction in ECU.	Engine cannot be started.	Does not operate. ISC feedback is not carried out. ISC learning is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0351 P0352 P0353	[P0351] Cylinder-#1 ignition coil (open or short circuit detected in the primary lead of the cylinder-#1 ignition coil.) [P0352] Cylinder-#2 ignition coil (open or short circuit detected in the primary lead of the cylinder-#2 ignition coil.) [P0353] Cylinder-#3 ignition coil (open or short circuit detected in the primary lead of the cylinder-#3 ignition coil.)	• Defective coupler between ignition coil and ECU. • Open or short circuit in wire harness between ignition coil and ECU. • Improperly installed ignition coil. • Defective ignition coil. • Malfunction in ECU.	Engine stops. Loss of engine power. Engine is difficult to start. Engine cannot be started. Engine idling speed is unstable. Increased exhaust emissions.	Injection to the applicable cylinder group is cut off. Air induction system solenoid is turned on all the time (air induction system air cut off). O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.
P0500 P1500	[P0500, P1500] Rear wheel sensor (no normal signals are received from the rear wheel sensor) [P1500] Neutral switch (open or short circuit is detected) [P1500] Clutch switch (open or short circuit is detected)	• Open or short circuit in wire harness between rear wheel sensor and ABS unit. • Open or short circuit in wire harness between ABS unit and ECU. • Open or short circuit in wire harness between neutral switch and ECU. • Open or short circuit in wire harness between clutch switch and ECU. • Defective rear wheel sensor. • Defective neutral switch. • Defective clutch switch. • Improper adjustment of clutch lever. • Malfunction in ECU.	Vehicle speed is not displayed on the meter. Engine stalls when the vehicle is decelerating to a stop. Engine idling speed is high. Indication of the neutral indicator light is incorrect. Engine cannot be restarted when the transmission is in gear even with the clutch lever squeezed. Engine idling speed is unstable. Increased exhaust emissions. Traction control does not work.	Vehicle speed displayed on the meter = 0 [km/h] O_2 feedback is not carried out. Fuel cut-off control when the rear wheel sensor or neutral switch malfunctions is carried out. ISC feedback is not carried out. ISC learning is not carried out. Traction control does not work. Cruise control system cannot be operated.
P0560	Charging voltage is abnormal.	• Battery overcharging (defective rectifier/regulator). • Battery overcharging (broken or disconnected lead in rectifier/regulator wire harness). • Battery over-discharging (broken or disconnected lead in charging system). • Battery over-discharging (defective rectifier/regulator).	Engine is difficult to start. Increased exhaust emissions. Battery performance has deteriorated or battery is defective.	O_2 feedback is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0601	Internal malfunction in ECU (ROM data error) (When this malfunction is detected in the ECU, the fault code number might not appear on the tool display.)	• Malfunction in ECU.	Engine cannot be started.	Engine cannot be started.
P0606	Internal malfunction in ECU (processor error) (When this malfunction is detected in the ECU, the fault code number might not appear on the tool display.)	• Malfunction in ECU.	Engine cannot be started. Engine response is poor. Loss of engine power.	Engine cannot be started. Ignition and injection are not carried out. Judgment for other fault codes is not carried out. Load control is not carried out. (The relay unit, headlight relay, and other relays are all turned off.) The CO adjustment mode and diagnostic mode cannot be activated. Output is restricted.
P062F	EEPROM fault code number (an error is detected while reading or writing on EEPROM)	• CO adjustment value is not properly written. • ISC learning value is not properly written. • OBD memory value is not properly written. • Malfunction in ECU.	Increased exhaust emissions. Engine cannot be started or is difficult to start. Engine idling speed is unstable. OBD memory value is not correct.	CO adjustment value for the faulty cylinder = 0 (default value) ISC learning values = Default values OBD memory value is initialized. Initialization of O_2 feedback learning value.
P0638	YCC-T drive system: malfunction detected.	• Defective coupler between throttle servo motor and ECU. • Open or short circuit in wire harness between throttle servo motor and ECU. • Defective throttle servo motor. • Throttle servo motor is stuck (mechanism or motor). • Malfunction in ECU. • Blown electric throttle valve fuse.	Engine response is poor. Loss of engine power. Engine idling speed is unstable.	O_2 feedback is not carried out. YCC-T evacuation is activated. Output is restricted. ISC feedback is not carried out. ISC learning is not carried out.
P0657	Fuel system voltage (incorrect voltage supplied to the fuel injector, fuel pump and relay unit)	• Open or short circuit in wire harness between relay unit and ECU. • Open circuit in wire harness between battery and ECU. • Defective relay unit. • Malfunction in ECU.	Engine is difficult to start. Increased exhaust emissions.	Monitor voltage = 12 [V] O_2 feedback is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P1004	Intake air pressure sensor 1 or intake air pressure sensor 2: when the main switch is turned to "ON", the intake air pressure sensor 1 voltage and intake air pressure sensor 2 voltage differ greatly.	• Malfunction in ECU. • Hose of intake air pressure sensor 1 or intake air pressure sensor 2 is detached, clogged, twisted or bent. • Intake air pressure sensor 1 or intake air pressure sensor 2 is defective.	Engine is difficult to start. Engine idling speed is unstable. Increased exhaust emissions. Loss of engine power.	Intake air pressure is fixed to 101.3 [kPa]. Intake air pressure difference is fixed to 0 [kPa]. Atmospheric pressure is fixed to 101.3 [kPa]. α–N is fixed. Fuel is not cut off due to the intake air pressure difference. Corrected output value of atmospheric pressure sensor is fixed to 0. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.
P1400	Air induction system solenoid (open or short circuit detected)	• Open or short circuit in wire harness. • Disconnected coupler. • Defective air induction system solenoid. • Defective air induction system solenoid controller. (malfunction in ECU)	Increased exhaust emissions.	Electric current in air induction system solenoid is prohibited (air induction system air in). O_2 feedback is not carried out.
P1601	Sidestand switch (open or short circuit of the black/red lead of the ECU is detected)	• Defective coupler between relay unit and ECU. • Open or short circuit in wire harness between relay unit and relay unit. • Defective coupler between sidestand switch and relay unit. • Open or short circuit in wire harness between sidestand switch and relay unit. • Defective sidestand switch. • Malfunction in ECU.	Engine cannot be started.	Engine is forcefully stopped (the injector output is stopped).

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P1602	Malfunction in ECU internal circuit (malfunction of ECU power cut-off function)	• Open or short circuit in wire harness between ECU and battery. • Open or short circuit in wire harness between ECU and main switch. • Blown backup fuse. • Malfunction in ECU.	Engine idling speed is unstable. Engine idling speed is high. Increased exhaust emissions. Engine is difficult to start.	O_2 feedback learning is not carried out. O_2 feedback learning value is not written.
P1604 P1605	[P1604] Lean angle sensor (ground short circuit detected) [P1605] Lean angle sensor (open or power short circuit detected)	[P1604] Low voltage of the lean angle sensor circuit (0.2 V or less) [P1605] High voltage of the lean angle sensor circuit (4.8 V or more) • Open or short circuit in wire harness between lean angle sensor and ECU. • Defective lean angle sensor. • Malfunction in ECU.	Engine cannot be started.	Engine cannot be started.
P1606 P1607	[P1606] Intake air pressure sensor 2 (ground short circuit detected) [P1607] Intake air pressure sensor 2 (open or power short circuit detected)	[P1606] Low voltage of the intake air pressure sensor 2 circuit (0.5 V or less) [P1607] High voltage of the intake air pressure sensor 2 circuit (4.8 V or more) • Defective coupler between intake air pressure sensor 2 and ECU. • Open or short circuit in wire harness between intake air pressure sensor 2 and ECU. • Improperly installed intake air pressure sensor 2. • Defective intake air pressure sensor 2. • Malfunction in ECU.	Engine is difficult to start. Increased exhaust emissions. Power on high ground is insufficient. Engine idling speed is unstable.	α–N is fixed. Intake air pressure difference is fixed to 0 [kPa]. Atmospheric pressure is fixed to 101.3 [kPa]. Corrected output value of atmospheric pressure sensor is fixed to 0. Fuel is not cut off due to the intake air pressure difference. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P2122 P2123 P2127 P2128 P2138	[P2122] Accelerator position sensor (open or ground short circuit detected) [P2123] Accelerator position sensor (power short circuit detected) [P2127] Accelerator position sensor (ground short circuit detected) [P2128] Accelerator position sensor (open or power short circuit detected) [P2138] Accelerator position sensor (output voltage deviation error)	[P2122, P2127] Low voltage of the accelerator position sensor circuit (0.25 V or less) [P2123, P2128] High voltage of the accelerator position sensor circuit (4.75 V or more) [P2138] Difference in output voltage 1 and output voltage 2 of the accelerator position sensor. • Defective coupler between accelerator position sensor and ECU. • Open or short circuit in wire harness between accelerator position sensor and ECU. • Improperly installed accelerator position sensor. • Defective accelerator position sensor. • Malfunction in ECU.	Engine response is poor. Loss of engine power. Engine idling speed is unstable.	No change in accelerator opening. (transientcontrol is not carried out). Accelerator opening is fixed to 0[°]. O_2 feedback is not carried out. YCC-T evacuation is activated. Fuel cut is prohibited by accelerator opening. Output is restricted. ISC feedback is not carried out. ISC learning is not carried out.
P2158	Front wheel sensor (no normal signals are received from the front wheel sensor)	• Open or short circuit in wire harness between front wheel sensor and ECU. • Defective front wheel sensor. • Malfunction in ECU.	Traction control does not work. Traction control system indicator on the meter comes on. Traction control system switch is disabled. (Traction control system indicator on the meter goes OFF.)	Traction control does not work.
P2195	O_2 sensor (open circuit detected)	• Signal voltage is 0.25–0.53 V. • Improperly installed O_2 sensor. • Defective coupler between O_2 sensor and ECU. • Open or short circuit in wire harness between O_2 sensor and ECU. • Defective O_2 sensor. • Malfunction in ECU.	Increased exhaust emissions.	O_2 feedback is not carried out. O_2 feedback learning is not carried out. Air induction system solenoid is turned on all the time (air induction system air cut off).

EAS31795
SELF-DIAGNOSTIC FUNCTION TABLE (FOR IMMOBILIZER SYSTEM)

TIP

For details of the fault code, refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-114.

Fault code No.	Item
51	Immobilizer unit: Code cannot be transmitted between the key and the immobilizer unit.
52	Immobilizer unit: Codes between the key and immobilizer unit do not match.
53	Immobilizer unit: Codes cannot be transmitted between the ECU and the immobilizer unit.
54	Immobilizer unit: Codes transmitted between the ECU and the immobilizer unit do not match.
55	Immobilizer unit: Key code registration malfunction.
56	ECU: Unidentified code is received.

EAS31119
COMMUNICATION ERROR WITH THE METER

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
U0155 (Yamaha diagnostic tool) Err (multi-function meter display)	CAN communication error (with the meter)	Communication between the ECU and the meter is not possible • Defective meter coupler and ECU coupler • Open or short circuit in the wire harness between the meter and the ECU • Defective meter • Defective ECU	Defective meter display. Traction control does not work.	Grip warmer output: OFF is fixed. MAP changeover: State is fixed. Traction control does not work. Meter switch input: OFF is fixed.

EAS31120
DIAGNOSTIC CODE: SENSOR OPERATION TABLE

Diagnostic code No.	Item	Tool display	Procedure
01	Throttle position sensor signal 1		
	• Fully closed position	11–21	Check with throttle valves fully closed.
	• Fully open position	96–106	Check with throttle valves fully open.
03	Intake air pressure 1	Displays the intake air pressure.	Operate the throttle while pushing the “(≋)” side of the start/engine stop switch. (If the display value changes, the performance is OK.)
04	Intake air pressure 2	Displays the intake air pressure.	Operate the throttle while pushing the “(≋)” side of the start/engine stop switch. (If the display value changes, the performance is OK.)

Diagnostic code No.	Item	Tool display	Procedure
05	Air temperature	Displays the air temperature.	Compare the actually measured air temperature with the tool display value.
06	Coolant temperature	When engine is cold: Displays temperature closer to air temperature. When engine is hot: Displays current coolant temperature.	Compare the actually measured coolant temperature with the tool display value.
07	Rear wheel vehicle speed pulses	Rear wheel speed pulse 0–999	Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
08	Lean angle sensor • Upright • Overturned	Lean angle sensor output voltage 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)	Fuel system voltage Approximately 12.0	Set the start/engine stop switch to "○", and then compare the actually measured battery voltage with the tool display value. (If the actually measured battery voltage is low, recharge the battery.)
13	Throttle position sensor signal 2 • Fully closed position • Fully open position	 9–23 94–108	 Check with throttle valves fully closed. Check with throttle valves fully open.
14	Accelerator position sensor signal 1 • Fully closed position • Fully open position	 12–22 97–107	 Check with throttle grip fully closed position. Check with throttle grip fully open position.
15	Accelerator position sensor signal 2 • Fully closed position • Fully open position	 10–24 95–109	 Check with throttle grip fully closed position. Check with throttle grip fully open position.
16	Front wheel vehicle speed pulses	Front wheel speed pulse 0–999	Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.

Diagnostic code No.	Item	Tool display	Procedure
20	Sidestand switch • Stand retracted • Stand extended	 ON OFF	Extend and retract the sidestand (with the transmission in gear).
21	gear position switch and clutch switch • Transmission is in neutral • Transmission is in gear or the clutch lever released • Clutch lever is squeezed with the transmission in gear and when the sidestand is retracted • Clutch lever is squeezed with the transmission in gear and when the sidestand is extended	 ON OFF ON OFF	Operate the transmission, clutch lever, and sidestand.
60	EEPROM fault code display • No history • History exists Display the EEPROM writing error for fault code No. P062F. If more than one item is defective, the displays alternates every two seconds to show all the detected numbers.	 00 • No malfunctions detected (If the self-diagnosis fault code P062F is indicated, the ECU is defective.) 01–03 (Cylinder adjustment value) • (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.) 11 (Data error for ISC (idle speed control) learning values) 12 (O_2 feedback learning value) 13 (OBD memory value)	—
67	ISC (idle speed control) learning condition display ISC (idle speed control) learning data erasure	00 ISC (idle speed control) learning data has been erased. 01 It is not necessary to erase the ISC (idle speed control) learning data. 02 It is necessary to erase the ISC (idle speed control) learning data.	To erase the ISC (idle speed control) learning data, set the start/engine stop switch from "⊠" to "⊂" 3 times in 5 seconds.
70	Control number	0–254 [-]	—

Diagnostic code No.	Item	Tool display	Procedure
86*	Shift switch • Shift pedal up position • Other position than the shift pedal up position	 ON OFF	Check the switch condition by operating the shift pedal.
87	O_2 feedback learning data erasure	00 O_2 feedback learning data has been erased. 01 O_2 feedback learning data has not been erased.	To erase the O_2 feedback learning data, set the start/engine stop switch from "⊠" to "○" 3 times in 5 seconds.

* Diagnostic code No. 86 is the diagnostic code number for the optional shift switch.

EAS31121
DIAGNOSTIC CODE: ACTUATOR OPERATION TABLE

Diagnostic code No.	Item	Actuation	Procedure
30	Cylinder-#1 ignition coil	Actuates the cylinder-#1 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.	Check that a spark is generated five times. • Connect an ignition checker.
31	Cylinder-#2 ignition coil	Actuates the cylinder-#2 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.	Check that a spark is generated five times. • Connect an ignition checker.
32	Cylinder-#3 ignition coil	Actuates the cylinder-#3 ignition coil five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.	Check that a spark is generated five times. • Connect an ignition checker.
36	Injector #1	Actuates the injector #1 five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen come on each time the injector is actuated.	Disconnect the fuel pump coupler. Check that injector #1 is actuated five times by listening for the operating sound.
37	Injector #2	Actuates the injector #2 five times at one-second intervals. The "check" indicator on the Yamaha diagnostic tool screen come on each time the injector is actuated.	Disconnect the fuel pump coupler. Check that injector #2 is actuated five times by listening for the operating sound.

Diagnostic code No.	Item	Actuation	Procedure
38	Injector #3	Actuates the injector #3 five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the injector is actuated.	Disconnect the fuel pump coupler. Check that injector #3 is actuated five times by listening for the operating sound.
48	Air induction system solenoid	Actuates the air induction system solenoid five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the air induction system solenoid is actuated.	Check that the air induction system solenoid is actuated five times by listening for the operating sound.
50	Relay unit	Actuates the relay unit five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the relay is actuated.	Check that the relay unit is actuated five times by listening for the operating sound.
51	Radiator fan motor relay	Actuates the radiator fan motor relay five times at five-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the relay is actuated.	Check that the radiator fan motor relay is actuated five times by listening for the operating sound.
52	Headlight relay	Actuates the headlight relay five times at five-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the relay is actuated.	Check that the headlight relay is actuated five times by listening for the operating sound.

EAS20164
EVENT CODE TABLE

No.	Item	Symptom	Possible causes	Note
192	Intake air pressure sensor 1	Brief abnormality detected in the intake air pressure sensor 1	Same as for fault code number P0107 and P0108	Perform the checks and maintenance jobs for fault code number P0107 and P0108.
193	Throttle position sensor	Brief abnormality detected in the throttle position sensor	Same as for fault code number P0122, P0123, P0222, P0223 and P2135	Perform the checks and maintenance jobs for fault code number P0122, P0123, P0222, P0223 and P2135
195	Sidestand switch	Brief abnormality detected in the ECU (black/red lead) input line	Same as for fault code number P1601	Perform the checks and maintenance jobs for fault code number P1601.
196	Coolant temperature sensor	Brief abnormality detected a in the coolant temperature sensor	Same as for fault code number P0117 and P0118	Perform the checks and maintenance jobs for fault code number P0117 and P0118.
197	Intake air temperature sensor	Brief abnormality detected in the intake air temperature sensor	Same as for fault code number P0112 and P0113	Perform the checks and maintenance jobs for fault code number P0112 and P0113.
199	Intake air pressure sensor 2	Brief abnormality detected in the intake air pressure sensor 2	Same as for fault code number P1606 and P1607	Perform the checks and maintenance jobs for fault code number P1606 and P1607.
203	Lean angle sensor	Brief abnormality detected in the lean angle sensor	Same as for fault code number P1604 and P1605	Perform the checks and maintenance jobs for fault code number P1604 and P1605.
207	Accelerator position sensor	Brief abnormality detected in the accelerator position sensor	Same as for fault code number P2122, P2123, P2127, P2128 and P2138	Perform the checks and maintenance jobs for fault code number P2122, P2123, P2127, P2128 and P2138.
240	O_2 sensor (Stuck at the upper limit for adjustment)	During O_2 feedback, the adjustment is maintained at the upper limit	• Open or short circuit in the wire harness between the sensor and ECU • Drop in fuel pressure • Clogged fuel injector • Fault in sensor • Malfunction in ECU • Malfunction in the fuel injection system	• If a fault code is occurring, respond to that first. * Rarely, Code 240 occurs even when the system is functioning properly.
241	O_2 sensor (Stuck at the lower limit for adjustment)	During O_2 feedback, the adjustment is maintained at the lower limit	• Open or short circuit in the wire harness between the sensor and ECU • Drop in fuel pressure • Clogged fuel injector • Fault in sensor • Malfunction in ECU • Malfunction in the fuel injection system	• If a fault code is occurring, respond to that first. * Rarely, Code 241 occurs even when the system is functioning properly.

No.	Item	Symptom	Possible causes	Note
242	ISC (Stuck at the upper limit for adjustment)	During idling, the adjustment is maintained at the upper limit	Idling engine speed is slow • Clogged throttle body • Poorly adjusted throttle cable • Poorly adjusted clutch cable • Malfunction in the fuel injection system • Dirty or worn spark plug • Malfunction in the battery • Malfunction in ECU	• Implement diagnosis mode (diagnostic code number 67), and check the ISC maintenance request. • If a fault code is occurring, respond to that first. * Rarely, Code 242 occurs even when the system is functioning properly.
243	ISC (Stuck at the lower limit for adjustment)	During idling, the adjustment is maintained at the lower limit	Idling engine speed is fast • Poorly adjusted throttle cable • Poorly adjusted clutch cable • Malfunction in the fuel injection system • Dirty or worn spark plug • Malfunction in the battery • Malfunction in ECU	• If a fault code is occurring, respond to that first. * Rarely, Code 243 occurs even when the system is functioning properly.
244	Poor starting/inability to start	Poor starting/inability to start detected	• No gasoline • Malfunction in the fuel injection system • Dirty or worn spark plug • Malfunction in the battery • Malfunction in ECU	• If a fault code is occurring, respond to that first. * Rarely, Code 244 occurs even when the system is functioning properly.
245	Engine stop	Engine stop detected	• No gasoline • Poorly adjusted throttle cable • Poorly adjusted clutch cable • Malfunction in the fuel injection system • Dirty or worn spark plug • Malfunction in the battery • Malfunction in ECU	• If a fault code is occurring, respond to that first. * Rarely, Code 245 occurs even when the system is functioning properly.

EAS32023
TROUBLESHOOTING DETAILS (EVENT CODE)
Event code No. 30

Event code No.	**30**
Item	**Latch up detected.**
Fail-safe system	Unable to start engine
	Unable to drive vehicle
Diagnostic code No.	08
Tool display	Lean angle sensor output voltage • 0.4–1.4 (upright) • 3.7–4.4 (overturned)
Procedure	Remove the lean angle sensor and incline it more than 65 degrees.

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	The vehicle has overturned.	Raise the vehicle upright.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Engine trouble warning light does not come on → Service is finished. Engine trouble warning light comes on → Go to item 2.
2	Installed condition of lean angle sensor.	Check the installed direction and condition of the sensor.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Engine trouble warning light does not come on → Service is finished. Engine trouble warning light comes on → Go to item 3.
3	Defective lean angle sensor.	Execute the diagnostic mode. (Code No. 08) Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-165.	Turn the main switch to “ON”, then to “OFF”, and then back to “ON”. Engine trouble warning light does not come on → Service is finished. Engine trouble warning light comes on → Go to item 4.
4	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.

Event code No. 70

TIP

If another error code is displayed at the same time, check the other error code first and repair it.

Event code No.		**70**	
Item		**Engine forcibly stops when the vehicle is left idling for a long period of time.**	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
1	Allow to idle for a long period of time.	Turn the main switch to “OFF”.	Check whether it is possible to start the engine. Able to start the engine → Service is finished. Unable to start the engine → Go to item 2.
2	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (Engine Control Unit)” on page 8-157.	Service is finished.

EAS20091

WIRING DIAGRAM

MT09TRA/MT09TRAH 2017

1. AC magneto
2. Rectifier/regulator
3. Main switch
4. Main fuse
5. ABS motor fuse
6. ABS solenoid fuse
7. Electronic throttle valve fuse
8. Backup fuse
9. Radiator fan motor fuse
10. Auxiliary fuse 2
11. Ignition fuse
12. ABS control unit fuse
13. Signaling system fuse
14. Auxiliary fuse 1
15. Battery
16. Engine ground
17. Fuel injection system fuse
18. Starter relay
19. Starter motor
20. Joint connector
21. Joint coupler
22. Relay unit
23. Starting circuit cut-off relay
24. Fuel pump relay
25. Sidestand switch
26. Immobilizer unit
27. Shift switch (OPTION)
28. ECU (Engine Control Unit)
29. Ignition coil #1
30. Ignition coil #2
31. Ignition coil #3
32. Spark plug
33. Injector #1
34. Injector #2
35. Injector #3
36. Grip warmer (left) (OPTION)
37. Grip warmer (right) (OPTION)
38. Air induction system solenoid
39. O_2 sensor
40. Crankshaft position sensor
41. Intake air temperature sensor
42. Coolant temperature sensor
43. Intake air pressure sensor 1
44. Intake air pressure sensor 2
45. Lean angle sensor
46. Front wheel sensor
47. Rear wheel sensor
48. ABS ECU (electronic control unit)
49. Throttle servo motor
50. Accelerator position sensor
51. Throttle position sensor
52. Yamaha diagnostic tool coupler
53. Meter assembly
54. Immobilizer system indicator light
55. Neutral indicator light
56. Meter light
57. Tachometer
58. Multi-function meter
59. Oil level warning light
60. Engine trouble warning light
61. Traction control system indicator light
62. High beam indicator light
63. Turn signal indicator light (left)
64. Turn signal indicator light (right)
65. ABS warning light
66. Oil level switch
67. Gear position switch
68. Fuel sender
69. Fuel pump
70. Handlebar switch (right)
71. Drive mode switch
72. Start/engine stop switch
73. Hazard switch
74. Front brake light switch
75. Rear brake light switch
76. Turn signal/hazard relay
77. Handlebar switch (left)
78. Clutch switch
79. Select switch
80. Menu switch
81. Horn switch
82. Horn
83. Turn signal switch
84. Dimmer/pass switch
85. Rear turn signal light (right)
86. Rear turn signal light (left)
87. Front turn signal light (right)
88. Front turn signal light (left)
89. Headlight control unit
90. Headlight (high beam)
91. Headlight (low beam)
92. Auxiliary light (right)
93. Auxiliary light (left)
94. License plate light
95. Tail/brake light
96. Radiator fan motor relay
97. Radiator fan motor
98. Parking lighting fuse
99. Auxiliary DC jack fuse 1
100. Auxiliary DC jack fuse 2
101. Headlight fuse
102. Auxiliary DC connector 1
103. Auxiliary DC connector 2
104. Auxiliary DC jack
105. Auxiliary DC jack (OPTION)

A. Wire harness
B. Sub-wire harness (Injector #2)
C. Sub-wire harness (Coolant temperature sensor)
D. Negative battery sub-wire harness

EAS30613

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
V	Violet
W	White
Y	Yellow
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/B	Brown/Black
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
Br/Y	Brown/Yellow
G/B	Green/Black
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
Gy/R	Gray/Red
L/B	Blue/Black
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
Lg/L	Light green/Blue
Lg/W	Light green/White
O/G	Orange/Green
P/B	Pink/Black
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
Sb/W	Sky blue/White
W/G	White/Green
W/L	White/Blue
W/R	White/Red
W/Y	White/Yellow
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red
Y/W	Yellow/White

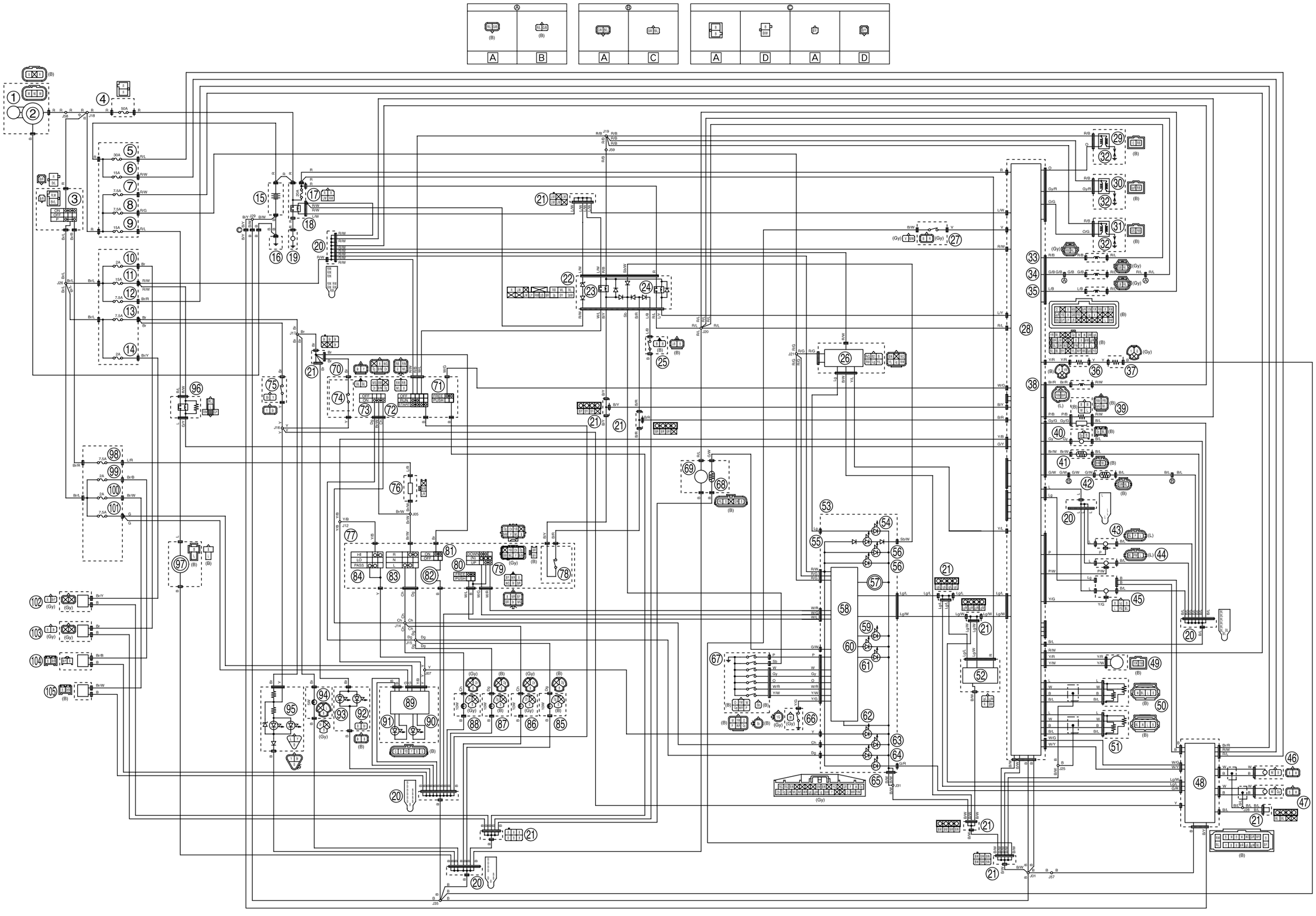
MT09TRA/MT09TRAH 2017
WIRING DIAGRAM

MT09TRA/MT09TRAH 2017
SCHÉMA DE CÂBLAGE

MT09TRA/MT09TRAH 2017
SCHALTPLAN

MT09TRA/MT09TRAH 2017
SCHEMA ELETTRICO

MT09TRA/MT09TRAH 2017
DIAGRAMA ELÉCTRICO



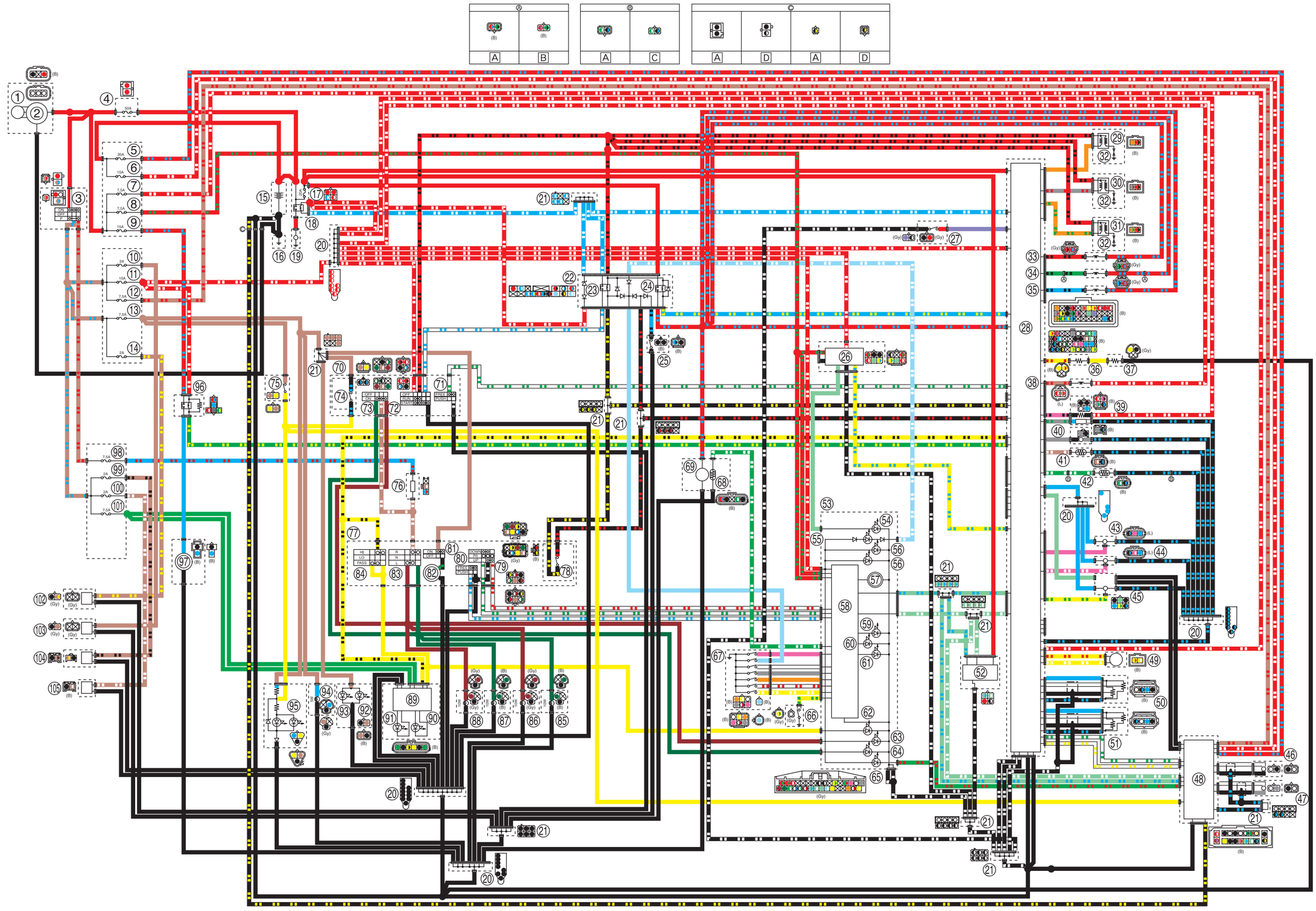
MT09TRA/MT09TRAH 2017
WIRING DIAGRAM

MT09TRA/MT09TRAH 2017
SCHÉMA DE CÂBLAGE

MT09TRA/MT09TRAH 2017
SCHALTPLAN

MT09TRA/MT09TRAH 2017
SCHEMA ELETTRICO

MT09TRA/MT09TRAH 2017
DIAGRAMA ELÉCTRICO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