



XVS13AW(C) XVS13CTW(C)

SERVICE MANUAL

EAS20050

**XVS13AW(C)/XVS13CTW(C)
SERVICE MANUAL
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NOTICE

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

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

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

NOTE:

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

IMPORTANT MANUAL INFORMATION

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



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



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



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

NOTE:

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

HOW TO USE THIS MANUAL

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

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

1
↓
CLUTCH

CLUTCH
Removing the clutch cover

3 → **4** → **5** → **6** →

Order	Job/Parts to remove	Qty	Remarks
	Muffler/Coolant reservoir cover		Refer to "ENGINE REMOVAL" on page 5-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 5-12.
1	Clutch cable holder	1	
2	Clutch cable	1	Disconnect.
3	Pull lever	1	
4	Pull lever spring	1	
5	Damper cover	1	
6	Clutch cover damper	1	
7	Clutch cover	1	
8	Clutch cover gasket	1	
9	Dowel pin	2	For installation, reverse the removal procedure.

5-46

CLUTCH

7 ←

2 ←

• Pull rod teeth "2"
Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.

2 Check:

- Pressure driven gear
Cracks/damage → Replace.
- Pull rod bearing
Damage/wear → Replace.

7 ←

2 ←

CHECKING THE PRESSURE PLATE
1. Check:

- Pressure plate
Cracks/damage → Replace.
- Bearing
Damage/wear → Replace.

CHECKING THE PRIMARY DRIVE GEAR
1. Check:

- Primary drive gear
Damage/wear → Replace the primary drive and primary driven gears as a set.
Excessive noise during operation → Replace the primary drive and primary driven gears as a set.

CHECKING THE PRIMARY DRIVEN GEAR
1. Check:

- Primary driven gear "1"
Damage/wear → Replace the primary drive and primary driven gears as a set.
Excessive noise during operation → Replace the primary drive and primary driven gears as a set.

CHECKING THE OIL/WATER PUMP DRIVE SPROCKET AND OIL/WATER PUMP DRIVE CHAIN
1. Check:

- Oil/water pump drive sprocket
Cracks/damage/wear → Replace the oil/water pump drive chain, and oil/water pump drive and driven sprockets as a set.

2. Check:

- Oil/water pump drive chain
Damage/stiffness → Replace the oil/water pump drive chain, and oil/water pump drive and driven sprockets as a set.

INSTALLING THE PRIMARY DRIVE GEAR
1. Install:

- Straight key
- Primary drive gear "1"
- Spacer "2"
- Lock washer "3"
- Primary drive gear nut

Primary drive gear nut
100 Nm (10.0 m·kg, 72 ft·lb)

NOTE:

- Make sure that the side of the primary drive gear "1" with the groove "a" is facing outward.
- Align the tab "b" on the lock washer "3" with the groove "c" in the spacer "2".
- While holding the generator rotor "4" with the sheave holder "5", tighten the primary drive gear nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.

CHECKING THE PULL LEVER SHAFT AND PULL ROD
1. Check:

- Pull lever shaft pinion gear teeth "1"

5-53

SYMBOLS

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

NOTE: _____

The following symbols are not relevant to every vehicle.

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

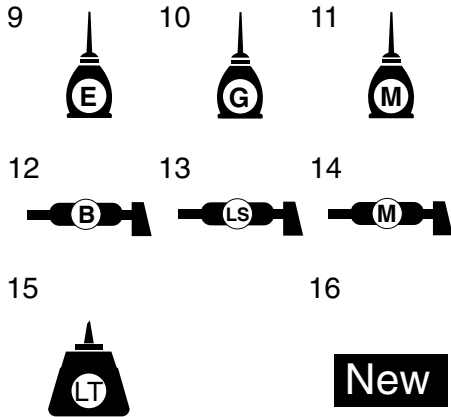
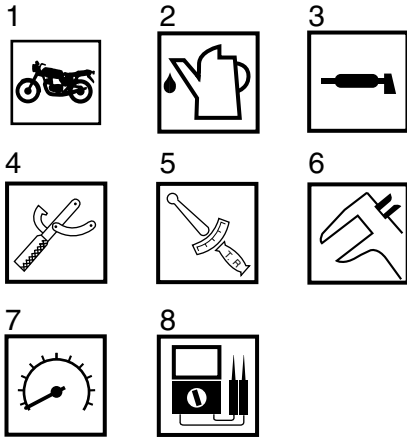




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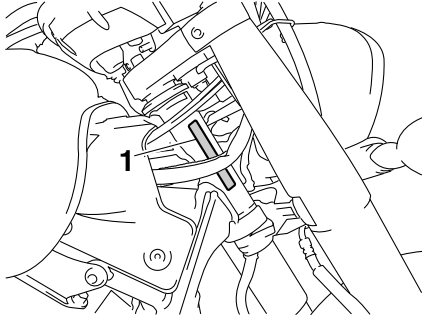
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IDENTIFICATION

EAS20140

VEHICLE IDENTIFICATION NUMBER

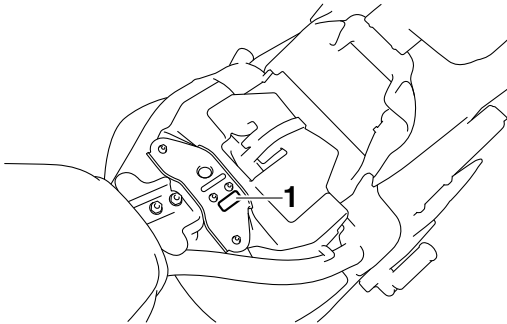
The vehicle identification number "1" is stamped into the right side of the steering head pipe.



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MODEL LABEL

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



EAS20170

FEATURES

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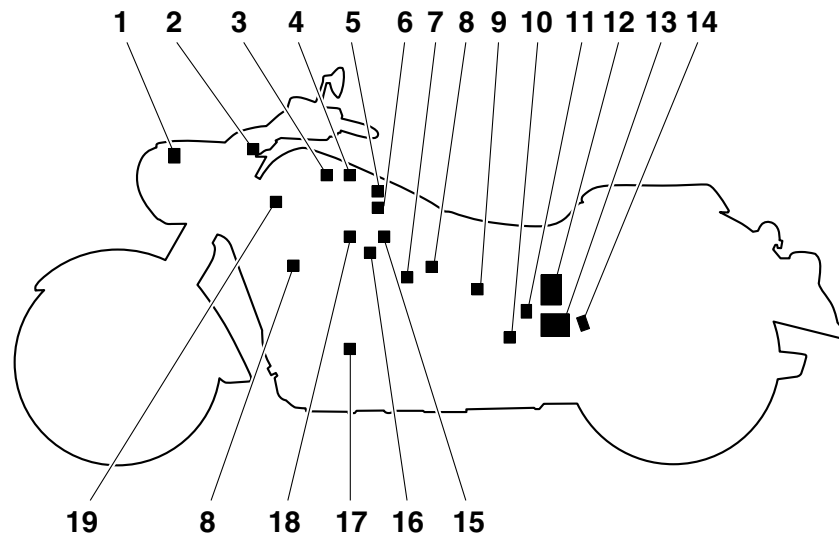
OUTLINE OF THE FI SYSTEM

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

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

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

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



- | | |
|--|-----------------------------------|
| 1. Air temperature sensor | 15. Rear cylinder injector |
| 2. Engine trouble warning light | 16. ISC (idle speed control) unit |
| 3. Front cylinder intake air pressure sensor | 17. Crankshaft position sensor |
| 4. Rear cylinder intake air pressure sensor | 18. Front cylinder injector |
| 5. Rear cylinder ignition coil | 19. Coolant temperature sensor |
| 6. Front cylinder ignition coil | |
| 7. Throttle position sensor | |
| 8. Spark plug | |
| 9. Speed sensor | |
| 10. Lean angle sensor | |
| 11. Relay unit (fuel pump relay) | |
| 12. Fuel pump | |
| 13. ECU (engine control unit) | |
| 14. O ₂ sensor | |

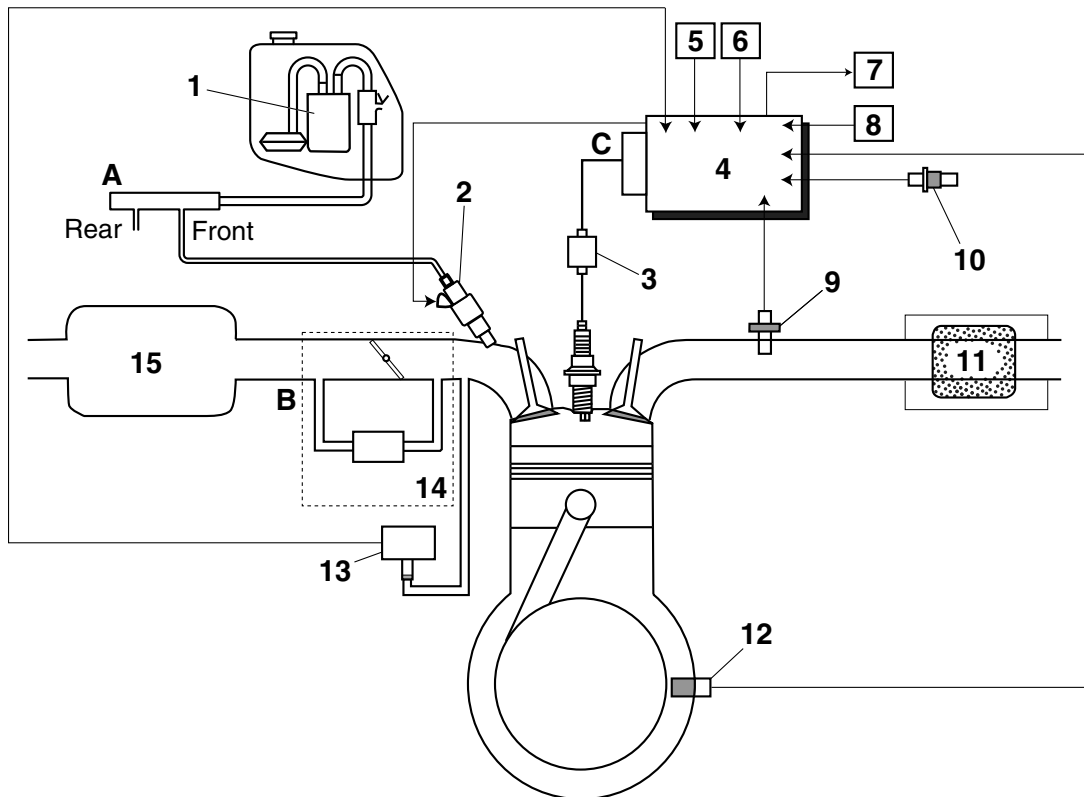
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FI SYSTEM

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

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

Illustration is for reference only.



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

EAS3D81033

INSTRUMENT FUNCTIONS

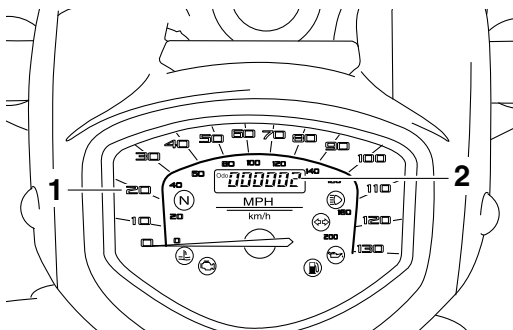
Multi-function meter unit

EWA3D81011



WARNING

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



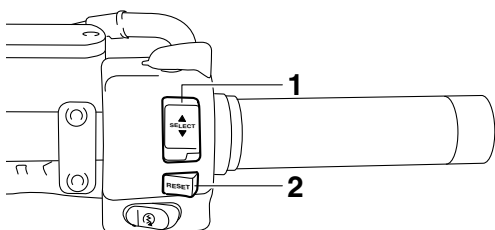
1. Speedometer
2. Odometer/tripmeter/fuel reserve tripmeter/clock

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

- a speedometer (which shows the riding speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled on the fuel reserve)
- a clock
- a self-diagnosis device
- a brightness control mode

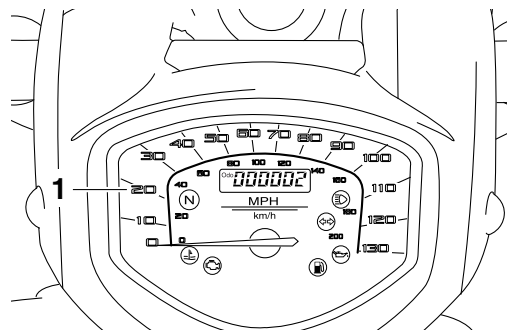
NOTE:

Be sure to turn the key to “ON” before using the “SELECT” switch “▲/▼” and “RESET” switch, except for setting the brightness control mode.



1. “SELECT” switch “▲/▼”
2. “RESET” switch

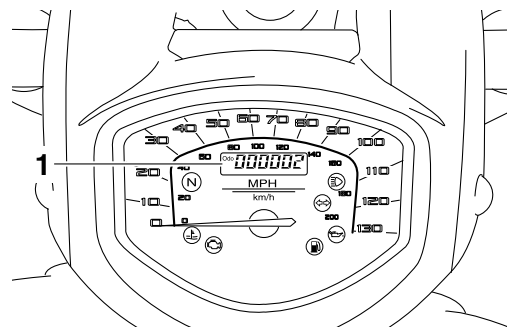
Speedometer



1. Speedometer

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

Odometer, tripmeter, and fuel reserve tripmeter modes



1. Odometer/tripmeter/fuel reserve tripmeter/clock

Push the “▲” side of the “SELECT” switch to switch the display between the odometer mode “ODO”, the tripmeter modes “TRIP 1” and “TRIP 2” and the clock mode in the following order: ODO → TRIP 1 → TRIP 2 → Clock → ODO

NOTE:

Push the “▼” side of the “SELECT” switch to switch the display in the reverse order.

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

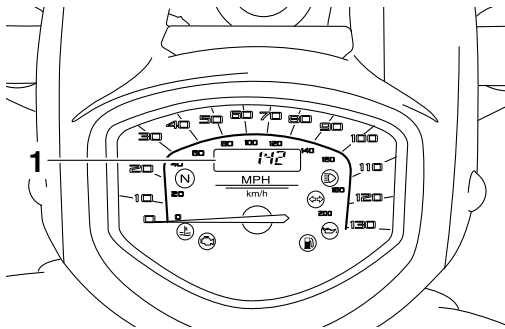
F-TRIP → TRIP 1 → TRIP 2 → Clock → ODO → F-TRIP

NOTE:

Push the “▼” side of the “SELECT” switch to switch the display in the reverse order.

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

Clock mode



1. Clock

Push the “RESET” switch for less than one second to display the clock for five seconds, regardless of the currently selected display mode.

To set the clock:

1. Push the “▲” or “▼” side of the “SELECT” switch to change the display to the clock mode.
2. Push the “▲” side of the “SELECT” switch and the “RESET” switch together for at least two seconds.
3. When the hour digits start flashing, push the “▲” or “▼” side of the “SELECT” switch to set the hours.
4. Push the “RESET” switch, and the minute digits will start flashing.
5. Push the “▲” or “▼” side of the “SELECT” switch to set the minutes.
6. Push the “RESET” switch and then release it to start the clock.

Self-diagnosis device

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

If any of those circuits are defective, the engine trouble warning light will come on, and then the odometer/tripmeter/clock display will indicate a two-digit error code (e.g., 12, 13, 14).

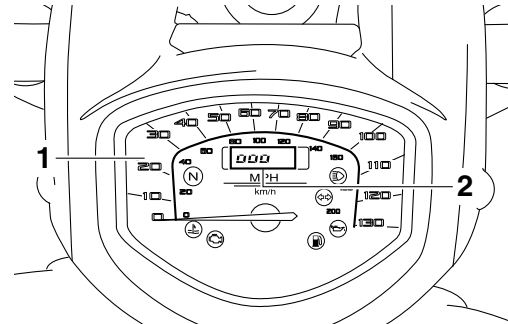
If the odometer/tripmeter/clock display indicates any error codes, note the code number, and then check the vehicle. Refer to “FUEL INJECTION SYSTEM” on page 8-31.

ECA3D81016

CAUTION:

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

Brightness control mode



1. Speedometer panel
2. Brightness level

This function allows you to adjust the brightness of the speedometer panel to suit the outside lighting conditions.

To set the brightness:

1. Turn the key to “OFF”.
2. Push and hold the “▲” side of the “SELECT” switch.
3. Turn the key to “ON”, and then release the “SELECT” switch after five seconds or more.
4. Push the “▲” or “▼” side of the “SELECT” switch to select the desired brightness level.
5. Push the “RESET” switch to confirm the selected brightness level. The display will return to the odometer, tripmeter or clock mode.

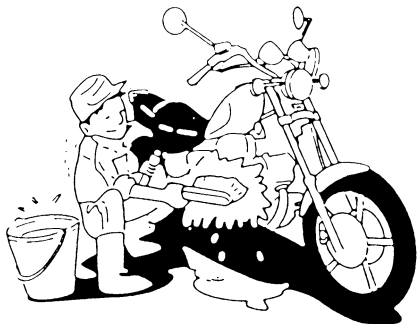
EAS20180

IMPORTANT INFORMATION

EAS20190

PREPARATION FOR REMOVAL AND DISASSEMBLY

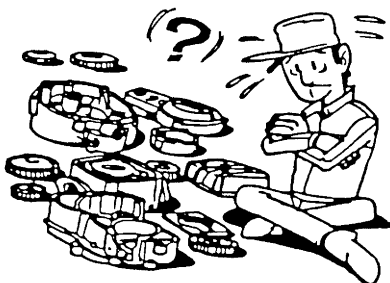
1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.



2. Use only the proper tools and cleaning equipment.

Refer to "SPECIAL TOOLS" on page 1-9.

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

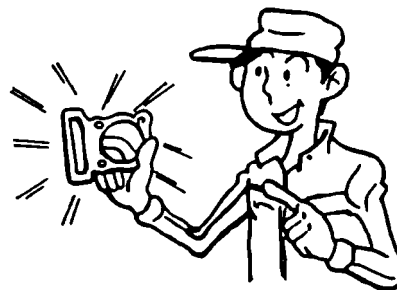


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200

REPLACEMENT PARTS

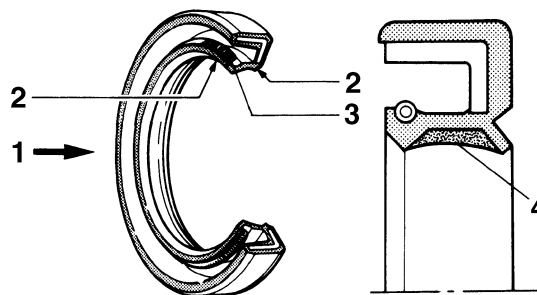
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

GASKETS, OIL SEALS AND O-RINGS

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

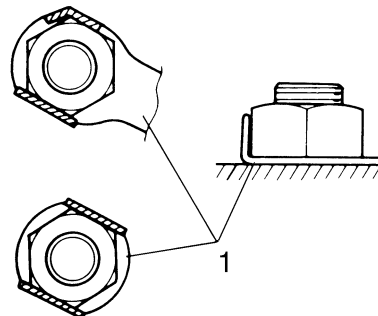


1. Oil
2. Lip
3. Spring
4. Grease

EAS20220

LOCK WASHERS/PLATES AND COTTER PINS

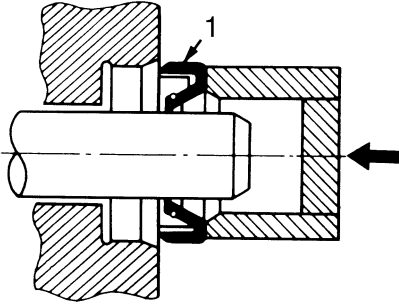
After removal, replace all lock washers/plates "1" and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



EAS20230

BEARINGS AND OIL SEALS

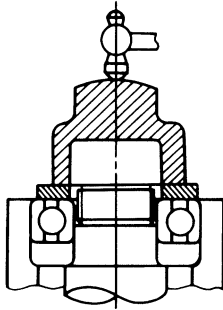
Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals "1", lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.



ECA13300

CAUTION:

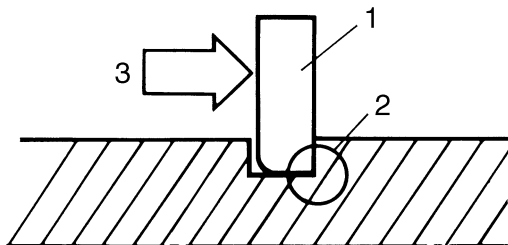
Do not spin the bearing with compressed air because this will damage the bearing surfaces.



EAS20240

CIRCLIPS

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



CHECKING THE CONNECTIONS

EAS20250

CHECKING THE CONNECTIONS

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

1. Disconnect:

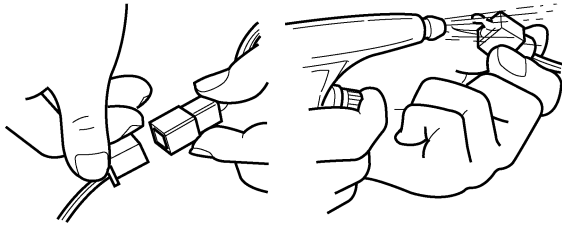
- Lead
- Coupler
- Connector

2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



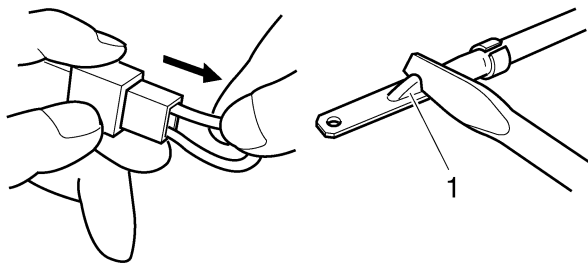
3. Check:

- All connections

Loose connection → Connect properly.

NOTE:

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



4. Connect:

- Lead
- Coupler
- Connector

NOTE:

Make sure all connections are tight.

5. Check:

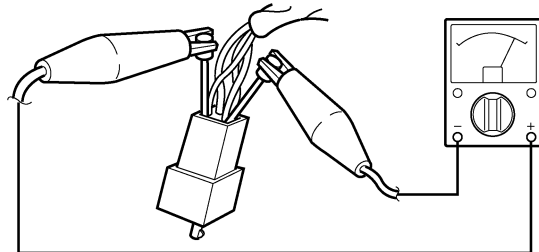
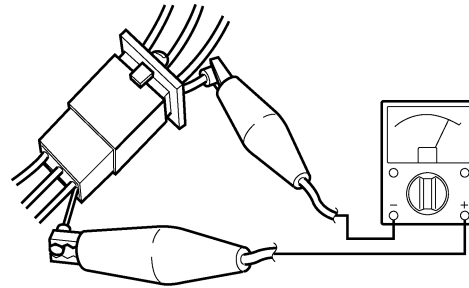
- Continuity
(with the pocket tester)



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

NOTE:

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



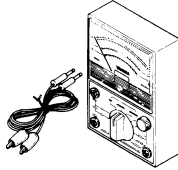
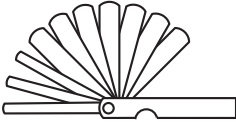
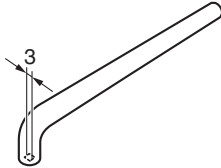
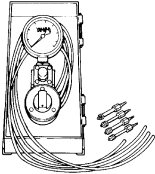

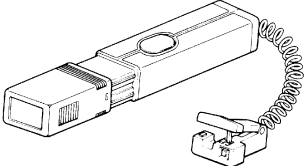
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SPECIAL TOOLS

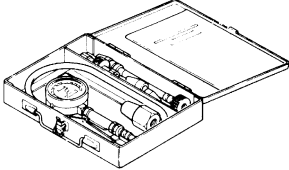
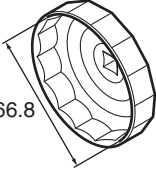

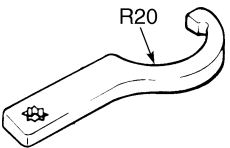
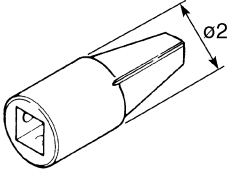
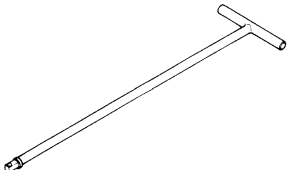
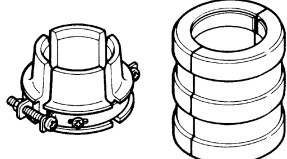
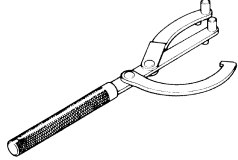
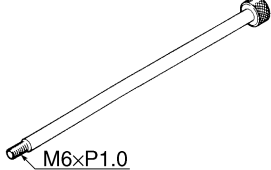
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

NOTE:

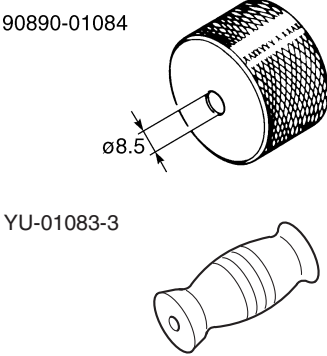
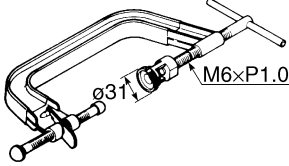
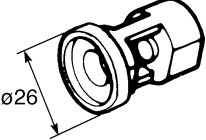
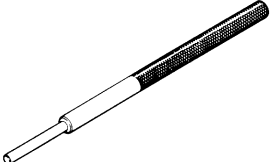
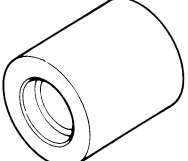
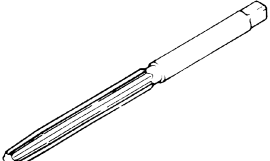
- For U.S.A. and Canada, use part numbers starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part numbers starting with “90890-”.

Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-8, 5-64, 8-73, 8-74, 8-75, 8-79, 8-80, 8-81, 8-82, 8-83, 8-84, 8-85, 8-86, 8-87, 8-88, 8-89, 8-90
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-5, 3-6
Tappet adjusting tool 90890-04154 YM-04154		3-6
Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456	90890-03094  YU-44456 	3-7
Timing light 90890-03141 Inductive clamp timing light YU-03141		3-10

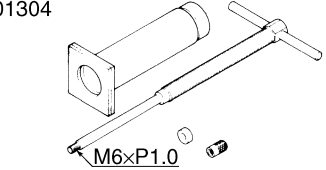
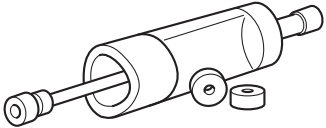
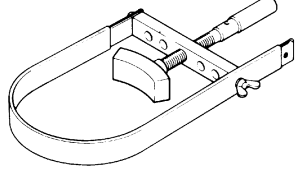
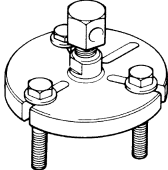
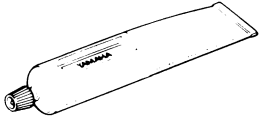
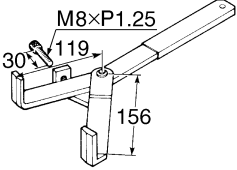
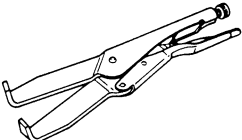
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Compression gauge 90890-03081 Engine compression tester YU-33223		3-11
Oil filter wrench 90890-01469 YM-01469		3-12
Belt tension gauge 90890-03170 Rear drive belt tension gauge YM-03170		3-25
Steering nut wrench 90890-01403 Spanner wrench YU-33975		3-26, 4-61
Damper rod holder 90890-01460		4-54, 4-56
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-54, 4-56
Fork seal driver 90890-01442 Adjustable fork seal driver (36–46 mm) YM-01442		4-56, 4-57
Rotor holding tool 90890-01235 Universal magneto & rotor holder YU-01235		5-15, 5-21, 5-22
Slide hammer bolt 90890-01083 Slide hammer bolt 6 mm YU-01083-1		5-16

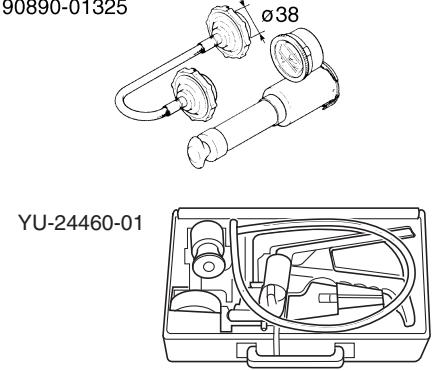
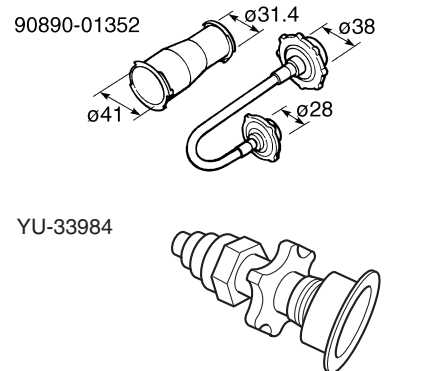
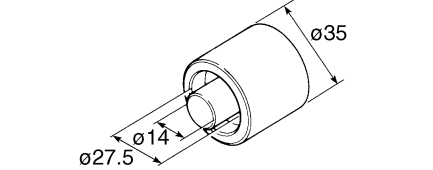
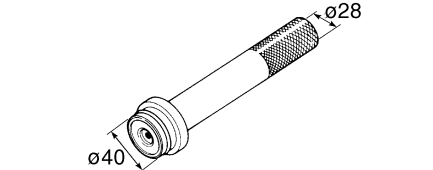
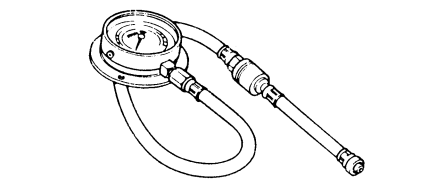
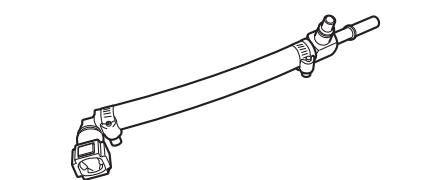
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Weight 90890-01084 YU-01083-3	 <p>90890-01084</p> <p>YU-01083-3</p>	5-16
Valve spring compressor 90890-04019 YM-04019	 <p>37</p> <p>M6xP1.0</p>	5-28, 5-33
Valve spring compressor attachment 90890-01243 Valve spring compressor adapter (26 mm) YM-01253-1	 <p>26</p>	5-28, 5-33
Valve guide remover (ø6) 90890-04064 Valve guide remover (6.0 mm) YM-04064-A		5-29
Valve guide installer (ø6) 90890-04065 Valve guide installer (6.0 mm) YM-04065-A		5-29
Valve guide reamer (ø6) 90890-04066 Valve guide reamer (6.0 mm) YM-04066		5-29

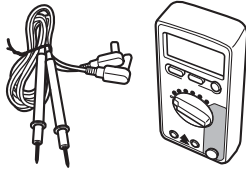
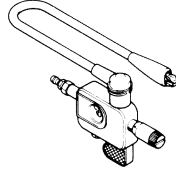
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-35
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-43, 5-44, 5-51, 5-54
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-43
Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®)		5-45, 5-71, 6-10
Universal clutch holder 90890-04086 YM-91042	90890-04086  YM-91042 	5-51, 5-55

SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01		6-3
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984		6-3
Mechanical seal installer 90890-04078 Water pump seal installer YM-33221-A		6-10
Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058		6-10
Pressure gauge 90890-03153 YU-03153		7-11
Fuel pressure adapter 90890-03176 YM-03176		7-11

SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		7-11
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		8-83

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GENERAL SPECIFICATIONS

EAS20280

GENERAL SPECIFICATIONS

Model

Model	XVS13AW 3D81 (USA) XVS13AWC 3D82 (California) XVS13AW 3D83 (CDN) XVS13CTW 5S61 (USA) XVS13CTWC 5S62 (California) XVS13CTW 5S63 (CDN)
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Dimensions

Overall length	2490 mm (98.0 in)
Overall width	980 mm (38.6 in)
Overall height	XVS13AW(C) 1115 mm (43.9 in) XVS13CTW(C) 1520 mm (59.8 in)
Seat height	715 mm (28.1 in)
Wheelbase	1690 mm (66.5 in)
Ground clearance	145 mm (5.71 in)
Minimum turning radius	3500 mm (137.8 in)

Weight

With oil and fuel	XVS13AW(C) 303.0 kg (668 lb) XVS13CTW(C) 323.0 kg (712 lb)
Maximum load	XVS13AW(C) 210 kg (463 lb) XVS13CTW(C) 190 kg (419 lb)

EAS20290

ENGINE SPECIFICATIONS

Engine

Engine type	Liquid cooled 4-stroke, SOHC
Displacement	1304.0 cm ³
Cylinder arrangement	V-type 2-cylinder
Bore × stroke	100.0 × 83.0 mm (3.94 × 3.27 in)
Compression ratio	9.50 :1
Standard compression pressure (at sea level)	1450 kPa/400 r/min (206.2 psi/400 r/min) (14.5 kgf/cm ² /400 r/min)
Minimum–maximum	1200–1500 kPa (170.7–213.3 psi) (12.0–15.0 kgf/cm ²)
Starting system	Electric starter

Fuel

Recommended fuel	XVS13AW(C) Unleaded gasoline only (USA/California) XVS13AW Regular unleaded gasoline only (CDN) XVS13CTW(C) Unleaded gasoline only (USA/California) XVS13CTW Regular unleaded gasoline only (CDN)
Fuel tank capacity	18.5 L (4.89 US gal) (4.07 Imp.gal)
Fuel reserve amount	3.7 L (0.98 US gal) (0.81 Imp.gal)

Engine oil

Lubrication system	Wet sump
Type	YAMALUBE 4 (20W40) or SAE20W40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	3.70 L (3.91 US qt) (3.26 Imp.qt)
Without oil filter cartridge replacement	3.20 L (3.38 US qt) (2.82 Imp.qt)
With oil filter cartridge replacement	3.40 L (3.59 US qt) (2.99 Imp.qt)

Oil filter

Oil filter type	Cartridge (paper)
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Oil pump

Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.12 mm (0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.09–0.19 mm (0.0035–0.0075 in)
Limit	0.26 mm (0.0102 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.06–0.13 mm (0.0024–0.0051 in)
Limit	0.20 mm (0.0079 in)
Bypass valve opening pressure	80.0–120.0 kPa (11.6–17.4 psi) (0.80–1.20 kgf/cm ²)
Relief valve operating pressure	391.0–489.0 kPa (56.7–70.9 psi) (3.91–4.89 kgf/cm ²)

ENGINE SPECIFICATIONS

Cooling system

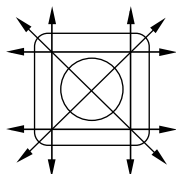
Radiator capacity (including all routes)	2.10 L (2.22 US qt) (1.85 Imp.qt)
Radiator capacity	0.55 L (0.58 US qt) (0.48 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.45 L (0.48 US qt) (0.40 Imp.qt)
Radiator cap opening pressure	93.3–122.7 kPa (13.5–17.8 psi) (0.93–1.23 kgf/cm ²)
Valve relief pressure	4.9 kPa (0.7 psi) (0.05 kgf/cm ²)
Thermostat	
Model/manufacturer	1AE/YAMAHA
Valve opening temperature	80.5–83.5 °C (176.9–182.3 °F)
Valve full open temperature	95.0 °C (203.0 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Radiator core	
Width	197.0 mm (7.76 in)
Height	320.0 mm (12.60 in)
Depth	22.0 mm (0.87 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	70/45 × 17/26 (1.017)
Impeller shaft tilt limit	0.15 mm (0.006 in)

Spark plug (s)

Manufacturer/model	NGK/LMAR7A-9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)

Cylinder head

Volume	44.20–46.40 cm ³ (2.70–2.83 cu.in)
Warpage limit	0.03 mm (0.0012 in)



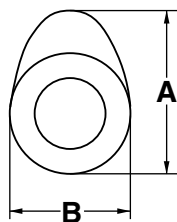
Camshaft

Drive system	Chain drive (left and right)
Camshaft journal diameter	20.959–20.980 mm (0.8252–0.8260 in)
Camshaft lobe dimensions	
Intake A	42.988–43.088 mm (1.6924–1.6964 in)
Limit	42.888 mm (1.6885 in)
Intake B	37.045–37.145 mm (1.4585–1.4624 in)
Limit	36.945 mm (1.4545 in)
Exhaust A	43.156–43.256 mm (1.6991–1.7030 in)
Limit	43.056 mm (1.6951 in)
Exhaust B	37.118–37.218 mm (1.4613–1.4653 in)

ENGINE SPECIFICATIONS

Limit

37.018 mm (1.4574 in)



Timing chain

Model/number of links
Tensioning system

98XRH2010-132M/132
Automatic

Rocker arm/rocker arm shaft

Rocker arm inside diameter
Rocker arm shaft outside diameter
Rocker-arm-to-rocker-arm-shaft clearance
Limit

12.000-12.018 mm (0.4724-0.4731 in)
11.976-11.991 mm (0.4715-0.4721 in)
0.009-0.042 mm (0.0004-0.0017 in)
0.095 mm (0.0037 in)

Valve, valve seat, valve guide

Valve clearance (cold)

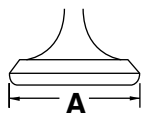
Intake
Exhaust

0.09-0.13 mm (0.0035-0.0051 in)
0.14-0.18 mm (0.0055-0.0071 in)

Valve dimensions

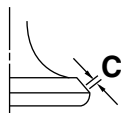
Valve head diameter A (intake)
Valve head diameter A (exhaust)

35.90-36.10 mm (1.4134-1.4213 in)
31.90-32.10 mm (1.2559-1.2638 in)



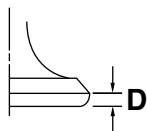
Valve seat width C (intake)
Valve seat width C (exhaust)

1.00-1.20 mm (0.0394-0.0472 in)
1.00-1.20 mm (0.0394-0.0472 in)



Valve margin thickness D (intake)
Valve margin thickness D (exhaust)

1.15-1.45 mm (0.0453-0.0571 in)
1.15-1.45 mm (0.0453-0.0571 in)

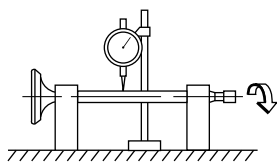


Valve stem diameter (intake)
Limit
Valve stem diameter (exhaust)
Limit
Valve guide inside diameter (intake)
Limit
Valve guide inside diameter (exhaust)

5.975-5.990 mm (0.2352-0.2358 in)
5.945 mm (0.2341 in)
5.960-5.975 mm (0.2346-0.2352 in)
5.930 mm (0.2335 in)
6.000-6.012 mm (0.2362-0.2367 in)
6.050 mm (0.2382 in)
6.000-6.012 mm (0.2362-0.2367 in)

ENGINE SPECIFICATIONS

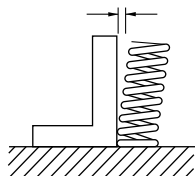
Limit	6.050 mm (0.2382 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)



Cylinder head valve seat width (intake)	1.00–1.20 mm (0.0394–0.0472 in)
Limit	1.6 mm (0.06 in)
Cylinder head valve seat width (exhaust)	1.00–1.20 mm (0.0394–0.0472 in)
Limit	1.6 mm (0.06 in)

Valve spring

Free length (intake)	42.43 mm (1.67 in)
Limit	40.31 mm (1.59 in)
Free length (exhaust)	42.43 mm (1.67 in)
Limit	40.31 mm (1.59 in)
Installed length (intake)	35.00 mm (1.38 in)
Installed length (exhaust)	35.00 mm (1.38 in)
Spring rate K1 (intake)	24.75 N/mm (141.32 lb/in) (2.52 kgf/mm)
Spring rate K2 (intake)	34.93 N/mm (199.45 lb/in) (3.56 kgf/mm)
Spring rate K1 (exhaust)	24.75 N/mm (141.32 lb/in) (2.52 kgf/mm)
Spring rate K2 (exhaust)	34.93 N/mm (199.45 lb/in) (3.56 kgf/mm)
Installed compression spring force (intake)	171–197 N (38.44–44.29 lbf) (17.44–20.09 kgf)
Installed compression spring force (exhaust)	171–197 N (38.44–44.29 lbf) (17.44–20.09 kgf)
Spring tilt (intake)	2.5°/1.9 mm
Spring tilt (exhaust)	2.5°/1.9 mm



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

Cylinder

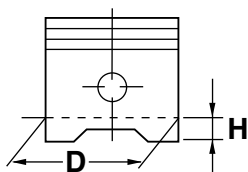
Bore	100.000–100.010 mm (3.9370–3.9374 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

Piston

Piston-to-cylinder clearance	0.030–0.055 mm (0.0012–0.0022 in)
Limit	0.15 mm (0.0059 in)
Diameter D	99.955–99.970 mm (3.9352–3.9358 in)

ENGINE SPECIFICATIONS

Height H 8.0 mm (0.31 in)



Offset 0.50 mm (0.0197 in)
 Piston pin bore inside diameter 23.004–23.015 mm (0.9057–0.9061 in)
 Limit 23.045 mm (0.9073 in)
 Piston pin outside diameter 22.991–23.000 mm (0.9052–0.9055 in)
 Limit 22.971 mm (0.9044 in)
 Piston-pin-to-piston-pin-bore clearance 0.004–0.024 mm (0.00016–0.00094 in)
 Limit 0.074 mm (0.00291 in)

Piston ring

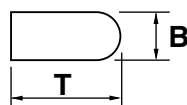
Top ring

Ring type

Barrel

Dimensions (B × T)

1.20 × 3.80 mm (0.05 × 0.15 in)



End gap (installed)

0.20–0.35 mm (0.0079–0.0138 in)

Limit

0.60 mm (0.0236 in)

Ring side clearance

0.030–0.080 mm (0.0012–0.0032 in)

Limit

0.130 mm (0.0051 in)

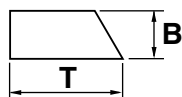
2nd ring

Ring type

Taper

Dimensions (B × T)

1.20 × 4.00 mm (0.05 × 0.16 in)



End gap (installed)

0.45–0.60 mm (0.0177–0.0236 in)

Limit

0.95 mm (0.0374 in)

Ring side clearance

0.030–0.070 mm (0.0012–0.0028 in)

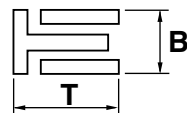
Limit

0.130 mm (0.0051 in)

Oil ring

Dimensions (B × T)

2.50 × 3.40 mm (0.10 × 0.13 in)



End gap (installed)

0.20–0.70 mm (0.0079–0.0276 in)

Connecting rod

Oil clearance (using plastigauge®)

0.030–0.054 mm (0.0012–0.0021 in)

Bearing color code

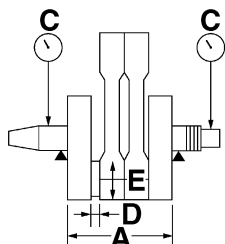
1.Blue 2.Black 3.Brown 4.Green 5.Yellow

ENGINE SPECIFICATIONS

Small end inside diameter	23.015–23.028 mm (0.9061–0.9066 in)
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Crankshaft

Width A	97.95–98.00 mm (3.856–3.858 in)
Runout limit C	0.020 mm (0.0008 in)
Big end side clearance D	0.320–0.474 mm (0.0126–0.0187 in)
Big end radial clearance E	0.022–0.046 mm (0.0009–0.0018 in)
Limit	0.09 mm (0.0035 in)



Balancer

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

Clutch

Clutch type	Wet, multiple-disc
Clutch release method	Outer push, screw push
Operation	Left hand operation
Clutch lever free play	5.0–10.0 mm (0.20–0.39 in)
Friction plate 1, 3 thickness	2.90–3.10 mm (0.114–0.122 in)
Wear limit	2.80 mm (0.1102 in)
Plate quantity	2 pcs
Friction plate 2 thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.1110 in)
Plate quantity	7 pcs
Clutch plate thickness	1.90–2.10 mm (0.075–0.083 in)
Plate quantity	8 pcs
Warping limit	0.20 mm (0.0079 in)
Clutch spring height	6.70 mm (0.26 in)
Minimum height	6.37 mm (0.25 in)
Spring quantity	1 pc
Clutch housing thrust clearance	0.050–0.450 mm (0.0020–0.0177 in)
Clutch housing radial clearance	0.010–0.046 mm (0.0004–0.0018 in)

Transmission

Transmission type	Constant mesh 5-speed
Primary reduction system	Spur gear
Primary reduction ratio	70/45 (1.556)
Secondary reduction system	Belt drive
Secondary reduction ratio	70/30 (2.333)
Operation	Left foot operation
Gear ratio	
1st	36/13 (2.769)
2nd	32/18 (1.778)
3rd	29/21 (1.381)
4th	29/26 (1.115)

ENGINE SPECIFICATIONS

5th	24/25 (0.960)
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	Guide bar
Shift fork guide bar bending limit	0.025 mm (0.0010 in)
Shift fork thickness	6.26–6.39 mm (0.2465–0.2516 in)

Air filter	
Air filter element	Oil-coated paper element

Fuel pump	
Pump type	Electrical
Model/manufacture	292020–0100/DENSO
Maximum consumption amperage	4.6 A
Output pressure	392.0 kPa (56.8 psi) (3.92 kgf/cm ²)

Fuel injector	
Model/quantity	INP-284/2
Manufacturer	NIKK

Throttle body	
Type/quantity	ACW40/2
Manufacturer	MIKUNI
ID mark	3D81 00 (USA/CDN) 3D82 10 (California)
Throttle valve size	#40

Throttle position sensor	
Resistance	4.0–6.0 k Ω
Output voltage (at idle)	0.63–0.73 V

Fuel injection sensor	
Crankshaft position sensor resistance	248–372 Ω
Intake air pressure sensor output voltage	3.75–4.25 V
Coolant temperature sensor resistance	290–354 Ω at 80 °C (176 °F)

Idling condition	
Engine idling speed	950–1050 r/min
Intake vacuum	32.0–37.3 kPa (9.4–11.0 inHg) (240–280 mmHg)
Water temperature	90.0–100.0 °C (194.00–212.00 °F)
Oil temperature	70.0–80.0 °C (158.00–176.00 °F)
Throttle cable free play	4.0–6.0 mm (0.16–0.24 in)

CHASSIS SPECIFICATIONS

EAS20300

CHASSIS SPECIFICATIONS

Chassis

Frame type	Double cradle
Caster angle	32.70°
Trail	145.0 mm (5.71 in)

Front wheel

Wheel type	Cast wheel
Rim size	16M/C × MT3.00
Rim material	Aluminum
Wheel travel	135.0 mm (5.31 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)

Rear wheel

Wheel type	Cast wheel
Rim size	16M/C × MT4.50
Rim material	Aluminum
Wheel travel	110.0 mm (4.33 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	130/90–16M/C 67H
Manufacturer/model	DUNLOP/D404F X
Manufacturer/model	BRIDGESTONE/EXEDRA G721
Wear limit (front)	1.0 mm (0.04 in)

Rear tire

Type	Tubeless
Size	170/70B 16M/C 75H
Manufacturer/model	DUNLOP/K555
Manufacturer/model	BRIDGESTONE/EXEDRA G722 G
Wear limit (rear)	1.0 mm (0.04 in)

Tire air pressure (measured on cold tires)

Loading condition	0–90 kg (0–198 lb)
Front	250 kPa (36 psi) (2.50 kgf/cm ²)
Rear	280 kPa (41 psi) (2.80 kgf/cm ²)
Loading condition	XVS13AW(C) 90–210 kg (198–463 lb)
	XVS13CTW(C) 90–190 kg (198–419 lb)
Front	250 kPa (36 psi) (2.50 kgf/cm ²)
Rear	280 kPa (41 psi) (2.80 kgf/cm ²)

Front brake

Type	Dual disc brake
Operation	Right hand operation
Front brake lever free play	2.0–5.0 mm (0.08–0.20 in)
Front disc brake	
Disc outside diameter × thickness	298.0 × 5.0 mm (11.73 × 0.20 in)

CHASSIS SPECIFICATIONS

Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc deflection limit	0.12 mm (0.0047 in)
Brake pad lining thickness (inner)	6.0 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	6.0 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	14.00 mm (0.55 in)
Caliper cylinder inside diameter	25.40 mm (1.00 in)
Caliper cylinder inside diameter	30.16 mm (1.19 in)
Recommended fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Right foot operation
Rear disc brake	
Disc outside diameter × thickness	298.0 × 6.0 mm (11.73 × 0.24 in)
Brake disc thickness limit	5.5 mm (0.22 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	5.8 mm (0.23 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	5.8 mm (0.23 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	41.30 mm (1.63 in)
Recommended fluid	DOT 4

Steering

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

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	135.0 mm (5.31 in)
Fork spring free length	345.5 mm (13.60 in)
Limit	339.4 mm (13.36 in)
Collar length	183.0 mm (7.20 in)
Installed length	339.4 mm (13.36 in)
Spring rate K1	7.35 N/mm (41.97 lb/in) (0.75 kgf/mm)
Spring stroke K1	0.0–135.0 mm (0.00–5.31 in)
Inner tube outer diameter	41.0 mm (1.61 in)
Optional spring available	No
Recommended oil	Yamaha fork oil 10WT
Quantity	490.0 cm ³ (16.57 US oz) (17.28 Imp.oz)
Level	105.0 mm (4.13 in)

Rear suspension

Type	Swingarm (link suspension)
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	48.0 mm (1.89 in)
Spring free length	182.0 mm (7.17 in)
Installed length	166.0 mm (6.54 in)

CHASSIS SPECIFICATIONS

Spring rate K1	160.00 N/mm (913.60 lb/in) (16.32 kgf/mm)
Spring stroke K1	0.0–48.0 mm (0.00–1.89 in)
Optional spring available	No
Enclosed gas/air pressure (STD)	1200 kPa (170.7 psi) (12.0 kgf/cm ²)
Spring preload adjusting positions	
Minimum	1
Standard	4
Maximum	9

Swingarm	
Swingarm end free play limit (radial)	1.0 mm (0.04 in)
Swingarm end free play limit (axial)	1.0 mm (0.04 in)

Drive belt	
Model/manufacture	UBD-0734/GATES CORPORATION
Drive belt slack (on the sidestand)	5.0–7.0 mm (0.20–0.28 in)
Drive belt slack (on a suitable stand)	4.0–6.0 mm (0.16–0.24 in)

ELECTRICAL SPECIFICATIONS

EAS20310

ELECTRICAL SPECIFICATIONS

Voltage

System voltage 12 V

Ignition system

Ignition system Transistorized coil ignition (digital)
Advancer type Electric
Ignition timing (B.T.D.C.) 5.0°/1000 r/min

Engine control unit

Model/manufacturer FUA0013/MITSUBISHI

Ignition coil

Model/manufacturer 2JN/MORIC
Minimum ignition spark gap 6.0 mm (0.24 in)
Primary coil resistance 2.16–2.64 Ω
Secondary coil resistance 8.64–12.96 k.Ω

Spark plug cap

Material Resin
Resistance 10.0 k.Ω

AC magneto

Model/manufacturer F3D8/MORIC
Standard output 14.0 V 32.9 A 5000 r/min
Standard output 14.0 V 460 W 5000 r/min
Stator coil resistance 0.112–0.168 Ω

Rectifier/regulator

Regulator type Semiconductor, short circuit
Model/manufacturer FH012AA/SHINDENGEN
Regulated voltage (DC) 14.2–14.8 V
Rectifier capacity (DC) 50.0 A
Withstand voltage 40.0 V

Battery

Model YTX20L-BS
Voltage, capacity 12 V, 18.0 Ah
Manufacturer GS YUASA
Ten hour rate amperage 1.80 A

Headlight

Bulb type Halogen bulb

Bulb voltage, wattage × quantity

Headlight 12 V, 60 W/55.0 W × 1
Tail/brake light 12 V, 5.0 W/21.0 W × 1
Front turn signal light 12 V, 21.0 W/5.0 W × 2
Rear turn signal light 12 V, 21.0 W × 2
License plate light 12 V, 5.0 W × 1
Meter lighting LED

ELECTRICAL SPECIFICATIONS

Indicator light

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

Electric starting system

System type	Constant mesh
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Starter motor

Model/manufacture	SM13/MITSUBA
Power output	0.90 kW
Armature coil resistance	0.0100–0.0200 Ω
Brush overall length	12.5 mm (0.49 in)
Limit	5.00 mm (0.20 in)
Brush spring force	7.65–10.01 N (27.54–36.03 oz) (780–1021 gf)
Commutator diameter	28.0 mm (1.10 in)
Limit	27.0 mm (1.06 in)
Mica undercut (depth)	0.70 mm (0.03 in)

Starter relay

Model/manufacture	2768115-A/JIDECO
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω

Horn

Horn type	Plane
Quantity	1 pc
Model/manufacture	HF-12/NIKKO
Maximum amperage	3.0 A
Coil resistance	1.01–1.11 Ω
Performance	108–116 dB/2 m

Turn signal relay

Relay type	Semi transistor
Model/manufacture	FB246H/DENSO
Built-in, self-canceling device	Yes
Turn signal blinking frequency	75.0–95.0 cycles/min
Wattage	21(23) W \times 2 + LED

Oil level switch

Model/manufacture	3D8/YAMATO
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Starting circuit cut-off relay

Model/manufacture	G8R-30Y-U3/OMRON
Coil resistance	162.0–198.0 Ω

Headlight relay

Model/manufacture	ACM33211 M05/MATSUSHITA
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ELECTRICAL SPECIFICATIONS

Coil resistance	86.40–105.60 Ω
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Fuel pump relay	
Model/manufacturer	G8R-30Y-U3/OMRON
Coil resistance	162.0–198.0 Ω

Fan motor relay	
Model/manufacturer	ACM33211 M05/MATSUSHITA
Coil resistance	86.40–105.60 Ω

Fuses	
Main fuse	50.0 A
Headlight fuse	20.0 A
Taillight fuse	10.0 A
Signaling system fuse	10.0 A
Ignition fuse	15.0 A
Radiator fan fuse	20.0 A
Fuel injection system fuse	10.0 A
Backup fuse	10.0 A
Reserve fuse	20.0 A
Reserve fuse	15.0 A
Reserve fuse	10.0 A

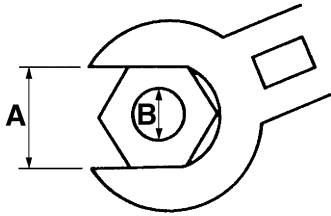
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TIGHTENING TORQUES

EAS20330

GENERAL TIGHTENING TORQUE SPECIFICATIONS

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












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

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













TIGHTENING TORQUES

EAS20340












ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Cylinder head stud bolt (exhaust pipe)	M8	4	15 Nm (1.5 m·kg, 11 ft·lb)	
Oil check bolt	M8	2	15 Nm (1.5 m·kg, 11 ft·lb)	
Cylinder head nut	M12	8	65 Nm (6.5 m·kg, 47 ft·lb)	
Cylinder head bolt	M8	4	13 Nm (1.3 m·kg, 9.4 ft·lb)	
Front cylinder head cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 30 mm (1.18 in)
Front cylinder head cover bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 45 mm (1.77 in)
Front cylinder head cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 55 mm (2.17 in)
Rear cylinder head cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 30 mm (1.18 in)
Rear cylinder head cover bolt	M6	7	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 45 mm (1.77 in)
Rear cylinder head cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	l = 55 mm (2.17 in)
Cylinder head blind plug	M14	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Spark plug	M10	2	13 Nm (1.3 m·kg, 9.4 ft·lb)	
Tappet cover bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing chain tensioner housing bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing chain tensioner bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Connecting rod bolt (1st)	M8	4	15 Nm (1.5 m·kg, 11 ft·lb)	See NOTE. 
Connecting rod bolt (final)	M8	4	Specified angle 125–135°	See NOTE. 
Generator rotor bolt	M12	1	90 Nm (9.0 m·kg, 65 ft·lb)	
Right balancer assembly bolt	M6	3	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Left balancer assembly bolt	M6	3	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Camshaft assembly bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Locknut (rocker arm adjusting screw)	M6	8	14 Nm (1.4 m·kg, 10 ft·lb)	
Timing chain guide bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Camshaft sprocket bolt	M7	4	20 Nm (2.0 m·kg, 14 ft·lb)	
Oil/water pump assembly bolt	M8	3	24 Nm (2.4 m·kg, 17 ft·lb)	
Oil/water pump assembly bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil pump housing cover bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Drain cock bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant delivery pipe bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil/water pump driven sprocket bolt	M6	1	15 Nm (1.5 m·kg, 11 ft·lb)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Oil filter cartridge union bolt	M20	1	70 Nm (7.0 m·kg, 50 ft·lb)	
Oil level switch bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kg, 31 ft·lb)	
Oil delivery pipe 1 bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil delivery pipe 2 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil delivery pipe 3 bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil/water pump drive chain guide bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Intake air pressure sensor bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Intake manifold joint bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Throttle body bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Left side cover bracket bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Exhaust pipe nut	M8	4	20 Nm (2.0 m·kg, 14 ft·lb)	
Exhaust pipe cover screw clamp	M6	6	6 Nm (0.6 m·kg, 4.3 ft·lb)	See NOTE.
Rear cylinder exhaust pipe bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Exhaust pipe band bolt	M8	2	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Muffler band bolt	M8	1	12 Nm (1.2 m·kg, 8.7 ft·lb)	
O ₂ sensor	M18	1	44 Nm (4.4 m·kg, 32 ft·lb)	
Muffler bracket and frame bolt	M10	3	53 Nm (5.3 m·kg, 38 ft·lb)	
Muffler bracket and muffler bolt	M10	2	35 Nm (3.5 m·kg, 25 ft·lb)	
Crankcase stud bolt	M12	6	15 Nm (1.5 m·kg, 11 ft·lb)	
Left crankcase bolt	M6	19	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Right crankcase bolt	M10	3	36 Nm (3.6 m·kg, 25 ft·lb)	
Generator cover bolt	M6	10	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankshaft end screw	M36	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing mark accessing screw	M14	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Stator coil bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankshaft position sensor/stator assembly lead holder bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankshaft position sensor bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant delivery 1 cover bolt	M6	9	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant delivery 2 cover bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil baffle plate 1 bolt	M6	7	10 Nm (1.0 m·kg, 7.2 ft·lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Oil baffle plate 2 bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase bearing retainer bolt	M6	4	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Primary drive gear bearing plate bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter clutch bolt	M8	6	24 Nm (2.4 m·kg, 17 ft·lb)	
Primary drive gear cover bolt	M6	12	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Primary drive gear nut	M18	1	100 Nm (10.0 m·kg, 72 ft·lb)	 Use the lock washer.
Clutch cover bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch cable holder bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch cover plate	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Damper cover bolt	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Clutch boss nut	M20	1	125 Nm (12.5 m·kg, 90 ft·lb)	 Stake.
Clutch spring plate retainer bolt	M6	6	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Shift shaft spring stopper	M8	1	22 Nm (2.2 m·kg, 16 ft·lb)	
Neutral switch	M10	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Speed sensor bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter motor lead nut	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Radiator filler pipe bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front cylinder thermostat inlet pipe 1 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front cylinder thermostat inlet pipe 2 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Rear cylinder thermostat inlet pipe 1 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Rear cylinder thermostat inlet pipe 2 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Rear cylinder thermostat inlet pipe 2 bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Thermostat cover inlet pipe bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Coolant reservoir bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Radiator outlet pipe bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant drain bolt	M12	1	2 Nm (0.2 m·kg, 1.4 ft·lb)	
Radiator bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	

TIGHTENING TORQUES

NOTE:

Connecting rod bolt

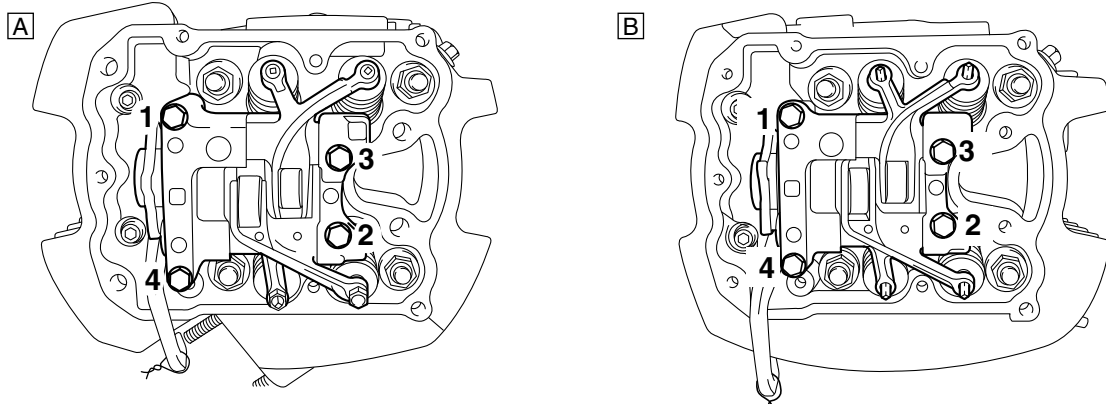
Tighten the connecting rod bolts to 15 Nm (1.5 m·kg, 11 ft·lb), and then tighten them further to reach the specified angle 125–135°.

NOTE:

Exhaust pipe cover screw clamp

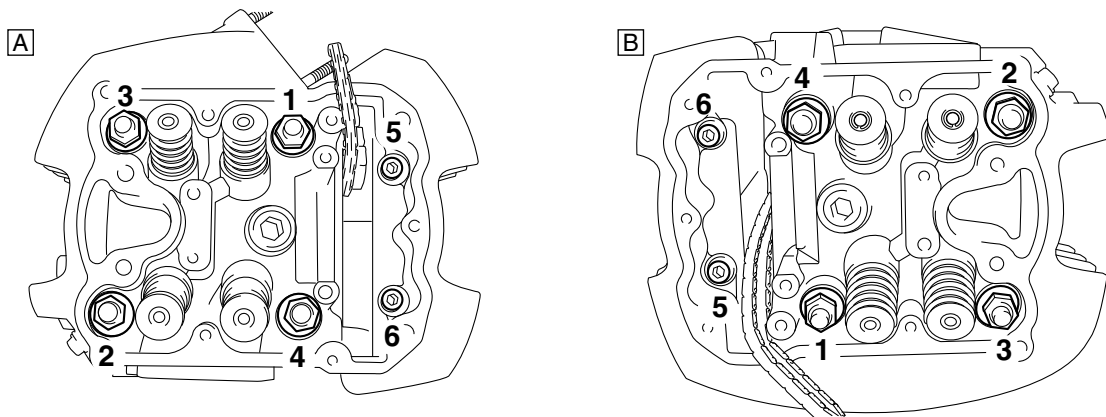
Do not retighten the exhaust pipe cover screw clamps; always replace them with new ones if they are loosened.

Camshaft assembly tightening sequence



- A. Front cylinder camshaft assembly
- B. Rear cylinder camshaft assembly

Cylinder head tightening sequence








- A. Front cylinder head
- B. Rear cylinder head







TIGHTENING TORQUES

EAS20350








CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine bracket bolt (right front upper side)	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Engine bracket bolt (left front upper side)	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Engine mounting bolt (front upper side)	M12	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Engine mounting nut (front lower side)	M12	1	88 Nm (8.8 m·kg, 64 ft·lb)	
Engine mounting nut (rear upper side)	M12	1	88 Nm (8.8 m·kg, 64 ft·lb)	
Engine bracket bolt (rear upper side)	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Engine mounting nut (rear lower side)	M12	1	88 Nm (8.8 m·kg, 64 ft·lb)	
Engine bracket bolt (rear lower side)	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Down tube and frame bolt	M10	4	48 Nm (4.8 m·kg, 35 ft·lb)	
Ignition coil bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Ignition coil bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear shock absorber assembly lower nut	M10	1	48 Nm (4.8 m·kg, 35 ft·lb)	
Rear shock absorber assembly upper nut	M10	1	48 Nm (4.8 m·kg, 35 ft·lb)	
Pivot shaft nut	M16	1	85 Nm (8.5 m·kg, 61 ft·lb)	
Relay arm and frame nut	M10	1	48 Nm (4.8 m·kg, 35 ft·lb)	
Connecting arm and relay arm nut	M12	1	59 Nm (5.9 m·kg, 43 ft·lb)	
Connecting arm and swingarm nut	M12	1	59 Nm (5.9 m·kg, 43 ft·lb)	
Drive belt upper guard bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Drive belt lower guard and swingarm bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Drive belt lower guard plate bolt (upper side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Drive belt lower guard plate bolt (lower side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Upper bracket pinch bolt	M8	2	20 Nm (2.0 m·kg, 14 ft·lb)	
Steering stem nut	M22	1	110 Nm (11.0 m·kg, 80 ft·lb)	
Lower ring nut (initial tightening torque)	M30	1	52 Nm (5.2 m·kg, 37 ft·lb)	See NOTE.
Lower ring nut (final tightening torque)	M30	1	18 Nm (1.8 m·kg, 13 ft·lb)	See NOTE.






TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Front fork cap bolt	M38	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Damper rod bolt	M12	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Lower front fork cover bolt	M6	4	18 Nm (1.8 m·kg, 13 ft·lb)	
Main switch and upper bracket bolt	M8	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Rear handlebar holder nut	M12	2	32 Nm (3.2 m·kg, 23 ft·lb)	
Front handlebar holder bolt	M8	4	28 Nm (2.8 m·kg, 20 ft·lb)	
Front brake master cylinder holder bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front brake lever bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake lever nut	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Clutch lever holder bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Grip end	M16	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Front brake hose union bolt	M10	3	30 Nm (3.0 m·kg, 22 ft·lb)	
Front brake hose holder and lower bracket bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front brake hose holder bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake hose joint bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front fender bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Front brake hose guide bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Headlight bracket bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Headlight body bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front turn signal light bracket bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Front turn signal light nut	M10	2	11 Nm (1.1 m·kg, 8.0 ft·lb)	
Air temperature sensor screw	M5	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Meter assembly bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Meter assembly cover bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Meter assembly cover bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel cock screw	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel pump bolt	M5	6	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Fuel sender bolt	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Fuel tank bracket bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Sub-fuel tank bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Canister bolt (California only)	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Seat lock bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front wheel axle	M16	1	59 Nm (5.9 m·kg, 43 ft·lb)	
Front wheel axle pinch bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Front brake caliper bracket bolt	M10	4	40 Nm (4.0 m·kg, 29 ft·lb)	
Front brake caliper bolt	M10	4	27 Nm (2.7 m·kg, 19 ft·lb)	
Front brake disc bolt	M8	12	23 Nm (2.3 m·kg, 17 ft·lb)	
Bleed screw (front brake caliper)	M7	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Rear wheel axle nut	M10	1	150 Nm (15.0 m·kg, 110 ft·lb)	
Drive belt adjusting locknut	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
Rear brake caliper bolt	M10	2	27 Nm (2.7 m·kg, 19 ft·lb)	
Rear brake disc bolt	M8	6	23 Nm (2.3 m·kg, 17 ft·lb)	
Bleed screw (rear brake caliper)	M7	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Rear brake hose union bolt	M10	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Rear brake hose guide bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake hose holder bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear wheel pulley nut	M12	5	95 Nm (9.5 m·kg, 68 ft·lb)	
Rear wheel drive hub stud bolt	M12	5	30 Nm (3.0 m·kg, 22 ft·lb)	
Rear fender bracket, rear fender, and frame bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Passenger seat bracket, rear feeder, and frame bolt	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
Passenger seat guide, rear fender, and frame bolt	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
Passenger seat bolt	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
License plate bracket and rear fender bolt	M6	2	11 Nm (1.1 m·kg, 8.0 ft·lb)	
Rear turn signal light nut	M10	2	11 Nm (1.1 m·kg, 8.0 ft·lb)	
Left side cover bolt	M6	1	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Relay cover bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Sub-fuel tank cover bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Coolant reservoir cover bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Side panel bolt (left and right)	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Positive battery lead bolt (starter relay side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Starter motor lead bolt (starter relay side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Relay bracket and frame bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Battery box bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Sidestand bracket bolt	M10	2	56 Nm (5.6 m·kg, 40 ft·lb)	
Sidestand switch bolt	M5	2	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Sidestand nut	M10	1	56 Nm (5.6 m·kg, 40 ft·lb)	
Shift rod locknut	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Shift arm bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Rear brake pedal arm bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake master cylinder bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Rear brake master cylinder bracket bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Rider footrest assembly bolt (left and right)	M10	4	64 Nm (6.4 m·kg, 46 ft·lb)	
Passenger footrest bolt (left and right)	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Horn bracket and down tube bolt	M8	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Coolant reservoir cover bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Locknut (rear brake master cylinder)	M8	1	16 Nm (1.6 m·kg, 11 ft·lb)	
Brake fluid reservoir bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rectifier/regulator cover bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Drive pulley nut	M22	1	140 Nm (14.0 m·kg, 100 ft·lb)	 Stake.
Drive pulley cover bolt	M6	5	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Drive pulley cover plate bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Drive pulley cover housing	M8	5	24 Nm (2.4 m·kg, 17 ft·lb)	
Windshield bolt*	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Windshield bracket bolt (upper side)*	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Windshield bracket bolt (lower side)*	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Sidebag bolt (left and right)*	M6	8	18 Nm (1.8 m·kg, 13 ft·lb)	
Backrest bolt*	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Sidebag bracket bolt (left and right)*	M8	8	23 Nm (2.3 m·kg, 17 ft·lb)	

* For XVS13CTW(C)

NOTE:

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






























LUBRICATION POINTS AND LUBRICANT TYPES

EAS20360

LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370















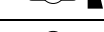
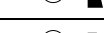




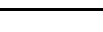
ENGINE

Lubrication point	Lubricant
Oil seals (lip)	
O-rings	
Bearings	
Cylinder head nuts and washers	
Connecting rods (small end and big end)	
Crankshaft journals	
Pistons	
Piston pins (outer surface)	
Buffer boss	
Camshaft cam lobes and camshaft journals	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Rocker arm shafts	
Camshaft carrier bolts	
Oil pump rotors (inner and outer) and oil/water pump housing	
Cylinder head bolts	
Starter clutch idle gear shaft	
Starter clutch idle gear	
Starter clutch gear (inner and outer surfaces)	
Torque limiter	
Primary driven gear (inner surface)	
Clutch push rod	
Oil/water pump drive sprocket (inner surface)	
Clutch thrust washers	
Clutch boss nut and washer	
Transmission gears (wheel and pinion) and collar	
Shift forks and shift fork guide bars	
Shift drum	
Shift shaft and shift shaft oil seal (lip)	
Crankcase (mating surface)	Yamaha bond No.1215 (Three Bond No.1215®)
Stator coil assembly lead grommet	Yamaha bond No.1215 (Three Bond No.1215®)

LUBRICATION POINTS AND LUBRICANT TYPES

EAS20380

CHASSIS

Lubrication point	Lubricant
Steering bearings and upper bearing dust cover (lip)	
Lower bearing dust seal (lip)	
Front wheel oil seals (lip)	
Rear wheel oil seal (lip)	
Rear wheel drive hub oil seal (lip)	
Rear wheel drive hub (mating surface)	
Brake pedal shaft (pivoting point)	
Shift pedal (pivoting point)	
Sidestand (pivoting point) and metal-to-metal moving parts	
Throttle grip tube guide (inner surface) and throttle cables	
Brake lever (pivoting point) and metal-to-metal moving parts	
Brake master cylinder push rod (contact surface)	
Clutch lever (pivoting point) and metal-to-metal moving parts	
Swingarm pivot bearings (inner surface)	
Swingarm pivot oil seals (lip)	
Rear shock absorber assembly upper bolt	
Connecting arm and swingarm collar (outer surface)	
Relay arm bearings (inner surface)	
Relay arm oil seals (lip)	
Pivot shaft (outer surface)	
Rear wheel axle (outer surface)	

LUBRICATION POINTS AND LUBRICANT TYPES

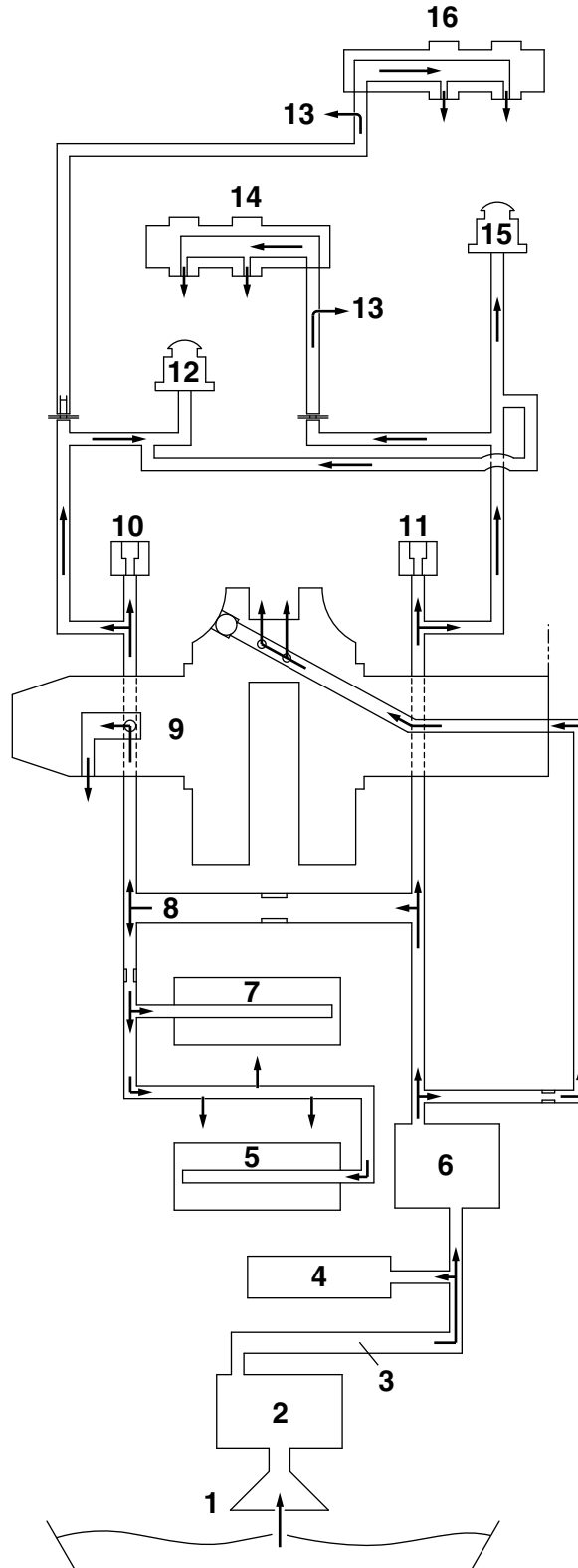
LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20390

LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20400

ENGINE OIL LUBRICATION CHART



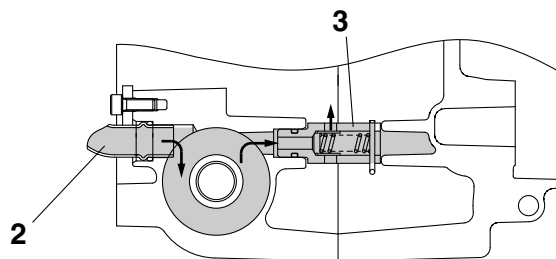
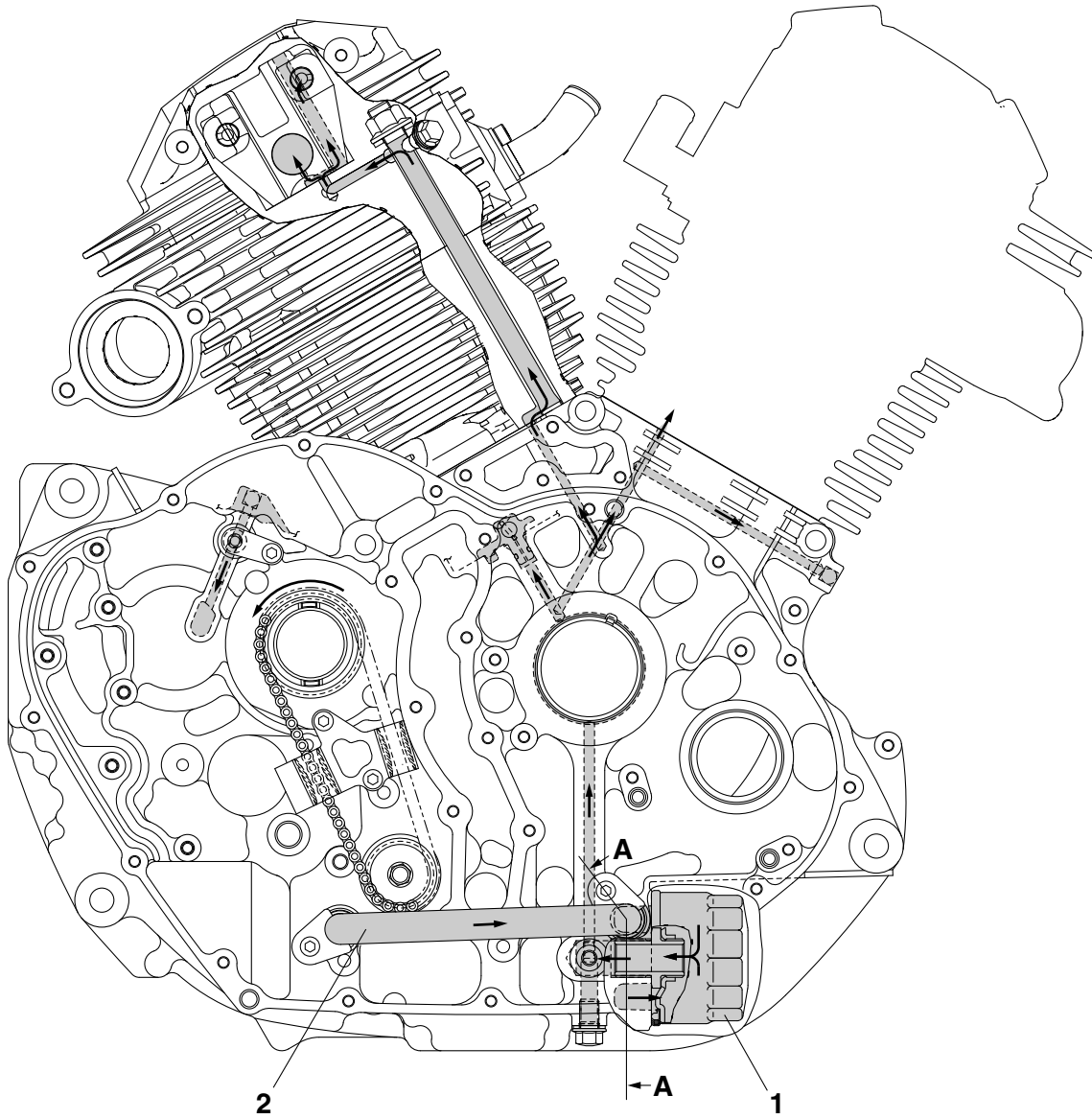
LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil strainer
2. Oil/water pump assembly
3. Oil delivery pipe 3
4. Relief valve assembly
5. Drive axle
6. Oil filter cartridge
7. Main axle
8. Main gallery
9. Crankcase
10. Front cylinder piston oil nozzle
11. Rear cylinder piston oil nozzle
12. Rear cylinder timing chain tensioner
13. Valve stem end (intake side)
14. Rear cylinder camshaft
15. Front cylinder timing chain tensioner
16. Front cylinder camshaft

LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410

LUBRICATION DIAGRAMS

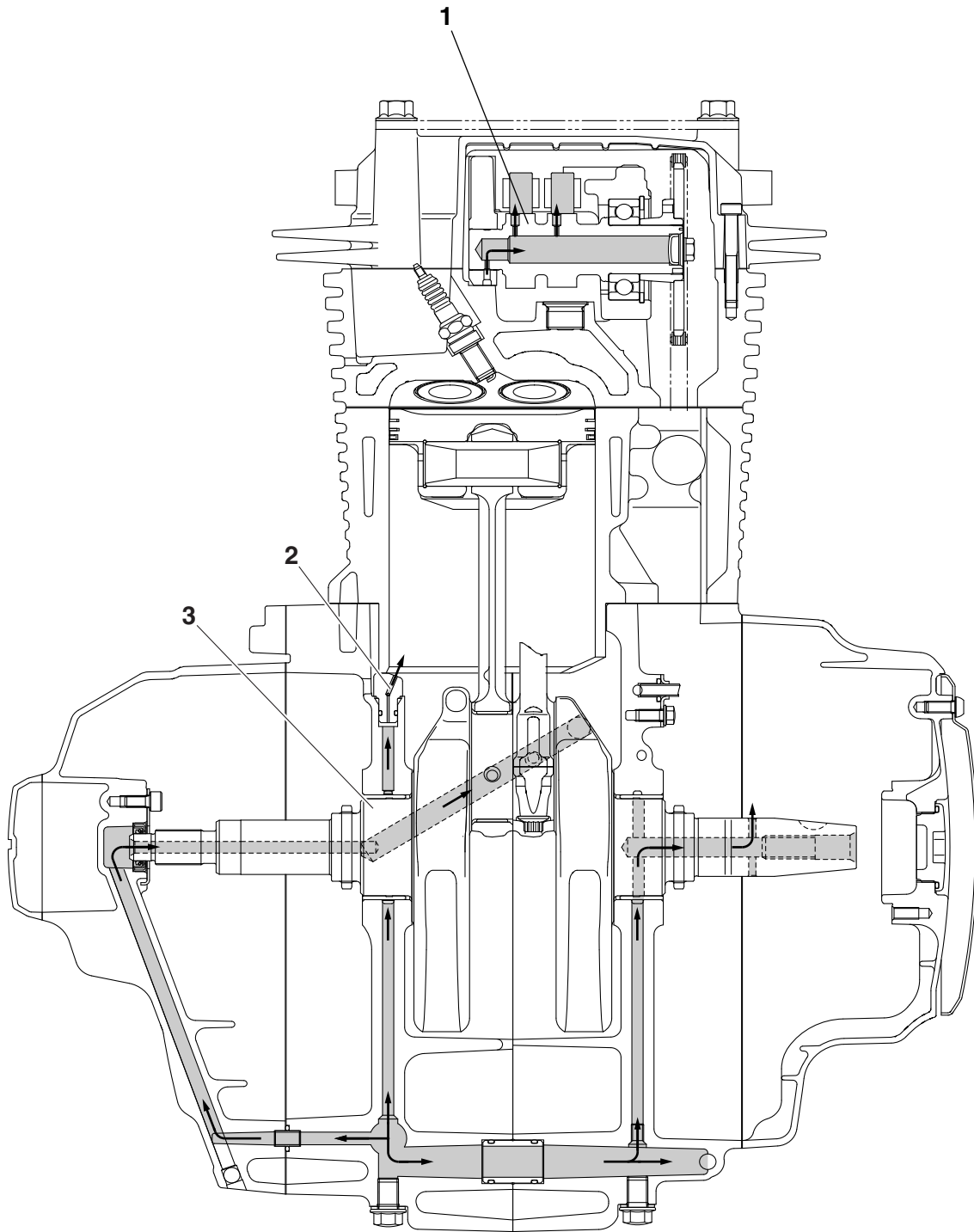


A-A

LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil filter cartridge
2. Oil delivery pipe 3
3. Relief valve assembly

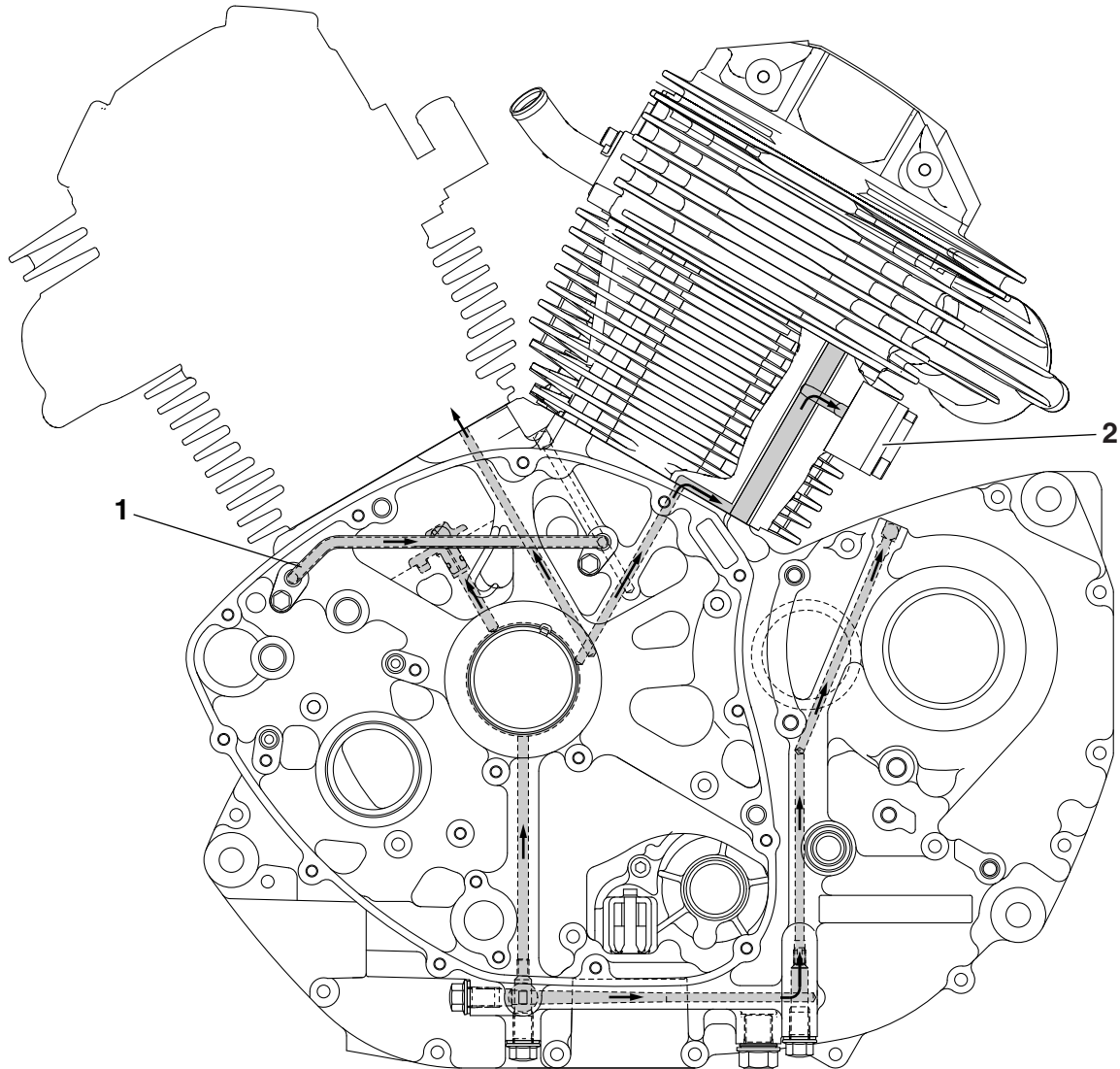
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Camshaft
2. Oil nozzle
3. Crankshaft

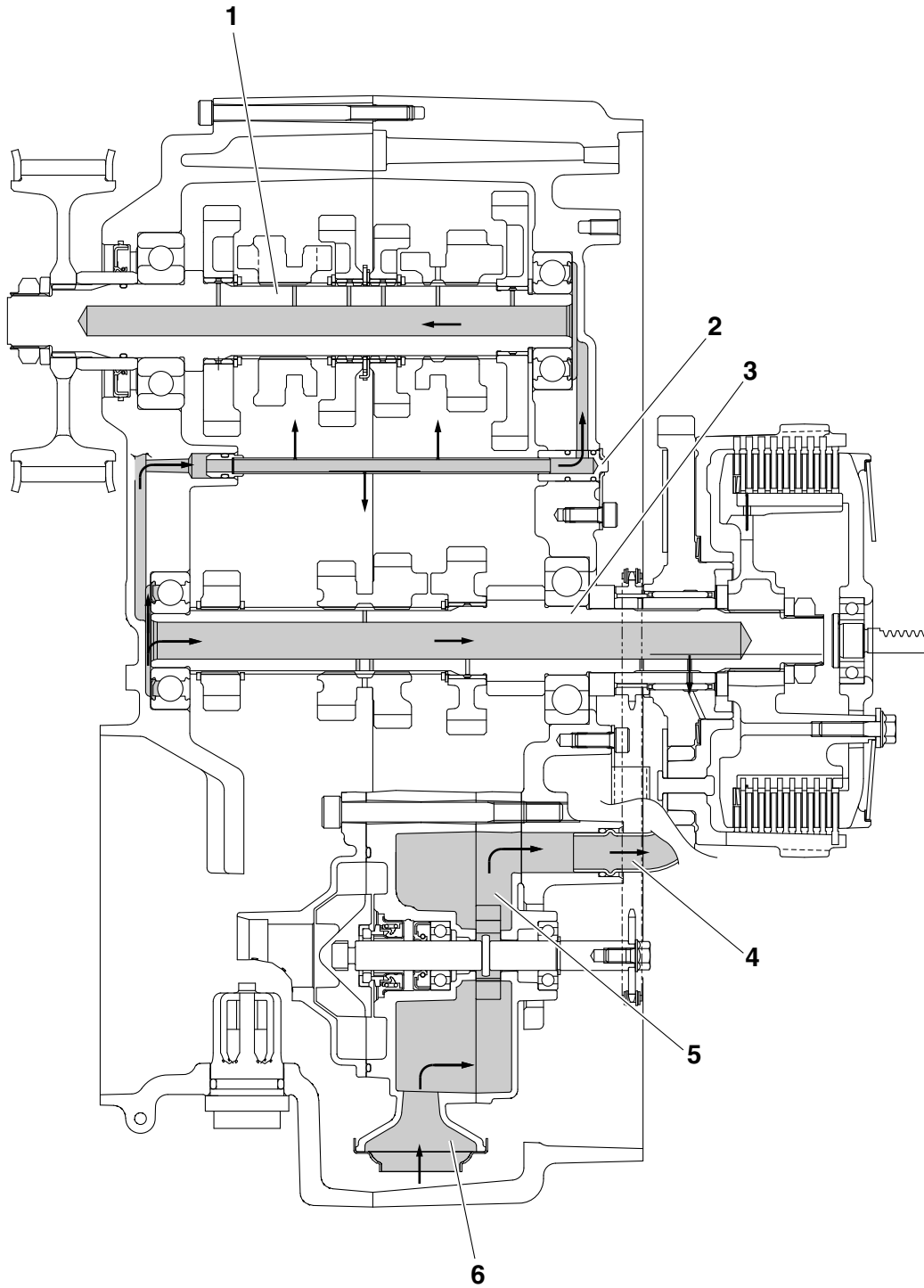
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil delivery pipe 1
2. Timing chain tensioner

LUBRICATION SYSTEM CHART AND DIAGRAMS

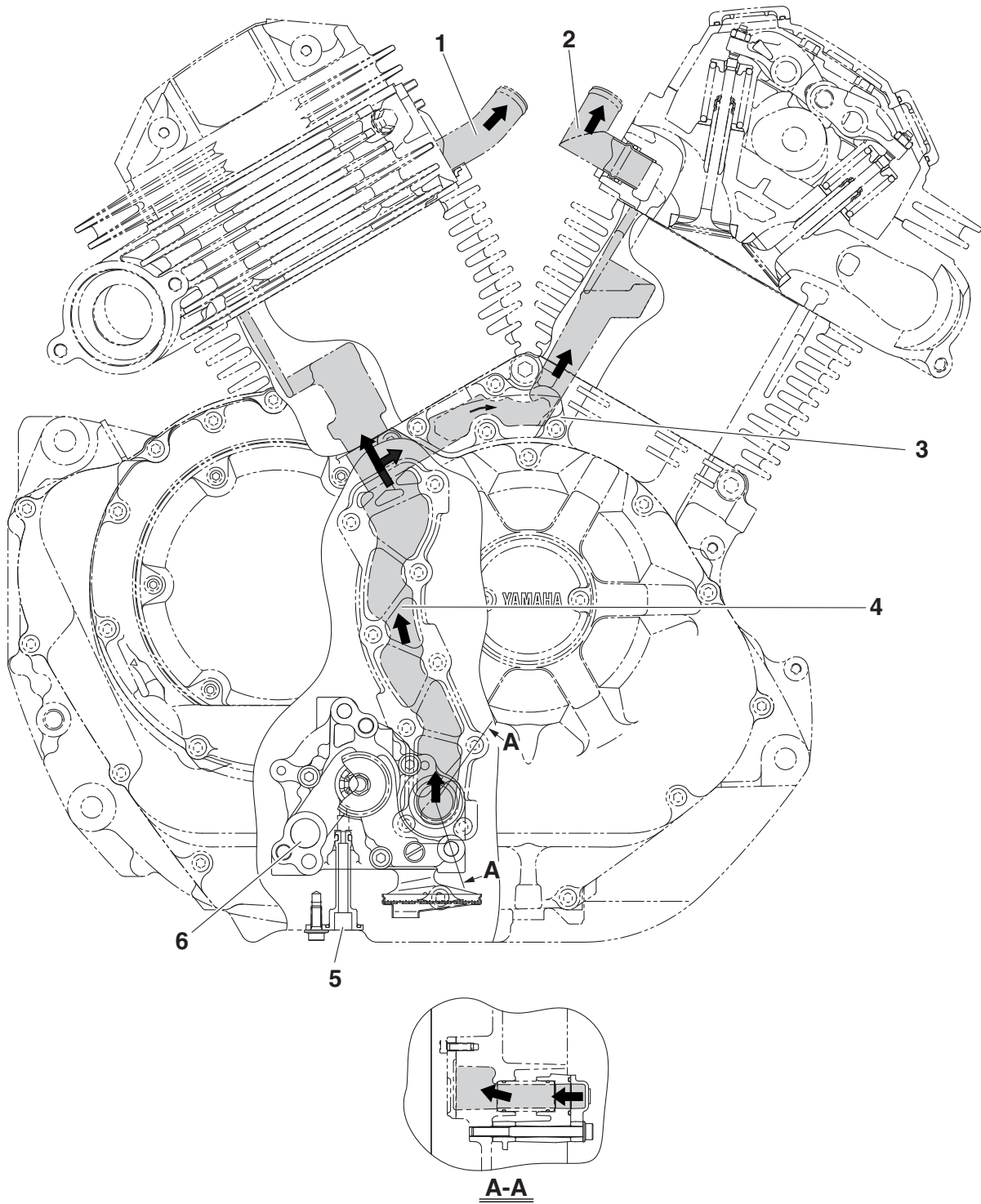


LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Drive axle
2. Oil delivery pipe 2
3. Main axle
4. Oil delivery pipe 3
5. Oil/water pump assembly
6. Oil strainer

EAS20420

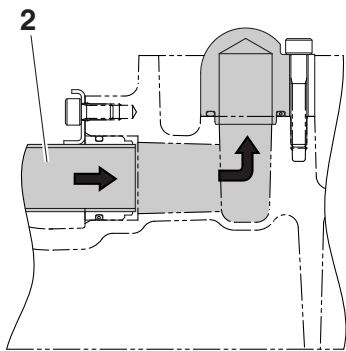
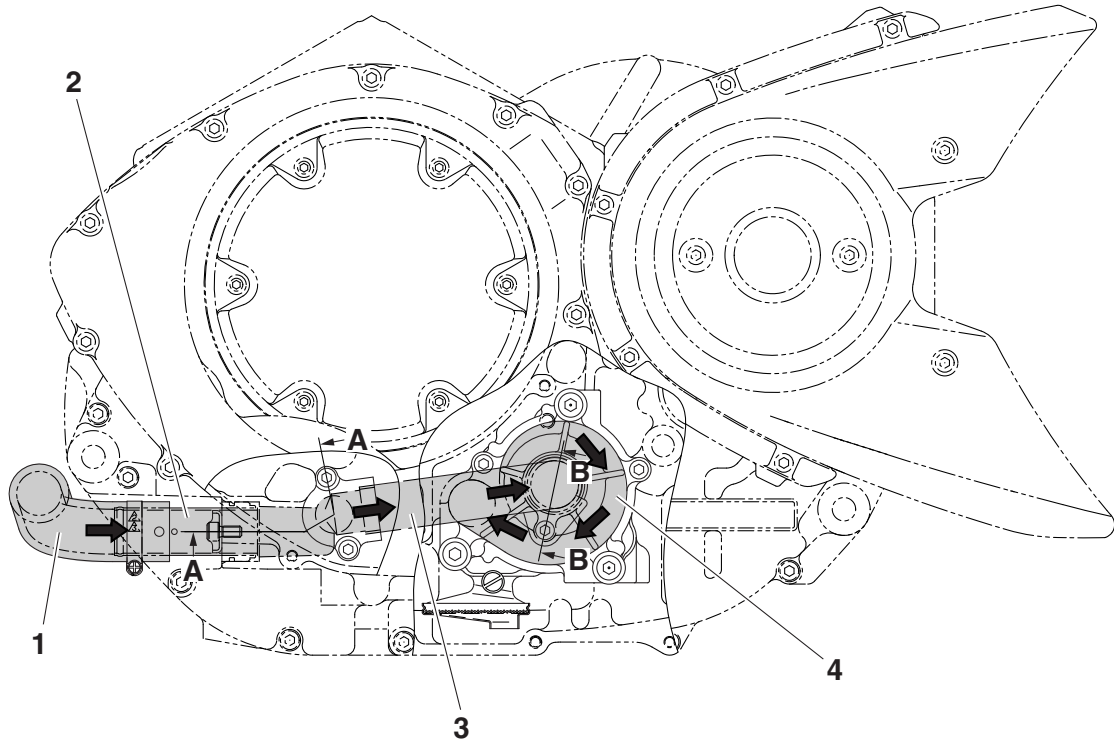
COOLING SYSTEM DIAGRAMS



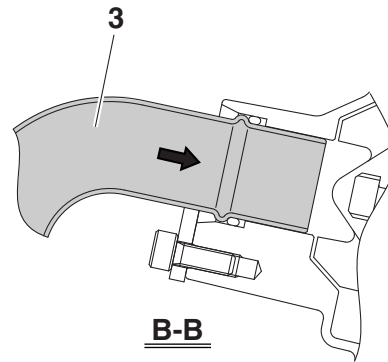
COOLING SYSTEM DIAGRAMS

1. Rear cylinder thermostat inlet pipe 1
2. Front cylinder thermostat inlet pipe 1
3. Coolant delivery cover 2
4. Coolant delivery cover 1
5. Drain cock
6. Oil/water pump assembly

COOLING SYSTEM DIAGRAMS



A-A

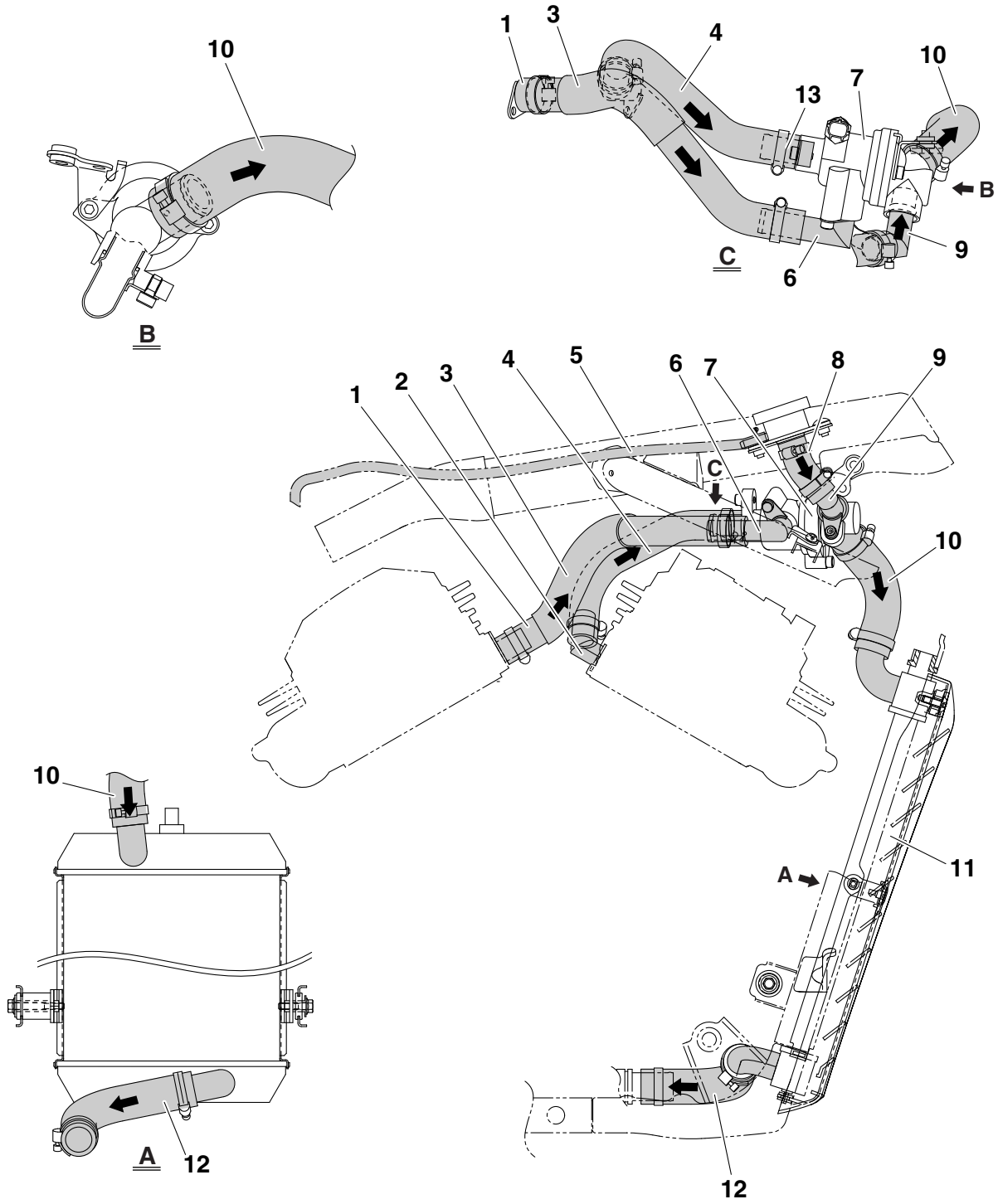


B-B

COOLING SYSTEM DIAGRAMS

1. Radiator outlet hose
2. Radiator outlet pipe
3. Coolant delivery pipe
4. Oil/water pump assembly

COOLING SYSTEM DIAGRAMS

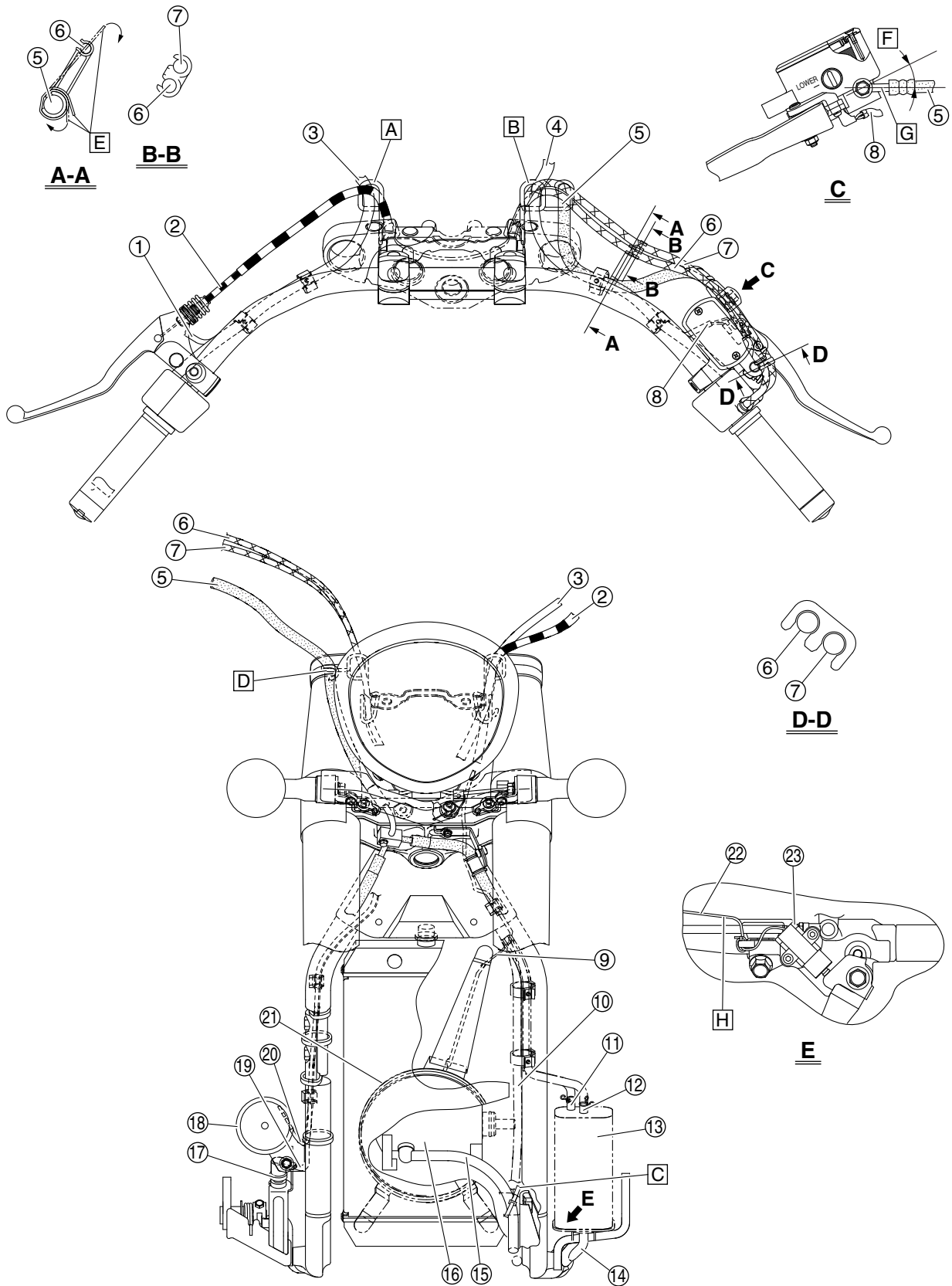


COOLING SYSTEM DIAGRAMS

1. Rear cylinder thermostat inlet pipe 1
2. Front cylinder thermostat inlet pipe 1
3. Rear cylinder thermostat inlet hose
4. Front cylinder thermostat inlet hose
5. Coolant reservoir hose
6. Rear cylinder thermostat inlet pipe 2
7. Thermostat assembly
8. Thermostat cover inlet hose
9. Thermostat cover inlet pipe
10. Radiator inlet hose
11. Radiator
12. Radiator outlet hose
13. Front cylinder thermostat inlet pipe 2

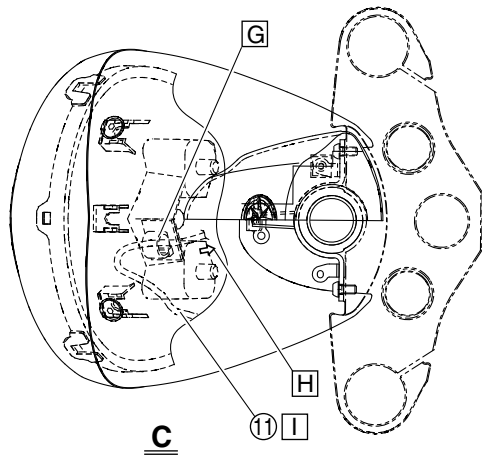
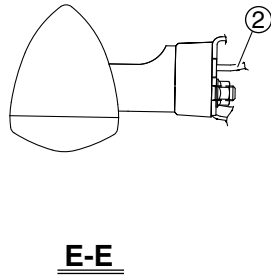
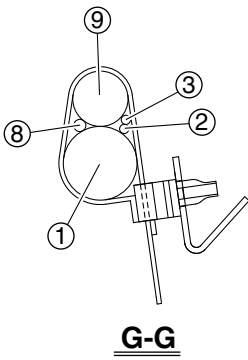
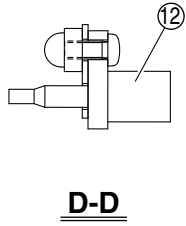
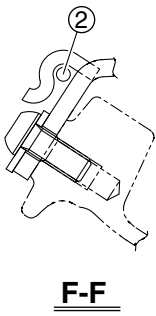
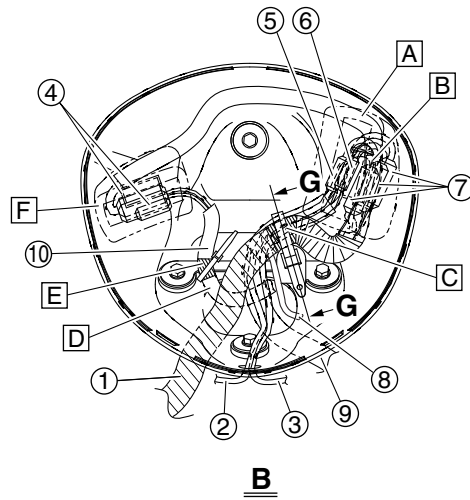
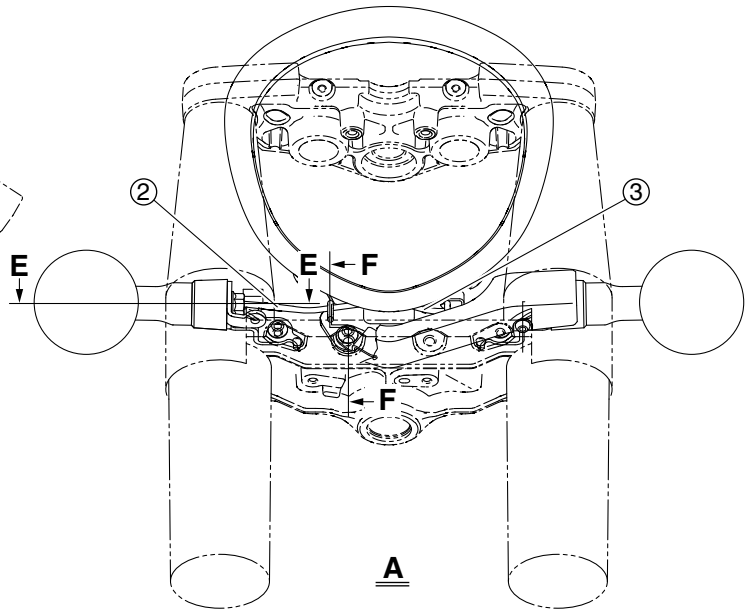
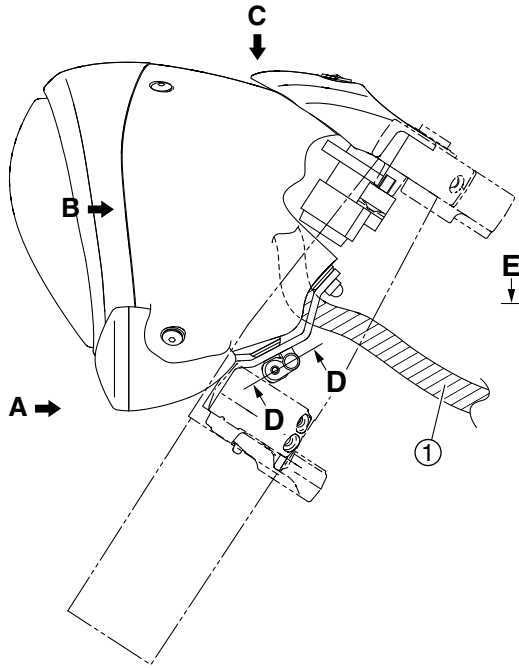
EAS20430

CABLE ROUTING



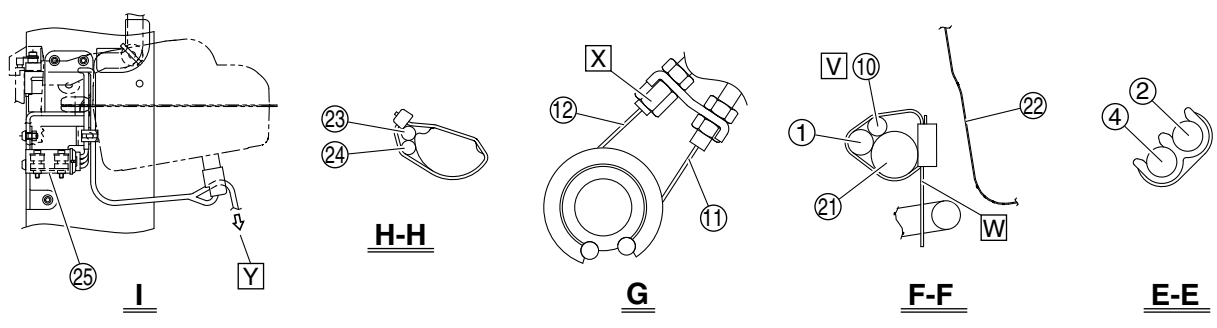
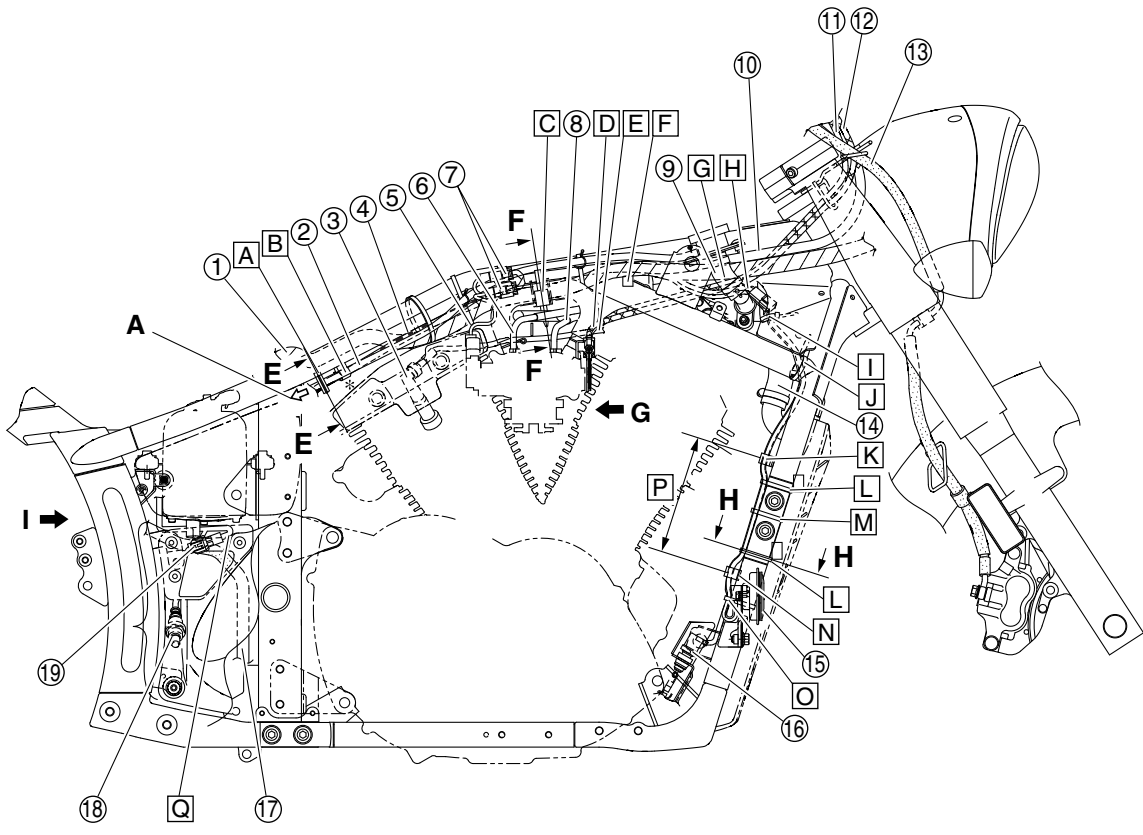
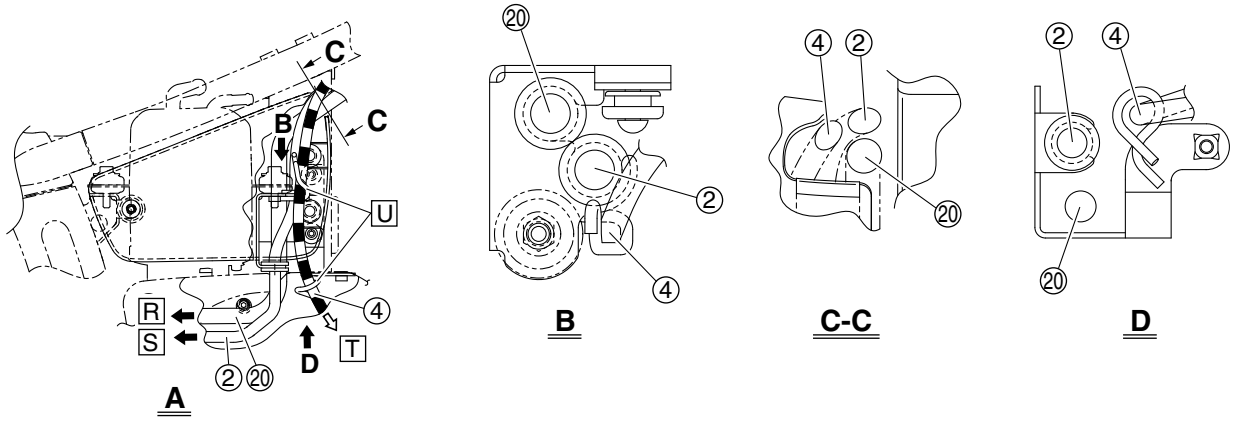
1. Clutch switch lead
 2. Clutch cable
 3. Left handlebar switch lead
 4. Right handlebar switch lead
 5. Front brake hose
 6. Throttle cable (accelerator cable)
 7. Throttle cable (decelerator cable)
 8. Front brake switch lead
 9. Radiator fan motor lead
 10. Fuel tank overflow hose
 11. Canister purge hose (California only)
 12. Canister charge hose (California only)
 13. Canister (California only)
 14. Canister breather hose (California only)
 15. Starter motor lead
 16. Starter motor
 17. Rear brake light switch
 18. Horn
 19. Rear brake light switch lead
 20. Horn lead
 21. Radiator fan motor
 22. Sidestand switch lead
 23. Sidestand switch
- A. Pass the clutch cable and left handlebar switch lead through the guide, making sure to route the lead to the outside of the cable.
 - B. Pass the throttle cables and right handlebar switch lead through the guide, making sure to route the lead to the outside of the cables.
 - C. Fasten the starter motor lead securely to the engine mounting boss with a plastic locking tie, making sure that the tie does not contact the engine bracket on the frame.
 - D. Pass the front brake hose through the guide.
 - E. Fit the rubber strap end without the tab onto the holder, wrap the strap around the front brake hose and holder, and then fit the end with the tab onto the holder, making sure to face the tab downward.
 - F. 30–50°
 - G. Install the front brake hose with its paint mark facing forward.
 - H. Route the sidestand switch lead over the shift rod.

CABLE ROUTING



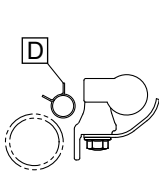
1. Wire harness
 2. Front right turn signal light
 3. Front left turn signal light
 4. Main switch couplers
 5. Front right turn signal light coupler
 6. Front left turn signal light coupler
 7. Meter assembly couplers
 8. Air temperature sensor lead
 9. Meter assembly lead
 10. Main switch lead
 11. Headlight lead
 12. Air temperature sensor
- A. Route the main switch lead that branches off from the wire harness behind the other leads.
 - B. Route the meter assembly lead that branches off from the wire harness in front of the meter assembly couplers and front turn signal light couplers, and then wrap the protective covering around the lead and couplers.
 - C. Fasten the wire harness, front turn signal light leads, meter assembly lead, and air temperature sensor lead with the plastic band, making sure to align the white tape on the wire harness, front turn signal light leads, and meter assembly lead with the band.
 - D. Route the main switch lead behind the wire harness and meter assembly lead.
 - E. Fasten the main switch lead at the white tape to the plastic band bracket with a plastic locking tie.
 - F. Wrap the protective covering around the main switch couplers.
 - G. Fasten the headlight lead with the holder.
 - H. To headlight
 - I. To wire harness

CABLE ROUTING

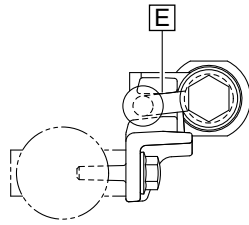


1. Wire harness
 2. Coolant reservoir hose
 3. Rear cylinder spark plug cap
 4. Clutch cable
 5. Throttle position sensor lead
 6. Rear cylinder intake air pressure sensor hose
 7. Right handlebar switch couplers
 8. Front cylinder intake air pressure sensor hose
 9. Thermostat cover inlet hose
 10. Right handlebar switch lead
 11. Throttle cable (accelerator cable)
 12. Throttle cable (decelerator cable)
 13. Front brake hose
 14. Radiator inlet hose
 15. Horn
 16. Rear brake light switch
 17. Brake fluid reservoir hose
 18. O₂ sensor
 19. O₂ sensor coupler
 20. Fuel hose
 21. Resonator hose joint
 22. Fuel tank
 23. Rear brake light switch lead
 24. Horn lead
 25. Lean angle sensor
- A. Fasten the clutch cable and coolant reservoir hose with the holder, making sure to position the holder 15–20 mm (0.59–0.79 in) to the rear of the holder (indicated with an asterisk in the illustration) that is attached to the frame.
 - B. Fasten the clutch cable with the plastic band. Face the end of the plastic band inward.
 - C. Fasten the resonator hose joint, wire harness, and right handlebar switch lead with the plastic band.
 - D. Make sure that the throttle cable (decelerator cable) does not contact the frame, the throttle cable (accelerator cable) does not contact the rear cylinder thermostat inlet hose, and the throttle cables do not contact each other.
 - E. Route the rear cylinder spark plug lead to the inside of the front cylinder intake air pressure sensor hose and front cylinder resonator hose.
 - F. Fasten the wire harness by sliding the plastic holder on the wire harness onto the stud on the frame.
 - G. Route the throttle cables to the inside of the thermostat cover inlet hose and under the wire harness, making sure that the cables are not pinched by the harness.
 - H. Route the rear brake light switch lead and horn lead to the inside of the thermostat cover inlet hose.
 - I. Fasten the rear brake light switch lead and horn lead to the frame with the tie, making sure to face the end of the tie inward.
 - J. Pass a plastic locking tie through the space between the frame and the frame support, and then fasten the rear brake light switch lead and horn lead to the frame with the tie, making sure to face the end of the tie inward.
 - K. Fasten the rear brake light switch lead and horn lead with the holder. Face the fastener of the holder outward.
 - L. Fasten the rear brake light switch lead and horn lead with a plastic locking tie, making sure to align the tie with the frame weld. Face the end of the plastic locking tie inward, and then cut off the excess end of the tie.
 - M. Fasten the rear brake light switch lead and horn lead with a plastic locking tie. Face the end of the plastic locking tie inward, and then cut off the excess end of the tie.
 - N. Fasten the rear brake light switch lead and horn lead with the holder, making sure to align the tape on each lead with the holder. Face the fastener of the holder outward.
 - O. Fasten the rear brake light switch lead and horn lead with a plastic locking tie, making sure to install the tie on the protective sleeve of each lead. Face the end of the plastic locking tie inward, and then cut off the excess end of the tie.
 - P. Make sure that there is no slack in the rear brake light switch lead and horn lead in the area shown in the illustration.
 - Q. Be sure not to pinch the O₂ sensor lead when installing the coolant reservoir cap cover.
 - R. To fuel pump
 - S. To coolant reservoir
 - T. To clutch cover
 - U. Pass the clutch cable through the guides.
 - V. Fasten the right handlebar switch lead with the plastic band, making sure to install the band on the lead's protective sleeve, not the lead itself.
 - W. Face the end of the plastic band downward, angled inward. Make sure that the end of the plastic band does not contact the fuel pipe.
 - X. Be sure to install the throttle cable (decelerator cable), identified by the longer nut, on the outer side of the throttle cable pulley.
 - Y. To O₂ sensor

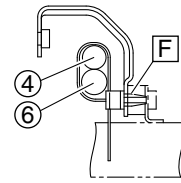
CABLE ROUTING



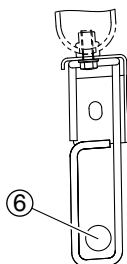
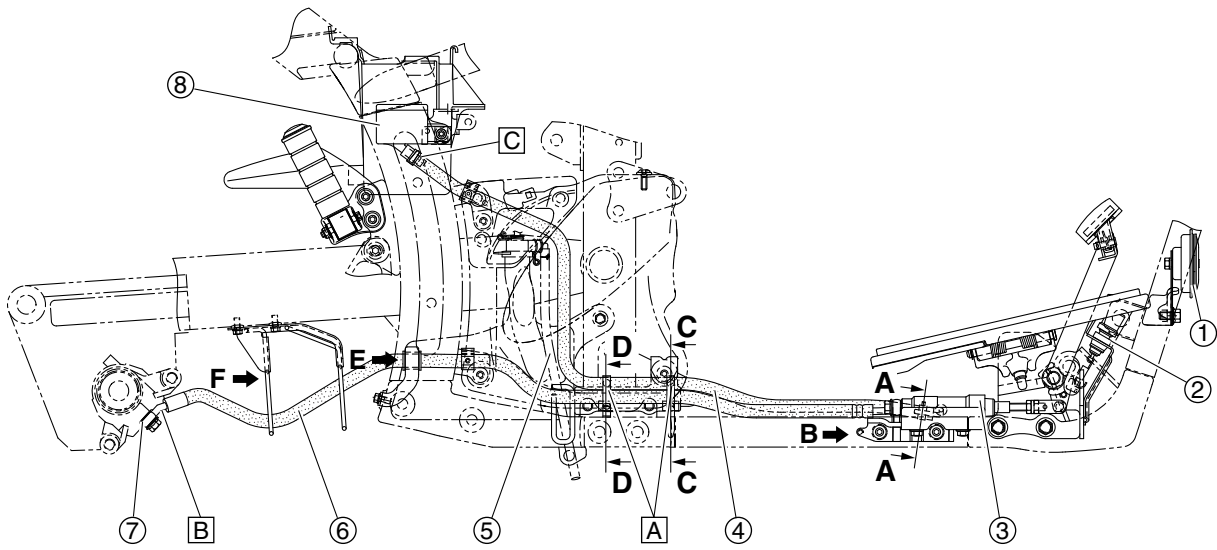
A-A



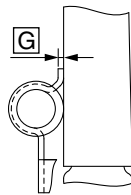
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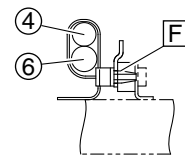
C-C



F



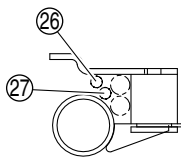
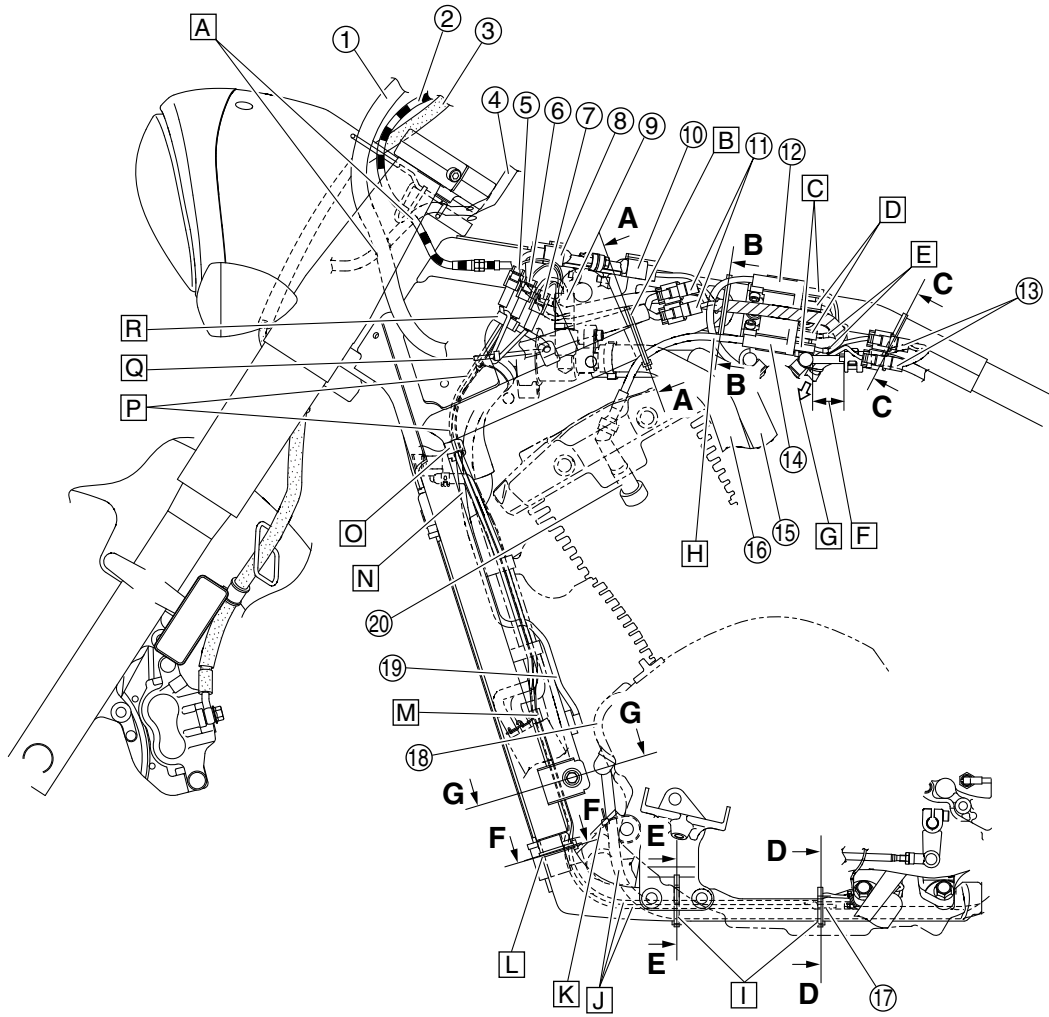
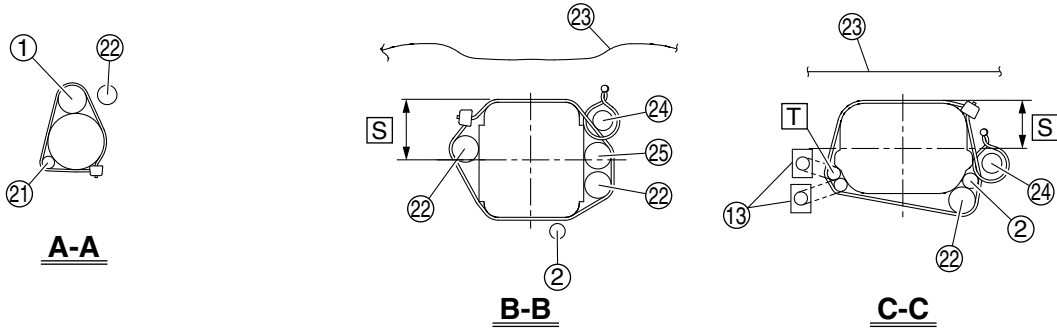
E



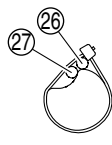
D-D

1. Horn
2. Rear brake light switch
3. Rear brake master cylinder
4. Brake fluid reservoir hose
5. Coolant reservoir breather hose
6. Rear brake hose
7. Rear brake caliper
8. Brake fluid reservoir
- A. Fasten the rear brake hose and brake fluid reservoir hose with the plastic bands, making sure to align the white paint marks on the brake fluid reservoir hose with the bands.
- B. Install the rear brake hose onto the rear brake caliper, making sure that the brake pipe touches the projection on the caliper.
- C. Face the ends of the hose clamp inward.
- D. Face the end of the hose clamp upward as shown in the illustration.
- E. Install the brake fluid reservoir hose onto the rear brake master cylinder, making sure that the brake pipe touches the projection on the rear brake master cylinder bracket.
- F. Insert the projection on the plastic band completely into the hole in the coolant reservoir cover bracket.
- G. Less than 3 mm (0.12 in)

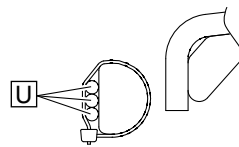
CABLE ROUTING



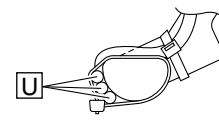
F-F



G-G



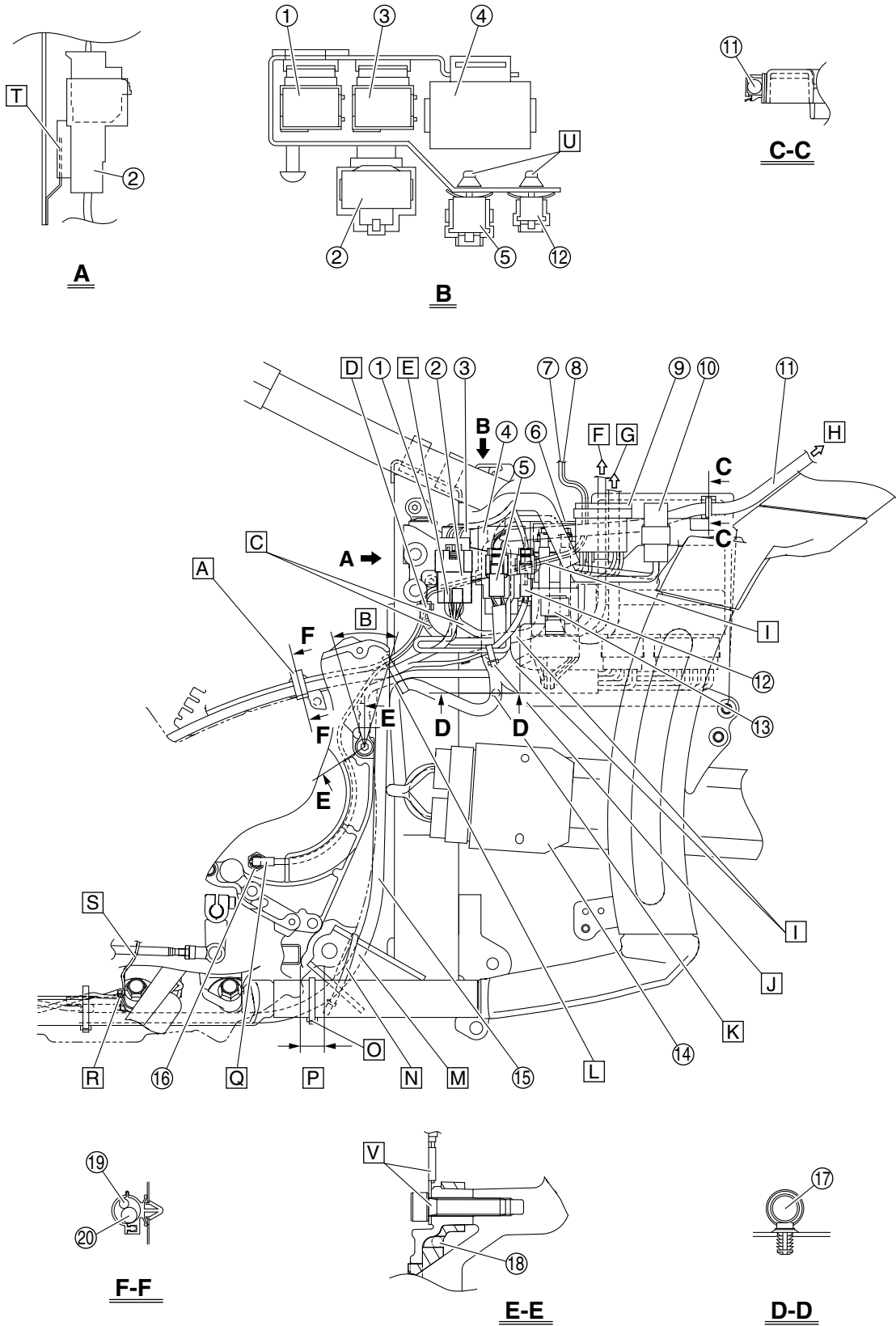
E-E



D-D

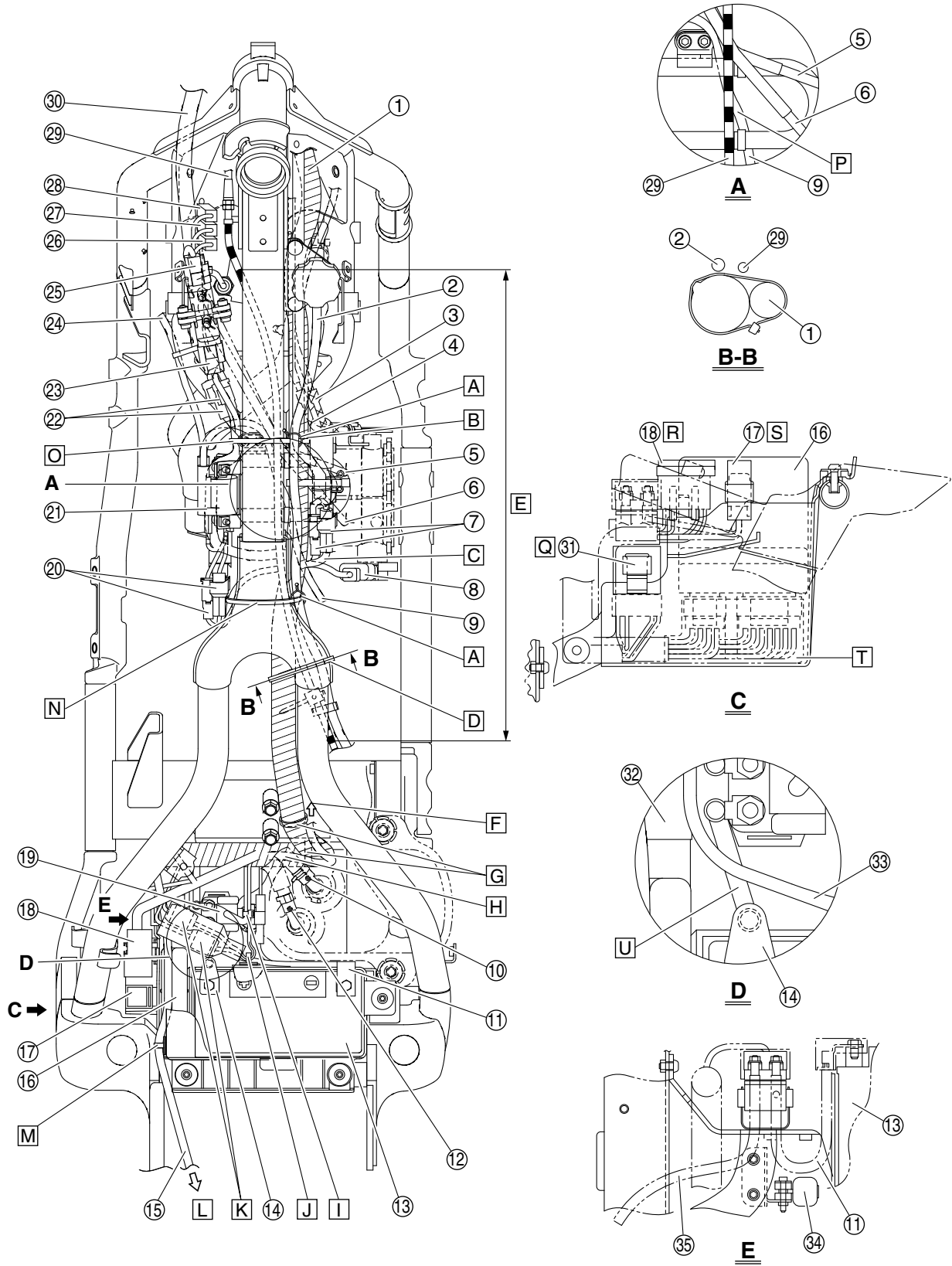
1. Left handlebar switch lead
 2. Clutch cable
 3. Front brake hose
 4. Meter assembly lead
 5. Sidestand switch coupler
 6. Oil level switch coupler
 7. Radiator fan motor coupler
 8. Front cylinder intake air pressure sensor
 9. Coolant temperature sensor coupler
 10. Rear cylinder intake air pressure sensor
 11. Left handlebar switch couplers
 12. Rear cylinder ignition coil
 13. Sub-wire harness couplers
 14. Front cylinder ignition coil
 15. Rear cylinder thermostat inlet hose
 16. Front cylinder thermostat inlet hose
 17. Oil level switch
 18. Starter motor lead
 19. Radiator fan motor lead
 20. Front cylinder spark plug cap
 21. Front cylinder spark plug lead
 22. Wire harness
 23. Fuel tank
 24. Coolant reservoir hose
 25. Right handlebar switch lead
 26. Oil level switch lead
 27. Sidestand switch lead
- A. Route the meter assembly lead under the left handlebar switch lead and clutch cable.
 - B. Fasten the left handlebar switch lead and front cylinder spark plug lead with a plastic locking tie. Be sure to install the plastic locking tie on the left handlebar switch lead's protective sleeve and position it 10–15 mm (0.39–0.59 in) from the end of the sleeve. Face the end of the plastic locking tie inward, and then cut off the excess end of the tie.
 - C. Black connectors
 - D. White connectors
 - E. Connect the ignition coil leads with the "I" marks to the front cylinder ignition coil. Route the ignition coil lead with the black terminal to the outside of the wire harness.
 - F. Route the sub-wire harness to the inside of the fuel pipe in the area shown in the illustration.
 - G. To engine
 - H. Route the front cylinder spark plug lead to the outside of the rear cylinder spark plug lead.
 - I. Fasten the sidestand switch lead, starter motor lead, and oil level switch lead with plastic locking ties. Face the end of each plastic locking tie downward, and then cut off the excess end of the tie.
 - J. The starter motor lead, neutral switch lead, and sidestand switch lead may be routed in any order in the area shown in the illustration.
 - K. Fasten the starter motor lead at the positioning tape to the engine mounting boss with a plastic locking tie. Position the buckle of the plastic locking tie in front of the boss, with the end facing upward, and then cut off the excess end of the tie to 15 mm (0.59 in) or less.
 - L. Fasten the starter motor lead and sidestand switch lead with a plastic locking tie. Face the end of the plastic locking tie rearward, and then cut off the excess end of the tie.
 - M. Fasten the sidestand switch lead and oil level switch lead with the holder. Face the fastener of the holder outward.
 - N. Route the radiator fan motor lead to the front of the fuel tank breather hose and fuel tank overflow hose.
 - O. Fasten the sidestand switch lead, oil level switch lead, and radiator fan motor lead with the holder. Face the fastener of the holder outward.
 - P. Route the sidestand switch lead, radiator fan motor lead, and oil level switch lead to the front of the radiator inlet hose.
 - Q. Fasten the sidestand switch lead to the frame with a plastic locking tie. The oil level switch lead and radiator fan motor lead may also be fastened with the plastic locking tie. Face the end of the plastic locking tie rearward, making sure that it does not contact the left side panel.
 - R. Fasten the sidestand switch lead, oil level switch lead, and radiator fan motor lead with the plastic band. Face the end of the plastic band rearward. Do not install the plastic band on the couplers or the sections of the leads that are not covered by the protective sleeves.
 - S. Cut off the excess end of the plastic locking tie and position the cut end within the area shown in the illustration.
 - T. Fasten the leads (to sub-wire harness) that branch off from the wire harness below the frame weld.
 - U. Fasten the sidestand switch lead, oil level switch lead, and radiator fan motor lead with a plastic locking tie. The leads may be fastened in any order.

CABLE ROUTING

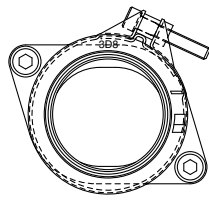


1. Headlight relay
2. Stator coil coupler
3. Radiator fan motor relay
4. Turn signal relay
5. Tail/brake light wire harness coupler
6. Starter relay
7. Speed sensor lead
8. Neutral switch lead
9. Fuse box
10. Main fuse
11. Tail/brake light wire harness
12. Crankshaft position sensor coupler
13. Relay unit
14. Rectifier/regulator
15. Starter motor lead
16. Neutral switch
17. Wire harness
18. Neutral switch lead
19. Sidestand switch lead
20. Crankshaft position sensor/stator assembly lead
- A. Fasten the crankshaft position sensor/stator assembly lead and speed sensor lead with the holder.
- B. Position the ground lead in the range shown in the illustration, 15° or less to the front or rear of the vertical line shown in the illustration.
- C. Connect the lead with white tape to the headlight relay and connect the lead without white tape to the radiator fan motor relay.
- D. Fasten the headlight relay lead, speed sensor lead, and neutral switch lead with a plastic locking tie, making sure to install the tie on the headlight relay lead's protective sleeve, 10–30 mm (0.39–1.18 in) from the end of the sleeve. Cut off the excess end of the plastic locking tie.
- E. Pass the crankshaft position sensor/stator assembly lead, and tail/brake light wire harness through the guide.
- F. To negative battery terminal
- G. To positive battery terminal
- H. To tail/brake light assembly
- I. Route the starter motor lead, ground lead, speed sensor lead, and neutral switch lead to the inside of the wire harness.
- J. Pass the crankshaft position sensor lead and tail/brake light wire harness through the guide, and then fasten them to the lower section of the guide with a plastic locking tie. Face the end of the plastic locking tie downward, angled inward, and then cut off the excess end of the tie.
- K. Insert the projection on the wire harness holder completely into the hole in the sub-fuel tank bracket.
- L. Fasten the speed sensor lead, crankshaft position sensor/stator assembly lead, ground lead, neutral switch lead, starter motor lead, and rectifier/regulator lead with a plastic locking tie, making sure to position the tie 10 mm (0.39 in) or less to the front or rear of the front edge of the frame. Face the end of the plastic locking tie upward, and then cut off the excess end of the tie down to the buckle, making sure that there are no sharp edges.
- M. Route the starter motor lead to the inside of the frame.
- N. Fasten the starter motor lead to the frame with a plastic locking tie. Face the end of the plastic locking tie downward, and then cut off the excess end of the tie to 10 mm (0.39 in) or less.
- O. Fasten the starter motor lead with a plastic locking tie. Position the plastic locking tie 20 mm (0.79 in) or less from the engine serial number. Face the end of the plastic locking tie downward, and then cut off the excess end of the tie.
- P. 20 mm (0.79 in)
- Q. Install the neutral switch lead terminal so that the lead is routed rearward. Make sure that there is no slack in the neutral switch lead.
- R. Fasten the sidestand switch lead with a plastic locking tie, making sure to fit the tie in the gap between the sidestand bracket and the frame boss. Face the end of the plastic locking tie forward, and then cut off the excess end of the tie.
- S. Route the oil level switch lead to the outside of the shift rod.
- T. Install the stator coil coupler completely onto the tab on the relay bracket.
- U. Insert the projections on the couplers completely into the holes in the relay bracket.
- V. Install the ground lead terminal with the drive pulley housing bolt, making sure that the crimped section of the terminal that secures the ground lead is facing inward as shown in the illustration.

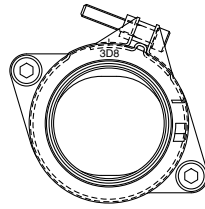
CABLE ROUTING



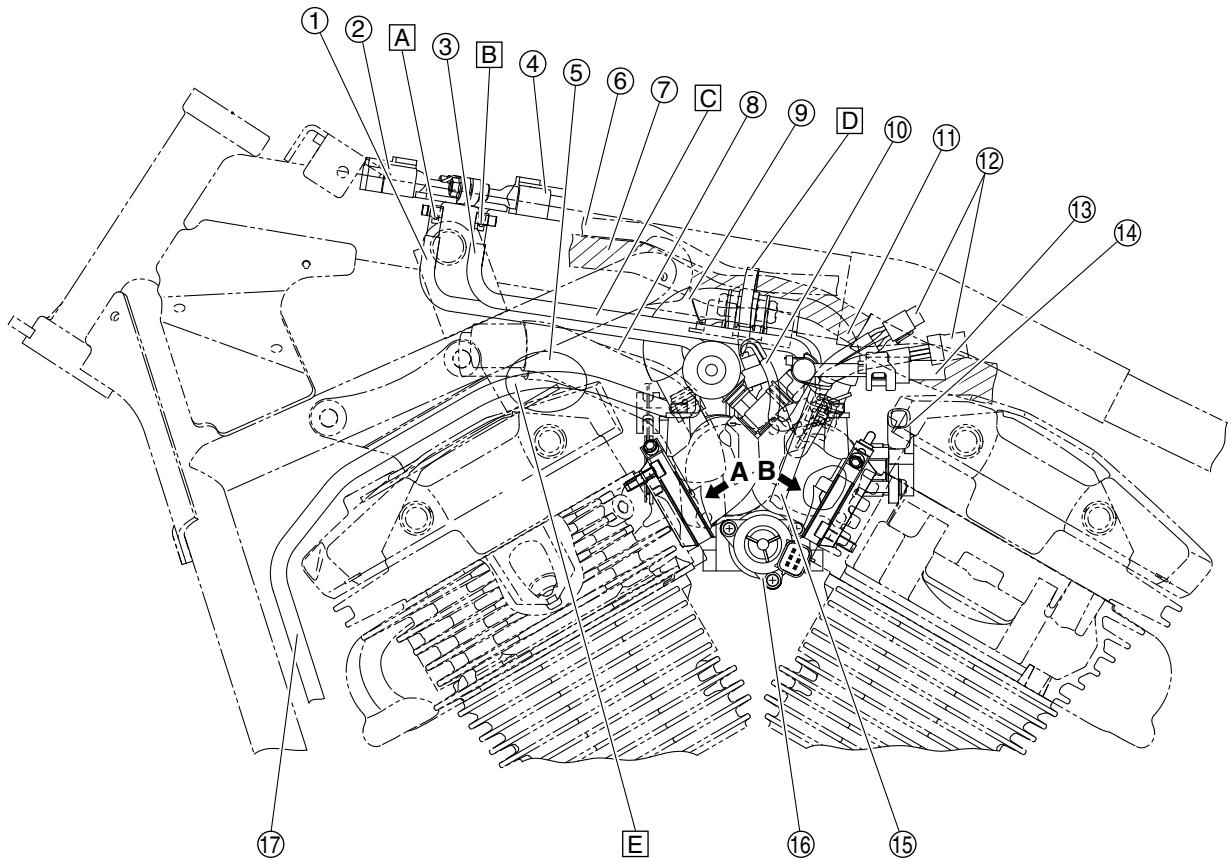
1. Wire harness
 2. Coolant reservoir hose
 3. Throttle cable (accelerator cable)
 4. Throttle cable (decelerator cable)
 5. Front cylinder intake air pressure sensor hose
 6. Rear cylinder intake air pressure sensor hose
 7. Right handlebar switch couplers
 8. Throttle position sensor
 9. Rear cylinder spark plug lead
 10. Air vent hose
 11. Negative battery lead terminal
 12. Fuel cock hose
 13. Battery
 14. Positive battery lead terminal
 15. Tail/brake light wire harness
 16. ECU (engine control unit)
 17. Main fuse
 18. Fuse box
 19. Starter relay coupler
 20. Sub-wire harness couplers
 21. Rear cylinder ignition coil
 22. Left handlebar switch couplers
 23. Rear cylinder intake air pressure sensor coupler
 24. Front cylinder spark plug lead
 25. Front cylinder intake air pressure sensor coupler
 26. Sidestand switch coupler
 27. Oil level switch coupler
 28. Radiator fan motor coupler
 29. Clutch cable
 30. Left handlebar switch lead
 31. Turn signal relay
 32. Relay unit
 33. Negative battery lead
 34. Lean angle sensor
 35. Starter motor lead
- A. Fasten the coolant reservoir hose to the plastic locking tie with the clamp.
 - B. Align the white tape on the right handlebar switch lead with the rear end of the frame weld.
 - C. Route the clutch cable to the inside of the wire harness where the leads (to throttle position sensor and right handlebar switch couplers) branch off from the harness.
 - D. Fasten the wire harness with a plastic locking tie. Face the end of the plastic locking tie downward, angled inward, and then cut off the excess end of the tie.
 - E. Be sure to route the clutch cable over any cable, lead, pipe, or hose that it crosses in the area shown in the illustration.
 - F. To fuel sender
 - G. Insert the projections on the wire harness holders completely into the holes in the frame.
 - H. Route the fuel sender lead under the air vent hose.
 - I. Fasten the starter relay lead, neutral switch lead, and speed sensor lead with a plastic locking tie, making sure to position the tie to the inside of the starter relay. Face the end of the plastic locking tie upward, and then cut off the excess end of the tie.
 - J. Fasten the neutral switch lead and speed sensor lead with a plastic locking tie.
 - K. Slide the boot over the neutral switch coupler and speed sensor coupler, making sure that they are covered completely.
 - L. To tail/brake light assembly
 - M. Fasten the tail/brake light wire harness with the holder.
 - N. Fasten the wire harness, clutch cable, and sub-wire harness that branches off from the wire harness with a plastic locking tie, making sure that the tie does not contact the protective tape on the frame.
 - O. Fasten the wire harness and right handlebar switch lead on the right side of the frame and fasten the wire harness on the left side of the frame with a plastic locking tie, making sure to install the tie on the harness' protective tape. Do not fasten the coolant reservoir hose and clutch cable.
 - P. Route the rear cylinder spark plug lead under the U-shaped fuel pipe.
 - Q. Install the turn signal relay completely onto the tab on the battery box.
 - R. Install the fuse box completely onto the tab on the battery box.
 - S. Install the main fuse completely onto the tab on the battery box.
 - T. Install the cover completely onto the ECU couplers.
 - U. Route the positive battery lead under the negative battery lead, making sure not to route it on top of the relay unit.



A

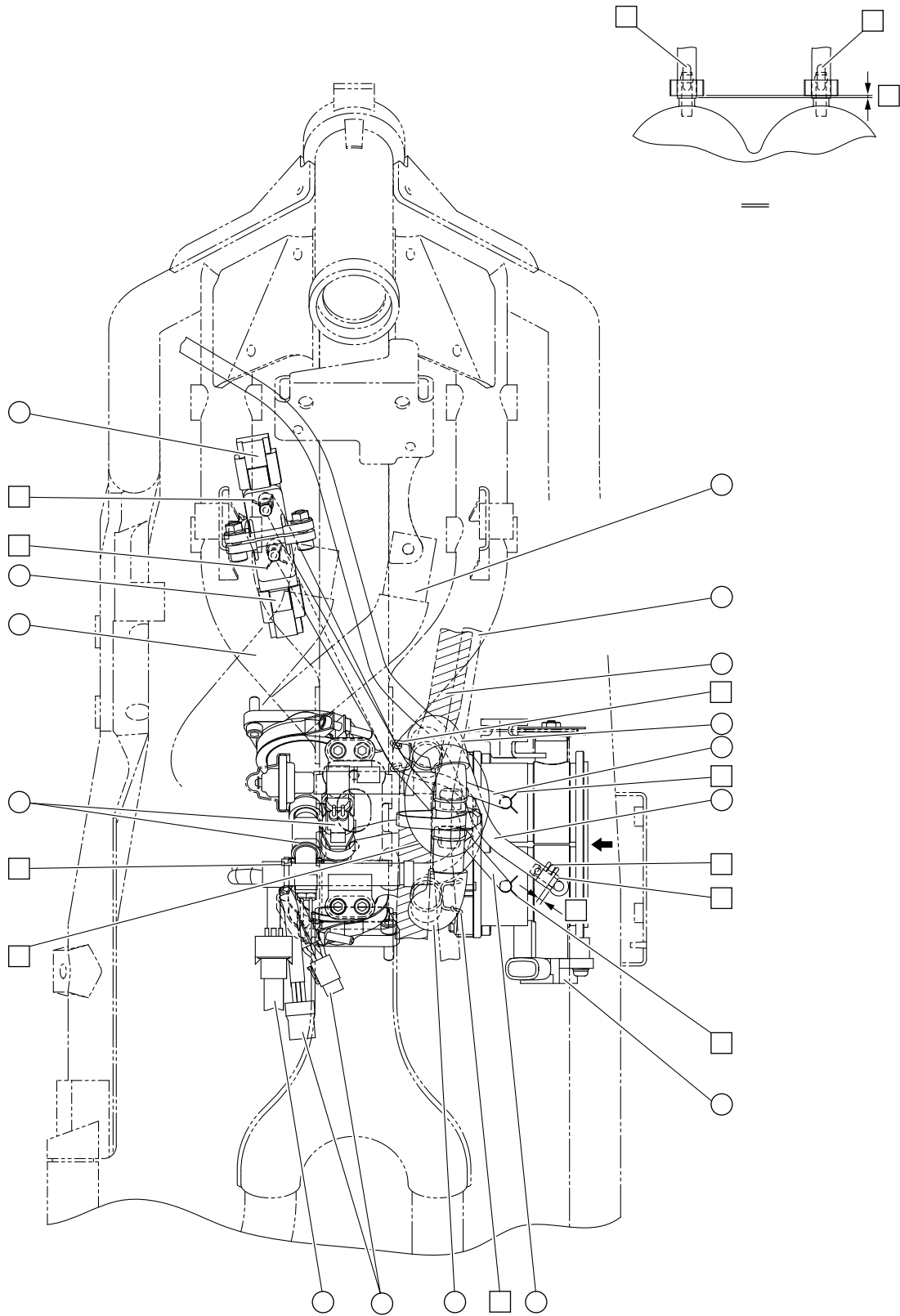


B



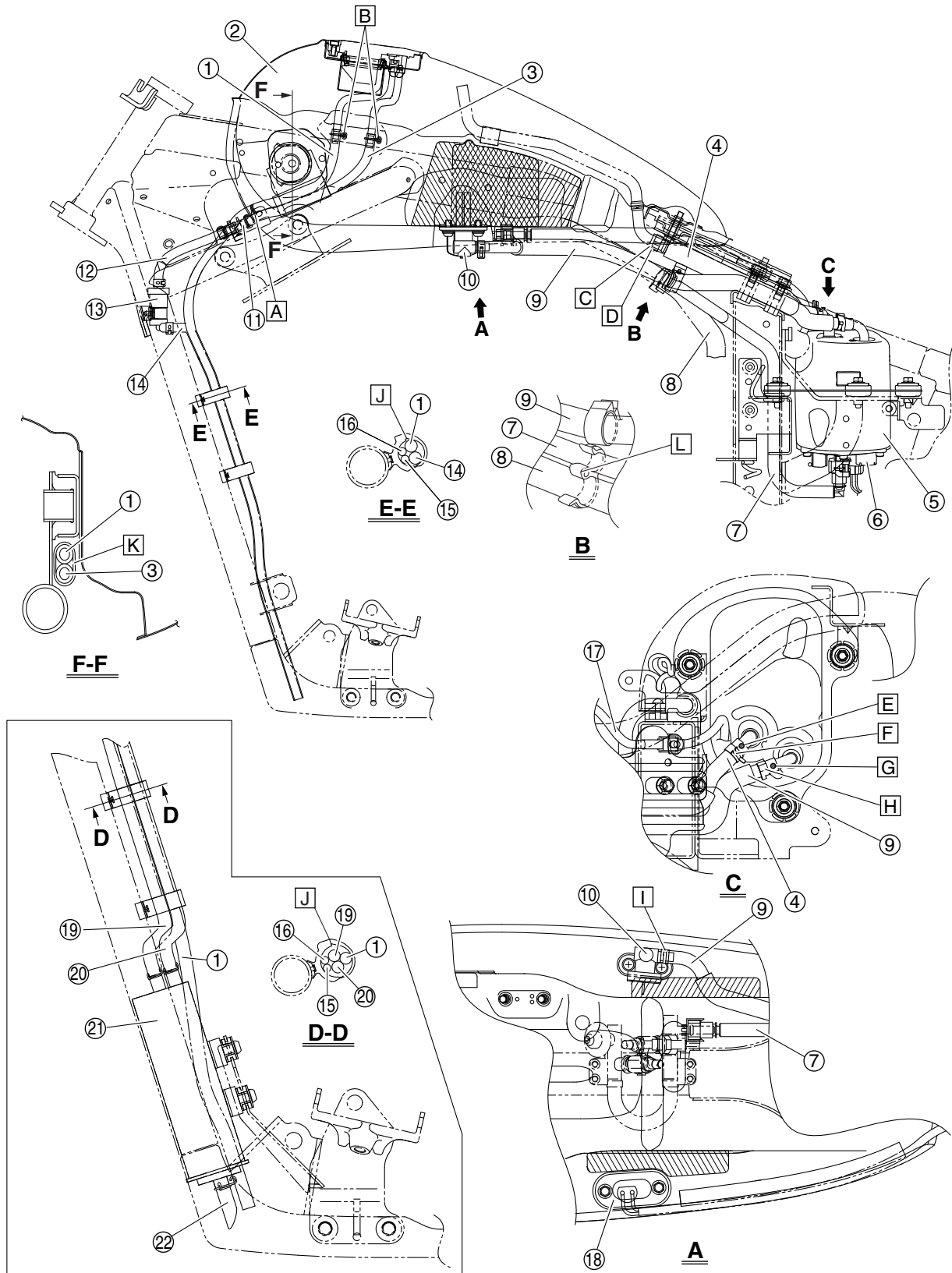
1. Front cylinder intake air pressure sensor hose
 2. Front cylinder intake air pressure sensor
 3. Rear cylinder intake air pressure sensor hose
 4. Rear cylinder intake air pressure sensor
 5. Front cylinder thermostat inlet hose
 6. Right handlebar switch lead
 7. Wire harness
 8. Rear cylinder thermostat inlet hose
 9. Front cylinder resonator hose
 10. Sub-wire harness
 11. Rear cylinder resonator hose
 12. Sub-wire harness couplers
 13. Fuel hose
 14. Throttle position sensor
 15. Crankcase breather hose
 16. ISC (idle speed control) unit
 17. Canister purge hose (California only)
- A. Install the front cylinder intake air pressure sensor hose with its yellow paint mark facing outward.
 - B. Install the rear cylinder intake air pressure sensor hose with its white paint mark facing outward.
 - C. Route the front cylinder intake air pressure sensor hose and rear cylinder intake air pressure sensor hose over the rear cylinder resonator hose and front cylinder resonator hose.
 - D. Fasten the wire harness and right handlebar switch lead with a plastic locking tie.
 - E. Route the canister purge hose (California only) under the rear cylinder thermostat inlet hose and front cylinder thermostat inlet hose.

CABLE ROUTING



1. Rear cylinder thermostat inlet hose
2. Right handlebar switch lead
3. Wire harness
4. Front cylinder resonator hose
5. Front cylinder intake air pressure sensor hose
6. Canister purge hose (California only)
7. Throttle position sensor
8. Rear cylinder intake air pressure sensor hose
9. Rear cylinder resonator hose
10. Sub-wire harness couplers
11. Fuel hose
12. Injectors
13. Front cylinder thermostat inlet hose
14. Rear cylinder intake air pressure sensor
15. Front cylinder intake air pressure sensor
 - A. Face the ends of the hose clamp inward.
 - B. Face the ends of the hose clamp outward.
 - C. Align the hose clamp with the white paint mark on the canister purge hose (California only) and face the ends of the clamp forward.
 - D. Route the canister purge hose (California only) to the outside of the front cylinder resonator hose, and then install it onto the throttle body pipe up to the bend in the pipe, making sure to face the white paint mark on the hose upward.
 - E. 2–4 mm (0.08–0.16 in)
 - F. Route the canister purge hose (California only) under the front cylinder intake air pressure sensor hose and rear cylinder intake air pressure sensor hose.
 - G. Fasten the sub-wire harness at the white tape with a plastic locking tie.
 - H. Face the ends of the hose clamp rearward.
 - I. Face the ends of the hose clamp forward.
 - J. Install the front cylinder intake air pressure sensor hose with its white paint mark facing outward.
 - K. Install the rear cylinder intake air pressure sensor hose with its yellow paint mark facing outward.
 - L. 0–1 mm (0–0.04 in)

CABLE ROUTING



1. Fuel tank overflow hose
 2. Fuel tank
 3. Fuel tank breather hose (fuel tank to hose joint)
 4. Air vent hose
 5. Sub-fuel tank
 6. Fuel pump
 7. Fuel hose
 8. Crankcase breather hose
 9. Fuel cock hose
 10. Fuel cock
 11. Hose joint
 12. Fuel tank breather hose (hose joint to rollover valve)
 13. Rollover valve
 14. Fuel tank breather hose (except for California)
 15. Sidestand switch lead
 16. Oil level switch lead
 17. Fuel sender lead
 18. Fuel sender
 19. Fuel tank breather hose (rollover valve to canister) (California only)
 20. Canister purge hose (California only)
 21. Canister (California only)
 22. Canister breather hose (California only)
- A. Route the fuel tank overflow hose, identified by the paint mark, over the fuel tank breather hose (fuel tank to hose joint).
 - B. Do not face the ends of the hose clamps inward.
 - C. Install the air vent hose to the fuel tank with its white paint mark facing downward.
 - D. Face the crimped section of the hose clamp downward.
 - E. Install the air vent hose with its paint mark facing upward.
 - F. Face the ends of the hose clamp upward.
 - G. Install the fuel cock hose with its yellow paint mark facing upward.
 - H. Face the crimped section of the hose clamp upward.
 - I. Face the crimped section of the hose clamp downward, making sure that it does not contact the fuel tank.
 - J. Face the fastener of the holder outward.
 - K. Be sure not to pinch the fuel tank overflow hose and fuel tank breather hose (fuel tank to hose joint) when installing the fuel tank.
 - L. Face the open ends of the holder downward.

PERIODIC CHECKS AND ADJUSTMENTS

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PERIODIC MAINTENANCE

EAS20450

PERIODIC MAINTENANCE

EAS20460

INTRODUCTION

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

EAU17600

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

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

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

EAU32183

GENERAL MAINTENANCE AND LUBRICATION CHART

No.	ITEM	ROUTINE	INITIAL	ODOMETER READINGS					
			600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
1	* Air filter element	<ul style="list-style-type: none"> Check condition and damage. Replace if necessary. 		√	√	√	√	√	√
2	* Clutch	<ul style="list-style-type: none"> Check operation. Adjust or replace cable. 	√	√	√	√	√	√	√
3	* Front brake	<ul style="list-style-type: none"> Check operation, fluid level, and for fluid leakage. Replace brake pads if necessary. 	√	√	√	√	√	√	√
4	* Rear brake	<ul style="list-style-type: none"> Check operation, fluid level, and for fluid leakage. Replace brake pads if necessary. 	√	√	√	√	√	√	√
5	* Brake hoses	<ul style="list-style-type: none"> Check for cracks or damage. Replace. 		√	√	√	√	√	√
			Every 4 years						
6	* Wheels	<ul style="list-style-type: none"> Check runout and for damage. Replace if necessary. 		√	√	√	√	√	√

PERIODIC MAINTENANCE

No.	ITEM	ROUTINE	INITIAL	ODOMETER READINGS					
			600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months	
7	* Tires	<ul style="list-style-type: none"> Check tread depth and for damage. Replace if necessary. Check air pressure. Correct if necessary. 		√	√	√	√	√	√
8	* Wheel bearings	<ul style="list-style-type: none"> Check bearings for smooth operation. Replace if necessary. 		√	√	√	√	√	√
9	* Swingarm pivot bearings	<ul style="list-style-type: none"> Check bearing assemblies for looseness. Moderately repack with lithium-soap-based grease. 			√			Repack.	
10	* Drive belt	<ul style="list-style-type: none"> Check belt tension. Adjust if necessary. 	√	Every 2500 mi (4000 km)					
11	* Steering bearings	<ul style="list-style-type: none"> Check bearing assemblies for looseness. Moderately repack with lithium-soap-based grease every 16000 mi (25000 km) or 24 months. 	√	√	√	√		Repack.	√
12	* Chassis fasteners	<ul style="list-style-type: none"> Check all chassis fitting and fasteners. Correct if necessary. 		√	√	√	√	√	√
13	Brake and clutch lever pivot shafts	<ul style="list-style-type: none"> Apply lithium-soap-based grease (all-purpose grease) lightly. 		√	√	√	√	√	√
14	Brake and shift pedal pivot shafts	<ul style="list-style-type: none"> Apply lithium-soap-based grease (all-purpose grease) lightly. 		√	√	√	√	√	√
15	Sidestand pivot	<ul style="list-style-type: none"> Check operation. Apply lithium-soap-based grease (all-purpose grease) lightly. 		√	√	√	√	√	√
16	* Sidestand switch	<ul style="list-style-type: none"> Check operation and replace if necessary. 	√	√	√	√	√	√	√
17	* Front fork	<ul style="list-style-type: none"> Check operation and for oil leakage. Replace if necessary. 		√	√	√	√	√	√
18	* Shock absorber assembly	<ul style="list-style-type: none"> Check operation and for oil leakage. Replace if necessary. 		√	√	√	√	√	√
19	* Rear suspension link pivots	<ul style="list-style-type: none"> Apply lithium-soap-based grease lightly. 						√	
20	Engine oil	<ul style="list-style-type: none"> Change (warm engine before draining). 	√	√	√	√	√	√	√
21	* Engine oil filter cartridge	<ul style="list-style-type: none"> Replace. 	√		√			√	
22	* Cooling system	<ul style="list-style-type: none"> Check hoses for cracks or damage. Replace if necessary. 		√	√	√	√	√	√
		<ul style="list-style-type: none"> Change with ethylene glycol anti-freeze coolant every 24 months. 						Change.	
23	* Front and rear brake switches	<ul style="list-style-type: none"> Check operation. 	√	√	√	√	√	√	√
24	* Control cables	<ul style="list-style-type: none"> Apply Yamaha chain and cable lube or engine oil SAE 10W-30 thoroughly. 	√	√	√	√	√	√	√
25	* Throttle grip housing and cable	<ul style="list-style-type: none"> Check operation and free play. Adjust the throttle cable free play if necessary. Lubricate the throttle grip housing and cable. 		√	√	√	√	√	√

PERIODIC MAINTENANCE

No.	ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
			600 mi (1000 km) or 1 month	4000 mi (7000 km) or 6 months	8000 mi (13000 km) or 12 months	12000 mi (19000 km) or 18 months	16000 mi (25000 km) or 24 months	20000 mi (31000 km) or 30 months
26	* Lights, signals and switches	<ul style="list-style-type: none"> • Check operation. • Adjust headlight beam. 	√	√	√	√	√	√

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

NOTE: _____

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

EAU17650

NOTE: _____

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

EAS20470

ENGINE

EAS20530

ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

NOTE:

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

1. Remove:

- Rider seat
- Left side cover
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
Refer to "FUEL TANK" on page 7-1.
- Front cylinder left cover
- Front cylinder right cover
- Rear cylinder left cover
- Rear cylinder right cover
Refer to "ENGINE REMOVAL" on page 5-1.

2. Remove:

- Throttle body
- Intake manifold assembly
Refer to "THROTTLE BODIES" on page 7-7.

3. Drain:

- Coolant
Refer to "CHANGING THE COOLANT" on page 3-17.

4. Remove:

- Front cylinder thermostat inlet hose
- Rear cylinder thermostat inlet hose
Refer to "THERMOSTAT" on page 6-4.

5. Disconnect:

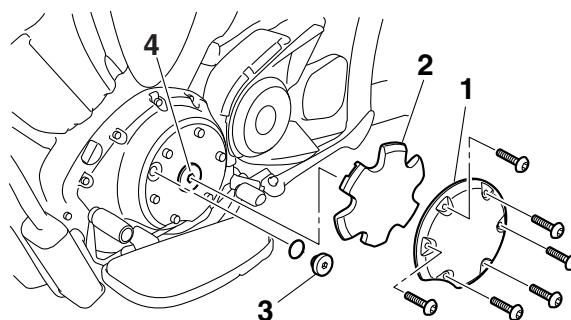
- Spark plug caps
Refer to "ENGINE REMOVAL" on page 5-1.

6. Remove:

- Spark plugs
Refer to "CAMSHAFTS" on page 5-12.

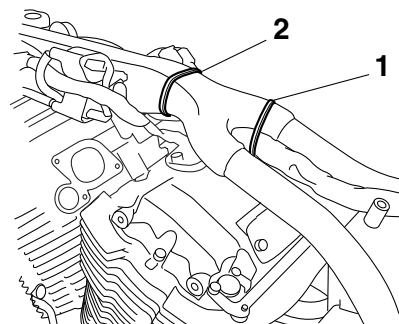
7. Remove:

- Damper cover "1"
- Damper "2"
- Timing mark accessing screw "3"
- Crankshaft end screw "4"



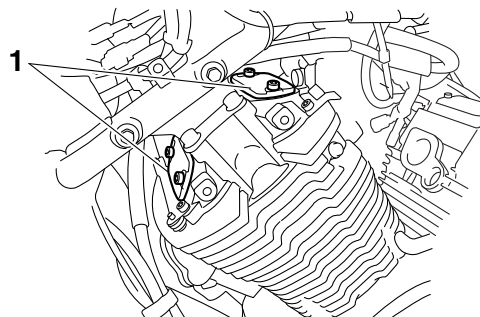
8. Remove:

- Plastic locking tie "1"
- Plastic locking tie "2"



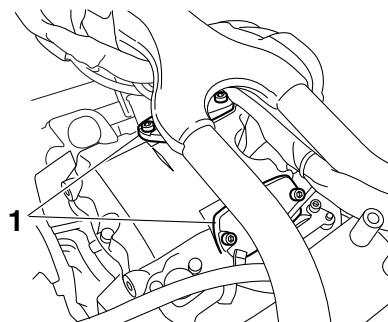
9. Remove:

- Front cylinder tappet covers "1"



10. Remove:

- Rear cylinder tappet covers "1"



11. Measure:

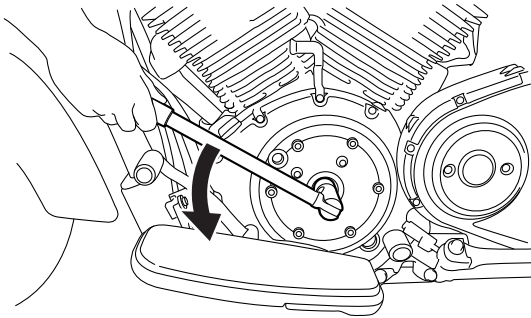
- Valve clearance
Out of specification → Adjust.



Valve clearance (cold)
Intake
 0.09–0.13 mm (0.0035–0.0051 in)
Exhaust
 0.14–0.18 mm (0.0055–0.0071 in)

Front cylinder

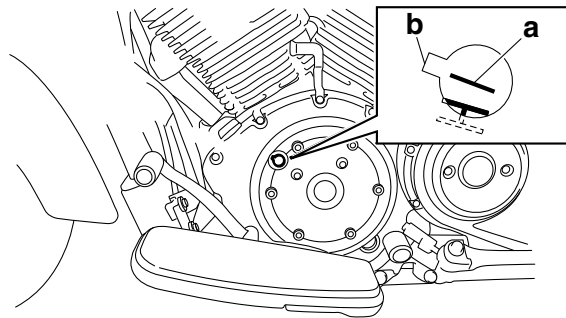
- a. Turn the crankshaft counterclockwise.



- b. When the front cylinder piston is at TDC on the compression stroke, align the TDC mark “a” on the generator rotor with the slot “b” in the generator cover.

NOTE:

- When the piston is at TDC on the compression stroke, there should be clearance between the valve stem tips and their respective rocker arm adjusting screws.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.



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



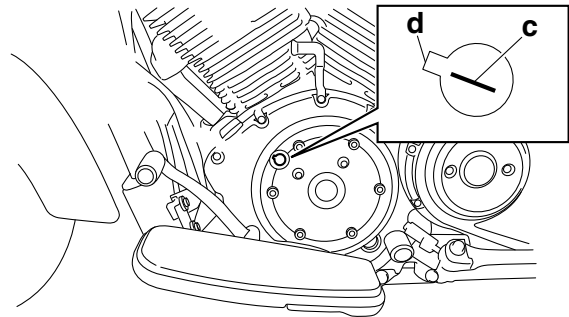
Thickness gauge
 90890-03180
Feeler gauge set
 YU-26900-9

Rear cylinder

- a. Turn the crankshaft counterclockwise from the front cylinder piston TDC by 300 degrees.
- b. When the rear cylinder piston is at TDC on the compression stroke, align the TDC mark “c” on the generator rotor with the slot “d” in the generator cover.

NOTE:

- When the piston is at TDC on the compression stroke, there should be clearance between the valve stem tips and their respective rocker arm adjusting screws.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.



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

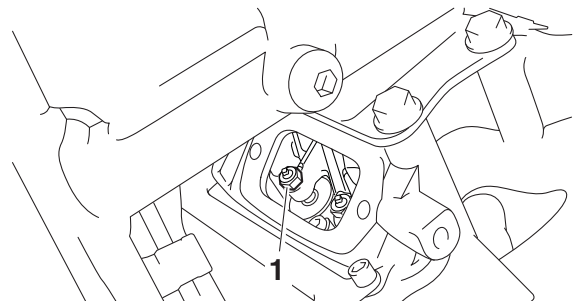


Thickness gauge
 90890-03180
Feeler gauge set
 YU-26900-9

12.Adjust:

- Valve clearance

- a. Loosen the locknut “1”.



- b. Insert a thickness gauge “2” between the end of the adjusting screw and the valve tip.



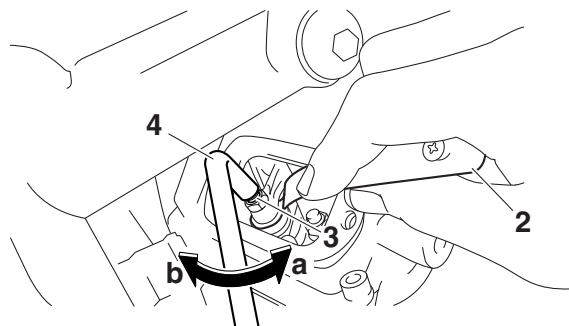
Thickness gauge
90890-03180
Feeler gauge set
YU-26900-9

- c. Turn the adjusting screw "3" in direction "a" or "b" with the tappet adjusting tool "4" until the specified valve clearance is obtained.



Tappet adjusting tool
90890-04154
YM-04154

Direction "a"
Valve clearance is increased.
Direction "b"
Valve clearance is decreased.



- d. Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.



Locknut (rocker arm adjusting screw)
14 Nm (1.4 m·kg, 10 ft·lb)

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



13.Install:

- Rear cylinder tappet covers
- Front cylinder tappet covers



Rear cylinder tappet cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
Front cylinder tappet cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

14.Install:

- Plastic locking ties

15.Install:

- Crankshaft end screw
(along with the O-ring **New**)
- Timing mark accessing screw
(along with the O-ring **New**)
- Damper
- Damper cover



Crankshaft end screw
10 Nm (1.0 m·kg, 7.2 ft·lb)
Timing mark accessing screw
6 Nm (0.6 m·kg, 4.3 ft·lb)
Damper cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

16.Install:

- All removed parts

NOTE: _____
For installation, reverse the removal procedure.

EAS20570

SYNCHRONIZING THE THROTTLE BODIES

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

1. Stand the vehicle on a level surface.

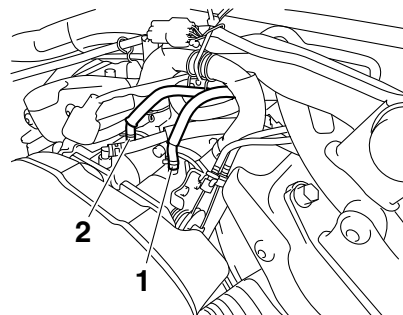
NOTE: _____
Place the vehicle on a suitable stand.

2. Remove:


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

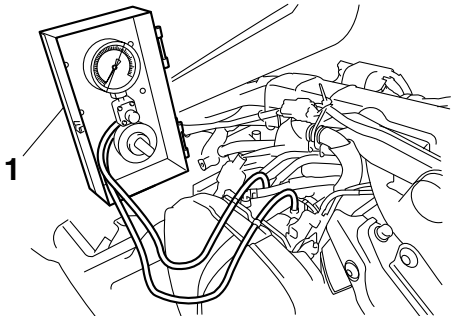
3. Disconnect:

- Front cylinder intake air pressure sensor hose "1"
- Rear cylinder intake air pressure sensor hose "2"

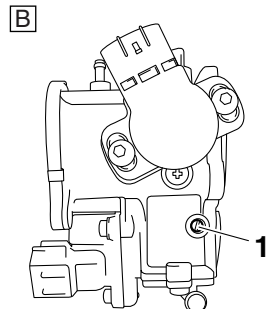
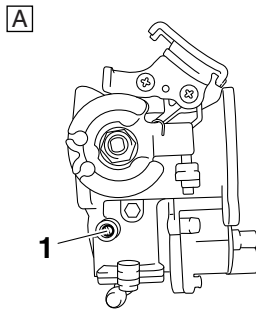
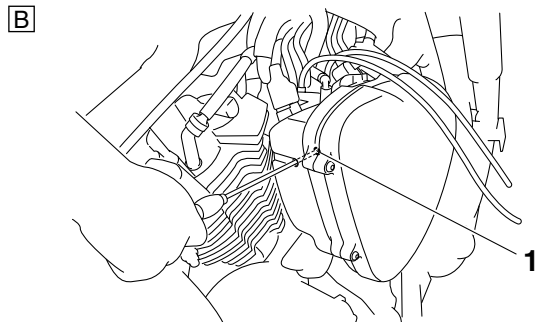
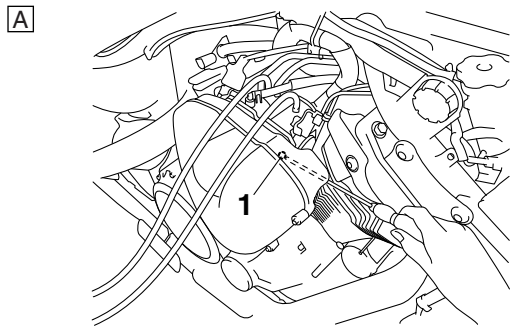


- 4. Install:
 - Vacuum gauge "1"
 - Digital tachometer

	<p>Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456</p>
---	---



- 5. Install:
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - 6. Adjust:
 - Throttle body synchronization
-
- a. Measure the vacuum pressure of the front cylinder throttle body and rear cylinder throttle body.
 - b. Using the throttle body with the lowest vacuum pressure as the standard, turn the air screw "1" of the other throttle body to adjust its vacuum pressure.
 - c. If the vacuum pressure of the throttle body with the lower pressure is out of specification, adjust it to specification first, and then synchronize the throttle bodies.



A. Front cylinder throttle body
B. Rear cylinder throttle body

- NOTE:** _____
- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
 - If the air screw is removed, turn the screw 3/4 turn in and be sure to synchronize the throttle body.

ECA14900

CAUTION: _____

Do not use the throttle valve adjusting screws to adjust the throttle body synchronization.

	<p>Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456</p>
---	---



Intake vacuum
32.0–37.3 kPa (9.4–11.0 inHg)
(240–280 mmHg)

NOTE:

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



7. Measure:

- Engine idling speed
 Out of specification → Adjust.
 Make sure that the vacuum pressure is within specification.

8. Stop the engine and remove the measuring equipment.

9. Connect:

- Rear cylinder intake air pressure sensor
- Front cylinder intake air pressure sensor

10. Adjust:

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



Throttle cable free play
4.0–6.0 mm (0.16–0.24 in)

11. Install:

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

EAS20630

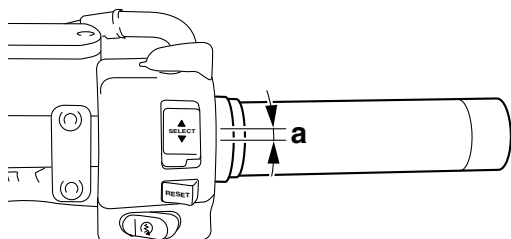
ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:

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

1. Check:

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



Throttle cable free play
4.0–6.0 mm (0.16–0.24 in)

2. Remove:

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

3. Adjust:

- Throttle cable free play



Throttle body side

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

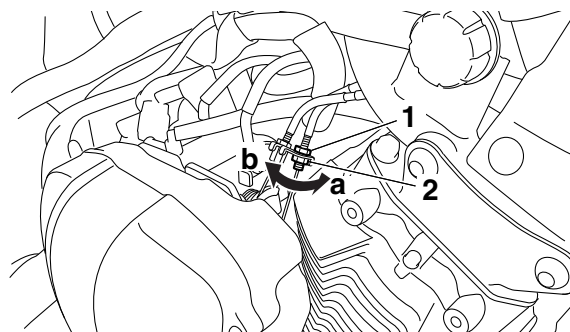
Direction “a”

Throttle cable free play is increased.

Direction “b”

Throttle cable free play is decreased.

- Tighten the locknut.



NOTE:

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



Handlebar side

- Slide back the throttle cable holder “1”.
- Loosen the locknut “2”.
- Turn the adjusting nut “3” in direction “a” or “b” until the specified throttle cable free play is obtained.

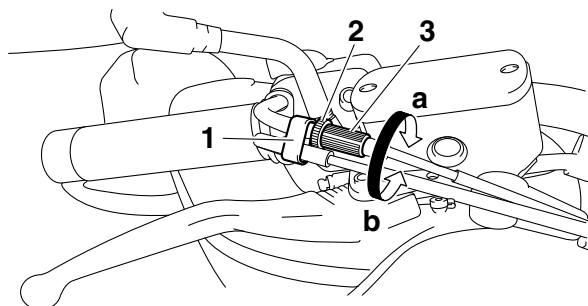
Direction “a”

Throttle cable free play is increased.

Direction “b”

Throttle cable free play is decreased.

- d. Tighten the locknut.
- e. Slide the throttle cable holder to its original position.



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

EAS20680

CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
 - Front cylinder left cover
 - Rear cylinder right cover
Refer to “ENGINE REMOVAL” on page 5-1.
2. Disconnect:
 - Spark plug cap
3. Remove:
 - Spark plug

ECA13320

CAUTION:

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

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



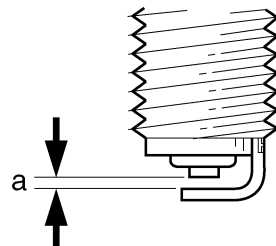
Manufacturer/model
NGK/LMAR7A-9

5. Check:
 - Electrode
Damage/wear → Replace the spark plug.
 - Insulator
Abnormal color → Replace the spark plug.
Normal color is medium-to-light tan.
6. Clean:
 - Spark plug
(with a spark plug cleaner or wire brush)

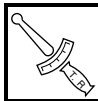
7. Measure:
 - Spark plug gap “a”
(with a wire thickness gauge)
Out of specification → Regap.



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



8. Install:
 - Spark plug



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

NOTE:

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

9. Connect:
 - Spark plug cap
10. Install:
 - Rear cylinder right cover
 - Front cylinder left cover
Refer to “ENGINE REMOVAL” on page 5-1.

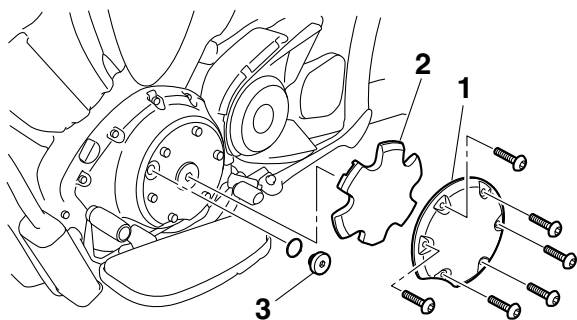
EAS20700

CHECKING THE IGNITION TIMING

NOTE:

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

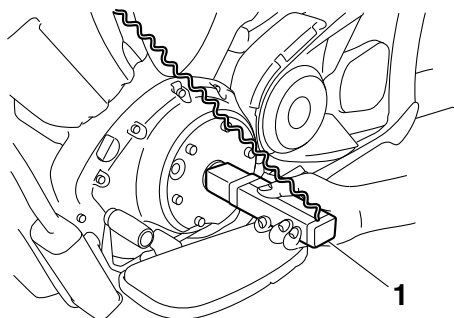
1. Remove:
 - Front cylinder covers
Refer to “ENGINE REMOVAL” on page 5-1.
2. Remove:
 - Damper cover “1”
 - Damper “2”
 - Timing mark accessing screw “3”
(along with the O-ring)



3. Connect:
- Timing light "1"
 - Digital tachometer



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



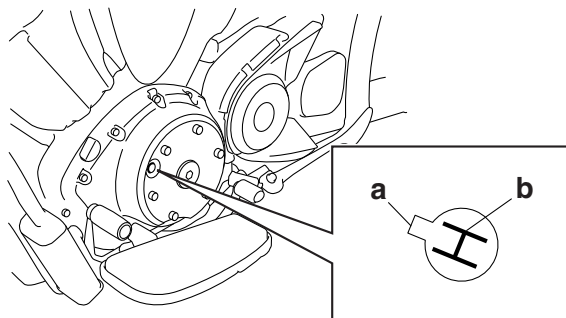
4. Check:
- Ignition timing

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



Engine idling speed
950–1050 r/min

- b. Check that slot "a" in the generator cover is within the firing range "b" on the generator rotor.
 Incorrect firing range → Check the ignition system.



NOTE: _____
 The ignition timing is not adjustable.



5. Install:
- Timing mark accessing screw
 (along with the O-ring **New**)
 - Damper
 - Damper cover



Timing mark accessing screw
6 Nm (0.6 m·kg, 4.3 ft·lb)
Damper cover bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

6. Install:
- Front cylinder covers
- Refer to "ENGINE REMOVAL" on page 5-1.

EAS20710

MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

NOTE: _____

Insufficient compression pressure will result in a loss of performance.

1. Measure:
- Valve clearance
 Out of specification → Adjust.
 Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-4.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
- Front cylinder covers
 - Rear cylinder covers
- Refer to "ENGINE REMOVAL" on page 5-1.
4. Disconnect:
- Spark plug caps
5. Remove:
- Spark plug

ECA13340

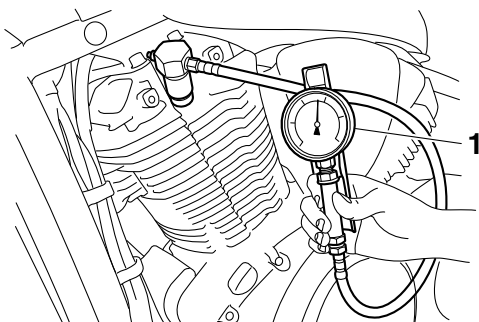
CAUTION: _____

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

6. Install:
- Compression gauge "1"



Compression gauge
90890-03081
Engine compression tester
YU-33223



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



Standard compression pressure
(at sea level)
1450 kPa/400 r/min (206.2
psi/400 r/min) (14.5 kgf/cm²/400
r/min)
Minimum–maximum
1200–1500 kPa (170.7–213.3 psi)
(12.0–15.0 kgf/cm²)

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

NOTE: _____

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

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

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



8. Install:
- Spark plug



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

9. Connect:
- Spark plug caps
10. Install:
- Rear cylinder covers
 - Front cylinder covers
- Refer to “ENGINE REMOVAL” on page 5-1.

EAS20750

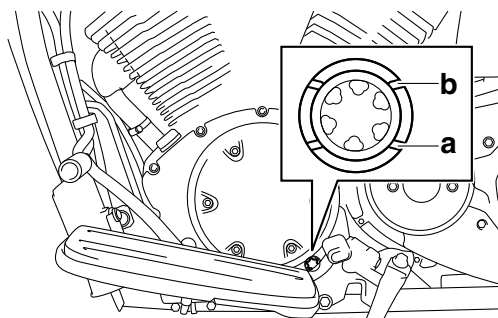
CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

NOTE: _____

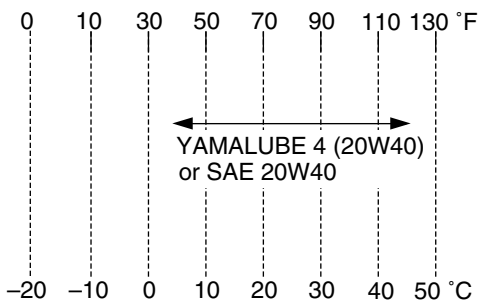
- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:
- Engine oil level
- The engine oil level should be between the minimum level mark “a” and maximum level mark “b”.
- Below the minimum level mark → Add the recommended engine oil to the proper level.





Type
**YAMALUBE 4 (20W40) or
 SAE20W40**
**Recommended engine oil grade
 API service SG type or higher,
 JASO standard MA**



ECA13380

CAUTION:

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives.
- Do not allow foreign materials to enter the crankcase.

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

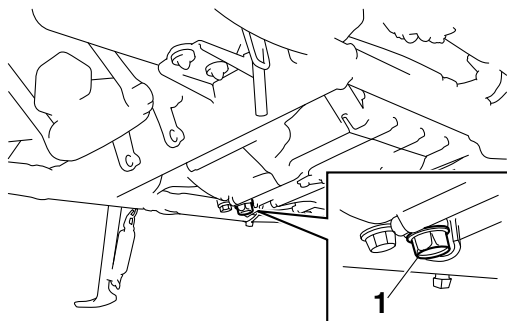
NOTE:

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

EAS20780

CHANGING THE ENGINE OIL

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



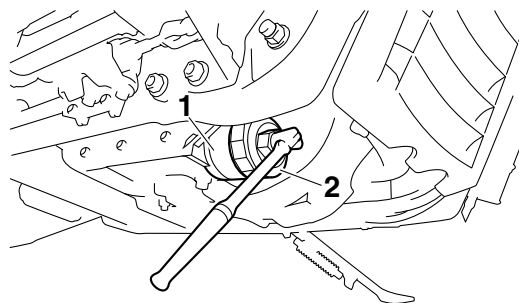
4. Drain:
 - Engine oil (completely from the crankcase)
5. If the oil filter cartridge is also to be replaced, perform the following procedure.



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



Oil filter wrench
90890-01469
YM-01469

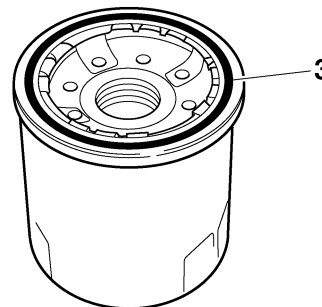


- b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of engine oil.

ECA13390

CAUTION:

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



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



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



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



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

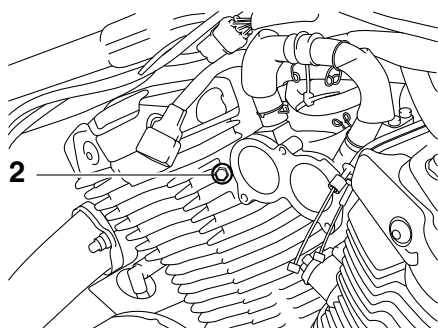
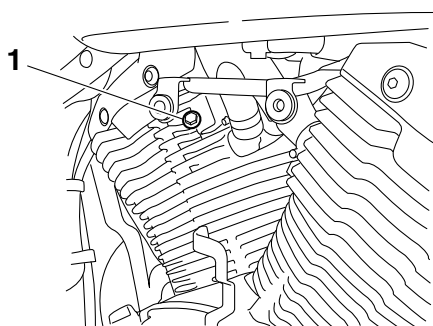
7. Fill:
- Crankcase
(with the specified amount of the recommended engine oil)



Engine oil quantity
Total amount
3.70 L (3.91 US qt) (3.26 Imp.qt)
Without oil filter cartridge replacement
3.20 L (3.38 US qt) (2.82 Imp.qt)
With oil filter cartridge replacement
3.40 L (3.59 US qt) (2.99 Imp.qt)

8. Start the engine, warm it up for several minutes, and then turn it off.
9. Check:
- Engine
(for engine oil leaks)
10. Check:
- Engine oil level
Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-11.
11. Remove:
- Left side cover
Refer to “GENERAL CHASSIS” on page 4-1.
 - Throttle body
Refer to “THROTTLE BODIES” on page 7-7.
12. Check:
- Engine oil pressure

- a. Slightly loosen the front cylinder oil check bolt “1” and rear cylinder oil check bolt “2”.



- b. Start the engine and keep it idling until engine oil starts to seep from the oil check bolts. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
- c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to “OIL PUMP” on page 5-73.
- d. Start the engine after solving the problem(s) and check the engine oil pressure again.
- e. Tighten the oil check bolts to specification.



Oil check bolt
15 Nm (1.5 m·kg, 11 ft·lb)

13. Install:
- Throttle body
Refer to “THROTTLE BODIES” on page 7-7.
 - Left side cover
Refer to “GENERAL CHASSIS” on page 4-1.

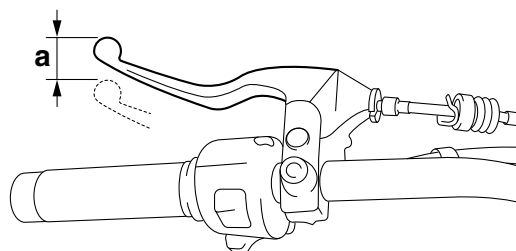
EAS20870

ADJUSTING THE CLUTCH LEVER FREE PLAY

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



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



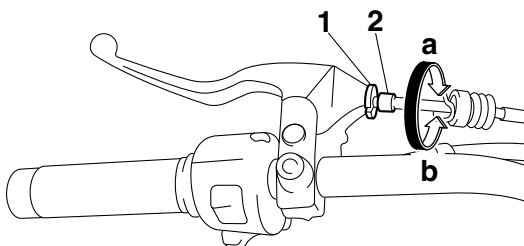
2. Adjust:
- Clutch lever free play

Handlebar side

- a. Loosen the locknut “1”.
- b. Turn the adjusting bolt “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”.



NOTE:

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



3. Remove:

- Left side panel
- Right side panel

Refer to “FUEL TANK” on page 7-1.

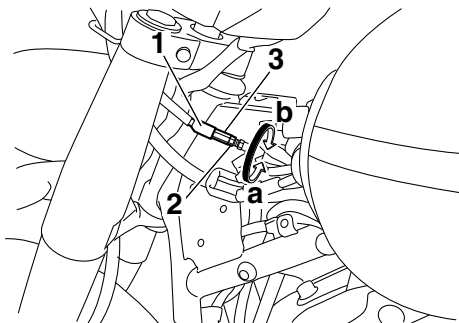


Engine side

- 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 clutch lever free play is obtained.

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

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



4. Install:
 - Right side panel
 - Left side panel

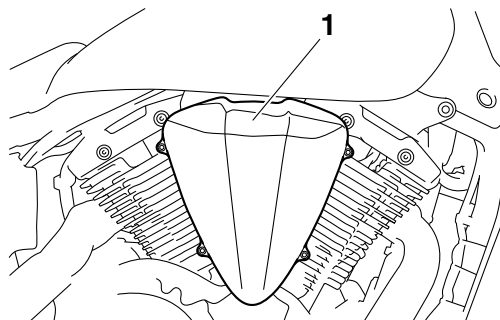
Refer to “FUEL TANK” on page 7-1.

EAS20960

REPLACING THE AIR FILTER ELEMENT

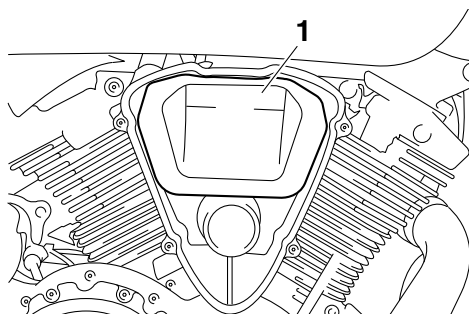
1. Remove:

- Air filter case cover “1”



2. Remove:

- Air filter element “1”



3. Check:

- Air filter element
Damage → Replace.

NOTE:

The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

4. Install:

- Air filter element
- Air filter case cover

ECA3D81015

CAUTION:

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

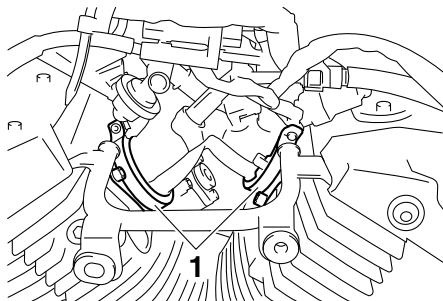
NOTE:

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

EAS3D81008

CHECKING THE INTAKE MANIFOLD JOINTS

- Remove:
 - Left side cover
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - Front cylinder thermostat inlet hose
 - Rear cylinder thermostat inlet hose
Refer to "THERMOSTAT" on page 6-4.
- Check:
 - Intake manifold joints "1"
Cracks/damage → Replace.



- Install:
 - Rear cylinder thermostat inlet hose
 - Front cylinder thermostat inlet hose
Refer to "THERMOSTAT" on page 6-4.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - Left side cover
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21030

CHECKING THE FUEL LINE

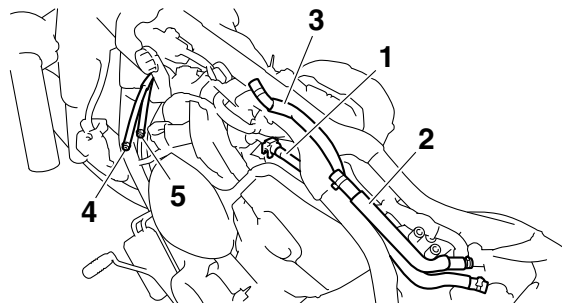
The following procedure applies to all of the fuel, air vent and breather hoses.

- Remove:
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
- Check:
 - Fuel hose "1"
 - Air vent hose "2"
 - Fuel cock hose "3"
 - Fuel tank breather hose "4"
 - Fuel tank overflow hose "5"
Cracks/damage → Replace.
Loose connection → Connect properly.

ECA3D81009

CAUTION:

Make sure the fuel tank breather hose and fuel tank overflow hose are routed correctly.

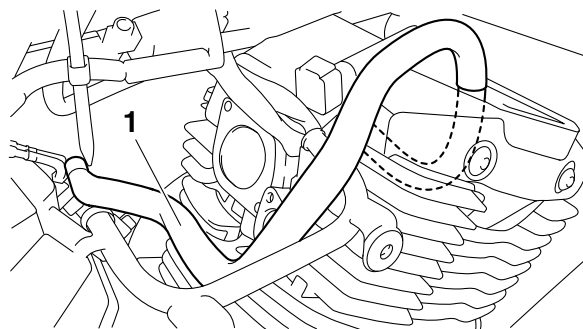


- Install:
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - Rider seat
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21070

CHECKING THE CRANKCASE BREATHER HOSE

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



ECA13450

CAUTION:

Make sure the crankcase breather hose is routed correctly.

- Install:
 - Fuel tank
Refer to "FUEL TANK" on page 7-1.
 - Air filter case

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

EAS21080

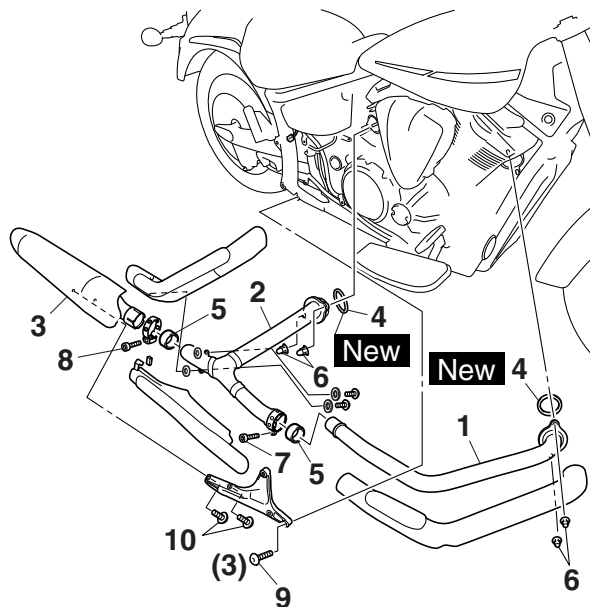
CHECKING THE EXHAUST SYSTEM

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

1. Check:
 - Front cylinder exhaust pipe “1”
 - Rear cylinder exhaust pipe “2”
 - Muffler “3”
Cracks/damage → Replace.
 - Gaskets “4”
 - Gaskets “5”
Exhaust gas leaks → Replace.
2. Check:

Tightening torques

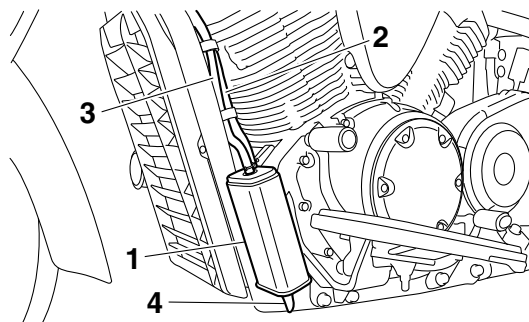
 - Exhaust pipe nuts “6”
 - Front cylinder exhaust pipe and rear cylinder exhaust pipe bolt “7”
 - Muffler and rear cylinder exhaust pipe bolt “8”
 - Muffler bracket and frame bolts “9”
 - Muffler bracket and muffler bolts “10”



EAS21090

CHECKING THE CANISTER (California only)

1. Check:
 - Canister “1”
 - Canister purge hose “2”
 - Canister charge hose “3”
 - Canister breather hose “4”
Cracks/damage → Replace.



EAS21110

CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

NOTE:

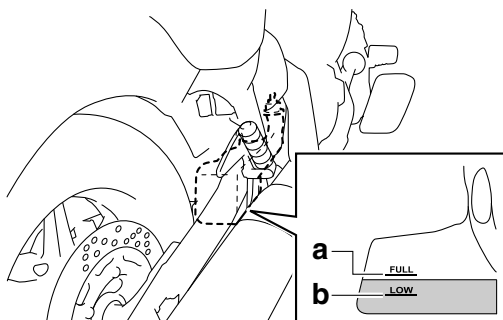
- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:

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

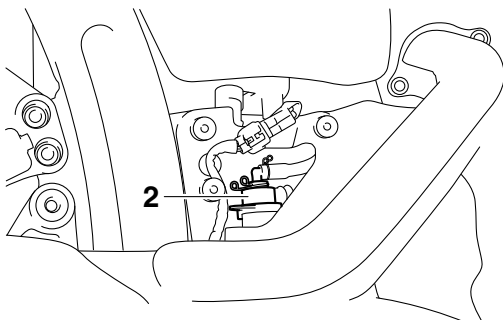
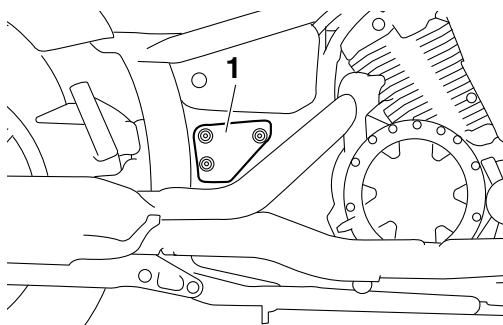


Exhaust pipe nut
20 Nm (2.0 m·kg, 14 ft·lb)
Front cylinder exhaust pipe and rear cylinder exhaust pipe bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
Muffler and rear cylinder exhaust pipe bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
Muffler bracket and frame bolt
53 Nm (5.3 m·kg, 38 ft·lb)
Muffler bracket and muffler bolt
35 Nm (3.5 m·kg, 25 ft·lb)



NOTE:

To add coolant, remove the coolant reservoir cap cover “1” and coolant reservoir cap “2”.



ECA13470

CAUTION:

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

3. Install:

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

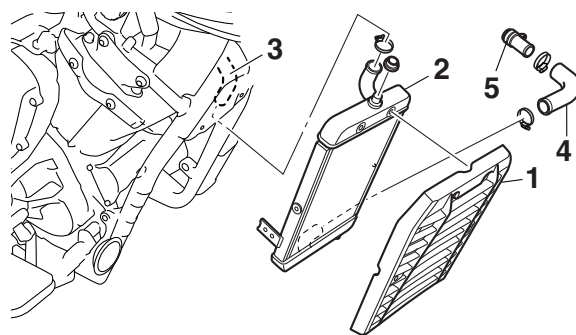
NOTE:

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

EAS21120

CHECKING THE COOLING SYSTEM

1. Remove:
- Front cylinder exhaust pipe
Refer to “ENGINE REMOVAL” on page 5-1.
2. Check:
- Radiator cover “1”
 - Radiator “2”
 - Radiator inlet hose “3”
 - Radiator outlet hose “4”
 - Radiator outlet pipe “5”
- Cracks/damage → Replace.
Refer to “RADIATOR” on page 6-1.



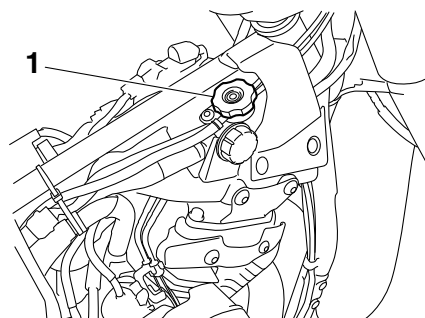
3. Install:

- Front cylinder exhaust pipe
Refer to “ENGINE REMOVAL” on page 5-1.

EAS21130

CHANGING THE COOLANT

1. Remove:
- Fuel tank
Refer to “FUEL TANK” on page 7-1.
 - Muffler
 - Coolant reservoir cover
Refer to “ENGINE REMOVAL” on page 5-1.
2. Remove:
- Radiator cap “1”



EWA13030

⚠ WARNING

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

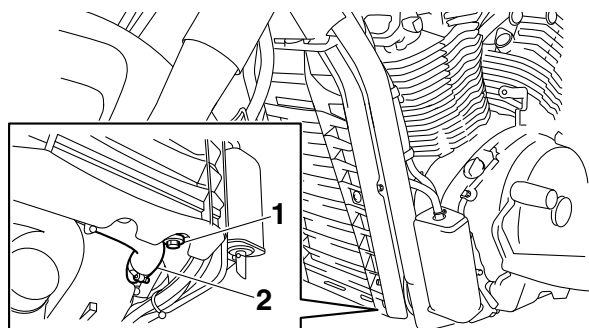
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counter-clockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

3. Remove:

- Coolant drain bolt (radiator) "1"
(along with the copper washer)

4. Disconnect:

- Radiator outlet hose "2"

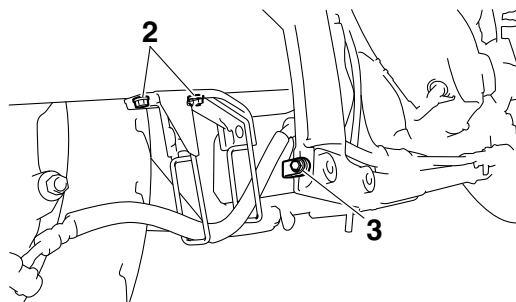
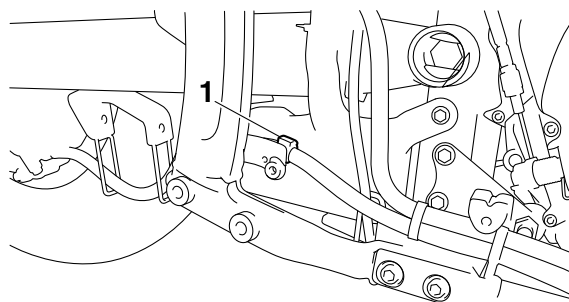


5. Drain:

- Coolant
(from the engine and radiator)

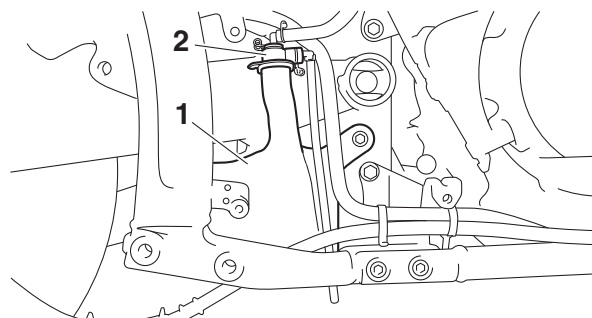
6. Remove:

- Rear brake hose plastic holder "1"
- Rear brake hose guide bolts "2"
- Rear brake hose holder "3"



7. Remove:

- Coolant reservoir "1"
- Coolant reservoir cap "2"



8. Drain:

- Coolant
(from the coolant reservoir)


9. Install:

- Coolant reservoir

	Coolant reservoir bolt 7 Nm (0.7 m·kg, 5.1 ft·lb)
---	---

10. Install:

- Rear brake hose holder
- Rear brake hose guide bolts
- Rear brake hose clamp

	Rear brake hose holder bolt 7 Nm (0.7 m·kg, 5.1 ft·lb)
	Rear brake hose guide bolt 7 Nm (0.7 m·kg, 5.1 ft·lb)


11. Connect:

- Radiator outlet hose

12. Install:

- Coolant drain bolt (radiator)

(along with the copper washer **New**)

	Coolant drain bolt (radiator) 2 Nm (0.2 m·kg, 1.4 ft·lb)
---	--

13.Fill:

- Cooling system
(with the specified amount of the recommended coolant)



Recommended antifreeze
High-quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Radiator capacity (including all routes)
2.10 L (2.22 US qt) (1.85 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)
0.45 L (0.48 US qt) (0.40 Imp.qt)

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

EWA13040

WARNING

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

ECA13480

CAUTION:

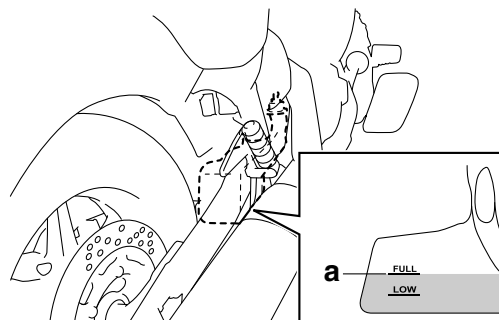
- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant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

14.Install:

- Radiator cap

15.Fill:

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



16.Install:

- Coolant reservoir cap

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

18.Check:

- Coolant level
Refer to "CHECKING THE COOLANT LEVEL" on page 3-16.

NOTE:

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

19.Install:

- Coolant reservoir cover
- Muffler
Refer to "ENGINE REMOVAL" on page 5-1.
- Fuel tank
Refer to "FUEL TANK" on page 7-1.

EAS21140


CHASSIS

EAS21150

ADJUSTING THE FRONT BRAKE LEVER FREE PLAY

1. Check:

- Front brake lever free play "a"
Out of specification → Adjust.



Front brake lever free play
2.0–5.0 mm (0.08–0.20 in)

2. Adjust:

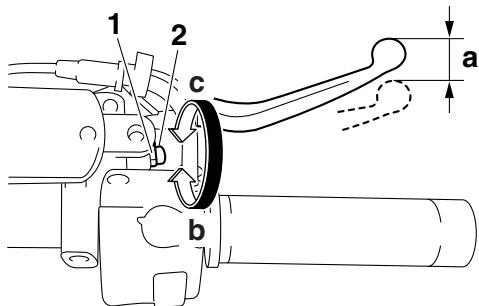
- Front brake lever free play



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

Direction "b"
Brake lever free play is increased.

Direction "c"
Brake lever free play is decreased.



c. Tighten the locknut.

EWA13050

WARNING

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

ECA3D81018

CAUTION:

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

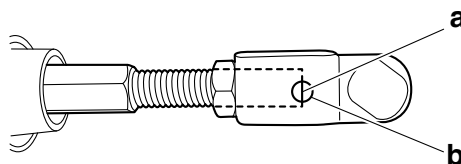


EAS21190

ADJUSTING THE REAR DISC BRAKE

1. Check:

- Brake pedal adjusting bolt position
Check that the end "a" of the brake pedal adjusting bolt is visible through the hole "b".
Incorrect → Adjust.

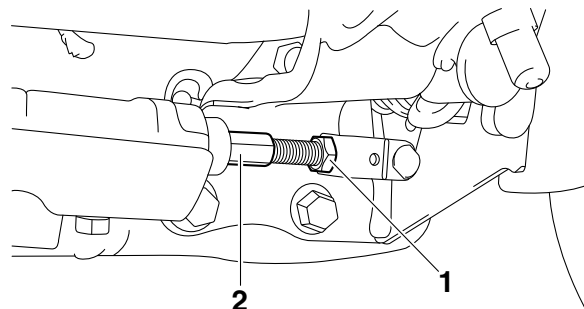


2. Adjust:

- Brake pedal adjusting bolt position



- a. Loosen the locknut "1".
- b. Adjust the brake pedal adjusting bolt "2" position by turning the adjusting bolt in or out so that its end is visible through the hole.



c. Tighten the locknut "1" to specification.



Locknut
16 Nm (1.6 m·kg, 11 ft·lb)

EWA3D81002

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.

ECA3D81019

CAUTION:

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



3. Adjust:

- Rear brake light switch
Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-22.

EAS21240

CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

NOTE:

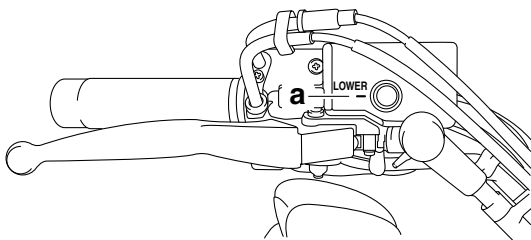
- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:

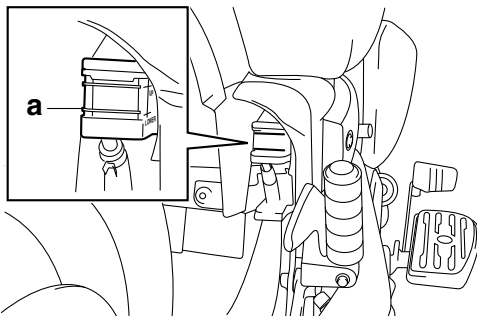
- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.



A



B



- A. Front brake
B. Rear brake

EWA3D81007

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

ECA13540

CAUTION:

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

NOTE:

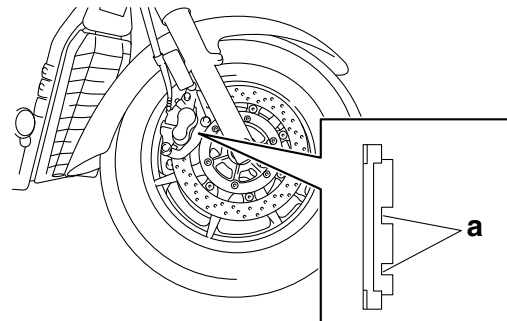
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

EAS21250

CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
 - Front brake pad
Wear indicators “a” almost touch the brake disc → Replace the brake pads as a set. Refer to “FRONT BRAKE” on page 4-22.



EAS21260

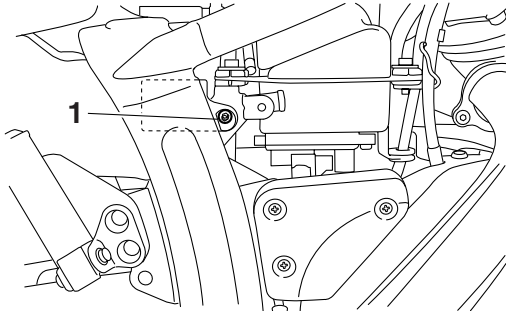
CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
 - Rear brake pad
Wear indicators “a” almost touch the brake disc → Replace the brake pads as a set. Refer to “REAR BRAKE” on page 4-34.

- a brake hose is loosened, disconnected or replaced.
- the brake fluid level is very low.
- brake operation is faulty.

1. Remove:
 - Rider seat
 - Sub-fuel tank cover
 Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
 - Brake fluid reservoir bolt “1”



NOTE:

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

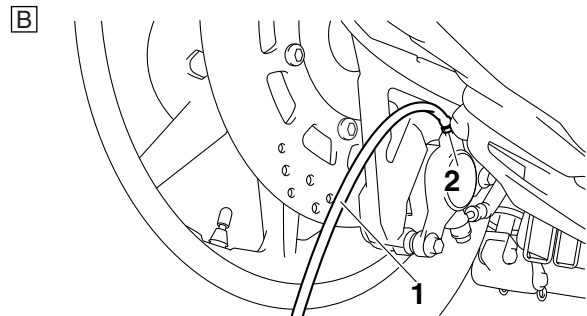
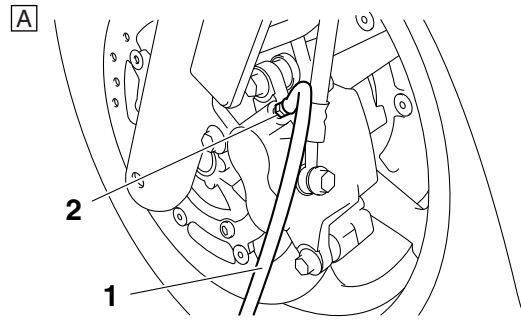
3. Install:
 - Brake fluid reservoir

NOTE:

Install the brake fluid reservoir temporarily.

4. Bleed:
 - Hydraulic brake system

- a. Fill the brake master cylinder reservoir or brake fluid reservoir to the proper level with the recommended 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. Front
- B. Rear

- d. Put the other end of the hose into an open container.
- e. Slowly apply the brake several times.
- f. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
- g. Loosen the bleed screw.

NOTE:

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

- 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. Tighten the bleed screw to specification.



**Bleed screw (front brake caliper)
6 Nm (0.6 m·kg, 4.3 ft·lb)
Bleed screw (rear brake caliper)
6 Nm (0.6 m·kg, 4.3 ft·lb)**

- k. Fill the brake master cylinder reservoir or brake fluid reservoir to the proper level with the recommended brake fluid.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

EWA13110

WARNING

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



5. Tighten:
 - Brake fluid reservoir bolt

	<p>Bleed fluid reservoir bolt 7 Nm (0.7 m·kg, 5.1 ft·lb) LOCTITE®</p>
--	--

6. Install:
 - Sub-fuel tank cover
 - Rider seat

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

EAS21380

ADJUSTING THE SHIFT PEDAL

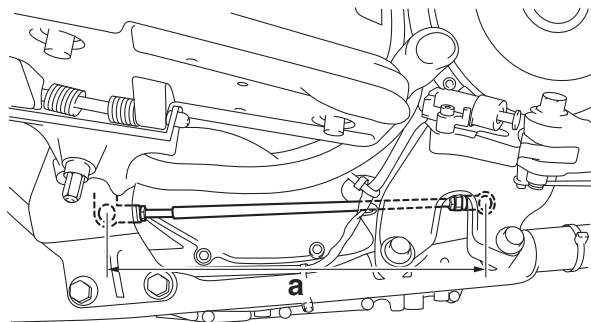
NOTE:

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

1. Measure:
 - Installed shift rod length “a”

Incorrect → Adjust.

	<p>Installed shift rod length 255–259 mm (10.04–10.20 in)</p>
--	--

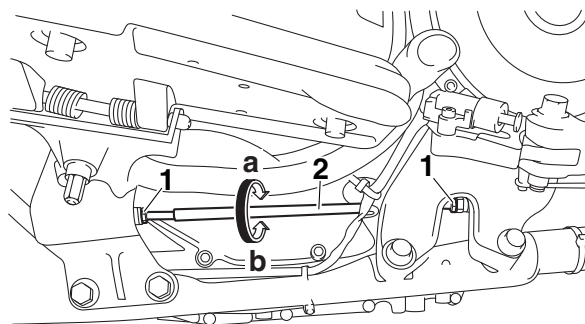


2. Adjust:
 - Installed shift rod length



- a. Loosen both locknuts “1”.
- b. Turn the shift rod “2” in direction “a” or “b” to obtain the correct shift rod length.

<p>Direction “a” Installed shift rod length is increased. Direction “b” Installed shift rod length is decreased.</p>



- c. Tighten the locknuts to specification.

	<p>Locknut 8 Nm (0.8 m·kg, 5.8 ft·lb)</p>
--	--

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



EAS21430

ADJUSTING THE DRIVE BELT SLACK

NOTE:

The drive belt slack must be checked at the tightest point on the belt.

ECA14950

CAUTION:

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

NOTE:

Measure the drive belt slack when the engine is cold, and when the drive belt is dry.

1. Stand the vehicle on a level surface.

EWA13120

WARNING

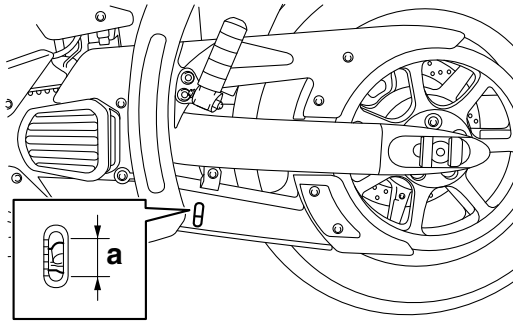
Securely support the vehicle so that there is no danger of it falling over.

NOTE:

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

2. Check:
 - Drive belt slack “a”

Out of specification → Adjust.

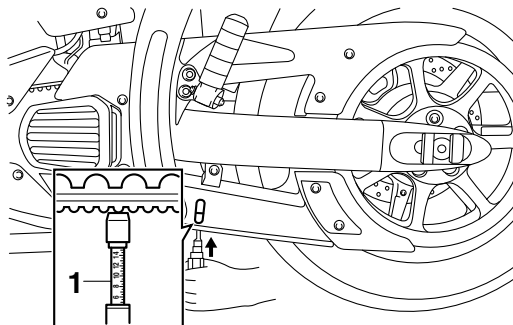


 **Drive belt slack (on the side-stand)**
 5.0–7.0 mm (0.20–0.28 in)
Drive belt slack (on a suitable stand)
 4.0–6.0 mm (0.16–0.24 in)

 **Belt tension gauge**
 90890-03170
Rear drive belt tension gauge
 YM-03170

NOTE:

- The level marks of the level window on the lower drive belt cover are in units of 5 mm (0.20 in). Use them as a standard for measuring the drive belt slack.
- Measure the drive belt slack when the drive belt has been pushed with 4.5 kg (10 lb) of pressure using a belt tension gauge “1”.

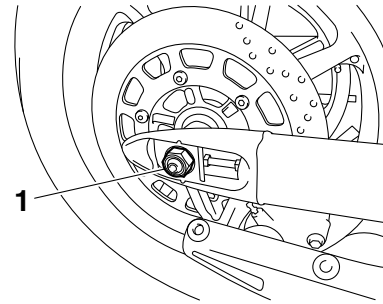


3. Remove:
 - Muffler
Refer to “ENGINE REMOVAL” on page 5-1.
4. Adjust:
 - Drive belt slack

NOTE:

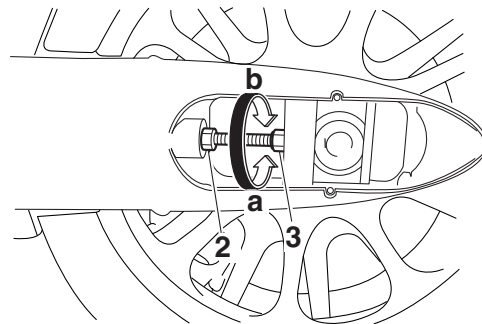
Place the vehicle on a suitable stand so that the rear wheel is elevated.

- a. Loosen the rear wheel axle nut “1”.



- b. Loosen both locknuts “2”.
- c. Turn both adjusting bolts “3” in direction “a” or “b” until the specified drive belt slack is obtained.


Direction “a”
 Drive belt is tightened.
Direction “b”
 Drive belt is loosened.



NOTE:

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

- d. Tighten the locknuts to specification.

 **Locknut**
 16 Nm (1.6 m·kg, 11 ft·lb)

- e. Tighten the rear wheel axle nut to specification.

 **Rear wheel axle nut**
 150 Nm (15.0 m·kg, 110 ft·lb)



5. Install:
 - Muffler
Refer to “ENGINE REMOVAL” on page 5-1.

EAS21510

CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

EWA13120

WARNING

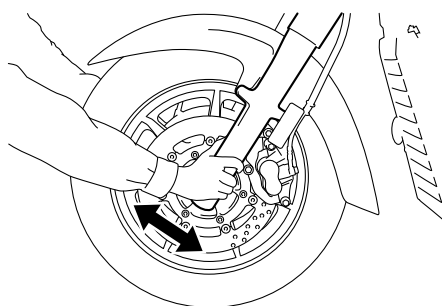
Securely support the vehicle so that there is no danger of it falling over.

NOTE:

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

2. Check:

- Steering head
Grasp the bottom of the front fork legs and gently rock the front fork.
Blinding/looseness → Adjust the steering head.



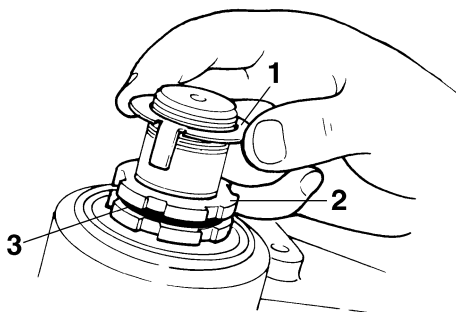
3. Remove:

- Upper bracket
Refer to "FRONT FORK" on page 4-50.

4. Adjust:

- Steering head

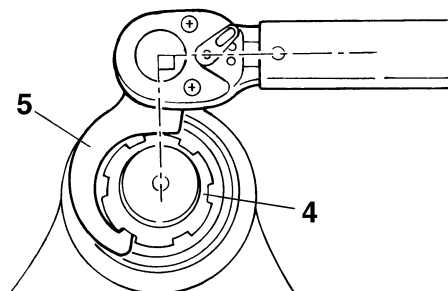
a. Remove the lock washer "1", the upper ring nut "2", and the rubber washer "3".



b. Tighten the lower ring nut "4" to specification with a steering nut wrench "5".

NOTE:

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



Steering nut wrench
90890-01403
Spanner wrench
YU-33975



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

c. Loosen the lower ring nut "4" completely and then tighten it to specification with a steering nut wrench.

EWA13140

WARNING

Do not overtighten the lower ring nut.



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

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

Refer to "STEERING HEAD" on page 4-59.

e. Install the rubber washer "3".

f. Install the upper ring nut "2".

NOTE:

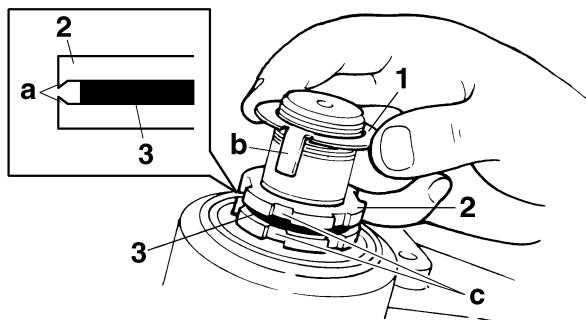
Install the upper ring nut and lower ring nut with their sharp-edged sides "a" facing each other.

g. Finger tighten the upper ring nut "2", and then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer "1".

NOTE:

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



5. Install:
- Upper bracket
Refer to "FRONT FORK" on page 4-50.

EAS21530

CHECKING THE FRONT FORK

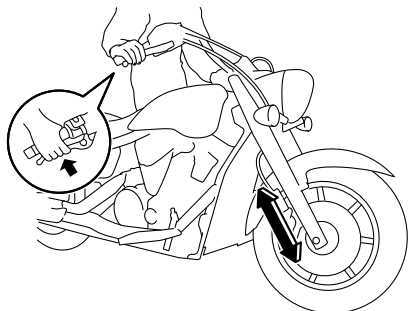
1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Check:
 - Inner tube
Damage/scratches → Replace.
 - Oil seal
Oil leakage → Replace.
3. Hold the vehicle upright and apply the front brake.
4. Check:
 - Front fork operation
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
Rough movement → Repair.
Refer to "FRONT FORK" on page 4-50.



EAS21590

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

EWA13120

WARNING

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

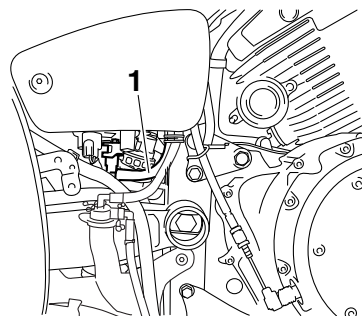
Spring preload

ECA13590

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Remove:
 - Rear cylinder exhaust pipe
 - Coolant reservoir cover
Refer to "ENGINE REMOVAL" on page 5-1.
2. Disconnect:
 - Fuel hose "1"
(from sub-fuel tank)
Refer to "FUEL TANK" on page 7-1.



3. Adjust:
 - Spring preload

- a. Adjust the spring preload with the special wrench "1" and wrench handle "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 decreased (suspension is softer).

Direction "b"

Spring preload is increased (suspension is harder).



Spring preload adjusting positions

Minimum

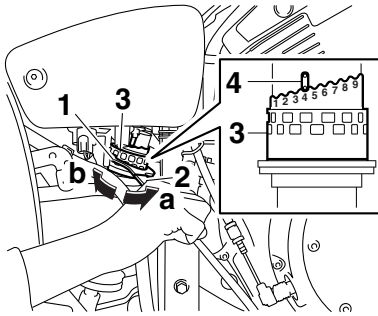
1

Standard

4

Maximum

9



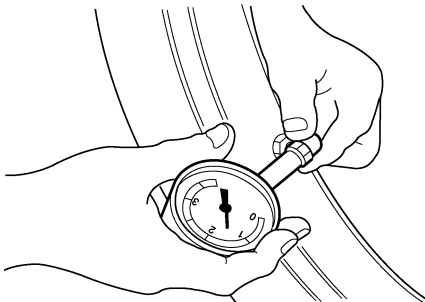
4. Connect:
 - Fuel hose
Refer to "FUEL TANK" on page 7-1.
5. Install:
 - Rear cylinder exhaust pipe
 - Coolant reservoir cover
Refer to "ENGINE REMOVAL" on page 5-1.

EAS21650

CHECKING THE TIRES

The following procedure applies to both of the tires.

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



EWA13180

WARNING

- The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
- The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
- Operation of an overloaded vehicle could cause tire damage, an accident or an injury. **NEVER OVERLOAD THE VEHICLE.**



Tire air pressure (measured on cold tires)

**Loading condition
0–90 kg (0–198 lb)**

Front

250 kPa (36 psi) (2.50 kgf/cm²)

Rear

280 kPa (41 psi) (2.80 kgf/cm²)

Loading condition

XVS13AW(C) 90–210 kg (198–463 lb)

XVS13CTW(C) 90–190 kg (198–419 lb)

Front

250 kPa (36 psi) (2.50 kgf/cm²)

Rear

280 kPa (41 psi) (2.80 kgf/cm²)

Maximum load

XVS13AW(C) 210 kg (463 lb)

XVS13CTW(C) 190 kg (419 lb)

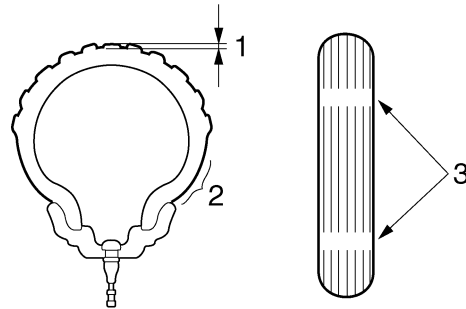
*** Total weight of rider, passenger, cargo and accessories**

EWA13190

WARNING

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

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



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



Wear limit (front)

1.0 mm (0.04 in)

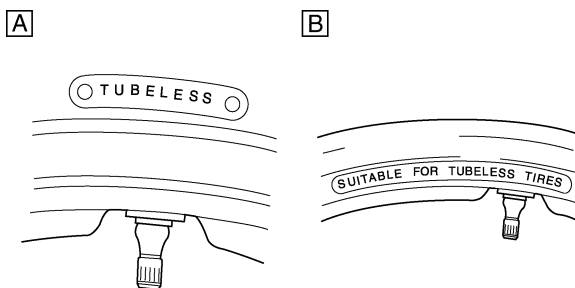
Wear limit (rear)

1.0 mm (0.04 in)

EWA14080

WARNING

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



A. Tire
B. Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

EWA14090

WARNING

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



Front tire
Size
 130/90-16M/C 67H
Manufacturer/model
 DUNLOP/D404F X
Manufacturer/model
 BRIDGESTONE/EXEDRA G721



Rear tire
Size
 170/70B 16M/C 75H
Manufacturer/model
 DUNLOP/K555
Manufacturer/model
 BRIDGESTONE/EXEDRA G722
 G

EWA13210

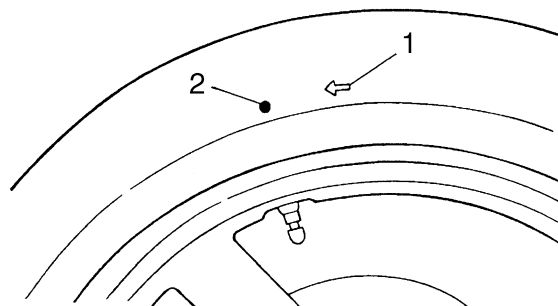
WARNING

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

NOTE:

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

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



EAS21670

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

EWA13260

WARNING

Never attempt to make any repairs to the wheel.

NOTE:

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

EAS21690

CHECKING AND LUBRICATING THE CABLES

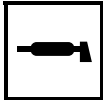
The following procedure applies to all of the inner and outer cables.

EWA13270

WARNING

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

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



Recommended lubricant
Engine oil or a suitable cable lubricant

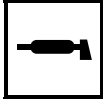
NOTE:

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

EAS21700

LUBRICATING THE LEVERS

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

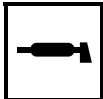


Recommended lubricant
Lithium-soap-based grease

EAS21710

LUBRICATING THE PEDAL

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

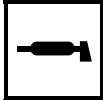


Recommended lubricant
Lithium-soap-based grease

EAS21720

LUBRICATING THE SIDESTAND

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



Recommended lubricant
Lithium-soap-based grease

EAS21740

LUBRICATING THE REAR SUSPENSION

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



Recommended lubricant
Molybdenum disulfide grease

EAS21750

ELECTRICAL SYSTEM

EAS21760

CHECKING AND CHARGING THE BATTERY

Refer to "ELECTRICAL COMPONENTS" on page 8-67.

EAS21770

CHECKING THE FUSES

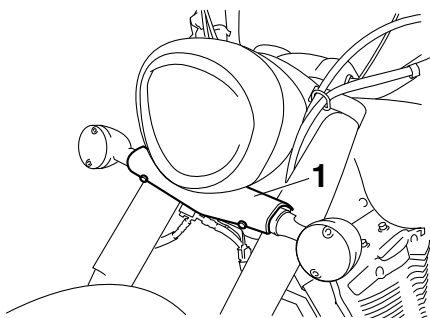
Refer to "ELECTRICAL COMPONENTS" on page 8-67.

EAS21790

REPLACING THE HEADLIGHT BULB

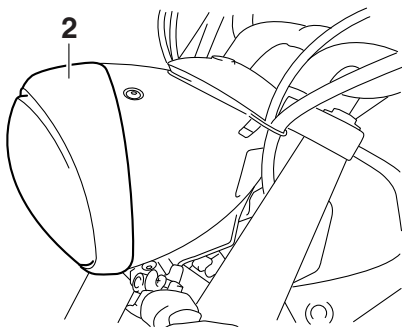
1. Remove:

- Turn signal light bracket cover "1"



2. Remove:

- Headlight lens unit "2"

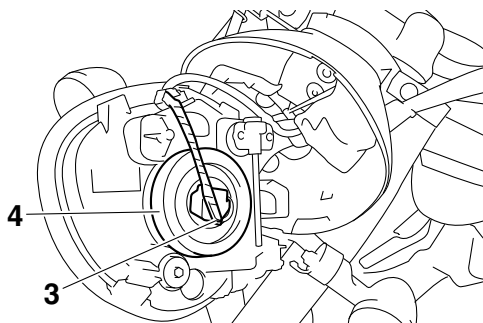


3. Disconnect:

- Headlight coupler "3"

4. Remove:

- Bulb cover "4"

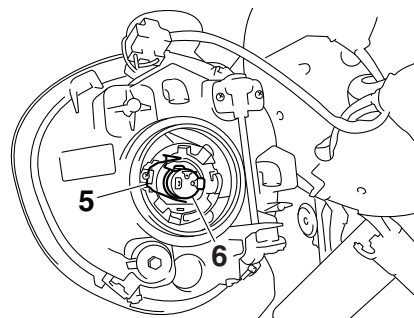


5. Detach:

- Headlight bulb holder "5"

6. 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.

7. Install:

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

ECA13690

CAUTION:

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

8. Attach:

- Headlight bulb holder

9. Install:

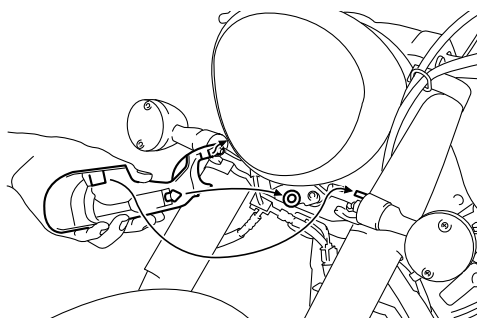
- Bulb cover

10. Connect:

- Headlight coupler

11. Install:

- Headlight lens unit
- Turn signal light bracket cover



CHASSIS

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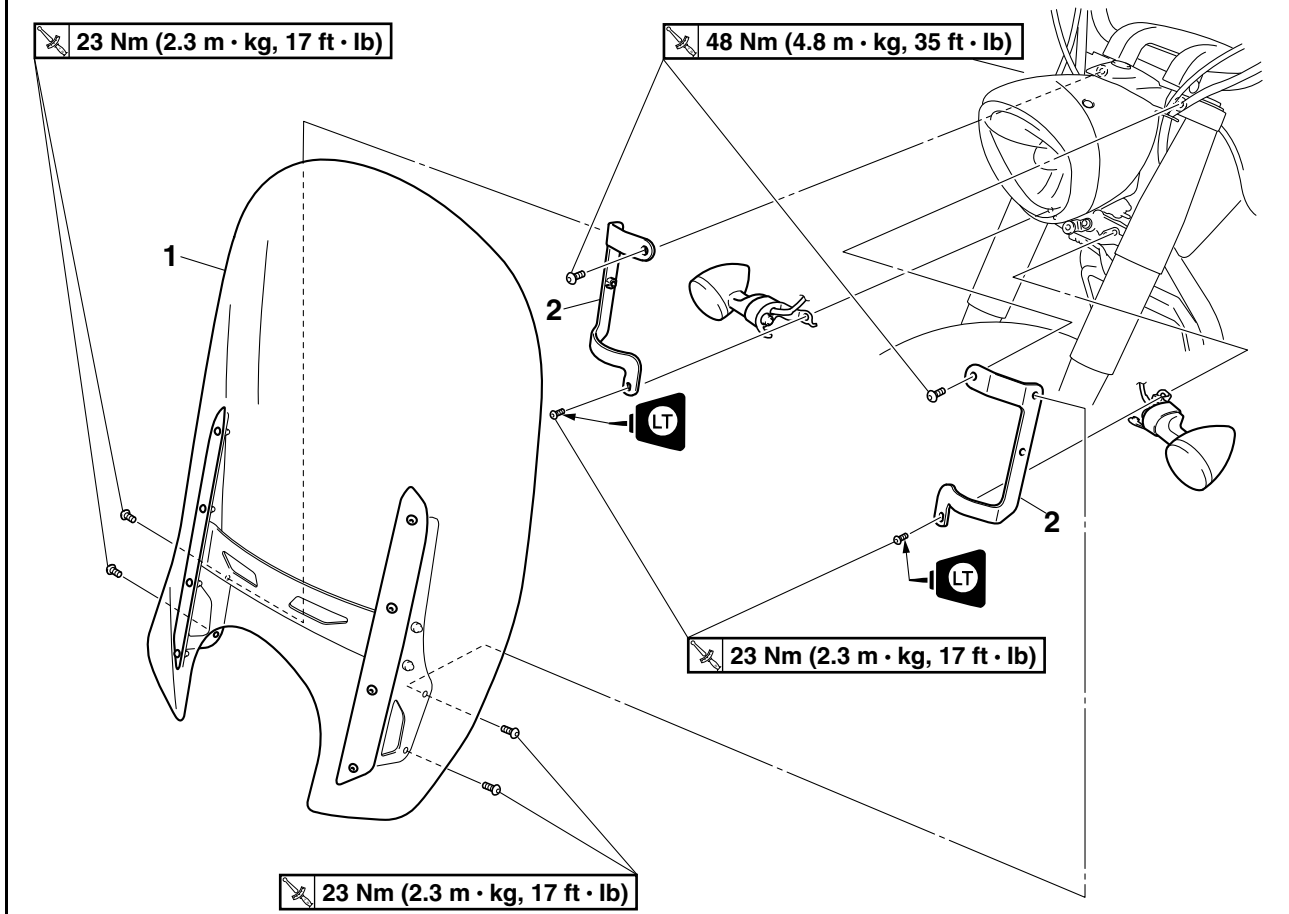
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EAS21830

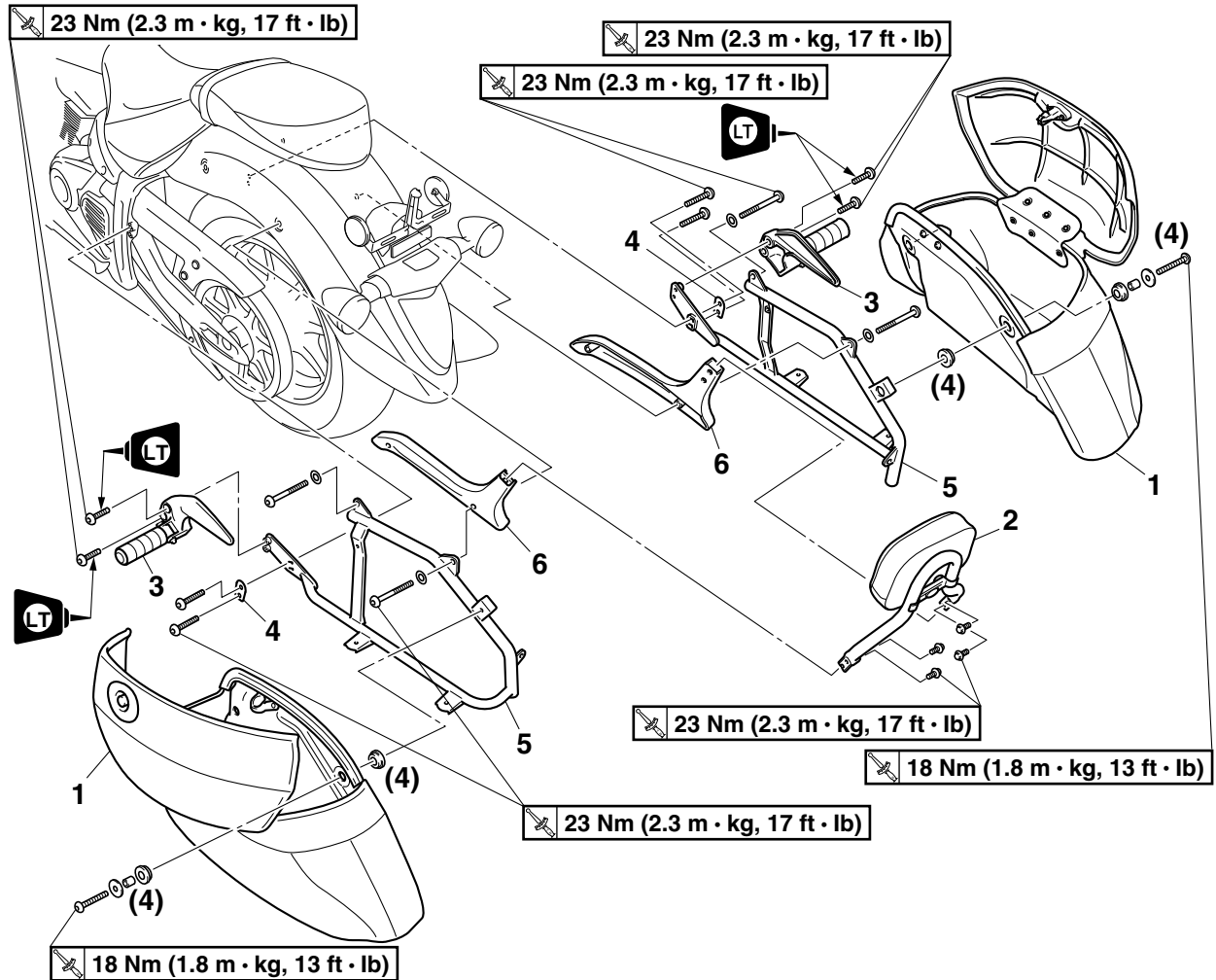
GENERAL CHASSIS

Removing the windshield (for XVS13CT)



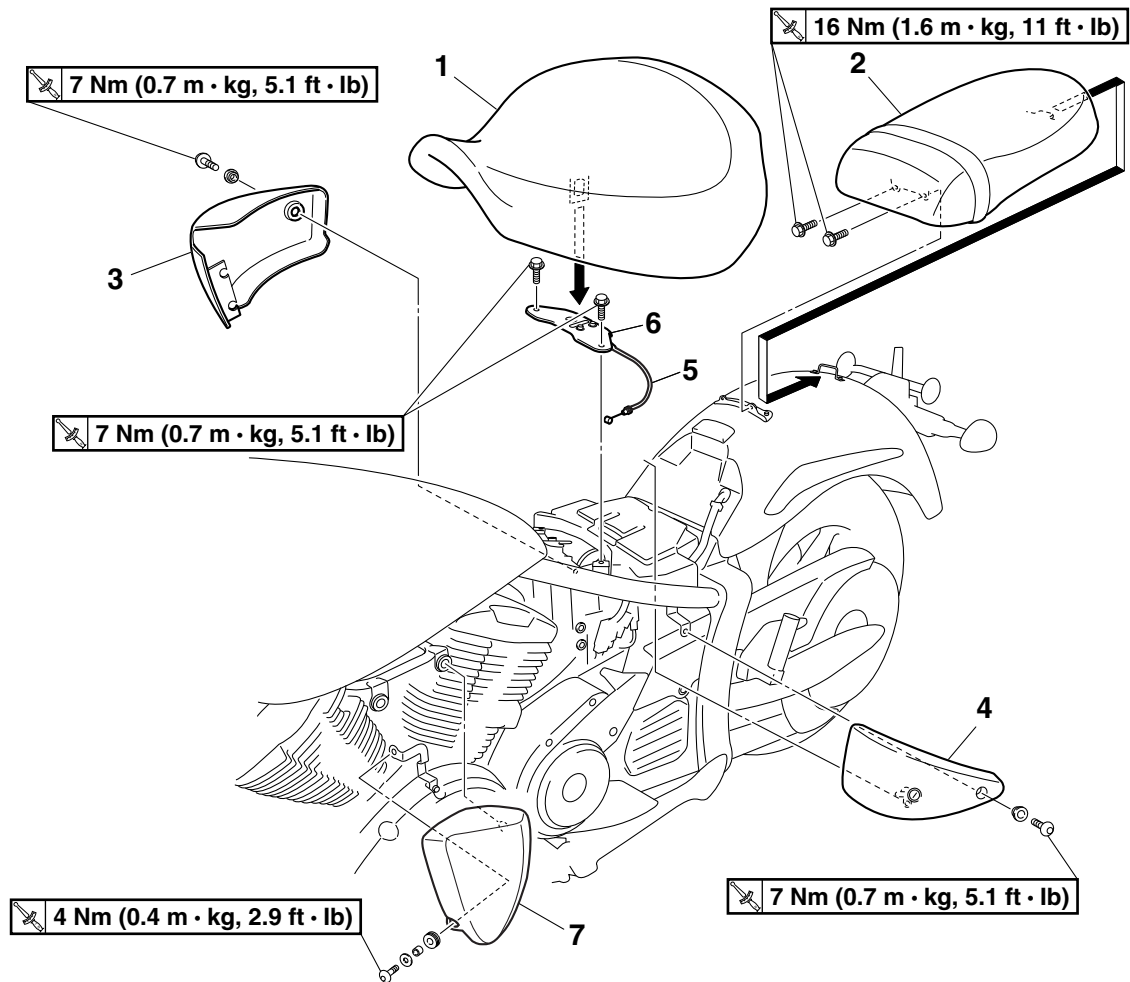
Order	Job/Parts to remove	Q'ty	Remarks
	Turn signal light bracket cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Windshield	1	
2	Windshield bracket (left and right)	2	
			For installation, reverse the removal procedure.

Removing the sidebags and backrest (for XVS13CT)



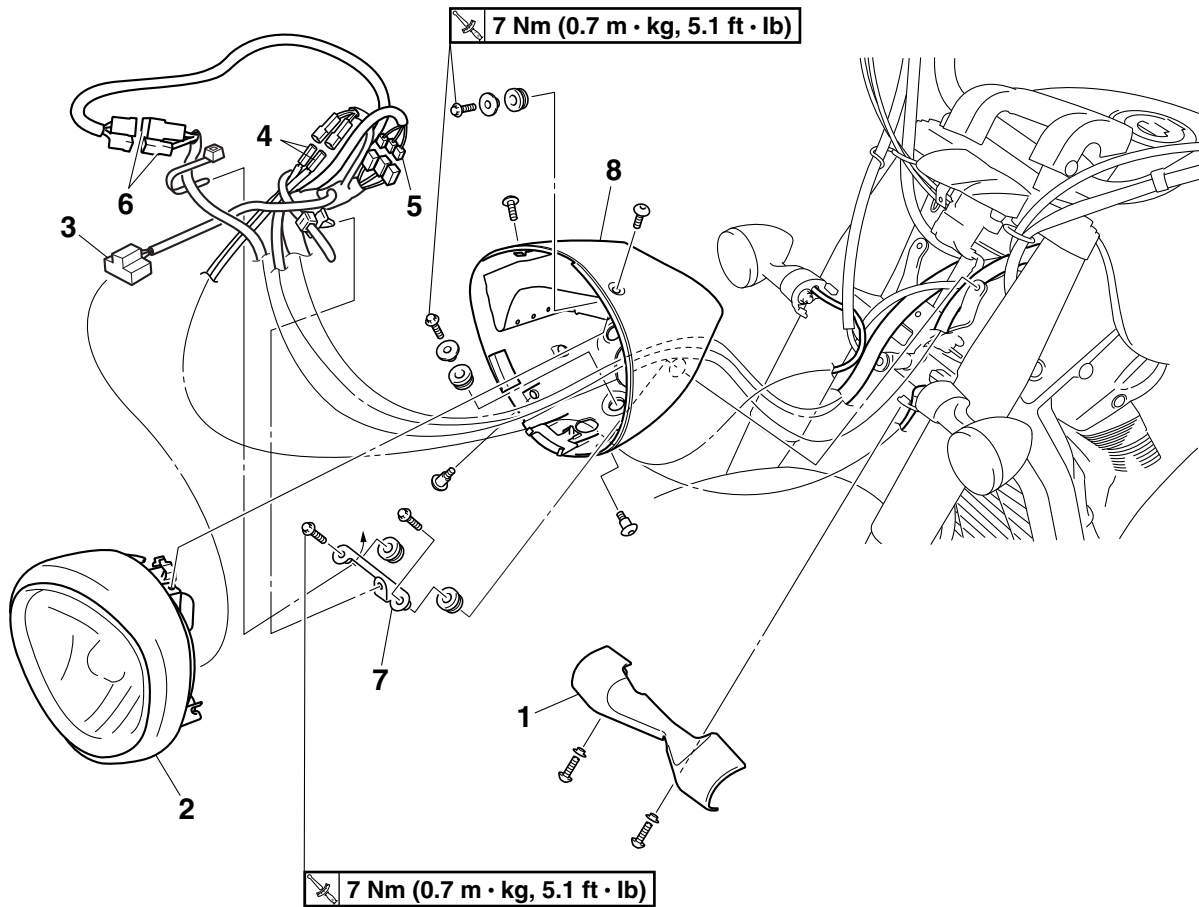
Order	Job/Parts to remove	Q'ty	Remarks
1	Sidebag (left and right)	2	NOTE: Water can be harmful to untreated leather. Use Yamaha Saddle Soap or another quality brand according to the manufacturer's directions to clean the leather on the sidebags. Polish the dry leather with a soft cloth, and then treat with Yamaha Mink Oil or another high-quality leather protectant for increased water resistance.
2	Backrest	1	
3	Passenger footrest (left and right)	2	
4	Sidebag bracket plate	2	
5	Sidebag bracket (left and right)	2	
6	Backrest bracket (left and right)	2	
			For installation, reverse the removal procedure.

Removing the rider seat and left side cover



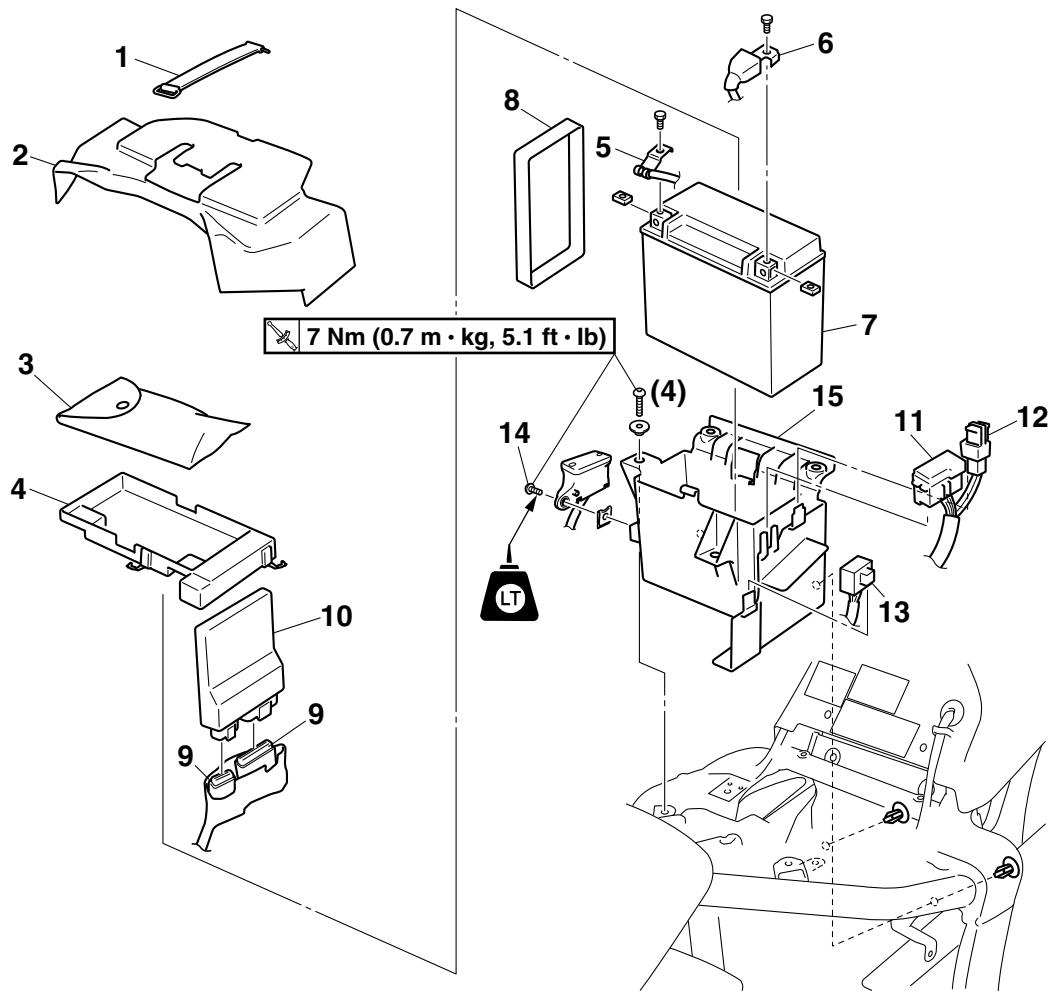
Order	Job/Parts to remove	Q'ty	Remarks
1	Rider seat	1	
2	Passenger seat	1	
3	Sub-fuel tank cover	1	
4	Relay cover	1	
5	Seat lock cable	1	Disconnect.
6	Seat lock bracket	1	
7	Left side cover	1	
			For installation, reverse the removal procedure.

Removing the headlight



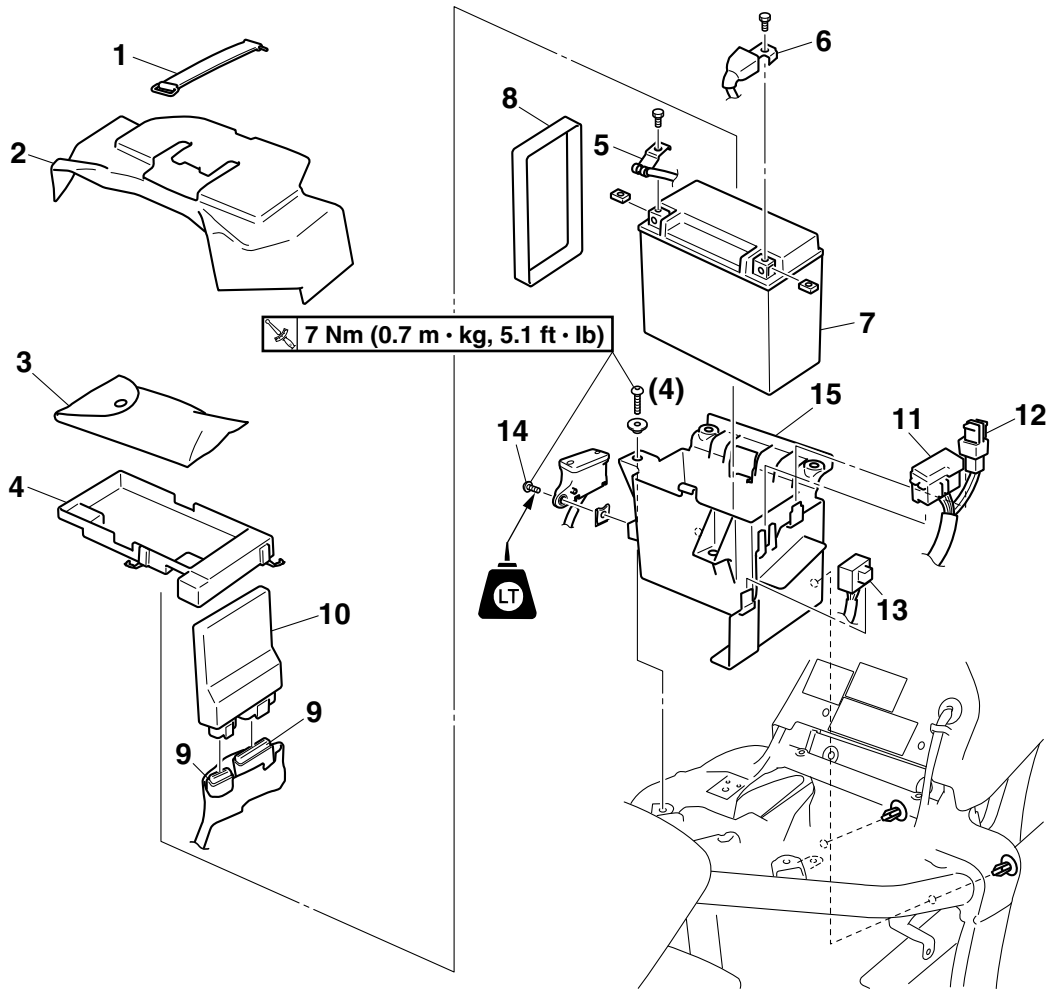
Order	Job/Parts to remove	Q'ty	Remarks
1	Turn signal light bracket cover	1	
2	Headlight lens unit	1	
3	Headlight coupler	1	Disconnect.
4	Turn signal light coupler	2	Disconnect.
5	Meter assembly coupler	3	Disconnect.
6	Main switch coupler	2	Disconnect.
7	Plastic band bracket	1	
8	Headlight body	1	
			For installation, reverse the removal procedure.

Removing the battery



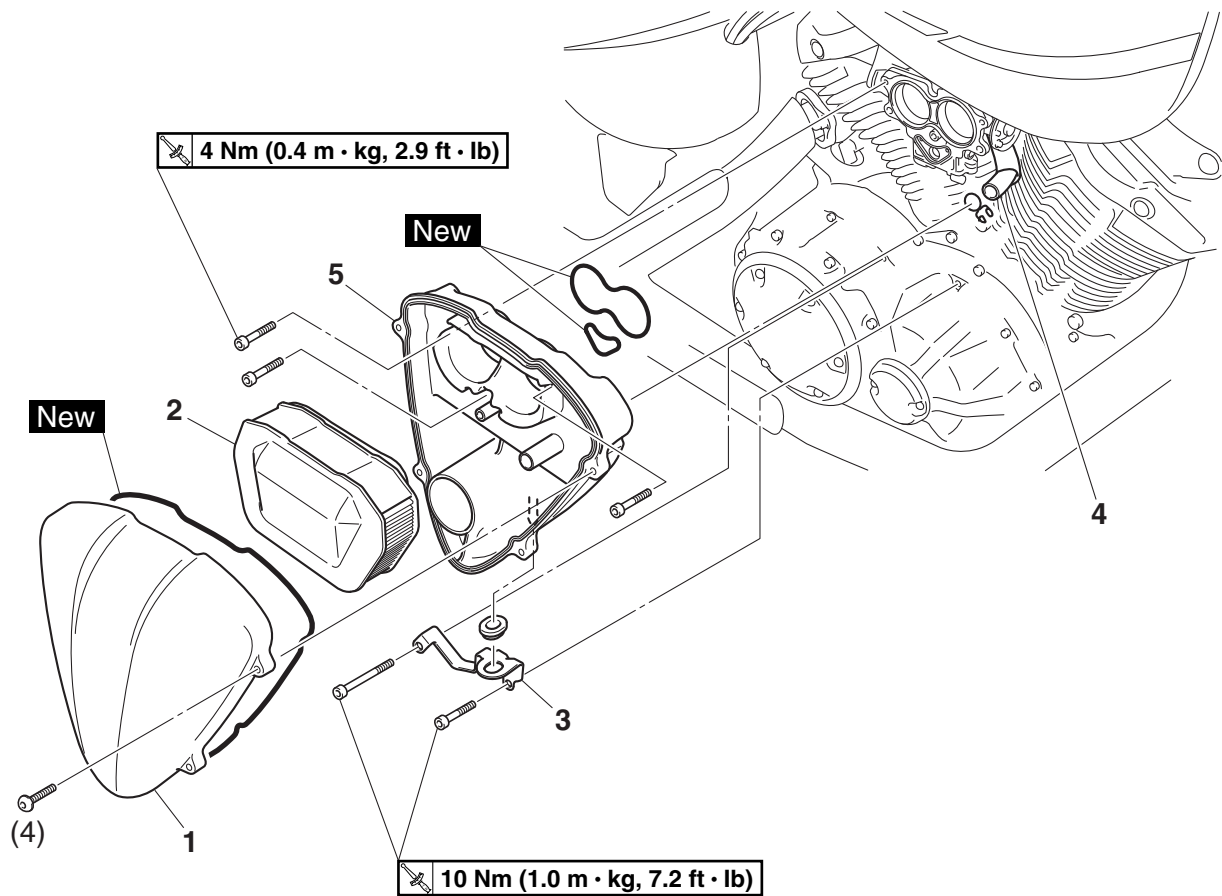
Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Sub-fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Battery cover band	1	
2	Battery cover	1	
3	Tool kit	1	
4	Tool kit tray	1	
5	Negative battery lead	1	Disconnect.
6	Positive battery lead	1	Disconnect.
7	Battery	1	
8	Battery band	1	
9	ECU coupler	2	Disconnect.
10	ECU (engine control unit)	1	
11	Fuse box	1	
12	Main fuse	1	
13	Relay unit	1	
14	Rear brake fluid reservoir bolt	1	

Removing the battery



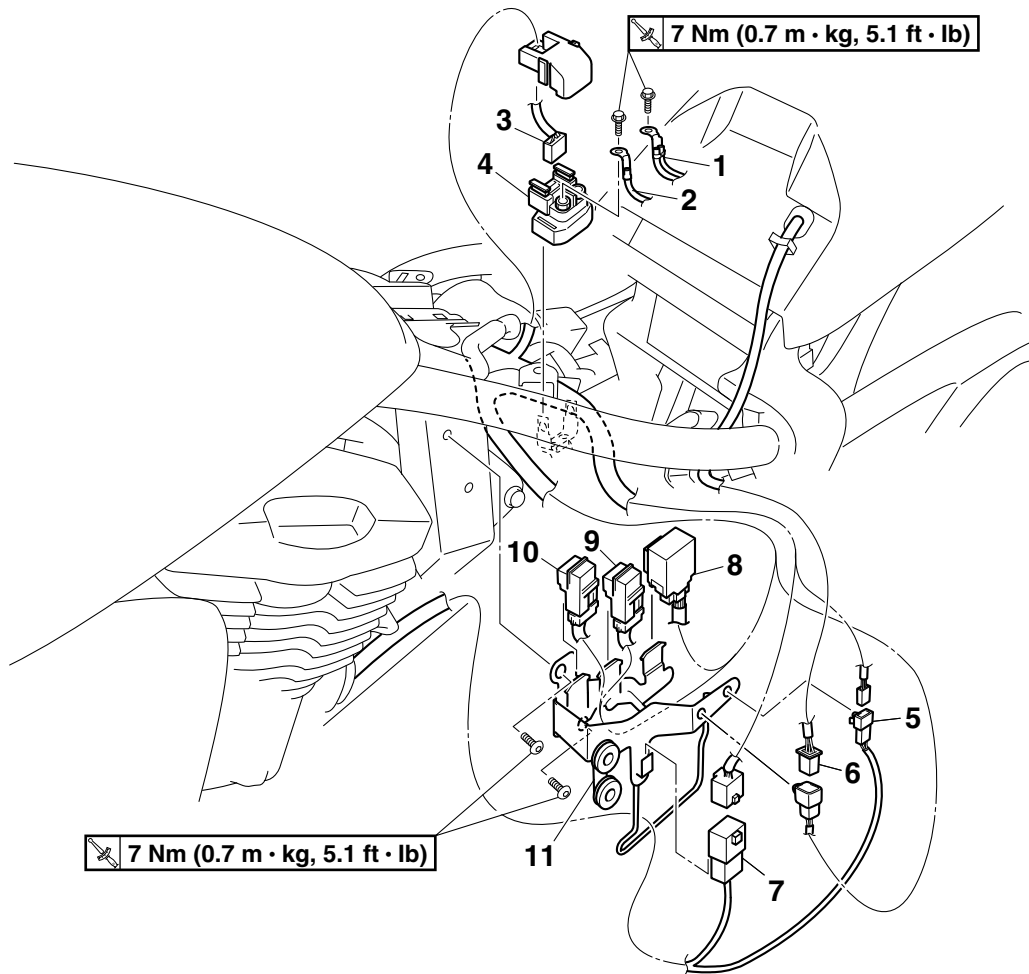
Order	Job/Parts to remove	Q'ty	Remarks
15	Battery box	1	
			For installation, reverse the removal procedure.

Removing the air filter case



Order	Job/Parts to remove	Q'ty	Remarks
1	Air filter case cover	1	
2	Air filter element	1	
3	Air filter case bracket	1	
4	Crankcase breather hose	1	Disconnect.
5	Air filter case	1	
			For installation, reverse the removal procedure.

Removing the relays

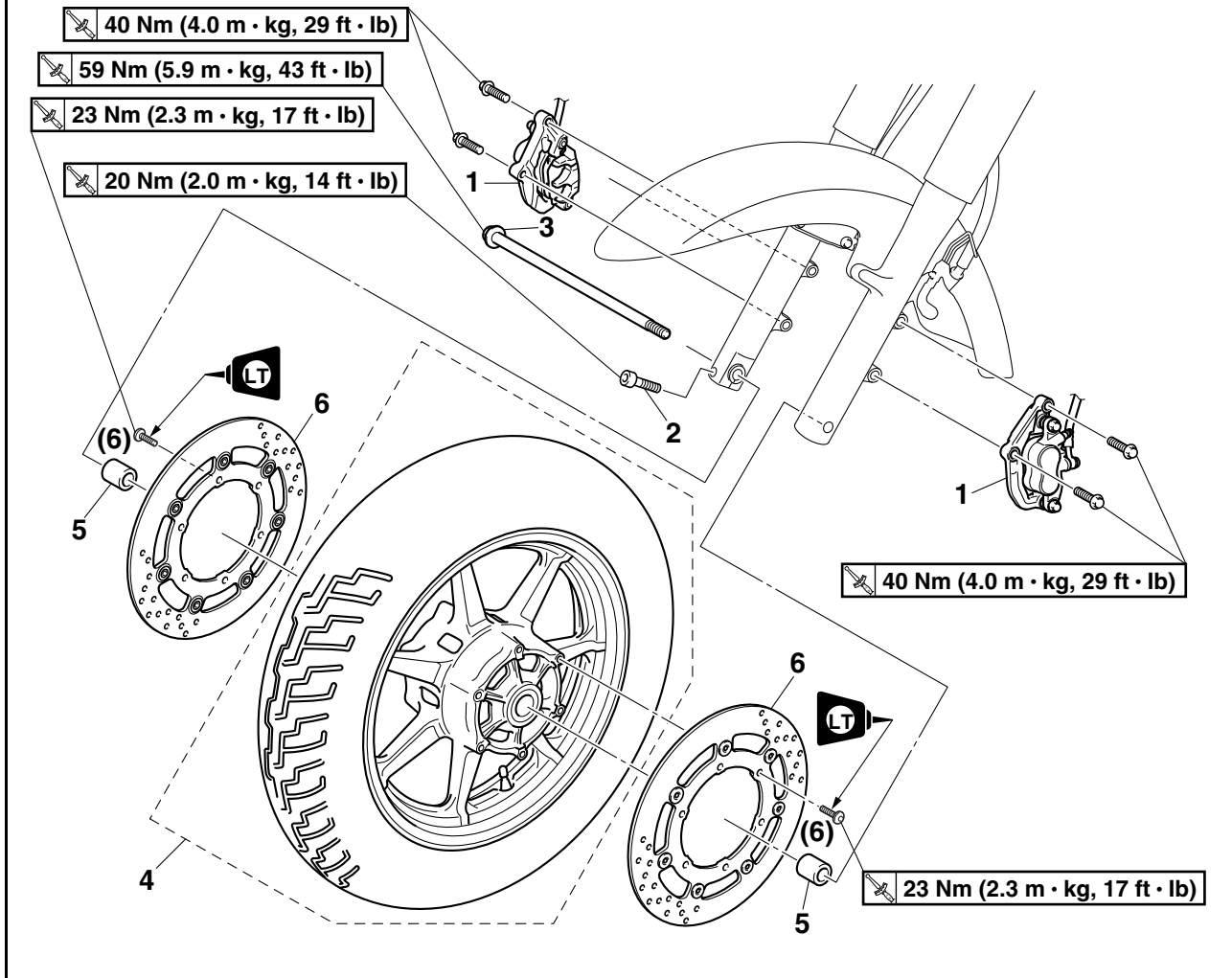


Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Sub-fuel tank cover/Battery box		Refer to "GENERAL CHASSIS" on page 4-1.
1	Positive battery lead	1	Disconnect.
2	Starter motor lead	1	Disconnect.
3	Starter relay coupler	1	Disconnect.
4	Starter relay	1	
5	Crankshaft position sensor coupler	1	Disconnect.
6	Tail/brake light wire harness coupler	1	Disconnect.
7	Stator coil coupler	1	Disconnect.
8	Turn signal relay	1	
9	Radiator fan motor relay	1	
10	Headlight relay	1	
11	Relay bracket	1	
			For installation, reverse the removal procedure.

EAS21870

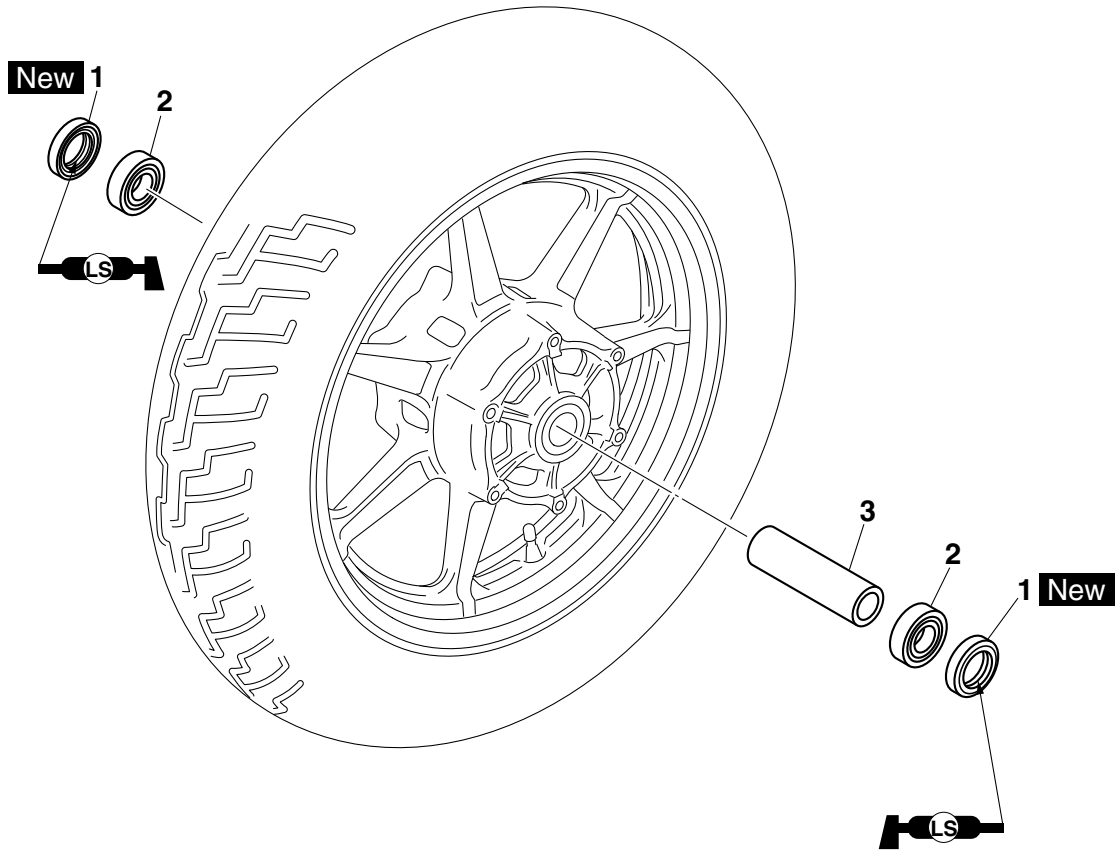
FRONT WHEEL

Removing the front wheel and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: Place the vehicle on a suitable stand so that the front wheel is elevated.
	Reflectors		Refer to "FRONT BRAKE" on page 4-22.
1	Front brake caliper	2	
2	Front wheel axle pinch bolt	1	Loosen.
3	Front wheel axle	1	
4	Front wheel	1	
5	Collar	2	
6	Front brake disc	2	
			For installation, reverse the removal procedure.

Disassembling the front wheel



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

EAS21900

REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Remove:
 - Front brake calipers

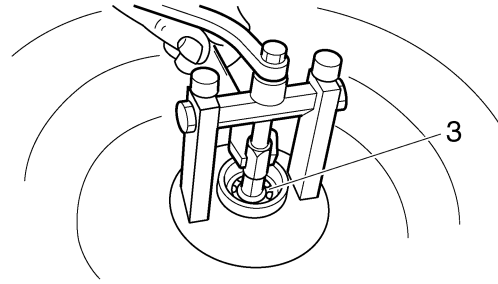
NOTE:

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

3. Elevate:
 - Front wheel

NOTE:

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



EAS21920

CHECKING THE FRONT WHEEL

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

EWA13460

WARNING

Do not attempt to straighten a bent wheel axle.

EAS21910

DISASSEMBLING THE FRONT WHEEL

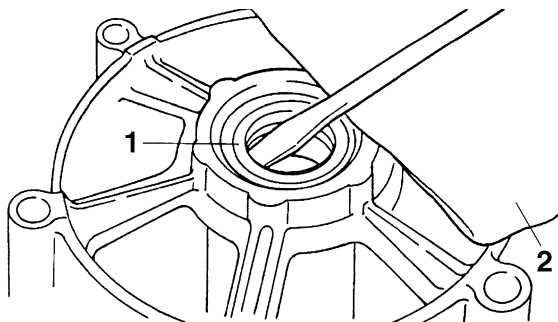
1. Remove:
 - Oil seals
 - Wheel bearings



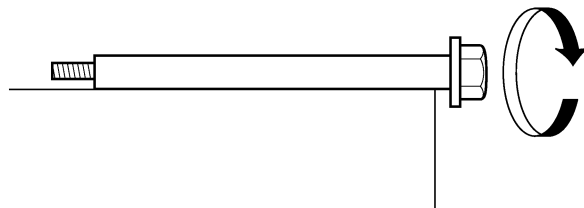
- a. Clean the outside of the front wheel hub.
- b. Remove the oil seals "1" with a flathead screwdriver.

NOTE:

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



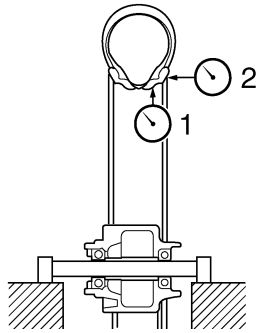
- c. Remove the wheel bearings "3" with a general bearing puller.



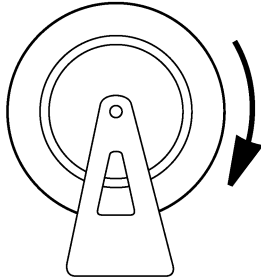
2. Check:
 - Tire
 - Front wheel
 - Damage/wear → Replace.
 - Refer to "CHECKING THE TIRES" on page 3-28 and "CHECKING THE WHEELS" on page 3-29.
3. Measure:
 - Radial wheel runout "1"
 - Lateral wheel runout "2"
 - Over the specified limits → Replace.



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



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



EAS21960

ASSEMBLING THE FRONT WHEEL

1. Install:

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

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

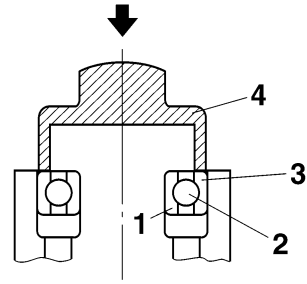
ECA3D81004

CAUTION:

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

NOTE:

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



EAS21970

ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:

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

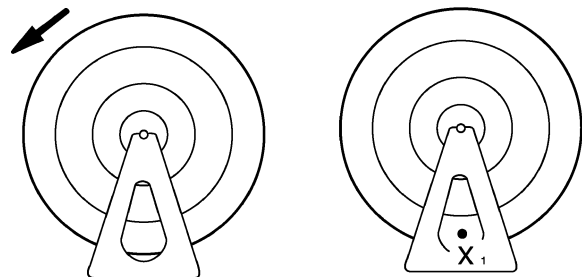
1. Remove:
 - Balancing weight(s)
2. Find:
 - Front wheel's heavy spot

NOTE:

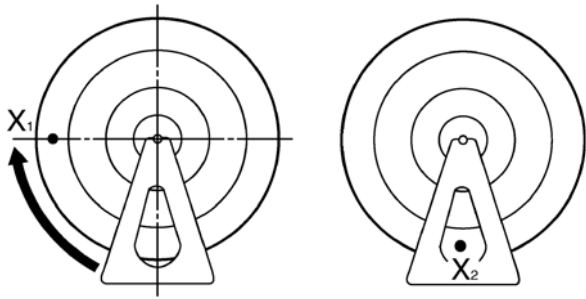
Place the front wheel on a suitable balancing stand.



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



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

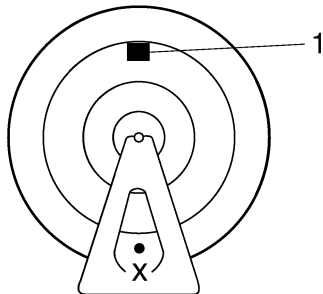


- f. Repeat steps (c) through (e) several times until all the marks come to rest at the same spot.
- g. The spot where all the marks come to rest is the front wheel's heavy spot "X".

3. Adjust:

- Front wheel static balance

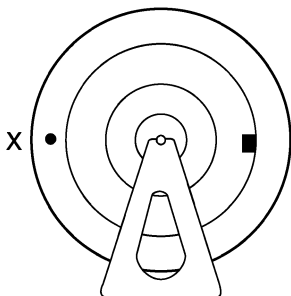
- a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".



NOTE:

Start with the lightest weight.

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

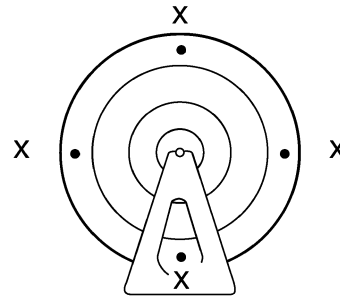


- c. If the heavy spot does not stay in that position, install a heavier weight.
- d. Repeat steps (b) and (c) until the front wheel is balanced.

4. Check:

- Front wheel static balance

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



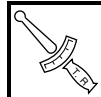
- b. If the front wheel does not remain stationary at all of the positions, rebalance it.

EAS22000

INSTALLING THE FRONT WHEEL (FRONT BRAKE DISC)

The following procedure applies to both of the brake discs.

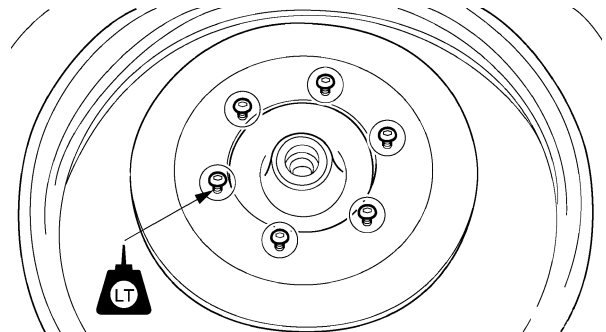
1. Install:
 - Front brake disc



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

NOTE:

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



2. Check:
 - Front brake discs
 Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-27.
3. Lubricate:
 - Oil seal lips

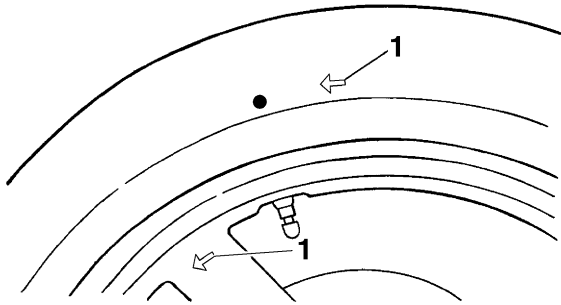


Recommended lubricant
Lithium-soap-based grease

4. Install:
 - Front wheel

NOTE:

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



5. Tighten:

- Front wheel axle
- Front wheel axle pinch bolt



Front wheel axle
59 Nm (5.9 m·kg, 43 ft·lb)
Front wheel axle pinch bolt
20 Nm (2.0 m·kg, 14 ft·lb)

ECA3D81011

CAUTION:

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

6. Install:

- Front brake calipers



Front brake caliper bolt
40 Nm (4.0 m·kg, 29 ft·lb)

EWA3D81008

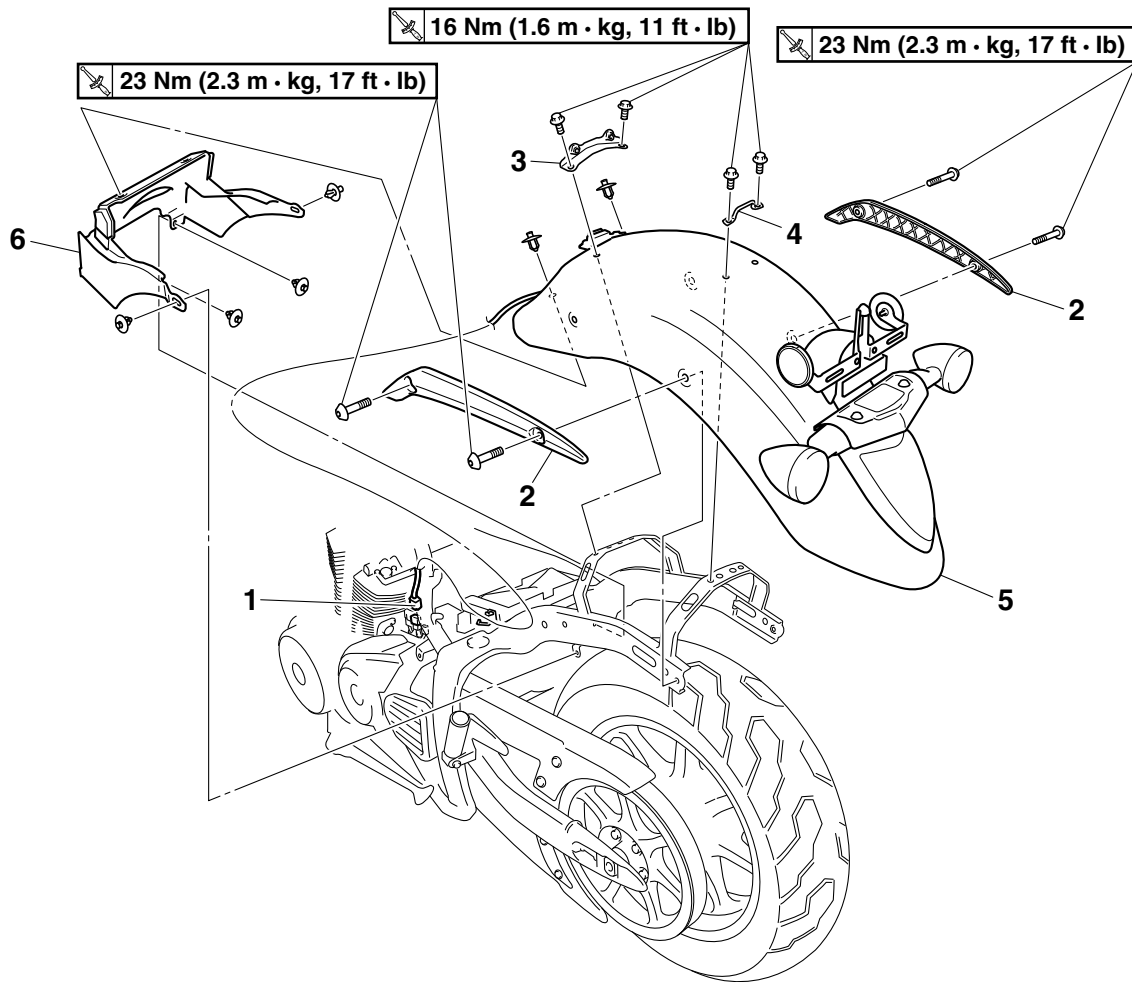
WARNING

Make sure the brake hoses are routed properly.

EAS22020

REAR WHEEL

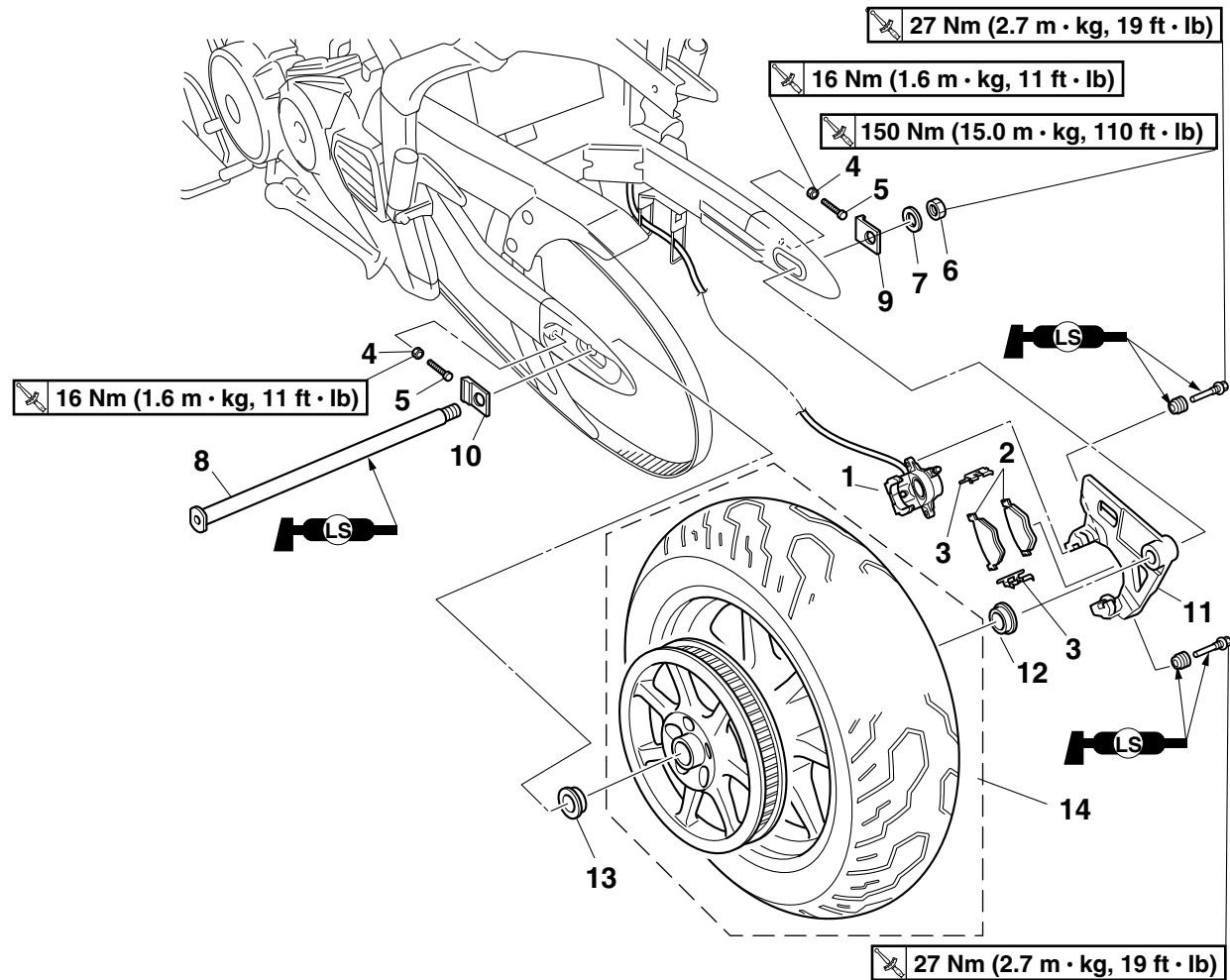
Removing the rear fender



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Passenger seat/Seat lock bracket/Tool kit tray		Refer to "GENERAL CHASSIS" on page 4-1.
1	Tail/brake light wire harness coupler	1	Disconnect.
2	Rear fender bracket	2	
3	Passenger seat bracket	1	
4	Passenger seat guide	1	
5	Rear fender assembly	1	
6	Mudguard	1	
			For installation, reverse the removal procedure.

REAR WHEEL

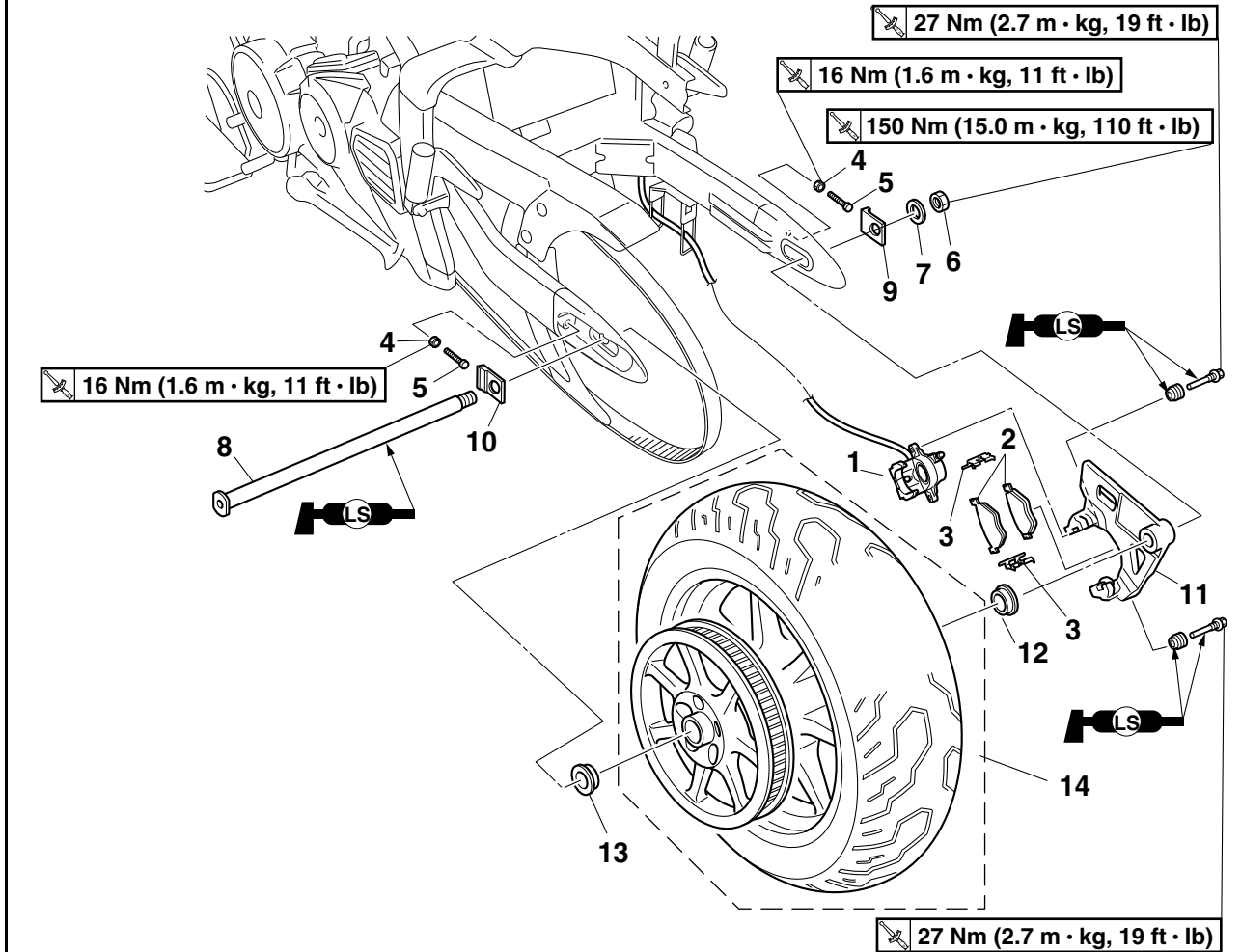
Removing the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Place the vehicle on a suitable stand so that the rear wheel is elevated.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
1	Rear brake caliper	1	
2	Rear brake pad	2	
3	Brake pad spring	2	
4	Drive belt adjusting locknut	2	Loosen.
5	Drive belt adjusting bolt	2	Loosen.
6	Rear wheel axle nut	1	
7	Washer	1	
8	Rear wheel axle	1	
9	Right drive belt puller	1	
10	Left drive belt puller	1	
11	Rear brake caliper bracket	1	
12	Collar	1	Black
13	Collar	1	Silver

REAR WHEEL

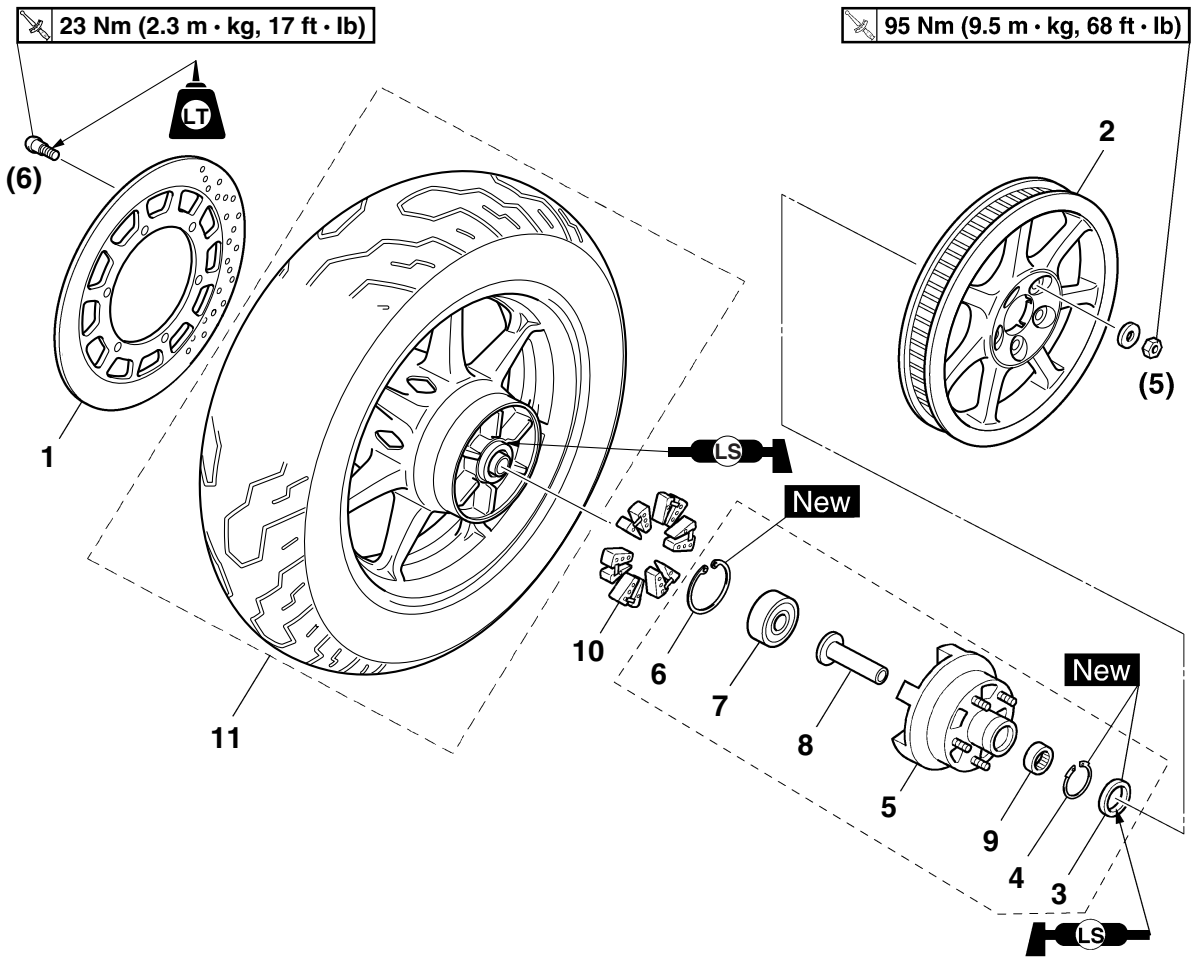
Removing the rear wheel



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

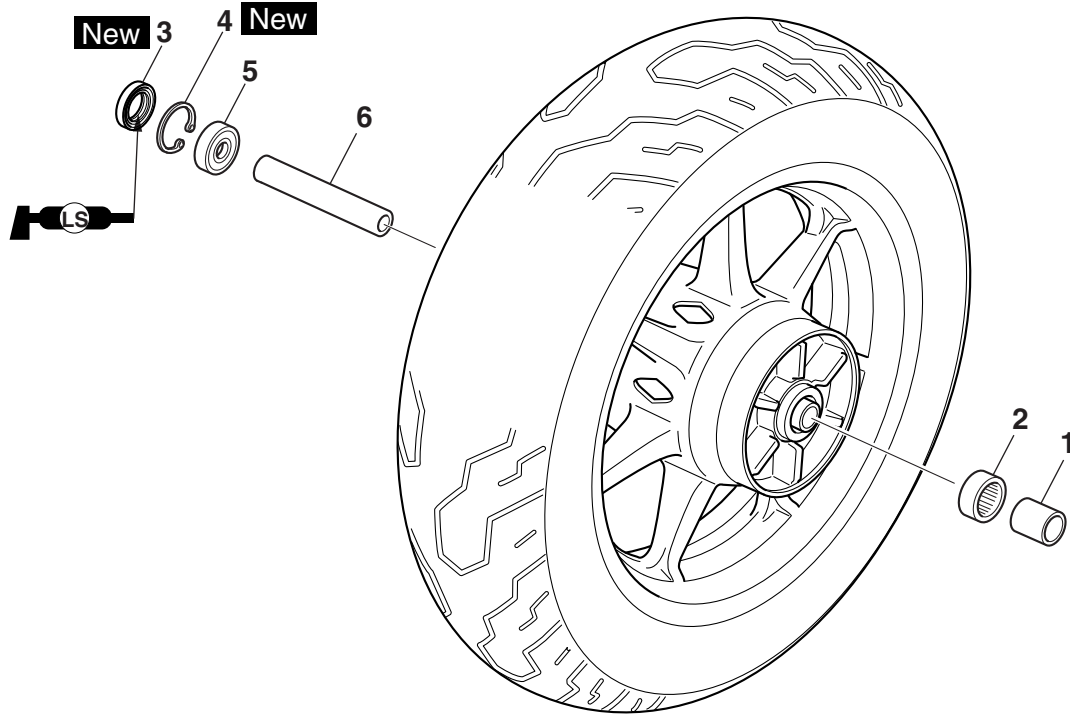
REAR WHEEL

Removing the rear brake disc and rear wheel drive hub



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

Disassembling the rear wheel



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

EAS28760

REMOVING THE REAR WHEEL (DISC)

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

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

2. Remove:

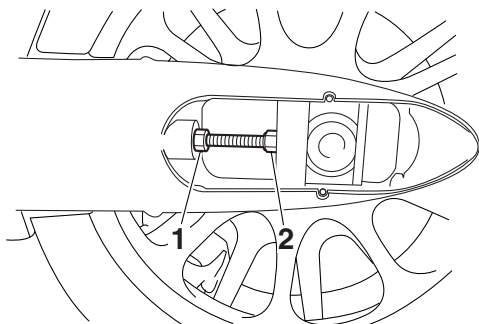
- Rear brake caliper

NOTE:

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

3. Loosen:

- Drive belt adjusting locknuts "1"
- Drive belt adjusting bolts "2"



4. Remove:

- Rear wheel axle nut
- Rear wheel axle
- Rear wheel

NOTE:

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

EAS22080

DISASSEMBLING THE REAR WHEEL

1. Remove:

- Oil seals
 - Wheel bearings
- Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-11.

EAS22090

CHECKING THE REAR WHEEL

1. Check:

- Rear wheel axle
- Rear wheel
- Wheel bearings

- Oil seals
Refer to "CHECKING THE FRONT WHEEL" on page 4-11.
2. Check:
 - Tire
 - Rear wheel
Damage/wear → Replace.
Refer to "CHECKING THE TIRES" on page 3-28 and "CHECKING THE WHEELS" on page 3-29.
 3. Measure:
 - Radial wheel runout
 - Lateral wheel runout
Refer to "CHECKING THE FRONT WHEEL" on page 4-11.



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

EAS3D81016

CHECKING THE REAR BRAKE CALIPER BRACKET

1. Check:

- Rear brake caliper bracket
Cracks/damage → Replace.

EAS22110

CHECKING THE REAR WHEEL DRIVE HUB

1. Check:

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

EAS22130

CHECKING AND REPLACING THE REAR WHEEL PULLEY

1. Check:

- Rear wheel pulley
Surface plating has come off → Replace the rear wheel pulley.
Bent teeth → Replace the rear wheel pulley.

2. Replace:

- Rear wheel pulley

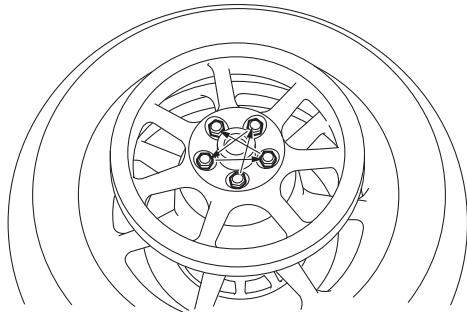
- a. Remove the self-locking nuts and the rear wheel pulley.
- b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the pulley.
- c. Install the new rear wheel pulley.



Rear wheel pulley self-locking nut
95 Nm (9.5 m·kg, 68 ft·lb)

NOTE:

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



EAS22140

ASSEMBLING THE REAR WHEEL

1. Install:

- Wheel bearings **New**
- Oil seals **New**
Refer to “ASSEMBLING THE FRONT WHEEL” on page 4-12.

EAS22150

ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:

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

1. Adjust:

- Rear wheel static balance
Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-12.

EAS28770

INSTALLING THE REAR WHEEL (REAR BRAKE DISC)

1. Lubricate:

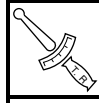
- Rear wheel axle
- Oil seal lips



Recommended lubricant
Lithium-soap-based grease

2. Install:

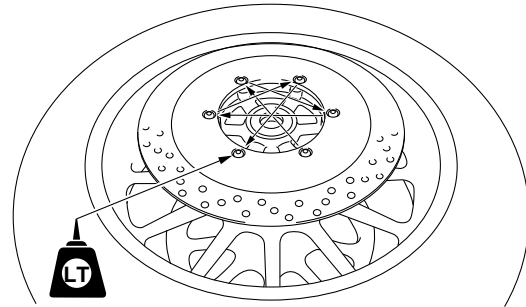
- Rear brake disc



Rear brake disc bolt
23 Nm (2.3 m·kg, 17 ft·lb)
LOCTITE®

NOTE:

- Apply locking agent (LOCTITE®) to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



3. Check:

- Rear brake disc
Refer to “CHECKING THE REAR BRAKE DISC” on page 4-40.

4. Install:

- Rear wheel axle
- Washer
- Rear wheel axle nut

NOTE:

Temporarily tighten the wheel axle nut.

5. Adjust:

- Drive belt slack
Refer to “ADJUSTING THE DRIVE BELT SLACK” on page 3-24.

6. Tighten:

- Rear wheel axle nut



Rear wheel axle nut
150 Nm (15.0 m·kg, 110 ft·lb)

7. Install:

- Rear brake caliper



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

EWA13500

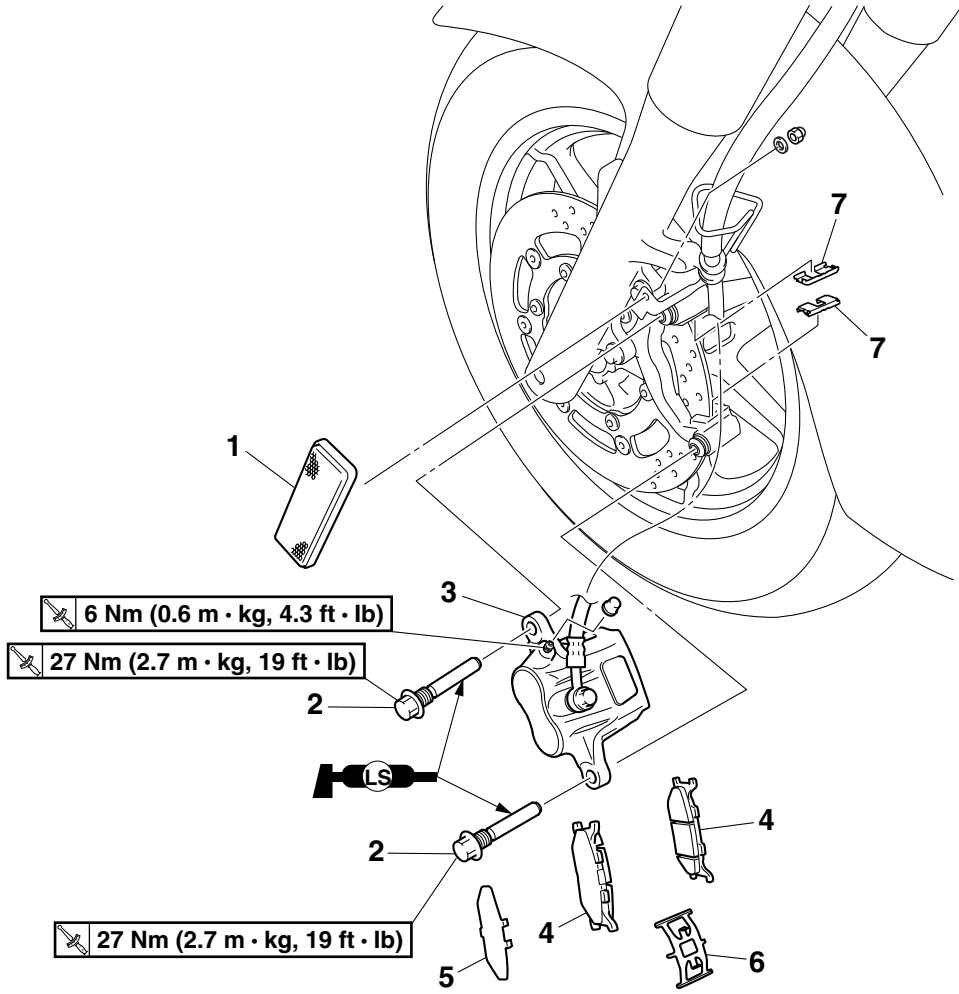


Make sure the brake hose is routed properly.

EAS22210

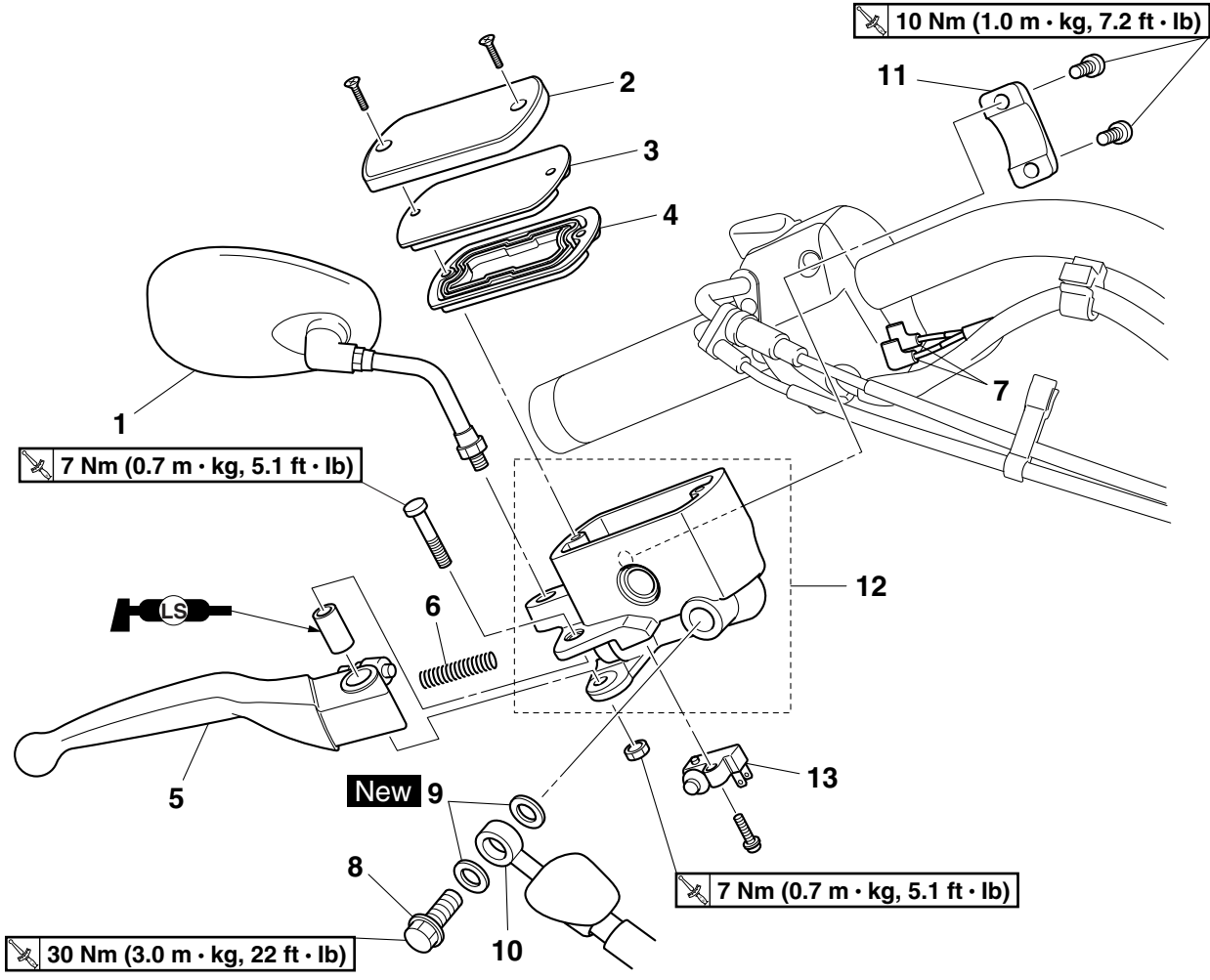
FRONT BRAKE

Removing the front brake pads



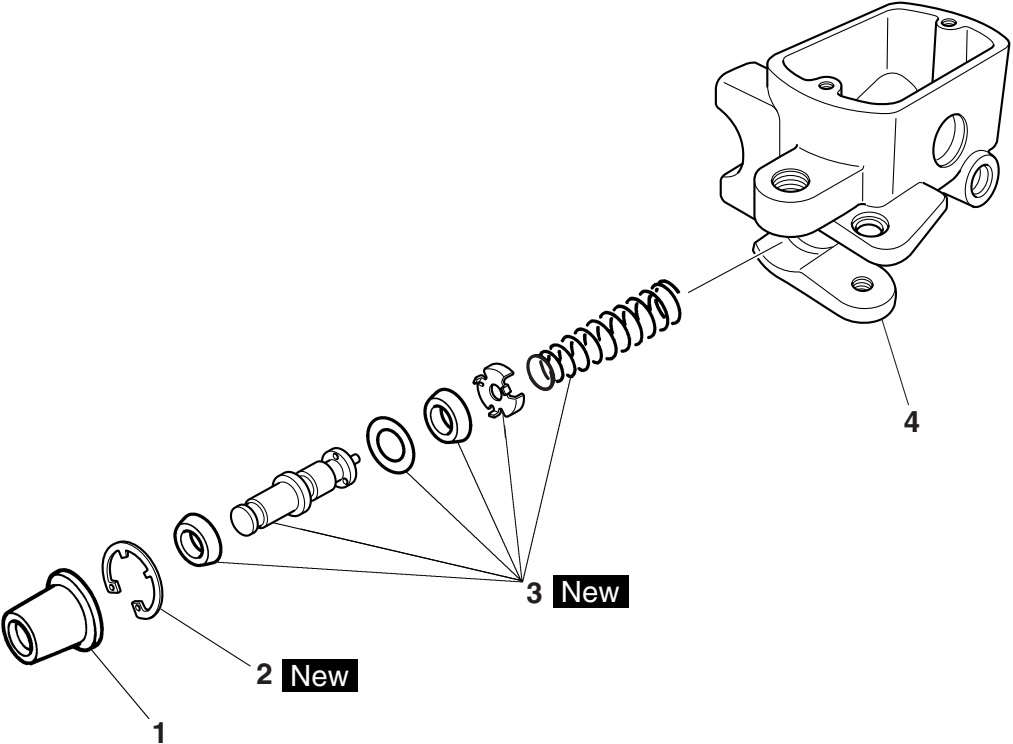
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Reflector	1	
2	Front brake caliper retaining bolt	2	
3	Front brake caliper	1	
4	Front brake pad	2	
5	Brake pad shim	1	
6	Front brake pad spring	1	
7	Front brake pad support	2	
			For installation,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

Removing the front brake master cylinder



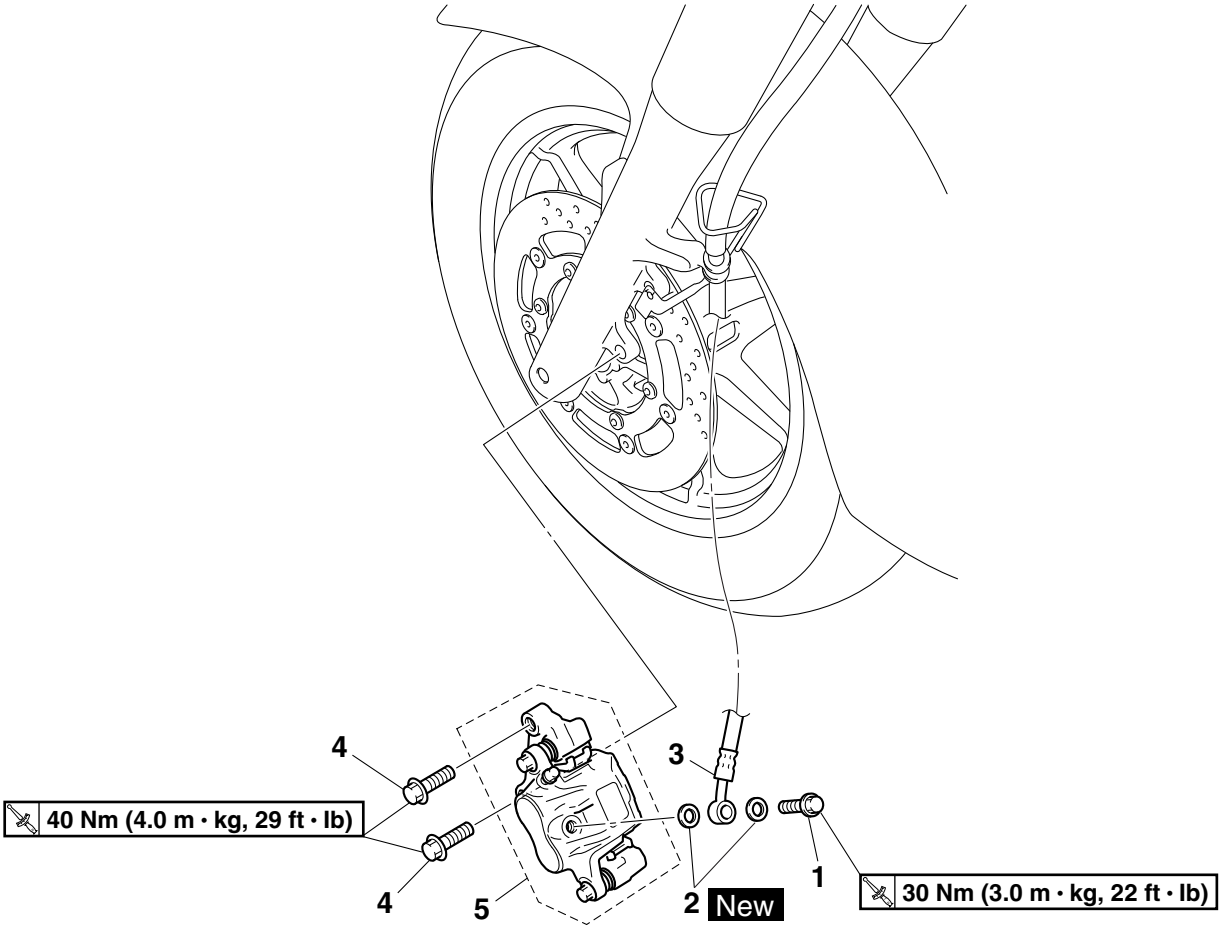
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.
1	Right rearview mirror	1	
2	Brake master cylinder reservoir cap	1	
3	Brake master cylinder reservoir diaphragm holder	1	
4	Brake master cylinder reservoir diaphragm	1	
5	Brake lever	1	
6	Spring	1	
7	Front brake light switch connector	2	Disconnect.
8	Front brake hose union bolt	1	
9	Copper washer	2	
10	Front brake hose	1	
11	Front brake master cylinder holder	1	
12	Front brake master cylinder	1	
13	Front brake light switch	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



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

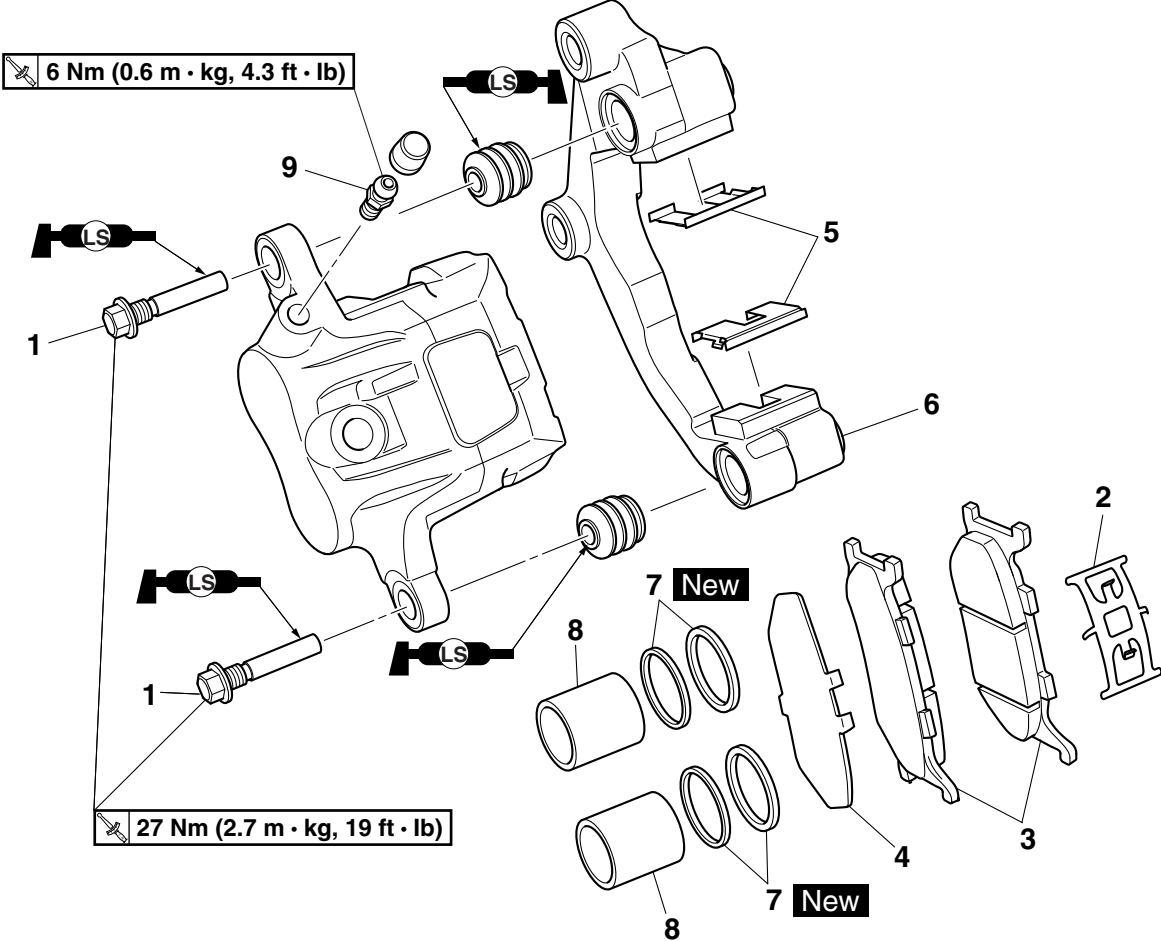
Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Reflector		Refer to "FRONT BRAKE" on page 4-22.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.
1	Front brake hose union bolt	1	
2	Copper washer	2	
3	Front brake hose	1	
4	Front brake caliper bracket bolt	2	
5	Front brake caliper	1	
			For installation, reverse the removal procedure.

FRONT BRAKE

Disassembling the front brake calipers



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

EAS22220

INTRODUCTION

EWA14100



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

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

EAS22240

CHECKING THE FRONT BRAKE DISCS

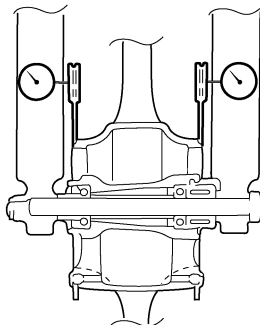
The following procedure applies to both brake discs.

1. Remove:
 - Front wheel

Refer to "FRONT WHEEL" on page 4-9.
2. Check:
 - Brake disc

Damage/galling → Replace.
3. Measure:
 - Brake disc deflection

Out of specification → Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit
0.12 mm (0.0047 in)

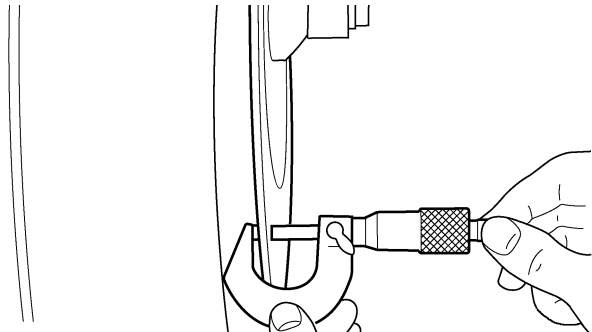
- a. Place the vehicle on a suitable stand so that the front wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 2 mm (0.08 in) below the edge of the brake disc.

4. Measure:
 - Brake disc thickness

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



Brake disc thickness limit
4.5 mm (0.18 in)



5. Adjust:
 - Brake disc deflection

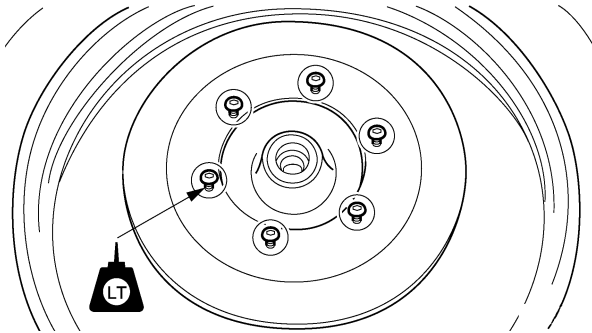
- a. Remove the brake disc.
- b. Rotate the brake disc by one bolt hole.
- c. Install the brake disc.



Brake disc bolt
23 Nm (2.3 m·kg, 17 ft·lb)
LOCTITE®

NOTE:

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



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



6. Install:
 - Front wheel
 Refer to "FRONT WHEEL" on page 4-9.

EAS22260

REPLACING THE FRONT BRAKE PADS

NOTE:

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

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



Brake pad lining thickness (inner)

6.0 mm (0.24 in)

Limit

0.8 mm (0.03 in)

Brake pad lining thickness (outer)

6.0 mm (0.24 in)

Limit

0.8 mm (0.03 in)

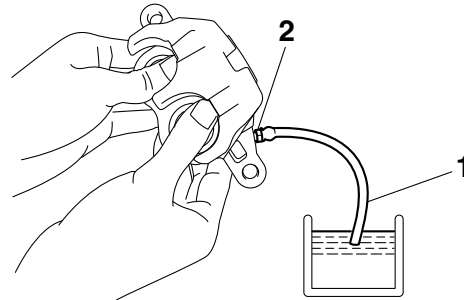


2. Install:
 - Brake pads
 - Brake pad spring

NOTE:

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

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



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



Bleed screw

6 Nm (0.6 m·kg, 4.3 ft·lb)

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



3. Lubricate:
 - Front brake caliper retaining bolts



Recommended lubricant

Lithium-soap-based grease

ECA14150

CAUTION:

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

4. Install:
 - Brake caliper retaining bolts

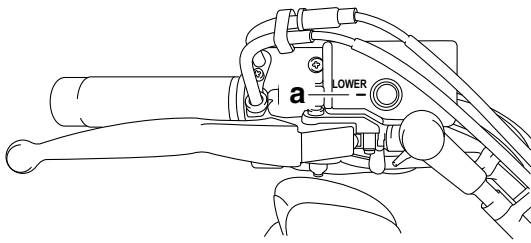


Brake caliper retaining bolt

27 Nm (2.7 m·kg, 19 ft·lb)

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

Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



6. Check:
- Brake lever operation
- Soft or spongy feeling → Bleed the brake system.
- Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

EAS22300

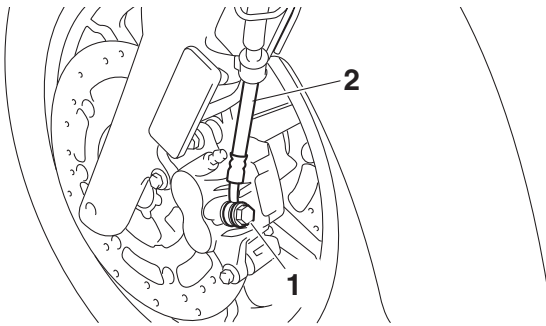
REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

NOTE:

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

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



NOTE:

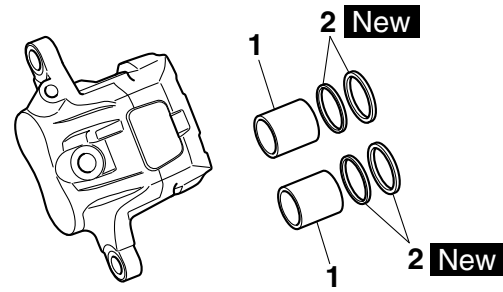
Put the end of the brake hose into a container and pump out the brake fluid carefully.

EAS22350

DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

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

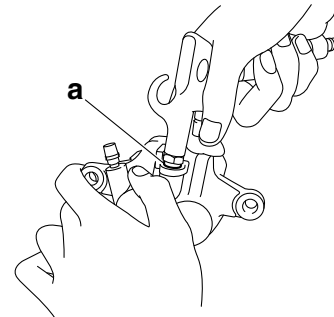


- a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA3D81009

WARNING

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



- b. Remove the brake caliper piston seals.

EAS22390

CHECKING THE FRONT BRAKE CALIPERS

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

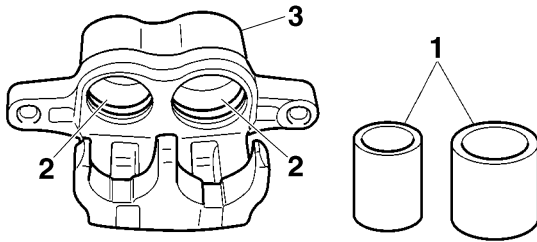
1. Check:
- Brake caliper pistons “1”
Rust/scratches/wear → Replace the brake caliper pistons.
 - Brake caliper cylinders “2”
Scratches/wear → Replace the brake caliper assembly.

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

EWA13600

WARNING

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



2. Check:

- Brake caliper bracket
Cracks/damage → Replace.

EAS22410

ASSEMBLING THE FRONT BRAKE CALIPERS

EWA13620

WARNING

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



Recommended fluid
DOT 4

EAS22440

INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:

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



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

EWA13530

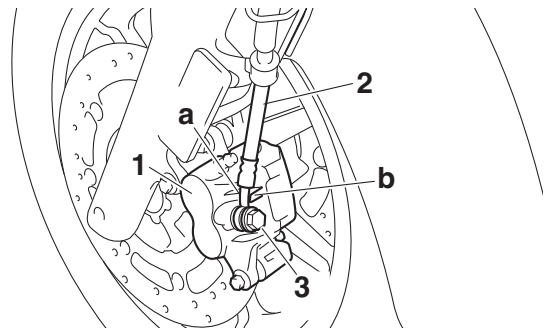
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-43.

ECA14170

CAUTION:

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



2. Remove:

- Front brake caliper

3. Install:

- Brake pad supports
- Brake pads
- Brake pad spring
- Front brake caliper



Front brake caliper retaining bolt
27 Nm (2.7 m·kg, 19 ft·lb)
Front brake caliper bracket bolt
40 Nm (4.0 m·kg, 29 ft·lb)

Refer to “REPLACING THE FRONT BRAKE PADS” on page 4-28.

4. Fill:

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



Recommended fluid
DOT 4

EWA3D81010

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

CAUTION:

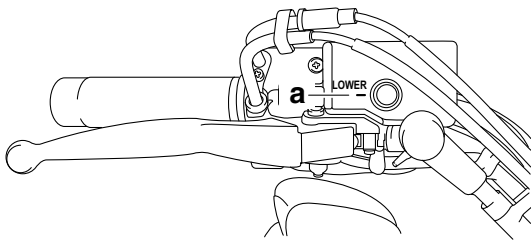
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:

- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

6. Check:

- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



7. Check:

- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

EAS22490

REMOVING THE FRONT BRAKE MASTER CYLINDER

NOTE:

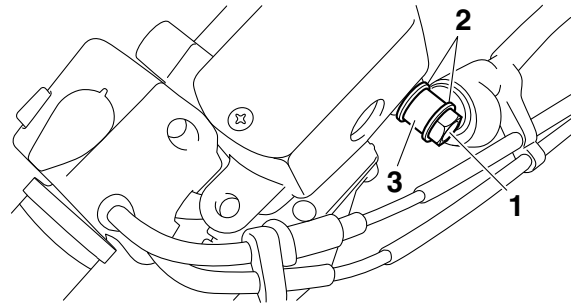
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:

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

NOTE:

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



EAS22500

CHECKING THE FRONT BRAKE MASTER CYLINDER

1. Check:

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

2. Check:

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

3. Check:

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

4. Check:

- Brake hoses
Cracks/damage/wear → Replace.

EAS22520

ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

WARNING

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



**Recommended fluid
DOT 4**

EAS22530

INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:

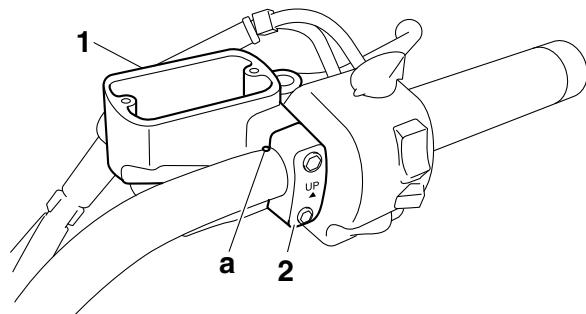
- Brake master cylinder "1"
- Front brake master cylinder holder "2"



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

NOTE:

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



2. Install:

- Copper washers **New**
- Front brake hose "1"
- Front brake hose union bolt "2"



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

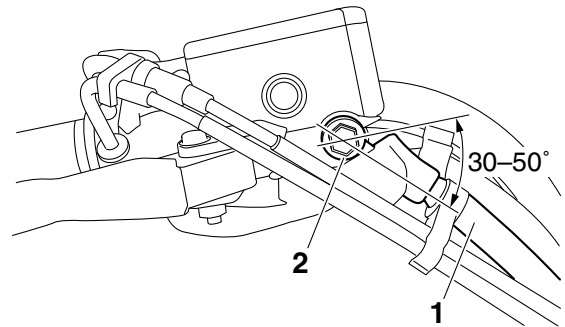
EWA13530

WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-43.

NOTE:

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



3. Fill:

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



Recommended 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

CAUTION:

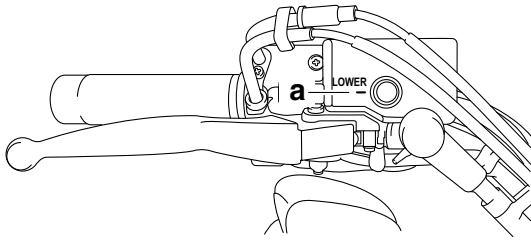
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:

- Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.

5. Check:

- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.



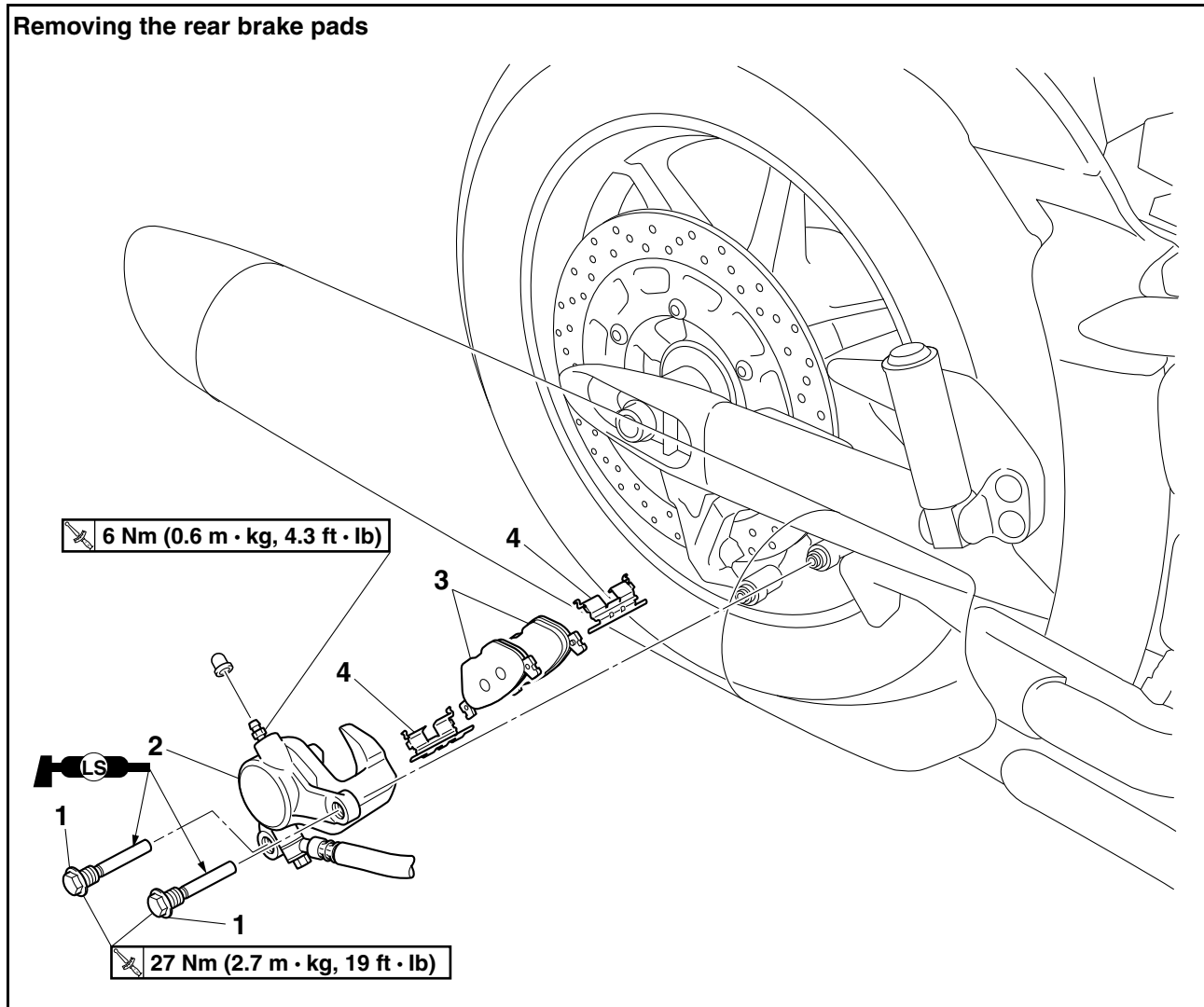
6. Check:

- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

EAS22550

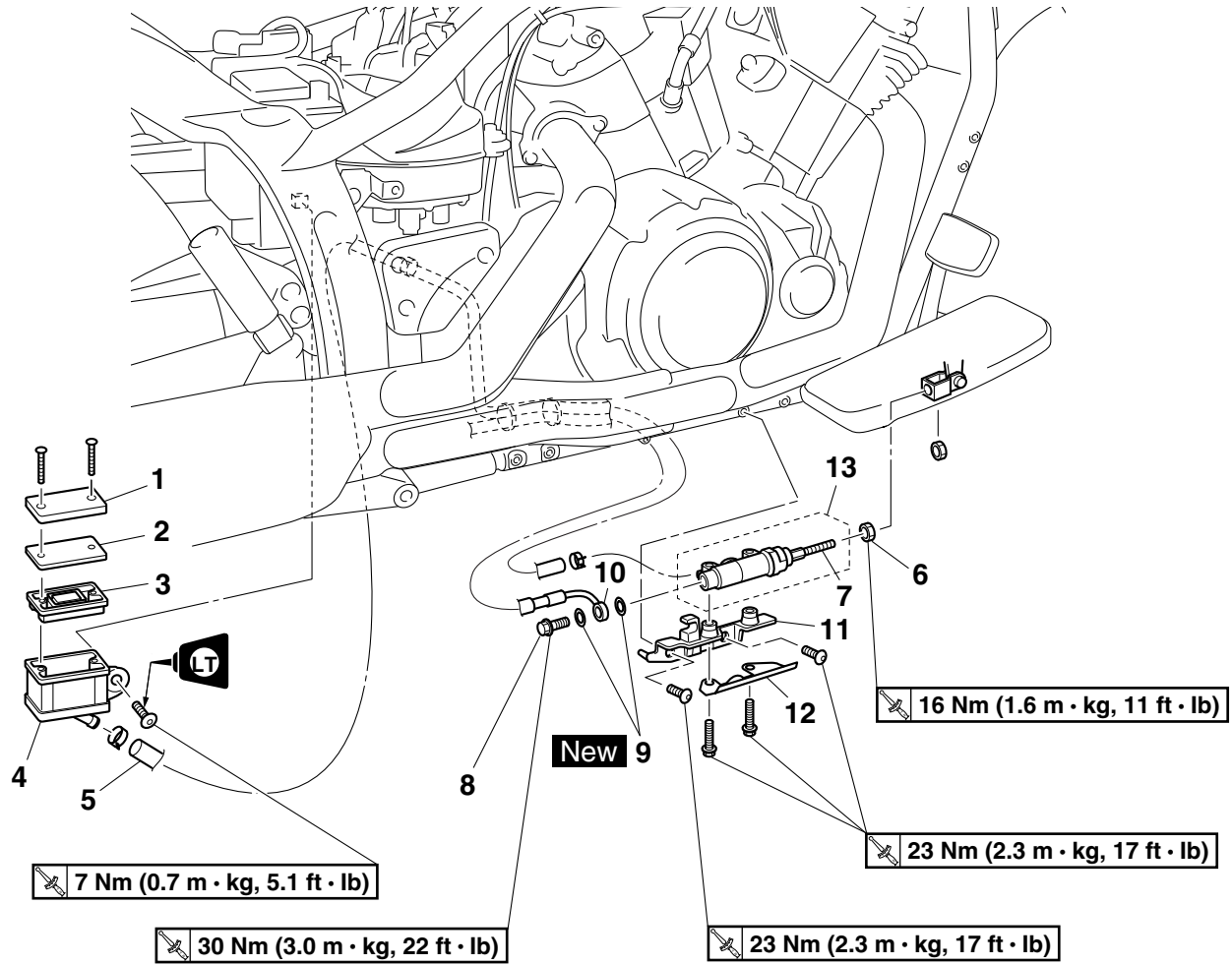
REAR BRAKE

Removing the rear brake pads



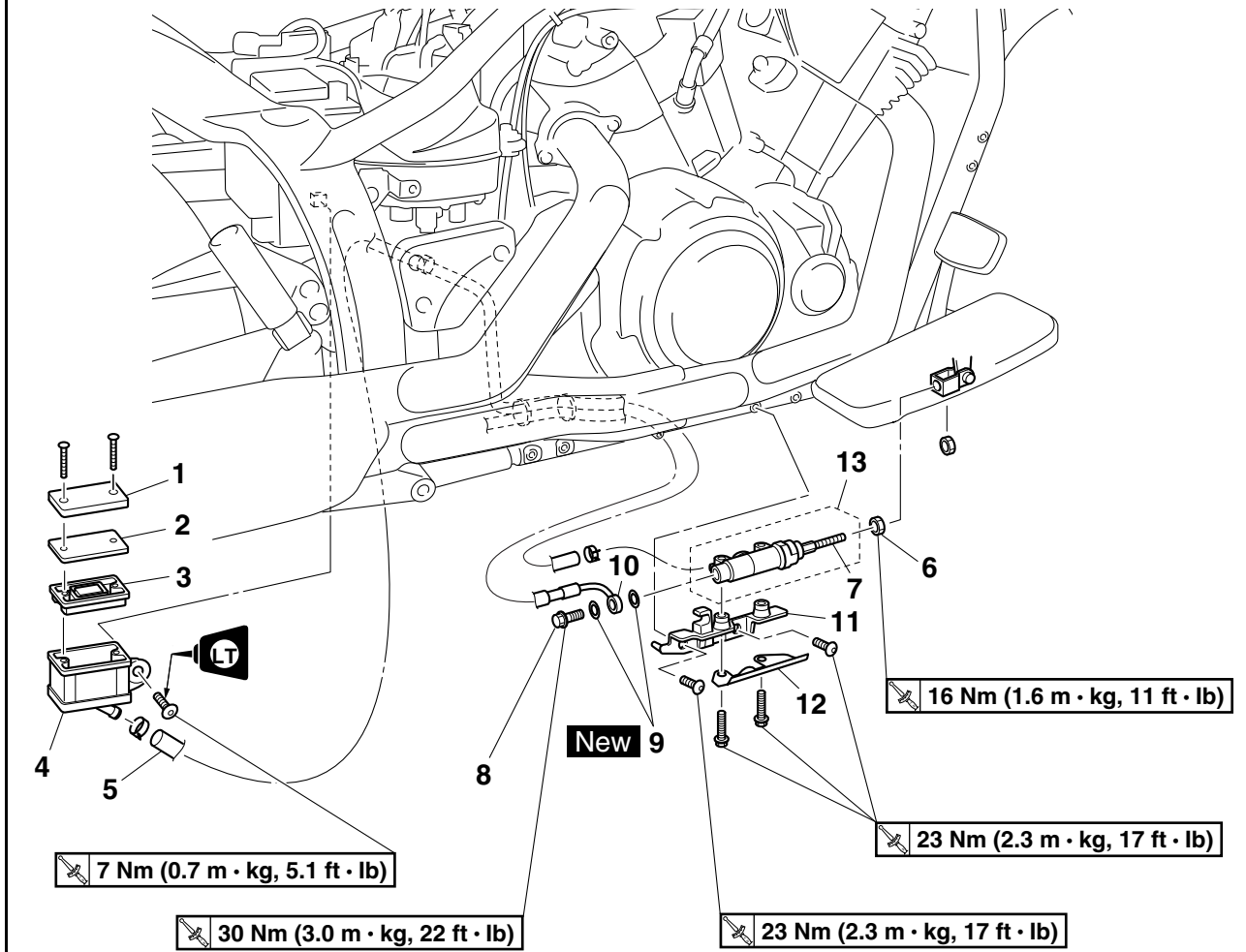
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake caliper retaining bolt	2	
2	Rear brake caliper	1	
3	Rear brake pad	2	
4	Brake pad spring	2	
			For installation, reverse the removal procedure.

Removing the rear brake master cylinder



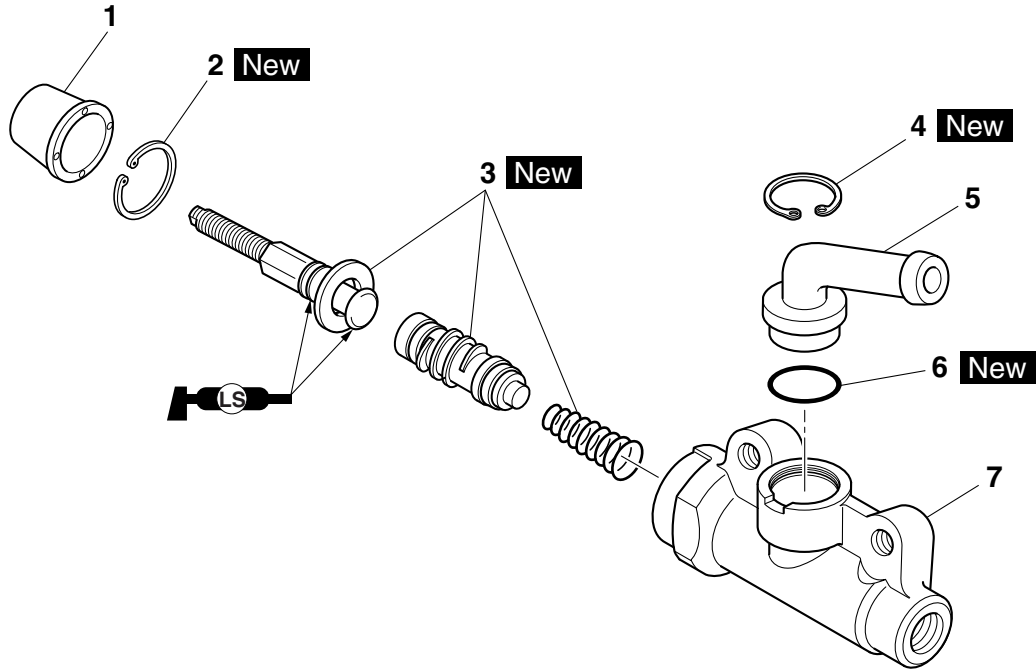
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.
	Sub-fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Brake fluid reservoir hose	1	
6	Locknut (rear brake master cylinder)	1	Loosen.
7	Brake pedal adjusting bolt	1	Loosen.
8	Rear brake hose union bolt	1	
9	Copper washer	2	
10	Rear brake hose	1	
11	Rear brake master cylinder bracket	1	
12	Rear brake master cylinder cover	1	

Removing the rear brake master cylinder



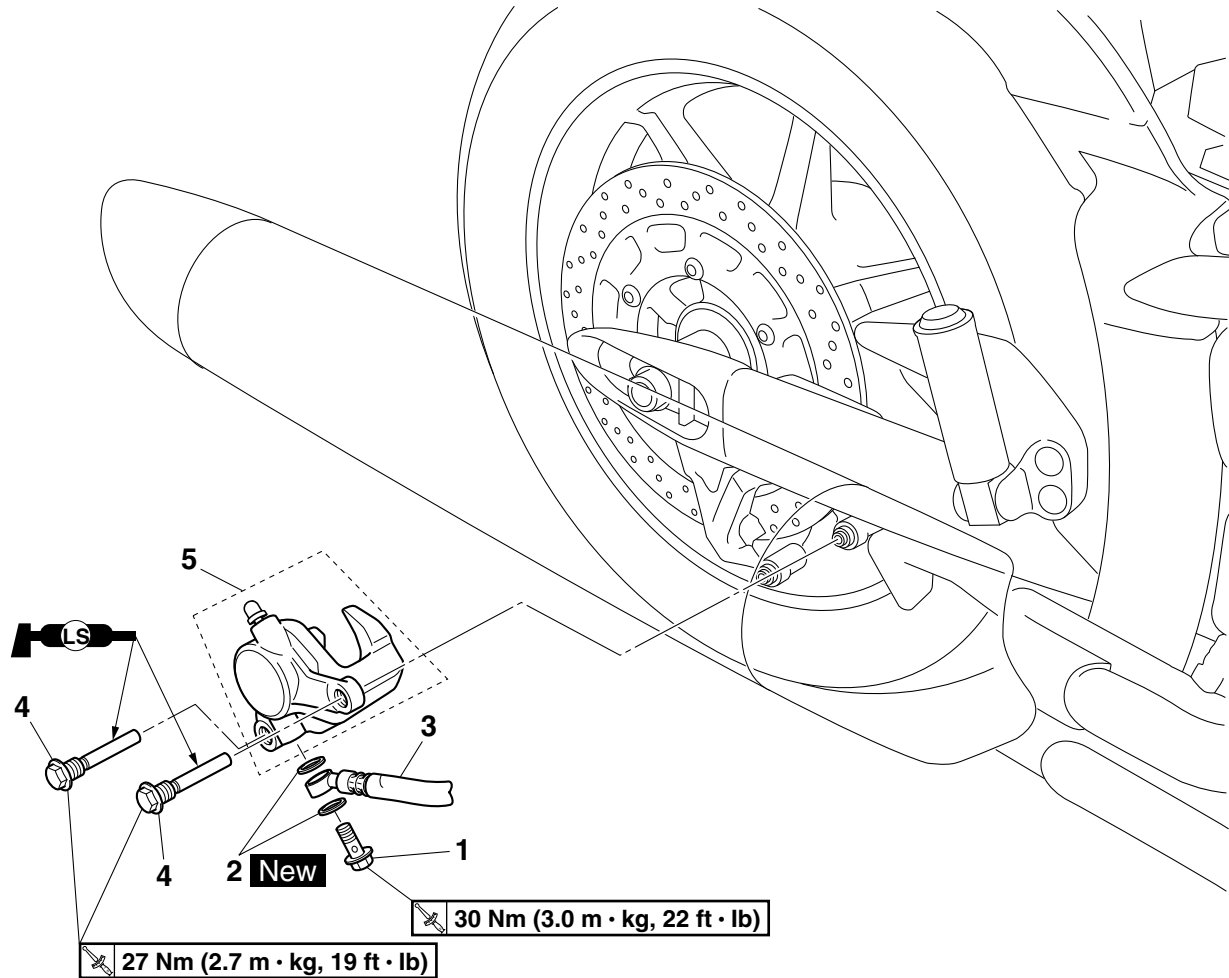
Order	Job/Parts to remove	Q'ty	Remarks
13	Rear brake master cylinder	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake master cylinder



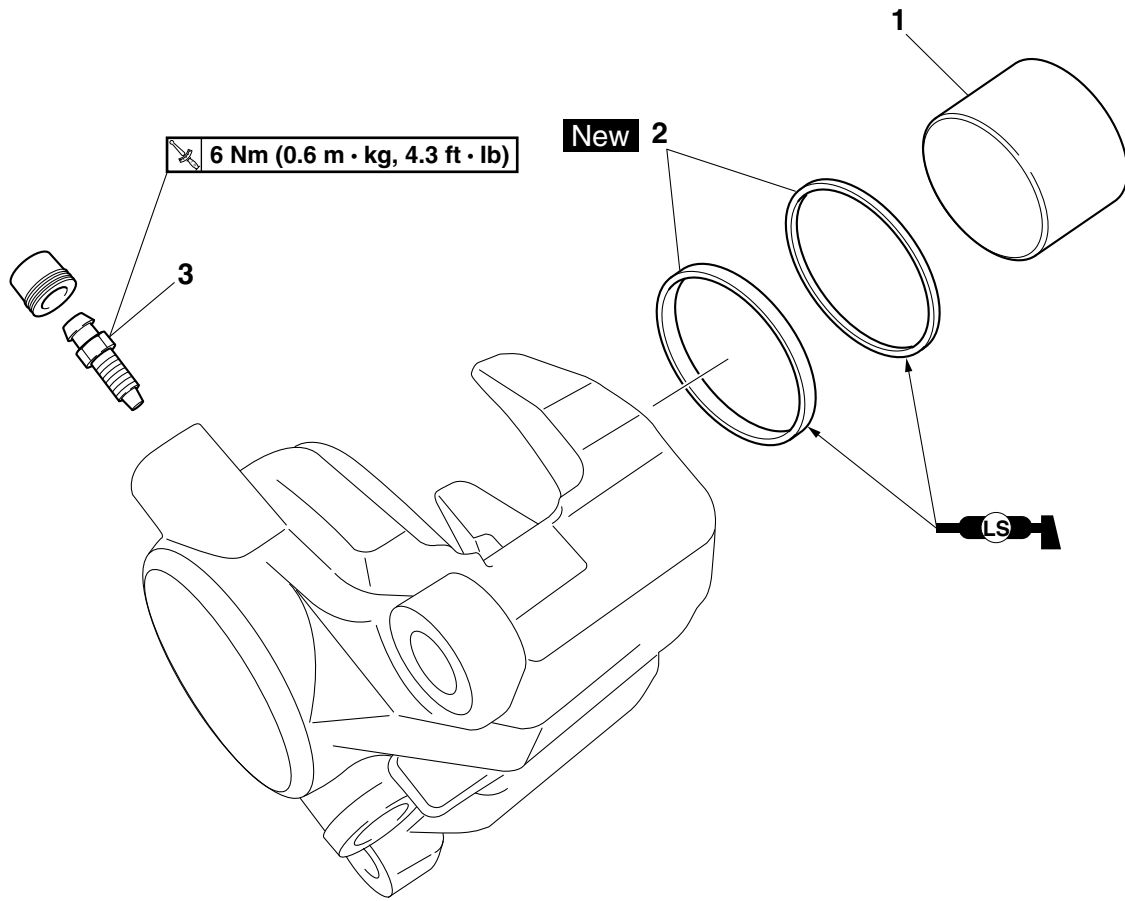
Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Circlip	1	
5	Brake hose joint	1	
6	O-ring	1	
7	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.
1	Rear brake hose union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	
4	Rear brake caliper retaining bolt	2	
5	Rear brake caliper	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake caliper



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

EAS22560

INTRODUCTION

EWA14100



WARNING

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

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

EAS22570

CHECKING THE REAR BRAKE DISC

1. Remove:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-15.
2. Check:
 - Brake disc
Damage/galling → Replace.
3. Measure:
 - Brake disc deflection
Out of specification → Correct the brake disc deflection or replace the brake disc.
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-27.



Brake disc deflection limit
0.15 mm (0.0059 in)

NOTE:

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

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

Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-27.



Brake disc thickness limit
5.5 mm (0.22 in)

5. Adjust:
 - Brake disc deflection
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-27.



Brake disc bolt
23 Nm (2.3 m·kg, 17 ft·lb)
LOCTITE®

6. Install:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-15.

EAS22580

REPLACING THE REAR BRAKE PADS

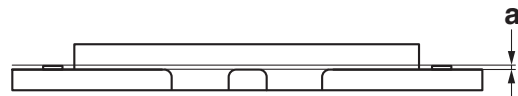
NOTE:

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

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



Brake pad lining thickness (inner)
5.8 mm (0.23 in)
Limit
0.8 mm (0.03 in)
Brake pad lining thickness (outer)
5.8 mm (0.23 in)
Limit
0.8 mm (0.03 in)

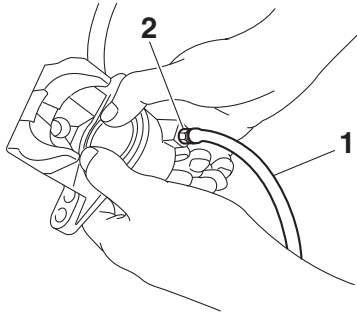


2. Install:
 - Brake pads
 - Brake pad springs


NOTE:

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


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



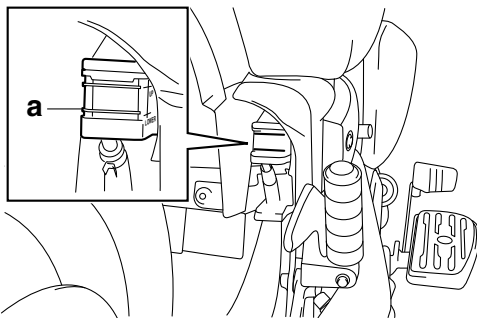
- c. Tighten the bleed screw to specification.

	Bleed screw 6 Nm (0.6 m·kg, 4.3 ft·lb)
---	--

3. Install:
 - Rear brake caliper

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

4. Check:
 - Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.



5. Check:
 - Brake pedal operation
Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-22.

EAS22590

REMOVING THE REAR BRAKE CALIPER

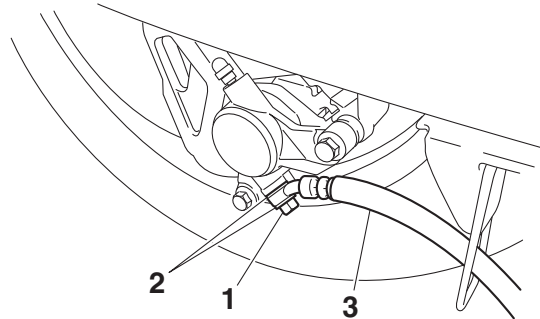
NOTE:

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

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

NOTE:

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



EAS22600

DISASSEMBLING THE REAR BRAKE CALIPER

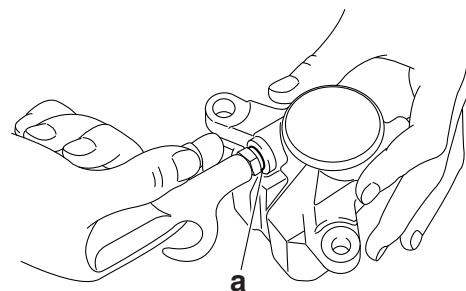
1. Remove:
 - Brake caliper piston
 - Brake caliper piston seals

- 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 seals.



EAS22640

CHECKING THE REAR BRAKE CALIPER

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

1. Check:

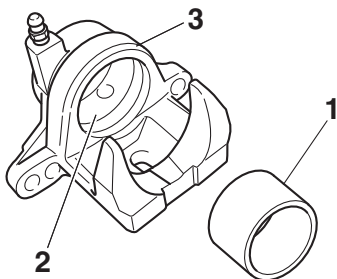
- Brake caliper piston “1”
Rust/scratches/wear → Replace the brake caliper piston.
- Brake caliper cylinder “2”
Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body “3”
Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages (brake caliper body)
Obstruction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

EWA13610



WARNING

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



EAS22650

ASSEMBLING THE REAR BRAKE CALIPER

EWA13620



WARNING

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

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



Recommended fluid
DOT 4

EAS22670

INSTALLING THE REAR BRAKE CALIPER

1. Install:

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



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

EWA13530



WARNING

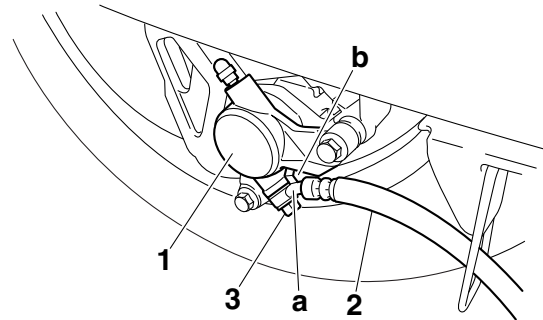
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-43.

ECA14170



CAUTION:

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



2. Remove:

- Rear brake caliper

3. Install:

- Brake pads
 - Brake pad springs
 - Rear brake caliper
- Refer to “REPLACING THE REAR BRAKE PADS” on page 4-40.



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

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



**Recommended fluid
DOT 4**

EWA13090

WARNING

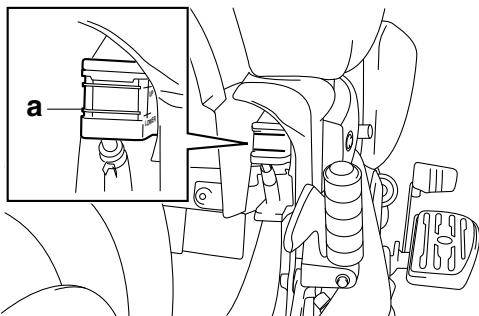
- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake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

ECA13540

CAUTION:

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

5. Bleed:
- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.
6. Check:
- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



7. Check:
- Brake pedal operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

EAS22700

REMOVING THE REAR BRAKE MASTER CYLINDER

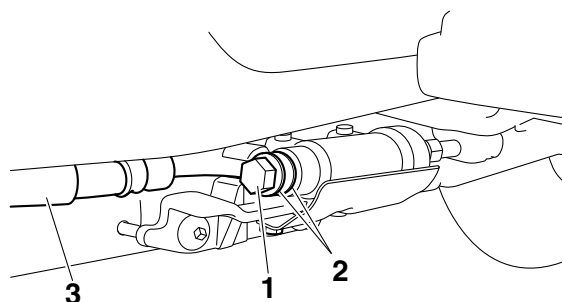
NOTE:

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

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

NOTE:

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



EAS22720

CHECKING THE REAR BRAKE MASTER CYLINDER

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

EAS22730

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

WARNING

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



**Recommended fluid
DOT 4**

EAS22750

INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:

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



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

EWA13530

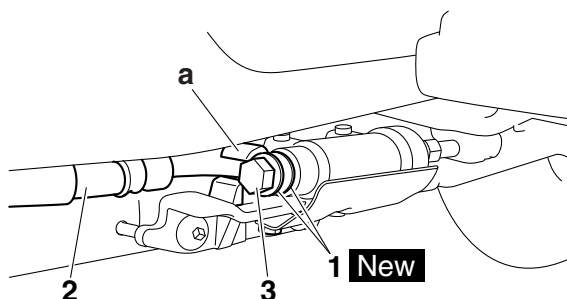
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-43.

ECA3D81005

CAUTION:

When installing the brake hose onto the brake master cylinder, make sure the brake pipe touches the projection “a” on the brake caliper bracket as shown.



2. Fill:

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



**Recommended fluid
DOT 4**

EWA13090

WARNING

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

ECA13540

CAUTION:

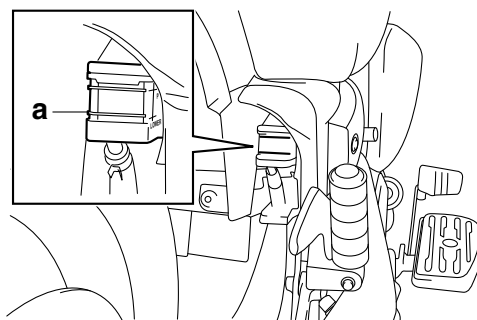
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilled brake fluid immediately.

3. Bleed:

- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

4. Check:

- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



5. Check:

- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-22.

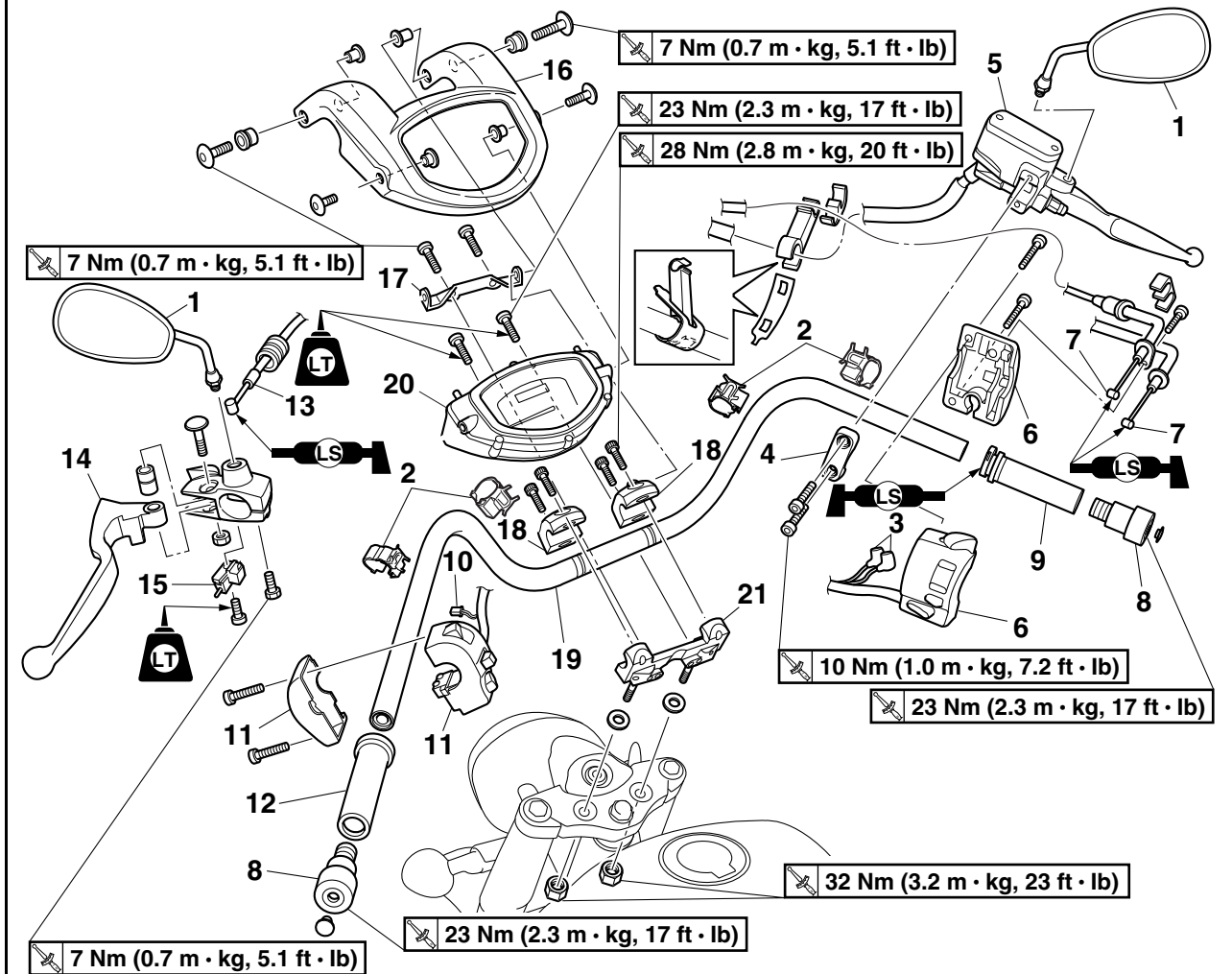
6. Adjust:

- Brake pedal adjusting bolt position
Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-20.

EAS22840

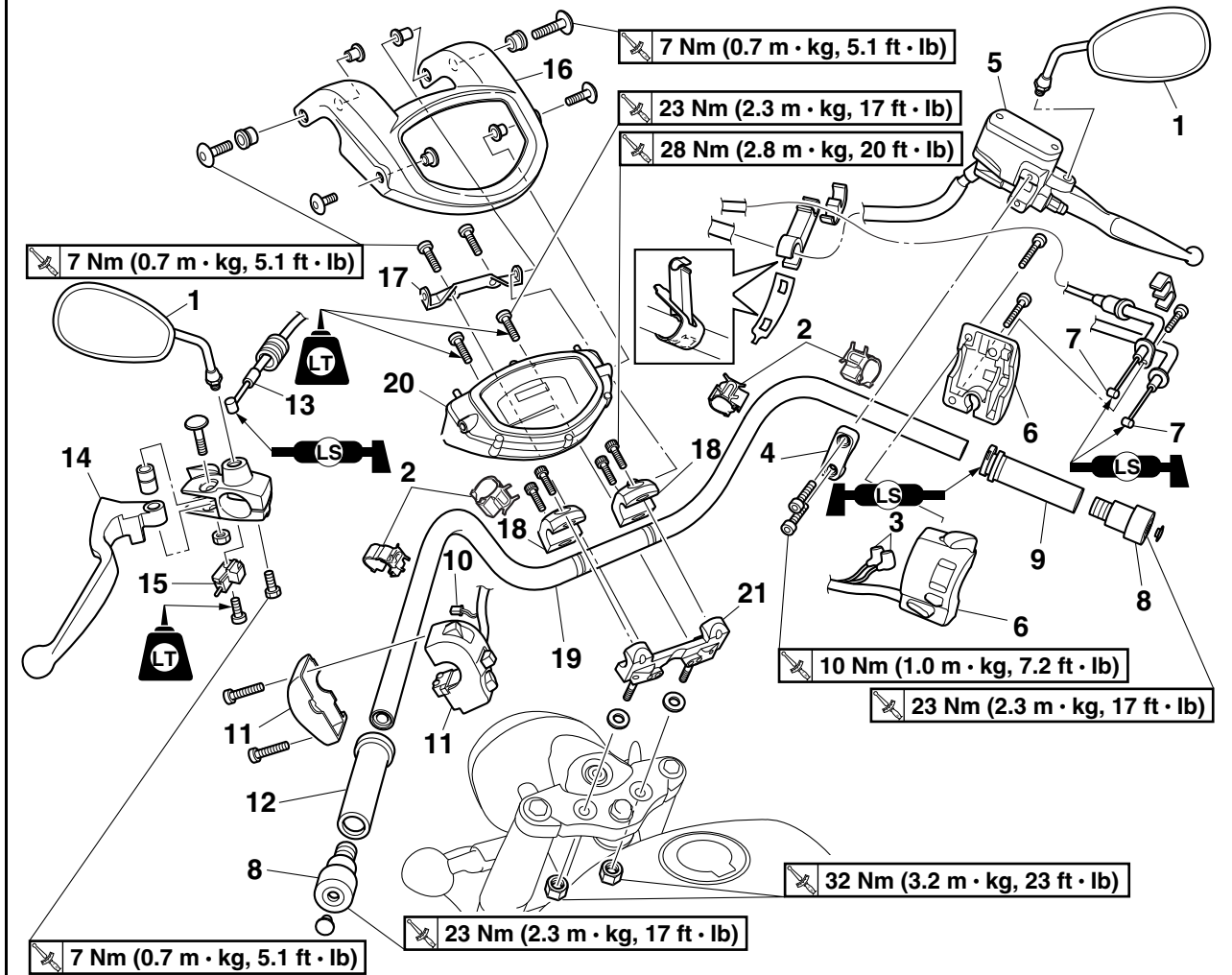
HANDLEBAR

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
1	Rearview mirror	2	
2	Plastic clamp	4	
3	Front brake light switch connector	2	Disconnect.
4	Front brake master cylinder holder	1	
5	Front brake master cylinder assembly	1	
6	Right handlebar switch	1	
7	Throttle cable	2	Disconnect.
8	Grip end	2	
9	Throttle grip	1	
10	Clutch switch coupler	1	Disconnect.
11	Left handlebar switch	1	
12	Handlebar grip	1	
13	Clutch cable	1	Disconnect.
14	Clutch lever	1	
15	Clutch switch	1	
16	Meter assembly cover	1	

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
17	Meter assembly cover bracket	1	
18	Front handlebar holder	2	
19	Handlebar	1	
20	Meter assembly	1	
21	Rear handlebar holder	1	
			For installation, reverse the removal procedure.

EAS22860

REMOVING THE HANDLEBAR

1. Stand the vehicle on a level surface.

EWA13120

WARNING

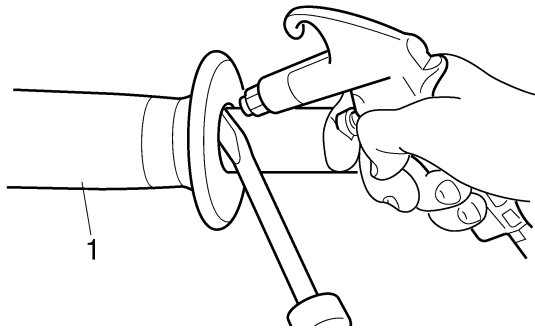
Securely support the vehicle so that there is no danger of it falling over.

2. Remove:

- Handlebar grip "1"

NOTE:

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



EAS22880

CHECKING THE HANDLEBAR

1. Check:

- Handlebar
- Bends/cracks/damage → Replace.

EWA13690

WARNING

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

EAS22930

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:

- Handlebar "1"
- Front handlebar holders "2"



Front handlebar holder bolt
28 Nm (2.8 m·kg, 20 ft·lb)

ECA3D81006

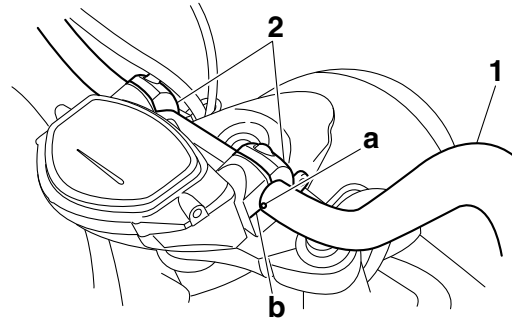
CAUTION:

- First, tighten the bolts on the lower side of the front handlebar holder, and then on the upper side.

- Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.

NOTE:

Align the punch mark "a" on the handlebar with the match mark "b" on the rear handlebar holder.



3. Install:

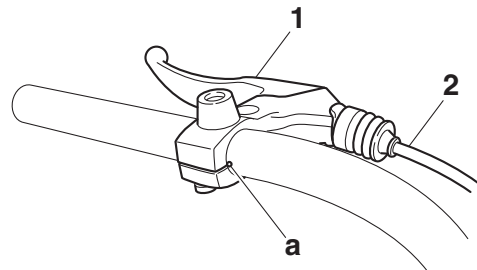
- Clutch lever "1"
- Clutch cable "2"



Clutch lever bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

NOTE:

Align the mating surfaces of the clutch lever with the punch mark "a" on the handlebar.

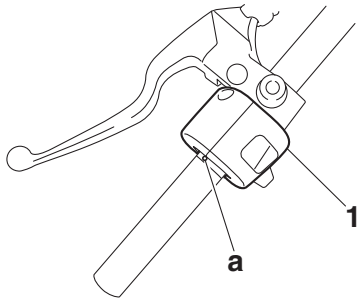


4. Install:

- Left handlebar switch "1"

NOTE:

Align the mating surfaces of the left handlebar switch with the punch mark "a" on the handlebar.



5. Install:

- Handlebar grip "1"



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

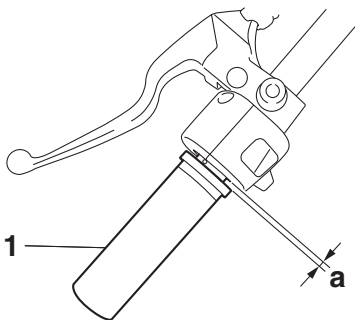
EWA13700

WARNING

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

NOTE:

There should be less than 3 mm (0.12 in) of clearance "a" between the handlebar grip and left handlebar switch.

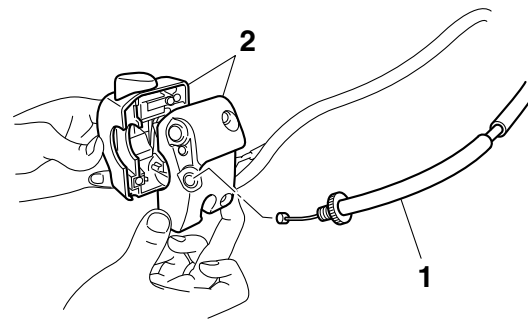


6. Connect:

- Throttle cable (decelerator cable) "1"
(to the right handlebar switch "2")

NOTE:

Rotate the right handlebar switch and screw it onto the end of the throttle cable.

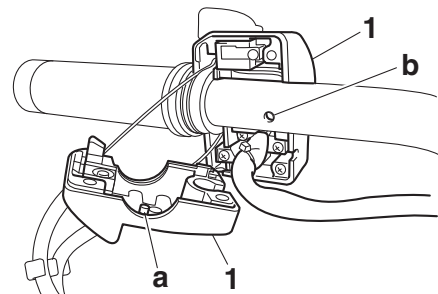


7. Install:

- Right handlebar switch "1"

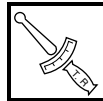
NOTE:

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



8. Install:

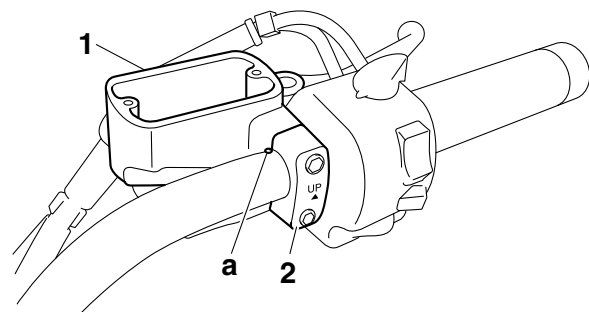
- Front brake master cylinder "1"
- Front brake master cylinder holder "2"



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

NOTE:

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



9. Adjust:

- Clutch lever free play
Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-13.



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

10. Adjust:

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

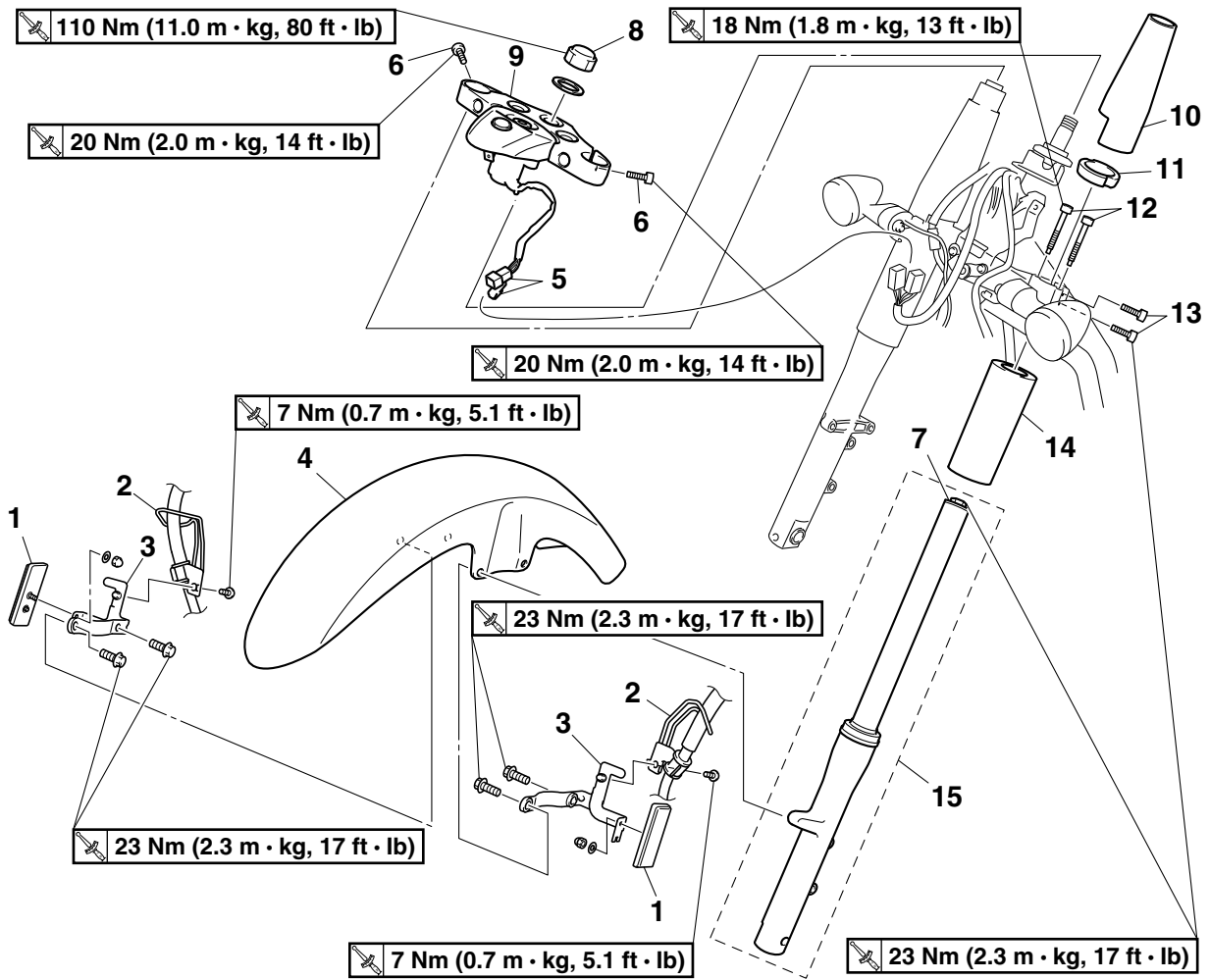


Throttle cable free play
4.0–6.0 mm (0.16–0.24 in)

EAS22950

FRONT FORK

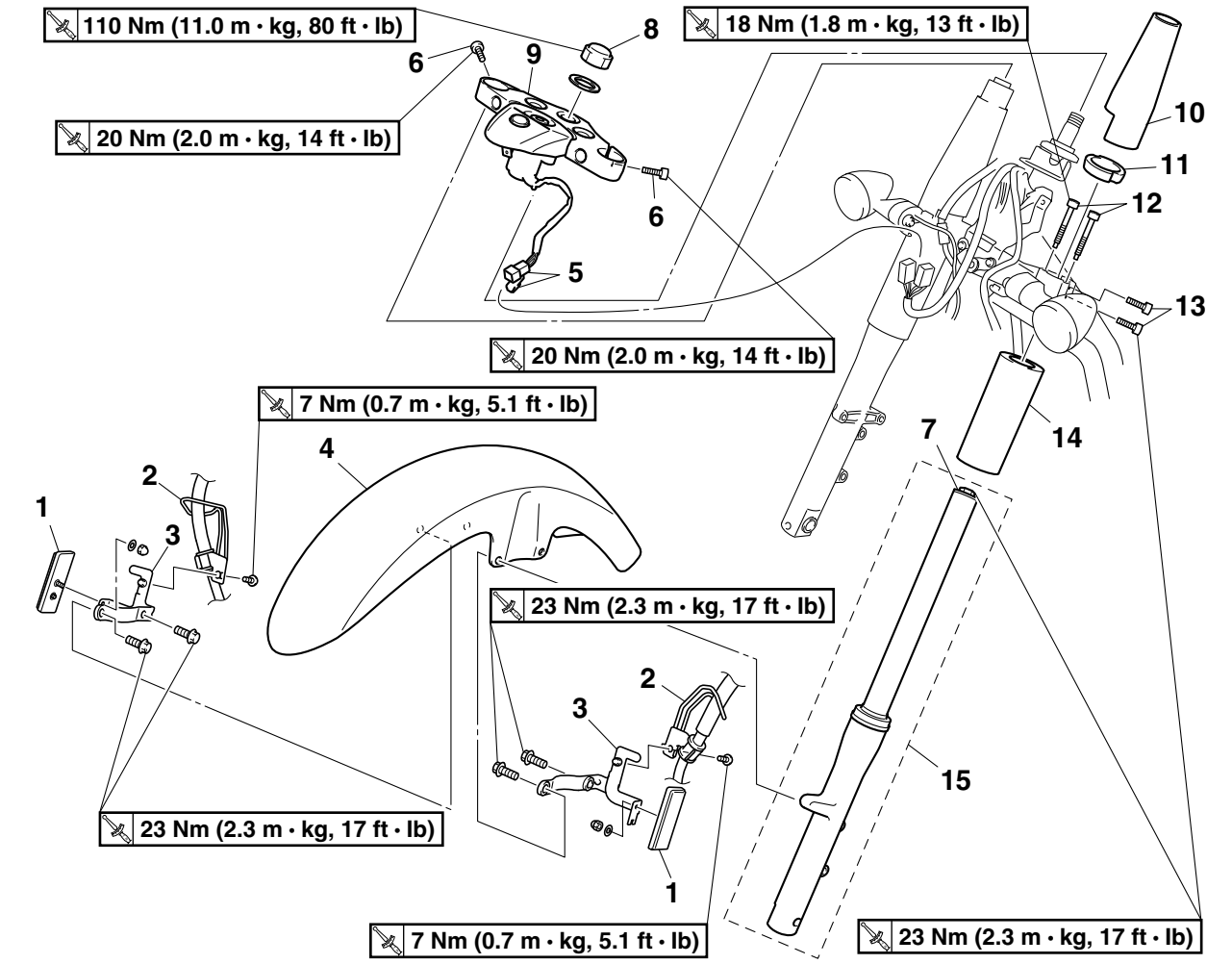
Removing the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Windshield bracket (left and right)		For XVS13CT only Refer to "GENERAL CHASSIS" on page 4-1.
	Headlight body		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-9.
	Rear handlebar holder		Refer to "HANDLEBAR" on page 4-45.
1	Front reflector	2	
2	Brake hose guide	2	
3	Reflector bracket	2	
4	Front fender	1	
5	Main switch coupler	2	Disconnect.
6	Upper bracket pinch bolt	2	Loosen.
7	Cap bolt	1	Loosen.
8	Steering stem nut	1	

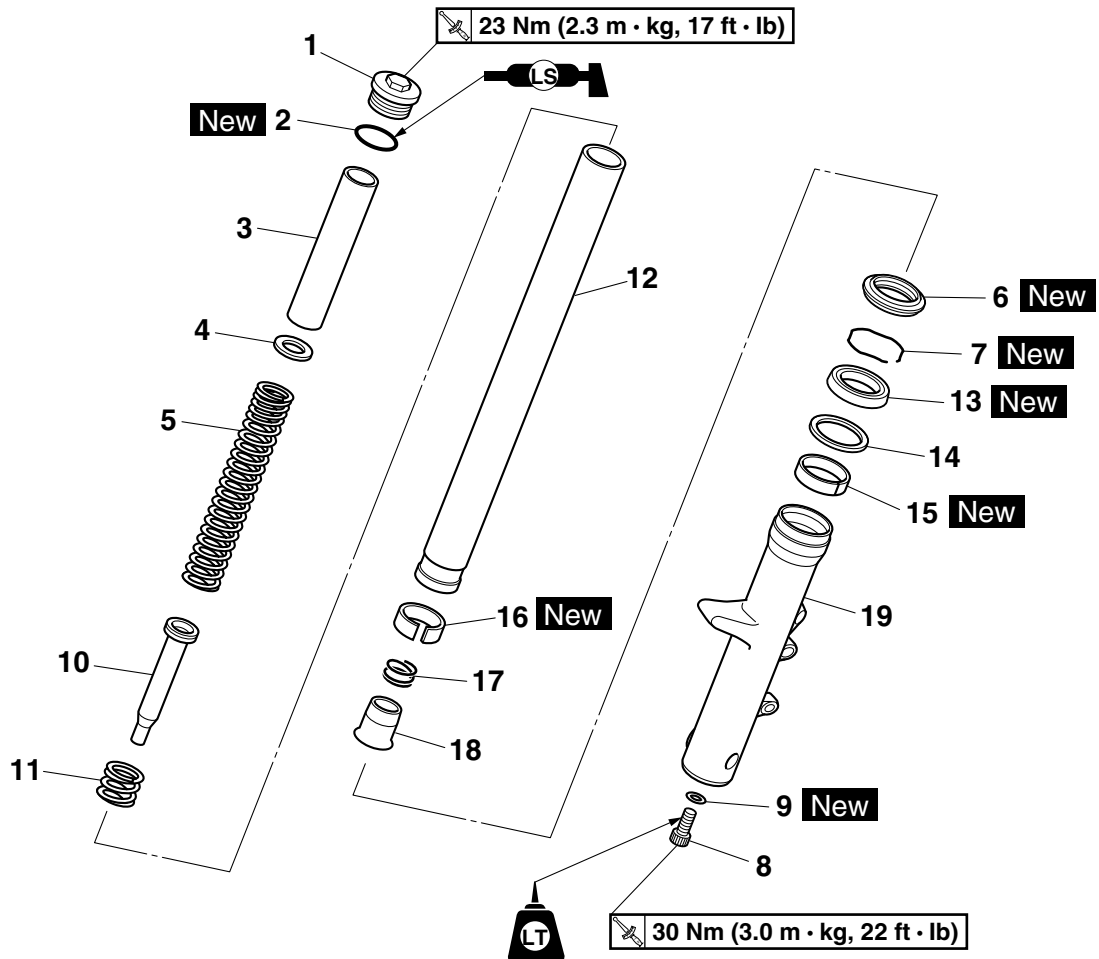
FRONT FORK

Removing the front fork legs



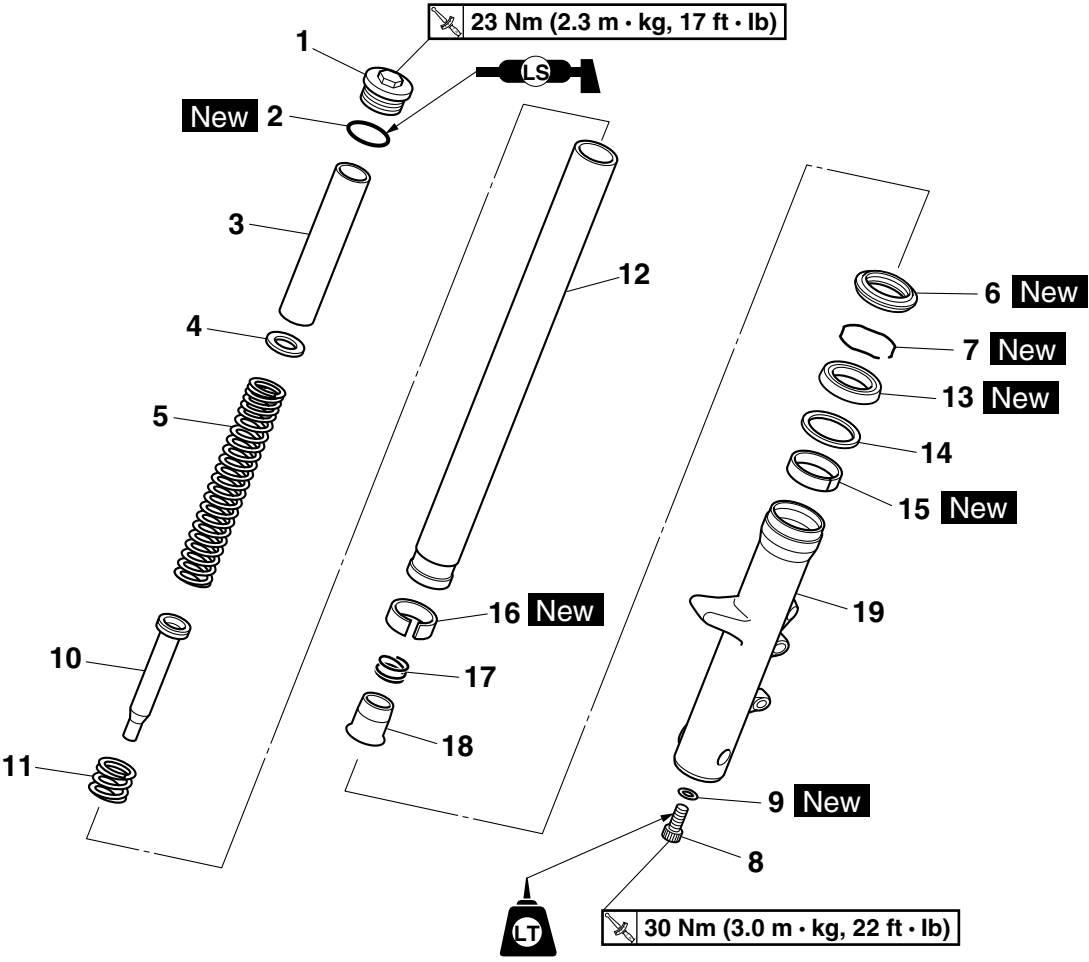
Order	Job/Parts to remove	Q'ty	Remarks
9	Upper bracket	1	
10	Upper front fork cover	1	
11	Upper front fork cover spacer	1	
12	Lower front fork cover bolt	2	
13	Lower bracket pinch bolt	2	Loosen.
14	Lower front fork cover	1	
15	Front fork leg	1	
			For installation, reverse the removal procedure.

Disassembling the front fork legs



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

Disassembling the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
17	Spring	1	
18	Oil flow stopper	1	
19	Outer tube	1	
			For assembly, reverse the disassembly procedure.

EAS22960

REMOVING THE FRONT FORK LEGS

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

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

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

2. Loosen:

- Lower bracket pinch bolts

EWA3D81004

WARNING

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

EAS22980

DISASSEMBLING THE FRONT FORK LEGS

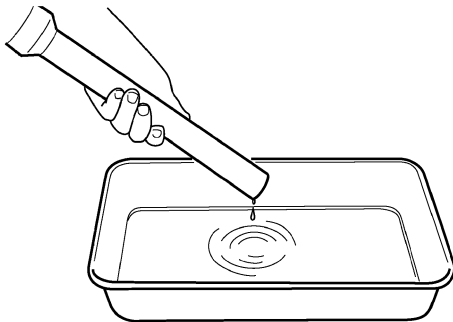
The following procedure applies to both of the front fork legs.

1. Drain:

- Fork oil

NOTE:

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



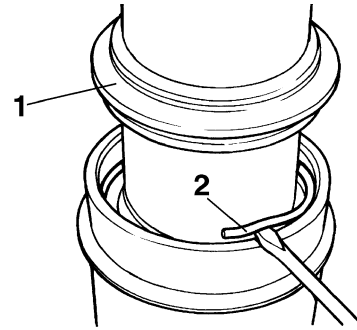
2. Remove:

- Dust seal "1"
- Oil seal clip "2"
(with a flathead screwdriver)

ECA14180

CAUTION:

Do not scratch the inner tube.




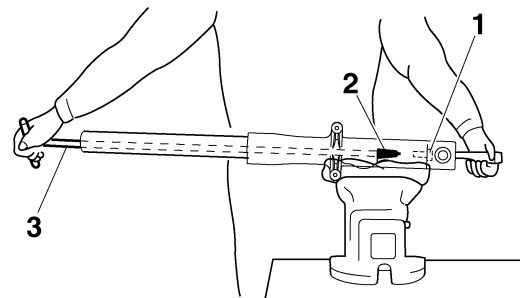
3. Remove:

- Damper rod bolt "1"
- Copper washer

NOTE:

While holding the damper rod with the damper rod holder "2" and T-handle "3", loosen the damper rod bolt.

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



4. Remove:

- Inner tube

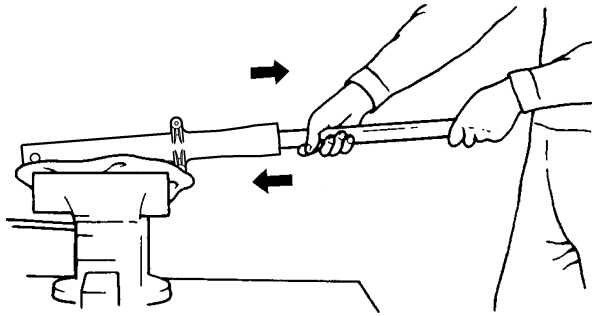


- a. Hold the front fork leg horizontally.
- b. Securely clamp the brake caliper bracket in a vise with soft jaws.
- c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.

ECA14190

CAUTION:

- 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.



EAS23010

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

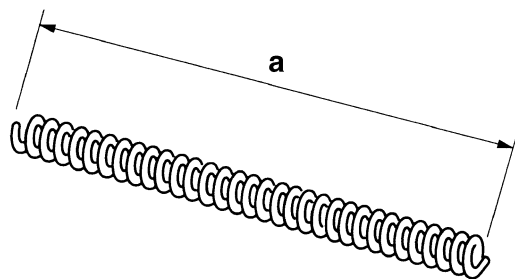
WARNING

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

2. Measure:
 - Spring free length "a"
 Out of specification → Replace.



Fork spring free length
345.5 mm (13.60 in)
Limit
339.4 mm (13.36 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

CAUTION:

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

EAS23020

ASSEMBLING THE FRONT FORK LEGS

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

EWA13660

WARNING

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

NOTE:

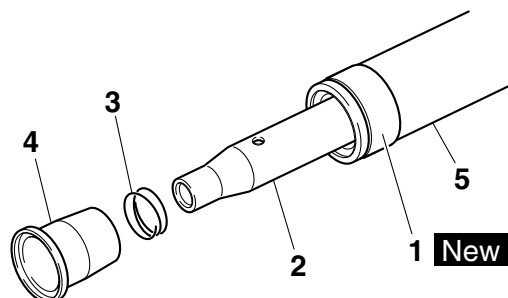
- When assembling the front fork leg, be sure to replace the following parts:
 - Inner tube bushing
 - Outer tube bushing
 - Oil seal
 - Dust seal
- Before assembling the front fork leg, make sure all of the components are clean.

1. Install:
 - Inner tube bushing "1" **New**
 - Damper rod "2"
 - Rebound spring
 - Spring "3"
 - Oil flow stopper "4"

ECA3D81007

CAUTION:

Allow the damper rod to slide slowly down the inner tube "5" until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Lubricate:

- Inner tube's outer surface

	<p>Recommended oil Yamaha fork oil 10WT</p>
---	--

3. Install:

- Inner tube
(in the outer tube)

4. Install:

- Copper washer **New**
- Damper rod bolt


5. Tighten:

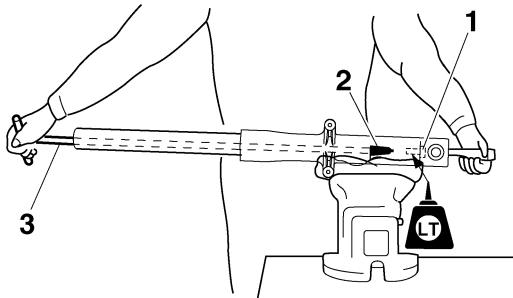
- Damper rod bolt "1"

	<p>Damper rod bolt 30 Nm (3.0 m·kg, 22 ft·lb) LOCTITE®</p>
---	---

NOTE: _____


While holding the damper rod assembly with the damper rod holder "2" and T-handle "3", tighten the damper rod bolt.

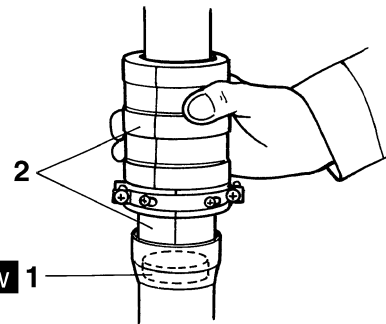
	<p>Damper rod holder 90890-01460 T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326</p>
--	--



6. Install:

- Outer tube bushing "1" **New**
- Washer
(with the fork seal driver "2")

	<p>Fork seal driver 90890-01442 Adjustable fork seal driver (36–46 mm) YM-01442</p>
---	---



7. Install:

- Oil seal "1" **New**
(with the fork seal driver "2")

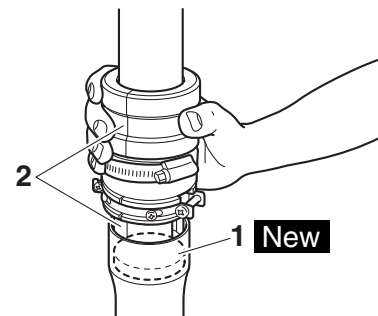
ECA14220

CAUTION: _____

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

NOTE: _____

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

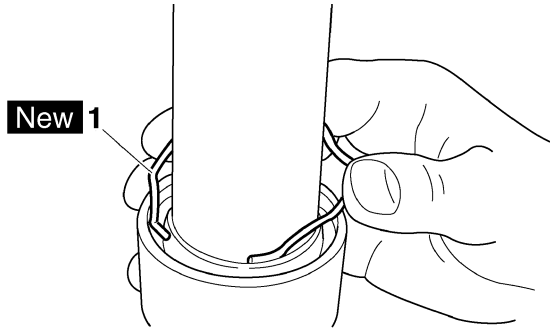


8. Install:

- Oil seal clip "1" **New**

NOTE:

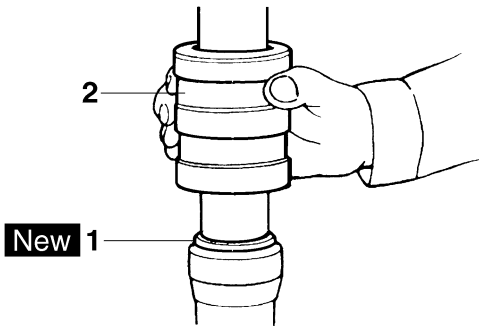
Adjust the oil seal clip so that it fits into the outer tube's groove.



9. Install:

- Dust seal "1" **New**
(with the fork seal driver weight "2")

	<p>Fork seal driver 90890-01442 Adjustable fork seal driver (36–46 mm) YM-01442</p>
--	---



10. Fill:

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

	<p>Quantity 490.0 cm³ (16.57 US oz) (17.28 Imp.oz) Recommended oil Yamaha fork oil 10WT</p>
--	--

11. Measure:

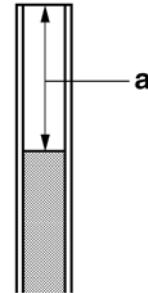
- Front fork leg oil level "a"
(from the top of the inner tube, with the outer tube fully compressed and without the fork spring)
Out of specification → Correct.



Level
105.0 mm (4.13 in)

NOTE:

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



12. Install:

- Spring
- Spring seat
- Spacer
- Cap bolt

(along with the O-ring **New**)

NOTE:

- Before installing the cap bolt, lubricate its O-ring with grease.
- Temporarily tighten the cap bolt.

EAS23050

INSTALLING THE FRONT FORK LEGS

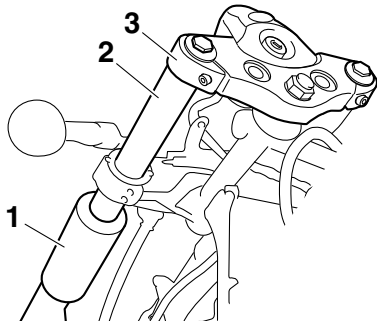
The following procedure applies to both of the front fork legs.

1. Install:

- Lower front fork cover "1"
- Front fork leg "2"
- Upper bracket "3"
Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:

Make sure the inner tube end is flush with the top of the upper bracket.



2. Tighten:
- Lower bracket pinch bolts



Lower bracket pinch bolt
23 Nm (2.3 m·kg, 17 ft·lb)

NOTE:

Tighten the lower bracket pinch bolts to specification twice. Tighten the upper and lower bolts alternately, starting with the upper bolts.

3. Remove:
- Upper bracket
4. Tighten:
- Lower front fork cover bolts

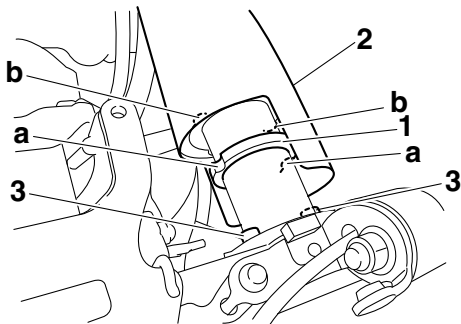


Lower front fork cover bolt
18 Nm (1.8 m·kg, 13 ft·lb)

5. Install:
- Upper front fork cover spacer "1"
 - Upper front fork cover "2"
 - Upper bracket

NOTE:

Align the grooves "a" in the upper front fork cover spacer "1", and groove "b" in the upper front fork cover "2" with the lower front fork cover bolts "3".



6. Tighten:
- Steering stem nut



Steering stem nut
110 Nm (11.0 m·kg, 80 ft·lb)

- Cap bolt



Cap bolt
23 Nm (2.3 m·kg, 17 ft·lb)

- Upper bracket pinch bolt



Upper bracket pinch bolt
23 Nm (2.3 m·kg, 17 ft·lb)

EWA13680

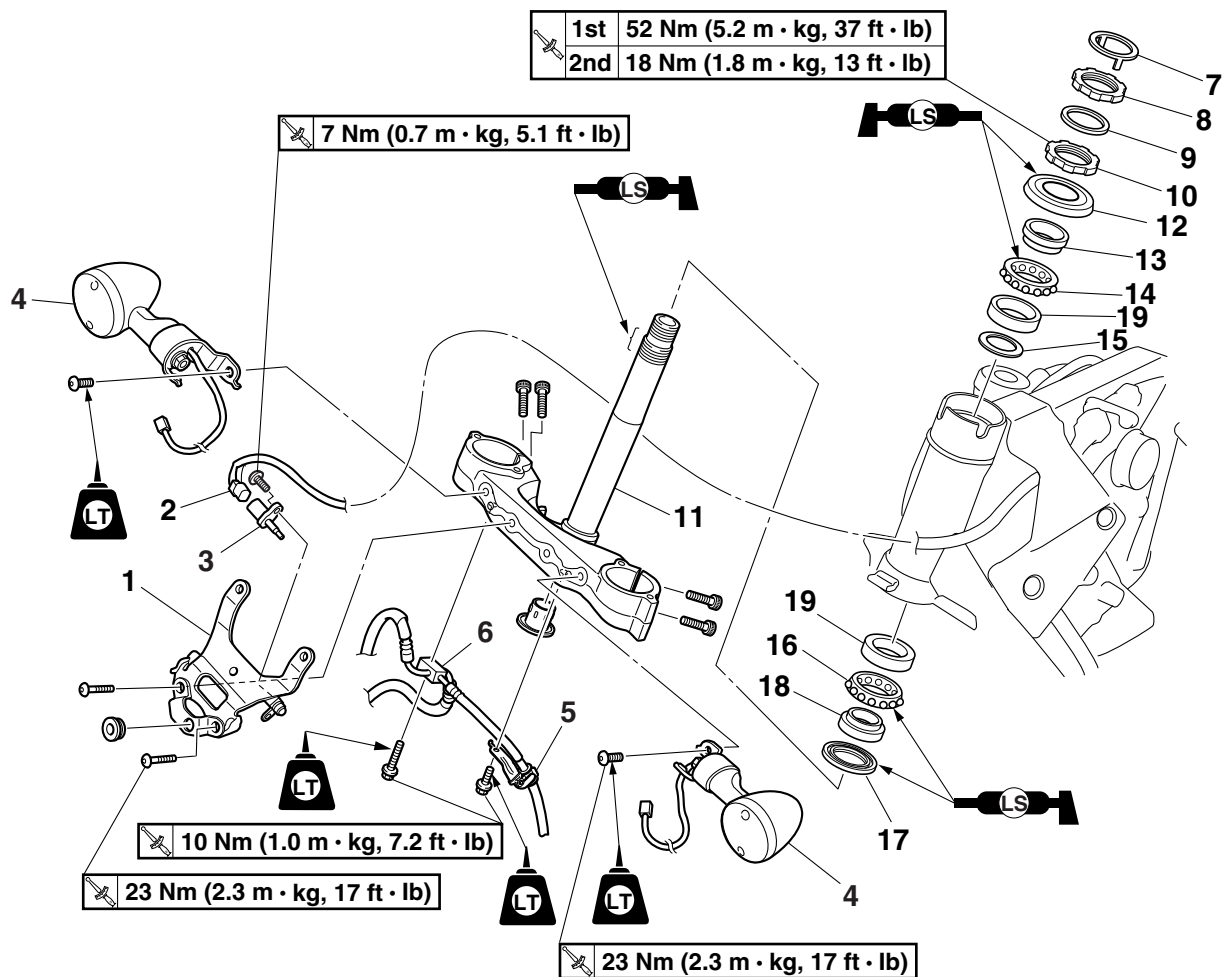
WARNING

Make sure the brake hoses are routed properly.

EAS23090

STEERING HEAD

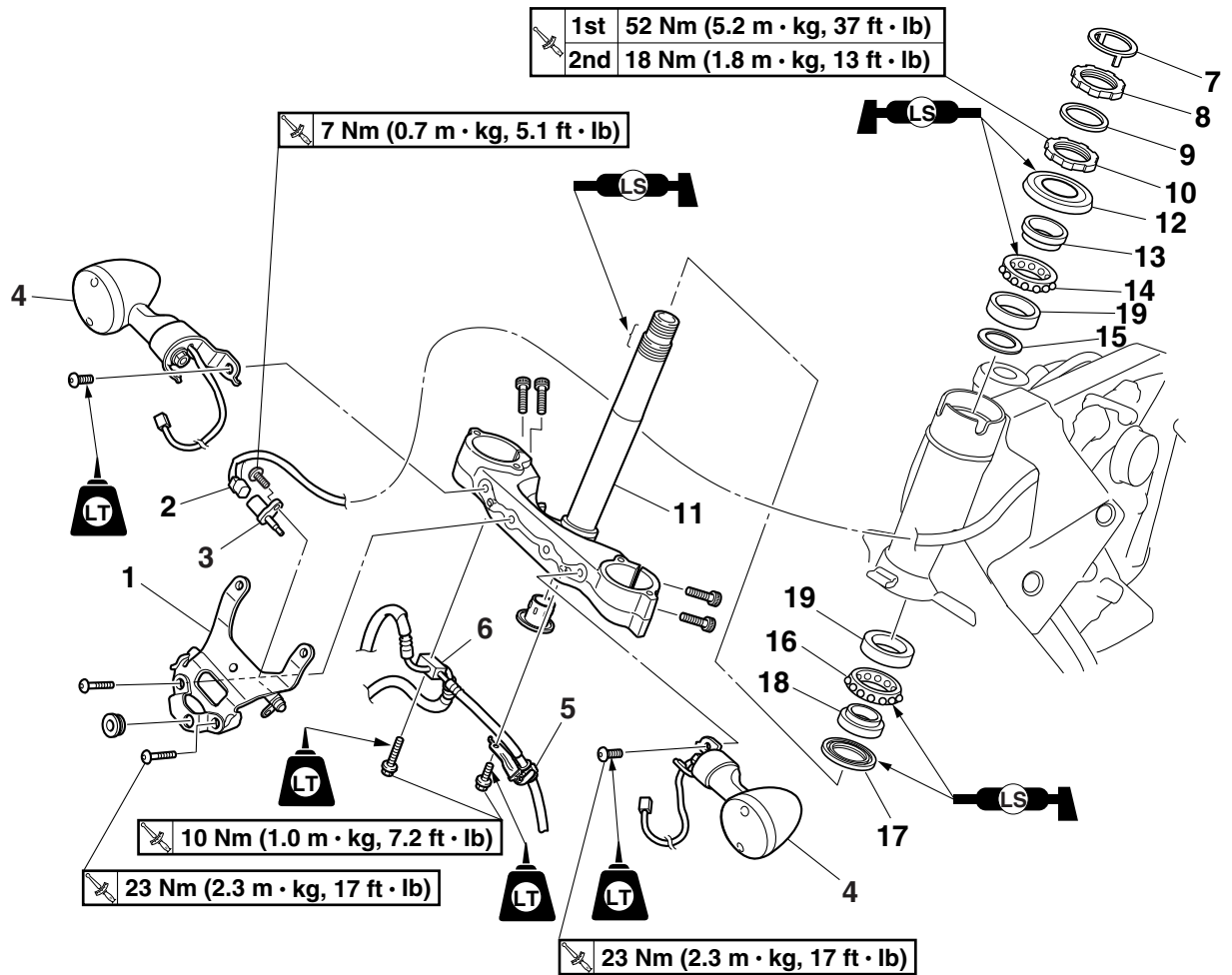
Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
	Upper bracket/Front fork legs		Refer to "FRONT FORK" on page 4-50.
1	Headlight bracket	1	
2	Air temperature sensor coupler	1	Disconnect.
3	Air temperature sensor	1	
4	Front turn signal light	2	
5	Front brake hose holder	1	
6	Front brake hose joint	1	
7	Lock washer	1	
8	Upper ring nut	1	
9	Rubber washer	1	
10	Lower ring nut	1	
11	Lower bracket	1	
12	Upper bearing cover	1	
13	Upper bearing inner race	1	
14	Upper bearing	1	
15	Washer	1	

STEERING HEAD

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
16	Lower bearing	1	
17	Dust seal	1	
18	Lower bearing inner race	1	
19	Bearing outer race	2	
			For installation, reverse the removal procedure.

EAS23110

REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Remove:

- Upper ring nut
- Rubber washer
- Lower ring nut "1"
- Lower bracket

EWA13730

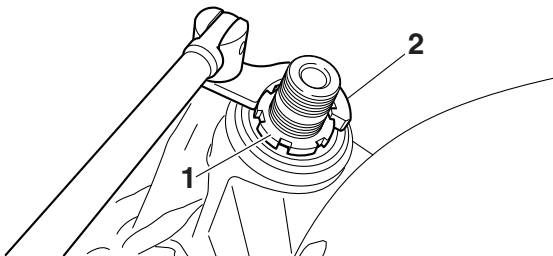
WARNING

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

NOTE:

Remove the lower ring nut with the steering nut wrench "2".

	<p>Steering nut wrench 90890-01403</p> <p>Spanner wrench YU-33975</p>
---	---



EAS23120

CHECKING THE STEERING HEAD

1. Wash:

- Bearings
- Bearing races

	<p>Recommended cleaning solvent Kerosene</p>
---	---

2. Check:

- Bearings
 - Bearing races
- Damage/pitting → Replace.

3. Replace:

- Bearings
- Bearing races



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

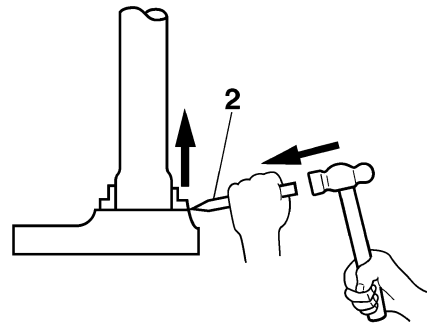
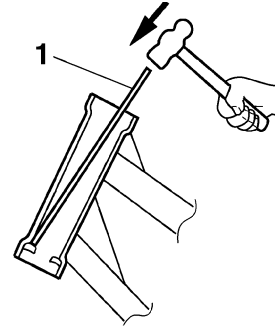
ECA14270

CAUTION:

If the bearing race is not installed properly, the steering head pipe could be damaged.

NOTE:

- Always replace the bearings and bearing races as a set.
- Whenever the steering head is disassembled, replace the dust seal.



4. Check:

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

EAS23140

INSTALLING THE STEERING HEAD

1. Lubricate:

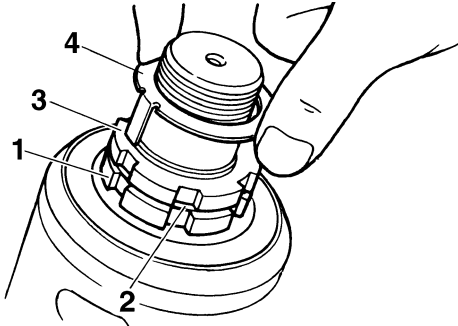
- Upper bearing
- Lower bearing
- Bearing races

	<p>Recommended lubricant Lithium-soap-based grease</p>
---	---

2. Install:

- Lower ring nut “1”
- Rubber washer “2”
- Upper ring nut “3”
- Lock washer “4”

Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-26.

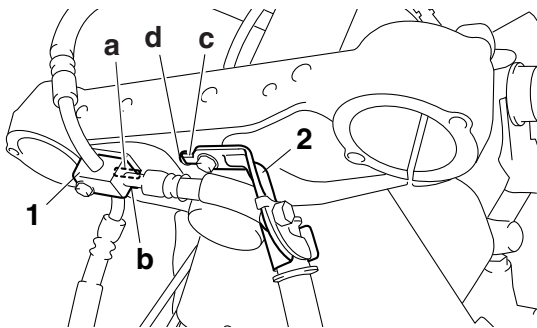


3. Install:

- Front brake hose joint “1”
- Front brake hose holder “2”

NOTE:

- Make sure that the projection “a” on the lower bracket contacts the side “b” of the front brake hose joint “1”.
- Align the projection “c” on the front brake hose holder with the hole “d” in the lower bracket.



4. Install:

- Front fork legs
- Upper bracket

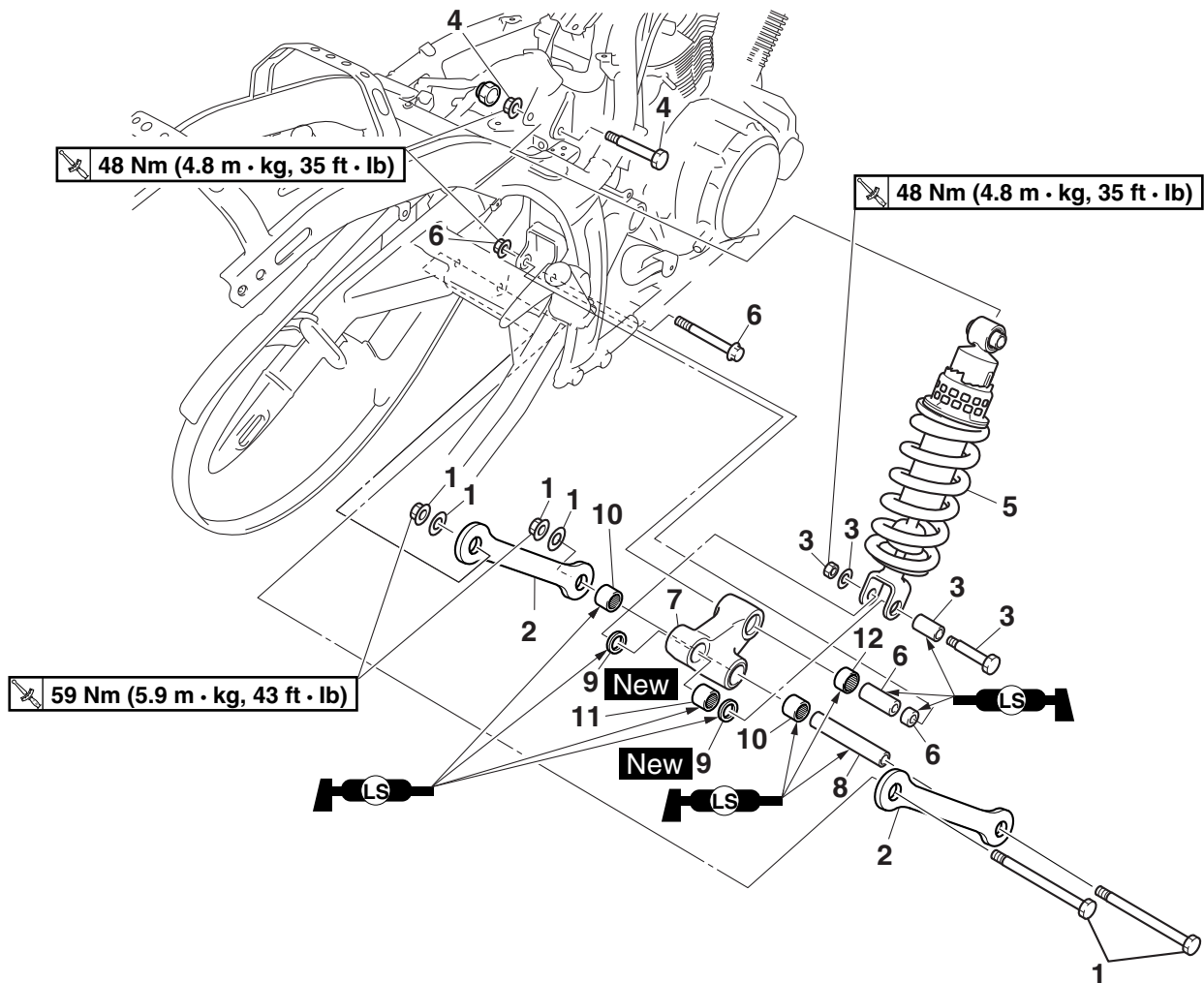
Refer to “FRONT FORK” on page 4-50.

REAR SHOCK ABSORBER ASSEMBLY

EAS23160

REAR SHOCK ABSORBER ASSEMBLY

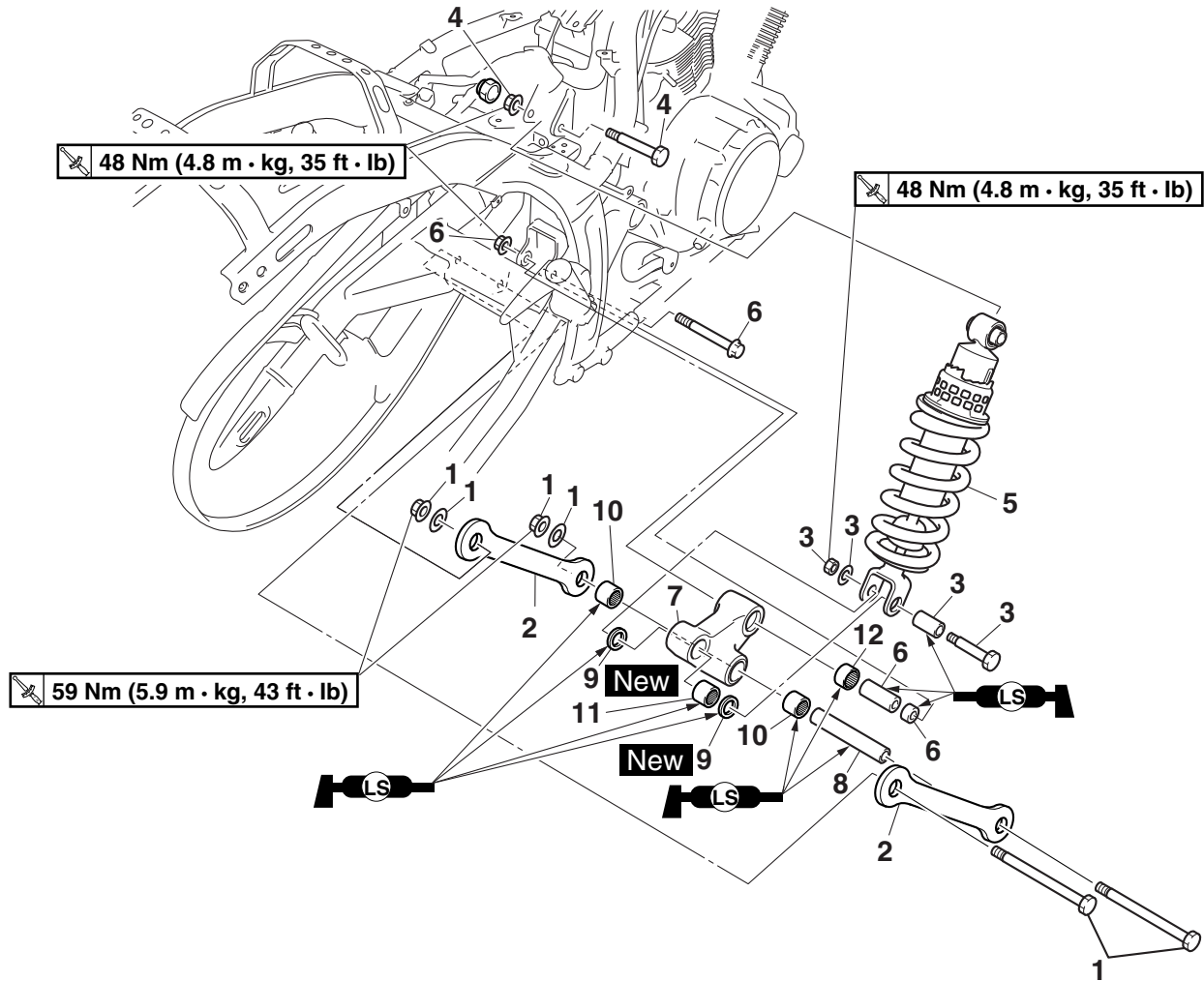
Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Battery box/Relay bracket		Refer to "GENERAL CHASSIS" on page 4-1.
	Muffler/Coolant reservoir cover		Refer to "ENGINE REMOVAL" on page 5-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
	Coolant reservoir		Refer to "RADIATOR" on page 6-1.
	Sub-fuel tank		Refer to "FUEL TANK" on page 7-1.
	Rear wheel		Refer to "REAR WHEEL" on page 4-15.
1	Connecting arm nut/Washer/Bolt	2/2/2	
2	Connecting arm	2	
3	Rear shock absorber assembly lower nut/Washer/Bolt/Collar	1/1/1/1	
4	Rear shock absorber assembly upper nut/Bolt	1/1	
5	Rear shock absorber assembly	1	
6	Relay arm nut/Bolt/Spacer/Collar	1/1/1/1	
7	Relay arm	1	

REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
8	Spacer	1	
9	Oil seal	2	
10	Bearing	2	
11	Bearing	1	
12	Bearing	1	
			For installation, reverse the removal procedure.

REAR SHOCK ABSORBER ASSEMBLY

EAS23180

HANDLING THE REAR SHOCK ABSORBER

EWA13740



WARNING

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

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.

EAS23190

DISPOSING OF A REAR SHOCK ABSORBER

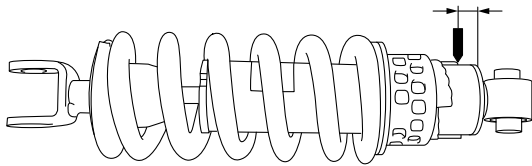
1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the rear shock absorber at a point 15–20 mm (0.60–0.79 in) from its end as shown.

EWA13760



WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.



EAS23230

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120



WARNING

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

NOTE: _____

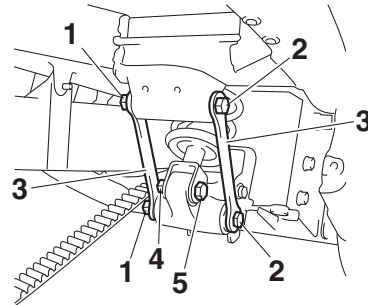
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Connecting arm nuts "1"
- Connecting arm bolts "2"
- Connecting arms "3"
- Rear shock absorber assembly lower nut "4"
- Rear shock absorber assembly lower bolt "5"

NOTE: _____

While removing the connecting arm bolts, hold the swingarm so that it does not drop down.

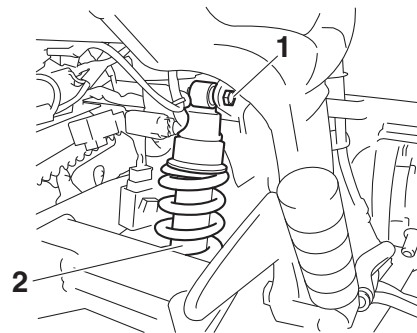


3. Remove:

- Rear shock absorber assembly upper nut
- Rear shock absorber assembly upper bolt "1"
- Rear shock absorber assembly "2"

NOTE: _____

Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm and relay arm.



EAS23240

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:

- Rear shock absorber rod
Bends/damage → Replace the rear shock absorber assembly.
- Rear shock absorber
Gas leaks/oil leaks → Replace the rear shock absorber assembly.

REAR SHOCK ABSORBER ASSEMBLY

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

EAS23260

CHECKING THE CONNECTING ARM AND RELAY ARM

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

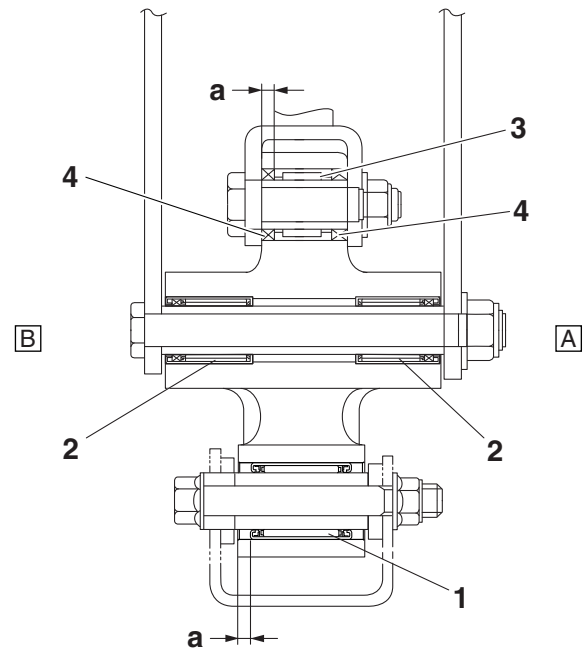
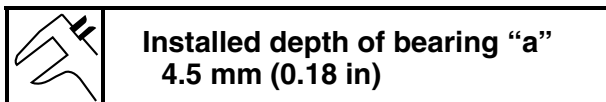
EAS23270

INSTALLING THE RELAY ARM

1. Lubricate:
 - Spacers
 - Bearings



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



- A. Left side
B. Right side

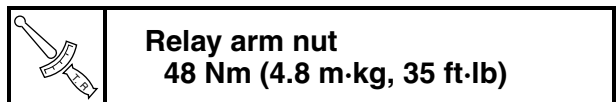
EAS23310

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
 - Spacer



2. Tighten:
 - Relay arm nut

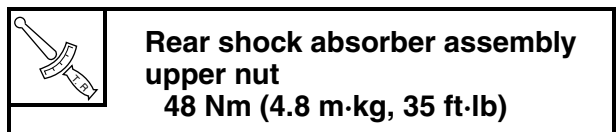


3. Install:
 - Rear shock absorber assembly

NOTE:

Raise the swingarm and then install the rear shock absorber assembly from between the swingarm and relay arm.

4. Tighten:
 - Rear shock absorber assembly upper nut



- Rear shock absorber assembly lower nut

REAR SHOCK ABSORBER ASSEMBLY



**Rear shock absorber assembly
lower nut**
48 Nm (4.8 m·kg, 35 ft·lb)

5. Install:

- Connecting arms

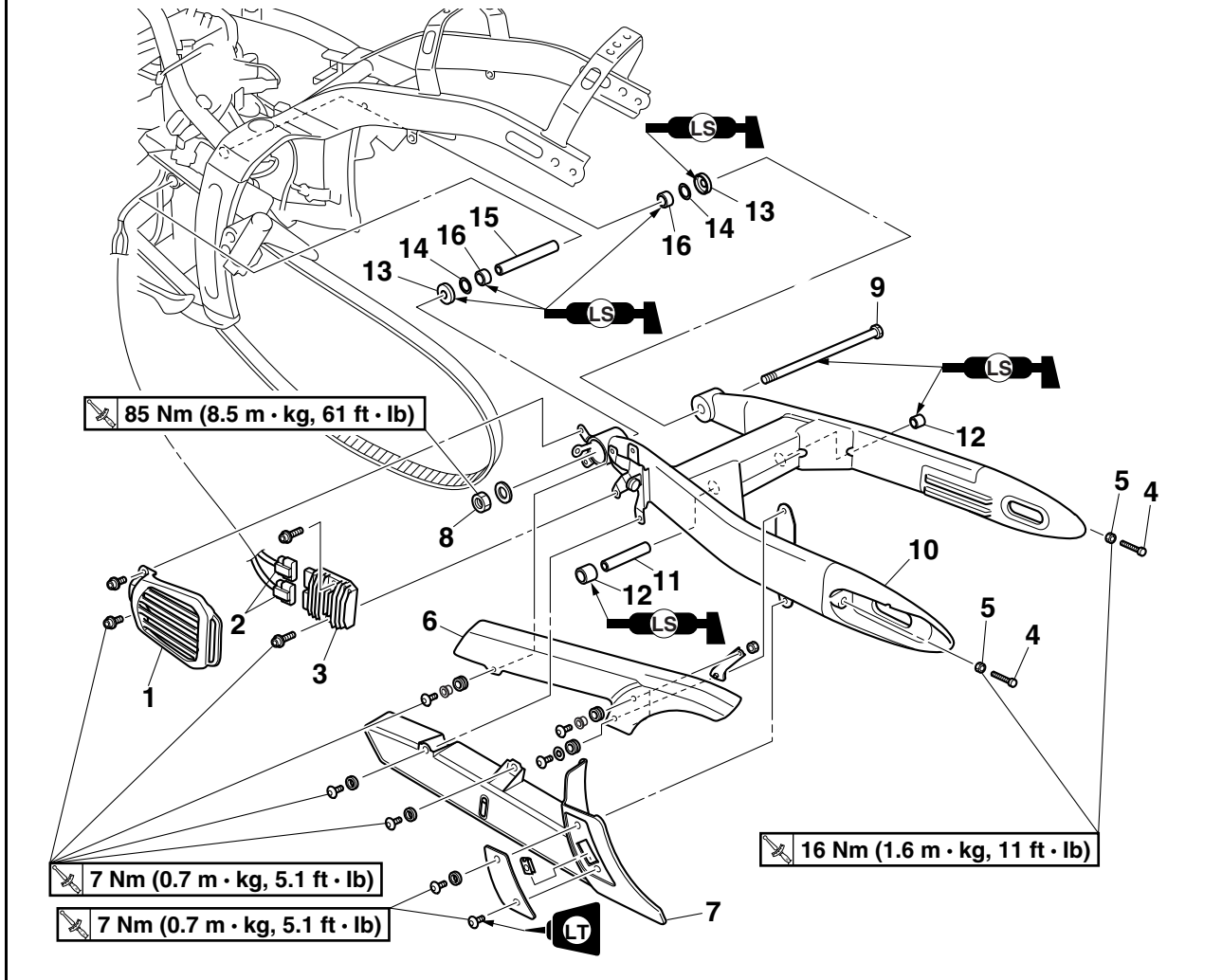
NOTE: _____

When installing the connecting arms, lift up the swingarm.

EAS23330

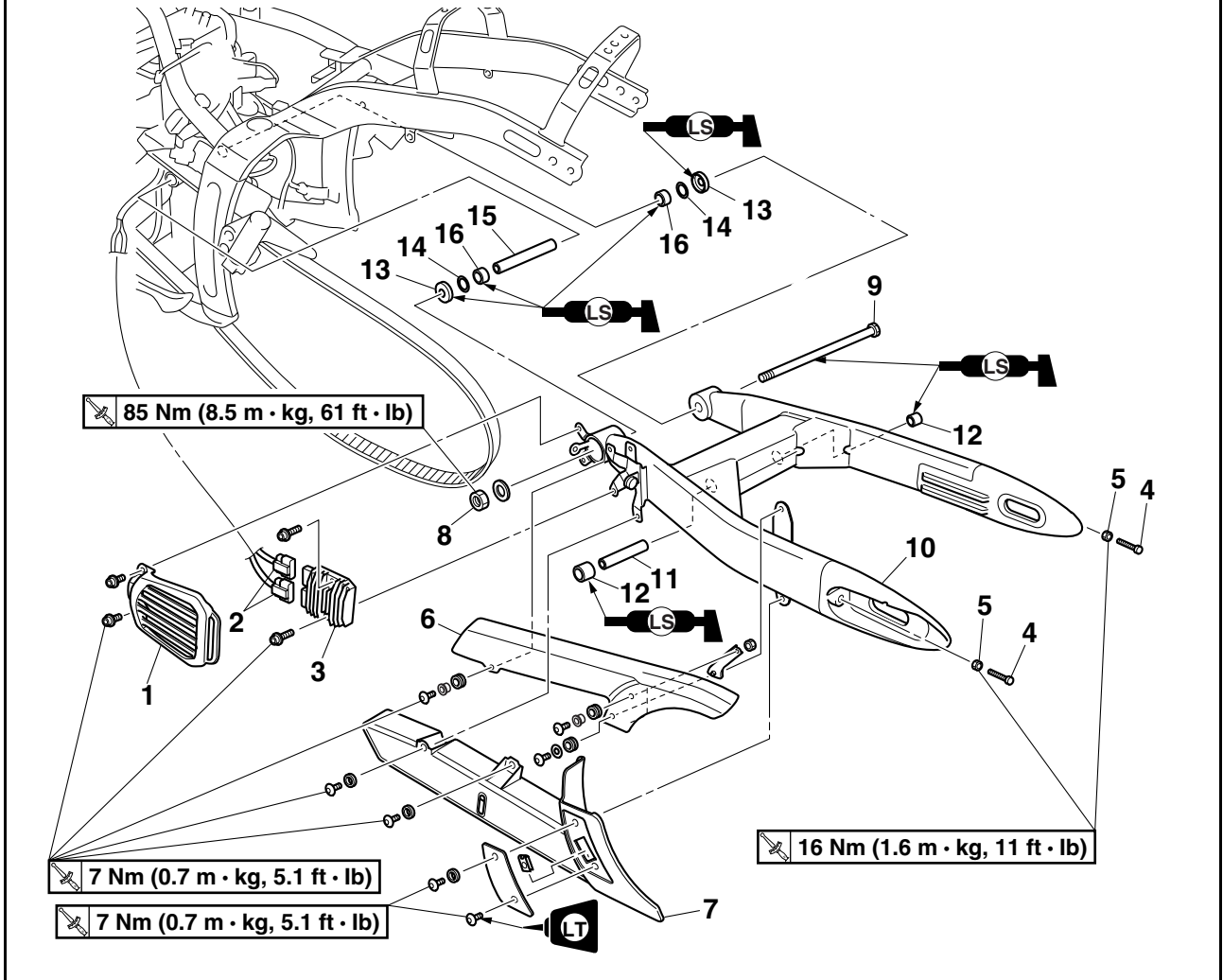
SWINGARM

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Connecting arms		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-63.
1	Rectifier/regulator cover	1	
2	Rectifier/regulator coupler	2	Disconnect.
3	Rectifier/regulator	1	
4	Drive belt adjusting bolt	2	
5	Drive belt adjusting locknut	2	
6	Drive belt upper guard	1	
7	Drive belt lower guard	1	
8	Pivot shaft nut	1	
9	Pivot shaft	1	
10	Swingarm	1	
11	Spacer	1	
12	Bearing	2	
13	Dust cover	2	
14	Washer	2	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
15	Spacer	1	
16	Bearing	2	
			For installation, reverse the removal procedure.

EAS23350

REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

EWA13120



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

NOTE:

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

2. Measure:

- Swingarm side play
- Swingarm vertical movement

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



**Pivot shaft nut
85 Nm (8.5 m·kg, 61 ft·lb)**

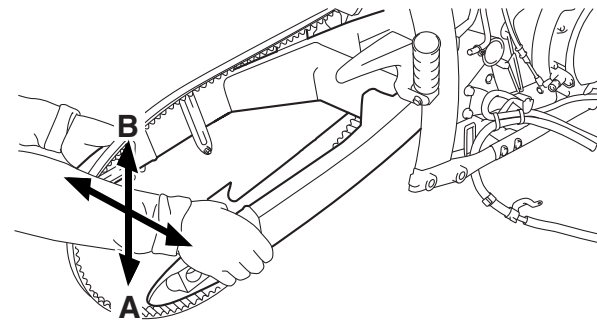
b. Measure the swingarm side play “A” by moving the swingarm from side to side.

c. If the swingarm side play is out of specification, check the spacers, bearings, washers, and dust covers.



**Swingarm side play (at the end of the swingarm)
1.0 mm (0.04 in)**

d. 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 spacers, bearings, washers, and dust covers.



EAS23360

CHECKING THE SWINGARM

1. Check:

- Swingarm
Bends/cracks/damage → Replace.

2. Check:

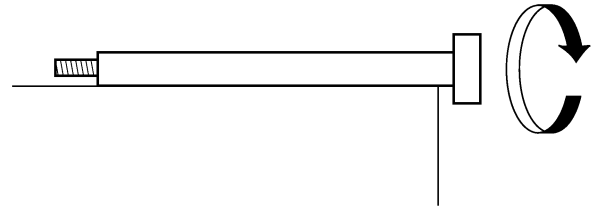
- Pivot shaft
Roll the pivot shaft on a flat surface.

Bends → Replace.

EWA13770



Do not attempt to straighten a bent pivot shaft.



3. Wash:

- Pivot shaft
- Dust covers
- Spacers
- Washers
- Bearings



**Recommended cleaning solvent
Kerosene**

4. Check:

- Dust covers
- Spacer
- Washers
Damage/wear → Replace.

5. Check:

- Bearings
Damage/pitting → Replace.

6. Check:

- Spacers
Damage/scratches → Replace.

EAS28780

INSTALLING THE SWINGARM

1. Lubricate:

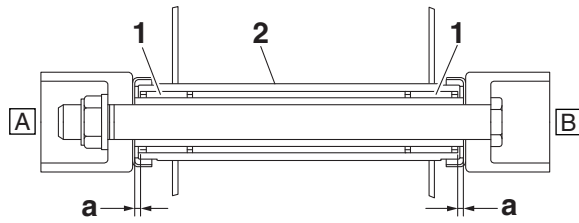
- Bearings
- Spacers
- Dust covers
- Pivot shaft



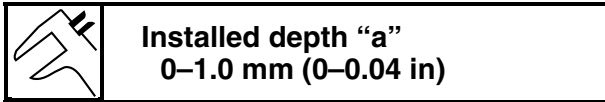
**Recommended lubricant
Lithium-soap-based grease**

2. Install:

- Bearings “1”

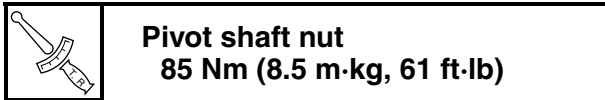


- 2. Swingarm
- A. Left side
- B. Right side



3. Install:

- Pivot shaft nut

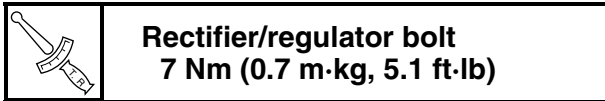


4. Install:

- Rectifier/regulator

NOTE: _____

When installing the rectifier/regulator, first tighten the upper bolt, then the lower bolt.



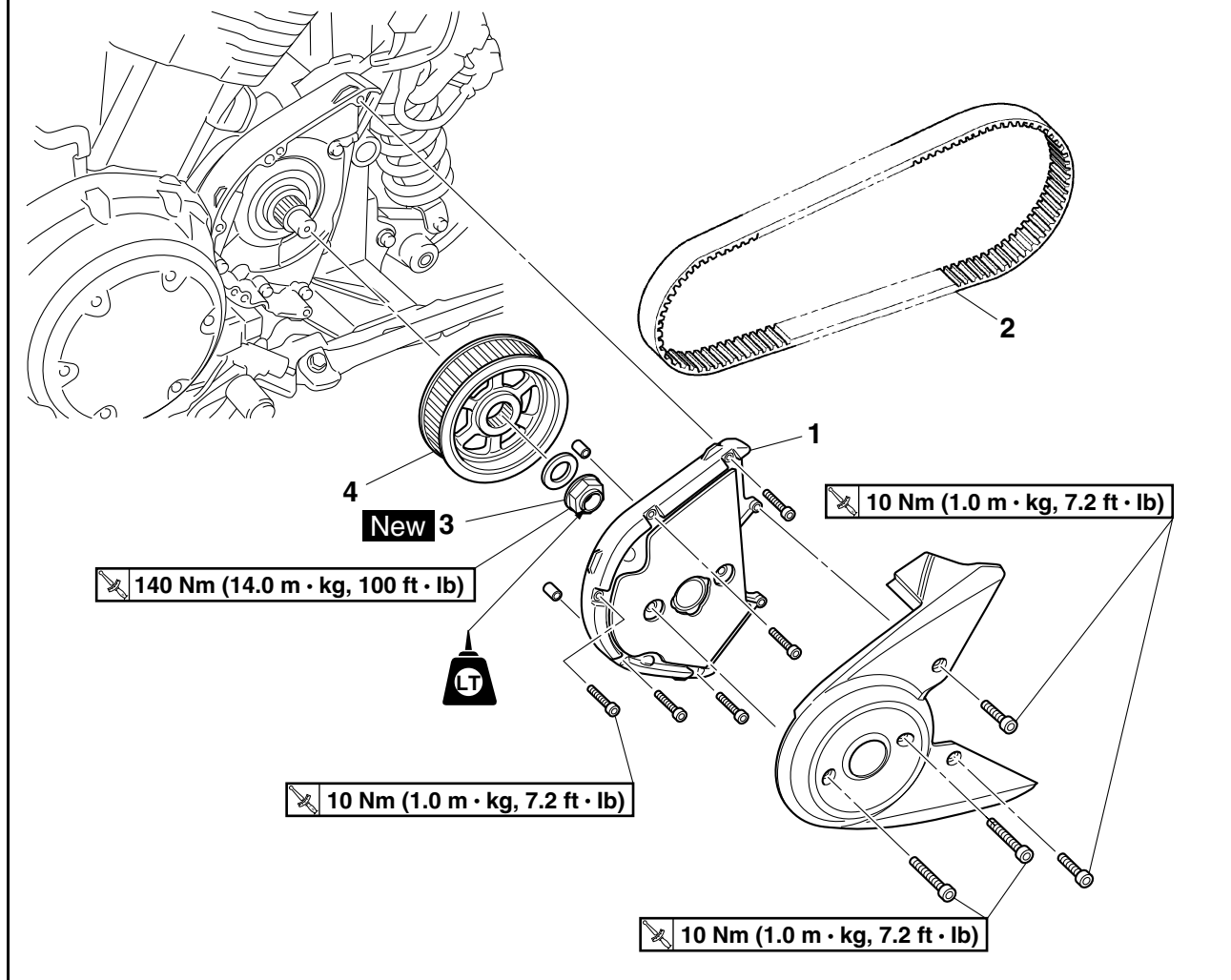
5. Adjust:

- Drive belt slack
Refer to "ADJUSTING THE DRIVE BELT SLACK" on page 3-24.

EAS23510

BELT DRIVE

Removing the drive belt



Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REAR WHEEL" on page 4-15.
	Swingarm		Refer to "SWINGARM" on page 4-68.
1	Drive pulley cover	1	
2	Drive belt	1	
3	Drive pulley nut	1	
4	Drive pulley	1	
			For installation, reverse the removal procedure.

EAS23520

REMOVING THE DRIVE BELT AND DRIVE PULLEY

NOTE:

Loosen the drive pulley nut before removing the rear wheel.

1. Loosen:

- Drive pulley nut

NOTE:

When loosening the drive pulley nut, press down on the brake pedal so the drive pulley does not move.

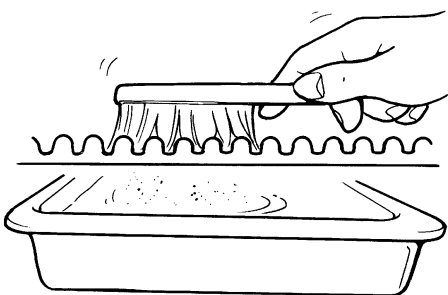
EAS23530

CHECKING THE DRIVE BELT

1. Clean:

- Drive belt

- Wipe the drive belt with a clean cloth.
- Put the drive belt in a mixture of mild detergent and water. Then, remove any dirt from the drive belt.
- Remove the drive belt from the mixture and rinse it off with clean water. Then, let the drive belt thoroughly dry.



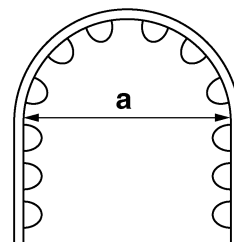
2. Check:

- Drive belt

ECA14690

CAUTION:

- To protect the drive belt from damage, handle it with care.
- The drive belt can not be bent smaller than 127 mm (5 in) "a".
- The removed drive belt can not be twisted inside out.



3. Check:

- Drive pulley
 - Rear wheel pulley
- Bent teeth → Replace the drive belt and pulleys as a set.

EAS23540

INSTALLING THE DRIVE BELT AND DRIVE PULLEY

1. Install:

- Drive belt

ECA14710

CAUTION:

Install the drive belt facing the same way it was removed.

Do not twist the drive belt when installing it.

2. Install:

- Swingarm
Refer to "SWINGARM" on page 4-68.
- Rear wheel
Refer to "REAR WHEEL" on page 4-15.

3. Tighten:

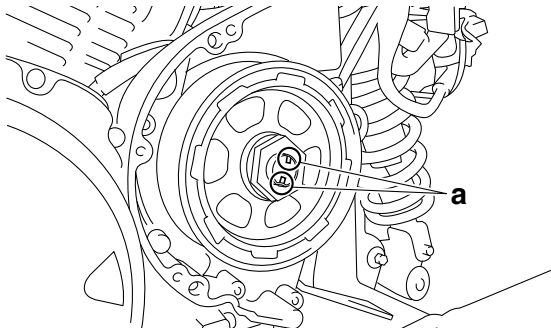
- Drive pulley nut



Drive pulley nut
140 Nm (14.0 m·kg, 100 ft·lb)
LOCTITE®

NOTE:

- Stake the drive pulley nut at the cutouts "a" in the drive axle.
- When tightening the drive pulley nut, press down on the brake pedal so the drive pulley does not move.

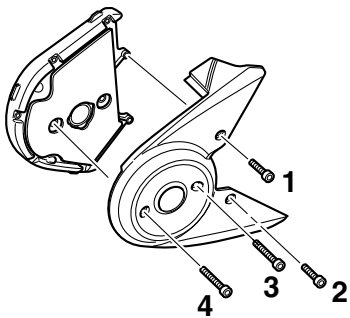


4. Tighten:

- Drive pulley cover plate bolt

NOTE:

Tighten the drive pulley cover plate bolts temporarily, and then tighten them in proper tightening sequence as shown.



5. Adjust:

- Drive belt slack

Refer to "ADJUSTING THE DRIVE BELT SLACK" on page 3-24.

ENGINE

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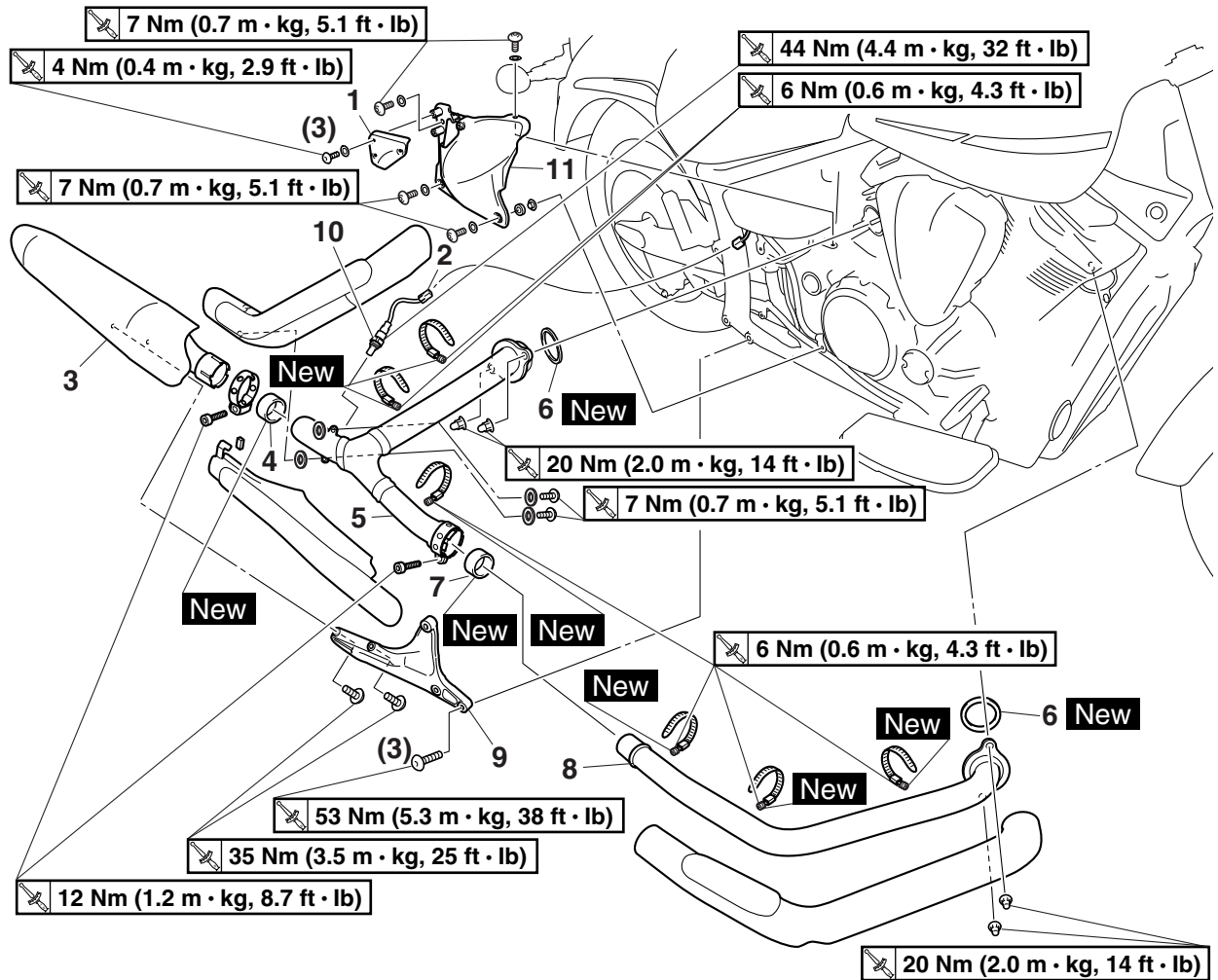
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EAS23710

ENGINE REMOVAL

Removing the muffler and exhaust pipes



Order	Job/Parts to remove	Q'ty	Remarks
1	Coolant reservoir cap cover	1	
2	O ₂ sensor coupler	1	Disconnect.
3	Muffler	1	
4	Gasket	1	
5	Rear cylinder exhaust pipe	1	
6	Gasket	2	
7	Gasket	1	
8	Front cylinder exhaust pipe	1	
9	Muffler bracket	1	
10	O ₂ sensor	1	
11	Coolant reservoir cover	1	
			For installation, reverse the removal procedure.

EAS3D81019

INSTALLING THE EXHAUST PIPE COVER SCREW CLAMPS

1. Install:

- Exhaust pipe cover screw clamps **New**



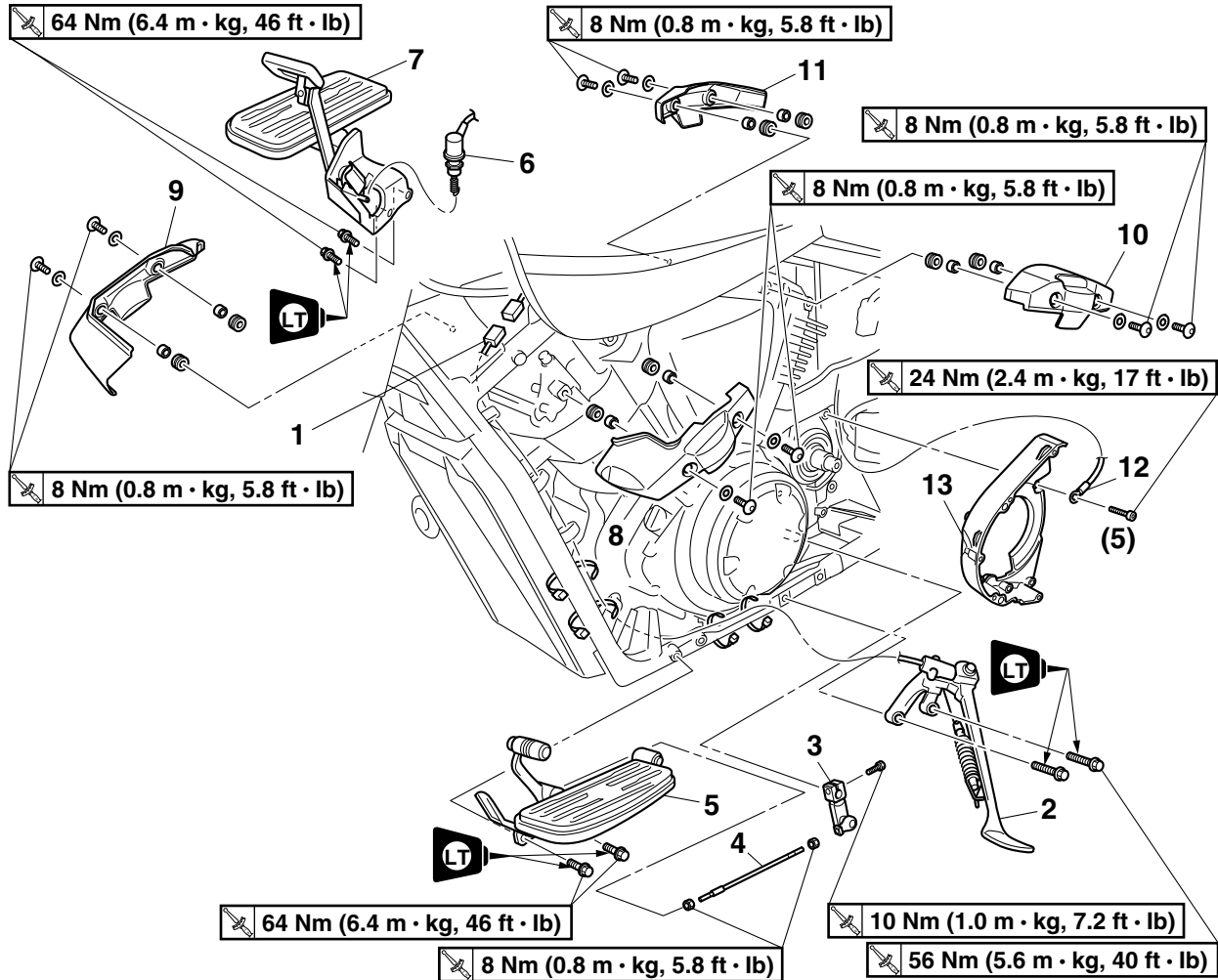
Exhaust pipe cover screw clamp
6 Nm (0.6 m·kg, 4.3 ft·lb)

NOTE:

Do not retighten the exhaust pipe cover screw clamps; always replace them with new ones if they are loosened.

ENGINE REMOVAL

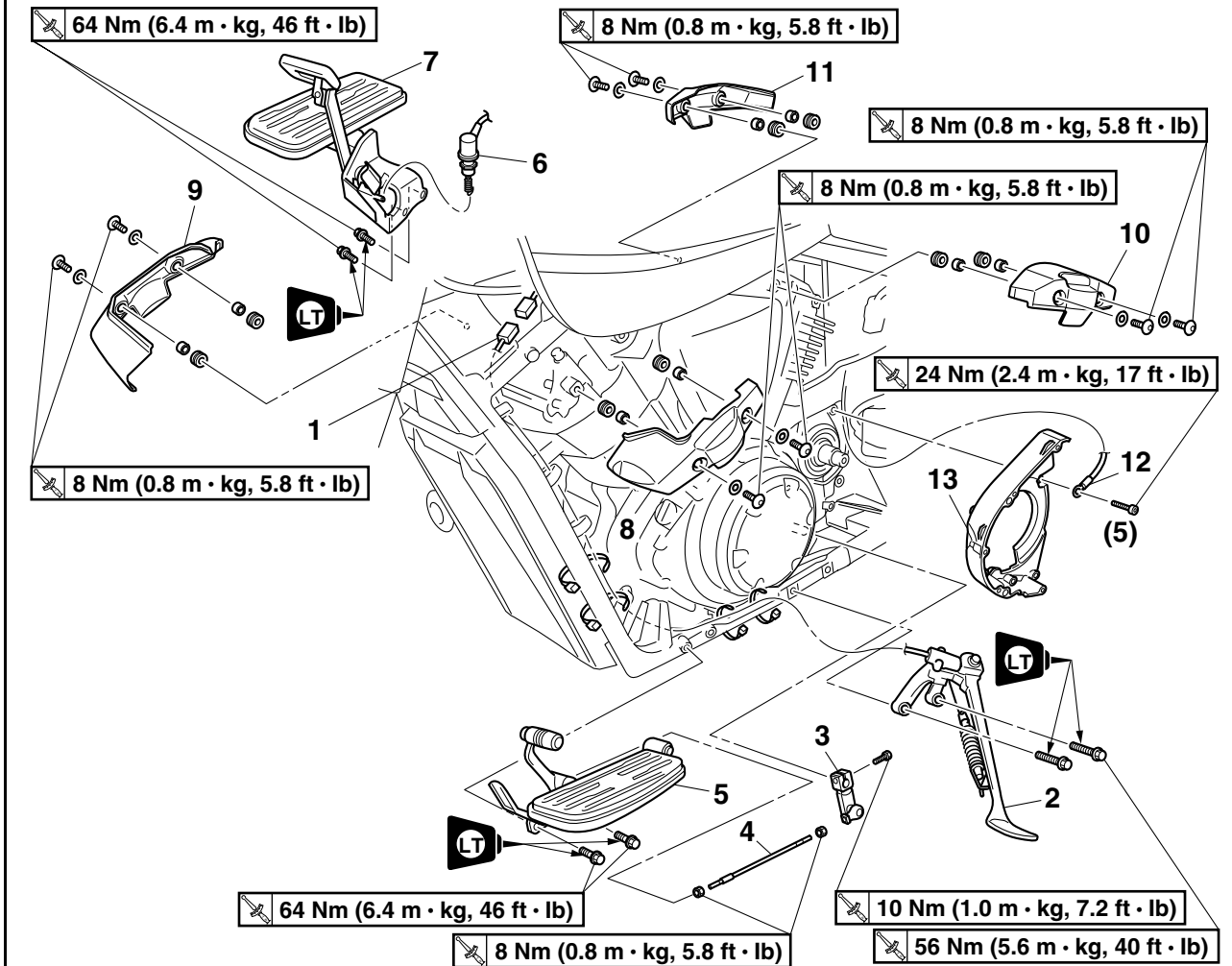
Removing the sidestand and drive pulley housing



Order	Job/Parts to remove	Q'ty	Remarks
	Drive belt		Refer to "BELT DRIVE" on page 4-72.
	Rear brake master cylinder		Refer to "REAR BRAKE" on page 4-34.
	Canister		California only. Refer to "THROTTLE BODIES" on page 7-7.
1	Sidestand switch coupler	1	Disconnect.
2	Sidestand	1	
3	Shift arm	1	
4	Shift rod	1	
5	Left footrest assembly	1	
6	Rear brake light switch	1	
7	Right footrest assembly	1	
8	Front cylinder left cover	1	
9	Front cylinder right cover	1	
10	Rear cylinder left cover	1	
11	Rear cylinder right cover	1	
12	Ground lead	1	Disconnect.

ENGINE REMOVAL

Removing the sidestand and drive pulley housing



Order	Job/Parts to remove	Q'ty	Remarks
13	Drive pulley housing	1	
			For installation, reverse the removal procedure.

EAS3D81039

INSTALLING THE CYLINDER COVERS

1. Install:

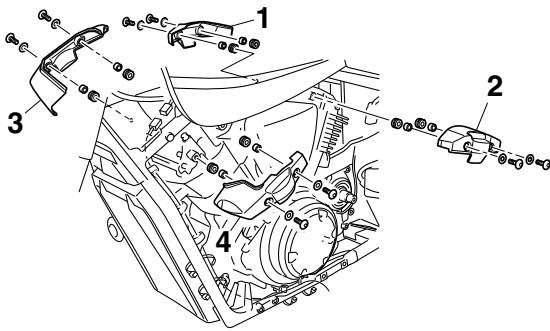
- Rear cylinder right cover "1"
- Rear cylinder left cover "2"
- Front cylinder right cover "3"
- Front cylinder left cover "4"



Cylinder cover bolt
8 Nm (0.8 m·kg, 5.8 ft·lb)

NOTE:

Tighten the cover bolts temporarily, and then tighten the front bolt, then the rear bolt, to specification.



EAS3D81018

INSTALLING THE SHIFT ARM

1. Install:

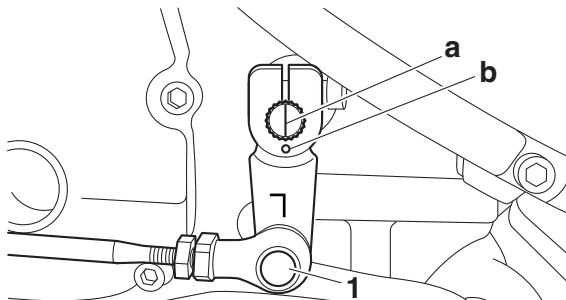
- Shift arm "1"



Shift arm bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Align the "1" mark "a" in the shift shaft with the punch mark "b" in the shift arm.

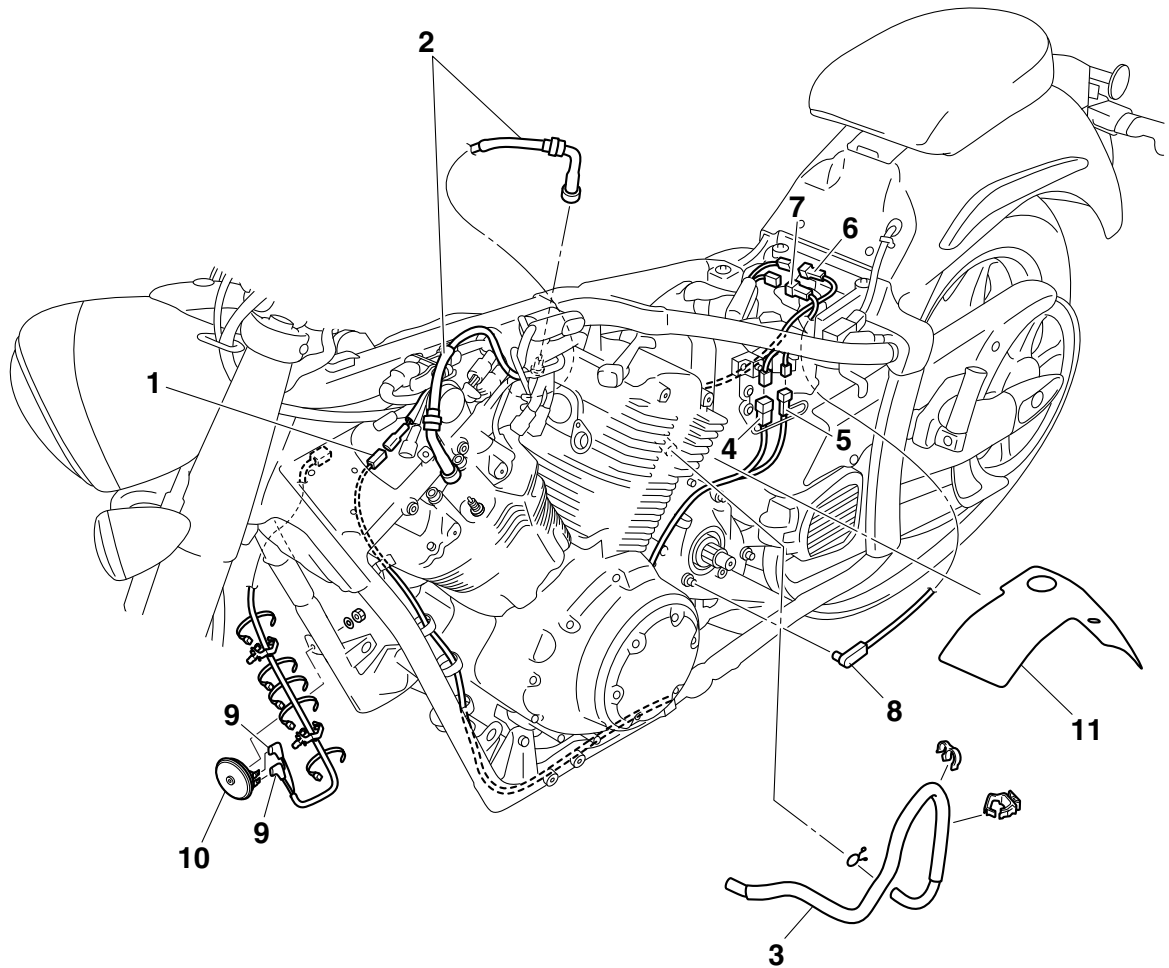


2. Adjust:

- Shift rod length
Refer to "ADJUSTING THE SHIFT PEDAL"
on page 3-24.

ENGINE REMOVAL

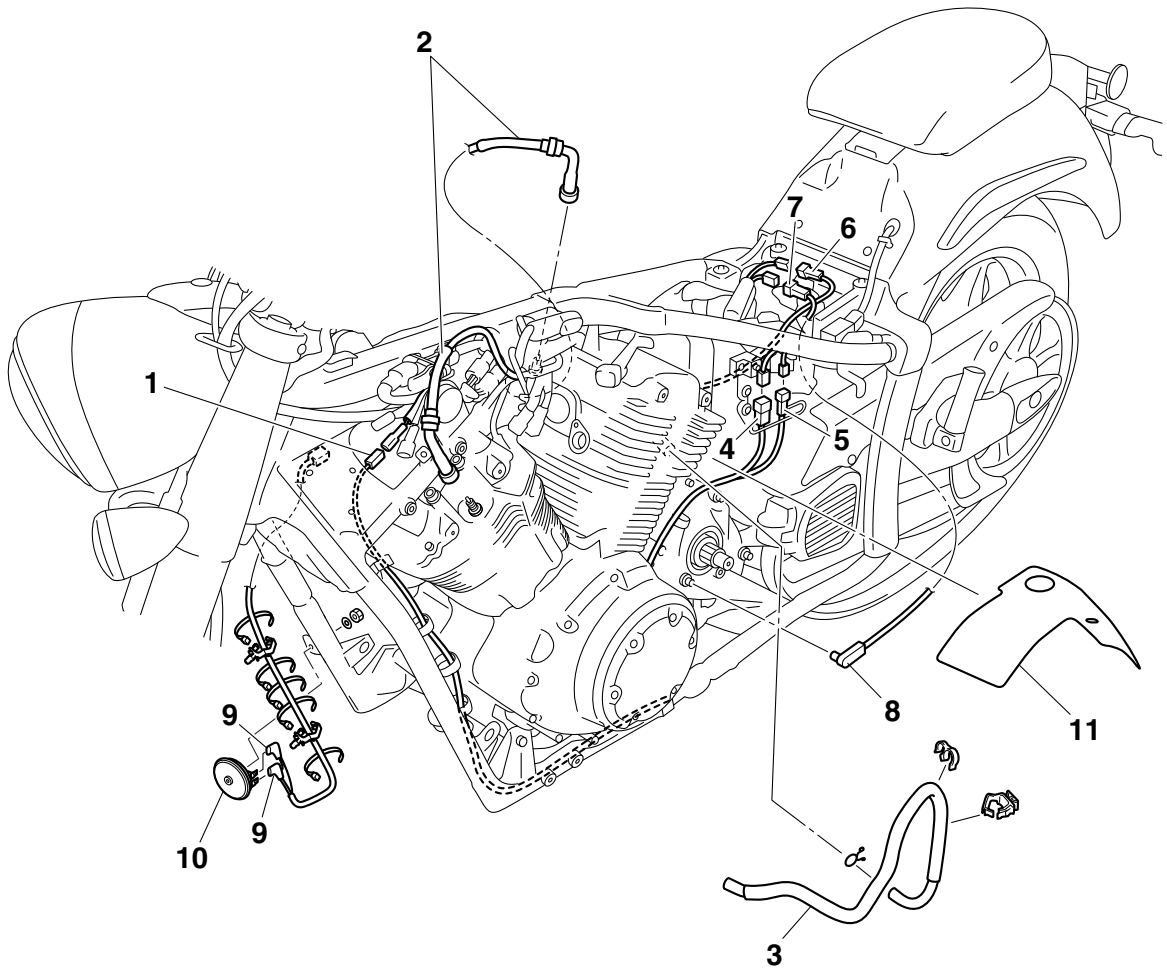
Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
	Sub-fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Thermostat		Refer to "THERMOSTAT" on page 6-4.
	Intake manifold assembly		Refer to "THROTTLE BODIES" on page 7-7.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-62.
1	Oil level switch coupler	1	Disconnect.
2	Spark plug cap	2	Disconnect.
3	Crankcase breather hose	1	
4	Stator coil coupler	1	Disconnect.
5	Crankshaft position sensor coupler	1	Disconnect.
6	Speed sensor coupler	1	Disconnect.
7	Neutral switch coupler	1	Disconnect.
8	Neutral switch connector	1	Disconnect.
9	Horn connector	2	Disconnect.
10	Horn	1	

ENGINE REMOVAL

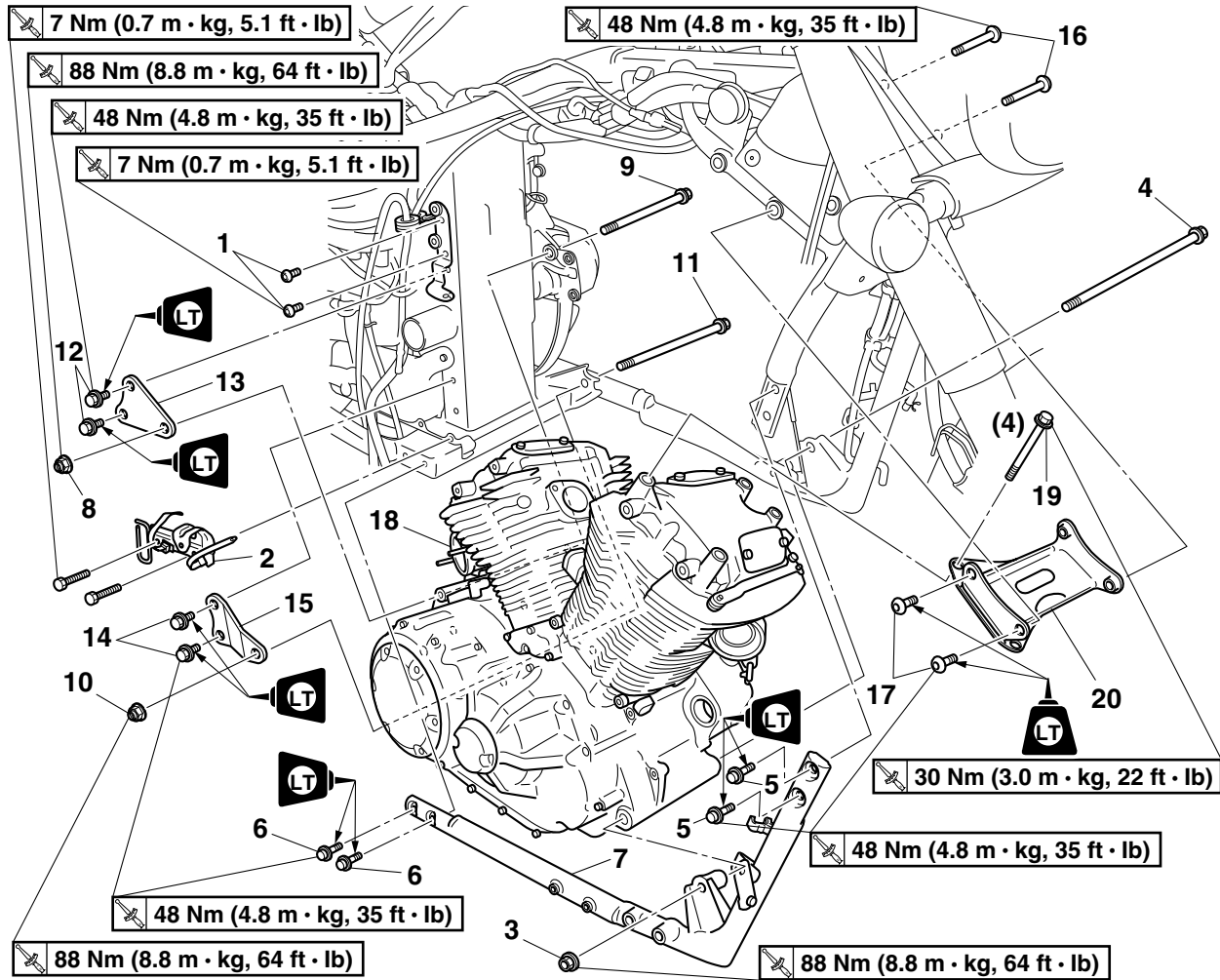
Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
11	Rubber cover	1	
			For assembly, reverse the removal procedure.

ENGINE REMOVAL

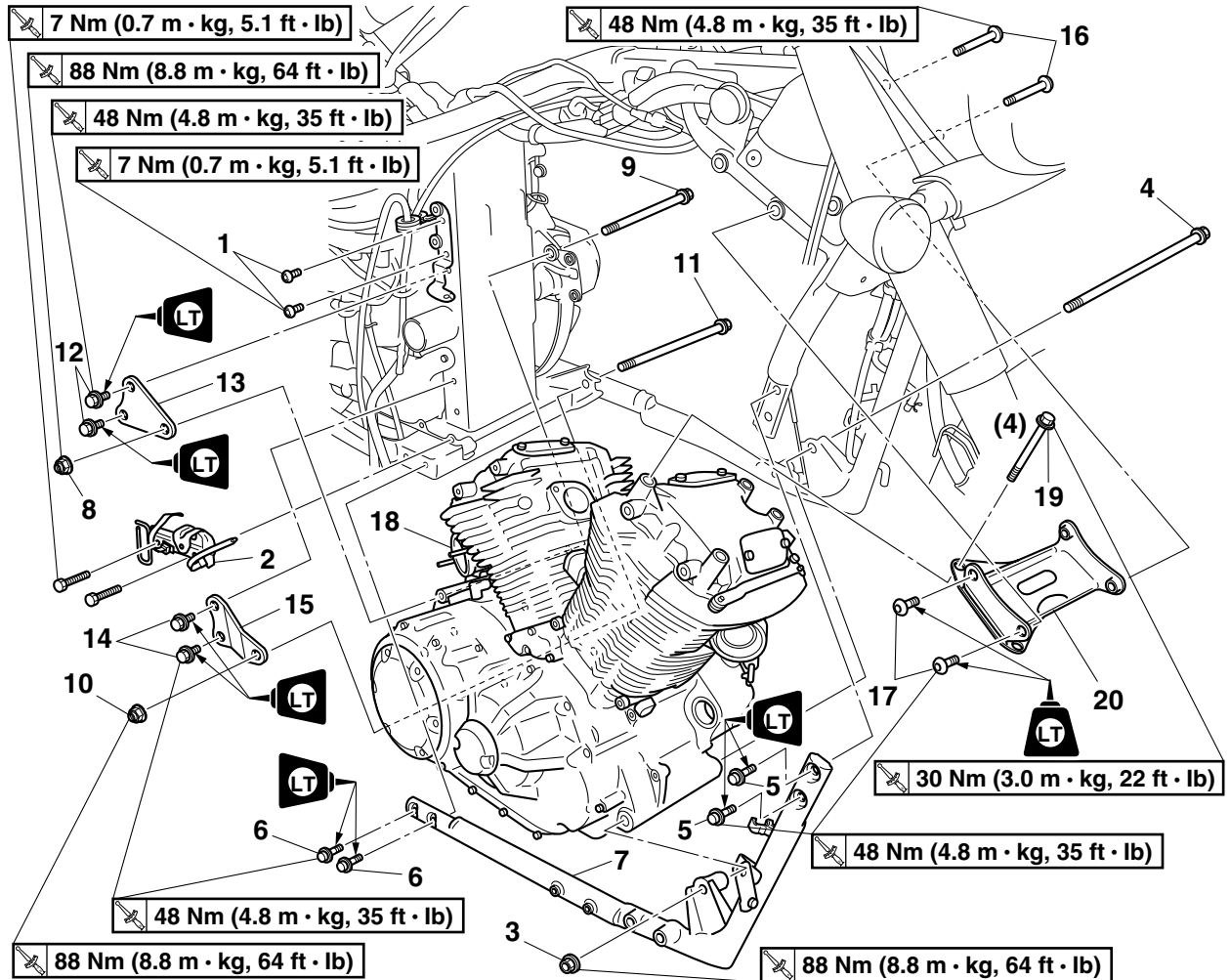
Removing the down tube and engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Sub-fuel tank bracket bolt	2	
2	Coolant reservoir cover bracket	1	
3	Engine mounting nut (front lower side)	1	
4	Engine mounting bolt (front lower side)	1	
5	Down tube bolt (front side)	2	
6	Down tube bolt (rear side)	2	
7	Down tube	1	
8	Engine mounting nut (rear upper side)	1	
9	Engine mounting bolt (rear upper side)	1	
10	Engine mounting nut (rear lower side)	1	
11	Engine mounting bolt (rear lower side)	1	
12	Engine bracket bolt (rear upper side)	2	
13	Engine bracket (rear upper side)	1	
14	Engine bracket bolt (rear lower side)	2	
15	Engine bracket (rear lower side)	1	
16	Engine mounting bolt (front left upper side)	2	
17	Engine mounting bolt (front right upper side)	2	

ENGINE REMOVAL

Removing the down tube and engine



Order	Job/Parts to remove	Q'ty	Remarks
18	Engine	1	
19	Engine bracket bolt (front upper side)	4	
20	Engine bracket (front upper side)	1	
			For installation, reverse the removal procedure.

EAS23720

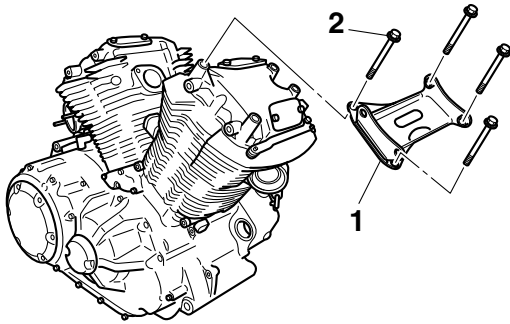
INSTALLING THE ENGINE

1. Install:

- Engine bracket (front upper side) "1"
- Engine bracket bolts (front upper side) "2"



Engine bracket bolt (front upper side)
30 Nm (3.0 m·kg, 22 ft·lb)

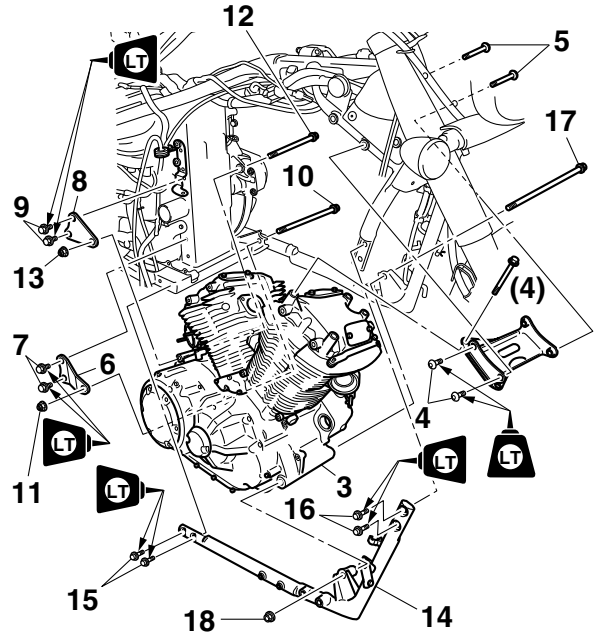


2. Install:

- Engine "3"
- Engine mounting bolts (front right upper side) "4"
- Engine mounting bolts (front left upper side) "5"
- Engine bracket (rear lower side) "6"
- Engine bracket bolts (rear lower side) "7"
- Engine bracket (rear upper side) "8"
- Engine bracket bolts (rear upper side) "9"
- Engine mounting bolt (rear lower side) "10"
- Engine mounting nut (rear lower side) "11"
- Engine mounting bolt (rear upper side) "12"
- Engine mounting nut (rear upper side) "13"
- Down tube "14"
- Down tube bolts (rear side) "15"
- Down tube bolts (front side) "16"
- Engine mounting bolt (front lower side) "17"
- Engine mounting nut (front lower side) "18"

NOTE:

- Apply locking agent (LOCTITE®) to the threads of the engine mounting bolts (front right upper side), engine bracket bolts (rear lower side), engine bracket bolts (rear upper side), down tube bolts (front side), and down tube bolts (rear side).
- Do not tighten the bolts and nuts.



3. Tighten:

- Engine bracket bolts (rear lower side) "7"
- Engine bracket bolts (rear upper side) "9"
- Down tube bolts (front side) "15"
- Down tube bolts (rear side) "16"



Engine bracket bolt (rear lower side)

48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®

Engine bracket bolt (rear upper side)

48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®

Down tube bolt (front side)

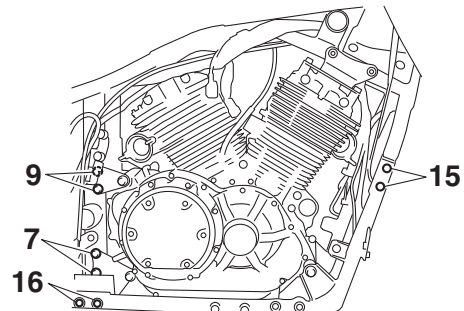
48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®

Down tube bolt (rear side)

48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®



4. Tighten:

- Engine mounting bolts (front right upper side) "4"
- Engine mounting bolts (front left upper side) "5"
- Engine mounting nut (rear lower side) "11"
- Engine mounting nut (rear upper side) "13"
- Engine mounting nut (front lower side) "16"



Engine mounting bolt (front right upper side)

48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®

Engine mounting bolt (front left upper side)

48 Nm (4.8 m·kg, 35 ft·lb)

LOCTITE®

Engine mounting nut (rear lower side)

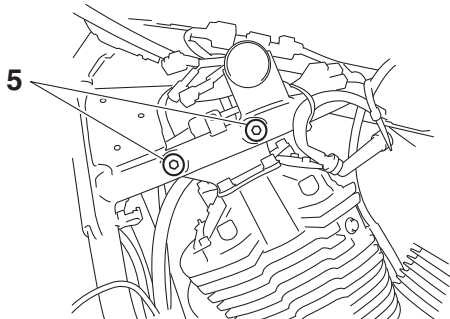
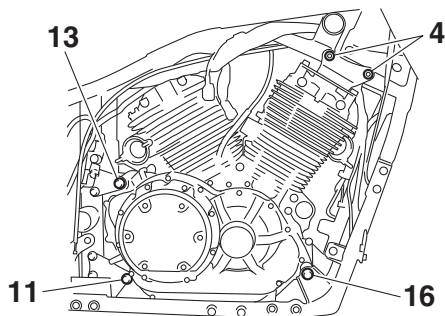
88 Nm (8.8 m·kg, 64 ft·lb)

Engine mounting nut (rear upper side)

88 Nm (8.8 m·kg, 64 ft·lb)

Engine mounting nut (front lower side)

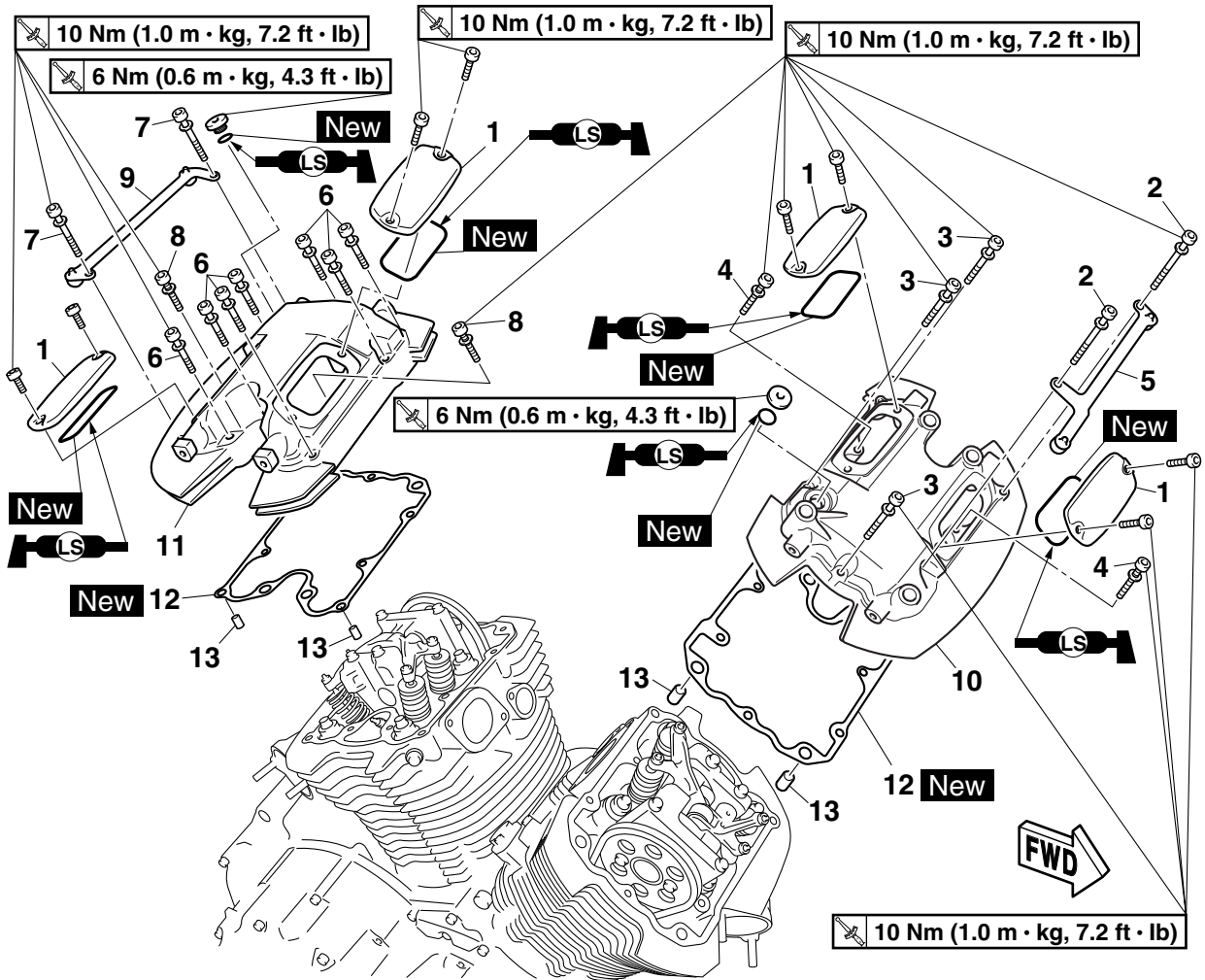
88 Nm (8.8 m·kg, 64 ft·lb)



EAS23740

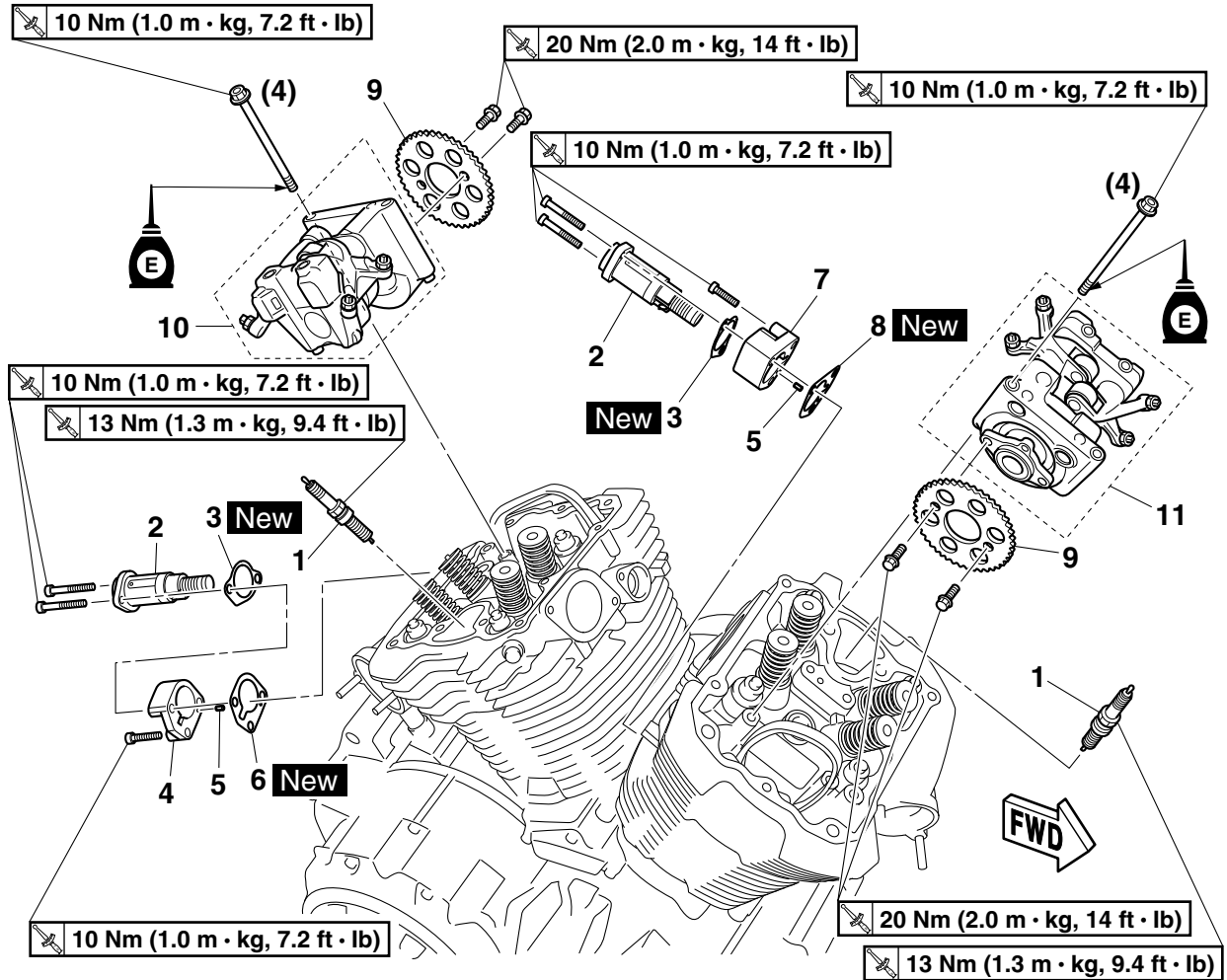
CAMSHAFTS

Removing the cylinder head covers



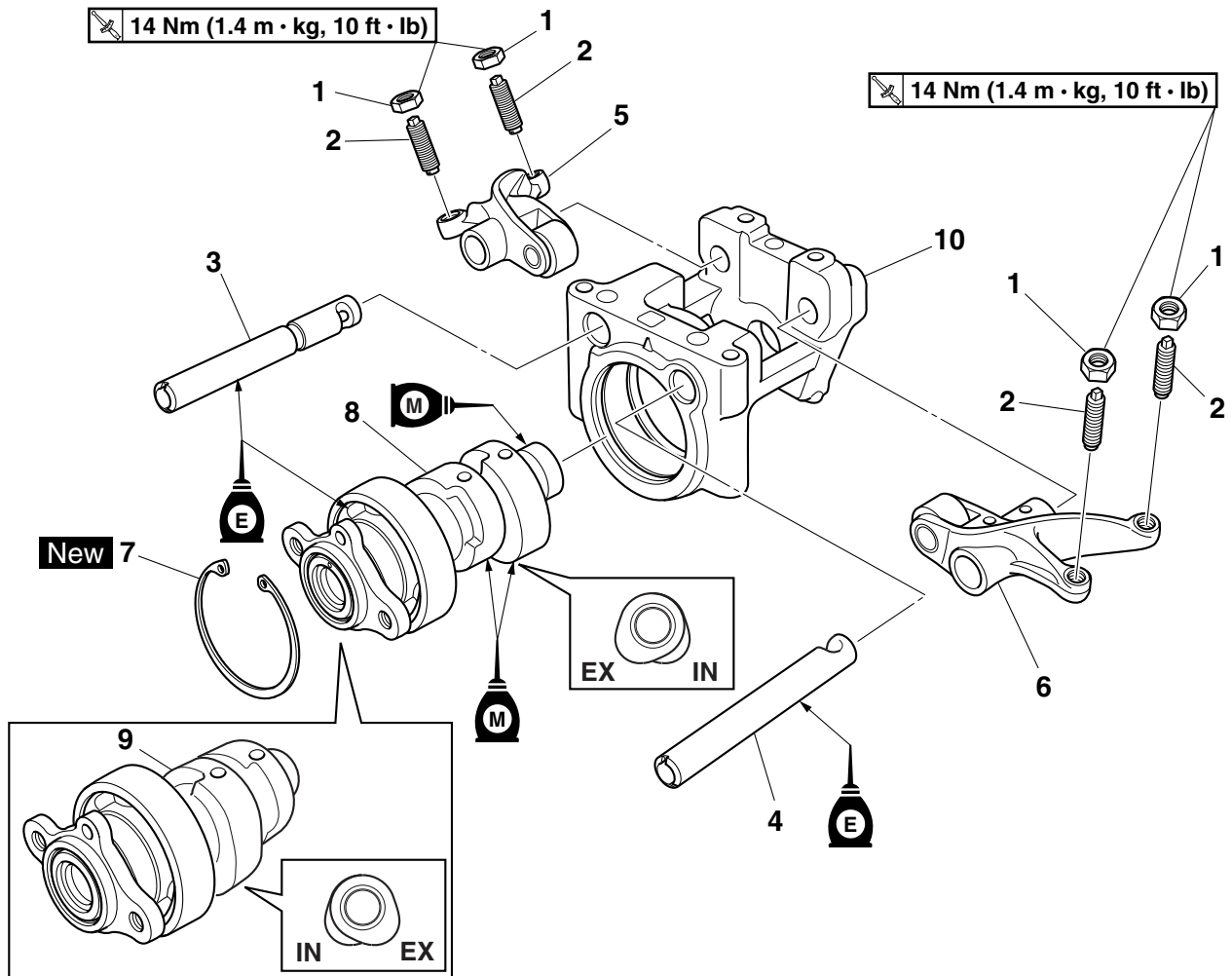
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
1	Tappet cover	4	
2	Front cylinder head cover bolt	2	l = 55 mm (2.17 in)
3	Front cylinder head cover bolt	3	l = 45 mm (1.77 in)
4	Front cylinder head cover bolt	2	l = 30 mm (1.18 in)
5	Front cylinder head cover bracket	1	
6	Rear cylinder head cover bolt	7	l = 45 mm (1.77 in)
7	Rear cylinder head cover bolt	2	l = 55 mm (2.17 in)
8	Rear cylinder head cover bolt	2	l = 30 mm (1.18 in)
9	Rear cylinder head cover bracket	1	
10	Front cylinder head cover	1	
11	Rear cylinder head cover	1	
12	Cylinder head cover gasket	2	
13	Dowel pin	4	
			For installation, reverse the removal procedure.

Removing the camshaft assemblies



Order	Job/Parts to remove	Q'ty	Remarks
1	Spark plug	2	
2	Timing chain tensioner	2	
3	Timing chain tensioner gasket	2	
4	Rear cylinder timing chain tensioner housing	1	
5	Pin	2	
6	Rear cylinder timing chain tensioner housing gasket	1	
7	Front cylinder timing chain tensioner housing	1	
8	Front cylinder timing chain tensioner housing gasket	1	
9	Camshaft sprocket	2	
10	Rear cylinder camshaft assembly	1	
11	Front cylinder camshaft assembly	1	
			For installation, reverse the removal procedure.

Removing the rocker arms and camshafts



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the camshaft assemblies
1	Locknut	4	Loosen.
2	Valve clearance adjusting screw	4	
3	Intake rocker arm shaft	1	
4	Exhaust rocker arm shaft	1	
5	Intake rocker arm	1	
6	Exhaust rocker arm	1	
7	Circlip	1	
8	Front cylinder camshaft	1	
9	Rear cylinder camshaft	1	
10	Camshaft carrier	1	
			For installation, reverse the removal procedure.

EAS3D81020

REMOVING THE CAMSHAFT ASSEMBLIES

1. Align:

- “1” mark on the front cylinder camshaft sprocket (with the arrow mark on the front cylinder camshaft carrier)

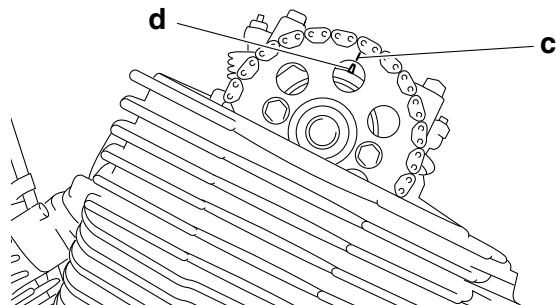
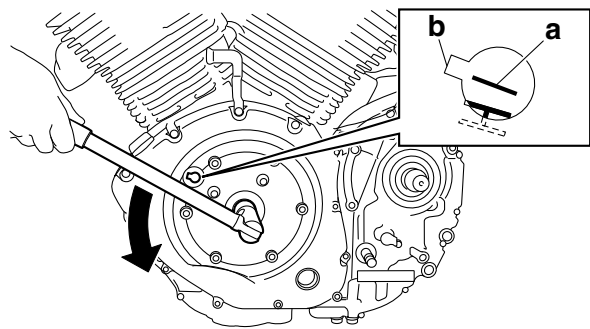


Front cylinder

- Turn the crankshaft counterclockwise.
- When the front cylinder piston is at TDC on the compression stroke, align the TDC mark “a” on the generator rotor with the slot “b” in the generator cover.

NOTE: _____

To position the front cylinder piston at TDC on the compression stroke, align the “1” mark “c” on the camshaft sprocket with the arrow mark “d” on the front cylinder camshaft carrier.

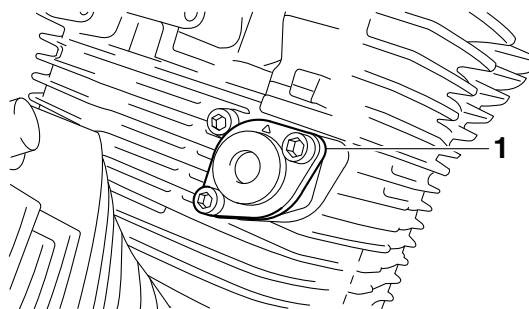


2. Remove:

- Front cylinder timing chain tensioner “1”

NOTE: _____

Never remove a timing chain tensioner when the engine is mounted.



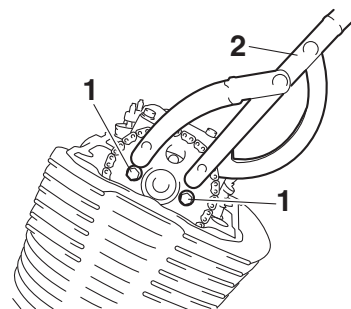
3. Remove:

- Front cylinder camshaft sprocket

NOTE: _____

- While holding the camshaft sprocket with the rotor holding tool “1”, loosen the camshaft sprocket bolts “2”.
- To prevent the timing chain from falling into the crankcase, fasten it with a wire.

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

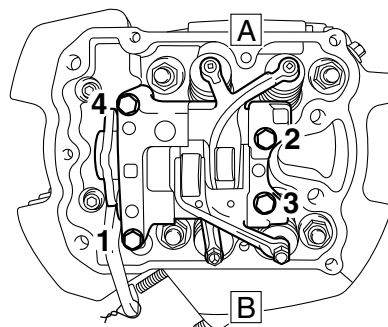


4. Remove:

- Front cylinder camshaft assembly

NOTE: _____

Loosen the bolts in the proper sequence as shown.



- Intake side
- Exhaust side

5. Align:

- “1” mark on the rear cylinder camshaft sprocket
(with the arrow mark on the rear cylinder camshaft carrier)

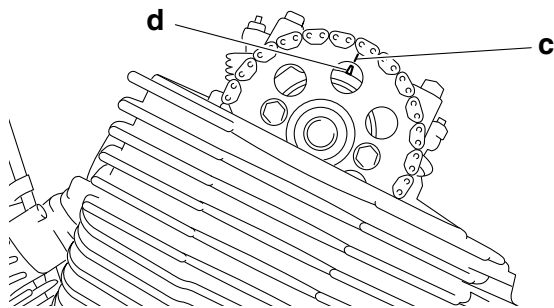
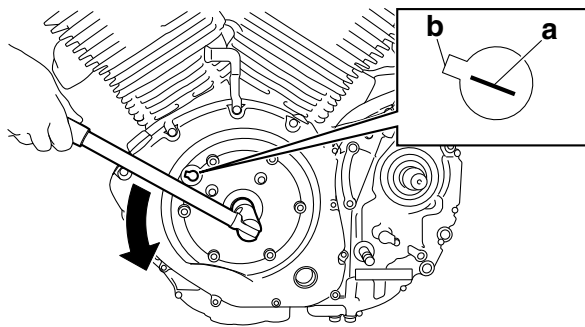


Rear cylinder

- Turn the crankshaft counterclockwise from the front cylinder piston TDC by 300 degrees.
- When the rear cylinder piston is at TDC on the compression stroke, align the TDC mark “a” on the generator rotor with the slot “b” in the generator cover.

NOTE:

To position the rear cylinder piston at TDC on the compression stroke, align the “1” mark “c” on the camshaft sprocket with the arrow mark “d” on the rear cylinder camshaft carrier.



6. Remove:

- Rear cylinder timing chain tensioner
- Rear cylinder camshaft sprocket
- Rear cylinder camshaft assembly

NOTE:

- Never remove a timing chain tensioner when the engine is mounted.
- Remove the parts using the same procedure as for the front cylinder camshaft assembly.

EAS3D81034

REMOVING THE ROCKER ARMS AND CAMSHAFTS

The following procedure applies to all of the rocker arms and camshafts.

1. Remove:

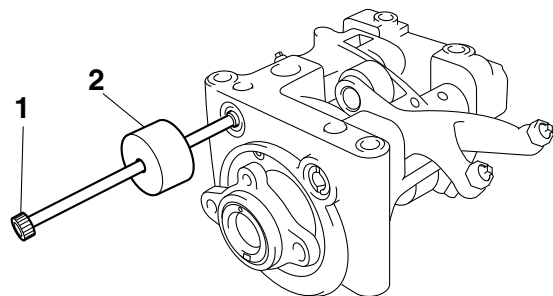
- Intake rocker arm shaft
- Exhaust rocker arm shaft
- Intake rocker arm
- Exhaust rocker arm

NOTE:

Remove the rocker arm shafts with the slide hammer bolt “1” and weight “2”.



Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1
Weight
90890-01084
YU-01083-3

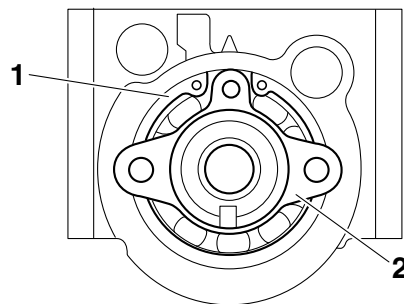


2. Remove:

- Circlip “1”
- Camshaft “2”

NOTE:

Position the camshaft as shown in the illustration so that the camshaft lobes will not catch on the camshaft carrier during removal.



EAS23840

CHECKING THE CAMSHAFTS

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



Camshaft lobe dimensions

Intake A

42.988–43.088 mm (1.6924–1.6964 in)

Limit

42.888 mm (1.6885 in)

Intake B

37.045–37.145 mm (1.4585–1.4624 in)

Limit

36.945 mm (1.4545 in)

Exhaust A

43.156–43.256 mm (1.6991–1.7030 in)

Limit

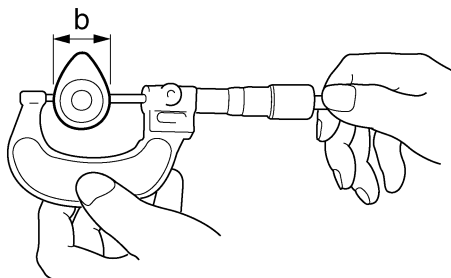
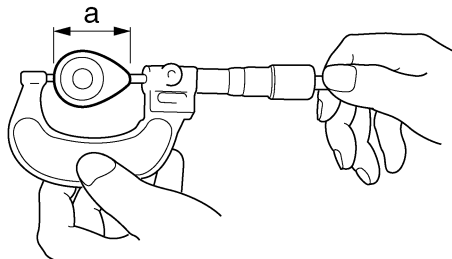
43.056 mm (1.6951 in)

Exhaust B

37.118–37.218 mm (1.4613–1.4653 in)

Limit

37.018 mm (1.4574 in)

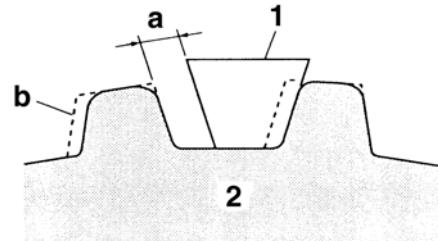


- Check:
 - Camshaft oil passage
Obstruction → Blow out with compressed air.

EAS23870

CHECKING THE CAMSHAFT SPROCKETS

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



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

EAS23880

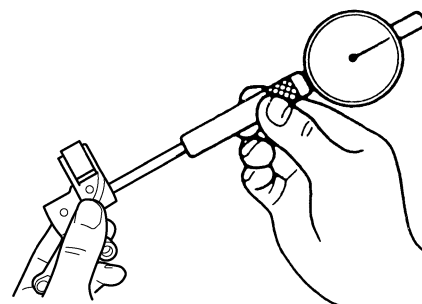
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

- Check:
 - Rocker arm
 - Rocker arm roller
Damage/wear → Replace.
- Check:
 - Rocker arm shaft
Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.
- Measure:
 - Rocker arm inside diameter
Out of specification → Replace.



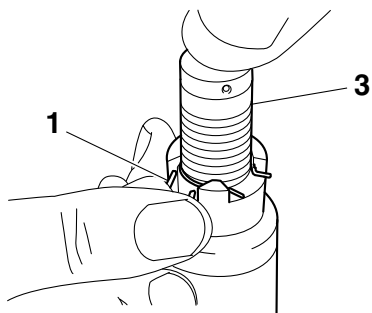
Rocker arm inside diameter
12.000–12.018 mm (0.4724–0.4731 in)



- b. Install the timing chain tensioner inner spring, timing chain tensioner spring seat, and timing chain tensioner rod.
- c. Squeeze timing chain tensioner clip 2 "1", and then push the timing chain tensioner rod "3" into the timing chain tensioner housing.

NOTE:

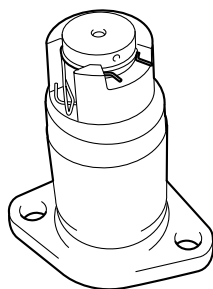
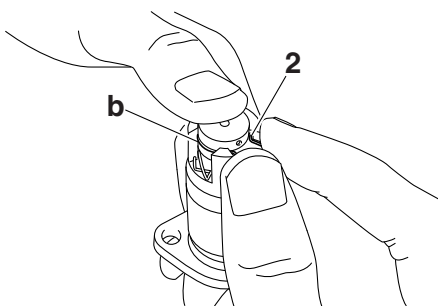
Do not release timing chain tensioner clip 2 while pushing the rod into the housing, otherwise the rod may be ejected.



- d. Align the groove "b" in the timing chain tensioner rod with timing chain tensioner clip 1 "2", and then squeeze the clip to fit it into the groove.

NOTE:

Make sure that the timing chain tensioner rod is secured by the clip, otherwise the rod may be ejected.

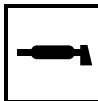


EAS24040

INSTALLING THE CAMSHAFTS AND ROCKER ARMS

The following procedure applies to all of the rocker arms and camshafts.

1. Lubricate:
 - Camshaft

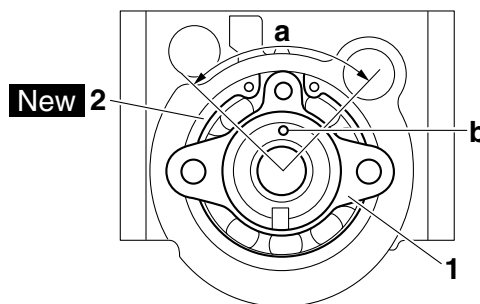


Recommended lubricant
Camshaft
 Molybdenum disulfide oil
Camshaft bearing
 Engine oil

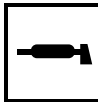
2. Install:
 - Camshaft "1"
 - Circlip "2" **New**

NOTE:

- Position the camshaft as shown in the illustration so that the camshaft lobes will not catch on the camshaft carrier during installation.
- Position the opening between the ends of the circlip in the 90° range "a" shown in the illustration.
- The front cylinder camshaft is identified by the punch mark "b". The rear cylinder camshaft does not have a punch mark.



3. Lubricate:
 - Rocker arm shafts



Recommended lubricant
 Engine oil

4. Install:
 - Rocker arms
 - Rocker arm shafts

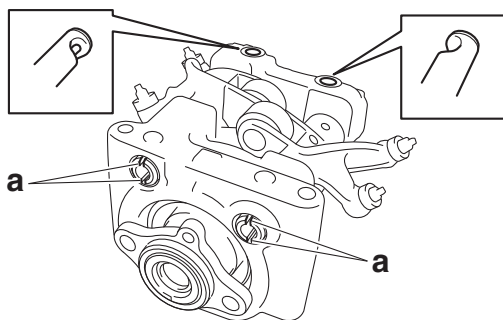
NOTE:

Make sure that the notches "a" in the rocker arm shafts are aligned vertically as shown in the illustration.

ECA3D81017

CAUTION:

Make sure the cotouts in the rocker arm shafts faces inward.



EAS3D81021

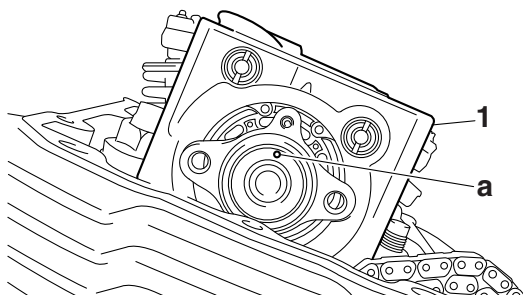
INSTALLING THE CAMSHAFT ASSEMBLIES

1. Install:

- Front cylinder camshaft assembly "1"

NOTE:

- Be sure to install the camshaft assembly with the punch mark "a" onto the front cylinder.
- The rear cylinder camshaft assembly does not have a punch mark.



2. Tighten:

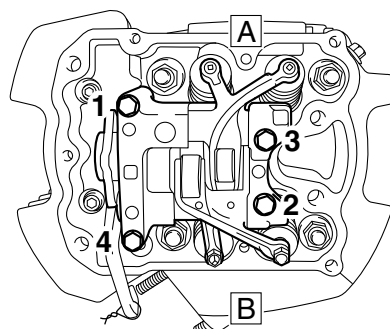
- Front cylinder camshaft assembly bolts

NOTE:

Tighten the bolts in the proper sequence as shown.



Front cylinder camshaft assembly bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)



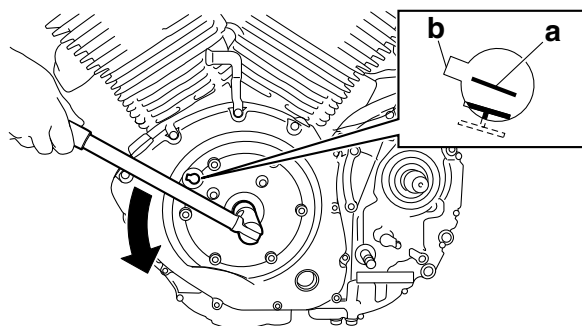
A. Intake side
B. Exhaust side

3. Install:

- Front cylinder camshaft sprocket

Front cylinder

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



- Install the timing chain "1" onto the front cylinder camshaft sprocket "2", then install the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts "3".

ECA13740

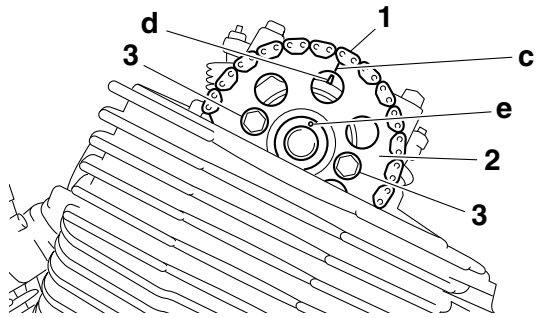
CAUTION:

Do not turn the crankshaft when installing the camshaft(s) to avoid damage or improper valve timing.

NOTE:

- To position the front cylinder piston at TDC on the compression stroke, align the "1" mark "c" on the camshaft sprocket with the arrow mark "d" on the front cylinder camshaft carrier.
- The front cylinder camshaft is identified by the punch mark "e". The rear cylinder camshaft does not have a punch mark.

- When installing the front cylinder camshaft sprocket, be sure to keep the timing chain as tight as possible on the exhaust side.



d. Remove the wire from the timing chain.



4. Tighten:

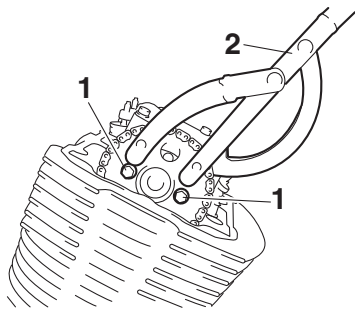
- Front cylinder camshaft sprocket bolts "1"

NOTE:

While holding the camshaft sprocket with the rotor holding tool "2", tighten the camshaft sprocket bolts.



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



5. Install:

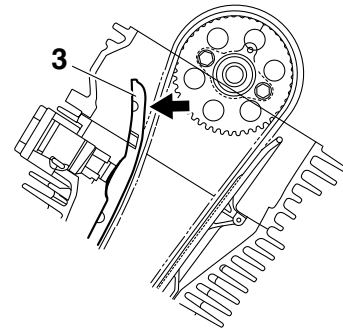
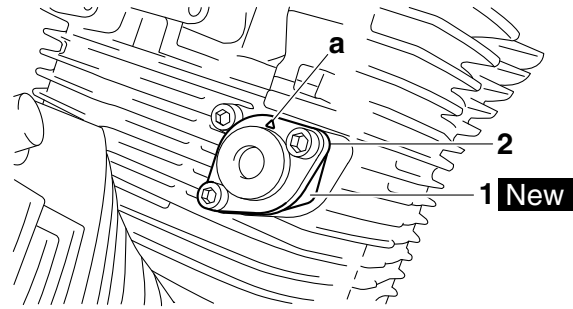
- Front cylinder timing chain tensioner gasket "1" **New**
- Front cylinder timing chain tensioner "2"



Front cylinder timing chain tensioner bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- The arrow mark "a" on the front cylinder timing chain tensioner should face up.
- Push the end of the front cylinder timing chain guide (intake side) "3" to release the timing chain tensioner rod.

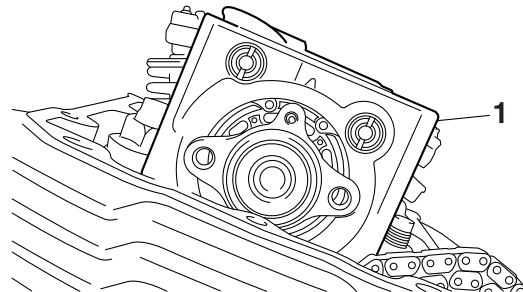


6. Install:

- Rear cylinder camshaft assembly "1"

NOTE:

Be sure to install the camshaft assembly without a punch mark onto the rear cylinder.



7. Tighten:

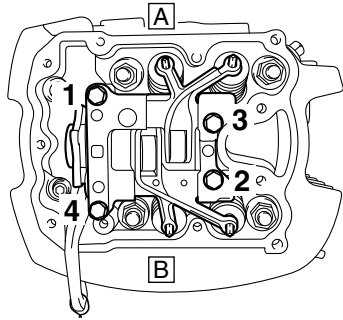
- Rear cylinder camshaft assembly bolts

NOTE:

Tighten the bolts in the proper sequence as shown.



Rear cylinder camshaft assembly bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)



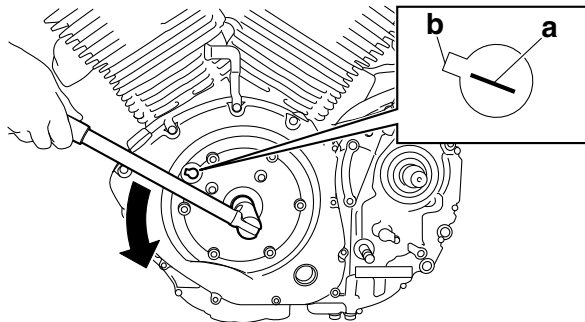
- A. Intake side
- B. Exhaust side

8. Install:
 - Rear cylinder camshaft sprocket



Rear cylinder

- a. Turn the crankshaft counterclockwise from the front cylinder piston TDC by 300 degrees.
- b. When the rear cylinder piston is at TDC on the compression stroke, align the TDC mark "a" on the generator rotor with the slot "b" in the generator cover.



- c. Install the timing chain "1" onto the rear cylinder camshaft sprocket "2", then install the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts "3".

ECA13740

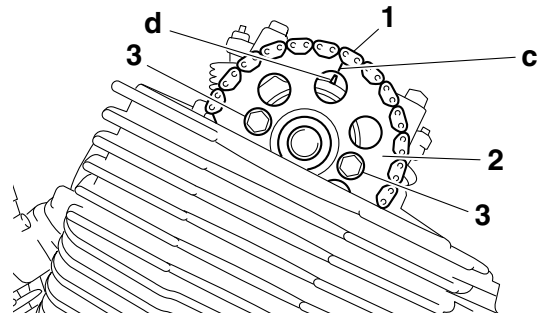
CAUTION:

Do not turn the crankshaft when installing the camshaft(s) to avoid damage or improper valve timing.

NOTE:

- To position the rear cylinder piston at TDC on the compression stroke, align the "1" mark "c" on the camshaft sprocket with the arrow mark "d" on the rear cylinder camshaft carrier.
- The rear cylinder camshaft assembly does not have a punch mark. Be sure to install the camshaft assembly without a punch mark onto the rear cylinder.

- When installing the rear cylinder camshaft sprocket, be sure to keep the timing chain as tight as possible on the intake side.



- d. Remove the wire from the timing chain.



9. Tighten:

- Rear cylinder camshaft sprocket bolts "1"

NOTE:

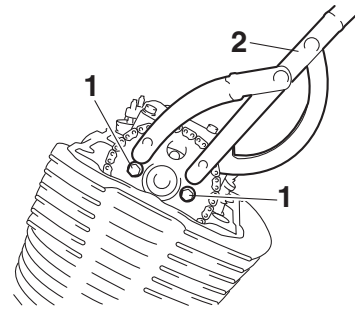
While holding the camshaft sprocket with the rotor holding tool "2", tighten the camshaft sprocket bolts.



Rotor holding tool

90890-01235

Universal magneto & rotor holder
YU-01235



10. Install:

- Rear cylinder timing chain tensioner gasket "1" **New**
- Rear cylinder timing chain tensioner "2"

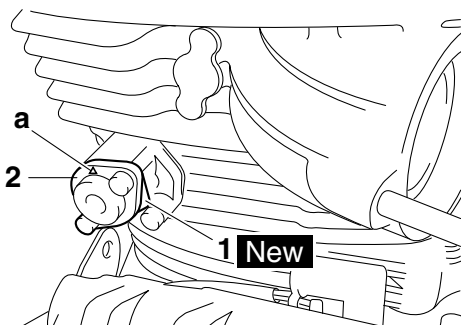


Rear cylinder timing chain tensioner bolt

10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- The arrow mark "a" on the rear timing chain tensioner should face up.
- Push the end of the rear cylinder timing chain guide (exhaust side) "3" to release the timing chain tensioner rod.

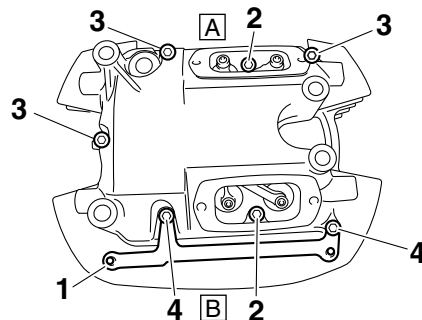


- Front cylinder head cover bracket "1"

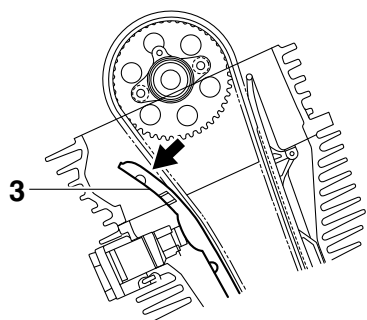


**Front cylinder head cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)**

- Bolts "2": l = 30 mm (1.18 in)
- Bolts "3": l = 45 mm (1.77 in)
- Bolts "4": l = 55 mm (2.17 in)



- A. Intake side
- B. Exhaust side



11. Measure:

- Valve clearance
Out of specification → Adjust.
Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-4.

EAS3D81035

INSTALLING THE CYLINDER HEAD COVERS

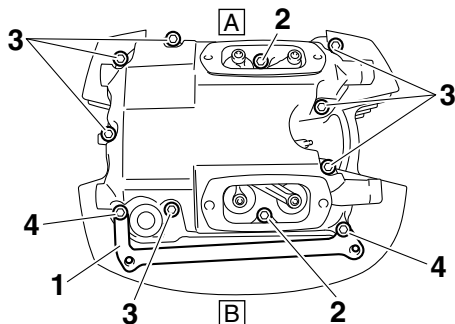
1. Install:

- Rear cylinder head cover
- Rear cylinder head cover bracket "1"



**Rear cylinder head cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)**

- Bolts "2": l = 30 mm (1.18 in)
- Bolts "3": l = 45 mm (1.77 in)
- Bolts "4": l = 55 mm (2.17 in)



- A. Intake side
- B. Exhaust side

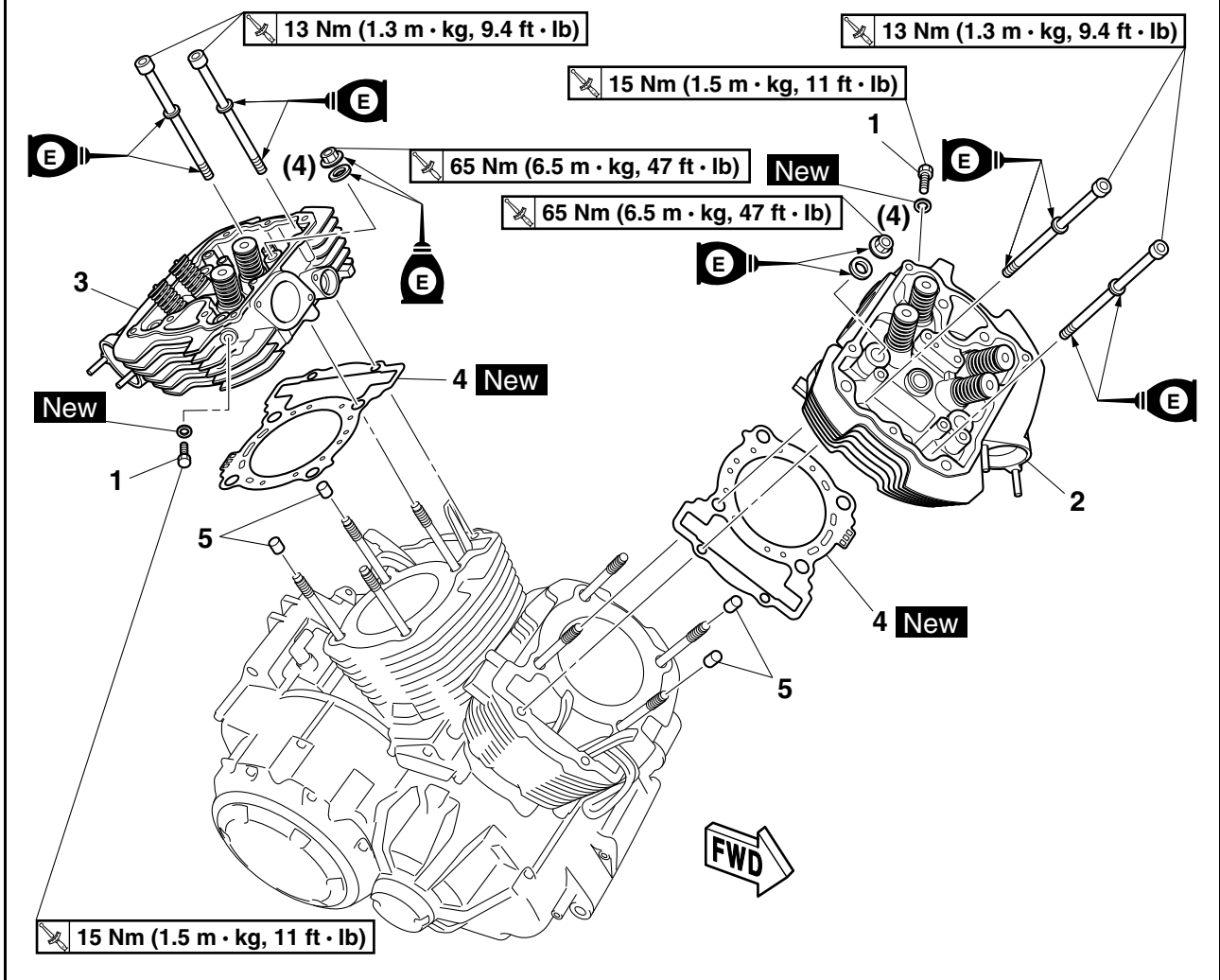
2. Install:

- Front cylinder head cover

EAS24110

CYLINDER HEADS

Removing the cylinder heads



Order	Job/Parts to remove	Q'ty	Remarks
	Camshaft assemblies		Refer to "CAMSHAFTS" on page 5-12.
1	Oil check bolt	2	
2	Front cylinder head	1	
3	Rear cylinder head	1	
4	Cylinder head gasket	2	
5	Dowel pin	4	
			For installation, reverse the removal procedure.

EAS24150

REMOVING THE CYLINDER HEADS

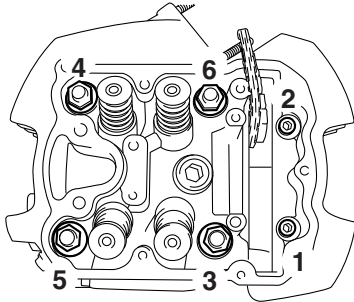
1. Remove:

- Cylinder head bolts
- Cylinder head nuts

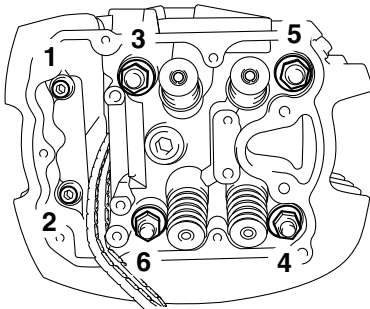
NOTE:

- Loosen the nuts and bolts in the proper sequence as shown.
- Loosen each nut and bolt 1/2 of a turn at a time. After all of the bolts and nuts are fully loosened, remove them.

A



B



- A. Front cylinder head
- B. Rear cylinder head

EAS24170

CHECKING THE CYLINDER HEADS

The following procedure applies to all of the cylinder heads.

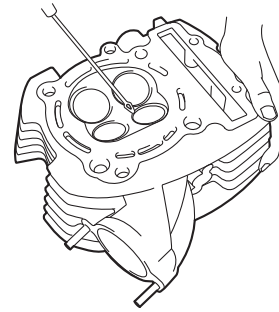
1. Eliminate:

- Combustion chamber carbon deposits (with a rounded scraper)

NOTE:

Do not use a sharp instrument to avoid damaging or scratching:

- Spark plug bore threads
- Valve seats



2. Check:

- Cylinder heads
Damage/scratches → Replace.

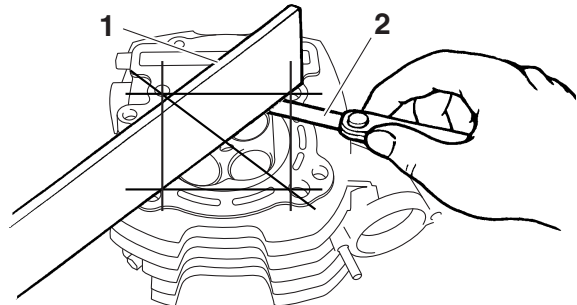
3. Measure:

- Cylinder head warpage
Out of specification → Resurface the cylinder head.



Warpage limit
0.03 mm (0.0012 in)

- a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



- b. Measure the warpage.
- c. If the limit is exceeded, resurface the cylinder head as follows.
- d. Place 400–600 grit wet sandpaper on a surface plate and resurface the cylinder head using a figure-eight sanding pattern.

NOTE:

To ensure an even surface, rotate the cylinder head several times.



EAS24230

INSTALLING THE CYLINDER HEADS

1. Tighten:

- Cylinder head nuts
- Cylinder head bolts

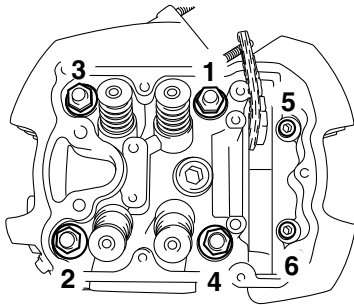


Cylinder head nut
65 Nm (6.5 m·kg, 47 ft·lb)
Cylinder head bolt
13 Nm (1.3 m·kg, 9.4 ft·lb)

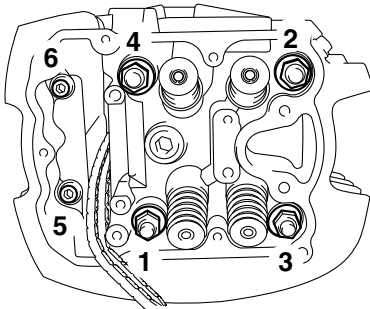
NOTE:

- Lubricate the cylinder head nuts and washers with engine oil.
- Tighten the cylinder head nuts and bolts in the proper tightening sequence as shown and torque them in two stages.

A



B

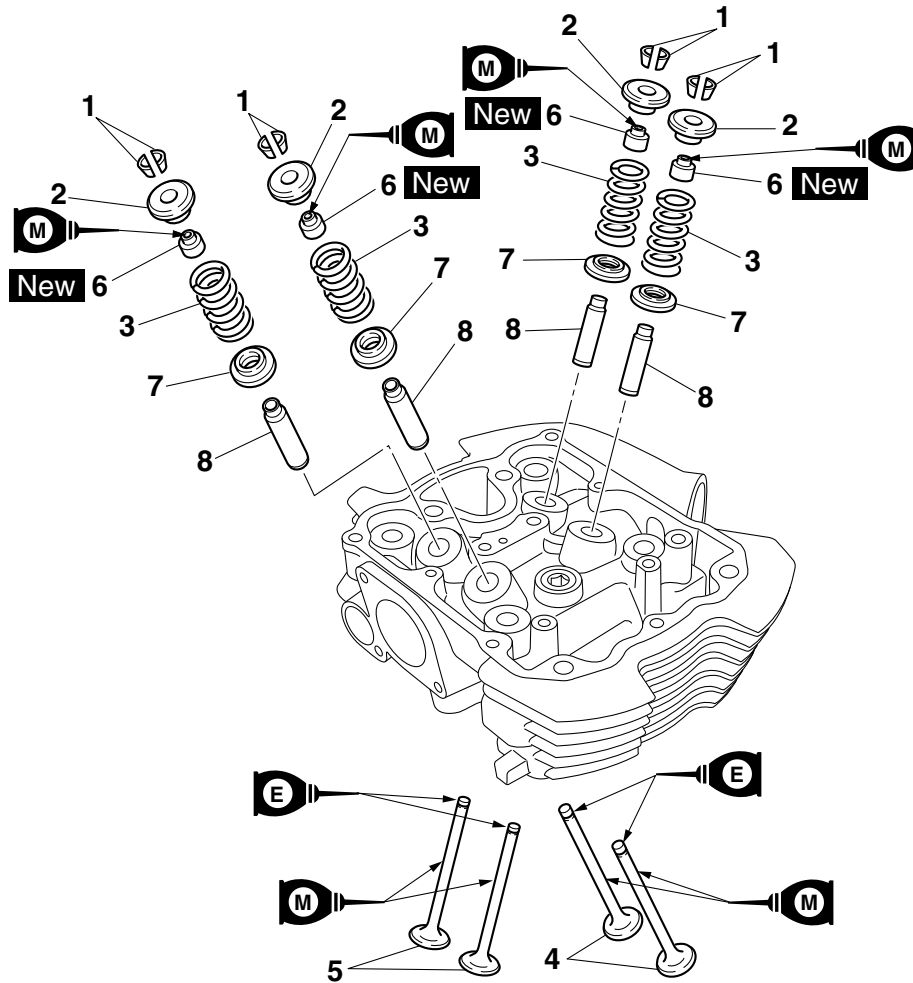


- A. Front cylinder head
- B. Rear cylinder head

EAS24270

VALVES AND VALVE SPRINGS

Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both cylinders.
	Cylinder heads		Refer to "CYLINDER HEADS" on page 5-24.
1	Valve cotter	8	
2	Upper spring seat	4	
3	Valve spring	4	
4	Intake valve	2	
5	Exhaust valve	2	
6	Valve stem seal	4	
7	Lower spring seat	4	
8	Valve guide	4	
			For installation, reverse the removal procedure.

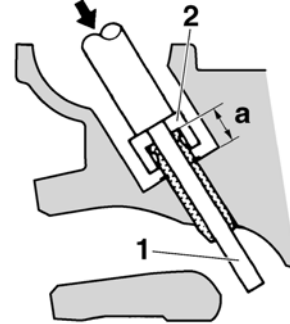


Valve-stem-to-valve-guide clearance (intake)
 0.010–0.037 mm (0.0004–0.0015 in)
Limit
 0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)
 0.025–0.052 mm (0.0010–0.0020 in)
Limit
 0.100 mm (0.0039 in)

b. Install the new valve guide with the valve guide installer “2” and valve guide remover “1”.

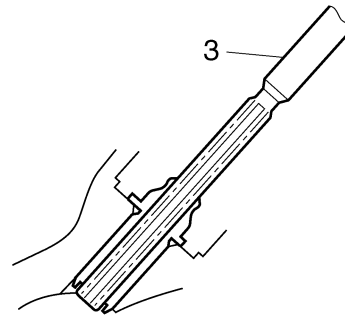
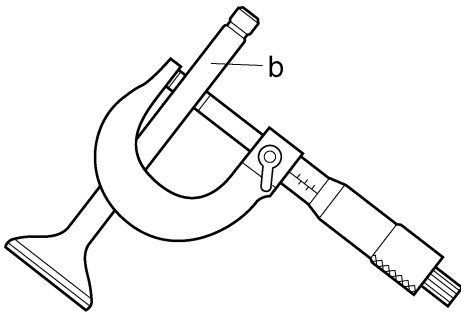
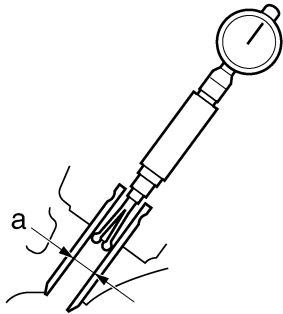


Valve guide position
 14.5–14.9 mm (0.571–0.587 in)



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.

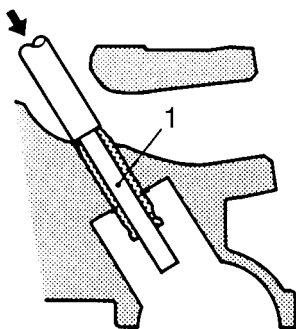


2. Replace:
 • Valve guide

NOTE:

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

a. Remove the valve guide with the valve guide remover “1”.



NOTE:

After replacing the valve guide, reface the valve seat.




Valve guide remover (ø6)
 90890-04064
Valve guide remover (6.0 mm)
 YM-04064-A
Valve guide installer (ø6)
 90890-04065
Valve guide installer (6.0 mm)
 YM-04065-A
Valve guide reamer (ø6)
 90890-04066
Valve guide reamer (6.0 mm)
 YM-04066

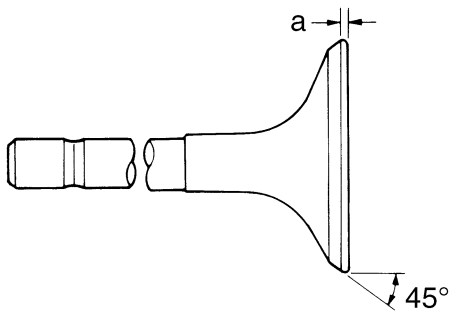
3. Eliminate:

- Carbon deposits
 (from the valve face and valve seat)

4. Check:
 - Valve face
Pitting/wear → Grind the valve face.
 - Valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
 - Valve margin thickness “a”
Out of specification → Replace the valve.




Valve margin thickness D (intake)
1.15–1.45 mm (0.0453–0.0571 in)
Valve margin thickness D (exhaust)
1.15–1.45 mm (0.0453–0.0571 in)



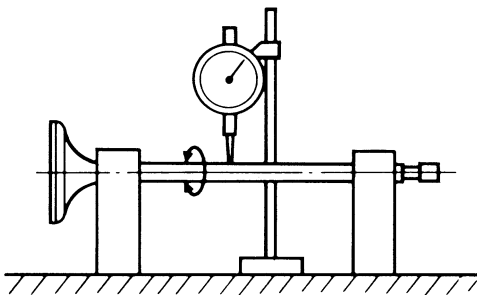
6. Measure:
 - Valve stem runout
Out of specification → Replace the valve.

NOTE: _____

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.



Valve stem runout
0.010 mm (0.0004 in)




EAS24300

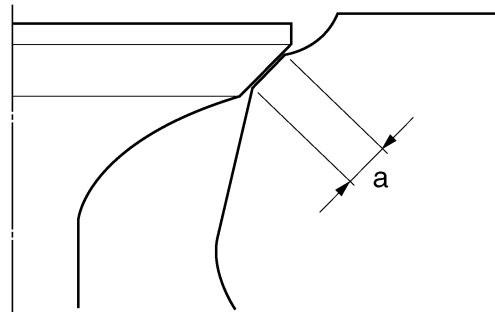
CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

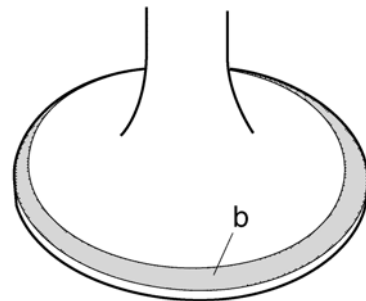
1. Eliminate:
 - Carbon deposits
(from the valve face and valve seat)
2. Check:
 - Valve seat
Pitting/wear → Replace the cylinder head.
3. Measure:
 - Valve seat width “a”
Out of specification → Replace the cylinder head.



Valve seat width C (intake)
1.00–1.20 mm (0.0394–0.0472 in)
Valve seat width C (exhaust)
1.00–1.20 mm (0.0394–0.0472 in)



- a. Apply Mechanic's blueing dye (Dykem) “b” onto the valve face.



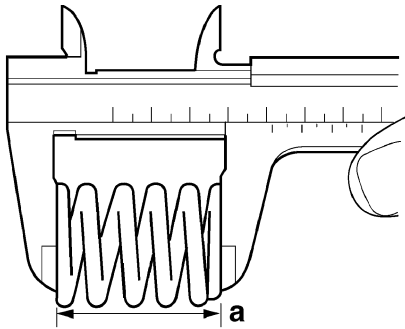
- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width.

NOTE: _____

Where the valve seat and valve face contacted one another, the blueing will have been removed.



4. Lap:
 - Valve face
 - Valve seat



2. Measure:

- Compressed valve spring force "a"
Out of specification → Replace the valve spring.



Installed compression spring force (intake)

171–197 N (38.44–44.29 lbf)
(17.44–20.09 kgf)

Installed compression spring force (exhaust)

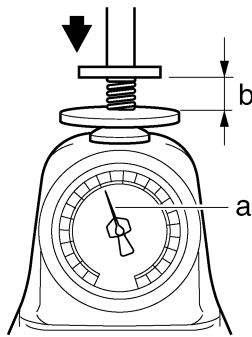
171–197 N (38.44–44.29 lbf)
(17.44–20.09 kgf)

Installed length (intake)

35.00 mm (1.38 in)

Installed length (exhaust)

35.00 mm (1.38 in)



b. Installed length

3. Measure:

- Valve spring tilt "a"
Out of specification → Replace the valve spring.

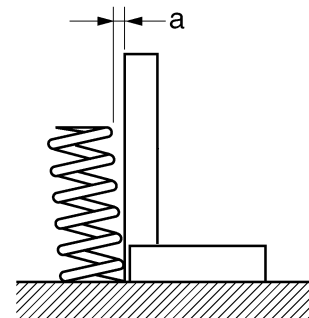


Spring tilt (intake)

2.5°/1.9 mm

Spring tilt (exhaust)

2.5°/1.9 mm



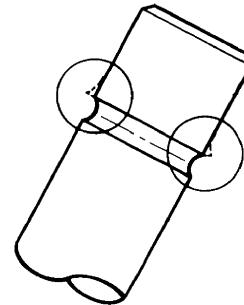
EAS24340

INSTALLING THE VALVES

The following procedure applies to all of the valves and related components.

1. Deburr:

- Valve stem end
(with an oil stone)



2. Lubricate:

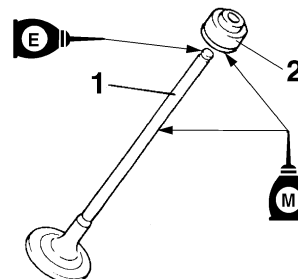
- Valve stem "1"
- Valve stem seal "2"
(with the recommended lubricant)

	Recommended lubricant Molybdenum disulfide oil
--	---

3. Lubricate:

- Valve stem end
(with the recommended lubricant)

	Recommended lubricant Engine oil
--	---



4. Install:

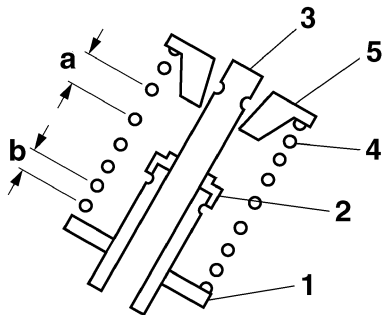
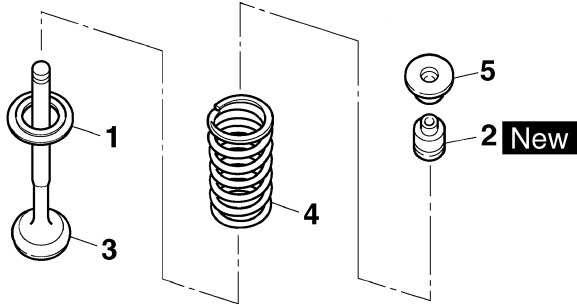
- Lower spring seat "1"

VALVES AND VALVE SPRINGS

- Valve stem seal "2" **New**
- Valve "3"
- Valve spring "4"
- Upper spring seat "5"
(into the cylinder head)

NOTE: _____

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.



b. Smaller pitch

5. Install:

- Valve cotters

NOTE: _____

Install the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



Valve spring compressor

90890-04019

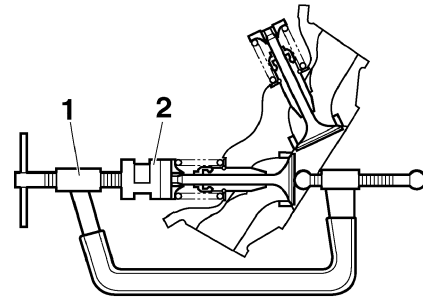
YM-04019

Valve spring compressor attachment

90890-01243

Valve spring compressor adapter (26 mm)

YM-01253-1

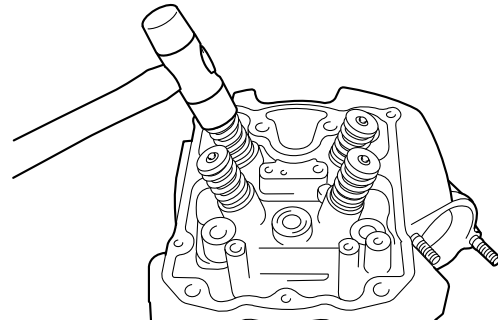


6. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

CAUTION: _____

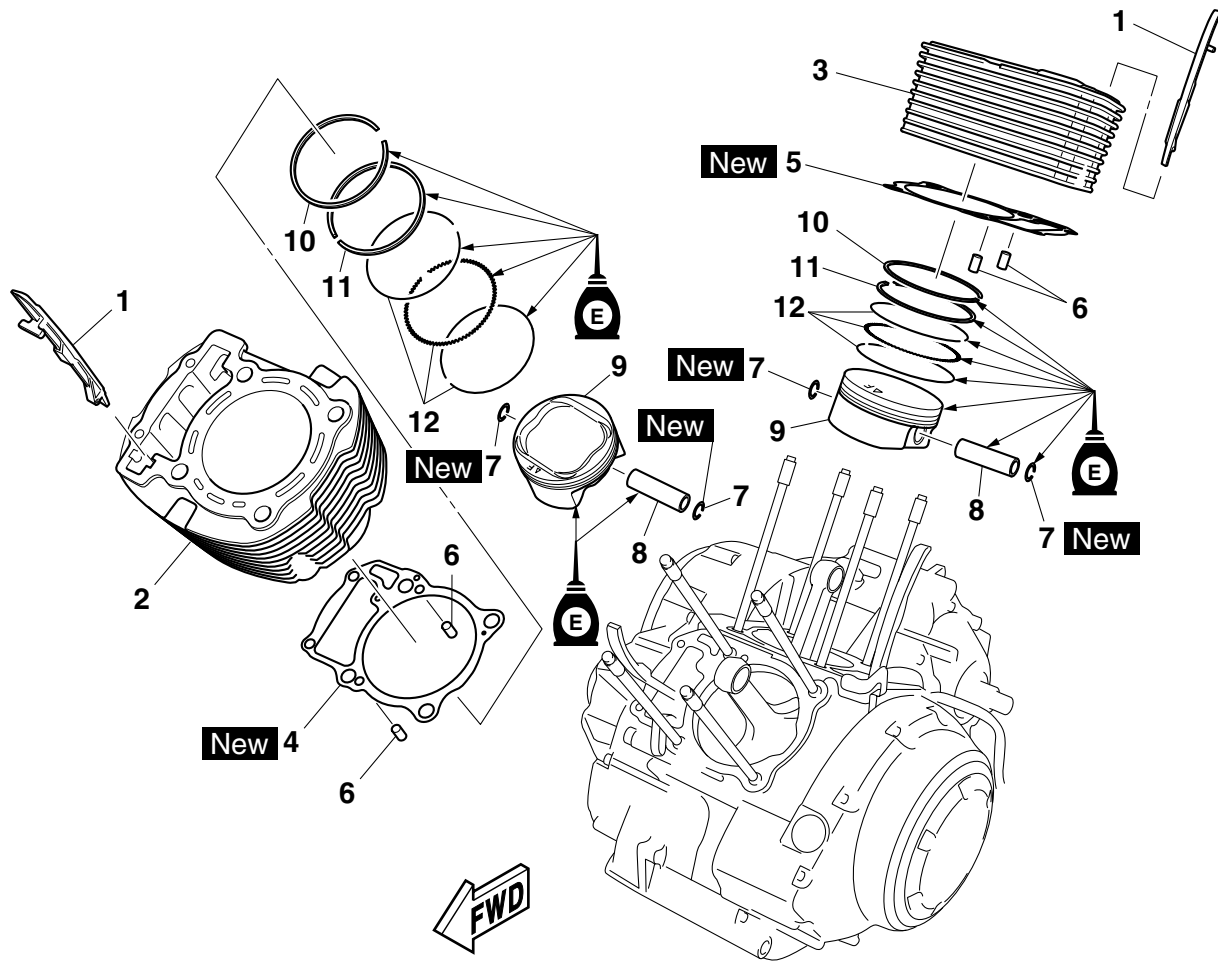
Hitting the valve tip with excessive force could damage the valve.



EAS24360

CYLINDERS AND PISTONS

Removing the cylinders and pistons



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder heads		Refer to "CYLINDER HEADS" on page 5-24.
1	Timing chain guide	2	
2	Front cylinder	1	
3	Rear cylinder	1	
4	Front cylinder gasket	1	
5	Rear cylinder gasket	1	
6	Dowel pin	4	
7	Circlip	4	
8	Piston pin	2	
9	Piston	2	
10	Top ring	2	
11	2nd ring	2	
12	Oil ring	2	
			For installation, reverse the removal procedure.

EAS24380

REMOVING THE PISTONS

The following procedure applies to all of the pistons.

1. Remove:
 - Piston pin clips "1"
 - Piston pin "2"
 - Piston "3"

ECA13810

CAUTION:

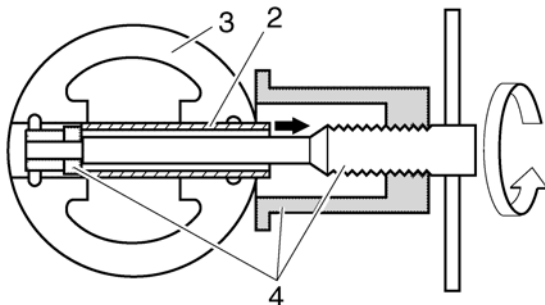
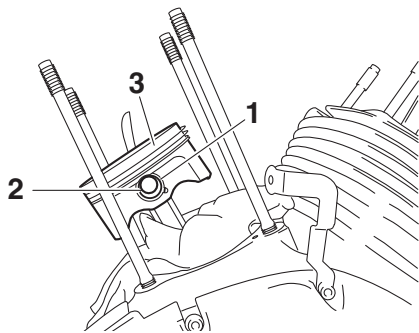
Do not use a hammer to drive the piston pin out.

NOTE:

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "4".



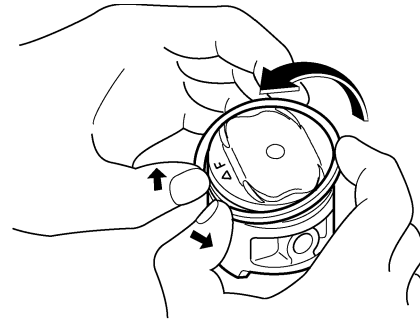
Piston pin puller set
90890-01304
Piston pin puller
YU-01304



2. Remove:
 - Top ring
 - 2nd ring
 - Oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24410

CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:
 - Piston wall
 - Cylinder wall

Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
 - Piston-to-cylinder clearance

- a. Measure the cylinder bore "C" with the cylinder bore gauge.

NOTE:

Measure the cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.



Bore
100.000–100.010 mm (3.9370–3.9374 in)
Taper limit
0.050 mm (0.0020 in)
Out of round limit
0.050 mm (0.0020 in)

"C" = maximum of D₁–D₆

"T" = maximum of D₁ or D₂ - maximum of D₅ or D₆

"R" = maximum of D₁, D₃ or D₅ - minimum of D₂, D₄ or D₆

EAS24430

CHECKING THE PISTON RINGS

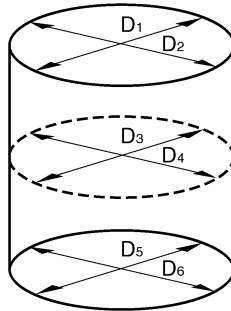
The following procedure applies to all of the piston rings.

1. Measure:

- Piston ring side clearance
Out of specification → Replace the piston and piston rings as a set.

NOTE:

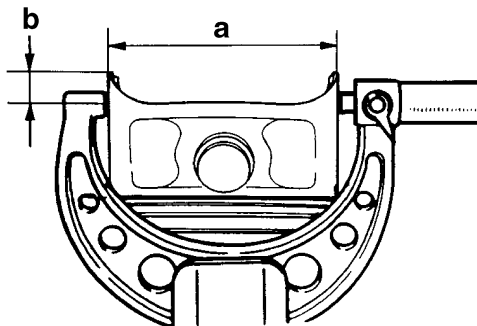
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- Measure the piston skirt diameter "D" "a" with the micrometer.



Piston Diameter D
99.955–99.970 mm (3.9352–3.9358 in)



- 8 mm (0.31 in) from the bottom edge of the piston
- If out of specification, replace the piston and piston rings as a set.
- Calculate the piston-to-cylinder clearance with the following formula.

- Piston-to-cylinder clearance =
Cylinder bore "C" -
Piston skirt diameter "P"

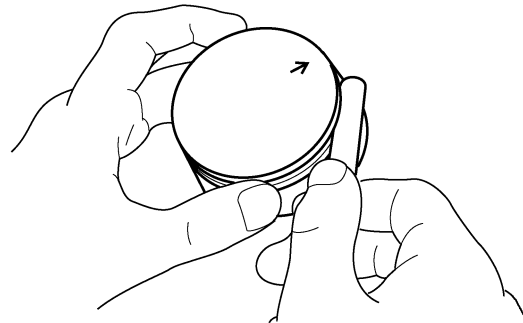


Piston-to-cylinder clearance
0.030–0.055 mm (0.0012–0.0022 in)
Limit
0.15 mm (0.0059 in)

- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.



Piston ring
Top ring
Ring side clearance
0.030–0.080 mm (0.0012–0.0032 in)
Limit
0.130 mm (0.0051 in)
2nd ring
Ring side clearance
0.030–0.070 mm (0.0012–0.0028 in)
Limit
0.130 mm (0.0051 in)



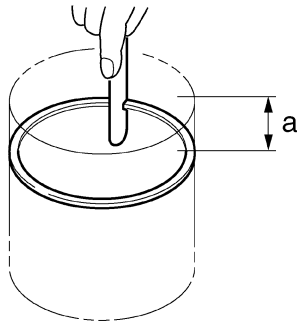
2. Install:

- Piston ring
(into the cylinder)

NOTE:

Level the piston ring in the cylinder with the piston crown.





a. 10 mm (0.39 in)

3. Measure:

- Piston ring end gap
Out of specification → Replace the piston ring.

NOTE:

The oil ring expander spacer 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)
0.20–0.35 mm (0.0079–0.0138 in)

Limit
0.60 mm (0.0236 in)

2nd ring

End gap (installed)
0.45–0.60 mm (0.0177–0.0236 in)

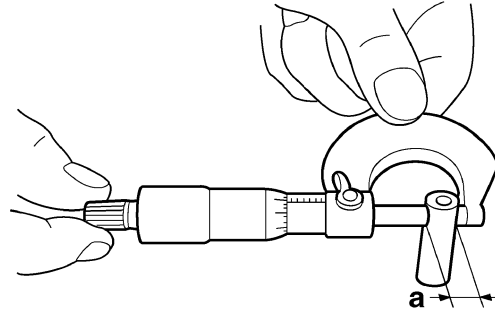
Limit
0.95 mm (0.0374 in)

Oil ring

End gap (installed)
0.20–0.70 mm (0.0079–0.0276 in)



Piston pin outside diameter
22.991–23.000 mm (0.9052–0.9055 in)
Limit
22.971 mm (0.9044 in)

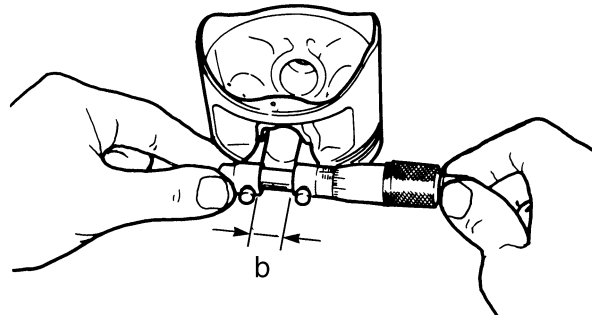


3. Measure:

- Piston pin bore diameter “b”
Out of specification → Replace the piston.



Piston pin bore inside diameter
23.004–23.015 mm (0.9057–0.9061 in)
Limit
23.045 mm (0.9073 in)



4. Calculate:

- Piston-pin-to-piston-pin-bore clearance
Out of specification → Replace the piston pin and piston as a set.

• Piston-pin-to-piston-pin-bore clearance =
Piston pin bore diameter “b” -
Piston pin outside diameter “a”



Piston-pin-to-piston-pin-bore clearance
0.004–0.024 mm (0.00016–0.00094 in)

EAS24440

CHECKING THE PISTON PINS

The following procedure applies to all of the piston pins.

1. Check:

- Piston pin
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

2. Measure:

- Piston pin outside diameter “a”
Out of specification → Replace the piston pin.

CYLINDERS AND PISTONS

EAS24460

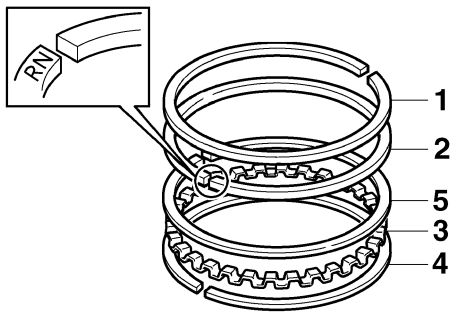
INSTALLING THE PISTONS AND CYLINDERS

The following procedure applies to all of the pistons and cylinders.

1. Install:
 - Top ring "1"
 - 2nd ring "2"
 - Oil ring expander "3"
 - Lower oil ring rail "4"
 - Upper oil ring rail "5"

NOTE:

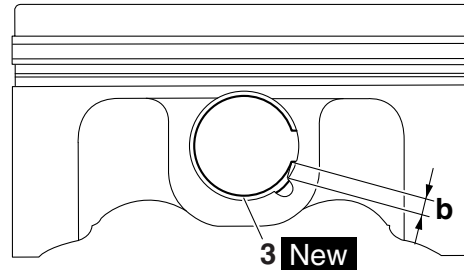
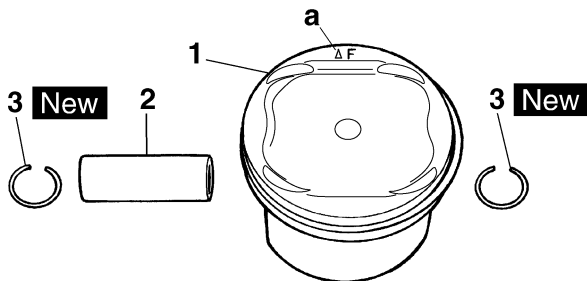
Be sure to install the piston rings so that the manufacturer's marks or numbers face up.



2. Install:
 - Piston "1"
 - Piston pin "2"
 - Piston pin clips "3" **New**

NOTE:

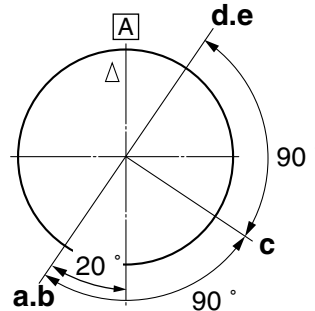
- Apply engine oil onto the piston pin.
- Make sure the arrow mark "a" on the piston faces towards the front side of the cylinder.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.
- Install the piston pin clips so that the clip ends are 3 mm (0.12 in) "b" or more from the cutout in the piston.
- Reinstall each piston into its original cylinder.



3. Lubricate:
 - Piston
 - Piston rings
 - Cylinder
(with the recommended lubricant)

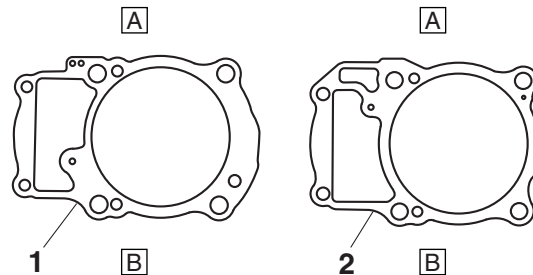
	Recommended lubricant Engine oil
--	---

4. Offset:
 - Piston ring end gaps



- a. Top ring
- b. Upper oil ring rail
- c. Oil ring expander
- d. Lower oil ring rail
- e. 2nd ring
- A. forward

5. Install:
 - Rear cylinder gasket "1"
 - Front cylinder gasket "2"



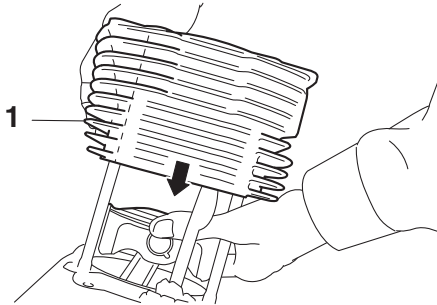
- A. Intake side
- B. Exhaust side

6. Install:

- Cylinder "1"

NOTE: _____

- While compressing the piston rings with one hand, install the cylinder with the other hand.
 - Pass the timing chain and timing chain guide through the timing chain cavity.
-

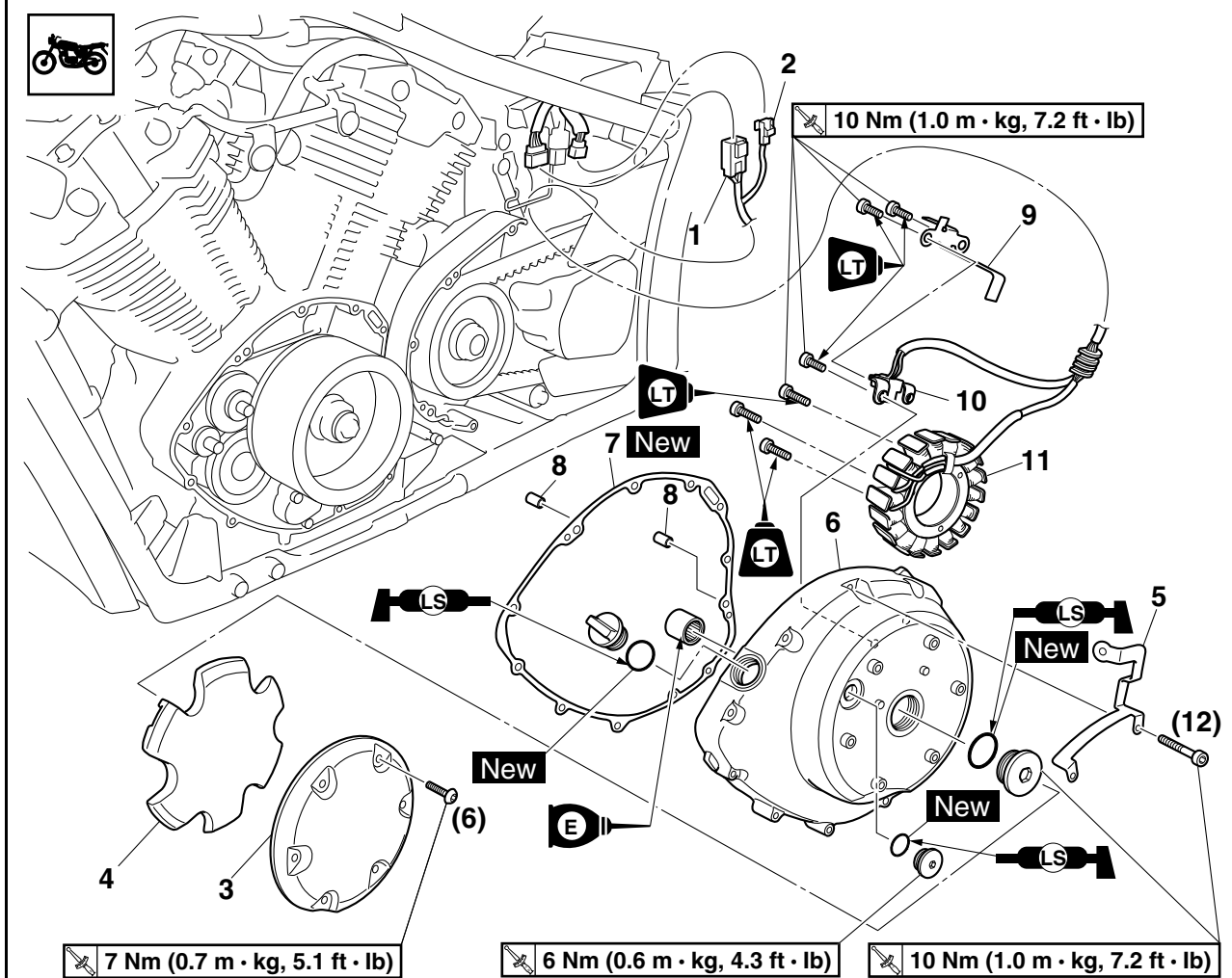


GENERATOR AND STARTER CLUTCH

EAS24480

GENERATOR AND STARTER CLUTCH

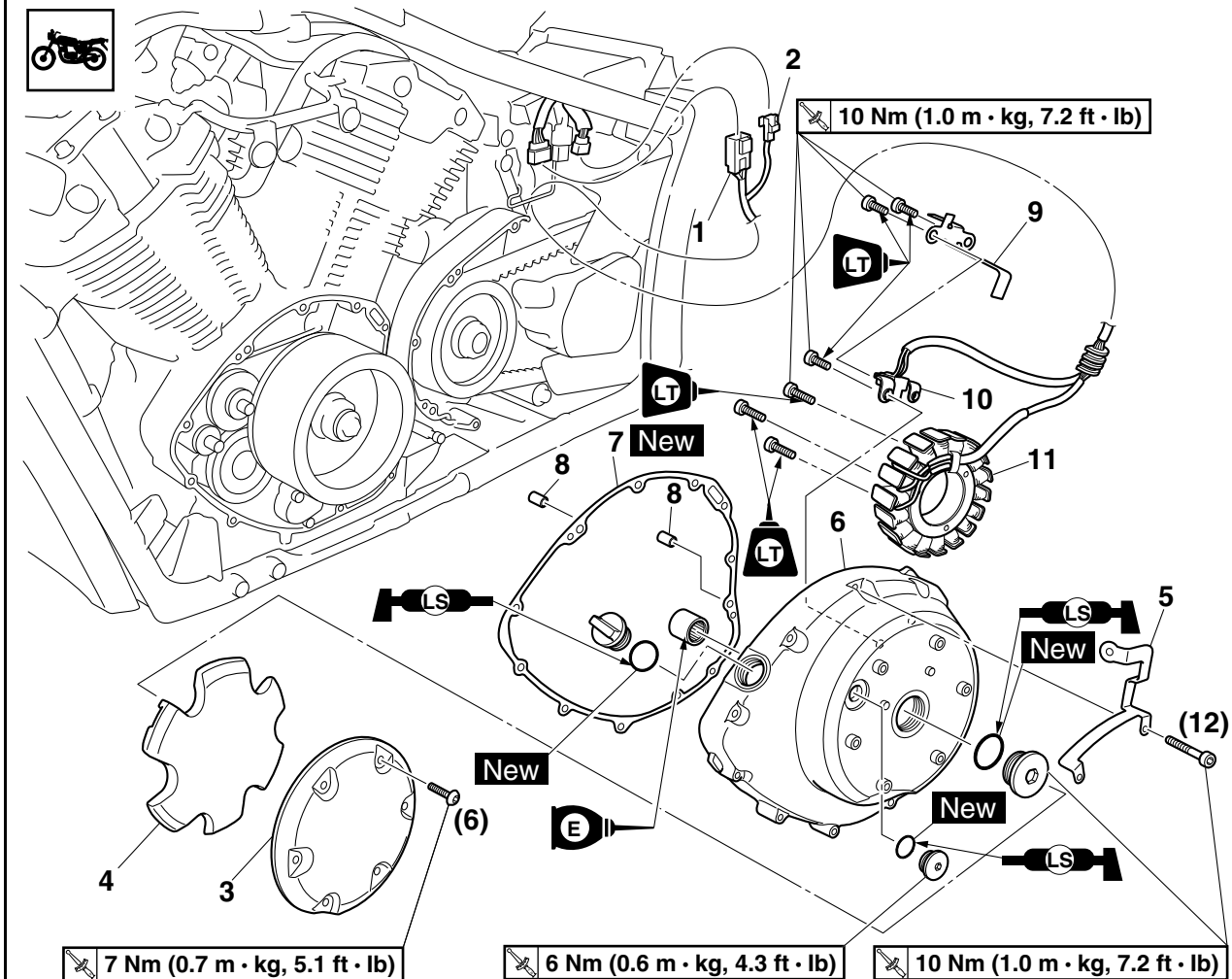
Removing the stator coil



Order	Job/Parts to remove	Q'ty	Remarks
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Canister		For California only. Refer to "THROTTLE BODIES" on page 7-7.
	Drive pulley cover		Refer to "BELT DRIVE" on page 4-72.
	Left footrest assembly/Sidestand		Refer to "ENGINE REMOVAL" on page 5-1.
1	Stator coil coupler	1	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Damper cover	1	
4	Generator cover damper	1	
5	Left side cover bracket	1	
6	Generator cover	1	
7	Generator cover gasket	1	
8	Dowel pin	2	

GENERATOR AND STARTER CLUTCH

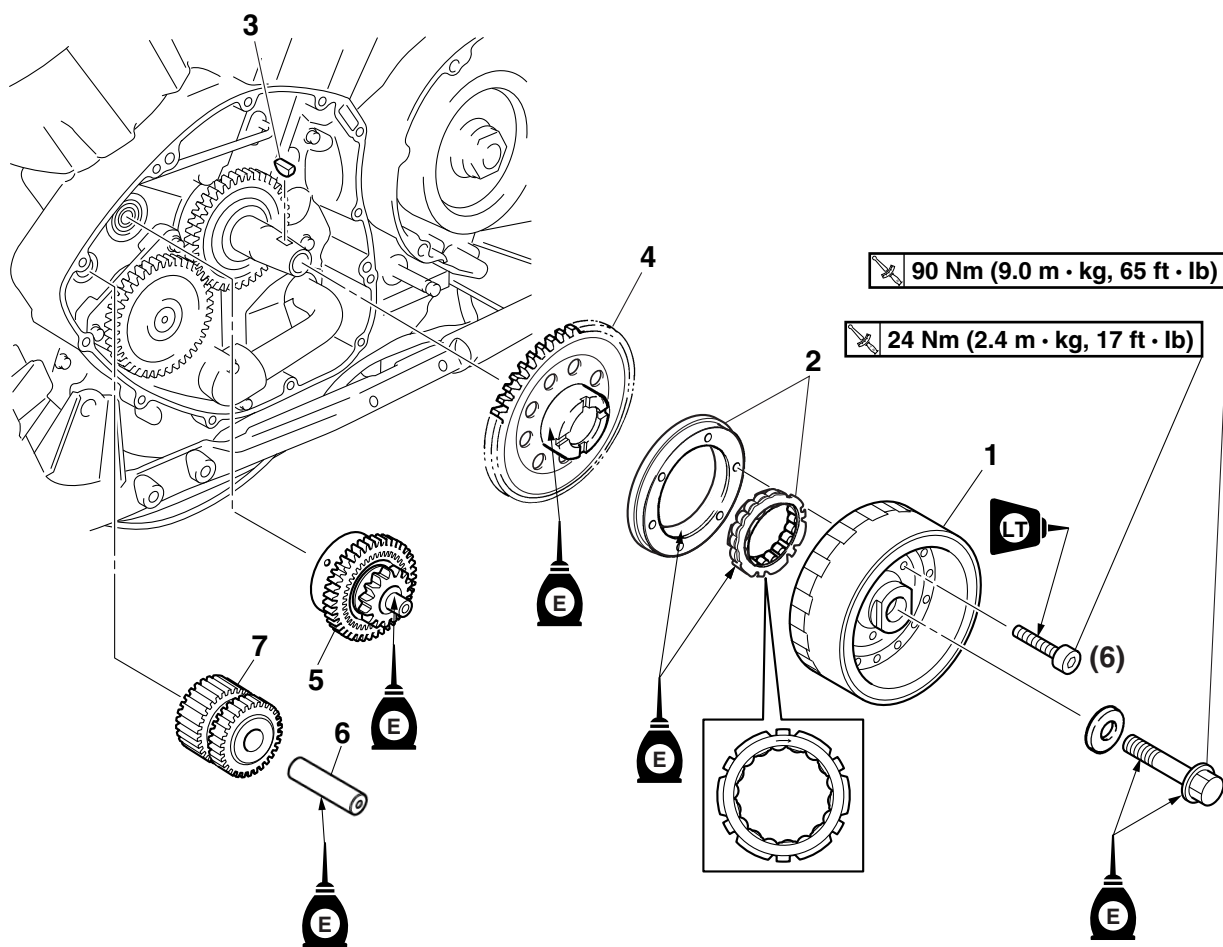
Removing the stator coil



Order	Job/Parts to remove	Q'ty	Remarks
9	Crankshaft position sensor/stator assembly lead holder	1	
10	Crankshaft position sensor	1	
11	Stator coil	1	
			For installation, reverse the removal procedure.

GENERATOR AND STARTER CLUTCH

Removing the generator rotor and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Generator rotor	1	
2	Starter clutch	1	
3	Woodruff key	1	
4	Starter clutch gear	1	
5	Torque limiter	1	
6	Starter clutch idle gear shaft	1	
7	Starter clutch idle gear	1	
			For installation, reverse the removal procedure.

GENERATOR AND STARTER CLUTCH

EAS24490

REMOVING THE GENERATOR

1. Remove:

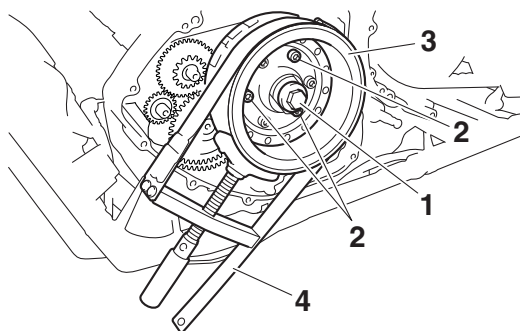
- Generator rotor bolt "1"
- Washer
- Starter clutch bolts "2"

NOTE:

- While holding the generator rotor "3" with the sheave holder "4", loosen the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



2. Remove:

- Generator rotor "1"
(with the flywheel puller "2")
- Woodruff key

ECA13880

CAUTION:

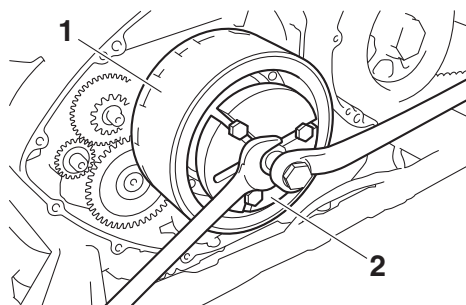
To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set's center bolt and the crankshaft.

NOTE:

- 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



EAS24560

REMOVING THE STARTER CLUTCH

1. Remove:

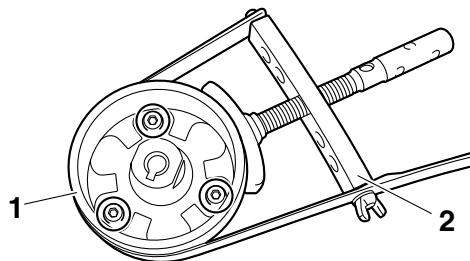
- Starter clutch bolts
- Starter clutch

NOTE:

While holding the generator rotor "1" with the sheave holder "2", loosen the starter clutch bolts.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS24570

CHECKING THE STARTER CLUTCH

1. Check:

- Starter clutch rollers
Damage/wear → Replace.

2. Check:

- Starter clutch idle gear
- Starter clutch gear
Burrs/chips/roughness/wear → Replace the defective part(s).

3. Check:

- Starter clutch gear's contacting surfaces
Damage/pitting/wear → Replace the starter clutch gear.

4. Check:

- Starter clutch operation

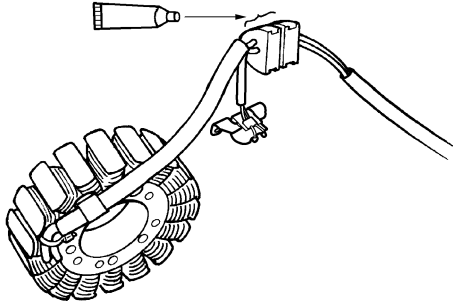
GENERATOR AND STARTER CLUTCH

3. Apply:

- Sealant
(onto the crankshaft position sensor/stator assembly lead grommet)



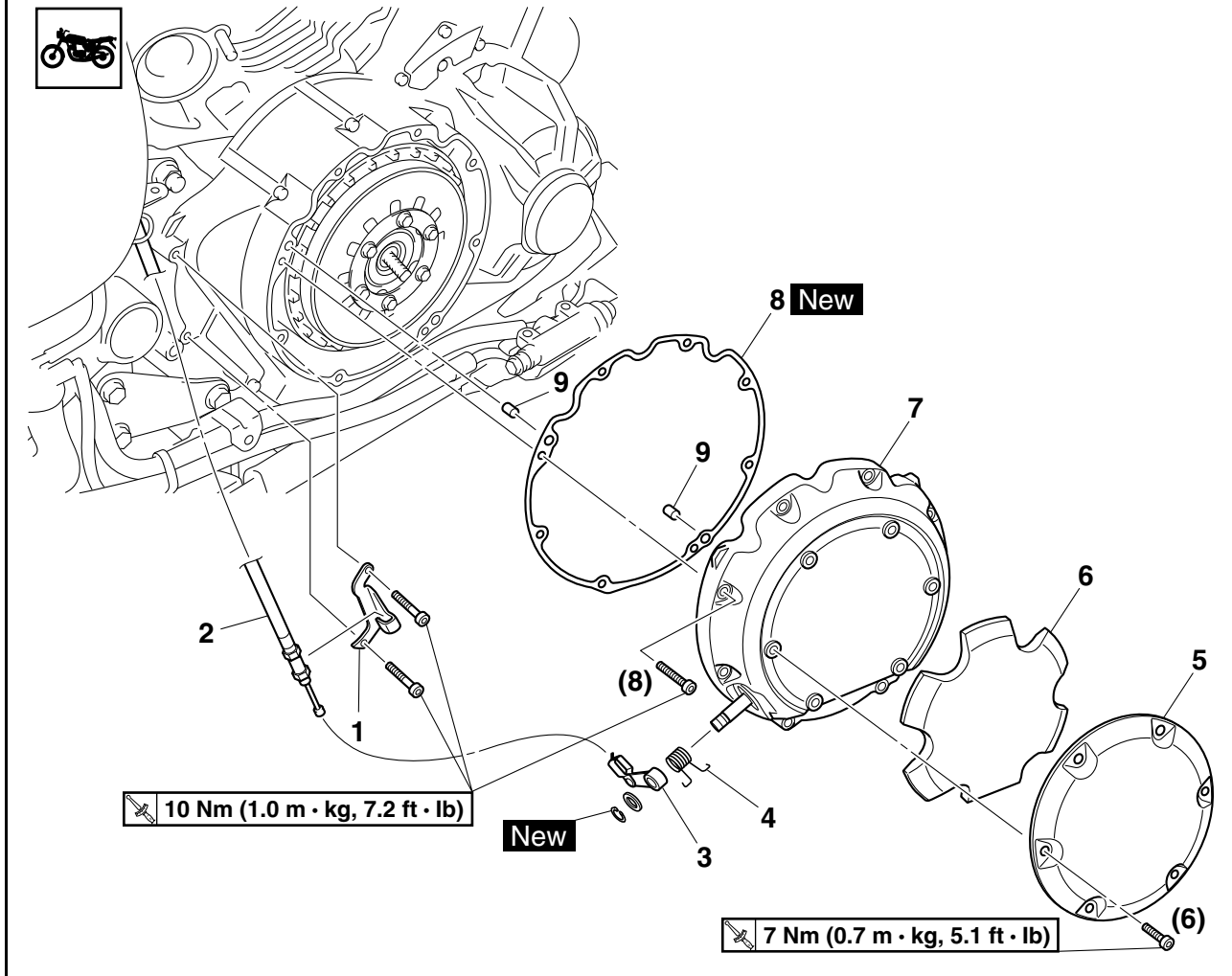
Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)



EAS25060

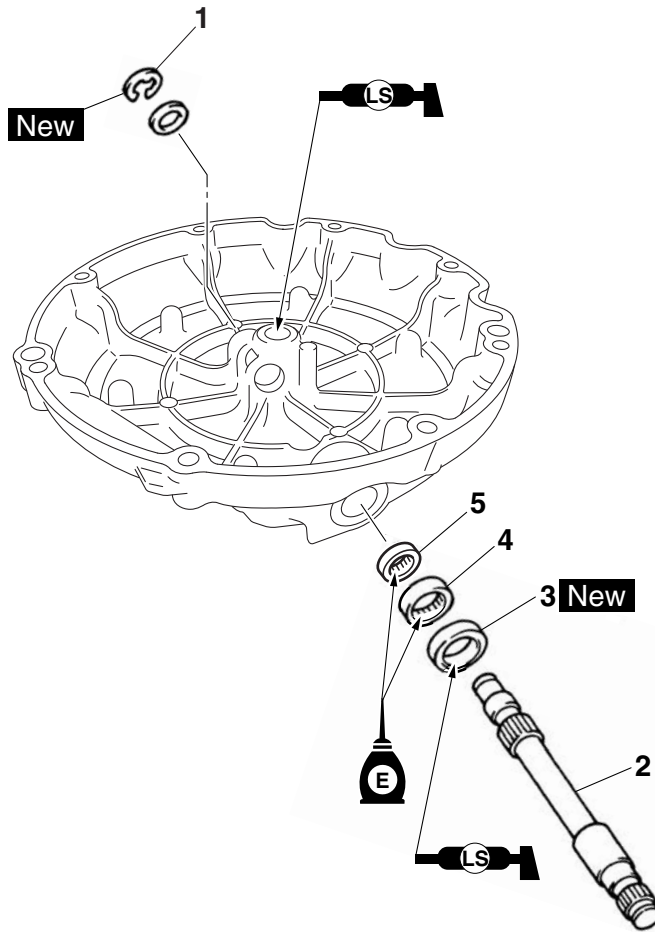
CLUTCH

Removing the clutch cover



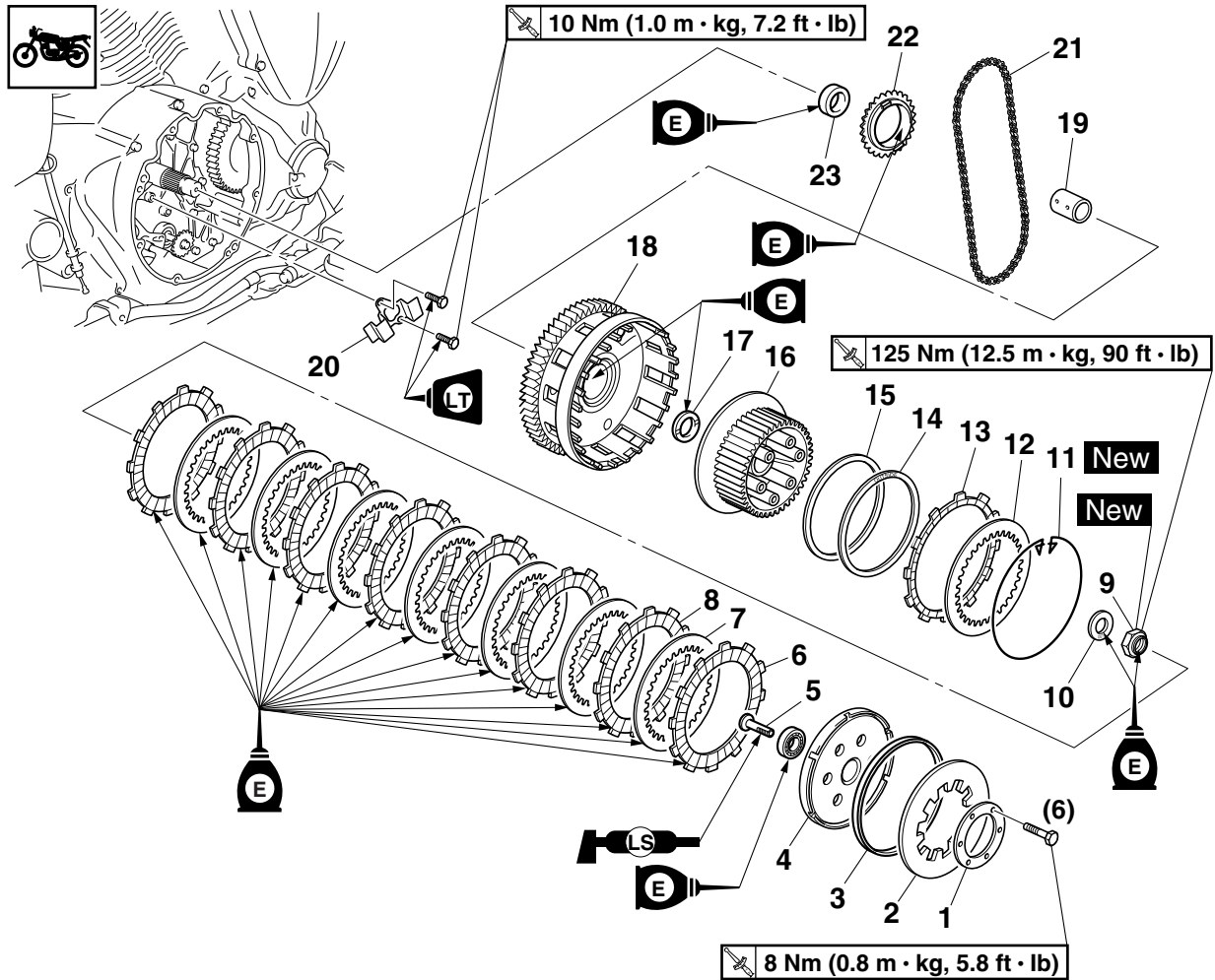
Order	Job/Parts to remove	Q'ty	Remarks
	Muffler/Coolant reservoir cover		Refer to "ENGINE REMOVAL" on page 5-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
1	Clutch cable holder	1	
2	Clutch cable	1	Disconnect.
3	Pull lever	1	
4	Pull lever spring	1	
5	Damper cover	1	
6	Clutch cover damper	1	
7	Clutch cover	1	
8	Clutch cover gasket	1	
9	Dowel pin	2	
			For installation, reverse the removal procedure.

Removing the pull lever shaft



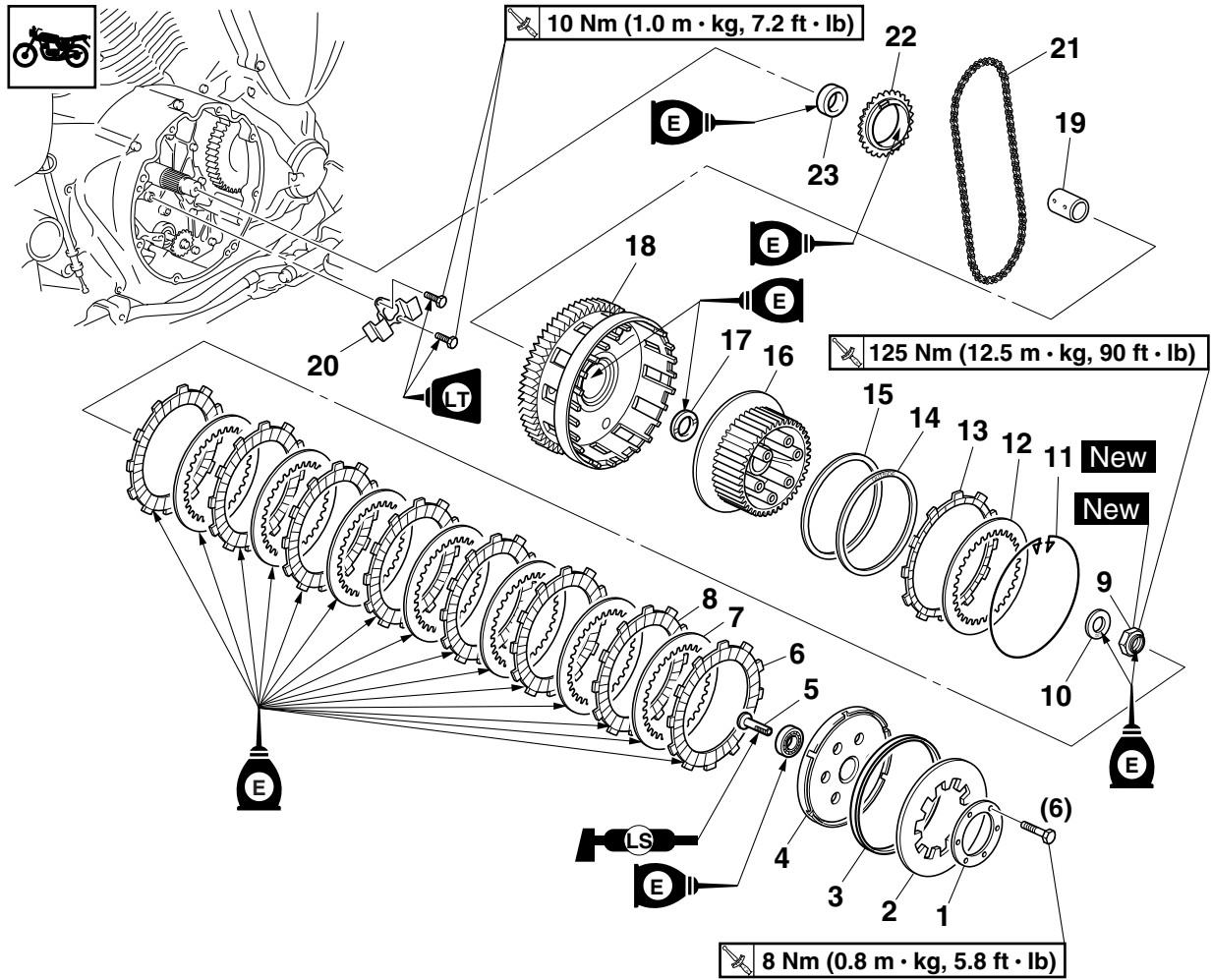
Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Pull lever shaft	1	
3	Oil seal	1	
4	Bearing	1	
5	Bearing	1	
			For installation, reverse the removal procedure.

Removing the clutch



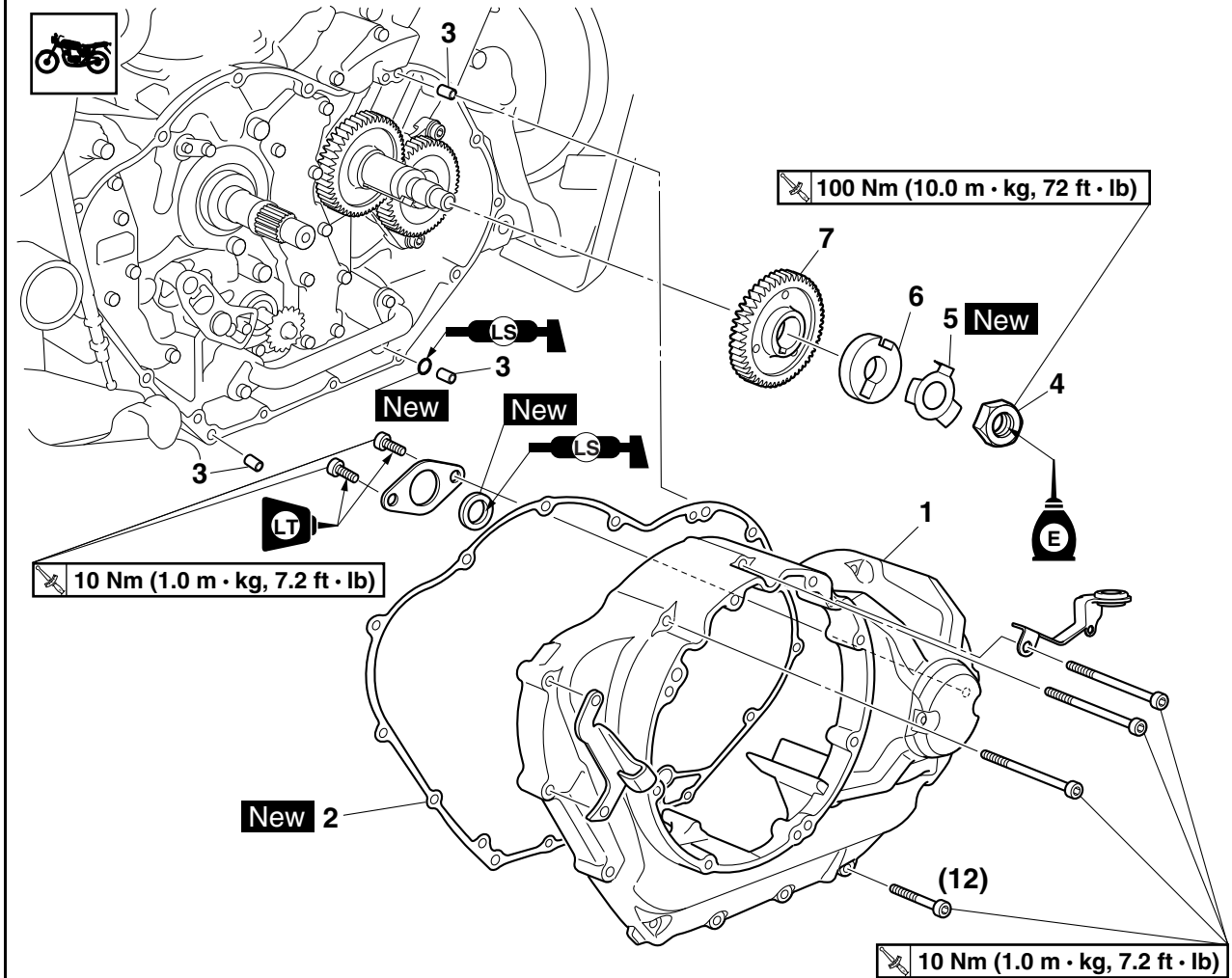
Order	Job/Parts to remove	Q'ty	Remarks
1	Clutch spring plate retainer	1	
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Pull rod	1	
6	Friction plate 1	1	Inside diameter: 124 mm (4.88 in)
7	Clutch plate	7	
8	Friction plate 2	7	Inside diameter: 124 mm (4.88 in)
9	Clutch boss nut	1	
10	Conical spring washer	1	
11	Wire circlip	1	
12	Clutch plate	1	
13	Friction plate 3	1	Inside diameter: 135 mm (5.31 in)
14	Clutch damper spring	1	
15	Clutch damper spring seat	1	
16	Clutch boss	1	
17	Thrust washer 1	1	

Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
18	Clutch housing	1	
19	Collar	1	
20	Oil/water pump drive chain guide	1	
21	Oil/water pump drive chain	1	
22	Oil/water pump drive sprocket	1	
23	Thrust washer 2	1	
			For installation, reverse the removal procedure.

Removing the primary drive gear



Order	Job/Parts to remove	Q'ty	Remarks
	Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear brake master cylinder		Refer to "REAR BRAKE" on page 4-34.
	Right footrest assembly/Rear brake light switch/Horn/Down tube		Refer to "ENGINE REMOVAL" on page 5-1.
	Generator cover		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-40.
1	Primary drive gear cover	1	
2	Primary drive gear cover gasket	1	
3	Dowel pin	3	
4	Primary drive gear nut	1	
5	Lock washer	1	
6	Spacer	1	
7	Primary drive gear	1	
			For installation, reverse the removal procedure.

EAS25080

REMOVING THE CLUTCH

1. Loosen:

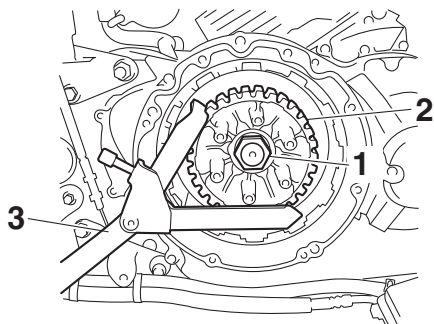
- Clutch boss nut "1"

NOTE:

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



Universal clutch holder
90890-04086
YM-91042

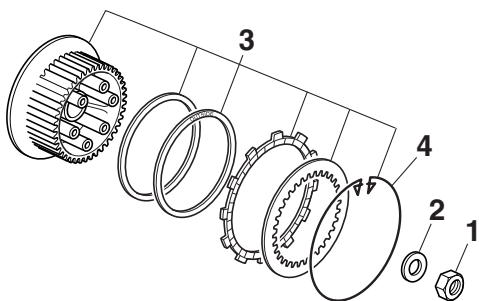


2. Remove:

- Clutch boss nut "1"
- Conical spring washer "2"
- Clutch boss assembly "3"

NOTE:

There is a built-in damper between the clutch boss and the clutch plate. It is not necessary to remove the wire circlip "4" and disassemble the built-in damper unless there is serious clutch chattering.



EAS25090

REMOVING THE PRIMARY DRIVE GEAR

1. Straighten the lock washer tab.

2. Remove:

- Primary drive gear nut "1"
- Lock washer "2"

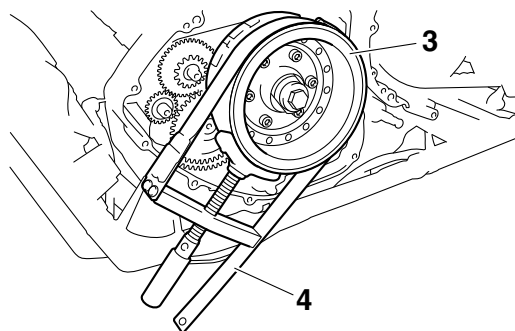
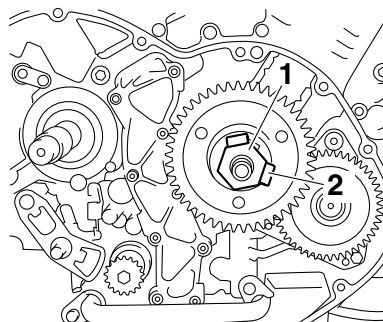
NOTE:

- While holding the generator rotor "3" with the sheave holder "4", loosen the primary drive gear nut.

- Do not allow the sheave holder to touch the projection on the generator rotor.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS25100

CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:

- Friction plate
Damage/wear → Replace the friction plates as a set.

2. Measure:

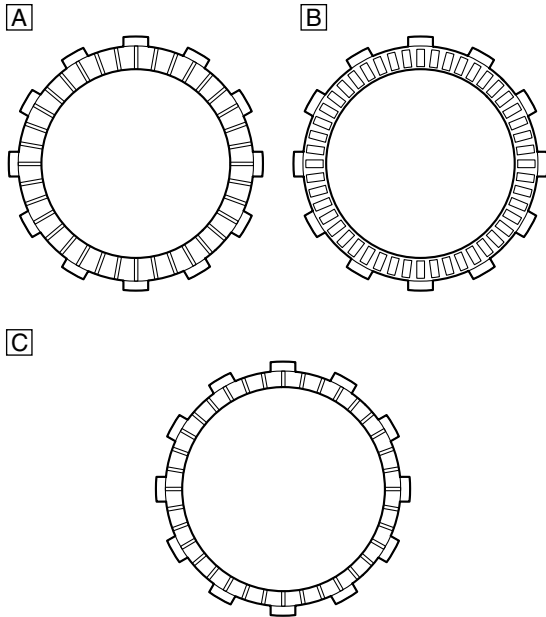
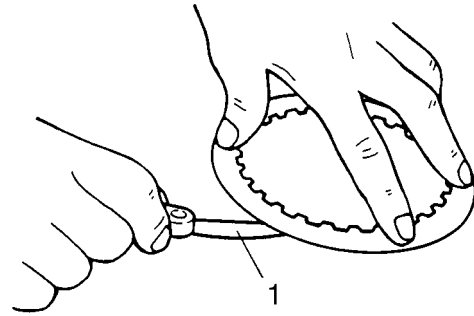
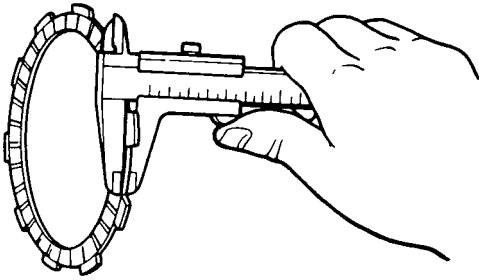
- Friction plate thickness
Out of specification → Replace the friction plates as a set.

NOTE:

Measure each friction plate at four places.



Friction plate 1, 3 thickness
2.90–3.10 mm (0.114–0.122 in)
Wear limit
2.80 mm (0.1102 in)



- A. Friction plate 1
- B. Friction plate 2
- C. Friction plate 3

EAS25110

CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

1. Check:
 - Clutch plate
Damage → Replace the clutch plates as a set.
2. Measure:
 - Clutch plate warpage
(with a surface plate and thickness gauge “1”)
Out of specification → Replace the clutch plates as a set.



Warpage limit
0.20 mm (0.0079 in)

EAS25130

CHECKING THE CLUTCH SPRING PLATE

1. Check:
 - Clutch spring plate
Damage → Replace.
2. Check:
 - Clutch spring plate seat
Damage → Replace.

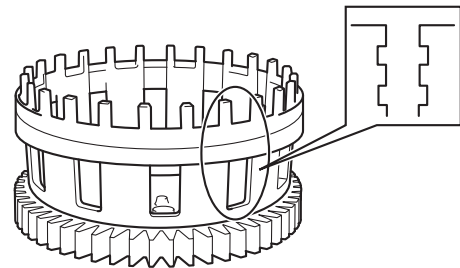
EAS25150

CHECKING THE CLUTCH HOUSING

1. Check:
 - Clutch housing dogs
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:

Pitting on the clutch housing dogs will cause erratic clutch operation.



2. Check:
 - Bearing
Damage/wear → Replace the bearing and clutch housing.

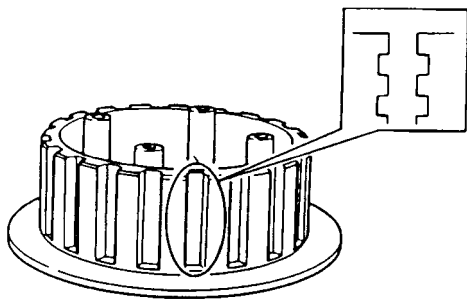
EAS25160

CHECKING THE CLUTCH BOSS

1. Check:
 - Clutch boss splines
Damage/pitting/wear → Replace the clutch boss.

NOTE:

Pitting on the clutch boss splines will cause erratic clutch operation.



EAS25170

CHECKING THE PRESSURE PLATE

1. Check:
 - Pressure plate
Cracks/damage → Replace.
 - Bearing
Damage/wear → Replace.

EAS25200

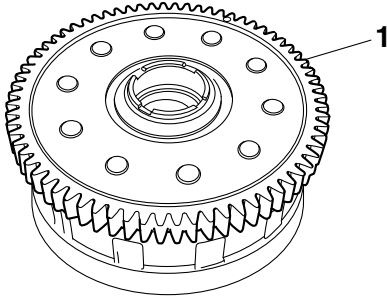
CHECKING THE PRIMARY DRIVE GEAR

1. Check:
 - Primary drive gear
Damage/wear → Replace the primary drive and primary driven gears as a set.
Excessive noise during operation → Replace the primary drive and primary driven gears as a set.

EAS25210

CHECKING THE PRIMARY DRIVEN GEAR

1. Check:
 - Primary driven gear “1”
Damage/wear → Replace the primary drive and primary driven gears as a set.
Excessive noise during operation → Replace the primary drive and primary driven gears as a set.

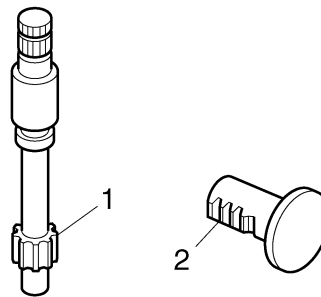


EAS25220

CHECKING THE PULL LEVER SHAFT AND PULL ROD

1. Check:
 - Pull lever shaft pinion gear teeth “1”

- Pull rod teeth “2”
Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.



2. Check:
 - Pull rod bearing
Damage/wear → Replace.

EAS3D81028

CHECKING THE OIL/WATER PUMP DRIVE SPROCKET AND OIL/WATER PUMP DRIVE CHAIN

1. Check:
 - Oil/water pump drive sprocket
Cracks/damage/wear → Replace the oil/water pump drive chain, and oil/water pump drive and driven sprockets as a set.
2. Check:
 - Oil/water pump drive chain
Damage/stiffness → Replace the oil/water pump drive chain, and oil/water pump drive and driven sprockets as a set.

EAS25230

INSTALLING THE PRIMARY DRIVE GEAR

1. Install:
 - Primary drive gear “1”
 - Spacer “2”
 - Lock washer “3”
 - Primary drive gear nut



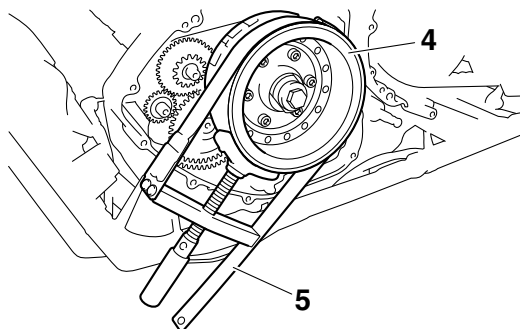
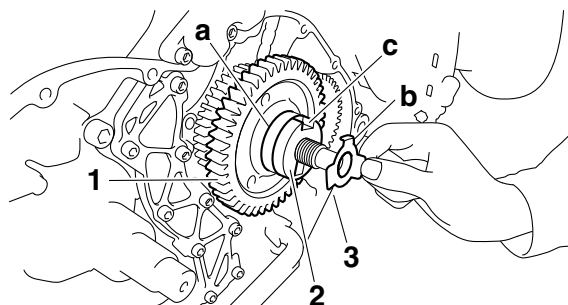
Primary drive gear nut
100 Nm (10.0 m·kg, 72 ft·lb)

- NOTE:**
- Make sure that the side of the primary drive gear “1” with the groove “a” is facing outward.
 - Align the tab “b” on the lock washer “3” with the groove “c” in the spacer “2”.
 - While holding the generator rotor “4” with the sheave holder “5”, tighten the primary drive gear nut.
 - Do not allow the sheave holder to touch the projection on the generator rotor.

- Lubricate the primary drive gear nut threads with engine oil.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



2. Bend lock washer tab along a flat side of the nut.

EAS25240

INSTALLING THE CLUTCH

1. Install:

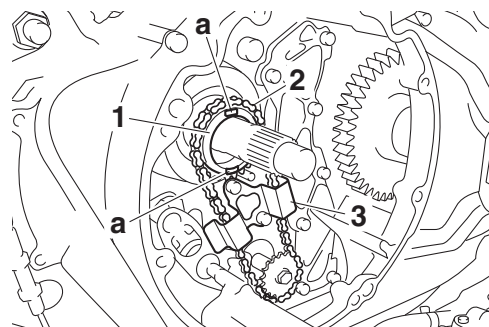
- Oil/water pump drive sprocket "1"
- Oil/water pump drive chain "2"
- Oil/water pump drive chain guide "3"

NOTE:

Install the oil/water pump drive sprocket with its projections "a" facing outward.



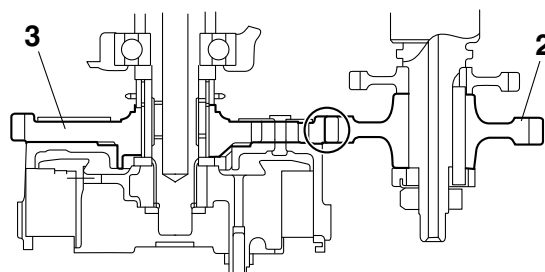
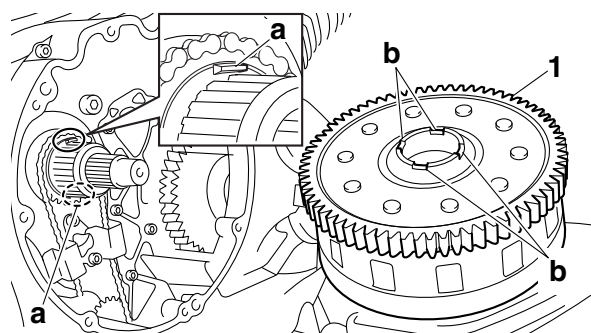
Oil/water pump drive chain guide bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
LOCTITE®



2. Install:
 - Clutch housing "1"

NOTE:

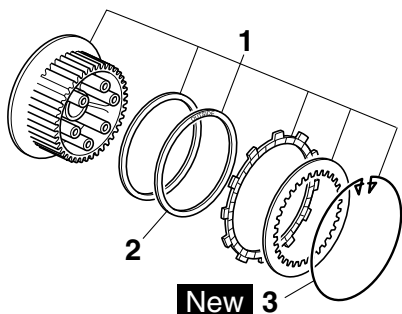
- Fit the projections "a" on the oil/water pump drive sprocket into the grooves "b" in the clutch housing.
- Lubricate the clutch housing bearing with engine oil.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- After installing the clutch housing, make sure that the primary drive gear "2" and clutch housing primary driven gear "3" are aligned as shown in the illustration.



3. Install:
 - Clutch boss assembly "1"

NOTE:

- Install the clutch damper spring "2" with the "OUTSIDE" mark facing out.
- If the wire circlip "3" has been removed, carefully install a new one.



4. Install:

- Clutch boss “1”
- Washer
- Conical spring washer “2”
- Clutch boss nut “3”



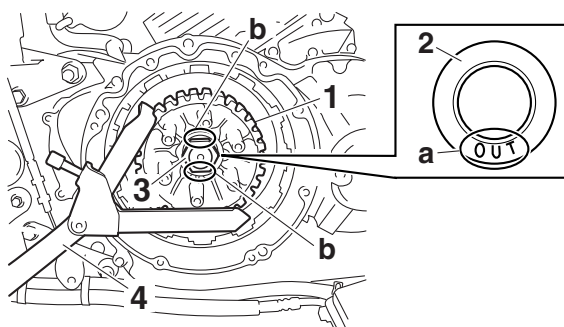
Clutch boss nut
125 Nm (12.5 m·kg, 90 ft·lb)

NOTE:

- Lubricate the clutch boss nut threads and conical spring washer mating surfaces with engine oil.
- Install the conical spring washer “2” with the “OUT” mark “a” facing out.
- While holding the clutch boss with the universal clutch holder “4”, tighten the clutch boss nut.
- Stake the clutch boss nut “3” at cutouts “b” in the main axle.

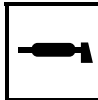


Universal clutch holder
90890-04086
YM-91042



5. Lubricate:

- Friction plates
- Clutch plates
(with the recommended lubricant)



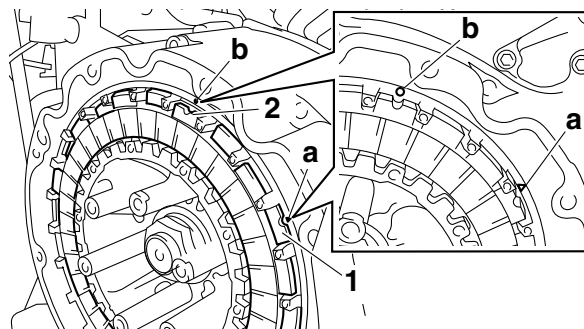
Recommended lubricant
Engine oil

6. Install:

- Friction plates 2 “1”
- Clutch plates
- Friction plate 1 “2”

NOTE:

- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Align the cutout in the tab of each friction plate 2 “1” with the “△” mark “a” on the clutch housing and align the cutout in the tab of friction plate 1 “2” with the punch mark “b” on the housing.



7. Install:

- Clutch spring plate
- Clutch spring plate retainer



Clutch spring plate retainer bolt
8 Nm (0.8 m·kg, 5.8 ft·lb)

NOTE:

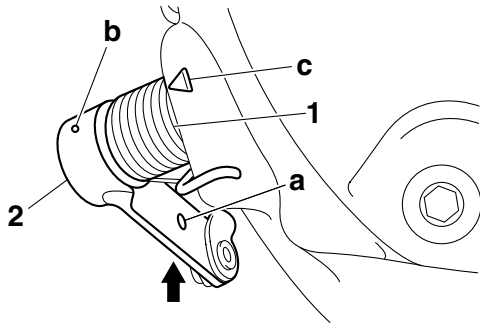
Tighten the clutch spring plate retainer bolts in stages and in a crisscross pattern.

8. Install:

- Pull lever spring “1”
- Pull lever “2”
- Washer
- Circlip **New**

NOTE:

- Make sure that the mark “a” on the pull lever is facing forward.
- When installing the pull lever, push it and check that its punch mark “b” aligns with the mark “c” on the clutch cover. Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.



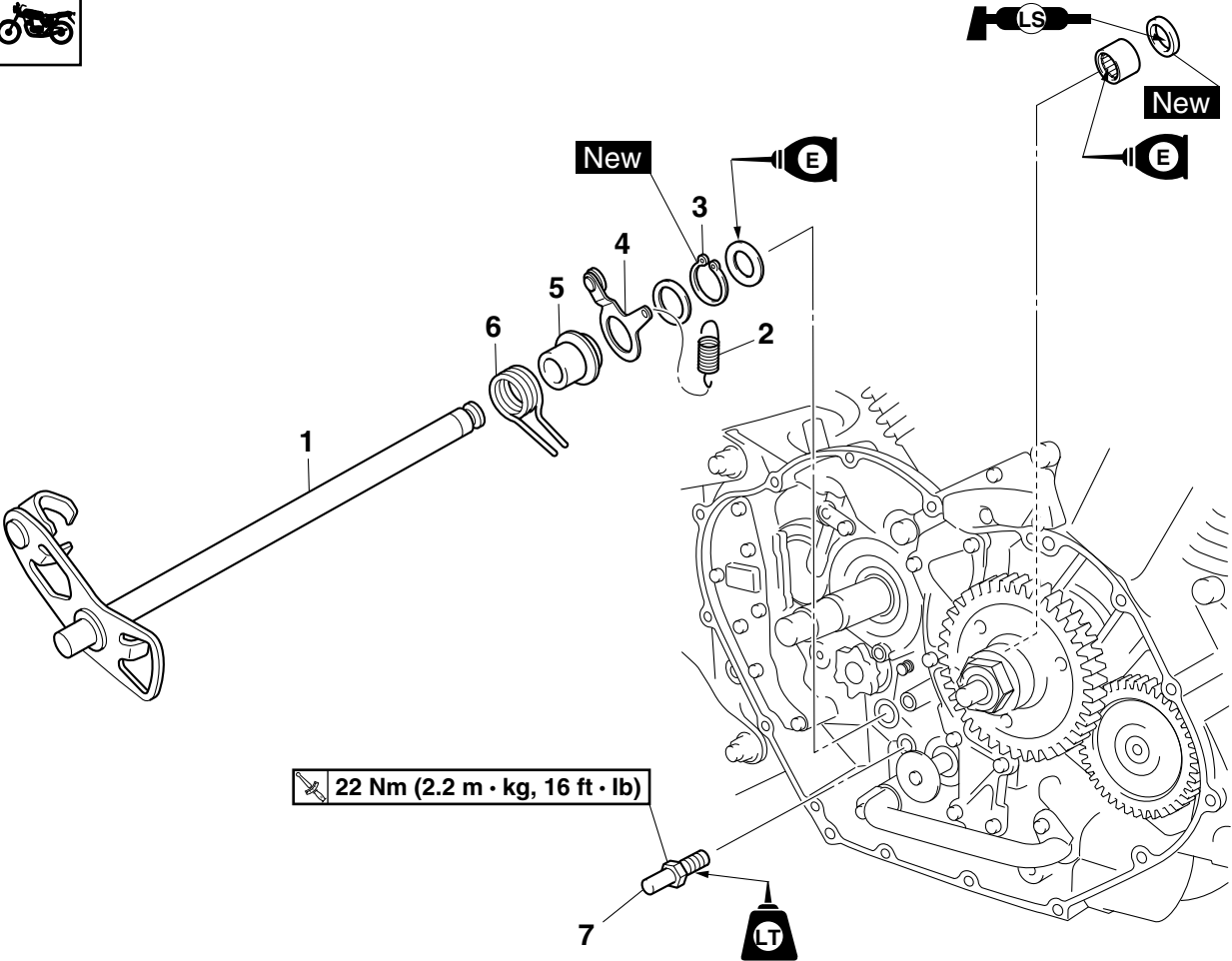
9. Adjust:

- Clutch lever free play
Refer to "ADJUSTING THE CLUTCH LEVER
FREE PLAY" on page 3-13.

EAS25410

SHIFT SHAFT

Removing the shift shaft and stopper lever



22 Nm (2.2 m · kg, 16 ft · lb)

Order	Job/Parts to remove	Q'ty	Remarks
	Drive pulley cover		Refer to "BELT DRIVE" on page 4-72.
	Shift arm		Refer to "ENGINE REMOVAL" on page 5-1.
	Primary drive gear cover		Refer to "CLUTCH" on page 5-46.
1	Shift shaft	1	
2	Stopper lever spring	1	
3	Circlip	1	
4	Stopper lever	1	
5	Collar	1	
6	Shift shaft spring	1	
7	Shift shaft spring stopper	1	
			For installation, reverse the removal procedure.

EAS25420

CHECKING THE SHIFT SHAFT

1. Check:
 - Shift shaft
Bends/damage/wear → Replace.
 - Shift shaft spring
Damage/wear → Replace.

EAS25430

CHECKING THE STOPPER LEVER

1. Check:
 - Stopper lever
Bends/damage → Replace.
Roller turns roughly → Replace the stopper lever.

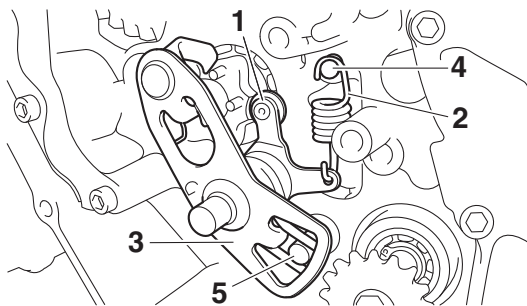
EAS25450

INSTALLING THE SHIFT SHAFT

1. Install:
 - Stopper lever “1”
 - Stopper lever spring “2”
 - Shift shaft “3”

NOTE:

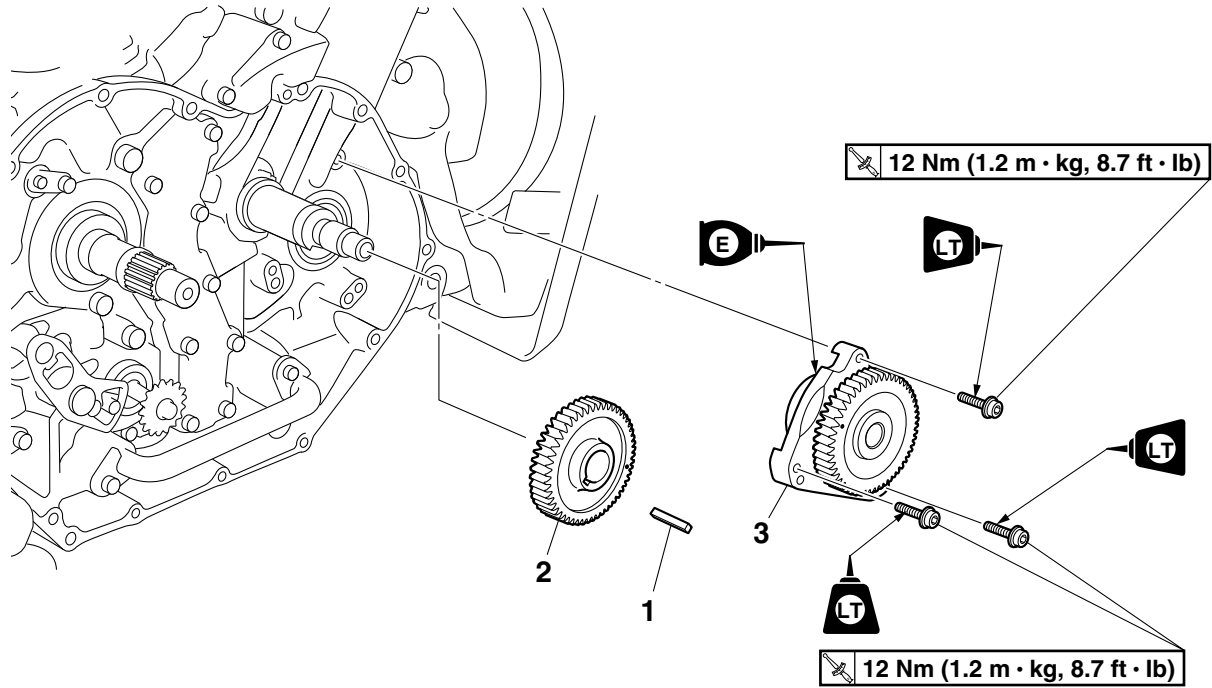
- Lubricate the oil seal lips with lithium-soap-based grease.
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss “4”.
- Mesh the stopper lever with the shift drum segment assembly.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper “5”.



EAS3D81023

BALANCER GEARS

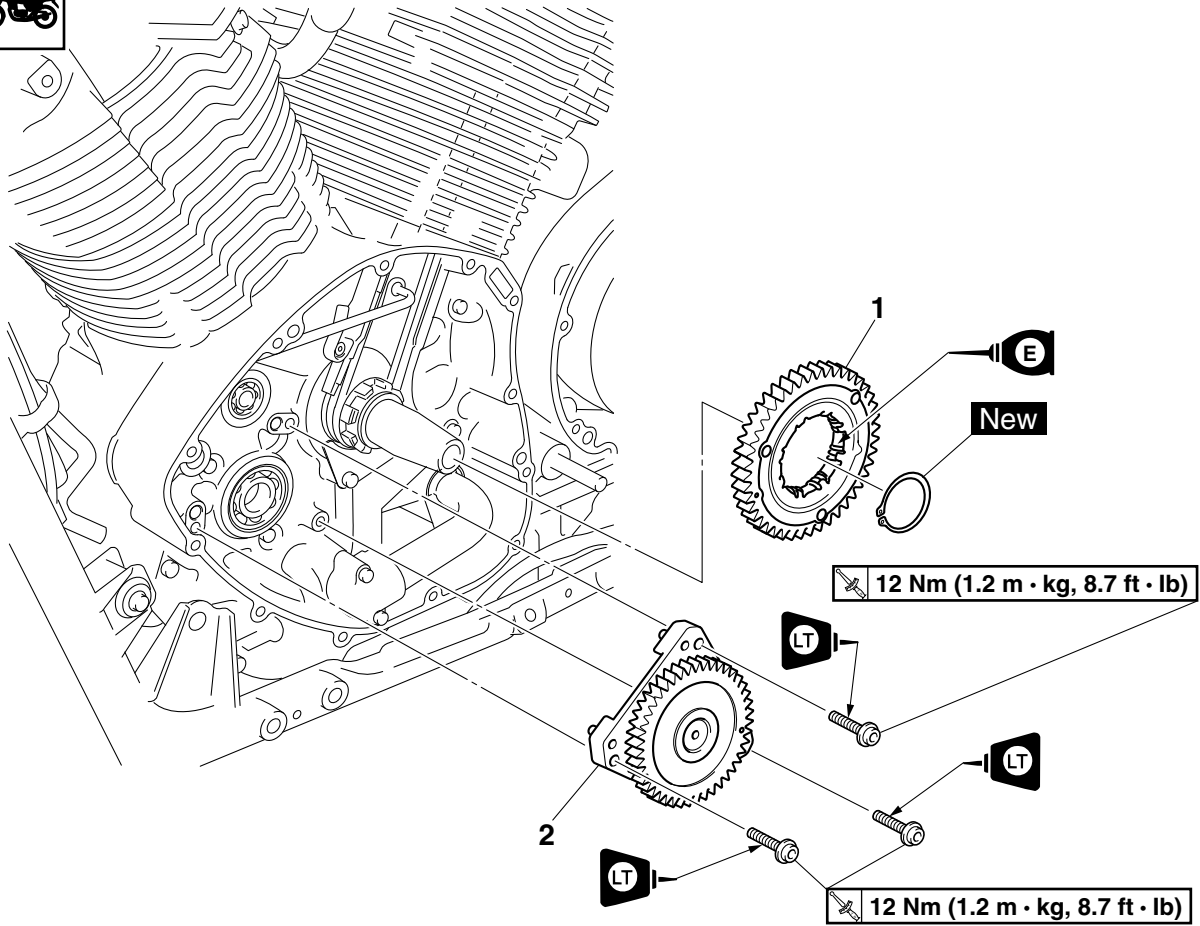
Removing the right balancer assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Primary drive gear		Refer to "CLUTCH" on page 5-46.
1	Straight key	1	
2	Right balancer drive gear	1	
3	Right balancer assembly	1	
			For installation, reverse the removal procedure.

BALANCER GEARS

Removing the left balancer assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Generator rotor/Starter clutch idle gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-40.
1	Left balancer drive gear	1	
2	Left balancer assembly	1	
			For installation, reverse the removal procedure.

EAS3D81024

CHECKING THE RIGHT BALANCER GEARS

1. Check:

- Right balancer drive gear
- Right balancer driven gear
- Right balancer driven gear bearing
Damage/wear → Replace the right balancer assembly.

EAS3D81025

CHECKING THE LEFT BALANCER GEARS

1. Check:

- Left balancer drive gear
- Left balancer driven gear
- Left balancer driven gear bearing
Damage/wear → Replace the left balancer assembly.

EAS3D81026

INSTALLING THE RIGHT BALANCER GEARS

1. Install:

- Right balancer assembly



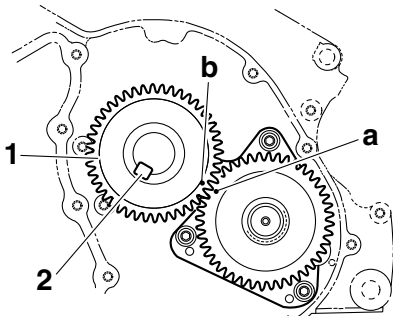
Right balancer assembly bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE®

2. Install:

- Right balancer drive gear “1”
- Straight key “2”

NOTE:

Align the punch mark “a” in the right balancer driven gear with the punch mark “b” in the right balancer drive gear.



EAS3D81027

INSTALLING THE LEFT BALANCER GEARS

1. Install:

- Left balancer assembly



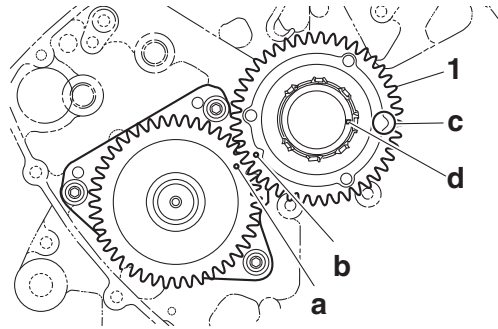
Left balancer assembly bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE®

2. Install:

- Left balancer drive gear “1”

NOTE:

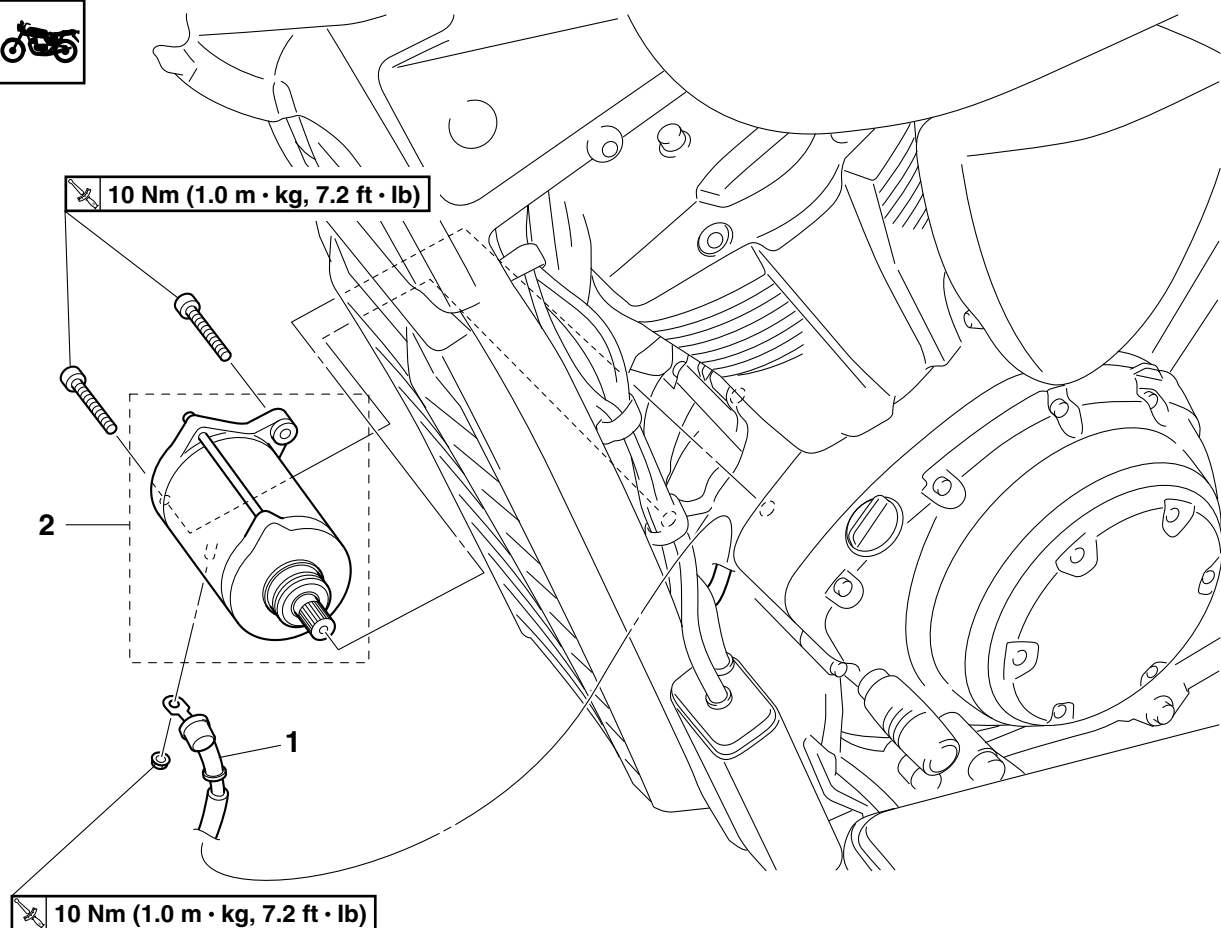
- Align the punch mark “a” in the left balancer driven gear with the punch mark “b” in the left balancer drive gear.
- Align the projection “c” on the left balancer drive gear with the punch mark “d” on the crankshaft when installing the gear.



EAS24780

ELECTRIC STARTER

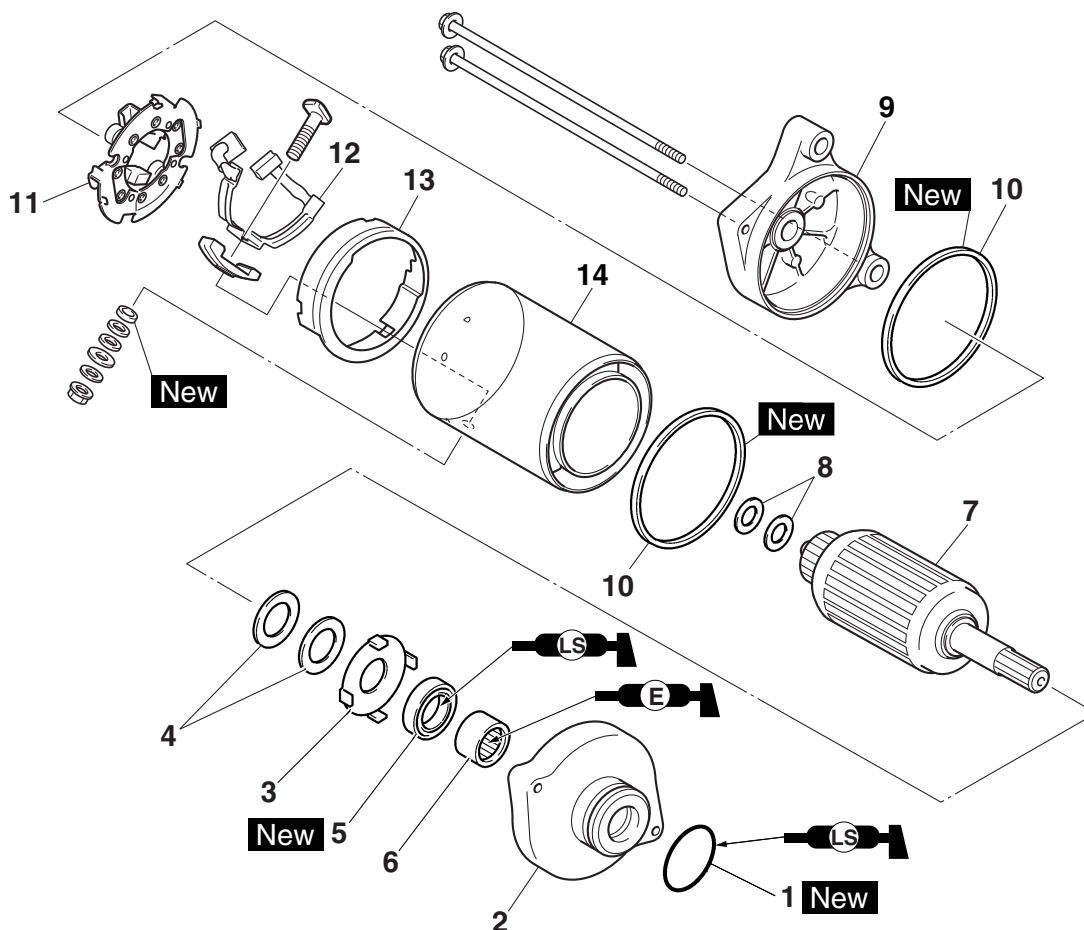
Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Starter motor lead	1	Disconnect.
2	Starter motor	1	
			For installation, reverse the removal procedure.

ELECTRIC STARTER

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	O-ring	1	
2	Starter motor front cover	1	
3	Lock washer	1	
4	Washer set	1	
5	Oil seal	1	
6	Bearing	1	
7	Armature assembly	1	
8	Washer set	1	
9	Starter motor rear cover	1	
10	Gasket	2	
11	Brush set (along with the brushes)	1	
12	Brush holder (along with the brushes)	1	
13	Brush holder bracket	1	
14	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.

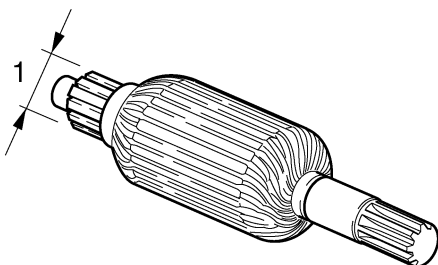
EAS24790

CHECKING THE STARTER MOTOR

1. Check:
 - Commutator
Dirt → Clean with 600 grit sandpaper.
2. Measure:
 - Commutator diameter “1”
Out of specification → Replace the starter motor.



Limit
27.0 mm (1.06 in)



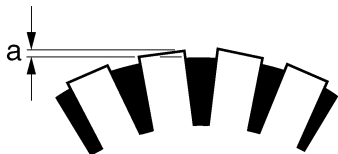
3. Measure:
 - Mica undercut “a”
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



Mica undercut (depth)
0.70 mm (0.03 in)

NOTE:

The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
 - Armature assembly resistances (commutator and insulation)
Out of specification → Replace the starter motor.

- a. Measure the armature assembly resistances with the pocket tester.

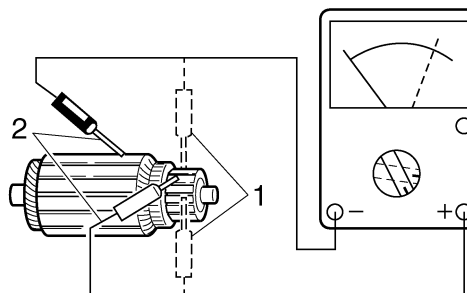


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



Armature coil
Commutator resistance “1”
0.01–0.02 Ω at 20 °C (68 °F)
Insulation resistance “2”
Above 1 MΩ at 20 °C (68 °F)

- b. If any resistance is out of specification, replace the starter motor.

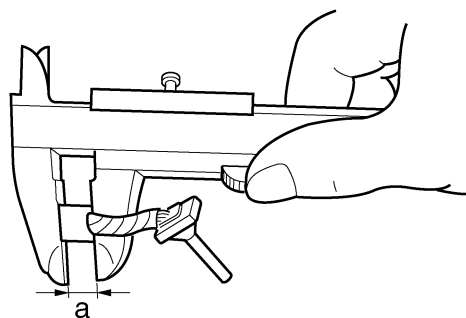


5. Measure:

- Brush length “a”
Out of specification → Replace the brushes as a set.



Limit
5.00 mm (0.20 in)

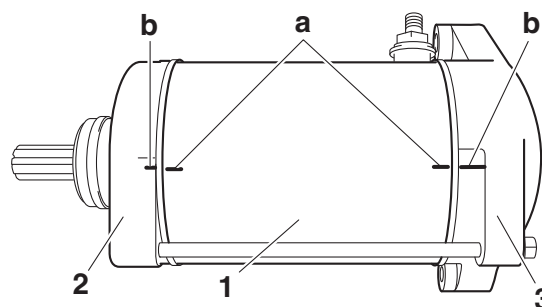
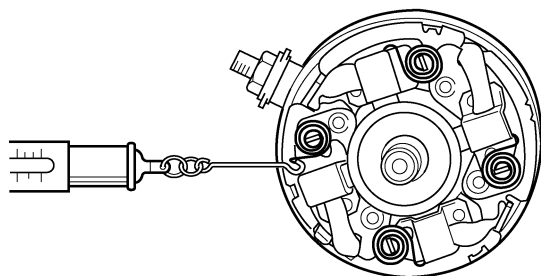


6. Measure:

- Brush spring force
Out of specification → Replace the brush springs as a set.



Brush spring force
7.65–10.01 N (27.54–36.03 oz)
(780–1021 gf)



7. Check:
 - Gear teeth
Damage/wear → Replace the gear.
8. Check:
 - Bearing
Damage/wear → Replace the defective part(s).

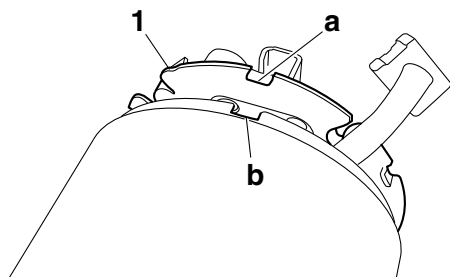
EAS24800

ASSEMBLING THE STARTER MOTOR

1. Install:
 - Brush seat

NOTE:

Align the tab “a” on the brush seat with the slot “b” in the starter motor yoke.



2. Install:
 - Starter motor yoke “1”
 - Starter motor front cover “2”
 - Starter motor rear cover “3”

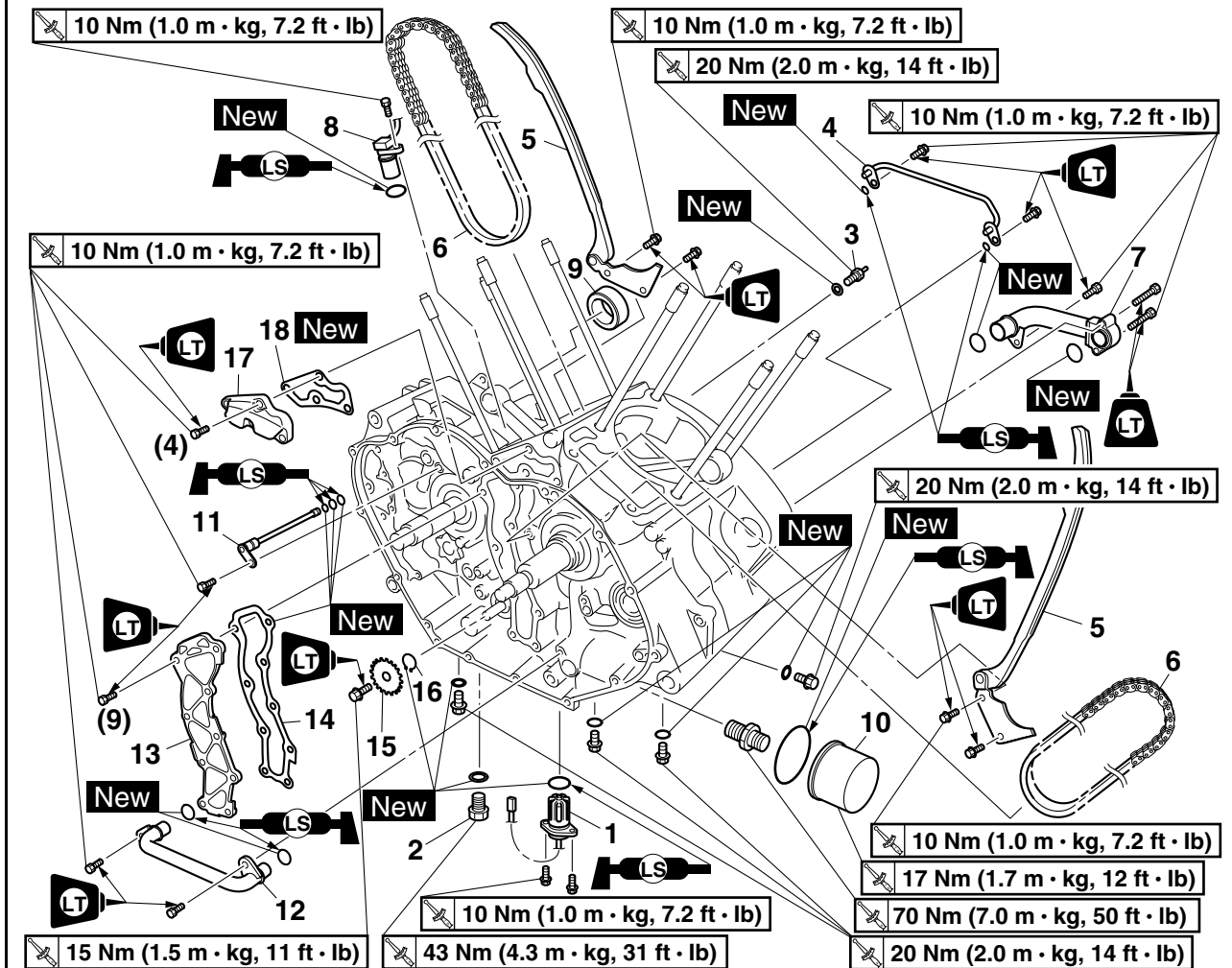
NOTE:

Align the match marks “a” on the starter motor yoke with the match marks “b” on the starter motor front and rear covers.

EAS25540

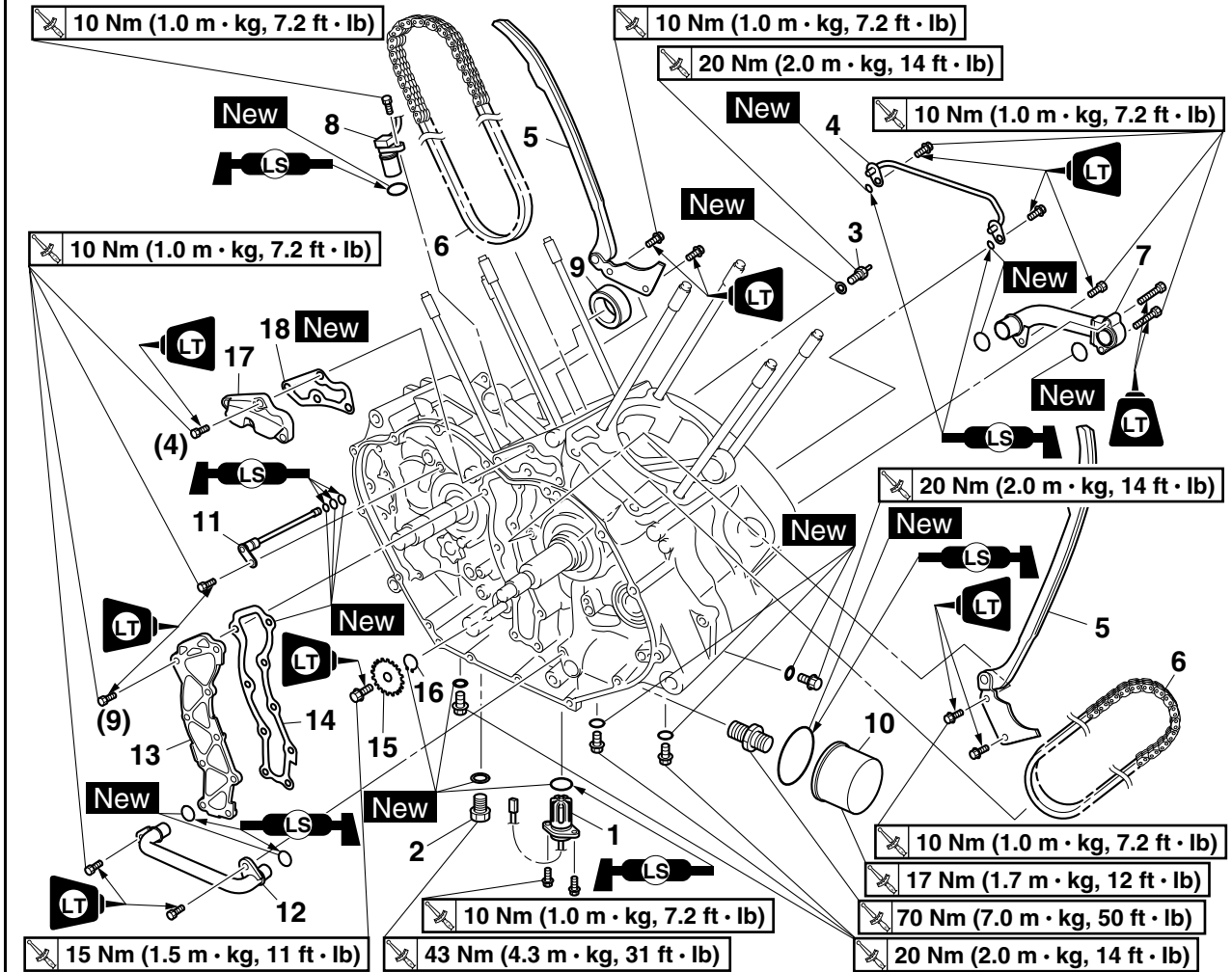
CRANKCASE

Removing the oil delivery pipes and timing chains



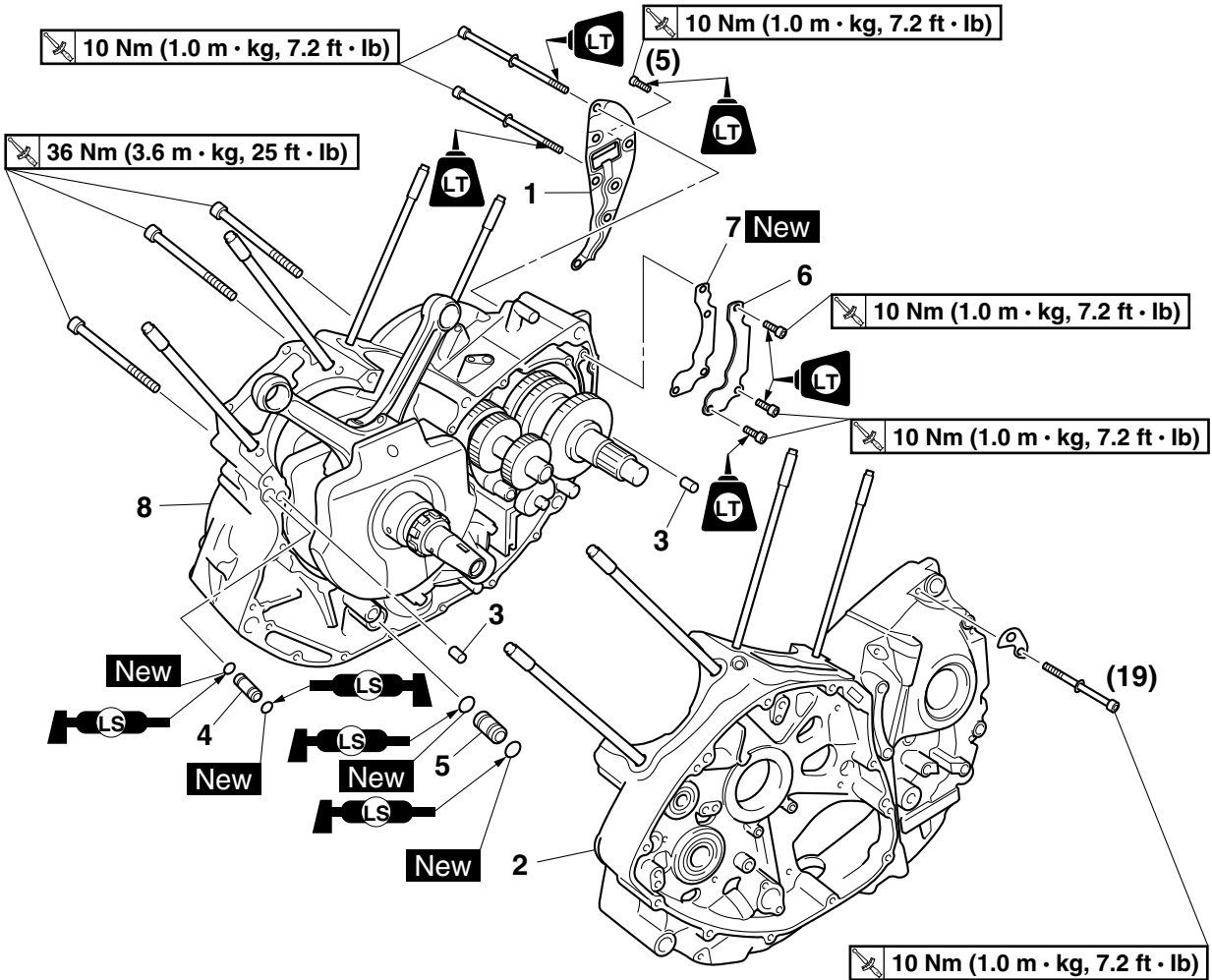
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Pistons		Refer to "CYLINDERS AND PISTONS" on page 5-34.
	Shift shaft		Refer to "SHIFT SHAFT" on page 5-57.
	Balancer assemblies		Refer to "BALANCER GEARS" on page 5-59.
1	Oil level switch	1	
2	Engine oil drain bolt	1	
3	Neutral switch	1	
4	Oil delivery pipe 1	1	
5	Timing chain guide	2	
6	Timing chain	2	
7	Coolant delivery pipe	1	
8	Speed sensor	1	
9	Spacer	1	
10	Oil filter cartridge	1	
11	Oil delivery pipe 2	1	

Removing the oil delivery pipes and timing chains



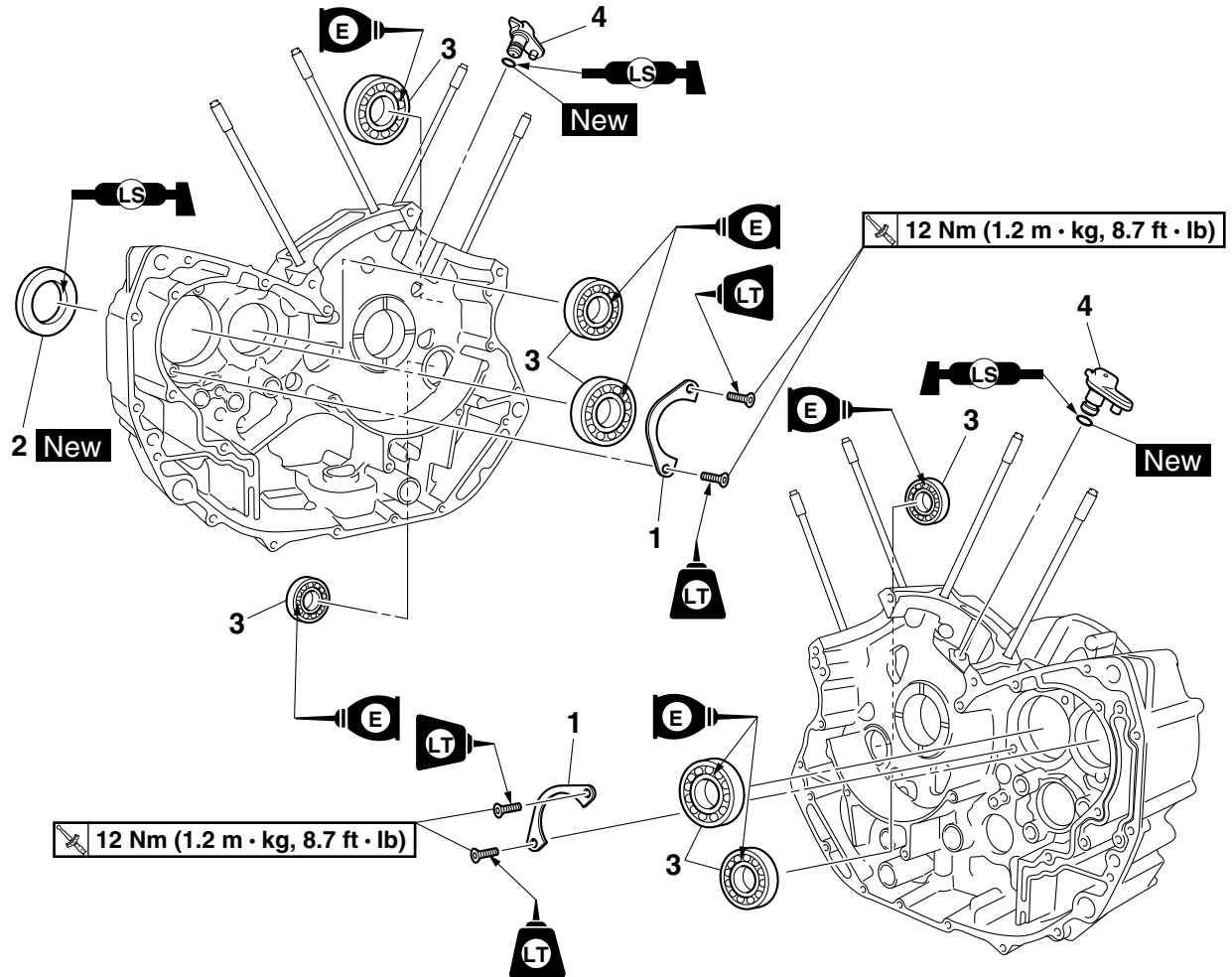
Order	Job/Parts to remove	Q'ty	Remarks
12	Oil delivery pipe 3	1	
13	Coolant delivery cover 1	1	
14	Coolant delivery cover 1 gasket	1	
15	Oil/water pump driven sprocket	1	
16	Circlip	1	
17	Coolant delivery cover 2	1	
18	Coolant delivery cover 2 gasket	1	
			For installation, reverse the removal procedure.

Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil baffle plate 1	1	
2	Left crankcase	1	
3	Dowel pin	2	
4	Joint pipe 1	1	
5	Joint pipe 2	1	
6	Oil baffle plate 2	1	
7	Gasket	1	
8	Right crankcase	1	
			For installation, reverse the removal procedure.

Removing the oil seal and bearings



Order	Job/Parts to remove	Q'ty	Remarks
	Oil/water pump assembly		Refer to "OIL PUMP" on page 5-73.
	Crankshaft		Refer to "CRANKSHAFT" on page 5-76.
	Transmission		Refer to "TRANSMISSION" on page 5-81.
1	Bearing retainer	2	
2	Oil seal	1	
3	Bearing	7	
4	Oil nozzle	2	
			For installation, reverse the removal procedure.

EAS25560

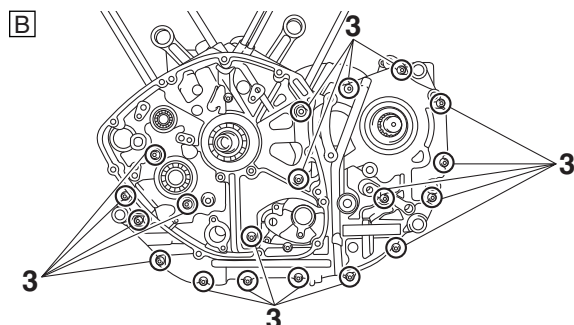
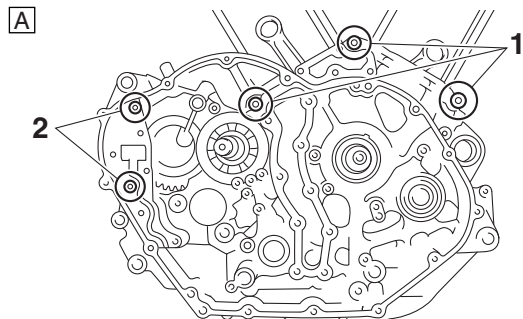
DISASSEMBLING THE CRANKCASE

- Remove:
 - Crankcase bolts

NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

- M10 × 110 mm bolts “1”
- M6 × 120 mm bolts “2”
- M6 × 80 mm bolts “3”



- A. Right crankcase
B. Left crankcase

- Remove:
 - Left crankcase

ECA13900

CAUTION:

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

EAS25580

CHECKING THE CRANKCASE

- Thoroughly wash the crankcase halves in a mild solvent.
- Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
- Check:
 - Crankcase
Cracks/damage → Replace.
 - Oil delivery passages
Obstruction → Blow out with compressed air.

EAS3D81029

CHECKING THE BEARINGS AND OIL SEAL

- Check:
 - Bearings
Clean and lubricate the bearings, then rotate the inner race with your finger.
Rough movement → Replace.
 - Oil seals
Damage/wear → Replace.

EAS25600

CHECKING THE OIL DELIVERY PIPES AND COOLANT DELIVERY PIPE

The following procedure applies to all of the oil delivery pipes and joint pipe.

- Check:
 - Oil delivery pipe
 - Joint pipe
Damage → Replace.
Obstruction → Wash and blow out with compressed air.
- Check:
 - Coolant delivery pipe
Cracks/damage/wear → Replace.

EAS25620

CHECKING THE TIMING CHAINS

- Check:
 - Timing chains
Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.

EAS3D81030

CHECKING THE OIL/WATER PUMP DRIVEN SPROCKET

- Check:
 - Oil/water pump driven sprocket
Cracks/damage/wear → Replace the oil/water pump driven sprocket and the oil/water pump drive chain as a set.

EAS3D81036

CHECKING THE OIL NOZZLES

The following procedure applies to all of the oil nozzles.

1. Check:

- Oil nozzle
Damage/wear → Replace the oil nozzle.
- Oil passage
Obstruction → Blow out with compressed air.

EAS3D81031

INSTALLING THE BEARING RETAINERS

1. Install:

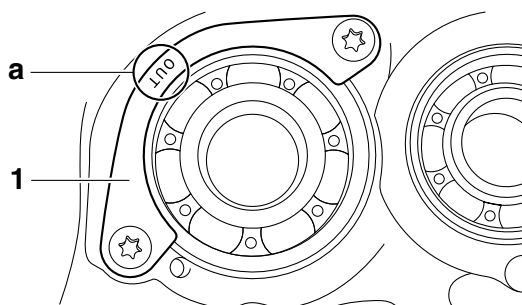
- Bearing retainers “1”

NOTE:

- Install each bearing retainer “1” with its “OUT” mark “a” facing outward.
- Apply locking agent (LOCTITE®) to the threads of the bearing retainer bolt.



Bearing retainer bolt
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE®



EAS25700

ASSEMBLING THE CRANKCASE

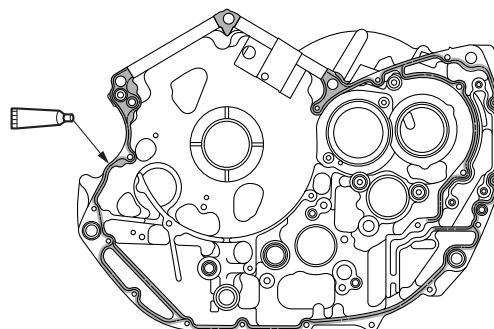
1. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
2. Apply:
 - Sealant
(onto the crankcase mating surfaces)



Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)

NOTE:

Do not allow any sealant to come into contact with the oil gallery.



3. Install:

- Left crankcase
(onto the right crankcase)

NOTE:

Tap lightly on the left crankcase with a soft-face hammer.

4. Install:

- Crankcase bolts (M10)
- Crankcase bolts (M6)

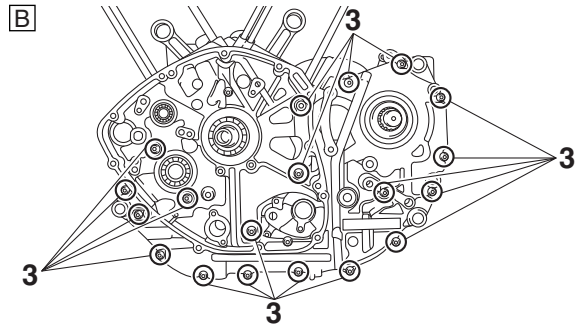
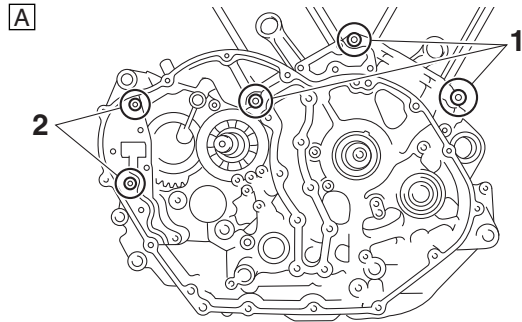


Crankcase bolt (M10)
36 Nm (3.6 m·kg, 25 ft·lb)
Crankcase bolt (M6)
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

- Apply locking agent (LOCTITE®) to the threads of the bolts “2”.
- Tighten each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.

- M10 × 110 mm bolts: “1”
- M6 × 120 mm bolts: “2”
- M6 × 80 mm bolts: “3”



A. Right crankcase

B. Left crankcase

5. Apply:

- Engine oil
(onto the crankshaft pin bearings and oil delivery holes)

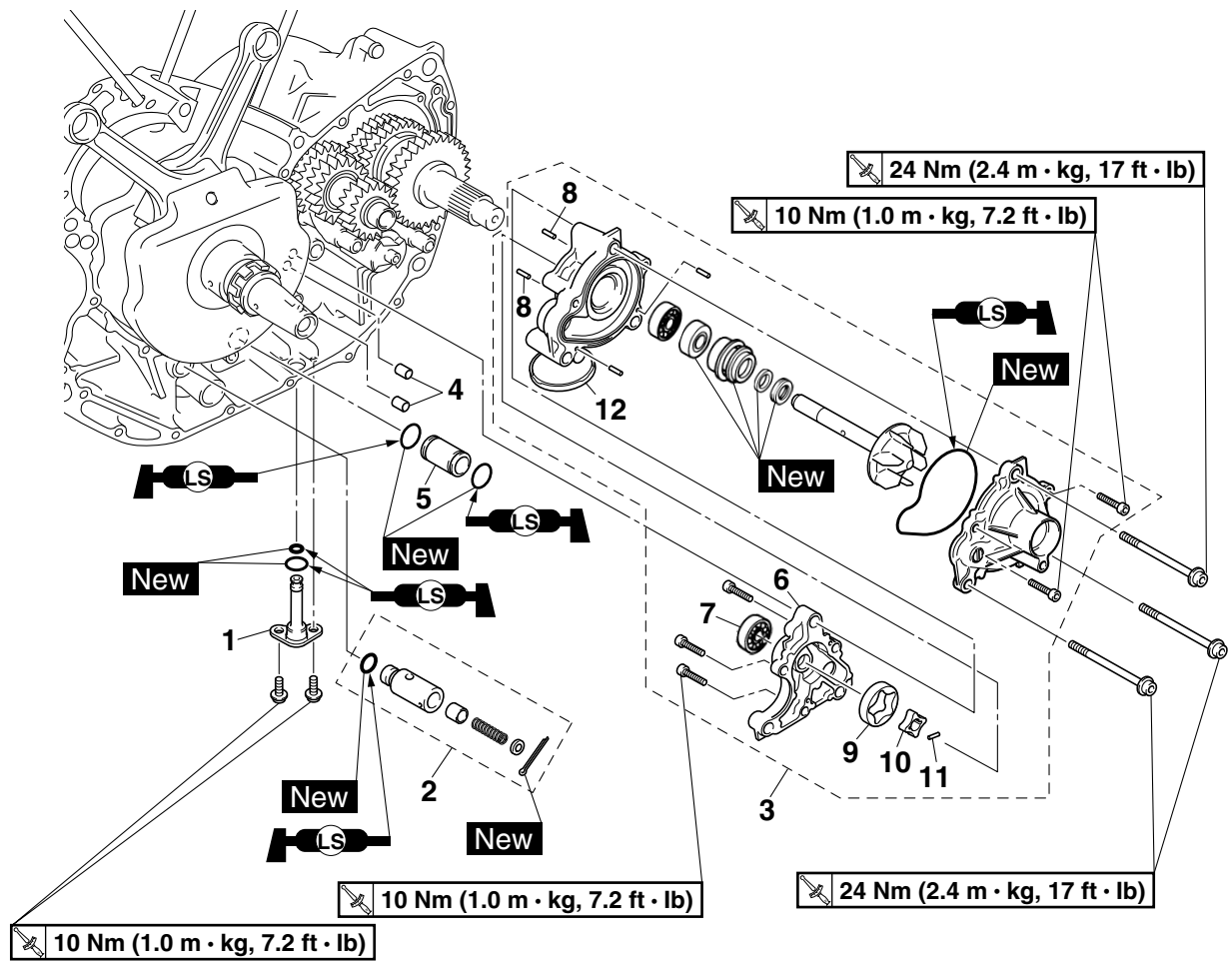
6. Check:

- Crankshaft and transmission operation
Rough movement → Repair.

EAS24910

OIL PUMP

Removing the oil/water pump assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-66.
1	Drain cock	1	
2	Relief valve assembly	1	
3	Oil/water pump assembly	1	
4	Dowel pin	2	
5	Joint pipe	1	
6	Oil pump housing	1	
7	Bearing	1	
8	Pin	2	
9	Oil pump outer rotor	1	
10	Oil pump inner rotor	1	
11	Pin	1	
12	Water pump housing	1	
			For installation, reverse the removal procedure.

EAS24960

CHECKING THE OIL PUMP

1. Check:

- Oil pump housing
 - Water pump housing
- Cracks/damage/wear → Replace the defective part(s).

2. Measure:

- Inner-rotor-to-outer-rotor-tip clearance “a”
 - Outer-rotor-to-oil-pump-housing clearance “b”
 - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
- Out of specification → Replace the oil/water pump assembly.



Inner-rotor-to-outer-rotor-tip clearance

Less than 0.12 mm (0.0047 in)

Limit

0.20 mm (0.0079 in)

Outer-rotor-to-oil-pump-housing clearance

0.09–0.19 mm (0.0035–0.0075 in)

Limit

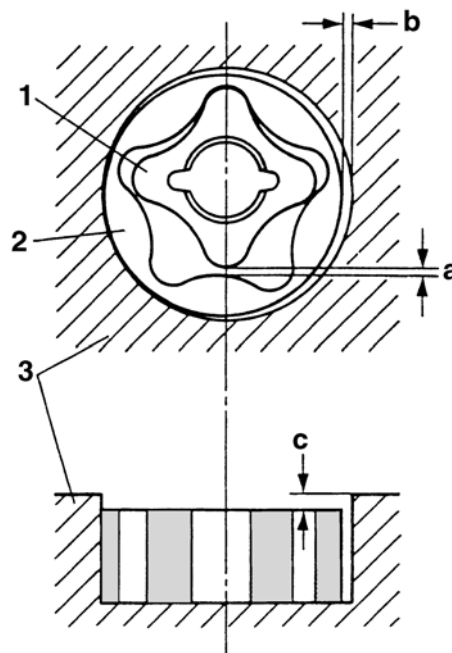
0.26 mm (0.0102 in)

Oil-pump-housing-to-inner-and-outer-rotor clearance

0.06–0.13 mm (0.0024–0.0051 in)

Limit

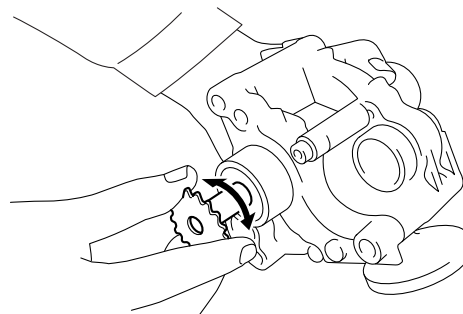
0.20 mm (0.0079 in)



1. Inner rotor
2. Outer rotor
3. Oil/water pump housing

3. Check:

- Oil pump operation
- Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



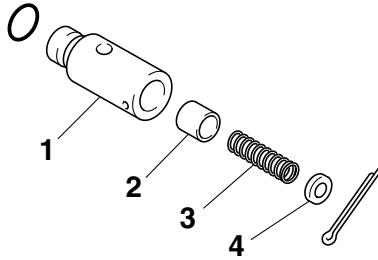
EAS24970

CHECKING THE RELIEF VALVE

1. Check:

- Relief valve body “1”
- Relief valve “2”
- Spring “3”
- Spring retainer “4”

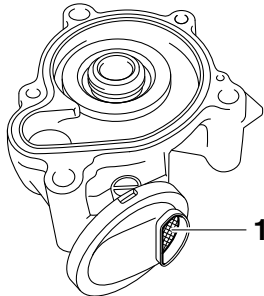
Damage/wear → Replace the defective part(s).



EAS24990

CHECKING THE OIL STRAINER

1. Check:
 - Oil strainer "1"
Damage → Replace.
Contaminants → Clean with solvent.



EAS25000

ASSEMBLING THE OIL PUMP


1. Lubricate:
 - Inner rotor
 - Outer rotor
(with the recommended lubricant)

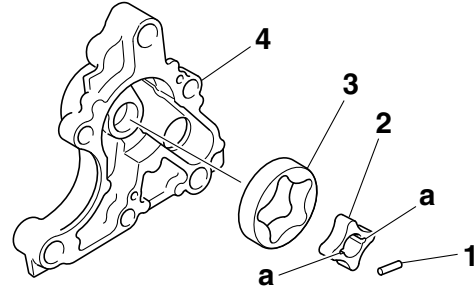
	Recommended lubricant Engine oil
---	---

2. Install:
 - Pin "1"
 - Oil pump inner rotor "2"
 - Oil pump outer rotor "3"
 - Pins
 - Oil pump housing "4"

NOTE: _____

When installing the inner rotor, align the pin in the impeller shaft with the grooves "a" in the inner rotor.

	Oil pump housing bolt 10 Nm (1.0 m·kg, 7.2 ft·lb)
---	--




3. Check:
 - Oil pump operation
Refer to "CHECKING THE OIL PUMP" on page 5-74.

EAS25020

INSTALLING THE OIL/WATER PUMP ASSEMBLY

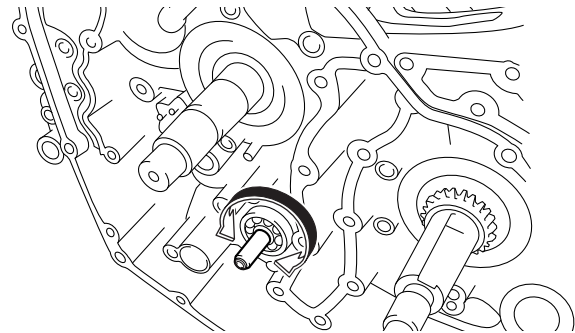
1. Install:
 - Oil/water pump assembly

	Oil/water pump assembly bolt 24 Nm (2.4 m·kg, 17 ft·lb)
---	--

ECA3D81020

CAUTION: _____

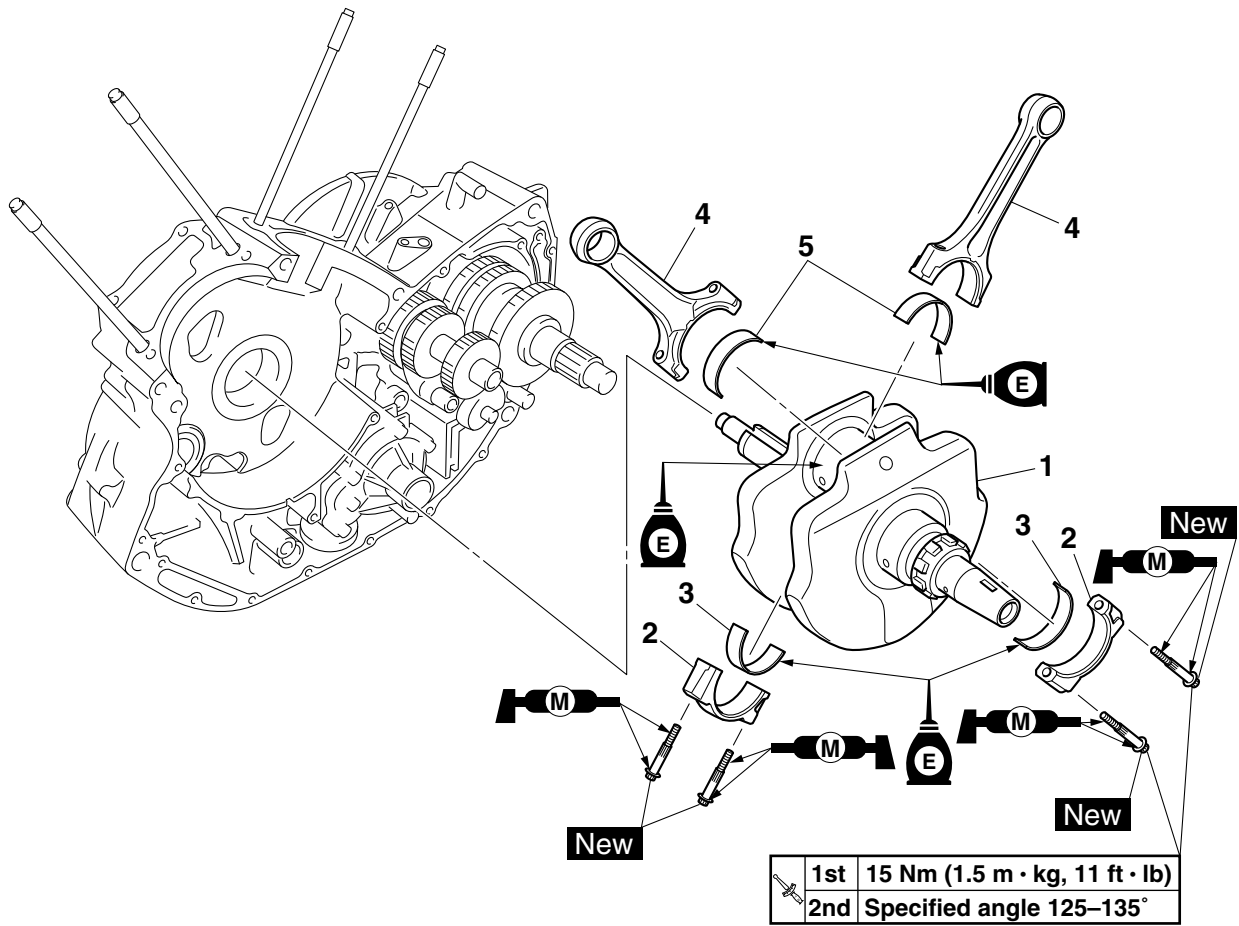
After tightening the bolts, make sure the oil/water pump assembly turns smoothly.



EAS25960

CRANKSHAFT

Removing the crankshaft



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-66.
1	Crankshaft	1	
2	Connecting rod cap	2	
3	Big end lower bearing	2	
4	Connecting rod	2	
5	Big end upper bearing	2	
			For installation, reverse the removal procedure.

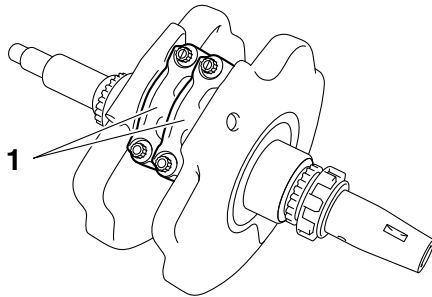
EAS26010

REMOVING THE CONNECTING RODS

- Remove:
 - Connecting rod caps "1"
 - Connecting rods
 - Big end bearings

NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



EAS26090

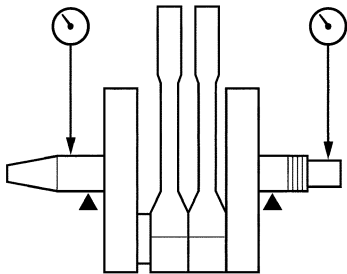
CHECKING THE CRANKSHAFT AND CONNECTING RODS

- Measure:
 - Crankshaft runout

Out of specification → Replace the crankshaft.



Runout limit C
0.020 mm (0.0008 in)



- Check:
 - Crankshaft journal surfaces
 - Crankshaft pin surfaces
 - Bearing surfaces

Scratches/wear → Replace the crankshaft.
- Measure:
 - Crankshaft-pin-to-big-end-bearing clearance

Out of specification → Replace the big end bearings.



Oil clearance (using plasti-gauge®)
0.030–0.054 mm (0.0012–0.0021 in)

The following procedure applies to all of the connecting rods.

ECA13930

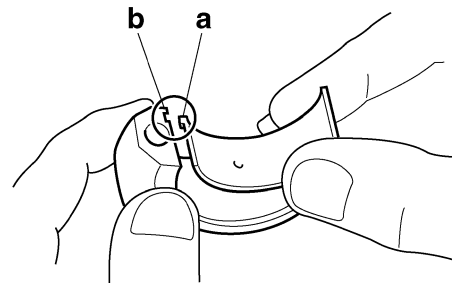
CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

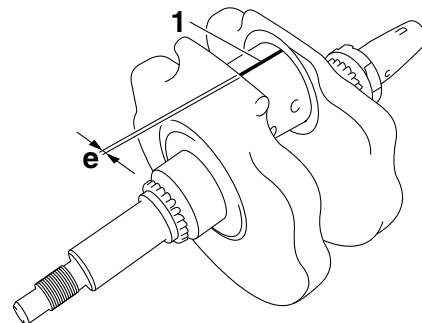
- Clean the big end bearings, crankshaft pin, and the inside of the connecting rod halves.
- Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

NOTE:

Align the projections "a" on the big end bearings with the notches "b" in the connecting rod and connecting rod cap.



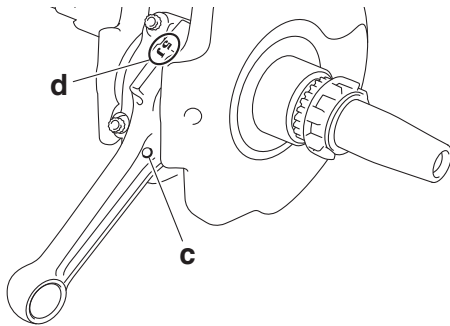
- Put a piece of Plastigauge® "1" on the crankshaft pin.



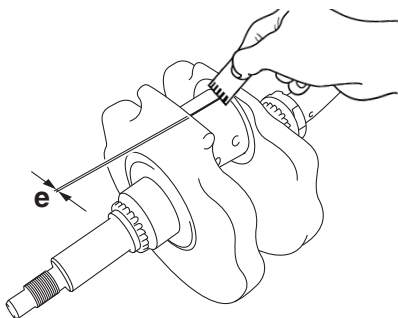
- Assemble the connecting rod halves.

NOTE:

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the projection “c” on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.



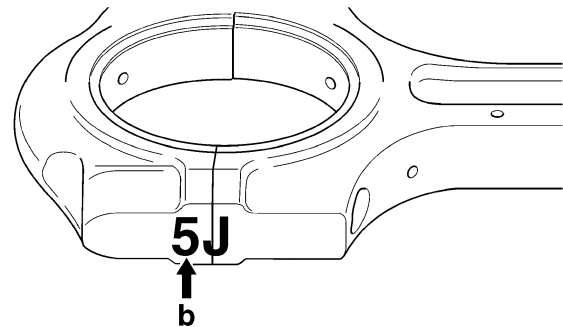
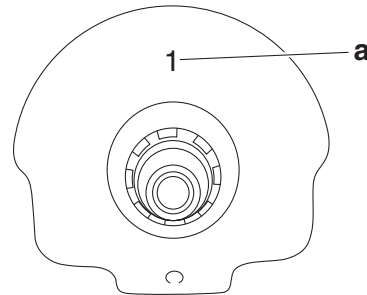
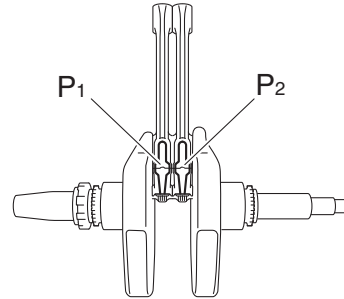
- e. Tighten the connecting rod bolts. Refer to “INSTALLING THE CONNECTING RODS” on page 5-79.
- f. Remove the connecting rod and big end bearings. Refer to “REMOVING THE CONNECTING RODS” on page 5-77.
- g. Measure the compressed Plastigauge® width “e” on the crankshaft pin. If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.



4. Select:
- Big end bearings (P₁-P₂)

NOTE:

- The numbers “a” stamped into the crankshaft web and the numbers “b” on the connecting rods are used to determine the replacement big end bearing sizes.
- P₁-P₂ refer to the bearings shown in the crankshaft illustration.



For example, if the connecting rod P₁ and the crankshaft web P numbers are 5 and 1 respectively, then the bearing size for P₁ is:

$P_1 \text{ (connecting rod) - P (crankshaft)}$ $=$ $5 - 1 = 4 \text{ (green)}$



Bearing color code
1.Blue 2.Black 3.Brown 4.Green
5.Yellow

5. Measure:

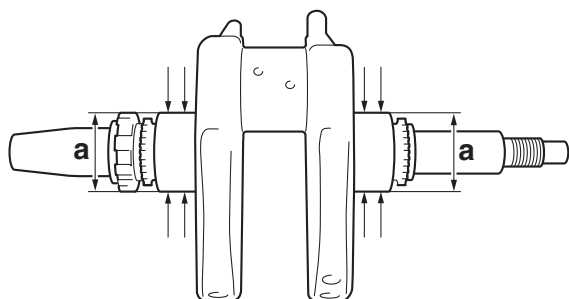
- Crankshaft journal diameter “a”
Out of specification → Replace the crankshaft.

NOTE:

Measure the diameter of each crankshaft journal at two places.



Crankshaft journal diameter
49.968–49.980 mm (1.9672–1.9677 in)



6. Measure:

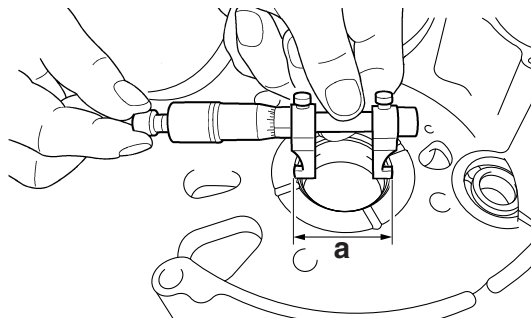
- Crankshaft journal bearing inside diameter “a”
Out of specification → Replace the crankcase assembly.

NOTE:

Measure the inside diameter of each crankshaft journal bearing at two places.



Crankshaft journal bearing inside diameter
50.010–50.030 mm (1.9689–1.9697 in)



7. Calculate:

- Crankshaft-journal-to-crankshaft-journal-bearing clearance
Out of specification → Replace the crankshaft and crankcase as a set.

NOTE:

Calculate the clearance by subtracting the crankshaft journal diameter from the crankshaft journal bearing inside diameter.



Crankshaft-journal-to-crankshaft-journal-bearing clearance
0.030–0.060 mm (0.0012–0.0024 in)

EAS26150

INSTALLING THE CONNECTING RODS

1. Lubricate:

- Bolt threads
(with the recommended lubricant)



Recommended lubricant
Molybdenum disulfide grease

2. Lubricate:

- Crankshaft pin
- Big end bearings
- Connecting rod inner surface
(with the recommended lubricant)



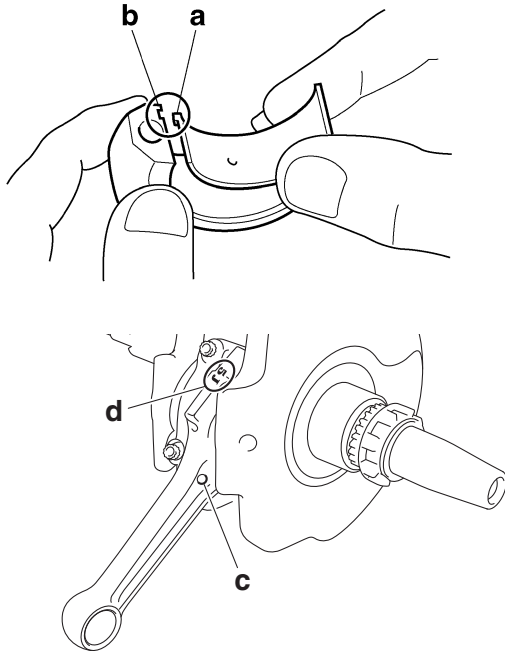
Recommended lubricant
Engine oil

3. Install:

- Big end bearings
- Connecting rods
- Connecting rod caps
(onto the crankshaft pin)

NOTE:

- Align the projections “a” on the big end bearings with the notches “b” in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the projection “c” on each connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.



4. Tighten:
- Connecting rod nuts

EWA3D81005

WARNING

- Replace the connecting rod bolts and nuts with new ones.
- Clean the connecting rod bolts.

NOTE:

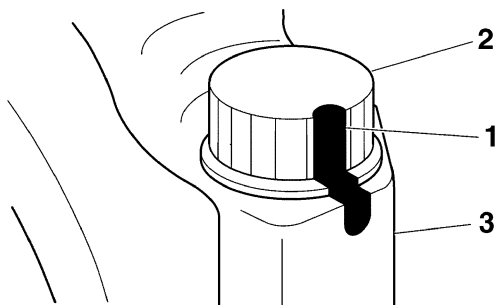
Tighten the connecting rod bolts using the following procedure.

- a. Tighten the connecting rod bolts to specification with a torque wrench.



Connecting rod bolt (1st)
15 Nm (1.5 m·kg, 11 ft·lb)

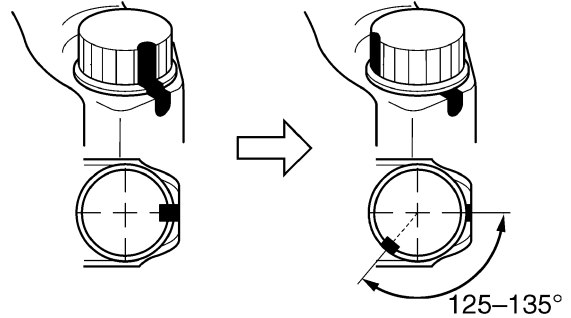
- b. Put a mark "1" on the corner of the connecting rod bolt "2" and the connecting rod cap "3".



- c. Tighten the connecting rod bolts further to reach the specified angle 125–135°.



Connecting rod bolt (final)
Specified angle 125–135°



EWA3D81006

WARNING

When a bolt is tightened more than the specified angle, do not loosen and then retighten it.

Replace the bolt with a new one and perform the procedure again.

ECA3D81012

CAUTION:

- Do not use a torque wrench to tighten the bolt to the specified angle.
- Tighten the bolt until it is at the specified angle.

EAS26210

INSTALLING THE CRANKSHAFT ASSEMBLY

1. Install:
- Crankshaft assembly

ECA3D81013

CAUTION:

To avoid scratching the crankshaft and to ease the installation procedure, lubricate each bearing with engine oil.

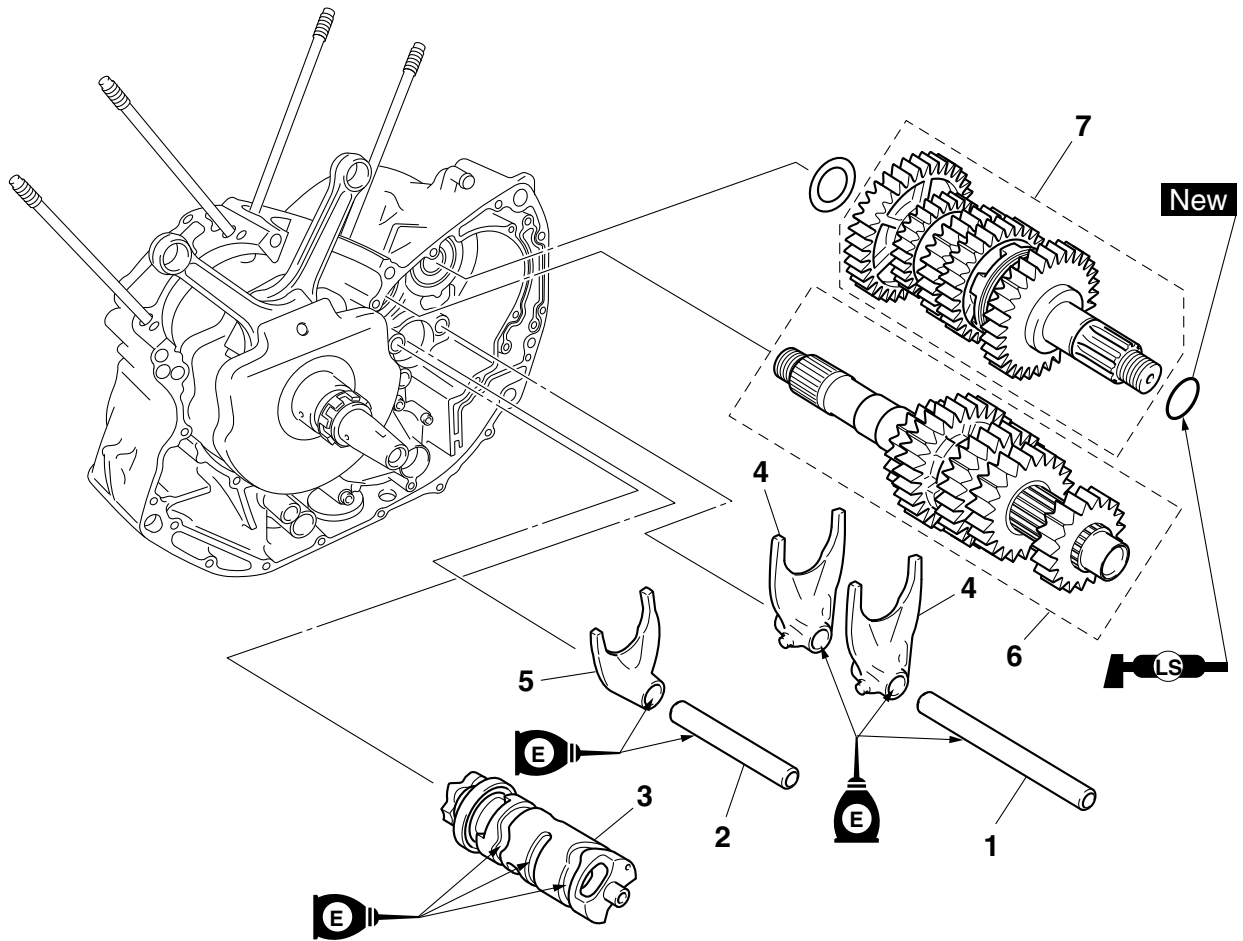
NOTE:

Align the right connecting rod with the rear cylinder sleeve hole.

EAS26240

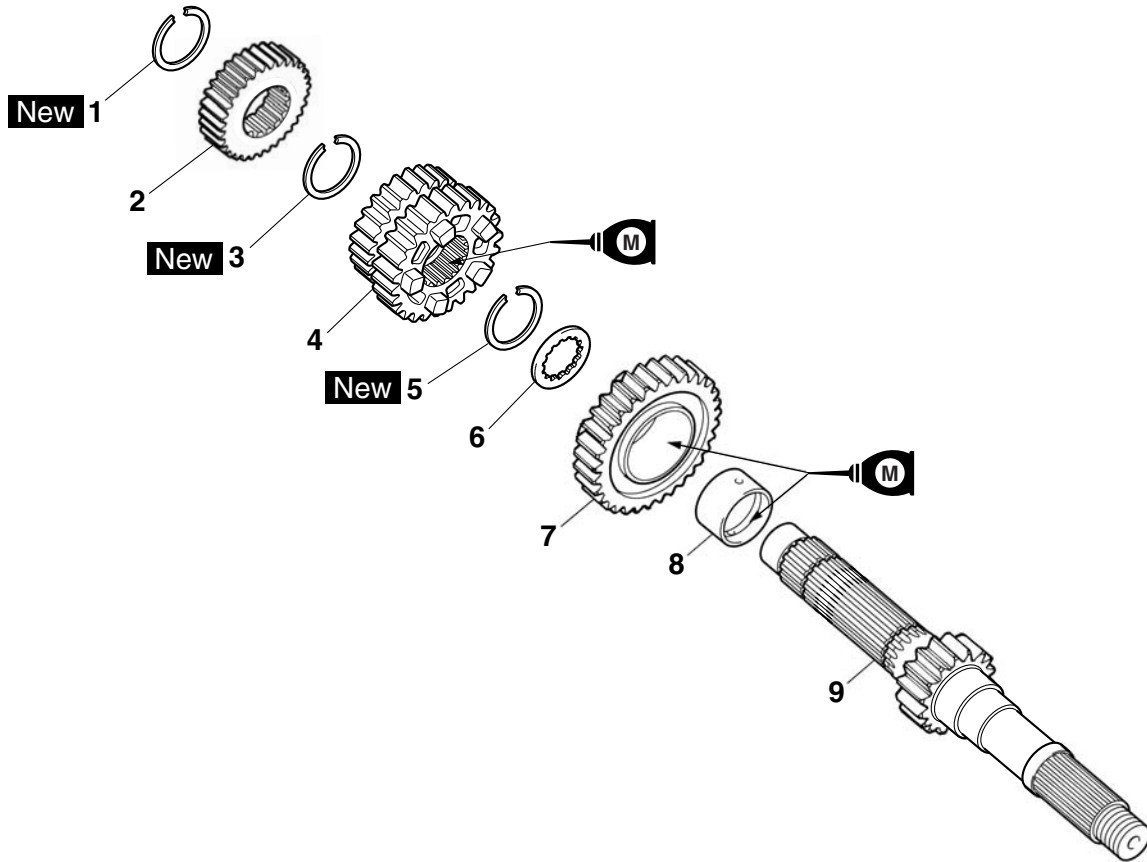
TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks



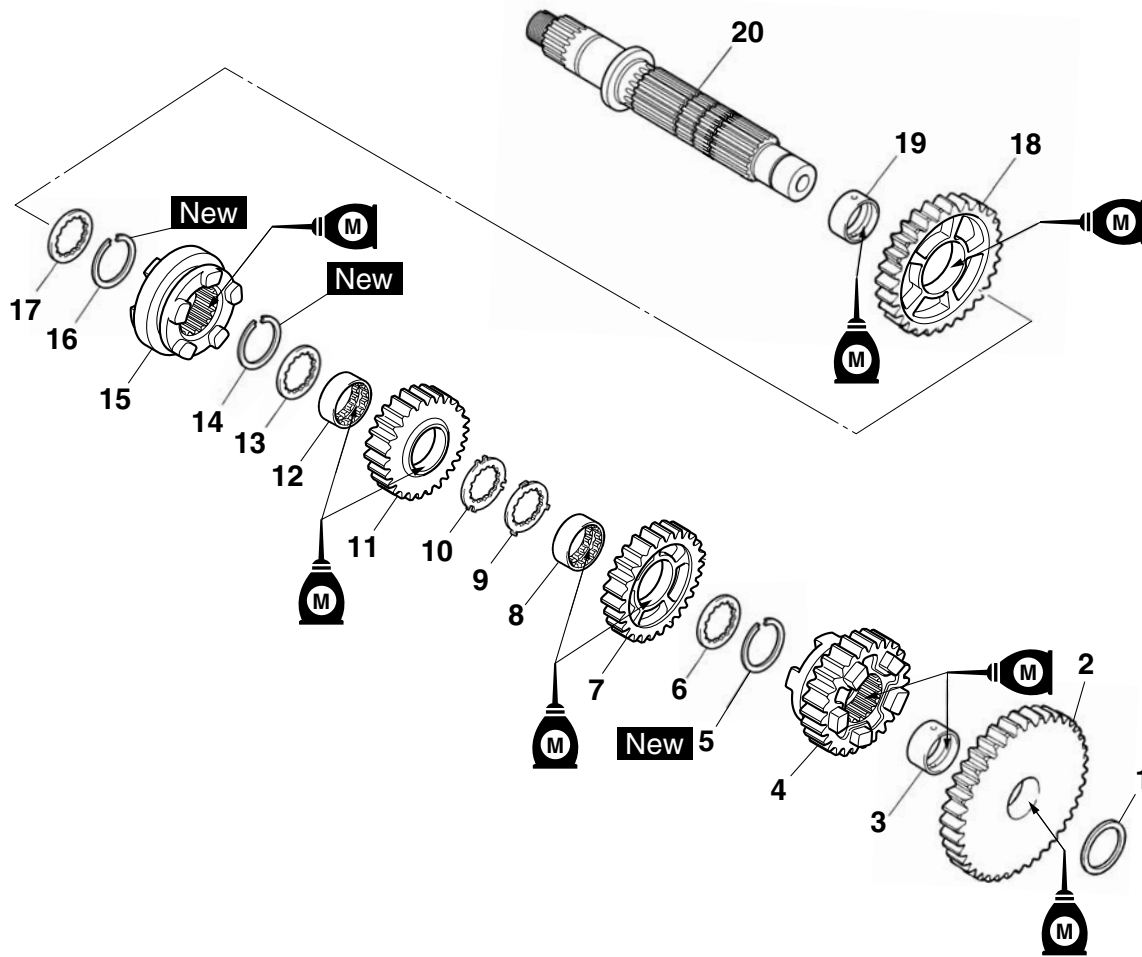
Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-66.
1	Long shift fork guide bar	1	
2	Short shift fork guide bar	1	
3	Shift drum assembly	1	
4	Shift fork 1	2	
5	Shift fork 2	1	
6	Main axle assembly	1	
7	Drive axle assembly	1	
			For installation, reverse the removal procedure.

Disassembling the main axle assembly



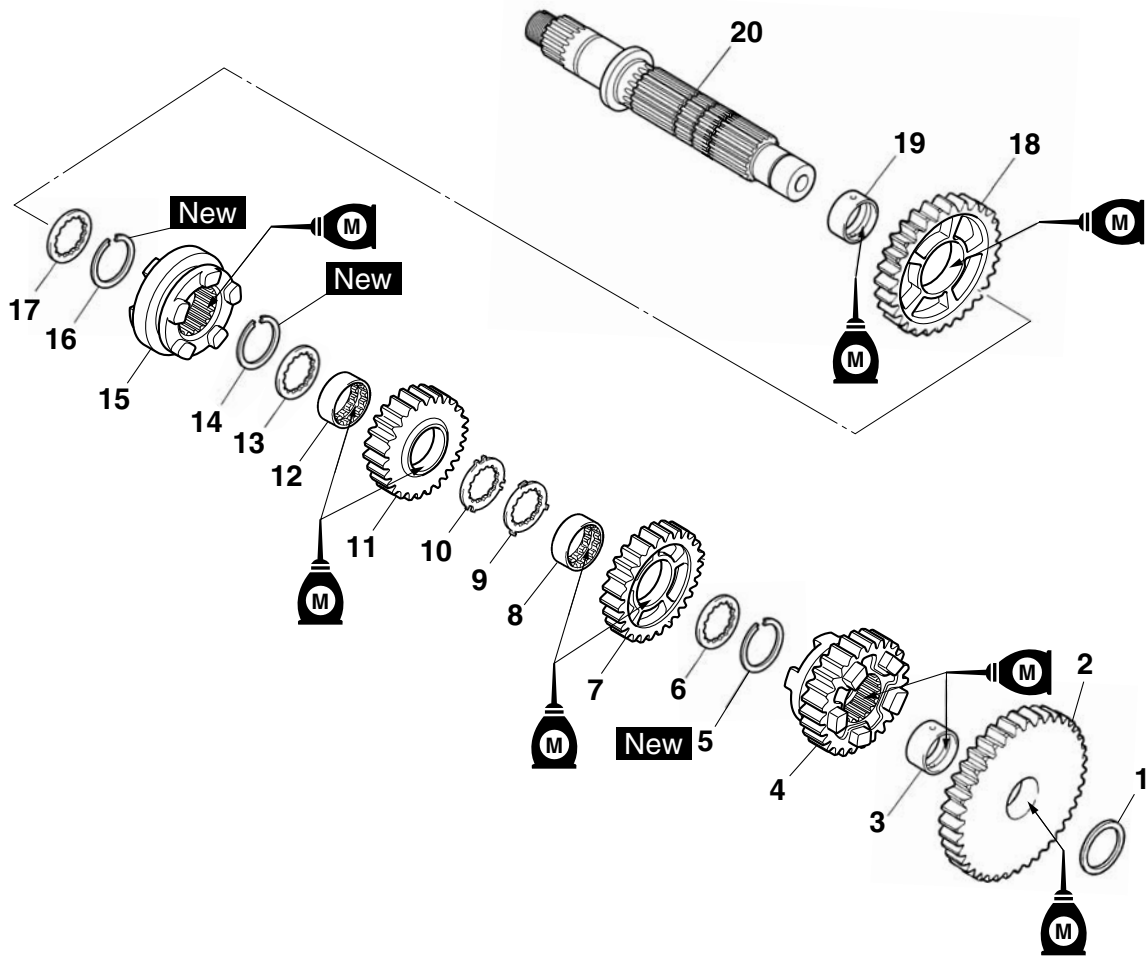
Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	2nd pinion gear	1	
3	Circlip	1	
4	3rd/4th pinion gear	1	
5	Circlip	1	
6	Toothed washer	1	
7	5th pinion gear	1	
8	Collar	1	
9	Main axle/1st pinion gear	1	
			For assembly, reverse the disassembly procedure.

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Washer	1	
2	1st wheel gear	1	
3	Collar	1	
4	5th wheel gear	1	
5	Circlip	1	
6	Toothed washer	1	
7	4th wheel gear	1	
8	Toothed spacer	1	
9	Toothed lock washer	1	
10	Toothed lock washer retainer	1	
11	3rd wheel gear	1	
12	Toothed spacer	1	
13	Toothed washer	1	
14	Circlip	1	
15	Dog clutch	1	
16	Circlip	1	
17	Toothed washer	1	

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
18	2nd wheel gear	1	
19	Collar	1	
20	Drive axle	1	
			For assembly, reverse the disassembly procedure.

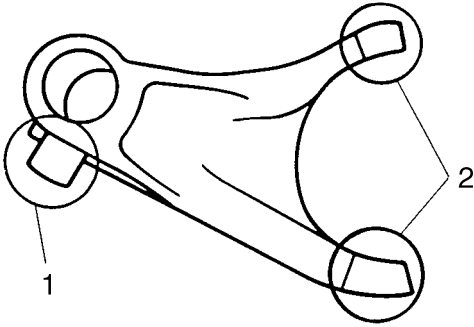
EAS26260

CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks and shift fork guide bars.

1. Check:

- Shift fork cam follower "1"
 - Shift fork pawls "2"
- Bends/damage/scoring/wear → Replace the shift fork.



2. Check:

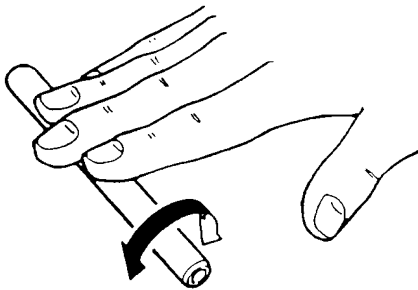
- Shift fork guide bar
- Roll the shift fork guide bar on a flat surface.
Bends → Replace.

EWA12840



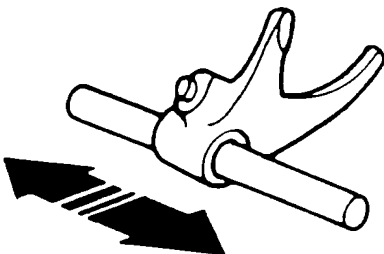
WARNING

Do not attempt to straighten a bent shift fork guide bar.



3. Check:

- Shift fork movement
(along the shift fork guide bar)
- Rough movement → Replace the shift forks and shift fork guide bar as a set.

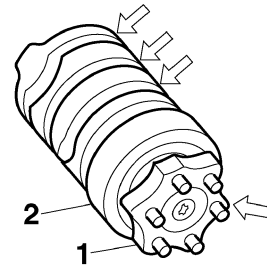


EAS26270

CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:

- Shift drum grooves
Damage/scratches/wear → Replace the shift drum assembly.
 - Shift drum segment "1"
 - Shift drum bearing "2"
- Damage/wear → Replace the shift drum assembly.
Damage/pitting → Replace the shift drum assembly.



EAS26300

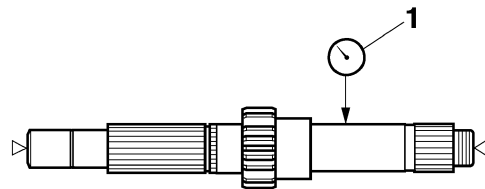
CHECKING THE TRANSMISSION

1. Measure:

- Main axle runout
(with a centering device and dial gauge "1")
- Out of specification → Replace the main axle.



Main axle runout limit
0.08 mm (0.0032 in)

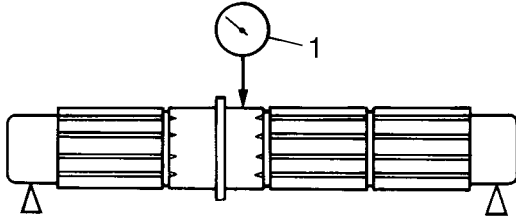


2. Measure:

- Drive axle runout
(with a centering device and dial gauge "1")
- Out of specification → Replace the drive axle.

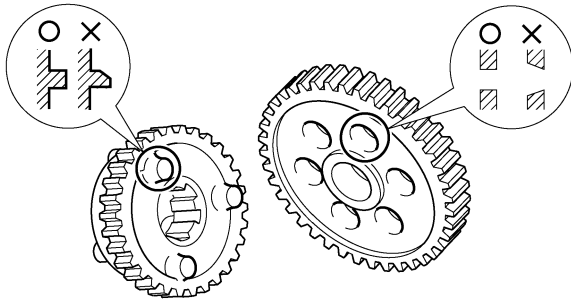


Drive axle runout limit
0.08 mm (0.0032 in)



3. Check:

- Transmission gears
Blue discoloration/pitting/wear → Replace the defective gear(s).
- Transmission gear dogs
Cracks/damage/rounded edges → Replace the defective gear(s).



4. Check:

- Transmission gear engagement (each pinion gear to its respective wheel gear)
Incorrect → Reassemble the transmission axle assemblies.

5. Check:

- Transmission gear movement
Rough movement → Replace the defective part(s).

EAS3D81032

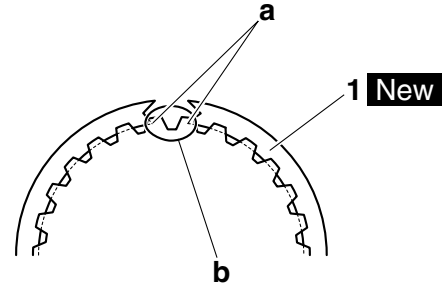
ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

1. Install:

- Toothed washer
- Circlip "1" **New**

NOTE:

Install the circlip so that both ends "a" rest on the sides of a spline "b" with both axles aligned.

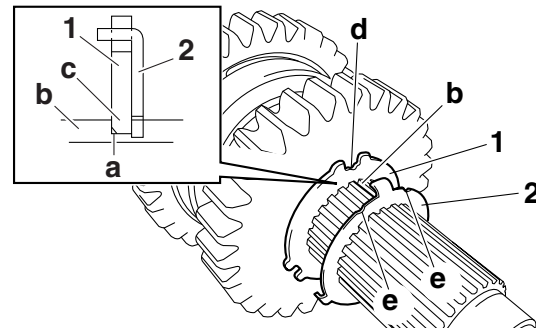


2. Install:

- Toothed lock washer retainer "1"
- Toothed lock washer "2"

NOTE:

- With the toothed lock washer retainer "1" in the groove "a" in the drive axle, align the projection "c" on the retainer with an axle spline "b", and then install the toothed lock washer "2".
- Be sure to align the projection on the toothed lock washer that is between the alignment marks "e" with the alignment mark "d" on the retainer.



EAS26320

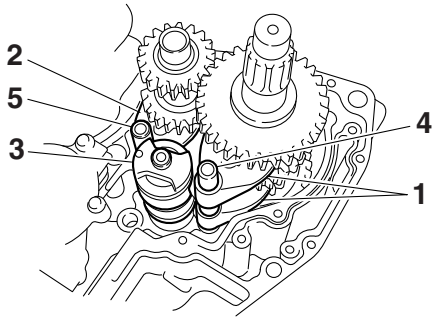
INSTALLING THE SHIFT FORKS AND SHIFT DRUM ASSEMBLY

1. Install:

- Shift forks 1 "1"
- Shift fork 2 "2"
- Shift drum assembly "3"
- Long shift fork guide bar "4"
- Short shift fork guide bar "5"

NOTE:

The embossed marks "3D8" on the shift forks should face towards the left side of the engine.

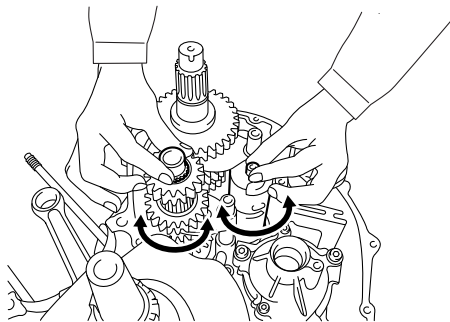


2. Check:

- Transmission
Rough movement → Repair.

NOTE: _____

- Apply engine oil to each gear and bearing thoroughly.
 - Before assembling the crankcase, make sure that the transmission is in neutral and that the gears turn freely.
-



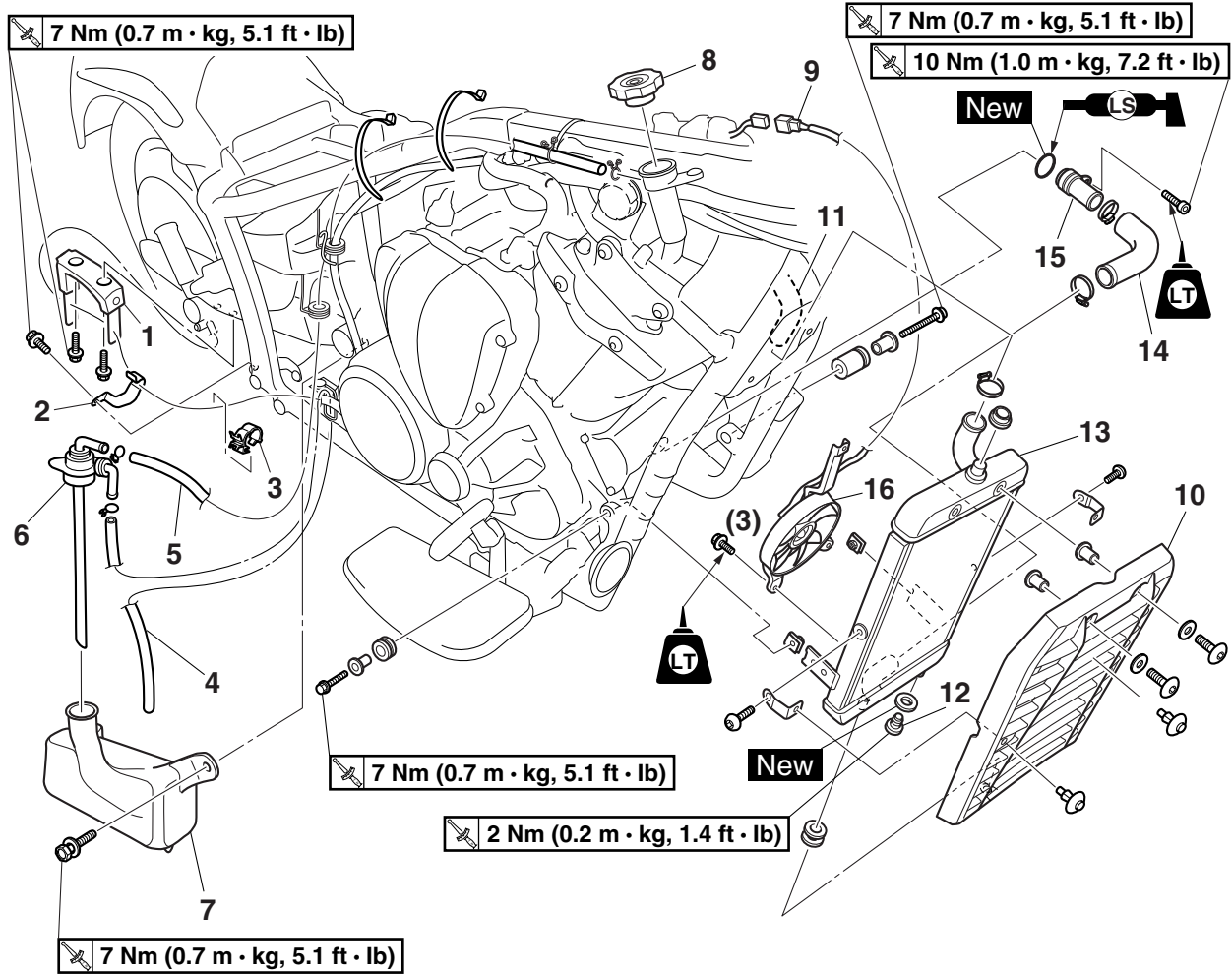
COOLING SYSTEM

RADIATOR	6-1
CHECKING THE RADIATOR.....	6-3
INSTALLING THE RADIATOR.....	6-3
THERMOSTAT	6-4
CHECKING THE THERMOSTAT	6-6
INSTALLING THE THERMOSTAT ASSEMBLY	6-6
WATER PUMP	6-7
DISASSEMBLING THE WATER PUMP	6-9
CHECKING THE WATER PUMP	6-9
ASSEMBLING THE WATER PUMP	6-9

EAS26380

RADIATOR

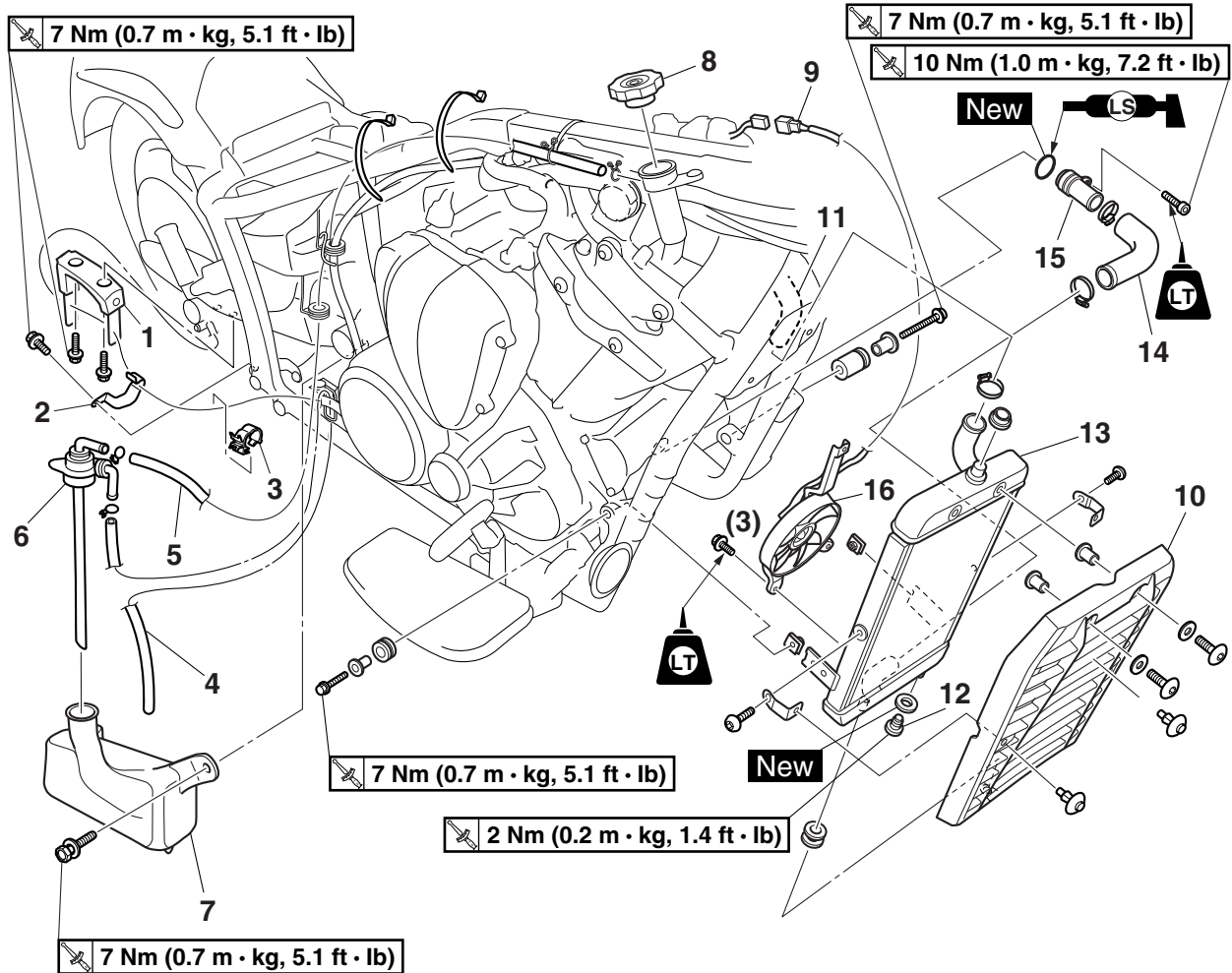
Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Sub-fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Muffler/Coolant reservoir cover		Refer to "ENGINE REMOVAL" on page 5-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
1	Rear brake hose guide	1	
2	Rear brake hose holder	1	
3	Plastic holder	1	
4	Coolant reservoir breather hose	1	
5	Coolant reservoir hose	1	
6	Coolant reservoir cap	1	
7	Coolant reservoir	1	
8	Radiator cap	1	
9	Radiator fan motor coupler	1	Disconnect.
10	Radiator cover	1	

RADIATOR

Removing the radiator

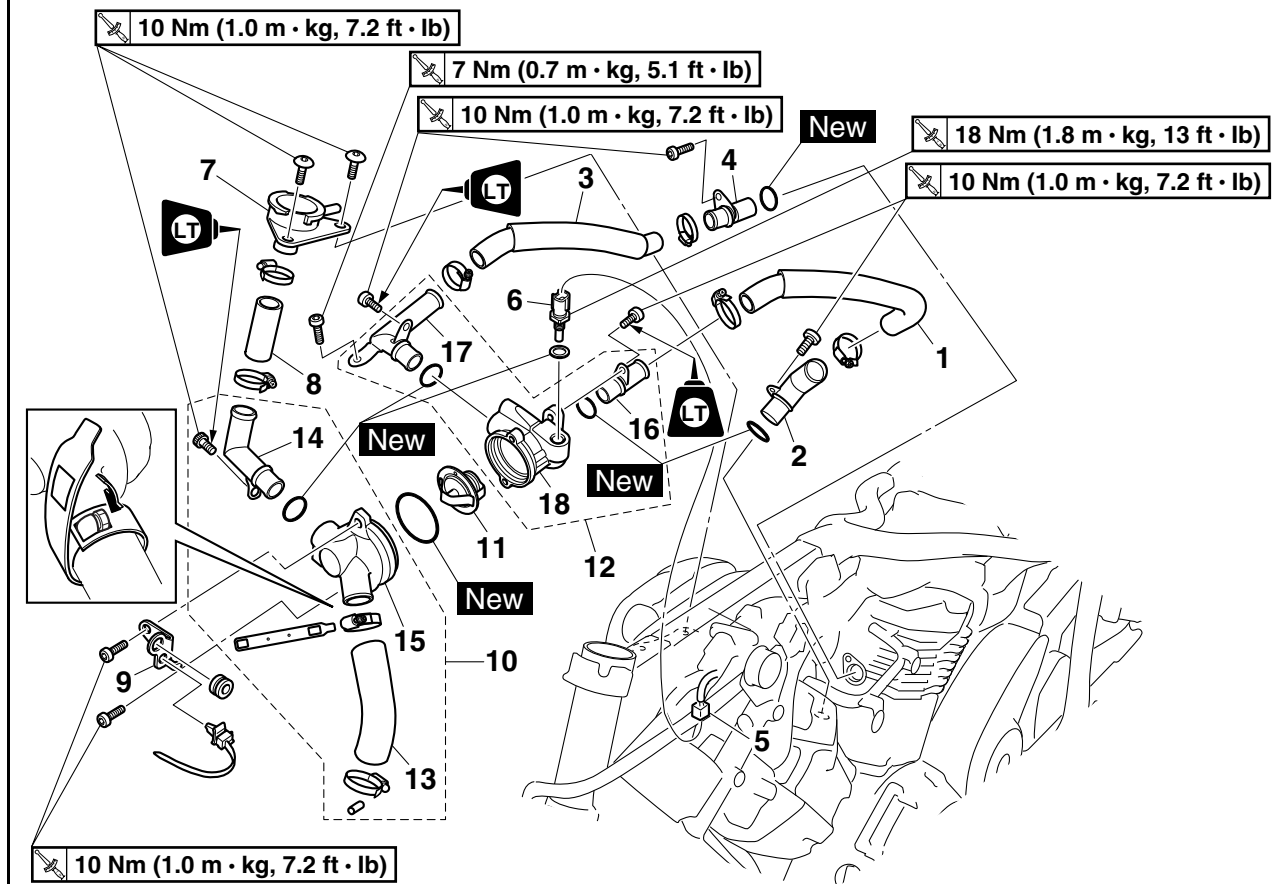


Order	Job/Parts to remove	Q'ty	Remarks
11	Radiator inlet hose	1	Disconnect.
12	Coolant drain bolt	1	
13	Radiator	1	
14	Radiator outlet hose	1	
15	Radiator outlet pipe	1	
16	Radiator fan	1	
			For installation, reverse the removal procedure.

EAS26440

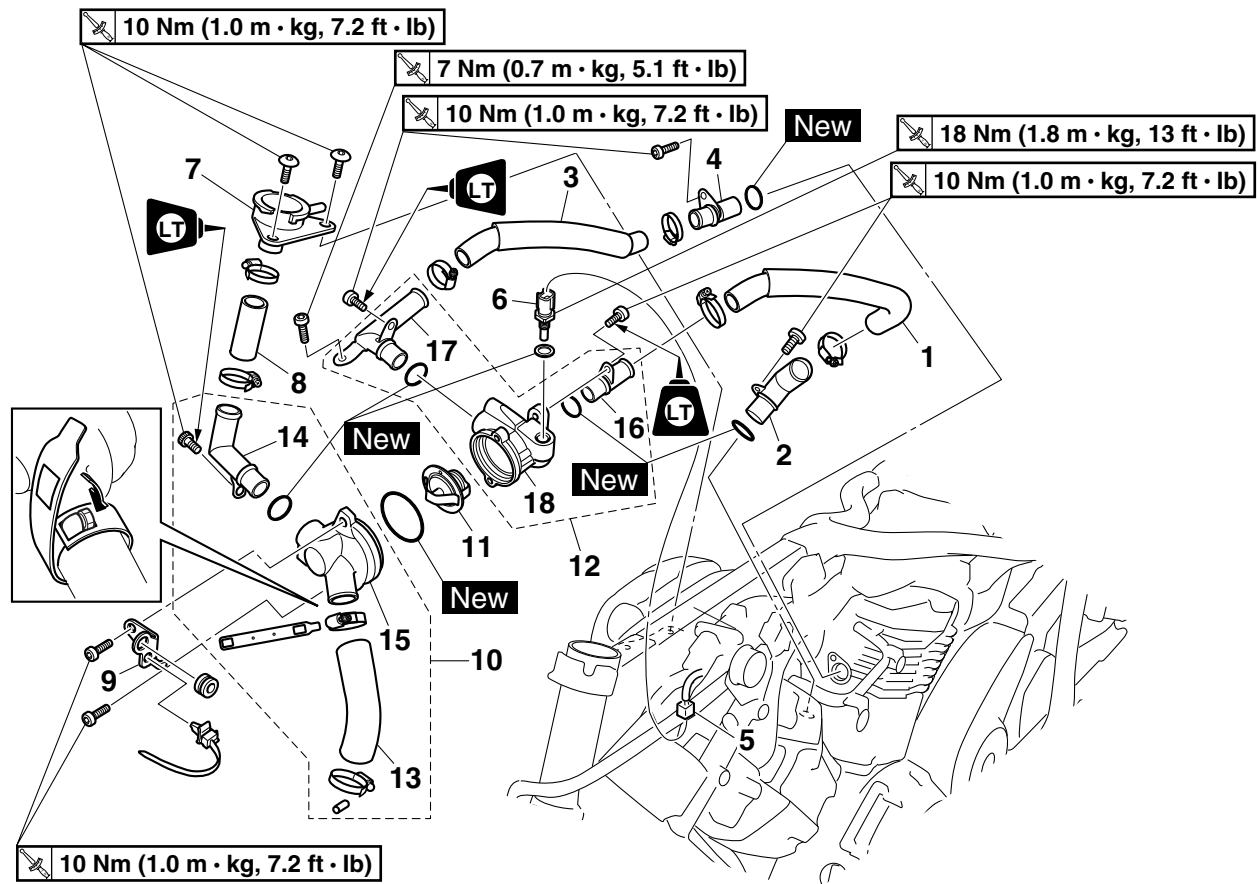
THERMOSTAT

Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Muffler/Front cylinder covers		Refer to "ENGINE REMOVAL" on page 5-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
1	Front cylinder thermostat inlet hose	1	
2	Front cylinder thermostat inlet pipe 1	1	
3	Rear cylinder thermostat inlet hose	1	
4	Rear cylinder thermostat inlet pipe 1	1	
5	Coolant temperature sensor coupler	1	Disconnect.
6	Coolant temperature sensor	1	
7	Radiator filler pipe	1	
8	Thermostat cover inlet hose	1	
9	Thermostat bracket	1	
10	Thermostat cover assembly	1	

Removing the thermostat

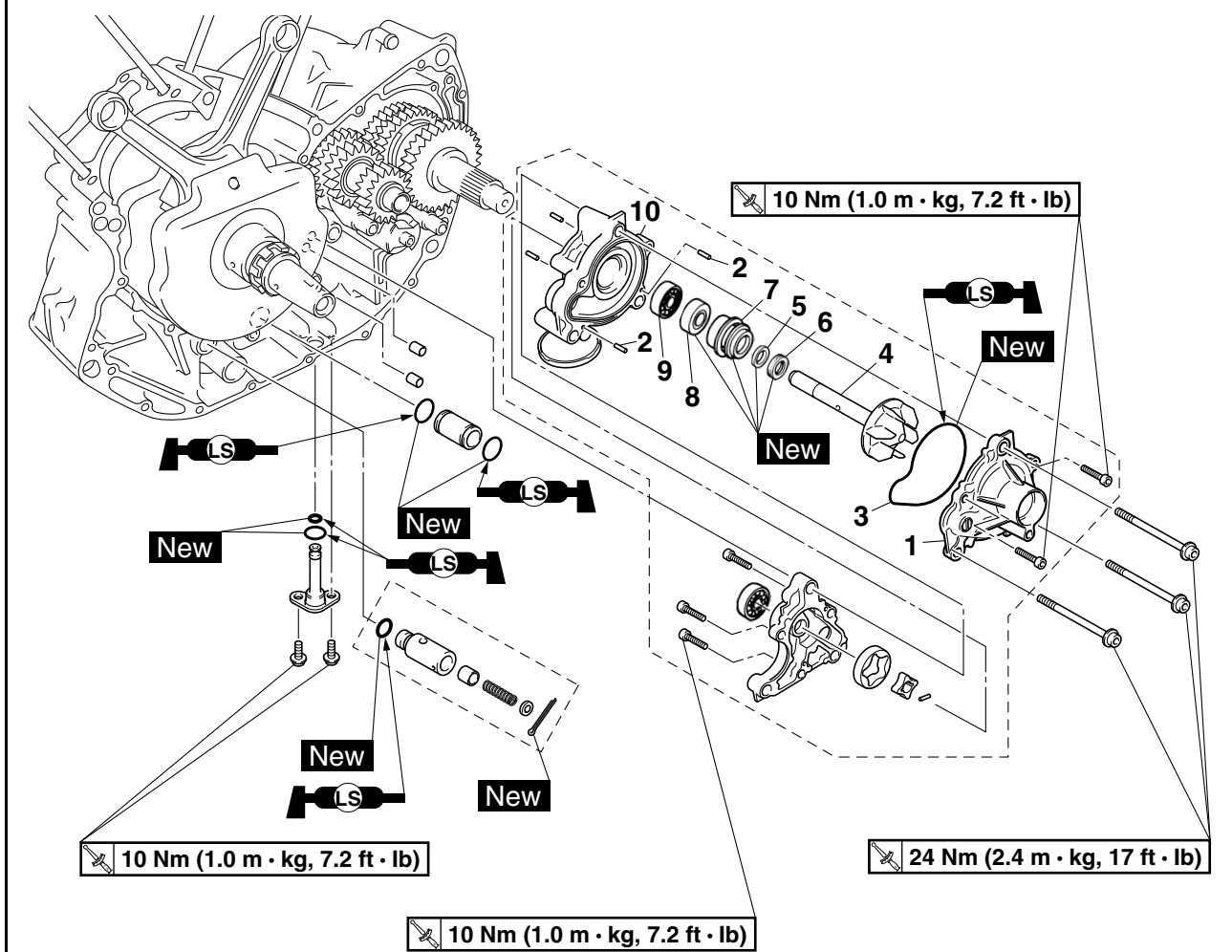


Order	Job/Parts to remove	Q'ty	Remarks
11	Thermostat	1	
12	Thermostat housing assembly	1	
13	Radiator inlet hose	1	
14	Thermostat cover inlet pipe	1	
15	Thermostat cover	1	
16	Front cylinder thermostat inlet pipe 2	1	
17	Rear cylinder thermostat inlet pipe 2	1	
18	Thermostat housing	1	
			For installation, reverse the removal procedure.

EAS26500

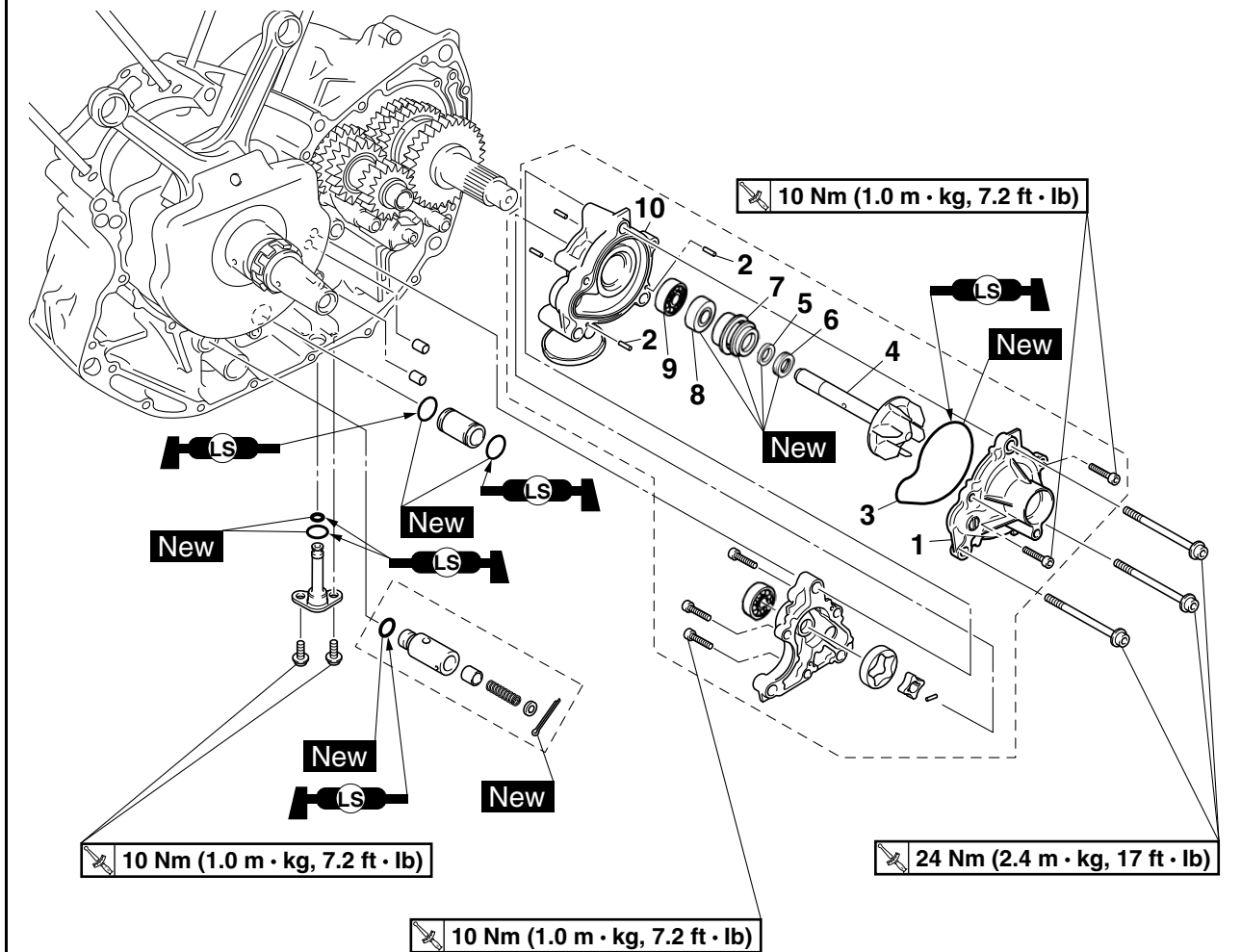
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Oil pump rotors		Separate. Refer to "CRANKCASE" on page 5-66.
	Oil pump rotors		Refer to "OIL PUMP" on page 5-73.
1	Water pump housing cover	1	
2	Pin	2	
3	O-ring	1	
4	Impeller shaft	1	
5	Rubber damper holder	1	
6	Rubber damper	1	
7	Water pump seal	1	
8	Oil seal	1	
9	Bearing	1	

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
10	Water pump housing	1	
			For installation, reverse the removal procedure.

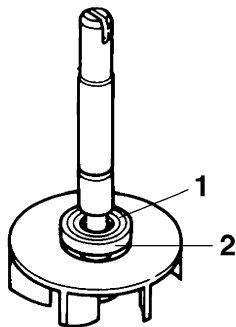
EAS26510

DISASSEMBLING THE WATER PUMP

- Remove:
 - Rubber damper holder "1"
 - Rubber damper "2"
(from the impeller, with a thin, flathead screwdriver)

NOTE: _____

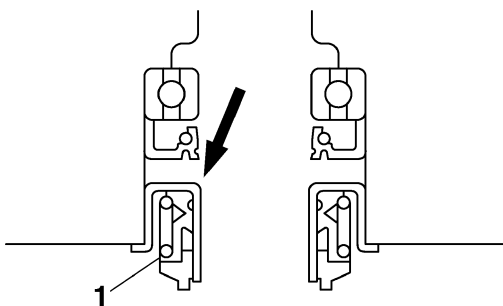
Do not scratch the impeller shaft.



- Remove:
 - Water pump seal "1"

NOTE: _____

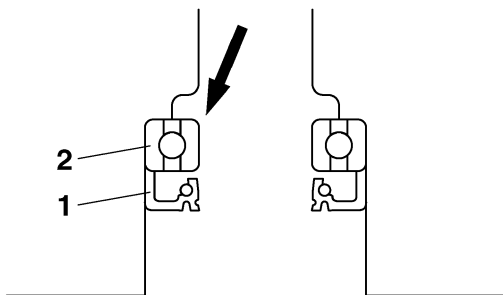
Remove the water pump seal from the inside of the water pump housing.



- Remove:
 - Oil seal "1"
 - Bearing "2"

NOTE: _____

Remove the bearing and oil seal from the inside of the water pump housing.



EAS26540

CHECKING THE WATER PUMP

- Check:
 - Water pump housing cover
 - Water pump housing
 - Impeller shaft
Cracks/damage/wear → Replace.
- Check:
 - Bearing
Rough movement → Replace.

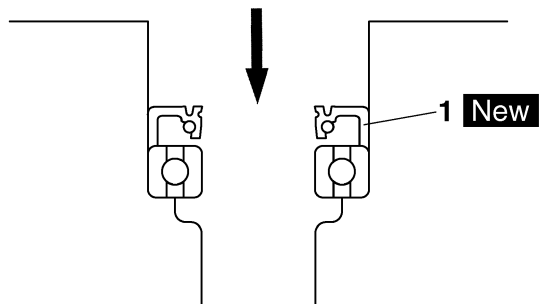
EAS26560

ASSEMBLING THE WATER PUMP

- Install:
 - Oil seal "1" **New**
(into the oil/water pump housing)

NOTE: _____

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket that matches its outside diameter.



- Install:
 - Water pump seal "1" **New**

ECA14080

CAUTION: _____

Never lubricate the water pump seal surface with oil or grease.

NOTE: _____

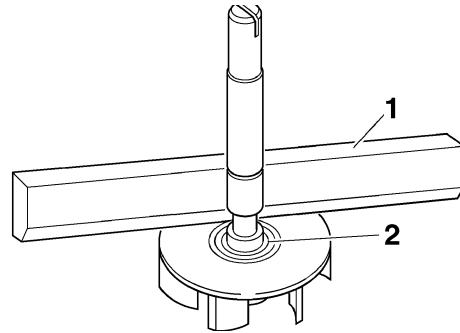
- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 (Three Bond No.1215®) "2" to the water pump housing "3".



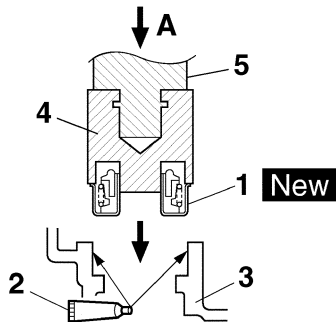
Mechanical seal installer
 90890-04078
Water pump seal installer
 YM-33221-A
Middle driven shaft bearing driver
 90890-04058
Bearing driver 40 mm
 YM-04058
Yamaha bond No. 1215
 90890-85505
 (Three Bond No.1215®)



Impeller shaft tilt limit
 0.15 mm (0.006 in)



- 1. Straightedge
- 2. Impeller



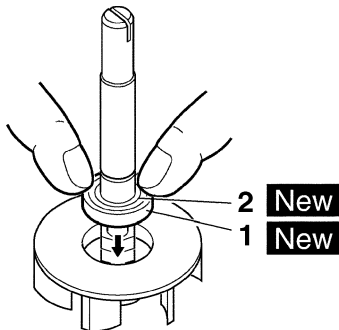
- A. Push down
- 4. Mechanical seal installer
- 5. Middle driven shaft bearing driver

3. Install:

- Rubber damper "1" **New**
- Rubber damper holder "2" **New**

NOTE:

Before installing the rubber damper, apply tap water or coolant onto its outer surface.



4. Measure:

- Impeller shaft tilt
- Out of specification → Repeat steps (3) and (4).

ECA14090

CAUTION:

Make sure the rubber damper and rubber damper holder are flush with the impeller.

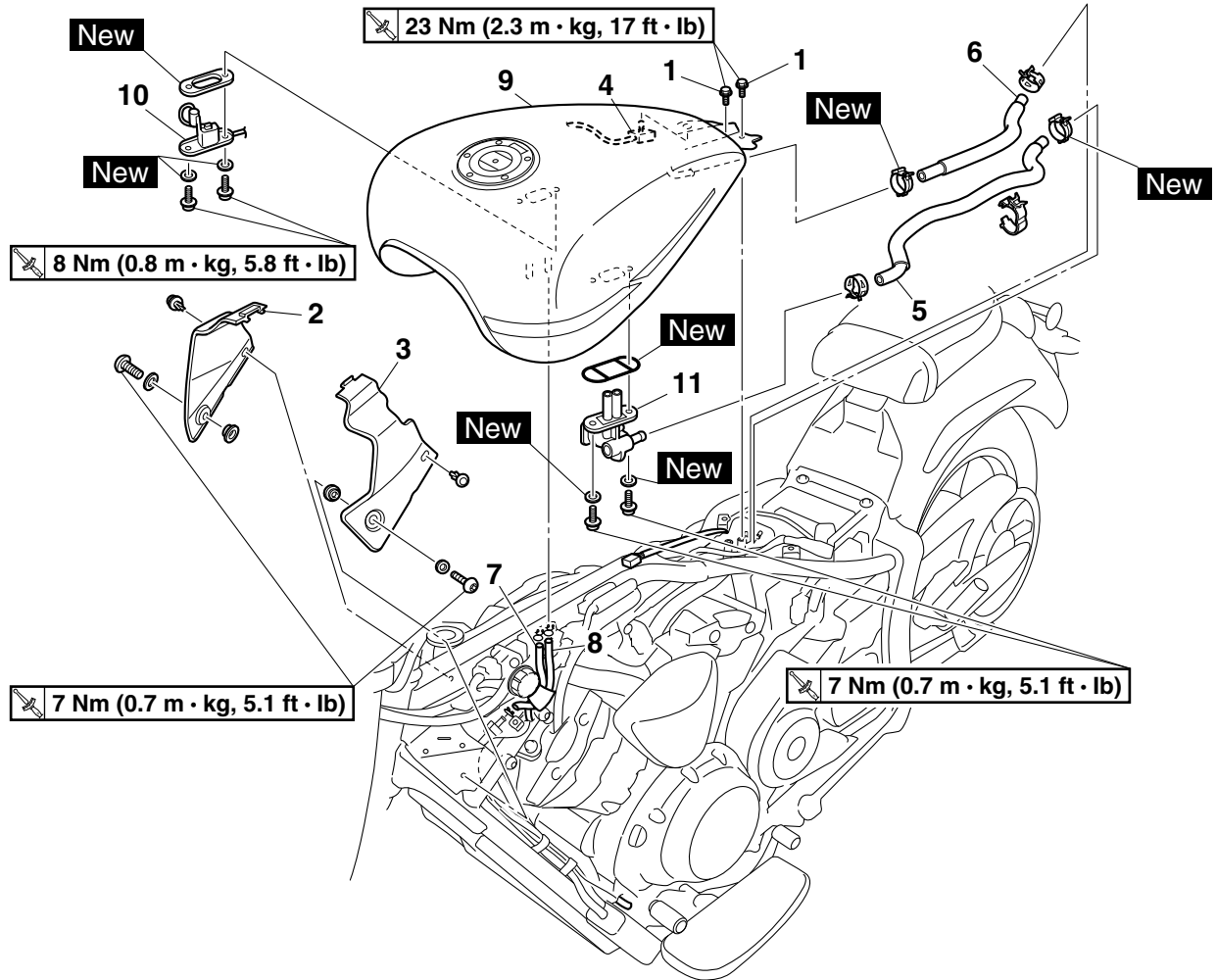
FUEL SYSTEM

FUEL TANK	7-1
REMOVING THE FUEL TANK.....	7-5
REMOVING THE FUEL PUMP	7-5
CHECKING THE FUEL COCK.....	7-5
CHECKING THE FUEL COCK OPERATION	7-5
CHECKING THE FUEL PUMP BODY	7-5
CHECKING THE ROLLOVER VALVE.....	7-5
INSTALLING THE FUEL PUMP.....	7-6
INSTALLING THE FUEL TANK HOSES.....	7-6
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CHECKING THE THROTTLE BODIES.....	7-11
CHECKING THE FUEL PRESSURE	7-11
ADJUSTING THE THROTTLE POSITION SENSOR	7-11
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EAS26620

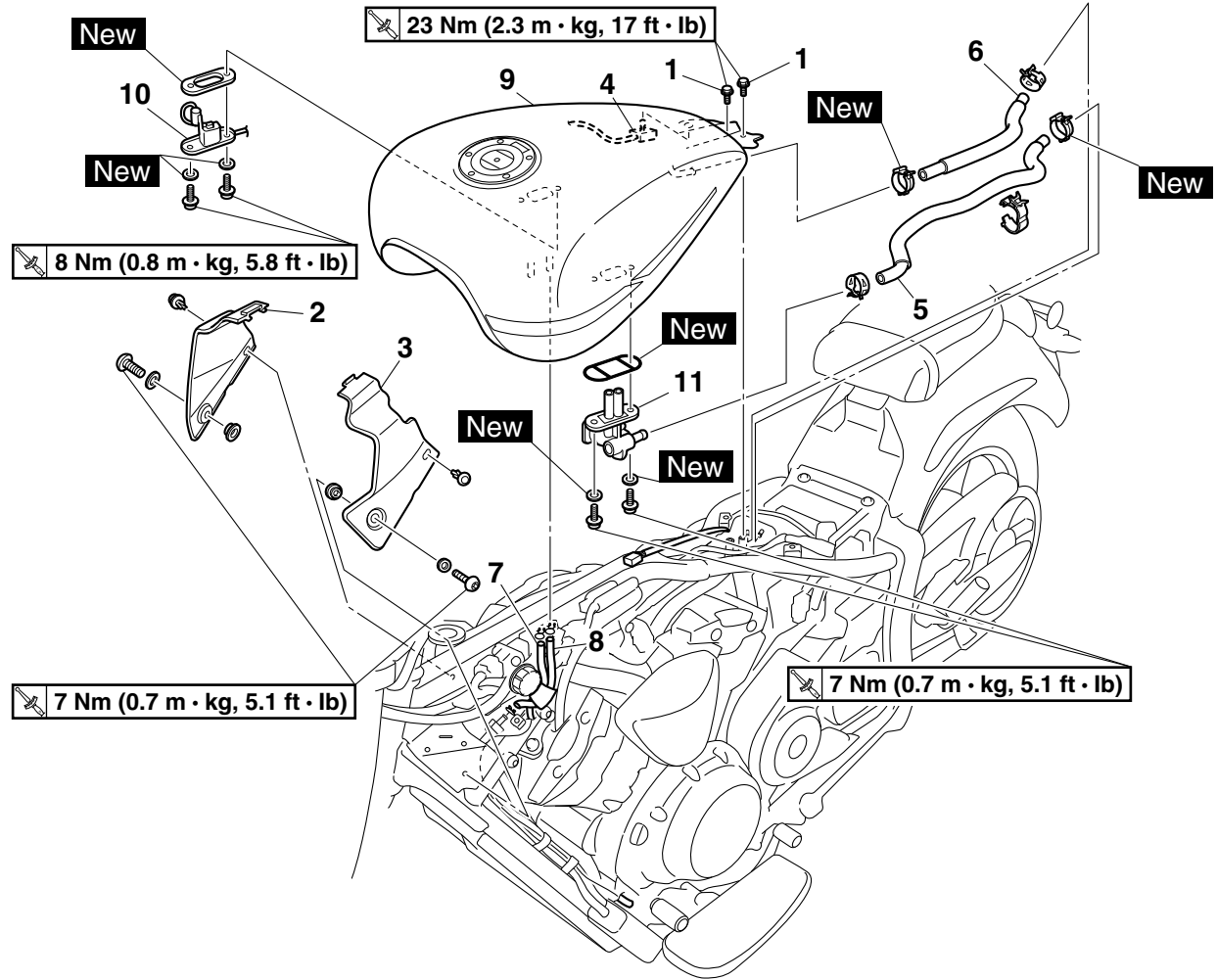
FUEL TANK

Removing the fuel tank



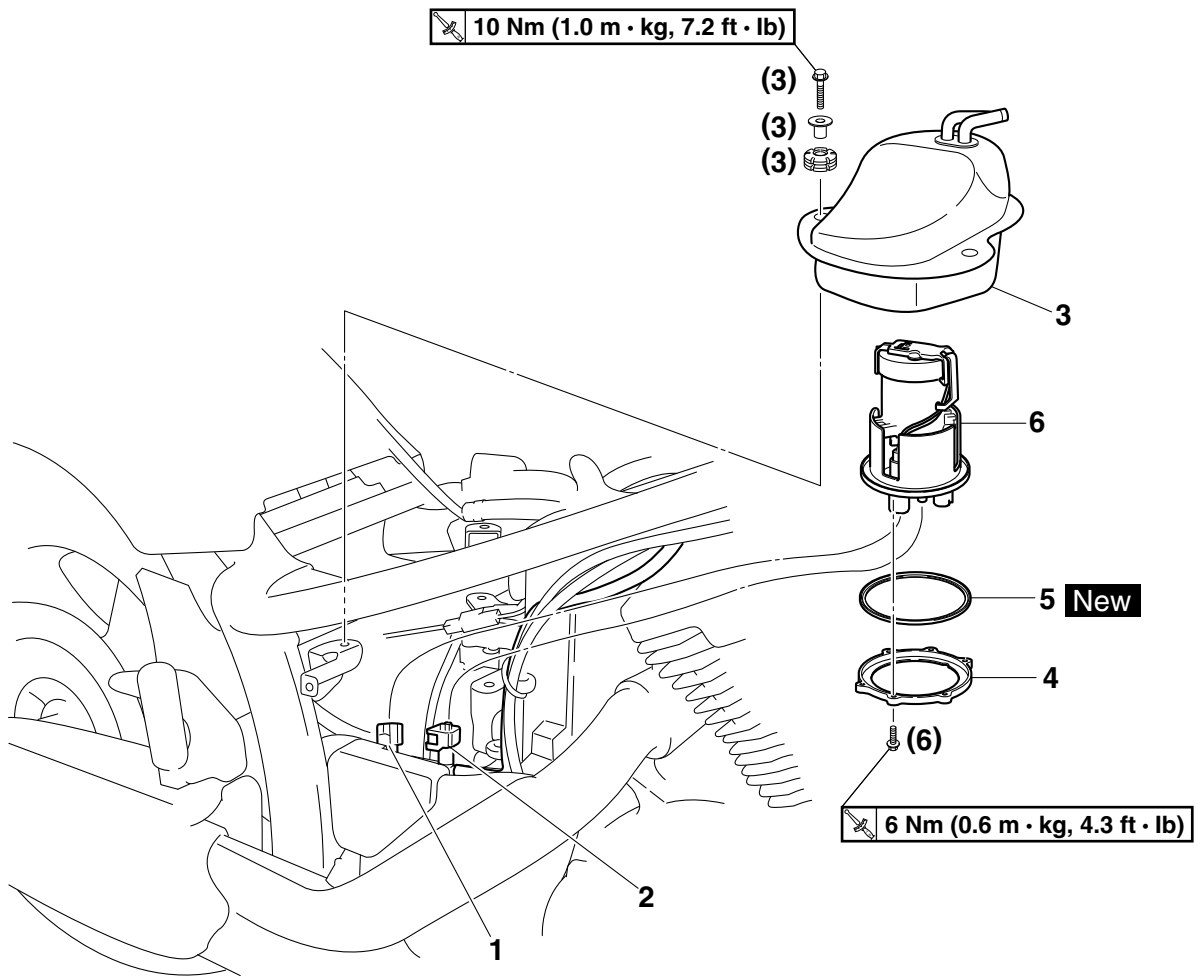
Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Relay cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel tank bolt	2	
2	Right side panel	1	
3	Left side panel	1	
4	Fuel sender coupler	1	Disconnect.
5	Fuel cock hose	1	NOTE: _____ Before removing the fuel cock hose, turn the fuel cock to "OFF". _____
6	Air vent hose	1	
7	Fuel tank overflow hose	1	
8	Fuel tank breather hose (fuel tank to hose joint)	1	
9	Fuel tank	1	
10	Fuel sender	1	

Removing the fuel tank



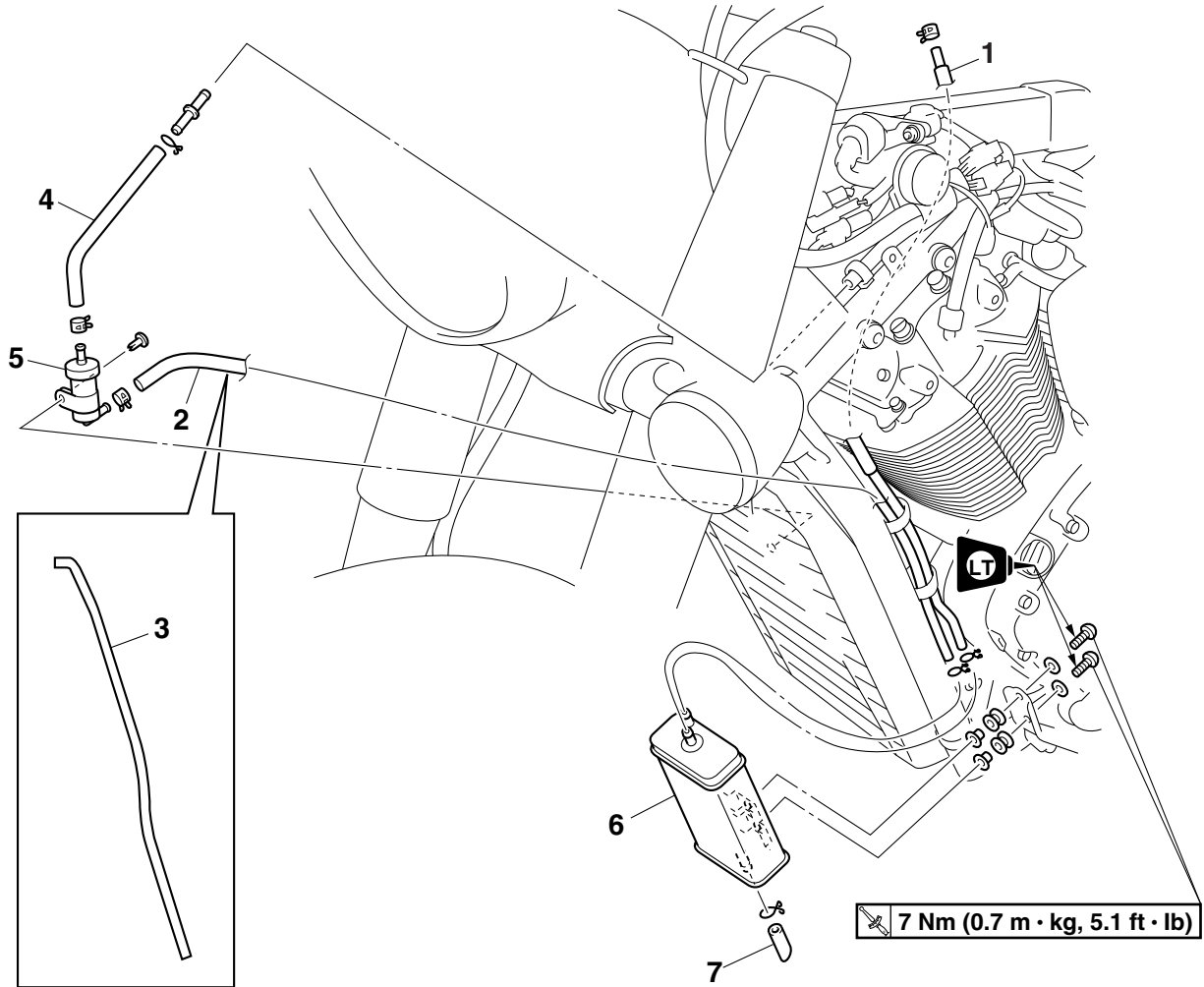
Order	Job/Parts to remove	Q'ty	Remarks
11	Fuel cock	1	
			For installation, reverse the removal procedure.

Removing the sub-fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Sub-fuel tank cover/Battery box		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel pump coupler	1	Disconnect.
2	Fuel hose	1	Disconnect.
3	Sub-fuel tank	1	
4	Fuel pump bracket	1	
5	Fuel pump gasket	1	
6	Fuel pump	1	
			For installation, reverse the removal procedure.

Removing the rollover valve and canister



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank/Side panels		Refer to "FUEL TANK" on page 7-1.
	Front cylinder covers		Refer to "ENGINE REMOVAL" on page 5-1.
1	Canister purge hose	1	California only
2	Fuel tank breather hose (rollover valve to canister)	1	California only
3	Fuel tank breather hose	1	Except for California
4	Fuel tank breather hose (hose joint to rollover valve)	1	
5	Rollover valve	1	
6	Canister	1	California only
7	Canister breather hose	1	California only
			For installation, reverse the removal procedure.

EAS3D81001

REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
 - Fuel cock hose

NOTE:

Before removing the fuel cock hose, turn the fuel cock to "OFF".

EAS3D81002

REMOVING THE FUEL PUMP

1. Remove:
 - Fuel hose

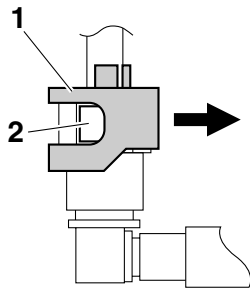
EWA3D81001

WARNING

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

NOTE:

- To remove the fuel hose from the fuel pump, 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.



2. Remove:
 - Fuel pump

ECA3D81001

CAUTION:

Do not drop the fuel pump or give it a strong shock.

EAS26650

CHECKING THE FUEL COCK

1. Check:
 - Fuel cock
Cracks/damage/wear → Replace.

2. Check:
 - Fuel cock strainer
Obstruction → clean.
Blow out the jets with compressed air.
Damage → Replace.

EAS26660

CHECKING THE FUEL COCK OPERATION

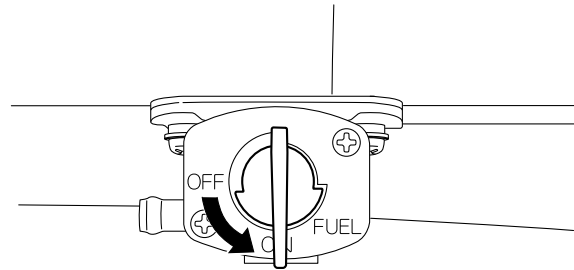
NOTE:

After installing the fuel cock, check its operation.

1. Check:
 - Fuel cock operation
Out of specification → Replace the fuel cock.

Fuel flows.
Fuel cock is OK.
Fuel does not flow.
Replace the fuel cock.

- a. Check that the fuel cock lever is turned to "ON".
- b. Place a container under the end of the fuel cock.



EAS26670

CHECKING THE FUEL PUMP BODY

1. Check:
 - Fuel pump body
Obstruction → Clean.
Cracks/damage → Replace the fuel pump assembly.

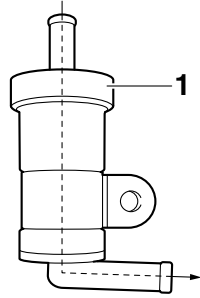
EAS3D81004

CHECKING THE ROLLOVER VALVE

1. Check:
 - Rollover valve "1"
Damage/faulty → Replace.

NOTE:

- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.



EAS3D81007

INSTALLING THE FUEL PUMP

1. Install:

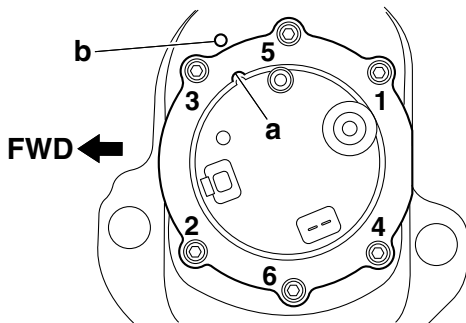
- Fuel pump



Fuel pump bolt
4 Nm (0.4 m·kg, 2.9 ft·lb)

NOTE:

- Do not damage the installation surfaces of the sub-fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align the projection “a” on the fuel pump with the slot in the fuel pump bracket and the indentation “b” in the sub-fuel tank.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



2. Install:

- Fuel hose

ECA3D81002

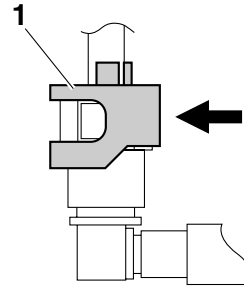
CAUTION:

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

NOTE:

- Install the fuel hose securely onto the fuel pump until a distinct “click” is heard.

- To install the fuel hose onto the fuel pump, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown.



EAS3D81040

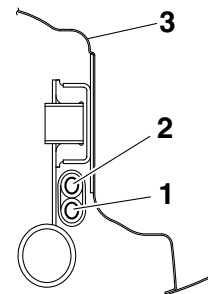
INSTALLING THE FUEL TANK HOSES

1. Install:

- Fuel tank breather hose (fuel tank to hose joint) “1”
- Fuel tank overflow hose “2”

NOTE:

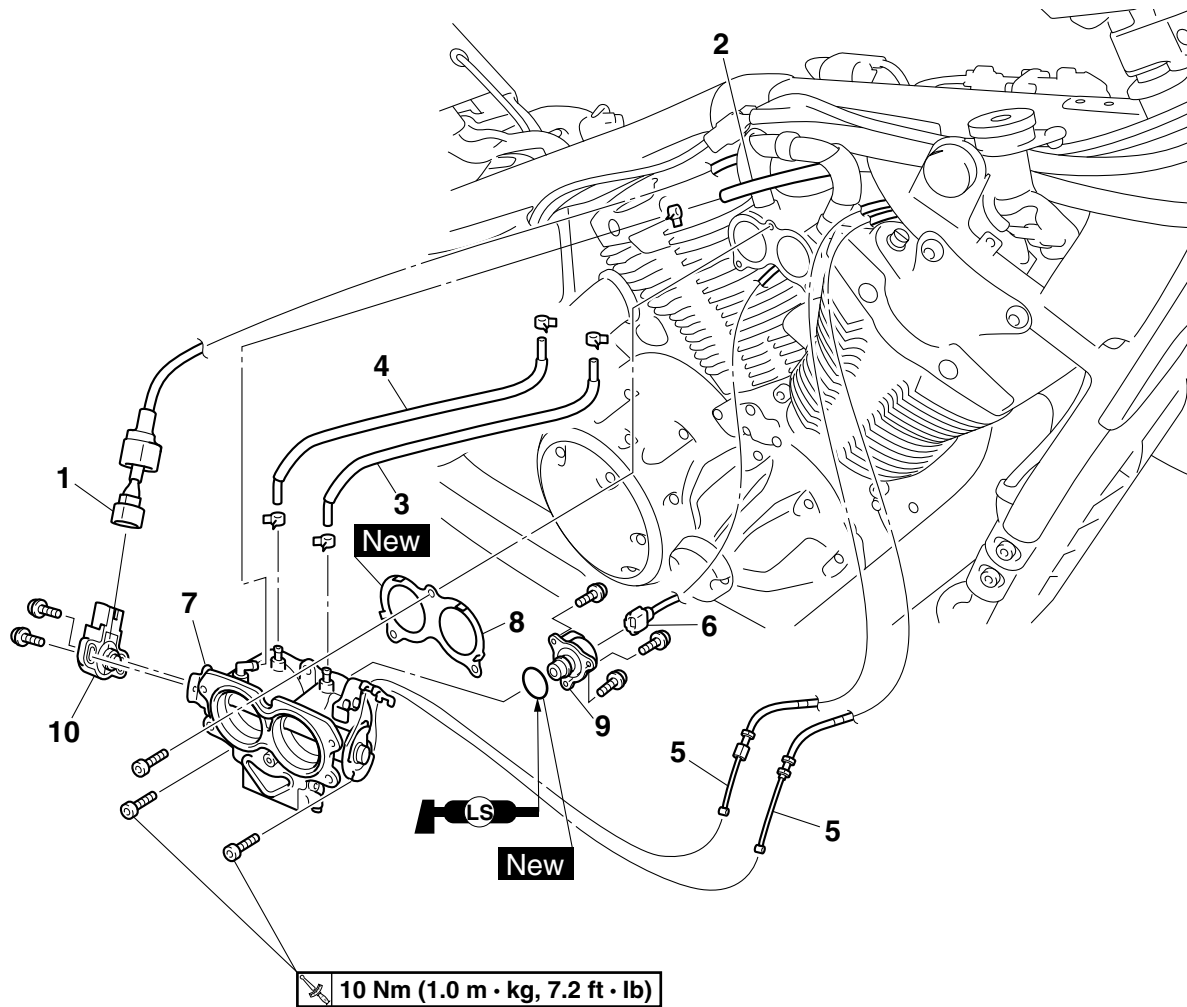
Install the fuel tank overflow hose and fuel tank breather hose (fuel tank to hose joint) as shown in the illustration, making sure that they are not pinched by the fuel tank “3”.



EAS26970

THROTTLE BODIES

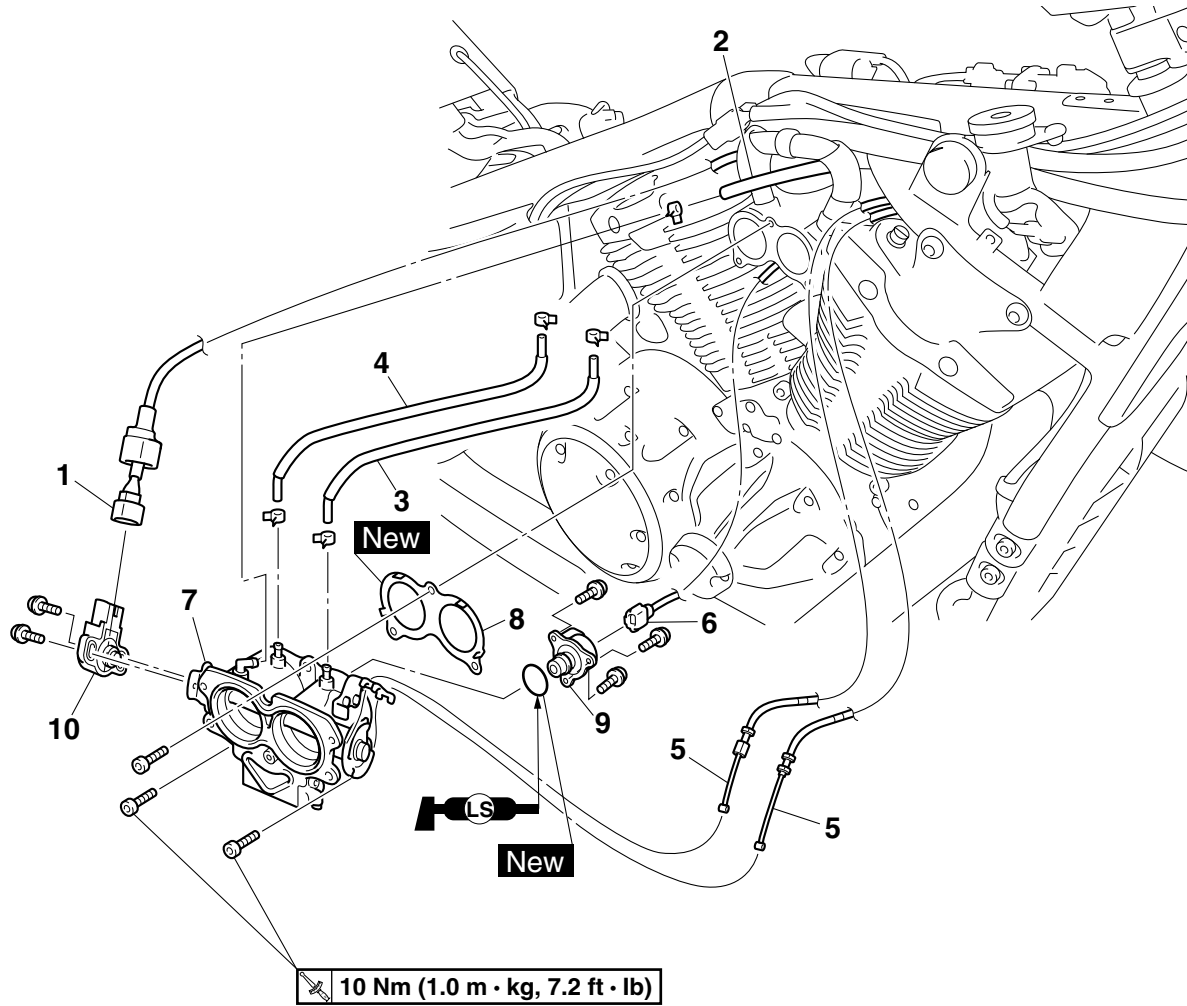
Removing the throttle body and ISC (idle speed control) unit



Order	Job/Parts to remove	Q'ty	Remarks
	Rider seat/Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Throttle position sensor coupler	1	Disconnect.
2	Canister purge hose	1	California only Disconnect.
3	Front cylinder intake air pressure sensor hose	1	
4	Rear cylinder intake air pressure sensor hose	1	
5	Throttle cable	2	Disconnect.
6	ISC (idle speed control) unit coupler	1	Disconnect.
7	Throttle body	1	ECA3D81003 CAUTION: _____ The throttle body should not be disassembled.
8	Gasket	1	
9	ISC (idle speed control) unit	1	

THROTTLE BODIES

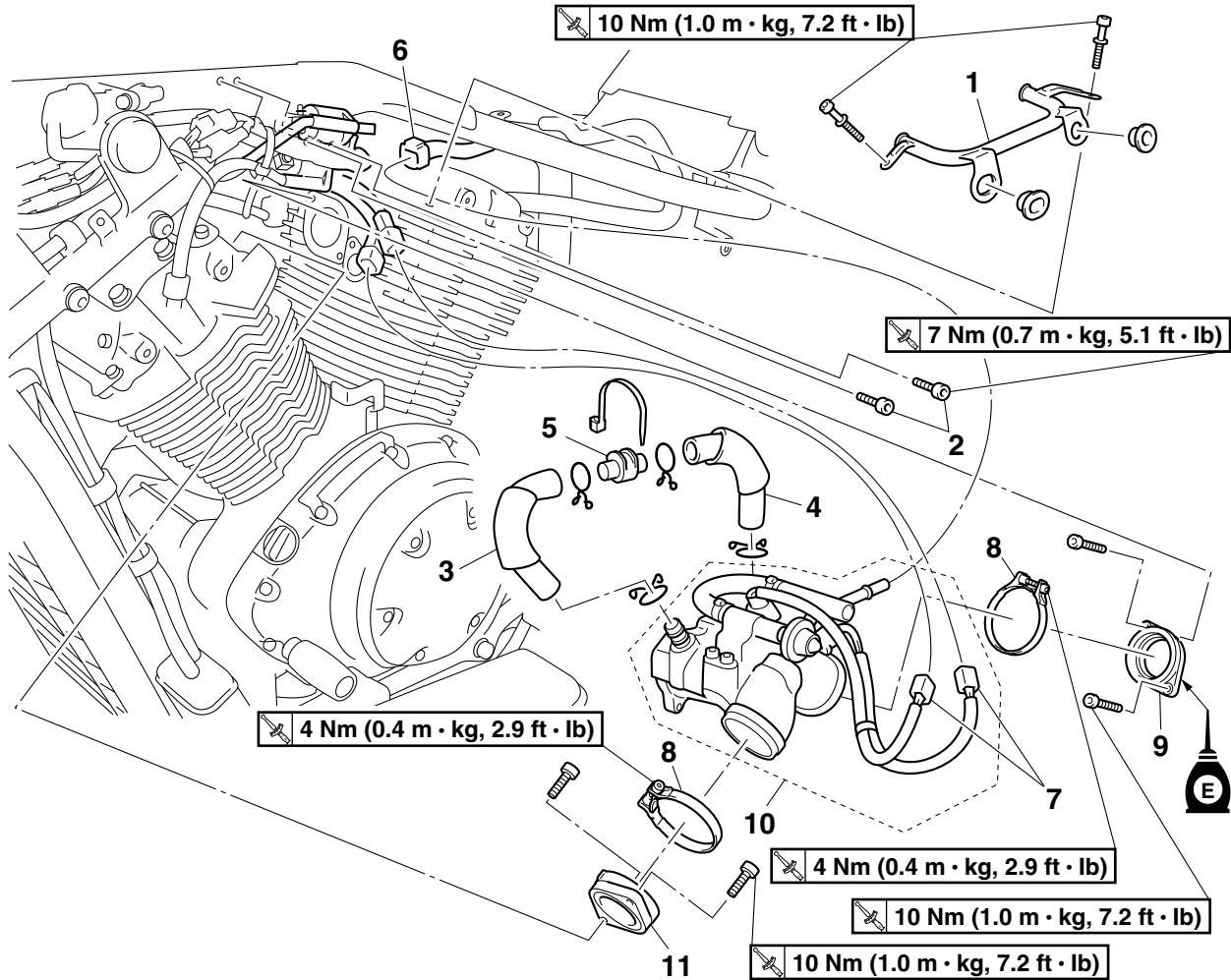
Removing the throttle body and ISC (idle speed control) unit



Order	Job/Parts to remove	Q'ty	Remarks
10	Throttle position sensor	1	
			For installation, reverse the removal procedure.

THROTTLE BODIES

Removing the intake manifold assembly

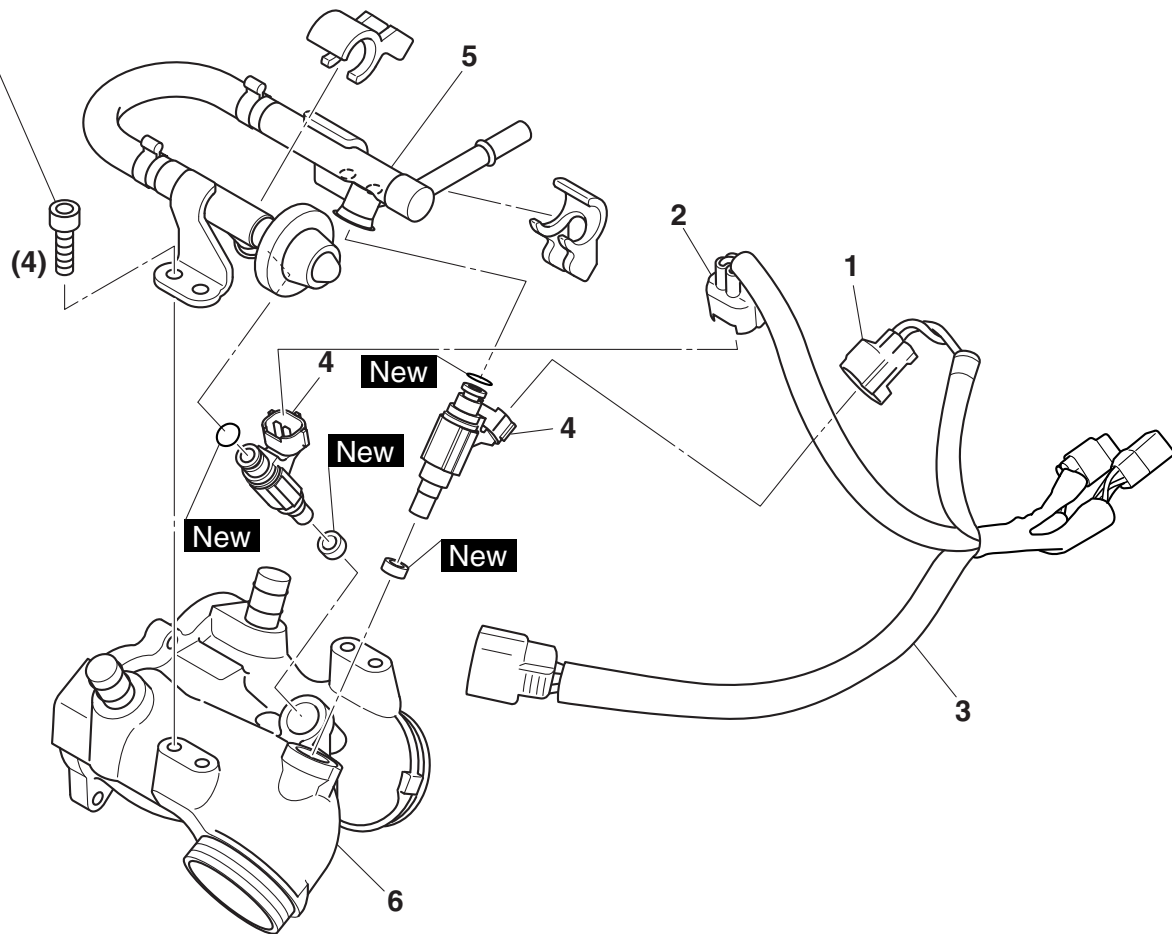


Order	Job/Parts to remove	Q'ty	Remarks
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Front cylinder covers		Refer to "ENGINE REMOVAL" on page 5-1.
	Front cylinder thermostat inlet hose/Rear cylinder thermostat inlet hose		Refer to "THERMOSTAT" on page 6-4.
	Throttle body		Refer to "THROTTLE BODIES" on page 7-7.
1	Left side cover bracket	1	
2	Ignition coil bracket bolt	2	
3	Front cylinder resonator hose	1	
4	Rear cylinder resonator hose	1	
5	Resonator hose joint	1	
6	Fuel hose	1	Disconnect.
7	Sub-wire harness coupler	2	Disconnect.
8	Intake manifold joint clamp screw	2	Loosen.
9	Rear cylinder intake manifold joint	1	
10	Intake manifold assembly	1	
11	Front cylinder intake manifold joint	1	
			For installation, reverse the removal procedure.

THROTTLE BODIES

Disassembling the intake manifold

10 Nm (1.0 m · kg, 7.2 ft · lb)



Order	Job/Parts to remove	Q'ty	Remarks
1	Front cylinder injector coupler	1	Disconnect.
2	Rear cylinder injector coupler	1	Disconnect.
3	Sub-wire harness	1	
4	Injector	2	
5	Fuel pipe	1	
6	Intake manifold	1	
			For assembly, reverse the disassembly procedure.

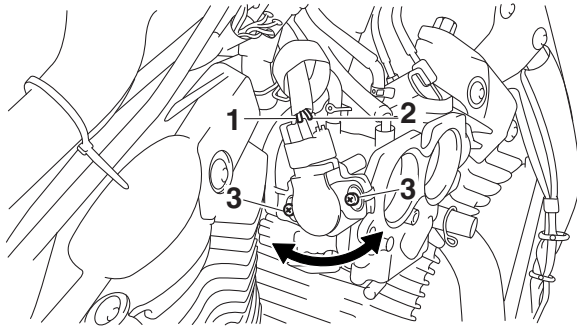
THROTTLE BODIES

- c. Turn the main switch to "ON".
- d. Measure the throttle position sensor output voltage.
- e. Adjust the throttle position sensor angle so that the output voltage is within the specified range.



Output voltage (at idle)
0.63–0.73 V

- f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws "3".



EAS3D81006

INSTALLING THE INTAKE MANIFOLD ASSEMBLY

1. Install:

- Intake manifold assembly



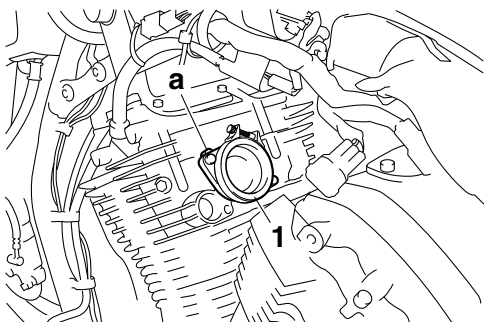
- a. Install the front cylinder intake manifold joint "1" to the front cylinder head.



Front cylinder intake manifold joint bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

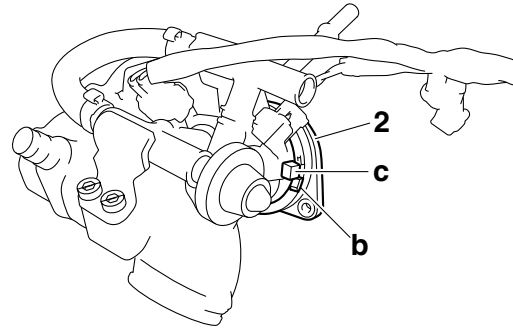
Install the front cylinder intake manifold joint with its projection "a" facing up as shown in the illustration.



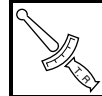
- b. Install the rear cylinder intake manifold joint "2" to the intake manifold assembly.

NOTE:

Make sure that the projection "b" on the rear cylinder intake manifold joint contacts the projection "c" on the intake manifold assembly.



- c. Install the intake manifold assembly.



Rear cylinder intake manifold joint bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

NOTE:

Lubricate the rear cylinder intake manifold joint and rear cylinder head mating surfaces with engine oil.



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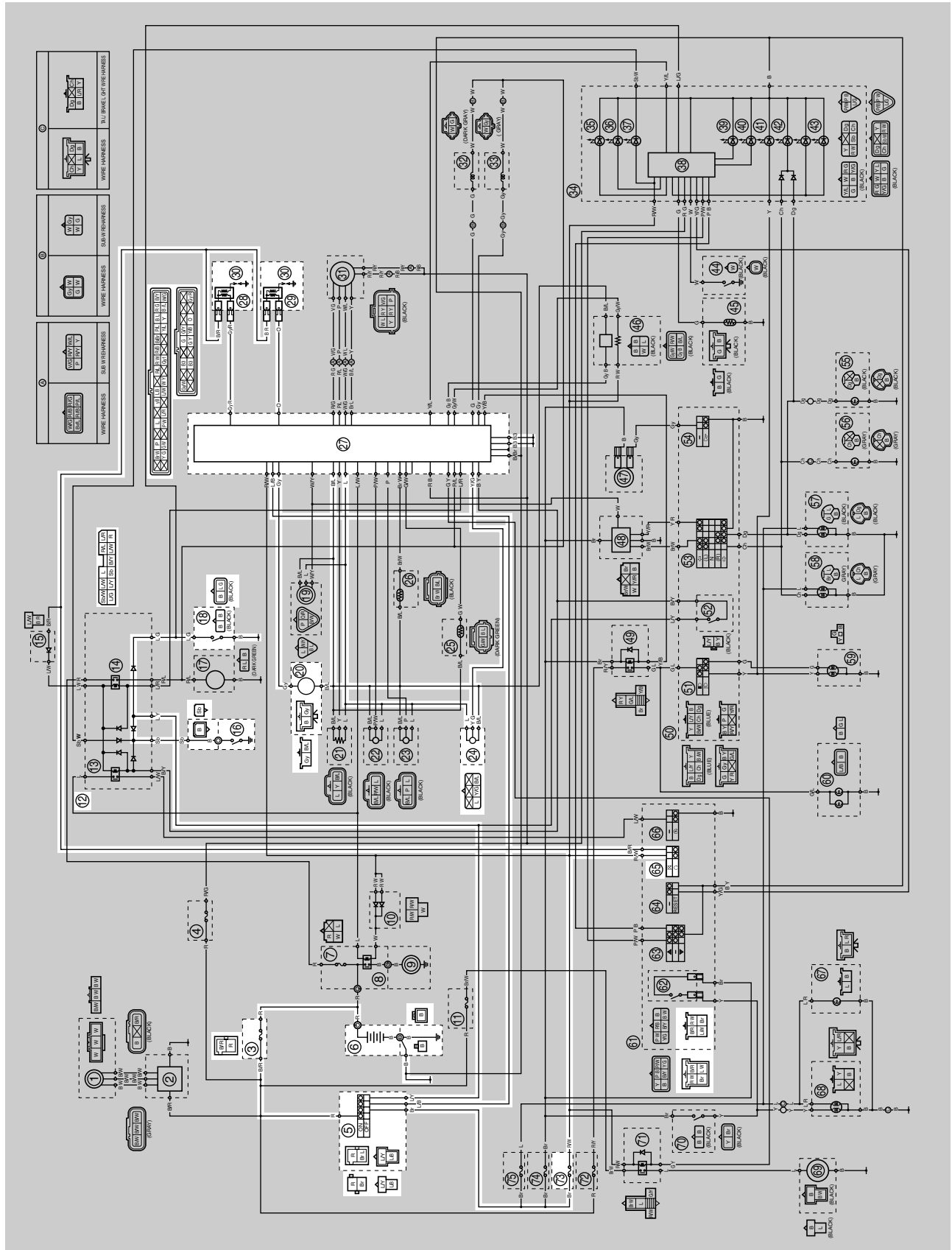


EAS27090

IGNITION SYSTEM

EAS27110

CIRCUIT DIAGRAM



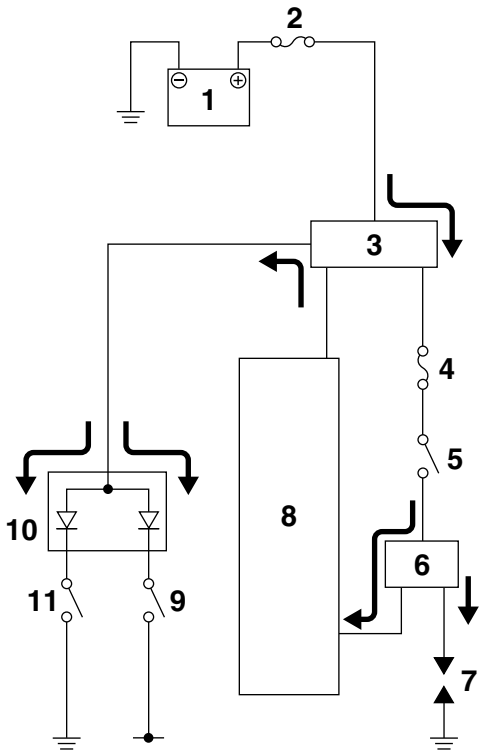
- 3. Main fuse
- 5. Main switch
- 6. Battery
- 12. Relay unit
- 16. Neutral switch
- 18. Sidestand switch
- 20. Crankshaft position sensor
- 24. Lean angle sensor
- 27. ECU (engine control unit)
- 28. Rear cylinder ignition coil
- 29. Front cylinder ignition coil
- 30. Spark plug
- 65. Engine stop switch
- 73. Ignition fuse

EAS3D81009

ENGINE STOPPING DUE TO SIDESTAND OPERATION

When the engine is running and the transmission is in gear, the engine will stop if the sidestand is moved down. This is because the electric current from the ignition coils does not flow to the ECU when both the neutral switch and sidestand switch are set to "OFF", thereby preventing the spark plugs from producing a spark. However, the engine continues to run under the following conditions:

- The transmission is in gear (the neutral switch is open) and the sidestand is up (the sidestand switch is closed).
- The transmission is in neutral (the neutral switch is closed) and the sidestand is down (the sidestand switch is open).



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Ignition coil
7. Spark plug
8. ECU (engine control unit)
9. Sidestand switch
10. Relay unit (diode)
11. Neutral switch

EAS27140

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

NOTE:

• Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Battery box
5. Headlight lens unit

<p>1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
<p>OK ↓</p>		
<p>3. Check the spark plugs. Refer to "CHECKING THE SPARK PLUGS" on page 3-9.</p>	<p>NG →</p>	<p>Regap or replace the spark plug(s).</p>
<p>OK ↓</p>		
<p>4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-82.</p>	<p>OK →</p>	<p>Ignition system is OK.</p>
<p>NG ↓</p>		
<p>5. Check the spark plug caps. Refer to "CHECKING THE SPARK PLUG CAPS" on page 8-83.</p>	<p>NG →</p>	<p>Replace the spark plug cap(s).</p>
<p>OK ↓</p>		
<p>6. Check the ignition coils. Refer to "CHECKING THE IGNITION COILS" on page 8-83.</p>	<p>NG →</p>	<p>Replace the ignition coil(s).</p>
<p>OK ↓</p>		
<p>7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-84.</p>	<p>NG →</p>	<p>Replace the crankshaft position sensor/stator assembly.</p>
<p>OK ↓</p>		

IGNITION SYSTEM

8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the main switch.
OK ↓		
9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the right handlebar switch.
OK ↓		
10. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the neutral switch.
OK ↓		
11. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the sidestand switch.
OK ↓		
12. Check the relay unit (diode). Refer to "CHECKING THE DIODES" on page 8-81.	NG →	Replace the relay unit.
OK ↓		
13. Check the lean angle sensor. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-84.	NG →	Replace the lean angle sensor.
OK ↓		
14. Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-1.	NG →	Properly connect or repair the ignition system's wiring.
OK ↓		
Replace the ECU.		

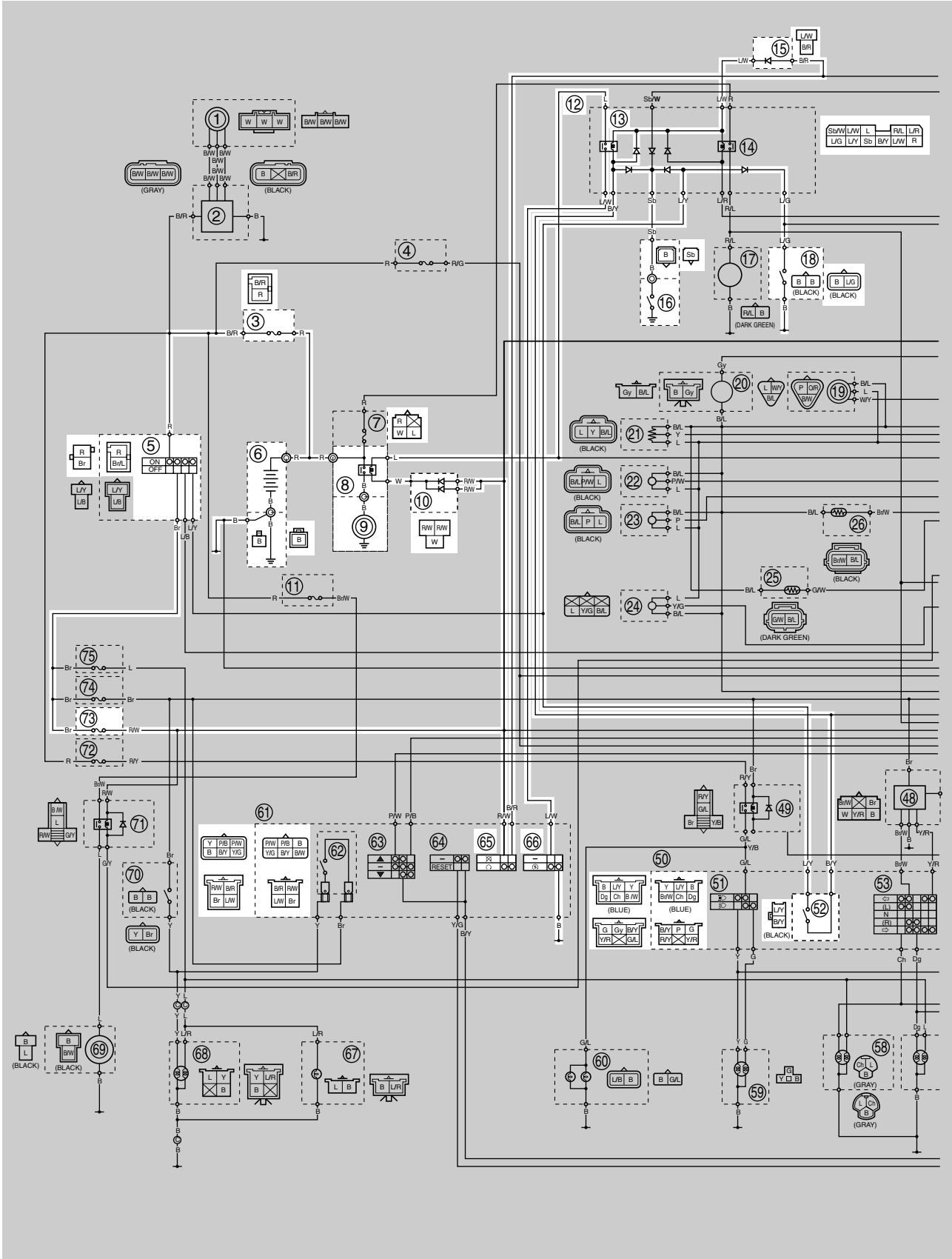
ELECTRIC STARTING SYSTEM

EAS27160

ELECTRIC STARTING SYSTEM

EAS27170

CIRCUIT DIAGRAM



ELECTRIC STARTING SYSTEM

- 3. Main fuse
- 5. Main switch
- 6. Battery
- 8. Starter relay
- 9. Starter motor
- 10. Diode 1
- 12. Relay unit
- 13. Starting circuit cut-off relay
- 15. Diode 2
- 16. Neutral switch
- 18. Sidestand switch
- 52. Clutch switch
- 65. Engine stop switch
- 66. Start switch
- 73. Ignition fuse

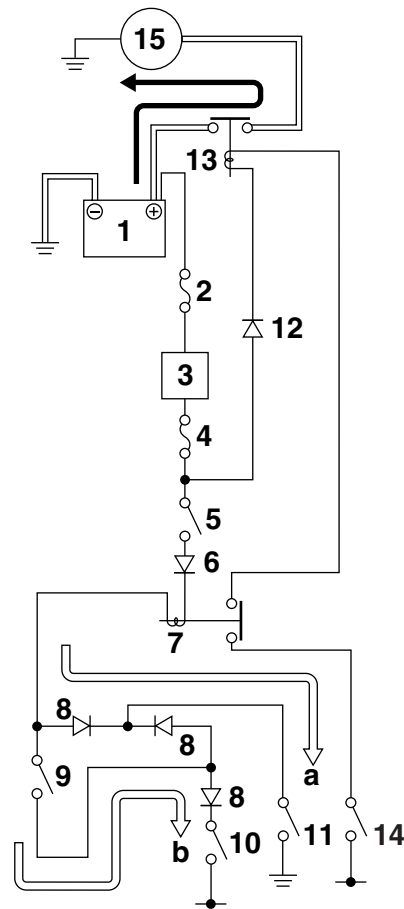
EAS27180

STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met, the starting circuit cut-off relay is closed and the engine can be started by pressing the start switch.



ELECTRIC STARTING SYSTEM

- a. WHEN THE TRANSMISSION IS IN NEUTRAL
- b. WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR
 1. Battery
 2. Main fuse
 3. Main switch
 4. Ignition fuse
 5. Engine stop switch
 6. Diode 2
 7. Relay unit (starting circuit cut-off relay)
 8. Relay unit (diode)
 9. Clutch switch
 10. Sidestand switch
 11. Neutral switch
 12. Diode 1
 13. Starter relay
 14. Start switch
 15. Starter motor

EAS27190

TROUBLESHOOTING

The starter motor fails to turn.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Headlight lens unit

<p>1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
<p>OK ↓</p>		
<p>3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-85.</p>	<p>OK →</p>	<p>The starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.</p>
<p>NG ↓</p>		
<p>4. Check the starter motor. Refer to "CHECKING THE STARTER MOTOR" on page 5-64.</p>	<p>NG →</p>	<p>Repair or replace the starter motor.</p>
<p>OK ↓</p>		
<p>5. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-79.</p>	<p>NG →</p>	<p>Replace the relay unit.</p>
<p>OK ↓</p>		
<p>6. Check the relay unit (diode). Refer to "CHECKING THE DIODES" on page 8-81.</p>	<p>NG →</p>	<p>Replace the relay unit.</p>
<p>OK ↓</p>		
<p>7. Check the diode 1. Refer to "CHECKING THE DIODES" on page 8-81.</p>	<p>NG →</p>	<p>Replace the diode 1.</p>
<p>OK ↓</p>		

ELECTRIC STARTING SYSTEM

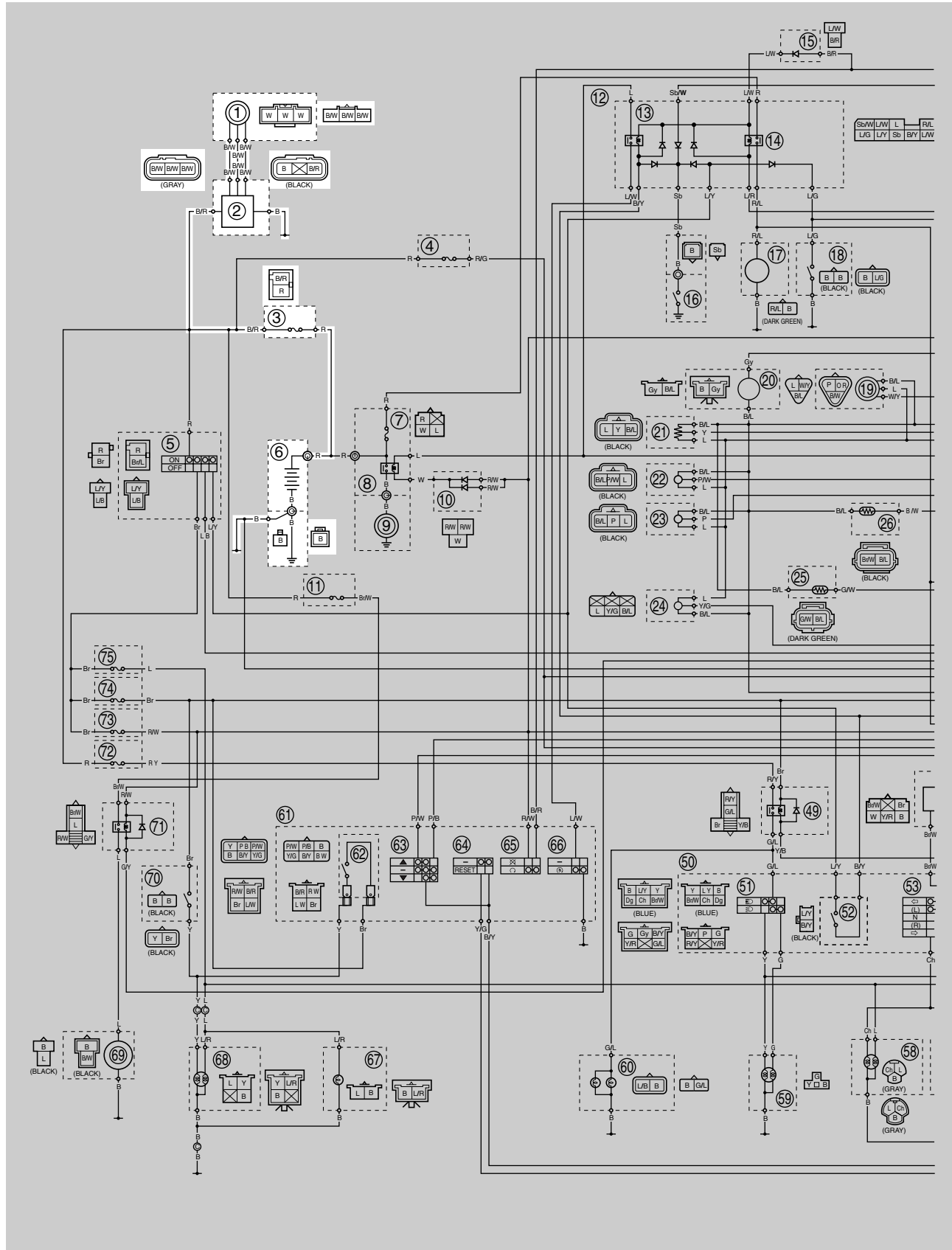
8. Check the diode 2. Refer to "CHECKING THE DIODES" on page 8-81.	NG →	Replace the diode 2.
OK ↓		
9. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-79.	NG →	Replace the starter relay.
OK ↓		
10. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the main switch.
OK ↓		
11. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the right handlebar switch.
OK ↓		
12. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the neutral switch.
OK ↓		
13. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the sidestand switch.
OK ↓		
14. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the clutch switch.
OK ↓		
15. Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the right handlebar switch.
OK ↓		
16. Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-7.	NG →	Properly connect or repair the starting system's wiring.
OK ↓		
The starting system circuit is OK.		

EAS27200

CHARGING SYSTEM

EAS27210

CIRCUIT DIAGRAM



1. AC magneto
2. Rectifier/regulator
3. Main fuse
6. Battery

EAS27230

TROUBLESHOOTING

The battery is not being charged.

NOTE:

- Before troubleshooting, remove the following part(s):
 1. Rider seat
 2. Tool kit tray
 3. Rectifier/regulator cover

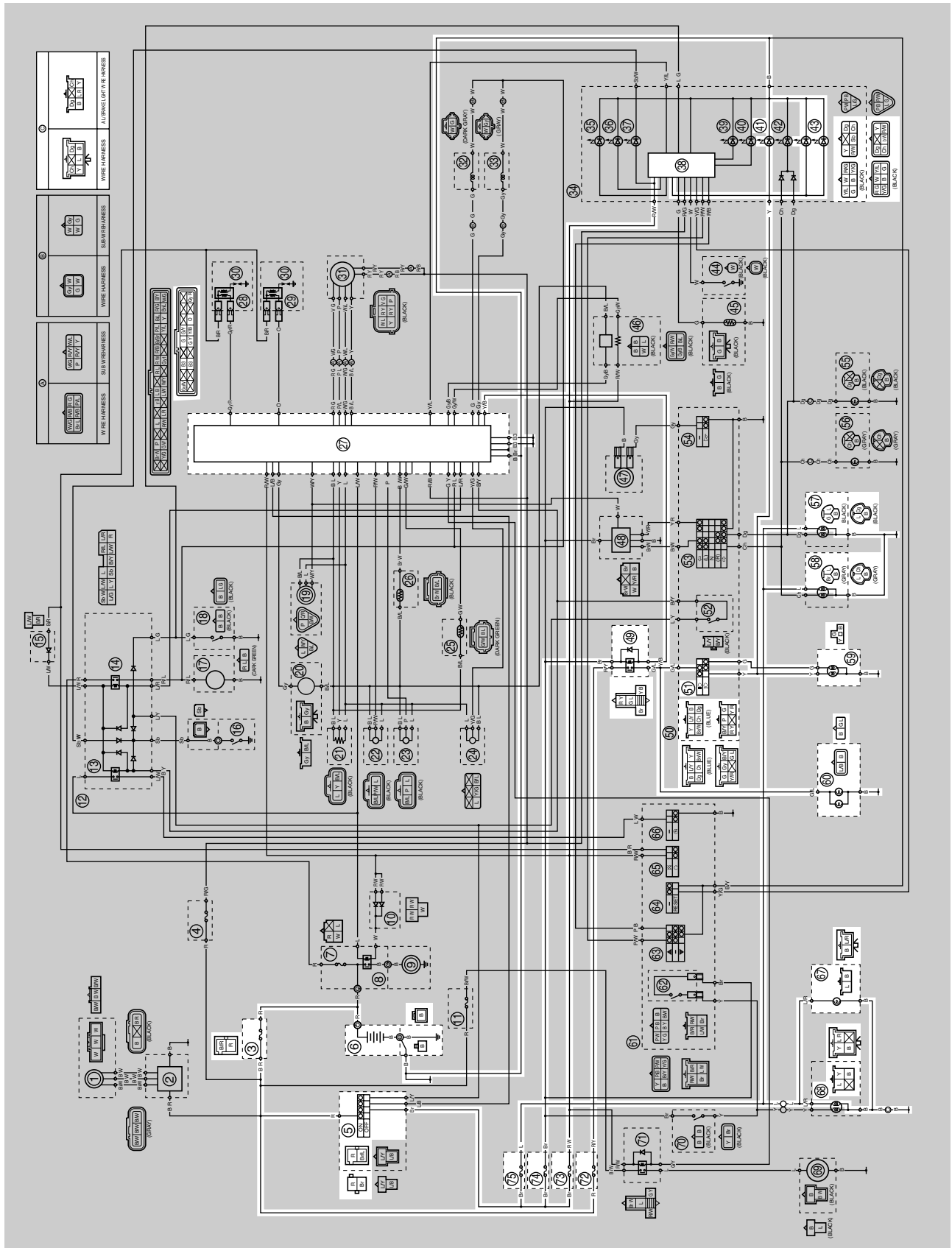
<p>1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse.</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
<p>OK ↓</p>		
<p>3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-85.</p>	<p>NG →</p>	<p>Replace the crankshaft position sensor/stator assembly.</p>
<p>OK ↓</p>		
<p>4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-85.</p>	<p>NG →</p>	<p>Replace the rectifier/regulator.</p>
<p>OK ↓</p>		
<p>5. Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-13.</p>	<p>NG →</p>	<p>Properly connect or repair the charging system's wiring.</p>
<p>OK ↓</p>		
<p>The charging system circuit is OK.</p>		

EAS27240

LIGHTING SYSTEM

EAS27250

CIRCUIT DIAGRAM



- 3. Main fuse
- 5. Main switch
- 6. Battery
- 27. ECU (engine control unit)
- 38. Multi-function meter
- 41. High beam indicator light
- 43. Meter light
- 49. Headlight relay
- 51. Dimmer switch
- 57. Front right turn signal light
- 58. Front left turn signal light
- 59. Headlight
- 60. Accessory light (OPTION)
- 67. License plate light
- 68. Tail/brake light
- 72. Headlight fuse
- 73. Ignition fuse
- 74. Signaling system fuse
- 75. Taillight fuse

EAS27260

TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, license plate light, position light, meter light and accessory light (OPTION).

NOTE:

• Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Headlight lens unit

<p>1. Check the condition of each bulb and bulb socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-74.</p>	<p>NG →</p>	<p>Replace the bulb(s) and bulb socket(s).</p>
<p>OK ↓</p>		
<p>2. Check the fuses. (Main, headlight, signaling system, ignition and taillight) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
<p>OK ↓</p>		
<p>4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
<p>OK ↓</p>		
<p>5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>The dimmer switch is faulty. Replace the left handlebar switch.</p>
<p>OK ↓</p>		
<p>6. Check the headlight relay. Refer to "CHECKING THE RELAYS" on page 8-79.</p>	<p>NG →</p>	<p>Replace the headlight relay.</p>
<p>OK ↓</p>		

7. Check the entire lighting system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-17.

OK ↓

Replace the ECU or meter assembly.

NG →

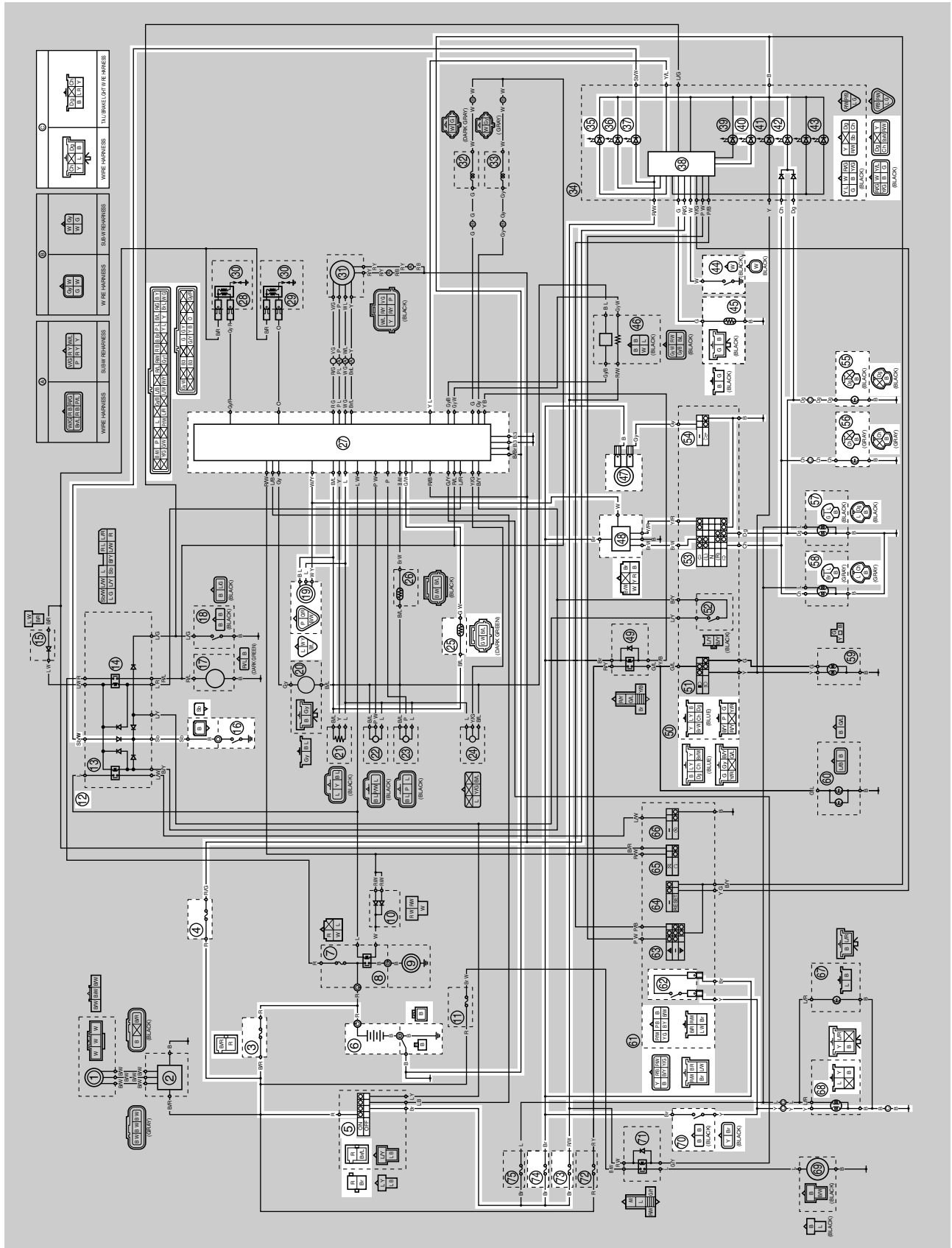
Properly connect or repair the lighting system's wiring.

EAS27270

SIGNALING SYSTEM

EAS27280

CIRCUIT DIAGRAM



3. Main fuse
4. Backup fuse (odometer and clock)
5. Main switch
6. Battery
12. Relay unit
16. Neutral switch
19. Speed sensor
25. Coolant temperature sensor
27. ECU (engine control unit)
35. Fuel level warning light
36. Oil level warning light
37. Neutral indicator light
38. Multi-function meter
40. Coolant temperature warning light
42. Turn signal indicator light
44. Oil level switch
45. Fuel sender
47. Horn
48. Turn signal relay
53. Turn signal switch
54. Horn switch
55. Rear right turn signal light
56. Rear left turn signal light
57. Front right turn signal light
58. Front left turn signal light
62. Front brake light switch
68. Tail/brake light
70. Rear brake light switch
73. Ignition fuse
74. Signaling system fuse

EAS27290

TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.
- The speedometer fails to operate.

NOTE:

- Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Headlight lens unit

<p>1. Check the fuses. (Main, signaling, ignition and back-up) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
OK ↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
OK ↓		
<p>4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.</p>	<p>NG →</p>	<p>Properly connect or repair the signaling system's wiring.</p>
OK ↓		
<p>Check the condition of each of the signaling system's circuits. Refer to "Checking the signaling system".</p>		

Check the signaling system

The horn fails to sound.

<p>1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>The horn switch is faulty. Replace the left handlebar switch.</p>
OK ↓		
<p>2. Check the horn. Refer to "CHECKING THE HORN" on page 8-86.</p>	<p>NG →</p>	<p>Replace the horn.</p>
OK ↓		

SIGNALING SYSTEM

3. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG →

Properly connect or repair the signaling system's wiring.

OK ↓

This circuit is OK.

The brake light fails to come on.

1. Check the brake light bulb and socket.
Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-74.

NG →

Replace the brake light bulb, socket or both.

OK ↓

2. Check the front brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-71.

NG →

Replace the front brake light switch.

OK ↓

3. Check the rear brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-71.

NG →

Replace the rear brake light switch.

OK ↓

4. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG →

Properly connect or repair the signaling system's wiring.

OK ↓

This circuit is OK.

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 8-74.

NG →

Replace the turn signal light bulb(s), socket(s) or both.

OK ↓

2. Check the turn signal switch.
Refer to "CHECKING THE SWITCHES" on page 8-71.

NG →

The turn signal switch is faulty. Replace the left handlebar switch.

OK ↓

SIGNALING SYSTEM

3. Check the turn signal relay. Refer to "CHECKING THE RELAYS" on page 8-79.	NG →	Replace the turn signal relay.
OK ↓		
4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG →	Properly connect or repair the signaling system's wiring.
OK ↓		
Replace the meter assembly.		
<u>The neutral indicator light fails to come.</u>		
1. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-71.	NG →	Replace the neutral switch.
OK ↓		
2. Check the relay unit (diode). Refer to "CHECKING THE DIODES" on page 8-81.	NG →	Replace the relay unit.
OK ↓		
3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG →	Properly connect or repair the signaling system's wiring.
OK ↓		
Replace the meter assembly.		
<u>The oil level warning light fails to come.</u>		
1. Check the oil level switch. Refer to "CHECKING THE OIL LEVEL SWITCH" on page 8-86.	NG →	Replace the oil level switch.
OK ↓		
2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-21.	NG →	Properly connect or repair the signaling system's wiring.
OK ↓		
Replace the meter assembly.		

The fuel level warning light fails to come.

1. Check the fuel sender.
Refer to "CHECKING THE FUEL SENDER" on page 8-87.

NG →

Replace the fuel sender.

OK ↓

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG →

Properly connect or repair the signaling system's wiring.

OK ↓

Replace the meter assembly.

The coolant temperature warning light fails to come.

1. Check the coolant temperature sensor.
Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-88.

NG →

Replace the coolant temperature sensor.

OK ↓

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG →

Properly connect or repair the signaling system's wiring.

OK ↓

Replace the ECU or meter assembly.

The speedometer fails to operate.

1. Check the speed sensor.
Refer to "CHECKING THE SPEED SENSOR" on page 8-88.

NG →

Replace the speed sensor.

OK ↓

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-21.

NG →

Properly connect or repair the signaling system's wiring.

OK ↓

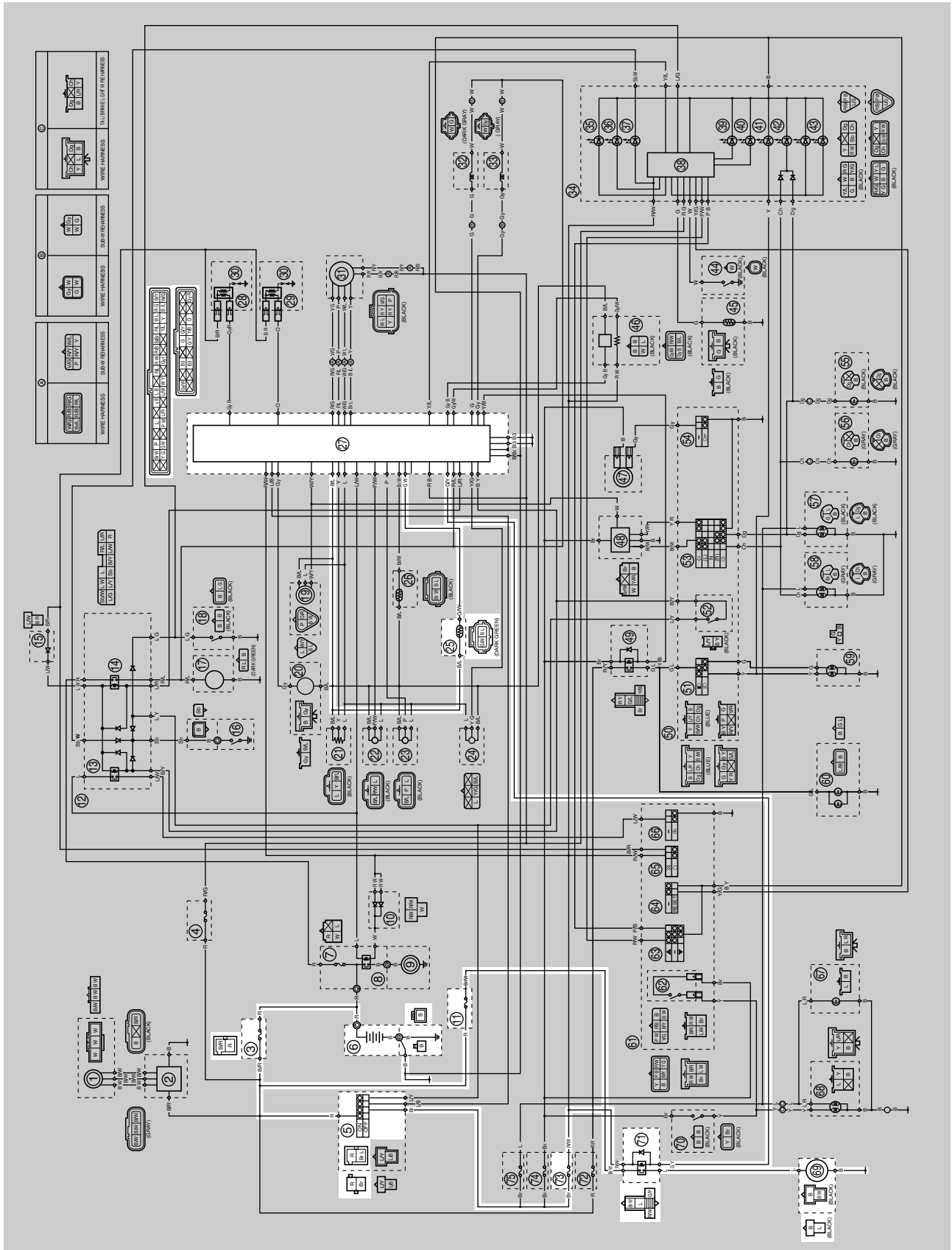
Replace the ECU or meter assembly.

EAS27300

COOLING SYSTEM

EAS27310

CIRCUIT DIAGRAM



- 3. Main fuse
- 5. Main switch
- 6. Battery
- 11. Radiator fan motor fuse
- 25. Coolant temperature sensor
- 27. ECU (engine control unit)
- 69. Radiator fan motor
- 71. Radiator fan motor relay
- 73. Ignition fuse

EAS27320

TROUBLESHOOTING

The radiator fan motor fails to turn.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Headlight lens unit

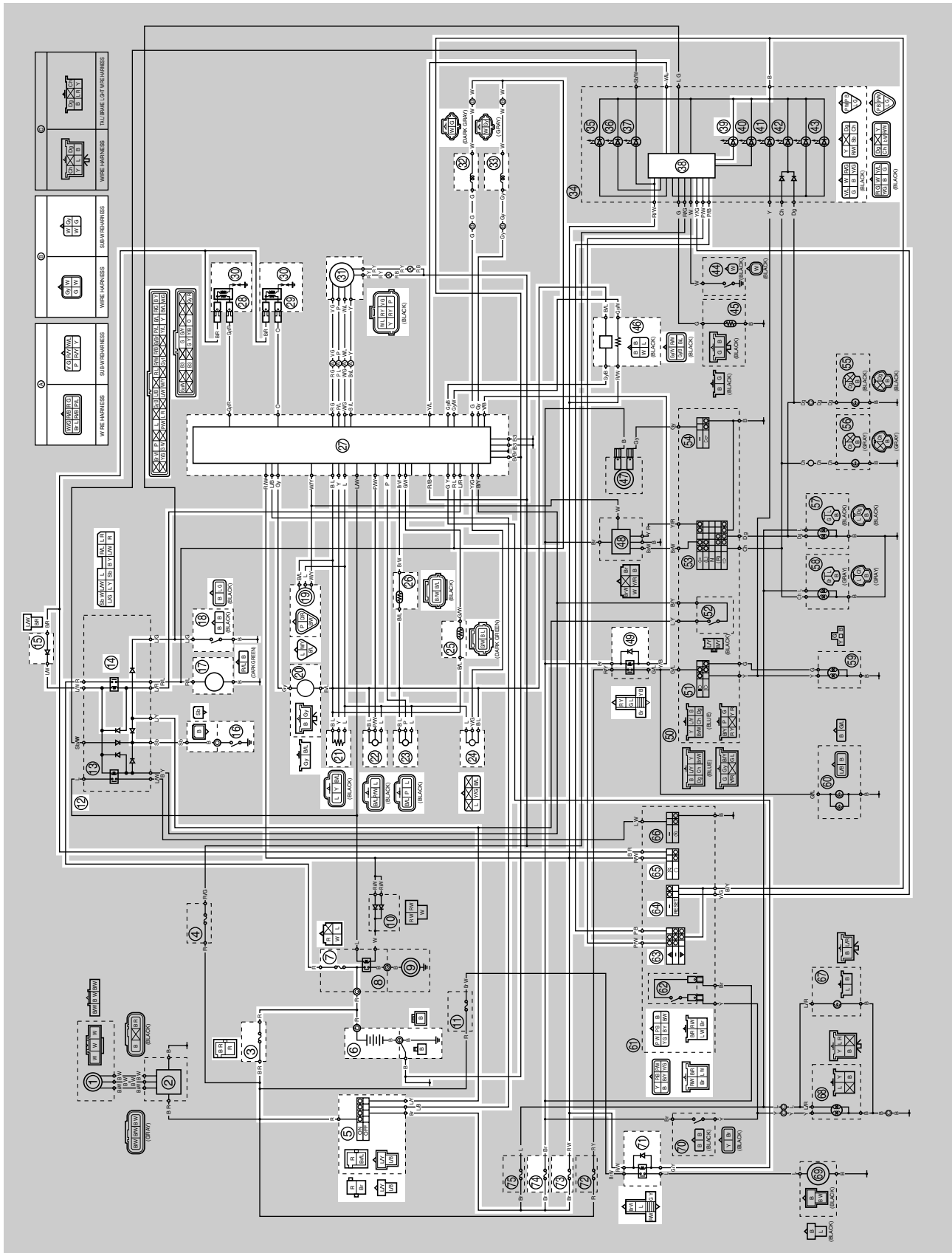
<p>1. Check the fuses. (Main, ignition and radiator fan motor) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
<p>OK ↓</p>		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
<p>OK ↓</p>		
<p>4. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 8-88.</p>	<p>NG →</p>	<p>Replace the radiator fan motor.</p>
<p>OK ↓</p>		
<p>5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-79.</p>	<p>NG →</p>	<p>Replace the radiator fan motor relay.</p>
<p>OK ↓</p>		
<p>6. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-88.</p>	<p>NG →</p>	<p>Replace the coolant temperature sensor.</p>
<p>OK ↓</p>		
<p>7. Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-27.</p>	<p>NG →</p>	<p>Properly connect or repair the cooling system's wiring.</p>
<p>OK ↓</p>		
<p>Replace the ECU.</p>		

EAS27330

FUEL INJECTION SYSTEM

EAS27340

CIRCUIT DIAGRAM



3. Main fuse
5. Main switch
6. Battery
7. Fuel injection system fuse
12. Relay unit
14. Fuel pump relay
15. Diode 2
16. Neutral switch
17. Fuel pump
18. Sidestand switch
19. Speed sensor
20. Crankshaft position sensor
21. Throttle position sensor
22. Rear cylinder intake air pressure sensor
23. Front cylinder intake air pressure sensor
24. Lean angle sensor
25. Coolant temperature sensor
26. Air temperature sensor
27. ECU (engine control unit)
28. Rear cylinder ignition coil
29. Front cylinder ignition coil
30. Spark plug
31. ISC (idle speed control) unit
32. Front cylinder injector
33. Rear cylinder injector
38. Multi-function meter
39. Engine trouble warning light
46. O₂ sensor
49. Headlight relay
63. Select switch
64. Reset switch
65. Engine stop switch
71. Radiator fan motor relay
73. Ignition fuse
74. Signaling system fuse

EAS27350

ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the odometer/tripmeter/fuel reserve tripmeter/clock LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

Engine trouble warning light indication and fuel injection system operation

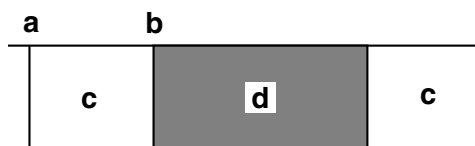
Warning light indication	ECU operation	Fuel injection operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

- | | |
|--|---|
| 12: Crankshaft position sensor | 41: Lean angle sensor (open or short-circuit) |
| 19: Blue/black ECU lead (broken or disconnected) | 50: ECU internal malfunction (memory check error) |
| 30: Lean angle sensor (latch up detected) | |

Checking the engine trouble warning light

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and it comes on while the start switch is being pushed. If the warning light does not come on under these conditions, the warning light (LED) may be defective.



- a. Main switch "OFF"
- b. Main switch "ON"
- c. Engine trouble warning light off
- d. Engine trouble warning light on for 1.4 seconds

EAS27380

SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

Self-Diagnostic Function table

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Front cylinder intake air pressure sensor (open or short circuit)	Front cylinder intake air pressure sensor: open or short circuit detected.	Able	Able
14	Front cylinder intake air pressure sensor (hose system)	Front cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor: open or short circuit detected.	Able	Able
19	Blue/black ECU lead (broken or disconnected)	A break or disconnection of the blue/black lead of the ECU is detected.	Unable	Unable
21	Coolant temperature sensor	Coolant temperature sensor: open or short circuit detected.	Able	Able
22	Air temperature sensor (open or short circuit)	Air temperature sensor: open or short circuit detected.	Able	Able
24	O ₂ sensor	No normal signal is received from the O ₂ sensor.	Able	Able

FUEL INJECTION SYSTEM

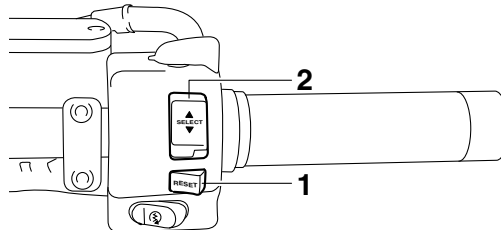
Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
25	Rear cylinder intake air pressure sensor (open or short circuit)	Rear cylinder intake air pressure sensor: open or short circuit detected.	Able	Able
26	Rear cylinder intake air pressure sensor (hose system)	Rear cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	Able	Able
30	Lean angle sensor (latch up detected)	The vehicle has overturned.	Unable	Unable
33	Front cylinder ignition coil (faulty ignition)	Malfunction detected in the primary wire of the front cylinder ignition coil.	Able (depending on the number of faulty cylinders)	Able (depending on the number of faulty cylinders)
34	Rear cylinder ignition coil (faulty ignition)	Malfunction detected in the primary wire of the rear cylinder ignition coil.	Able (depending on the number of faulty cylinders)	Able (depending on the number of faulty cylinders)
37	ISC valve (stuck fully open)	Engine speed is high when the engine is idling.	Able	Able
41	Lean angle sensor (open or short circuit)	Lean angle sensor: open or short circuit detected.	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.	Able	Able
	Neutral switch	Open or short circuit is detected in the neutral switch.		
43	Fuel system voltage (monitoring voltage)	The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	Error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (monitoring voltage)	Power supply to the fuel injection system is not normal.	Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	Unable	Unable
70	Engine idling stop	Engine has been left idling. (The ECU automatically stops the engine after 20 minutes if it is left idling.)	Able	Able

EAS27420

DIAGNOSTIC MODE

Setting the diagnostic mode

1. Turn the main switch to “OFF” and set the engine stop switch to “○”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Press and hold the “RESET” switch “1” and the “▲” side of the “SELECT” switch “2” turn the main switch to “ON”, and continue to press the switches for 8 seconds or more.



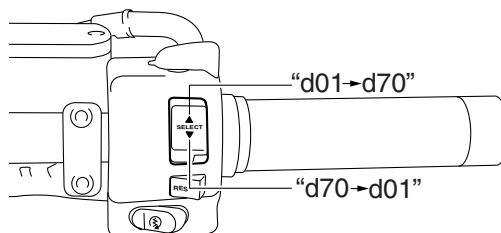
NOTE:

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

4. Simultaneously press the “▲” side of the “SELECT” switch and the “RESET” switch for 2 seconds or more to activate the diagnostic mode. The diagnostic code number “d01” appears on the clock LCD.
5. Set the engine stop switch to “⊗”.
6. Select the diagnostic code number corresponding to the fault code number by pressing the “SELECT” and “RESET” switches.

NOTE:

- To decrease the selected diagnostic code number, press the “▼” side of the “SELECT” switch. Press the “▼” side of the “SELECT” switch for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the “▲” side of the switch. Press the “▲” side of the switch for 1 second or longer to automatically increase the diagnostic code numbers.



7. Verify the operation of the sensor or actuator.

- Sensor operation

The data representing the operating conditions of the sensor appears on the odometer/trip meter/fuel reserve trip meter/clock LCD.

- Actuator operation

Set the engine stop switch to “○” to operate the actuator.

FUEL INJECTION SYSTEM

NOTE:

If the engine stop switch is set to “○”, set it to “⊗”, and then set it to “○” again.

8. Turn the main switch to “OFF” to cancel the diagnostic mode.

Diagnostic code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
12	No normal signals are received from the crankshaft position sensor.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective crankshaft position sensor. • Malfunction in crankshaft position sensor rotor. • Malfunction in ECU. • Improperly installed sensor. 	—
13	Front cylinder intake air pressure sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective front cylinder intake air pressure sensor. • Malfunction in ECU. 	03
14	Front cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	<ul style="list-style-type: none"> • Front cylinder intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU. 	03
15	Throttle position sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU. • Improperly installed throttle position sensor. 	01
19	A break or disconnection of the blue/black lead of the ECU is detected.	<ul style="list-style-type: none"> • Open circuit in wire harness (ECU coupler). • Malfunction in ECU. 	20
21	Coolant temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective coolant temperature sensor. • Malfunction in ECU. • Improperly installed coolant temperature sensor. 	06
22	Air temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective air temperature sensor. • Malfunction in ECU. • Improperly installed air temperature sensor. 	05
24	No normal signal is received from the O ₂ sensor.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective O₂ sensor. • Malfunction in ECU. • Improperly installed sensor. 	—
25	Rear cylinder intake air pressure sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective rear cylinder intake air pressure sensor. • Malfunction in ECU. 	04
26	Rear cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	<ul style="list-style-type: none"> • Rear cylinder intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU. 	04

FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
30	The vehicle has over-turned.	<ul style="list-style-type: none"> • Overturned. • Malfunction in ECU. 	08
33	Malfunction detected in the primary wire of the front cylinder ignition coil.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Malfunction in front cylinder ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cut-off circuit system. 	30
34	Malfunction detected in the primary wire of the rear cylinder ignition coil.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Malfunction in rear cylinder ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cut-off circuit system. 	31
37	Engine speed is high when the engine is idling.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Open or short circuit in sub-wire harness. • Malfunction in throttle body. • Malfunction in throttle cables. • ISC valve is stuck fully open due to disconnected ISC unit hose or coupler. (High engine idling speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.) • Malfunction in ECU. 	54
41	Lean angle sensor: open or short circuit detected.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU. 	08
42	No normal signals are received from the speed sensor. Open circuit is detected in the neutral switch.	<ul style="list-style-type: none"> • Open circuit in wire harness. • Defective speed sensor. • Malfunction in speed sensor detected. • Defective neutral switch. • Malfunction in the engine side of the neutral switch. • Malfunction in ECU. 	07 21
43	The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Malfunction in ECU. 	09
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	<ul style="list-style-type: none"> • Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory). 	60
46	Power supply to the fuel injection system is not normal.	Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 8-13.	—
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	<ul style="list-style-type: none"> • Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.) 	—

FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
Er-1	No signals are received from the ECU.	<ul style="list-style-type: none"> • Open or short circuit in wire harness. • Malfunction in meter. • Malfunction in ECU. • Defective wire connection of the ECU coupler. 	—
Er-2	No signals are received from the ECU within the specified duration.	<ul style="list-style-type: none"> • Improper connection in wire harness. • Malfunction in meter. • Malfunction in ECU. 	—
Er-3	Data from the ECU cannot be received correctly.	<ul style="list-style-type: none"> • Improper connection in wire harness. • Malfunction in meter. • Malfunction in ECU. 	—
Er-4	Non-registered data has been received from the meter.	<ul style="list-style-type: none"> • Improper connection in wire harness. • Malfunction in meter. • Malfunction in ECU. 	—

Sensor operation table

Diagnostic code No.	Item	Meter display	Checking method
01	Throttle angle <ul style="list-style-type: none"> • Fully closed position • Fully opened position 	12–22 87–107	Check with throttle fully closed. Check with throttle fully open.
03	Pressure difference (atmospheric pressure and front cylinder intake air pressure)	Displays the front cylinder intake air pressure.	Set the engine stop switch to “○”, and then push the start switch “⊗”. (If the display value changes, the performance is OK.)
04	Pressure difference (atmospheric pressure and rear cylinder intake air pressure)	Displays the rear cylinder intake air pressure.	Set the engine stop switch to “○”, and then push the start switch “⊗”. (If the display value changes, the performance is OK.)
05	Air temperature	Displays the air temperature.	Compare the actually measured intake air temperature with the meter display value.
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter display value.

FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Meter display	Checking method
07	Vehicle speed pulse	0-999	Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
08	Lean angle sensor <ul style="list-style-type: none"> • Upright • Overturned 	0.4-1.4 3.7-4.4	Remove the lean angle sensor and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Set the engine stop switch to "○", and then compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
20	Sidestand switch <ul style="list-style-type: none"> • Sidestand retracted • Sidestand extended 	ON OFF	Set on/off the sidestand switch (with the transmission in gear).
21	Neutral switch <ul style="list-style-type: none"> • Neutral • In gear 	ON OFF	Shift the transmission.
60	EEPROM fault code display <ul style="list-style-type: none"> • No history • History exists 	00 01 or 02 (Cylinder fault code) <ul style="list-style-type: none"> • (If both cylinders are defective, the display alternates every two seconds.) 	—
61	Malfunction history code display <ul style="list-style-type: none"> • No history • History exists 	00 Fault codes 12-70 <ul style="list-style-type: none"> • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.) 	—

FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Meter display	Checking method
62	Malfunction history code erasure <ul style="list-style-type: none"> • No history • History exists 	0 Up to 25 fault codes	— To erase the history, set the engine stop switch to “○”.
70	Control number	0–255	—

Actuator operation table

Diagnostic code No.	Item	Actuation	Checking method
30	Front cylinder ignition coil	Actuates the front cylinder ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> • Connect an ignition checker.
31	Rear cylinder ignition coil	Actuates the rear cylinder ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> • Connect an ignition checker.
36	Front cylinder injector	Actuates the front cylinder injector five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the front cylinder injector five times.
37	Rear cylinder injector	Actuates the rear cylinder injector five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the rear cylinder injector five times.
50	Fuel pump relay	Actuates the fuel pump relay five times at one-second intervals. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel pump relay five times.

FUEL INJECTION SYSTEM

Diagnostic code No.	Item	Actuation	Checking method
51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light and rotates the radiator fan motor.	Check the operating sound of the radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light and headlight.	Check the operating sound of the headlight relay five times.
54	ISC valve	Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 12 seconds until it is completed. Illuminates the engine trouble warning light.	The ISC unit vibrates when the ISC valve operates.

EAS27460

TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the meter display according to the reinstatement method.

Fault code No.:

Code number displayed on the meter when the engine failed to work normally. Refer to "Self-Diagnostic Function table".

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-37.

FUEL INJECTION SYSTEM

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.	
Diagnostic code No.	—	—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of crankshaft position sensor.		Check for looseness or pinching.	Cranking the engine.
2	Connections <ul style="list-style-type: none"> • Crankshaft position sensor coupler • Main wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU coupler. (gray–gray) (black/blue–black/blue) 	
4	Defective crankshaft position sensor.		<ul style="list-style-type: none"> • Replace if defective. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-84. 	

FUEL INJECTION SYSTEM

Fault code No.	13	Symptom	Front cylinder intake air pressure sensor: open or short circuit detected.	
Diagnostic code No.	03	Front cylinder intake air pressure sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Front cylinder intake air pressure sensor coupler • Main wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between front cylinder intake air pressure sensor coupler and ECU coupler. (black/blue–black/blue) (pink–pink) (blue–blue) 	
3	Defective front cylinder intake air pressure sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No.03) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSORS" on page 8-89. 	

FUEL INJECTION SYSTEM

Fault code No.	14	Symptom	Front cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	
Diagnostic code No.	03	Front cylinder intake air pressure sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Front cylinder intake air pressure sensor hose		<ul style="list-style-type: none"> • Check the front cylinder intake air pressure sensor hose condition. • Repair or replace the sensor hose. 	Starting the engine and operating it at idle.
2	Front cylinder intake air pressure sensor malfunction at intermediate electrical potential.		<ul style="list-style-type: none"> • Check and repair the connection. • Replace it if there is a malfunction. 	
3	Connections <ul style="list-style-type: none"> • Front cylinder intake air pressure sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
4	Defective front cylinder intake air pressure sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 03) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSORS" on page 8-89. 	

FUEL INJECTION SYSTEM

Fault code No.	15	Symptom	Throttle position sensor: open or short circuit detected.	
Diagnostic code No.	01	Throttle position sensor		
Order	Item/components and probable cause		Check or maintenance job	
1	Installed condition of throttle position sensor.		<ul style="list-style-type: none"> • Check for looseness or pinching. • Check that the sensor is installed in the specified position. 	
2	Connections <ul style="list-style-type: none"> • Throttle position sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between throttle position sensor coupler and ECU coupler. (blue–blue) (yellow–yellow) (black/blue–black/blue) 	
4	Throttle position sensor lead open circuit output voltage check.		<ul style="list-style-type: none"> • Check for open circuit and replace the throttle position sensor. (black/blue–yellow) 	
			Open circuit item	Output voltage
			Ground wire open circuit	5 V
			Output wire open circuit	0 V
			Power supply wire open circuit	0 V
5	Defective throttle position sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 01) • Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-89. 	

FUEL INJECTION SYSTEM

Fault code No.	19	Symptom	A break or disconnection of the blue/black lead of the ECU is detected.	
Diagnostic code No.	20	Sidestand switch		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connection • Wire harness ECU coupler		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 20) • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	If the transmission is in gear, retracting the sidestand. If the transmission is in neutral, reconnecting the wiring.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between ECU and blue/black lead. 	
3	Defective sidestand switch.		<ul style="list-style-type: none"> • Replace if defective. Refer to "CHECKING THE SWITCHES" on page 8-71. 	

Fault code No.	21	Symptom	Coolant temperature sensor: open or short circuit detected.	
Diagnostic code No.	06	Coolant temperature sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of coolant temperature sensor.		Check for looseness or pinching.	Turning the main switch to "ON".
2	Connections • Coolant temperature sensor coupler • Wire harness ECU coupler		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between coolant temperature sensor coupler and ECU coupler. (black/blue-black/blue) (green/white-green/white) 	
4	Defective coolant temperature sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 06) • Replace if defective. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-88. 	

FUEL INJECTION SYSTEM

Fault code No.	22	Symptom	Air temperature sensor: open or short circuit detected.	
Diagnostic code No.	05	Air temperature sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of air temperature sensor.		Check for looseness or pinching.	Turning the main switch to "ON".
2	Connections <ul style="list-style-type: none"> • Air temperature sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between air temperature sensor coupler and ECU coupler. (brown/white–brown/white) (black/blue–black/blue) 	
4	Defective air temperature sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 05) • Replace if defective. Refer to "CHECKING THE AIR TEMPERATURE SENSOR" on page 8-90. 	

FUEL INJECTION SYSTEM

Fault code No.	24	Symptom	No normal signal is received from the O ₂ sensor.	
Diagnostic code No.	—	—		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of O ₂ sensor.		Check for looseness or pinching.	Starting the engine and operating it at idle.
2	Connections <ul style="list-style-type: none"> • O₂ sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between O₂ sensor coupler and ECU coupler. (gray/white–gray/white) (red/white–red/white) (gray/black–gray/black) (black/blue–black/blue) 	
4	Check fuel pressure.		<ul style="list-style-type: none"> • Refer to “CHECKING THE FUEL PRESSURE” on page 7-11. 	
5	Defective O ₂ sensor.		<ul style="list-style-type: none"> • Replace if defective. 	

FUEL INJECTION SYSTEM

Fault code No.	25	Symptom	Rear cylinder intake air pressure sensor: open or short circuit detected.	
Diagnostic code No.	04	Rear cylinder intake air pressure sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Rear cylinder intake air pressure sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between rear cylinder intake air pressure sensor coupler and ECU coupler. (black/blue–black/blue) (pink/white–pink/white) (blue–blue) 	
3	Defective rear cylinder intake air pressure sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 04) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSORS" on page 8-89. 	

FUEL INJECTION SYSTEM

Fault code No.	26	Symptom	Rear cylinder intake air pressure sensor: hose system malfunction (clogged or detached hose).	
Diagnostic code No.	04	Rear cylinder intake air pressure sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Rear cylinder intake air pressure sensor hose		<ul style="list-style-type: none"> • Check the rear cylinder intake air pressure sensor hose condition. • Repair or replace the sensor hose. 	Starting the engine and operating it at idle.
2	Rear cylinder intake air pressure sensor malfunction at intermediate electrical potential.		<ul style="list-style-type: none"> • Check and repair the connection. • Replace it if there is a malfunction. 	
3	Connections <ul style="list-style-type: none"> • Rear cylinder intake air pressure sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
4	Defective rear cylinder intake air pressure sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 04) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSORS" on page 8-89. 	

Fault code No.	30	Symptom	The vehicle has overturned.	
Diagnostic code No.	08	Lean angle sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	The vehicle has overturned.		Raise the vehicle upright.	Turning the main switch to "ON" (however, the engine cannot be restarted unless the main switch is first turned "OFF").
2	Installed condition of lean angle sensor.		Check for looseness or pinching.	
3	Connections <ul style="list-style-type: none"> • Lean angle sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	
4	Defective lean angle sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 08) • Replace if defective. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-84. 	

FUEL INJECTION SYSTEM

Fault code No.	33	Symptom	Malfunction detected in the primary wire of the front cylinder ignition coil.	
Diagnostic code No.	30, 32	Front cylinder ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Front cylinder ignition coil connector (primary coil side) • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the connector and coupler for any pins that may be pulled out. • Check the locking condition of the connector and coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between front cylinder ignition coil connector and ECU coupler. (orange–orange) • Between front cylinder ignition coil connector and right handlebar switch coupler. (black/red–black/red) 	
3	Defective front cylinder ignition coil.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 30) • Check the primary and secondary coils for continuity. • Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-83. 	

FUEL INJECTION SYSTEM

Fault code No.	34	Symptom	Malfunction detected in the primary wire of the rear cylinder ignition coil.	
Diagnostic code No.	31, 33	Rear cylinder ignition coil		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Rear cylinder ignition coil connector (primary coil side) • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the connector and coupler for any pins that may be pulled out. • Check the locking condition of the connector and coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between rear cylinder ignition coil connector and ECU coupler. (gray/red–gray/red) • Between rear cylinder ignition coil connector and right handlebar switch coupler. (black/red–black/red) 	
3	Defective rear cylinder ignition coil.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 31) • Check the primary and secondary coils for continuity. • Replace if defective. Refer to “CHECKING THE IGNITION COILS” on page 8-83. 	

FUEL INJECTION SYSTEM

Fault code No.	37	Symptom	Engine speed is high when the engine is idling.	
Diagnostic code No.	54	ISC valve		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Throttle valve does not fully close.		<ul style="list-style-type: none"> • Check the throttle bodies. Refer to "THROTTLE BODIES" on page 7-7. • Check the throttle cables. Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" on page 3-8. 	ISC valve returns to its original position by turning the main switch to "ON" and back to "OFF". Reinstated if the engine idling speed is within specification after starting the engine.
2	ISC valve is stuck fully open due to disconnected ISC unit coupler. (High engine idling speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.)		<ul style="list-style-type: none"> • Check that the ISC unit coupler is not disconnected. • The ISC valve is stuck fully open if it does not operate when the main switch is turned to "OFF". (Touch the ISC unit with your hand and check if it is vibrating to confirm if the ISC valve is operating.) 	
3	ISC valve is not moving correctly.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 54) • After the ISC valve is fully closed, it opens to the standby opening position when the engine is started. This operation takes approximately 12 seconds. Start the engine. If the error recurs, replace the throttle body assembly. 	

FUEL INJECTION SYSTEM

Fault code No.	41	Symptom	Lean angle sensor: open or short circuit detected.	
Diagnostic code No.	08	Lean angle sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Lean angle sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in lead.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between lean angle sensor coupler and ECU coupler. (blue–blue) (yellow/green–yellow/green) (black/blue–black/blue) 	
3	Defective lean angle sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 08) • Replace if defective. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-84. 	

FUEL INJECTION SYSTEM

Fault code No.	42	Symptom	A. No normal signals are received from the speed sensor. B. Open circuit is detected in the neutral switch.	
Diagnostic code No.	A	07	Speed sensor	
	B	21	Neutral switch	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
A-1	Connections <ul style="list-style-type: none"> • Speed sensor coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine, and activating the speed sensor by operating the vehicle at 20 to 30 km/h.
A-2	Open or short circuit in speed sensor lead.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between speed sensor coupler and ECU coupler. (blue–blue) (white/yellow–white/yellow) (black/blue–black/blue) 	
A-3	Gear for detecting vehicle speed has broken.		<ul style="list-style-type: none"> • Replace if defective. Refer to “TRANSMISSION” on page 5-81. 	
A-4	Defective speed sensor.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 07) • Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 8-88. 	

FUEL INJECTION SYSTEM

Fault code No.	42	Symptom	A. No normal signals are received from the speed sensor. B. Open circuit is detected in the neutral switch.	
Diagnostic code No.	A	07	Speed sensor	
	B	21	Neutral switch	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
B-1	Connections <ul style="list-style-type: none"> • Neutral switch coupler • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine, and activating the speed sensor by operating the vehicle at 20 to 30 km/h.
B-2	Open circuit in neutral switch lead.		<ul style="list-style-type: none"> • Repair or replace if there is an open circuit. • Between neutral switch coupler and relay unit coupler (fuel pump relay). (sky blue–sky blue) • Between relay unit coupler and main switch. (blue/yellow–blue/yellow) • Between main switch and ECU coupler. (blue/black–blue/black) 	
B-3	Faulty shift drum (neutral detection area).		<ul style="list-style-type: none"> • Replace if defective. Refer to “TRANSMISSION” on page 5-81. 	
B-4	Defective neutral switch.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 21) • Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-71. 	

FUEL INJECTION SYSTEM

Fault code No.	43	Symptom	The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	
Diagnostic code No.	09	Fuel system voltage		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Relay unit coupler (fuel pump relay) • Wire harness ECU coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine and operating it at idle.
2	Open or short circuit in the wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between relay unit coupler (fuel pump relay) and ECU coupler. (blue/red–blue/red) (red/blue–red/blue) • Between relay unit coupler (fuel pump relay) and starter relay coupler. (red–red) • Between relay unit coupler (fuel pump relay) and diode 2 coupler. (blue/white–blue/white) • Between diode 2 coupler and right handlebar switch coupler. (black/red–black/red) 	
3	Malfunction or open circuit in relay unit (fuel pump relay).		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 09) • Replace if defective. • If there is no malfunction with the relay unit (fuel pump relay), replace the ECU. 	

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).	
Diagnostic code No.	60	EEPROM improper cylinder indication		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU.		<ul style="list-style-type: none"> • Execute the diagnostic mode. (Code No. 60) <ol style="list-style-type: none"> 1. Check the faulty cylinder. (If multiple cylinders are defective, the numbers of the faulty cylinders are displayed alternately at 2-second intervals.) • Replace ECU if defective. 	Turning the main switch to "ON".

FUEL INJECTION SYSTEM

Fault code No.	46	Symptom	Power supply to the fuel injection system is not normal.	
Diagnostic code No.	—	—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connection • Wire harness ECU coupler		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Starting the engine and operating it at idle.
2	Faulty battery.		<ul style="list-style-type: none"> • Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-75. 	
3	Malfunction in rectifier/regulator.		<ul style="list-style-type: none"> • Replace if defective. Refer to “CHARGING SYSTEM” on page 8-13. 	
4	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit. • Between battery and main fuse. (red–red) • Between main fuse and main switch coupler. (black/red–red) • Between main switch coupler and ignition fuse. (brown–brown) • Between ignition fuse and ECU coupler. (red/white–red/white) 	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
Diagnostic code No.	—	—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU.		Replace the ECU. NOTE: _____ Do not perform this procedure with the main switch turned to “ON”. _____	Turning the main switch to “ON”.

FUEL INJECTION SYSTEM

Fault code No.	Er-1	Symptom	No signals are received from the ECU.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Wire harness ECU coupler • Meter assembly coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) 	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

Fault code No.	Er-2	Symptom	No signals are received from the ECU within the specified duration.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Wire harness ECU coupler • Meter assembly coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) 	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code No.	Er-3	Symptom	Data from the ECU cannot be received correctly.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Wire harness ECU coupler • Meter assembly coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) 	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

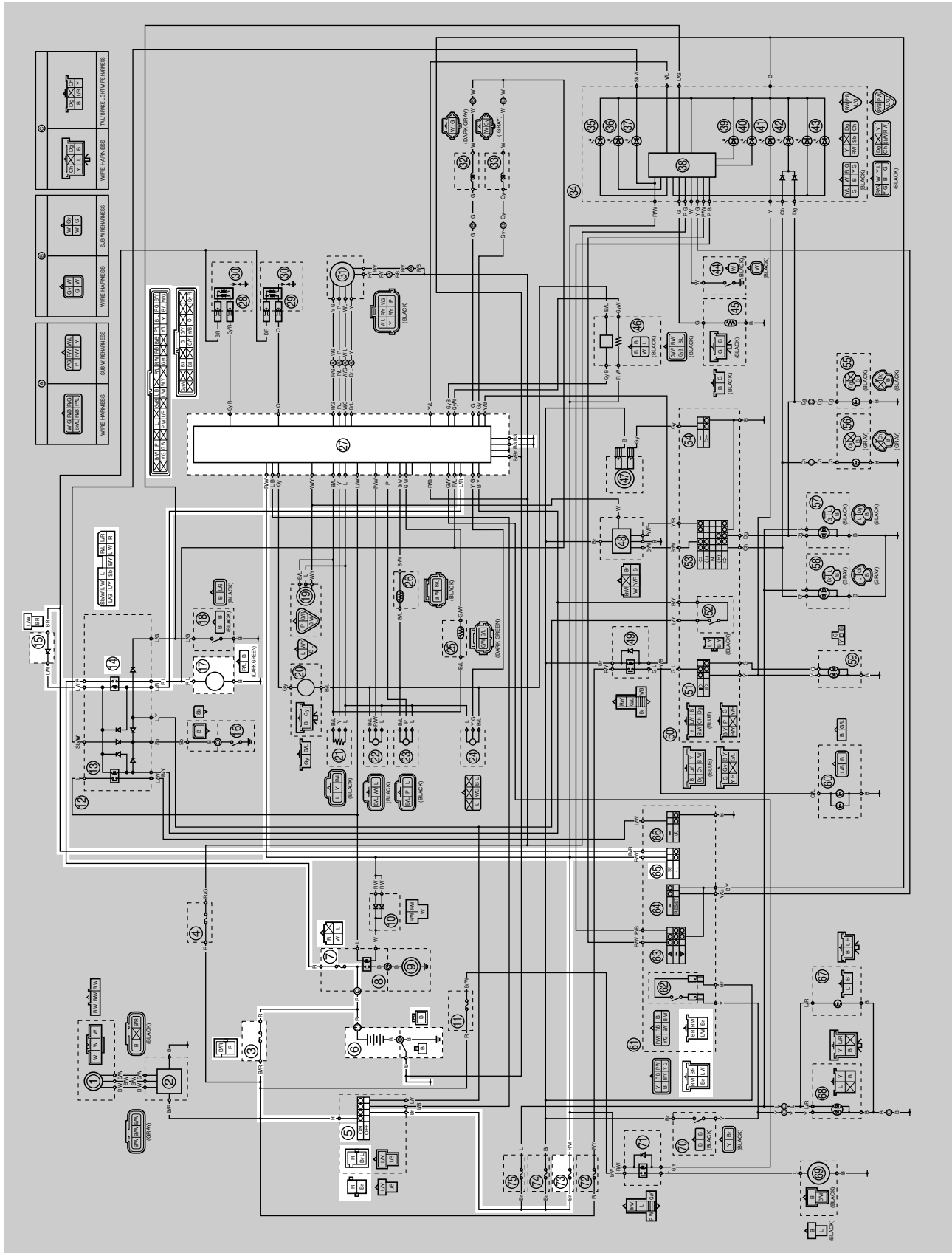
Fault code No.	Er-4	Symptom	Non-registered data has been received from the meter.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> • Wire harness ECU coupler • Meter assembly coupler 		<ul style="list-style-type: none"> • Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely. 	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> • Repair or replace if there is an open or short circuit between meter assembly coupler and ECU coupler. (yellow/blue–yellow/blue) 	
3	Malfunction in meter assembly.		Replace the meter assembly.	
4	Malfunction in ECU.		Replace the ECU.	

EAS27550

FUEL PUMP SYSTEM

EAS27560

CIRCUIT DIAGRAM



- 3. Main fuse
- 5. Main switch
- 6. Battery
- 7. Fuel injection system fuse
- 14. Fuel pump relay
- 15. Diode 2
- 17. Fuel pump
- 27. ECU (engine control unit)
- 65. Engine stop switch
- 73. Ignition fuse

EAS27570

TROUBLESHOOTING

The fuel pump fails to operate.

NOTE:

• Before troubleshooting, remove the following part(s):

1. Rider seat
2. Tool kit tray
3. Fuel tank
4. Battery box
5. Headlight lens unit

<p>1. Check the fuses. (Main, ignition and fuel injection system) Refer to "CHECKING THE FUSES" on page 8-75.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
OK ↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-75.</p>	<p>NG →</p>	<ul style="list-style-type: none"> • Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
OK ↓		
<p>4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-71.</p>	<p>NG →</p>	<p>The engine stop switch is faulty. Replace the right handlebar switch.</p>
OK ↓		
<p>5. Check the relay unit (fuel pump relay). Refer to "CHECKING THE RELAYS" on page 8-79.</p>	<p>NG →</p>	<p>Replace the relay unit.</p>
OK ↓		
<p>6. Check the fuel pump. Refer to "CHECKING THE FUEL PUMP BODY" on page 7-5.</p>	<p>NG →</p>	<p>Replace the fuel pump.</p>
OK ↓		
<p>7. Check the diode 2. Refer to "CHECKING THE DIODES" on page 8-81.</p>	<p>NG →</p>	<p>Replace the diode 2.</p>
OK ↓		

8. Check the entire fuel pump system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-63.

OK ↓

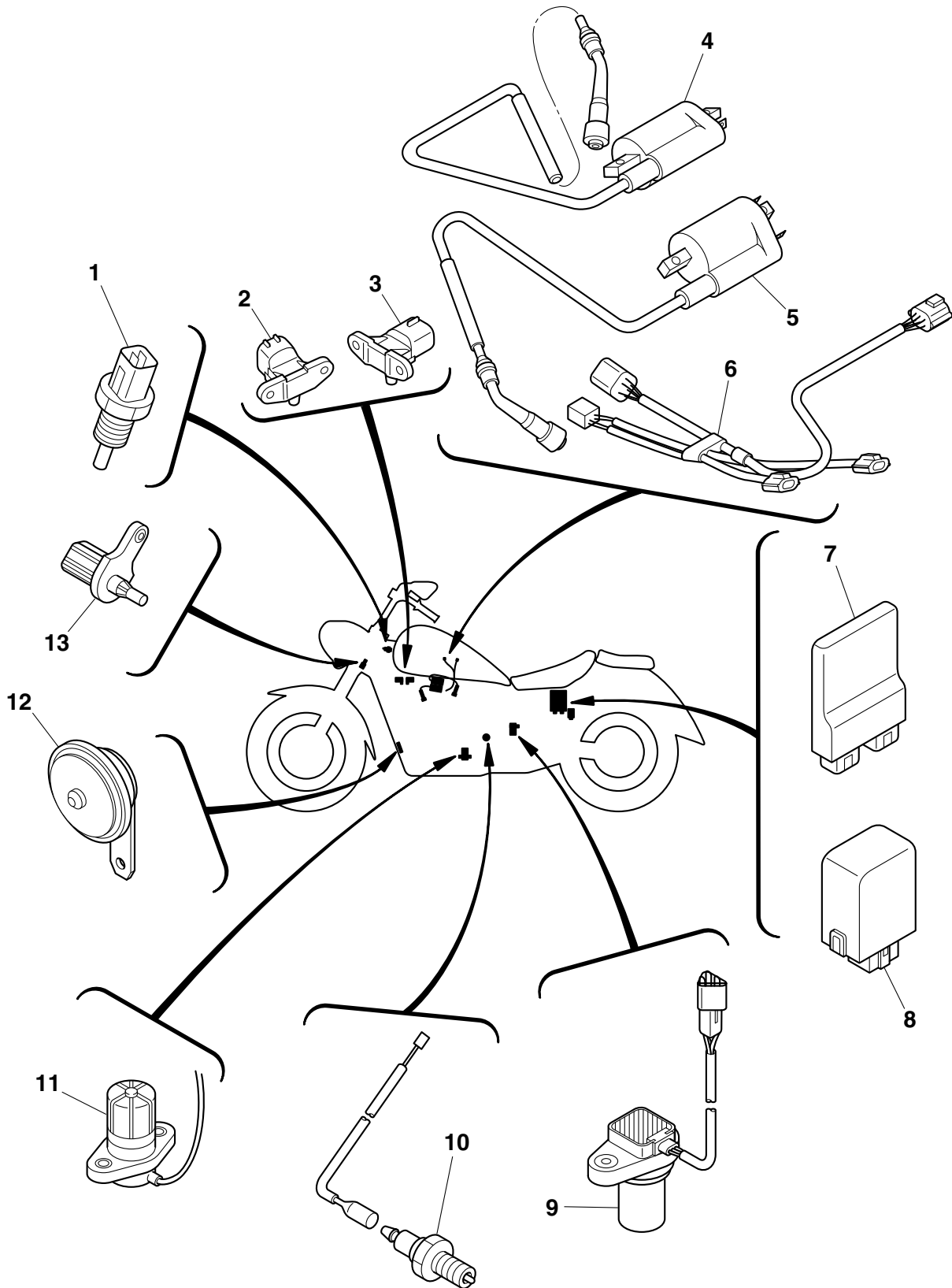
Replace the ECU.

NG →

Properly connect or repair the fuel pump system's wiring.

EAS27970

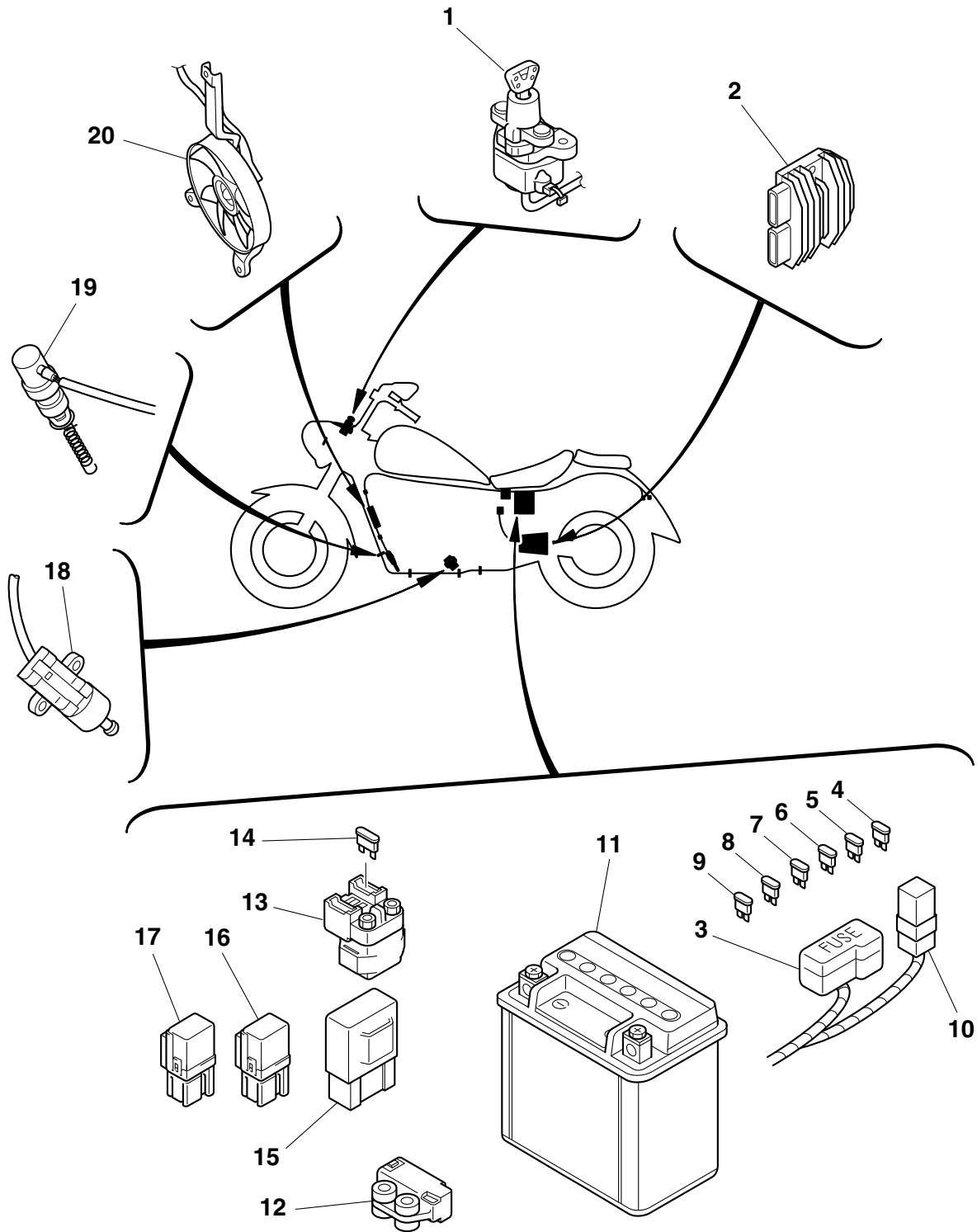
ELECTRICAL COMPONENTS



ELECTRICAL COMPONENTS

1. Coolant temperature sensor
2. Front cylinder intake air pressure sensor
3. Rear cylinder intake air pressure sensor
4. Rear cylinder ignition coil
5. Front cylinder ignition coil
6. Sub-wire harness
7. ECU (engine control unit)
8. Turn signal relay
9. Speed sensor
10. Neutral switch
11. Oil level switch
12. Horn
13. Air temperature sensor

ELECTRICAL COMPONENTS



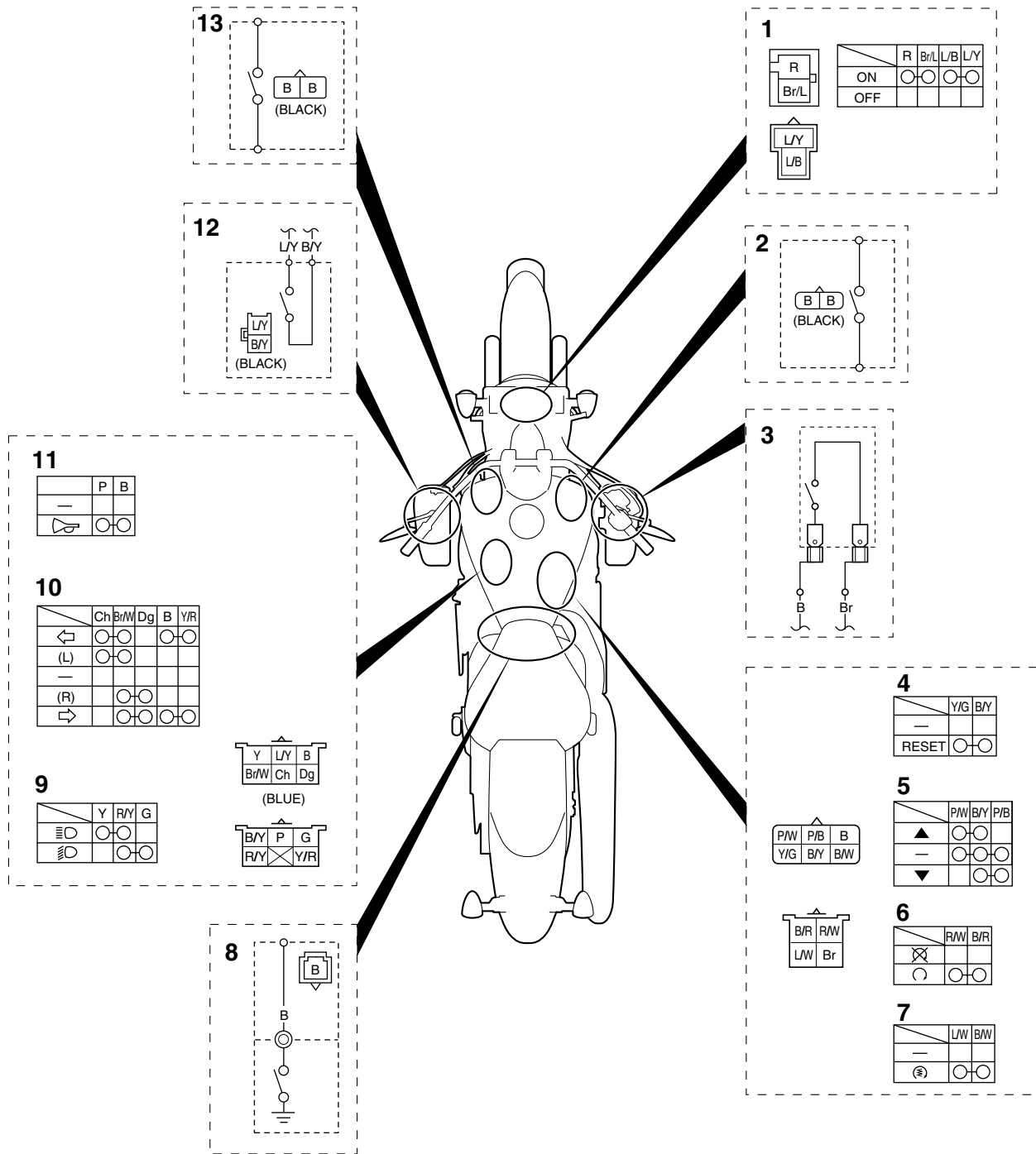
ELECTRICAL COMPONENTS

1. Main switch
2. Rectifier/regulator
3. Fuse box
4. Headlight fuse
5. Backup fuse
6. Radiator fan motor fuse
7. Taillight fuse
8. Ignition fuse
9. Signaling system fuse
10. Main fuse
11. Battery
12. Lean angle sensor
13. Starter relay
14. Fuel injection system fuse
15. Relay unit
16. Radiator fan motor relay
17. Headlight relay
18. Sidestand switch
19. Rear brake light switch
20. Radiator fan motor

ELECTRICAL COMPONENTS

EAS27980

CHECKING THE SWITCHES



ELECTRICAL COMPONENTS

1. Main switch
2. Rear brake light switch
3. Front brake light switch
4. Reset switch
5. Select switch
6. Engine stop switch
7. Start switch
8. Neutral switch
9. Dimmer switch
10. Turn signal switch
11. Horn switch
12. Clutch switch
13. Sidestand switch

ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

CAUTION:

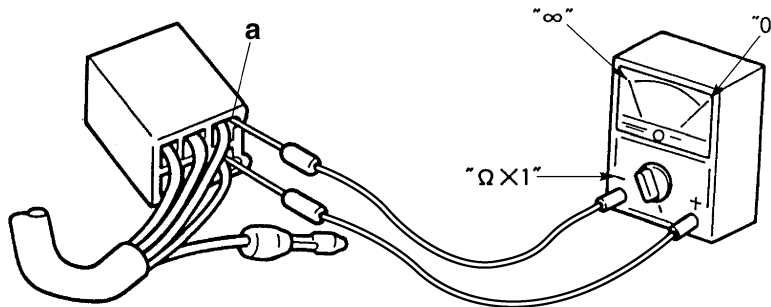
Never insert the tester probes into the coupler terminal slots "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



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

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.

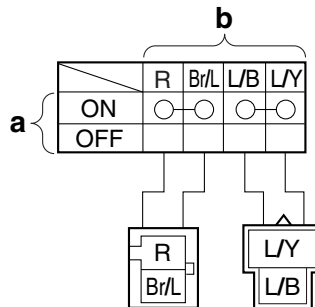


The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.

The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "○—○".

There is continuity between the red and brown/blue leads, and between the blue/black and blue/yellow leads when the switch is set to "ON".



Checking the condition of the bulb sockets

The following procedure applies to all of the bulb sockets.

1. Check:
 - Bulb socket (for continuity) (with the pocket tester)
No continuity → Replace.



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

NOTE: _____

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicates no continuity, replace the bulb socket.



EAS28000

CHECKING THE FUSES

The following procedure applies to all of the fuses.

ECA13680

CAUTION: _____

To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
 - Rider seat
Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
 - Fuse



- a. Connect the pocket tester to the fuse and check the continuity.

NOTE: _____

Set the pocket tester selector to “Ω × 1”.



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

- b. If the pocket tester indicates “∞”, replace the fuse.



3. Replace:
 - Blown fuse



- a. Set the main switch to “OFF”.
- b. Install a new fuse of the correct amperage rating.
- c. Set on the switches to verify if the electrical circuit is operational.
- d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	50 A	1
Headlight	20 A	1
Ignition	15 A	1
Radiator fan motor	20 A	1
Fuel injection system	10 A	1
Signaling system	10 A	1
Taillight	10 A	1
Backup (odometer and clock)	10 A	1
Spare	20 A	1
Spare	15 A	1
Spare	10 A	1

EWA13310

WARNING _____

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.



4. Install:
 - Rider seat
Refer to “GENERAL CHASSIS” on page 4-1.

EAS28030

CHECKING AND CHARGING THE BATTERY

EWA13290

WARNING _____

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- Wear protective eye gear when handling or working near batteries.

- b. Connect a charger and ammeter to the battery and start charging.

NOTE: _____

Set the charging voltage to 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be overcharged.

- c. Make sure that the current is higher than the standard charging current written on the battery.

NOTE: _____

If the current is lower than the standard charging current written on the battery, set the charging voltage adjusting dial to 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.



Charging method using a constant voltage charger

- a. Measure the open-circuit voltage prior to charging.

NOTE: _____

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.

NOTE: _____

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

- d. Charge the battery until the battery's charging voltage is 15 V.

NOTE: _____

Set the charging time to 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.



6. Install:
- Battery
7. Connect:
- Battery leads
(to the battery terminals)

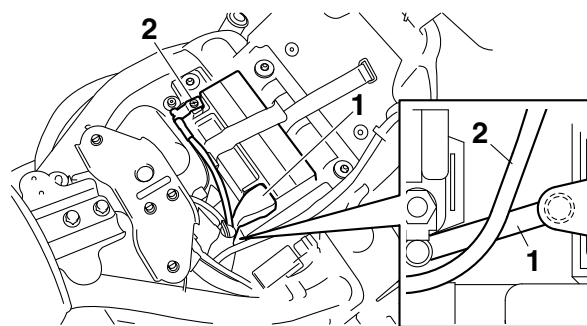
NOTE: _____

Route the positive battery lead under the negative battery lead, making sure not to route it on top of the relay unit.

ECA3D81023

CAUTION: _____

First, connect the positive battery lead “1”, then the negative battery lead “2”.



8. Check:
- Battery terminals
Dirt → Clean with a wire brush.
Loose connection → Connect properly.
9. Lubricate:
- Battery terminals

	Recommended lubricant Dielectric grease
--	--

10. Install:

- Rider seat
- Tool kit tray

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

EAS28040

CHECKING THE RELAYS

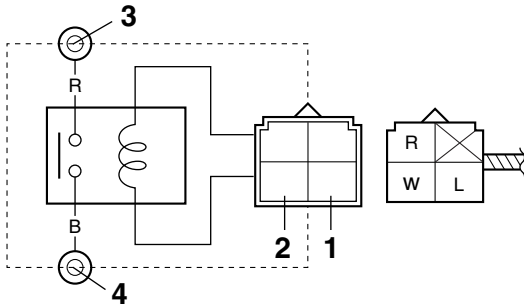
Check each relay for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.




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

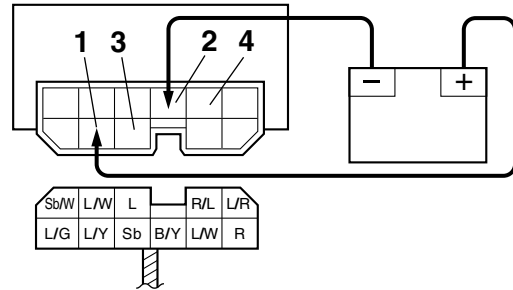


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe




Result
Continuity
(between "3" and "4")

Relay unit (starting circuit cut-off relay)

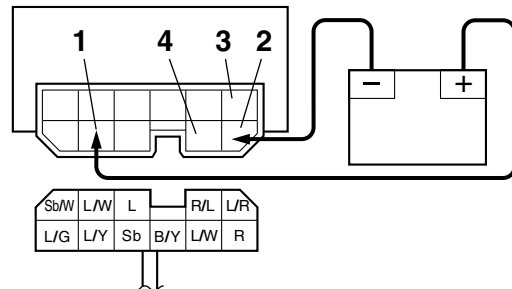


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe




Result
Continuity
(between "3" and "4")

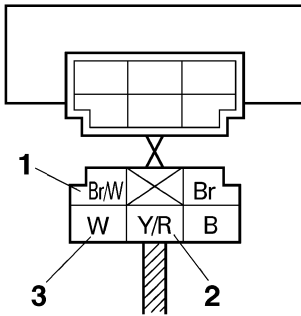
Relay unit (fuel pump relay)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Result
Continuity
(between "3" and "4")



- b. Turn the main switch to "ON".
- c. Measure the turn signal relay output voltage.



EAS28050

CHECKING THE DIODES

Relay unit (diode)

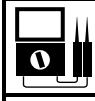
1. Check:
 - Relay unit (diode)
 Out of specification → Replace.



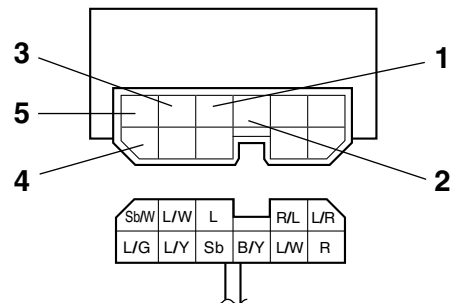
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

NOTE:

The pocket tester or the analog pocket tester readings are shown in the following table.



- | | |
|----------------------|--|
| Continuity | Positive tester probe → sky blue "1" |
| | Negative tester probe → black/yellow "2" |
| No continuity | Positive tester probe → black/yellow "2" |
| | Negative tester probe → sky blue "1" |
| Continuity | Positive tester probe → sky blue "1" |
| | Negative tester probe → blue/yellow "3" |
| No continuity | Positive tester probe → blue/yellow "3" |
| | Negative tester probe → sky blue "1" |
| Continuity | Positive tester probe → sky blue "1" |
| | Negative tester probe → sky blue/white "4" |
| No continuity | Positive tester probe → sky blue/white "4" |
| | Negative tester probe → sky blue "1" |
| Continuity | Positive tester probe → blue/green "5" |
| | Negative tester probe → blue/yellow "3" |
| No continuity | Positive tester probe → blue/yellow "3" |
| | Negative tester probe → blue/green "5" |



- a. Disconnect the relay unit from the wire harness.

- b. Connect the pocket tester ($\Omega \times 1$) to the relay unit terminals as shown.
- c. Check the relay unit (diode) for continuity.
- d. Check the relay unit (diode) for no continuity.




Diode 1

1. Check:
 - Diode 1
Out of specification → Replace.

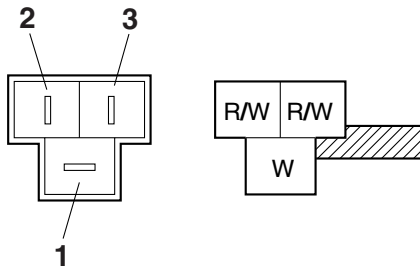


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

NOTE: _____
The pocket tester and the analog pocket tester readings are shown in the following table.



Continuity
Positive tester probe → white "1"
Negative tester probe → red/white "2" or red/white "3"
No continuity
Positive tester probe → red/white "2" or red/white "3"
Negative tester probe → white "1"




- a. Disconnect the diode 1 from the wire harness.
- b. Connect the pocket tester ($\Omega \times 1$) to the diode 1 terminals as shown.
- c. Check the diode 1 for continuity.
- d. Check the diode 1 for no continuity.




Diode 2

1. Check:
 - Diode 2
Out of specification → Replace.

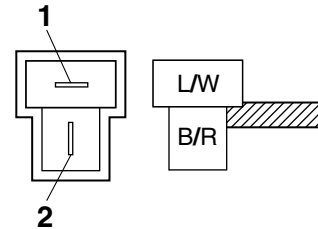


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

NOTE: _____
The pocket tester and the analog pocket tester readings are shown in the following table.



Continuity
Positive tester probe → blue/white "1"
Negative tester probe → black/red "2"
No continuity
Positive tester probe → black/red "2"
Negative tester probe → blue/white "1"




- a. Disconnect the diode 2 from the wire harness.
- b. Connect the pocket tester ($\Omega \times 1$) to the diode 2 terminals as shown.
- c. Check the diode 2 for continuity.
- d. Check the diode 2 for no continuity.

EAS3D81017

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)

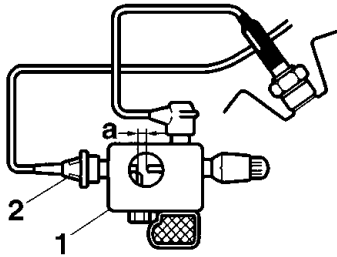
NOTE:

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

- a. Disconnect the spark plug cap from the spark plug.
- b. Connect the ignition checker "1" as shown.



Ignition checker
90890-06754
Opama pet-4000 spark checker
YM-34487




2. Spark plug cap
- c. Turn the main switch to "ON" and set the engine stop switch to "○".
- d. Measure the ignition spark gap "a".
- e. Crank the engine by pushing the start switch "⊕" and gradually increase the spark gap until a misfire occurs.

EAS28070

CHECKING THE SPARK PLUG CAPS


The following procedure applies to all of the spark plug caps.

1. Check:
 - Spark plug cap resistance
 Out of specification → Replace.

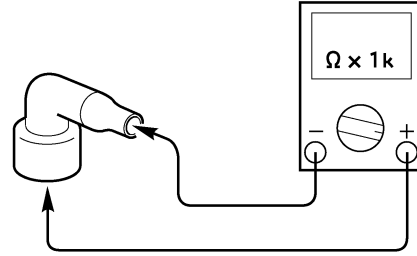


Resistance
10.0 k.Ω

- a. Remove the spark plug cap from the spark plug lead.
- b. Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap as shown.



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




- c. Measure the spark plug cap resistance.

EAS28100

CHECKING THE IGNITION COILS


The following procedure applies to all of the ignition coils.

1. Check:
 - Primary coil resistance
 Out of specification → Replace.



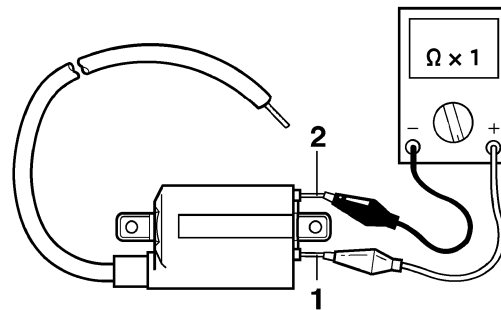
Primary coil resistance
2.16–2.64 Ω

- a. Disconnect the ignition coil connectors from the ignition coil terminals.
- b. Connect the pocket tester ($\Omega \times 1$) to the ignition coil as shown.



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

- Positive tester probe → black/red "1"
- Negative tester probe → orange or gray/red "2"



- c. Measure the primary coil resistance.

2. Check:
 - Secondary coil resistance
 Out of specification → Replace.



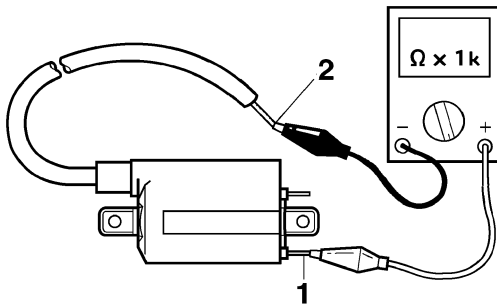
Secondary coil resistance
8.64–12.96 k.Ω

- a. Disconnect the spark plug cap from the ignition coil.
- b. Connect the pocket tester ($\Omega \times 1k$) to the ignition coil as shown.



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

- Positive tester probe → black/red “1”
- Negative tester probe → spark plug lead “2”



- c. Measure the secondary coil resistance.

EAS28120

CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
 - Crankshaft position sensor coupler (from the wire harness)
2. Check:
 - Crankshaft position sensor resistance
Out of specification → Replace the crankshaft position sensor/stator assembly.



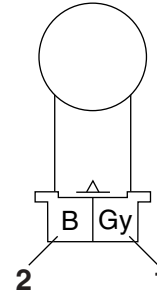
Crankshaft position sensor resistance
248–372 Ω

- a. Connect the pocket tester ($\Omega \times 100$) 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.

EAS28130

CHECKING THE LEAN ANGLE SENSOR

1. Remove:
 - Lean angle sensor
2. Check:
 - Lean angle sensor output voltage
Out of specification → Replace.



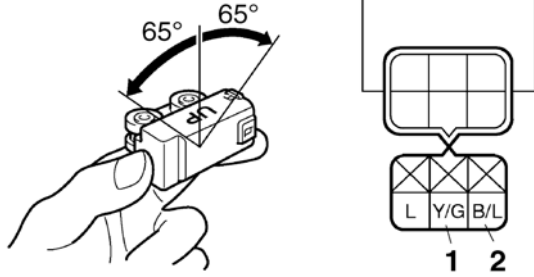
Lean angle sensor output voltage
Less than 65°: 0.4–1.4 V
More than 65°: 3.7–4.4 V

- a. Connect the lean angle sensor coupler to the wire harness.
- b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.



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

- Positive tester probe → yellow/green “1”
- Negative tester probe → black/blue “2”



- c. Turn the main switch to "ON".
- d. Tilt the lean angle sensor 65°.
- e. Measure the lean angle sensor output voltage.



EAS3D81011

CHECKING THE STARTER MOTOR OPERATION

1. Check:
 - Starter motor operation
Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
Refer to "TROUBLESHOOTING" on page 8-11.

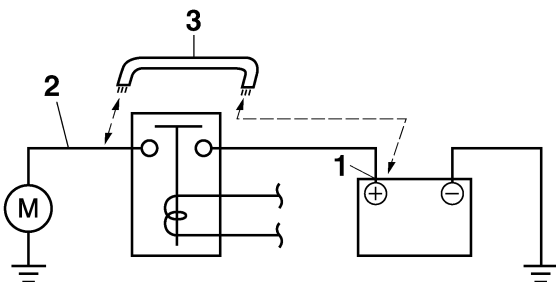


- a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

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.



EAS28150

CHECKING THE STATOR COIL

1. Disconnect:
 - Stator coil coupler (from the wire harness)
2. Check:
 - Stator coil resistance
Out of specification → Replace the crankshaft position sensor/stator assembly.



Stator coil resistance
0.112–0.168 Ω

- a. Connect the pocket tester ($\Omega \times 1$) to the stator coil coupler as shown.

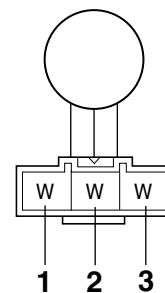


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- 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.



EAS28170

CHECKING THE RECTIFIER/REGULATOR

1. Check:
 - Charging voltage
Out of specification → Replace the rectifier/regulator.



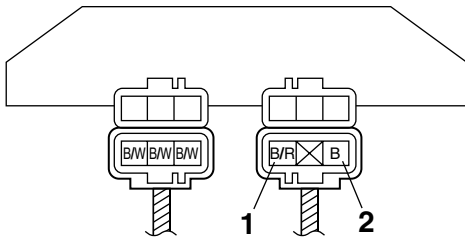
Charging voltage
14 V at 5000 r/min

- a. Attach the engine tachometer to the spark plug lead of the front cylinder.
- b. Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.



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

- Positive tester probe → black/red “1”
- Negative tester probe → black “2”

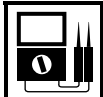


- c. Start the engine and operate it run at approximately 5000 r/min.
- d. Measure the charging voltage.

EAS28180

CHECKING THE HORN

1. Check:
 - Horn resistance
 Out of specification → Replace.



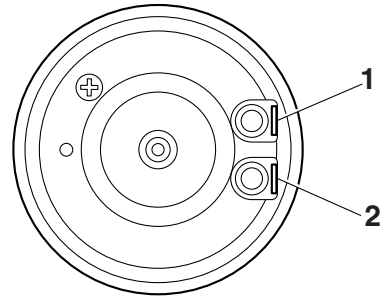
Coil resistance
1.01–1.11 Ω

- a. Disconnect the horn connectors from the horn terminals.
- b. Connect the pocket tester ($\Omega \times 1$) to the horn terminals.



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

- Positive tester probe → horn terminal “1”
- Negative tester probe → horn terminal “2”

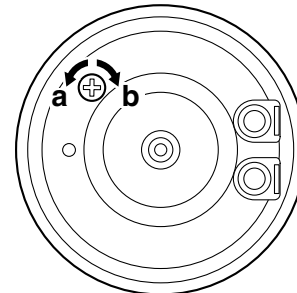


- c. Measure the horn resistance.

2. Check:

- Horn sound
- Faulty sound → Adjust or replace.

- a. Connect a battery (12 V) to the horn.
- b. Turn the adjusting screw in direction “a” or “b” until the specified horn sound is obtained.



EAS3D81012

CHECKING THE OIL LEVEL SWITCH

1. Drain:
 - Engine oil
2. Remove:
 - Oil level switch (from the crankcase)
3. Check:
 - Oil level switch resistance
 Out of specification → Replace the oil level switch.



Oil level switch resistance
Minimum level position
114–126 Ω
Maximum level position
484–536 Ω

a. Connect the pocket tester ($\Omega \times 100$) to the oil level switch terminal as shown.



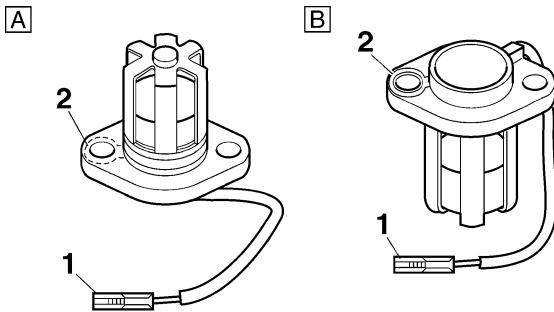
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

Minimum level position "A"

- Positive tester probe → connector (white) "1"
- Negative tester probe → body ground "2"

Maximum level position "B"

- Positive tester probe → connector (white) "1"
- Negative tester probe → body ground "2"




b. Measure the oil level switch resistance.

EAS3D81013

CHECKING THE FUEL SENDER

1. Disconnect:
 - Fuel sender coupler (from the wire harness)
2. Remove:
 - Fuel sender (from the fuel tank)
3. Check:
 - Fuel sender resistance
 Out of specification → Replace the fuel sender.



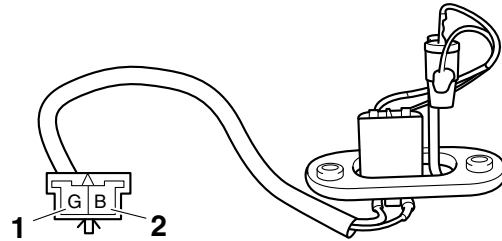
Fuel sender resistance
830–1720 Ω at 25 °C (77 °F)

a. Connect the pocket tester ($\Omega \times 1$) to the fuel sender terminals as shown.



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

- Positive tester probe → green "1"
- Negative tester probe → black "2"



b. Measure the fuel sender resistance.

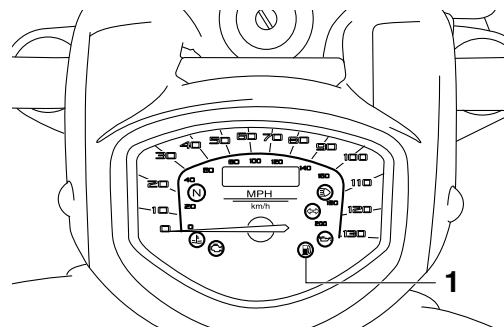
EAS3D81014

CHECKING THE FUEL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the fuel level detection circuit.

1. Check:

- Fuel level warning light "1" (Turn the main switch to "ON".)
Warning light comes on for a few seconds, then goes off → Warning light is OK.
Warning light does not come on → Replace the meter assembly.
Warning light flashes eight times, then goes off for three seconds in a repeated cycle (malfunction detected in fuel sender or thermistor) → Replace the fuel pump assembly.



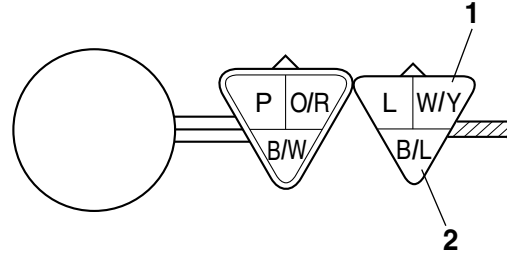
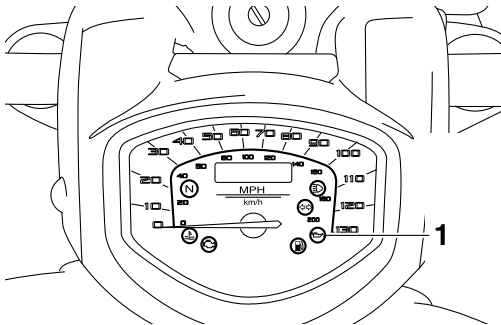
EAS3D81015

CHECKING THE OIL LEVEL WARNING LIGHT

This model is equipped with a self-diagnosis device for the oil level detection circuit.

1. Check:

- Oil level warning light “1”
(Turn the main switch to “ON”).
Warning light comes on for a few seconds, then goes off → Warning light is OK.
Warning light does not come on → Replace the meter assembly.
Warning light flashes ten times, then goes off for 2.5 seconds in a repeated cycle (malfunction detected in oil level switch) → Replace the oil level switch.



- Set the main switch to “ON”.
- Elevate the rear wheel and slowly rotate it.
- Measure the voltage of white/yellow and black/blue. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.

EAS28250

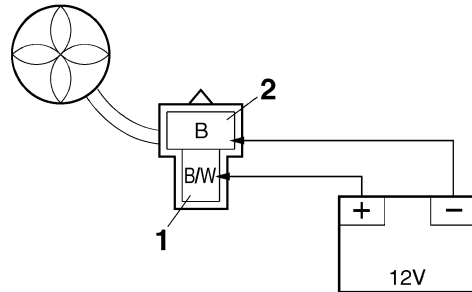
CHECKING THE RADIATOR FAN MOTOR

1. Check:

- Radiator fan motor
Faulty/rough movement → Replace.

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect a battery (DC 12 V) as shown.

- Positive tester probe → black/white “1”
- Negative tester probe → black “2”



- Check the radiator fan motor movement.

EAS28240

CHECKING THE SPEED SENSOR

1. Check:

- Speed sensor output voltage
Out of specification → Replace.



Output voltage reading cycle
0.6 V to 4.8 V to 0.6 V to 4.8 V

- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.



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

- Positive tester probe → white/yellow “1”
- Negative tester probe → black/blue “2”

EAS28260

CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:


- Coolant temperature sensor
Refer to “THERMOSTAT” on page 6-4.

EWA14130



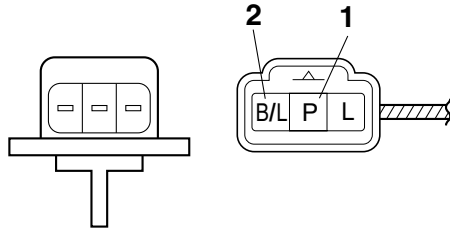
WARNING

- Handle the coolant temperature sensor with special care.



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

- Positive tester probe → pink “1” or pink/white
- Negative tester probe → black/blue “2”



- b. Set the main switch to “ON”.
- c. Measure the intake air pressure sensor output voltage.



EAS28420
CHECKING THE AIR TEMPERATURE SENSOR


1. Remove:
 - Air temperature sensor

EWA3D81003

WARNING


- Handle the air temperature sensor with special care.
- Never subject the air temperature sensor to strong shocks. If the air temperature sensor is dropped, replace it.

2. Check:
 - Air temperature sensor resistance
Out of specification → Replace.

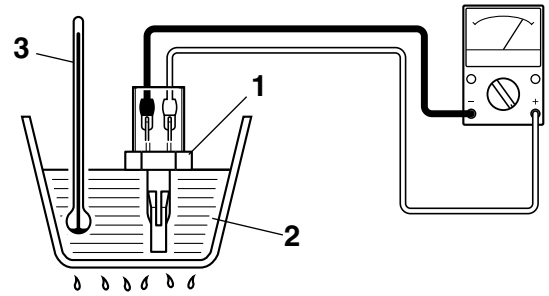


Air temperature sensor resistance
290–390 Ω at 80 °C (176 °F)

- a. Connect the pocket tester ($\Omega \times 100$) to the air temperature sensor terminal as shown.



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



- b. Immerse the air temperature sensor “1” in a container filled with water “2”.

NOTE:

Make sure that the air temperature sensor terminals do not get wet.

- c. Place a thermometer “3” in the water.
- d. Slowly heat the water, and then let it cool down to the specified temperature.
- e. Measure the air temperature sensor resistance.



TROUBLESHOOTING

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EAS28450

TROUBLESHOOTING

EAS28460

GENERAL INFORMATION

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470

STARTING FAILURES

Engine

1. Cylinder(s) and cylinder head(s)
 - 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 filter
 - Clogged fuel tank breather hose
 - Clogged fuel tank overflow hose
 - Clogged rollover valve
 - Deteriorated or contaminated fuel
2. Fuel pump
 - Faulty fuel pump
 - Faulty relay unit (fuel pump relay)
3. Fuel cock
 - Clogged or damaged fuel hose

4. Throttle body(-ies)
 - Deteriorated or contaminated fuel
 - Sucked-in air

Electrical system

1. Battery
 - Discharged battery
 - Faulty battery
2. Fuse(s)
 - Blown, damaged or incorrect fuse
 - Improperly installed fuse
3. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
4. Ignition coil(s)
 - Cracked or broken ignition coil body
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
5. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Broken generator rotor Woodruff key
6. Switches and wiring
 - Faulty main switch
 - Faulty engine stop switch
 - Broken or shorted wiring
 - Faulty neutral switch
 - Faulty start switch
 - Faulty sidestand switch
 - Faulty clutch switch
 - Improperly grounded circuit
 - Loose connections
7. Starting system
 - Faulty starter motor
 - Faulty starter relay
 - Faulty relay unit (starting circuit cut-off relay)
 - Faulty starter clutch

EAS28490

INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder(s) and cylinder head(s)
 - Incorrect valve clearance
 - Damaged valve train components
2. Air filter
 - Clogged air filter element

Fuel system

1. Throttle body(-ies)
 - Damaged or loose throttle body joint
 - Improperly synchronized throttle bodies
 - Improper throttle cable free play
 - Flooded throttle body

Electrical system

1. Battery
 - Discharged battery
 - Faulty battery
2. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
3. Ignition coil(s)
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
 - Cracked or broken ignition coil
4. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Broken generator rotor Woodruff key

EAS28510

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURES” on page 9-1.

Engine

1. Air filter
 - Clogged air filter element

Fuel system

1. Fuel pump
 - Faulty fuel pump

EAS28530

FAULTY GEAR SHIFTING

Shifting is difficult

Refer to “Clutch drags”.

EAS28540

SHIFT PEDAL DOES NOT MOVE

Shift shaft

- Improperly adjusted shift rod
- Bent shift shaft

Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork

- Bent shift fork guide bar

Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

EAS28550

JUMPS OUT OF GEAR

Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

Shift forks

- Worn shift fork

Shift drum

- Incorrect axial play
- Worn shift drum groove

Transmission

- Worn gear dog

EAS28560

FAULTY CLUTCH

Clutch slips

1. Clutch
 - Improperly assembled clutch
 - Improperly adjusted clutch cable
 - Loose or fatigued clutch spring
 - Worn friction plate
 - Worn clutch plate
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (low)
 - Deteriorated oil

Clutch drags

1. Clutch
 - Unevenly tensioned clutch springs
 - Warped pressure plate
 - Bent clutch plate
 - Swollen friction plate
 - Bent clutch pull rod
 - Broken clutch boss
 - Burnt primary driven gear bushing
 - Match marks not aligned
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (high)
 - Deteriorated oil

EAS28600

OVERHEATING

Engine

1. Clogged coolant passages
 - Cylinder head(s) and piston(s)
 - Heavy carbon buildup
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity
 - Inferior oil quality

Cooling system

1. Coolant
 - Low coolant level
2. Radiator
 - Damaged or leaking radiator
 - Faulty radiator cap
 - Bent or damaged radiator fin
3. Water pump
 - Damaged or faulty water pump
4. Thermostat
 - Thermostat stays closed
5. Hose(s) and pipe(s)
 - Damaged hose
 - Improperly connected hose
 - Damaged pipe
 - Improperly connected pipe

Fuel system

1. Throttle body(-ies)
 - Damaged or loose throttle body joint
2. Air filter
 - Clogged air filter element

Chassis

1. Brake(s)
 - Dragging brake

Electrical system

1. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
2. Ignition system
 - Faulty ECU
3. Cooling system
 - Faulty radiator fan motor relay
 - Faulty coolant temperature sensor
 - Faulty ECU

EAS28610

OVERCOOLING

Cooling system

1. Thermostat
 - Thermostat stays open

EAS28620

POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28650

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

EAS28670

UNSTABLE HANDLING

1. Handlebar
 - Bent or improperly installed handlebar
2. Steering head components
 - Improperly installed upper bracket
 - Improperly installed lower bracket (improperly tightened ring nut)
 - Bent steering stem
 - Damaged ball bearing or bearing race
3. Front fork leg(s)
 - Uneven oil levels (both front fork legs)

- Unevenly tensioned fork spring (both front fork legs)
 - Broken fork spring
 - Bent or damaged inner tube
 - Bent or damaged outer tube
4. Swingarm
- Worn bearing or bushing
 - Bent or damaged swingarm
5. Rear shock absorber assembly
- Faulty rear shock absorber spring
 - Leaking oil or gas
6. Tire(s)
- Uneven tire pressures (front and rear)
 - Incorrect tire pressure
 - Uneven tire wear
7. Wheel(s)
- Incorrect wheel balance
 - Deformed cast wheel
 - Damaged wheel bearing
 - Bent or loose wheel axle
 - Excessive wheel runout
8. Frame
- Bent frame
 - Damaged steering head pipe
 - Improperly installed bearing race

EAS28710

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main switch)
- Burnt-out headlight bulb

Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

Tail/brake light does not come on

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out

- Wrong tail/brake light bulb

- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

Turn signal does not come on

- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

Turn signal flashes slowly

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

Turn signal remains lit

- Faulty turn signal relay
- Burnt-out turn signal bulb

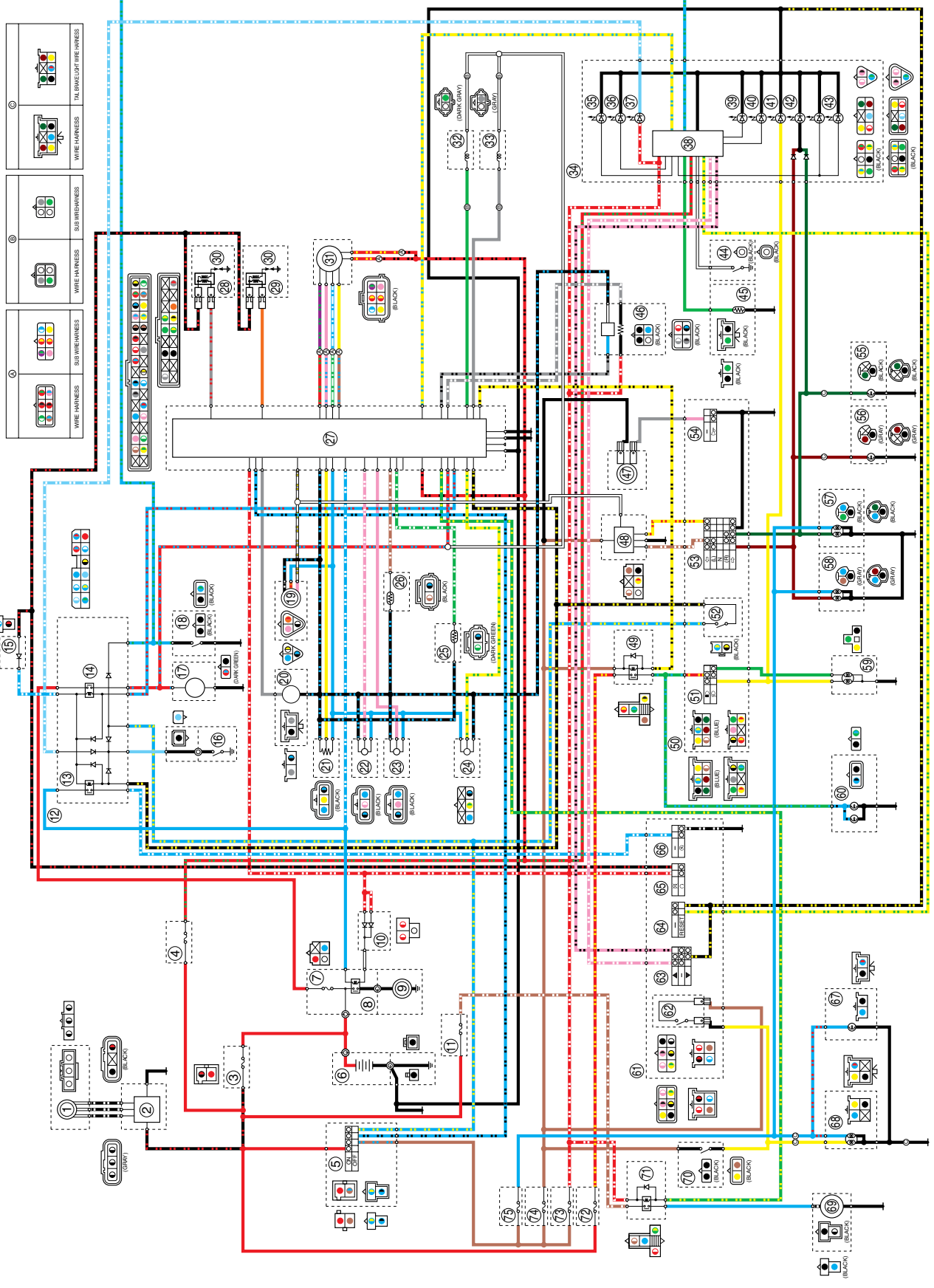
Turn signal flashes quickly

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

Horn does not sound

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

XVS13AW(C)/XVS13CTW(C) 2007 WIRING DIAGRAM



WIRING DIAGRAM**XVS13AW(C)/XVS13CTW(C)
2007**

1. AC magneto
2. Rectifier/regulator
3. Main fuse
4. Backup fuse (odometer and clock)
5. Main switch
6. Battery
7. Fuel injection system fuse
8. Starter relay
9. Starter motor
10. Diode 1
11. Radiator fan motor fuse
12. Relay unit
13. Starting circuit cut-off relay
14. Fuel pump relay
15. Diode 2
16. Neutral switch
17. Fuel pump
18. Sidestand switch
19. Speed sensor
20. Crankshaft position sensor
21. Throttle position sensor
22. Rear cylinder intake air pressure sensor
23. Front cylinder intake air pressure sensor
24. Lean angle sensor
25. Coolant temperature sensor
26. Air temperature sensor
27. ECU (engine control unit)
28. Rear cylinder Ignition coil
29. Front cylinder Ignition coil
30. Spark plug
31. ISC (idle speed control) unit
32. Front cylinder injector
33. Rear cylinder injector
34. Meter assembly
35. Fuel level warning light
36. Oil level warning light
37. Neutral indicator light
38. Multi-function meter
39. Engine trouble warning light
40. Coolant temperature warning light
41. High beam indicator light
42. Turn signal indicator light
43. Meter light
44. Oil level switch
45. Fuel sender
46. O₂ sensor
47. Horn
48. Turn signal relay
49. Headlight relay
50. Left handlebar switch
51. Dimmer switch
52. Clutch switch

53. Turn signal switch
54. Horn switch
55. Rear right turn signal light
56. Rear left turn signal light
57. Front right turn signal light
58. Front left turn signal light
59. Headlight
60. Accessory light (OPTION)
61. Right handlebar switch
62. Front brake light switch
63. Select switch
64. Reset switch
65. Engine stop switch
66. Start switch
67. License plate light
68. Tail/brake light
69. Radiator fan motor
70. Rear brake light switch
71. Radiator fan motor relay
72. Headlight fuse
73. Ignition fuse
74. Signaling system fuse
75. Taillight fuse

COLOR CODE

B	Black
Br	Brown
Ch	Chocolate
Dg	Dark green
G	Green
Gy	Gray
L	Blue
O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow
B/Br	Black/Brown
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/L	Brown/Blue
Br/W	Brown/White
G/L	Green/Blue
G/W	Green/White
G/Y	Green/Yellow
Gy/B	Gray/Black
Gy/R	Gray/Red
Gy/W	Gray/White
L/B	Blue/Black
L/G	Blue/Green
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
O/R	Orange/Red
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
V/G	Violet/Green
W/G	White/Green
W/L	White/Blue
W/Y	White/Yellow
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red



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2500 SHINGAI IWATA SHIZUOKA JAPAN