YAMAHA

Yamaha TMax XP500

2008 2012

EAS20040

XP500Y
SERVICE MANUAL

First edition, March 2008

EAS20071

IMPORTANT

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

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.

TIP

- 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.

EAS20081

IMPORTANT MANUAL INFORMATION

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

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

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

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

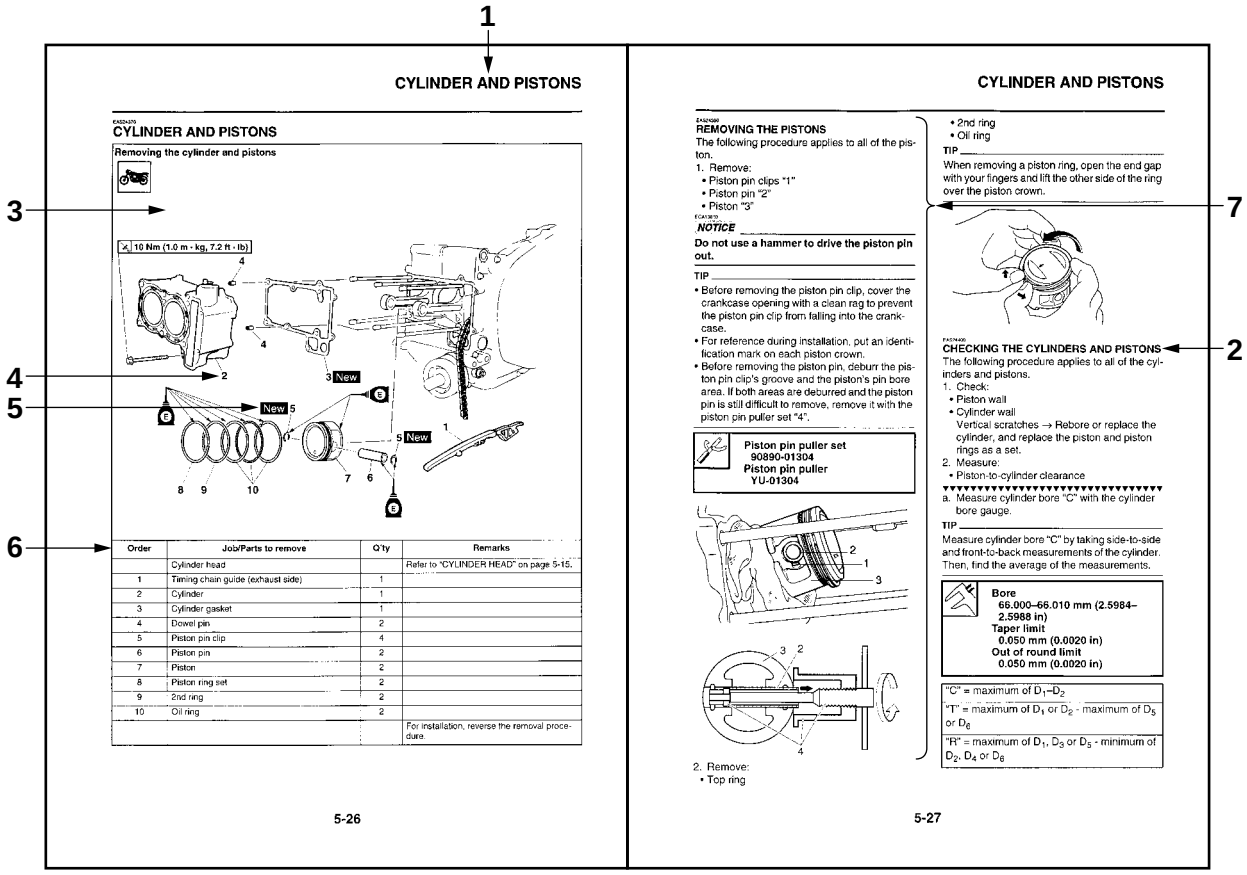
TIP	A TIP provides key information to make procedures easier or clearer.

EAS20090

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.



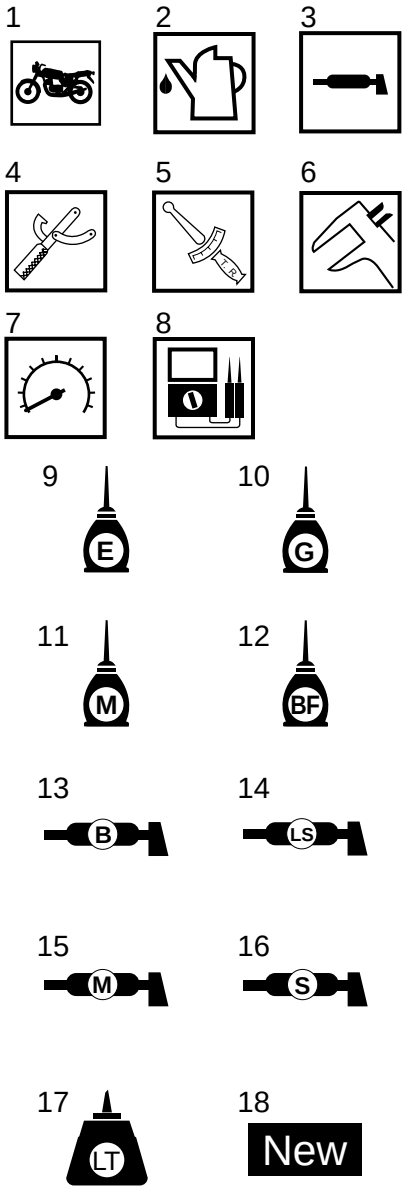
EAS20100

SYMBOLS

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

TIP

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. Brake fluid
13. Wheel bearing grease
14. Lithium-soap-based grease
15. Molybdenum disulfide grease
16. Silicone grease
17. Apply locking agent (LOCTITE®).
18. Replace the part with a new one.

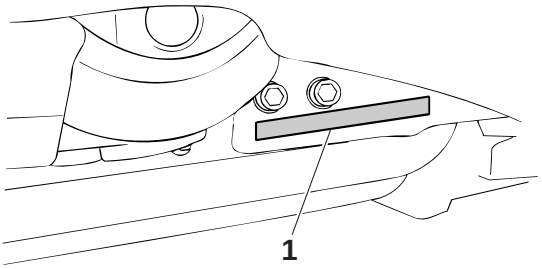
EAS20110

TABLE OF CONTENTS

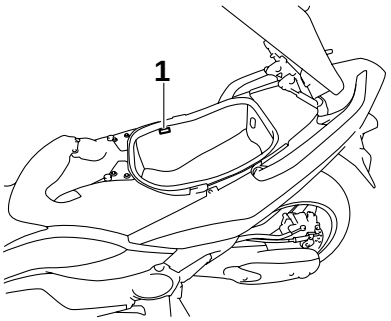
GENERAL INFORMATION

EAS20130
IDENTIFICATION

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



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



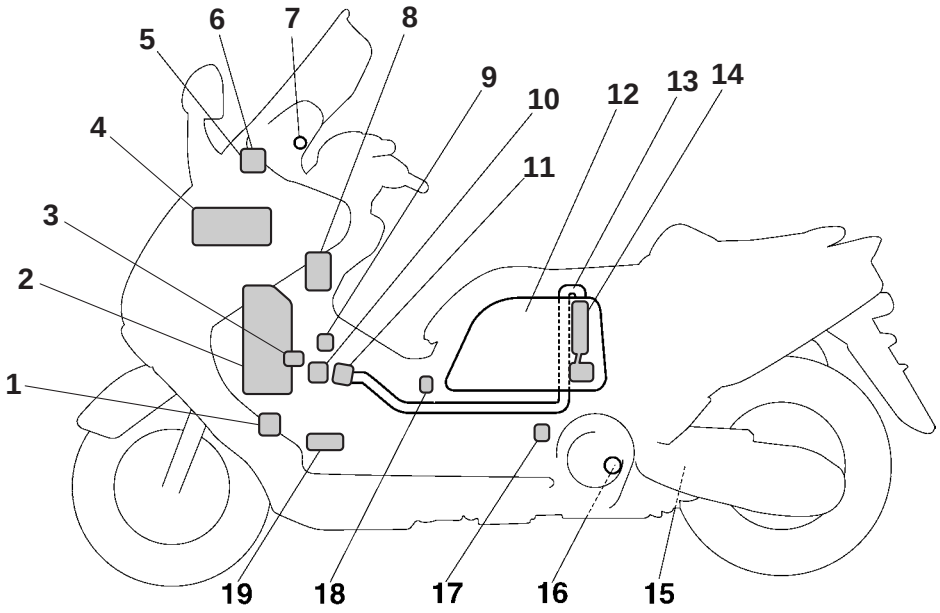
EAS20170
FEATURES

EAS4B51038
OUTLINE OF FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions. In a conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective chamber. Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operation under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

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

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



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

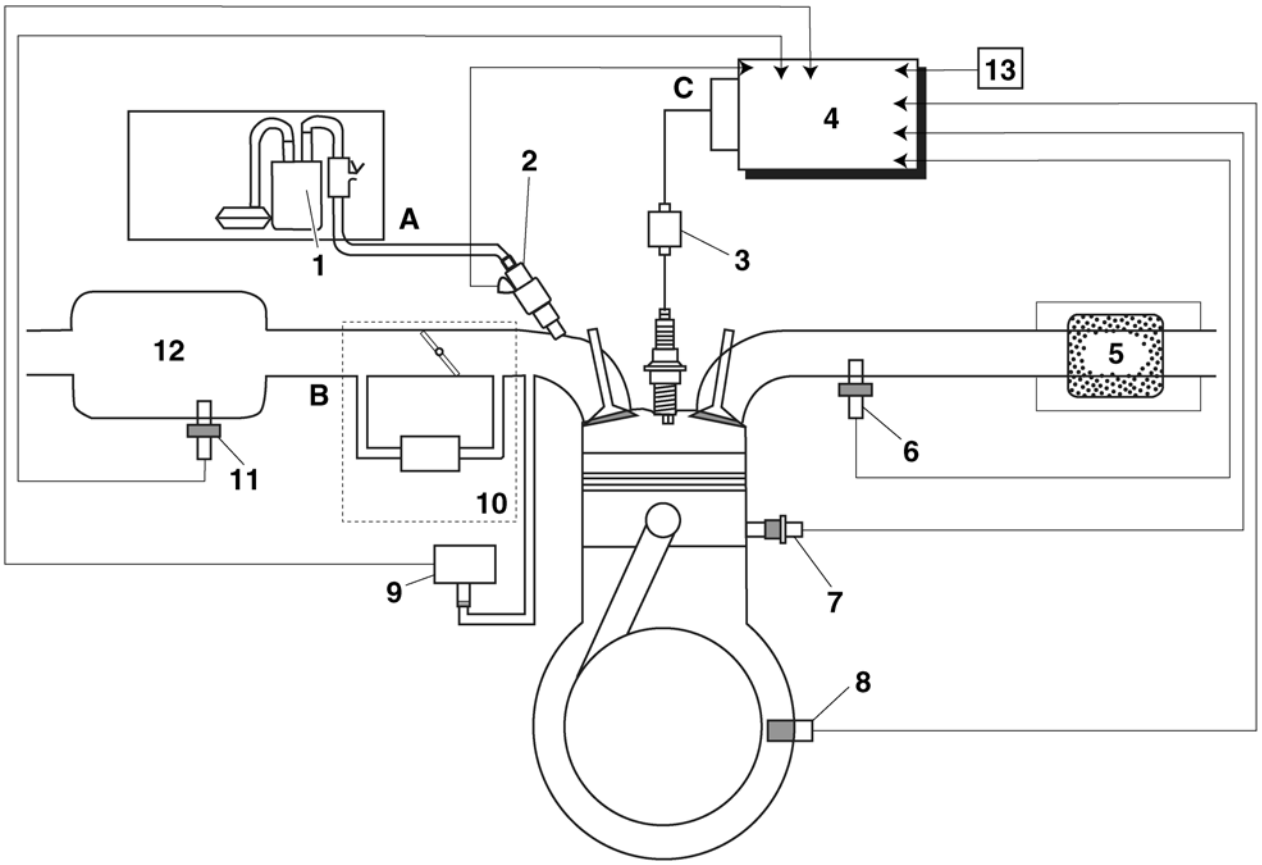
EAS4B51039

FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator (in the fuel pump) maintains the fuel pressure that is applied to the fuel injector at 240–260 kPa (2.40–2.60 kg/cm², 34.1–37.0 psi) higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU (engine control unit) energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU (engine control unit). Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, and O_2 sensor enable the ECU (engine control unit) to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.

Illustration is for reference only.



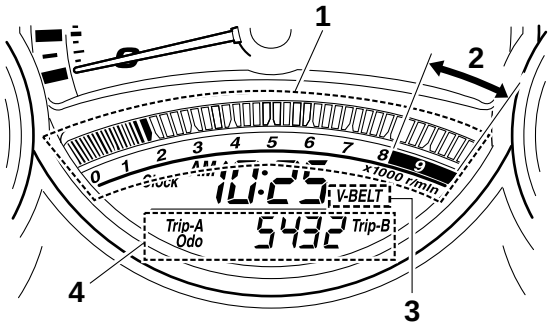
1. Fuel pump
2. Fuel injector
3. Ignition coil
4. ECU (engine control unit)
5. Catalyst
6. O_2 sensor
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Intake air pressure sensor
10. Throttle body
11. Intake air temperature sensor
12. Air filter case
13. Throttle position sensor

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

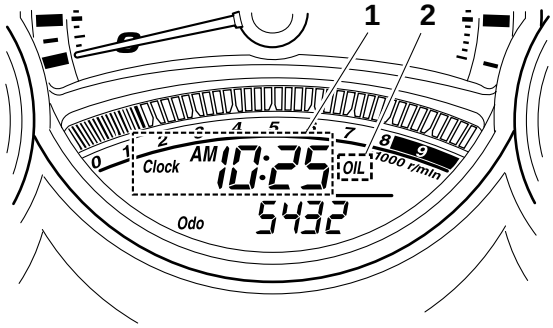
EAS4B51037
MULTI-FUNCTION DISPLAY

EWA4B54001
WARNING

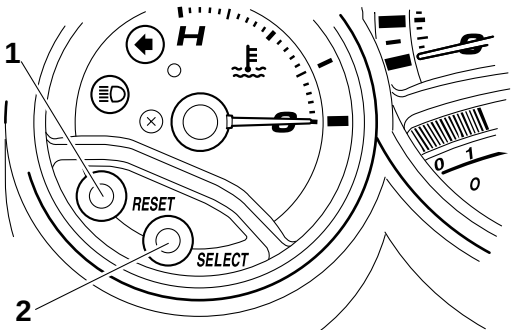
Be sure to stop the vehicle before making any setting changes to the multi-function display. Changing settings while riding can distract the operator and increase the risk of an accident.



1. Tachometer
2. Tachometer red zone
3. V-belt replacement indicator “V-BELT”
4. Odometer/tripmeters



1. Clock
2. Oil change indicator “OIL”



1. “RESET” button
2. “SELECT” button

The multi-function display is equipped with the following:
- a tachometer (which shows engine 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 when the remaining fuel in the fuel tank reaches approximately 3.0 L (0.79 US gal) (0.66 Imp.gal))
- a self-diagnosis device
- a clock
- an oil change tripmeter (which shows the distance traveled since the last engine oil change)
- a V-belt replacement tripmeter (which shows the distance traveled since the last V-belt replacement)

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

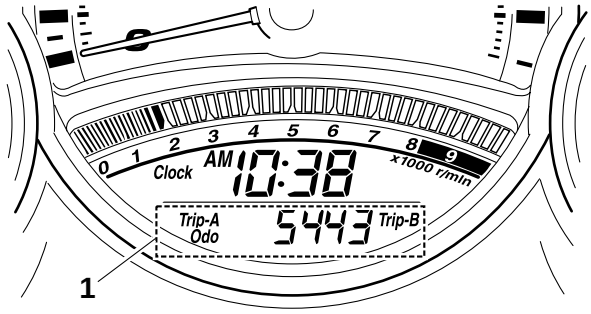
Tachometer
The tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

ECA4B51024
NOTICE

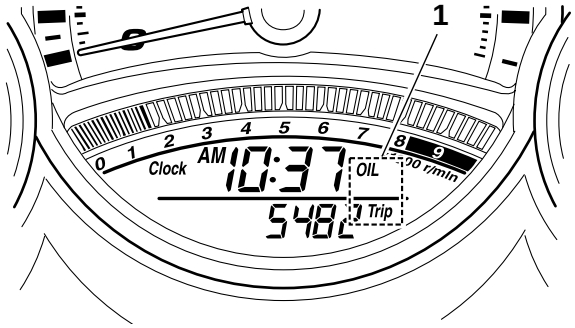
Do not operate the engine in the tachometer red zone.
Red zone: 8250 r/min and above

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

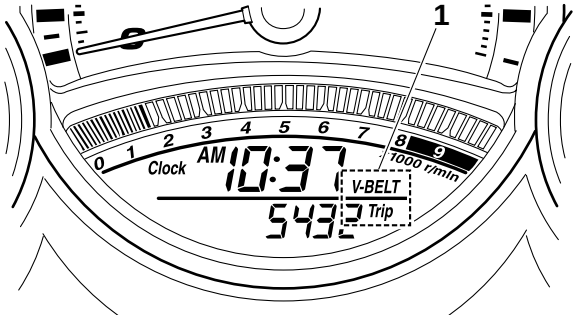
Odometer and tripmeter modes



1. Odometer/tripmeters

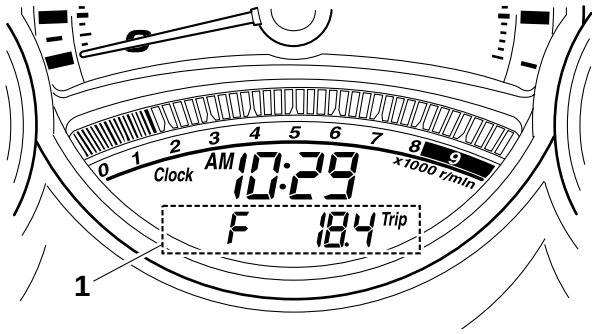


1. Oil change tripmeter



1. V-belt replacement tripmeter

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



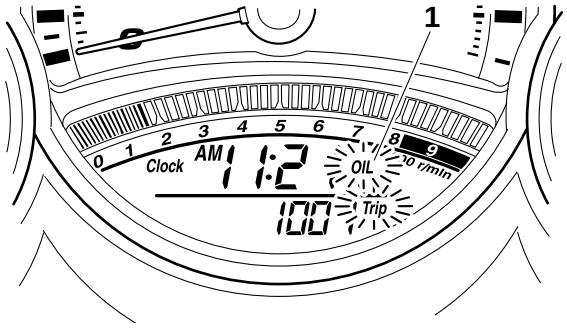
1. Fuel reserve tripmeter

To reset a tripmeter, select it by pushing the “SELECT” button until “F Trip”, “Trip-A” or “Trip-B” is displayed. While “F Trip”, “Trip-A” or “Trip-B” is displayed, push the “RESET” button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

TIP

The display cannot be changed back to “F Trip” after pushing the “RESET” button.

Oil change indicator “OIL”

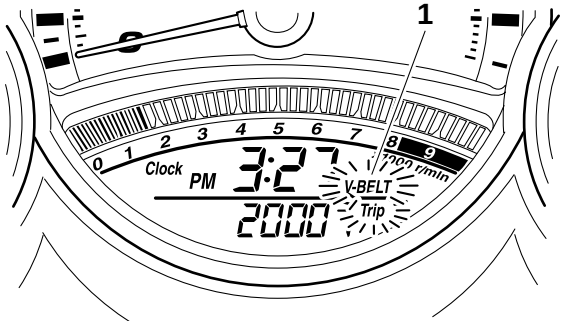


1. Oil change indicator “OIL”

This indicator flashes at the initial 1000 km (600 mi), then at 5000 km (3125 mi) and every 5000 km (3125 mi) thereafter to indicate that the engine oil should be changed.
After changing the engine oil, reset the oil change indicator. To reset the oil change indicator, select it by pushing the “SELECT” button until “OIL Trip” is displayed, and then push the “RESET” button at least 1 second. When pushing the “RESET” button, “OIL Trip” starts flashing. While “OIL Trip” is flashing, push the “RESET” button for at least 3 seconds.
If the engine oil is changed before the oil change indicator “OIL” flashes (i.e. before the periodic oil change interval has been reached), the indicator

"OIL" must be reset after the oil change for the next periodic oil change to be indicated at the correct time.
The electrical circuit of the indicator can be checked according to the following procedure.
1. Set the engine stop switch to "○" and turn the key to "ON".
2. Check that the oil change indicator comes on for a few seconds and then goes off.
3. If the oil change indicator does not come on, check the electrical circuit.
   Refer to "SIGNALING SYSTEM" on page 8-19.

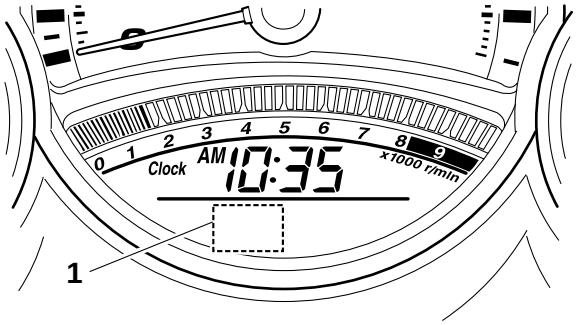
V-belt replacement indicator "V-BELT"



1. V-belt replacement indicator "V-BELT"

This indicator flashes every 20000 km (12500 mi) when the V-belt needs to be replaced. After changing the V-belt, reset the V-belt replacement indicator. To reset the V-belt replacement indicator, select it by pushing the "SELECT" button until "V-BELT Trip" is displayed, and then push the "RESET" button at least 1 second. When pushing the "RESET" button, "V-BELT Trip" starts flashing. While "V-BELT Trip" is flashing, push the "RESET" button for at least 3 seconds.
If the V-belt is changed before the V-belt replacement indicator "V-BELT" flashes (i.e. before the periodic V-belt change interval has been reached), the indicator "V-BELT" must be reset after the V-belt change for the next periodic V-belt change to be indicated at the correct time.
The electrical circuit of the indicator can be checked according to the following procedure.
1. Turn the key to "ON" and make sure that the engine stop switch is set to "○".
2. If the V-belt replacement indicator does not come on, check the electrical circuit.
   Refer to "SIGNALING SYSTEM" on page 8-19.

Self-diagnosis device



1. Fault code display

This model is equipped with a self-diagnosis device for various electrical circuits.
If any of those circuits are not working correctly, the engine trouble warning light will come on, and then the display will indicate a two-digit fault code.
Refer to "FUEL INJECTION SYSTEM" on page 8-29.

ECA4B51025

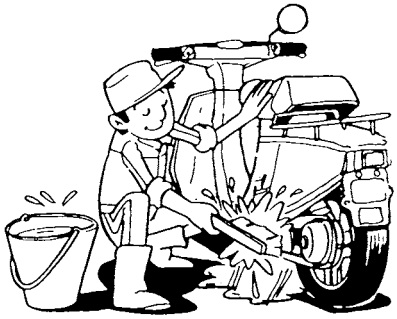
NOTICE

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

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 1-10.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.

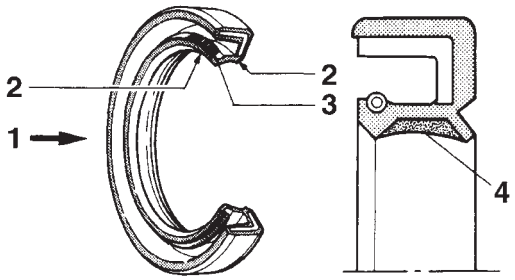
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200
REPLACEMENT PARTS

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

EAS20210
GASKETS, OIL SEALS AND O-RINGS

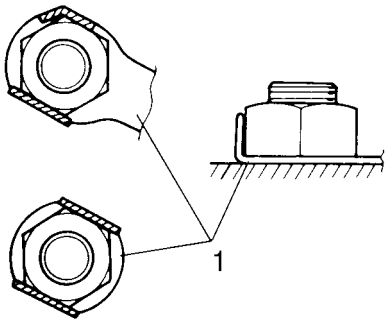
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



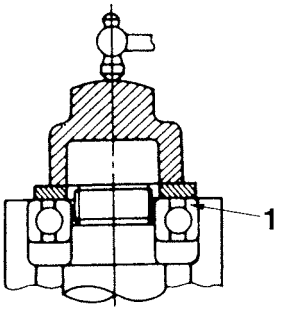
1. Oil
2. Lip
3. Spring
4. Grease

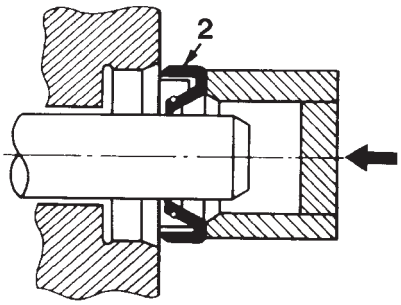
EAS20220
LOCK WASHERS/PLATES AND COTTER PINS

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



EAS20230
BEARINGS AND OIL SEALS
Install bearings “1” and oil seals “2” so that the manufacturer’s marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.





ECA13300
NOTICE

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

EAS20240
CIRCLIPS
Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip “1”, make sure the sharp-edged corner “2” is positioned opposite the thrust “3” that the circlip receives.

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

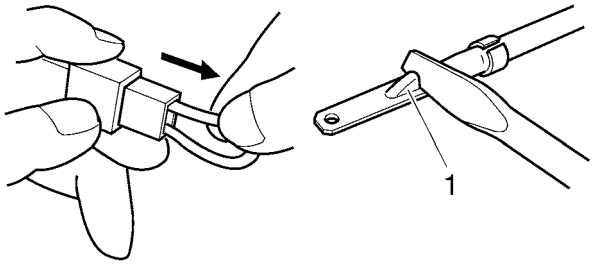
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.

3. Check:
   - All connections

   Loose connection → Connect properly.

TIP

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



4. Connect:
   - Lead
   - Coupler
   - Connector

TIP

Make sure all connections are tight.

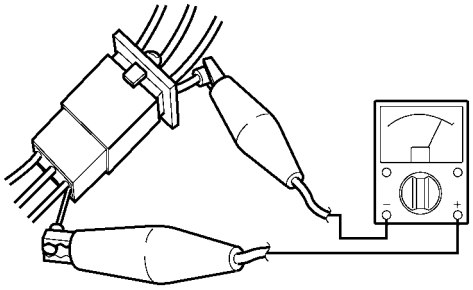
5. Check:
   - Continuity

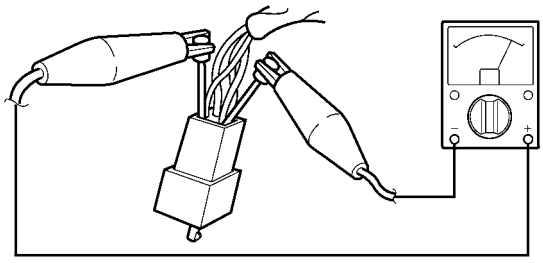
   (with the pocket tester)

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

TIP

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





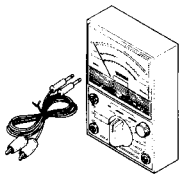
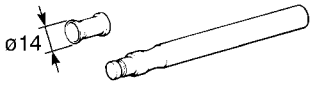
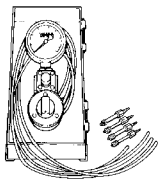
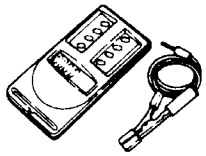
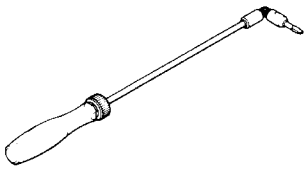
EAS20260

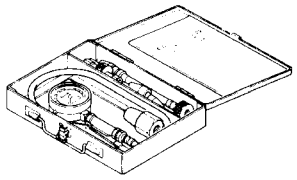
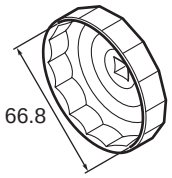
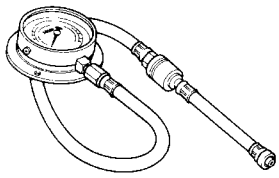
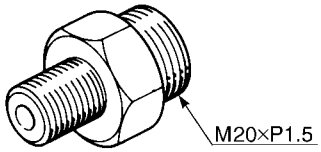
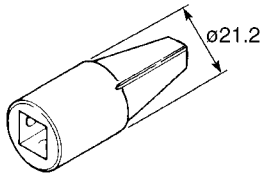
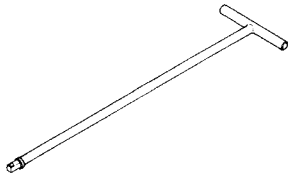
SPECIAL TOOLS

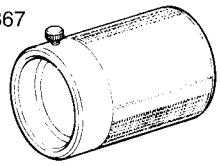
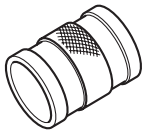
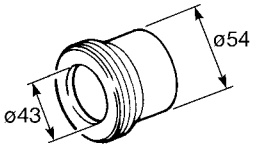
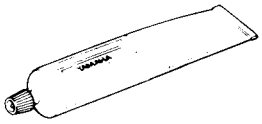
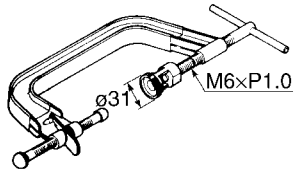
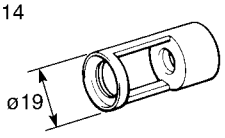
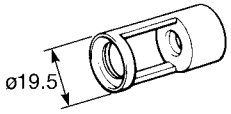
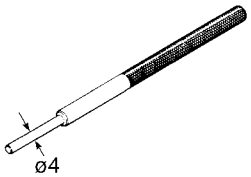
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

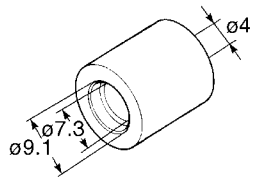
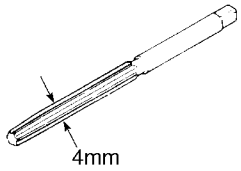
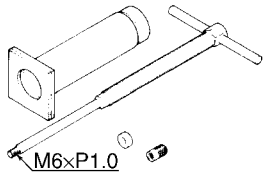
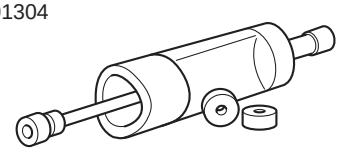
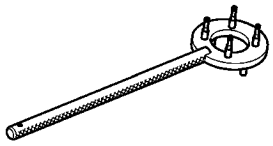
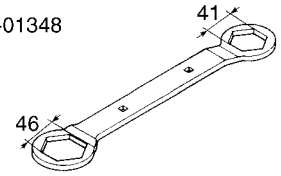
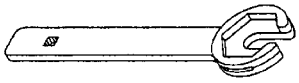
TIP

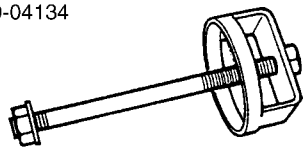
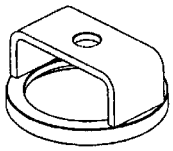
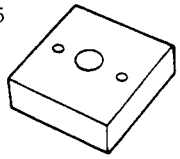
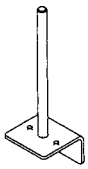
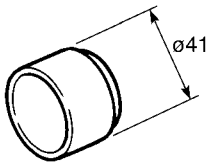
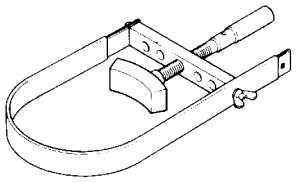
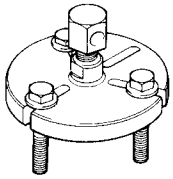
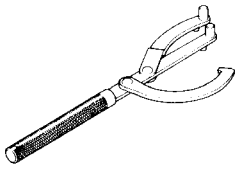
- For U.S.A. and Canada, use part numbers starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part numbers starting with “90890-”.

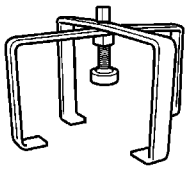
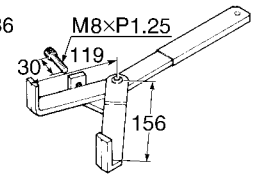
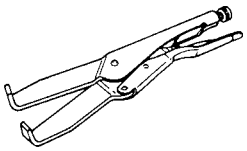
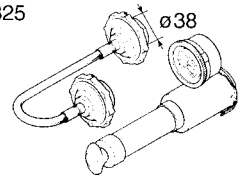
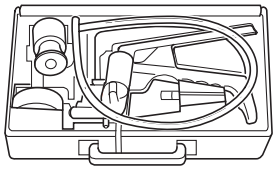
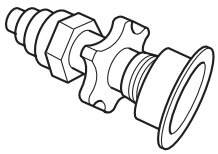
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-9, 5-33, 7-8, 8-63, 8-64, 8-65, 8-69, 8-70, 8-71, 8-72, 8-73, 8-74, 8-75, 8-76, 8-77, 8-78
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-5
Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456	90890-03094  YU-44456 	3-7
Digital tachometer 90890-06760 YU-39951-B		3-7, 3-8
Carburetor angle driver 90890-03158		3-8

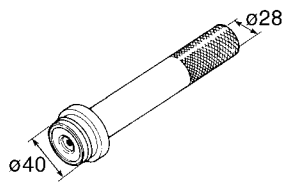
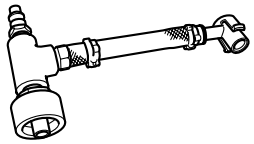
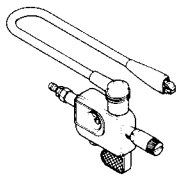
Tool name/Tool No.	Illustration	Reference pages
Compression gauge 90890-03081 Engine compression tester YU-33223		3-10
Oil filter wrench 90890-01469 YM-01469		3-12, 6-6
Oil pressure gauge set 90890-03120		3-13
Oil pressure adapter B 90890-03124		3-13
Pressure gauge 90890-03153 YU-03153		3-13, 7-4
Steering nut wrench 90890-01403 Spanner wrench YU-33975		3-26, 4-60
Damper rod holder 90890-01460		4-53, 4-54
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-53, 4-54

Tool name/Tool No.	Illustration	Reference pages
Fork seal driver weight 90890-01367 Replacement hammer YM-A9409-7	90890-01367  YM-A9409-7/YM-A5142-4 	4-54, 4-55
Fork seal driver attachment (ø43) 90890-01374 Replacement 43 mm YM-A5142-3		4-54
Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®)		5-14, 5-44, 5-52, 5-69, 6-12
Valve spring compressor 90890-04019 YM-04019		5-19, 5-24
Valve spring compressor attachment 90890-04114 Valve spring compressor adapter 19.5 mm YM-04114	90890-04114  YM-04114 	5-19, 5-24
Valve guide remover (ø4) 90890-04111 Valve guide remover (4.0 mm) YM-04111		5-21

Tool name/Tool No.	Illustration	Reference pages
Valve guide installer (ø4) 90890-04112 Valve guide installer (4.0 mm) YM-04112		5-21
Valve guide reamer (ø4) 90890-04113 Valve guide reamer (4.0 mm) YM-04113		5-21
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-27
Sheave holder 90890-01481		5-41, 5-44, 5-45
Locknut wrench 90890-01348 YM-01348	90890-01348  YM-01348 	5-41, 5-44

Tool name/Tool No.	Illustration	Reference pages
Sheave spring compressor 90890-04134 YM-04134	90890-04134  YM-04134 	5-41, 5-44
Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135	90890-04135  YM-04135 	5-41, 5-44
Oil seal guide (ø41) 90890-01396		5-43
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-50, 5-51, 5-52
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-50
Rotor holding tool 90890-01235 Universal magneto & rotor holder YU-01235		5-57, 5-61

Tool name/Tool No.	Illustration	Reference pages
Clutch spring compressor 90890-01482		5-57, 5-60
Universal clutch holder 90890-04086 YM-91042	90890-04086  YM-91042 	5-57, 5-60
Plane bearing installer 90890-04139		5-73, 5-76
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01	90890-01325  YU-24460-01 	6-3
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984	YU-33984 	6-3

Tool name/Tool No.	Illustration	Reference pages
Mechanical seal installer 90890-04078 Water pump seal installer YM-33221-A		6-12
Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058		6-12
Fuel pressure adapter 90890-03181		7-4
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		8-72

SPECIFICATIONS

2

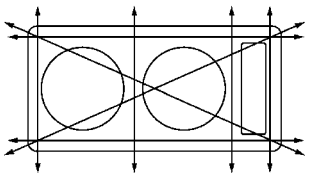
EAS20280
GENERAL SPECIFICATIONS

Model	
Model	4B55 (CAN)
Dimensions	
Overall length	2195 mm (86.4 in)
Overall width	775 mm (30.5 in)
Overall height	1445 mm (56.9 in)
Seat height	800 mm (31.5 in)
Wheelbase	1580 mm (62.2 in)
Ground clearance	125 mm (4.92 in)
Minimum turning radius	2800 mm (110.2 in)
Weight	
With oil and fuel	222.0 kg (489 lb)
Maximum load	193 kg (425 lb)

EAS20290
ENGINE SPECIFICATIONS

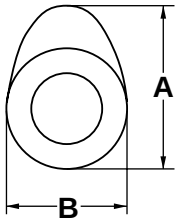
Engine	
Engine type	Liquid cooled 4-stroke, DOHC
Displacement	499.0 cm³
Cylinder arrangement	Forward-inclined parallel 2-cylinder
Bore × stroke	66.0 × 73.0 mm (2.60 × 2.87 in)
Compression ratio	11.00 :1
Standard compression pressure (at sea level)	1400 kPa/360 r/min (199.1 psi/360 r/min) (14.0 kgf/cm²/360 r/min)
Minimum–maximum	1220–1570 kPa (173.5–223.3 psi) (12.2–15.7 kgf/cm²)
Starting system	Electric starter
Fuel	
Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	15.0 L (3.96 US gal) (3.30 Imp.gal)
Fuel reserve amount	3.0 L (0.79 US gal) (0.66 Imp.gal)
Engine oil	
Lubrication system	Dry sump
Type	YAMALUBE 4 (10W-40) or SAE 10W-40, YAMALUBE 4 (20W-50) or SAE 20W-50
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	3.60 L (3.81 US qt) (3.17 Imp.qt)
Without oil filter cartridge replacement	2.80 L (2.96 US qt) (2.46 Imp.qt)
With oil filter cartridge replacement	2.90 L (3.07 US qt) (2.55 Imp.qt)
Oil pressure (hot)	150.0 kPa/1200 r/min (21.8 psi/1200 r/min) (1.50 kgf/cm²/1200 r/min)
Chain drive oil	
Type	SAE 80 API GL-4 Hypoid gear oil
Quantity	0.70 L (0.74 US qt) (0.62 Imp.qt)
Oil filter	
Oil filter type	Paper
Oil pump	
Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	0.040–0.120 mm (0.0016–0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.045–0.085 mm (0.0018–0.0033 in)
Limit	0.155 mm (0.0061 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.11–0.23 mm (0.0043–0.0091 in)
Limit	0.30 mm (0.0118 in)
Bypass valve opening pressure	80.0–120.0 kPa (11.6–17.4 psi) (0.80–1.20 kgf/cm²)
Relief valve operating pressure	450.0–550.0 kPa (65.3–79.8 psi) (4.50–5.50 kgf/cm²)

Pressure check location	MAIN GALLERY
Cooling system	
Radiator capacity (including all routes)	1.48 L (1.56 US qt) (1.30 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.25 L (0.26 US qt) (0.22 Imp.qt)
Radiator cap opening pressure	107.9–137.3 kPa (15.6–19.9 psi) (1.08–1.37 kgf/cm²)
Thermostat	
Model/manufacturer	4JH/NIPPON THERMOSTAT
Valve opening temperature	69.0–73.0 °C (156.20–163.40 °F)
Valve full open temperature	85.0 °C (185.00 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Radiator core	
Width	329.0 mm (12.95 in)
Height	135.4 mm (5.33 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	23/19 (1.210)
Impeller shaft tilt limit	0.15 mm (0.0059 in)
Spark plug (s)	
Manufacturer/model	NGK/CR7E
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)
Cylinder head	
Volume	14.97–15.57 cm³ (0.91–0.95 cu.in)
Warpage limit	0.03 mm (0.0012 in)

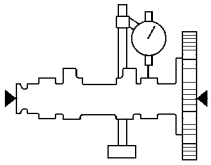


Camshaft	
Drive system	Chain drive (left)
Camshaft cap inside diameter	23.000–23.021 mm (0.9055–0.9063 in)
Camshaft journal diameter	22.967–22.980 mm (0.9042–0.9047 in)
Camshaft-journal-to-camshaft-cap clearance	0.020–0.054 mm (0.0008–0.0021 in)
Camshaft lobe dimensions	
Intake A	33.252–33.352 mm (1.3091–1.3131 in)
Limit	33.152 mm (1.3052 in)
Intake B	24.956–25.056 mm (0.9825–0.9865 in)
Limit	24.856 mm (0.9786 in)
Exhaust A	33.252–33.352 mm (1.3091–1.3131 in)
Limit	33.152 mm (1.3052 in)
Exhaust B	24.956–25.056 mm (0.9825–0.9865 in)

Limit	24.856 mm (0.9786 in)



Camshaft runout limit	0.030 mm (0.0012 in)

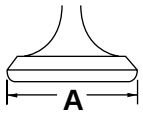


Timing chain

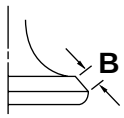
Model/number of links	SCR-0409 SV/132
Tensioning system	Automatic

Valve, valve seat, valve guide

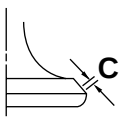
Valve clearance (cold)	
Intake	0.15–0.20 mm (0.0059–0.0079 in)
Exhaust	0.25–0.30 mm (0.0098–0.0118 in)
Valve dimensions	
Valve head diameter A (intake)	24.90–25.10 mm (0.9803–0.9882 in)
Valve head diameter A (exhaust)	21.90–22.10 mm (0.8622–0.8701 in)



Valve face width B (intake)	1.140–1.980 mm (0.0449–0.0780 in)
Valve face width B (exhaust)	1.140–1.980 mm (0.0449–0.0780 in)

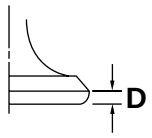


Valve seat width C (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)
Valve seat width C (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)

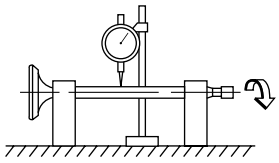


Valve margin thickness D (intake)	0.60–0.80 mm (0.0236–0.0315 in)

Valve margin thickness D (exhaust)	0.60–0.80 mm (0.0236–0.0315 in)



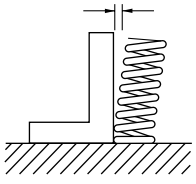
Valve stem diameter (intake)	3.975–3.990 mm (0.1565–0.1571 in)
Limit	3.945 mm (0.1553 in)
Valve stem diameter (exhaust)	3.960–3.975 mm (0.1559–0.1565 in)
Limit	3.930 mm (0.1547 in)
Valve guide inside diameter (intake)	4.000–4.012 mm (0.1575–0.1580 in)
Limit	4.050 mm (0.1594 in)
Valve guide inside diameter (exhaust)	4.000–4.012 mm (0.1575–0.1580 in)
Limit	4.050 mm (0.1594 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.040 mm (0.0016 in)



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

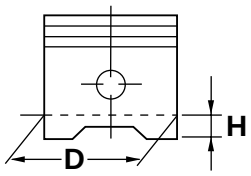
Valve spring

Free length (intake)	35.59 mm (1.40 in)
Limit	33.81 mm (1.33 in)
Free length (exhaust)	35.59 mm (1.40 in)
Limit	33.81 mm (1.33 in)
Installed length (intake)	30.39 mm (1.20 in)
Installed length (exhaust)	30.39 mm (1.20 in)
Spring rate K1 (intake)	18.84 N/mm (107.60 lb/in) (1.92 kgf/mm)
Spring rate K2 (intake)	24.52 N/mm (140.01 lb/in) (2.50 kgf/mm)
Spring rate K1 (exhaust)	18.84 N/mm (107.60 lb/in) (1.92 kgf/mm)
Spring rate K2 (exhaust)	24.52 N/mm (140.01 lb/in) (2.50 kgf/mm)
Installed compression spring force (intake)	91.2–104.9 N (20.50–23.59 lbf) (9.3–10.7 kgf)
Installed compression spring force (exhaust)	91.2–104.9 N (20.50–23.59 lbf) (9.3–10.7 kgf)
Spring tilt (intake)	2.5°/1.6 mm
Spring tilt (exhaust)	2.5°/1.6 mm

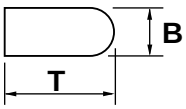


Winding direction (intake)	Clockwise

Winding direction (exhaust)	Clockwise
Valve lifter	
Valve lifter outside diameter (intake)	24.476–24.500 mm (0.9636–0.9646 in)
Limit	24.451 mm (0.9626 in)
Valve lifter outside diameter (exhaust)	24.476–24.500 mm (0.9636–0.9646 in)
Limit	24.451 mm (0.9626 in)
Cylinder	
Bore	66.000–66.010 mm (2.5984–2.5988 in)
Wear limit	66.100 mm (2.6024 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)
Piston	
Piston-to-cylinder clearance	0.020–0.045 mm (0.0008–0.0018 in)
Limit	0.15 mm (0.0059 in)
Diameter D	65.965–65.980 mm (2.5970–2.5976 in)
Height H	9.0 mm (0.35 in)

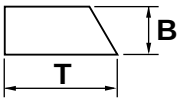


Offset	0.50 mm (0.0197 in)
Offset direction	Intake side
Piston pin bore inside diameter	15.002–15.013 mm (0.5906–0.5911 in)
Limit	15.043 mm (0.5922 in)
Piston pin outside diameter	14.991–15.000 mm (0.5902–0.5906 in)
Limit	14.971 mm (0.5894 in)
Piston-pin-to-piston-pin-bore clearance	0.002–0.022 mm (0.0001–0.0009 in)
Piston ring	
Top ring	
Ring type	Barrel
Dimensions (B × T)	0.80 × 2.45 mm (0.03 × 0.10 in)

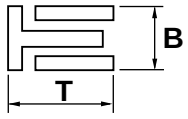


End gap (installed)	0.15–0.25 mm (0.0059–0.0098 in)
Limit	0.50 mm (0.0197 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)
Limit	0.100 mm (0.0039 in)
2nd ring	
Ring type	Plain

Dimensions (B × T)	0.80 × 2.50 mm (0.03 × 0.10 in)



End gap (installed)	0.40–0.50 mm (0.0157–0.0197 in)
Limit	0.75 mm (0.0295 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.100 mm (0.0039 in)
Oil ring	
Dimensions (B × T)	1.50 × 2.00 mm (0.06 × 0.08 in)



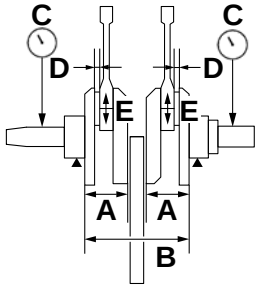
End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
Ring side clearance	0.040–0.160 mm (0.0016–0.0063 in)

Connecting rod

Oil clearance (using plastigauge®)	0.026–0.050 mm (0.0010–0.0020 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green
Small end inside diameter	15.005–15.018 mm (0.5907–0.5913 in)

Crankshaft

Width A	50.00–50.60 mm (1.969–1.992 in)
Width B	118.55–118.60 mm (4.67–4.67 in)
Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.160–0.262 mm (0.0063–0.0103 in)
Big end radial clearance E	0.026–0.050 mm (0.0010–0.0020 in)



Journal oil clearance (using plastigauge®)	0.040–0.082 mm (0.0016–0.0032 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green
Crankshaft journal diameter	55.032–55.074 mm (2.1666–2.1683 in)

Balancer

Balancer drive method	Piston

Clutch

Clutch type	Wet, multiple-disc automatic
Clutch release method	Automatic
Friction plate thickness	2.75–3.05 mm (0.108–0.120 in)
Wear limit	2.65 mm (0.1043 in)
Plate quantity	5 pcs
Clutch plate 1 thickness	1.30–1.50 mm (0.051–0.059 in)

Plate quantity	4 pcs
Warpage limit	0.10 mm (0.0039 in)
Clutch plate 2 thickness	1.80–2.00 mm (0.071–0.079 in)
Plate quantity	2 pcs
Warpage limit	0.20 mm (0.0079 in)
Clutch spring free length	25.80 mm (1.02 in)
Minimum length	20.40 mm (0.80 in)
Spring quantity	6 pcs
Clutch spring plate height	4.70 mm (0.19 in)
Minimum height	4.40 mm (0.17 in)
Spring quantity	1 pc
Clutch damper spring height	3.50 mm (0.14 in)
Minimum height	3.10 mm (0.12 in)
Spring quantity	6 pcs
V-belt	
V-belt width	32.0 mm (1.26 in)
Limit	30.5 mm (1.20 in)
Transmission	
Transmission type	V-belt automatic
Primary reduction system	Spur gear/helical gear
Primary reduction ratio	52/32 × 36/22 (2.659)
Secondary reduction system	Chain drive
Secondary reduction ratio	41/25 × 40/29 (2.262)
Operation	Centrifugal automatic type
Main axle runout limit	0.08 mm (0.0032 in)
Drive axle runout limit	0.08 mm (0.0032 in)
Air filter	
Air filter element	Oil-coated paper element
Fuel pump	
Pump type	Electrical
Model/manufacturer	4B5/AISAN
Maximum consumption amperage	1.9 A
Output pressure	246.0–254.0 kPa (35.7–36.8 psi) (2.46–2.54 kgf/cm²)
Fuel injector	
Model/quantity	1100-87J80,1100-87J90/2
Manufacturer	AISAN
Throttle body	
Type/quantity	ACW31-3/1
Manufacturer	MIKUNI
ID mark	4B54 10
Throttle position sensor	
Resistance	4.0–6.0 kΩ
Fuel injection sensor	
Crankshaft position sensor resistance	189–231 Ω at 20 °C (68 °F)

Intake air pressure sensor output voltage	3.15–4.15 V
Intake air temperature sensor resistance	2.21–2.69 kΩ at 20 °C (68 °F)
Coolant temperature sensor resistance	2.32–2.59 kΩ at 20 °C (68 °F) 310–326 Ω at 80 °C (176 °F)

Idling condition

Engine idling speed	1100–1300 r/min
Intake vacuum	33.0 kPa (9.7 inHg) (248 mmHg)
Water temperature	85.0–100.0 °C (185.00–212.00 °F)
Oil temperature	70.0 °C (158.00 °F)
Throttle cable free play	3.0–5.0 mm (0.12–0.20 in)

EAS20300
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Diamond
Caster angle	25.00°
Trail	92.0 mm (3.62 in)
Front wheel	
Wheel type	Cast wheel
Rim size	15M/C × MT3.50
Rim material	Aluminum
Wheel travel	120.0 mm (4.72 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)
Rear wheel	
Wheel type	Cast wheel
Rim size	15M/C × MT5.00
Rim material	Aluminum
Wheel travel	116.0 mm (4.57 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)
Front tire	
Type	Tubeless
Size	120/70R15 M/C 56H
Manufacturer/model	DUNLOP/GPR-100F
Manufacturer/model	BRIDGESTONE/BT011F
Wear limit (front)	1.0 mm (0.04 in)
Rear tire	
Type	Tubeless
Size	160/60R15 M/C 67H
Manufacturer/model	DUNLOP/GPR-100L
Manufacturer/model	BRIDGESTONE/BT012R
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	225 kPa (33 psi) (2.25 kgf/cm²)
Rear	250 kPa (36 psi) (2.50 kgf/cm²)
Loading condition	90–193 kg (198–425 lb)
Front	225 kPa (33 psi) (2.25 kgf/cm²)
Rear	280 kPa (41 psi) (2.80 kgf/cm²)
Front brake	
Type	Dual disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	267.0 × 4.0 mm (10.51 × 0.16 in)

Brake disc thickness limit	3.5 mm (0.14 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	4.0 mm (0.16 in)
Limit	0.5 mm (0.02 in)
Brake pad lining thickness (outer)	4.0 mm (0.16 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	15.00 mm (0.59 in)
Caliper cylinder inside diameter	30.23 mm (1.19 in)
Caliper cylinder inside diameter	27.00 mm (1.06 in)
Recommended fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Left hand operation
Rear disc brake	
Disc outside diameter × thickness	267.0 × 5.0 mm (10.51 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	8.0 mm (0.31 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	8.0 mm (0.31 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	14.0 mm (0.55 in)
Caliper cylinder inside diameter	38.10 mm (1.50 in)
Recommended fluid	DOT 4

Steering

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

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	120.0 mm (4.72 in)
Fork spring free length	303.9 mm (11.96 in)
Limit	297.8 mm (11.72 in)
Collar length	195.0 mm (7.68 in)
Installed length	284.9 mm (11.22 in)
Spring rate K1	8.14 N/mm (46.48 lb/in) (0.83 kgf/mm)
Spring stroke K1	0.0–120.0 mm (0.00–4.72 in)
Inner tube outer diameter	43.0 mm (1.69 in)
Inner tube bending limit	0.2 mm (0.01 in)
Optional spring available	No
Recommended oil	Yamaha fork oil 10WT
Quantity	517.0 cm³ (17.48 US oz) (18.23 Imp.oz)
Level	87.0 mm (3.43 in)

Rear suspension

Type	Swingarm
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	43.3 mm (1.70 in)
Spring free length	191.2 mm (7.53 in)

Installed length	180.0 mm (7.09 in)
Spring rate K1	225.60 N/mm (1288.18 lb/in) (23.00 kgf/mm)
Spring rate K2	294.00 N/mm (1678.74 lb/in) (29.98 kgf/mm)
Spring stroke K1	0.0–28.8 mm (0.00–1.13 in)
Spring stroke K2	28.8–43.0 mm (1.13–1.69 in)
Optional spring available	No
Enclosed gas/air pressure (STD)	4900 kPa (696.9 psi) (49.0 kgf/cm²)

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)

EAS20310
ELECTRICAL SPECIFICATIONS

Voltage	
System voltage	12 V
Ignition system	
Ignition system	Transistorized coil ignition (digital)
Advancer type	Digital
Ignition timing (B.T.D.C.)	10.0°/1200 r/min
Engine control unit	
Model/manufacturer	TBDF81/DENSO
Ignition coil	
Model/manufacturer	JO313/DENSO
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	1.87–2.53 Ω
Secondary coil resistance	12.00–18.00 kΩ
Spark plug cap	
Material	Resin
Resistance	10.0 kΩ
AC magneto	
Model/manufacturer	F004T39871/MITSUBISHI
Standard output	14.0 V, 27.0 A 5000 r/min
Standard output	14.0 V, 378 W 5000 r/min
Stator coil resistance	0.225–0.275 Ω at 20 °C (68 °F)
Rectifier/regulator	
Regulator type	Semi conductor-short circuit
Model/manufacturer	SH678-11/SHINDENGEN
Regulated voltage (DC)	14.1–14.9 V
Rectifier capacity (DC)	22.0 A
Withstand voltage	200.0 V
Battery	
Model	YTZ10S
Voltage, capacity	12 V, 8.6 Ah
Manufacturer	GS YUASA
Ten hour rate amperage	0.86 A
Headlight	
Bulb type	Halogen bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 60 W/55.0 W × 1
Headlight	12 V, 55.0 W × 1
Tail/brake light	12 V, 5.0 W/21.0 W × 1
Front turn signal/position 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

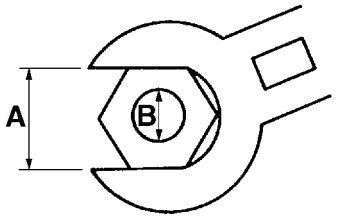
Meter lighting	LED
Indicator light	
Turn signal indicator light	LED × 2
High beam indicator light	LED
Engine trouble warning light	LED
Electric starting system	
System type	Constant mesh
Starter motor	
Model/manufacturer	SM-18/MITSUBA
Power output	0.70 kW
Armature coil resistance	0.0100–0.0200 Ω at 20 °C (68 °F)
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.02–6.51 N (21.69–23.45 oz) (614–664 gf)
Mica undercut (depth)	0.70 mm (0.03 in)
Starter relay	
Model/manufacturer	RC19-075A/MITSUBA
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω
Horn	
Horn type	Plane
Quantity	1 pc
Model/manufacturer	HF-12/NIKKO
Maximum amperage	3.0 A
Coil resistance	1.06–1.11 Ω at 20 °C (68 °F)
Performance	105–118 dB/2m
Turn signal relay	
Relay type	Full transistor
Model/manufacturer	FE246BH/DENSO
Built-in, self-canceling device	No
Turn signal blinking frequency	75–95 cycles/min
Fuel sender unit	
Model/manufacturer	4B5/AISAN
Sender unit resistance (full)	4.0–10.0 Ω
Sender unit resistance (empty)	93.0–100.0 Ω
Starting circuit cut-off relay	
Model/manufacturer	5EA/MATSUSHITA
Headlight relay	
Model/manufacturer	5EA/MATSUSHITA
Fan motor relay	
Model/manufacturer	5EA/MATSUSHITA

Fuel injection system relay	
Model/manufacturer	5JJ/MATSUSHITA
Fuses	
Main fuse	30.0 A
Headlight fuse	20.0 A
Taillight fuse	10.0 A
Signaling system fuse	15.0 A
Ignition fuse	10.0 A
Radiator fan fuse	15.0 A
Fuel injection system fuse	10.0 A
Backup fuse	10.0 A
Spare fuse	30.0 A
Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	10.0 A

EAS20320
TIGHTENING TORQUES

EAS20330
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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



A. Distance between flats
B. Outside thread diameter

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

EAS20340
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Camshaft cap	M6	12	10 Nm (1.0 m·kg, 7.2 ft·lb)	E
Engine oil check bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Exhaust pipe stud bolt	M8	4	15 Nm (1.5 m·kg, 11 ft·lb)	
Cylinder head nut	M9	4	35 Nm (3.5 m·kg, 25 ft·lb)	E
Cylinder head nut	M9	2	46 Nm (4.6 m·kg, 33 ft·lb)	E
Cylinder head bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Cylinder bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Spark plug	M10	2	13 Nm (1.3 m·kg, 9.4 ft·lb)	
Cylinder head cover bolt	M6	10	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing chain tensioner rod accessing plug	M20	1	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Cylinder head stud bolt	M9	6	13 Nm (1.3 m·kg, 9.4 ft·lb)	See TIP.
Connecting rod nut (1st)	M7	4	16 Nm (1.6 m·kg, 11 ft·lb)	See TIP.
Connecting rod nut (final)	M7	4	Specified angle 90°	See TIP.
Balancer connecting rod nut	M9	2	60 Nm (6.0 m·kg, 43 ft·lb)	M
Balancer cylinder bolt	M10	4	58 Nm (5.8 m·kg, 42 ft·lb)	LT
Generator rotor nut (1st)	M18	1	65 Nm (6.5 m·kg, 47 ft·lb)	See TIP.
Generator rotor nut (final)	M18	1	Specified angle 120°	See TIP.
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing chain guide (intake side) bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Water pump housing cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump assembly bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump inlet and outlet pipes bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Thermostat cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Radiator guard bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Radiator filler pipe bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Coolant pipe bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil pump assembly bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil strainer bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Oil filter cartridge union bolt	M20	1	63 Nm (6.3 m·kg, 45 ft·lb)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Oil delivery pipe bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Intake manifold bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Air filter case bolt	M6	2	9 Nm (0.9 m·kg, 6.5 ft·lb)	
Fuel injector bolt	M6	2	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Exhaust pipe nut	M8	3	20 Nm (2.0 m·kg, 14 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Muffler nut	M10	1	31 Nm (3.1 m·kg, 22 ft·lb)	
Muffler end protector bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Exhaust pipe protector bolt	M6	1	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Muffler end protector cover bolt	M6	5	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Muffler protector (side) bolt	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Muffler protector (upper) bolt	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Crankcase bolt	M6	5	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase bolt	M8	8	24 Nm (2.4 m·kg, 17 ft·lb)	
Engine oil pressure check point plug	M20	1	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Engine oil passage bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kg, 31 ft·lb)	
Oil tank bolt	M6	7	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Stator coil base screw	M6	3	12 Nm (1.2 m·kg, 8.7 ft·lb)	
Timing mark accessing plug	M16	1	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Generator cover bolt	M6	19	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Outer V-belt case bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Outer V-belt case bolt	M8	6	24 Nm (2.4 m·kg, 17 ft·lb)	
Inner V-belt case plate bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Inner V-belt case bolt	M8	2	24 Nm (2.4 m·kg, 17 ft·lb)	
Crankshaft end access cover screw	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
V-belt case air filter case screw	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Generator cover protector screw	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
V-belt case air filter case cover screw	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Generator cover protector cover screw	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
V-belt case air filter element (left) bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Starter clutch bolt	M8	3	30 Nm (3.0 m·kg, 22 ft·lb)	
Clutch boss nut	M48	1	130 Nm (13.0 m·kg, 94 ft·lb)	
Clutch assembly nut	M16	1	65 Nm (6.5 m·kg, 47 ft·lb)	
Primary sheave nut	M20	1	160 Nm (16.0 m·kg, 115 ft·lb)	Shell BT grease 3®
Secondary sheave spring seat nut	M36	1	90 Nm (9.0 m·kg, 65 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Secondary sheave nut	M18	1	90 Nm (9.0 m·kg, 65 ft·lb)	BEL-RAY assembly lube®
Crankshaft right end bearing retainer screw	M6	1	11 Nm (1.1 m·kg, 8.0 ft·lb)	LT
Secondary shaft bearing retainer bolt	M6	2	12 Nm (1.2 m·kg, 8.7 ft·lb)	LT
Stator coil bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Crankshaft position sensor bolt	M5	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	LT
Starter motor bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter motor insulator nut	M6	1	11 Nm (1.1 m·kg, 8.0 ft·lb)	
O_2 sensor	M18	1	45 Nm (4.5 m·kg, 32 ft·lb)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kg, 13 ft·lb)	

TIP

Cylinder head stud bolt

The tightening torque is for reference only. Install the cylinder head stud bolt so that it protrudes 151.1–151.3 mm (5.95–5.96 in) from the crankcase.

TIP

Connecting rod nut

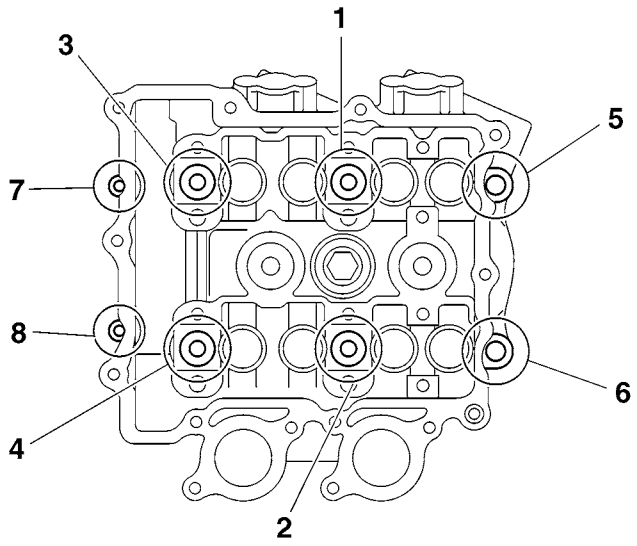
Tighten the connecting rod nuts to 16 Nm (1.6 m·kg, 11 ft·lb), and then tighten them further to reach the specified angle 90°.

TIP

Generator rotor nut

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

Cylinder head tightening sequence:



EAS20350
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting bolt (front upper side)	M12	1	88 Nm (8.8 m·kg, 64 ft·lb)	
Engine mounting bolt (front right lower side)	M10	2	45 Nm (4.5 m·kg, 32 ft·lb)	
Engine mounting bolt (front left lower side)	M10	2	45 Nm (4.5 m·kg, 32 ft·lb)	
Engine mounting nut (rear side)	M12	1	105 Nm (10.5 m·kg, 75 ft·lb)	
Rear frame bolt	M12	2	83 Nm (8.3 m·kg, 60 ft·lb)	
Front cowling stay bolt (front side)	M10	2	48 Nm (4.8 m·kg, 35 ft·lb)	
Front cowling stay bolt (rear side)	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Radiator bracket bolt	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Footrest board bracket bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Footrest board cover bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Radiator filler pipe bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Main switch/immobilizer unit bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Fuel tank bracket bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Frame cross member bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Muffler bracket nut	M10	1	32 Nm (3.2 m·kg, 23 ft·lb)	
Tail bracket bolt	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
Taillight assembly bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Seat hinge assembly bolt	M8	4	16 Nm (1.6 m·kg, 11 ft·lb)	
Seat hinge damper ball joint	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
Fuel tank bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Fuel pump bolt	M5	6	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Canister bracket nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Canister bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Storage box bolt	M6	10	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Seat lock bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Seat hinge housing	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Fuel tank cover bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Grab bar bolt	M8	4	16 Nm (1.6 m·kg, 11 ft·lb)	
Seat nut	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front cowling assembly bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Storage compartment bracket bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Battery holder bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Windshield bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rearview mirror nut	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Pivot shaft	M22	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Pivot shaft nut	M22	1	100 Nm (10.0 m·kg, 72 ft·lb)	
Swingarm bolt	M10	3	40 Nm (4.0 m·kg, 29 ft·lb)	
Swingarm damper nut	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear shock absorber assembly rear nut	M12	1	53 Nm (5.3 m·kg, 38 ft·lb)	
Rear shock absorber assembly front bolt	M16	1	68 Nm (6.8 m·kg, 49 ft·lb)	
Upper bracket pinch bolt	M8	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Lower bracket pinch bolt	M8	4	26 Nm (2.6 m·kg, 19 ft·lb)	
Lower bracket cover bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	LT
Horn bracket nut	M8	1	16 Nm (1.6 m·kg, 11 ft·lb)	
Front fork cap bolt	M40	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Damper rod bolt	M10	2	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Steering stem nut	M28	1	115 Nm (11.5 m·kg, 85 ft·lb)	
Lower ring nut (initial tightening torque)	M30	1	52 Nm (5.2 m·kg, 37 ft·lb)	See TIP.
Lower ring nut (final tightening torque)	M30	1	14 Nm (1.4 m·kg, 10 ft·lb)	See TIP.
Handlebar nut	M10	2	40 Nm (4.0 m·kg, 29 ft·lb)	
Brake hose union bolt	M10	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Brake master cylinder holder bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Brake lever pivot nut	M6	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Grip end	M16	2	26 Nm (2.6 m·kg, 19 ft·lb)	
Front fender bolt	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front wheel axle	M18	1	72 Nm (7.2 m·kg, 52 ft·lb)	
Front wheel axle pinch bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Rear wheel axle nut	M14	1	105 Nm (10.5 m·kg, 75 ft·lb)	
Rear wheel axle pinch bolt	M8	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Front brake caliper bolt	M10	4	40 Nm (4.0 m·kg, 29 ft·lb)	
Front reflector nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake caliper bleed screw	M8	2	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Rear brake caliper bolt	M10	2	40 Nm (4.0 m·kg, 29 ft·lb)	
Rear brake caliper retaining bolt	M10	2	31 Nm (3.1 m·kg, 22 ft·lb)	S
Rear brake caliper rear brake lock cable holder bolt	M8	1	22 Nm (2.2 m·kg, 16 ft·lb)	
Rear brake caliper bleed screw	M7	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Front brake disc bolt	M6	12	18 Nm (1.8 m·kg, 13 ft·lb)	LT
Wheel ring bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT

Item	Thread size	Q'ty	Tightening torque	Remarks
Rear brake disc bolt	M6	6	18 Nm (1.8 m·kg, 13 ft·lb)	LT
Rear wheel drive hub bolt	M10	4	69 Nm (6.9 m·kg, 50 ft·lb)	LT
Front brake hose joint bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake hose holder bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake hose holder bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake lock cable holder bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Centerstand bracket nut	M10	4	55 Nm (5.5 m·kg, 40 ft·lb)	
Centerstand nut	M10	2	55 Nm (5.5 m·kg, 40 ft·lb)	
Sidestand nut	M10	1	39 Nm (3.9 m·kg, 28 ft·lb)	
Passenger footrest bolt	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
ECU (engine control unit) 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)	
Transmission chain drive case cover screw	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Transmission chain drive holder assembly	M10	3	30 Nm (3.0 m·kg, 22 ft·lb)	
Chain drive oil drain bolt	M12	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Outer chain drive case	M6	18	10 Nm (1.0 m·kg, 7.2 ft·lb)	

TIP

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 14 Nm (1.4 m·kg, 10 ft·lb) with a torque wrench.

EAS20360
LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370
ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Bearings	E
Cylinder head nut seats and washers	E
Camshaft cap bolt seats	E
Big end bearings and crank pins	E
Connecting rod big end contact surfaces (to crank)	E
Balancer big end bearings and crank pin	E
Balancer connecting rod big end contact surface (to crank)	E
Pistons, ring grooves, and piston rings	E
Cylinder inner surface	E
Piston pins	E
Connecting rod bolt threads and nut seats	M
Balancer connecting rod bolt threads and nut seats	M
Crankshaft journal bearings and crankshaft journals	E
Balancer piston surface	E
Balancer cylinder inner surface	E
Balancer piston pin	E
Camshaft cam lobes and camshaft journals	M
Valves and valve stems	M
Valve stem seals	M
Valve pads	M
Valve lifters	E
Impeller shaft	M
Oil pump rotors (inner and outer)	E
Oil pump driven gear shaft	E
Oil filter cartridge union bolt threads and washer	E
Oil pump gaskets	LS
Fuel injector gaskets and O-ring	E
Exhaust pipe gaskets	Shell BT grease 3®
Starter clutch idle gear inner surface	E
Starter clutch idle gear shaft	E
Starter clutch and starter clutch gear	E

Lubrication point	Lubricant
Primary driven gear spline and main axle spline	
1st pinion gear spline and main axle spline	
1st wheel gear spline and drive axle spline	
Crankshaft right end spacer and O-rings	Shell BT grease 3®
Crankshaft right end threads	Shell BT grease 3®
Primary sheave nut seats	Shell BT grease 3®
Secondary shaft right end threads	BEL-RAY assembly lube®
Secondary sheave nut seats	BEL-RAY assembly lube®
Outer V-belt case crankshaft right end point	
Pivot shaft taper roller bearing	
Cylinder head cover inner gaskets mating surface	Yamaha bond No.1215 (Three bond No.1215®)
Timing chain guide (upper side) mating surface	Yamaha bond No.1215 (Three bond No.1215®)
Crankcase mating surfaces	Yamaha bond No.1215 (Three bond No.1215®)
Inner V-belt case seal mating surface	Yamaha bond No.1215 (Three bond No.1215®)
Crankshaft position sensor/stator assembly lead grommet	Yamaha bond No.1215 (Three bond No.1215®)

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Lubrication point	Lubricant
Steering bearings (upper and lower)	LS
Upper bearing cover seal lip and lower bearing dust seal lip	LS
Steering bearing races (inner and outer)	LS
Tube guide (throttle grip) inner surface and throttle cables	LS
Rear brake lock cable end (lever end)	LS
Brake lever pivoting point and metal-to-metal moving parts	S
Drive axle spline	LS
Transmission chain drive taper roller bearing	LS
Transmission chain drive case bearings	Chain drive oil
Transmission chain drive secondary driven gear oil seal lip	LS
Rear wheel and rear wheel drive hub mating surface	LS
Rear wheel drive hub spline	LS
Rear shock absorber assembly bearing inner surface	LS
Rear shock absorber assembly spacer and collar	LS
Pivot shaft oil seal and collar	LS
Rear shock absorber assembly front bolt seats	LS
Seat lock metal-to-metal moving parts	LS
Seat hinge metal-to-metal moving parts	LS
Seat lock cable	LS
Passenger footrest pivoting point	LS
Centerstand pivoting point and metal-to-metal moving parts	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Front wheel oil seal lip	LS
Rear wheel oil seal lip	LS

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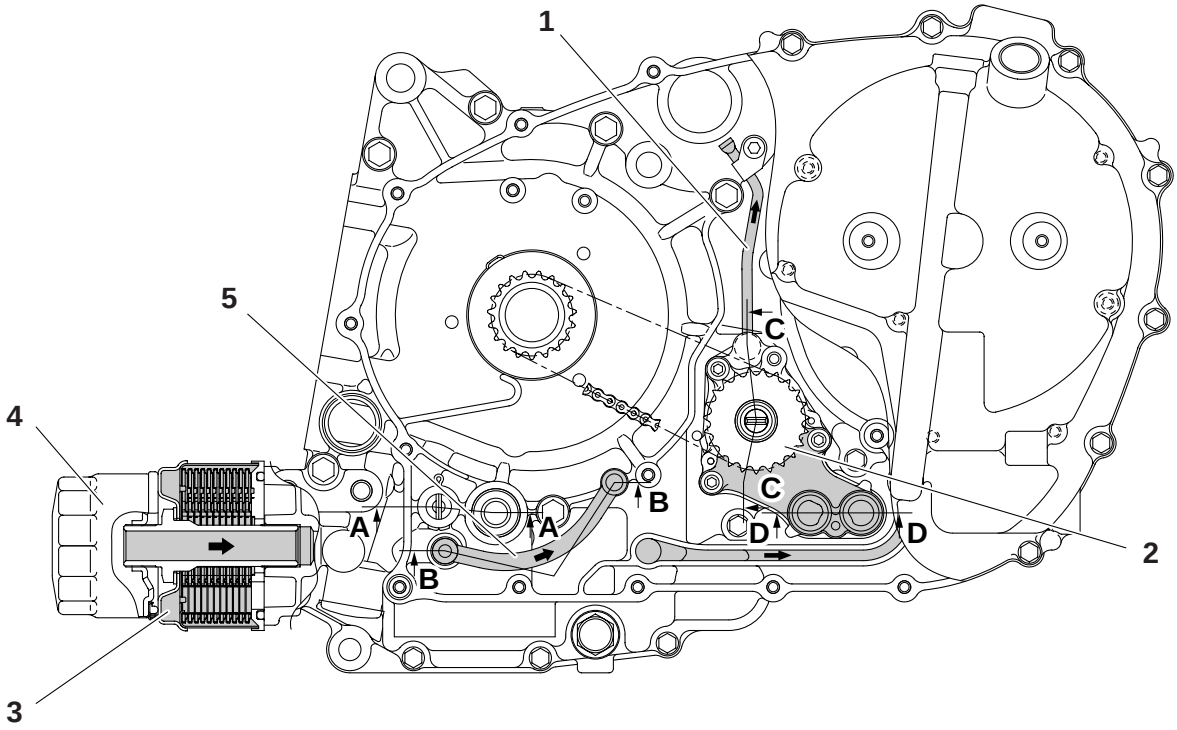
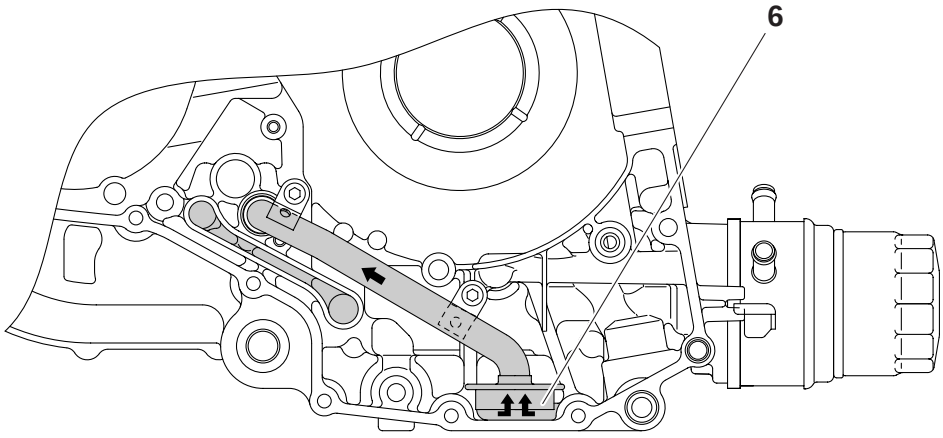
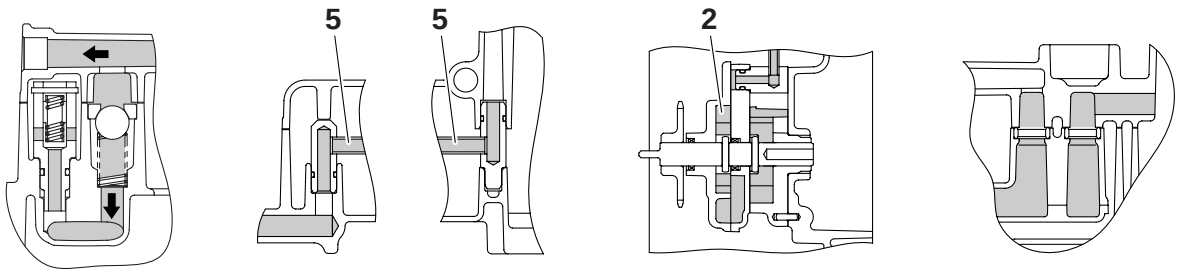
LUBRICATION SYSTEM DIAGRAMS

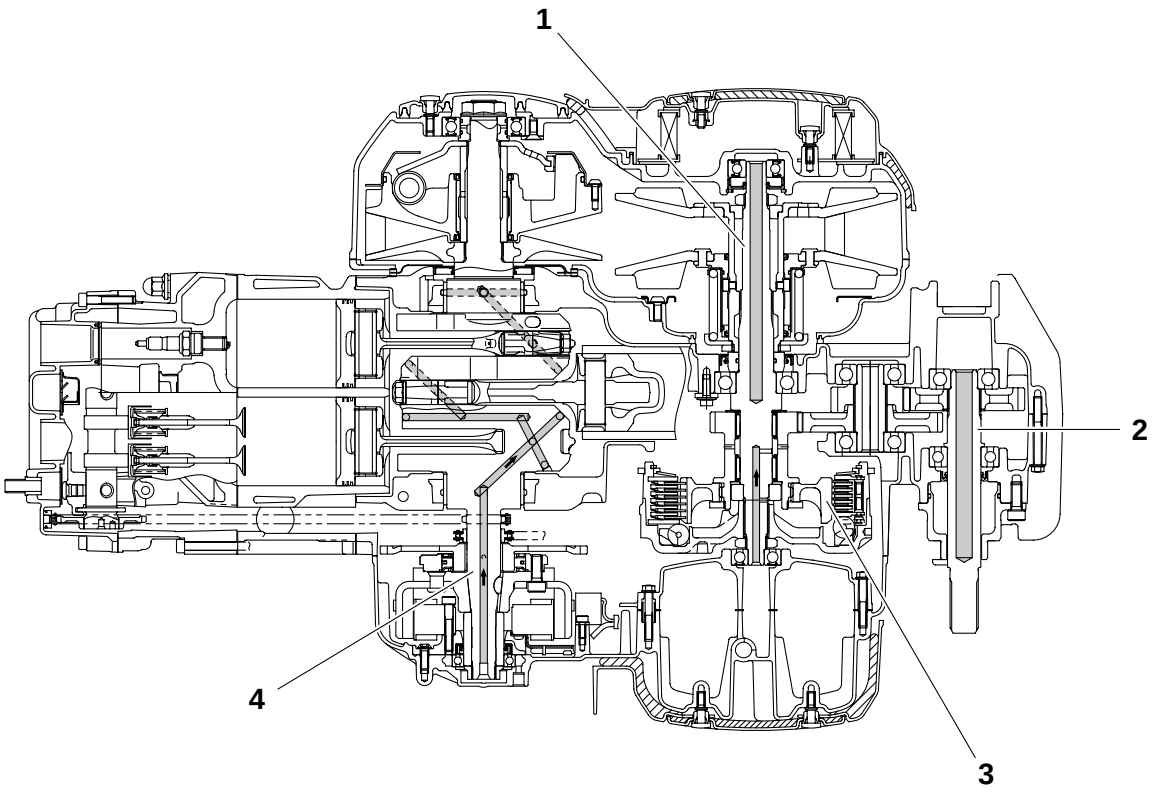
EAS20410
LUBRICATION DIAGRAMS







1. Oil delivery pipe
2. Oil pump
3. Oil cooler
4. Oil filter cartridge
5. Oil pipe
6. Oil strainer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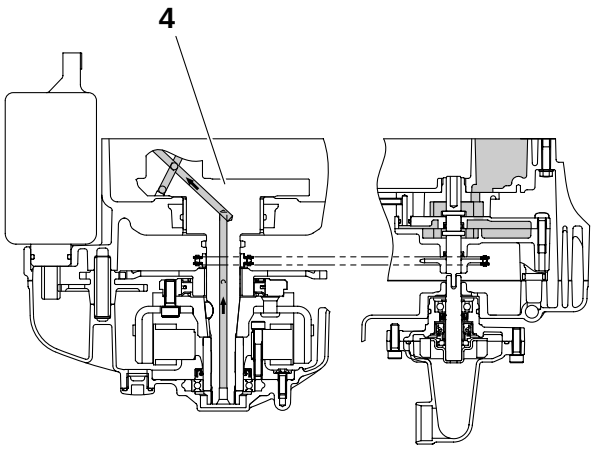
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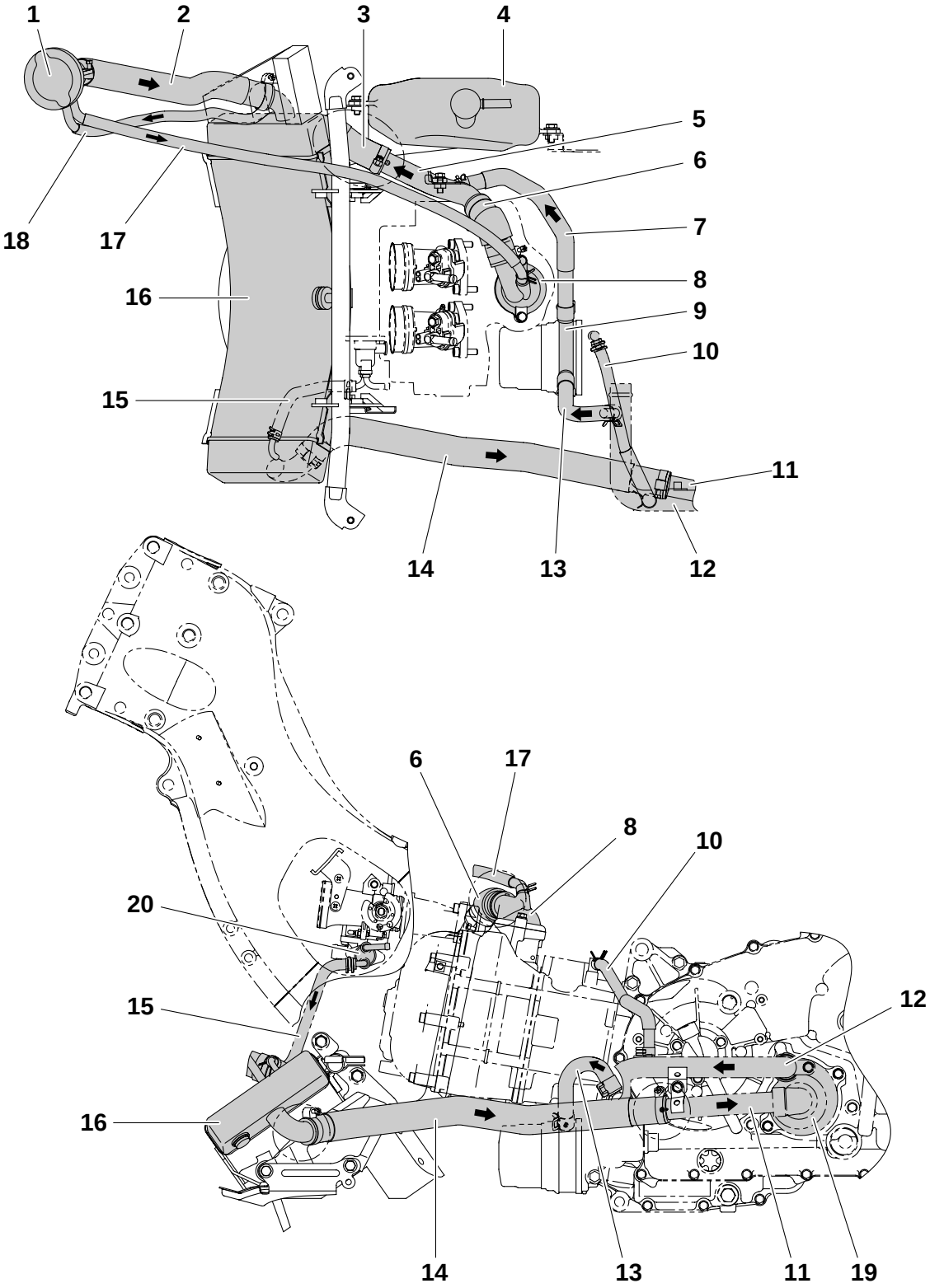
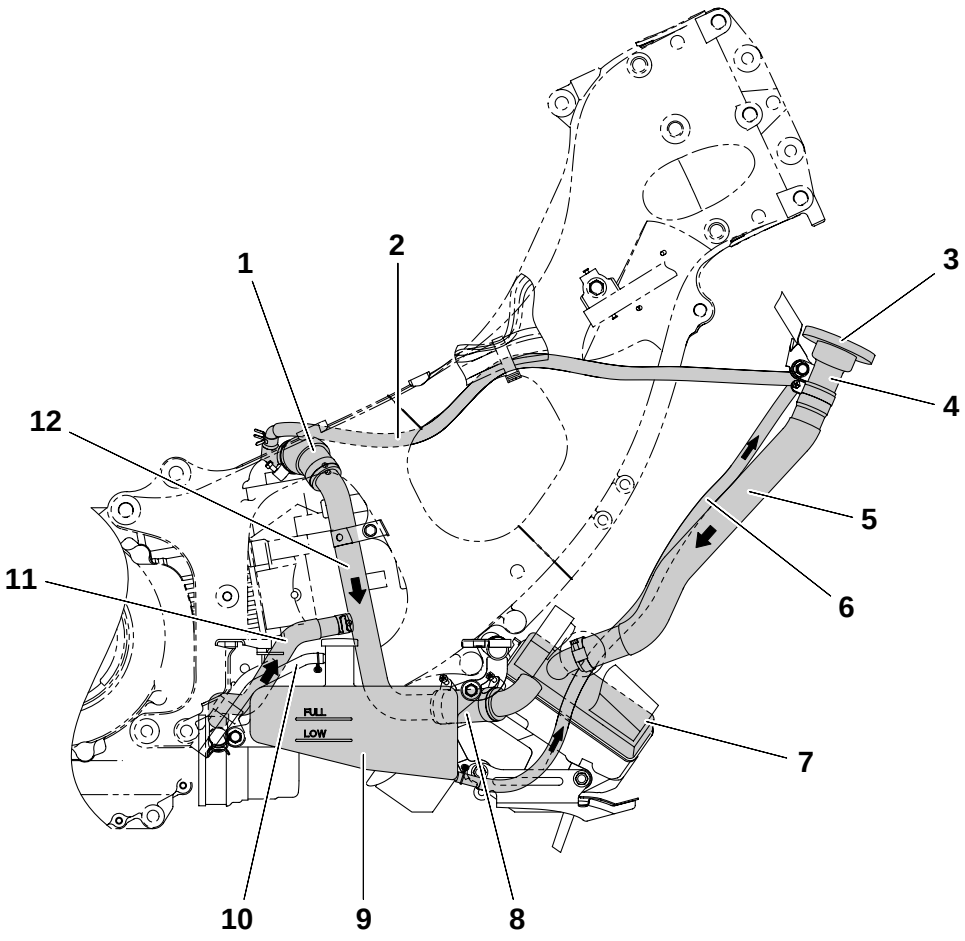
1. Secondary shaft
2. Drive axle
3. Clutch
4. Crankshaft

EAS20420

COOLING SYSTEM DIAGRAMS



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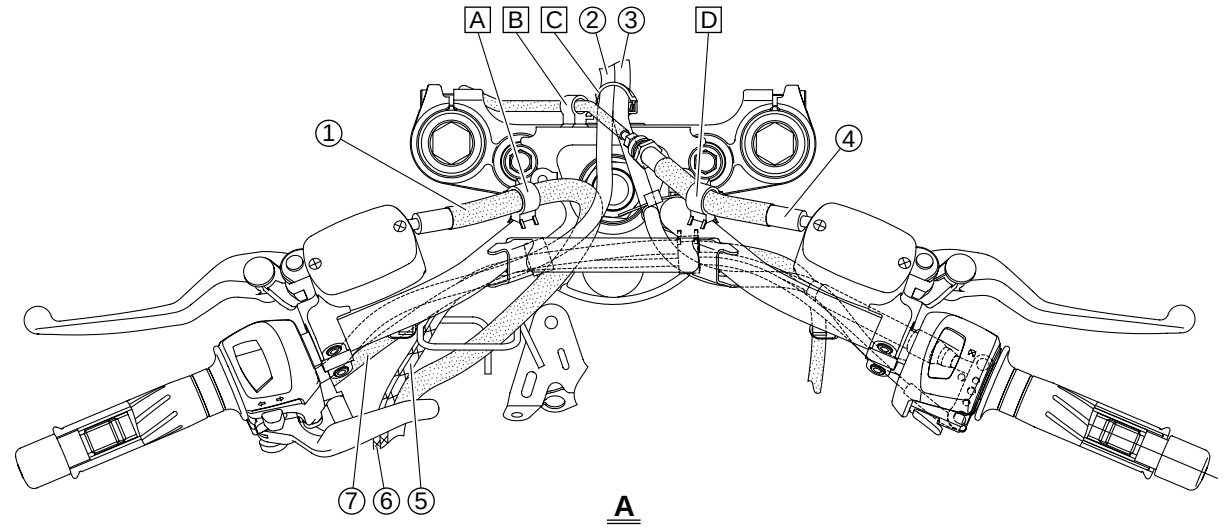
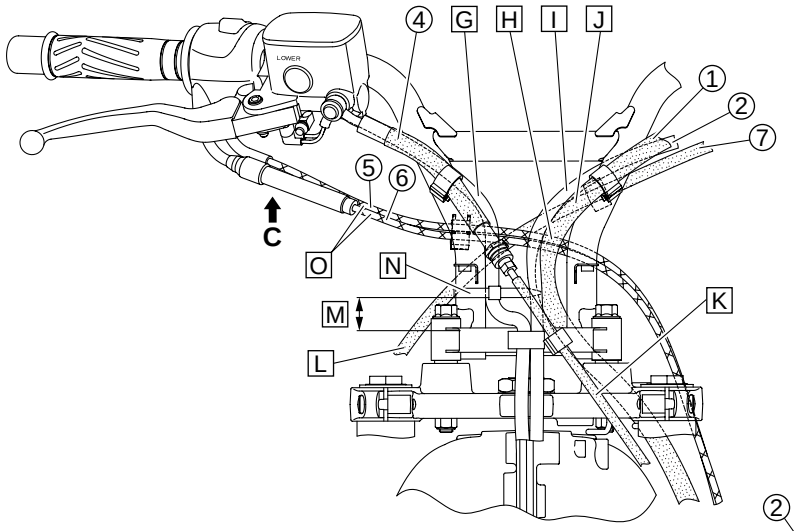
FULL
LOW

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

EAS20430
CABLE ROUTING



A



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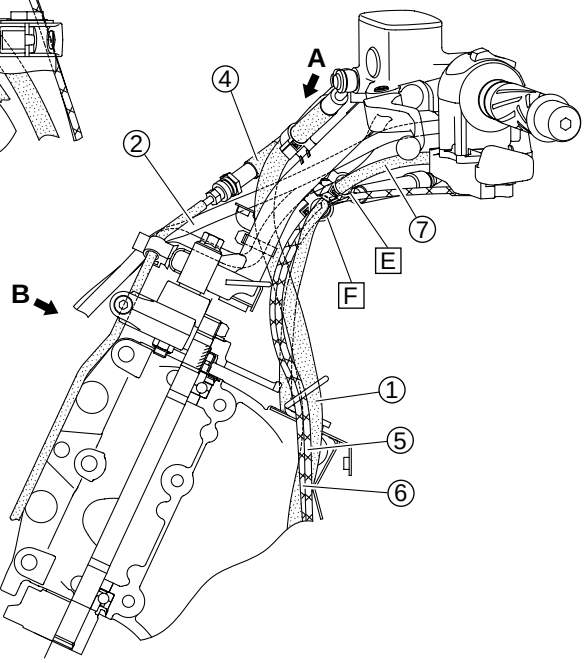
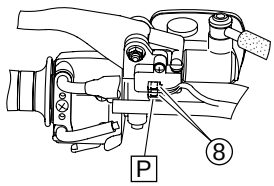
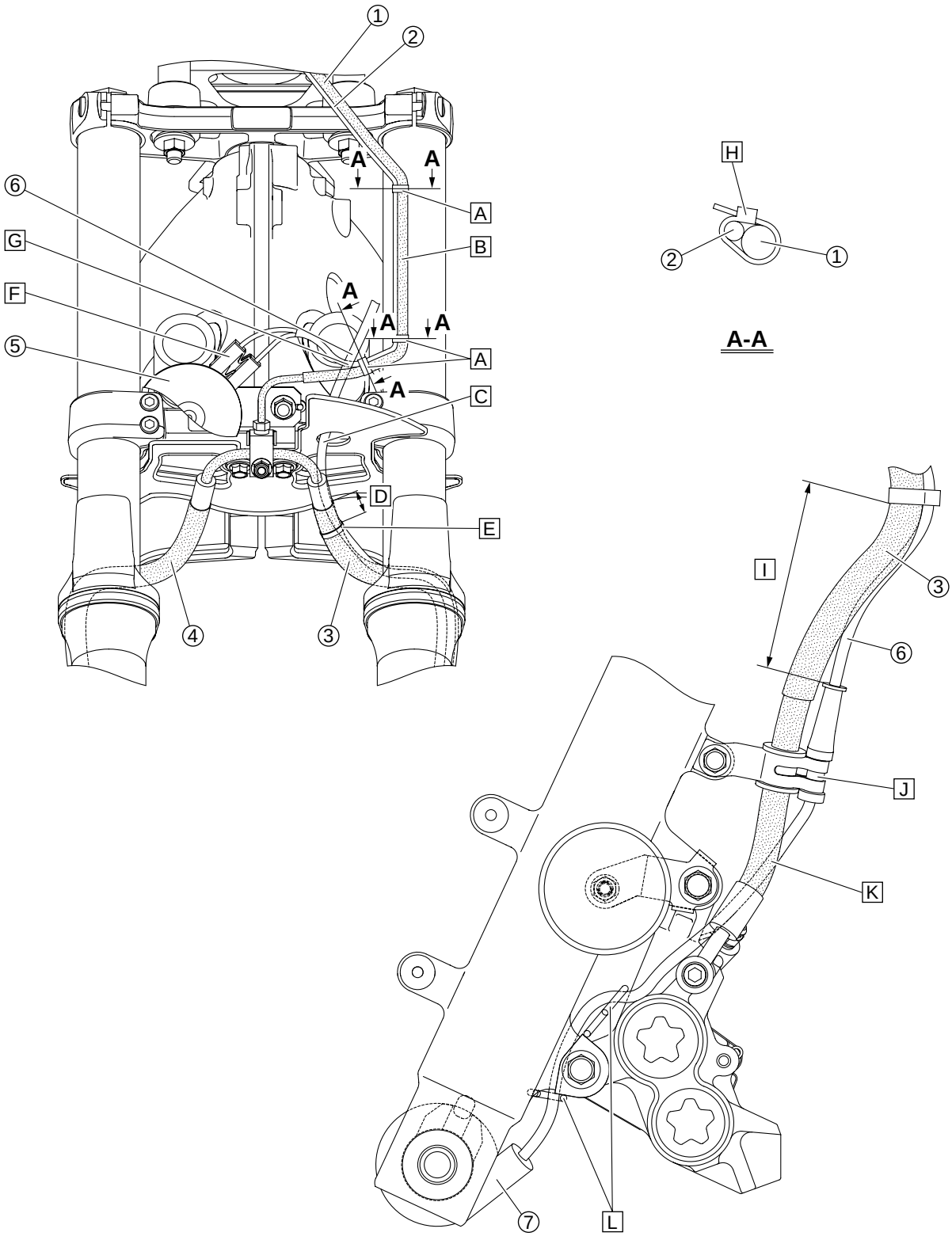




C

1. Rear brake hose
2. Left handlebar switch lead
3. Right handlebar switch lead
4. Front brake hose
5. Throttle cable (decelerator cable)
6. Throttle cable (accelerator cable)
7. Rear brake lock cable
8. Front brake light switch connectors

A. Fasten the rear brake hose with the holder.
B. Fasten the front brake pipe with the holder.
C. Fasten the left and right handlebar switch leads with the holder.
D. Fasten the front brake hose with the holder.
E. Fasten the rear brake lock cable with the holder.
F. Fasten the throttle cables with the holder.
G. Route the right handlebar switch lead behind the handlebar, and then route it through the opening in the handlebar toward the front of the vehicle.
H. Route the throttle cables behind the rear brake hose.
I. Route the left handlebar switch lead behind the handlebar, and then route it through the opening in the handlebar toward the front of the vehicle.
J. Route the rear brake hose in front of the handlebar, and then route it through the opening in the handlebar toward the rear of the vehicle.
K. Route the left handlebar switch lead behind the front brake pipe.
L. Route the rear brake lock cable behind the handlebar and throttle cables.
M. Route the right handlebar switch lead along the handlebar in the area shown in the illustration.
N. Fasten the right handlebar switch lead with the plastic band, making sure to point the end of the band inward.
O. Route the throttle cables behind the handlebar and in front of the rear brake lock cable.
P. Install the front brake light switch connectors so that the leads are routed inward.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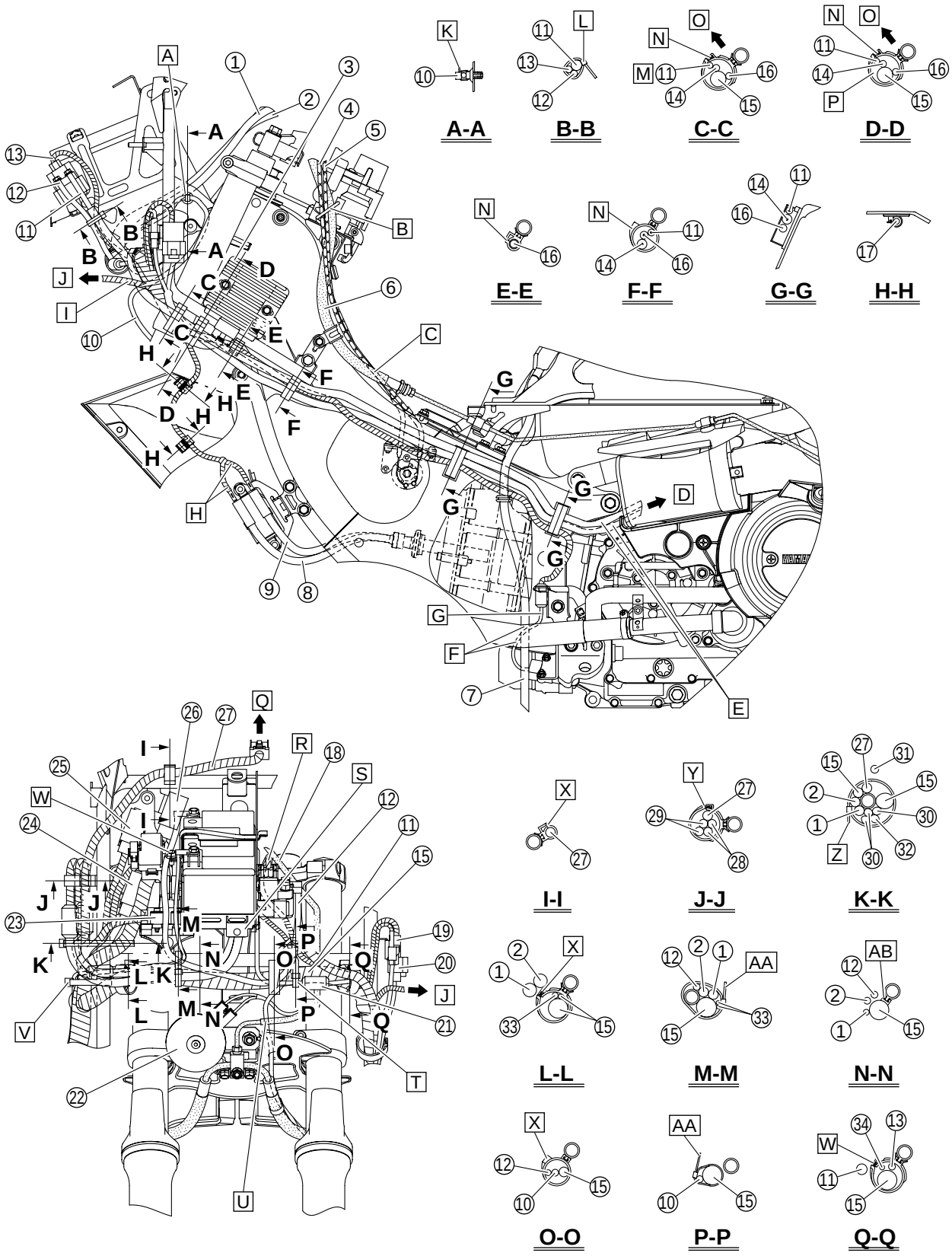
A-A

1. Front brake pipe
2. Wire harness (to horn)
3. Front brake hose (to left front brake caliper)
4. Front brake hose (to right front brake caliper)
5. Horn
6. Speed sensor lead
7. Speed sensor

A. Fasten the wire harness (to horn) and front brake pipe with plastic locking ties, making sure to position each tie 0–5 mm (0–0.20 in) from the bends in the pipe.
B. Route the wire harness (to horn) along the front brake pipe, making sure that there is no slack in the lead.
C. Pass the speed sensor lead through the hole in the lower bracket cover.
D. 20–30 mm (0.8–1.2 in)
E. Fasten the speed sensor lead and front brake hose (to left front brake caliper) with a plastic locking tie, making sure to align the tie with the white paint mark on the lead.
F. Make sure that the horn coupler is completely seated on the horn terminals.
G. Pass the speed sensor lead between the front brake pipe and the wire harness (to horn).
H. Point the end of the plastic locking tie inward, angled rearward, and then cut off the excess end of the tie to 5–10 mm (0.20–0.39 in).
I. 86–96 mm (3.4–3.8 in)
J. Fasten the grommet on the speed sensor lead with the holder.
K. Route the speed sensor lead to the inside of the front brake hose (to left front brake caliper).
L. Pass the speed sensor lead through the upper and lower portions of the guide.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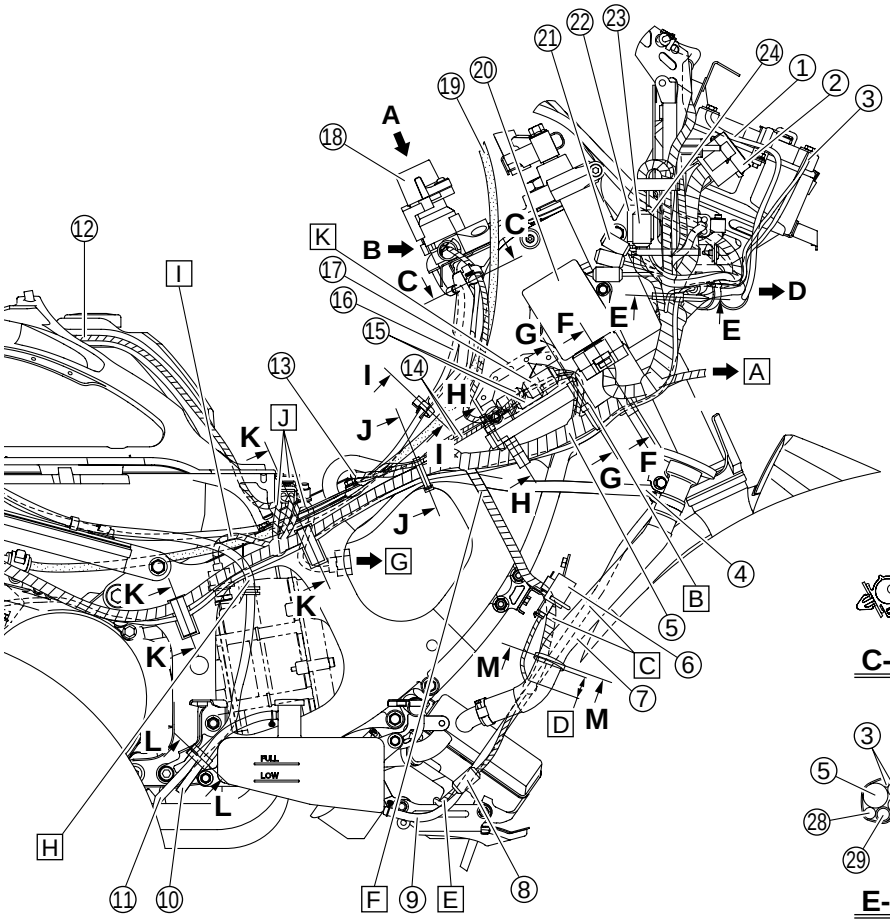
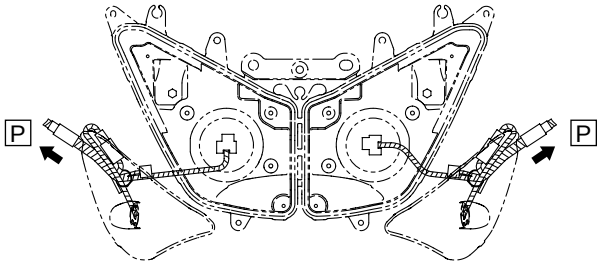
N-N
O-O
P-P
Q-Q

1. Left handlebar switch lead
2. Right handlebar switch lead
3. Rectifier/regulator
4. Throttle cable (accelerator cable)
5. Throttle cable (decelerator cable)
6. Rear brake hose
7. Fuel tank overflow hose
8. Spark plug lead #1
9. Spark plug lead #2
10. Speed sensor lead
11. Starter motor lead
12. Positive battery lead
13. Wire harness (to starter relay)
14. Generator lead
15. Wire harness
16. Wire harness (to sidestand switch)
17. Wire harness (to ignition coil)
18. Front brake pipe
19. Crankshaft position sensor coupler
20. Stator coil coupler
21. Speed sensor coupler
22. Horn
23. Lean angle sensor
24. Starting circuit cut-off relay
25. Radiator fan motor relay
26. Fuel injection system relay
27. Wire harness (to meter assembly)
28. Wire harness (to right handlebar switch)
29. Wire harness (to left handlebar switch)
30. Wire harness (to relays)
31. Wire harness (to headlight relay)
32. Lean angle sensor lead
33. Negative battery lead
34. Wire harness (to speed sensor)

A. Fasten the speed sensor lead at the white paint mark with the plastic locking tie.
B. Pass the throttle cables and rear brake hose through the guide, making sure to route the cables to the outside of the hose.
C. Route the throttle cables to the inside of the rear brake hose.
D. To starter motor and engine
E. Route the generator lead and starter motor lead below the engine mounting bolt.
F. Route the fuel tank overflow hose and sidestand switch lead to the inside of the radiator outlet hose.
G. Route the sidestand switch lead to the front of the footrest board bracket.
H. Install the ignition coil connectors so that the leads are routed outward.
I. Route the wire harness (to left headlight) to the outside of the starter motor lead.
J. To left headlight unit
K. Cut off the excess end of the plastic locking tie to 5–10 mm (0.20–0.39 in).
L. Point the end of the plastic band inward.
M. Route the starter motor lead to the outside of the other leads.
N. Face the catch of the holder outward.
O. Outward
P. Route the starter motor lead and generator lead to the outside of the wire harness.
Q. To meter assembly
R. Route the wire harness (to starter relay) behind the starter relay.
S. Pass the left and right handlebar switch leads through the opening in the front cowling stay as shown in the illustration.
T. Fasten the speed sensor lead with the plastic band, making sure to position the band next to the speed sensor coupler.
U. Route the speed sensor lead behind the front brake pipe.
V. Fasten the fuse box lead to the front cowling stay with the plastic band.
W. Route the positive battery lead above the battery holder bolt.
X. Face the catch of the holder upward.
Y. Face the catch of the holder forward.
Z. Point the end of the plastic band forward.
AA. Point the end of the plastic band upward.
AB. Fasten the wire harness by sliding the plastic holder on the harness onto the stud on the front cowling stay.





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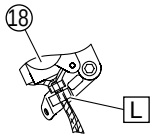

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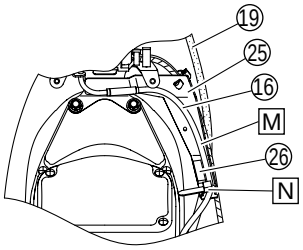

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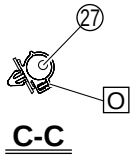
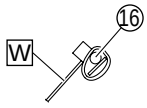


C-C



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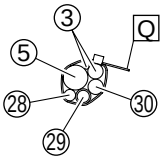

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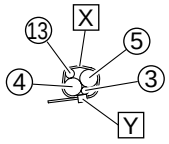

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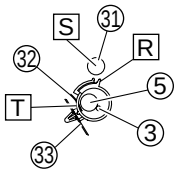

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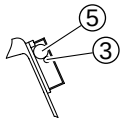
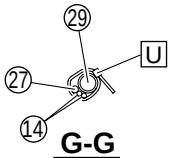


K-K



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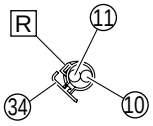
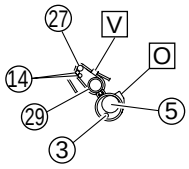
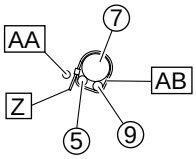


L-L



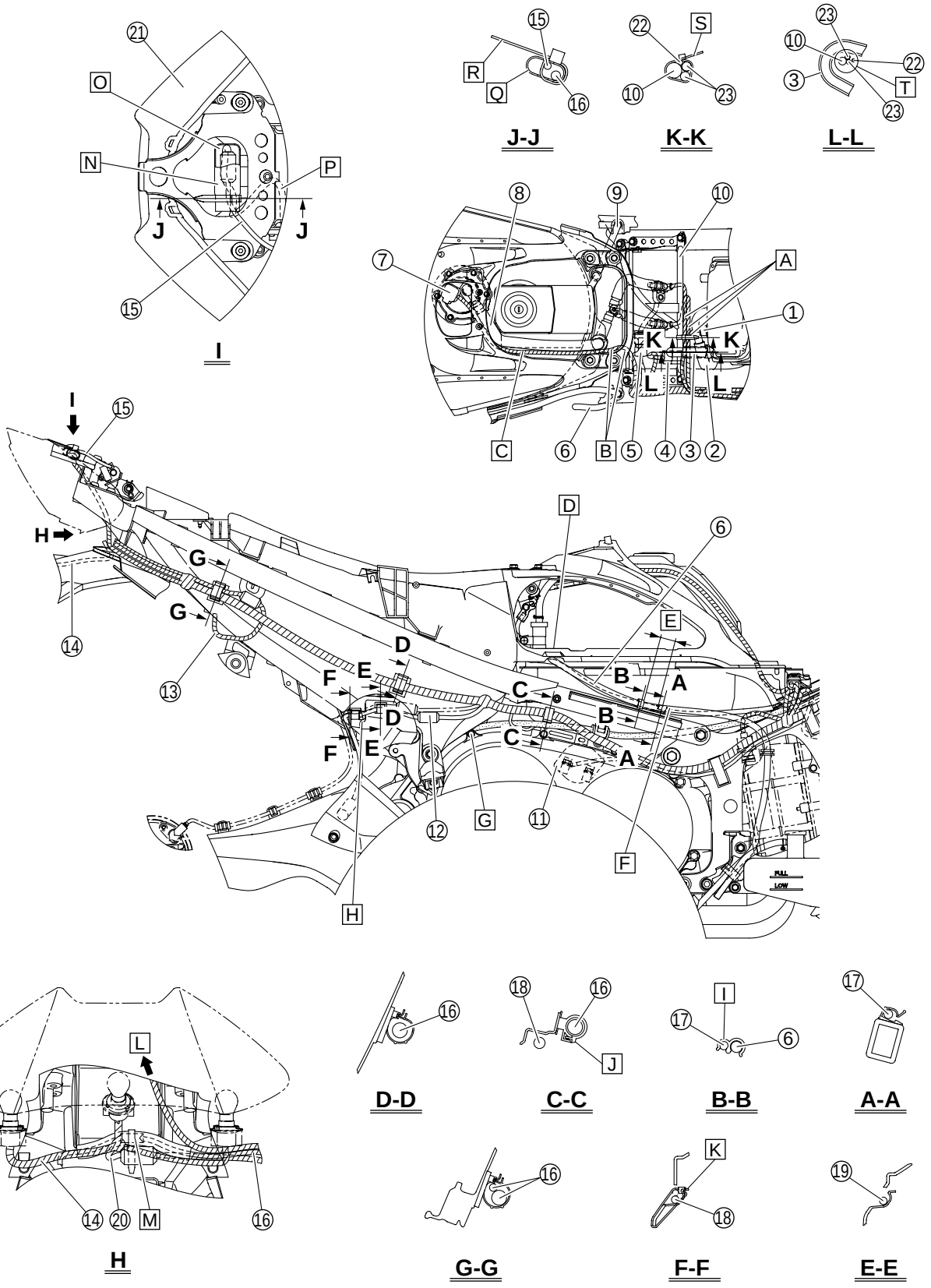
H-H



M-M

1. Positive battery lead
2. Fuse box
3. Negative battery lead
4. Cooling system air bleed hose
5. Wire harness
6. Turn signal relay
7. Radiator filler hose
8. Radiator fan motor coupler
9. Coolant reservoir hose
10. Coolant reservoir breather hose
11. Fuel tank breather hose
12. Wire harness (to fuel pump)
13. Wire harness (to intake air temperature sensor)
14. Wire harness (to fuel injector)
15. Fuel injector couplers
16. Seat lock cable
17. Main switch coupler
18. Main switch
19. Rear brake lock cable
20. ECU (engine control unit)
21. Grip warmer coupler
22. Headlight relay
23. Left handlebar switch coupler
24. Right handlebar switch coupler
25. Air filter case bracket
26. Damper
27. Wire harness (to main switch)
28. Wire harness (to headlight relay)
29. Front cowling stay
30. Wire harness (to fuse box)
31. Wire harness (to ECU)
32. Rubber cover
33. Radiator filler pipe bracket
34. Footrest board bracket

A. To right headlight unit
B. Route the wire harness to the inside of the front cowling stay.
C. Route the wire harness and coolant reservoir hose to the outside of the relay guard.
D. Fasten the coolant reservoir hose and wire harness to the radiator filler hose with the plastic band, making sure to position the band 0–100 mm (0–3.9 in) from where the turn signal relay lead branches off from the harness.
E. Route the radiator fan motor lead over the radiator bracket.
F. Route the wire harness to the outside of the cooling system air bleed hose.
G. To throttle position sensor
H. Route the fuel tank breather hose to the outside of the wire harness.
I. Route the wire harness (to coolant temperature sensor) under the fuel tank bracket.
J. Route the wire harnesses (to fuel pump, intake air pressure sensor, and throttle position sensor) to the front of the fuel tank bracket.
K. Connect the main switch coupler and fuel injector couplers, and then install the rubber cover around the couplers, making sure to face the opening of the cover upward.
L. Fasten the main switch lead with the holder, making sure that the plastic locking tie is positioned to the inside of the holder. Face the catch of the holder forward.
M. Pass the seat lock cable between the air filter case bracket and the damper.
N. Fasten the seat lock cable to the air filter case bracket with the plastic band, making sure to align the band with the cutouts in the bracket.
O. Face the catch of the holder outward.
P. To wire harness
Q. Point the end of the plastic band forward.
R. Face the catch of the holder upward.
S. Do not fasten the wire harness (to ECU) with the holder.
T. Be sure to fasten the rubber cover by passing the holder through the hole in the cover.
U. Point the end of the plastic band outward, angled downward, as shown in the illustration.
V. Fasten the wire harnesses (to fuel injector and main switch) with the plastic band, making sure to install the band around the protective sleeves of the leads, not the leads themselves. Point the end of the plastic band outward, angled downward, as shown in the illustration.
W. Point the end of the plastic band inward.
X. Do not pinch the cooling system air bleed hose when installing the plastic band.
Y. Position the buckle of the plastic band under the leads, with the end pointing inward.
Z. Point the end of the plastic band inward.
AA. Do not fasten the wire harness (to turn signal relay) with the plastic band.
AB. Do not pinch the coolant reservoir hose when installing the plastic band.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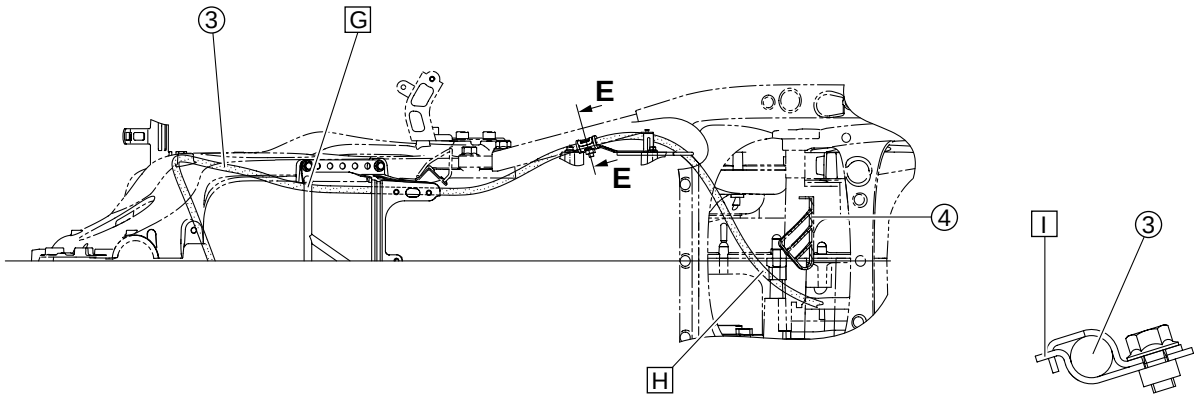
1. Intake air temperature sensor coupler
2. Cylinder head breather hose
3. Fast idle plunger intake hose
4. Throttle position sensor coupler
5. Intake air pressure sensor coupler
6. Fuel tank breather hose
7. Fuel pump coupler
8. Fuel hose
9. Fuel tank overflow hose
10. Frame cross member
11. Starter motor
12. O_2 sensor coupler
13. Storage box light sub-wire harness
14. License plate light lead
15. Storage box light switch lead
16. Wire harness
17. Seat lock cable
18. Rear brake lock cable
19. O_2 sensor lead
20. Tail/brake light assembly lead
21. Tail/brake light assembly
22. Wire harness (to intake air temperature sensor)
23. Fuel injector leads

A. Make sure that there is no slack in the fuel injector leads and wire harness (to intake air temperature sensor) to the left of the plastic band.
B. Route the wire harness (to fuel pump) under the fuel tank bracket, and then pass it through the hole in the storage box.
C. Route the wire harness (to fuel pump) to the outside of the fuel hose.
D. Pass the seat lock cable and fuel tank breather hose between the storage box and the fuel tank.
E. Fasten the seat lock cable and fuel tank breather hose with the holder, making sure to position the holder 0–70 mm (0–2.8 in) from the seat lock cable holder affixed to the frame.
F. Fasten the seat lock cable with the holder, making sure to position the white protector on the cable to the front of the holder.
G. Route the rear brake lock cable to the inside of the outer V-belt case bolt.
H. Position the plastic locking tie to the front of the holder on the rear cowling assembly, making sure that the tie contacts the holder.
I. Fasten the seat lock cable with the portion of the holder that has the smaller diameter.
J. Face the catch of the holder downward.
K. Point the end of the plastic locking tie outward, and then cut off the excess end of the tie to 0–5 mm (0–0.20 in).
L. To storage box light switch
M. Install the rubber cover over the license plate light connector and leads, making sure to cover the sections of the leads that are not covered by the protective sleeves. Then, fasten the rubber cover with the plastic band so that the band is positioned around the center of the connector.
N. Place the rubber cover in the opening in the rear cover bracket.
O. Push the storage box light switch coupler as far into the rubber cover as possible.
P. Pass the wire harness (to storage box light switch) between the rear frame and the tail/brake light assembly.
Q. Pass the plastic band through the holes in the rubber cover, and then fasten the storage box light switch lead and wire harness with the band.
R. Point the end of the plastic band rearward.
S. Point the end of the plastic band forward.
T. Route the fast idle plunger intake hose around the wire harness (to intake air temperature sensor), fuel injector leads, and frame cross member as shown in the illustration.



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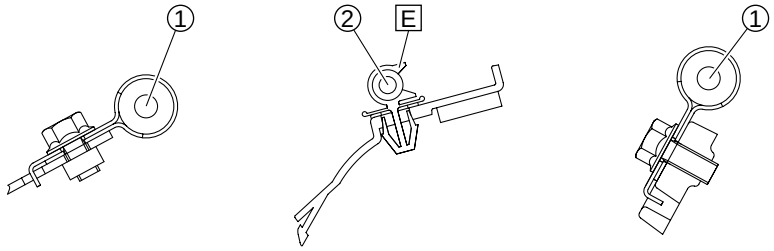

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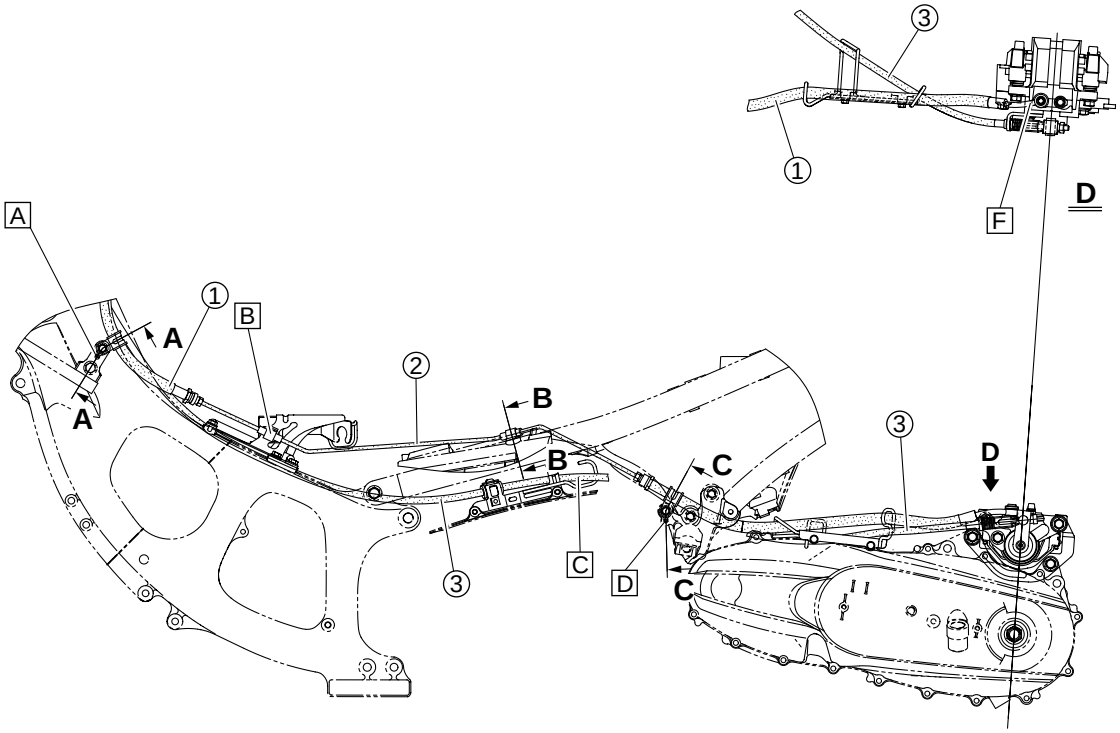
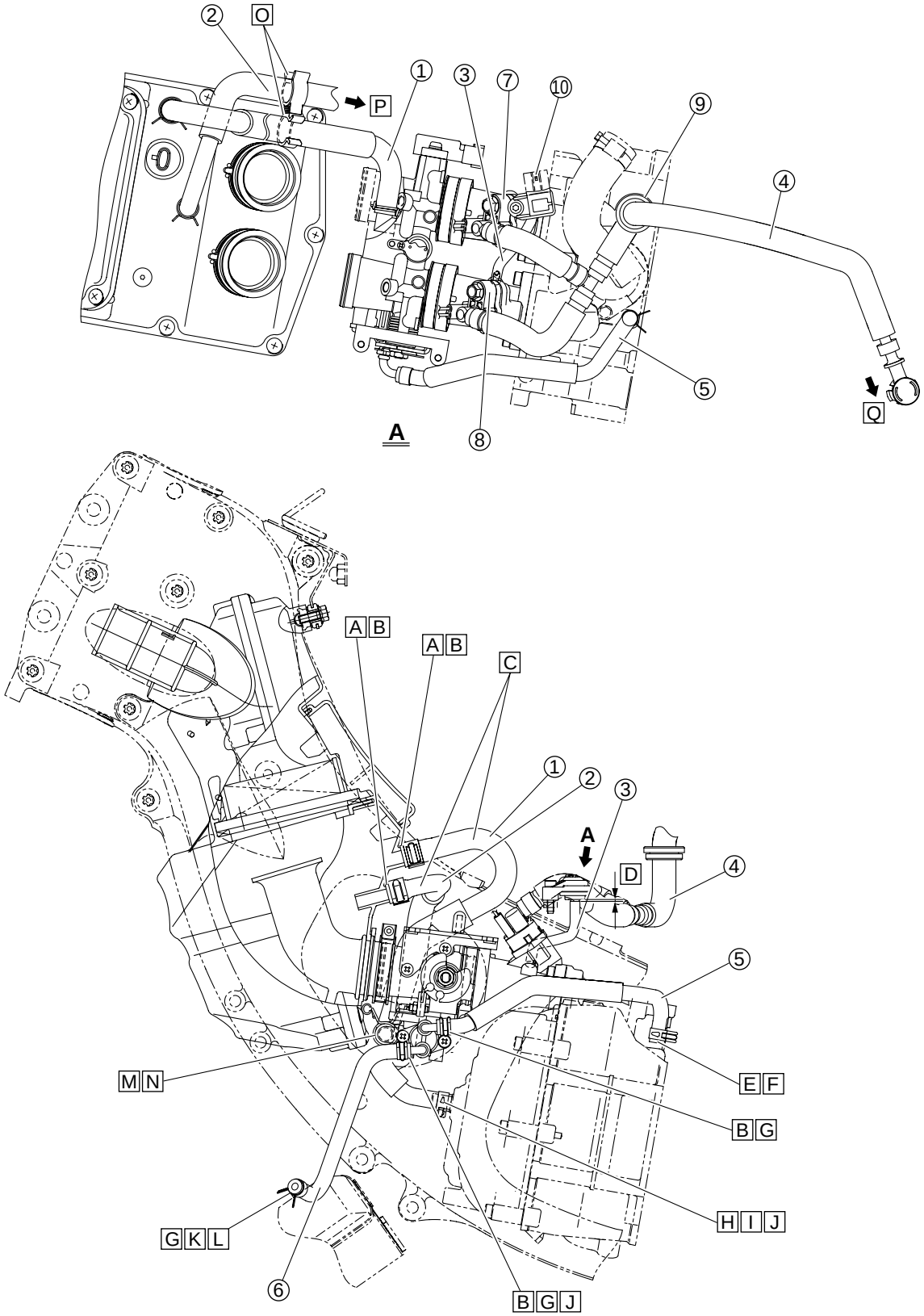


1. Rear brake hose
2. Rear brake pipe
3. Rear brake lock cable
4. Ribs (bottom of storage box)

A. Install the rear brake hose holder to the front cowling stay, making sure to fit the projection on the holder into the hole in the stay.
B. Face the catch of the holder upward.
C. Pass the rear brake lock cable through the guide.
D. Install the rear brake hose holder to the left passenger footrest, making sure to fit the projection on the holder into the hole in the footrest.
E. Point the open ends of the holder inward.
F. Install the rear brake hose onto the rear brake caliper, making sure that the pipe section on the end of the hose contacts the rib on the caliper.
G. Route the rear brake lock cable under the frame cross member and fuel tank bracket.
H. Route the rear brake lock cable to the left of the ribs on the bottom of the storage box.
I. Be sure to fit the projection on the outer section of the rear brake lock cable holder into the hole in the inner section.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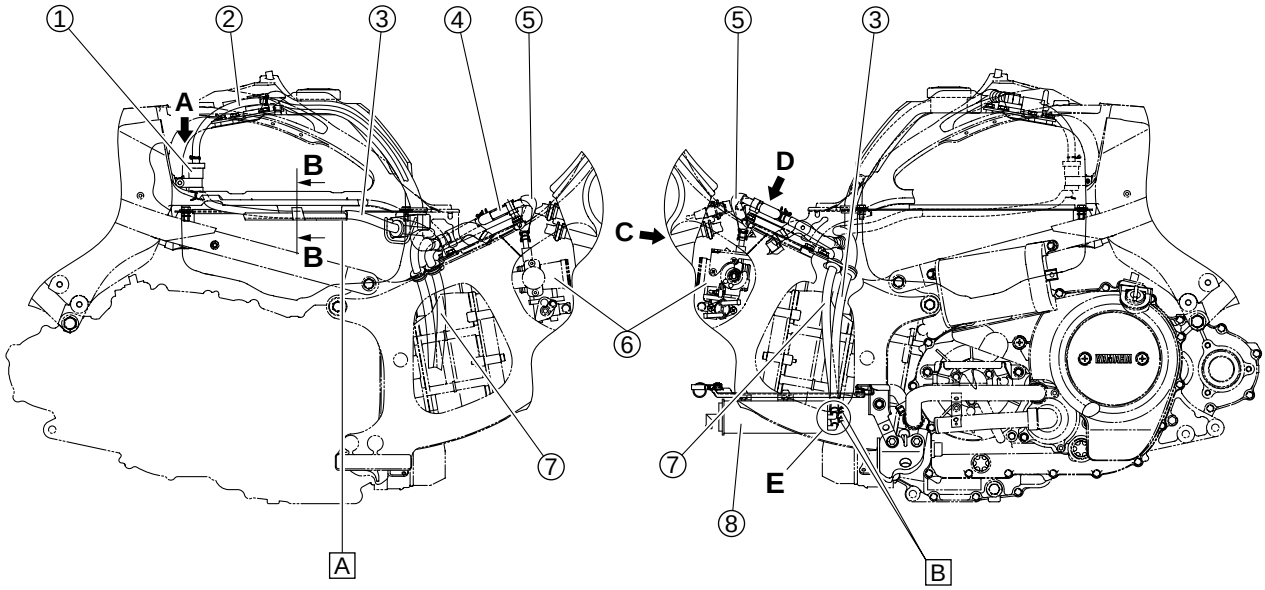
1. Fast idle plunger intake hose
2. Cylinder head breather hose
3. Intake air pressure sensor hose
4. Fuel hose
5. Fast idle plunger inlet coolant hose
6. Fast idle plunger outlet coolant hose
7. Fuel injector #2
8. Fuel injector #1
9. Coolant temperature sensor
10. Intake air pressure sensor coupler

A. Face the white paint mark on the hose upward.
B. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp to the left.
C. Install the hose onto the hose fitting of the air filter case, making sure that the hose contacts the case.
D. 0–3 mm (0–0.12 in)
E. Face the pink paint mark on the hose rearward.
F. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp rearward.
G. Install the hose up to the bend in the hose fitting.
H. Install the hose onto the hose fitting of the cylinder head, making sure that the hose contacts the head.
I. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp downward.
J. Face the white paint mark on the hose to the left.
K. Face the yellow paint mark on the hose forward.
L. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp downward, angled forward, so that they do not contact the spark plug wires or radiator.
M. Face the white paint mark on the hose forward.
N. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp upward.
O. Fasten the fast idle plunger intake hose and cylinder head breather hose with the holder, making sure to align the holder with the white paint mark on the fast idle plunger intake hose.
P. To cylinder head cover
Q. To fuel pump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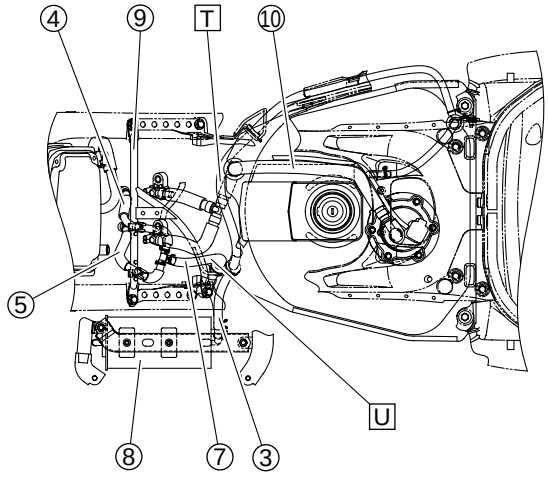
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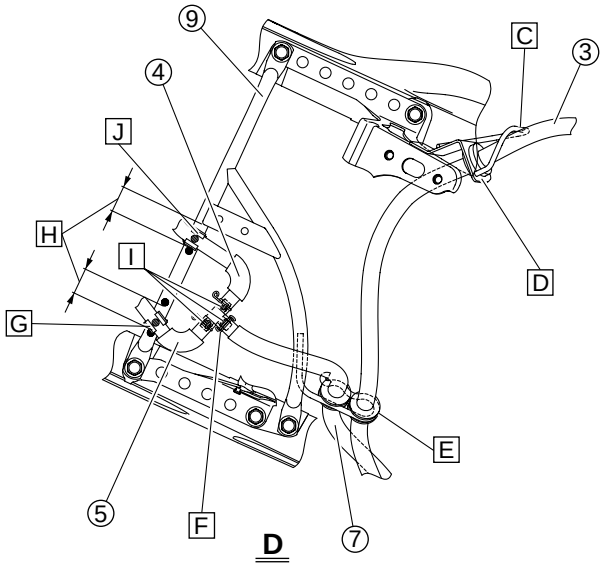
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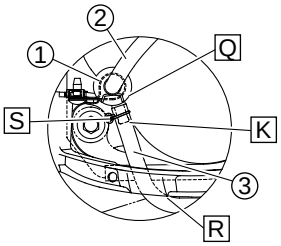
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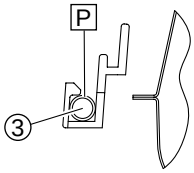
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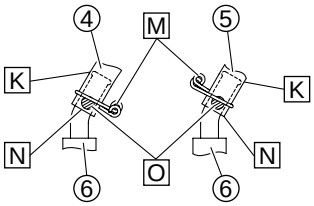
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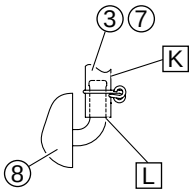
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E

1. Rollover valve
2. Fuel tank breather hose (fuel tank to rollover valve)
3. Fuel tank breather hose (rollover valve to canister)
4. Canister purge hose (throttle body #2 to 3-way joint)
5. Canister purge hose (throttle body #1 to 3-way joint)
6. Throttle body
7. Canister purge hose (3-way joint to canister)
8. Canister
9. Frame cross member
10. Fuel hose

A. Do not fit the protector of the fuel tank breather hose (rollover valve to canister) into the guide on the storage box.
B. Point the ends of each hose clamp rearward.
C. Pass the fuel tank breather hose (rollover valve to canister) through the guide on the fuel tank bracket, making sure that the hose is positioned to the inside of the guide.
D. Fit the grommet on the fuel tank breather hose (rollover valve to canister) into the cutout in the fuel tank bracket.
E. Fasten the grommets on the fuel tank breather hose (rollover valve to canister) and canister purge hose (3-way joint to canister) with the holder on the frame cross member.
F. Make sure that the canister purge hose (3-way joint to canister), canister purge hose (throttle body #1 to 3-way joint), and canister purge hose (throttle body #2 to 3-way joint) are completely seated on the 3-way joint.
G. Fasten the canister purge hose (throttle body #1 to 3-way joint) with the holder on the frame cross member, making sure to align the yellow paint mark on the hose with the holder.
H. Attach the holders to the frame cross member at the locations shown in the illustration.
I. Face the white paint mark on each hose upward. Position each hose clamp 1–4 mm (0.04–0.16 in) from the end of the respective pipe, making sure to point the ends of the clamp upward.
J. Fasten the canister purge hose (throttle body #2 to 3-way joint) with the holder on the frame cross member, making sure to align the white paint mark on the hose with the holder.
K. Do not install the hose clamp on the flange at the end of the hose fitting.
L. Install the hose up to the bend in the hose fitting on the canister.
M. Point the ends of each hose clamp inward.
N. Install the canister purge hose up to the bend in the hose fitting on the throttle body.
O. Face the yellow paint mark on each canister purge hose forward.
P. Fasten the fuel tank breather hose (rollover valve to canister) with the holder on the storage box.
Q. Install the fuel tank breather hose (rollover valve to canister) onto the pipe fitting, making sure that it contacts the rollover valve.
R. Pass the fuel tank breather hose (rollover valve to canister) through the cutout in the storage box.
S. Point the ends of the hose clamp rearward.
T. Route the fuel tank breather hose (rollover valve to canister) above and to the outside of the fuel hose.
U. Route the canister purge hose (3-way joint to canister) over the frame cross member.

PERIODIC CHECKS AND ADJUSTMENTS

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.

EAU17610
PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

No.		ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
				1000 km (600 mi) or 1 month	7000 km (4000 mi) or 6 months	13000 km (8000 mi) or 12 months	19000 km (12000 mi) or 18 months	25000 km (16000 mi) or 24 months	31000 km (20000 mi) or 30 months
1	*	Fuel line	• Check fuel hoses for cracks or damage. • Replace if necessary.		√		√		√
2	*	Spark plugs	• Check condition. • Adjust gap and clean. • Replace every 19000 km (12000 mi) or 18 months.		√		Replace.		√
3	*	Valve clearance	• Check and adjust valve clearance when engine is cold.	Every 42000 km (26600 mi)					
4	*	Crankcase breather system	• Check breather hose for cracks or damage. • Replace if necessary.		√		√		√
5	*	Fuel injection	• Check and adjust engine idle speed and synchronization.	√	√	√	√	√	√
6	*	Evaporative emission control system	• 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.

EAU32195
GENERAL MAINTENANCE AND LUBRICATION CHART

No.		ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
				1000 km (600 mi) or 1 month	7000 km (4000 mi) or 6 months	13000 km (8000 mi) or 12 months	19000 km (12000 mi) or 18 months	25000 km (16000 mi) or 24 months	31000 km (20000 mi) or 30 months
1		Air filter element	• Replace.	Every 19000 km (12000 mi)					
2	*	V-belt case air filter elements	• Clean.		√	√	√	√	√
3	*	Front brake	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√
4	*	Rear brake	• Check operation, fluid level, and for fluid leakage. • Replace brake pads if necessary.	√	√	√	√	√	√
5	*	Brake hoses	• Check for cracks or damage.		√	√	√	√	√
			• Replace.	Every 4 years					
6		Rear brake lock	• Check operation. • Adjust.	√	√	√	√	√	√
7	*	Wheels	• Check runout and for damage. • Replace if necessary.		√	√	√	√	√
8	*	Tires	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√	√	√	√

No.		ITEM	ROUTINE	INITIAL	ODOMETER READINGS				
				1000 km (600 mi) or 1 month	7000 km (4000 mi) or 6 months	13000 km (8000 mi) or 12 months	19000 km (12000 mi) or 18 months	25000 km (16000 mi) or 24 months	31000 km (20000 mi) or 30 months
9	*	Wheel bearings	• Check bearings for smooth operation. • Replace if necessary.		√	√	√	√	√
10	*	Steering bearings	• Check bearing assemblies for looseness.	√	√	√	√	√	√
			• Moderately repack with lithium-soap-based grease.	Every 19000 km (12000 mi)					
11	*	Chassis fasteners	• Check all chassis fitting and fasteners. • Correct if necessary.		√	√	√	√	√
12		Front brake lever pivot shaft	• Apply silicone grease lightly.		√	√	√	√	√
13		Rear brake lever pivot shaft	• Apply silicone grease lightly.		√	√	√	√	√
14		Centerstand and sidestand pivots	• Check operation. • Apply lithium-soap-based grease lightly.		√	√	√	√	√
15	*	Sidestand switch	• Check operation and replace if necessary.	√	√	√	√	√	√
16	*	Front fork	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	√
17	*	Shock absorber assembly	• Check operation and for oil leakage. • Replace if necessary.		√	√	√	√	√
18		Engine oil	• Change.	√	When the oil change indicator flashes				
			• Check oil level and vehicle for oil leakage.	√	√	√	√	√	√
19		Engine oil filter cartridge	• Replace.	√	At 20000 km (12500 mi) and thereafter every 20000 km (12500 mi)				
20	*	Cooling system	• Check coolant level and vehicle for coolant leakage.		√	√	√	√	√
			• Change.	Every 3 years					
21		Chain drive oil	• Check vehicle for oil leakage. • Change.		√	√	√	√	√
22	*	V-belt	• Replace.	When the V-belt replacement indicator flashes					
23	*	Front and rear brake switches	• Check operation.	√	√	√	√	√	√
24	*	Control cables	• Apply Yamaha chain and cable lube or engine oil SAE 10W-30 thoroughly.	√	√	√	√	√	√
25	*	Throttle grip housing and cable	• Check operation and free play. • Adjust the throttle cable free play if necessary. • Lubricate the throttle grip housing and cable.		√	√	√	√	√
26	*	Lights, signals and switches	• Check operation. • Adjust headlight beam.	√	√	√	√	√	√

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

TIP

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

EAU38260

TIP

- The air filter and V-belt filter need more frequent service if you are 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.

EAS20471
ENGINE

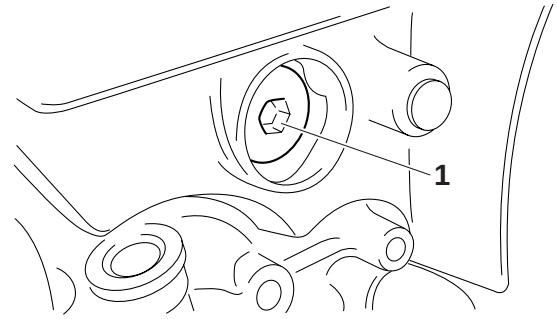
EAS20490
ADJUSTING THE VALVE CLEARANCE

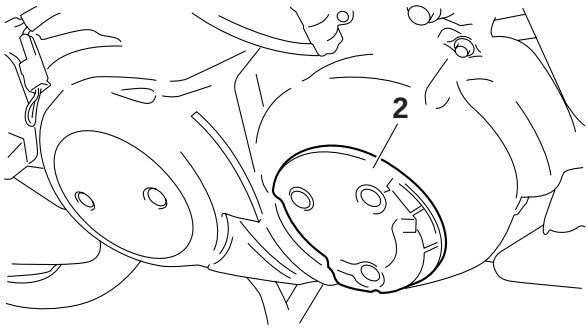
The following procedure applies to all of the valves.

TIP

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

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





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

Valve clearance (cold)
Intake
0.15–0.20 mm (0.0059–0.0079 in)
Exhaust
0.25–0.30 mm (0.0098–0.0118 in)

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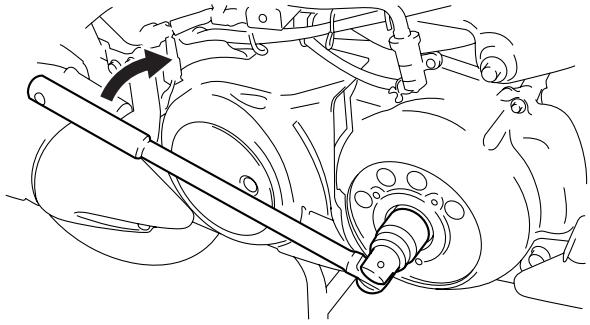
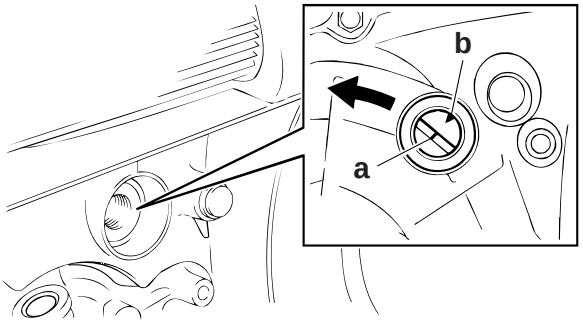
a. Turn the crankshaft clockwise.

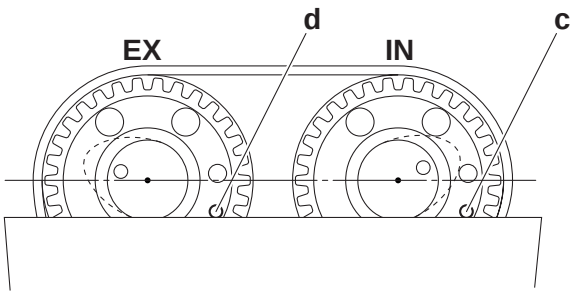


b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the mark "b" on the generator cover.

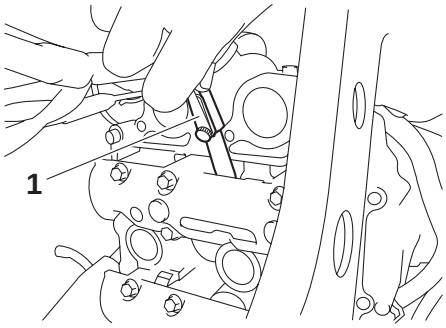
TIP

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





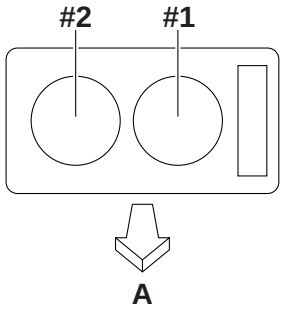
c. Measure the valve clearance with a thickness gauge “1”.



TIP

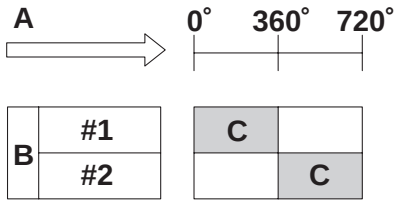
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2



A. Front

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



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

Cylinder #2	360°

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7. Remove:
   - Camshafts

TIP

- Refer to “CAMSHAFTS” on page 5-6.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

8. Adjust:
   - Valve clearance

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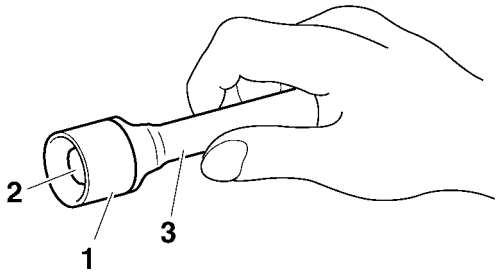
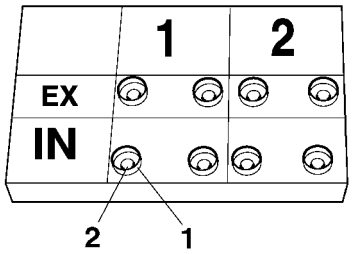
a. Remove the valve lifter “1” and the valve pad “2” with a valve lapper “3”.

Valve lapper
90890-04101
Valve lapping tool
YM-A8998

TIP

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



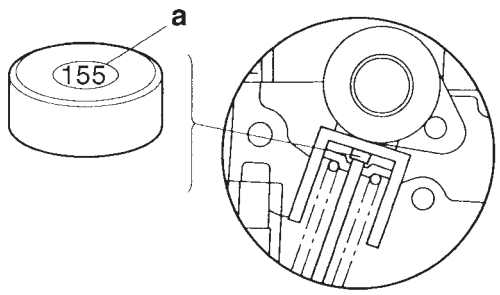


b. Calculate the difference between the specified valve clearance and the measured valve clearance.
   Example:
   Specified valve clearance = 0.15–0.22 mm (0.0059–0.0087 in)
   Measured valve clearance = 0.25 mm (0.0098 in)
   0.25 mm (0.0098 in) - 0.22 mm (0.0087 in) = 0.03 mm (0.001 in)
c. Check the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

TIP

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

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



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

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

TIP

Refer to the following table for the available valve pads.

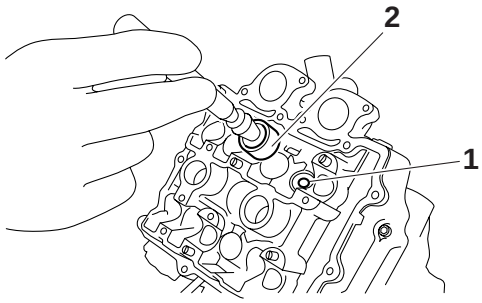
Valve pad range	Nos. 120–240
Valve pad thickness	1.20–2.40 mm (0.0472–0.0945 in)
Available valve pads	25 thicknesses in 0.05 mm (0.002 in) increments

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

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

TIP

- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with engine oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.



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

	**Camshaft cap bolt** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

TIP

- Refer to "CAMSHAFTS" on page 5-6.
- Lubricate the camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.

• Turn the crankshaft clockwise several full turns to seat the parts.

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

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9. Install:
   • All removed parts

TIP

For installation, reverse the removal procedure.

10. Adjust:
    • Throttle cable free play
      Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" on page 3-9.

EAS20571
SYNCHRONIZING THE THROTTLE BODY

TIP

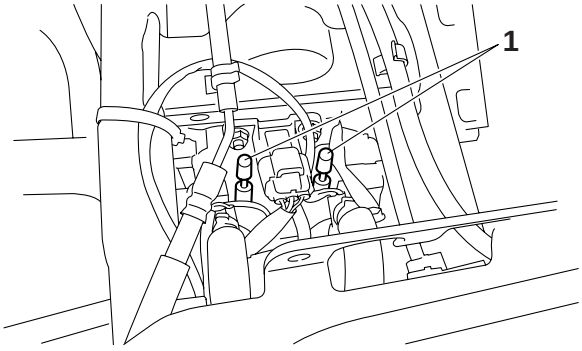
Prior to synchronizing the throttle body, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the vehicle on a level surface.

TIP

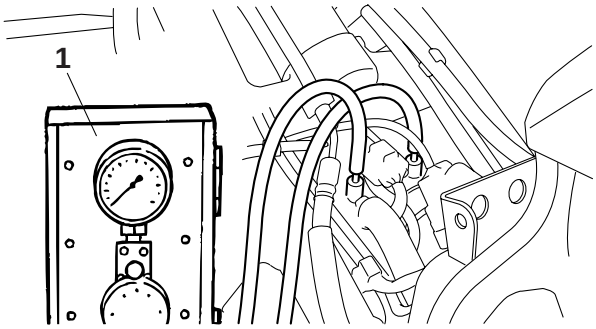
Place the vehicle on the centerstand.

2. Remove:
   • Bottom cowling
     Refer to "GENERAL CHASSIS" on page 4-1.
3. Remove:
   • Synchronizing pipe caps "1"



4. Install:
   • Vacuum gauge "1"
     (onto the synchronizing pipes)
   • Digital tachometer
     (onto the spark plug lead of cylinder #1)

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



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

Engine idling speed
1100–1300 r/min

7. Adjust:
   • Throttle body synchronization

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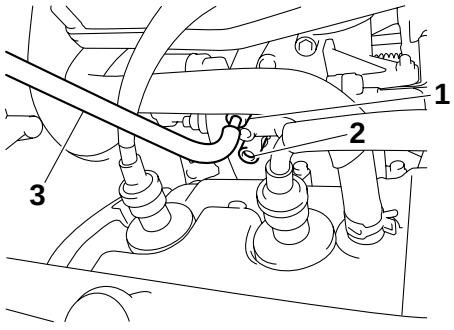
a. Turn the cylinder #1 air screw "1" and cylinder #2 air screw "2" using the carburetor angle driver "3".



TIP

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

ECA14900
NOTICE

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

Carburetor angle driver
90890-03158

Intake vacuum
33.0 kPa (9.7 inHg) (248 mmHg)

TIP

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

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

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

11. Install:
   • Synchronizing pipe caps
12. Install:
   • Bottom cowling
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS20610
ADJUSTING THE ENGINE IDLING SPEED

TIP

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

1. Start the engine and let it warm up for several minutes.
2. Remove:
   • Left side panel
   • Right center panel
   Refer to "GENERAL CHASSIS" on page 4-1.
3. Install:
   • Digital tachometer
   (onto the spark plug lead of cylinder #1)

Digital tachometer
90890-06760
YU-39951-B

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

Engine idling speed
1100–1300 r/min

5. Adjust:
   • Engine idling speed

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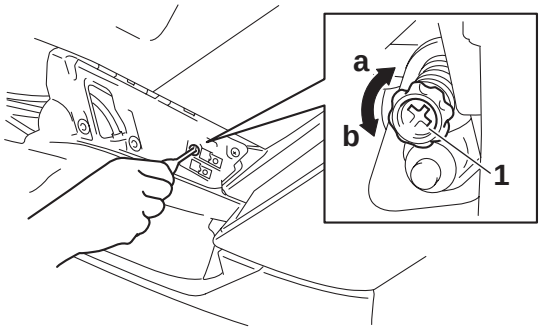
a. Turn the idling speed adjusting screw "1" in direction "a" or "b" until the specified engine idling speed is obtained.

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



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6. Install:
   • Right center panel
   • Left side panel
   Refer to "GENERAL CHASSIS" on page 4-1.
7. Adjust:
   • Throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" on page 3-9.

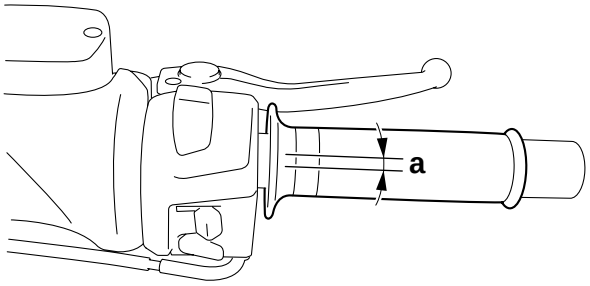
Throttle cable free play
3.0–5.0 mm (0.12–0.20 in)

EAS20630
ADJUSTING THE THROTTLE CABLE FREE PLAY

TIP

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

1. Check:
   - Throttle cable free play "a"
     Out of specification → Adjust.



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

2. Adjust:
   - Throttle cable free play

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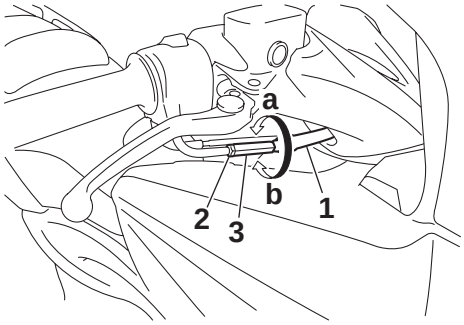
Handlebar end

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

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



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

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EAS20680
CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
   - Bottom cowling
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   - Spark plug cap
3. Remove:
   - Spark plug

ECA13320

NOTICE

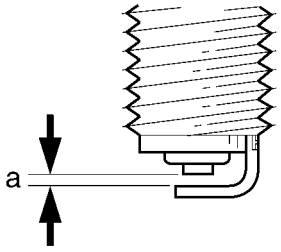
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

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

Manufacturer/model
NGK/CR7E

5. Check:
   - Electrode
     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
0.7–0.8 mm (0.028–0.031 in)



8. Install:
   - Spark plug

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

TIP

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

9. Connect:
   • Spark plug
10. Remove:
   • Bottom cowling
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS20710
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

TIP

Insufficient compression pressure will result in a loss of performance.

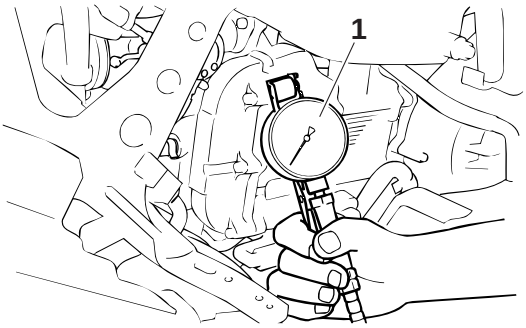
1. Measure:
   • Valve clearance
   Out of specification → Adjust.
   Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-4.
2. Remove:
   • Bottom cowling
   Refer to "GENERAL CHASSIS" on page 4-1.
3. Start the engine, warm it up for several minutes, and then turn it off.
4. Disconnect:
   • Spark plug cap
5. Remove:
   • Spark plug

ECA13340
NOTICE

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

6. Install:
   • Compression gauge "1"

Compression gauge
90890-03081
Engine compression tester
YU-33223



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

Standard compression pressure (at sea level)
1400 kPa/360 r/min (199.1 psi/360 r/min) (14.0 kgf/cm²/360 r/min)
Minimum–maximum
1220–1570 kPa (173.5–223.3 psi) (12.2–15.7 kgf/cm²)

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

TIP

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

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

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

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8. Install:
   • Spark plug

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

9. Connect:
   • Spark plug cap
10. Install:
   • Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.

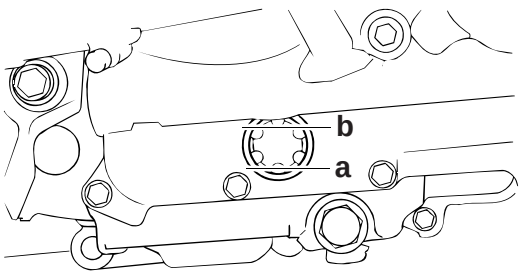
EAS20730
CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

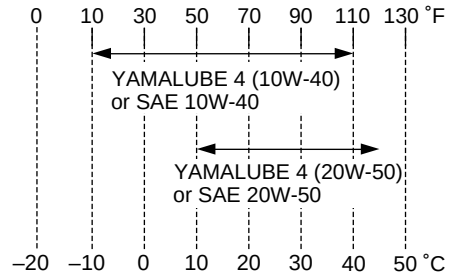
TIP

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

2. Start the engine, warm it up for several minutes, and then turn it off.
3. Wait two minutes until the oil settles, and then check the oil level through the check window located at the bottom-left side of the crankcase.
4. 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.

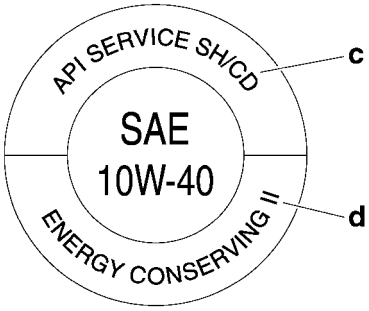


Type
YAMALUBE 4 (10W-40) or SAE 10W-40, YAMALUBE 4 (20W-50) or SAE 20W-50
Recommended engine oil grade
API service SG type or higher, JASO standard MA



ECA4B51002
NOTICE

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



TIP

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

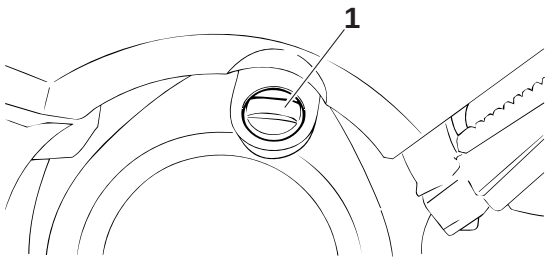
5. Start the engine, warm it up for several minutes, and then turn it off.
6. Check the engine oil level again.

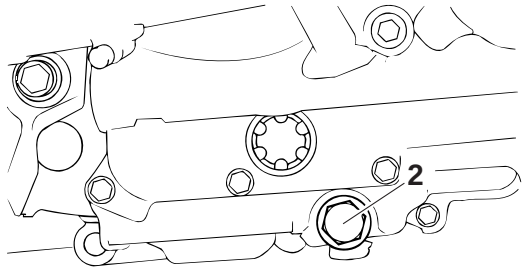
TIP

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

EAS20780
CHANGING THE ENGINE OIL

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





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

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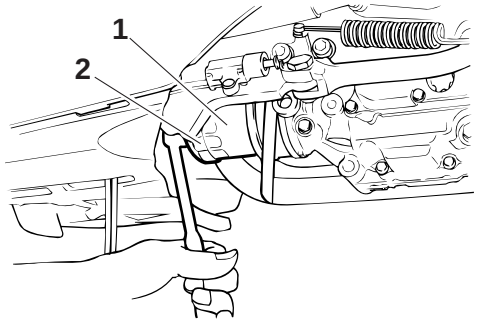
a. Remove the oil filter cartridge “1” with an oil filter wrench “2”.

	**Oil filter wrench** **90890-01469** **YM-01469**

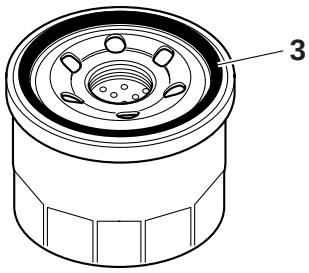


b. Lubricate the O-ring “3” of the new oil filter cartridge with a thin coat of engine oil.

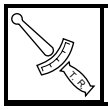
ECA13390

NOTICE

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



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

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

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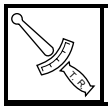
6. Check:
   - Engine oil drain bolt gasket
     Damage → Replace.
7. Install:
   - Engine oil drain bolt (along with the gasket)

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

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

	**Engine oil quantity** **Total amount** **3.60 L (3.81 US qt) (3.17 Imp.qt)** **Without oil filter cartridge replacement** **2.80 L (2.96 US qt) (2.46 Imp.qt)** **With oil filter cartridge replacement** **2.90 L (3.07 US qt) (2.55 Imp.qt)**

9. Install:
   - Engine oil filler cap

10. Start the engine, warm it up for several minutes, and then turn it off.
11. Check:
    • Engine
    (for engine oil leaks)
12. Check:
    • Engine oil level
    Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-11.
13. Check:
    • Engine oil pressure

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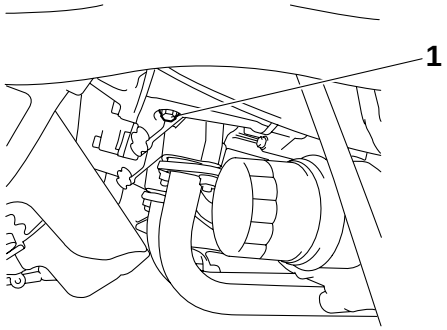
a. Remove the bottom cowling. Refer to "GENERAL CHASSIS" on page 4-1.
b. Slightly loosen the oil check bolt "1".



c. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
d. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "OIL PUMP" on page 5-62.
e. Start the engine after solving the problem(s) and check the engine oil pressure again.
f. Tighten the oil check bolt to specification.

	**Engine oil check bolt** **20 Nm (2.0 m·kg, 14 ft·lb)**

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

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EAS20820
MEASURING THE ENGINE OIL PRESSURE

1. Check:
    • Engine oil level
    Below the minimum level mark → Add the recommended engine oil to the proper level.
2. Start the engine, warm it up for several minutes, and then turn it off.

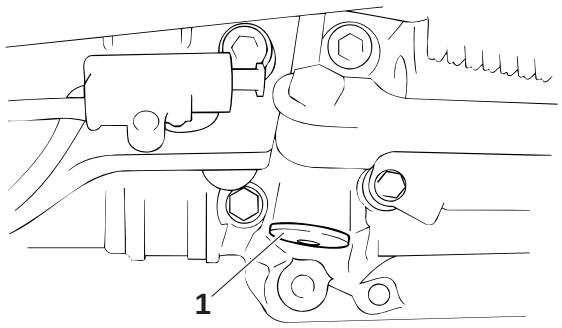
ECA13410
NOTICE

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

3. Remove:
    • Engine oil pressure check point plug "1"

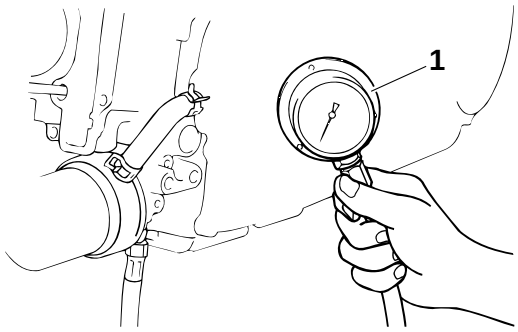
EWA12980
WARNING

The engine, muffler and engine oil are extremely hot.



4. Install:
    • Oil pressure gauge "1"
    • Adapter

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



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

Oil pressure (hot)
150.0 kPa/1200 r/min (21.8 psi/1200 r/min) (1.50 kgf/cm²/1200 r/min)
Oil temperature
70.0 °C (158.00 °F)

Out of specification → Adjust.

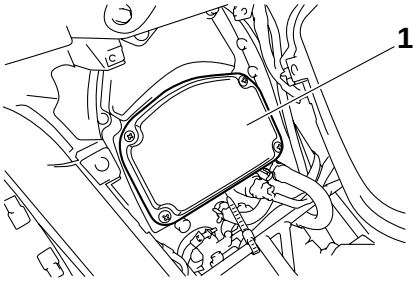
Engine oil pressure	Possible causes
Below specification	• Faulty oil pump • Clogged oil filter • Leaking oil passage • Broken or damaged oil seal
Above specification	• Leaking oil passage • Faulty oil filter • Oil viscosity too high

6. Install:
   • Engine oil pressure check point plug

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

EAS20961
REPLACING THE AIR FILTER ELEMENT

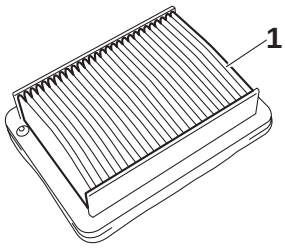
1. Remove:
   • Front lower inner panel
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
   • Air filter case cover "1"



3. Check:
   • Air filter element "1"
   Damage → Replace.

TIP

- Replace the air filter element every 40000 km of operation.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.



4. Install:
   • Air filter case cover

ECA4B51003
NOTICE

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

TIP

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

5. Install:
   • Front lower inner panel
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS4B51007
REPLACING THE V-BELT

1. Remove:
   • Right footrest board
   Refer to "GENERAL CHASSIS" on page 4-1.
   • Outer V-belt case
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-35.
2. Check:
   • V-belt
   Cranks/damage/wear → Replace.
   Grease/oil → Clean the primary and secondary pulleys.
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-35.

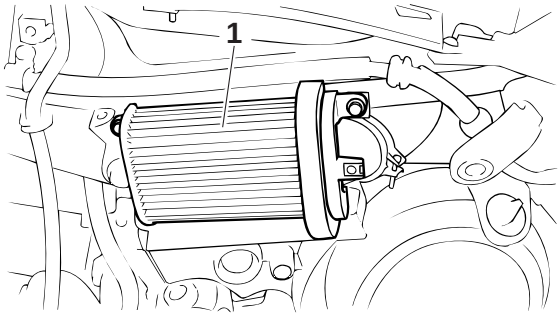
TIP

Replace the V-belt every 20000 km of operation.

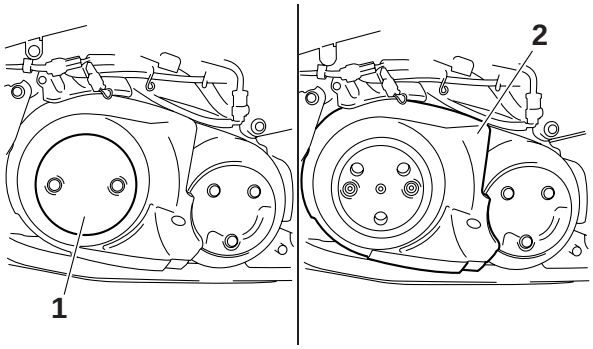
3. Install:
   • Outer V-belt case
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-35.
   • Right footrest board
   Refer to "GENERAL CHASSIS" on page 4-1.

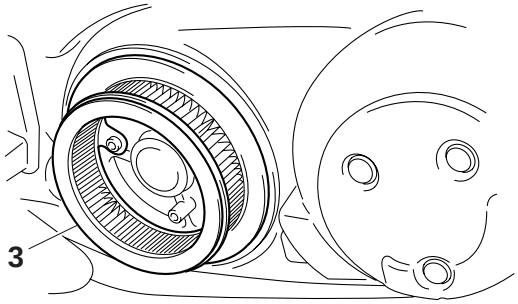
EAS20980
CLEANING THE V-BELT CASE AIR FILTER ELEMENT

1. Remove:
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
   • V-belt case air filter element (left) “1”

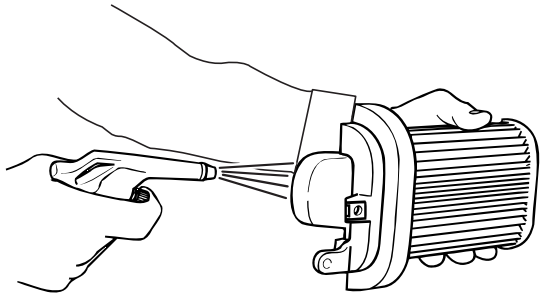


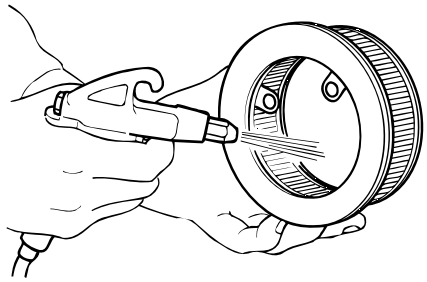
3. Remove:
   • V-belt case air filter case cover “1”
   • V-belt case air filter case “2”
   • V-belt case air filter element (right) “3”





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





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

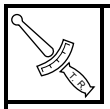
ECA13440
NOTICE

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

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

	**V-belt case air filter case screw** **7 Nm (0.7 m·kg, 5.1 ft·lb)** **V-belt case air filter case cover screw** **7 Nm (0.7 m·kg, 5.1 ft·lb)**

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

	**V-belt case air filter element (left) bolt** **7 Nm (0.7 m·kg, 5.1 ft·lb)**

EAS21010
CHECKING THE THROTTLE BODY JOINTS

1. Remove:
   • Front lower inner panel
   Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:
   • Throttle body joints “1”
   Cracks/damage → Replace the intake manifolds.

3. Install:
   • Front lower inner panel
   Refer to “GENERAL CHASSIS” on page 4-1.

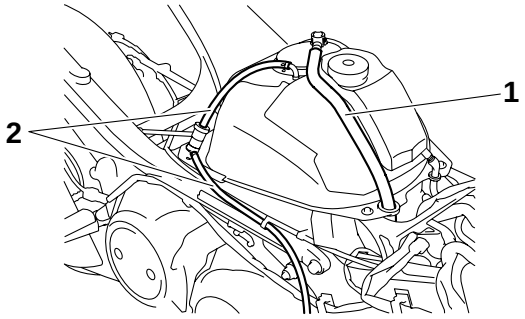
EAS21030
CHECKING THE FUEL LINE

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

1. Remove:
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Fuel hose “1”
   • Fuel tank breather hose “2”
   Cracks/damage → Replace.
   Loose connection → Connect properly.

ECA14940
NOTICE

Make sure the fuel tank breather hose is routed correctly.



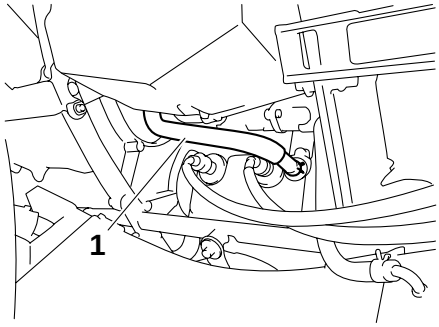
3. Install:
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21050
CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Cylinder head breather hose “1”
   Cracks/damage → Replace.
   Loose connection → Connect properly.

ECA14920
NOTICE

Make sure the cylinder head breather hose is routed correctly.

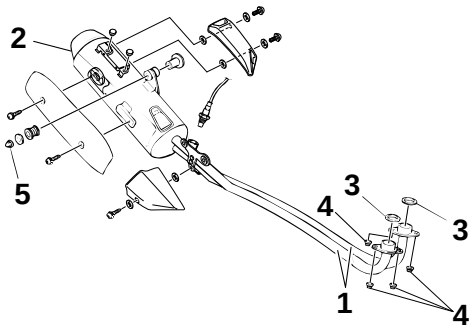


3. Install:
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21080
CHECKING THE EXHAUST SYSTEM

1. Remove:
   • Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Exhaust pipes “1”
   • Muffler “2”
   Cracks/damage → Replace.
   • Gaskets “3”
   Exhaust gas leaks → Replace.
3. Check:
   • Tightening torque
   • Exhaust pipe nuts “4”
   • Muffler nut “5”

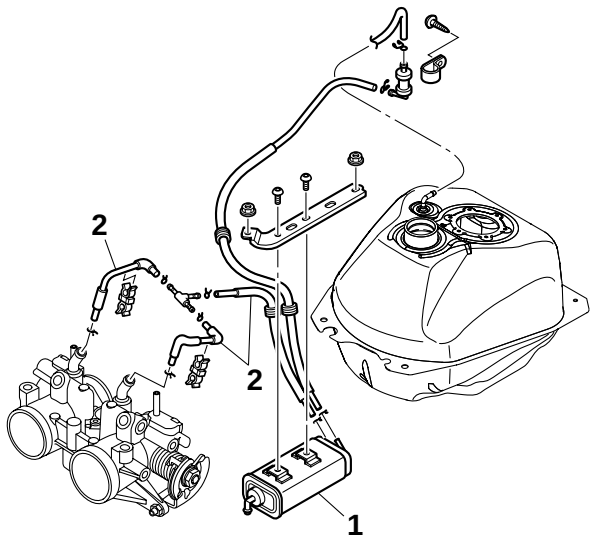
Exhaust pipe nut
20 Nm (2.0 m·kg, 14 ft·lb)
Muffler nut
31 Nm (3.1 m·kg, 22 ft·lb)



4. Install:
   • Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21090
CHECKING THE CANISTER

1. Remove:
   • Storage box
   Refer to “GENERAL CHASSIS” on page 4-1.
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
2. Check:
   • Canister “1”
   • Canister purge hoses “2”
   Cracks/damage → Replace.



3. Install:
   • Fuel tank
   Refer to “FUEL TANK” on page 7-1.
   • Storage box
   Refer to “GENERAL CHASSIS” on page 4-1

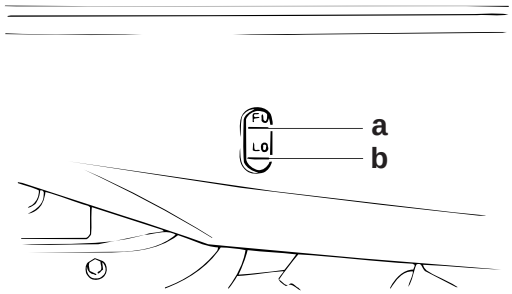
EAS21110
CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

TIP

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

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



ECA13470
NOTICE

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

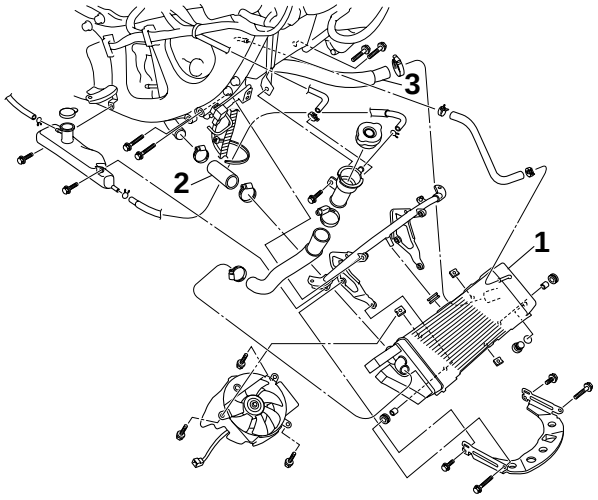
3. Start the engine, warm it up for several minutes, and then turn it off.
4. Check:
   • Coolant level

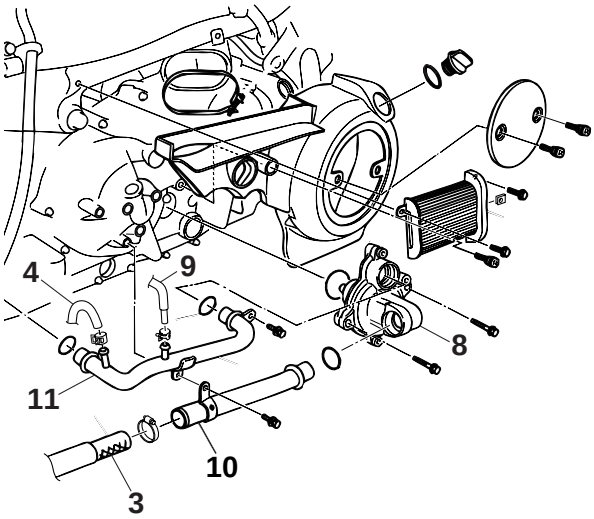
TIP

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

EAS21120
CHECKING THE COOLING SYSTEM

1. Remove:
   • Bottom cowling
   • Footrest boards
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Radiator “1”
   • Radiator inlet hose “2”
   • Radiator outlet hose “3”
   • Oil cooler inlet hose “4”
   • Oil cooler outlet hose “5”
   • Oil cooler “6”
   • Thermostat outlet hose “7”
   • Water pump “8”
   • Oil cooler hose “9”
   • Water pump inlet pipe “10”
   • Water pump outlet pipe “11”
   Cracks/damage → Replace.
   Refer to “RADIATOR” on page 6-1, “THERMOSTAT” on page 6-7 and “WATER PUMP” on page 6-9.

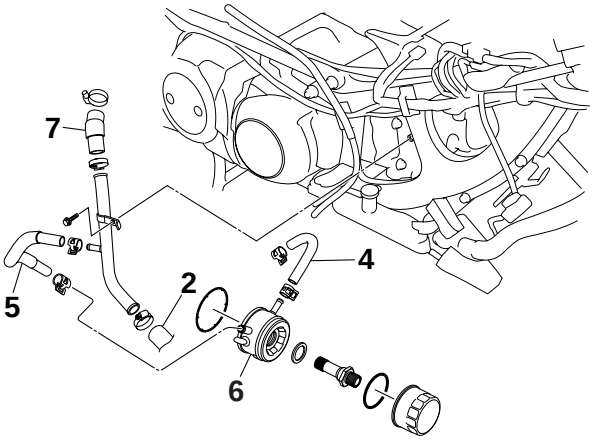


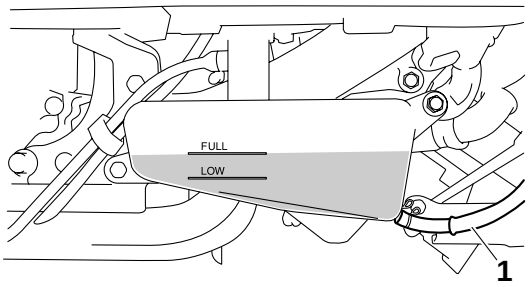


3. Install:
   - Footrest boards
   - Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21130
CHANGING THE COOLANT

1. Remove:
   - Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
   - Coolant reservoir hose “1”



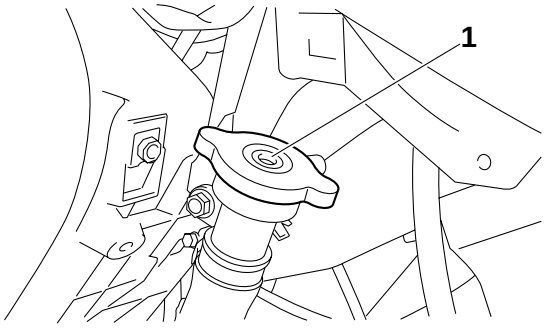


3. Drain:
   - Coolant
   (from the coolant reservoir)
4. Remove:
   - Radiator cap “1”

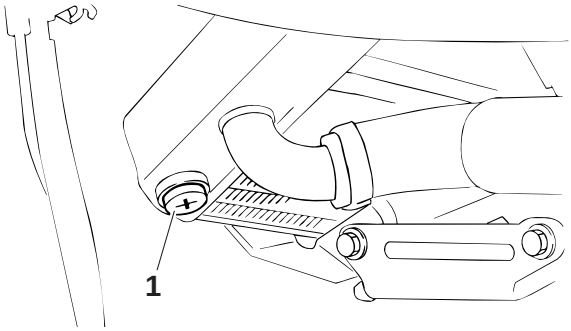
EWA4B51001
WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may

be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove it.



5. Remove:
   • Coolant drain bolt “1”
   (along with the gasket)



6. Drain:
   • Coolant
   (from the engine and radiator)
7. Install:
   • Coolant drain bolt
   (along with the gasket New)
8. Connect:
   • Coolant reservoir hose
9. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)

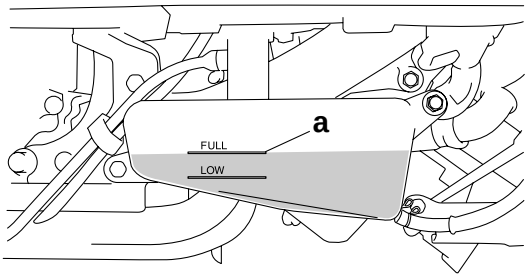
Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Radiator capacity (including all routes)
1.48 L (1.56 US qt) (1.30 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)
0.25 L (0.26 US qt) (0.22 Imp.qt)

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

EWA13040
WARNING
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

ECA13480
NOTICE
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

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



12. Install:
    - Coolant reservoir cap
13. Start the engine, warm it up for several minutes, and then stop it.
14. Check:
    - Coolant level
      Refer to “CHECKING THE COOLANT LEVEL” on page 3-17.

TIP

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

15. Install:
    - Bottom cowling
      Refer to “GENERAL CHASSIS” on page 4-1.

EAS21140
CHASSIS

EAS21160
ADJUSTING THE FRONT DISC BRAKE

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

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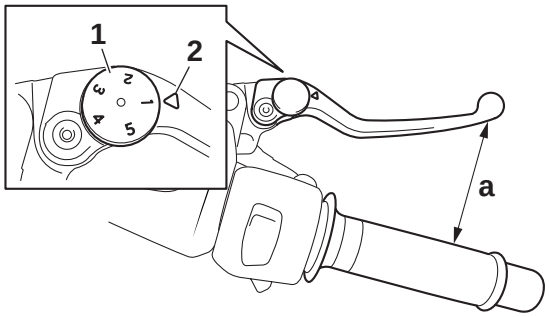
a. While pushing the brake lever forward, turn the adjusting dial “1” until the brake lever is in the desired position.

TIP

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

Position #1
Distance “a” is the largest.
Position #5
Distance “a” is the smallest.



EWA13050

⚠ WARNING

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

ECA13490

NOTICE

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

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EAS21210
ADJUSTING THE REAR DISC BRAKE

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

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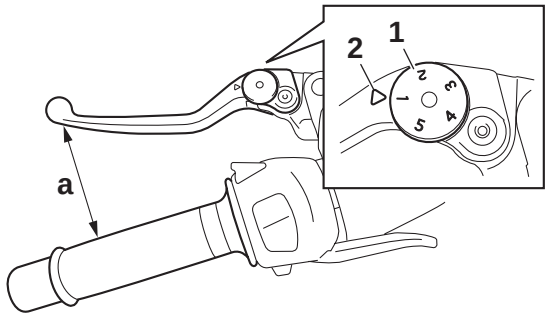
a. While pushing the brake lever forward, turn the adjusting dial “1” until the brake lever is in the desired position.

TIP

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

Position #1
Distance “a” is the largest.
Position #5
Distance “a” is the smallest.



EWA13050

⚠ WARNING

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

ECA13490

NOTICE

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

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EAS21240
CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

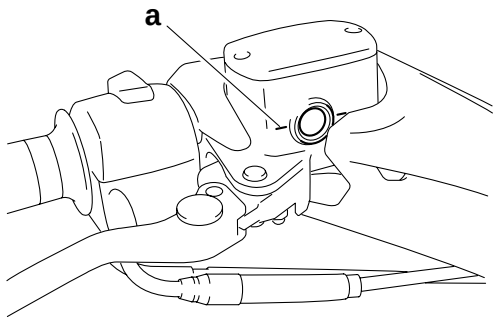
TIP

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

2. Check:
   • Brake fluid level
   Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.

Recommended fluid
DOT 4

A



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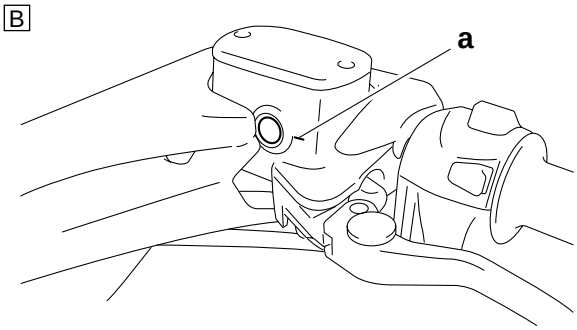


A. Front brake
B. Rear brake

EWA13090

WARNING

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

ECA13540

NOTICE

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

TIP

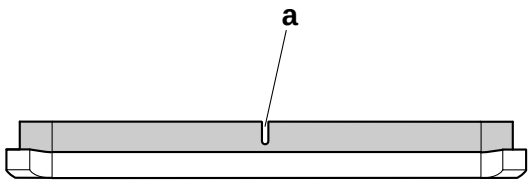
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

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 indicator groove “a” has almost disappeared → Replace the brake pads as a set.
     Refer to “FRONT BRAKE” on page 4-18.

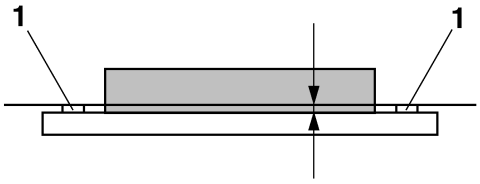


EAS21260

CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - Rear brake pad
     Wear indicators “1” almost touch the brake disc → Replace the brake pads as a set.
     Refer to “REAR BRAKE” on page 4-30.

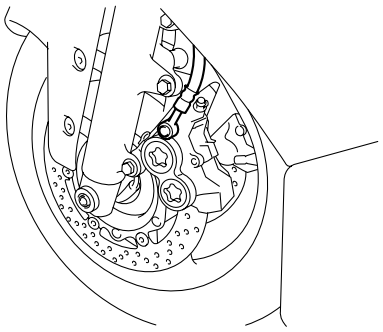


EAS21280

CHECKING THE FRONT BRAKE HOSES

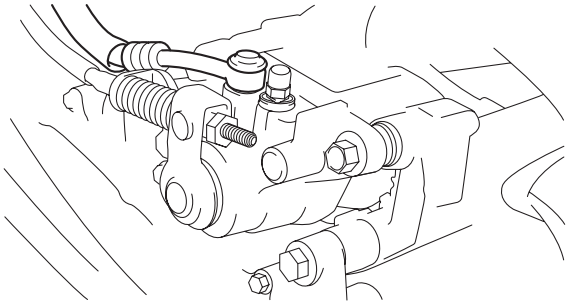
The following procedure applies to all of the brake hoses and brake hose clamps.

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



2. Check:
   • Brake hose holders
   Loose → Tighten the holder bolt.
3. Hold the vehicle upright and apply the brake several times.
4. Check:
   • Brake hoses
   Brake fluid leakage → Replace the damaged hose.
   Refer to “FRONT BRAKE” on page 4-18.

EAS21290
CHECKING THE REAR BRAKE HOSE
1. Check:
   • Brake hose
   Cracks/damage/wear → Replace.



2. Check:
   • Brake hose holder
   Loose connection → Tighten the holder bolt.
3. Hold the vehicle upright and apply the front brake several times.
4. Check:
   • Brake hose
   Brake fluid leakage → Replace the damaged hose.
   Refer to “REAR BRAKE” on page 4-30.

EAS4B51008
ADJUSTING THE REAR BRAKE LOCK CABLE
EWA4B51003
WARNING

Do not apply the rear brake lock lever when riding.

TIP
- Place the vehicle on the centerstand.
- Before adjusting the rear brake lock lever, check the rear brake fluid level.

1. Measure:
   • Rear brake lock cable length “a”
   Out of specification → Adjust.

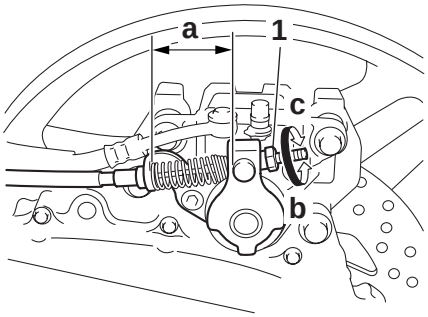
Rear brake lock cable length
45–47 mm (1.77–1.85 in)

2. Adjust:
   • Rear brake lock cable length “a”

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Slowly apply the rear brake several times.
b. Turn the adjusting nut “1” in direction “b” or “c” until the rear brake lock cable length “a” is 42–44 mm (1.65–1.73 in) when the rear brake lock lever is released.
c. Set the rear brake lock lever and wait more than 5 minutes.
d. Release the rear brake lock lever.
e. Turn the adjusting nut “1” in direction “b” or “c” until the rear brake lock cable length “a” is 45–47 mm (1.77–1.85 in).

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



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EAS21350
BLEEDING THE HYDRAULIC BRAKE SYSTEM
EWA13100
WARNING

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

TIP
- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir to overflow.
- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this pre-

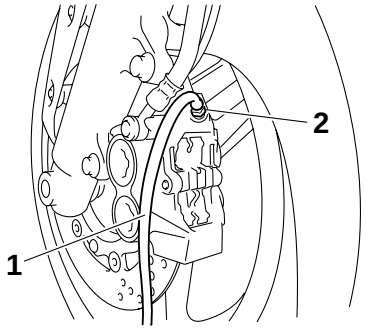
caution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Bleed:
   - Hydraulic brake system

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

A



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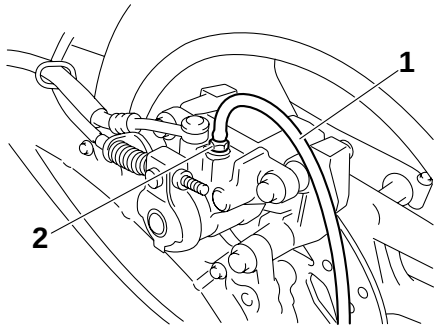

A. Front brake caliper
B. Rear brake caliper

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

TIP

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

h. Tighten the bleed screw and then release the brake lever.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Tighten the bleed screw to specification.

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

k. Fill the brake master cylinder 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.

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EAS21480

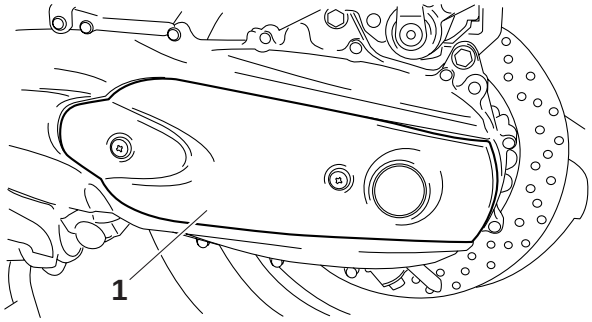
CHECKING THE CHAIN DRIVE OIL LEVEL

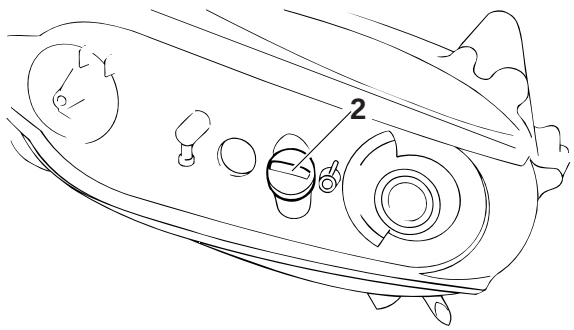
1. Stand the vehicle on a level surface.

TIP

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

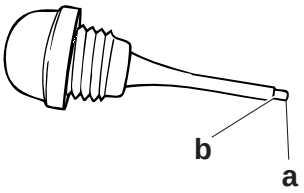
2. Remove:
   - Transmission chain drive case cover “1”
   - Chain drive oil filler cap “2”





3. Check:
   • Chain drive oil level
   Wipe the dipstick clean, insert it into the oil filler hole (without screw it in), and then remove it to check the oil level.
   The chain drive oil level should be between the minimum level mark “a” and maximum level mark “b”.
   Below the minimum level mark → Add the recommended chain drive oil to the proper level.

Type
SAE 80 API GL-4 Hypoid gear oil



4. Install:
   • Chain drive oil filler cap
   • Transmission chain drive case cover

Transmission chain drive case cover screw
7 Nm (0.7 m·kg, 5.1 ft·lb)

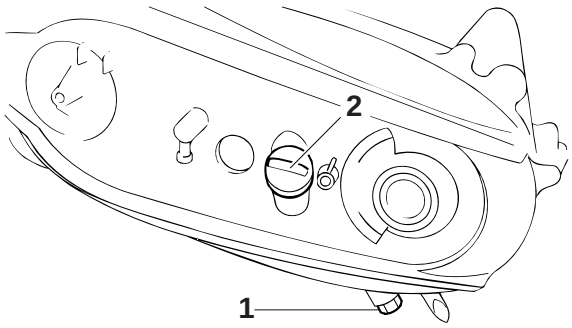
EAS21490
CHANGING THE CHAIN DRIVE OIL

1. Stand the vehicle on a level surface.

TIP

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

2. Place a container under the chain drive.
3. Remove:
   • Chain drive oil drain bolt “1”
   (along with the gasket)
   • Chain drive oil filler cap “2”



4. Drain:
   • Chain drive oil
   (completely from the chain drive case)
5. Check:
   • Drain bolt gasket
   Damage → Replace.
6. Install:
   • Chain drive oil drain bolt
   (along with the gasket)

Chain drive oil drain bolt
20 Nm (2.0 m·kg, 14 ft·lb)

7. Fill:
   • Chain drive oil
   (with the specified amount of the recommended chain drive oil)

Type
SAE 80 API GL-4 Hypoid gear oil
Quantity
0.70 L (0.74 US qt) (0.62 Imp.qt)

8. Check:
   • Chain drive oil level
   Refer to “CHECKING THE CHAIN DRIVE OIL LEVEL” on page 3-24.
9. Install:
   • Chain drive oil filler cap

EAS21500
CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

EWA13120
WARNING

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

TIP

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

2. Check:
   • Steering head
   Grasp the bottom of the front fork legs and gently rock the front fork.
   Binding/looseness → Adjust the steering head.
3. Remove:
   • Upper bracket
   Refer to "STEERING HEAD" on page 4-58.
4. Adjust:
   • Steering head

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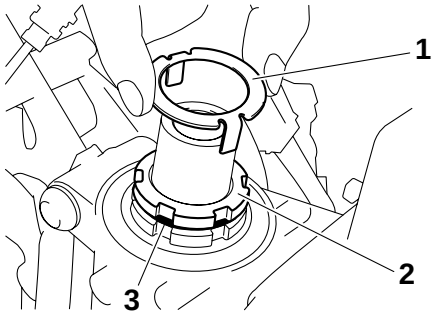
a. Remove the lock washer "1", the upper ring nut "2", and the rubber washer "3".



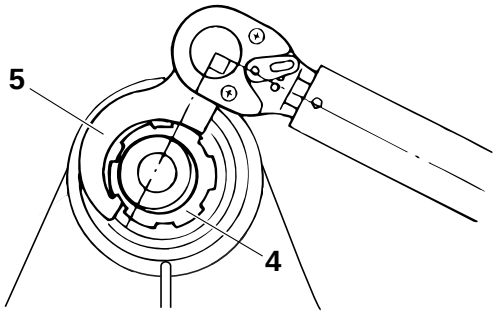
b. Loosen the lower ring nut "4" and then tighten it to specification with a steering nut wrench "5".

Steering nut wrench
90890-01403
Spanner wrench
YU-33975

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

TIP

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



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

EWA13140

⚠ WARNING

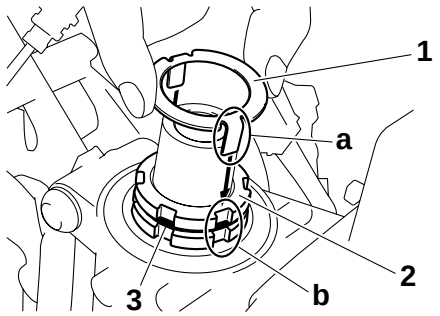
Do not overtighten the lower ring nut.

Lower ring nut (final tightening torque)
14 Nm (1.4 m·kg, 10 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 4-58.
e. Install the rubber washer "3".
f. Install the upper ring nut "2".
g. Finger tighten the upper ring nut "2", then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
h. Install the lock washer "1".

TIP

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



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5. Install:
   • Upper bracket
   Refer to "STEERING HEAD" on page 4-58.
6. Measure:
   • Steering head tension

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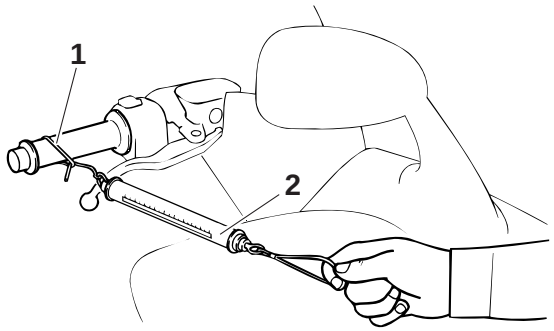
TIP

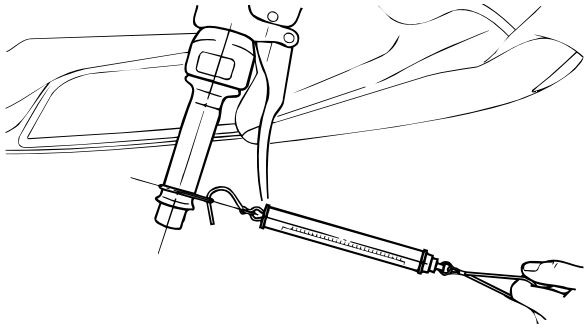
Make sure all of the cables and wires are properly routed.

a. Point the front wheel straight ahead.
b. Install a plastic locking tie "1" loosely around the end of the handlebar as shown.
c. Hook a spring gauge "2" onto the plastic locking tie.



d. Hold the spring gauge at a 90° angle from the handlebar, pull the spring gauge, and then record the measurement when the handlebar starts to run.

Steering head tension
1.97–4.90 N (200–500 gf) (7.06–17.65 oz)



e. Repeat the above procedure on the opposite handlebar.
f. If the steering head tension is out of specification (both handlebar ends should be within specification), remove the upper bracket and loosen or tighten the lower ring nut.
g. Reinstall the upper bracket and measure the steering head tension again as described above.
h. Repeat the above procedure until the steering head tension is within specification.
i. Grasp the bottom of the front fork legs and gently rock the front fork.
   Binding/looseness → Adjust the steering head.

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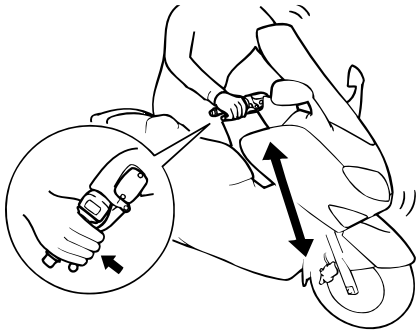
EAS21530
CHECKING THE FRONT FORK

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

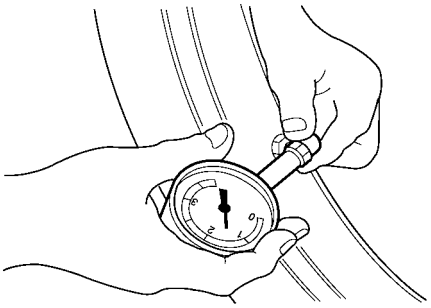
2. Check:
   • Inner tube
   Damage/scratches → Replace.
   • Oil seal
   Oil leakage → Replace.
3. Hold the vehicle upright and apply the front brake.
4. Check:
   • Front fork operation
   Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
   Rough movement → Repair.
   Refer to “FRONT FORK” on page 4-49.



EAS21650
CHECKING THE TIRES

The following procedure applies to both of the tires.

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



EWA13180
⚠ WARNING

- **The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.**
- **The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.**
- **Operation of an overloaded vehicle could cause tire damage, an accident or an injury.**

NEVER OVERLOAD THE VEHICLE.

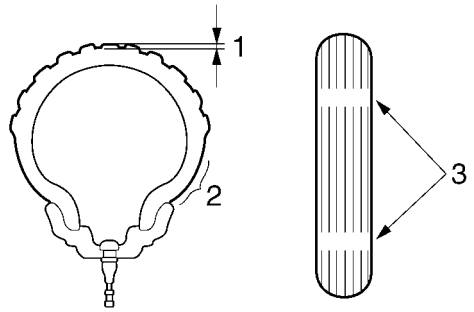
Tire air pressure (measured on cold tires)
Loading condition
0–90 kg (0–198 lb)
Front
225 kPa (33 psi) (2.25 kgf/cm²)
Rear
250 kPa (36 psi) (2.50 kgf/cm²)
Loading condition
90–193 kg (198–425 lb)
Front
225 kPa (33 psi) (2.25 kgf/cm²)
Rear
280 kPa (41 psi) (2.80 kgf/cm²)
*** Total weight of rider, passenger, 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.



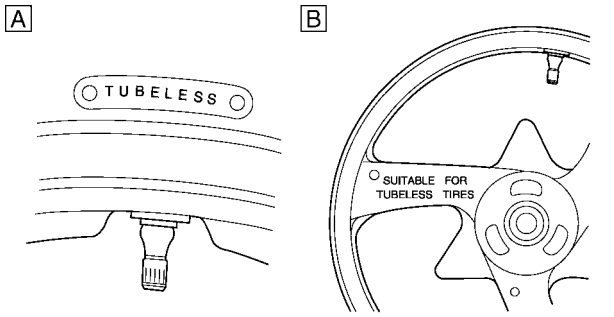
1. Tire tread depth
2. Side wall
3. Wear indicator

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

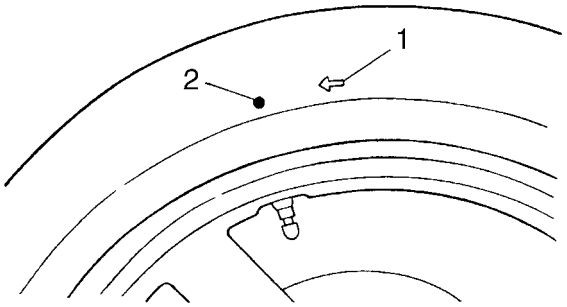
Rear tire
Size
160/60R15 M/C 67H
Manufacturer/model
DUNLOP/GPR-100L
Manufacturer/model
BRIDGESTONE/BT012R

EWA13210
WARNING

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

TIP

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



EAS21670
CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

EWA13260
WARNING

Never attempt to make any repairs to the wheel.

TIP

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

EAS21690
CHECKING AND LUBRICATING THE CABLES

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

EWA4B51004
WARNING

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

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

Recommended lubricant
Engine oil or a suitable cable lubricant

TIP

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

EAS21700
LUBRICATING THE LEVERS

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

Recommended lubricant
Silicone grease

EAS21720
LUBRICATING THE SIDESTAND

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

Recommended lubricant
Lithium-soap-based grease

EAS21730
LUBRICATING THE CENTERSTAND

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

Recommended lubricant
Lithium-soap-based grease

EAS21740
LUBRICATING THE REAR SUSPENSION

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

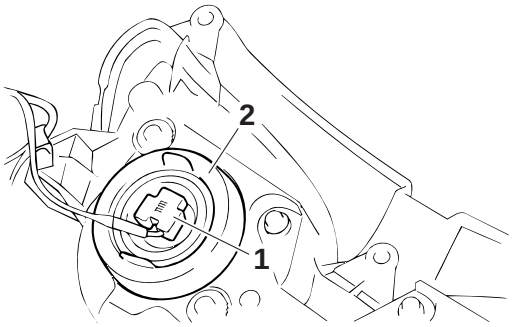
Recommended lubricant
Lithium-soap-based grease

EAS21750
ELECTRICAL SYSTEM

EAS21760
CHECKING AND CHARGING THE BATTERY
Refer to “ELECTRICAL COMPONENTS” on page 8-57.

EAS21770
CHECKING THE FUSES
Refer to “ELECTRICAL COMPONENTS” on page 8-57.

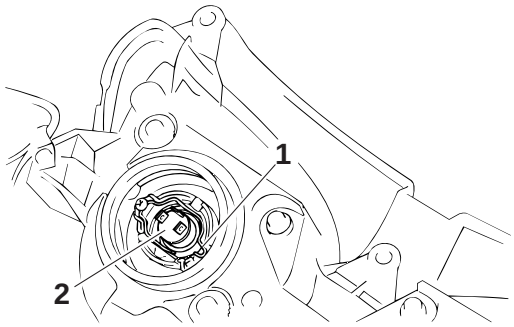
EAS21790
REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Remove:
   • Front cowling
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
   • Headlight coupler “1”
3. Remove:
   • Headlight bulb holder “2”



4. Detach:
   • Headlight bulb holder “1”
5. Remove:
   • Headlight bulb “2”

EWA13320
⚠ WARNING

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



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

ECA13690
NOTICE

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

7. Install:
   • Headlight bulb holder cover
8. Connect:
   • Headlight coupler
9. Install:
   • Front cowling
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21810
ADJUSTING THE HEADLIGHT BEAMS
1. Adjust:
   • Headlight beam (vertically)

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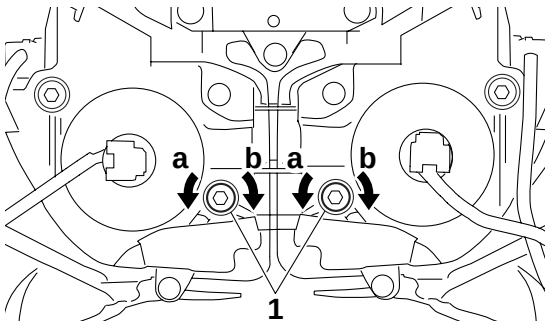
a. Turn the adjusting screw “1” in direction “a” or “b”.

Direction “a”
Headlight beam is raised.
Direction “b”
Headlight beam is lowered.



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2. Adjust:
   • Headlight beam (horizontally)

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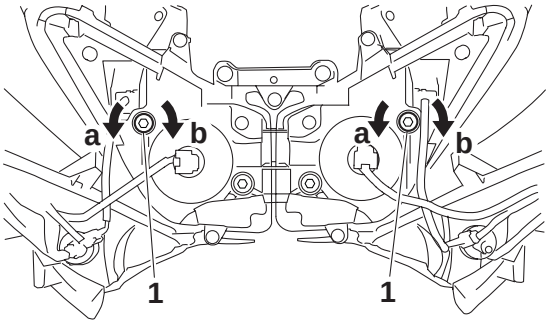
a. Turn the adjusting screw “1” in direction “a” or “b”.
   Left headlight

Direction “a”
Headlight beam moves to the right.
Direction “b”
Headlight beam moves to the left.

Right headlight

Direction “a”
Headlight beam moves to the left.
Direction “b”
Headlight beam moves to the right.



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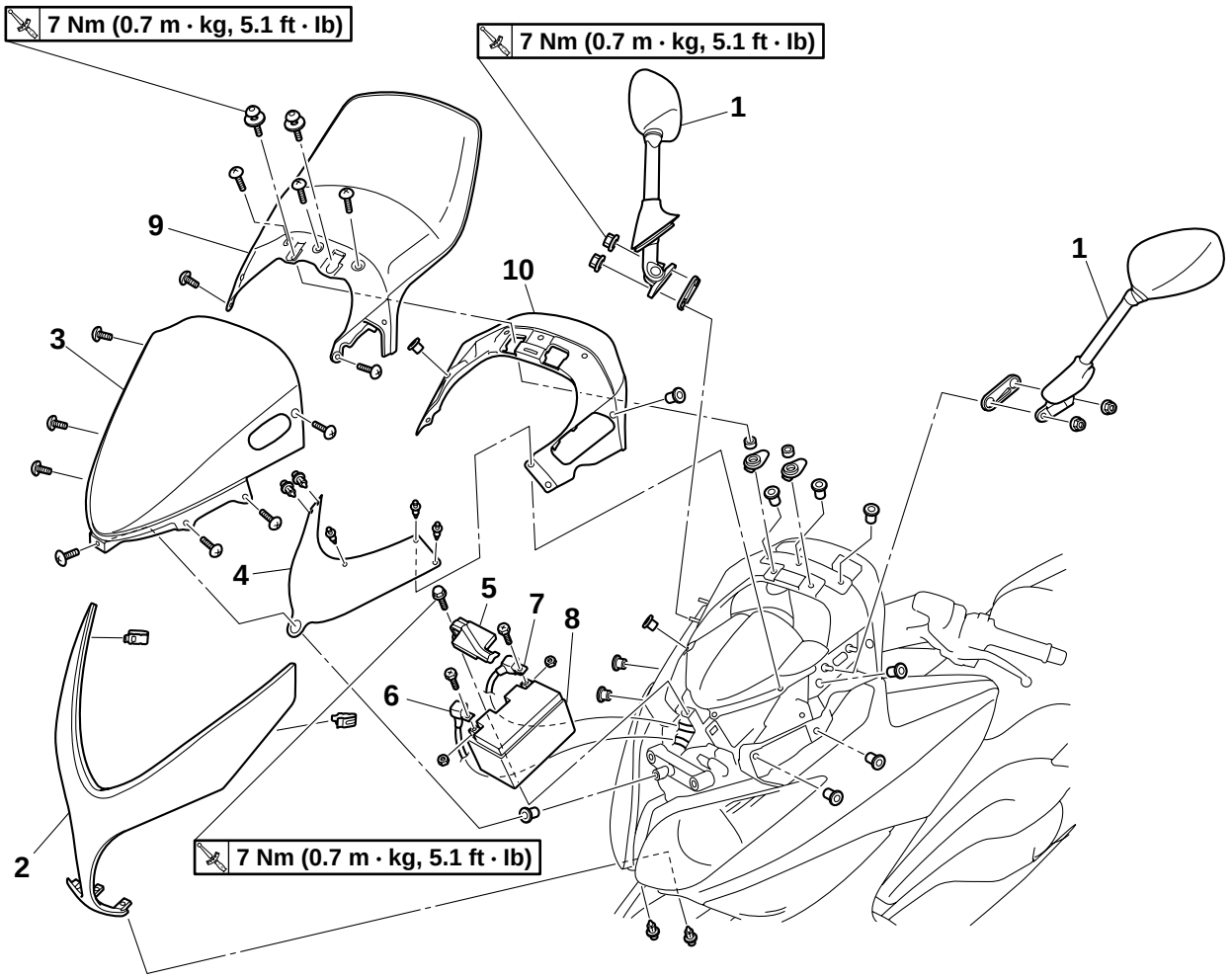
CHASSIS

EAS21830

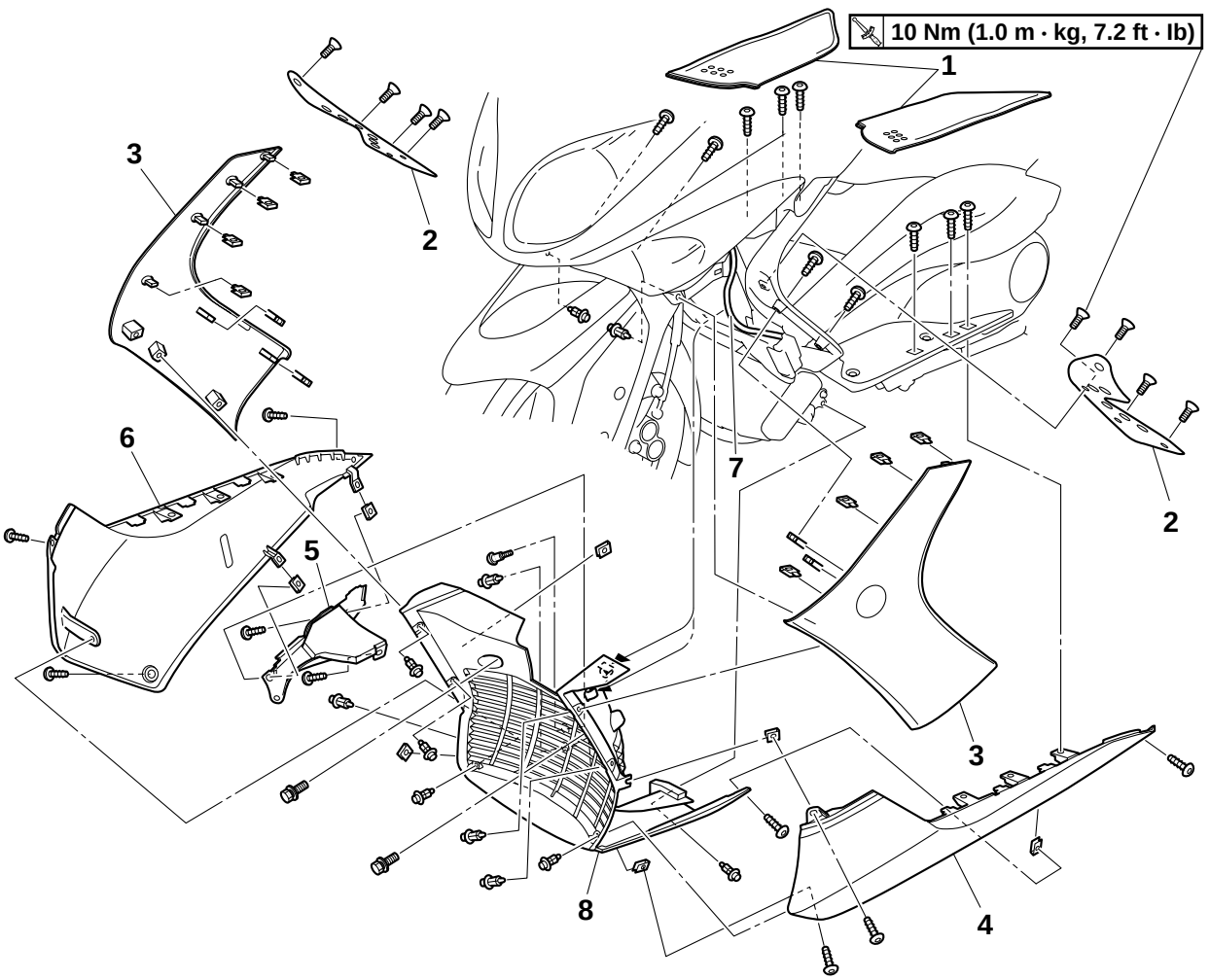
GENERAL CHASSIS

Removing the battery and windshield



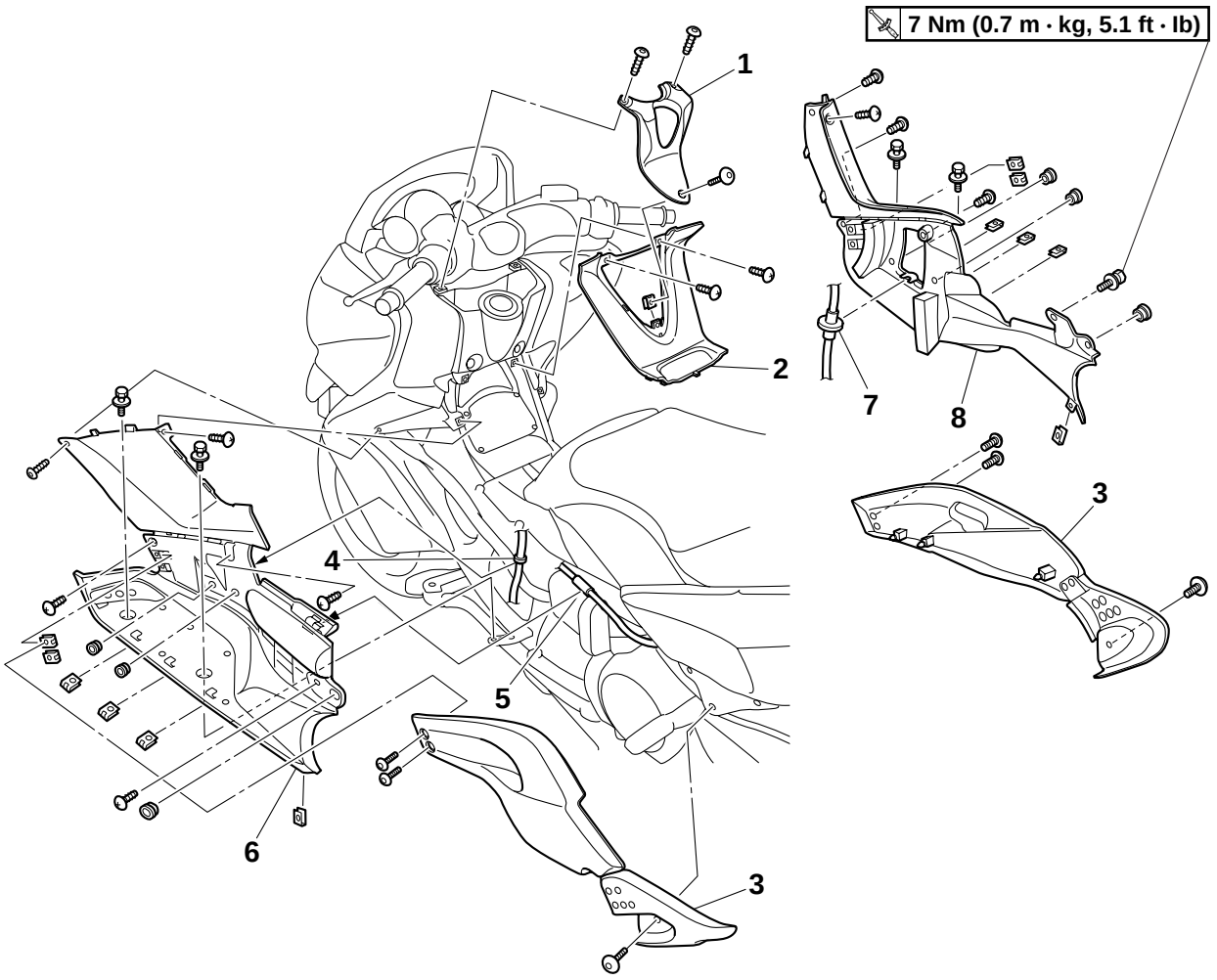
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear view mirror	2	
2	Front upper outer panel	1	
3	Front upper inner panel	1	
4	Battery cover	1	
5	Battery holder	1	
6	Negative battery lead	1	Disconnect.
7	Positive battery lead	1	Disconnect.
8	Battery	1	
9	Windshield	1	
10	Windshield bracket upper cover	1	
			For installation, reverse the removal procedure.

Removing the bottom cowling



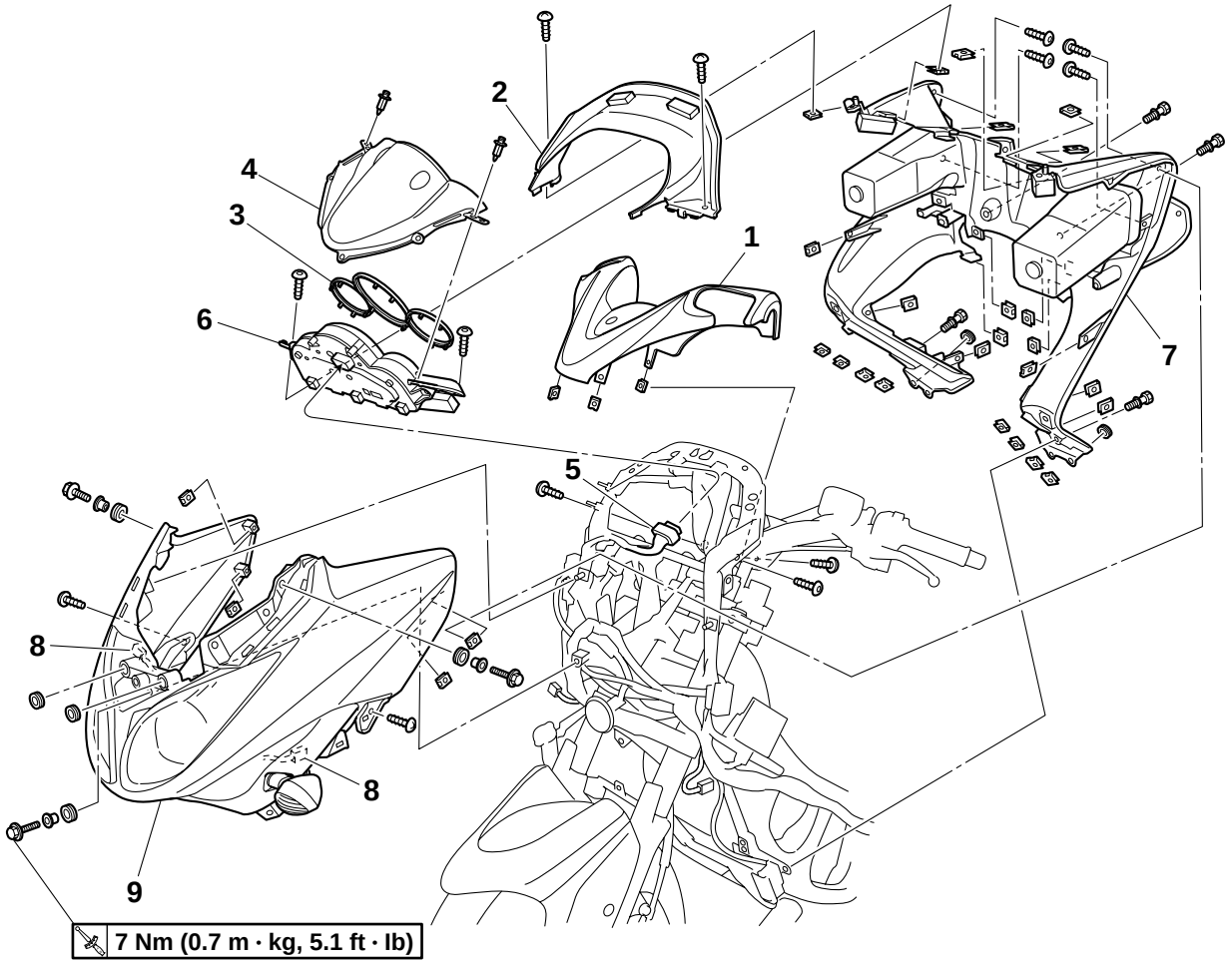
Order	Job/Parts to remove	Q'ty	Remarks
1	Footrest board mat	2	
2	Footrest board cover	2	
3	Side panel	2	
4	Left side cowling	1	
5	Bottom panel	1	
6	Right side cowling	1	
7	Wire harness (to ignition coil)	1	Unhook.
8	Bottom cowling	1	
			For installation, reverse the removal procedure.

Removing the footrest boards



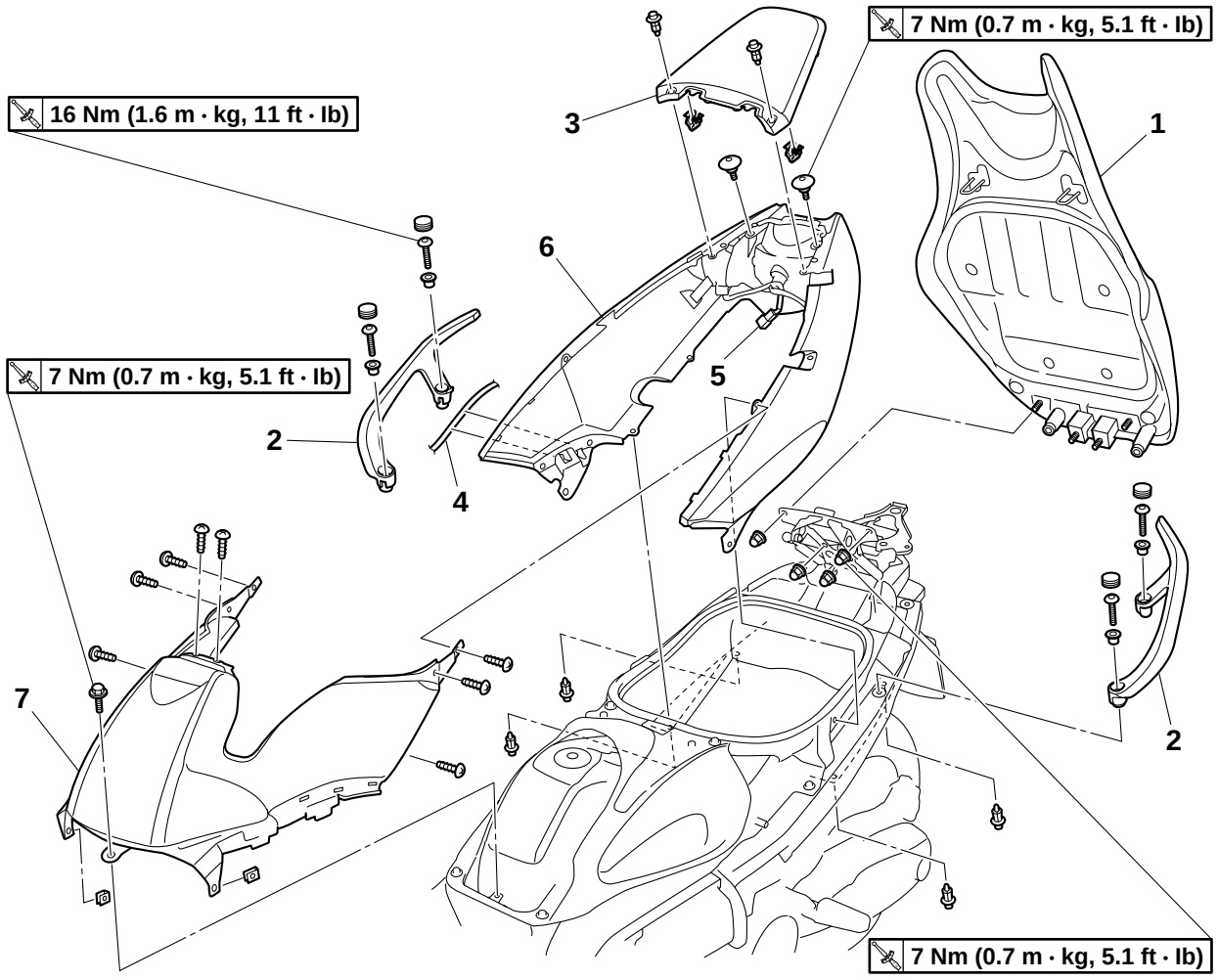
Order	Job/Parts to remove	Q'ty	Remarks
1	Front lower outer panel	1	
2	Front lower inner panel	1	
3	Center panel	2	
4	Fuel tank overflow hose	1	Unhook.
5	Rear brake pipe	1	Unhook.
6	Left footrest board	1	
7	Fuel tank breather hose	1	Unhook.
8	Right footrest board	1	
			For installation, reverse the removal procedure.

Removing the front cowling assembly



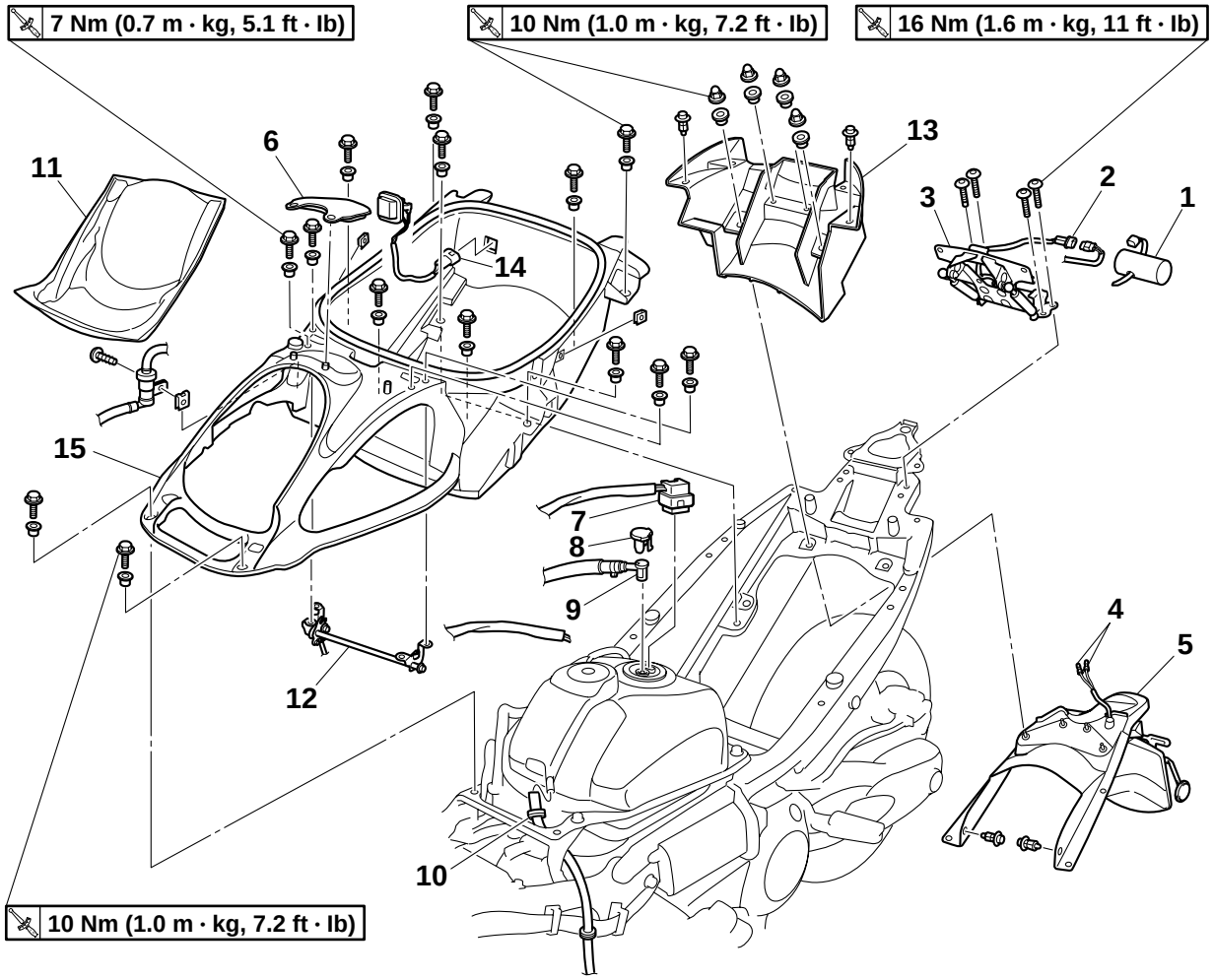
Order	Job/Parts to remove	Q'ty	Remarks
1	Upper handlebar cover	1	
2	Windshield bracket lower cover	1	
3	Meter ring	1	
4	Meter assembly cover	1	
5	Meter assembly coupler	1	Disconnect.
6	Meter assembly	1	
7	Storage compartment	1	
8	Headlight sub-wire harness coupler	2	Disconnect.
9	Front cowling assembly	1	
			For installation, reverse the removal procedure.

Removing the rear cowling assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Seat	1	
2	Grab bar	2	
3	Rear cover	1	
4	O_2 sensor lead	1	Unhook.
5	Taillight assembly coupler	1	Disconnect.
6	Rear cowling assembly	1	
7	Fuel tank cover	1	
			For installation, reverse the removal procedure.

Removing the storage box

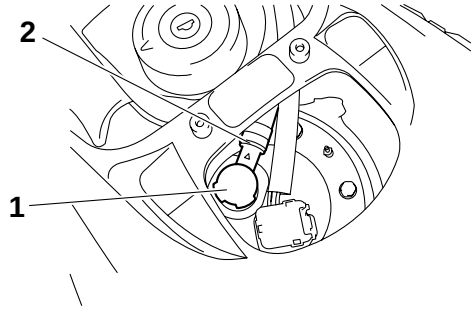


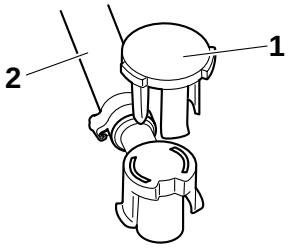
Order	Job/Parts to remove	Q'ty	Remarks
1	Coupler rubber cover	1	
2	Storage box light switch coupler	1	Disconnect.
3	Seat hinge assembly	1	
4	License plate light connector	2	Disconnect.
5	Mudguard	1	
6	Fuel pump access cover	1	
7	Fuel pump coupler	1	Disconnect.
8	Fuel hose connector cover	1	
9	Fuel hose	1	Disconnect.
10	Fuel tank overflow hose	1	
11	Storage box inner mat	1	
12	Seat lock	1	
13	Seat hinge housing	1	
14	Storage box light sub-wire harness coupler	1	Disconnect.
15	Storage box	1	
			For installation, reverse the removal procedure.

EAS4B51010
REMOVING THE FUEL HOSE
1. Remove:
   • Fuel hose connector cover “1”
2. Disconnect:
   • Fuel hose “2”

ECA4B51001
NOTICE
- **Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**
- **Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.**
- **Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.**

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

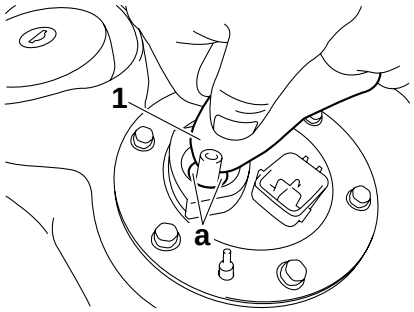




EAS4B51011
INSTALLING THE FUEL HOSE
1. Install:
   • Fuel hose
   • Fuel hose connector cover

ECA4B51021
NOTICE
When installing the fuel hose, make sure that it is securely connected, and that the fuel hose connector cover is in the correct position, otherwise the fuel hose will not be properly installed.

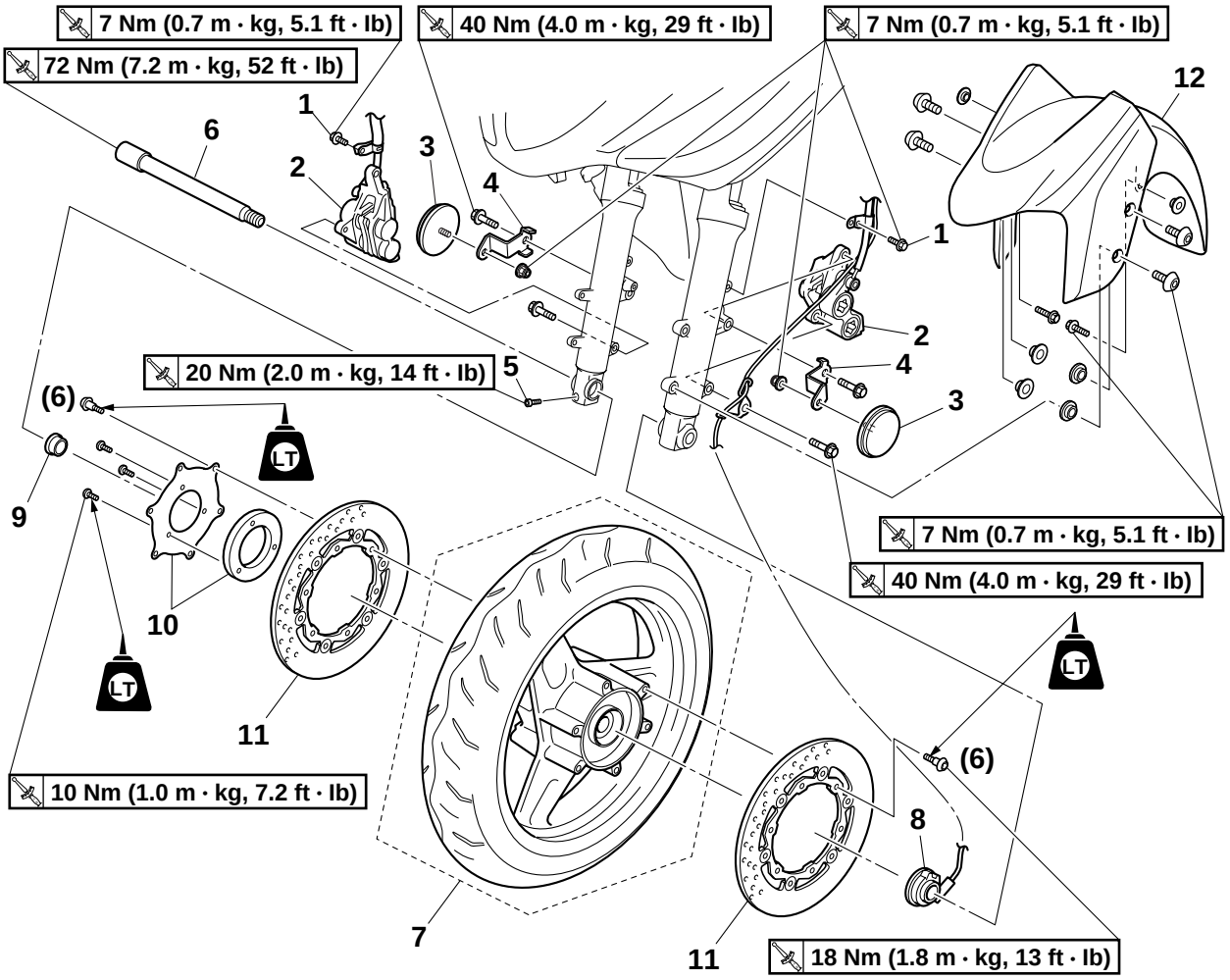
TIP
- Wipe up any fuel remaining in the recess “a” in the fuel pump with a dry rag “1”.
- After installing the fuel hose connector cover, make sure that it is installed securely.



EAS21870

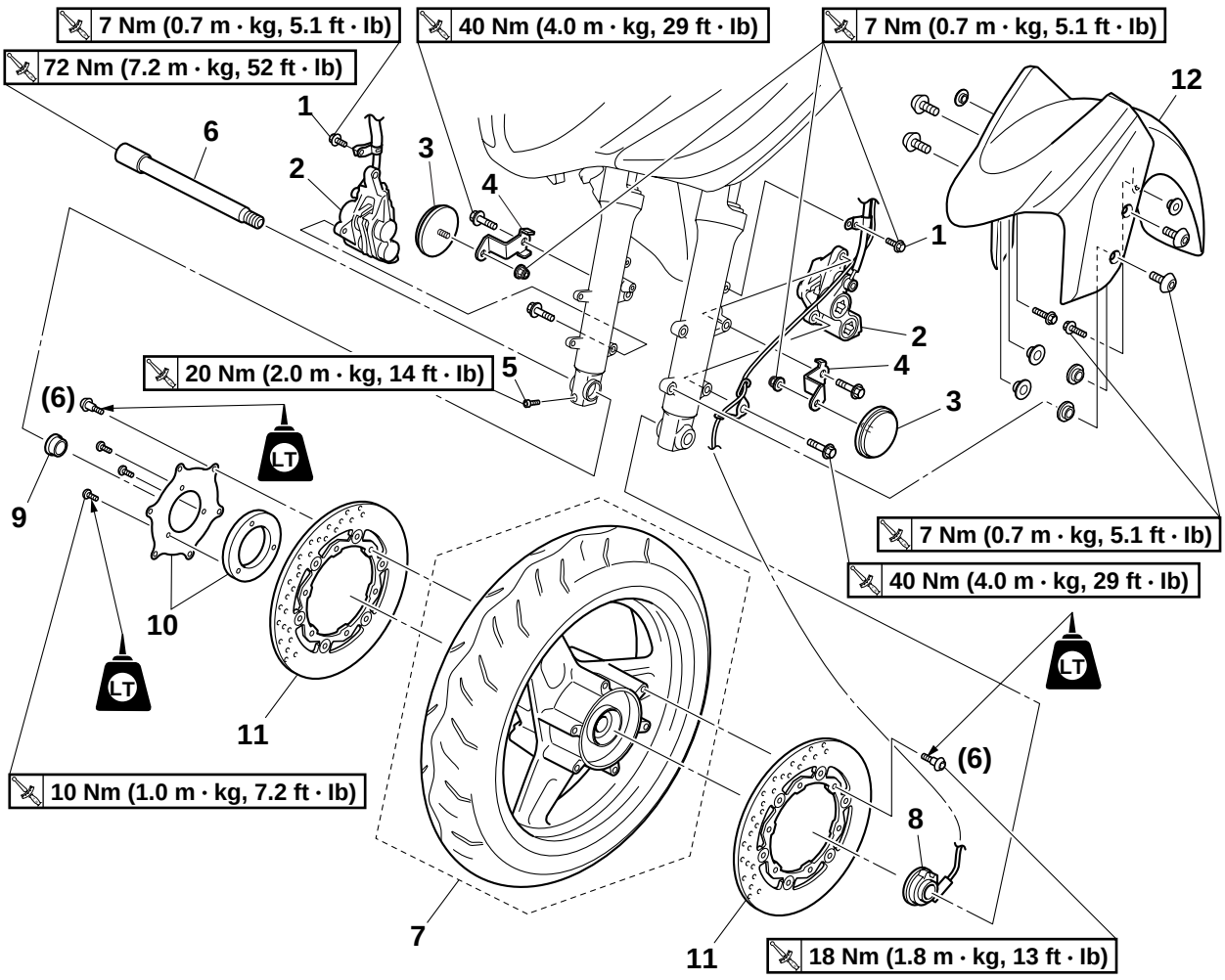
FRONT WHEEL

Removing the front wheel and brake discs



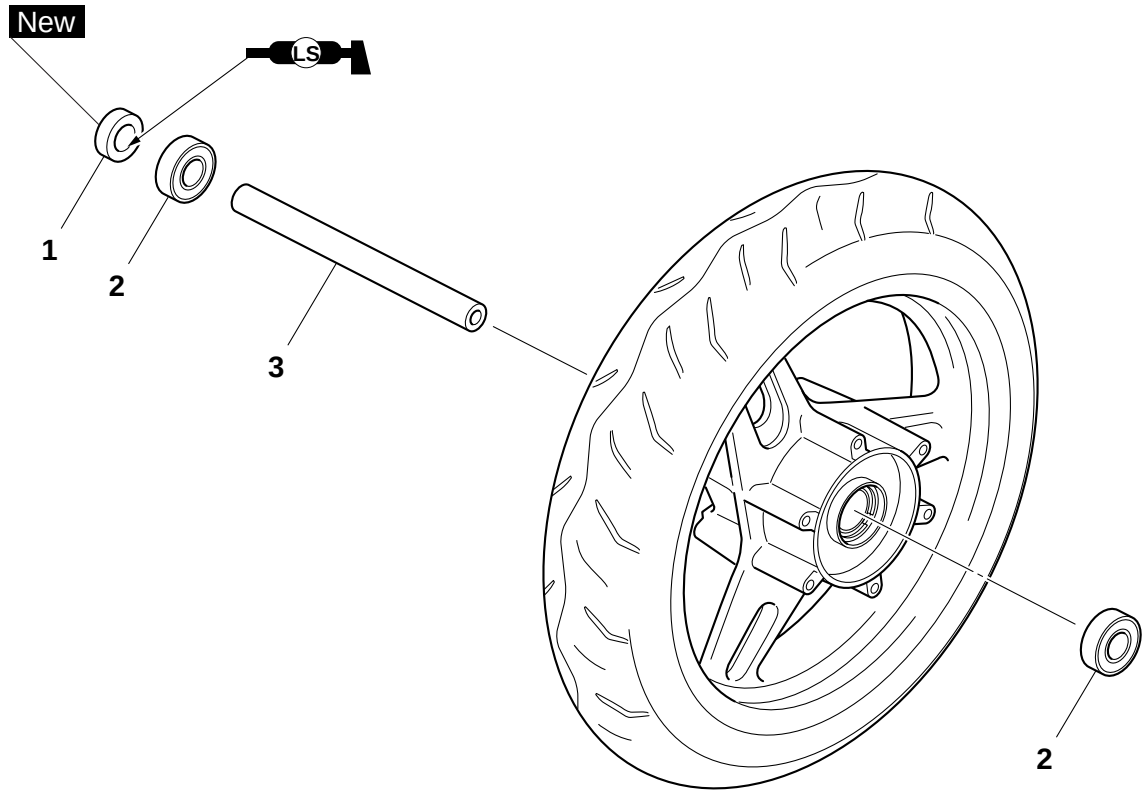
Order	Job/Parts to remove	Q'ty	Remarks
			TIP Place the vehicle on a suitable stand so that the front wheel is elevated.
1	Front brake hose holder bolt	2	
2	Front brake caliper	2	
3	Front reflector	2	
4	Front reflector bracket	2	
5	Front wheel axle pinch bolt	1	Loosen.
6	Front wheel axle	1	
7	Front wheel	1	
8	Speed sensor	1	
9	Collar	1	
10	Wheel ring	1	
11	Front brake disc	2	

Removing the front wheel and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
12	Front fender	1	
			For installation, reverse the removal procedure.

Disassembling the front wheel



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

TIP

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

3. Elevate:
   • Front wheel

TIP

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

EAS21910
DISASSEMBLING THE FRONT WHEEL
1. Remove:
   • Oil seal
   • Wheel bearings

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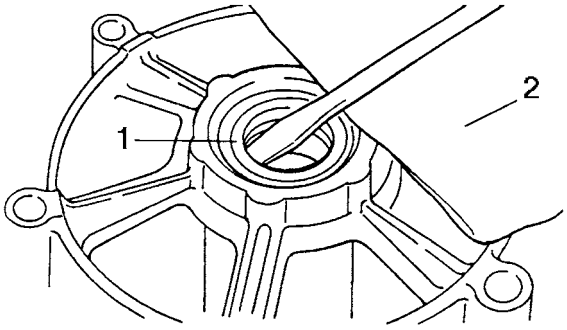
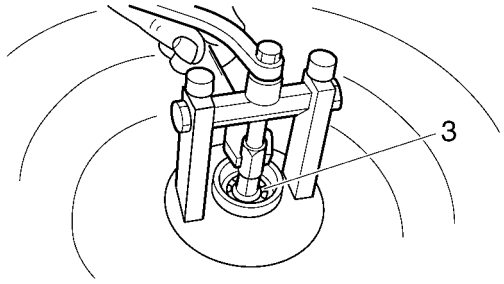
a. Clean the surface of the front wheel hub.
b. Remove the oil seal “1” with a flat-head screwdriver.

TIP

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



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



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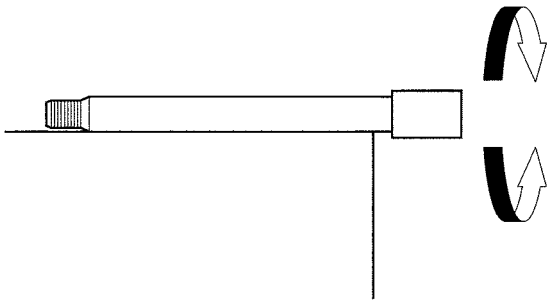
EAS21920
CHECKING THE FRONT WHEEL
1. Check:
   • Wheel axle
   Roll the wheel axle on a flat surface.
   Bends → Replace.

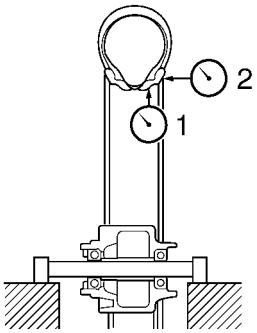
EWA13460
WARNING

Do not attempt to straighten a bent wheel axle.

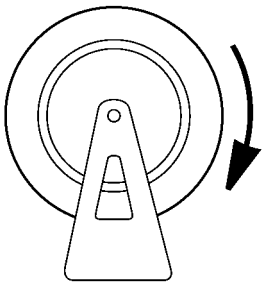


2. Check:
   • Tire
   • Front wheel
   Damage/wear → Replace.
   Refer to “CHECKING THE TIRES” on page 3-27 and “CHECKING THE WHEELS” on page 3-29.
3. Measure:
   • Radial wheel runout “1”
   • Lateral wheel runout “2”
   Over the specified limits → Replace.

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 seal
     Damage/wear → Replace.



EAS21960
ASSEMBLING THE FRONT WHEEL

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

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

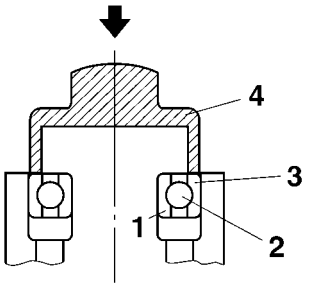
ECA4B51004

NOTICE

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

TIP

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



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EAS21970
ADJUSTING THE FRONT WHEEL STATIC BALANCE

TIP

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

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

TIP

Place the front wheel on a suitable balancing stand.

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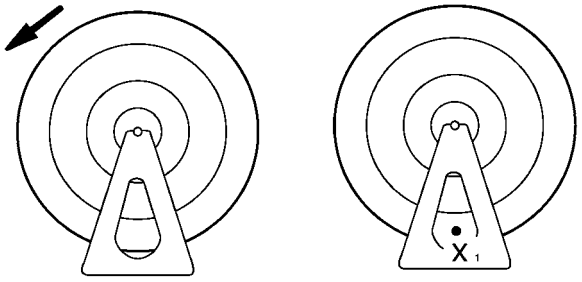
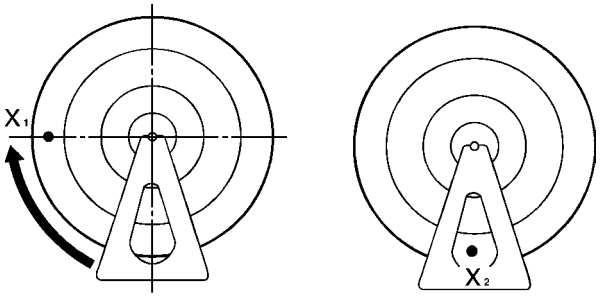
a. Spin the front wheel.
b. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.



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



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

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3. Adjust:
   • Front wheel static balance

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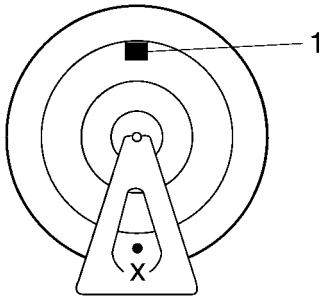
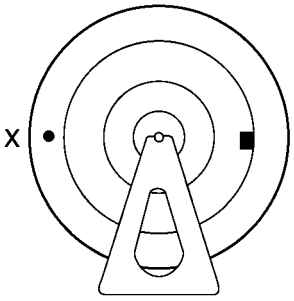
a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

TIP

Start with the lightest weight.



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



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

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4. Check:
   • Front wheel static balance

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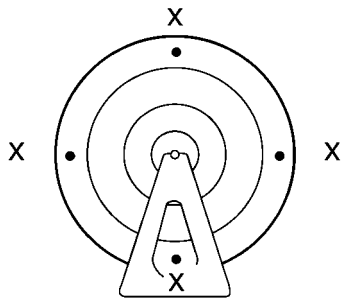
a. Turn the front wheel and make sure it stays at each position shown.



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

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EAS21990

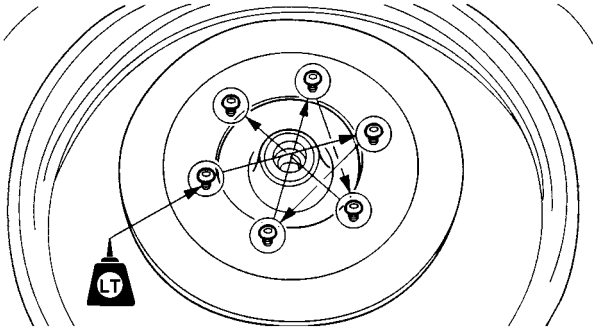
INSTALLING THE FRONT WHEEL (DISC)

1. Install:
   • Front brake discs

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

TIP

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



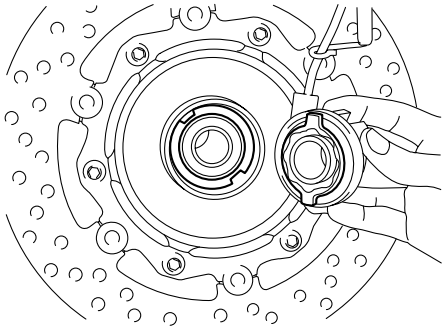
2. Check:
   • Front brake discs
   Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.
3. Lubricate:
   • Oil seal lips
   • Speed sensor

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

4. Install:
   • Speed sensor

TIP

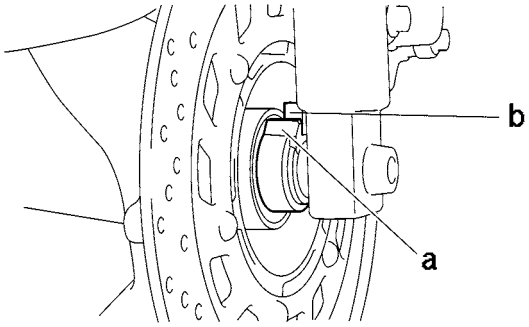
Be sure to fit the two projections on the speed sensor in between the projections on the wheel hub.



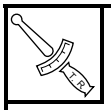
5. Install:
   - Front wheel

TIP

Make sure the slot “a” in the speed sensor fits over the stopper “b” on the outer tube.



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

	**Front wheel axle** **72 Nm (7.2 m·kg, 52 ft·lb)** **Front wheel axle pinch bolt** **20 Nm (2.0 m·kg, 14 ft·lb)**

ECA4B51005

NOTICE

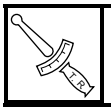
Before tightening the wheel axle, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

7. Install:
   - Front brake calipers

EWA13490

⚠ WARNING

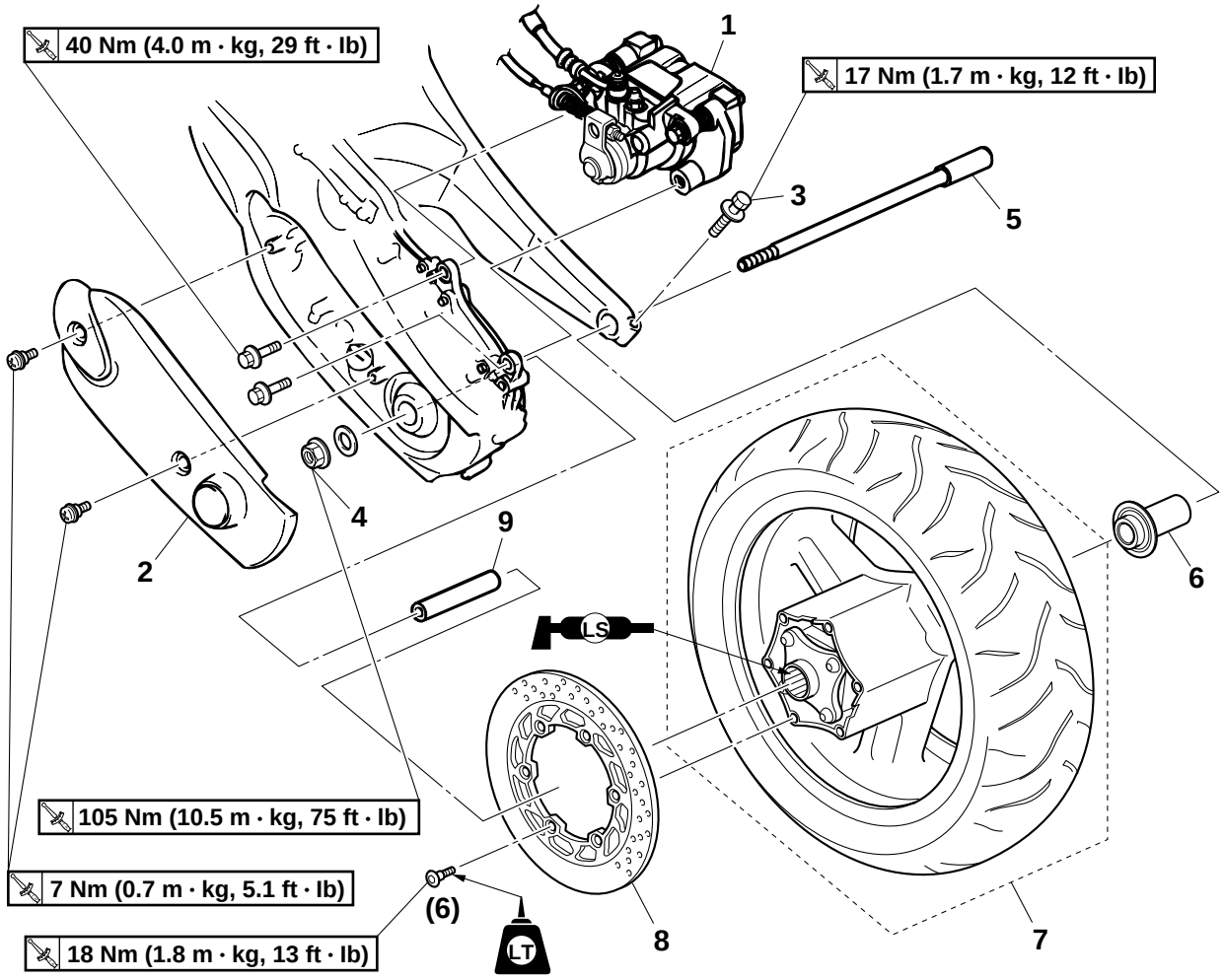
Make sure the brake cable is routed properly.

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

EAS22020

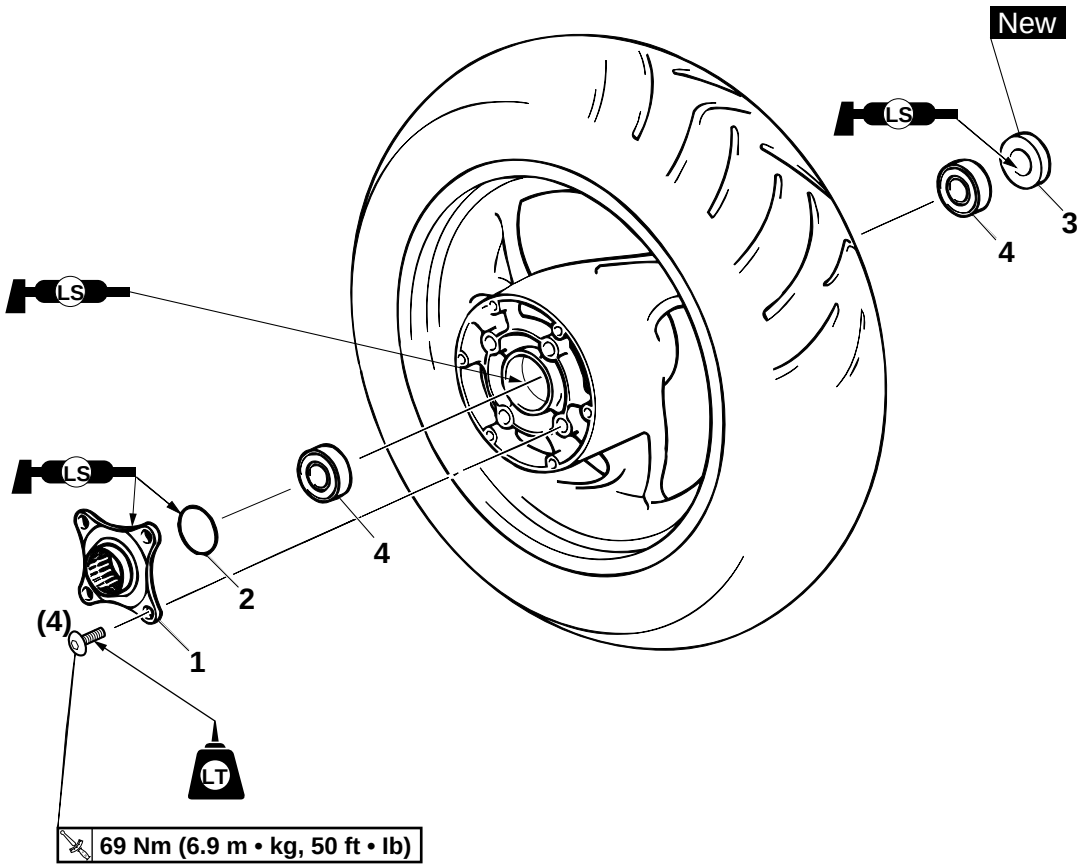
REAR WHEEL

Removing the rear wheel and brake disc



Order	Job/Parts to remove	Q'ty	Remarks
			TIP Place the vehicle on the centerstand so that the rear wheel is elevated.
1	Rear brake caliper	1	
2	Transmission chain drive case cover	1	
3	Rear wheel axle pinch bolt	1	Loosen.
4	Rear wheel axle nut	1	
5	Rear wheel axle	1	
6	Collar	1	
7	Rear wheel	1	
8	Rear brake disc	1	
9	Spacer	1	
			For installation, reverse the removal procedure.

Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear wheel drive hub	1	
2	O-ring	1	
3	Oil seal	1	
4	Wheel bearing	2	
			For assembly, reverse the disassembly procedure.

EAS22040
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.

TIP

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

2. Remove:
   - Rear brake caliper

TIP

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

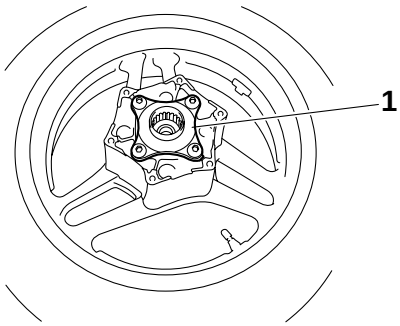
EAS22090
CHECKING THE REAR WHEEL

1. Check:
   - Wheel axle
     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 3-27 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)

EAS4B51012
CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
   - Rear wheel drive hub "1"
     Cracks/damage → Replace.



EAS22150
ADJUSTING THE REAR WHEEL STATIC BALANCE

TIP

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

1. Adjust:
   - Rear wheel static balance
     Refer to "ADJUSTING THE FRONT WHEEL STATIC BALANCE" on page 4-12.

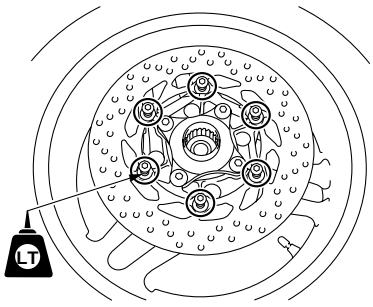
EAS4B51013
INSTALLING THE REAR WHEEL (DISC)

1. Install:
   - Rear wheel drive hub
   - Rear brake disc

Rear wheel drive hub bolt
69 Nm (6.9 m·kg, 50 ft·lb)
LOCTITE®
Rear brake disc bolt
18 Nm (1.8 m·kg, 13 ft·lb)
LOCTITE®

TIP

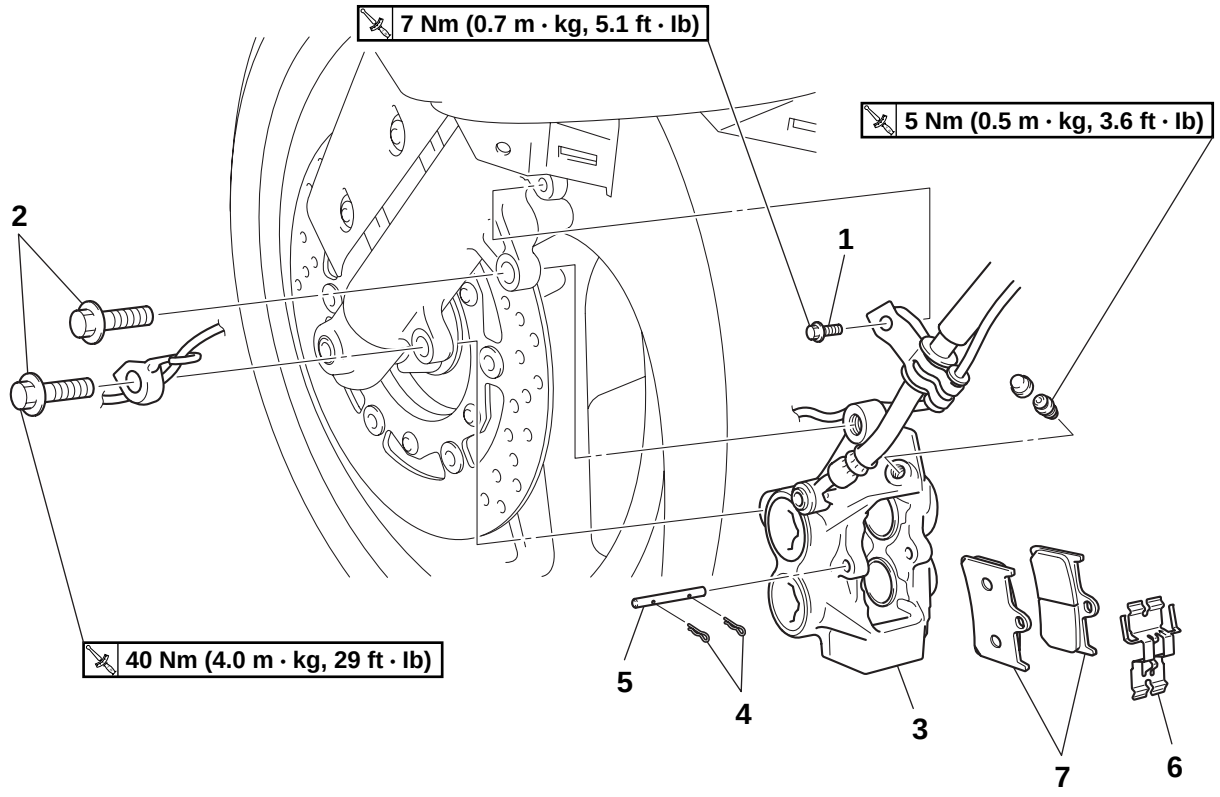
Tighten the brake disc bolts in stages and in a crisscross pattern.



2. Check:
   - Rear brake disc
     Refer to "CHECKING THE REAR BRAKE DISC" on page 4-36.

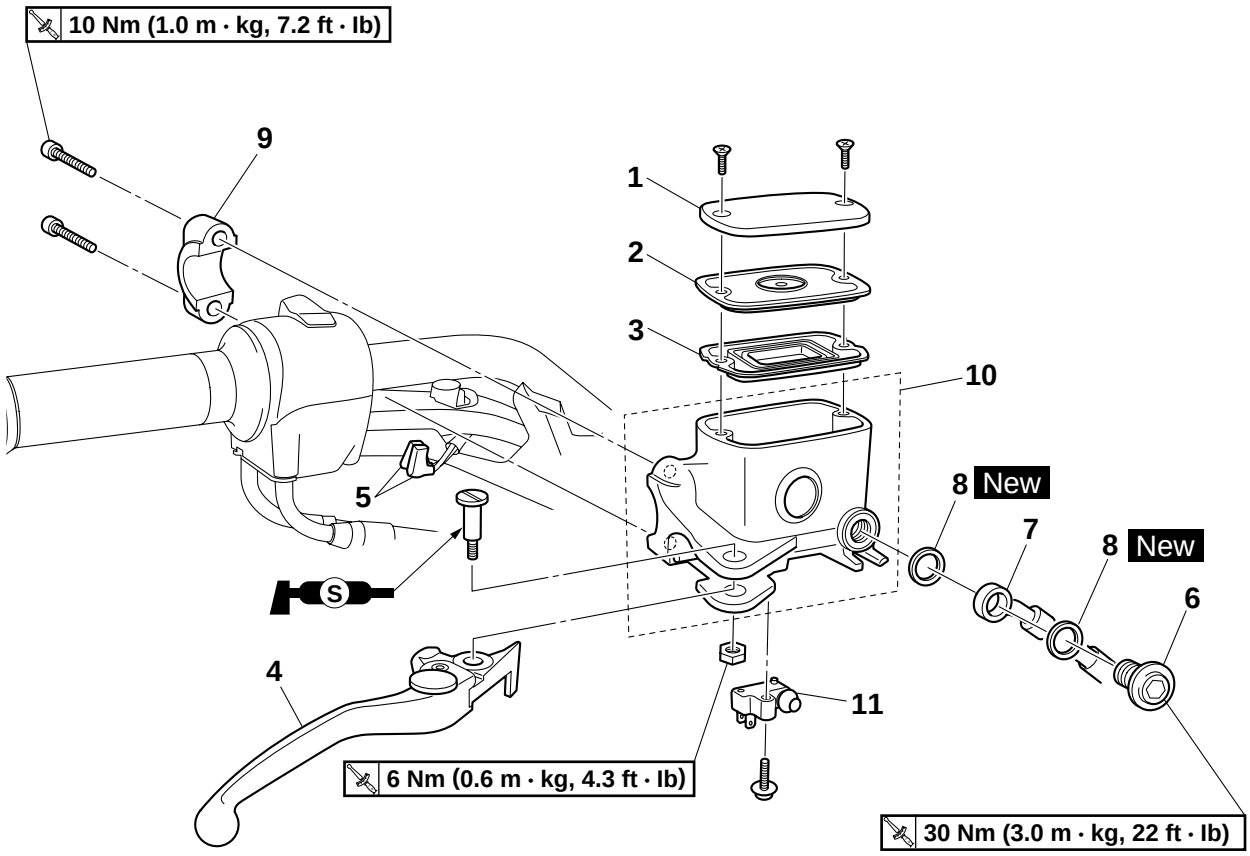
EAS22210
FRONT BRAKE

Removing the front brake pads



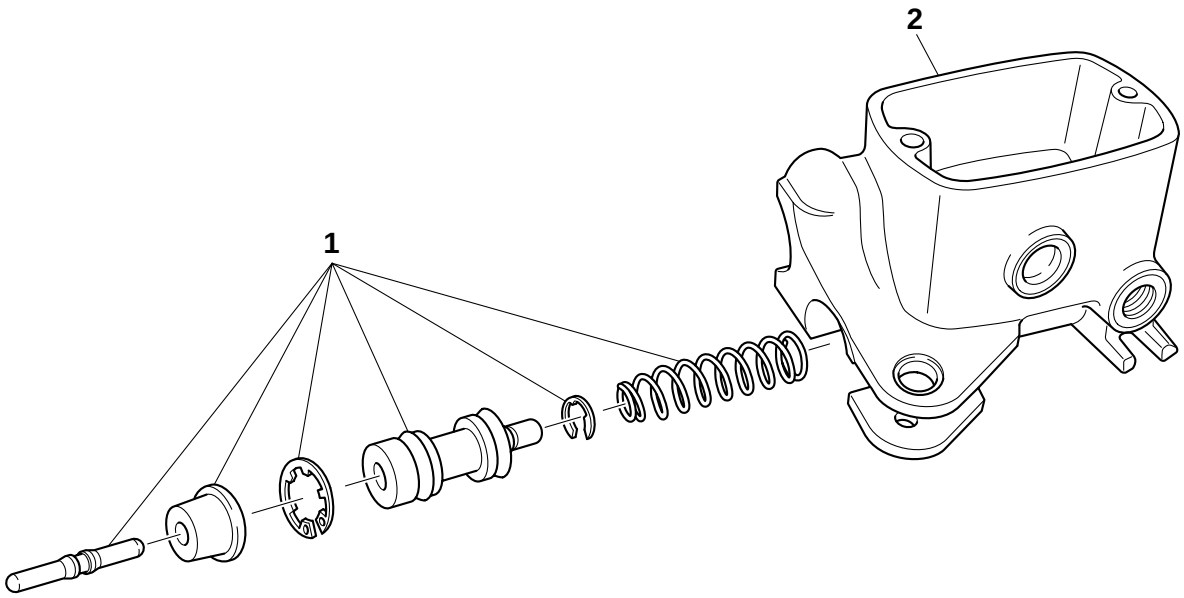
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Front brake hose holder bolt	1	
2	Front brake caliper bolt	2	
3	Front brake caliper	1	
4	Brake pad clip	2	
5	Brake pad pin	1	
6	Brake pad spring	1	
7	Front brake pad	2	
			For installation,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

Removing the front brake master cylinder



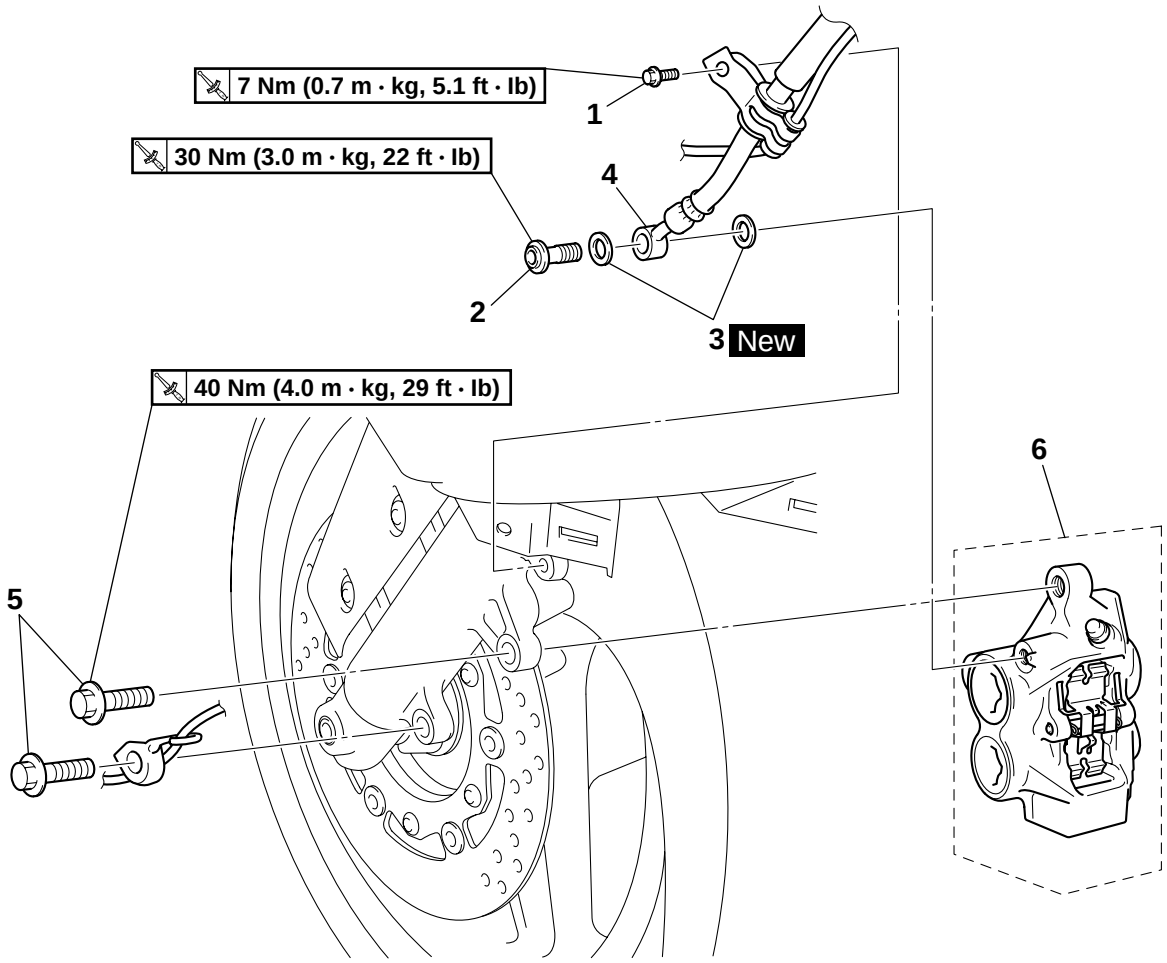
Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Front brake lever	1	
5	Front brake light switch connector	2	Disconnect.
6	Brake hose union bolt	1	
7	Front brake hose	1	
8	Brake hose gasket	2	
9	Front brake master cylinder holder	1	
10	Front brake master cylinder	1	
11	Front brake light switch	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



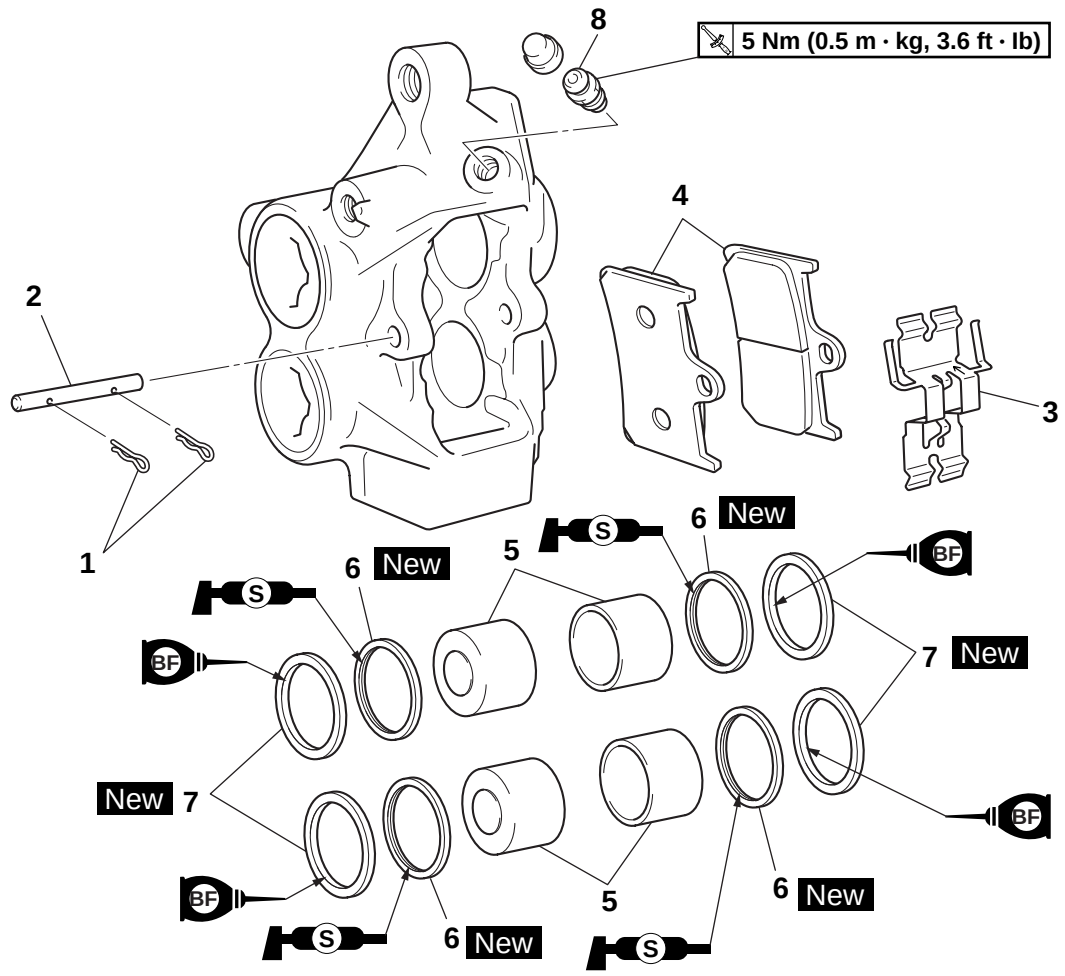
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
1	Front brake hose holder bolt	1	
2	Brake hose union bolt	1	
3	Brake hose gasket	2	
4	Front brake hose	1	
5	Front brake caliper bolt	2	
6	Front brake caliper	1	
			For installation, reverse the removal procedure.

Disassembling the front brake calipers



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

EAS22220
INTRODUCTION
EWA4B51008
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 GETTING INTO 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 4-8.
2. Check:
   - Brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.

Brake disc deflection limit
0.15 mm (0.0059 in)

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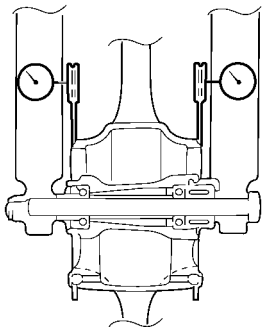
a. Place the vehicle on a suitable stand so that the front wheel is elevated.
b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake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



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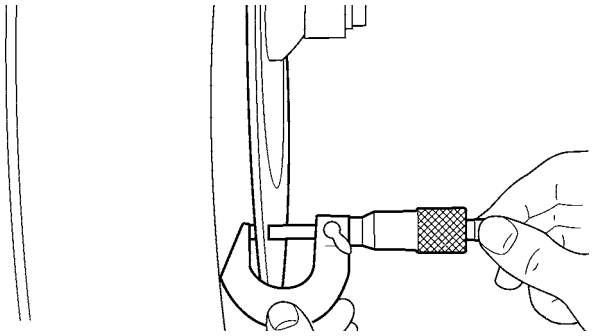
4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.

Brake disc thickness limit
3.5 mm (0.14 in)



5. Adjust:
   - Brake disc deflection

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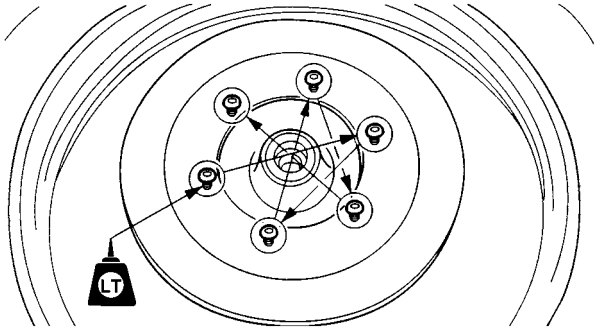
a. Remove the brake disc.
b. Rotate the brake disc by one bolt hole.
c. Install the brake disc and new brake disc bolts.

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

TIP

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



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

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6. Install:
   • Front wheel
   Refer to "FRONT WHEEL" on page 4-8.

EAS22250
REPLACING THE FRONT BRAKE PADS

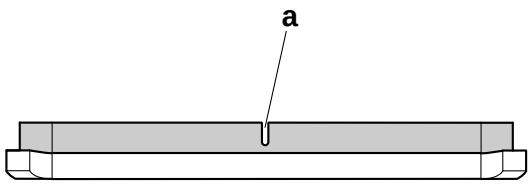
The following procedure applies to both brake calipers.

TIP

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

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

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



2. Install:
   • Front brake pads
   • Brake pad spring

TIP

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

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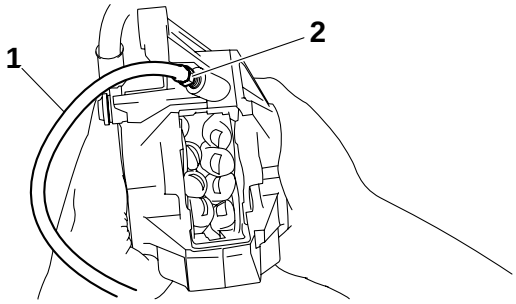
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.
b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.



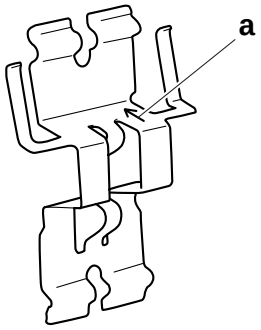
c. Tighten the bleed screw.

Front brake caliper bleed screw
5 Nm (0.5 m·kg, 3.6 ft·lb)

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

TIP

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



e. Install the brake pad pin and brake pad clips.

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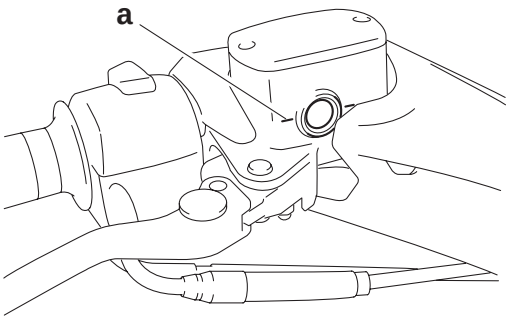
3. Install:
   • Front brake caliper

	Front brake caliper bolt **40 Nm (4.0 m·kg, 29 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 lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22300

REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

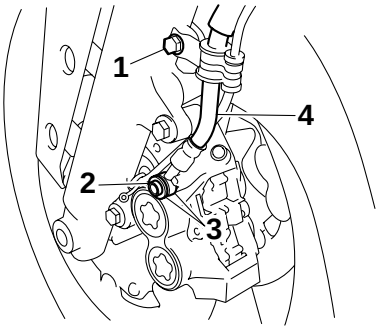
TIP

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

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

TIP

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

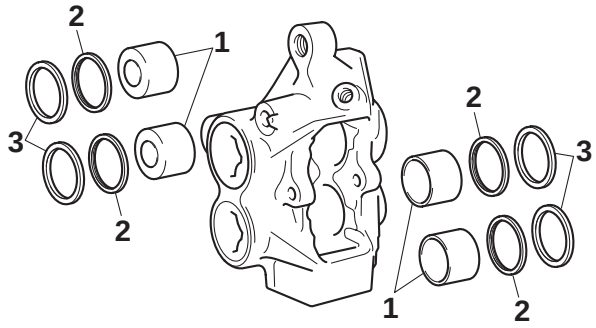


EAS22360

DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

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



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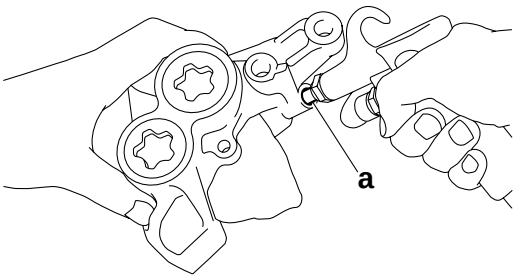
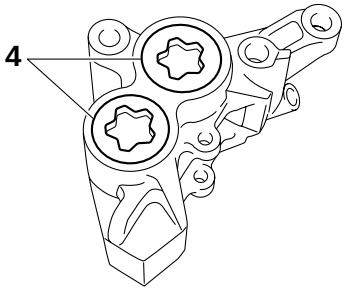
a. Blow compressed air into the brake hose joint opening "a" to force out the pistons from the brake caliper.

EWA4B51005

⚠ WARNING

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





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

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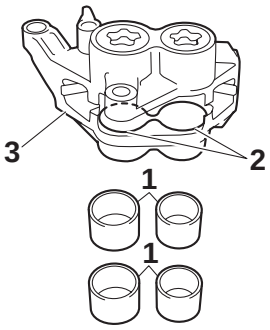
EAS22390
CHECKING THE FRONT BRAKE CALIPERS

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

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

EWA4B51006
WARNING

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



EAS22410
ASSEMBLING THE FRONT BRAKE CALIPERS

EWA4B51007
WARNING

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

Recommended fluid
DOT 4

EAS22440
INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

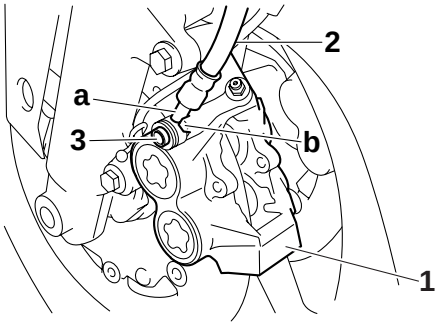
1. Install:
   - Front brake caliper “1” (temporarily)
   - Brake hose gaskets New
   - Front brake hose “2”
   - Brake hose union bolt “3”

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 2-35.

ECA14170
NOTICE
When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



2. Remove:
   • Front brake caliper
3. Install:
   • Brake pads
   • Brake pad spring
   • Brake pad pin
   • Brake pad clips
   • Front brake caliper
   • Front brake hose holder bolt

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

Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-24.

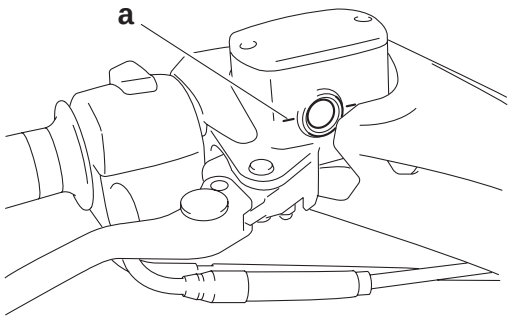
4. Fill:
   • Brake master cylinder reservoir
   (with the specified amount of the recommended brake fluid)

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

5. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
6. Check:
   • Brake fluid level
   Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.



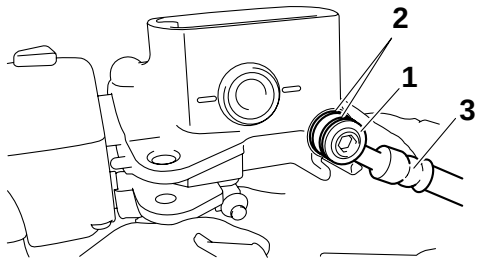
7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22490
REMOVING THE FRONT BRAKE MASTER CYLINDER

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

1. Remove:
   • Brake hose union bolt "1"
   • Brake hose gaskets "2"
   • Front brake hose "3"

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



EAS22500
CHECKING THE FRONT BRAKE MASTER CYLINDER

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

EAS22520
ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520
WARNING

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

Recommended fluid
DOT 4

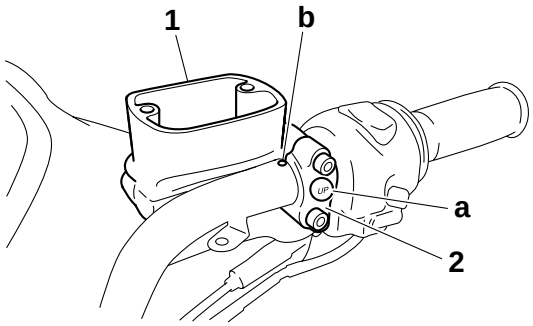
EAS22530
INSTALLING THE FRONT BRAKE MASTER CYLINDER

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

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

TIP

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



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

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

EWA13530
WARNING

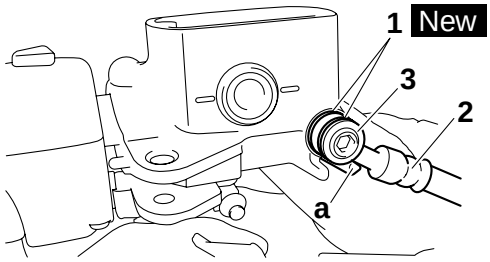
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

ECA14160
NOTICE

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

TIP

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



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

Recommended fluid
DOT 4

EWA13540

⚠ WARNING

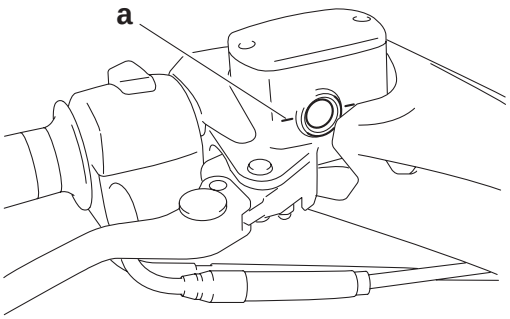
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

NOTICE

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

4. Bleed:
   • Brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
5. Check:
   • Brake fluid level
   Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

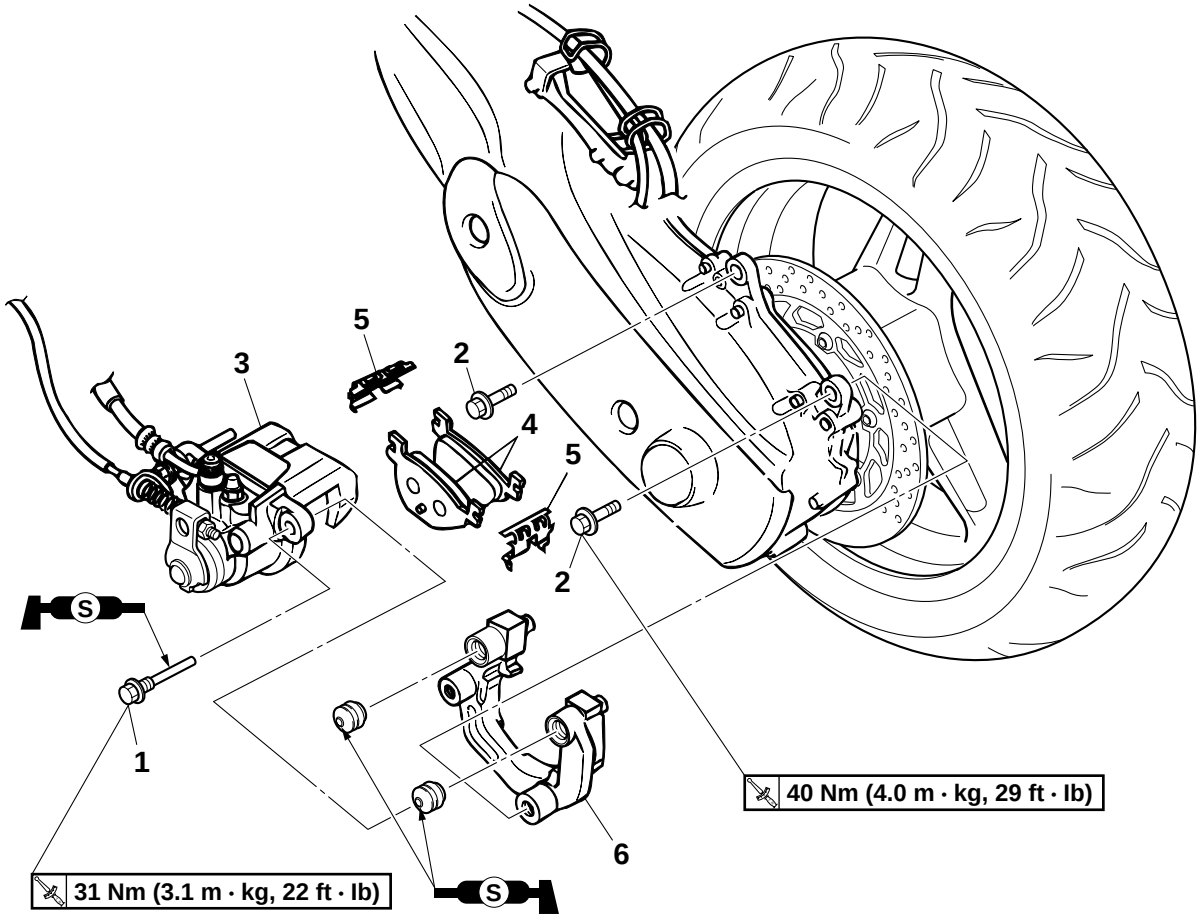


6. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

EAS22550

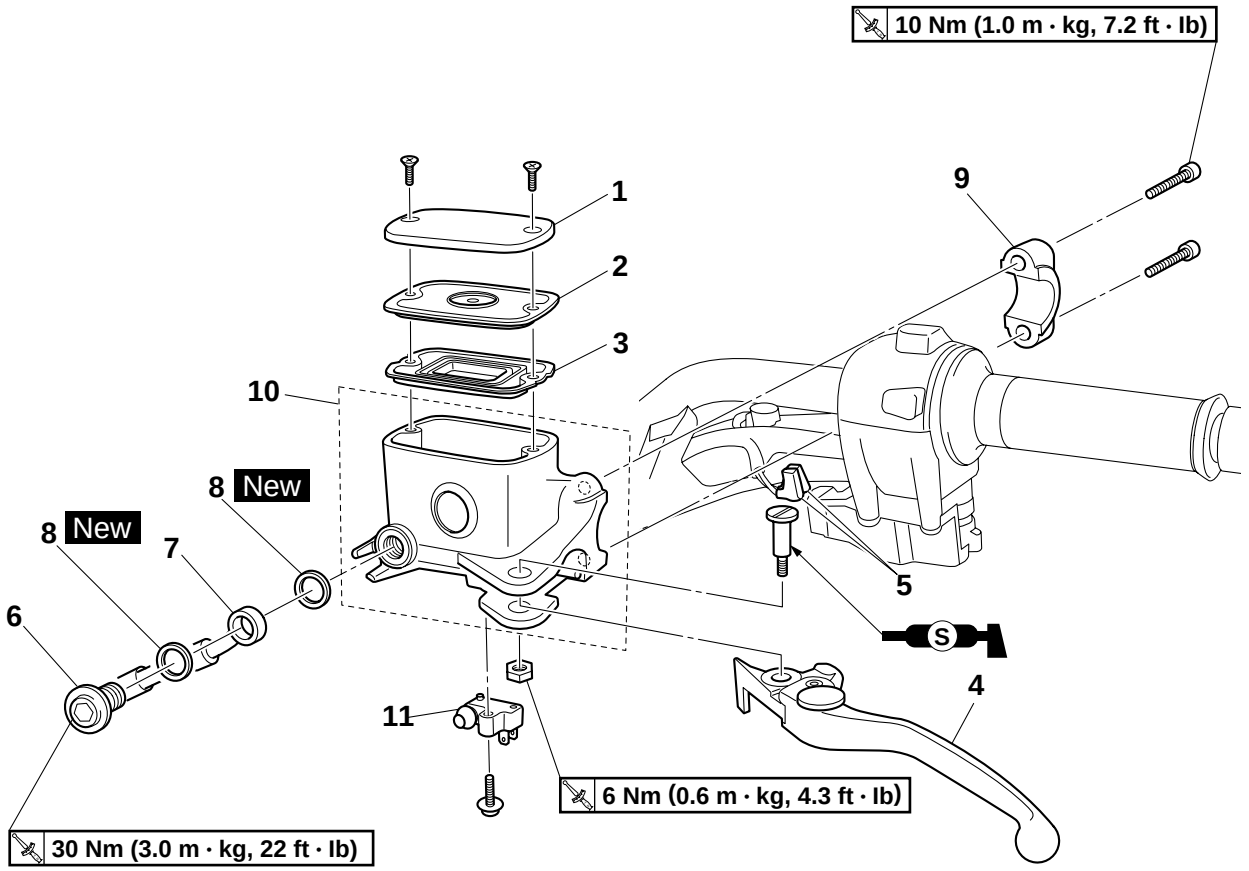
REAR BRAKE

Removing the rear brake pads



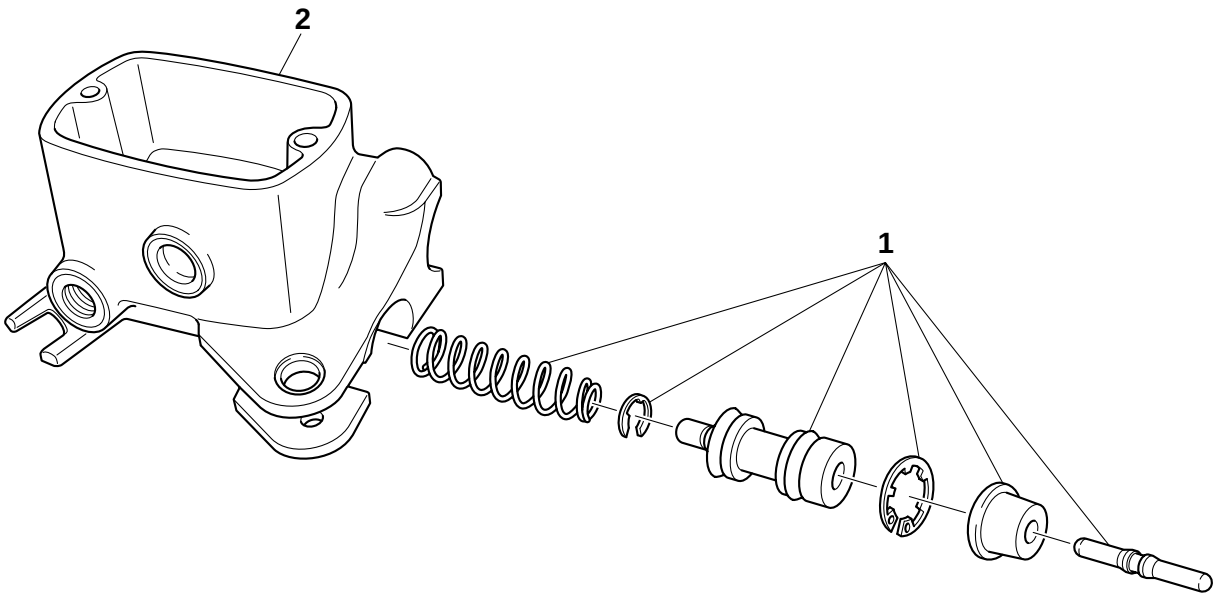
Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake caliper retaining bolt (rear)	1	
2	Rear brake caliper bolt	2	
3	Rear brake caliper	1	
4	Rear brake pad	2	
5	Brake pad support	2	
6	Rear brake caliper bracket	1	
			For installation, reverse the removal procedure.

Removing the rear brake master cylinder



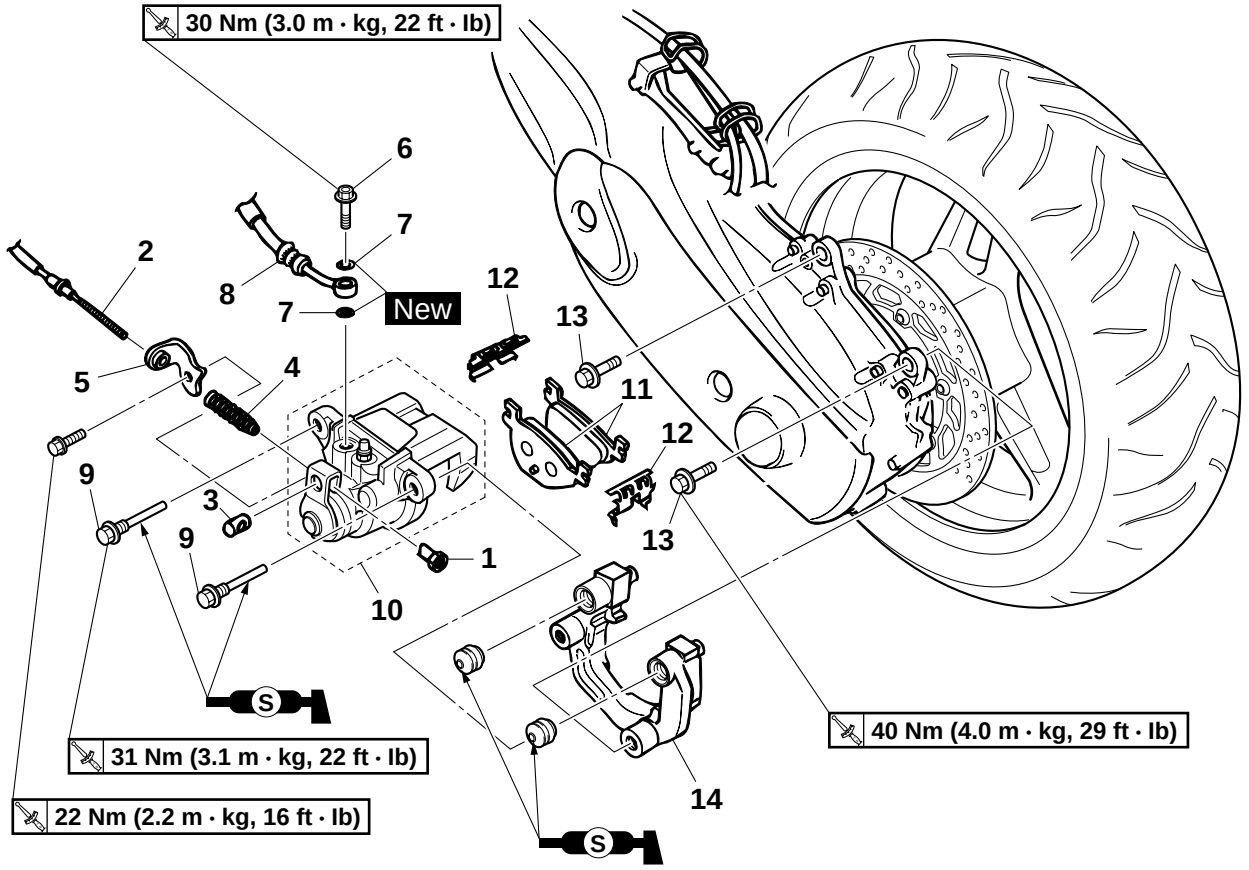
Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Rear brake lever	1	
5	Rear brake light switch connector	2	Disconnect.
6	Brake hose union bolt	1	
7	Rear brake hose	1	
8	Brake hose gasket	2	
9	Rear brake master cylinder holder	1	
10	Rear brake master cylinder	1	
11	Rear brake light switch	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake master cylinder



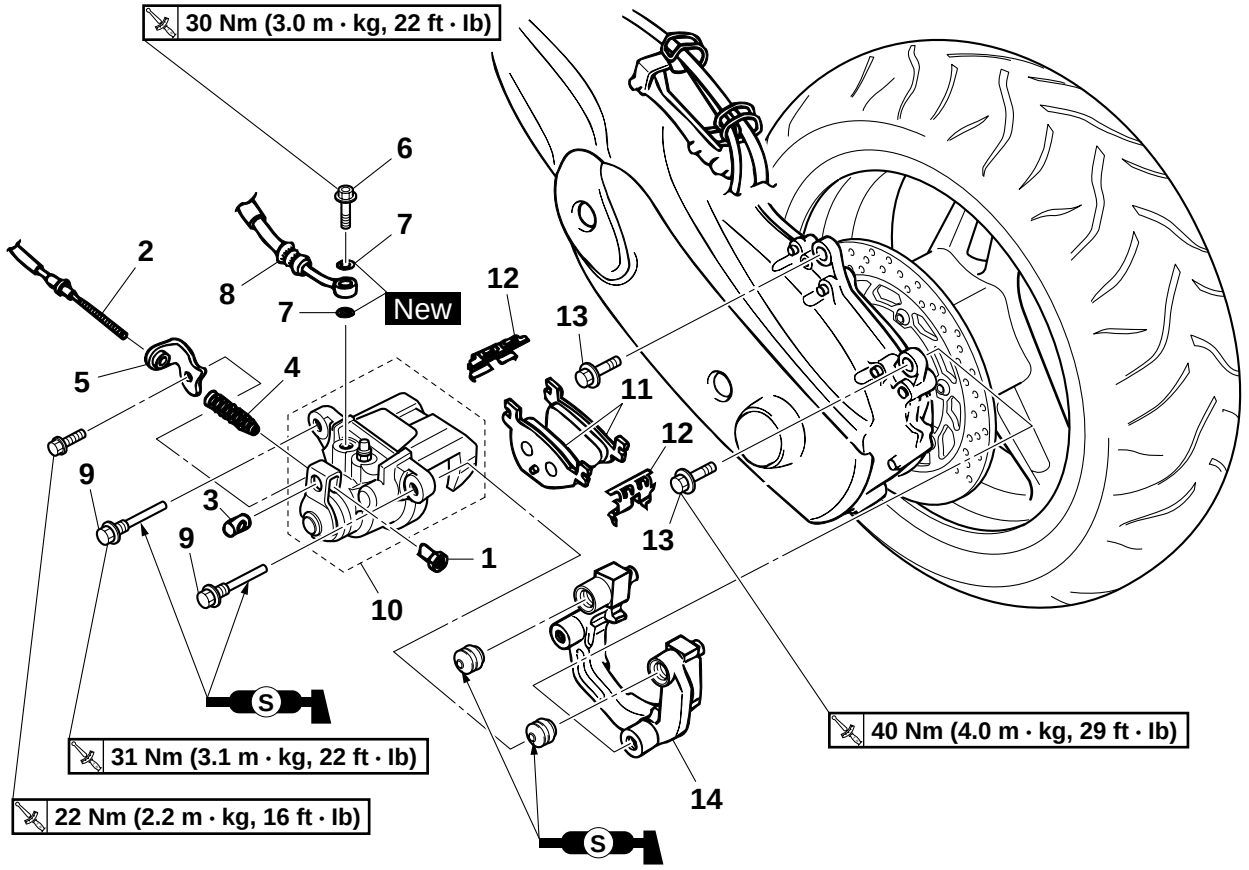
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the rear brake caliper



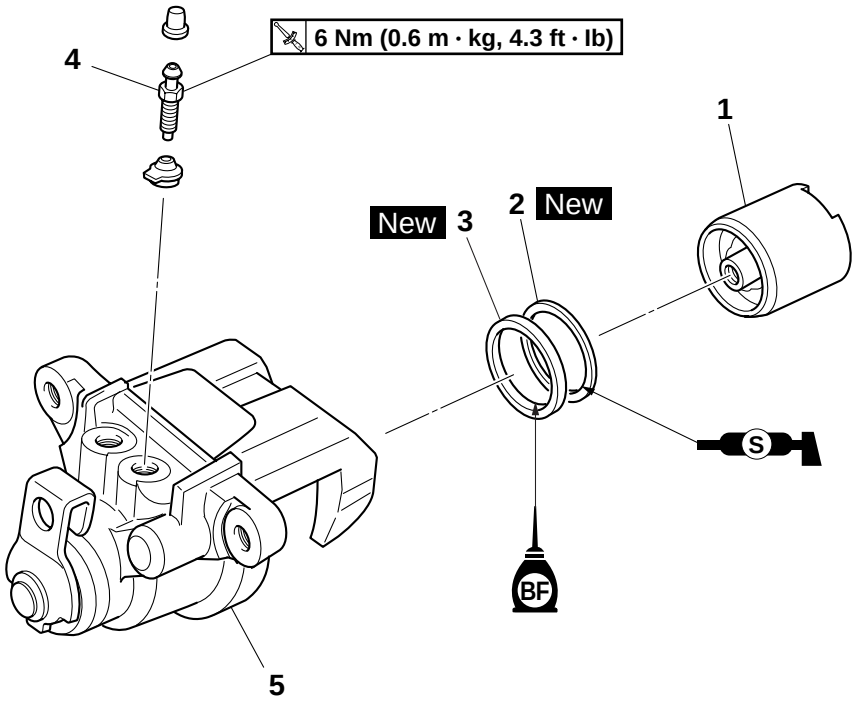
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
1	Rear brake lock cable adjusting nut	1	
2	Rear brake lock cable	1	
3	Pin	1	
4	Spring	1	
5	Rear brake lock cable holder	1	
6	Brake hose union bolt	1	
7	Brake hose gasket	2	
8	Rear brake hose	1	
9	Rear brake caliper retaining bolt	2	
10	Rear brake caliper	1	
11	Rear brake pad	2	
12	Brake pad support	2	
13	Rear brake caliper bolt	2	

Removing the rear brake caliper



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

EAS22560
INTRODUCTION
EWA4B51008
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 GETTING INTO 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 4-23.

Brake disc deflection limit
0.15 mm (0.0059 in)

4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.

Brake disc thickness limit
4.5 mm (0.18 in)

5. Adjust:
   - Brake disc deflection
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.

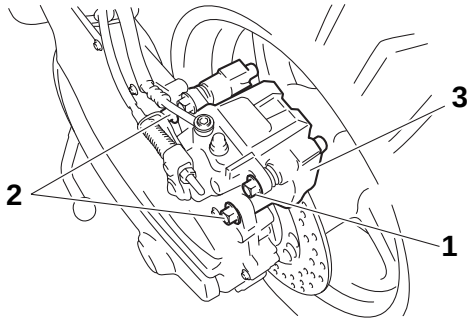
Rear brake disc bolt
18 Nm (1.8 m·kg, 13 ft·lb)
LOCTITE®

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

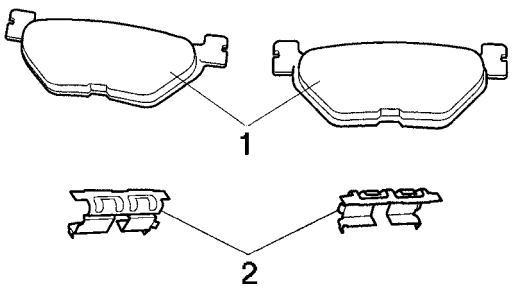
EAS22580
REPLACING THE REAR BRAKE PADS
TIP

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

1. Remove:
   - Rear brake caliper retaining bolt (rear) "1"
   - Rear brake caliper bolts "2"
   - Rear brake caliper "3"



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



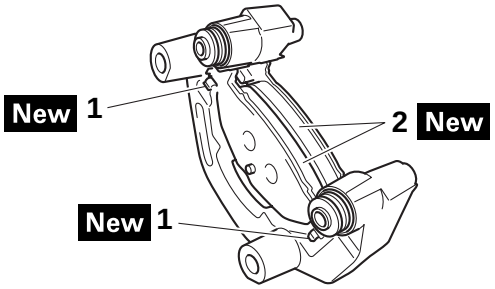
3. Measure:
   • Brake pad wear limit “a”
   Out of specification → Replace the brake pads as a set.

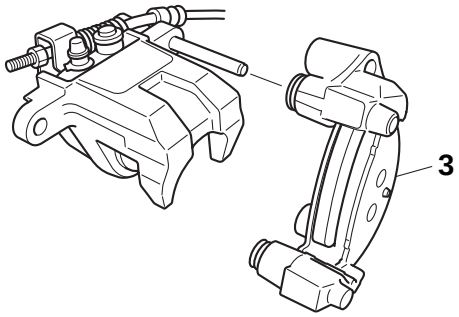
Brake pad lining thickness (inner)
8.0 mm (0.31 in)
Limit
0.8 mm (0.03 in)
Brake pad lining thickness (outer)
8.0 mm (0.31 in)
Limit
0.8 mm (0.03 in)

4. Install:
   • Brake pad supports “1” New
   • Rear brake pads “2” New
   • Rear brake caliper bracket “3” (to brake caliper)

TIP

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





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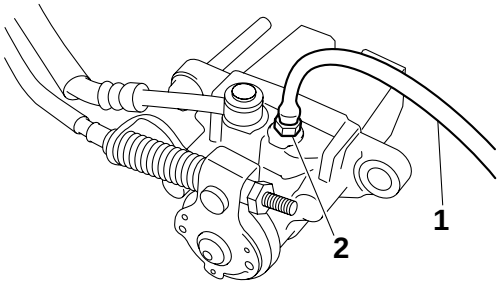
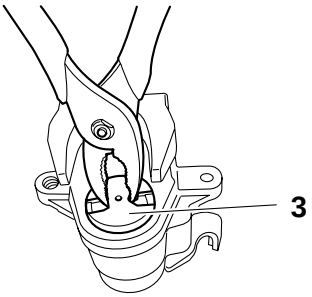
a. Connect a clear plastic hose “1” tightly to the bleed screw “2”. Put the other end of the hose into an open container.

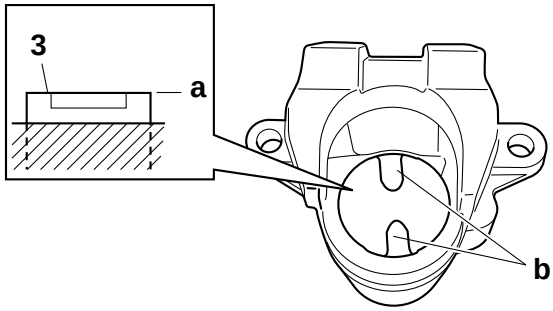


b. Loosen the bleed screw, and then turn the brake caliper piston “3” clockwise until section “a” of the brake caliper piston is level with the surface of the brake caliper body.

TIP

Align the recesses “b” in the brake caliper piston with the brake caliper body as shown in the illustration.





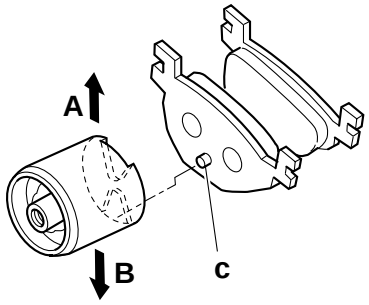
c. Tighten the bleed screw.

	Rear brake caliper bleed screw **6 Nm (0.6 m·kg, 4.3 ft·lb)**

d. Install new brake pads, new pad supports, and the rear brake caliper.

TIP

Align the projection "c" on the piston side of the brake pad with the lower recess in the brake caliper piston.



A. Up
B. Down

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5. Lubricate:
   • Rear brake caliper retaining bolt

	Recommended lubricant **Silicone grease**

ECA4B51007

NOTICE

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

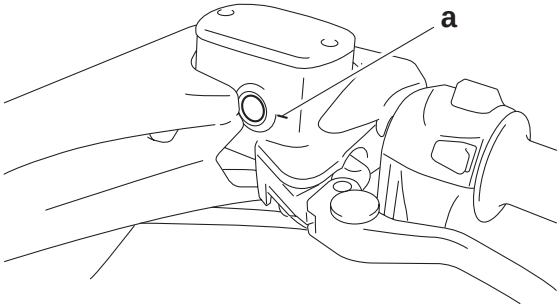
6. Install:
   • Rear brake caliper retaining bolt (rear)

	Rear brake caliper retaining bolt (rear) **31 Nm (3.1 m·kg, 22 ft·lb)**

7. Install:
   • Rear brake caliper bolts

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

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



9. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22590

REMOVING THE REAR BRAKE CALIPER

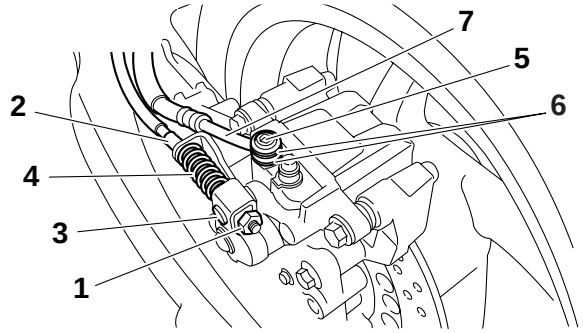
TIP

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

1. Remove:
   • Rear brake lock cable adjusting nut "1"
   • Rear brake lock cable "2"
   • Pin "3"
   • Spring "4"
   • Brake hose union bolt "5"
   • Brake hose gaskets "6"
   • Rear brake hose "7"

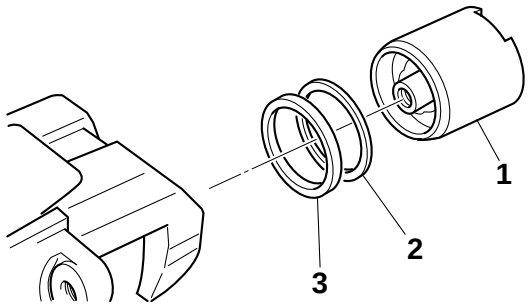
TIP

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



EAS22630
DISASSEMBLING THE REAR BRAKE CALIPER

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



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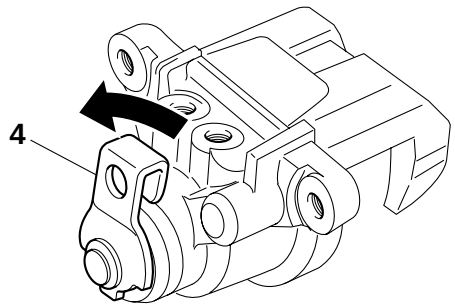
a. Operate the rear brake lock lever “4” continuously in the direction shown by the arrow until the brake caliper piston comes out.



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

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EAS22640
CHECKING THE REAR BRAKE CALIPER

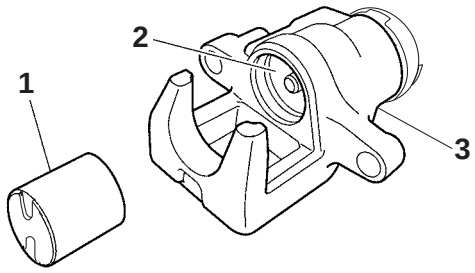
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seal	Every two years
Piston dust seal	Every two years
Brake hose	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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.

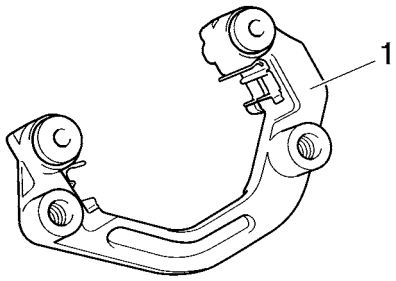
EWA4B51009

WARNING

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



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



EAS22660
ASSEMBLING THE REAR BRAKE CALIPER

EWA4B51010
WARNING

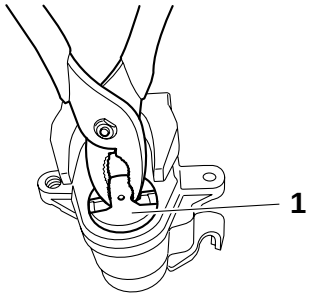
- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the brake caliper piston dust seal and piston seal to swell and distort.**
- **Whenever a brake caliper is disassembled,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

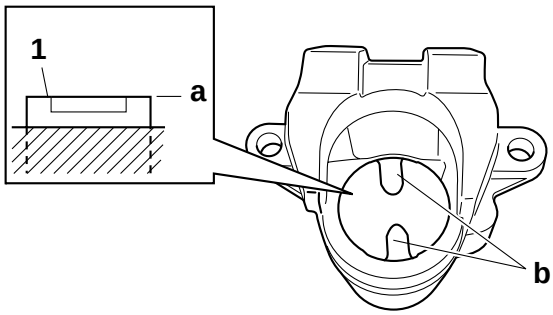
Recommended fluid
DOT 4

1. Install:
   - Brake caliper piston “1”
     Turn the brake caliper piston clockwise until section “a” of the brake caliper piston is level with the surface of the brake caliper body.

TIP

Align the recesses “b” in the brake caliper piston with the brake caliper body as shown in the illustration.





EAS22670
INSTALLING THE REAR BRAKE CALIPER

1. Install:
   - Rear brake caliper bracket
   - Rear brake caliper “1” (temporarily)
   - Brake hose gaskets New
   - Rear brake hose “2”
   - Brake hose union bolt “3”

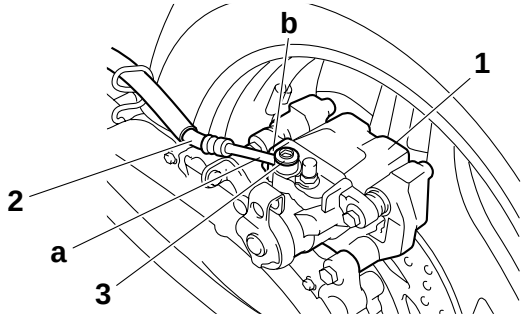
Rear brake caliper retaining bolt (front)
31 Nm (3.1 m·kg, 22 ft·lb)
Brake hose union bolt
30 Nm (3.0 m·kg, 22 ft·lb)

EWA13530
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

ECA14170
NOTICE

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



2. Remove:
   - Rear brake caliper retaining bolt (rear)
   - Rear brake caliper
   - Rear brake caliper bracket
3. Install:
   - Brake pad supports
   - Rear brake pads
   - Rear brake caliper bracket
   - Rear brake caliper
   - Rear brake caliper retaining bolt (rear)
     Refer to “REPLACING THE REAR BRAKE PADS” on page 4-36.

Rear brake caliper bolt
40 Nm (4.0 m·kg, 29 ft·lb)
Rear brake caliper retaining bolt (rear)
31 Nm (3.1 m·kg, 22 ft·lb)

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

	Recommended fluid **DOT 4**

EWA4B51011

⚠ WARNING

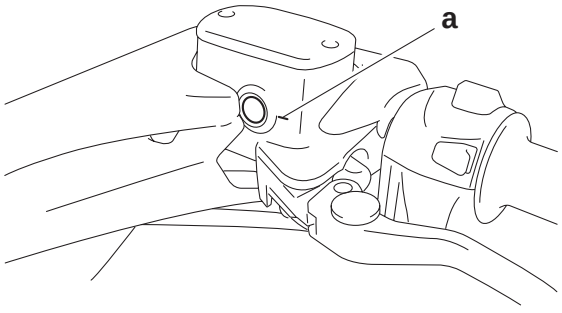
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor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

ECA13540

NOTICE

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

5. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
6. Check:
   • Brake fluid level
   Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.



7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
8. Install:
   • Rear brake lock cable holder
   • Spring
   • Pin
   • Rear brake lock cable
   • Rear brake lock cable adjusting nut

	Rear brake lock cable holder bolt **22 Nm (2.2 m·kg, 16 ft·lb)**

9. Check:
   • Rear brake lock cable length
   Refer to "ADJUSTING THE REAR BRAKE LOCK CABLE" on page 3-23.

EAS22700

REMOVING THE REAR BRAKE MASTER CYLINDER

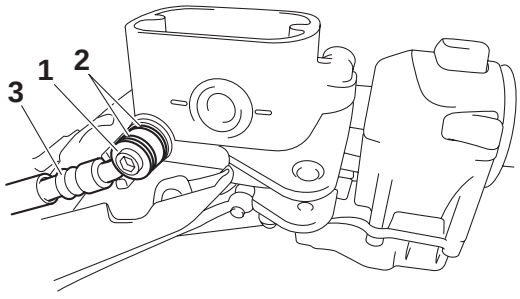
TIP

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

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

TIP

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



EAS22710

CHECKING THE REAR BRAKE MASTER CYLINDER

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

2. Check:
   • Brake master cylinder kit
     Damage/scratches/wear → Replace.
3. Check:
   • Brake master cylinder reservoir
   • Brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.
4. Check:
   • Brake hose
     Cracks/damage/wear → Replace.

EAS22730
ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520
WARNING

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

Recommended fluid
DOT 4

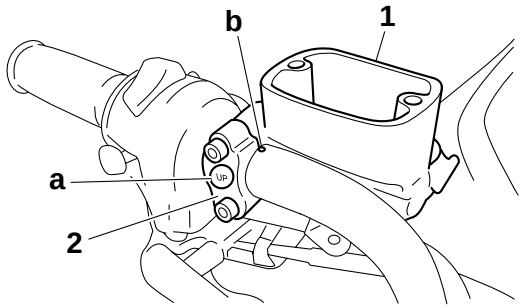
EAS22750
INSTALLING THE REAR BRAKE MASTER CYLINDER

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

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

TIP

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



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

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

EWA13530
WARNING

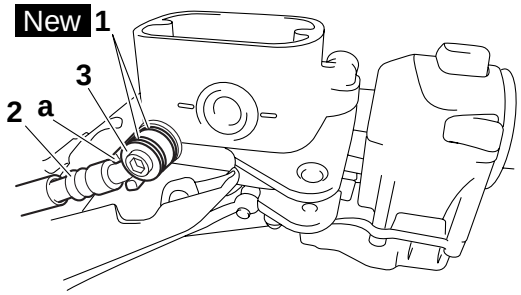
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

ECA14160
NOTICE

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

TIP

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



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

Recommended fluid
DOT 4

EWA4B51011
WARNING

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

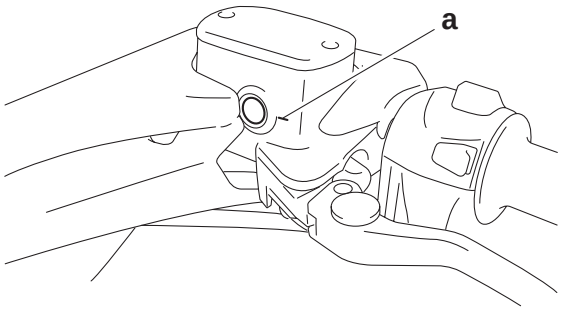
• When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

NOTICE

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

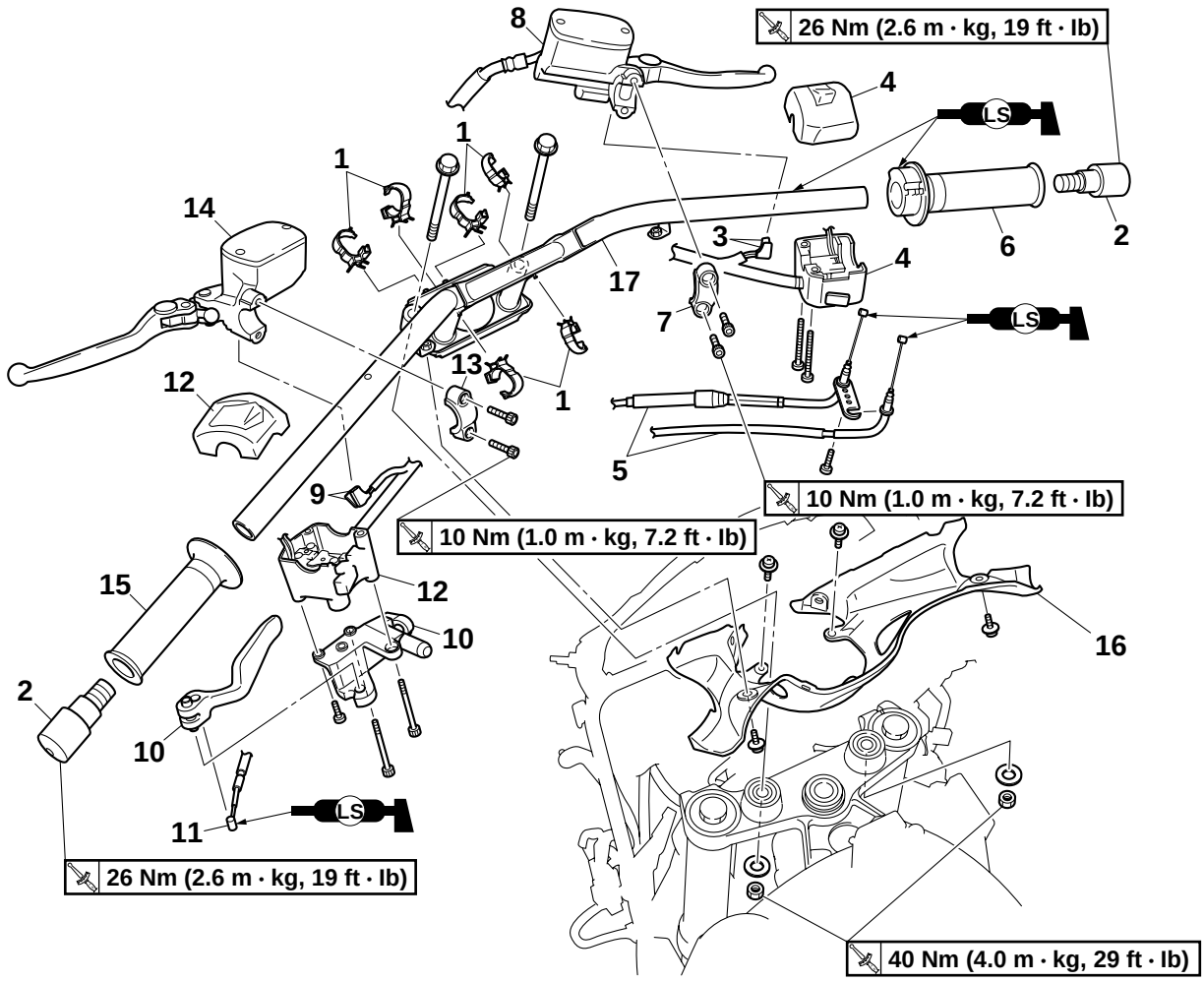
4. Bleed:
   • Brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
5. Check:
   • Brake fluid level
   Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



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

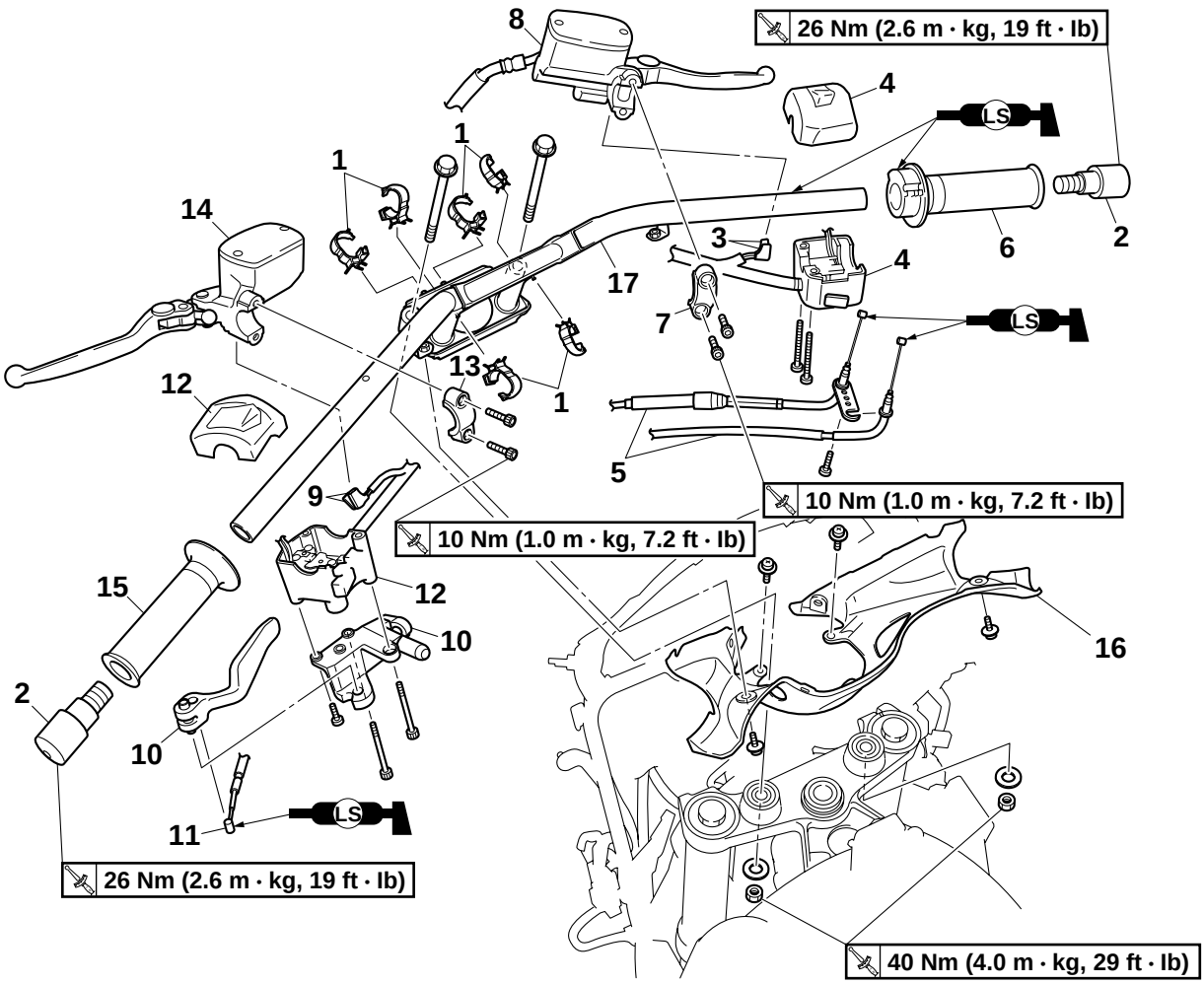
EAS22840
HANDLEBAR

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
1	Plastic clamp	6	
2	Grip end	2	
3	Front brake light switch connector	2	Disconnect.
4	Right handlebar switch	1	
5	Throttle cable	2	Disconnect.
6	Throttle grip	1	
7	Front brake master cylinder holder	1	
8	Front brake master cylinder assembly	1	
9	Rear brake light switch connector	2	Disconnect.
10	Rear brake lock lever/holder	1/1	
11	Rear brake lock cable	1	Disconnect.
12	Left handlebar switch	1	
13	Rear brake master cylinder holder	1	
14	Rear brake master cylinder assembly	1	

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
15	Handlebar grip	1	
16	Lower handlebar cover	1	
17	Handlebar	1	
			For installation, reverse the removal procedure.

EAS4B51014
REMOVING THE HANDLEBAR
1. Stand the vehicle on a level surface.

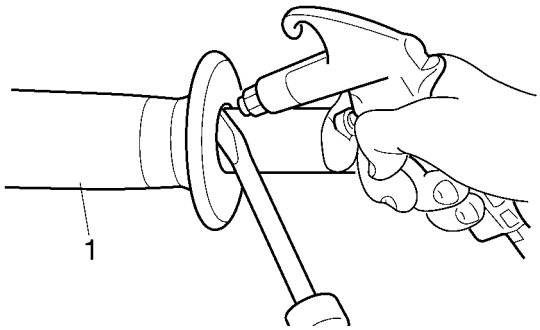
EWA13120
⚠ WARNING

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

2. Remove:
   • Handlebar grip “1”

TIP

Blow compressed air between the left end of 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.

EAS22931
INSTALLING THE HANDLEBAR
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

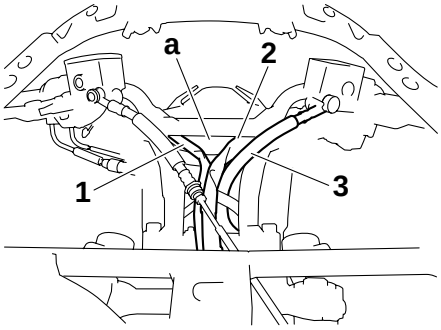
Securely support the vehicle so that there is no danger of it falling over.

2. Install:
   • Handlebar

	**Handlebar nut** **40 Nm (4.0 m·kg, 29 ft·lb)**

TIP

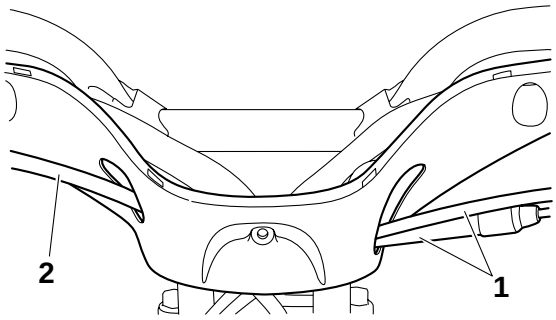
Route the right handlebar switch lead “1”, left handlebar switch lead “2”, and rear brake hose “3” through the opening “a” in the handlebar. Refer to “CABLE ROUTING” on page 2-35.



3. Install:
   • Lower handlebar cover

TIP

Route the throttle cables “1” and rear brake lock cable “2” through the lower handlebar cover.



4. Install:
   • Handlebar grip

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

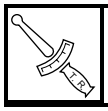
a. Apply a thin coat of a rubber adhesive to the left end of the handlebar.
b. Slide the handlebar grip over the left end of the handlebar.
c. Wipe off any excess rubber adhesive with a clean rag.

EWA13700
⚠ WARNING

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

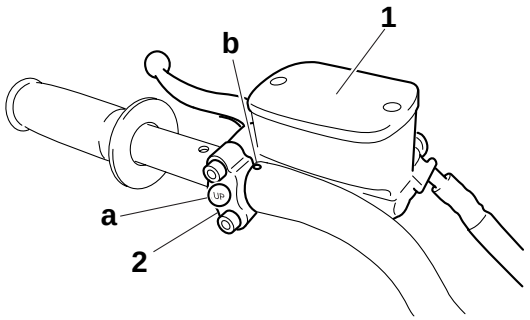
▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

5. Install:
   • Rear brake master cylinder assembly “1”
   • Rear brake master cylinder holder “2”

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

TIP

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



6. Connect:
   • Rear brake lock cable
     (to rear brake lock lever)

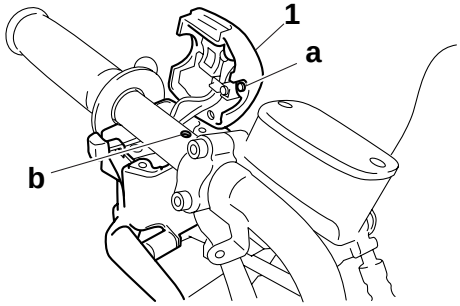
TIP

Lubricate the inside of the rear brake lock cable and rear brake lock lever with a thin coat of lithium-soap-based grease.

7. Install:
   • Left handlebar switch “1”
   • Rear brake lock lever
   • Rear brake lock lever holder

TIP

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

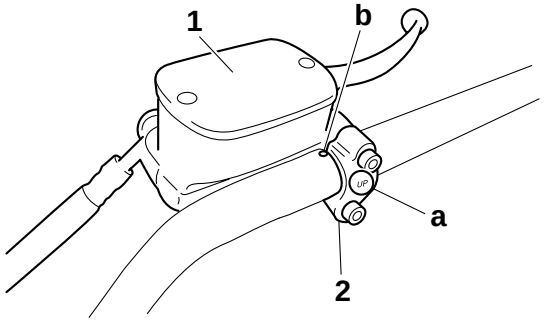


8. Install:
   • Front brake master cylinder assembly “1”
   • Front brake master cylinder holder “2”

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

TIP

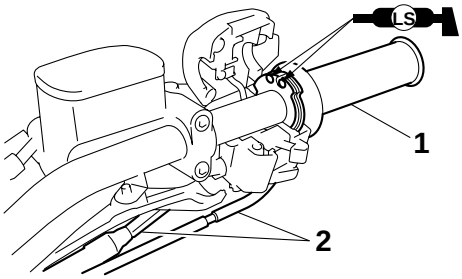
- Install the front brake master cylinder holder with the “UP” mark “a” facing up.
- Align the end of the brake master cylinder holder with the punch mark “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



9. Install:
   • Throttle grip “1”
   • Throttle cables “2”

TIP

Lubricate the inside of the throttle grip with a thin coat of lithium-soap-based grease and install it onto the handlebar.



10. Install:
    • Right handlebar switch “1”

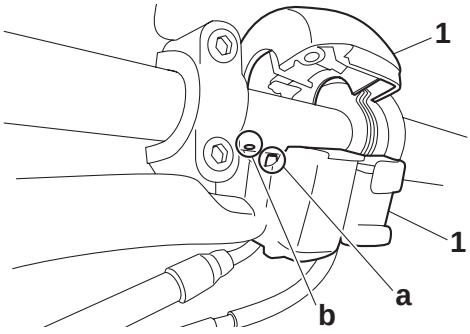
EWA13720

WARNING

Make sure the throttle grip operates smoothly.

TIP

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



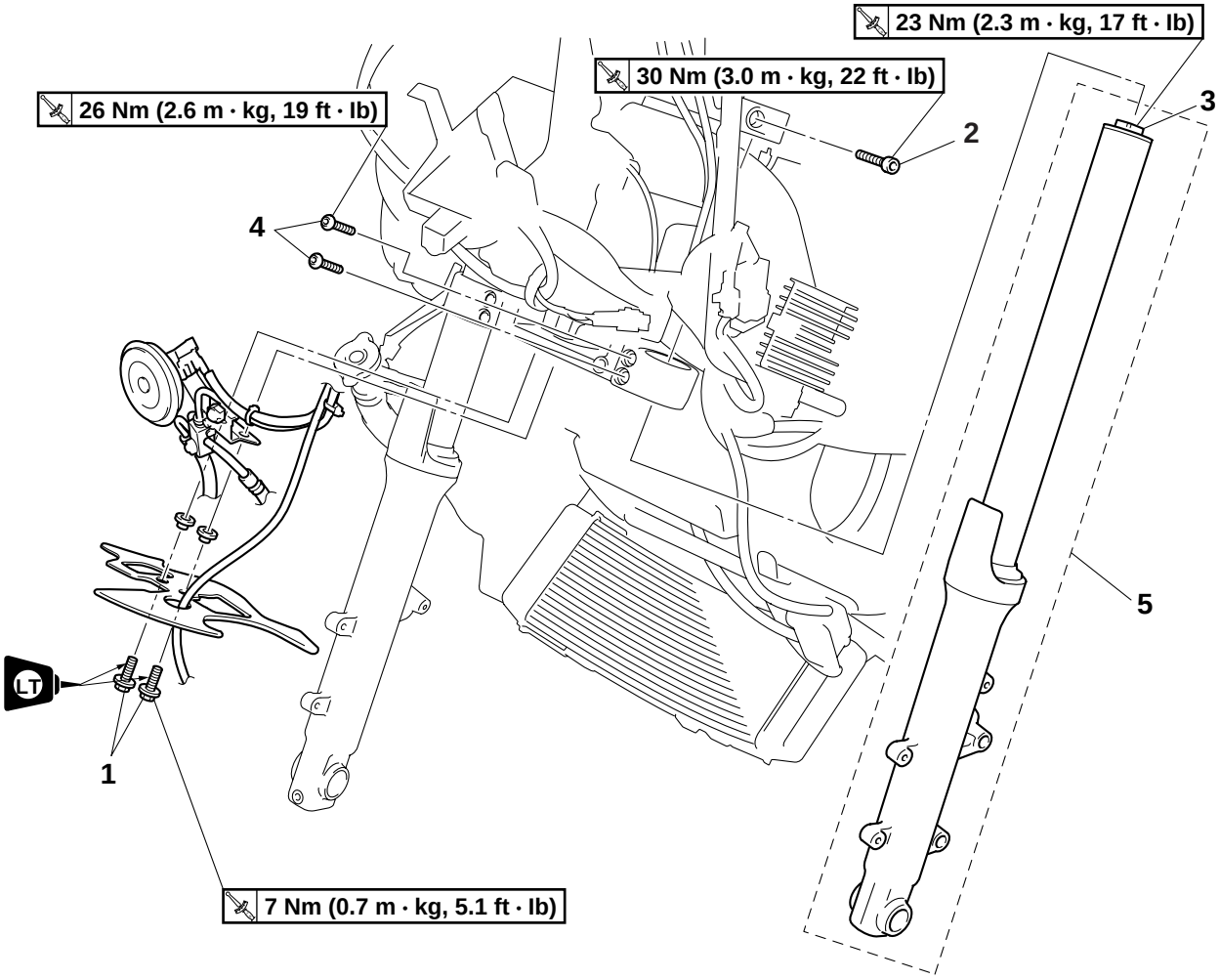
11. Adjust:
    • Throttle cable free play
      Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.

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

12.Adjust:
- Rear brake lock cable length
  Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-23.

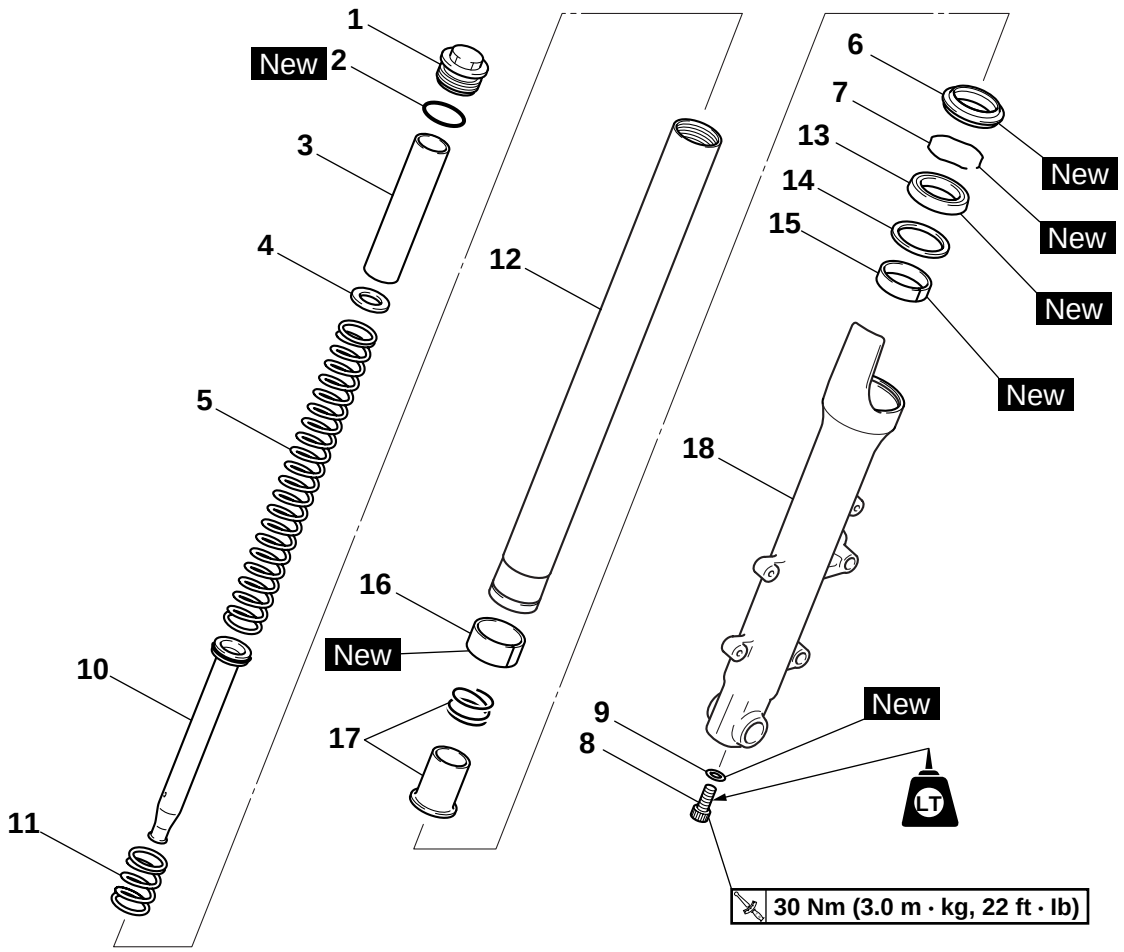
EAS22950
FRONT FORK

Removing the front fork legs



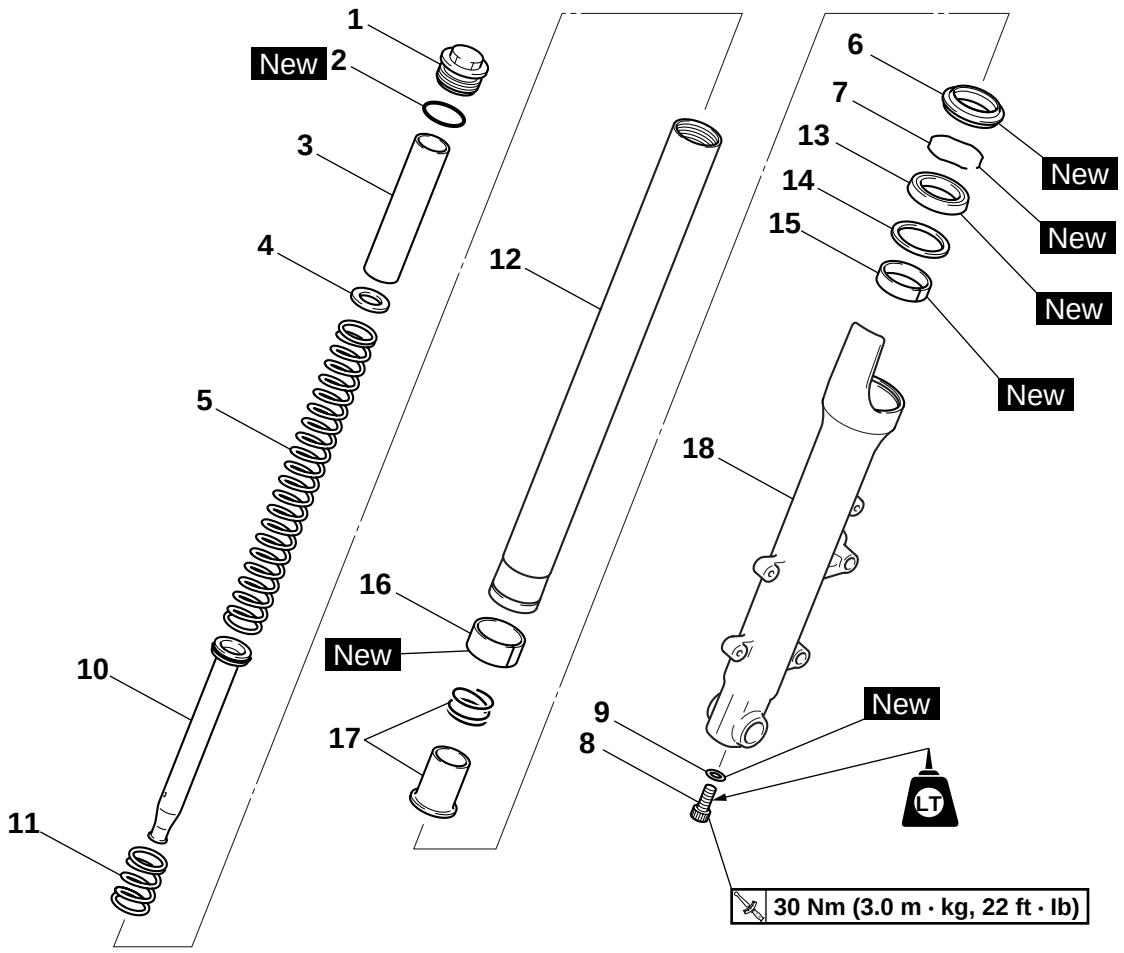
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel/Front fender		Refer to "FRONT WHEEL" on page 4-8.
1	Lower bracket cover bolt	2	
2	Upper bracket pinch bolt	1	Loosen.
3	Cap bolt	1	Loosen.
4	Lower bracket pinch bolt	2	Loosen.
5	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	Fork spring seat	1	
5	Fork spring	1	
6	Dust seal	1	
7	Oil seal clip	1	
8	Damper rod bolt	1	
9	Copper washer	1	
10	Damper rod	1	
11	Rebound spring	1	
12	Inner tube	1	
13	Oil seal	1	
14	Washer	1	
15	Outer tube bushing	1	
16	Inner tube bushing	1	

Disassembling the front fork legs



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

EAS22960
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

TIP

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

2. Remove:
   • Lower bracket cover bolts

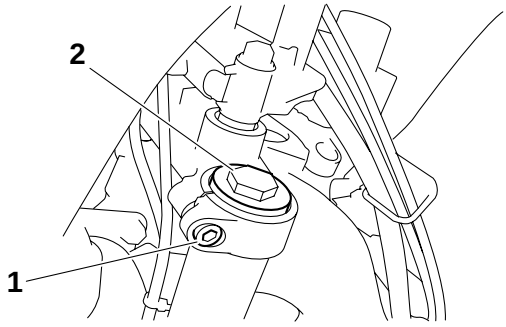
TIP

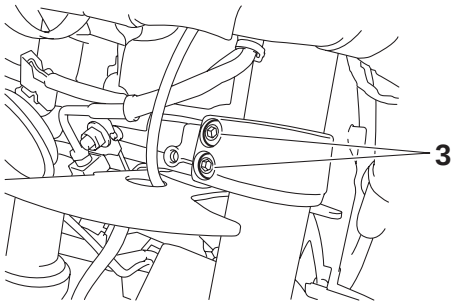
Before removing the lower bracket cover bolts, support the front brake calipers so that there is no strain placed on the brake pipe or speed sensor lead.

3. Loosen:
   • Upper bracket pinch bolt “1”
   • Cap bolt “2”
   • Lower bracket pinch bolts “3”

EWA13640
⚠ WARNING

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



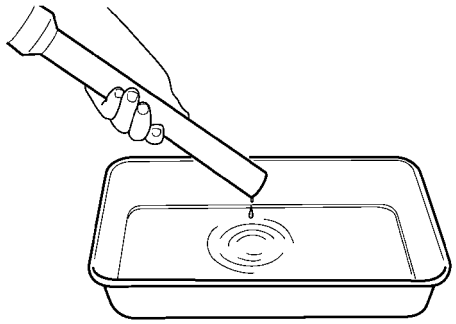


4. Remove:
   • Front fork leg

EAS22980
DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Drain:
   • Fork oil

TIP

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



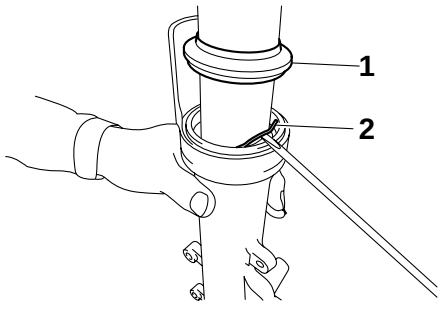
2. Remove:
   • Dust seal “1”
   • Oil seal clip “2”
     (with a flat-head screwdriver)

ECA14180
NOTICE

Do not scratch the inner tube.

TIP

- Do not remove the fork leg protector from the outer tube.
- If the front fork leg protector must be removed, always install a new one.

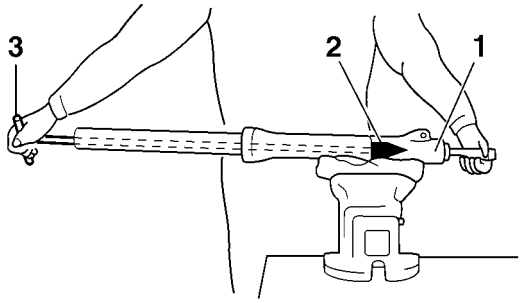


3. Remove:
   • Damper rod bolt “1”
   • Copper washer

TIP

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

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



4. Remove:
   • Inner tube

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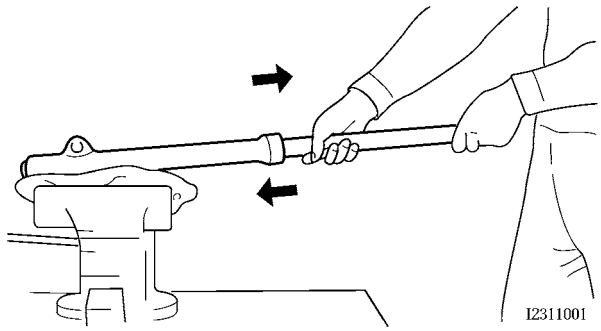
a. Hold the front fork leg horizontally.
b. Securely clamp the brake caliper bracket in a vise with soft jaws.
c. Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.

ECA14190

NOTICE

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



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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.

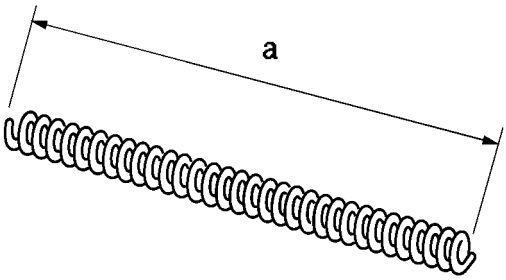
EWA13650

⚠ 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
303.9 mm (11.96 in)
Limit
297.8 mm (11.72 in)

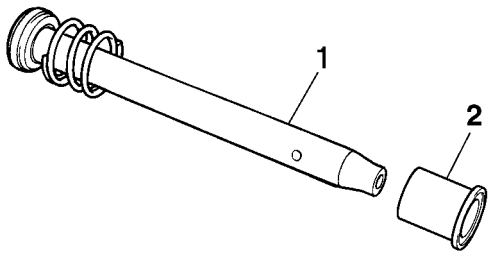


3. Check:
   • Damper rod “1”
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.
   • Oil flow stopper “2”
   Damage → Replace.

ECA4B51006

NOTICE

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.**

TIP

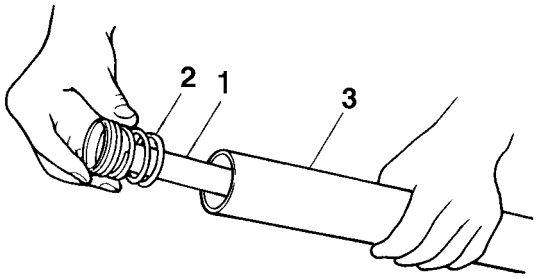
- When assembling the front fork leg, be sure to replace the following parts:
  - –Inner tube bushing
  - –Outer tube bushing
  - –Oil seal
  - –Dust seal
- Before assembling the front fork leg, make sure all of the components are clean.

1. Install:
   - Damper rod “1”
   - Rebound spring “2”

ECA4B51008

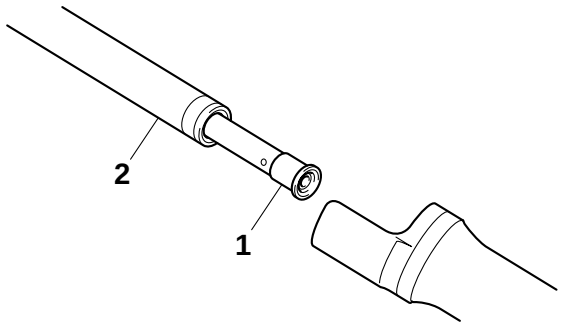
NOTICE

Allow the damper rod to slide slowly down the inner tube “3” until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Install:
   - Oil flow stopper “1”
3. Lubricate:
   - Inner tube’s outer surface “2”

Recommended oil
Yamaha fork oil 10WT



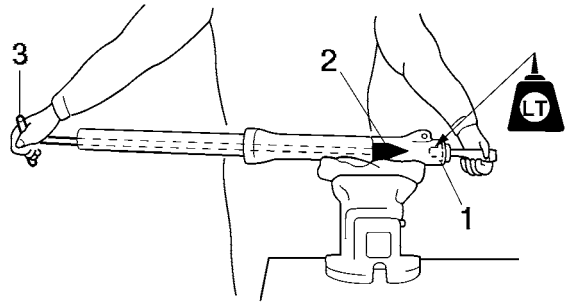
4. Install:
   - Inner tube (into the outer tube)
   - Copper washer New
   - Damper rod bolt
5. Tighten:
   - Damper rod bolt “1”

Damper rod bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP

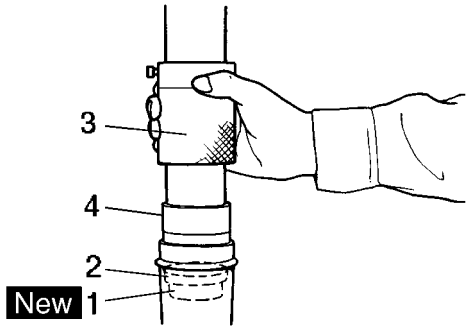
While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

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



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

Fork seal driver weight
90890-01367
Replacement hammer
YM-A9409-7
Fork seal driver attachment (ø43)
90890-01374
Replacement 43 mm
YM-A5142-3



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

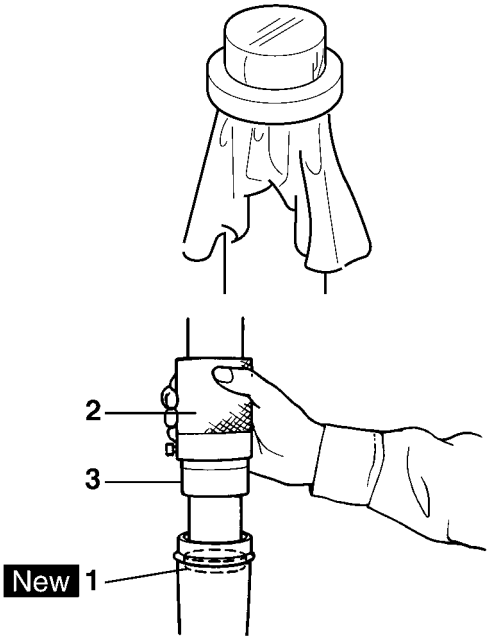
ECA14220

NOTICE

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

TIP

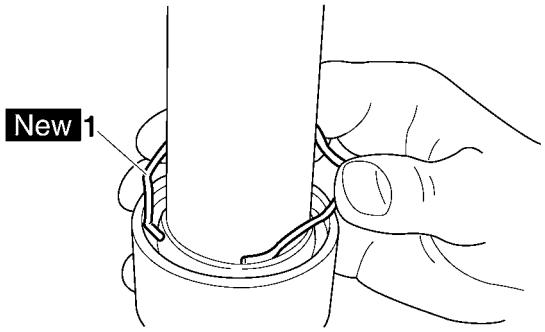
- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag to protect the oil seal during installation.



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

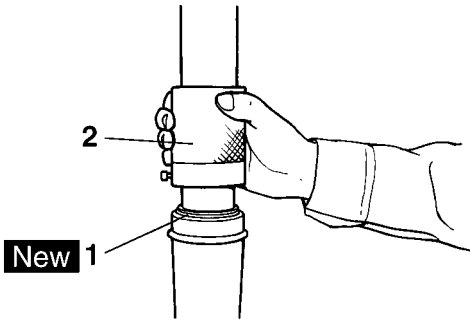
TIP

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



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

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



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

Recommended oil
Yamaha fork oil 10WT
Quantity
517.0 cm³ (17.48 US oz) (18.23 Imp.oz)

ECA14230

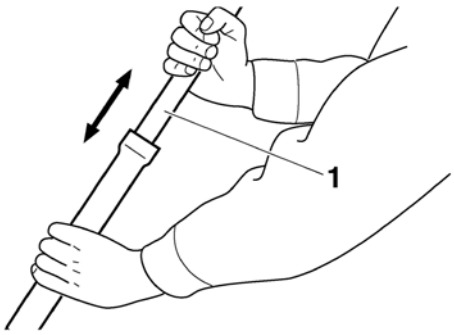
NOTICE

- **Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

11. After filling the front fork leg, slowly stroke the inner tube "1" up and down (at least ten times) to distribute the fork oil.

TIP

Be sure to stroke the inner tube slowly because the fork oil may spurt out.



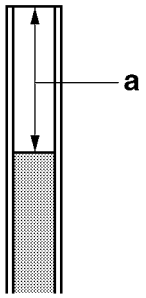
12. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

TIP

Be sure to bleed the front fork leg of any residual air.

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

	Level **87.0 mm (3.43 in)**



14. Install:
    - Fork spring
    - Fork spring seat
    - Spacer
    - Cap bolt

      (along with the O-ring New)

TIP

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

EAS23050

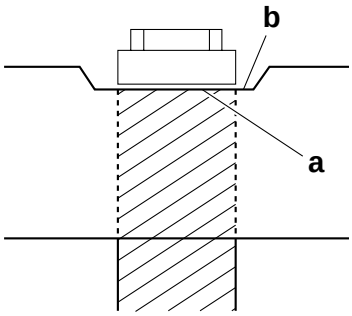
INSTALLING THE FRONT FORK LEGS

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

1. Install:
   - Front fork leg
     Temporarily tighten the upper and lower bracket pinch bolts.

TIP

Make sure the inner tube end "a" is flush with the lower edge "b" of the upper bracket.



2. Tighten:
   - Lower bracket pinch bolts "1"

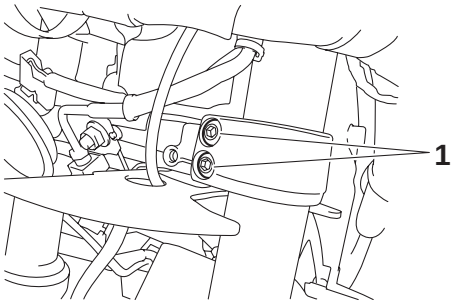
	Lower bracket pinch bolt **26 Nm (2.6 m·kg, 19 ft·lb)**

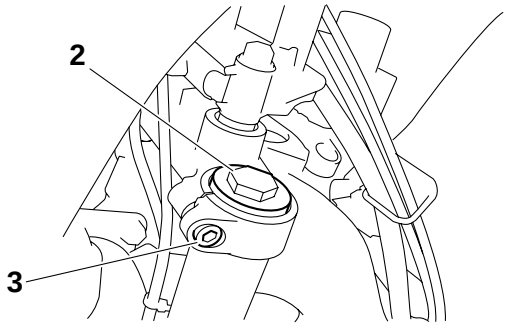
   - Cap bolt "2"

	Cap bolt **23 Nm (2.3 m·kg, 17 ft·lb)**

   - Upper bracket pinch bolt "3"

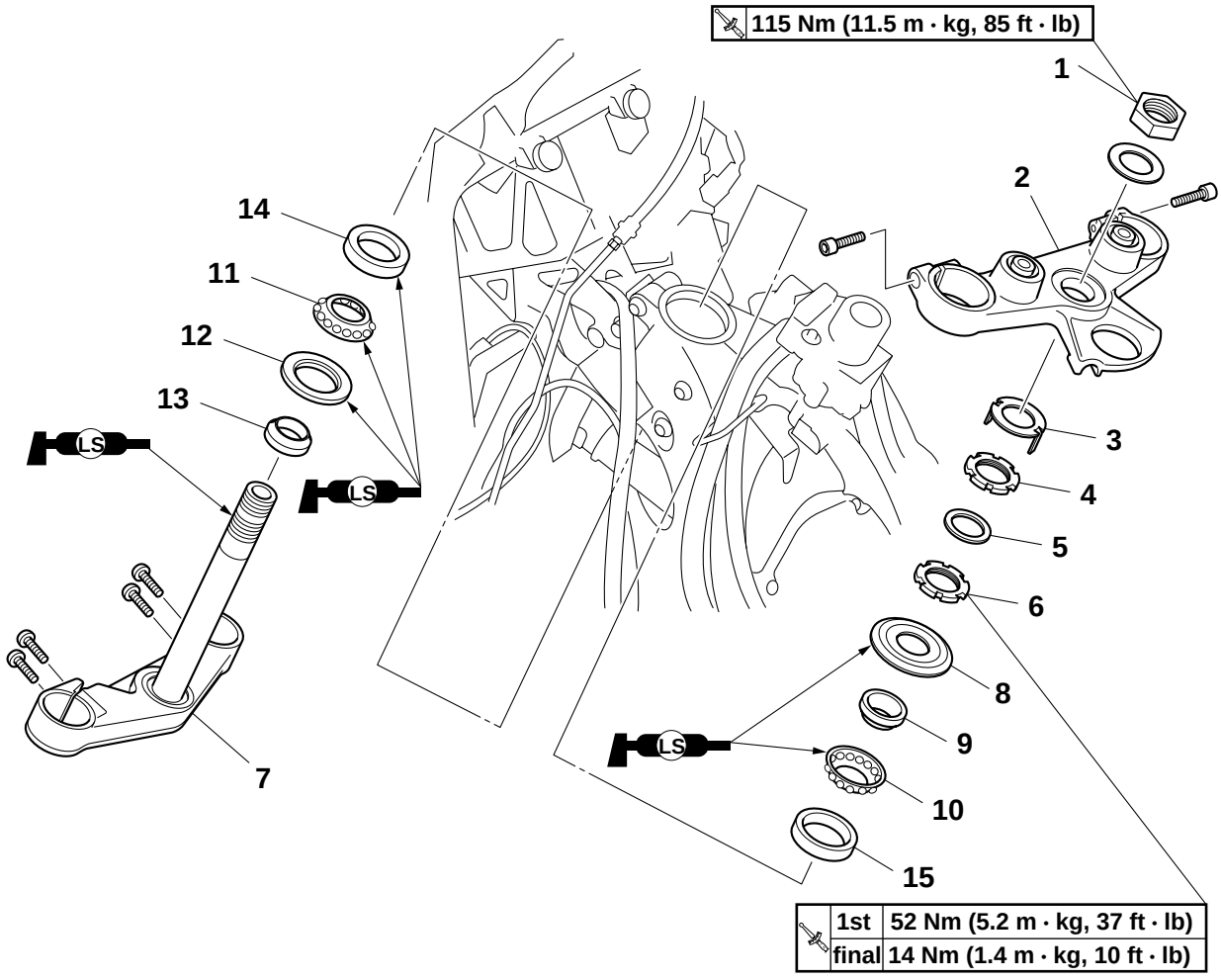
	Upper bracket pinch bolt **30 Nm (3.0 m·kg, 22 ft·lb)**




2
3

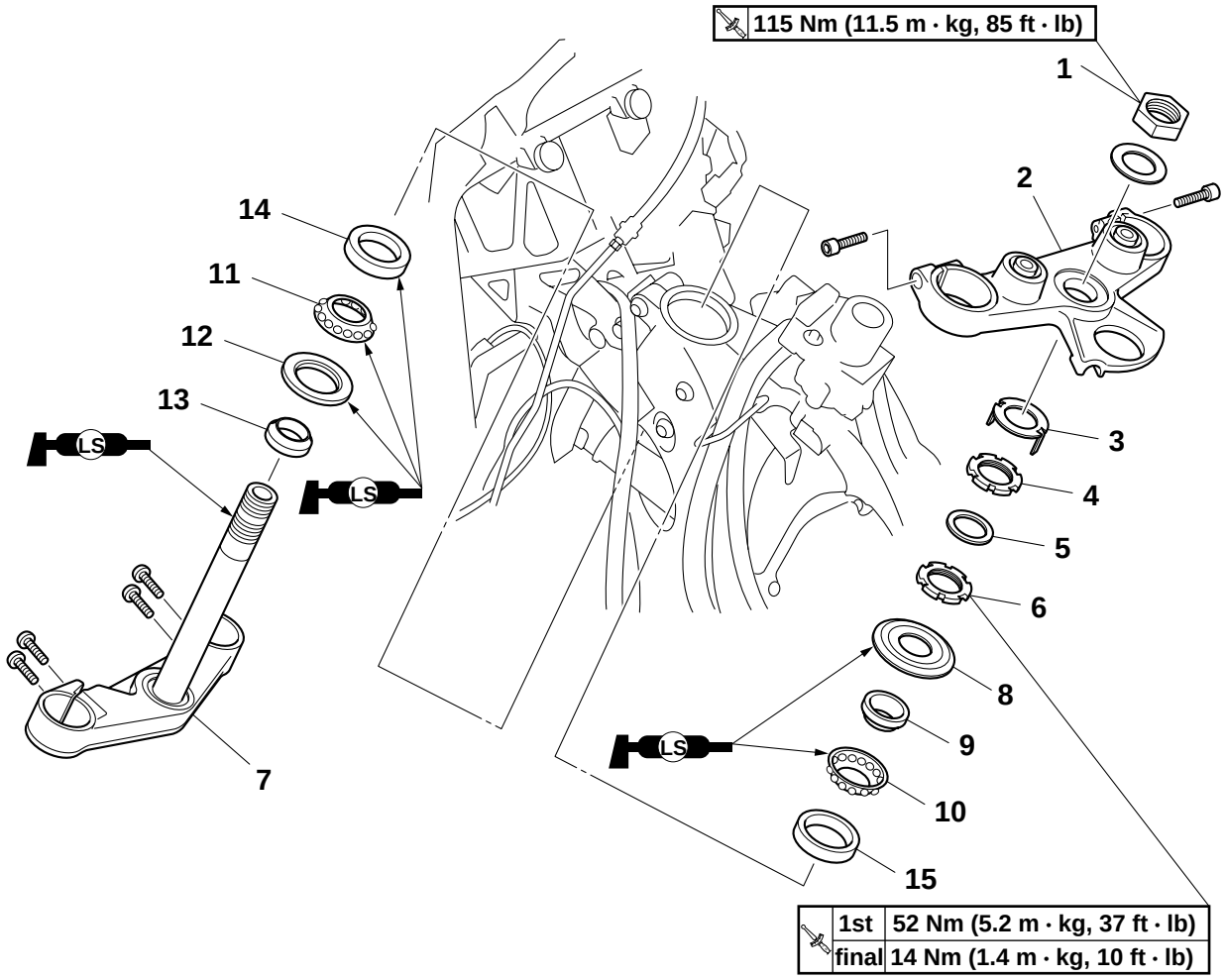
EAS23090
STEERING HEAD

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-8.
	Front fork legs		Refer to "FRONT FORK" on page 4-49.
	Handlebar		Refer to "HANDLEBAR" on page 4-44.
1	Steering stem nut	1	
2	Upper bracket	1	
3	Lock washer	1	
4	Upper ring nut	1	
5	Rubber washer	1	
6	Lower ring nut	1	
7	Lower bracket	1	
8	Upper bearing cover	1	
9	Upper bearing inner race	1	
10	Upper bearing	1	
11	Lower bearing	1	

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
12	Dust seal	1	
13	Lower bearing inner race	1	
14	Lower bearing outer race	1	
15	Upper bearing outer race	1	
			For installation, reverse the removal procedure.

EAS23110
REMOVING THE LOWER BRACKET
1. Stand the vehicle on a level surface.

EWA13120
WARNING

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

2. Remove:
   - Upper ring nut
   - Rubber washer
   - Lower ring nut “1”
   - Lower bracket

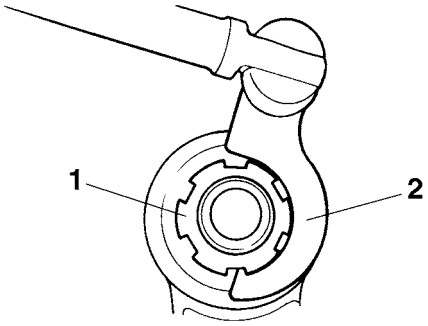
TIP

Remove the upper ring nut and lower ring nut with the steering nut wrench “2”.

EWA13730
WARNING

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

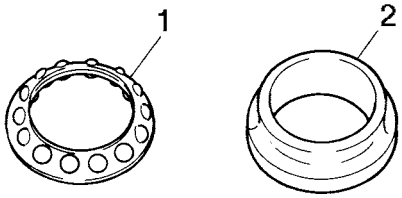
Steering nut wrench
90890-01403
Spanner wrench
YU-33975



EAS23120
CHECKING THE STEERING HEAD
1. Wash:
   - Bearings
   - Bearing races

Recommended cleaning solvent
Kerosene

2. Check:
   - Bearings “1”
   - Bearing races “2”
     Damage/pitting → Replace.



3. Replace:
   - Bearings
   - Bearing races

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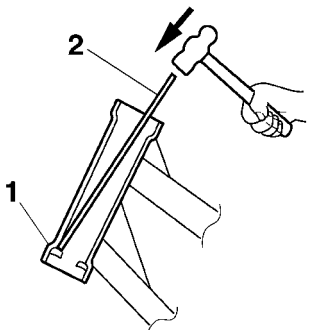
a. Remove the bearing races from the steering head pipe “1” with a long rod “2” and hammer.
b. Remove the bearing race from the lower bracket “3” with a floor chisel “4” and hammer.
c. Install a new rubber seal and new bearing races.

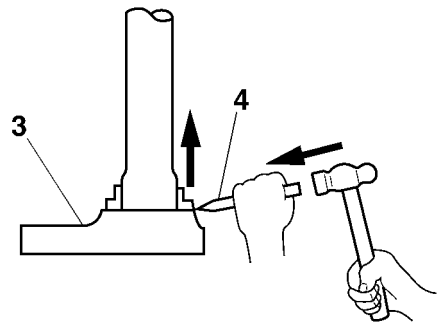
ECA14270
NOTICE

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

TIP

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





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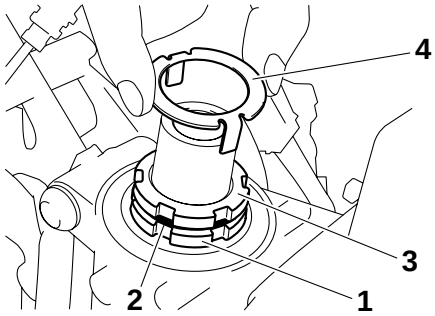
4. Check:
   • Upper bracket
   • Lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

EAS23140
INSTALLING THE STEERING HEAD

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

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

2. Install:
   • Lower ring nut “1”
   • Rubber washer “2”
   • Upper ring nut “3”
   • Lock washer “4”
   Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-25.



3. Install:
   • Upper bracket
   • Washer
   • Steering stem nut

TIP

Temporarily tighten the steering stem nut.

4. Install:
   • Front fork legs
   Refer to “FRONT FORK” on page 4-49.

TIP

Temporarily tighten the upper and lower bracket pinch bolts.

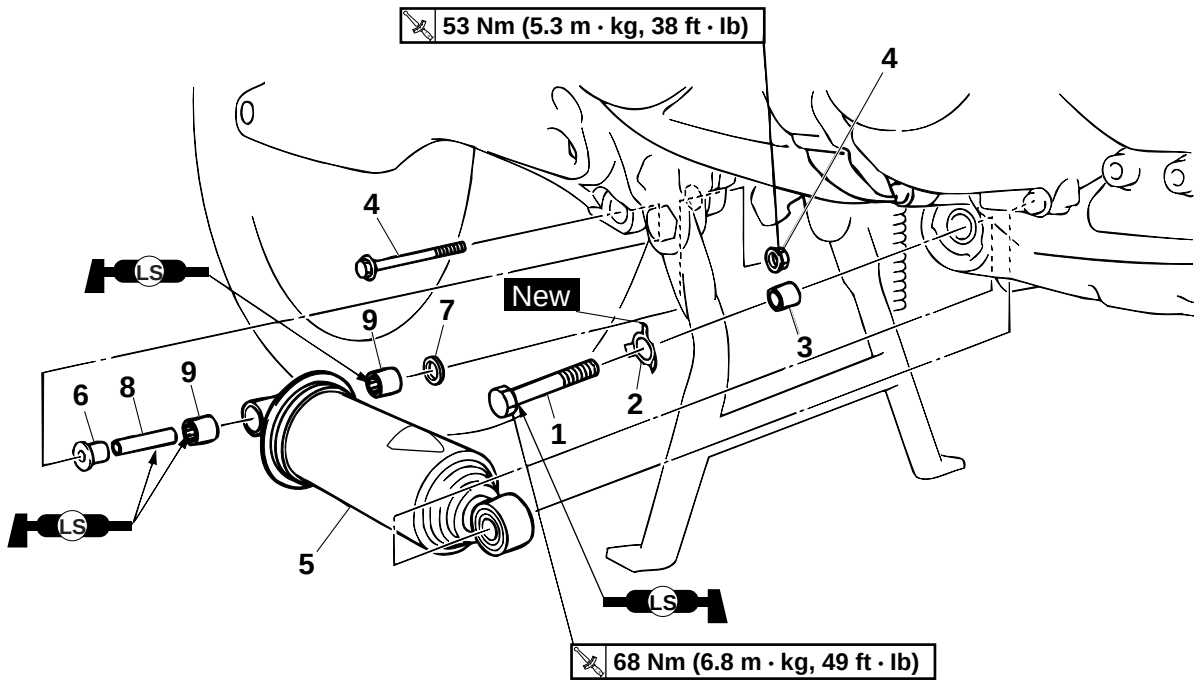
5. Tighten:
   • Steering stem nut

	Steering stem nut **115 Nm (11.5 m·kg, 85 ft·lb)**

EAS23160

REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-1.
1	Rear shock absorber assembly front bolt	1	
2	Lock washer	1	
3	Collar	1	
4	Rear shock absorber assembly rear nut/bolt	1/1	
5	Rear shock absorber assembly	1	
6	Collar	1	
7	Washer	1	
8	Spacer	1	
9	Bearing	2	
			For installation, reverse the removal procedure.

EAS23180
HANDLING THE REAR SHOCK ABSORBER

EWA13740
⚠ WARNING

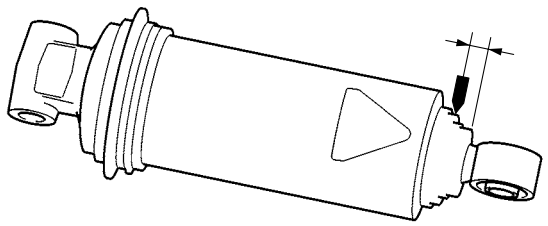
This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber.
- **Do not tamper or attempt to open the rear shock absorber.**
- **Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.**
- **Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.**

EAS23190
DISPOSING OF A REAR SHOCK ABSORBER

1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2–3-mm hole through the rear shock absorber at a point 10–14 mm from its end as shown.

EWA13760
⚠ WARNING

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



EAS23210
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120
⚠ WARNING

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

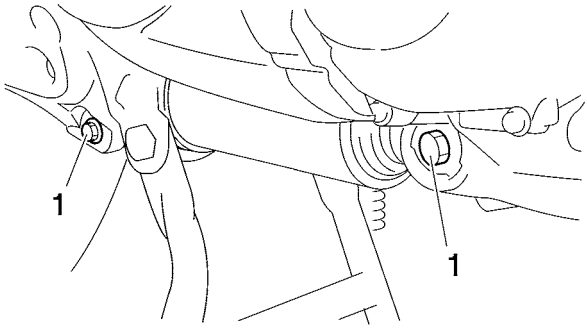
TIP

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

2. Remove:
   - Rear shock absorber assembly bolts “1”

TIP

- Straighten the lock washer tab.
- When removing the rear shock absorber assembly bolts “1”, hold the swingarm so that it does not drop down.



3. Remove:
   - Rear shock absorber assembly

EAS23240
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:
   - Bearing
     Damage/wear → Replace.
   - Spacer
     Damage/wear → Replace.
   - Bolts
     Bends/damage/wear → Replace.

EAS23300
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
   - Spacer
   - Bearings
   - Rear shock absorber assembly front bolt

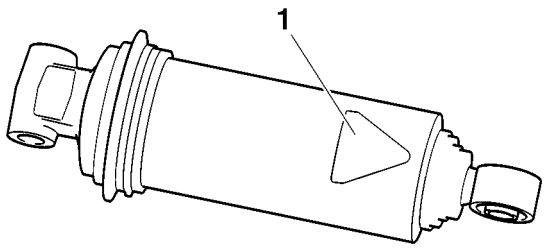
	Recommended lubricant **Lithium-soap-based grease**

2. Install:
   - Rear shock absorber assembly

TIP

- Make sure that the warning label “1” on the rear shock absorber assembly faces up.
- When installing the rear shock absorber assembly, lift up the swingarm.

• Lubricate the rear shock absorber assembly front bolt seats with lithium-soap-based grease.



3. Tighten:
   • Rear shock absorber assembly rear nut

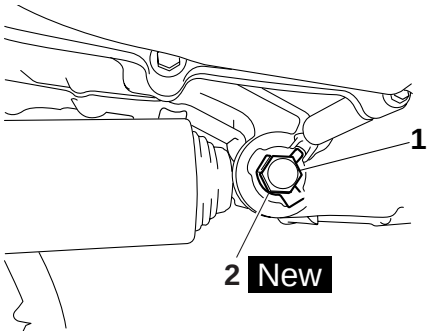
	Rear shock absorber assembly rear nut **53 Nm (5.3 m·kg, 38 ft·lb)**

4. Tighten:
   • Rear shock absorber assembly front bolt “1”

	Rear shock absorber assembly front bolt **68 Nm (6.8 m·kg, 49 ft·lb)**

TIP

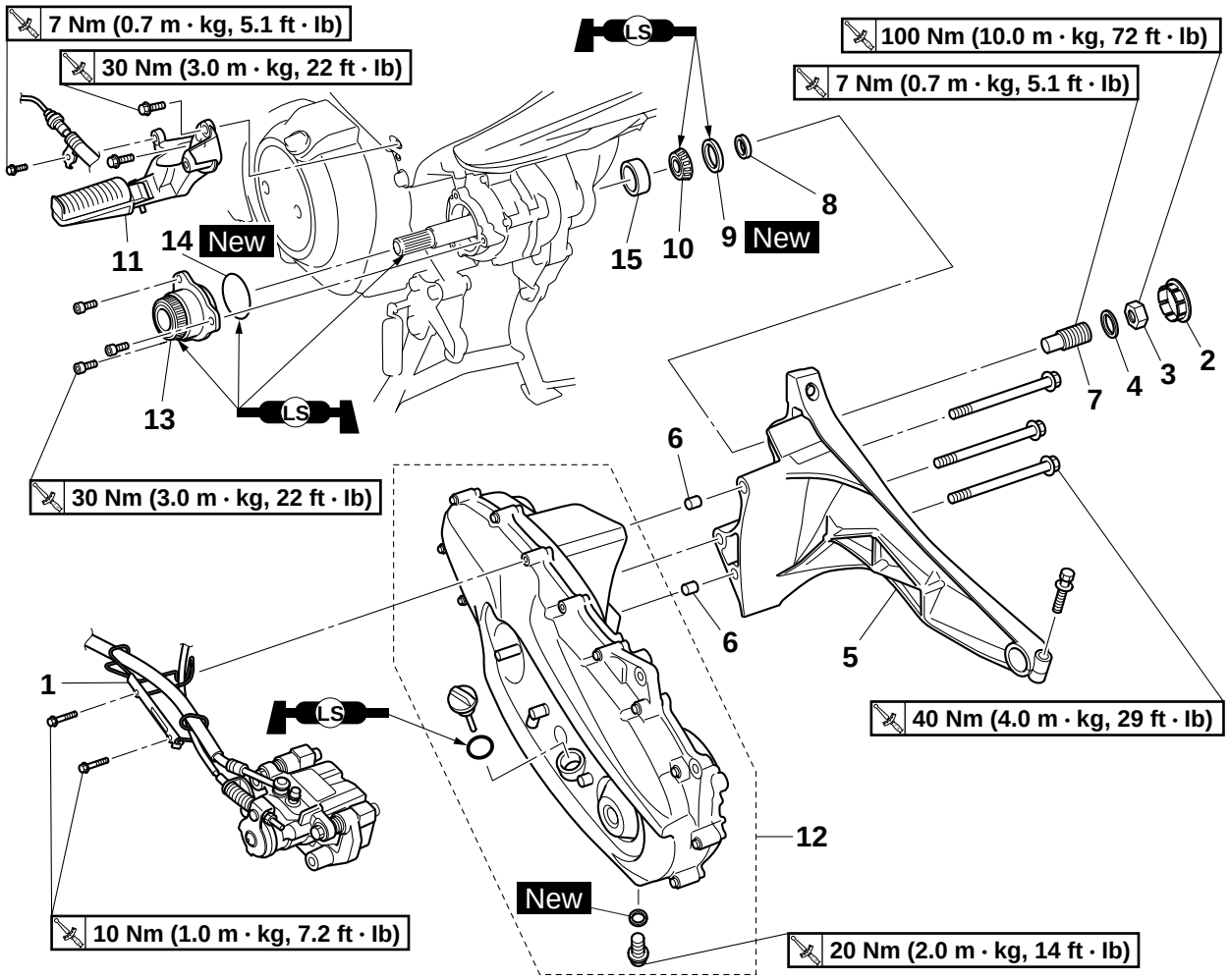
Bend the lock washer “2” tab along a flat side of the bolt “1”.



EAS4B51015

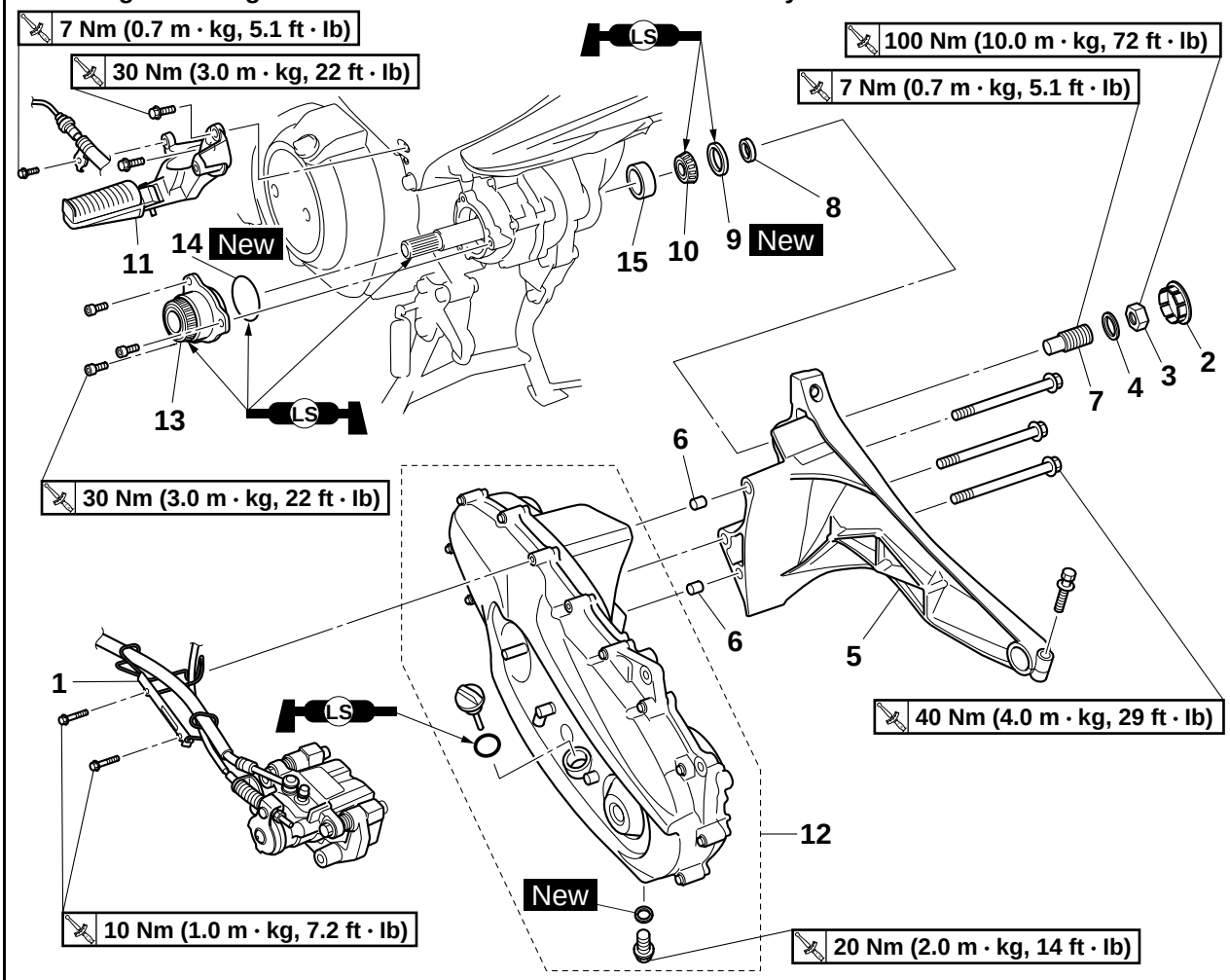
SWINGARM AND TRANSMISSION CHAIN DRIVE

Removing the swingarm and transmission chain drive assembly



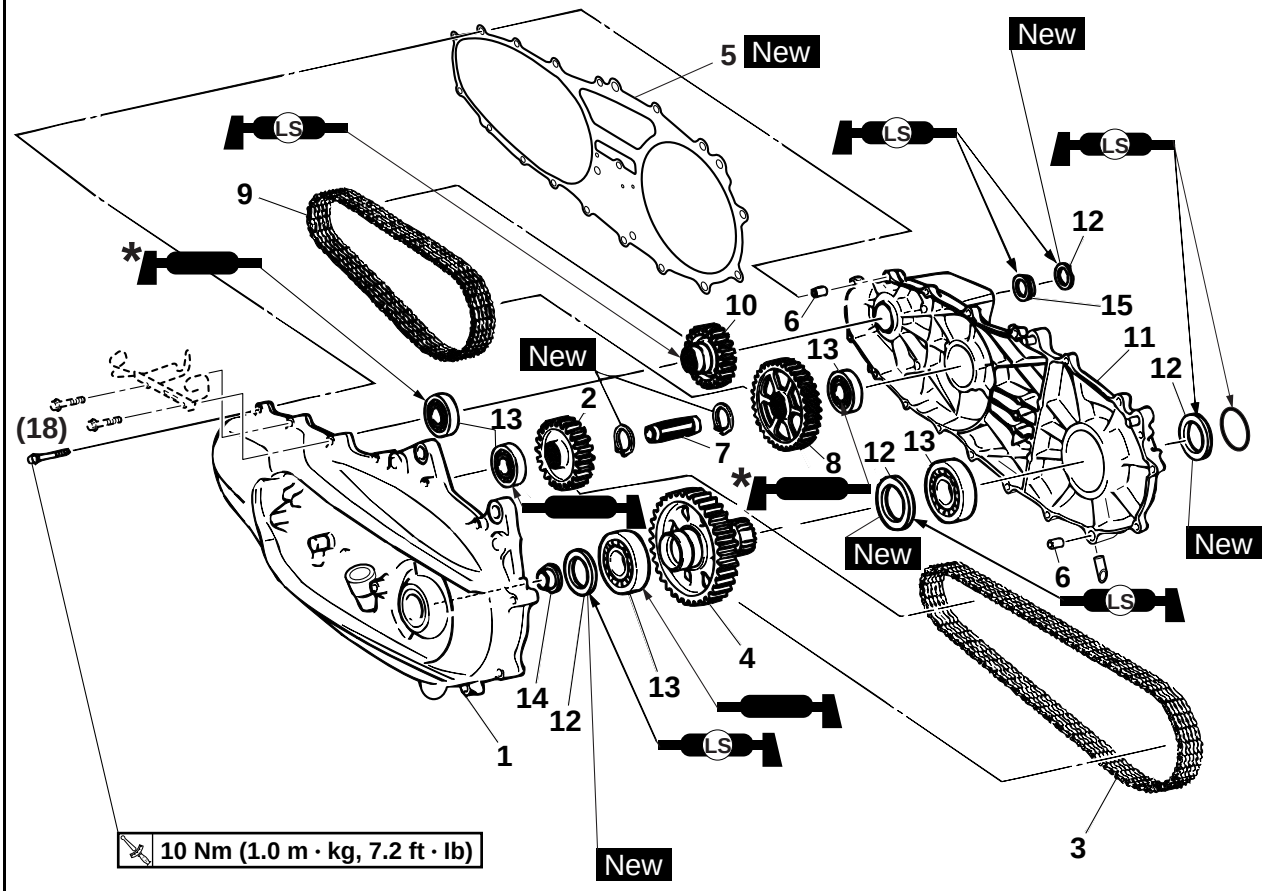
Order	Job/Parts to remove	Q'ty	Remarks
	Chain drive oil		Drain. Refer to "CHECKING THE CHAIN DRIVE OIL LEVEL" on page 3-24.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-1.
	Rear cowling assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear wheel		Refer to "REAR WHEEL" on page 4-15.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-62.
1	Rear brake hose/rear brake lock cable holder	1	
2	Pivot shaft end cover	1	
3	Pivot shaft nut	1	
4	Washer	1	
5	Swingarm	1	
6	Dowel pin	2	
7	Pivot shaft	1	
8	Collar	1	

Removing the swingarm and transmission chain drive assembly



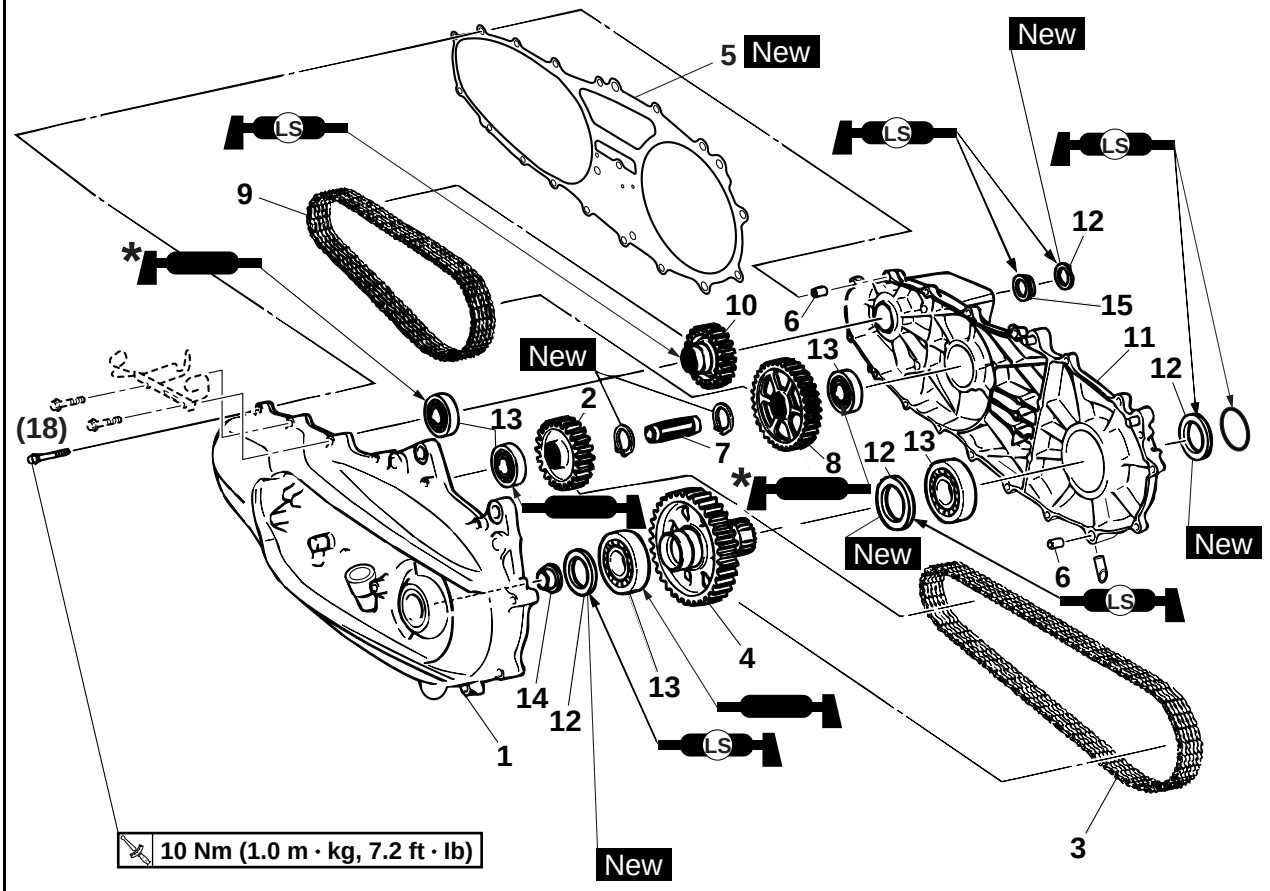
Order	Job/Parts to remove	Q'ty	Remarks
9	Oil seal	1	
10	Pivot shaft taper roller bearing	1	
11	Left passenger footrest	1	
12	Transmission chain drive assembly	1	
13	Transmission chain drive holder assembly	1	
14	O-ring	1	
15	Bearing race	1	
			For installation, reverse the removal procedure.

Disassembling the transmission chain drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Outer chain drive case	1	
2	Secondary drive gear	1	
3	Secondary drive chain	1	
4	Secondary driven gear	1	
5	Chain drive case gasket	1	
6	Dowel pin	2	
7	Middle shaft	1	
8	Primary driven gear	1	
9	Primary drive chain	1	
10	Primary drive gear	1	
11	Inner chain drive case	1	
12	Oil seal	4	
13	Bearing	5	
14	Collar	1	

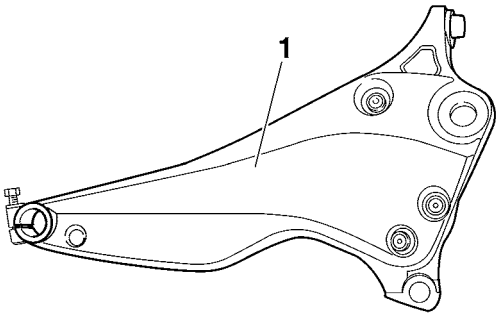
Disassembling the transmission chain drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
15	Bearing retainer	1	
			For assembly, reverse the disassembly procedure.

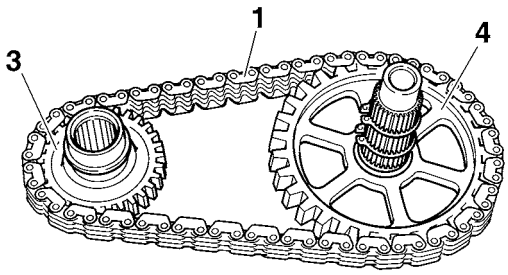
* Apply chain drive oil.

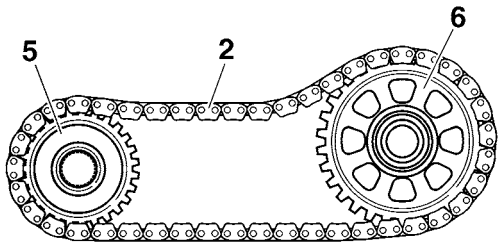
EAS4B51017
CHECKING THE SWINGARM
1. Check:
   • Swingarm “1”
   Damage/wear → Replace.



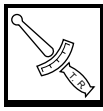
2. Check:
   • Pivot shaft
   • Collar
   • Bearing
   Damage/wear → Replace.

EAS4B51016
CHECKING THE CHAINS AND GEARS
1. Check:
   • Primary drive chain “1”
   • Secondary drive chain “2”
   Damage/stiffness → Replace the drive chain and its respective gears as a set.
2. Check:
   • Primary drive gear “3”
   • Primary driven gear “4”
   • Secondary drive gear “5”
   • Secondary driven gear “6”
   Damage/wear → Replace the respective gears and respective drive chain as a set.



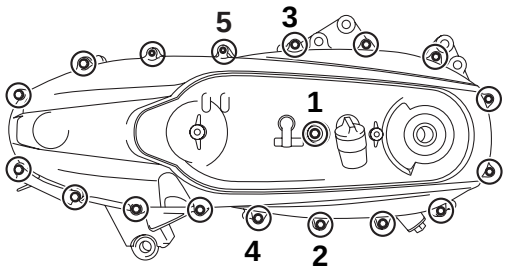


EAS4B51018
ASSEMBLING THE TRANSMISSION CHAIN DRIVE ASSEMBLY
1. Install:
   • Outer chain drive case

	**Chain drive case bolt** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

TIP

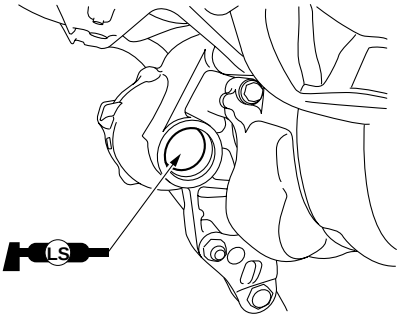
First, tighten the chain drive case bolts that are numbered in the illustration in the order shown, and then tighten the unnumbered bolts in a crisscross pattern.



EAS4B51019
INSTALLING THE TRANSMISSION CHAIN DRIVE ASSEMBLY
1. Install:
   • Pivot shaft taper roller bearing

TIP

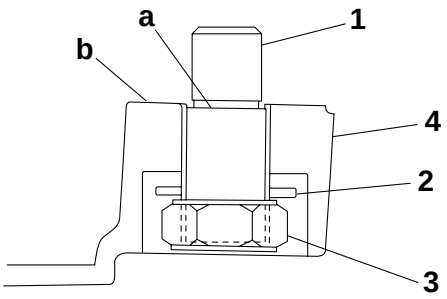
Fill the space in the crankcase with lithium-soap-based grease before installing the pivot shaft taper roller bearing.



2. Install:
   - Pivot shaft “1”
   - Washer “2”
   - Pivot shaft nut “3”

TIP

Install the parts to the swingarm “4” temporarily, making sure that the portion “a” of the pivot shaft does not protrude past the swingarm surface “b”.



3. Install:
   - Transmission chain drive assembly
   - Dowel pins
   - Swingarm
   - Swingarm bolts

	Swingarm bolt **40 Nm (4.0 m·kg, 29 ft·lb)**

4. Tighten:
   - Pivot shaft
   - Pivot shaft nut

	Pivot shaft **7 Nm (0.7 m·kg, 5.1 ft·lb)** **Pivot shaft nut** **100 Nm (10.0 m·kg, 72 ft·lb)**

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a. With your fingers, screw in the pivot shaft until it touches the collar, and then tighten the pivot shaft to the specified torque.
b. Tighten the pivot shaft nut to the specified torque.

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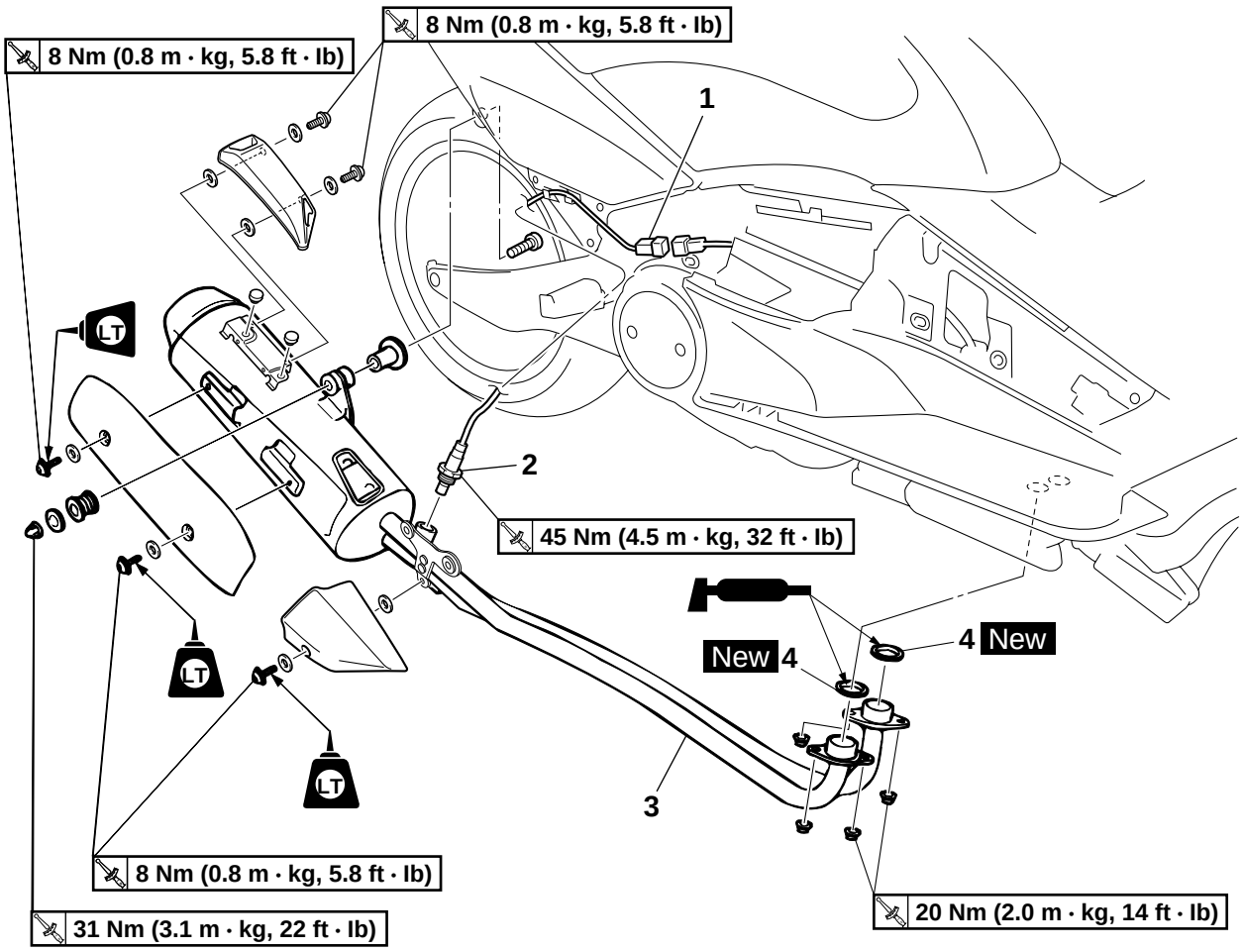
5. Fill:
   - Transmission chain drive case
     Refer to “CHANGING THE CHAIN DRIVE OIL” on page 3-25.
6. Check:
   - Chain drive oil level
     Refer to “CHECKING THE CHAIN DRIVE OIL LEVEL” on page 3-24.

ENGINE

EAS23710

ENGINE REMOVAL

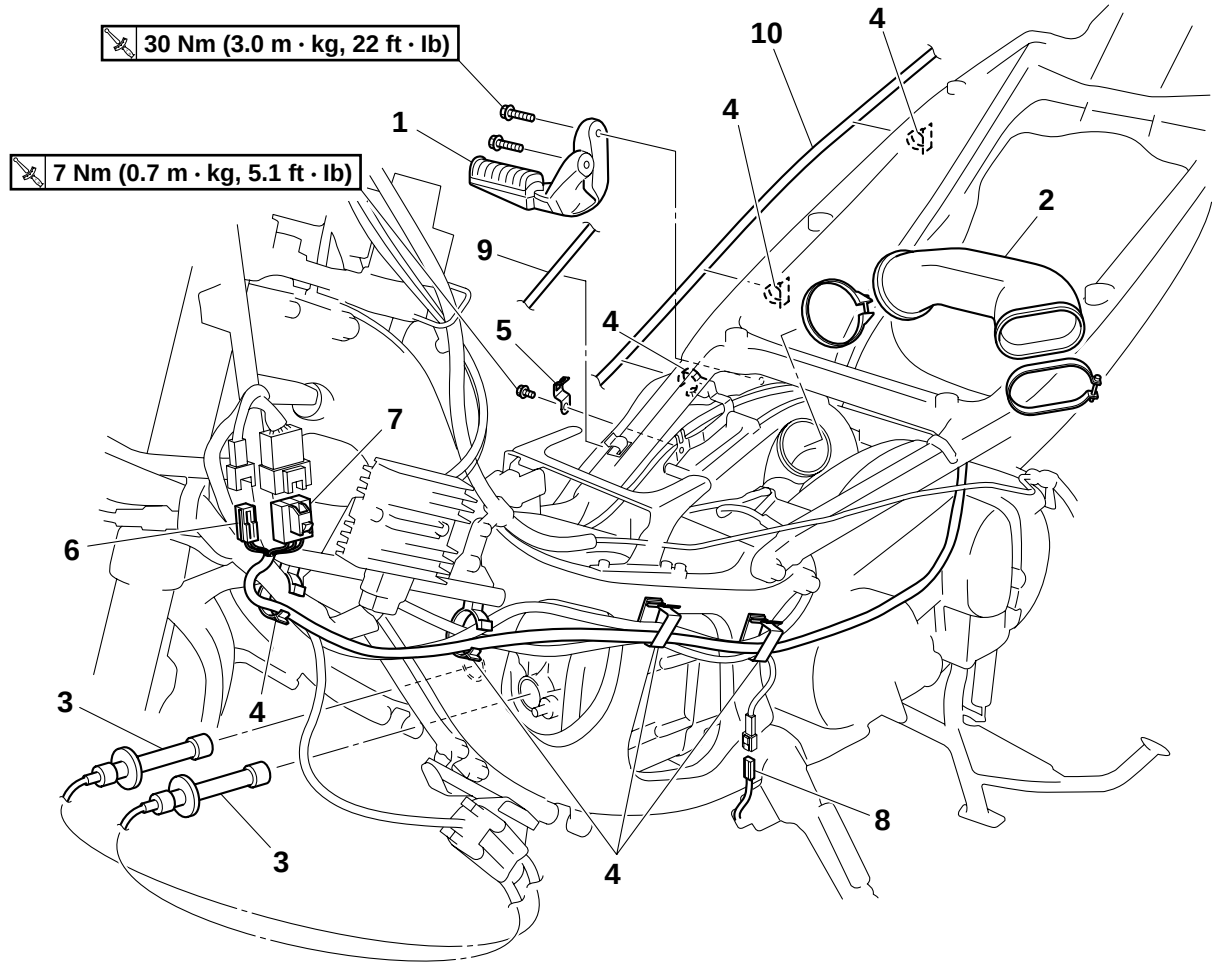
Removing the exhaust assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Bottom cowling/Left center panel		Refer to "GENERAL CHASSIS" on page 4-1.
1	O_2 sensor coupler	1	Disconnect.
2	O_2 sensor	1	
3	Exhaust assembly	1	
4	Gasket	2	
			For installation, reverse the removal procedure.

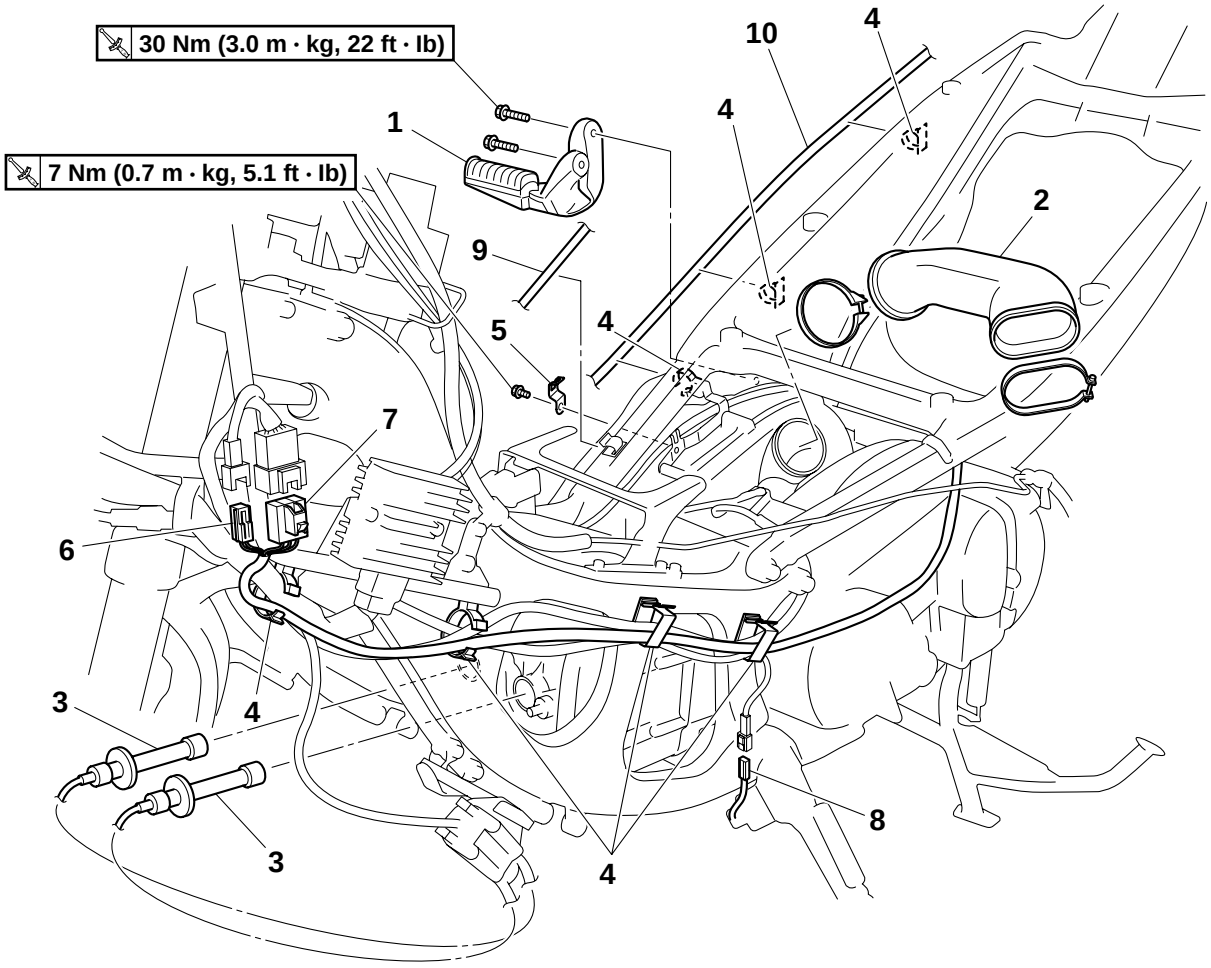
* Apply Shell BT grease 3®.

Disconnecting the leads



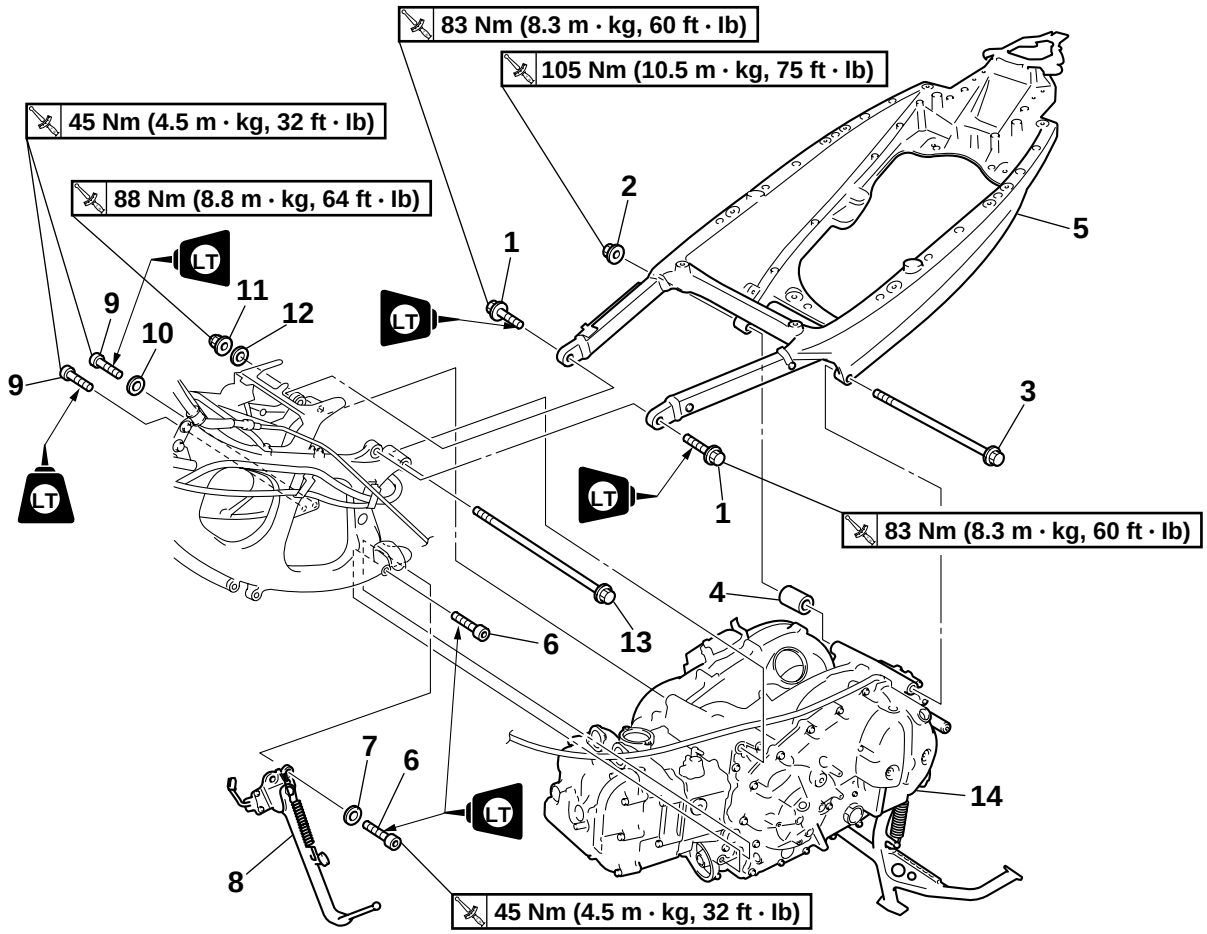
Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling/Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
	Chain drive oil		Drain. Refer to "CHANGING THE CHAIN DRIVE OIL" on page 3-25.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Intake manifolds		Refer to "THROTTLE BODY" on page 7-5.
	Radiator bracket		Refer to "RADIATOR" on page 6-1.
	Oil cooler		Refer to "OIL COOLER" on page 6-4.
	Thermostat		Refer to "THERMOSTAT" on page 6-7.
	Water pump assembly		Refer to "WATER PUMP" on page 6-9.
	Rear wheel		Refer to "REAR WHEEL" on page 4-15.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-62.

Disconnecting the leads



Order	Job/Parts to remove	Q'ty	Remarks
	Transmission chain drive holder assembly		Refer to "SWINGARM AND TRANSMISSION CHAIN DRIVE" on page 4-65.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-31.
1	Right passenger footrest	1	
2	V-belt case air duct	1	
3	Spark plug cap	2	Disconnect.
4	Plastic clamp	7	Open.
5	Rear brake lock cable holder	1	
6	Crankshaft position sensor coupler	1	Disconnect.
7	Stator coil coupler	1	Disconnect.
8	Sidestand switch coupler	1	Disconnect.
9	Seat lock cable	1	
10	Wire harness	1	
			For installation, reverse the removal procedure.

Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear frame bolt	2	
2	Engine mounting nut (rear side)	1	
3	Engine mounting bolt (rear side)	1	
4	Spacer	1	
5	Rear frame	1	
6	Engine mounting bolt (front left lower side)	2	
7	Washer	1	
8	Sidestand	1	
9	Engine mounting bolt (front right lower side)	2	
10	Washer	1	
11	Engine mounting nut (front upper side)	1	
12	Washer	1	
13	Engine mounting bolt (front upper side)	1	
14	Engine	1	
			For installation, reverse the removal procedure.

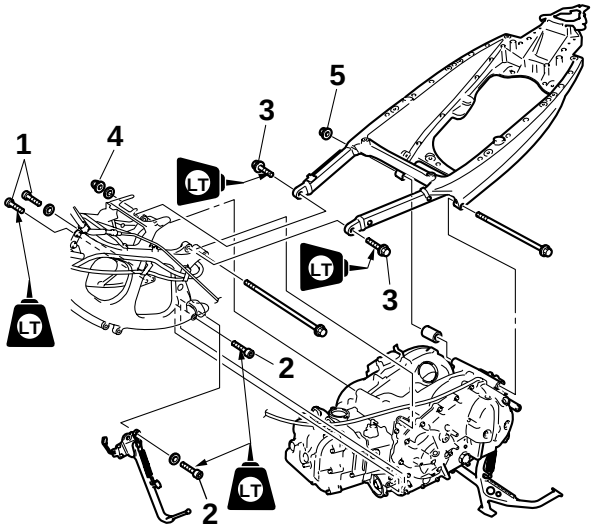
EAS23720
INSTALLING THE ENGINE

1. Install:
   - All removed parts

TIP

- Apply locking agent (LOCTITE®) to engine mounting bolts (front right lower side) “1”, engine mounting bolts (front left lower side) “2”, and rear frame bolts “3”.
- For installation, reverse the removal procedure.
- Do not fully tighten the bolts and nuts.

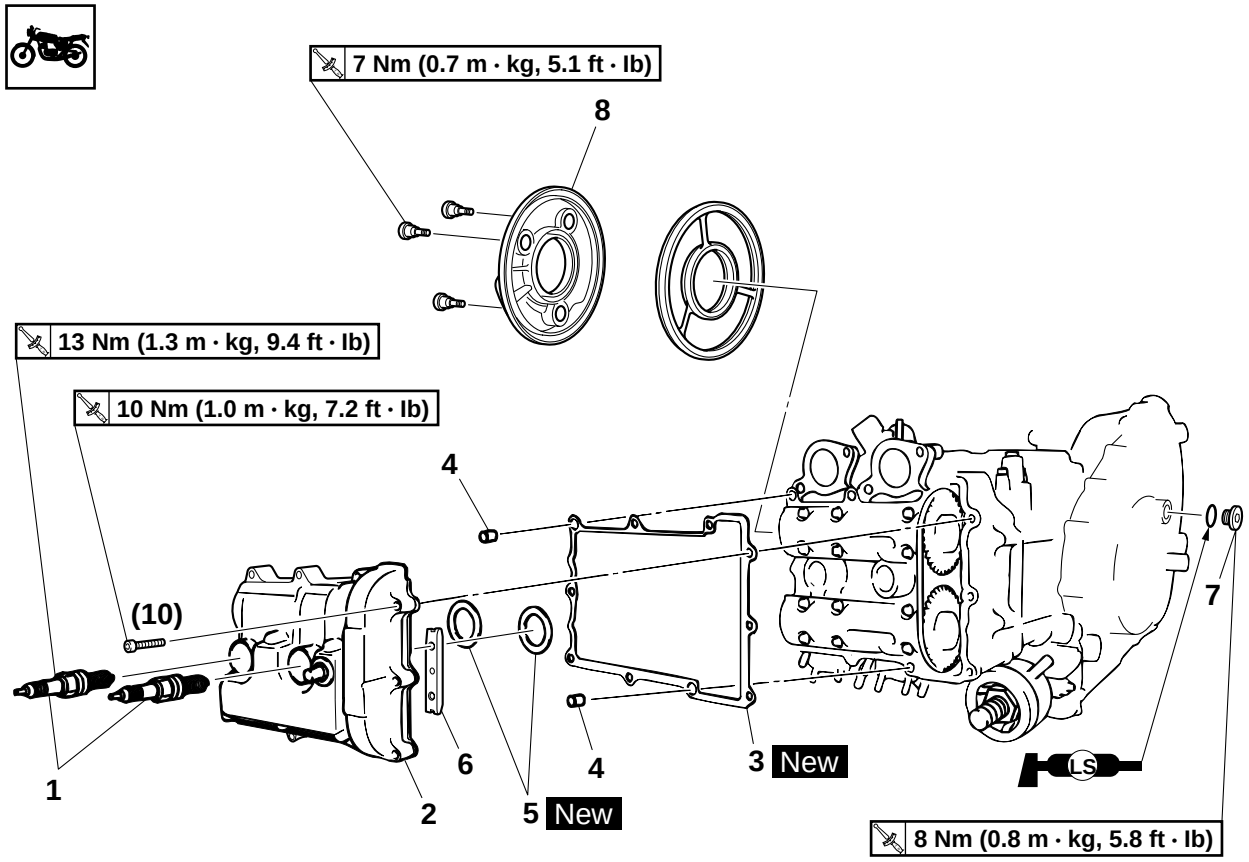
2. Tighten:
   - Engine mounting nut (front upper side) “4”
   - Engine mounting bolts (front right lower side) “1”
   - Engine mounting bolts (front left lower side) “2”
   - Engine mounting nut (rear side) “5”
   - Rear frame bolts “3”



Engine mounting nut (front upper side)
88 Nm (8.8 m·kg, 64 ft·lb)
Engine mounting bolt (front right lower side)
45 Nm (4.5 m·kg, 32 ft·lb)
LOCTITE®
Engine mounting bolt (front left lower side)
45 Nm (4.5 m·kg, 32 ft·lb)
LOCTITE®
Engine mounting nut (rear side)
105 Nm (10.5 m·kg, 75 ft·lb)
Rear frame bolt
83 Nm (8.3 m·kg, 60 ft·lb)
LOCTITE®

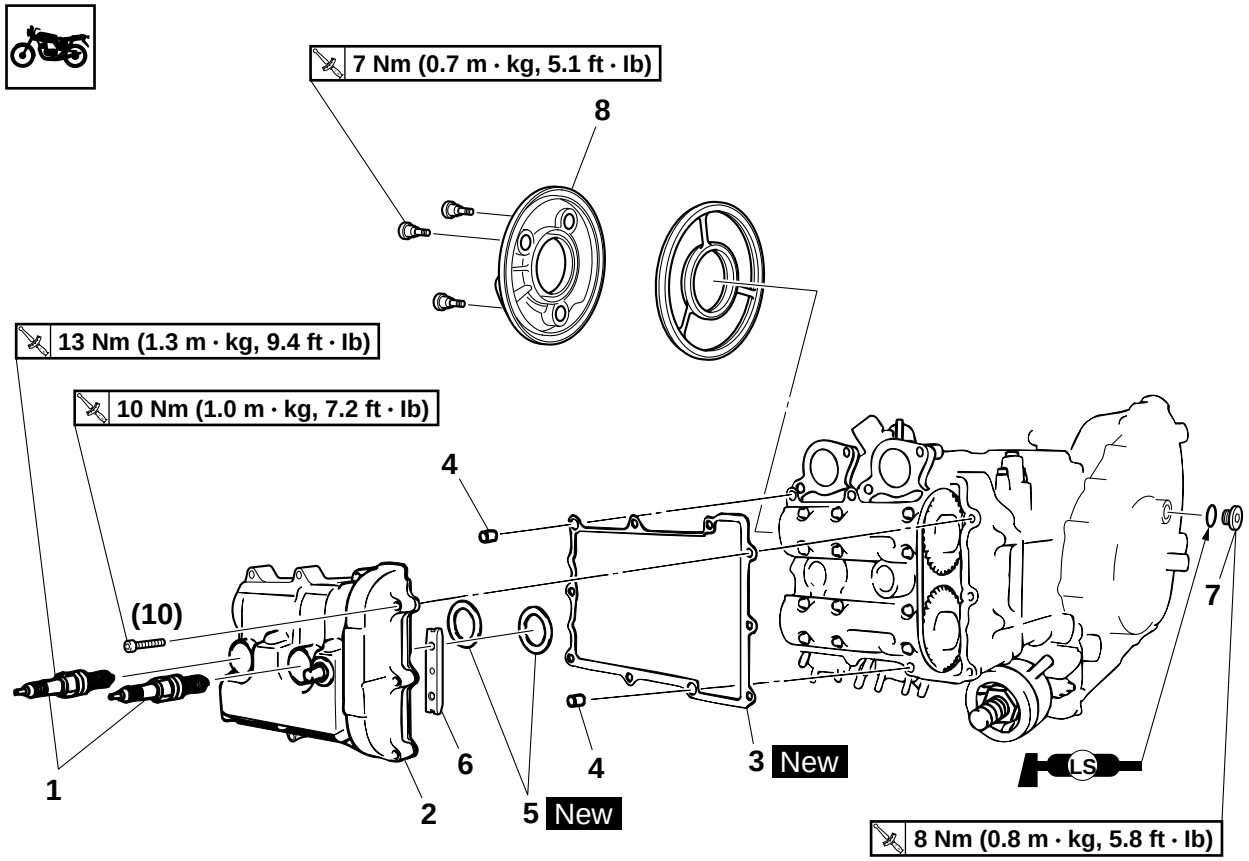
EAS23760
CAMSHAFTS

Removing the cylinder head cover



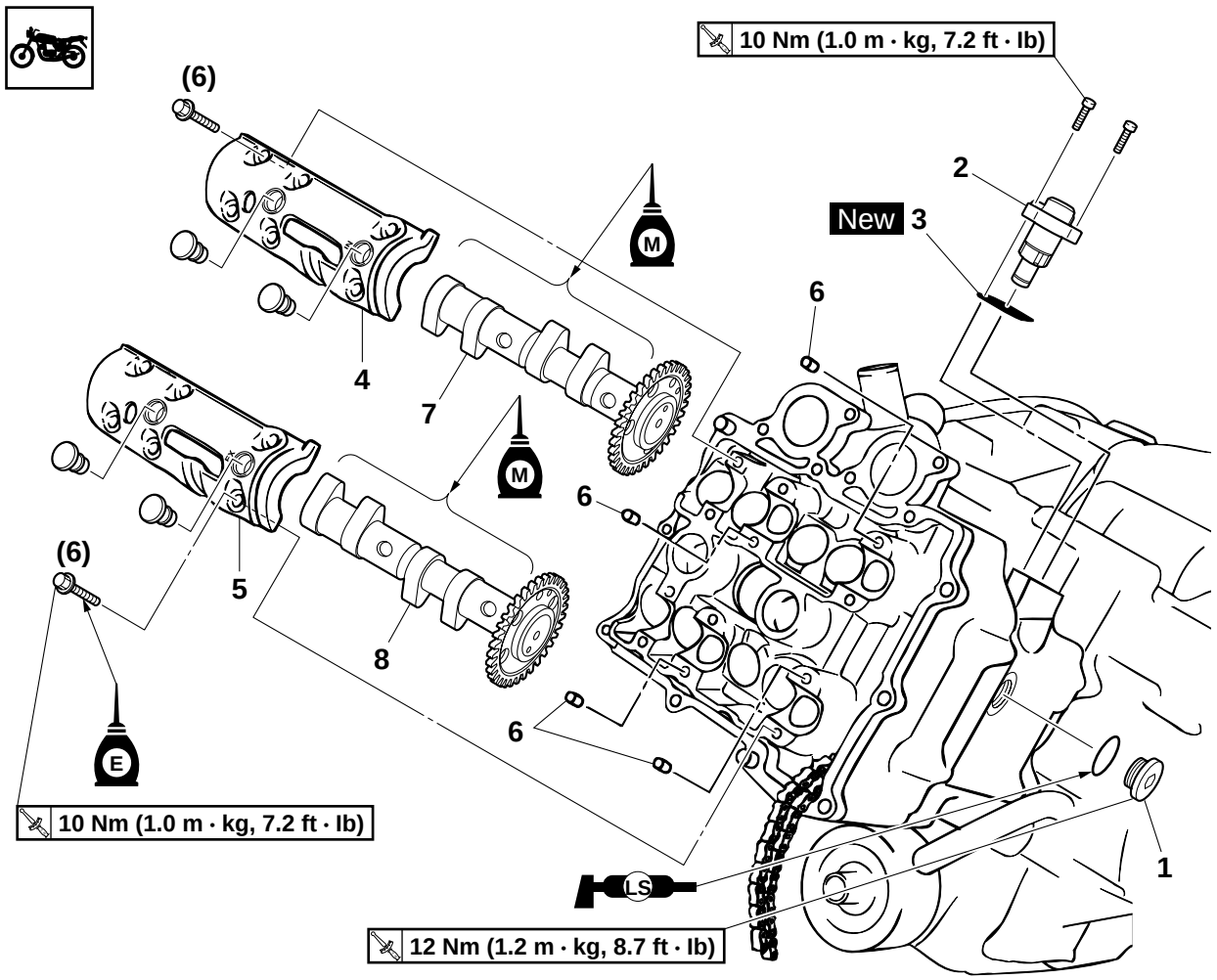
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel/Front fender		Refer to "FRONT WHEEL" on page 4-8.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Intake manifolds		Refer to "THROTTLE BODY" on page 7-5.
1	Spark plug	2	
2	Cylinder head cover	1	
3	Cylinder head cover gasket	1	
4	Dowel pin	2	
5	Gasket	2	
6	Timing chain guide (upper side)	1	

Removing the cylinder head cover



Order	Job/Parts to remove	Q'ty	Remarks
7	Timing mark accessing plug	1	
8	Crankshaft end access cover	1	
			For installation, reverse the removal procedure.

Removing the camshafts



Order	Job/Parts to remove	Q'ty	Remarks
1	Timing chain tensioner rod accessing plug	1	
2	Timing chain tensioner	1	
3	Timing chain tensioner gasket	1	
4	Intake camshaft cap	1	
5	Exhaust camshaft cap	1	
6	Dowel pin	4	**TIP** During removal, the dowel pins may still be connected to the camshaft caps.
7	Intake camshaft	1	
8	Exhaust camshaft	1	
			For installation, reverse the removal procedure.

EAS23810
REMOVING THE CAMSHAFTS

1. Align:
   - "I" mark "a" on the generator rotor (with the stationary pointer "b" on the generator cover)

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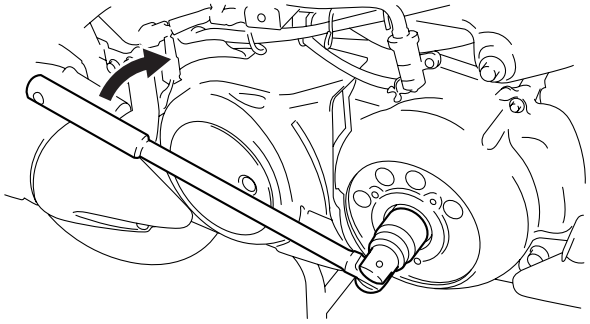
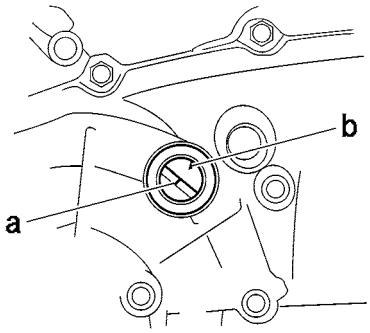
a. Turn the crankshaft clockwise.

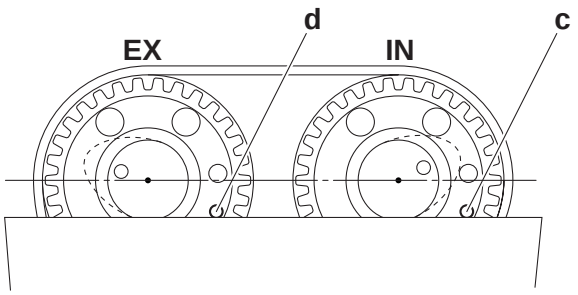


b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the stationary pointer "b" on the generator cover.

TIP

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





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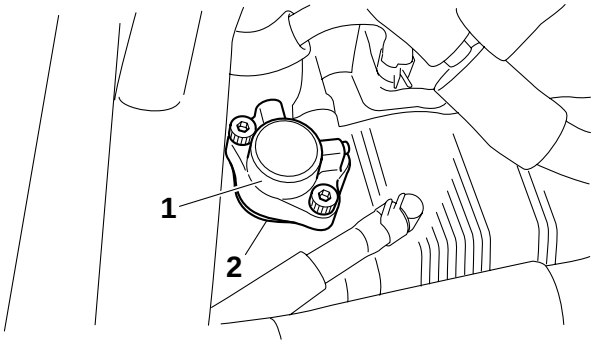
2. Remove:
   - Timing chain tensioner "1"
   - Timing chain tensioner gasket "2"

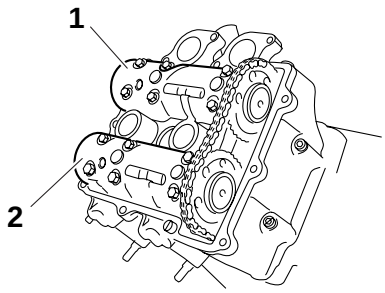


3. Remove:
   - Intake camshaft cap "1"
   - Exhaust camshaft cap "2"
   - Dowel pins

ECA13720

NOTICE

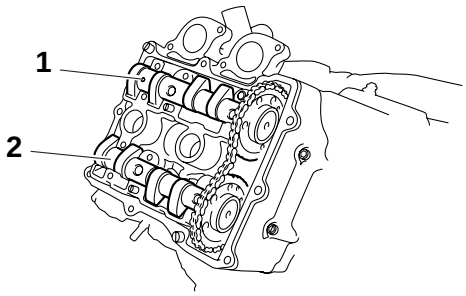
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

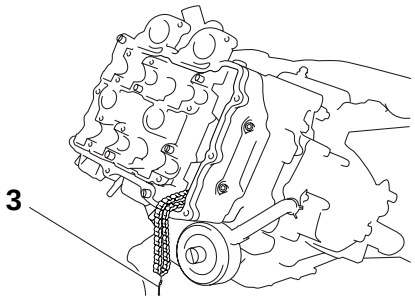


4. Remove:
   - Intake camshaft "1"
   - Exhaust camshaft "2"

TIP

To prevent the timing chain from falling into the crankcase, fasten with a wire "3".

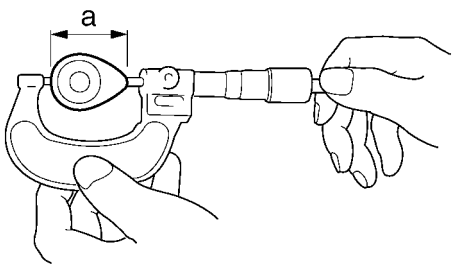




EAS23850
CHECKING THE CAMSHAFTS

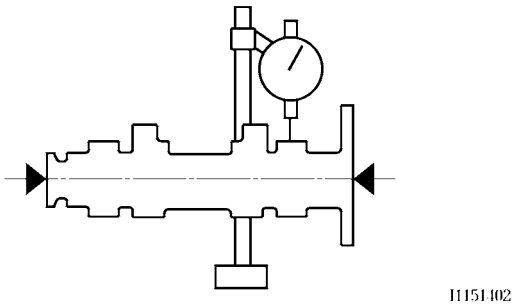
1. Check:
   • Camshaft lobes
   Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   • Camshaft lobe dimensions “a” and “b”
   Out of specification → Replace the camshaft.

Camshaft lobe dimensions
Intake A
33.252–33.352 mm (1.3091–1.3131 in)
Limit
33.152 mm (1.3052 in)
Intake B
24.956–25.056 mm (0.9825–0.9865 in)
Limit
24.856 mm (0.9786 in)
Exhaust A
33.252–33.352 mm (1.3091–1.3131 in)
Limit
33.152 mm (1.3052 in)
Exhaust B
24.956–25.056 mm (0.9825–0.9865 in)
Limit
24.856 mm (0.9786 in)



3. Measure:
   • Camshaft runout
   Out of specification → Replace.

Camshaft runout limit
0.030 mm (0.0012 in)



4. Measure:
   • Camshaft-journal-to-camshaft-cap clearance
   Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.020–0.054 mm (0.0008–0.0021 in)

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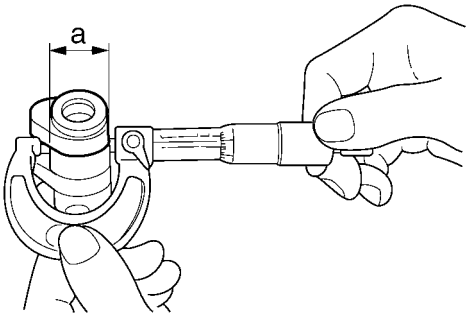
a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position a strip of Plastigauge® “1” onto the camshaft journal as shown.



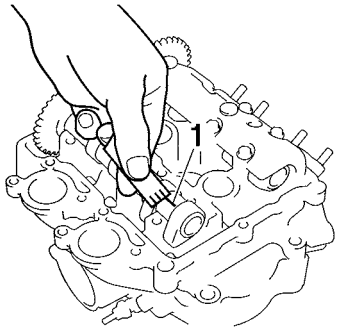
c. Install the dowel pins and camshaft caps.

TIP

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

	Camshaft cap bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

d. Remove the camshaft caps and then measure the width of the Plastigauge® “1”.



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

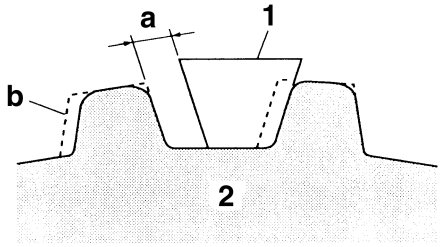
	Camshaft journal diameter **22.967–22.980 mm (0.9042–0.9047 in)**

EAS4B51035

CHECKING THE CAMSHAFT SPROCKETS

The following procedure applies to both of the camshaft sprockets.

1. Check:
   - Camshaft sprocket
     More than 1/4 tooth wear “a” → Replace the camshafts and the timing chain as a set.

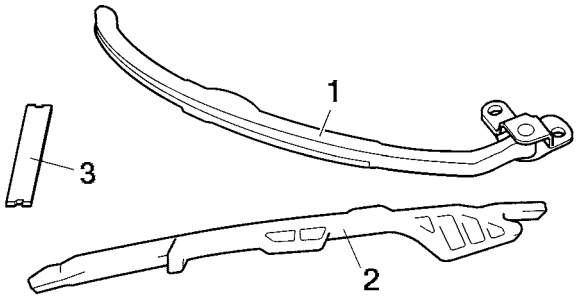


a. 1/4 tooth
b. Correct
1. Timing chain roller
2. Camshaft sprocket

EAS23950

CHECKING THE TIMING CHAIN GUIDES

1. Check:
   - Timing chain guide (intake side) “1”
   - Timing chain guide (exhaust side) “2”
   - Timing chain guide (upper side) “3”
     Damage/wear → Replace the defective part(s).



EAS23960
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - Timing chain tensioner
     Cracks/damage → Replace.

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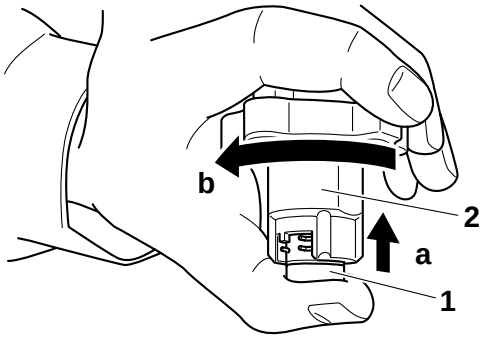
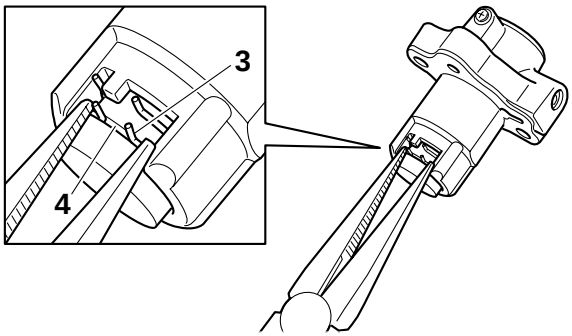
a. Push the timing chain tensioner rod "1" into the timing chain tensioner housing by hand.

TIP

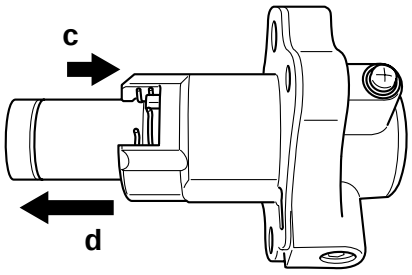
While pushing the timing chain tensioner rod "a", turn it clockwise "b" with the timing chain tensioner body "2" until if stops.



b. Lock the timing chain tensioner rod "1" by setting the circlip "3" to groove "4" while pushing the timing chain tensioner rod.



c. Push the timing chain tensioner rod "c".
d. Make sure that the timing chain tensioner rod comes out "d" of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



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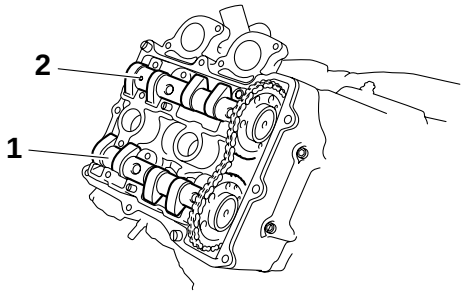
EAS24000
INSTALLING THE CAMSHAFTS

1. Install:
   - Exhaust camshaft "1"
   - Intake camshaft "2"



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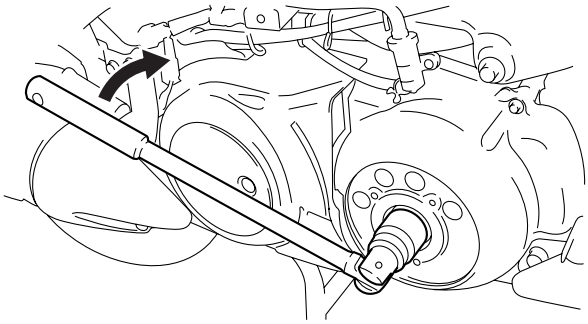
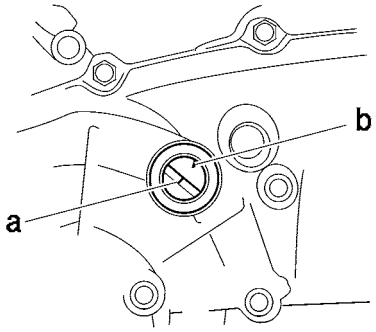
a. Turn the crankshaft clockwise.



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



c. Install the timing chain onto both camshaft sprockets, and then install the camshafts onto the cylinder head.

TIP

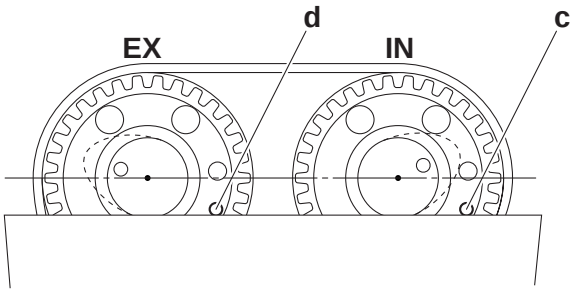
- When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
- The camshafts should be installed onto the cylinder head so that the alignment hole "c" on the intake camshaft sprocket and the alignment

hole “d” on the exhaust camshaft sprocket align with the cylinder head mating surface, as shown in the illustration.

ECA4B51015

NOTICE

Do not turn the crankshaft when installing the camshafts to avoid damage or improper valve timing.



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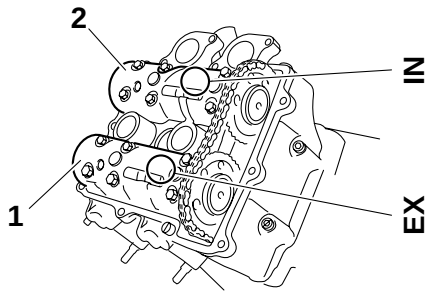
2. Install:
   - Dowel pins
   - Exhaust camshaft cap “1”
   - Intake camshaft cap “2”

TIP

Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
“IN”: Intake
“EX”: Exhaust



3. Install:
   - Camshaft cap bolts

	Camshaft cap bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

TIP

- Lubricate the camshaft cap bolt seats.
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

ECA13730

NOTICE

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

4. Install:
   - Timing chain tensioner gasket New
   - Timing chain tensioner

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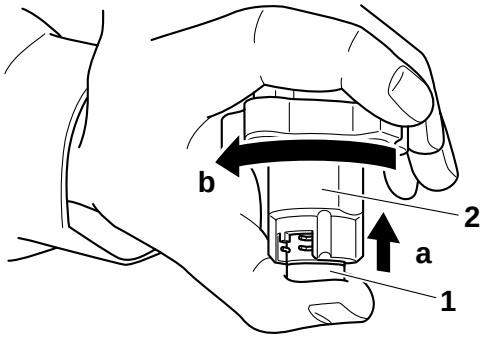
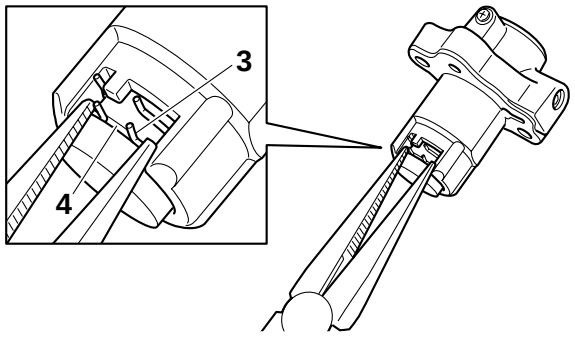
a. Push the timing chain tensioner rod “1” into the timing chain tensioner housing by hand.

TIP

While pushing the timing chain tensioner rod “a”, turn it clockwise “b” with the timing chain tensioner body “2” until if stops.



b. Lock the timing chain tensioner rod “1” by setting the circlip “3” into groove “4” while pushing the timing chain tensioner rod.



c. Install the timing chain tensioner to the cylinder block.

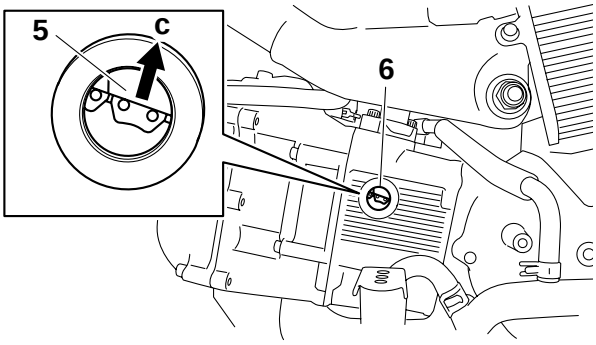
	Timing chain tensioner bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

EWA4B51013

⚠ WARNING

Always use a new gasket.

d. Release the timing chain tensioner rod by pushing up the timing chain guide “5” from the hole “6”.



ECA4B51014

NOTICE

Do not push up the timing chain. Push up "c" the timing chain guide "5".

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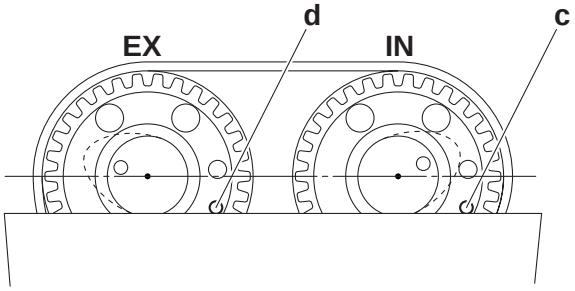
5. Turn:
   - Crankshaft
     (several turns clockwise)
6. Check:
   - "I" mark "a"
     Make sure that the "I" mark is aligned with the stationary pointer "b".
   - Camshaft sprocket alignment holes "c" and "d".
     Make sure that the camshaft sprocket alignment hole is aligned with the cylinder head mating surface.
     Out of alignment → Correct.
     Refer to the installation steps above.

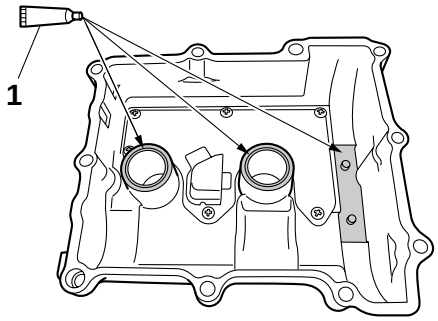


7. Measure:
   - Valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-4.
8. Install:
   - Timing chain guide (upper side)
   - Gaskets New
     (to the cylinder head cover)

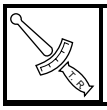
TIP

- Apply Yamaha bond No.1215 "1" onto the mating surface of the cylinder head cover and timing chain guide (upper side).
- Apply Yamaha bond No.1215 "1" onto the mating surfaces of the cylinder head cover and gaskets.

	**Yamaha bond No. 1215** **90890-85505** **(Three Bond No.1215®)**



9. Install:
   - Cylinder head cover gasket New
   - Cylinder head cover

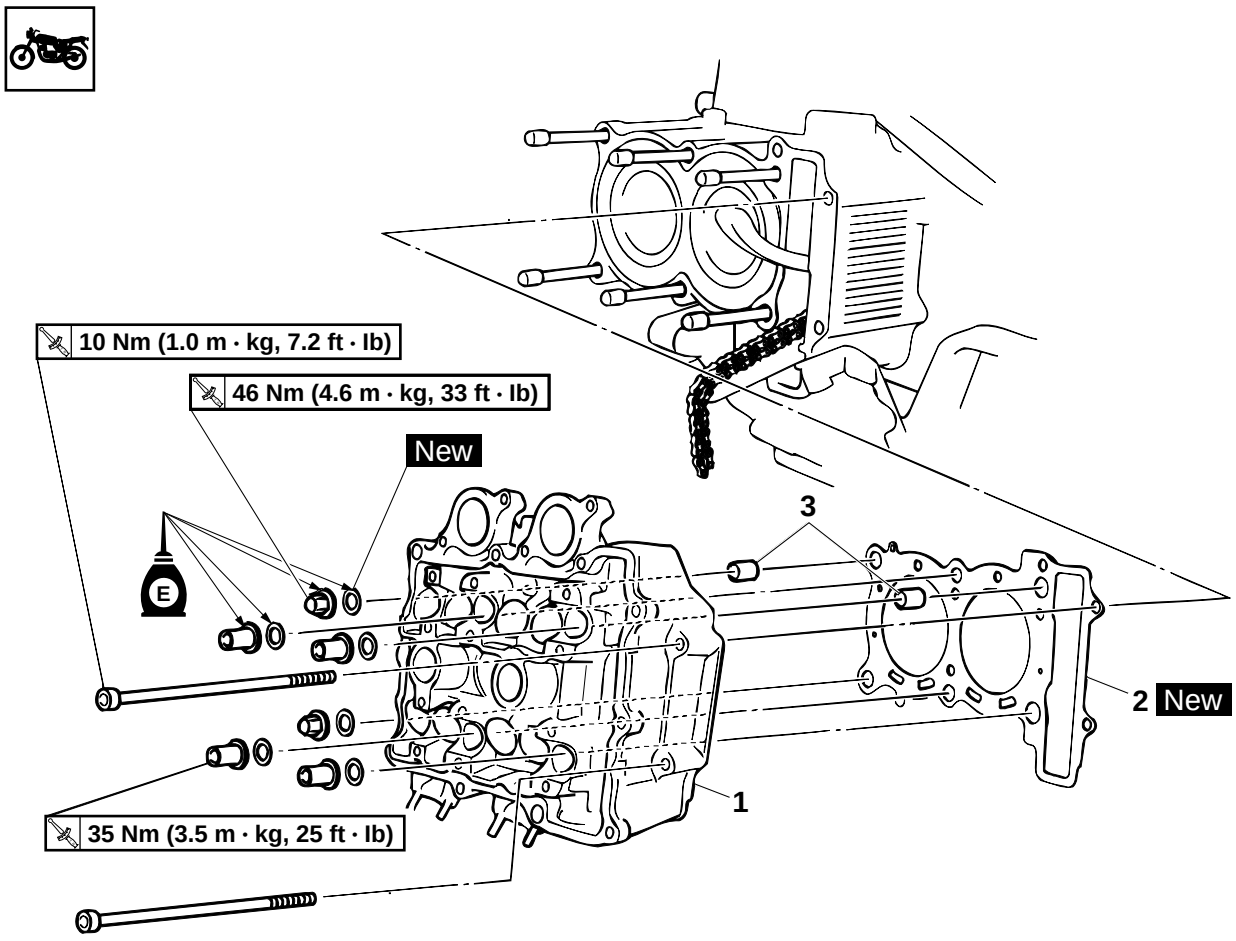
	**Cylinder head cover bolt** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

TIP

Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

EAS24100
CYLINDER HEAD

Removing the cylinder head



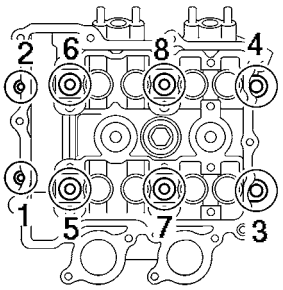
Order	Job/Parts to remove	Q'ty	Remarks
	Camshafts		Refer to "CAMSHAFTS" on page 5-6.
	Exhaust assembly		Refer to "ENGINE REMOVAL" on page 5-1.
	Thermostat/Coolant temperature sensor		Refer to "THERMOSTAT" on page 6-7.
	Coolant pipe		Refer to "OIL COOLER" on page 6-4.
	Intake and exhaust camshafts		Refer to "CAMSHAFTS" on page 5-6.
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.

EAS24120
REMOVING THE CYLINDER HEAD

1. Remove:
   - Cylinder head bolts
   - Cylinder head nuts

TIP

- Loosen the bolts and nuts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.

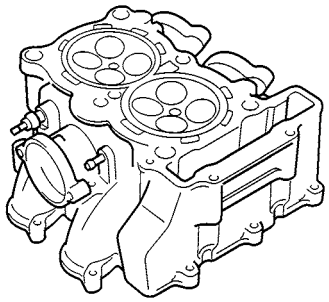


EAS24160
CHECKING THE CYLINDER HEAD

1. Eliminate:
   - Combustion chamber carbon deposits (with a rounded scraper)

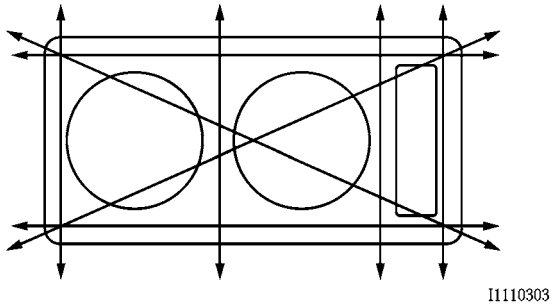
TIP

Do not use a sharp instrument to avoid damaging or scratching:
- Spark plug bore threads
- Valve seats

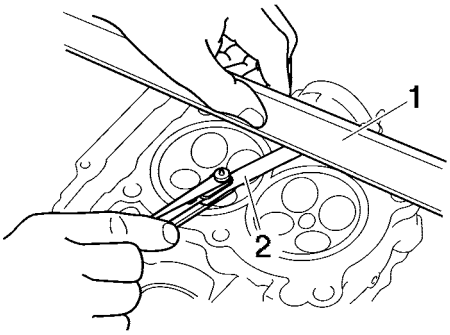


2. Check:
   - Cylinder head
     Damage/scratches → Replace.
   - Cylinder head water jacket
     Mineral deposits/rust → Eliminate.
3. Measure:
   - Cylinder head warpage
     Out of specification → Resurface the cylinder head.

Warpage limit
0.03 mm (0.0012 in)



a. Place a straightedge “1” and a thickness gauge “2” across the cylinder head.



b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

TIP

To ensure an even surface, rotate the cylinder head several times.

EAS24240
INSTALLING THE CYLINDER HEAD

1. Install:
   - Dowel pins
   - Cylinder head gasket New
2. Install:
   - Cylinder head

TIP

Pass the timing chain through the timing chain cavity.

3. Tighten:
   - Cylinder head nuts “1”

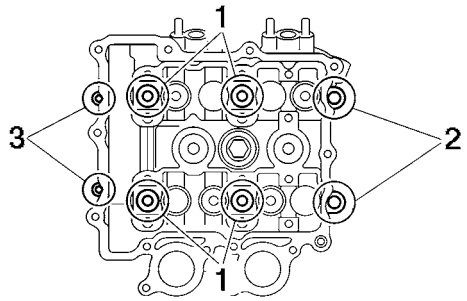
	Cylinder head nut **35 Nm (3.5 m·kg, 25 ft·lb)**

• Cylinder head nuts “2”

	Cylinder head nut **46 Nm (4.6 m·kg, 33 ft·lb)**

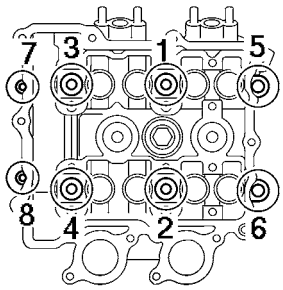
• Cylinder head bolts “3”

	Cylinder head bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**



TIP

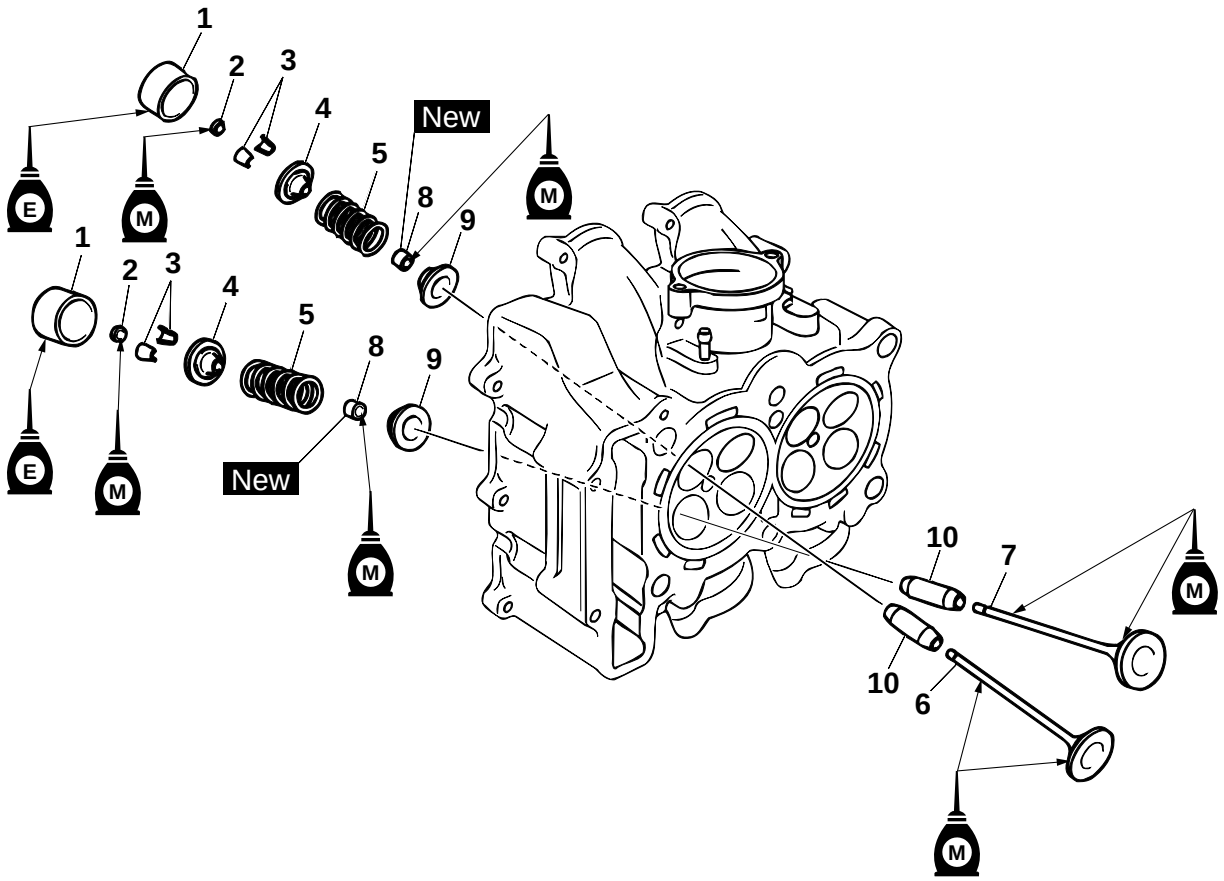
- Lubricate the cylinder head nuts and washers with engine oil.
- Tighten the cylinder head nuts and bolts in the proper tightening sequence as shown and torque them in two stages.



EAS24270

VALVES AND VALVE SPRINGS

Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
1	Valve lifter	8	
2	Valve pad	8	
3	Valve cotter	16	
4	Valve retainer	8	
5	Valve spring	8	
6	Intake valve	4	
7	Exhaust valve	4	
8	Valve stem seal	8	
9	Valve spring seat	8	
10	Valve guide	8	
			For installation, reverse the removal procedure.

EAS24280
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

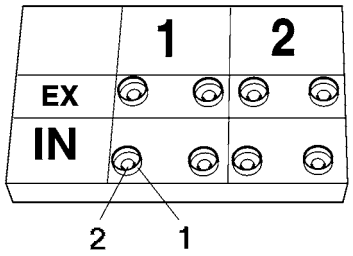
TIP

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Remove:
   - Valve lifter "1"
   - Valve pad "2"

TIP

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



2. Check:
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS" on page 5-21.

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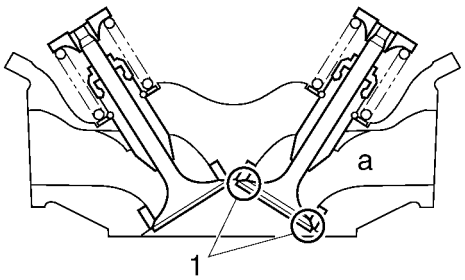
a. Pour a clean solvent "a" into the intake and exhaust ports.
b. Check that the valves properly seal.

TIP

There should be no leakage at the valve seat "1".



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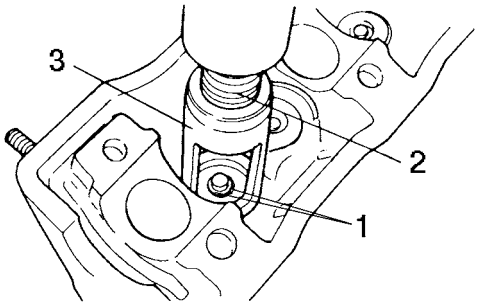
3. Remove:
   - Valve cotters "1"

TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "2" and the valve spring compressor attachment "3".

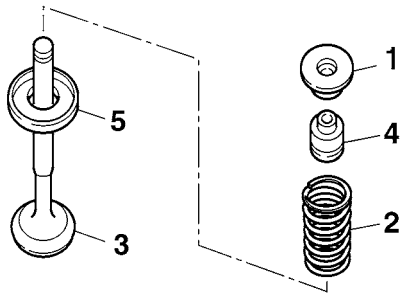
Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-04114
Valve spring compressor adapter 19.5 mm
YM-04114



4. Remove:
   - Upper spring seat "1"
   - Valve spring "2"
   - Valve "3"
   - Valve stem seal "4"
   - Lower spring seat "5"

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



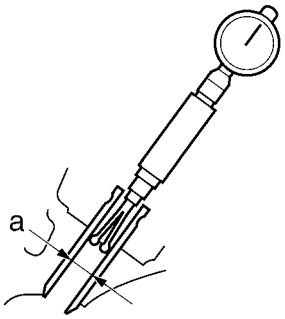
EAS24290
CHECKING THE VALVES AND VALVE GUIDES

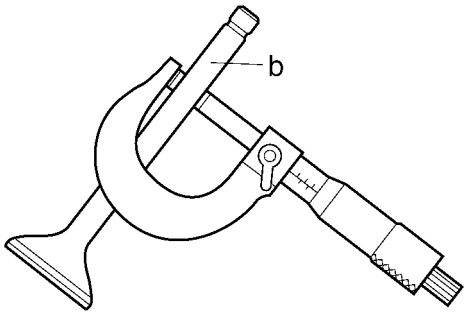
The following procedure applies to all of the valves and valve guides.

1. Measure:
   • Valve-stem-to-valve-guide clearance
   Out of specification → Replace the valve guide.

• Valve-stem-to-valve-guide clearance = Valve guide inside diameter “a” - Valve stem diameter “b”

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





2. Replace:
   • Valve guide

TIP

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

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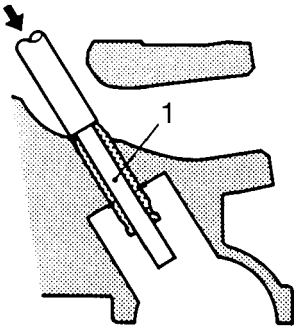
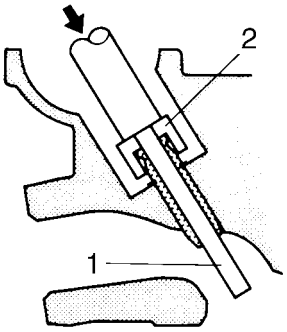
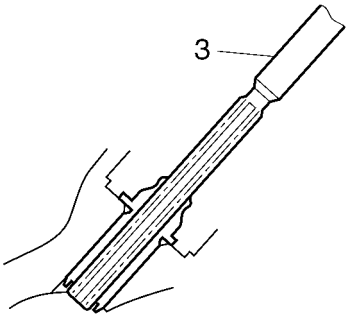
a. Remove the valve guide with the valve guide remover “1”.



b. Install the new valve guide with the valve guide installer “2” and valve guide remover “1”.



c. After installing the valve guide, bore the valve guide with the valve guide reamer “3” to obtain the proper valve-stem-to-valve-guide clearance.



TIP

After replacing the valve guide, reface the valve seat.

Valve guide remover (ø4)
90890-04111
Valve guide remover (4.0 mm)
YM-04111
Valve guide installer (ø4)
90890-04112
Valve guide installer (4.0 mm)
YM-04112
Valve guide reamer (ø4)
90890-04113
Valve guide reamer (4.0 mm)
YM-04113

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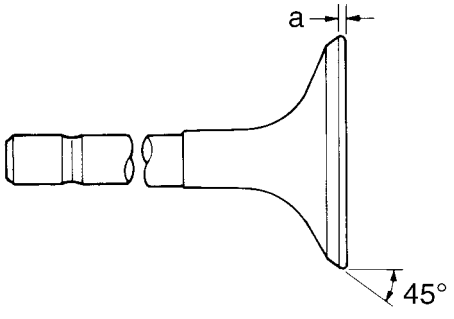
3. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
4. Check:
   • Valve face
   Pitting/wear → Grind the valve face.
   • Valve stem end
   Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   • Valve margin thickness “a”
   Out of specification → Replace the valve.

Valve margin thickness D (intake)
0.60–0.80 mm (0.0236–0.0315 in)
Valve margin thickness D (exhaust)
0.60–0.80 mm (0.0236–0.0315 in)

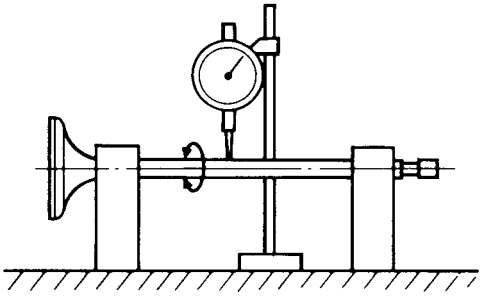


6. Measure:
   • Valve stem runout
   Out of specification → Replace the valve.

TIP

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

Valve stem runout
0.040 mm (0.0016 in)

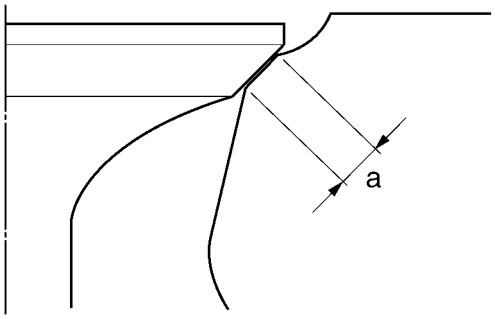


EAS24300
CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
2. Check:
   • Valve seat
   Pitting/wear → Replace the cylinder head.
3. Measure:
   • Valve seat width “a”
   Out of specification → Replace the cylinder head.

Valve seat width C (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)



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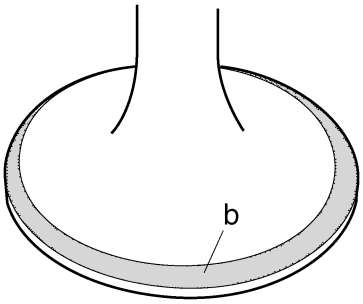
a. Apply Mechanic’s blueing dye (Dykem) “b” onto the valve face.



b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

TIP

Where the valve seat and valve face contacted one another, the blueing will have been removed.

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4. Lap:
   • Valve face
   • Valve seat

TIP

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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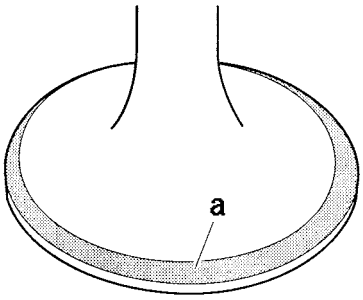
a. Apply a coarse lapping compound “a” to the valve face.

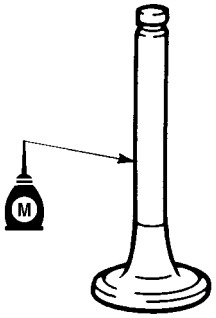
ECA13790

NOTICE

Do not let the lapping compound enter the gap between the valve stem and the valve guide.



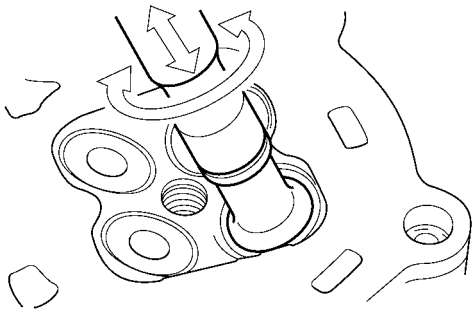
b. Apply molybdenum disulfide oil onto the valve stem.



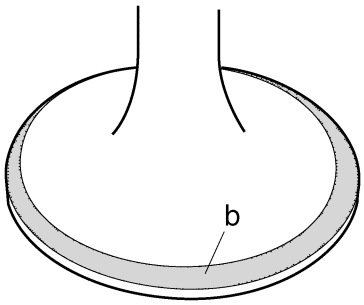
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

TIP

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply Mechanic’s blueing dye (Dykem) “b” onto the valve face.



h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.

j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.

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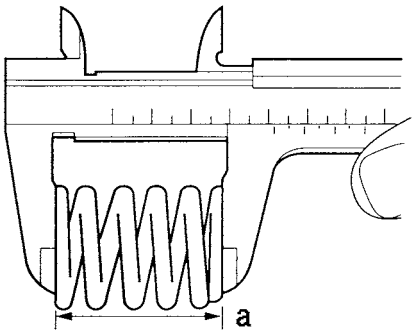
EAS24310

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

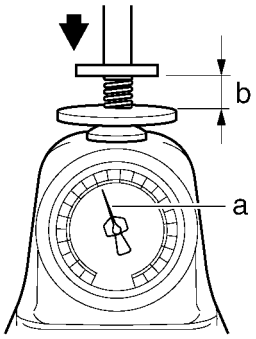
1. Measure:
   • Valve spring free length “a”
   Out of specification → Replace the valve spring.

Free length (intake)
35.59 mm (1.40 in)
Limit
33.81 mm (1.33 in)
Free length (exhaust)
35.59 mm (1.40 in)
Limit
33.81 mm (1.33 in)



2. Measure:
   • Compressed valve spring force “a”
   Out of specification → Replace the valve spring.

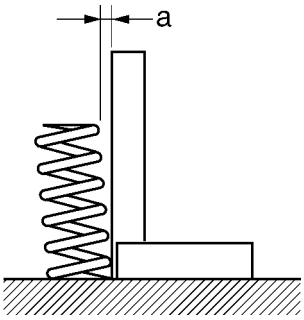
Installed compression spring force (intake)
91.2–104.9 N (20.50–23.59 lbf) (9.3–10.7 kgf)
Installed compression spring force (exhaust)
91.2–104.9 N (20.50–23.59 lbf) (9.3–10.7 kgf)
Installed length (intake)
30.39 mm (1.20 in)
Installed length (exhaust)
30.39 mm (1.20 in)



b. Installed length

3. Measure:
   • Valve spring tilt “a”
   Out of specification → Replace the valve spring.

Spring tilt (intake)
2.5°/1.6 mm
Spring tilt (exhaust)
2.5°/1.6 mm

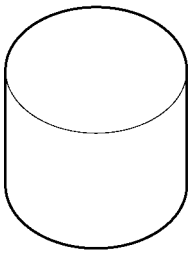


EAS24320

CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

1. Check:
   • Valve lifter
   Damage/scratches → Replace the valve lifters and cylinder head.

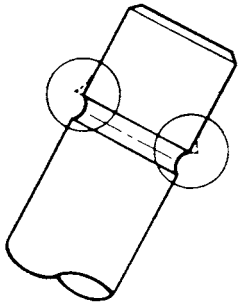


EAS24340

INSTALLING THE VALVES

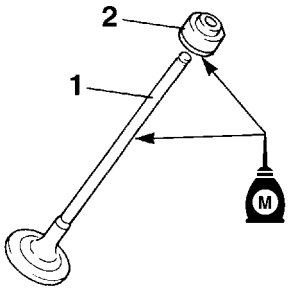
The following procedure applies to all of the valves and related components.

1. Deburr:
   • Valve stem end
   (with an oil stone)



2. Lubricate:
   • Valve stem “1”
   • Valve stem seal “2”
   (with the recommended lubricant)

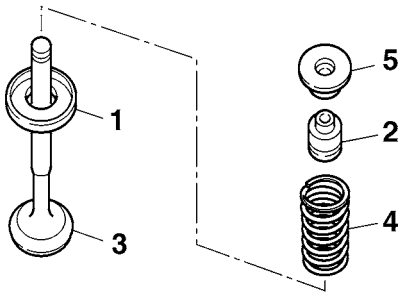
	Recommended lubricant **Molybdenum disulfide oil**

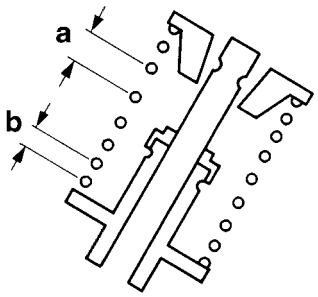


3. Install:
   • Lower spring seat “1”
   • Valve stem seal “2”
   • Valve “3”
   • Valve spring “4”
   • Upper spring seat “5”
   (into the cylinder head)

TIP

• Make sure each valve is installed in its original place.
• Install the valve springs with the larger pitch “a” facing up.





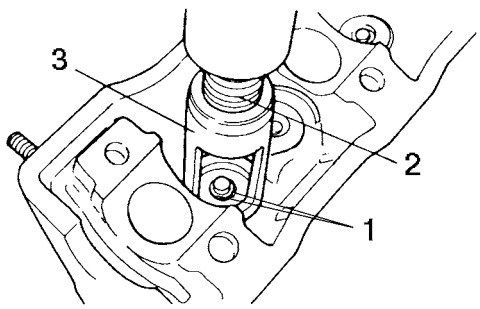
b. Smaller pitch

4. Install:
   • Valve cotters “1”

TIP

Install the valve cotters by compressing the valve spring with the valve spring compressor “2” and the valve spring compressor attachment “3”.

	Valve spring compressor **90890-04019** **YM-04019** **Valve spring compressor attachment** **90890-04114** **Valve spring compressor adapter 19.5 mm** **YM-04114**

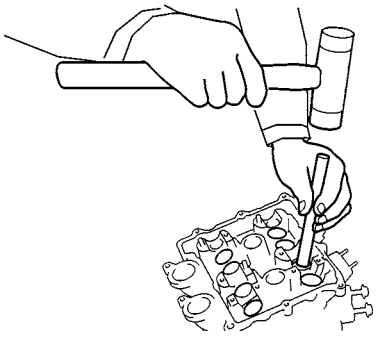


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

NOTICE

Hitting the valve tip with excessive force could damage the valve.



6. Lubricate:
   • Valve pad
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

7. Lubricate:
   • Valve lifter
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

8. Install:
   • Valve pad
   • Valve lifter

ECA4B51016

NOTICE

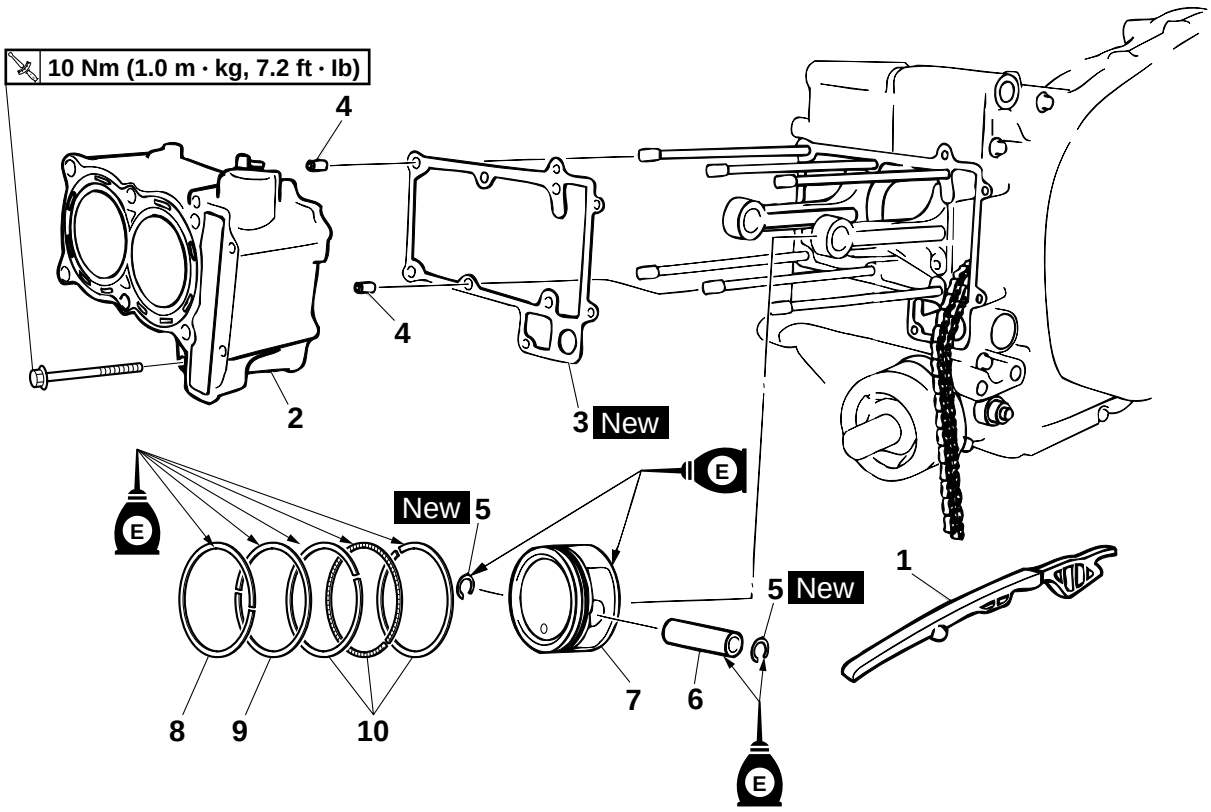
After making sure that the valve pads are fully inserted, install the valve lifter taking care so that the pads do not fall.

TIP

- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

EAS24370
CYLINDER AND PISTONS

Removing the cylinder and pistons



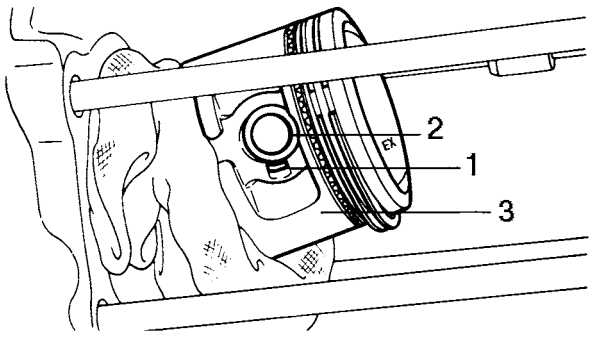
Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	4	
6	Piston pin	2	
7	Piston	2	
8	Piston ring set	2	
9	2nd ring	2	
10	Oil ring	2	
			For installation, reverse the removal procedure.

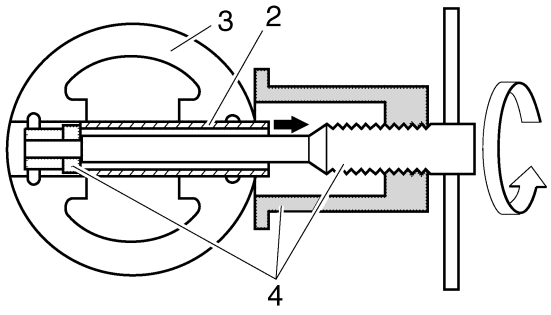
EAS24380
REMOVING THE PISTONS
The following procedure applies to all of the piston.
1. Remove:
   - Piston pin clips “1”
   - Piston pin “2”
   - Piston “3”

ECA13810
NOTICE
Do not use a hammer to drive the piston pin out.

TIP
- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- For reference during installation, put an identification mark on each piston crown.
- Before removing the piston pin, deburr the piston pin clip’s groove and the piston’s pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “4”.

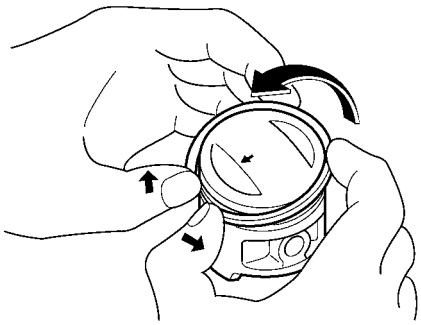
Piston pin puller set
90890-01304
Piston pin puller
YU-01304





2. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

TIP
When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24400
CHECKING THE CYLINDERS AND PISTONS
The following procedure applies to all of the cylinders and pistons.
1. Check:
   - Piston wall
   - Cylinder wall
     Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - Piston-to-cylinder clearance

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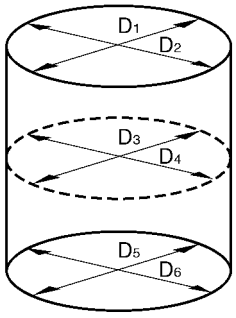
a. Measure cylinder bore “C” with the cylinder bore gauge.

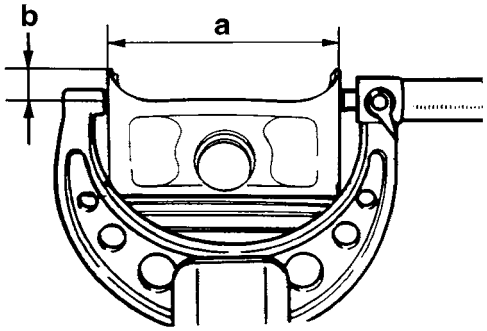
TIP
Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

Bore
66.000–66.010 mm (2.5984–2.5988 in)
Taper limit
0.050 mm (0.0020 in)
Out of round limit
0.050 mm (0.0020 in)

“C” = maximum of D_1–D_2
“T” = maximum of D_1 or D_2 - maximum of D_5 or D_6
“R” = maximum of D_1, D_3 or D_5 - minimum of D_2, D_4 or D_6



b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
c. Measure piston skirt diameter D “a” with the micrometer.



b. 9.0 mm (0.35 in) from the bottom edge of the piston

Piston
Diameter D
65.965–65.980 mm (2.5970–2.5976 in)

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

• Piston-to-cylinder clearance =
Cylinder bore “C” -
Piston skirt diameter “P”

Piston-to-cylinder clearance
0.020–0.045 mm (0.0008–0.0018 in)
Limit
0.15 mm (0.0059 in)

f. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

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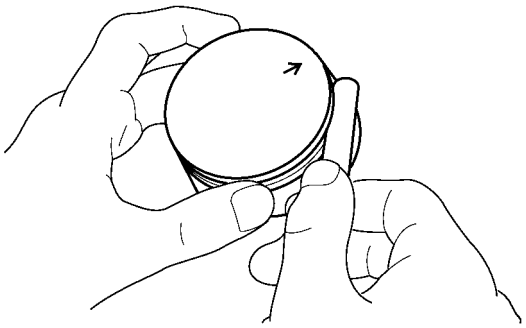
EAS24430
CHECKING THE PISTON RINGS

1. Measure:
• Piston ring side clearance
Out of specification → Replace the piston and piston rings as a set.

TIP

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

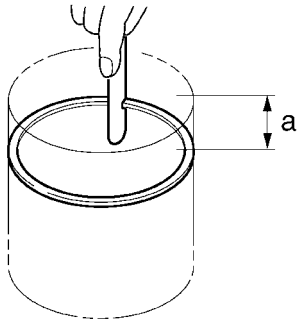
Piston ring
Top ring
Ring side clearance
0.030–0.065 mm (0.0012–0.0026 in)
2nd ring
Limit
0.100 mm (0.0039 in)
Ring side clearance
0.020–0.055 mm (0.0008–0.0022 in)
Limit
0.100 mm (0.0039 in)



2. Install:
• Piston ring
(into the cylinder)

TIP

Level the piston ring into the cylinder with the piston crown.



a. 10 mm (0.39 in)

3. Measure:
   • Piston ring end gap
   Out of specification → Replace the piston ring.

TIP

The oil ring expander spacer end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.

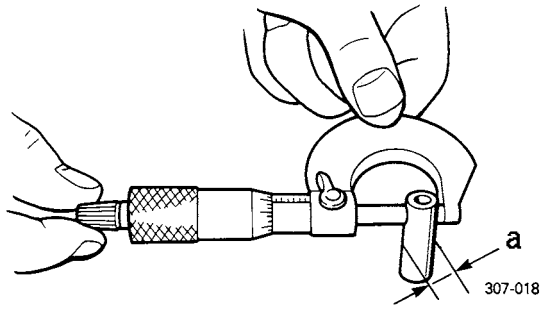
Piston ring
Top ring
End gap (installed)
0.15–0.25 mm (0.0059–0.0098 in)
Limit
0.50 mm (0.0197 in)
2nd ring
End gap (installed)
0.40–0.50 mm (0.0157–0.0197 in)
Limit
0.75 mm (0.0295 in)
Oil ring
End gap (installed)
0.10–0.35 mm (0.0039–0.0138 in)

EAS24440
CHECKING THE PISTON PINS

The following procedure applies to both of the piston pins.

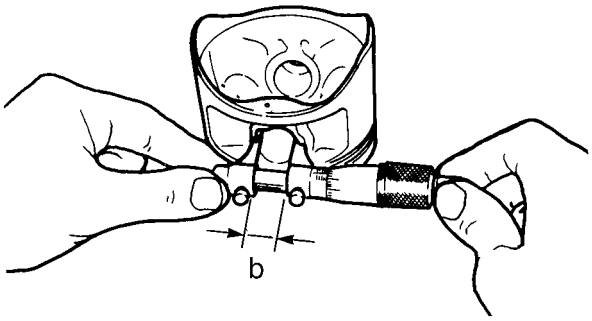
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter “a”
   Out of specification → Replace the piston pin.

Piston pin outside diameter
14.991–15.000 mm (0.5902–0.5906 in)
Limit
14.971 mm (0.5894 in)



3. Measure:
   • Piston pin bore diameter “b”
   Out of specification → Replace the piston.

Piston pin bore inside diameter
15.002–15.013 mm (0.5906–0.5911 in)
Limit
15.043 mm (0.5922 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
0.002–0.022 mm (0.0001–0.0009 in)

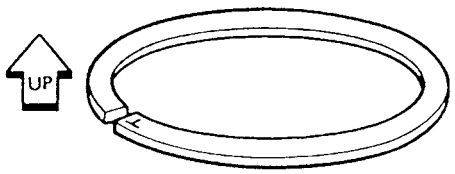
EAS24470
INSTALLING THE PISTONS AND CYLINDER

The following procedure applies to all of the pistons and cylinders.

1. Install:
   • Top ring
   • 2nd ring
   • O-ring

TIP

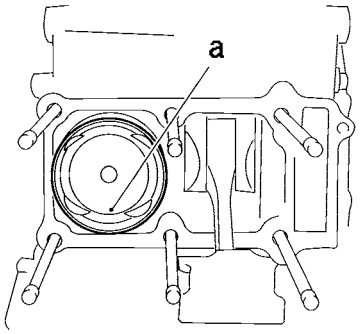
Be sure to install the top and 2nd rings so that the manufacturer marks or numbers face up.

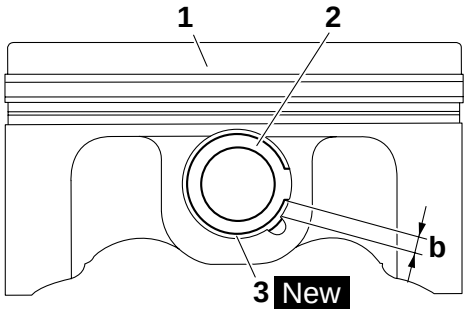


2. Install:
   - Piston “1”
   - Piston pin “2”
   - Piston pin clips “3” New

TIP

- Apply engine oil onto the piston pin.
- Make sure the mark “a” on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Install the piston pin clips so that the clip ends are 3 mm (0.12 in) “b” or more from the cutout in the piston.
- Reinstall each piston into its original cylinder.

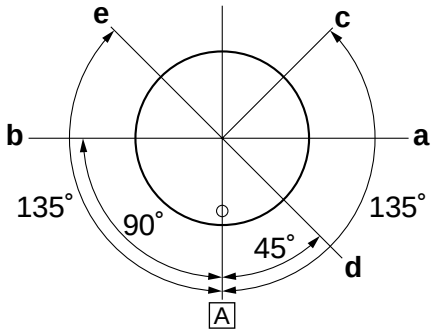




3. Install:
   - Dowel pins
   - Cylinder gasket New
4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

5. Offset:
   - Piston ring end gaps



a. Top ring
b. 2nd ring
c. Upper oil ring rail
d. Oil ring expander
e. Lower oil ring rail
A. forward

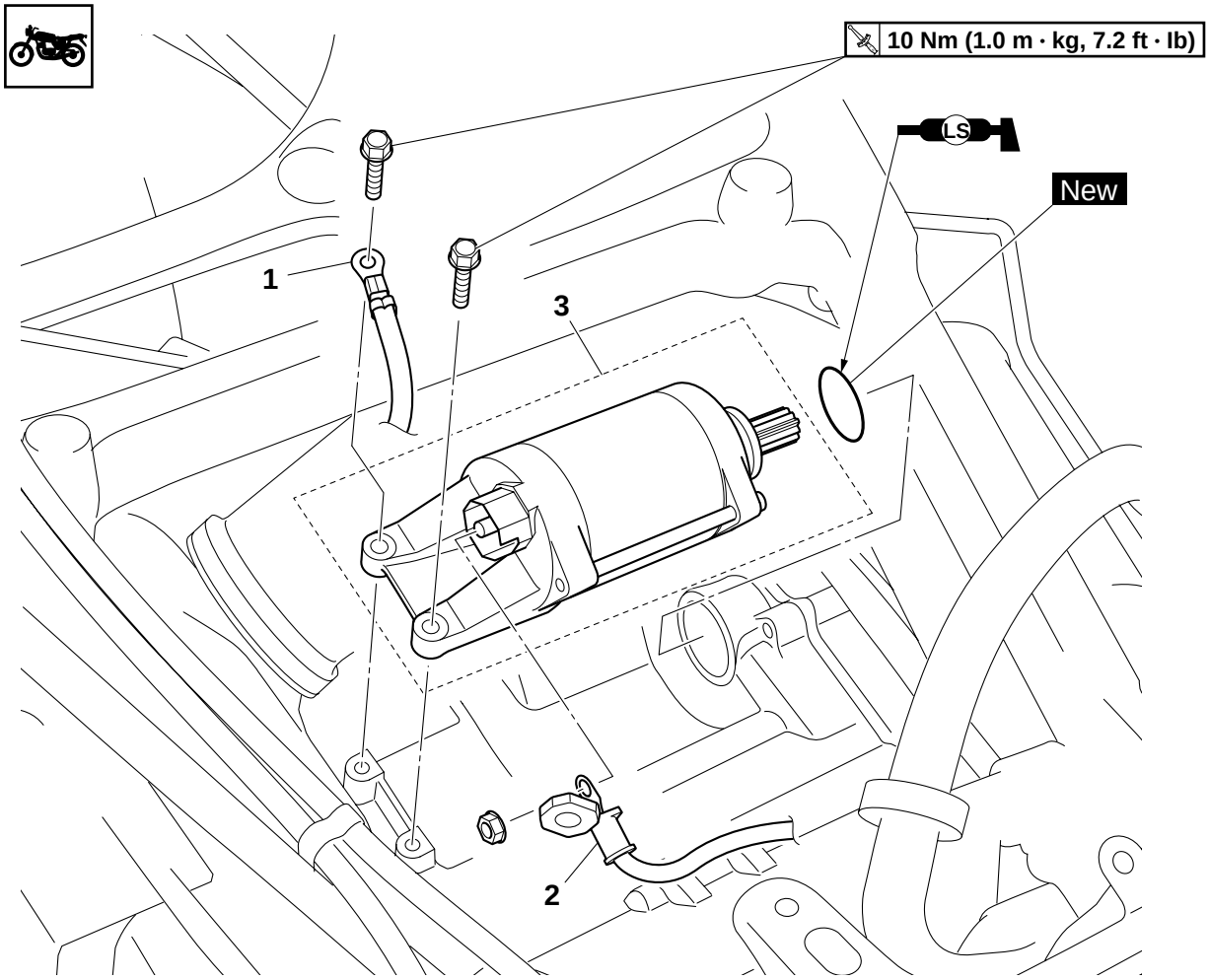
6. Install:
   - Cylinder

TIP

- While compressing the piston rings, install the cylinder.
- Pass the timing chain and timing chain guide (intake side) through the timing chain cavity.

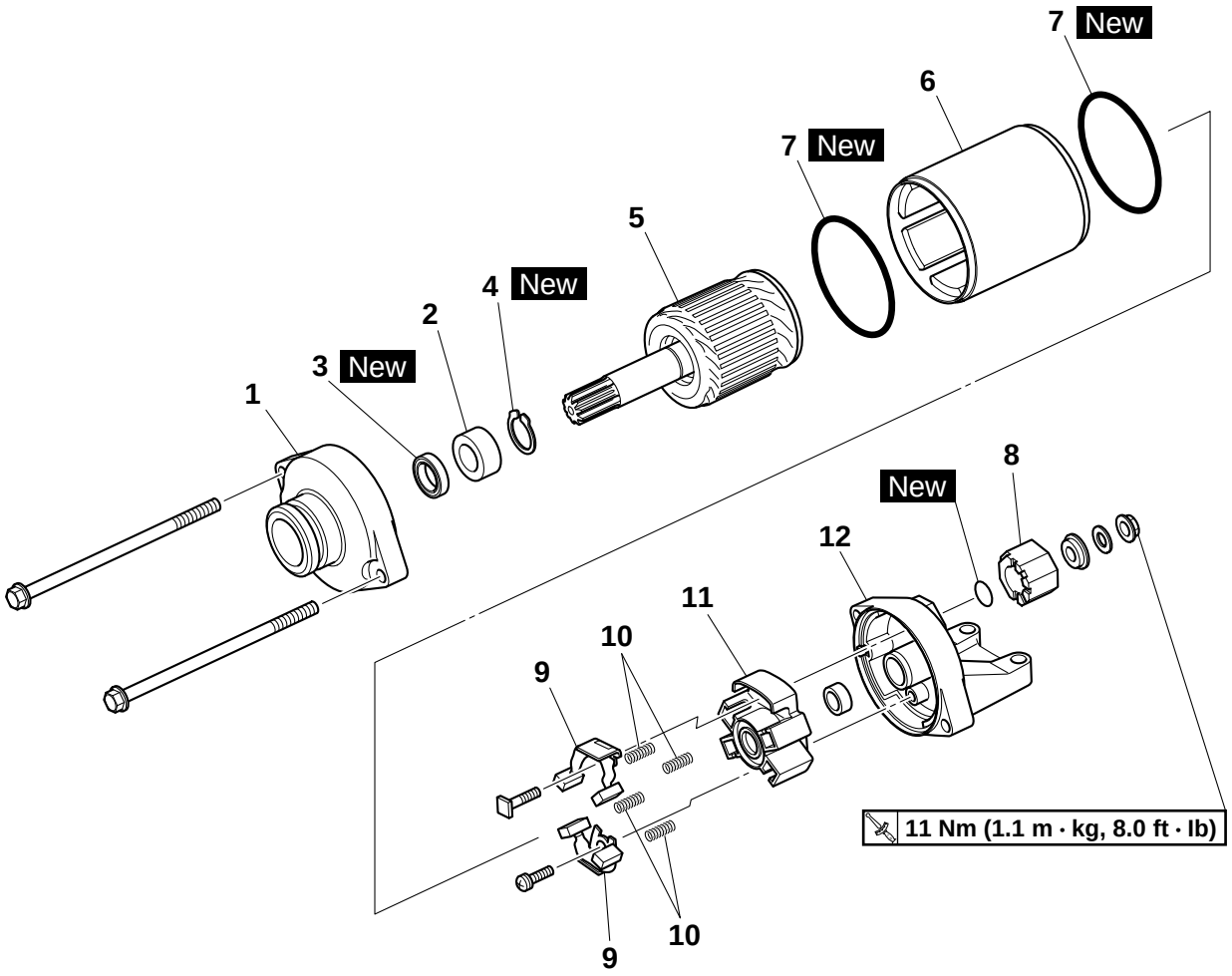
EAS24780
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Negative battery lead	1	
2	Starter motor lead	1	
3	Starter motor	1	
			For installation, reverse the removal procedure.

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Starter motor front cover	1	
2	Bearing	1	
3	Oil seal	1	
4	Circlip	1	
5	Armature assembly	1	
6	Starter motor yoke	1	
7	O-ring	2	
8	Insulator	1	
9	Brush	2	
10	Brush spring	4	
11	Brush holder	1	
12	Starter motor rear cover	1	
			For assembly, reverse the disassembly procedure.

EAS24790
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   • Mica undercut “a”
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut (depth)
0.70 mm (0.03 in)

TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.

3. Measure:
   • Armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

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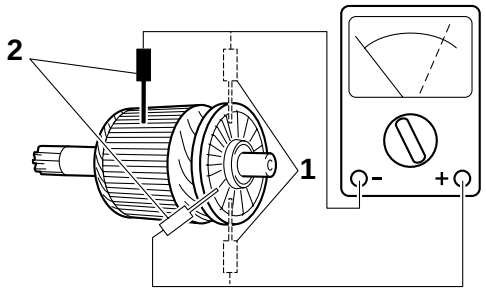
a. Measure the armature assembly resistances with the pocket tester.

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

Armature coil
Commutator coil resistance “1”
0.0100–0.0200 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.



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4. Measure:
   • Brush length “a”
   Out of specification → Replace the brushes as a set.

Limit
6.50 mm (0.26 in)

5. Measure:
   • Brush spring force
   Out of specification → Replace the brush springs as a set.

Brush spring force
6.02–6.51 N (21.69–23.45 oz)
(614–664 gf)

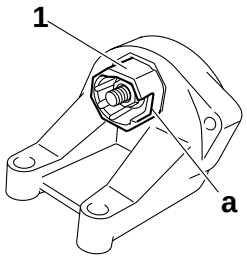
6. Check:
   • Gear teeth
   Damage/wear → Replace the armature assembly.

EAS24800
ASSEMBLING THE STARTER MOTOR

1. Install:
   • Insulator “1”

TIP

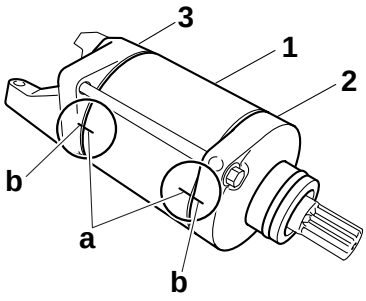
Install the insulator so that the slot “a” is positioned as shown in the illustration.



2. Install:
   - Starter motor yoke “1”
   - Starter motor front cover “2”
   - Starter motor rear cover “3”

TIP

Align the match marks “a” on the starter motor yoke with the match marks “b” on the front and starter motor rear covers.



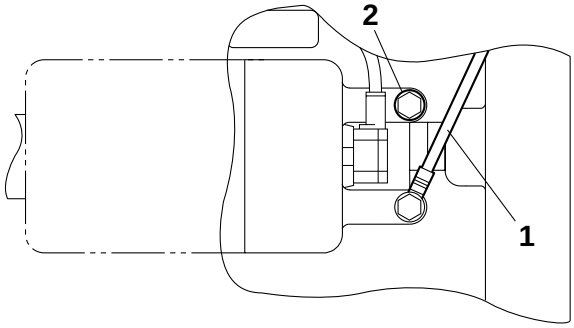
EAS24810

INSTALLING THE STARTER MOTOR

1. Connect:
   - Negative battery lead “1”

TIP

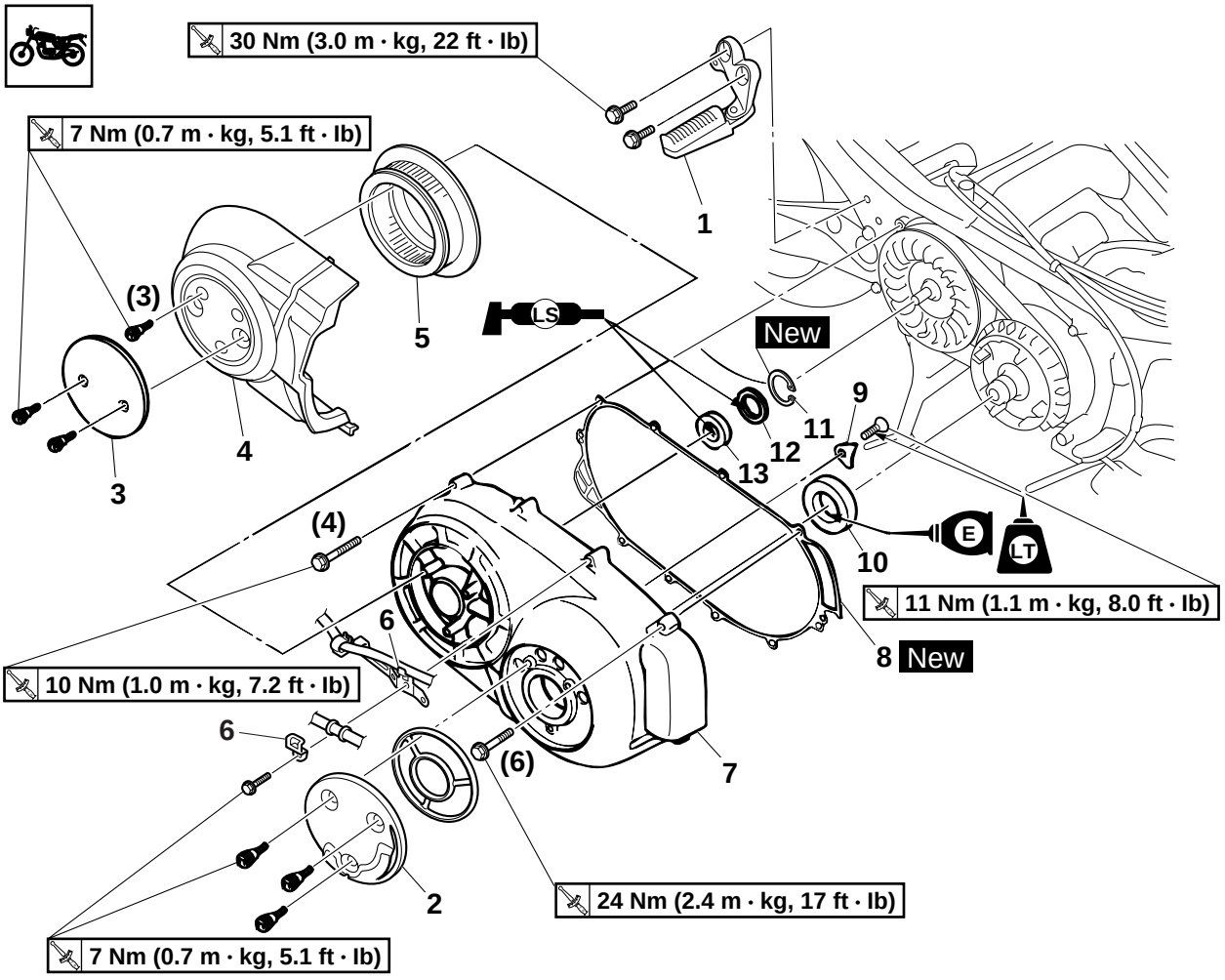
Make sure that the negative battery lead “1” does not touch the starter motor bolt “2”.



EAS24610

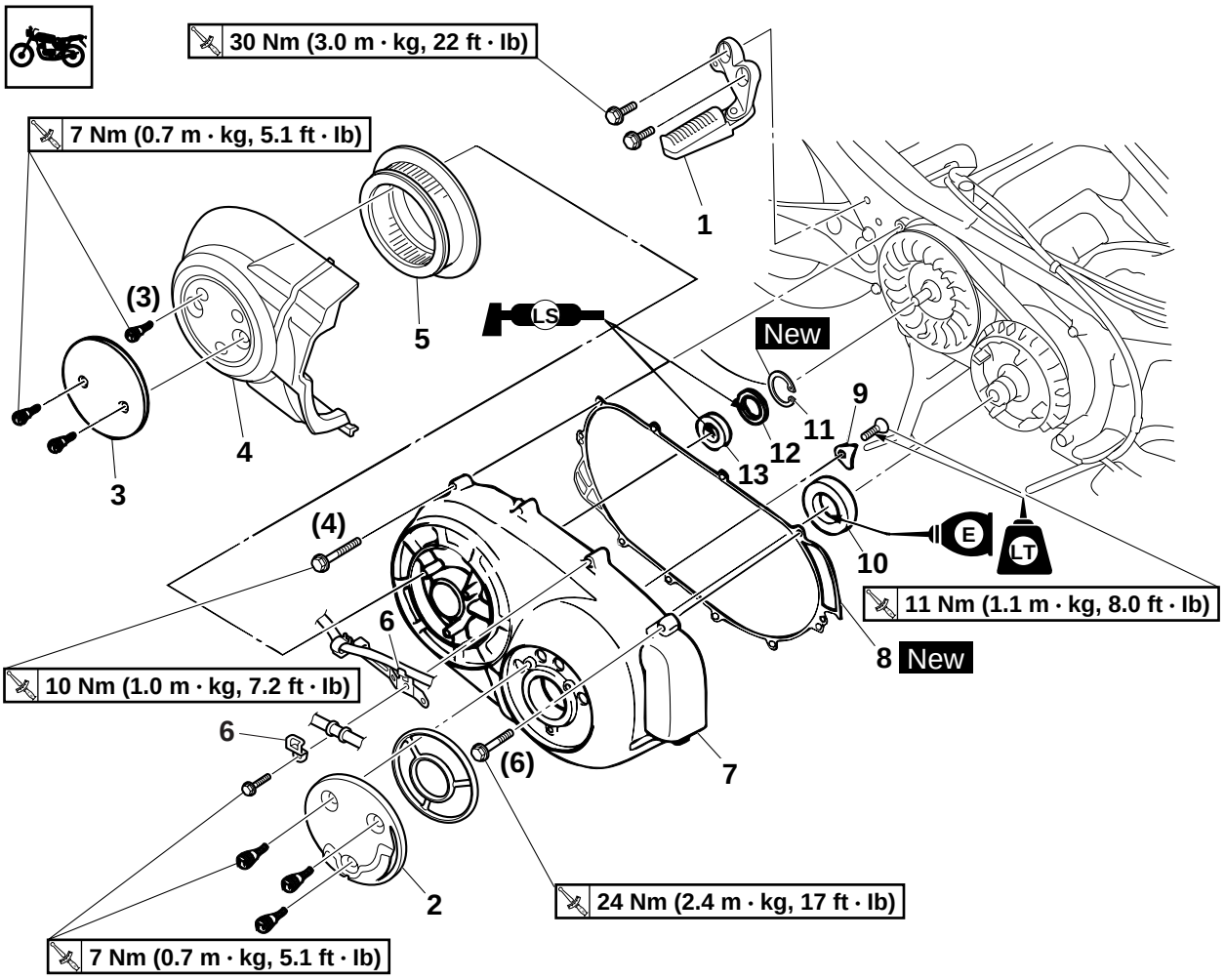
V-BELT AUTOMATIC TRANSMISSION

Removing the V-belt case cover



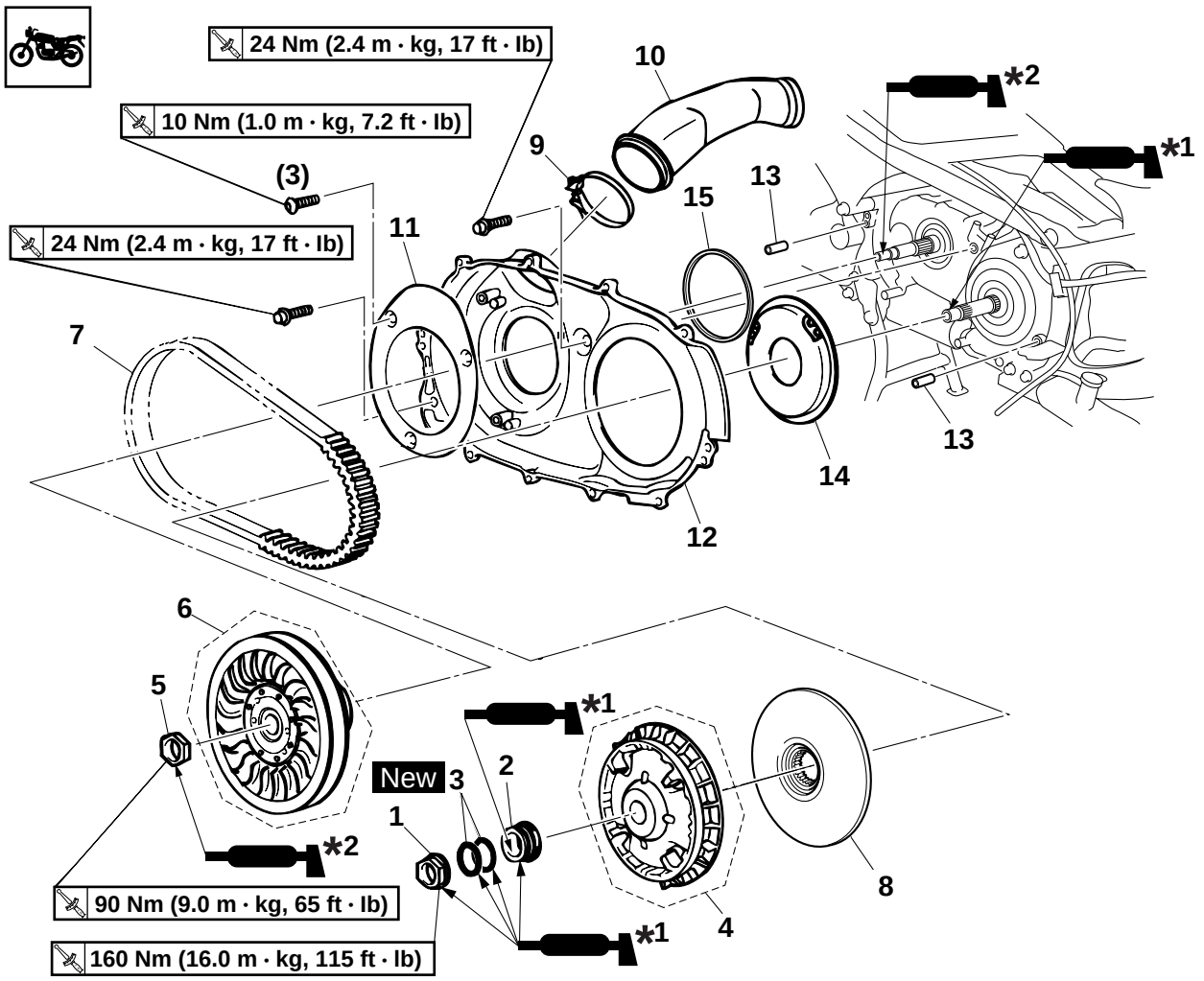
Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	V-belt case air filter element (left)		Refer to "WATER PUMP" on page 6-9.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
1	Right passenger footrest	1	
2	Crankshaft end access cover	1	
3	V-belt case air filter case cover	1	
4	V-belt case air filter case	1	
5	V-belt case air filter element (right)	1	
6	Rear brake lock cable holder	1	
7	Outer V-belt case	1	
8	Outer V-belt case gasket	1	
9	Bearing retainer	1	
10	Bearing	1	
11	Circlip	1	

Removing the V-belt case cover



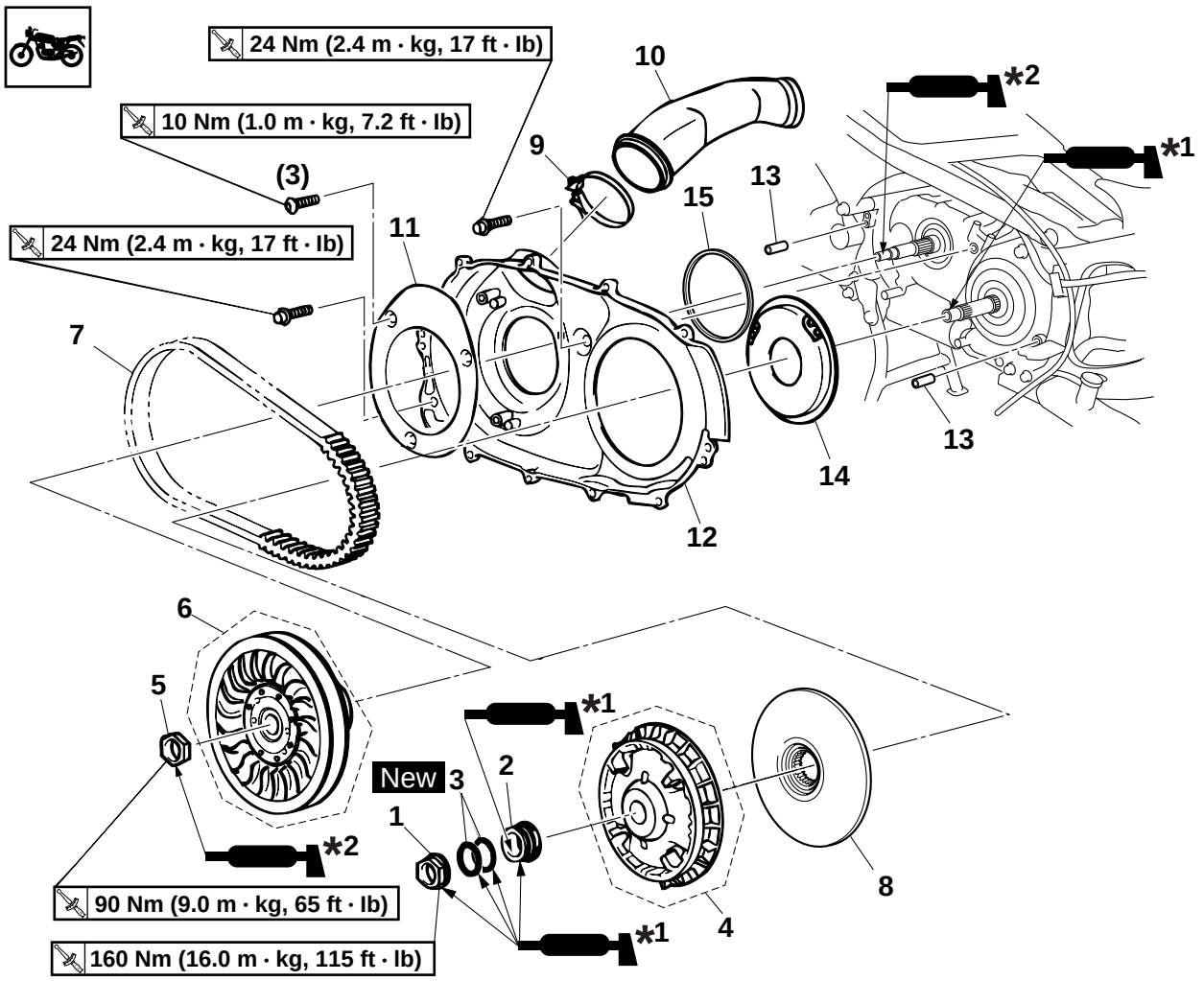
Order	Job/Parts to remove	Q'ty	Remarks
12	Oil seal	1	
13	Bearing	1	
			For installation, reverse the removal procedure.

Removing the V-belt and primary/secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Primary sheave nut	1	
2	Spacer	1	
3	O-ring	2	
4	Primary sheave assembly	1	
5	Secondary sheave nut	1	
6	Secondary sheave assembly	1	
7	V-belt	1	
8	Primary fixed sheave	1	
9	V-belt case air duct joint clamp	1	Loosen.
10	V-belt case air duct	1	
11	Inner V-belt case plate	1	
12	Inner V-belt case	1	
13	Dowel pin	2	
14	Plate	1	

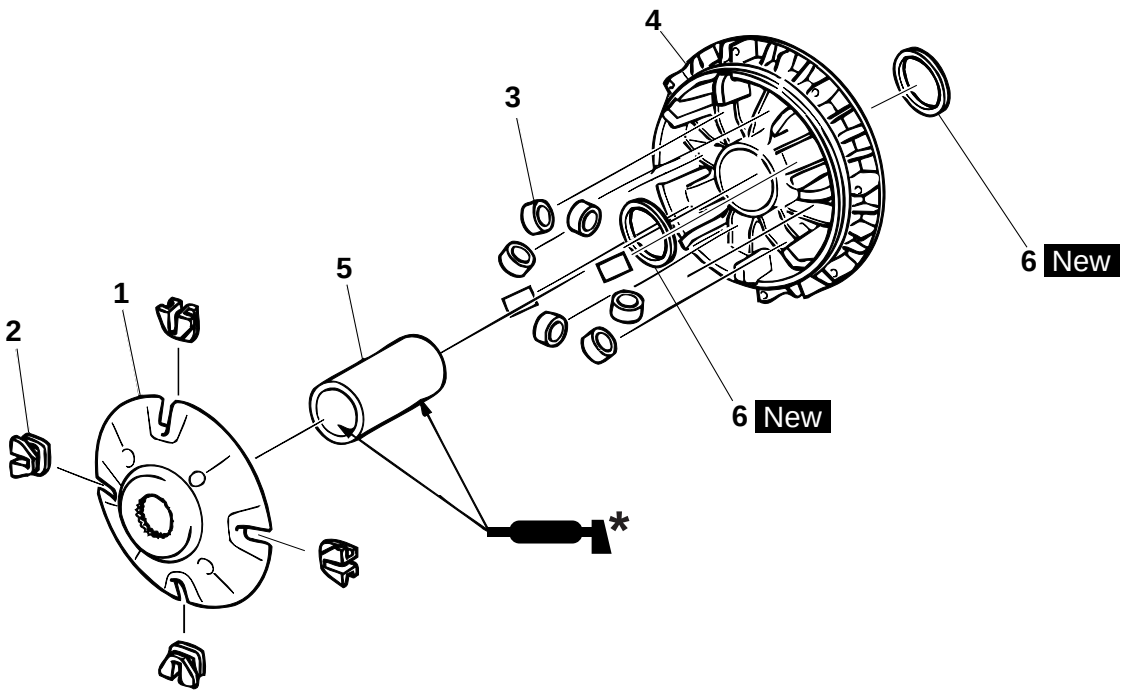
Removing the V-belt and primary/secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
15	Inner V-belt case seal	1	
			For installation, reverse the removal procedure.

*1 Apply Shell BT grease 3®.
*2 Apply BEL-RAY assembly lube®.

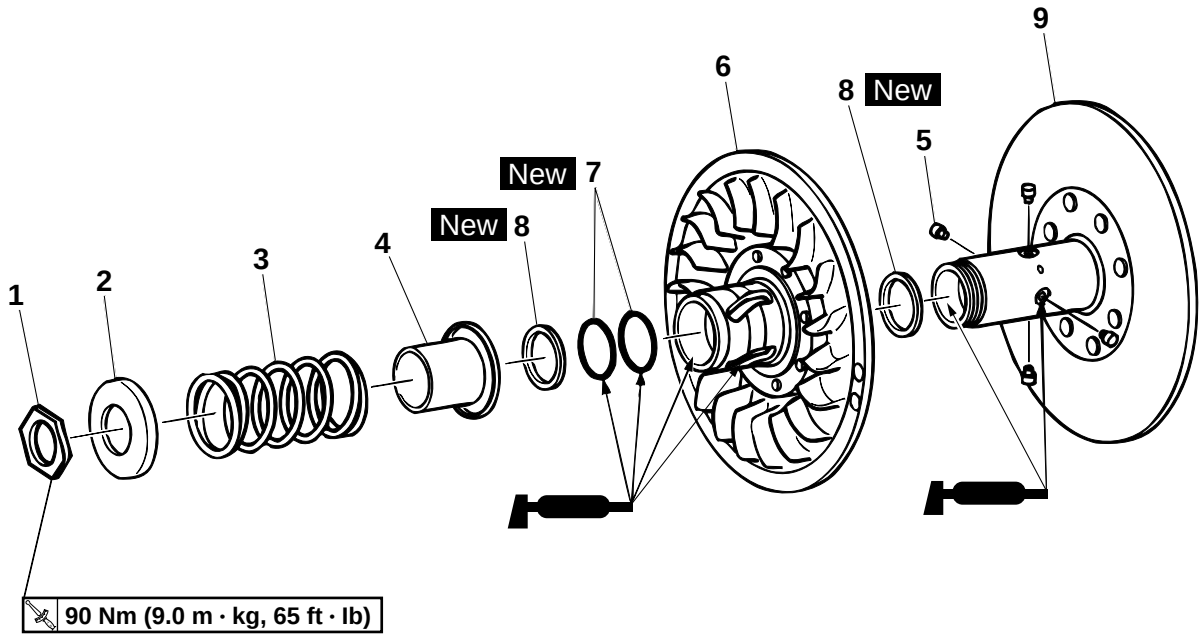
Disassembling the primary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Cam	1	
2	Slider	4	
3	Primary sheave weight	8	
4	Primary sliding sheave	1	
5	Collar	1	
6	Oil seal	2	
			For assembly, reverse the disassembly procedure.

* Apply BEL-RAY assembly lube®.

Disassembling the secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Secondary sheave spring seat nut	1	
2	Upper spring seat	1	
3	Secondary sheave compression spring	1	
4	Spring seat	1	
5	Guide pin	4	
6	Secondary sliding sheave	1	
7	O-ring	2	
8	Oil seal	2	
9	Secondary fixed sheave	1	
			For assembly, reverse the disassembly procedure.

* Apply BEL-RAY assembly lube®.

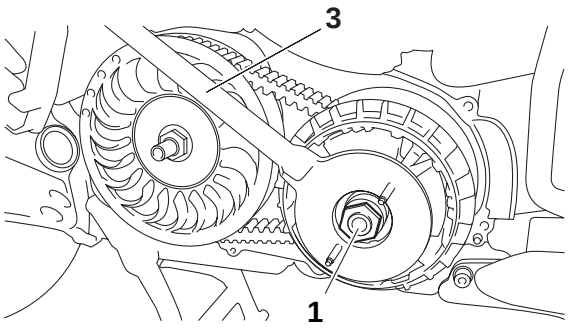
EAS4B51022
REMOVING THE PRIMARY SHEAVE AND SECONDARY SHEAVE

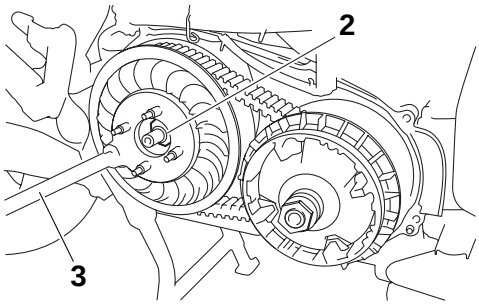
1. Remove:
   - Primary sheave nut “1”
   - Secondary sheave nut “2”

TIP

While holding the primary and secondary sheave with the sheave holder “3”, loosen the nut.

Sheave holder
90890-01481

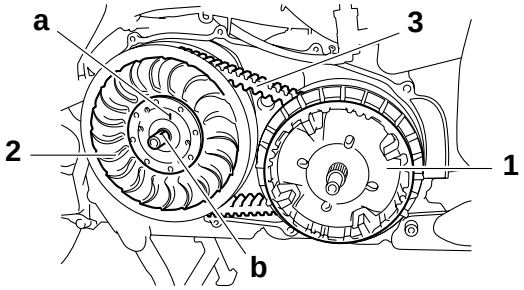




2. Remove:
   - Primary sheave assembly “1”
   - Secondary sheave assembly “2”
   - V-belt “3”

TIP

- Before removal, put alignment marks “a” and “b” as shown.
- Align these marks during reassembly.



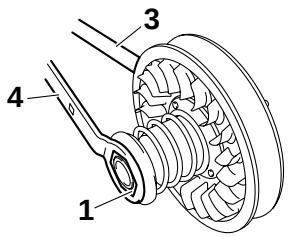
EAS24640
DISASSEMBLING THE SECONDARY SHEAVE

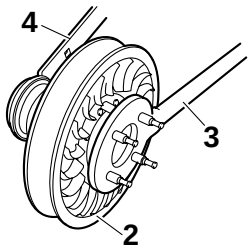
1. Loosen:
   - Secondary sheave spring seat nut “1”

TIP

- While holding the secondary fixed sheave “2” with the sheave holder “3”, loosen the secondary sheave spring seat nut with the locknut wrench “4”.
- Do not loosen the secondary sheave spring seat nut “1” more than 1/4 turn.

Sheave holder
90890-01481
Locknut wrench
90890-01348
YM-01348



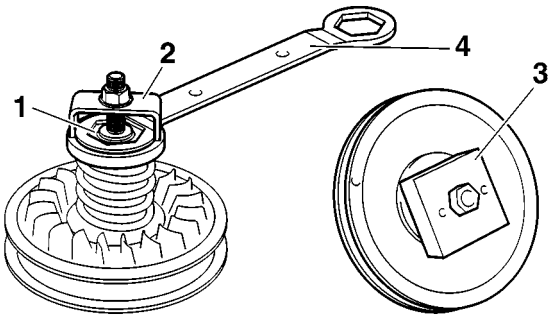


2. Remove:
   - Secondary sheave spring seat nut “1”

TIP

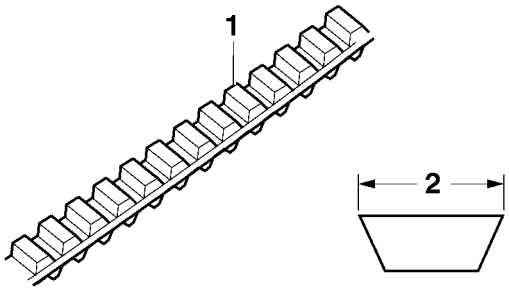
Install the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave assembly as shown. Then, compress the spring, and remove the secondary sheave spring seat nut with locknut wrench “4”.

Sheave spring compressor
90890-04134
YM-04134
Locknut wrench
90890-01348
YM-01348
Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135



EAS24670
CHECKING THE V-BELT
1. Check:
   • V-belt "1"
   Cracks/damage/wear → Replace.
   Grease/oil → Clean the primary and secondary sheave.
2. Measure:
   • V-belt width "2"
   Out of specification → Replace.

V-belt width
32.0 mm (1.26 in)
Limit
30.5 mm (1.20 in)

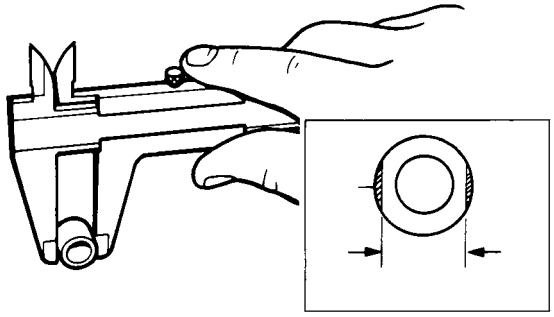


EAS24680
CHECKING THE PRIMARY SHEAVE
1. Check:
   • Primary sliding sheave
   • Primary fixed sheave
   Cracks/damage/wear → Replace the primary sliding sheave and primary fixed sheave as a set.

EAS4B51023
CHECKING THE V-BELT CASE AIR DUCT
1. Check:
   • V-belt case air duct
   Cracks/damage → Replace.

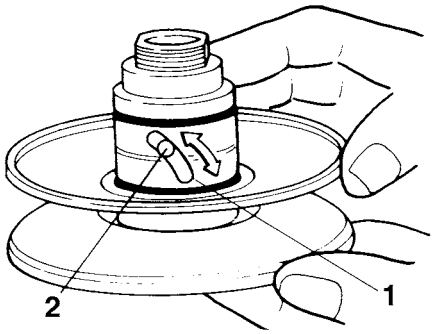
EAS24690
CHECKING THE PRIMARY SHEAVE WEIGHTS
The following procedure applies to all of the primary sheave weights.
1. Check:
   • Primary sheave weight
   Cracks/damage/wear → Replace.
2. Measure:
   • Primary sheave weight outside diameter
   Out of specification → Replace.

Primary sheave weight outside diameter
25.0 mm (0.98 in)
Limit
24.5 mm (0.96 in)



EAS24700
CHECKING THE SLIDERS
The following procedure applies to all of the sliders.
1. Check:
   • Slider
   Cracks/damage/wear → Replace.

EAS24710
CHECKING THE SECONDARY SHEAVE
1. Check:
   • Secondary fixed sheave
   • Secondary sliding sheave
   Cracks/damage/wear → Replace the secondary fixed and sliding sheaves as a set.
2. Check:
   • Torque cam groove "1"
   Damage/wear → Replace the secondary fixed and sliding sheaves as a set.
3. Check:
   • Guide pin "2"
   Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

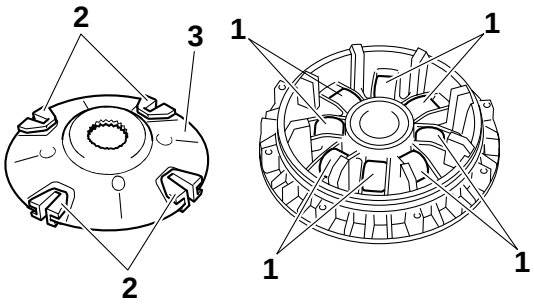


EAS24720
ASSEMBLING THE PRIMARY SHEAVE

1. Clean:
   - Primary fixed sheave
   - Primary sliding sheave
   - Collar
   - Cam
   - Primary sheave weights
2. Install:
   - Primary sheave weights “1”
   - Sliders “2”
   - Cam “3”

TIP

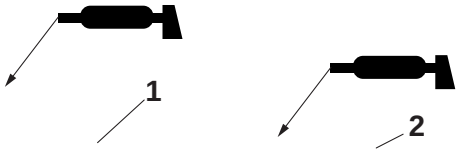
Do not apply the grease inside of the primary sheave.



EAS24730
ASSEMBLING THE SECONDARY SHEAVE

1. Lubricate:
   - Secondary fixed sheave inner surface “1”
   - Secondary sliding sheave inner surface “2”
   - Grease nipple groove
   - Oil seals New

	Recommended lubricant **BEL-RAY assembly lube®**

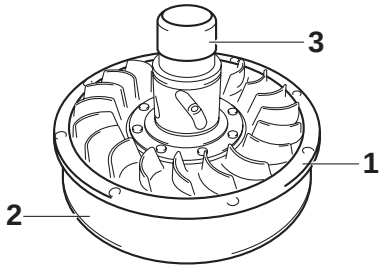


2. Install:
   - Secondary sliding sheave “1”

TIP

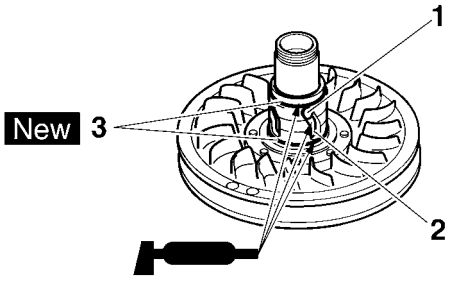
Install the secondary sliding sheave onto the secondary fixed sheave “2” with the oil seal guide “3”.

	Oil seal guide (ø41) **90890-01396**



3. Install:
   - Guide pins “1”
4. Lubricate:
   - Guide pin groove “2”
   - O-rings “3” New
     (with the recommended lubricant)

	Recommended lubricant **BEL-RAY assembly lube**

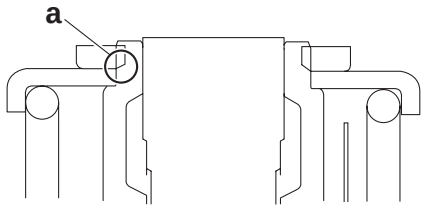


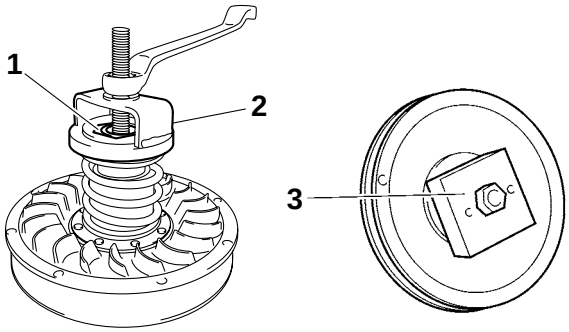
5. Install:
   - Secondary sheave spring seat nut “1”

TIP

- Install the secondary sheave spring seat nut with its beveled side “a” facing the spring seat.
- Attach the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave as shown.
  Then compress the spring, and temporarily tighten the secondary sheave spring seat nut.

Sheave spring compressor
90890-04134
YM-04134
Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135





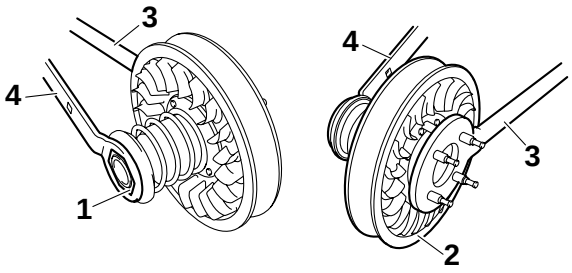
6. Tighten:
   - Secondary sheave spring seat nut “1”

TIP

While holding the secondary fixed sheave “2” with the rotor holding tool “3”, tighten the secondary sheave spring seat nut “1” with the locknut wrench “4”.

Sheave holder
90890-01481
Locknut wrench
90890-01348
YM-01348

Secondary sheave spring seat nut
90 Nm (9.0 m·kg, 65 ft·lb)

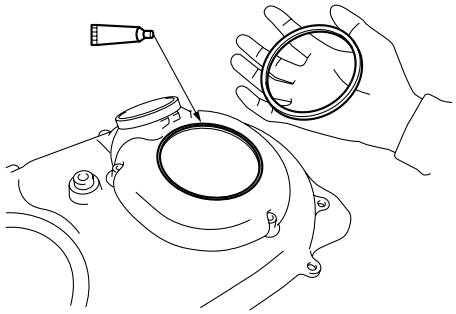


EAS4B51024

INSTALLING THE PRIMARY SHEAVE ASSEMBLY, SECONDARY SHEAVE ASSEMBLY AND V-BELT

1. Apply:
   - Sealant
     (onto the inner V-belt case seal)

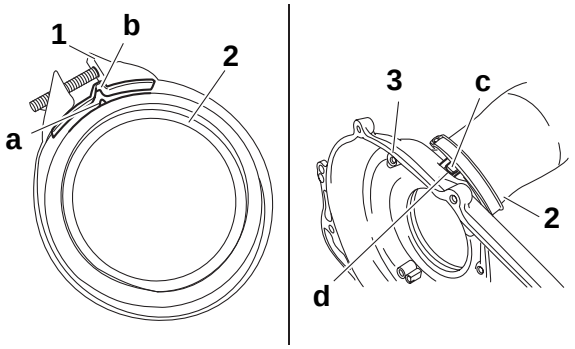
Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)



2. Install:
   - V-belt case air duct joint clamp “1”
   - V-belt case air duct “2”

TIP

- Align the projection “a” in the V-belt case air duct “2” with the slot “b” on the V-belt case air duct joint clamp “1”.
- Align the projection “c” in the V-belt case air duct “2” with the slot “d” in the inner V-belt case “3”.



3. Install:
   • Primary fixed sheave “1”
   • V-belt “2”
   • Secondary sheave assembly “3”

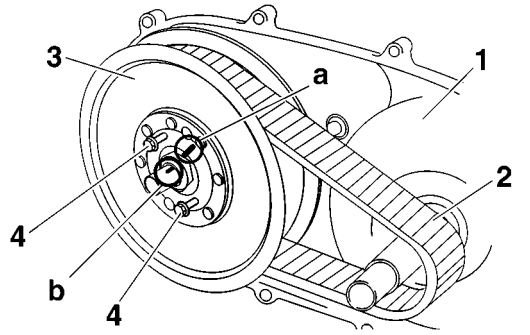
ECA4B51017

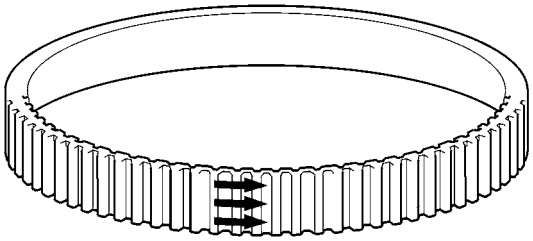
NOTICE

Do not allow grease to contact the V-belt, primary and secondary sheave.

TIP

- When installing the belt, screw M6 (more than 45 mm (1.77 in)) bolts “4” to spread apart the secondary sheave and then install the V-belt. Make sure to install the V-belt with the arrows facing in the direction shown.
- Install the V-belt and secondary sheave assembly then pass the V-belt the primary sheave side.
- Align the “a” and “b” during reassembly.



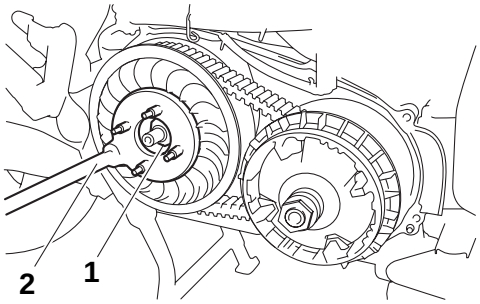


4. Tighten:
   • Secondary sheave nut “1”

TIP

While holding the secondary sheave with the sheave holder “2”, tighten the secondary sheave nut.

	**Secondary sheave nut** **90 Nm (9.0 m·kg, 65 ft·lb)**
	**Sheave holder** **90890-01481**



5. Tighten:
   • Primary sheave nut “1”

ECA4B51022

NOTICE

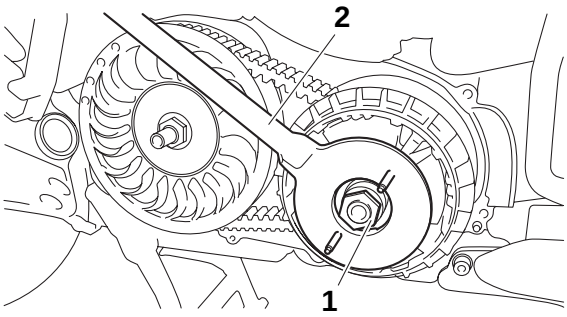
- **Before tightening the nut to remount the primary sheave, make sure that the serrations of the cam are fitted firmly into the serrations of the crankshaft.**
- **Also, make sure that cam is properly seated.**
- **Apply grease to the thread and seat of the primary sheave nut.**

	Recommended lubricant **Shell BT grease 3®**

TIP

While holding the primary sheave with the sheave holder “2”, tighten the primary sheave nut.

	**Primary sheave nut** **160 Nm (16.0 m·kg, 115 ft·lb)**
	**Sheave holder** **90890-01481**



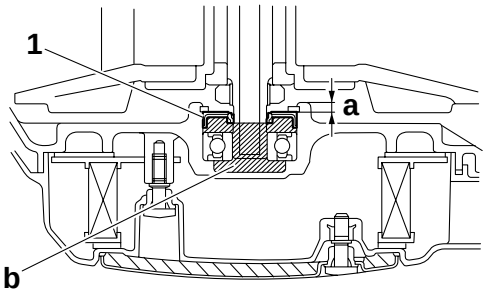
EAS4B51025

INSTALLING THE V-BELT CASE

1. Install:
   • Oil seal “1”
   (into outer V-belt case)

	**Installed depth of oil seal “a”** **4.0–4.3 mm (0.16–0.17 in)**

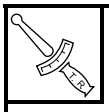
2. Fill the space “b” shown in the illustration with 10 g or more of lithium-soap-based grease.

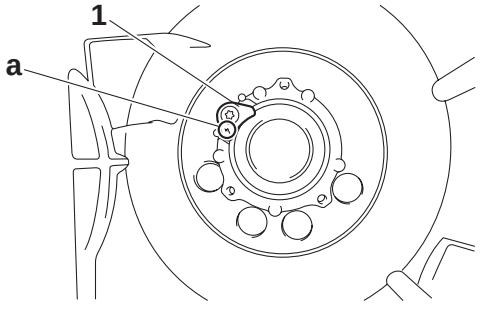


3. Install:
   • Bearing retainer “1”

TIP

- Install each bearing retainer “1” with its mark “a” facing outward.
- Apply locking agent (LOCTITE®) to the threads of the bearing retainer bolt.

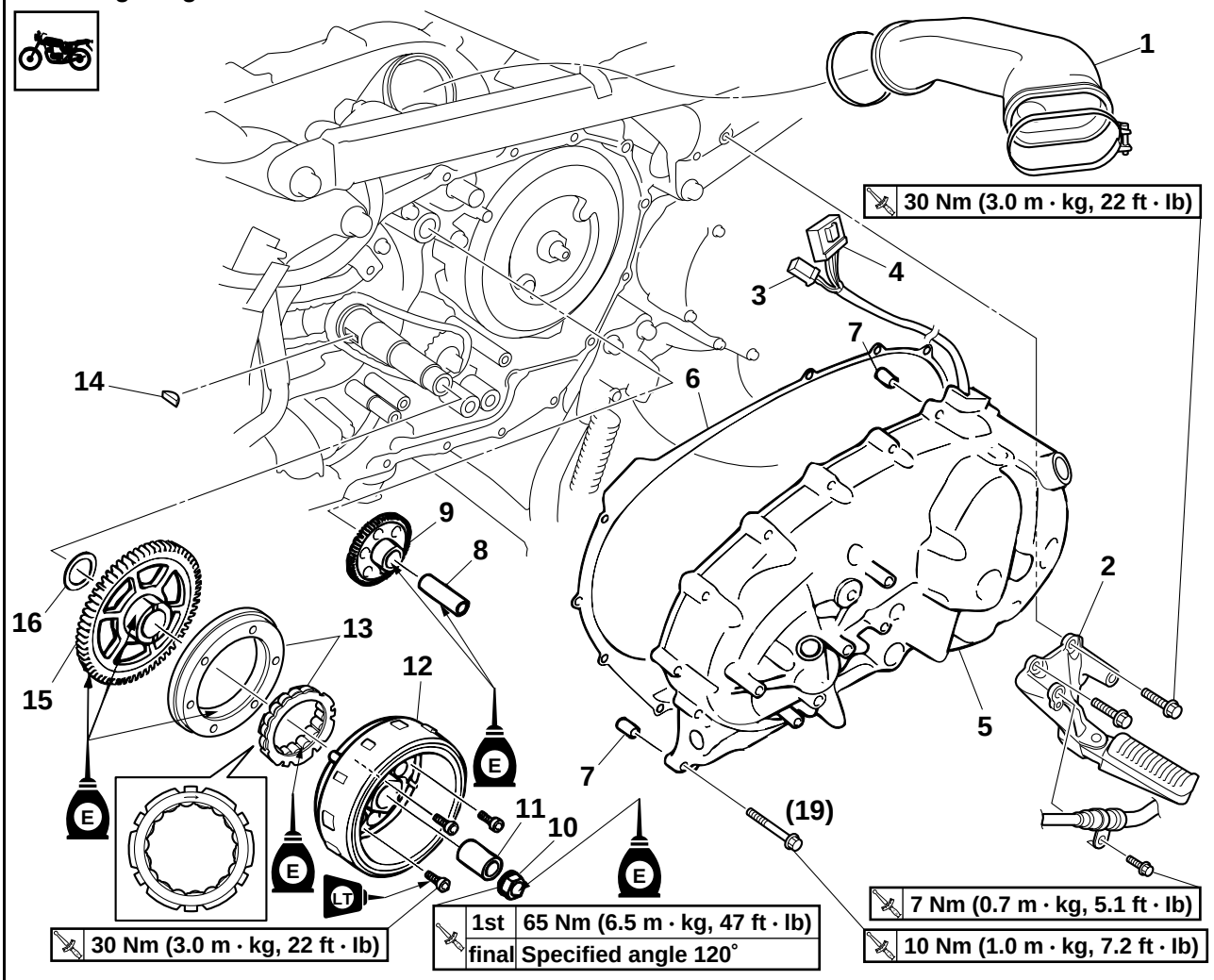
	**Bearing retainer bolt** **11 Nm (1.1 m·kg, 8.0 ft·lb)** **LOCTITE®**



EAS24480

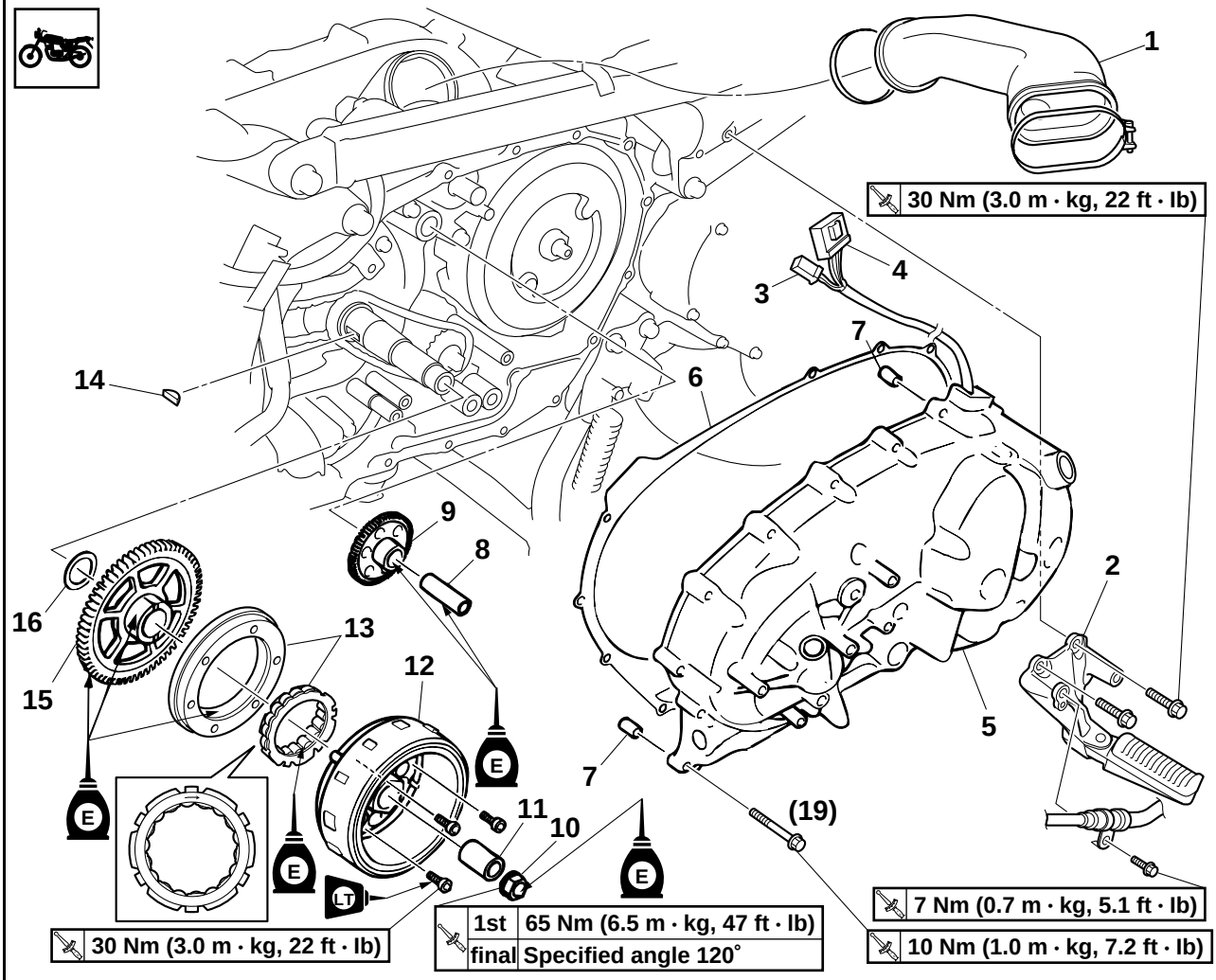
GENERATOR AND STARTER CLUTCH

Removing the generator rotor and starter clutch



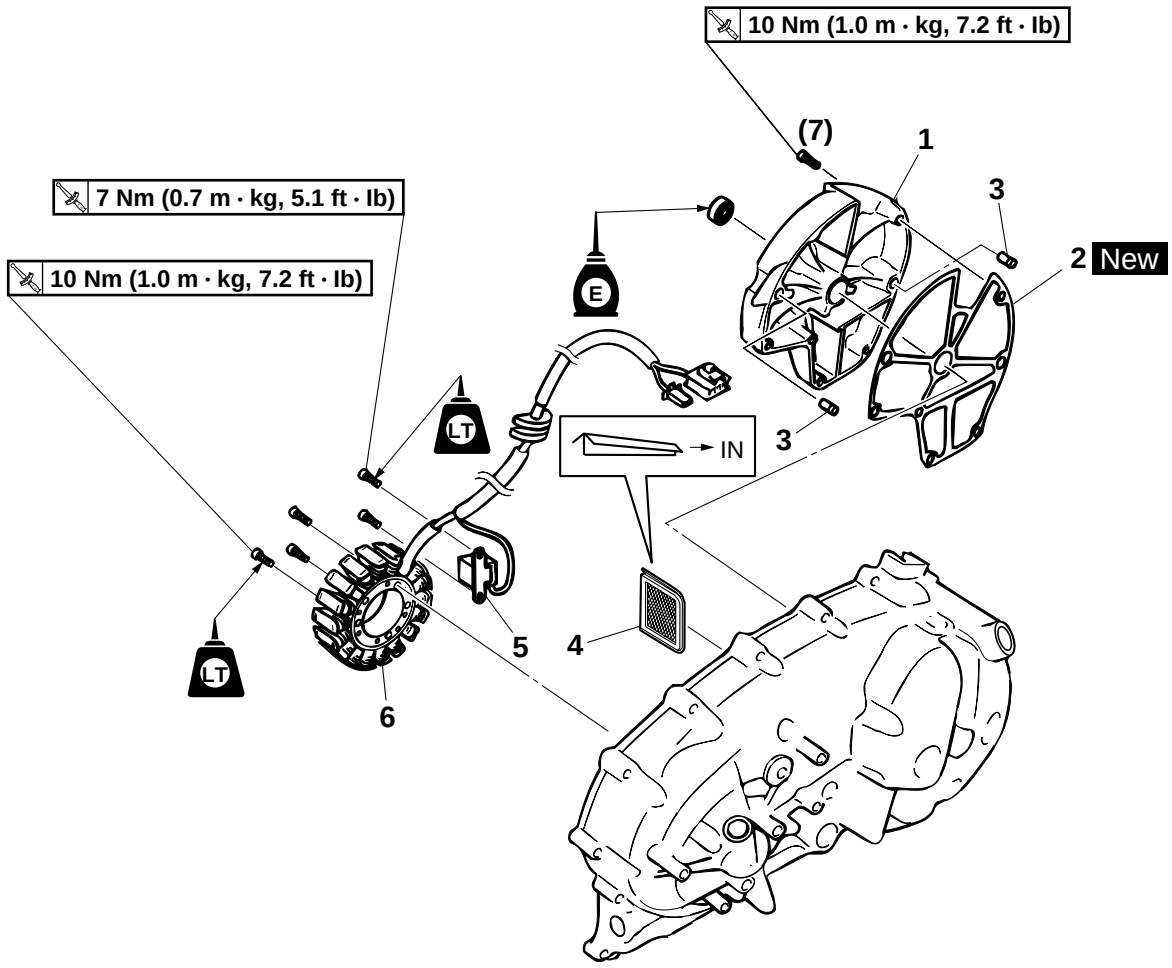
Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling/Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Water pump assembly		Refer to "WATER PUMP" on page 6-9.
1	V-belt case air duct	1	
2	Left passenger footrest	1	
3	Crankshaft position sensor coupler	1	Disconnect.
4	Stator coil coupler	1	Disconnect.
5	Generator cover	1	
6	Generator cover gasket	1	
7	Dowel pin	2	
8	Starter clutch idle gear shaft	1	

Removing the generator rotor and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
9	Starter clutch idle gear	1	
10	Generator rotor nut	1	
11	Spacer	1	
12	Generator rotor	1	
13	Starter clutch	1	
14	Woodruff key	1	
15	Starter clutch gear	1	
16	Washer	1	
			For installation, reverse the removal procedure.

Removing the stator coil and oil tank



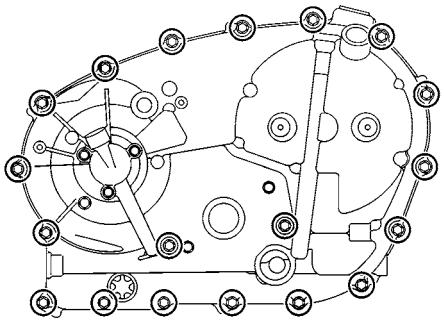
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil tank	1	
2	Oil tank gasket	1	
3	Dowel pin	2	
4	Oil strainer	1	
5	Crankshaft position sensor	1	
6	Stator coil	1	
			For installation, reverse the removal procedure.

EAS24490
REMOVING THE GENERATOR

1. Remove:
   • Generator cover

TIP

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.

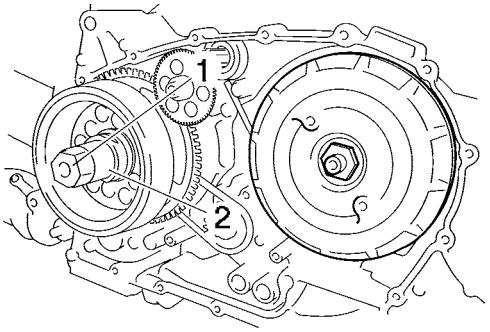


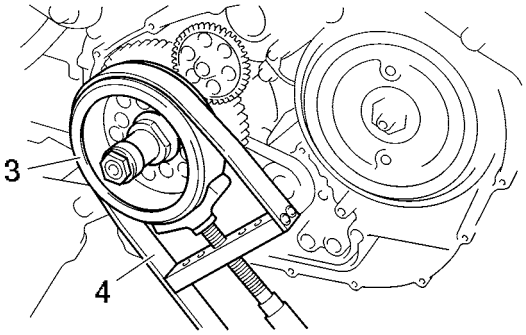
2. Remove:
   • Generator rotor nut “1”
   • Spacer “2”

TIP

- While holding the generator rotor “3” with the sheave holder “4”, loosen the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



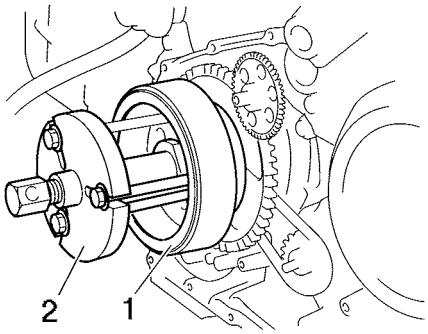


3. Remove:
   • Generator rotor “1”
   (with the flywheel puller “2”)
   • Woodruff key

TIP

Make sure the flywheel puller is centered over the generator rotor.

Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B



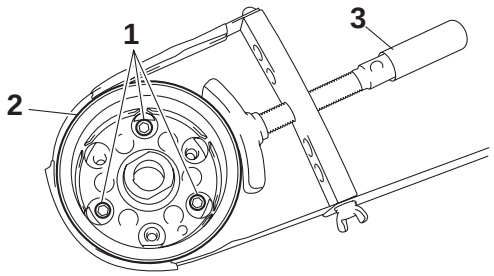
EAS24560
REMOVING THE STARTER CLUTCH

1. Remove:
   • Starter clutch bolts “1”
   • Starter clutch

TIP

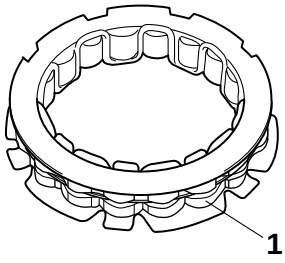
- While holding the generator rotor “2” with the sheave holder “3”, remove the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

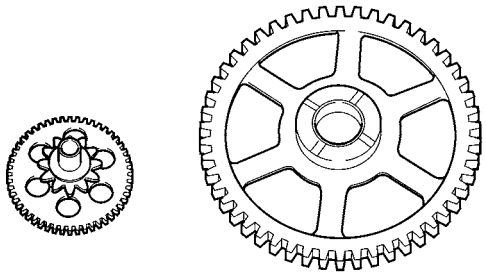


EAS24570
CHECKING THE STARTER CLUTCH

1. Check:
   - Starter clutch rollers “1”
     Damage/wear → Replace.



2. Check:
   - Starter clutch idle gear
   - Starter clutch gear
     Burrs/chips/roughness/wear → Replace the defective part(s).



3. Check:
   - Starter clutch gear contacting surfaces
     Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   - Starter clutch operation

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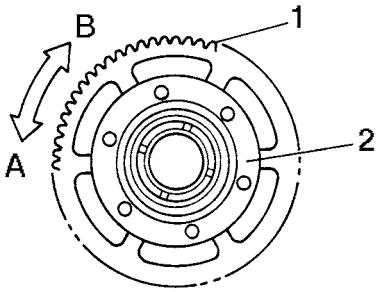
a. Install the starter clutch gear “1” onto the starter clutch “2” and hold the starter clutch.
b. When turning the starter clutch gear counterclockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch gear clockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.



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EAS24990
CHECKING THE OIL STRAINER

1. Check:
   - Oil strainer
     Damage → Replace.
     Contaminants → Clean with solvent.

EAS24600
INSTALLING THE STARTER CLUTCH

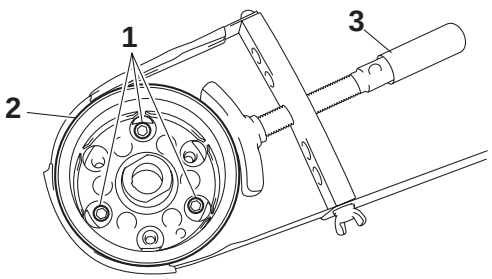
1. Install:
   - Starter clutch
   - Starter clutch bolts “1”

Starter clutch bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP

- While holding the generator rotor “2” with the sheave holder “3”, tighten the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

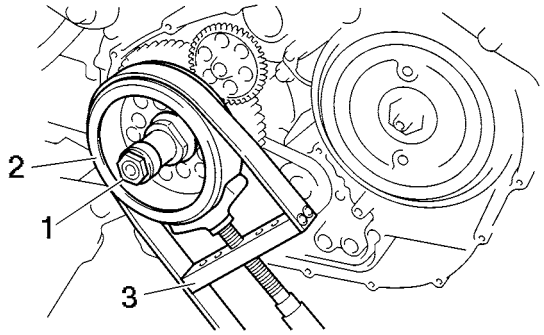


EAS24500
INSTALLING THE GENERATOR

1. Install:
   - Woodruff key
   - Generator rotor “1”
   - Spacer “2”
   - Generator rotor nut “3”

TIP

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly sealed in the keyway of the crankshaft.
- Lubricate the generator rotor nut seats and threads with engine oil.



Generator rotor nut (final)
Specified angle 120°

ECA4B51018

NOTICE

- **When tightening the generator rotor nut, be sure to use a beam type torque wrench.**
- **Tighten the nut until it is at the specified angle.**

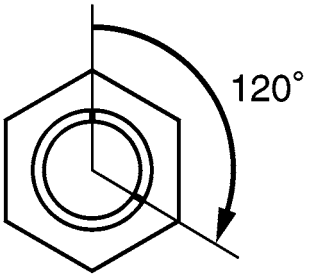
2. Tighten:
   - Generator rotor nut “1”

Generator rotor nut (1st)
65 Nm (6.5 m·kg, 47 ft·lb)

TIP

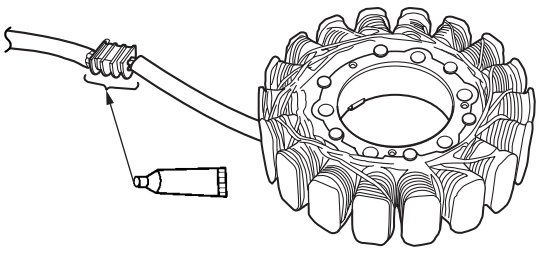
- While holding the generator rotor “2” with the sheave holder “3”, tighten the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



3. Apply:
   - Sealant
     (onto the crankshaft position sensor lead grommet)

Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)



4. Install:
   - Generator cover

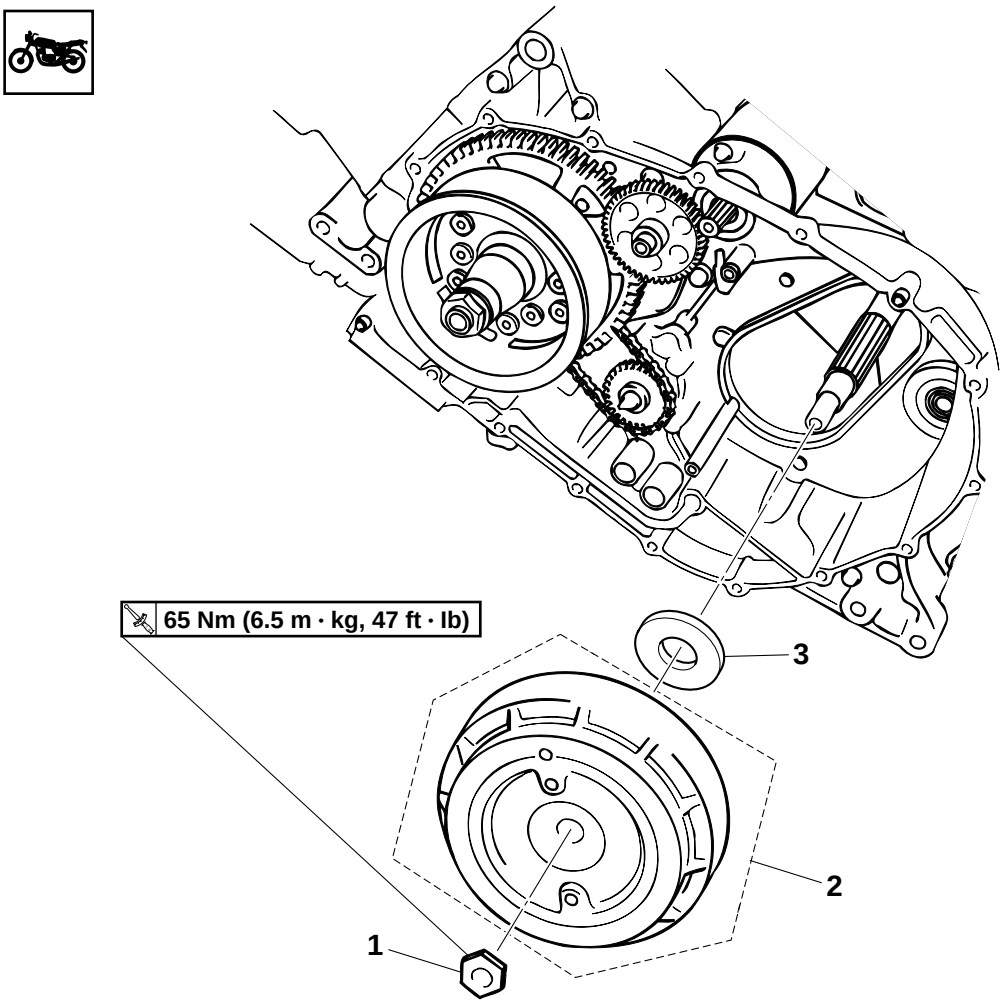
Generator cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

TIP

Tighten the generator cover bolts in stages and in a crisscross pattern.

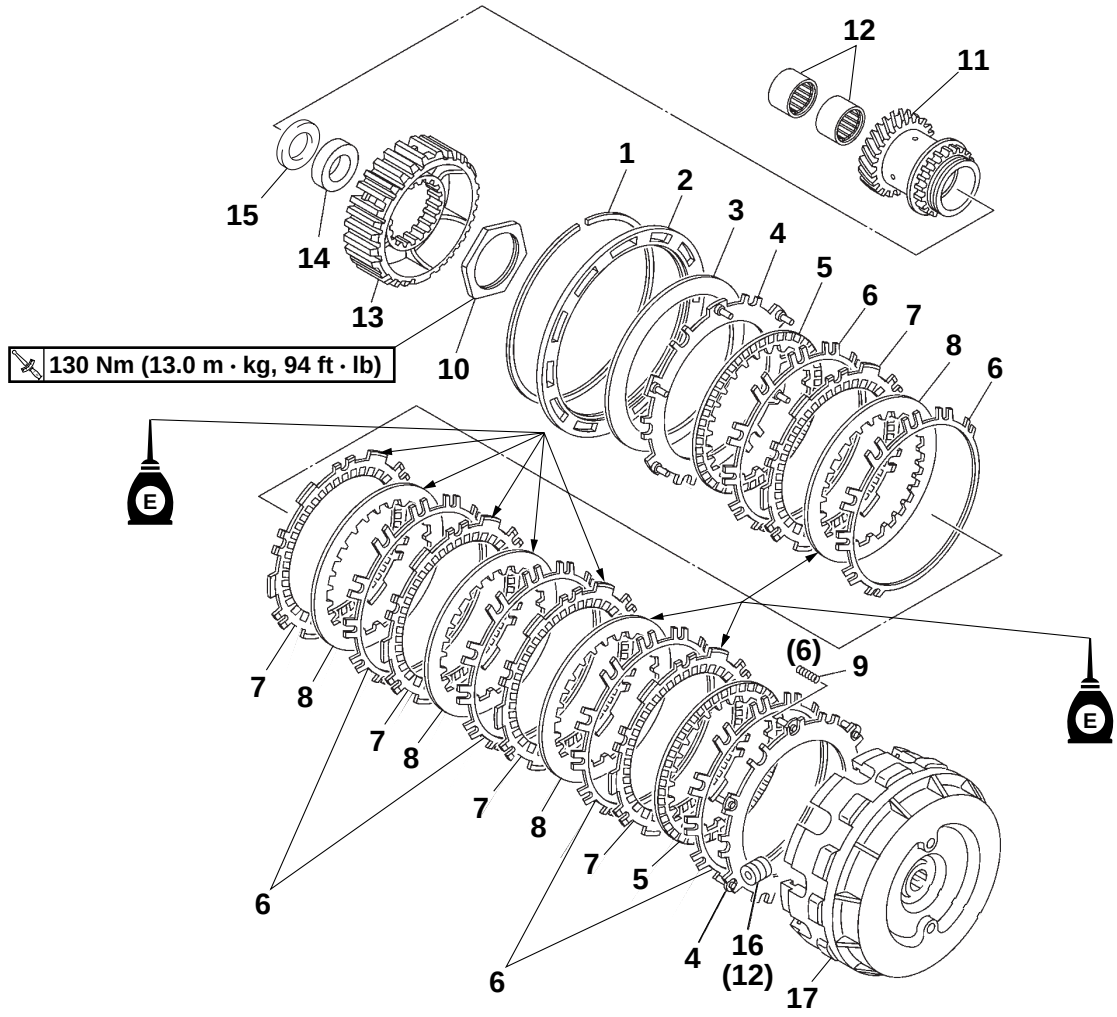
EAS25061
CLUTCH

Removing the clutch



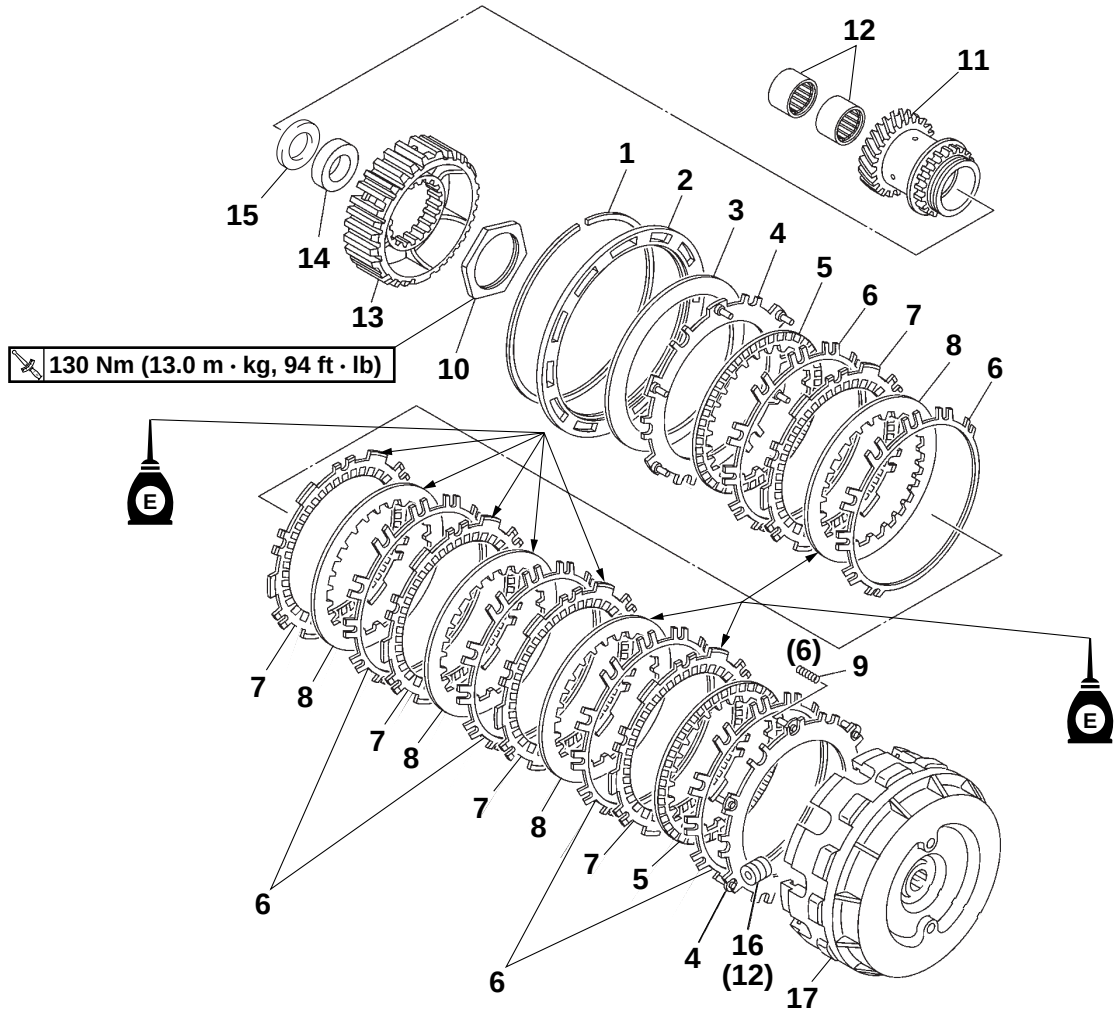
Order	Job/Parts to remove	Q'ty	Remarks
	Generator cover		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-47.
1	Clutch assembly nut	1	
2	Clutch assembly	1	
3	Washer	1	
			For installation, reverse the removal procedure.

Disassembling the clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Spring stopper plate	1	
3	Clutch spring plate	1	
4	Pressure plate	2	
5	Clutch plate 2	2	
6	Clutch damper spring	6	
7	Friction plate	5	
8	Clutch plate 1	4	
9	Clutch spring	6	
10	Clutch boss nut	1	
11	Primary drive gear	1	
12	Bearing	2	
13	Clutch boss	1	
14	Collar	1	
15	Thrust plate	1	
16	Clutch weight	12	

Disassembling the clutch



Order	Job/Parts to remove	Q'ty	Remarks
17	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

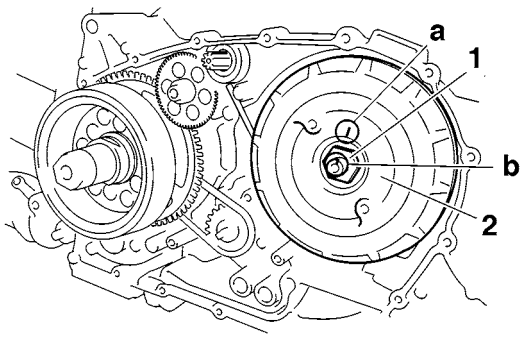
EAS25070
REMOVING THE CLUTCH

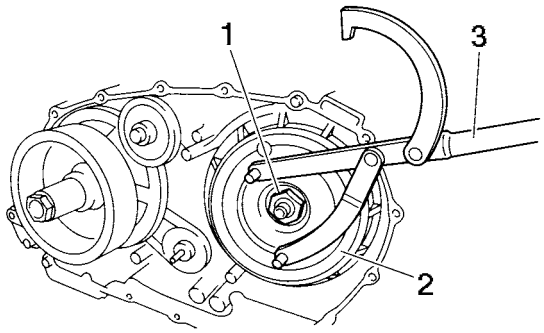
1. Remove:
   - Clutch assembly nut “1”
   - Clutch assembly “2”

TIP

- Before removal, put alignment marks “a” and “b” as shown.
- While holding the clutch assembly with the rotor holding tool “3”, loosen the clutch assembly nut.
- Align these marks during reassembly.

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





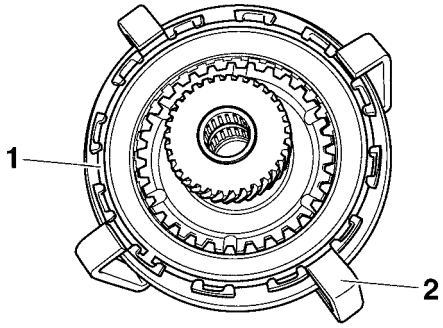
EAS4B51026
DISASSEMBLING THE CLUTCH

1. Remove:
   - Circlip “1”

TIP

While compressing the clutch springs with the clutch spring compressor “2”, remove the circlip.

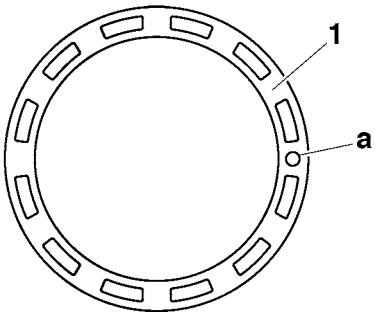
Clutch spring compressor
90890-01482



2. Remove:
   - Spring stopper plate “1”

TIP

One to three holes “a” are drilled in the spring stopper plate to adjust the balance of the clutch assembly. Before removing the spring stopper plate, make alignment marks on both the plate and the clutch housing so that the plate can be reinstalled in its original position.

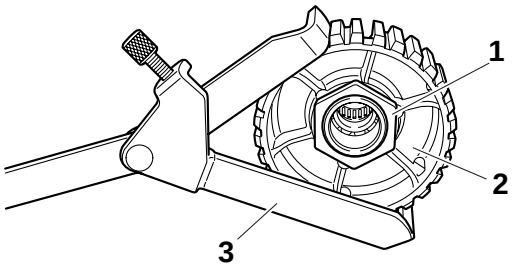


3. Loosen:
   - Clutch boss nut “1”

TIP

While holding the clutch boss “2” with the universal clutch holder “3”, loosen the clutch boss nut.

Universal clutch holder
90890-04086
YM-91042

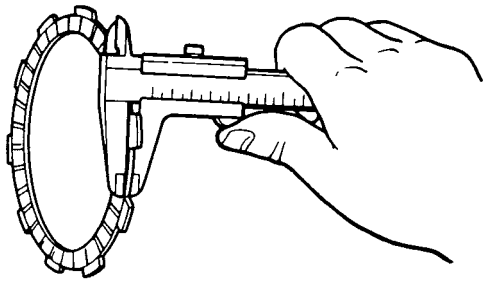


EAS25100
CHECKING THE FRICTION PLATES
The following procedure applies to all of the friction plates.
1. Check:
   - Friction plate
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   - Friction plate thickness
     Out of specification → Replace the friction plates as a set.

TIP

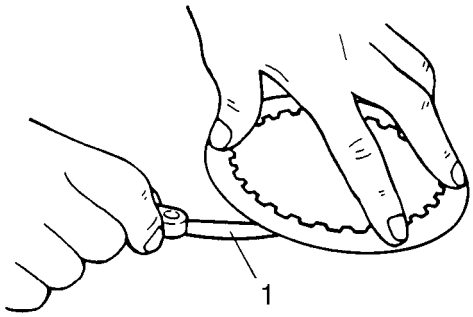
Measure the friction plate at four places.

Friction plate thickness
2.75–3.05 mm (0.108–0.120 in)
Wear limit
2.65 mm (0.1043 in)



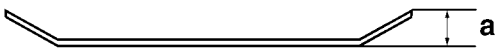
EAS25110
CHECKING THE CLUTCH PLATES
The following procedure applies to all of the clutch plates.
1. Check:
   - Clutch plate
     Damage → Replace the clutch plates as a set.
2. Measure:
   - Clutch plate warpage
     (with a surface plate and thickness gauge “1”)
     Out of specification → Replace the clutch plates as a set.

Clutch plate 1
Warpage limit
0.10 mm (0.0039 in)
Clutch plate 2
Warpage limit
0.20 mm (0.0079 in)



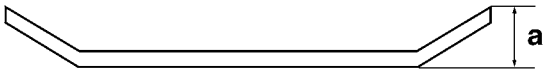
EAS4B51027
CHECKING THE CLUTCH DAMPER SPRINGS
The following procedure applies to all of the clutch damper springs.
1. Check:
   - Clutch damper spring
     Damage → Replace.
2. Measure:
   - Clutch damper spring free height “a”
     Out of specification → Replace the clutch damper springs as a set.

Clutch damper spring height
3.50 mm (0.14 in)
Minimum height
3.10 mm (0.12 in)



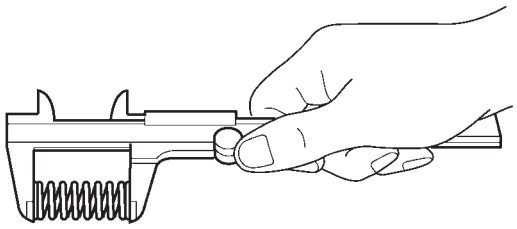
EAS25130
CHECKING THE CLUTCH SPRING PLATE
1. Check:
   - Clutch spring plate
     Damage → Replace.
2. Measure:
   - Clutch spring plate free height “a”
     Out of specification → Replace the clutch spring plate.

Clutch spring plate height
4.70 mm (0.19 in)
Minimum height
4.40 mm (0.17 in)



EAS25140
CHECKING THE CLUTCH SPRINGS
The following procedure applies to all of the clutch springs.
1. Check:
   - Clutch spring
     Damage → Replace the clutch springs as a set.
2. Measure:
   - Clutch spring free length
     Out of specification → Replace the clutch springs as a set.

Clutch spring free length
25.80 mm (1.02 in)
Minimum length
20.40 mm (0.80 in)

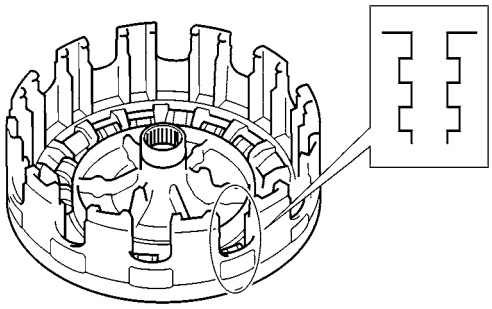


11412901

EAS25150
CHECKING THE CLUTCH HOUSING
1. Check:
   - Clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

TIP

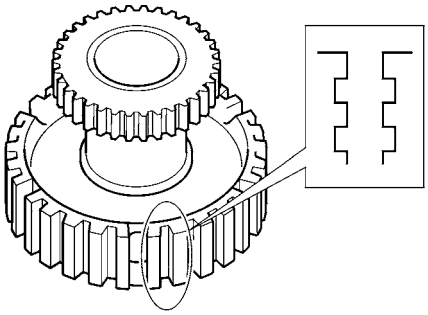
Pitting on the clutch housing dogs will cause erratic clutch operation.



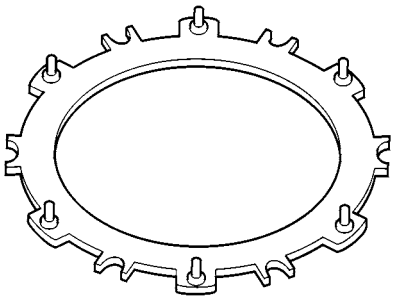
EAS25160
CHECKING THE CLUTCH BOSS
1. Check:
   - Clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

TIP

Pitting on the clutch boss splines will cause erratic clutch operation.



EAS25170
CHECKING THE PRESSURE PLATE
1. Check:
   - Pressure plate
     Cracks/damage → Replace.



EAS4B51029
ASSEMBLING THE CLUTCH
1. Lubricate:
   - Friction plates
   - Clutch plate
     (with the recommended lubricant)

Recommended lubricant
Engine oil

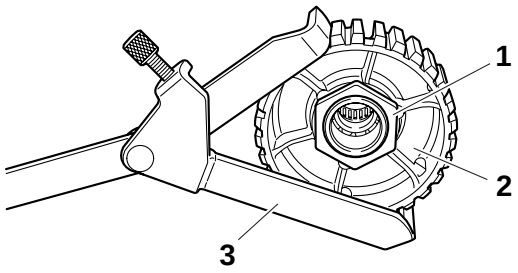
2. Install:
   • Clutch boss
   • Primary drive gear
   • Clutch boss nut
3. Tighten:
   • Clutch boss nut “1”

Clutch boss nut
130 Nm (13.0 m·kg, 94 ft·lb)

TIP

While holding the clutch boss “2” with the universal clutch holder “3”, tighten the clutch boss nut.

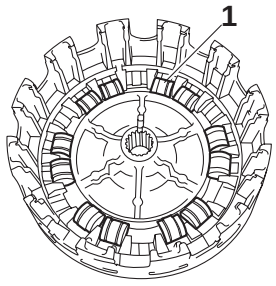
Universal clutch holder
90890-04086
YM-91042



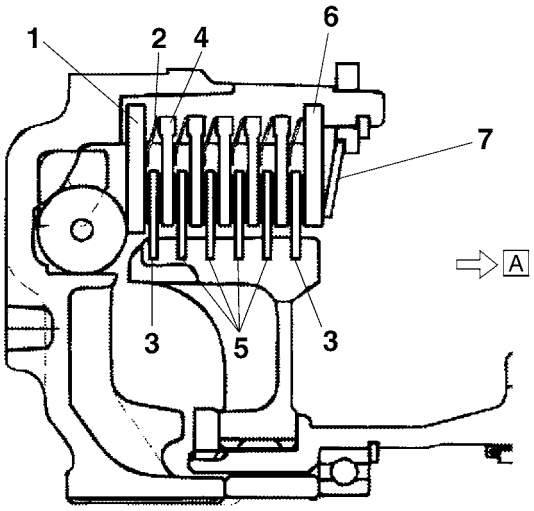
4. Install:
   • Clutch weights “1”

TIP

Install the weights in the clutch housing at the intervals shown in the illustration.



5. Install:
   • Thrust plate “1”
   • Clutch springs
   • Clutch damper springs “2”
   • Clutch plates 2 “3”
   • Friction plates “4”
   • Clutch plates 1 “5”
   • Pressure plate “6”
   • Clutch spring plate “7”



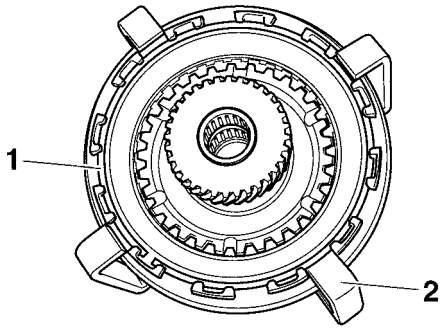
A. Engine side

6. Install:
   • Circlip “1”

TIP

While compressing the clutch springs with the clutch spring compressor “2”, install the circlip.

Clutch spring compressor
90890-01482



EAS25240
INSTALLING THE CLUTCH

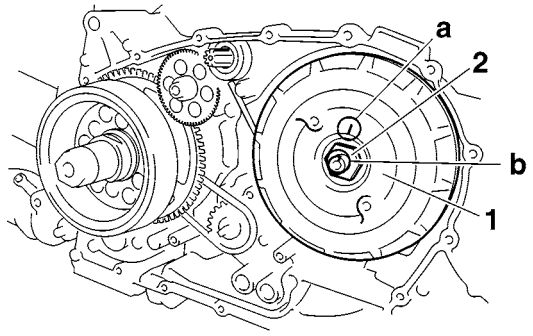
1. Install:
   • Clutch assembly “1”
   • Clutch assembly nut “2”

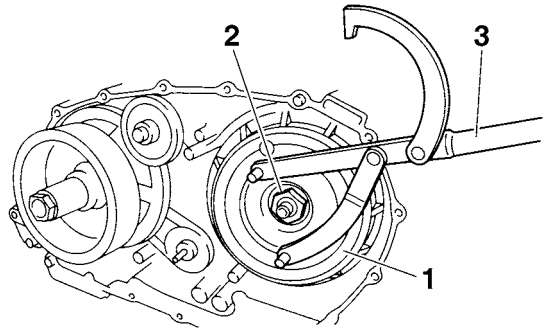
	Clutch assembly nut **65 Nm (6.5 m·kg, 47 ft·lb)**

TIP

- Align the “a” and “b” during reassembly.
- While holding the clutch assembly with the rotor holding tool “3”, tighten the clutch assembly nut.

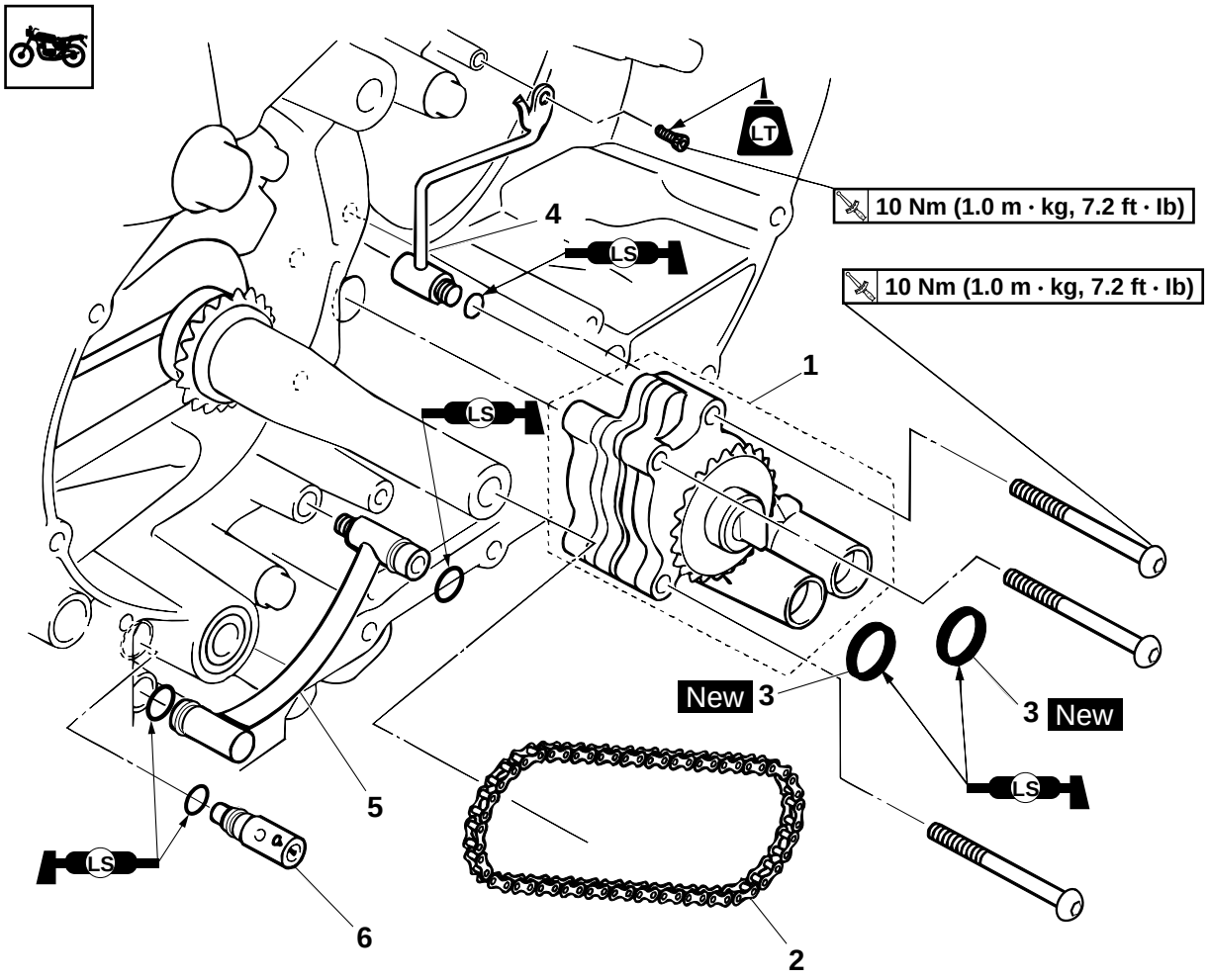
	Rotor holding tool **90890-01235** **Universal magneto & rotor holder** **YU-01235**





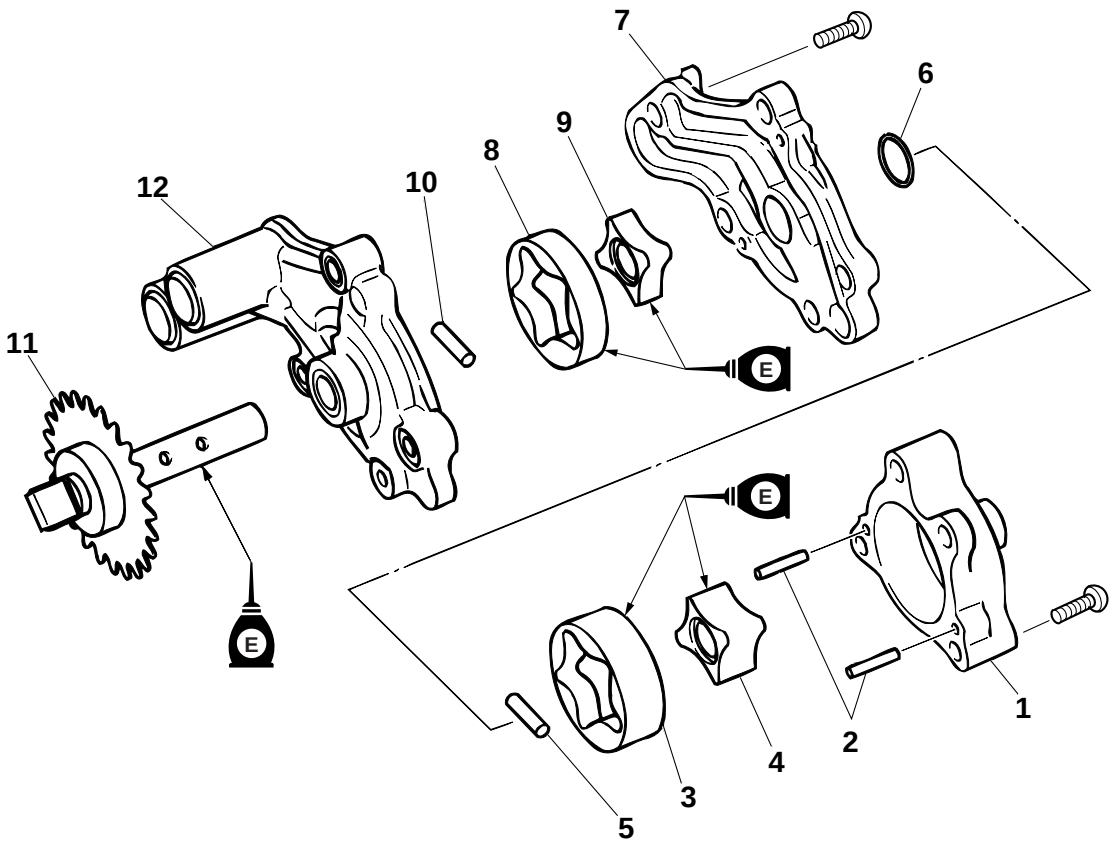
EAS24901
OIL PUMP

Removing the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Starter clutch gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-47.
1	Oil pump assembly	1	
2	Oil pump drive chain	1	
3	Gasket	2	
4	Oil delivery pipe	1	
5	Oil pipe	1	
6	Relief valve assembly	1	
			For installation, reverse the removal procedure.

Disassembling the oil pump

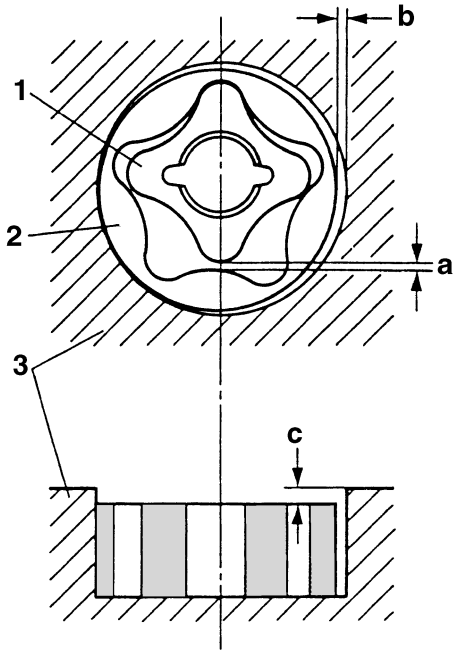


Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing 1	1	
2	Dowel pin	2	
3	Oil pump outer rotor 1	1	
4	Oil pump inner rotor 1	1	
5	Pin	1	
6	Washer	1	
7	Oil pump housing center	1	
8	Oil pump outer rotor 2	1	
9	Oil pump inner rotor 2	1	
10	Pin	1	
11	Oil pump driven gear	1	
12	Oil pump housing 2	1	
			For assembly, reverse the disassembly procedure.

EAS24960
CHECKING THE OIL PUMP

1. Check:
   - Oil pump driven gear “1”
   - Oil pump housing 2 “2”
   - Oil pump housing 1 “3”
   Cracks/damage/wear → Replace the defective part(s).

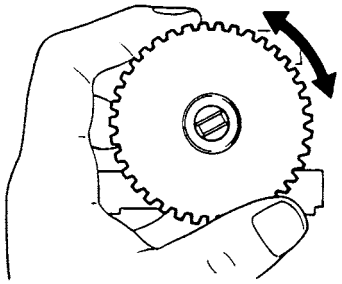
2. Measure:
   - Inner-rotor-to-outer-rotor-tip clearance “a”
   - Outer-rotor-to-oil-pump-housing clearance “b”
   - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
   Out of specification → Replace the oil pump.



1. Inner rotor
2. Outer rotor
3. Oil pump housing

Inner-rotor-to-outer-rotor-tip clearance
0.040–0.120 mm (0.0016–0.0047 in)
Limit
0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance
0.045–0.085 mm (0.0018–0.0033 in)
Limit
0.155 mm (0.0061 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance
0.11–0.23 mm (0.0043–0.0091 in)
Limit
0.30 mm (0.0118 in)

3. Check:
   - Oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS24970
CHECKING THE RELIEF VALVE

1. Check:
   - Relief valve body
   Damage/wear → Replace.

EAS4B51030
CHECKING THE OIL PIPES

1. Check:
   - Oil pipe
   - Oil delivery pipe
   Damage → Replace.
   Obstruction → Wash and blow out with compressed air.

EAS4B51031
CHECKING THE OIL PUMP DRIVE CHAIN

1. Check:
   - Oil pump drive chain
   Cracks/stiffness → Replace the oil pump chain and oil pump driven sprocket as a set.

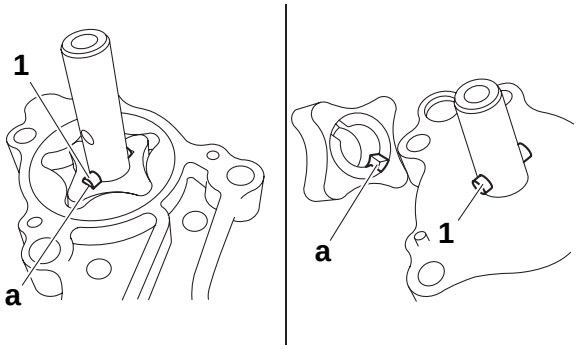
EAS25000
ASSEMBLING THE OIL PUMP
1. Lubricate:
   - Inner rotor
   - Outer rotor
   - Oil pump shaft
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

2. Install:
   - Inner rotors

TIP

When installing the inner rotor, align the pin "1" in the oil pump shaft with the groove "a" in the inner rotor.



3. Check:
   - Oil pump operation
     Refer to "CHECKING THE OIL PUMP" on page 5-64.

EAS25020
INSTALLING THE OIL PUMP
1. Install:
   - Oil pump assembly

	Oil pump bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

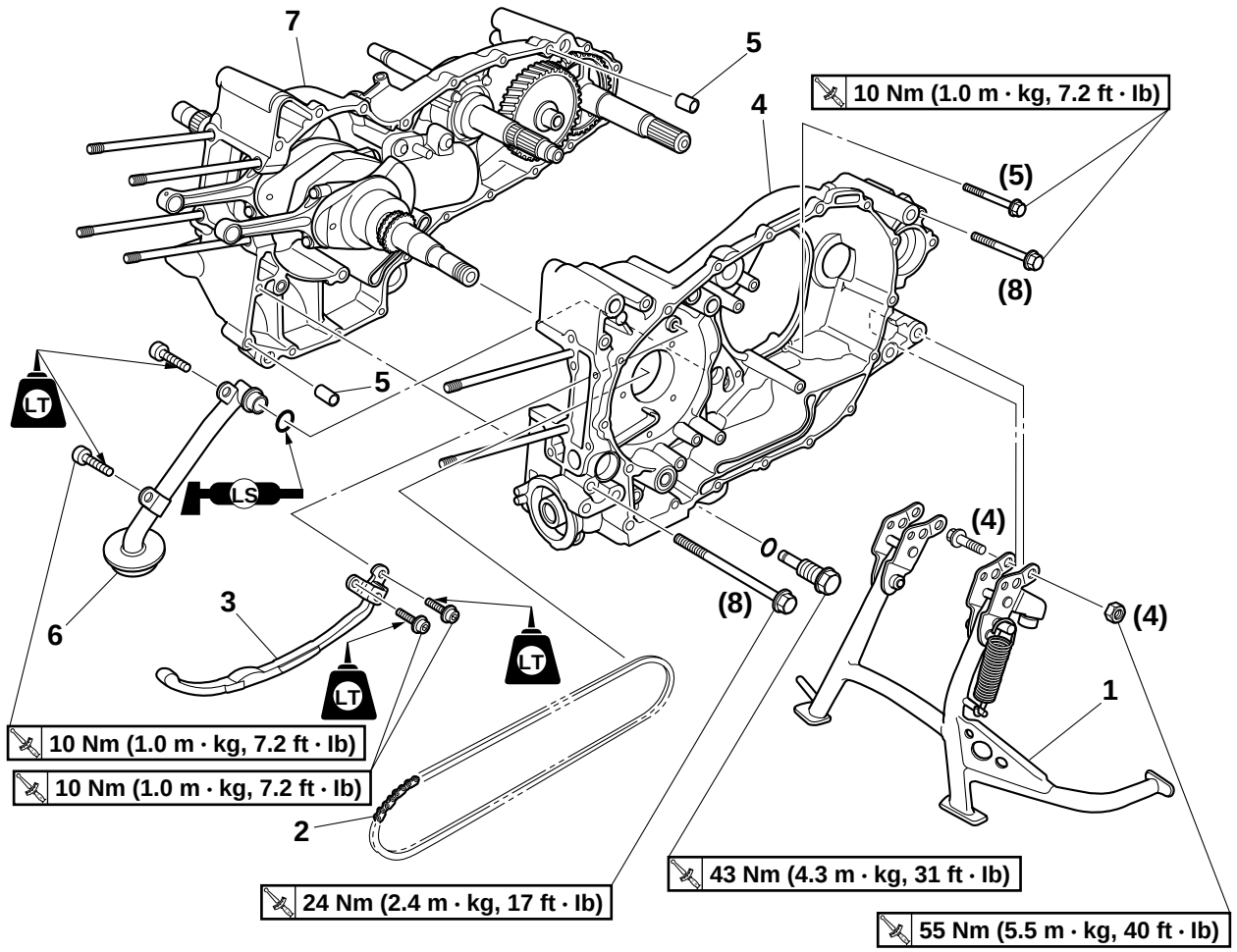
ECA13890

NOTICE

After tightening the bolts, make sure the oil pump turns smoothly.

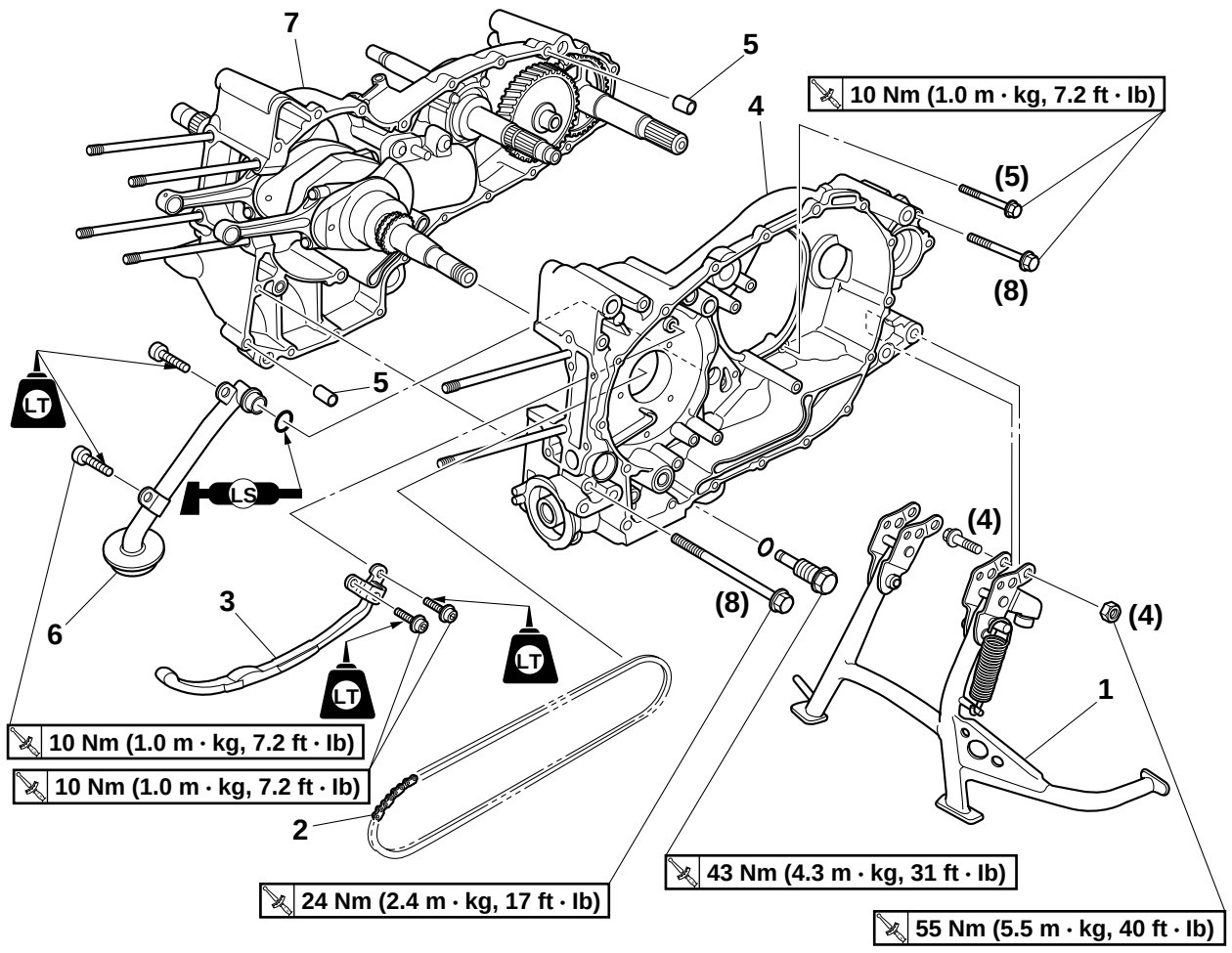
EAS25540
CRANKCASE

Separating the crankcase



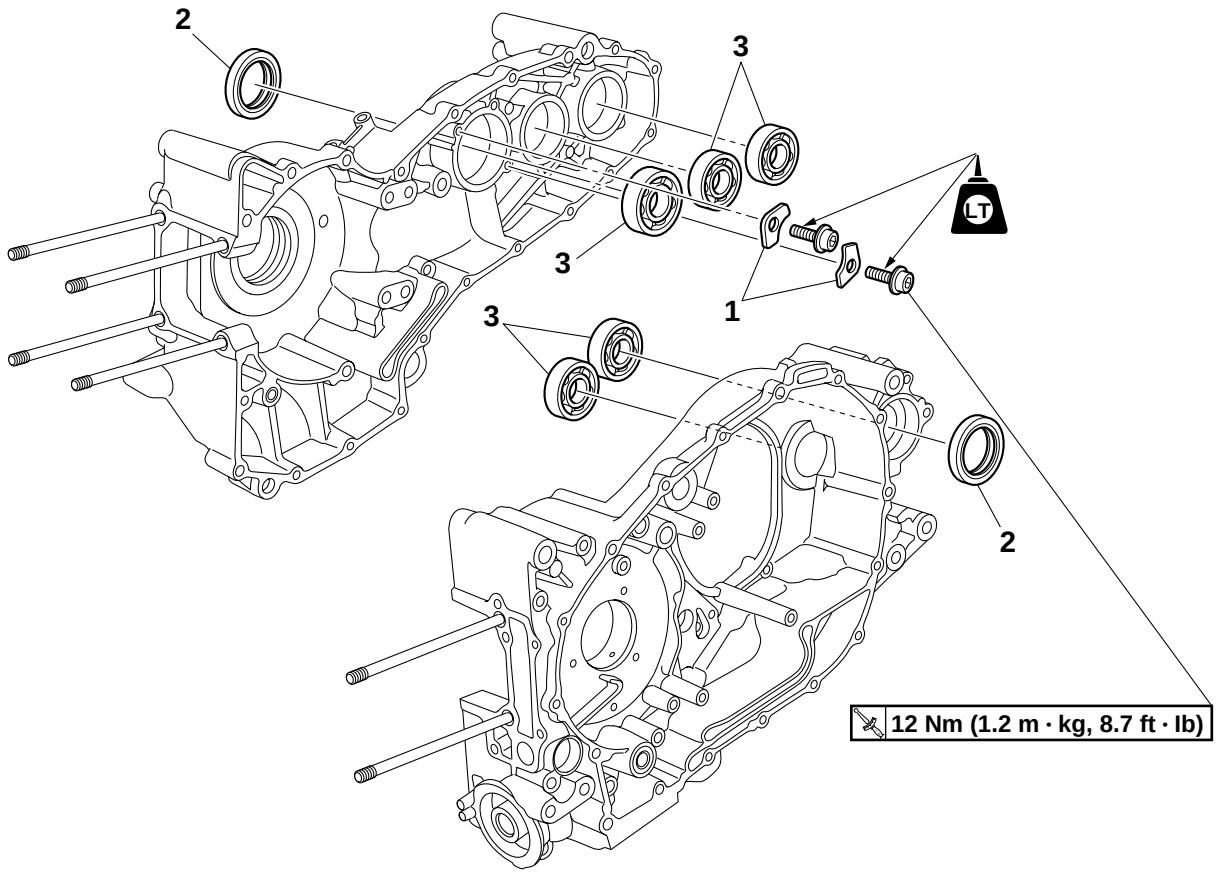
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
	Cylinder/Pistons		Refer to "CYLINDER AND PISTONS" on page 5-26.
	Starter clutch gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-47.
	Clutch assembly		Refer to "CLUTCH" on page 5-54.
	Oil pump assembly		Refer to "OIL PUMP" on page 5-62.
	Inner V-belt case		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-35.
1	Centerstand assembly	1	
2	Timing chain	1	
3	Timing chain guide (intake side)	1	
4	Left crankcase	1	
5	Dowel pin	2	
6	Oil strainer	1	

Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
7	Right crankcase	1	
			For installation, reverse the removal procedure.

Removing the oil seals and bearings



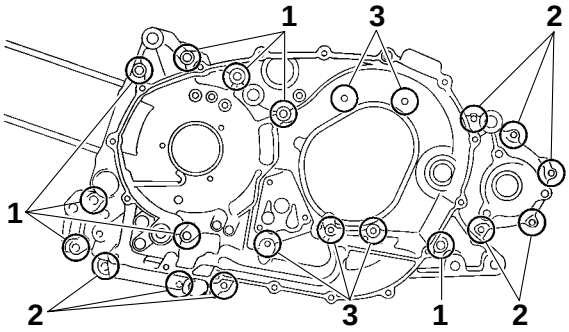
Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft assembly		Refer to "CRANKSHAFT" on page 5-71.
	Transmission		Refer to "TRANSMISSION" on page 5-79.
1	Bearing retainer	2	
2	Oil seal	2	
3	Bearing	5	
			For installation, reverse the removal procedure.

EAS25560
DISASSEMBLING THE CRANKCASE
1. Remove:
   • Crankcase bolts

TIP

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

   • M8 × 110 mm bolts “1”
   • M6 × 50 mm bolts “2”
   • M6 × 35 mm bolts “3”



2. Remove:
   • Left crankcase

ECA13900

NOTICE

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

EAS25580
CHECKING THE CRANKCASE
1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
   • Crankcase
   Cracks/damage → Replace.
   • Oil delivery passages
   Obstruction → Blow out with compressed air.

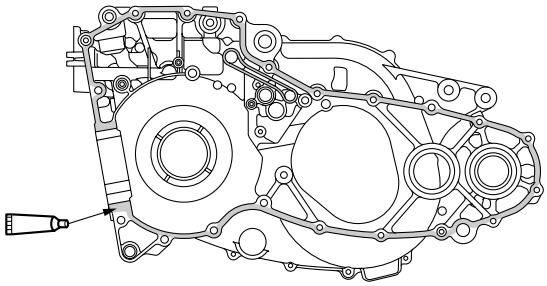
EAS4B51032
CHECKING THE TIMING CHAIN
1. Check:
   • Timing chain
   Damage/stiffness → Replace the timing chain and camshafts as a set.

EAS25700
ASSEMBLING THE CRANKCASE
1. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
2. Apply:
   • Sealant
   (onto the crankcase mating surfaces)

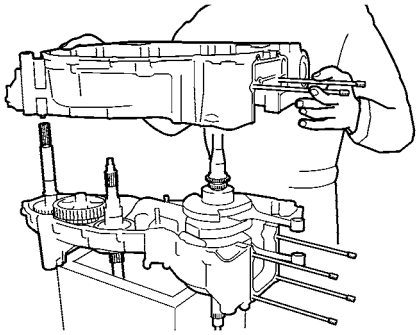
Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)

TIP

Do not allow any sealant to come into contact with the oil gallery.



3. Install:
   • Dowel pins
   • Left crankcase



4. Install:
   • Crankcase bolts (M8)
   • Crankcase bolts (M6)

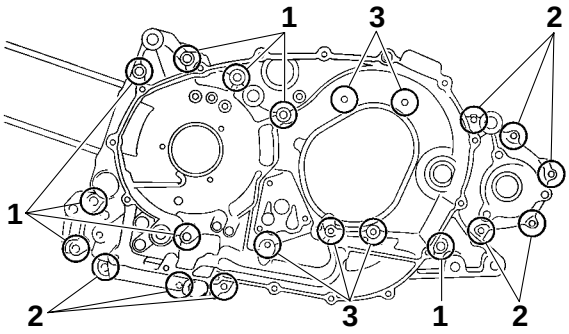
Crankcase bolt (M8)
24 Nm (2.4 m·kg, 17 ft·lb)
Crankcase bolt (M6)
10 Nm (1.0 m·kg, 7.2 ft·lb)

TIP

Tighten each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.

   • M8 × 110 mm bolts “1”
   • M6 × 50 mm bolts “2”

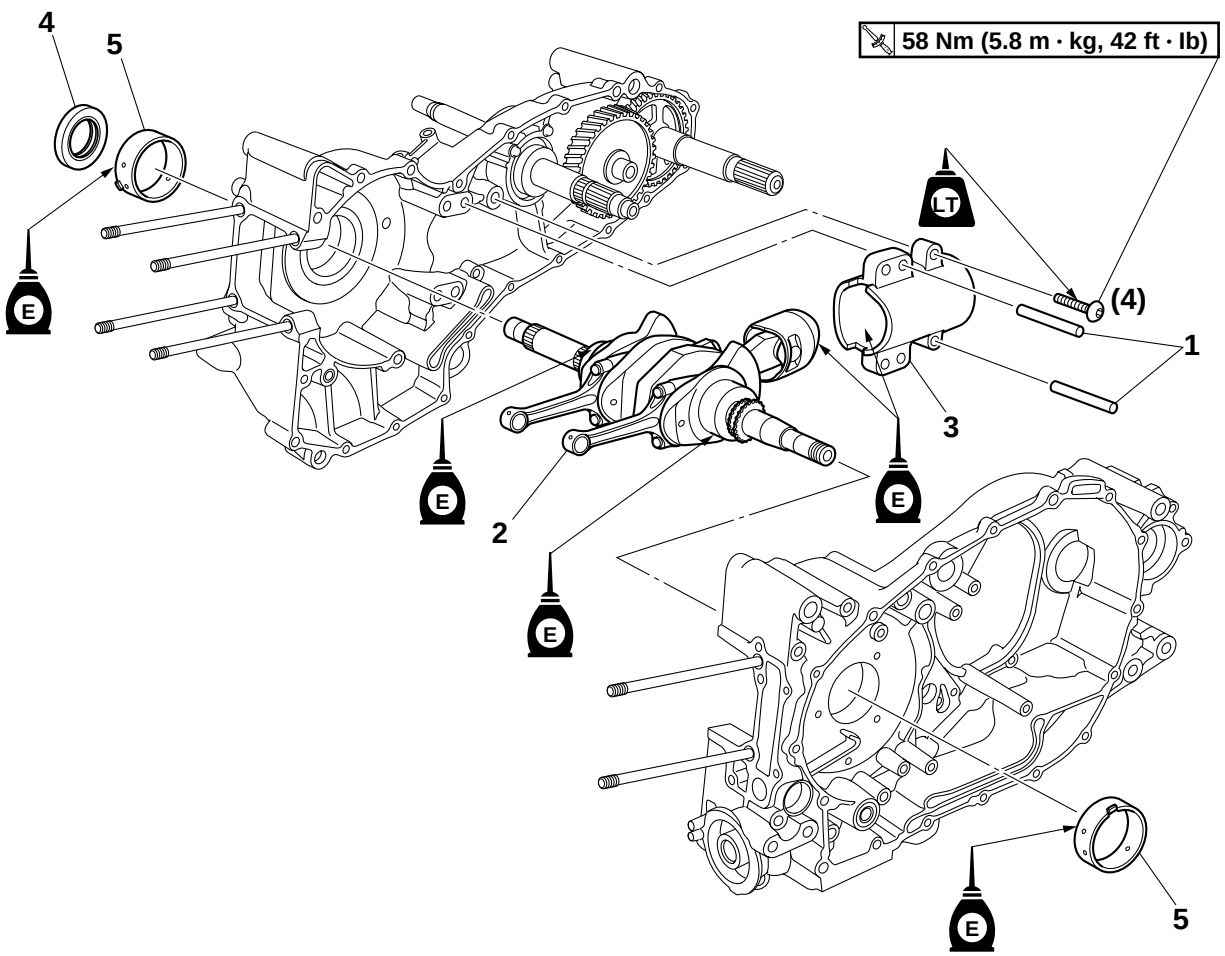
• M6 × 35 mm bolts “3”



5. Check:
   • Crankshaft and transmission operation
   Rough movement → Repair.

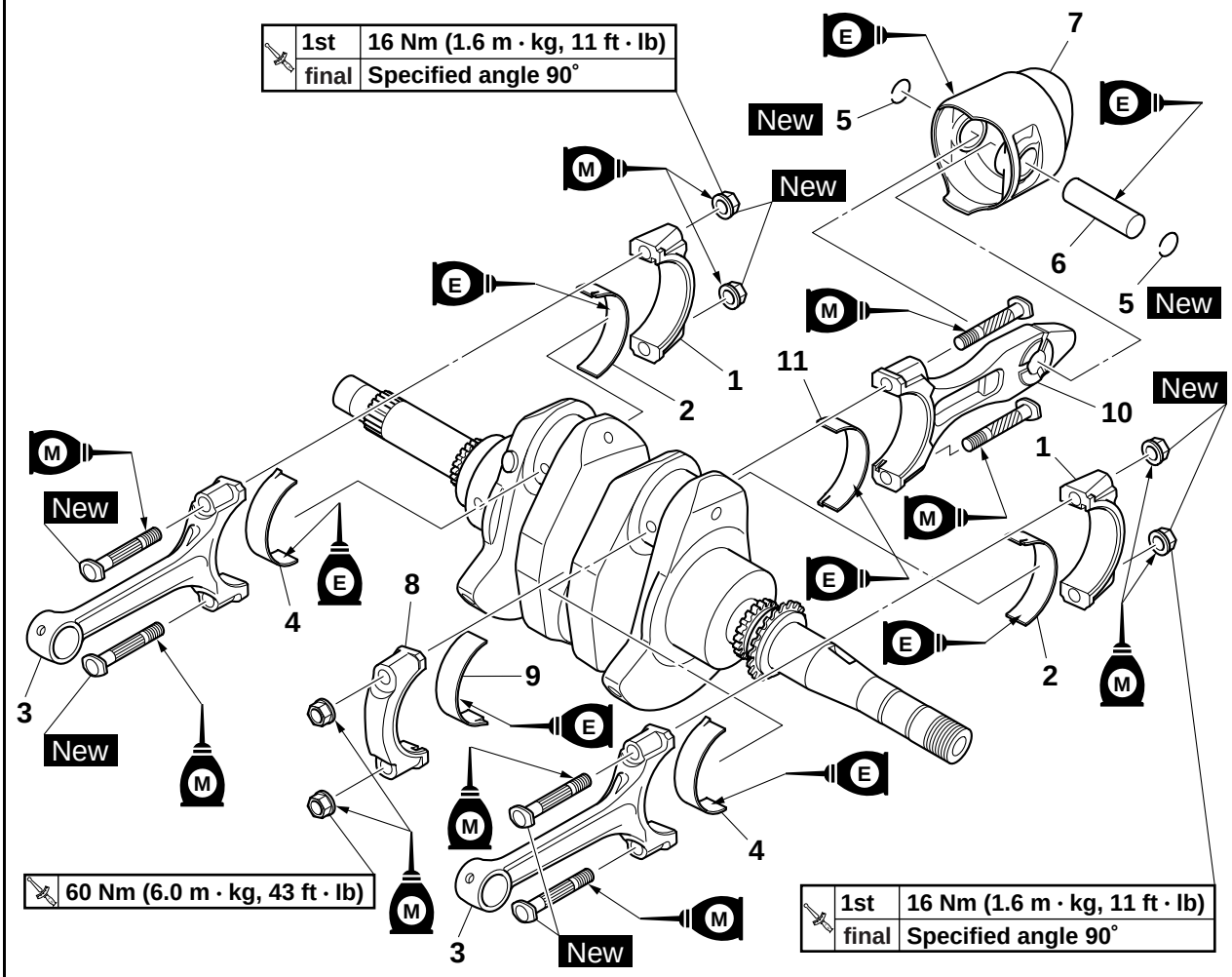
EAS25960
CRANKSHAFT

Removing the crankshaft assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-66.
1	Dowel pin	2	
2	Crankshaft assembly	1	
3	Balancer cylinder	1	
4	Oil seal	1	
5	Crankshaft journal bearing	2	
			For installation, reverse the removal procedure.

Removing the connecting rods

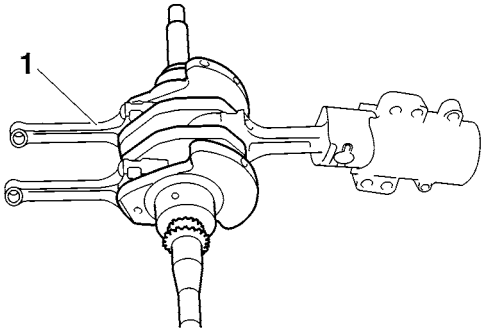


Order	Job/Parts to remove	Q'ty	Remarks
1	Connecting rod cap	2	
2	Big end lower bearing	2	
3	Connecting rod	2	
4	Big end upper bearing	2	
5	Circlip	2	
6	Balancer piston pin	1	
7	Balancer piston	1	
8	Balancer connecting rod cap	1	
9	Balancer big end lower bearing	1	
10	Balancer connecting rod	1	
11	Balancer big end upper bearing	1	
			For installation, reverse the removal procedure.

EAS26010
REMOVING THE CONNECTING RODS
The following procedure applies to all of the connecting rods.
1. Remove:
   - Connecting rod cap
   - Connecting rod "1"
   - Big end bearings

TIP

Identify the position of each big end bearing so that it can be reinstalled in its original place.

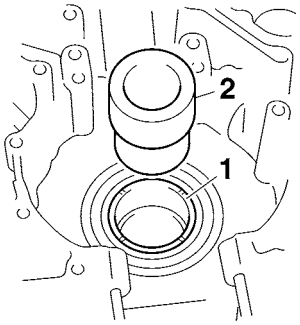


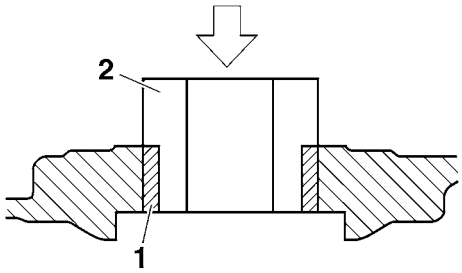
EAS26050
REMOVING THE CRANKSHAFT JOURNAL BEARINGS
The following procedure applies to both of the crankshaft main journal bearings.
1. Remove:
   - Crankshaft assembly
   - Crankshaft journal bearing "1"

TIP

Remove the crankshaft journal bearing using the plane bearing installer "2".

	Plane bearing installer **90890-04139**



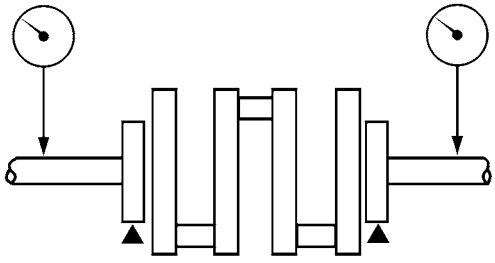


TIP

Identify the position of each crankshaft journal bearing so that it can be reinstalled in its original place.

EAS26090
CHECKING THE CRANKSHAFT AND CONNECTING RODS
1. Measure:
   - Crankshaft runout
     Out of specification → Replace the crankshaft.

	Runout limit C **0.030 mm (0.0012 in)**



2. Check:
   - Crankshaft journal surfaces
   - Crankshaft pin surfaces
   - Bearing surfaces
     Scratches/wear → Replace the crankshaft.

3. Measure:
   • Crankshaft-pin-to-big-end-bearing clearance
   Out of specification → Replace the big end bearings.

Oil clearance (using plastigauge®)
0.026–0.050 mm (0.0010–0.0020 in)

The following procedure applies to all of the connecting rods.

ECA13930

NOTICE

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

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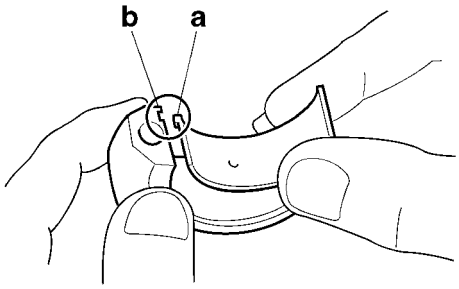
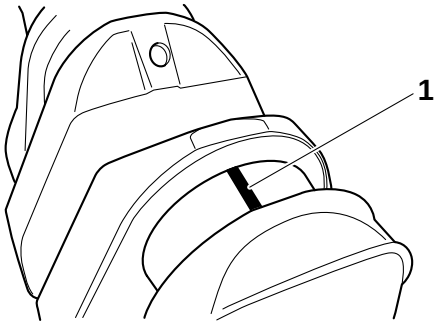
a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

TIP

Align the projections "a" on the big end bearings with the notches "b" in the connecting rod and connecting rod cap.



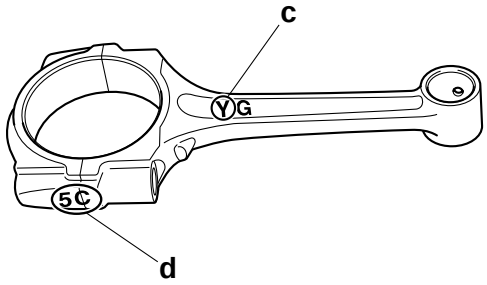
c. Put a piece of Plastigauge® "1" on the crankshaft pin.



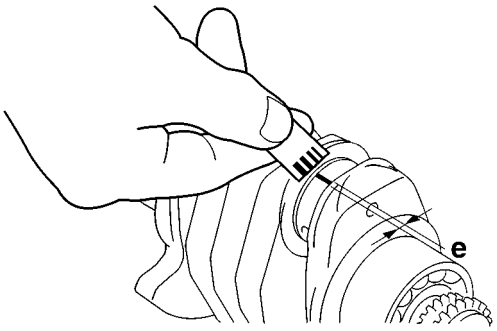
d. Assemble the connecting rod halves.

TIP

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the "Y" mark "c" on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters "d" on both the connecting rod and connecting rod cap are aligned.



e. Tighten the connecting rod nuts.
   Refer to "INSTALLING THE CONNECTING RODS" on page 5-77.
f. Remove the connecting rod and big end bearings.
   Refer to "REMOVING THE CONNECTING RODS" on page 5-73.
g. Measure the compressed Plastigauge® width "e" on the crankshaft pin.
   If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.



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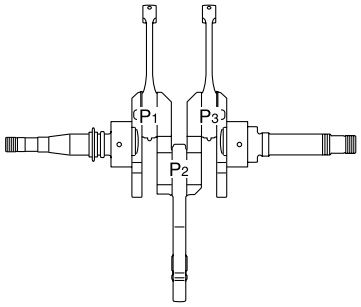
4. Select:
   • Big end bearings (P_1–P_3)

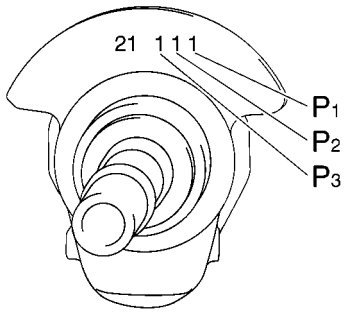
TIP

- The numbers "A" stamped into the crankshaft web and the numbers "B" on the connecting rods are used to determine the replacement big end bearing sizes.

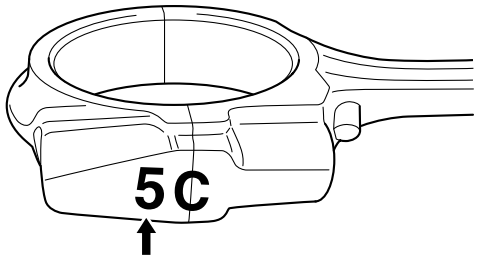
• P_1–P_3 refer to the bearings shown in the crankshaft illustration.



A



B



For example, if the connecting rod P_1 and the crankshaft web P_1 numbers are 5 and 1 respectively, then the bearing size for P_1 is:

P_1 (connecting rod) - P_1 (crankshaft)
=
5 - 1 = 4 (green)

Bearing color code
1.Blue 2.Black 3.Brown 4.Green

5. Measure:
   • Crankshaft-journal-to-crankshaft-journal bearing clearance.
   Out of specification → Replace the crankshaft journal bearings.

Journal oil clearance (using plastigauge®)
0.040–0.082 mm (0.0016–0.0032 in)

The following procedure applies to all of the crankshaft journal bearings.

ECA13920

NOTICE

Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

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ECA4B51026

NOTICE

On the journal, the larger value is used as a basis for calculation of the oil clearance, and on the journal bearing, the smaller value is used.

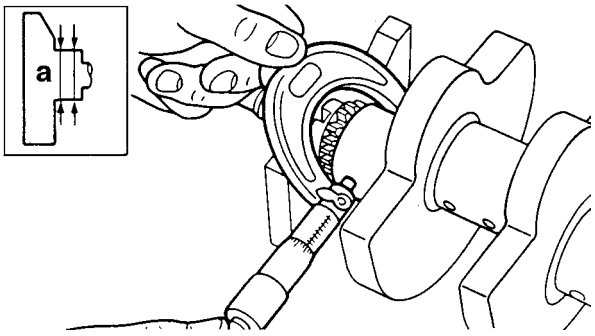
a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Check the bearing surface. If the bearing surface is worn or scratched, both bearings should be replaced.

TIP

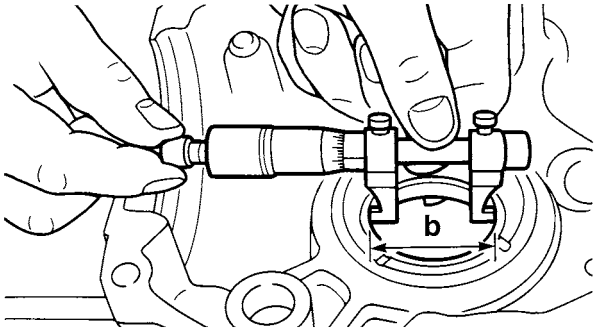
If either of the right or left journal bearing is worn or scratched, both bearings should be replaced as a set.

c. Measure the crankshaft journal diameter “a” of each crankshaft journal at two places. If it is out of specification, replace the crankshaft.

Crankshaft journal diameter
55.032–55.074 mm (2.1666–2.1683 in)



d. Measure the crankshaft journal bearing inside diameter "b" of each crankshaft journal bearing at two places.



e. If crankshaft journal bearing inside diameter is "45.03" and crankshaft journal diameter is "44.98", then the journal oil clearance is:

Journal oil clearance: Crankshaft journal bearing inside diameter - Crankshaft journal diameter = 45.03 - 44.98 = 0.05 mm

If the oil clearance is out of specification, select replacement bearings.

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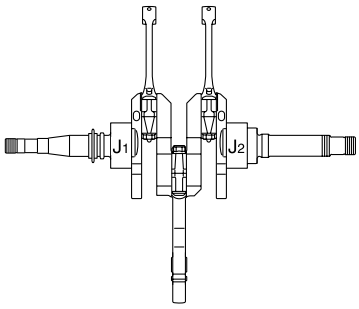
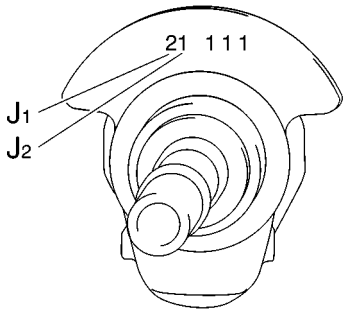
6. Select:
   • Crankshaft journal bearings (J_1–J_2)

TIP

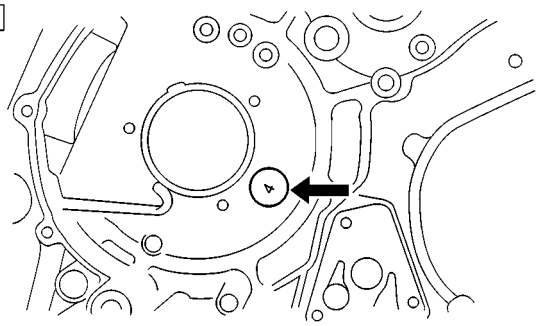
- The numbers "A" stamped into the crankshaft web and the numbers "B" on the crankcase are used to determine the replacement crankshaft journal bearing size.
- J_1–J_2 refer to the bearings shown in the crankshaft illustration.



A



B



For example, if the crankcase J_1 and the crankshaft web J_1 numbers are 4 and 2 respectively, then the bearing size for J_1 is:

J_1 (crankcase) - J_1 (crankshaft web) = 4 - 2 = 2 (black)

	**Bearing color code** **1.Blue 2.Black 3.Brown 4.Green**

EAS25630

INSTALLING THE CRANKSHAFT JOURNAL BEARINGS

The following procedure applies to both of the crankshaft main journal bearings.

1. Attach:
   • Crankshaft journal bearing "1"

TIP

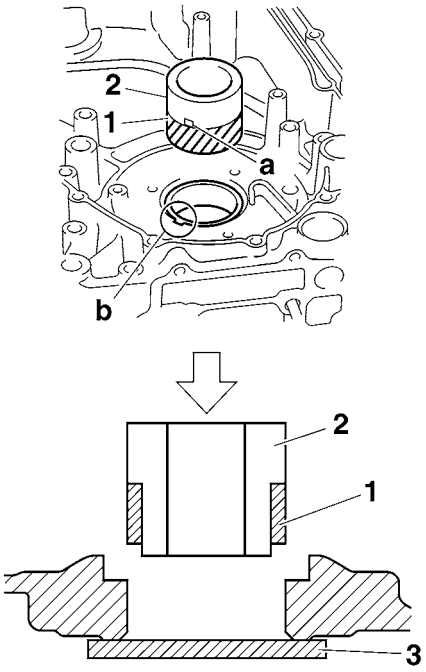
Attach the crankshaft journal bearing to the plane bearing installer "2".

	**Plane bearing installer** **90890-04139**

2. Install:
   • Crankshaft journal bearing

TIP

- Align the projection "a" on the bearing with the projection "b" on the crankcase.
- Place an iron "3" plate beneath the crankcase and press fit until the end of the plain bearing installer touches the iron plate.



EAS26150
INSTALLING THE CONNECTING RODS

1. Lubricate:
   - Bolt threads
   - Nut seats
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide grease**

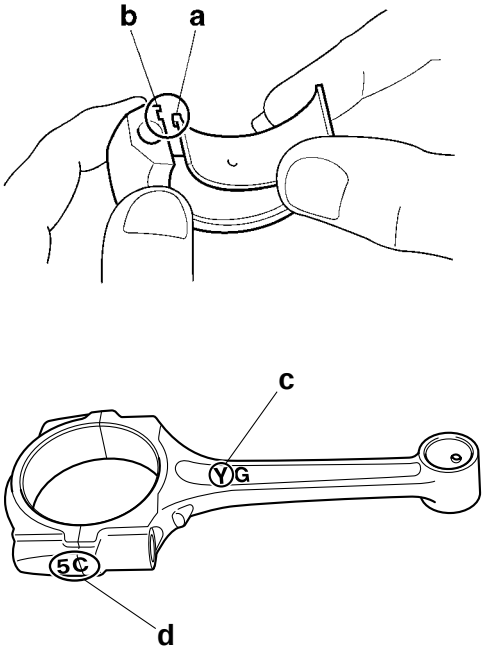
2. Lubricate:
   - Crankshaft pins
   - Big end bearings
   - Connecting rod inner surface
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

3. Install:
   - Big end bearings
   - Connecting rods
   - Connecting rod caps
   (onto the crankshaft pins)

TIP

- Align the projections “a” on the big end bearings with the notches “b” in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the “Y” marks “c” on the connecting rods face towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.



4. Tighten:
   - Connecting rod nuts

EWA13390

WARNING

- **Replace the connecting rod bolts and nuts with new ones.**
- **Clean the connecting rod bolts and nuts.**

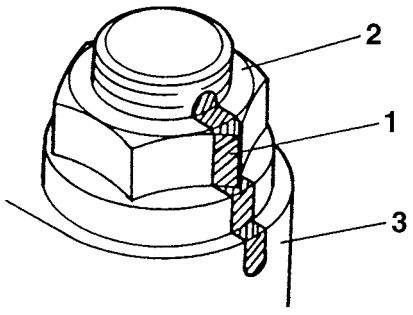
TIP

Tighten the connecting rod bolts using the following procedure.

a. Tighten the connecting rod nuts with a torque wrench.

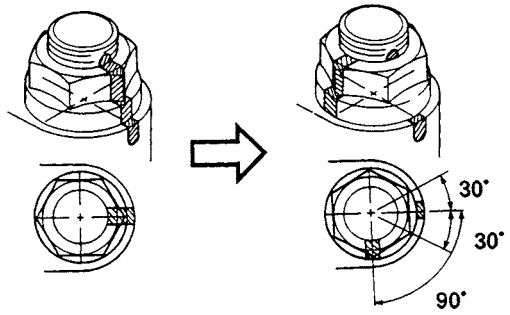
	Connecting rod nut (1st) **16 Nm (1.6 m·kg, 11 ft·lb)**

b. Put a mark “1” on the corner of the connecting rod nut “2” and the connecting rod cap “3”.



c. Tighten the connecting rod nuts further to reach the specified angle 90°.

	Connecting rod nut (final) Specified angle 90°



EWA13400

⚠ WARNING

If the connecting rod nut is tightened more than the specified angle, do not loosen the nut and then retighten it. Instead, replace the connecting rod bolt and nut with a new one and perform the procedure again.

ECA4B51019

NOTICE

- **Do not use a torque wrench to tighten the connecting rod nut to the specified angle.**
- **Tighten the nut until it is at the specified angle.**

TIP

On a hexagonal nut, note that the angle from one corner to another is 60°.

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5. Install:
   - Balancer connecting rod
   - Balancer connecting rod cap

	Balancer connecting rod cap nut 60 Nm (6.0 m·kg, 43 ft·lb)

ECA4B51020

NOTICE

- **When tightening the nuts, be sure to use a beam type torque wrench.**
- **Tighten the nuts to the specified torque. Apply continuous torque between 30 Nm (3.0 m·kg, 22 ft·lb) and 60 Nm (6.0 m·kg, 43 ft·lb) without pausing. After reaching 30 Nm (3.0 m·kg, 22 ft·lb), DO NOT STOP TIGHTENING until the specified torque is achieved. If the tightening is interrupted between 30 Nm (3.0 m·kg, 22 ft·lb) and 60 Nm (6.0 m·kg, 43 ft·lb), loosen the nut to less than 30 Nm (3.0 m·kg, 22 ft·lb) and start again.**

EAS4B51033

INSTALLING THE CRANKSHAFT ASSEMBLY

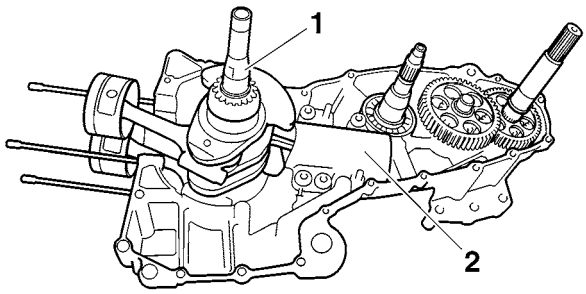
1. Install:
   - Crankshaft assembly “1”
   - Balancer piston cylinder “2”

	Balancer piston cylinder bolt 58 Nm (5.8 m·kg, 42 ft·lb)

ECA4B51023

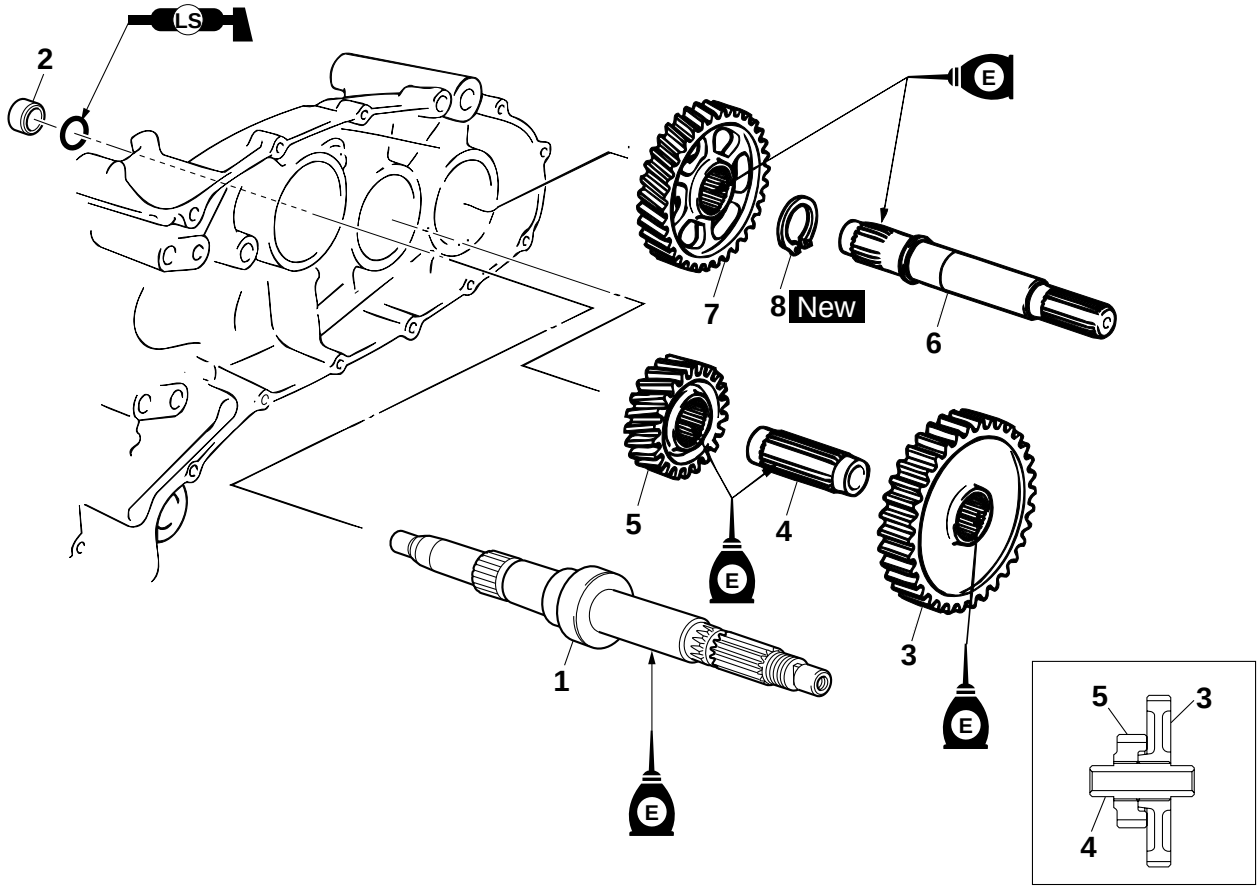
NOTICE

To avoid scratching the crankshaft and to ease the installation procedure, apply grease onto the oil seal lips and apply engine oil onto each bearing.



EAS26240
TRANSMISSION

Removing the transmission

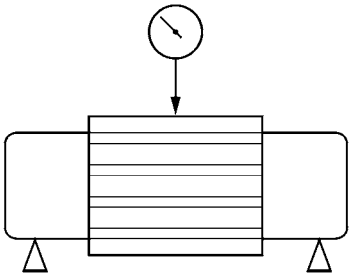


Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-66.
1	Secondary shaft	1	
2	Collar	1	
3	Primary driven gear	1	
4	Main axle	1	
5	1st pinion gear	1	
6	Drive axle	1	
7	1st wheel gear	1	
8	Circlip	1	
			For installation, reverse the removal procedure.

EAS26300
CHECKING THE TRANSMISSION

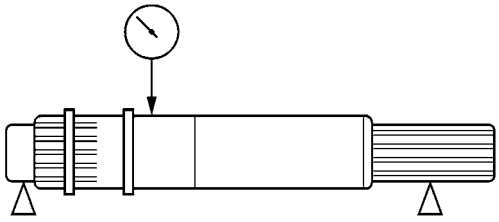
1. Measure:
   • Main axle runout
   (with a centering device and dial gauge)
   Out of specification → Replace the main axle.

Main axle runout limit
0.08 mm (0.0032 in)



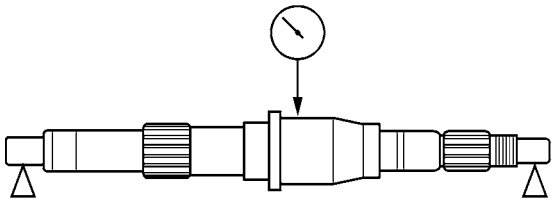
2. Measure:
   • Drive axle runout
   (with a centering device and dial gauge)
   Out of specification → Replace the drive axle.

Drive axle runout limit
0.08 mm (0.0032 in)

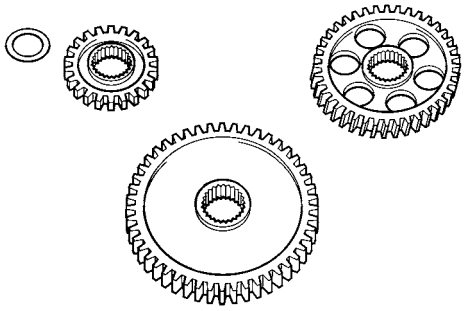


3. Measure:
   • Secondary shaft runout
   (with a centering device and dial gauge)
   Out of specification → Replace the secondary shaft.

Maximum secondary shaft runout
0.08 mm (0.0031 in)



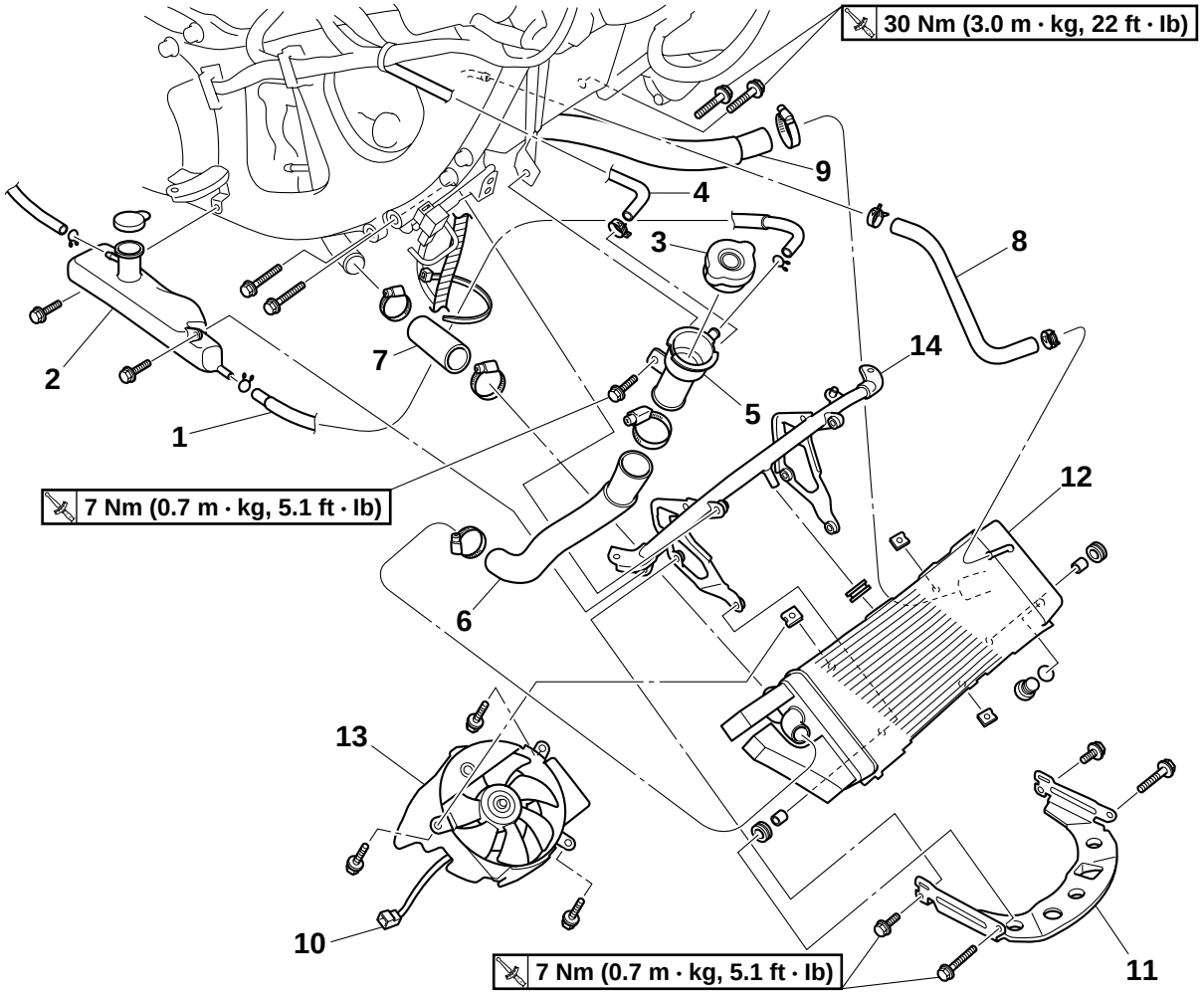
4. Check:
   • Transmission gear movement
   Rough movement → Replace the defective part(s).
5. Check:
   • Circlips
   Bends/damage/looseness → Replace.



COOLING SYSTEM

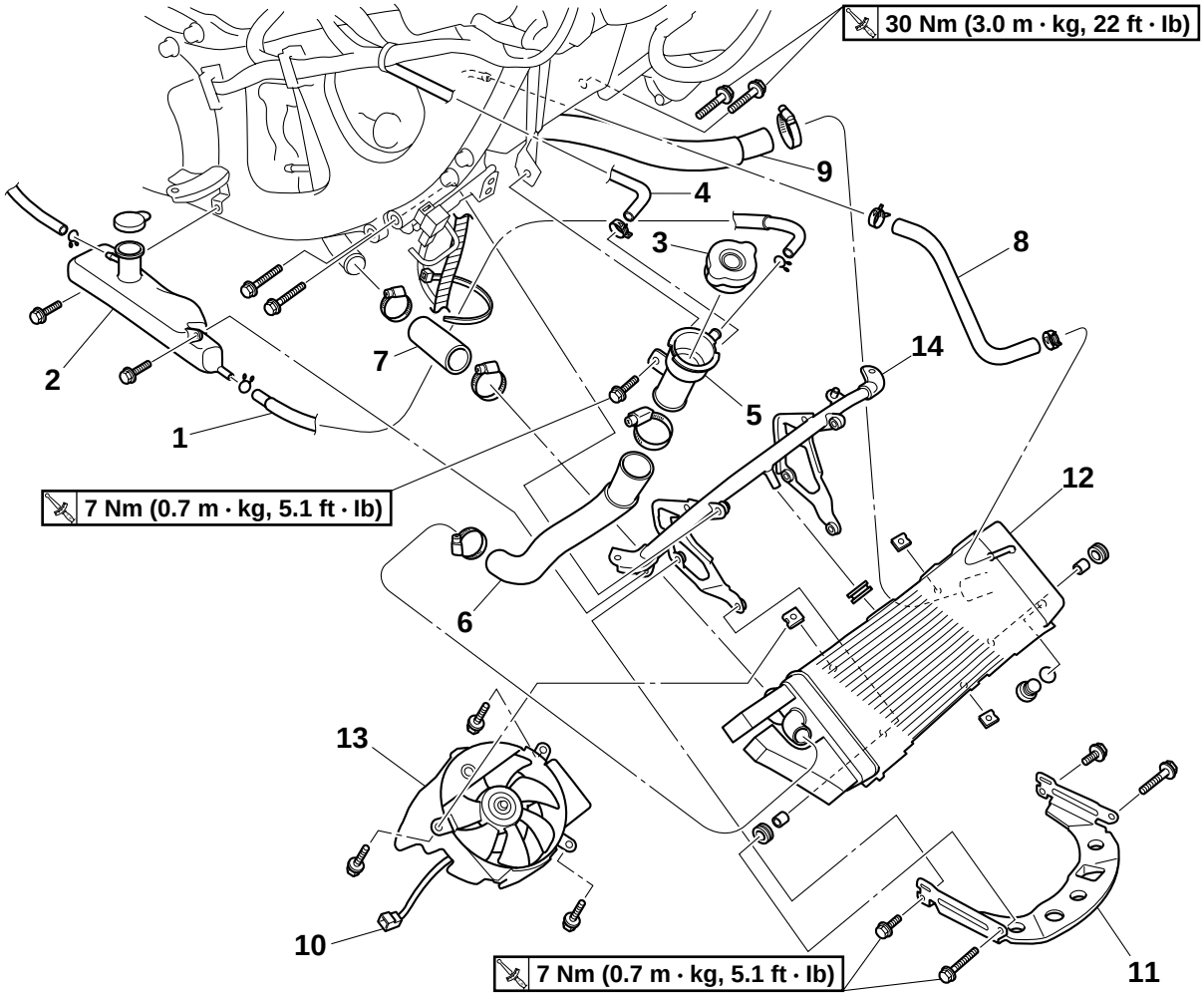
EAS26380
RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Footrest boards		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
1	Coolant reservoir hose	1	
2	Coolant reservoir	1	
3	Radiator cap	1	
4	Cooling system air bleed hose	1	
5	Radiator filler pipe	1	
6	Radiator filler hose	1	
7	Radiator inlet hose	1	
8	Fast idle plunger outlet coolant hose	1	Disconnect.
9	Radiator outlet hose	1	Disconnect.
10	Radiator fan motor coupler	1	Disconnect.
11	Radiator guard	1	
12	Radiator	1	

Removing the radiator



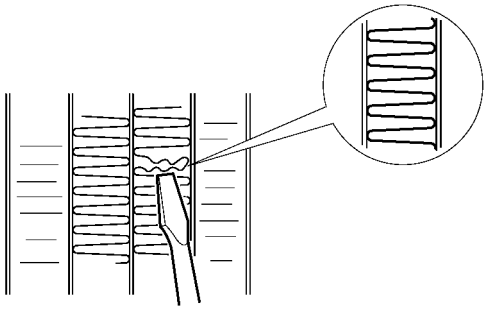
Order	Job/Parts to remove	Q'ty	Remarks
13	Radiator fan	1	
14	Radiator bracket	1	
			For installation, reverse the removal procedure.

EAS26390
CHECKING THE RADIATOR

1. Check:
   • Radiator fins
   Obstruction → Clean.
   Apply compressed air to the rear of the radiator.
   Damage → Repair or replace.

TIP

Straighten any flattened fins with a thin, flat-head screwdriver.



2. Check:
   • Radiator hoses
   • Radiator pipes
   Cracks/damage → Replace.
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
107.9–137.3 kPa (15.6–19.9 psi)
(1.08–1.37 kgf/cm²)

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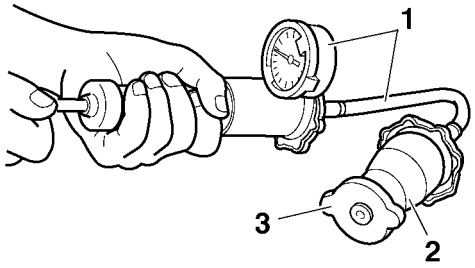
a. Install the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator cap "3".

Radiator cap tester
90890-01325
Radiator pressure tester
YU-24460-01
Radiator cap tester adapter
90890-01352
Radiator pressure tester adapter
YU-33984



b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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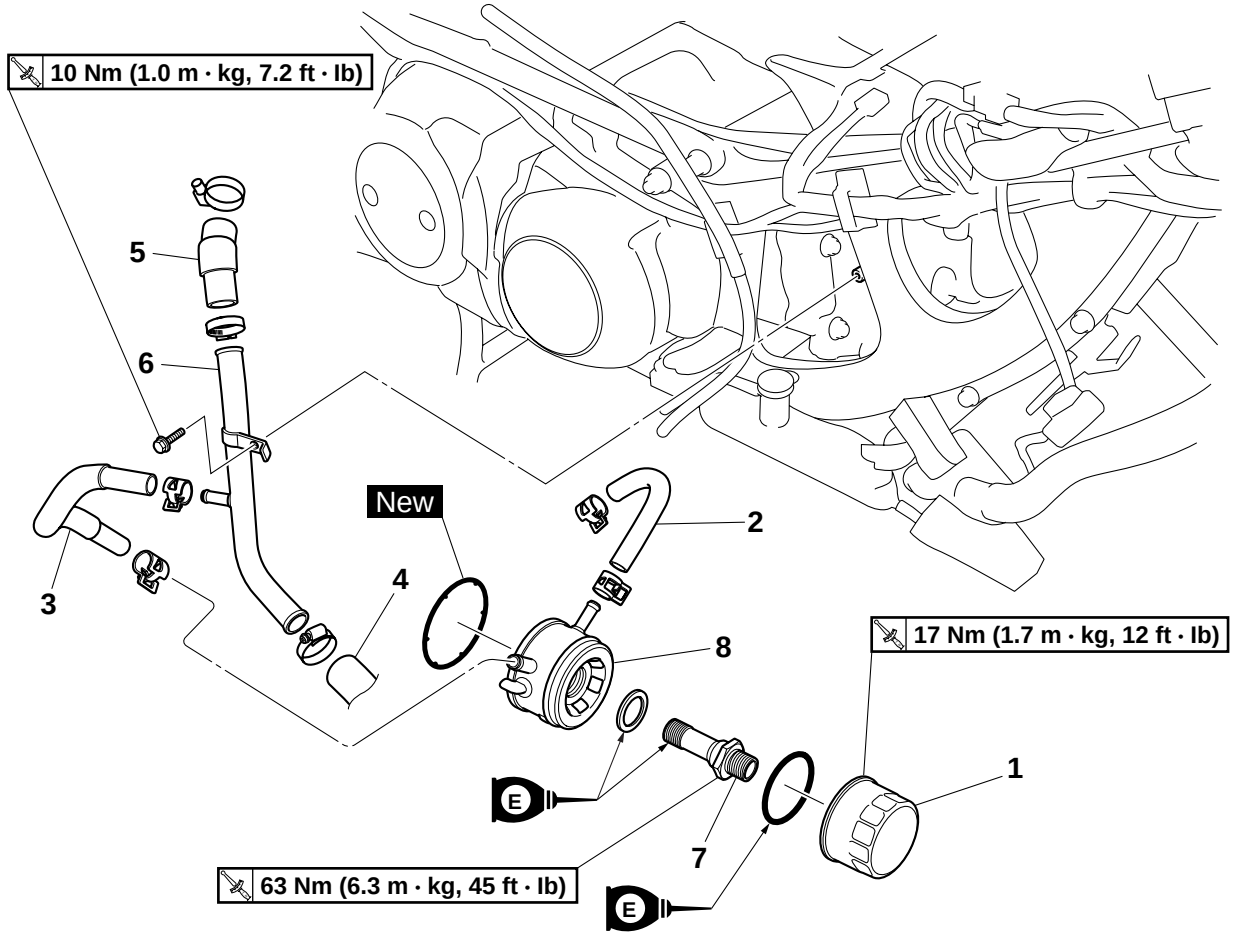
4. Check:
   • Radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to "COOLING SYSTEM" on page 8-25.

EAS26400
INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-18.
2. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR" on page 6-3.

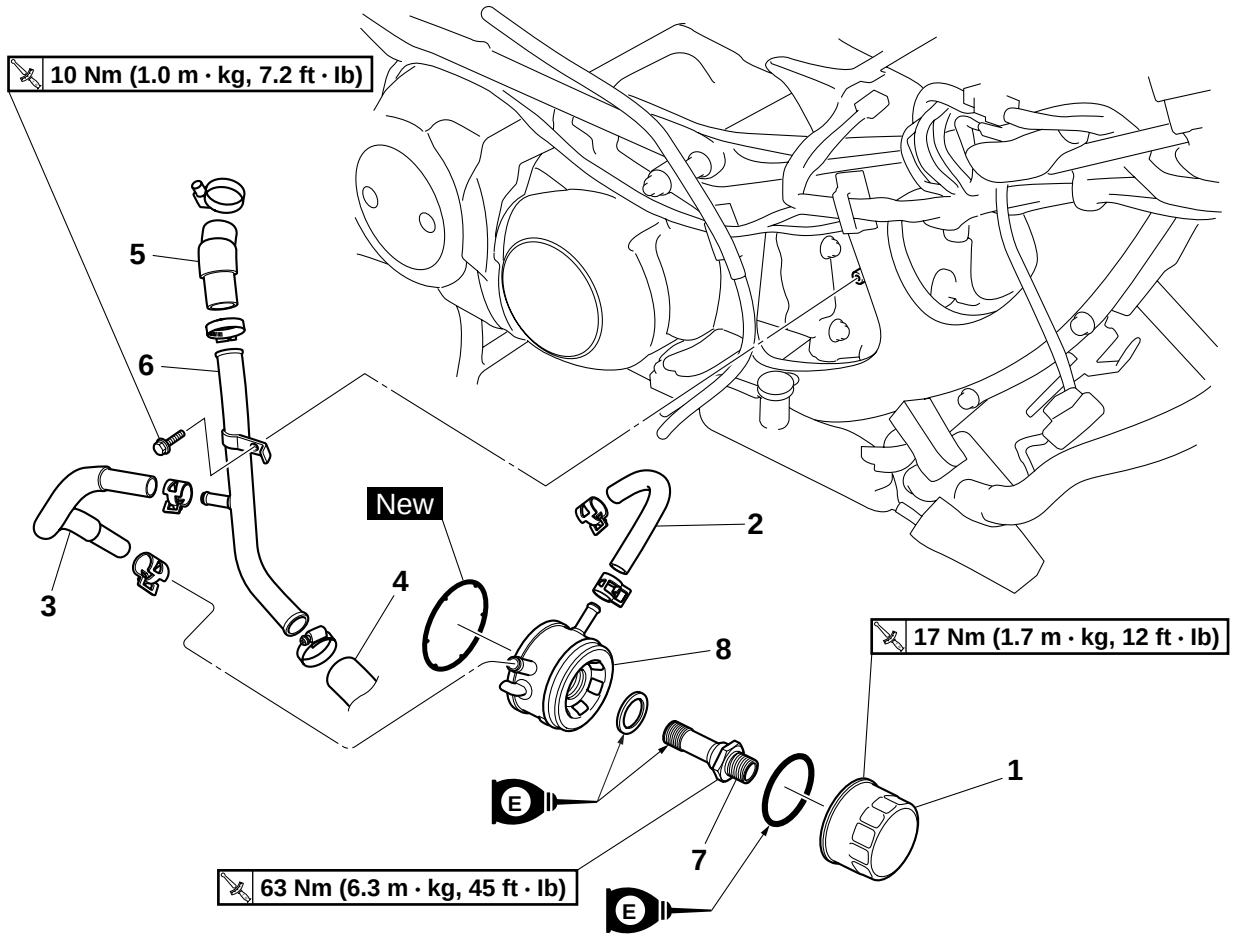
EAS26410
OIL COOLER

Removing the oil cooler



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-12.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
1	Oil filter cartridge	1	
2	Oil cooler inlet hose	1	
3	Oil cooler outlet hose	1	
4	Radiator inlet hose	1	Disconnect.
5	Thermostat outlet hose	1	
6	Coolant pipe	1	
7	Oil filter cartridge union bolt	1	

Removing the oil cooler



Order	Job/Parts to remove	Q'ty	Remarks
8	Oil cooler	1	
			For installation, reverse the removal procedure.

EAS26420
CHECKING THE OIL COOLER

1. Check:
   - Oil cooler
     Cracks/damage → Replace.
2. Check:
   - Oil cooler inlet hose
   - Oil cooler outlet hose
     Cracks/damage/wear → Replace.

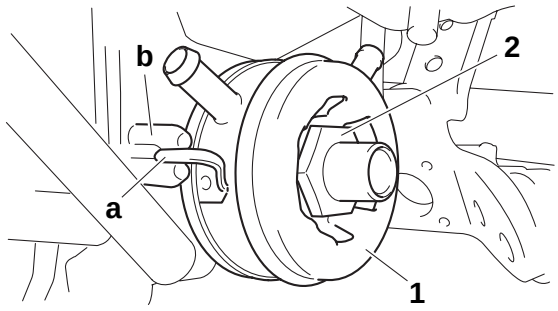
EAS26430
INSTALLING THE OIL COOLER

1. Clean:
   - Mating surfaces of the oil cooler and the crankcase
     (with a cloth dampened with lacquer thinner)
2. Install:
   - O-ring New
   - Oil cooler "1"
   - Oil filter cartridge union bolt "2"

	Oil filter cartridge union bolt **63 Nm (6.3 m·kg, 45 ft·lb)**

TIP

- Before installing the oil cooler, lubricate the union bolt threads and washer with engine oil.
- Make sure that the O-ring is positioned properly.
- Align the projection "a" on the oil cooler with the slot "b" in the crankcase.



3. Install:
   - Oil filter cartridge

	Oil filter wrench **90890-01469** **YM-01469**

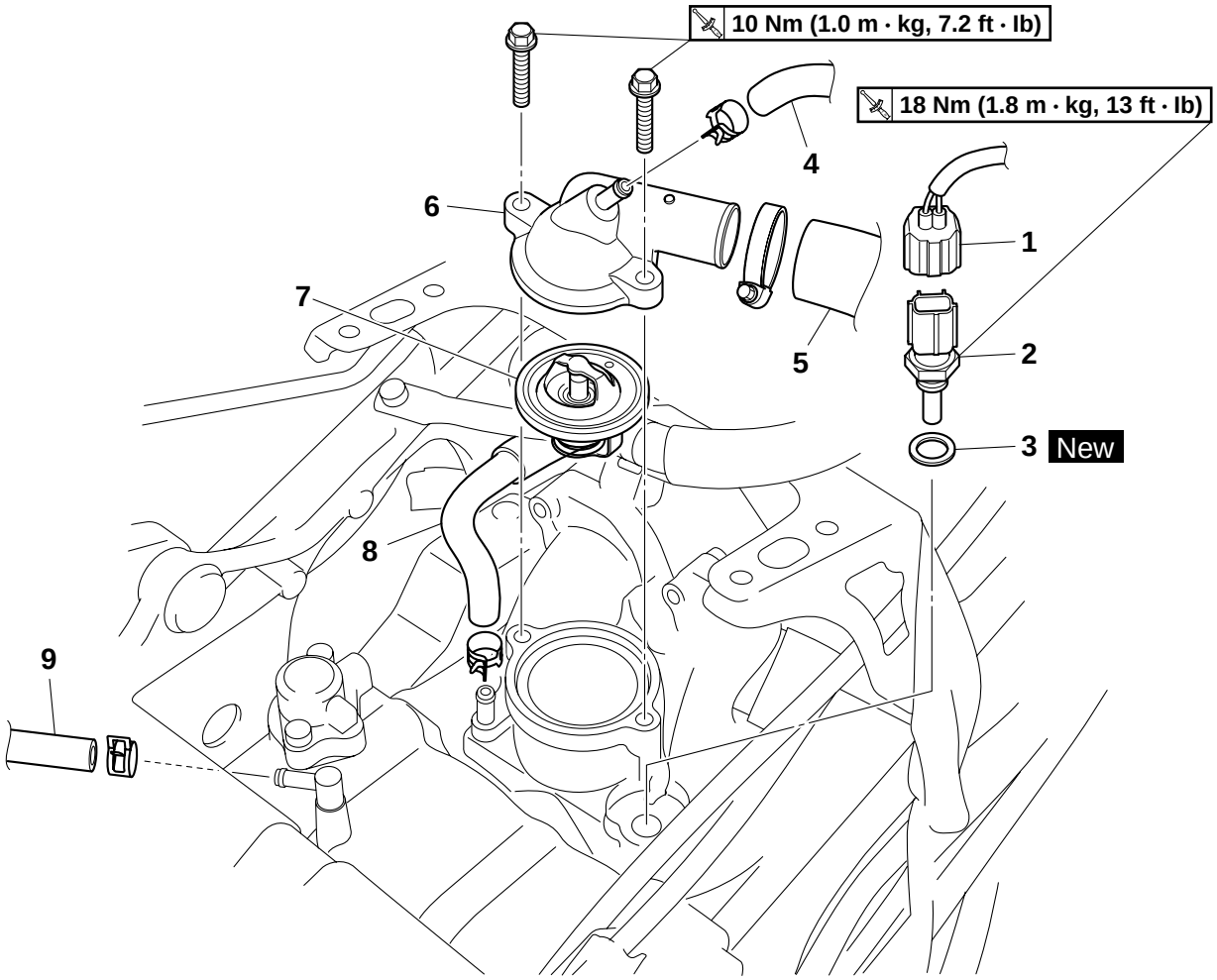
	Oil filter cartridge **17 Nm (1.7 m·kg, 12 ft·lb)**

Refer to "CHANGING THE ENGINE OIL" on page 3-12.

4. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" on page 3-18.
   - Crankcase
     (with the specified amount of the recommended engine oil)
     Refer to "CHANGING THE ENGINE OIL" on page 3-12.
5. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
6. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to "CHECKING THE RADIATOR" on page 6-3.

EAS26440
THERMOSTAT

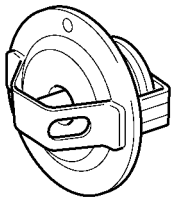
Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
1	Coolant temperature sensor coupler	1	Disconnect.
2	Coolant temperature sensor	1	
3	Copper washer	1	
4	Cooling system air bleed hose	1	Disconnect.
5	Thermostat outlet hose	1	Disconnect.
6	Thermostat cover	1	
7	Thermostat	1	
8	Fast idle plunger inlet coolant hose	1	Disconnect.
9	Coolant hose	1	Disconnect.
			For installation, reverse the removal procedure.

EAS26450
CHECKING THE THERMOSTAT

1. Check:
   - Thermostat
     Does not open at 71–85 °C (159.8–185.0 °F)
     → Replace.



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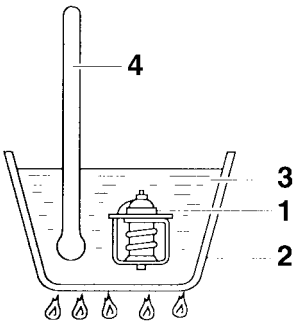
a. Suspend the thermostat “1” in a container “2” filled with water.
b. Slowly heat the water “3”.
c. Place a thermometer “4” in the water.
d. While stirring the water, observe the thermostat and thermometer’s indicated temperature.



A. Fully closed
B. Fully open

TIP

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

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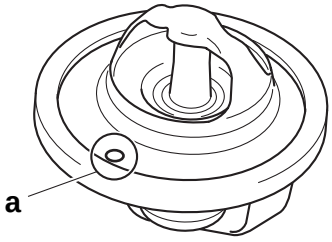
2. Check:
   - Thermostat cover
     Cracks/damage → Replace.

EAS26480
INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
   - Thermostat

TIP

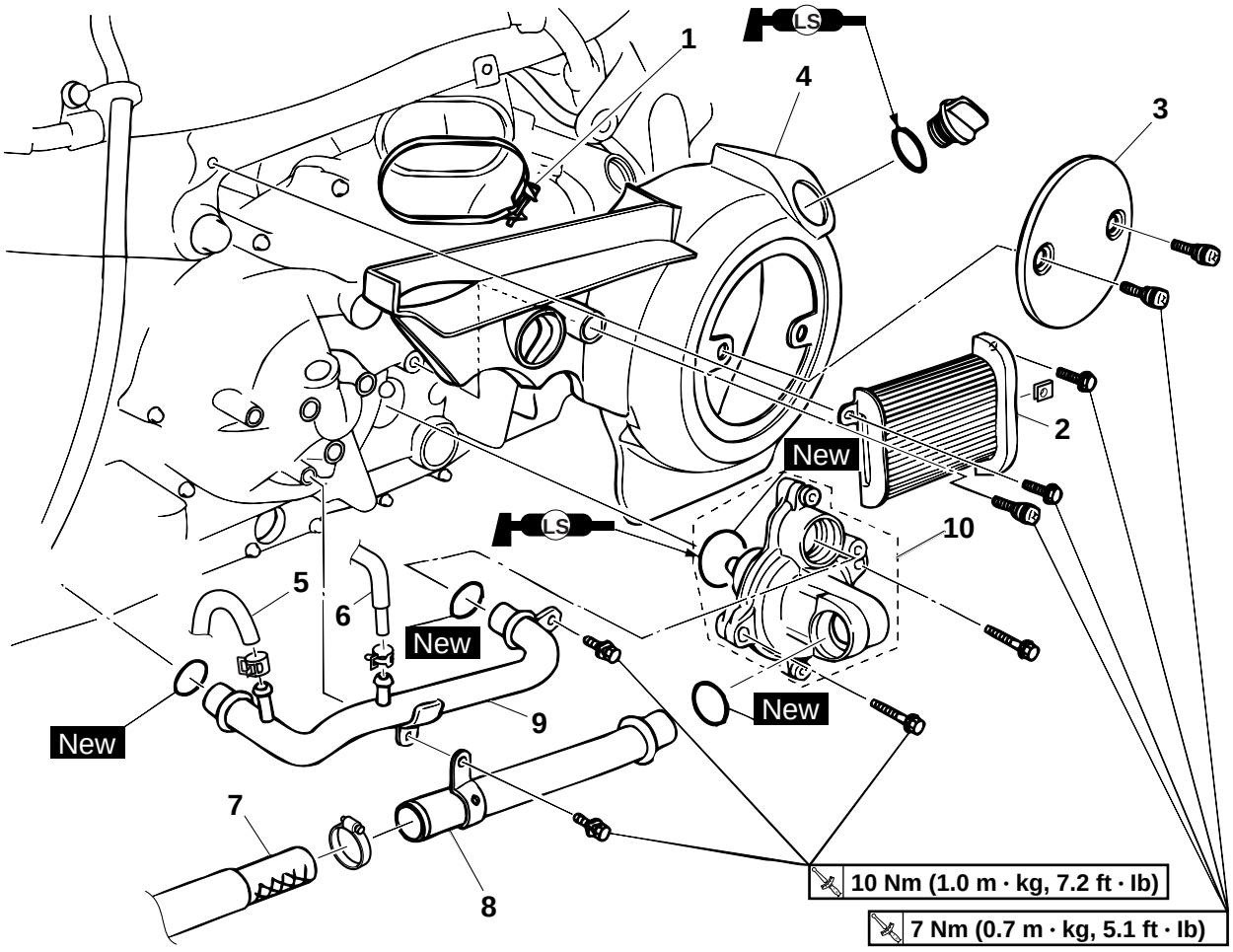
Install the thermostat with its breather hole “a” facing forward.



2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-18.
3. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.

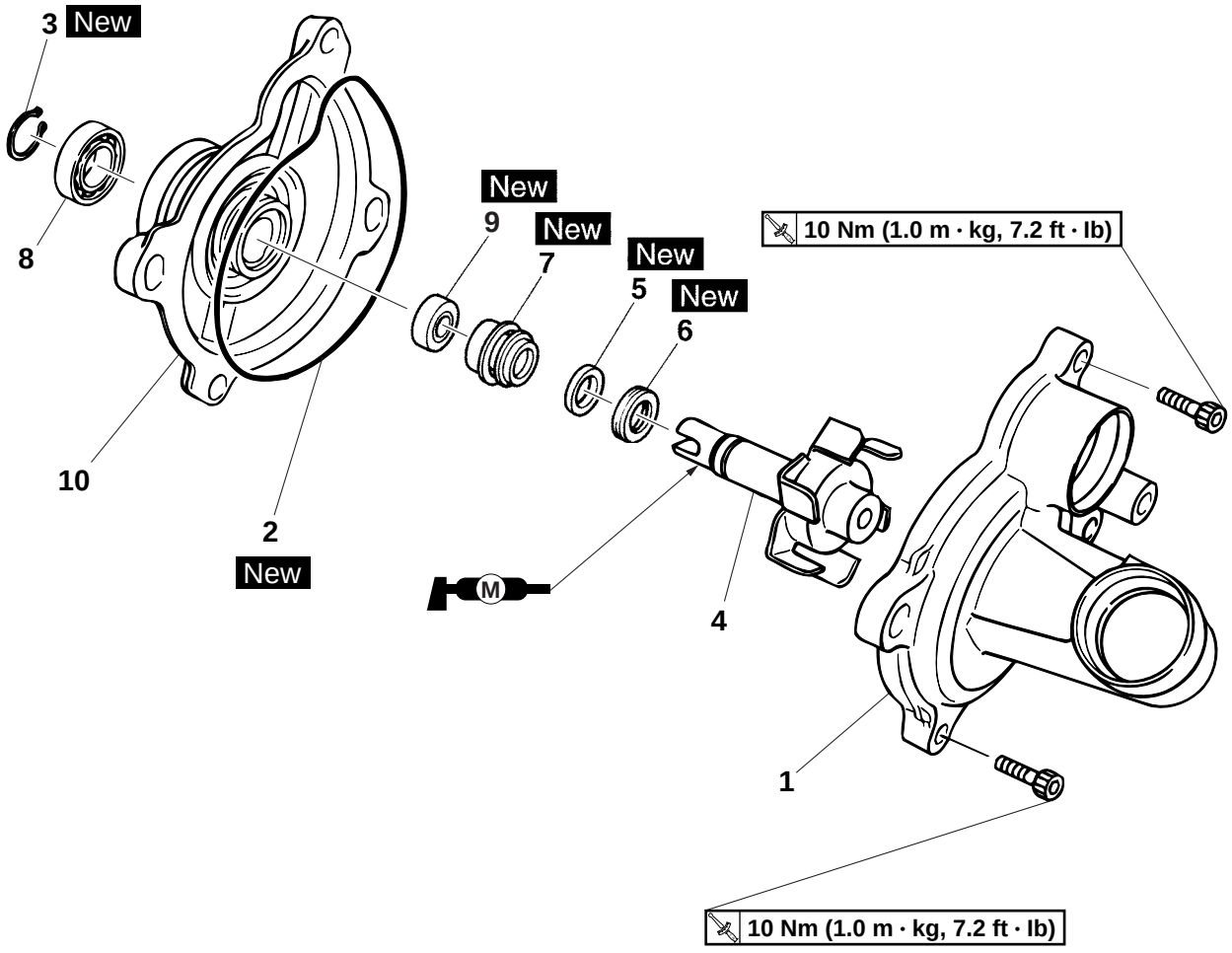
EAS26500
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Left footrest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
1	V-belt case air filter element joint clamp screw	1	Loosen.
2	V-belt case air filter element (left)	1	
3	Generator cover protector cover	1	
4	Generator cover protector	1	
5	Oil cooler inlet hose	1	Disconnect.
6	Coolant hose	1	Disconnect.
7	Radiator outlet hose	1	Disconnect.
8	Water pump inlet pipe	1	
9	Water pump outlet pipe	1	
10	Water pump assembly	1	
			For installation, reverse the removal procedure.

Disassembling the water pump

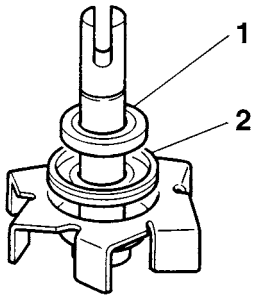


Order	Job/Parts to remove	Q'ty	Remarks
			TIP It is not necessary to remove the impeller shaft, unless the coolant level is extremely low or coolant contains engine oil.
1	Water pump housing cover	1	
2	O-ring	1	
3	Circlip	1	
4	Impeller shaft	1	
5	Rubber damper holder	1	
6	Rubber damper	1	
7	Water pump seal	1	
8	Bearing	1	
9	Oil seal	1	
10	Water pump housing	1	
			For assembly, reverse the disassembly procedure.

EAS26510
DISASSEMBLING THE WATER PUMP
1. Remove:
   - Rubber damper holder “1”
   - Rubber damper “2”
     (from the impeller, with a thin, flat-head screwdriver)

TIP

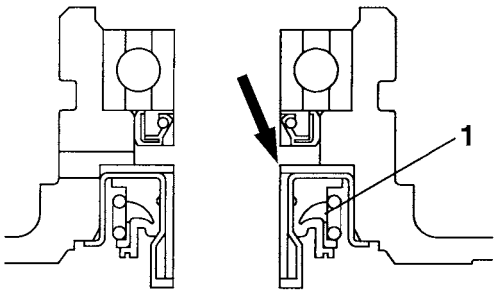
Do not scratch the impeller shaft.



2. Remove:
   - Water pump seal “1”

TIP

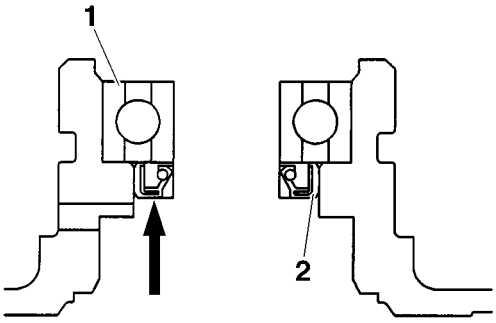
Remove the water pump seal from the inside of the water pump housing.



3. Remove:
   - Bearing “1”
   - Oil seal “2”

TIP

Remove the bearing and oil seal from the outside of the water pump housing.



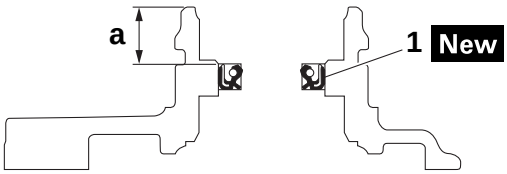
EAS26550
CHECKING THE WATER PUMP
1. Check:
   - Water pump housing cover
   - Water pump housing
   - Impeller shaft
   - Water pump seal
   - Oil seal
   - Rubber damper
   - Rubber damper holder
     Cracks/damage/wear → Replace.
2. Check:
   - Bearing
     Rough movement → Replace.
3. Check:
   - Water pump inlet pipe
   - Water pump outlet pipe
     Cracks/damage/wear → Replace.

EAS26570
ASSEMBLING THE WATER PUMP
1. Install:
   - Oil seal “1” New

TIP

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket that matches its outside diameter.

Installed depth of oil seal “a”
11.5 mm (0.45 in)



2. Install:
   - Water pump seal “1” New

ECA14080

NOTICE

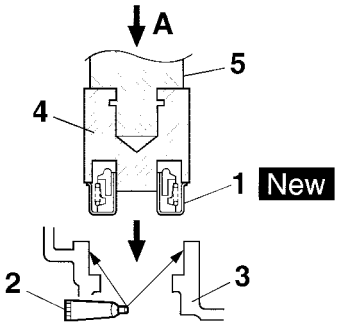
Never lubricate the water pump seal surface with oil or grease.

TIP

- Install the water pump seal with the special tools.

• Before installing the water pump seal, apply Yamaha bond No.1215 “2” to the water pump housing “3”.

Mechanical seal installer
90890-04078
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Bearing driver 40 mm
YM-04058
Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)

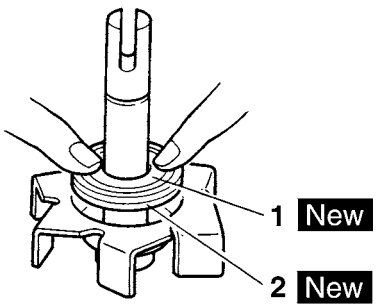


A. Push down
4. Mechanical seal installer
5. Middle driven shaft bearing driver

3. Install:
• Rubber damper holder “1” New
• Rubber damper “2” New

TIP

Before installing the rubber damper, apply tap water or coolant onto its outer surface.

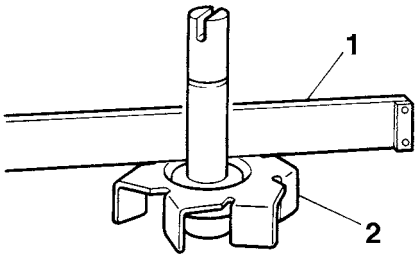


4. Measure:
• Impeller shaft tilt
Out of specification → Repeat step (3).

ECA14090
NOTICE

Make sure the rubber damper and rubber damper holder are flush with the impeller.

Impeller shaft tilt limit
0.15 mm (0.0059 in)



1. Straightedge
2. Impeller shaft

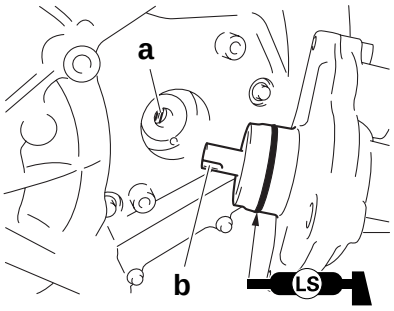
EAS26580
INSTALLING THE WATER PUMP

1. Install:
• O-ring New
• Water pump assembly

TIP

• Align the projection “a” on the oil pump shaft and water pump shaft groove “b”.
• Lubricate the O-ring with a thin coat of lithium-soap-based grease.

Water pump assembly bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)



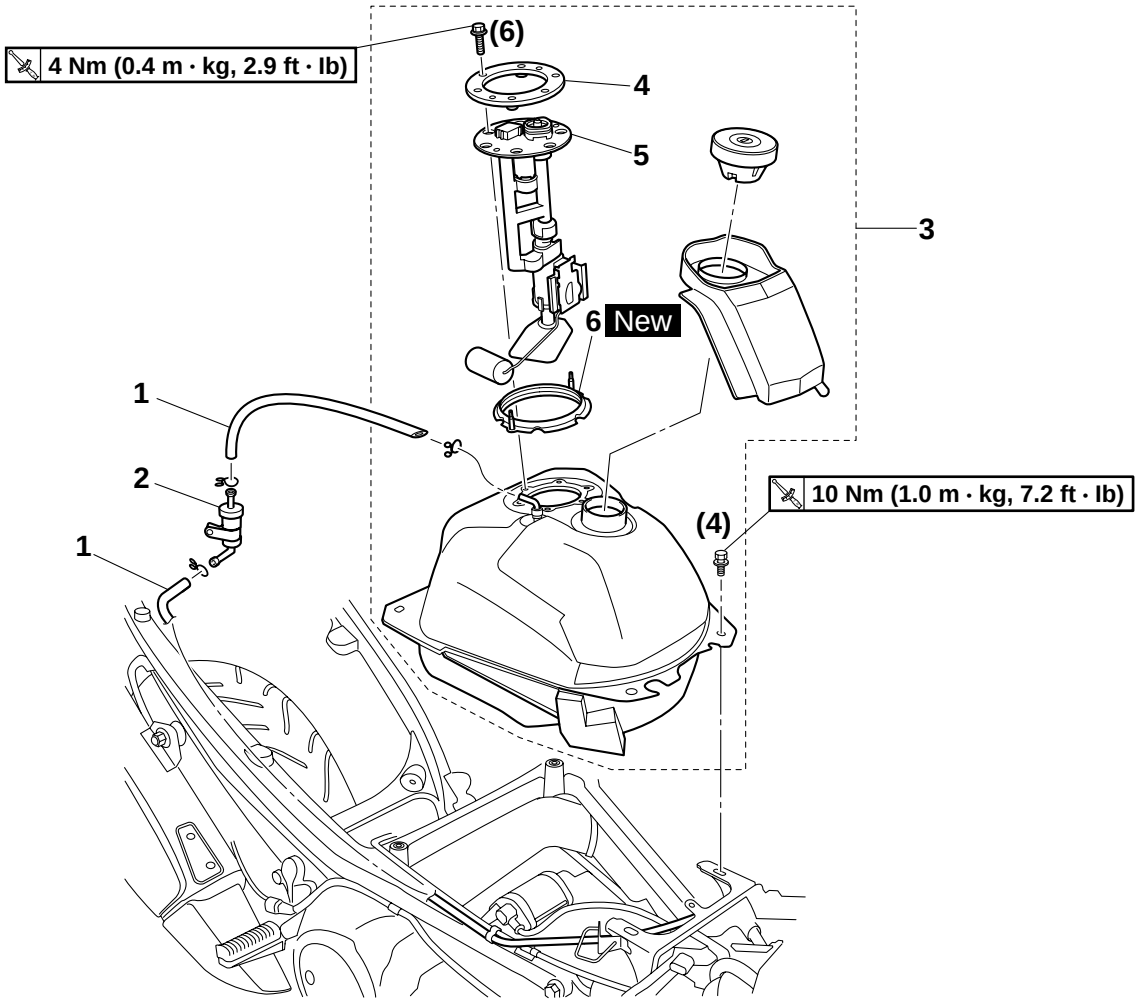
2. Fill:
• Cooling system
(with the specified amount of the recommended coolant)
Refer to “CHANGING THE COOLANT” on page 3-18.

3. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
4. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to “CHECKING THE RADIATOR” on page 6-3.

FUEL SYSTEM

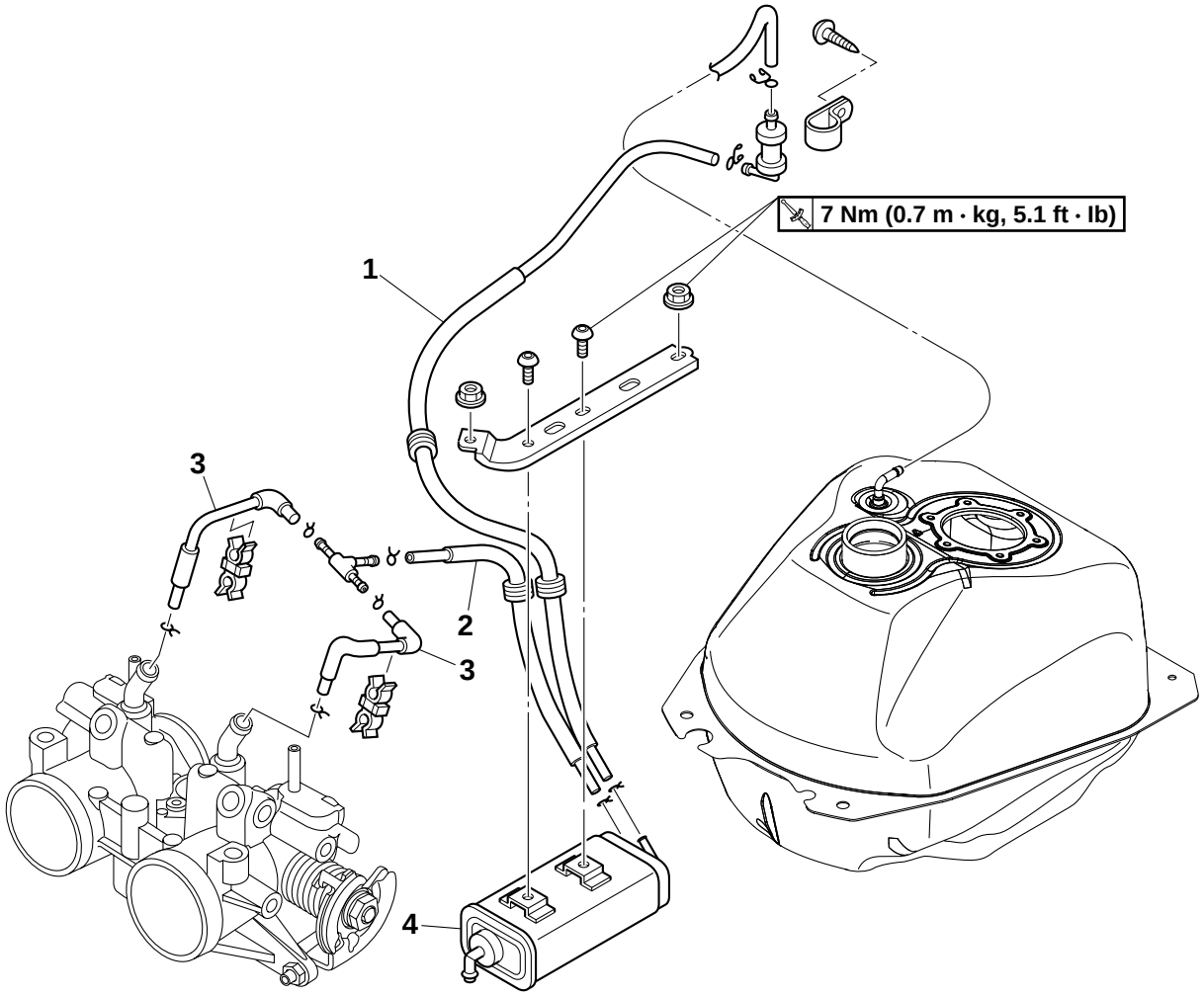
EAS26620
FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel tank breather hose	2	
2	Rollover valve	1	
3	Fuel tank	1	
4	Fuel pump bracket	1	
5	Fuel pump	1	
6	Fuel pump gasket	1	
			For installation, reverse the removal procedure.

Removing the canister



Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Fuel tank breather hose	1	
2	Canister purge hose (3-way joint to canister)	1	
3	Canister purge hose (throttle body to 3-way joint)	2	
4	Canister	1	
			For installation, reverse the removal procedure.

EAS26630
REMOVING THE FUEL TANK
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   • Fuel tank

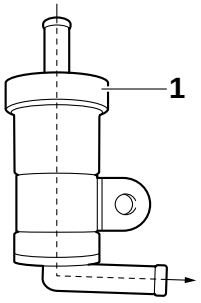
EAS26640
REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump

ECA14720
NOTICE
• Do not drop the fuel pump or give it a strong shock.
• Do not touch the base section of the fuel sender.

EAS26670
CHECKING THE FUEL PUMP BODY
1. Check:
   • Fuel pump body
   Obstruction → Clean.
   Cracks/damage → Replace the fuel pump assembly.

EAS4B51002
CHECKING THE ROLLOVER VALVE
1. Check:
   • Rollover valve “1”
   Damage/faulty → Replace.

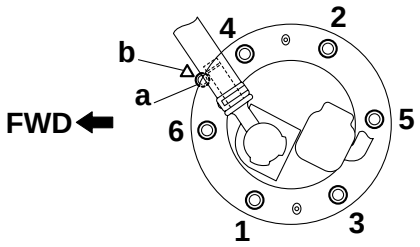
TIP
- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.



EAS4B51003
INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump

	Fuel pump bolt **4 Nm (0.4 m·kg, 2.9 ft·lb)**

TIP
- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align projection “a” on the fuel pump with point “b” of the fuel tank.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.



EAS27010
CHECKING THE FUEL PRESSURE
1. Check:
   • Pressure regulator operation

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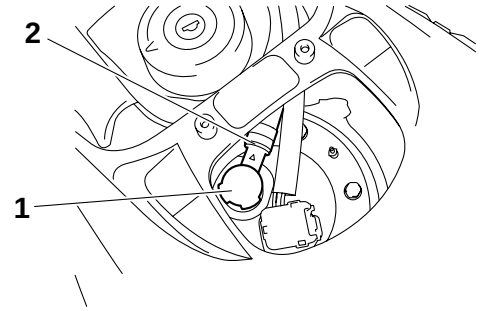
a. Remove the fuel hose connector cover “1” and disconnect the fuel hose “2” from the fuel pump.

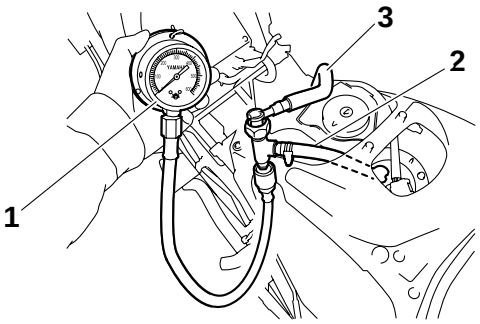
ECA4B51001
NOTICE
• Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
• Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.
• Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.

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



b. Connect the pressure gauge “1” and fuel pressure adapter “2” to the fuel pump and the fuel hose “3”.

Pressure gauge
90890-03153
YU-03153
Fuel pressure adapter
90890-03181



c. Start the engine.
d. Measure the fuel pressure.
Faulty → Replace the fuel pump.

Output pressure
246.0–254.0 kPa (35.7–36.8 psi)
(2.46–2.54 kgf/cm²)

e. Set the main switch to “OFF”.
f. Remove the pressure gauge and fuel pressure adapter.

TIP

Before removing the special tools, place a few rags in the area under where they will be removed.

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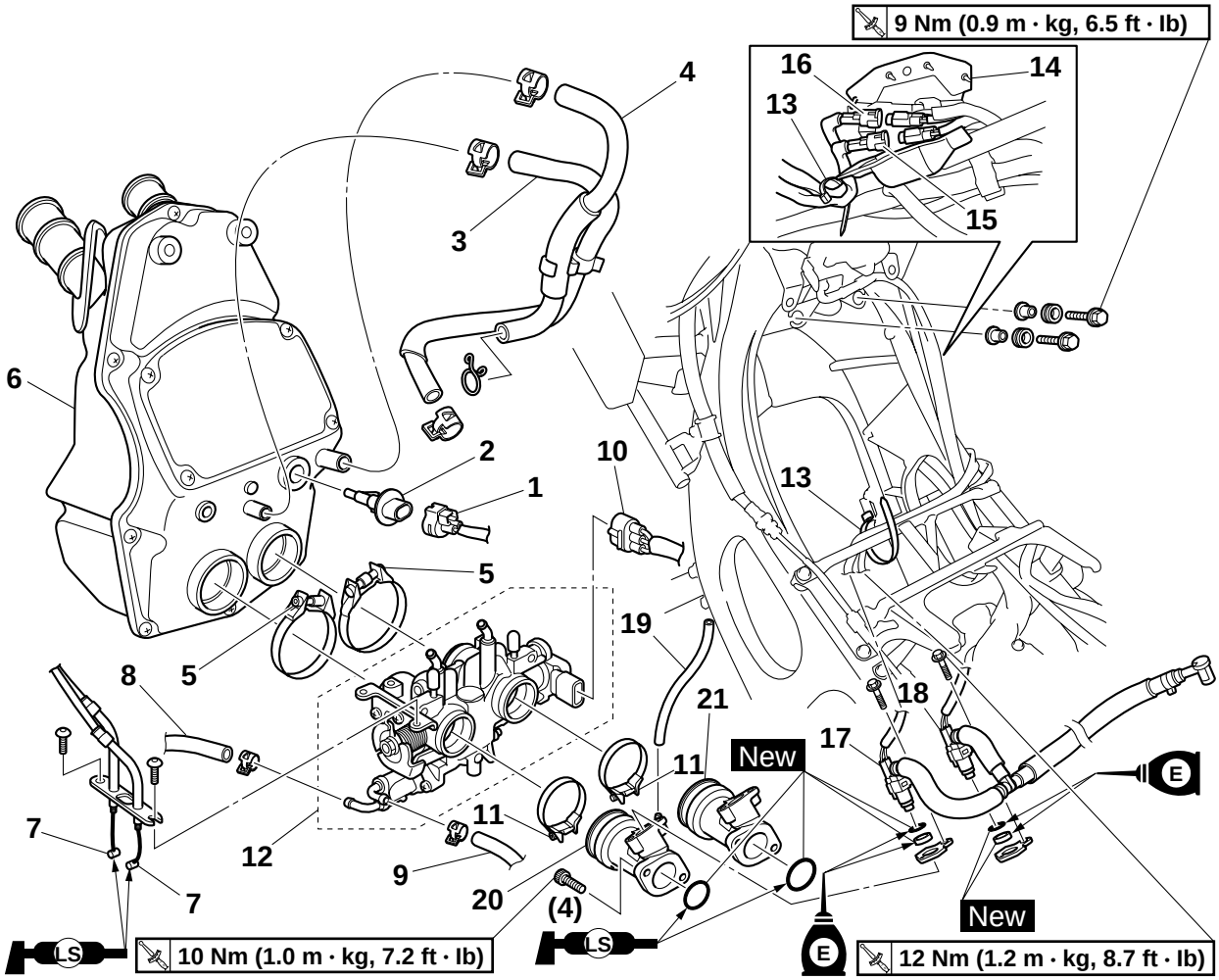
EAS26970

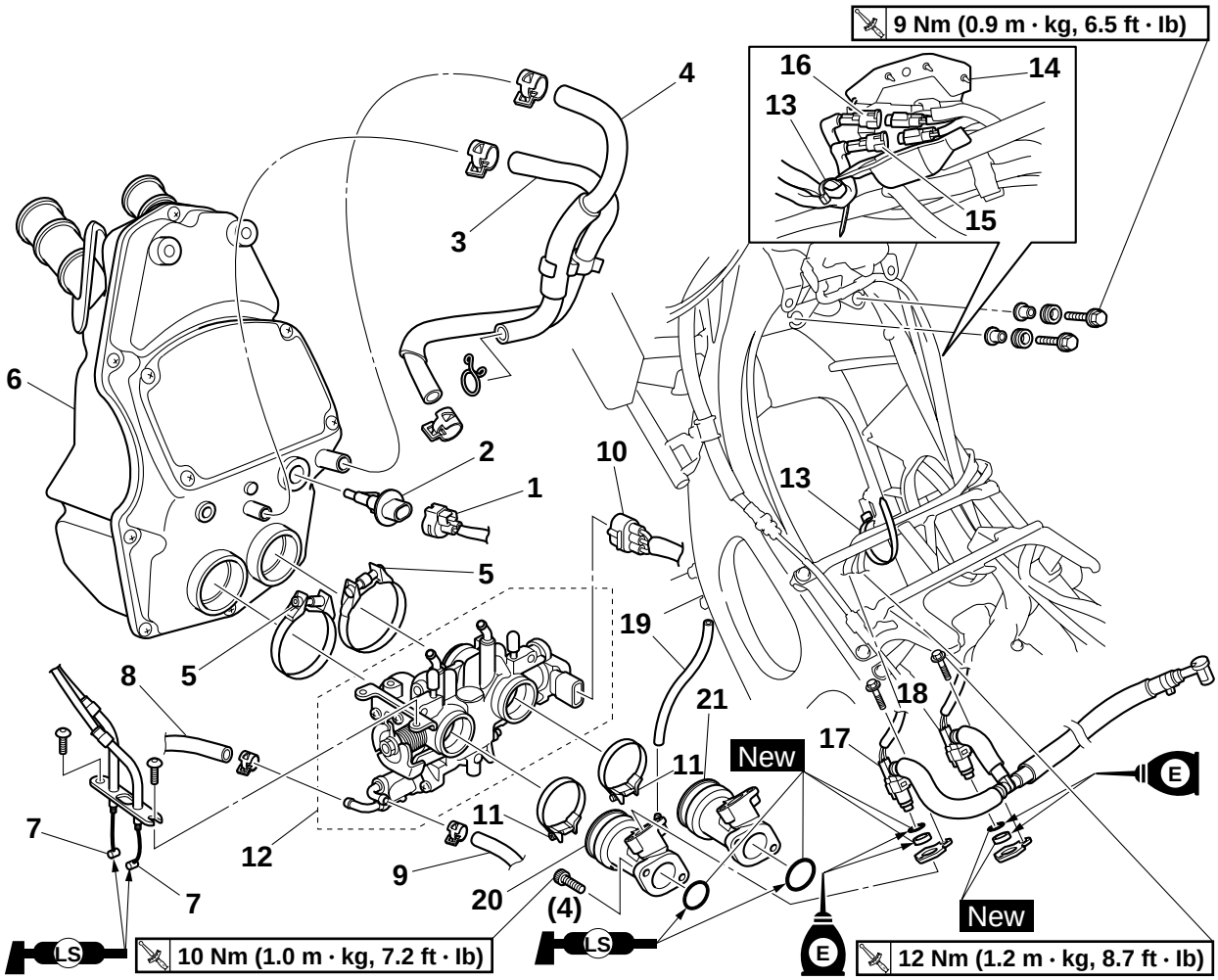
THROTTLE BODY

Removing the throttle body assembly



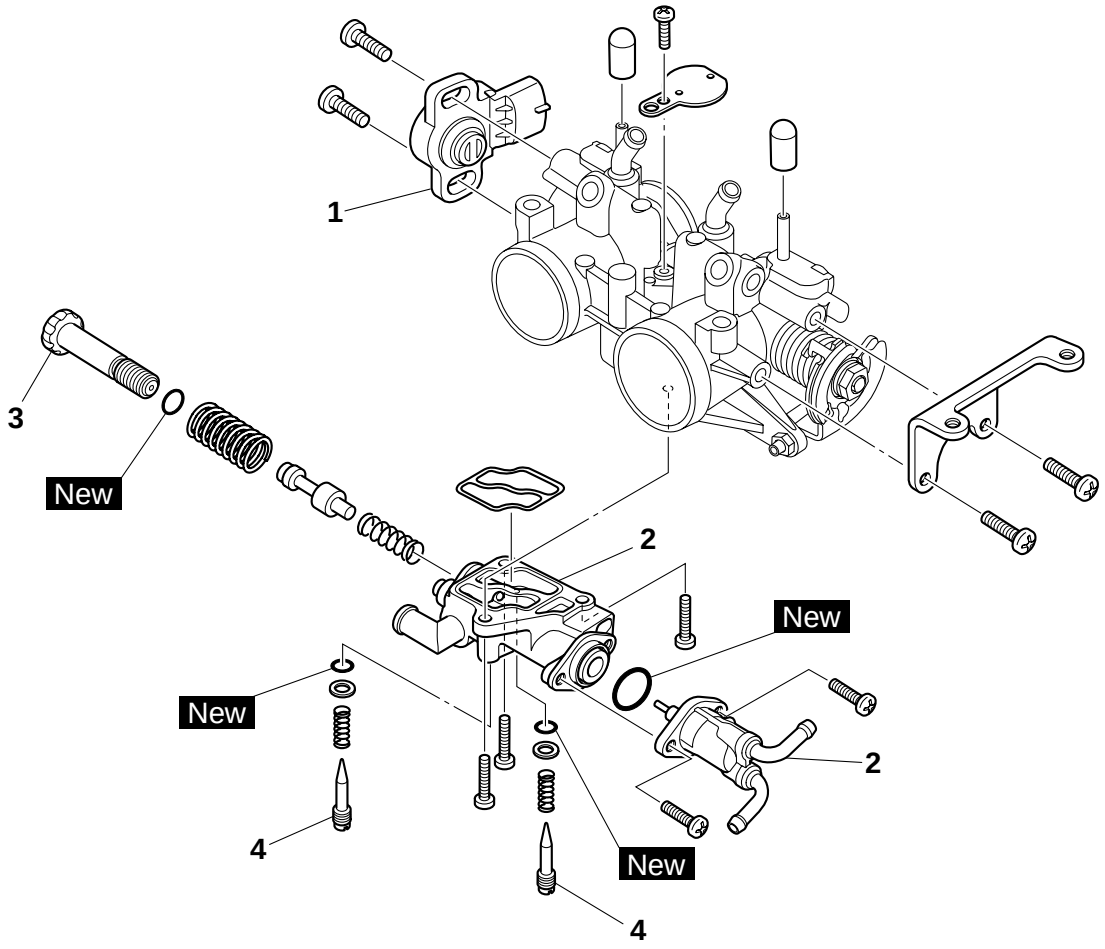
Order	Job/Parts to remove	Q'ty	Remarks
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank/Canister purge hoses		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-18.
1	Intake air temperature sensor coupler	1	Disconnect.
2	Intake air temperature sensor	1	
3	Cylinder head breather hose	1	
4	Fast idle plunger intake hose	1	
5	Air filter case joint clamp screw	2	Loosen.
6	Air filter case	1	
7	Throttle cable	2	
8	Fast idle plunger outlet coolant hose	1	
9	Fast idle plunger inlet coolant hose	1	
10	Throttle position sensor coupler	1	Disconnect.
11	Throttle body joint clamp screw	2	Loosen.

Removing the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
12	Throttle body assembly	1	
13	Plastic band	2	
14	Coupler cover	1	
15	Fuel injector #1 coupler	1	Green
16	Fuel injector #2 coupler	1	Black
17	Fuel injector #1	1	
18	Fuel injector #2	1	
19	Intake air pressure sensor hose	1	
20	Intake manifold #1	1	
21	Intake manifold #2	1	
			For installation, reverse the removal procedure.

Disassembling the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
			TIP Before disassembling the throttle body assembly, make sure to note the number of times the air screw is turned out from the seated position to its set position.
1	Throttle position sensor	1	
2	Fast idle plunger	1	
3	Idling speed adjusting screw	1	
4	Air screw	2	
			For assembly, reverse the disassembly procedure.

EAS26980
CHECKING THE INJECTORS
1. Check:
   • Injectors
   Damage → Replace.

EAS26990
CHECKING THE THROTTLE BODY
1. Check:
   • Throttle body
   Cracks/damage → Replace the throttle body.
2. Check:
   • Fuel passages
   Obstructions → Clean.

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a. Wash the throttle body in a petroleum- based solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages with compressed air.

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EAS27020
ADJUSTING THE THROTTLE POSITION SENSOR

TIP

Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Check:
   • Throttle position sensor
   Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77.
2. Adjust:
   • Throttle position sensor angle

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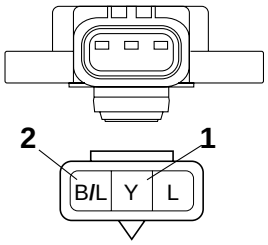
a. Connect the throttle position sensor coupler.
b. Connect the pocket tester (AC 20 V) to the throttle position sensor coupler as shown.
c. Turn the main switch to “ON”.

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

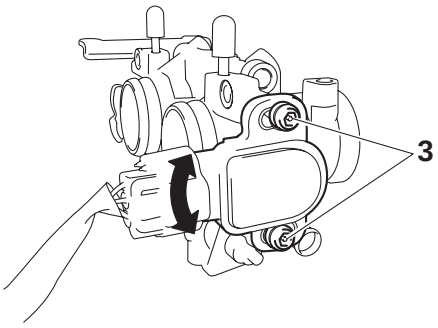
• Positive tester probe
  Yellow “1”
• Negative tester probe
  Black/Blue “2”



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.

Throttle position sensor closed position voltage
0.63–0.73 V

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “3”.



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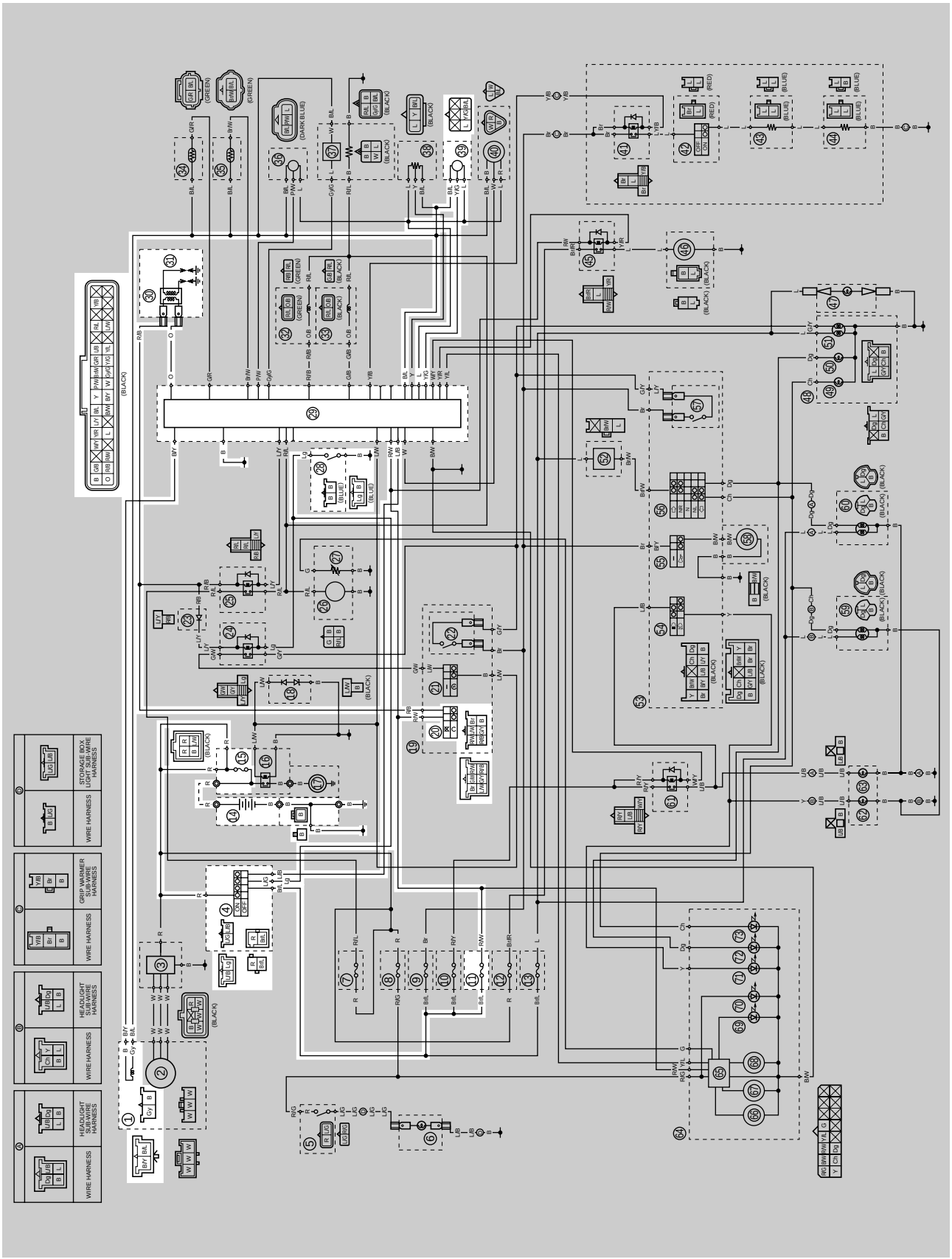
ELECTRICAL SYSTEM

EAS27090
IGNITION SYSTEM

EAS27110
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Main switch
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
39. Lean angle sensor

EAS27140
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

TIP

• Before troubleshooting, remove the following part(s):
1. Footrest boards
2. Front cowling assembly

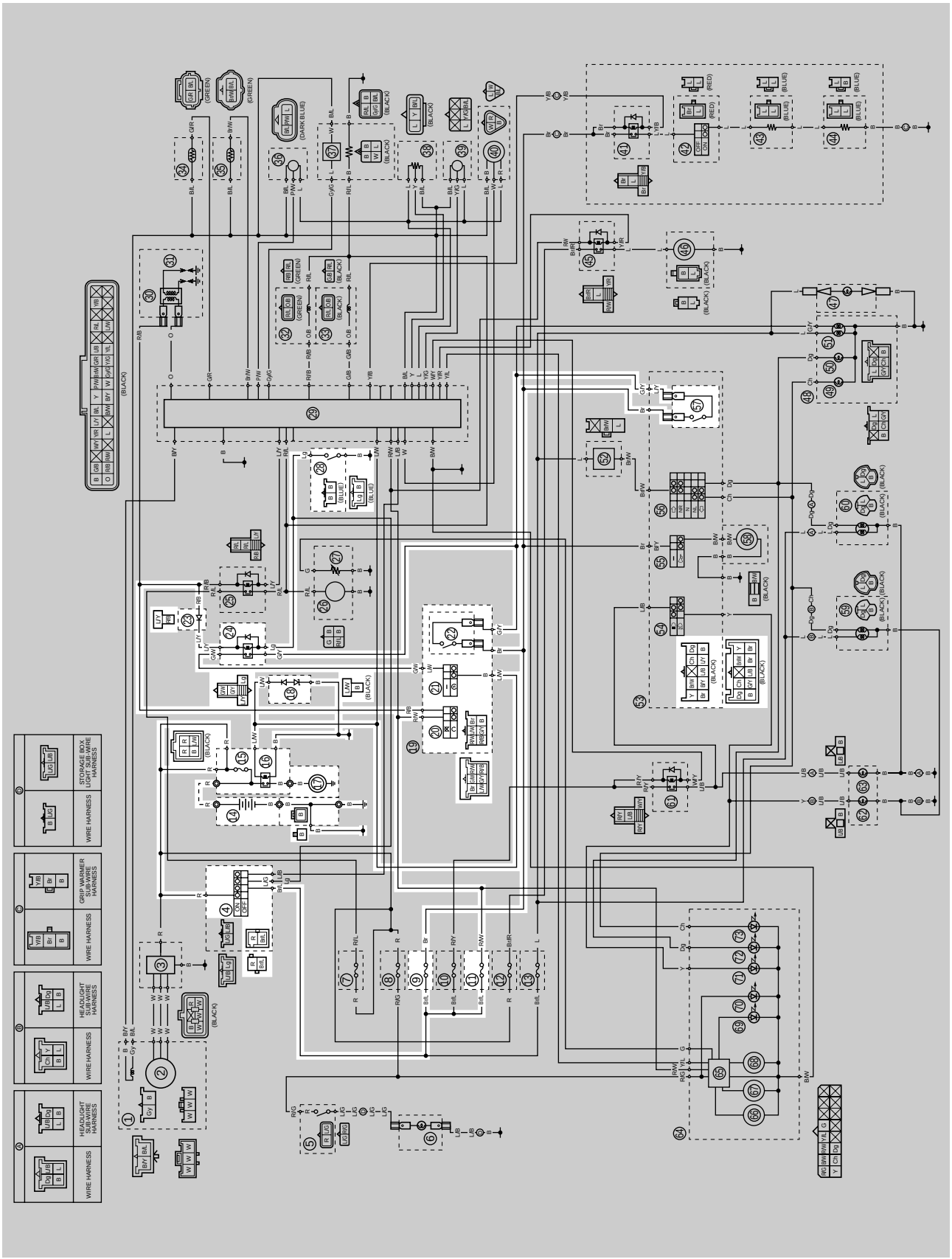
1. Check the fuses. (Main and ignition) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the spark plugs. Refer to “CHECKING THE SPARK PLUGS” on page 3-9.	NG →	Re-gap or replace the spark plugs.
OK ↓		
4. Check the ignition spark gap. Refer to “CHECKING THE IGNITION SPARK GAP” on page 8-72.	OK →	Ignition system is OK.
NG ↓		
5. Check the spark plug caps. Refer to “CHECKING THE SPARK PLUG CAPS” on page 8-71.	NG →	Replace the spark plug caps.
OK ↓		
6. Check the ignition coil. Refer to “CHECKING THE IGNITION COIL” on page 8-71.	NG →	Replace the ignition coil.
OK ↓		
7. Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-72.	NG →	Replace the crankshaft position sensor/stator assembly.
OK ↓		
8. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the main switch.
OK ↓		

9. Check the engine stop switch.
   Refer to “CHECKING THE SWITCHES” on page 8-61.
   NG → The engine stop switch is faulty. Replace the right handlebar switch.
   OK ↓
10. Check the sidestand switch.
    Refer to “CHECKING THE SWITCHES” on page 8-61.
    NG → Replace the sidestand switch.
    OK ↓
11. Check the lean angle sensor.
    Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-73.
    NG → Replace the lean angle sensor.
    OK ↓
12. Check the entire ignition system wiring.
    Refer to “CIRCUIT DIAGRAM” on page 8-1.
    NG → Properly connect or repair the ignition system wiring.
    OK ↓

Replace the ECU (engine control unit).

EAS27160
ELECTRIC STARTING SYSTEM

EAS27170
CIRCUIT DIAGRAM



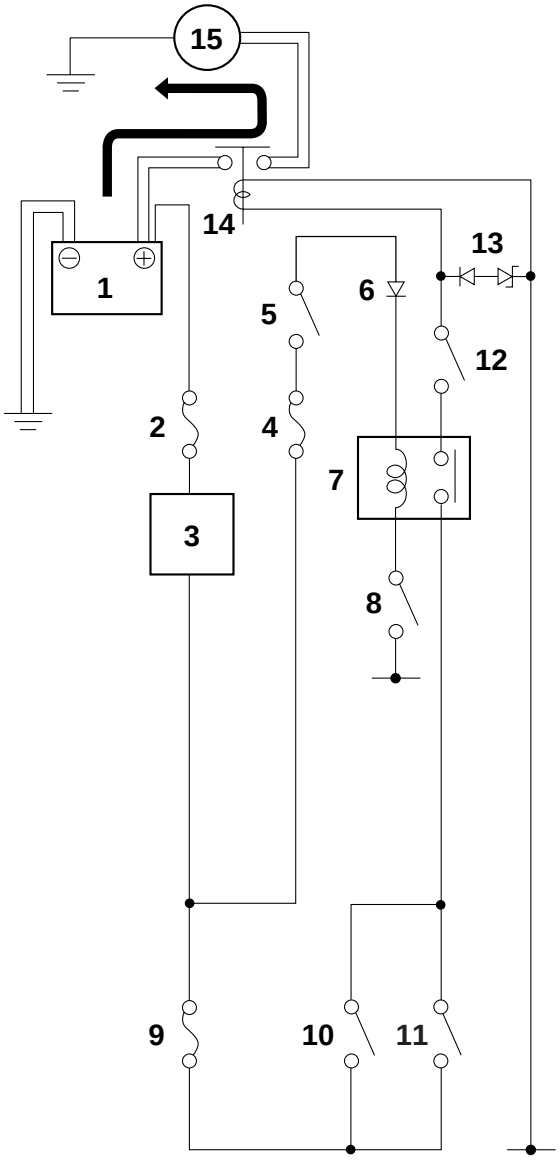
4. Main switch
9. Signaling system fuse
11. Ignition fuse
14. Battery
15. Main fuse
16. Starter relay
17. Starter motor
18. Diode 1
20. Engine stop switch
21. Start switch
22. Front brake light switch
23. Diode 2
24. Starting circuit cut-off relay
28. Sidestand switch
57. Rear brake light switch

EAS27180
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to "○" and the main switch is set to "ON" (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The front brake lever is pulled to the handlebar (the front brake light switch is closed) and the sidestand is up (the sidestand switch is closed).
- The rear brake lever is pulled to the handlebar (the rear brake light switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off 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 "⊛".



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Diode 2
7. Starting circuit cut-off relay
8. Sidestand switch
9. Signaling system fuse
10. Front brake light switch
11. Rear brake light switch
12. Start switch
13. Diode 1
14. Starter relay
15. Starter motor

EAS27190
TROUBLESHOOTING
The starter motor fails to turn.

TIP
• Before troubleshooting, remove the following part(s):
1. Front cowling assembly
2. Storage box
3. Fuel tank

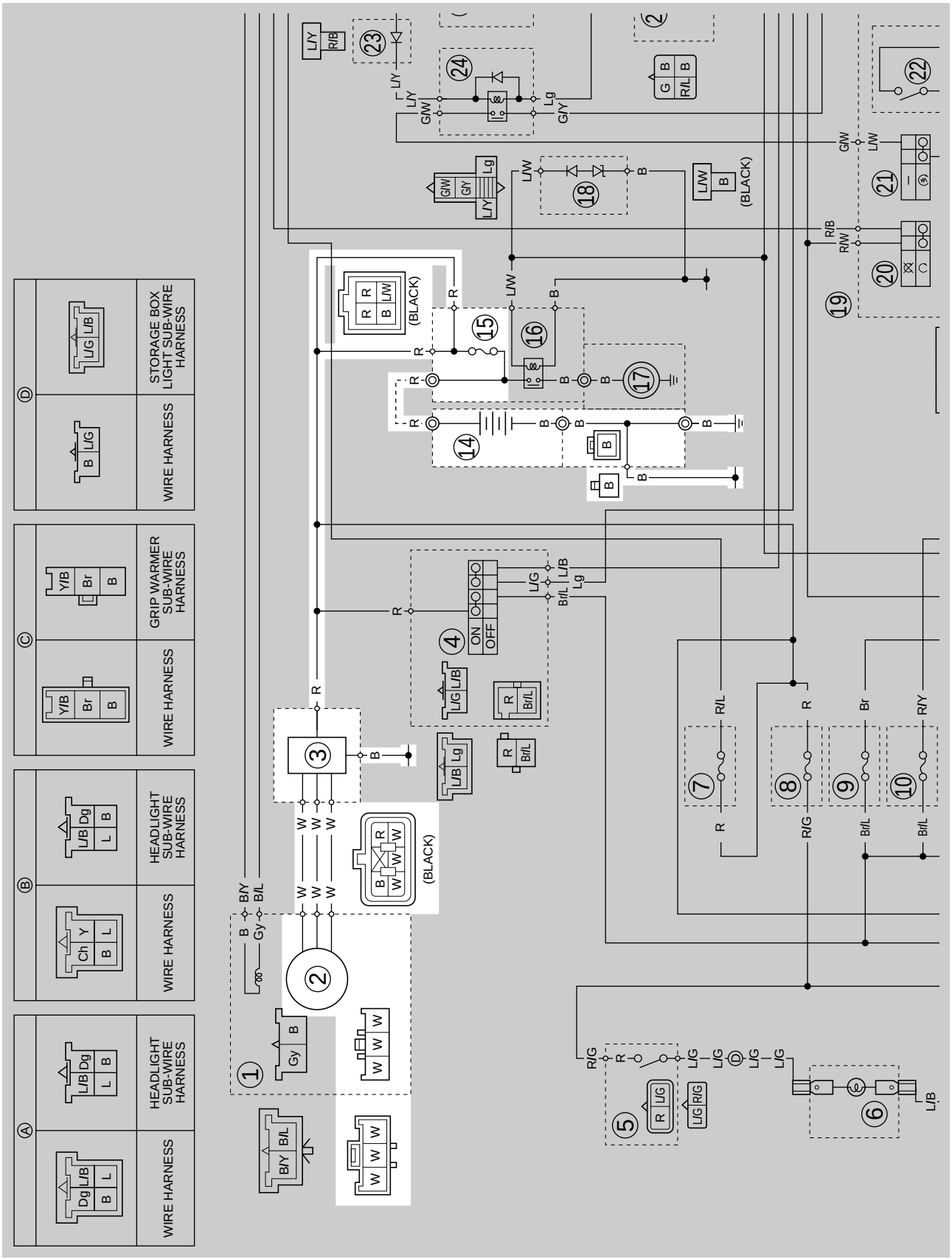
1. Check the fuses. (Main, ignition and signaling system) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the starter motor operation. Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 8-73.	OK →	Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.
NG ↓		
4. Check the starter motor. Refer to “CHECKING THE STARTER MOTOR” on page 5-33.	NG →	Repair or replace the starter motor.
OK ↓		
5. Check the diode 1. Refer to “CHECKING THE DIODE” on page 8-71.	NG →	Replace the diode 1.
OK ↓		
6. Check the starting circuit cut-off relay. Refer to “CHECKING THE RELAYS” on page 8-69.	NG →	Replace the starting circuit cut-off relay.
OK ↓		
7. Check the starter relay. Refer to “CHECKING THE RELAYS” on page 8-69.	NG →	Replace the starter relay.
OK ↓		

8. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 8-61.
   NG → Replace the main switch.
   OK ↓
9. Check the engine stop switch.
   Refer to “CHECKING THE SWITCHES” on page 8-61.
   NG → The engine stop switch is faulty. Replace the right handlebar switch.
   OK ↓
10. Check the sidestand switch.
    Refer to “CHECKING THE SWITCHES” on page 8-61.
    NG → Replace the sidestand switch.
    OK ↓
11. Check the front brake light switch.
    Refer to “CHECKING THE SWITCHES” on page 8-61.
    NG → Replace the front brake light switch.
    OK ↓
12. Check the rear brake light switch.
    Refer to “CHECKING THE SWITCHES” on page 8-61.
    NG → Replace the rear brake light switch.
    OK ↓
13. Check the start switch.
    Refer to “CHECKING THE SWITCHES” on page 8-61.
    NG → The start switch is faulty. Replace the right handlebar switch.
    OK ↓
14. Check the entire starting system wiring.
    Refer to “CIRCUIT DIAGRAM” on page 8-5.
    NG → Properly connect or repair the starting system wiring.
    OK ↓

The starting system circuit is OK.

EAS27200
CHARGING SYSTEM

EAS27210
CIRCUIT DIAGRAM



2. AC magneto
3. Rectifier/regulator
14. Battery
15. Main fuse

EAS27220

TROUBLESHOOTING

The battery is not being charged.

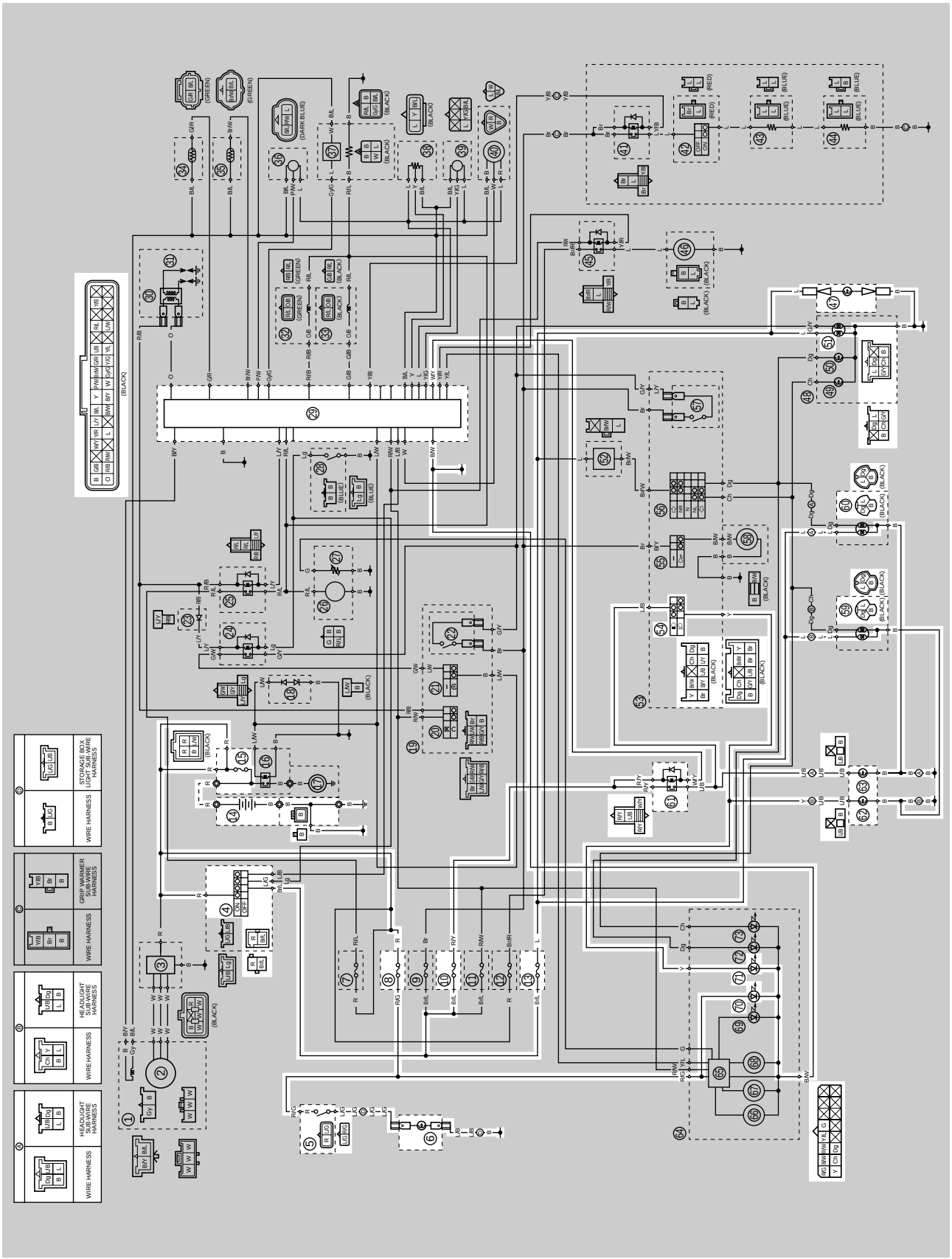
TIP

• Before troubleshooting, remove the following part(s):
1. Front cowling assembly

1. Check the fuse. (Main) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse.
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the stator coil. Refer to “CHECKING THE STATOR COIL” on page 8-74.	NG →	Replace the crankshaft position sensor/stator assembly.
OK ↓		
4. Check the rectifier/regulator. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 8-74.	NG →	Replace the rectifier/regulator.
OK ↓		
5. Check the entire charging system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-11.	NG →	Properly connect or repair the charging system wiring.
OK ↓		
This circuit is OK.		

EAS27240
LIGHTING SYSTEM

EAS27250
CIRCUIT DIAGRAM



4. Main switch
5. Storage box light switch
6. Storage box light
8. Backup fuse (odometer and clock)
10. Headlight fuse
13. Taillight fuse
14. Battery
15. Main fuse
29. ECU (engine control unit)
47. License plate light
51. Tail/brake light
54. Dimmer switch
59. Front right turn signal/position light
60. Front left turn signal/position light
61. Headlight relay
62. Headlight (high beam)
63. Headlight (low beam)
70. Meter light
71. High beam indicator light

EAS27260
TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, license plate light, position lights, or meter light.

TIP

• Before troubleshooting, remove the following part(s):
1. Front cowling assembly
2. Mudguard

1. Check the condition of each bulb and bulb socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.	NG →	Replace the bulb(s) and bulb socket(s).
OK ↓		
2. Check the fuses. (Main, headlight, ignition, taillight and backup) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
4. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the main switch.
OK ↓		
5. Check the dimmer switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	The dimmer switch is faulty. Replace the left handlebar switch.
OK ↓		
6. Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 8-69.	NG →	Replace the headlight relay.
OK ↓		
7. Check the storage box light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the storage box light switch.
OK ↓		

8. Check the entire lighting system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-15.

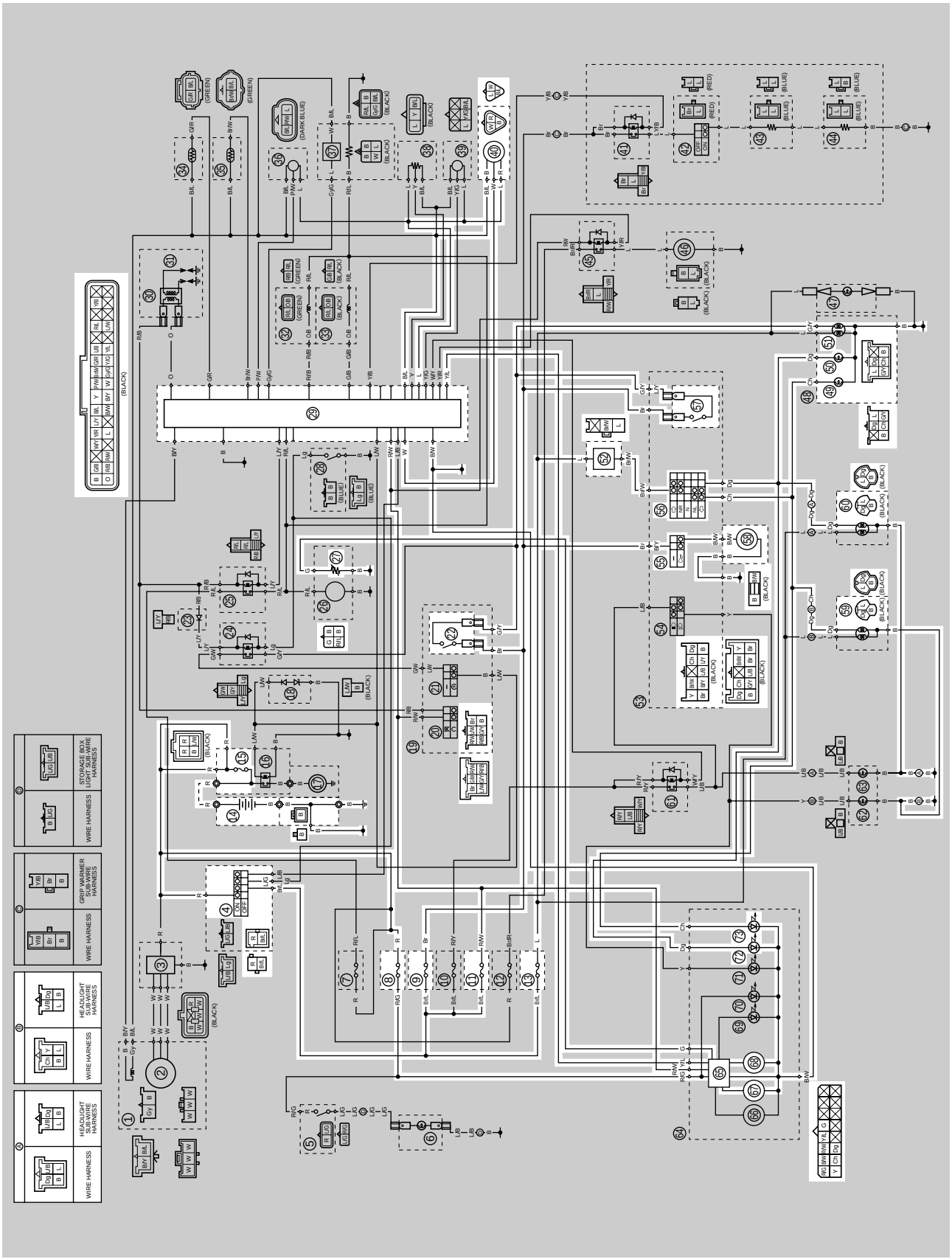
NG → Properly connect or repair the lighting system wiring.

OK ↓

Replace the ECU (engine control unit) or meter assembly.

EAS27270
SIGNALING SYSTEM

EAS27280
CIRCUIT DIAGRAM



4. Main switch
8. Backup fuse (odometer and clock)
9. Signaling system fuse
11. Ignition fuse
13. Taillight fuse
14. Battery
15. Main fuse
22. Front brake light switch
27. Fuel sender
29. ECU (engine control unit)
40. Speed sensor
49. Rear left turn signal light
50. Rear right turn signal light
51. Tail/brake light
52. Turn signal relay
55. Horn switch
56. Turn signal switch
57. Rear brake light switch
58. Horn
59. Front right turn signal/position light
60. Front left turn signal/position light
65. Multi-function meter
67. Speedometer
68. Fuel meter
72. Right turn signal indicator light
73. Left turn signal indicator light

EAS27290
TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.
- The fuel meter fails to operate.
- The speedometer fails to operate.

TIP

- Before troubleshooting, remove the following part(s):

1. Front cowling assembly
2. Storage box

1. Check the fuses. (Main, ignition, signaling system, taillight and backup) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the main switch.
OK ↓		
4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Check the condition of each of the signaling system circuits. Refer to “Checking the signaling system”.		

Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	The horn switch is faulty. Replace the left handlebar switch.
OK ↓		
2. Check the horn. Refer to “CHECKING THE HORN” on page 8-75.	NG →	Replace the horn.
OK ↓		

3. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

The tail/brake light fails to come on.

1. Check the tail/brake light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.	NG →	Replace the tail/brake light bulb, socket or both.

OK ↓

2. Check the front brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the front brake light switch.

OK ↓

3. Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the rear brake light switch.

OK ↓

4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.	NG →	Replace the turn signal light bulb, socket or both.

OK ↓

2. Check the turn signal switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	The turn signal switch is faulty. Replace the left handlebar switch.

OK ↓

3. Check the turn signal relay.
   Refer to “CHECKING THE TURN SIGNAL RELAY” on page 8-70.
   NG → Replace the turn signal relay.
   OK ↓
4. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly.

The fuel meter fails to operate.

1. Check the fuel sender.
   Refer to “CHECKING THE FUEL SENDER” on page 8-75.
   NG → Replace the fuel pump assembly.
   OK ↓
2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly.

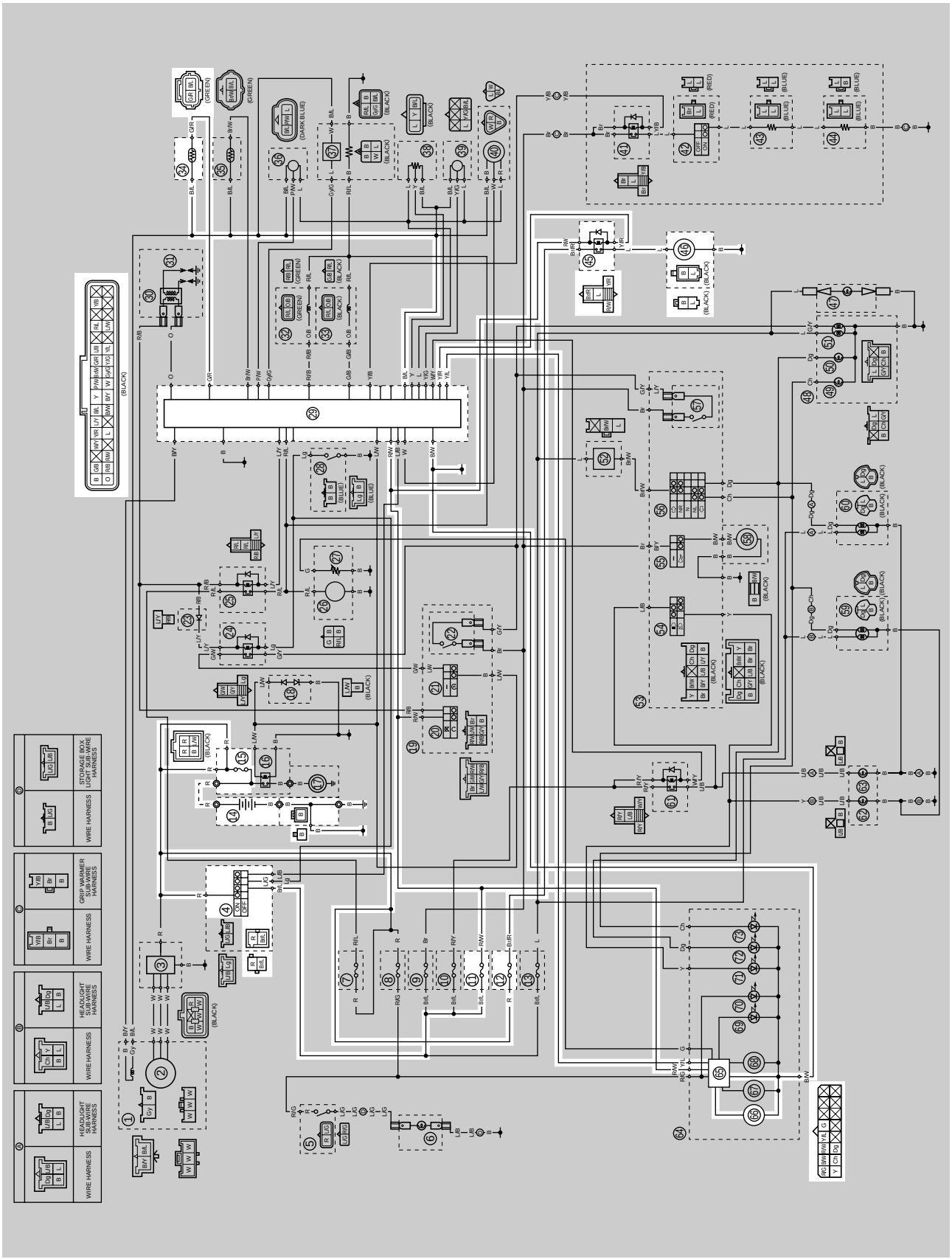
The speedometer fails to operate.

1. Check the speed sensor.
   Refer to “CHECKING THE SPEED SENSOR” on page 8-76.
   NG → Replace the speed sensor.
   OK ↓
2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly.

EAS27300
COOLING SYSTEM

EAS27310
CIRCUIT DIAGRAM



4. Main switch
11. Ignition fuse
12. Radiator fan fuse
14. Battery
15. Main fuse
29. ECU (engine control unit)
34. Coolant temperature sensor
45. Radiator fan motor relay
46. Radiator fan motor
65. Multi-function meter
66. Coolant temperature meter

EAS27320
TROUBLESHOOTING

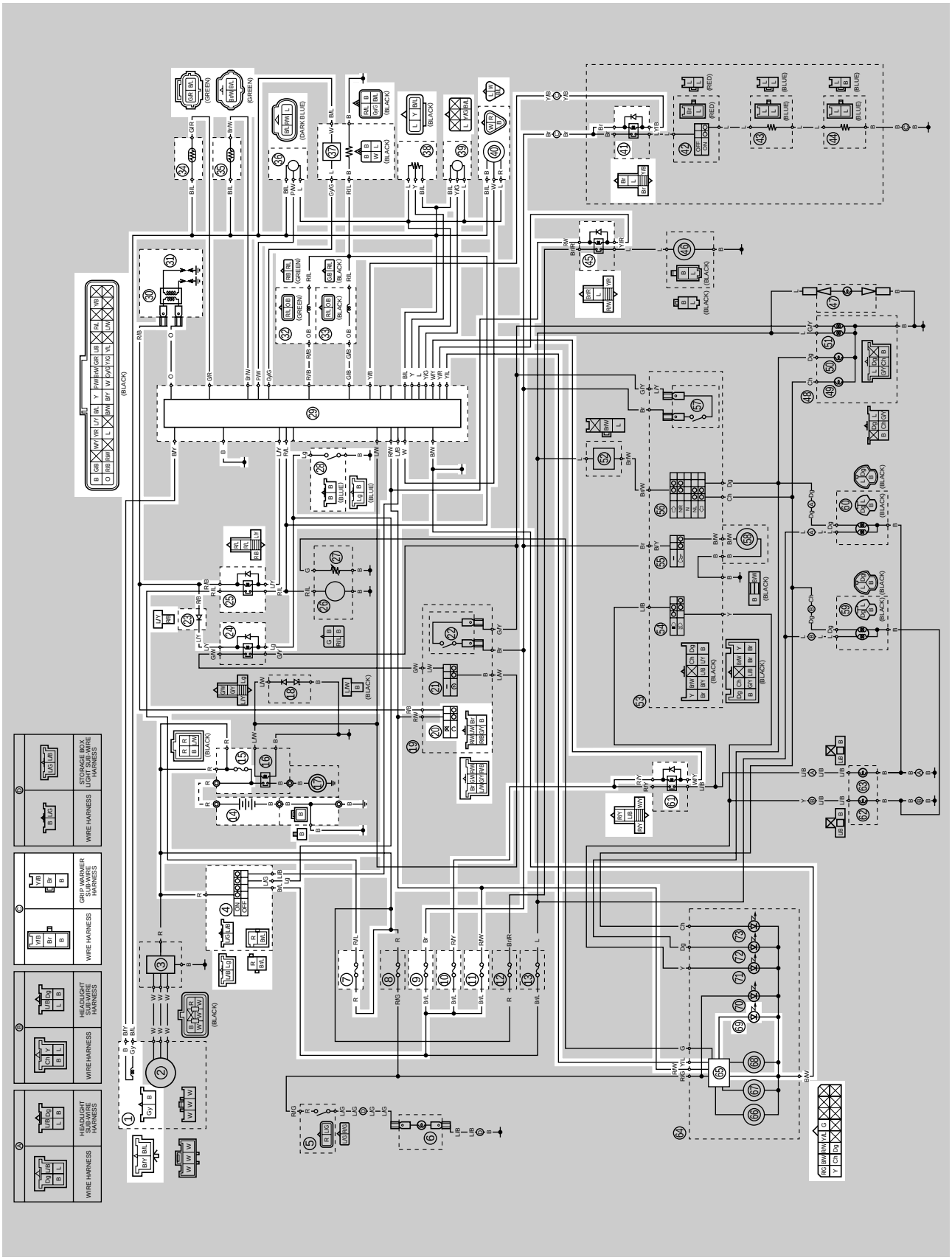
TIP

• Before troubleshooting, remove the following part(s):
1. Front cowling assembly
2. Storage box
3. Fuel tank

1. Check the fuses. (Main, ignition and radiator fan) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the main switch.
OK ↓		
4. Check the radiator fan motor. Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 8-76.	NG →	Replace the radiator fan motor.
OK ↓		
5. Check the radiator fan motor relay. Refer to “CHECKING THE RELAYS” on page 8-69.	NG →	Replace the radiator fan motor relay.
OK ↓		
6. Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-76.	NG →	Replace the coolant temperature sensor.
OK ↓		
7. Check the entire cooling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-25.	NG →	Properly connect or repair the cooling system wiring.
OK ↓		
Replace the ECU (engine control unit) or meter assembly.		

EAS27330
FUEL INJECTION SYSTEM

EAS27340
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Main switch
7. Fuel injection system fuse
9. Signaling system fuse
10. Headlight fuse
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
23. Diode 2
24. Starting circuit cut-off relay
25. Fuel injection system relay
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
32. Fuel injector #1
33. Fuel injector #2
34. Coolant temperature sensor
35. Intake air temperature sensor
36. Intake air pressure sensor
37. O_2 sensor
38. Throttle position sensor
39. Lean angle sensor
40. Speed sensor
41. Grip warmer relay (OPTION)
45. Radiator fan motor relay
61. Headlight relay
65. Multi-function meter
69. Engine trouble warning light

EAS27350
ECU SELF-DIAGNOSTIC FUNCTION

The ECU (engine control unit) 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 (engine control unit).

- 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 (engine control unit) 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 clock LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU (engine control unit) until it is deleted.

Engine trouble warning light indication and FI system operation

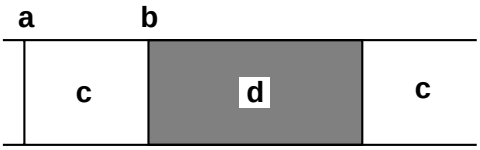
Warning light indication	ECU (engine control unit) operation	FI operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	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:	Sidestand switch (open circuit in the wire to the ECU (engine control unit))	50:	ECU (engine control unit) internal malfunction (faulty ECU (engine control unit) memory)
30:	Lean angle sensor (latch up detected)		

Checking for a defective engine trouble warning light bulb

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to “ON” and when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light bulb 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

EAS4B51034
SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU (engine control unit) detects an abnormal signal from a sensor while the vehicle is being driven, the ECU (engine control unit) 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 (engine control unit) 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.
The ECU (engine control unit) takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU (engine control unit) directly operates an actuator. Details on the fail-safe actions are given in the table below.

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	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor-open or short circuit detected.	Able	Able
14	Intake air pressure sensor (pipe system)	Intake air pressure sensor-pipe system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor-open or short circuit detected.	Able	Able
16	Throttle position sensor (stuck)	The throttle position sensor is stuck.	Able	Able
19	Sidestand switch (open circuit wire harness to ECU (engine control unit))	Open circuit is detected in the input line from the sidestand switch to the ECU (engine control unit).	Unable	Unable

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
21	Coolant temperature sensor	Coolant temperature sensor-open or short circuit detected.	Able	Able
22	Intake air temperature sensor	Intake 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
30	Lean angle sensor	Latch up detected. No normal signal is received from the lean angle sensor.	Unable	Unable
33	Ignition coil (faulty ignition)	Malfunction detected in the primary wire of the ignition coil.	Unable	Unable
37	Fast idle plunger (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
43	Fuel system voltage (monitor voltage)	The ECU (engine control unit) 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 (engine control unit) internal malfunction (memory check error)	Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU (engine control unit), the fault code number might not appear on the meter.)	Unable	Unable

Communication error with the meter

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
Er-1	ECU (engine control unit) internal malfunction (output signal error)	No signals are received from the ECU (engine control unit).	Unable	Unable
Er-2	ECU (engine control unit) internal malfunction (output signal error)	No signals are received from the ECU (engine control unit) within the specified duration.	Unable	Unable
Er-3	ECU (engine control unit) internal malfunction (output signal error)	Data from the ECU (engine control unit) cannot be received correctly.	Unable	Unable

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
Er-4	ECU (engine control unit) internal malfunction (input signal error)	Non-registered data has been received from the meter.	Unable	Unable

EAS27400
TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
   • Fault code number

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Check the fault code number displayed on the meter.
b. Identify the system with the malfunction. Refer to “Self-Diagnostic Function table”.
c. Identify the probable cause of malfunction. Refer to “Diagnostic code table”.

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2. Checking and repair the probable case of malfunction.

Fault code No.	No fault code No.
Check and repair. Refer to “TROUBLESHOOTING DETAILS” on page 8-40. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.	Check and repair. Refer to “Self-Diagnostic Function table”.

3. Perform ECU (engine control unit) reinstatement action.
   Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS” on page 8-40.
4. Turn the main switch to “OFF” and back to “ON”, and then check that no fault code number is displayed.

TIP

If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (Diagnostic code No.62)”.

TIP

Turning the main switch to “OFF” will not erase the malfunction history.

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.

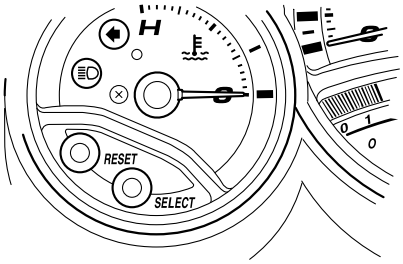
01: Throttle position sensor (throttle angle) 30: Ignition coil 36: Fuel injector #1 37: Fuel injector #2

   If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.
   If no malfunction is detected in the sensors and actuators, check and repair the inner parts of the engine.

EAS27431
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. Simultaneously press and hold the “SELECT” and “RESET” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.



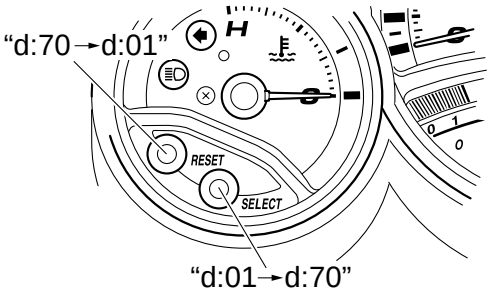
TIP

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

4. Simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.
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” buttons.

TIP

- To decrease the selected diagnostic code number, press the “RESET” button. Press the “RESET” button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the “SELECT” button. Press the “SELECT” button for 1 second or longer to automatically increase the diagnostic code numbers.



7. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating condition of the sensor appears on the odometer/tripmeter LCD.
   - Actuator operation
     Set the engine stop switch to “ ” to operate the actuator.

TIP

If the engine stop switch is set to “ ”, set it to “ ”, and then set it to “ ” again.

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.	• Open or short circuit in wire harness. • Defective crankshaft position sensor. • Malfunction in generator rotor. • Malfunction in ECU (engine control unit). • Improperly installed sensor.	—
13	Intake air pressure sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake air pressure sensor. • Malfunction in ECU (engine control unit).	03
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction of the intake air pressure sensor in the intermediate electrical potential. • Malfunction in ECU (engine control unit).	03
15	Throttle position sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU (engine control unit). • Improperly installed throttle position sensor.	01
16	Stuck throttle position sensor detected.	• Stuck throttle position sensor. • Malfunction in ECU (engine control unit).	01
19	A break or disconnection of the blue/black lead of the ECU (engine control unit) is detected.	• Open or short circuit in wire harness. • Malfunction in ECU (engine control unit).	20
21	Coolant temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective coolant temperature sensor. • Malfunction in ECU (engine control unit). • Improperly installed coolant temperature sensor.	06
22	Intake air temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake temperature sensor. • Malfunction in ECU (engine control unit). • Improperly installed intake air temperature sensor.	05
24	No normal signal is received from the O_2 sensor.	• Open or short circuit in wire harness. • Defective O_2 sensor. • Malfunction in ECU (engine control unit). • Improperly installed O_2 sensor.	—
30	Latch up detected. No normal signal is received from the lean angle sensor.	• The vehicle has overturned. • Defective lean angle sensor. • Malfunction in ECU (engine control unit). • Improperly installed lean angle sensor.	08
33	Malfunction detected in the primary wire of the ignition coil.	• Open or short circuit in wire harness. • Malfunction in ignition coil. • Malfunction in ECU (engine control unit). • Malfunction in a component of ignition cut-off circuit system.	30

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
37	Engine speed is high when the engine is idling.	• Stuck fast idle plunger (in fully open position). • Malfunction in ECU (engine control unit).	01
41	Lean angle sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU (engine control unit).	08
43	The ECU (engine control unit) is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	• Open circuit in wire harness. • Malfunction in ECU (engine control unit). • Defective fuel injection system relay.	50
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	• Malfunction in ECU (engine control unit). (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 8-11.	—
50	Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	• Malfunction in ECU (engine control unit). (The program and data are not properly written on or read from the internal memory.)	—
Er-1	No signals are received from the ECU (engine control unit).	• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).	—
Er-2	No signals are received from the ECU (engine control unit) within the specified duration.	• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).	—
Er-3	Data from the ECU (engine control unit) cannot be received correctly.	• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).	—
Er-4	Non-registered data has been received from the meter.	• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).	—

Sensor operation table

Diagnostic code No.	Item	Meter display	Checking method
01	Throttle angle • Fully closed position • Fully opened position	 (15–16) (97–102)	 Check with throttle fully closed. Check with throttle fully open.
03	Pressure difference (atmospheric pressure and intake air pressure)	Displays the intake air pressure.	Set the engine stop switch to "○", and then push the start switch "⊜". (If the display value changes, the performance is OK.)
05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured intake air temperature with the meter display value. (*1)
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter display value.
07	Vehicle speed pulse	0–999	Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
08	Lean angle sensor • Upright • Overturned	 0.4–1.4 V 3.8–4.2 V	Remove the lean angle sensor and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
20	Sidestand switch • Stand retracted • Stand extended	 ON OFF	Extend and retract the sidestand.
60	EEPROM fault code display • No fault • Fault detected	 00 01 or 02 (cylinder fault code) • (If both cylinders are defective, the display alternates every two seconds.)	—

Diagnostic code No.	Item	Meter display	Checking method
61	Malfunction history code display • No history • History exists	 00 Fault codes 12–50 • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
62	Malfunction history code erasure • No history • History exists	 00 Up to 17 fault codes	 — To erase the history, set the engine stop switch to "∩".
70	Control number	00–255	—

*1 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Actuator operation table

Diagnostic code No.	Item	Actuation	Checking method
30	Ignition coil	Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.	Check the spark five times. • Connect an ignition checker.
36	Fuel injector #1	Actuates the injector #1 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the injector #1 five times.
37	Fuel injector #2	Actuates the injector #2 five times at one-second intervals. Illuminates the engine trouble warning light.	Check the operating sound of the injector #2 five times.

Diag-nostic code No.	Item	Actuation	Checking method
50	Fuel injection system relay	Actuates the fuel injection system 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 injection system relay five times.
51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.
57	Grip warmer relay	Actuates the grip warmer relay. (The light is off when the relay is off, and the light is on when the relay is on.) Illuminates the engine trouble warning light.	Check the operating sound of the grip warmer relay one time.

EAS27471

TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given. After the check and service of the malfunctioning part have been completed, reset the meter display according to the reinstatement method.

Fault code No.:

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 8-35.

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 the installed area for looseness or pinching.	Cranking the engine.
2	Connections • Crankshaft position sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU (engine control unit) coupler. (black/yellow–black/yellow) (black/blue–black/blue)	
4	Defective crankshaft position sensor.	• Replace if defective. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-72.	

Fault code No.	13	Symptom	Intake air pressure sensor: open or short circuit detected.
Diagnostic code No.		03	Intake air pressure sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Intake air pressure sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Cranking the engine.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between intake air pressure sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (pink/white–pink/white) (blue–blue)	
3	Defective intake air pressure sensor.	• Execute the diagnostic mode. (Code No. 03) • Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-77.	

Fault code No.	14	Symptom	Intake air pressure sensor: hose system malfunction (clogged or detached hose).
Diagnostic code No.		03	Intake air pressure sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose	• Check the intake air pressure sensor hose condition. • Repair or replace the sensor hose.	Starting the engine and operating it at idle.
2	Intake air pressure sensor malfunction at intermediate electrical potential.	• Check and repair the connection. • Replace it if there is a malfunction.	
3	Connections • Intake air pressure sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
4	Defective intake air pressure sensor.	• Execute the diagnostic mode. (Code No. 03) • Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-77.	

Fault code No.	15	Symptom	Throttle position sensor: open or short circuit detected.
Diagnostic code No.		01	Throttle position sensor

Order	Item/components and probable cause	Check or maintenance job		Reinstatement method
1	Installed condition of throttle position sensor.	• Check for looseness or pinching. • Check that the sensor is installed in the specified position.		Turning the main switch to “ON”.
2	Connections • Throttle position sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between throttle position sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (yellow–yellow) (blue–blue)		
4	Throttle position sensor lead wire open circuit output voltage check.	• 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.	• Execute the diagnostic mode. (Code No. 01) • Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77.		

Fault code No.	16	Symptom	Stuck throttle position sensor detected.
Diagnostic code No.		01	Throttle position sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.	• Check for looseness or pinching. • Check that the sensor is installed in the specified position.	Reinstated by starting the engine, operating it at idle, and then racing it.
2	Defective throttle position sensor.	• Execute the diagnostic mode. (Code No. 01) • Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77.	

Fault code No.	19	Symptom	A break or disconnection of the blue/black lead of the ECU (engine control unit) 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 (engine control unit) coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Reinstated by retracting the sidestand. Reinstated by reconnecting the wiring.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between ECU (engine control unit) and main switch. (blue/black–blue/black)	
3	Defective sidestand switch.	• Execute the diagnostic mode. (Code No. 20) • Replace if defective. Refer to “CHECKING THE SWITCHES” on page 8-61.	

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 (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between coolant temperature sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (green/red–green/red)	
4	Defective coolant temperature sensor.	• Execute the diagnostic mode. (Code No. 06) • Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-76.	

Fault code No.	22	Symptom	Intake air temperature sensor: open or short circuit detected.
Diagnostic code No.		05	Intake air temperature sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of intake air temperature sensor.	Check for looseness or pinching.	Turning the main switch to “ON”.
2	Connections • Intake air temperature sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between intake air temperature sensor coupler and ECU coupler. (black/blue–black/blue) (brown/white–brown/white)	
4	Defective intake air temperature sensor.	• Execute the diagnostic mode. (Code No. 05) • Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-78.	

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 and warming up the engine until the coolant temperature rises over 60 °C (140 °F). Then, maintaining the engine speed at 2000 r/min to 3000 r/min until the warning light goes off. When the warning light goes off, the reset operation is finished.
2	Connections • O_2 sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between O_2 sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (gray/green–gray/green) (red/blue–red/blue) (black–black)	
4	Check fuel pressure.	Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.	
5	Defective O_2 sensor.	Replace if defective.	

Fault code No.	30	Symptom	Latch up detected. No normal signal is received from the lean angle sensor.
Diagnostic code No.		08	Lean angle sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	The vehicle has overturned.	Raise the vehicle upright.	Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned “OFF”).
2	Installed condition of the lean angle sensor.	Check for looseness or pinching.	
3	Defective lean angle sensor.	• Execute the diagnostic mode. (Code No. 08) • Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-73.	

Fault code No.	33	Symptom	Malfunction detected in the primary wire of the ignition coil.
Diagnostic code No.		30	Ignition coil

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Ignition coil primary side connector (orange) • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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.	• Repair or replace if there is an open or short circuit. • Between ignition coil connector and ECU (engine control unit) coupler. (orange–orange) • Between ignition coil connector and right handlebar switch coupler. (red/black–red/black)	
3	Defective ignition coil.	• Execute the diagnostic mode. (Code No. 30) • Replace if defective. Refer to “CHECKING THE IGNITION COIL” on page 8-71.	

Fault code No.	37	Symptom	Engine speed is high when the engine is idling.
Diagnostic code No.		01	Throttle position sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Stuck fast idle plunger detected.	• Check the throttle body. Refer to “THROTTLE BODY” on page 7-5.	Reinstated by starting the engine and operating it at idle for about 5 minutes. Do not turn the throttle grip.
2	Throttle valve does not fully close.	• Check the throttle body. Refer to “THROTTLE BODY” on page 7-5.	

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 • Lean angle sensor coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Reinstated immediately when it becomes normal.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between lean angle sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (yellow/green–yellow/green) (blue–blue)	
3	Defective lean angle sensor.	• Execute the diagnostic mode. (Code No. 08) • Replace if defective.	

Fault code No.	43	Symptom	The ECU (engine control unit) is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).
Diagnostic code No.		50	Fuel injection system relay

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Fuel injection system relay coupler • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have 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	Defective fuel injection system relay.	Replace if defective.	
3	Open or short circuit in the wire harness.	• Repair or replace if there is an open or short circuit. • Between the fuel injection system relay coupler and ECU (engine control unit) coupler. (red/blue–red/blue) • Between the fuse box coupler and fuel injection system relay coupler. (red/blue–red/blue) • Between the fuse box coupler and battery terminal. (red–red)	
4	Malfunction or open circuit in fuel injection system relay.	• Execute the diagnostic mode. (Code No. 50) • Replace if defective. • If there is no malfunction with the fuel injection system relay, replace the ECU (engine control unit).	

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 (engine control unit).	• Execute the diagnostic mode. (Code No. 60) • Check the faulty cylinder. (If multiple cylinders are defective, the number of the faulty cylinders appears alternately at 2-second intervals.) • Replace ECU (engine control unit) if defective.	Turning the main switch to “ON”.

Fault code No.	46	Symptom	Power supply to the fuel injection system is not normal.
Diagnostic code No.		—	—

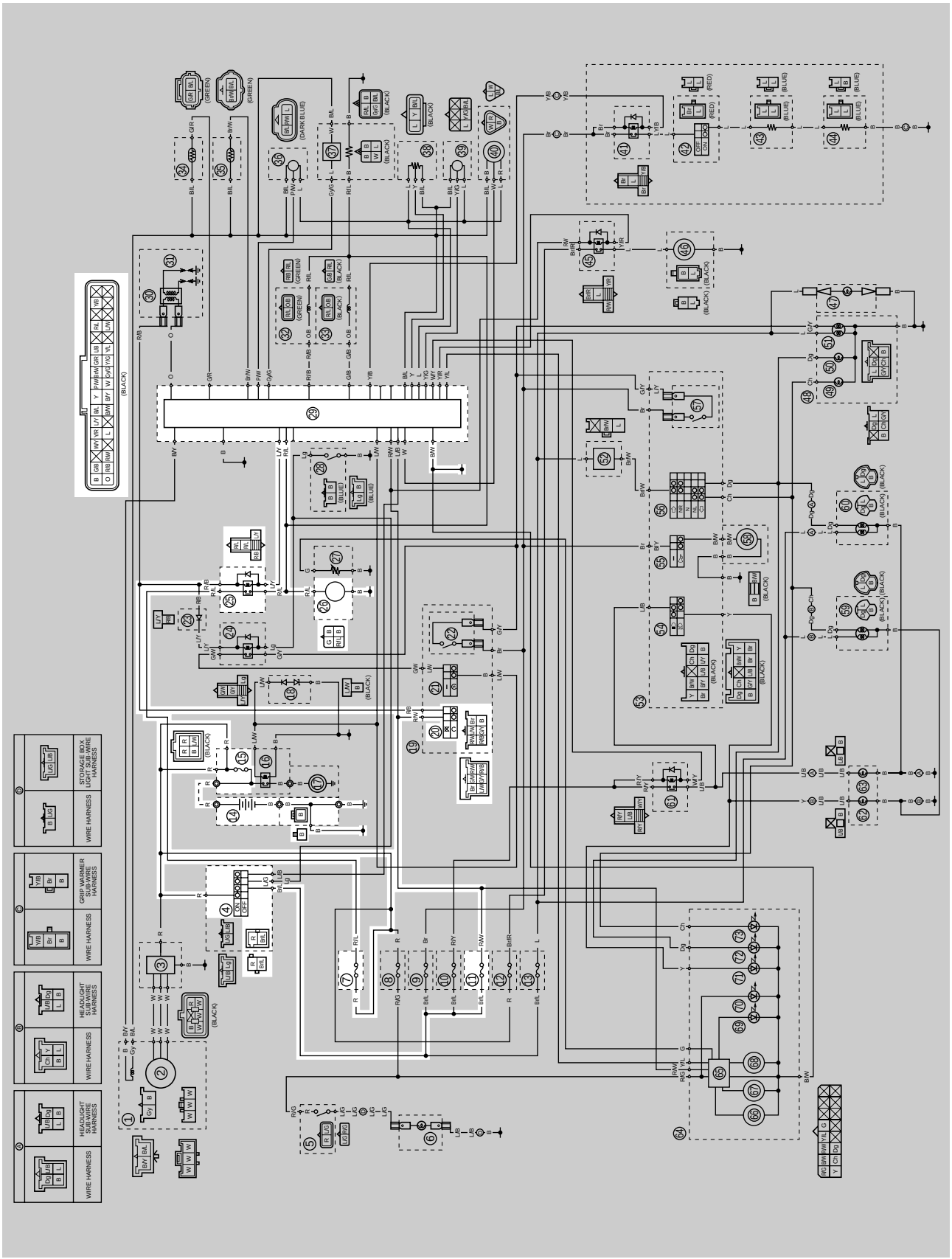
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connection. • Wire harness ECU (engine control unit) coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and operating it at idle.
2	Faulty battery.	• Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	
3	Malfunction in rectifier/regulator.	• Replace if defective. Refer to “CHARGING SYSTEM” on page 8-11.	
4	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between battery terminal and main switch coupler. (red–red) • Between main switch coupler and fuse box coupler. (brown/blue–brown/blue) • Between fuse box coupler and ECU (engine control unit) coupler. (red/white–red/white)	

Fault code No.	50	Symptom	Faulty ECU (engine control unit) 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 (engine control unit)	Replace the ECU (engine control unit).	Turning the main switch to “ON”

EAS27550
FUEL PUMP SYSTEM

EAS27560
CIRCUIT DIAGRAM



4. Main switch
7. Fuel injection system fuse
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
25. Fuel injection system relay
26. Fuel pump
29. ECU (engine control unit)

EAS27570

TROUBLESHOOTING

If the fuel pump fails to operate.

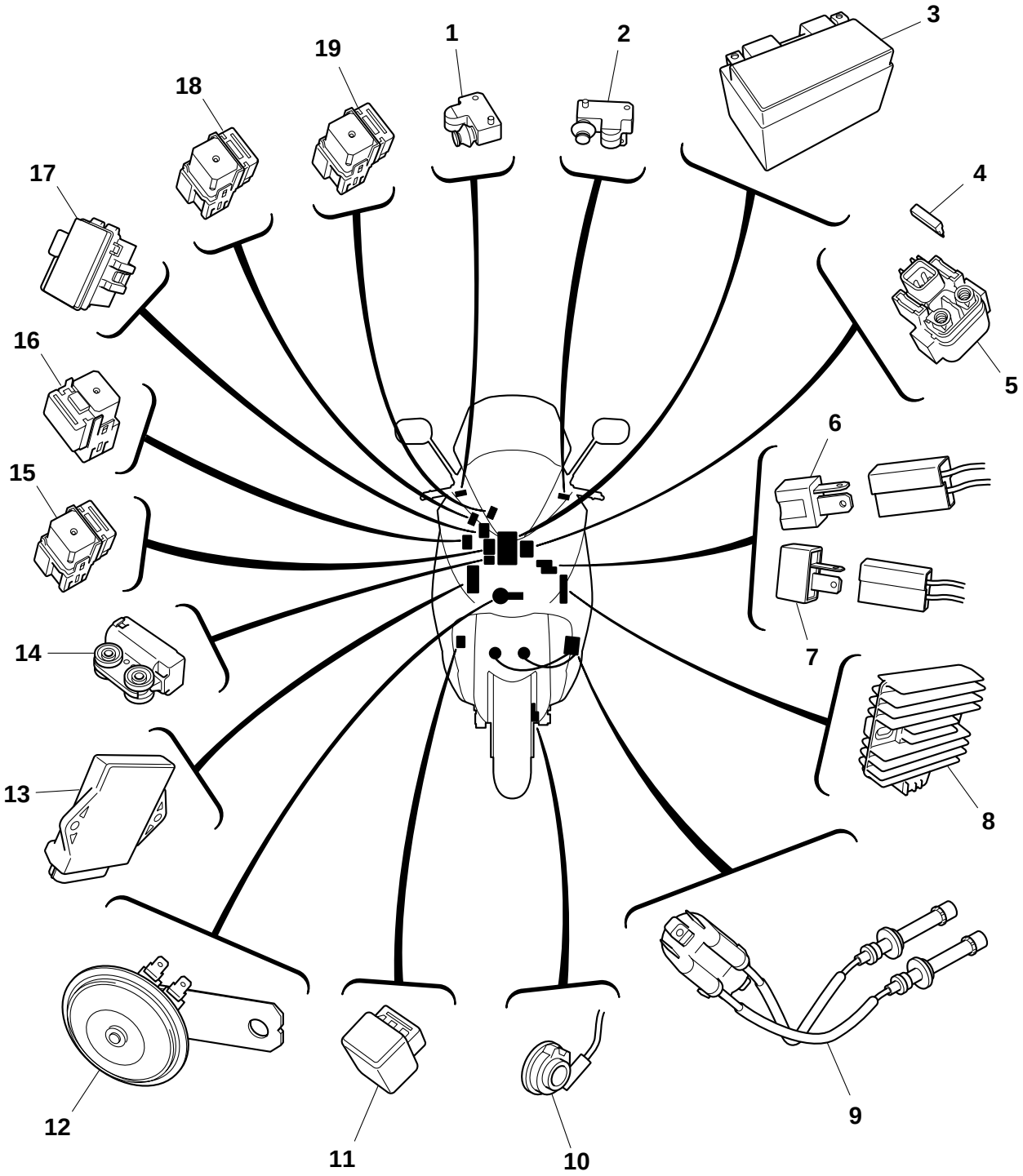
TIP

• Before troubleshooting, remove the following part(s):
1. Front cowling assembly
2. Storage box

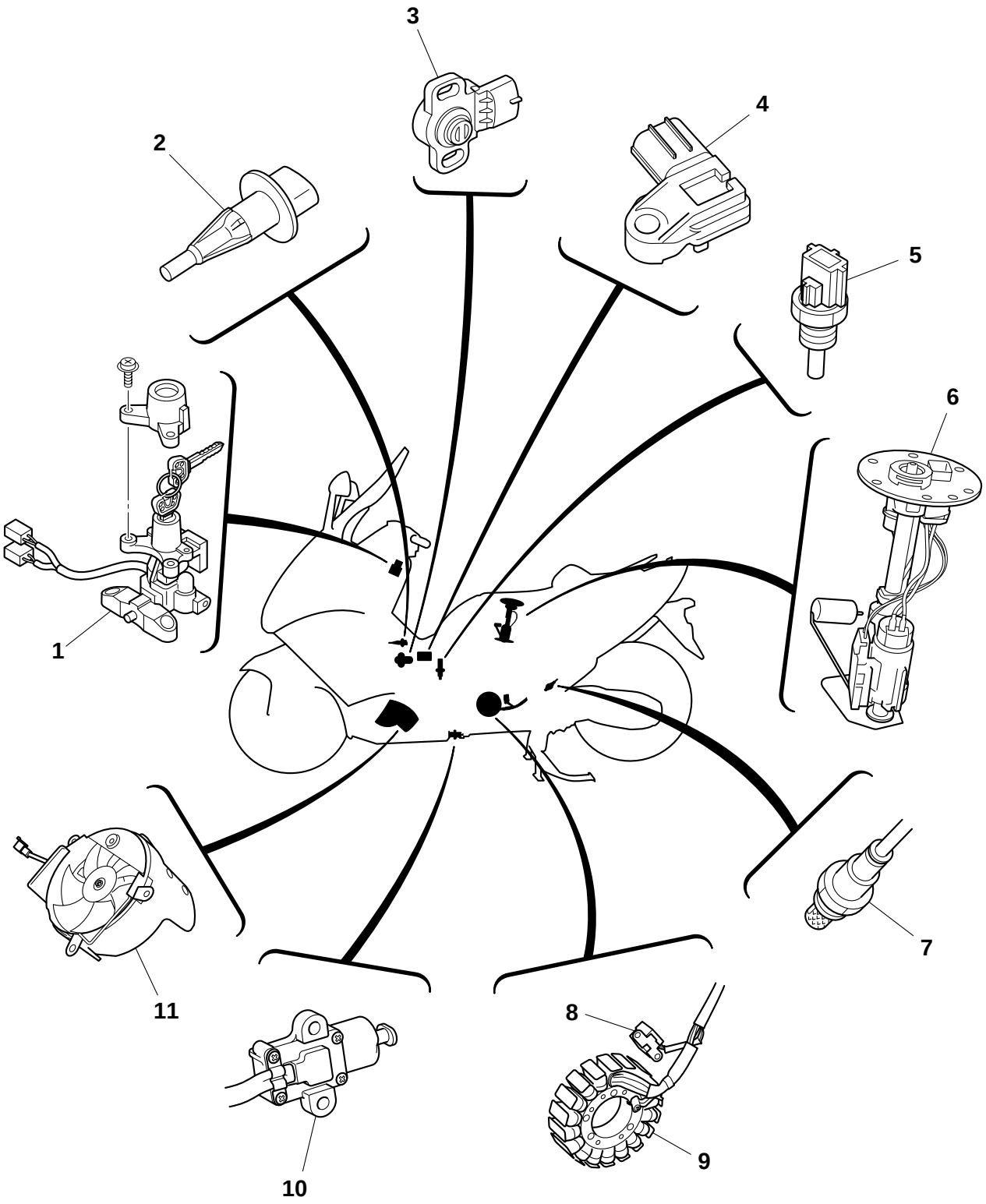
1. Check the fuses. (Main, ignition and fuel injection system) Refer to “CHECKING THE FUSES” on page 8-65.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	Replace the main switch.
OK ↓		
4. Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-61.	NG →	The engine stop switch is faulty. Replace the right handlebar switch.
OK ↓		
5. Check the fuel injection system relay. Refer to “CHECKING THE RELAYS” on page 8-69.	NG →	Replace the fuel injection system relay.
OK ↓		
6. Check the fuel pump. Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.	NG →	Replace the fuel pump assembly.
OK ↓		
7. Check the entire fuel pump system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-53.	NG →	Properly connect or repair the fuel pump system wiring.
OK ↓		
Replace the ECU (engine control unit).		

EAS27971

ELECTRICAL COMPONENTS



1. Front brake light switch
2. Rear brake light switch
3. Battery
4. Main fuse
5. Starter relay
6. Diode 2
7. Diode 1
8. Rectifier/regulator
9. Ignition coil
10. Speed sensor
11. Turn signal relay
12. Horn
13. ECU (electronic control unit)
14. Lean angle sensor
15. Starting circuit cut-off relay
16. Headlight relay
17. Fuse box
18. Radiator fan motor relay
19. Fuel injection system relay


3
4
2
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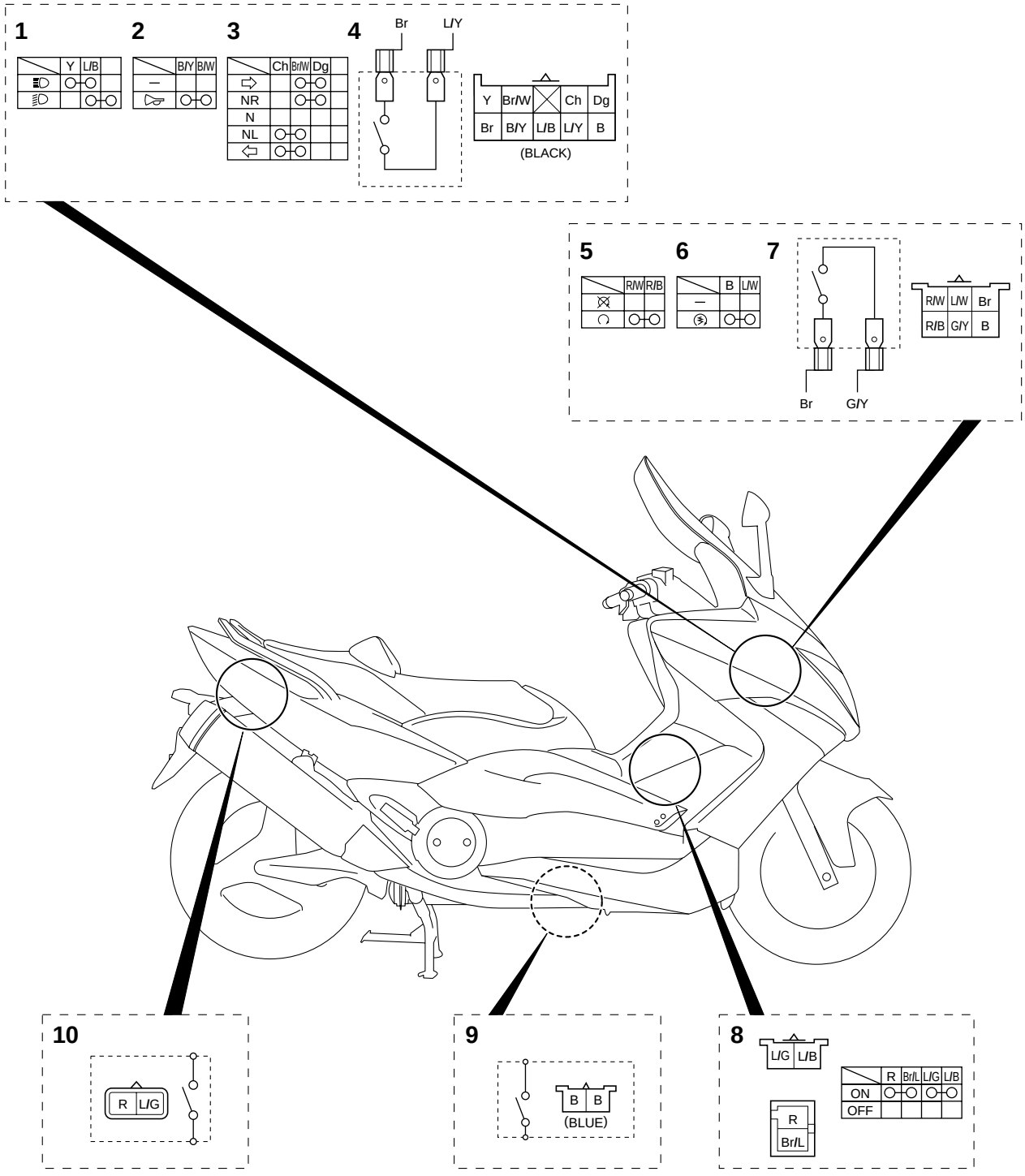
1. Main switch
2. Intake air temperature sensor
3. Throttle position sensor
4. Intake air pressure sensor
5. Coolant temperature sensor
6. Fuel pump
7. O_2 sensor
8. Crankshaft position sensor
9. Stator coil
10. Sidestand switch
11. Radiator fan

EAS27980
CHECKING THE SWITCHES



1. Dimmer switch
2. Horn switch
3. Turn signal switch
4. Rear brake light switch
5. Engine stop switch
6. Start switch
7. Front brake light switch
8. Main switch
9. Sidestand switch
10. Storage box light switch

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

NOTICE

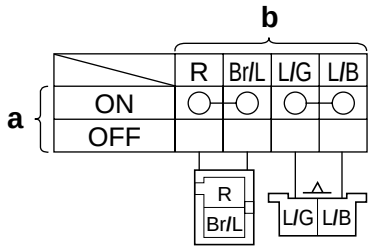
Never insert the tester probes into the coupler terminal slots "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

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

TIP

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.
The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.
The continuity (i.e., a closed circuit) between switch terminals at a given switch position is indicated by " ○——○ ". There is continuity between red, brown/blue and brown/red when the switch is set to "ON" and between red and brown/red when the switch is set to "P".



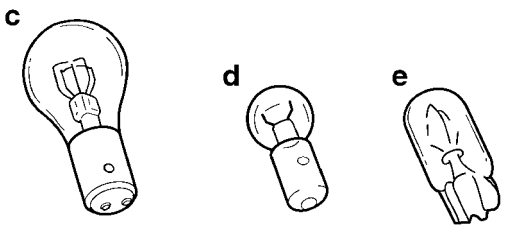
EAS27990
CHECKING THE BULBS AND BULB SOCKETS

TIP

Do not check any of the lights that use LEDs.

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs
The bulbs used on this vehicle are shown in the illustration.
- Bulbs "a" and "b" are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs "c" are used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs "d" and "e" are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.



Checking the condition of the bulbs
The following procedure applies to all of the bulbs.

1. Remove:
   - Bulb

EWA4B51012
WARNING

Since the headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.

ECA4B51010
NOTICE

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - Bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

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

TIP

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
b. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "3", and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

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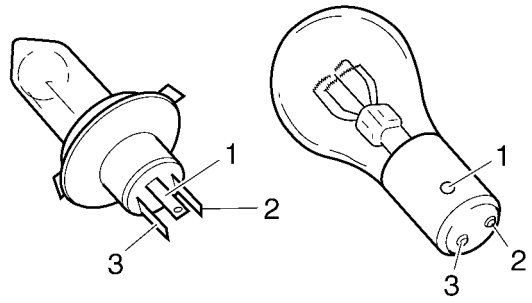

Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
   (with the pocket tester)
   No continuity → Replace.

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

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section, however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.
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EAS28000
CHECKING THE FUSES
The following procedure applies to all of the fuses.
ECA13680
NOTICE
To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   • Battery cover
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Fuse

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a. Connect the pocket tester to the fuse and check the continuity.

TIP
Set the pocket tester selector to "Ω × 1".

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

b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
   • Blown fuse

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a. Turn the main switch to "OFF".
b. Install a new fuse of the correct amperage rating.
c. Set on the switches to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	30 A	1
Headlight	20 A	1
Taillight	10 A	1
Signaling system	15 A	1
Radiator fan	15 A	1
Ignition	10 A	1
Fuel injection system	10 A	1
Backup (odometer and clock)	10 A	1
Spare	30 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.

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4. Install:
   • Battery cover
   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.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

ECA4B54001
NOTICE

- **This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

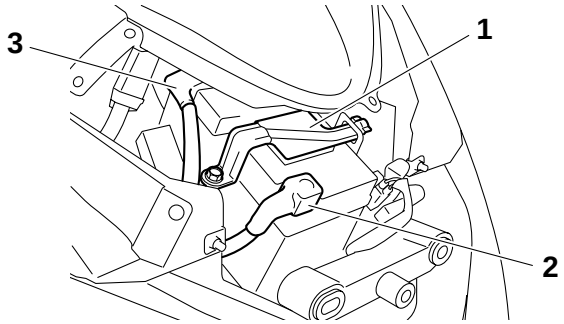
TIP

Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   • Battery cover
   Refer to “GENERAL CHASSIS” on page 4-1.
   • Battery holder “1”
2. Disconnect:
   • Battery leads
   (from the battery terminals)

ECA4B51012
NOTICE

First, disconnect the negative battery lead “2”, then the positive battery lead “3”.



3. Remove:
   • Battery
4. Check:
   • Battery charge

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a. Connect a pocket tester to the battery terminals.

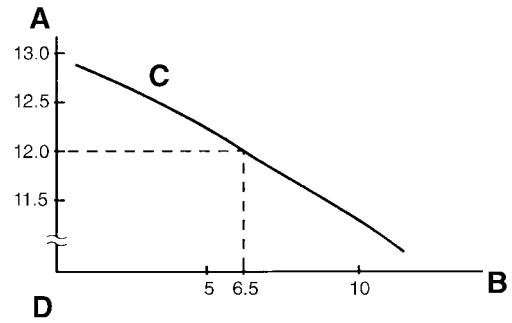
• Positive tester probe → positive battery terminal • Negative tester probe → negative battery terminal

TIP

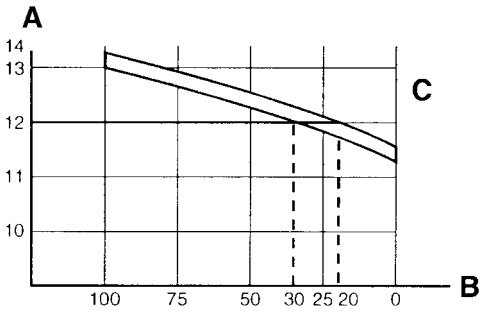
- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30%



A. Open-circuit voltage (V)
B. Charging time (hours)
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



A. Open-circuit voltage (V)
B. Charging condition of the battery (%)
C. Ambient temperature 20 °C (68 °F)

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5. Charge:
   • Battery
   (refer to the appropriate charging method)

EWA13300

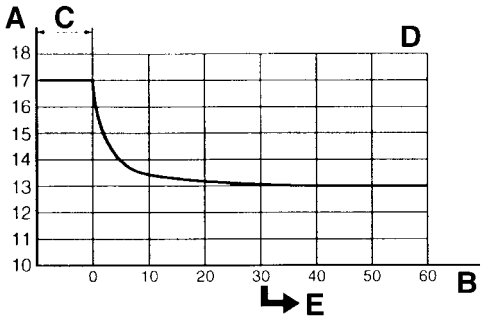
⚠ WARNING

Do not quick charge a battery.

ECA4B54002

NOTICE

- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**



A. Open-circuit voltage (V)
B. Time (minutes)
C. Charging
D. Ambient temperature 20 °C (68 °F)
E. Check the open-circuit voltage.

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Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is turned off.

b. Connect a charger and ammeter to the battery and start charging.

TIP

Set the charging voltage to 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Standard charging current is reached
  Battery is good.
- Standard charging current is not reached
  Replace the battery.

d. Adjust the voltage so that the current is at the standard charging level.
e. Set the time according to the charging time suitable for the open-circuit voltage.
f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is turned off.

b. Connect a charger and ammeter to the battery and start charging.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until the battery's charging voltage is 15 V.

TIP

Set the charging time at 20 hours (maximum).

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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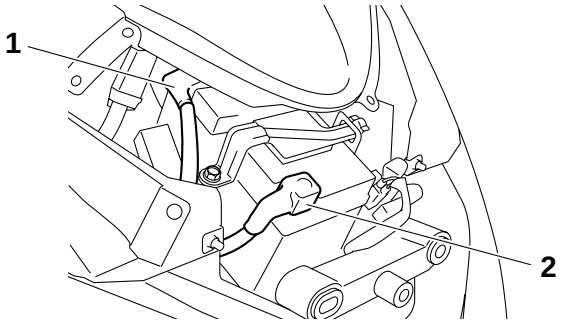
6. Install:
   - Battery
7. Connect:
   - Battery leads
     (to the battery terminals)

ECA4B51013

NOTICE

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:
    - Battery holder

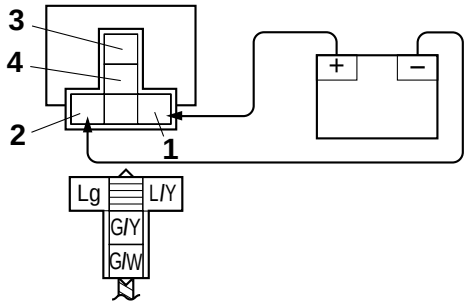
• Battery cover
Refer to “GENERAL CHASSIS” on page 4-1.

EAS28040
CHECKING THE RELAYS
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

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

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the relay terminal as shown.
Check the relay operation.
Out of specification → Replace.

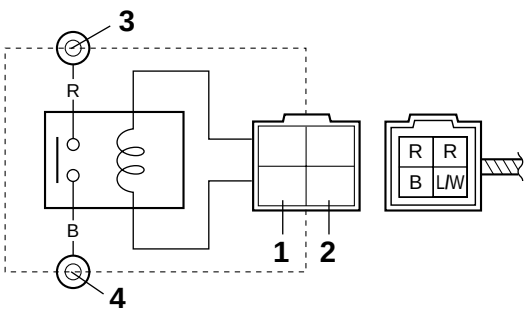
Starting circuit cut-off relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

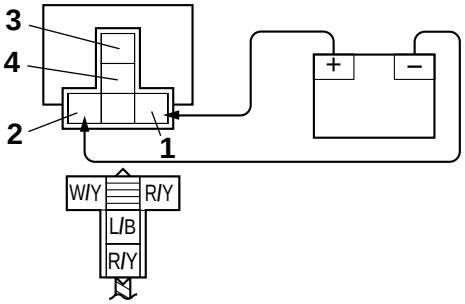
Starter relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

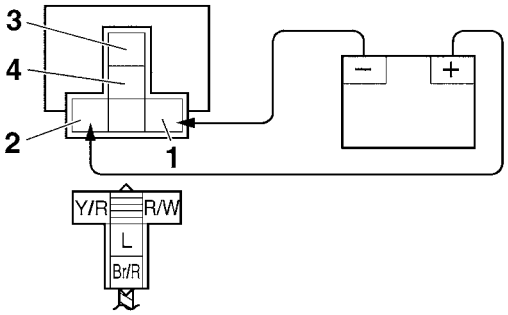
Headlight relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

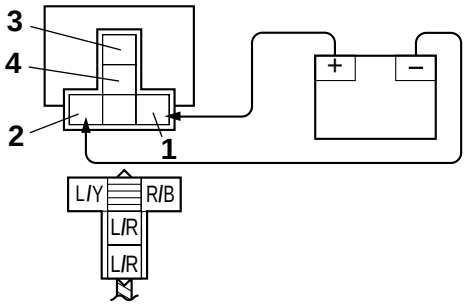
Radiator fan motor relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

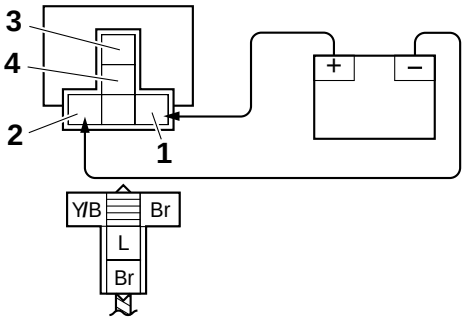
Fuel injection system relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

Grip warmer relay (OPTION)



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between “3” and “4”)

EAS4B51020
CHECKING THE TURN SIGNAL RELAY

1. Check:
   • Turn signal relay input voltage
   Out of specification → The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

Turn signal relay input voltage
DC 12 V

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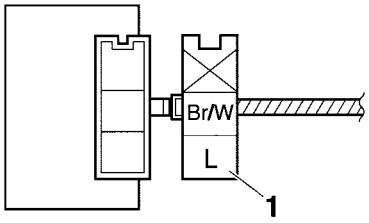
a. Connect the pocket tester (DC 20 V) to the turn signal relay terminal as shown.

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

• Positive tester probe → blue “1”
• Negative tester probe → ground



b. Turn the main switch to “ON”.
c. Measure the turn signal relay input voltage.

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2. Check:
   • Turn signal relay output voltage
   Out of specification → Replace.

Turn signal relay output voltage
DC 12 V

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a. Connect the pocket tester (DC 20 V) to the turn signal relay terminal as shown.

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

• Positive tester probe → brown/white “1”
• Negative tester probe → ground

b. Turn the main switch to “ON”.
c. Measure the turn signal relay output voltage.

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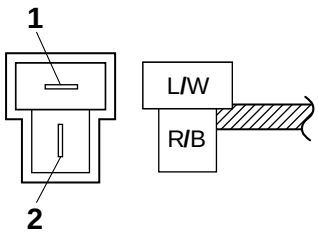
EAS28050
CHECKING THE DIODE
1. Check:
   • Diode 1
   Out of specification → Replace.

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

TIP

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 →** **red/black “2”** **No continuity** **Positive tester probe →** **red/black “2”** **Negative tester probe →** **blue/white “1”**



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a. Disconnect the diode 1 from the wire harness.
b. Connect the pocket tester (Ω × 1) to the diode 1 terminals as shown.
c. Check the diode 1 for continuity.
d. Check the diode 1 for no continuity.

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EAS28070
CHECKING THE SPARK PLUG CAPS
The following procedure applies to all of the spark plug caps.
1. Check:
   • Spark plug cap resistance
   Out of specification → Replace.

	Resistance **10.0 kΩ**

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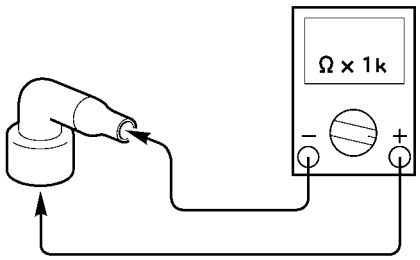
a. Remove the spark plug cap from the spark plug lead.
b. Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.

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



c. Measure the spark plug cap resistance.

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EAS28080
CHECKING THE IGNITION COIL
1. Check:
   • Primary coil resistance
   Out of specification → Replace.

	Primary coil resistance **1.87–2.53 Ω**

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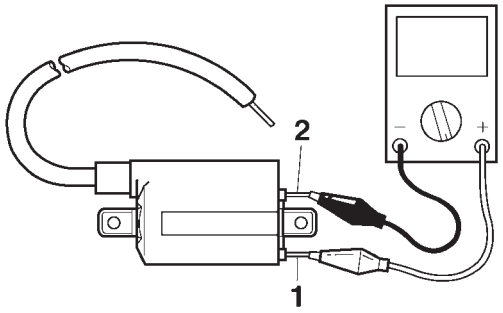
a. Disconnect the ignition coil connectors from the ignition coil terminals.
b. Connect the pocket tester (Ω × 1) to the ignition coil as shown.

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

- Positive tester probe→ red/black “1”
- Negative tester probe → orange “2”



c. Measure the primary coil resistance.

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2. Check:
   - Secondary coil resistance
     Out of specification → Replace.

Secondary coil resistance
12.00–18.00 kΩ

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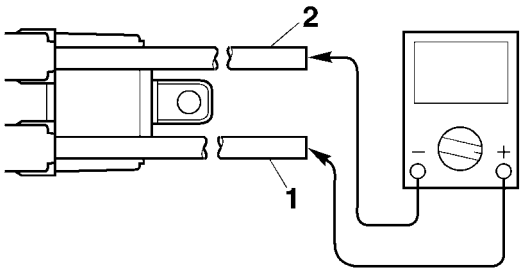
a. Disconnect the spark plug cap from the ignition coil.
b. Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

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



- Negative tester probe → spark plug lead “1”
- Positive tester probe → spark plug lead “2”

c. Measure the secondary coil resistance.

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EAS28930
CHECKING THE IGNITION SPARK GAP

1. Check:
   - Ignition spark gap
     Out of specification → Perform the ignition system troubleshooting, starting with step 5. Refer to “TROUBLESHOOTING” on page 8-3.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

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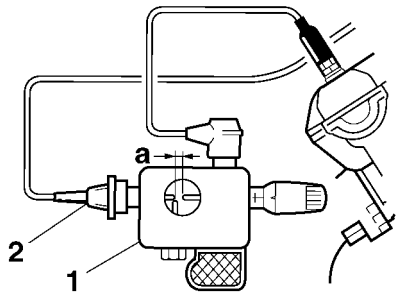
a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker “1” as shown.

Ignition checker
90890-06754
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.

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EAS28120
CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
   - Crankshaft position sensor coupler (from the wire harness)

2. Check:
   • Crankshaft position sensor resistance
   Out of specification → Replace the crankshaft position sensor/stator assembly.

Crankshaft position sensor resistance
189–231 Ω at 20 °C (68 °F)

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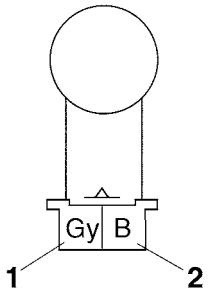
a. Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

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

• Positive tester probe → gray “1”
• Negative tester probe → black “2”



b. Measure the crankshaft position sensor resistance.

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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 45°: 0.4–1.4 V
More than 45°: 3.7–4.4 V

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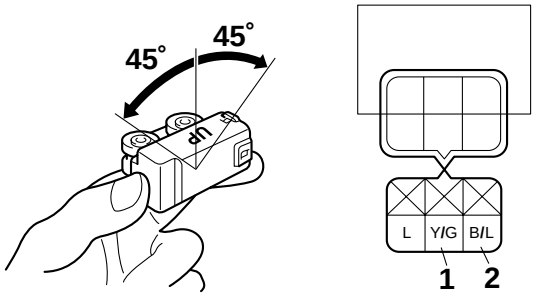
a. Connect the lean angle sensor coupler to the wire harness.
b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

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

• Positive tester probe → yellow/green “1”
• Negative tester probe → black/blue “2”



c. Set the main switch to “ON”.
d. Turn the lean angle sensor 45°.
e. Measure the lean angle sensor output voltage.

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EAS28940

CHECKING THE STARTER MOTOR OPERATION

1. Check:
   • Starter motor operation
   Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
   Refer to “TROUBLESHOOTING” on page 8-9.

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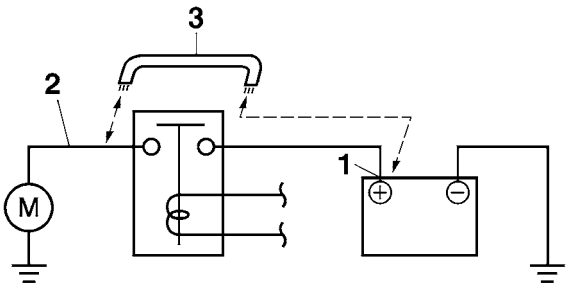
a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.

EWA13810

⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.**



b. Check the starter motor operation.

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EAS28150

CHECKING THE STATOR COIL

1. Disconnect:
   - Stator coil coupler (from the wire harness)
2. Check:
   - Stator coil resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.225–0.275 Ω at 20 °C (68 °F)

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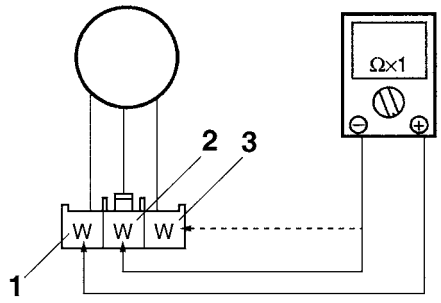
a. Connect the pocket tester (Ω × 1) to the stator coil coupler as shown.

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.

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EAS28170

CHECKING THE RECTIFIER/REGULATOR

1. Check:
   - Rectifier/regulator output voltage
     Out of specification → Replace the rectifier/regulator.

Rectifier/regulator output voltage
14 V at 5000 r/min

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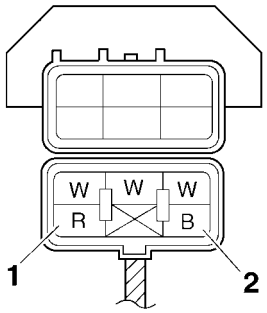
a. Set the engine tachometer to the spark plug lead of cylinder #1.
b. Connect the pocket tester (AC 20 V) to the rectifier/regulator coupler as shown.

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

- Positive tester probe → red “1”
- Negative tester probe → black “2”



c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the rectifier/regulator output voltage.

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EAS28180
CHECKING THE HORN

1. Check:
   • Horn resistance
   Out of specification → Replace.

Coil resistance
1.06–1.11 Ω at 20 °C (68 °F)

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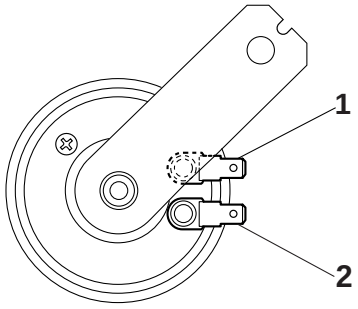
a. Disconnect the horn leads from the horn terminals.
b. Connect the pocket tester (Ω × 1) to the horn terminals.

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.

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2. Check:
   • Horn sound
   Faulty sound → Adjust or replace.

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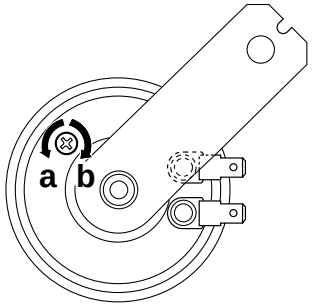
a. Connect a battery (12 V) to the horn.
b. Turn the adjusting screw in direction "a" or "b" until the specified horn sound is obtained.



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EAS28230
CHECKING THE FUEL SENDER

1. Disconnect:
   • Fuel pump coupler
   • Fuel hose
   (from the fuel pump)
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
   • Fuel pump
   (from the fuel tank)
   Refer to "FUEL TANK" on page 7-1.
3. Check:
   • Fuel sender resistance
   Out of specification → Replace the fuel pump assembly.

Sender unit resistance (full)
4.0–10.0 Ω
Sender unit resistance (empty)
93.0–100.0 Ω

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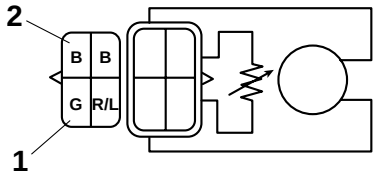
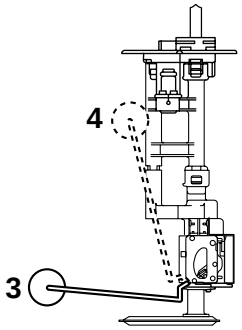
a. Connect the pocket tester (Ω × 1) to the fuel pump terminals as shown.

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

• Positive tester probe → green "1"
• Negative tester probe → black "2"



b. Move the fuel sender float to empty fuel tank position "3" and full fuel tank position "4" level position.



c. Measure the fuel sender resistance.

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4. Install:
   • Fuel pump
     Refer to "FUEL TANK" on page 7-1.
5. Connect:
   • Fuel hose
   • Fuel pump coupler
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS28240

CHECKING THE SPEED SENSOR

1. Check:
   • Speed sensor output voltage
     Out of specification → Replace.

	Output voltage reading cycle **0 V to 5.0 V to 0 V to 5.0 V**

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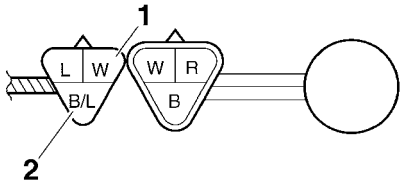
a. Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

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

• Positive tester probe → white "1" • Negative tester probe → black/blue "2"



b. Set the main switch to "ON".

c. Elevate the front wheel and slowly rotate it.

d. Measure the voltage of white and black/blue. With each full rotation of the front wheel, the voltage reading should cycle from 0 V to 5.0 V to 0 V to 5.0 V.

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EAS28250

CHECKING THE RADIATOR FAN MOTOR

1. Check:
   • Radiator fan motor
     Faulty/rough movement → Replace.

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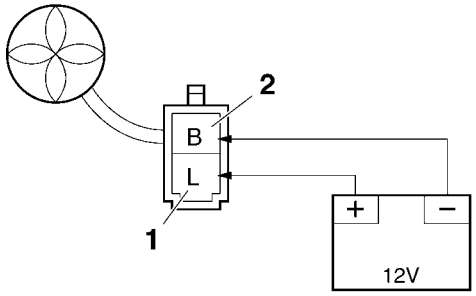
a. Disconnect the radiator fan motor coupler from the wire harness.

b. Connect the battery (DC 12 V) as shown.

• Positive tester probe → blue "1" • Negative tester probe → black "2"



c. Measure the radiator fan motor movement.

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EAS28260

CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
   • Coolant temperature sensor
     Refer to "THERMOSTAT" on page 6-7.

EWA14130

⚠ WARNING

- **Handle the coolant temperature sensor with special care.**
- **Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.**

2. Check:
   • Coolant temperature sensor resistance
     Out of specification → Replace.

	Coolant temperature sensor resistance **2.32–2.59 kΩ at 20 °C (68 °F)** **310–326 Ω at 80 °C (176 °F)**

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a. Connect the pocket tester (Ω × 100) to the coolant temperature sensor terminals as shown.

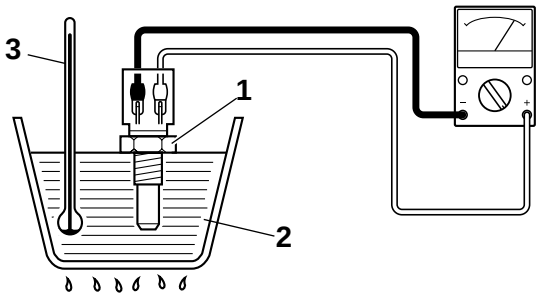
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

TIP

Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the coolant.



d. Slowly heat the coolant, and then let it cool down to the specified temperature.
e. Measure the coolant temperature sensor resistance.

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3. Install:
   • Coolant temperature sensor

Coolant temperature sensor
18 Nm (1.8 m·kg, 13 ft·lb)

EAS28300

CHECKING THE THROTTLE POSITION SENSOR

1. Remove:
   • Throttle position sensor (from the throttle body)
2. Check:
   • Throttle position sensor maximum resistance
   Out of specification → Replace the throttle position sensor.

Resistance
4.0–6.0 kΩ

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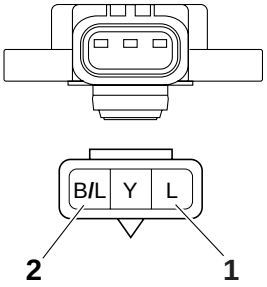
a. Connect the pocket tester (Ω × 1k) to the throttle position sensor terminals as shown.

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

• Tester positive lead → blue "1"
• Tester negative lead → black/blue "2"



b. Measure the throttle position sensor maximum resistance.

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3. Install:
   • Throttle position sensor

TIP

When installing the throttle position sensor, adjust its angle properly. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR" on page 7-8.

EAS28410

CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
   • Intake air pressure sensor output voltage
   Out of specification → Replace.

Intake air pressure sensor output voltage
3.15–4.15 V

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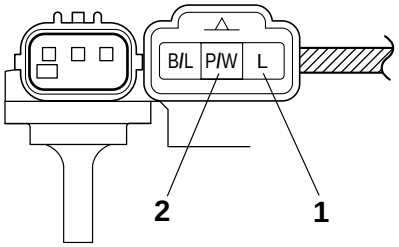
a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.

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

• Positive tester probe → blue “1” • Negative tester probe → pink/white “2”



b. Turn the main switch to “ON”.
c. Measure the intake air pressure sensor output voltage.

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EAS28420
CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
   • Intake air temperature sensor (from the air filter case)

EWA14110
⚠ WARNING

- **Handle the intake air temperature sensor with special care.**
- **Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.**

2. Check:
   • Intake air temperature sensor resistance
   Out of specification → Replace.

	**Intake air temperature sensor resistance** **2.21–2.69 kΩ at 20 °C (68 °F)**

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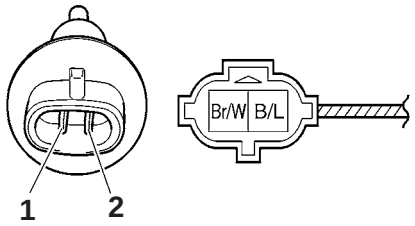
a. Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

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

• Positive tester probe → black/blue “1” • Negative tester probe → brown/white “2”



b. Measure the intake air temperature sensor resistance.

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TROUBLESHOOTING

EAS28450
TROUBLESHOOTING

EAS28460
GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28480
STARTING FAILURE/HARD STARTING

Engine
1. Cylinder(s) and cylinder head
   - Loose spark plug
   - Loose cylinder head or cylinder
   - Damaged cylinder head gasket
   - Damaged cylinder gasket
   - Worn or damaged cylinder
   - Incorrect valve clearance
   - Improperly sealed valve
   - Incorrect valve-to-valve-seat contact
   - Incorrect valve timing
   - Faulty valve spring
   - Seized valve
2. Piston(s) and piston ring(s)
   - Improperly installed piston ring
   - Damaged, worn or fatigued piston ring
   - Seized piston ring
   - Seized or damaged piston
3. Air filter
   - Improperly installed air filter
   - Clogged air filter element
4. Crankcase and crankshaft
   - Improperly assembled crankcase
   - Seized crankshaft

Fuel system
1. Fuel tank
   - Empty fuel tank
   - Clogged fuel tank cap breather hole
   - Deteriorated or contaminated fuel
   - Clogged or damaged fuel hose
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel injection system relay
   - Damaged vacuum hose
   - Improperly routed hose
3. Throttle body
   - Deteriorated or contaminated fuel
   - Sucked-in air

Electrical system
1. Battery
   - Discharged battery
   - Faulty battery
2. Fuse(s)
   - Blown, damaged or incorrect fuse
   - Improperly installed fuse
3. Spark plug(s)
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug
   - Worn or damaged electrode
   - Worn or damaged insulator
   - Faulty spark plug cap
4. Ignition coil
   - Cracked or broken ignition coil body
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
5. Ignition system
   - Faulty ECU (engine control unit)
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty engine stop switch
   - Broken or shorted wiring
   - Faulty front, rear or both brake light switches
   - Faulty start switch
   - Faulty sidestand switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty starting circuit cut-off relay
   - Faulty starter clutch

EAS28500
INCORRECT ENGINE IDLING SPEED

Engine
1. Cylinder(s) and cylinder head
   - Incorrect valve clearance
   - Damaged valve train components
2. Air filter
   - Clogged air filter element

Fuel system
1. Throttle body
   - Damaged or loose throttle body joint
   - Improperly synchronized throttle body
   - Improperly adjusted engine idling speed

- 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
   - Faulty spark plug lead
4. Ignition system
   - Faulty ECU (engine control unit)
   - Faulty crankshaft position sensor

EAS28510

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD START-ING” on page 9-1.

Engine

1. Air filter
   - Clogged air filter element

Fuel system

1. Fuel pump
   - Faulty fuel pump

EAS28580

FAULTY CLUTCH

Engine operates but scooter will not move

1. V-belt
   - Bent, damaged or worn V-belt
   - Slipping V-belt
2. Primary pulley cam and primary pulley slider
   - Damaged or worn primary pulley cam
   - Damaged or worn primary pulley slider
3. Clutch spring(s)
   - Damaged clutch spring
4. Transmission gear(s)
   - Damaged transmission gear

Clutch slips

1. Clutch
   - Improperly assembled clutch
   - Fatigued clutch spring
   - Worn friction plate
   - Worn clutch plate
2. Engine oil
   - Incorrect oil level
   - Incorrect oil viscosity (low)
   - Deteriorated oil
3. Primary sliding sheave
   - Seized primary sliding sheave

Poor starting performance

1. V-belt
   - V-belt slips
   - Oil or grease on the V-belt
2. Primary sliding sheave
   - Faulty operation
   - Worn pin groove
   - Worn pin
3. Clutch shoe(s)
   - Bent, damaged or worn clutch shoe

Poor speed performance

1. V-belt
   - Oil or grease on the V-belt
2. Primary pulley weight(s)
   - Faulty operation
   - Worn primary pulley weight
3. Primary fixed sheave
   - Worn primary fixed sheave
4. Primary sliding sheave
   - Worn primary sliding sheave
5. Secondary fixed sheave
   - Worn secondary fixed sheave
6. Secondary sliding sheave
   - Worn secondary sliding sheave

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

- Thermostat
- Thermostat stays closed
- Oil cooler
- Clogged or damaged oil cooler
- Hose(s) and pipe(s)
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

Fuel system

1. Throttle body
   - Faulty throttle body
   - Damaged or loose throttle body joint
2. Air filter
   - Clogged air filter element

Chassis

1. Brake(s)
   - Dragging brake

Electrical system

1. Spark plug(s)
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
2. Ignition system
   - Faulty ECU (engine control unit)

EAS28610
OVERCOOLING

Cooling system

1. Thermostat
   - Thermostat stays open

EAS28620
POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28660
FAULTY FRONT FORK LEGS

Leaking oil

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod bolt
- Damaged damper rod bolt copper washer
- Cracked or damaged cap bolt O-ring

Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28670
UNSTABLE HANDLING

1. Handlebar
   - Bent or improperly installed handlebar
2. Steering head components
   - Improperly installed upper bracket
   - Improperly installed lower bracket (improperly tightened ring nut)
   - Bent steering stem
   - Damaged ball bearing or bearing race
3. Front fork leg(s)
   - Uneven oil levels (both front fork legs)
   - Unevenly tensioned fork spring (both front fork legs)
   - Broken fork spring
   - Bent or damaged inner tube
   - Bent or damaged outer tube
4. Swingarm
   - Worn bearing or bushing
   - Bent or damaged swingarm
5. Rear shock absorber assembly
   - Faulty rear shock absorber spring
   - Leaking oil or gas
6. Tire(s)
   - Uneven tire pressures (front and rear)
   - Incorrect tire pressure
   - Uneven tire wear
7. Wheel(s)
   - Incorrect wheel balance
   - Deformed cast wheel
   - Damaged wheel bearing
   - Bent or loose wheel axle
   - Excessive wheel runout
8. Frame
   - Bent frame
   - Damaged steering head pipe
   - Improperly installed bearing race

EAS28710
FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

Headlight bulb burnt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light 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

EAS28740

WIRING DIAGRAM

XP500Y 2009

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Storage box light switch
6. Storage box light
7. Fuel injection system fuse
8. Backup fuse (odometer and clock)
9. Signaling system fuse
10. Headlight fuse
11. Ignition fuse
12. Radiator fan fuse
13. Taillight fuse
14. Battery
15. Main fuse
16. Starter relay
17. Starter motor
18. Diode 1
19. Right handlebar switch
20. Engine stop switch
21. Start switch
22. Front brake light switch
23. Diode 2
24. Starting circuit cut-off relay
25. Fuel injection system relay
26. Fuel pump
27. Fuel sender
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
32. Fuel injector #1
33. Fuel injector #2
34. Coolant temperature sensor
35. Intake air temperature sensor
36. Intake air pressure sensor
37. O_2 sensor
38. Throttle position sensor
39. Lean angle sensor
40. Speed sensor
41. Grip warmer relay (OPTION)
42. Grip warmer switch (OPTION)
43. Grip warmer (OPTION)
44. Grip warmer (OPTION)
45. Radiator fan motor relay
46. Radiator fan motor
47. License plate light
48. Taillight assembly
49. Rear left turn signal light
50. Rear right turn signal light
51. Tail/brake light
52. Turn signal relay
53. Left handlebar switch
54. Dimmer switch
55. Horn switch
56. Turn signal switch
57. Rear brake light switch
58. Horn
59. Front right turn signal/position light
60. Front left turn signal/position light
61. Headlight relay
62. Headlight (high beam)
63. Headlight (low beam)
64. Meter assembly
65. Multi-function meter
66. Coolant temperature meter
67. Speedometer
68. Fuel meter
69. Engine trouble warning light
70. Meter light
71. High beam indicator light
72. Right turn signal indicator light
73. Left turn signal indicator light

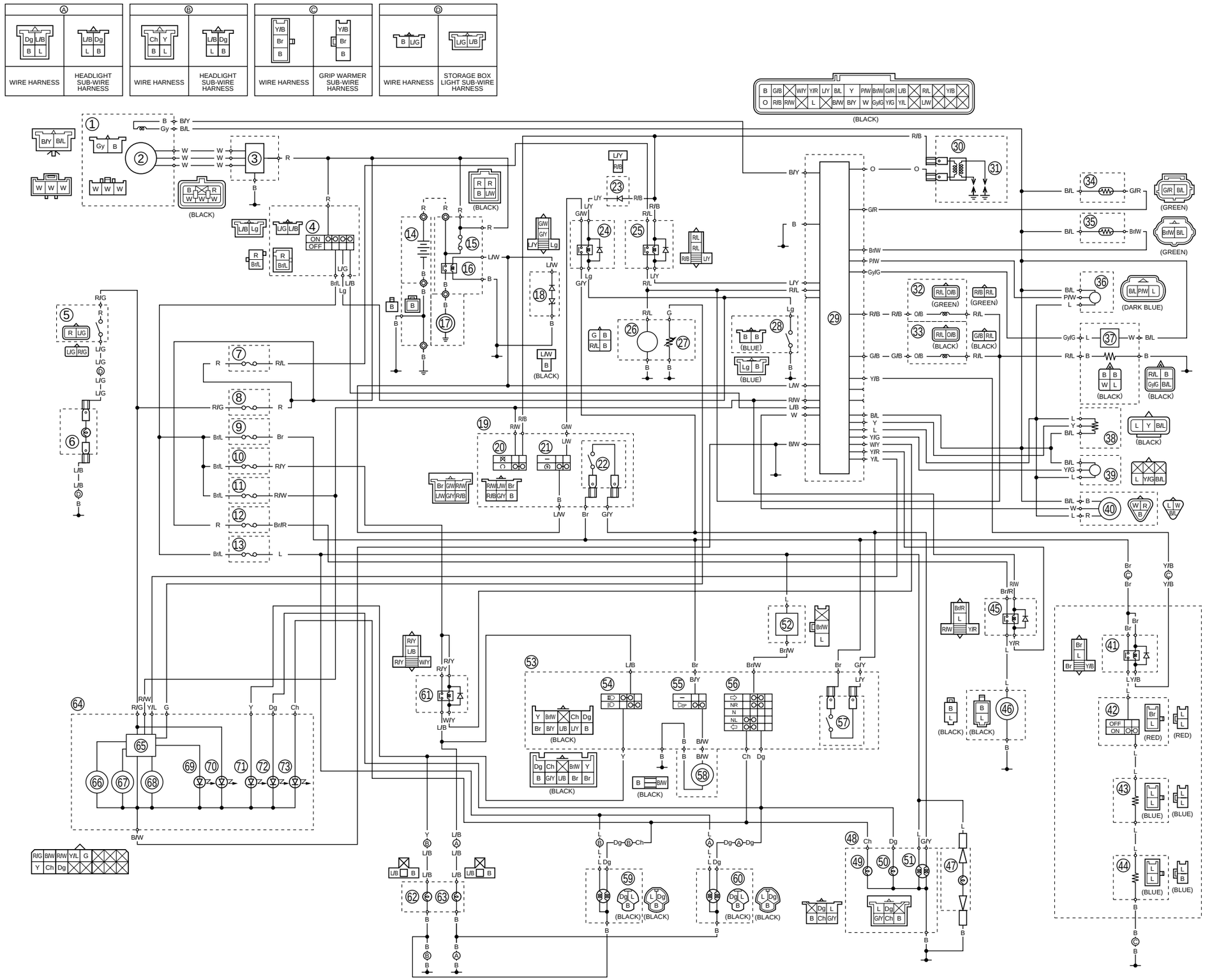
EAS28750

COLOR CODE

B	Black
Br	Brown
Ch	Chocolate
Dg	Dark green
G	Green
Gy	Gray
L	Blue
Lg	Light green
O	Orange
R	Red
W	White
Y	Yellow
B/L	Black/Blue
B/W	Black/White
B/Y	Black/Yellow
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
G/B	Green/Black
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
L/B	Blue/Black
L/G	Blue/Green
L/W	Blue/White
L/Y	Blue/Yellow
O/B	Orange/Black
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
W/Y	White/Yellow
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red

XP500Y 2009 WIRING DIAGRAM

XP500Y 2009 SCHÉMA DE CÂBLAGE



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