YAMAHA 2016

SERVICE MANUAL

MTM690
MTM690-U

XSR

B34-F8197-E0

EAS20002

MTM690/MTM690-U
SERVICE MANUAL

First edition, November 2015

EAS20003
IMPORTANT

This manual was produced by MBK Industrie. 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. and MBK Industrie are 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.**

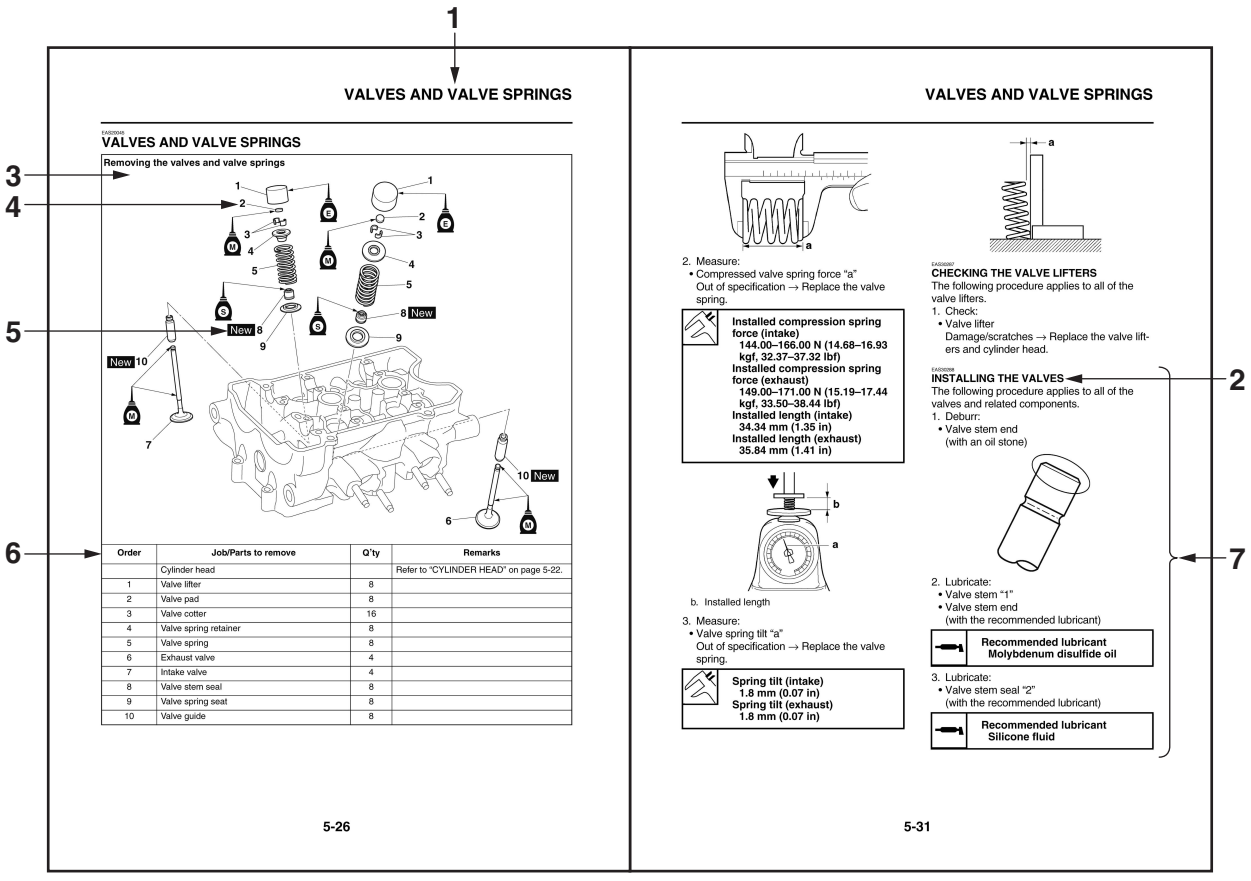
TIP	A TIP provides key information to make procedures easier or clearer.

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.

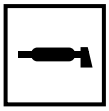


EAS20005
SYMBOLS

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		

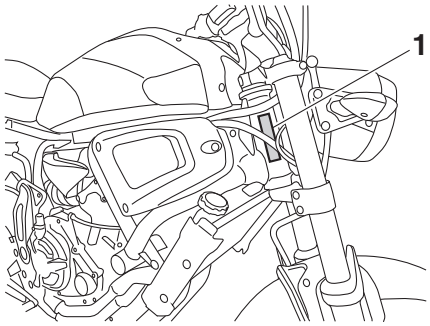
EAS10003

TABLE OF CONTENTS

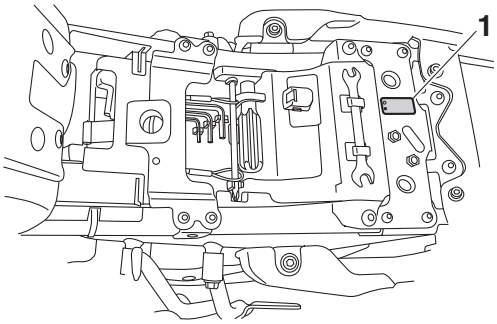
GENERAL INFORMATION

EAS20007
IDENTIFICATION

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

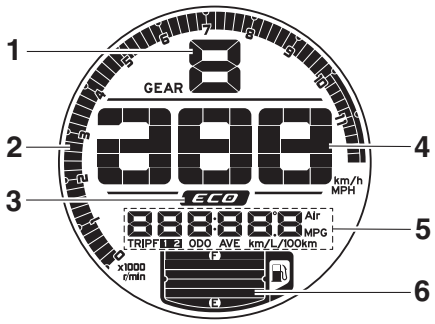


EAS30003
MODEL LABEL
The model label “1” is affixed to the frame under the seat. This information will be needed to order spare parts.

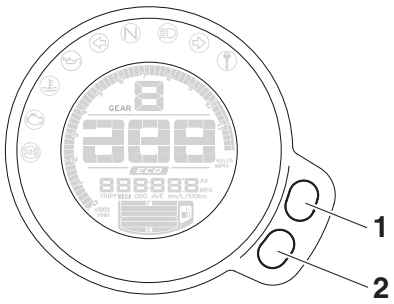


EAS20008
FEATURES

EAS30982
MULTI-FUNCTION METER UNIT



1. Transmission gear display
2. Tachometer
3. Eco indicator “ECO”
4. Speedometer
5. Multi-function display
6. Fuel meter



1. Top set button
2. Bottom set button

EWA17650
⚠ WARNING

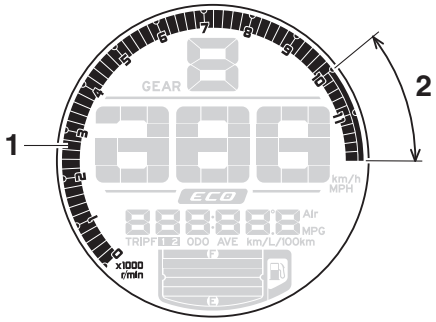
Be sure to stop the vehicle before making any setting changes to the multi-function meter unit. Changing settings while riding can distract the operator and increase the risk of an accident.

The multi-function meter unit is equipped with the following:
- a speedometer
- a tachometer
- a fuel meter
- an eco indicator
- a transmission gear display
- a multi-function display

TIP
- Except when switching to the brightness control mode or to display the clock, turn the key to “ON” before using the bottom and top set buttons.
- For the UK: To switch the speedometer and multi-function display between kilometers and miles, set the multi-function display to the odometer mode or a tripmeter mode, and then press the bottom set button for three seconds.

Speedometer
The speedometer shows the vehicle’s traveling speed.

Tachometer



1. Tachometer
2. Tachometer red zone

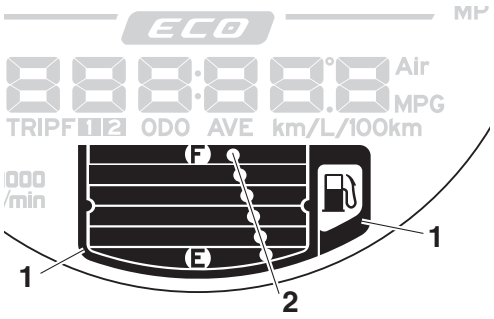
The tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

ECA19660
NOTICE

Do not operate the engine in the tachometer red zone.

	Red zone **10000 r/min and above**

Fuel meter



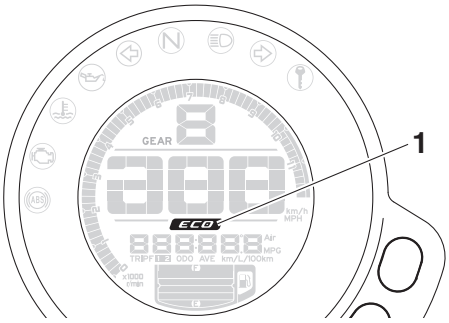
1. Frame
2. Fuel meter

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

TIP

This fuel meter is equipped with a self-diagnosis system. If a problem is detected in the fuel tank electrical circuit, the fuel level segments, frame, and "⛽" flash repeatedly. If this occurs, check the electrical circuit. Refer to "SIGNALING SYSTEM" on page 8-21.

Eco indicator



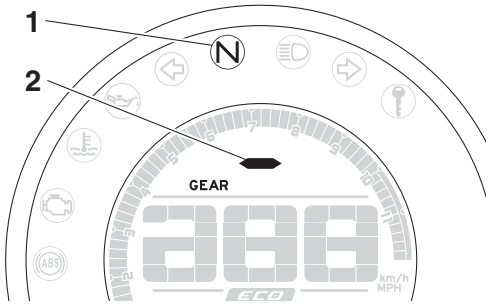
1. Eco indicator "ECO"

This 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.

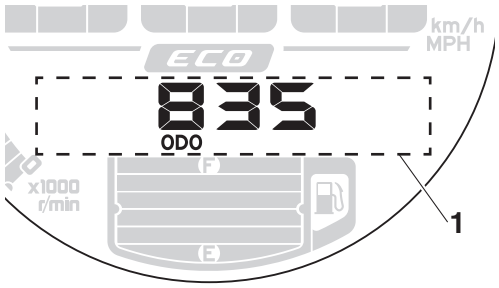
Transmission gear display



1. Neutral indicator light "**N**"
2. Transmission gear display

This display shows the selected gear. The neutral position is indicated by "–" and by the neutral indicator light.

Multi-function display



1. Multi-function display

The multi-function display is equipped with the following:
- an odometer
- two tripmeters
- a fuel reserve tripmeter
- an instantaneous fuel consumption display
- an average fuel consumption display
- a coolant temperature display
- an air temperature display
- a clock
- a brightness control mode

The odometer shows the total distance the vehicle has traveled.
The tripmeters show the distance traveled since they were last reset.

TIP

- The odometer will lock at 999999 and cannot be reset.
- The tripmeter will reset to 0 and continue counting after 9999.9 is reached.

Push the bottom set button to switch the display between odometer “ODO”, tripmeters “TRIP 1” and “TRIP 2”, instantaneous fuel consumption “km/L” or “L/100 km”, average fuel consumption “AVE_ _._ km/L” or “AVE_ _._ L/100 km”, coolant temperature “_ _ °C”, ambient temperature “Air_ _ °C”, and clock “_ _:_ _” in the following order:

ODO → TRIP 1 → TRIP 2 → km/L or L/100 km → AVE_ _._ km/L or AVE_ _._ L/100 km → _ _ °C → Air_ _ °C → Clock _ _:_ _ → ODO

For the UK:
Push the bottom set button to switch the display between odometer “ODO”, tripmeters “TRIP 1” and “TRIP 2”, instantaneous fuel consumption “km/L”, “L/100 km” or “MPG”, average fuel consumption “AVE_ _._ km/L”, “AVE_ _._ L/100 km” or “AVE_ _._ MPG”, coolant temperature “_ _ °C”, and ambient temperature, and “Air_ _ °C”, and clock “_ _:_ _” in the following order:

ODO → TRIP 1 → TRIP 2 → km/L, L/100 km or MPG → AVE_ _._ km/L, AVE_ _._ L/100 km or AVE_ _._ MPG → _ _ °C → Air_ _ °C → Clock _ _:_ _ → ODO

TIP

- Push the top set button to switch the display in the reverse order.
- The fuel reserve tripmeter and error code displays come on automatically, while the brightness control mode is accessed separately.

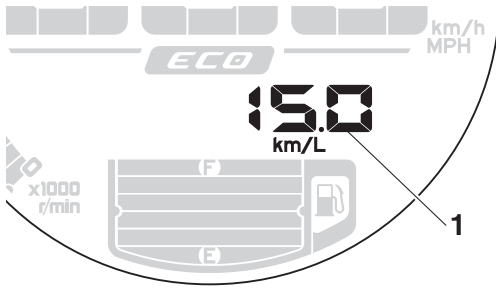
If the lower segment and frame of the fuel meter start flashing, the display automatically changes to fuel reserve tripmeter “TRIP F” and starts counting the distance traveled from that point. In this case, push the bottom set button to switch the display between the various tripmeter, odometer, and fuel consumption modes in the following order:

TRIP F → km/L or L/100 km → AVE_ _._ km/L or AVE_ _._ L/100 km → _ _ °C → Air_ _ °C → Clock _ _:_ _ → ODO → TRIP 1 → TRIP 2 → TRIP F

For the UK: TRIP F → km/L, L/100 km or MPG → AVE_ _._ km/L, AVE_ _._ L/100 km or AVE_ _._ MPG → _ _ °C → Air_ _ °C → Clock _ _:_ _ → ODO → TRIP 1 → TRIP 2 → TRIP F

To reset a tripmeter, select it by pushing the bottom set button, and then push the top set button for one second.
If you do not reset the fuel reserve tripmeter manually, after refueling and traveling 5km (3mi) it resets automatically and disappears from the display.

Instantaneous fuel consumption



1. Instantaneous fuel consumption display

The instantaneous fuel consumption display can be set to either “km/L” or “L/100 km”; or for the UK, “MPG” or “km/L” or “L/100 km”.

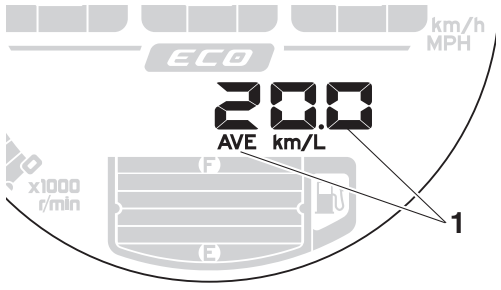
- “km/L”: The distance that can be traveled on 1.0 L of fuel under current riding conditions.
- “L/100 km”: The amount of fuel necessary to travel 100 km under current riding.
- “MPG”: The distance that can be traveled on 1.0 Imp.gal of fuel under current riding conditions.

To switch the instantaneous fuel consumption display settings, push the bottom set button for two second.

TIP

If traveling at speeds under 20 km/h (12 mi/h), “_ _._” is displayed.

Average fuel consumption



1. Average fuel consumption display

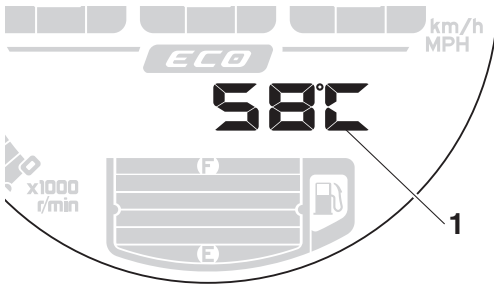
This display shows the average fuel consumption since it was last reset.
The average fuel consumption display can be set to either “AVE_ _._ km/L”, “AVE_ _._ L/100 km” or “AVE_ _._ MPG” (for the UK).
- “AVE_ _._ km/L”: The average distance that can be traveled on 1.0 L of fuel.
- “AVE_ _._ L/100 km”: The average amount of fuel necessary to travel 100 km.
- “AVE_ _._ MPG”: The average distance that can be traveled on 1.0 Imp.gal of fuel.

To switch the average fuel consumption display settings, push the bottom set button for two seconds.
To reset the average fuel consumption, push the top set button for one second.

TIP

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

Coolant temperature



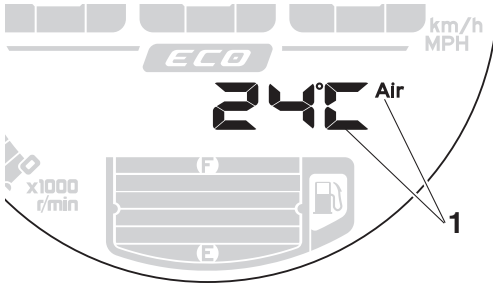
1. Coolant temperature display

This display shows the coolant temperature from 40 °C to 116 °C in 1 °C increments.
If the message “HI” flashes, stop the vehicle, then stop the engine and let the it cool.

TIP

- When the coolant temperature is below 40 °C, “Lo” will be displayed.
- The coolant temperature varies with changes in the weather and engine load.

Air temperature



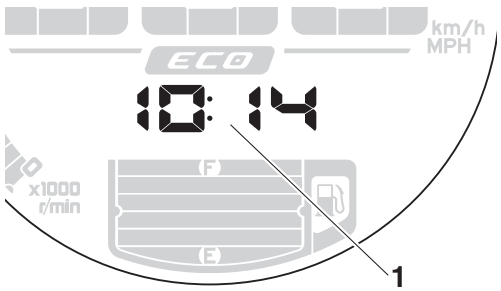
1. Air temperature display

This display shows the air temperature from –9 °C to 99 °C in 1 °C increments. The temperature displayed may vary from the actual ambient temperature.

TIP

- When the air temperature is below –9 °C, “Lo” will be displayed.
- The accuracy of the temperature reading may be affected when riding slowly (under 20 km/h [12.5 mi/h]) or when stopped at traffic signals, railroad crossings, etc.

Clock



1. Clock

The clock displays time in 12-hour format. Even when the key is not in the “ON” position, the clock can be viewed for 10 seconds by pushing the bottom set button.

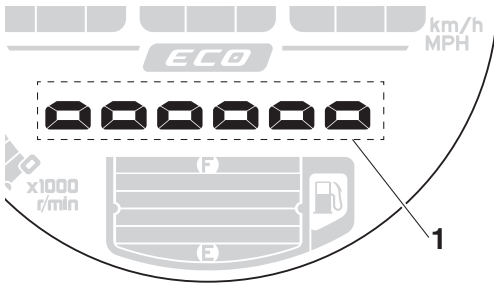
To set the clock

1. Turn the main switch to “ON”.
2. Push the bottom set button and top set button together for two seconds and the hour digits will start flashing.
3. Push the top set button to set the hours.
4. Push the bottom set button and the minute digits will start flashing.
5. Push the top set button to set the minutes.
6. Push the bottom set button to confirm settings and start the clock.

TIP

- When setting the hours and minutes, push the top set button briefly to increase the increment value one by one, or push and hold the button to increase the increment value continuously.

Brightness control



1. Brightness level display

The brightness level of the multi-function meter unit panel can be adjusted to suit the rider’s preference.

To adjust the brightness

1. Turn the main switch to “OFF”.
2. Push and hold the bottom set button.
3. Turn the main switch to “ON” and continue pushing the bottom set button until the display switches to the brightness control mode.
4. Push the top set button to set the brightness level.
5. Push the bottom set button to confirm the selected brightness level and exit the brightness control mode.

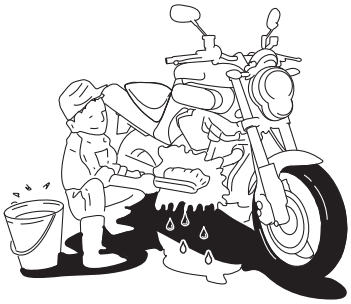
TIP

There are 6 brightness level settings.

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 1-14.
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.

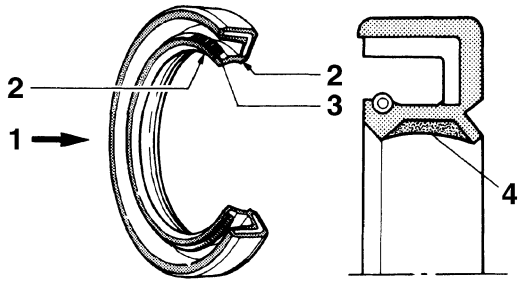
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

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

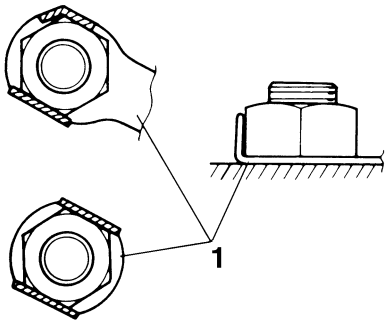
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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

EAS30009
LOCK WASHERS/PLATES AND COTTER PINS

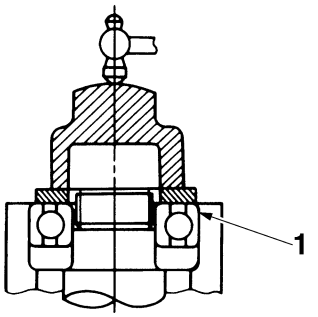
After removal, replace all lock washers/plates "1" and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.

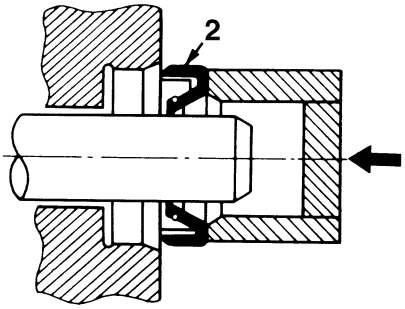


EAS30010
BEARINGS AND OIL SEALS
Install bearings “1” and oil seals “2” so that the manufacturer marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

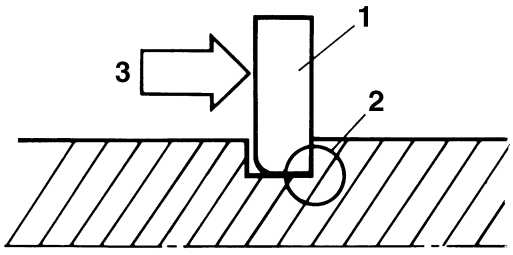
ECA13300
NOTICE

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.

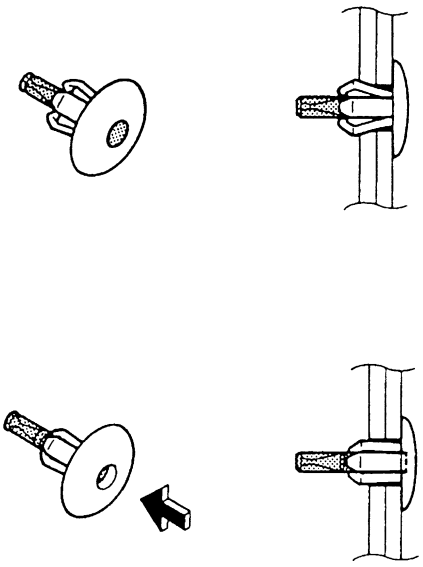
EAS20010
BASIC SERVICE INFORMATION

EAS30013
QUICK FASTENERS

Rivet type
1. Remove:
   • Quick fastener

TIP

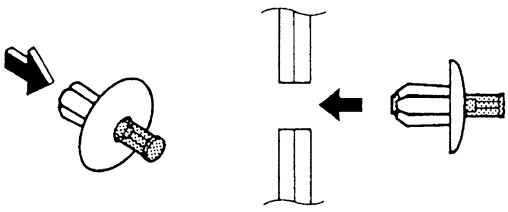
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.

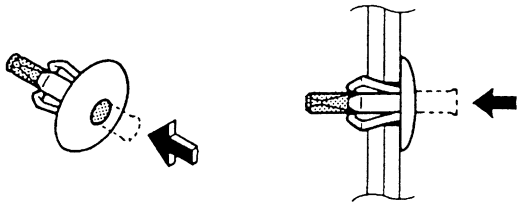


2. Install:
   • Quick fastener

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 in with a screwdriver. Make sure that the pin is flush with the fastener's head.

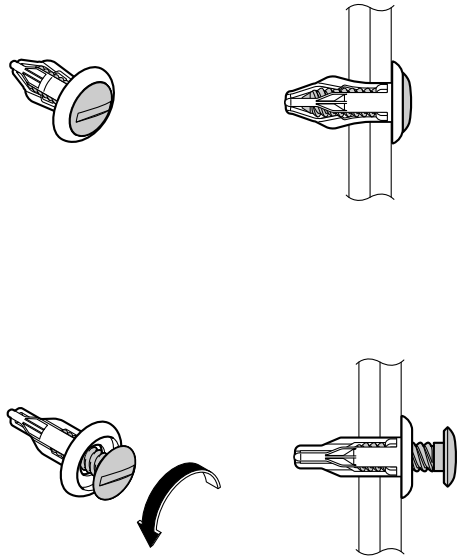




Screw type
1. Remove:
   • Quick fastener

TIP

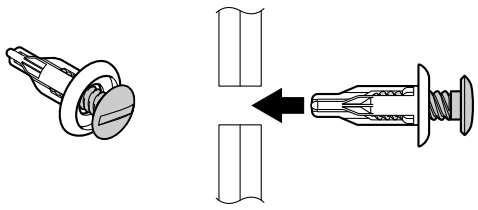
To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.

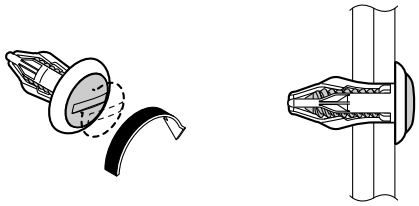


2. Install:
   • Quick fastener

TIP

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



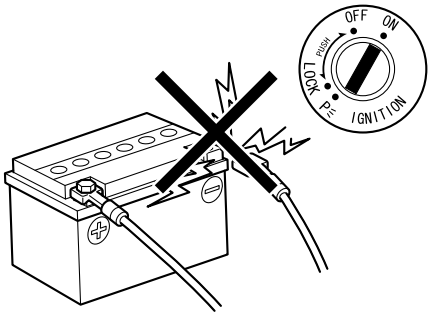


EAS30014
ELECTRICAL SYSTEM

Electrical parts handling

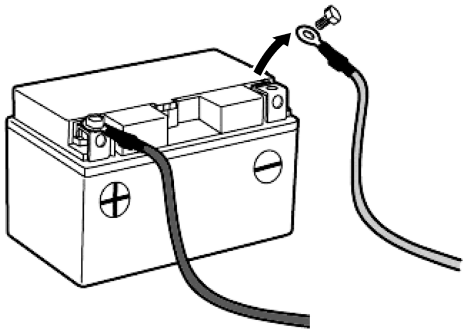
ECA16600
NOTICE

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



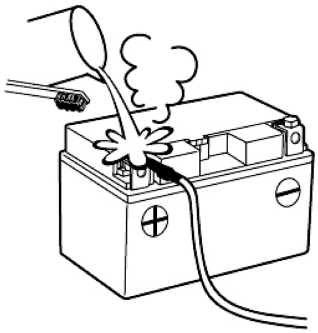
ECA16751
NOTICE

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.



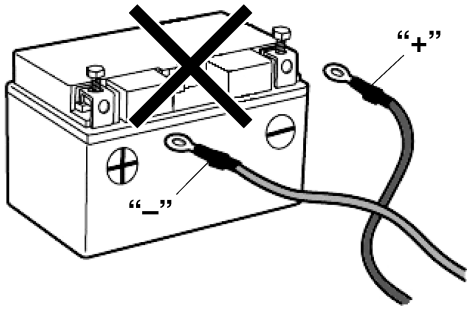
TIP

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



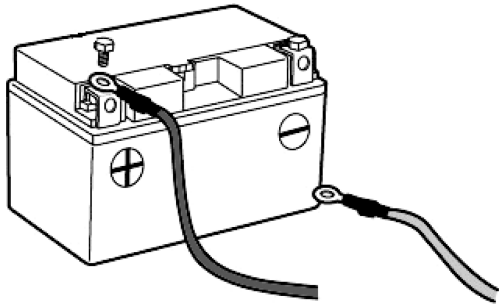
ECA16760
NOTICE

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



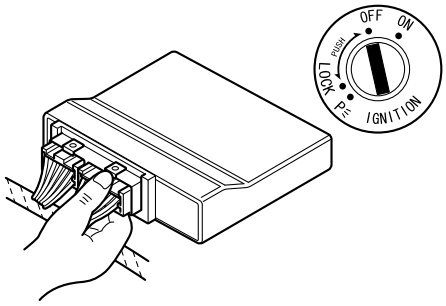
ECA16771
NOTICE

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

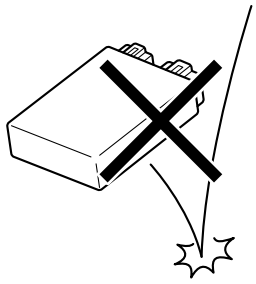
Turn the main switch to "OFF" before disconnecting or connecting an electrical component.



ECA16620

NOTICE

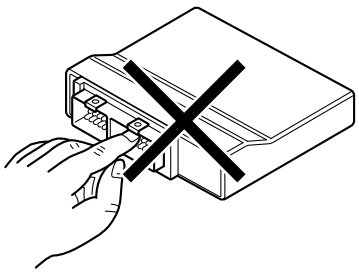
Handle electrical components with special care, and do not subject them to strong shocks.



ECA16630

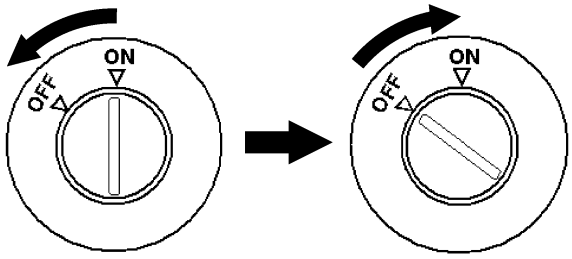
NOTICE

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

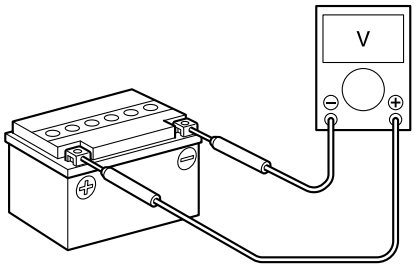
When resetting the ECU by turning the main switch to "OFF", be sure to wait approximately 5 seconds before turning the main switch back to "ON".



Checking the electrical system

TIP

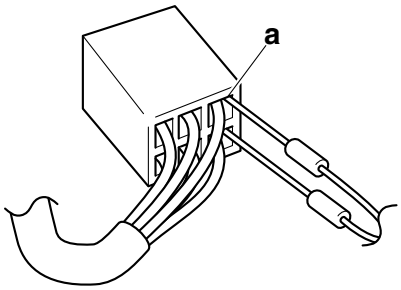
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECA14371

NOTICE

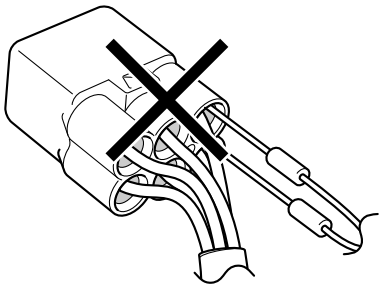
Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.



ECA16640

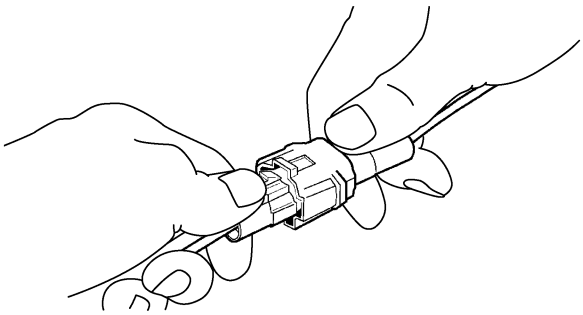
NOTICE

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.

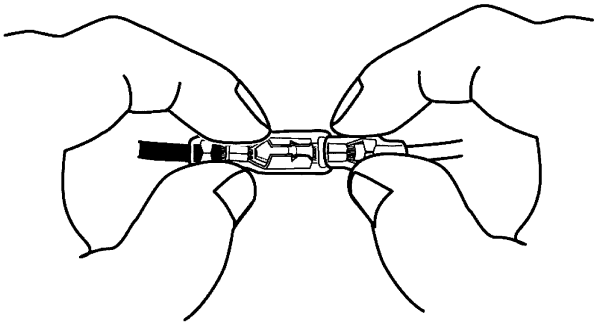


Checking the connections
Check the leads, couplers, and connectors for stains, rust, moisture, etc.
1. Disconnect:
   • Lead
   • Coupler
   • Connector

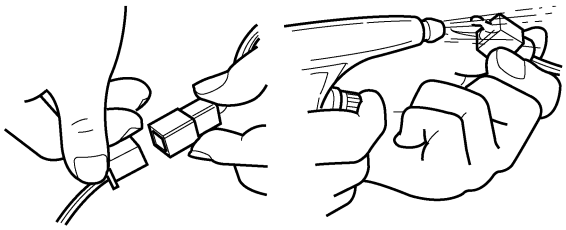
ECA16780
NOTICE
• When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.
• There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.



ECA16790
NOTICE
When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.

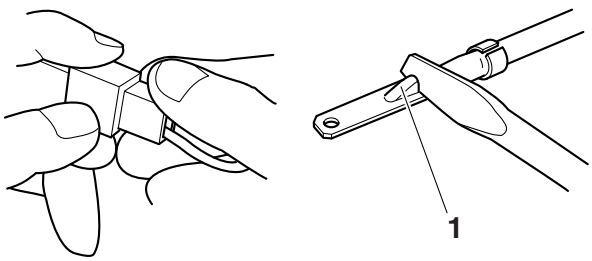


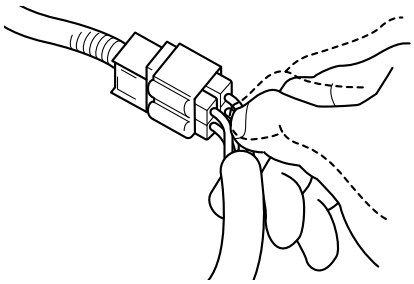
2. Check:
   • Lead
   • Coupler
   • Connector
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.



3. Check:
   • All connections
   Loose connection → Connect properly.

TIP
• If the pin “1” on the terminal is flattened, bend it up.
• After disassembling and assembling a coupler, pull on the leads to make sure that they are installed securely.

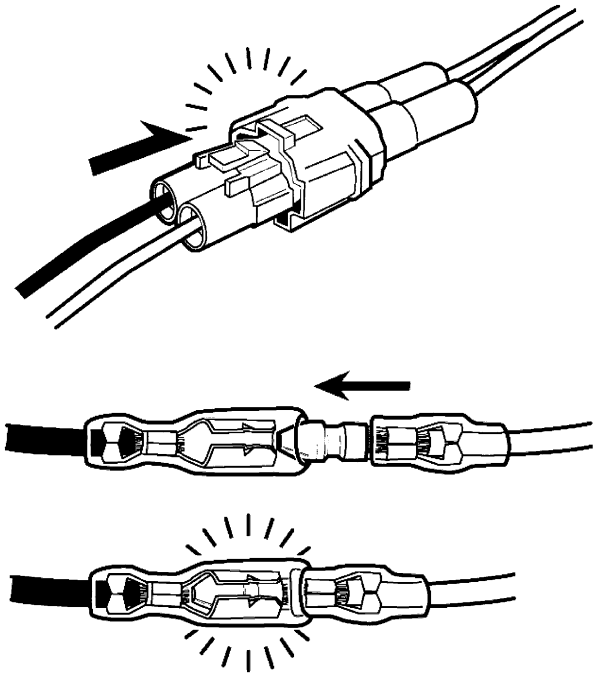




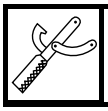
4. Connect:
   • Lead
   • Coupler
   • Connector

TIP

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



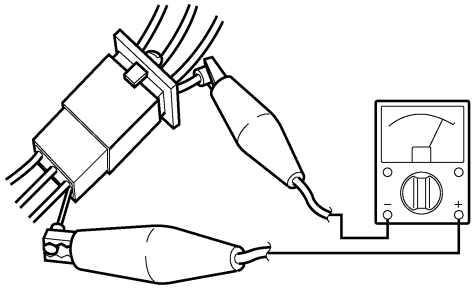
5. Check:
   • Continuity
   (with the pocket tester)

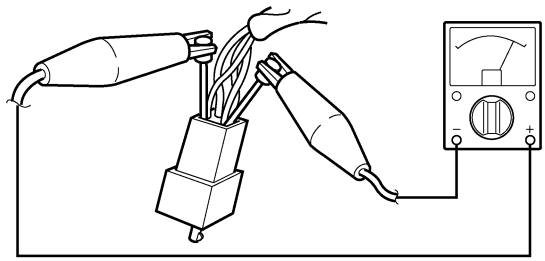


Pocket tester
90890-03132

TIP

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (4).
- As a quick remedy, use a contact revitalizer available at most part stores.





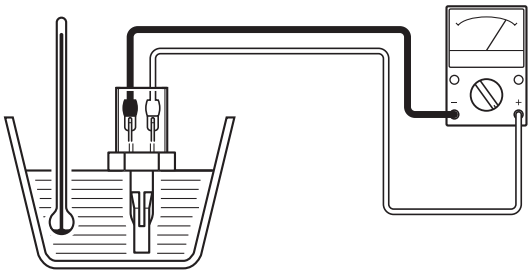
6. Check:
   • Resistance

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

TIP

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

Intake air temperature sensor resistance
5.40–6.60 kΩ at 0 °C (32 °F)
290–390 Ω at 80 °C (176 °F)

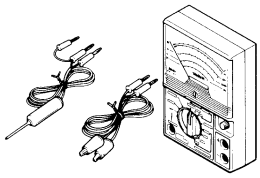
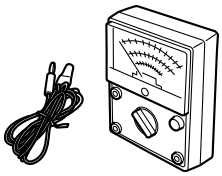
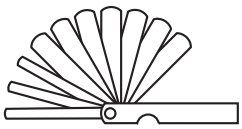
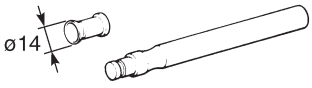
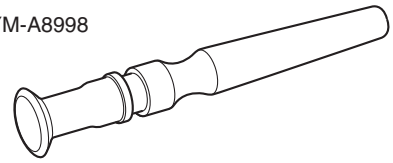
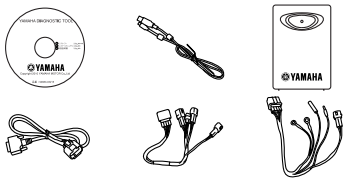


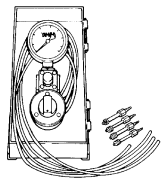
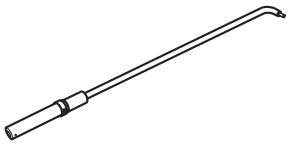
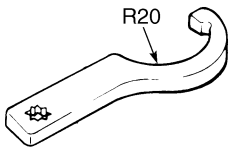
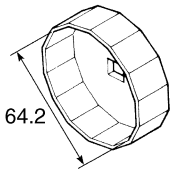
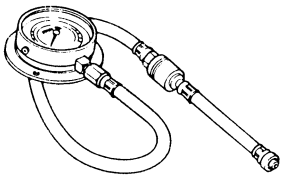
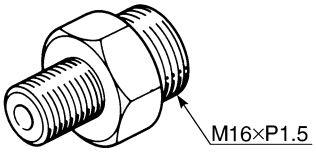
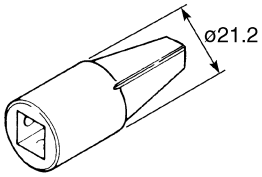
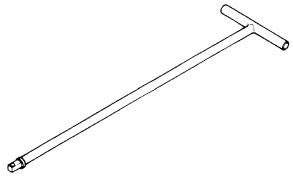
EAS20012
SPECIAL TOOLS

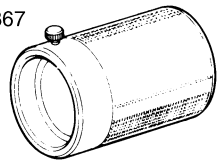
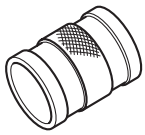
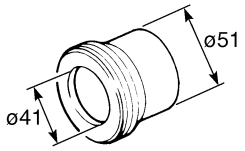
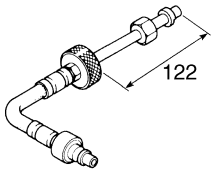
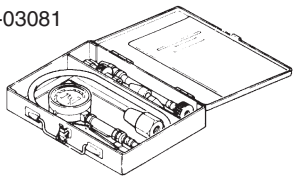
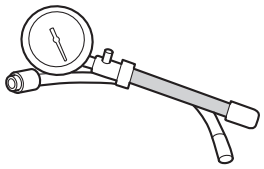
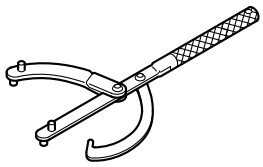
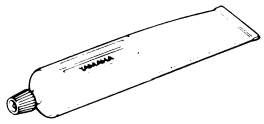
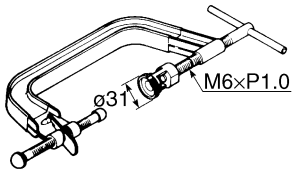
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

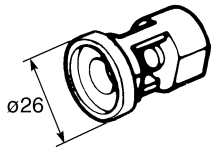
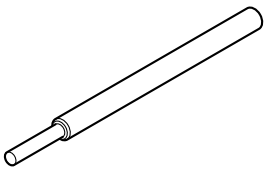
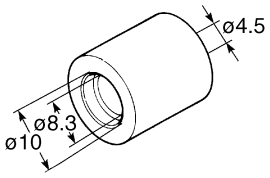
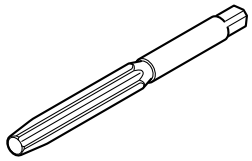
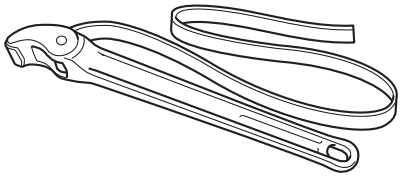
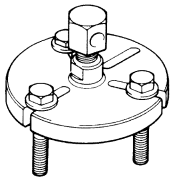
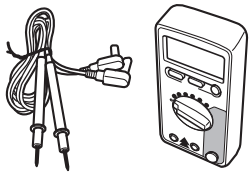
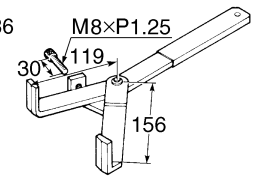
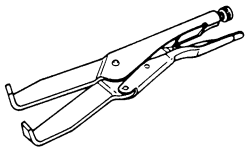
TIP

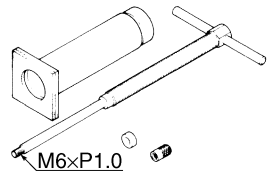
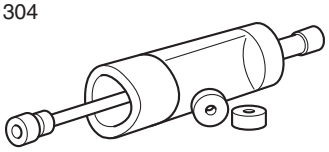
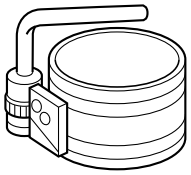
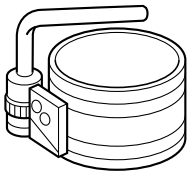
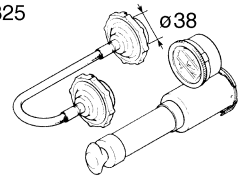
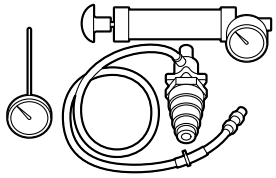
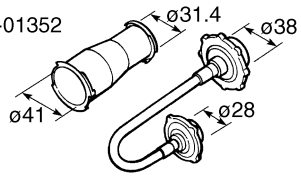
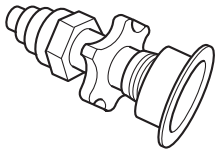
- For U.S.A. and Canada, use part number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part number starting with “90890-”.

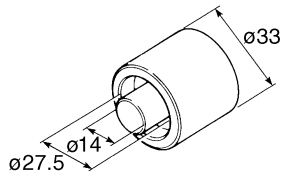
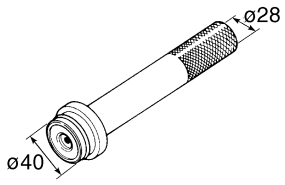
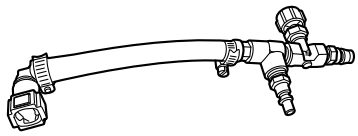
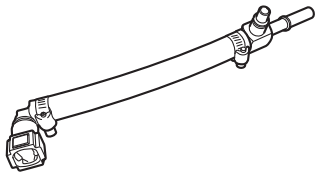
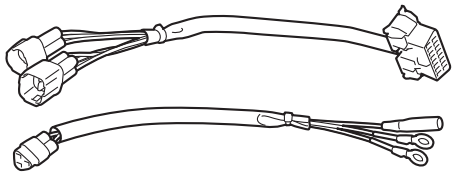
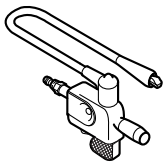
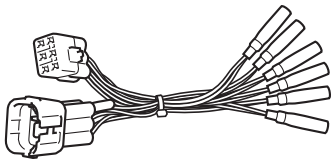
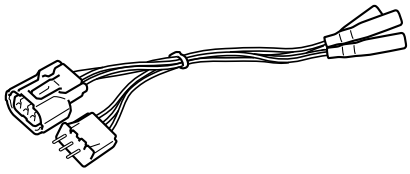
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03132		1-13
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-13, 8-155, 8-156, 8-157, 8-157, 8-161, 8-162, 8-163, 8-163, 8-164, 8-164, 8-165, 8-165, 8-167, 8-167, 8-168, 8-169, 8-170, 8-170, 8-171
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-6, 4-19, 4-28, 5-51
Valve lapper 90890-04101 Valve lapping tool YM-A8998	90890-04101  YM-A8998 	3-7
Yamaha diagnostic tool 90890-03250		3-8, 4-61, 4-62, 5-2, 8-36, 8-124, 8-147

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		3-9
Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472		3-19, 4-82
Oil filter wrench 90890-01426 Oil filter wrench YU-38411		3-22
Pressure gauge 90890-03153 Pressure gauge YU-03153		3-23, 7-14, 7-15
Oil pressure adapter H 90890-03139		3-23
Damper rod holder 90890-01460		4-74, 4-76
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-74, 4-76

Tool name/Tool No.	Illustration	Reference pages
Fork seal driver weight 90890-01367 Replacement hammer YM-A9409-7	90890-01367  YM-A9409-7/YM-A5142-4 	4-77, 4-77, 4-77
Fork seal driver attachment (ø41) 90890-01381 Replacement 41 mm YM-A5142-2		4-77, 4-77
Extension 90890-04136		5-1
Compression gauge 90890-03081 Engine compression tester YU-33223	90890-03081  YU-33223 	5-1
Rotor holding tool 90890-01235 Universal magneto and rotor holder YU-01235		5-15, 5-19
Yamaha bond No. 1215 90890-85505 (Three bond No.1215®)		5-22, 5-41, 5-66, 5-68
Valve spring compressor 90890-04019 Valve spring compressor YM-04019		5-29, 5-34

Tool name/Tool No.	Illustration	Reference pages
Valve spring compressor attachment 90890-01243 Valve spring compressor adapter (26 mm) YM-01253-1		5-29, 5-34
Valve guide remover (ø4.5) 90890-04116 Valve guide remover (4.5 mm) YM-04116		5-31
Valve guide installer (ø4.5) 90890-04117 Valve guide installer (4.5 mm) YM-04117		5-31
Valve guide reamer (ø4.5) 90890-04118 Valve guide reamer (4.5 mm) YM-04118		5-31
Rotor holding tool 90890-04166 YM-04166		5-39, 5-39, 5-40, 5-40
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-39
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		5-44, 8-166, 8-169
Universal clutch holder 90890-04086 Universal clutch holder YM-91042	90890-04086  YM-91042 	5-50, 5-53

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-72
Piston ring compressor 90890-05158 Piston ring compressor YM-08037	 	5-79
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	90890-01325  YU-24460-A 	6-3
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	90890-01352  YU-33984 	6-3

Tool name/Tool No.	Illustration	Reference pages
Mechanical seal installer 90890-04132 Water pump seal installer YM-33221-A		6-12
Middle driven shaft bearing driver 90890-04058 Middle drive bearing installer 40 & 50 mm YM-04058		6-12
Fuel injector pressure adapter 90890-03210 Fuel injector pressure adapter YU-03210		7-14
Fuel pressure adapter 90890-03176 Fuel pressure adapter YM-03176		7-15
OBD/ GST Leadwire kit 90890-03249		8-36
Ignition checker 90890-06754 Oppama pet–4000 spark checker YM-34487		8-164
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		8-169

SPECIFICATIONS

EAS20013
GENERAL SPECIFICATIONS

Model	
Model	B341 (MTM690) B342 (MTM690-U)
Dimensions	
Overall length	2075 mm (81.7 in)
Overall width	820 mm (32.3 in)
Overall height	1130 mm (44.5 in)
Seat height	815 mm (32.1 in)
Wheelbase	1405 mm (55.3 in)
Ground clearance	140 mm (5.51 in)
Minimum turning radius	2700 mm (106.3 in)
Weight	
Curb weight	186 kg (410 lb)
Loading	
Maximum load	172 kg (379 lb)

EAS20014
ENGINE SPECIFICATIONS

Engine	
Engine type	Liquid cooled 4-stroke, DOHC
Displacement	689 cm³
Cylinder arrangement	Inline 2-cylinder
Bore × stroke	80.0 × 68.6 mm (3.15 × 2.70 in)
Compression ratio	11.5 : 1
Compression pressure (#1 cylinder)	770–990 kPa/355 r/min (7.7–9.9 kgf/cm²/355 r/min, 109.5–140.8 psi/355 r/min)
Compression pressure (#2 cylinder)	690–880 kPa/355 r/min (6.9–8.8 kgf/cm²/355 r/min, 98.1–125.2 psi/355 r/min)
Starting system	Electric starter
Fuel	
Recommended fuel	Premium unleaded gasoline (Gasohol (E10) acceptable)
Minimum research octane	95
Fuel tank capacity	14.0 L (3.70 US gal, 3.08 Imp.gal)
Fuel reserve amount	2.7 L (0.71 US gal, 0.59 Imp.gal)
Engine oil	
Lubrication system	Wet sump
Recommended brand	YAMALUBE
SAE viscosity grades	10W-40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Quantity (disassembled)	3.00 L (3.17 US qt, 2.64 Imp.qt)
Without oil filter cartridge replacement	2.30 L (2.43 US qt, 2.02 Imp.qt)
With oil filter cartridge replacement	2.60 L (2.75 US qt, 2.29 Imp.qt)
Oil pressure	280.0 kPa/5000 r/min at 100 °C (40.6 psi/5000 r/min at 212 °F)
Oil filter	
Oil filter type	Cartridge
Oil pump	
Oil pump type	Trochoid
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	0.09–0.15 mm (0.0035–0.0059 in)
Limit	0.22 mm (0.0087 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.03–0.08 mm (0.0012–0.0032 in)
Bypass valve opening pressure	80.0–120.0 kPa (0.80–1.20 kgf/cm², 11.6–17.4 psi)
Relief valve operating pressure	630.0–810.0 kPa (6.30–8.10 kgf/cm², 91.4–117.5 psi)

Cooling system	
Coolant quantity	
Radiator (including all routes)	1.60 L (1.69 US qt, 1.41 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	108.0–137.4 kPa (1.08–1.37 kgf/cm², 15.7–19.9 psi)
Thermostat	
Valve opening temperature	80.0–84.0 °C (176.00–183.20 °F)
Valve full open temperature	95.0 °C (203.00 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Radiator core	
Width	322.6 mm (12.70 in)
Height	180.0 mm (7.09 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	77/40 × 17/25 (1.309)
Spark plug(s)	
Manufacturer/model	NGK/LMAR8A-9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)
Cylinder head	
Combustion chamber volume	18.48–20.08 cm³ (1.13–1.23 cu.in)
Warpage limit	0.05 mm (0.0020 in)
Camshaft	
Drive system	Chain drive (right)
Camshaft cap inside diameter	22.000–22.021 mm (0.8661–0.8670 in)
Camshaft journal diameter	21.959–21.972 mm (0.8645–0.8650 in)
Camshaft-journal-to-camshaft-cap clearance	0.028–0.062 mm (0.0011–0.0024 in)
Camshaft lobe dimensions	
Lobe height (Intake)	35.610–35.710 mm (1.4020–1.4059 in)
Limit	35.510 mm (1.3980 in)
Base circle diameter (Intake)	27.950–28.050 mm (1.1004–1.1043 in)
Limit	27.850 mm (1.0965 in)
Lobe height (Exhaust)	35.710–35.810 mm (1.4059–1.4098 in)
Limit	35.610 mm (1.4020 in)
Base circle diameter (Exhaust)	27.950–28.050 mm (1.1004–1.1043 in)
Limit	27.850 mm (1.0965 in)
Camshaft runout limit	0.030 mm (0.0012 in)
Timing chain	
Tensioning system	Automatic
Valve, valve seat, valve guide	
Valve clearance (cold)	
Intake	0.11–0.20 mm (0.0043–0.0079 in)
Exhaust	0.24–0.30 mm (0.0094–0.0118 in)
Valve dimensions	
Valve head diameter (intake)	31.40–31.60 mm (1.2362–1.2441 in)

Valve head diameter (exhaust)	26.40–26.60 mm (1.0394–1.0472 in)
Valve seat contact width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Valve seat contact width (exhaust)	0.90–1.10 mm (0.0354–0.0433 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)	40.30 mm (1.59 in)
Limit	38.29 mm (1.51 in)
Free length (exhaust)	41.39 mm (1.63 in)
Limit	39.32 mm (1.55 in)
Installed length (intake)	34.34 mm (1.35 in)
Installed length (exhaust)	35.84 mm (1.41 in)
Spring rate K1 (intake)	26.03 N/mm (2.65 kgf/mm, 148.63 lbf/in)
Spring rate K2 (intake)	42.21 N/mm (4.30 kgf/mm, 241.02 lbf/in)
Spring rate K1 (exhaust)	28.90 N/mm (2.95 kgf/mm, 165.02 lbf/in)
Spring rate K2 (exhaust)	44.19 N/mm (4.51 kgf/mm, 252.32 lbf/in)
Installed compression spring force (intake)	144.00–166.00 N (14.68–16.93 kgf, 32.37–37.32 lbf)
Installed compression spring force (exhaust)	149.00–171.00 N (15.19–17.44 kgf, 33.50–38.44 lbf)
Spring tilt (intake)	1.8 mm (0.07 in)
Spring tilt (exhaust)	1.8 mm (0.07 in)
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise
Cylinder	
Bore	80.000–80.010 mm (3.1496–3.1500 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)
Piston	
Piston-to-cylinder clearance	0.015–0.040 mm (0.0006–0.0016 in)
Diameter	79.970–79.985 mm (3.1484–3.1490 in)
Measuring point (from piston skirt bottom)	8.0 mm (0.31 in)
Offset	0.00 mm (0.0000 in)
Piston pin bore inside diameter	18.004–18.015 mm (0.7088–0.7093 in)
Limit	18.045 mm (0.7104 in)
Piston pin outside diameter	17.990–17.995 mm (0.7083–0.7085 in)
Limit	17.970 mm (0.7075 in)
Piston-pin-to-piston-pin-bore clearance	0.009–0.025 mm (0.0004–0.0010 in)
Limit	0.075 mm (0.0030 in)

Piston ring	
Top ring	
Ring type	Barrel
End gap (installed)	0.15–0.25 mm (0.0059–0.0098 in)
Limit	0.50 mm (0.0197 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)
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)
Limit	0.80 mm (0.0315 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.115 mm (0.0045 in)
Oil ring	
End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
Connecting rod	
Oil clearance	0.027–0.051 mm (0.0011–0.0020 in)
Bearing color code	1. Blue 2. Black 3. Brown 4. Green
Crankshaft	
Runout limit	0.030 mm (0.0012 in)
Big end side clearance	0.160–0.262 mm (0.0063–0.0103 in)
Journal oil clearance	0.018–0.042 mm (0.0007–0.0017 in)
Bearing color code	-1. Violet-Pink 0. White-Pink 1. Blue-Pink 2. Black-Pink 3. Brown-Pink
Balancer	
Balancer drive method	Gear
Balancer shaft runout limit	0.030 mm (0.0012 in)
Balancer shaft journal to balancer shaft bearing clearance	0.020–0.054 mm (0.0008–0.0021 in)
Clutch	
Clutch type	Wet, multiple-disc
Clutch release method	Outer pull, rack and pinion pull
Clutch lever free play	5.0–10.0 mm (0.20–0.39 in)
Friction plate 2 thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.111 in)
Plate quantity	5 pcs
Friction plate 1 thickness	2.90–3.10 mm (0.114–0.122 in)
Wear limit	2.80 mm (0.110 in)
Plate quantity	2 pcs
Clutch plate thickness	1.90–2.10 mm (0.075–0.083 in)
Plate quantity	6 pcs
Warpage limit	0.10 mm (0.004 in)
Clutch spring free length	50.00 mm (1.97 in)
Limit	47.50 mm (1.87 in)
Spring quantity	6 pcs
Transmission	
Transmission type	Constant mesh 6-speed

Primary reduction ratio	1.925 (77/40)
Final drive	Chain
Secondary reduction ratio	2.688 (43/16)
Operation	Left foot operation
Gear ratio	
1st	2.846 (37/13)
2nd	2.125 (34/16)
3rd	1.632 (31/19)
4th	1.300 (26/20)
5th	1.091 (24/22)
6th	0.964 (27/28)
Main axle runout limit	0.08 mm (0.0032 in)
Drive axle runout limit	0.08 mm (0.0032 in)
Shifting mechanism	
Shift mechanism type	Shift drum and guide bar
Shift fork guide bar bending limit	0.050 mm (0.0020 in)
Shift fork thickness	5.76–5.89 mm (0.2268–0.2319 in)
Air filter	
Air filter element	Oil-coated paper element
Fuel pump	
Pump type	Electrical
Maximum consumption amperage	3.3 A
Fuel injector	
Model/quantity	297500–2310/2
Throttle body	
Type/quantity	EHDW38–1
ID mark	1WS1 10
Throttle position sensor	
Resistance	2.64–6.16 kΩ
Output voltage (at idle)	0.63–0.73 V
Fuel injection sensor	
Crankshaft position sensor resistance	228–342 Ω
Intake air pressure sensor output voltage	3.57–3.71 V at 101.3 kPa (3.57–3.71 V at 1.01 kgf/cm², 3.57–3.71 V at 14.7 psi)
Intake air temperature sensor resistance	290–390 Ω at 80 °C (290–390 Ω at 176 °F)
Coolant temperature sensor resistance	2510–2780 Ω at 20 °C (2510–2780 Ω at 68 °F)
Idling condition	
Fuel line pressure at idling	300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi) / Regulated pressure 324 kPa (3.2 kgf/cm², 47.0 psi)
Engine idling speed	1250–1450 r/min
CO%	0.0–2.0 %
Intake vacuum	40.6 kPa (305 mmHg, 12.0 inHg)
Water temperature	85.0–105.0 °C (185.00–221.00 °F)
Oil temperature	60.0–80.0 °C (140.00–176.00 °F)

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

EAS20015
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Diamond
Caster angle	25.0°
Trail	90 mm (3.5 in)
Front wheel	
Wheel type	Cast wheel
Rim size	17M/C × MT3.50
Rim material	Aluminum
Wheel travel	130 mm (5.1 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Rear wheel	
Wheel type	Cast wheel
Rim size	17M/C × MT5.50
Rim material	Aluminum
Wheel travel	130 mm (5.1 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Front tire	
Type	Tubeless
Size	120/70 R17M/C (58V)
Manufacturer/model	PIRELLI/PHANTOM SPORTSCOMP
Wear limit (front)	1.6 mm (0.06 in)
Rear tire	
Type	Tubeless
Size	180/55 R17M/C (73V)
Manufacturer/model	PIRELLI/PHANTOM SPORTSCOMP
Wear limit (rear)	1.6 mm (0.06 in)
Tire air pressure (measured on cold tires)	
Loading condition	0–173 kg (0–381 lb)
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	250 kPa (2.50 kgf/cm², 36 psi)
High-speed riding	
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	250 kPa (2.50 kgf/cm², 36 psi)
Front brake	
Type	Dual disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	282.0 × 4.5 mm (11.10 × 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 (inner)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)

Brake pad lining thickness (outer)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	15.00 mm (0.59 in)
Caliper cylinder inside diameter	30.23 mm (1.19 in)
Caliper cylinder inside diameter	27.00 mm (1.06 in)
Specified brake fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Right foot operation
Rear 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 (inner)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	38.18 mm (1.50 in)
Specified brake fluid	DOT 4

Steering

Steering bearing type	Angular bearing
Center to lock angle (left)	35.0°
Center to lock angle (right)	35.0°

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	130.0 mm (5.12 in)
Fork spring free length	345.4 mm (13.60 in)
Limit	331.6 mm (13.06 in)
Fork spring installed length	338.4 mm (13.32 in)
Collar length	150.0 mm (5.91 in)
Spring rate K1	8.50 N/mm (0.87 kgf/mm, 48.54 lbf/in)
Spring stroke K1	0.0–130.0 mm (0.00–5.12 in)
Inner tube outer diameter	41.0 mm (1.61 in)
Inner tube bending limit	0.2 mm (0.01 in)
Recommended oil	Fork oil 10W or equivalent
Quantity	403.0 cm^3 (13.63 US oz, 14.21 Imp.oz)
Level	162.0 mm (6.38 in)

Rear suspension

Type	Swingarm (link suspension)
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	55.0 mm (2.17 in)
Spring free length	171.5 mm (6.75 in)
Spring installed length	158.5 mm (6.24 in)
Spring rate K1	107.80 N/mm (10.99 kgf/mm, 615.54 lbf/in)
Spring stroke K1	0.0–55.0 mm (0.00–2.17 in)
Enclosed gas/air pressure (STD)	980 kPa (9.8 kgf/cm^2, 139.4 psi)

Spring preload	
Minimum	1
Standard	3
Maximum	9

Drive chain

Size/manufacturer	525VAZ/DAIDO
Chain type	Sealed type
Number of links	108
15-link length limit	239.3 mm (9.42 in)
Drive chain slack	51.0–56.0 mm (2.01–2.20 in)
Limit	58.0 mm (2.28 in)

EAS20016
ELECTRICAL SPECIFICATIONS

Voltage	
System voltage	12 V
Ignition system	
Ignition system	TCI
Ignition timing (B.T.D.C.)	10.0°/1200 r/min
Engine control unit	
Model/manufacturer	TBDFS2/DENSO (MTM690) TBDFU1/DENSO (MTM690-U)
Ignition coil	
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	1.19–1.61 Ω
Secondary coil resistance	8.50–11.50 kΩ
Lean angle sensor output voltage	
Less than 65°	0.4–1.4 V
More than 65°	3.7–4.4 V
AC magneto	
Charging system	AC magneto
Standard output	14.0 V, 29.3 A at 5000 r/min
Stator coil resistance	0.128–0.192 Ω (W-W)
Rectifier/regulator	
Regulator type	Semi conductor-short circuit
Regulated voltage (DC)	14.1–14.9 V
Rectifier capacity	50.0 A
Battery	
Model	YTZ10S
Voltage, capacity	12 V, 8.6 Ah
Specific gravity	1.310
Manufacturer	GS YUASA
Ten hour rate charging current	0.86 A
Headlight	
Bulb type	Halogen bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 60.0 W/55.0 W × 1
Auxiliary light	12 V, 5.0 W × 1
Tail/brake light	LED
Front turn signal light	12 V, 10.0 W × 2
Rear turn signal light	12 V, 10.0 W × 2
License plate light	12 V, 5.0 W × 1
Meter lighting	LED

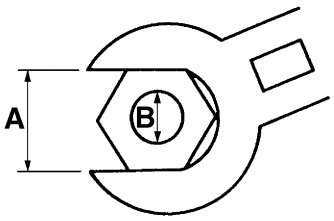
Indicator light	
Neutral indicator light	LED
Turn signal indicator light	LED
Oil pressure warning light	LED
High beam indicator light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED
ABS warning light	LED
Immobilizer system indicator light	LED
Electric starting system	
System type	Constant mesh
Starter motor	
Power output	0.50 kW
Armature coil resistance	0.0150–0.0250 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)
Starter relay	
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω
Horn	
Horn type	Plane
Quantity	1
Maximum amperage	3.0 A
Turn signal/hazard relay	
Relay type	Full transistor
Built-in, self-canceling device	No
Fuel sender unit	
Sender unit resistance (full)	9.0–11.0 Ω
Sender unit resistance (empty)	213.0–219.0 Ω
Fuse	
Main fuse	30.0 A
Headlight fuse	15.0 A
Signaling system fuse	10.0 A
Ignition fuse	10.0 A
Radiator fan motor fuse	10.0 A
Parking lighting fuse	7.5 A
Fuel injection system fuse	10.0 A
ABS motor fuse	30.0 A
ABS control unit fuse	7.5 A
ABS solenoid fuse	20.0 A
Auxiliary fuse	2.0 A
Backup fuse	7.5 A
Spare fuse	30.0 A

Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	10.0 A
Spare fuse	7.5 A
Spare fuse	2.0 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		
		Nm	m·kgf	ft·lbf
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

EAS30016
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Exhaust pipe nut	M8	4	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Cylinder head stud bolt (exhaust pipe)	M8	4	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Muffler bracket bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Muffler bracket bolt	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Muffler cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
O_2 sensor	M12	1	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Starter motor terminal nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Engine ground lead bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
O_2 sensor coupler bracket bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Spark plug	M10	2	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Exhaust camshaft sprocket bolt	M7	2	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Intake camshaft sprocket bolt	M7	2	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Exhaust camshaft cap bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	E
Intake camshaft cap bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	E
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner cap bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Timing mark accessing bolt	M8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Crankshaft end cover	M36	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder head cover bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Breather plate bolt	M5	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	LT
Cylinder head bolt	M10	6	See TIP.	E
Cylinder head bolt	M6	2	See TIP.	
Timing chain guide bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Timing chain bolt (right side of cylinder head)	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter clutch bolt	M8	3	32 Nm (3.2 m·kgf, 23 ft·lbf)	LT
Generator rotor bolt	M12	1	70 Nm (7.0 m·kgf, 51 ft·lbf)	E
Generator cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Generator cover bolt	M6	8	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Stator coil bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Coupler and hose bracket bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor front cover bolt	M5	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Starter motor terminal and rear cover nut	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Clutch boss nut	M20	1	95 Nm (9.5 m·kgf, 69 ft·lbf)	Stake. E

Item	Thread size	Q'ty	Tightening torque	Remarks
Clutch spring bolt	M6	6	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Clutch cover bolt	M6	10	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Clutch cable holder bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Oil pump drive chain guide bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Shift shaft spring stopper	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	LT
Oil pump cover screw	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Oil pump bolt	M6	4	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Holder bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Oil pan bolt	M6	11	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil strainer bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Crankcase bolt	M9	6	See TIP.	l=80 mm (3.15 in) E
Crankcase bolt	M8	6	See TIP.	l=70 mm (2.76 in) E
Crankcase bolt	M8	2	See TIP.	l=65 mm (2.56 in) E
Crankcase bolt	M6	2	See TIP.	l=65 mm (2.56 in) E
Crankcase bolt	M6	3	See TIP.	l=60 mm (2.36 in) E
Crankcase bolt	M6	8	See TIP.	l=40 mm (1.57 in) E
Oil pressure switch	PT1/8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	Three bond No.1215®
Oil pressure switch lead bolt	M4	1	1.8 Nm (0.18 m·kgf, 1.3 ft·lbf)	
Oil pressure switch lead holder bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Blind plate bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Gear position switch bolt	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	LT
Cylinder plug bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Main gallery bolt	M16	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Connecting rod bolt	M8	4	See TIP.	M
Balancer driven gear bolt	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	E
Balancer shaft cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Bearing retainer bolt	M6	3	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Shift drum retainer bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Radiator cap bolt	M3	1	1.0 Nm (0.10 m·kgf, 0.72 ft·lbf)	
Coolant reservoir bolt	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	

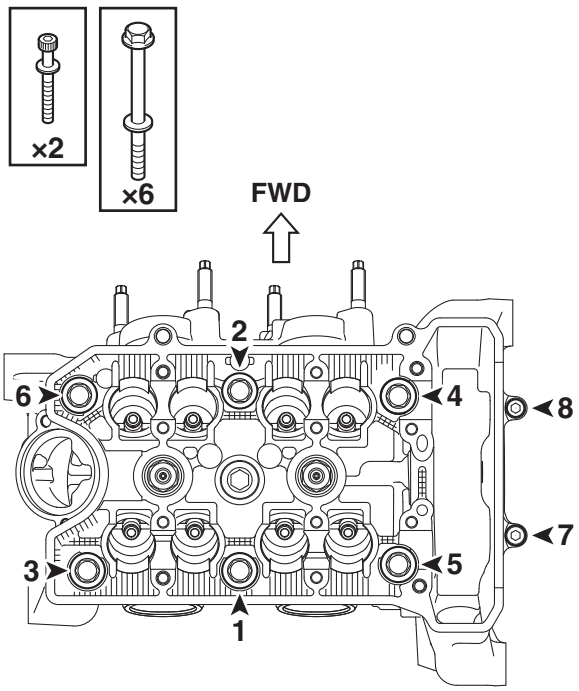
Item	Thread size	Q'ty	Tightening torque	Remarks
Radiator side cover bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator side cover bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator fan motor bolt	M6	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Radiator bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Horn nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator inlet hose clamp screw	M5	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Water jacket joint inlet hose clamp screw	M5	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Water jacket joint bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Oil filter cartridge union bolt	M20	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	E
Coolant temperature sensor	M10	1	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Thermostat cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Water pump housing bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Water pump inlet/outlet pipe bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant drain bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Intake air pressure sensor bolt	M5	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Intake air temperature sensor bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Air duct bracket screw	M5	4	1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)	
Air filter element screw	M5	1	1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)	
Throttle cable locknut (throttle body side)	M6	2	4.5 Nm (0.45 m·kgf, 3.3 ft·lbf)	
Throttle cable locknut (handlebar side)	M6	1	4.3 Nm (0.43 m·kgf, 3.1 ft·lbf)	
Throttle body joint clamp screw	M5	4	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Air filter case joint clamp screw	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Air filter case bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Fuel rail bolt	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Throttle position sensor screw	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
ISC (Idle Speed Control) valve plate screw	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kgf, 31 ft·lbf)	

TIP

Cylinder head bolt

Tighten the cylinder head bolts "1"–"8" in the proper tightening sequence as follows:

1. Lubricate the cylinder head bolts "1"–"6" threads and mating surface with engine oil.
2. Tighten the cylinder head bolts "1"–"6" to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).
3. Tighten the cylinder head bolts "1"–"6" to 40 Nm (4.0 m·kgf, 29 ft·lbf).
4. Loosen and retighten the cylinder head bolts "1"–"6" to 20 Nm (2.0 m·kgf, 14 ft·lbf) in the proper tightening sequence, and then tighten them further to reach the specified angle 90° in the proper tightening sequence.
5. Tighten the cylinder head bolts "7" and "8" to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).

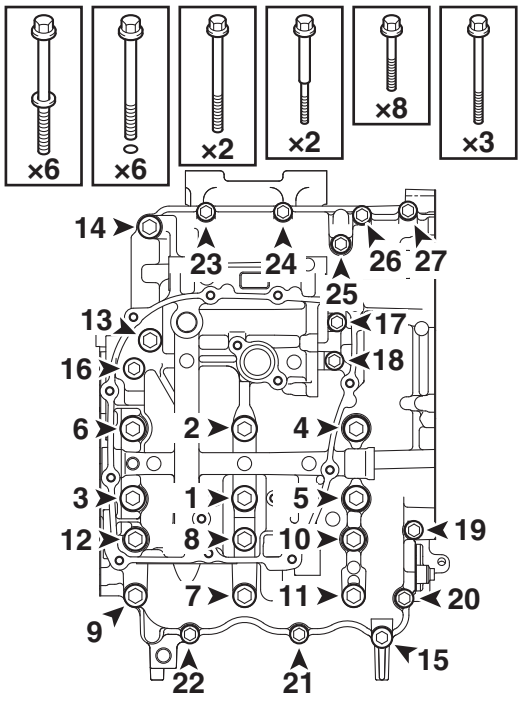


TIP

Crankcase bolt

Tighten the crankcase bolts "1"–"27" in the proper tightening sequence as follows: Tighten the bolts "1"–"16" in the order of the embossed numbers on the crankcase.

1. Lubricate the crankcase bolts "1"–"27" threads, mating surfaces, washers, and O-rings with the engine oil.
2. Tighten the crankcase bolts "1"–"6" to 24 Nm (2.4 m·kgf, 17 ft·lbf).
3. Loosen and retighten the crankcase bolts "1"–"6" to 17 Nm (1.7 m·kgf, 12 ft·lbf) in the proper tightening sequence, and then tighten them further to reach the specified angle 60° in the proper tightening sequence.
4. Tighten the crankcase bolts "7"–"27".
   "7"–"14": 24 Nm (2.4 m·kgf, 17 ft·lbf)
   "15"–"16": 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
   "17"–"27": 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
   Tighten the bolts "17"–"27" in any tightening sequence using a crisscross pattern.



TIP

Connecting rod bolt

Tighten the connecting rod bolts to 20 Nm (2.0 m·kgf, 14 ft·lbf), and then tighten them further to reach the specified angle 175–185°.

EAS30017
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting nut (rear upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting nut (rear lower side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting bolt (left front side)	M12	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	
Engine mounting bolt (left upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting bolt (right front side)	M12	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	
Engine mounting bolt (right upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine bracket bolt (right)	M8	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Engine bracket bolt (left)	M8	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Clutch cable guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear frame bolt	M8	4	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Seat bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Seat lock bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Seat lock nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Seat lock key cylinder bolt	M6	2	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Battery cover bolt	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Battery terminal bolt	M6	2	2.3 Nm (0.23 m·kgf, 1.7 ft·lbf)	
Lean angle sensor bolt	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Starter relay bolt	M6	2	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Battery box bolt	M6	4	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Battery box nut	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Tail/brake light nut	M6	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Rear fender cover bolt	M5	5	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Clamp screw	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Mudguard assembly bolt	M6	4	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Lower fender cover screw	M5	3	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
License plate nut	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
License plate bracket bolt	M5	3	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Rear reflector nut	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Headlight assembly bolt (M6 × 16 mm)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Headlight assembly bolt (M5 × 12 mm)	M5	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Headlight lens unit bolt	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Front turn signal light bolt	M6	6	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Meter assembly cover bolt	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Fuel tank top cover bolt	M5	8	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Fuel tank top cover bolt	M5	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Fuel tank cover bolt	M5	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Fuel tank center cover bolt	M5	4	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Outer side cover bolt	M5	8	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Inner side cover bolt	M5	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Air scoop bolt	M6	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Electrical components tray 1 bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Electrical components tray 2 nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Electrical components tray 2 bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Hydraulic unit assembly bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front reflector nut	M6	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Front brake disc bolt	M6	10	18 Nm (1.8 m·kgf, 13 ft·lbf)	LT
Front wheel sensor rotor bolt	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	LT
Front wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front wheel axle	M16	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Front wheel axle pinch bolt	M8	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Drive chain puller locknut	M8	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Rear wheel sprocket nut	M10	6	80 Nm (8.0 m·kgf, 58 ft·lbf)	
Rear brake disc bolt	M8	5	30 Nm (3.0 m·kgf, 22 ft·lbf)	LT
Rear wheel sensor rotor bolt	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	LT
Rear wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Wheel axle nut	M18	1	105 Nm (10.5 m·kgf, 76 ft·lbf)	
Rear brake caliper retaining bolt	M12	1	27 Nm (2.7 m·kgf, 20 ft·lbf)	
Rear brake caliper bolt	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	LT
Brake master cylinder reservoir cap bolt	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Brake lever pivot bolt	M6	1	1.0 Nm (0.10 m·kgf, 0.72 ft·lbf)	
Brake lever pivot nut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Front brake light switch screw	M4	1	1.2 Nm (0.12 m·kgf, 0.87 ft·lbf)	
Brake caliper bleed screw	M8	3	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Front brake caliper bolt	M10	2	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Front brake hose union bolt	M10	5	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Front brake master cylinder holder bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Brake pad retaining bolt	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Screw plug	M10	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Rear brake hose joint bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose joint bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose union bolt	M10	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake pipe holder bracket bolt	M5	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Brake fluid reservoir holder bolt	M5	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Footrest assembly bolt (right footrest)	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake master cylinder bolt	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Brake pedal bolt	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Rear brake hose/lead guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose/lead holder bolt	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Rear brake pedal adjusting locknut	M8	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Rearview mirror	M10	2	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Handlebar switch screw (right)	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Throttle cable housing bolt	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Handlebar switch screw (left)	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Grip end	M16	2	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Upper handlebar holder bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Lower handlebar holder nut	M10	2	32 Nm (3.2 m·kgf, 23 ft·lbf)	
Clutch lever pivot nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Clutch lever holder pinch bolt	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Clutch cable locknut	M8	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Meter assembly screw	M4	3	1.8 Nm (0.18 m·kgf, 1.3 ft·lbf)	
Meter assembly bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fork damper rod bolt	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Upper bracket pinch bolt (left and right)	M8	2	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Upper bracket pinch bolt (center)	M10	1	21 Nm (2.1 m·kgf, 15 ft·lbf)	
Front fork cap bolt	M38	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Front fender bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fender bolt	M6	4	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Front brake hose/lead holder bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose holder bracket bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Front brake hose lower holder bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Cap nut	M25	1	See TIP.	
Drive chain guard bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Relay arm nut	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Connecting arm nut (relay arm side)	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Rear shock absorber assembly bolt (front side)	M10	1	44 Nm (4.4 m·kgf, 32 ft·lbf)	
Rear shock absorber assembly nut (rear side)	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Pivot shaft protector bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Pivot shaft protector bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Sidestand bolt	M10	2	63 Nm (6.3 m·kgf, 46 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Footrest assembly bolt (left footrest)	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Footrest plate bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Passenger footrest bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Pivot shaft nut	M16	1	110 Nm (11 m·kgf, 80 ft·lbf)	
Footrest bracket bolt	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	LT
Sidestand pivot nut	M10	1	46 Nm (4.6 m·kgf, 33 ft·lbf)	
Sidestand switch nut	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Connecting arm nut (frame side)	M12	1	52 Nm (5.2 m·kgf, 38 ft·lbf)	
Drive sprocket cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Drive sprocket nut	M22	1	95 Nm (9.5 m·kgf, 69 ft·lbf)	Stake E
Shift rod locknut (shift arm side)	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Shift rod locknut (shift pedal side)	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	Left-hand threads
Shift arm pinch bolt	M6	1	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Shift rod upper joint bolt	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	LT
Fuel pump bolt	M5	4	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Fuel tank cap bolt	M5	5	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Fuel tank bolt (front side)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank bolt (rear side)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear fuel tank bracket bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Front fuel tank bracket bolt	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Fuel tank overflow/breather hose clamp screw	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

TIP

Cap nut

1. First, tighten the cap nut to approximately 52 Nm (5.2 m·kgf, 38 ft·lbf) with a torque wrench, then loosen the cap nut completely.
2. Retighten the cap nut to 18 Nm (1.8 m·kgf, 13 ft·lbf) with a torque wrench.

EAS20018
LUBRICATION POINTS AND LUBRICANT TYPES

EAS30018
ENGINE

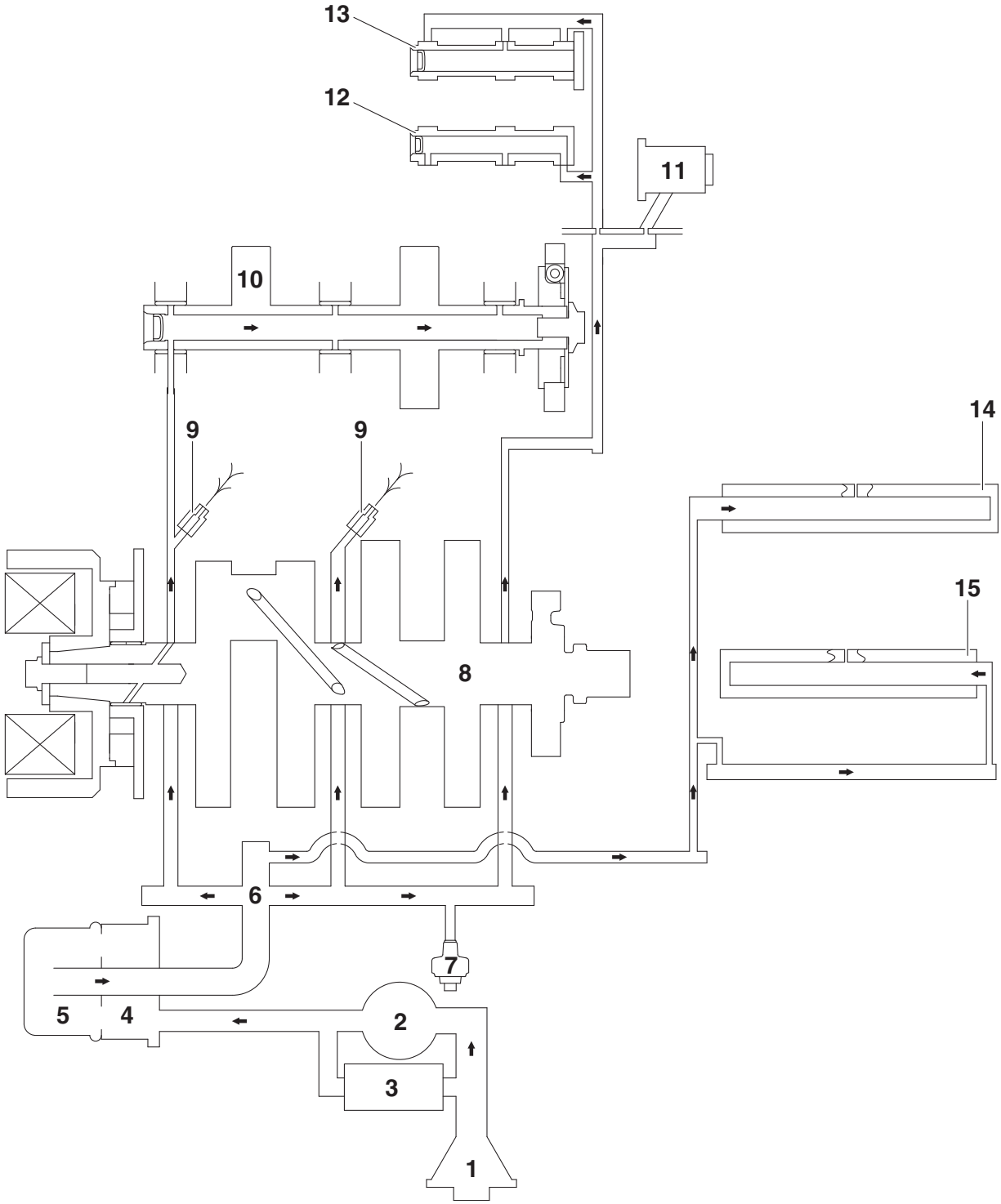
Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Coolant hose insertion part	Water or S
Bearings	E
Camshaft lobes and journals (intake and exhaust)	M
Valve stem seal (installed on valve guide)	S
Valve lifter outer surface (intake and exhaust)	E
Valve stems and stem ends (intake and exhaust)	M
Decompression camshaft moving point	E
Crankshaft big ends	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts	M
Crankshaft journals	E
Balancer shaft journals	E
Generator rotor bolt thread and washer	E
Balancer shaft buffer plate bolt	E
Oil pump rotors (inner and outer)	E
Oil pump shaft	E
Oil cooler union bolt	E
Starter clutch idle 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 thrust washer	E
Clutch boss nut and conical washer	E
Transmission gears (wheel and pinion) and collar	M
Transmission gears inner surface (shift fork contact parts)	M
Drive sprocket nut	E
Shift drum assembly	E
Shift forks and shift fork guide bars	E
Shift shaft washer	E
Shift shaft moving surface	E

EAS30019
CHASSIS

Lubrication point	Lubricant
Front wheel oil seal lips	LS
Rear wheel oil seal lip	LS
Rear wheel drive hub mating surface	LS
Pivot shaft bearing and pivot shaft spacer	LS
Pivot shaft	LS
Connecting arm inside surface	LS
Connecting arm bearing and connecting arm spacer	LS
Relay arm bearing and relay arm spacer	LS
Shift pedal pivoting point and metal-to-metal moving parts	LS
Shift rod joint (engine side)	LS
Rear brake pedal pivoting point and metal-to-metal moving parts	LS
Upper bearing and lower bearing	LS
Upper bearing cover seal lip and lower bearing dust seal lip	LS
Throttle cable housing inner surface and throttle cable	LS
Clutch lever pivoting point and clutch cable	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Sidestand and sidestand switch	LS
Passenger footrest pivoting point	LS

EAS20019
LUBRICATION SYSTEM CHART AND DIAGRAMS

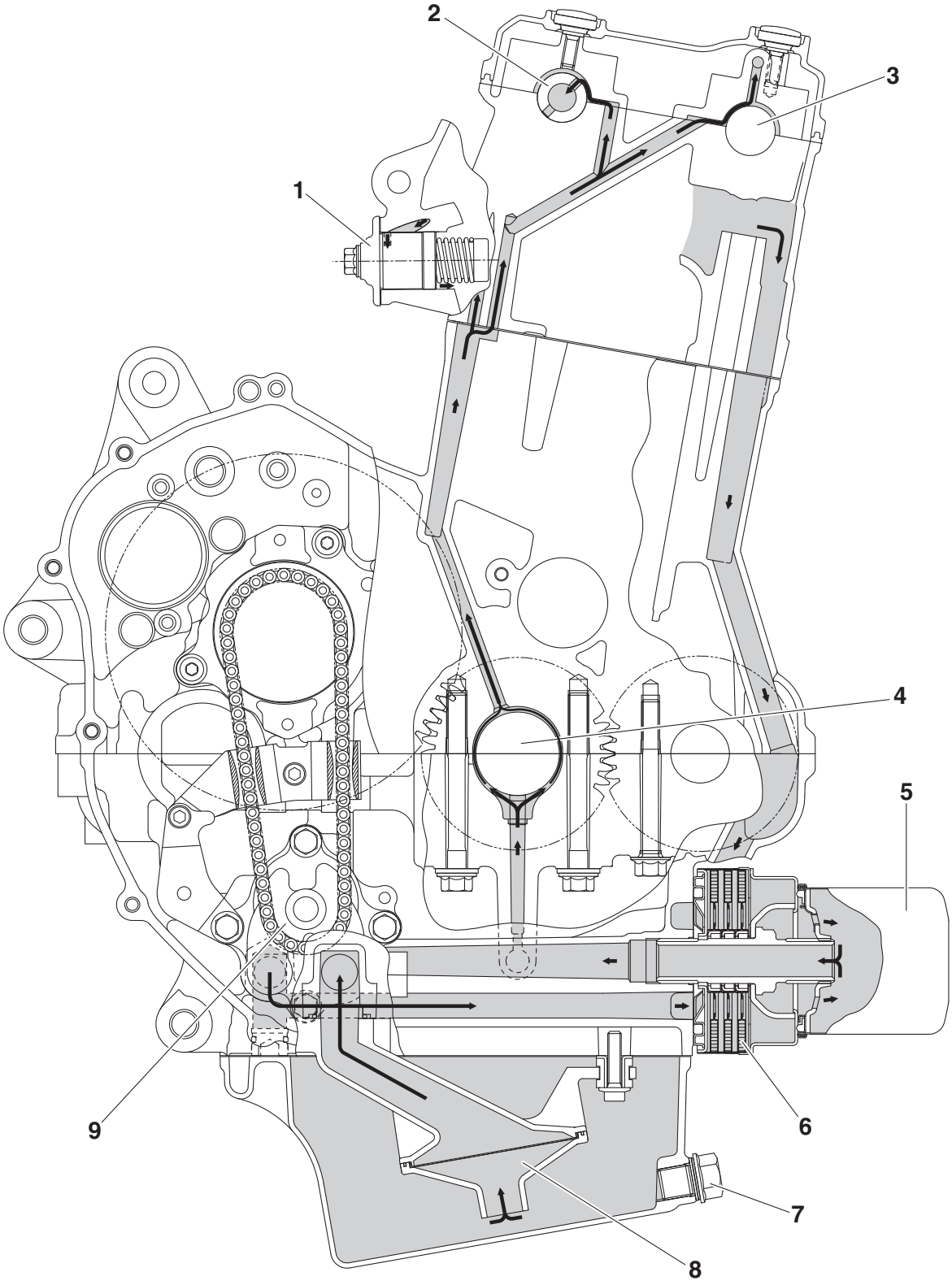
EAS30020
ENGINE OIL LUBRICATION CHART



1. Oil strainer
2. Oil pump
3. Relief valve
4. Oil cooler
5. Oil filter cartridge
6. Main gallery
7. Oil pressure switch
8. Crankshaft
9. Oil nozzle
10. Balancer shaft assembly
11. Timing chain tensioner
12. Intake camshaft
13. Exhaust camshaft
14. Main axle
15. Drive axle

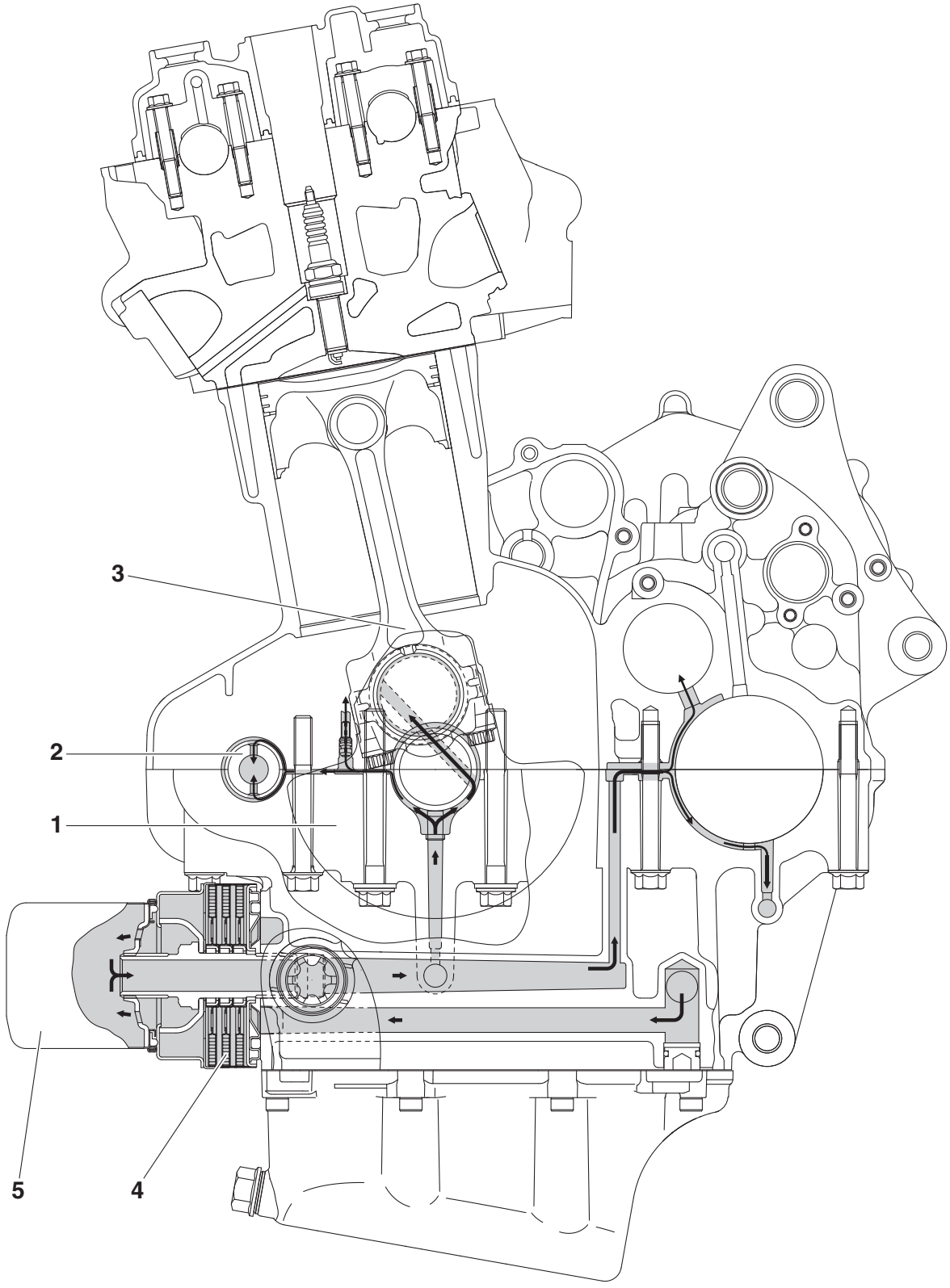
EAS30021
LUBRICATION DIAGRAMS

Crankcase, cylinder, and cylinder head (right side view)



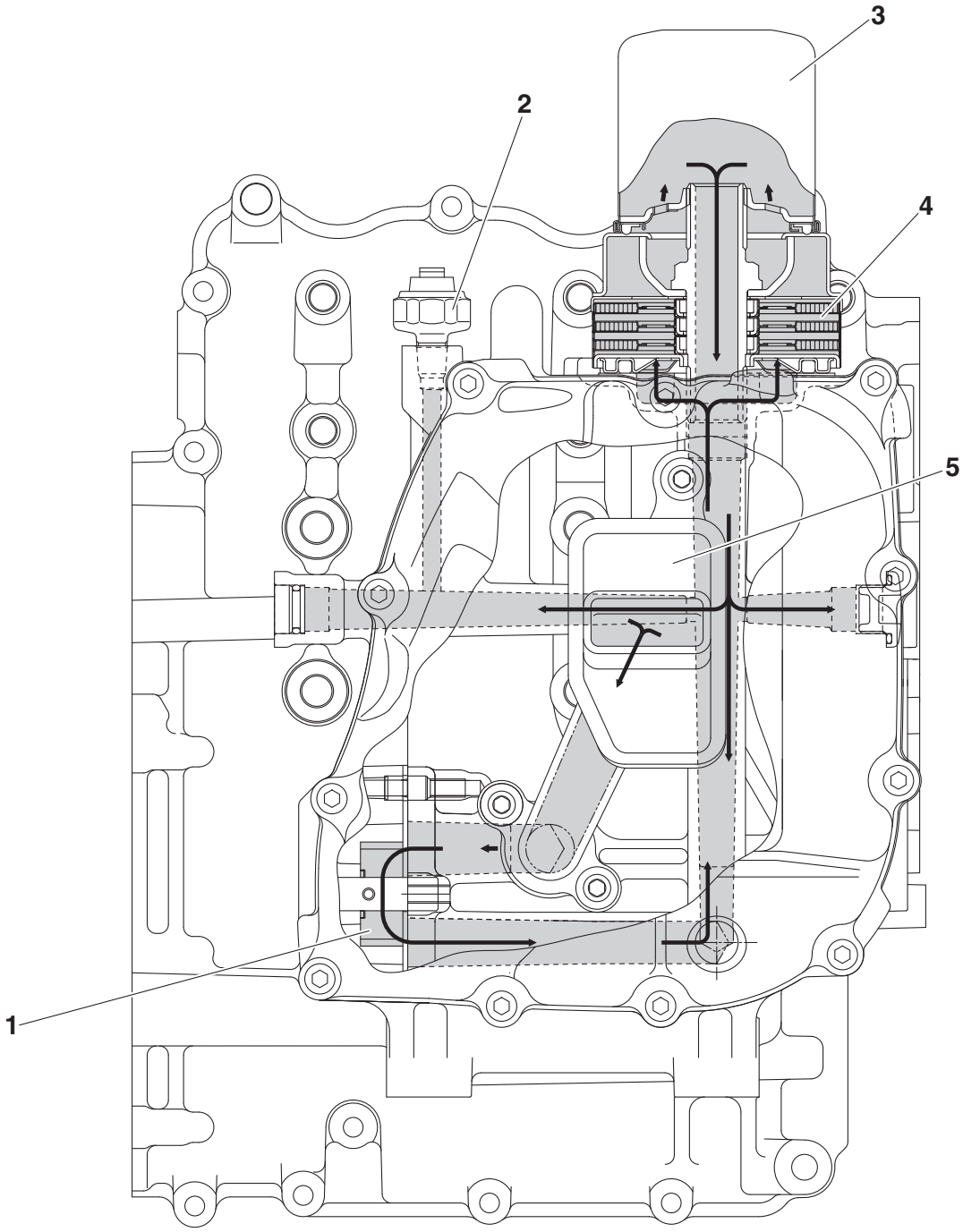
1. Timing chain tensioner
2. Intake camshaft
3. Exhaust camshaft
4. Crankshaft
5. Oil filter cartridge
6. Oil cooler
7. Oil drain bolt
8. Oil strainer
9. Oil pump

Crankcase and cylinder (left side view)



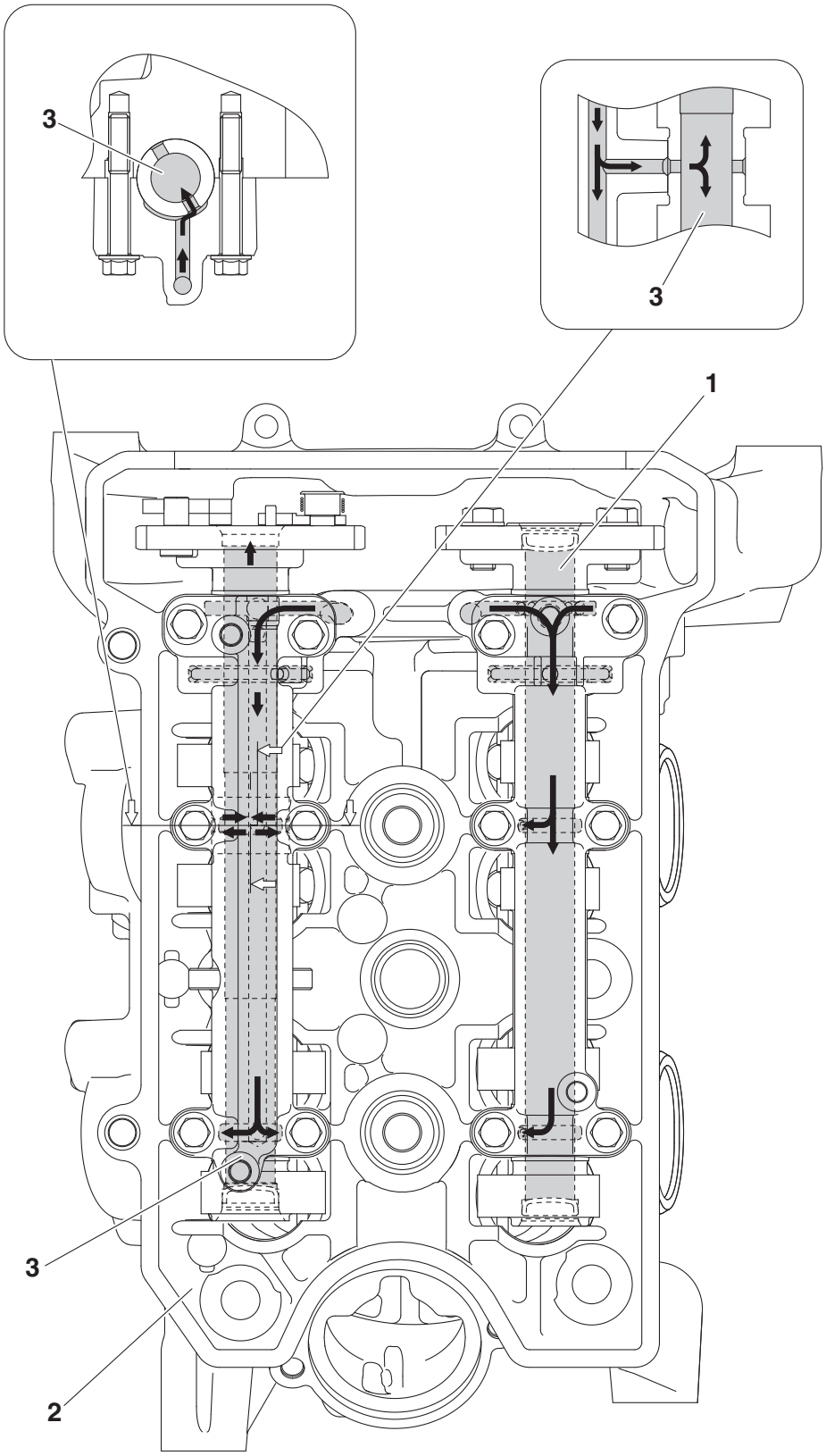
1. Crankshaft
2. Balancer shaft assembly
3. Connecting rod
4. Oil cooler
5. Oil filter cartridge

Oil pump (bottom view)



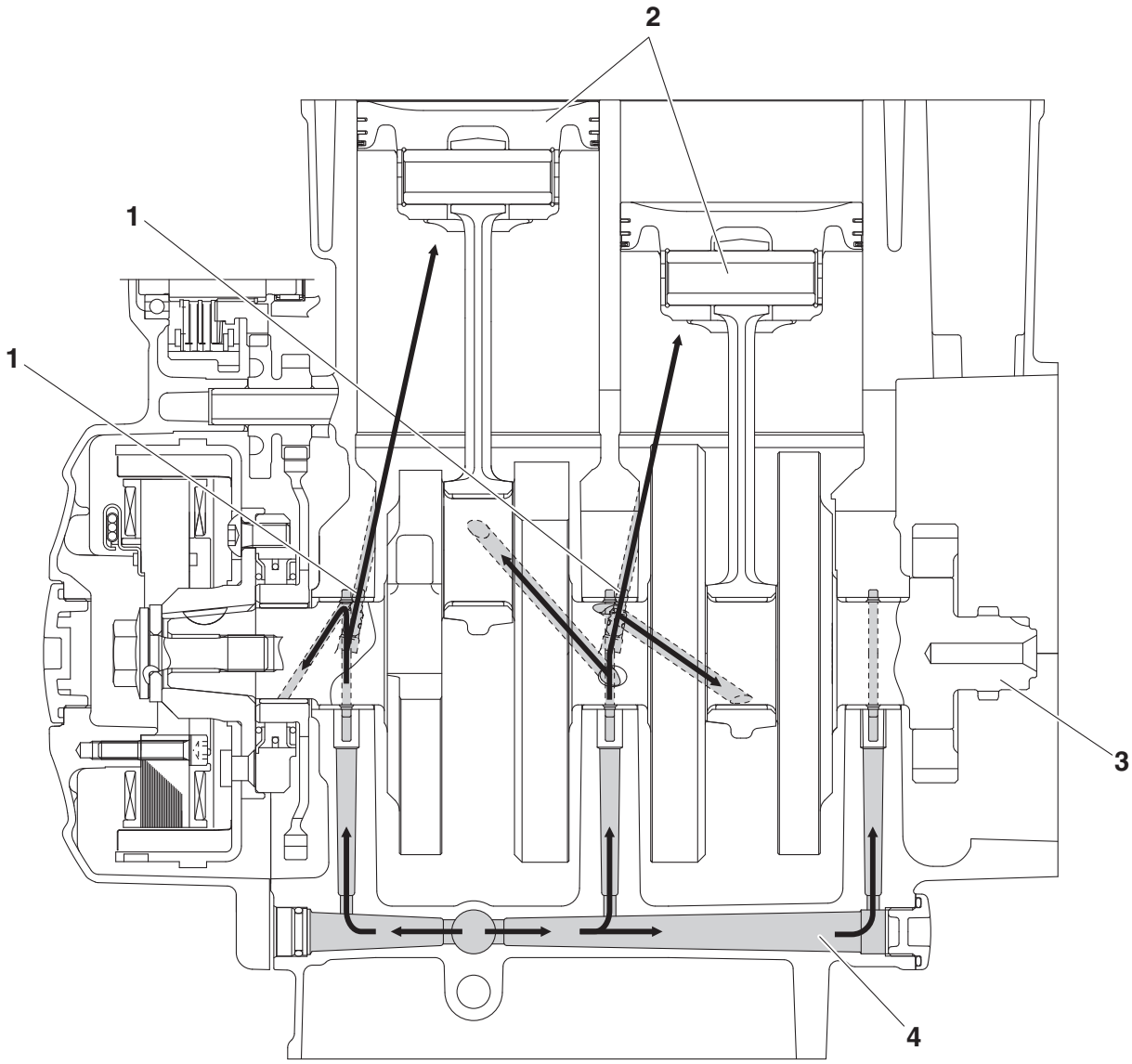
1. Oil pump
2. Oil pressure switch
3. Oil filter cartridge
4. Oil cooler
5. Oil strainer

Camshaft (top view)



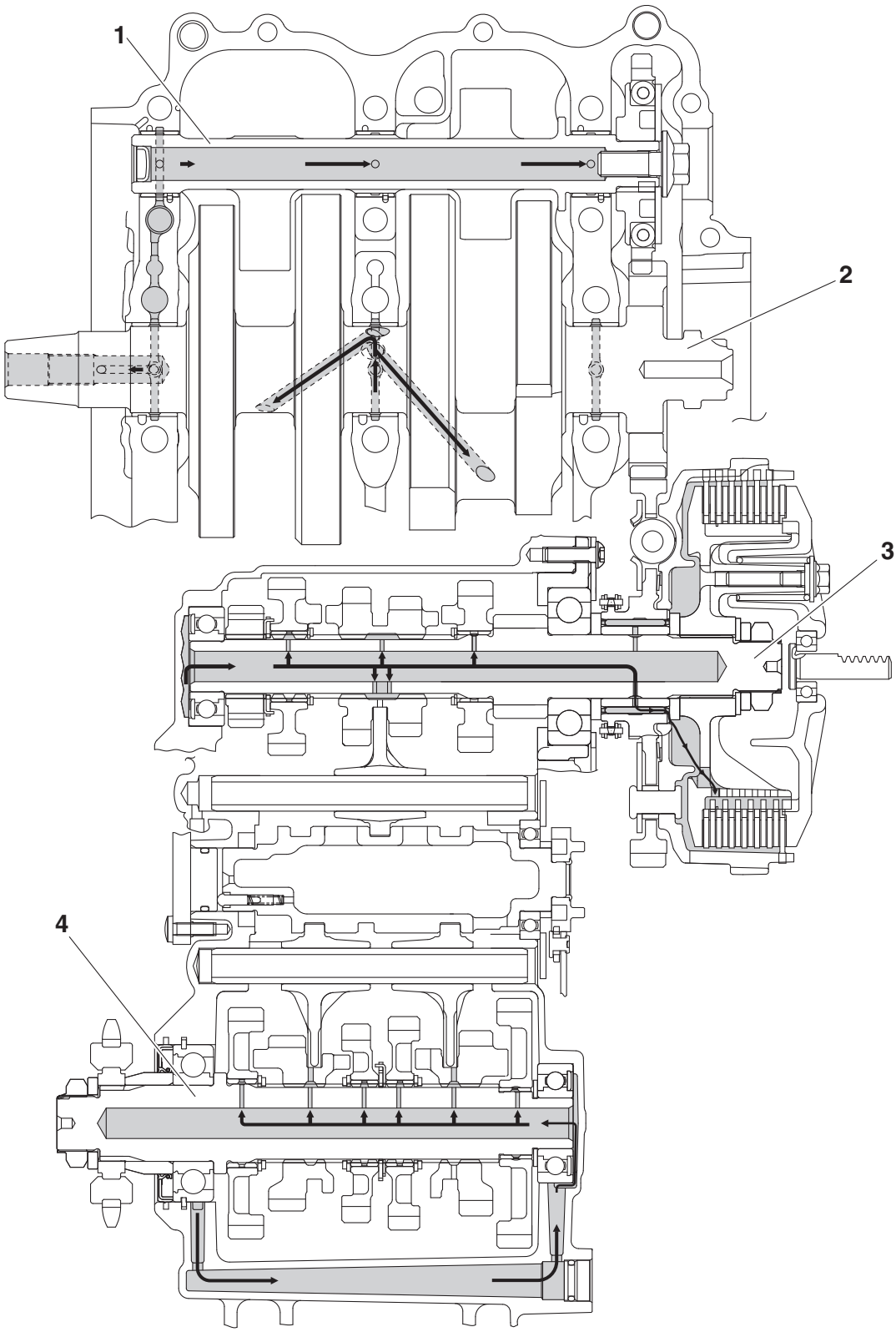
1. Intake camshaft
2. Cylinder head
3. Exhaust camshaft

Crankshaft (front view)



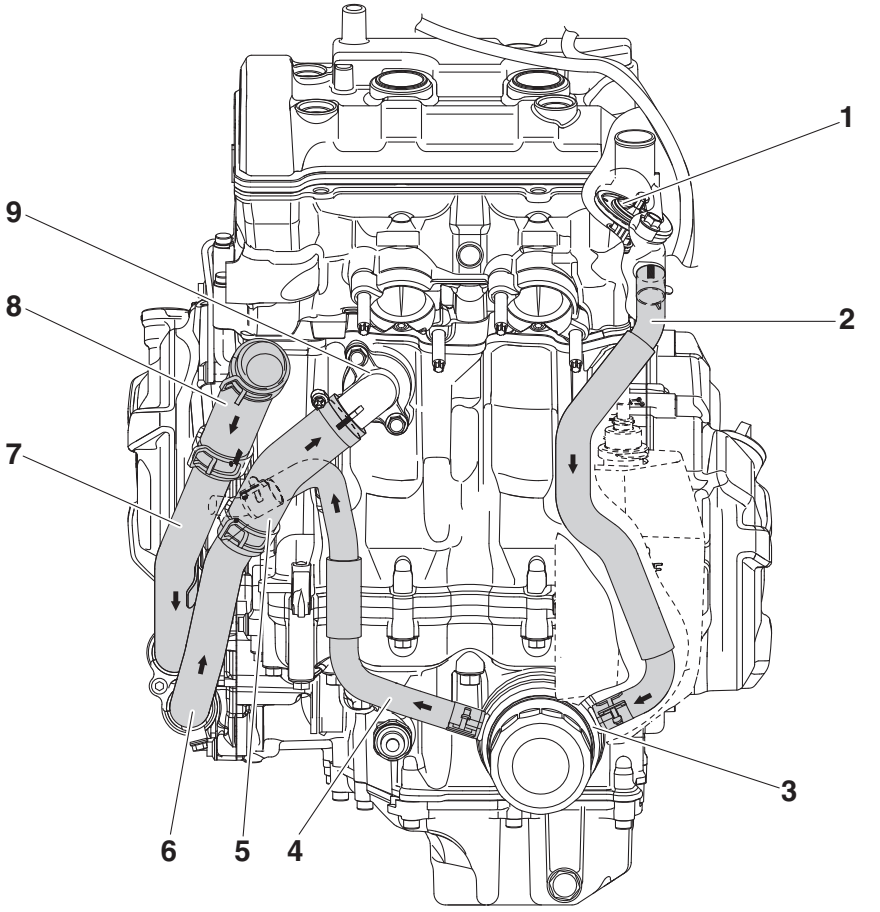
1. Oil nozzle
2. Piston
3. Crankshaft
4. Main gallery

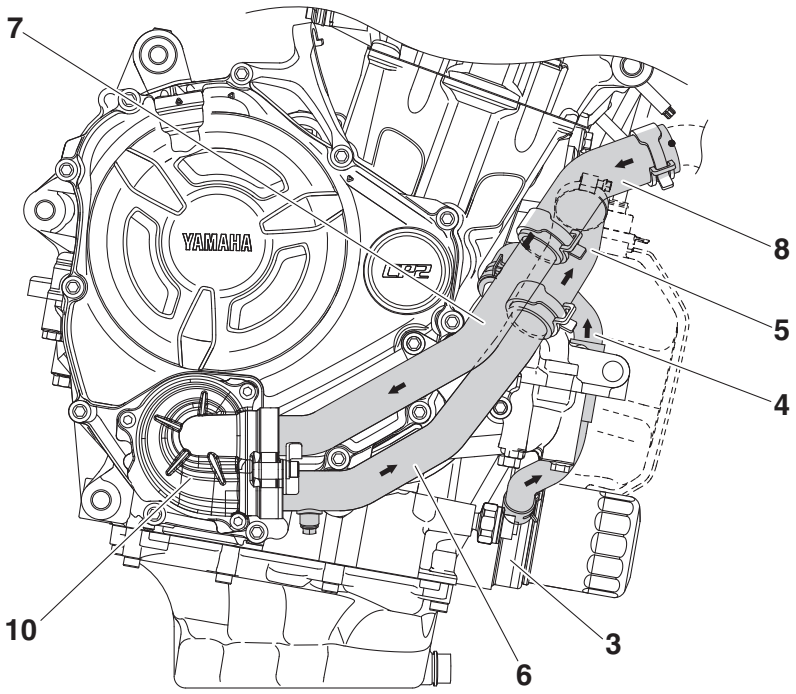
Crankshaft and transmission (top view)



1. Balancer shaft assembly
2. Crankshaft
3. Main axle
4. Drive axle

EAS20020
COOLING SYSTEM DIAGRAMS

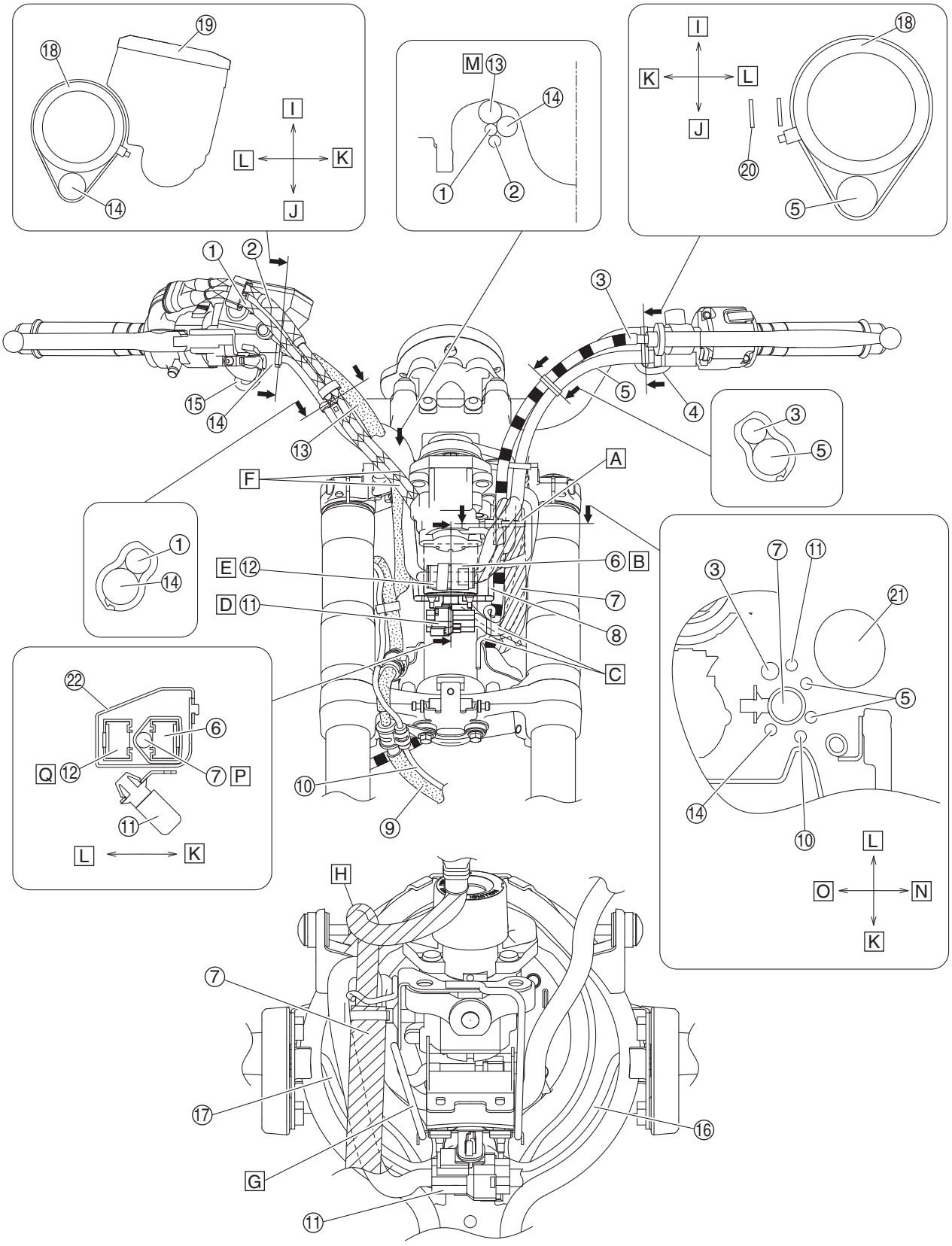




1. Thermostat
2. Oil cooler inlet hose
3. Oil cooler
4. Oil cooler outlet hose
5. Water jacket joint inlet hose
6. Water pump outlet pipe
7. Water pump inlet pipe
8. Radiator outlet hose
9. Water jacket joint
10. Water pump

EAS20021
CABLE ROUTING

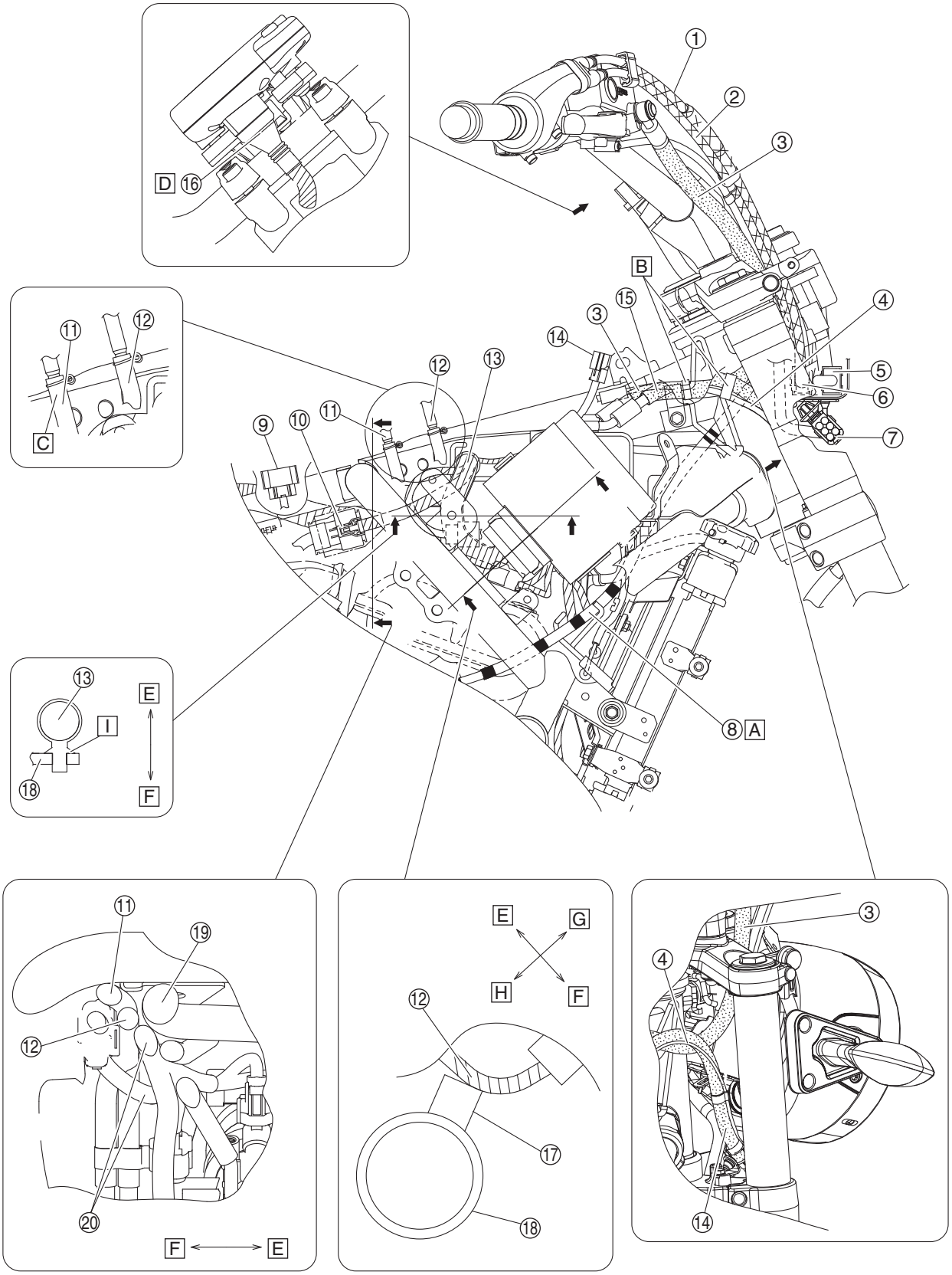
Handlebar (front view)



1. Throttle cable (decelerator cable)
2. Throttle cable (accelerator cable)
3. Clutch cable
4. Clutch switch lead
5. Handlebar switch lead (left handlebar switch)
6. Handlebar switch coupler (left handlebar switch)
7. Wire harness
8. Cable guide
9. Brake hose (hydraulic unit to left front brake caliper)
10. Front wheel sensor lead
11. Sub-wire harness coupler (headlight, turn signal light, and auxiliary light)
12. Handlebar switch coupler (right handlebar switch)
13. Brake hose (front brake master cylinder to hydraulic unit)
14. Handlebar switch lead (right handlebar switch)
15. Front brake light switch lead
16. Front turn signal light lead (right turn signal light)
17. Front turn signal light lead (left turn signal light)
18. Handlebar
19. Front brake master cylinder assembly
20. Clutch lever holder
21. Front fork
22. Coupler cover

A. Insert the projection on the holder into the hole in the cable guide.
B. Fasten the left handlebar switch coupler to the wire harness with tape, and then place the coupler in the coupler cover. Make sure that the wire harness is positioned to the rear of the coupler.
C. Route the throttle cables through the guide. Be sure to route the throttle cable (decelerator cable) over the throttle cable (accelerator cable).
D. Connect the sub-wire harness coupler (headlight, turn signal light, and auxiliary light), and then insert the projection on the coupler into the hole in the cable guide.
E. Position the right handlebar switch coupler to the rear of the left handlebar switch coupler.
F. Route the throttle cables to the rear of the main switch.
G. Connect the auxiliary light coupler, and then place the coupler in the headlight body.
H. To meter assembly
I. Upward
J. Downward
K. Forward
L. Rearward
M. Route the brake hose (front brake master cylinder to hydraulic unit) through the guide as shown in the illustration.
N. Outward
O. Inward
P. Bend the wire harness 180° and secure it with tape.
Q. Connect the right handlebar switch coupler, and then place the coupler in the coupler cover.

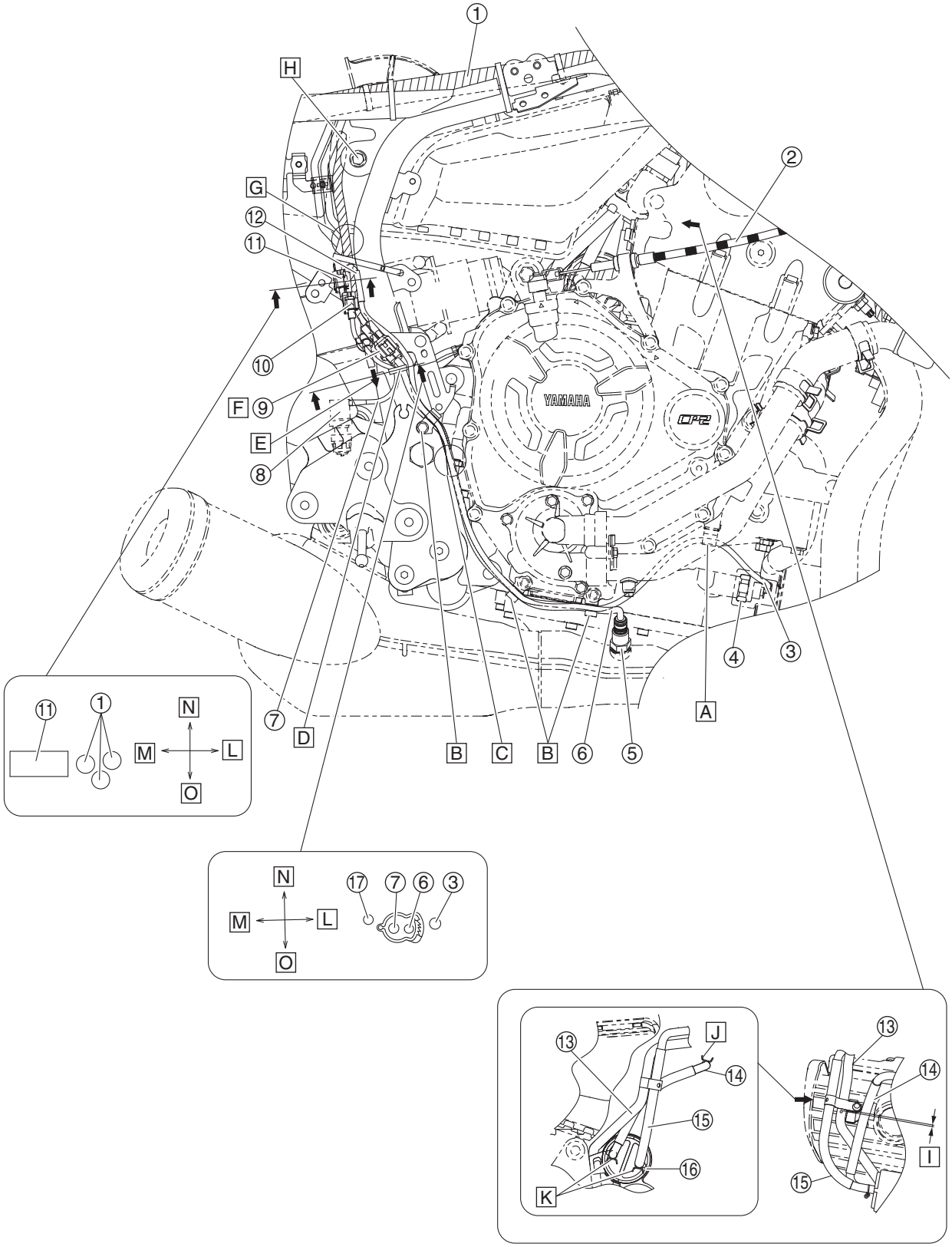
ECU and clutch cable (right side view)



1. Throttle cable (accelerator cable)
2. Throttle cable (decelerator cable)
3. Brake hose (front brake master cylinder to hydraulic unit)
4. Front wheel sensor lead
5. Handlebar switch coupler (left handlebar switch)
6. Handlebar switch coupler (right handlebar switch)
7. Sub-wire harness coupler (headlight, turn signal light, and auxiliary light)
8. Clutch cable
9. Fuel pump coupler
10. Sub-wire harness coupler
11. Fuel tank breather hose
12. Fuel tank overflow hose
13. Wire harness
14. Intake air temperature sensor coupler
15. Brake hose (hydraulic unit to left front brake caliper)
16. Meter assembly cover
17. Damper
18. Frame
19. Cylinder head breather hose
20. Sub-wire harness

A. Route the clutch cable through the guide as shown in the illustration.
B. Fasten the brake hose (hydraulic unit to left front brake caliper) and front wheel sensor lead with the holders. Refer to “CABLE ROUTING (Hydraulic unit assembly (top and right side view))”.
C. Blue paint mark
D. After connecting the meter assembly coupler, install the coupler cover completely until it contacts the meter assembly.
E. Inward
F. Outward
G. Forward
H. Rearward
I. Insert the projection on the wire harness holder into the hole in the frame.

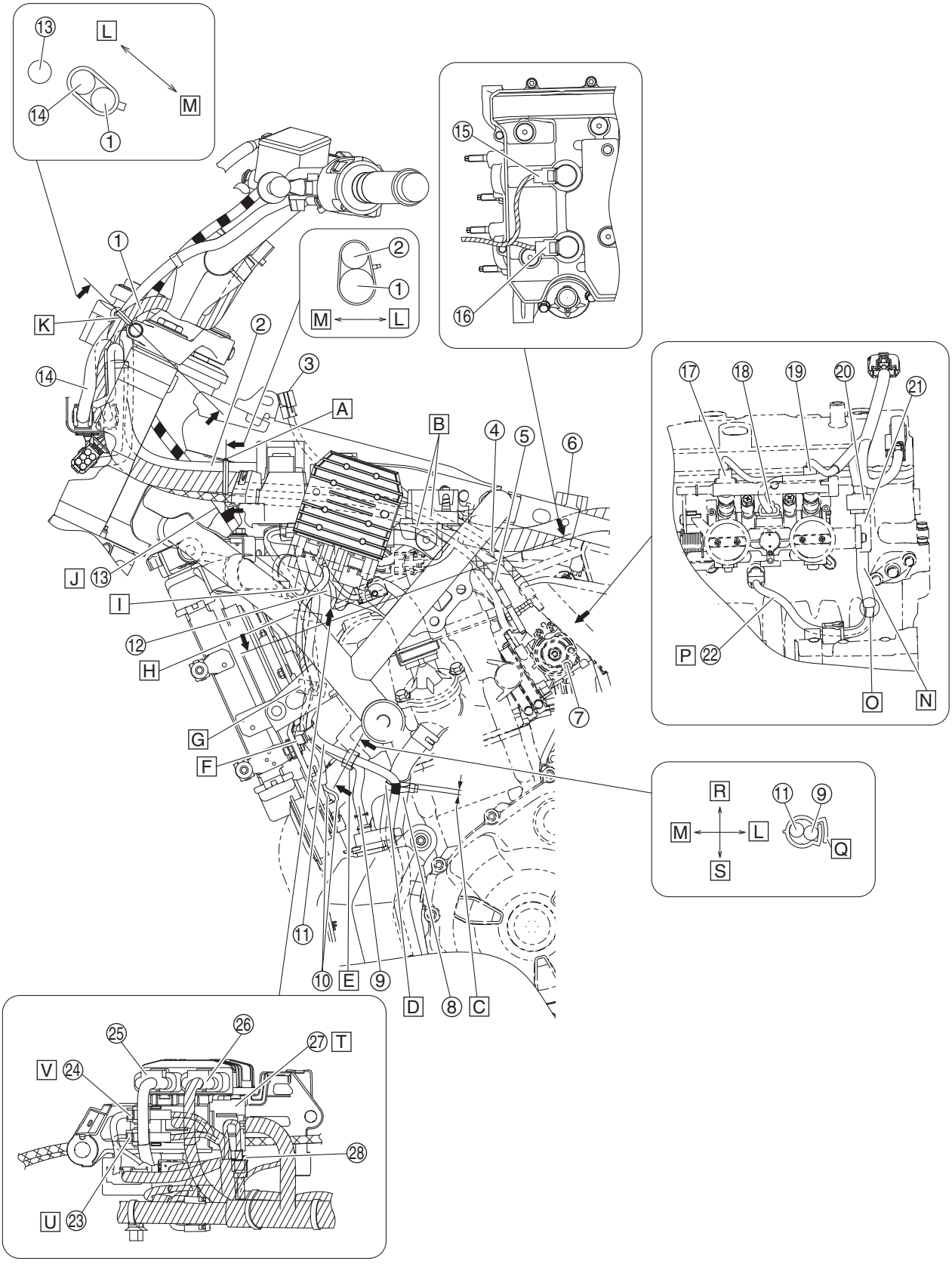
Canister (right side view)



1. Wire harness
2. Clutch cable
3. Oil pressure switch lead
4. Oil pressure switch
5. O_2 sensor
6. O_2 sensor lead
7. Rear brake light switch lead
8. Rear brake light switch
9. O_2 sensor coupler
10. Rear brake light switch coupler
11. Rear wheel sensor coupler
12. Oil pressure switch connector
13. Fuel tank overflow hose
14. Canister purge hose (hose joint to canister)
15. Fuel tank breather hose
16. Canister
17. Rear wheel sensor lead

A. Route the oil pressure switch lead through the guide, and then secure the lead by bending the guide around the lead.
B. Route the oil pressure switch lead to the inside of the O_2 sensor lead, and then secure the leads by bending the guides around the leads.
C. Do not pinch the O_2 sensor lead between the pivot shaft protector and the engine.
D. Fasten the rear brake light switch lead and O_2 sensor lead with the holder.
E. To rear brake caliper bracket
F. Connect the O_2 sensor coupler, and then insert the projection on the coupler into the hole in the bracket.
G. Make sure that the wire harness is not pinched between the pivot shaft protector (right) and the frame.
H. Route the wire harness to the inside of the bracket as shown in the illustration so that the harness does not contact the air filter case bolt flange.
I. Less than 10 mm (0.39 in)
J. Point the ends of the hose clamp upward.
K. Point the ends of the hose clamp downward.
L. Forward
M. Rearward
N. Inward
O. Outward

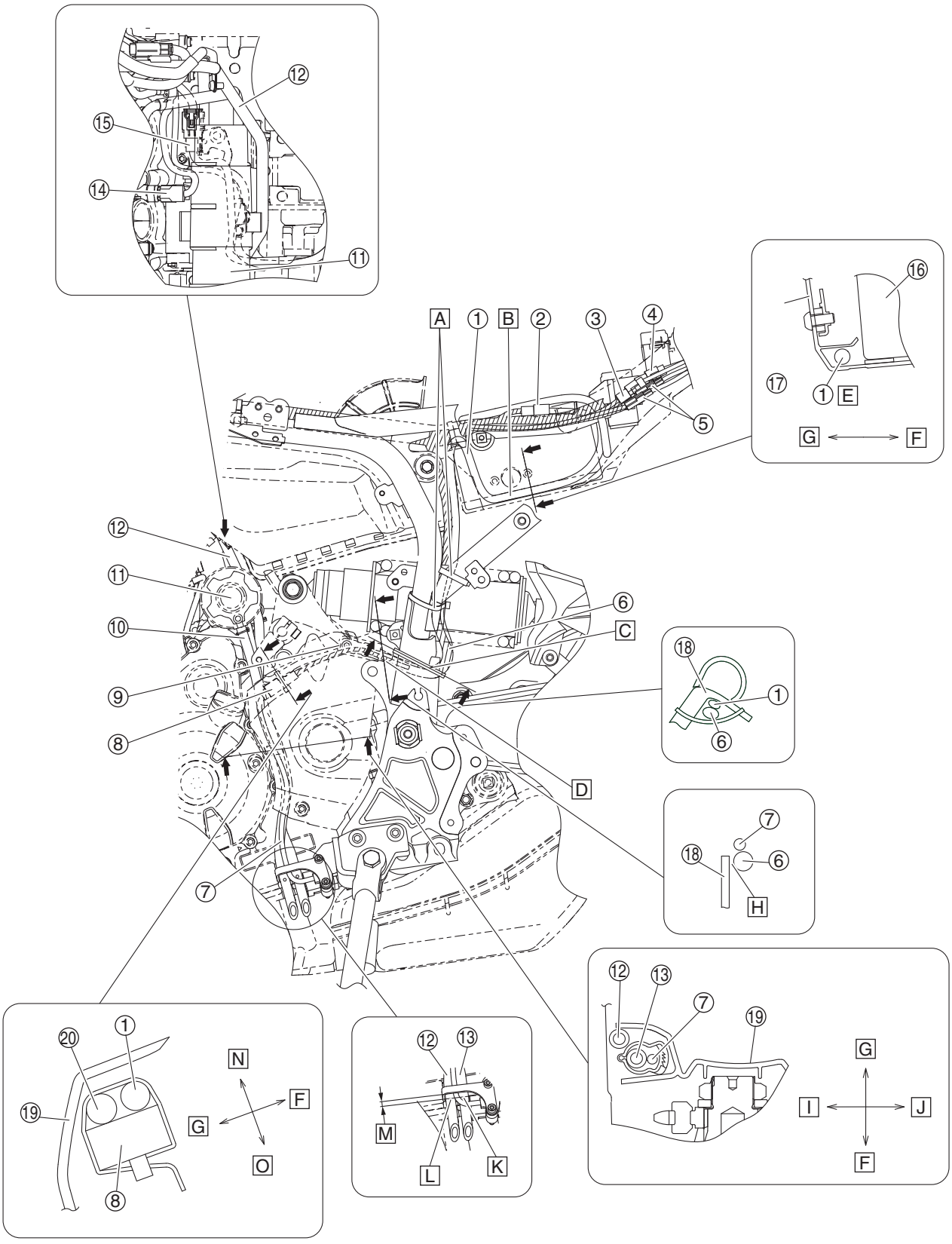
Rectifier/regulator (left side view)



1. Wire harness
2. Main switch lead
3. Intake air temperature sensor coupler
4. Throttle cable (decelerator cable)
5. Throttle cable (accelerator cable)
6. Fuel pump coupler
7. Throttle body assembly
8. Oil cooler inlet hose
9. Coolant reservoir hose
10. Horn lead
11. AC magneto lead
12. Radiator inlet hose
13. Clutch cable
14. Handlebar switch lead (left handlebar switch)
15. Ignition coil #2 coupler
16. Ignition coil #1 coupler
17. Injector #1 coupler
18. ISC (Idle Speed Control) unit coupler
19. Injector #2 coupler
20. Throttle position sensor coupler
21. Throttle position sensor
22. Coolant temperature sensor lead
23. Crankshaft position sensor coupler
24. Radiator fan motor coupler
25. AC magneto lead coupler
26. Rectifier/regulator coupler
27. Joint coupler
28. Auxiliary DC outlet coupler

A. Fasten the main switch lead and wire harness with the plastic band at the location shown in the illustration.
B. Make sure that the throttle cables do not cross between the guide on the frame and the throttle body.
C. 5–10 mm (0.20–0.39 in)
D. Fasten the AC magneto lead to the oil cooler inlet hose with a plastic locking tie. Make sure to route the AC magneto lead to the outside of the oil cooler inlet hose. Align the plastic locking tie with the blue tape on the AC magneto lead. Face the buckle of the plastic locking tie rearward, and then cut off the excess end of the tie to 2 mm (0.08 in) or less.
E. Fasten the AC magneto lead and coolant reservoir hose with the holder at the location shown in the illustration. Make sure that there is no slack in the AC magneto lead.
F. Secure the holder by inserting the projection on the holder into the hole in the radiator fan motor bracket, and then fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder. Make sure that the coolant reservoir hose and leads do not cross between the oil cooler inlet hose and this holder.
G. Fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder.
H. Fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder at the location shown in the illustration. Make sure that there is no slack in the AC magneto lead, horn lead, and coolant reservoir hose.
I. Route the AC magneto lead to the inside of the radiator inlet hose, and then connect the AC magneto coupler to the rectifier/regulator.
J. Route the clutch cable through the hole in the cover.
K. Fasten the left handlebar switch lead and wire harness with the plastic band at the location shown in the illustration.
L. Inward
M. Outward
N. Route the coolant temperature sensor lead and gear position switch lead between the throttle position sensor and the cylinder head.
O. The gear position switch lead and coolant temperature sensor lead may be positioned and routed in any order. Make sure that there is no slack in the gear position switch lead.
P. Route the coolant temperature sensor lead to the front of the gear position switch lead.
Q. Face the catch of the holder inward.
R. Upward
S. Downward
T. Install the joint coupler completely onto the tab on the electrical components tray 1.
U. Connect the coupler, and then insert the projection on the coupler into the hole in the electrical components tray 1.
V. Connect the coupler, and then insert the projection on the coupler into the hole in the electrical components tray 1.

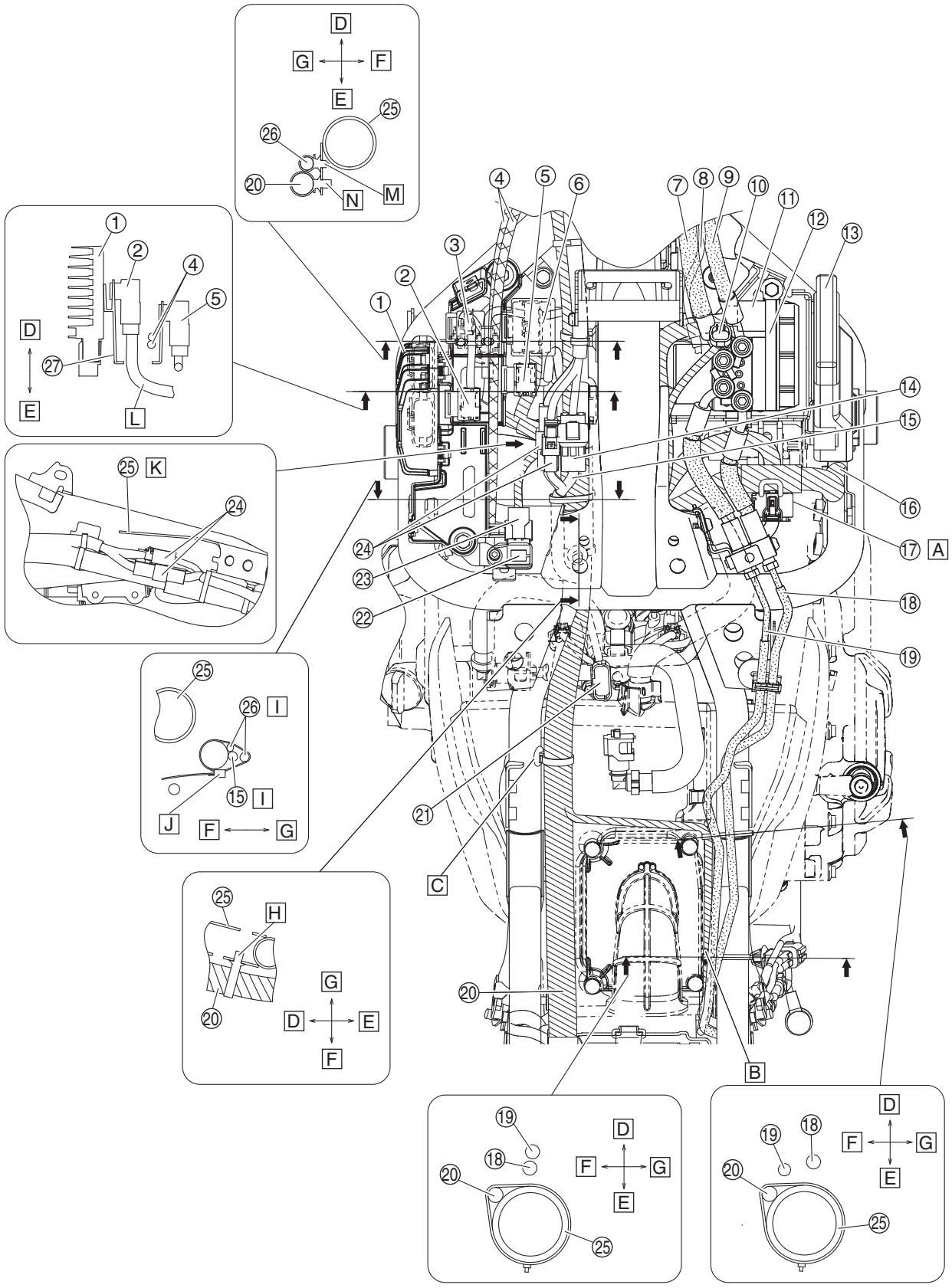
Canister (left side view)



1. Starter motor lead
2. Positive battery sub-wire harness
3. Tail/brake light coupler
4. License plate light coupler
5. Rear turn signal light coupler
6. Engine ground lead
7. Sidestand switch lead
8. Sidestand switch coupler
9. Terminal cover
10. Canister breather hose
11. Canister
12. Fuel tank overflow hose
13. Fuel tank breather hose
14. Coolant temperature sensor coupler
15. Gear position switch coupler
16. Battery
17. Battery box
18. Frame
19. Drive sprocket cover
20. Gear position switch lead

A. Fasten the engine ground lead and starter motor lead to the frame with plastic locking ties. Point the end of each plastic locking tie rearward, and then cut off the excess end of the tie to 2 mm (0.08 in) or less.
B. Make sure that the starter motor lead is not twisted.
C. Fasten the starter motor lead and engine ground lead with the holder. Align the white tape on the starter motor lead with the holder.
D. Make sure that there is no twist in the starter motor lead and sidestand switch lead.
E. Fit the starter motor lead between the bottom of the battery box and the rib on the battery box.
F. Inward
G. Outward
H. Do not pinch the sidestand switch lead between the engine ground lead and the frame.
I. Forward
J. Rearward
K. Blue paint mark
L. White paint mark
M. 2–3 mm (0.08–0.12 in)
N. Upward
O. Downward

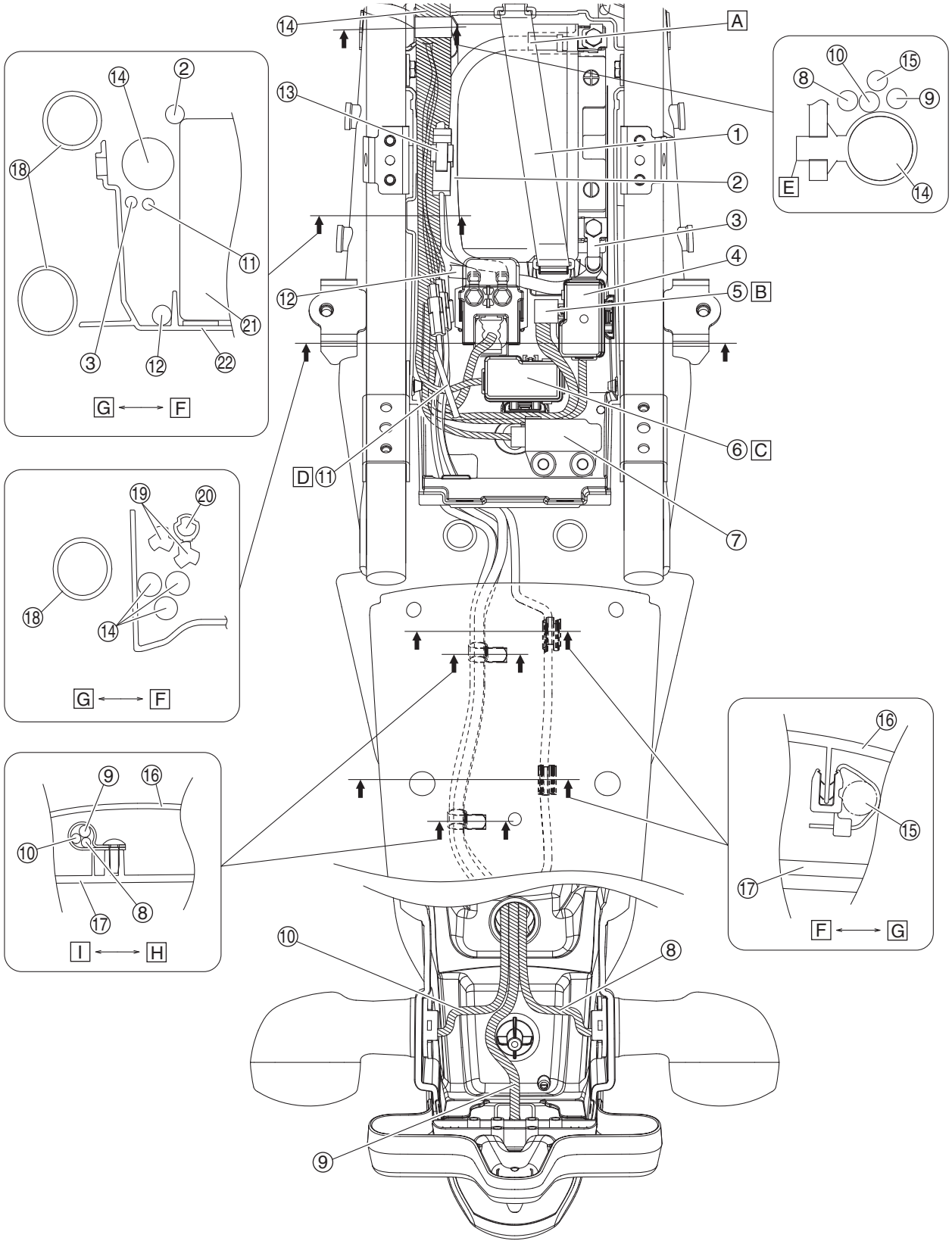
Electrical components tray (top view)



1. Rectifier/regulator
2. Headlight relay
3. Turn signal/hazard relay
4. Throttle cable
5. Radiator fan motor relay
6. Relay unit
7. Brake hose (front brake master cylinder to hydraulic unit)
8. Front wheel sensor lead
9. Brake hose (hydraulic unit to left front brake caliper)
10. Intake air temperature sensor coupler
11. ABS ECU coupler
12. Hydraulic unit assembly
13. ECU (Engine Control Unit)
14. Immobilizer unit coupler
15. Immobilizer unit lead
16. ECU lead
17. Sub-wire harness coupler
18. Brake hose (hydraulic unit to rear brake caliper)
19. Brake hose (rear brake master cylinder to hydraulic unit)
20. Wire harness
21. Fuel pump coupler
22. Intake air pressure sensor
23. Intake air pressure sensor coupler
24. Main switch coupler
25. Frame
26. Main switch lead
27. Electrical components tray 1

A. Insert the projection on the bracket into the hole in the sub-wire harness coupler.
B. White paint mark
C. Insert the projection on the wire harness holder into the hole in the frame.
D. Forward
E. Rearward
F. Inward
G. Outward
H. Insert the projection on the wire harness holder into the hole in the frame from the bottom of the frame.
I. Route the immobilizer unit lead and main switch lead to the outside of the wire harness.
J. Face the buckle of the plastic band downward with the end pointing inward.
K. Position the immobilizer unit coupler and main switch couplers under the frame.
L. Route the headlight relay lead and turn signal/hazard relay lead through the rear hole in the electrical component tray 1.
M. Insert the projection on the main switch lead holder into the upper hole in the frame.
N. Insert the projection on the wire harness holder into the lower hole in the frame.

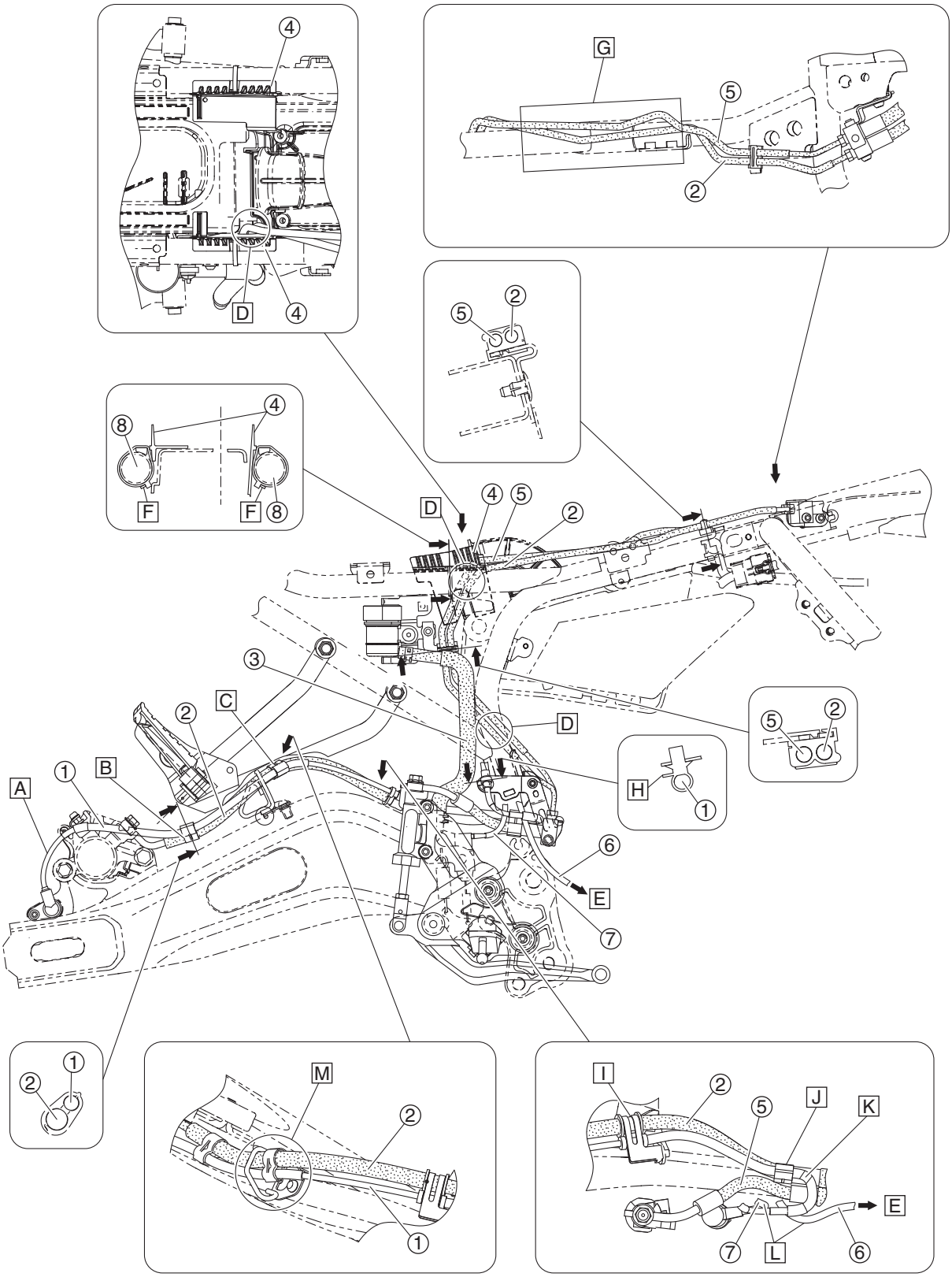
Battery and rear fender (top view)



1. Battery band
2. Positive battery lead
3. Negative battery lead
4. Fuse box 1
5. Yamaha diagnostic tool coupler
6. Fuse box 2
7. Lean angle sensor
8. Rear turn signal light lead (right turn signal light)
9. License plate light lead
10. Rear turn signal light lead (left turn signal light)
11. Seat lock cable
12. Starter motor lead
13. Positive battery sub-wire harness coupler
14. Wire harness
15. Tail/brake light lead
16. Rear fender
17. Lower fender cover
18. Frame
19. Rear turn signal light coupler
20. License plate light coupler
21. Battery
22. Battery box

A. Route the positive battery lead through the hole in the battery band.
B. Position the Yamaha diagnostic tool lead and coupler above fuse boxes 1 and 2 as shown in the illustration.
C. Connect all of the couplers near fuse box 2, and then install fuse box 2 to the battery box.
D. Route the seat lock cable over the each lead.
E. Insert the projection on the wire harness holder into the hole in the battery box.
F. Inward
G. Outward
H. Right
I. Left

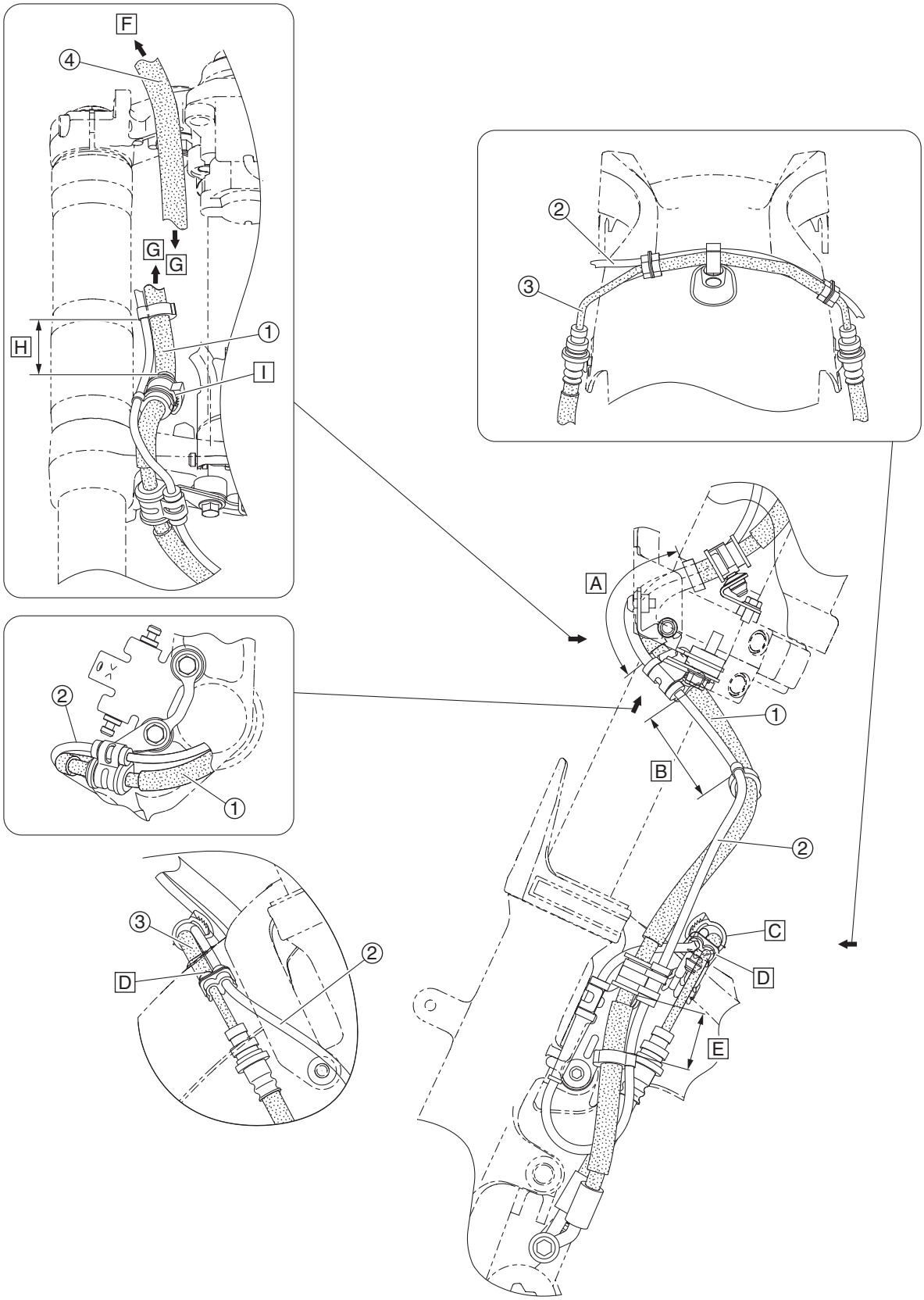
Rear brake hose (right side view)



1. Rear wheel sensor lead
2. Brake hose (hydraulic unit to rear brake caliper)
3. Rear brake fluid reservoir hose
4. Seal
5. Brake hose (rear brake master cylinder to hydraulic unit)
6. O_2 sensor lead
7. Rear brake light switch lead
8. Frame

A. Route the rear wheel sensor lead to the outside of the brake hose (hydraulic unit to rear brake caliper). Make sure that the rear wheel sensor lead is not twisted.
B. Align the holder with the pipe section of the brake hose (hydraulic unit to rear brake caliper).
C. Position the holder halfway between the guide and the end of the protective sleeve on the rear wheel sensor lead as shown in the illustration.
D. Route the brake hoses to the inside of the frame.
E. To O_2 sensor
F. Fasten the seal to the frame with a plastic locking tie. Face the buckle of the plastic locking tie inward with the end pointing downward.
G. Route the brake hoses on top of the frame.
H. Point the end of the plastic locking tie rearward, and then cut off the excess end of the tie to 5 mm (0.20 in) or less.
I. Fasten the grommets on the rear wheel sensor lead and the brake hose (hydraulic unit to rear brake caliper) with the holder.
J. Fasten the rear wheel sensor lead and brake hose (hydraulic unit to rear brake caliper) with the holder. Route the rear wheel sensor lead over the brake hose (hydraulic unit to rear brake caliper). Align the holder with the pipe section of the brake hose (hydraulic unit to rear brake caliper), making sure that the white tape on the rear wheel sensor lead is positioned to the front of the holder.
K. White tape
L. Route the rear brake light switch lead and O_2 sensor lead to the inside of the rear wheel sensor lead.
M. Route the rear wheel sensor lead and brake hose (hydraulic unit to rear brake caliper) through the guide.

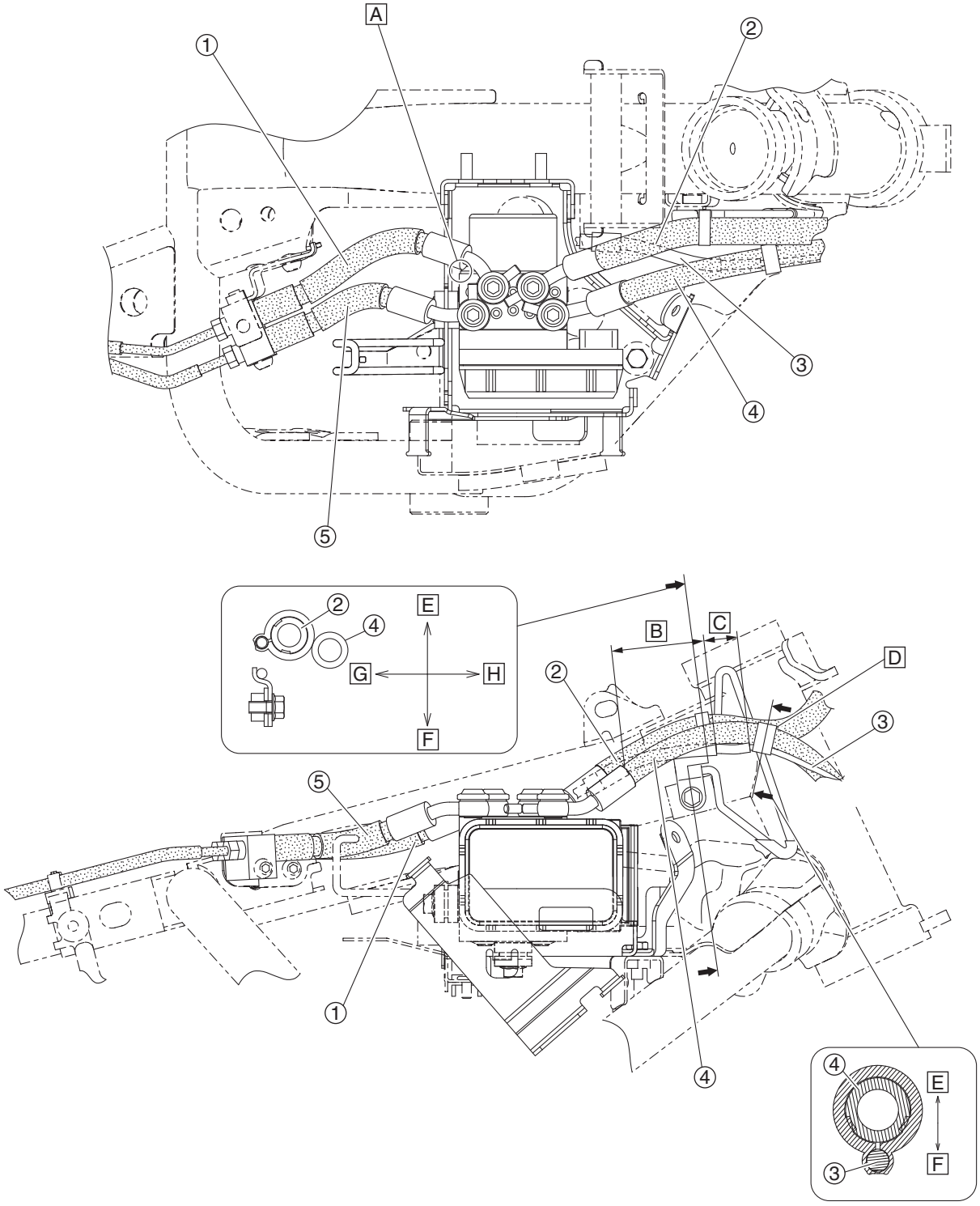
Front brake hose (left and right side view)



1. Brake hose (hydraulic unit to left front brake caliper)
2. Front wheel sensor lead
3. Brake hose (left front brake caliper to right front brake caliper)
4. Brake hose (front brake master cylinder to hydraulic unit)

A. Make sure that there is no slack in the front wheel sensor lead and that the lead is not pinched between the headlight bracket and the brake hose (hydraulic unit to left front brake caliper) in the area shown in the illustration.
B. Fasten the front wheel sensor lead and brake hose (hydraulic unit to left front brake caliper) with the holder as shown in the illustration. Position the holder 80–100 mm (3.15–3.94 in) from the grommet on the hose and route the lead over the hose.
C. Face the catch of the holder forward, and then close the holder until three clicks or more are heard.
D. Make sure that the holder contacts the end of the hose protector on the brake hose.
E. Fasten the front wheel sensor lead and brake hose (hydraulic unit to left front brake caliper) with the holder as shown in the illustration. Position the holder 30–50 mm (1.18–1.97 in) from the grommet on the hose and route the lead to the rear of the hose.
F. To front brake master cylinder
G. To hydraulic unit
H. 15–25 mm (0.59–0.98 in)
I. Fasten the front wheel sensor lead and brake hose (hydraulic unit to left front brake caliper) with the holder as shown in the illustration. Position the holder 15 mm (0.59 in) or less from the grommet on the hose and route the lead to the outside of the hose. Face the catch of the holder inward, and then close the holder until three clicks or more are heard.

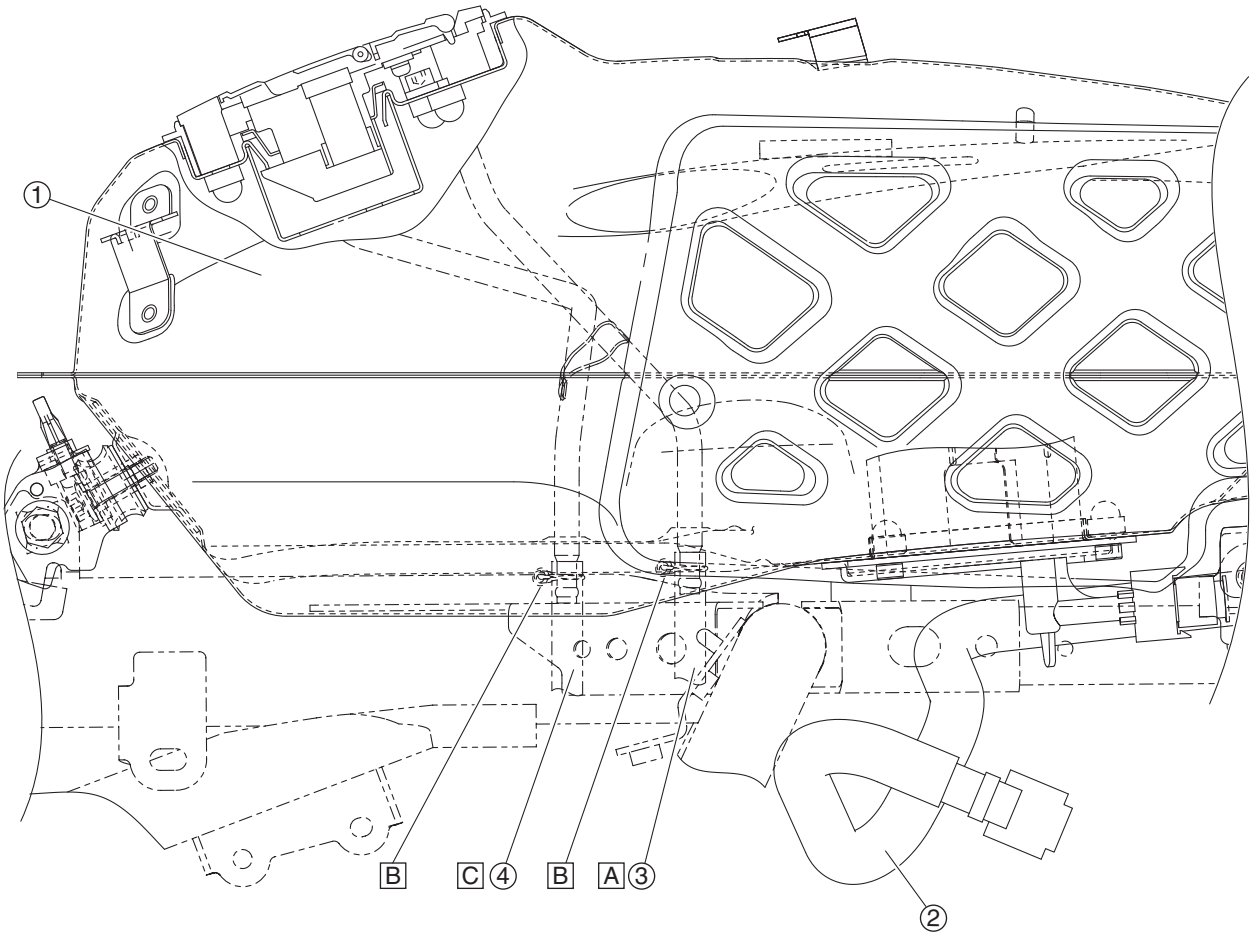
Hydraulic unit assembly (top and right side view)



1. Brake hose (rear brake master cylinder to hydraulic unit)
2. Brake hose (front brake master cylinder to hydraulic unit)
3. Front wheel sensor lead
4. Brake hose (hydraulic unit to left front brake caliper)
5. Brake hose (hydraulic unit to rear brake caliper)

A. Make sure that the pipe section of the brake hose (rear brake master cylinder to hydraulic unit) does not contact the hydraulic unit.
B. Protective sleeve and tape
C. Tape
D. Fasten the front wheel sensor lead to the brake hose (hydraulic unit to left front brake caliper) with the holder. Align the edge of the holder with the edge of the tape on the front wheel sensor lead as shown in the illustration.
E. Upward
F. Downward
G. Inward
H. Outward

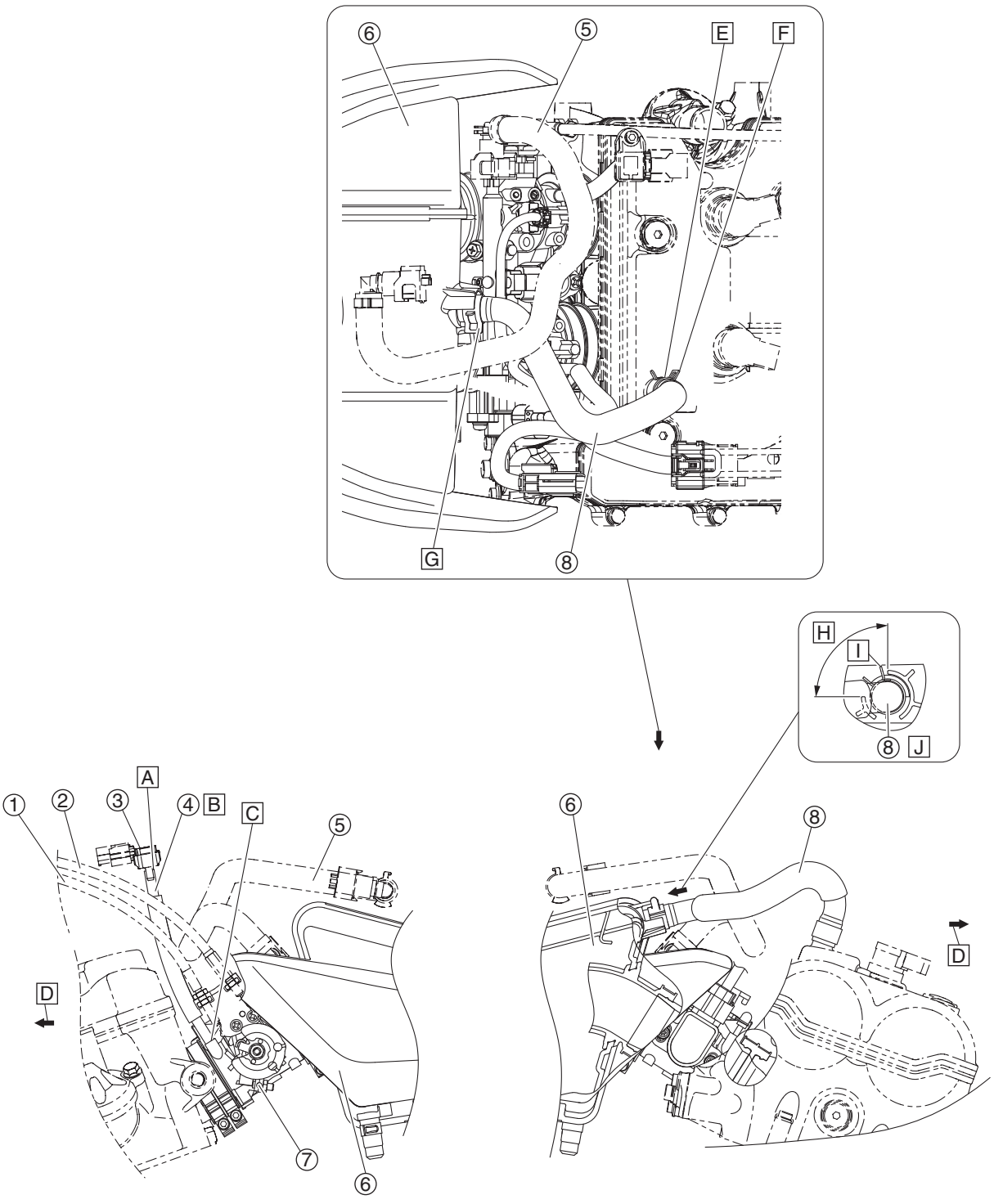
Fuel tank (left side view)



1. Fuel tank
2. Fuel hose
3. Fuel tank breather hose
4. Fuel tank overflow hose

A. Face the blue paint mark on the fuel tank breather hose to the right. Install the hose up to the wide portion of the pipe.
B. Align the ends of the hose clamp with the paint mark on the hose. Make sure not to install the hose clamp on the raised portion of the hose fitting. Make sure that the hose clamp does not contact the bottom of the fuel tank.
C. Face the white paint mark on the fuel tank overflow hose to the right. Install the hose up to the wide portion of the pipe.

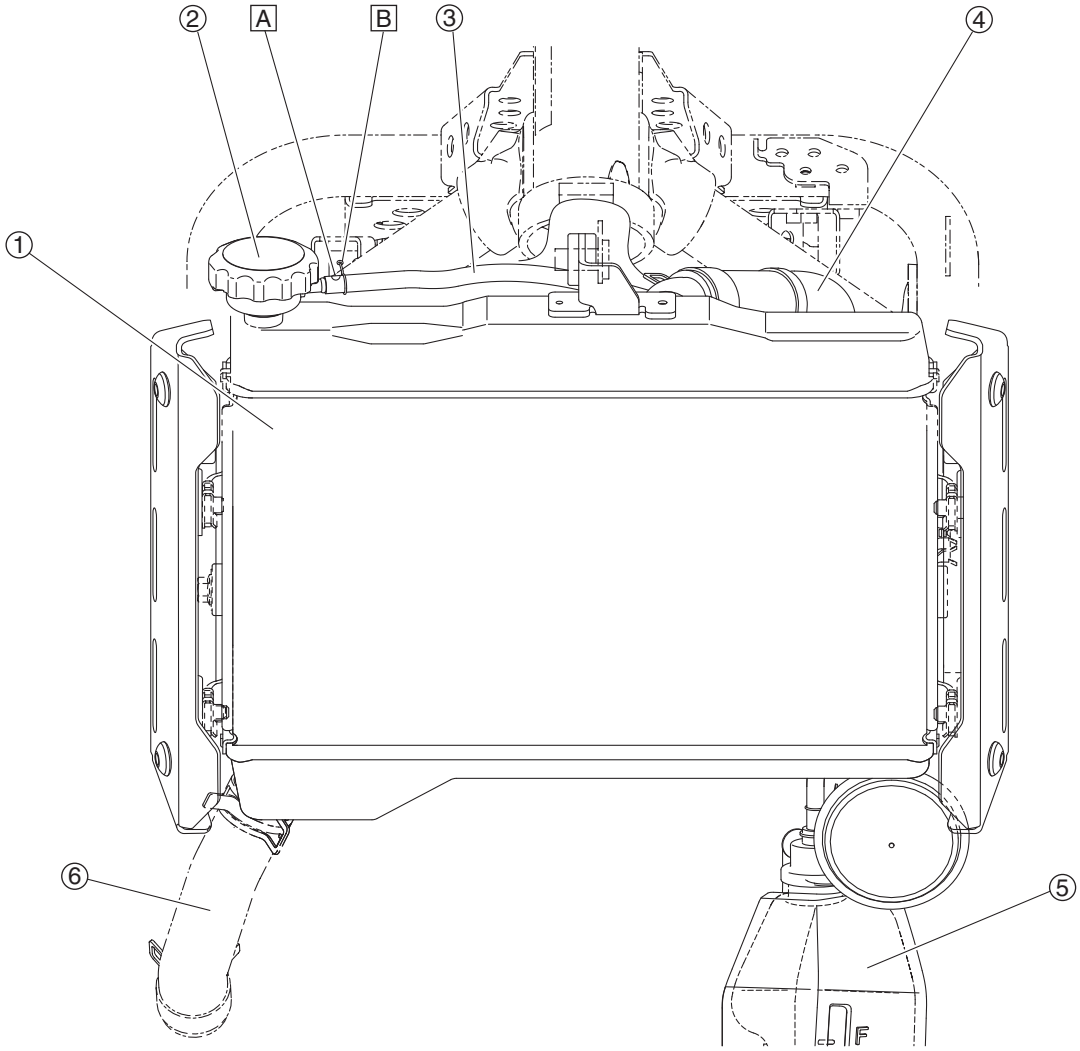
Throttle body (top, right, and left side view)



1. Throttle cable (accelerator cable)
2. Throttle cable (decelerator cable)
3. Intake air pressure sensor
4. Intake air pressure sensor hose
5. Fuel hose
6. Air filter case
7. Throttle body assembly
8. Cylinder head breather hose

A. Install the intake air pressure sensor hose up to the bend in the hose fitting of the intake air pressure sensor.
B. Make sure that the hose is not twisted.
C. Install the intake air pressure sensor hose onto the throttle body assembly, making sure that the hose contacts the throttle body assembly.
D. Forward
E. Face the yellow paint mark on the cylinder head breather hose to the left. Install the cylinder head breather hose completely onto the hose fitting.
F. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose. Point the ends of the hose clamp to the left.
G. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose.
H. 90°
I. Position the ends of the hose clamp within the range shown in the illustration.
J. Face the blue paint mark on the cylinder head breather hose upward. Install the cylinder head breather hose onto the air filter case, making sure that the hose contacts the case.

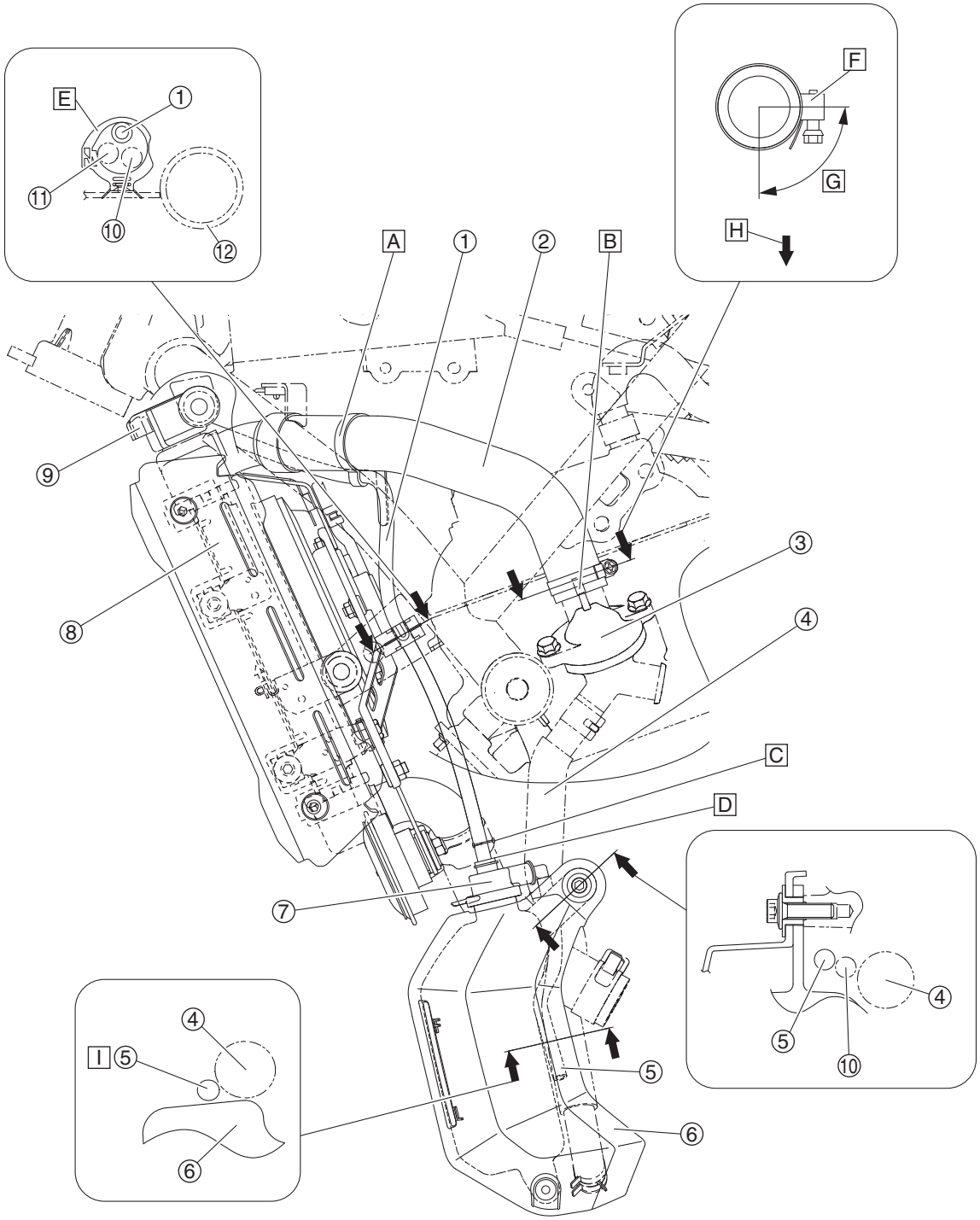
Radiator (front view)



1. Radiator
2. Radiator cap
3. Coolant reservoir hose
4. Radiator inlet hose
5. Coolant reservoir
6. Radiator outlet hose

A. Connect the end of the coolant reservoir hose that is identified by the white paint mark to the radiator.
B. Point the ends of the hose clamp toward the frame.

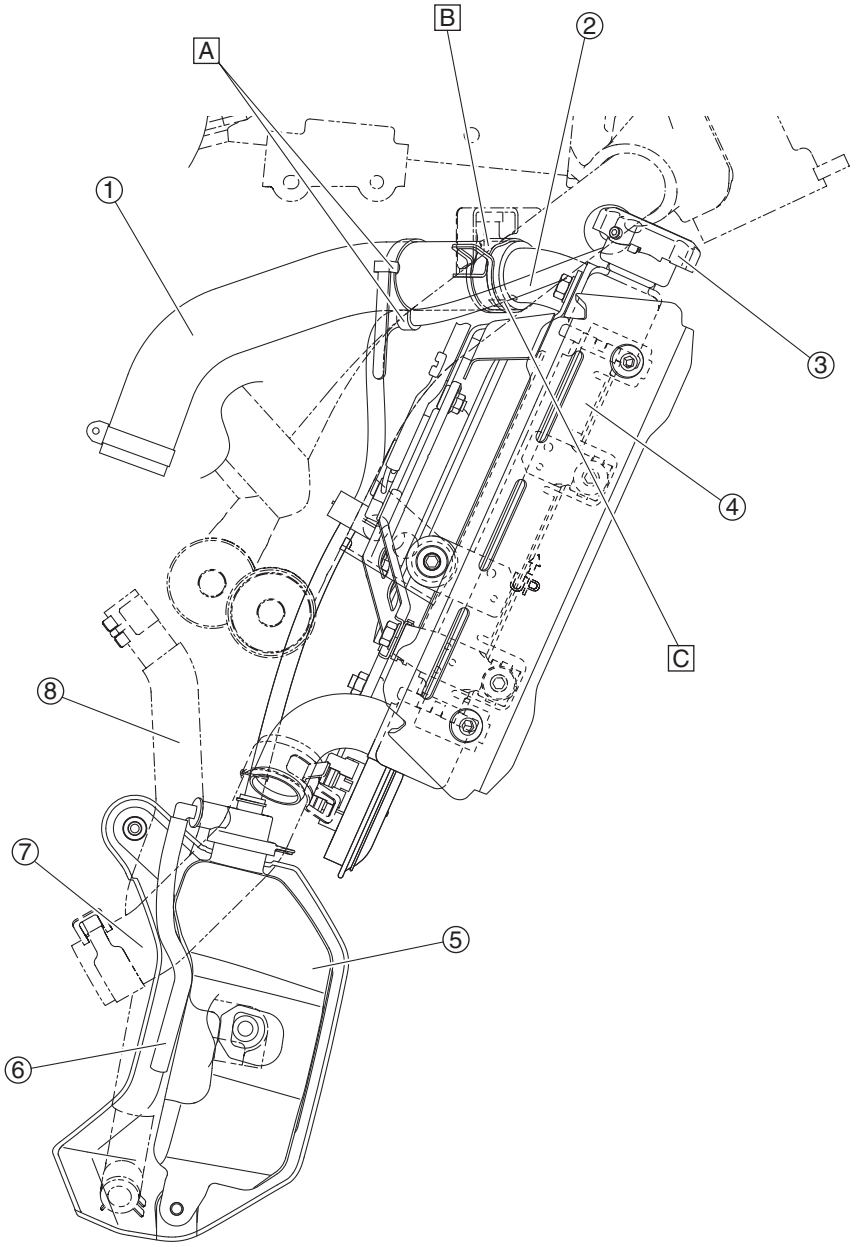
Radiator (left side view)



1. Coolant reservoir hose
2. Radiator inlet hose
3. Thermostat housing
4. Oil cooler inlet hose
5. Coolant reservoir breather hose
6. Coolant reservoir
7. Coolant reservoir cap
8. Radiator
9. Radiator cap
10. AC magneto lead
11. Horn lead
12. Frame

A. Fasten the coolant reservoir hose to the radiator inlet hose with the plastic locking tie. Position the coolant reservoir hose directly under the radiator inlet hose. Face the buckle of the plastic locking tie inward with the end pointing downward.
B. Align the white paint mark on the radiator inlet hose with the projection on the thermostat housing. Install the radiator inlet hose onto the thermostat housing, making sure that the hose contacts the projection on the housing.
C. Point the ends of the hose clamp outward.
D. Install the coolant reservoir hose onto the coolant reservoir cap, making sure that the hose contacts the cap.
E. Face the catch of the holder forward.
F. Position the clamp screw within the range shown in the illustration.
G. 90°
H. Outward
I. Route the coolant reservoir breather hose to the outside of the oil cooler inlet hose.

Radiator (right side view)



1. Radiator inlet hose
2. Coolant reservoir hose
3. Radiator cap
4. Radiator
5. Coolant reservoir
6. Coolant reservoir breather hose
7. Radiator outlet hose
8. Oil cooler inlet hose

A. Align the plastic locking tie with the white paint marks on the radiator inlet hose and coolant reservoir hose.
B. Point the ends of the hose clamp in the direction shown in the illustration. Make sure that the ends of the hose clamp do not contact the coolant reservoir hose.
C. Align the yellow paint mark on the radiator inlet hose with the projection on the radiator pipe. Install the radiator inlet hose onto the radiator pipe, making sure that the hose contacts the projection on the pipe.

PERIODIC CHECKS AND ADJUSTMENTS

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.

EAS30614
PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM
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.

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

EAS30615
GENERAL MAINTENANCE AND LUBRICATION CHART
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.

NO.		ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING					ANNUAL CHECK
				1000 km (600 mi)	10000 km (6000 mi)	20000 km (12000 mi)	30000 km (18000 mi)	40000 km (24000 mi)	
1	*	**Air filter element**	• Replace.					√	
2		**Air filter check hose**	• Clean.	√	√	√	√	√	
3		**Clutch**	• Check operation. • Adjust.	√	√	√	√	√	
4	*	**Front brake**	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
			• Replace brake pads.	Whenever worn to the limit					
5	*	**Rear brake**	• Check operation, fluid level and vehicle for fluid leakage.	√	√	√	√	√	√
			• Replace brake pads.	Whenever worn to the limit					

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)	
6	*	**Brake hoses**	• Check for cracks or damage. • Check for correct routing and clamping.		√	√	√	√	√
			• Replace.	Every 4 years					
7	*	**Brake fluid**	• Change.	Every 2 years					
8	*	**Wheels**	• Check runout and for damage.		√	√	√	√	
9	*	**Tires**	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√
10	*	**Wheel bearings**	• Check bearings for looseness or damage.		√	√	√	√	
11	*	**Swingarm**	• 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 800 km (500 mi) and after washing the vehicle, riding in the rain or riding in wet areas					
13	*	**Steering bearings**	• Check bearing play and steering for roughness.	√	√	√	√	√	
			• Lubricate with lithium-soap-based grease.	Every 20000 km (12000 mi)					
14	*	**Chassis fasteners**	• Make sure that all nuts, bolts and screws are properly tightened.		√	√	√	√	√
15		**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**	• Check operation. • Lubricate with lithium-soap-based grease.		√	√	√	√	√
20	*	**Sidestand switch**	• Check operation.	√	√	√	√	√	√
21	*	**Front fork**	• Check operation and for oil leakage.		√	√	√	√	
22	*	**Shock absorber assembly**	• Check operation and shock absorber for oil leakage.		√	√	√	√	
23	*	**Rear suspension relay arm and connecting arm pivoting points**	• Check operation.		√	√	√	√	
			• Lubricate with lithium-soap-based grease.			√		√	
24		**Engine oil**	• Change. • 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 coolant.	Every 3 years					
27	*	**Front and rear brake switches**	• Check operation.	√	√	√	√	√	√

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)	
28		**Moving parts and cables**	• Lubricate.		√	√	√	√	√
29	*	**Throttle grip**	• Check operation. • Check throttle grip free play, and adjust if necessary. • Lubricate cable and grip housing.		√	√	√	√	√
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.

EAS30619
CHECKING THE FUEL LINE

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

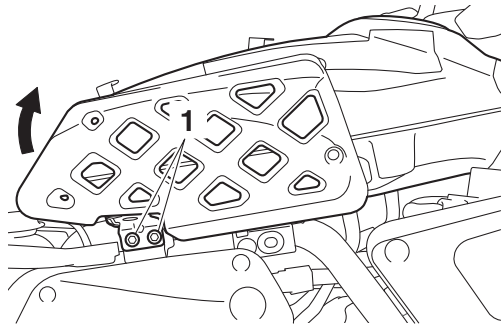
1. Remove:
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank top cover
   - Fuel tank covers
   - Fuel tank center cover
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
   - Rear fuel tank bracket bolts "1"

TIP

After removing the rear fuel tank bracket bolts, lift up the rear of the fuel tank.

ECA20070
NOTICE

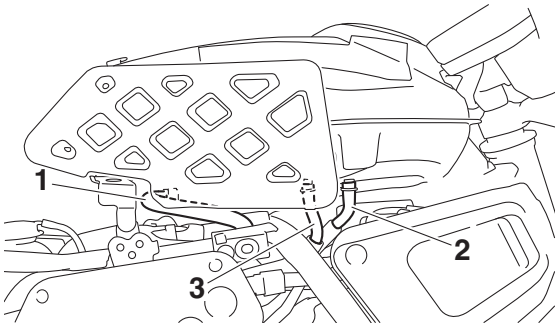
When lifting up the fuel tank, be careful not to pull the fuel tank overflow hose and fuel tank breather hose.



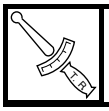
2. Check:
   - Fuel hose "1"
   - Fuel tank overflow hose "2"
   - Fuel tank breather hose "3"
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA16950
NOTICE

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



3. Install:
   - Rear fuel tank bracket bolt



Rear fuel tank bracket bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

4. Install:
   - Fuel tank center cover
   - Fuel tank covers
   - Fuel tank top cover
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.

EAS30620
CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank top cover
   - Fuel tank covers
   - Fuel tank center cover
   - Air scoops
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
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.

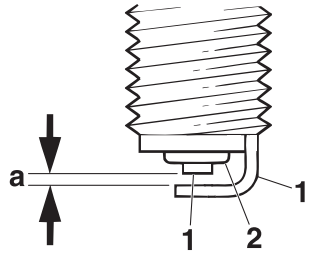
3. Check:
   - Spark plug type
     Incorrect → Change.

Manufacturer/model
NGK/LMAR8A-9

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 Nm (1.3 m·kgf, 9.4 ft·lbf)

TIP

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

8. Install:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Air scoops
   • Fuel tank center cover
   • Fuel tank covers
   • Fuel tank top cover
   Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.

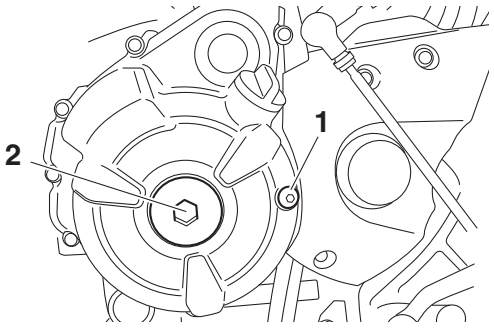
EAS30622
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

TIP

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

1. Drain:
   • Coolant
   Refer to “CHANGING THE COOLANT” on page 3-24.
2. Remove:
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Fuel tank top cover
   • Fuel tank covers
   • Fuel tank center cover
   • Air scoop
   Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Radiator
   • Radiator inlet hose
   Refer to “RADIATOR” on page 6-1.
   • Clutch cable guide
   Refer to “ENGINE REMOVAL” on page 5-3.
3. Remove:
   • Ignition coils
   • Spark plugs
   • Cylinder head cover
   • Cylinder head cover gasket
   Refer to “CAMSHAFTS” on page 5-11.
4. Remove:
   • Timing mark accessing bolt “1”
   • Crankshaft end cover “2”



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

Valve clearance (cold)
Intake
0.11–0.20 mm (0.0043–0.0079 in)
Exhaust
0.24–0.30 mm (0.0094–0.0118 in)

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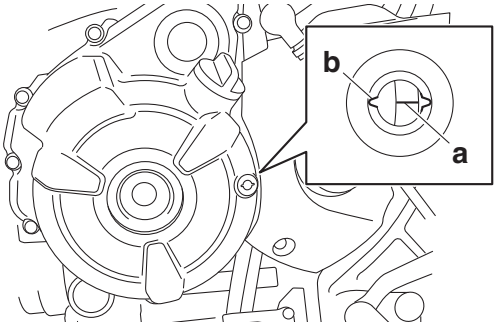
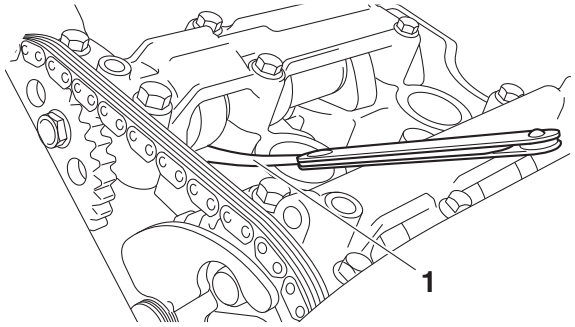
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the generator rotor with the slot "b" in the generator rotor cover.



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

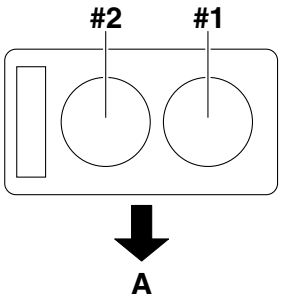
Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9



TIP

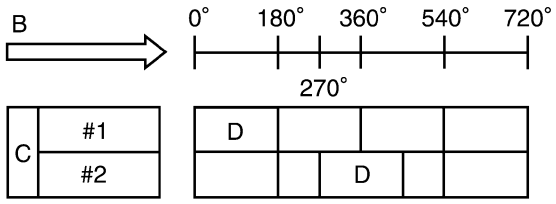
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2



A. Front

d. To measure the valve clearances of cylinder #2 turn the crankshaft 270° counterclockwise.



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

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6. Remove:
   • Camshaft

TIP

- Refer to "CHANGING THE COOLANT" on page 3-24.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

7. Adjust:
   • Valve clearance

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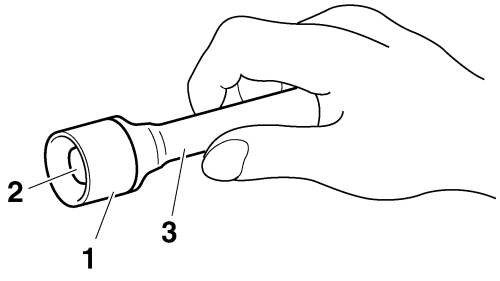
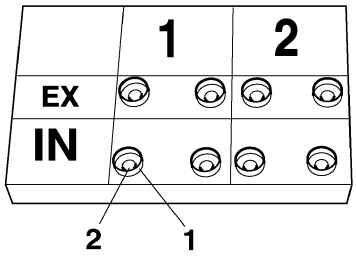
a. Remove the valve lifter "1" and the valve pad "2" with a valve lapper "3".



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

TIP

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

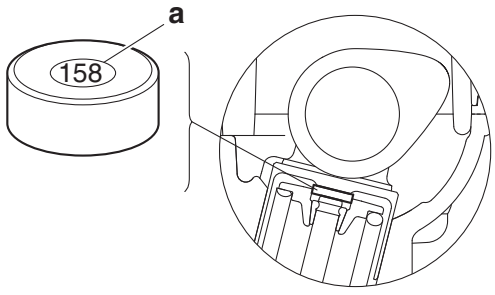


b. Calculate the difference between the specified valve clearance and the measured valve clearance.
   Example:
   Specified valve clearance = 0.11–0.20 mm (0.0043–0.0079 in)
   Measured valve clearance = 0.25 mm (0.0098 in)
   0.25 mm (0.0098 in)–0.20 mm (0.0079 in) = 0.05 mm (0.0020 in)
c. Check the 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 (0.0622 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 (0.0622 in) + 0.05 mm (0.0020 in) = 1.63 mm (0.0641 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.

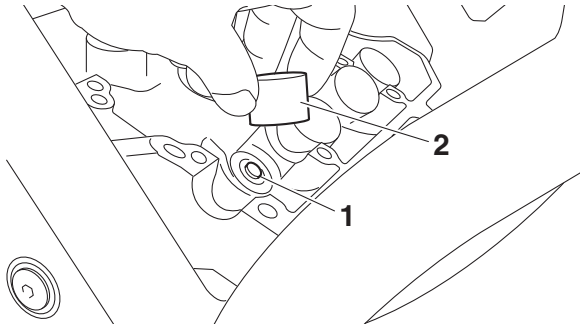
Valve pad range	No. 150–240
Valve pad thickness	1.50–2.40 mm (0.0590–0.0944 in)
Available valve pads	25 thicknesses in 0.05 mm (0.0020 in) increments

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 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.

Exhaust camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
Intake camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

- Refer to "CAMSHAFTS" on page 5-11.
- Lubricate the camshaft lobes and camshaft journals with molybdenum disulfide oil.
- First, install the exhaust camshaft.
- Align the camshafts sprocket marks with the cylinder head edge.
- 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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8. Install:
   - All removed parts

TIP

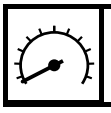
For installation, reverse the removal procedure.

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
1250–1450 r/min

3. Check:
   - ISC (idle speed control) learning value
     "00" or "01" → Check the intake system.
     "02" → Clean the ISC (idle speed control) valve.
     Refer to "CLEANING THE ISC (IDLE SPEED CONTROL) VALVE" on page 7-10.

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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.

Yamaha diagnostic tool
90890-03250

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
- Cylinder head breather hose
- Vacuum hoses

Checking the throttle body synchronization

1. Stand the vehicle on a level surface.

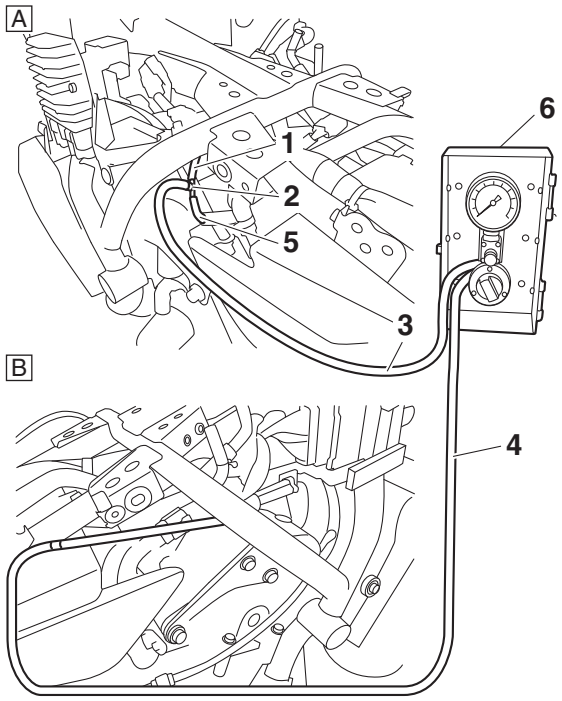
TIP

Place the vehicle on a suitable stand.

2. Remove:
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank top cover
   - Fuel tank covers
   - Fuel tank center cover
   - Air scoops
   - Outer side covers
   - Inner side covers
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
3. Disconnect:
   - Intake air pressure sensor hose
   - Cap
     Refer to "THROTTLE BODIES" on page 7-7.
4. Install:
   - Hose "1" (Parts No.: 5JW-24311-00)
   - 3-way joint "2" (Parts No.: 90413-05014)

- Vacuum gauge hose #1 “3”
- Vacuum gauge hose #2 “4”
- Intake air pressure sensor hose “5”
- Vacuum gauge “6”

Vacuum gauge
90890-03094
Vacuummate
YU-44456



A. Throttle body #1
B. Throttle body #2

5. Install:
   - 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
1250–1450 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.

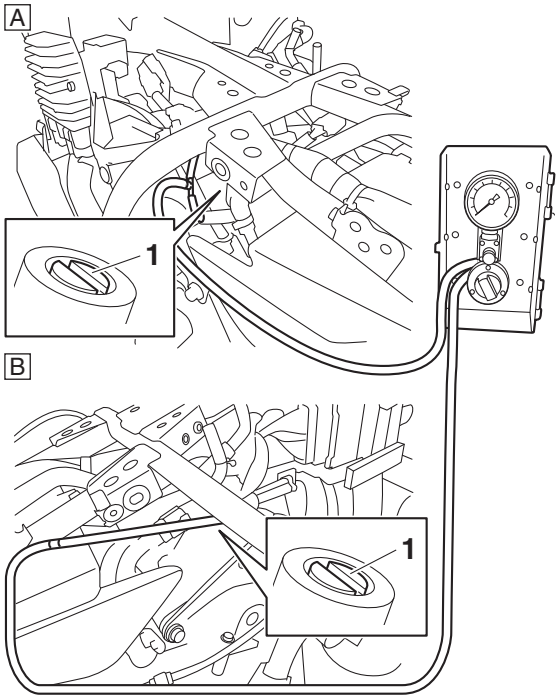
Engine idling speed
1250–1450 r/min

b. With throttle body #1 as standard, adjust throttle body #2 using the air screw “1”.

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



A. Throttle body #1
B. Throttle body #2

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2. Stop the engine and remove the measuring equipment.
3. Connect:
   • Intake air pressure sensor hose
   • Cap
   Refer to “THROTTLE BODIES” on page 7-7.
4. Install:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Inner side covers
   • Outer side covers
   • Air scoops
   • Fuel tank center cover
   • Fuel tank covers
   • Fuel tank top cover
   Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
5. Adjust:
   • Throttle grip free play
   Refer to “CHECKING THE THROTTLE GRIP OPERATION” on page 3-27.

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

EAS30798
CHECKING THE THROTTLE BODY JOINTS

1. Remove:
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Fuel tank top cover
   • Fuel tank covers
   • Fuel tank center cover
   • Outer side covers
   • Inner side covers
   Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
2. Disconnect:
   • Intake air pressure sensor hose
   Refer to “THROTTLE BODIES” on page 7-7.
3. Remove:
   • Throttle bodies
   Refer to “THROTTLE BODIES” on page 7-7.
4. Check:
   • Throttle body joints
   Cracks/damage → Replace.
5. Install:
   • Throttle bodies
   Refer to “THROTTLE BODIES” on page 7-7.
6. Connect:
   • Intake air pressure sensor hose
   Refer to “THROTTLE BODIES” on page 7-7.
7. Install:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Inner side covers
   • Outer side covers
   • Fuel tank center cover
   • Fuel tank covers
   • Fuel tank top cover
   Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.

EAS30626
CHECKING THE CANISTER

1. Remove:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
2. Check:
   • Canister
   • Canister purge hoses
   • Fuel tank breather hoses

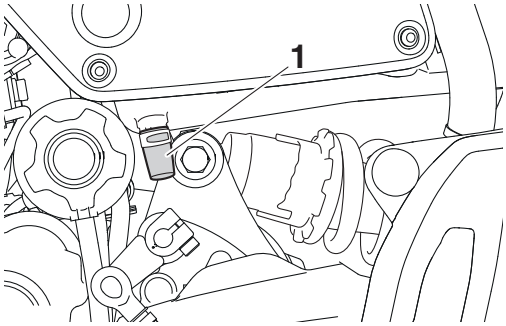
- Canister breather hose
  Cracks/damage→ Replace.

3. Install:
   - Fuel tank
     Refer to “FUEL TANK” on page 7-1.

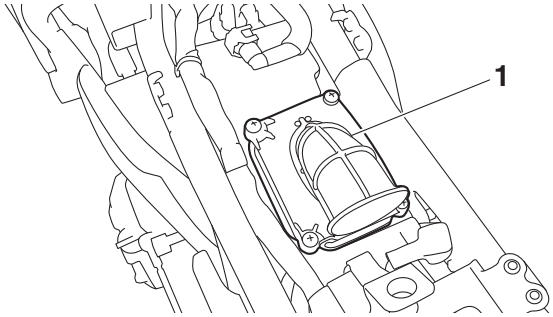
EAS31130
REPLACING THE AIR FILTER ELEMENT AND CLEANING THE CHECK HOSE

TIP

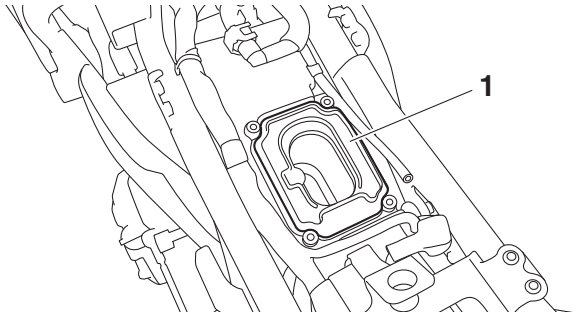
There is an air filter check hose “1” at the bottom of the air filter case. If dust and/or water collects in this hose, clean the air filter check hose and replace the air filter element.



1. Remove:
   - Seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   - Fuel tank top cover
   - Fuel tank covers
   - Fuel tank center cover
   - Outer side cover (left)
   - Inner side cover (left)
     Refer to “GENERAL CHASSIS (3)” on page 4-5.
   - Fuel tank
     Refer to“FUEL TANK” on page 7-1.
2. Remove:
   - Air duct bracket “1”
     Refer to “GENERAL CHASSIS (4)” on page 4-7.



3. Remove:
   - Air filter element “1”



4. Check:
   - Air filter element
     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.

5. Install:
   - Air filter element
   - Air duct bracket

Air filter element screw
1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)
Air duct bracket screw
1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)

ECA14401

NOTICE

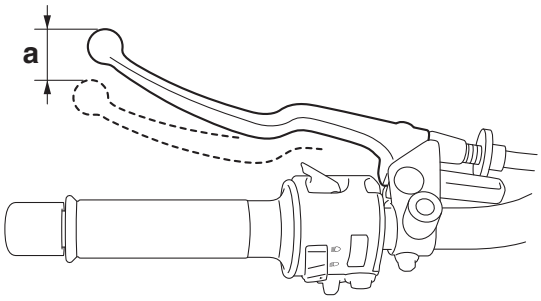
Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect carburetor synchronization, leading to poor engine performance and possible overheating.

6. Install:
   - Fuel tank
     Refer to “FUEL TANK” on page 7-1.
   - Inner side cover (left)
   - Outer side cover (left)
   - Fuel tank center cover
   - Fuel tank covers
   - Fuel tank top cover
     Refer to “GENERAL CHASSIS (3)” on page 4-5.
   - Seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.

EAS30629
ADJUSTING THE CLUTCH LEVER FREE PLAY

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

Clutch lever free play
5.0–10.0 mm (0.20–0.39 in)



2. Adjust:
   • Clutch lever free play

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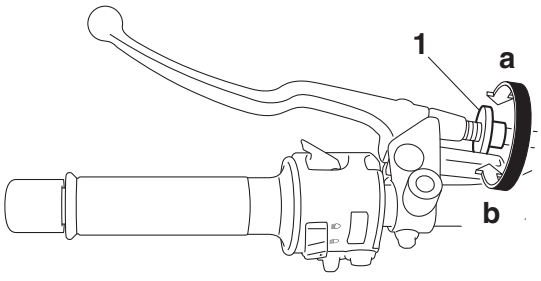
Handlebar side

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

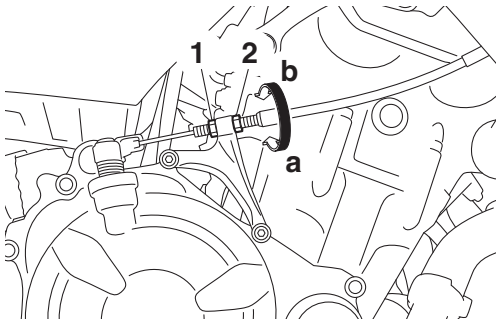
a. Loosen the locknut "1".

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 Nm (0.7 m·kgf, 5.1 ft·lbf)



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EAS30801
CHECKING THE BRAKE OPERATION

1. Check:
   • Brake operation
   Brake not working properly → Check the brake system.
   Refer to "FRONT BRAKE" on page 4-29 and "REAR BRAKE" on page 4-43.

TIP

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

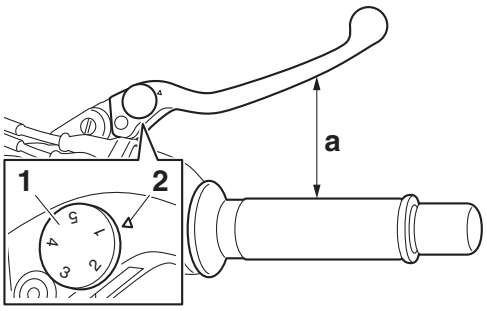
EAS30630
ADJUSTING THE FRONT DISC BRAKE

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

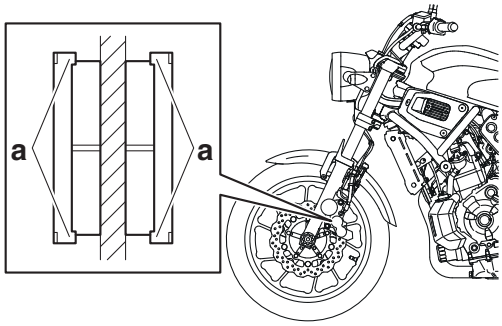
After adjusting the brake lever position, make sure there is no brake drag.

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 “a” almost touch the brake disc → Replace the brake pads as a set.
     Refer to “FRONT BRAKE” on page 4-29.



EAS30631

ADJUSTING THE REAR DISC BRAKE

1. Adjust:
   - Brake pedal position

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a. Loosen the locknut “1”.
b. Turn the adjusting nut “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 pedal adjusting locknut
18 Nm (1.8 m·kgf, 13 ft·lbf)

EWA17030

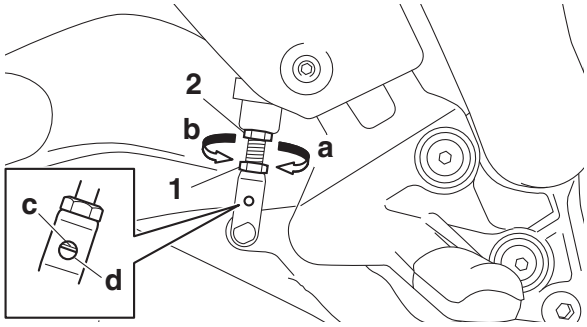
⚠ WARNING

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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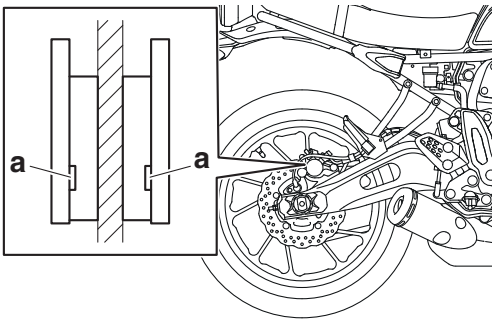
2. Adjust:
   • Rear brake light switch
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" on page 3-26.

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 indicators "a" almost touch the brake disc → Replace the brake pads as a set.
   Refer to "REAR BRAKE" on page 4-43.



EAS30894
CHECKING THE BRAKE HOSES

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

1. Check:
   • Brake hoses
   Cracks/damage/wear → Replace.
2. Check:
   • Brake hose holders
   Loose → Tighten the holder bolts.
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 4-29, "REAR BRAKE" on page 4-43 and "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-56.

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

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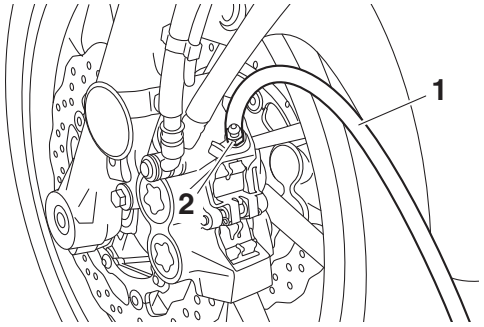
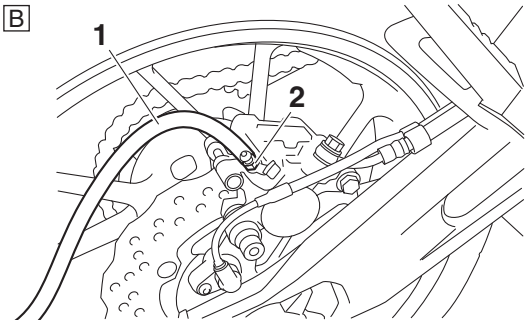
a. Fill the brake master cylinder reservoir or brake fluid reservoir to the proper level with the specified brake fluid.
b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
c. Connect a clear plastic hose "1" tightly to the bleed screw "2".

A



B



A. Front brake caliper
B. Rear brake caliper

d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully squeeze the brake lever 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 4-60.

ECA18060

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 Nm (0.5 m·kgf, 3.6 ft·lbf)

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 3-15.

EWA13110

WARNING

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

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EAS30632

CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

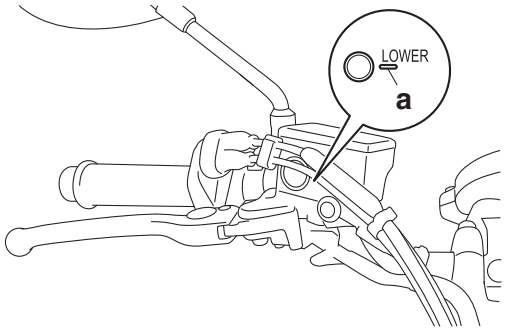
TIP

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

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

Specified brake fluid
DOT 4

A



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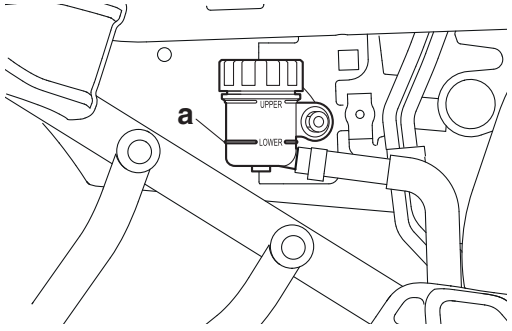


A. Front brake
B. Rear brake

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.

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.

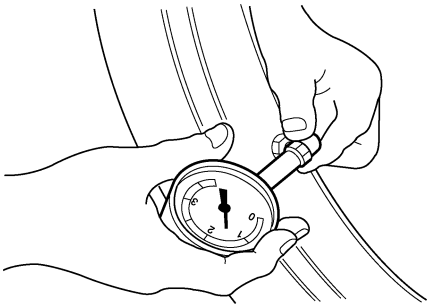
TIP

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.**

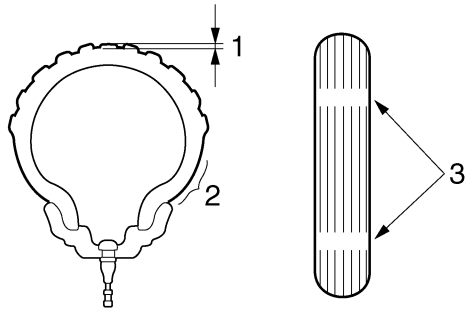
NEVER OVERLOAD THE VEHICLE.

Tire air pressure (measured on cold tires)
Loading condition
0–173 kg (0–381 lb)
Front
225 kPa (2.25 kgf/cm², 33 psi)
Rear
250 kPa (2.50 kgf/cm², 36 psi)
High-speed riding
Front
225 kPa (2.25 kgf/cm², 33 psi)
Rear
250 kPa (2.50 kgf/cm², 36 psi)
Maximum load
172 kg (379 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)
1.6 mm (0.06 in)
Wear limit (rear)
1.6 mm (0.06 in)

EWA14090

⚠ WARNING

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

Front tire
Size
120/70 R17M/C (58V)
Manufacturer/model
PIRELLI/PHANTOM SPORTS-COMP

Rear tire
Size
180/55 R17M/C (73V)
Manufacturer/model
PIRELLI/PHANTOM SPORTS-COMP

EWA13210

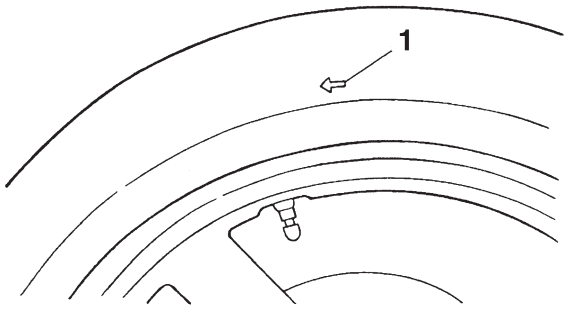
⚠ WARNING

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.



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 4-14 and "CHECKING THE REAR WHEEL" on page 4-24.

EAS30802

CHECKING THE SWINGARM OPERATION

1. Check:
   - Swingarm operation
     Swingarm not working properly → Check the swingarm.
     Refer to "SWINGARM" on page 4-88.
2. Check:
   - Swingarm excessive play
     Refer to "SWINGARM" on page 4-88.

EAS30643

LUBRICATING THE SWINGARM PIVOT

1. Lubricate:
   - Bearing
   - Spacer

Recommended lubricant
Lithium-soap-based grease

Refer to "INSTALLING THE SWINGARM" on page 4-91.

EAS30644

ADJUSTING 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.

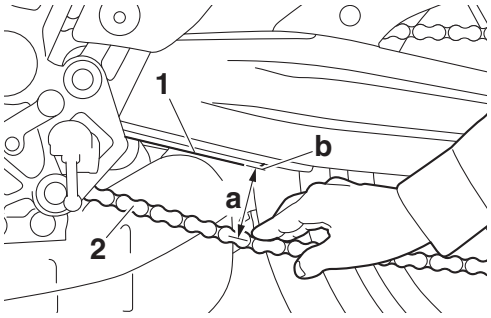
TIP

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

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

TIP

Measure the distance "a" between the rib end "b" on the drive chain guide "1" and the center of the drive chain "2".



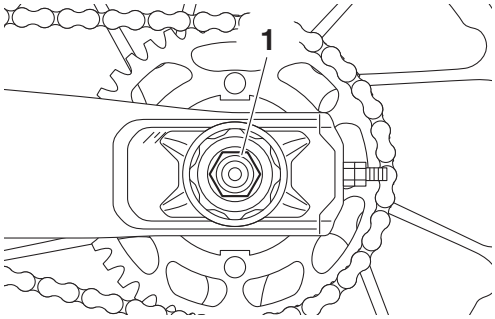
Drive chain slack
51.0–56.0 mm (2.01–2.20 in)
Limit
58.0 mm (2.28 in)

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.

4. Loosen:
   • Wheel axle nut "1"



5. Adjust:
   • Drive chain slack

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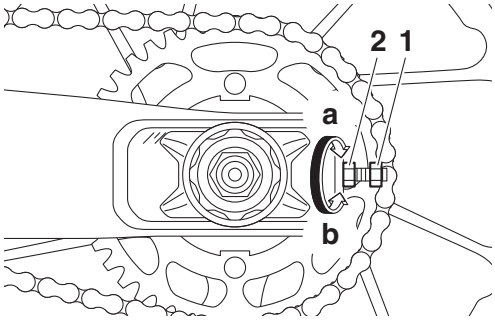
a. Loosen both of the drive chain puller locknuts "1".
b. Turn both of the drive chain puller adjusting nuts "2" in direction "a" or "b" until the specified drive chain slack is obtained.

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 swingarm end plate and the adjusting nuts.



c. Tighten the wheel axle nut to specification.

Wheel axle nut
105 Nm (10.5 m·kgf, 76 ft·lbf)

d. Tighten the drive chain puller locknuts to specification.

Drive chain puller locknut
16 Nm (1.6 m·kgf, 12 ft·lbf)

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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 suitable stand so that the front wheel is elevated.

2. Check:
   - Steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Blinding/looseness → Adjust the steering head.
3. Remove:
   - Upper bracket
     Refer to “FRONT FORK” on page 4-70.
4. Adjust:
   - Steering head

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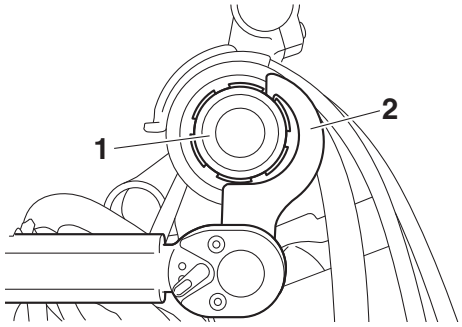
a. Loosen the cap nut “1”, and then tighten it to specification with a steering nut wrench “2”.

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

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

b. Loosen the cap nut completely, then tighten it to specification.

EWA17770
WARNING

Do not overtighten the cap nut.

Cap nut (final tightening torque)
18 Nm (1.8 m·kgf, 13 ft·lbf)

c. 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 4-80.

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5. Install:
   - Upper bracket
     Refer to “FRONT FORK” on page 4-70.

EAS30646
LUBRICATING THE STEERING HEAD
1. Lubricate:
   - Upper bearing
   - Lower bearing
   - Bearing cover
   - Lower bearing dust seal

Recommended lubricant
Lithium-soap-based grease

EAS31802
CHECKING THE CHASSIS FASTENERS
Make sure that all nuts, bolts, and screws are properly tightened.

Refer to “CHASSIS TIGHTENING TORQUES” on page 2-20.

EAS30804
LUBRICATING THE BRAKE LEVER
Lubricate the pivoting point and metal-to-metal moving parts of the lever.

	Recommended lubricant **Silicone grease**

EAS30649
LUBRICATING THE PEDAL
Lubricate the pivoting point and metal-to-metal moving parts of the pedal.

	Recommended lubricant **Lithium-soap-based 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**

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**

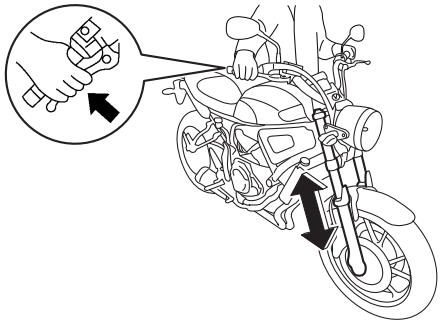
EAS30652
CHECKING THE SIDESTAND SWITCH
Refer to “CHECKING THE SWITCHES” on page 8-153.

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 4-70.



EAS30808
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY
Refer to “CHECKING THE REAR SHOCK ABSORBER ASSEMBLY” on page 4-86.

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

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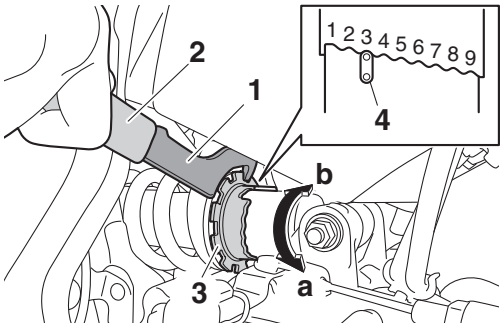
a. Adjust the spring preload with the special wrench “1” and extension bar “2” included in the owner’s tool kit.
b. Turn the adjusting ring “3” in direction “a” or “b”.
c. Align the desired position on the adjusting ring with the stopper “4”.

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

Spring preload
Minimum
1
Standard
3
Maximum
9



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EAS30809
CHECKING THE CONNECTING ARM AND RELAY ARM

Refer to “CHECKING THE RELAY ARM” on page 4-86 and “CHECKING THE CONNECTING ARM” on page 4-90.

EAS30656
CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

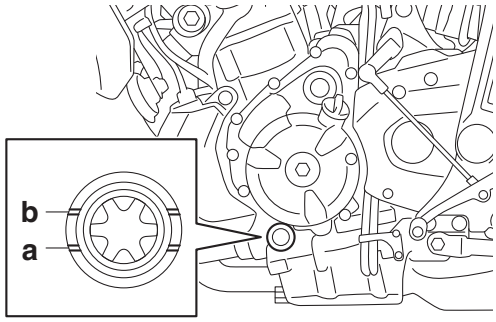
TIP

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

2. Start the engine, warm it up for several minutes, and then turn it off.
3. 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.

TIP

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



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.**

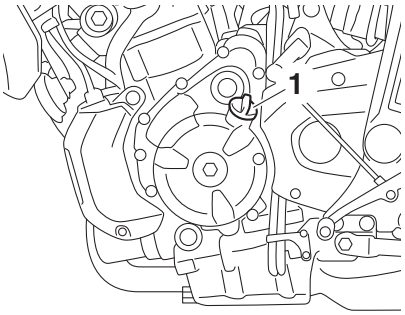
4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check the engine oil level again.

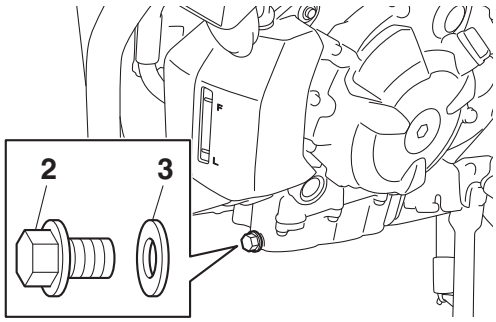
TIP

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” (along with the gasket “3”)





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

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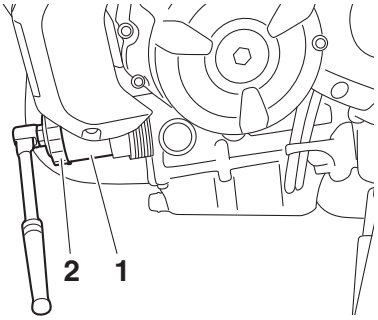
a. Remove the oil filter cartridge "1" with an oil filter wrench "2".

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

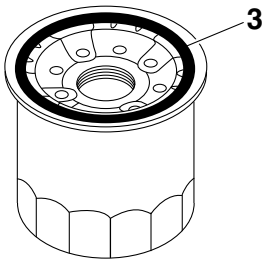


b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of engine oil.

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 Nm (1.7 m·kgf, 12 ft·lbf)

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

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

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

Engine oil quantity
Quantity (disassembled)
3.00 L (3.17 US qt, 2.64 Imp.qt)
Without oil filter cartridge replacement
2.30 L (2.43 US qt, 2.02 Imp.qt)
With oil filter cartridge replacement
2.60 L (2.75 US qt, 2.29 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 3-21.

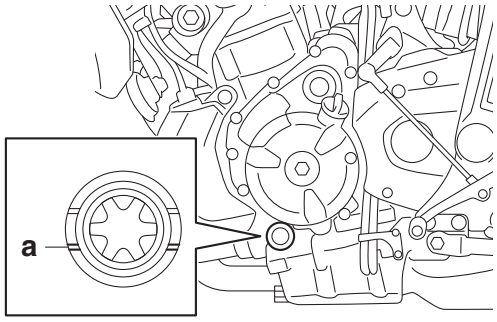
EAS30810
MEASURING THE ENGINE OIL PRESSURE

1. Stand the vehicle on a level surface.

TIP

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

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



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

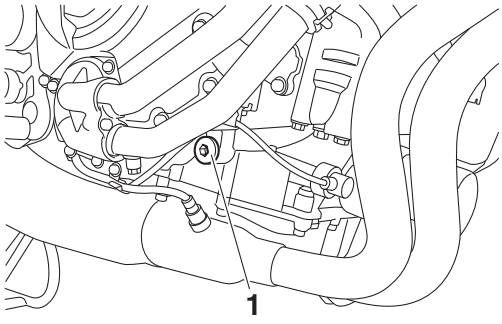
ECA13410
NOTICE

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.

4. Remove:
   - Main gallery bolt "1"

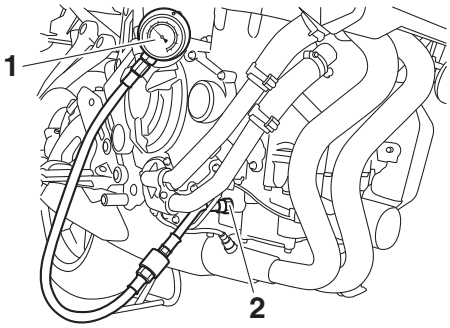
EWA12980
⚠ WARNING

The engine, muffler and engine oil are extremely hot.



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

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



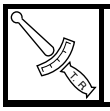
6. Measure:
   - Engine oil pressure
     (at the following conditions)

Oil pressure
280.0 kPa/5000 r/min at 100 °C
(40.6 psi/5000 r/min at 212 °F)

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

7. Install:
   - Main gallery bolt
   - O-ring New



Main gallery bolt
8 Nm (0.8 m·kgf, 5.8 ft·lbf)

TIP

Lubricate the O-ring with a thin coat of lithium-soap-based grease.

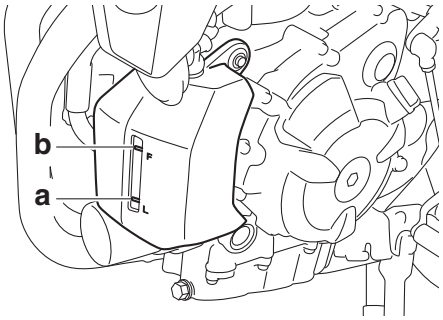
EAS30811
CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

TIP

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

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



ECA13470

NOTICE

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

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

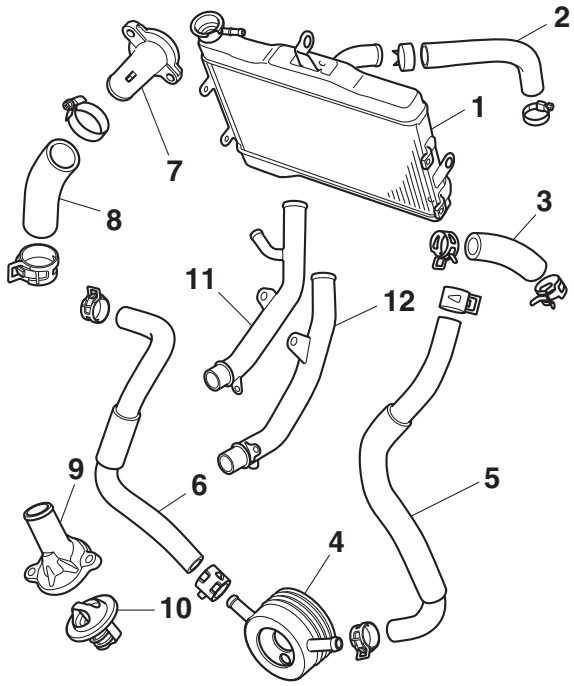
TIP

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

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 jacket joint inlet hose "8"
   • Thermostat cover "9"
   • Thermostat "10"
   • Water pump inlet pipe "11"
   • Water pump outlet pipe "12"
   Cracks/damage → Replace.
   Refer to "RADIATOR" on page 6-1, "OIL COOLER" on page 6-5, "THERMOSTAT" on page 6-7 and "WATER PUMP" on page 6-9.



EAS30813

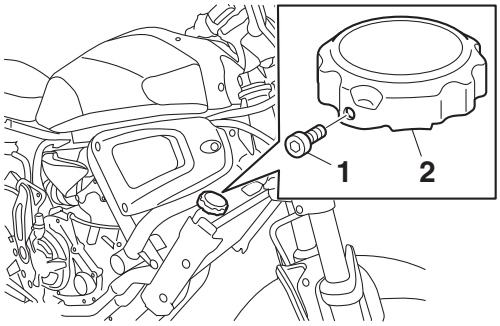
CHANGING THE COOLANT

1. Remove:
   • Radiator cap bolt "1"
   • Radiator cap "2"

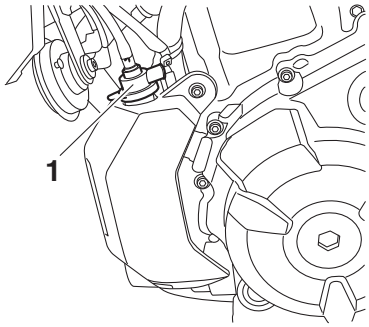
EWA13030

⚠ WARNING

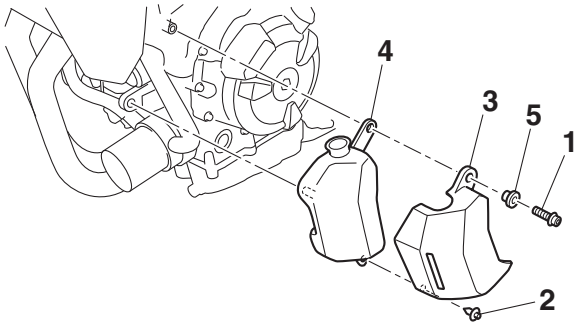
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly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



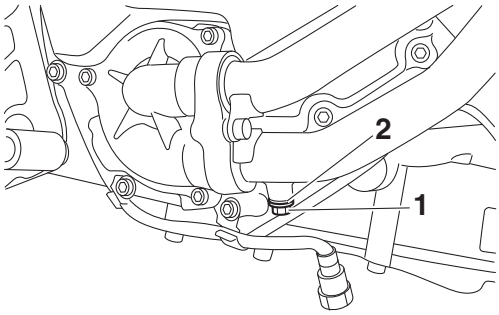
2. Remove:
   • Coolant reservoir cap “1”



3. Remove:
   • Coolant reservoir bolt “1”
   • Coolant reservoir quick fastener “2”
   • Coolant reservoir cover “3”
   • Coolant reservoir “4”
   • Collar “5”



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



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

	Coolant drain bolt **7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

8. Install:
   • Collar
   • Coolant reservoir
   • Coolant reservoir cover
   • Coolant reservoir quick fastener
   • Coolant reservoir bolt

	Coolant reservoir bolt **5 Nm (0.5 m·kgf, 3.6 ft·lbf)**

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)** **Coolant quantity** **Radiator (including all routes)** **1.60 L (1.69 US qt, 1.41 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

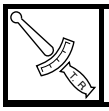
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

ECA13481

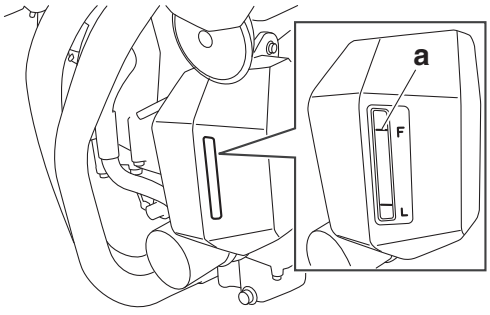
NOTICE

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

10. Install:
    - Radiator cap
    - Radiator cap bolt

	**Radiator cap bolt** **1.0 Nm (0.10 m·kgf, 0.72 ft·lbf)**

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 3-23.

TIP

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

EAS30814

CHECKING THE FRONT BRAKE LIGHT SWITCH

Refer to “CHECKING THE SWITCHES” on page 8-153.

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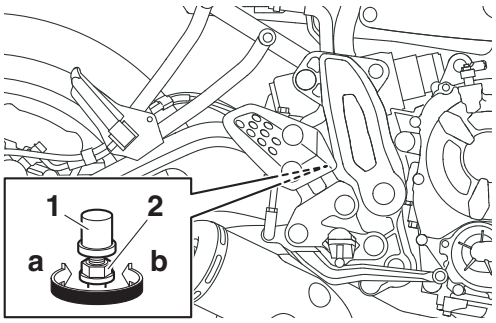
a. Hold the main body “1” of the rear brake light switch so that it does not rotate and turn the adjusting nut “2” in direction “a” or “b” until the rear brake light comes on at the proper time.

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.

EAS30861
CHECKING THE THROTTLE GRIP OPERATION

1. Check:
   • Throttle cables
   Damage/deterioration → Replace.
   • Throttle cable installation
   Incorrect → Reinstall the throttle cables.
   Refer to "HANDLEBAR" on page 4-65.
2. Check:
   • Throttle grip movement
   Rough movement → Lubricate or replace the defective part(s).

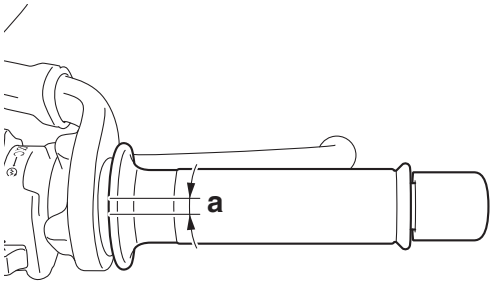
Recommended lubricant
Suitable cable lubricant

TIP

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

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

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



4. Adjust:
   • Throttle grip free play

TIP

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

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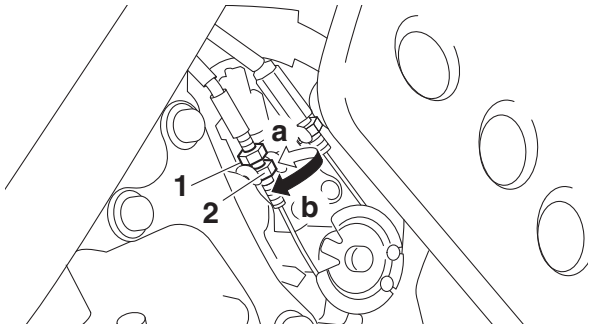
Throttle body side

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

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

c. Tighten the locknut.

Throttle cable locknut (throttle body side)
4.5 Nm (0.45 m·kgf, 3.3 ft·lbf)



TIP

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

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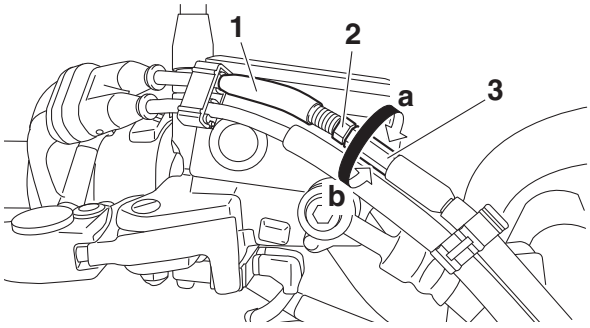
Handlebar side

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.

Throttle cable locknut (handlebar side)
4.3 Nm (0.43 m·kgf, 3.1 ft·lbf)

e. Slide the rubber cover to its original position.

TIP

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

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EAS30816

CHECKING AND CHARGING THE BATTERY

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

EAS30662

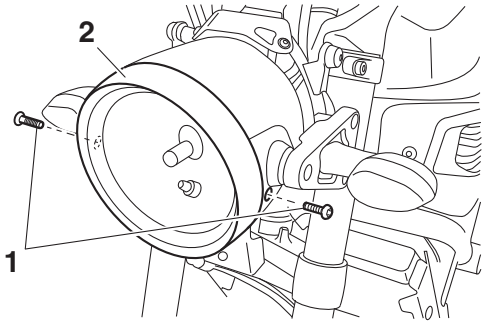
CHECKING THE FUSES

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

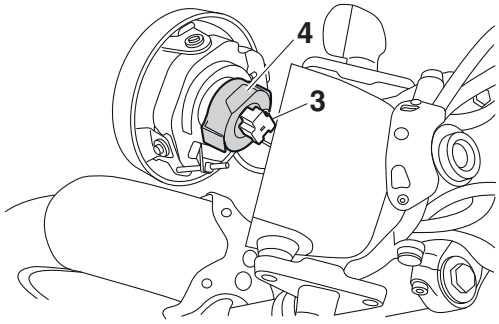
EAS30665

REPLACING THE HEADLIGHT BULB

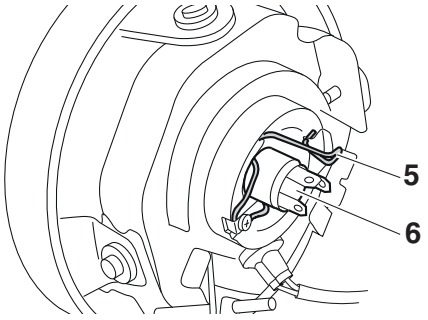
1. Remove:
   • Headlight lens unit bolt "1"
   • Headlight lens unit "2"



2. Disconnect:
   • Headlight coupler "3"
3. Remove:
   • Headlight bulb cover "4"



4. Detach:
   • Headlight bulb holder "5"
5. Remove:
   • Headlight bulb "6"



EWA13320

WARNING

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

6. Install:
   • Headlight bulb New
   Secure the new headlight bulb with the headlight bulb holder.

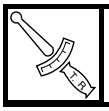
ECA13690

NOTICE

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely

affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

7. Attach:
   • Headlight bulb holder
8. Install:
   • Headlight bulb cover
9. Connect:
   • Headlight coupler
10. Install:
   • Headlight lens unit

	**Headlight lens unit bolt 4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)**

EAS30664
ADJUSTING THE HEADLIGHT BEAM

1. Adjust:
   • Headlight beam (vertically)

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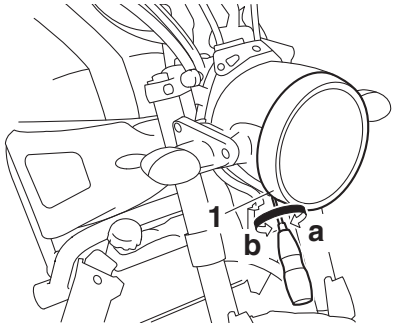
a. Turn the adjusting screw "1" in direction "a" or "b".

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



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2. Adjust:
   • Headlight beam (horizontally)

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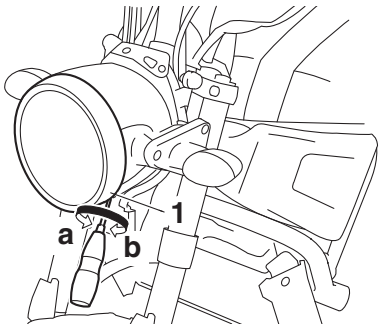
a. Turn the adjusting screw "1" in direction "a" or "b".

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



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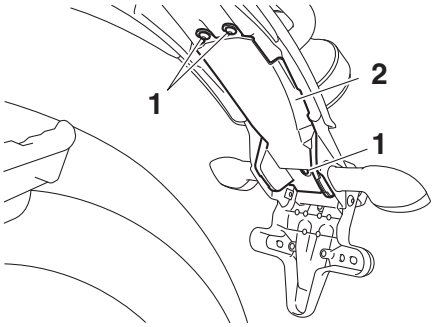
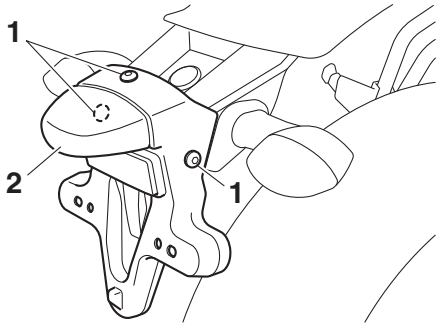
EAS31831
REPLACING THE LICENSE PLATE LIGHT BULB

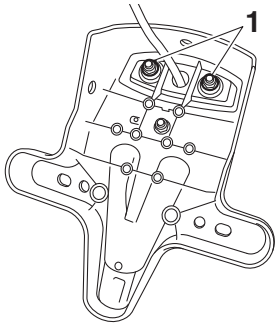
1. Remove:
   • Lower fender cover screws "1"
   • Lower fender cover "2"



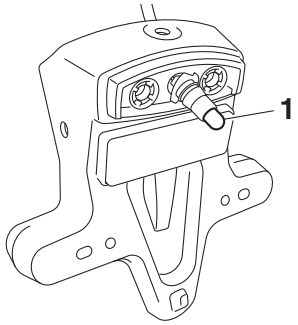
2. Remove:
   • License plate bracket bolts "1"
   • License plate bracket "2"



3. Remove:
   • License plate nuts "1"
   • License plate light



4. Remove:
   • License plate light bulb “1”



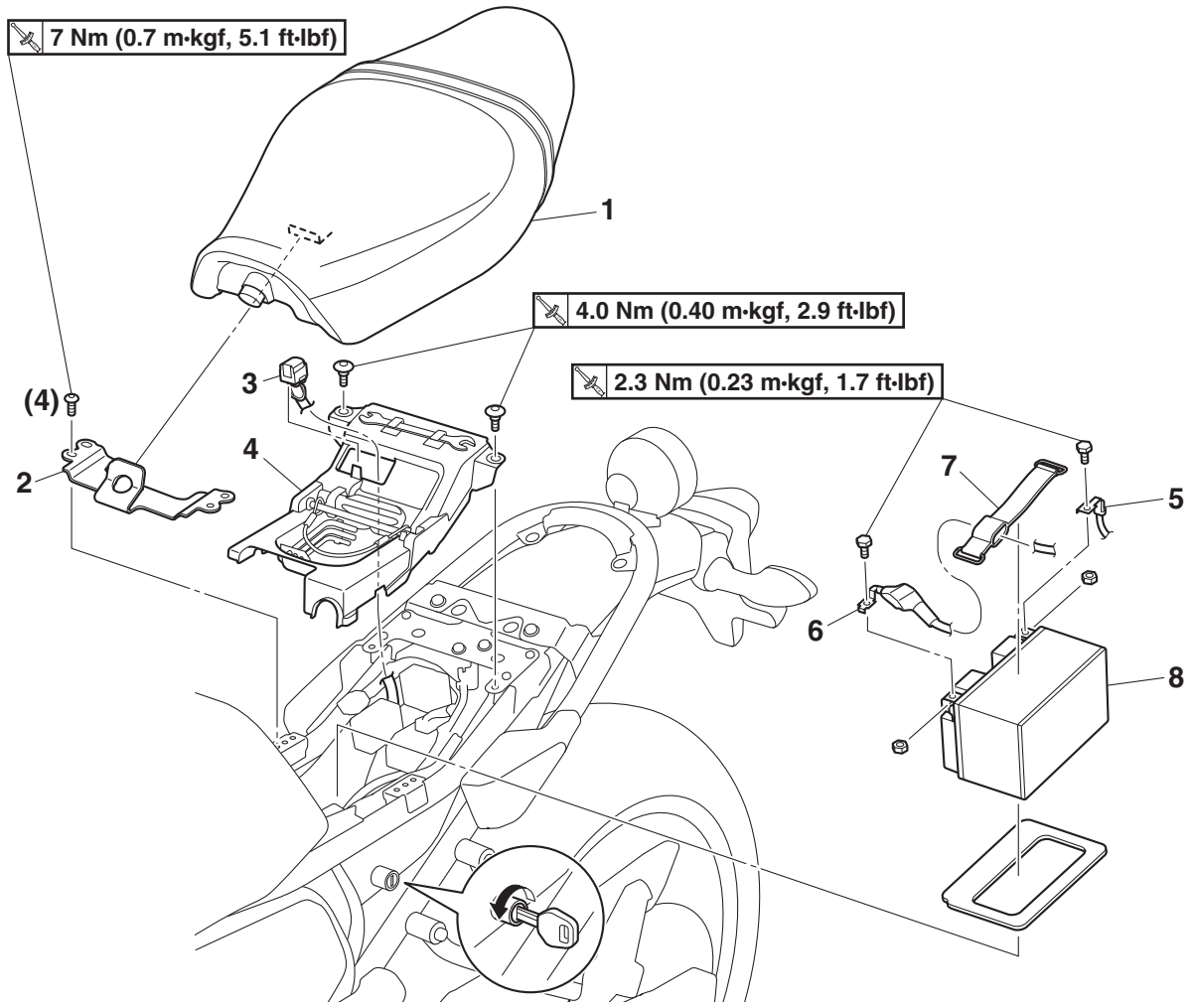
5. Install:
   • License plate light bulb New
6. Install:
   • License plate light
   • License plate nuts
   • License plate bracket
   • License plate bracket bolts
   • Lower fender cover
   • Lower fender cover screws

License plate nut
3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)
License plate bracket bolt
6 Nm (0.6 m·kgf, 4.3 ft·lbf)
Lower fender cover screw
2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)

CHASSIS

EAS20026
GENERAL CHASSIS (1)

Removing the seat and battery



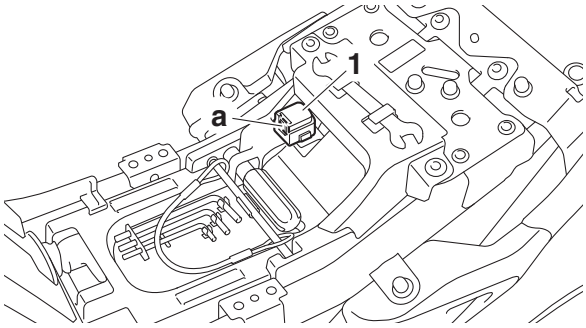
Order	Job/Parts to remove	Q'ty	Remarks
1	Seat	1	
2	Seat bracket	1	
3	Yamaha diagnostic tool coupler	1	
4	Battery cover	1	
5	Negative battery lead	1	Disconnect.
6	Positive battery lead	1	Disconnect.
7	Battery band	1	
8	Battery	1	

EAS31798
INSTALLING THE YAMAHA DIAGNOSTIC TOOL COUPLER

1. Install:
   • Yamaha diagnostic tool coupler “1”

TIP

Install the Yamaha diagnostic tool coupler onto the tab “a” on the battery cover.

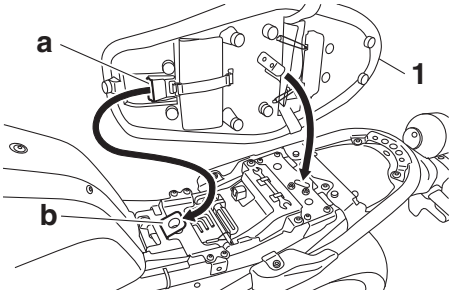


EAS30125
INSTALLING THE SEAT

1. Install:
   • Seat “1”

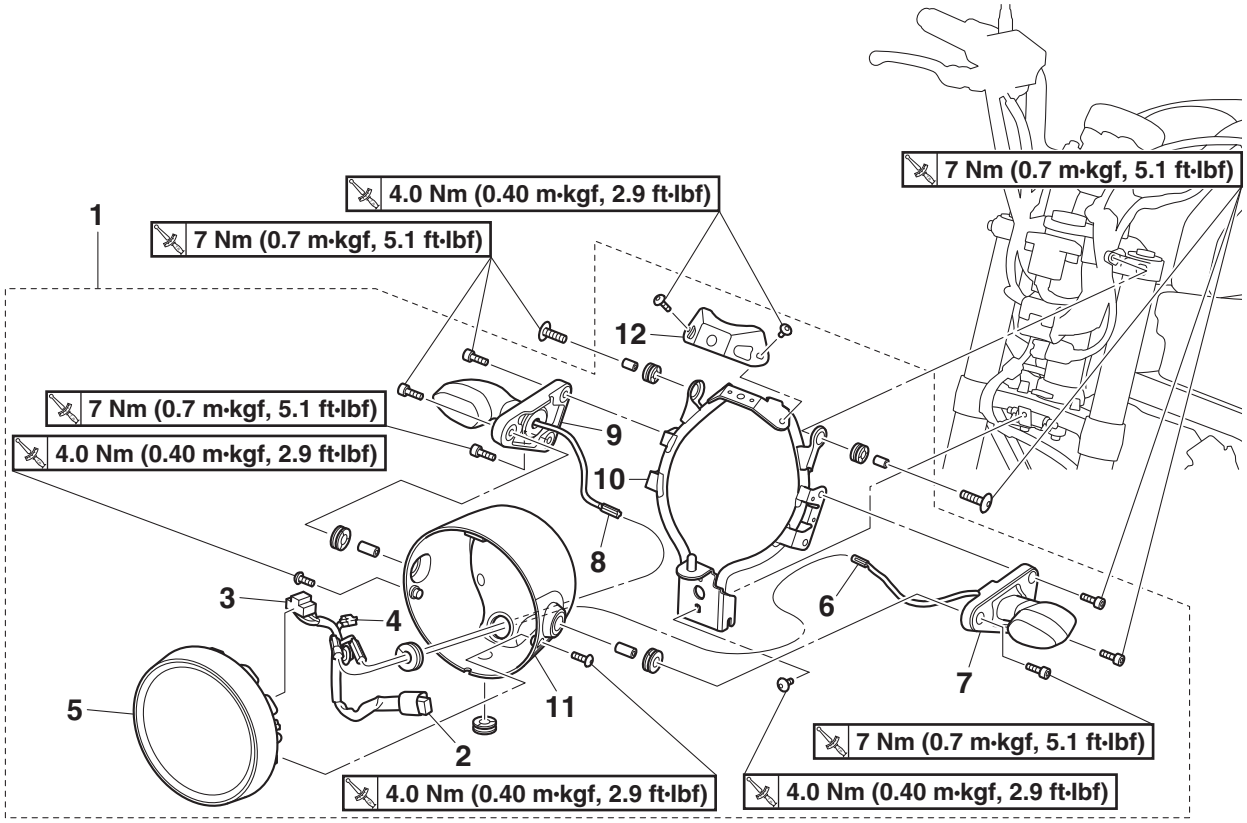
TIP

Fit the slot “a” in the seat onto the projection “b” on the rider seat bracket as shown, push the rear of the seat down to lock it in place, and then remove the key.



EAS20155
GENERAL CHASSIS (2)

Removing the headlight



Order	Job/Parts to remove	Q'ty	Remarks
1	Headlight assembly	1	
2	Sub-wire harness coupler (headlight, turn signal light, auxiliary light)	1	Disconnect.
3	Headlight coupler	1	Disconnect.
4	Auxiliary light coupler	1	Disconnect.
5	Headlight lens unit	1	
6	Front turn signal light coupler (left)	1	Disconnect.
7	Front turn signal light (left)	1	
8	Front turn signal light coupler (right)	1	Disconnect.
9	Front turn signal light (right)	1	
10	Headlight lens unit bracket	1	
11	Headlight body	1	
12	Meter assembly cover	1	

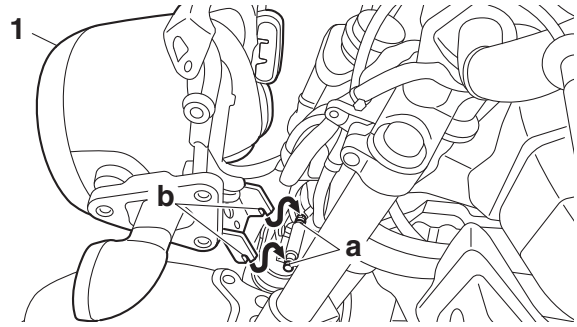
EAS31128
INSTALLING THE HEADLIGHT ASSEMBLY

1. Install:
   • Headlight assembly “1”

Headlight assembly bolt (M6 × 16 mm)
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Headlight assembly bolt (M5 × 12 mm)
4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)

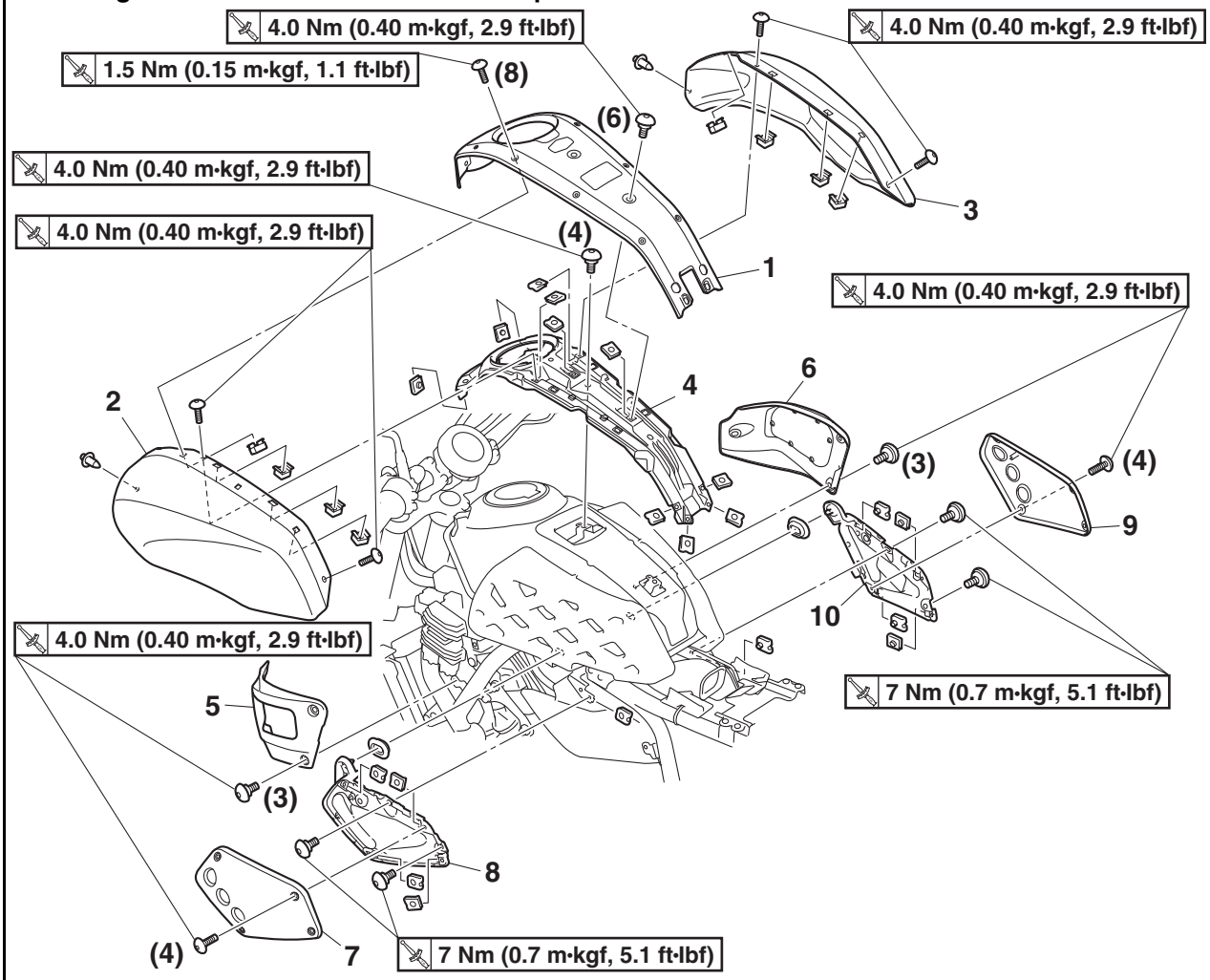
TIP

Fit the projections “a” on the headlight bracket into the grooves “b” in the headlight assembly.



EAS20156
GENERAL CHASSIS (3)

Removing the fuel tank covers and air scoops

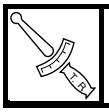


Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Fuel tank top cover	1	
2	Fuel tank cover (left)	1	
3	Fuel tank cover (right)	1	
4	Fuel tank center cover	1	
5	Air scoop (left)	1	
6	Air scoop (right)	1	
7	Outer side cover (left)	1	
8	Inner side cover (left)	1	
9	Outer side cover (right)	1	
10	Inner side cover (right)	1	

EAS31105
INSTALLING THE FUEL TANK COVERS

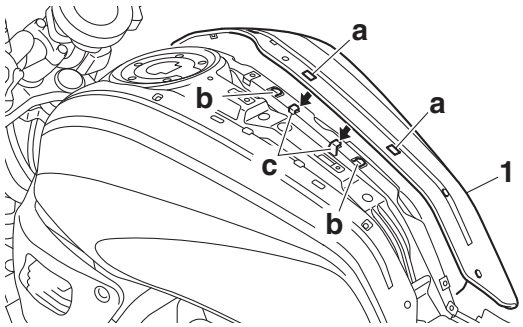
The following procedure applies to both of the fuel tank covers.

1. Install:
   • Fuel tank cover “1”

	**Fuel tank cover bolt** **4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)**

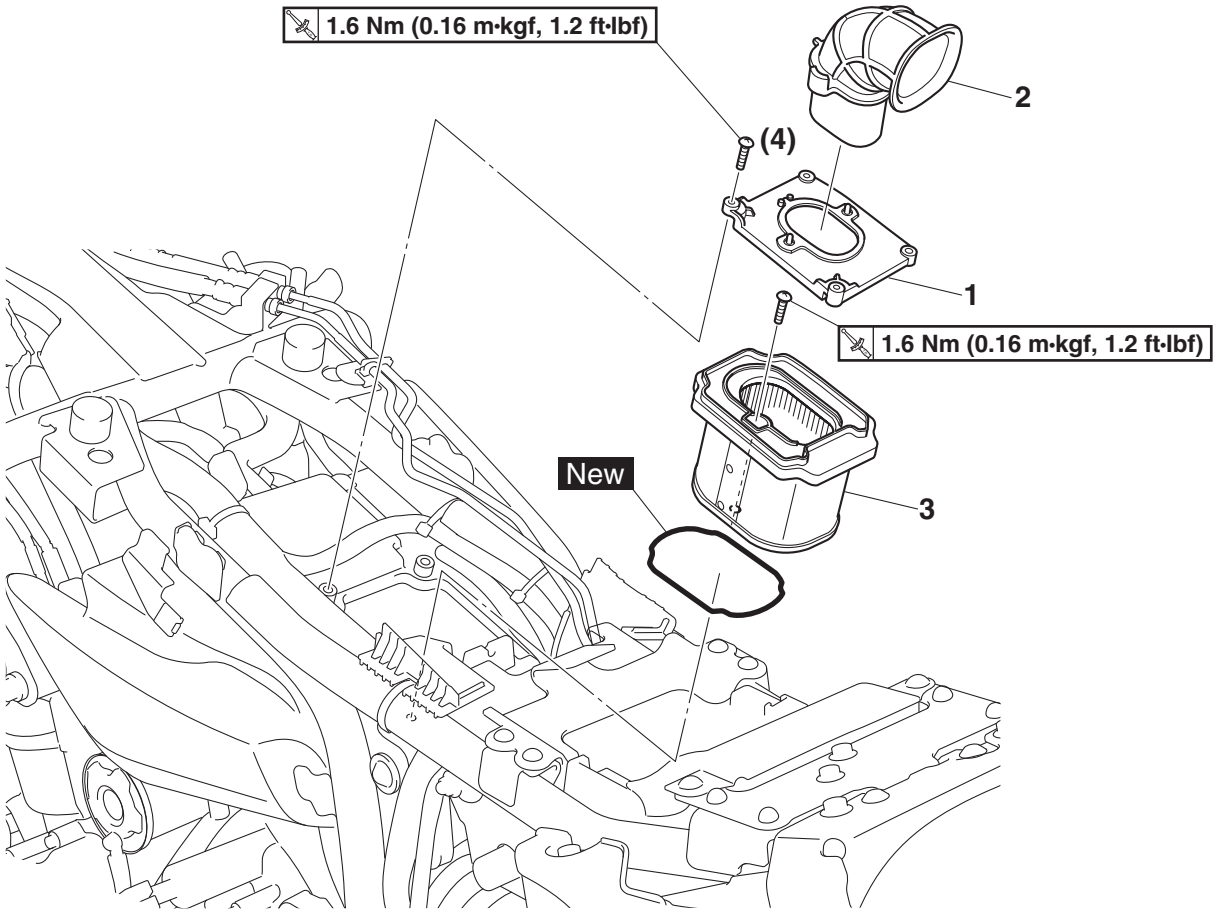
TIP

Align the holes “a” in the fuel tank cover with the projections “b” on the fuel tank center cover, and fit the fuel tank cover into the slots “c” in the fuel tank center cover.



EAS20157
GENERAL CHASSIS (4)

Removing the air filter element



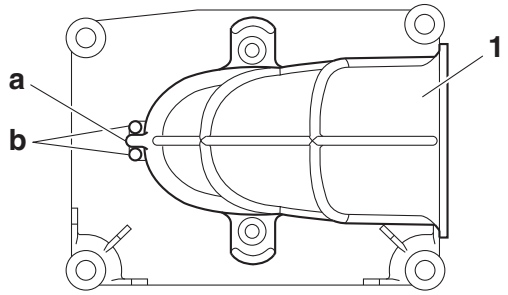
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Outer side cover (left)/Inner side cover (left)		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Air duct bracket	1	
2	Air duct	1	
3	Air filter element	1	

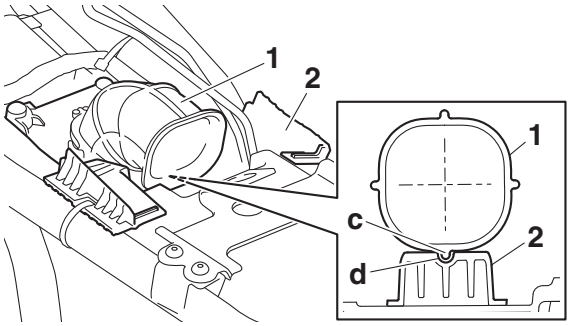
EAS31797
INSTALLING THE AIR DUCT

1. Install:
   • Air duct “1”

TIP

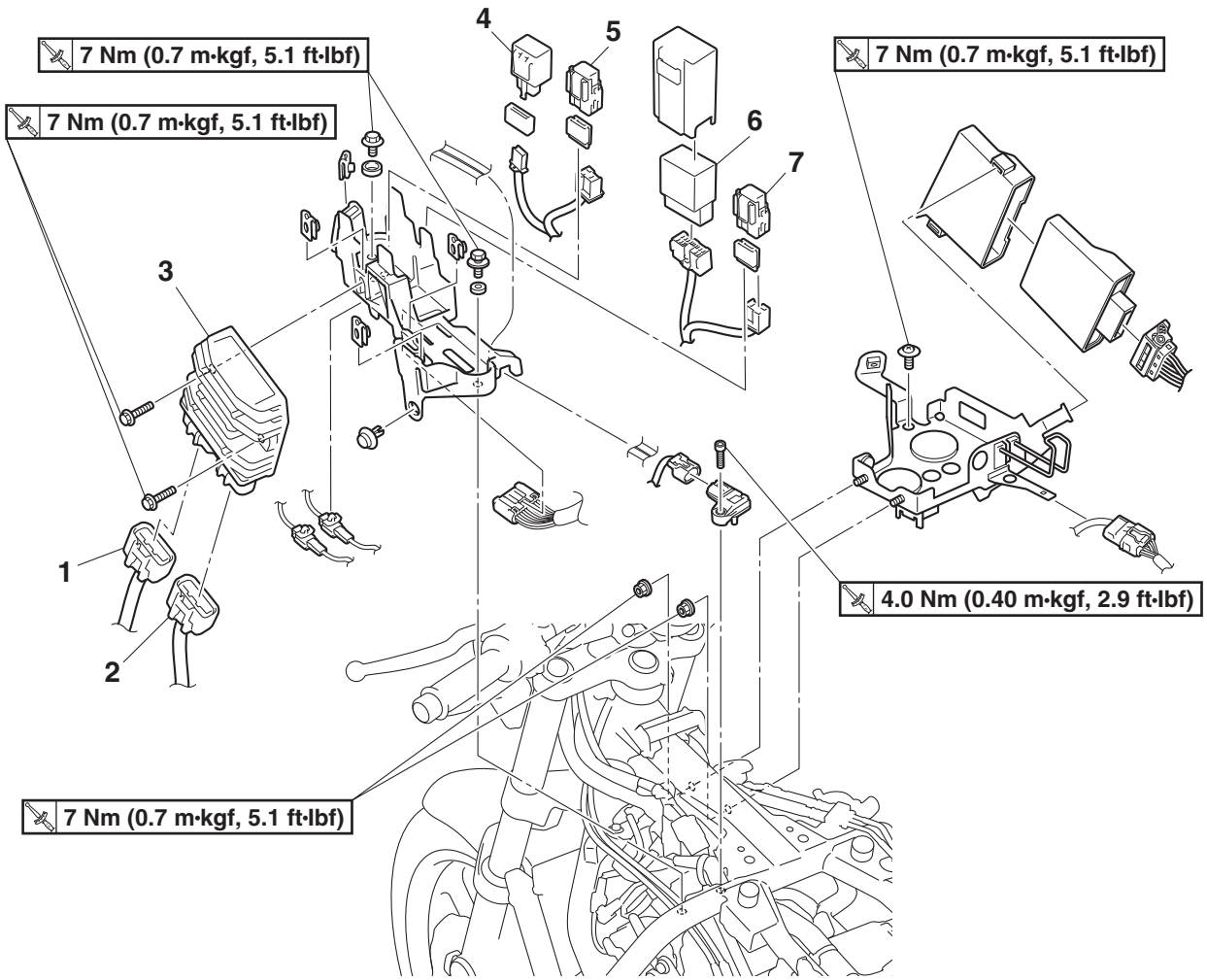
• Align the tab “a” on the air duct between the projections “b” on the air duct bracket.
• Align the projection “c” on the air duct with the slot “d” in the seal “2”.





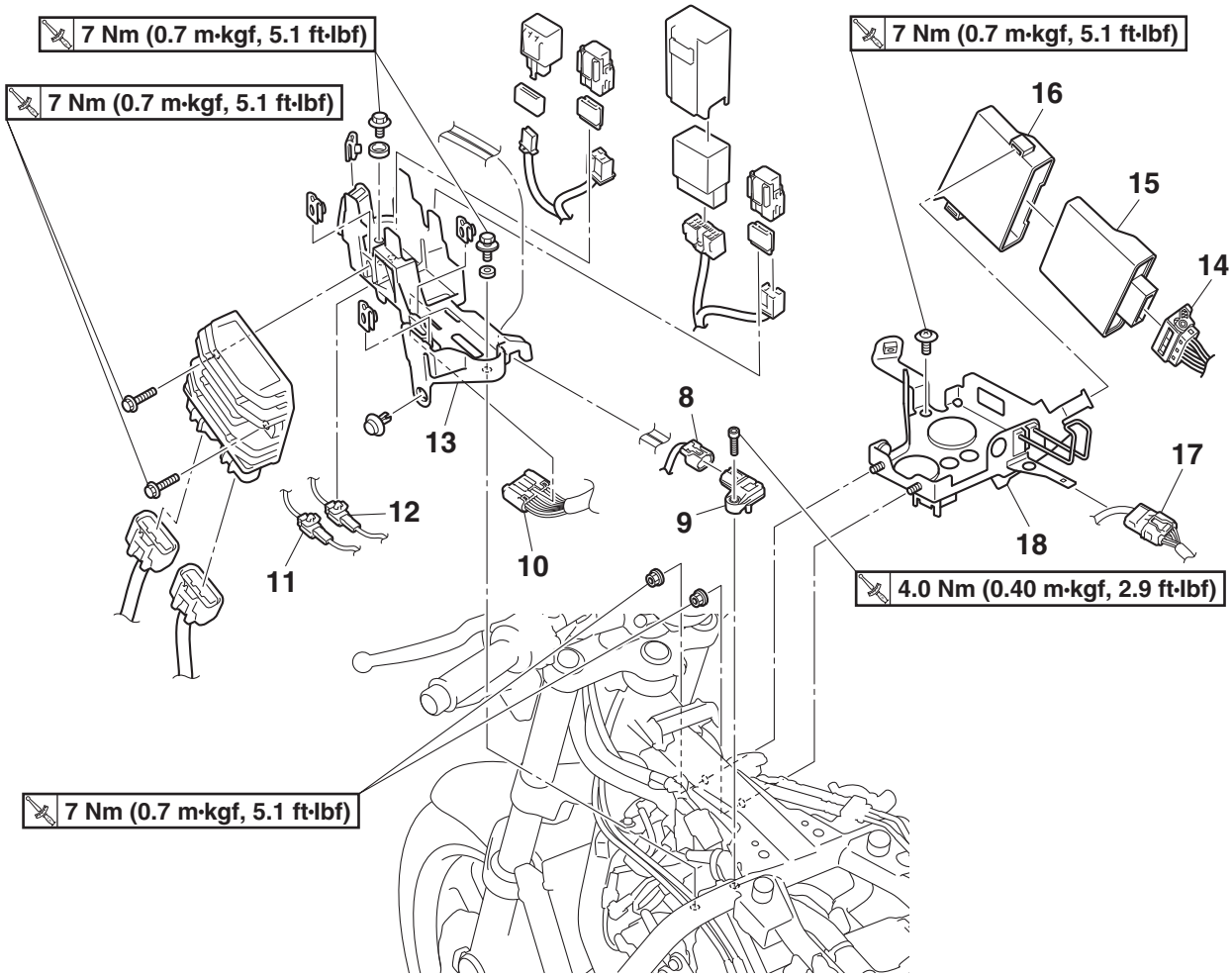
EAS20158
GENERAL CHASSIS (5)

Removing the electrical components tray



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Air scoops/Outer side covers/Inner side covers		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Hydraulic unit assembly		Refer to "ABS (ANTI-LOCK BRAKE SYSTEM)" on page 4-56.
1	Stator coil coupler	1	Disconnect.
2	Rectifier/regulator coupler	1	Disconnect.
3	Rectifier/regulator	1	
4	Turn signal/hazard relay	1	
5	Headlight relay	1	
6	Relay unit	1	
7	Fan motor relay	1	

Removing the electrical components tray

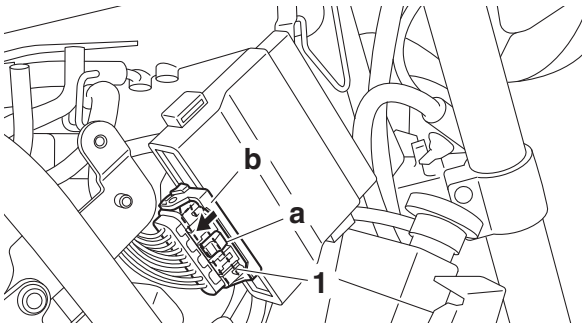


Order	Job/Parts to remove	Q'ty	Remarks
8	Intake air pressure sensor coupler	1	Disconnect.
9	Intake air pressure sensor	1	
10	Joint coupler	1	
11	Fan motor coupler	1	
12	Crankshaft position sensor coupler	1	
13	Electrical components tray 1	1	
14	ECU coupler	1	Disconnect.
15	ECU (Engine Control Unit)	1	
16	Band	1	
17	Sub-wire harness coupler	1	
18	Electrical components tray 2	1	

EAS31108
REMOVING THE ECU (engine control unit)
1. Disconnect:
   • ECU coupler “1”

TIP

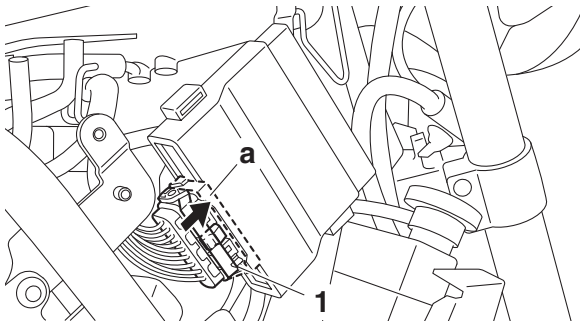
While pushing the portion “a” of the ECU coupler, move the lock lever “b” in the direction of the arrow shown to disconnect the coupler.



EAS31109
INSTALLING THE ECU (engine control unit)
1. Connect:
   • ECU coupler “1”

TIP

Connect the ECU coupler, and then push the lock lever “a” of the coupler in the direction of the arrow shown.

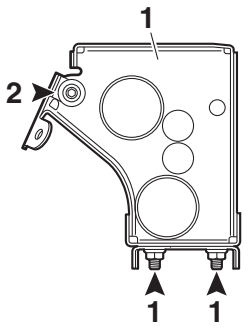


EAS31129
INSTALLING THE ELECTRICAL COMPONENTS TRAYS
1. Install:
   • Electrical components tray 2 “1”

	Electrical components tray 2 nut **7 Nm (0.7 m·kgf, 5.1 ft·lbf)** **Electrical components tray 2 bolt** **7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

TIP

Tighten the electrical components tray 2 nuts and bolt in the proper tightening sequence as shown.

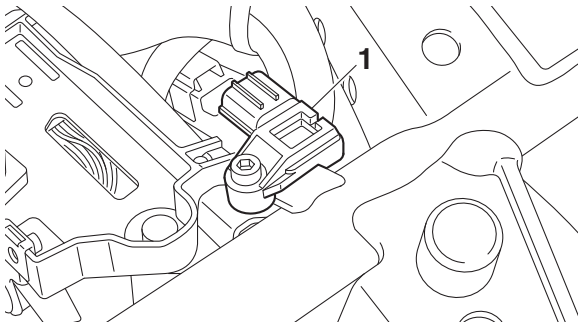


2. Install:
   • Intake air pressure sensor “1”

	Intake air pressure sensor bolt **4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)**

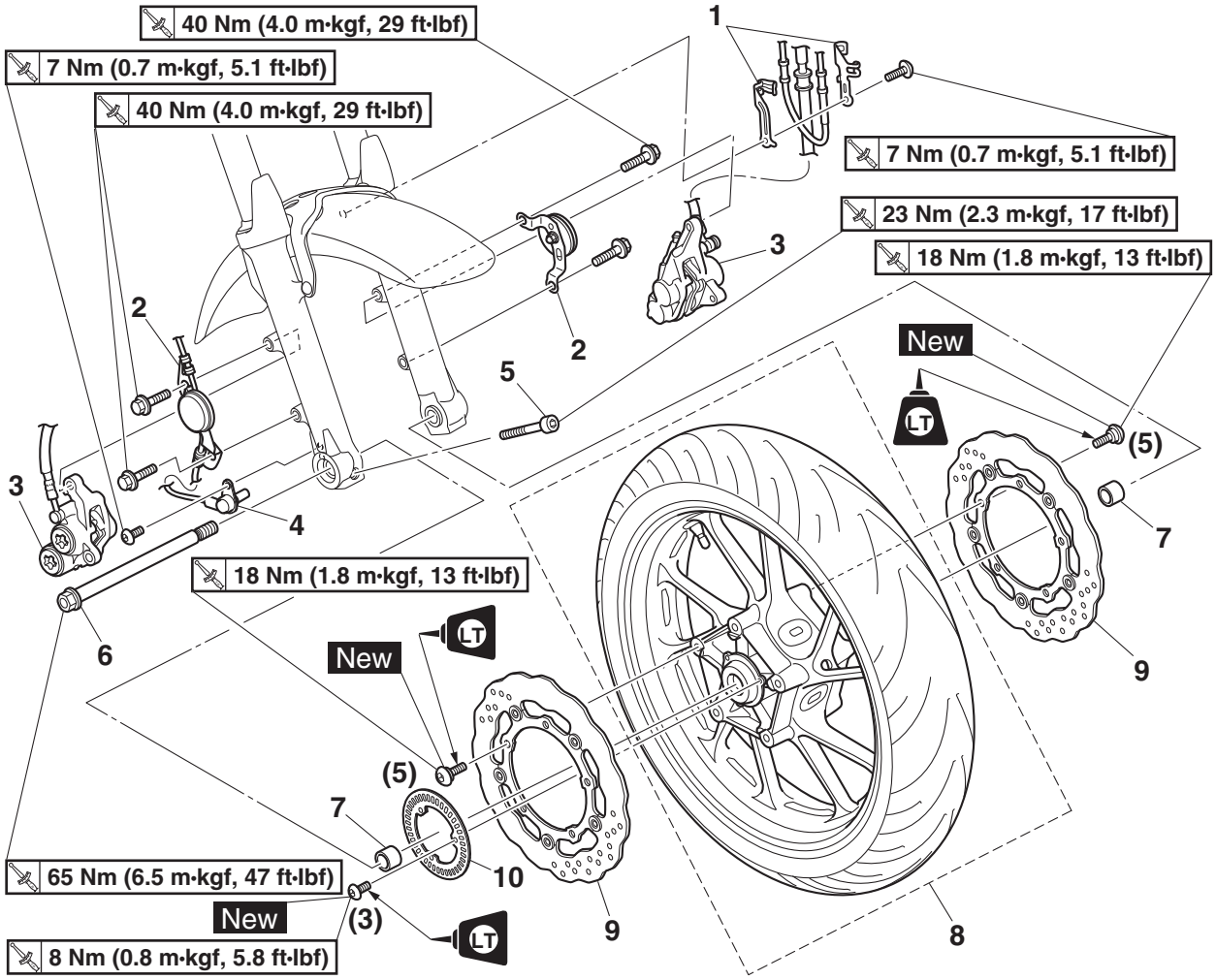
TIP

Make sure that the intake air pressure sensor contacts the frame.



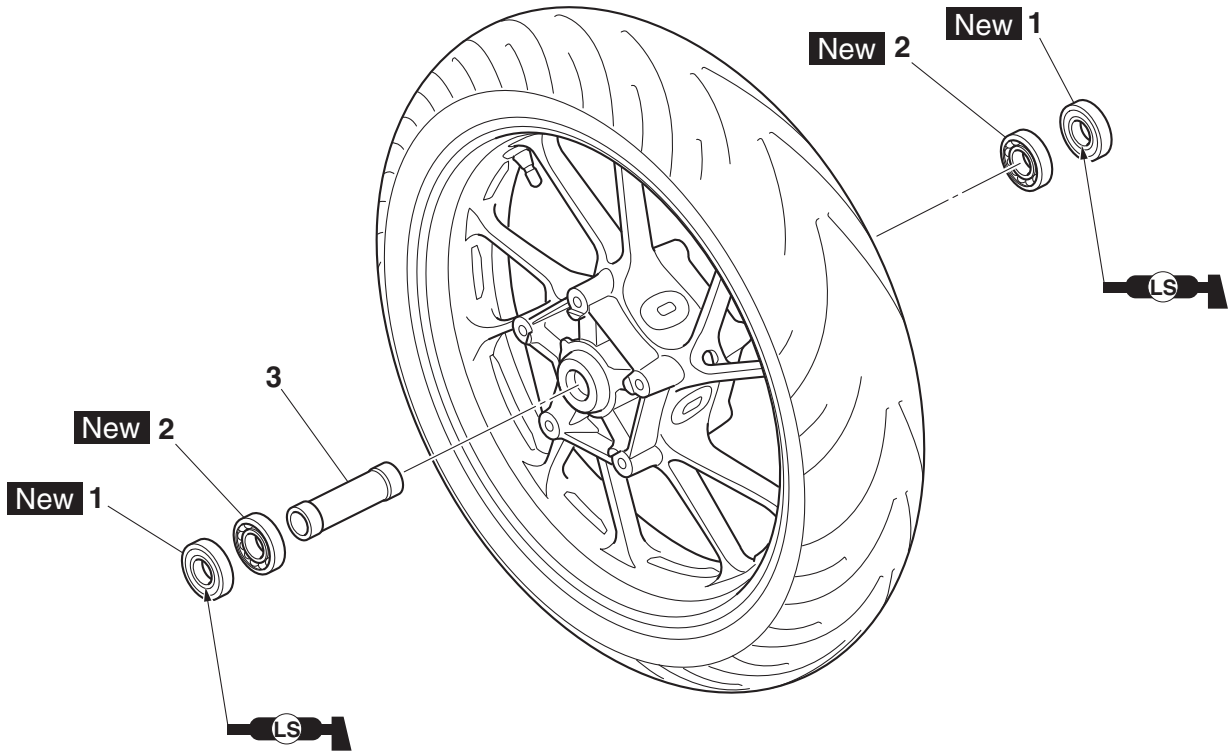
EAS20028
FRONT WHEEL

Removing the front wheel and brake discs



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

Disassembling the front wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	2	
2	Wheel bearing	2	
3	Spacer	1	

EAS30145
REMOVING THE FRONT WHEEL
ECA20981
NOTICE
- **Keep any type of magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the front wheel sensor or front wheel sensor rotor; otherwise, the sensor or rotor may be damaged, resulting in improper performance of the ABS system.**
- **Do not drop the front wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the front wheel sensor rotor, wipe it off immediately.**

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 hose/lead holders
   - Front reflectors
   - Front brake calipers
   - Front wheel sensor

ECA20990
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 outer tube.**

3. Elevate:
   - Front wheel

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

EAS30146
DISASSEMBLING THE FRONT WHEEL
1. Remove:
   - Oil seal
   - Wheel bearings

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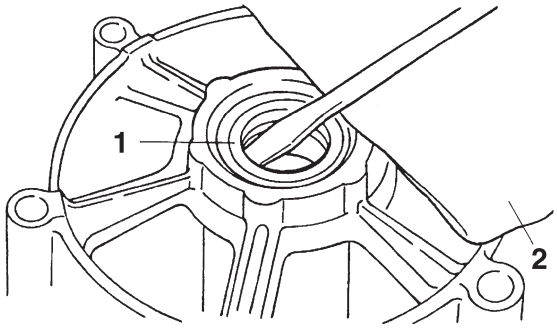
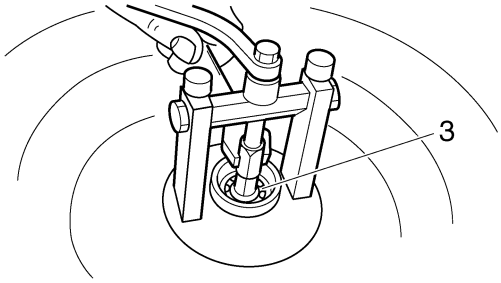
a. Clean the surface of the front wheel hub.
b. Remove the oil seals “1” with a flat-head screwdriver.

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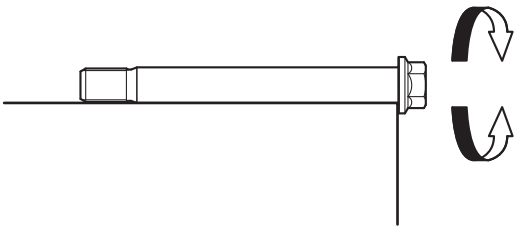
EAS30147
CHECKING THE FRONT WHEEL
1. Check:
   - Wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

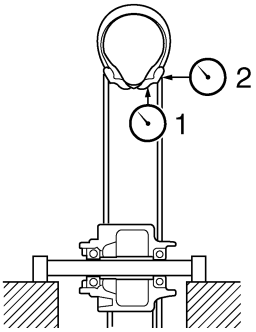
EWA13460
⚠ WARNING
Do not attempt to straighten a bent wheel axle.



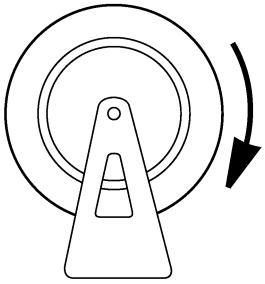
2. Check:
   - Tire
   - Front wheel
     Damage/wear → Replace.
     Refer to “CHECKING THE TIRES” on page 3-16 and “CHECKING THE WHEELS” on page 3-16.
3. Measure:
   - Radial wheel runout “1”

• 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 seal
Damage/wear → Replace.

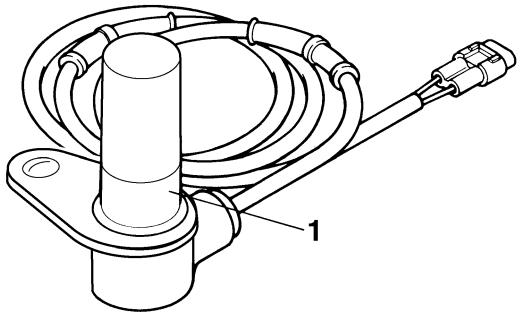


EAS30155
MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR

ECA21070
NOTICE

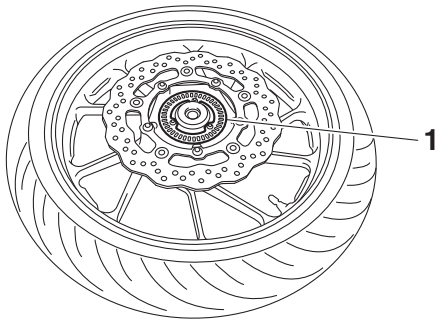
- **Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.**
- **The front wheel sensor cannot be disassembled. Do not attempt to disassemble it. If faulty, replace with a new one.**
- **Keep any type of magnets (including 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 deflection
Out of specification → Clean the installation surface of the wheel sensor rotor and correct the wheel sensor rotor deflection, or replace the wheel sensor rotor.

Wheel sensor rotor deflection limit
0.25 mm (0.0098 in)

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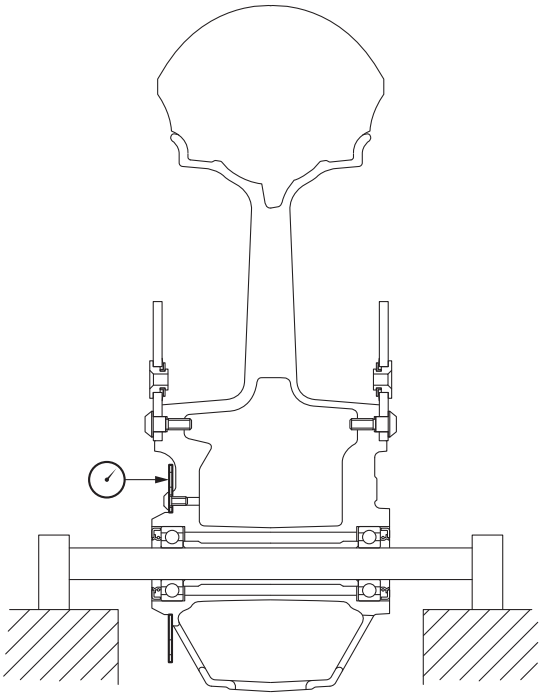
a. Hold the dial gauge at a right angle against the wheel sensor rotor surface.
b. Measure the wheel sensor rotor deflection.

TIP

Do not touch the surface of the wheel sensor rotor with a sharp object.



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

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

ECA18100

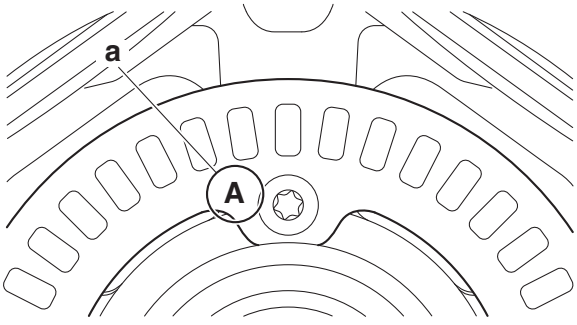
NOTICE

Replace the wheel sensor rotor bolts with new ones.

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

TIP

Install the wheel sensor rotor with the stamped mark “a” facing outward.



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EAS30151

ASSEMBLING THE FRONT WHEEL

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

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

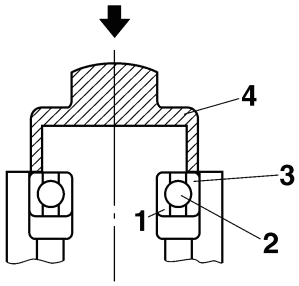
ECA18110

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.

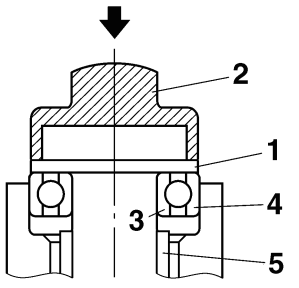


b. Install the spacer.

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”.



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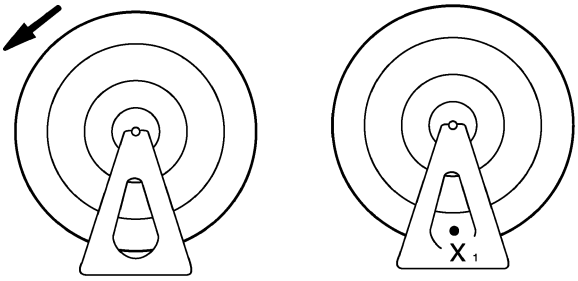
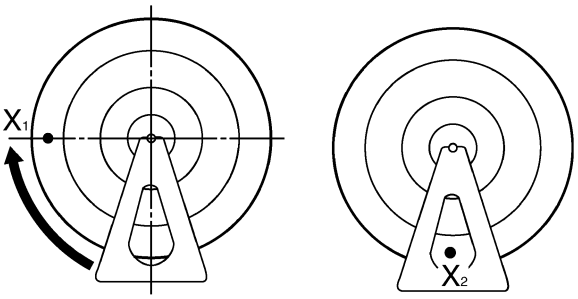
a. Spin the front wheel.
b. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.



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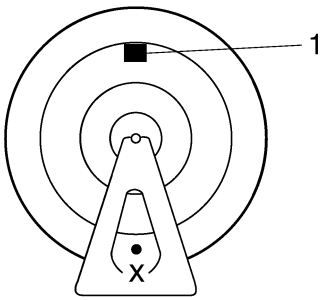
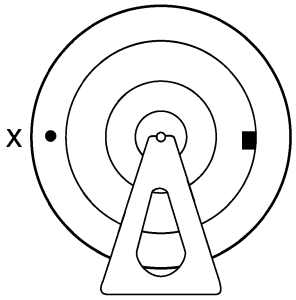
a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

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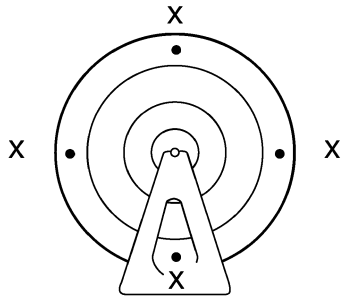
a. Turn the front wheel and make sure it stays at each position shown.



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 wheel sensor rotor
   • Front brake discs

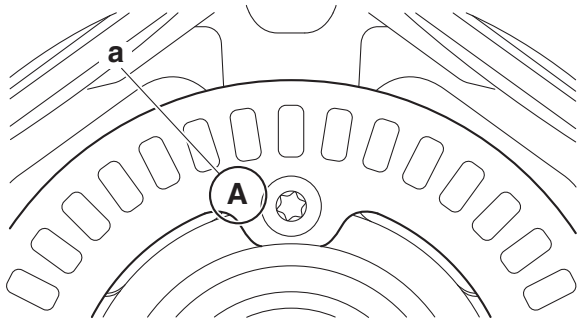
Front wheel sensor rotor bolt
8 Nm (0.8 m·kgf, 5.8 ft·lbf)
LOCTITE®
Front brake disc bolt
18 Nm (1.8 m·kgf, 13 ft·lbf)
LOCTITE®

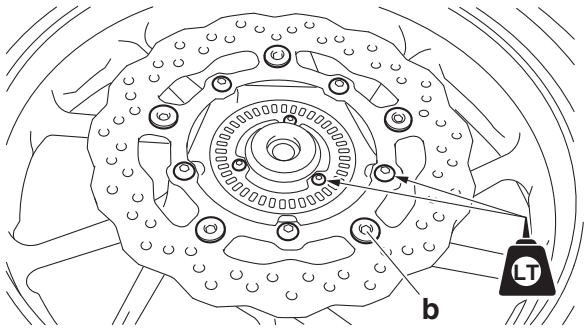
ECA21011
NOTICE

- **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.**
- **Replace the brake disc bolts and wheel sensor rotor bolts with new ones.**

TIP

- Install the wheel sensor rotor with the stamped mark “a” facing outward.
- Install each front brake disc so that the chamfered portions of the rivets “b” face outward.
- Tighten the brake disc bolts in stages and in a crisscross pattern.





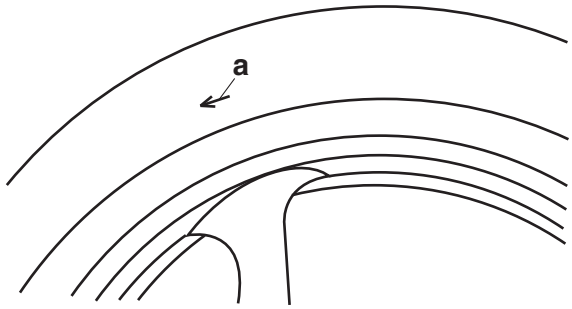
2. Check:
   - Front brake discs
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-35.
3. Lubricate:
   - Oil seal lips

Recommended lubricant
Lithium-soap-based grease

4. Install:
   - Collars
   - Front wheel
   - Front wheel axle

TIP

Install the front wheel with the mark “a” on the front tire pointing in the direction of wheel rotation.



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

Front wheel axle
65 Nm (6.5 m·kgf, 47 ft·lbf)
Front wheel axle pinch bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

ECA14140
NOTICE

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

TIP

First, tighten the wheel axle, then the wheel axle pinch bolt.

6. Install:
   - Front wheel sensor

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

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 wheel sensor lead for twists.

• To route the front wheel sensor lead, refer to "CABLE ROUTING" on page 2-43.

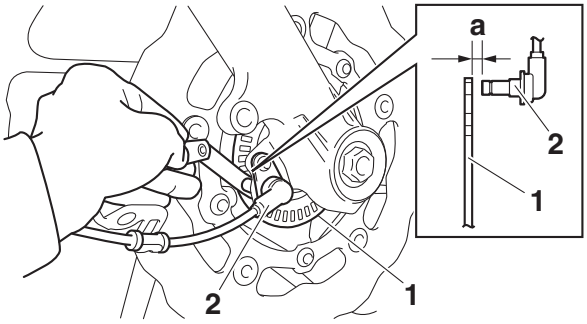
7. Measure:
   • Distance "a"
   (between the front wheel sensor rotor "1" and front wheel sensor "2")
   Out of specification → Check the wheel bearing for looseness, and the front wheel sensor and sensor rotor installation conditions (warpage caused by overtorque, wrong installation direction, rotor 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)
0.5–1.3 mm (0.02–0.05 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 reflectors
   • Front brake hose/lead holders "1"

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

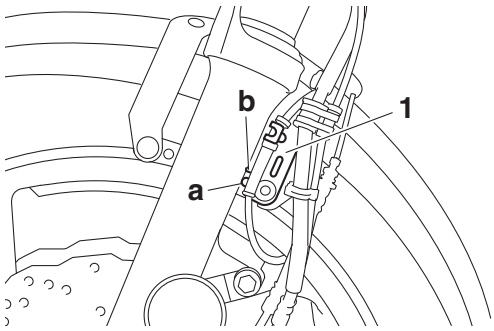
EWA13500

⚠ WARNING

Make sure the brake hose is routed properly.

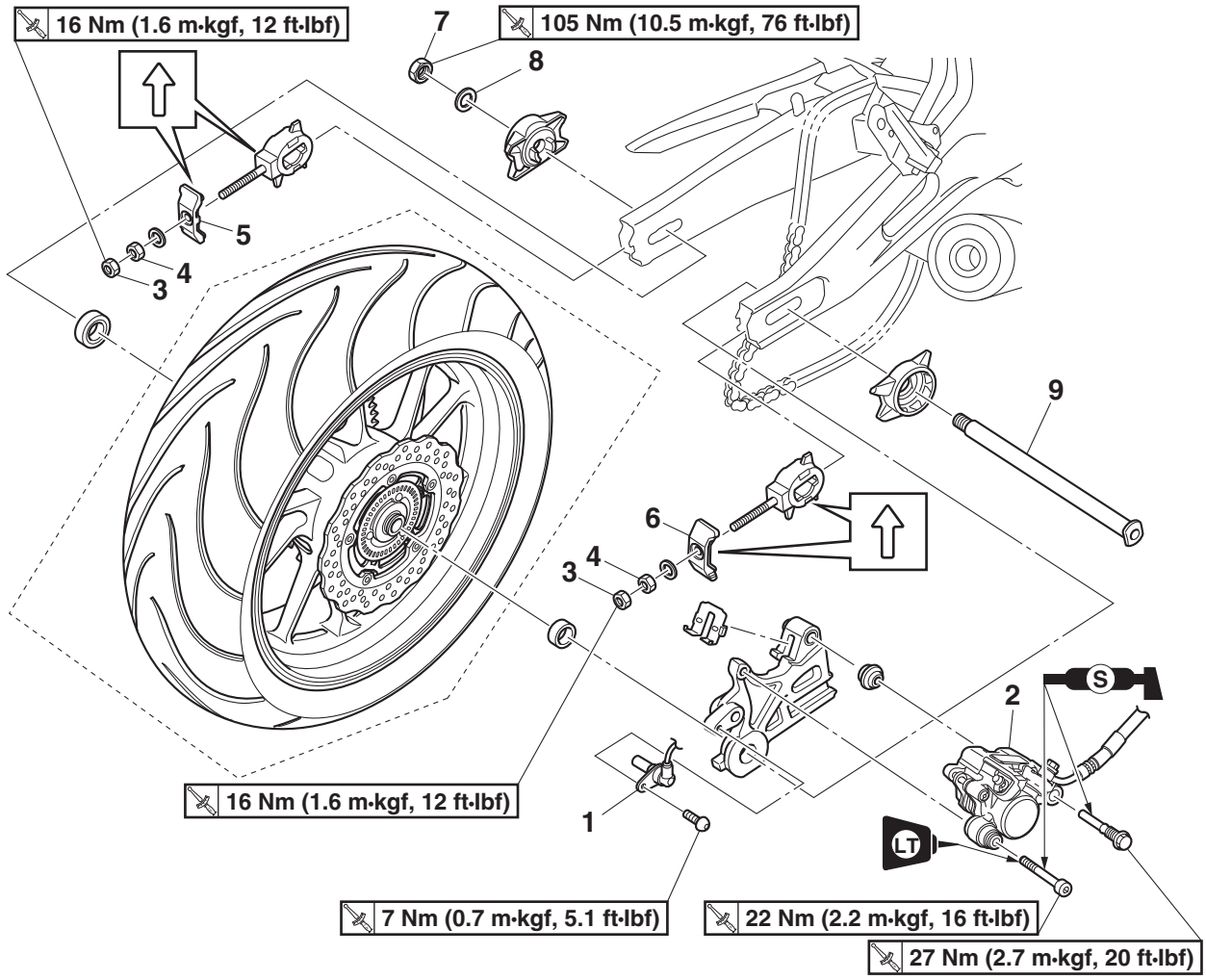
TIP

Install the front brake hose/lead holder so that the projection "a" on the holder contacts the stopper "b" on the front fork.



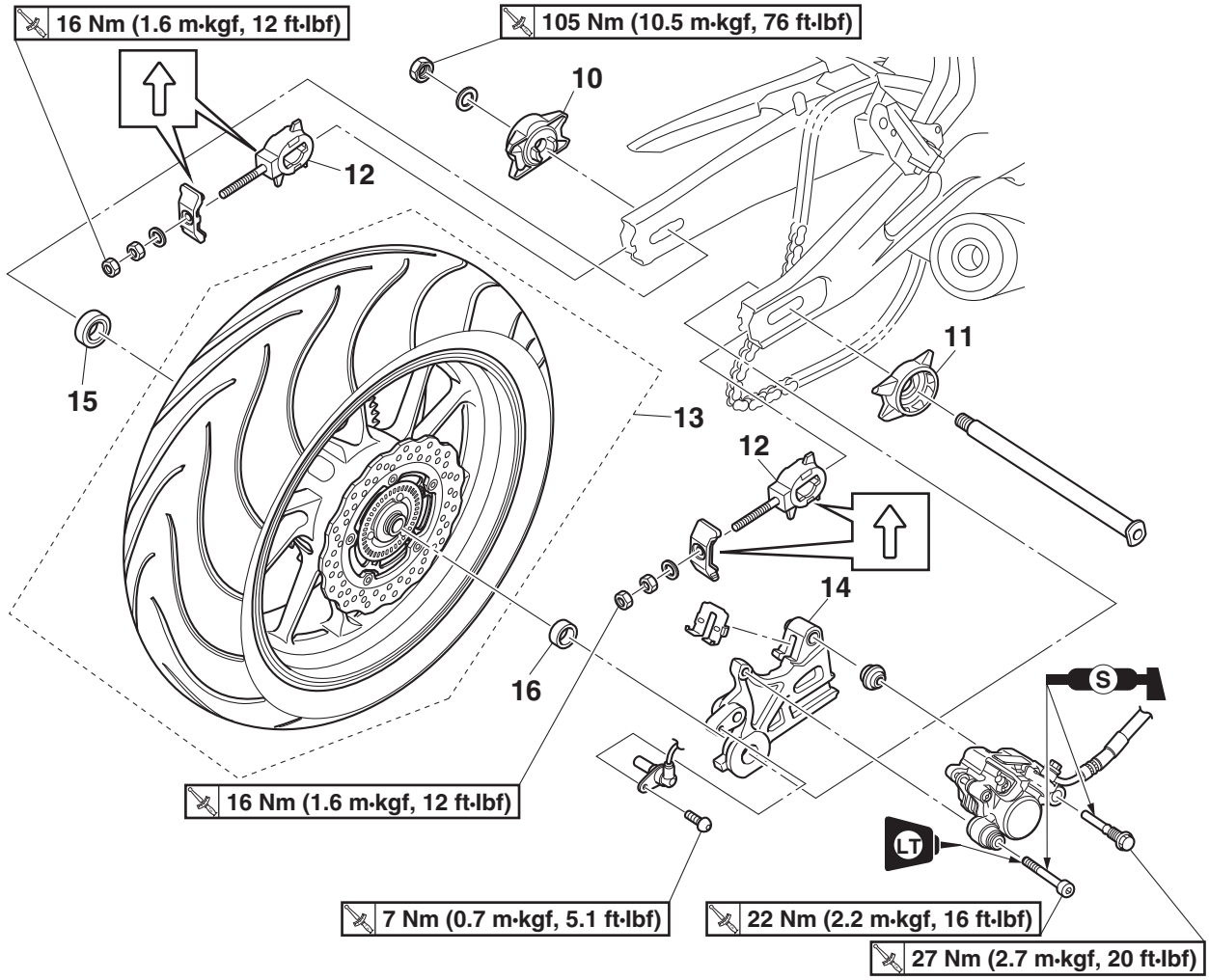
EAS20029
REAR WHEEL

Removing the rear wheel



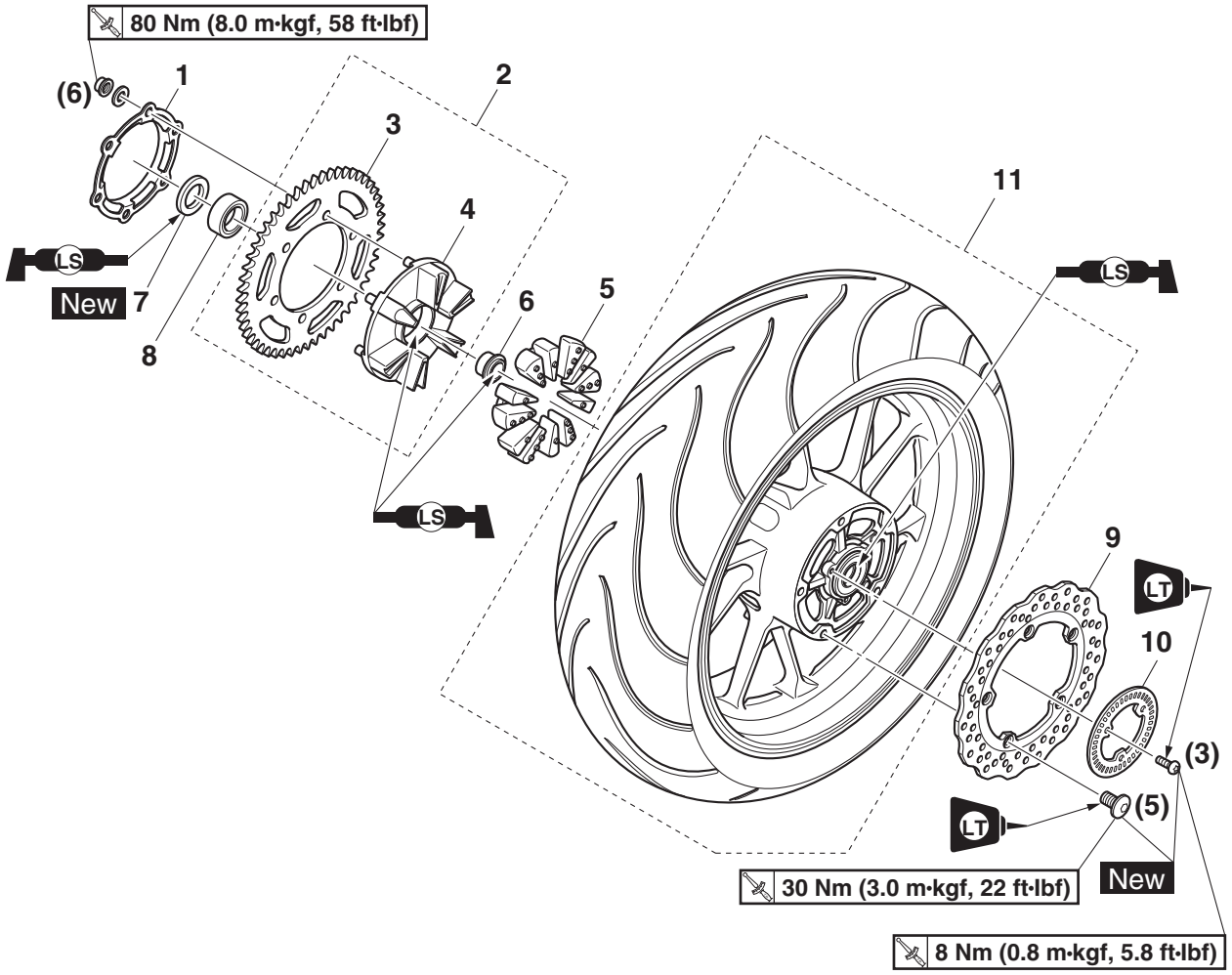
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear wheel sensor	1	
2	Rear brake caliper	1	
3	Drive chain puller locknut	2	Loosen.
4	Drive chain adjusting nut	2	Loosen.
5	Swingarm end plate (left)	1	
6	Swingarm end plate (right)	1	
7	Wheel axle nut	1	
8	Washer	1	
9	Rear wheel axle	1	

Removing the rear wheel



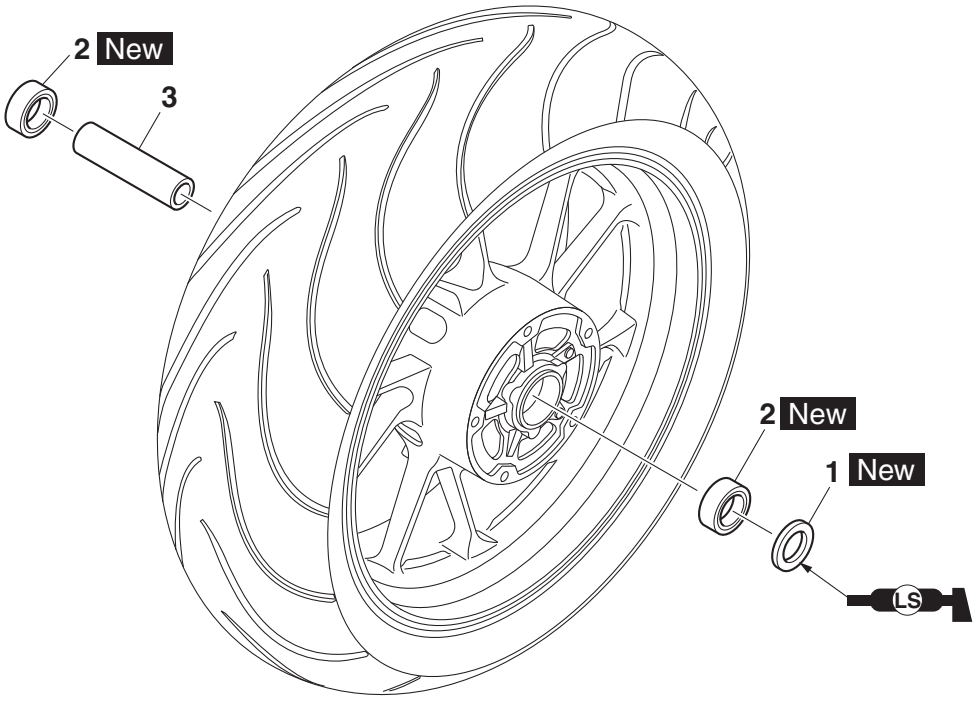
Order	Job/Parts to remove	Q'ty	Remarks
10	Drive chain slack adjusting plate (left)	1	
11	Drive chain slack adjusting plate (right)	1	
12	Chain puller	2	
13	Rear wheel	1	
14	Brake caliper bracket	1	
15	Collar (left)	1	
16	Collar (right)	1	

Removing the rear brake disc and rear wheel sprocket



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

Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	1	
2	Wheel bearing	2	
3	Spacer	1	

EAS30156
REMOVING THE REAR WHEEL (DISC BRAKE)

ECA21030
NOTICE

- **Keep any type of magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the rear wheel sensor or rear wheel sensor rotor; otherwise, the sensor or rotor may be damaged, resulting in improper performance of the ABS system.**
- **Do not drop the rear wheel sensor rotor or subject it to shocks.**
- **If any solvent gets on the rear wheel sensor rotor, wipe it off immediately.**

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

TIP

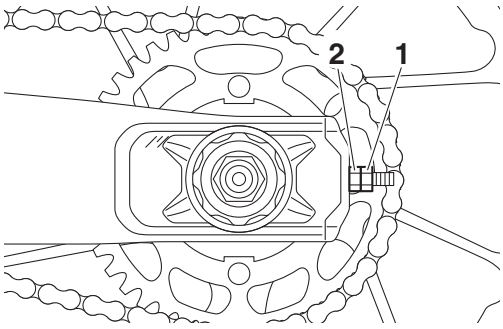
Place the vehicle on a suitable stand so that the rear wheel is elevated.

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

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.**

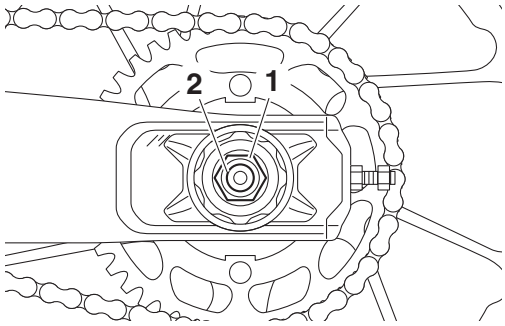
3. Loosen:
   - Drive chain puller locknuts “1”
   - Drive chain adjusting nuts “2”



4. Remove:
   - Wheel axle nut “1”
   - Washer
   - Rear wheel axle “2”
   - Drive chain slack adjusting plates
   - Rear wheel

TIP

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



EAS30158
DISASSEMBLING THE REAR WHEEL

1. Remove:
   - Oil seal
   - Wheel bearings

   Refer to “DISASSEMBLING THE FRONT WHEEL” on page 4-14.

EAS30159
CHECKING THE REAR WHEEL

1. Check:
   - Rear wheel axle
   - Wheel bearings
   - Oil seal

   Refer to “CHECKING THE FRONT WHEEL” on page 4-14.
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

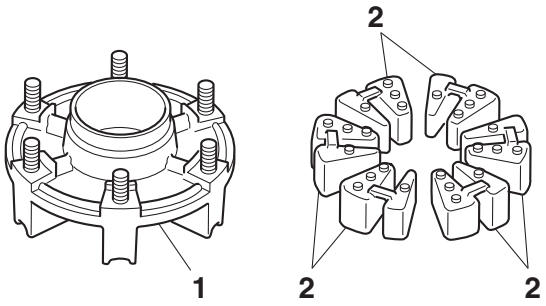
   Refer to “CHECKING THE FRONT WHEEL” on page 4-14.

EAS30160
CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
   - Rear wheel drive hub “1”

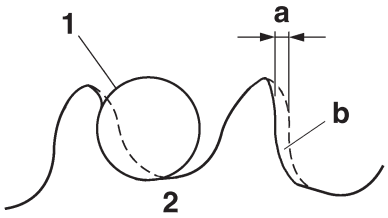
     Cracks/damage → Replace.
   - Rear wheel drive hub dampers “2”

     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 sprockets as a set.
   Bent teeth → Replace the drive sprockets as a set.



b. Correct
1. Drive chain roller
2. Rear wheel sprocket

2. Replace:
   • Rear wheel sprocket

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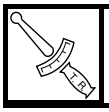
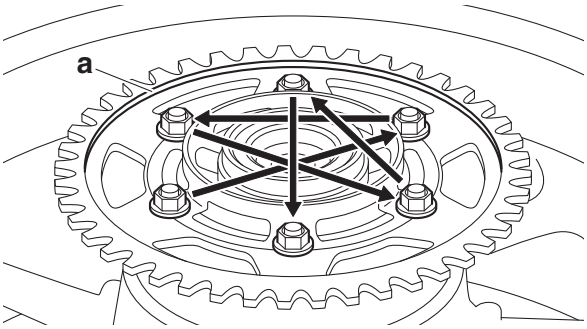
a. Remove the rear wheel sprocket nuts, bracket, and the rear wheel sprocket.
b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
c. Install a new rear wheel sprocket.

	**Rear wheel sprocket nut** **80 Nm (8.0 m·kgf, 58 ft·lbf)**

TIP

- Install the rear wheel sprocket so that the stepped side "a" of the sprocket faces away from the hub.
- Tighten the rear wheel sprocket nuts in stages and in a crisscross pattern.



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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 4-15.
2. Check:
   • Rear wheel sensor rotor
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-15.
3. Measure:
   • Wheel sensor rotor deflection
   Refer to "MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR" on page 4-15.

	**Wheel sensor rotor deflection limit** **0.25 mm (0.0098 in)**

EAS30163
ASSEMBLING THE REAR WHEEL

ECA21050
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 4-16.

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 4-16.

EAS30165
INSTALLING THE REAR WHEEL (REAR BRAKE DISC)

1. Install:
   • Rear brake disc
   • Rear wheel sensor rotor

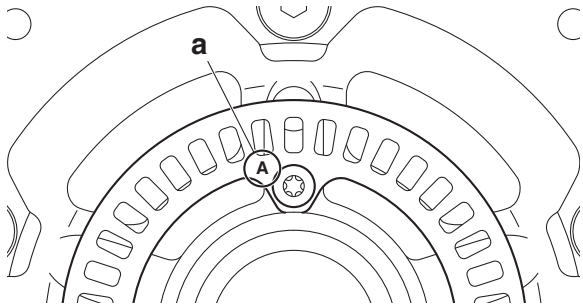
Rear wheel sensor rotor bolt
8 Nm (0.8 m·kgf, 5.8 ft·lbf)
LOCTITE®
Rear brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

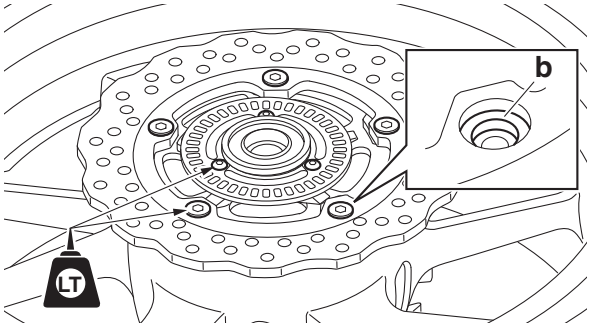
ECA21011
NOTICE

• 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.
• Replace the brake disc bolts and wheel sensor rotor bolts with new ones.

TIP

• Install the wheel sensor rotor with the stamped mark "a" facing outward.
• Install the brake disc so that the recessed portions of the bolt holes "b" face away from the hub.
• Tighten the brake disc bolts in stages and in a crisscross pattern.





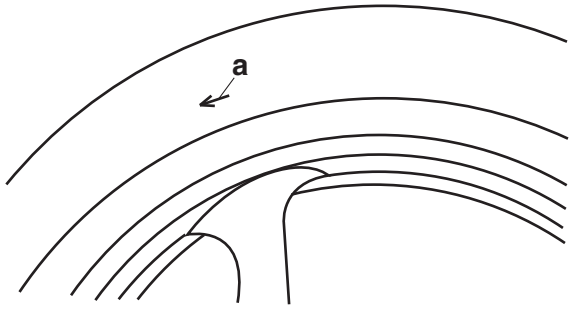
2. Install:
   • Rear wheel sprocket
   Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-25.
3. Check:
   • Rear brake disc
   Refer to "CHECKING THE REAR BRAKE DISC" on page 4-49.
4. Lubricate:
   • Oil seal lips

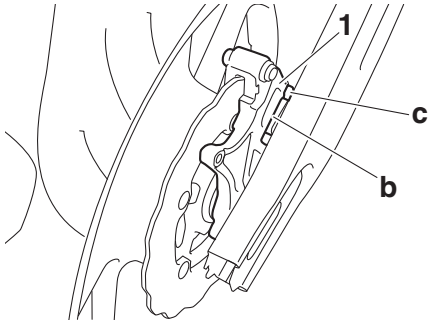
Recommended lubricant
Lithium-soap-based grease

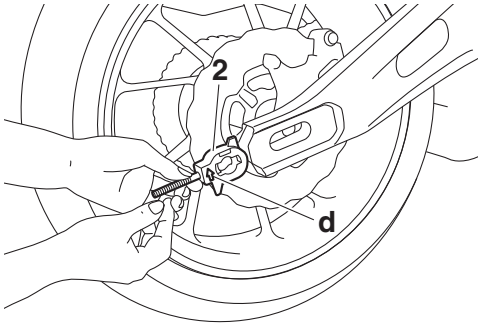
5. Install:
   • Collar (right)
   • Collar (left)
   • Brake caliper bracket "1"
   • Rear wheel
   • Chain pullers "2"
   • Drive chain slack adjusting plates
   • Rear wheel axle
   • Washer
   • Wheel axle nut
   • Swingarm end plates "3"

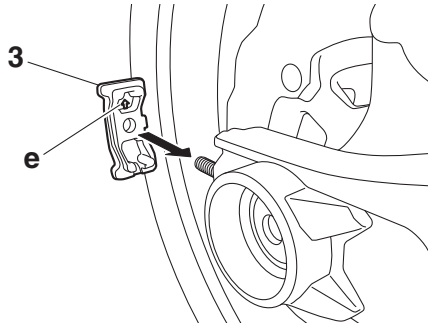
TIP

- Install the rear wheel with the mark “a” on the rear tire pointing in the direction of wheel rotation.
- Align the projection “b” in the swingarm with the slot “c” of the brake caliper bracket.
- Make sure that the arrow mark “d” on each chain puller points upward.
- Make sure that the arrow mark “e” on each swingarm end plate points upward.

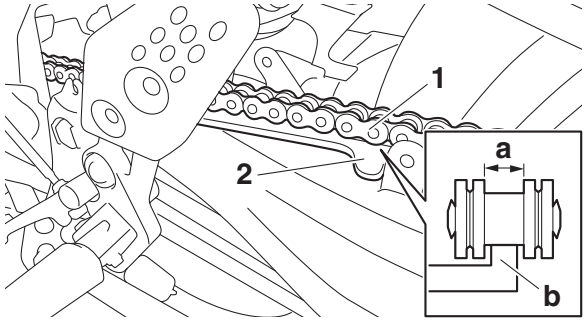








6. Install:
   - Rear brake caliper
   - Rear brake caliper retaining bolt
   - Rear brake caliper bolt
7. Fit the space “a” between the side plates of the drive chain “1” onto the rib “b” on the drive chain guide “2”.



8. Adjust:
   - Drive chain slack
     Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-17.

Drive chain slack
51.0–56.0 mm (2.01–2.20 in)

9. Tighten:
   - Wheel axle nut
   - Rear brake caliper retaining bolt
   - Rear brake caliper bolt

Wheel axle nut
105 Nm (10.5 m·kgf, 76 ft·lbf)
Rear brake caliper retaining bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)
Rear brake caliper bolt
22 Nm (2.2 m·kgf, 16 ft·lbf)
LOCTITE®

EWA13500

⚠ WARNING

Make sure the brake hose is routed properly.

10. Install:
    - Rear wheel sensor

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

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

To route the rear wheel sensor lead, refer to "CABLE ROUTING" on page 2-43.

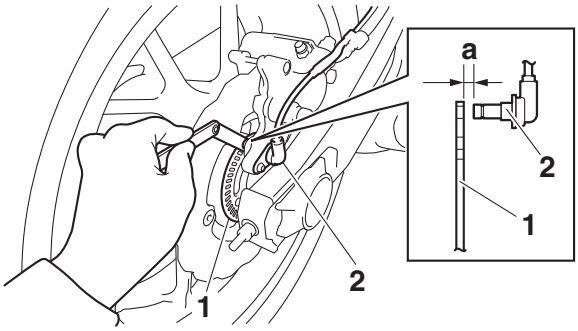
11.Measure:
- Distance "a"
  (between the rear wheel sensor rotor "1" and rear wheel sensor "2")
  Out of specification → Check the wheel bearing for looseness, and the rear wheel sensor and sensor rotor installation conditions (warpage caused by overtorque, wrong installation direction, rotor decentering, 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)
0.7–1.5 mm (0.03–0.06 in)

TIP

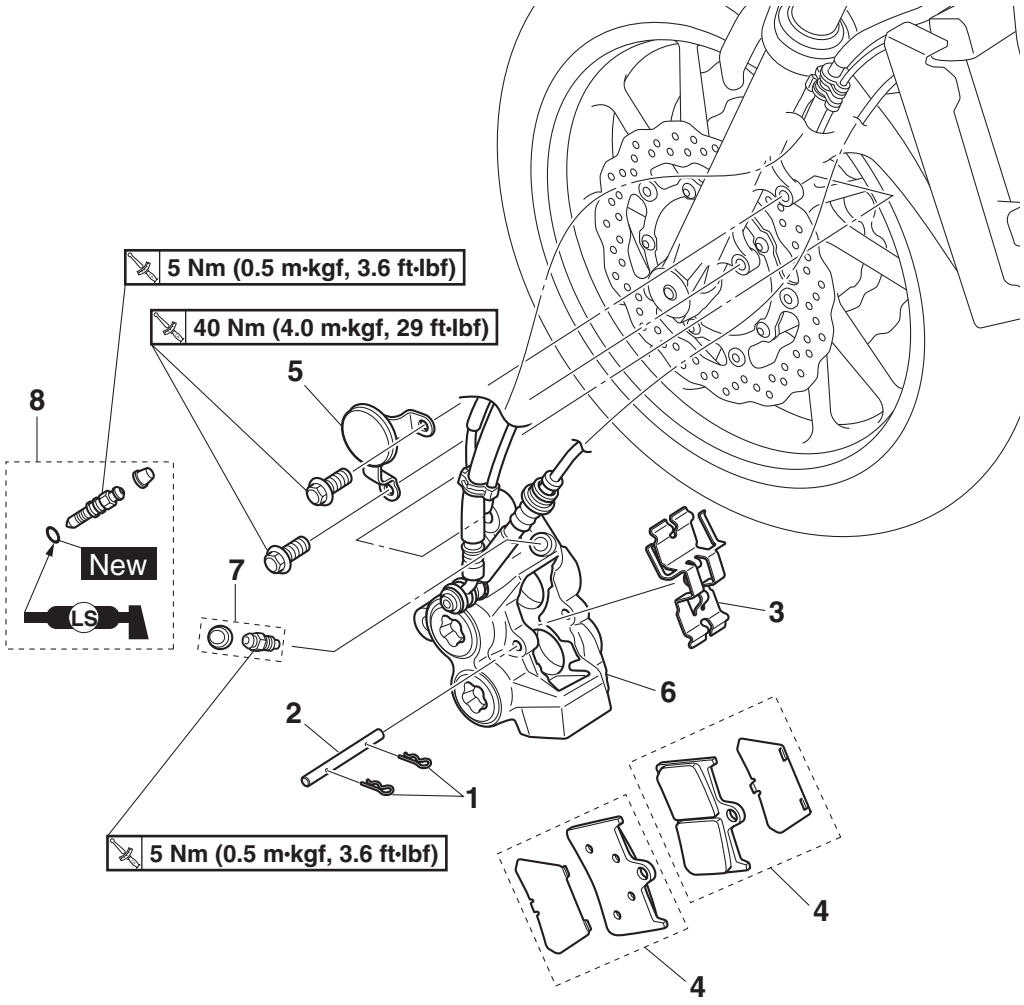
Measure the distance between the rear wheel sensor rotor and rear wheel sensor in several places in one rotation of the rear wheel. Do not turn the rear wheel while the thickness gauge is installed. This may damage the rear wheel sensor rotor and the rear wheel sensor.

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



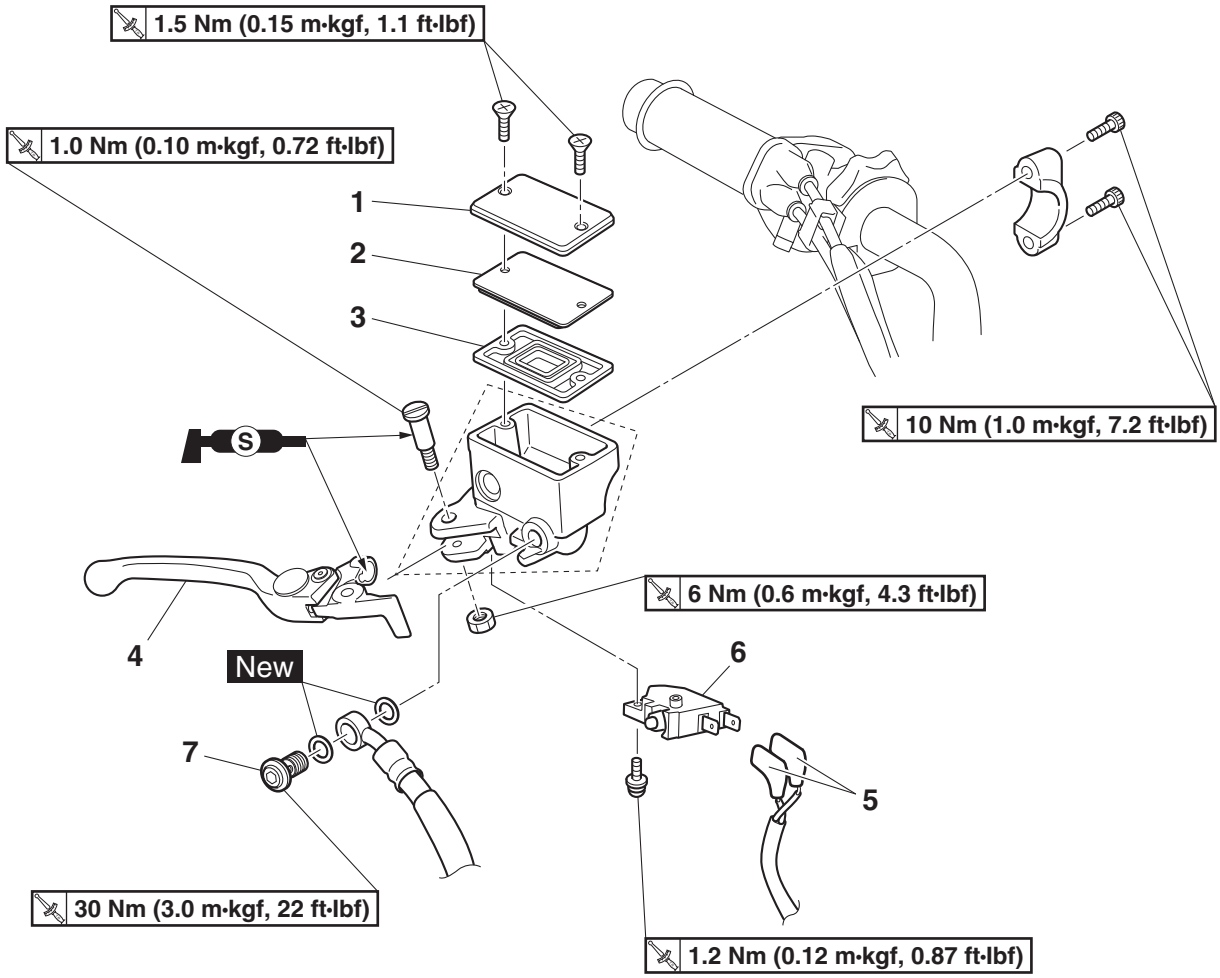
EAS20030
FRONT BRAKE

Removing the front brake pads



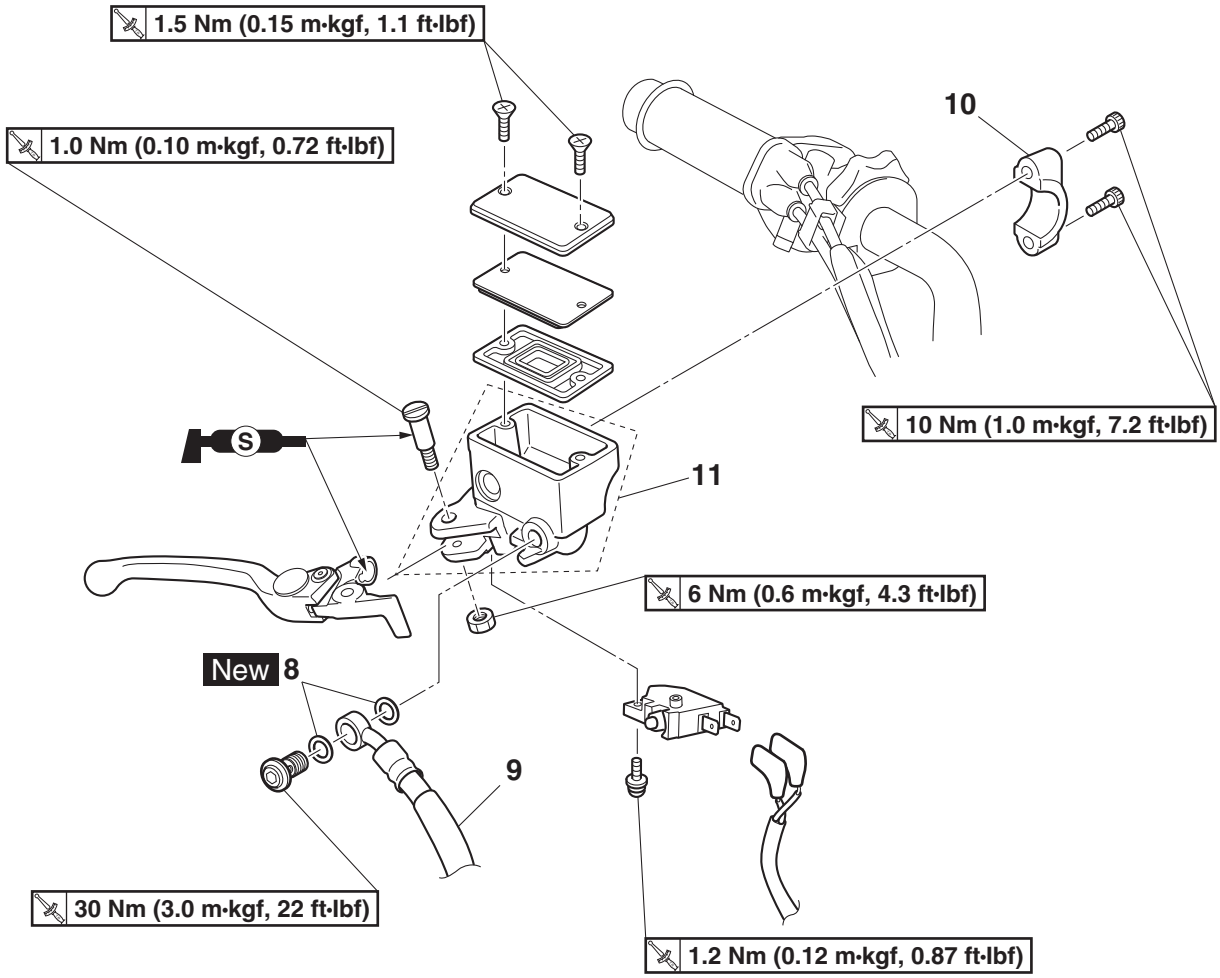
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Brake pad	2	
5	Front reflector	1	
6	Front brake caliper	1	
7	Brake caliper bleed screw	1	Left side only.
8	Brake caliper bleed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

Removing the front brake master cylinder



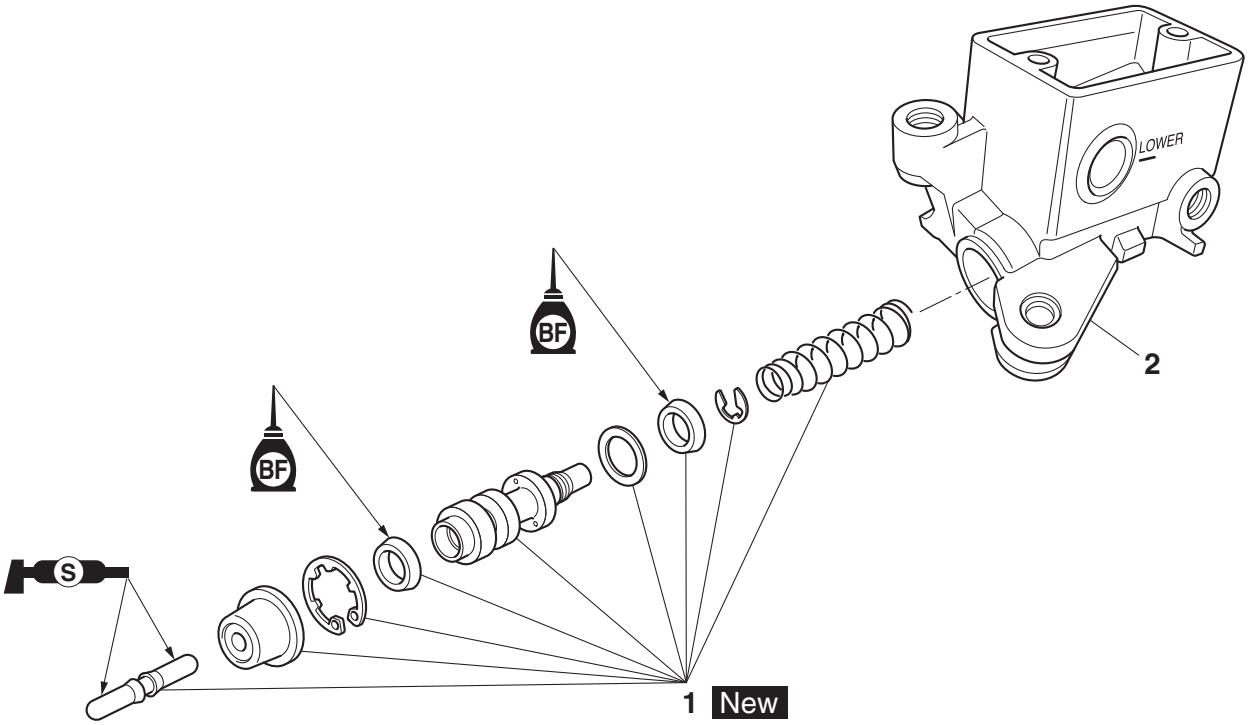
Order	Job/Parts to remove	Q'ty	Remarks
	Rearview mirror (right)		Refer to "HANDLEBAR" on page 4-65.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Brake lever	1	
5	Front brake light switch connector	2	Disconnect.
6	Front brake light switch	1	
7	Front brake hose union bolt	1	

Removing the front brake master cylinder



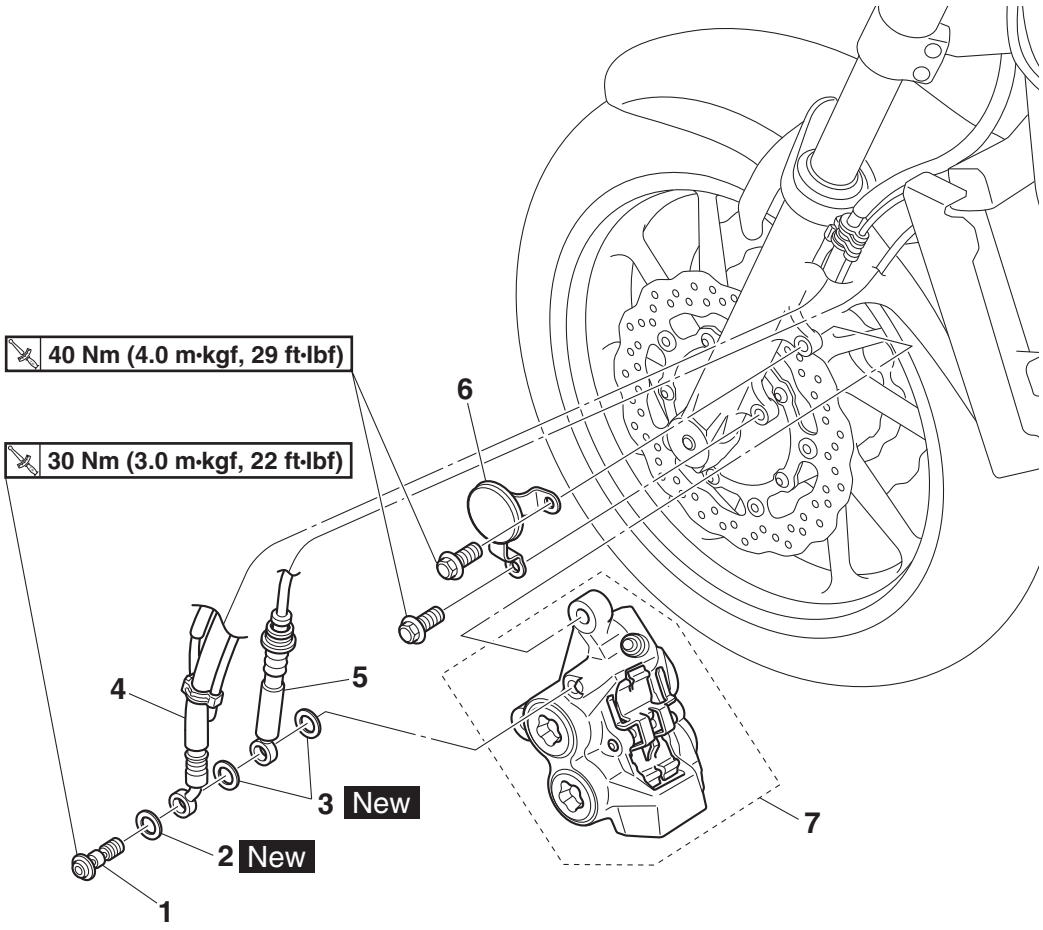
Order	Job/Parts to remove	Q'ty	Remarks
8	Brake hose gasket	2	
9	Brake hose (front brake master cylinder to hydraulic unit)	1	
10	Front brake master cylinder holder	1	
11	Front brake master cylinder assembly	1	

Disassembling the front brake master cylinder



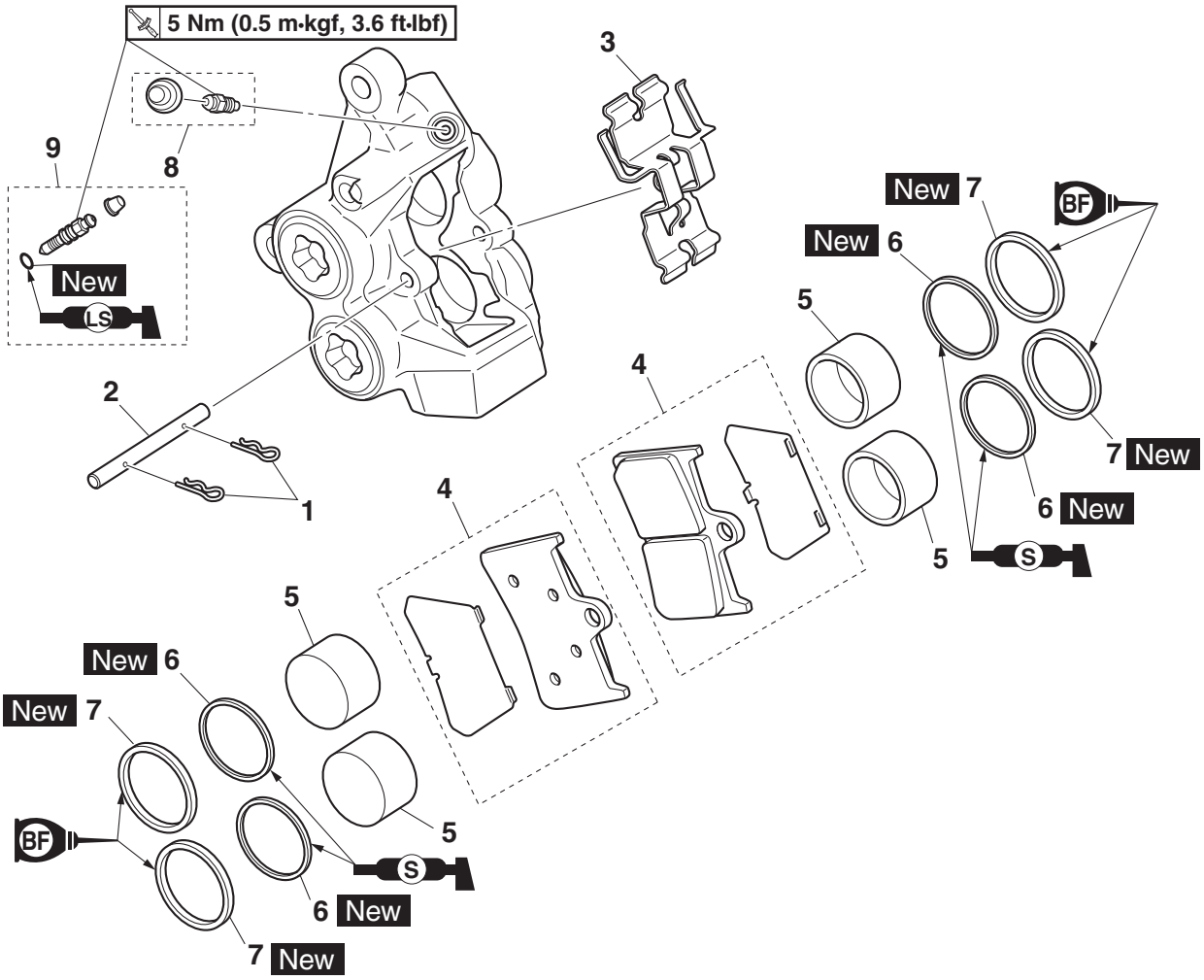
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	

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 3-14.
1	Front brake hose union bolt	1	
2	Brake hose gasket	1	Left side only.
3	Brake hose gasket	2	
4	Brake hose (hydraulic unit to left front brake caliper)	1	Left side only.
5	Brake hose (left front brake caliper to right front brake caliper)	1	
6	Front reflector	1	
7	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	Brake caliper bleed screw	1	Left side only.
9	Brake caliper bleed screw	1	Right side only.

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 4-12.
2. Check:
   - Front brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.

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

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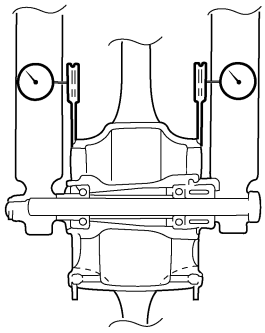
a. Place the vehicle on a suitable stand so that the front wheel is elevated.
b. Before measuring the brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc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



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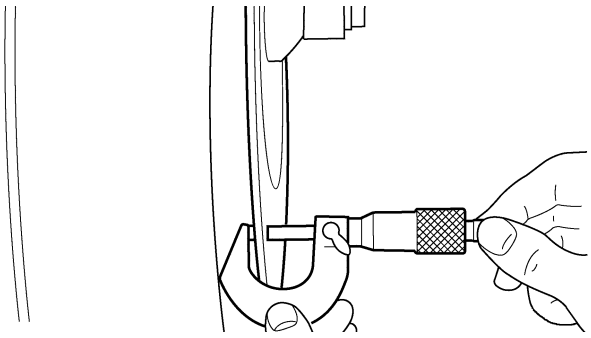
4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.

Brake disc thickness limit
4.0 mm (0.16 in)



5. Adjust:
   - Brake disc deflection

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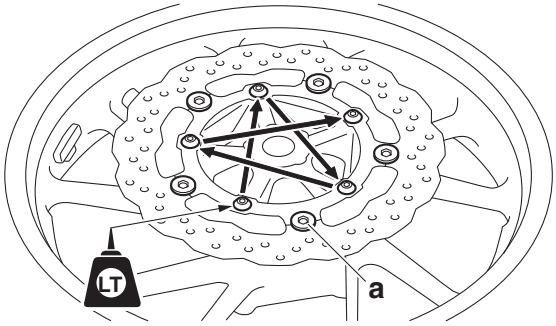
a. Remove the brake disc.
b. Rotate the brake disc by one bolt hole.
c. Install the brake disc.

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

ECA19150
NOTICE

Replace the brake disc bolts with new ones.

TIP
- Install each front brake disc so that the chamfered portions of the rivets "a" face outward.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



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

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6. Install:
   • Front wheel
   Refer to "FRONT WHEEL" on page 4-12.

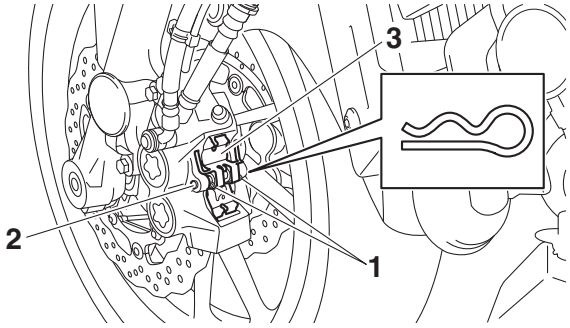
EAS30170
REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

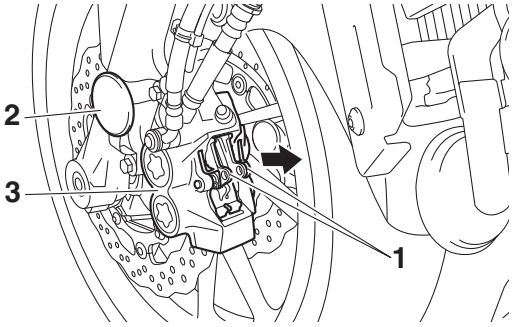
TIP

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"

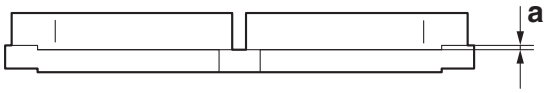


2. Remove:
   • Brake pads "1"
   • Front reflector "2"
   • Front brake caliper "3"



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

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



4. Install:
   • Brake pads
   • Brake pad spring

TIP

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

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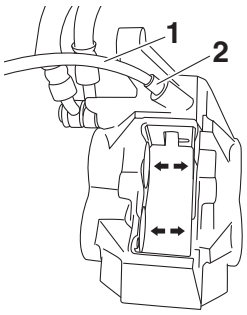
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.



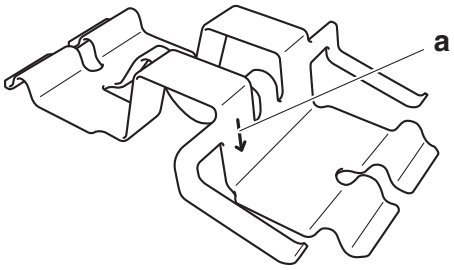
c. Tighten the bleed screw.

	Brake caliper bleed screw **5 Nm (0.5 m·kgf, 3.6 ft·lbf)**

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

TIP

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



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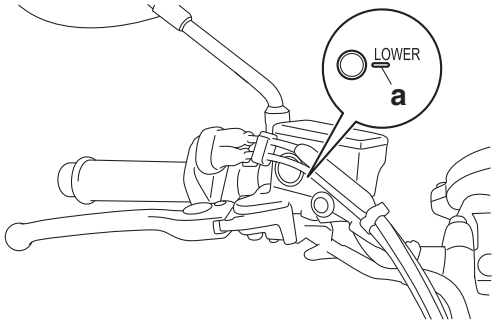
5. Install:
   - Brake pad pin
   - Brake pad clips
   - Front reflector
   - Front brake caliper

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

6. Check:
   - Brake fluid level
     Below the minimum level mark "a" → Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-15.



7. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.

EAS30724

REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

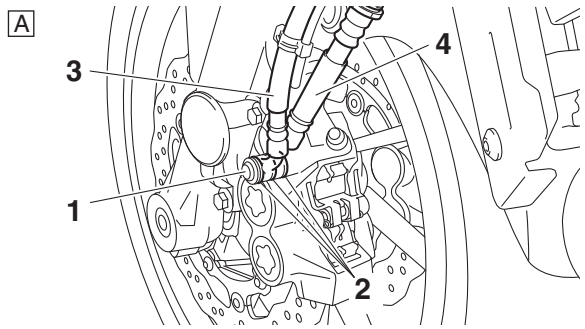
TIP

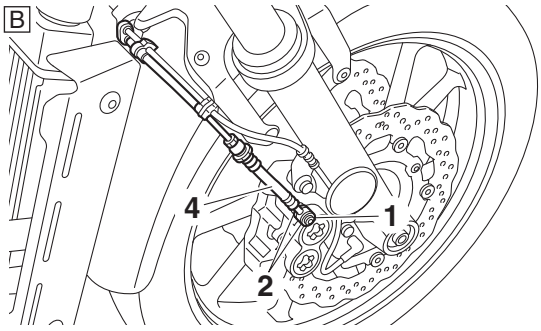
Before removing the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   - Brake hose union bolt "1"
   - Brake hose gaskets "2"
   - Brake hose (hydraulic unit to left front brake caliper) "3"
   - Brake hose (left front brake caliper to right front brake caliper) "4"

TIP

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



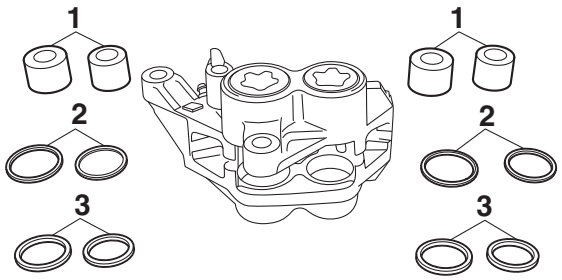


A. Left side
B. Right side

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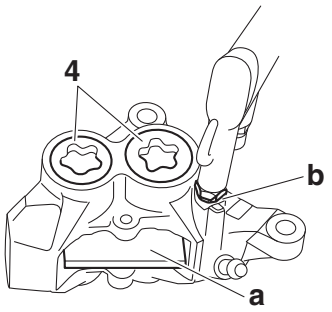
a. Secure the right side brake caliper pistons with a piece of wood "a".
b. Blow compressed air into the brake hose joint opening "b" to force out the left side pistons from the brake caliper.

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.

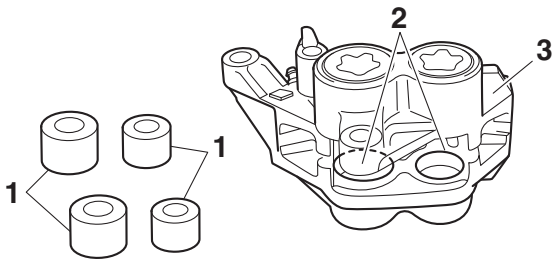
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Piston dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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

EWA13621
WARNING

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

Specified brake fluid
DOT 4

EAS30175
INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:
   - Front brake caliper "1"
   - Front reflector "2"
   - Brake hose gaskets "3" New
   - Brake hose (left front brake caliper to right front brake caliper) "4"
   - Brake hose (hydraulic unit to left front brake caliper) "5"
   - Brake hose union bolt "6"

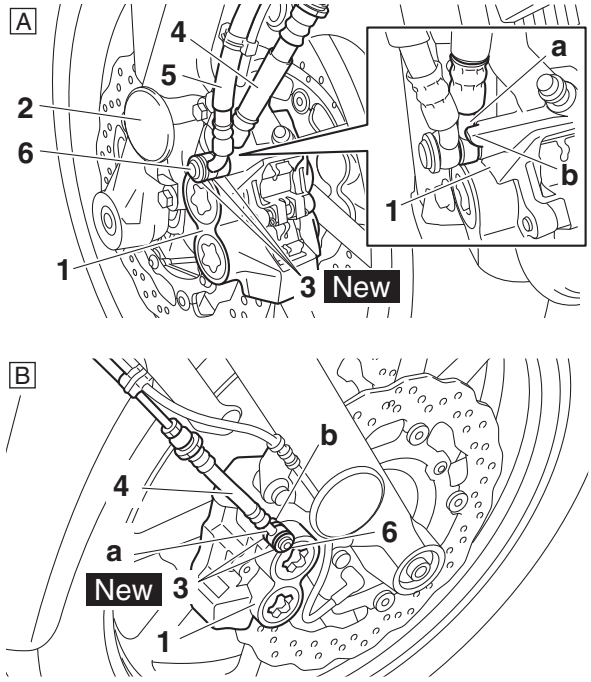
Front brake caliper bolt
40 Nm (4.0 m·kgf, 29 ft·lbf)
Front brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13531
WARNING

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

ECA20851
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.**
- **There should be 0.5–1.5 mm (0.020–0.059 in) of clearance between the brake pipes. (Left side only)**



A. Left side
B. Right side

2. Install:
   - Brake pads
   - Brake pad spring
   - Brake pad pin
   - Brake pad clips
   Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-36.
3. Fill:
   - Brake master cylinder reservoir (with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

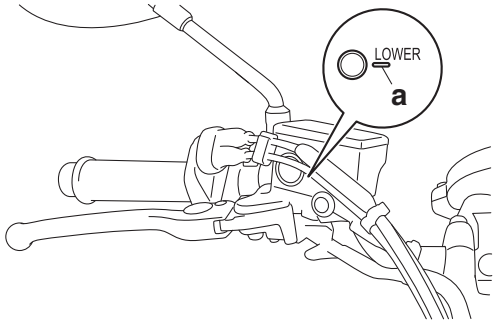
EWA13090
WARNING

- **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.

4. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.
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 3-15.



6. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.

EAS30179
REMOVING THE FRONT BRAKE MASTER CYLINDER

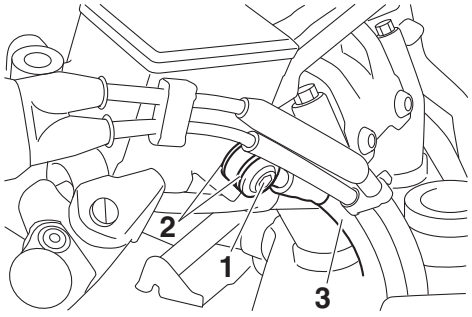
TIP

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 (front brake master cylinder to hydraulic unit) "3"

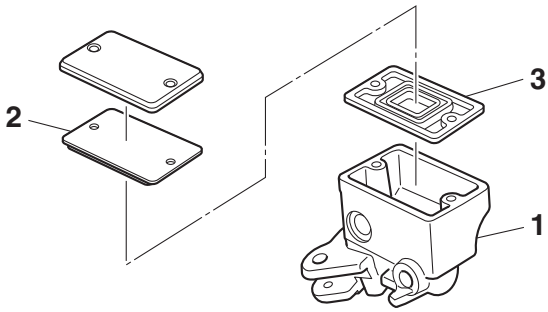
TIP

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

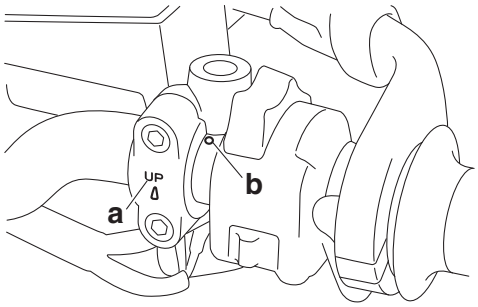
EAS30182
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - Front brake master cylinder assembly
   - Front brake master cylinder holder

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

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 right handlebar switch and the front brake master cylinder holder. Also, the punch mark should be seen.



2. Install:
   - Brake hose (front brake master cylinder to hydraulic unit)
   - Brake hose gaskets New
   - Brake hose union bolt

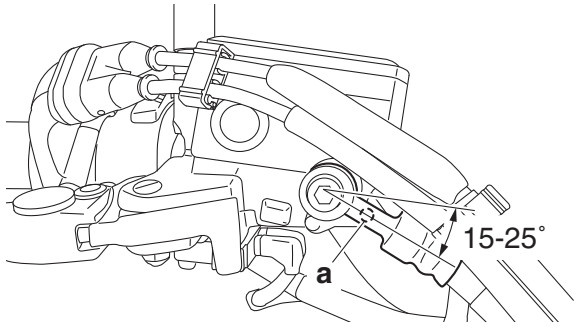
Front brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13531
WARNING

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

TIP

- Install the brake pipe so that paint mark "a" on the pipe faces to the rear of the vehicle.
- Attach the brake hose so that its angle is 15° to 25° 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

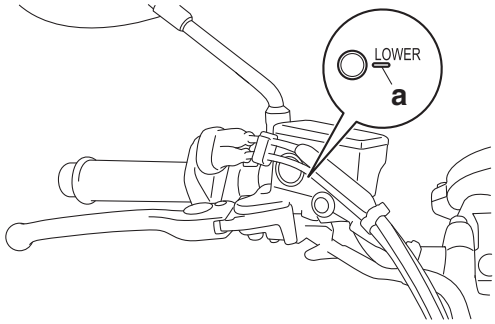
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor 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 3-14.

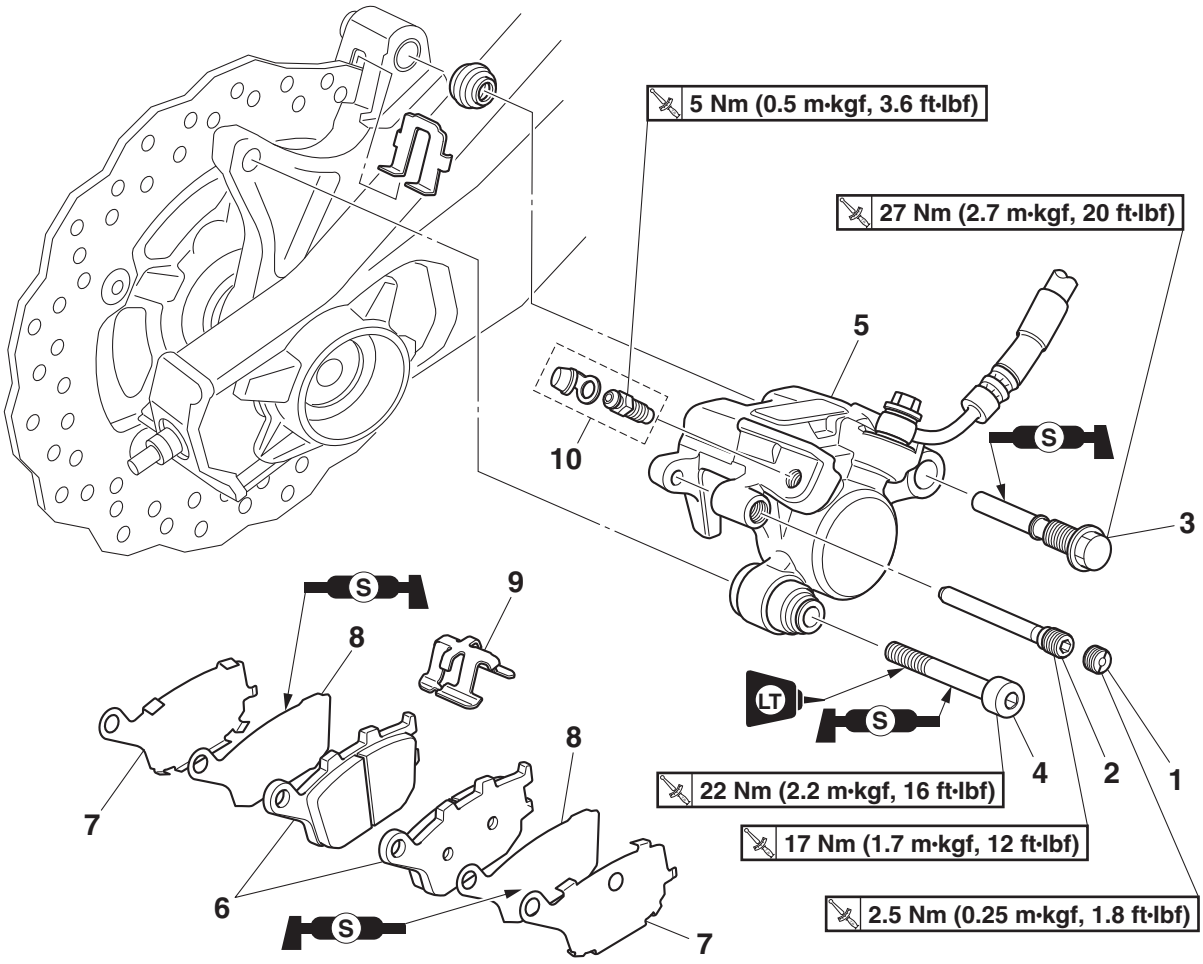
5. Check:
   • Brake fluid level
   Below the minimum level mark “a” → Add the specified brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-15.



6. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-14.

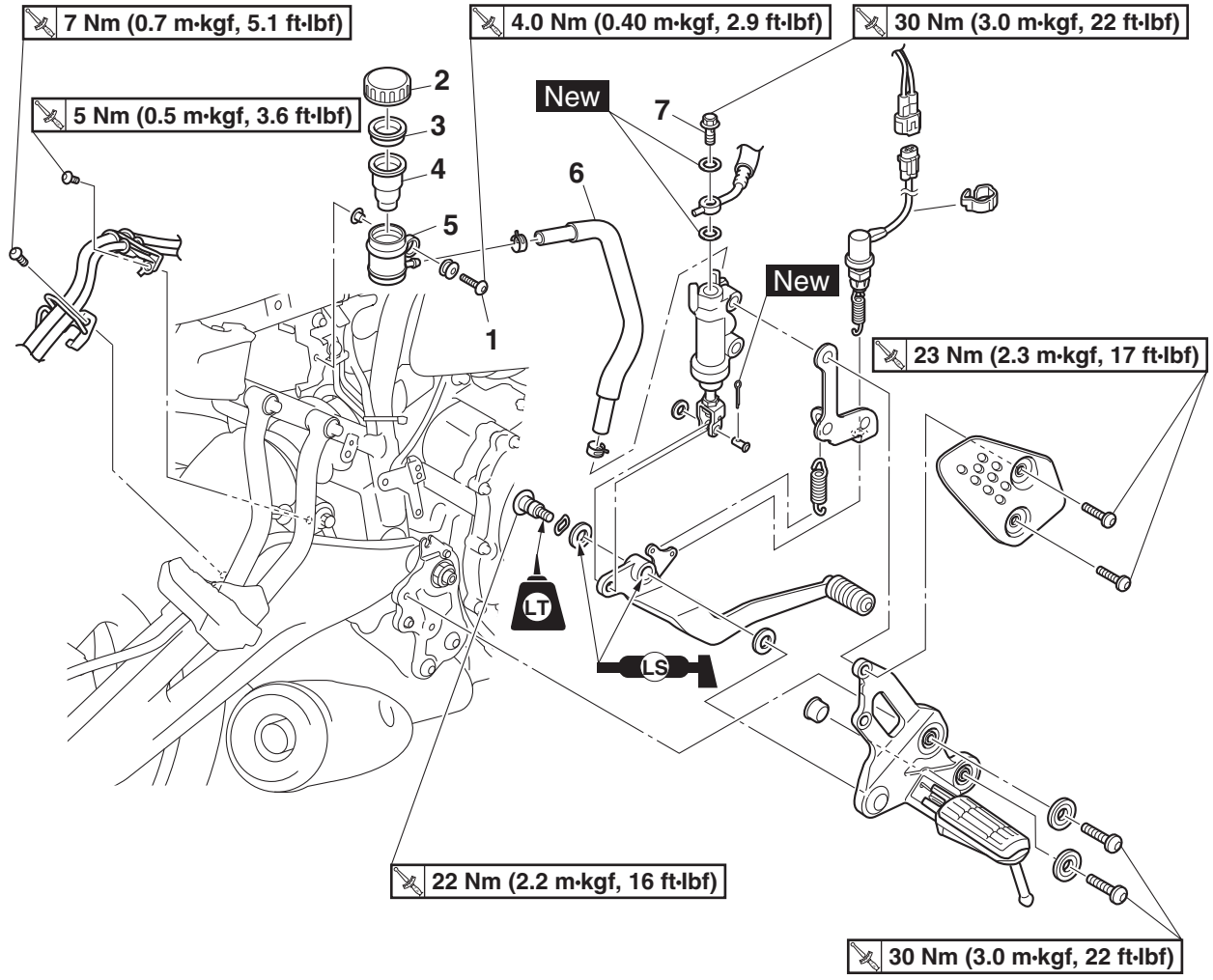
EAS20031
REAR BRAKE

Removing the rear brake pads



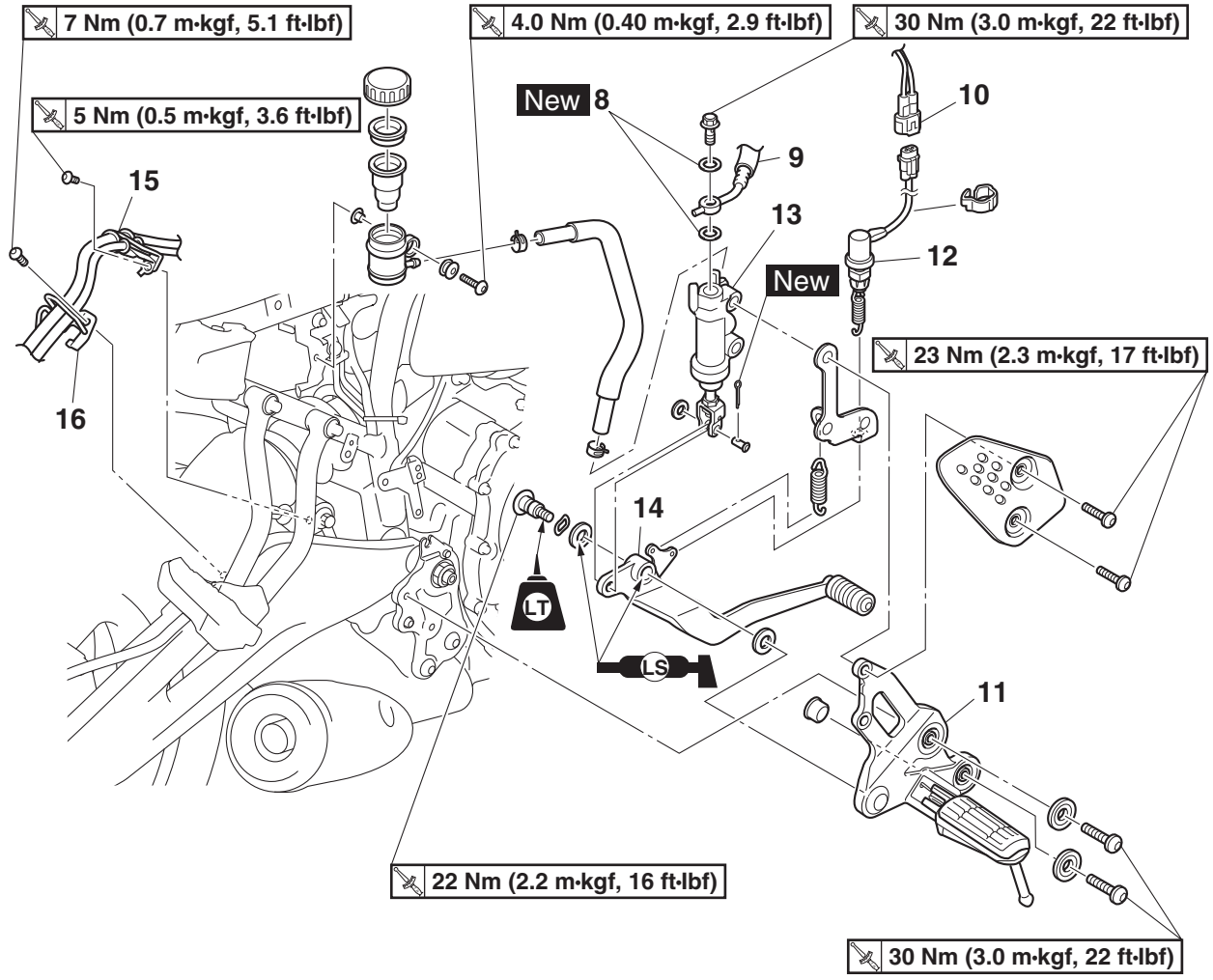
Order	Job/Parts to remove	Q'ty	Remarks
1	Screw plug	1	
2	Brake pad retaining bolt	1	
3	Rear brake caliper retaining bolt	1	
4	Rear brake caliper bolt	1	
5	Rear brake caliper	1	
6	Brake pad	2	
7	Brake pad shim	2	
8	Brake pad insulator	2	
9	Brake pad spring	1	
10	Brake caliper bleed screw	1	

Removing the rear brake master cylinder



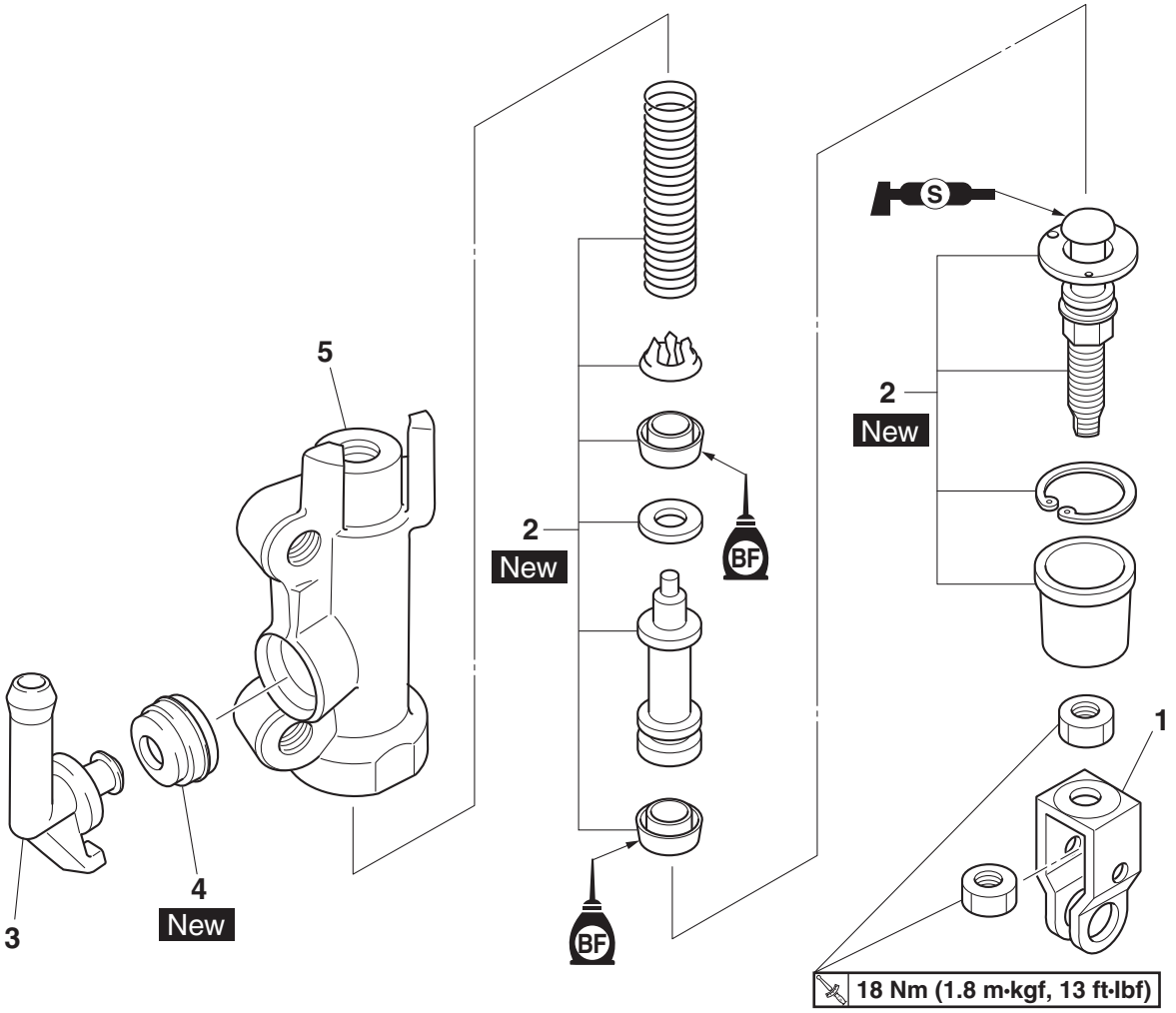
Order	Job/Parts to remove	Q'ty	Remarks
	Pivot shaft protector (right)		Refer to "SWINGARM" on page 4-88.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.
1	Brake fluid reservoir bolt	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
7	Rear brake hose union bolt	1	

Removing the rear brake master cylinder



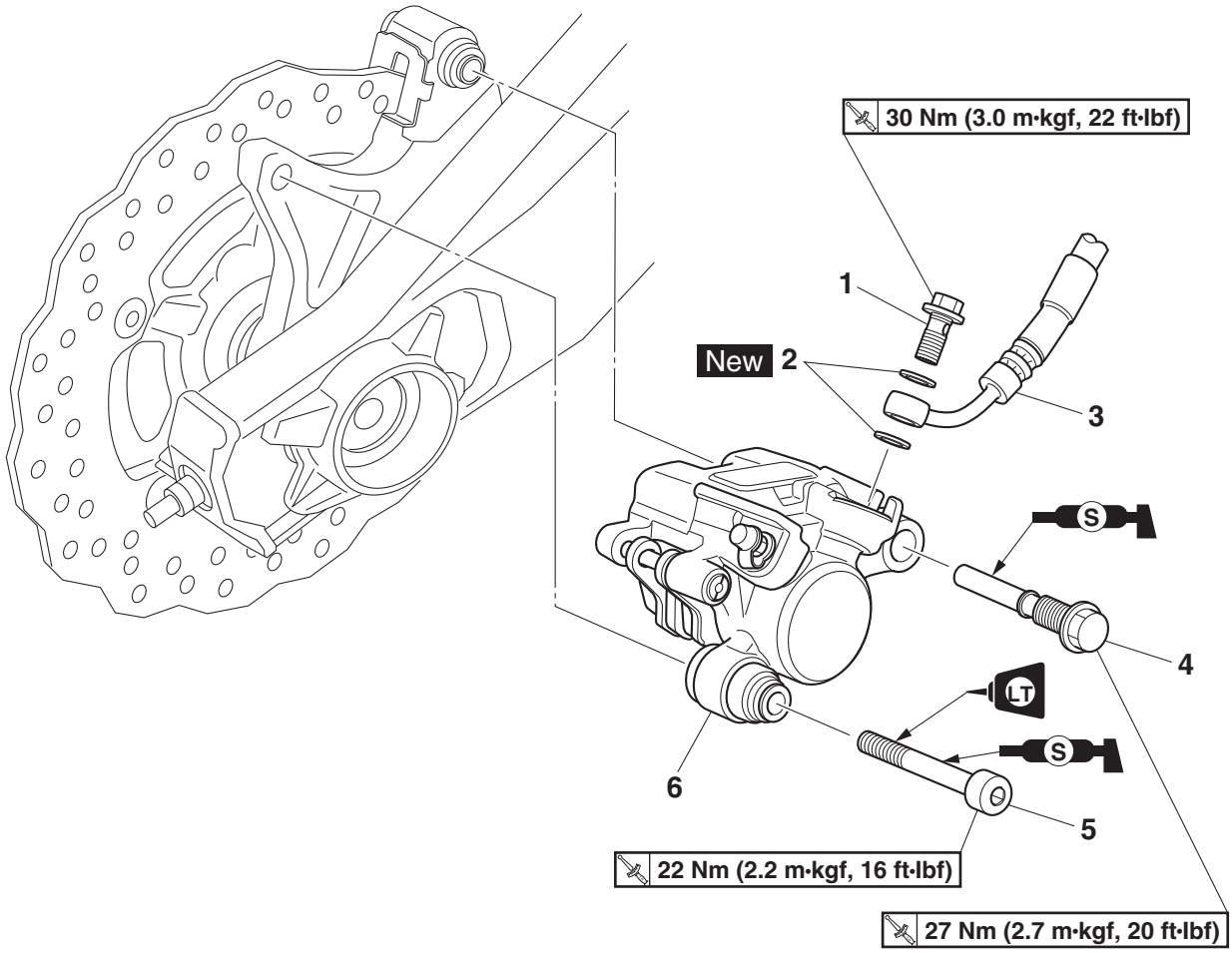
Order	Job/Parts to remove	Q'ty	Remarks
8	Brake hose gasket	2	
9	Brake hose (rear brake master cylinder to hydraulic unit)	1	Disconnect.
10	Rear brake light switch coupler	1	Disconnect.
11	Footrest assembly (right)	1	
12	Rear brake light switch	1	
13	Rear brake master cylinder	1	
14	Brake pedal	1	
15	Rear brake hose/lead holder	1	
16	Rear brake hose/lead guide	1	

Disassembling the rear brake master cylinder



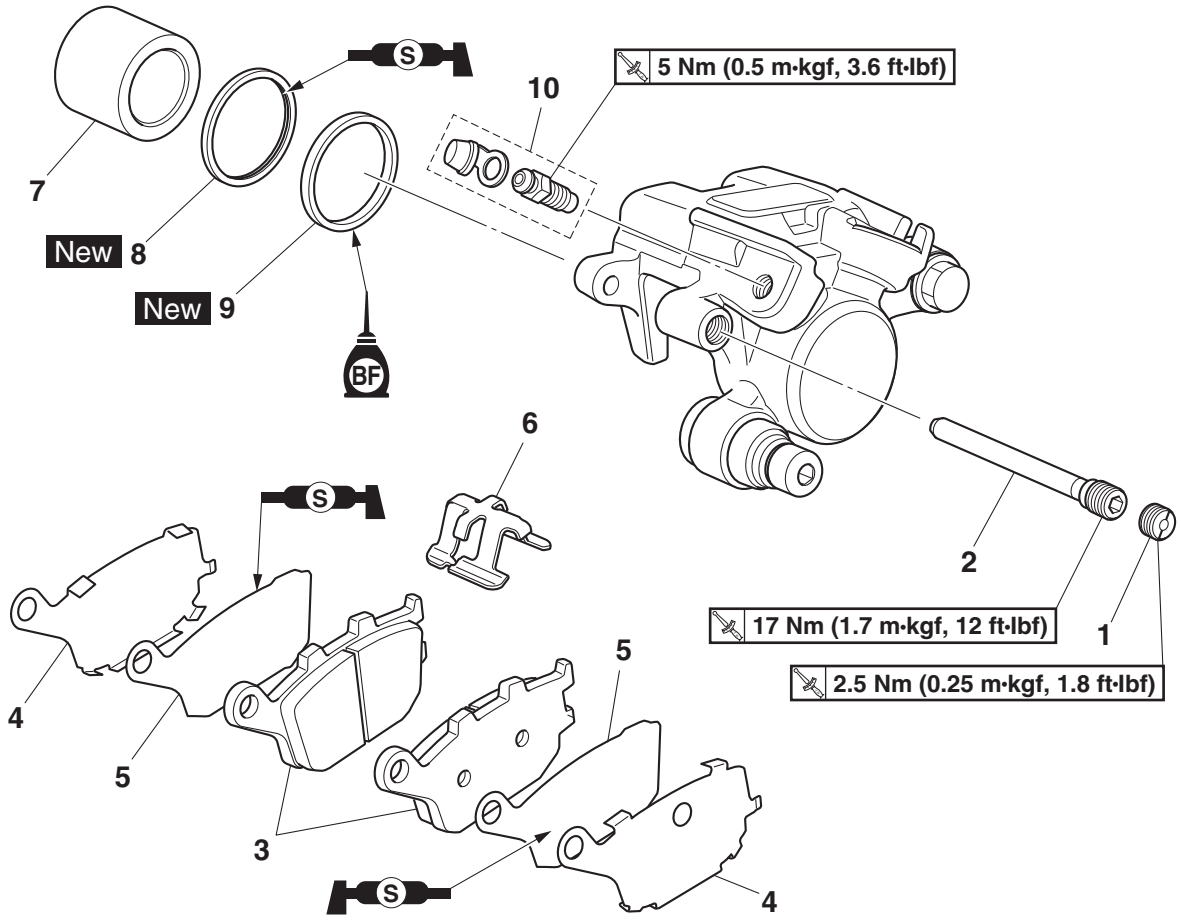
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder yoke	1	
2	Brake master cylinder kit	1	
3	Hose joint	1	
4	Bushing	1	
5	Brake master cylinder body	1	

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 3-14.
1	Rear brake hose union bolt	1	
2	Brake hose gasket	2	
3	Brake hose (hydraulic unit to rear brake caliper)	1	
4	Rear brake caliper retaining bolt	1	
5	Rear brake caliper bolt	1	
6	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	Brake caliper 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 4-20.
2. Check:
   - Rear brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-35.

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 4-35.

Brake disc thickness limit
4.5 mm (0.18 in)

5. Adjust:
   - Brake disc deflection
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-35.

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

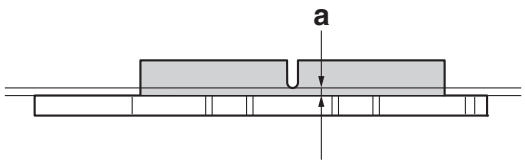
6. Install:
   - Rear wheel
     Refer to "REAR WHEEL" on page 4-20.

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



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

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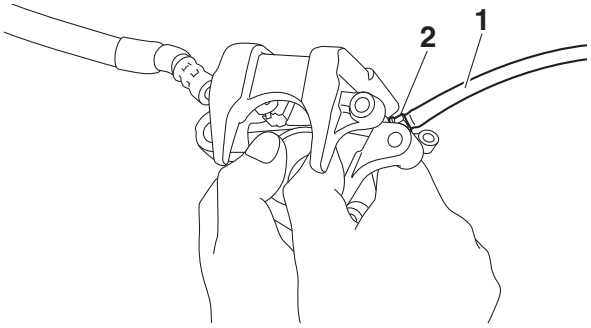
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.



c. Tighten the bleed screw.

Brake caliper bleed screw
5 Nm (0.5 m·kgf, 3.6 ft·lbf)

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

TIP

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

ECA18210

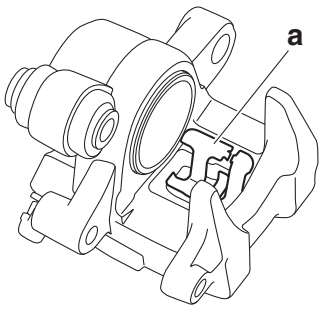
NOTICE

- **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 bolt
   - Rear brake caliper retaining bolt

Recommended lubricant
Silicone grease

ECA18210

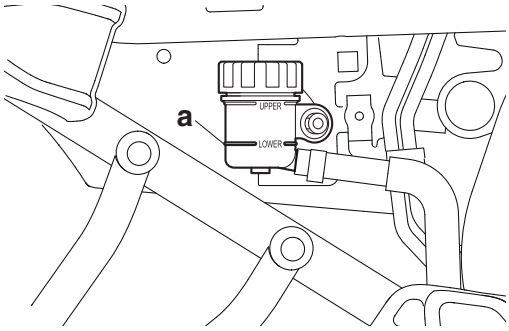
NOTICE

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

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

Rear brake caliper bolt
22 Nm (2.2 m·kgf, 16 ft·lbf)
LOCTITE®
Rear brake caliper retaining bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)
Brake pad retaining bolt
17 Nm (1.7 m·kgf, 12 ft·lbf)
Screw plug
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

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 3-15.



6. Check:
   • Brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.

EAS30186
REMOVING THE REAR BRAKE CALIPER

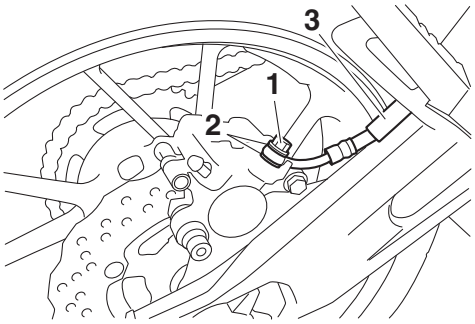
TIP

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

1. Remove:
   • Rear brake hose union bolt "1"
   • Brake hose gaskets "2"
   • Brake hose (hydraulic unit to rear brake caliper) "3"

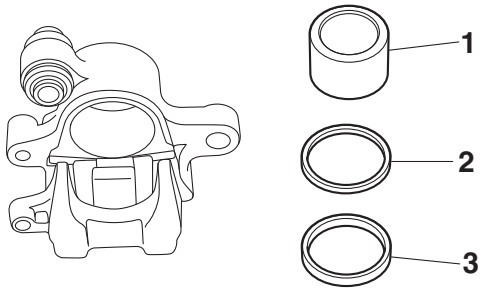
TIP

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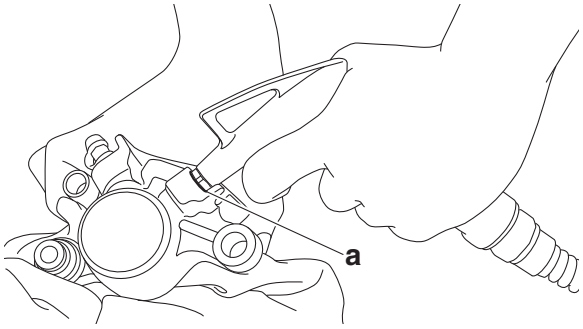
a. Blow compressed air into the brake hose joint opening "a" to force out the piston from the brake caliper.

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

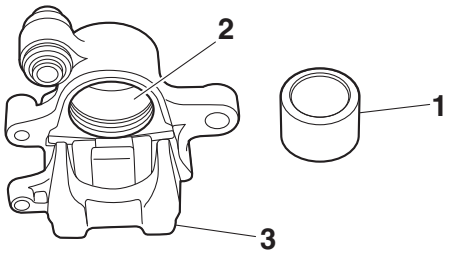
1. Check:
   • Brake caliper piston "1"
   Rust/scratches/wear → Replace the brake caliper piston.

- 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.

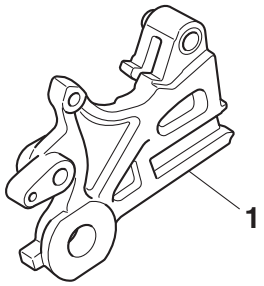
EWA17070

⚠ 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 4-20.



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.**

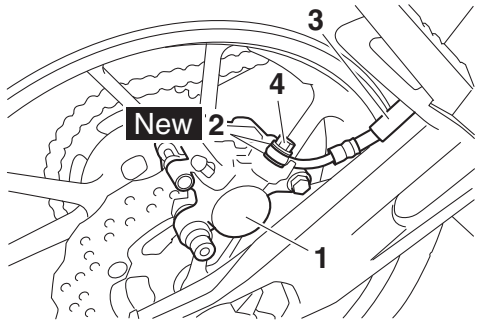
Specified brake fluid
DOT 4

EAS30190

INSTALLING THE REAR BRAKE CALIPER

1. Install:
   - Rear brake caliper “1” (temporarily)
   - Brake hose gaskets “2” New
   - Brake hose (hydraulic unit to rear brake caliper) “3”
   - Rear brake hose union bolt “4”

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



EWA13531

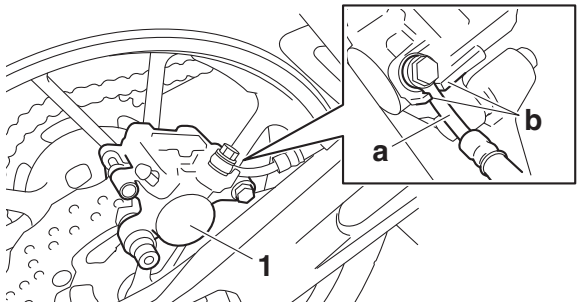
⚠ WARNING

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 (onto the brake pads)

- 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 4-49.

Rear brake caliper bolt
22 Nm (2.2 m·kgf, 16 ft·lbf)
LOCTITE®
Rear brake caliper retaining bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)
Brake pad retaining bolt
17 Nm (1.7 m·kgf, 12 ft·lbf)
Screw plug
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

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

Specified brake fluid
DOT 4

EWA13090

⚠ WARNING

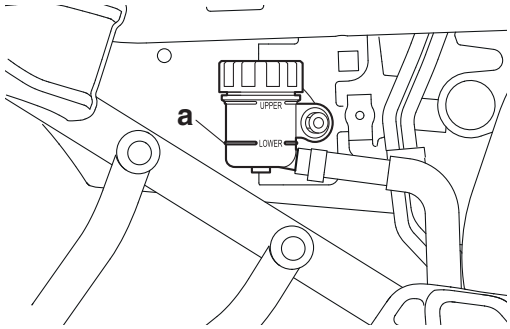
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor 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 3-14.
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 3-15.



7. Check:
   - Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.

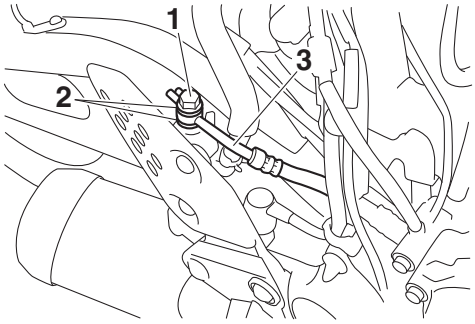
EAS30193

REMOVING THE REAR BRAKE MASTER CYLINDER

1. Remove:
   - Brake hose union bolt "1"
   - Brake hose gaskets "2"
   - Brake hose (rear brake master cylinder to hydraulic unit) "3"

TIP

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

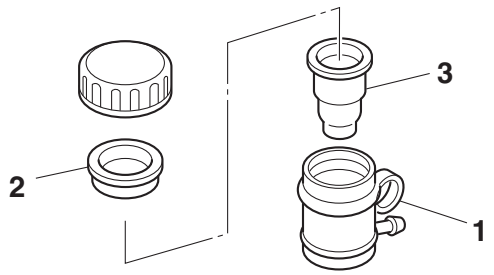


EAS30194

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 → 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

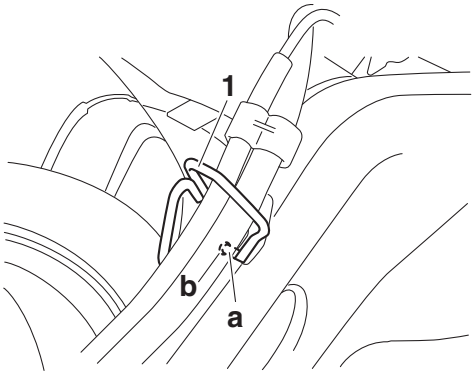
EAS30196
INSTALLING THE REAR BRAKE MASTER CYLINDER

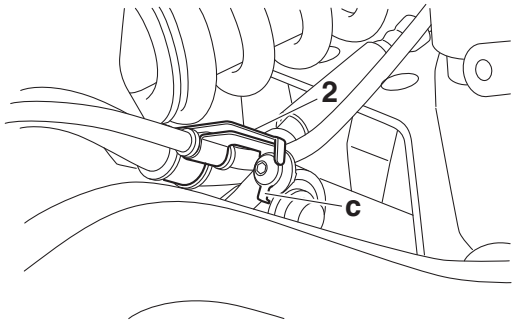
1. Install:
   • Rear brake hose/lead guide “1”
   • Rear brake hose/lead holder “2”

TIP

• Fit the projection “a” on the rear brake hose/lead guide into the hole “b” in the swingarm.
• Make sure that the projection “c” on the rear brake hose/lead holder contacts the swingarm.

Rear brake hose/lead guide bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Rear brake hose/lead holder bolt
5 Nm (0.5 m·kgf, 3.6 ft·lbf)





2. Install:
   • Brake hose gaskets New
   • Brake hose (rear brake master cylinder to hydraulic unit)
   • Brake hose union bolt
   • Brake fluid reservoir hose

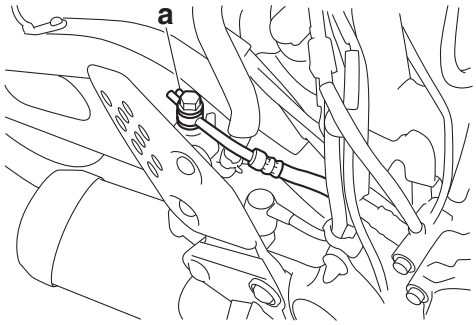
Rear brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

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.



3. Fill:
   • Brake fluid reservoir
   (with the specified amount of the specified brake fluid)

	Specified brake fluid **DOT 4**

EWA13090

WARNING

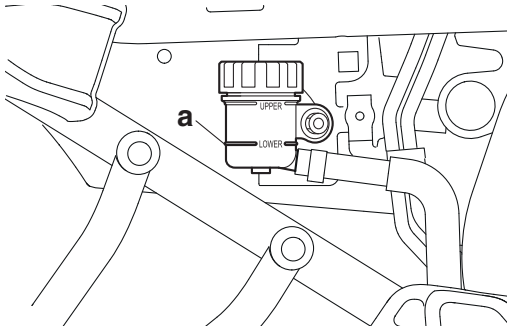
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

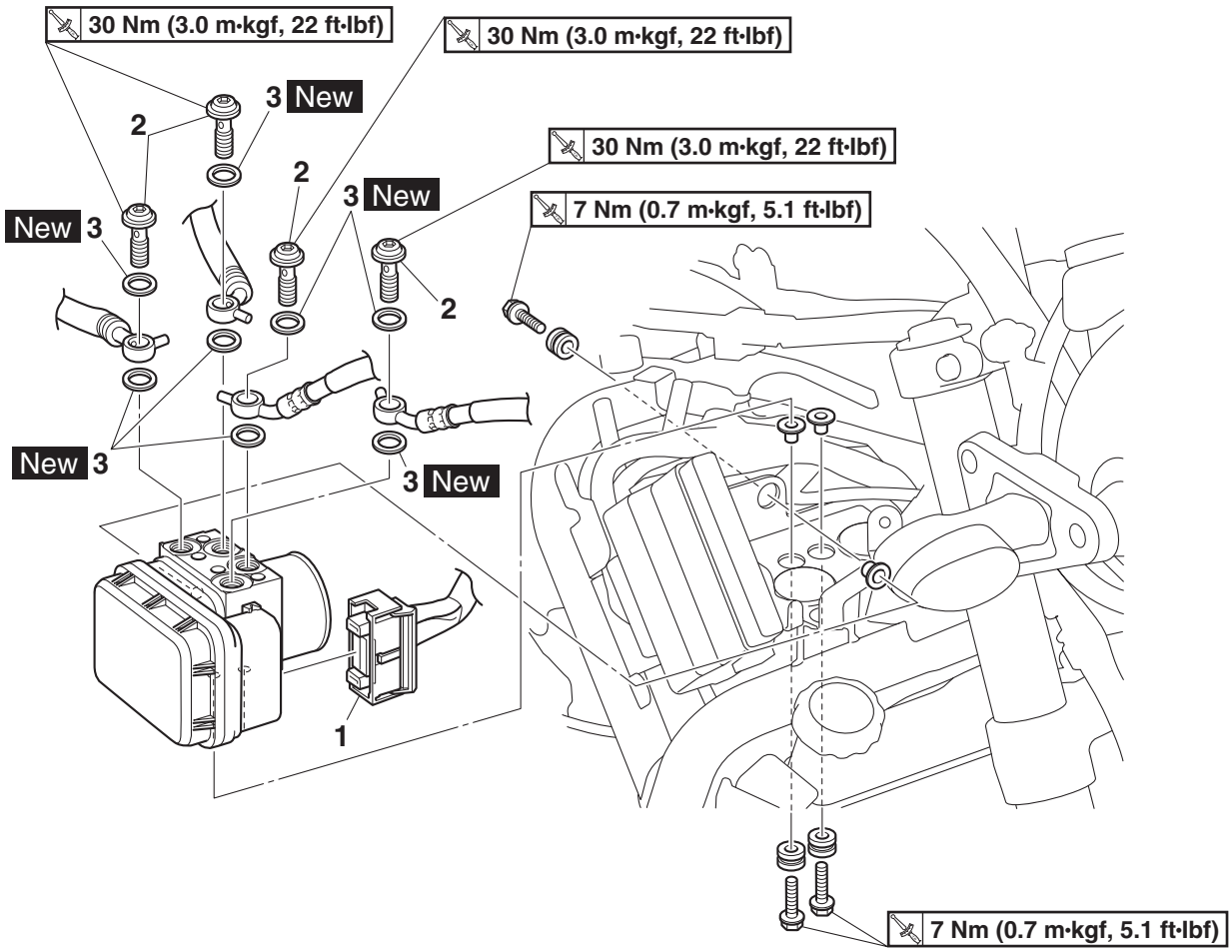
4. Bleed:
   • Brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)” on page 3-14.
5. Check:
   • Brake fluid level
   Below the minimum level mark “a” → Add the specified brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-15.



6. Adjust:
   • Brake pedal position
   Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-13.
7. Adjust:
   • Rear brake light operation timing
   Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-26.

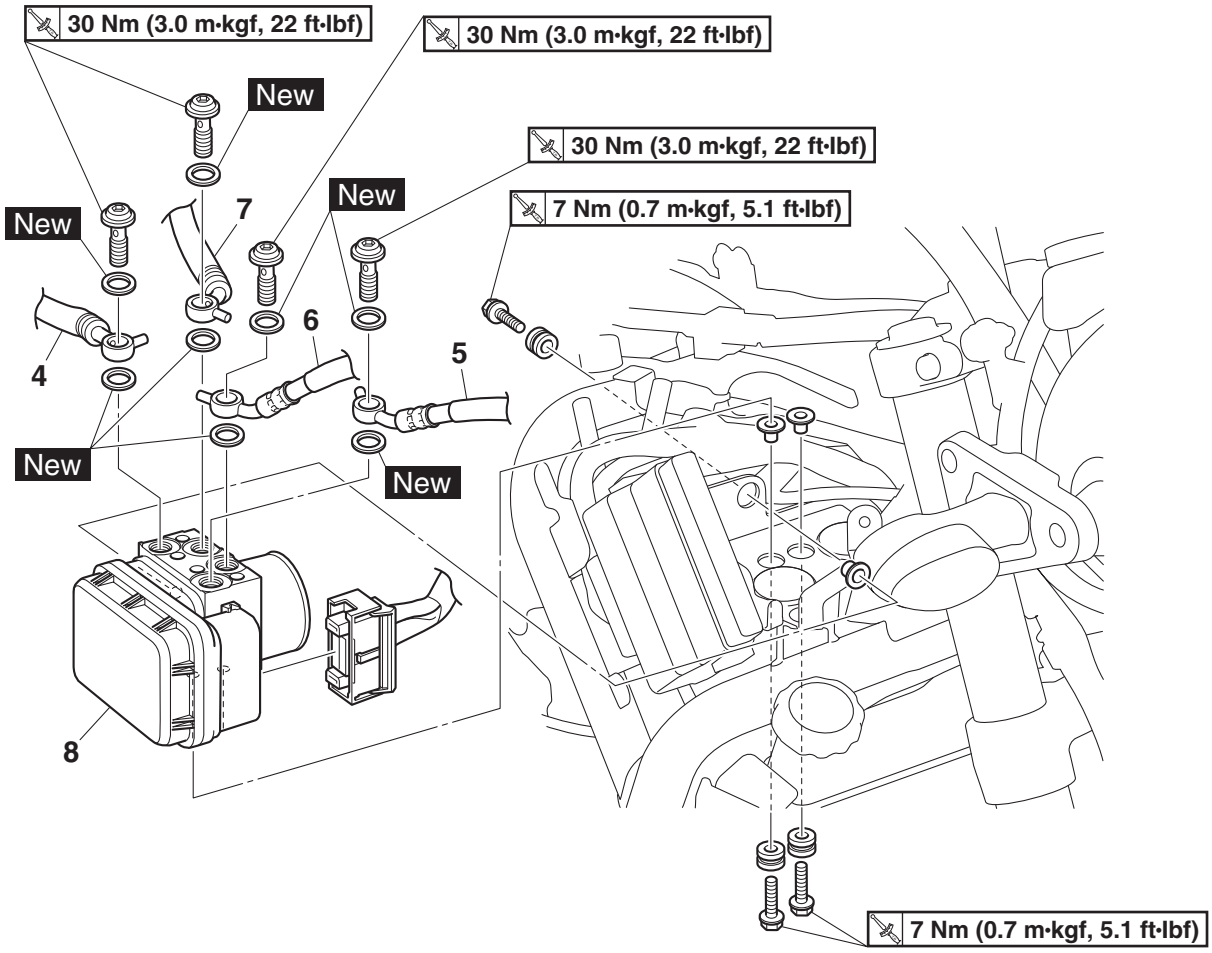
EAS20032
ABS (ANTI-LOCK BRAKE SYSTEM)

Removing the hydraulic unit assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to"BLEEDING THE HYDRAULIC BRAKE SYSTEM (ABS)" on page 3-14.
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank top cover/Fuel tank covers/Air scoop (right)		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	ABS ECU coupler	1	Disconnect.
2	Brake hose union bolt	4	
3	Brake hose gasket	8	

Removing the hydraulic unit assembly



Order	Job/Parts to remove	Q'ty	Remarks
4	Brake hose (hydraulic unit to rear brake caliper)	1	Disconnect.
5	Brake hose (hydraulic unit to left front brake caliper)	1	Disconnect.
6	Brake hose (front brake master cylinder to hydraulic unit)	1	Disconnect.
7	Brake hose (rear brake master cylinder to hydraulic unit)	1	Disconnect.
8	Hydraulic unit assembly	1	

EAS31036
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.

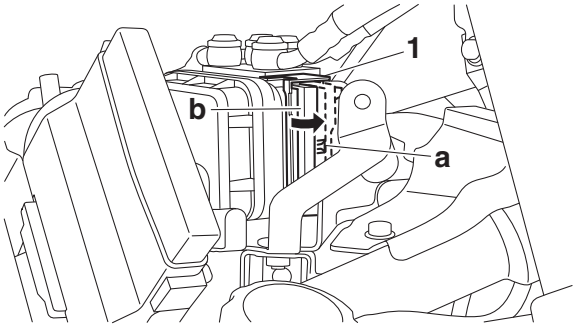
ECA18241
NOTICE

- **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

While pushing the portion "a" of the ABS ECU coupler, move the lock lever "b" in the direction of the arrow shown to disconnect the coupler.



2. Remove:
   - Brake hoses

TIP

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

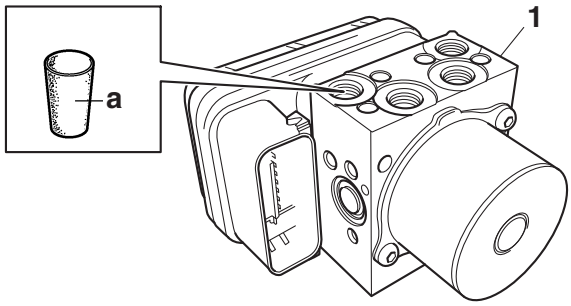
ECA14530
NOTICE

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

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 × 1.25) 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.



EAS31037
CHECKING THE HYDRAULIC UNIT ASSEMBLY

1. Check:
   - Hydraulic unit assembly
     Cracks/damage → Replace the hydraulic unit assembly and the brake hoses that are connected to the assembly as a set.

EAS31039
INSTALLING THE HYDRAULIC UNIT ASSEMBLY

1. Install:
   - Hydraulic unit assembly

	**Hydraulic unit assembly bolt 7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

TIP

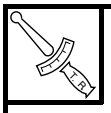
Do not allow any foreign materials to enter the hydraulic unit assembly or the brake hoses when installing the hydraulic unit assembly.

ECA21110

NOTICE

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

2. Remove:
   • Rubber plugs or bolts (M10 × 1.25)
3. Install:
   • Brake hose (rear brake master cylinder to hydraulic unit) “1”
   • Brake hose (front brake master cylinder to hydraulic unit) “2”
   • Brake hose (hydraulic unit to left front brake caliper) “3”
   • Brake hose (hydraulic unit to rear brake caliper) “4”



Front brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
Rear brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

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.

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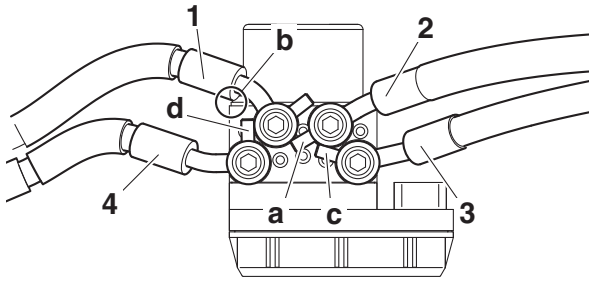
a. Temporarily install the brake hoses as shown in the illustration.
b. Position the brake hose (front brake master cylinder to hydraulic unit) “2” so that its projection “a” contacts the brake hose (rear brake master cylinder to hydraulic unit) “1”, and then temporarily tighten the union bolt for the brake hose (front brake master cylinder to hydraulic unit).
c. Temporarily tighten the union bolt for the brake hose (rear brake master cylinder to hydraulic unit) “1”.

TIP

Make sure that the pipe section “b” of the brake hose (rear brake master cylinder to hydraulic unit) does not contact the hydraulic unit.

d. Position the brake hose (hydraulic unit to left front brake caliper) “3” so that its projection “c” contacts the brake hose (front brake master cylinder to hydraulic unit) “2”, and then temporarily tighten the union bolt for the brake hose (hydraulic unit to left front brake caliper).
e. Position the brake hose (hydraulic unit to rear brake caliper) “4” so that its projection “d” contacts the brake hose (rear brake master cylinder to hydraulic unit) “1”, and then temporarily tighten the union bolt for the brake hose (hydraulic unit to rear brake caliper).
f. Tighten the brake hose union bolts to specification.



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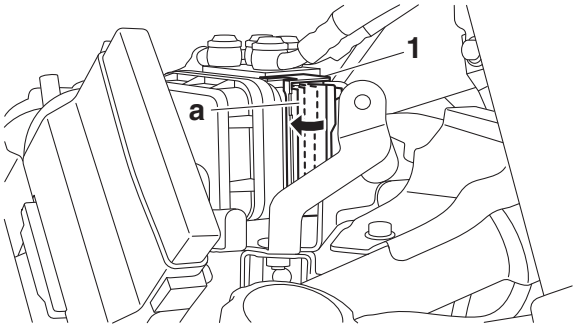
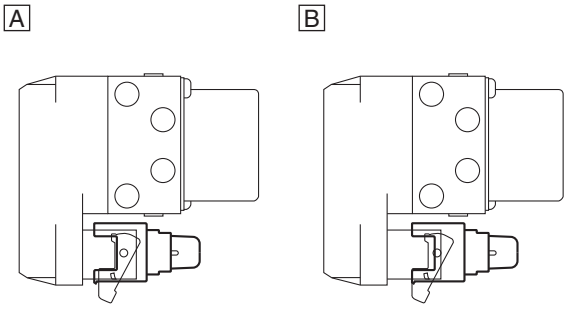
4. Connect:
   • ABS ECU coupler “1”

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 3-14.
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 4-60.)

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 4-64.)

EAS31040
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.

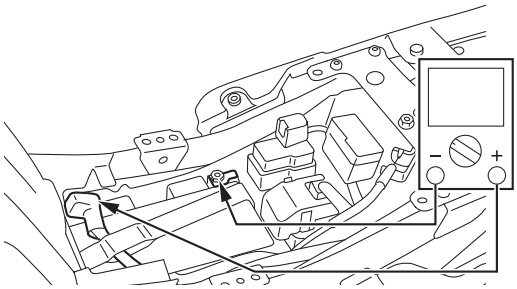
1. Place the vehicle on a suitable stand.
2. Turn the main switch to "OFF".
3. Remove:
   • Seat
   • Seat bracket
   • Battery cover
   Refer to "GENERAL CHASSIS (1)" on page 4-1.

4. Check:
   • Battery voltage
   Lower than 12.8 V → Charge or replace the battery.

Battery voltage
Higher than 12.8 V

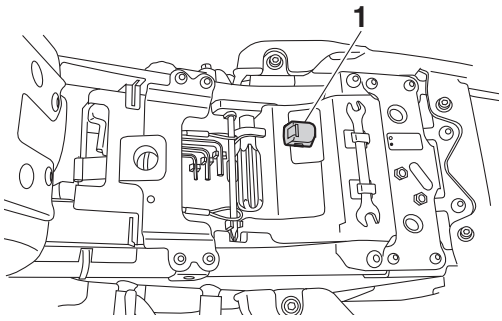
TIP

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).

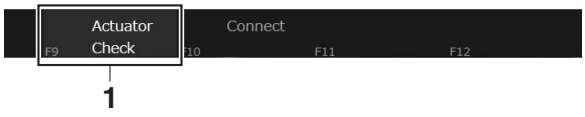
Yamaha diagnostic tool
90890-03250



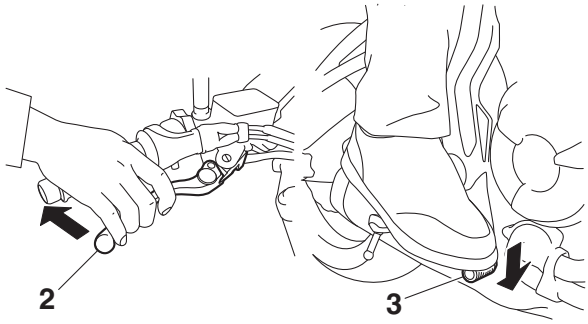
6. Start the Yamaha diagnostic tool and display the diagnosis of function screen.
7. Select code No. 2, “Brake line routing confirmation”.
8. Click “Actuator Check” “1”, and then operate the brake lever “2” and brake pedal “3” simultaneously.

TIP

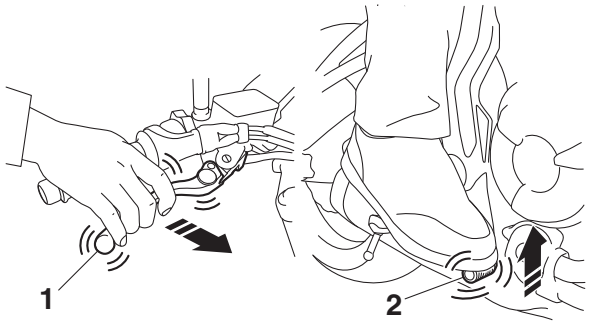
• The hydraulic unit operates 1 second after the brake lever and brake pedal are operated simultaneously and continues for approximately 5 seconds.
• The operation of the hydraulic unit can be confirmed using the indicator.
On: The hydraulic unit is operating.
Flashing: The conditions for operating the hydraulic unit have not been met.
Off: The brake lever and brake pedal are not being operated.



1



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.

ECA18280

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

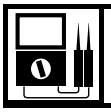
WARNING

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.

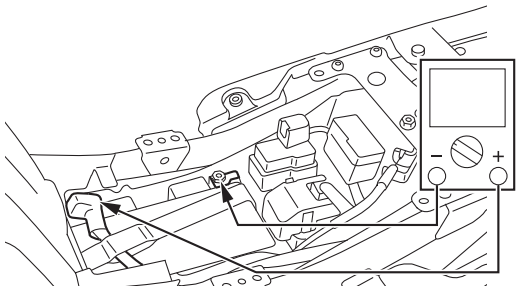
1. Place the vehicle on a suitable stand.
2. Turn the main switch to "OFF".
3. Remove:
   - Seat
   - Seat bracket
   - Battery cover
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
4. Check:
   - Battery voltage
   Lower than 12.8 V → Charge or replace the battery.



Battery voltage
Higher than 12.8 V

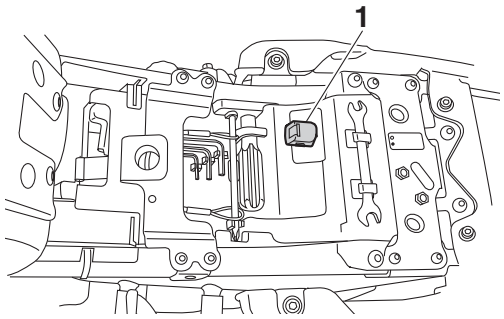
TIP

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).

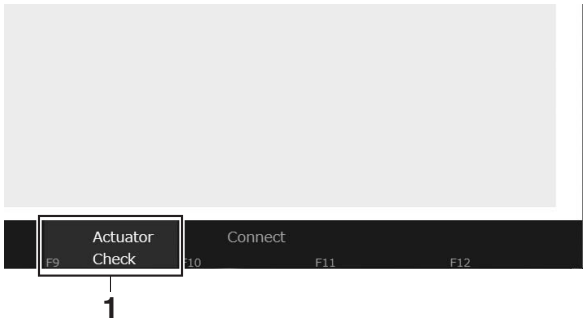
Yamaha diagnostic tool
90890-03250

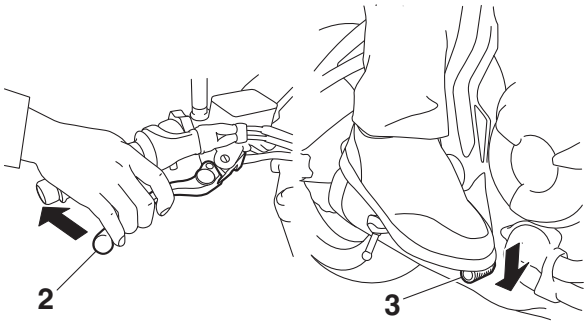


6. Start the Yamaha diagnostic tool and display the diagnosis of function screen.
7. Select code No. 1, "ABS reaction-force confirmation".
8. Click "Actuator Check" "1", and then operate the brake lever "2" and brake pedal "3" simultaneously.

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.

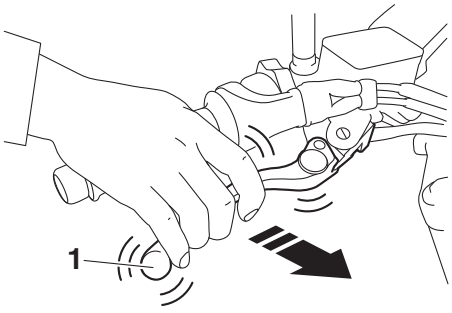




9. A reaction-force pulsating action is generated in the brake lever "1" and continues for a few seconds.

TIP

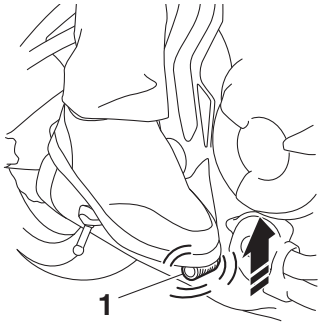
- The reaction-force pulsating action consists of quick pulses.
- Be sure to continue operating the brake lever and brake pedal even after the pulsating action has stopped.
- "ON" and "OFF" on the tool screen indicate when the brakes are being applied and released respectively.



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.

ECA18280

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.**

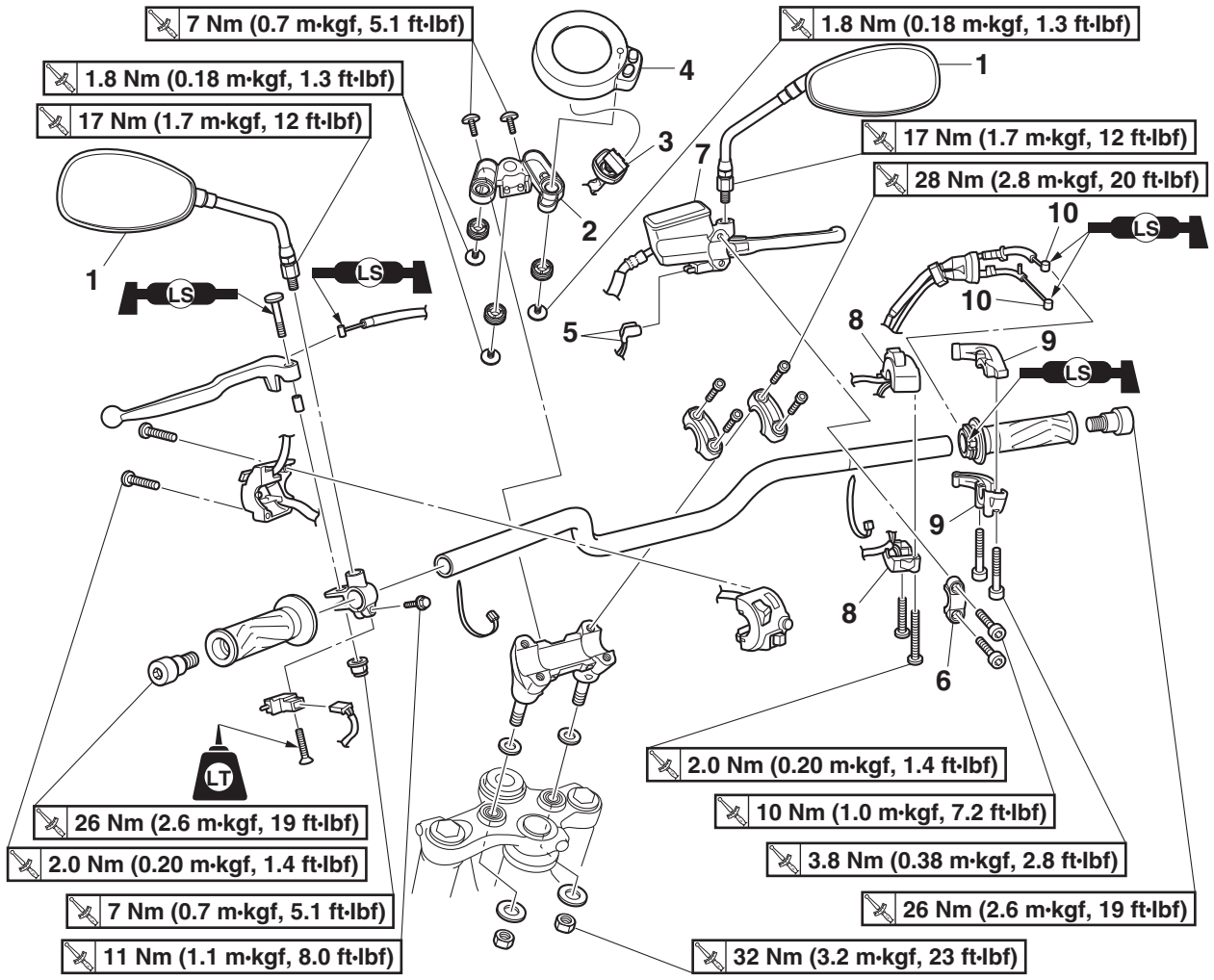
12. Turn the main switch to "OFF".
13. Remove the Yamaha diagnostic tool from the Yamaha diagnostic tool coupler, and then install the protective cap.
14. Turn the main switch to "ON".
15. Set the start/engine stop switch to "○".
16. Check for brake fluid leakage around the hydraulic unit.
    Brake fluid leakage → Replace the hydraulic unit, brake hoses, and related parts as a set.

17. If the operation of the hydraulic unit is normal, delete all of the fault codes.

EAS31041
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 10 km/h (6 mph) or performing a trial run.

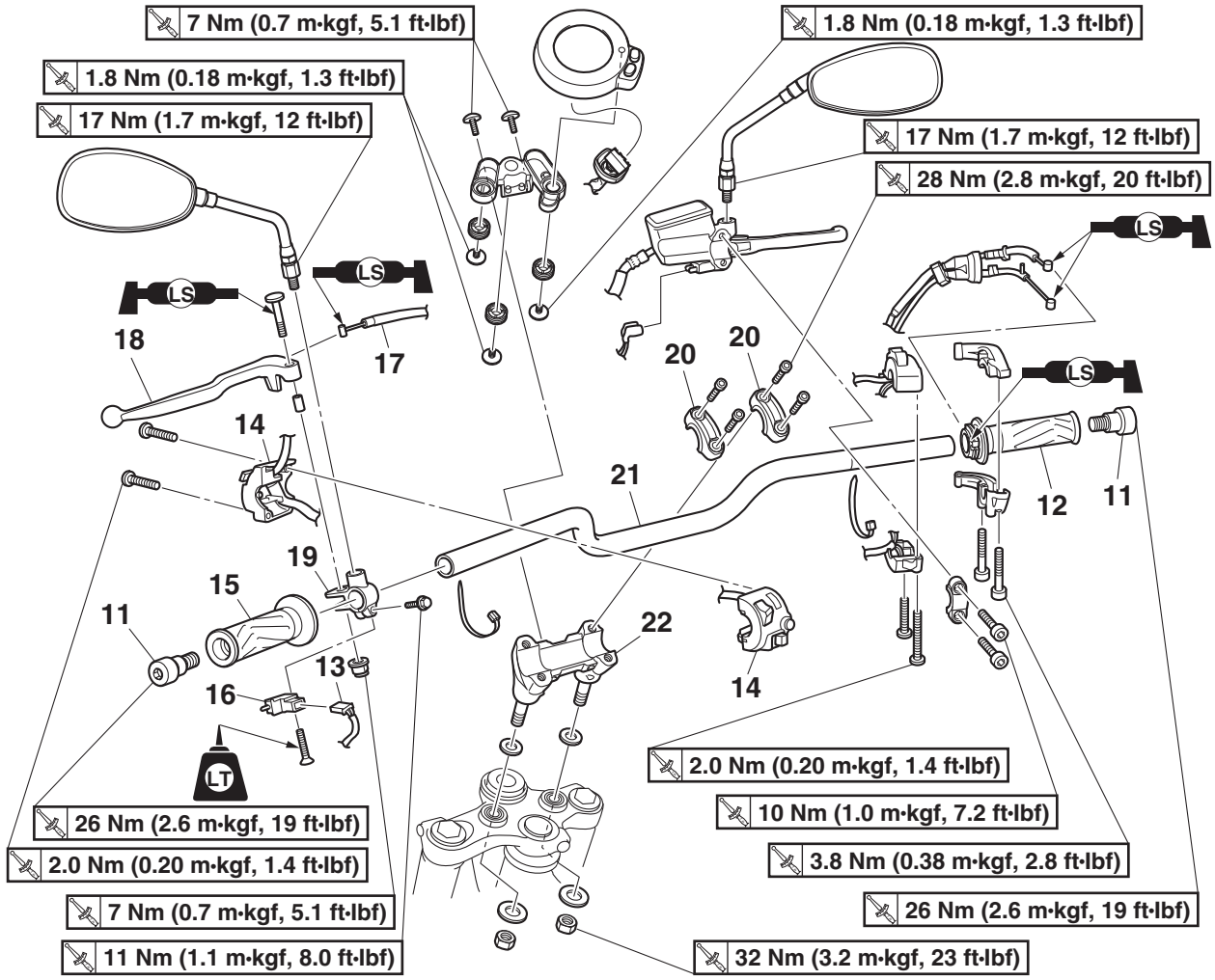
EAS20033
HANDLEBAR

Removing the handlebar and meter assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Rearview mirror	2	
2	Meter assembly bracket	1	
3	Meter assembly coupler	1	Disconnect.
4	Meter assembly	1	
5	Front brake light switch connector	2	Disconnect.
6	Front brake master cylinder holder	1	
7	Front brake master cylinder assembly	1	
8	Handlebar switch (right)	1	
9	Throttle cable housing	1	
10	Throttle cable	2	Disconnect.

Removing the handlebar and meter assembly



Order	Job/Parts to remove	Q'ty	Remarks
11	Grip end	2	
12	Throttle grip	1	
13	Clutch switch coupler	1	Disconnect.
14	Handlebar switch (left)	1	
15	Handlebar grip	1	
16	Clutch switch	1	
17	Clutch cable	1	Disconnect.
18	Clutch lever	1	
19	Clutch lever holder	1	
20	Upper handlebar holder	2	
21	Handlebar	1	
22	Lower handlebar holder	1	

EAS30203
REMOVING THE HANDLEBAR
1. Stand the vehicle on a level surface.

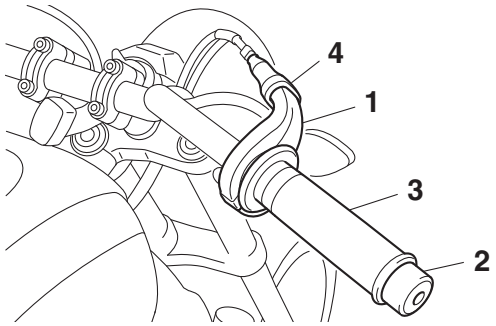
EWA13120
⚠ WARNING

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

2. Remove:
   - Throttle cable housings “1”
   - Grip end (right) “2”
   - Throttle grip “3”

TIP

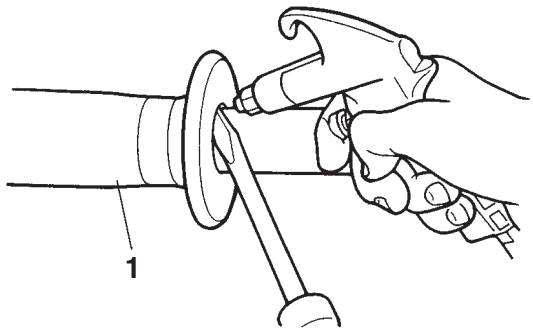
While removing the throttle cable housing, pull back the rubber cover “4”.



3. Remove:
   - Handlebar grip “1”

TIP

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



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 holder
   - Handlebar “1”
   - Upper handlebar holders “2”

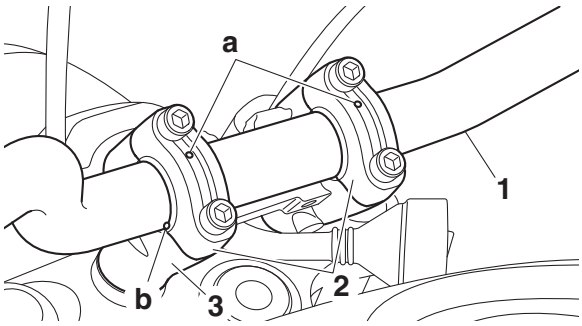
Lower handlebar holder nut
32 Nm (3.2 m·kgf, 23 ft·lbf)
Upper handlebar holder bolt
28 Nm (2.8 m·kgf, 20 ft·lbf)

ECA18300
NOTICE

First, tighten the bolts on the front side of the handlebar holder, and then on the rear side.

TIP

- The upper handlebar holders should be installed with the punch marks “a” facing forward.
- Align the punch mark “b” on the handlebar with the left side upper surface of the lower handlebar holder “3”.



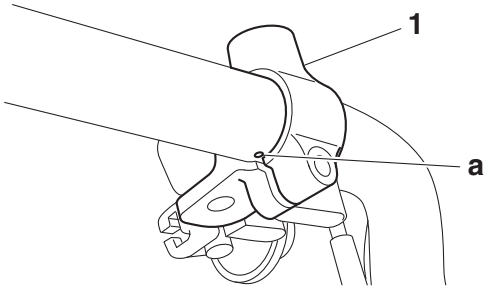
3. Install:
   - Clutch lever holder “1”
   - Clutch lever “2”
   - Clutch lever pivot bolt “3”
   - Clutch cable
   - Clutch switch “4”

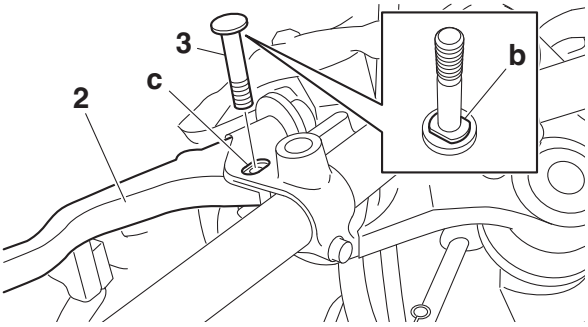
Clutch lever holder pinch bolt
11 Nm (1.1 m·kgf, 8.0 ft·lbf)
Clutch lever pivot nut
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

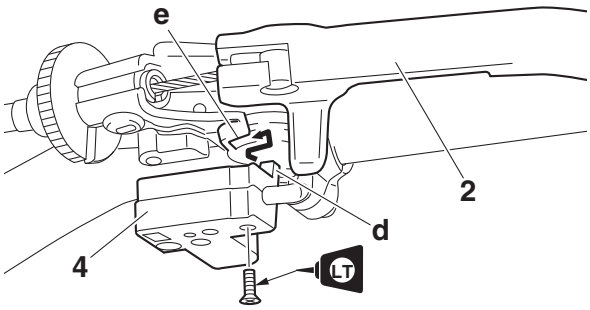
TIP

- Lubricate the clutch lever pivot bolt with the lithium-soap-based grease.

- Align the center of slit on the clutch lever holder with the punch mark “a” on the handlebar.
- Fit the projection “b” on the bottom of the bolt head into the slot “c” in the bolt hole in the clutch lever holder.
- While squeezing the clutch lever, fit the projection “d” on the clutch switch into the slot “e” in the clutch lever holder.







4. Install:
   - Handlebar grip “1”
   - Grip end (left) “2”

	Grip end **26 Nm (2.6 m·kgf, 19 ft·lbf)**

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

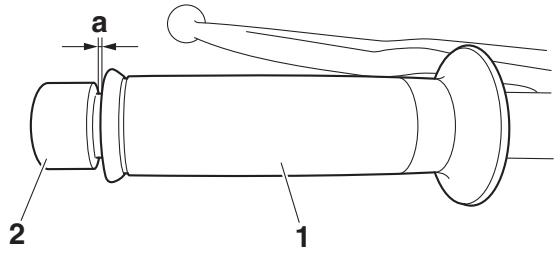
EWA13700

⚠ WARNING

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

TIP

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



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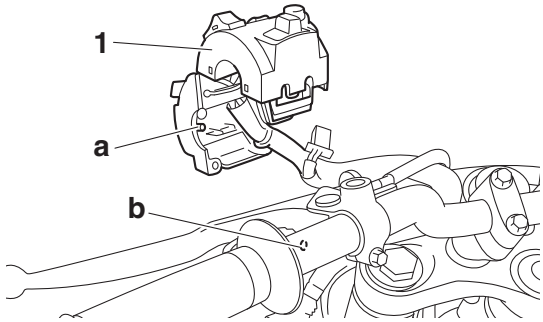
5. Install:
   - Handlebar switch (left) “1”

	Handlebar switch screw (left) **2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)**

TIP

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

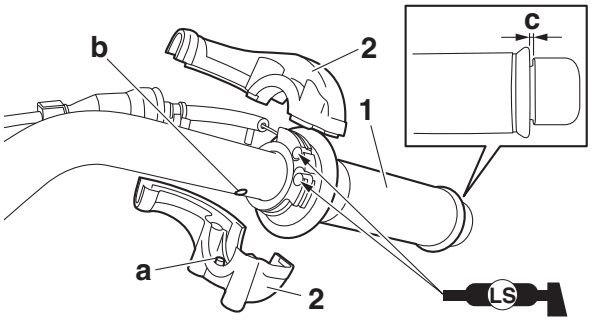


6. Install:
   - Throttle grip “1”
   - Throttle cables
   - Grip end (right)
   - Throttle cable housings “2”

	Grip end **26 Nm (2.6 m·kgf, 19 ft·lbf)** **Throttle cable housing bolt** **3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)**

TIP

- Lubricate the end of the throttle cables and the inside of the throttle grip with a thin coat of lithium-soap-based grease.
- Align the projection “a” on the throttle cable housing with the hole “b” in the handlebar.
- There should be 1–3 mm (0.04–0.12 in) of clearance “c” between the throttle grip and the grip end.

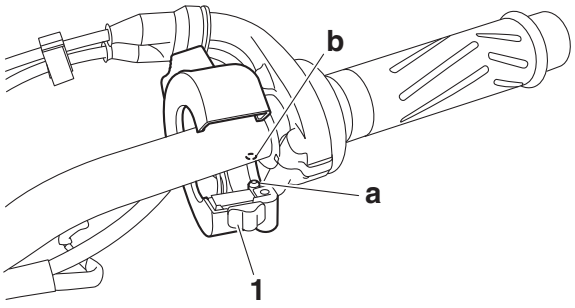


7. Install:
   - Handlebar switch (right) “1”

	Handlebar switch screw (right) 2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)

TIP

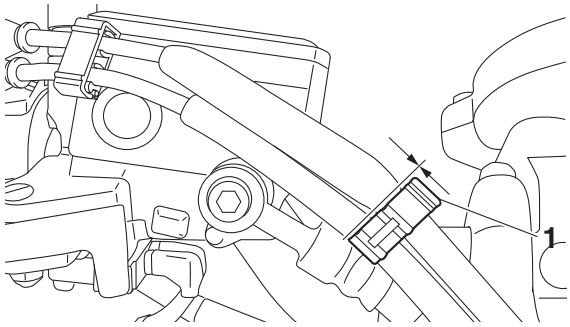
Align the projection “a” on the right handlebar switch with the hole “b” in the handlebar.

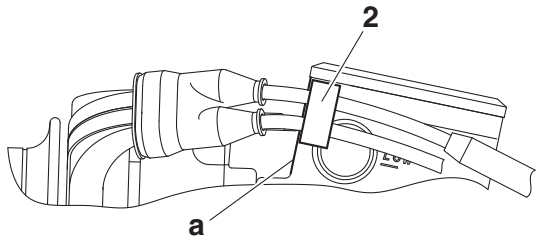


8. Install:
   - Throttle cable holder 1 “1”
   - Throttle cable holder 2 “2”

TIP

- Make sure that the throttle cable holder 1 “1” contacts the throttle cable adjusting nut and that the open ends of the holder are pointing rearward.
- Align the throttle cable holder 2 “2” with the edge “a” of the front brake master cylinder.





9. Install:
   - Front brake master cylinder assembly
     Refer to “INSTALLING THE FRONT BRAKE MASTER CYLINDER” on page 4-41.
10. Adjust:
   - Throttle grip free play
     Refer to “CHECKING THE THROTTLE GRIP OPERATION” on page 3-27.

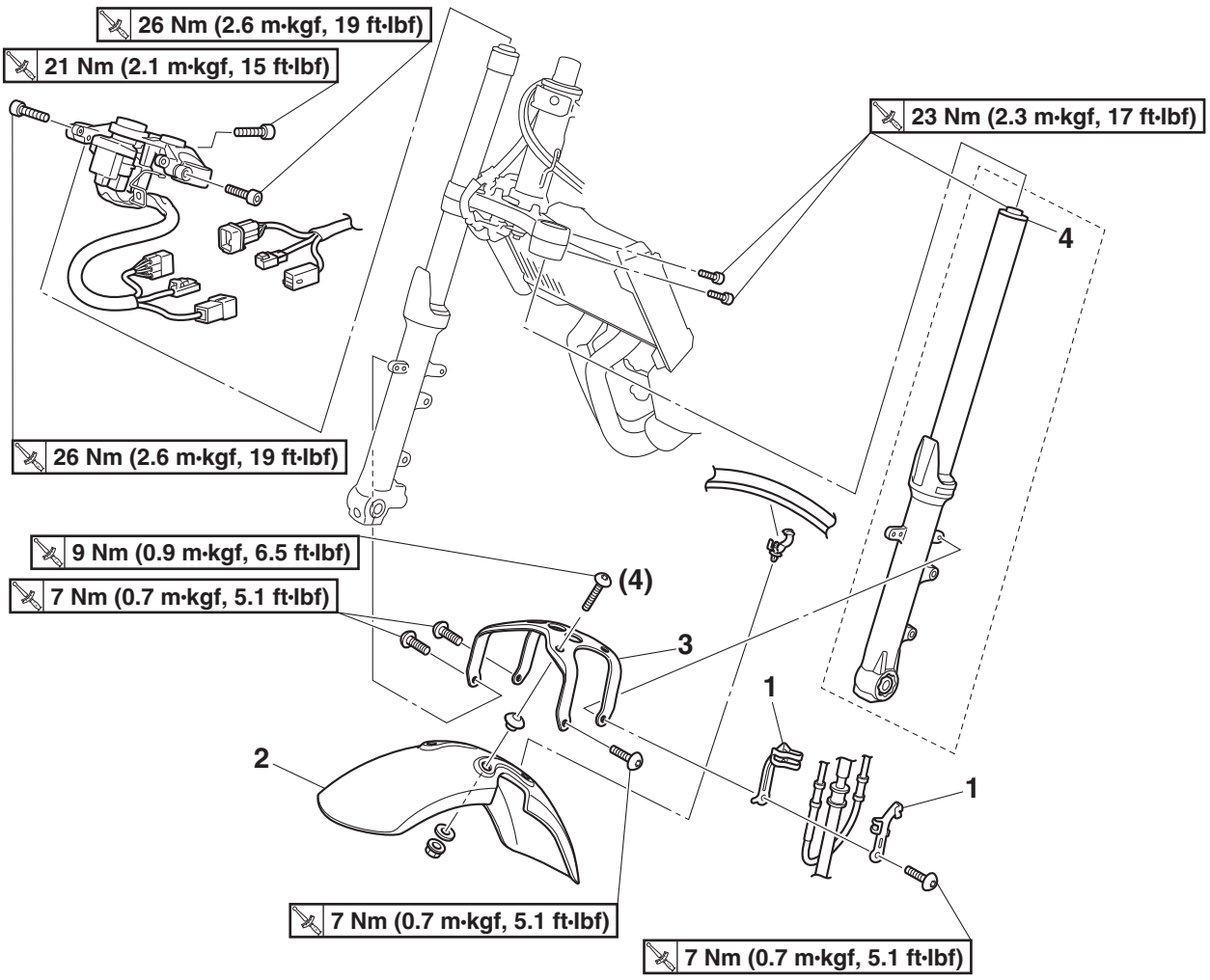
	Throttle grip free play 3.0–5.0 mm (0.12–0.20 in)

11. Adjust:
   - Clutch lever free play
     Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-12.

	Clutch lever free play 5.0–10.0 mm (0.20–0.39 in)

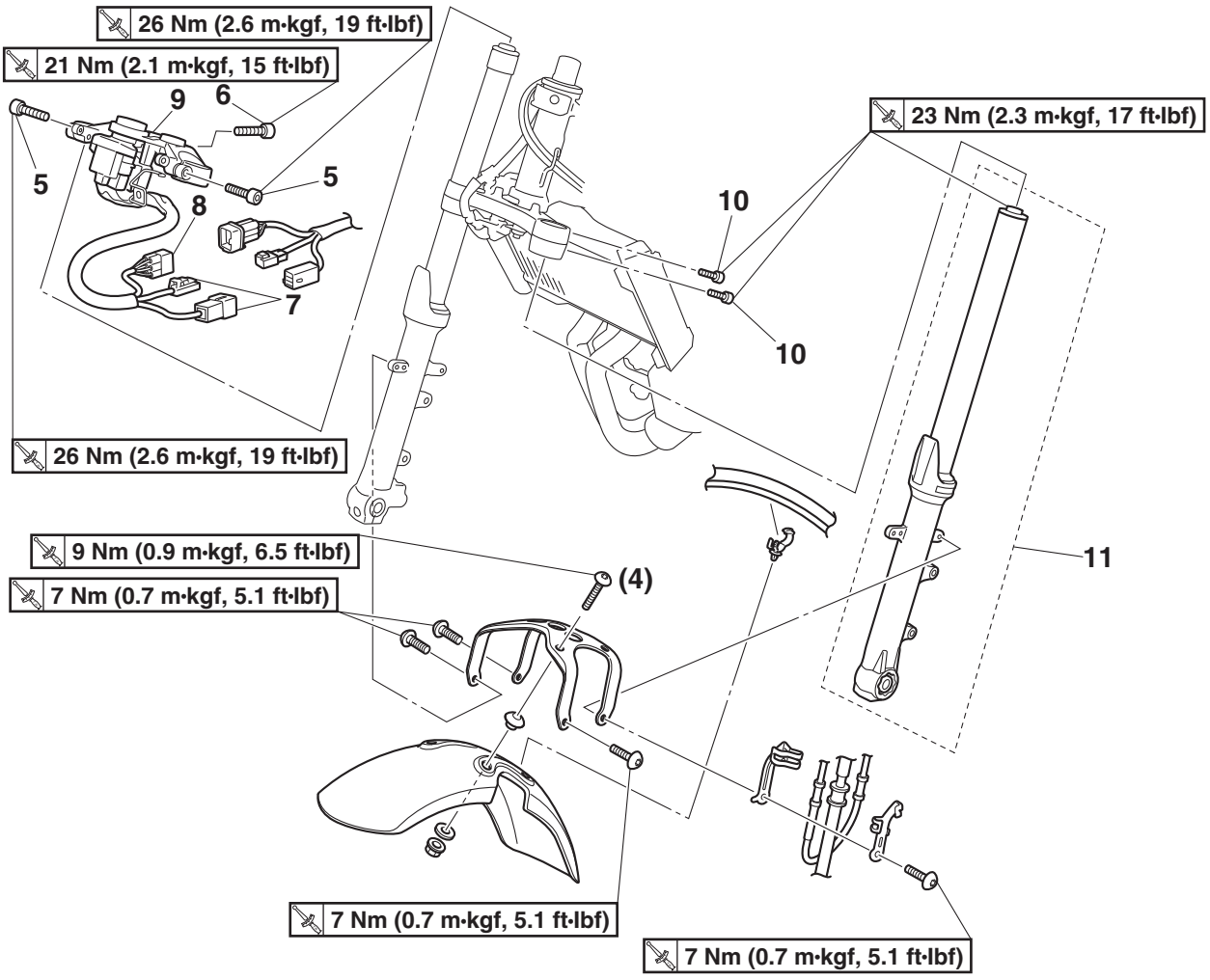
EAS20034
FRONT FORK

Removing the front fork legs



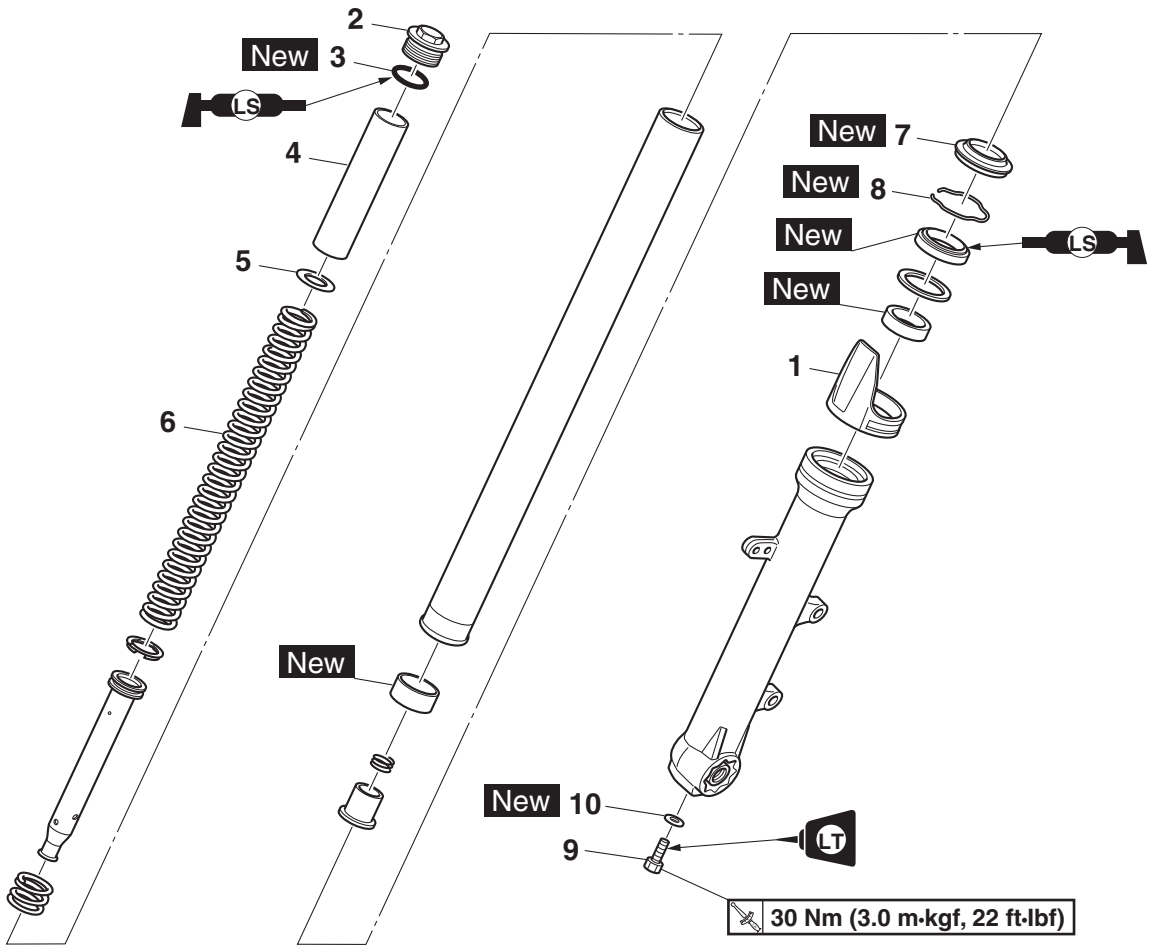
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Handlebar		Refer to "HANDLEBAR" on page 4-65.
	Fuel tank center cover		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-12.
1	Front brake hose/lead holder	2	
2	Front fender	1	
3	Front fender bracket	1	
4	Front fork cap bolt	1	Loosen.

Removing the front fork legs



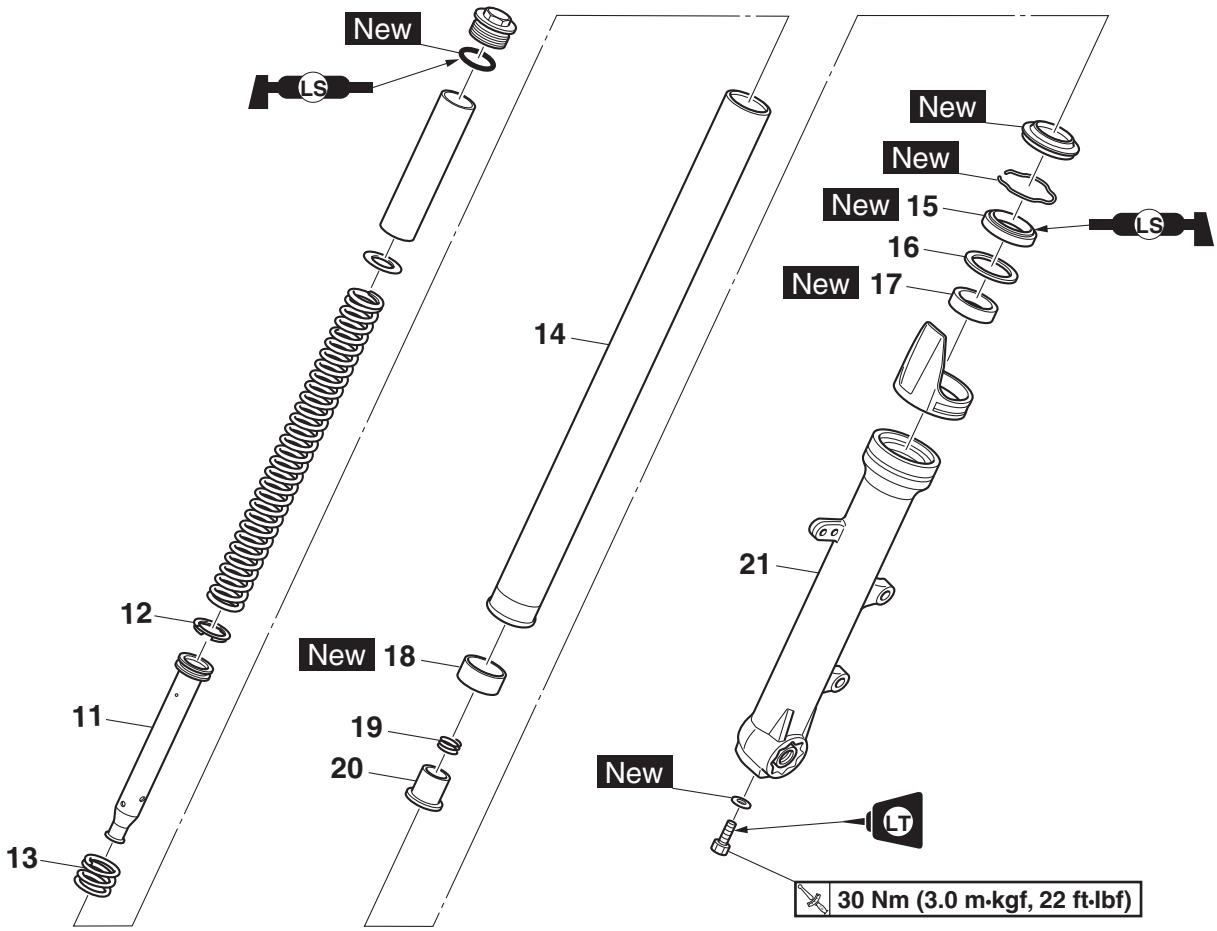
Order	Job/Parts to remove	Q'ty	Remarks
5	Upper bracket pinch bolt (left and right)	2	Loosen.
6	Upper bracket pinch bolt (center)	1	Loosen.
7	Main switch coupler	2	Disconnect.
8	Immobilizer unit coupler	1	Disconnect.
9	Upper bracket	1	
10	Lower bracket pinch bolt	2	Loosen.
11	Front fork leg	1	

Disassembling the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
1	Protector	1	
2	Front fork cap bolt	1	
3	O-ring	1	
4	Spacer	1	
5	Spring seat	1	
6	Fork spring	1	
7	Dust seal	1	
8	Oil seal clip	1	
9	Front fork damper rod bolt	1	
10	Copper washer	1	

Disassembling the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
11	Damper rod	1	
12	Damper rod ring	1	
13	Rebound spring	1	
14	Inner tube	1	
15	Oil seal	1	
16	Washer	1	
17	Outer tube bushing	1	
18	Inner tube bushing	1	
19	Oil flow stopper spring	1	
20	Oil flow stopper	1	
21	Outer tube	1	

EAS31648
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Stand the vehicle on a level surface.

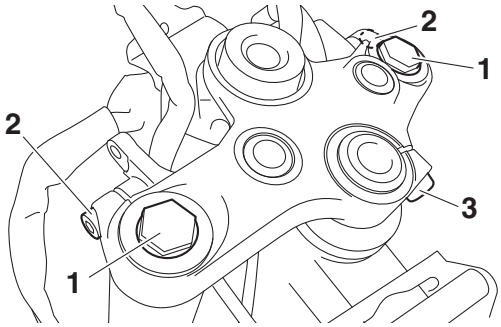
EWA13120
⚠ WARNING

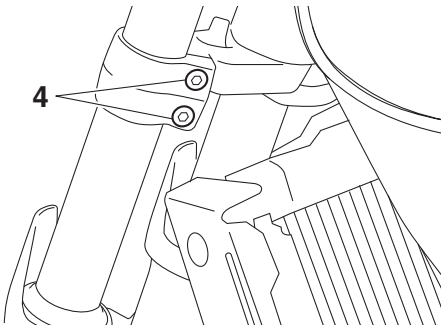
Securely support the vehicle so that there is no danger of it falling over.

TIP

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

2. Loosen:
   - Front fork cap bolt “1”
   - Upper bracket pinch bolts (left and right) “2”
   - Upper bracket pinch bolt (center) “3”
   - Lower bracket pinch bolts “4”





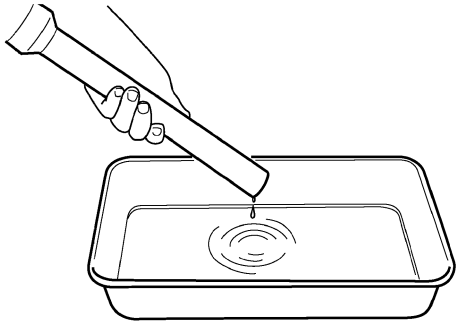
EWA13640
⚠ WARNING

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

EAS30207
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Drain:
   - Fork oil

TIP

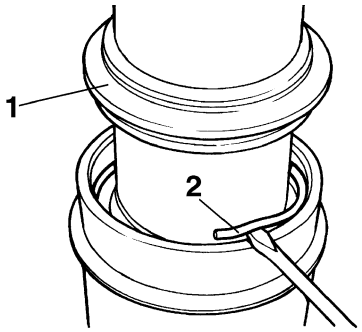
Stroke the outer tube several times while draining the fork oil.



2. Remove:
   - Dust seal “1”
   - Oil seal clip “2”
     (with a flathead screwdriver)

ECA14180
NOTICE

Do not scratch the inner tube.

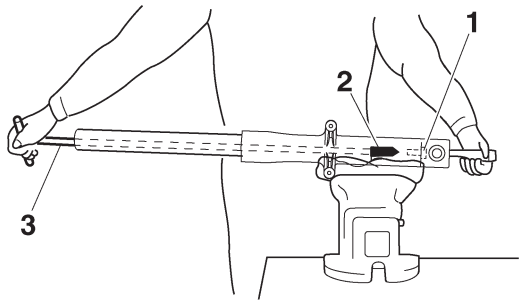


3. Remove:
   - Front fork damper rod bolt “1”
   - Copper washer

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, loosen the front fork damper rod bolt.

Damper rod holder
90890-01460
T-handle
90890-01326
T-handle 3/8" drive 60 cm long
YM-01326



4. Remove:
   • Inner tube

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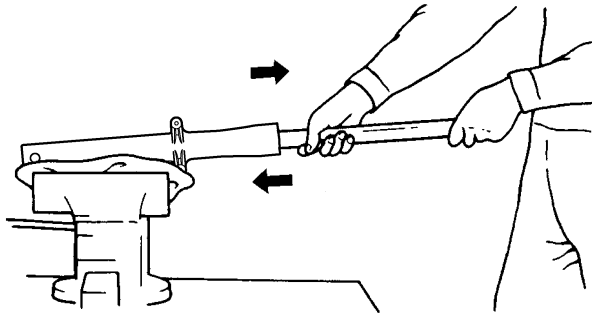
a. Hold the front fork leg horizontally.
b. Securely clamp the brake caliper bracket in a vise with soft jaws.
c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.

ECA14190

NOTICE

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



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EAS30208

CHECKING THE FRONT FORK LEGS

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

1. Check:
   • Inner tube
   • Outer tube
   Bends/damage/scratches → Replace.

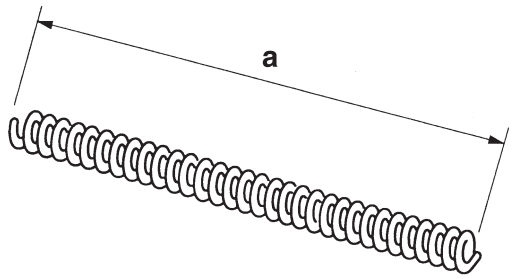
EWA13650

WARNING

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

2. Measure:
   • Fork spring free length “a”
   Out of specification → Replace.

Fork spring free length
345.4 mm (13.60 in)
Limit
331.6 mm (13.06 in)



3. Check:
   • Damper rod
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
   • Oil flow stopper
   Damage → Replace.

ECA14200

NOTICE

• The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.
• When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.

EAS30209

ASSEMBLING THE FRONT FORK LEGS

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

EWA13660

WARNING

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

TIP

• When assembling the front fork leg, be sure to replace the following parts:
  –Inner tube bushing
  –Outer tube bushing
  –Oil seal
  –Oil seal clip
  –Dust seal
  –O-ring
• Before assembling the front fork leg, make sure all of the components are clean.

1. Install:
   • Oil flow stopper spring “1”
   • Oil flow stopper “2”
   • Damper rod ring “3”

- Damper rod “4”
- Rebound spring
- Inner tube bushing “5” New

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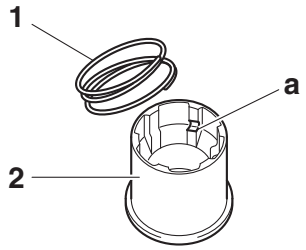
a. Install the oil flow stopper spring into the oil flow stopper.

TIP

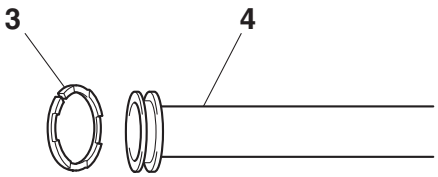
Make sure that the oil flow stopper spring is installed securely into the grooves “a” in the oil flow stopper.



b. Install the damper rod ring onto the damper rod.

TIP

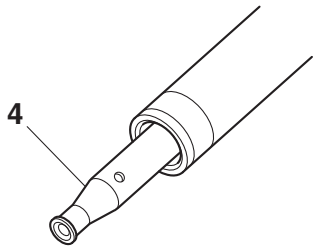
Fit the damper rod ring into the damper rod groove so that the side of the ring with the projections is facing in the direction shown in the illustration.



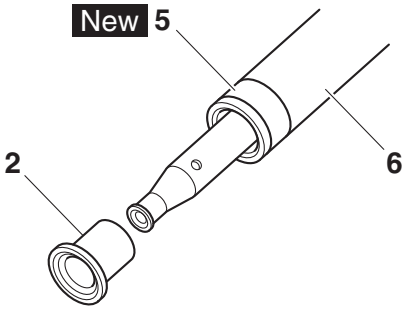
c. Install the damper rod and rebound spring to the inner tube.

TIP

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



d. Install the oil flow stopper and inner tube bushing onto the inner tube “6”.



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2. Lubricate:
   - Inner tube’s outer surface

	Recommended oil **Yamaha fork oil 10WT**

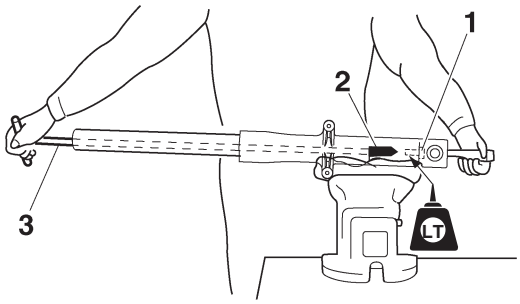
3. Install:
   - Inner tube
     (in the outer tube)
4. Install:
   - Copper washer New
   - Front fork damper rod bolt
5. Tighten:
   - Front fork damper rod bolt “1”

	Front fork damper rod bolt **30 Nm (3.0 m·kgf, 22 ft·lbf)** **LOCTITE®**

TIP

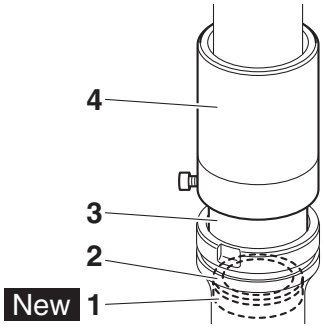
While holding the damper rod assembly with the damper rod holder “2” and T-handle “3”, tighten the front fork damper rod bolt.

	Damper rod holder **90890-01460** **T-handle** **90890-01326** **T-handle 3/8" drive 60 cm long** **YM-01326**



6. Install:
   - Outer tube bushing “1” New
   - Washer “2”
     (with the fork seal driver attachment “3” and fork seal driver weight “4”)

Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7
Fork seal driver attachment (ø41)
90890-01381
Replacement 41 mm
YM-A5142-2



7. Install:
   - Oil seal “1” New
     (with the fork seal driver attachment “2” and fork seal driver weight “3”)

ECA14220

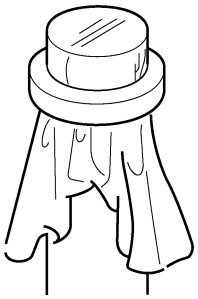
NOTICE

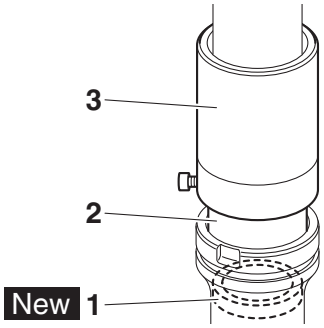
Make sure the numbered side of the oil seal faces up.

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.

Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7
Fork seal driver attachment (ø41)
90890-01381
Replacement 41 mm
YM-A5142-2

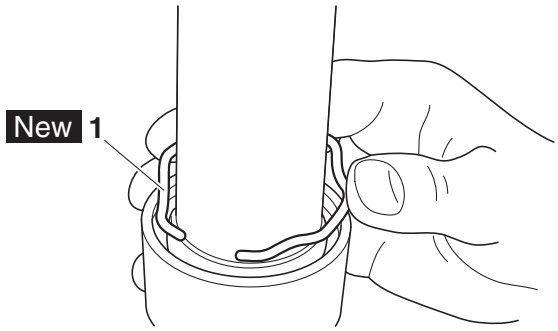




8. Install:
   - Oil seal clip “1” New

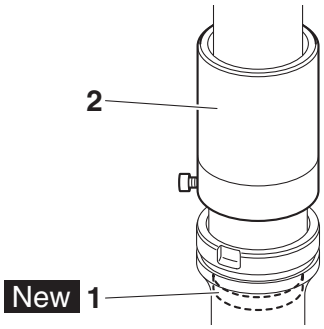
TIP

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



9. Install:
   - Dust seal “1” New
     (with the fork seal driver weight “2”)

Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7



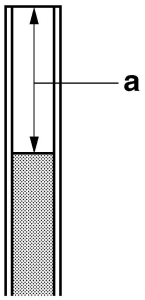
10.Fill:
- Front fork leg
  (with the specified amount of the recommended fork oil)

Quantity
403.0 cm³ (13.63 US oz, 14.21 Imp.oz)
Recommended oil
Fork oil 10W or equivalent

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

Level
162.0 mm (6.4 in)

TIP
- While filling the front fork leg, keep it upright.
- After filling, slowly pump the front fork leg up and down to distribute the fork oil.

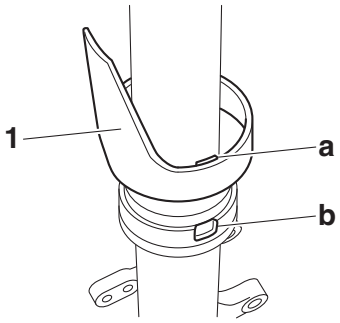


12.Install:
- Fork spring
- Spring seat
- Spacer
- Front fork cap bolt
  (along with the O-ring New)

TIP
- Before installing the front fork cap bolt, lubricate its O-ring with grease.
- Temporarily tighten the front fork cap bolt.
- Tighten the front fork cap bolt specified torque, when installing the front fork with upper bracket.

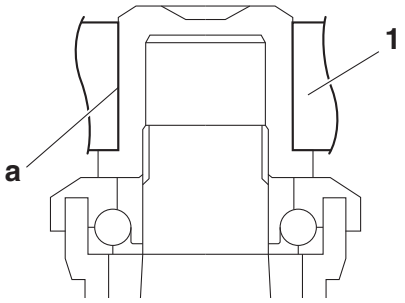
13.Install:
- Protector "1"

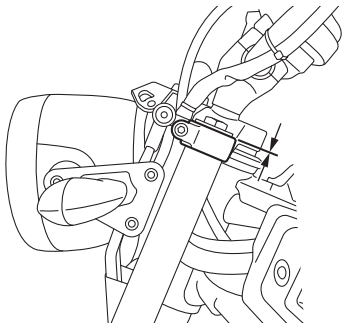
TIP
Align the projection "a" on the protector with the slot "b" in the outer tube.



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 lower bracket pinch bolts.
2. Install:
   - Upper bracket "1"

TIP
Before installing the upper bracket, remove any grease from the outer surface "a" of the cap nut.
- Make sure the inner tube end is flush with the top of the upper bracket.





3. Tighten:
   - Lower bracket pinch bolts
   - Upper bracket pinch bolt (center)
   - Upper bracket pinch bolts (left and right)
   - Front fork cap bolt

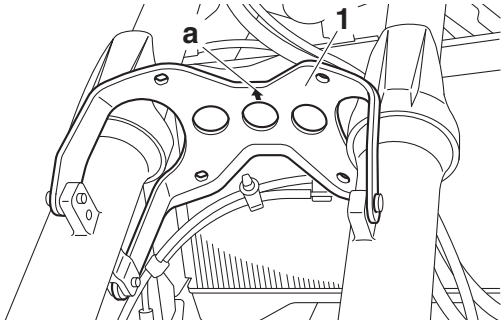
Lower bracket pinch bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)
Upper bracket pinch bolt (center)
21 Nm (2.1 m·kgf, 15 ft·lbf)
Upper bracket pinch bolt (left and right)
26 Nm (2.6 m·kgf, 19 ft·lbf)
Front fork cap bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

4. Install:
   - Front fender brackets “1”
   - Front fender

Front fender bracket bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Front fender bolt
9 Nm (0.9 m·kgf, 6.5 ft·lbf)

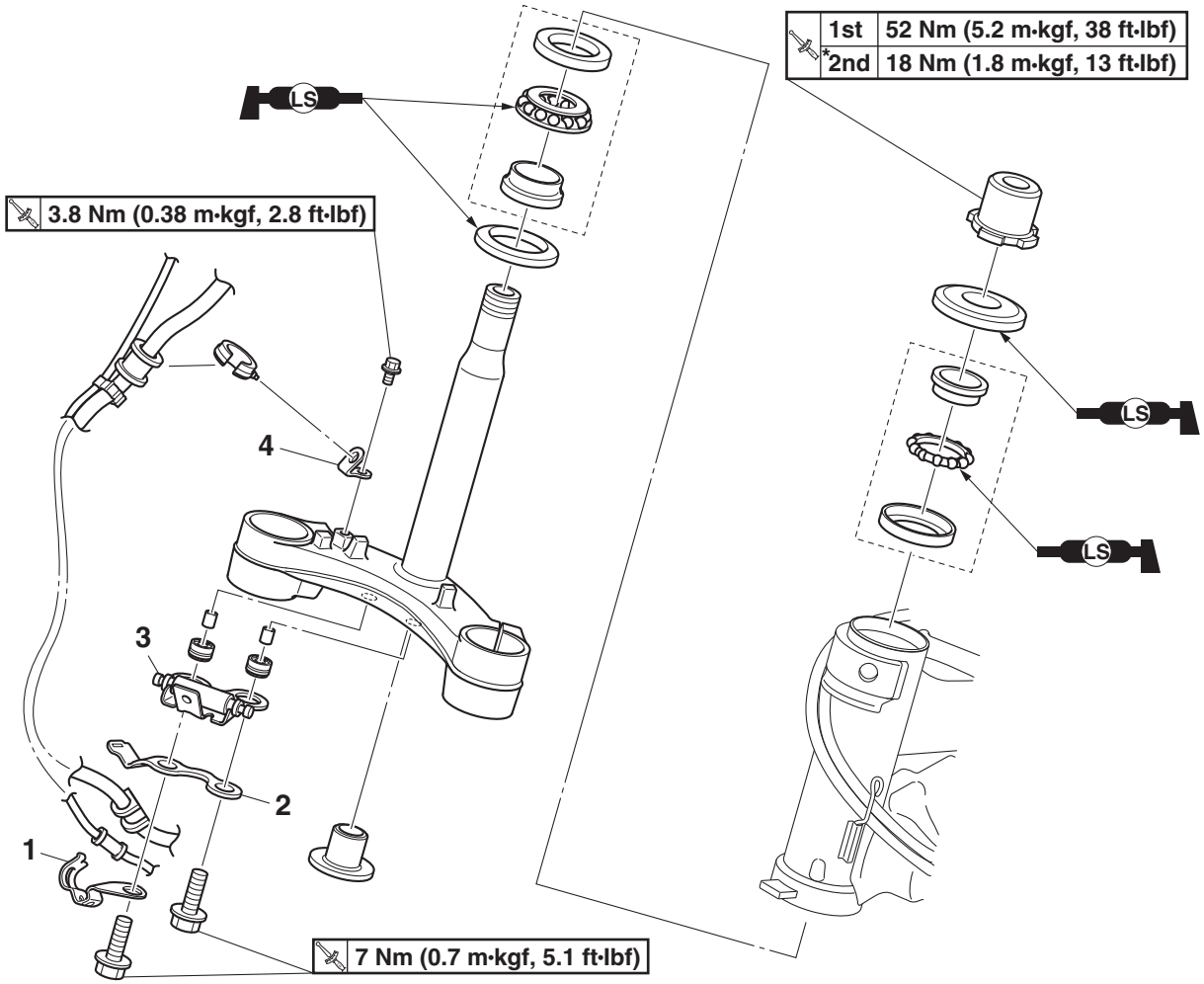
TIP

Install the front fender bracket to the front fork with the arrow mark “a” on the bracket pointing forward.



EAS20035
STEERING HEAD

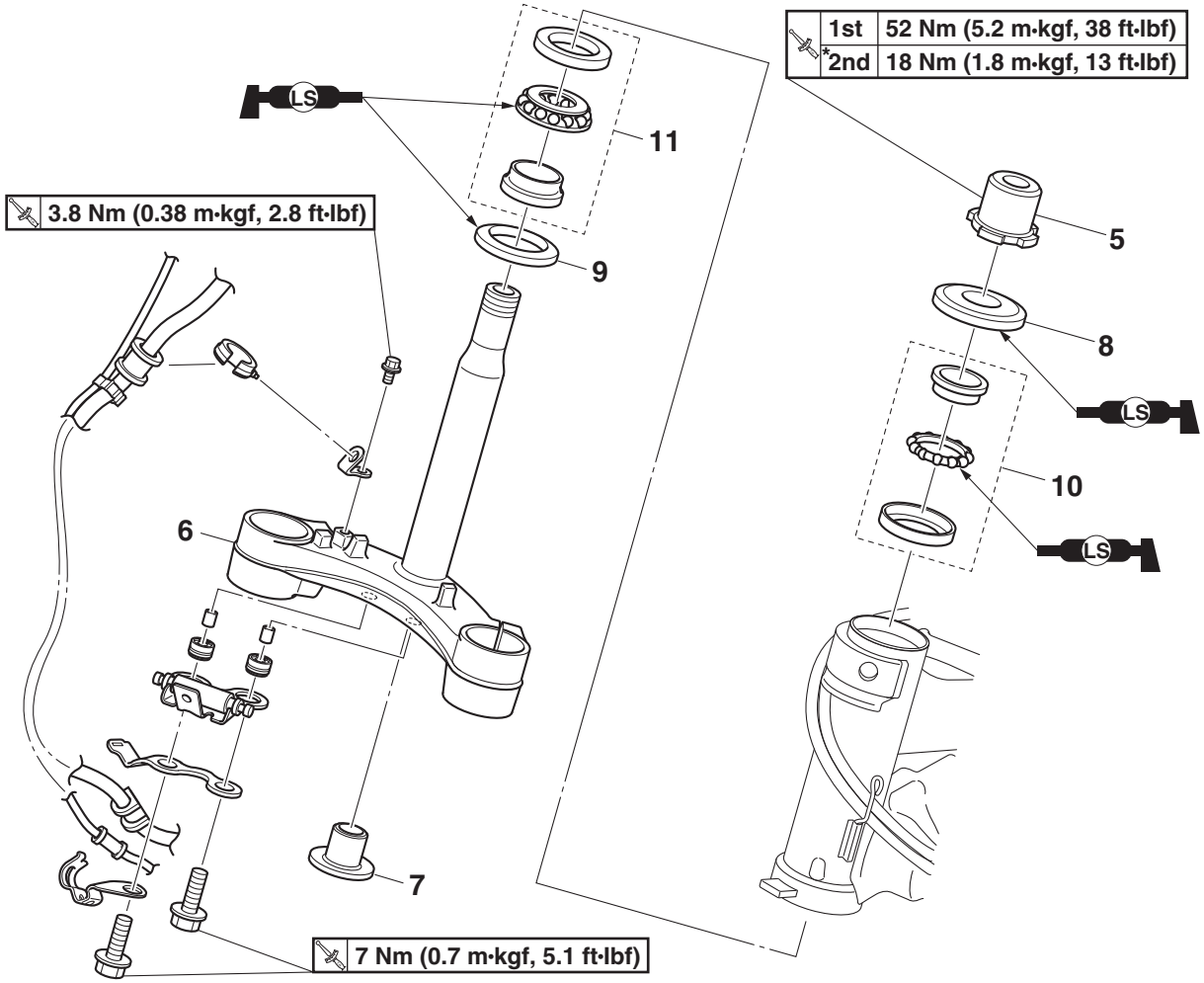
Removing the lower bracket



*** Loosen the cap nut completely, and then tighten it to specification.**

Order	Job/Parts to remove	Q'ty	Remarks
	Headlight assembly		Refer to "GENERAL CHASSIS (2)" on page 4-3.
	Handlebar		Refer to "HANDLEBAR" on page 4-65.
	Front fork legs		Refer to "FRONT FORK" on page 4-70.
1	Front brake hose lower holder	1	
2	Front brake hose upper holder	1	
3	Headlight bracket	1	
4	Front brake hose holder bracket	1	

Removing the lower bracket



*** Loosen the cap nut completely, and then tighten it to specification.**

Order	Job/Parts to remove	Q'ty	Remarks
5	Cap nut	1	
6	Lower bracket	1	
7	Lower bracket cap	1	
8	Bearing cover	1	
9	Lower bearing dust seal	1	
10	Upper bearing	1	
11	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:
   - Cap nut “1”
   - Lower bracket

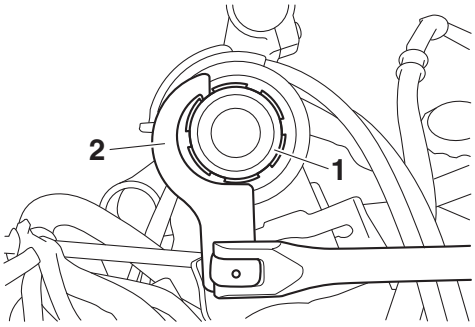
EWA13730
⚠ WARNING

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

TIP

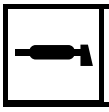
Remove the cap nut with the steering nut wrench “2”.

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



EAS30214
CHECKING THE STEERING HEAD

1. Wash:
   - Bearing
   - Bearing races



Recommended cleaning solvent
Kerosene

2. Check:
   - Bearing
   - Bearing races
     Damage/pitting → Replace the bearings and bearing races as a set.
3. Replace:
   - Bearing
   - Bearing races

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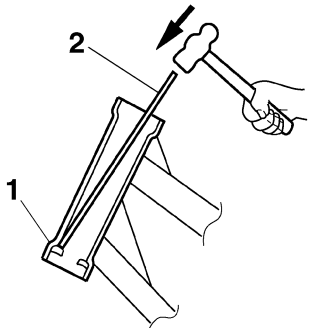
a. Remove the bearing races from the steering head pipe “1” with a long rod “2” and hammer.
b. Remove the bearing race “3” from the lower bracket with a floor chisel “4” and hammer.
c. Install a new dust seal and new bearing races.

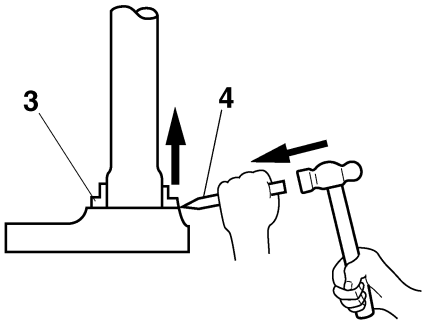
ECA14270
NOTICE

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:
   - Lower bracket
     (along with the steering stem)
     Bends/cracks/damage → Replace.

EAS30216
INSTALLING THE STEERING HEAD

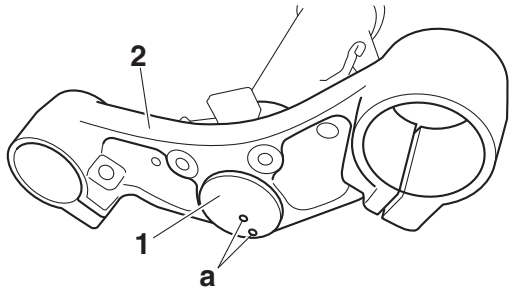
1. Lubricate:
   - Upper bearing
   - Lower bearing

Recommended lubricant
Lithium-soap-based grease

2. Install:
   - Lower bracket cap “1”
     (onto the lower bracket “2”)

TIP

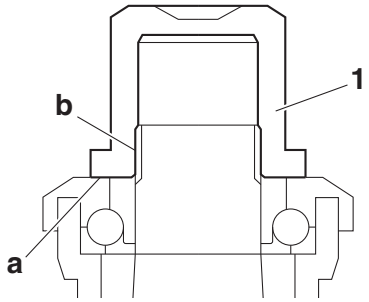
Face the holes “a” in the lower bracket cap rearward.



3. Install:
   • Lower bracket
   • Cap nut “1”
   Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-19.

TIP

Before installing the cap nut, remove any grease from the contact surfaces “a” between the cap nut and the bearing cover and from the threads “b” of the lower bracket and cap nut.



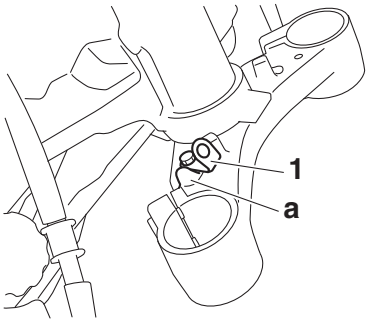
4. Install:
   • Front brake hose holder bracket “1”
   • Headlight bracket
   • Front brake hose upper holder “2”
   • Front brake hose lower holder “3”

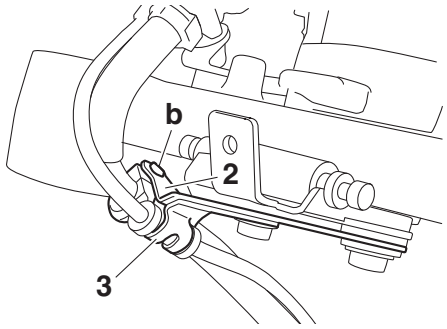
Front brake hose holder bracket bolt
3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)
Front brake hose lower holder bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

• Make sure that the front brake hose holder bracket contacts the projection “a” on the lower bracket.

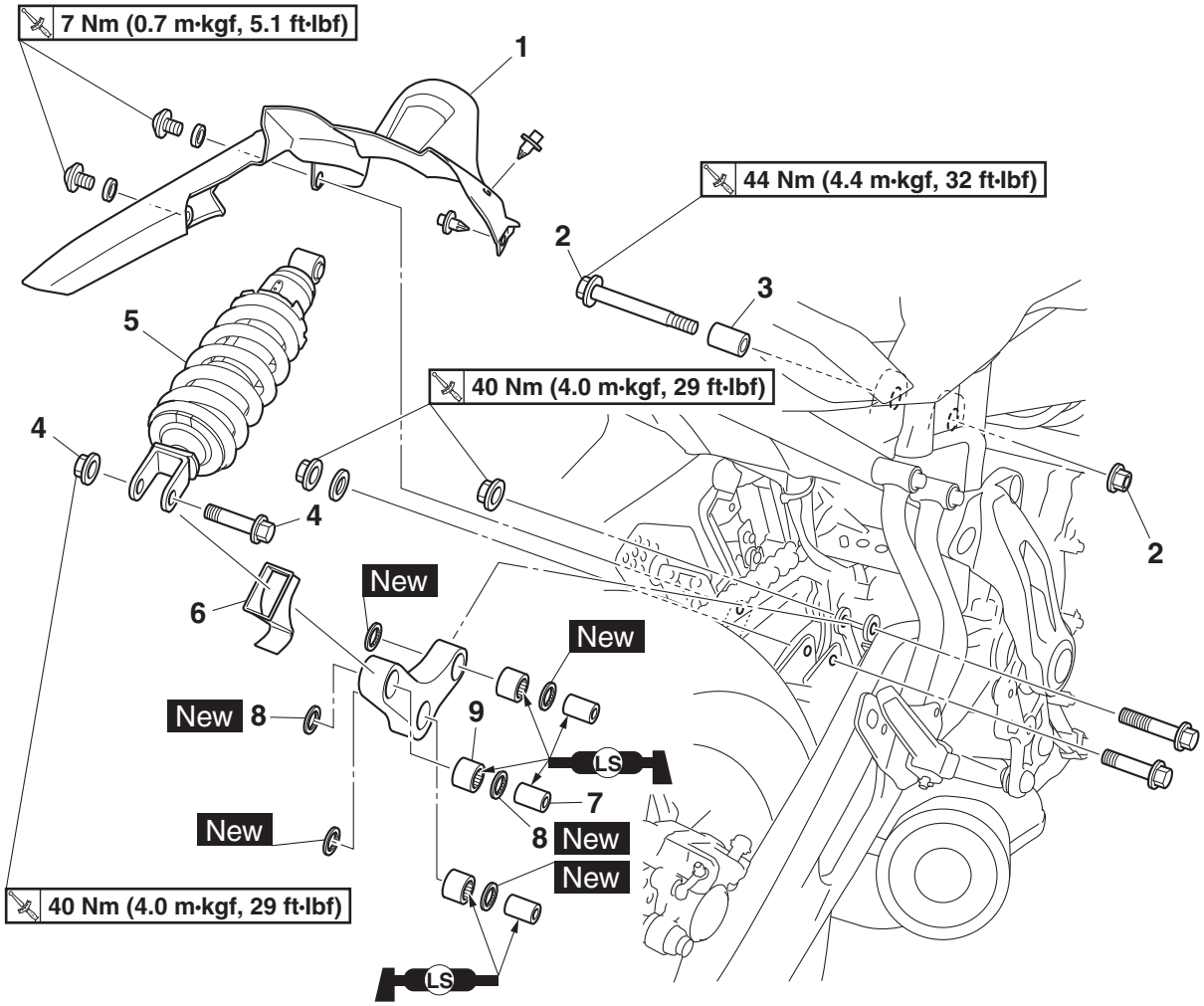
• Make sure that the projection “b” on the front brake hose lower holder fits into the hole in the front brake hose upper holder.





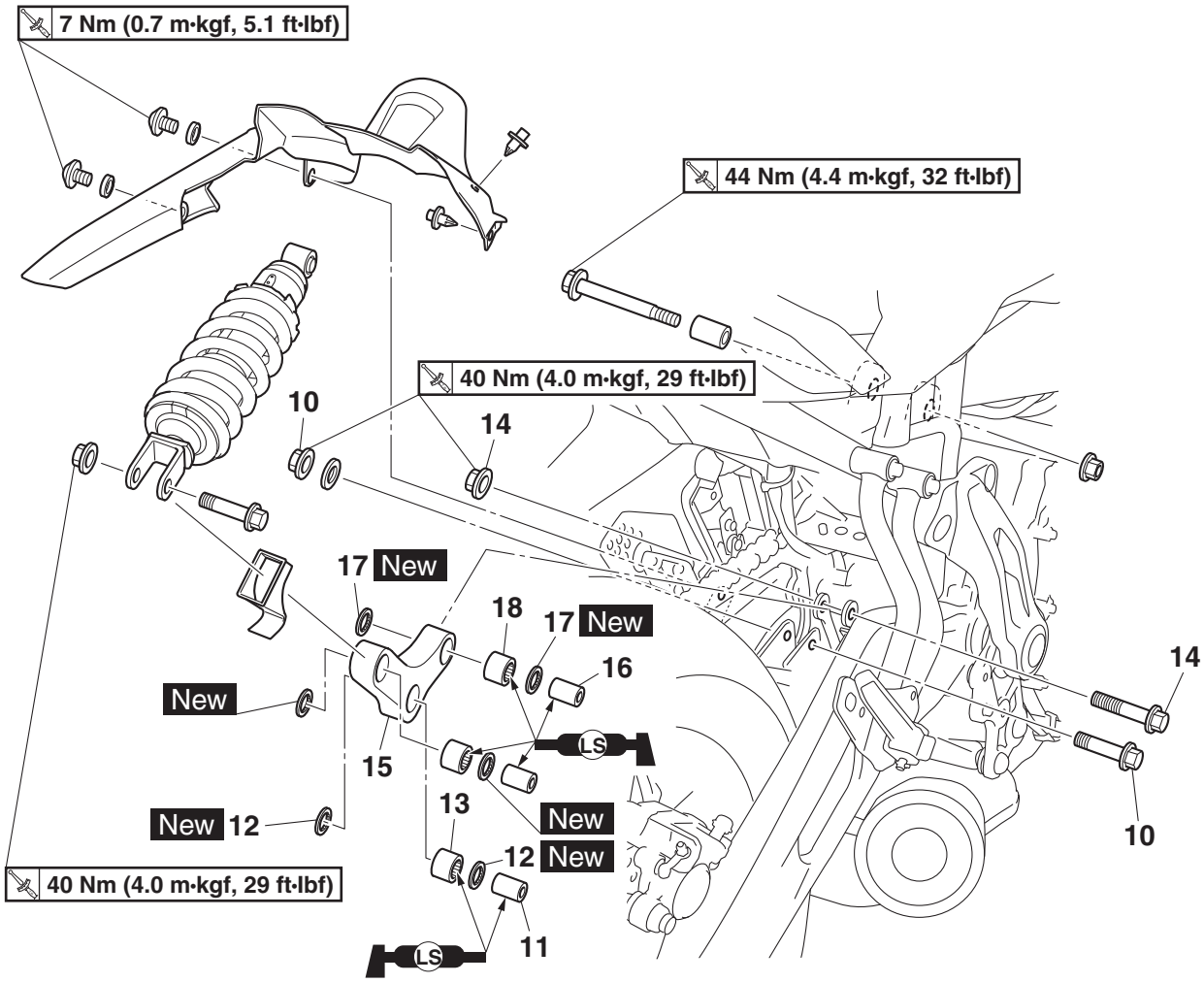
EAS20036
REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Drive chain guard	1	
2	Rear shock absorber assembly nut/bolt (front side)	1/1	
3	Spacer	1	
4	Rear shock absorber assembly nut/bolt (rear side)	1/1	
5	Rear shock absorber assembly	1	
6	Relay arm rubber cover	1	
7	Spacer	1	
8	Oil seal	2	
9	Bearing	1	

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
10	Relay arm nut/bolt	1/1	
11	Spacer	1	
12	Oil seal	2	
13	Bearing	1	
14	Connecting arm nut/bolt (relay arm side)	1/1	
15	Relay arm	1	
16	Spacer	1	
17	Oil seal	2	
18	Bearing	1	

EAS30826
HANDLING THE REAR SHOCK ABSORBER

EWA13740
⚠ WARNING

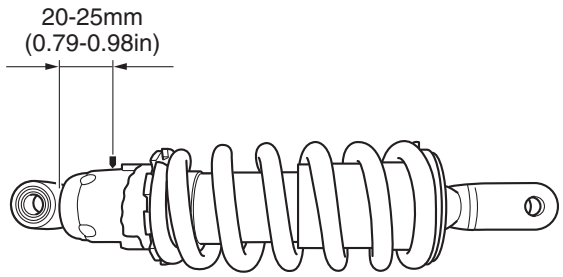
This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear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

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 → Replace the rear shock absorber assembly.
   - Spring
     Damage/wear → Replace the rear shock absorber assembly.
   - Bolts
     Bends/damage/wear → Replace.

EAS31112
CHECKING THE RELAY ARM

1. Check:
   - Relay arm
     Damage/wear → Replace.
2. Check:
   - Bearings
   - Oil seals
     Damage/pitting → Replace.
3. Check:
   - Collars
     Damage/scratches → Replace.

EAS30222
INSTALLING THE RELAY ARM

1. Lubricate:
   - Spacers
   - Bearings

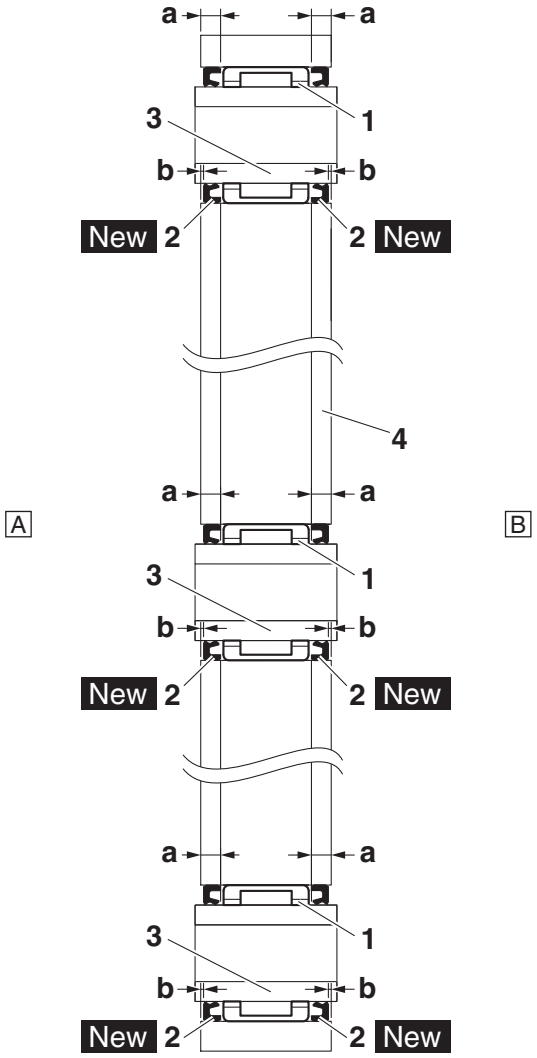
	Recommended lubricant **Lithium-soap-based grease**

2. Install:
   - Bearings “1”
   - Oil seals “2” New
   - Spacers “3”
     (to the relay arm “4”)

	Installed depth “a” **4.0 mm (0.16 in)** **Installed depth “b”** **More than 0.3 mm (0.01 in)**

TIP

When installing the oil seals to the relay arm, face the character stamps of the oil seals outside.

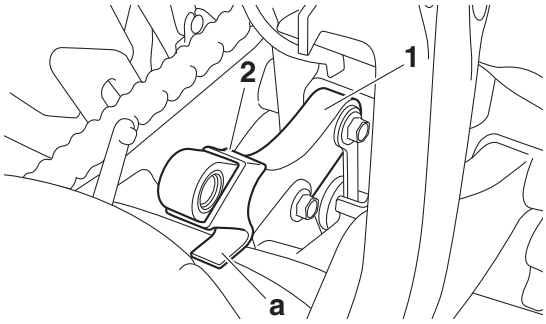


A. Left side
B. Right side

3. Install:
   • Relay arm “1”
   • Relay arm rubber cover “2” (to the relay arm)

TIP

Make sure that the portion “a” of the relay arm rubber cover is positioned on top of the swingarm.



4. Tighten:
   • Connecting arm nut
   • Relay arm nut

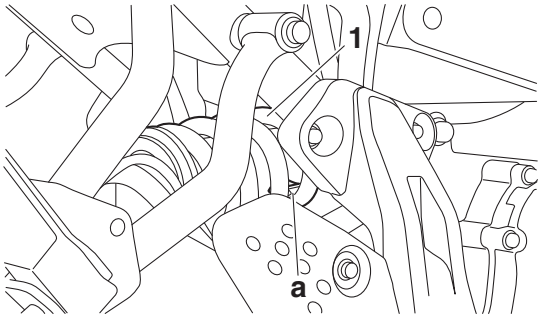
Connecting arm nut (relay arm side)
40 Nm (4.0 m·kgf, 29 ft·lbf)
Relay arm nut
40 Nm (4.0 m·kgf, 29 ft·lbf)

EAS30225
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
   • Rear shock absorber assembly “1”

TIP

Make sure that the label “a” on the rear shock absorber assembly faces down.

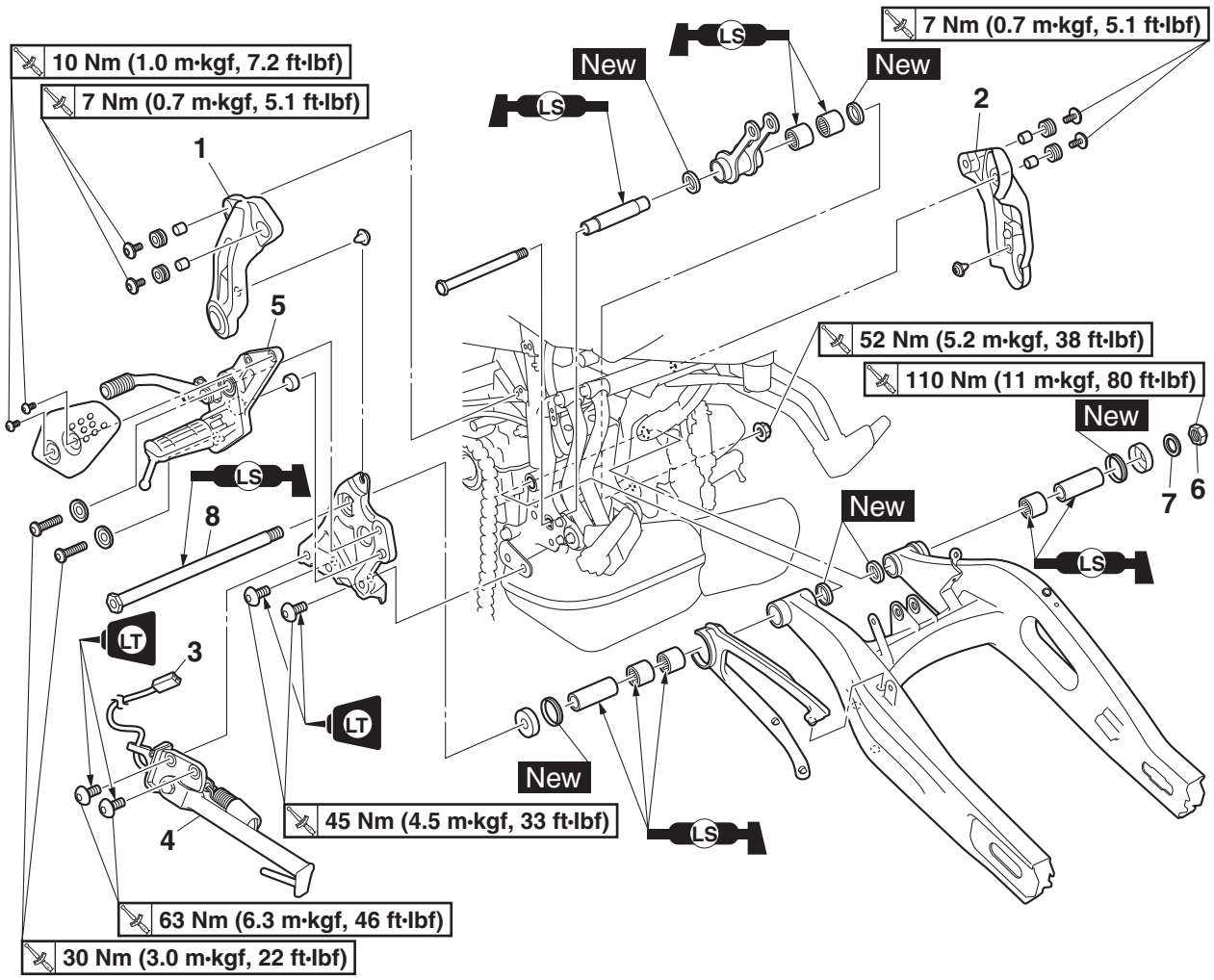


2. Tighten:
   • Rear shock absorber assembly nut (front side)
   • Rear shock absorber bolt (rear side)

Rear shock absorber assembly bolt (front side)
44 Nm (4.4 m·kgf, 32 ft·lbf)
Rear shock absorber assembly nut (rear side)
40 Nm (4.0 m·kgf, 29 ft·lbf)

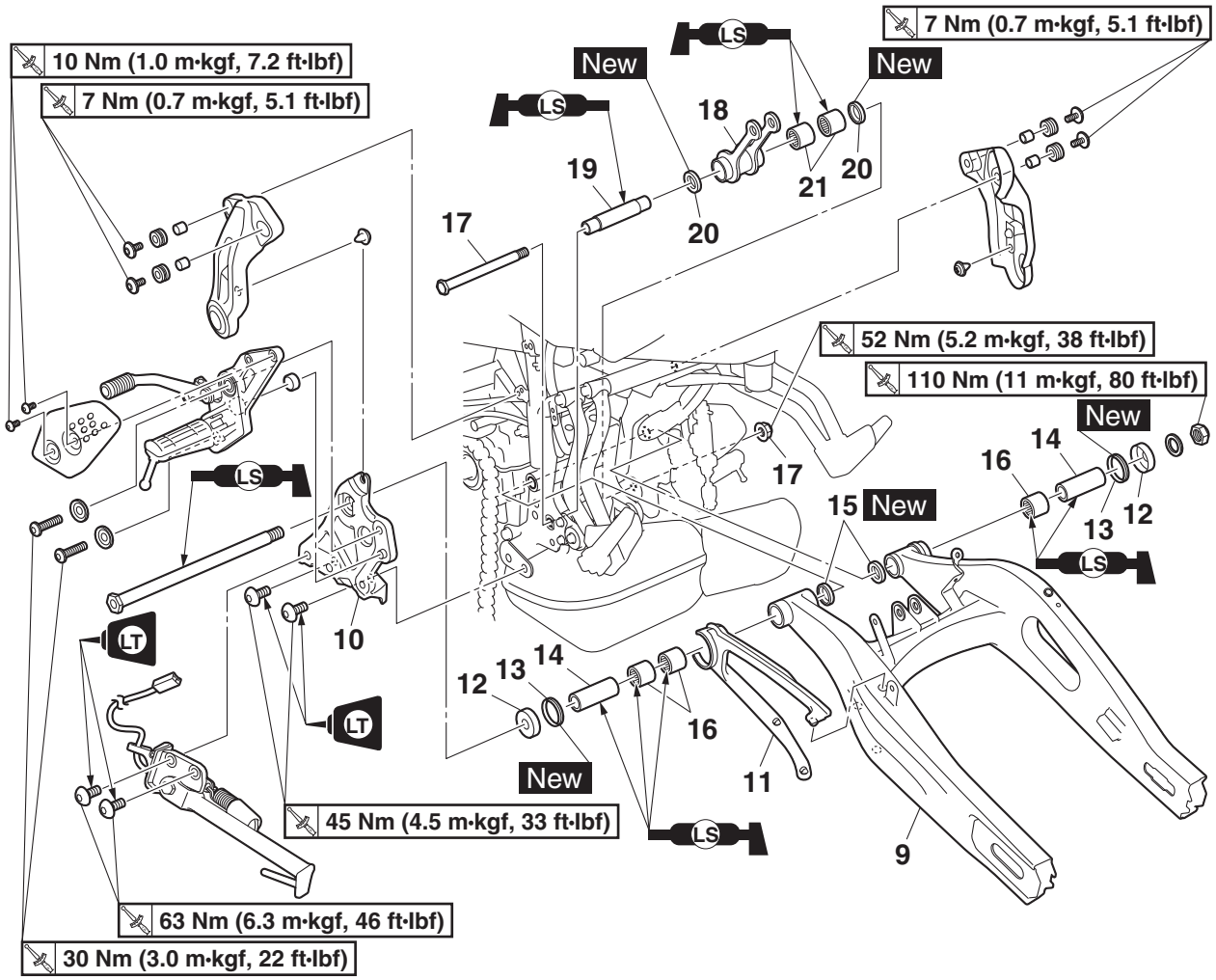
EAS20037
SWINGARM

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Rear brake caliper/Rear brake hose guide/Rear brake hose holder		Refer to "REAR BRAKE" on page 4-43.
	Rear wheel		Refer to "REAR WHEEL" on page 4-20.
	Relay arm		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-84.
	Drive sprocket cover		Refer to "CHAIN DRIVE" on page 4-93.
1	Pivot shaft protector (left)	1	
2	Pivot shaft protector (right)	1	
3	Sidestand switch coupler	1	Disconnect.
4	Sidestand	1	
5	Footrest assembly (left)	1	
6	Pivot shaft nut	1	
7	Washer	1	
8	Pivot shaft	1	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
9	Swingarm	1	
10	Footrest bracket (left)	1	
11	Drive chain guide	1	
12	Dust cover	2	
13	Oil seal	2	
14	Collar	2	
15	Oil seal	2	
16	Bearing	3	
17	Connecting arm nut/bolt (frame side)	1/1	
18	Connecting arm	1	
19	Spacer	1	
20	Oil seal	2	
21	Bearing	2	

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 a suitable stand so that the rear wheel is elevated.

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

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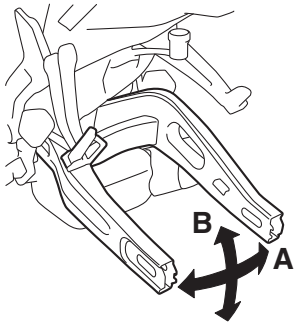
a. Measure the tightening torque of the pivot shaft nut.

	Pivot shaft nut **110 Nm (11 m·kgf, 80 ft·lbf)**

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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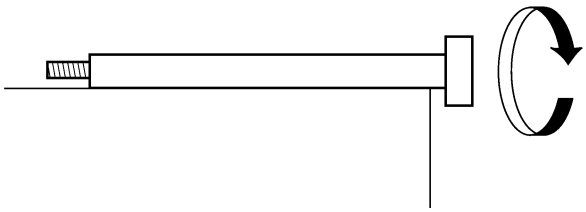
3. Remove:
   - Swingarm

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

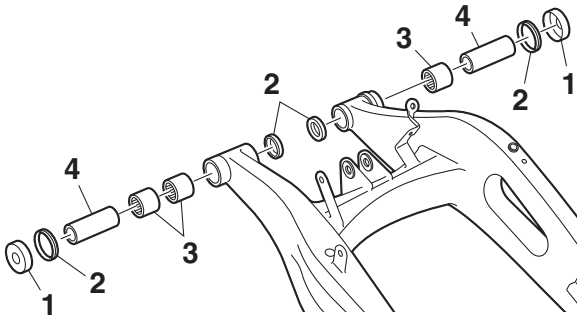
Do not attempt to straighten a bent pivot shaft.



3. Wash:
   - Pivot shaft
   - Dust covers
   - Collars
   - Bearings
   - Washer

	Recommended cleaning solvent **Kerosene**

4. Check:
   - Dust covers "1"
   - Oil seals "2"
     Damage /wear → Replace.
   - Bearings "3"
     Damage/pitting → Replace.
   - Collars "4"
     Damage/scratches → Replace.



EAS31113
CHECKING THE CONNECTING ARM

1. Check:
   - Connecting arm
     Damage/wear → Replace.
2. Check:
   - Bearings
   - Oil seals
     Damage/pitting → Replace.

3. Check:
   • Collar
   Damage/scratches → Replace.

EAS31114
INSTALLING THE CONNECTING ARM

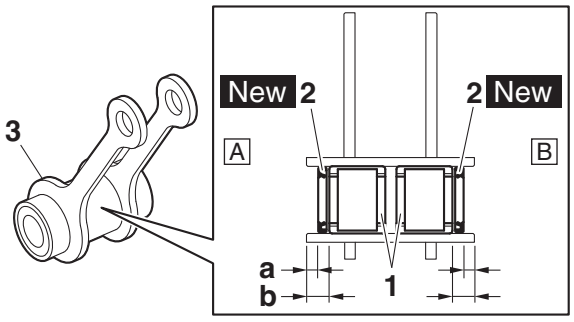
1. Lubricate:
   • Spacers
   • Bearings

Recommended lubricant
Lithium-soap-based grease

2. Install:
   • Bearings “1”
   • Oil seals “2” New
   (to the connecting arm “3”)

TIP

When installing the oil seals to the connecting arm, face the character stamp of the oil seals outside.



A. Left side
B. Right side

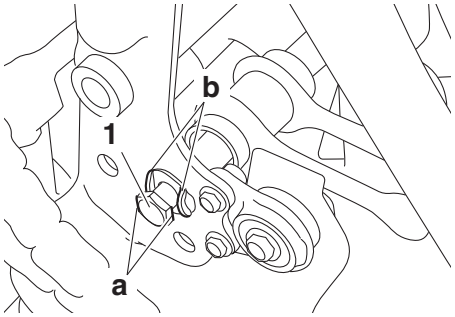
Installed depth “a”
3.5–4.5 mm (0.14–0.18 in)
Installed depth “b”
8.0–9.0 mm (0.31–0.35 in)

3. Install:
   • Spacer
   • Connecting arm
   • Connecting arm bolt “1”
   • Connecting arm nut

Connecting arm nut (frame side)
52 Nm (5.2 m·kgf, 38 ft·lbf)

TIP

Align two flat sides “a” of the connecting arm bolt with the projections “b” on the frame.



EAS30228
INSTALLING THE SWINGARM

1. Lubricate:
   • Collar
   • Pivot shaft
   • Bearings

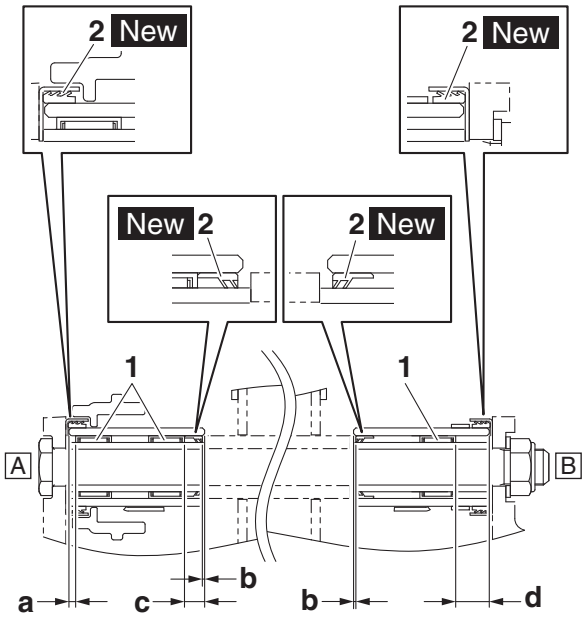
Recommended lubricant
Lithium-soap-based grease

2. Install:
   • Bearings “1”
   • Oil seals “2” New
   (to the swingarm)

Installed depth “a”
3.0 mm (0.12 in)
Installed depth “b”
1.0 mm (0.04 in)
Installed depth “c”
9.0 mm (0.35 in)
Installed depth “d”
15 mm (0.59 in)

TIP

Install the oil seals to the swingarm so that they are facing in the directions shown in the illustration.



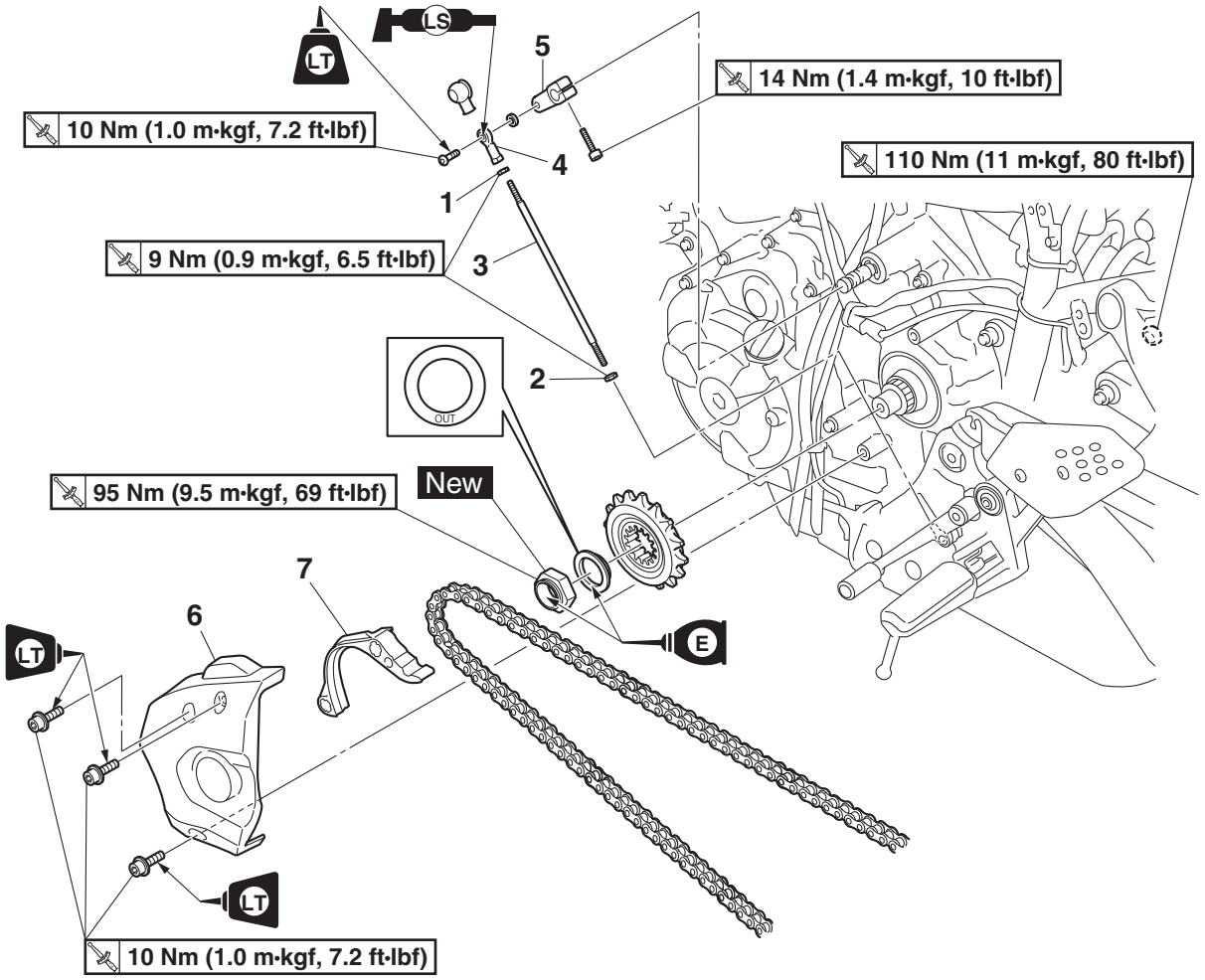
A. Left side
B. Right side

3. Adjust:
   • Drive chain slack
   Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-17.

	Drive chain slack **51.0–56.0 mm (2.01–2.20 in)**

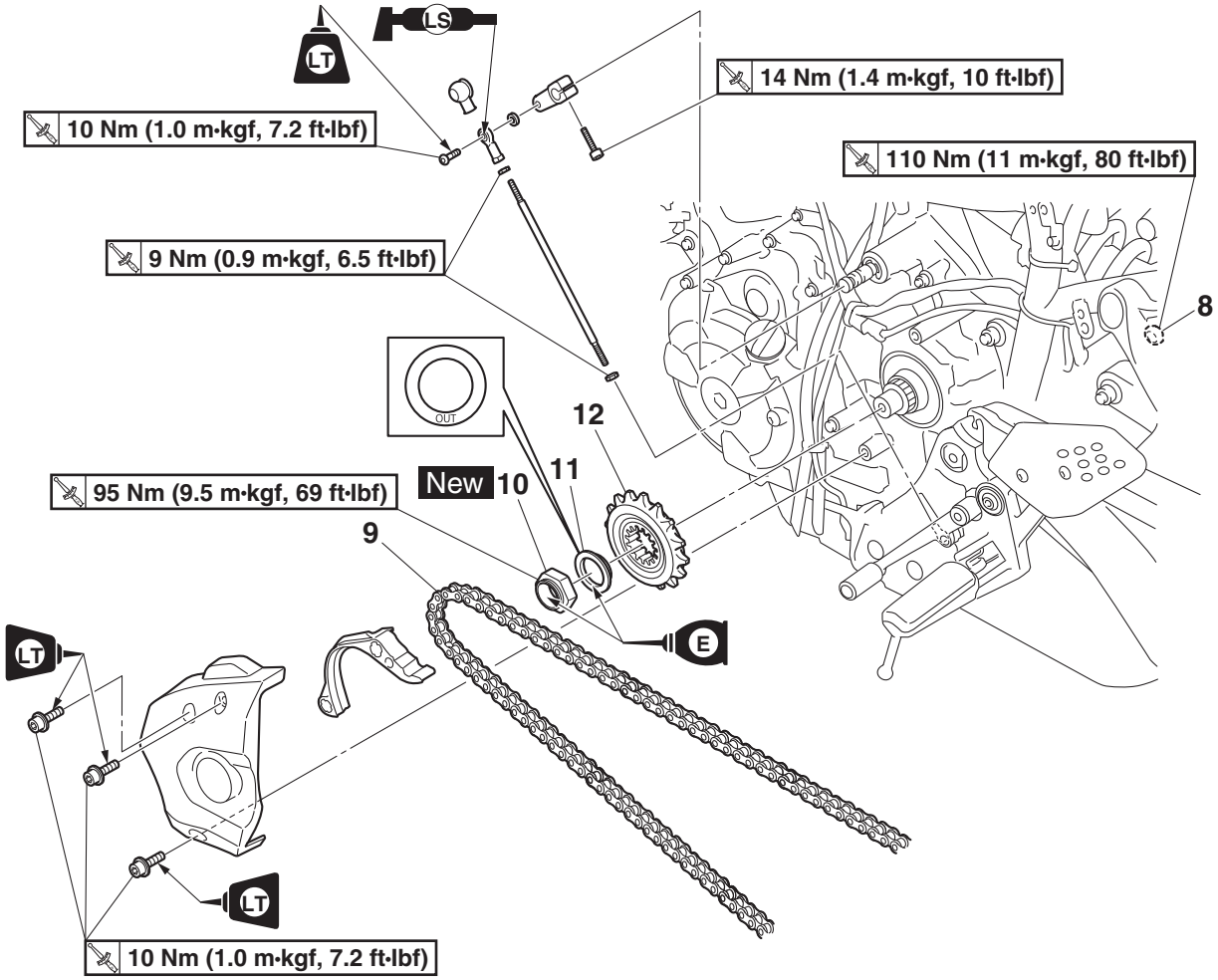
EAS20038
CHAIN DRIVE

Removing the drive chain



Order	Job/Parts to remove	Q'ty	Remarks
	Drive chain guard		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-84.
	Pivot shaft protectors/sidestand		Refer to "SWINGARM" on page 4-88.
1	Shift rod locknut (shift arm side)	1	
2	Shift rod locknut (shift pedal side)	1	Left-hand threads
3	Shift rod	1	
4	Shift rod joint	1	
5	Shift arm	1	
6	Drive sprocket cover	1	
7	Drive chain guide	1	

Removing the drive chain



Order	Job/Parts to remove	Q'ty	Remarks
8	Pivot shaft nut	1	Loosen.
9	Drive chain	1	
10	Drive sprocket nut	1	
11	Washer	1	
12	Drive sprocket	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 a suitable stand so that the rear wheel is elevated.

2. Remove:
   • Drive chain “1”

TIP

Push the rear wheel forward and remove the drive chain from the rear wheel sprocket. Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-17.

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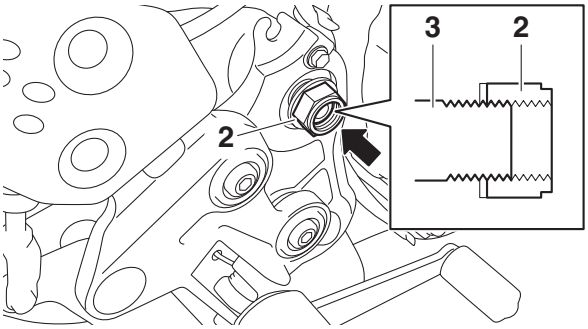
a. Loosen the pivot shaft nut “2” so that the engaged thread length on the pivot shaft “3” is 3–4 ridges.

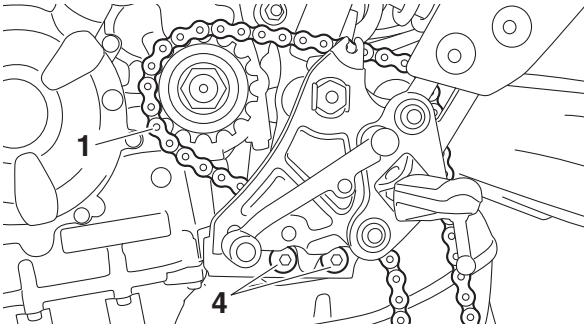
ECA21200
NOTICE

Make sure that the pivot shaft nut does not come off the pivot shaft.

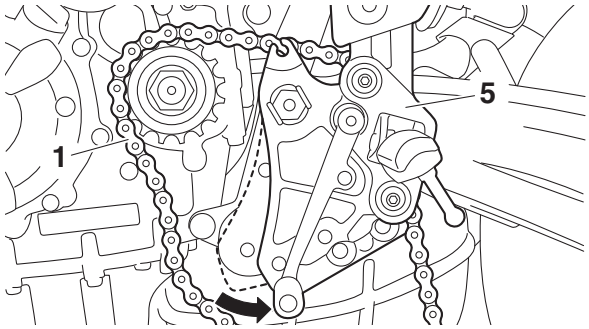
b. Tap the pivot shaft nut to push the pivot shaft to the left.



c. Remove the footrest bracket bolts “4”.



d. Move the footrest bracket “5” rearward, and then remove the drive chain.



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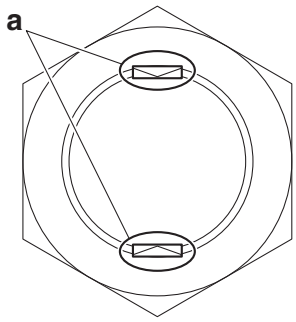
EAS31115
REMOVING THE DRIVE SPROCKET
1. Straighten the drive sprocket nut ribs “a”.



2. Loosen:
   • Drive sprocket nut

TIP

Loosen the drive sprocket nut while pressing the brake pedal.

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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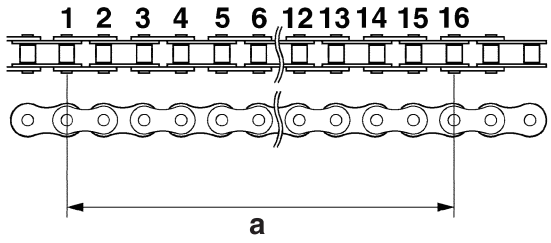
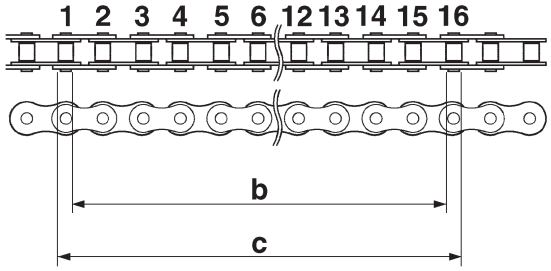
a. Measure the length “b” between the inner sides of the pins and the length “c” between the outer sides of the pins on a 15-link section of the drive chain as shown in the illustration.
b. Calculate the length “a” of the 15-link section of the drive chain using the following formula.
   Drive chain 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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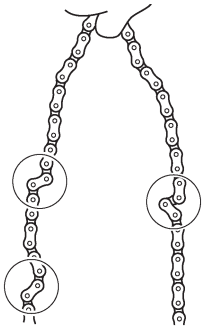
2. Check:
   • Drive chain
   Stiffness → Clean and lubricate or replace.



3. Clean:
   • Drive chain

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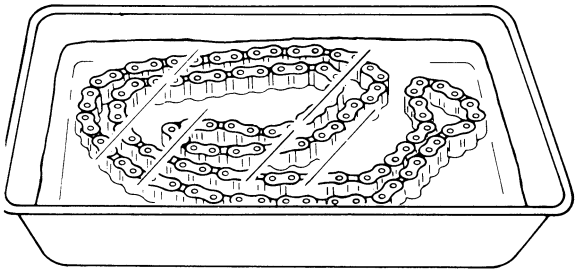
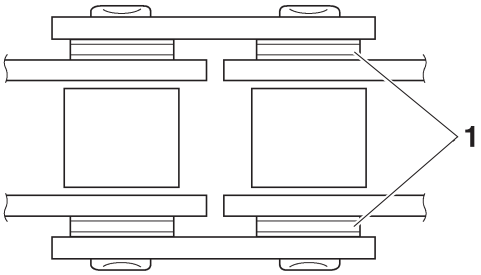
a. Wipe the drive chain with a clean cloth.
b. Put the drive chain in kerosene and remove any remaining dirt.
c. Remove the drive chain from the kerosene and completely dry it.

ECA14290

NOTICE

• This motorcycle 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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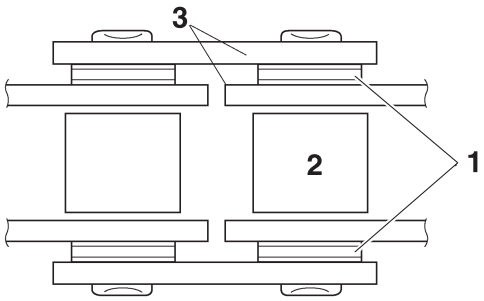
4. Check:
   • O-rings "1"
   Damage → Replace the drive chain.
   • Drive chain rollers "2"
   Damage/wear → Replace the drive chain.
   • Drive chain side plates "3"
   Damage/wear/cracks → Replace the drive chain.

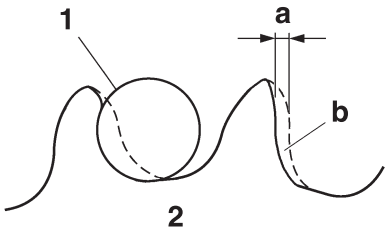


5. Lubricate:
   • Drive chain

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, drive chain, and rear wheel sprocket as a set.
   Bent teeth → Replace the drive sprocket, drive chain, and rear wheel sprocket 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 4-25.

EAS30233
CHECKING THE REAR WHEEL DRIVE HUB

Refer to "CHECKING THE REAR WHEEL DRIVE HUB" on page 4-24.

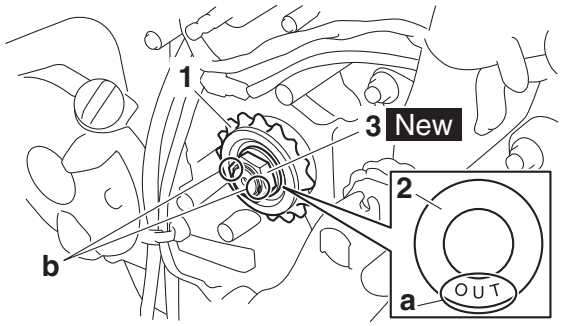
EAS31116
INSTALLING THE DRIVE SPROCKET

1. Install:
   • Drive sprocket "1"
   • Washer "2"
   • Drive sprocket nut "3" New

Drive sprocket nut
95 Nm (9.5 m·kgf, 69 ft·lbf)

TIP

- While applying the rear brake, tighten the drive sprocket nut.
- Install washer with the "OUT" mark "a" facing out.
- Stake the drive sprocket nut at cutouts "b" in the drive axle.

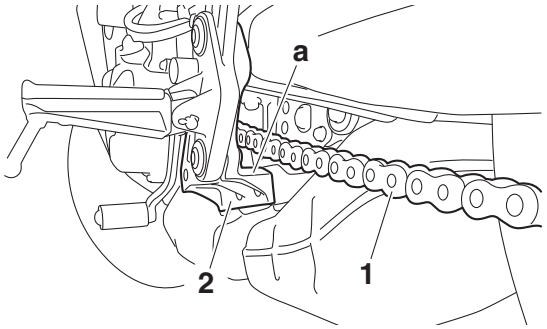


EAS30234
INSTALLING THE DRIVE CHAIN

1. Install:
   • Drive chain "1"

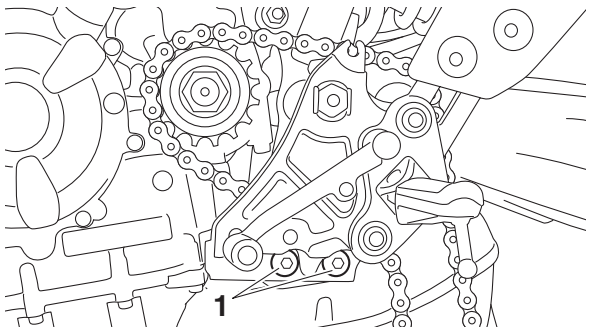
TIP

Make sure that the drive chain is positioned above the portion "a" of the footrest bracket "2".



2. Tighten:
   • Footrest bracket bolts "1"

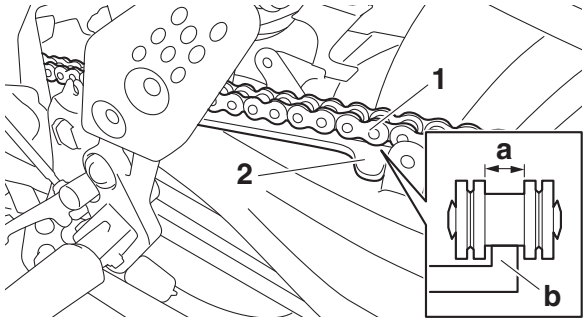
Footrest bracket bolt
45 Nm (4.5 m·kgf, 33 ft·lbf)
LOCTITE®



3. Lubricate:
   • Drive chain

Recommended lubricant
Chain lubricant suitable for O-ring chains

4. Fit the space “a” between the side plates of the drive chain “1” onto the rib “b” on the drive chain guide “2”.

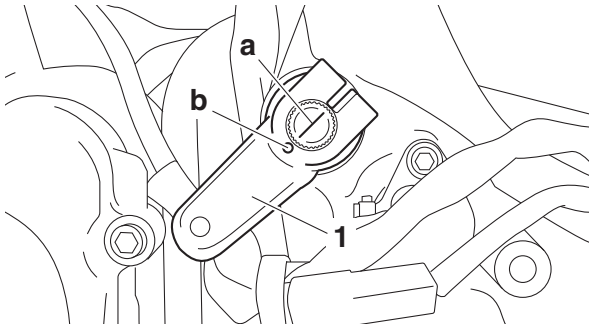


5. Install:
   - Shift arm “1”
   - Shift rod joint
   - Shift rod
   - Shift rod locknuts

TIP

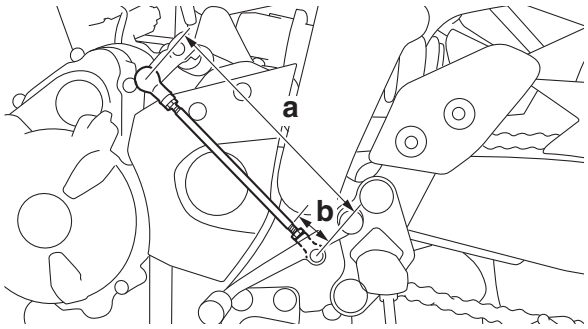
Before installing, make sure to align the mark “a” of the shift shaft with the punch mark “b” of the shift arm.

Shift arm pinch bolt
14 Nm (1.4 m·kgf, 10 ft·lbf)



6. Measure:
   - Installed shift rod length “a” and “b”
     Incorrect → Adjust.

Installed length “a”
217.5–219.5 mm (8.56–8.64 in)
Installed length “b”
35.0–36.0 mm (1.38–1.42 in)



7. Adjust:
   - Installed shift rod length

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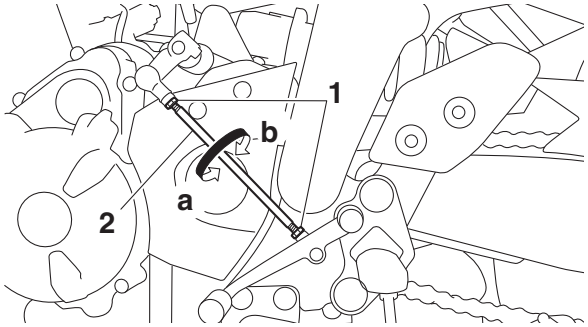
a. Loosen both locknuts “1”.

TIP

The shift rod locknut (shift pedal side) has left-hand threads.

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.



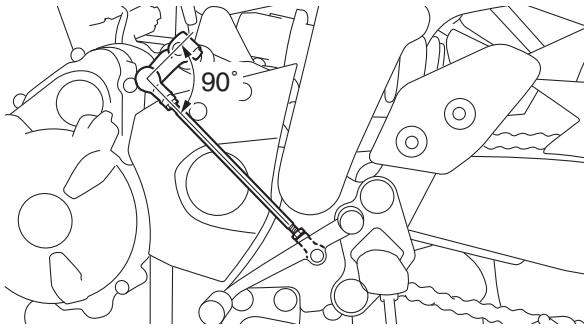
c. Tighten both locknuts.

TIP

The shift rod locknut (shift pedal side) has left-hand threads.

Shift rod locknut (shift arm side)
9 Nm (0.9 m·kgf, 6.5 ft·lbf)
Shift rod locknut (shift pedal side)
9 Nm (0.9 m·kgf, 6.5 ft·lbf)
Left-hand threads

d. Make sure the installed shift rod length is within specification. Make sure that the installed shift rod length is within specification and that the angle between the shift arm and the shift rod is 90°.



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8. Adjust:
   • Drive chain slack
   Refer to“ADJUSTING THE DRIVE CHAIN SLACK” on page 3-17.

Drive chain slack
51.0–56.0 mm (2.01–2.20 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.

ENGINE

EAS20041
ENGINE INSPECTION

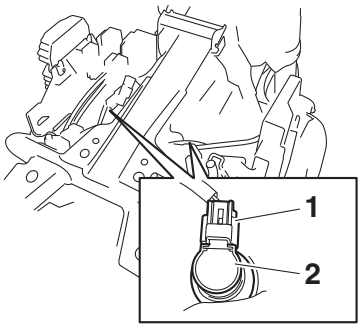
EAS30249
MEASURE THE COMPRESSION PRESSURE

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:
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank center cover
   - Air scoops
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
4. Disconnect:
   - Ignition coil couplers "1"
5. Remove:
   - Ignition coils "2"



6. Remove:
   - Spark plugs

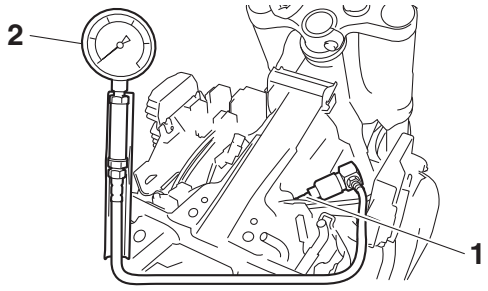
ECA13340

NOTICE

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

7. Install:
   - Extension "1"
   - Compression gauge "2"

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



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

TIP

Due to the engine characteristics, the compression pressure is different for cylinder #1 and cylinder #2.

Compression pressure (#1 cylinder)
770–990 kPa/355 r/min (7.7–9.9 kgf/cm²/355 r/min, 109.5–140.8 psi/355 r/min)
Compression pressure (#2 cylinder)
690–880 kPa/355 r/min (6.9–8.8 kgf/cm²/355 r/min, 98.1–125.2 psi/355 r/min)

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

EWA12940

⚠ WARNING

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

TIP

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

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

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

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9. Install:
   • Spark plugs
   • Ignition coils

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

10. Connect:
    • Ignition coil couplers
11. Install:
    • Fuel tank
      Refer to “FUEL TANK” on page 7-1.
    • Air scoops
    • Fuel tank center cover
    • Fuel tank cover (left)
    • Fuel tank cover (right)
    • Fuel tank top cover
      Refer to “GENERAL CHASSIS (3)” on page 4-5.
    • Seat
      Refer to “GENERAL CHASSIS (1)” on page 4-1.

EAS31132
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 8-36.

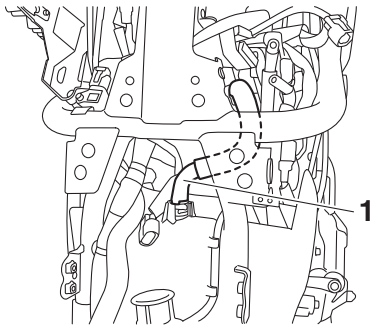
Yamaha diagnostic tool
90890-03250

EAS31133
CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
   • Seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Fuel tank top cover
   • Fuel tank cover (left)
   • Fuel tank cover (right)
   • Fuel tank center cover
     Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Fuel tank
     Refer to “FUEL TANK” on page 7-1.
2. Check:
   • Cylinder head breather hose “1”
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14920
NOTICE

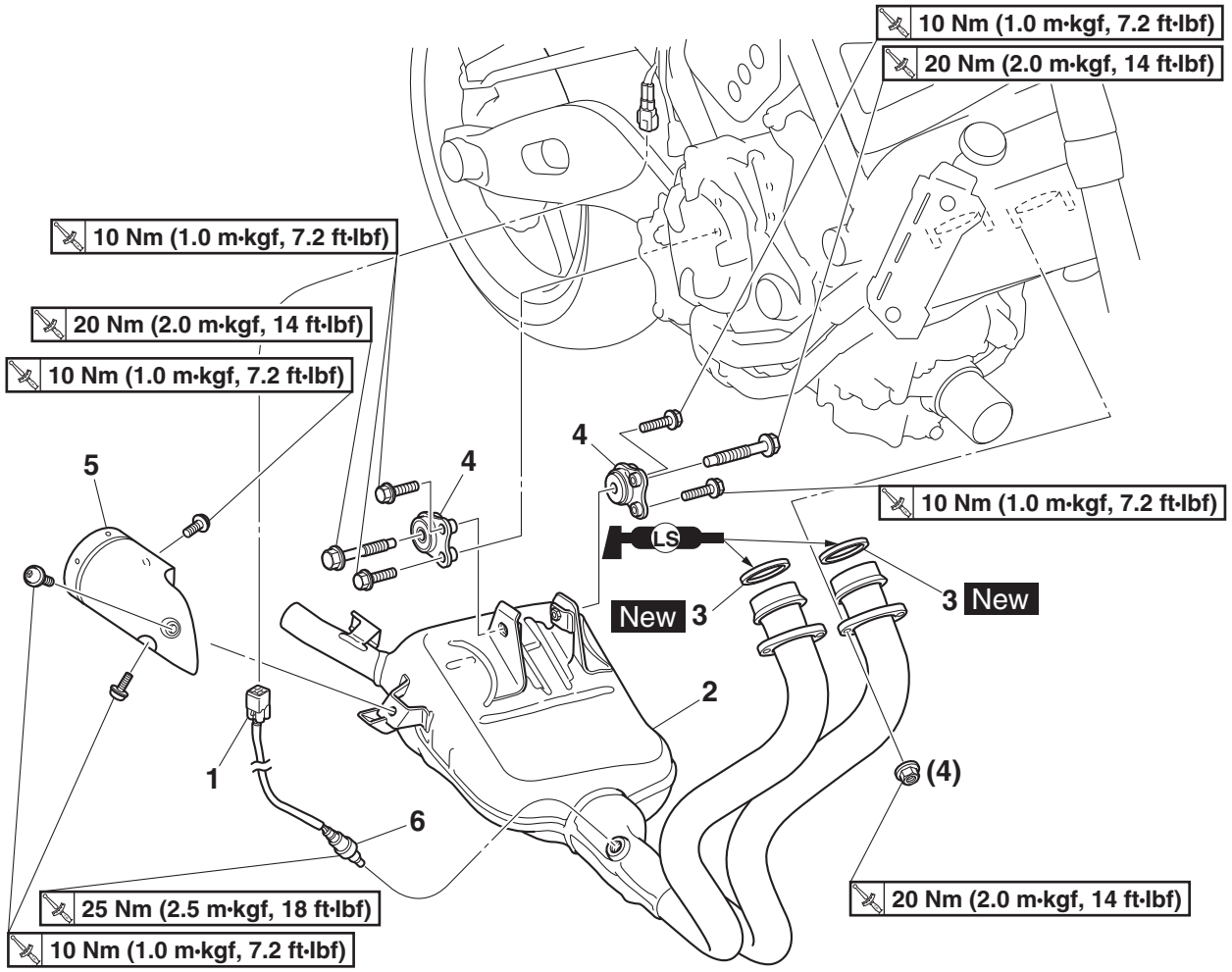
Make sure the cylinder head breather hose is routed correctly.



3. Install:
   • Fuel tank
     Refer to “FUEL TANK” on page 7-1.
   • Fuel tank center cover
   • Fuel tank cover (left)
   • Fuel tank cover (right)
   • Fuel tank top cover
     Refer to “GENERAL CHASSIS (3)” on page 4-5.
   • Seat
     Refer to “GENERAL CHASSIS (1)” on page 4-1.

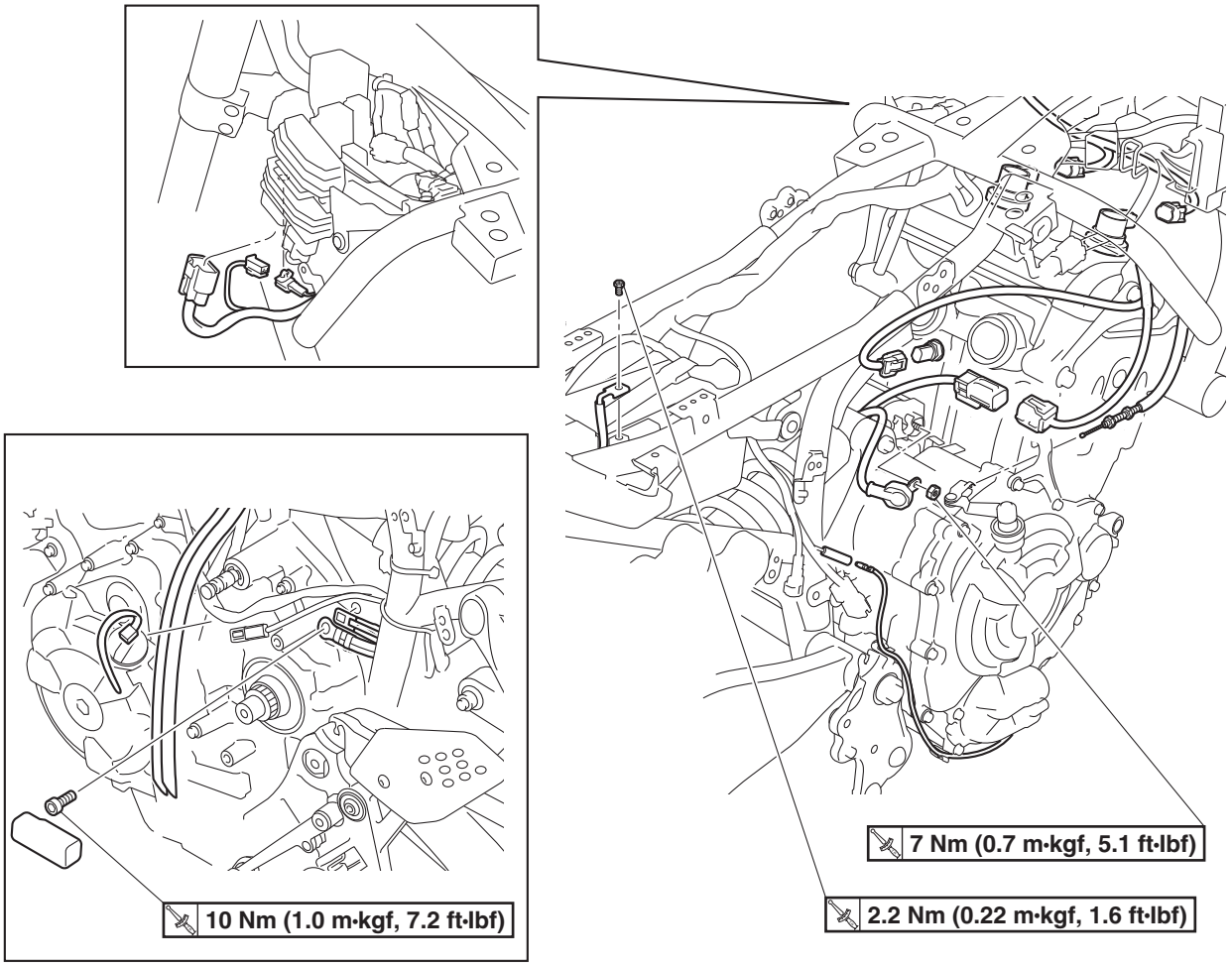
EAS20042
ENGINE REMOVAL

Removing the muffler and exhaust pipe



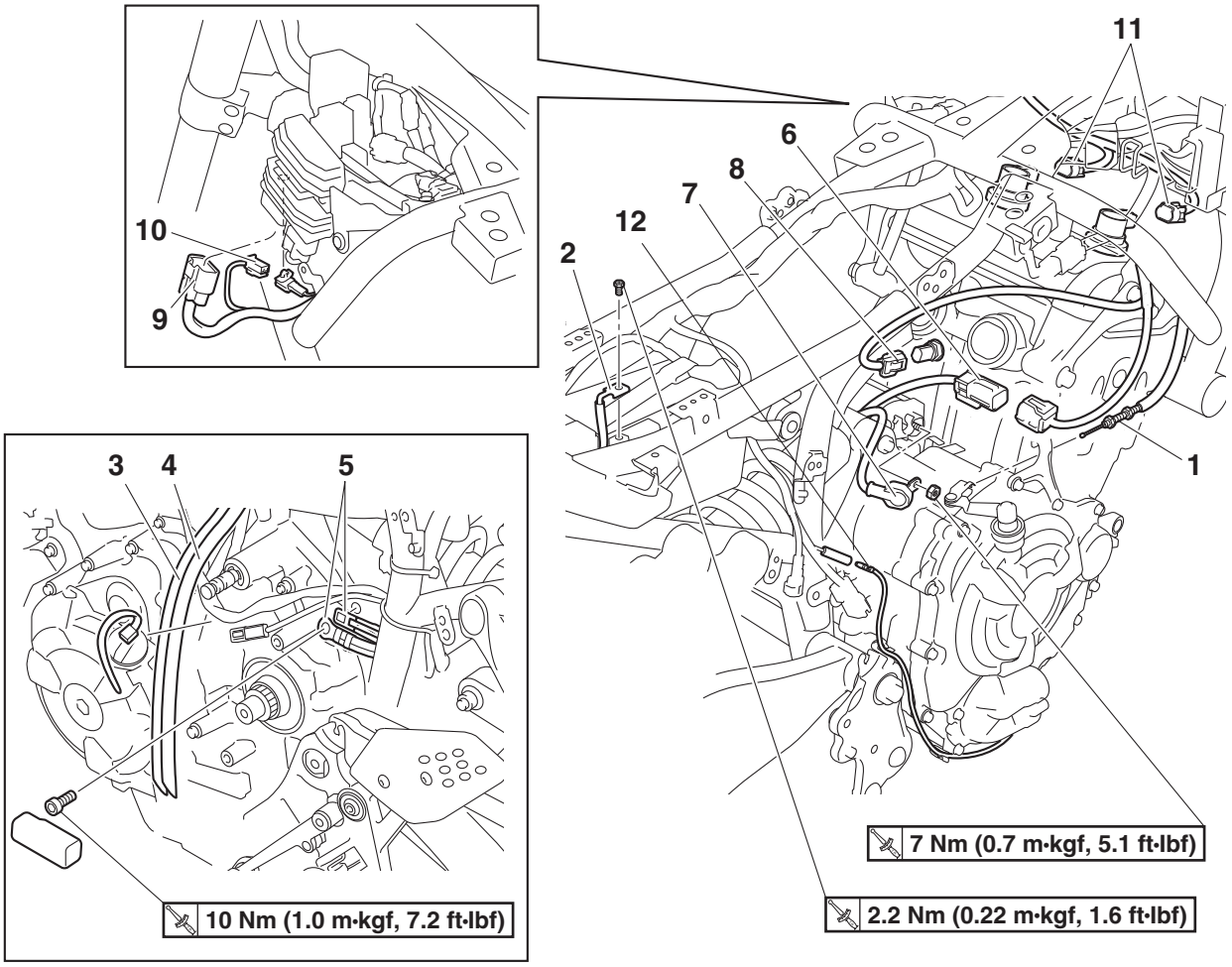
Order	Job/Parts to remove	Q'ty	Remarks
	Pivot shaft protector (right)		Refer to "SWINGARM" on page 4-88.
	Footrest assembly (right)		Refer to "REAR BRAKE" on page 4-43.
1	O_2 sensor coupler	1	Disconnect.
2	Muffler assembly	1	
3	Exhaust gasket	2	
4	Muffler bracket	2	
5	Muffler cover	1	
6	O_2 sensor	1	Remove the O_2 sensor only when necessary.

Disconnecting the leads and hoses



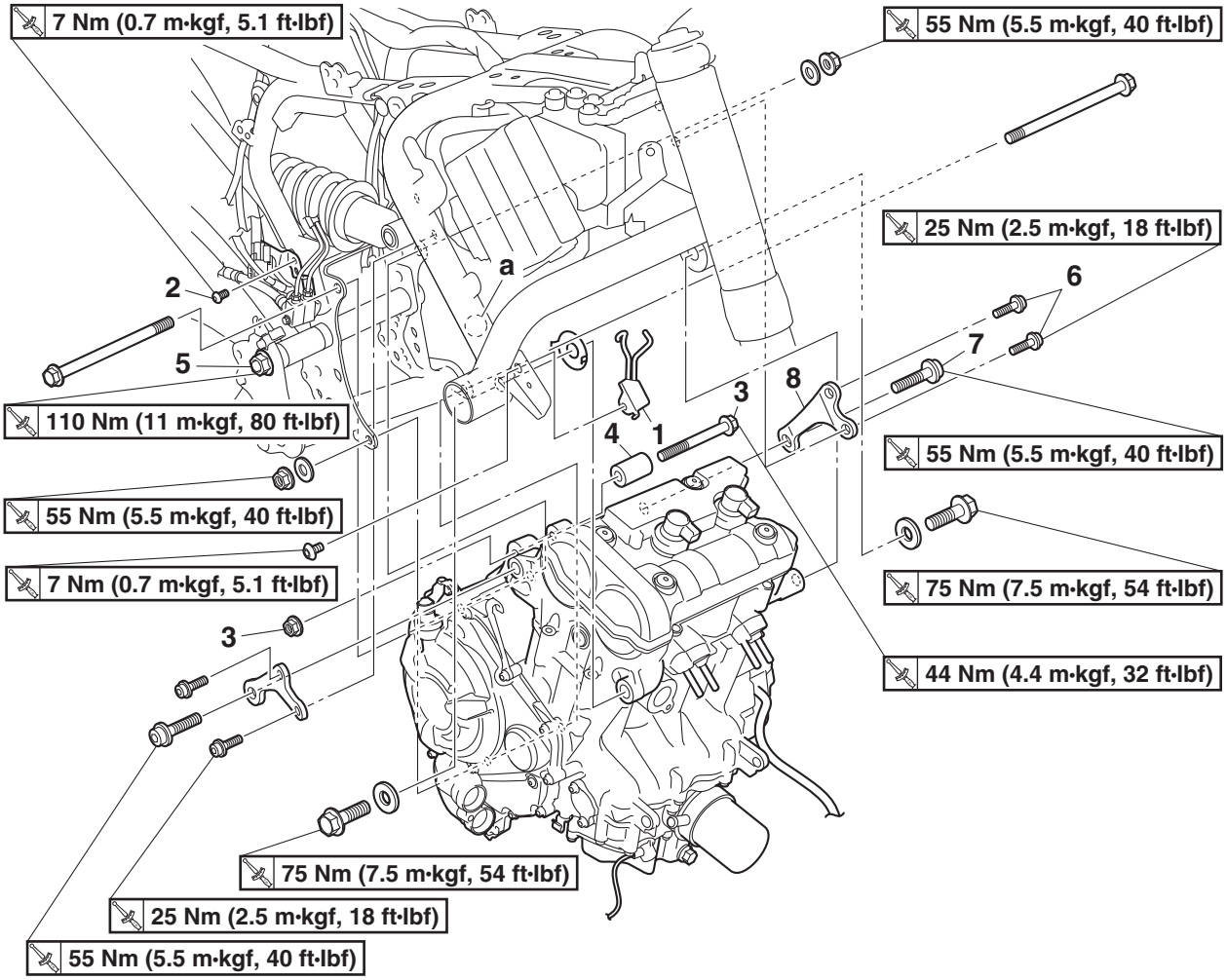
Order	Job/Parts to remove	Q'ty	Remarks
	Battery cover		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Pivot shaft protectors/Sidestand/Footrest assembly (left)		Refer to "SWINGARM" on page 4-88.
	Brake fluid reservoir/Footrest assembly (right)		Refer to "REAR BRAKE" on page 4-43.
	Fuel tank center cover/Air scoops/Outer side cover/Inner side cover		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air duct bracket		Refer to "GENERAL CHASSIS (4)" on page 4-7.
	Throttle bodies/Air filter case/Cylinder head breather hose		Refer to "THROTTLE BODIES" on page 7-7.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Radiator/Coolant reservoir		Refer to "RADIATOR" on page 6-1.
	Oil cooler outlet hose/Oil cooler inlet hose		Refer to "OIL COOLER" on page 6-5.
	Water pump inlet pipe/Water pump outlet pipe		Refer to "WATER PUMP" on page 6-9.
	Drive chain/Drive sprocket		Refer to "CHAIN DRIVE" on page 4-93.

Disconnecting the leads and hoses



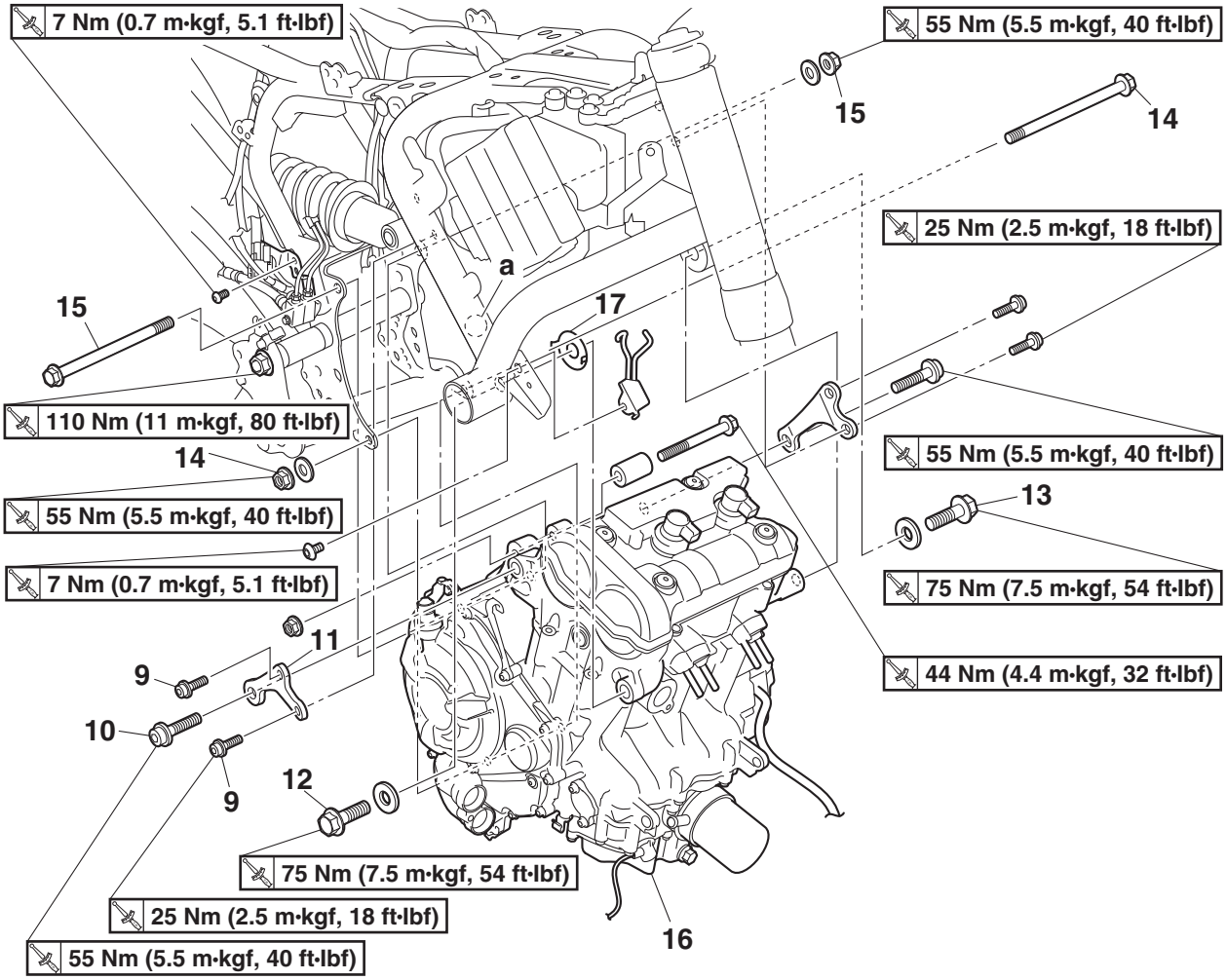
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-21.
1	Clutch cable	1	Disconnect.
2	Negative battery lead	1	Disconnect.
3	Fuel tank overflow hose	1	
4	Fuel tank breather hose	1	
5	Engine ground lead	2	Disconnect.
6	Gear position switch coupler	1	Disconnect.
7	Starter motor lead	1	Disconnect.
8	Coolant temperature sensor coupler	1	Disconnect.
9	Stator coil coupler	1	Disconnect.
10	Crankshaft position sensor coupler	1	Disconnect.
11	Ignition coil coupler	2	Disconnect.
12	Oil pressure switch connector	1	Disconnect.

Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Clutch cable guide	1	
2	Rear brake hose joint bracket bolt	1	
3	Rear shock absorber assembly bolt/nut (front side)	1/1	
4	Spacer	1	
5	Pivot shaft nut	1	Loosen.
6	Engine bracket bolt (left)	2	
7	Engine mounting bolt (left upper side)	1	
8	Engine bracket (left)	1	

Removing the engine

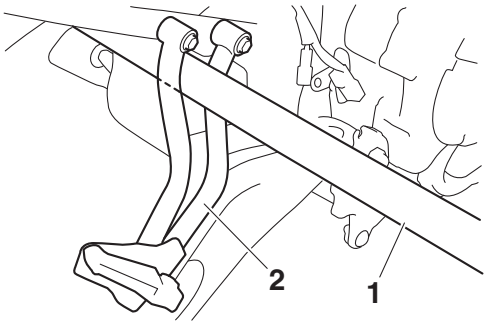


Order	Job/Parts to remove	Q'ty	Remarks
9	Engine bracket bolt (right)	2	
10	Engine mounting bolt (right upper side)	1	
11	Engine bracket (right)	1	
12	Engine mounting bolt (right front side)	1	
13	Engine mounting bolt (left front side)	1	
14	Engine mounting bolt/nut (rear lower side)	1/1	
15	Engine mounting bolt/nut (rear upper side)	1/1	
16	Engine	1	
17	Plate	1	Install the plate only for frames that have a stamped "1" mark at the location "a".

EAS30250
REMOVING THE ENGINE

TIP

Pass a suitable rod "1" through the holes in the brackets of the passenger footrests "2" and secure the rod to support the vehicle.



1. Remove:
   • Engine mounting bolt (rear lower side) "1"

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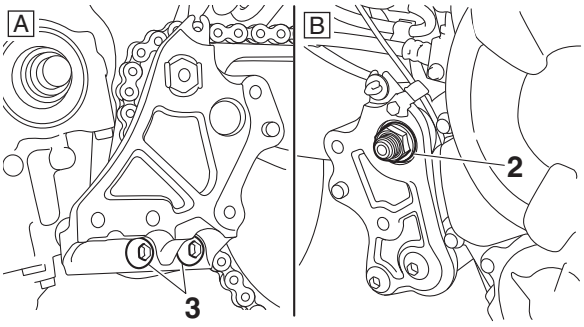
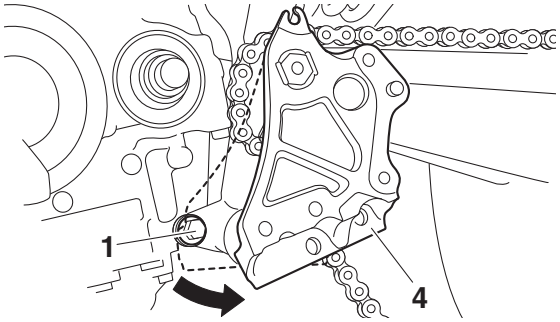
a. Loosen the pivot shaft nut "2", and then remove the footrest bracket bolts "3".



A. Left side
B. Right side

b. Move the footrest bracket "4" rearward, and then loosen the engine mounting bolt (rear lower side).



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2. Remove:
   • Engine mounting bolt (rear upper side) "1"

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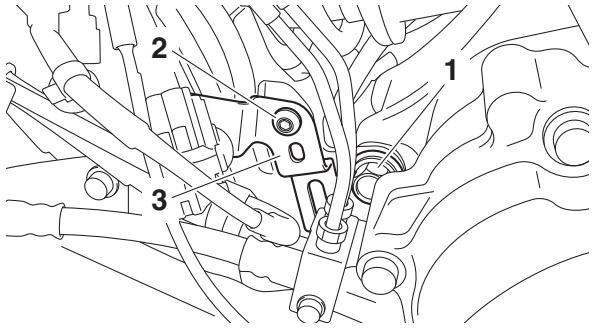
a. Remove the rear brake hose joint bracket bolt "2".

b. Move the rear brake hose joint bracket "3" slightly rearward, and then remove the engine mounting bolt (rear upper side).

ECA21181

NOTICE

Do not move the rear brake hose joint bracket more than necessary. Otherwise, the brake hoses could bend and break.



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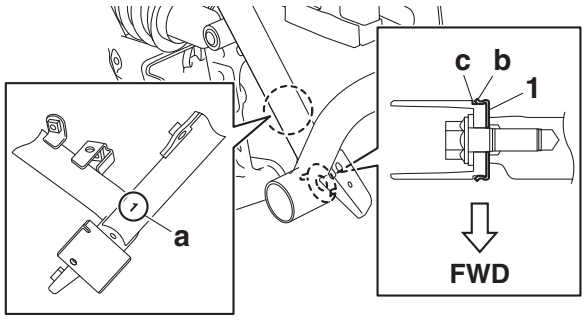
EAS30251
INSTALLING THE ENGINE

1. Install: (for models with a stamped "1" mark on the frame)
   • Plate "1"

TIP

• Install the plate only for frames that have a stamped "1" mark at the location "a".
• Fit the projections "b" on the plate into the slots "c" in the frame.



2. Install:
   • Engine "2"
3. Install:
   • Engine mounting bolt (rear upper side) "3"
   • Engine mounting nut (rear upper side) "4"
   • Engine mounting bolt (rear lower side) "5"
   • Engine mounting nut (rear lower side) "6"
   • Engine mounting bolt (left front side) "7"
   • Engine mounting bolt (right front side) "8"
   • Engine mounting bolt (right upper side) "9"
   • Engine bracket bolts (right) "10"
   • Engine bracket (right) "11"

TIP

Temporarily tighten the bolts and nuts.

4. Tighten:
   - Engine mounting nut (rear upper side) “4”
   - Engine mounting nut (rear lower side) “6”
   - Engine mounting bolt (left front side) “7”

Engine mounting nut (rear upper side)
55 Nm (5.5 m·kgf, 40 ft·lbf)
Engine mounting nut (rear lower side)
55 Nm (5.5 m·kgf, 40 ft·lbf)
Engine mounting bolt (left front side)
75 Nm (7.5 m·kgf, 54 ft·lbf)

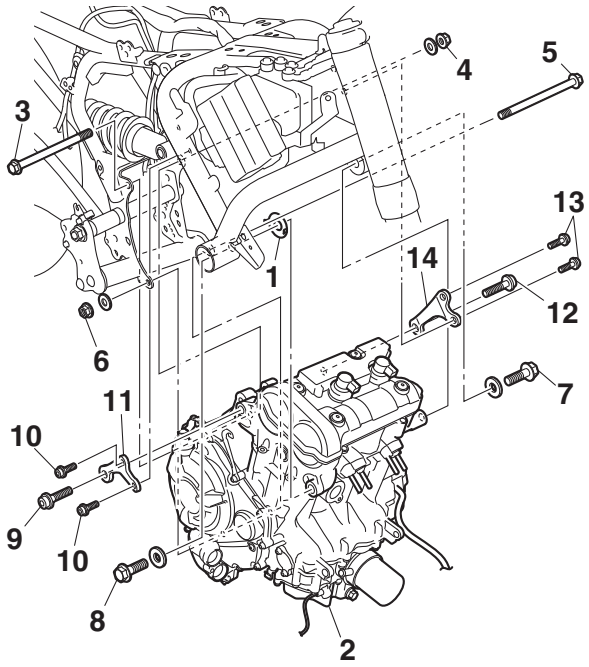
5. Install:
   - Engine mounting bolt (left upper side) “12”
   - Engine bracket bolts (left) “13”
   - Engine bracket (left) “14”

TIP

Temporarily tighten the bolts.

6. Tighten:
   - Engine mounting bolt (left upper side) “12”
   - Engine mounting bolt (right front side) “8”
   - Engine mounting bolt (right upper side) “9”
   - Engine bracket bolts (right) “10”
   - Engine bracket bolts (left) “13”

Engine mounting bolt (left upper side)
55 Nm (5.5 m·kgf, 40 ft·lbf)
Engine mounting bolt (right front side)
75 Nm (7.5 m·kgf, 54 ft·lbf)
Engine mounting bolt (right upper side)
55 Nm (5.5 m·kgf, 40 ft·lbf)
Engine bracket bolt (right)
25 Nm (2.5 m·kgf, 18 ft·lbf)
Engine bracket bolt (left)
25 Nm (2.5 m·kgf, 18 ft·lbf)

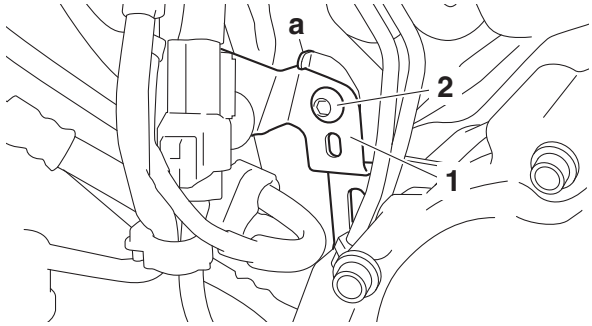


7. Install:
   - Rear brake hose joint bracket “1”
   - Rear brake hose joint bracket bolt “2”

Rear brake hose joint bracket bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

Make sure that the rear brake hose joint bracket contacts the projection “a” on the frame.

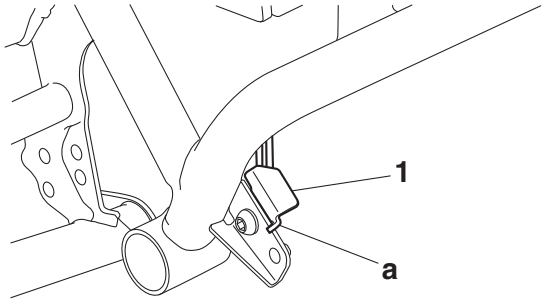


8. Install:
   - Clutch cable guide “1”

Clutch cable guide bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

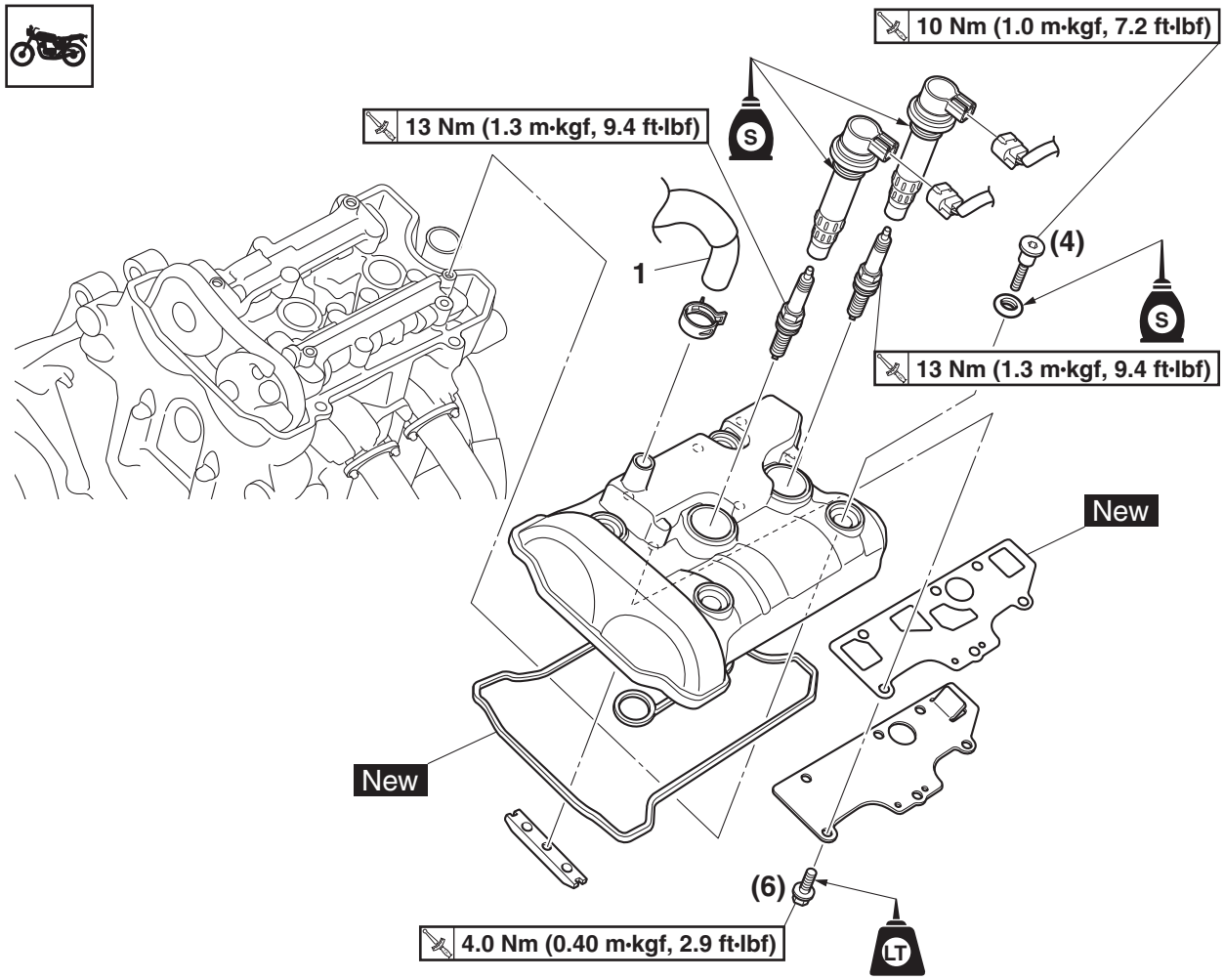
TIP

Make sure that the projection “a” on the clutch cable guide contacts the frame.


1
a

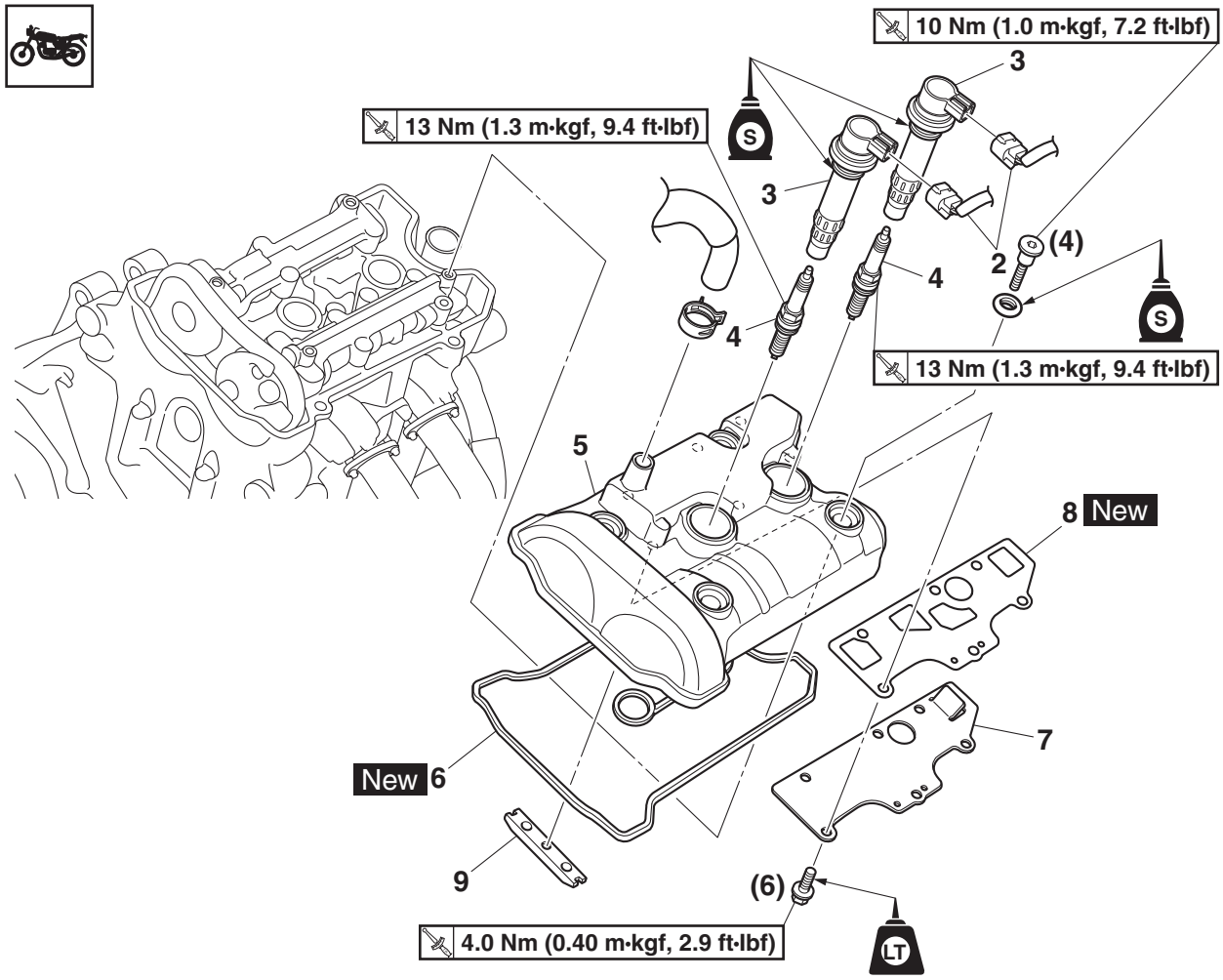
EAS20043
CAMSHAFTS

Removing the cylinder head cover



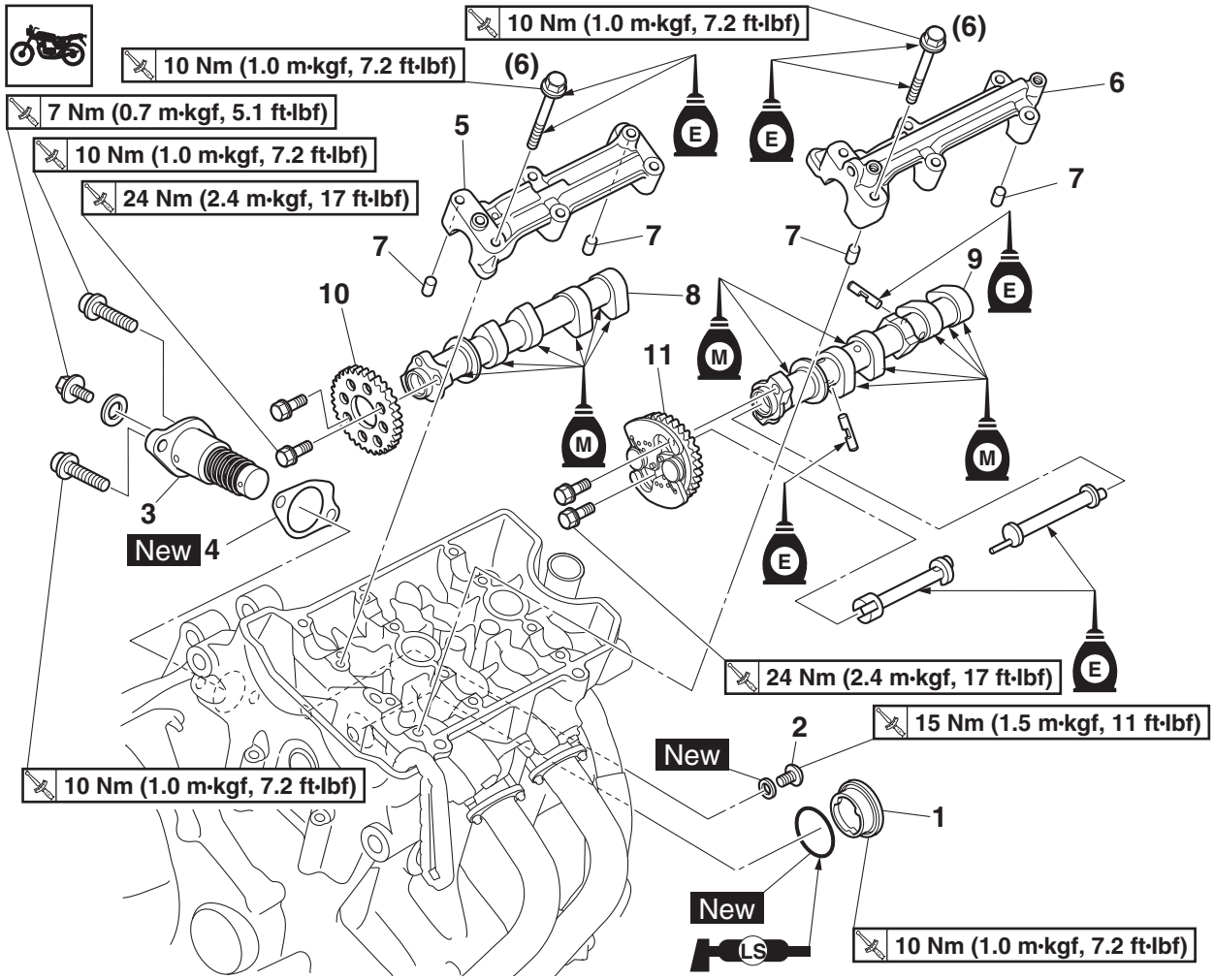
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Air scoops		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Radiator inlet hose/Radiator		Refer to "RADIATOR" on page 6-1.
	Clutch cable guide		Refer to "ENGINE REMOVAL" on page 5-3.
1	Cylinder head breather hose	1	Disconnect.

Removing the cylinder head cover



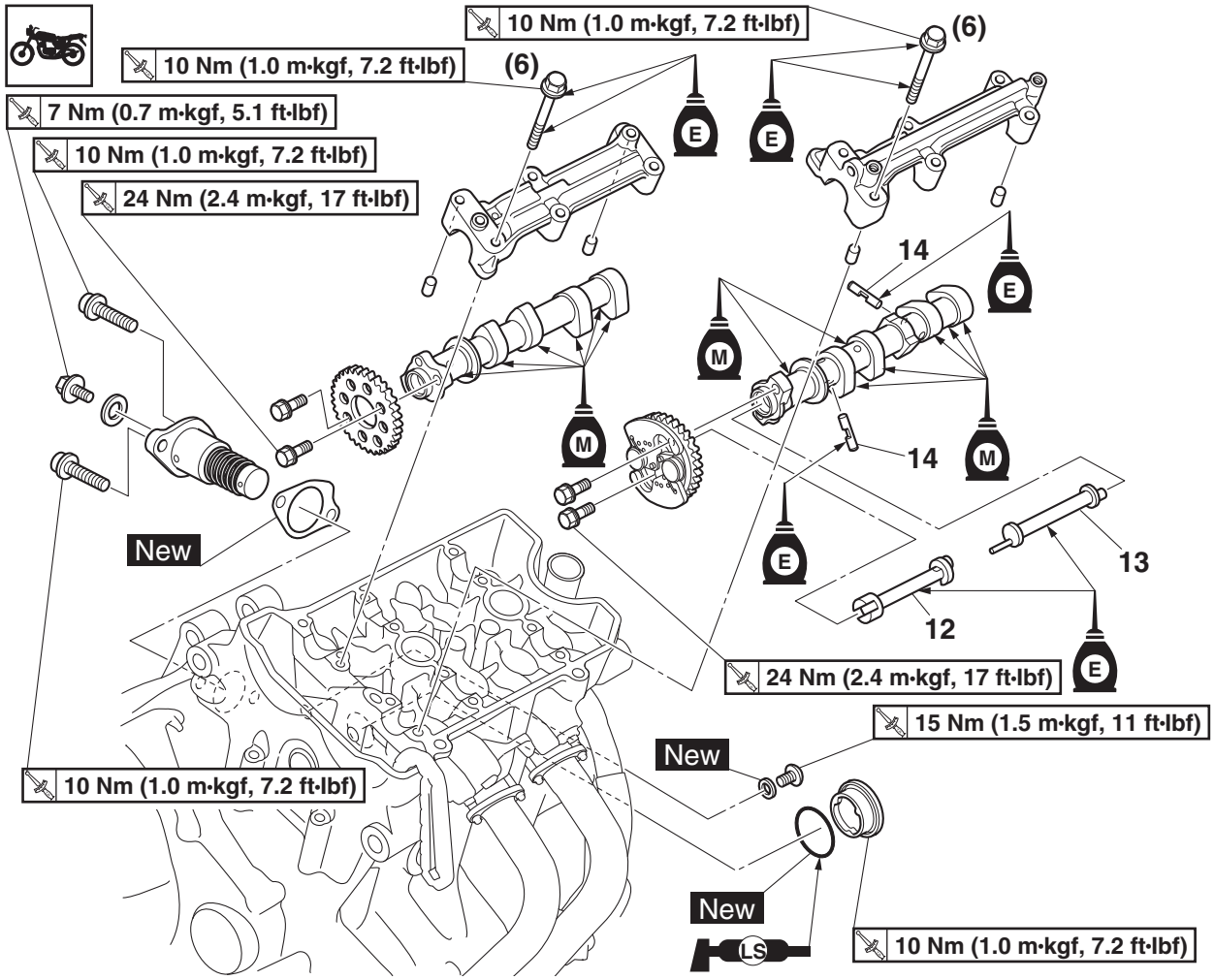
Order	Job/Parts to remove	Q'ty	Remarks
2	Ignition coil coupler	2	Disconnect.
3	Ignition coil	2	
4	Spark plug	2	
5	Cylinder head cover	1	
6	Cylinder head cover gasket	1	
7	Breather plate	1	
8	Breather plate gasket	1	
9	Timing chain guide (upper side)	1	

Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
1	Crankshaft end cover	1	
2	Timing mark accessing bolt	1	
3	Timing chain tensioner	1	
4	Timing chain tensioner gasket	1	
5	Intake camshaft cap	1	
6	Exhaust camshaft cap	1	
7	Dowel pin	4	
8	Intake camshaft	1	
9	Exhaust camshaft	1	
10	Intake camshaft sprocket	1	
11	Exhaust camshaft sprocket	1	

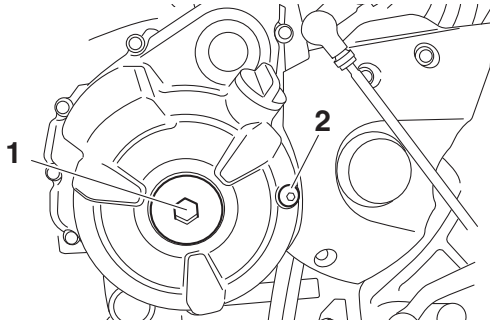
Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
12	Decompressor lever #2	1	
13	Decompressor lever #1	1	
14	Decompressor lever pin	2	

EAS30256
REMOVING THE CAMSHAFTS

1. Remove:
   • Crankshaft end cover “1”
   • Timing mark accessing bolt “2”



2. Align:
   • Mark “a” on the generator rotor (with the slot “b” in the generator rotor cover)

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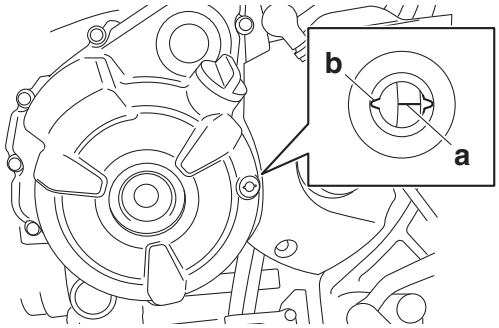
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC on the exhaust stroke, align the TDC mark “a” on the generator rotor with the slot “b” in the generator rotor cover.



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3. Remove:
   • Timing chain tensioner “1”
   • Timing chain tensioner gasket

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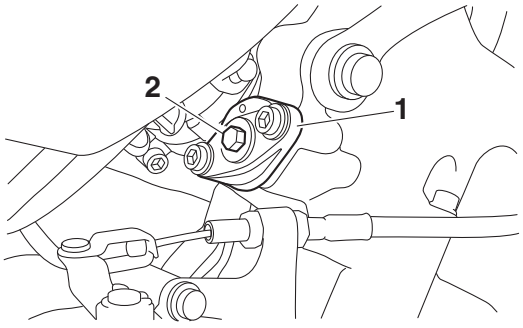
a. Insert the hexagon wrench “2” (part No.: 1WS-12228-00) into the timing chain tensioner.
b. Remove the timing chain tensioner.



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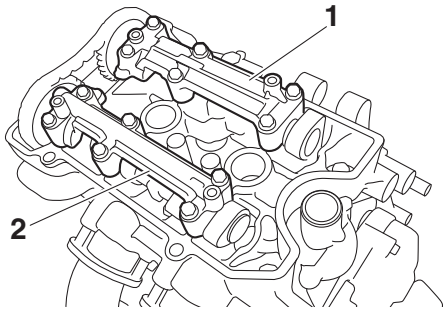
4. Remove:
   • Intake camshaft cap “1”
   • Exhaust camshaft cap “2”

ECA13720
NOTICE

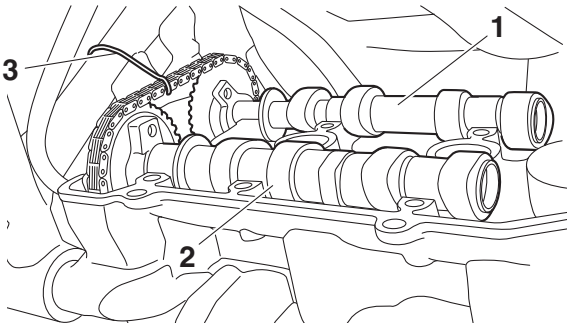
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.



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”.

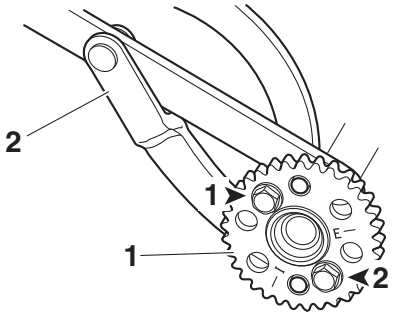


6. Remove:
   • Intake camshaft sprocket “1”

TIP

While holding the intake camshaft sprocket with the rotor holding tool “2”, loosen the intake camshaft sprocket bolts.

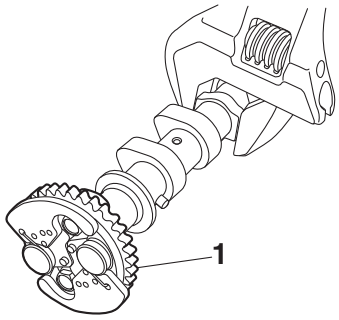
Rotor holding tool
90890-01235
Universal magneto and rotor holder
YU-01235



7. Remove:
   • Exhaust camshaft sprocket “1”

TIP

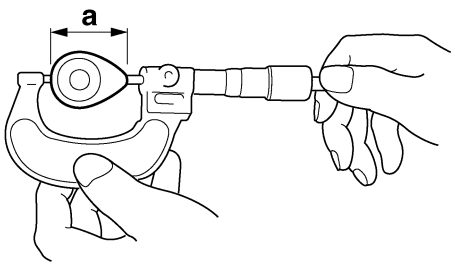
While holding the exhaust camshaft with a suitable tool, loosen the exhaust camshaft sprocket bolts.

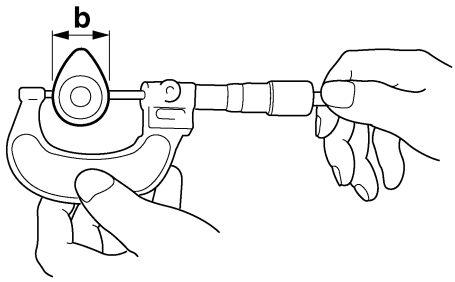


EAS30257
CHECKING THE CAMSHAFTS

1. Check:
   • Camshaft lobes
   Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   • Camshaft lobe dimensions “a” and “b”
   Out of specification → Replace the camshaft.

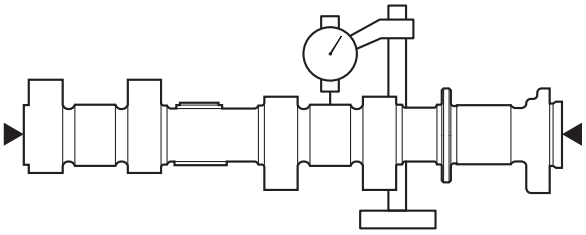
Camshaft lobe dimensions
Lobe height (Intake)
35.610–35.710 mm (1.4020–1.4059 in)
Limit
35.510 mm (1.3980 in)
Base circle diameter (Intake)
27.950–28.050 mm (1.1004–1.1043 in)
Limit
27.850 mm (1.0965 in)
Lobe height (Exhaust)
35.710–35.810 mm (1.4059–1.4098 in)
Limit
35.610 mm (1.4020 in)
Base circle diameter (Exhaust)
27.950–28.050 mm (1.1004–1.1043 in)
Limit
27.850 mm (1.0965 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)

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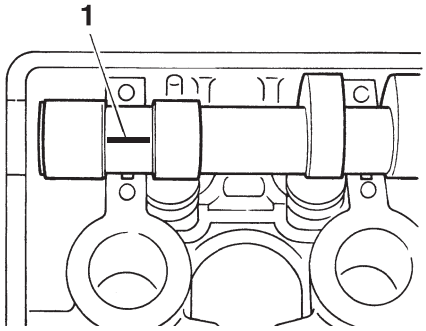
a. Install the camshafts into the cylinder head (without the camshaft caps).
b. Position a strip of Plastigauge® "1" onto the camshaft journal as shown.



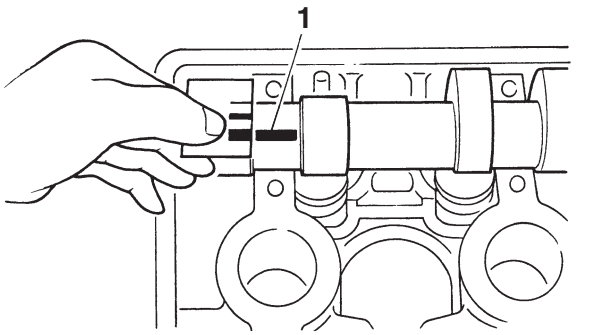
c. Install the dowel pins and camshaft caps.

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®.

Exhaust camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
Intake camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

d. Remove the camshaft caps, and then measure the width of the Plastigauge® "1".



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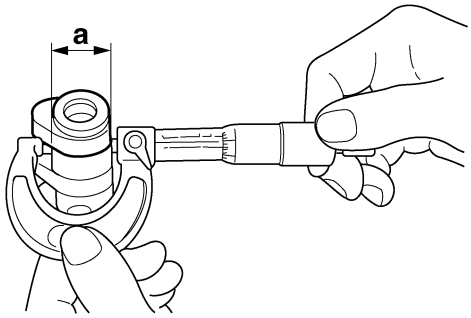
5. Measure:
   • Camshaft journal diameter "a"
   Out of specification → Replace the camshaft.
   Within specification → Replace the cylinder head and camshaft caps as a set.

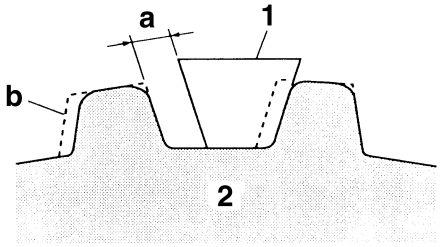
Camshaft journal diameter
21.959–21.972 mm (0.8645–0.8650 in)



EAS30936

CHECKING THE CAMSHAFT SPROCKETS

1. Check:
   • Camshaft sprocket
   More than 1/4 tooth wear "a" → Replace the camshaft sprockets and timing chain as a set.



a. 1/4 tooth
b. Correct
1. Timing chain
2. Camshaft sprocket

EAS30266
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   • Timing chain tensioner
   Cracks/damage/rough movement → Replace.

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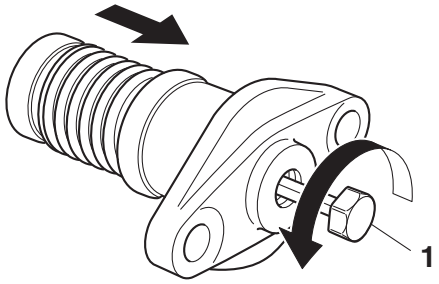
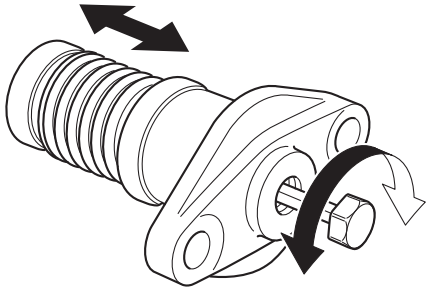
a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

TIP

While pressing the timing chain tensioner rod, wind it counterclockwise with a hexagon wrench "1" (Parts No.: 1WS-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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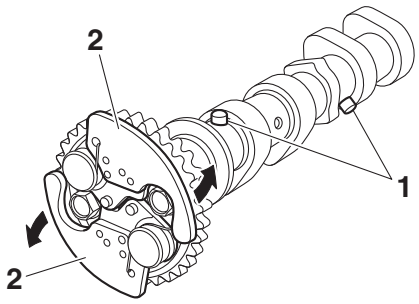
EAS30267
CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • Decompression system

TIP

- Check that the decompressor lever pins "1" projects from the camshaft.
- Check that the decompressor cams "2" and decompressor lever pins "1" moves smoothly.



EAS30269
INSTALLING THE CAMSHAFTS

1. Align:
   • Mark "a" on the generator rotor
   (with the slot "b" in the generator rotor cover)

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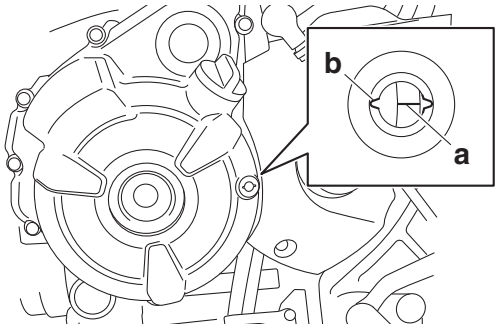
a. Turn the crankshaft counterclockwise.
b. When piston #1 is at TDC, align the TDC mark "a" on the generator rotor with the slot "b" in the generator rotor cover.



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2. Install:
   • Intake camshaft sprocket "1"

	**Intake camshaft sprocket bolt 24 Nm (2.4 m·kgf, 17 ft·lbf)**

ECA19980

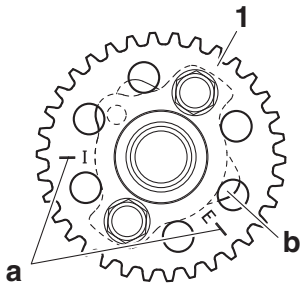
NOTICE

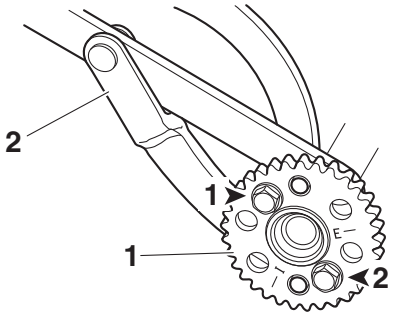
Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

TIP

- Make sure that the marks "a" on the intake camshaft sprocket are aligned with cam lobe #1 "b" as shown in the illustration.
- While holding the intake camshaft sprocket with the rotor holding tool "2", tighten the intake camshaft sprocket bolts in the proper tightening sequence as shown.

Rotor holding tool
90890-01235
Universal magneto and rotor holder
YU-01235

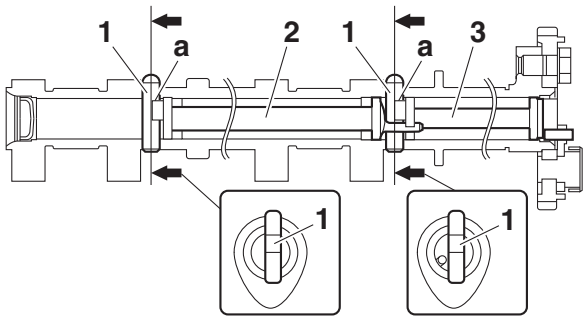




3. Install:
   - Decompressor lever pins “1”
   - Decompressor lever #1 “2”
   - Decompressor lever #2 “3”

TIP

- Face the cutout “a” in each decompressor lever pin toward the exhaust camshaft sprocket.
- Install the decompressor lever pins, decompressor lever #1, and decompressor lever #2 into the exhaust camshaft as shown in the illustration.



4. Install:
   - Exhaust camshaft sprocket “1”

Exhaust camshaft sprocket bolt
24 Nm (2.4 m·kgf, 17 ft·lbf)

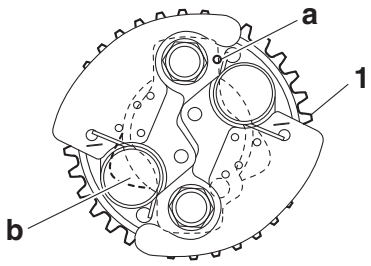
ECA19980

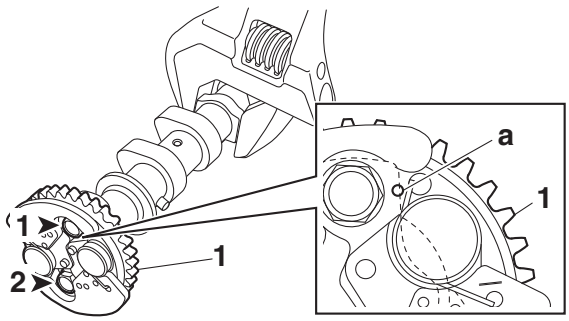
NOTICE

Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

TIP

- Make sure that the mark “a” on the exhaust camshaft sprocket is aligned with cam lobe #1 “b” as shown in the illustration.
- While holding the exhaust camshaft with a suitable tool, tighten the exhaust camshaft sprocket bolts.
- Tighten the camshaft sprocket bolts in the tightening sequence as shown.





5. Install:
   - Timing chain “1”
     (onto the exhaust camshaft sprocket “2”)
   - Exhaust camshaft
   - Exhaust camshaft cap

ECA20930

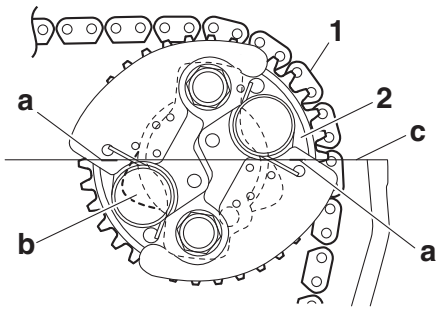
NOTICE

- **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.**

TIP

- When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
- Make sure that the match marks “a” on the exhaust camshaft sprocket and cam lobe #1 “b” are aligned with the cylinder head edge “c” as shown in the illustration.
- Temporarily tighten the exhaust camshaft cap bolts, and then tighten the bolts to specification in a crisscross pattern.

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



6. Install:
   - Timing chain “1” (onto the intake camshaft sprocket “2”)
   - Intake camshaft
   - Intake camshaft cap

ECA20930

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.**

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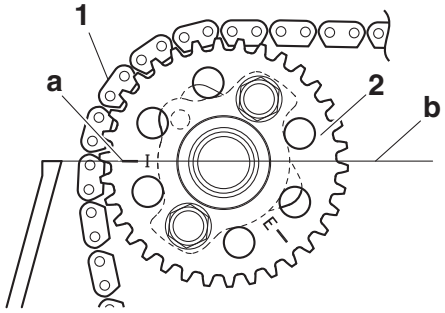
a. Install the timing chain onto intake camshaft sprocket, and then install the intake camshaft onto the cylinder head.

TIP

Make sure the match mark “a” on the intake camshaft sprocket is aligned with the cylinder head edge “b”.



b. Tighten the intake camshaft cap bolts.

TIP

Temporarily tighten the intake camshaft cap bolts, and then tighten the bolts to specification in a crisscross pattern.

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

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7. Install:
   - Timing chain tensioner
   - Timing chain tensioner gasket New

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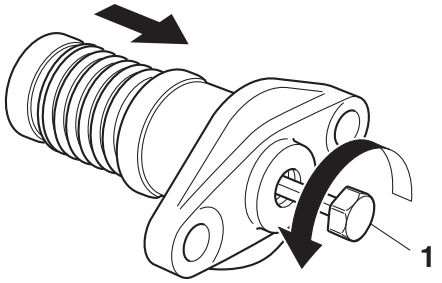
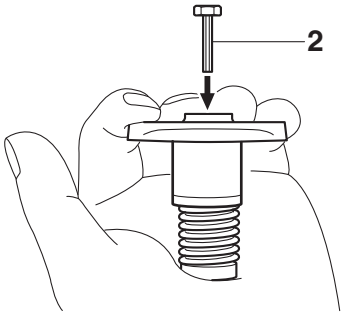
a. While lightly pressing the timing chain tensioner rod by hand, turn the timing chain tensioner rod fully counterclockwise with a hexagon wrench “1”.



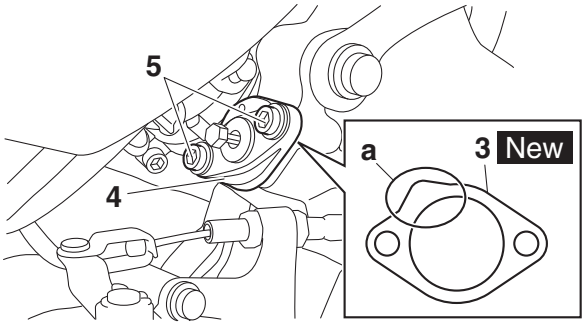
b. Keep pressing the timing chain tensioner rod by hand, remove the hexagon wrench, and then insert the hexagon wrench “2” (Parts No.: 1WS-12228-00) into the timing chain tensioner rod.



c. Install a new timing chain tensioner gasket "3", the timing chain tensioner "4", and the timing chain tensioner bolts "5" on the cylinder block.

TIP

Be sure to install the timing chain tensioner gasket so that the portion "a" of the gasket is protruding from the upper inner side of the timing chain tensioner.



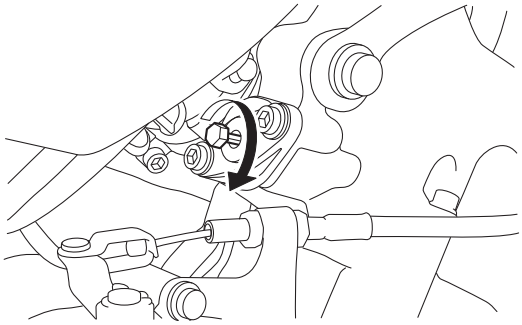
d. Tighten the timing chain tensioner bolts to specification.

	Timing chain tensioner bolt **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

e. 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.



f. Remove the hexagon wrench.
g. Install the timing chain tensioner cap bolt and gasket, and then tighten the timing chain tensioner cap bolt to specification.

	Timing chain tensioner cap bolt **7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

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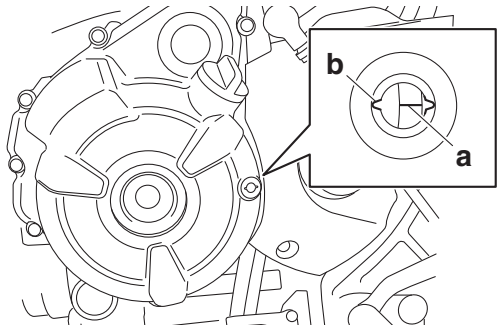
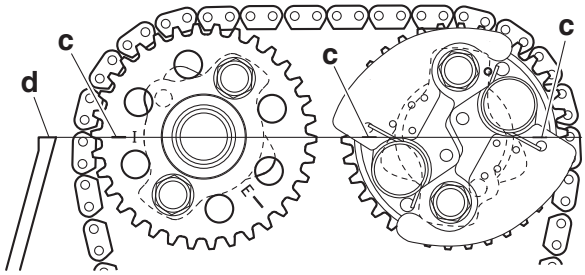
8. Turn:
   • Crankshaft
   (several turns counterclockwise)
9. Check:
   • Mark "a"
   Make sure the mark "a" on the generator rotor is aligned with the slot "b" in the generator rotor cover.
   • Camshaft sprocket match mark
   Make sure the match marks "c" on the camshaft sprockets are aligned with the cylinder head mating surface "d".
   Out of alignment → Adjust.
   Refer to the installation steps above.



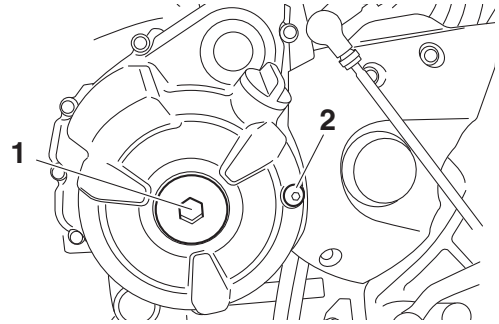


10. Measure:
    • Valve clearance
    Out of specification → Adjust.
    Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-5.
11. Install:
    • Timing mark accessing bolt "1"

	Timing mark accessing bolt **15 Nm (1.5 m·kgf, 11 ft·lbf)**

• Crankshaft end cover "2"

	Crankshaft end cover **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**



EAS30274
INSTALLING THE CYLINDER HEAD COVER

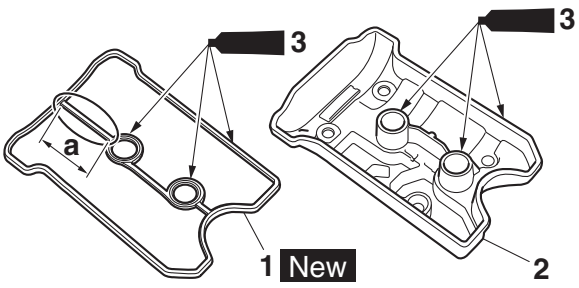
1. Install:
   - Timing chain guide (top side)
   - Cylinder head cover gasket "1" New (to the cylinder head cover)
   - Cylinder head cover "2"

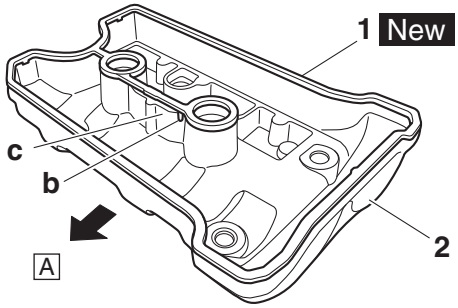
	Cylinder head cover bolt **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

TIP

- Apply Yamaha bond No.1215 "3" onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- After installing the cylinder head cover gasket "1" to the cylinder head cover, cut off the "a" section.
- Make sure that the projection "b" on the cylinder head cover gasket is positioned on the exhaust side of the rib "c" on the cylinder head cover.

	Yamaha bond No. 1215 **90890-85505** **(Three bond No.1215®)**





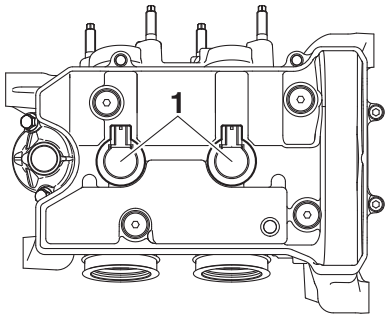
A. Exhaust side

2. Install:
   - Spark plugs
   - Ignition coils "1"

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

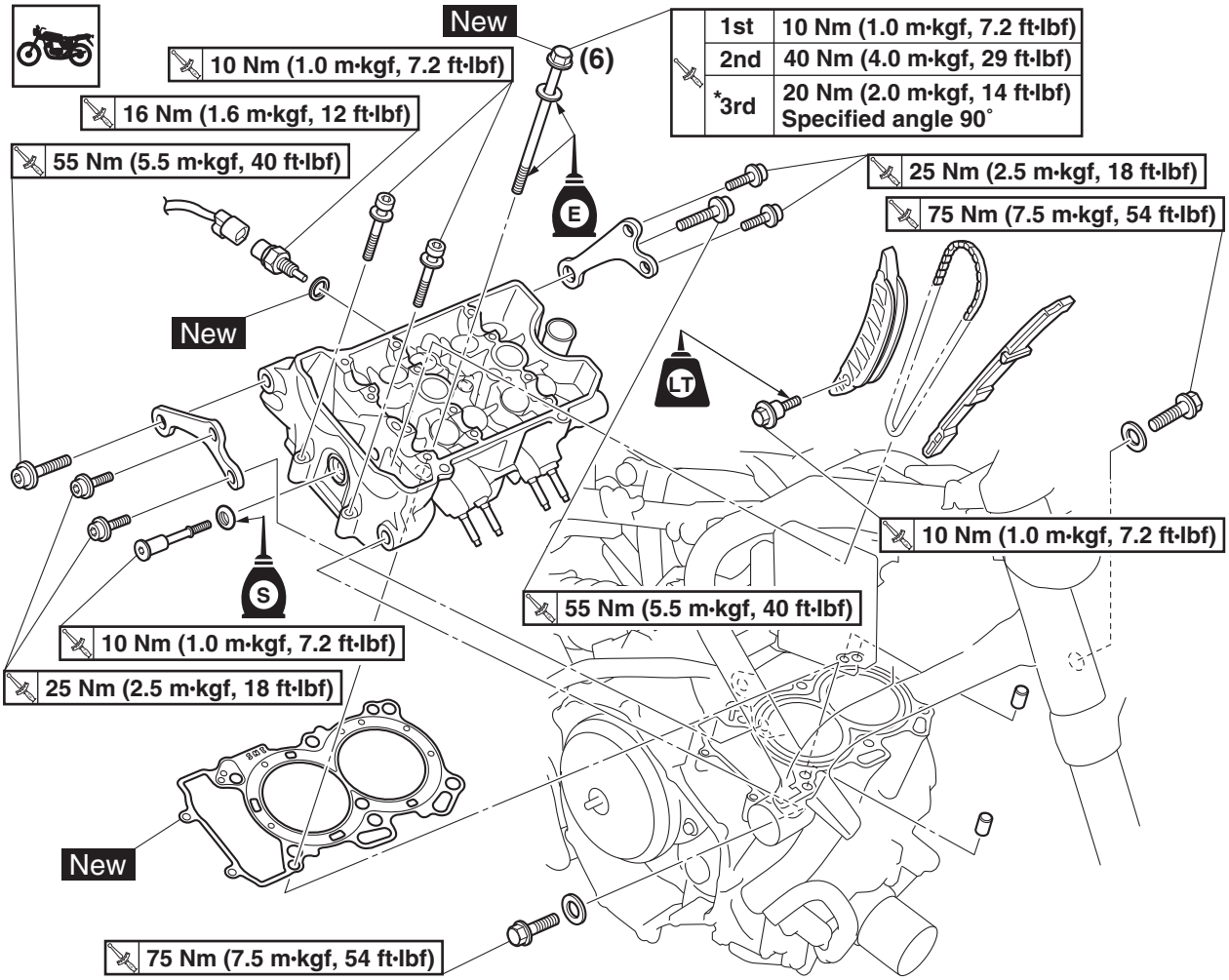
TIP

Install the ignition coils "1" in the direction shown in the illustration.



EAS20044
CYLINDER HEAD

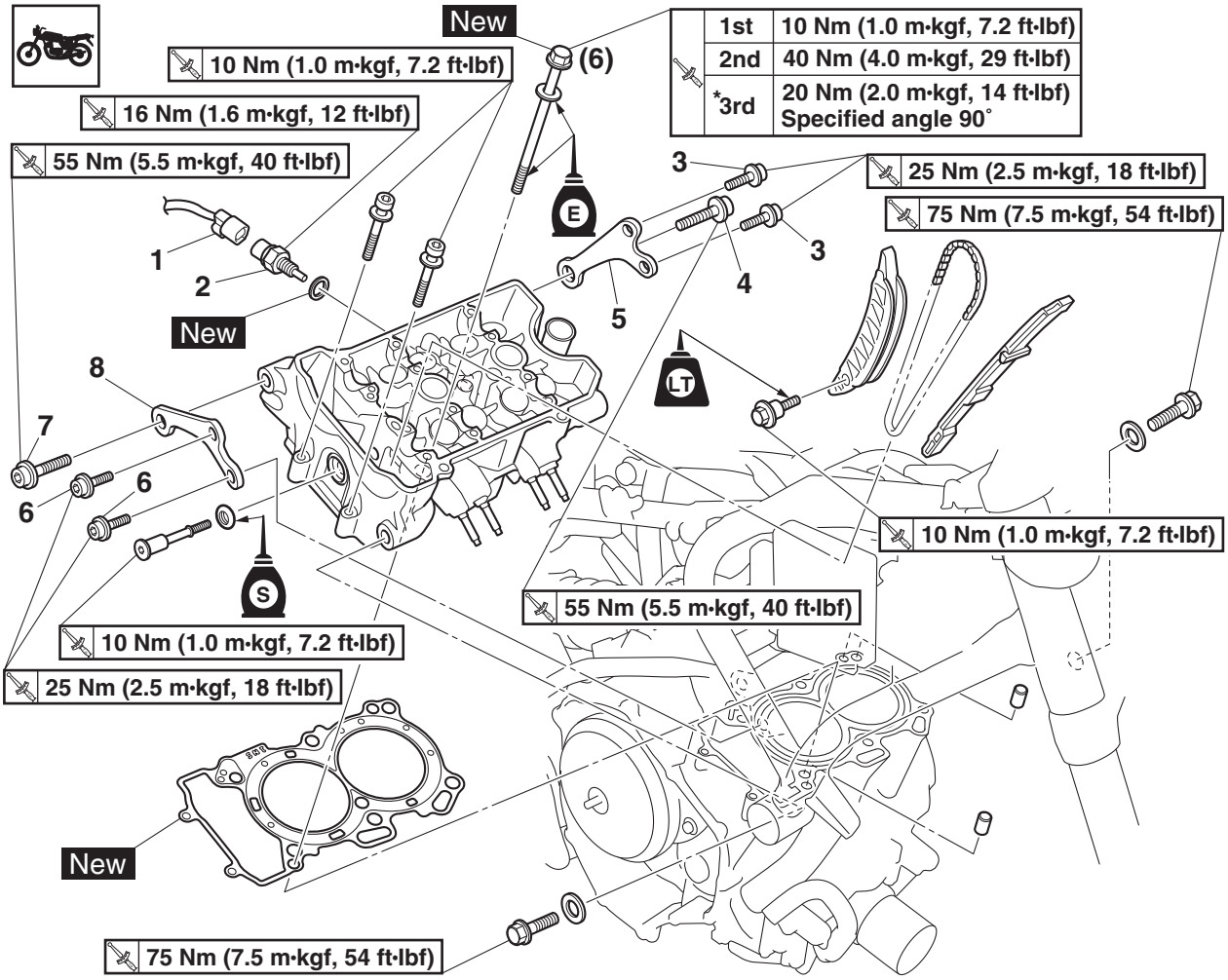
Removing the cylinder head



*** Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.**

Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Air scoops		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air duct bracket		Refer to "GENERAL CHASSIS (4)" on page 4-7.
	Throttle bodies		Refer to "THROTTLE BODIES" on page 7-7.
	Footrest assembly (right)		Refer to "REAR BRAKE" on page 4-43.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Oil cooler inlet hose		Disconnect. Refer to "OIL COOLER" on page 6-5.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Cylinder head cover/Intake camshaft/Exhaust camshaft		Refer to "CAMSHAFTS" on page 5-11.
	Clutch cover		Refer to "CLUTCH" on page 5-46.
	Thermostat		Refer to "THERMOSTAT" on page 6-7.

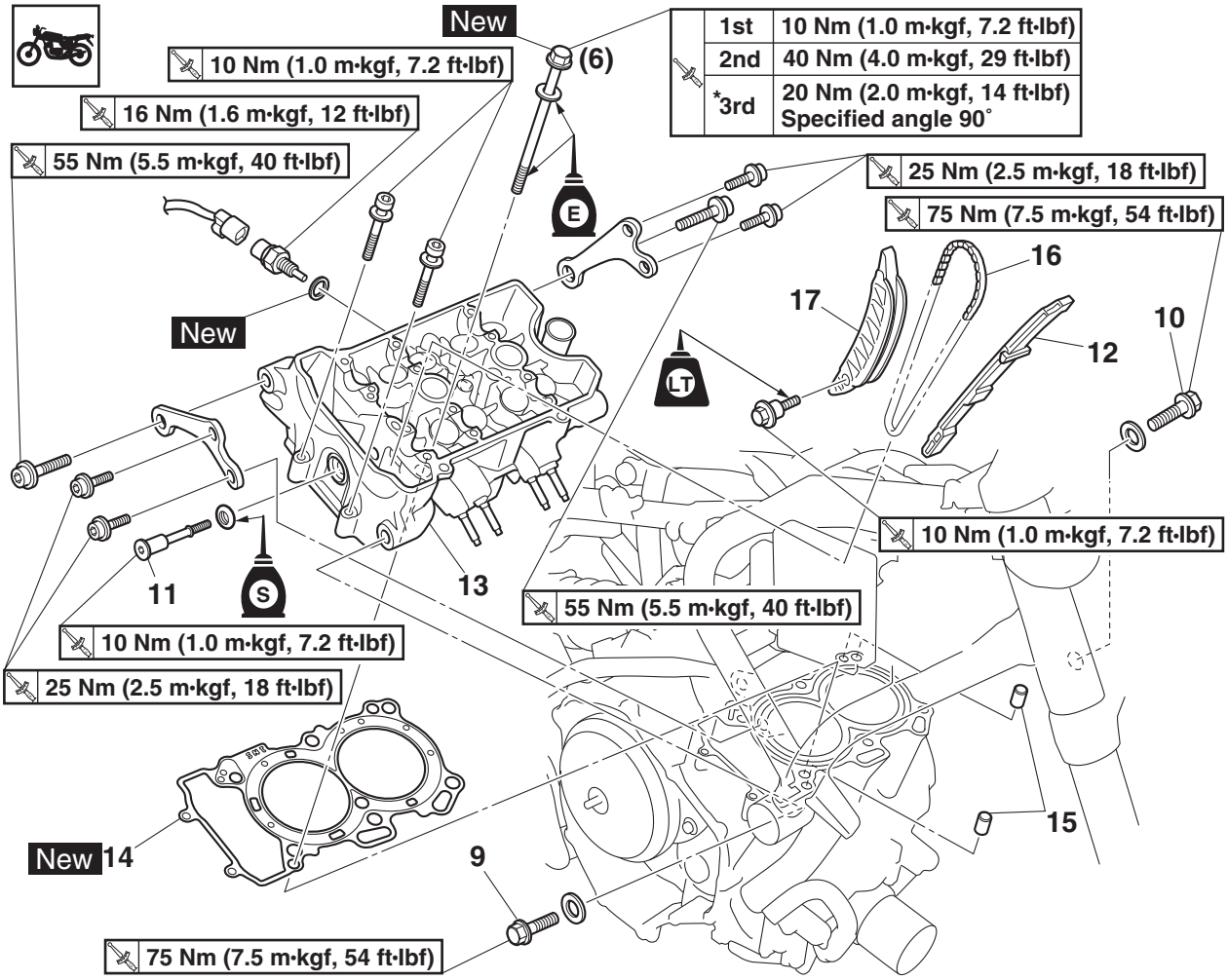
Removing the cylinder head



*** Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.**

Order	Job/Parts to remove	Q'ty	Remarks
1	Coolant temperature sensor coupler	1	Disconnect.
2	Coolant temperature sensor	1	
3	Engine bracket bolt (left)	2	
4	Engine mounting bolt (left upper side)	1	
5	Engine bracket (left)	1	
6	Engine bracket bolt (right)	2	
7	Engine mounting bolt (right upper side)	1	
8	Engine bracket (right)	1	

Removing the cylinder head



*** Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.**

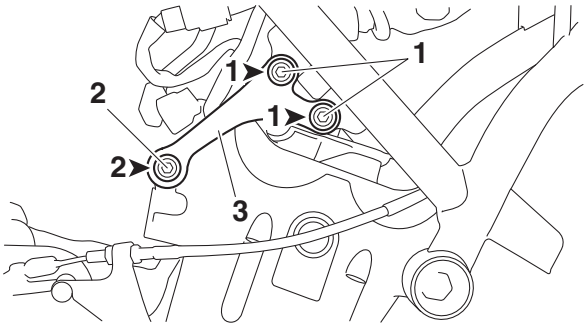
Order	Job/Parts to remove	Q'ty	Remarks
9	Engine mounting bolt (right front side)	1	
10	Engine mounting bolt (left front side)	1	
11	Timing chain bolt (right side of cylinder head)	1	
12	Timing chain guide (exhaust side)	1	
13	Cylinder head	1	
14	Cylinder head gasket	1	
15	Dowel pin	2	
16	Timing chain	1	
17	Timing chain guide (intake side)	1	

EAS30276
REMOVING THE CYLINDER HEAD

1. Remove:
   The following procedure applies to both of the engine bracket.
   • Engine bracket bolts “1”
   • Engine mounting bolt “2”
   • Engine bracket “3”

TIP

• Place a suitable stand under the engine.
• Loosen the bolts in the proper sequence as shown.

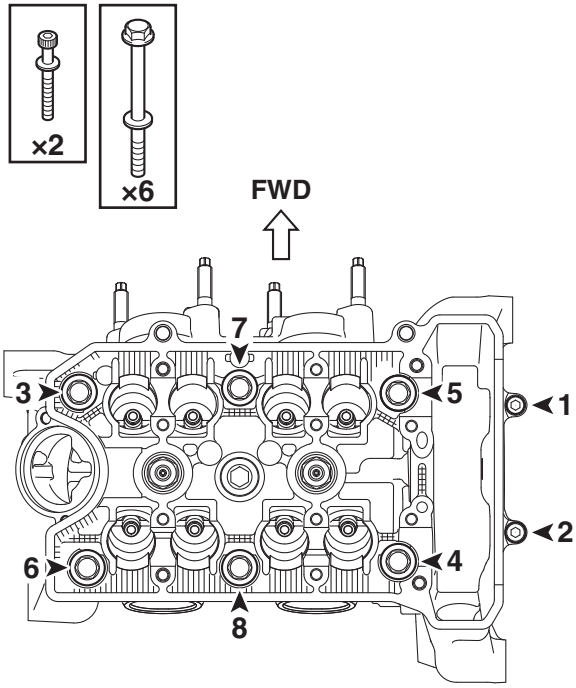


2. Remove:
   • Cylinder head bolt (M6) (×2)
   • Cylinder head bolt (M10) (×6)

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.

   • M6 × 45 mm: “1”, “2”
   • M10 × 100 mm: “3”–“8”



EAS30278
CHECKING THE TIMING CHAIN GUIDES

1. Check:
   • Timing chain guide (exhaust side)
   • Timing chain guide (intake side)
   Damage/wear → Replace.

EAS30277
CHECKING THE CYLINDER HEAD

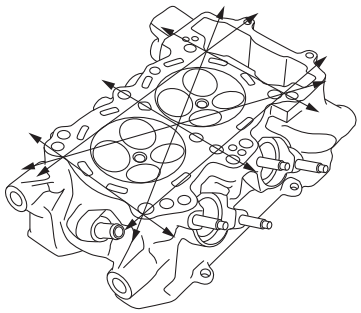
1. Eliminate:
   • Combustion chamber carbon deposits (with a rounded scraper)

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 **0.05 mm (0.0020 in)**



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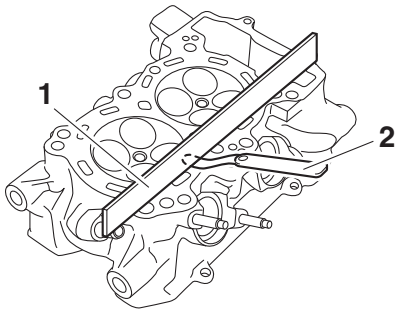
a. Place a straightedge “1” and a thickness gauge “2” across the cylinder head.



b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

TIP

To ensure an even surface, rotate the cylinder head several times.

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EAS30282

INSTALLING THE CYLINDER HEAD

1. Install:
   - Cylinder head
   - Cylinder head bolt (M10) (×6) New
   - Cylinder head bolt (M6) (×2)

TIP

- Pass the timing chain through the timing chain cavity.
- Lubricate the cylinder head bolt (M10) threads and mating surface with engine oil.

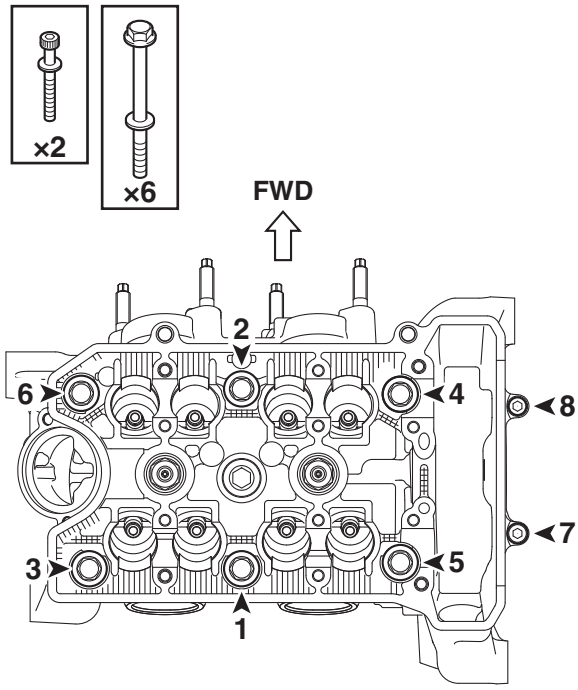
2. Tighten:
   - Cylinder head bolts “1”–“6”
   - Cylinder head bolts “7”, “8”

Cylinder head bolt (“1”–“6”)
1st: 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
2nd: 40 Nm (4.0 m·kgf, 29 ft·lbf)
***3rd: 20 Nm (2.0 m·kgf, 14 ft·lbf)**
Specified angle 90°
Cylinder head bolt (“7”, “8”)
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

* Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.

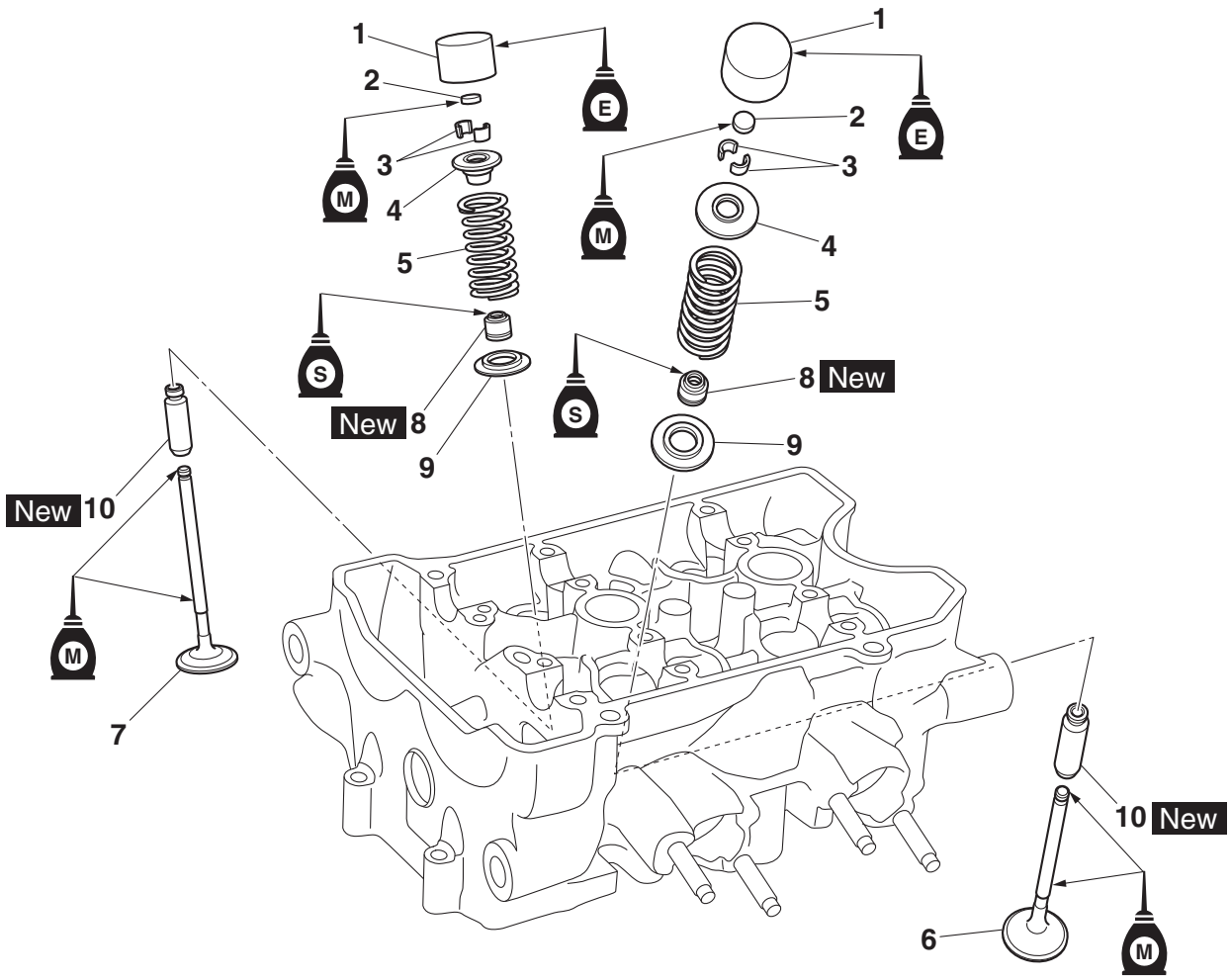
TIP

Tighten the cylinder head bolts in the tightening sequence as shown and torque them in 4 stages.



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 5-23.
1	Valve lifter	8	
2	Valve pad	8	
3	Valve cotter	16	
4	Valve spring retainer	8	
5	Valve spring	8	
6	Exhaust valve	4	
7	Intake valve	4	
8	Valve stem seal	8	
9	Valve spring seat	8	
10	Valve guide	8	

EAS30283
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

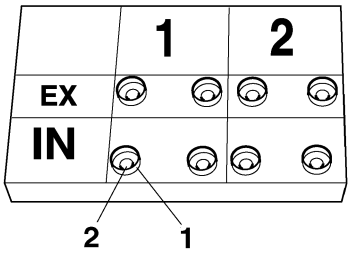
TIP

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 5-31.

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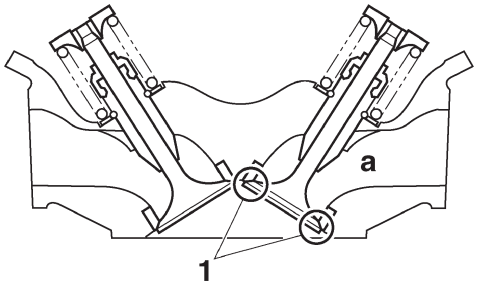
a. Pour a clean solvent "a" into the intake and exhaust ports.
b. Check that the valves properly seal.

TIP

There should be no leakage at the valve seat "1".



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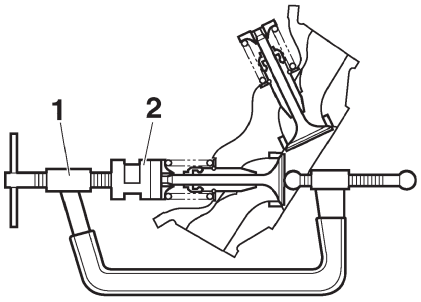
3. Remove:
   - Valve cotters

TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".

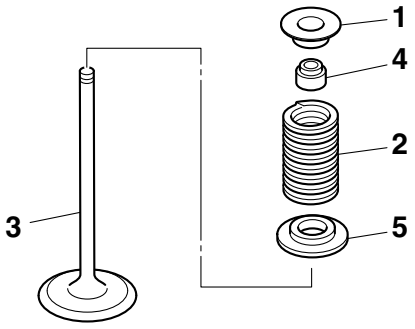
Valve spring compressor
90890-04019
Valve spring compressor
YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1



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.



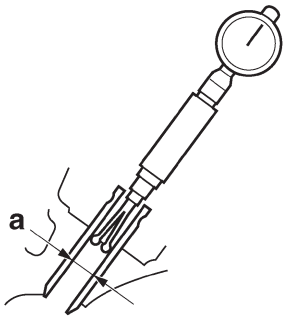
EAS30284
CHECKING THE VALVES AND VALVE GUIDES

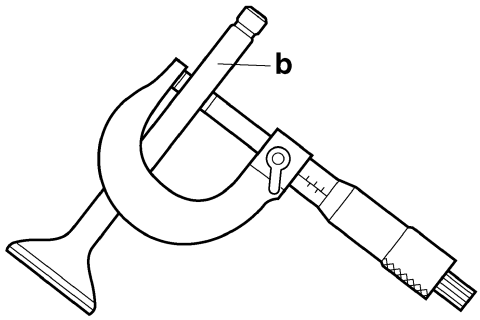
The following procedure applies to all of the valves and valve guides.

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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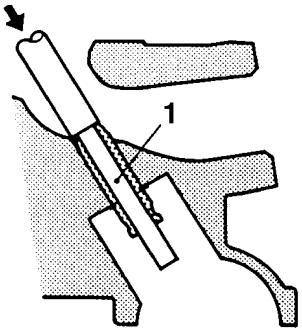
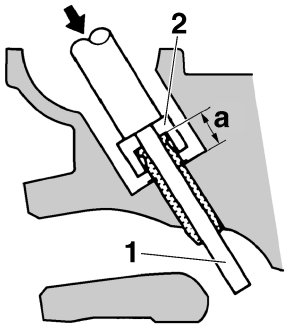
a. Remove the valve guide with the valve guide remover “1”.



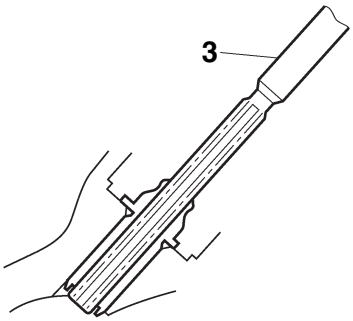
b. Install the new valve guide with the valve guide installer “2” and valve guide remover “1”.

Valve guide position
14.8–15.2 mm (0.58–0.60 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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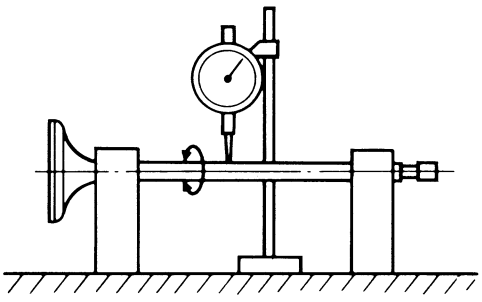
3. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
4. Check:
   • Valve face
   Pitting/wear → Grind the valve face.
   • Valve stem end
   Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   • Valve stem runout
   Out of specification → 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)

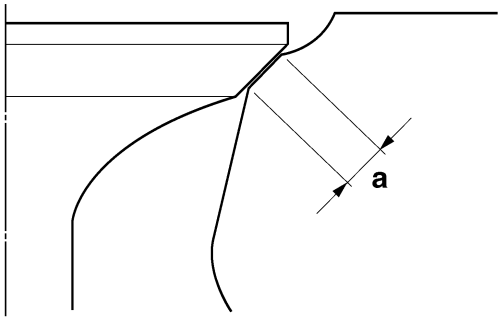


EAS30285
CHECKING THE VALVE SEATS

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 width “a”
   Out of specification → Replace the cylinder head.

Valve seat contact width (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Valve seat contact width (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)



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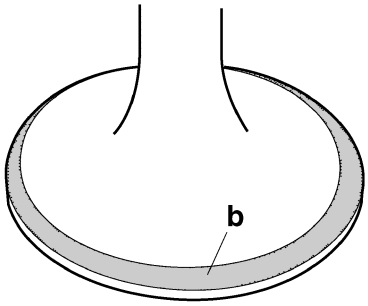
a. Apply blue layout fluid “b” onto the valve face.



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 width.

TIP

Where the valve seat and valve face contacted one another, the blueing will have been removed.

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4. Lap:
   • Valve face
   • Valve seat

TIP

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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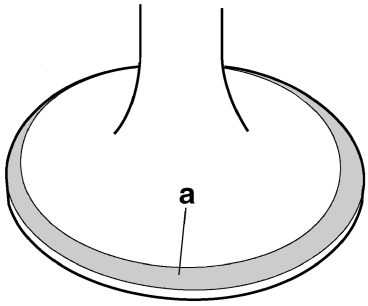
a. Apply a coarse lapping compound “a” to the valve face.

ECA13790

NOTICE

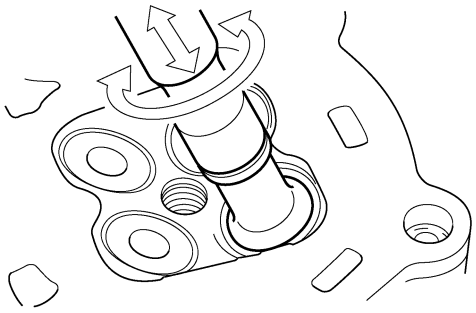
Do not let the lapping compound enter the gap between the valve stem and the valve guide.



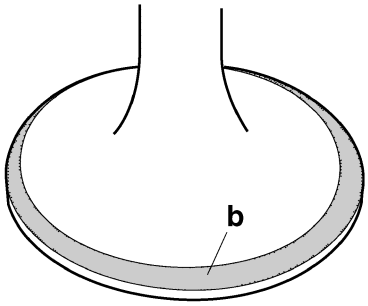
b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

TIP

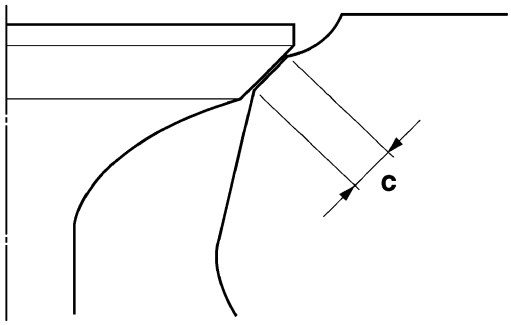
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply 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 width “c” again. If the valve seat width is out of specification, reface and lap the valve seat.



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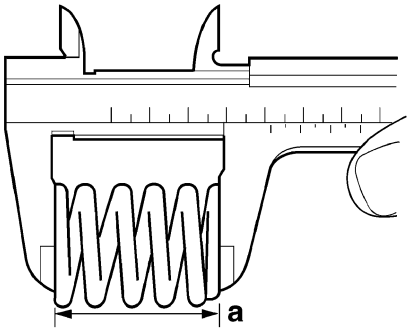
EAS30286

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

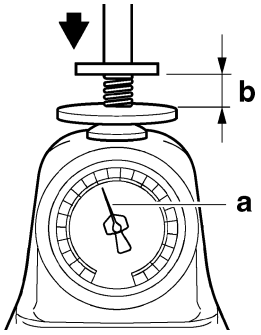
1. Measure:
   • Valve spring free length “a”
   Out of specification → Replace the valve spring.

Free length (intake)
40.30 mm (1.59 in)
Limit
38.29 mm (1.51 in)
Free length (exhaust)
41.39 mm (1.63 in)
Limit
39.32 mm (1.55 in)



2. Measure:
   • Compressed valve spring force “a”
   Out of specification → Replace the valve spring.

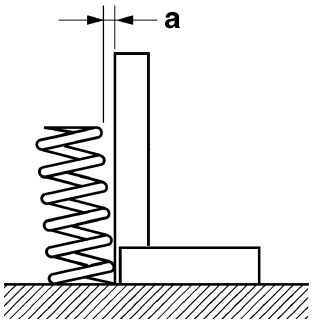
Installed compression spring force (intake)
144.00–166.00 N (14.68–16.93 kgf, 32.37–37.32 lbf)
Installed compression spring force (exhaust)
149.00–171.00 N (15.19–17.44 kgf, 33.50–38.44 lbf)
Installed length (intake)
34.34 mm (1.35 in)
Installed length (exhaust)
35.84 mm (1.41 in)



b. Installed length

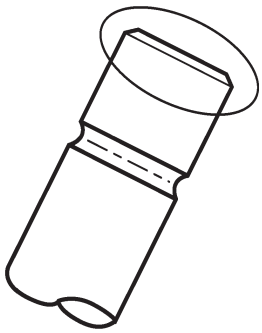
3. Measure:
   • Valve spring tilt “a”
   Out of specification → Replace the valve spring.

Spring tilt (intake)
1.8 mm (0.07 in)
Spring tilt (exhaust)
1.8 mm (0.07 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)

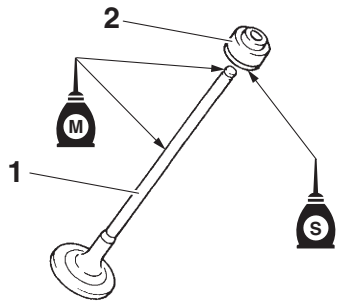


2. Lubricate:
   • Valve stem “1”
   • Valve stem end
   (with the recommended lubricant)

Recommended lubricant
Molybdenum disulfide oil

3. Lubricate:
   • Valve stem seal “2”
   (with the recommended lubricant)

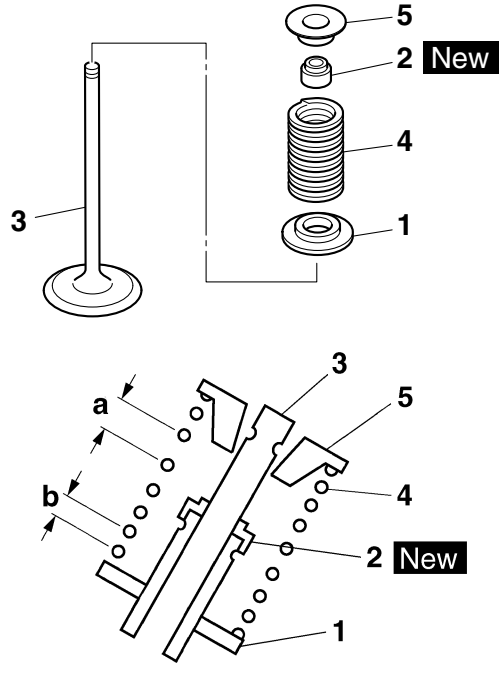
Recommended lubricant
Silicone fluid



4. Install:
   • Valve spring seat “1”
   (into the cylinder head)
   • Valve stem seal “2” New
   • Valve “3”
   • Valve spring “4”
   • Valve spring retainer “5”

TIP

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch “a” facing up.



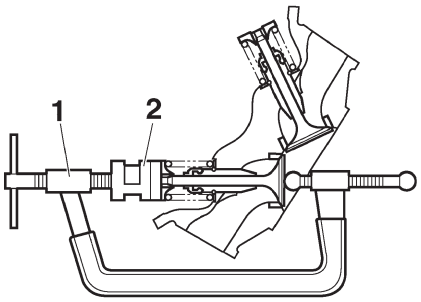
b. Smaller pitch

5. Install:
   • Valve cotters

TIP

Install the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.

Valve spring compressor
90890-04019
Valve spring compressor
YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1

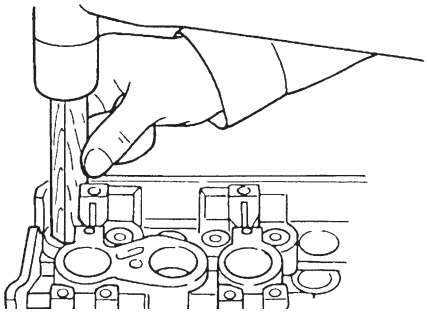


6. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

NOTICE

Hitting the valve tip with excessive force could damage the valve.



7. Lubricate:
   • Valve lifter
   (with the recommended lubricant)

Recommended lubricant
Engine oil

8. Install:
   • Valve pad
   • Valve lifter

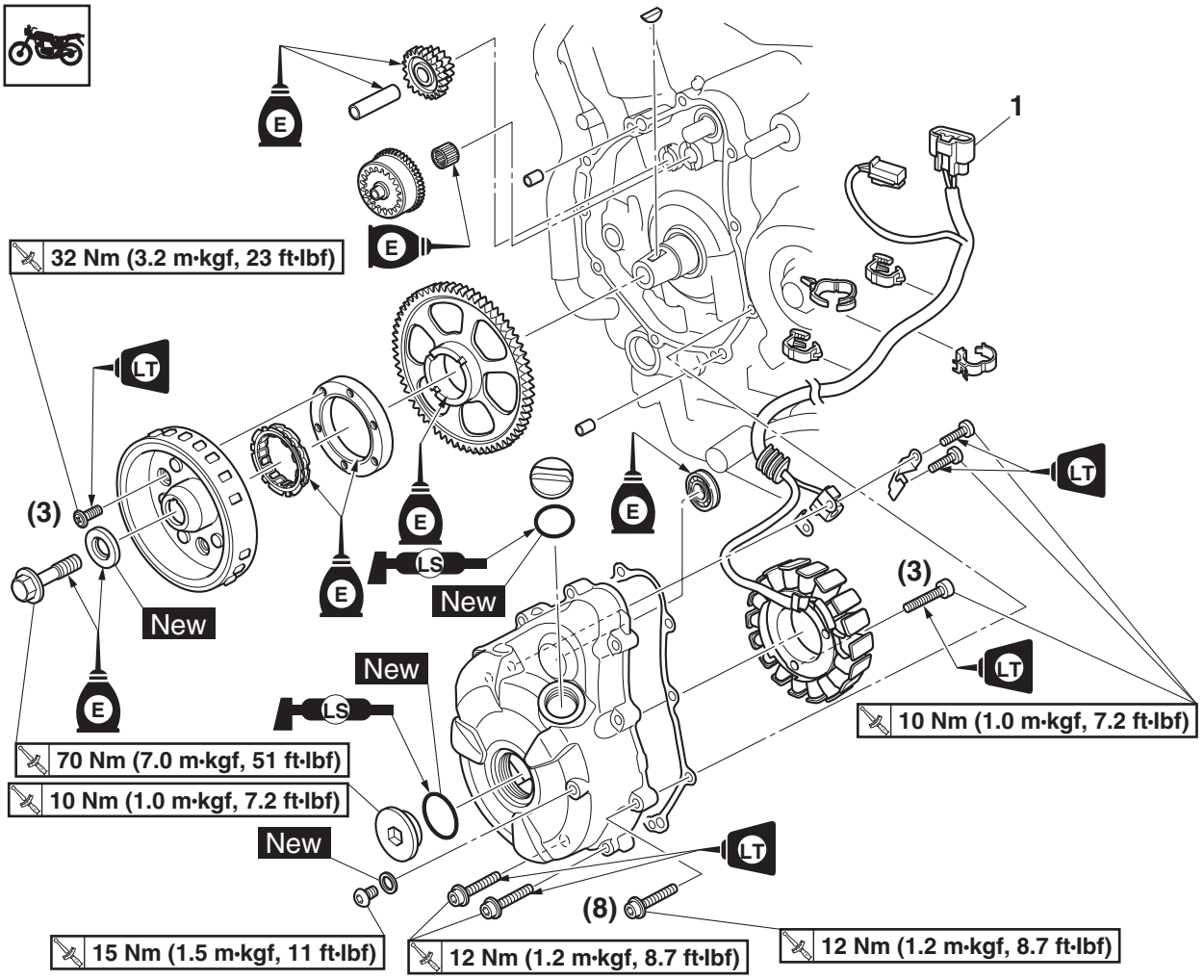
TIP

- The valve lifter must move smoothly when rotated with a finger.

- Each valve lifter and valve pad must be reinstalled in their original position.

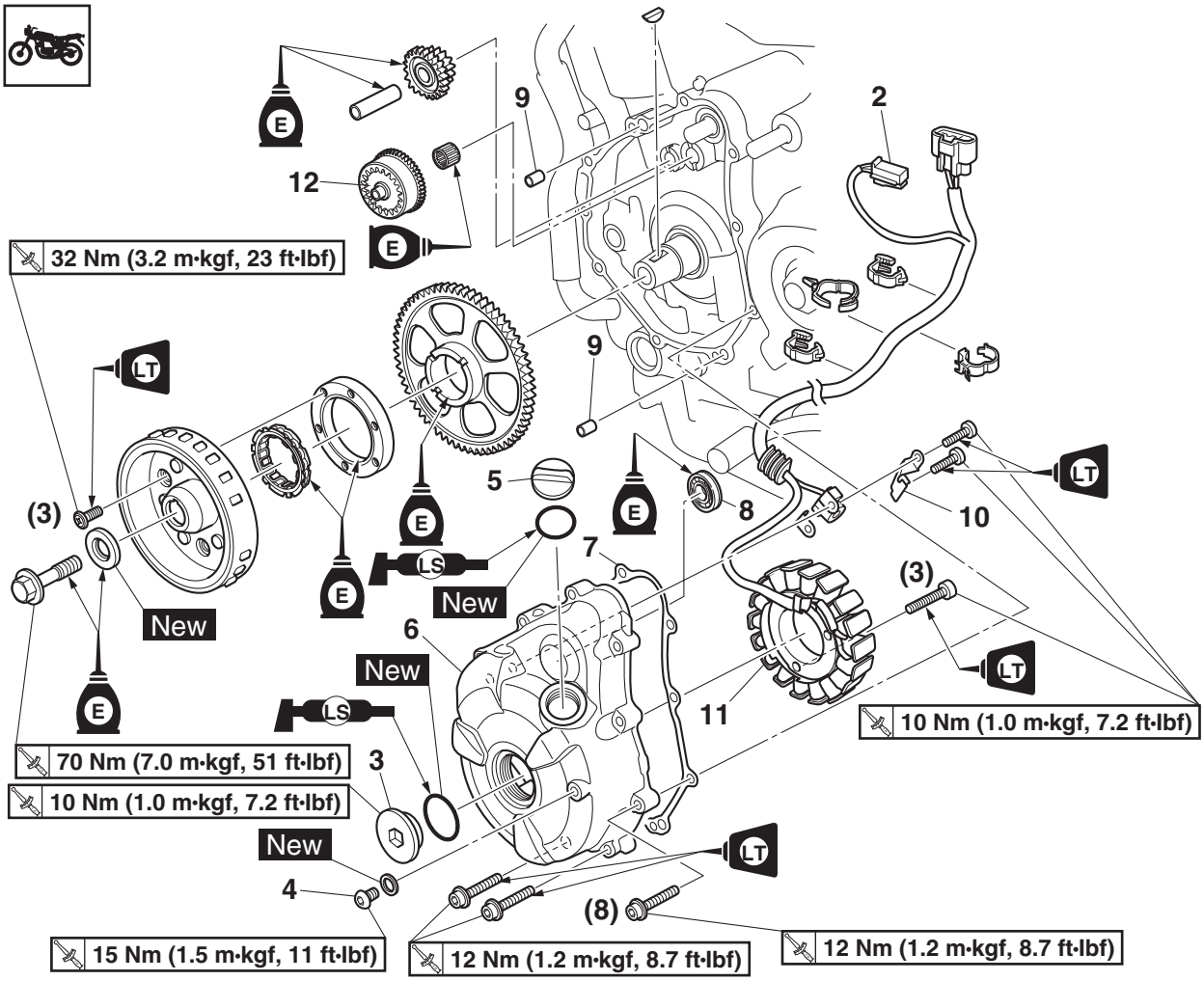
EAS20140
GENERATOR AND STARTER CLUTCH

Removing the stator coil, generator rotor and starter clutch



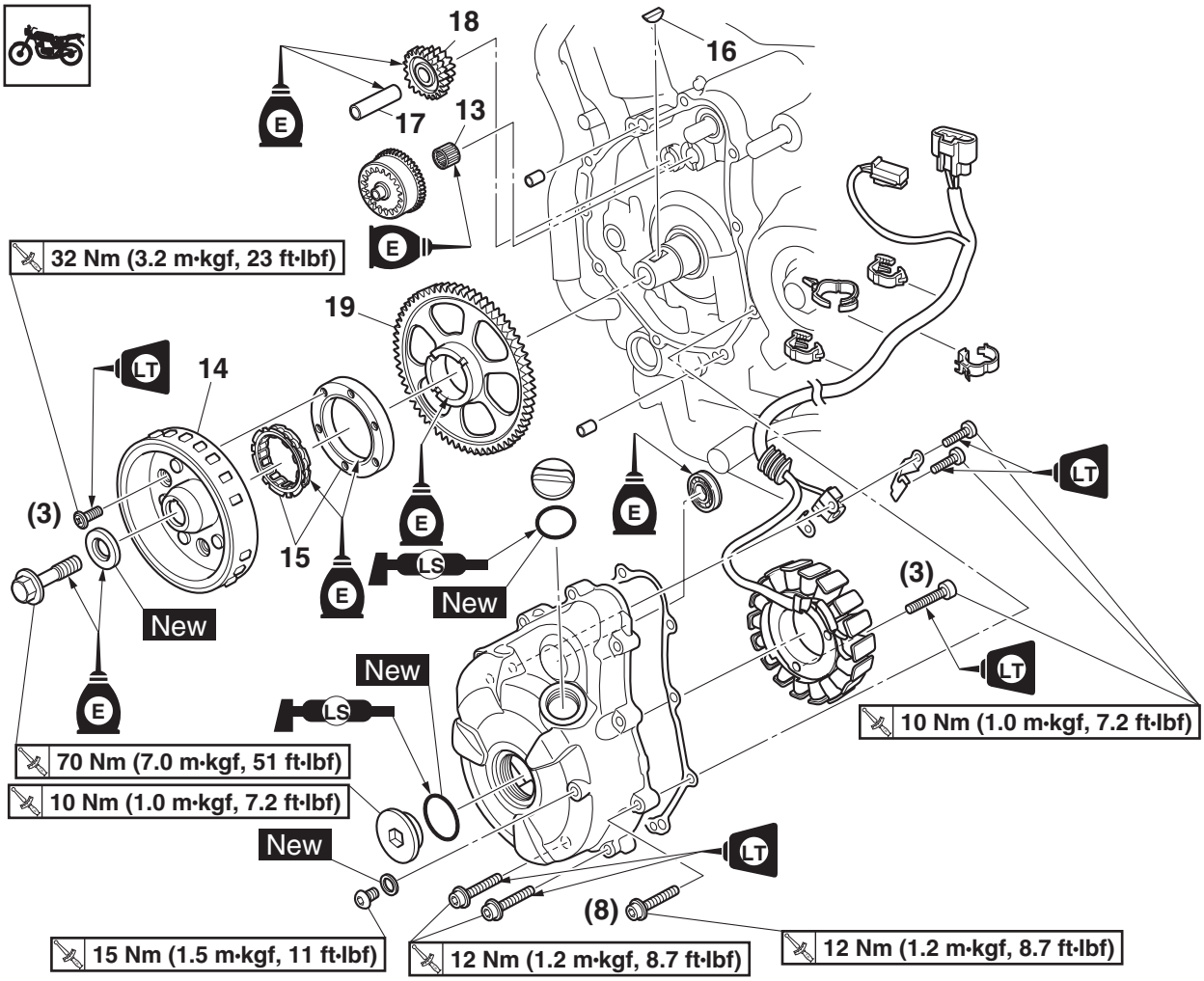
Order	Job/Parts to remove	Q'ty	Remarks
	Air scoop (left)		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Drive sprocket cover		Refer to "CHAIN DRIVE" on page 4-93.
	Coolant reservoir		Refer to "RADIATOR" on page 6-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-21.
1	Stator coil coupler	1	Disconnect.

Removing the stator coil, generator rotor and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
2	Crankshaft position sensor coupler	1	Disconnect.
3	Crankshaft end cover	1	
4	Timing mark accessing bolt	1	
5	Oil filler cap	1	
6	Generator cover	1	
7	Generator cover gasket	1	
8	Bearing	1	
9	Dowel pin	2	
10	Stator coil lead holder	1	
11	Stator coil assembly (Stator coil/Crankshaft position sensor)	1	
12	Torque limiter	1	

Removing the stator coil, generator rotor and starter clutch



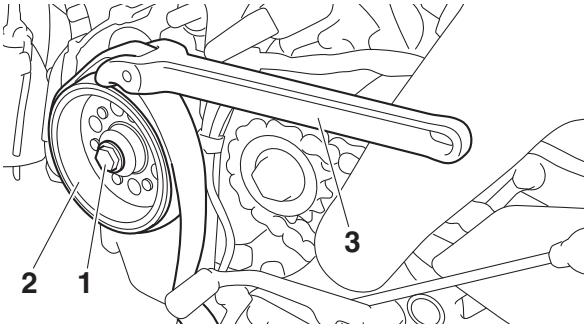
Order	Job/Parts to remove	Q'ty	Remarks
13	Bearing	1	
14	Generator rotor	1	
15	Starter clutch	1	
16	Woodruff key	1	
17	Starter clutch idle gear shaft	1	
18	Starter clutch idle gear	1	
19	Starter clutch gear	1	

EAS30867
REMOVING THE GENERATOR
1. Remove:
   • Generator rotor bolt “1”
   • Washer

TIP

While holding the generator rotor “2” with the rotor holding tool “3”, loosen the generator rotor bolt.

Rotor holding tool
90890-04166
YM-04166



2. Remove:
   • Generator rotor “1”
   (with the flywheel puller “2”)
   • Woodruff key

ECA13880

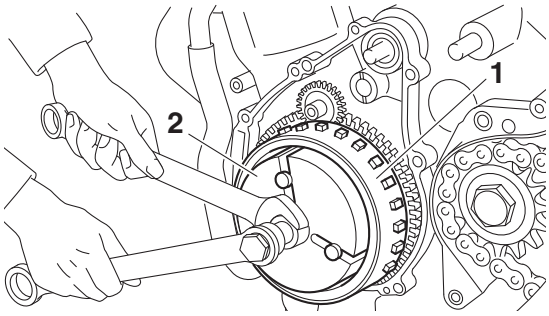
NOTICE

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

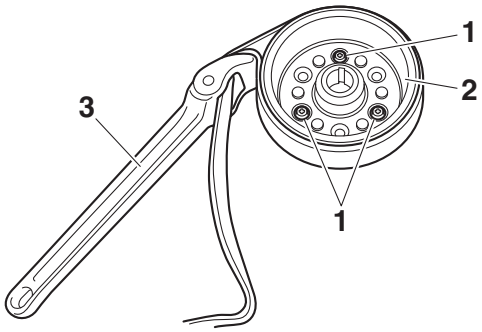


EAS30868
REMOVING THE STARTER CLUTCH
1. Remove:
   • Starter clutch bolts “1”
   • Starter clutch

TIP

While holding the generator rotor “2” with the rotor holding tool “3”, loosen the starter clutch bolts.

Rotor holding tool
90890-04166
YM-04166



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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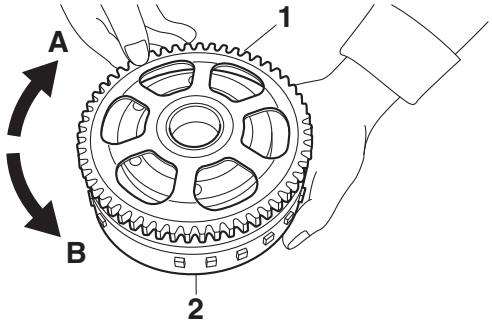
a. Install the starter clutch gear “1” onto the generator rotor “2” and hold the generator rotor.

b. When turning the starter clutch gear clockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch gear counterclockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.



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EAS30870
CHECKING THE TORQUE LIMITER

1. Check:
   • Torque limiter
   Damage/wear → Replace.

TIP

Do not disassemble the torque limiter.

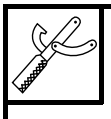
EAS30871
INSTALLING THE STARTER CLUTCH

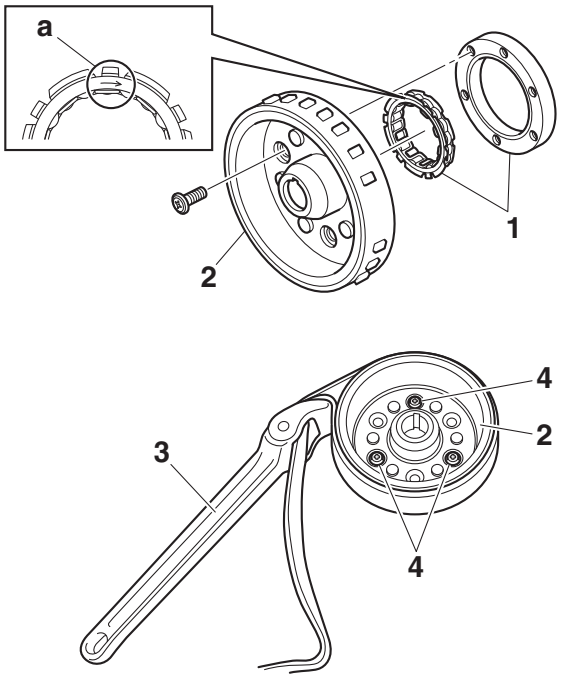
1. Install:
   • Starter clutch “1”

	**Starter clutch bolt** **32 Nm (3.2 m·kgf, 23 ft·lbf)** **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 rotor holding tool “3”, tighten the starter clutch bolts “4”.

	**Rotor holding tool** **90890-04166** **YM-04166**



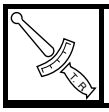
EAS30872
INSTALLING THE GENERATOR

1. Install:
   • Woodruff key
   • Generator rotor
   • Washer New
   • Generator rotor bolt

TIP

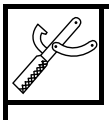
- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.
- Lubricate the generator rotor bolt threads and washer mating surfaces with engine oil.

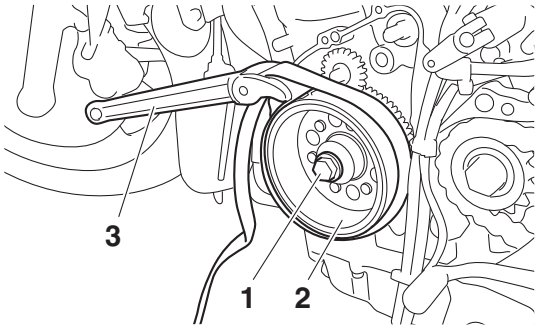
2. Tighten:
   • Generator rotor bolt “1”

	**Generator rotor bolt** **70 Nm (7.0 m·kgf, 51 ft·lbf)**

TIP

While holding the generator rotor “2” with the rotor holding tool “3”, tighten the generator rotor bolt.

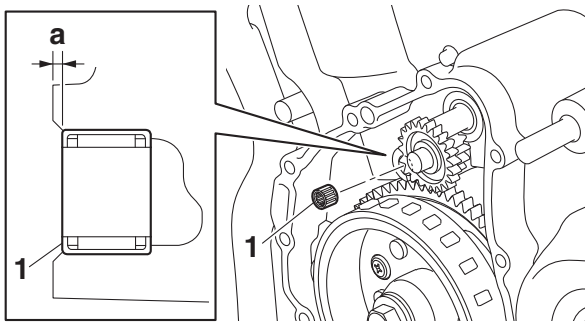
	**Rotor holding tool** **90890-04166** **YM-04166**



3. Install:
   • Bearing “1”

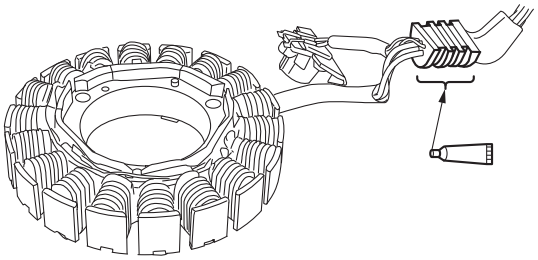
TIP

Make sure that the bearing does not protrude past the surface “a” of the cylinder.



4. Apply:
   • Sealant
   (onto the stator coil lead grommet)

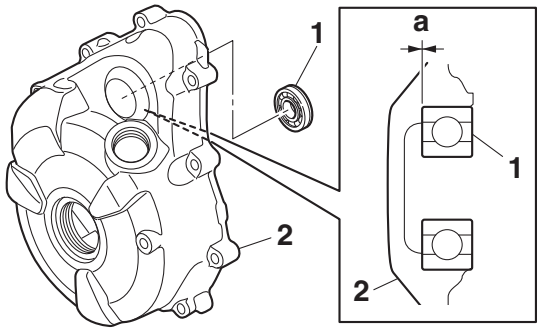
	Yamaha bond No. 1215 **90890-85505** **(Three bond No.1215®)**



5. Install:
   • Bearing “1”

TIP

Make sure that the bearing contacts the surface “a” of the generator cover “2”.

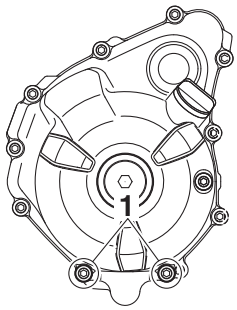


6. Install:
   • Generator cover gasket New
   • Generator cover

	Generator cover bolt **12 Nm (1.2 m·kgf, 8.7 ft·lbf)** **LOCTITE®** **Generator cover bolt** **12 Nm (1.2 m·kgf, 8.7 ft·lbf)**

TIP

- Tighten the generator cover bolts in stages and in a crisscross pattern.
- Apply LOCTITE® to the threads of only the generator cover bolts “1” shown in the illustration.



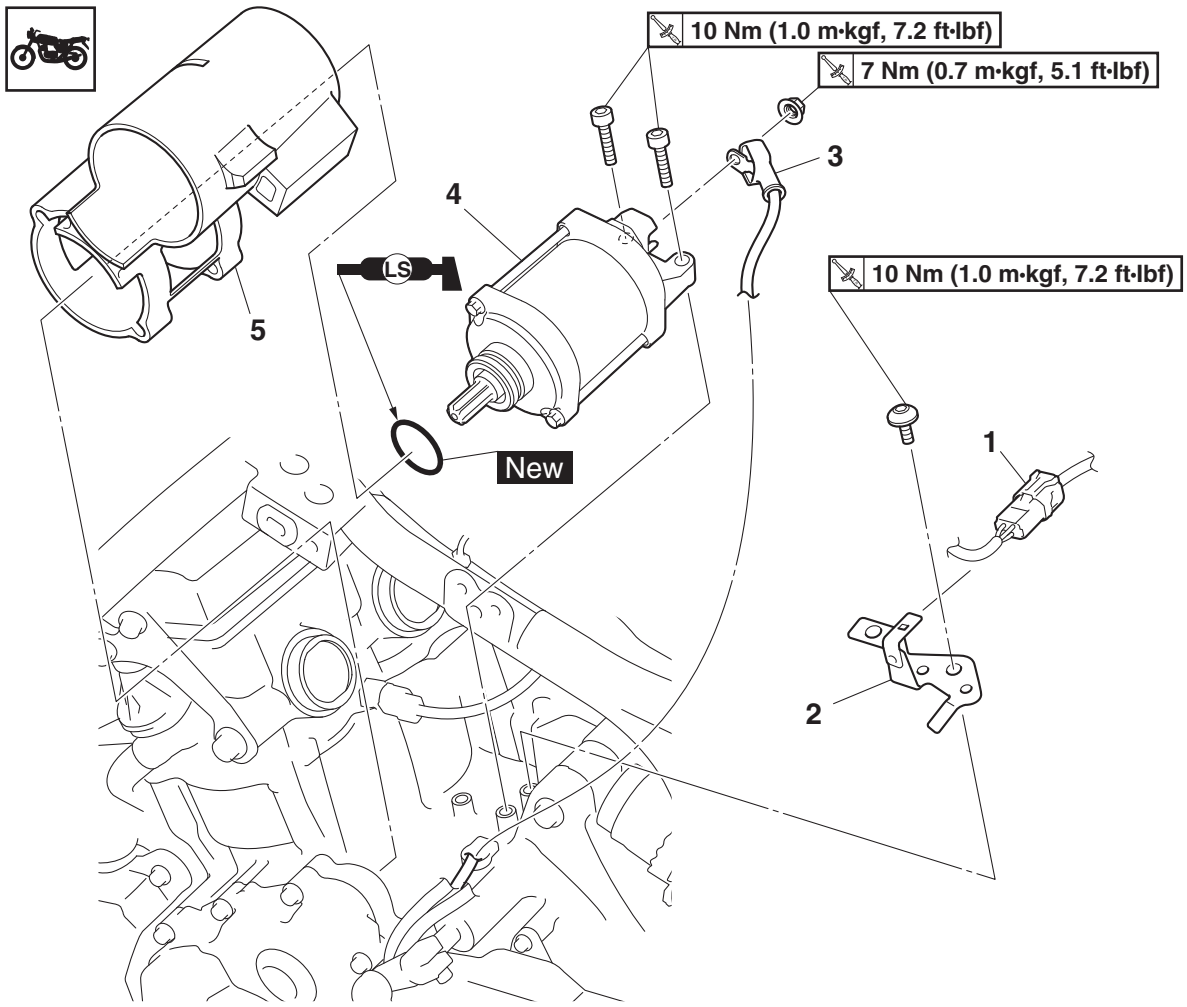
7. Connect:
   • Stator coil coupler
   • Crankshaft position sensor coupler

TIP

To route the stator coil lead, refer to “CABLE ROUTING” on page 2-43.

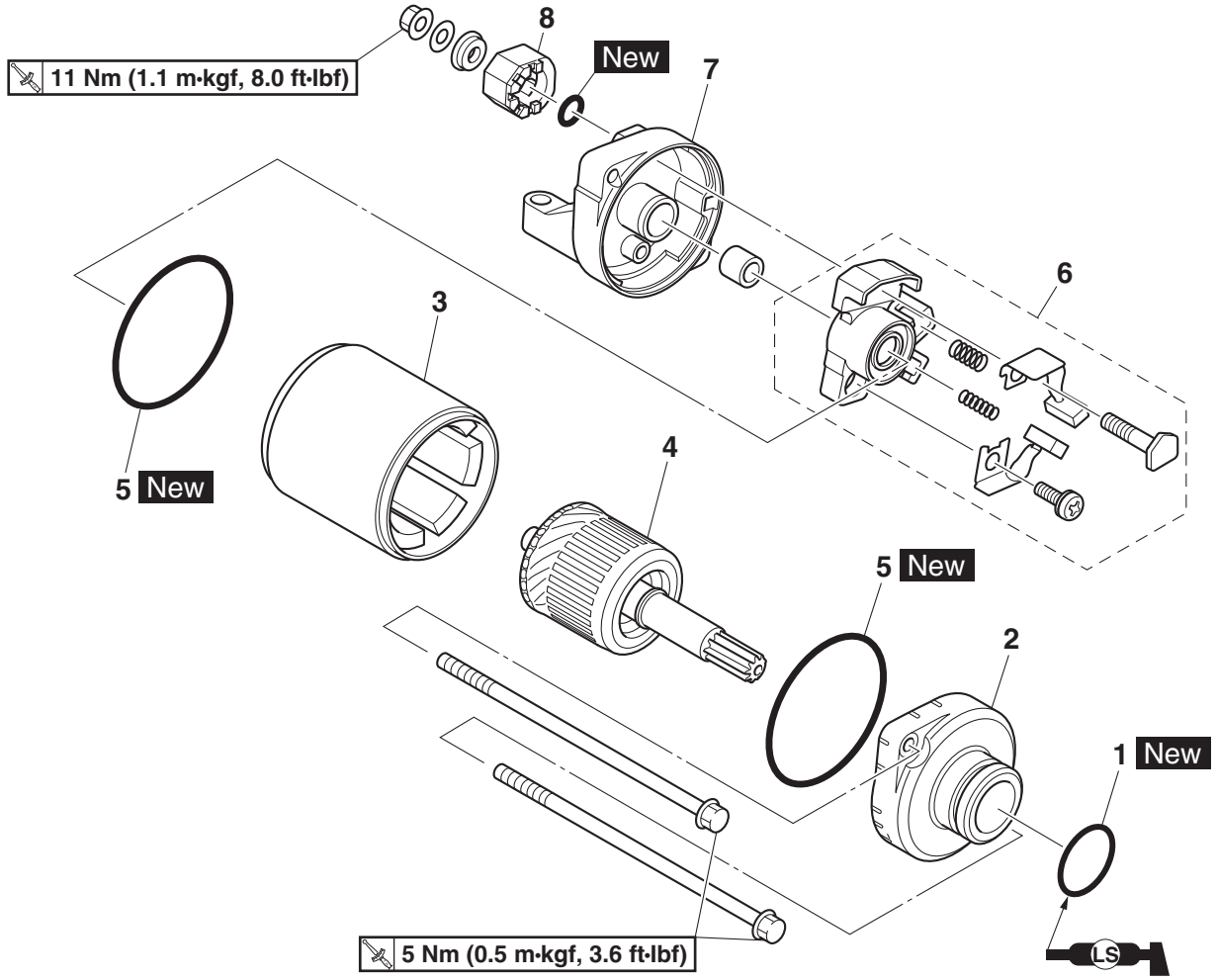
EAS20052
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Outer side covers/Inner side covers		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank/Canister		Refer to "FUEL TANK" on page 7-1.
	Pivot shaft protectors		Refer to "SWINGARM" on page 4-88.
	Air duct bracket		Refer to "GENERAL CHASSIS (4)" on page 4-7.
	Throttle bodies/Air filter case		Refer to "THROTTLE BODIES" on page 7-7.
1	Gear position switch coupler	1	
2	Coupler and hose bracket	1	
3	Starter motor lead	1	Disconnect.
4	Starter motor	1	
5	Canister holder	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	
8	Lead guide	1	

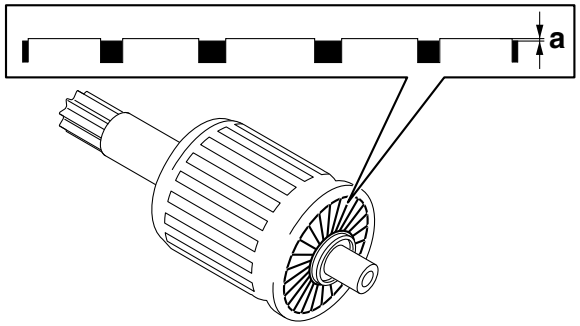
EAS30325
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   • Mica undercut “a”
   Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut (depth)
0.70 mm (0.03 in)

TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.



3. Measure:
   • Armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

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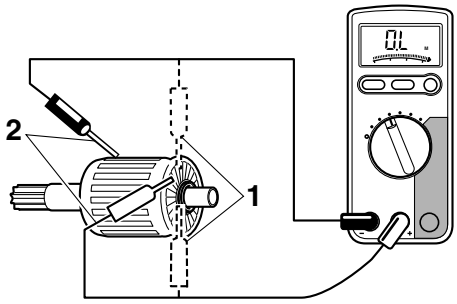
a. Measure the armature assembly resistances with the digital circuit tester.

Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927

Armature coil
Commutator resistance “1”
0.015–0.025 Ω
Insulation resistance “2”
Above 1 MΩ at 20 °C (68 °F)

b. If any resistance is out of specification, replace the starter motor.



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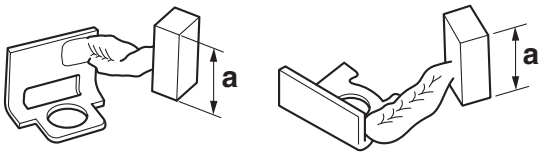
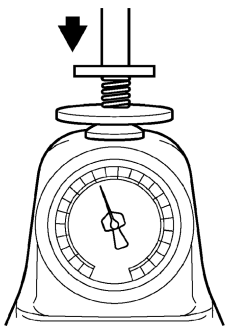
4. Measure:
   • Brush length “a”
   Out of specification → Replace the brush holder set.

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.

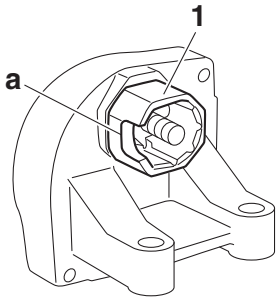
7. Check:
   • Bearing
   • Oil seal
   Damage/wear → Replace the starter motor front cover.

EAS30326
ASSEMBLING THE STARTER MOTOR

1. Install:
   • Lead guide “1”

TIP

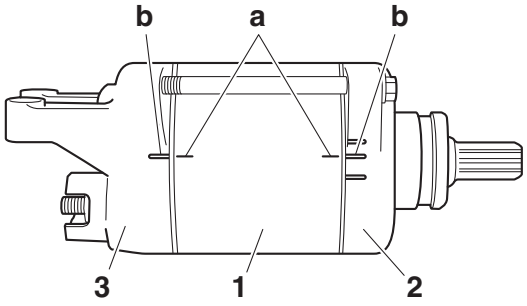
Make sure that the slot “a” in the lead guide is facing in the direction shown in the illustration.



2. Install:
   • Starter motor yoke “1”
   • Starter motor front cover “2”
   • Starter motor rear cover “3”

TIP

Align the match marks “a” on the starter motor yoke with the match marks “b” on the front cover and rear covers.

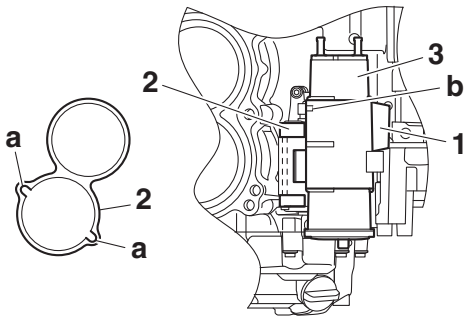


EAS30327
INSTALLING THE STARTER MOTOR

1. Install:
   • Canister holder “1”
   • Starter motor “2”
   • Canister “3”

TIP

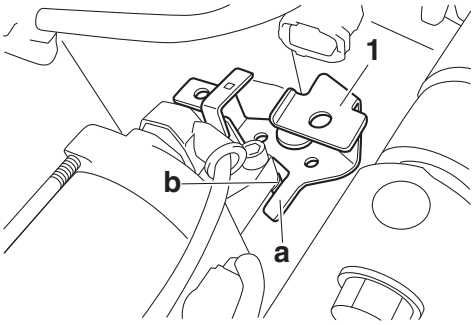
• Pass the starter motor front cover bolts through the slots “a” in the canister holder to secure it.
• Install the canister holder with the stamped mark “2RC” “b” facing forward.



2. Install:
   • Coupler and hose holder bracket “1”

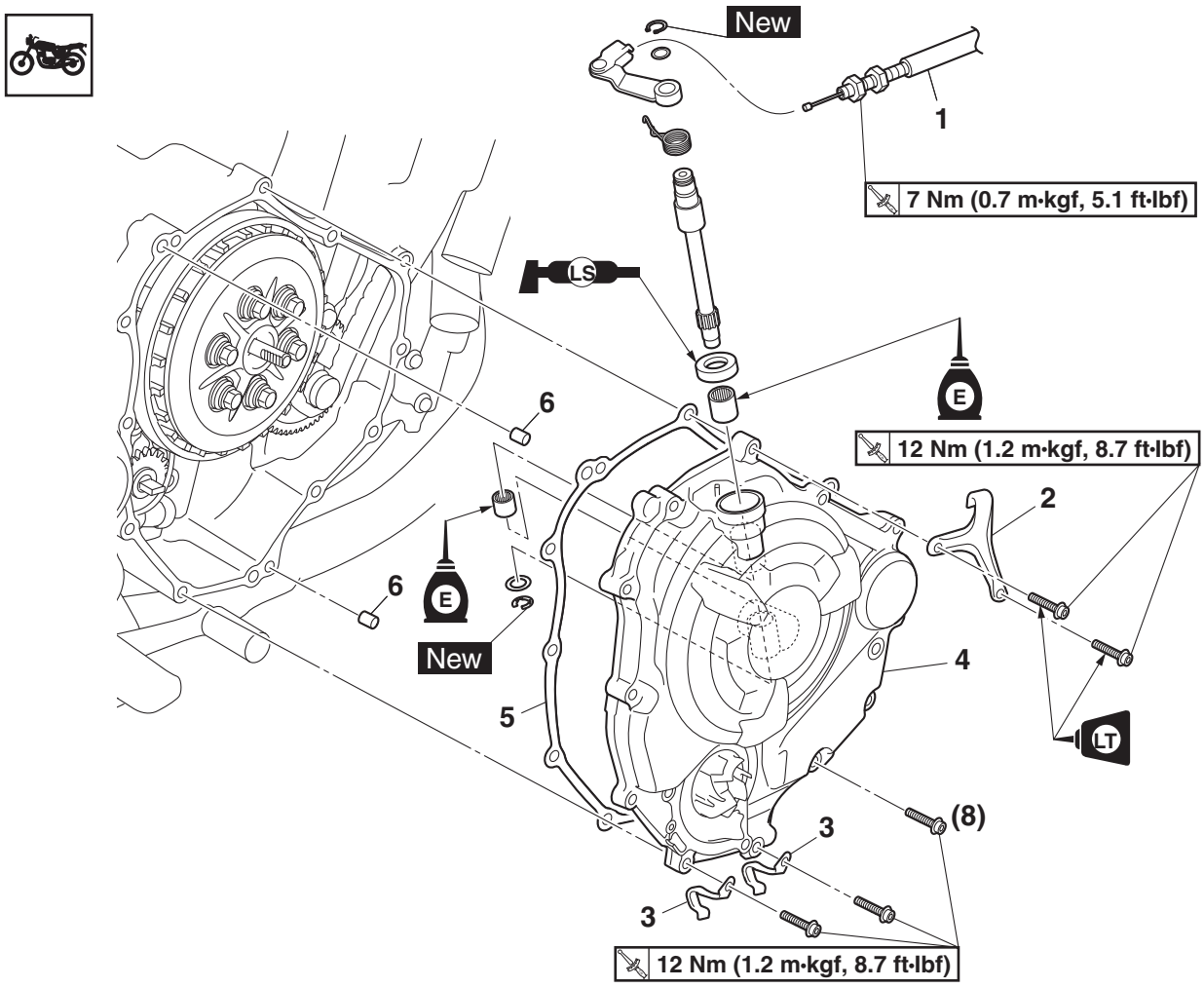
TIP

Make sure that the tab “a” on the coupler and hose holder bracket contacts the projection “b” on the cylinder block.



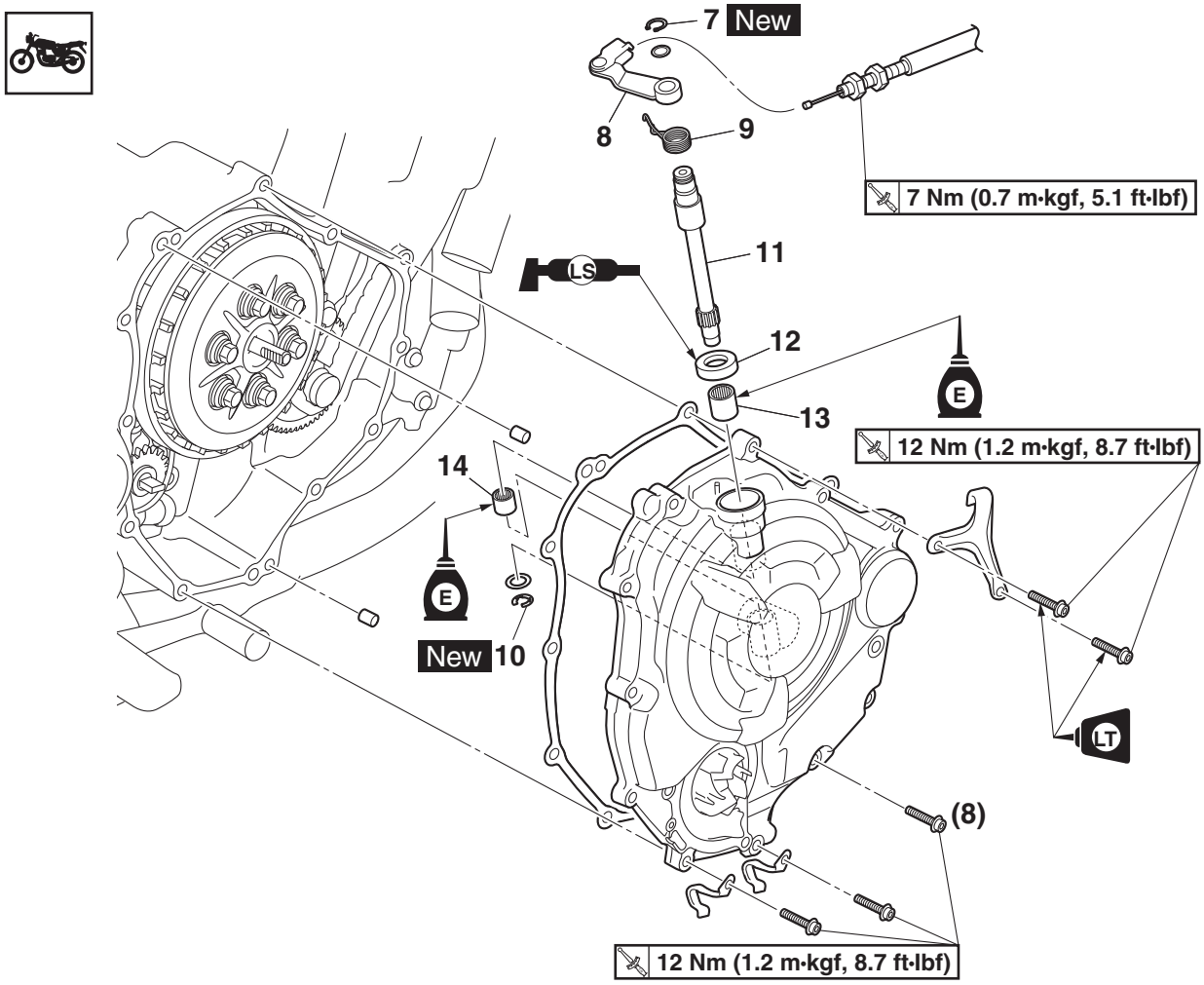
EAS20055
CLUTCH

Removing the clutch cover and pull lever shaft



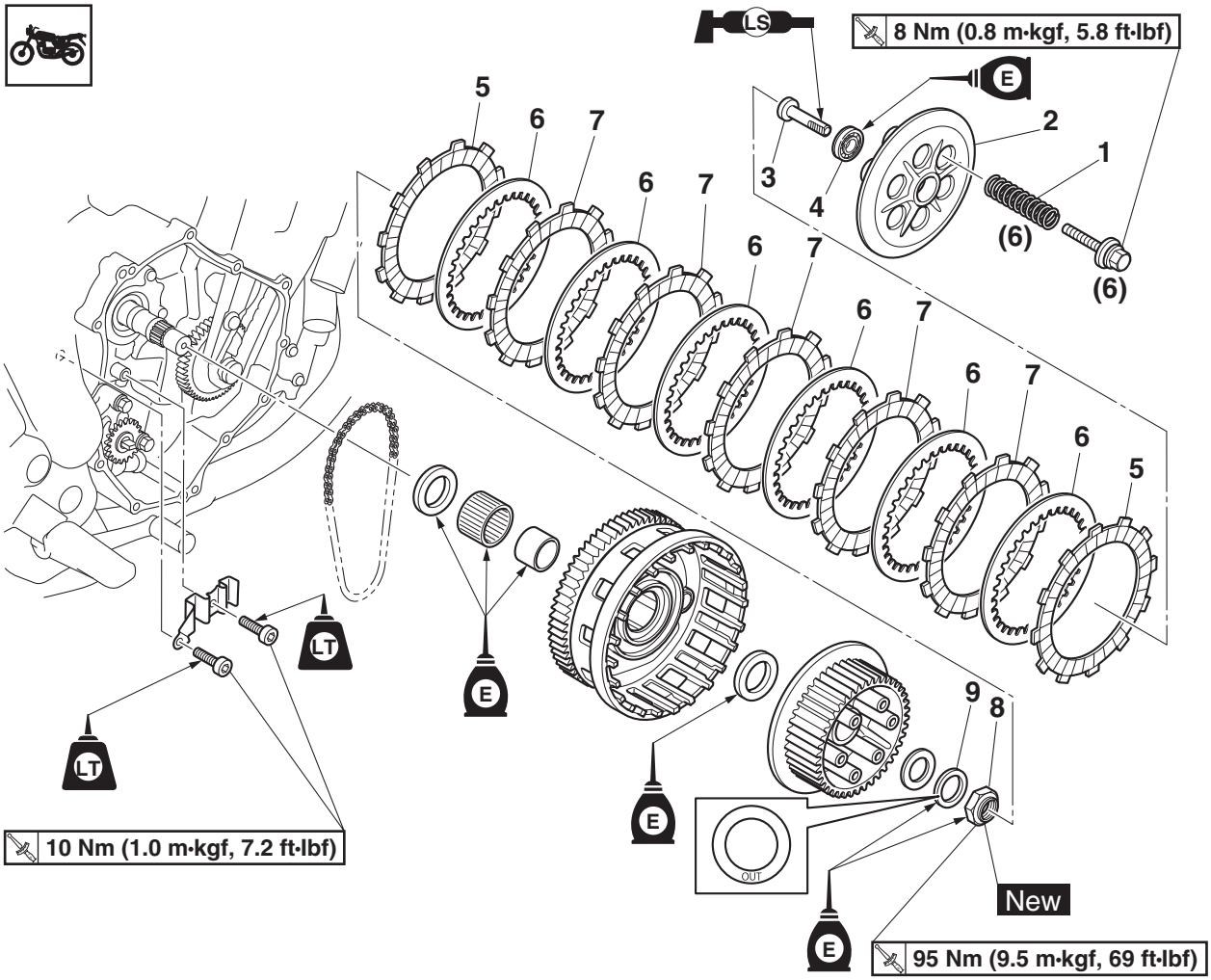
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-21.
	Water pump housing		Refer to "WATER PUMP" on page 6-9.
1	Clutch cable	1	Disconnect.
2	Clutch cable holder	1	
3	Holder (O_2 sensor lead and oil pressure switch lead)	2	
4	Clutch cover	1	
5	Clutch cover gasket	1	
6	Dowel pin	2	

Removing the clutch cover and pull lever shaft



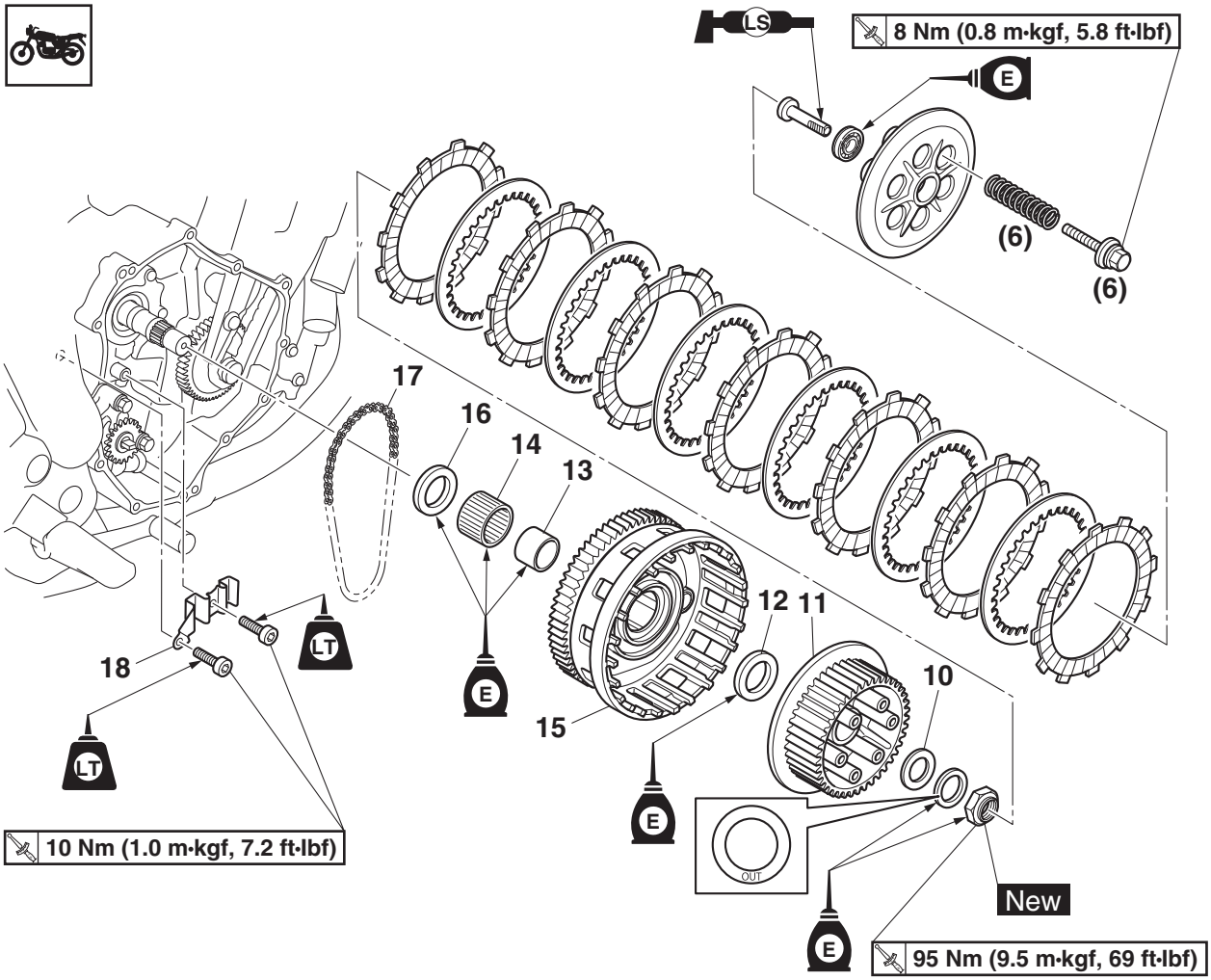
Order	Job/Parts to remove	Q'ty	Remarks
7	Circlip	1	
8	Pull lever	1	
9	Pull lever spring	1	
10	Circlip	1	
11	Pull lever shaft	1	
12	Oil seal	1	
13	Bearing	1	
14	Bearing	1	

Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Compression spring	6	
2	Pressure plate	1	
3	Pull rod	1	
4	Bearing	1	
5	Friction plate 1	2	
6	Clutch plate	6	
7	Friction plate 2	5	
8	Clutch boss nut	1	
9	Conical spring washer	1	

Removing the clutch



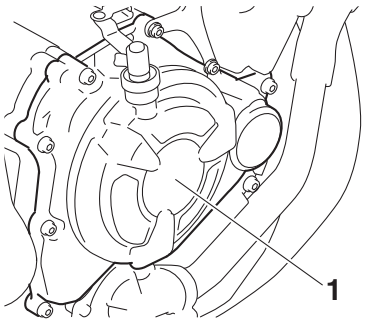
Order	Job/Parts to remove	Q'ty	Remarks
10	Washer	1	
11	Clutch boss	1	
12	Thrust plate	1	
13	Spacer	1	
14	Bearing	1	
15	Clutch housing	1	
16	Thrust plate	1	
17	Oil pump drive chain	1	
18	Oil pump drive chain guide	1	

EAS30346
REMOVING THE CLUTCH

1. Remove:
   • Clutch cover “1”
   • Gasket

TIP

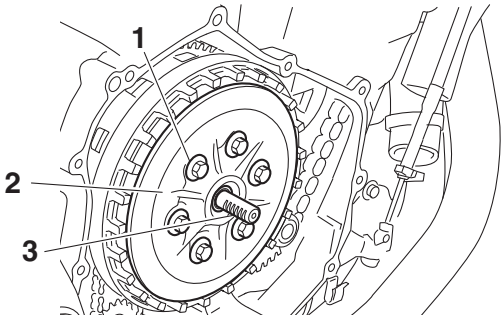
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



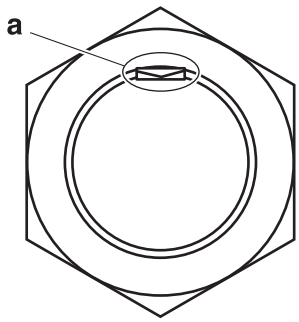
2. Remove:
   • Compression spring bolts “1”
   • Compression springs
   • Pressure plate “2”
   • Pull rod “3”

TIP

Loosen the compression spring bolts in stages and in a crisscross pattern.



3. Remove:
   • Friction plates 1
   • Clutch plates
   • Friction plates 2
4. Straighten the clutch boss nut rib “a”.

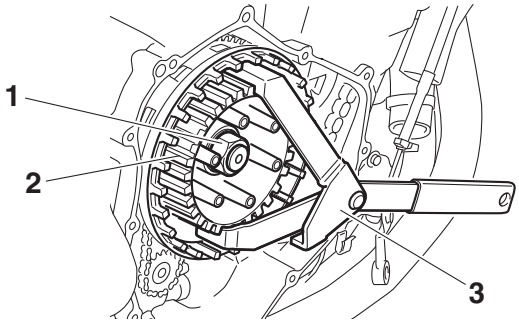


5. Loosen:
   • Clutch boss nut “1”

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



6. Remove:
   • Spacer “1”
   • Bearing “2”
   • Clutch housing “3”

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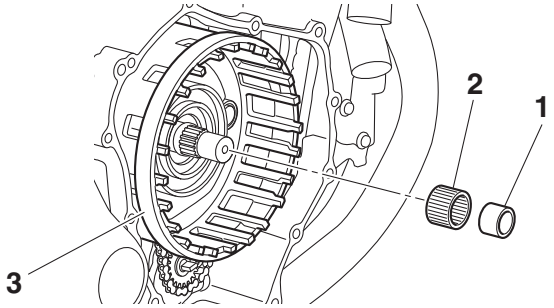
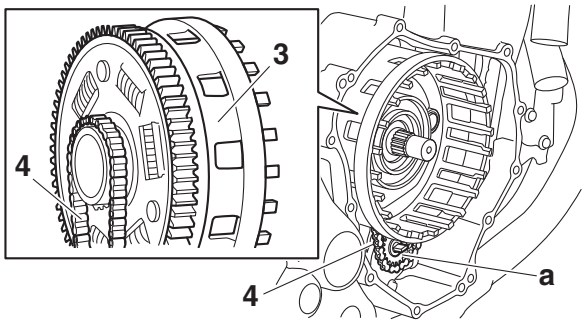
a. Remove the spacer and bearing.



b. Remove the oil pump drive chain “4” from the oil pump driven sprocket “a”, and then remove the clutch housing.



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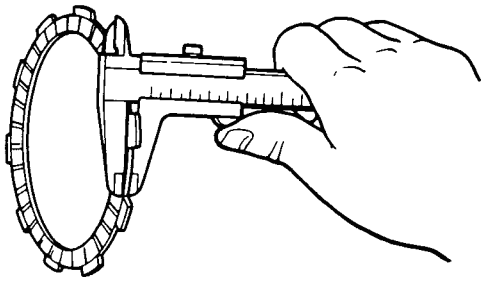
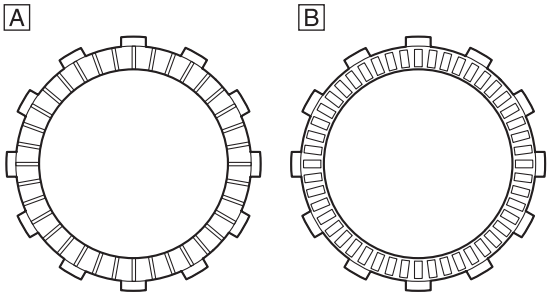
EAS30348
CHECKING THE FRICTION PLATES
The following procedure applies to all of the friction plates.
1. Check:
   • Friction plate
   Damage/wear → Replace the friction plates as a set.
2. Measure:
   • Friction plate thickness
   Out of specification → Replace the friction plates as a set.

TIP
Measure the friction plate at four places.

Friction plate 1 thickness
2.90–3.10 mm (0.114–0.122 in)
Wear limit
2.80 mm (0.110 in)
Friction plate 2 thickness
2.92–3.08 mm (0.115–0.121 in)
Wear limit
2.82 mm (0.111 in)



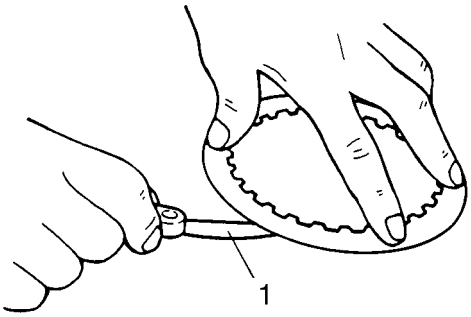


A. Friction plate 1
B. Friction plate 2

EAS30349
CHECKING THE CLUTCH PLATES
The following procedure applies to all of the clutch plates.
1. Check:
   • Clutch plate
   Damage → Replace the clutch plates as a set.
2. Measure:
   • Clutch plate warpage
   (with a surface plate and thickness gauge “1”)
   Out of specification → Replace the clutch plates as a set.

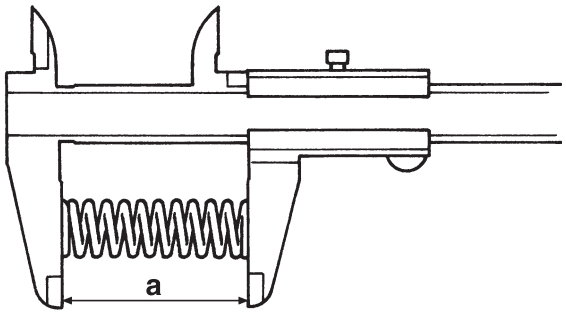
Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9

Warpage limit
0.10 mm (0.004 in)



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
50.00 mm (1.97 in)
Limit
47.50 mm (1.87 in)



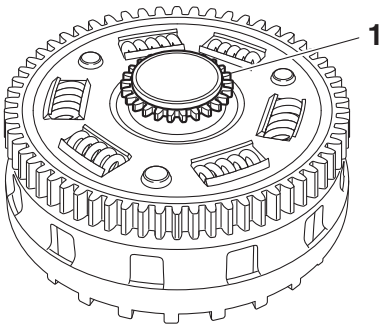
EAS30352
CHECKING THE CLUTCH HOUSING

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

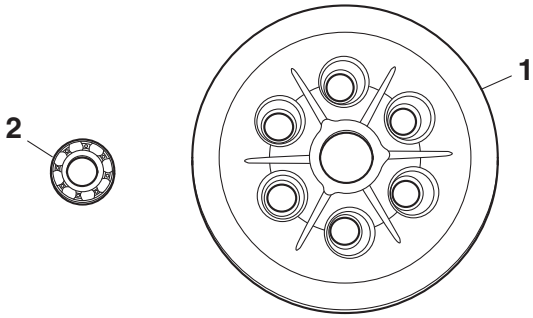
1. Check:
   - Clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

TIP

Pitting on the clutch boss splines will cause erratic clutch operation.

EAS30354
CHECKING THE PRESSURE PLATE

1. Check:
   - Pressure plate "1"
     Cracks/damage → Replace.
   - Bearing "2"
     Damage/wear → Replace.

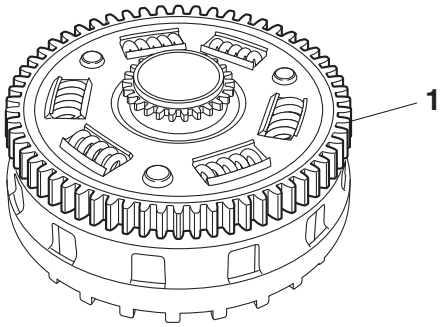


EAS30356
CHECKING THE PRIMARY DRIVE GEAR

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.

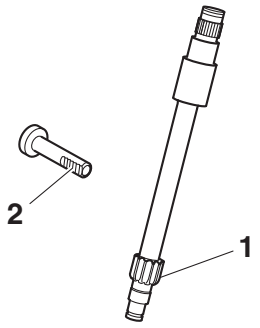
EAS30357
CHECKING THE PRIMARY DRIVEN GEAR

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.



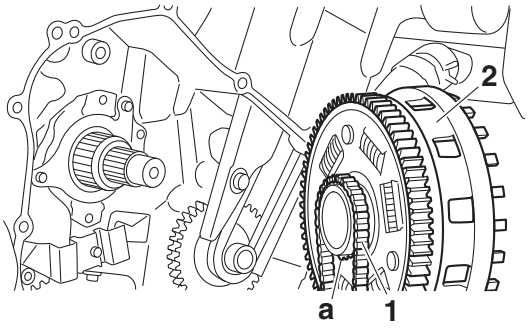
2. Check:
   • Pull rod bearing
     Damage/wear → Replace.

EAS30363
INSTALLING THE CLUTCH

1. Install:
   • Oil pump drive chain “1”
   • Thrust plate
   • Clutch housing “2”
   • Bearing
   • Spacer

TIP

Install the oil pump drive chain onto the oil pump drive sprocket “a”.



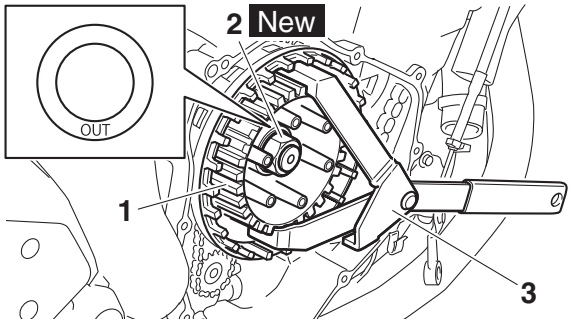
2. Install:
   • Thrust plate
   • Clutch boss “1”
   • Washer
   • Conical spring washer
   • Clutch boss nut “2” New

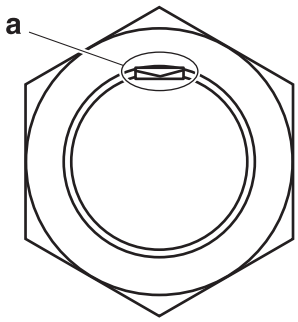
	Clutch boss nut **95 Nm (9.5 m·kgf, 69 ft·lbf)**

TIP

- Lubricate the conical spring washer and clutch boss nut threads with engine oil.
- Install the washer on the main axle with the “OUT” mark facing away from the vehicle.
- While holding the clutch boss “1” with the universal clutch holder “3”, tighten the clutch boss nut.
- Stake the clutch boss nut at a cutout “a” in the main axle.

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

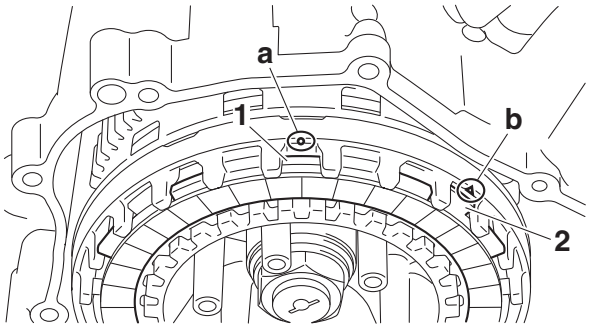




3. Install:
   • Friction plates 1 “1”
   • Friction plates 2 “2”

TIP

- First, install a friction plate, and then alternate between a clutch plate and a friction plate.
- Align a projection on friction plate 1 with the punch mark “a” on the clutch housing and align a projection on friction plate 2 with the “△” mark “b” on the housing.



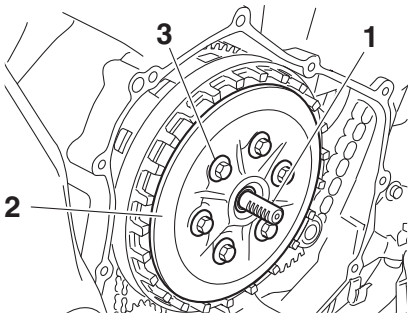
4. Install:
   • Bearing
   • Pull rod “1”
   • Pressure plate “2”

- Clutch springs
- Clutch spring bolts “3”

	Clutch spring bolt **8 Nm (0.8 m·kgf, 5.8 ft·lbf)**

TIP

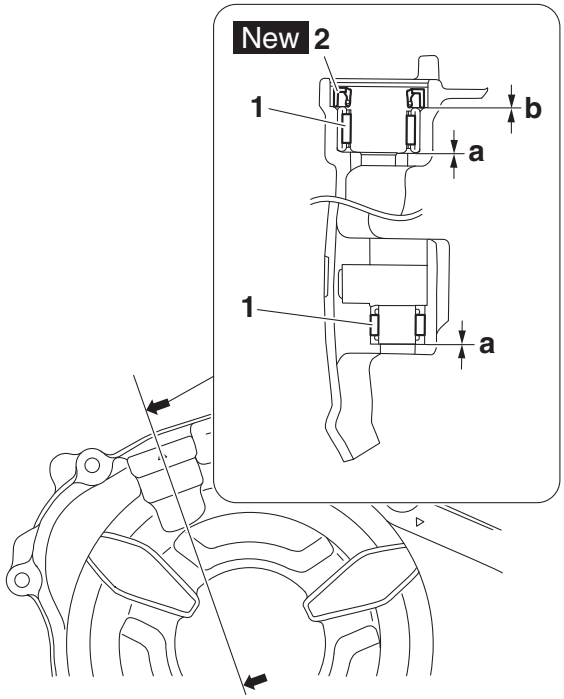
- Apply lithium-soap-based grease onto the pull rod.
- Tighten the clutch spring bolts in stages and in a crisscross pattern.



5. Install:
   - Bearings “1”
   - Oil seal “2” New
     (to the clutch cover)

TIP

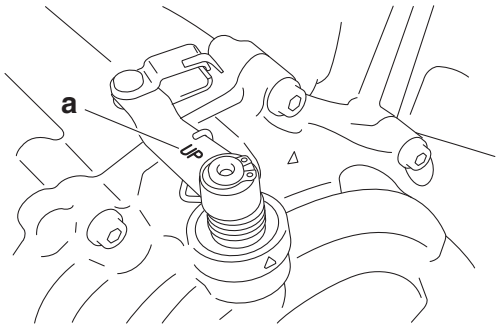
- Lubricate the bearings with engine oil and lubricate the oil seal with lithium-soap-based grease.
- Install the bearings until they contact the surfaces “a” and install the oil seal until it contacts the surface “b” as shown in the illustration.

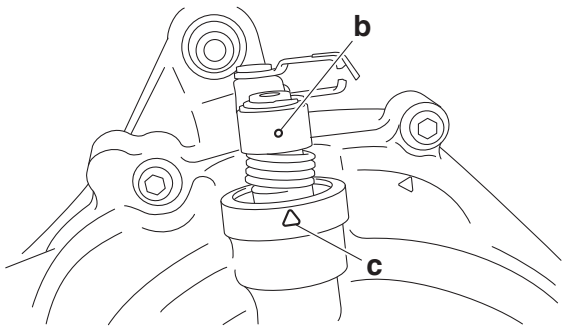


6. Install:
   - Pull lever

TIP

- Install the pull lever with the “UP” mark “a” facing toward upper side.
- When installing the pull lever, push the pull lever and check that the punch mark “b” on the pull lever aligns with the mark “c” on the clutch cover.





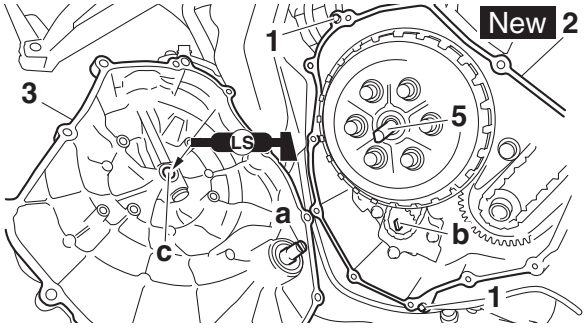
7. Install:
   - Dowel pins “1”

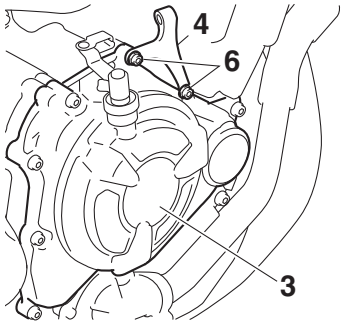
- Clutch cover gasket “2” New
- Clutch cover “3”
- Clutch cable holder “4”

Clutch cover bolt
12 Nm (1.2 m·kgf, 8.7 ft·lbf)
Clutch cable holder bolt
12 Nm (1.2 m·kgf, 8.7 ft·lbf)
LOCTITE®

TIP

- Align the slit “a” in the impeller shaft with the projection “b” on the oil pump driven sprocket.
- Face the serrations on the clutch pull rod “5” rearward and align the rod with the hole “c” in the clutch cover.
- Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.
- Apply locking agent (LOCTITE®) to the threads of only the clutch cable holder bolts “6” shown in the illustration.
- Tighten the bolts in stages and in a crisscross pattern.



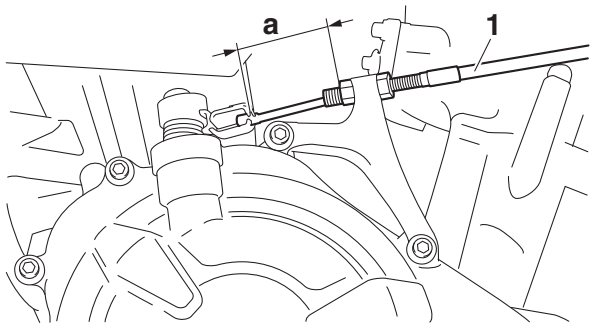


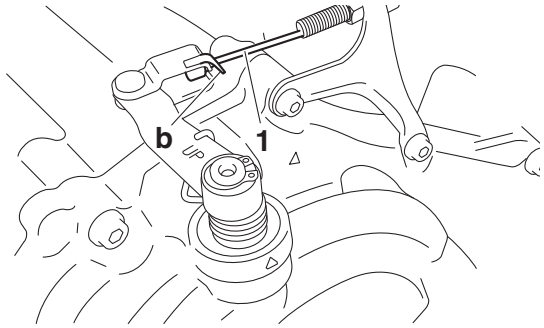
8. Connect:
   - Clutch cable “1”

TIP

- Install the clutch cable so that the clutch cable length “a” is 51.6–62.2mm (2.03–2.45 in) as shown in the illustration. In addition, make sure that the vehicle is positioned upright when measuring the clutch cable length.

- After installing the clutch cable, bend the projection “b” on the pull lever.



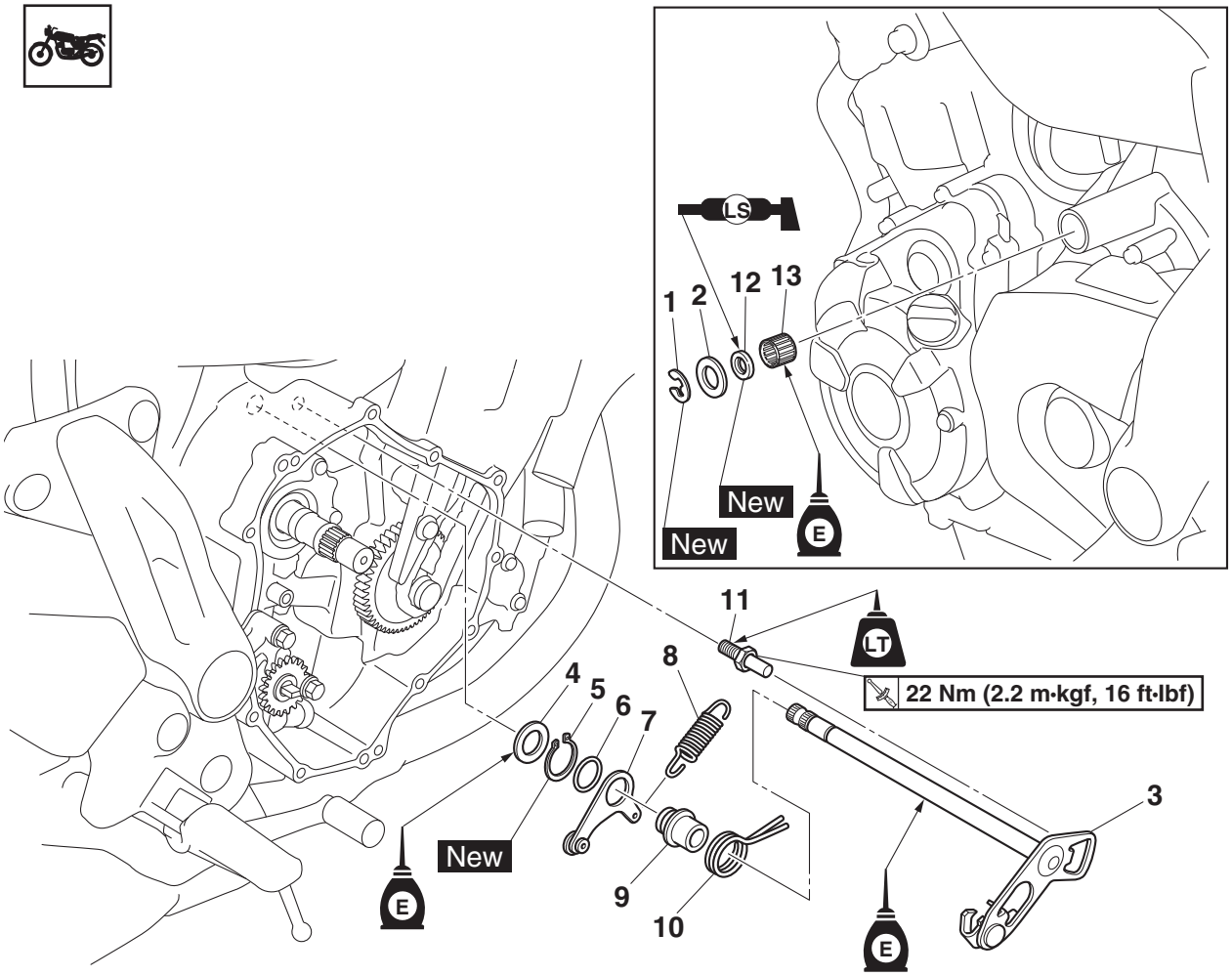


9. Adjust:
   - Clutch lever free play
     Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-12.

Clutch lever free play
5.0–10.0 mm (0.20–0.39 in)

EAS20057
SHIFT SHAFT

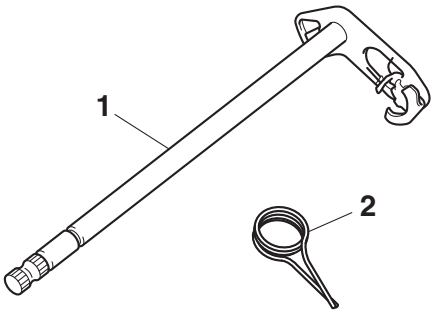
Removing the shift shaft and stopper lever



Order	Job/Parts to remove	Q'ty	Remarks
	Clutch housing		Refer to "CLUTCH" on page 5-46.
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	

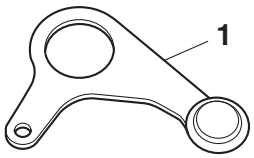
EAS30377
CHECKING THE SHIFT SHAFT

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.



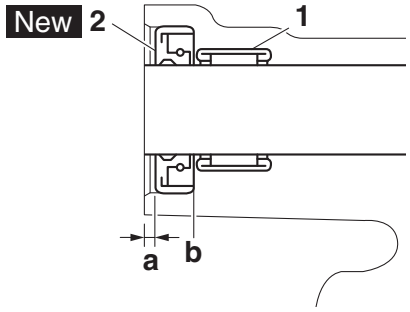
EAS30381
INSTALLING THE SHIFT SHAFT

1. Install:
   - Bearing “1”
   - Oil seal “2” New

Install depth “a”
0.6–1.1 mm (0.02–0.04 in)

TIP

- Apply engine oil onto the bearing.
- Make sure that the bearing does not protrude past the line “b” shown in the illustration.
- Lubricate the oil seal lips with lithium-soap-based grease.

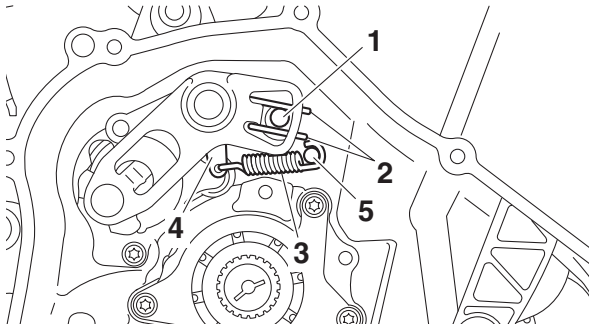


2. Install:
   - Shift shaft spring stopper
   - Washer
   - Shift shaft assembly
   - Stopper lever spring

Shift shaft spring stopper
22 Nm (2.2 m·kgf, 16 ft·lbf)
LOCTITE®

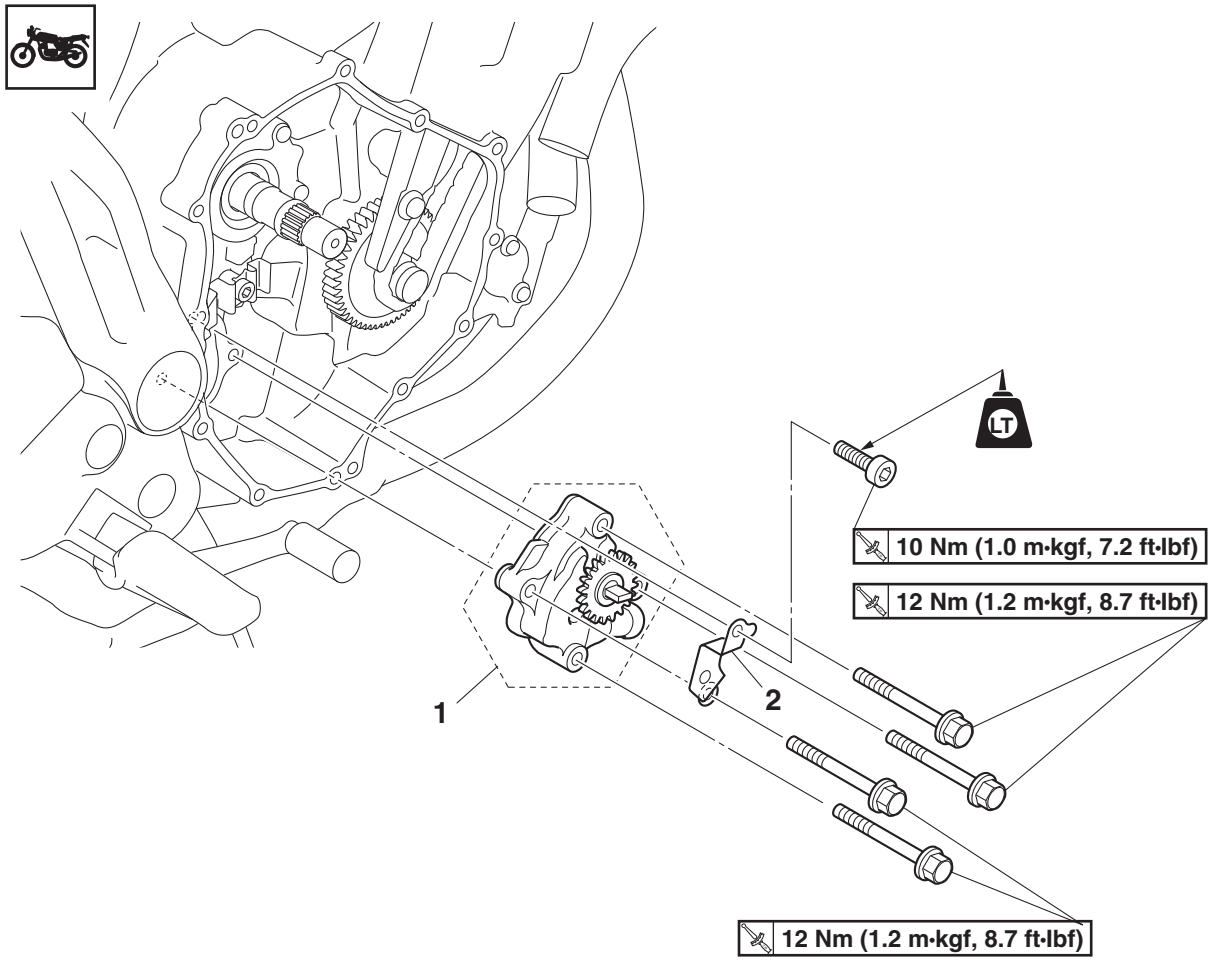
TIP

- Hook the end of the shift shaft spring “2” onto the shift shaft spring stopper “1”.
- Hook the ends of the stopper lever spring “3” onto the stopper lever “4” and the stopper lever spring hook “5”.
- Mesh the stopper lever with the shift drum segment assembly.



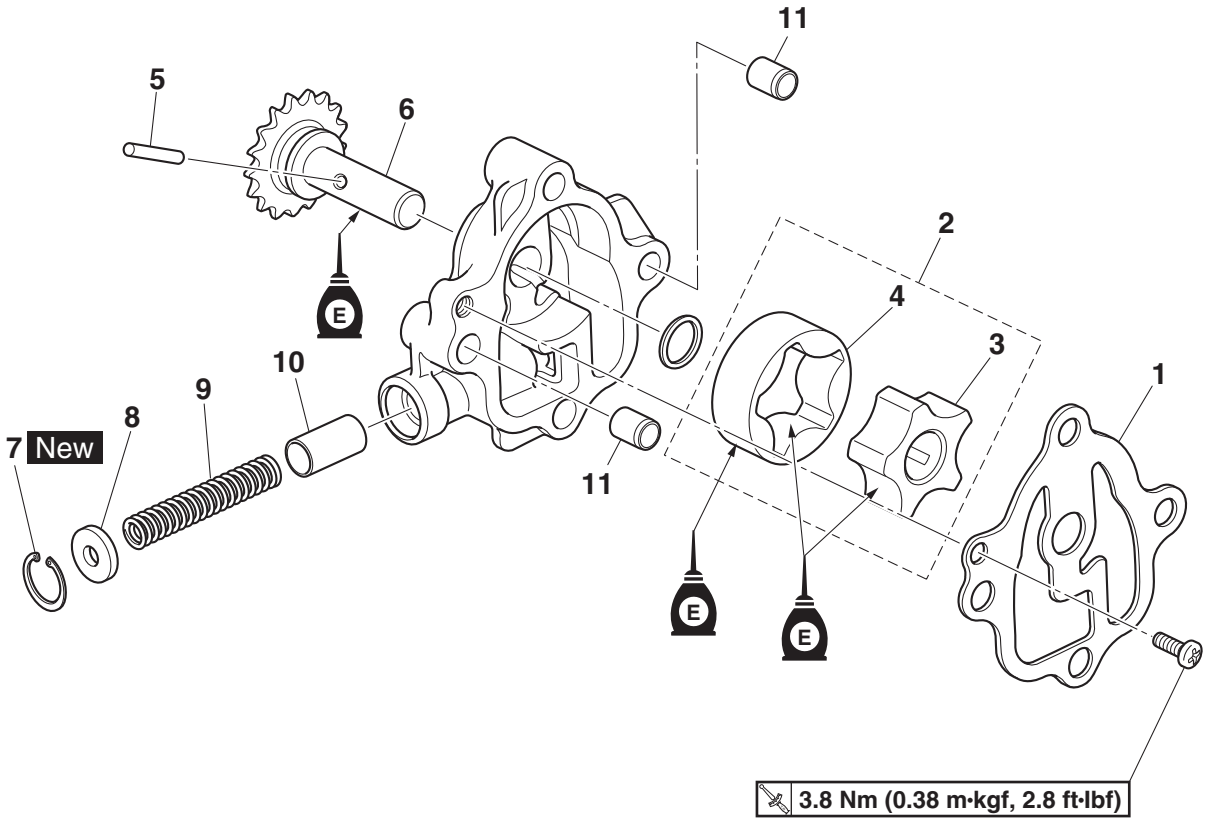
EAS20054
OIL PUMP

Removing the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Clutch housing		Refer to "CLUTCH" on page 5-46.
1	Oil pump assembly	1	
2	Holder	1	

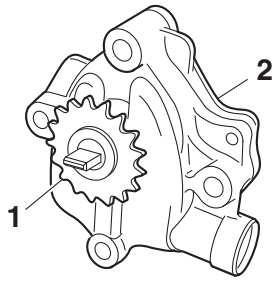
Disassembling the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump cover	1	
2	Oil pump rotor assembly	1	
3	Oil pump inner rotor	1	
4	Oil pump outer rotor	1	
5	Pin	1	
6	Oil pump driven sprocket	1	
7	Circlip	1	Hold down the washer when removing the circlip.
8	Washer	1	
9	Spring	1	
10	Relief valve	1	
11	Dowel pin	2	

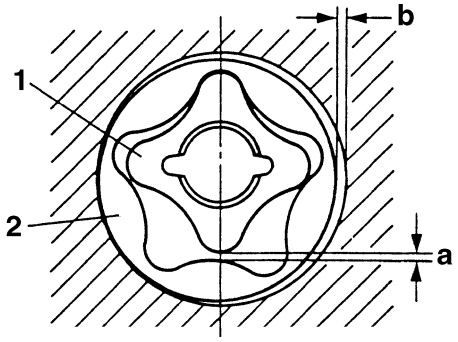
EAS30336
CHECKING THE SPROCKET AND CHAIN
1. Check:
   • Oil pump drive sprocket
   Refer to “CHECKING THE CLUTCH HOUSING” on page 5-52.
   • Oil pump driven sprocket
   Refer to “CHECKING THE OIL PUMP” on page 5-60.
2. Check:
   • Oil pump drive chain
   Damage/stiffness → Replace the oil pump drive chain, oil pump drive sprocket (clutch housing), and oil pump driven sprocket 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).



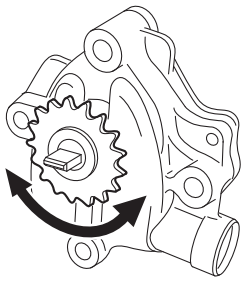
2. Measure:
   • Inner-rotor-to-outer-rotor-tip clearance “a”
   • Outer-rotor-to-oil-pump-housing clearance “b”

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
0.09–0.15 mm (0.0035–0.0059 in)
Limit
0.22 mm (0.0087 in)

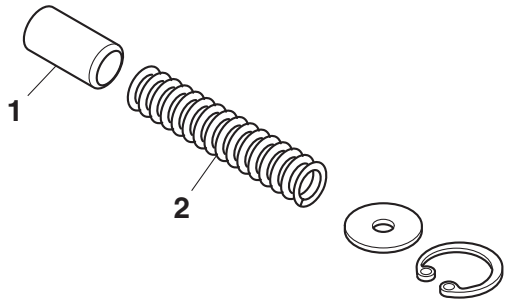


1. Inner rotor
2. Outer rotor

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
   (with the recommended lubricant)

Recommended lubricant
Engine oil

2. Lubricate:
   • Oil pump driven sprocket
   (with the recommended lubricant)

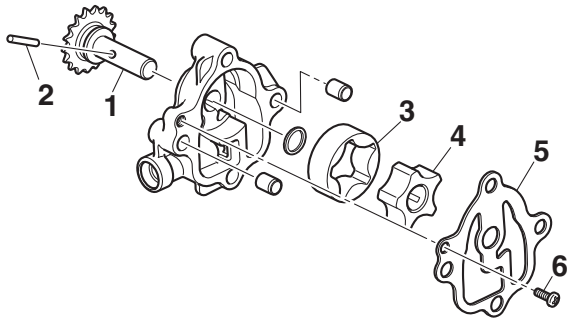
	Recommended lubricant **Engine oil**

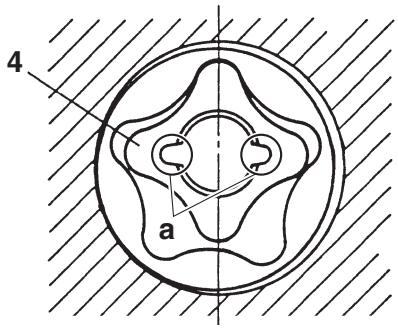
3. Install:
   • Oil pump driven sprocket “1”
   • Pin “2”
   • Outer rotor “3”
   • Inner rotor “4”
   • Oil pump cover “5”
   • Oil pump cover screw “6”

	Oil pump cover screw **3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)**

TIP

Align the pin in the oil pump shaft with the grooves “a” in the inner rotor.





4. Check:
   • Oil pump operation
   Refer to “CHECKING THE OIL PUMP” on page 5-60.

EAS30343
INSTALLING THE OIL PUMP

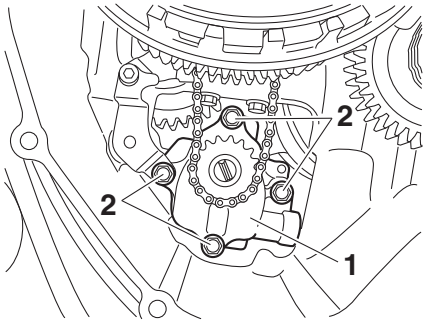
1. Install:
   • Oil pump “1”
   • Oil pump bolts “2”

	Oil pump bolt **12 Nm (1.2 m·kgf, 8.7 ft·lbf)**

ECA20940

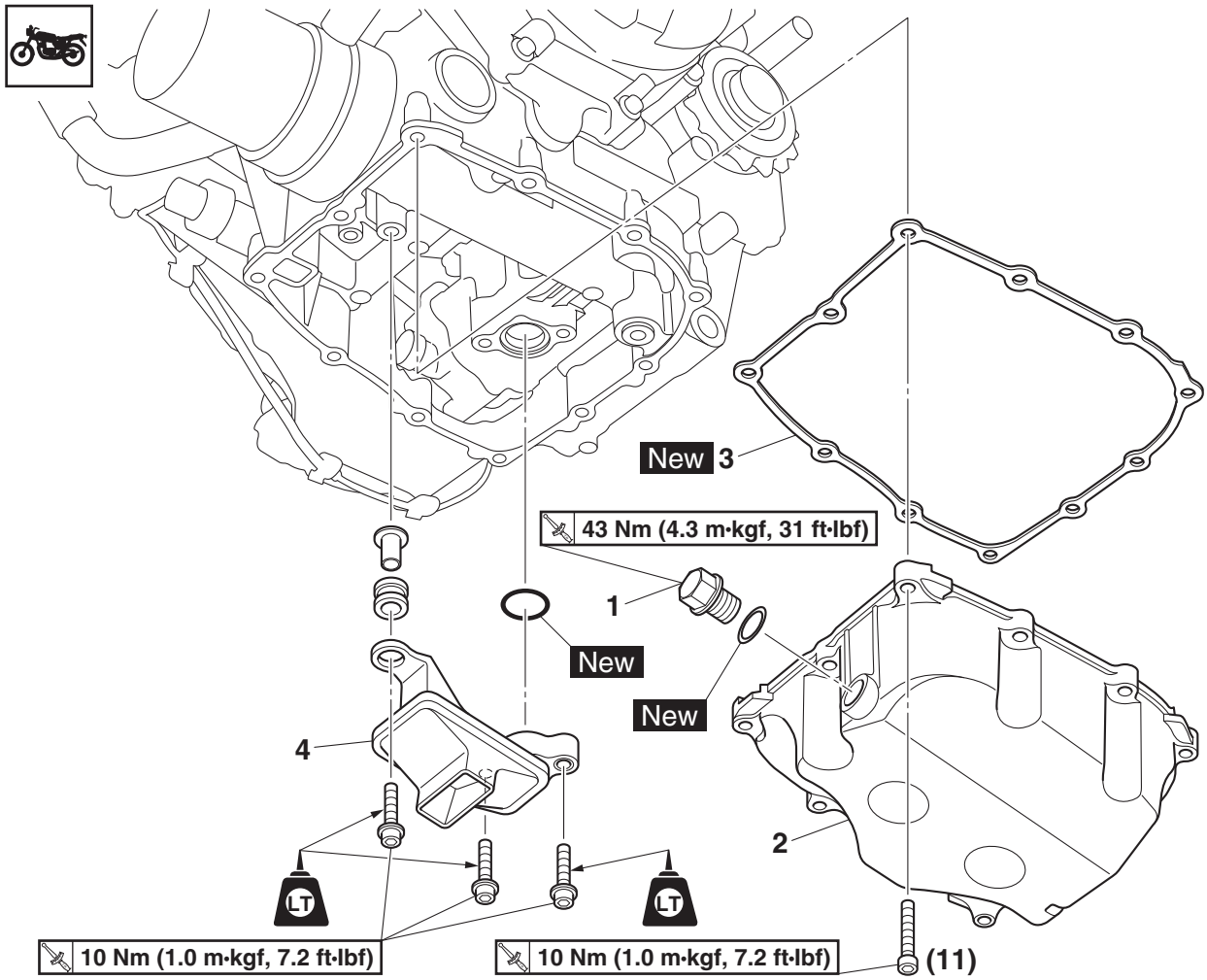
NOTICE

After installing the oil pump drive chain and driven sprocket, make sure the oil pump turns smoothly.



EAS20177
OIL PAN

Removing the oil pan



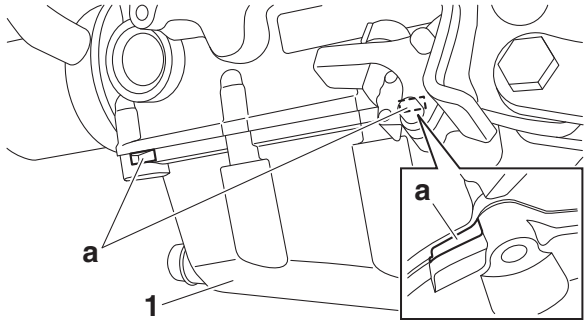
Order	Job/Parts to remove	Q'ty	Remarks
	Pivot shaft protector (right)		Refer to "SWINGARM" on page 4-88.
	Footrest assembly (right)		Refer to "REAR BRAKE" on page 4-43.
	Muffler assembly		Refer to "ENGINE REMOVAL" on page 5-3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-21.
1	Engine oil drain bolt	1	
2	Oil pan	1	
3	Oil pan gasket	1	
4	Oil strainer	1	

EAS31068
REMOVING THE OIL PAN

1. Remove:
   • Oil pan “1”
   • 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.
• Insert a flat-head screwdriver into the slots “a” in the oil pan to remove the oil pan.

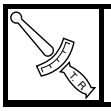


EAS31069
CHECKING THE OIL STRAINER

1. Check:
   • Oil strainer
   Damage → Replace.
   Contaminants → Clean with solvent.

EAS31070
INSTALLING THE OIL PAN

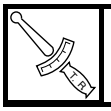
1. Install:
   • Oil pan gasket New
   • Oil pan

	**Oil pan bolt** **10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

TIP

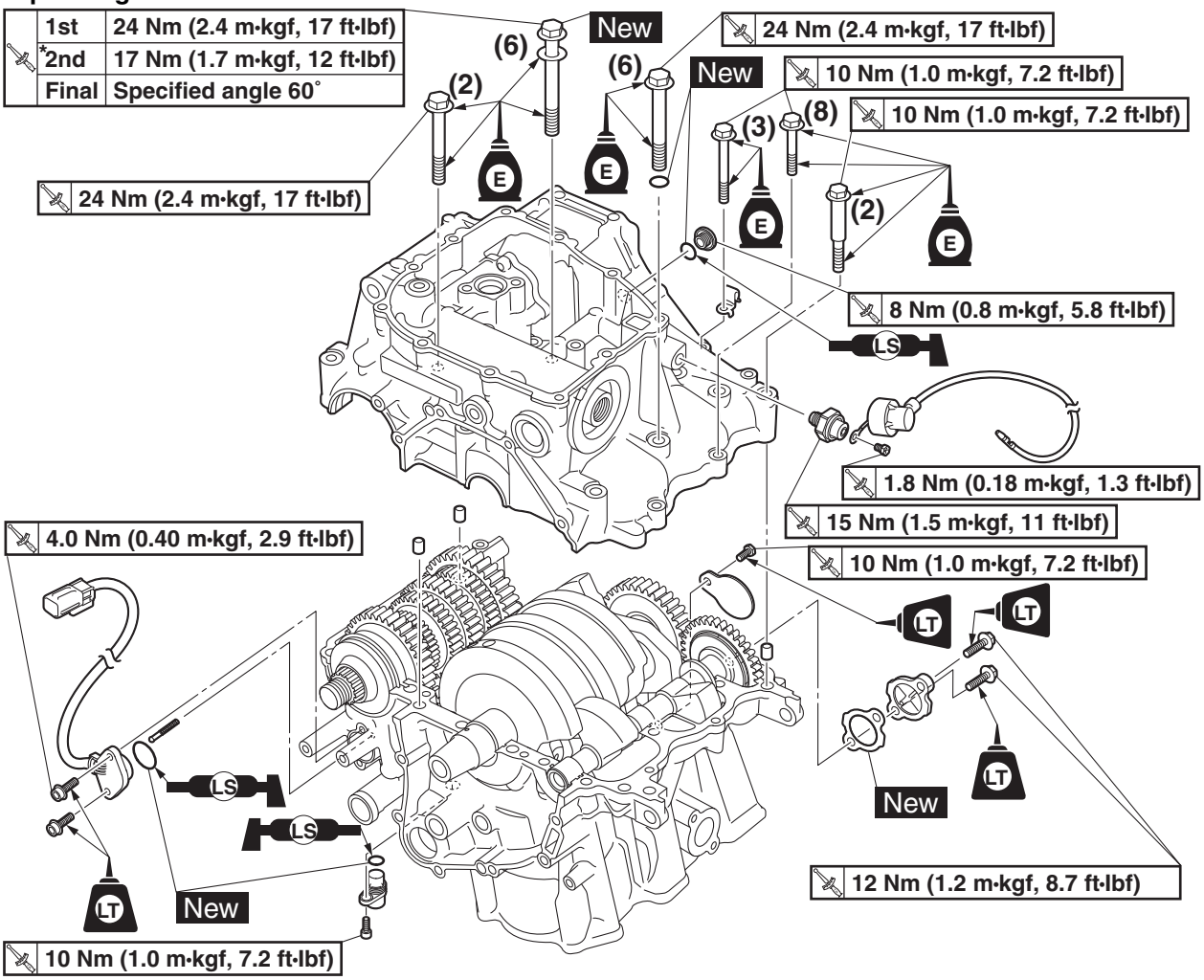
Tighten the oil pan bolts in stages and in a crisscross pattern.

2. Install:
   • Gasket New
   • Engine oil drain bolt

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

EAS20059
CRANKCASE

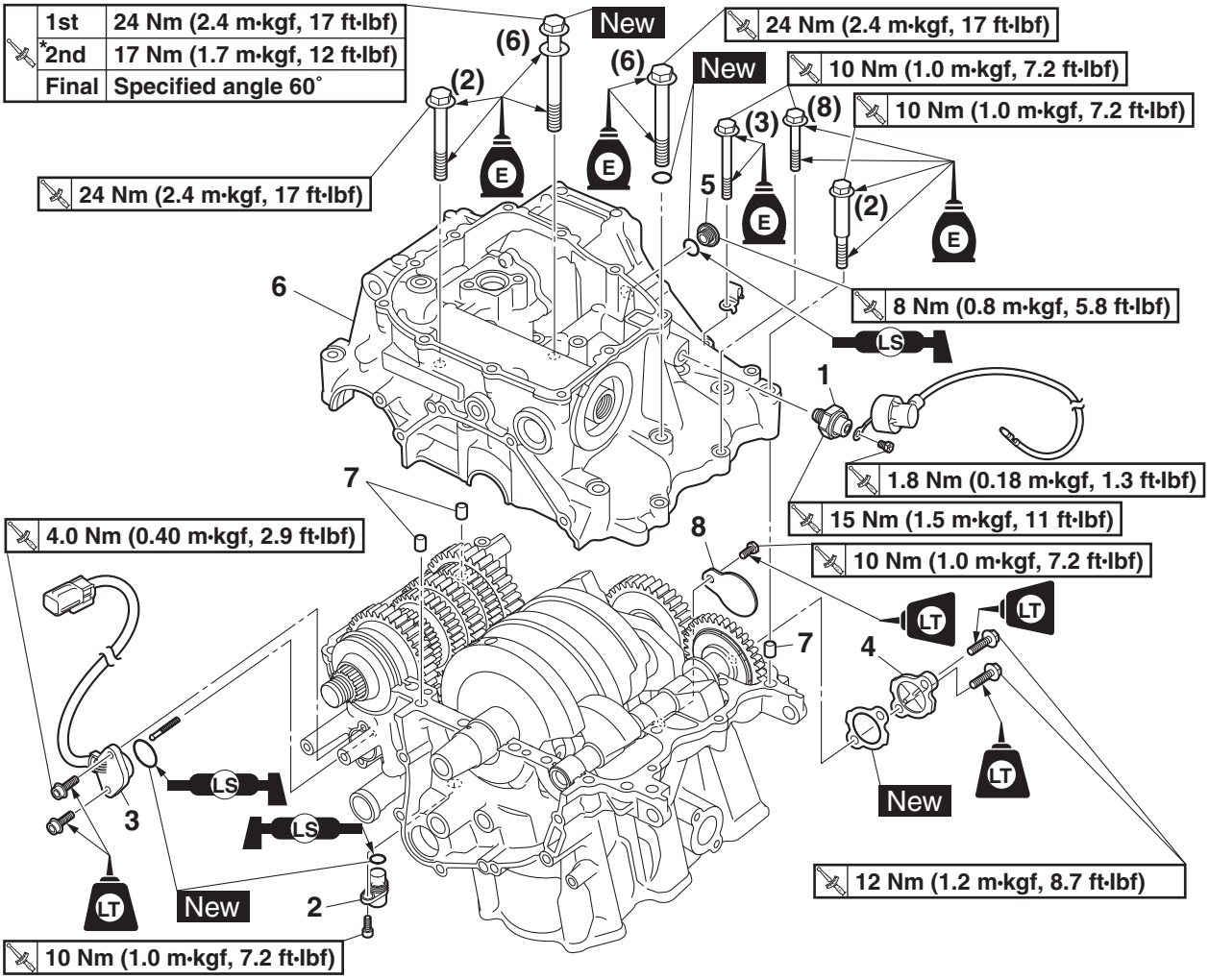
Separating the crankcase



*** Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.**

Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-3.
	Cylinder head cover		Refer to "CAMSHAFTS" on page 5-11.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-23.
	Starter clutch		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-36.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-42.
	Clutch housing		Refer to "CLUTCH" on page 5-46.
	Oil strainer		Refer to "OIL PAN" on page 5-62.

Separating the crankcase



*** Following the tightening order, loosen the bolt one by one, and then retighten it to the specific torque.**

Order	Job/Parts to remove	Q'ty	Remarks
	Oil cooler		Refer to "OIL COOLER" on page 6-5.
	Drive sprocket		Refer to "CHAIN DRIVE" on page 4-93.
1	Oil pressure switch	1	
2	Cylinder plug	1	
3	Gear position switch	1	
4	Balancer shaft access cover	1	
5	Main gallery bolt	1	
6	Crankcase	1	
7	Dowel pin	3	
8	Blind plate	1	

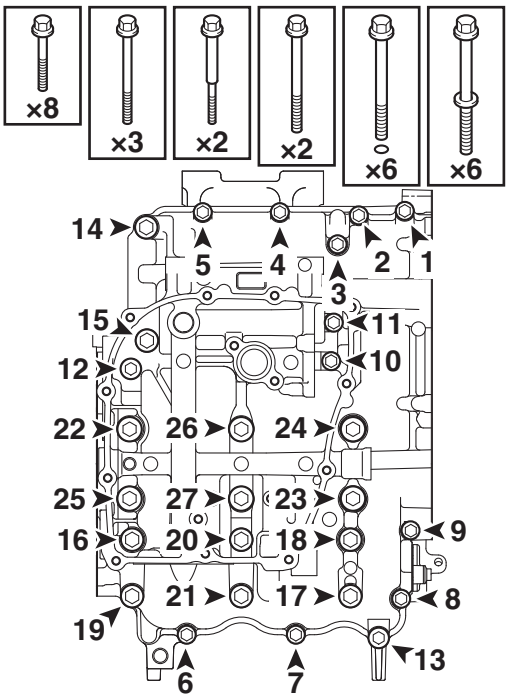
EAS30389
DISASSEMBLING THE CRANKCASE

1. Place the engine upside down.
2. Remove:
   • Crankcase bolt (×27)

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 "1"–"11" in any loosening sequence.
- Loosen the bolts "12"–"27" in the proper sequence as shown.
- The numbers embossed "1"–"16" on the crankcase indicate the crankcase tightening sequence.

• M6 × 40 mm bolt (×8): "1", "2", "4"–"7", "10", "11"
• M6 × 60 mm bolt (×3): "3", "8", "9"
• M6 × 65 mm bolt (×2): "12", "13"
• M8 × 65 mm bolt (×2): "14", "15"
• M8 × 70 mm bolt (×6) (bolts with O-rings): "16"– "21"
• M9 × 80 mm bolt (×6) (bolts with washers): "22"–"27"



3. Remove:
   • Crankcase
   • Dowel pins

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.

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)

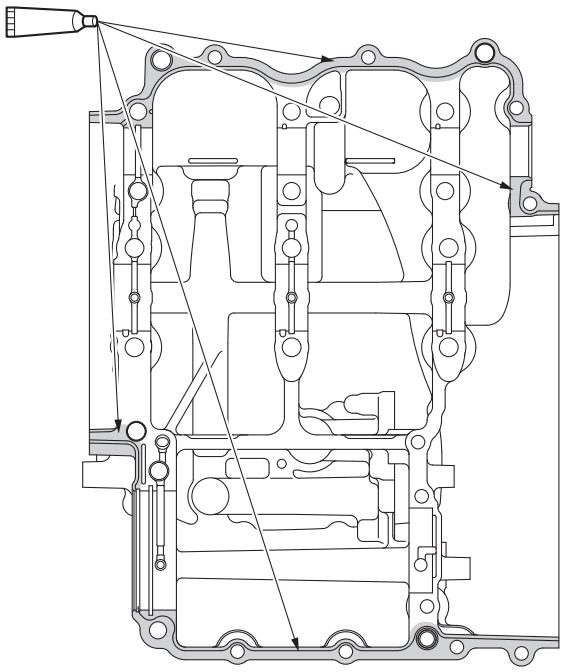
	Recommended lubricant **Engine oil**

2. Apply:
   • Sealant
   (onto the crankcase mating surfaces)

	Yamaha bond No. 1215 **90890-85505** **(Three bond No.1215®)**

ECA20880
NOTICE

Do not allow any sealant to come into contact with the oil gallery, crankshaft journal bearings, or balancer shaft journal bearings.

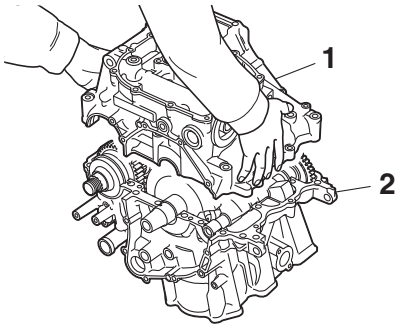


3. Install:
   • Dowel pins
4. Set the shift drum assembly and transmission gears in the neutral position.
5. Install:
   • Crankcase “1”
   (onto the cylinder “2”)

ECA13980

NOTICE

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

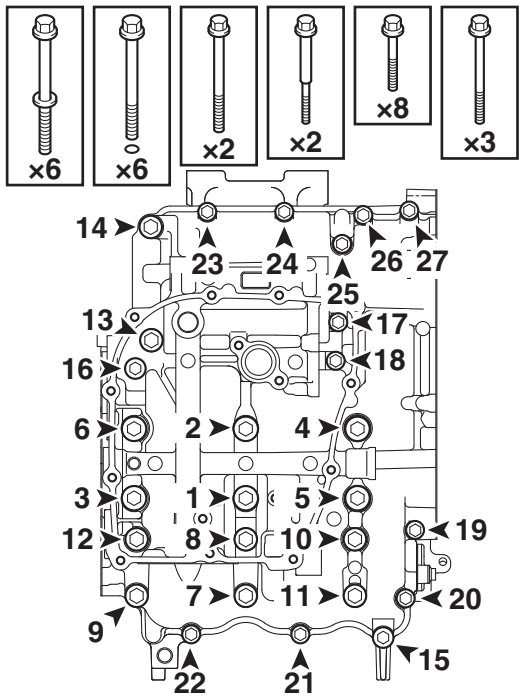


6. Install:
   • Crankcase bolt (×27)

TIP

- Tighten the bolts “1”–“16” in the order of the embossed numbers on the crankcase.
- Lubricate the bolts “1”–“6” threads, mating surfaces and washers with engine oil.
- Lubricate the bolts “7”–“12” threads, mating surfaces and O-rings with engine oil.
- Lubricate the bolts “13”–“27” threads and mating surfaces with engine oil.

  • M9 × 80 mm bolt (×6) (bolts with washers): “1”–“6” New
  • M8 × 70 mm bolt (×6) (bolts with new O-rings): “7”–“12”
  • M8 × 65 mm bolt (×2): “13”, “14”
  • M6 × 65 mm bolt (×2): “15”, “16”
  • M6 × 40 mm bolt (×8): “17”, “18”, “21”–“24”, “26”, “27”
  • M6 × 60 mm bolt (×3): “19”, “20”, “25”



7. Tighten:
   • Crankcase bolts “1”–“6”

Crankcase bolts (bolts with washers) “1”–“6”
1st: 24 Nm (2.4 m·kgf, 17 ft·lbf)
***2nd: 17 Nm (1.7 m·kgf, 12 ft·lbf)**
Final: specified angle 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.

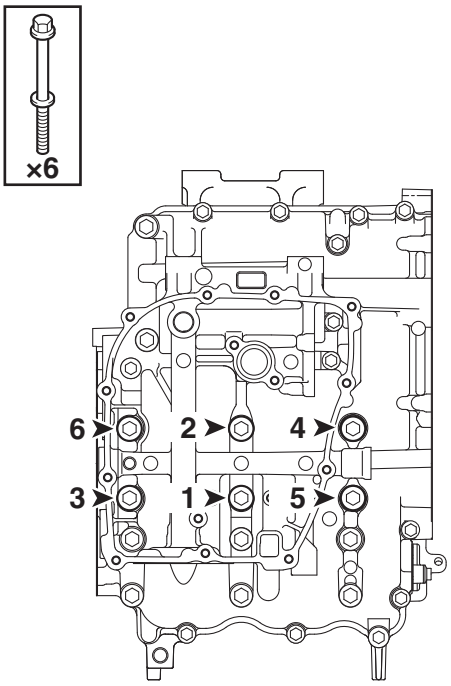
ECA20890

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.

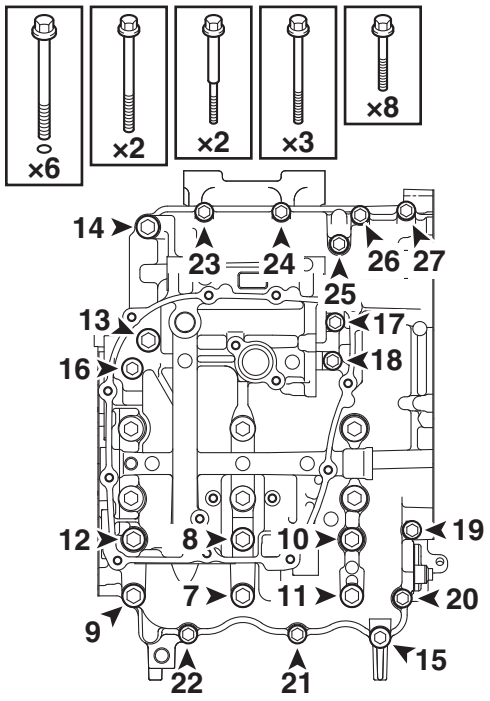


8. Tighten:
   • Crankcase bolts “7”–“27”

Crankcase bolts “7”–“14”
24 Nm (2.4 m·kgf, 17 ft·lbf)
Crankcase bolts “15”–“27”
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

- Tighten the bolts “7”–“16” in the tightening sequence cast on the crankcase.
- Tighten the bolts “17”–“27” in any tightening sequence using a crisscross pattern.



EAS31071

INSTALLING THE OIL PRESSURE SWITCH

1. Install:
   • Oil pressure switch “1”
   • Oil pressure switch lead “2”

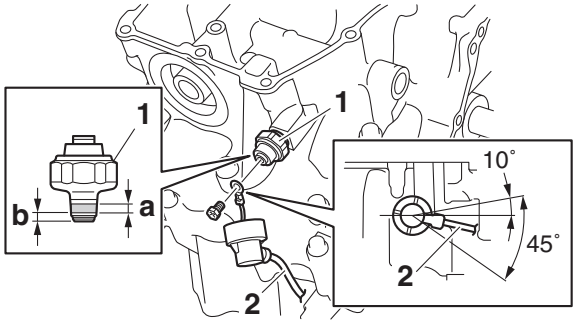
Oil pressure switch
15 Nm (1.5 m·kgf, 11 ft·lbf)
Oil pressure switch lead bolt
1.8 Nm (0.18 m·kgf, 1.3 ft·lbf)

2. Apply:
   • Sealant
   (onto the oil pressure switch threads)

Yamaha bond No. 1215
90890-85505
(Three bond No.1215®)

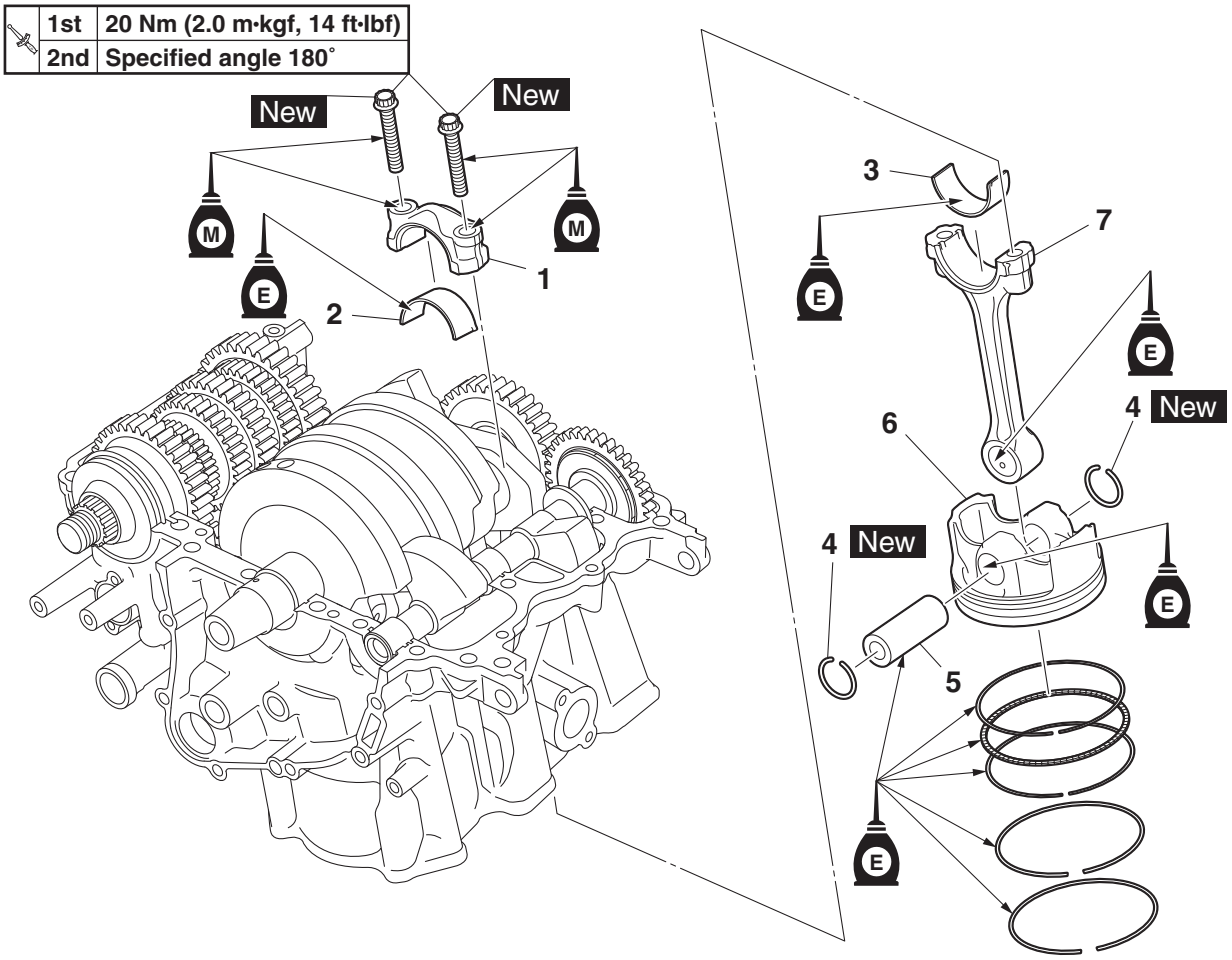
TIP

- Apply Three bond No.1215® to the threads “a” of the oil pressure switch. However, do not apply Three bond No.1215® to the portion “b” of the oil pressure switch.
- Install the oil pressure switch lead so that it is routed within the range shown in the illustration.


1
b
a
1
10˚
45˚
2
2

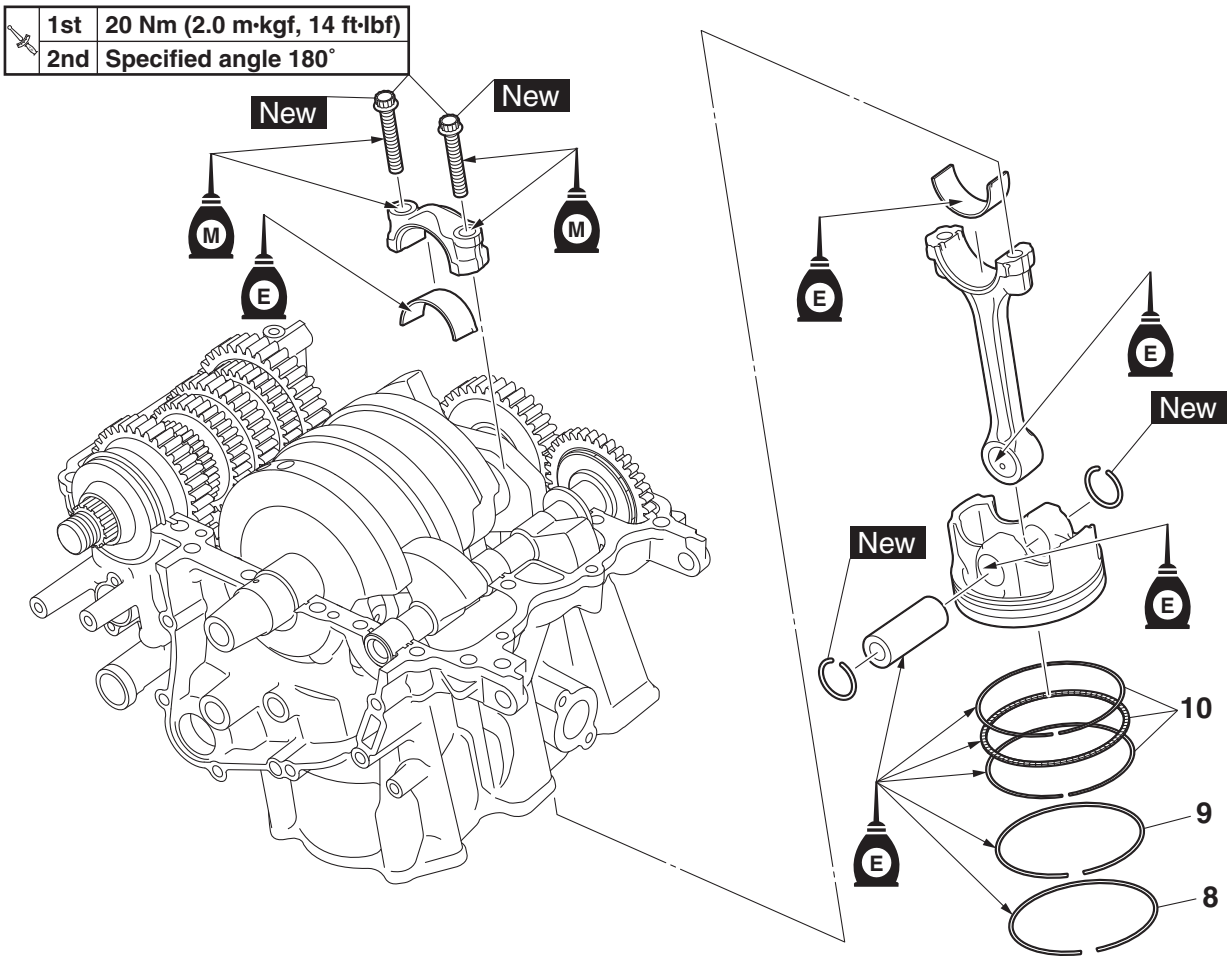
EAS20132
CONNECTING RODS AND PISTONS

Removing the connecting rods and pistons



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to all of the connecting rods and pistons.
			Refer to "CRANKCASE" on page 5-64.
1	Connecting rod cap	1	
2	Big end lower bearing	1	
3	Big end upper bearing	1	
4	Piston pin clip	2	
5	Piston pin	1	
6	Piston	1	
7	Connecting rod	1	

Removing the connecting rods and pistons



Order	Job/Parts to remove	Q'ty	Remarks
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	

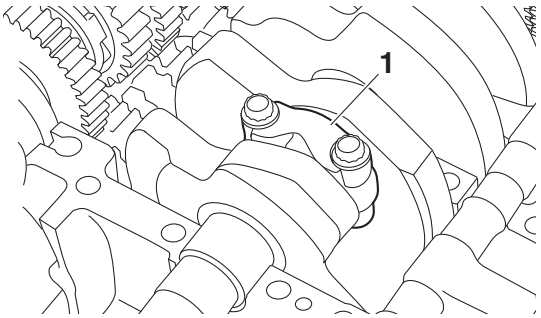
EAS30745
REMOVING THE CONNECTING RODS AND PISTONS

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 connecting rod cap 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”
   - Connecting rod “4”

ECA13810

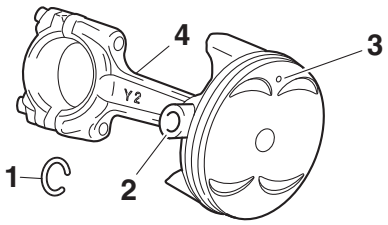
NOTICE

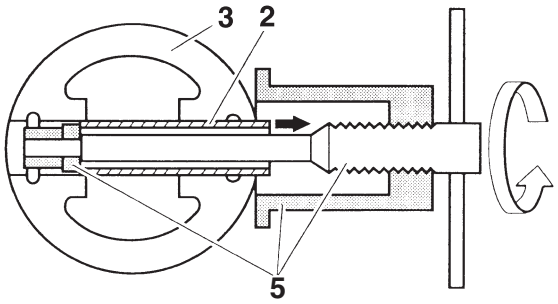
Do not use a hammer to drive the piston pin out.

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 debarred and the piston pin is still difficult to remove, remove it with the piston pin puller set “5”.

Piston pin puller set
90890-01304
Piston pin puller
YU-01304

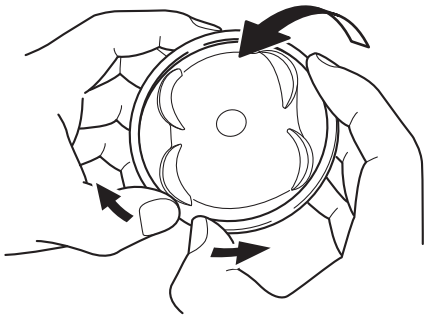




3. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

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

The following procedure applies to all of the cylinders and pistons.

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

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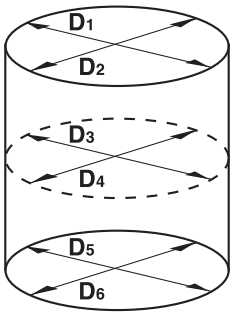
a. Measure cylinder bore with the cylinder bore gauge.

TIP

Measure cylinder bore by taking side-to-side and front-to-back measurements of the cylinder.

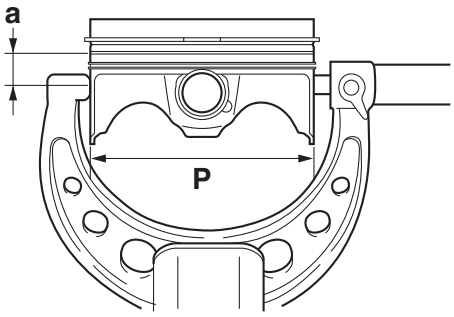
Bore
80.000–80.010 mm (3.1496–3.1500 in)
Taper limit
0.050 mm (0.0020 in)
Out of round limit
0.050 mm (0.0020 in)

"C" = maximum of D_1, D_2, D_3, D_4, D_5, D_6
Taper (front-to-back) = maximum difference between D_1, D_3, D_5 Taper (side-to-side) = maximum difference between D_2, D_4, D_6
Out of round (top) = difference between D_1, D_2 Out of round (middle) = difference between D_3, D_4 Out of round (bottom) = difference between 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.

Diameter
79.970–79.985 mm (3.1484–3.1490 in)



a. 8.0 mm (0.31 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"

f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

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EAS30748

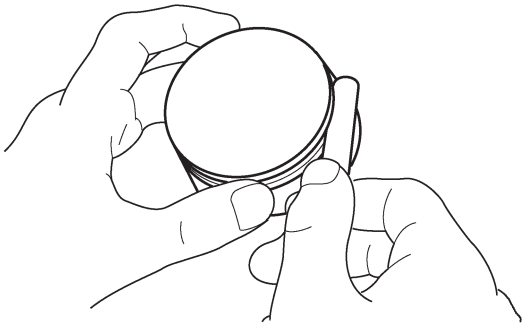
CHECKING THE PISTON RINGS

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.

Top ring
Ring side clearance
0.030–0.065 mm (0.0012–0.0026 in)
Limit
0.115 mm (0.0045 in)
Ring side clearance
0.020–0.055 mm (0.0008–0.0022 in)
Limit
0.115 mm (0.0045 in)



2. Install:
   • Piston ring
   (into the cylinder)

TIP

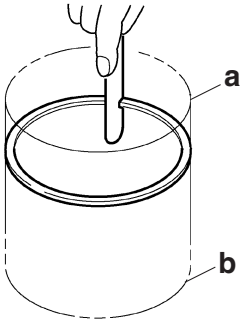
Use the piston crown to level the piston ring near the bottom of the cylinder where the cylinder wear is lowest.

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.

Piston ring
Top ring
End gap (installed)
0.15–0.25 mm (0.0059–0.0098 in)
Limit
0.50 mm (0.0197 in)
2nd ring
End gap (installed)
0.30–0.45 mm (0.0118–0.0177 in)
Limit
0.80 mm (0.0315 in)
Oil ring
End gap (installed)
0.10–0.35 mm (0.0039–0.0138 in)



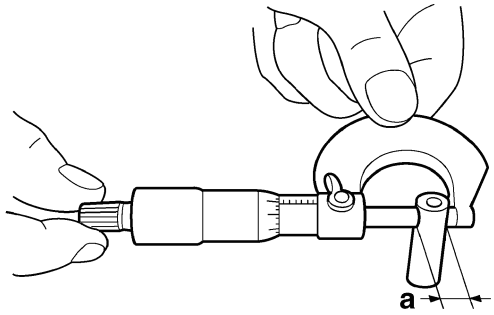
a. Bottom of cylinder
b. Top of cylinder

EAS30749
CHECKING THE PISTON PIN

The following procedure applies to all of the piston pins.

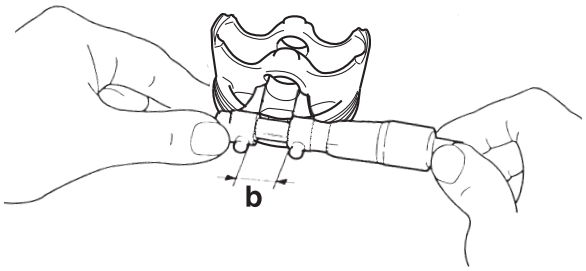
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin, and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter "a"
   Out of specification → Replace the piston pin.

Piston pin outside diameter
17.990–17.995 mm (0.7083–0.7085 in)
Limit
17.970 mm (0.7075 in)



3. Measure:
   • Piston pin bore inside diameter "b"
   Out of specification → Replace the piston.

Piston pin bore inside diameter
18.004–18.015 mm (0.7088–0.7093 in)
Limit
18.045 mm (0.7104 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
0.009–0.025 mm (0.0004–0.0010 in)
Limit
0.075 mm (0.0030 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.

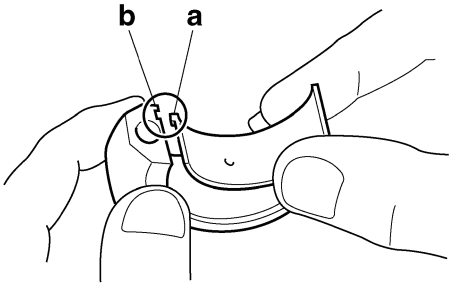
ECA13930
NOTICE

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.

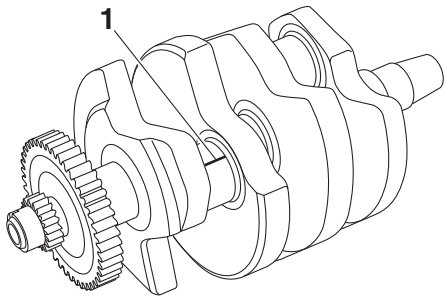
a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rods halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

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.



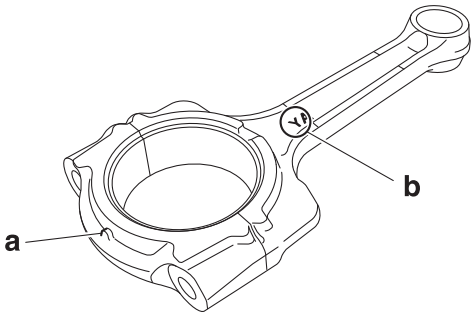
d. Assemble the connecting rod halves.

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

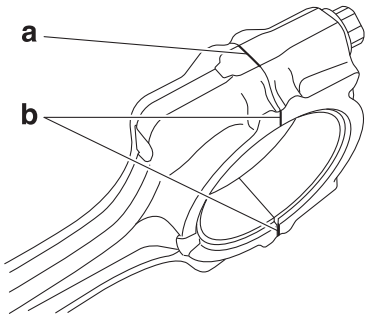
Install by carrying out the following procedures in order to assemble in the most suitable condition.

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 Nm (3.0 m·kgf, 22 ft·lbf)**

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.

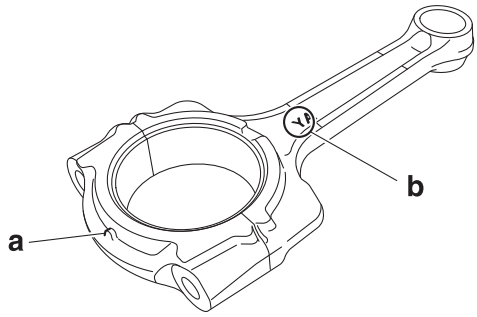


a. Side machined face
b. Thrusting faces

f. Loosen the connecting rod bolts, 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

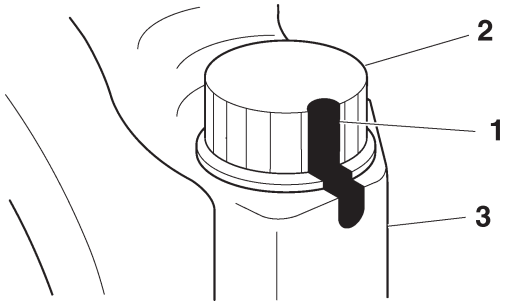
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Make sure that the projection “a” on the connecting rod cap faces the same direction as the “Y” mark “b” on the connecting rod.
- Make sure the “Y” marks “b” on the connecting rods face towards the left side of the crankshaft.



g. Tighten the connecting rod bolts with a torque wrench.

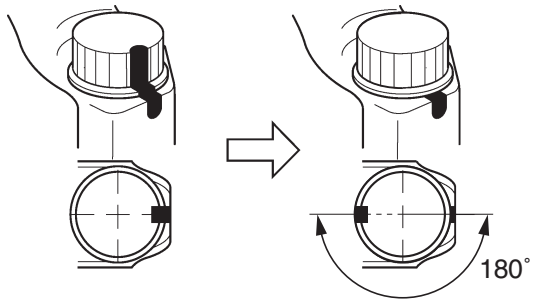
	Connecting rod bolt (1st) **20 Nm (2.0 m·kgf, 14 ft·lbf)**

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 180°**



EWA16610

WARNING

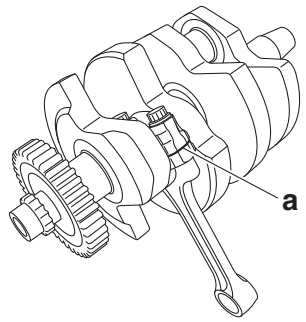
If the bolt is tightened more than the specified angle, do not loosen the bolt and then retighten it. Instead, replace the bolt with a new one and perform the procedure again.

ECA20890

NOTICE

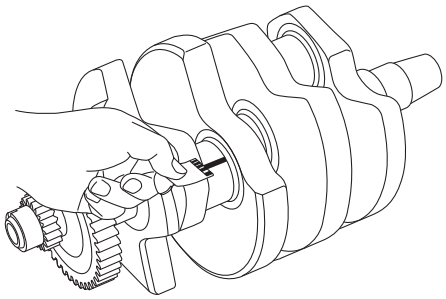
Do not use a torque wrench to tighten the bolt to the specified angle.

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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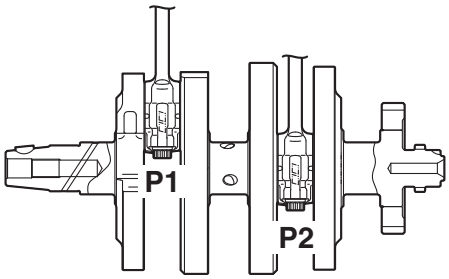
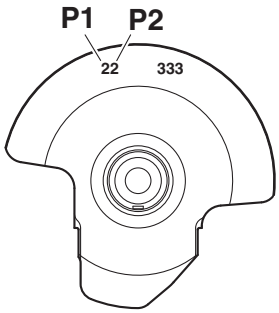
2. Select:
   • Big end bearings (P_1–P_2)

TIP

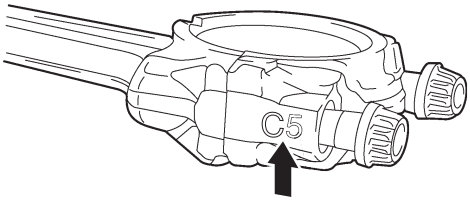
- The numbers "A" stamped into the crankshaft web and the numbers "B" on the connecting rods are used to determine the replacement big end bearings sizes.
- "P_1"–"P_2" refer to the bearings shown in the crankshaft illustration.



A



B



For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "5" and "2" respectively, then the bearing size for "P_1" is:

"P_1" (connecting rod)– "P_1" (crankshaft) = 5 – 2 = 3 (brown)

Bearing color code
1. Blue 2. Black 3. Brown 4. Green

EAS30751

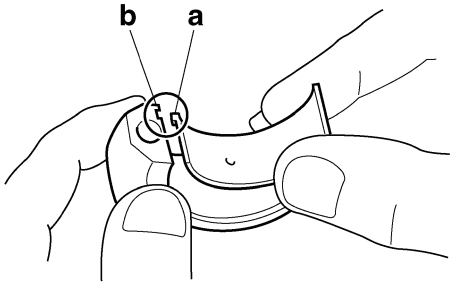
INSTALLING THE CONNECTING ROD AND PISTON

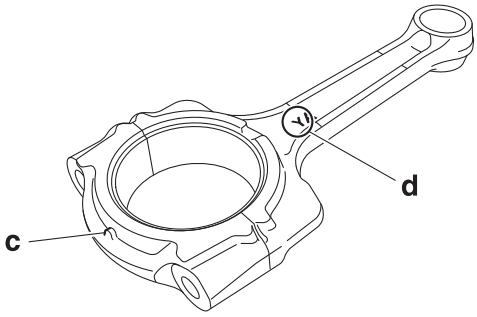
The following procedure applies to all of the connecting rods and pistons.

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

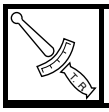
Tighten the connecting rod bolts using the plastic-region tightening angle method. Always install new bolts.

TIP

Install by carrying out the following procedures in order to assemble in the most suitable condition.

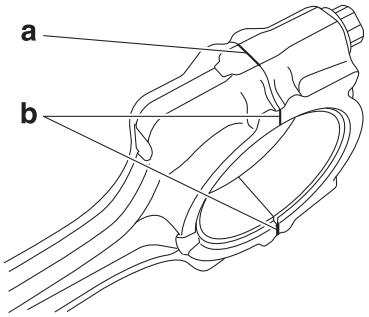
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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 Nm (3.0 m·kgf, 22 ft·lbf)**

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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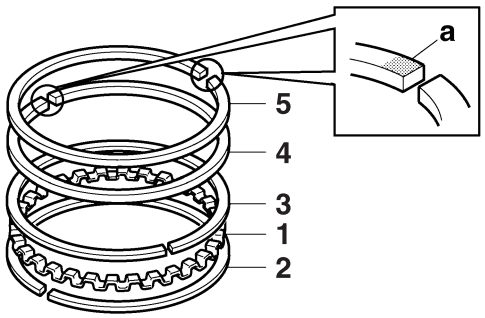
3. Install:
   - Oil ring expander “1”
   - Lower oil ring rail “2”
   - Upper oil ring rail “3”
   - 2nd ring “4”
   - Top ring “5”

TIP

Be sure to install the piston rings so that the manufacturer’s marks “a” face up.

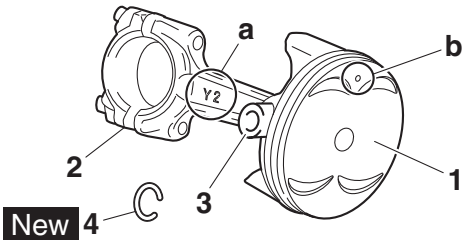


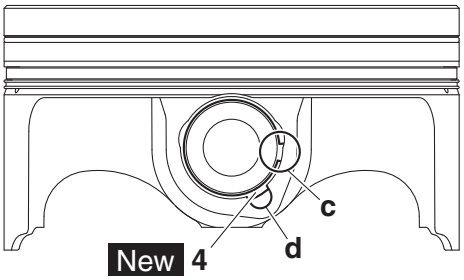
4. Install:
   - Piston “1”
     (onto the respective connecting rod “2”)

- 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.
- When installing a piston pin clip, make sure that the clip ends “c” are positioned away from the cutout “d” in the piston as shown in the illustration.
- Reinstall each piston into its original cylinder.

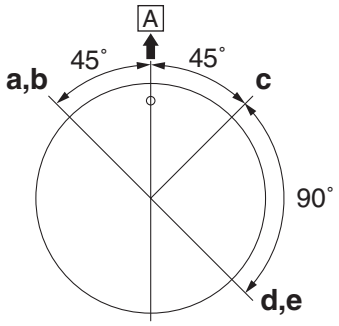




5. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

6. Offset:
   - Piston ring end gaps



a. 2nd ring
b. Lower oil ring rail
c. Upper oil ring rail
d. Top ring
e. Oil ring expander
A. Exhaust side

7. Lubricate:
   - Crankshaft pin
   - Connecting rod big end bearing inner surface
   (with the recommended lubricant)

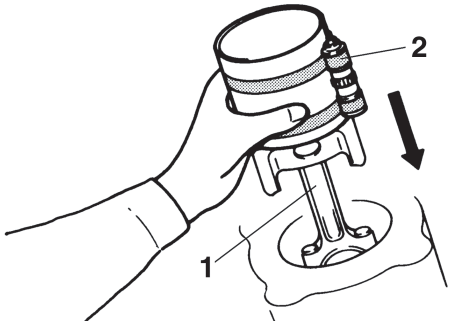
	Recommended lubricant **Engine oil**

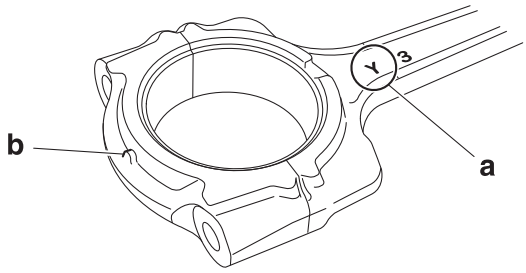
8. Install:
   - Connecting rod assemblies “1”
   (into the cylinder and onto the crankshaft pin)
   - Connecting rod caps
   (onto the connecting rod)

TIP

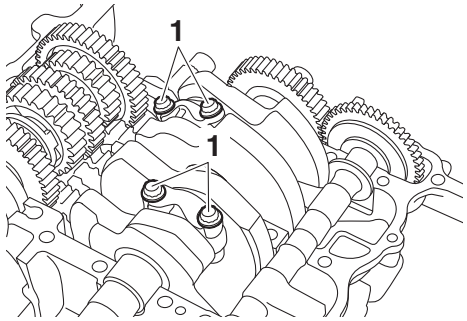
- While compressing the piston ring with piston ring compressor “2”, install the connecting rod assembly into the cylinder with the other hand.
- Make sure the “Y” marks “a” on the connecting rods face towards the left side of the crankshaft.
- Make sure that the projection “b” on the connecting rod cap faces the same direction as the “Y” mark “a” on the connecting rod.
- Apply Molybdenum disulfide oil to the threads and seats of the connecting rod bolt.

	Piston ring compressor **90890-05158** **Piston ring compressor** **YM-08037**





9. Tighten:
   • Connecting rod bolts “1”



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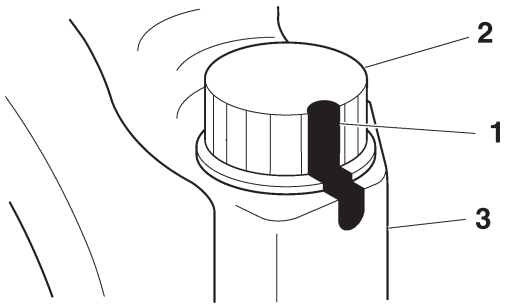
TIP

Tighten the connecting rod bolts using the following procedure.

a. Tighten the connecting rod bolts with a torque wrench.

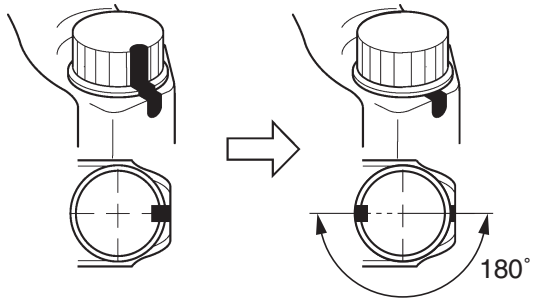
	Connecting rod bolt (1st) 20 Nm (2.0 m·kgf, 14 ft·lbf)

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 180°



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

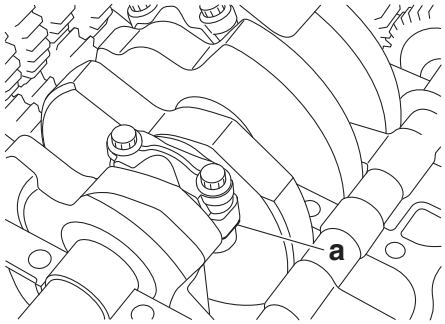
Do not use a torque wrench to tighten the bolt to the specified angle.

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.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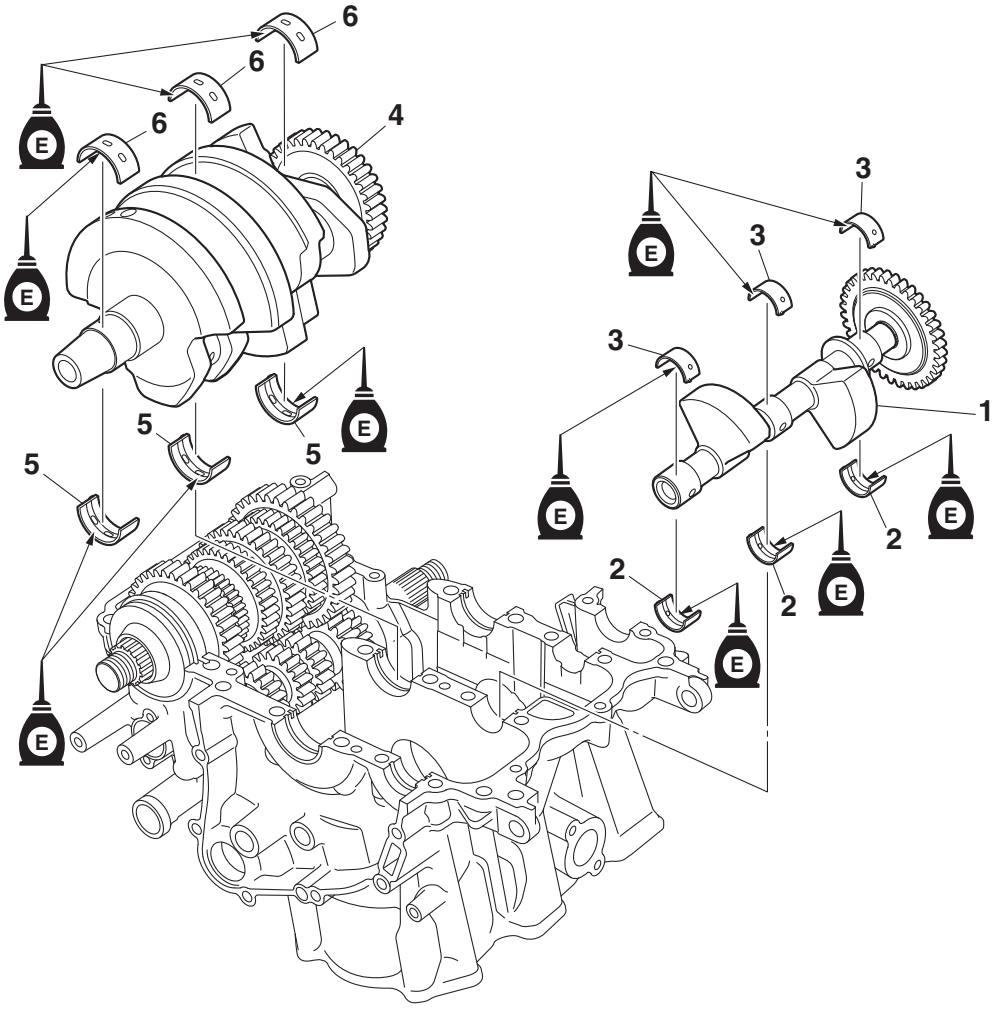
EAS20178
CRANKSHAFT AND BALANCER SHAFT

Removing the crankshaft and balancer shaft



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Refer to "CRANKCASE" on page 5-64.
	Connecting rod		Refer to "CONNECTING RODS AND PISTONS" on page 5-70.
1	Balancer shaft assembly	1	
2	Balancer shaft journal lower bearing	3	
3	Balancer shaft journal upper bearing	3	
4	Crankshaft assembly	1	
5	Crankshaft journal lower bearing	3	
6	Crankshaft journal upper bearing	3	

EAS31072
REMOVING THE BALANCER SHAFT JOURNAL BEARINGS
1. Remove:
   - Balancer shaft journal lower bearings (from the crankcase)
   - Balancer shaft journal upper bearings (from the cylinder)

TIP

Identify the position of each balancer shaft journal bearing so that it can be reinstalled in its original place.

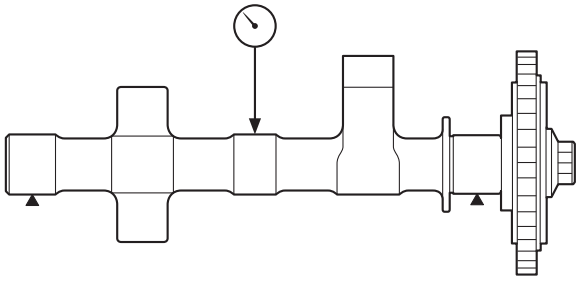
EAS31074
REMOVING THE CRANKSHAFT JOURNAL BEARINGS
1. Remove:
   - Crankshaft journal lower bearings (from the crankcase)
   - Crankshaft journal upper bearings (from the cylinder)

TIP

Identify the position of each crankshaft journal bearing so that it can be reinstalled in its original place.

EAS31142
CHECKING THE BALANCER SHAFT ASSEMBLY
1. Check:
   - Balancer driven gear
     Damage/wear → Replace the balancer drive gear and balancer shaft assembly as a set.
     Excessive noise during operation → Replace the balancer drive gear and balancer shaft assembly as a set.
2. Measure:
   - Balancer shaft runout
     Out of specification → Replace the balancer shaft assembly.

Balancer shaft runout limit
0.030 mm (0.0012 in)



3. Check:
   - Balancer shaft assembly
     Cracks/damage/wear → Replace the balancer shaft assembly and journal bearings.
     Dirt → Clean.
   - Bearings
     Damage/wear → Replace.
4. Measure:
   - Balancer shaft-journal-to-balancer shaft-journal-bearing clearance
     Out of specification → Replace the balancer shaft journal bearings.

Balancer shaft journal to balancer shaft bearing clearance
0.020–0.054 mm (0.0008–0.0021 in)
Balancer shaft journal to balancer shaft bearing clearance
0.020–0.054 mm (0.0008–0.0021 in)

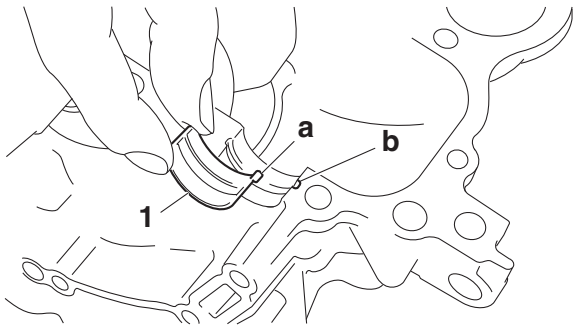
ECA18400
NOTICE

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.

a. Clean the balancer shaft journal bearings, balancer shaft journals, and bearing portions of the crankcase and cylinder.
b. Install the balancer shaft journal upper bearings “1” and the balancer shaft assembly into the cylinder.

TIP

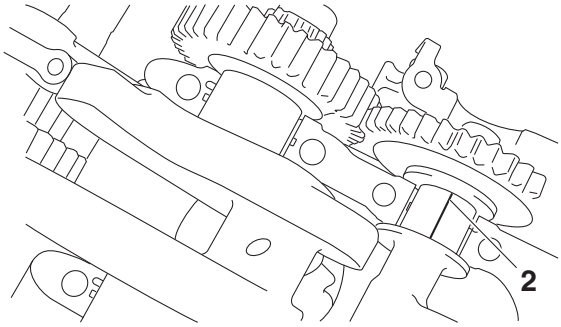
Align the projections “a” on the balancer shaft journal upper bearings with the notches “b” in the cylinder.



c. Put a piece of Plastigauge® “2” on each balancer shaft journal.

TIP

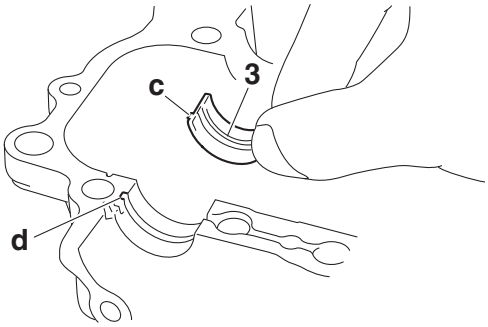
Do not put the Plastigauge® over the oil hole in the balancer shaft journal.



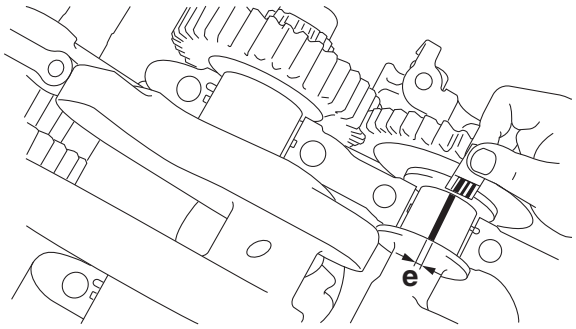
d. Install the balancer shaft journal lower bearings "3" into the crankcase and assemble the crankcase and cylinder.

TIP

- Align the projections "c" of the balancer shaft journal lower bearings with the notches "d" in the crankcase.
- Do not move the balancer shaft until the clearance measurement has been completed.



e. Tighten the bolts to specification in the tightening sequence cast on the crankcase. Refer to "CRANKCASE" on page 5-64.
f. Remove the crankcase and the balancer shaft journal lower bearings.
g. Measure the compressed Plastigauge® width "e" 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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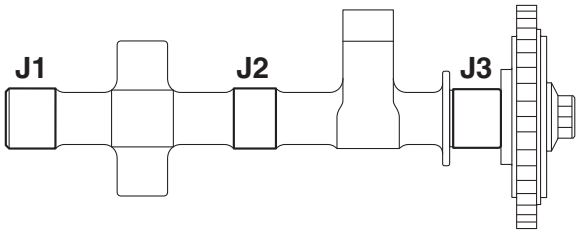
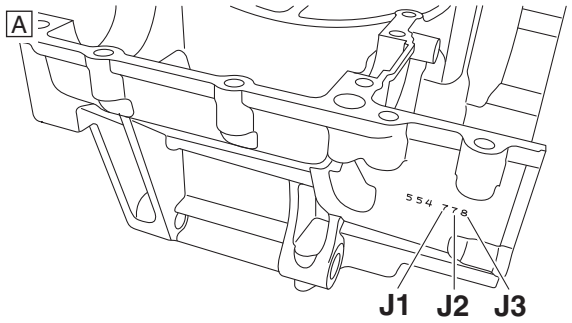
5. Select:
   - Balancer shaft journal bearings (J_1–J_3)

TIP

- The numbers "A" stamped into the crankcase and the numbers "B" stamped into the balancer shaft web are used to determine the replacement balancer shaft journal bearing sizes.
- J_1–J_3 refer to the bearings shown in the crankcase and balancer shaft web illustration.
- If J_1–J_3 are the same, use the same size for all of the bearings.





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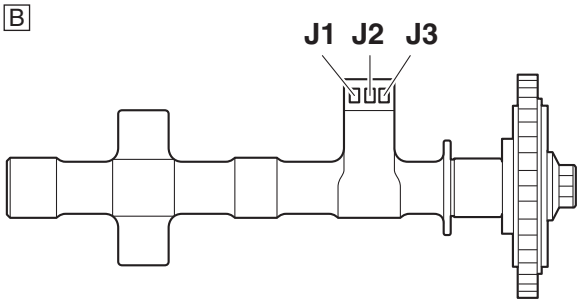


For example, if the crankcase J_1 and balancer shaft web J_1 numbers are 6 and 5 respectively, then the bearing size for J_1 is:

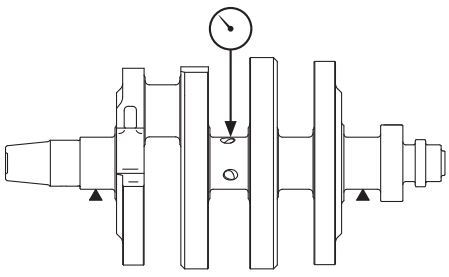
J_1 (crankcase) – J_1 (balancer shaft web)
= 6 – 5 =
1 (blue)

Bearing color code
1. Blue 2. Black 3. Brown 4. Green 5. Yellow

EAS31075
CHECKING THE CRANKSHAFT

1. Check:
   - Balancer drive gear
     Damage/wear → Replace the balancer drive gear and balancer shaft assembly as a set.
     Excessive noise during operation → Replace the balancer drive gear and balancer shaft assembly as a set.
2. Measure:
   - Crankshaft runout
     Out of specification → Replace the crankshaft.

Runout limit
0.030 mm (0.0012 in)



3. Check:
   - Crankshaft journal surfaces
   - Crankshaft pin surfaces
   - Bearing surfaces
     Scratches/wear → Replace the crankshaft.
4. Measure:
   - Crankshaft-journal-to-crankshaft-journal-bearing clearance
     Out of specification → Replace the crankshaft journal bearings.

Journal oil clearance
0.018–0.042 mm (0.0007–0.0017 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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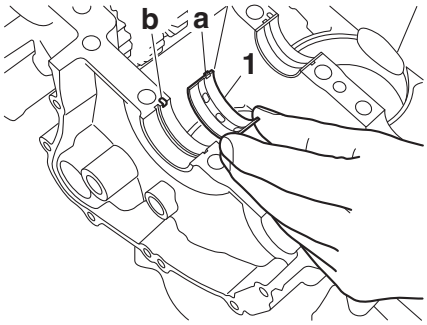
a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the cylinder and crankcase.
b. Install the crankshaft journal upper bearings “1” and the crankshaft into the cylinder.

TIP

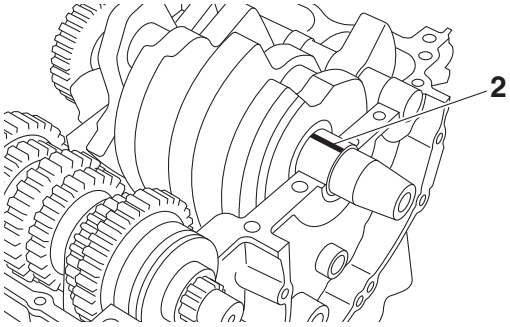
Align the projections “a” on the crankshaft journal upper bearings with the notches “b” in the cylinder.



c. Put a piece of Plastigauge® “2” on each crankshaft journal.

TIP

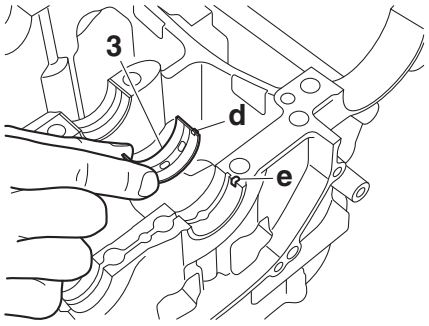
Do not put the Plastigauge® over the oil hole in the crankshaft journal.



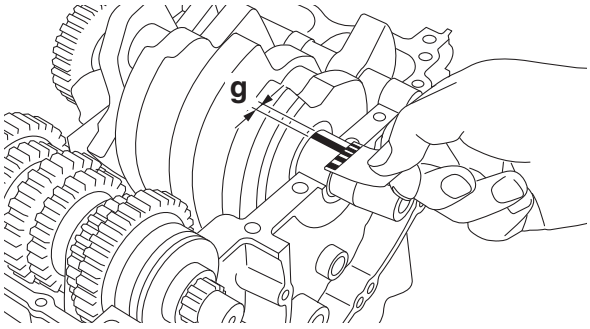
d. Install the crankshaft journal lower bearings "3" into the crankcase and assemble the crankcase and cylinder.

TIP

- Align the projections "d" of the crankshaft journal lower bearings with the notches "e" in the crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.



e. Tighten the bolts to specification in the tightening sequence cast on the crankcase. Refer to "CRANKCASE" on page 5-64.
f. Remove the crankcase and the crankshaft journal lower bearings.
g. Measure the compressed Plastigauge® width "g" 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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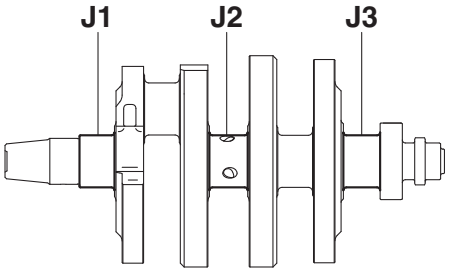
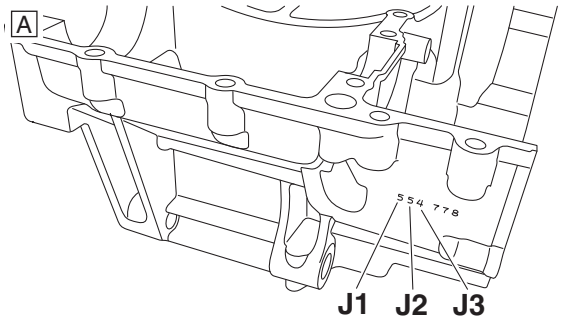
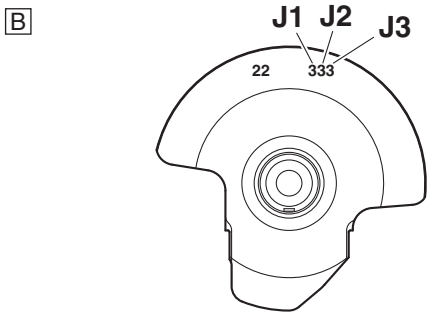
5. Select:
   - Crankshaft journal bearings (J_1–J_3)

TIP

- The numbers "A" stamped into the crankcase and the numbers "B" stamped into the crankshaft web are used to determine the replacement crankshaft journal bearing sizes.
- J_1–J_3 refer to the bearings shown in the crankcase and crankshaft web illustration.
- If J_1–J_3 are the same, use the same size for all of the bearings.







For example, if the crankcase J_1 and crankshaft web J_1 numbers are 5 and 3 respectively, then the bearing size for J_1 is:

J_1 (crankcase) – J_1 (crankshaft web) –2 = 5 – 3 – 2 = 0 (white–pink)

Bearing color code
-1. Violet-Pink 0. White-Pink 1. Blue-Pink 2. Black-Pink 3. Brown-Pink

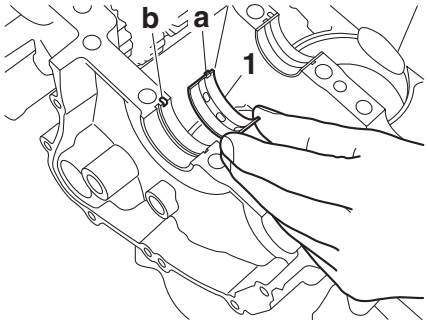
EAS31077
INSTALLING THE CRANKSHAFT

1. Install:
   - Crankshaft journal upper bearings (into the upper crankcase)
   - Crankshaft journal lower bearings (into the lower crankcase)

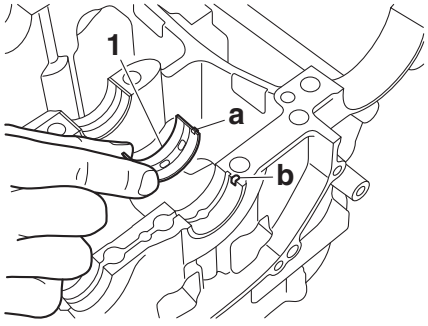
TIP

- Align the projections “a” on the crankshaft journal bearings “1” with the notches “b” in the crankcase.
- Be sure to install each crankshaft journal bearing in its original place.

A



B



A. Cylinder
B. Crankcase

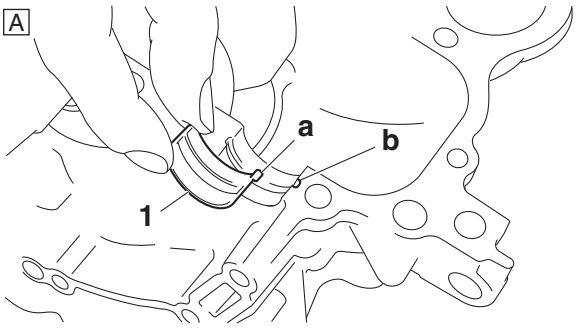
EAS31078
INSTALLING THE BALANCER SHAFT ASSEMBLY

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 crankcase.
- Be sure to install each balancer shaft journal bearing in its original place.

A



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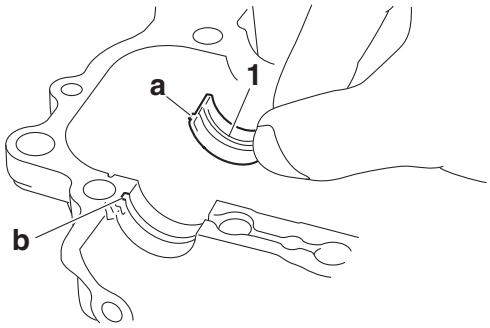
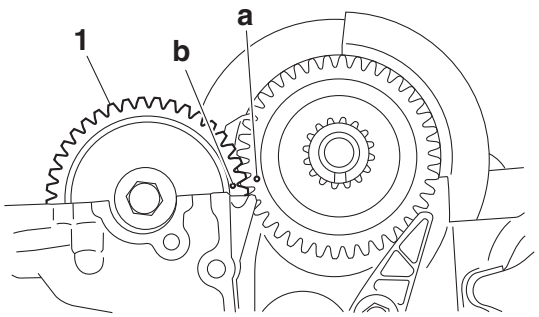


A. Upper crankcase
B. Lower crankcase

2. Install:
   - Balancer shaft “1”

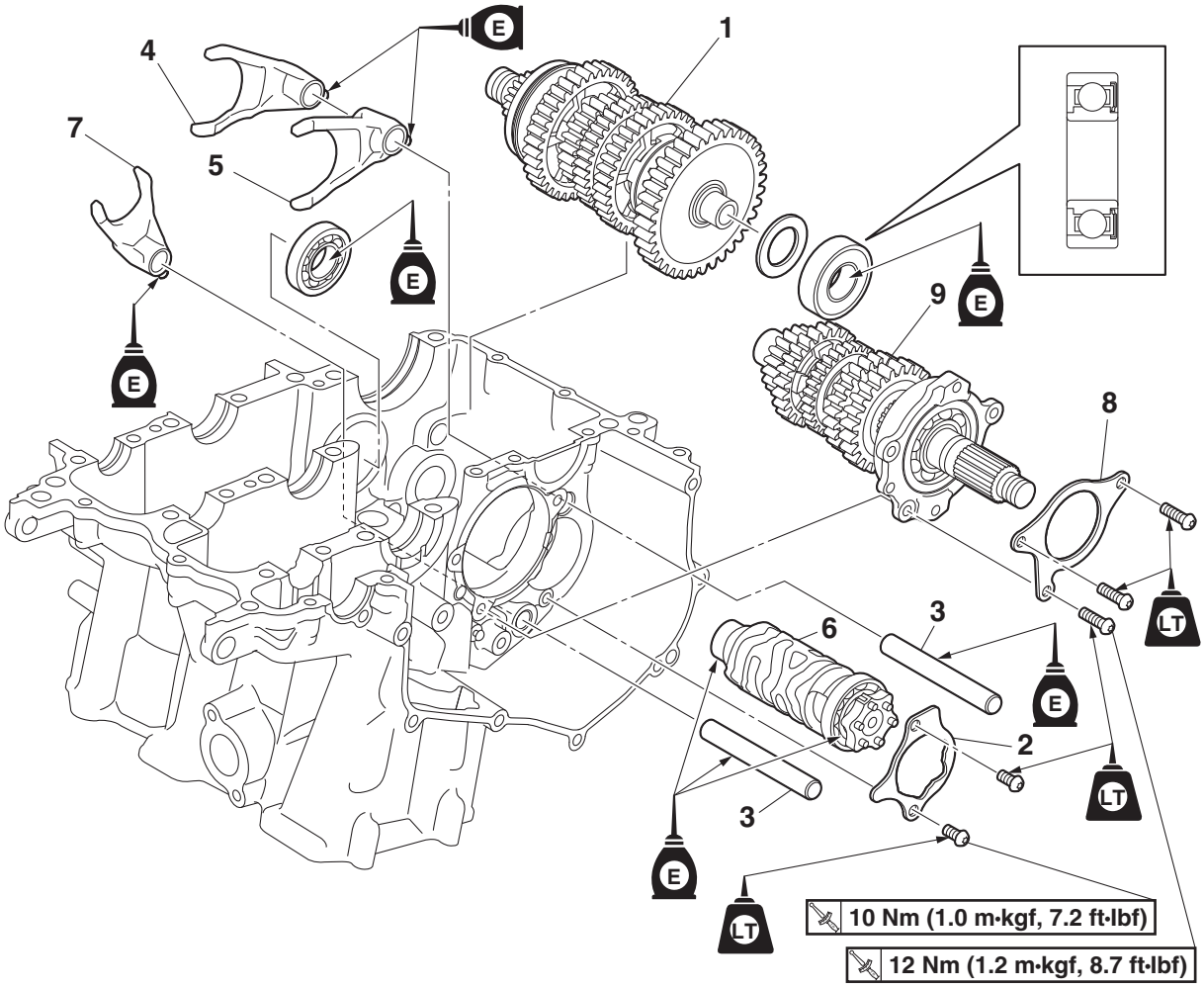
TIP

Align the punch mark “a” in the balancer drive gear with the punch mark “b” in the balancer driven gear.



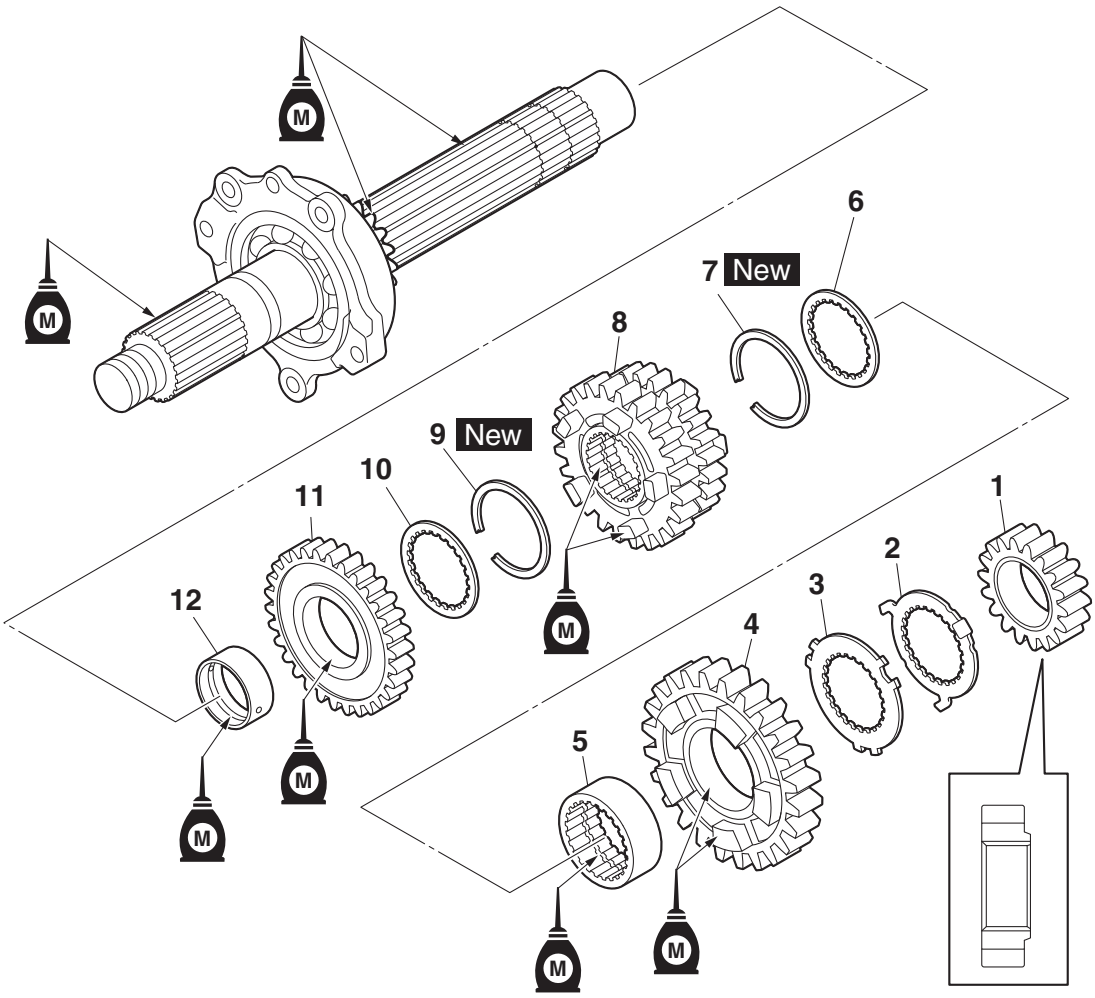
EAS20062
TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks



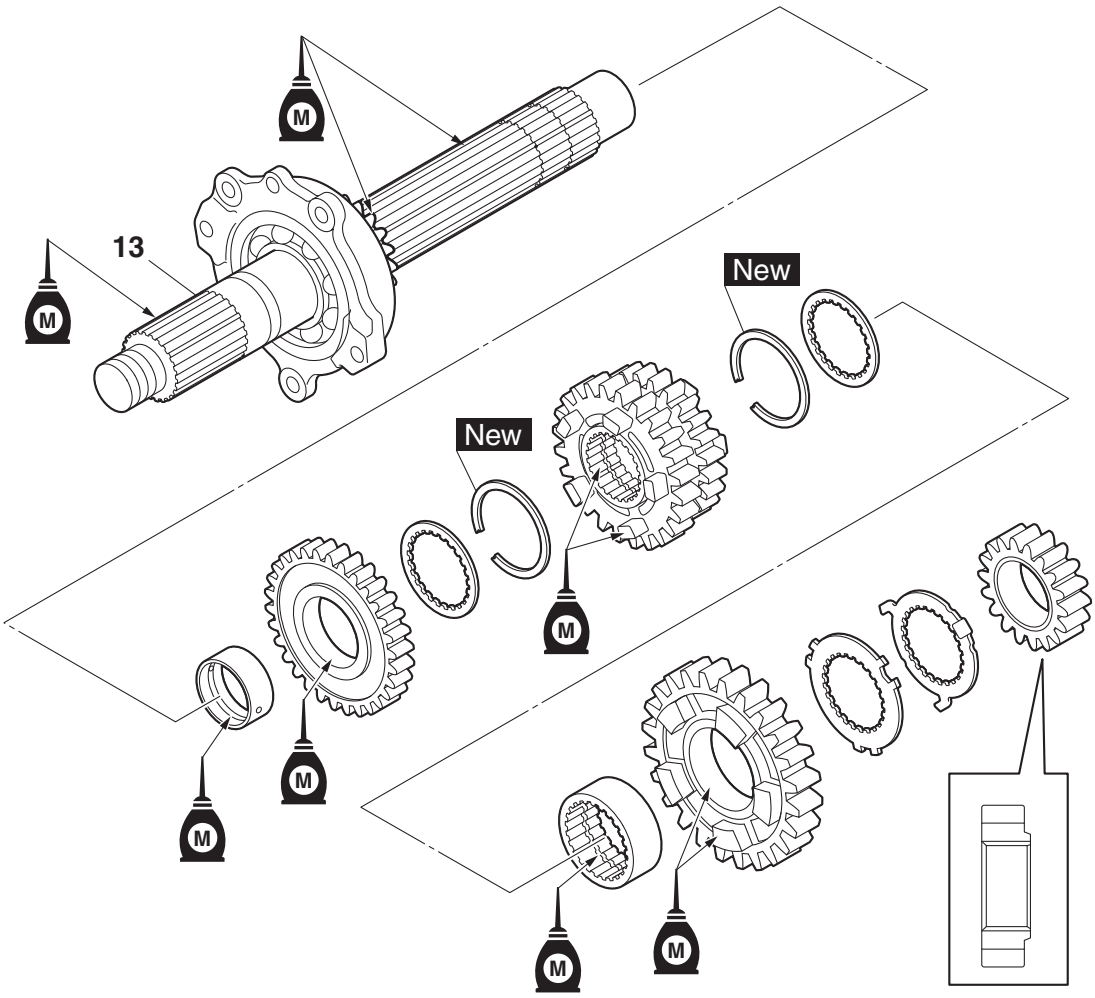
Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Refer to "CRANKCASE" on page 5-64.
1	Drive axle assembly	1	
2	Shift drum retainer	1	
3	Shift fork guide bar	2	
4	Shift fork "L"	1	
5	Shift fork "R"	1	
6	Shift drum assembly	1	
7	Shift fork "C"	1	
8	Bearing retainer	1	
9	Main axle assembly	1	

Disassembling the main axle assembly



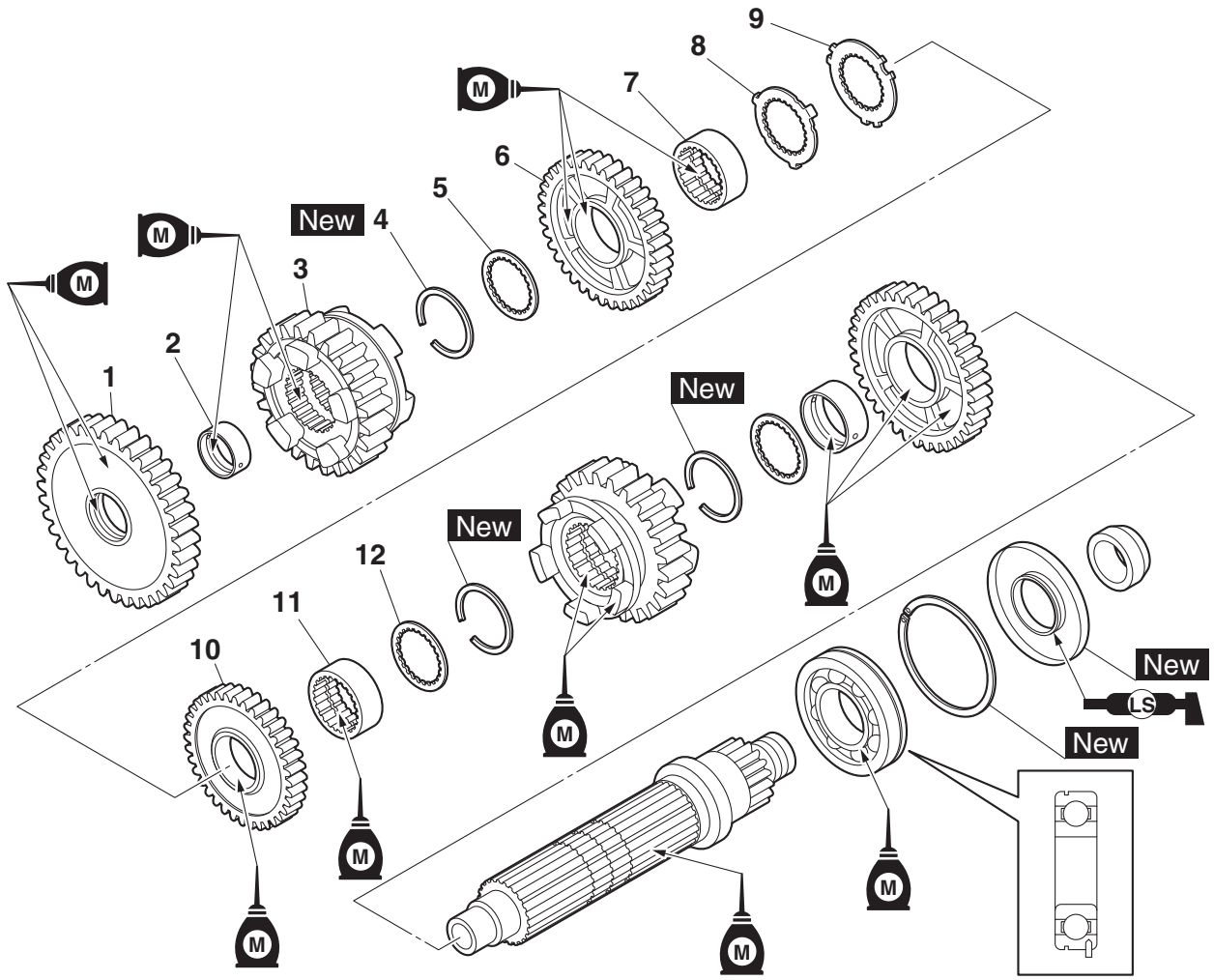
Order	Job/Parts to remove	Q'ty	Remarks
1	2nd pinion gear	1	
2	Toothed lock washer	1	
3	Toothed lock washer retainer	1	
4	6th pinion gear	1	
5	Collar	1	
6	Washer	1	
7	Circlip	1	
8	3rd pinion gear	1	
9	Circlip	1	
10	Washer	1	
11	5th pinion gear	1	
12	Collar	1	

Disassembling the main axle assembly



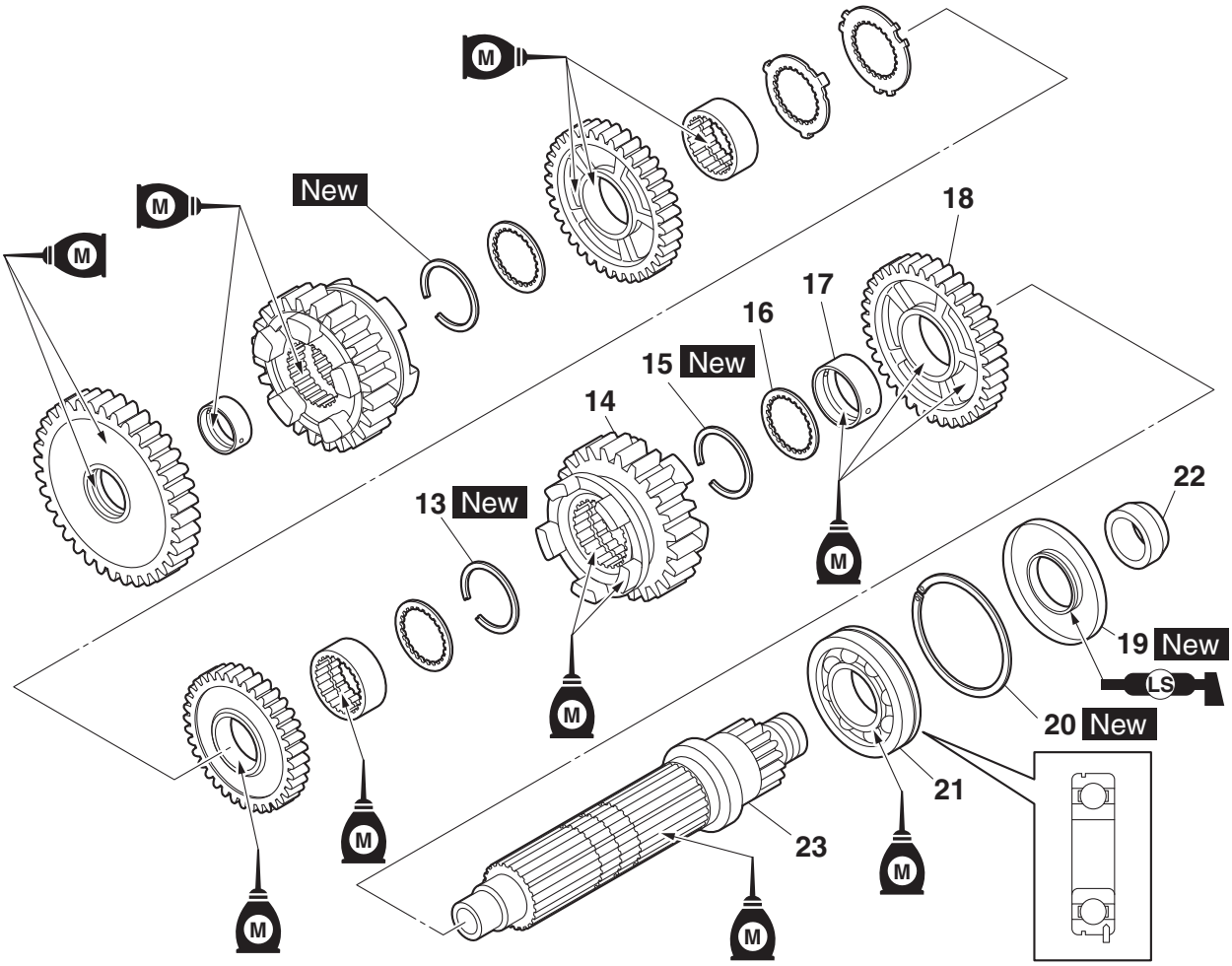
Order	Job/Parts to remove	Q'ty	Remarks
13	Main axle	1	

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	1st wheel gear	1	
2	Collar	1	
3	5th wheel gear	1	
4	Circlip	1	
5	Washer	1	
6	3rd wheel gear	1	
7	Collar	1	
8	Toothed lock washer	1	
9	Toothed lock washer retainer	1	
10	4th wheel gear	1	
11	Collar	1	
12	Washer	1	

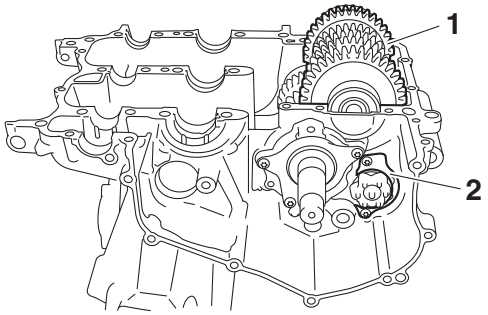
Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
13	Circlip	1	
14	6th wheel gear	1	
15	Circlip	1	
16	Washer	1	
17	Collar	1	
18	2nd wheel gear	1	
19	Oil seal	1	
20	Circlip	1	
21	Bearing	1	
22	Collar	1	
23	Drive axle	1	

EAS30430
REMOVING THE TRANSMISSION

1. Remove:
   - Drive axle assembly “1”
   - Shift drum retainer “2”
   - Shift fork guide bars
   - Shift fork “L” and “R”
   - Shift drum assembly
   - Shift fork “C”



2. Remove:
   - Bearing retainer
   - Main axle assembly bearing housing “1”
   - Main axle assembly “2”

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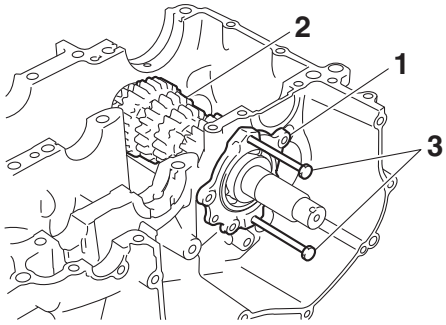
a. Insert two bolts “3” of the proper size, as shown in the illustration, into the main axle assembly bearing housing.



b. Tighten the bolts until they contact the crankcase surface.
c. Continue tightening the bolts until the main axle assembly comes free from the cylinder.

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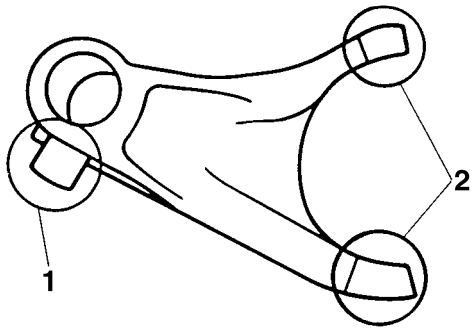
EAS30431
CHECKING THE SHIFT FORKS

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.

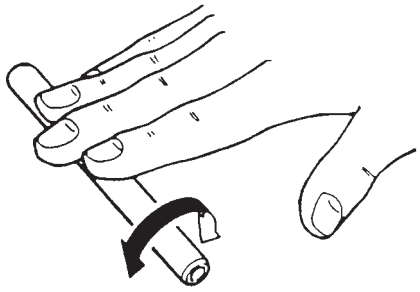


2. Check:
   - Shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

EWA12840

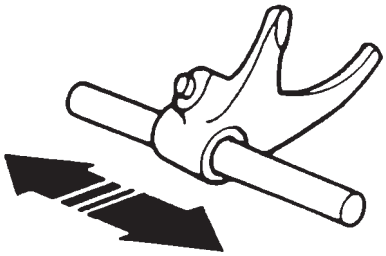
⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.



319-010

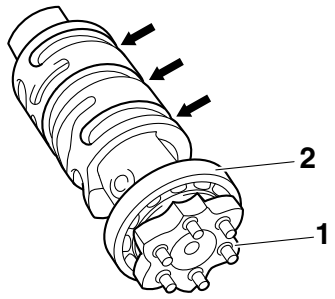
3. Check:
   - Shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.



319-011

EAS30432
CHECKING THE SHIFT DRUM ASSEMBLY

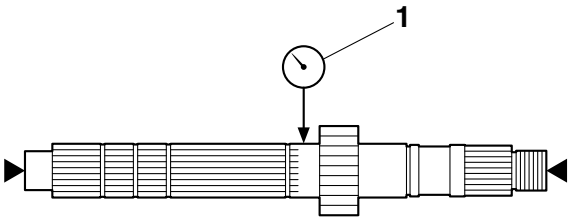
1. Check:
   - Shift drum groove
     Damage/scratches/wear → Replace the shift drum assembly.
   - Shift drum segment “1”
     Damage/wear → Replace the shift drum assembly.
   - Shift drum bearing “2”
     Damage/pitting → Replace the shift drum assembly.



EAS30433
CHECKING THE TRANSMISSION

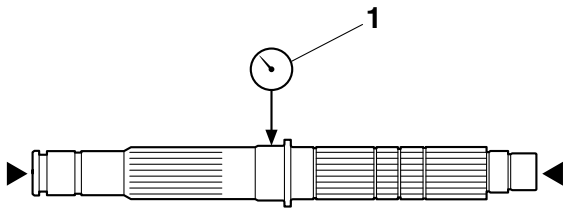
1. Measure:
   • Main axle runout
   (with a centering device and dial gauge “1”)
   Out of specification → Replace the main axle.

	Main axle runout limit **0.08 mm (0.0032 in)**

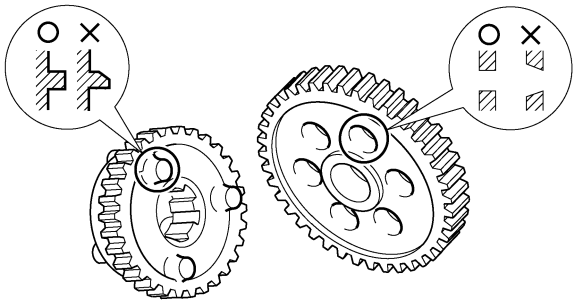


2. Measure:
   • Drive axle runout
   (with a centering device and dial gauge “1”)
   Out of specification → Replace the drive axle.

	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).



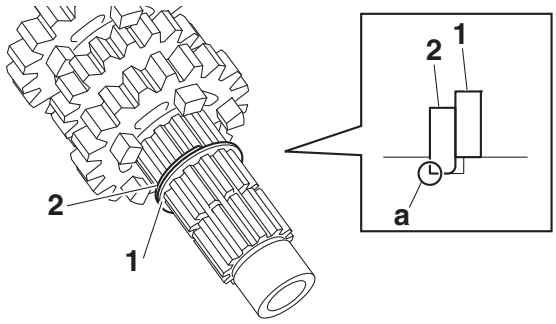
4. Check:
   • Transmission gear engagement
   (each pinion gear to its respective wheel gear)
   Incorrect → Reassemble the transmission axle assemblies.
5. Check:
   • Transmission gear movement
   Rough movement → Replace the defective part(s).
6. Check:
   • Circlips
   Bends/damage/looseness → Replace.

EAS30435
ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

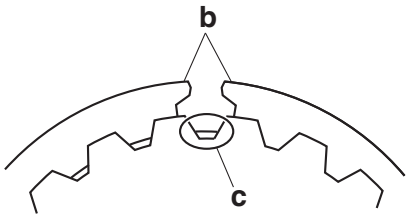
1. Install:
   • Toothed washer “1”
   • Circlip “2” New

TIP

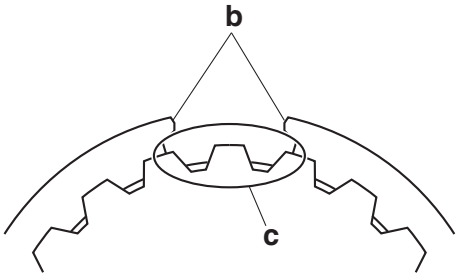
- Be sure the circlip sharp-edged corner “a” is positioned opposite side to the toothed washer and gear.
- Align the opening between the ends “b” of the circlip with a groove “c” in the axle.



A



B

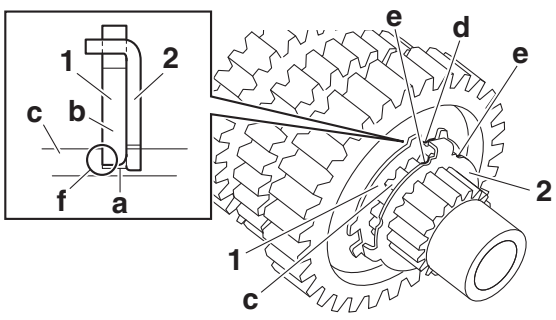


A. Main axle
B. Drive axle

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 “b” on the retainer with an axle spline “c”, and then install the toothed lock washer.
- Be sure to align the projection on the toothed lock washer that is between the alignment marks “e” with the alignment mark “d” on the retainer.
- Be sure the toothed lock washer retainer sharp-edged corner “f” is positioned opposite side to the toothed lock washer.



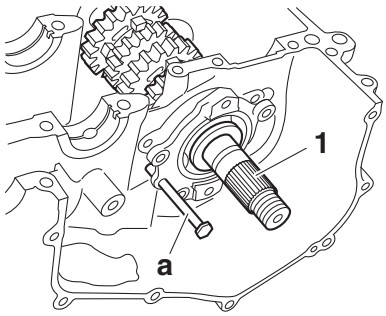
EAS30438
INSTALLING THE TRANSMISSION

1. Install:
   • Main axle assembly “1”
   • Bearing retainer

Bearing retainer bolt
12 Nm (1.2 m·kgf, 8.7 ft·lbf)
LOCTITE®

TIP

Use a suitable pin “a” to position the bearing housing, and then install the housing until it contacts the cylinder.



2. Install:
   • Shift fork “C”
   • Shift drum assembly
   • Shift fork guide bar

TIP

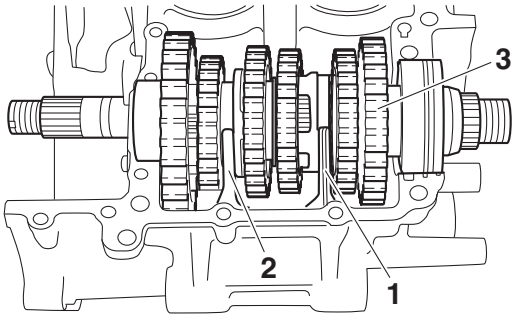
- The embossed marks on the shift forks should face towards the right side of the engine.
- Install shift fork “C” into the groove in the 3rd pinion gear on the main axle.

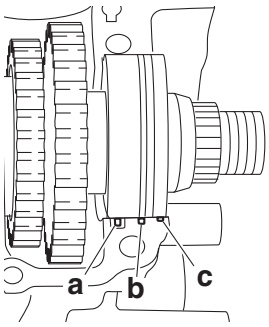
3. Install:
   • Shift fork “L” “1”
   • Shift fork “R” “2”
   • Shift fork guide bar
   • Shift drum retainer
   • Drive axle assembly “3”

Shift drum retainer bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
LOCTITE®

TIP

- Install shift fork “L” into the groove in the 6th wheel gear and shift fork “R” into the groove in the 5th wheel gear on the drive axle.
- Make sure that the projection “a” on the drive axle assembly is inserted into the slot in the cylinder.
- Make sure that the drive axle bearing circlip “b” and flange “c” of the oil seal are inserted into the grooves in the cylinder.





4. Check:
   • Transmission
   Rough movement → Repair.

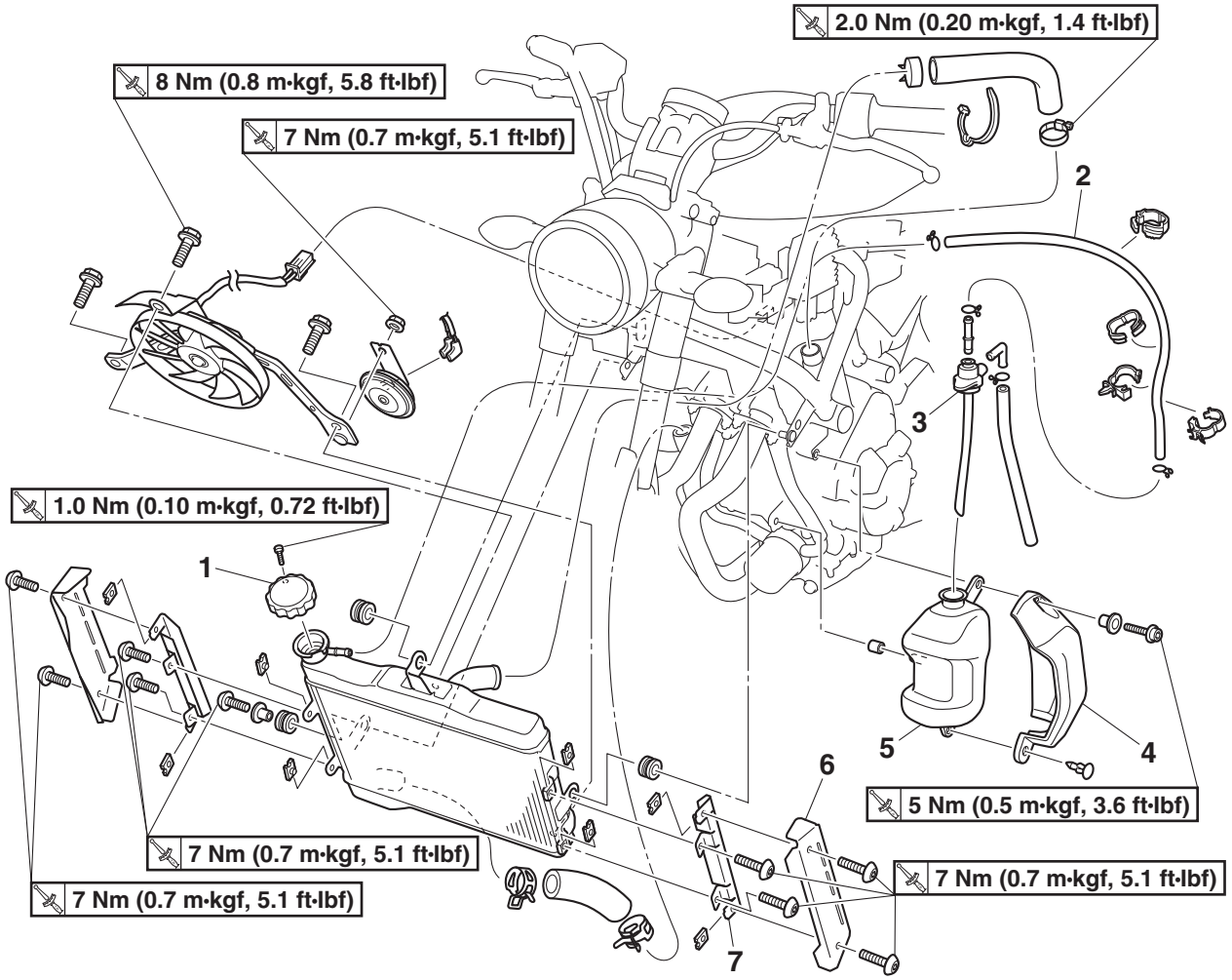
TIP

Oil each gear, shaft, and bearing thoroughly.

COOLING SYSTEM

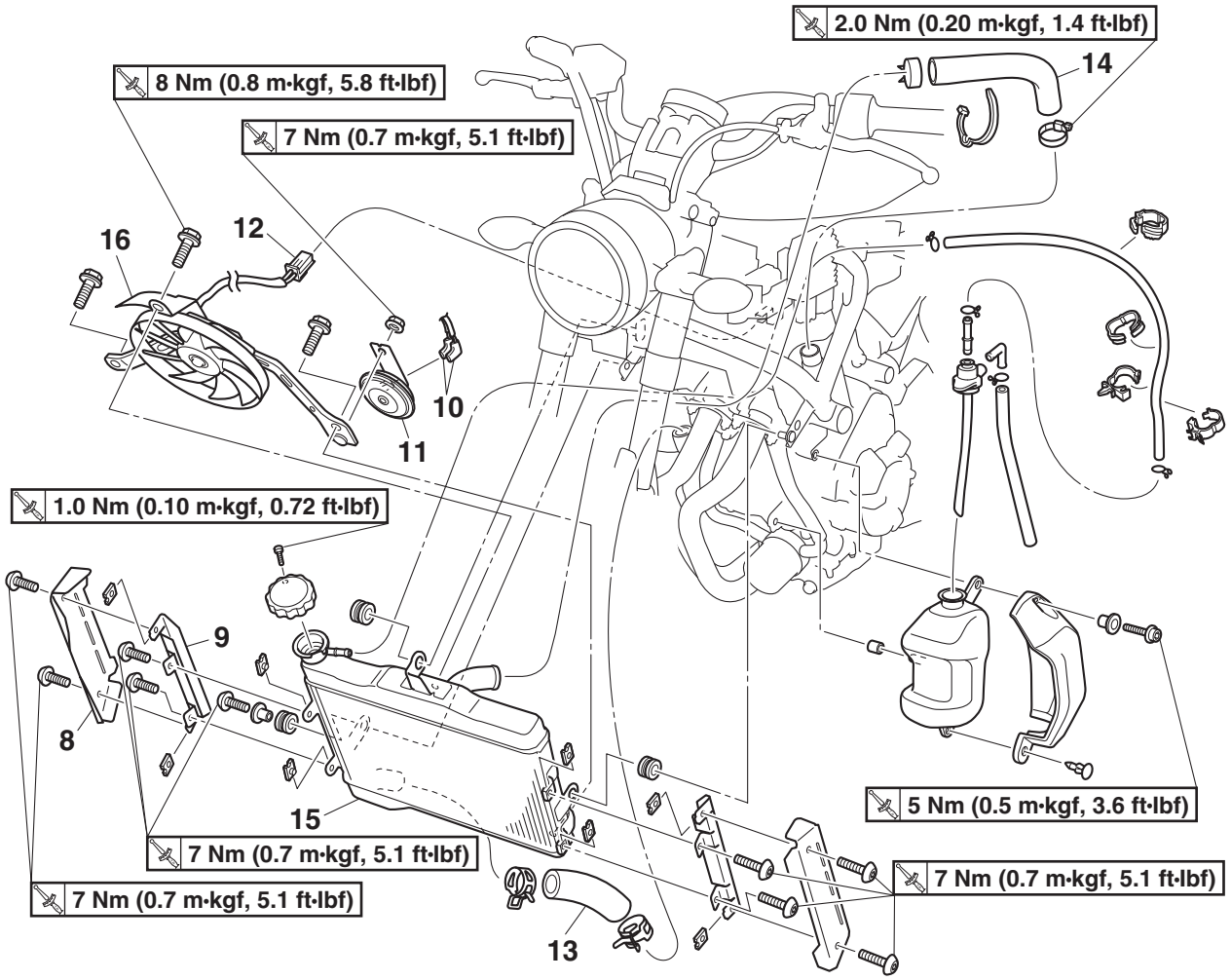
EAS20063
RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Air scoop (left)		Refer to "GENERAL CHASSIS (3)" on page 4-5.
1	Radiator cap	1	
2	Coolant reservoir hose	1	
3	Coolant reservoir cap	1	
4	Coolant reservoir cover	1	
5	Coolant reservoir	1	
6	Radiator side cover (left)	1	
7	Radiator side cover bracket bolt (left)	1	

Removing the radiator



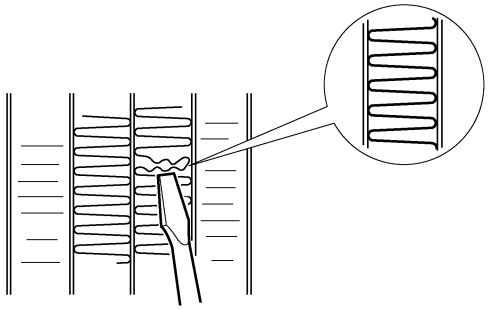
Order	Job/Parts to remove	Q'ty	Remarks
8	Radiator side cover (right)	1	
9	Radiator side cover bracket bolt (right)	1	
10	Horn connector	2	Disconnect.
11	Horn	1	
12	Radiator fan motor coupler	1	Disconnect.
13	Radiator outlet hose	1	
14	Radiator inlet hose	1	
15	Radiator	1	
16	Radiator fan	1	

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
   Cracks/damage → Replace.
   • Radiator pipes
   Cracks/damage → Replace the radiator.
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.

Radiator cap valve opening pressure
108.0–137.4 kPa (1.08–1.37 kgf/cm², 15.7–19.9 psi)

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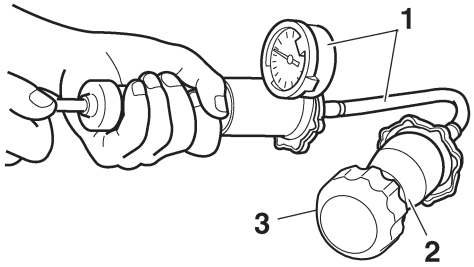
a. Install the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator cap "3".

Radiator cap tester
90890-01325
Mityvac cooling system tester kit
YU-24460-A
Radiator cap tester adapter
90890-01352
Pressure tester adapter
YU-33984



b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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4. Check:
   • Radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to "COOLING SYSTEM" on page 8-29.

EAS31796
INSTALLING THE RADIATOR SIDE COVER BRACKETS AND RADIATOR SIDE COVERS

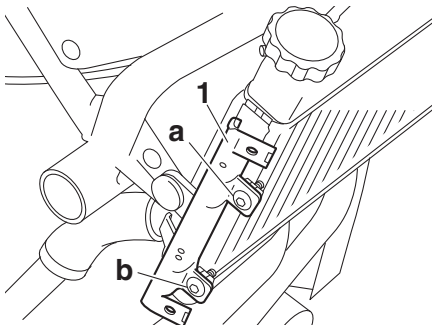
The following procedure applies to both of the radiator side cover brackets and radiator side covers.

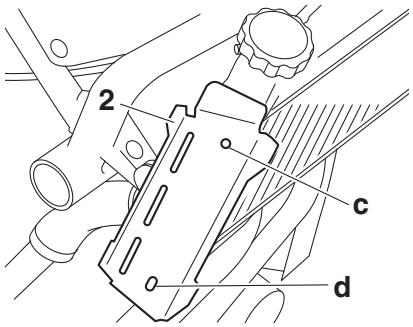
1. Install:
   • Radiator side cover bracket bolt "1"
   • Radiator side cover "2"

Radiator side cover bracket bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Radiator side cover bolt
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

• Install the radiator side cover bracket so that the end with round hole "a" is pointing upward and the end with the oval hole "b" is pointing downward.
• Install the radiator side cover so that the end with the round hole "c" is pointing upward and the end with the oval hole "d" is pointing downward.



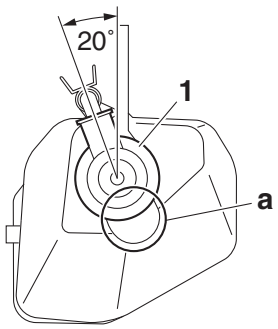


EAS30440
INSTALLING THE RADIATOR

1. Install:
   • Coolant reservoir cap “1”

TIP

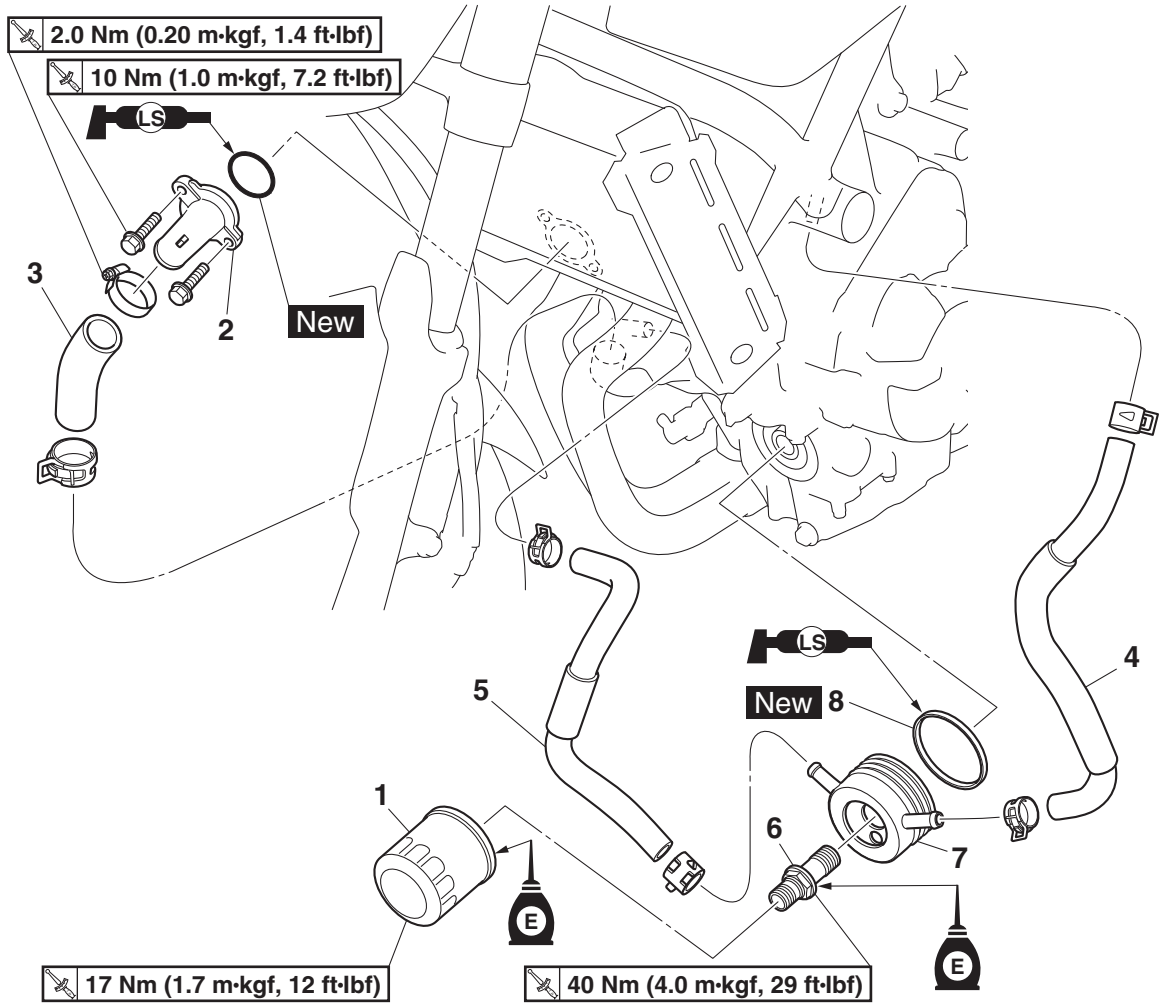
Point the tab “a” on the coolant reservoir cap in the direction shown in the illustration.



2. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to “CHANGING THE COOLANT” on page 3-24.
3. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
4. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to “CHECKING THE RADIATOR” on page 6-3.

EAS20064
OIL COOLER

Removing the oil cooler

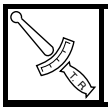


Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-21.
	Coolant reservoir		Refer to "RADIATOR" on page 6-1.
1	Oil filter cartridge	1	
2	Water jacket joint	1	
3	Water jacket joint inlet hose	1	
4	Oil cooler inlet hose	1	
5	Oil cooler outlet hose	1	
6	Oil filter cartridge union bolt	1	
7	Oil cooler	1	
8	Gasket	1	

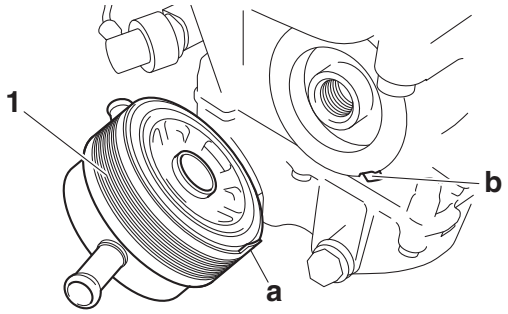
EAS30441
CHECKING THE OIL COOLER
1. Check:
   • Oil cooler
   Cracks/damage → Replace.
2. Check:
   • Oil cooler inlet hose
   • Oil cooler outlet hose
   • Water pump outlet hose
   Cracks/damage → Replace.

EAS31123
CHECKING THE WATER JACKET JOINT
1. Check:
   • Water jacket joint
   Mineral deposits/rust → Eliminate.

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:
   • Gasket New
   • Oil cooler "1"
   • Oil filter cartridge union bolt

	**Oil filter cartridge union bolt** **40 Nm (4.0 m·kgf, 29 ft·lbf)**

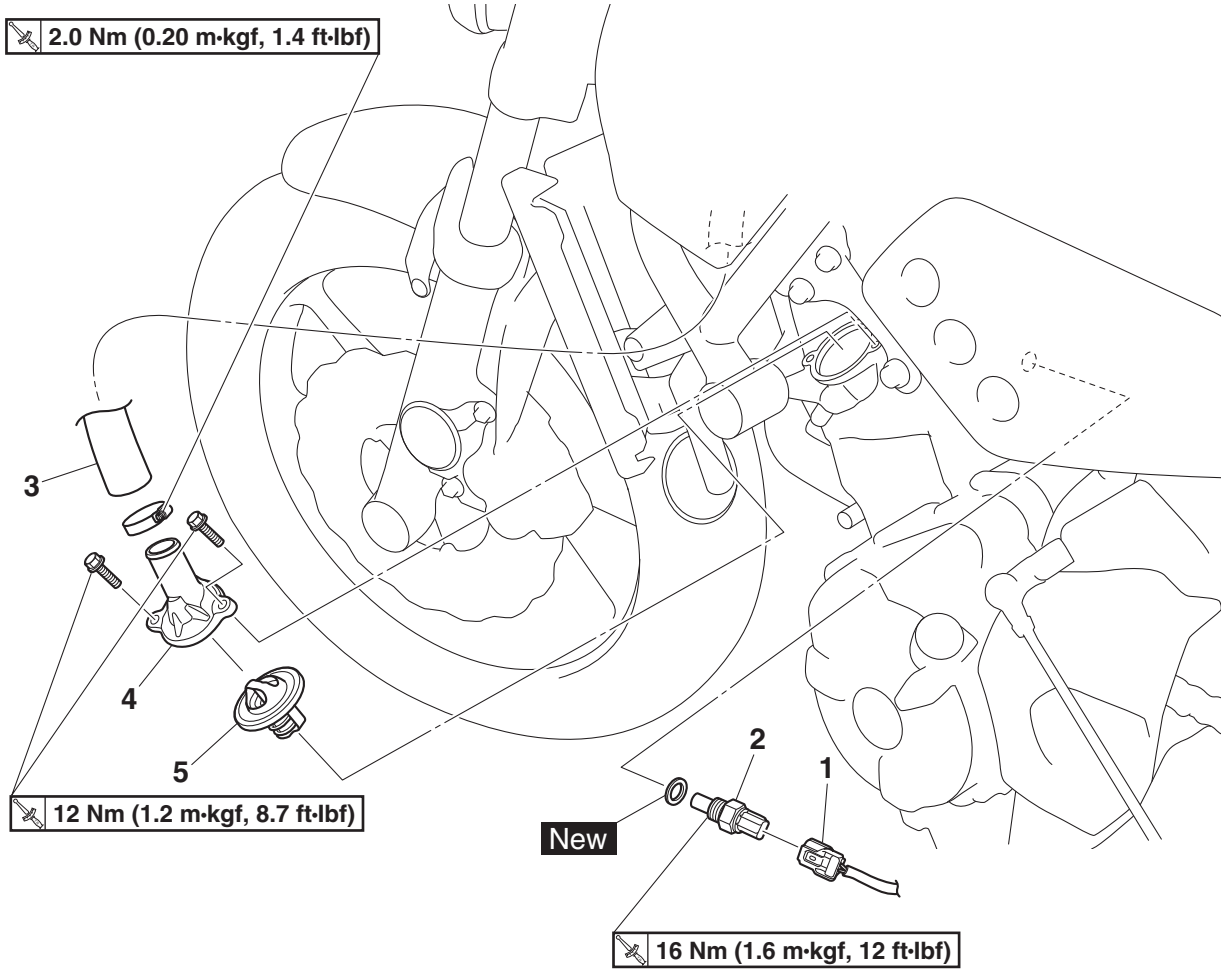
TIP
- Before installing the oil cooler, apply engine oil lightly to the oil filter cartridge union bolt.
- Align the projection "a" on the oil cooler with the slot "b" in the crankcase.



3. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-24.
   • Crankcase
   (with the specified amount of the recommended engine oil)
   Refer to "CHANGING THE ENGINE OIL" on page 3-21.
4. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
   Refer to "INSTALLING THE RADIATOR" on page 6-4.
5. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR" on page 6-3.

EAS20065
THERMOSTAT

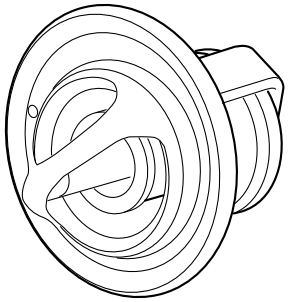
Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank/Canister		Refer to "FUEL TANK" on page 7-1.
1	Coolant temperature sensor coupler	1	Disconnect.
2	Coolant temperature sensor	1	
3	Radiator inlet hose	1	Disconnect.
4	Thermostat cover	1	
5	Thermostat	1	

EAS30443
CHECKING THE THERMOSTAT

1. Check:
   • Thermostat
   Does not open at 80–84 °C (176–183.2 °F) → Replace.



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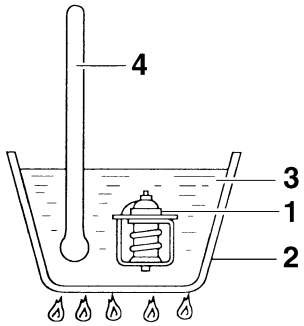
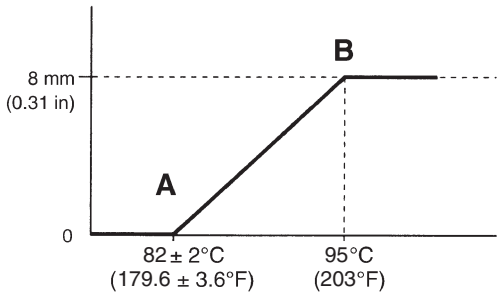
a. Suspend the thermostat "1" in a container "2" filled with water.
b. Slowly heat the water "3".
c. Place a thermometer "4" in the water.
d. While stirring the water, observe the thermostat and thermometer's indicated temperature.





A. Fully closed
B. Fully open

TIP

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

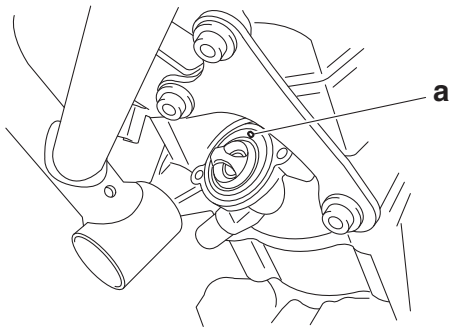
2. Check:
   • Thermostat cover
   Cracks/damage → Replace.

EAS30939
INSTALLING THE THERMOSTAT

1. Install:
   • Thermostat

TIP

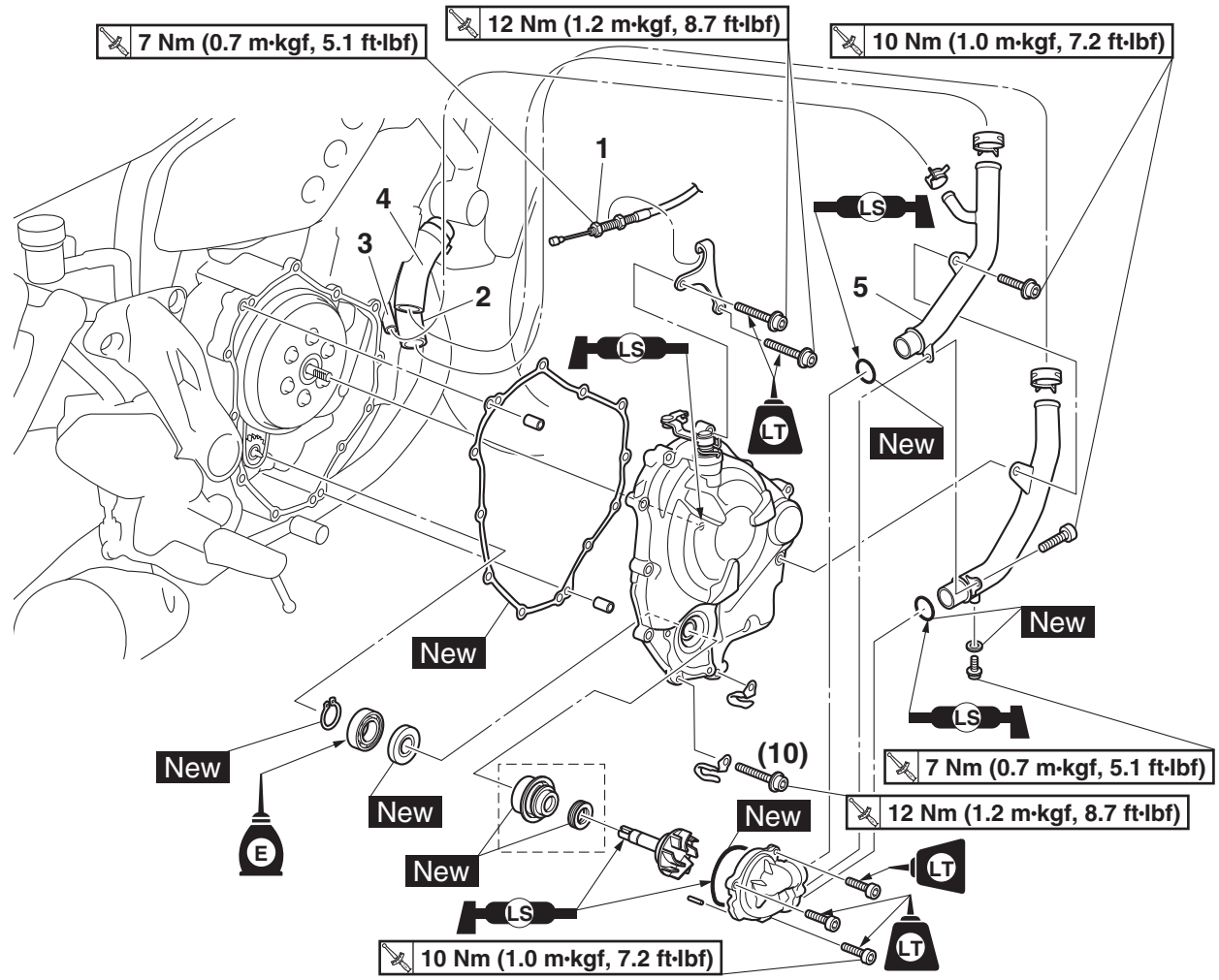
Install the thermostat with its breather valve "a" facing inward.



2. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-24.
3. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
4. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR" on page 6-3.

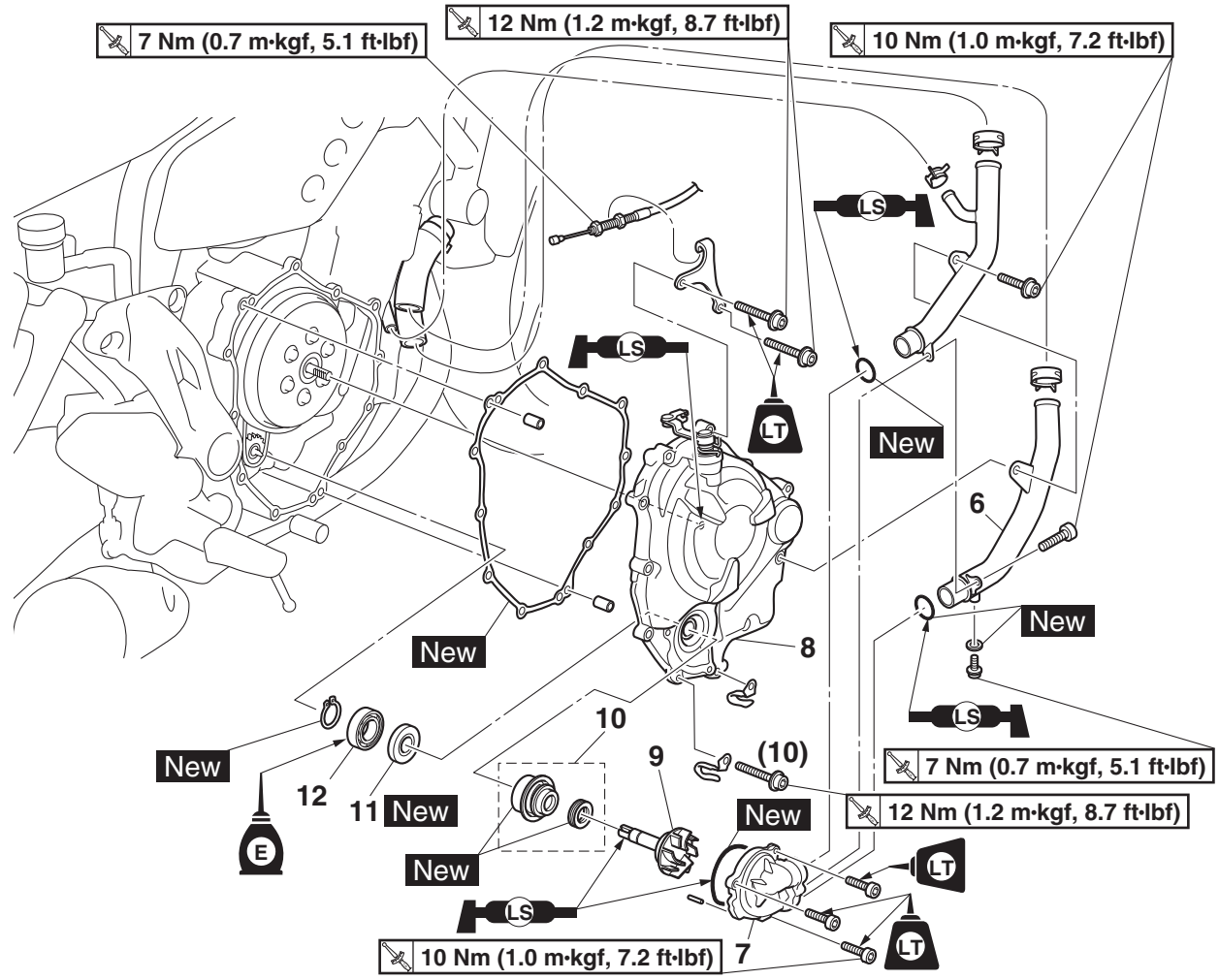
EAS20066
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-24.
	Engine oil		Refer to "CHANGING THE ENGINE OIL" on page 3-21.
1	Clutch cable	1	Disconnect.
2	Water pump outlet hose	1	Disconnect.
3	Oil cooler outlet hose	1	Disconnect.
4	Radiator outlet hose	1	Disconnect.
5	Water pump inlet pipe	1	

Removing the water pump



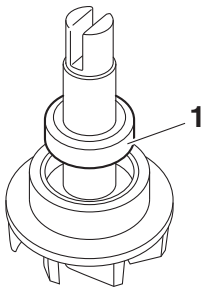
Order	Job/Parts to remove	Q'ty	Remarks
6	Water pump outlet pipe	1	
7	Water pump housing	1	
8	Clutch cover	1	
9	Impeller shaft	1	
10	Water pump seal assembly	1	
11	Oil seal	1	
12	Bearing	1	

EAS30446
DISASSEMBLING THE WATER PUMP

1. Remove:
   • Mechanical seal (impeller side) “1”
   (from the impeller, with a thin, flat-head screwdriver)

TIP

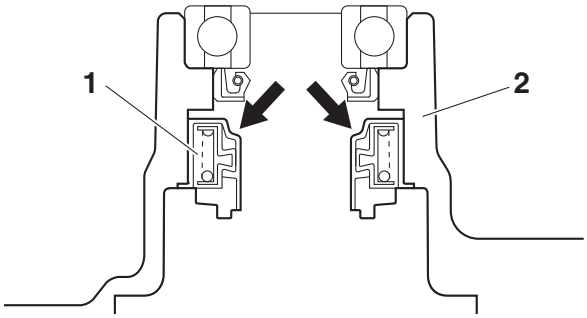
Do not scratch the impeller shaft.



2. Remove:
   • Mechanical seal (housing side) “1”

TIP

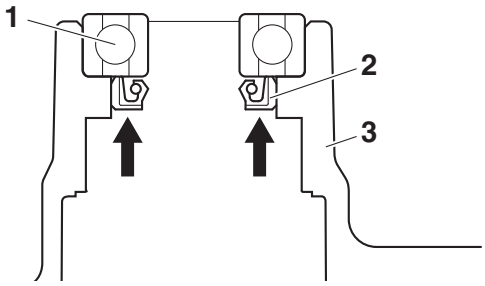
Remove the mechanical seal (housing side) from the inside of the clutch cover “2”.



3. Remove:
   • Bearing “1”
   • Oil seal “2”

TIP

Remove the bearing and oil seal from the outside of the clutch cover “3”.



EAS30447
CHECKING THE WATER PUMP

1. Check:
   • Water pump housing
   • Clutch cover
   • Impeller shaft
   Cracks/damage/wear → Replace.
2. Check:
   • Bearing
   Rough movement → Replace.
3. Check:
   • Water pump outlet pipe
   • Water pump inlet pipe
   Cracks/damage/wear → Replace.

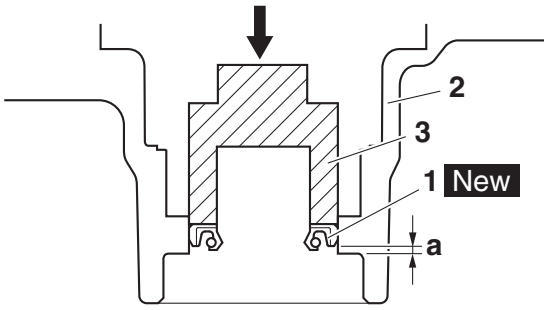
EAS30448
ASSEMBLING THE WATER PUMP

1. Install:
   • Oil seal “1” New
   • Bearing
   (into the clutch cover “2”)

TIP

Install the oil seal with a socket “3” that matches its outside diameter.

Installed depth of oil seal “a”
0.5–1.0 mm (0.02–0.04 in)



2. Install:
   • Mechanical seal (housing side) “1” New
   (into the clutch cover “2”)

ECA20330

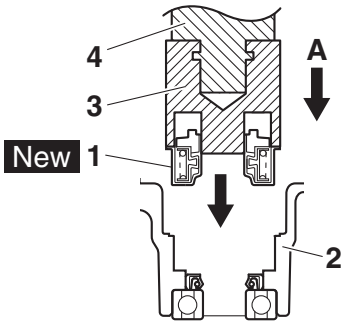
NOTICE

Never lubricate the mechanical seal (housing 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 clutch cover.

Mechanical seal installer
90890-04132
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Middle drive bearing installer 40 & 50 mm
YM-04058

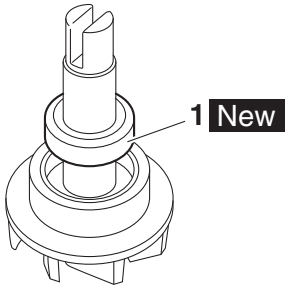


3. Mechanical seal installer
4. Middle driven shaft bearing driver
A. Push down

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.



4. Measure:
   • Mechanical seal (impeller side)
   Out of specification → Repeat steps (3) and (4).

ECA14090

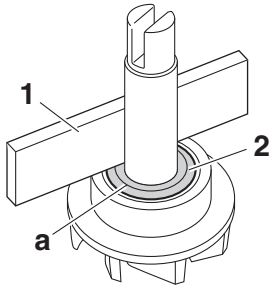
NOTICE

Make sure the rubber damper and rubber damper holder are flush with the impeller.

TIP

If the surface "a" of the mechanical seal (impeller side) that contacts the mechanical seal (housing side) is dirty, clean it.

Mechanical seal (impeller side)
0.15 mm (0.006 in)

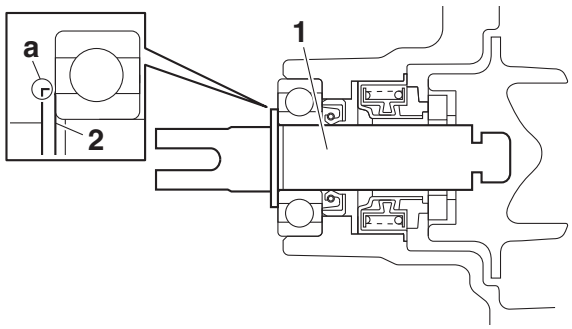


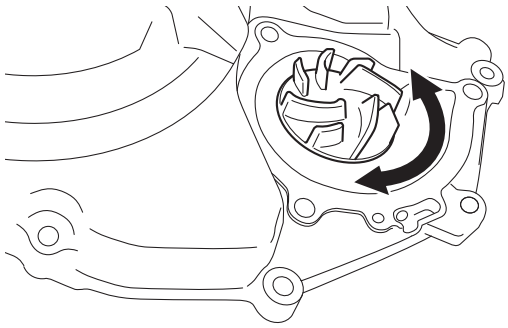
1. Straightedge
2. Impeller

5. Install:
   • Impeller shaft "1"
   • Circlip "2"

TIP

- Be sure the circlip sharp-edged corner "a" is positioned opposite side to the bearing.
- After installation, check that the impeller shaft rotates smoothly.





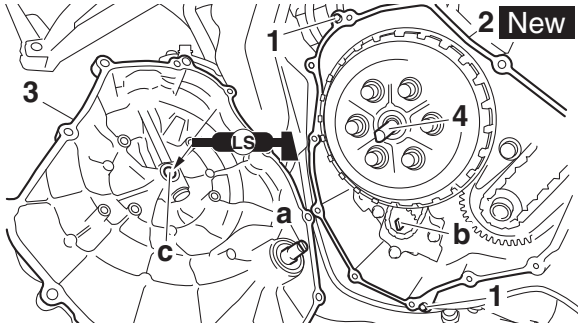
EAS31117
INSTALLING THE CLUTCH COVER

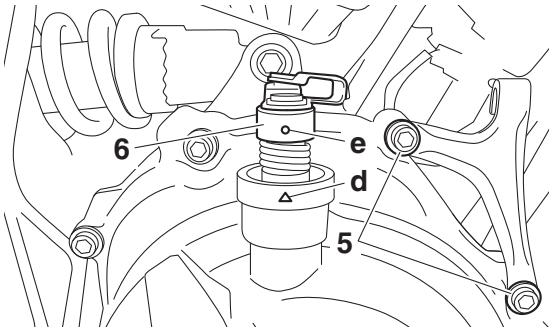
1. Install:
   - Dowel pins “1”
   - Clutch cover gasket “2” New
   - Clutch cover “3”

	**Clutch cover bolt** **12 Nm (1.2 m·kgf, 8.7 ft·lbf)** **Clutch cable holder bolt** **12 Nm (1.2 m·kgf, 8.7 ft·lbf)** **LOCTITE®**

TIP

- Align the slit “a” in the impeller shaft with the projection “b” on the oil pump driven sprocket.
- Face the serrations on the clutch pull rod “4” rearward and align the rod with the hole “c” in the clutch cover.
- Apply looking agent (LOCTITE®) to the threads of only the clutch cable holder bolts “5”.
- Tighten the bolts in stages and in a crisscross pattern.
- After installing the clutch cover, make sure that the alignment mark “d” on the clutch cover is aligned with the punch mark “e” on the pull lever “6”.



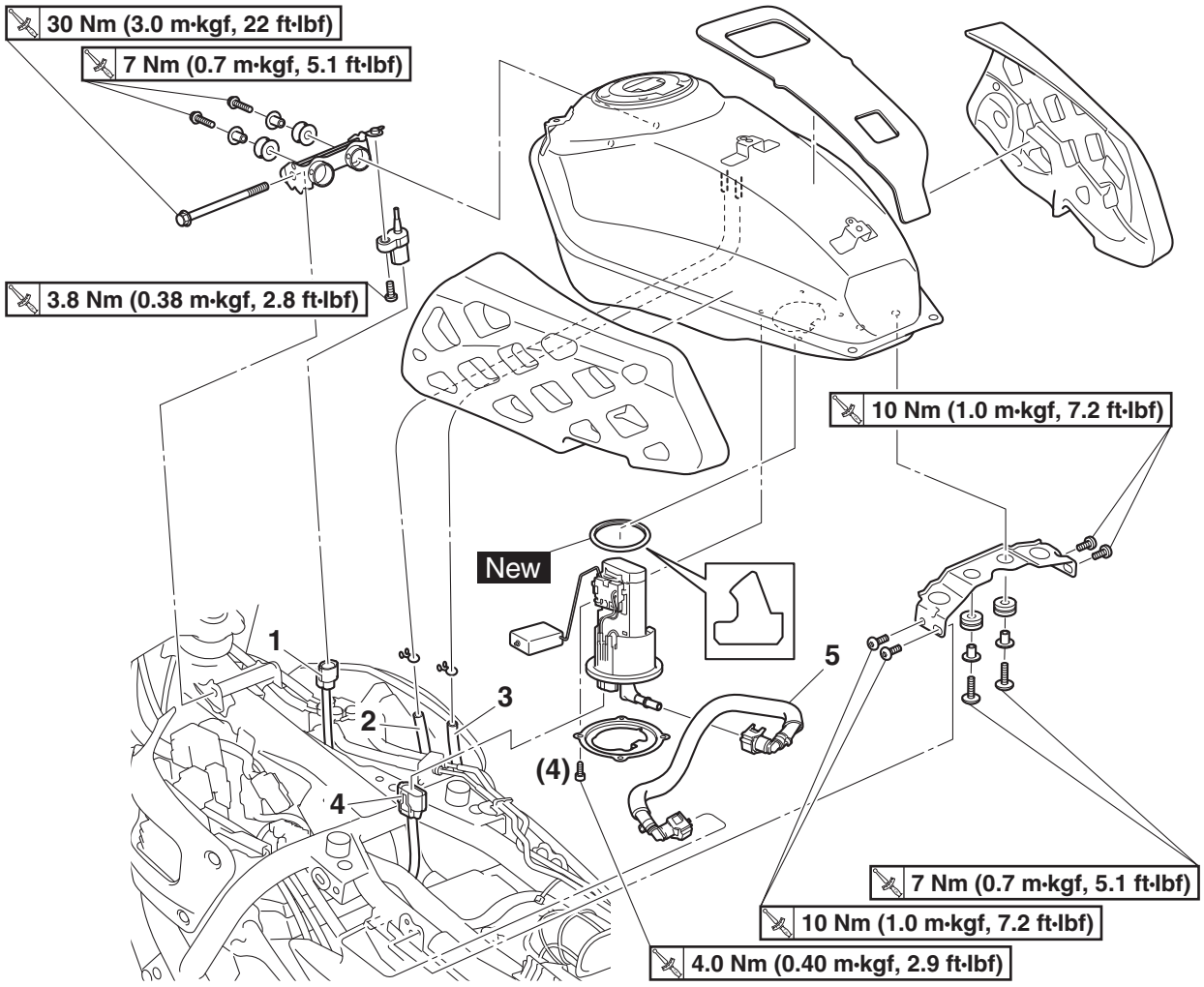


2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-24.
3. Check:
   - Cooling system
     Leaks → Repair or replace the faulty part.
4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.
5. Adjust:
   - Clutch lever free play
     Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-12.

FUEL SYSTEM

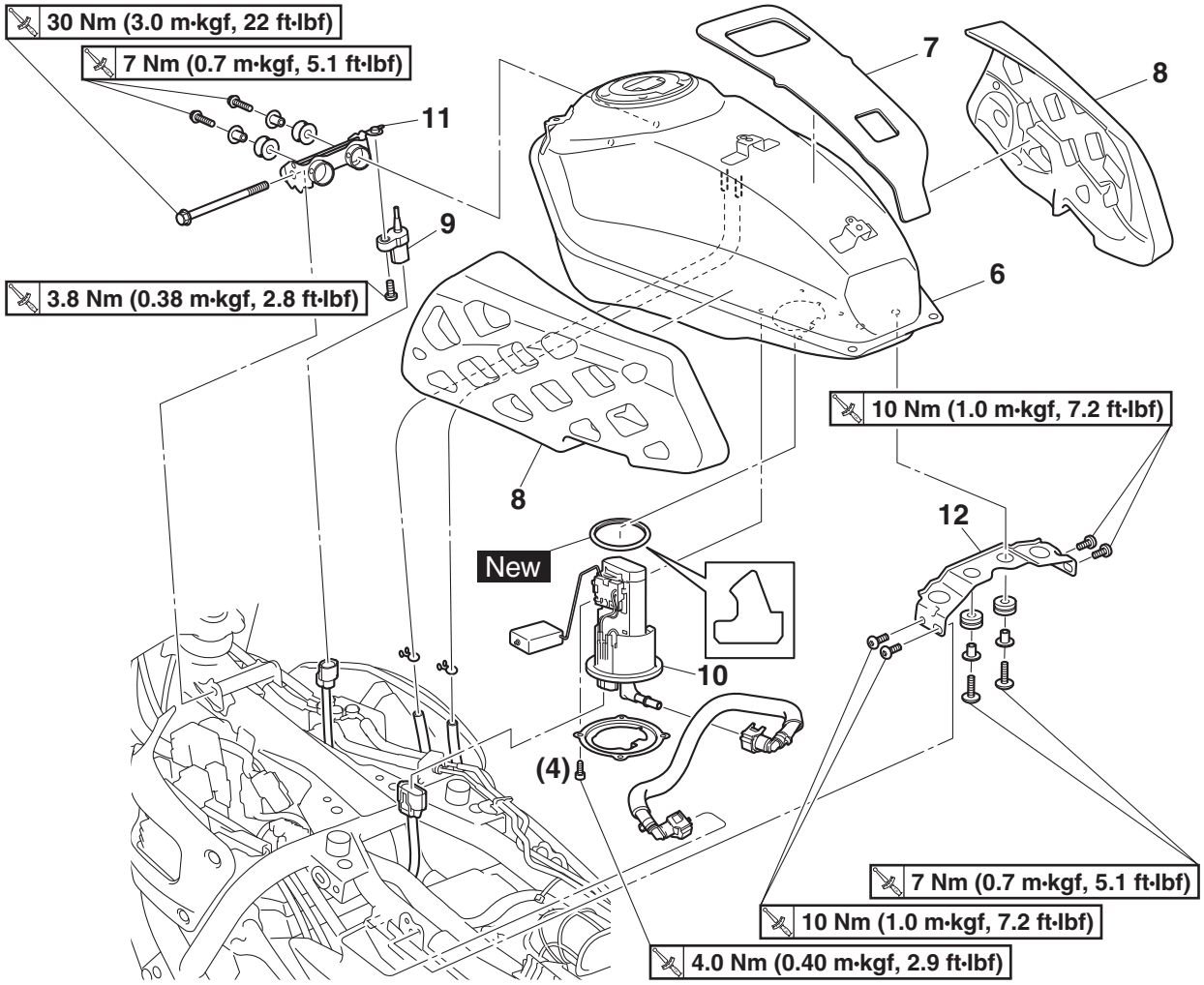
EAS20067
FUEL TANK

Removing the fuel tank and fuel pump



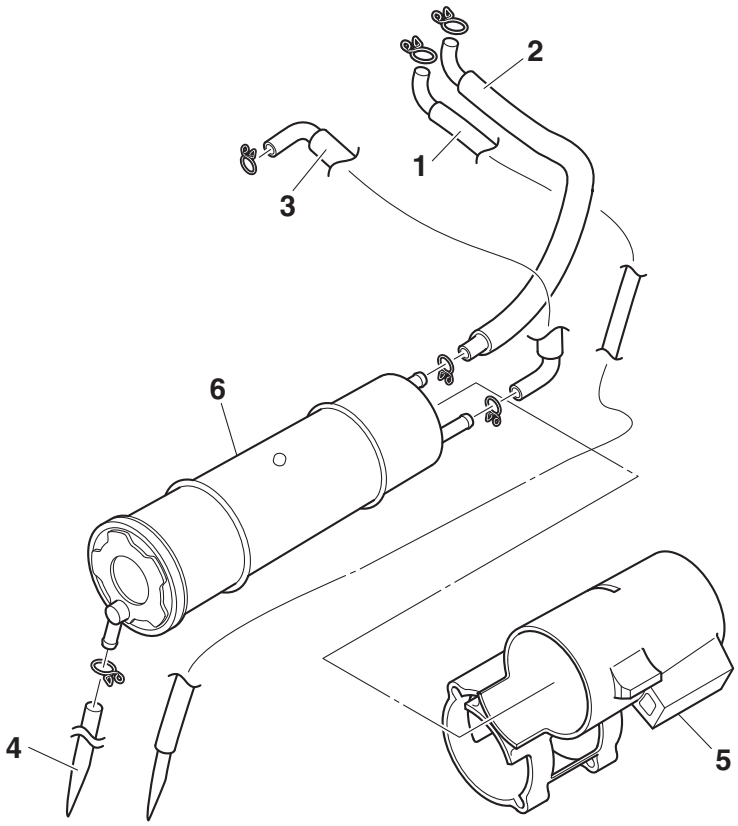
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Inner side cover (left)		Refer to "GENERAL CHASSIS (3)" on page 4-5.
1	Intake air temperature sensor coupler	1	Disconnect.
2	Fuel tank overflow hose	1	Disconnect.
3	Fuel tank breather hose	1	Disconnect.
4	Fuel pump coupler	1	Disconnect.
5	Fuel hose	1	

Removing the fuel tank and fuel pump



Order	Job/Parts to remove	Q'ty	Remarks
6	Fuel tank	1	
7	Damper 1	1	
8	Damper 2	2	
9	Intake air temperature sensor	1	
10	Fuel pump	1	
11	Front fuel tank bracket	1	
12	Rear fuel tank bracket	1	

Removing the canister



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Fuel tank overflow hose	1	
2	Fuel tank breather hose (fuel tank to canister)	1	
3	Canister purge hose (hose joint to canister)	1	
4	Canister breather hose	1	
5	Canister holder	1	Refer to "ELECTRIC STARTER" on page 5-42.
6	Canister	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 hose

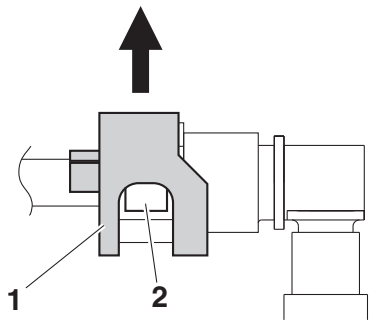
EWA17320
⚠ WARNING

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.

ECA20020
NOTICE

Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.

TIP
- To remove the fuel hose from the fuel rail and fuel pump, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then remove the hose.
- Remove the fuel hose manually without using any tools.
- Before removing the hose, place a few rags in the area under where it will be removed.



3. Remove:
   • Fuel tank

TIP

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank against a wall or the like.

EAS30451
REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump

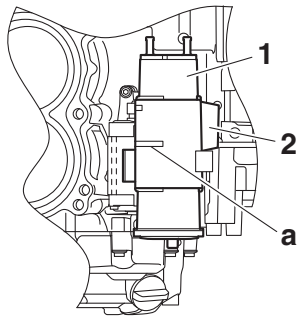
ECA14721
NOTICE
- **Do not drop the fuel pump or give it a strong shock.**
- **Do not touch the base section of the fuel sender.**

EAS30454
CHECKING THE FUEL PUMP BODY
1. Check:
   • Fuel pump body
   Obstruction → Clean.
   Cracks/damage → Replace fuel pump assembly.

EAS31330
INSTALLING THE CANISTER
1. Install:
   • Canister "1"
   • Canister holder "2"

TIP

Fit the projection on the canister into the slot "a" in the canister holder.

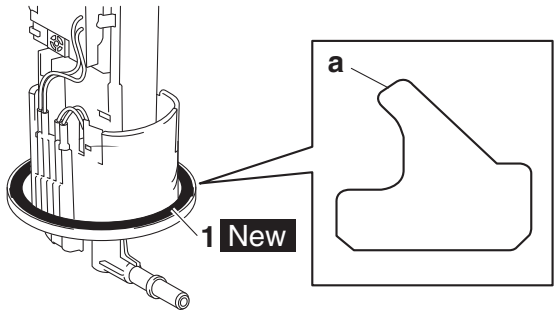


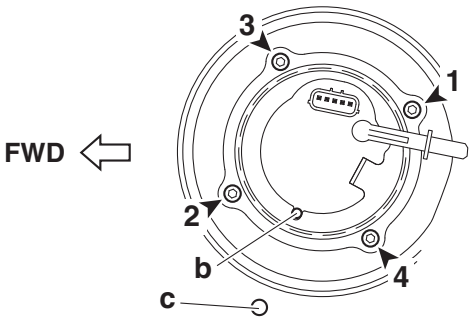
EAS30456
INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump gasket "1" New
   • Fuel pump
   • Fuel pump bracket

	**Fuel pump bolt** **4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)**

TIP
- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- The gasket lip "a" shall face toward the fuel tank.
- Align the projection "b" on the fuel pump with the punch mark "c" on the fuel tank.
- Align the slot in the fuel pump bracket with the projection "b" on the fuel pump.

• Tighten the fuel pump bolts in the proper tightening sequence as shown.



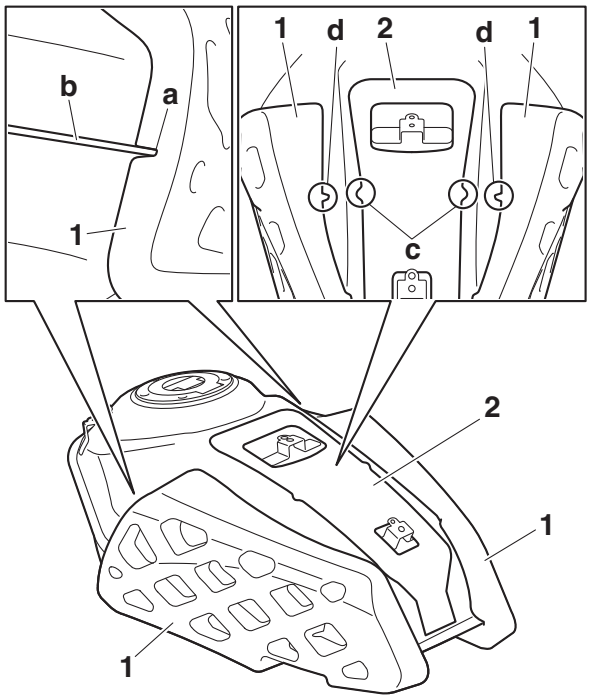


EAS31801
INSTALLING THE DAMPERS

1. Install:
   • Damper 2 “1”
   • Damper 1 “2”

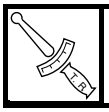
TIP

• Fit the slot “a” in each damper 2 over the rib “b” on the fuel tank.
• Align the projections “c” on damper 1 with the projection “d” on each damper 2.



EAS31081
INSTALLING THE FUEL TANK BRACKET

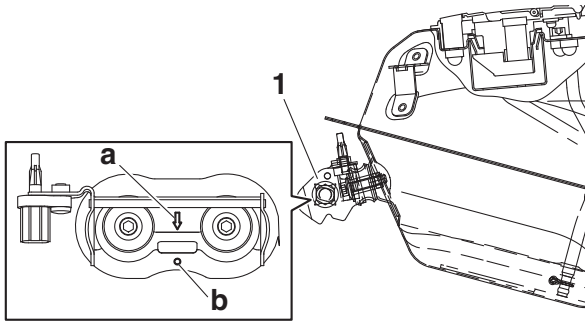
1. Install:
   • Grommets
   • Collars
   • Front fuel tank bracket “1”



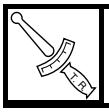
Fuel tank bolt (front side)
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

Make sure that the arrow mark “a” on the front fuel tank bracket points toward the hole “b” in the fuel tank.



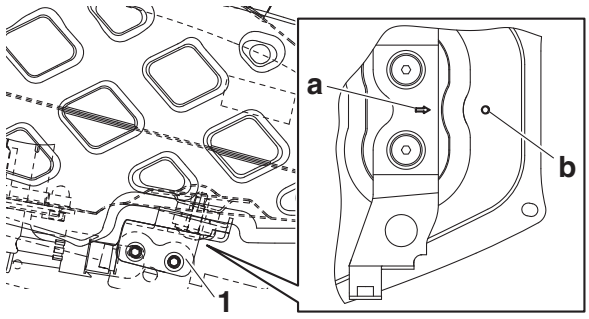
2. Install:
   • Grommets
   • Collars
   • Rear fuel tank bracket “1”



Fuel tank bolt (rear side)
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

Make sure that the arrow mark “a” on the rear fuel tank bracket points toward the punch mark “b” on the fuel tank.



EAS30457
INSTALLING THE FUEL TANK

1. Tighten:
   • Front fuel tank bracket bolt (temporarily)

TIP

Temporarily tighten the front fuel tank bracket bolt.

2. Install:
   • Fuel hose

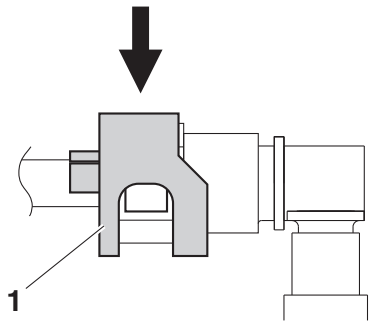
ECA18420

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 and fuel pump until a distinct “click” is heard.
- To install the fuel hose, slide the fuel hose connector cover “1” on each end of the hose in the direction of the arrow shown.



3. Connect:
   • Fuel pump coupler
   • Fuel tank breather hose
   • Fuel tank overflow hose
   • Intake air temperature sensor
4. Tighten:
   • Rear fuel tank bracket bolts

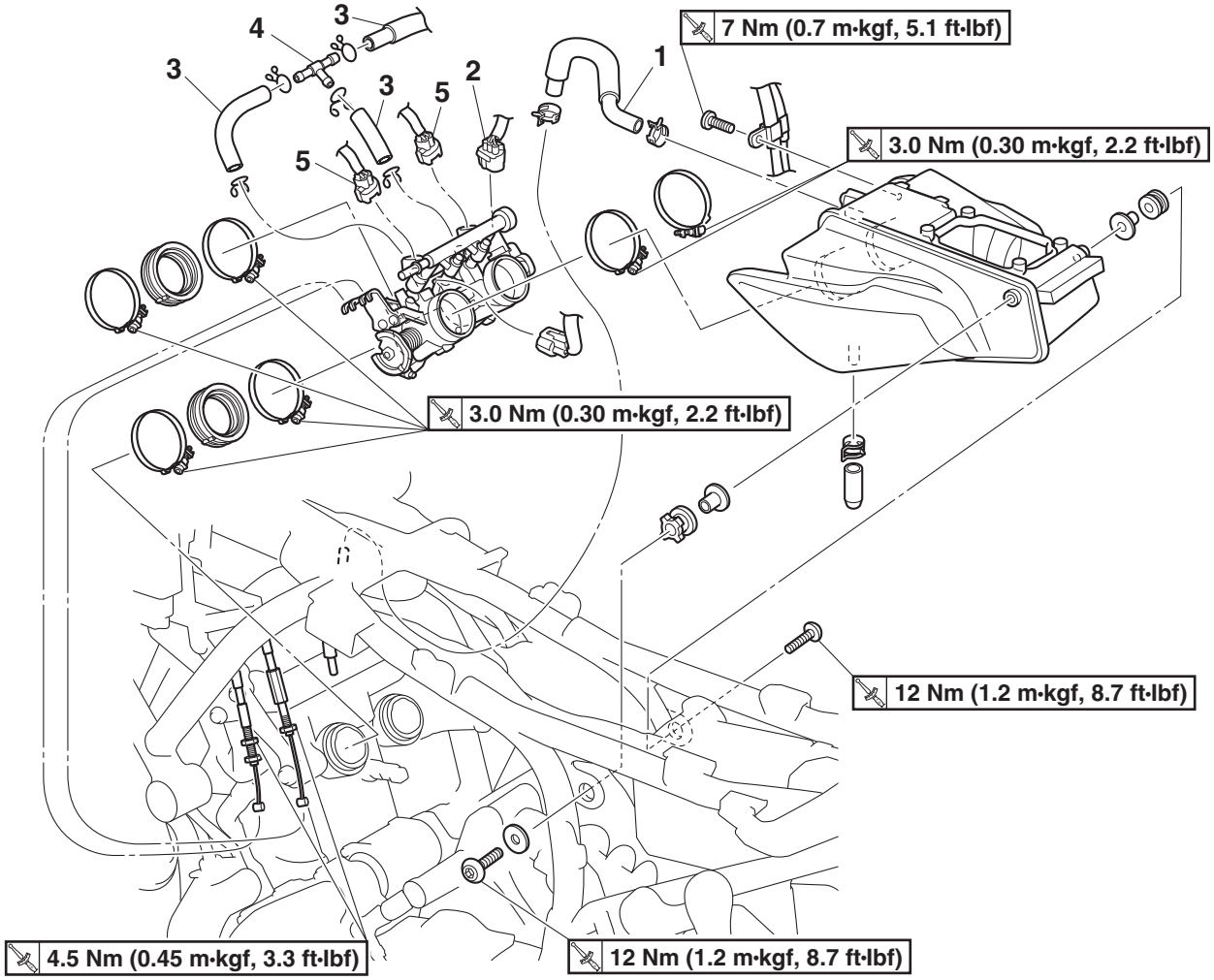
	Rear fuel tank bracket bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)

5. Tighten:
   • Front fuel tank bracket bolt

	Front fuel tank bracket bolt 30 Nm (3.0 m·kgf, 22 ft·lbf)

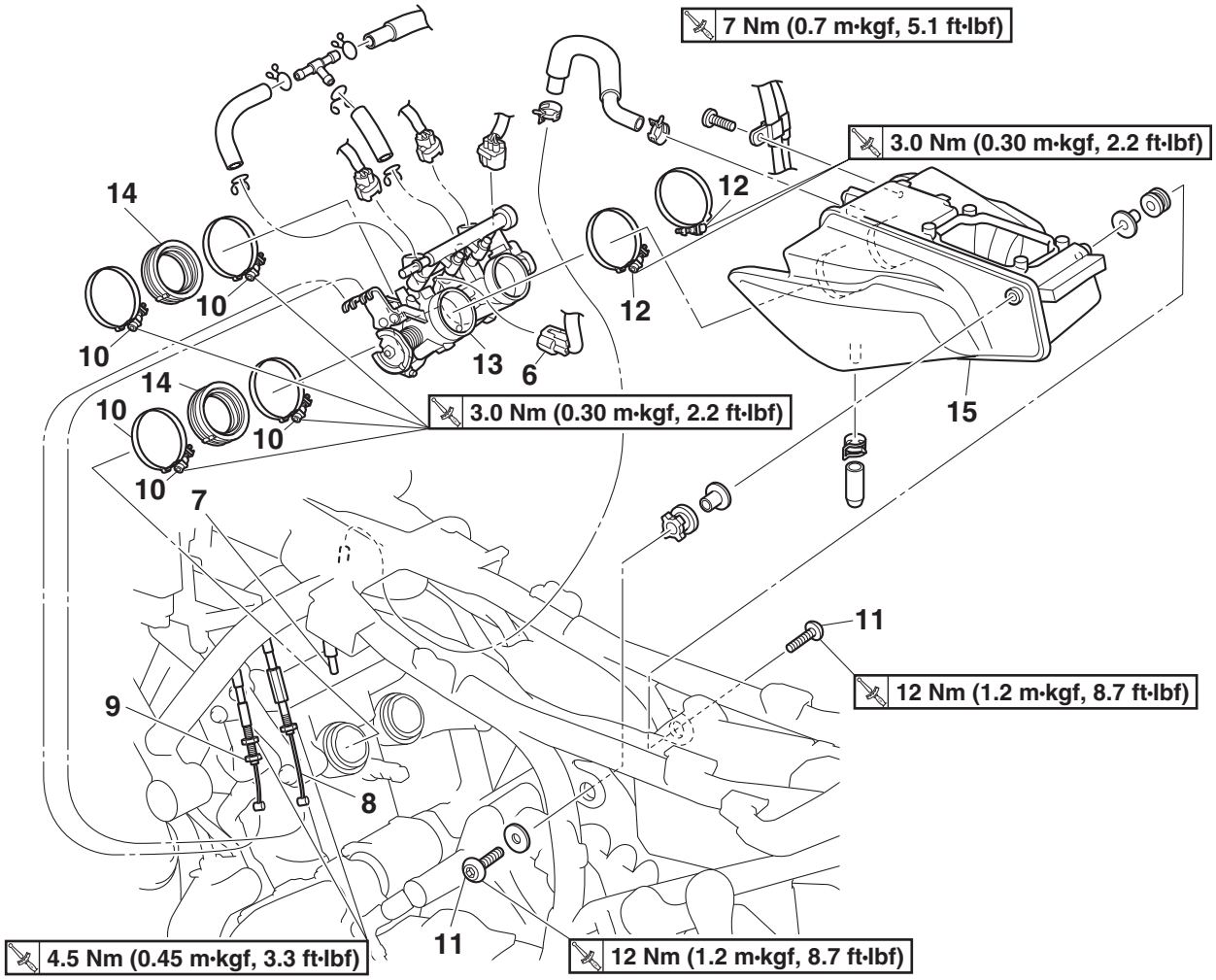
EAS20070
THROTTLE BODIES

Removing the air filter case and throttle bodies



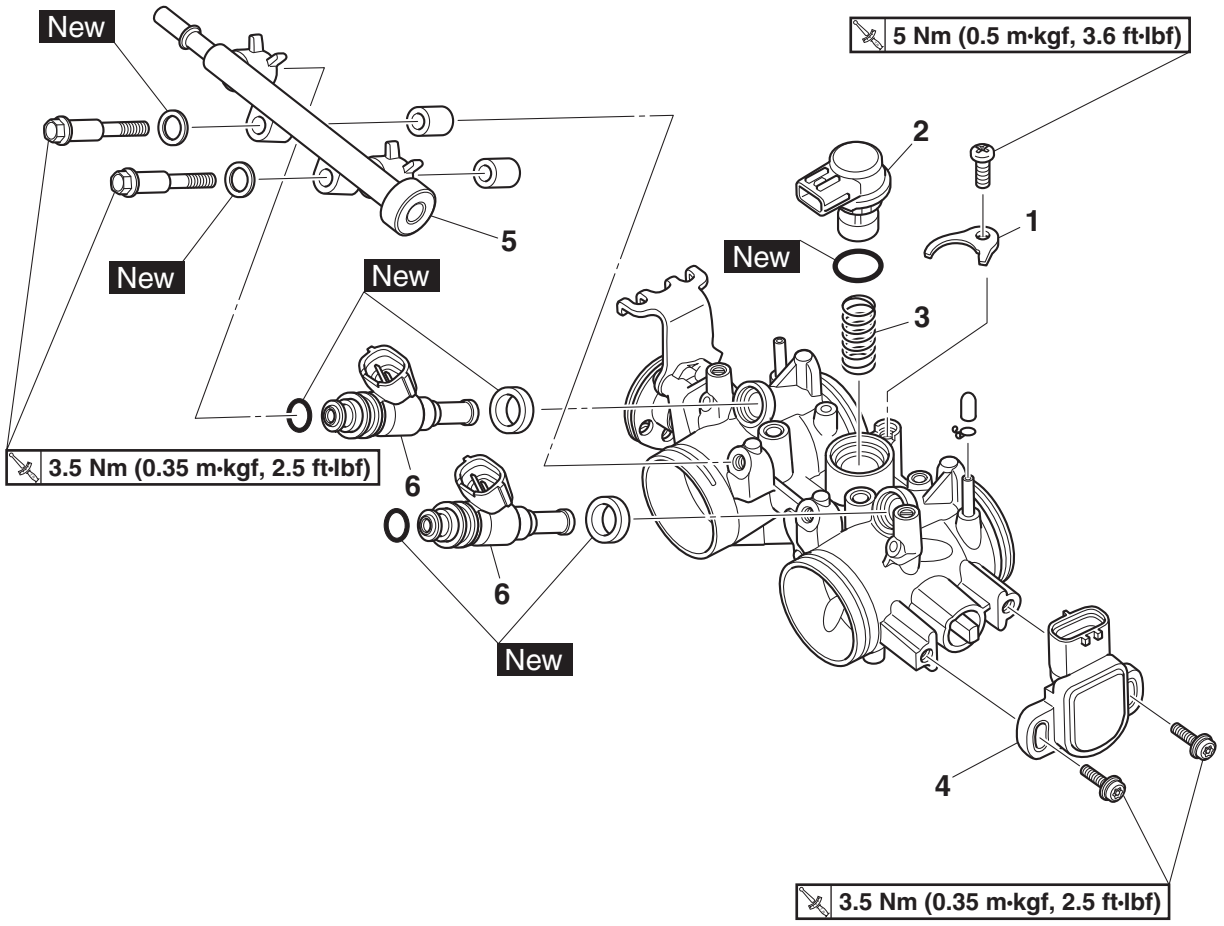
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Fuel tank center cover/Inner side covers		Refer to "GENERAL CHASSIS (3)" on page 4-5.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air duct bracket		Refer to "GENERAL CHASSIS (4)" on page 4-7.
	Pivot shaft protector (left/right)		Refer to "SWINGARM" on page 4-88.
1	Cylinder head breather hose	1	
2	Throttle position sensor coupler	1	Disconnect.
3	Canister purge hose	3	
4	Hose joint	1	
5	Injector coupler	2	Disconnect.

Removing the air filter case and throttle bodies



Order	Job/Parts to remove	Q'ty	Remarks
6	ISC (Idle Speed Control) unit coupler	1	Disconnect.
7	Intake air pressure sensor hose	1	Disconnect.
8	Throttle cable (decelerator cable)	1	Disconnect.
9	Throttle cable (accelerator cable)	1	Disconnect.
10	Throttle body joint clamp screw	4	Loosen.
11	Air filter case bolt	2	
12	Air filter case joint clamp screw	2	Loosen.
13	Throttle bodies	1	
14	Throttle body joint	2	
15	Air filter case	1	

Removing the fuel injectors



Order	Job/Parts to remove	Q'ty	Remarks
1	ISC (Idle Speed Control) valve plate	1	
2	ISC (Idle Speed Control) valve	1	
3	Spring	1	
4	Throttle position sensor	1	
5	Fuel rail	1	
6	Fuel injector	2	

EAS30475
CHECKING THE INJECTORS (BEFORE REMOVING)
1. Check:
   • Injectors
   Use the diagnostic code numbers “36–37”.
   Refer to “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 9-5.

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:
   • Fuel rail “1”

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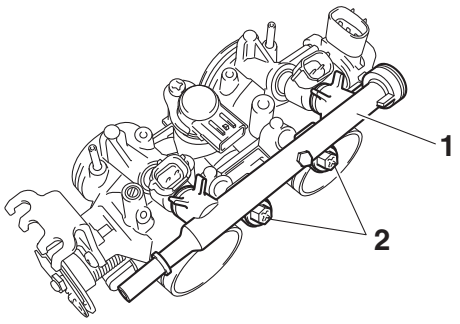
a. Remove the fuel rail bolts “2” as shown.



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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 8-171.

EAS30479
CHECKING THE THROTTLE BODIES
TIP

Before checking 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
• Vacuum hoses

EWA17850
⚠ WARNING

If the throttle bodies are subjected to strong shocks or dropped during checking, replace them.

1. Check:
   • Throttle bodies
   Cracks/damage → Replace the throttle bodies.

EAS31143
CLEANING THE ISC (IDLE SPEED CONTROL) VALVE
1. Remove the throttle bodies from the vehicle.

TIP

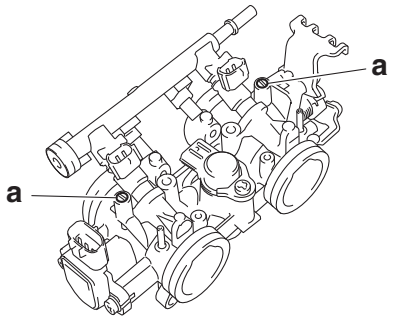
Before removing the throttle bodies, disconnect the throttle cables and couplers.

Cleaning the throttle bodies
1. Clean:
   • Throttle bodies

ECA20910
NOTICE

• Observe the following precautions; otherwise, the throttle bodies may not operate properly.
• Do not open the throttle valves quickly.
• Do not subject the throttle bodies to excessive force.
• Wash the throttle bodies in a petroleum-based solvent.
• Do not use any caustic carburetor cleaning solution.
• Do not apply cleaning solvent directly to any plastic parts, sensors, or seals.
• Do not directly push the throttle valves to open them.

• Do not turn the bypass air screws "a"; otherwise, the throttle body synchronization will be affected.



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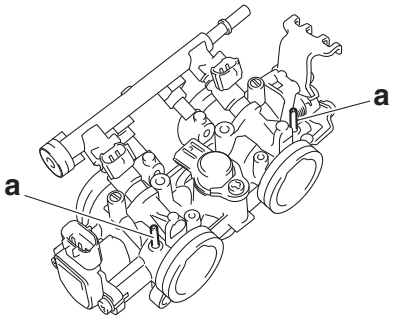
a. Place the throttle bodies on a flat surface with the air filter case side facing up.
b. Install the caps (895-14169-00) onto the hose fittings "a".



c. Push the lever in the direction shown in the illustration to hold the throttle valves in the open position.

EWA16680

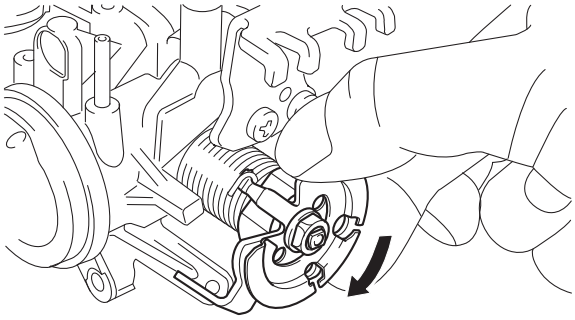
⚠ WARNING

When cleaning the throttle bodies, be careful not to injure yourself on the throttle valves or other components of the throttle bodies.

ECA21190

NOTICE

• 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 a petroleum-based solvent to the throttle valves and the inside of the throttle bodies to remove any carbon deposits.

TIP

- Do not allow any petroleum-based solvent to enter the opening for the injectors.
- Do not apply any petroleum-based solvent to the portions of the throttle valve shafts between the throttle bodies.

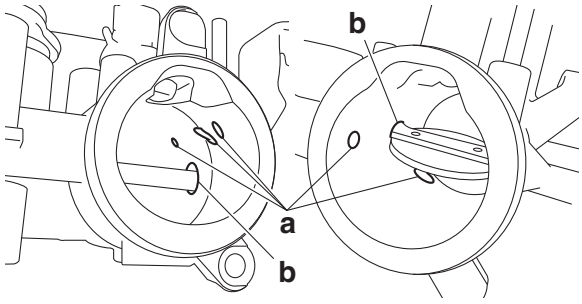
e. Remove the carbon deposits from the inside of each throttle body in a downward direction, from the air filter case side of the throttle body to the engine side.

ECA18470

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 a petroleum-based 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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Cleaning the ISC (idle speed control) valve

1. Remove:
   - ISC (Idle Speed Control) valve plate
   - ISC (Idle Speed Control) valve
   - O-ring
2. Clean:
   - ISC (Idle Speed Control) valve "1"

Recommended cleaning agent:
Yamaha oil & brake cleaner

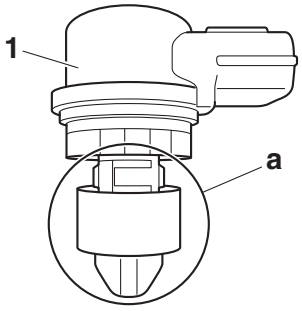
ECA21230

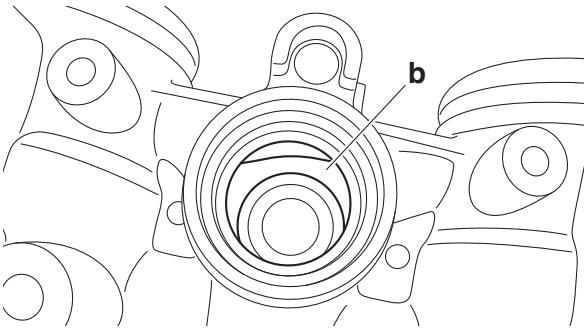
NOTICE

- **Be sure to use the recommended cleaning agent.**
- **Do not spray the cleaning agent directly onto the ISC valve or throttle bodies and do not immerse them in the cleaning agent.**
- **To prevent scratching the components, do not use a brush, metal file, or other abrasive tool.**
- **Do not clean with compressed air.**
- **Do not allow the removed deposits or foreign materials to adhere to the sealing surfaces of the O-ring.**
- **Do not scratch or deform the ISC valve or air passage; otherwise, poor starting performance, an unstable engine idling speed, or uncontrollable engine speed could result.**
- **Do not clean any areas other than those indicated in the illustrations. If the cleaning agent attaches to the ISC valve or enters the throttle bodies, thoroughly wipe it off.**

TIP

Clean the area "a" of the ISC valve and the ISC valve installation hole "b" in the throttle bodies.



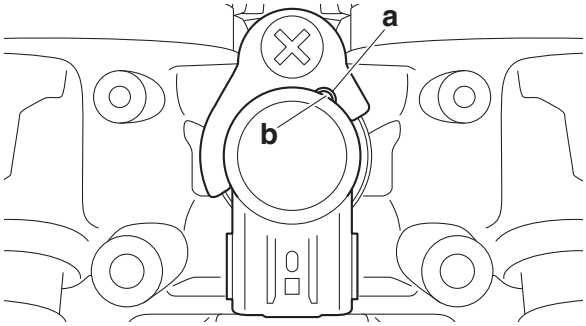


3. Install:
   - O-ring New
   - ISC (Idle Speed Control) valve
   - ISC (Idle Speed Control) valve plate

ISC (Idle Speed Control) valve plate screw
5 Nm (0.5 m·kgf, 3.6 ft·lbf)

TIP

Align the slot "a" in the ISC valve plate with the projection "b" on the ISC valve.



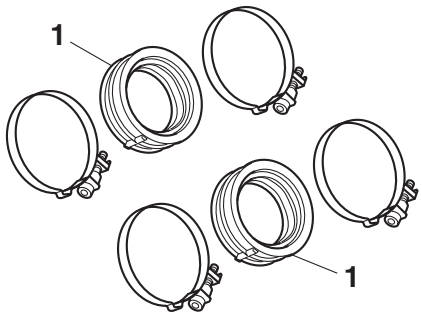
Resetting the ISC (idle speed control) learning values

1. Install:
   - Throttle bodies
2. 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.
3. Adjust:
   - Throttle bodies synchronizing
     Out of specification → Replace the throttle bodies.
     Refer to "SYNCHRONIZING THE THROTTLE BODIES" on page 3-8.

EAS30792

CHECKING THE THROTTLE BODY JOINTS

1. Check:
   - Throttle body joints "1"
     Cracks/damage → Replace.



EAS30485
ADJUSTING THE THROTTLE POSITION SENSOR

EWA16690
⚠ WARNING

• Handle the throttle position sensor with special care.
• Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.

1. Check:
   • Throttle position sensor
   Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-169.
2. Adjust:
   • Throttle position sensor angle

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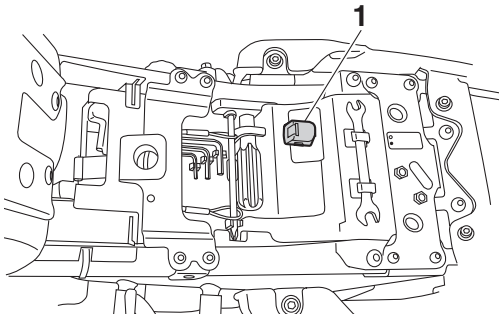
a. Temporary tighten the throttle position sensor bolts.
b. Check that the throttle valves are fully closed.
c. Connect the throttle position sensor to the wire harness.
d. Remove the protective cap "1", and then connect the Yamaha diagnostic tool to coupler.

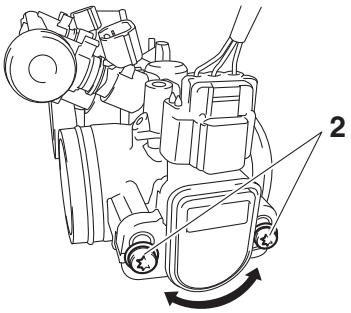
TIP

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 bolts "2".

	Throttle position sensor screw 3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)



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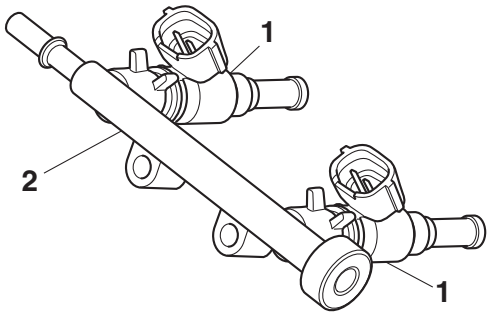
EAS31124
INSTALLING THE FUEL INJECTORS

ECA20000
NOTICE

• Always use new O-rings.
• When checking the injectors, do not allow any foreign material to enter or adhere to the injectors, fuel rail, or O-rings.
• Be careful not to twist or pinch the O-rings when installing the injectors.
• If an injector is subject to strong shocks or excessive force, replace it.
• If installing the original fuel rail and screws, remove the white paint marks using a cleaning solvent. Otherwise, paint chips on the screw seats could prevent the screws from being tightened to the specified torque.

1. Install new seals onto the end of each injector.
2. Install the fuel injectors "1" to the fuel rail "2".



	Fuel rail bolt 3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)

3. Install the fuel injector assemblies to the throttle bodies.
4. Check the injector pressure after the fuel injectors are installed to the throttle bodies.
   Refer to "CHECKING THE INJECTOR PRESSURE" on page 7-14.

EAS30481
CHECKING THE INJECTOR PRESSURE

TIP

- After installing the fuel 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

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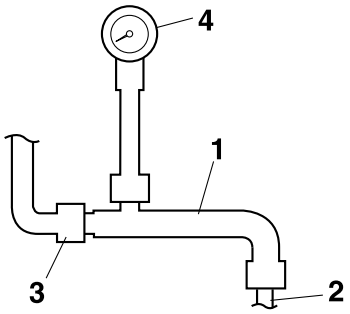
a. Connect the fuel injector pressure adapter "1" to the fuel rail "2", and then connect an air compressor "3" to the adapter.
b. Connect the pressure gauge "4" to the fuel injector pressure adapter "1".

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 pressure is reached.

Specific air pressure
490 kPa (4.9 kgf/cm^2, 69.7 psi)

ECA18440
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 for about one minute.
   Pressure drops → Check the pressure gauge and adapter.
   Check the seals and O-rings, and then reinstall.
   Replace the fuel injectors.

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EAS30482
CHECKING THE FUEL PRESSURE

1. Remove:
   - Seat
     Refer to "GENERAL CHASSIS (1)" on page 4-1.
   - Fuel tank center cover
     Refer to "GENERAL CHASSIS (3)" on page 4-5.
2. Check:
   - Fuel pressure

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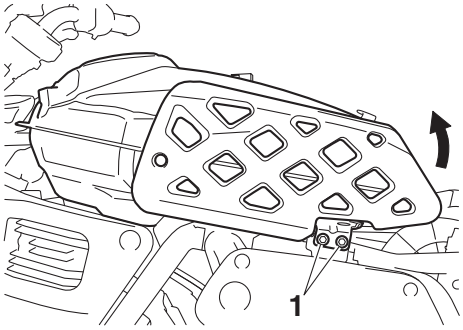
a. Remove the rear fuel tank bracket bolts "1" and holdup the fuel tank.

ECA20070
NOTICE

When lifting up the fuel tank, be careful not to pull the fuel tank overflow hose and fuel tank breather hose.



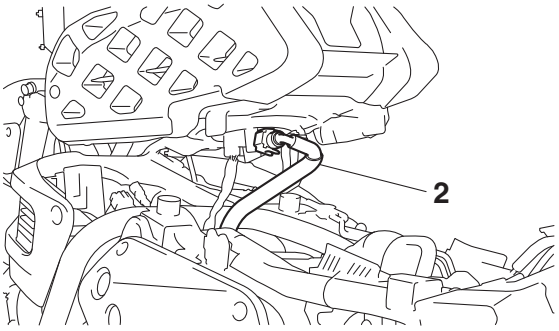
b. Disconnect the fuel hose "2" from the fuel tank.

EWA16640
⚠ WARNING

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

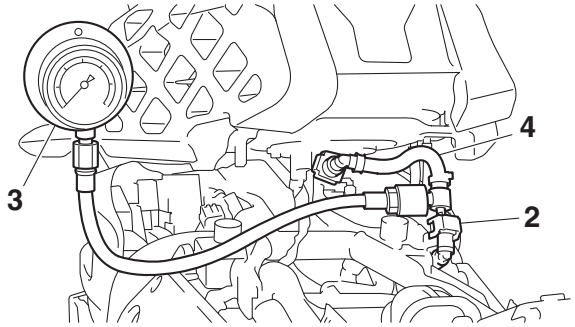
ECA20010
NOTICE

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.



c. Connect the pressure gauge "3" and adapter "4" to the fuel hose "2".

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 pressure.

Fuel line pressure at idling
300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi) / Regulated pressure 324 kPa (3.2 kgf/cm², 47.0 psi)

Faulty → Replace the fuel pump.

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3. Install:
   • Fuel tank

Rear fuel tank bracket bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

Refer to "FUEL TANK" on page 7-1.
• Fuel tank center cover
Refer to "GENERAL CHASSIS (3)" on page 4-5.
• Seat
Refer to "GENERAL CHASSIS (1)" on page 4-1.

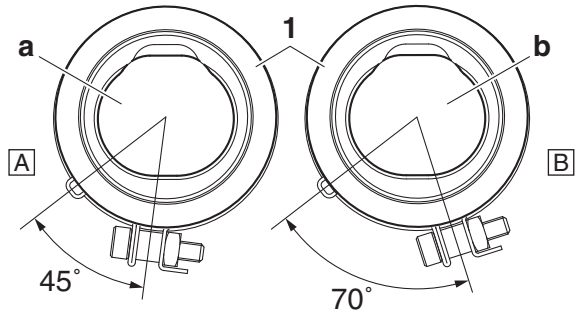
EAS30937
INSTALLING THE THROTTLE BODY JOINTS

1. Install:
   • Throttle body joints "1"

Throttle body joint clamp screw
3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)

TIP

Be sure to install the throttle body joints "1" as shown in the illustration.



a. #1 cylinder
b. #2 cylinder
A. Left
B. Right

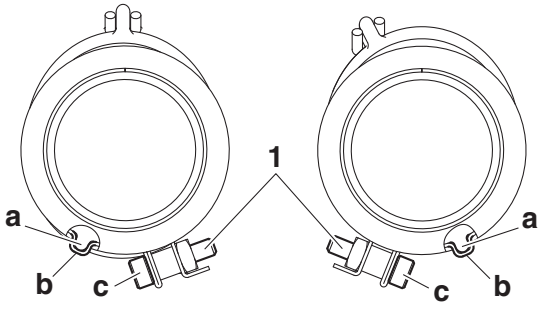
EAS31092
INSTALLING THE AIR FILTER CASE

1. Install:
   • Air filter case joint clamps "1"

Air filter case joint clamp screw
3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)

TIP

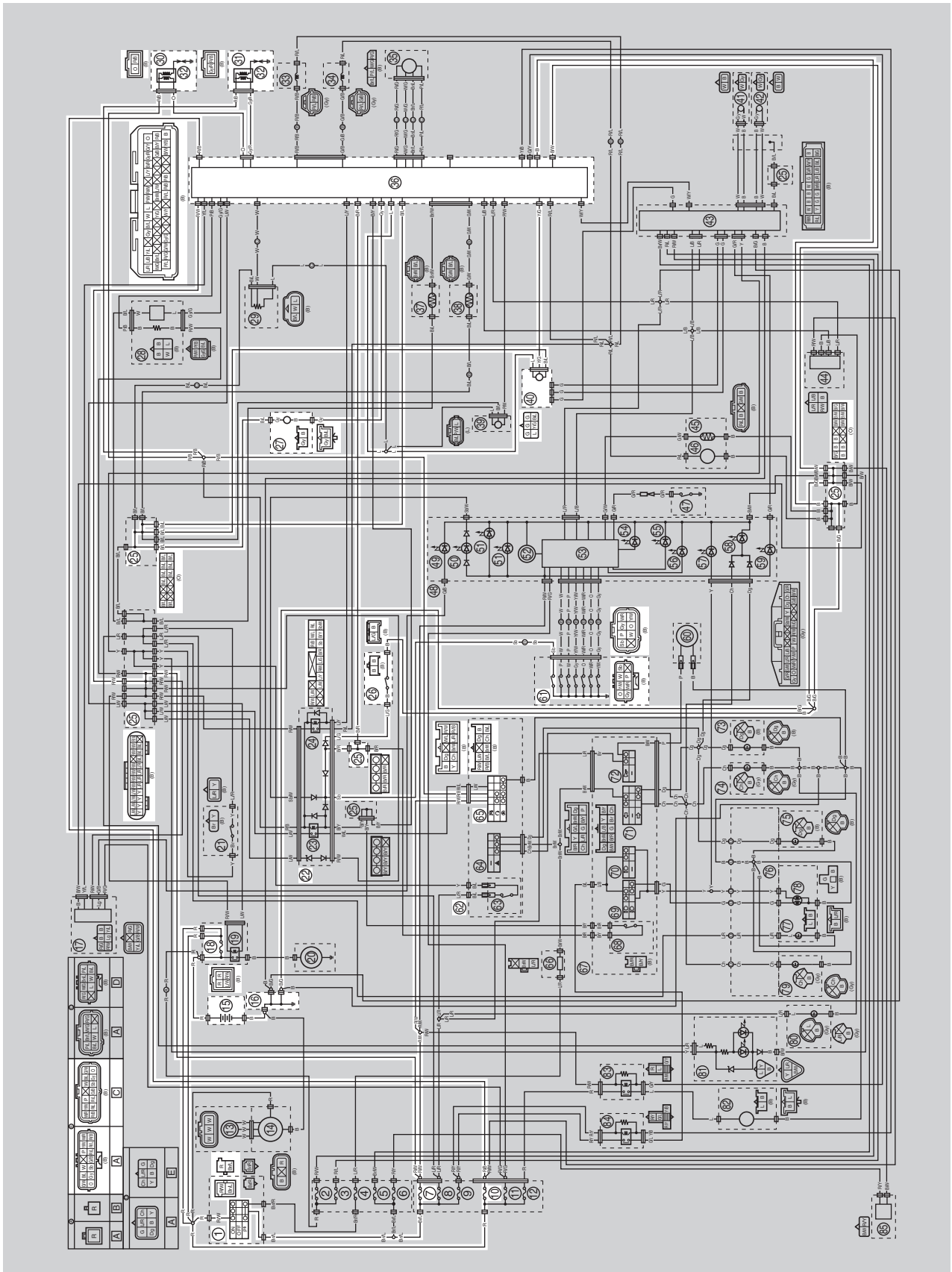
- Align the projection "a" on the air filter case joint with the slot "b" in the air filter case joint clamp.
- Face the screw head "c" of the air filter case joint clamp outward.



ELECTRICAL SYSTEM

EAS20072
IGNITION SYSTEM

EAS30490
CIRCUIT DIAGRAM

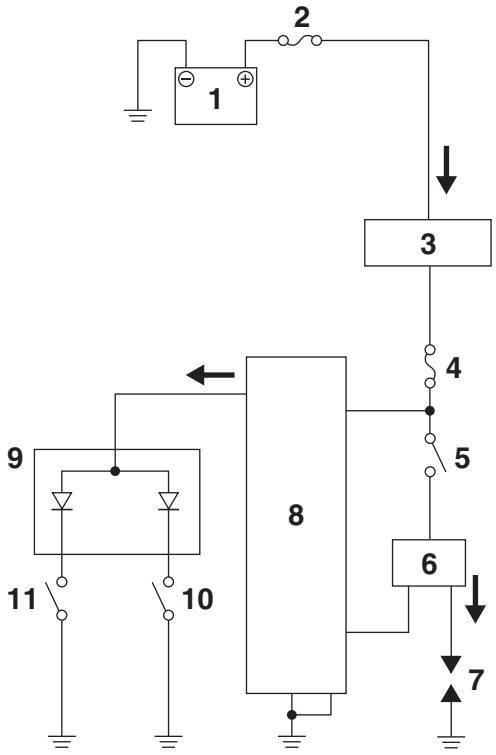


1. Main switch
7. Ignition fuse
10. Fuel injection system fuse
15. Battery
16. Engine ground
18. Main fuse
22. Relay unit
25. Joint coupler
26. Sidestand switch
27. Crankshaft position sensor
30. Ignition coil #1
31. Ignition coil #2
32. Spark plug
36. ECU (Engine Control Unit)
40. Lean angle sensor
61. Gear position switch
62. Handlebar switch (right)
65. Start/engine stop switch
A. Wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)

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 ECU does not flow to the ignition coils or fuel injectors when the gear position switch (neutral circuit) or sidestand switch is open. 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. Relay unit (diode)
10. Sidestand switch
11. Gear position switch

EAS30492
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

TIP

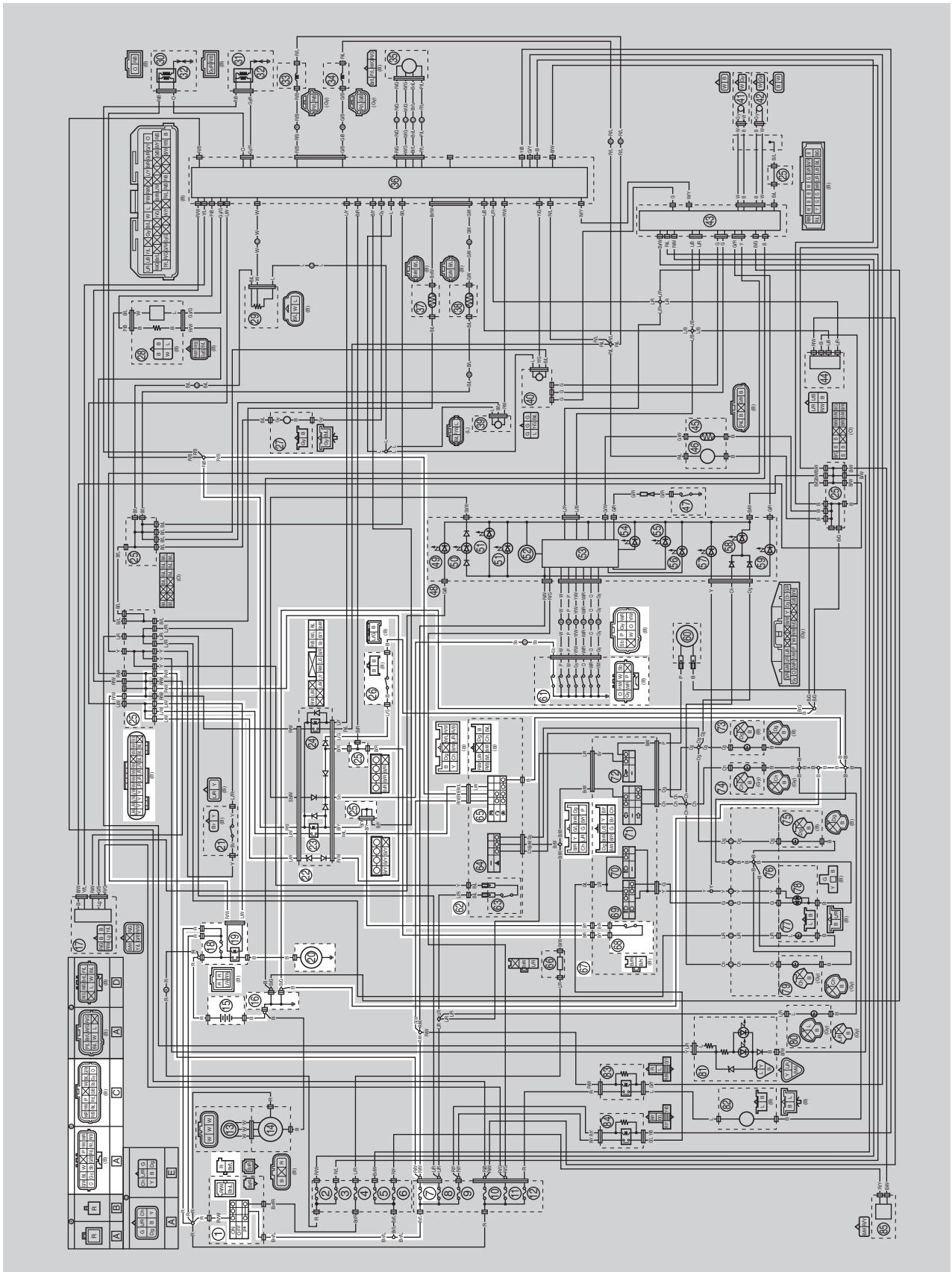
• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank
4. Drive sprocket cover
5. Headlight assembly

1. Check the fuses. (Ignition, fuel injection system, and main) 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 3-4.	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 8-164.	NG →	Replace the ignition coil(s).
OK ↓		
6. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-165.	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 →	• The start/engine stop switch is faulty. • Replace the right handlebar switch.
OK ↓		
9. Check the gear position switch. Refer to “CHECKING THE GEAR POSITION SWITCH” on page 8-170.	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 wiring. Refer to “CIRCUIT DIAGRAM” on page 8-1.	NG →	Properly connect or replace the wiring harness.
OK ↓		
Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.		

EAS20073
ELECTRIC STARTING SYSTEM

EAS30493
CIRCUIT DIAGRAM



1. Main switch
7. Ignition fuse
15. Battery
16. Engine ground
18. Main fuse
19. Starter relay
20. Starter motor
22. Relay unit
23. Starting circuit cut-off relay
25. Joint coupler
26. Sidestand switch
61. Gear position switch
62. Handlebar switch (right)
65. Start/engine stop switch
67. Handlebar switch (left)
68. Clutch switch

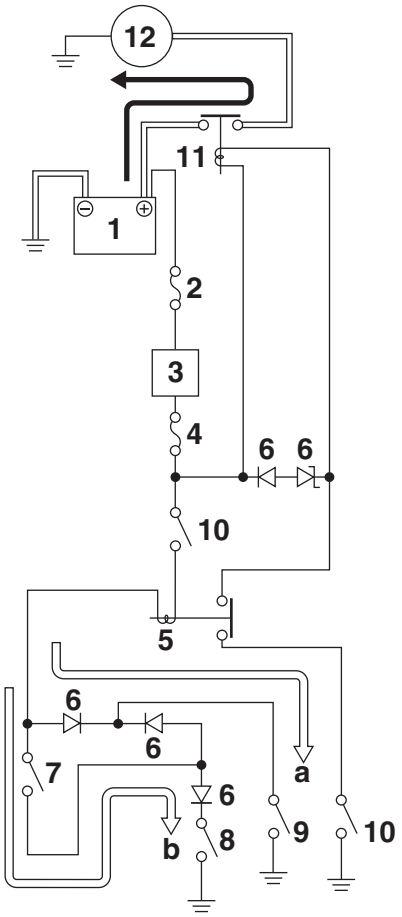
A. Wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)

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 cranked up by pressing 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. Starting circuit cut-off relay
6. Relay unit (diode)
7. Clutch switch
8. Sidestand switch
9. Gear position switch
10. Start/engine stop switch
11. Starter relay
12. Starter motor

EAS30495
TROUBLESHOOTING

The starter motor fails to turn.

TIP

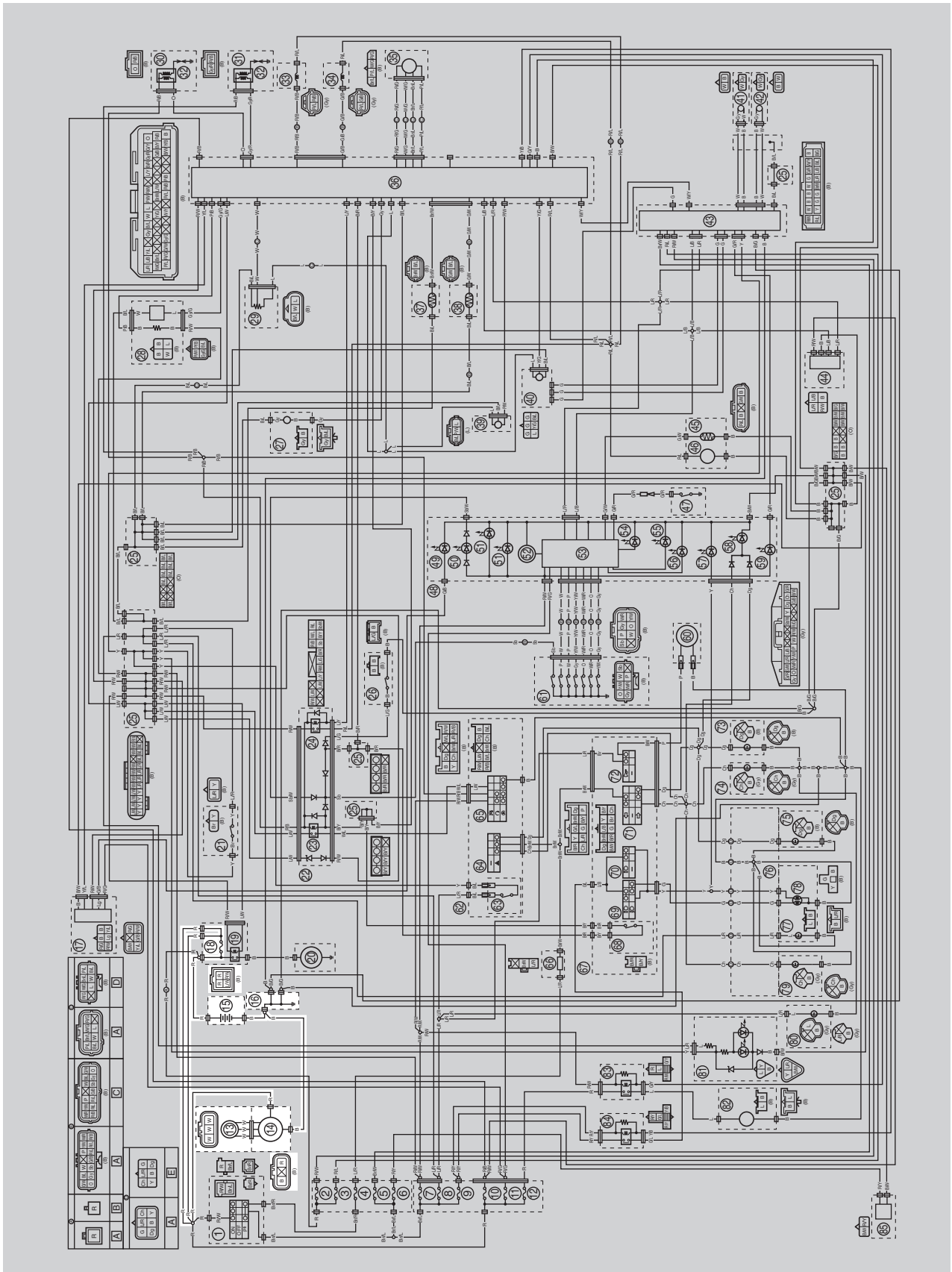
• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank
4. Throttle bodies/Air filter case
5. Drive sprocket cover
6. Headlight assembly

1. Check the fuses. (Ignition, fuel injection system, and main) 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 8-166.	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 5-44.	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 8-170.	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 →	• The start/engine stop switch is faulty. • Replace the right handlebar switch.
OK ↓		
13. Check the entire starting system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-7.	NG →	Properly connect or replace the wiring harness.
OK ↓		
The starting system circuit is OK.		

EAS20074
CHARGING SYSTEM

EAS30496
CIRCUIT DIAGRAM



13.AC magneto
14.Rectifier/regulator
15.Battery
16.Engine ground
18.Main fuse

EAS30497
TROUBLESHOOTING

The battery is not being charged.

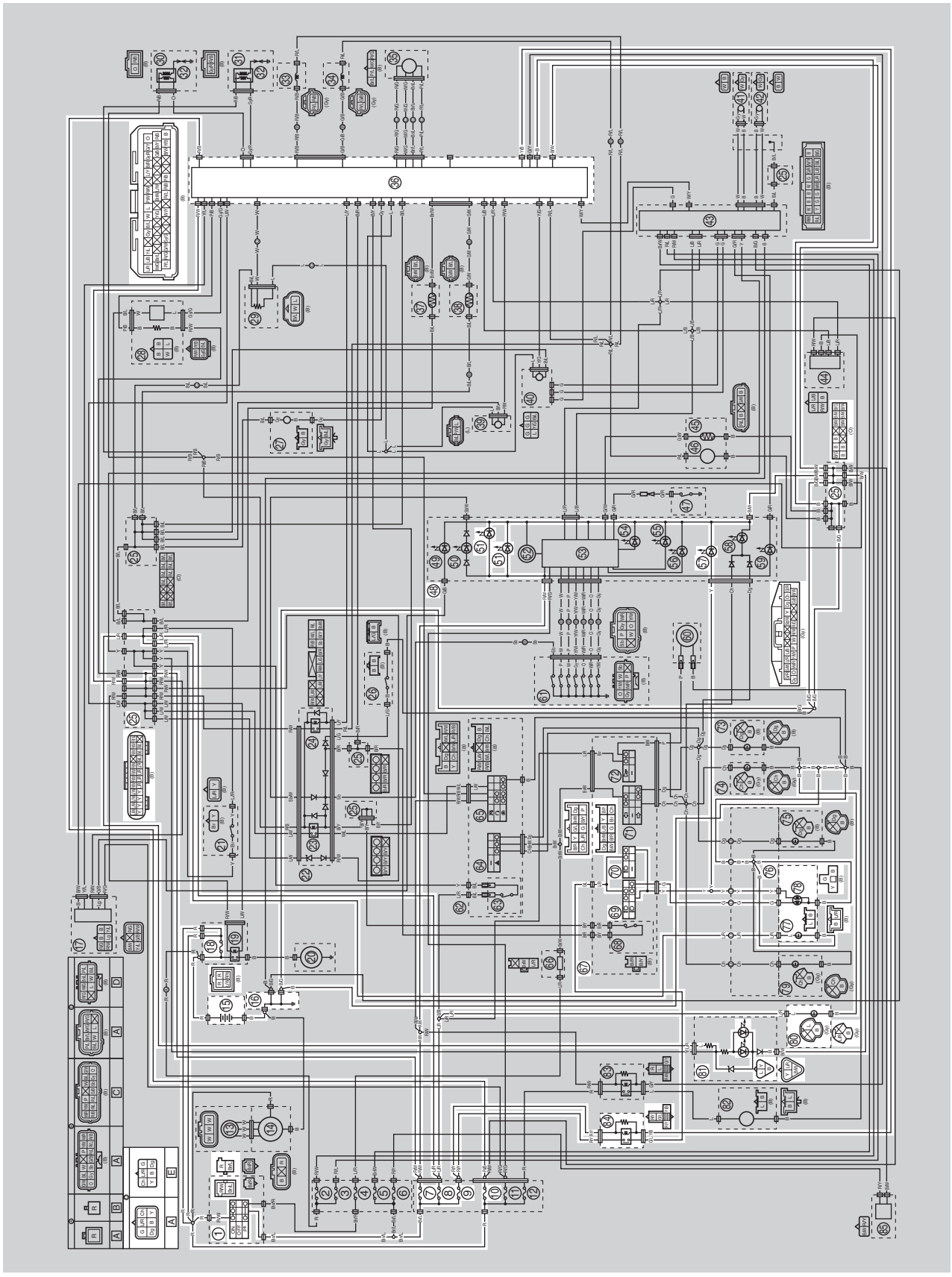
TIP

• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Air scoop (left)

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 wiring. Refer to "CIRCUIT DIAGRAM" on page 8-13.	NG →	Properly connect or replace the wiring harness.
OK ↓		
The charging system circuit is OK.		

EAS20075
LIGHTING SYSTEM

EAS30498
CIRCUIT DIAGRAM



1. Main switch
7. Ignition fuse
8. Signaling system fuse
9. Headlight fuse
10. Fuel injection system fuse
15. Battery
16. Engine ground
18. Main fuse
25. Joint coupler
36. ECU (Engine Control Unit)
48. Meter assembly
51. Meter light
57. High beam indicator light
67. Handlebar switch (left)
69. Dimmer switch
70. Pass switch
76. Headlight assembly
77. Auxiliary light
78. Headlight
80. License plate light
81. Tail/brake light
84. Headlight relay
A. Wire harness
E. Sub-wire harness (headlight, turn signal light, auxiliary light)

EAS30499
TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, license plate light or meter light.

TIP

• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank
4. 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. (Ignition, signaling system, headlight, fuel injection system, and main) 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 switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG →	• The dimmer switch is faulty. • Replace the left handlebar switch.
OK ↓		
6. Check the pass switch. Refer to “CHECKING THE SWITCHES” on page 8-153.	NG →	• The pass switch is faulty. • Replace the left handlebar switch.
OK ↓		
7. Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 8-161.	NG →	Replace the headlight relay.
OK ↓		

8. Check the entire lighting system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-17.

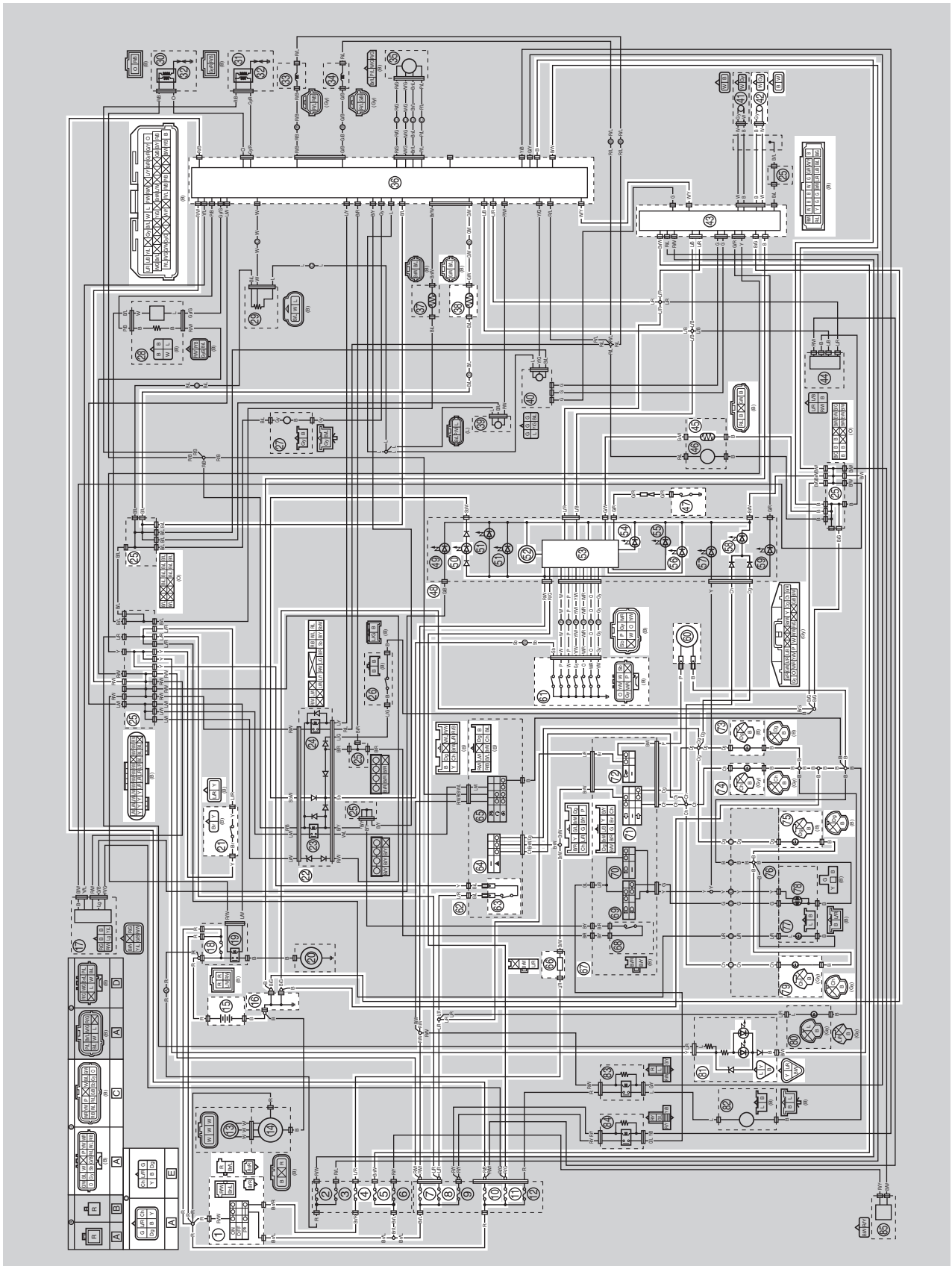
NG → Properly connect or replace the wiring harness.

OK ↓

Replace the ECU, meter assembly, or tail/brake light. Refer to“REPLACING THE ECU (engine control unit)” on page 8-158.

EAS20076
SIGNALING SYSTEM

EAS30500
CIRCUIT DIAGRAM



1. Main switch
4. Parking lighting fuse
5. ABS control unit fuse
7. Ignition fuse
8. Signaling system fuse
10. Fuel injection system fuse
11. Backup fuse
15. Battery
16. Engine ground
18. Main fuse
21. Rear brake light switch
22. Relay unit
25. Joint coupler
36. ECU (Engine Control Unit)
38. Coolant temperature sensor
42. Rear wheel sensor
43. ABS ECU (electronic control unit)
45. Fuel sender
47. Oil pressure switch
48. Meter assembly
50. Neutral indicator light
52. Tachometer
53. Multi-function meter
54. Oil pressure warning light
56. Coolant temperature warning light
58. Turn signal indicator light
60. Horn
61. Gear position switch
62. Handlebar switch (right)
63. Front brake light switch
64. Hazard switch
66. Turn signal/hazard relay
67. Handlebar switch (left)
71. Turn signal switch
72. Horn switch
73. Rear turn signal light (right)
74. Rear turn signal light (left)
75. Front turn signal light (right)
79. Front turn signal light (left)
81. Tail/brake light

A. Wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)
E. Sub-wire harness (headlight, turn signal light, auxiliary light)

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 come on.
- The speedometer fails to operate.

TIP

- Before troubleshooting, remove the following part(s):

1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank
4. Drive sprocket cover
5. Headlight assembly

1. Check the fuses. (Parking lighting, ABS control unit, ignition, signaling system, fuel injection system, backup, and main) 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 wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG →	Properly connect or replace the wiring harness.
OK ↓		
Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system".		

Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-153.	NG →	• The horn switch is faulty. • Replace the left handlebar switch.
OK ↓		

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-21.
   NG → Properly connect or replace the wiring harness.
   OK ↓
Replace the horn.

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 wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-21.
   NG → Properly connect or replace the wiring harness.
   OK ↓
Replace the tail/brake light.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulbs and sockets.
   Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-156.
   NG → Replace the turn signal light bulb, socket or both.
   OK ↓
2. Check the turn signal switch.
   Refer to “CHECKING THE SWITCHES” on page 8-153.
   NG → • The turn signal switch is faulty.
   • Replace the left handlebar switch.
   OK ↓
3. Check the hazard switch.
   Refer to “CHECKING THE SWITCHES” on page 8-153.
   NG → • The hazard switch is faulty.
   • Replace the right handlebar switch.
   OK ↓
4. Check the turn signal/hazard relay.
   Refer to “CHECKING THE RELAYS” on page 8-161.
   NG → Replace the turn signal/hazard relay.
   OK ↓

5. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-21.	NG →	Properly connect or replace the wiring harness.
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 8-170.	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 wiring. Refer to “CIRCUIT DIAGRAM” on page 8-21.	NG →	Properly connect or replace the wiring harness.
OK ↓		
Replace the meter assembly.		

The oil pressure warning light fails to come on when the main switch is set to “ON”.

1. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-21.	NG →	Properly connect or replace the wiring harness
OK ↓		
2. Disconnect the oil pressure switch lead from the oil pressure switch, and then check whether the oil pressure warning light comes on when the lead is connected to the engine ground.	NG →	Replace the meter assembly.
OK ↓		
Replace the oil pressure switch.		

The oil pressure warning light remains on after the engine is started.

1. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-21.

NG → Properly connect or replace the wiring harness.

OK ↓

2. Measure the engine oil pressure.
   Refer to “MEASURING THE ENGINE OIL PRESSURE” on page 3-23.

NG → Check the engine oil leakage, oil viscosity, oil seal, oil filter, or oil pump.

OK ↓

Replace the oil pressure switch.

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 8-167.

NG → Replace the fuel pump assembly.

OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-21.

NG → Properly connect or replace the wiring harness.

OK ↓

Replace the meter assembly.

The coolant temperature warning light fails to come on.

1. Check the coolant temperature sensor.
   Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-168.

NG → Replace the coolant temperature sensor.

OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-21.

NG → Properly connect or replace the wiring harness.

OK ↓

Replace the ECU or meter assembly.
Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.

The speedometer fails to operate.

1. Check the rear wheel sensor.
   Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR” on page 4-25.

NG → Replace the rear wheel sensor.

OK ↓

2. Check the entire rear wheel sensor wiring.
   Refer to TIP.

NG → Properly connect or replace the wiring harness.

OK ↓

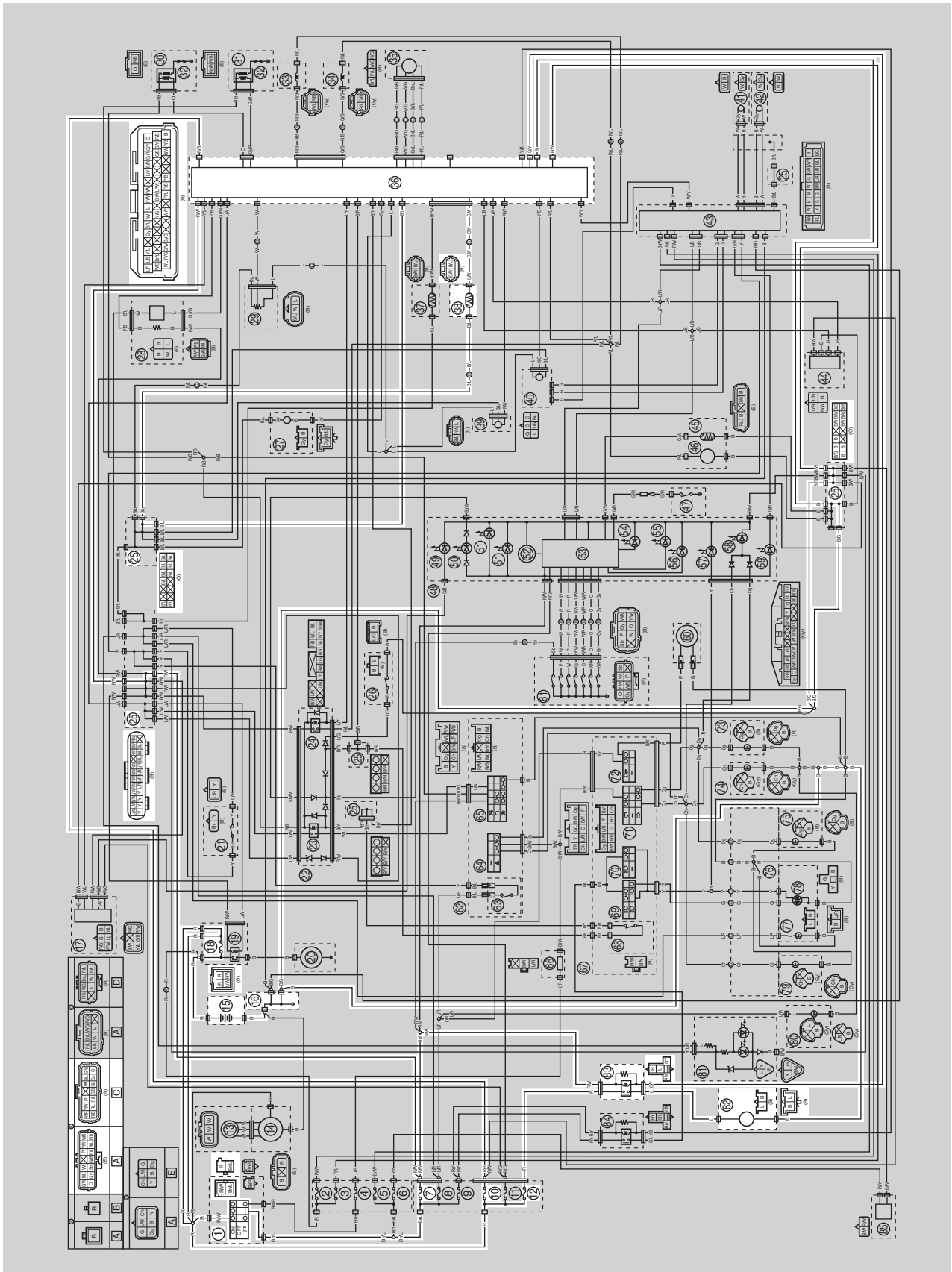
Replace the ECU, ABS ECU, or meter assembly. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.

TIP

Replace the wire harness 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 meter assembly coupler.
  (blue/black–blue/black)
  (blue/red–blue/red)

EAS20077
COOLING SYSTEM

EAS30502
CIRCUIT DIAGRAM



1. Main switch
7. Ignition fuse
10. Fuel injection system fuse
12. Radiator fan motor fuse
15. Battery
16. Engine ground
18. Main fuse
25. Joint coupler
36. ECU (Engine Control Unit)
38. Coolant temperature sensor
82. Radiator fan motor
83. Radiator fan motor relay
A. Wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)

EAS30503
TROUBLESHOOTING

The radiator fan motor fails to turn.

TIP

• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank

1. Check the fuses. (Ignition, fuel injection system, radiator fan motor, and main) 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 8-168.	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 8-168.	NG →	Replace the coolant temperature sensor.
OK ↓		

7. Check the entire cooling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-29.

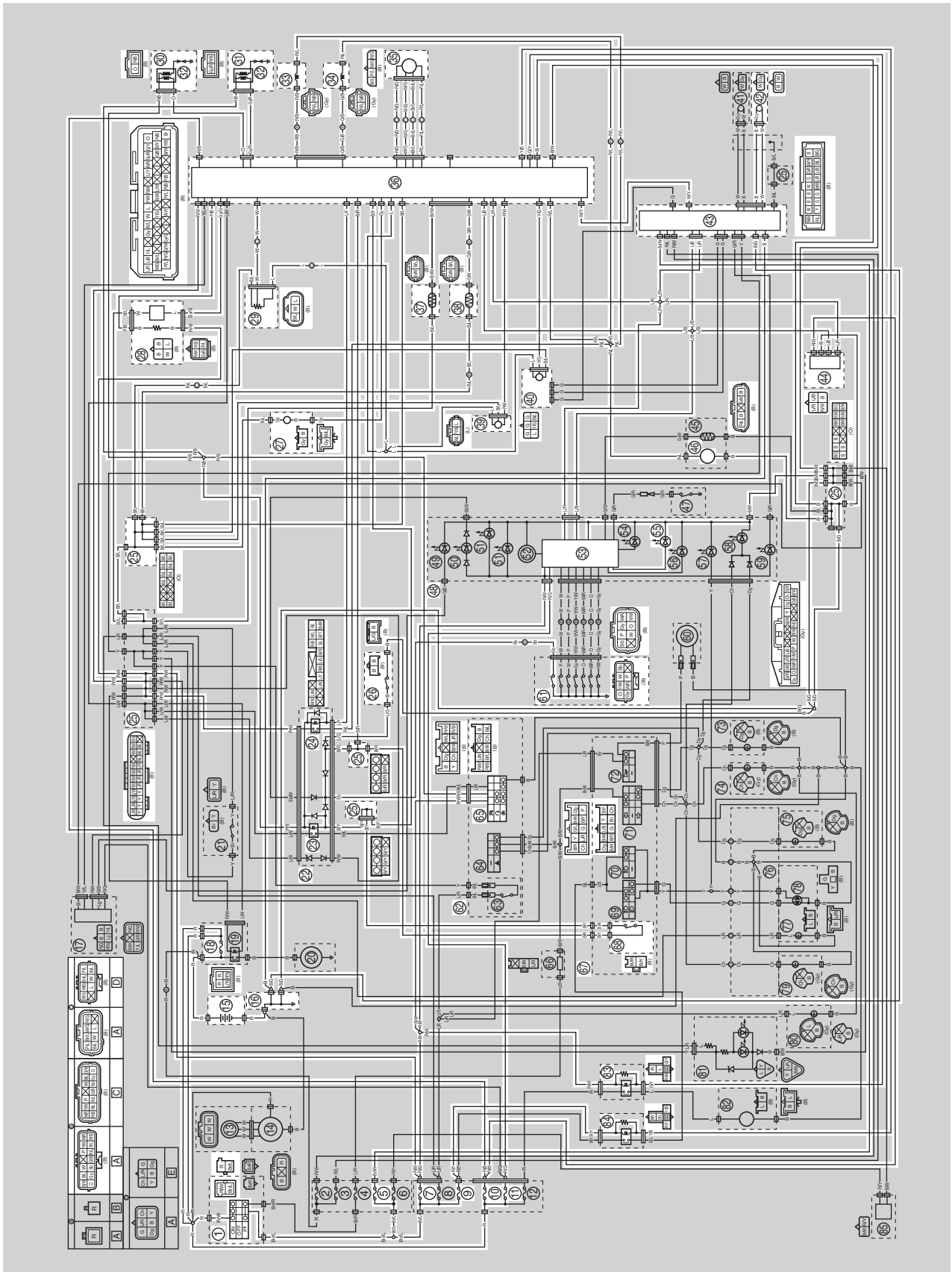
NG → Properly connect or replace the wiring harness.

OK ↓

Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.

EAS20078
FUEL INJECTION SYSTEM

EAS30504
CIRCUIT DIAGRAM



1. Main switch
5. ABS control unit fuse
7. Ignition fuse
9. Headlight fuse
10. Fuel injection system fuse
11. Backup fuse
15. Battery
16. Engine ground
18. Main fuse
22. Relay unit
23. Starting circuit cut-off relay
24. Fuel pump relay
25. Joint coupler
26. Sidestand switch
27. Crankshaft position sensor
28. O_2 sensor
29. Throttle position sensor
30. Ignition coil #1
31. Ignition coil #2
32. Spark plug
33. Fuel injector #1
34. Fuel injector #2
35. ISC (Idle Speed Control) unit
36. ECU (Engine Control Unit)
37. Intake air temperature sensor
38. Coolant temperature sensor
39. Intake air pressure sensor
40. Lean angle sensor
42. Rear wheel sensor
43. ABS ECU (electronic control unit)
44. Yamaha diagnostic tool coupler
46. Fuel pump
48. Meter assembly
53. Multi-function meter
55. Engine trouble warning light
61. Gear position switch
62. Handlebar switch (right)
65. Start/engine stop switch
67. Handlebar switch (left)
68. Clutch switch
83. Radiator fan motor relay
84. Headlight relay

A. Wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)
D. Sub-wire harness (throttle position sensor, ISC)

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

▼▼▼

a. Check the fault code numbers that have a condition of "Detected" using the Yamaha diagnostic tool.
b. Identify the faulty system with the fault code number.
c. Identify the probable cause of the malfunction.

▲▲▲

2. Check and repair the probable cause of the malfunction.

Fault code No.	No fault code No.
Check and repair. Refer to "TROUBLESHOOTING DETAILS (FAULT CODE)" on page 8-38. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to "TROUBLESHOOTING DETAILS (FAULT CODE)" on page 8-38 and "SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE" on page 9-5.	Check and repair.

3. Perform the reinstatement action for the fuel injection system.
   Refer to "Confirmation of service completion" in the appropriate table in "TROUBLESHOOTING DETAILS (FAULT CODE)" on page 8-38.

TIP

- If another fault code number is displayed, repeat steps (1) to (3) until no fault code number is displayed.
- Turning the main switch to "OFF" will not erase the malfunction history.

The engine operation is not normal, but the engine trouble warning light does not come on.

1. Check the operation of the following sensors and actuators in the diagnostic mode. Refer to "DIAGNOSTIC CODE: SENSOR OPERATION TABLE" on page 9-12 and "DIAGNOSTIC CODE: ACTUATOR OPERATION TABLE" on page 9-14.

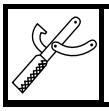
01: Throttle position sensor signal (throttle angle) 30: Cylinder-#1 ignition coil 31: Cylinder-#2 ignition coil 36: Fuel injector #1 37: Fuel injector #2

   If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.
   If no malfunction is detected in the sensors and actuators, check and repair the inner parts of the engine.

EAS30951

YAMAHA DIAGNOSTIC TOOL

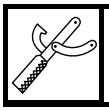
This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



Yamaha diagnostic tool
90890-03250

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

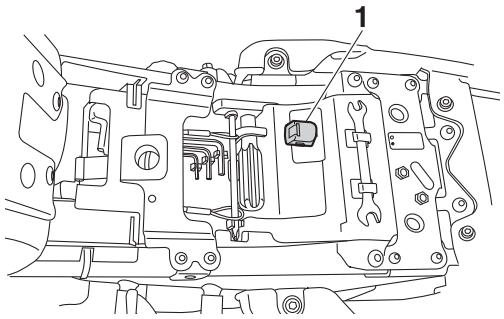
Diagnosis of malfunction:	Fault codes recorded on the ECU are read, and the contents are displayed. The freeze frame data (FFD) is the operation data when a malfunction was detected. This data can be used to identify when the malfunction occurred and check the engine conditions and running conditions 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.

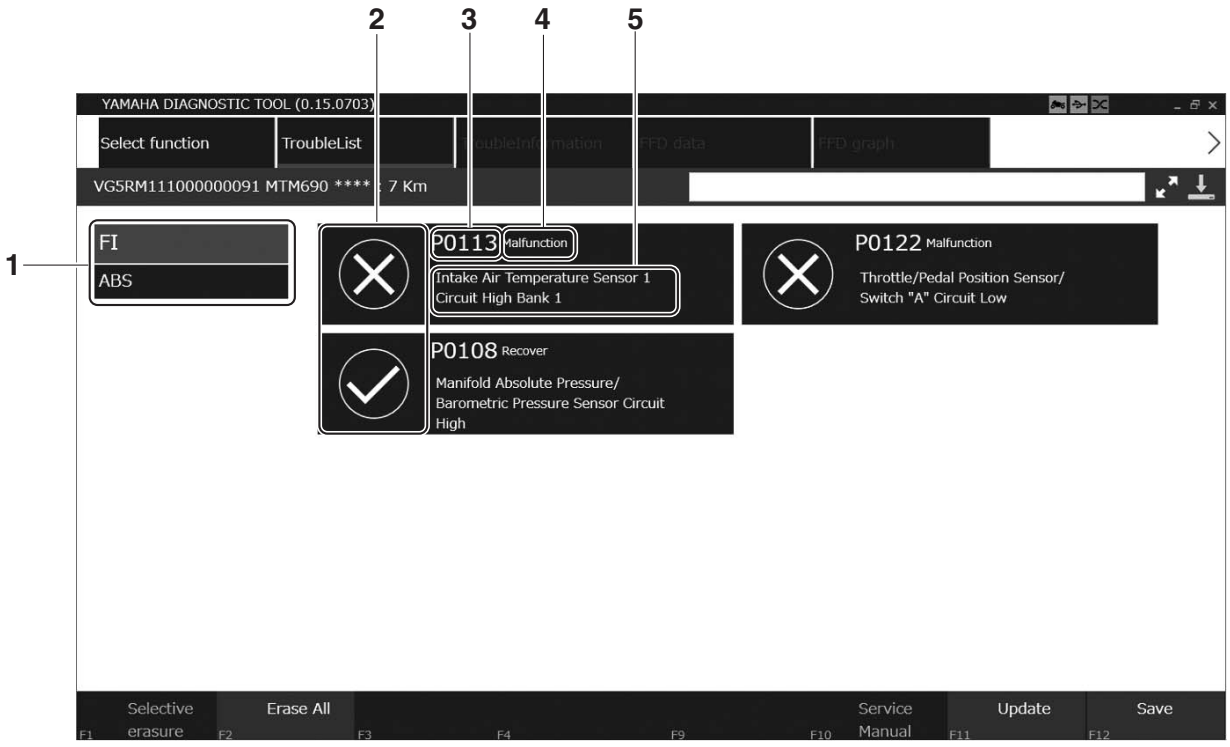


Operation of the Yamaha diagnostic tool (Malfunction mode)

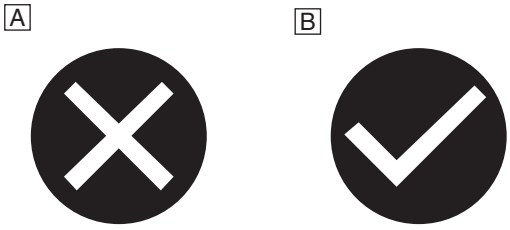
The results of the fault diagnosis are displayed as shown in the following screen shot.

TIP

The screen display may vary depending on the version of the Yamaha diagnostic tool that you are using.



1. The types of the control units are displayed. (e.g., FI, ABS)
2. The icons indicating the diagnosis results are displayed.



A. Detected malfunction
B. Recovered malfunction

3. The fault code numbers are displayed.
4. The current conditions are displayed. (Detected/Recovered)
5. The item names and symptoms of the detected malfunctions are displayed.

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
- Ignition coil #1
- Ignition coil #2
- Throttle position sensor
- Intake air pressure sensor
- Coolant temperature sensor
- Intake air temperature sensor
- O_2 sensor
- Lean angle sensor
- ABS ECU (electronic control unit)
- ISC (Idle Speed Control) unit
- Relay unit
- Headlight relay
- Radiator fan motor relay
- Meter assembly
- Immobilizer unit

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.

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	—

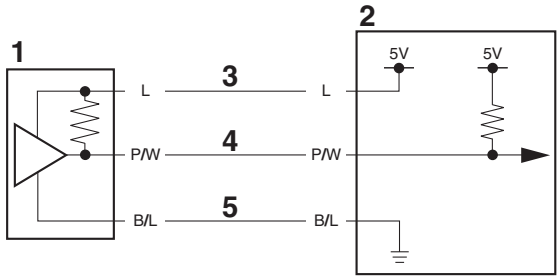
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of O_2 sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → 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 engine stop switch to “ON”.

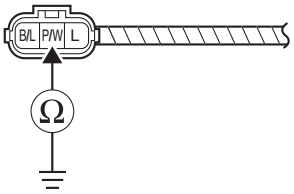
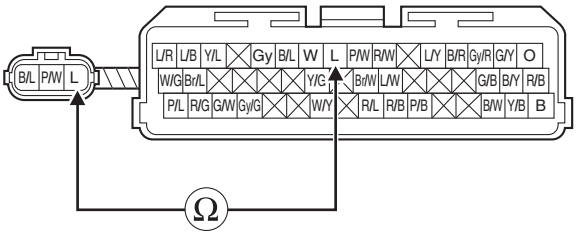
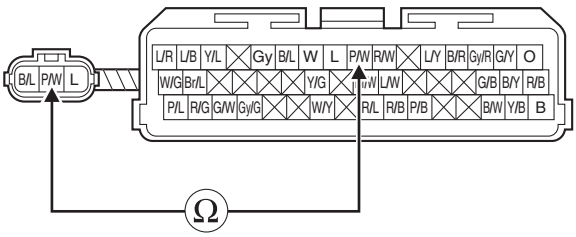
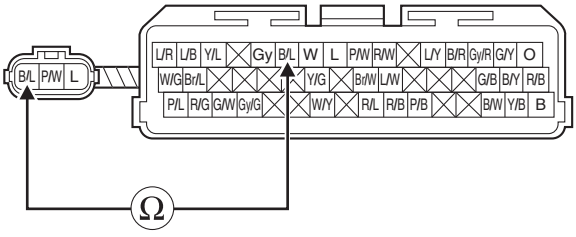
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ON”, 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 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 coupler. red/white–red/white Between main switch and ignition fuse. brown/blue–brown/blue Between ignition fuse and joint coupler. 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 engine stop switch to “ON”.
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 engine stop switch to “ON”.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	Service is finished.

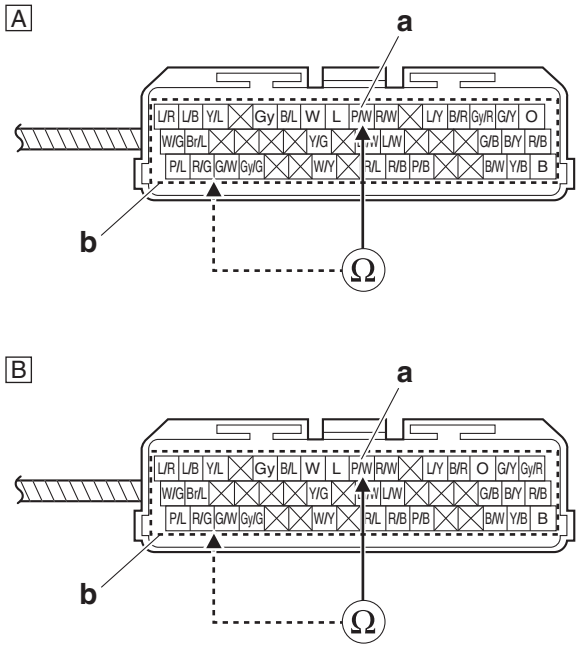
6	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0107, P0108

Fault code No.	**P0107, P0108**
Item	**[P0107] Intake air pressure sensor: ground short circuit detected. [P0108] Intake air pressure sensor: 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.
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 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.
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 coupler from the intake air pressure sensor.
3-3	[For P0107] Ground short circuit Between intake air pressure sensor coupler and ground: pink/white–ground If there is continuity, replace the wire harness. 
3-4	[For P0108] Open circuit Between intake air pressure sensor 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 coupler and ECU coupler: pink/white–pink/white If there is no continuity, replace the wire harness. 
3-6	[For P0108] Open circuit Between intake air pressure 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 8-38.		
3-8	[For P0107/P0108] Short circuit Between intake air pressure sensor output terminal (pink/white) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness.  A. MTM690 B. MTM690-U		
4	Installed condition of intake air pressure 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 pressure sensor.	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. Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-169.	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 8-158.	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.	

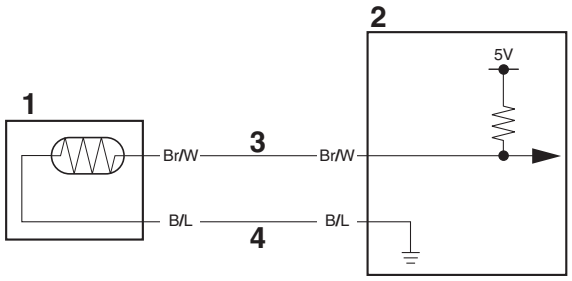
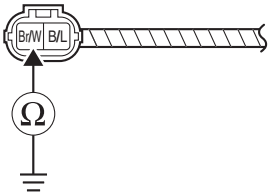
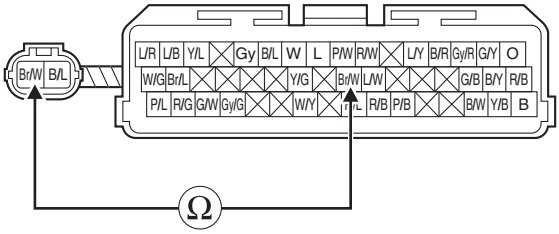
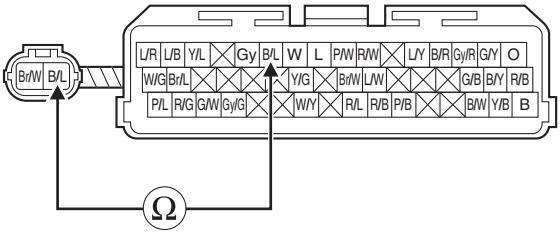
Fault code No. P0112, P0113

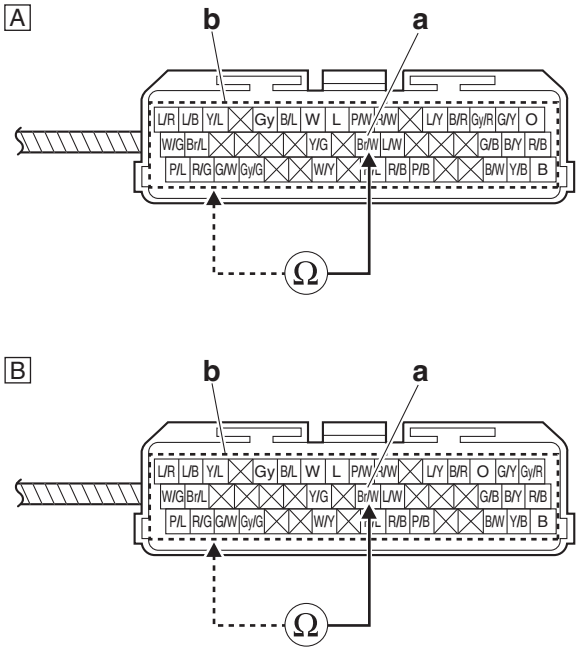
TIP

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.

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. 
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 8-38.		
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.  A. MTM690 B. MTM690-U		
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 PRESSURE 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 8-158.	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.	

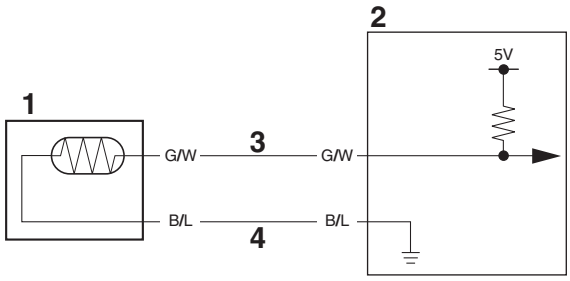
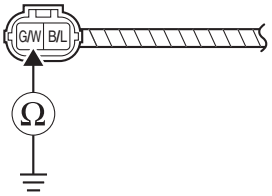
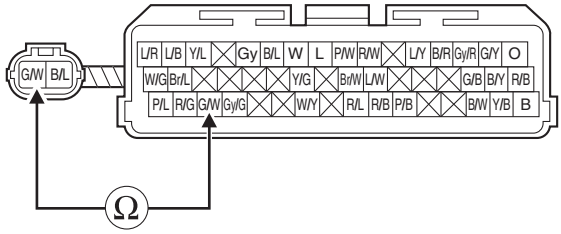
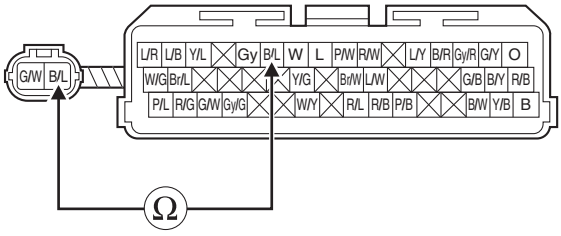
Fault code No. P0117, P0118

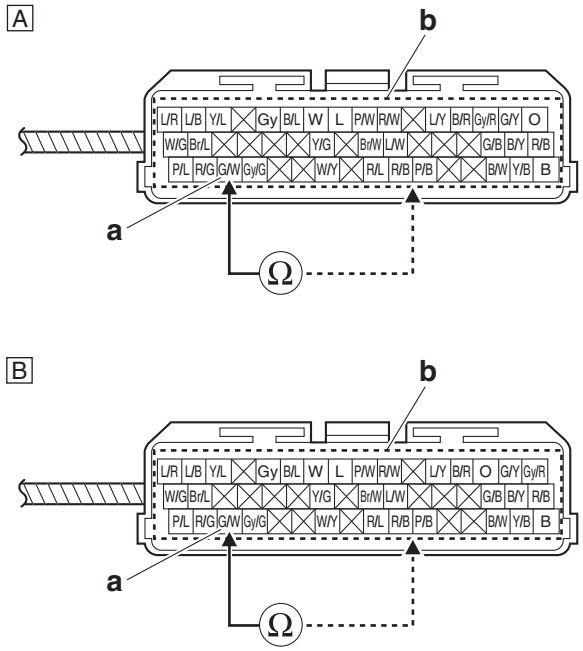
TIP

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.
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. Coolant temperature sensor 2. ECU 3. Sensor output lead 4. Sensor ground lead
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 coolant temperature sensor coupler and ground: green/white–ground If there is continuity, replace the wire harness. 
3-4	[For P0118] Open circuit Between coolant temperature sensor coupler and ECU coupler: green/white–green/white If there is no continuity, replace the wire harness. 
3-5	[For P0118] Open circuit Between coolant temperature sensor coupler and ECU coupler: black/blue–black/blue If there is no continuity, replace the wire harness. 

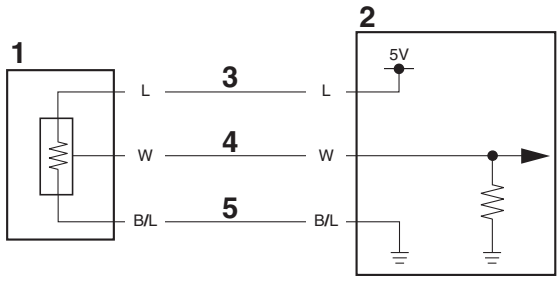
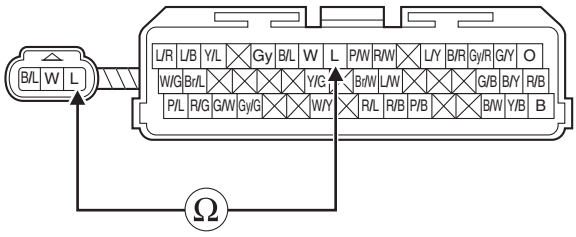
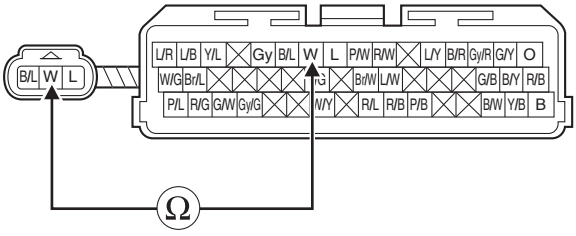
3-6	Disconnect the couplers from the parts that are connected to the ECU. Refer to “Parts connected to the ECU” on page 8-38.		
3-7	[For P0117/P0118] Short circuit Between coolant temperature sensor output terminal (green/white) “a” of ECU coupler and any other ECU coupler terminal “b”. If there is continuity, replace the wire harness.  A. MTM690 B. MTM690-U		
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 8-168.	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 8-158.	Service is finished.

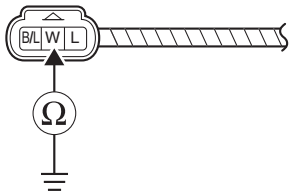
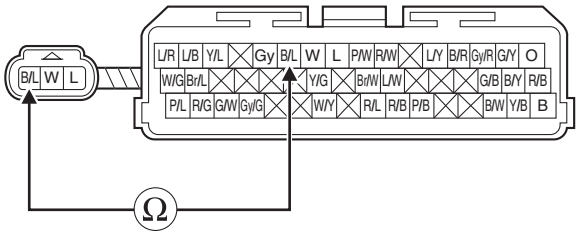
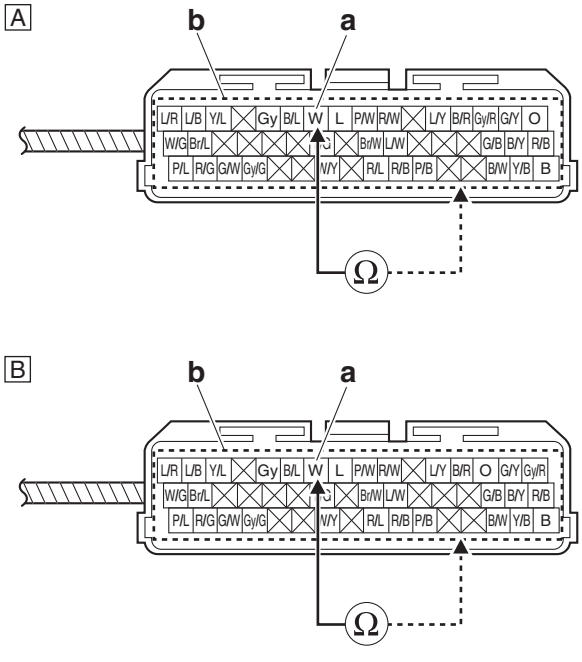
7	Delete the fault code and check that the engine trouble warning light goes off.	Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.	

Fault code No. P0122, P0123

Fault code No.		**P0122, P0123**
Item		**[P0122] Throttle position sensor: open or ground short circuit detected.** **[P0123] Throttle position sensor: power short circuit detected.**
Fail-safe system		Able/Unable to start engine
		Able/Unable to drive vehicle
Diagnostic code No.		01
01	**Tool display**	Throttle position sensor signal • 11–21 (fully closed position) • 96–106 (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.

3-1	 1. Throttle position 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 throttle position sensor coupler from the throttle position sensor.
3-3	[For P0122] Open circuit Between throttle position sensor coupler and ECU coupler: blue–blue If there is no continuity, replace the wire harness. 
3-4	[For P0122] Open circuit Between throttle position sensor coupler and ECU coupler: white–white If there is no continuity, replace the wire harness. 

3-5	[For P0122] Ground short circuit Between throttle position sensor coupler and ground: white–ground If there is continuity, replace the wire harness. 
3-6	[For P0123] Open circuit Between throttle position 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 8-38.
3-8	[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.  A. MTM690 B. MTM690-U

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 7-13.	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	Throttle position sensor resistance.	Measure the throttle position sensor resistance. black/blue–blue Refer to “CHECKING THE THROTTLE POSITION 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 8 and finish the service. Condition is “Detected” → Go to item 6.
6	Defective throttle position sensor.	Check throttle position sensor signal. 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.	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 8-158.	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
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 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 8-158.	
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 7. 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 8-171.	Execute the diagnostic mode. (Code No. 36) 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. 36) 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. 36) 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. red/black–red/black red/blue–red/blue Between sub-wire harness coupler and ECU coupler. red/black–red/black red/blue–red/blue Between sub-wire harness coupler and relay unit coupler. red/blue–red/blue	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 7. No operating sound → Go to item 6.

6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	
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. 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 8-171.	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 red/blue–red/blue 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.

6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	
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. 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.
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 coupler. black/blue–black/blue Between joint coupler 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 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 5-36.	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 8-165. 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 8-158.	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 right handlebar switch coupler. 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.

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 8-164.	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 8-158.	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.
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 right handlebar switch coupler. 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 8-164.	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 8-158.	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

Fault code No.	**P0500**	
Item	**A**	**Rear wheel sensor: no normal signals are received from the rear wheel sensor.**
	B	**Gear position 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
A-1	Locate the malfunction.	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.
		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 gear position 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.
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 8-158.	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**	
Item	**A**	**Rear wheel sensor: no normal signals are received from the rear wheel sensor.**
	B	**Gear position 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	Gear position switch • "ON" (when the transmission is in neutral) • "OFF" (when the transmission is in gear or 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.	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.
		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 gear position 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.
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 ECU coupler and joint coupler. black/yellow–black/yellow Between joint coupler and relay unit coupler. black/yellow–black/yellow Between relay unit coupler and sub-wire harness coupler. sky blue–sky blue Between sub-wire harness coupler and gear position 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 gear position switch.	Check the gear position switch. Replace if defective. Refer to "CHECKING THE GEAR POSITION SWITCH" on page 8-170.	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 5-88.	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.
B-8	Malfunction in ECU.	Replace the ECU. Refer to "REPLACING THE ECU (engine control unit)" on page 8-158.	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**	
Item	**A**	**Rear wheel sensor: no normal signals are received from the rear wheel sensor.**
	B	**Gear position 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
C-1	Locate the malfunction.	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.
		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 gear position 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.
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 clutch switch coupler and left handlebar switch coupler. black/red–black/red black/yellow–black/yellow Between left handlebar switch coupler and joint coupler. black/red–black/red black/yellow–black/yellow Between joint coupler and ECU coupler. black/red–black/red black/yellow–black/yellow	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 8-158.	Service is finished.
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. P0507

TIP

- If fault code numbers “P0507” and “P0560” are both indicated, take the actions specified for fault code number “P0560” first.
- If fault code numbers “P0507” and “P0500” are both indicated, take the actions specified for fault code number “P0500” first.

Fault code No.	**P0507**	
Item	**A**	**Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).**
	B	**Defective ISC (idle speed control) unit (ISC operating sound is not heard).**
Fail-safe system	Able to start engine	
	Able to drive vehicle	
Diagnostic code No.	54	
Actuation	Fully closes the ISC valve, and then opens the valve. This operation is performed 3 times and takes approximately 6 seconds each time. The “check” indicator on the Yamaha diagnostic tool screen comes on during the operation.	
Procedure	Check that the ISC unit is actuated three times by listening for the operating sound.	

Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**
A-1	Locate the malfunction.	Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (idle speed control) valve, and then fully opens the valve. This operation takes approximately 6 seconds.	ISC operating sound is heard → Go to item A-2. Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Condition is “Recovered” → Go to item A-6 and finish the service. Condition is “Detected” → Go to item A-2.
A-2	Incorrect rear wheel sensor signal.	Check the rear wheel sensor. 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 the section for the defective rear wheel sensor for fault code No. P0500.	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 A-6 and finish the service. Condition is “Detected” → Go to item A-3.
A-3	Throttle valve does not fully close.	Check the throttle body assembly. Refer to “THROTTLE BODIES” on page 7-7. Check the throttle grip free play. Refer to “CHECKING THE THROTTLE GRIP OPERATION” on page 3-27.	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 A-6 and finish the service. Condition is “Detected” → Go to item A-4.

A-4	ISC valve is not moving correctly.	Replace the ISC valve.	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 A-6 and finish the service. Condition is “Detected” → Go to item A-5.
A-5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	Service is finished.
A-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.	**P0507**	
Item	**A**	**Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).**
	B	**Defective ISC (idle speed control) unit (ISC operating sound is not heard).**
Fail-safe system	Able to start engine	
	Able to drive vehicle	
Diagnostic code No.	54	
Actuation	Fully closes the ISC valve, and then opens the valve. This operation is performed 3 times and takes approximately 6 seconds each time. The "check" indicator and "" on the Yamaha diagnostic tool screen comes on during the operation.	
Procedure	The ISC unit vibrates when the ISC valve operates.	

Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
B-1	Locate the malfunction.	Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (idle speed control) valve, and then fully opens the valve. This operation takes approximately 6 seconds.	ISC operating sound is heard → Go to item A-2 for the component other than ISC (idle speed control) unit is defective. ISC operating sound is not heard → Go to item B-2.
B-2	Connection of ISC (idle speed control) 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.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-3.
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. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-4.
B-4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between ISC (idle speed control) unit coupler and sub-wire harness coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue Between sub-harness and ECU coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-5.

B-5	Installed condition of ISC (idle speed control) unit.	Check for looseness or pinching. Improperly installed ISC (idle speed control) unit → Reinstall the ISC (idle speed control) unit. Check the intake air passages for air leaks.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.
B-6	ISC valve is not moving correctly.	Replace the ISC valve.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-7.
B-7	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	Service is finished.
B-8	Delete the fault code and check that the engine trouble warning light goes off.	Start the engine and let it idle for approximately 10 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. P0511

Fault code No.	**P0511**
Item	**ISC unit: malfunction in ISC unit.**
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	Connection of ISC 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 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 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” → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Properly connect or replace the wire harness. Between ISC (idle speed control) unit coupler and sub-wire harness coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue Between sub-harness and ECU coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue	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	Faulty ISC valve operation.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is not heard → Replace the throttle body 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 8-158.	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. 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

Fault code No.		**P0601**	
Item		**Faulty ECU memory. (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 8-158.	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.) 01–02 (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 5. 01: Go to item 2. 02: Go to item 3. 11–13: Go to item 4.	
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 5-2. 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 6 and finish the service. Condition is “Detected” → Repeat item 1. If the same number is indicated, go to item 5.
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 5-2. 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 6 and finish the service. Condition is “Detected” → Repeat item 1. If the same number is indicated, go to item 5.

4	“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 6 and finish the service. Condition is “Detected” → Repeat item 1. If the same number is indicated, go to item 5.
5	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.	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. 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.
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 relay unit coupler and ECU coupler. red/blue–red/blue blue/yellow–blue/yellow Between relay unit coupler and joint coupler. red/white–red/white Between joint coupler and ignition fuse. red/white–red/white Between ignition fuse and main switch coupler. brown/blue–brown/blue Between main switch coupler and starter relay coupler. red–red Between starter relay coupler and battery terminal. red–red	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 8-158.	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. 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.
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between sidestand switch coupler and relay unit coupler. blue/green–blue/green Between relay unit coupler and joint coupler. black/red–black/red Between joint coupler and ECU coupler. black/red–black/red	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 8-158.	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	—

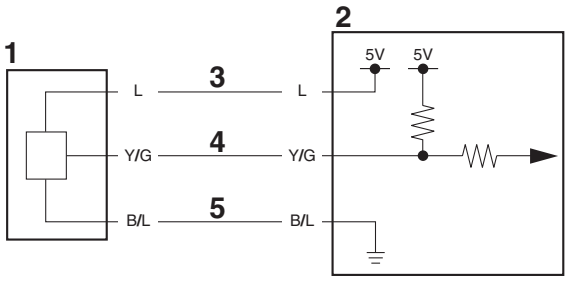
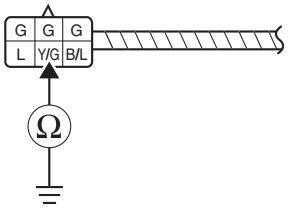
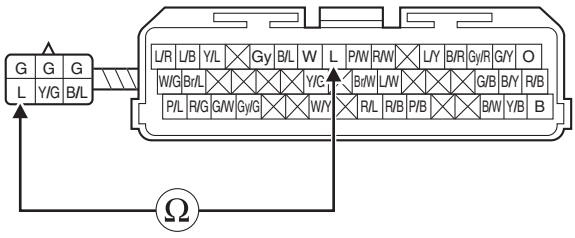
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Installed condition of battery leads. Check the installed condition of the battery and battery leads (loose bolts).	Improperly installed battery or battery leads → Reinstall or replace the battery leads.	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.
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 backup fuse.	Blown fuse → Replace the fuse or 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 between battery and ECU coupler.	Open or short circuit → Replace the wire harness. Between battery terminal and starter relay. red–red Between starter relay and fuel injection system fuse. red–red Between fuel injection system fuse and ECU coupler. red/black–red/black	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.

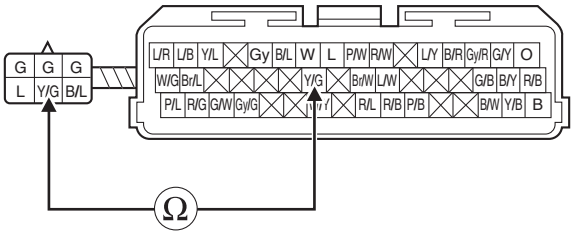
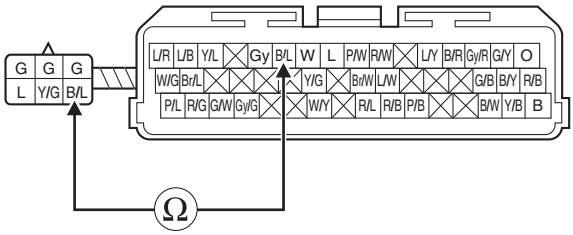
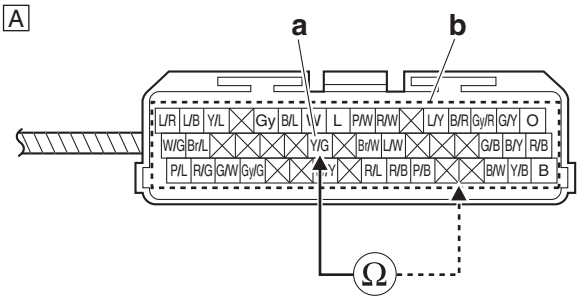
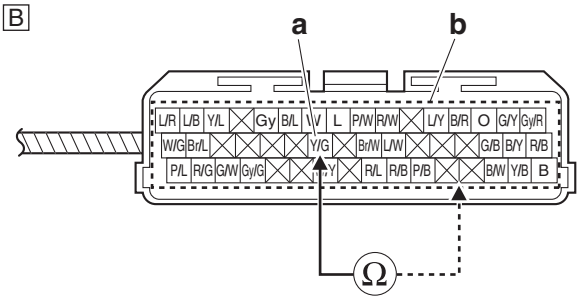
5	Wire harness continuity between main switch and ECU coupler.	Open or short circuit → Replace the wire harness. Between main switch and ignition fuse. brown/blue–brown/blue Between ignition fuse and joint coupler. red/white–red/white Between joint coupler and ECU coupler. red/white–red/white	Turn the 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 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.

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. 

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 8-38.
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. A  B  A. MTM690 B. MTM690-U

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 8-158.	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. 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
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 coupler. black/blue–black/blue red/white–red/white Between joint coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue red/white–red/white Between joint coupler 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”.
5	Check fuel pressure.	Refer to “CHECKING THE FUEL PRESSURE” on page 7-14.	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 8-158.	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.	

EAS31790
TROUBLESHOOTING DETAILS (EVENT 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.
- When the Yamaha diagnostic tool is used, event code No. U0155 is displayed as a fault code.

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.
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 ECU coupler. blue/black–blue/black blue/red–blue/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 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 8-158.	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.	

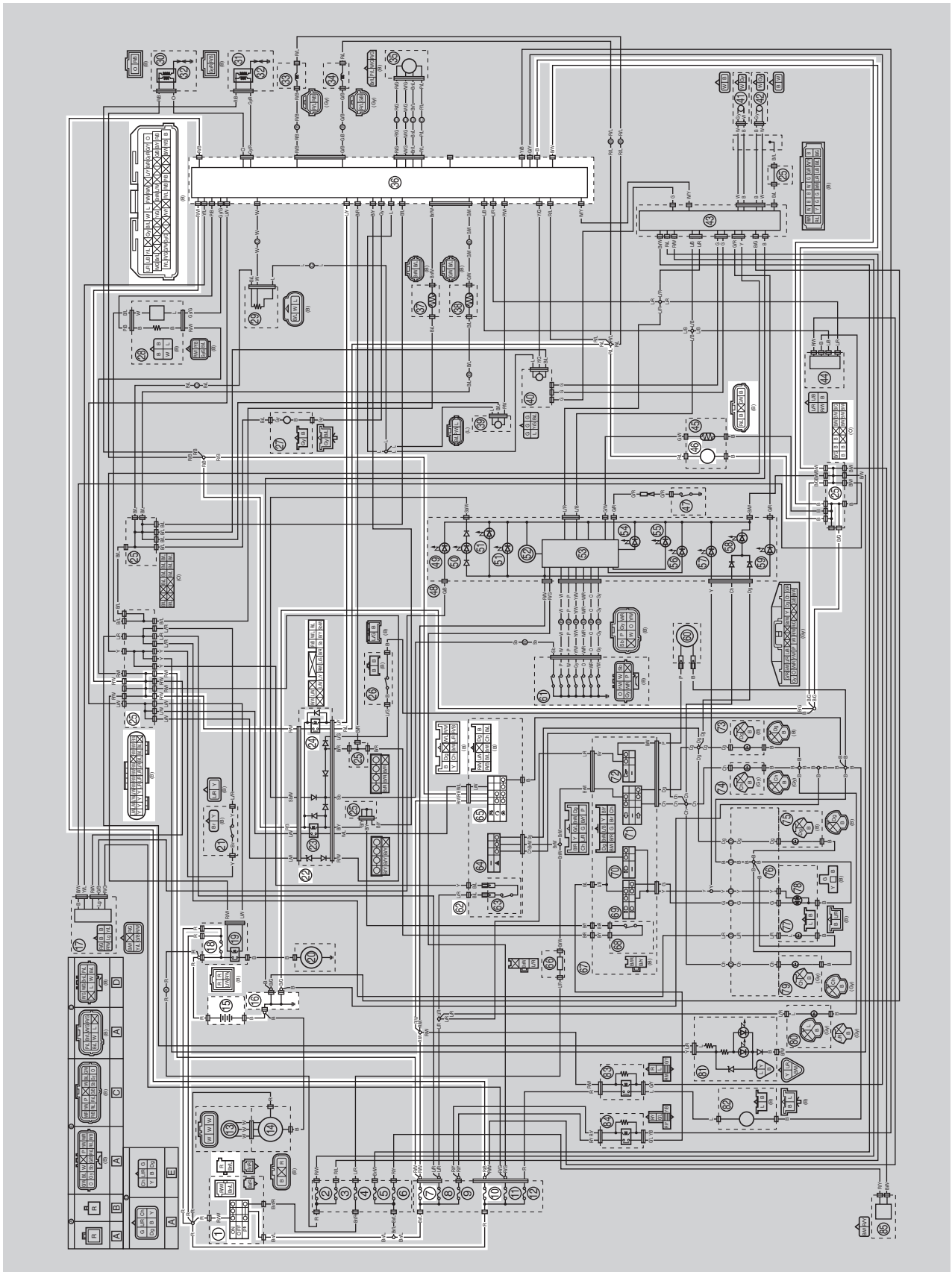
Event code No. 30

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 8-158.	Service is finished.

EAS20081
FUEL PUMP SYSTEM

EAS30513
CIRCUIT DIAGRAM



1. Main switch
7. Ignition fuse
10. Fuel injection system fuse
15. Battery
16. Engine ground
18. Main fuse
22. Relay unit
24. Fuel pump relay
25. Joint coupler
36. ECU (Engine Control Unit)
46. Fuel pump
62. Handlebar switch (right)
65. Start/engine stop switch

EAS30514
TROUBLESHOOTING

If the fuel pump fails to operate.

TIP

• Before troubleshooting, remove the following part(s):
1. Battery cover
2. Fuel tank center cover/Air scoops
3. Fuel tank
4. Headlight assembly

1. Check the fuses. (Ignition, fuel injection system, and main) 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 →	• The start/engine stop switch is faulty. • Replace the right handlebar switch.
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 BODY" on page 7-4.	NG →	Replace the fuel pump assembly.
OK ↓		

7. Check the entire fuel pump system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-101.

NG →

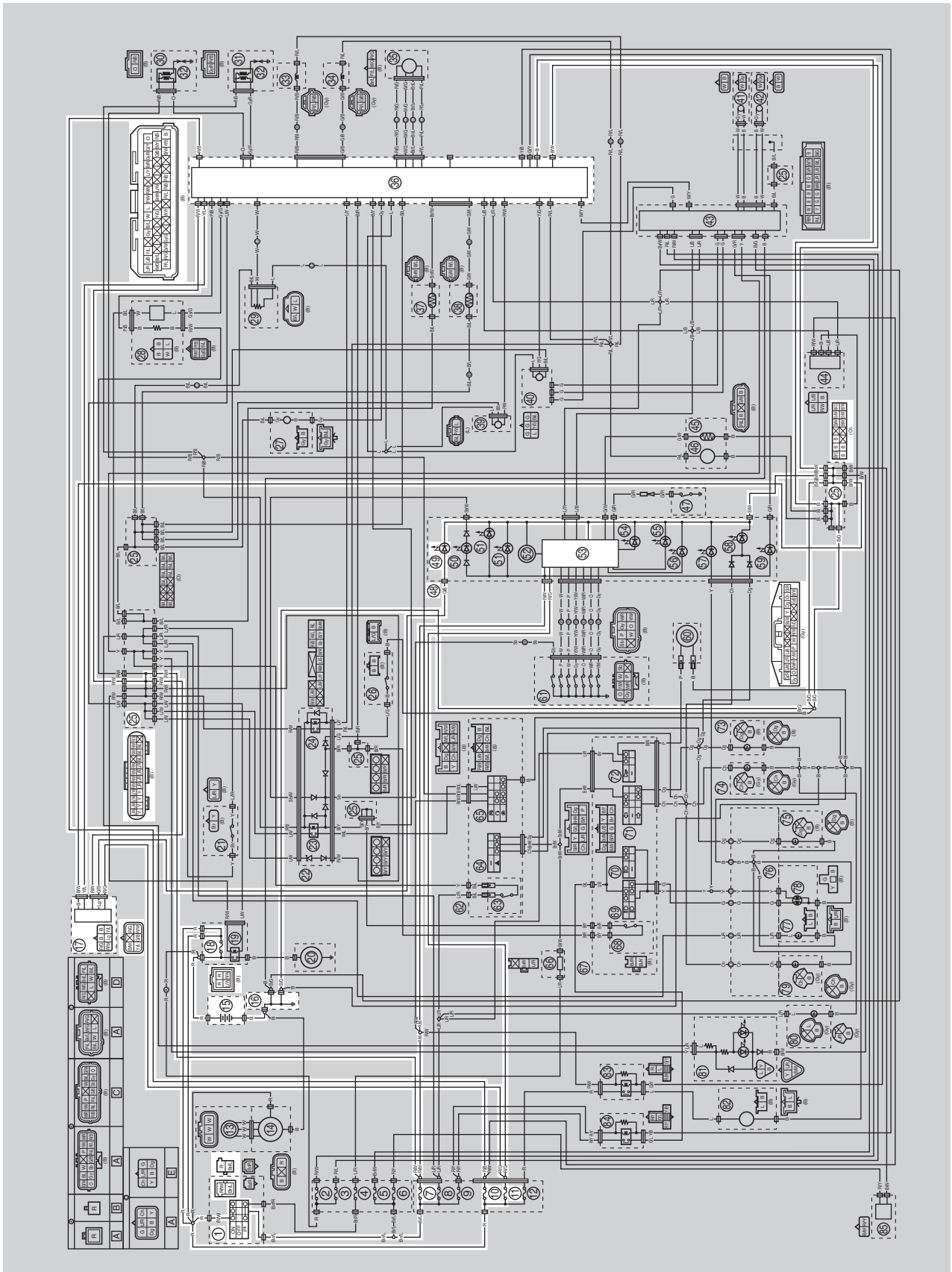
Properly connect or replace the wiring harness.

OK ↓

Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-158.

EAS20084
IMMOBILIZER SYSTEM

EAS30519
CIRCUIT DIAGRAM



1. Main switch
7. Ignition fuse
10. Fuel injection system fuse
11. Backup fuse
15. Battery
16. Engine ground
17. Immobilizer unit
18. Main fuse
25. Joint coupler
36. ECU (Engine Control Unit)
48. Meter assembly
49. Immobilizer system indicator light
53. Multi-function meter

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 (which is installed in the code re-registering key)
- an immobilizer unit
- the ECU
- an immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key is registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.
Therefore, always use a standard key for driving. (See 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	Accessory lock* and key	
	Main switch	Immobilizer unit				
Standard key is lost			√			New standard key
All keys have been lost (including code re-registering key)	√		√	√	√	Code re-registering key and standard keys
ECU is defective				√		Code re-registering key and standard keys
Immobilizer unit is defective		√				Code re-registering key and standard keys
Main switch is defective	√		√	√	√	Code re-registering key and standard keys
Accessory lock* is defective					√	Not required

* Accessory locks mean the seat lock and fuel tank cap.

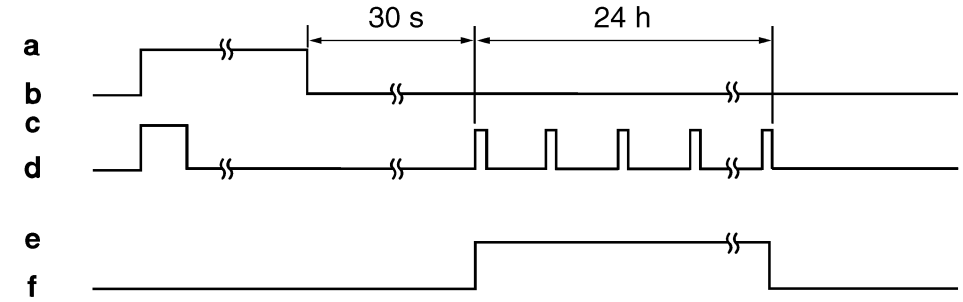
Code re-registering key registration:
When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.
To register a code re-registering key:
1. Turn the main switch to “ON” with the code re-registering key.

TIP
Check that the immobilizer system indicator light comes on for a few seconds, 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 8-112).

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 the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.

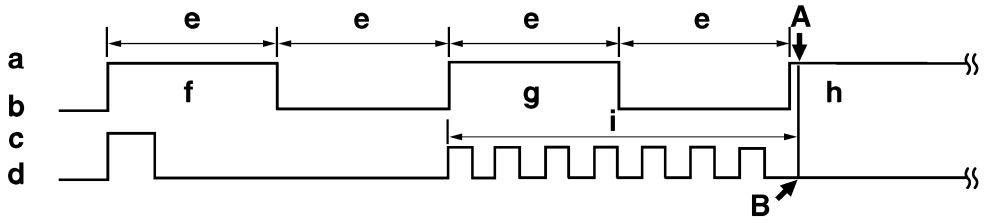
5. Turn the main switch to "ON".

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.

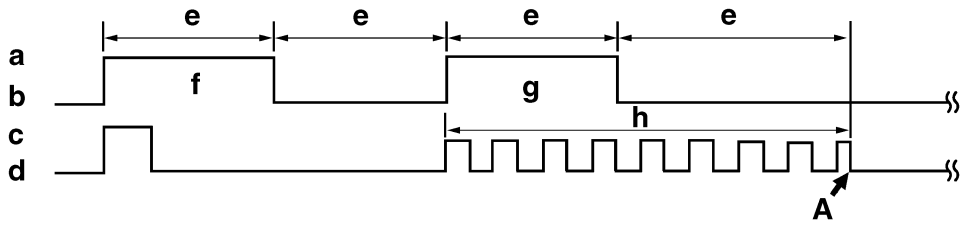
Standard key registration



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. (Ignition, fuel injection system, backup, and main) 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 8-105.	NG →	Properly connect or replace the wiring harness.
OK ↓		
• Check the condition each of the immobilizer system circuits. • Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-112.		

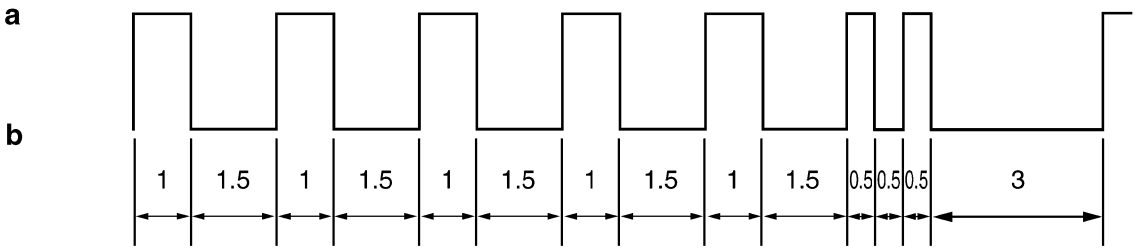
EAS30523
SELF-DIAGNOSIS FAULT CODE INDICATION

When a system malfunction occurs, the immobilizer system indicator light flashes. The pattern of flashing also shows the fault code.

Fault code	Part	Symptom	Cause	Action
51	IMMOBILIZER UNIT	Code cannot be transmitted between the key and the immobilizer unit.	1. Radio wave interference caused by objects around the keys and antennas. 2. Immobilizer unit malfunction. 3. Key malfunction.	1. Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas. 2. Replace the main switch/immobilizer unit. 3. Replace the key.
52	IMMOBILIZER UNIT	Codes between the key and immobilizer unit do not match.	1. Signal received from other transponder (failed to recognize code after ten consecutive attempts). 2. Signal received from unregistered standard key.	1. Place the immobilizer unit at least 50 mm 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 8-158.
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 8-158.
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 8-158.

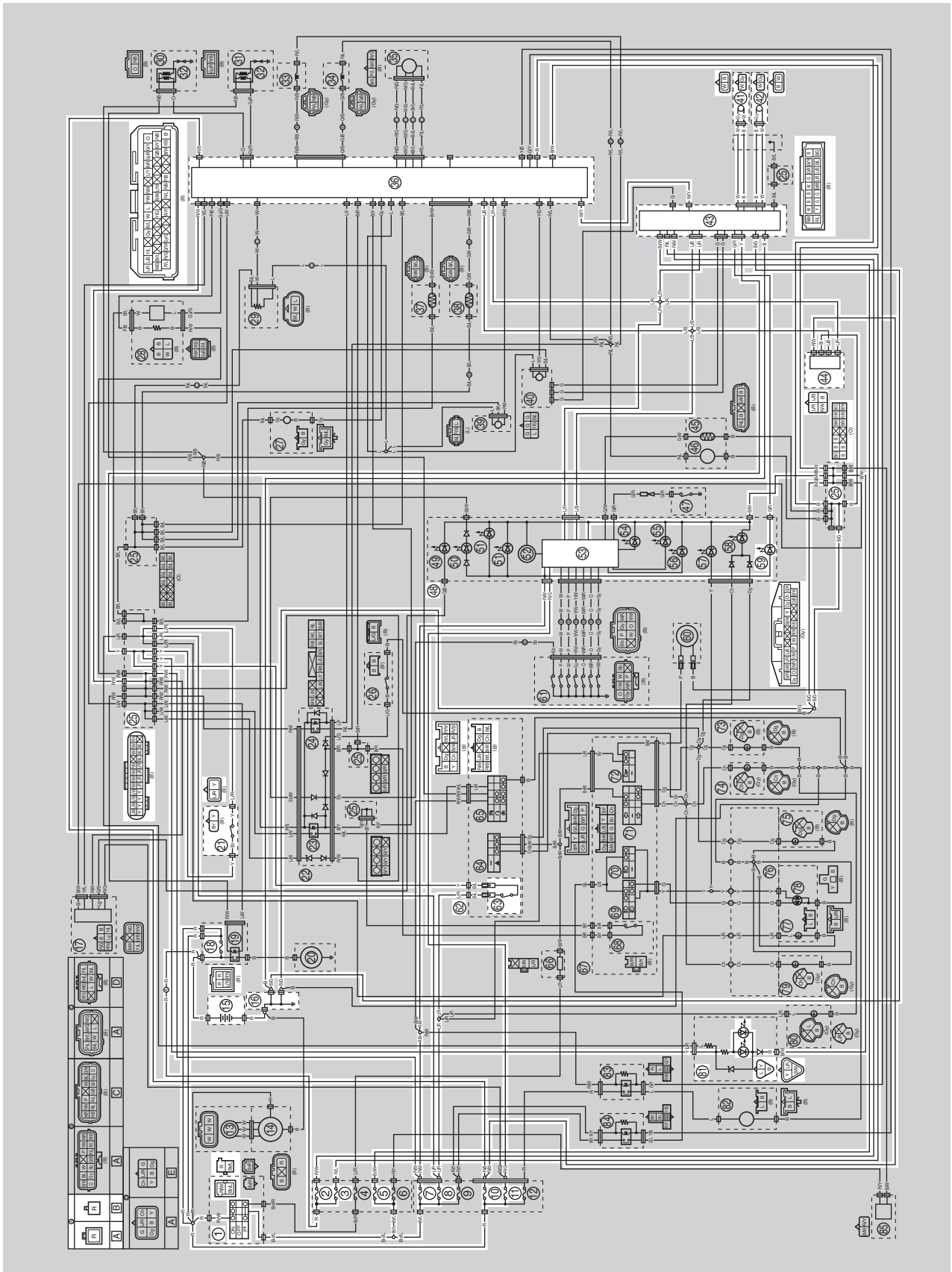
Immobilizer system indicator light fault code indication
Units of 10: Cycles of on for 1 second and off for 1.5 seconds.
Units of 1: Cycles of on for 0.5 second and off for 0.5 second.
Example: fault code 52



a. Light on
b. Light off

EAS20085
ABS (ANTI-LOCK BRAKE SYSTEM)

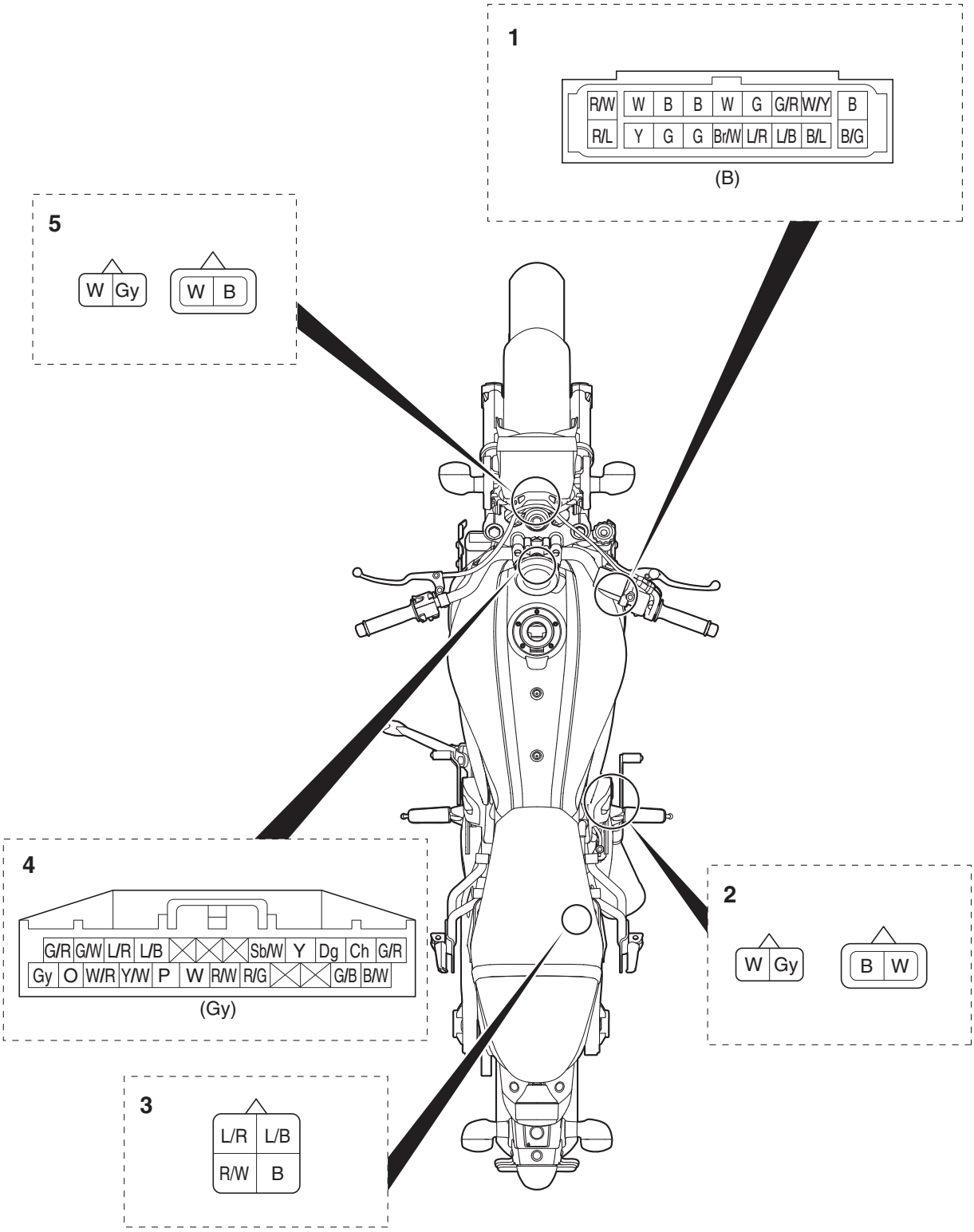
EAS30988
CIRCUIT DIAGRAM



1. Main switch
2. ABS solenoid fuse
3. ABS motor fuse
5. ABS control unit fuse
7. Ignition fuse
8. Signaling system fuse
10. Fuel injection system fuse
11. Backup fuse
15. Battery
16. Engine ground
18. Main fuse
21. Rear brake light switch
25. Joint coupler
36. ECU (Engine Control Unit)
41. Front wheel sensor
42. Rear wheel sensor
43. ABS ECU (electronic control unit)
44. Yamaha diagnostic tool coupler
48. Meter assembly
53. Multi-function meter
59. ABS warning light
62. Handlebar switch (right)
63. Front brake light switch
81. Tail/brake light

A. Wire harness
B. Positive battery sub-wire harness

EAS30990
ABS COUPLER LOCATION CHART



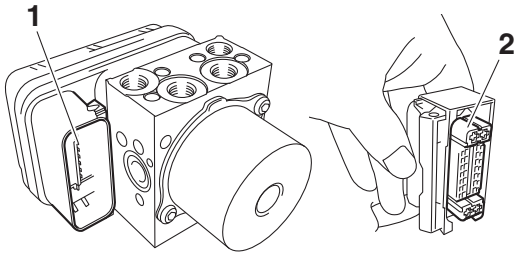
1. ABS ECU coupler
2. Rear wheel sensor coupler
3. Yamaha diagnostic tool coupler
4. Meter assembly coupler
5. Front wheel sensor coupler

EAS30991
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.



EAS30992
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 8-124. 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 8-120.

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 inside of the right air scoop, 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

ECA18490

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.)

EAS30993

BASIC INSTRUCTIONS FOR TROUBLESHOOTING

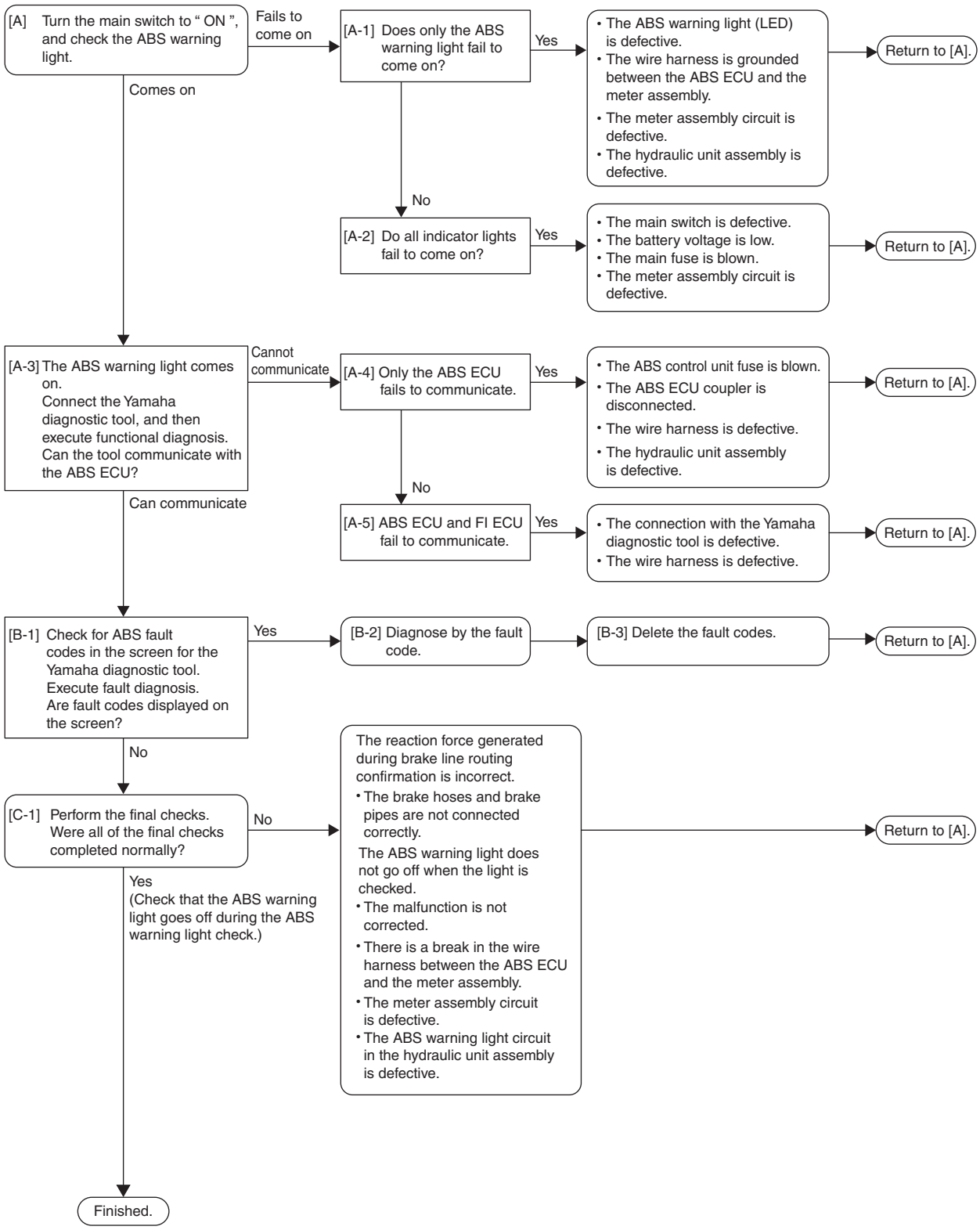
EWA17420

⚠ 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.

EAS30994
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.

EAS30995
[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]

EAS30996
[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.

EAS30997
[A-2] ALL 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 8-115.
   • If the meter assembly circuit is open, replace the wire harness.

EAS31134
[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.)

EAS31135
[A-4] ONLY THE ABS ECU FAILS TO COMMUNICATE (The select unit screen does not appear.)
1. ABS control unit fuse
   • Check the ABS control unit fuse for continuity.
   Refer to “CHECKING THE FUSES” on page 8-157.
   • If the ABS control unit 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 4-58.
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/white terminal of the ABS ECU coupler.
   Check for continuity between black/green terminal of the ABS ECU coupler and the ground, and between the black terminal of the ABS ECU coupler and 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 blue/red terminal of the ABS ECU coupler and blue/red terminal of the Yamaha diagnostic tool coupler. (CANH)
   Check for continuity between blue/black terminal of the ABS ECU coupler and blue/black terminal of the Yamaha diagnostic tool coupler. (CANL)
4. ABS ECU malfunction
   Replace the hydraulic unit assembly.

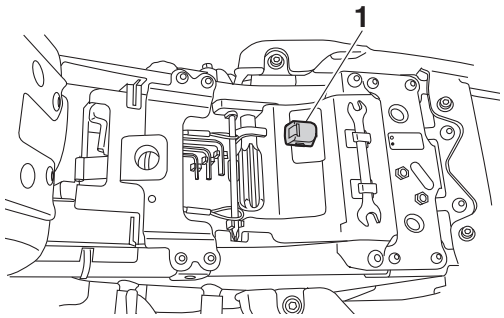
EAS31136
[A-5] ABS ECU AND FI ECU FAIL TO COMMUNICATE (Cannot connect due to a tool error.)
1. Yamaha diagnostic tool
   Check that the Yamaha diagnostic tool is properly connected.
2. Wire harness
   • Open circuit in the wire harness between the ABS ECU coupler and the Yamaha diagnostic tool coupler.
   Check for continuity between blue/red terminal of the ABS ECU coupler and blue/red terminal of the Yamaha diagnostic tool coupler. (CANH)
   Check for continuity between blue/black terminal of the ABS ECU coupler and blue/black terminal of the Yamaha diagnostic tool coupler. (CANL)

EAS31137
[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]

EAS31138
[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
90890-03250

Connecting the Yamaha diagnostic tool
Removing the 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

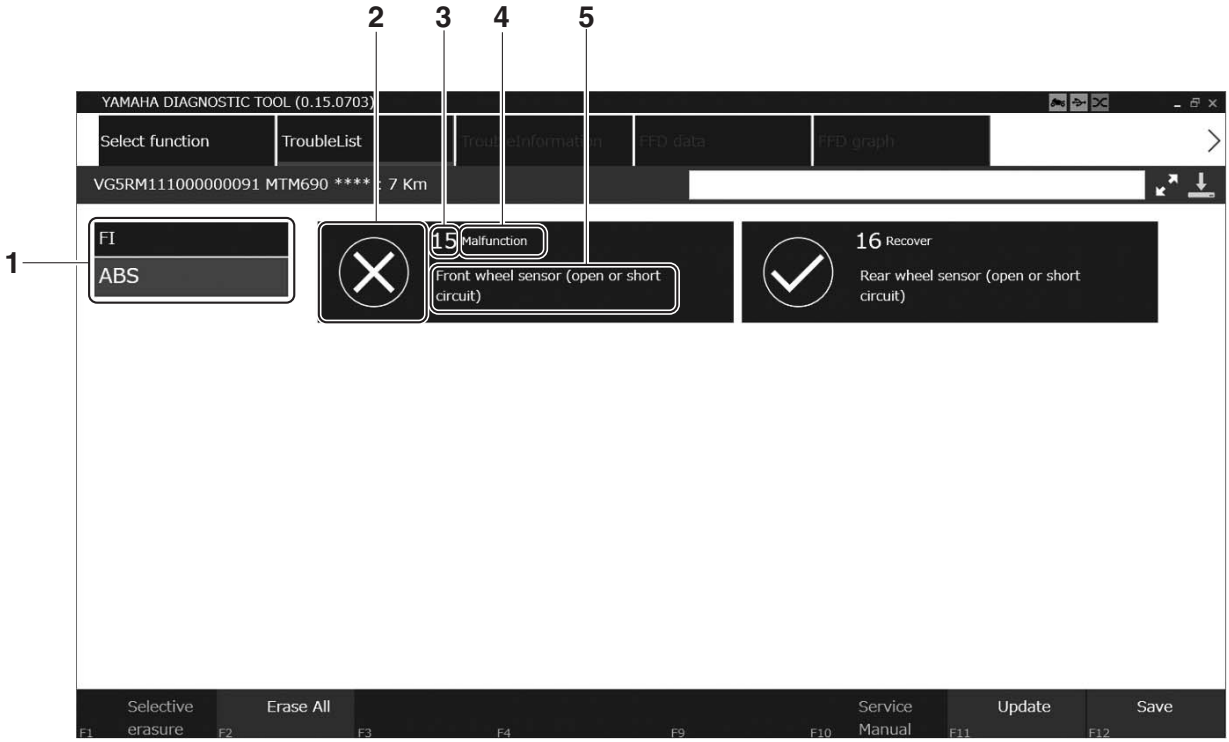
Check the inspection points after terminating the connection with the Yamaha diagnostic tool and turning the main switch off.

Operation of the Yamaha diagnostic tool (Fault diagnosis mode)

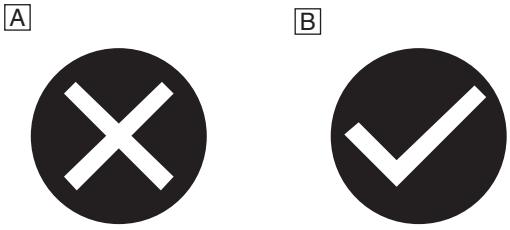
The results of the fault diagnosis are displayed as shown in the following screen shot.

TIP

The screen display may vary depending on the version of the Yamaha diagnostic tool that you are using.



1. The types of the control units are displayed. (e.g., FI, ABS)
2. The icons indicating the diagnosis results are displayed.



A. Detected malfunction
B. Recovered malfunction

3. The fault code numbers are displayed.
4. The current conditions are displayed. (Detected/Recovered)
5. The item names and symptoms of the detected malfunctions are displayed.

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

Fault code No.	Item	Symptom	Check point
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
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.

Fault code No. 11, 25

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.	**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 4-14.
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 4-15.
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 4-15.

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 4-24.
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 4-25.
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 4-25.

Fault code No. 13, 26

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.	**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 4-14.
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 4-15.
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 4-15.

Fault code No. 14, 27

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.	**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.)**

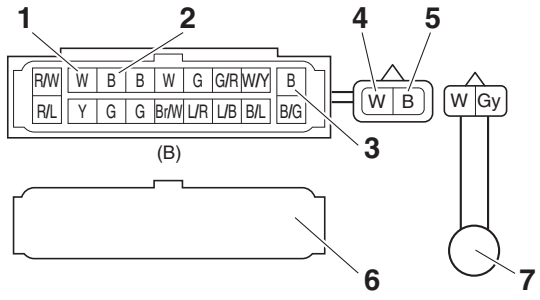
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-24.
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 4-25.
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 4-25.

Fault code No. 15

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.**

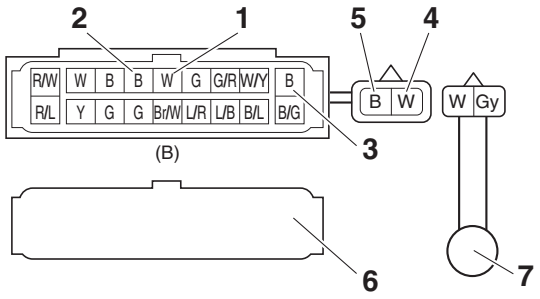
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective coupler between the front wheel sensor and the hydraulic unit assembly	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. See TIP.
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 terminal “3” and the white terminal “4” and between the black 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. Front 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 4-12 and “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

Fault code No. 16

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**
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. See TIP.
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 terminal “3” and the white terminal “4” and between the black 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. Rear 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 4-20 and “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

Fault code No. 17, 45

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.	**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 4-14.
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 4-15.
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 4-15.

Fault code No. 18, 46

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.	**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 4-24.
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 4-25.
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 4-25.

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 4-56.

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 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 joint coupler. (yellow–yellow) • Between joint coupler and front brake light switch coupler. (yellow–yellow) • Between ABS ECU coupler and joint coupler. (yellow–yellow) • Between joint 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 4-56.

Fault code No. 31

TIP

Turn the main switch to “OFF” before disconnecting or connecting a coupler.

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.
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. See TIP.
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 4-56.

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 4-56.

Fault code No. 33

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**
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. See TIP.
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 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 4-56.

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 4-56.

Fault code No. 41

Fault code No.	**41**
Item	**Front wheel ABS (intermittent wheel speed pulses or incorrect de-pressurization)**
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 4-14.
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 4-14 and “CHECKING THE FRONT BRAKE DISCS” on page 4-35.
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 4-35.
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 4-56.

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 4-24.
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 4-24.
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 4-49.
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 4-56.

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 4-14.
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 4-15.
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 4-15.

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 4-24.
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 4-25.
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 4-25.

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

TIP

Turn the main switch to “OFF” before disconnecting or connecting a coupler.

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. See TIP.
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 control unit fuse. (brown/white–brown/white)
4	Defective charging system	Check the charging system. Refer to “CHARGING SYSTEM” on page 8-13.

Fault code No. 54

TIP

Turn the main switch to “OFF” before disconnecting or connecting a coupler.

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. See TIP.
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 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 4-56.

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.**

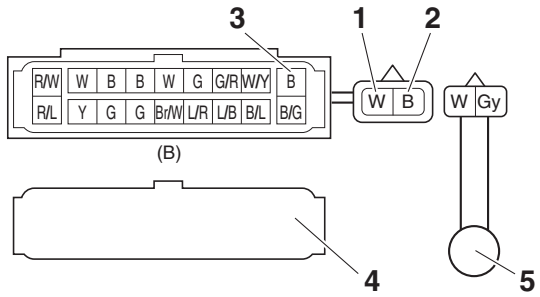
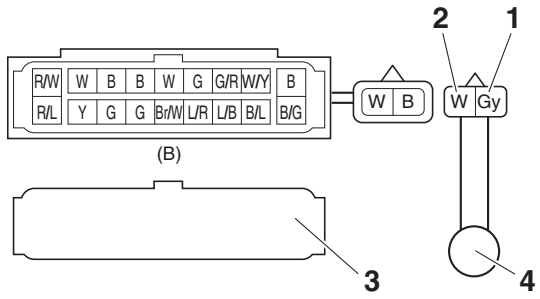
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

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.**

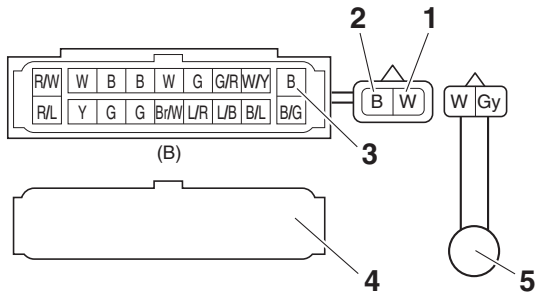
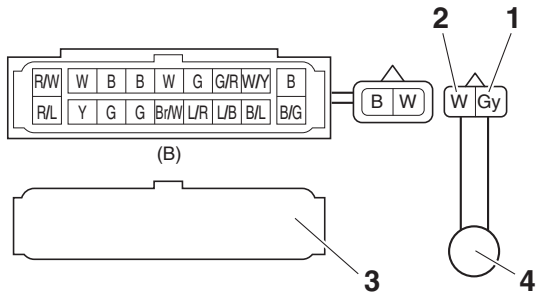
Order	**Item/components and probable cause**	**Check or maintenance job**
1	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

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 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. Front wheel sensor
2	Defective front 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. Front wheel sensor
3	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

Fault code No. 64

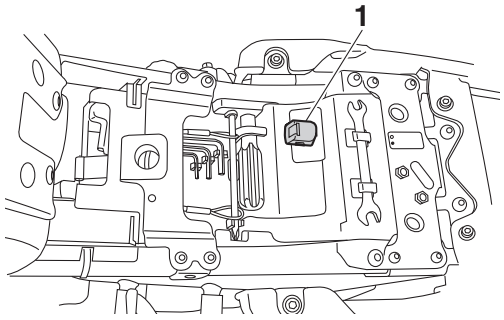
Fault code No.	**64**
Item	**Rear wheel sensor power supply (voltage of power supply is low)**
Symptom	**Power voltage supplied from the ABS ECU to the rear wheel sensor is too low.**

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 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. Rear 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. Rear wheel sensor
3	Defective hydraulic unit assembly	Replace the hydraulic unit assembly. Refer to “ABS (ANTI-LOCK BRAKE SYSTEM)” on page 4-56.

EAS31139
[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 **90890-03250**

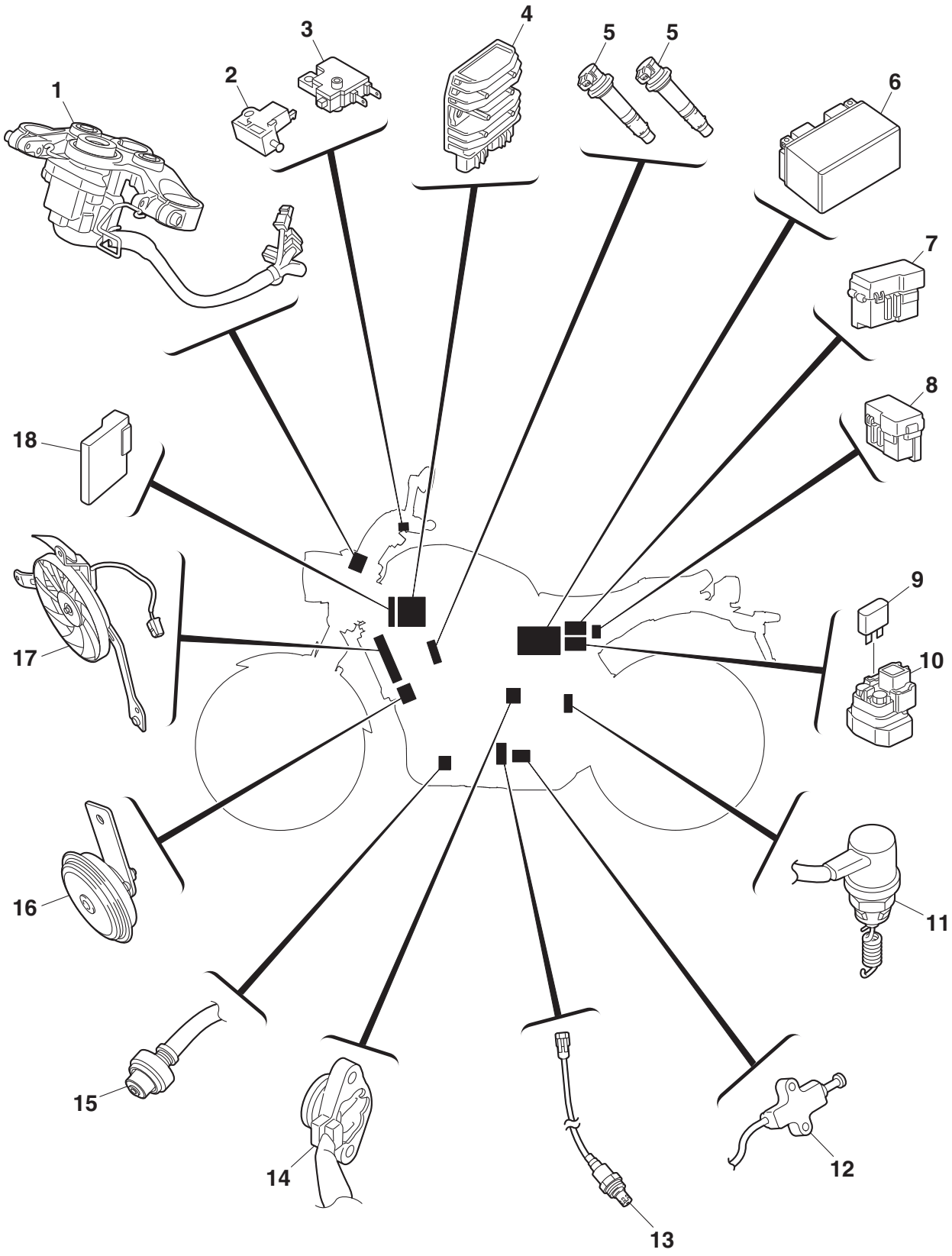
Connecting the Yamaha diagnostic tool
Remove the protective cap “1”, and then connect the Yamaha diagnostic tool to the coupler.



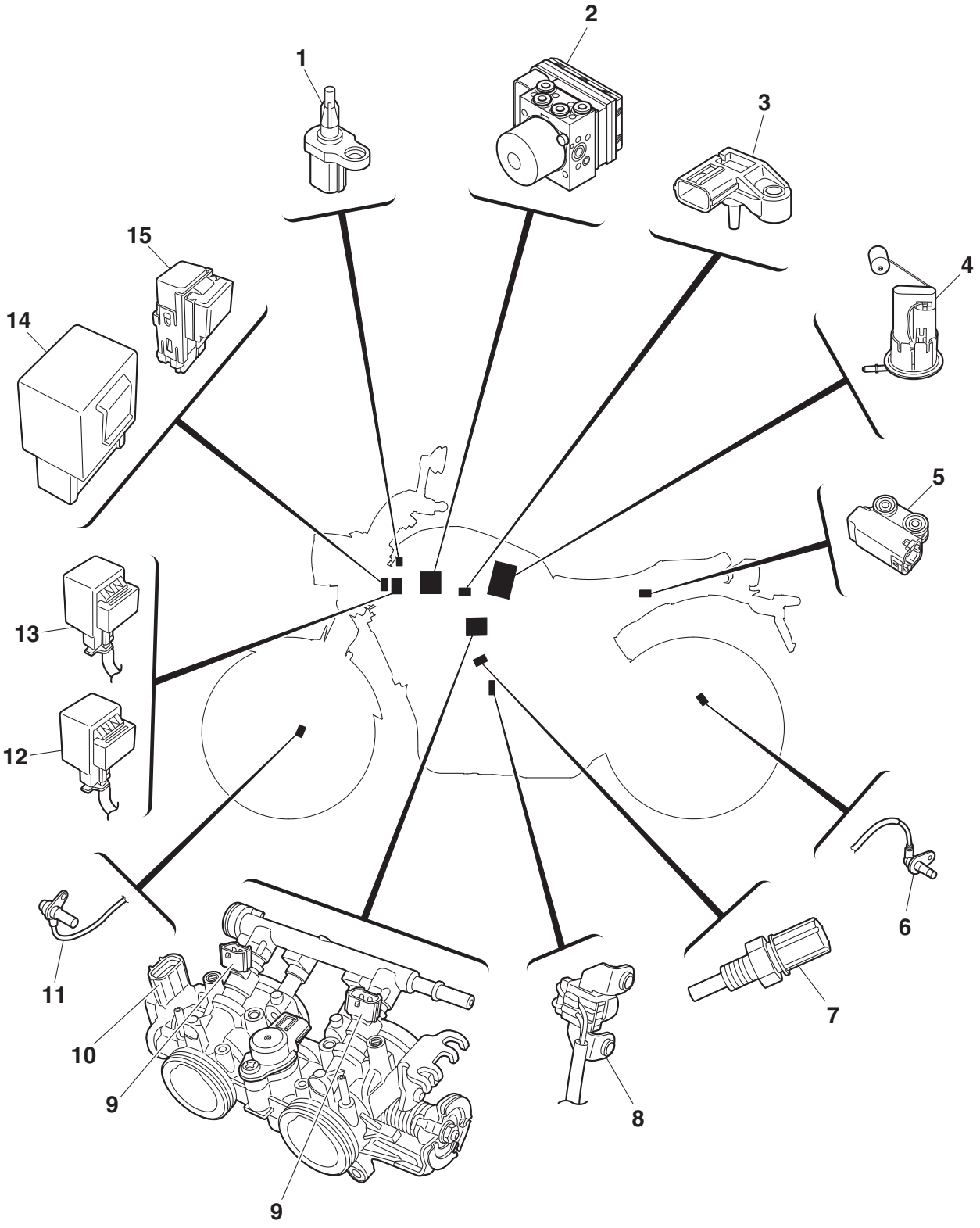
EAS31140
[C-1] FINAL CHECK
Check all the following items to complete the inspection.
If the process is not completed properly, start again from the beginning.

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 3-15.
2. Check the wheel sensors for proper installation.
   Refer to “INSTALLING THE FRONT WHEEL (DISC BRAKE)” on page 4-17 and “INSTALLING THE REAR WHEEL (REAR BRAKE DISC)” on page 4-26.
3. Perform brake line routing confirmation.
   Refer to “HYDRAULIC UNIT OPERATION TESTS” on page 4-60.
   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 4-64.
   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
2. Front brake light switch
3. Clutch switch
4. Rectifier/regulator
5. Ignition coil
6. Battery
7. Fuse box 1
8. Fuse box 2
9. Main fuse
10. Starter relay
11. Rear brake light switch
12. Sidestand switch
13. O_2 sensor
14. Gear position switch
15. Oil pressure switch
16. Horn
17. Radiator fan motor
18. ECU (Engine Control Unit)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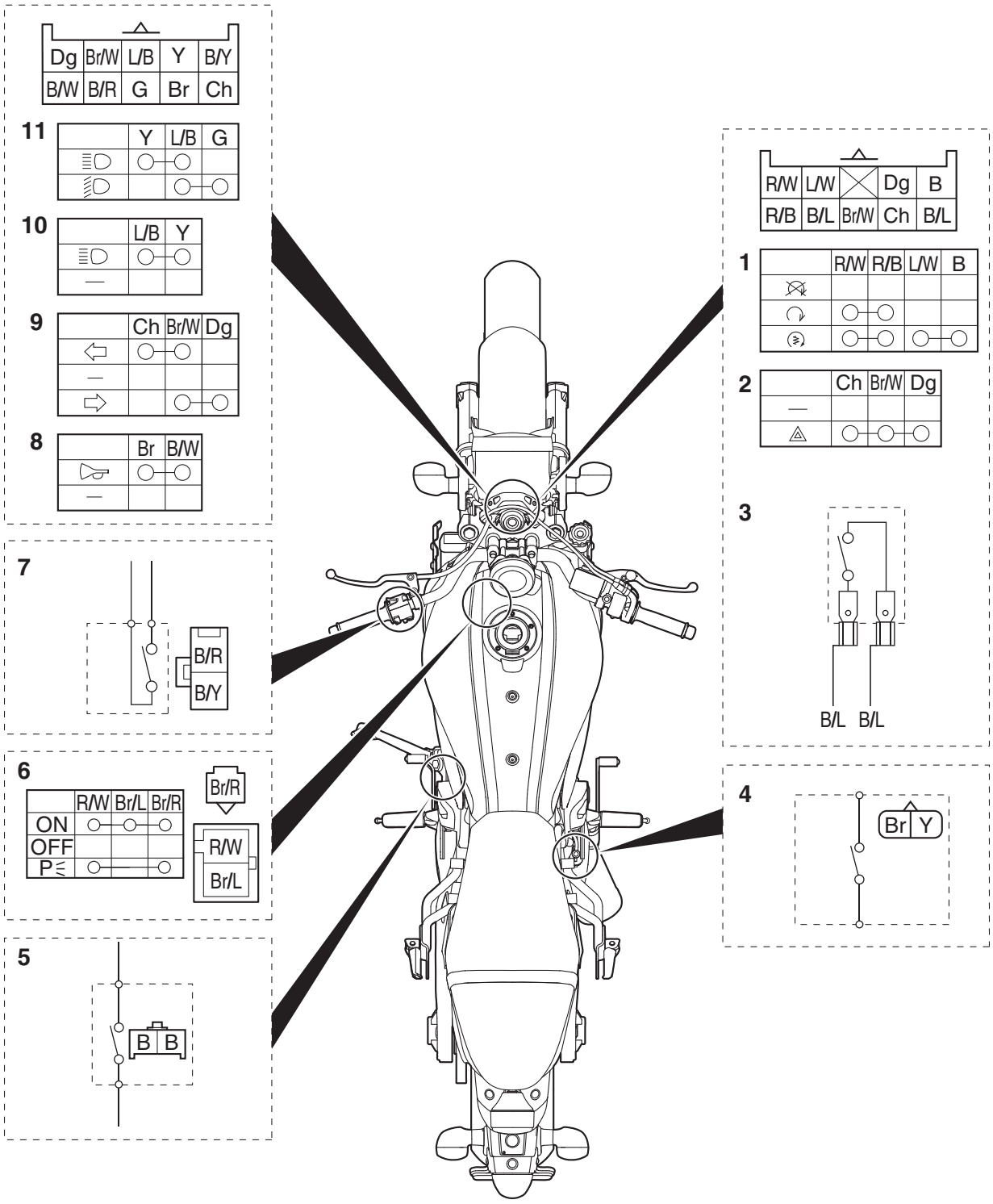
1. Intake air temperature sensor
2. Hydraulic unit assembly
3. Intake air pressure sensor
4. Fuel pump
5. Lean angle sensor
6. Rear wheel sensor
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Fuel injector
10. Throttle position sensor
11. Front wheel sensor
12. Radiator fan motor relay
13. Headlight relay
14. Relay unit
15. Turn signal/hazard relay

EAS30549
CHECKING THE SWITCHES



1. Start/engine stop switch
2. Hazard switch
3. Front brake light switch
4. Rear brake light switch
5. Sidestand switch
6. Main switch
7. Clutch switch
8. Horn switch
9. Turn signal switch
10. Pass switch
11. Dimmer switch

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA18520

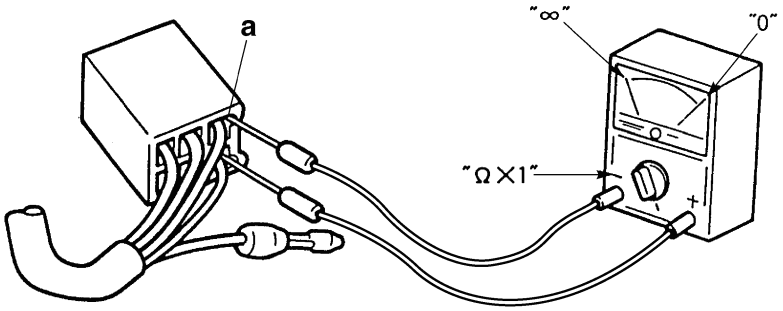
NOTICE

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

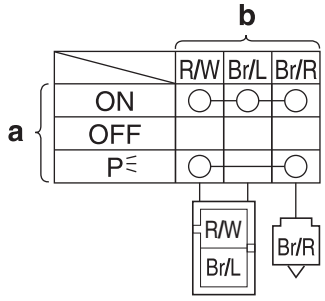
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.
The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.
The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "○——○".
There is continuity between red/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≦".

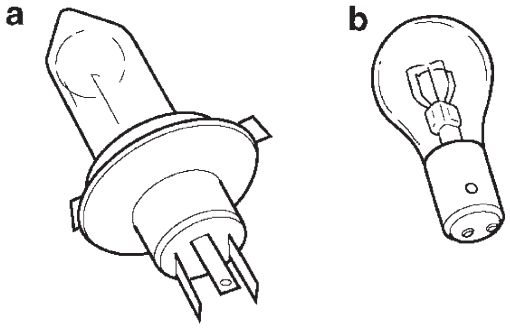


EAS30550
CHECKING THE BULBS AND BULB SOCKETS

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 on the left.
- Bulbs "a" are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs "b" are used for turn signal lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs "c" are used for license plate and auxiliary lights and can be removed from their respective sockets by carefully pulling them out.



Checking the condition of the bulbs

The following procedure applies to all of the bulbs.
1. Remove:
   - Bulb

EWA13320
⚠ WARNING

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

ECA14381
NOTICE

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of a headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - Bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

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

TIP

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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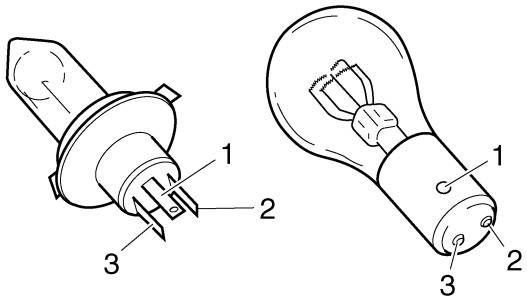
a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
b. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "3", and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.



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Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
   (with the pocket tester)
   No continuity → Replace.

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

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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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:
   • Seat
   • Seat bracket
   • Battery cover
   Refer to "GENERAL CHASSIS (1)" on page 4-1.
2. Check:
   • Fuse

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

TIP
Set the pocket tester selector to "Ω × 1".

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

b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
   • Blown fuse

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

Fuses	Amperage rating	Q'ty
Main	30 A	1
ABS motor	30 A	1
ABS solenoid	20 A	1
Headlight	15 A	1
Signaling system	10 A	1
Ignition	10 A	1
Fuel injection system	10 A	1
Radiator fan motor	10 A	1
Parking lighting	7.5 A	1
ABS control unit	7.5 A	1
Backup	7.5 A	1
Auxiliary	2.0 A	1
Spare	30 A	1
Spare	20 A	1
Spare	15 A	1
Spare	10 A	1
Spare	7.5 A	1
Spare	2.0 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:
   • Battery cover
   • Seat bracket

• 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).
Refer to "REMOVING THE ECU (engine control unit)" on page 4-11.
3. Clean the ISC (idle speed control).
Refer to "CLEANING THE ISC (IDLE SPEED CONTROL) VALVE" on page 7-10.
4. Check:
• Engine idling speed
Start the engine, warm it up, and then measure the engine idling speed.

	Engine idling speed 1250–1450 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.**

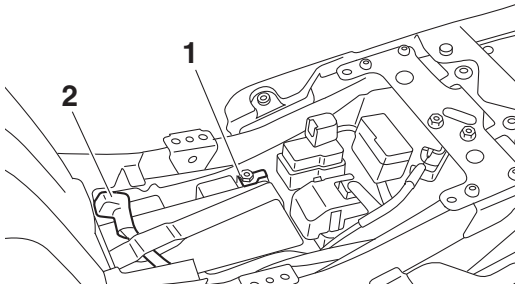
TIP

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:
• Seat
• Seat bracket
• Battery cover
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 pocket tester to the battery terminals.

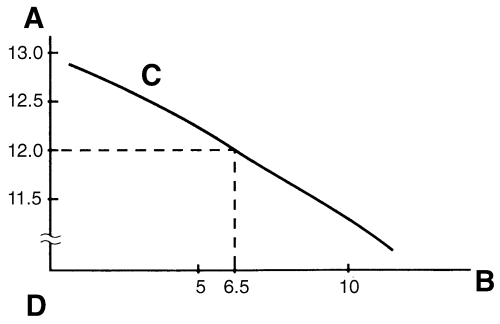
• Positive tester probe → positive battery terminal • Negative tester probe → negative battery terminal

TIP

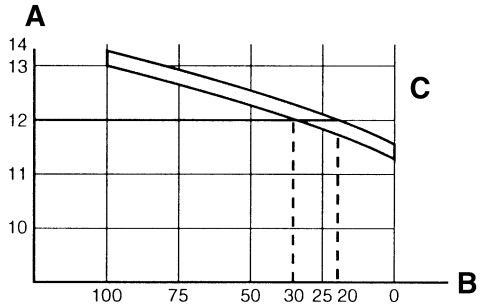
- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example Open-circuit voltage = 12.0 V Charging time = 6.5 hours Charge of the battery = 20–30%



A. Open-circuit voltage (V)
B. Charging time (hours)
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



A. Open-circuit voltage (V)
B. Charging condition of the battery (%)
C. Ambient temperature 20 °C (68 °F)

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5. Charge:
   • Battery
   (refer to the appropriate charging method)

EWA13300

⚠ WARNING

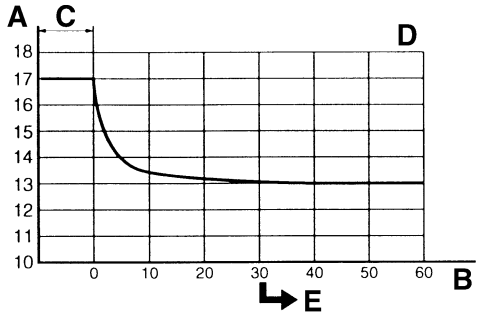
Do not quick charge a battery.

ECA13671

NOTICE

- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the 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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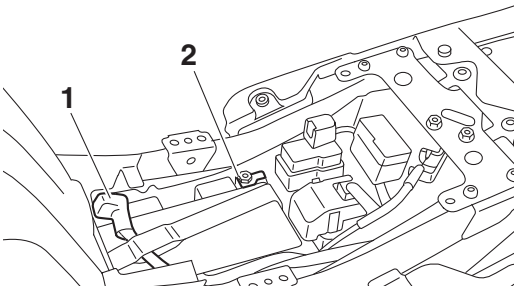
6. Install:
   • Battery
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
7. Connect:
   • Battery leads
   (to the battery terminals)

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:
   • Battery cover
   • Seat bracket
   • Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.

EAS30553

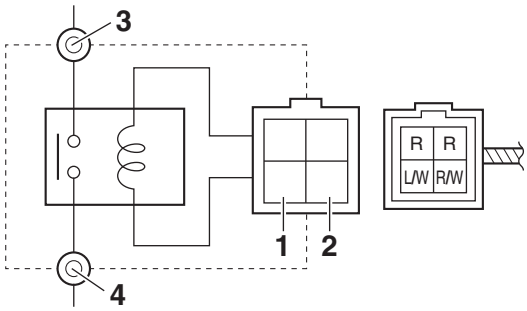
CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

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

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

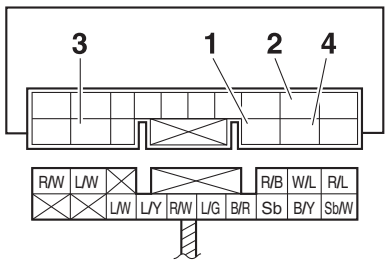
Starter relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Relay operation
Continuity
(between “3” and “4”)

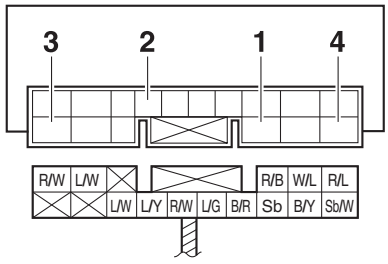
Relay unit (starting circuit cut-off relay)



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)

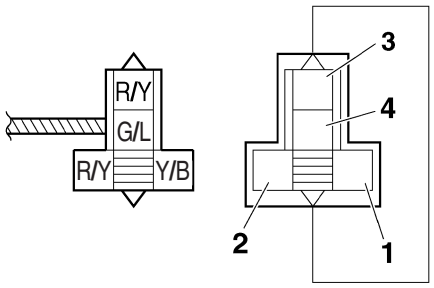


1. Positive battery terminal

2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

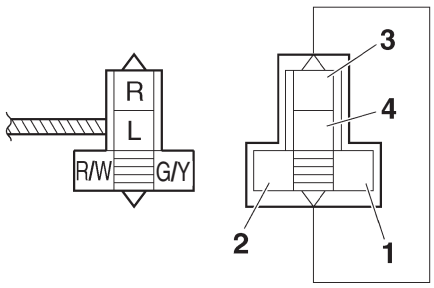
Headlight relay



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 replace the wire harness.

Turn signal/hazard relay input voltage
DC 12V

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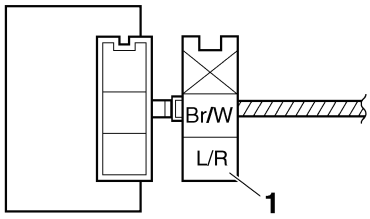
a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.

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

• Positive tester probe
Blue/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 12V

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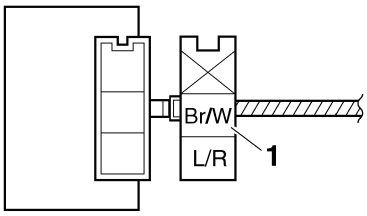
a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.

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

- Positive tester probe
  Brown/white “1”
- Negative tester probe
  Ground



b. Turn the main switch to “ON”.
c. Measure the turn signal/hazard relay output voltage.

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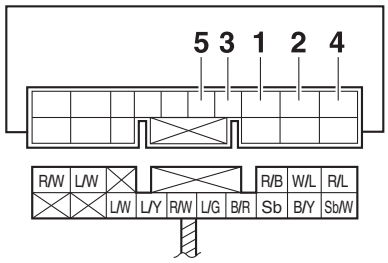
EAS30795
CHECKING THE RELAY UNIT (DIODE)
1. Check:
   - Relay unit (diode)
     Out of specification → Replace.

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

TIP

The pocket tester or the analog pocket tester readings are shown in the following table.

Continuity
Positive tester probe
Sky blue “1”
Negative tester probe
Black/yellow “2”
No continuity
Positive tester probe
Black/yellow “2”
Negative tester probe
Sky blue “1”
Continuity
Positive tester probe
Sky blue “1”
Negative tester probe
Blue/red “3”
No continuity
Positive tester probe
Blue/red “3”
Negative tester probe
Sky blue “1”
Continuity
Positive tester probe
Sky blue “1”
Negative tester probe
Sky blue/white “4”
No continuity
Positive tester probe
Sky blue/white “4”
Negative tester probe
Sky blue “1”
Continuity
Positive tester probe
Blue/green “5”
Negative tester probe
Black/red “3”
No continuity
Positive tester probe
Black/red “3”
Negative tester probe
Blue/green “5”



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a. Disconnect the relay unit coupler from the wire harness.
b. Connect the pocket tester ($\Omega \times 1$) to the relay unit terminal as shown.

c. Check the relay unit (diode) for continuity.
d. Check the relay unit (diode) for no continuity.

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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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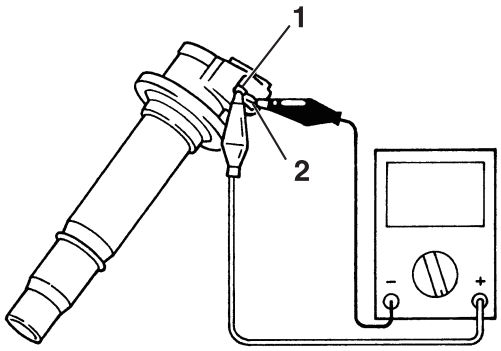
a. Disconnect the ignition coil coupler from the ignition coil.
b. Connect the pocket tester (Ω × 1) to the ignition coil as shown.

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

• Positive tester probe
  Ignition coil terminal "1"
• Negative tester probe
  Ignition coil terminal "2"



c. Measure the primary coil resistance.

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2. Check:
   • Secondary coil resistance
   Out of specification → Replace.

Secondary coil resistance
8.50–11.50 kΩ

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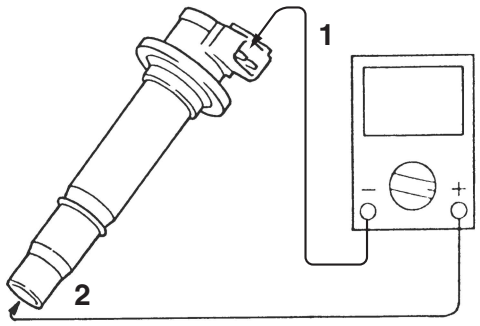
a. Connect the pocket tester (Ω × 1 k) to the ignition coil as shown.

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

• Negative tester probe
  Ignition coil terminal "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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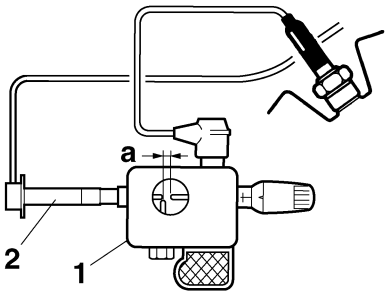
a. Remove the ignition coil from the spark plug.
b. Connect the ignition checker "1" as shown.

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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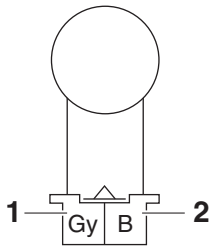
a. Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

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

• Positive tester probe
  Gray "1"
• Negative tester probe
  Black "2"



b. Measure the crankshaft position sensor resistance.

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EAS30561
CHECKING THE LEAN ANGLE SENSOR

1. Remove:
   • Lean angle sensor (from the battery box.)
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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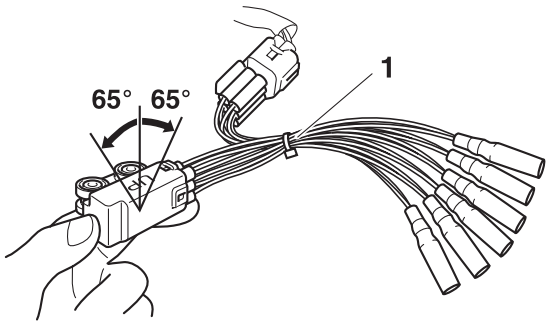
a. Connect the test harness– lean angle sensor (6P) "1" to the lean angle sensor and wire harness as shown.
b. Connect the pocket tester (DC 20 V) to the test harness– lean angle sensor (6P).

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C
Test harness– lean angle sensor (6P)
90890-03209
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 8-10.

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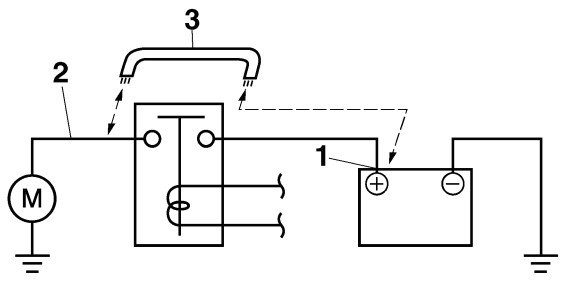
a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

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
0.128–0.192 Ω (W-W)

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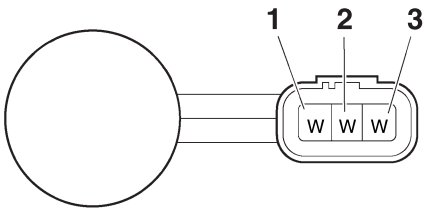
a. Connect the digital circuit tester to the stator coil coupler as shown.

Digital circuit tester
90890-03174
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:
   • Charging voltage
   Out of specification → Replace the rectifier/regulator.

Charging voltage
14 V at 5000 r/min

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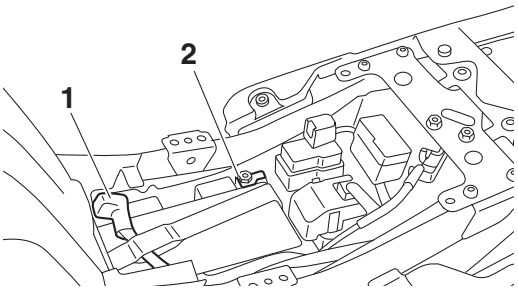
a. Connect the pocket tester (DC 20 V) to the battery terminals as shown.

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

- Positive tester probe
  Positive battery terminal "1"
- Negative tester probe
  Negative battery terminal "2"



b. Start the engine and let it run at approximately 5000 r/min.
c. Measure the charging voltage.

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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

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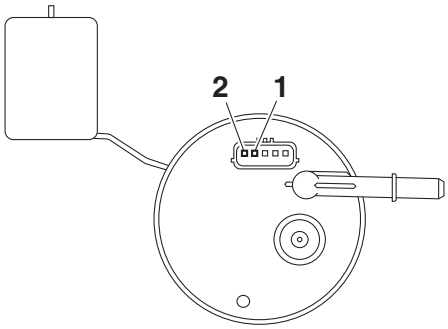
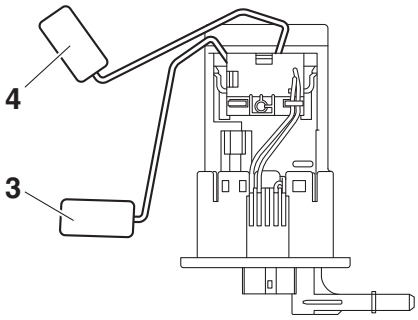
a. Connect the pocket tester (Ω × 10/ × 100) to the fuel sender terminals as shown.

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

- Positive tester probe
  Fuel pump terminal "1"
- Negative tester probe
  Fuel pump terminal "2"



b. Move the fuel sender float to minimum "3" and maximum "4" level position.



c. Measure the fuel sender resistance.

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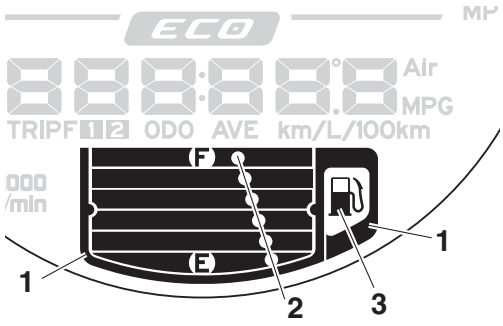
EAS30938
CHECKING THE FUEL METER/FUEL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the fuel level detection circuit.

1. Check:
   - Frame "1"
   - Fuel meter "2"
   - Fuel level warning light "3"
     (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.
     Fuel level segments, frame, and fuel level warning light flashes repeatedly → Replace the fuel pump assembly.



EAS30577
CHECKING THE RADIATOR FAN MOTOR

1. Check:
   • Radiator fan motor
   Faulty/rough movement → Replace.

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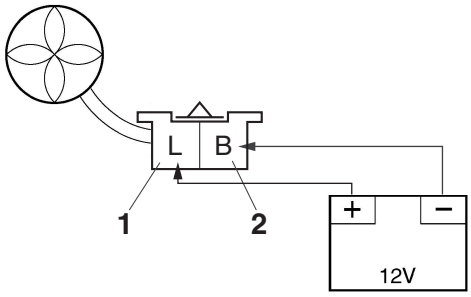
a. Disconnect the radiator fan motor coupler from the wire harness.
b. Connect the battery (DC 12 V) as shown.

• 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 5-23.

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 **2510–2780 Ω at 20 °C (2510–2780 Ω at 68 °F)**

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a. Connect the pocket tester (Ω × 1 k) to the coolant temperature sensor as shown.

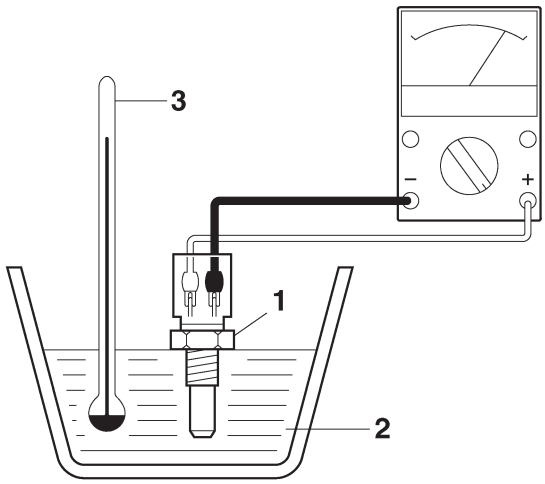
Pocket tester **90890-03112** **Analog pocket tester** **YU-03112-C**

b. Immerse the coolant temperature sensor “1” in a container filled with coolant “2”.

TIP

Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the coolant.



d. Heat the coolant or let it cool down to the specified temperatures.
e. Measure the coolant temperature sensor resistance.

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3. Install:
   • Coolant temperature sensor

Coolant temperature sensor **16 Nm (1.6 m·kgf, 12 ft·lbf)**

EAS30581
CHECKING THE THROTTLE POSITION SENSOR

1. Remove:
   • Throttle position sensor (from the throttle body)

EWA16690
WARNING

• Handle the throttle position sensor with special care.
• Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.

2. Check:
   • Throttle position sensor maximum resistance
   Out of specification → Replace the throttle position sensor.

Resistance
2.64–6.16 kΩ

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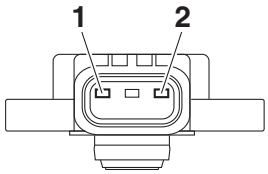
a. Connect the pocket tester (Ω × 1k) to the throttle position sensor as shown.

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

• Positive tester probe
  Sensor terminal "1"
• Negative tester probe
  Sensor terminal "2"



b. Check 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 7-13.

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
4.200 V at 119.990 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.

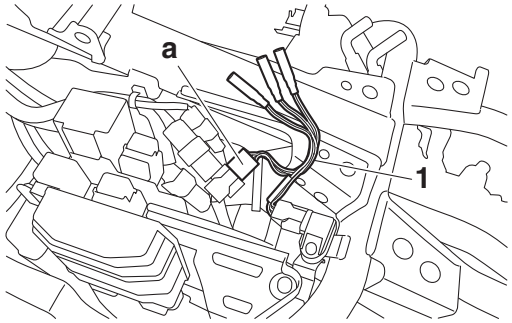
ECA20920
NOTICE

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) "a".

Digital circuit tester
90890-03174
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/white (wire harness color)
• Negative tester probe
  Black/blue (wire harness color)



c. Set the main switch to “ON”.
d. Measure the intake air pressure sensor output voltage.

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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
290–390 Ω at 80 °C (290–390 Ω at 176 °F)

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a. Connect the pocket tester (× 100) to the intake air temperature sensor terminal as shown.

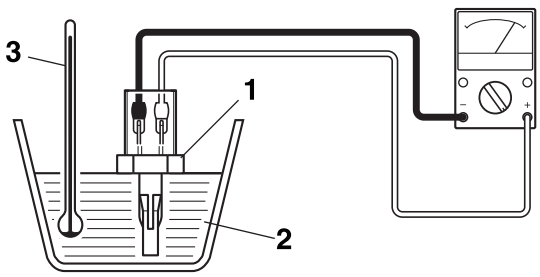
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Immerse the intake air temperature sensor “1” in a container filled with water “2”.

TIP

Make sure that the intake air temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the water.



d. 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

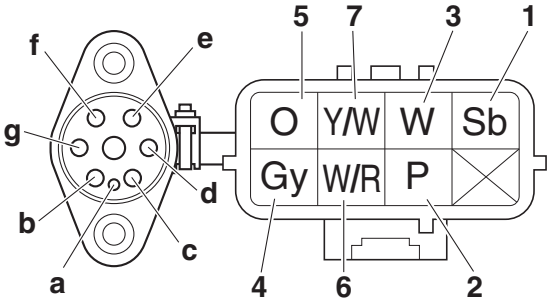
Intake air temperature sensor bolt
3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)

EAS31088
CHECKING THE GEAR POSITION SWITCH

1. Remove:
   • Drive sprocket cover
   Refer to “CHAIN DRIVE” on page 4-93.
   • Gear position switch
   Refer to “CRANKCASE” on page 5-64.
2. Check:
   • Gear position switch
   Out of specification → Replace the gear position switch.

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

Result
Neutral position
Continuity
Positive tester probe
Sky blue “1”
Negative tester probe
Switch terminal “a”
1st position
Continuity
Positive tester probe
Pink “2”
Negative tester probe
Switch terminal “b”
2nd position
Continuity
Positive tester probe
White “3”
Negative tester probe
Switch terminal “c”
3rd position
Continuity
Positive tester probe
Gray “4”
Negative tester probe
Switch terminal “d”
4th position
Continuity
Positive tester probe
Orange “5”
Negative tester probe
Switch terminal “e”
5th position
Continuity
Positive tester probe
White/red “6”
Negative tester probe
Switch terminal “f”
6th position
Continuity
Positive tester probe
Yellow/white “7”
Negative tester probe
Switch 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 7-7.
2. Check:
   • Fuel injector resistance
   Out of specification → Replace the fuel injector.

Resistance
12.0 Ω@20 °C (12.0 Ω@68 °F)

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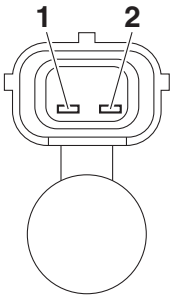
a. Disconnect the fuel injector coupler from the fuel injector.
b. Connect the pocket tester (Ω × 10) to the fuel injector coupler as shown.

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

• Positive tester probe
Fuel injector terminal “1”
• Negative tester probe
Fuel injector terminal “2”



c. Measure the fuel injector resistance.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

TROUBLESHOOTING

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 FAILURE

Engine
1. Cylinder(s) and cylinder head
   - Loose spark plug
   - Loose cylinder head or cylinder
   - Damaged cylinder head gasket
   - Damaged cylinder gasket
   - Worn or damaged cylinder
   - Incorrect valve clearance
   - Improperly sealed valve
   - Incorrect valve-to-valve-seat contact
   - Incorrect valve timing
   - Faulty valve spring
   - Seized valve
2. Piston(s) and piston ring(s)
   - Improperly installed piston ring
   - Damaged, worn or fatigued piston ring
   - Seized piston ring
   - Seized or damaged piston
3. Air filter
   - Improperly installed air filter
   - Clogged air filter element
4. Crankcase and crankshaft
   - Improperly assembled crankcase
   - Seized crankshaft

Fuel system
1. Fuel tank
   - Empty fuel tank
   - Clogged fuel tank cap breather hose
   - Deteriorated or contaminated fuel
   - Clogged or damaged fuel hose
2. Fuel pump
   - Faulty fuel pump
   - Faulty relay unit (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 straight key
6. Switches and wiring
   - Faulty main switch
   - Faulty start/engine stop switch
   - Broken or shorted wiring
   - Faulty gear position switch (neutral circuit)
   - Faulty sidestand switch
   - Faulty clutch switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty relay unit (starting circuit cut-off relay)
   - Faulty starter clutch

EAS30601
INCORRECT ENGINE IDLING SPEED

Engine
1. Cylinder(s) and cylinder head
   - Incorrect valve clearance
   - Damaged valve train components
2. Air filter
   - Clogged air filter element

Fuel system
1. Throttle body (-ies)
   - Damaged or loose throttle body joint
   - Improperly synchronized throttle bodies
   - Improper throttle grip free play
   - Flooded throttle body
   - Vacuum hose

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 straight key

EAS30602
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE
Refer to “STARTING FAILURE” 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 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 cap 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
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main switch)
- Burnt-out headlight bulb

Headlight bulb burnt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

Tail/brake light does not come on
- 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 TROUBLE-SHOOTING” on page 8-121.

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 8-35.

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 (ground short circuit detected) [P0108] Intake air pressure sensor (open or power short circuit detected)	[P0107] Low voltage of the intake air pressure sensor circuit (0.2 V or less) [P0108] High voltage of the intake air pressure sensor circuit (4.8 V or more) • Defective coupler between intake air pressure sensor and ECU. • Open or short circuit in wire harness between intake air pressure sensor and ECU. • Defective intake air pressure sensor. • Malfunction in ECU.	Engine idling speed is high. 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.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
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 (0.2 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.
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 (0.2 V or less) [P0118] High voltage of the coolant temperature sensor circuit (4.8 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].

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
P0122 P0123	[P0122] Throttle position sensor (open or ground short circuit detected) [P0123] Throttle position sensor (power short circuit detected)	[P0122] Low voltage of the throttle position sensor circuit (0.2 V or less) [P0123] High voltage of the throttle position sensor circuit (4.8 V or more) • 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. ISC feedback is not carried out. ISC learning is not carried out.
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.
P0201 P0202	[P0201] Fuel injector #1 (malfunction in fuel injector #1) [P0202] Fuel injector #2 (malfunction in fuel injector #2)	• 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. ISC feedback is not carried out. ISC learning is not carried out. Injection to the applicable cylinder group is cut off.

Fault code No.	Item	Probable cause of malfunction	Vehicle symptom	Fail-safe system operation
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.
P0351 P0352	[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.)	• 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. O_2 feedback is not carried out. ISC feedback is not carried out. ISC learning is not carried out.
P0500	• Rear wheel sensor (no normal signals are received from the rear wheel sensor) • Gear position switch (open or short circuit is detected) • Clutch switch (open or short circuit is detected)	• Open or short circuit in wire harness between rear wheel sensor and ECU. • Open or short circuit in wire harness between ABS unit and ECU. • Open or short circuit in wire harness between gear position switch and ECU. • Open or short circuit in wire harness between clutch switch and ECU. • Defective rear wheel sensor. • Defective gear position 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.	Vehicle speed displayed on the meter = 0 [km/h] The gear ratio is fixed to the gear ratio of the top gear. O_2 feedback is not carried out. Fuel cut-off control when the rear wheel sensor or gear position switch malfunctions is 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
P0507	• Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard). • Defective ISC (idle speed control) unit (ISC operating sound is not heard).	• Defective speed sensor. • Defective coupler between ISC unit and ECU. • Open or short circuit in wire harness between ISC unit and ECU. • Improperly installed ISC unit. • Disconnected ISC unit hose or air leak from intake air passage. • Defective throttle valve or throttle cable. • Defective ISC unit (ISC valve stuck fully open). • Malfunction in ECU.	Engine idling speed is high.	ISC learning is not carried out.
P0511	ISC unit (malfunction in ISC unit)	• Defective coupler between ISC unit and ECU. • Open or short circuit in wire harness between ISC unit and ECU. • Defective ISC stepping motor. • Malfunction in ECU.	Engine is difficult to start. Engine idling speed is unstable. Engine idling speed is high.	Power is not supplied to the ISC unit. ISC learning is not carried out.
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	Faulty ECU memory. (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. Writing to EEPROM 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.
P0657	Fuel system voltage (incorrect voltage supplied to the fuel injector and fuel pump)	• 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.
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 ECU. • Defective coupler between sidestand switch and ECU. • Open or short circuit in wire harness between sidestand switch and ECU. • 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.
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.

EAS31795
SELF-DIAGNOSTIC FUNCTION TABLE (FOR IMMOBILIZER SYSTEM)

TIP

For details of the fault code, refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-112.

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.

EAS31120
DIAGNOSTIC CODE: SENSOR OPERATION TABLE

Diagnostic code No.	Item	Tool display	Procedure
01	Throttle position sensor signal		
	• 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	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.)
05	Intake 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	Lean angle sensor output voltage	Remove the lean angle sensor and incline it more than 65 degrees.
	• Upright	0.4–1.4	
	• Overturned	3.7–4.4	
09	Fuel system voltage (battery 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.)
20	Sidestand switch		Extend and retract the sidestand (with the transmission in gear).
	• Stand retracted	ON	
	• Stand extended	OFF	

Diagnostic code No.	Item	Tool display	Procedure
21	Gear position switch and clutch switch • 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	 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.) 01–02 (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)	 — —
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 [-]	—
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 engine stop switch from "⊠" to "○" 3 times in 5 seconds.

EAS31121
DIAGNOSTIC CODE: ACTUATOR OPERATION TABLE

Diagnostic code No.	Item	Actuation	Procedure
30	Cylinder-#1 ignition coil	Actuates 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 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.
36	Fuel injector #1	Actuates fuel injector #1 five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.	Disconnect the fuel pump coupler. Check that fuel injector #1 is actuated five times by listening for the operating sound.
37	Fuel injector #2	Actuates fuel injector #2 five times at one-second intervals. The “check” indicator on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.	Disconnect the fuel pump coupler. Check that fuel injector #2 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.

Diagnostic code No.	Item	Actuation	Procedure
54	ISC valve	Fully closes the ISC valve, and then opens the valve. This operation is performed 3 times and takes approximately 6 seconds each time. The “check” indicator on the Yamaha diagnostic tool screen come on during the operation.	Check that the ISC unit is actuated three times by listening for the operating sound.

EAS20164
EVENT CODE TABLE

No.	Item	Symptom	Possible cause	Remarks
U0155	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 sensor and the ECU • Defective meter • Defective ECU	Perform the checks and maintenance jobs for event code number U0155 (meter display: Err).
30	Latch up detected	Latch up detected	• Vehicle has overturned • Improperly installed sensor • Sensor malfunction • Defective ECU	Perform the checks and maintenance jobs for event code number 30.
70	Engine idling stop	Engine has been left idling (This is not a malfunction.)	This is not a malfunction.	Activation of the engine idling stop control is not a system malfunction.
192	Intake air pressure sensor	Brief abnormality detected in intake air pressure sensor	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 throttle position sensor	Same as for fault code number P0122 and P0123	Perform the checks and maintenance jobs for fault code number P0122 and P0123.
195	Sidestand switch	Brief abnormality detected in black/red input lead of ECU	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 in 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 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.
203	Lean angle sensor	Brief abnormality detected in 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.
204	Fuel system voltage (monitor voltage)	Brief abnormality detected in voltage supplied to fuel injector and fuel pump	Same as for fault code number P0657	Perform the checks and maintenance jobs for fault code number P0657.
205	Vehicle system power supply	Brief abnormality detected in charging voltage	Same as for fault code number P0560	Perform the checks and maintenance jobs for fault code number P0560.

No.	Item	Symptom	Possible cause	Remarks
240	O_2 sensor (Correction value remains at upper limit)	Correction value remains at upper limit during O_2 feedback	• Open or short circuit in the wire harness between the sensor and the ECU gray/green–gray/green pink/black–pink/black black/blue–black/blue • Low fuel pressure • Clogged fuel injector • Sensor malfunction • Defective ECU • Defective fuel injection system	• If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 240 may be indicated even if the system is normal.
241	O_2 sensor (Correction value remains at lower limit)	Correction value remains at lower limit during O_2 feedback	• Open or short circuit in the wire harness between the sensor and the ECU gray/green–gray/green pink/black–pink/black black/blue–black/blue • Low fuel pressure • Clogged fuel injector • Sensor malfunction • Defective ECU • Defective fuel injection system	• If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 241 may be indicated even if the system is normal.
242	ISC (idle speed control) (Correction value remains at upper limit)	Correction value remains at upper limit while the engine is idling	Low engine idling speed • Clogged throttle body • Improperly adjusted throttle cable • Improperly adjusted clutch cable • Defective fuel injection system • Dirty or worn spark plug • Defective battery • Defective ECU	• Execute the diagnostic mode (diagnostic code number 67) and check the ISC maintenance requirements. • If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 242 may be indicated even if the system is normal.
243	ISC (idle speed control) (Correction value remains at lower limit)	Correction value remains at lower limit while the engine is idling	High engine idling speed • Improperly adjusted throttle cable • Improperly adjusted clutch cable • Defective fuel injection system • Dirty or worn spark plug • Defective battery • Defective ECU	• If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 243 may be indicated even if the system is normal.

No.	Item	Symptom	Possible cause	Remarks
244	Difficult/unable to start engine	Engine starting difficult/unable condition detected	• Empty fuel tank • Defective fuel injection system • Dirty or worn spark plug • Defective battery • Defective ECU	• If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 244 may be indicated even if the system is normal.
245	Engine stall	Engine stall detected	• Empty fuel tank • Improperly adjusted throttle cable • Improperly adjusted clutch cable • Defective fuel injection system • Dirty or worn spark plug • Defective battery • Defective ECU	• If a fault code is indicated, perform the checks and maintenance jobs for the fault code first. * Event code number 245 may be indicated even if the system is normal.

EAS20091

WIRING DIAGRAM

MTM690/MTM690-U 2016

1. Main switch
2. ABS solenoid fuse
3. ABS motor fuse
4. Parking lighting fuse
5. ABS control unit fuse
6. Auxiliary fuse
7. Ignition fuse
8. Signaling system fuse
9. Headlight fuse
10. Fuel injection system fuse
11. Backup fuse
12. Radiator fan motor fuse
13. AC magneto
14. Rectifier/regulator
15. Battery
16. Engine ground
17. Immobilizer unit
18. Main fuse
19. Starter relay
20. Starter motor
21. Rear brake light switch
22. Relay unit
23. Starting circuit cut-off relay
24. Fuel pump relay
25. Joint coupler
26. Sidestand switch
27. Crankshaft position sensor
28. O_2 sensor
29. Throttle position sensor
30. Ignition coil #1
31. Ignition coil #2
32. Spark plug
33. Fuel injector #1
34. Fuel injector #2
35. ISC (Idle Speed Control) unit
36. ECU (Engine Control Unit)
37. Intake air temperature sensor
38. Coolant temperature sensor
39. Intake air pressure sensor
40. Lean angle sensor
41. Front wheel sensor
42. Rear wheel sensor
43. ABS ECU (electronic control unit)
44. Yamaha diagnostic tool coupler
45. Fuel sender
46. Fuel pump
47. Oil pressure switch
48. Meter assembly
49. Immobilizer system indicator light
50. Neutral indicator light
51. Meter light
52. Tachometer
53. Multi-function meter
54. Oil pressure warning light
55. Engine trouble warning light
56. Coolant temperature warning light
57. High beam indicator light
58. Turn signal indicator light
59. ABS warning light
60. Horn
61. Gear position switch
62. Handlebar switch (right)
63. Front brake light switch
64. Hazard switch
65. Start/engine stop switch
66. Turn signal/hazard relay
67. Handlebar switch (left)
68. Clutch switch
69. Dimmer switch
70. Pass switch
71. Turn signal switch
72. Horn switch
73. Rear turn signal light (right)
74. Rear turn signal light (left)
75. Front turn signal light (right)
76. Headlight assembly
77. Auxiliary light
78. Headlight
79. Front turn signal light (left)
80. License plate light
81. Tail/brake light
82. Radiator fan motor
83. Radiator fan motor relay
84. Headlight relay
85. Auxiliary DC outlet

A. Wire harness
B. Positive battery sub-wire harness
C. Sub-wire harness (gear position switch, coolant temperature sensor, fuel injector)
D. Sub-wire harness (throttle position sensor, ISC)
E. Sub-wire harness (headlight, turn signal light, auxiliary light)

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
W	White
Y	Yellow
B/G	Black/Green
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
G/B	Green/Black
G/L	Green/Blue
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
Gy/R	Gray/Red
L/B	Blue/Black
L/G	Blue/Green
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
P/B	Pink/Black
P/L	Pink/Blue
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
Sb/W	Sky blue/White
W/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/W	Yellow/White

MBK Industrie
Z.I. de Rouvroy 02100 Saint Quentin
Société Anonyme au capital de 45 000 000 €
R.C St-Quentin B 329 035 422

MBK

YAMAHA

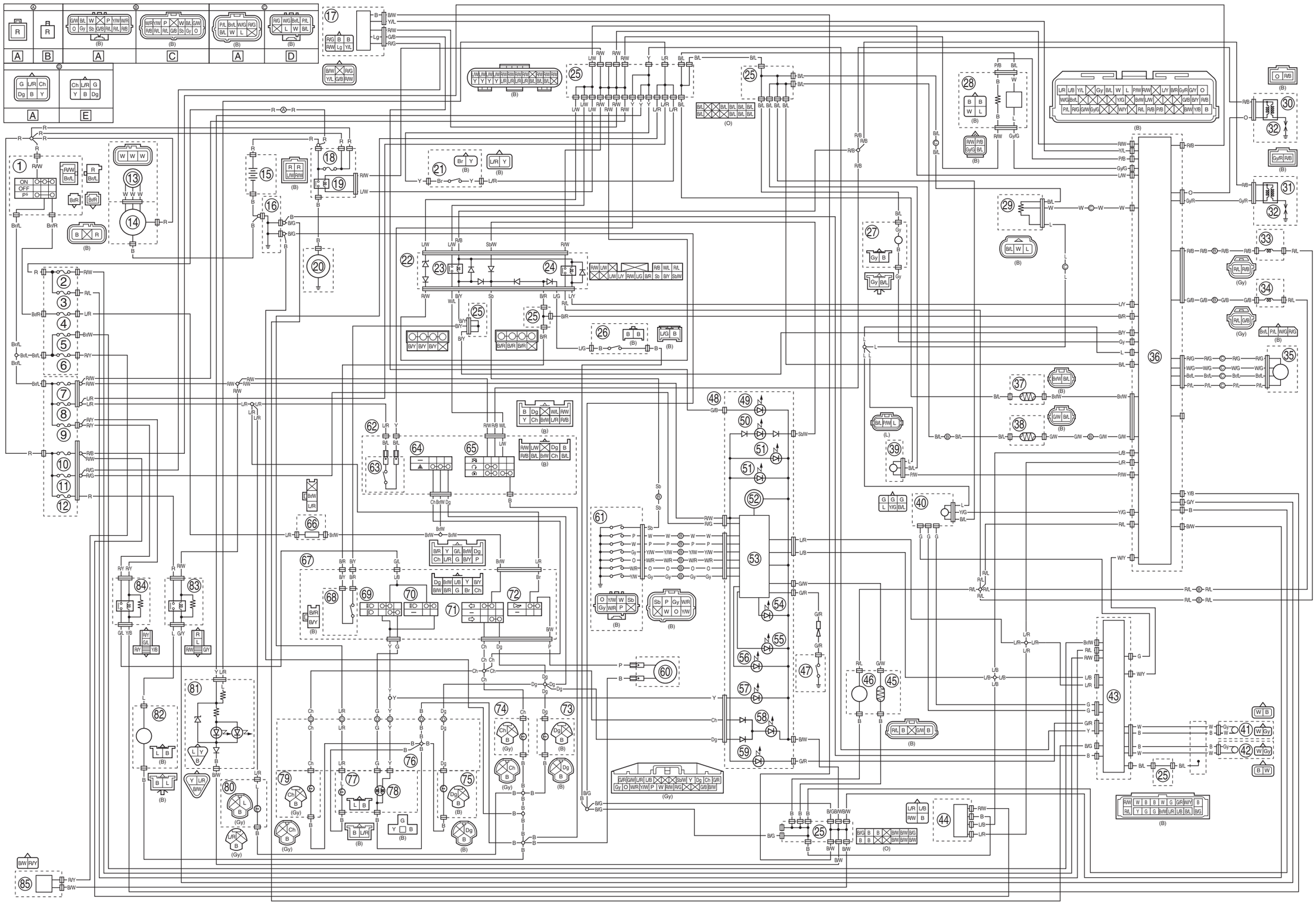
MTM690 2016
WIRING DIAGRAM

MTM690 2016
SCHÉMA DE CÂBLAGE

MTM690 2016
SCHALTPLAN

MTM690 2016
SCHEMA ELETTRICO

MTM690 2016
DIAGRAMA ELÉCTRICO



MTM690 2016
WIRING DIAGRAM

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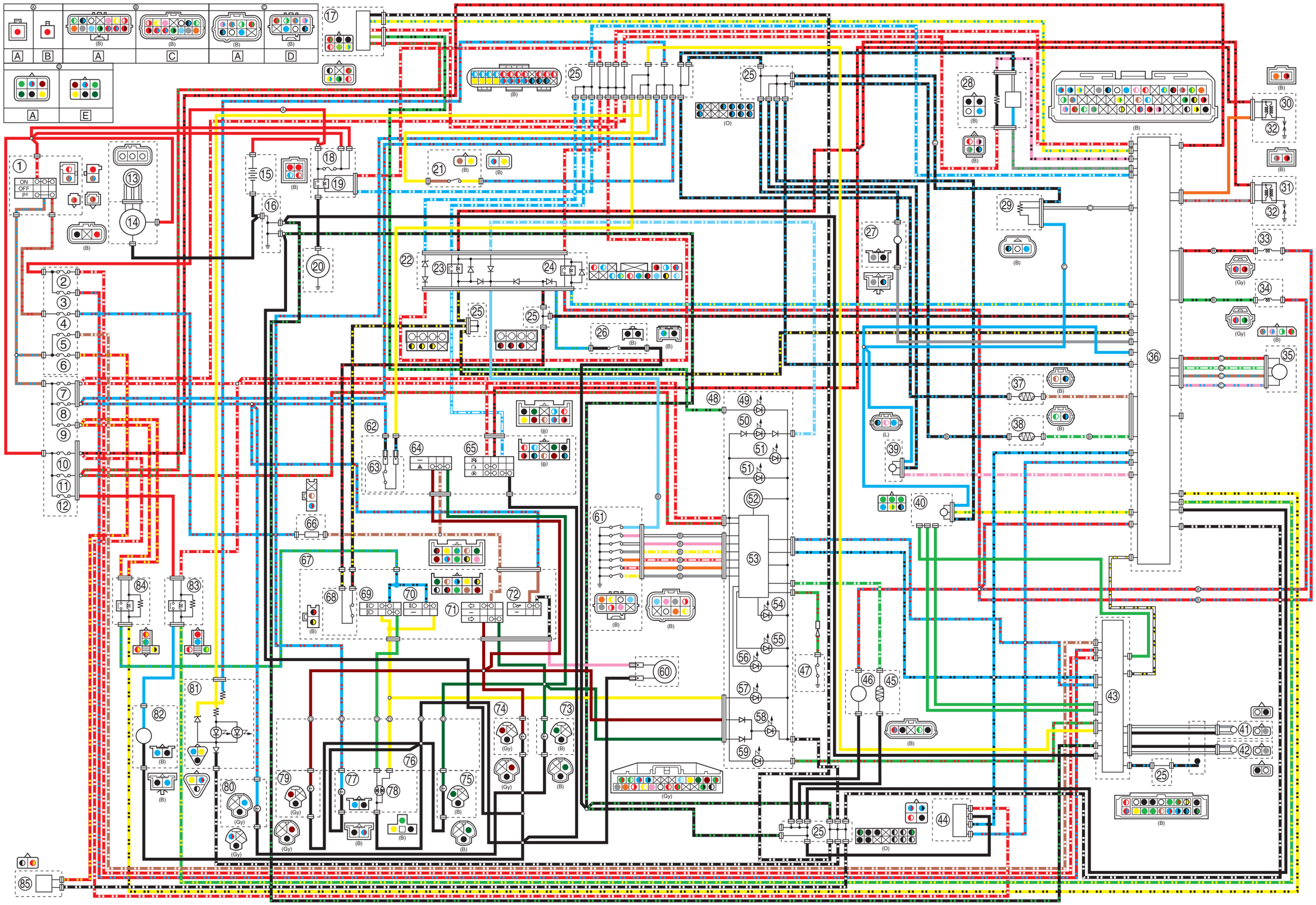
MTM690 2016
SCHALTPLAN

MTM690 2016
SCHEMA ELETTRICO

MTM690 2016
DIAGRAMA ELÉCTRICO



MTM690-U 2016
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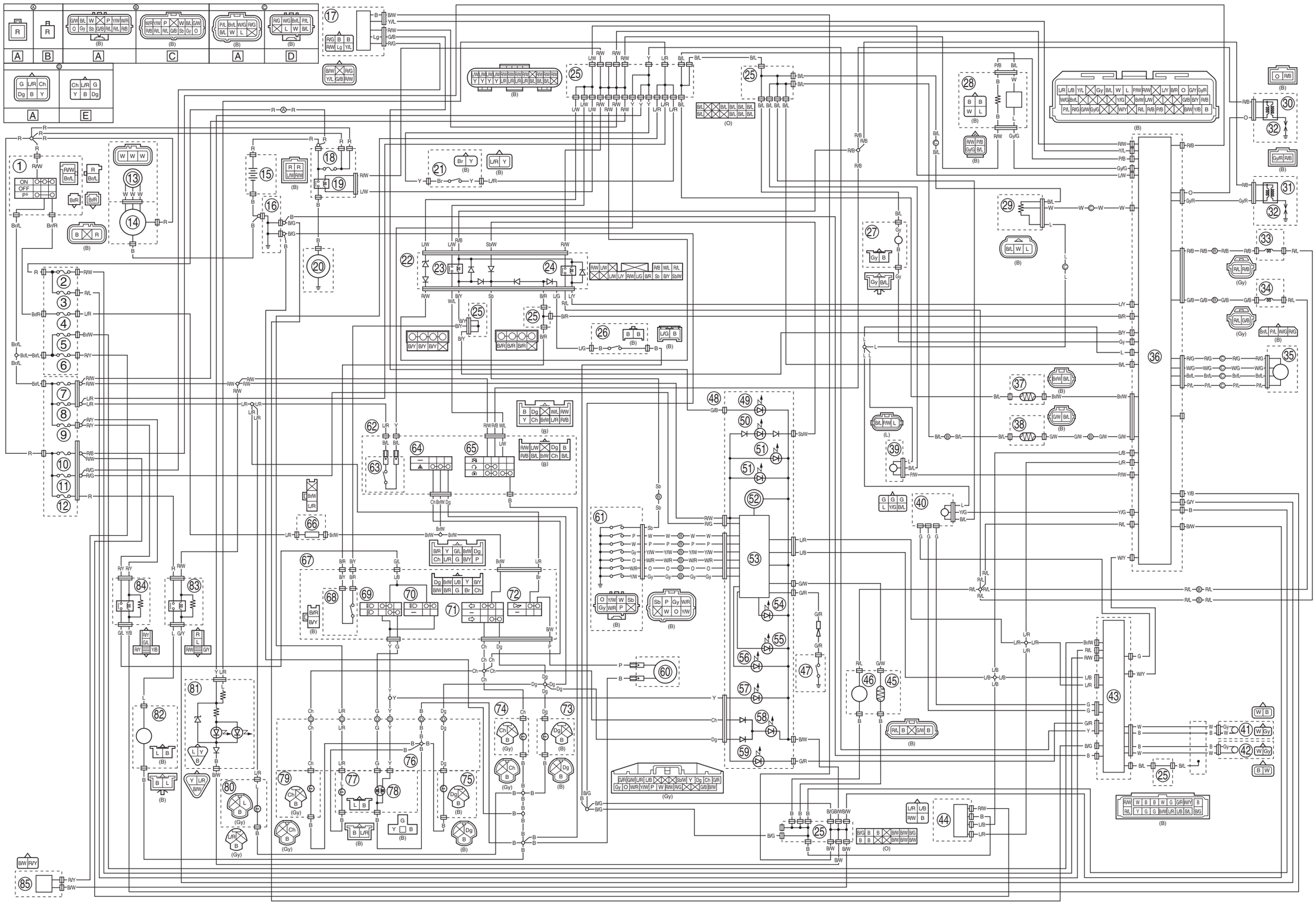

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