



**YAMAHA**

**2016**

**SERVICE MANUAL**

**YF70GG**

**YF70GPG**

**YF70GPSG**

**YF70GPLG**

**YFM70GDXG**

**YFM70GDHG**

**YFM70GPXG**

**YFM70GPHG**

**YFM70GPSG**

**YFM70GPLG**

**YFM700FWAD**

***GRIZZLY***

**2UD-F8197-E0**

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EBS20002

**YF70GG/YF70GPG/YF70GPSG/  
YF70GPLG/YFM70GDXG/  
YFM70GDHG/YFM70GPXG/  
YFM70GPHG/YFM70GPSG/  
YFM70GPLG/YFM700FWAD  
SERVICE MANUAL**

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## 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

Designs and specifications are subject to change without notice.

## IMPORTANT MANUAL INFORMATION

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

	<b>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.</b>
 <b>WARNING</b>	<b>A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</b>
<b>NOTICE</b>	<b>A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.</b>
<b>TIP</b>	A TIP provides key information to make procedures easier or clearer.

# HOW TO USE THIS MANUAL

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

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

**1**

**CYLINDER HEAD, CYLINDER, AND PISTON**

**Removing the cylinder head**

1st	30 Nm (3.0 m·kgf, 22 ft·lbf)
2nd	70 Nm (7.0 m·kgf, 51 ft·lbf)
3rd	Loosen 360°
4th	30 Nm (3.0 m·kgf, 22 ft·lbf)
5th	Specified angle 85-90°
6th	Specified angle 85-90° (again)

10 Nm (1.0 m·kgf, 7.2 ft·lbf)

10 Nm (1.0 m·kgf, 7.2 ft·lbf)

10 Nm (1.0 m·kgf, 7.2 ft·lbf)

18 Nm (1.8 m·kgf, 13 ft·lbf)

Order	Job/Parts to remove	Q'ty	Remarks
1	Oil hose (crankcase to cylinder)	1	
2	Cylinder bolt	2	
3	Cylinder head bolt	2	M6
4	Cylinder head bolt	4	M11
5	Cylinder head	1	
6	Cylinder head gasket	1	
7	Dowel pin	2	

5-20

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER HEAD**

1. Eliminate:

- Combustion chamber carbon deposits (with a rounded scraper)

**NOTICE**  
Do not use a sharp instrument; otherwise, the following may be damaged or scratched:

- 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)

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

---

**CHECKING THE CYLINDER AND PISTON**

1. Check:

- Piston wall
- Cylinder wall
- Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:

- Piston-to-cylinder clearance

a. Measure the cylinder bore "C" with the cylinder bore gauge.

**TIP**  
Measure the cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder.

**Bore**  
103.000–103.020 mm (4.0551–4.0559 in)

**Wear limit**  
103.080 mm (4.0583 in)

**Taper limit**  
0.050 mm (0.0020 in)

**Out of round limit**  
0.050 mm (0.0020 in)

"C" = maximum of D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub>, D<sub>4</sub>, D<sub>5</sub>, D<sub>6</sub>

Taper (front-to-back) = maximum difference between D<sub>1</sub>, D<sub>3</sub>, D<sub>5</sub>

Taper (side-to-side) = maximum difference between D<sub>2</sub>, D<sub>4</sub>, D<sub>6</sub>

Out of round (top) = difference between D<sub>1</sub>, D<sub>2</sub>

Out of round (middle) = difference between D<sub>3</sub>, D<sub>4</sub>

Out of round (bottom) = difference between D<sub>5</sub>, D<sub>6</sub>

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.





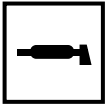













5-23

## SYMBOLS

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

### TIP

The following symbols are not relevant to every vehicle.

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

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## GENERAL INFORMATION

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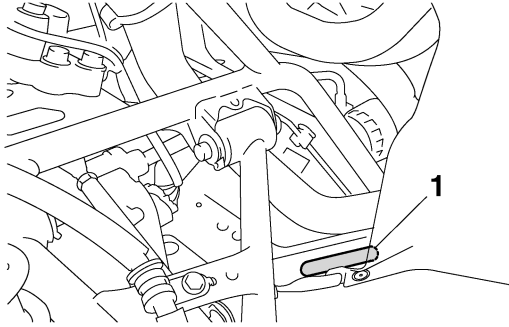
EBS20009

## IDENTIFICATION

EBS30003

### VEHICLE IDENTIFICATION NUMBER

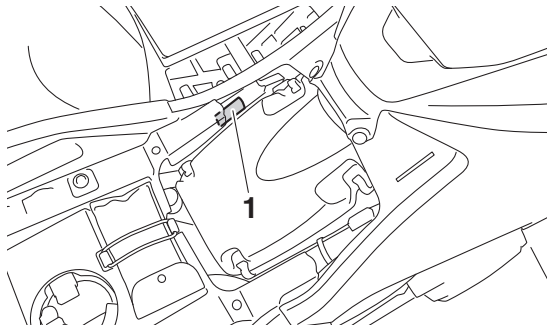
The vehicle identification number “1” is stamped into the frame.



EBS30004

### MODEL LABEL

The model label “1” is affixed at the location in the illustration. This information will be needed to order spare parts.



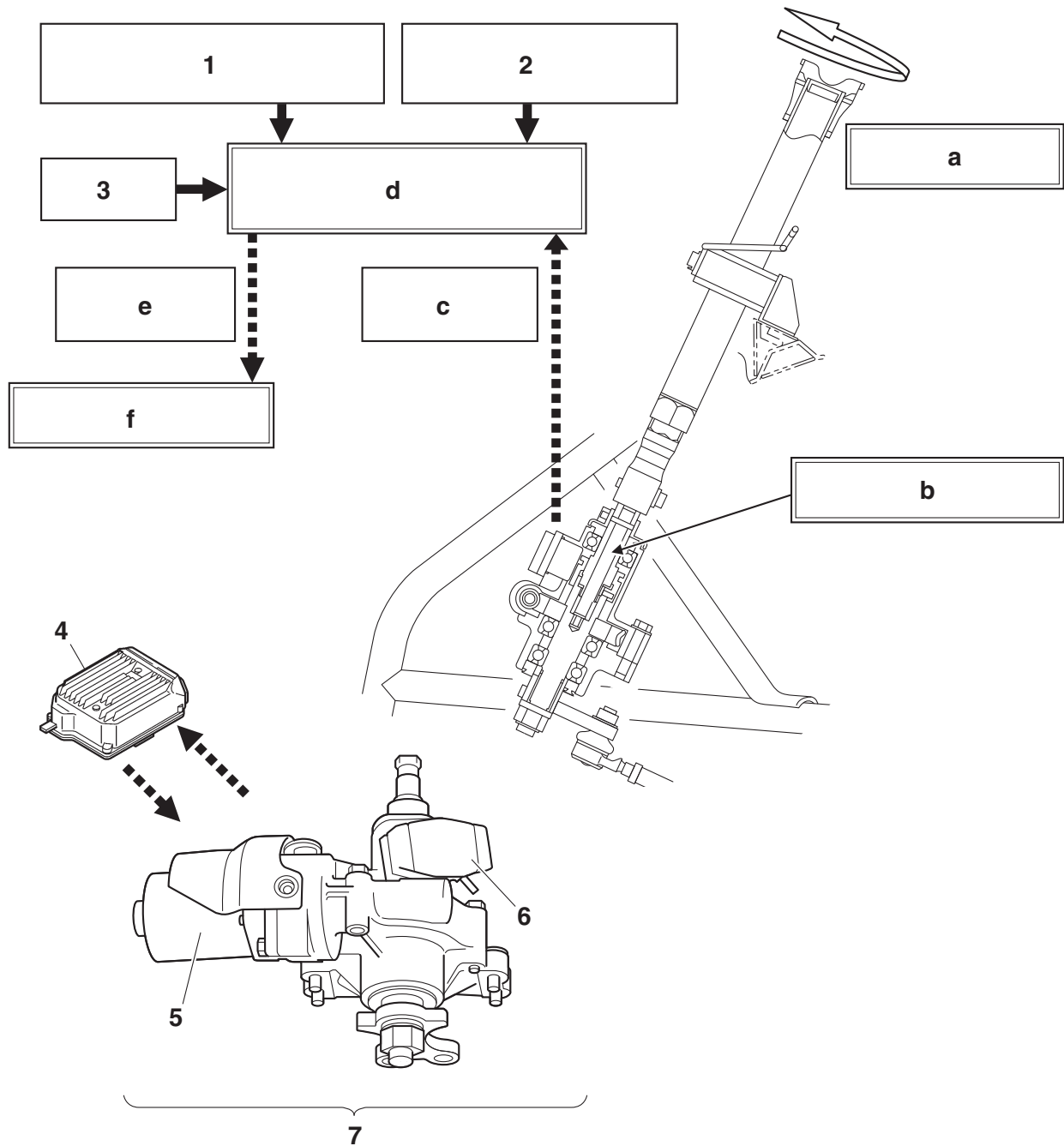


EBS20010

## FEATURES

EBS30007

### OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)



# FEATURES

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1. Speed information from speed sensor
2. Engine RPM information from ECU
3. Battery
4. EPS control unit
5. EPS motor
6. Torque sensor
7. EPS unit
  - a. Operates steering
  - b. Twists torsion bar
  - c. Sends the torque sensor signal
  - d. EPS control unit calculates assist power
  - e. Electricity output switched by EPS control unit
  - f. Activates EPS motor

ECB01790

## **NOTICE**

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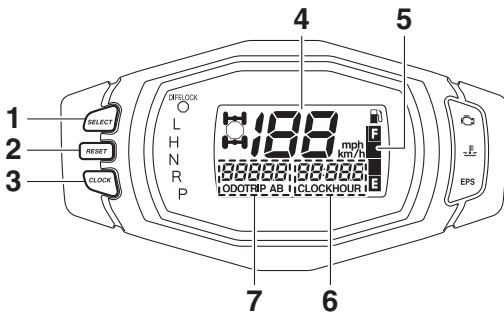
**To prevent accidental damage to the EPS unit, it must not be disassembled.**

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EBS30008

## INSTRUMENT FUNCTIONS

### Multi-function display



1. "SELECT" button
2. "RESET" button
3. "CLOCK" button
4. Speedometer
5. Fuel meter
6. Clock/Hour meter
7. Odometer/Tripmeter A/Tripmeter B

The multi-function display is equipped with the following:

- a speedometer
- an odometer
- two tripmeters (which show the distance traveled since they were last set to zero)
- a clock
- an hour meter (which shows the total time the engine has been running)
- a fuel meter
- a self-diagnosis device

### Odometer and tripmeter modes

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

ODO → TRIP A → TRIP B → ODO

To reset a tripmeter, select it by pushing the "SELECT" button, and then push the "RESET" button for at least three seconds. The tripmeters can be used to estimate the distance that can be traveled with a full tank of fuel. This information will enable you to plan future fuel stops.

#### TIP

Pushing and holding in the "SELECT" button, and turning the key to "I" (on) while the button is pushed, switches the display between "mph" and "km/h".

### Clock mode

Pushing the "CLOCK" button switches the display between the clock mode "CLOCK" and the hour meter mode "HOUR" in the following order: CLOCK → HOUR → CLOCK

### To set the clock

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

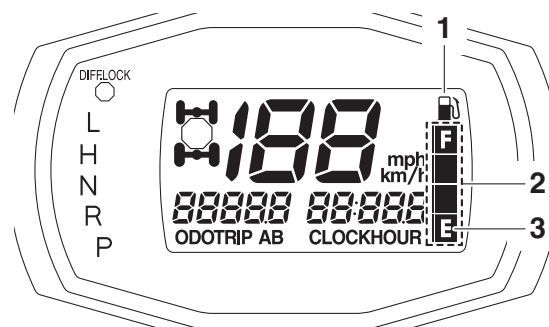
### Fuel meter

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

#### TIP

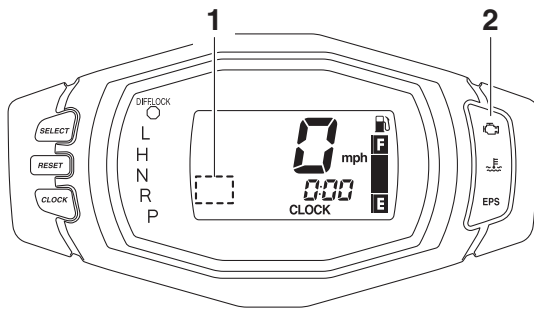
This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is not working correctly, all the display segments and fuel level warning indicator will start flashing. If this occurs, check the electrical circuit.

Refer to "SIGNALING SYSTEM" on page 9-19.



1. Fuel level warning indicator
2. Fuel meter
3. "E" segment

## Self-diagnosis device



1. Fault code display
2. Engine trouble warning light

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

If a problem is detected in any of those circuits, the engine trouble warning light will come on or flash and the multi-function display will indicate an fault code.

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

ECB02030

### **NOTICE**

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

EBS20011

## IMPORTANT INFORMATION

EBS30009

### PREPARATION FOR REMOVAL AND DISASSEMBLY

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



2. Use only the proper tools and cleaning equipment.

Refer to "SPECIAL TOOLS" on page 1-14.

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

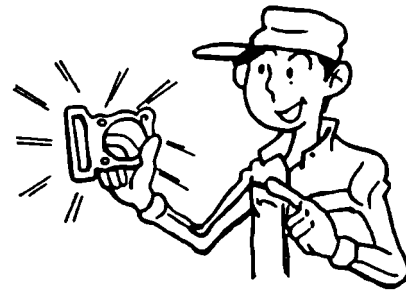


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EBS30010

### REPLACEMENT PARTS

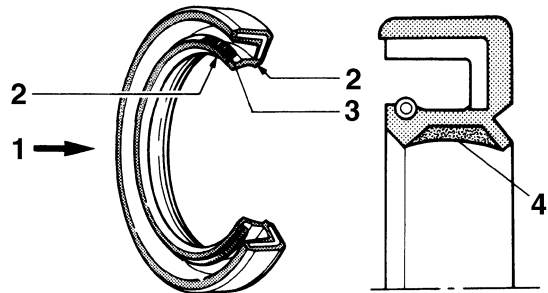
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EBS30011

### 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.

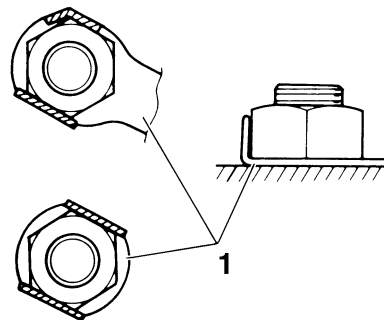


1. Oil
2. Lip
3. Spring
4. Grease

EBS30012

### 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.





EBS30013

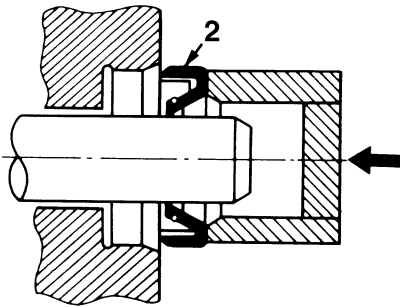
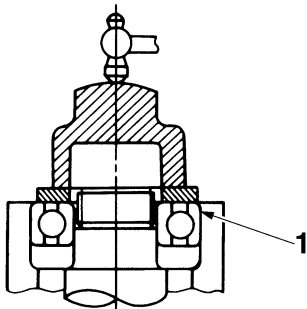
## BEARINGS AND OIL SEALS

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.

ECB01260

### NOTICE

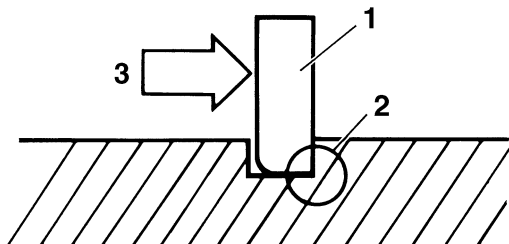
**Do not spin the bearing with compressed air because this will damage the bearing surfaces.**



EBS30014

## 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.



EBS20012

## BASIC SERVICE INFORMATION

EBS30016

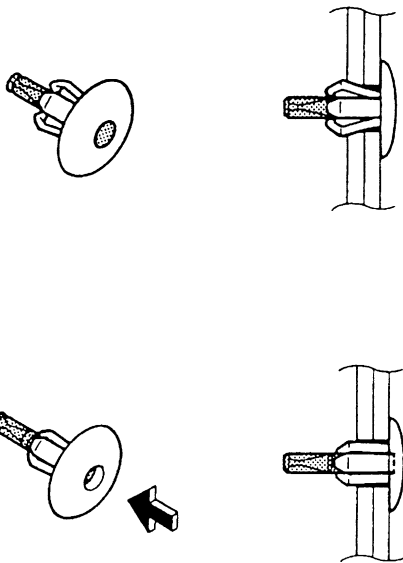
### QUICK FASTENERS

#### Rivet type

1. Remove:
  - Quick fastener

#### TIP

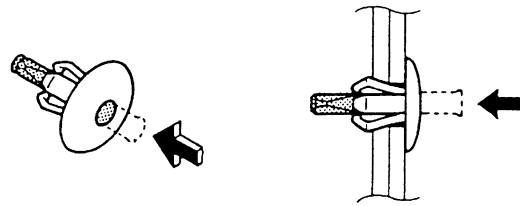
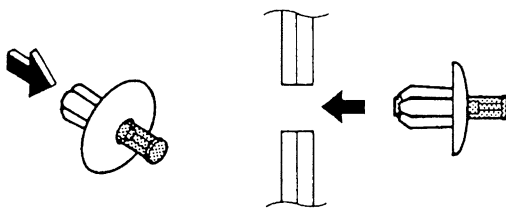
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.



2. Install:
  - Quick fastener

#### TIP

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

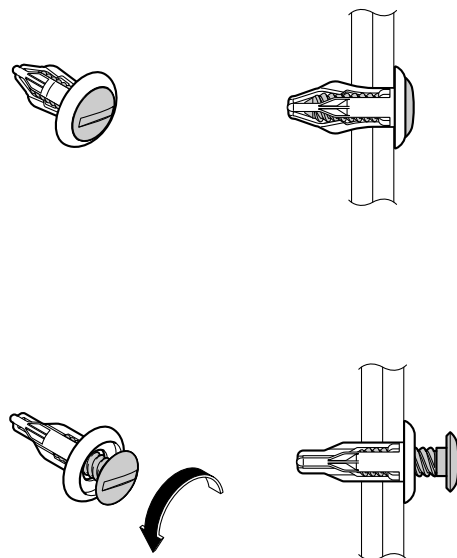


#### Screw type

1. Remove:
  - Quick fastener

#### TIP

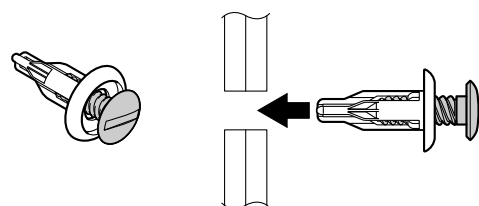
To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.

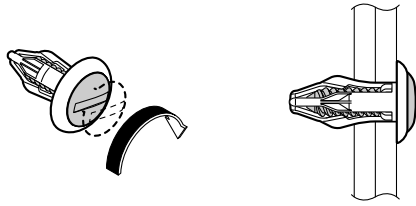


2. Install:
  - Quick fastener

#### TIP

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





EBS30017

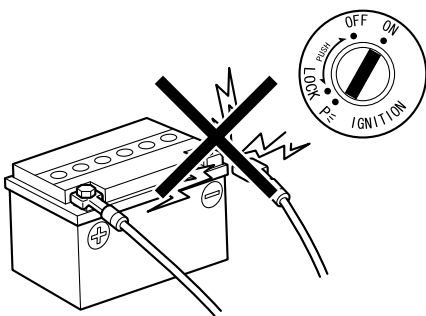
## ELECTRICAL SYSTEM

### Electrical parts handling

ECB01460

#### NOTICE

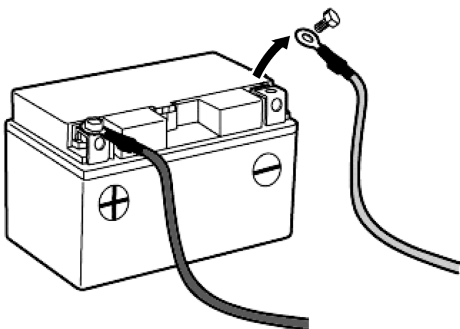
Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.



ECB01510

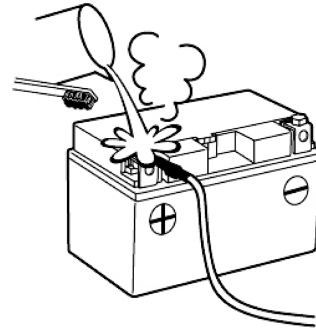
#### NOTICE

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



#### TIP

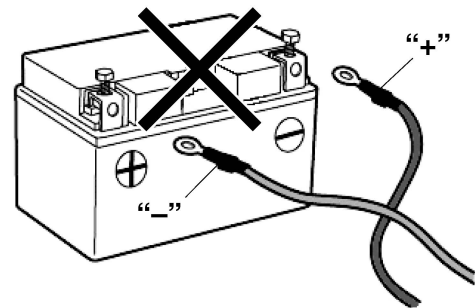
If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.



ECB01520

#### NOTICE

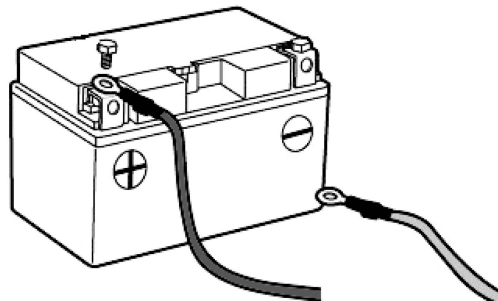
Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.



ECB01530

#### NOTICE

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

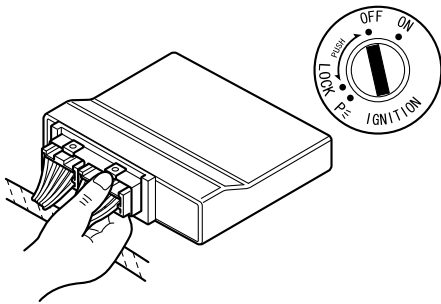


ECB01470

#### NOTICE

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

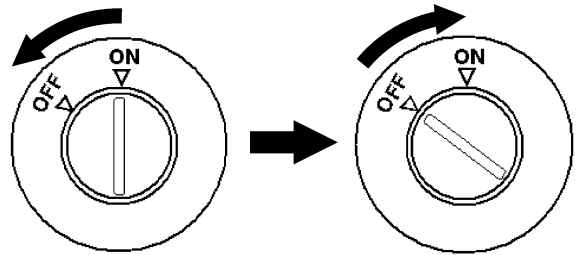
# BASIC SERVICE INFORMATION



ECB01480

## NOTICE

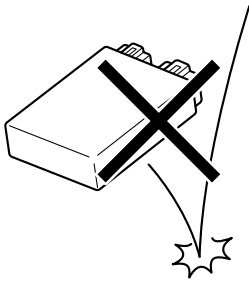
Handle electrical components with special care, and do not subject them to strong shocks.



## Checking the electrical system

### TIP

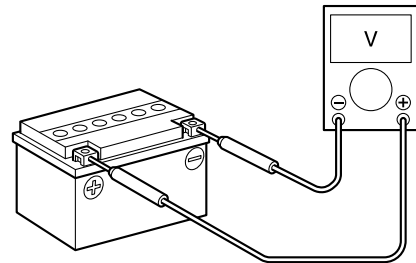
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECB01490

## NOTICE

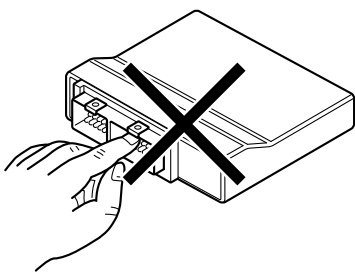
Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.



ECB01440

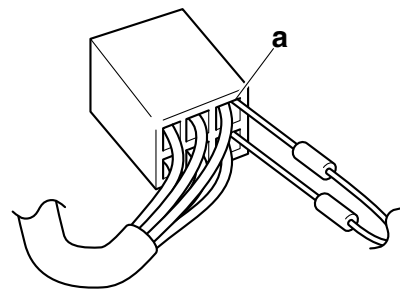
## NOTICE

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



### TIP

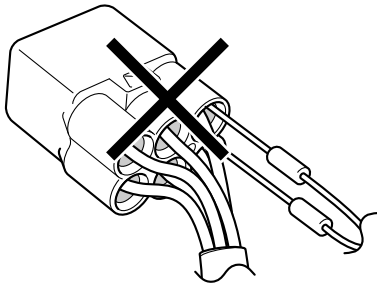
When resetting the ECU by turning the main switch to “OFF”, be sure to wait approximately 5 seconds before turning the main switch back to “ON”.



ECB01500

## NOTICE

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



## Checking the connections

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

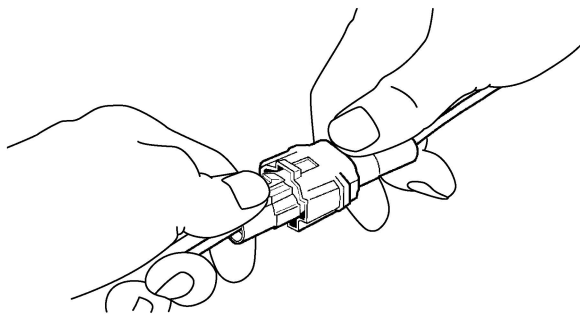
### 1. Disconnect:

- Lead
- Coupler
- Connector

ECB01540

### NOTICE

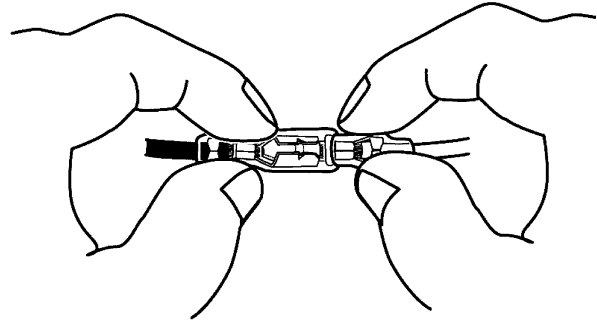
- When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.
- There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.



ECB01550

### NOTICE

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

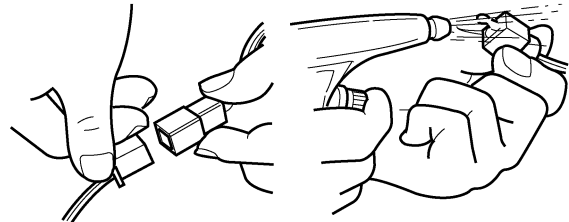


### 2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.

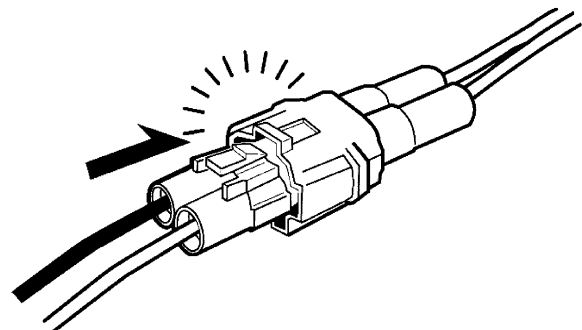


### 3. Connect:

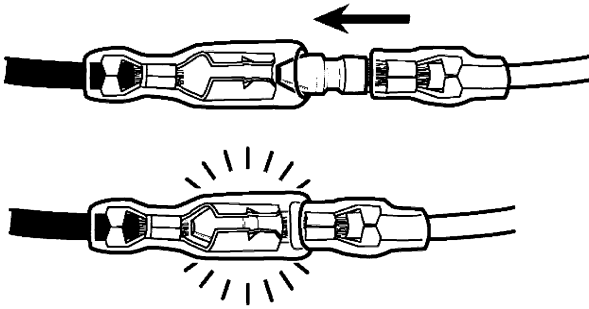
- Lead
- Coupler
- Connector

### TIP

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



## BASIC SERVICE INFORMATION



#### 4. Check:

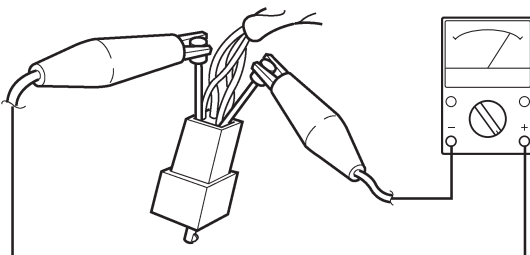
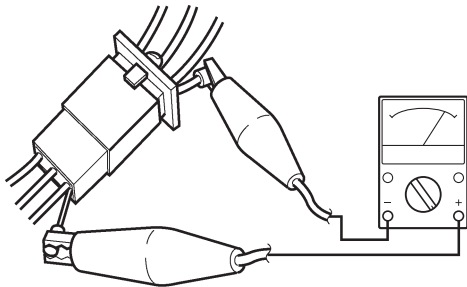
- Continuity  
(with the pocket tester)



**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.



#### 5. Check:

- Resistance



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

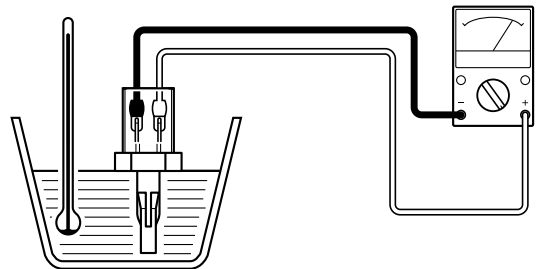
#### TIP

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



#### Intake air temperature sensor resistance

5.40–6.60 k $\Omega$  at 0 °C (32 °F)  
290–390  $\Omega$  at 80 °C (176 °F)



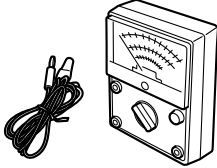
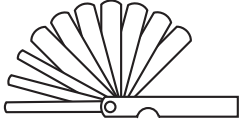

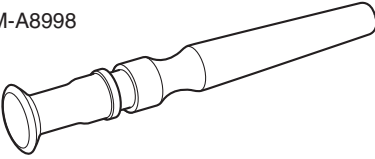
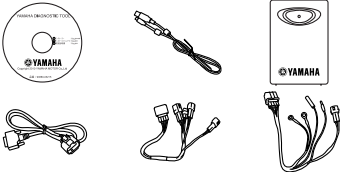
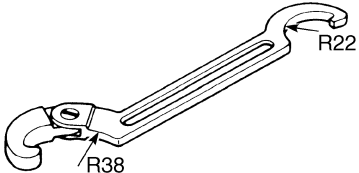
EBS20013

## SPECIAL TOOLS


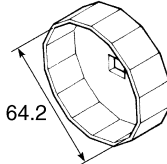
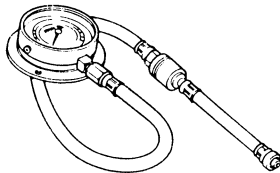
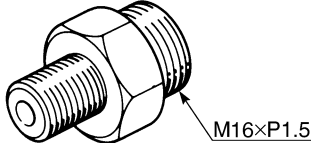
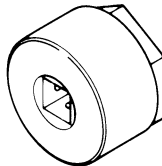
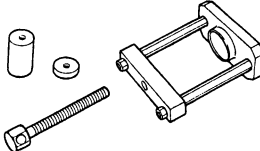
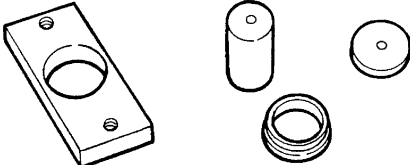
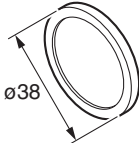
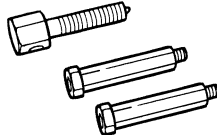
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

### TIP

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

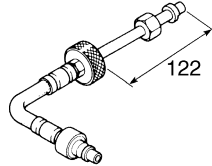
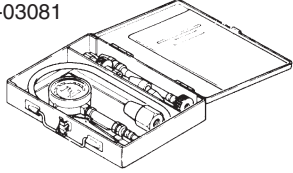
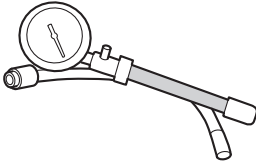
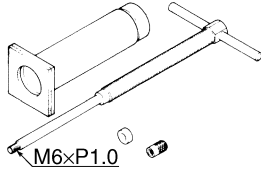
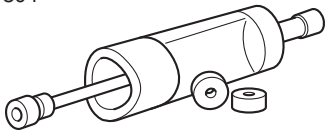
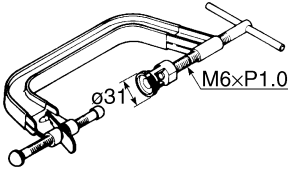
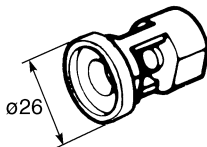
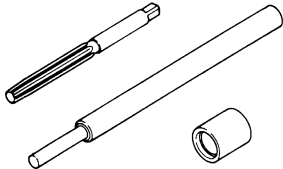
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-13, 1-13, 9-82, 9-83, 9-84, 9-84, 9-88, 9-90, 9-91, 9-91, 9-91, 9-92, 9-92, 9-93, 9-93, 9-94, 9-94, 9-95, 9-95, 9-96, 9-96, 9-96, 9-97, 9-97, 9-98, 9-98
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-5
Valve lapper 90890-04101 Valve lapping tool YM-A8998	90890-04101  YM-A8998 	3-6
Yamaha diagnostic tool 90890-03231		3-9, 9-33
Ring nut wrench 90890-01268 Spanner wrench YU-01268		3-18, 3-19

# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Belt tension gauge 90890-03170 Rear drive belt tension gauge YM-03170		3-21
Oil filter wrench 90890-01426 Oil filter wrench YU-38411		3-24
Pressure gauge 90890-03153 Pressure gauge YU-03153		3-25, 7-7
Oil pressure adapter H 90890-03139		3-25
Damper rod holder (30 mm) 90890-01327 Damper rod holder (30 mm) YM-01327		4-57, 4-57
Ball joint remover 90890-01474 Ball joint remover YM-01474		4-63, 4-68
Ball joint remover attachment set 90890-01480 Ball joint adapter set YM-01480		4-63, 4-68
Ball joint installer attachment 38mm 90890-01583 Ball joint installer attachment 38mm YM-01583		4-63
Ball joint remover short shaft set 90890-01514 Ball joint remover short shaft set YM-01514		4-63



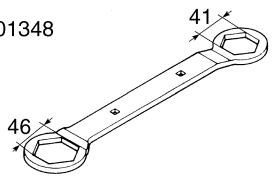
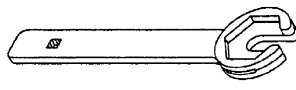
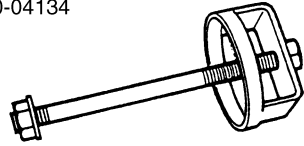
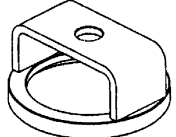
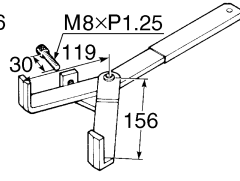
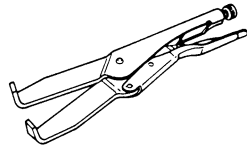
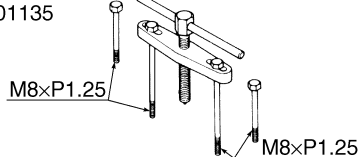
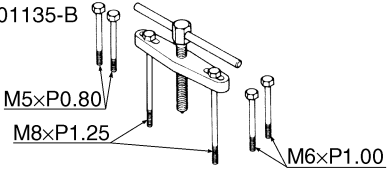
# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Extension 90890-04136		5-1
Compression gauge 90890-03081 Engine compression tester YU-33223	90890-03081  YU-33223 	5-1
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-22
Valve spring compressor 90890-04019 Valve spring compressor YM-04019		5-29, 5-33
Valve spring compressor attachment 90890-01243 Valve spring compressor adapter (26 mm) YM-01253-1		5-29, 5-33
Valve guide remover & installer set (ø5.5) 90890-04016 Valve guide remover (5.5 mm) YM-01122		5-31

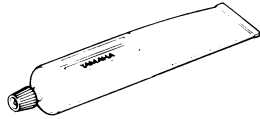
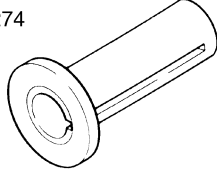
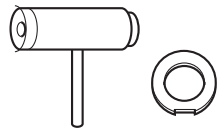
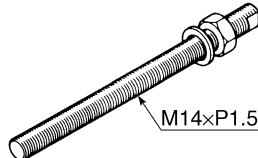
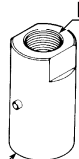
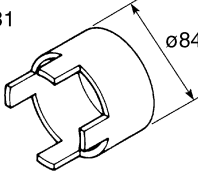

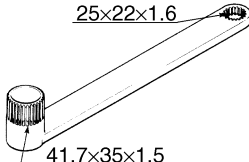
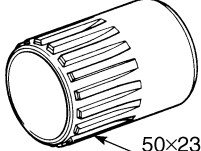
# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Valve guide remover & installer set (ø5.5) 90890-04016 Valve guide installer (5.5 mm) YM-04015	<p>The illustration shows a long, thin metal rod with a threaded end, a shorter rod with a similar threaded end, and a small cylindrical cap. Below these is a larger, hollow cylindrical component with a flange at one end.</p>	5-31
Valve guide remover & installer set (ø5.5) 90890-04016 Valve guide reamer (5.5 mm) YM-01196	<p>The illustration shows a long, thin metal rod with a threaded end, a shorter rod with a similar threaded end, and a small cylindrical cap. Below these is a larger, hollow cylindrical component with a flange at one end.</p>	5-31
Rotor holding tool 90890-04166 YM-04166	<p>The illustration shows a pair of long-handled pliers with a curved, hook-like end. A long, thin metal strip is attached to the pliers, extending from the handle area.</p>	5-37, 5-37, 5-38, 5-39, 5-45, 5-46, 5-52, 5-57
Flywheel puller (M38 X P1.5) 90890-04178 Flywheel puller (M38 X P1.5) YM-04178	<p>The illustration shows a cylindrical metal puller with a threaded end. A double-headed arrow indicates the diameter of the threaded section, labeled 'M38xP1.5'.</p>	5-37
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927	<p>The illustration shows a digital multimeter with a display screen and several buttons. Two test leads with alligator clips are connected to the multimeter.</p>	5-42, 7-8
Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135	<p>The illustration shows a square metal block with two circular holes on its top surface. Below it is a metal bracket with a vertical post and a horizontal base.</p>	5-52, 5-56

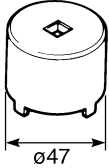
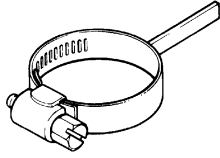
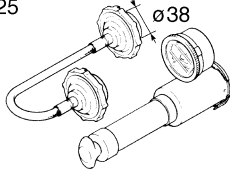
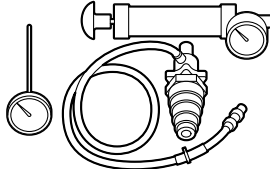
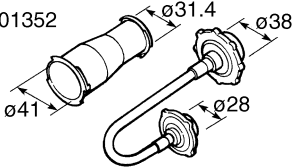
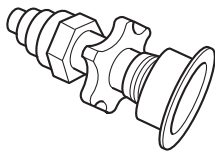
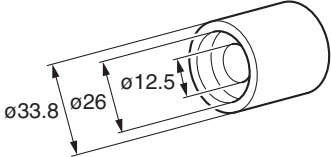
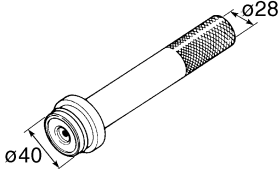
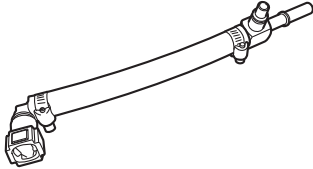
# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Locknut wrench 90890-01348 Locknut wrench YM-01348	90890-01348  YM-01348 	5-52, 5-56
Sheave spring compressor 90890-04134 Sheave spring compressor YM-04134	90890-04134  YM-04134 	5-52, 5-56
Universal clutch holder 90890-04086 Universal clutch holder YM-91042	90890-04086  YM-91042 	5-61, 5-62
Crankcase separating tool 90890-01135 Crankcase separator YU-01135-B	90890-01135  YU-01135-B 	5-67, 5-72

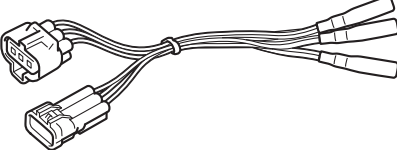
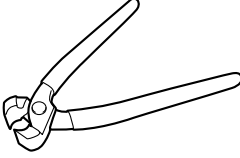
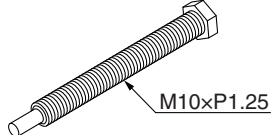
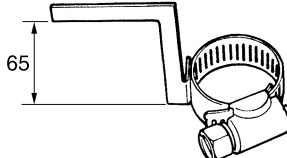
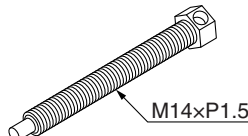
# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Yamaha bond No. 1215 90890-85505 (Three bond No.1215®)		5-68
Crankshaft installer pot 90890-01274 Installing pot YU-90058	<p>90890-01274</p>  <p>YU-90058/YU-90059</p> 	5-74
Crankshaft installer bolt 90890-01275 Bolt YU-90060	 <p>M14×P1.5</p>	5-74
Adapter (M16) 90890-04130 Adapter #13 YM-04059	 <p>M14×P1.5</p> <p>M16×P1.5</p>	5-74
Spacer (crankshaft installer) 90890-04081 Pot spacer YM-91044	<p>90890-04081</p>  <p>ø84</p> <p>YM-91044</p> 	5-74
Coupling gear/middle shaft tool 90890-01229 Gear holder YM-01229	 <p>25×22×1.6</p> <p>41.7×35×1.5</p>	5-84, 5-84, 5-87, 5-87
Bearing retainer wrench 90890-04128 Middle gear bearing retainer YM-04128	 <p>50×23×2.0</p>	5-85, 5-86

# SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Ring nut wrench 90890-01430 Ring nut wrench YM-38404		5-85, 5-86
Final gear backlash band 90890-01511 Middle drive gear lash tool YM-01230		5-88, 8-29
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	90890-01325  YU-24460-A 	6-6
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	90890-01352  YU-33984 	6-6
Mechanical seal installer 90890-01581 Mechanical seal installer YM-01581		6-12
Middle driven shaft bearing driver 90890-04058 Middle drive bearing installer 40 & 50 mm YM-04058		6-12
Fuel pressure adapter 90890-03176 Fuel pressure adapter YM-03176		7-7

## SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Test harness– TPS (3P) 90890-03204 Test harness– TPS (3P) YU-03204		7-8
Boots band installation tool 90890-01526 Boots band installation tool YM-01526		8-9, 8-11, 8-21, 8-21, 8-23
Ring gear fix bolt (M10) 90890-01527 Ring gear fix bolt (M10) YM-01527		8-13
Gear lash measurement tool 90890-01475 Middle drive gear lash tool YM-01475		8-13
Ring gear fix bolt (M14) 90890-01524 Ring gear fix bolt (M14) YM-01524		8-29

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## SPECIFICATIONS

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# GENERAL SPECIFICATIONS

EBS20014

## GENERAL SPECIFICATIONS

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### Model

Model	2UD2 (YF70GPG) (for CDN) 2UD3 (YFM70GPXG) (for Europe) 2UD4 (YFM70GPXG) (for Oceania) 2UD5 (YFM700FWAD) (for Russia) 2UD7 (YF70GPG) (for CDN) 2UD8 (YFM70GPHG) (for Europe) 2UD9 (YFM70GPHG) (for Oceania) 2UDA (YFM700FWAD) (for Russia) B302 (YF70GG) (for CDN) B303 (YFM70GDXG) (for Europe) B305 (YFM70GDHG) (for Europe) B312 (YF70GPSG) (for CDN) B313 (YFM70GPSG) (for Europe) B314 (YFM70GPSG) (for Oceania) B316 (YF70GPLG) (for CDN) B317 (YFM70GPLG) (for Europe) B318 (YFM70GPLG) (for Russia)
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### Dimensions

Overall length	2070 mm (81.5 in)
Overall width	1230 mm (48.4 in)
Overall height	1253 mm (49.3 in)
Seat height	918 mm (36.1 in)
Wheelbase	1250 mm (49.2 in)
Ground clearance	288 mm (11.3 in)
Minimum turning radius	3500 mm (138 in)
Maximum water depth	35 cm (14 in)

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### Weight

Curb weight	308.0 kg (679 lb) (YF70GG, YFM70GDHG, YFM70GDXG) 314.0 kg (692 lb) (YF70GPG, YFM700FWAD, YFM70GPHG, YFM70GPXG) 320.0 kg (705 lb) (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG)
Maximum loading limit	240.0 kg (530 lb) (Total weight of rider, cargo, accessories, and tongue)

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### Loading

Front carrier load limit	50.0 kg (110 lb)
Rear carrier load limit	90.0 kg (198 lb)
Storage compartment load limit	4.0 kg (9 lb)
Front storage compartment load limit	0.5 kg (1 lb)
Rear storage compartment load limit	2.0 kg (4 lb)
Trailer hitch pulling load limit	5880 N (600 kgf, 1322 lbf)
Trailer hitch vertical load limit	147 N (15 kgf, 33 lbf)



# ENGINE SPECIFICATIONS

EBS20015

## ENGINE SPECIFICATIONS

### Engine

Engine type	Liquid cooled 4-stroke, DOHC
Cylinder arrangement	Single cylinder
Displacement	708 cm <sup>3</sup>
Bore × stroke	103.0 × 85.0 mm (4.06 × 3.35 in)
Compression ratio	10.1 : 1
Standard compression pressure (at sea level)	650–1000 kPa (6.5–10.0 kgf/cm <sup>2</sup> , 92.4–142.2 psi)
Starting system	Electric starter

### Fuel

Recommended fuel	Regular unleaded gasoline only (for CDN and Oceania) Regular unleaded gasoline only with a research octane number of 95 or higher (for Europe) Unleaded gasoline only. Minimum research octane number 91 (for Russia)
Fuel tank capacity	18.0 L (4.75 US gal, 3.96 Imp.gal)
Fuel reserve amount	4.0 L (1.06 US gal, 0.88 Imp.gal)

### Engine oil

Lubrication system	Wet sump
Recommended brand	YAMALUBE
Type	SAE 0W-30, 10W-30, 10W-40, 15W-40, 20W-40 or 20W-50
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Without oil filter cartridge replacement	2.00 L (2.11 US qt, 1.76 Imp.qt)
With oil filter cartridge replacement	2.10 L (2.22 US qt, 1.85 Imp.qt)
Quantity (disassembled)	2.60 L (2.75 US qt, 2.29 Imp.qt)

### Differential gear oil

Type	Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil
Quantity	0.22 L (0.23 US qt, 0.19 Imp.qt)
Quantity (disassembled)	0.23 L (0.24 US qt, 0.20 Imp.qt)

### Final gear oil

Type	Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil
Quantity	0.20 L (0.21 US qt, 0.18 Imp.qt)
Quantity (disassembled)	0.25 L (0.26 US qt, 0.22 Imp.qt)

### Oil filter

Oil filter type	Cartridge
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# ENGINE SPECIFICATIONS

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## Oil pump

Inner-rotor-to-outer-rotor-tip clearance limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance limit	0.240 mm (0.0094 in)
Oil pressure (hot)	50.0 kPa/1600 r/min (0.50 kgf/cm <sup>2</sup> /1600 r/min, 7.3 psi/1600 r/min)

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## Cooling system

Coolant quantity	
Radiator (including all routes)	1.76 L (1.86 US qt, 1.55 Imp.qt)
Coolant reservoir (up to the maximum level mark)	0.25 L (0.26 US qt, 0.22 Imp.qt)
Radiator core	
Width	340.0 mm (13.39 in)
Height	258.0 mm (10.16 in)
Depth	24.0 mm (0.94 in)
Radiator cap opening pressure	107.9–137.3 kPa (1.1–1.4 kgf/cm <sup>2</sup> , 15.6–19.9 psi)
Thermostat	
Valve opening temperature	69–73 °C (156–163 °F)
Valve full open temperature	84 °C (183 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Water pump	
Water pump type	Single suction centrifugal pump
Impeller shaft tilt limit	0.15 mm (0.006 in)

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## Spark plug (s)

Manufacturer/model	NGK/CPR7EA-9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)

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## Cylinder head

Warpage limit	0.03 mm (0.0012 in)
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## Camshaft

Drive system	Chain drive (left)
Camshaft journal diameter	21.946–21.963 mm (0.8640–0.8647 in)
Camshaft lobe dimensions	
Lobe height (Intake) limit	33.800 mm (1.3307 in)
Base circle diameter (Intake) limit	24.850 mm (0.9783 in)
Lobe height (Exhaust) limit	30.750 mm (1.2106 in)
Base circle diameter (Exhaust) limit	22.350 mm (0.8799 in)
Camshaft-journal-to-camshaft-cap clearance	0.037–0.075 mm (0.0015–0.0030 in)

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## Valve, valve seat, valve guide

Valve clearance (cold)	
Intake	0.10–0.20 mm (0.0039–0.0079 in)
Exhaust	0.22–0.32 mm (0.0087–0.0126 in)
Valve dimensions	
Valve head diameter (intake)	38.90–39.10 mm (1.5315–1.5394 in)
Valve head diameter (exhaust)	31.90–32.10 mm (1.2559–1.2638 in)
Valve seat contact width (intake)	1.34–1.48 mm (0.0528–0.0583 in)
Valve seat contact width (intake) limit	1.9 mm (0.07 in)
Valve seat contact width (exhaust)	1.34–1.48 mm (0.0528–0.0583 in)

# ENGINE SPECIFICATIONS

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Valve seat contact width (exhaust) limit	1.9 mm (0.07 in)
Valve stem diameter (intake) limit	5.420 mm (0.2134 in)
Valve stem diameter (exhaust) limit	5.415 mm (0.2132 in)
Valve guide inside diameter (intake) limit	5.550 mm (0.2185 in)
Valve guide inside diameter (exhaust) limit	5.550 mm (0.2185 in)
Valve-stem-to-valve-guide clearance (intake) limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust) limit	0.100 mm (0.0039 in)
Valve stem runout	0.040 mm (0.0016 in)

---

## Valve spring

Spring tilt (intake)	1.7 mm (0.07 in)
Spring tilt (exhaust)	1.7 mm (0.07 in)
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise

---

## Cylinder

Bore	103.000–103.020 mm (4.0551–4.0559 in)
Wear limit	103.080 mm (4.0583 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

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## Piston

Piston-to-cylinder clearance	0.040–0.075 mm (0.0016–0.0030 in)
Diameter	102.960–102.975 mm (4.0535–4.0541 in)
Measuring point (from piston skirt bottom)	11.0 mm (0.43 in)
Piston pin bore inside diameter limit	23.035 mm (0.9069 in)
Piston pin outside diameter limit	22.974 mm (0.9045 in)

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## Piston ring

Top ring	
Ring type	Barrel
End gap (installed) limit	0.50 mm (0.0197 in)
Ring side clearance limit	0.12 mm (0.0047 in)
2nd ring	
Ring type	Taper
End gap (installed) limit	0.70 mm (0.0276 in)
Ring side clearance limit	0.12 mm (0.0047 in)
Oil ring	
End gap (installed) limit	1.0 mm (0.04 in)

---

## Crankshaft

Crank assembly width	65.68–65.76 mm (2.586–2.589 in)
Runout limit	0.030 mm (0.0012 in)
Big end side clearance	0.090–0.500 mm (0.0035–0.0197 in)

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## Clutch

Clutch type	Wet, centrifugal automatic
Clutch shoe thickness limit	1.0 mm (0.04 in)
Clutch housing inside diameter	150.0 mm (5.91 in)
Clutch-in revolution	2000–2100 r/min
Clutch-stall revolution	3800–3900 r/min

# ENGINE SPECIFICATIONS

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## V-belt

V-belt width limit	31.3 mm (1.23 in)
Transmission type	V-belt automatic
Operation	Left hand operation
Low range	31/16 (1.938)
High range	27/25 (1.080)
Reverse gear	23/14 × 28/23 (2.000)
Gear ratio	2.380–0.700 : 1
Drive axle runout limit	0.06 mm (0.0024 in)
Secondary reduction ratio	43/21 × 24/18 × 33/9 (10.011)
Secondary reduction system	Shaft drive

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## Shaft drive

Middle gear backlash	0.10–0.30 mm (0.004–0.012 in)
Final gear backlash	0.10–0.20 mm (0.004–0.008 in)
Differential gear backlash	0.05–0.25 mm (0.002–0.010 in)

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## Shifting mechanism

Shift fork thickness	5.76–5.89 mm (0.2268–0.2319 in)
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## Decompression device

Device type	Auto decomp
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## Air filter

Air filter element	Wet element
Air filter oil grade	Foam air-filter oil

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## Fuel pump

Pump type	Electrical
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## Throttle body

Type/quantity	44EIS/1
ID mark	B161 00
Throttle valve size	#100

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## Fuel injector

Model/quantity	E270103/1
Resistance	12.0 Ω

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## Throttle position sensor

Resistance	2.64–6.16 kΩ
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## Idling condition

Engine idling speed	1550–1650 r/min
CO (%)	2.8 %
Intake vacuum	26.7 kPa (200 mmHg, 7.9 inHg)
Water temperature	85 °C (185 °F)
Oil temperature	55–65 °C (131–149 °F)
Throttle lever free play	3.0–5.0 mm (0.12–0.20 in)
Speed limiter length	12 mm (0.5 in)

# ENGINE SPECIFICATIONS

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## **Air induction system**

Solenoid resistance

18–22  $\Omega$

# CHASSIS SPECIFICATIONS

EBS20016

## CHASSIS SPECIFICATIONS

### Chassis

Frame type	Steel tube frame
Caster angle	4.53°
Camber angle	0.3°
Kingpin angle	11.3°
Kingpin offset	0.0 mm (0.00 in)
Trail	26.0 mm (1.02 in)
Toe-in (with tires touching the ground)	0.0–10.0 mm (0.00–0.39 in)
Tread rear (STD)	975.0 mm (38.39 in)
Tread front (STD)	1000.0 mm (39.37 in)

### Front wheel

Wheel type	Cast wheel (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG) Panel wheel (YF70GG, YF70GPG, YFM700FWAD, YFM70GDHG, YFM70GDYG, YFM70GPHG, YFM70GPXG)
Rim size	12 × 6.0AT
Wheel material	Steel
Radial wheel runout limit	1.2 mm (0.05 in)
Lateral wheel runout limit	1.2 mm (0.05 in)

### Rear wheel

Wheel type	Cast wheel (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG) Panel wheel (YF70GG, YF70GPG, YFM700FWAD, YFM70GDHG, YFM70GDYG, YFM70GPHG, YFM70GPXG)
Rim size	12 × 7.5AT
Wheel material	Steel
Radial wheel runout limit	1.2 mm (0.05 in)
Lateral wheel runout limit	1.2 mm (0.05 in)

### Front tire

Type	Tubeless
Size	AT26 × 8–12
Manufacturer/model	MAXXIS/MU05Y
Wear limit (front)	3.0 mm (0.12 in)

### Rear tire

Type	Tubeless
Size	AT26 × 10–12
Manufacturer/model	MAXXIS/MU06Y
Wear limit (rear)	3.0 mm (0.12 in)

### Tire air pressure (measured on cold tires)

Recommended	
Vehicle load	0 - maximum
Front	35.0 kPa (0.350 kgf/cm <sup>2</sup> , 5.0 psi)
Rear	30.0 kPa (0.300 kgf/cm <sup>2</sup> , 4.4 psi)

# CHASSIS SPECIFICATIONS

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Minimum	
Vehicle load	0 - maximum
Front	32.0 kPa (0.320 kgf/cm <sup>2</sup> , 4.6 psi)
Rear	27.0 kPa (0.270 kgf/cm <sup>2</sup> , 4.0 psi)

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## Front brake

Type	Hydraulic disc brake
Operation	Right hand operation
Disc outside diameter × thickness	220.0 × 3.5 mm (8.66 × 0.14 in)
Brake disc thickness limit	3.0 mm (0.12 in)
Brake disc deflection limit	0.10 mm (0.0039 in)
Brake pad lining thickness limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	33.96 mm (1.34 in)
Specified brake fluid	DOT 4

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## Rear brake

Type	Hydraulic disc brake
Operation	Left hand and right foot operation
Disc outside diameter × thickness	205.0 × 3.5 mm (8.07 × 0.14 in)
Brake disc thickness limit	3.0 mm (0.12 in)
Brake disc deflection limit	0.10 mm (0.0039 in)
Brake pad lining thickness limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	33.96 mm (1.34 in)
Specified brake fluid	DOT 4
Brake pedal free play	1.0–6.0 mm (0.04–0.24 in)

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## Front suspension

Type	Double wishbone
Spring/shock absorber type	Coil spring/gas-oil damper
Shock absorber travel	111.7 mm (4.40 in)
Installed length	259.8 mm (10.23 in)
Wheel travel	193 mm (7.6 in)

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## Rear suspension

Type	Double wishbone
Spring/shock absorber type	Coil spring/gas-oil damper
Wheel travel	232 mm (9.1 in)
Rear shock absorber assembly travel	120.3 mm (4.74 in)
Installed length	284.6 mm (11.20 in)
Front and rear suspension spring preload adjusting positions	
Minimum	1
Standard	2
Maximum	5

# ELECTRICAL SPECIFICATIONS

EBS20017

## ELECTRICAL SPECIFICATIONS

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### Voltage

System voltage 12 V

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### Engine control unit

Model/manufacturer F8T85873/MITSUBISHI (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG)  
F8T85875/MITSUBISHI (YF70GPG, YFM700FWAD, YFM70GPHG, YFM70GPXG)  
F8T85876/MITSUBISHI (YF70GG, YFM70GDHG, YFM70GDXG)

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### Ignition system

Ignition system TCI  
Advancer type Digital  
Ignition timing (B.T.D.C.) 7.0°/1600 r/min  
Pickup coil resistance 152.0–228.0 Ω

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### Ignition coil

Primary coil resistance 2.16–2.64 Ω  
Secondary coil resistance 8.64–12.96 kΩ

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### Spark plug cap

Resistance 10.0 kΩ

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### Charging system

Charging system AC magneto  
Standard output 14.0 V, 35.0 A at 5000 r/min  
Stator coil resistance 0.15–0.22 Ω

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### Rectifier/regulator

Regulator type Semi conductor-short circuit  
Regulated voltage (DC) 14.3–14.7 V  
Rectifier capacity (DC) 50.0 A

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### Battery

Model YTX20L-BS  
Voltage, capacity 12 V, 18.0 Ah

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### Handle mounted light

Handle mounted light bulb type Halogen bulb

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### Bulb voltage, wattage × quantity

Headlight LED  
Handle mounted light 12 V, 35.0/36.5 W × 1  
Tail/brake light LED  
Meter lighting EL (Electroluminescent)

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### Indicator light

Neutral indicator light LED  
Reverse indicator light LED

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## ELECTRICAL SPECIFICATIONS

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Coolant temperature warning light	LED
Park indicator light	LED
Engine trouble warning light	LED
High-range indicator light	LED
Low-range indicator light	LED
Differential gear lock indicator light	LED
EPS warning light	LED (YF70GPG, YF70GPLG, YF70GPSG, YFM700FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)

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<b>Starter motor</b>	
Power output	0.80 kW
Armature coil resistance	0.005–0.015 $\Omega$
Brush overall length limit	6.50 mm (0.26 in)
Mica undercut (depth)	0.70 mm (0.03 in)

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<b>Starter relay</b>	
Amperage	180.0 A
Coil resistance	4.18–4.62 $\Omega$

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<b>Horn (except for CDN)</b>	
Horn type	Plane (YFM700FWAD, YFM70GDHG, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)
Quantity	1 pcs (YFM700FWAD, YFM70GDHG, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)
Maximum amperage	1.0 A (YFM700FWAD, YFM70GDHG, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)

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<b>Fuel sender unit</b>	
Sender unit resistance (full)	19.00–21.00 $\Omega$
Sender unit resistance (empty)	138.50–141.50 $\Omega$

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<b>EPS torque sensor</b>	
Coil resistance	1.00–1.50 k $\Omega$ (YF70GPG, YF70GPLG, YF70GPSG, YFM700FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)

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<b>Auxiliary DC output</b>	
Jack capacity	12 V, 10.0 A (120 W)

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<b>Fuel injection sensor</b>	
Crankshaft position sensor resistance	152–228 $\Omega$
Intake air pressure sensor output voltage	3.75–4.25 V
Intake air temperature sensor resistance	5.40–6.60 k $\Omega$ at 0 °C (32 °F) 290–390 $\Omega$ at 80 °C (176 °F)
Coolant temperature sensor resistance	2.32–2.59 k $\Omega$ at 20 °C (68 °F) 310–326 $\Omega$ at 80 °C (176 °F)

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<b>Fuses</b>	
Main fuse	40.0 A

## ELECTRICAL SPECIFICATIONS

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Headlight fuse	10.0 A
Signaling system fuse	10.0 A
Ignition fuse	10.0 A
Radiator fan motor fuse	20.0 A
Auxiliary DC jack fuse	10.0 A
Fuel injection system fuse	15.0 A
Four-wheel-drive motor fuse	10.0 A
EPS fuse	40.0 A (YF70GPG, YF70GPLG, YF70GPSG, YFM700FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)
Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	10.0 A

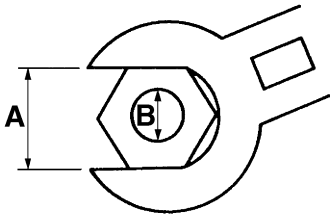
EBS20018

## TIGHTENING TORQUES

EBS30018

### GENERAL TIGHTENING TORQUE SPECIFICATIONS

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








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

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








# TIGHTENING TORQUES

EBS30019








## ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
V-belt cooling exhaust duct joint clamp screw	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
V-belt cooling intake duct joint clamp screw	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Exhaust pipe nut	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Muffler bolt	M8	1	33 Nm (3.3 m·kgf, 24 ft·lbf)	
Muffler bracket bolt	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Exhaust pipe protector bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Spark arrester bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder head cover bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Breather plate cover bolt	M6	4	See TIP.	
Camshaft cap bolt	M6	8	See TIP.	
Cylinder head bolt	M11	4	See TIP.	
Cylinder head bolt	M6	2	See TIP.	
Cylinder bolt	M6	2	See TIP.	
Cylinder head stud bolt (exhaust pipe)	M8	2	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner cap bolt	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Timing chain stopper guide bolt (lower)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain guide bolt (intake side)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Air cut-off valve bracket bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Reed valve cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
AC magneto cover bolt	M6	11	See TIP.	
Crankshaft end accessing screw	M32	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Timing mark accessing screw	M14	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
AC magneto/crankshaft position sensor lead holder bolt	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
AC magneto rotor nut	M14	1	160 Nm (16 m·kgf, 116 ft·lbf)	
Starter clutch bolt	M6	8	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Thermostat cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Thermostat cover air bleed bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump housing bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant drain bolt	M6	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Water pump air bleed bolt	M6	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Impeller	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	Left-hand thread
Water jacket joint bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump outlet pipe bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil filter cartridge	—	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Oil filter cartridge union bolt	M20	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Oil hose union bolt (crankcase to cylinder)	M12	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Oil pipe bolt (crankcase)	M14	2	35 Nm (3.5 m·kgf, 25 ft·lbf)	
Oil pipe bolt (AC magneto cover)	M8	2	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Oil pump drive sprocket nut	M12	1	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Oil pump driven sprocket nut	M12	1	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Oil pump bolt	M6	3	See TIP.	
Oil pump housing cover screw	M5	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Shift lever cover bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Shift lever 2 bolt	M6	1	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Fuel rail screw	M6	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Throttle cable locknut (throttle body side)	M6	1	0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)	
Throttle cable housing cover screw	M4	3	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Drive belt cover bolt	M6	12	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Drive belt case bolt	M6	8	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Bearing housing bolt (primary sheave assembly)	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Bearing retainer bolt (bearing housing)	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Primary sheave assembly nut	M16	1	140 Nm (14 m·kgf, 100 ft·lbf)	
Primary sheave cap screw	M4	8	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Secondary sheave assembly nut	M16	1	100 Nm (10 m·kgf, 72 ft·lbf)	
Secondary sheave spring retaining nut	M36	1	90 Nm (9.0 m·kgf, 65 ft·lbf)	
Clutch housing assembly bolt	M6	9	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Clutch carrier assembly nut	M22	1	190 Nm (19 m·kgf, 137 ft·lbf)	Left-hand thread Stake. 
Crankcase bolt (M8)	M8	3	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Crankcase bolt (M6)	M6	14	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Main gallery bolt	M16	1	35 Nm (3.5 m·kgf, 25 ft·lbf)	
Stopper lever stopper bolt	M14	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Relief plug	M14	1	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Engine oil drain bolt	M14	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Shift drum stopper bolt	M14	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Dipstick guide bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Bearing retainer bolt (crankcase)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Middle drive pinion gear nut	M22	1	190 Nm (19 m·kgf, 137 ft·lbf)	Stake.
Middle drive shaft bearing housing bolt	M10	4	38 Nm (3.8 m·kgf, 27 ft·lbf)	

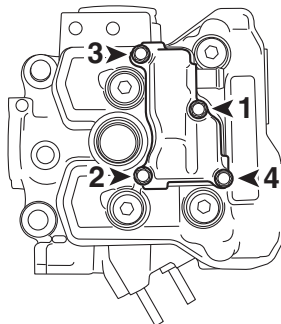
# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Middle drive shaft bearing retainer bolt	M8	4	29 Nm (2.9 m·kgf, 21 ft·lbf)	Stake. 
Rear drive shaft coupling gear nut (middle gear side)	M16	1	150 Nm (15 m·kgf, 108 ft·lbf)	
Middle driven shaft bearing retainer	M55	1	80 Nm (8.0 m·kgf, 58 ft·lbf)	Left-hand thread 
Middle driven pinion gear bearing housing bolt	M8	4	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Middle driven pinion gear bearing retainer	M60	1	130 Nm (13 m·kgf, 94 ft·lbf)	Left-hand thread 
Front drive shaft coupling gear nut (middle gear side)	M16	1	115 Nm (11.5 m·kgf, 83 ft·lbf)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor cover bolt	M5	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Starter motor lead nut	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Starter motor lead terminal nut	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Spark plug (new)	M10	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Stator coil assembly bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Throttle position sensor screw	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Intake air pressure sensor screw	M5	1	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Crankshaft position sensor bolt	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Coolant temperature sensor	M12	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Gear position switch bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Reverse switch	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Speed sensor bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	

## TIP

### Breather plate cover bolt

Tighten the breather plate cover bolts to 10 Nm (1.0 m·kgf, 7.2 f·lbf) in the proper tightening sequence.



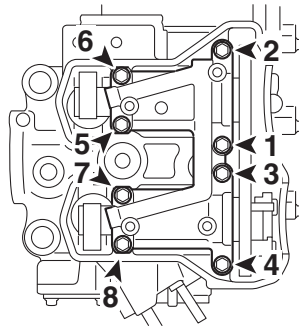
## TIP

### Camshaft cap bolt

Tighten the camshaft cap bolts to 10 Nm (1.0 m·kgf, 7.2 f·lbf) in the proper tightening sequence.

## TIGHTENING TORQUES

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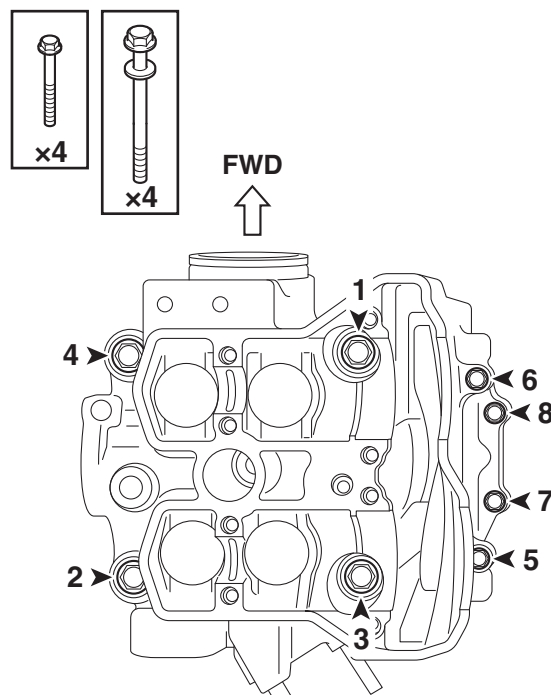


### TIP

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#### Cylinder head bolt and cylinder bolt

1. Temporarily tighten the cylinder head bolts (M6) and cylinder bolts (M6).
  2. Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
  3. Tighten the cylinder head bolts (M11) to 70 Nm (7.0 m·kgf, 51 ft·lbf) in the proper tightening sequence.
  4. Loosen the cylinder head bolts (M11) 360°.
  5. Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
  6. Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence.
  7. Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence again.
  8. Tighten the cylinder head bolts (M6) and cylinder bolts (M6) to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.
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### TIP

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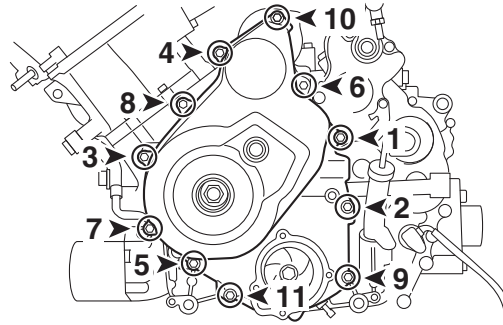
#### AC magneto cover bolt

Tighten the AC magneto cover bolts to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.

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# TIGHTENING TORQUES

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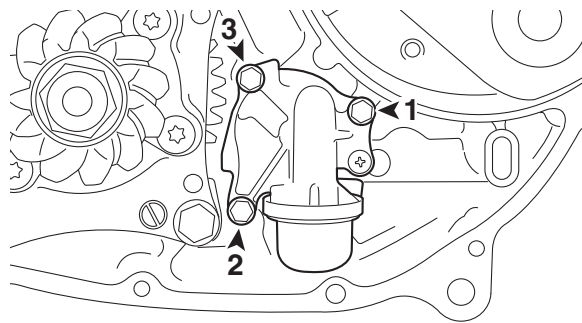
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## TIP

### Oil pump bolt

Tighten the oil pump bolts to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.

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# TIGHTENING TORQUES

EBS30020






## CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting bolt (front) (M6)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Engine mounting bolt (front) (M10)	M10	2	42 Nm (4.2 m·kgf, 30 ft·lbf)	
Engine mounting bolt (rear) (M6)	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Engine mounting bolt (rear) (M10)	M10	2	42 Nm (4.2 m·kgf, 30 ft·lbf)	
Rubber damper nut (front side)	M10	2	42 Nm (4.2 m·kgf, 30 ft·lbf)	
Rubber damper nut (rear side)	M10	2	42 Nm (4.2 m·kgf, 30 ft·lbf)	
Trailer hitch bolt (for panel wheel models)	M10	2	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Trailer hitch bolt (for cast wheel models)	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Drive select lever unit bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Drive select lever guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Shift arm bolt	M6	1	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Shift control cable nut	M14	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Drive select lever shift rod locknut (select lever unit side)	M6	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	Left-hand thread
Drive select lever shift rod locknut (shift arm side)	M6	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Brake pedal free play adjusting nut	M8	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Brake pedal height adjuster locknut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Coolant reservoir bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel pump nut	M6	6	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank breather hose joint bolt	M6	1	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Throttle body joint clamp screw (throttle body side)	M5	1	2.8 Nm (0.28 m·kgf, 2.0 ft·lbf)	
Throttle body joint clamp screw (cylinder head side)	M5	1	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Skid plate bolt	M6	8	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Footrest bracket bolt	M8	4	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Footrest board bolt	M6	8	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Footrest board bolt (left)	M6	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Footrest board nut	M6	10	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Top cover bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Top cover screw	M5	4	0.4 Nm (0.04 m·kgf, 0.29 ft·lbf)	
Side panel bolt	M6	2	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Air filter case bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Air filter case joint clamp screw (throttle body side)	M5	1	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Air filter case joint clamp screw (air filter case side)	M5	1	0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)	









## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Air intake duct clamp screw	M5	1	0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)	
Storage compartment bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front carrier bolt	M8	4	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Front carrier bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front guard bolt	M8	4	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Front carrier bracket bolt	M8	2	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Front guard cover bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front guard cover bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Front grill bolt	M6	2	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Front grill bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Front fender bolt	M6	2	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Main switch locknut	M27	1	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Headlight cover bolt	M5	4	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Headlight unit screw	M5	4	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Front fender inner panel bolt	M6	5	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Front fender inner panel nut	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Rear carrier bolt	M10	2	60 Nm (6.0 m·kgf, 43 ft·lbf)	
Rear carrier bolt	M8	2	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Rear carrier bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear carrier bracket bolt	M10	2	60 Nm (6.0 m·kgf, 43 ft·lbf)	
License plate bracket nut (for CDN)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear fender bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear fender bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Rear fender bracket bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Rear storage compartment bracket screw	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Tail/brake light unit nut	M5	2	2.8 Nm (0.28 m·kgf, 2.0 ft·lbf)	
Front wheel nut	M10	8	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Front wheel axle nut	M20	2	260 Nm (26 m·kgf, 188 ft·lbf)	Stake.
Rear wheel nut	M10	8	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Rear wheel axle nut	M20	2	260 Nm (26 m·kgf, 188 ft·lbf)	Stake.
Brake hose joint bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Brake pipe locknut	M10	4	19 Nm (1.9 m·kgf, 14 ft·lbf)	
Front brake caliper bolt	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Front brake disc bolt	M8	8	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake caliper bolt	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake disc bolt	M8	8	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Brake hose union bolt	M10	6	27 Nm (2.7 m·kgf, 20 ft·lbf)	
Brake pad holding bolt	M6	4	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Brake pad holding bolt plug	M10	4	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Brake caliper guide pin	M8	4	17 Nm (1.7 m·kgf, 12 ft·lbf)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Brake caliper retaining pin nut	M8	4	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Brake caliper bleed screw	M8	4	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Steering knuckle and front upper arm nut	M12	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Steering knuckle and front lower arm nut	M12	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Steering knuckle and tie-rod nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Front upper arm nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Front lower arm nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Front shock absorber assembly nut	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Front brake disc guard bolt	M6	6	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose holder bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front arm protector bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear knuckle nut	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Rear upper arm nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Rear lower arm nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Rear shock absorber assembly nut	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Rear brake disc guard bolt	M6	6	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose guide bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake disc cleaning plate bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear arm protector bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear arm protector nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Stabilizer joint nut	M10	4	56 Nm (5.6 m·kgf, 41 ft·lbf)	
Stabilizer holder bolt	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Handlebar cover bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Meter cover nut	M5	3	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Handle mounted light screw	M5	2	1.3 Nm (0.13 m·kgf, 0.94 ft·lbf)	
Handlebar holder bolt	M8	4	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Shift control cable adjuster locknut	M6	1	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Front brake master cylinder holder bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake master cylinder holder bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Brake fluid reservoir cap screw	M4	4	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Throttle lever assembly screw	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Throttle lever assembly cover bolt	M4	3	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Front brake light switch screw	M4	1	1.2 Nm (0.12 m·kgf, 0.87 ft·lbf)	
Rear brake light switch screw	M4	1	1.2 Nm (0.12 m·kgf, 0.87 ft·lbf)	
Handlebar switch screw (left)	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Horn switch holder screw (except for CDN)	M3	1	0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)	
Front brake lever pivot bolt	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Front brake lever pivot nut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Rear brake lever pivot bolt	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Rear brake lever pivot nut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Steering stem bolt	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Steering stem bracket bolt	M10	2	51 Nm (5.1 m·kgf, 37 ft·lbf)	
Bearing retainer (steering stem)	M42	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Steering stem support bolt (except for EPS models)	M8	4	34 Nm (3.4 m·kgf, 25 ft·lbf)	
Steering stem pinch bolt (for EPS models)	M8	1	35 Nm (3.5 m·kgf, 25 ft·lbf)	
EPS unit bolt (for EPS models)	M8	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Pitman arm nut (except for EPS models)	M16	1	190 Nm (19 m·kgf, 137 ft·lbf)	
Pitman arm nut (for EPS models)	M16	1	210 Nm (21 m·kgf, 152 ft·lbf)	
EPS motor cover bolt (for EPS models)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Pitman arm and tie-rod nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Tie-rod end locknut (pitman arm side)	M10	2	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Tie-rod end locknut (front wheel side)	M10	2	15 Nm (1.5 m·kgf, 11 ft·lbf)	Left-hand thread
Differential assembly nut	M10	1	66 Nm (6.6 m·kgf, 48 ft·lbf)	
Differential assembly bolt	M10	2	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Differential gear oil filler bolt	M14	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Differential gear oil drain bolt	M10	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Differential case cover bolt	M8	5	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Differential motor bolt	M6	3	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Front drive shaft yoke nut (differential case side)	M14	1	62 Nm (6.2 m·kgf, 45 ft·lbf)	
Final drive assembly nut	M10	2	66 Nm (6.6 m·kgf, 48 ft·lbf)	
Final gear oil filler bolt	M14	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Final gear oil drain bolt	M14	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Final gear oil level check bolt	M8	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Final drive case cover bolt	M8	11	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Final drive pinion gear bearing housing bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Electrical components tray bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Positive battery lead bolt	M6	1	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Starter motor lead bolt	M6	1	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Lean angle sensor bolt	M5	2	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
EPS control unit screw (for EPS models)	M6	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Battery holding bracket fitting screw	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Battery holding bracket nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
ECU (engine control unit) screw	M6	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Intake air temperature sensor screw	M5	1	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Ignition coil bolt	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Horn bracket bolt (except for CDN)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Frame ground bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	





































# LUBRICATION POINTS AND LUBRICANT TYPES

EBS20094

## LUBRICATION POINTS AND LUBRICANT TYPES

EBS30021

### ENGINE

Lubrication point	Lubricant/Sealant
Oil seal lips	
Bearings	
O-rings	 or 
Cylinder head bolt threads and washers	
Crankshaft seals	
Piston pin	
Cylinder inner surface, piston, piston rings and ring grooves	
Valve stems and stem ends (intake and exhaust)	
Valve stem seals (intake and exhaust)	
Valve lifter surfaces	
Camshaft lobes	
Oil pump rotors (inner and outer)	
Oil pump shaft	
Oil filter cartridge union bolt	
Dipstick mating surface	
Starter idler gear inner surface	
Starter idler gear shafts	
Starter wheel gear/Starter clutch	
Clutch housing shaft end	
Clutch carrier assembly	
One-way clutch bearing	
Reverse idle gear shaft	
Reverse idle gear	
Secondary shaft	
Middle driven pinion gear inner surface	
Middle driven shaft splines	
Shift drum	
Shift forks and shift fork guide bar	
Shift fork and transmission gear contact surface	
Stopper lever and stopper lever shaft	
Shift drum stopper ball	
Shift lever 1 and shift lever 2	
Transmission gears	
Transmission washer and bearing	
Transmission collars	

## LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant/Sealant
Crankcase mating surface	Yamaha bond No.1215 (Three Bond No.1215®)

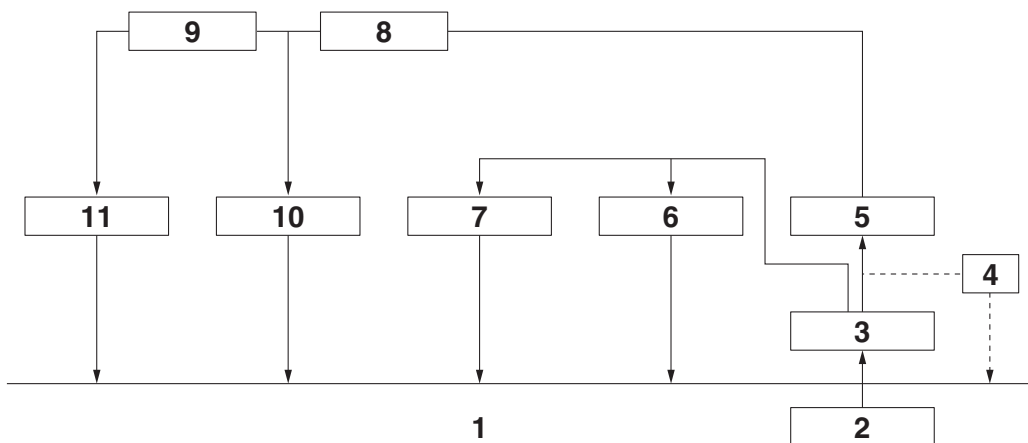
# LUBRICATION SYSTEM CHART AND DIAGRAMS

EBS20020

## LUBRICATION SYSTEM CHART AND DIAGRAMS

EBS30022

### ENGINE OIL LUBRICATION CHART





# LUBRICATION SYSTEM CHART AND DIAGRAMS

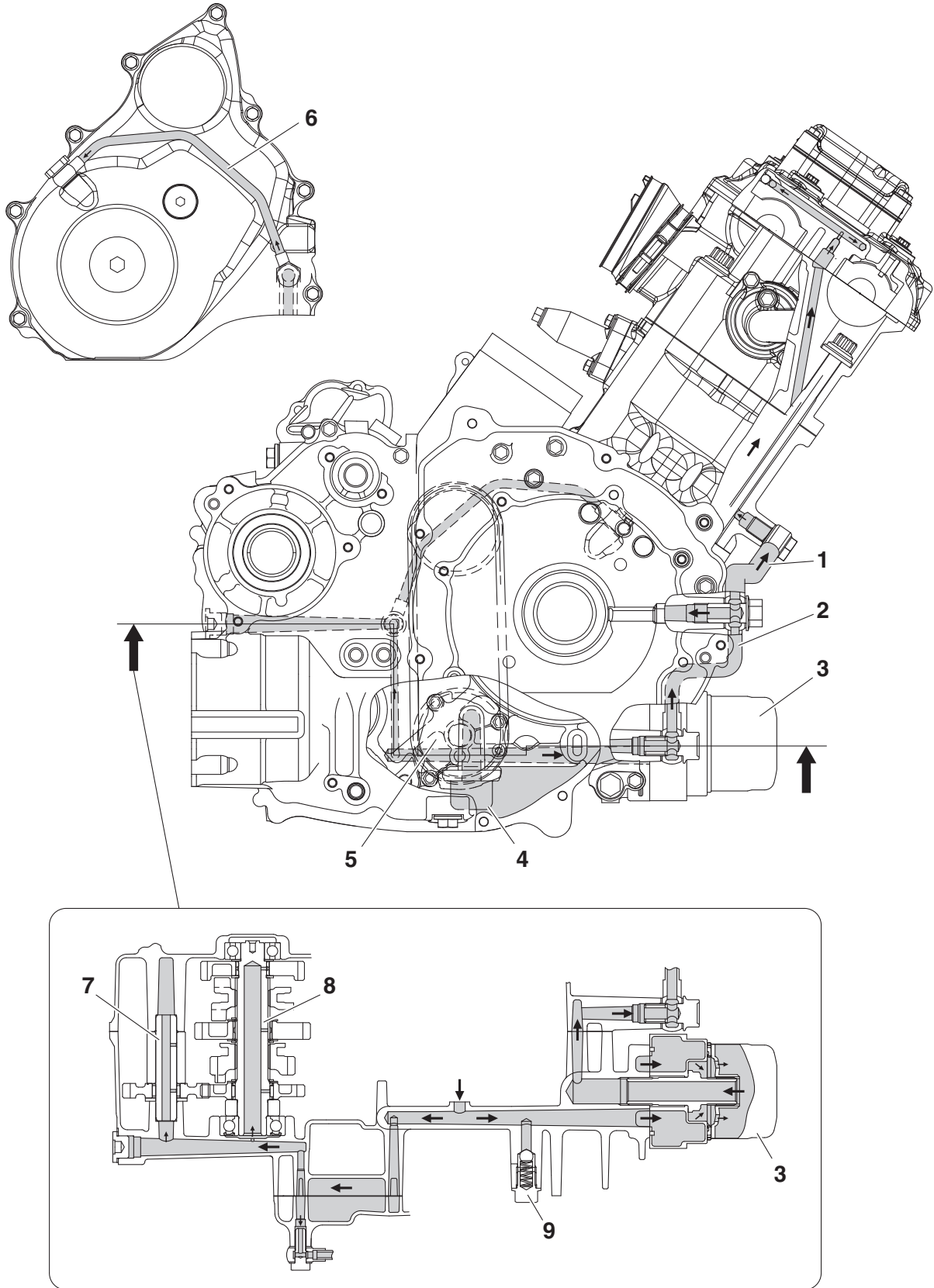
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1. Oil pan
2. Oil strainer
3. Oil pump
4. Relief valve
5. Oil filter cartridge
6. Drive axle
7. Reverse idle gear shaft
8. Oil pipe (crankcase)
9. Oil hose (crankcase to cylinder)
10. Crankshaft
11. Cylinder head

# LUBRICATION SYSTEM CHART AND DIAGRAMS

EBS30023

## LUBRICATION DIAGRAMS



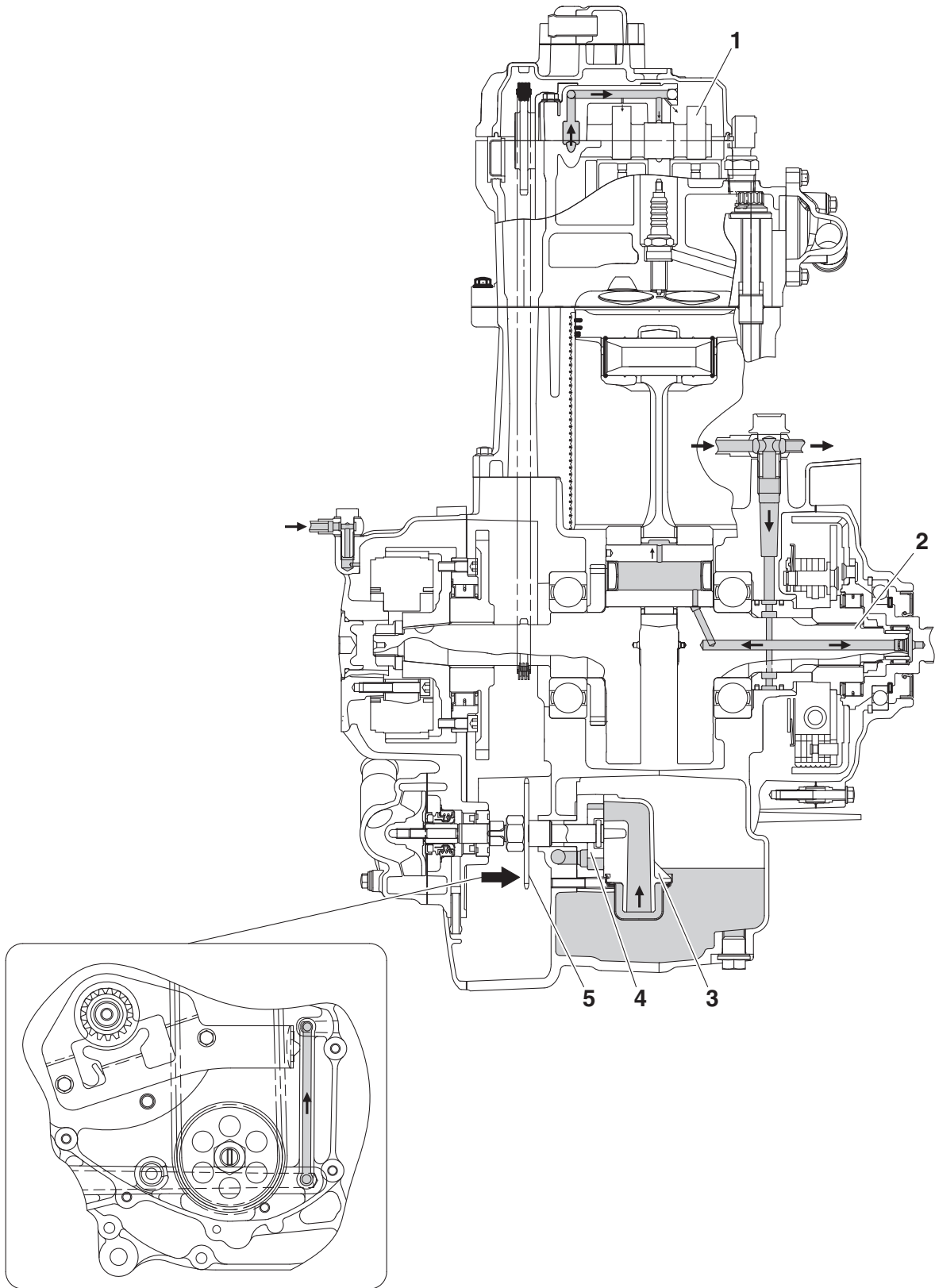
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Oil hose (crankcase to cylinder)
2. Oil pipe (crankcase)
3. Oil filter cartridge
4. Oil strainer
5. Oil pump
6. Oil pipe (AC magneto cover)
7. Reverse idle gear shaft
8. Drive axle
9. Relief valve

# LUBRICATION SYSTEM CHART AND DIAGRAMS

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# LUBRICATION SYSTEM CHART AND DIAGRAMS

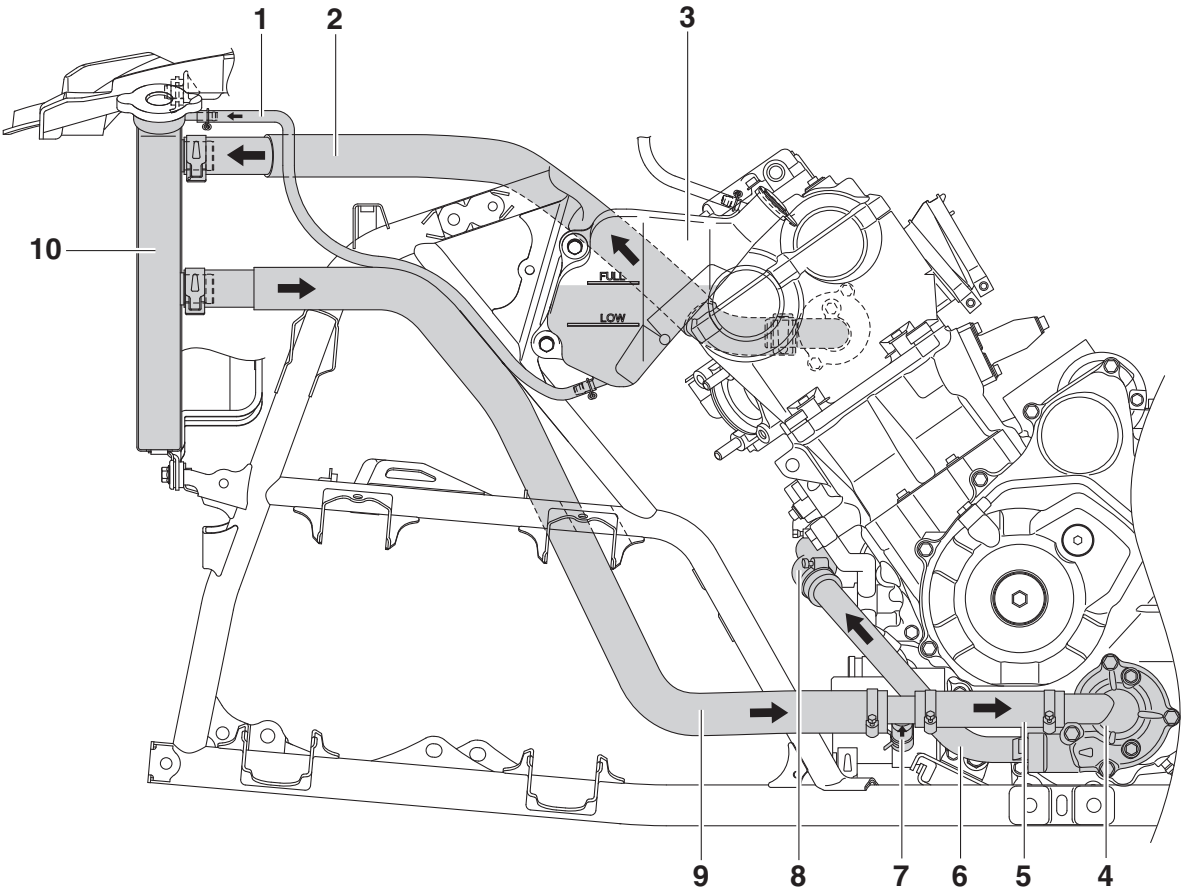
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1. Camshaft
2. Crankshaft
3. Oil strainer
4. Oil pump
5. Oil pump driven sprocket

# COOLING SYSTEM DIAGRAMS

EBS20021

## COOLING SYSTEM DIAGRAMS



# COOLING SYSTEM DIAGRAMS

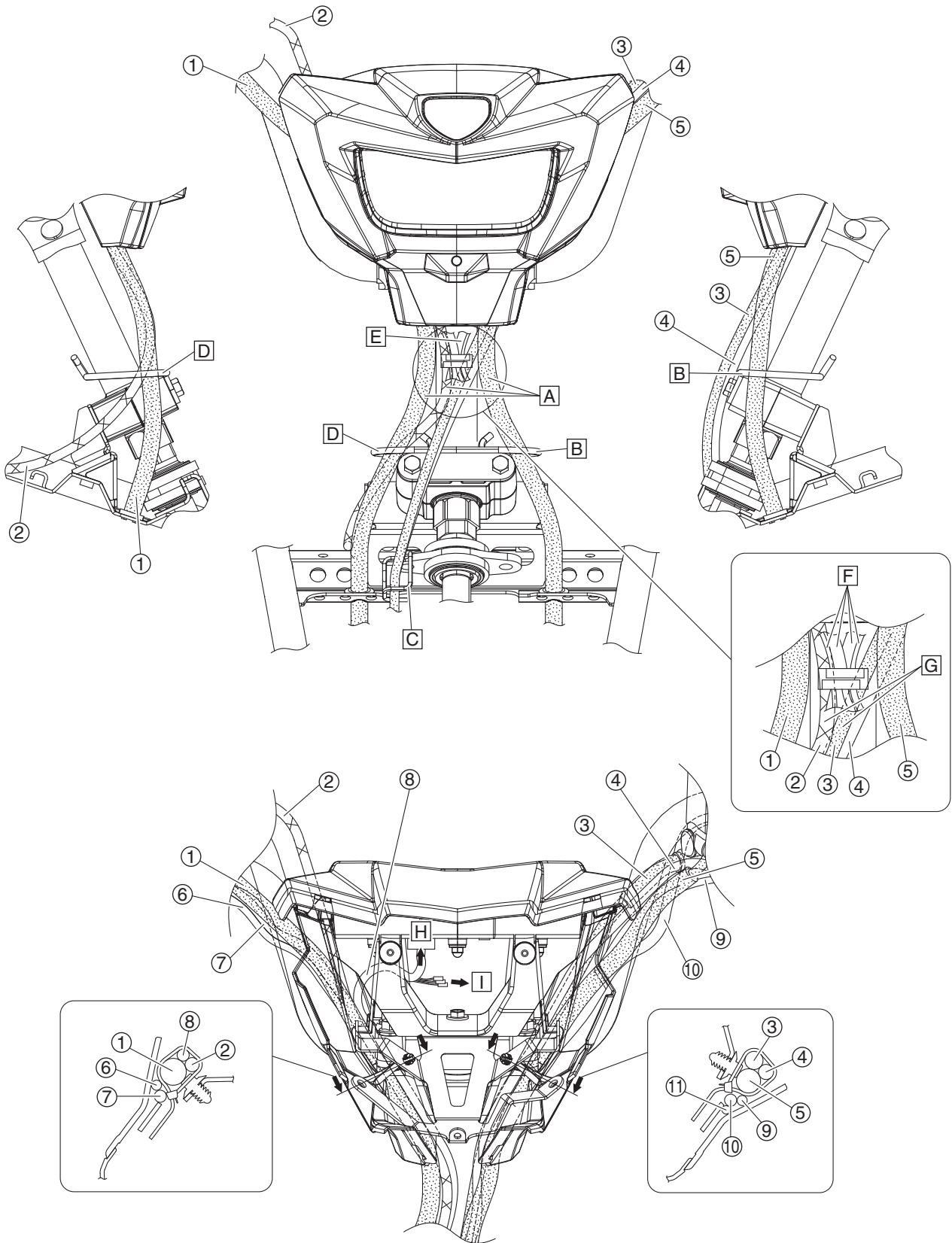
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1. Coolant reservoir hose
2. Radiator inlet hose
3. Coolant reservoir
4. Water pump
5. Water pump inlet hose
6. Water pump outlet pipe
7. Oil cooler inlet hose
8. Water pump outlet hose
9. Radiator outlet hose
10. Radiator

EBS20022

## CABLE ROUTING

Handlebar (front view 1)

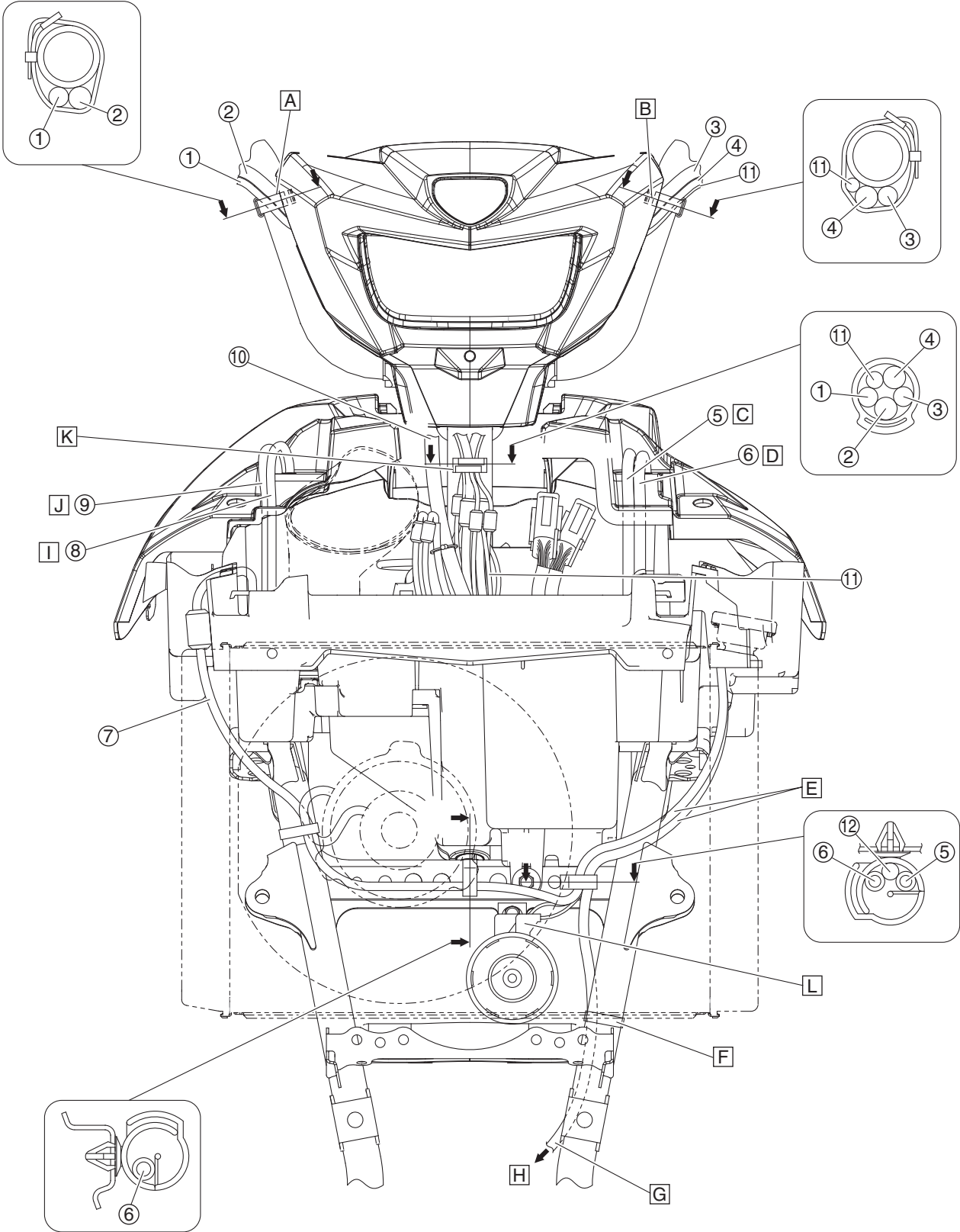




1. Front brake hose
  2. Throttle cable
  3. Rear brake cable
  4. Shift control cable
  5. Rear brake hose
  6. Front brake light switch lead
  7. On-Command four-wheel-drive motor switch and differential gear lock switch lead
  8. Meter assembly lead
  9. Rear brake light switch lead
  10. Handlebar switch lead (left)
  11. Horn switch lead (except for CDN)
- A. Adjust the front brake hose, throttle cable and rear brake hose so that the slack in the hoses and cable is positioned below the handle mounted light cover and to the front of the steering stem.
  - B. Pass the rear brake hose through the guide.
  - C. Pass the rear brake cable and shift control cable through the guide.
  - D. Pass the front brake hose and throttle cable through the guide.
  - E. Route the leads on top of where the cables cross.
  - F. Pass the leads through the holder.
  - G. Do not fasten the throttle cable or rear brake cable. Make sure that the throttle cable and rear brake cable are not twisted around the other leads.
  - H. To meter assembly
  - I. To handle mounted light

# CABLE ROUTING

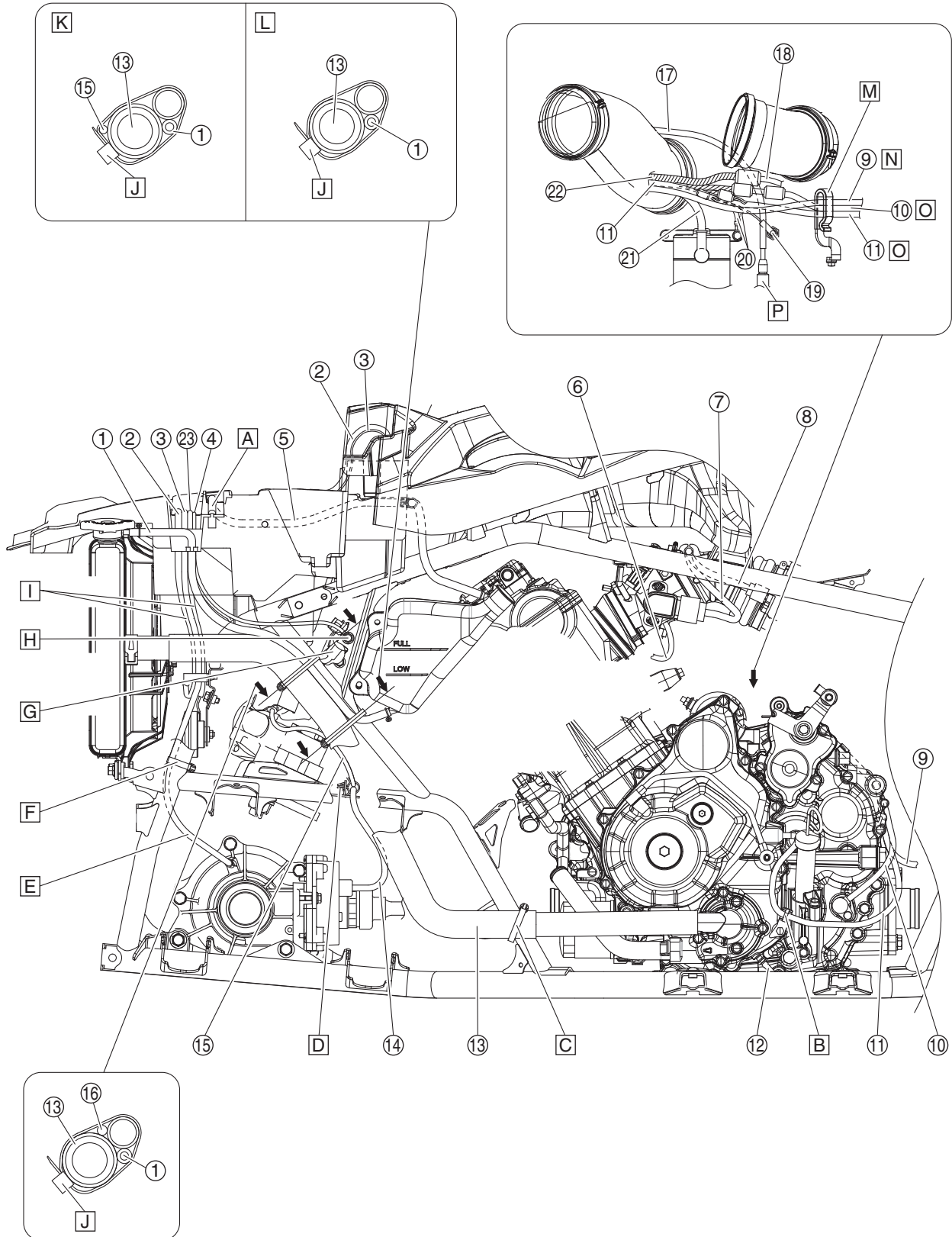
## Handlebar (front view 2)



1. Front brake light switch lead
  2. On-Command four-wheel-drive motor switch and differential gear lock switch lead
  3. Rear brake light switch lead
  4. Handlebar switch lead (left)
  5. Differential case breather hose
  6. Radiator fan motor breather hose
  7. Radiator fan motor lead
  8. Final drive case breather hose
  9. Throttle body breather hose
  10. Meter assembly lead
  11. Horn switch lead (except for CDN)
  12. Horn lead (except for CDN)
- A. Fasten the front brake light switch lead and On-Command four-wheel-drive motor switch and differential gear lock switch lead with the plastic band, making sure to route the lead under the handlebar and to face the end of the band forward. Align the plastic band with the portion of the handlebar where the handlebar begins to bend.
  - B. Fasten the rear brake light switch lead, handlebar switch lead (left), and horn switch lead (except for CDN) with the plastic band, making sure to route the lead under the handlebar and to face the end of the band forward. Align the plastic band with the portion of the handlebar where the handlebar begins to bend.
  - C. Pass the differential case breather hose through the hole on the battery cover.
  - D. Pass the radiator fan motor breather hose through the hole on the battery cover.
  - E. Route the radiator fan motor breather hose, differential case breather hose, and horn lead (except for CDN) in front of the frame.
  - F. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
  - G. Route the differential case breather hose to the inside of the frame.
  - H. To differential assembly
  - I. Pass the final drive case breather hose through the hole on the battery cover.
  - J. Pass the throttle body breather hose through the hole on the battery cover.
  - K. Fasten the front brake light switch lead, rear brake light switch lead, On-Command four-wheel-drive motor switch and differential gear lock switch lead, handlebar switch lead (left), and horn switch lead (except for CDN) with the clamp in front of the steering stem. Be sure to fasten the clamp above the couplers and fasten it around the protective sleeves of the leads, not the leads themselves.
  - L. Install the horn L-shaped connectors so that the leads are routed to the left (except for CDN).

# CABLE ROUTING

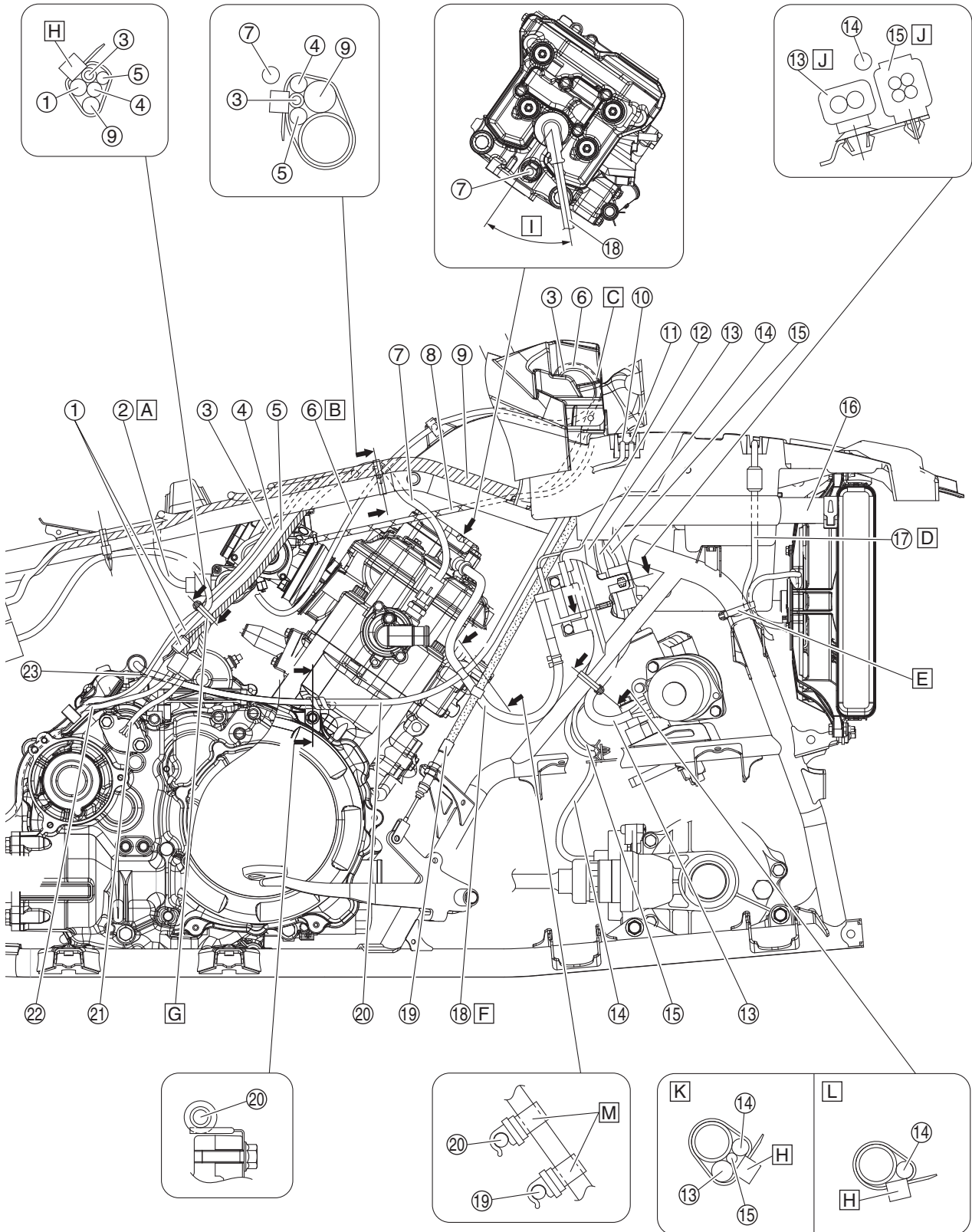
## Engine (left side view)



1. Coolant reservoir hose
2. Radiator fan motor breather hose
3. Differential case breather hose
4. Ground lead
5. Coolant reservoir breather hose
6. Throttle body breather hose
7. TPS lead
8. Intake air pressure sensor lead
9. Final drive case breather hose
10. Speed sensor lead
11. AC magneto/crankshaft position sensor lead
12. Water pump breather hose
13. Radiator outlet hose
14. Differential motor lead
15. EPS torque sensor lead (for EPS models)
16. Air induction system solenoid lead
17. Shift control cable
18. Gear position switch lead
19. Reverse switch lead
20. Negative battery lead
21. Starter motor lead
22. Wire harness
23. Horn lead (except for CDN)
  - A. Face the end of the coolant reservoir breather hose downward.
  - B. Pass the AC magneto/crankshaft position sensor lead through the holder.
  - C. Fasten the radiator outlet hose to the frame with the plastic band, making sure to face the end of the band inward.
  - D. Place the differential motor lead and EPS torque sensor lead (for EPS models) in the holder, and then insert the ends of the holder into the hole in the stay on the frame.
  - E. Route the differential case breather hose to the inside of the frame.
  - F. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
  - G. Connect the air induction system solenoid coupler to the air cut-off valve assembly.
  - H. Attach the ground lead terminal to the frame using the bolt.
  - I. Route the radiator fan motor breather hose, differential case breather hose, and horn lead (except for CDN) to the inside of the radiator outlet hose.
  - J. Face the end of the plastic band inward.
  - K. For EPS models
  - L. Except for EPS models
  - M. Pass the hose and leads through the guide in the order listed.
  - N. Route the final drive case breather hose above the reverse switch lead and negative battery lead.
  - O. Route the speed sensor lead and AC magneto/crankshaft position sensor lead above the reverse switch lead.
  - P. Route the shift control cable below the gear position switch lead, speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose.

# CABLE ROUTING

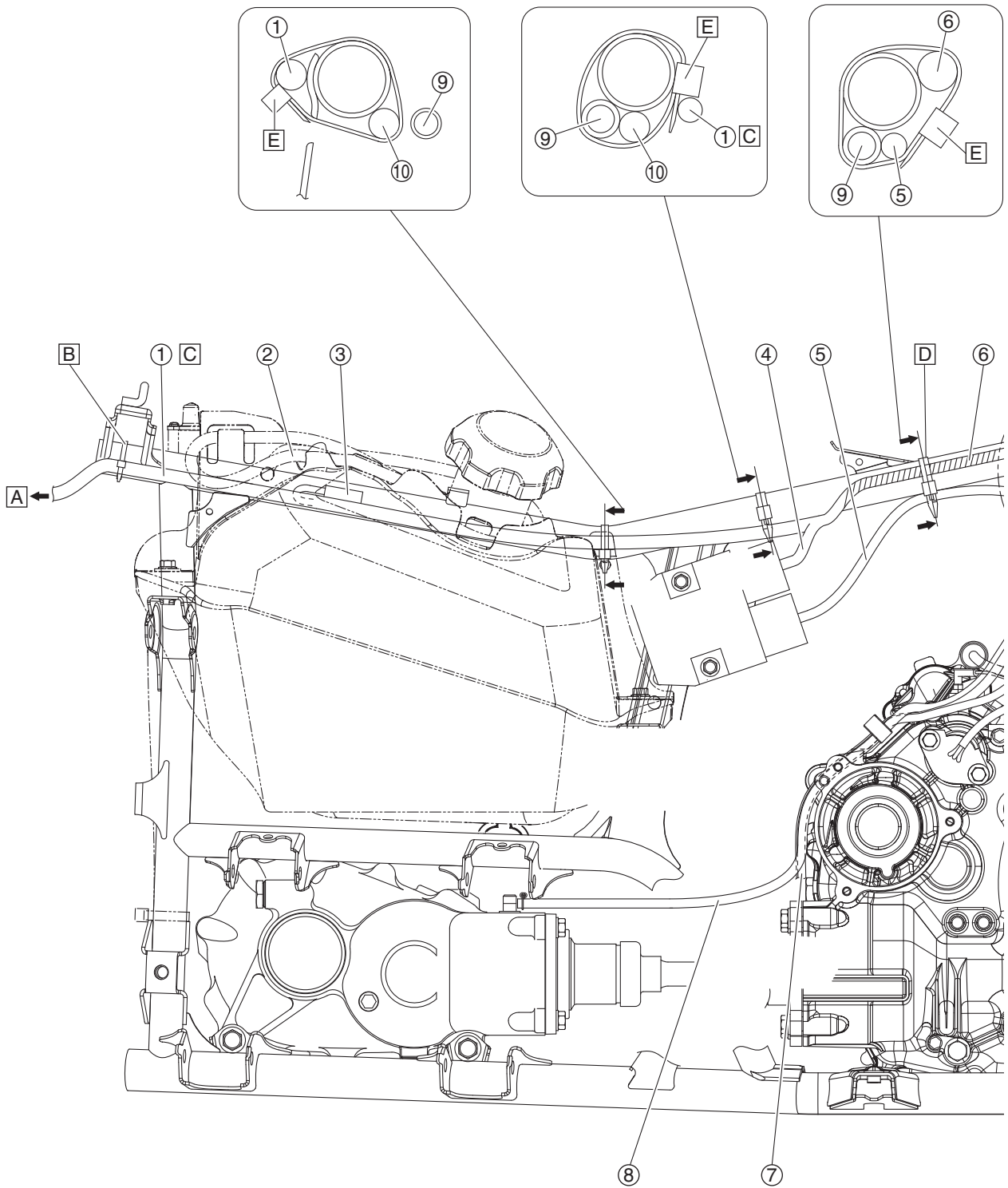
## Engine (right side view 1)



1. AC magneto/crankshaft position sensor lead
2. ISC unit lead
3. Final drive case breather hose
4. Negative battery lead
5. Starter motor lead
6. Throttle body breather hose
7. Coolant temperature sensor lead
8. Throttle cable
9. Wire harness
10. Main switch lead
11. Auxiliary DC jack lead
12. Ignition coil lead
13. EPS motor coupler (for EPS models)
14. Differential motor lead
15. EPS torque sensor coupler (for EPS models)
16. Radiator inlet hose
17. Radiator fan motor lead
18. Spark plug lead
19. Brake pedal cable
20. Shift control cable
21. Gear position switch lead
22. Speed sensor lead
23. Reverse switch lead
- A. Route the ISC unit lead to the inside of the fuel hose and AC magneto/crankshaft position sensor lead.
- B. Route the throttle body breather hose under the throttle cable.
- C. Pass the final drive case breather hose and throttle body breather hose through the hole on the battery cover.
- D. Route the radiator fan motor lead between the electrical components tray and the radiator inlet hose.
- E. Fasten the radiator fan motor lead and radiator fan motor breather hose to the frame with the plastic band, making sure to face the end of the band inward. Be sure to fasten the plastic band around the protective sleeve of the lead, not the lead itself.
- F. Route the spark plug lead to the inside of the rear brake cable and shift control cable.
- G. Fasten the hose, leads, and wire harness with the plastic band, making sure to position the band near the split in the wire harness.
- H. Face the end of the plastic band inward.
- I. 45°
- J. Insert the projection on each coupler into the hole in the frame from the inside of the frame.
- K. For EPS models
- L. Except for EPS models
- M. Fasten the spark plug leads with the larger diameter section of each holder.

# CABLE ROUTING

## Engine (right side view 2)



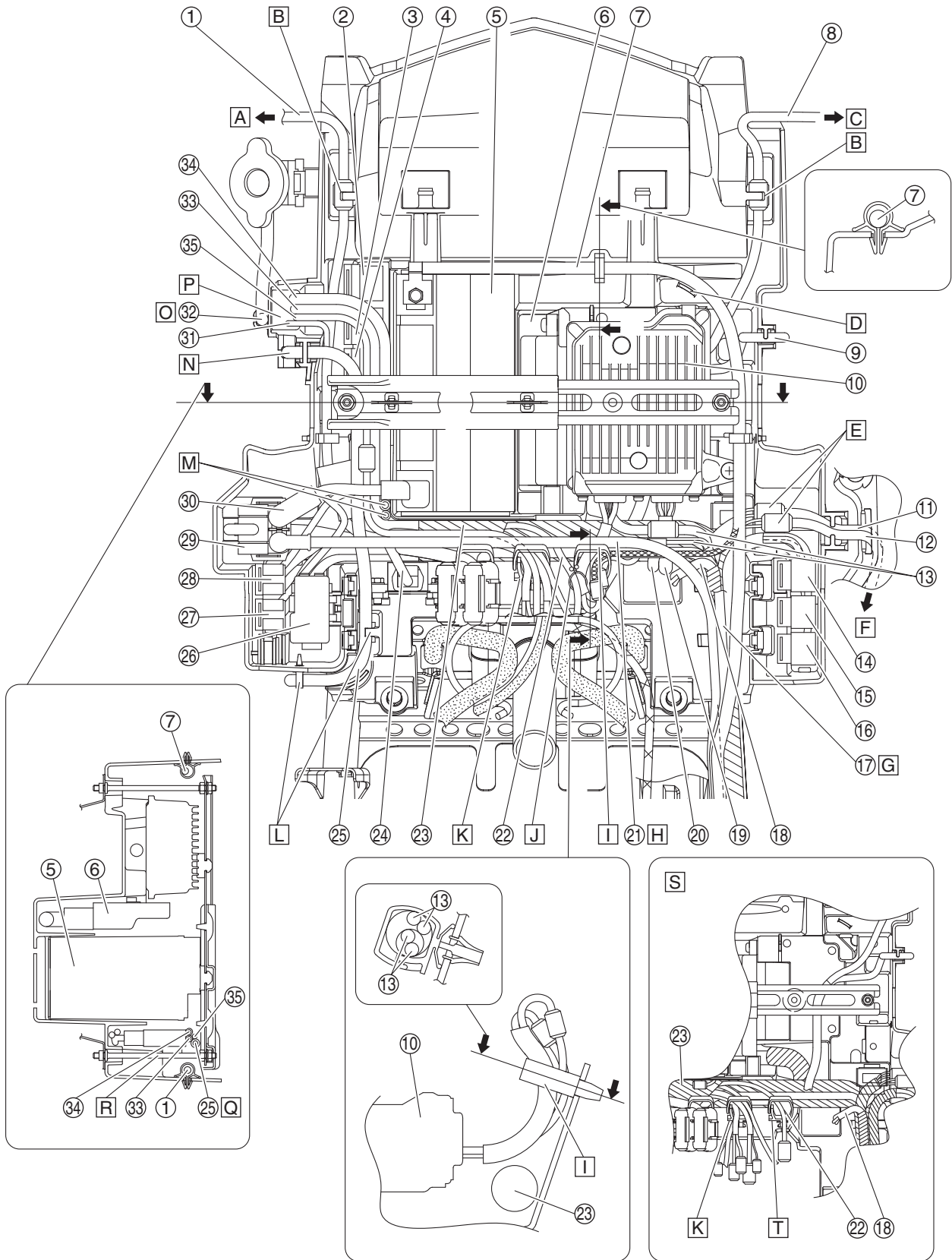


## CABLE ROUTING

---

1. Tail/brake light lead
2. Fuel tank breather hose
3. Circuit breaker
4. Rectifier/regulator lead
5. AC magneto/crankshaft position sensor lead
6. Wire harness
7. Speed sensor lead
8. Final drive case breather hose
9. Fuel hose
10. Fuel pump lead
  - A. To tail/brake light
  - B. Fasten the tail/brake light lead to the frame with a plastic locking tie, making sure to face the end of the tie downward.
  - C. Route the tail/brake light lead to the outside of the frame.
  - D. Install the plastic band near the split in the wire harness.
  - E. Face the end of the plastic band downward.

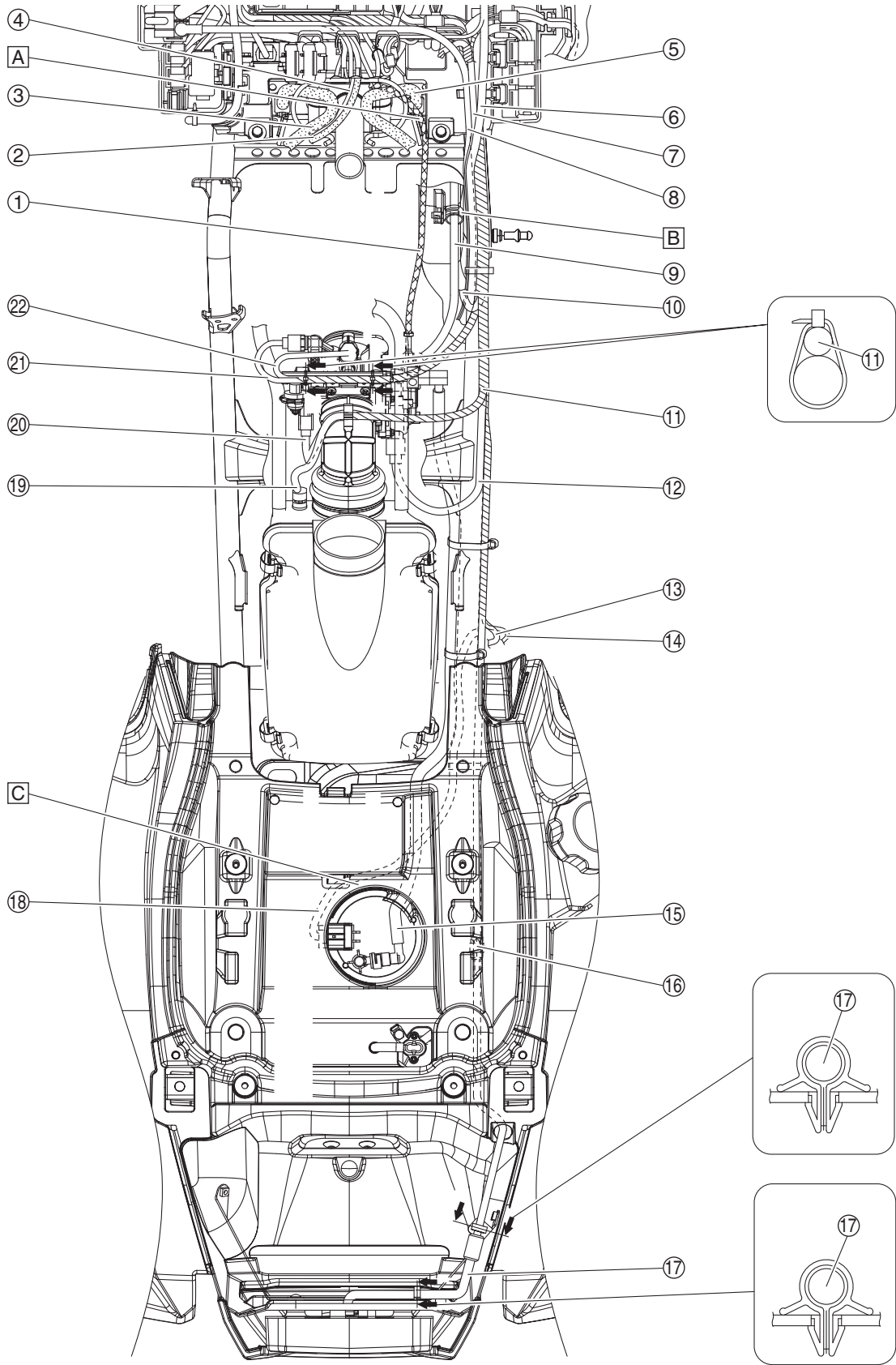
## Electrical components tray (top view)



1. Headlight lead (left)
2. Four-wheel-drive motor relay 1
3. Four-wheel-drive motor relay 2
4. Headlight relay
5. Battery
6. ECU (Engine Control Unit)
7. Negative battery lead
8. Headlight lead (right)
9. Radiator fan motor lead
10. EPS (electric power steering) control unit (for EPS models)
11. Auxiliary DC jack lead
12. Main switch lead
13. EPS control unit lead (for EPS models)
14. Radiator fan motor relay
15. Fuel injection system relay
16. Headlight relay 2
17. Final drive case breather hose
18. Differential motor lead
19. EPS motor lead (for EPS models)
20. EPS torque sensor lead (for EPS models)
21. Starter motor lead
22. Meter assembly lead
23. Wire harness
24. Lean angle sensor lead
25. Coolant reservoir breather hose
26. Fuse box
27. Main fuse
28. EPS fuse (for EPS models)
29. Starter relay
30. Positive battery lead
31. Ground lead
32. Coolant reservoir hose
33. Differential case breather hose
34. Radiator fan motor breather hose
35. Horn lead (except for CDN)
  - A. To headlight (left)
  - B. Connect the headlight coupler, and then fasten the coupler with the holder on the electrical components tray.
  - C. To headlight (right)
  - D. Route the negative battery lead along the guide on the electrical components tray.
  - E. Place the couplers on the inside of the electrical components tray.
  - F. To main switch and auxiliary DC jack
  - G. Route the final drive case breather hose above the leads in the electrical components tray.
  - H. Route the starter motor lead above the leads in the electrical components tray.
  - I. Fasten the EPS control unit leads with the holder. (for EPS models)
  - J. Fasten the meter assembly lead and EPS control unit lead with the twist tie. (for EPS models)
  - K. Fasten the handlebar switch lead (left), On-Command four-wheel-drive motor switch and differential gear lock switch lead, front brake light switch lead, rear brake light switch lead, and horn switch lead (except for CDN) with the holder.
  - L. Pass the coolant reservoir breather hose through the guides on the electrical components tray and route it under the positive battery lead and starter motor lead.
  - M. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose and horn lead (except for CDN).
  - N. Fasten the coolant reservoir breather hose with the holder on the electrical components tray.
  - O. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose.
  - P. Pass the hoses and ground lead, and horn lead (except for CDN) through the opening in the electrical components tray.
  - Q. Route the coolant reservoir breather hose above the other hoses.
  - R. Route the hoses to the inside of the screw.
  - S. Except for EPS models
  - T. Fasten the meter assembly lead with the holder.

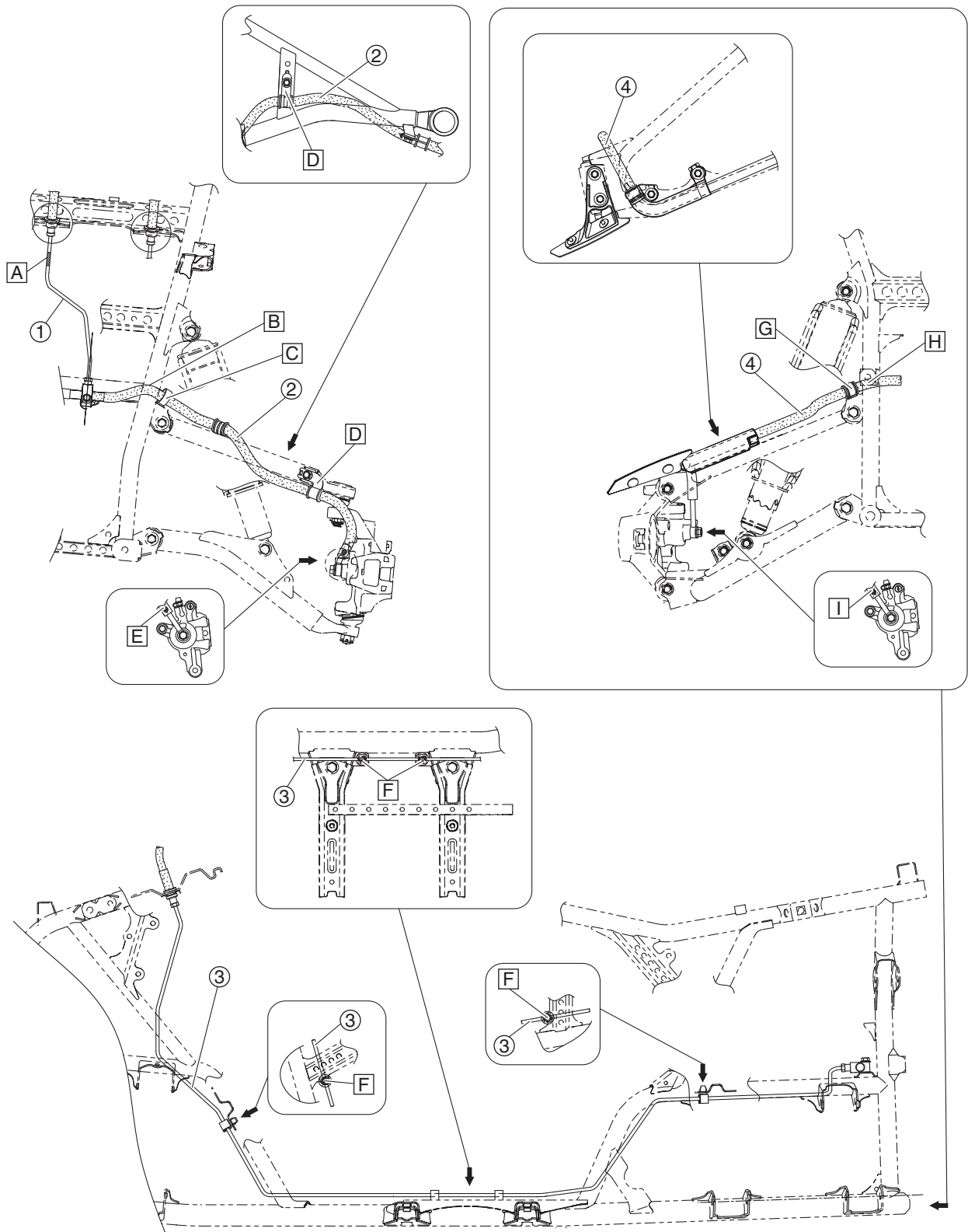
# CABLE ROUTING

Engine (top view)



1. Throttle cable
2. Rear brake cable
3. Rear brake hose
4. Shift control cable
5. Front brake hose
6. Negative battery lead
7. Final drive case breather hose
8. Starter motor lead
9. Throttle body breather hose
10. Coolant temperature sensor lead
11. Wire harness
12. ISC unit lead
13. Rectifier/regulator lead
14. AC magneto lead
15. Fuel hose
16. Circuit breaker
17. Tail/brake light lead
18. Fuel pump lead
19. Intake air temperature sensor lead
20. TPS lead
21. Intake air pressure sensor lead
22. Fuel injector lead
- A. Route the throttle cable between the air duct and the frame.
- B. Fasten the throttle body breather hose with the holder.
- C. Make sure that the fuel hose and fuel pump lead are not pinched between the frame and the rear fender.

## Front and rear brake hoses



## CABLE ROUTING

---

1. Front brake pipe
2. Front brake hose
3. Rear brake pipe
4. Rear brake hose
- A. Face the mark on the front brake pipe upward.
- B. Route the front brake hose above the frame.
- C. Pass the front brake hose through the holder.
- D. Fasten the front brake hose with the holder.
- E. Connect the end of the front brake hose that is identified by the green paint mark to the left front brake caliper.
- F. Pass the rear brake pipe through the holder.
- G. Fasten the rear brake hose with the holder.
- H. Route the rear brake hose above the frame.
- I. Connect the end of the rear brake hose that is identified by the green paint mark to the left rear brake caliper.





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# PERIODIC MAINTENANCE

EBS20023

## PERIODIC MAINTENANCE

EBS30024

### 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.

EBS30025

### PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

#### TIP

- For vehicles not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For vehicles equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the vehicle isn't used for a long period of time, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NO.	ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇒	INITIAL			EVERY		
				month	1	3	6	6	12
				km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
				hours	20	80	160	160	320
1	* Fuel line	• Check fuel hoses for cracks or other damage, and replace if necessary.			√	√	√		
2	Spark plug	• Check condition and clean, regap, or replace if necessary.	√	√	√	√	√		
3	* Valves	• Check valve clearance and adjust if necessary.	√		√	√	√		
4	* Crankcase breather system	• Check breather hose for cracks or other damage, and replace if necessary.			√	√	√		
5	* Exhaust system	• Check for leakage and replace gasket(s) if necessary. • Check for looseness and tighten all screw clamps and joints if necessary.			√	√	√		
6	Spark arrester	• Clean.			√	√	√		
7	* Air induction system	• Check the air cut-off valve, reed valve, and hose for damage. • Replace any damaged parts if necessary.	√	√	√	√	√		

EBS30026

### GENERAL MAINTENANCE AND LUBRICATION CHART

#### TIP

- For vehicles not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For vehicles equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the vehicle isn't used for a long period of time, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

# PERIODIC MAINTENANCE

NO.	ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇒	INITIAL			EVERY		
				month	1	3	6	6	12
				km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
hours	20	80	160	160	320				
1	Air filter element	<ul style="list-style-type: none"> <li>Clean and replace if necessary.</li> </ul>		Every 20–40 hours (more often in wet or dusty areas)					
2	* Front brake	<ul style="list-style-type: none"> <li>Check operation and correct if necessary.</li> <li>Check fluid level and ATV for fluid leakage, and correct if necessary.</li> </ul>		√	√	√	√	√	
		<ul style="list-style-type: none"> <li>Replace brake pads.</li> </ul>		Whenever worn to the limit					
3	* Rear brake	<ul style="list-style-type: none"> <li>Check operation and correct if necessary.</li> <li>Check brake pedal free play and adjust if necessary.</li> <li>Check fluid level and ATV for fluid leakage, and correct if necessary.</li> </ul>		√	√	√	√	√	
		<ul style="list-style-type: none"> <li>Replace brake pads.</li> </ul>		Whenever worn to the limit					
4	* Brake hoses	<ul style="list-style-type: none"> <li>Check for cracks or other damage, and replace if necessary.</li> </ul>			√	√	√	√	
		<ul style="list-style-type: none"> <li>Replace.</li> </ul>		Every 4 years					
5	* Brake fluid	<ul style="list-style-type: none"> <li>Change.</li> </ul>		Every 2 years					
6	* Wheels	<ul style="list-style-type: none"> <li>Check runout and for damage, and replace if necessary.</li> </ul>		√		√	√	√	
7	* Tires	<ul style="list-style-type: none"> <li>Check tread depth and for damage, and replace if necessary.</li> <li>Check air pressure and balance, and correct if necessary.</li> </ul>		√		√	√	√	
8	* Wheel hub bearings	<ul style="list-style-type: none"> <li>Check for looseness or damage, and replace if necessary.</li> </ul>		√		√	√	√	
9	* V-belt	<ul style="list-style-type: none"> <li>Check for wear, cracks or other damage, and replace if necessary.</li> </ul>		√		√	√	√	
10	* Chassis fasteners	<ul style="list-style-type: none"> <li>Make sure that all nuts, bolts, and screws are properly tightened.</li> </ul>		√	√	√	√	√	
11	* Shock absorber assemblies	<ul style="list-style-type: none"> <li>Check operation and correct if necessary.</li> <li>Check for oil leakage and replace if necessary.</li> </ul>				√	√	√	
12	* Stabilizer bushes	<ul style="list-style-type: none"> <li>Check for cracks or other damage, and replace if necessary.</li> </ul>				√	√	√	
13	* Rear knuckle pivots	<ul style="list-style-type: none"> <li>Lubricate with lithium-soap-based grease.</li> </ul>				√	√	√	
14	* Steering shaft	<ul style="list-style-type: none"> <li>Lubricate with lithium-soap-based grease.</li> </ul>				√	√	√	
15	* Steering system	<ul style="list-style-type: none"> <li>Check operation and repair or replace if damaged.</li> <li>Check toe-in and adjust if necessary.</li> </ul>		√	√	√	√	√	
16	* Engine mount	<ul style="list-style-type: none"> <li>Check for cracks or other damage, and replace if necessary.</li> </ul>				√	√	√	
17	* Axle boots	<ul style="list-style-type: none"> <li>Check for cracks or other damage, and replace if necessary.</li> </ul>		√	√	√	√	√	
18	Engine oil	<ul style="list-style-type: none"> <li>Change.</li> <li>Check ATV for oil leakage, and correct if necessary.</li> </ul>		√		√	√	√	
19	Engine oil filter cartridge	<ul style="list-style-type: none"> <li>Replace.</li> </ul>		√		√		√	
20	Differential gear oil	<ul style="list-style-type: none"> <li>Change.</li> <li>Check ATV for oil leakage, and correct if necessary.</li> </ul>		√				√	
21	Final gear oil	<ul style="list-style-type: none"> <li>Change.</li> <li>Check ATV for oil leakage, and correct if necessary.</li> </ul>		√				√	
22	Cooling system	<ul style="list-style-type: none"> <li>Check coolant level and ATV for coolant leakage, and correct if necessary.</li> </ul>		√	√	√	√	√	
		<ul style="list-style-type: none"> <li>Replace coolant.</li> </ul>		Every 2 years					
23	* Moving parts and cables	<ul style="list-style-type: none"> <li>Lubricate.</li> </ul>			√	√	√	√	
24	* Drive select lever safety system cable	<ul style="list-style-type: none"> <li>Check operation and adjust or replace if necessary.</li> </ul>				√	√	√	

# PERIODIC MAINTENANCE

NO.	ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇒	INITIAL			EVERY		
				month	1	3	6	6	12
				km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
hours	20	80	160	160	320				
25	* Throttle lever	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Check throttle lever free play, and adjust if necessary.</li> <li>• Lubricate cable and lever housing.</li> </ul>		√	√	√	√	√	
26	* Front and rear brake switches	<ul style="list-style-type: none"> <li>• Check operation and correct if necessary.</li> </ul>		√	√	√	√	√	
27	* Lights and switches	<ul style="list-style-type: none"> <li>• Check operation and correct if necessary.</li> <li>• Adjust headlight beams.</li> </ul>		√	√	√	√	√	

**TIP**

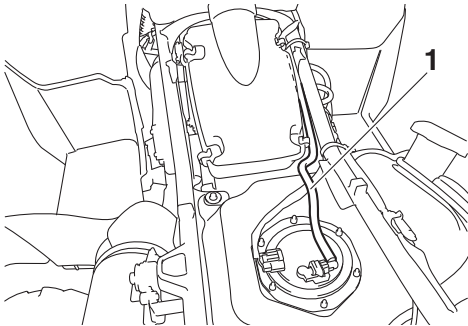
- Some maintenance items need more frequent service if you are riding in unusually wet, dusty, sandy or muddy areas, or at full throttle.
- Hydraulic brake service
  - Regularly check and, if necessary, correct the brake fluid level.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

# PERIODIC MAINTENANCE

EBS30027

## CHECKING THE FUEL LINE

1. Remove:
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
  - Rear fender  
Refer to "GENERAL CHASSIS (3)" on page 4-8.
  - V-belt cooling exhaust duct  
Refer to "ENGINE REMOVAL (1)" on page 5-3.
2. Check:
  - Fuel hose "1"  
Cracks/damage → Replace.  
Loose connection → Connect properly.



3. Install:
  - V-belt cooling exhaust duct  
Refer to "ENGINE REMOVAL (1)" on page 5-3.
  - Rear fender  
Refer to "GENERAL CHASSIS (3)" on page 4-8.
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30029

## CHECKING THE SPARK PLUG

1. Remove:
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
2. Disconnect:
  - Spark plug cap
3. Remove:
  - Spark plug

ECB01270

### NOTICE

**Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.**

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

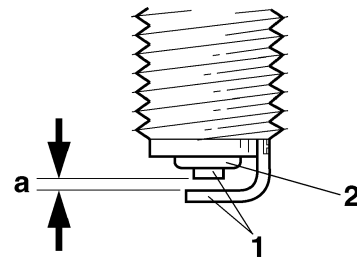


**Manufacturer/model**  
**NGK/CPR7EA-9**

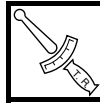
5. Check:
  - Electrodes "1"  
Damage/wear → Replace the spark plug.
  - Insulator "2"  
Abnormal color → Replace the spark plug.  
Normal color is medium-to-light tan.
6. Clean:
  - Spark plug  
(with a spark plug cleaner or wire brush)
7. Measure:
  - Spark plug gap "a"  
(with a wire thickness gauge)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



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



8. Install:
  - Spark plug



**Spark plug (new)**  
**11 Nm (1.1 m·kgf, 8.0 ft·lbf)**  
**Spark plug (reused)**  
**Specified angle 30–45°**

### TIP

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

9. Connect:
  - Spark plug cap
10. Install:
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

# PERIODIC MAINTENANCE

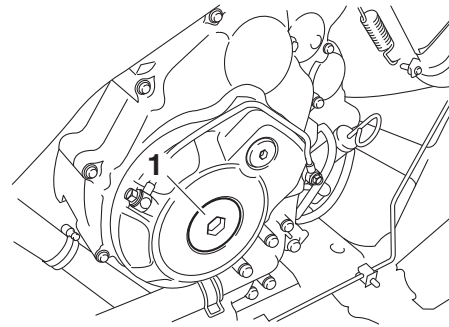
EBS30028

## ADJUSTING THE VALVE CLEARANCE

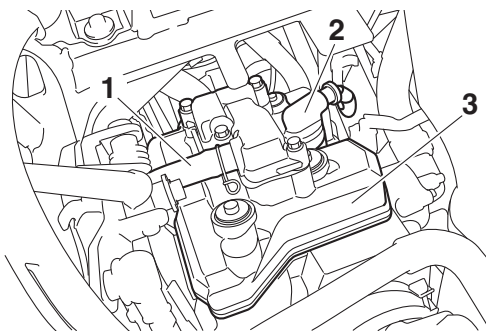
The following procedure applies to all of the valves.

### 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:
  - Side panel (left)
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
  - Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
  - Storage compartment  
Refer to "GENERAL CHASSIS (5)" on page 4-17.
2. Disconnect:
  - Cylinder head breather hose "1"  
Refer to "ENGINE REMOVAL (3)" on page 5-8.
  - Spark plug cap "2"  
Refer to "CAMSHAFTS" on page 5-12.
3. Remove:
  - Spark plug
  - Cylinder head cover "3"  
Refer to "CAMSHAFTS" on page 5-12.



ECB01270

### NOTICE

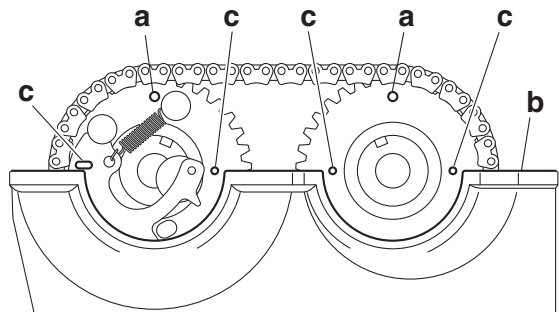
**Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.**

4. Remove:
  - Crankshaft end accessing screw "1"

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

	<b>Valve clearance (cold)</b>
	<b>Intake</b> 0.10–0.20 mm (0.0039–0.0079 in)
	<b>Exhaust</b> 0.22–0.32 mm (0.0087–0.0126 in)

- Turn the crankshaft counterclockwise.
- Position the holes "a" in the intake camshaft sprocket and exhaust camshaft sprocket above the cylinder head mating surface "b" as shown in the illustration, and align the marks "c" on the sprockets with the cylinder head mating surface "b".

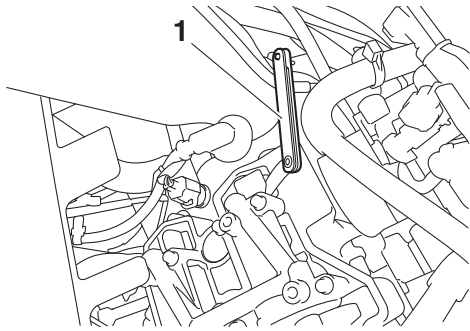


- Measure the valve clearance with a thickness gauge "1".

	<b>Thickness gauge</b> 90890-03180
	<b>Feeler gauge set</b> YU-26900-9



# PERIODIC MAINTENANCE




6. Remove:

- Camshafts  
Refer to "CAMSHAFTS" on page 5-12.

7. Adjust:

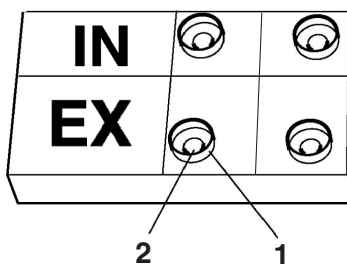
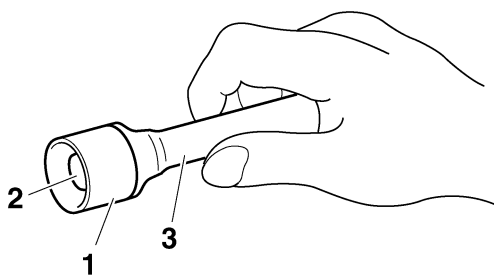
- Valve clearance

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

	<b>Valve lapper</b> <b>90890-04101</b> <b>Valve lapping tool</b> <b>YM-A8998</b>
---	---

**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 = 0.10–0.20 mm (0.0039–0.0079 in)

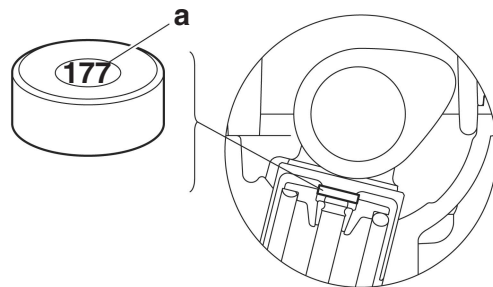
Measured valve clearance = 0.27 mm (0.0106 in)

$0.27 \text{ mm (0.0106 in)} - 0.20 \text{ mm (0.0079 in)} = 0.07 \text{ mm (0.0028 in)}$

- c. Check the thickness of the current valve pad, and then calculate the sum of the values obtained to determine the required valve pad thickness and the valve pad number.

**TIP**

- The number "a" marked on the valve pad indicate the valve pad thickness.
- Refer to the following table for the available valve pads.
- If there are no available valve pads with the same thickness as the calculated valve pad thickness, select the next thickest valve pad.



Number "a"	Thickness
145	1.450 mm (0.05709 in)
150	1.500 mm (0.05906 in)
155	1.550 mm (0.06102 in)
160	1.600 mm (0.06299 in)
162	1.625 mm (0.06398 in)
165	1.650 mm (0.06496 in)
167	1.675 mm (0.06594 in)
170	1.700 mm (0.06693 in)
172	1.725 mm (0.06791 in)
175	1.750 mm (0.06890 in)
177	1.775 mm (0.06988 in)
180	1.800 mm (0.07087 in)
182	1.825 mm (0.07185 in)
185	1.850 mm (0.07283 in)
187	1.875 mm (0.07382 in)

# PERIODIC MAINTENANCE

Number "a"	Thickness
190	1.900 mm (0.07480 in)
192	1.925 mm (0.07579 in)
195	1.950 mm (0.07677 in)
197	1.975 mm (0.07776 in)
200	2.000 mm (0.07874 in)
202	2.025 mm (0.07972 in)
205	2.050 mm (0.08071 in)
207	2.075 mm (0.08169 in)
210	2.100 mm (0.08268 in)
212	2.125 mm (0.08366 in)
215	2.150 mm (0.08465 in)
220	2.200 mm (0.08661 in)
225	2.250 mm (0.08858 in)
230	2.300 mm (0.09055 in)

Example:

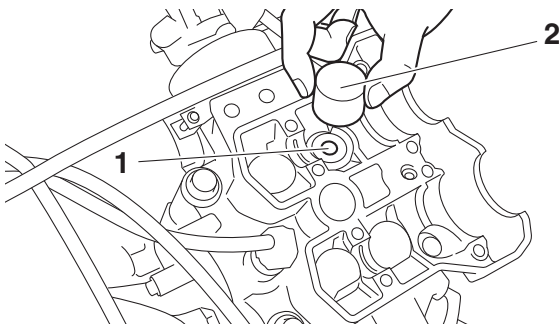
$$1.775 \text{ mm (0.06988 in)} + 0.07 \text{ mm (0.0028 in)} = 1.845 \text{ mm (0.07264 in)}$$

The valve pad number is 185.


d. Install a new valve pad "1" and the valve lifter "2".

### TIP

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



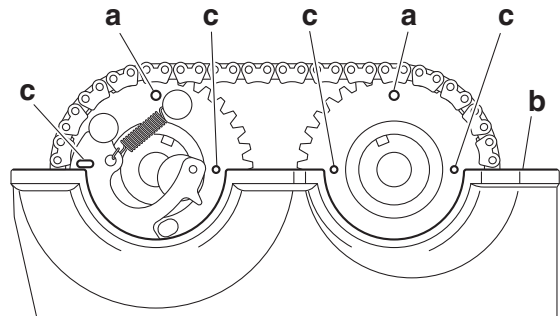
e. Install the exhaust and intake camshafts, timing chain and camshaft caps.

	<b>Camshaft cap bolt</b> 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
---	---

### TIP

- Refer to "CAMSHAFTS" on page 5-12.
- Lubricate the camshaft lobes and camshaft journals with engine oil.

- Position the holes "a" in the intake camshaft sprocket and exhaust camshaft sprocket above the cylinder head mating surface "b" as shown in the illustration, and align the marks "c" on the sprockets with the cylinder head mating surface "b".
- Turn the crankshaft counterclockwise several full turns to seat the parts.




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



8. Install:

- O-ring **New**
- Crankshaft end accessing screw


	<b>Crankshaft end accessing screw</b> 11 Nm (1.1 m-kgf, 8.0 ft-lbf)
---	--

9. Install:

- Cylinder head cover gasket **New**
- Cylinder head cover  
Refer to "CAMSHAFTS" on page 5-12.
- Spark plug

### TIP

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

	<b>Cylinder head cover bolt</b> 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
	<b>Spark plug (new)</b> 11 Nm (1.1 m-kgf, 8.0 ft-lbf)
	<b>Spark plug (reused)</b> Specified angle 30–45°

10. Connect:

- Spark plug cap  
Refer to "CAMSHAFTS" on page 5-12.

## 11. Connect:

- Cylinder head breather hose  
Refer to "ENGINE REMOVAL (3)" on page 5-8.

## 12. Install:

- Storage compartment  
Refer to "GENERAL CHASSIS (5)" on page 4-17.
- Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
- Side panel (right)
- Side panel (left)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30030

## CHECKING THE BREATHER HOSES

### 1. Remove:

- Side panel (left)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
- Air filter case  
Refer to "GENERAL CHASSIS (5)" on page 4-17.

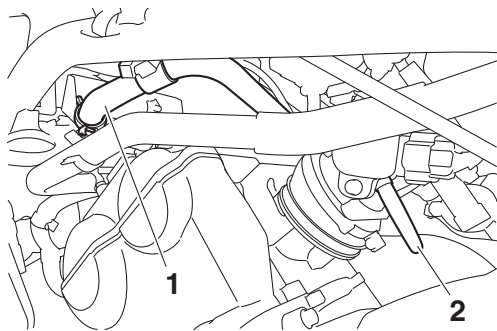
### 2. Check:

- Cylinder head breather hose "1"
- Throttle body breather hose "2"  
Cracks/damage → Replace.  
Loose connection → Connect properly.

ECB01680

### NOTICE

**Make sure the cylinder head breather hose is routed correctly.**



### 3. Install:

- Air filter case  
Refer to "GENERAL CHASSIS (5)" on page 4-17.
- Side panel (left)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30031

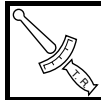
## CHECKING THE EXHAUST SYSTEM

### 1. Check:

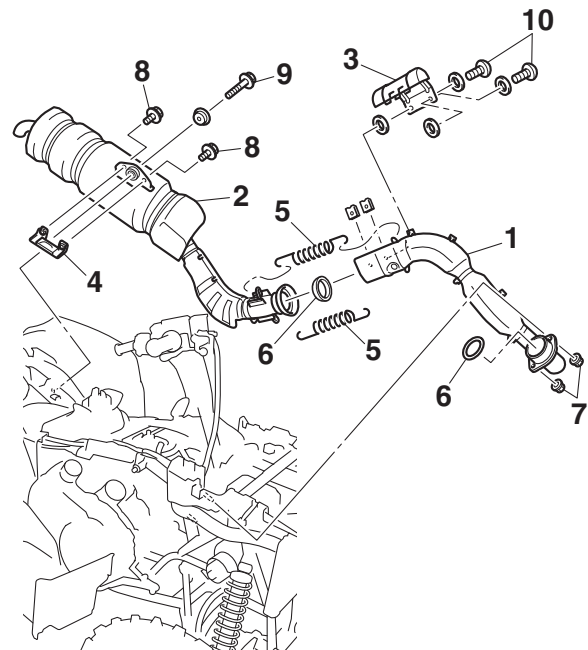
- Exhaust pipe "1"
- Muffler "2"
- Exhaust pipe protector "3"
- Muffler bracket "4"
- Springs "5"  
Cracks/damage → Replace.
- Gaskets "6"  
Exhaust gas leaks → Replace.

### 2. Check:

- Tightening torque



Exhaust pipe nut "7"	20 Nm (2.0 m·kgf, 14 ft·lbf)
Muffler bracket bolt "8"	20 Nm (2.0 m·kgf, 14 ft·lbf)
Muffler bolt "9"	33 Nm (3.3 m·kgf, 24 ft·lbf)
Exhaust pipe protector bolt "10"	7 Nm (0.7 m·kgf, 5.1 ft·lbf)



EBS30574

## ADJUSTING THE EXHAUST GAS VOLUME

### TIP

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

# PERIODIC MAINTENANCE

1. Connect the Yamaha diagnostic tool to the coupler. For information about connecting the Yamaha diagnostic tool, refer to "YAMAHA DIAGNOSTIC TOOL" on page 9-32.



**Yamaha diagnostic tool  
90890-03231**

EBS30032

## CLEANING THE SPARK ARRESTER

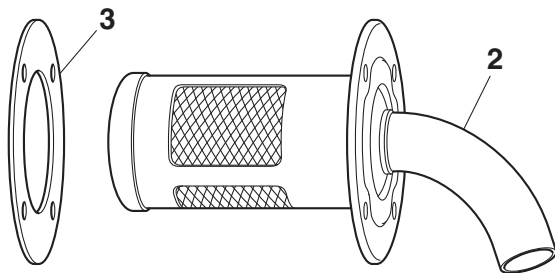
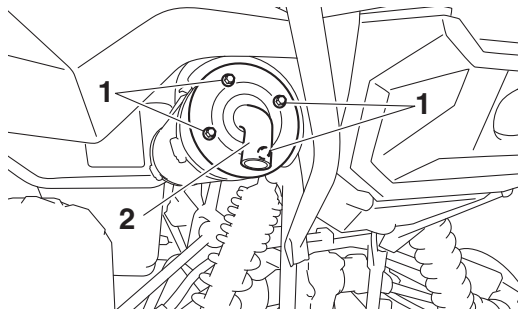
1. Clean:
  - Spark arrester

EWB03080

### **WARNING**

- Select a well-ventilated area free of combustible materials.
- Always let the exhaust system cool before performing this operation.
- Do not start the engine when removing the tailpipe from the muffler.

- a. Remove the bolts "1".
- b. Remove the tailpipe "2" by pulling it out of the muffler and gasket "3".



- c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and the inner contact surfaces of the muffler.
- d. Install a new gasket, and then insert the tailpipe into the muffler and align the bolt holes.
- e. Install the bolts "1" and tighten them.



**Spark arrester bolt  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

EBS30033

## CHECKING THE AIR INDUCTION SYSTEM

Refer to "CHECKING THE AIR INDUCTION SYSTEM" on page 7-13.

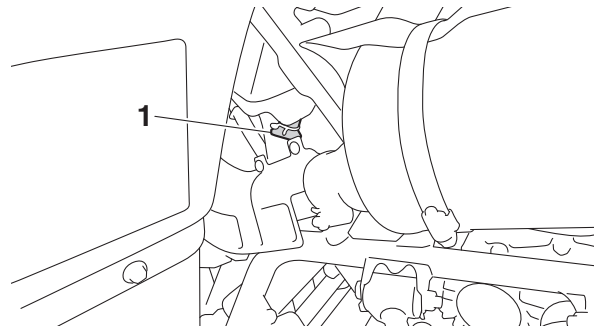
EBS30037

## CLEANING THE AIR FILTER ELEMENT

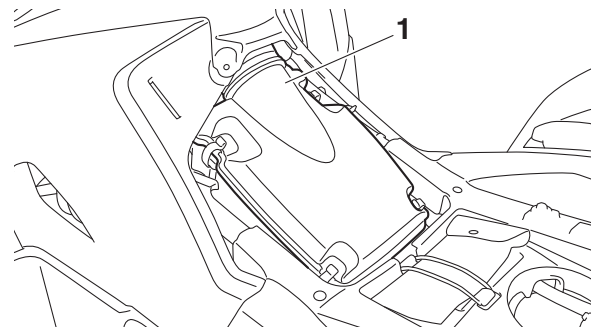
1. Check:
  - Air filter check hose "1"

### TIP

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

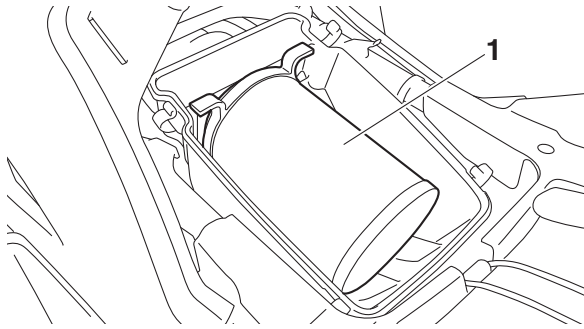


2. Remove:
  - Seat  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
3. Remove:
  - Air filter case cover "1"



4. Remove:
  - Air filter element assembly "1"

# PERIODIC MAINTENANCE



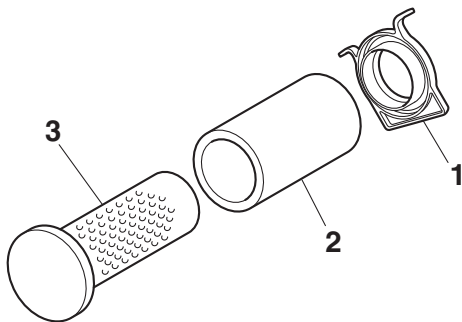
## 5. Disassemble:

- Air filter element holder “1”
- Air filter element “2”
- Air filter element frame “3”

ECB01800

### NOTICE

**The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.**



## 6. Check:

- Air filter element
  - Air filter element frame
  - Air filter element holder
- Damage → Replace.

## 7. Clean:

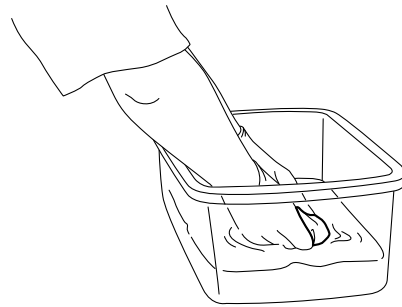
- Air filter element

a. Carefully wash the air filter element in solvent.

EWB02760

### WARNING

**Never use low flash point solvents, such as gasoline, to clean the air filter element. Such solvents may cause a fire or an explosion.**



b. After cleaning, squeeze the air filter element to remove the excess solvent.

ECB01290

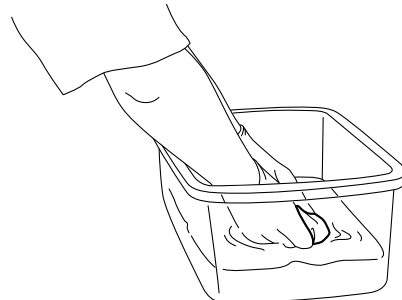
### NOTICE

**Do not twist the air filter element when squeezing it.**



c. Properly dispose of the used solvent.

d. Carefully wash the air filter element in soap water.



e. Thoroughly rinse the air filter element with water, and then let it dry.

ECB01290

### NOTICE

**Do not twist the air filter element when squeezing it.**

f. Pour the recommended oil into a storage bag large enough for the air filter element.



**Air filter oil grade  
Foam air-filter oil**

# PERIODIC MAINTENANCE

- g. Place the air filter element into the storage bag and repeatedly squeeze the element until the air filter element is saturated with oil.

**TIP**

The air filter element should be wet but not dripping.



8. Assemble:

- Air filter element frame
- Air filter element
- Air filter element holder

9. Install:

- Air filter element assembly

10. Install:

- Air filter case cover

11. Install:

- Seat

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

EBS30044

## CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the front brake pads.

1. Remove:

- Front wheels

Refer to "FRONT WHEELS" on page 4-20.

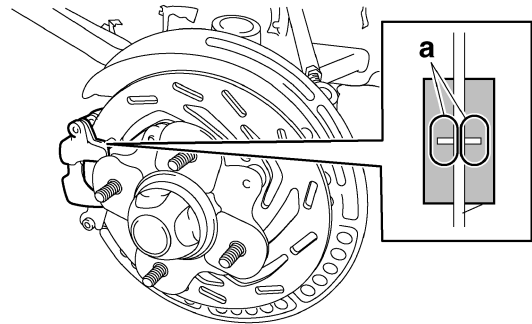
2. Operate the brake.

3. Check:

- Front brake pads

Wear indicator grooves "a" have almost disappeared → Replace the brake pads and brake pad spring as a set.

Refer to "FRONT BRAKE" on page 4-26.



4. Install:

- Front wheels

Refer to "FRONT WHEELS" on page 4-20.

EBS30050

## CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the rear brake pads.

1. Remove:

- Rear wheels

Refer to "REAR WHEELS" on page 4-23.

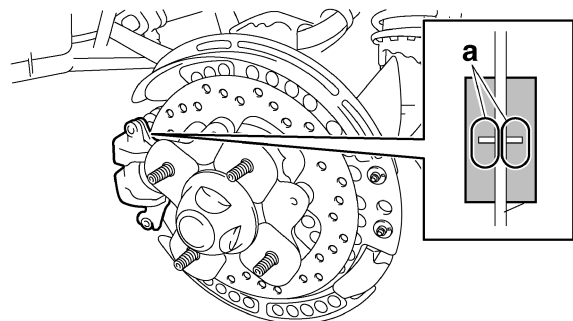
2. Operate the brake.

3. Check:

- Rear brake pads

Wear indicator grooves "a" have almost disappeared → Replace the brake pads and brake pad spring as a set.

Refer to "REAR BRAKE" on page 4-37.



4. Install:

- Rear wheels

Refer to "REAR WHEELS" on page 4-23.

EBS30580

## ADJUSTING THE FRONT DISC BRAKE

1. Check:

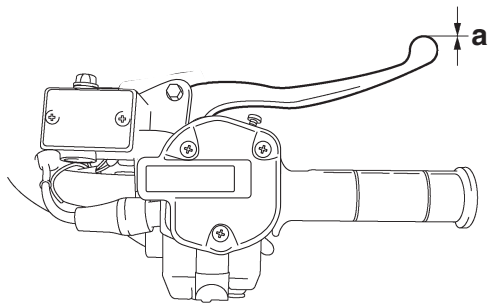
- Front brake lever free play "a"

Out of specification → Bleed the front brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.



**Front brake lever free play (lever end)**  
0 mm (0 in)



EBS30581

## ADJUSTING THE REAR DISC BRAKE

EWB03730

### **WARNING**

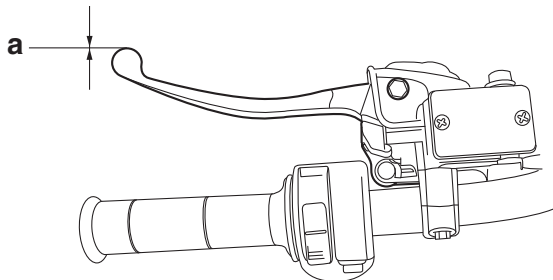
**Always adjust both the brake pedal and the rear brake lever whenever adjusting the rear brake.**

#### 1. Check:

- Rear brake lever free play “a”  
Out of specification → Bleed the rear brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.



**Rear brake lever free play (lever end)**  
**0 mm (0 in)**

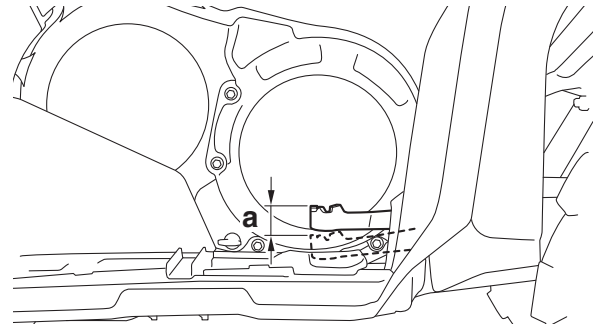


#### 2. Check:

- Brake pedal free play “a”  
Out of specification → Adjust.



**Brake pedal free play**  
**1.0–6.0 mm (0.04–0.24 in)**



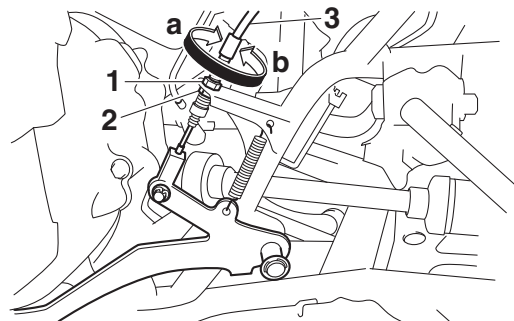
#### 3. Adjust:

- Brake pedal free play

- Remove the front fender inner panel (right). Refer to “GENERAL CHASSIS (3)” on page 4-8.
- Loosen the adjusting nut “1” and locknut “2”.
- Turn the adjusting nut “1” in direction “a” until the rear brake cable “3” is taut.
- Turn the adjusting nut “1” one turn in direction “b”, and then tighten the locknut “2”.
- While holding the locknut “2”, tighten the adjusting nut “1”.



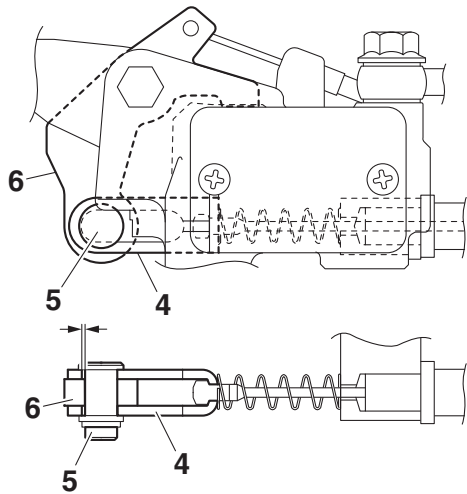
**Brake pedal free play adjusting nut**  
**7 Nm (0.7 m·kgf, 5.1 ft·lbf)**



- Check that there is a gap between the rear brake cable joint (rear brake master cylinder side) “4” and the pin “5”.
- Check that the brake pedal free play is within the specified limits.

#### TIP

When checking the brake pedal free play, make sure that the brake lever bracket “6” does not move.



- h. Adjust the drive select lever control cable.  
Refer to “ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD” on page 3-32.

EWB03740

## **⚠ WARNING**

After this adjustment is performed, lift the front and rear wheels off the ground by placing a block under the engine, and spin the rear wheels to ensure there is no brake drag. If any brake drag is noticed perform the above steps again.

- i. Install the front fender inner panel (right).  
Refer to “GENERAL CHASSIS (3)” on page 4-8.

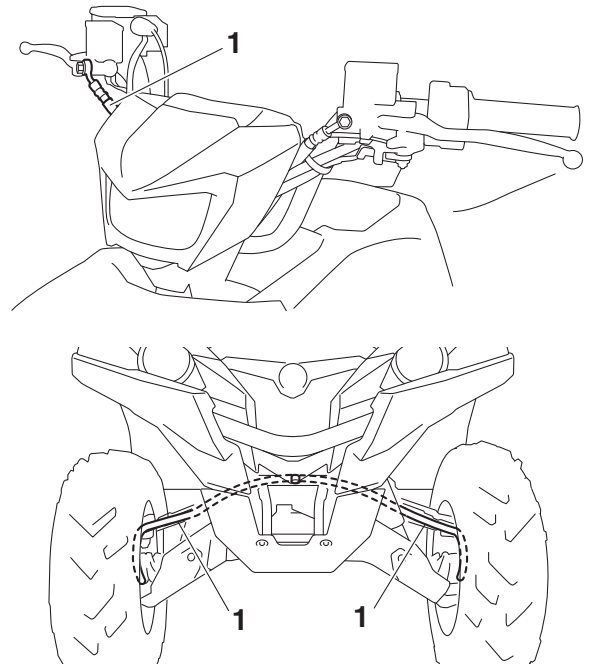


EBS30461

## **CHECKING THE FRONT BRAKE HOSES**

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

1. Check:
  - Front brake hoses “1”  
Cracks/damage/wear → Replace.



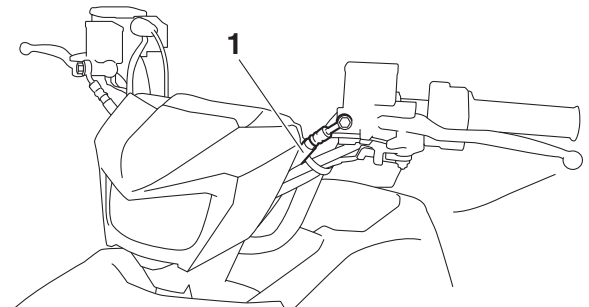
2. Check:
  - Brake hose holders  
Loose → Tighten the holder bolt.
3. Apply the brake several times.
4. Check:
  - Brake hoses  
Brake fluid leakage → Replace the damaged hose.  
Refer to “FRONT BRAKE” on page 4-26.

EBS30582

## **CHECKING THE REAR BRAKE HOSES**

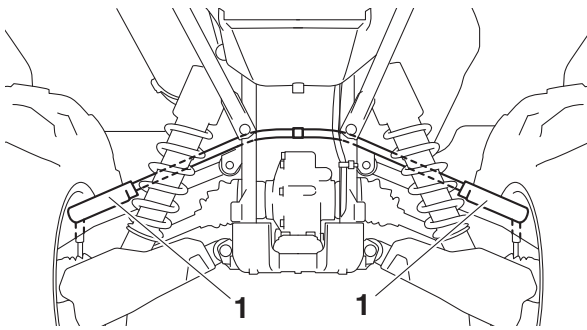
The following procedure applies to all of the brake hoses and brake hose clamps.

1. Check:
  - Rear brake hoses “1”  
Cracks/damage/wear → Replace.





# PERIODIC MAINTENANCE



2. Check:
  - Brake hose holders  
Loose → Tighten the holder bolt.
3. Apply the brake several times.
4. Check:
  - Brake hoses  
Brake fluid leakage → Replace the damaged hose.  
Refer to “REAR BRAKE” on page 4-37.

EBS30045

## CHECKING THE BRAKE FLUID LEVEL

1. Place the vehicle on a level surface.

### TIP

When checking the brake fluid level, make sure that the top of the brake fluid reservoir is horizontal.

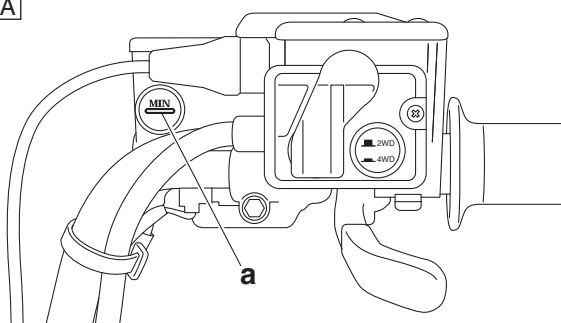
2. Check:

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

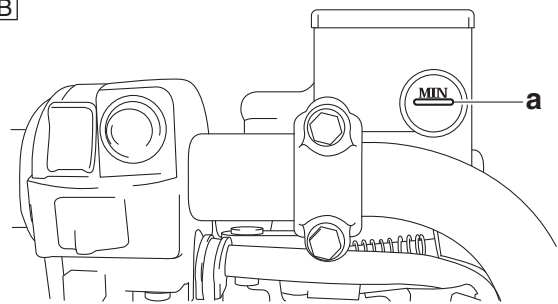


**Specified brake fluid  
DOT 4**

A



B



- A. Front brake
- B. Rear brake

EWB02790

### 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.

ECB01320

### 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.

EBS30046

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

EWB02800

### 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 fluid reservoir to overflow.



### 3. Check:

- Wheel bearings  
Refer to "CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS" on page 4-62 and "CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS" on page 4-71.

EBS30058

### CHECKING THE TIRES

The following procedure applies to all of the tires.

EWB02960

#### **WARNING**

This model is equipped with low-pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

### Tire characteristics

EWB02970

#### **WARNING**

Tire characteristics influence the handling of vehicles. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.



**Front tire**  
**Type**  
 Tubeless  
**Size**  
 AT26 × 8–12  
**Manufacturer/model**  
 MAXXIS/MU05Y  
**Rear tire**  
**Type**  
 Tubeless  
**Size**  
 AT26 × 10–12  
**Manufacturer/model**  
 MAXXIS/MU06Y

### Tire pressure

EWB02980

#### **WARNING**

- Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
- Use no more than the following pressures when seating the tire beads.

### Front

250 kPa (2.5 kgf/cm<sup>2</sup>) (36 psi)

### Rear

250 kPa (2.5 kgf/cm<sup>2</sup>) (36 psi)

Higher pressures and fast inflation may cause a tire to burst. Inflate the tires very slowly and carefully.



**Tire air pressure (measured on cold tires)**

#### Recommended

**Vehicle load**  
 0 - maximum

#### Front

35.0 kPa (0.350 kgf/cm<sup>2</sup>, 5.0 psi)

#### Rear

30.0 kPa (0.300 kgf/cm<sup>2</sup>, 4.4 psi)

#### Minimum

**Vehicle load**  
 0 - maximum

#### Front

32.0 kPa (0.320 kgf/cm<sup>2</sup>, 4.6 psi)

#### Rear

27.0 kPa (0.270 kgf/cm<sup>2</sup>, 4.0 psi)

### Maximum loading limit

EWB02990

#### **WARNING**

Be extra careful of the vehicle balance and stability when towing a trailer.



#### Maximum loading limit

240.0 kg (530 lb) (Total weight of rider, cargo, accessories, and tongue)

#### Loading

**Front carrier load limit**

50.0 kg (110 lb)

**Rear carrier load limit**

90.0 kg (198 lb)

**Storage compartment load limit**

4.0 kg (9 lb)

**Trailer hitch pulling load limit**

5880 N (600 kgf, 1322 lbf)

**Trailer hitch vertical load limit**

147 N (15 kgf, 33 lbf)

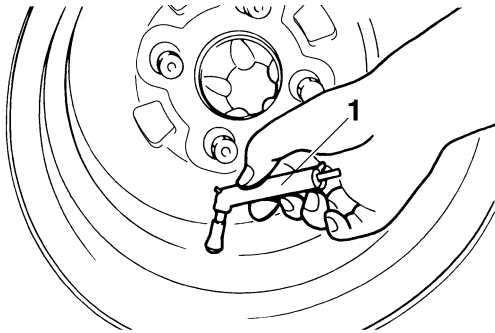
### 1. Measure:

- Tire pressure  
 Out of specification → Adjust.

# PERIODIC MAINTENANCE

## TIP

- The tire pressure gauge “1” is included as standard equipment.
- In order to insure an accurate reading, make sure that the gauge is clean before use.



EWB03000

## WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.

- Maintain proper tire pressures.
- Set tire pressures when the tires are cold.
- Tire pressures must be equal in both front tires and equal in both rear tires.

## 2. Check:

- Tire surfaces  
Wear/damage → Replace.

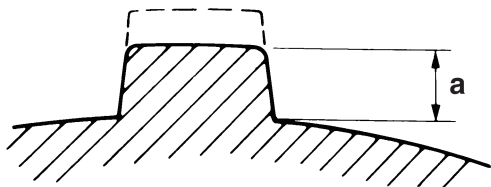


Wear limit (front)  
3.0 mm (0.12 in)  
Wear limit (rear)  
3.0 mm (0.12 in)

EWB03100

## WARNING

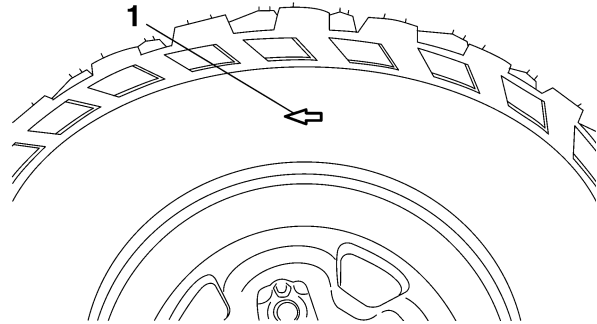
It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.



a. Wear limit

## TIP

The arrow mark “1” on the tire must point in the direction of wheel rotation.



EBS30055

## CHECKING THE V-BELT

### 1. Remove:

- Drive belt cover  
Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.

### 2. Check:

- V-belt “1”  
Cracks/damage/wear → Replace.  
Grease/oil → Clean the primary and secondary sheaves.

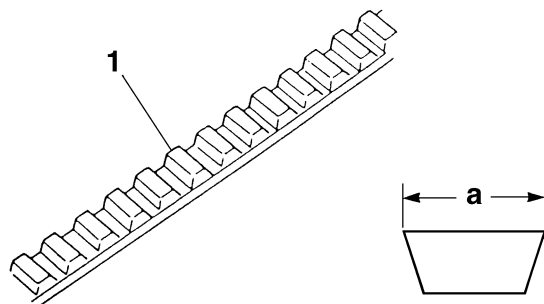
Refer to “REPLACING THE V-BELT” on page 3-18.

### 3. Measure:

- V-belt width “a”  
Out of specification → Replace.  
Refer to “REPLACING THE V-BELT” on page 3-18.



V-belt width limit  
31.3 mm (1.23 in)



### 4. Install:

- Drive belt cover  
Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.

EBS30056

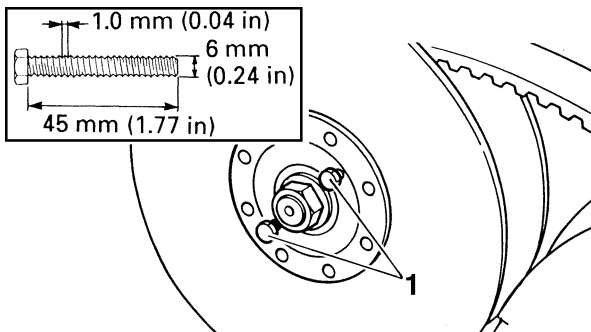
## REPLACING THE V-BELT

1. Remove:
  - Drive belt cover
  - Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-49.
2. Replace:
  - V-belt

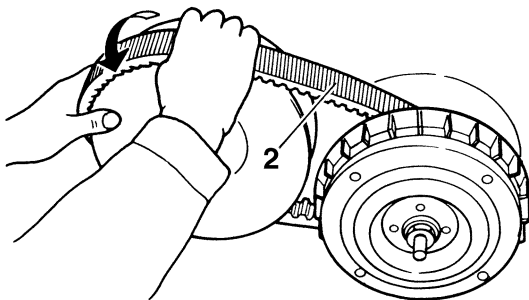
- a. Install the bolts "1" (90101-06016) into the secondary fixed sheave holes.

### TIP

Tightening the bolts "1" will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.



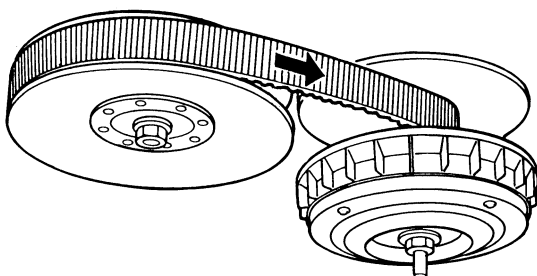
- b. Remove the V-belt "2" from the primary sheave and secondary sheave.



- c. Install a new V-belt.

### TIP

Install the new V-belt so that its arrow faces the direction shown in the illustration.



- d. Remove the bolts.



EBS30069

## CHECKING THE FASTENER

1. Check:
  - Fasteners
  - Damage/pitting → Replace.
  - Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30059

## CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

1. Place the vehicle on a level place.
2. Check:
  - Front shock absorber assembly
  - Refer to "CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-67.
3. Check:
  - Operation
  - Pump the front shock absorber assembly up and down several times.
  - Unsmooth operation → Replace front shock absorber assembly.
  - Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-65.

EBS30430

## ADJUSTING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

EWB03760



**WARNING**

Always adjust the spring preload for both front shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:
  - Spring preload
  - Turn the adjuster "1" in direction "a" or "b".



Ring nut wrench  
90890-01268  
Spanner wrench  
YU-01268

## Direction “a”

Spring preload is increased (suspension is harder).

## Direction “b”

Spring preload is decreased (suspension is softer).



### Front and rear suspension spring preload adjusting positions

Minimum

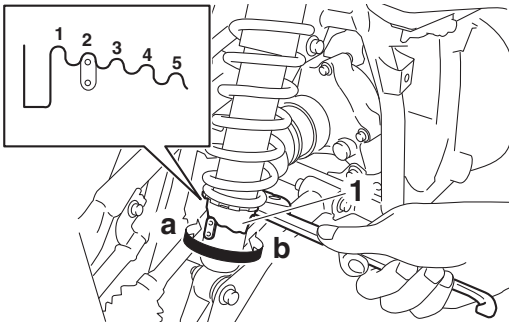
1

Standard

2

Maximum

5



EBS30060

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear shock absorber assemblies.

1. Place the vehicle on a level place.
2. Check:
  - Rear shock absorber assembly  
Refer to “CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES” on page 4-73.
3. Check:
  - Operation  
Pump the rear shock absorber assembly up and down several times.  
Unsmooth operation → Replace rear shock absorber assembly.  
Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-72.

EBS30431

## ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

The following procedure applies to both of the rear shock absorber assemblies.

EWB03770

## ⚠ WARNING

Always adjust the spring preload for both rear shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:
  - Spring preload  
Turn the adjuster “1” in direction “a” or “b”.



Ring nut wrench

90890-01268

Spanner wrench

YU-01268

## Direction “a”

Spring preload is increased (suspension is harder).

## Direction “b”

Spring preload is decreased (suspension is softer).



### Front and rear suspension spring preload adjusting positions

Minimum

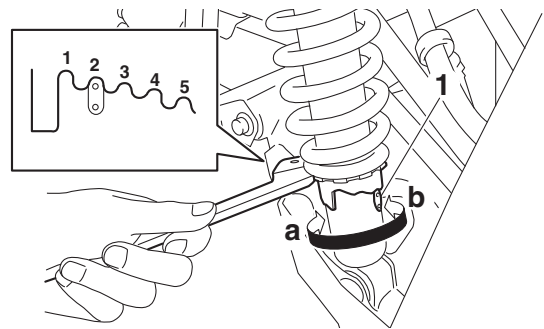
1

Standard

2

Maximum

5



EBS30064

## CHECKING THE STABILIZER BUSHING

1. Check:
  - Stabilizer bushings  
Damage/wear → Replace.  
Refer to “REAR KNUCKLES AND STABILIZER” on page 4-70.

EBS30065

## LUBRICATING THE REAR KNUCKLE PIVOTS

1. Lubricate:
  - Rear knuckle pivots







# PERIODIC MAINTENANCE



**Toe-in (with tires touching the ground)**  
0.0–10.0 mm (0.00–0.39 in)

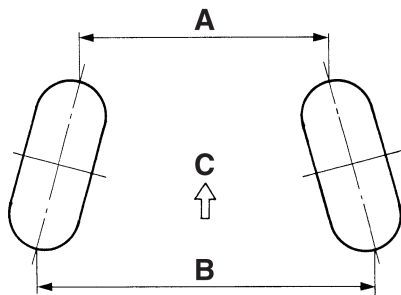
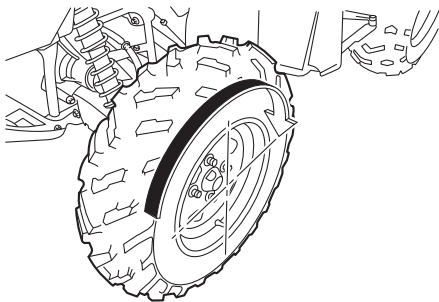
**TIP**

Before measuring the toe-in, make sure that the tire pressure is correct.

- a. Mark both front tire tread centers.
- b. Face the handlebar straight ahead.
- c. Measure the width “A” between the marks.
- d. Rotate the front tires 180° until the marks are exactly opposite one another.
- e. Measure the width “B” between the marks.
- f. Calculate the toe-in using the formula given below.

**Toe-in = “B” – “A”**

- g. If the toe-in is incorrect, adjust it.



C. Forward

3. Adjust:
  - Toe-in

EWB03750

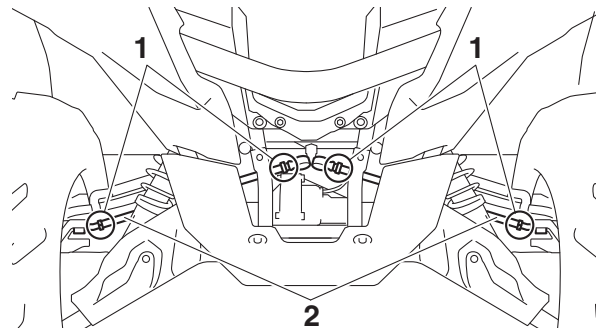


**WARNING**

- Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mis-handling and an accident.

- After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

- a. Mark both tie-rods ends.  
This reference point will be needed during adjustment.
- b. Loosen the tie-rod end locknuts “1” of both tie-rods.
- c. The same number of turns should be given to both the right and left tie-rods “2” until the specified toe-in is obtained. This is to keep the length of the tie-rods the same.



- d. Tighten the tie-rod end locknuts to specification.



**Tie-rod end locknut (front wheel side)**

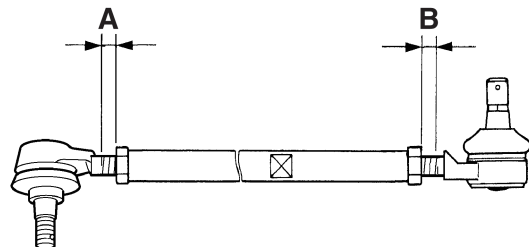
**15 Nm (1.5 m·kgf, 11 ft·lbf)**

**Tie-rod end locknut (pitman arm side)**

**15 Nm (1.5 m·kgf, 11 ft·lbf)**

**TIP**

Adjust the tie-rod ends so that “A” and “B” are equal.



4. Check:
  - Handlebar

## TIP

After adjusting the toe-in, the handlebar should be centered.

Refer to "INSTALLING THE HANDLEBAR" on page 4-50.

EBS30067

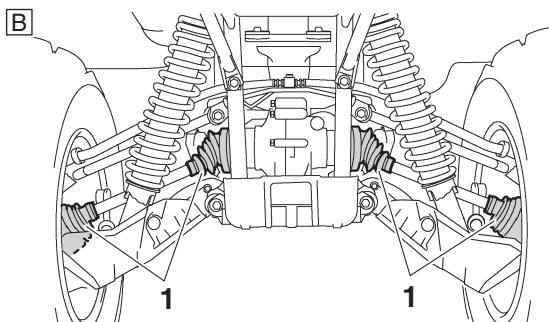
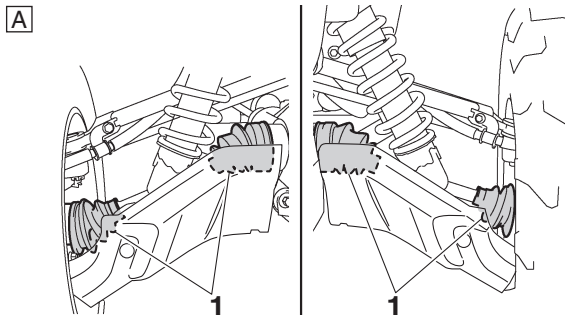
## CHECKING THE ENGINE MOUNT

- Check:
  - Rubber damper  
Cracks/damage → Replace.
  - Engine mounting bolts
  - Rubber damper nuts  
Loosen → Tighten.
 Refer to "ENGINE REMOVAL (3)" on page 5-8.

EBS30068

## CHECKING THE CONSTANT VELOCITY SHAFT ASSEMBLY DUST BOOTS

- Check:
  - Dust boots "1"  
Damage → Replace.
 Refer to "FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT" on page 8-4 and "REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT" on page 8-15.



- A. Front  
B. Rear

EBS30038

## CHECKING THE ENGINE OIL LEVEL

- Place the vehicle on a level surface.
- Check the engine oil level on a cold engine.

## TIP

If the engine was started before the oil level was checked, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

- Remove:
  - Dipstick accessing cover  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
- 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.

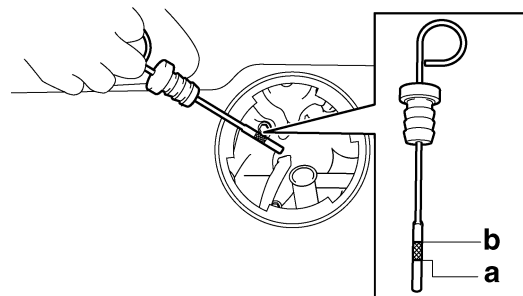
ECB01810

## NOTICE

**Do not allow foreign materials to enter the crankcase.**

## TIP

Insert the dipstick completely into the oil filler hole, and then remove it again to check the oil level.



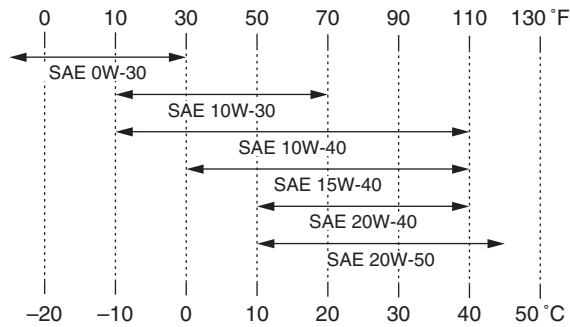
**Recommended brand  
YAMALUBE**

**Type**

**SAE 0W-30, 10W-30, 10W-40,  
15W-40, 20W-40 or 20W-50**

**Recommended engine oil grade  
API service SG type or higher,  
JASO standard MA**

# PERIODIC MAINTENANCE



ECB01820

## NOTICE

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

5. Check the engine oil level again.

ECB01830

## NOTICE

Be sure the engine oil is at the correct level, otherwise engine damage may result.

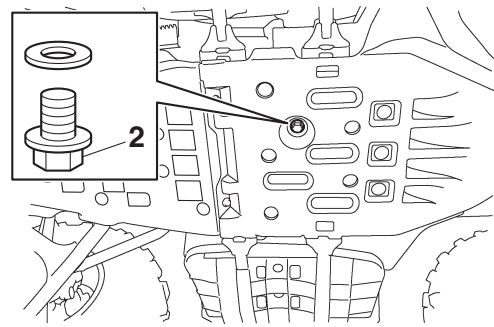
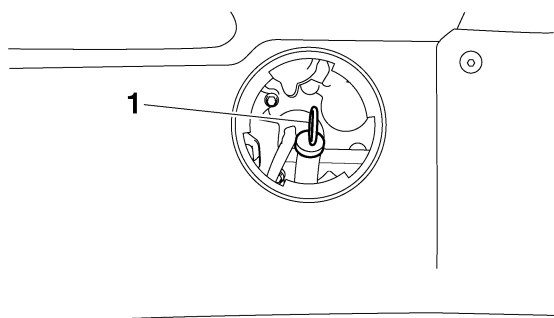
6. Install:

- Dipstick accessing cover  
Refer to “GENERAL CHASSIS (4)” on page 4-11.

EBS30039

## CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Remove:
  - Dipstick accessing cover  
Refer to “GENERAL CHASSIS (4)” on page 4-11.
3. Place a container under the engine oil drain bolt.
4. Remove:
  - Dipstick “1”
  - Engine oil drain bolt “2”  
(along with the gasket)



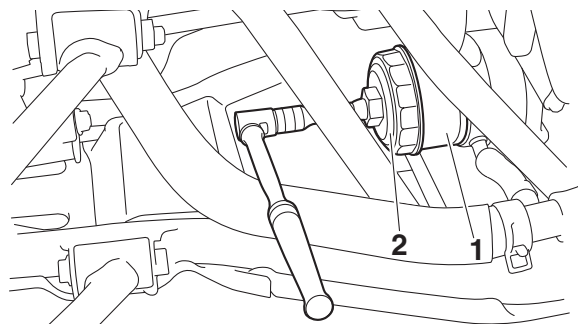
5. Drain:

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

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



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

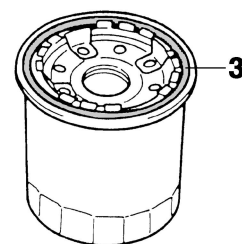


- b. Lubricate the O-ring “3” of a new oil filter cartridge with a thin coat of engine oil.

ECB01280

## 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 the oil filter wrench.

# PERIODIC MAINTENANCE



**Oil filter cartridge**  
15 Nm (1.5 m·kgf, 11 ft·lbf)



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



**Engine oil drain bolt**  
22 Nm (2.2 m·kgf, 16 ft·lbf)

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



**Engine oil quantity**  
**Quantity (disassembled)**  
2.60 L (2.75 US qt, 2.29 Imp.qt)  
**Without oil filter cartridge replacement**  
2.00 L (2.11 US qt, 1.76 Imp.qt)  
**With oil filter cartridge replacement**  
2.10 L (2.22 US qt, 1.85 Imp.qt)

9. Install:
- Dipstick
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 3-23.
13. Install:
- Dipstick accessing cover  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
14. Check:
- Engine oil pressure  
Refer to "MEASURING THE ENGINE OIL PRESSURE" on page 3-25.

EBS30458

## MEASURING THE ENGINE OIL PRESSURE

1. Check:
- Engine oil level  
Refer to "CHANGING THE ENGINE OIL" on page 3-24.

2. Remove:
- Side panel (left)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.
  - Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
3. Start the engine, warm it up for several minutes, and then turn it off.

ECB02550

### NOTICE

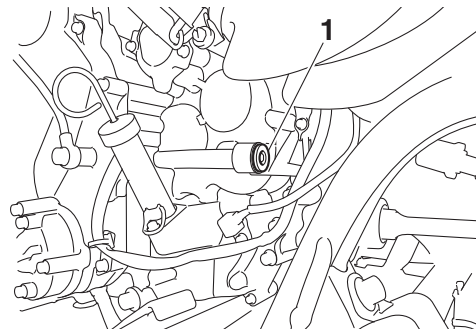
**When the engine is cold, the engine oil will have a higher viscosity, causing the engine oil pressure to increase. Therefore, be sure to measure the engine oil pressure after warming up the engine.**

4. Remove:
- Main gallery bolt "1"

EWB03630

### WARNING

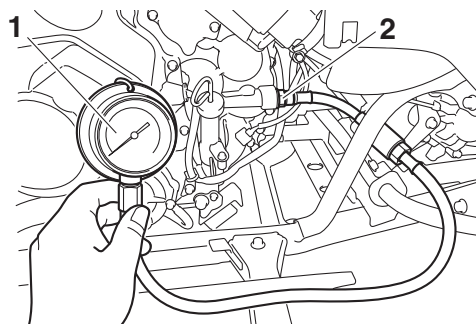
**The engine, muffler and engine oil are extremely hot.**



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




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



# PERIODIC MAINTENANCE

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



**Oil pressure (hot)**  
**50.0 kPa/1600 r/min (0.50**  
**kgf/cm<sup>2</sup>/1600 r/min, 7.3 psi/1600**  
**r/min)**

Out of specification → Check.

Engine oil pressure	Possible causes
Below specification	<ul style="list-style-type: none"> <li>• Faulty oil pump</li> <li>• Clogged oil strainer</li> <li>• Leaking oil passage</li> <li>• Broken or damaged oil seal</li> </ul>
Above specification	<ul style="list-style-type: none"> <li>• Leaking oil passage</li> <li>• Faulty oil filter</li> <li>• Oil viscosity too high</li> </ul>

7. Install:
- Main gallery bolt
  - Gasket **New**




**Main gallery bolt**  
**35 Nm (3.5 m·kgf, 25 ft·lbf)**  
**LOCTITE®**

8. Install:
- Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
  - Side panel (left)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30042

## CHECKING THE DIFFERENTIAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
  - Differential gear oil filler bolt "1"  
(along with the gasket)
3. Check:
  - Differential gear oil level  
The differential gear oil level should be up to the brim "2" of the hole.  
Below the brim → Add the recommended differential gear oil to the proper level.

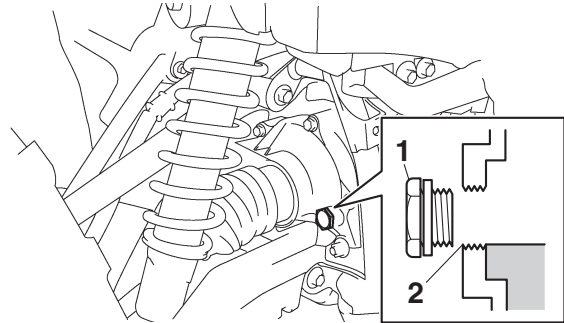


**Type**  
**Yamaha Friction Modified Plus**  
**Shaft Drive Oil (Part No.: ACC-**  
**SHFTL-PL-32) or SAE 80 API**  
**GL-4 Hypoid gear oil**


ECB01600

### NOTICE

**Take care not to allow foreign material to enter the differential case.**



4. Check:
- Differential gear oil filler bolt gasket  
Damage → Replace.
5. Install:
- Differential gear oil filler bolt  
(along with the gasket)

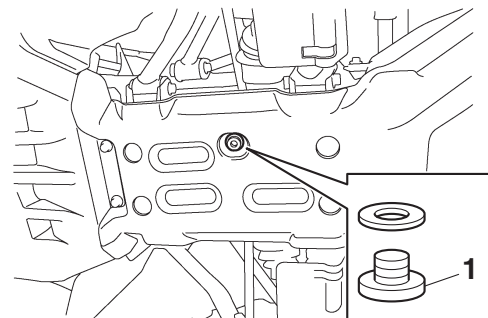


**Differential gear oil filler bolt**  
**23 Nm (2.3 m·kgf, 17 ft·lbf)**


EBS30043

## CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a container under the differential case.
3. Remove:
  - Differential gear oil filler bolt  
(along with the gasket)
  - Differential gear oil drain bolt "1"  
(along with the gasket)  
Completely drain the differential case of its oil.



4. Install:
- Differential gear oil drain bolt  
(along with the gasket **New**)



**Differential gear oil drain bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

# PERIODIC MAINTENANCE

5. Fill:
- Differential case  
(with the specified amount of the recommended differential gear oil)



**Type**  
Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil

**Quantity (disassembled)**  
0.23 L (0.24 US qt, 0.20 Imp.qt)

**Quantity**  
0.22 L (0.23 US qt, 0.19 Imp.qt)

ECB01600

## NOTICE

Take care not to allow foreign material to enter the differential case.

6. Check:
- Oil level  
Refer to "CHECKING THE DIFFERENTIAL GEAR OIL LEVEL" on page 3-26.
7. Install:
- Differential gear oil filler bolt  
(along with the gasket)



**Differential gear oil filler bolt**  
23 Nm (2.3 m·kgf, 17 ft·lbf)

EBS30040

## CHECKING THE FINAL GEAR OIL LEVEL

- Place the vehicle on a level surface.
- Remove:
  - Final gear oil level check bolt "1"  
(along with the gasket)
- Check:
  - Final gear oil level  
The final gear oil level should be up to the brim "2" of the hole.  
Below the brim → Add the recommended final gear oil to the proper level.

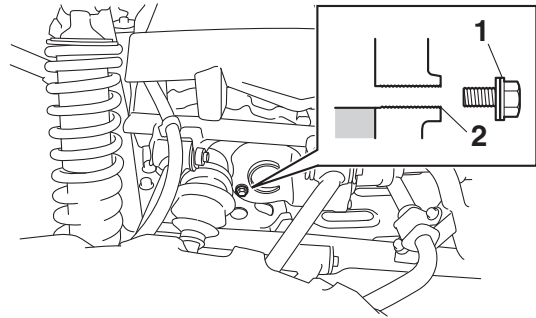


**Type**  
Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil

ECB01690

## NOTICE

Take care not to allow foreign material to enter the final drive case.



4. Check:
- Final gear oil level check bolt gasket  
Damage → Replace.
5. Install:
- Final gear oil level check bolt  
(along with the gasket)

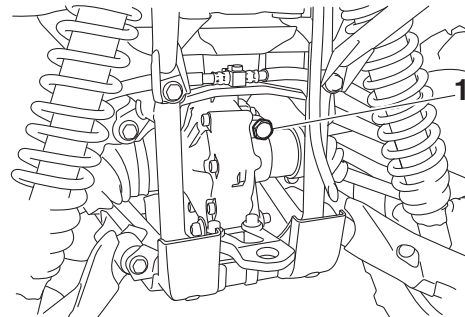


**Final gear oil level check bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

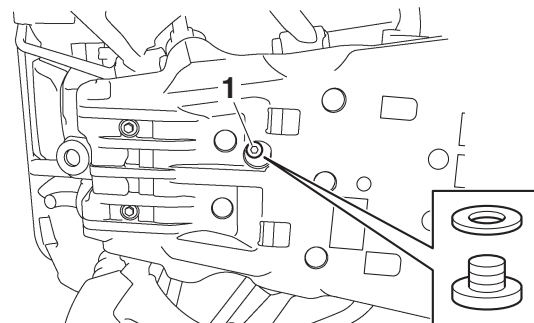
EBS30041

## CHANGING THE FINAL GEAR OIL

- Place the vehicle on a level surface.
- Place a container under the final drive case.
- Remove:
  - Final gear oil filler bolt "1"  
(along with the gasket)



4. Remove:
- Final gear oil level check bolt  
(along with the gasket)
  - Final gear oil drain bolt "1"  
(along with the gasket)  
Completely drain the final drive case of its oil.



# PERIODIC MAINTENANCE

## 5. Install:

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



**Final gear oil drain bolt**  
23 Nm (2.3 m·kgf, 17 ft·lbf)

## 6. Fill:

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



**Type**  
Yamaha Friction Modified Plus  
Shaft Drive Oil (Part No.: ACC-  
SHFTL-PL-32) or SAE 80 API  
GL-4 Hypoid gear oil  
**Quantity (disassembled)**  
0.25 L (0.26 US qt, 0.22 Imp.qt)  
**Quantity**  
0.20 L (0.21 US qt, 0.18 Imp.qt)

ECB01690

### NOTICE

**Take care not to allow foreign material to enter the final drive case.**

## 7. Check:

- Oil level  
Refer to "CHECKING THE FINAL GEAR OIL LEVEL" on page 3-27.

## 8. Install:

- Final gear oil level check bolt  
(along with the gasket)
- Final gear oil filler bolt  
(along with the gasket)



**Final gear oil level check bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)  
**Final gear oil filler bolt**  
23 Nm (2.3 m·kgf, 17 ft·lbf)

EBS30034

## CHECKING THE COOLING SYSTEM

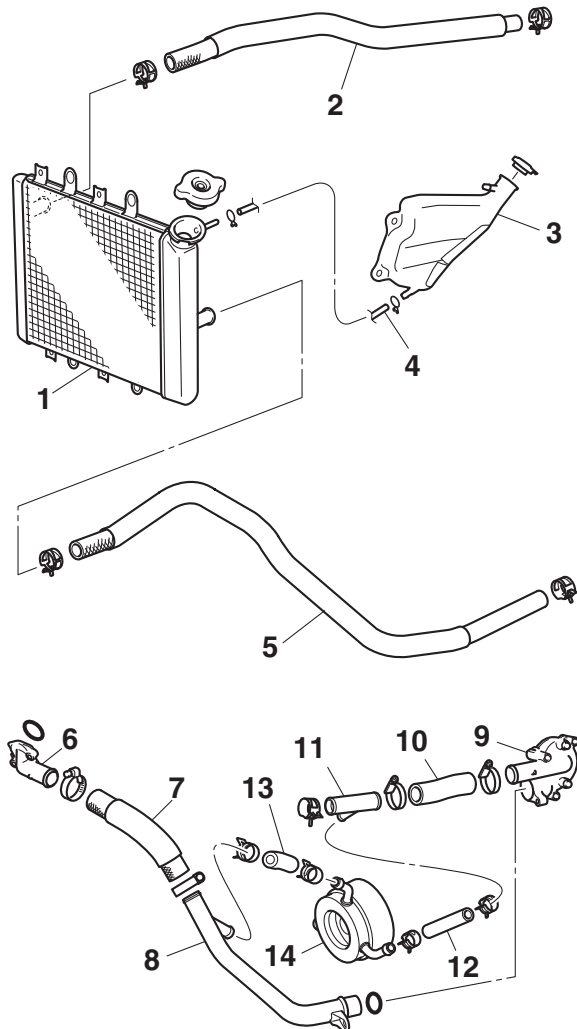
### 1. Remove:

- Front fenders  
Refer to "GENERAL CHASSIS (3)" on page 4-8.
- Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.

### 2. Check:

- Radiator "1"
- Radiator inlet hose "2"
- Coolant reservoir "3"
- Coolant reservoir hose "4"

- Radiator outlet hose "5"
  - Water jacket joint "6"
  - Water pump outlet hose "7"
  - Water pump outlet pipe "8"
  - Water pump housing "9"
  - Water pump inlet hose "10"
  - Cooling water hose joint "11"
  - Oil cooler inlet hose "12"
  - Oil cooler outlet hose "13"
  - Oil cooler "14"
- Cracks/damage → Replace.  
Coolant leakage → Replace any damaged hose and pipe  
Refer to "RADIATOR" on page 6-4 and "WATER PUMP" on page 6-10.



### 3. Install:

- Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
- Front fenders  
Refer to "GENERAL CHASSIS (3)" on page 4-8.

EBS30035

## CHECKING THE COOLANT LEVEL

1. Place the vehicle on a level surface.

### TIP

The coolant level must be checked on a cold engine since the level varies with engine temperature.

2. Check:

- Coolant level

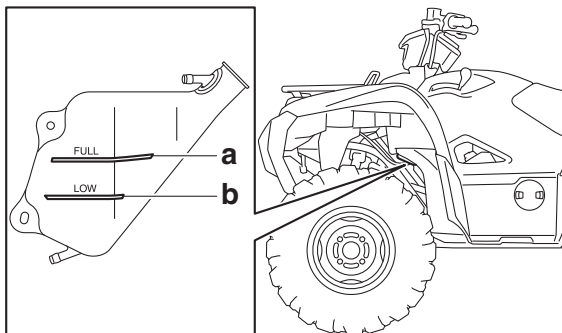
The coolant level should be between the maximum level mark “a” and minimum level mark “b”.

Below the minimum level mark → Add the recommended coolant to the proper level.

ECB01300

### 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.**



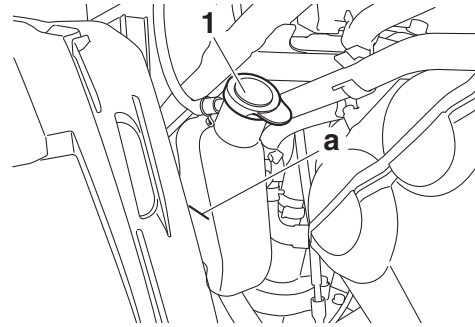
3. If the coolant is at or below the minimum level mark, remove the side panel (left).

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

4. Remove the reservoir cap “1”, add coolant or distilled water to the maximum level mark “a”, install the reservoir cap and then install the side panel (left).



**Coolant reservoir (up to the maximum level mark)**  
0.25 L (0.26 US qt, 0.22 Imp.qt)



EBS30036

## CHANGING THE COOLANT

1. Remove:

- Side panel (left)
- Side panel (right)

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

- Upper panel

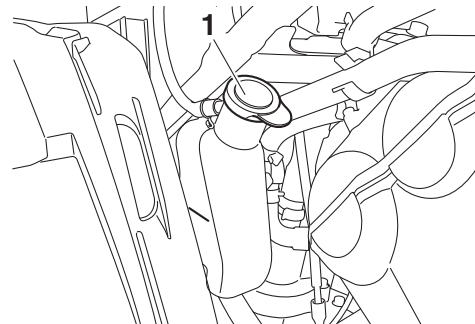
Refer to “GENERAL CHASSIS (2)” on page 4-6.

- Footrest board (left)

Refer to “GENERAL CHASSIS (4)” on page 4-11.

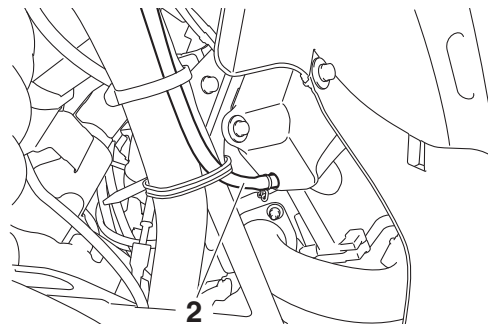
2. Remove:

- Coolant reservoir cap “1”



3. Disconnect:

- Coolant reservoir hose “2”



4. Drain:

- Coolant (from the coolant reservoir)

5. Connect:

- Coolant reservoir hose



## PERIODIC MAINTENANCE

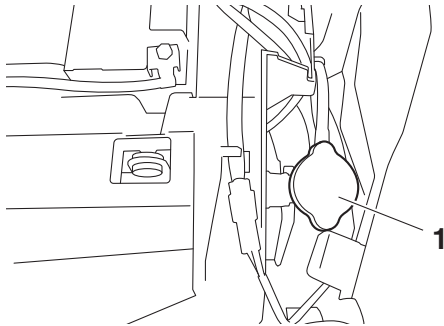
6. Remove:
- Radiator cap “1”

EWB02770

### 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:

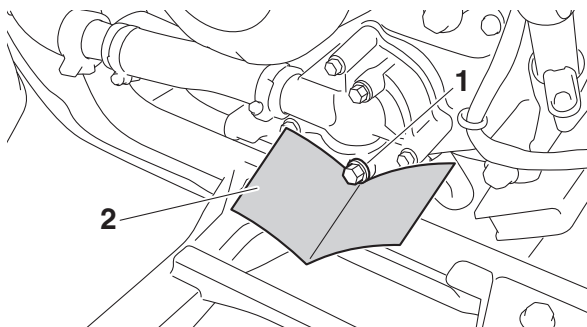
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.



7. Remove:
- Coolant drain bolt “1”  
(along with the copper washer)

### TIP

Place a container under the engine, and then remove the coolant drain bolt. (Use a trough “2” or a similar object as shown to prevent coolant from spilling on the engine guard.)



8. Drain:
- Coolant  
(from the engine and radiator)
9. Install:
- Coolant drain bolt  
(along with the copper washer **New**)



**Coolant drain bolt**  
8 Nm (0.8 m·kgf, 5.8 ft·lbf)

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



**Recommended antifreeze**  
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines  
Mixing ratio  
1:1 (antifreeze:water)  
Radiator (including all routes)  
1.76 L (1.86 US qt, 1.55 Imp. qt)  
Coolant reservoir (up to the maximum level mark)  
0.25 L (0.26 US qt, 0.22 Imp. qt)

### Handling notes for coolant

Coolant is potentially harmful and should be handled with special care.

EWB02780

### 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.

ECB01310

### NOTICE

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

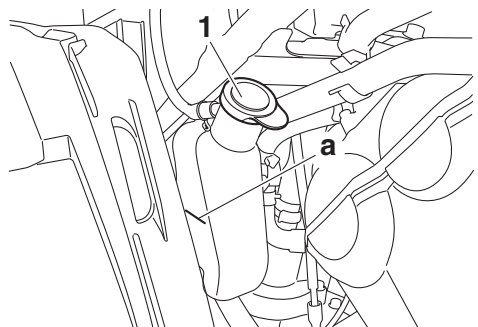
11. Install:
- Radiator cap

12. Fill:
- Coolant reservoir  
(with the recommended coolant to the maximum level mark “a”)

# PERIODIC MAINTENANCE

13. Install:

- Coolant reservoir cap "1"

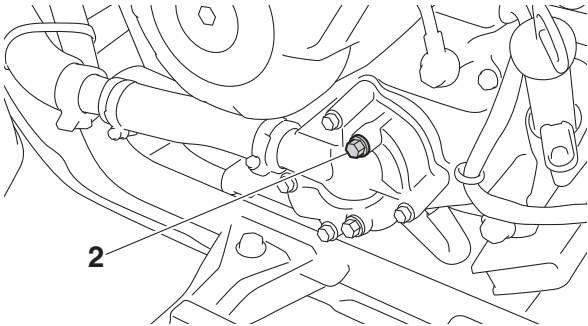


14. Bleed:

- Cooling system



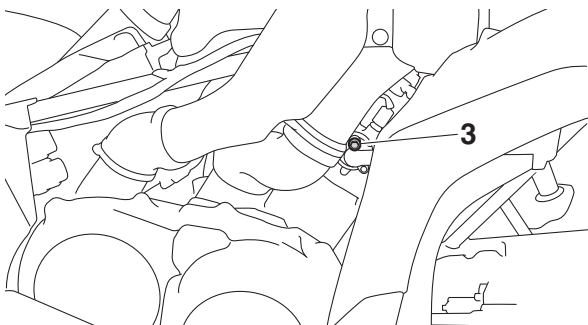
- a. Loosen the water pump air bleed bolt "2", without removing it, to allow all of the air to escape from the air bleed bolt hole.



- b. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.

**Water pump air bleed bolt**  
**8 Nm (0.8 m·kgf, 5.8 ft·lbf)**

- c. Loosen the thermostat cover air bleed bolt "3", without removing it, to allow all of the air to escape from the air bleed bolt hole.



- d. When coolant begins to flow out of the bolt hole, tighten the thermostat cover air bleed bolt to specification.

**Thermostat cover air bleed bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**



15. Start the engine, warm it up for ten minutes, and then rev the engine five times.
16. Pour the recommended coolant into the radiator until it is full.
17. Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.
18. Check:
- Coolant level  
Refer to "CHECKING THE COOLANT LEVEL" on page 3-29.
19. Start the engine, and then check for coolant leakage.
20. Install:
- Footrest board (left)  
Refer to "GENERAL CHASSIS (4)" on page 4-11.
  - Upper panel  
Refer to "GENERAL CHASSIS (2)" on page 4-6.
  - Side panel (left)
  - Side panel (right)  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30053  
**CHECKING AND LUBRICATING THE CABLES**

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

EWB02820

**⚠ WARNING**

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

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

**Recommended lubricant**  
**Engine oil or a suitable cable lubricant**

## TIP

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

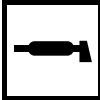
### 3. Apply:

- Lithium-soap-based grease (onto end of the cable)

EBS30464

### LUBRICATING THE LEVERS

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



**Recommended lubricant**  
Silicone grease

EBS30465

### LUBRICATING THE PEDAL

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



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

EBS30462

### ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD

ECB02700

## NOTICE

**Before moving the drive select lever, bring the vehicle to a complete stop and return the throttle lever to its closed position. Otherwise the transmission may be damaged.**

- “H” (high)
- “L” (low)
- “R” (reverse)
- “P” (park)
- Drive select lever shift control cable
- Drive select lever shift rod

### 1. Adjust:

- Brake pedal free play  
Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.

### 2. Remove:

- Handle mounted light cover  
Refer to “REPLACING THE HANDLE MOUNTED LIGHT BULB” on page 3-34.
- Side panel (left)  
Refer to “GENERAL CHASSIS (1)” on page 4-1.

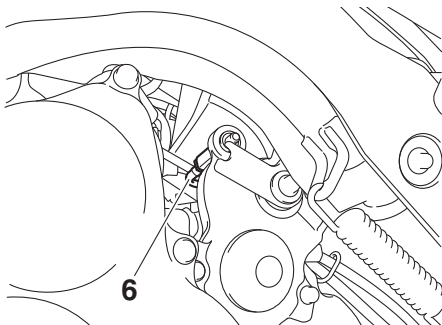
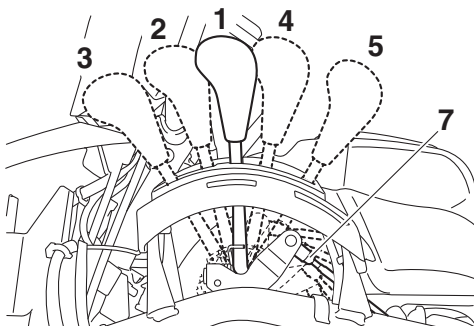
### 3. Adjust:

- Drive select lever shift control cable
- Drive select lever shift rod

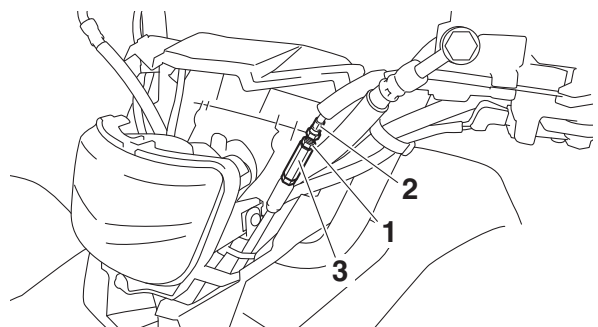
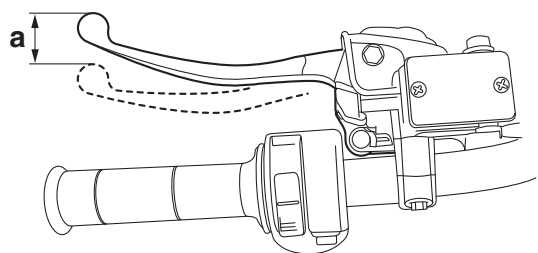


### Drive select lever shift control cable:

- Make sure that the drive select lever is in “N” (neutral).
- Squeeze the brake lever 15–25 mm (0.59–0.98 in) “a”, loosen the locknut “1”, and then adjust the shift control cable “2” with the adjuster “3” so that the drive select lever can be shifted to “R” (reverse) from “N” (neutral), and to “P” (park) from “R” (reverse).



- “N” (neutral)



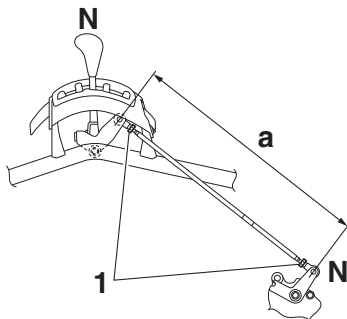
# PERIODIC MAINTENANCE

- c. Release the brake lever so that "a" is 0 mm (0 in), and then verify that the drive select lever cannot be shifted to "R" (reverse) from "N" (neutral), or to "P" (park) from "R" (reverse).
- d. If the operation of the drive select lever is incorrect, repeat steps (a) to (c).
- e. Tighten the locknut.



## Drive select lever shift rod:

- a. Make sure the drive select lever and transmission are in "N" (neutral).
- b. Loosen both locknuts "1".
- c. Adjust the length "a" of the shift rod to 410 mm (16.1 in).



- d. Tighten the locknuts.



**Drive select lever shift rod locknut (select lever unit side)**  
**8 Nm (0.8 m·kgf, 5.8 ft·lbf)**  
**Drive select lever shift rod locknut (shift arm side)**  
**8 Nm (0.8 m·kgf, 5.8 ft·lbf)**

- e. Start the engine, and then check that the drive select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.

## TIP

If the neutral indicator light does not come on when the drive select lever is in the "N" (neutral) position, stop the engine. Then, with the drive select lever in the "N" (neutral) position and without opening the throttle, start the engine and check that the neutral indicator light comes on.

- f. Adjust the shift control cable again if necessary.



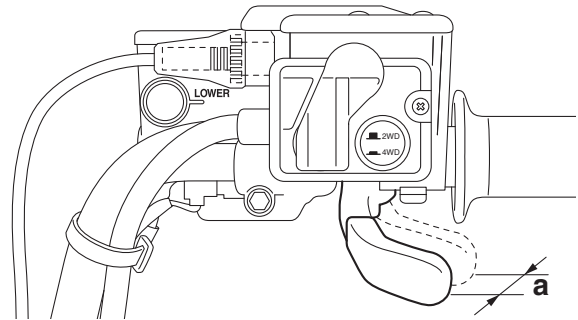
EBS30446

## ADJUSTING THE THROTTLE LEVER FREE PLAY

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



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



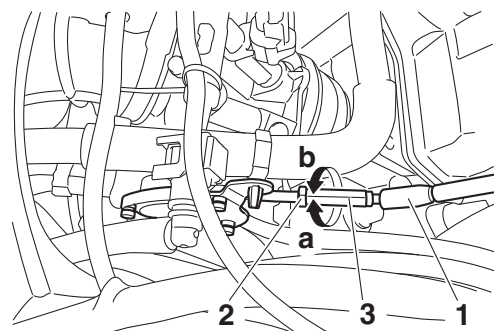
2. Remove:
  - Storage compartment
 Refer to "GENERAL CHASSIS (5)" on page 4-17.
3. Adjust:
  - Throttle lever free play



## Throttle body side

- a. Slide back the rubber cover "1".
- b. Loosen the locknut "2" on the throttle body side.
- c. Turn the adjusting nut "3" in direction "a" or "b" until the correct free play is obtained.

**Direction "a"**  
**Free play is increased.**  
**Direction "b"**  
**Free play is decreased.**



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

## TIP

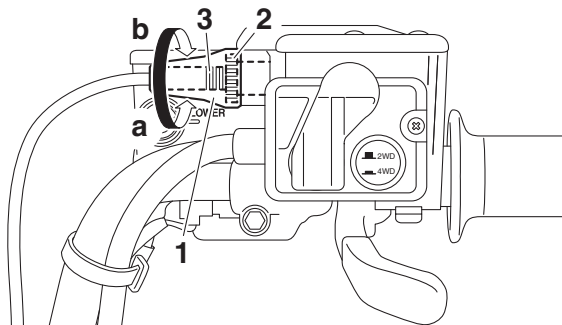
If the free play cannot be adjusted here, adjust it at the handlebar side of the cable.



### Handlebar side

- a. Slide back the rubber cover "1".
- b. Loosen the locknut "2".
- c. Turn the adjusting bolt "3" in direction "a" or "b" until the correct free play is obtained.

Direction "a"  
Free play is increased.  
Direction "b"  
Free play is decreased.



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

EWB03810

## WARNING

After adjusting the throttle cable free play, start the engine and turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.



4. Install:
  - Storage compartment
 Refer to "GENERAL CHASSIS (5)" on page 4-17.

EBS30463

## ADJUSTING THE SPEED LIMITER

The speed limiter keeps the throttle from becoming fully-opened even when the throttle lever is applied to the maximum position. Screwing in the adjusting screw stops the engine speed from increasing.

1. Measure:
  - Speed limiter length
 Out of specification → Adjust.

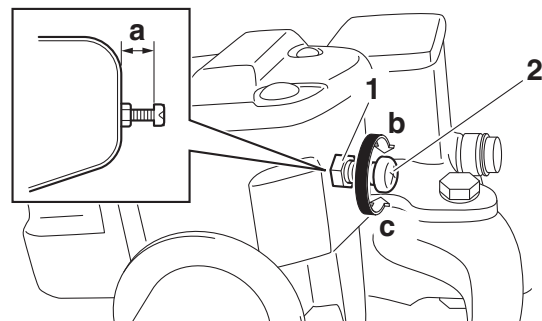


Speed limiter length  
12 mm (0.5 in)

2. Adjust:
  - Speed limiter length "a"

- a. Loosen the locknut "1".
- b. Turn the adjuster "2" in direction "b" or "c" until the specified speed limiter length is obtained.

Direction "b"  
Speed limiter length is decreased.  
Direction "c"  
Speed limiter length is increased.



- c. Tighten the locknut.

EWB03830

## WARNING

- Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as their riding technique improves. Never remove the speed limiter for a beginning rider.
- For proper throttle lever operation, do not turn out the adjuster more than the specified length. Also, always adjust the throttle cable free play to within specification.

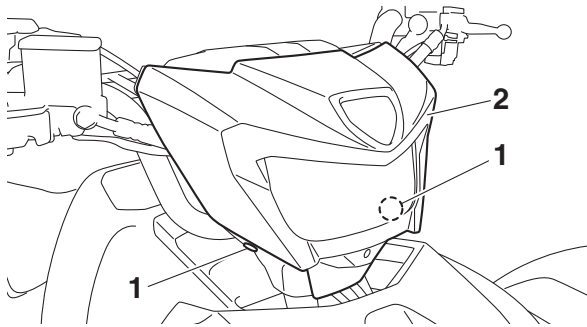


EBS30593

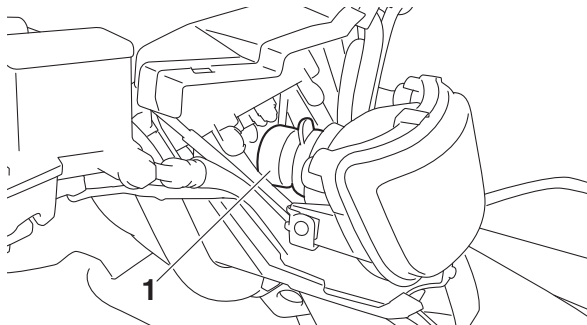
## REPLACING THE HANDLE MOUNTED LIGHT BULB

1. Remove:
  - Quick fastener "1"
  - Handle mounted light cover "2"

# PERIODIC MAINTENANCE



2. Remove:
- Handle mounted light bulb cover "1"



3. Remove:
- Handle mounted light bulb holder "1"
  - Handle mounted light bulb

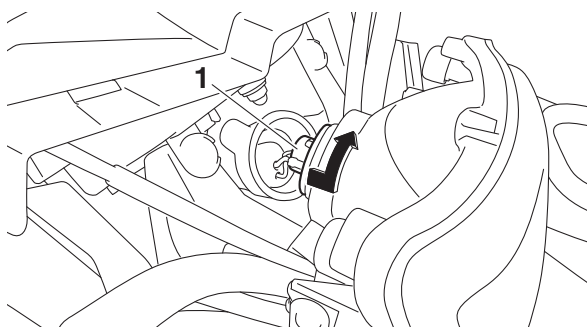
EWB03940

## **⚠ WARNING**

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

## **TIP**

Remove the handle mounted light bulb holder by pushing it in and turning it counterclockwise, and then remove the defective bulb.



4. Install:
- Handle mounted light bulb **New**  
Secure the new handle mounted light bulb with the handle mounted light bulb holder.

ECB02990

## **NOTICE**

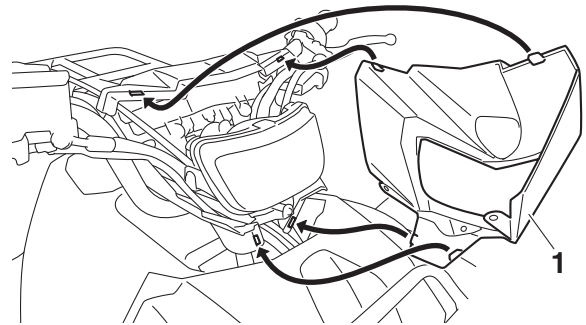
Avoid touching the glass part of the handle mounted light bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the handle mounted light bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol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

5. Install:
- Handle mounted light bulb holder

## **TIP**

Install the handle mounted light bulb holder by pushing it in and turning it clockwise.

6. Install:
- Cover at the rear of the handle mounted light
7. Install:
- Handle mounted light cover "1"
  - Quick fastener



EBS30594

## **ADJUSTING THE HEADLIGHT AND HANDLE MOUNTED LIGHT BEAMS**

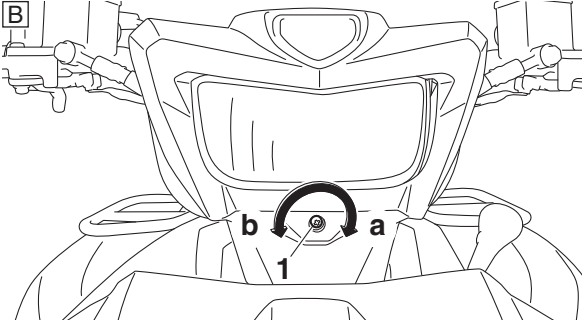
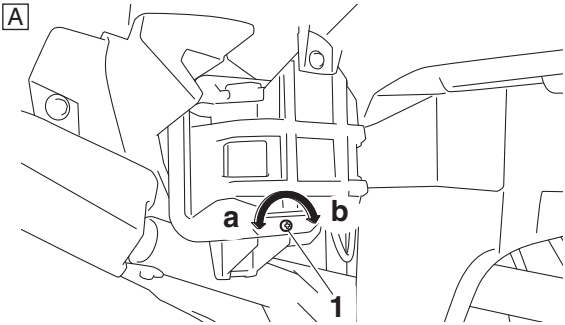
1. Adjust:
- Headlight and handle mounted light beam (vertically)

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

**Direction "a"**  
Light beam is raised.  
**Direction "b"**  
Light beam is lowered.

# PERIODIC MAINTENANCE

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- A. Headlight (left and right)
- B. Handle mounted light



## PERIODIC MAINTENANCE

---



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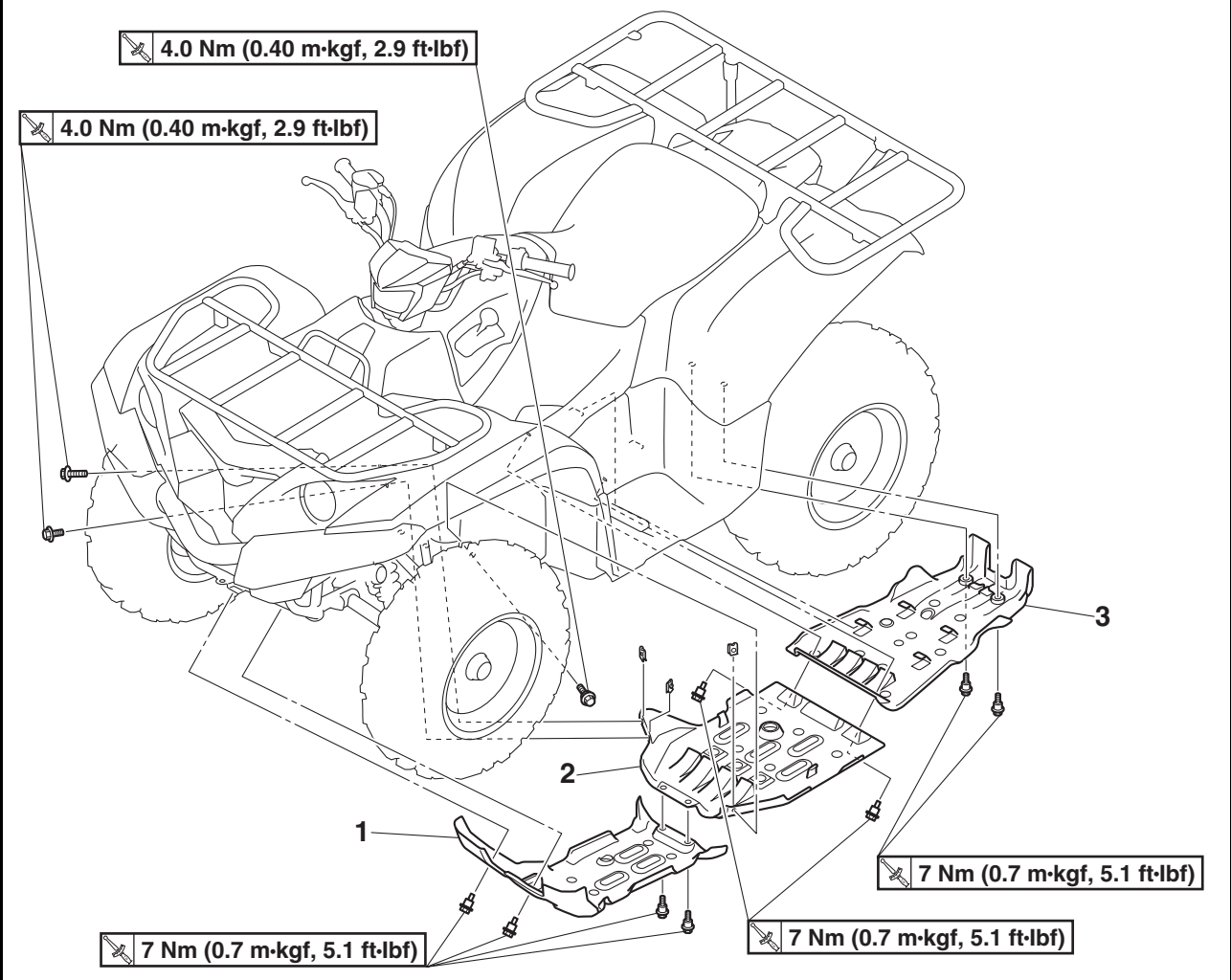
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EBS20024

## GENERAL CHASSIS (1)

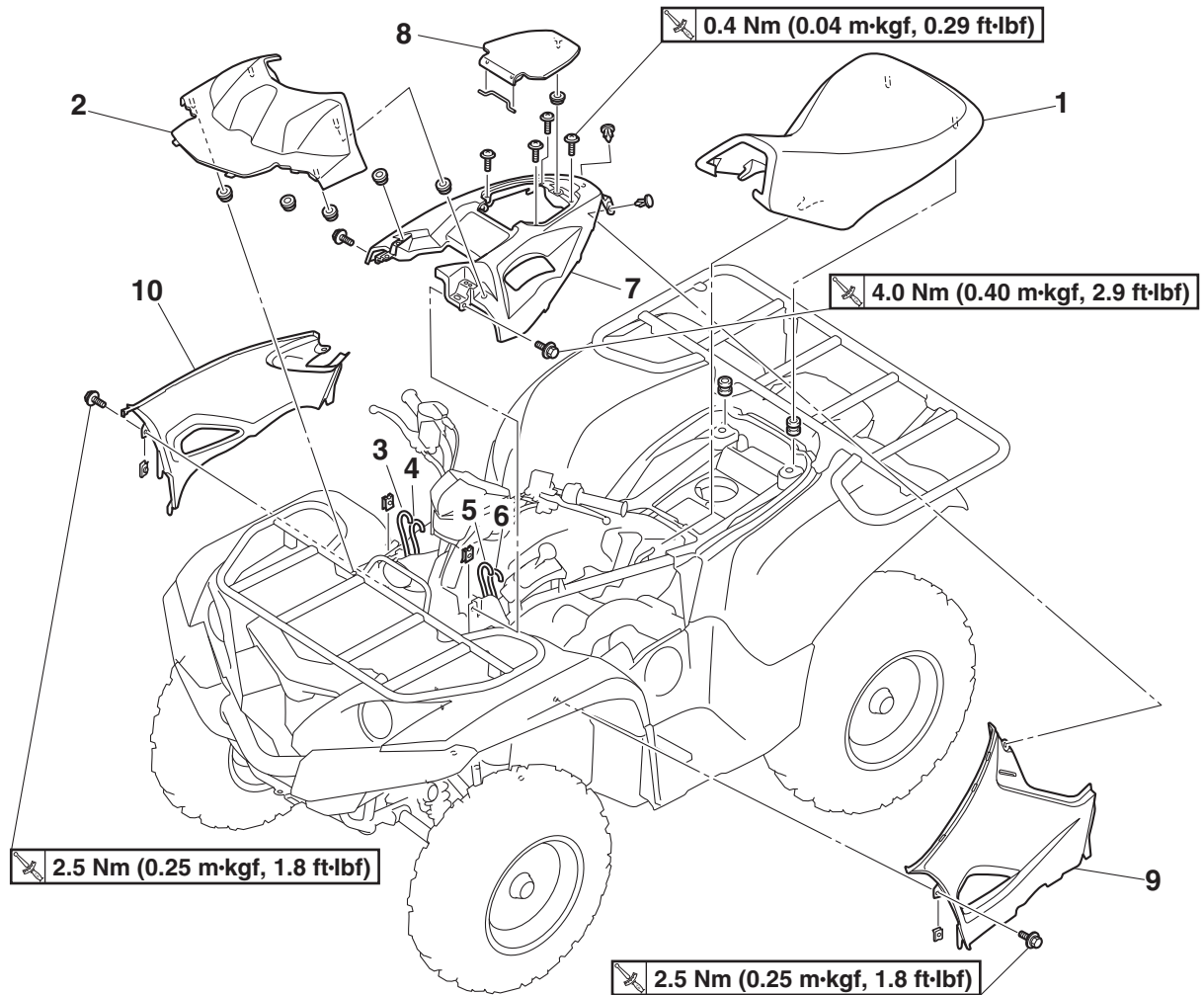
### Removing the skid plates



Order	Job/Parts to remove	Q'ty	Remarks
1	Front skid plate	1	
2	Center skid plate	1	
3	Rear skid plate	1	

# GENERAL CHASSIS (1)

## Removing the seat and side panels

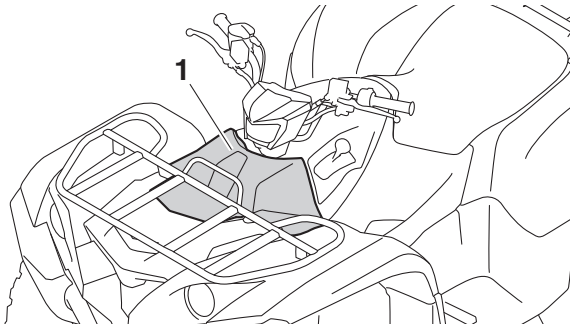


Order	Job/Parts to remove	Q'ty	Remarks
1	Seat	1	
2	Battery cover	1	
3	Throttle body breather hose	1	Disconnect.
4	Final drive case breather hose	1	Disconnect.
5	Differential case breather hose	1	Disconnect.
6	Radiator fan motor breather hose	1	Disconnect.
7	Top cover	1	
8	Storage compartment lid	1	
9	Side panel (left)	1	
10	Side panel (right)	1	

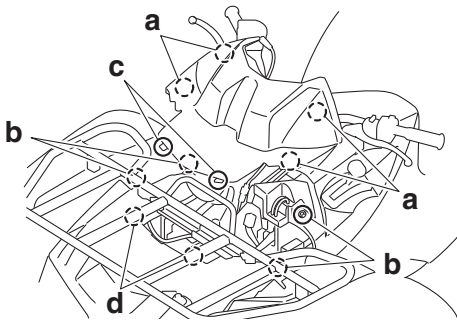
EBS30449

## REMOVING THE BATTERY COVER

1. Remove:
  - Battery cover "1"



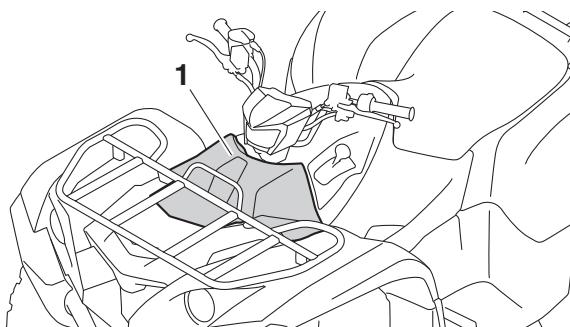
- a. Lift the rear of the battery cover to remove the projections "a" on the cover from the grommets "b".
- b. Slide the battery cover rearward to unhook its projections "c" from the holes "d" in the upper panel.



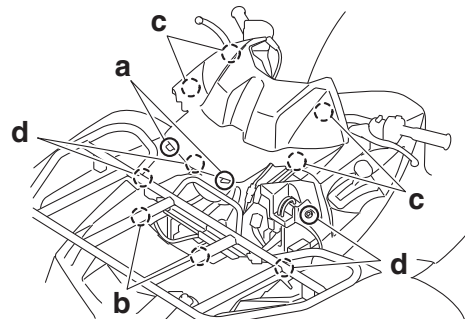
EBS30450

## INSTALLING THE BATTERY COVER

1. Install:
  - Battery cover "1"



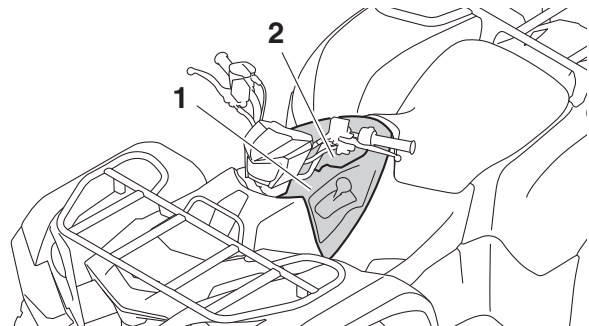
- a. Fit the projections "a" on the battery cover into the holes "b" in the upper panel.
- b. Fit the projections "c" on the battery cover into the grommets "d".



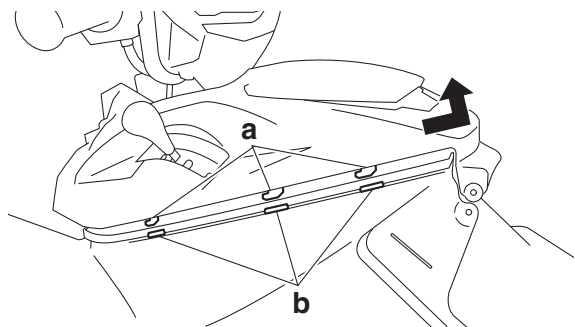
EBS30451

## REMOVING THE TOP COVER

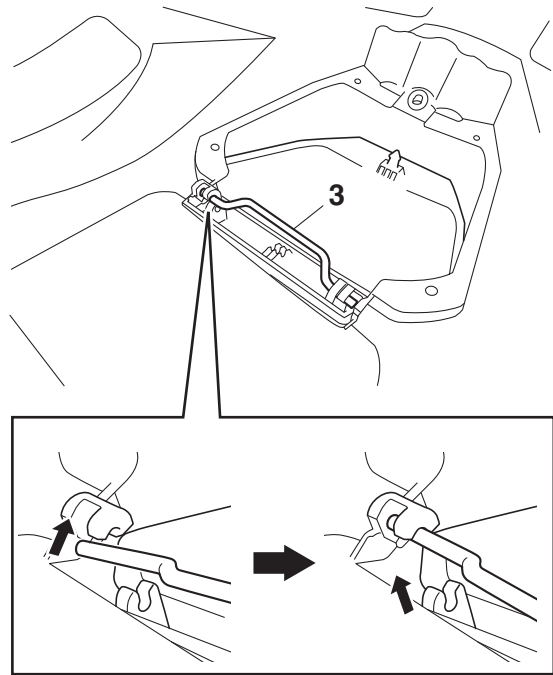
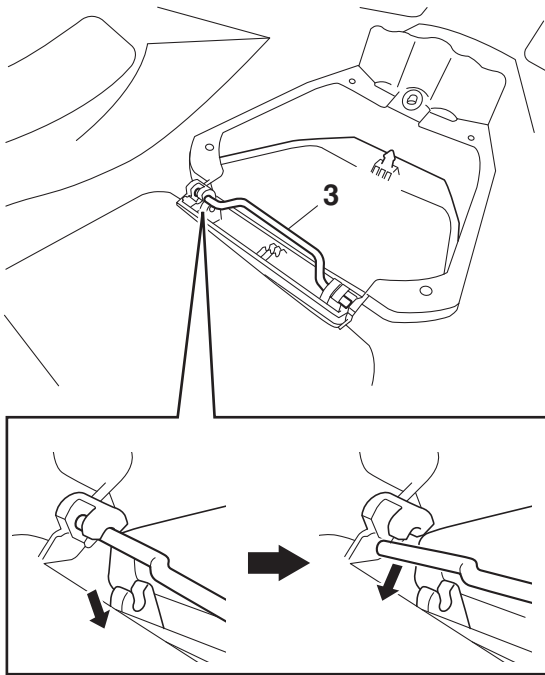
1. Remove:
  - Top cover "1"
  - Storage compartment lid "2"



- a. Remove the quick fasteners, screws, and bolts.
- b. Slide the top cover rearward and lift it up to unhook its projections "a" from the holes "b" in the side panels.




- c. Place the top cover upside down.
- d. Remove the storage compartment lid from the left end of the hinge "3".
- e. Remove the left end of the hinge from the top cover, and then remove the hinge and storage compartment lid from the top cover.

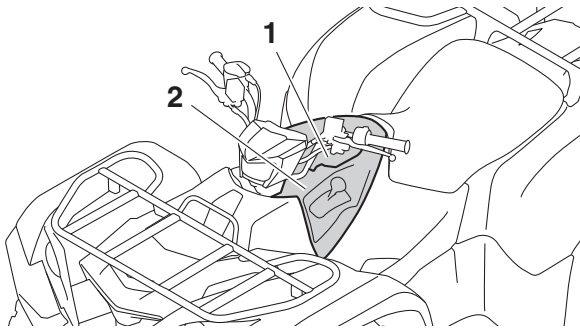


EBS30452

## INSTALLING THE TOP COVER

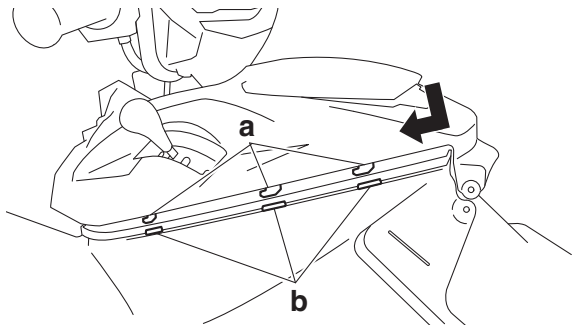
1. Install:
  - Storage compartment lid "1"
  - Top cover "2"

	<p><b>Top cover bolt</b>  <b>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</b></p>
---	--



- a. Place the top cover upside down.
- b. Fit the right end of the hinge "3" into the storage compartment lid and top cover.
- c. Fit the left end of the hinge into the top cover, and then fit the storage compartment lid onto the left end of the hinge.

- d. Fit the projections "a" on the top cover into the holes "b" in the side panels and slide the cover forward.



- e. Install the bolts, screws, and quick fasteners.



EBS30453

## REMOVING THE SIDE PANELS

The following procedure applies to both of the side panels.

The following procedure applies to both of the side panels.

1. Remove:
  - Side panel "1"

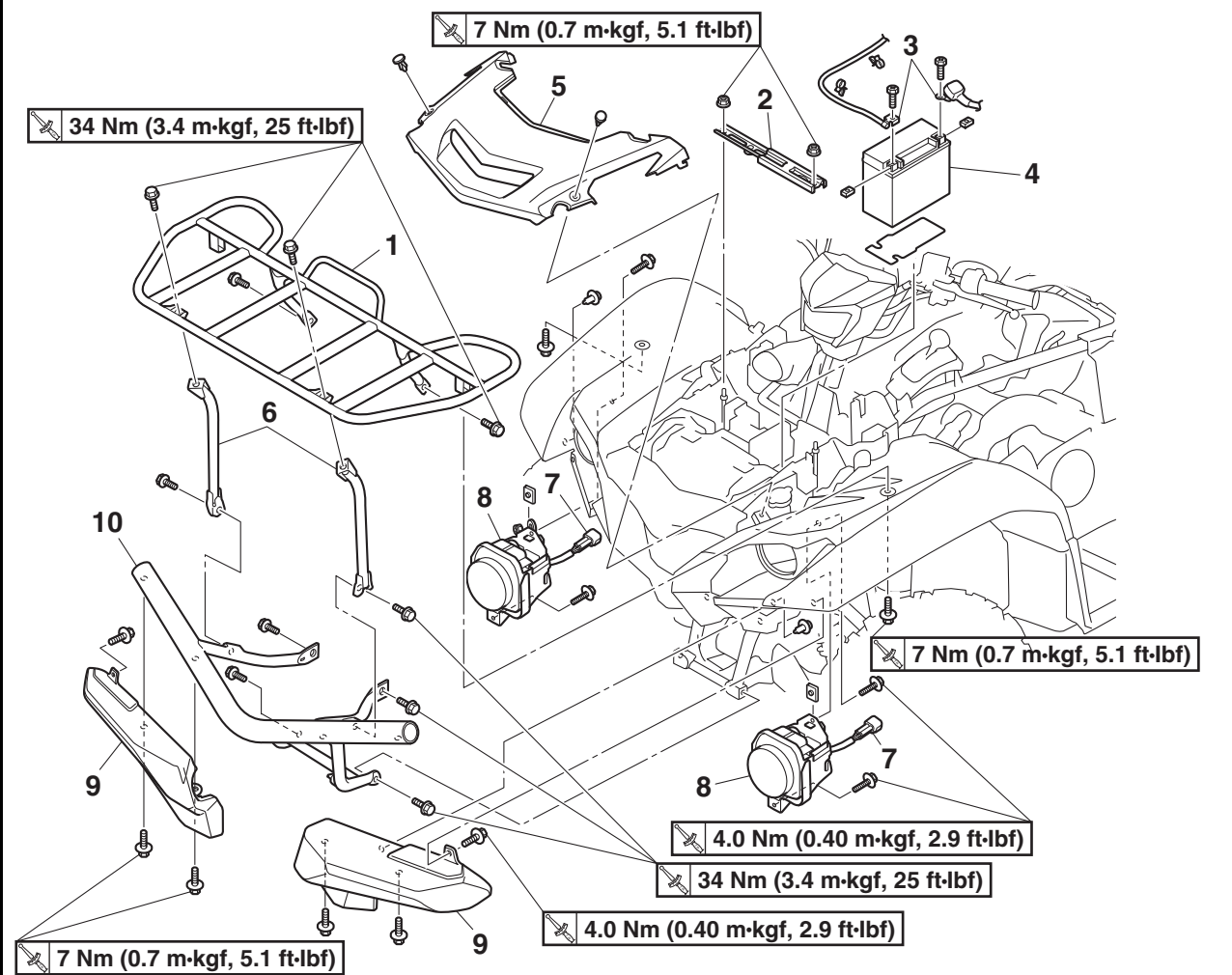




EBS20087

## GENERAL CHASSIS (2)

### Removing the front carrier and front guard

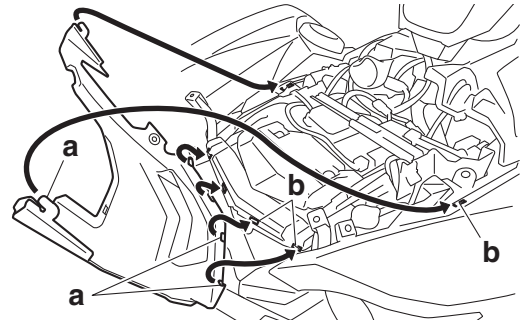
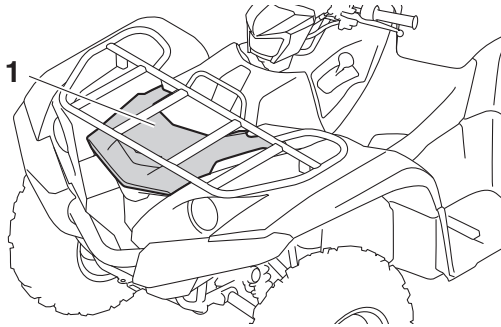


Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Battery cover		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Front carrier	1	
2	Battery holding bracket	1	
3	Battery lead	2	Disconnect.
4	Battery	1	
5	Upper panel	1	
6	Front carrier bracket	2	
7	Headlight coupler	2	Disconnect.
8	Headlight unit	2	
9	Front guard cover	2	
10	Front guard	1	

EBS30455

## REMOVING THE UPPER PANEL

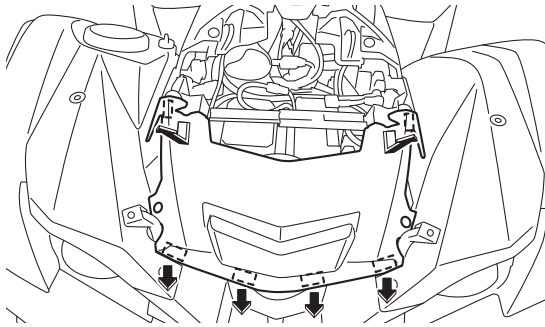
1. Remove:
  - Upper panel "1"



- b. Install the quick fasteners.



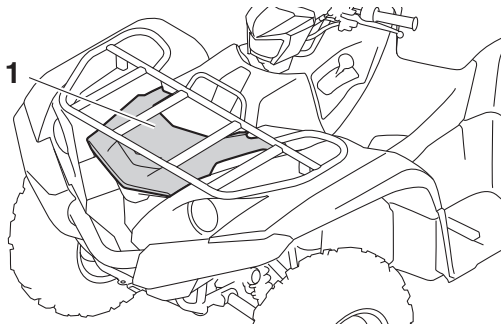
- a. Remove the quick fasteners.
- b. Slide the upper panel forward and lift it up to remove it.



EBS30456

## INSTALLING THE UPPER PANEL

1. Install:
  - Upper panel "1"

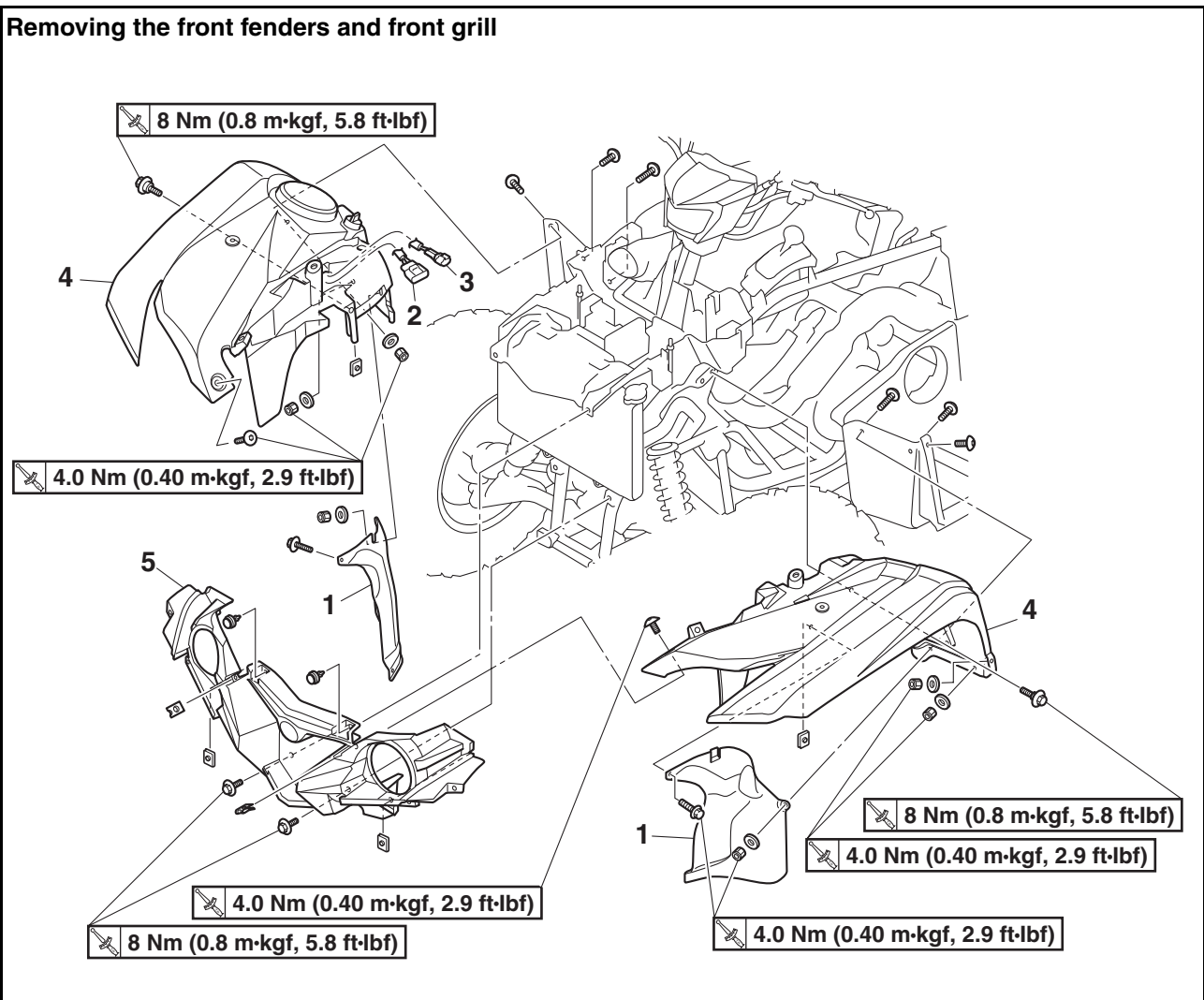


- a. Fit the projections "a" on the upper panel into the holes "b" in the front fender, and then slide the panel rearward.

EBS20088

## GENERAL CHASSIS (3)

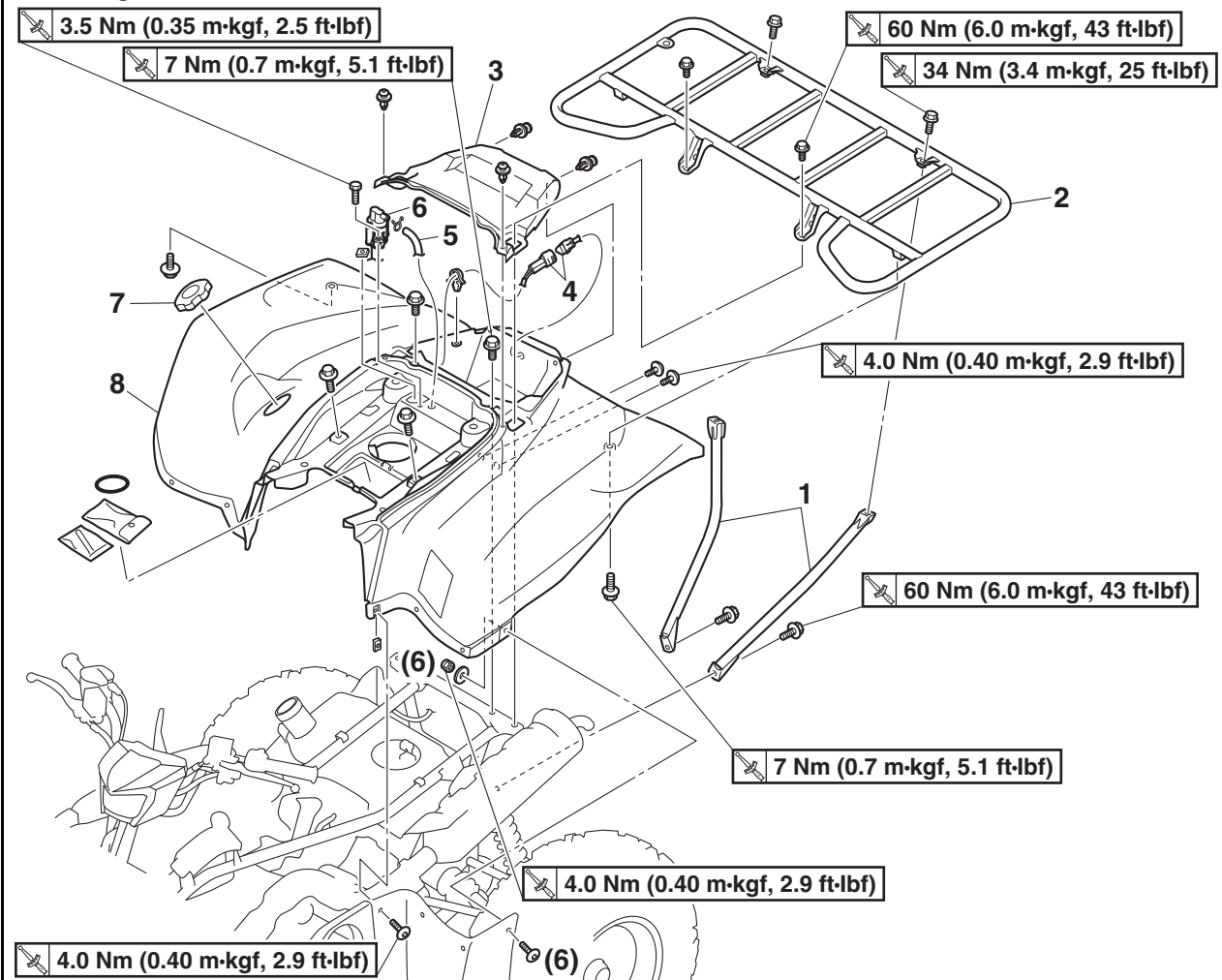
### Removing the front fenders and front grill



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Battery cover/Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front carrier/Front guard		Refer to "GENERAL CHASSIS (2)" on page 4-6.
1	Front fender inner panel	2	
2	Main switch coupler	1	Disconnect.
3	Auxiliary DC jack coupler	1	Disconnect.
4	Front fender	2	
5	Front grill	1	

# GENERAL CHASSIS (3)

## Removing the rear carrier and rear fender



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Rear carrier bracket	2	
2	Rear carrier	1	
3	Rear storage compartment cover	1	
4	Tail/brake light coupler	1	Disconnect.
5	Fuel tank breather hose	1	Disconnect.
6	Fuel tank breather hose joint	1	
7	Fuel tank cap	1	
8	Rear fender	1	

EBS30356

### INSTALLING THE REAR FENDER

1. Install:

- Rear fender



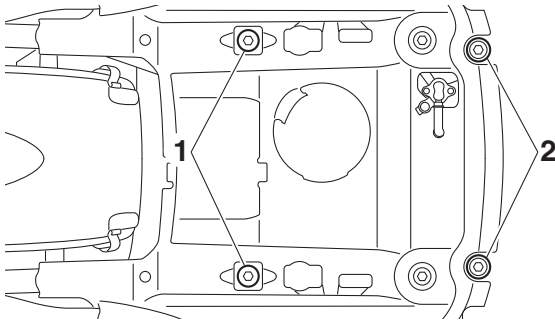
**Rear fender bolt**  
**7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

#### TIP

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The bolts may be tightened to the specified torque in any tightening sequence. However, install the front bolts “1” and tighten them temporarily before installing the rear bolts “2”.

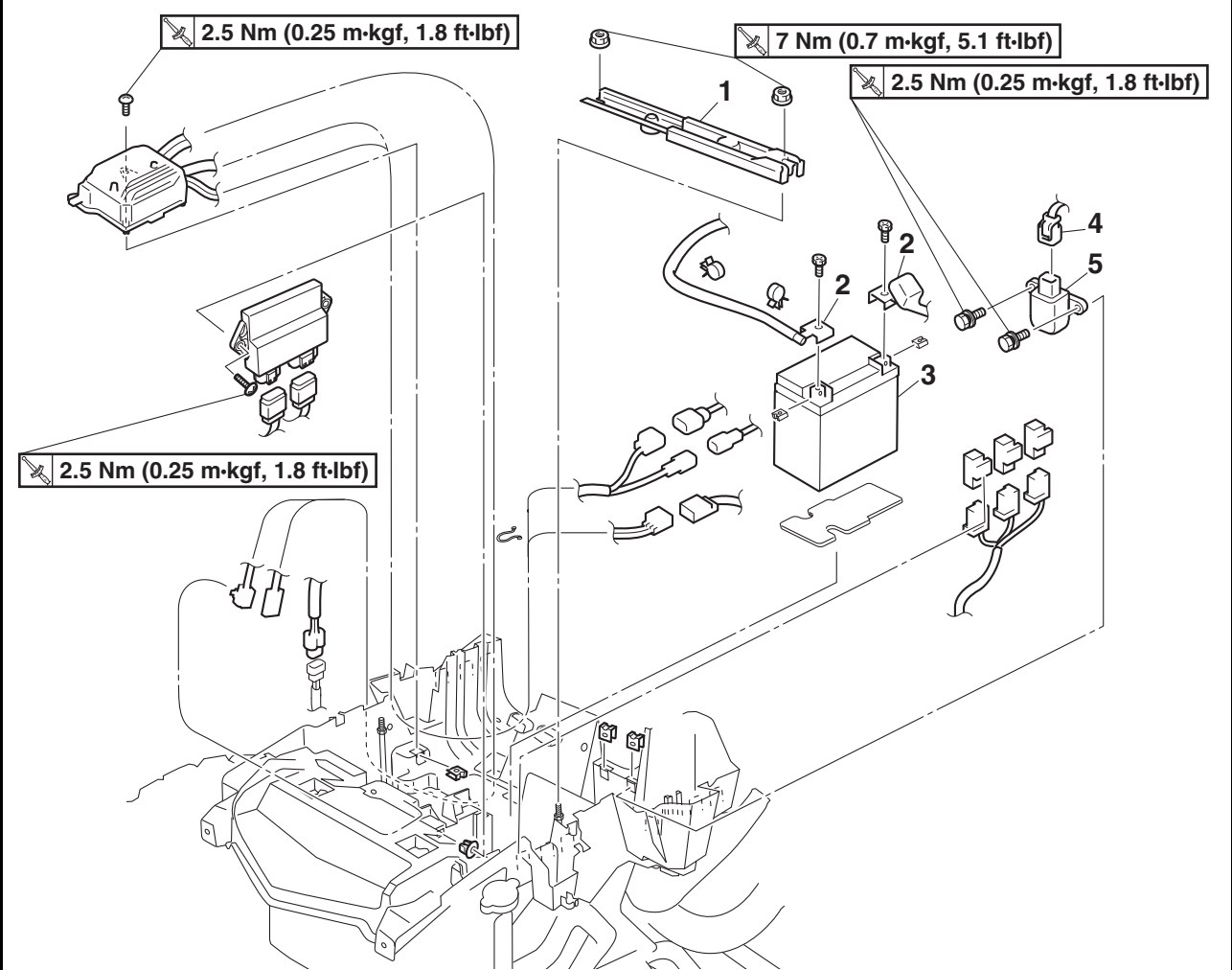
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EBS20089

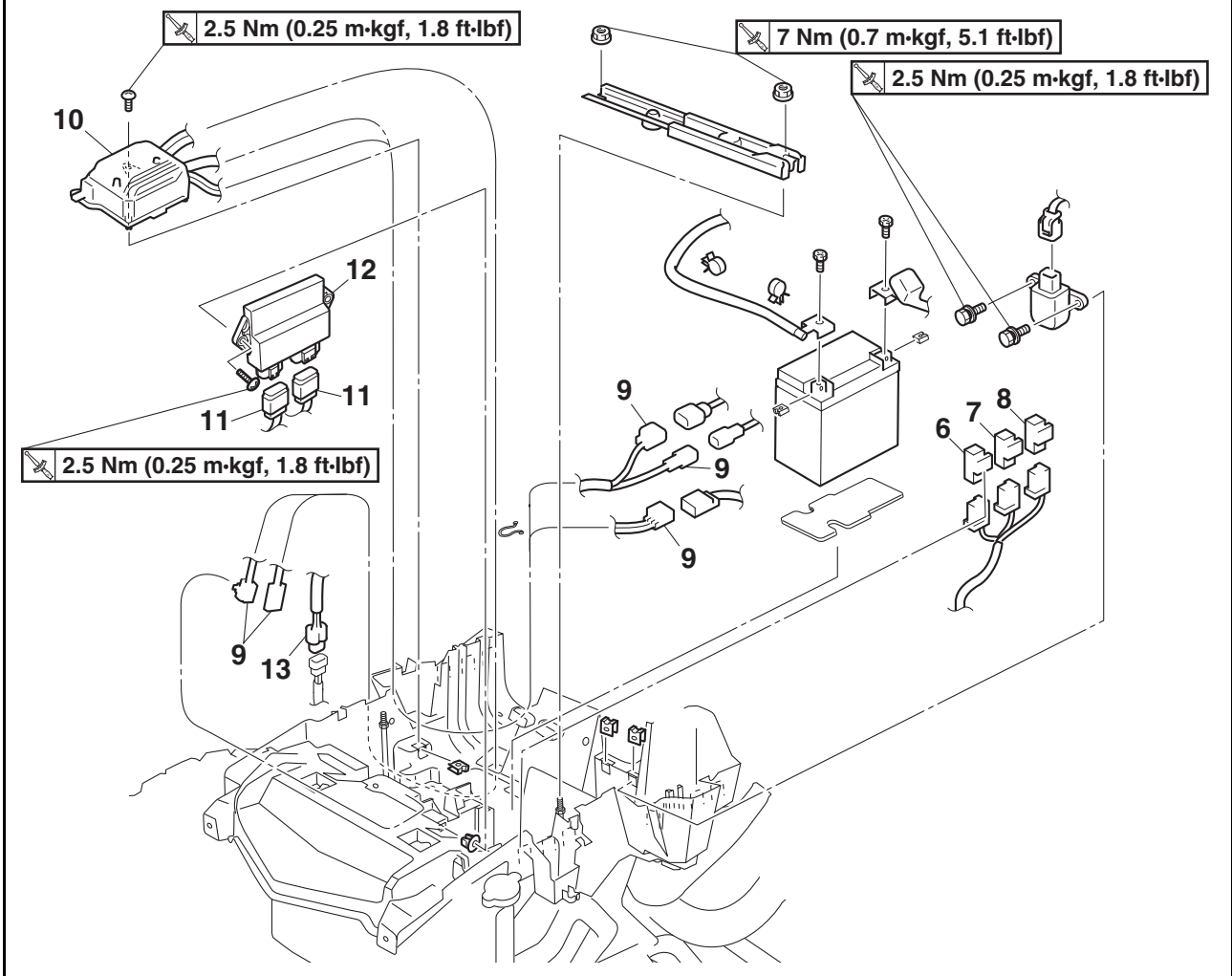
## GENERAL CHASSIS (4)

### Removing the electrical components tray 1/2



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Battery cover/Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front carrier/Front guard		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Front fenders/Front grill		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Air intake duct/Storage compartment		Refer to "GENERAL CHASSIS (5)" on page 4-17.
	V-belt cooling exhaust duct/V-belt cooling intake duct		Refer to "ENGINE REMOVAL (1)" on page 5-3.
1	Battery holding bracket	1	
2	Battery lead	2	Disconnect.
3	Battery	1	
4	Lean angle sensor coupler	1	Disconnect.
5	Lean angle sensor	1	

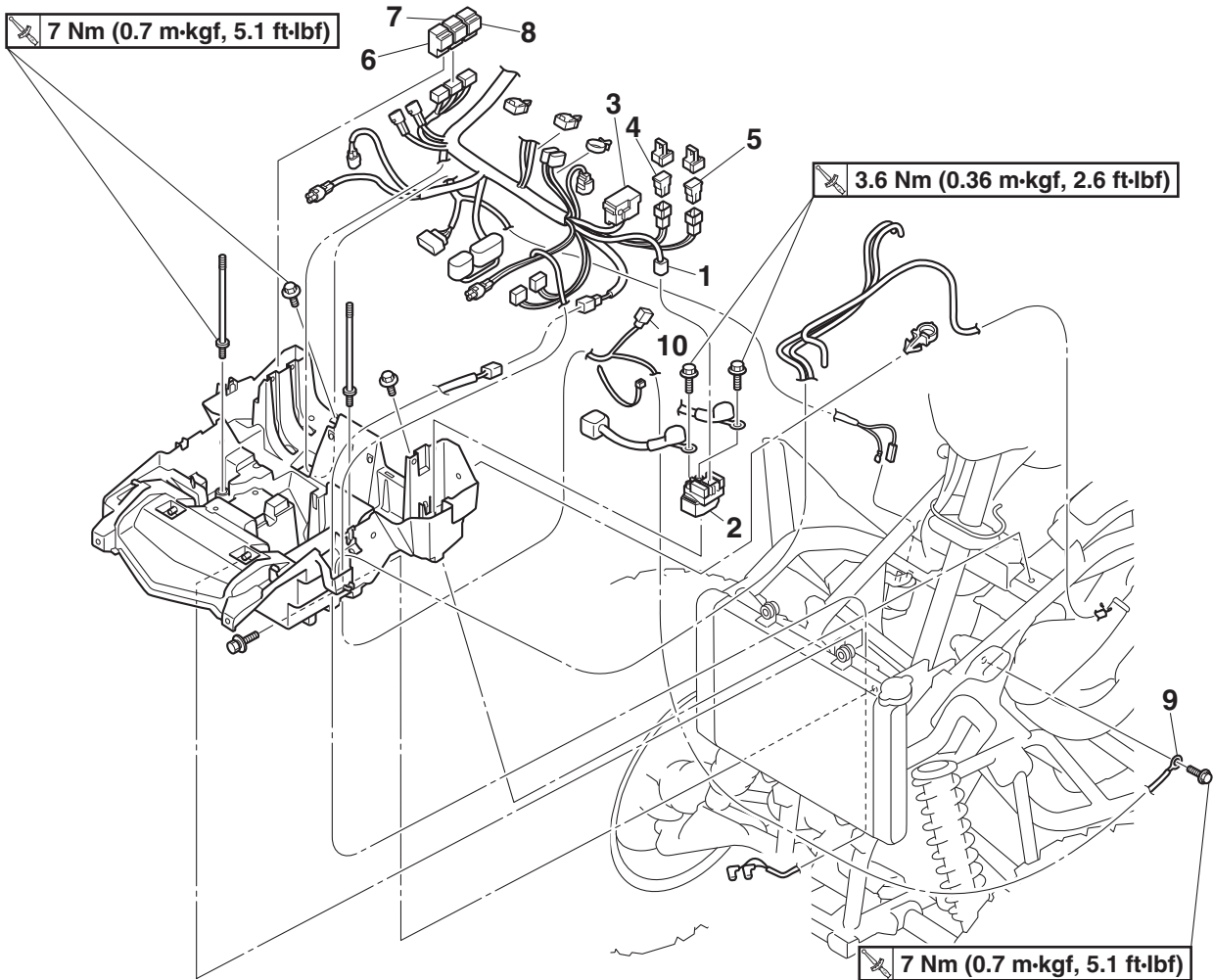
## Removing the electrical components tray 1/2



Order	Job/Parts to remove	Q'ty	Remarks
6	Four-wheel-drive motor relay 1	1	
7	Four-wheel-drive motor relay 2	1	
8	Headlight relay 1	1	
9	EPS control unit coupler	5	Disconnect. For EPS models
10	EPS (electric power steering) control unit	1	For EPS models
11	ECU coupler	2	Disconnect.
12	ECU (Engine Control Unit)	1	
13	Radiator fan motor coupler	1	Disconnect.

# GENERAL CHASSIS (4)

## Removing the electrical components tray 2/2

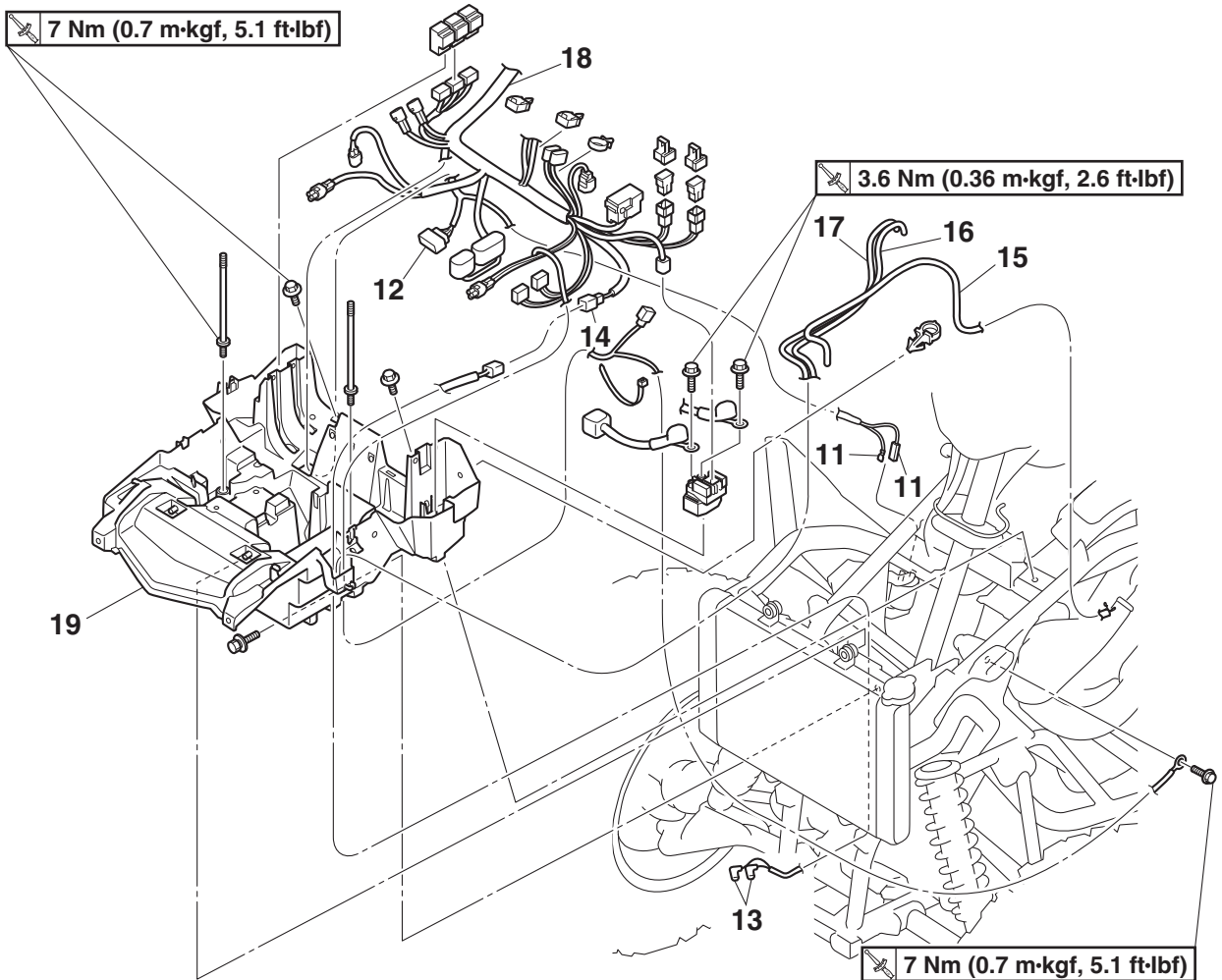


Order	Job/Parts to remove	Q'ty	Remarks
1	Starter relay coupler	1	Disconnect.
2	Starter relay	1	
3	Fuse box	1	
4	EPS fuse	1	For EPS models
5	Main fuse	1	
6	Radiator fan motor relay	1	
7	Fuel injection system relay	1	
8	Headlight relay 2	1	
9	Frame ground terminal	1	
10	Air cut-off valve coupler	1	Disconnect.



# GENERAL CHASSIS (4)

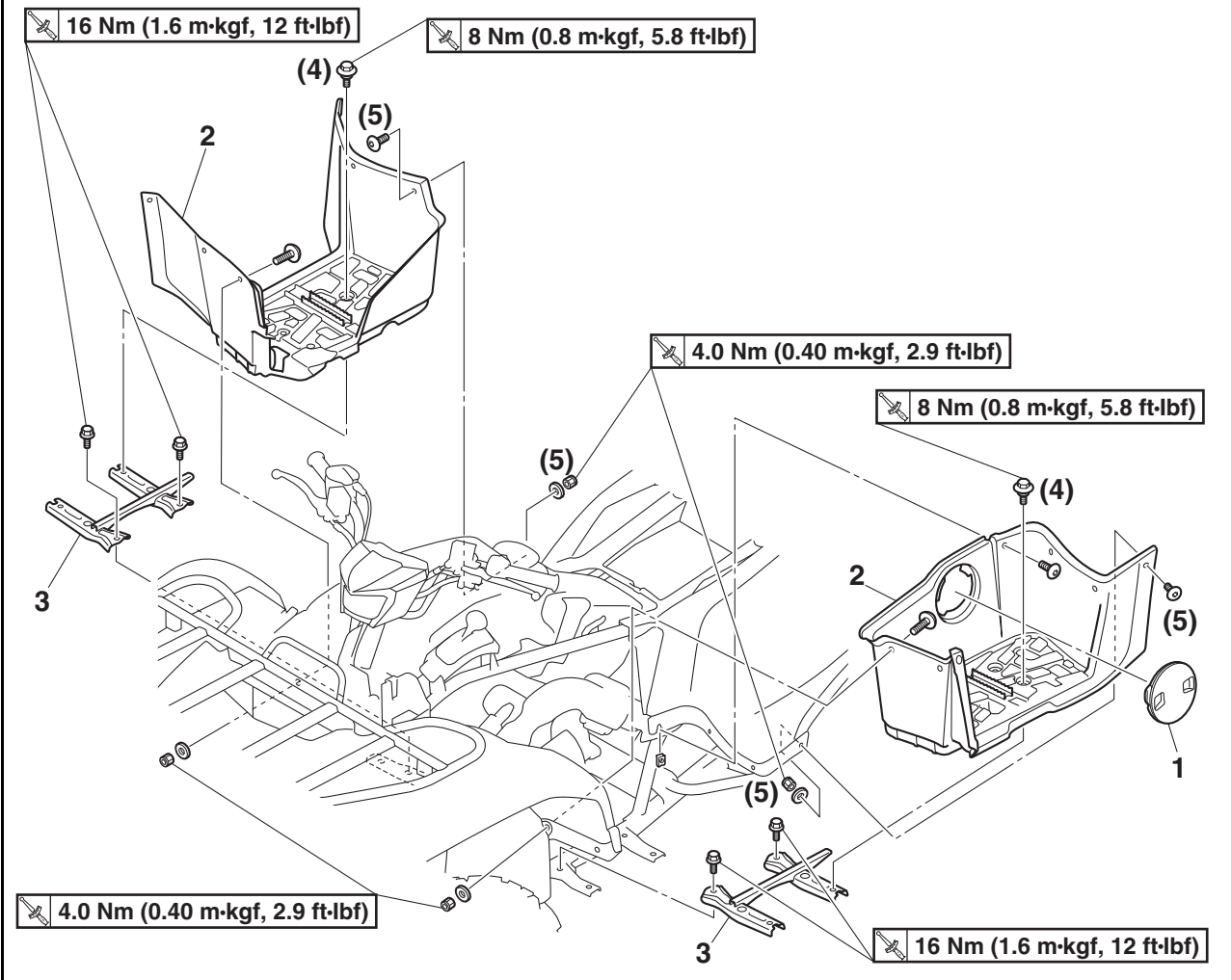
## Removing the electrical components tray 2/2



Order	Job/Parts to remove	Q'ty	Remarks
11	Ignition coil connector	2	Disconnect.
12	Differential motor coupler	1	Disconnect.
13	Horn connector	2	Disconnect. Except for CDN
14	Horn switch coupler	1	Disconnect. Except for CDN
15	Coolant reservoir breather hose	1	Disconnect.
16	Radiator fan motor breather hose	1	Disconnect.
17	Differential case breather hose	1	Disconnect.
18	Wire harness	1	
19	Electrical components tray	1	

# GENERAL CHASSIS (4)

## Removing the footrest boards



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Dipstick accessing cover	1	
2	Footrest board	2	
3	Footrest bracket	2	

EBS30357

## INSTALLING THE FOOTREST BOARDS

The following procedure applies to both of the footrest boards.

1. Install:

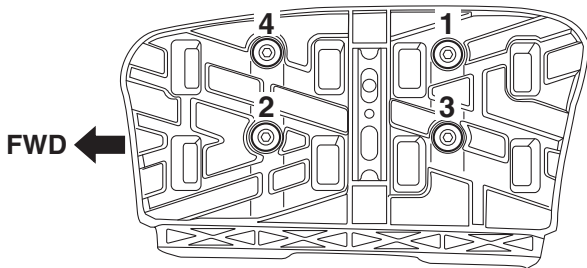
- Footrest board



**Footrest board bolt**  
**8 Nm (0.8 m·kgf, 5.8 ft·lbf)**

### TIP

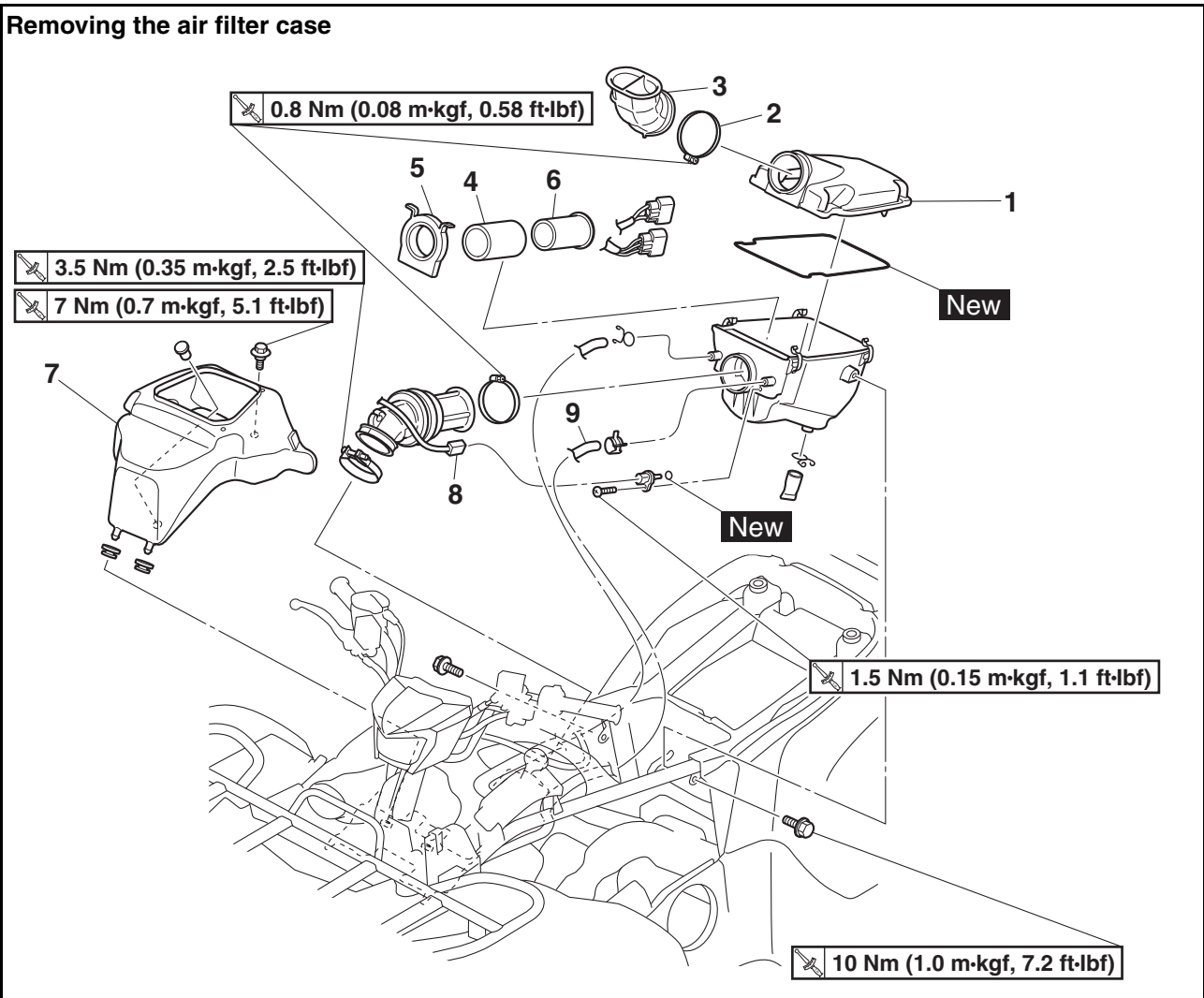
Tighten the footrest board bolts to the specified torque in the proper tightening sequence as shown.



EBS20090

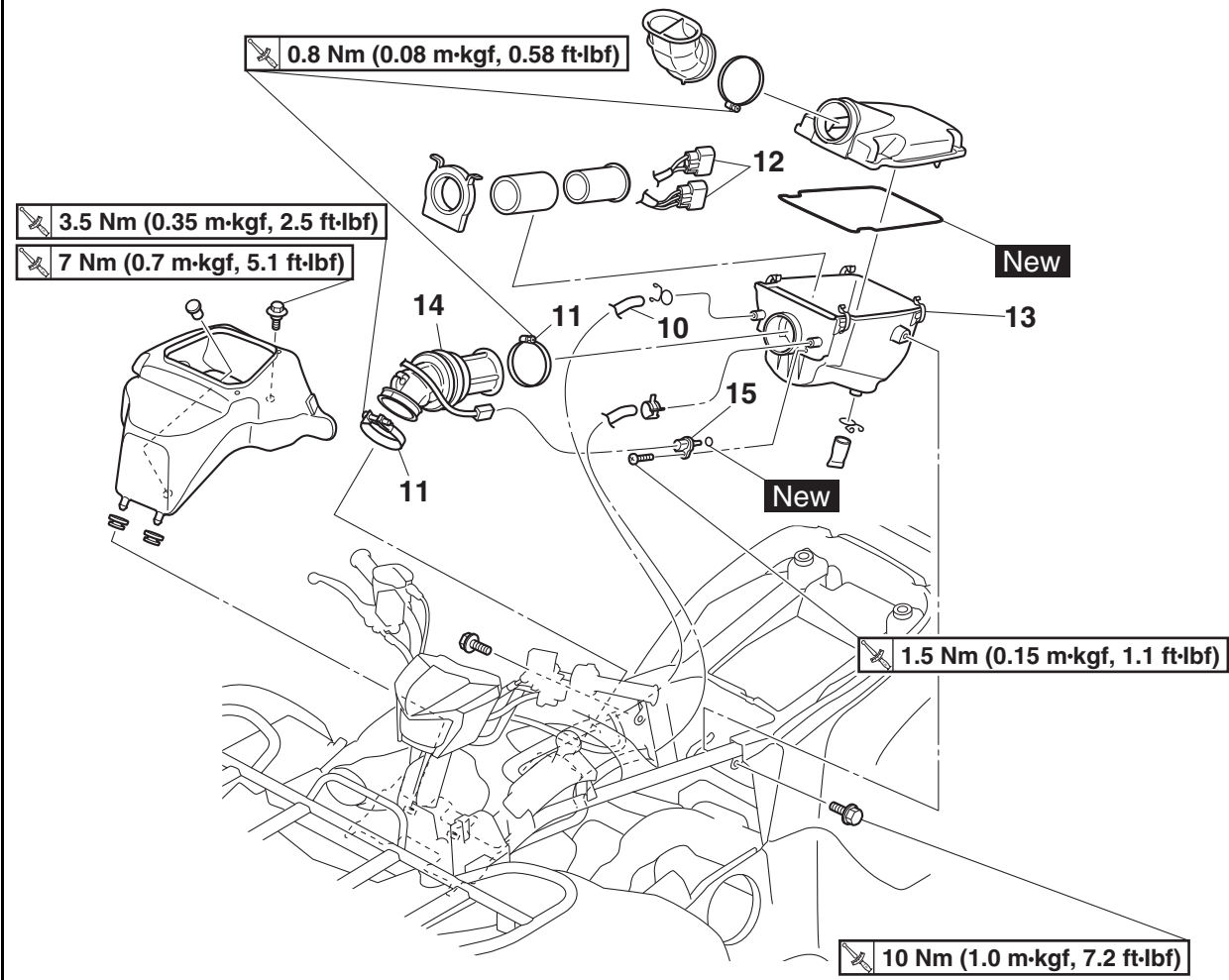
## GENERAL CHASSIS (5)

### Removing the air filter case



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Air filter case cover	1	
2	Air intake duct clamp screw	1	Loosen.
3	Air intake duct	1	
4	Air filter element	1	
5	Air filter element holder	1	
6	Air filter element frame	1	
7	Storage compartment	1	
8	Intake air temperature sensor coupler	1	Disconnect.
9	Air induction system hose (air cut-off valve assembly to air filter case)	1	Disconnect.

## Removing the air filter case



Order	Job/Parts to remove	Q'ty	Remarks
10	Cylinder head breather hose	1	Disconnect.
11	Air filter case joint clamp screw	2	Loosen.
12	Rectifier/regulator coupler	2	Disconnect.
13	Air filter case	1	
14	Air filter case joint	1	
15	Intake air temperature sensor	1	

EBS30457

## INSTALLING THE AIR FILTER CASE

### 1. Install:

- Intake air temperature sensor
- Air filter case
- Air filter case joint "1"  
(to the air filter case)



#### Intake air temperature sensor screw

1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)

#### Air filter case bolt

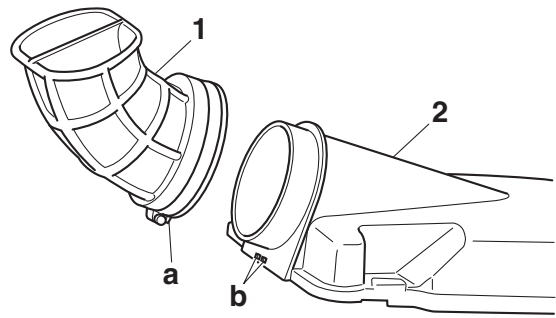
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

#### Air filter case joint clamp screw (throttle body side)

3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)

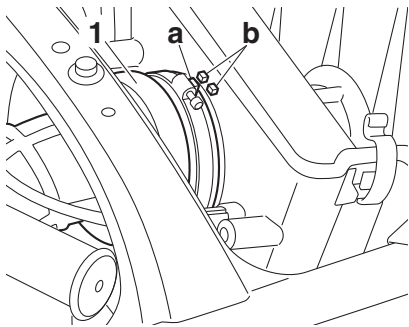
#### Air filter case joint clamp screw (air filter case side)

0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)



### TIP

Fit the projection "a" on the air filter case joint between the projections "b" on the air filter case.



### 2. Connect:

- Cylinder head breather hose
- Air induction system hose (air cut-off valve assembly to air filter case)
- Intake air temperature sensor coupler

### 3. Install:

- Air filter element assembly
- Air intake duct "1"  
(to the air filter case cover)
- Air filter case cover
- Storage compartment



#### Air intake duct clamp screw

0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)

#### Storage compartment bolt

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

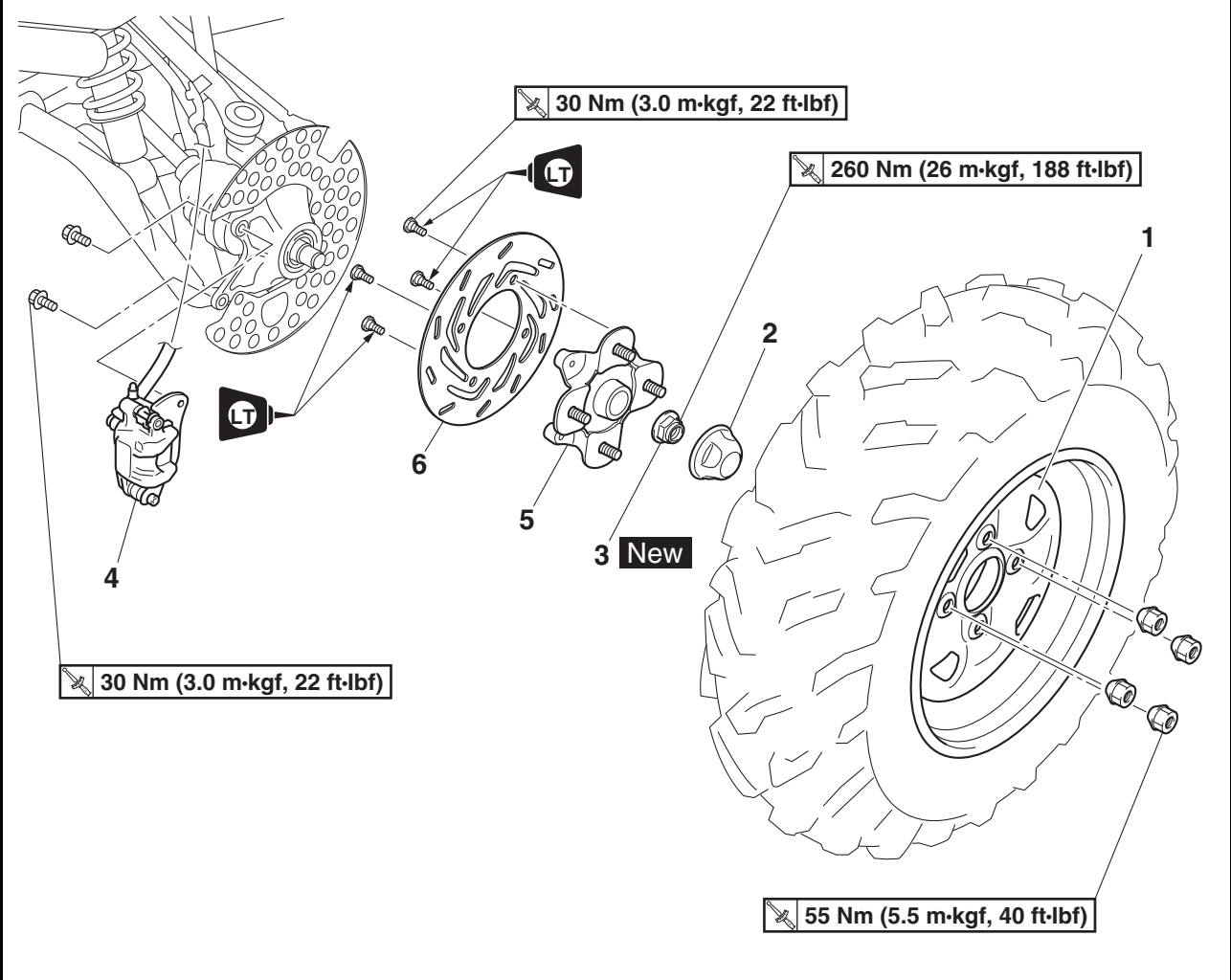
### TIP

Fit the projection "a" on the air intake duct between the projections "b" on the air filter case cover "2".

EBS20095

## FRONT WHEELS

### Removing the front wheels and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front wheels. Place the vehicle on a level surface.
1	Front wheel	1	
2	Wheel cap	1	
3	Front wheel axle nut	1	
4	Front brake caliper assembly	1	<b>TIP</b> _____ Do not squeeze the front brake lever when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Front brake disc	1	

EBS30358

## REMOVING THE FRONT WHEELS

1. Place the vehicle on a level surface.
2. Elevate:
  - Front wheels

### TIP

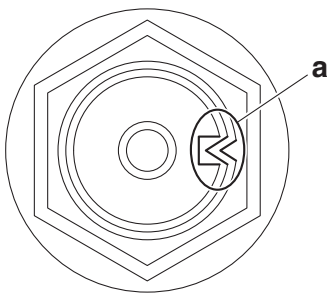
Place the vehicle on a suitable stand so that the front wheels are elevated.

EBS30359

## REMOVING THE FRONT WHEEL HUBS

The following procedure applies to both of the front wheel hubs.

1. Straighten the wheel axle nut rib "a".



2. Remove:
  - Wheel axle nut
3. Remove:
  - Front brake caliper

### TIP

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

EBS30360

## CHECKING THE FRONT WHEELS

The following procedure applies to both of the front wheels.

1. Check:
  - Tire
  - Wheel

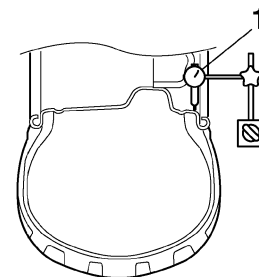
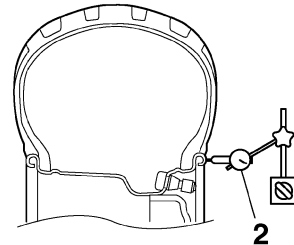
Refer to "CHECKING THE TIRES" on page 3-16 and "CHECKING THE WHEELS" on page 3-15.
2. Measure:
  - Radial wheel runout "1"
  - Lateral wheel runout "2"

Over the specified limit → Replace the wheel or check the wheel bearing play.

Refer to "CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS" on page 4-62.



**Radial wheel runout limit**  
**1.2 mm (0.05 in)**  
**Lateral wheel runout limit**  
**1.2 mm (0.05 in)**



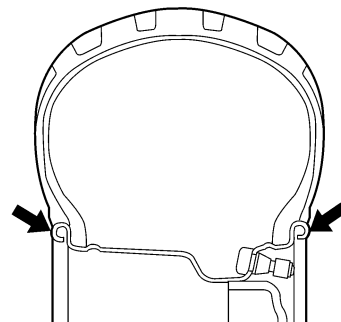
3. Check:
  - Wheel balance

Out of balance → Adjust.

EWB03020

### WARNING

**After replacing the tire, ride conservatively to allow the tire to be properly seated in the rim. Failure to do so may cause an accident resulting in vehicle damage and possible injury.**



EBS30361

## CHECKING THE FRONT WHEEL HUBS

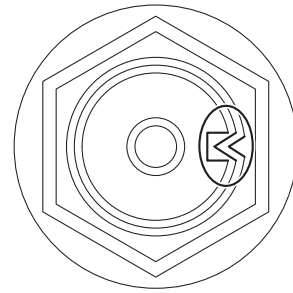
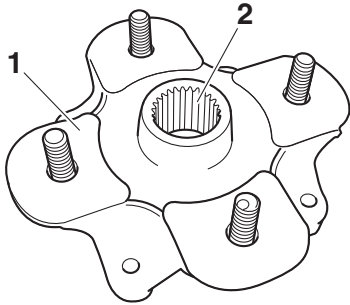
The following procedure applies to both of the front wheel hubs.

1. Check:
  - Wheel hub "1"

Cracks/damage → Replace.



- Splines (wheel hub) “2”  
Wear/damage → Replace the wheel hub.



EBS30362

## INSTALLING THE FRONT BRAKE DISCS

The following procedure applies to both of the front brake discs.

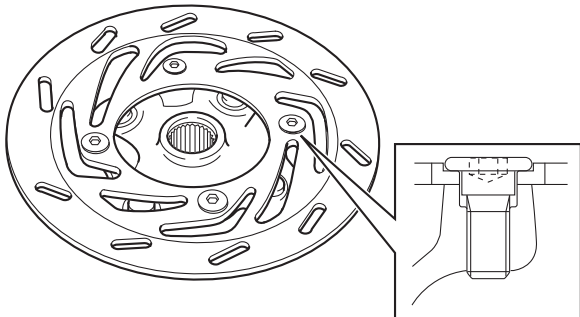
1. Install:
  - Brake disc



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

### TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.



EBS30363

## INSTALLING THE FRONT WHEEL HUBS

The following procedure applies to both of the front wheel hubs.

1. Install:
  - Wheel axle nut **New**



**Front wheel axle nut**  
260 Nm (26 m·kgf, 188 ft·lbf)

### TIP

- Do not apply oil to the threads of the nut.
- After tightening the nut, stake the collar of the nut into the notch of the shaft.

2. Check:

- Brake disc  
Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-31.

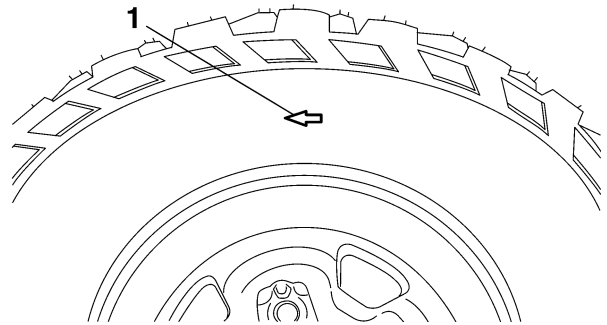
EBS30364

## INSTALLING THE FRONT WHEELS

1. Install:
  - Wheel

### TIP

The arrow mark “1” on the tire must point in the direction of wheel rotation.



2. Tighten:
  - Wheel nuts “1”

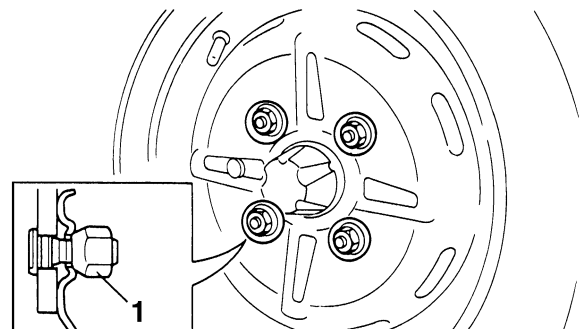


**Front wheel nut**  
55 Nm (5.5 m·kgf, 40 ft·lbf)

EWB03130

### ⚠ WARNING

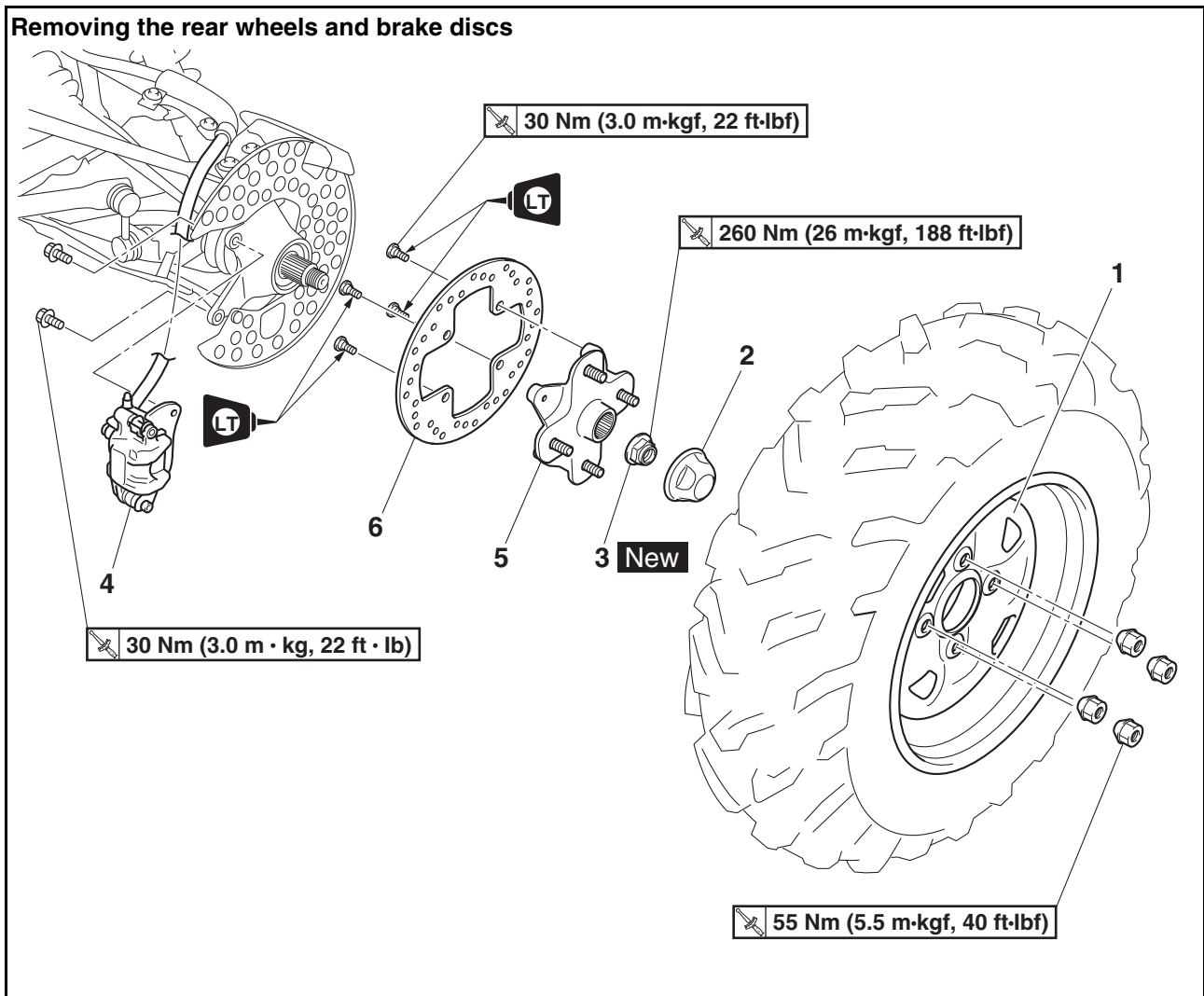
Tapered wheel nuts are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.



EBS20096

## REAR WHEELS

### Removing the rear wheels and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear wheels. Place the vehicle on a level surface.
1	Rear wheel	1	
2	Wheel cap	1	
3	Rear wheel axle nut	1	
4	Rear brake caliper assembly	1	<b>TIP</b> _____ Do not squeeze the rear brake lever and brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut. _____
5	Rear wheel hub	1	
6	Rear brake disc	1	

EBS30365

## REMOVING THE REAR WHEELS

1. Place the vehicle on a level surface.
2. Elevate:
  - Rear wheels

### TIP

Place the vehicle on a suitable stand so that the rear wheels are elevated.

3. Remove:
  - Rear brake calipers

### TIP

Do not apply the brake lever and depress the brake pedal when removing the brake calipers.

EBS30366

## REMOVING THE REAR WHEEL HUBS

The following procedure applies to both of the rear wheel hubs.

1. Remove:
  - Wheel axle nut

Refer to “REMOVING THE FRONT WHEEL HUBS” on page 4-21.
2. Remove:
  - Rear brake caliper

### TIP

Do not operate the brake lever or brake pedal when removing the brake caliper.

EBS30367

## CHECKING THE REAR WHEELS

The following procedure applies to both of the rear wheels.

1. Check:
  - Tire
  - Wheel

Refer to “CHECKING THE TIRES” on page 3-16 and “CHECKING THE WHEELS” on page 3-15.
2. Measure:
  - Radial wheel runout
  - Lateral wheel runout

Refer to “CHECKING THE FRONT WHEELS” on page 4-21.

Over the specified limit → Replace the wheel or check the wheel bearing play.

Refer to “REAR WHEELS” on page 4-23.



**Radial wheel runout limit**  
1.2 mm (0.05 in)  
**Lateral wheel runout limit**  
1.2 mm (0.05 in)

3. Check:

- Wheel balance
- Refer to “CHECKING THE FRONT WHEELS” on page 4-21.

EBS30368

## CHECKING THE REAR WHEEL HUBS

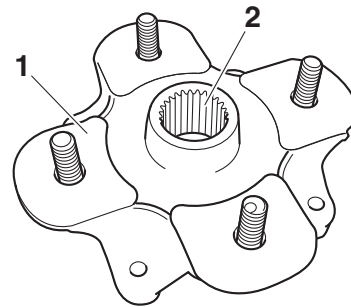
The following procedure applies to both of the rear wheel hubs.

1. Check:
  - Wheel hub “1”

Cracks/damage → Replace.

  - Splines (wheel hub) “2”

Wear/damage → Replace.

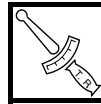


EBS30369

## INSTALLING THE REAR BRAKE DISCS

The following procedure applies to both of the rear brake discs.

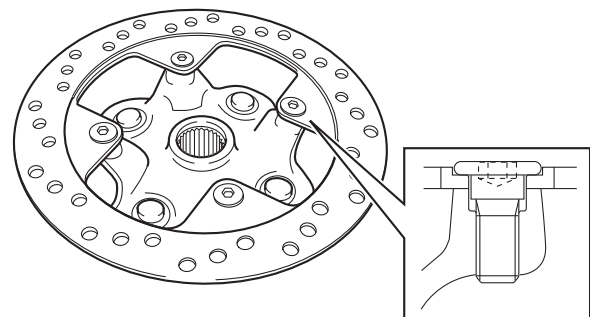
1. Install:
  - Brake disc



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

### TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.



EBS30370

## INSTALLING THE REAR WHEEL HUBS

The following procedure applies to both of the rear wheel hubs.

# REAR WHEELS

## 1. Install:

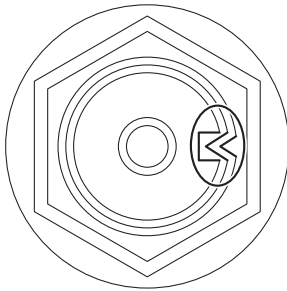
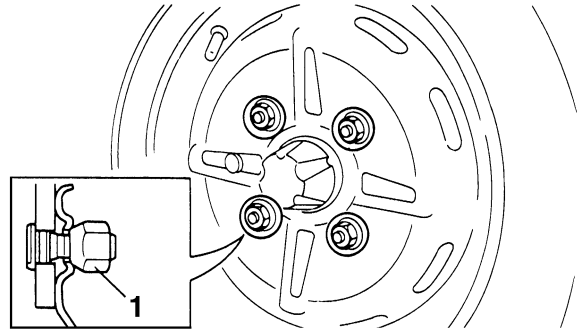
- Wheel axle nut **New**



**Rear wheel axle nut**  
**260 Nm (26 m·kgf, 188 ft·lbf)**

### TIP

- Do not apply oil to the threads of the nut.
- After tightening the nut, stake the collar of the nut into the notch of the shaft.



EBS300371

## INSTALLING THE REAR WHEELS

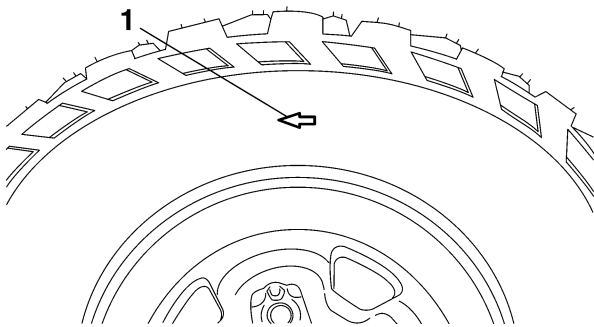
The following procedure applies to both of the rear wheels.

### 1. Install:

- Wheel

### TIP

The arrow mark "1" on the tire must point in the direction of wheel rotation.



### 2. Tighten:

- Wheel nuts "1"



**Rear wheel nut**  
**55 Nm (5.5 m·kgf, 40 ft·lbf)**

EWB03130



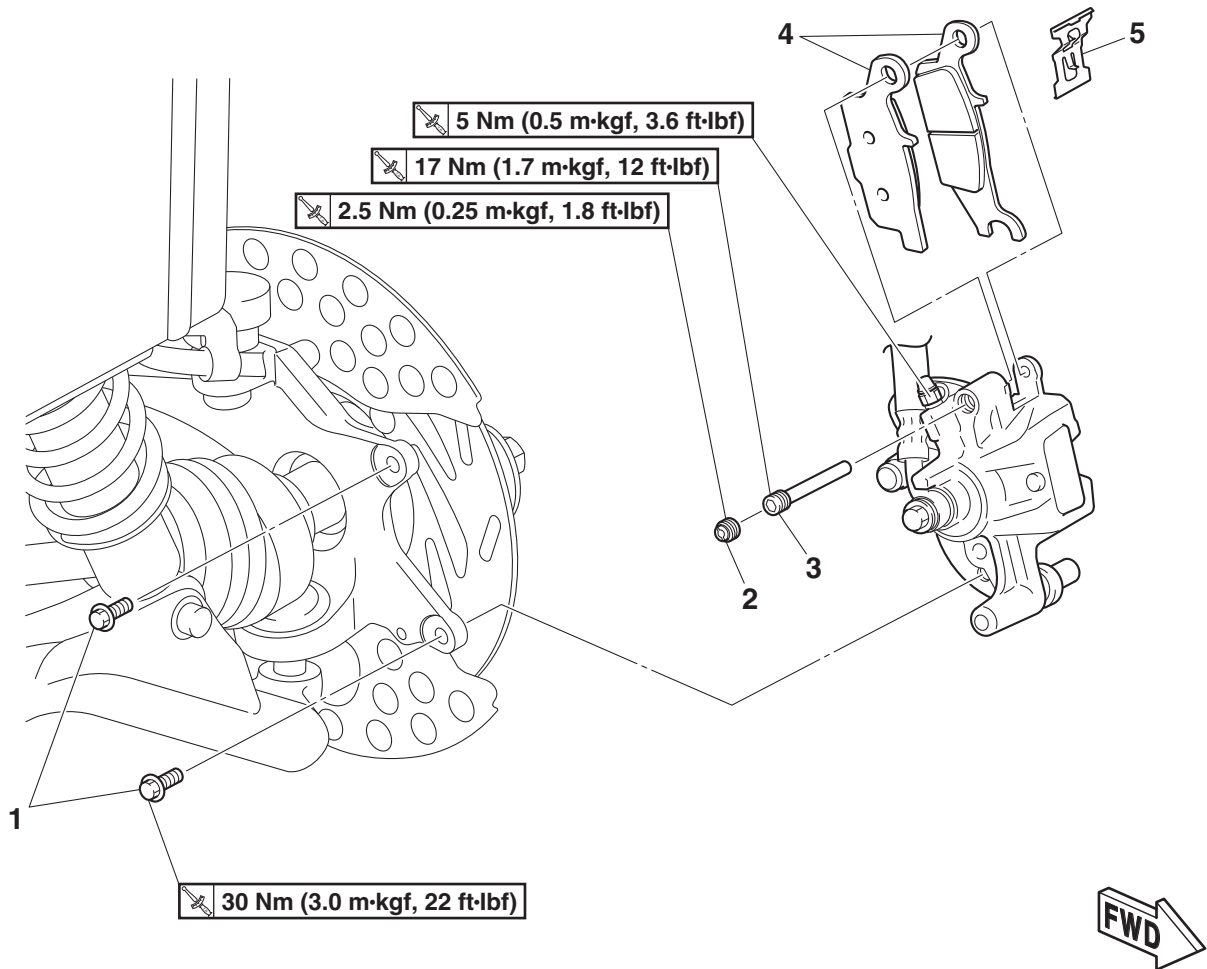
**WARNING**

Tapered wheel nuts are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.

EBS20097

## FRONT BRAKE

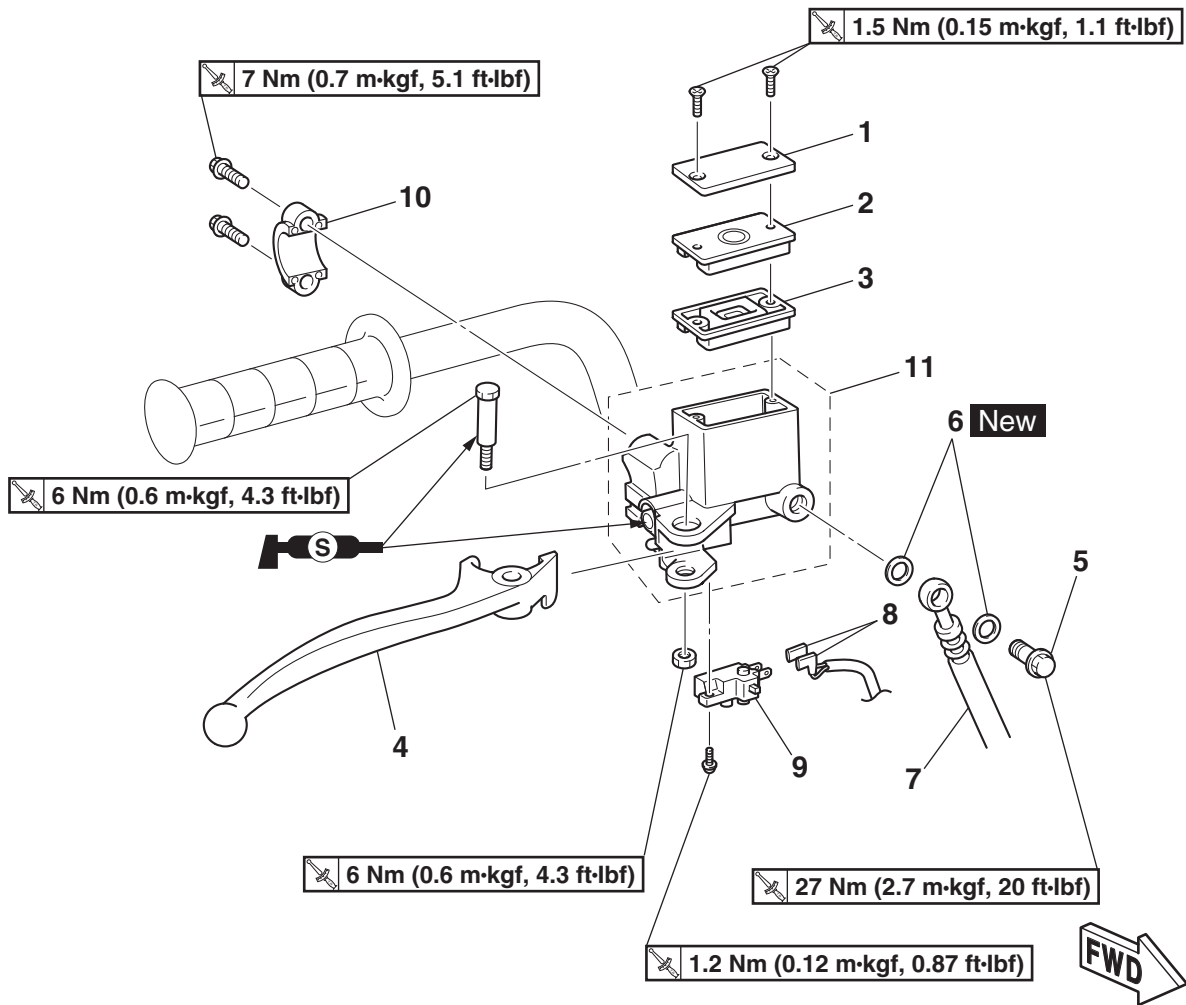
### Removing the front brake pads



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Front wheel		Refer to "FRONT WHEELS" on page 4-20.
1	Front brake caliper bolt	2	
2	Brake pad holding bolt plug	1	
3	Brake pad holding bolt	1	
4	Front brake pad	2	
5	Brake pad spring	1	

# FRONT BRAKE

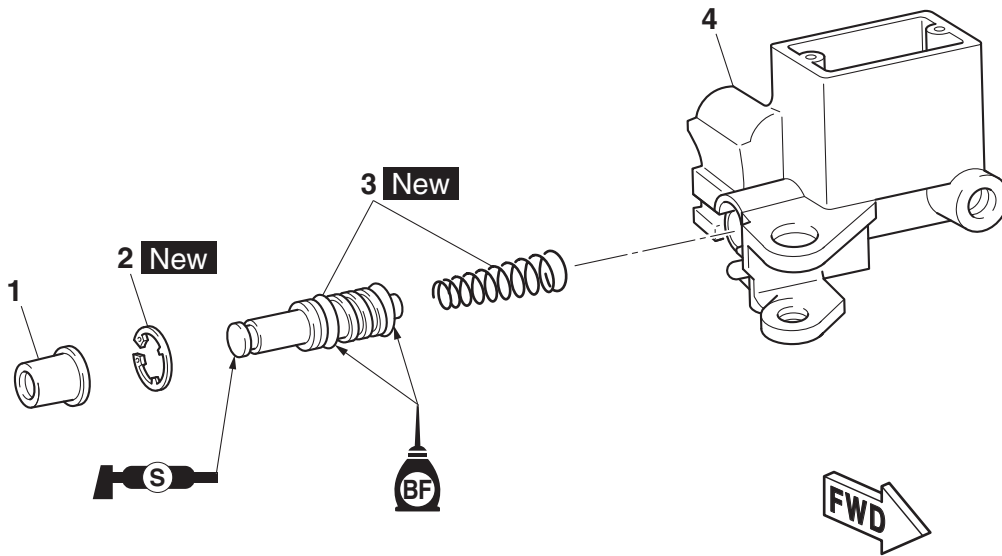
## Removing the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.
	On-Command four-wheel-drive motor switch and differential gear lock switch		Refer to "HANDLEBAR" on page 4-48.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake lever	1	
5	Union bolt	1	
6	Copper washer	2	
7	Front brake hose	1	Disconnect.
8	Front brake light switch connector	2	Disconnect.
9	Front brake light switch	1	
10	Front brake master cylinder holder	1	
11	Front brake master cylinder	1	

# FRONT BRAKE

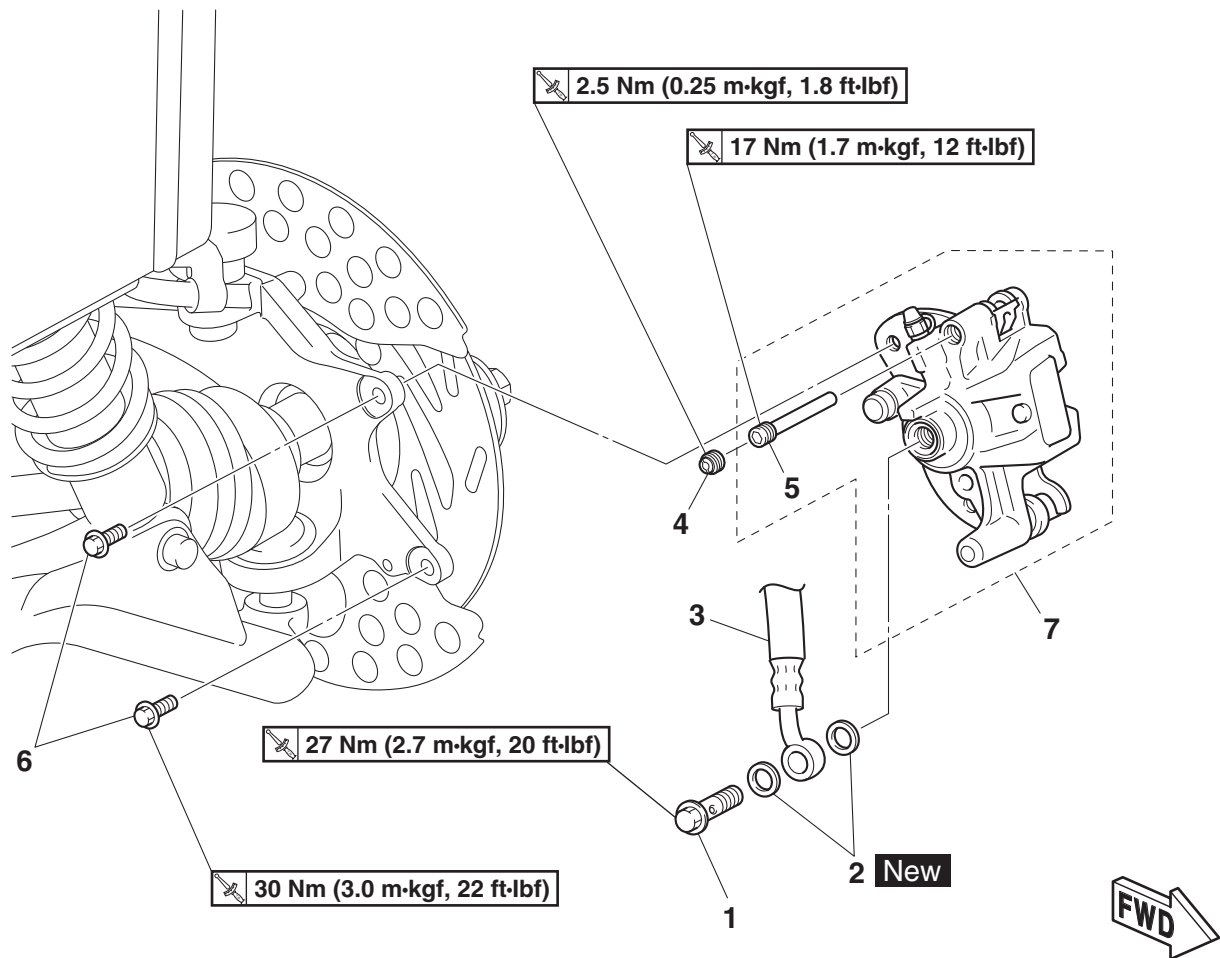
## Disassembling the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	

# FRONT BRAKE

## Removing the front brake calipers

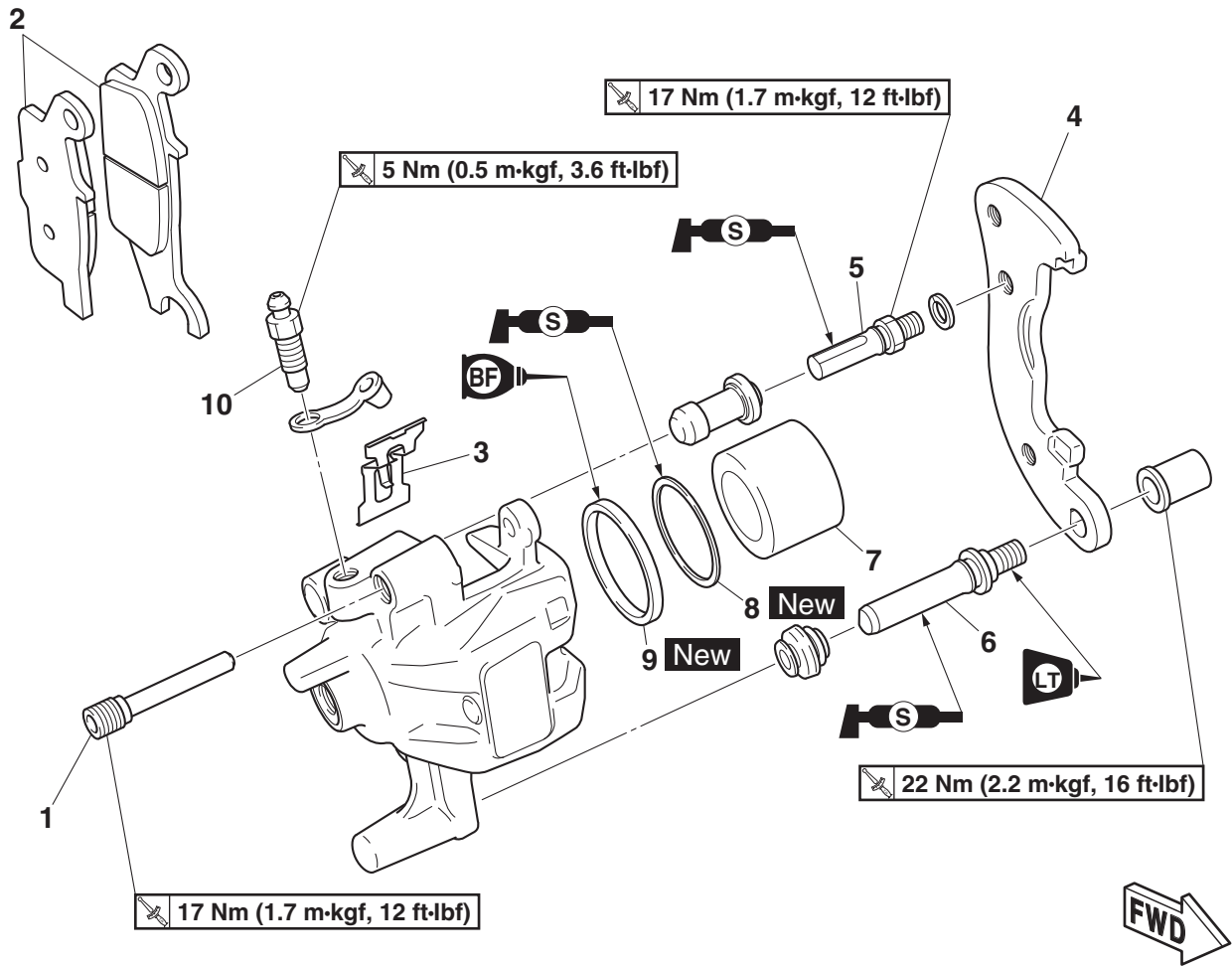


Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.
	Front wheel		Refer to "FRONT WHEELS" on page 4-20.
1	Union bolt	1	
2	Copper washer	2	
3	Front brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Front brake caliper bolt	2	
7	Front brake caliper assembly	1	



# FRONT BRAKE

## Disassembling the front brake calipers



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

EBS30372

## INTRODUCTION

EWB02930

### 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 spilled brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

### FIRST AID FOR BRAKE FLUID ENTERING THE EYES:

- Flush with water for 15 minutes and get immediate medical attention.

EBS30373

## CHECKING THE FRONT BRAKE DISCS

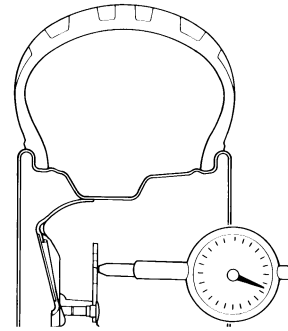
The following procedure applies to both brake discs.

1. Remove:
  - Front wheel  
Refer to "FRONT WHEELS" on page 4-20.
2. Check:
  - Brake disc  
Damage/galling → Replace.
3. Measure:
  - Brake disc deflection  
Out of specification → Correct the brake disc deflection or replace the brake disc.



**Brake disc deflection limit**  
0.10 mm (0.0039 in)

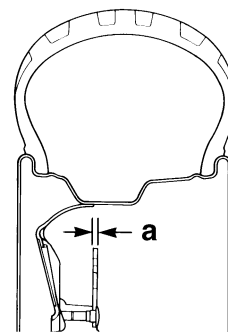
- a. Hold the dial gauge at a right angle against the brake disc surface.
- b. Measure the deflection 3.0 mm (0.12 in) below the edge of the brake disc.



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



**Brake disc thickness limit**  
3.0 mm (0.12 in)



5. Adjust:
  - Brake disc deflection



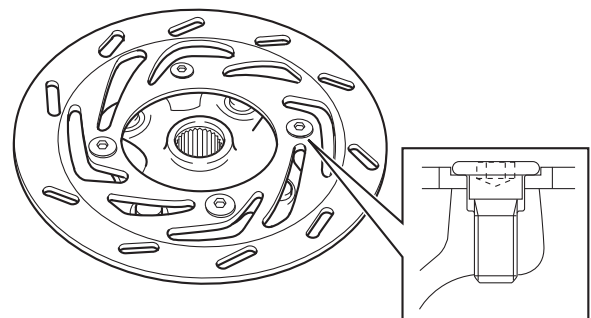
- a. Remove the brake disc.
- b. Rotate the brake disc by one bolt hole.
- c. Install the brake disc.



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

### TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.



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



6. Install:
- Front wheels
- Refer to "FRONT WHEELS" on page 4-20.

EBS30374

## REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

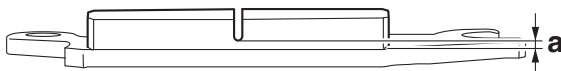
### TIP \_\_\_\_\_

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 and brake pad spring as a set.



**Brake pad lining thickness limit**  
1.0 mm (0.04 in)



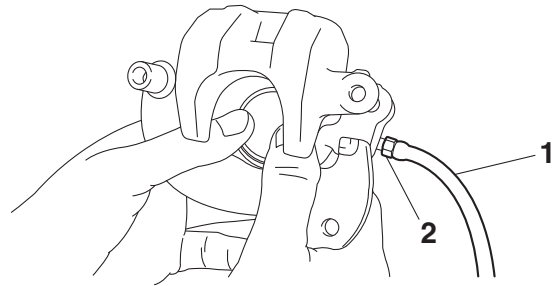
2. Install:
- Brake pad spring
  - Brake pads

### TIP \_\_\_\_\_

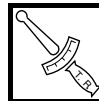
Always install new brake pads and a new brake pad spring as a set.



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



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

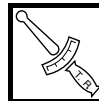


**Brake caliper bleed screw**  
5 Nm (0.5 m·kgf, 3.6 ft·lbf)

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



3. Install:
- Brake pad holding bolt
  - Brake pad holding bolt plug
  - Brake caliper



**Brake pad holding bolt**  
17 Nm (1.7 m·kgf, 12 ft·lbf)  
**Brake pad holding bolt plug**  
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)  
**Front brake caliper bolt**  
30 Nm (3.0 m·kgf, 22 ft·lbf)

4. Check:
- Brake fluid level
- Below the minimum level mark → Add the specified brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.
5. Check:
- Brake lever operation
- Soft or spongy feeling → Bleed the brake system. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.

EBS30375

## DISASSEMBLING THE FRONT BRAKE CALIPERS

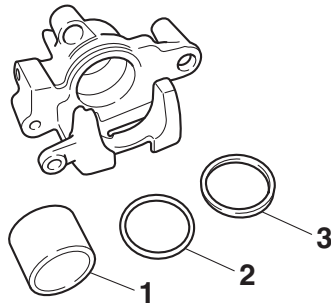
The following procedure applies to both of the brake calipers.

### TIP \_\_\_\_\_

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

1. Remove:

- Brake caliper piston “1”
- Brake caliper dust seal “2”
- Brake caliper piston seal “3”

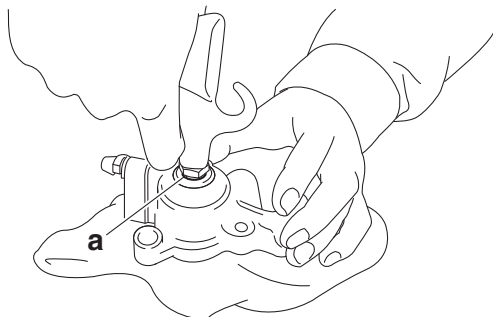


a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWB02890

**WARNING**

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



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

EBS30380

**CHECKING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

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

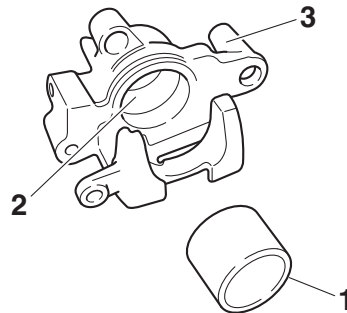
1. Check:

- Brake caliper 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.

EWB03140

**WARNING**

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



EBS30376

**ASSEMBLING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

EWB03150

**WARNING**

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



EBS30377

**INSTALLING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

1. Install:
  - Brake caliper assembly
  - Brake caliper bolts "1"
  - Brake hose "2"
  - Copper washers "3" **New**
  - Brake hose union bolt "4"



**Front brake caliper bolt**  
30 Nm (3.0 m-kgf, 22 ft-lbf)  
**Brake hose union bolt**  
27 Nm (2.7 m-kgf, 20 ft-lbf)

EWB02870



**WARNING**

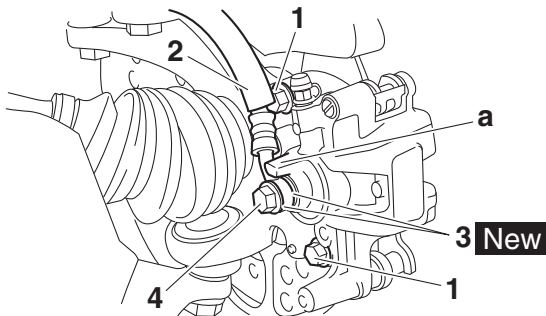
**Proper brake hose routing is essential to insure safe vehicle operation.**

Refer to "CABLE ROUTING" on page 2-33.

ECB02330

**NOTICE**

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



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



**Specified brake fluid**  
DOT 4

EWB02790



**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.**

ECB01320

**NOTICE**

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

3. Bleed:
  - Brake system  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.
4. Check:
  - Brake fluid level  
Below the minimum level mark → Add the specified brake fluid to the proper level.  
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.
5. Check:
  - Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.

EBS30378

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

EBS30379

## ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWB03590

### 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.
- Whenever a master cylinder is disassembled, replace the brake master cylinder kit.



**Specified brake fluid  
DOT 4**

EBS30381

## INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:

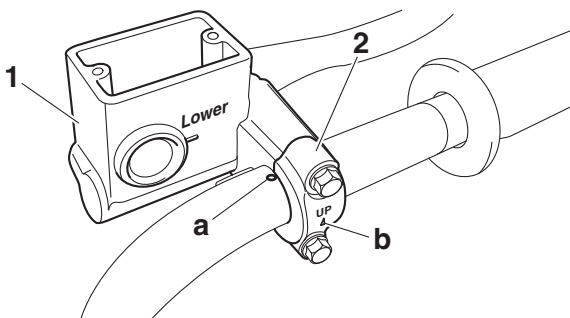
- Brake master cylinder "1"
- Brake master cylinder holder "2"



**Front brake master cylinder holder bolt  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

### TIP

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



2. Install:

- Brake hose
- Copper washers **New**
- Brake hose union bolt



**Brake hose union bolt  
27 Nm (2.7 m·kgf, 20 ft·lbf)**

EWB02870

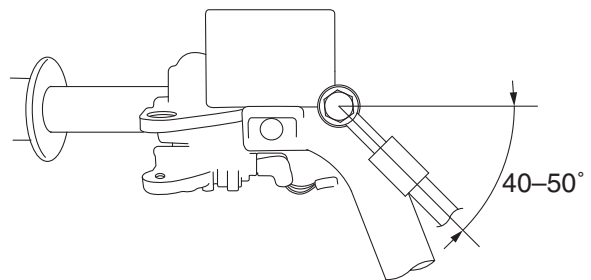
### WARNING

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

Refer to "CABLE ROUTING" on page 2-33.

### TIP

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



3. Fill:

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



**Specified brake fluid  
DOT 4**

EWB02880

### 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.

ECB01320

### NOTICE

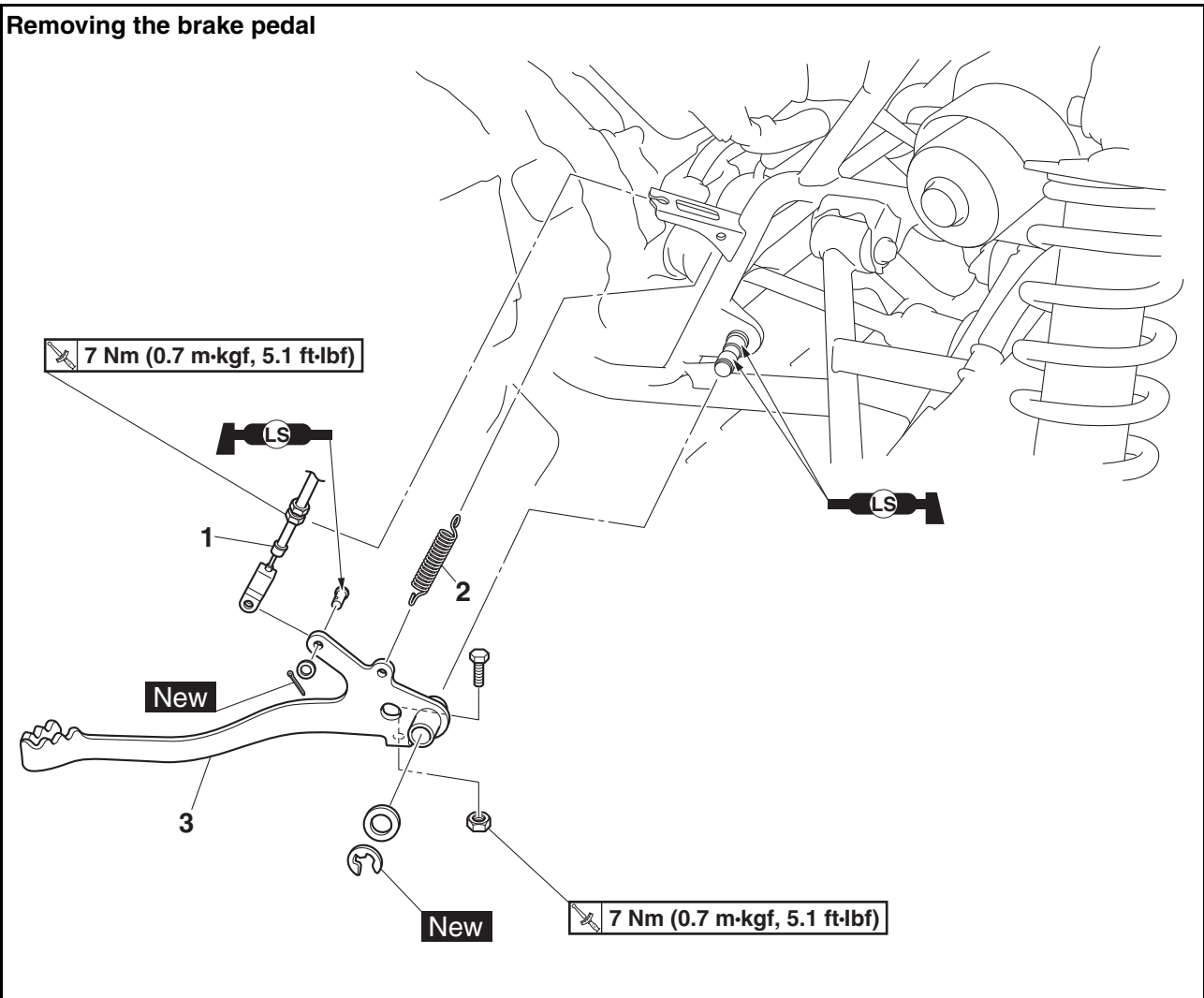
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:
  - Brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.
5. Check:
  - Brake fluid level  
Below the minimum level mark → Add the specified brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.
6. Check:
  - Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

EBS20098

## REAR BRAKE

### Removing the brake pedal

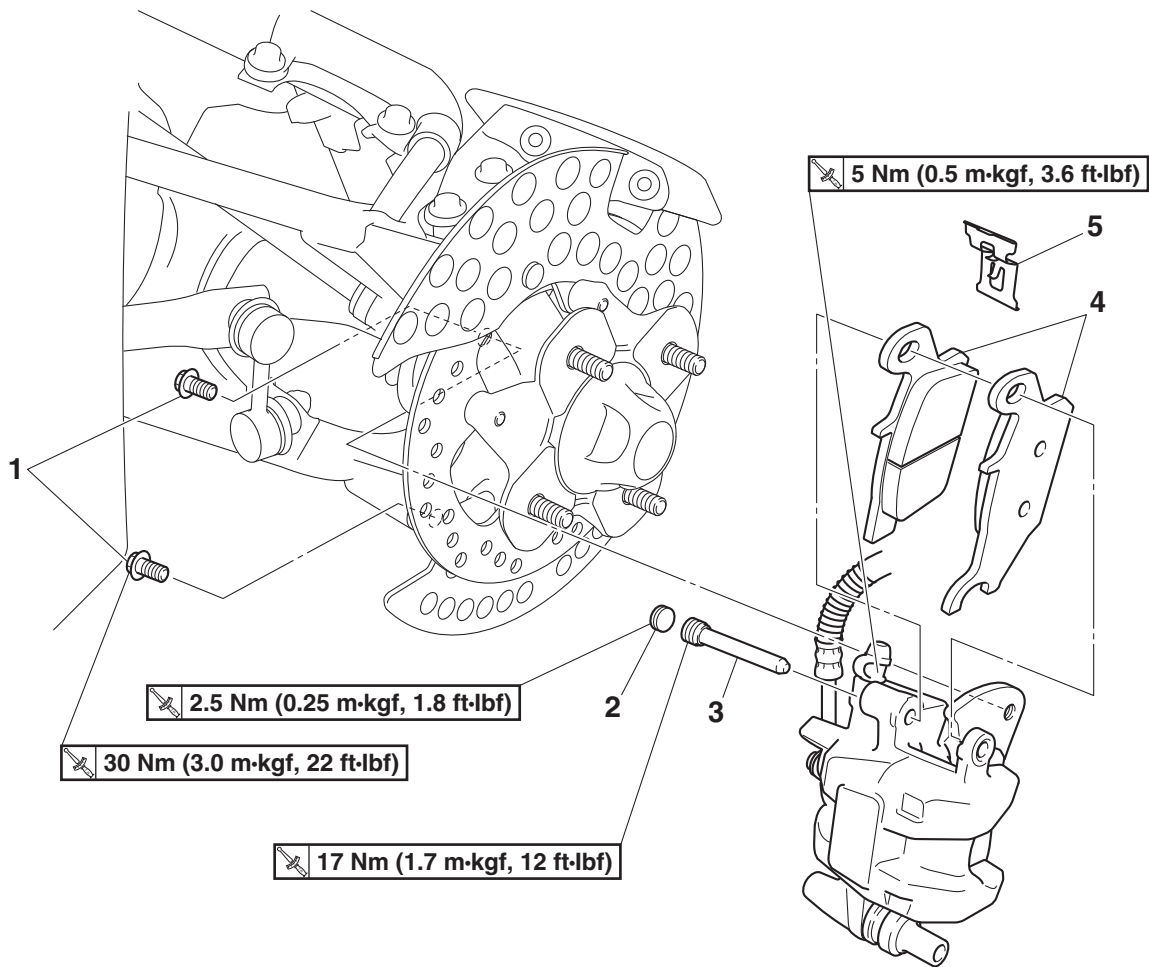


Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front fender inner panel (right)		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Footrest board (right)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
1	Brake pedal cable	1	Disconnect.
2	Brake pedal spring	1	
3	Brake pedal	1	



# REAR BRAKE

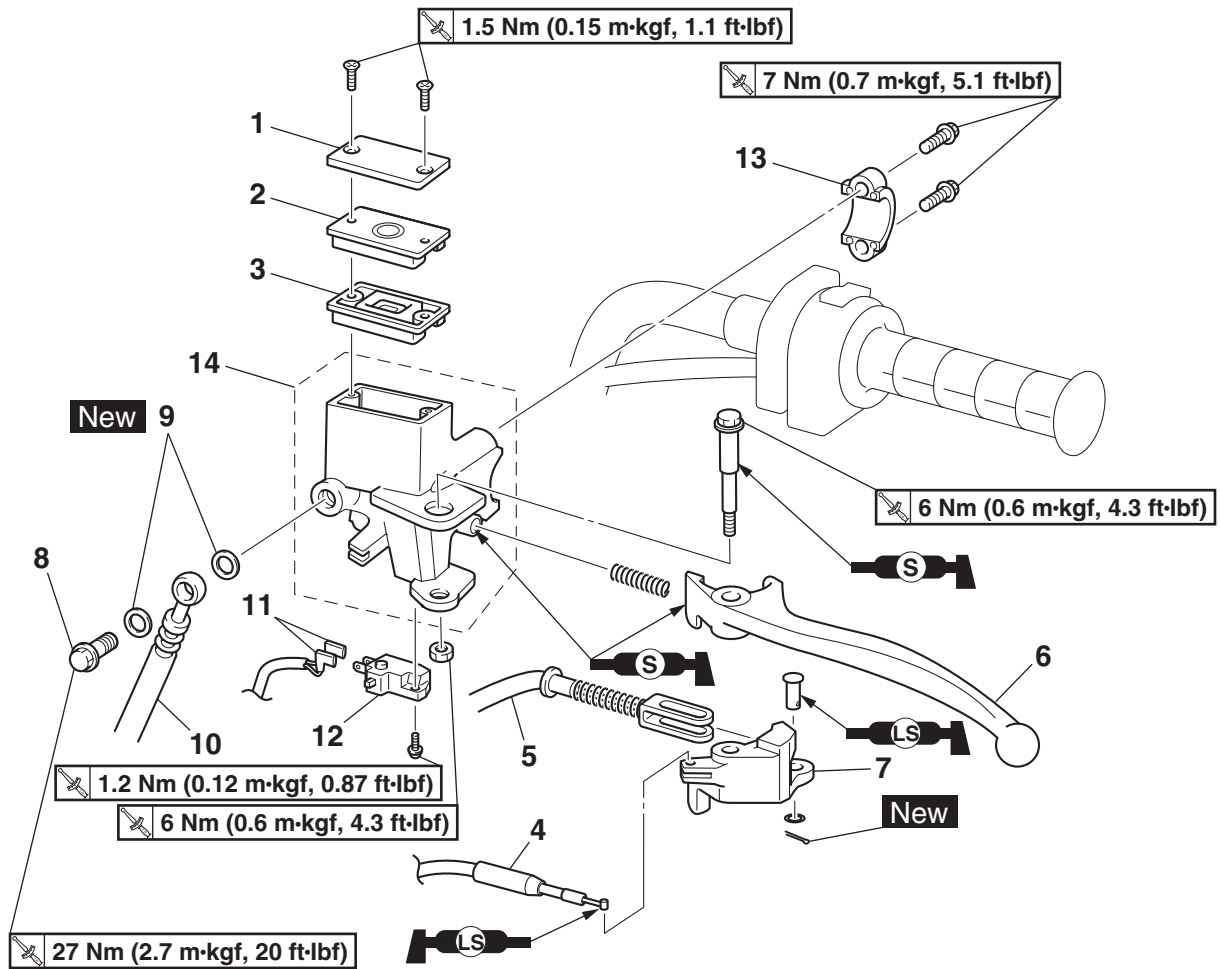
## Removing the rear brake pads



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
	Rear wheel		Refer to "REAR WHEELS" on page 4-23.
1	Rear brake caliper bolt	2	
2	Brake pad holding bolt plug	1	
3	Brake pad holding bolt	1	
4	Rear brake pad	2	
5	Brake pad spring	1	

# REAR BRAKE

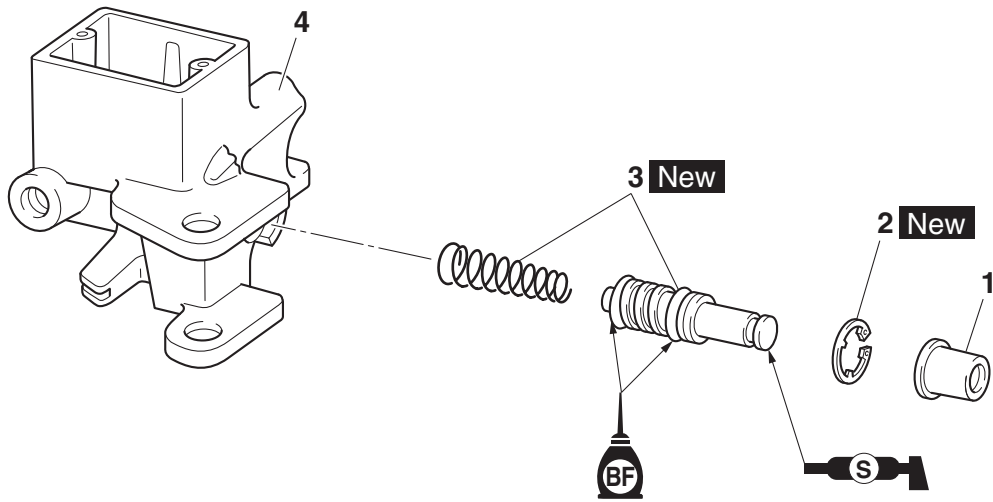
## Removing the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Shift control cable	1	Disconnect.
5	Rear brake cable	1	Disconnect.
6	Brake lever	1	
7	Brake lever bracket	1	
8	Union bolt	1	
9	Copper washer	2	
10	Rear brake hose	1	Disconnect.
11	Rear brake light switch connector	2	Disconnect.
12	Rear brake light switch	1	
13	Rear brake master cylinder holder	1	
14	Rear brake master cylinder	1	

# REAR BRAKE

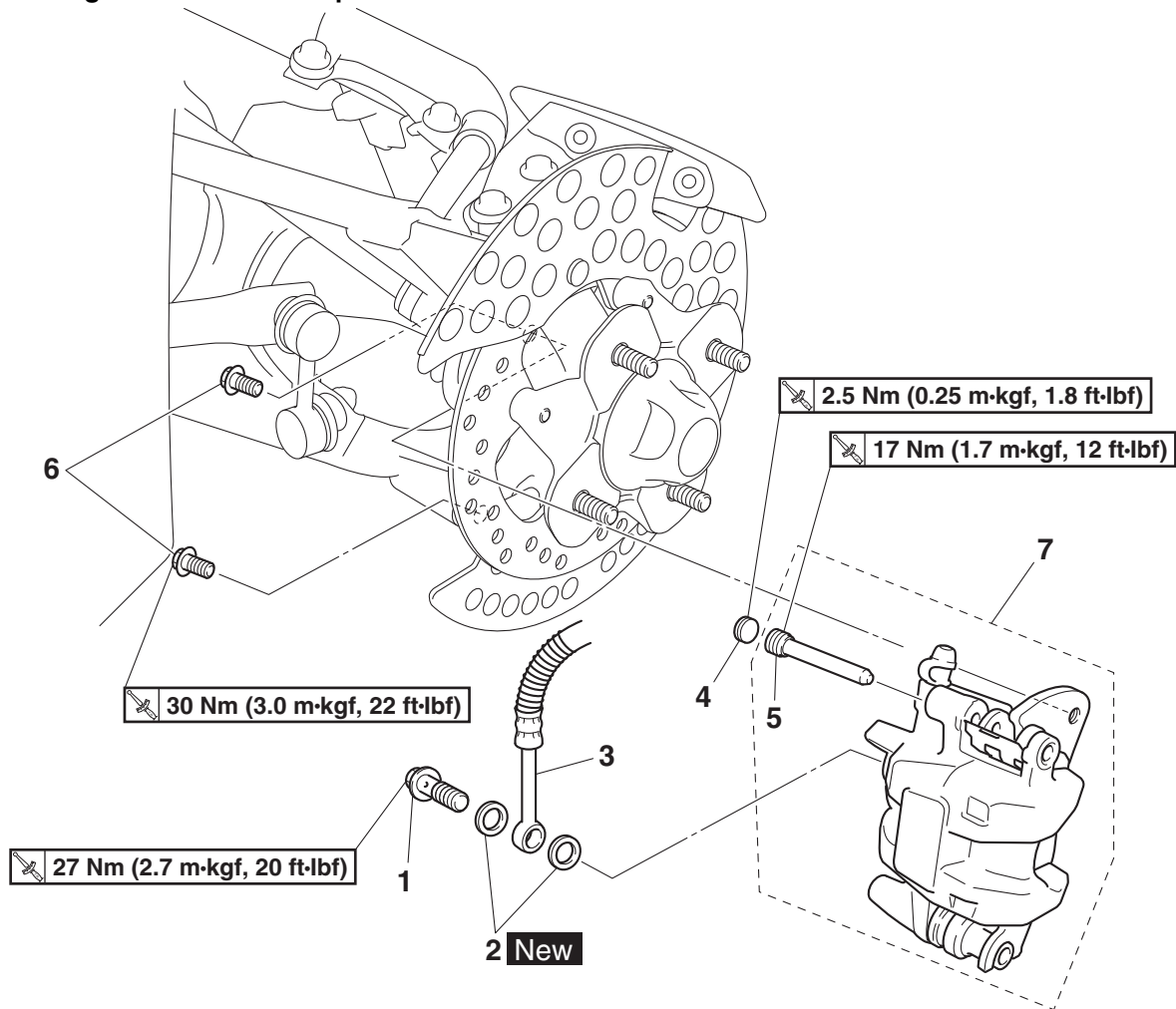
## Disassembling the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	

# REAR BRAKE

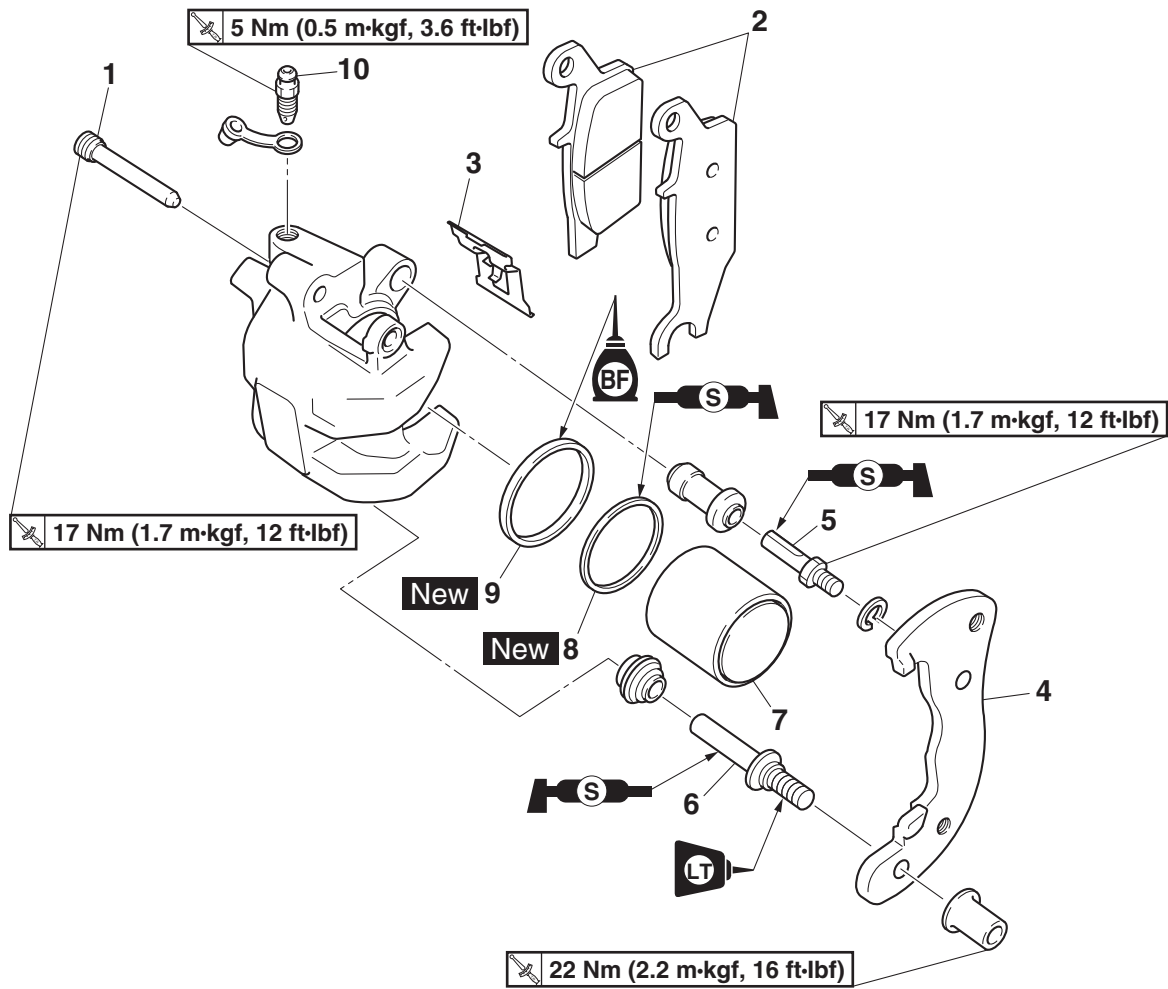
## Removing the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.
	Rear wheel		
1	Union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Rear brake caliper bolt	2	
7	Rear brake caliper assembly	1	

# REAR BRAKE

## Disassembling the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
1	Brake pad holding bolt	1	
2	Brake pad	2	
3	Brake pad spring	1	
4	Brake caliper bracket	1	
5	Brake caliper guide pin	1	
6	Brake caliper retaining pin	1	
7	Brake caliper piston	1	
8	Brake caliper dust seal	1	
9	Brake caliper piston seal	1	
10	Bleed screw	1	

EBS30382

## INTRODUCTION

EWB02930

### **WARNING**

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

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

### FIRST AID FOR BRAKE FLUID ENTERING THE EYES:

- Flush with water for 15 minutes and get immediate medical attention.

EBS30383

## CHECKING THE REAR BRAKE DISCS

The following procedure applies to both brake discs.

1. Remove:
  - Rear wheel  
Refer to "REAR WHEELS" on page 4-23.
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 4-31.



**Brake disc deflection limit**  
**0.10 mm (0.0039 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 4-31.



**Brake disc thickness limit**  
**3.0 mm (0.12 in)**

5. Adjust:
  - Brake disc deflection  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-31.



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

6. Install:
  - Rear wheels  
Refer to "REAR WHEELS" on page 4-23.

EBS30384

## REPLACING THE REAR BRAKE PADS

The following procedure applies to both brake calipers.

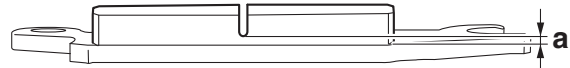
### TIP

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 and brake pad spring as a set.



**Brake pad lining thickness limit**  
**1.0 mm (0.04 in)**



2. Install:
  - Brake pad spring
  - Brake pads

### TIP

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



# REAR BRAKE

EBS30387

## CHECKING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

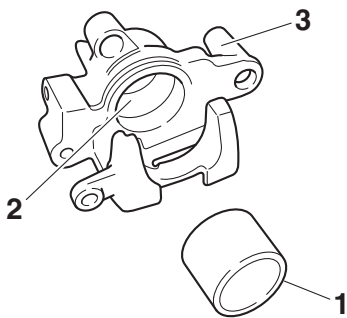
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals, dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

- 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.

EWB03140

### **WARNING**

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



EBS30388

## ASSEMBLING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

EWB03150

### **WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.

- Never use solvents on internal brake components as they will cause the brake caliper piston dust seals and brake caliper piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.



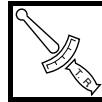
**Specified brake fluid  
DOT 4**

EBS30389

## INSTALLING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

- Install:
  - Brake caliper assembly
  - Brake caliper bolts "1"
  - Brake hose "2"
  - Copper washers "3" **New**
  - Brake hose union bolt "4"



**Rear brake caliper bolt  
30 Nm (3.0 m·kgf, 22 ft·lbf)  
Brake hose union bolt  
27 Nm (2.7 m·kgf, 20 ft·lbf)**

EWB02870

### **WARNING**

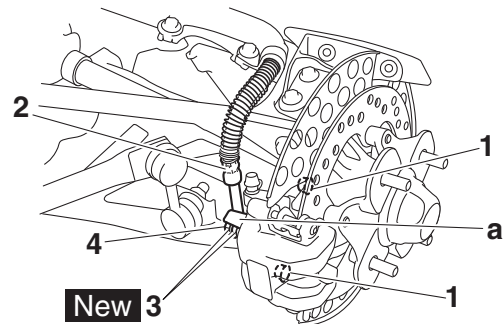
Proper brake hose routing is essential to insure safe vehicle operation.

Refer to "CABLE ROUTING" on page 2-33.

ECB02330

### **NOTICE**

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



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





**Specified brake fluid  
DOT 4**

EWB02790

## **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.

ECB01320

## **NOTICE**

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

3. Bleed:
  - Brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.
4. Check:
  - Brake fluid level  
Below the minimum level mark → Add the specified brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.
5. Check:
  - Brake lever and pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

EBS30390

## **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  
Cracks/damage → Replace.
  - Brake master cylinder reservoir diaphragm  
Cracks/damage → Replace.
4. Check:
  - Brake hoses  
Cracks/damage/wear → Replace.

EBS30391

## **ASSEMBLING THE REAR BRAKE MASTER CYLINDER**

EWB03590

## **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.
- Whenever a master cylinder is disassembled, replace the brake master cylinder kit.



**Specified brake fluid  
DOT 4**

EBS30392

## **INSTALLING THE REAR BRAKE MASTER CYLINDER**

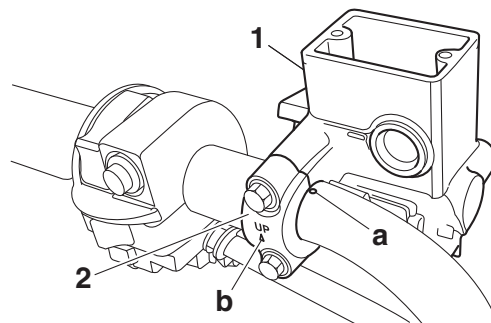
1. Install:
  - Brake master cylinder “1”
  - Brake master cylinder holder “2”



**Rear brake master cylinder holder bolt  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

## **TIP**

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



2. Install:
  - Brake hose

- Copper washers **New**
- Brake hose union bolt



**Brake hose union bolt**  
27 Nm (2.7 m·kgf, 20 ft·lbf)

EWB02870

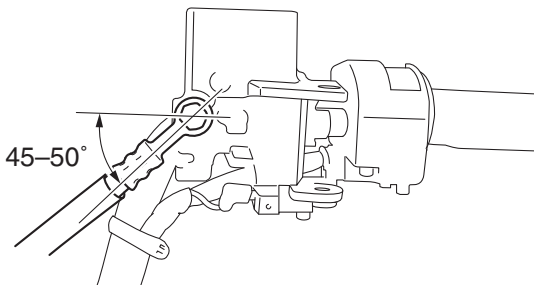
## WARNING

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

Refer to "CABLE ROUTING" on page 2-33.

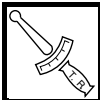
## TIP

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



## 3. Install:

- Brake lever bracket
- Brake lever



**Rear brake lever pivot bolt**  
6 Nm (0.6 m·kgf, 4.3 ft·lbf)  
**Rear brake lever pivot nut**  
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

ECB02890

## NOTICE

The brake lever pivot bolt and nut have left-handed threads. To tighten the pivot bolt and nut, turn them counterclockwise.

## 4. Fill:

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



**Specified brake fluid**  
DOT 4

EWB02880

## 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.

ECB01320

## 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 3-14.

## 6. Check:

- Brake fluid level  
Below the minimum level mark → Add the specified brake fluid to the proper level.  
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.

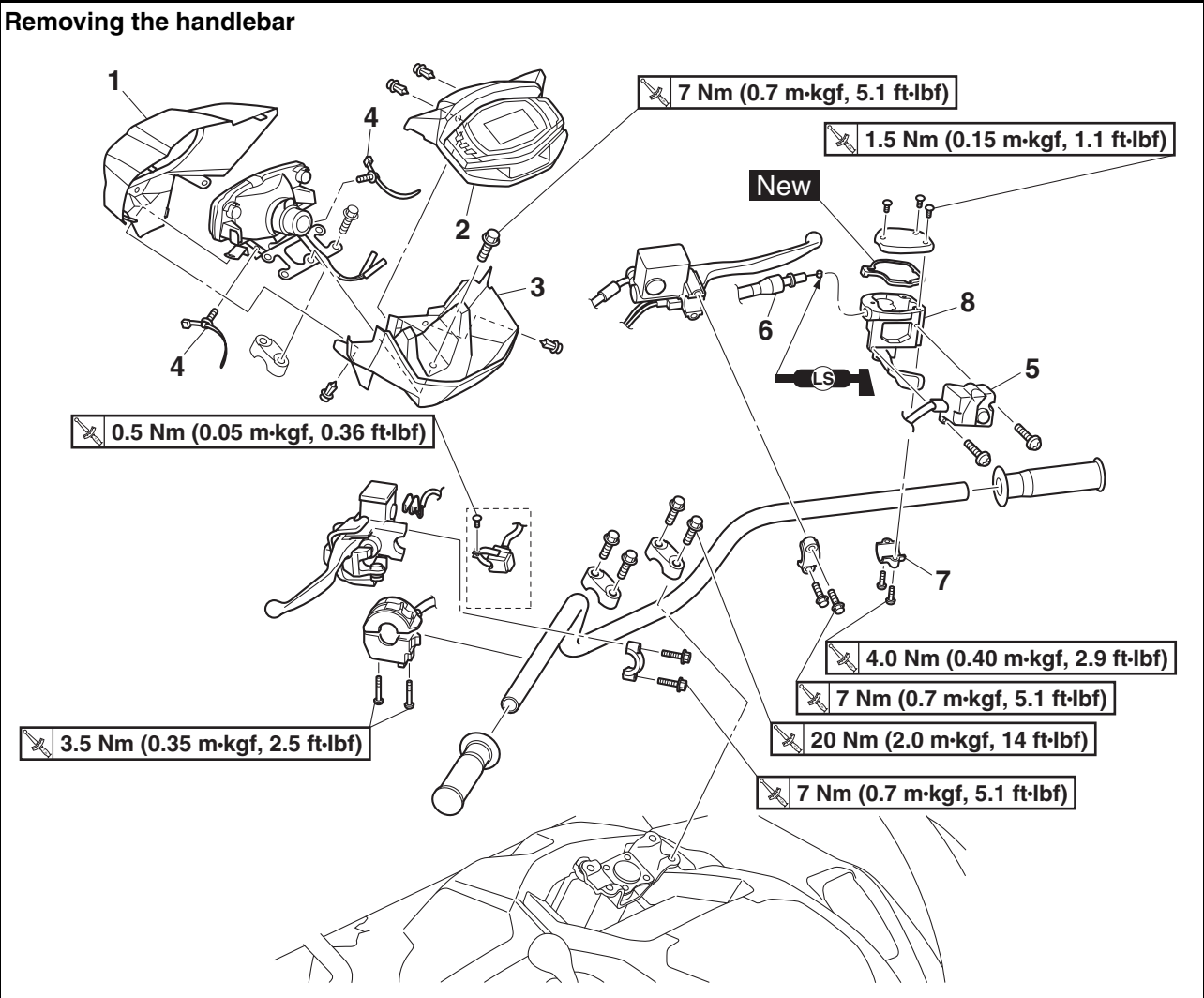
## 7. Check:

- Brake lever and pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.

EBS20099

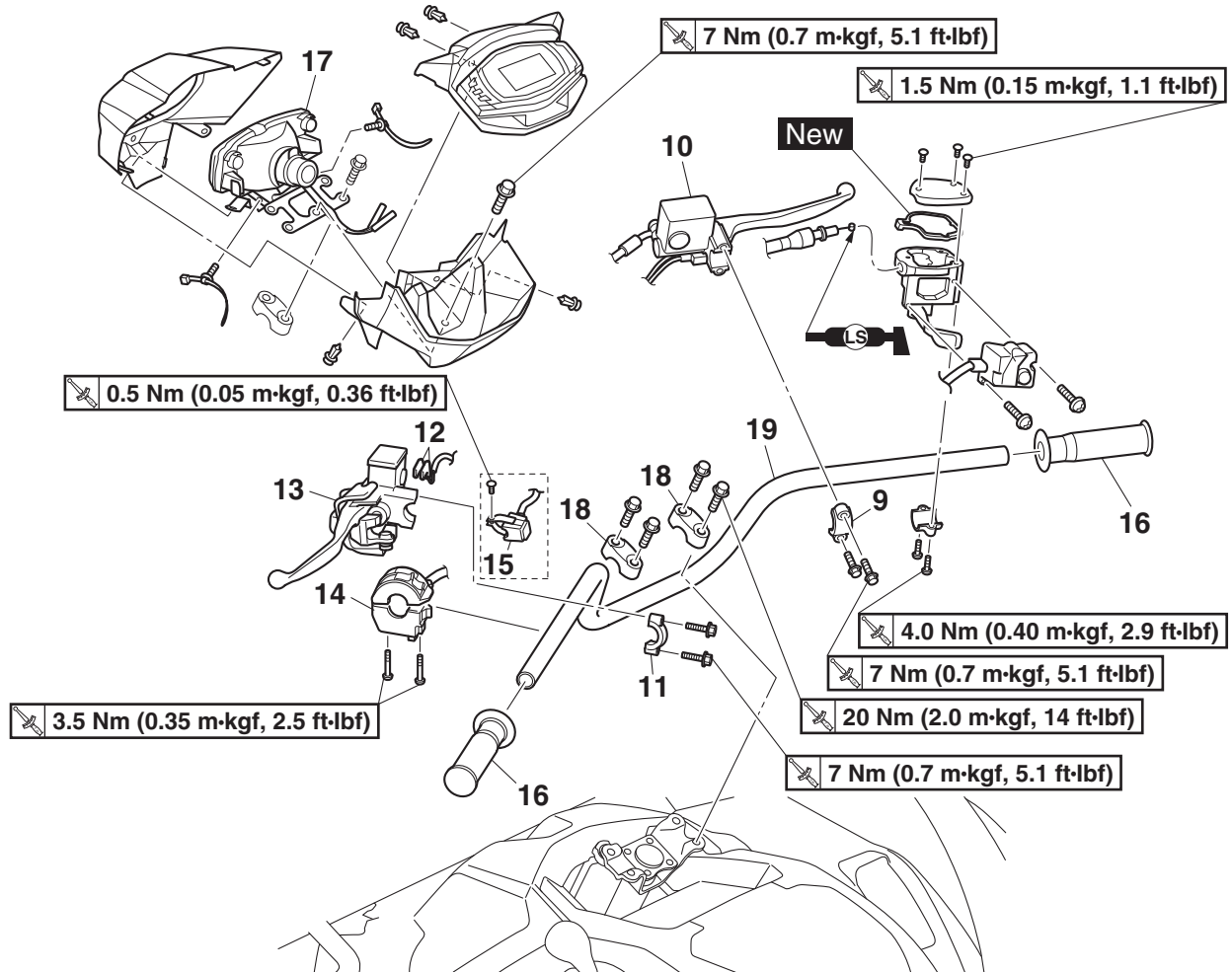
## HANDLEBAR

### Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
1	Handle mounted light cover	1	
2	Multi-function meter	1	
3	Handlebar cover	1	
4	Plastic band	2	
5	On-Command four-wheel-drive motor switch and differential gear lock switch	1	
6	Throttle cable	1	Disconnect.
7	Throttle lever assembly holder	1	
8	Throttle lever assembly	1	

## Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
9	Front brake master cylinder holder	1	
10	Front brake master cylinder	1	
11	Rear brake master cylinder holder	1	
12	Rear brake light switch connector	2	Disconnect.
13	Rear brake master cylinder	1	
14	Handlebar switch (left)	1	
15	Horn switch	1	Except for CDN
16	Handlebar grip	2	
17	Handle mounted light assembly	1	
18	Handlebar holder	2	
19	Handlebar	1	

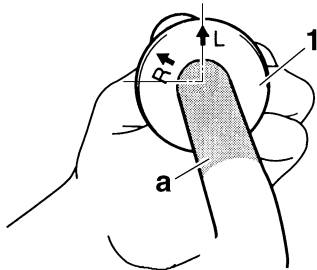


- d. Wipe off any excess rubber adhesive with a clean rag.

EWB03690

**WARNING**

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



4. Install:

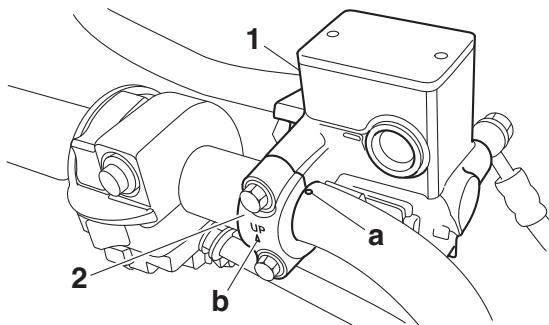
- Handlebar switch (left)
- Rear brake master cylinder "1"
- Rear brake master cylinder holder "2"



**Rear brake master cylinder holder bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**TIP**

- Align the end of the brake master cylinder holder with the punch mark "a" on the handlebar.
- The "UP" mark "b" on the brake master cylinder holder should face up.
- First tighten the bolt on the upper side of the brake master cylinder holder, and then tighten the bolt on the lower side.



5. Install (except for CDN):

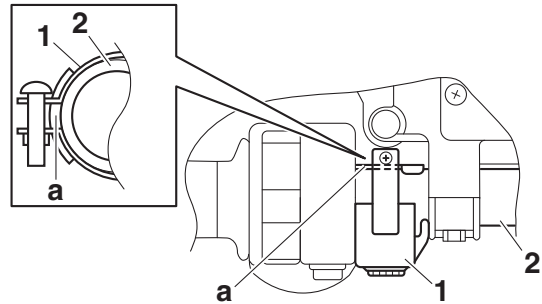
- Horn switch "1"



**Horn switch holder screw (except for CDN)**  
0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)

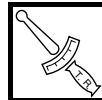
**TIP**

Be sure to fit the projection "a" on the handlebar "2" between the ends of the horn switch.



6. Install:

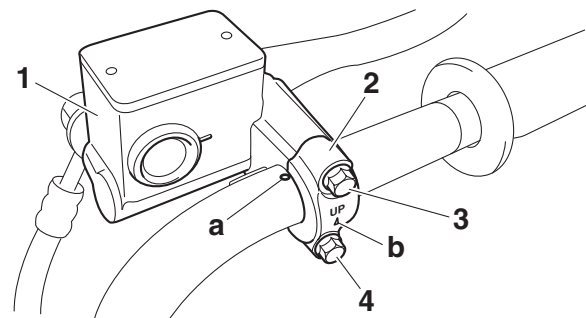
- Front brake master cylinder "1"
- Front brake master cylinder holder "2"



**Front brake master cylinder holder bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**TIP**

- Align the end of the brake master cylinder holder with the punch mark "a" on the handlebar.
- The "UP" mark "b" on the brake master cylinder holder should face up.
- First tighten the bolt "3" on the upper side of the brake master cylinder holder, and then tighten the bolt "4" on the lower side.

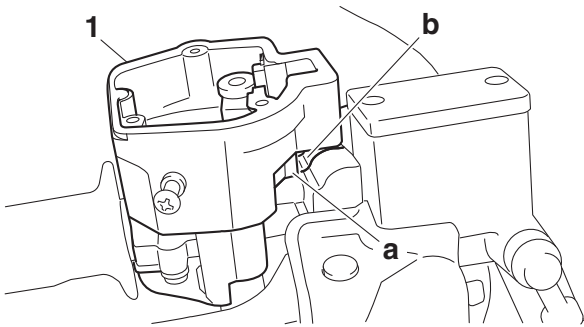


7. Install:

- Throttle lever assembly "1"
- Throttle lever assembly holder

**TIP**

Align the projection "a" on the throttle lever assembly with the end of the brake master cylinder holder "b".



8. Connect:
- Throttle cable

**TIP**

Lubricate the end of the throttle cable with a thin coat of lithium-soap-based grease.



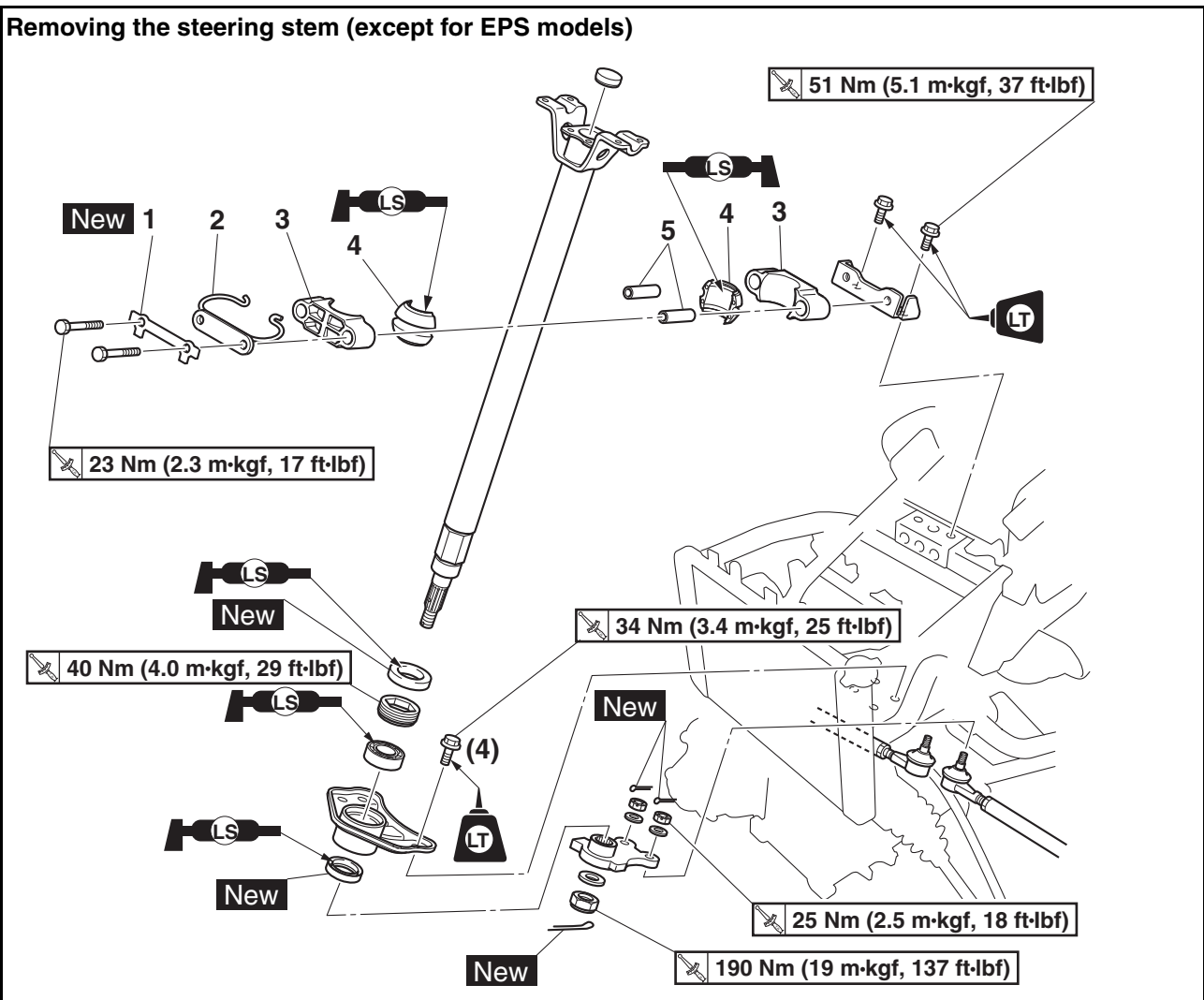
**Throttle lever assembly cover  
bolt**  
**1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)**

9. Adjust:
- Rear brake lever free play  
Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.
10. Adjust:
- Throttle lever free play  
Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-33.

EBS20101

## STEERING STEM

### Removing the steering stem (except for EPS models)

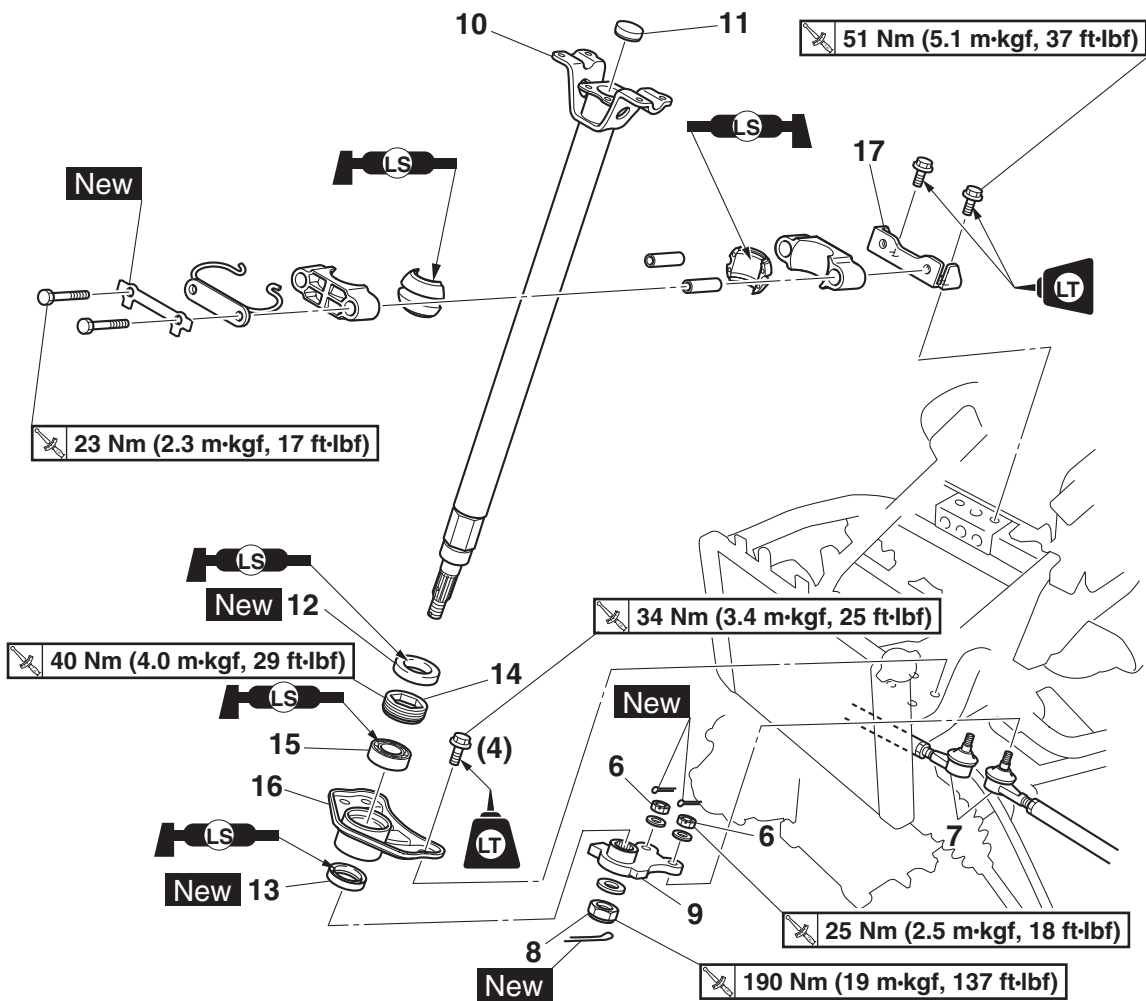


Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Battery cover/Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front carrier/Front guard		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Front fender		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Electrical components tray		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Storage compartment		Refer to "GENERAL CHASSIS (5)" on page 4-17.
	Handlebar		Refer to "HANDLEBAR" on page 4-48.
1	Lock washer	1	
2	Cable guide	1	
3	Steering stem bushing holder	2	
4	Steering stem bushing	2	
5	Collar	2	



# STEERING STEM

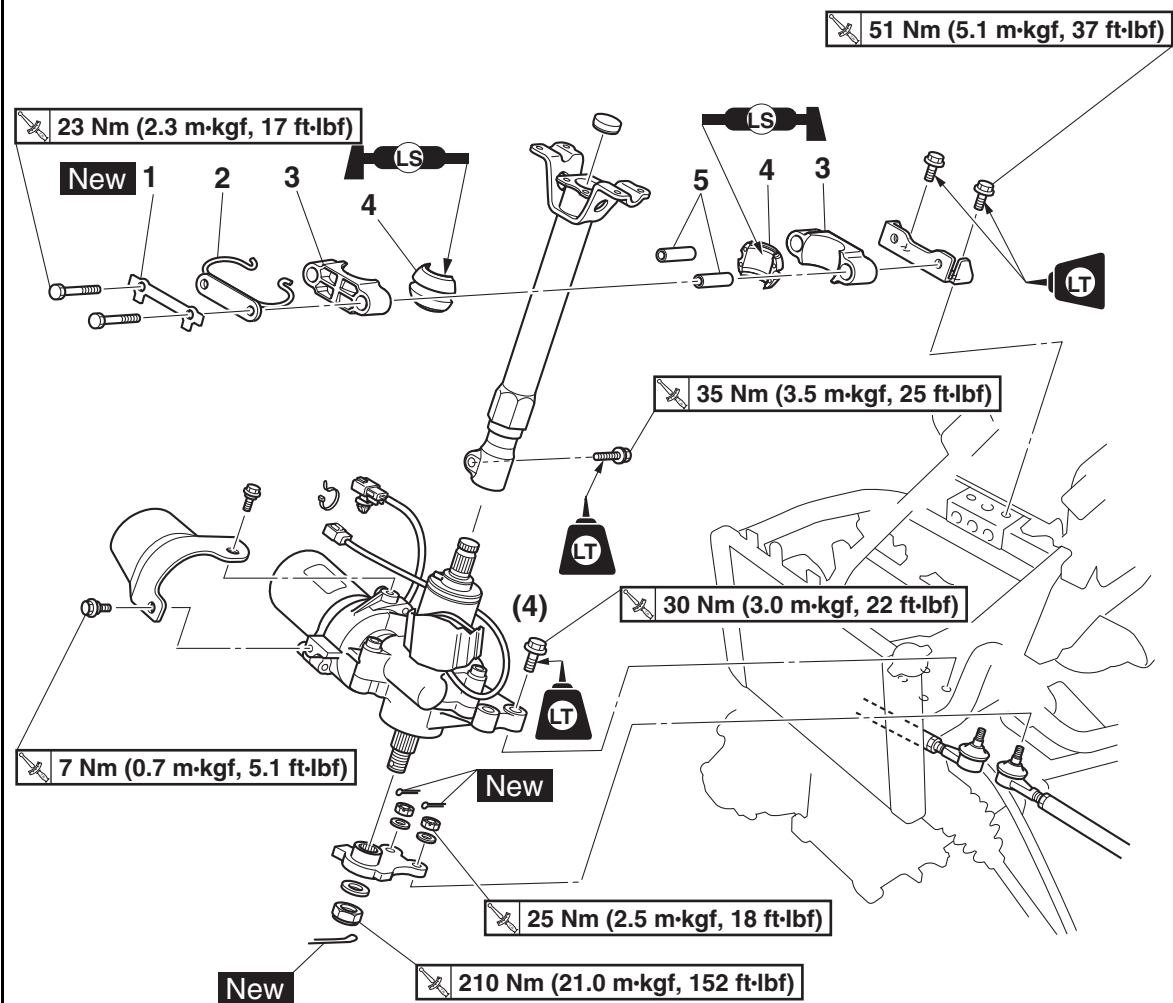
## Removing the steering stem (except for EPS models)



Order	Job/Parts to remove	Q'ty	Remarks
6	Tie-rod nut	2	
7	Tie-rod	2	Disconnect.
8	Pitman arm nut	1	
9	Pitman arm	1	
10	Steering stem	1	
11	Plug	1	
12	Oil seal	1	
13	Oil seal	1	
14	Bearing retainer	1	
15	Bearing	1	
16	Steering stem support	1	
17	Steering stem bracket	1	

# STEERING STEM

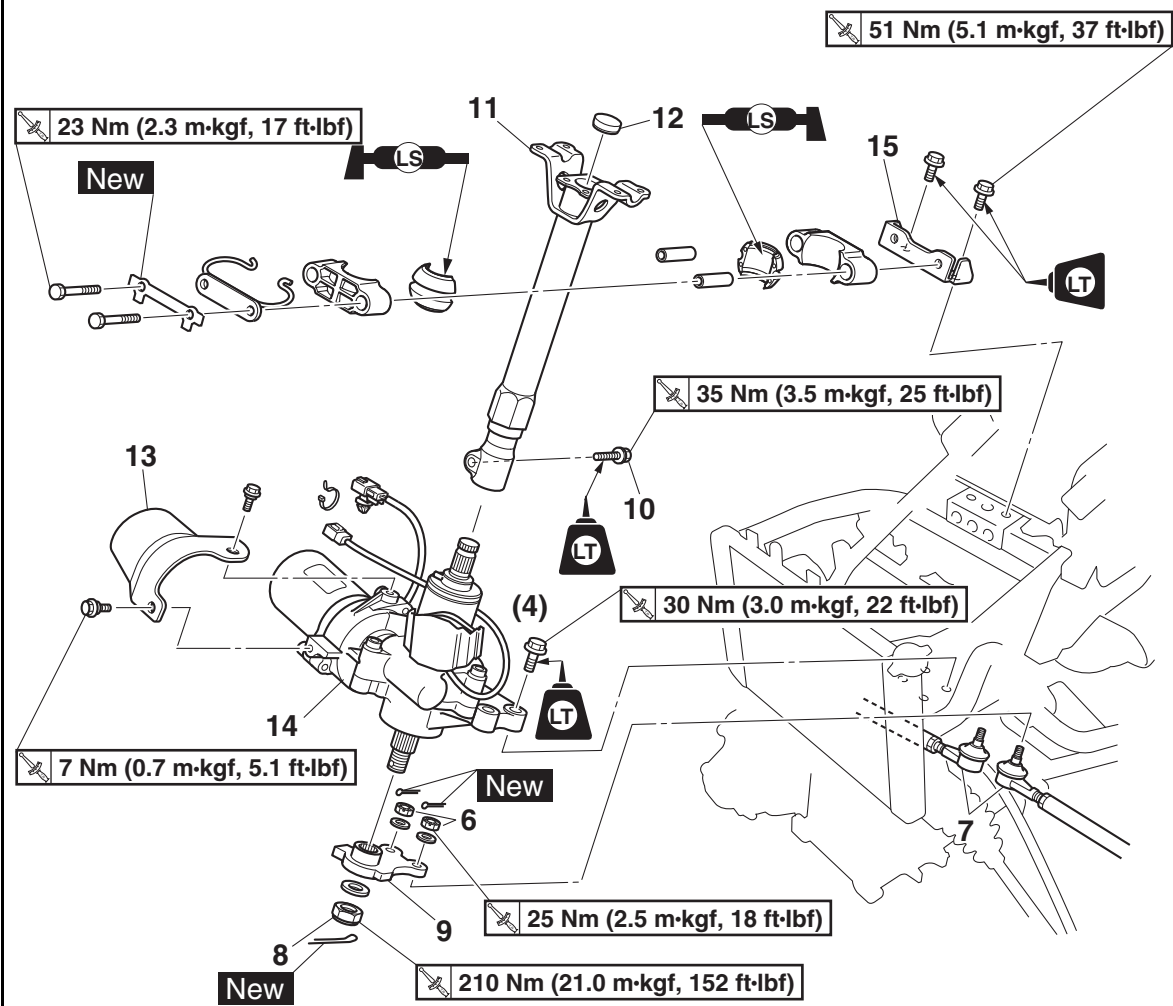
## Removing the steering stem (for EPS models)



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Battery cover/Seat/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front carrier/Front guard		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Front fender		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Electrical components tray		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Storage compartment		Refer to "GENERAL CHASSIS (5)" on page 4-17.
	Handlebar		Refer to "HANDLEBAR" on page 4-48.
1	Lock washer	1	
2	Cable guide	1	
3	Steering stem bushing holder	2	
4	Steering stem bushing	2	
5	Collar	2	

# STEERING STEM

## Removing the steering stem (for EPS models)



Order	Job/Parts to remove	Q'ty	Remarks
6	Tie-rod nut	2	
7	Tie-rod	2	Disconnect.
8	Pitman arm nut	1	
9	Pitman arm	1	
10	Steering stem pinch bolt	1	
11	Steering stem	1	
12	Plug	1	
13	EPS motor cover	1	
14	EPS unit	1	
15	Steering stem bracket	1	

EBS30396

## REMOVING THE BEARING RETAINER (except for EPS models)

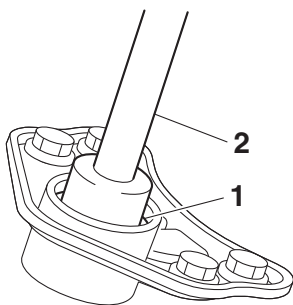
1. Remove:
  - Bearing retainer “1”

### TIP

Remove the bearing retainer with the damper rod holder “2”.



**Damper rod holder (30 mm)**  
90890-01327  
**Damper rod holder (30 mm)**  
YM-01327



EBS30397

## CHECKING THE STEERING STEM

1. Check:
  - Steering stem
 Bends → Replace.

EWB03780

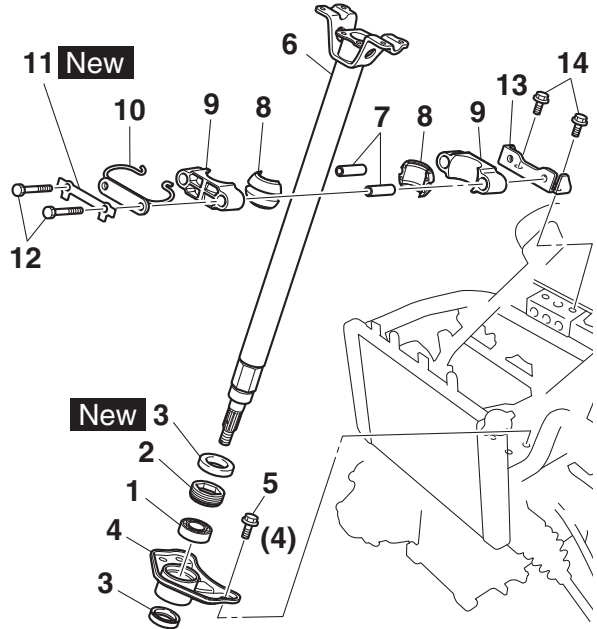


**Do not attempt to straighten a bent stem; this may dangerously weaken the stem.**

2. Check:
  - Steering stem bushings
 Wear/damage → Replace.

EBS30109

## INSTALLING THE STEERING STEM (except for EPS models)



1. Install:
  - Bearing “1”
  - Bearing retainer “2”
  - Oil seals “3” **New**



**Bearing retainer (steering stem)**  
40 Nm (4.0 m·kgf, 29 ft·lbf)

### TIP

Install the bearing retainer with the damper rod holder.



**Damper rod holder (30 mm)**  
90890-01327  
**Damper rod holder (30 mm)**  
YM-01327

2. Install:
  - Steering stem support “4”
  - Steering stem support bolts “5” (temporarily tighten)
3. Install:
  - Steering stem “6”
4. Install:
  - Collars “7”
  - Steering stem bushings “8”
  - Steering stem bushing holders “9”
  - Cable guide “10”
  - Lock washer “11” **New**

# STEERING STEM

- Steering stem bolts "12"  
(temporarily tighten)

**TIP**

Apply lithium-soap-based grease to the steering stem bushings.

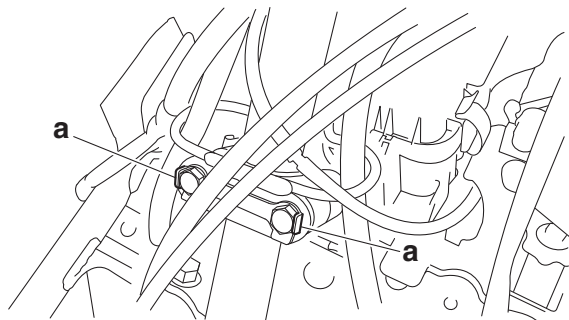
5. Install:
  - Steering stem bracket "13"
  - Steering stem bracket bolts "14"  
(temporarily tighten)
6. Tighten:
  - Steering stem bolts "12"



**Steering stem bolt**  
23 Nm (2.3 m-kgf, 17 ft-lbf)

**TIP**

- Bend the lock washer tabs "a" along a flat side of the bolts.
- Pass the brake hoses through the cable guide. Refer to "CABLE ROUTING" on page 2-33.

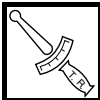


7. Tighten:
  - Steering stem support bolts "5"



**Steering stem support bolt (except for EPS models)**  
34 Nm (3.4 m-kgf, 25 ft-lbf)  
LOCTITE®

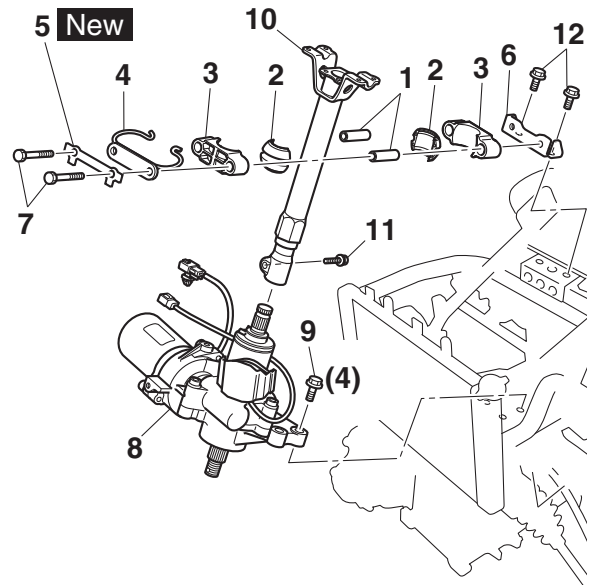
8. Tighten:
  - Steering stem bracket bolts "14"



**Steering stem bracket bolt**  
51 Nm (5.1 m-kgf, 37 ft-lbf)  
LOCTITE®

EBS30398

## INSTALLING THE STEERING STEM (for EPS models)



1. Install:
  - Collars "1"
  - Steering stem bushings "2"
  - Steering stem bushing holders "3"
  - Cable guide "4"
  - Lock washer "5" **New**
  - Steering stem bracket "6"
  - Steering stem bolts "7"  
(temporarily tighten)

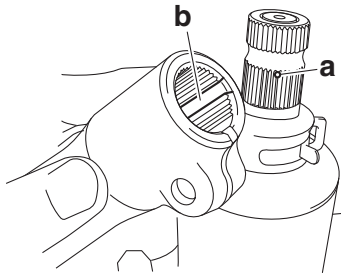
**TIP**

Apply lithium-soap-based grease to the steering stem bushings.


2. Install:
  - EPS unit "8"
  - EPS unit bolts "9"  
(temporarily tighten)
3. Install:
  - Steering stem "10"
  - Steering stem pinch bolt "11"  
(temporarily tighten)

**TIP**


Align the punch mark "a" on the EPS unit with the groove "b" in the steering stem.



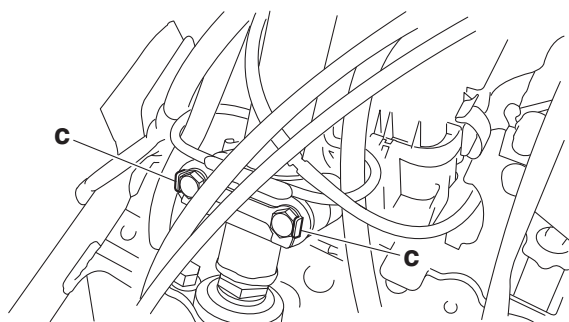
4. Install:
  - Steering stem bracket bolts "12" (temporarily tighten)
5. Tighten:
  - EPS unit bolts "9"
  - Steering stem pinch bolts "11"

	<p><b>EPS unit bolt (for EPS models)</b>                      30 Nm (3.0 m·kgf, 22 ft·lbf)                      LOCTITE®</p> <p><b>Steering stem pinch bolt (for EPS models)</b>                      35 Nm (3.5 m·kgf, 25 ft·lbf)                      LOCTITE®</p>
---	--


6. Tighten:
  - Steering stem bolts "7"

	<p><b>Steering stem bolt</b>                      23 Nm (2.3 m·kgf, 17 ft·lbf)</p>
---	--

- TIP**
- Bend the lock washer tabs "c" along a flat side of the bolts.
  - Pass the brake hoses through the cable guide. Refer to "CABLE ROUTING" on page 2-33.




7. Tighten
  - Steering stem bracket bolts "12"

	<p><b>Steering stem bracket bolt</b>                      51 Nm (5.1 m·kgf, 37 ft·lbf)                      LOCTITE®</p>
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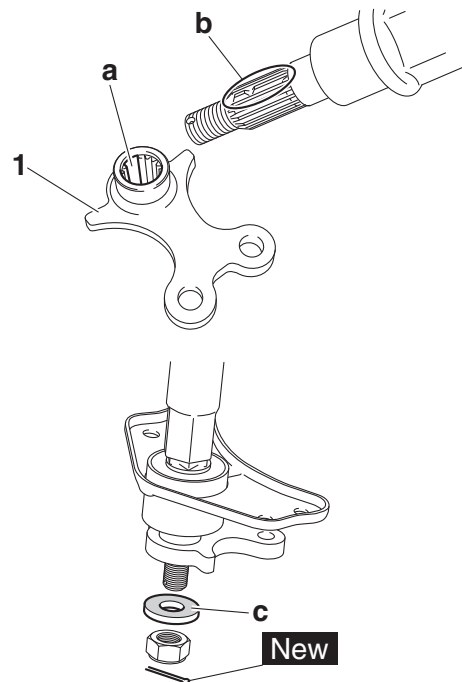
EBS30399

## INSTALLING THE PITMAN ARM (except for EPS models)

1. Install:
  - Pitman arm "1"
  - Washer
  - Pitman arm nut
  - Cotter pin **New**

	<p><b>Pitman arm nut (except for EPS models)</b>                      190 Nm (19 m·kgf, 137 ft·lbf)</p>
---	---


- TIP**
- Align the groove "a" in the pitman arm with the steering stem spline "b" that is indented.
  - Install the washer so that the rubber side "c" of the washer faces towards the pitman arm.



EBS30400

## INSTALLING THE PITMAN ARM (for EPS models)

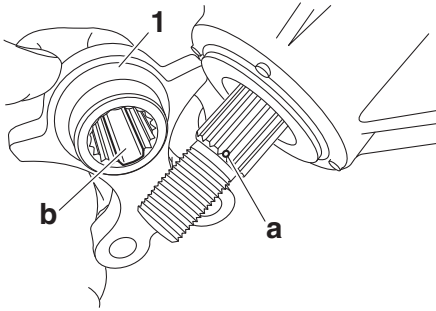
1. Install:
  - Pitman arm "1"
  - Washer
  - Pitman arm nut
  - Cotter pin **New**

	<p><b>Pitman arm nut (for EPS models)</b>                      210 Nm (21 m·kgf, 152 ft·lbf)</p>
---	--

**TIP**

Align the punch mark “a” on the EPS unit with the groove “b” in the pitman arm.

---

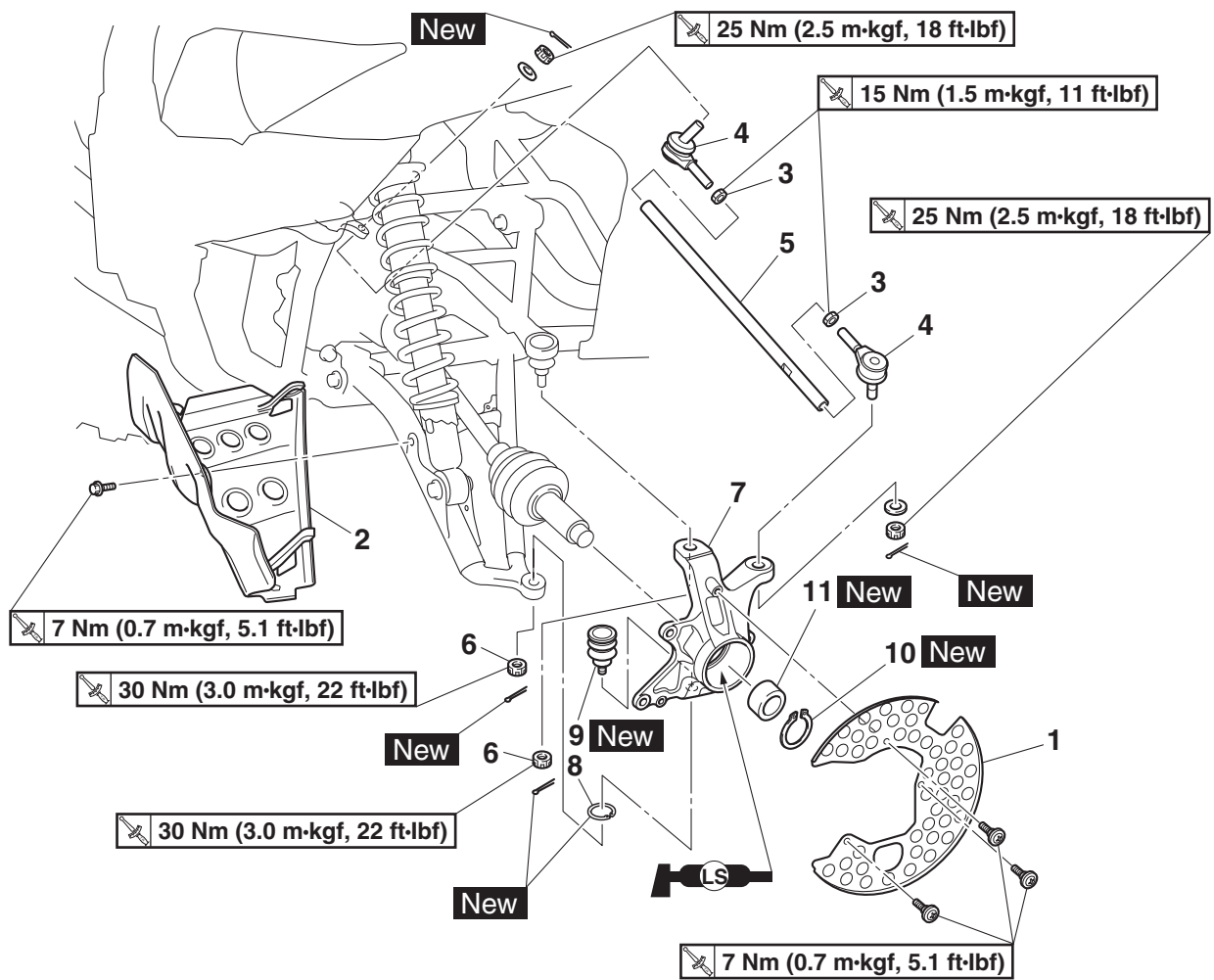


# TIE-RODS AND STEERING KNUCKLES

EBS20100

## TIE-RODS AND STEERING KNUCKLES

### Removing the tie-rods and steering knuckles



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the tie-rods and steering knuckles.
	Front wheel hub		Refer to "FRONT WHEELS" on page 4-20.
1	Brake disc guard	1	
2	Front arm protector	1	
3	Tie-rod end locknut	2	
4	Tie-rod end	2	
5	Tie-rod	1	
6	Nut	2	
7	Steering knuckle	1	
8	Circlip	1	
9	Ball joint	1	
10	Circlip	1	
11	Wheel bearing	1	



# TIE-RODS AND STEERING KNUCKLES

EBS30401

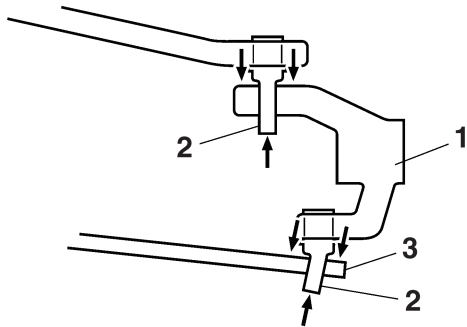
## REMOVING THE STEERING KNUCKLES

The following procedure applies to both of the steering knuckles.

1. Remove:
  - Steering knuckle "1"

### TIP

Use a general puller to separate the ball joints "2" from the steering knuckle "1" or the front lower arm "3".

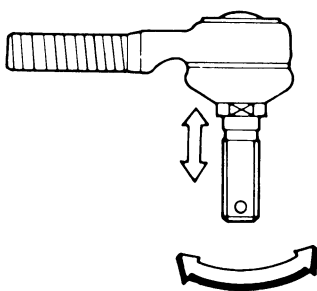


EBS30402

## CHECKING THE TIE-RODS

The following procedure applies to both of the tie-rods.

1. Check:
  - Tie-rod movement  
Rough movement → Replace the tie-rod end.
2. Check:
  - Tie-rod  
Bends/damage → Replace.  
Rubber boot damage → Replace the tie-rod end.



EBS30403

## CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS

The following procedure applies to both of the steering knuckles and front wheel bearings.

1. Check:
  - Steering knuckle  
Damage/pitting → Replace.

2. Check:
  - Front wheel bearing "1"  
Rough movement/excessive free play → Replace.

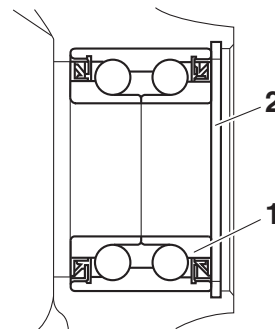


- a. Clean the surface of the steering knuckle.
- b. Remove the circlip "2".
- c. Drive out the bearing.

EWB03790

### WARNING

Eye protection is recommended when using striking tools.



- d. Apply lithium-soap-based grease to the balls of the new bearing.
- e. Install the new bearing.

ECB02650

### NOTICE

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

- f. Install a new circlip.

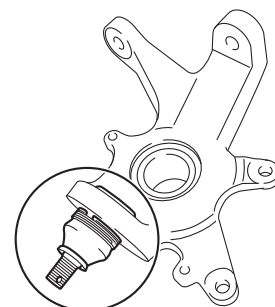


EBS30404

## CHECKING THE STEERING KNUCKLE BALL JOINTS

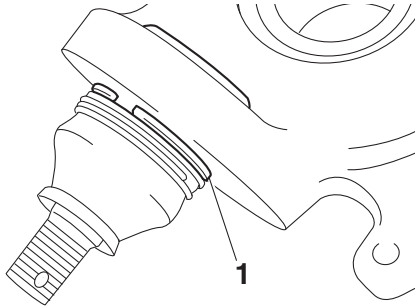
The following procedure applies to both of the steering knuckle ball joints.

1. Check:
  - Ball joint (steering knuckle)  
Damage/pitting → Replace the ball joint.  
Rubber boot damage → Replace the ball joint.  
Rough movement → Replace the ball joint.



# TIE-RODS AND STEERING KNUCKLES

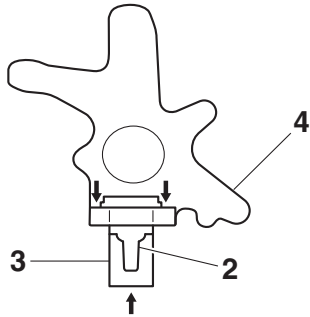
- a. Clean the surface of the steering knuckle.  
 b. Remove the circlip "1".



- c. Remove the ball joint "2".

**TIP**

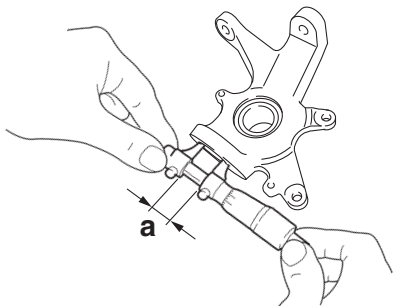
Use a suitable socket "3" to separate the ball joint "2" from the steering knuckle "4".



- d. Measure the ball joint bore inside diameter "a".  
 Out of specification → Replace the steering knuckle.



**Ball joint bore inside diameter  
 32.45–32.50 mm (1.278–1.280 in)**



- e. Attach the special tools and new ball joint "5" to the steering knuckle "4".

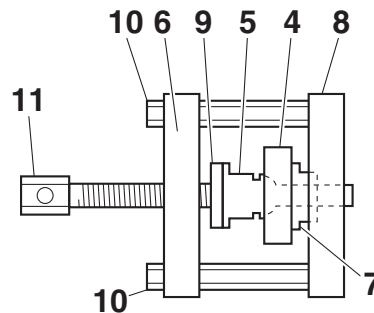
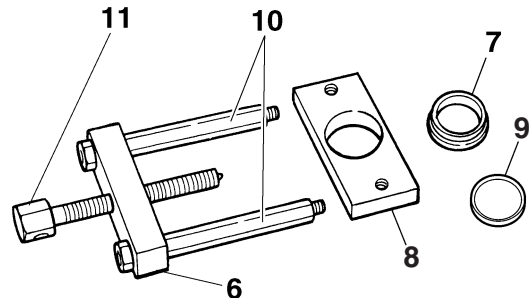
**TIP**

- Always use a new ball joint.
- Do not tap or damage the top of the ball joint.



**Ball joint remover  
 90890-01474**  
**Ball joint remover  
 YM-01474**  
**Ball joint remover attachment set  
 90890-01480**  
**Ball joint adapter set  
 YM-01480**  
**Ball joint installer attachment  
 38mm  
 90890-01583**  
**Ball joint installer attachment  
 38mm  
 YM-01583**  
**Ball joint remover short shaft set  
 90890-01514**  
**Ball joint remover short shaft set  
 YM-01514**

No.	Tool name	Tool No.
6	Body	90890-01474 YM-01474
7	Installer spacer	90890-01480 YM-01480
8	Base	
9	Ball joint installer attachment 38mm	90890-01583 YM-01583
10	Guide bolt	90890-01514 YM-01514
11	Short bolt	



- f. Hold the base "8" in place while turning in the short bolt "11" to install the new ball joint "5" into the steering knuckle "4".  
 g. Remove the special tools.

# TIE-RODS AND STEERING KNUCKLES

h. Install a new circlip.



EBS30405

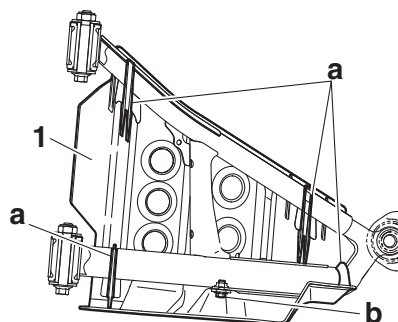
## INSTALLING THE TIE-RODS

The following procedure applies to both of the tie-rods.

1. Install:
  - Tie-rod

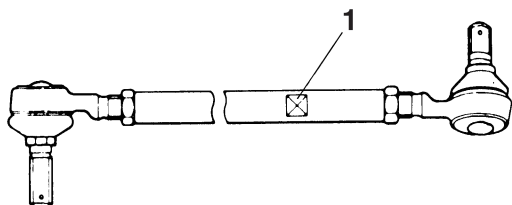


**Steering knuckle and tie-rod nut**  
25 Nm (2.5 m-kgf, 18 ft-lbf)  
**Pitman arm and tie-rod nut**  
25 Nm (2.5 m-kgf, 18 ft-lbf)



### TIP

Install the tie-rod so that the groove “1” is on the wheel side.



2. Adjust:

- Toe-in  
Refer to “ADJUSTING THE TOE-IN” on page 3-21.

EBS30406

## INSTALLING THE FRONT ARM PROTECTORS

The following procedure applies to both of the front arm protectors.

1. Install:
  - Front arm protector “1”



**Front arm protector bolt**  
7 Nm (0.7 m-kgf, 5.1 ft-lbf)

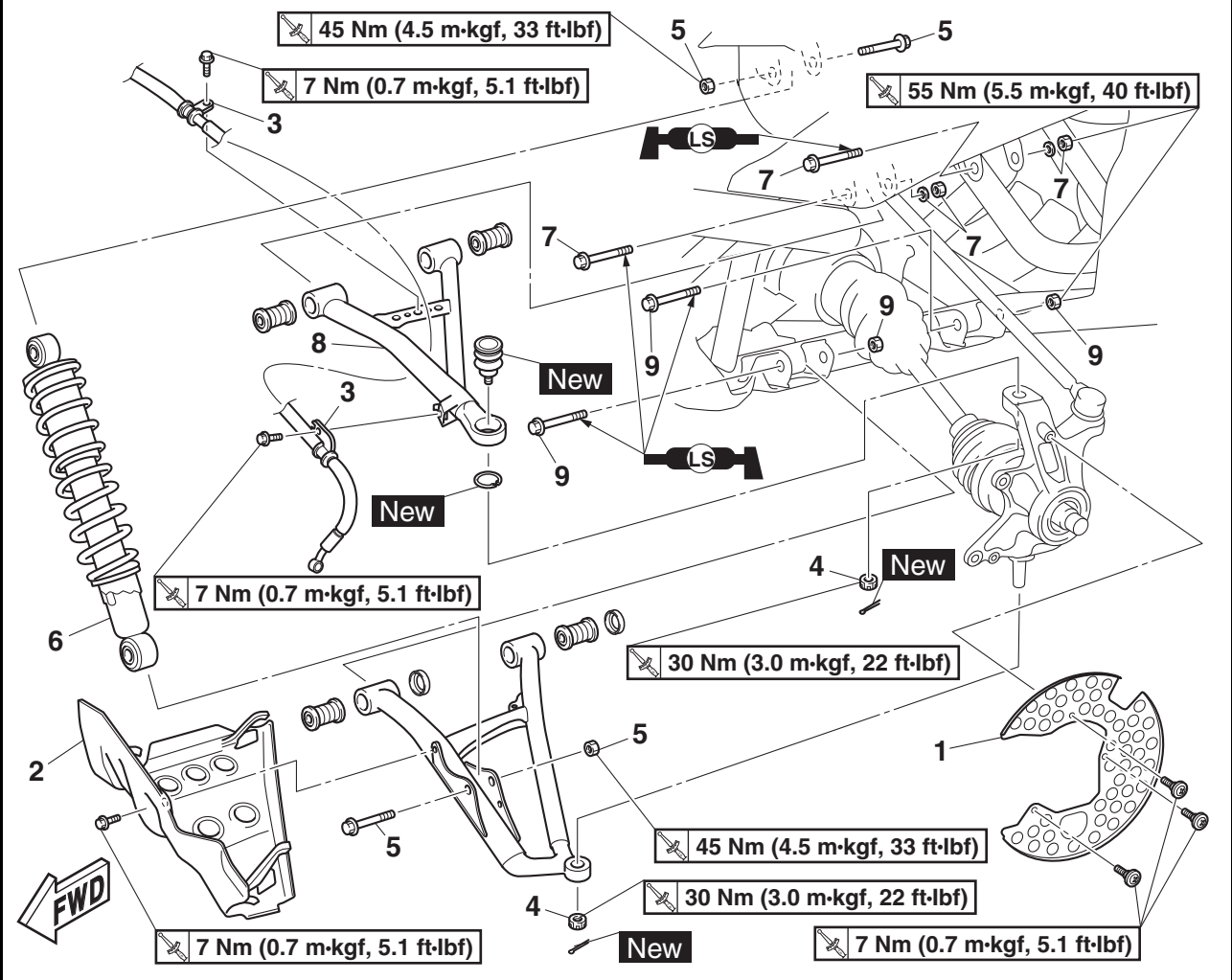
- a. Fit the holders “a” on the front arm protector onto the lower arm.
- b. Tighten the bolt “b”.

# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

EBS20031

## FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

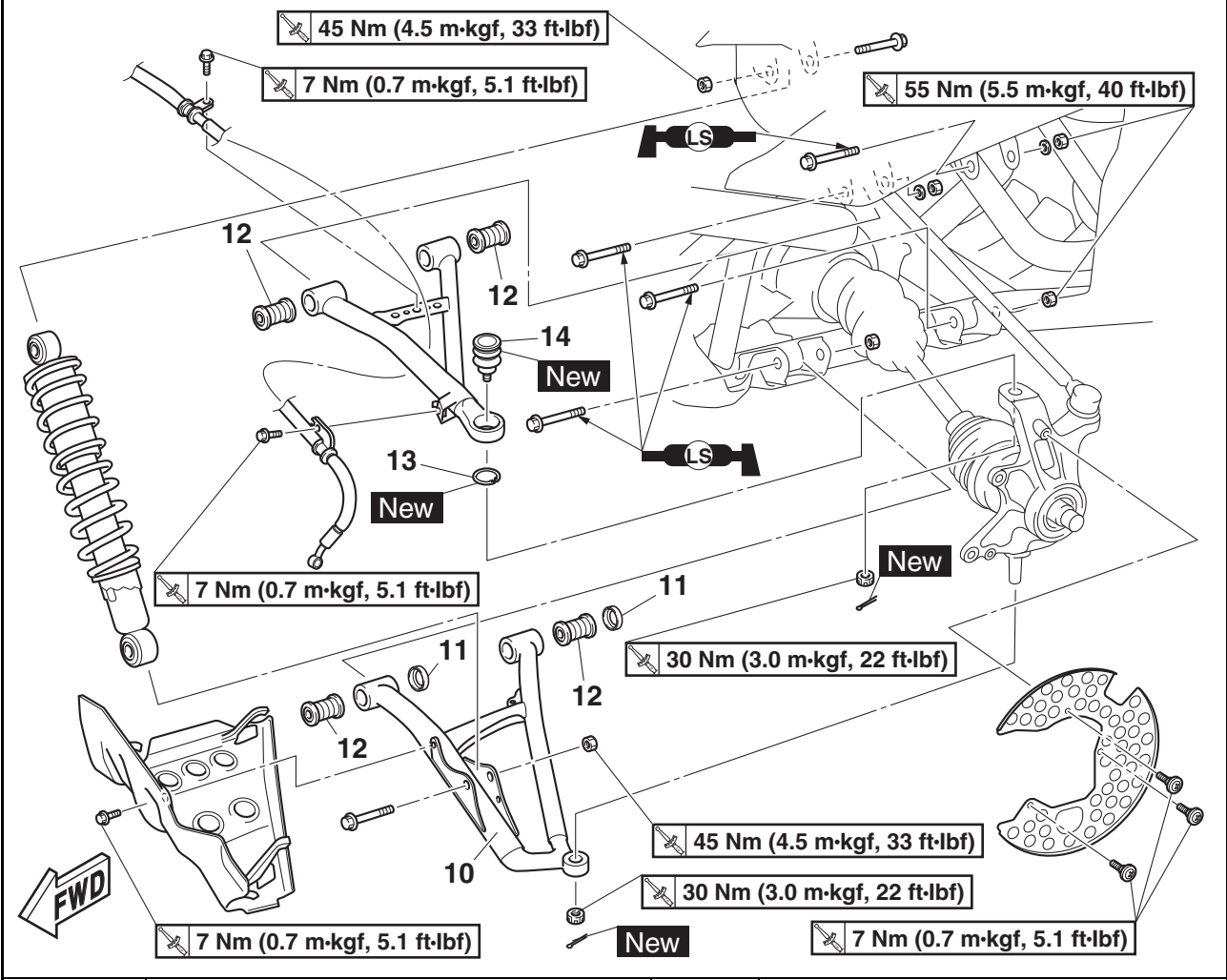
### Removing the front arms and front shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.
	Front wheel hub		Refer to "FRONT WHEELS" on page 4-20.
	Front brake caliper assembly		Refer to "FRONT BRAKE" on page 4-26.
1	Brake disc guard	1	
2	Front arm protector	1	
3	Front brake hose holder	2	
4	Nut	2	
5	Nut/Bolt	2/2	
6	Front shock absorber assembly	1	
7	Nut/Washer/Bolt	2/2/2	
8	Front upper arm	1	
9	Nut/Bolt	2/2	

# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

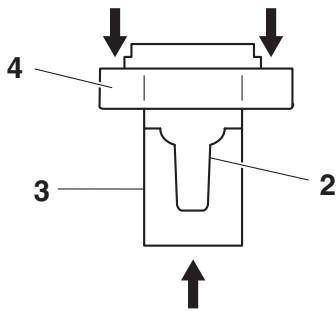
## Removing the front arms and front shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
10	Front lower arm	1	
11	Dust cover	2	
12	Bushing	4	
13	Circlip	1	
14	Ball joint	1	




# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES



d. Attach the special tools and new ball joint “5” to the front upper arm “4”.

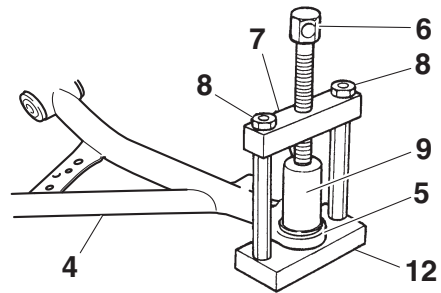
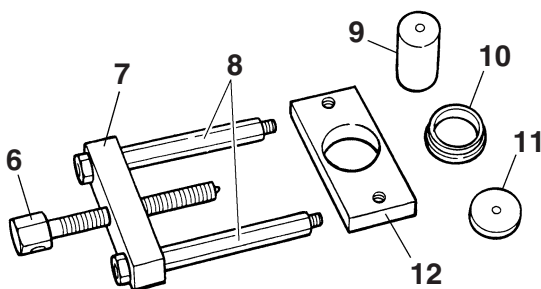
**TIP**

- Always use a new ball joint.
- Do not tap or damage the top of the ball joint.



**Ball joint remover**  
90890-01474  
**Ball joint remover**  
YM-01474  
**Ball joint remover attachment set**  
90890-01480  
**Ball joint adapter set**  
YM-01480

No.	Tool name	Tool No.
6	Long bolt	90890-01474 YM-01474
7	Body	
8	Guide bolt	
9	Remover attachment	
10	Installer spacer	90890-01480 YM-01480
11	Installer washer	
12	Base	



- e. Hold the base “12” in place while turning in the long bolt “6” to install the new ball joint “5” into the front upper arm “4”.
- f. Remove the special tools.
- g. Install a new circlip.



EBS30118

## INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.

1. Install:
- Front upper arm
  - Front lower arm
  - Front shock absorber assembly




a. Install the front upper arm “1” and front lower arm “2”.

**TIP**

- Lubricate the front upper and lower arm bolts “3” with lithium-soap-based grease.
- Be sure to position the front upper and lower arm bolts “3” so that the bolt heads face forward.
- Install the washers “4”.
- Temporarily tighten the front upper and lower arm nuts “5”.

b. Install the front shock absorber assembly “6”, bolts “7”, and nuts “8”.



**Front shock absorber assembly nut**  
45 Nm (4.5 m·kgf, 33 ft·lbf)

c. Install the steering knuckle, upper steering knuckle nut “9”, and lower steering knuckle nut “10”.

# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES



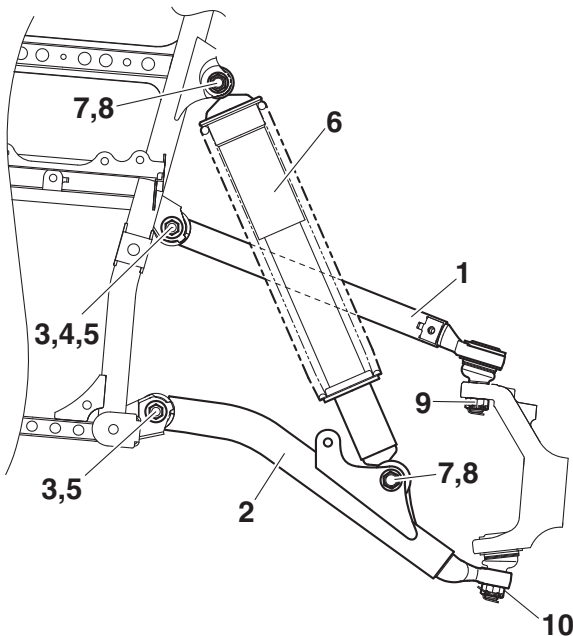
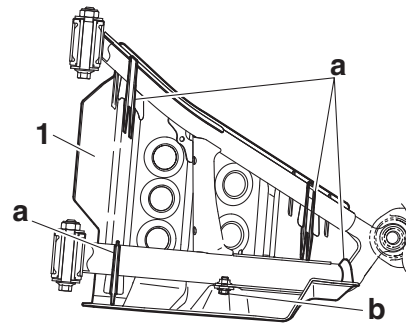
**Steering knuckle and front upper arm nut**  
 30 Nm (3.0 m·kgf, 22 ft·lbf)  
**Steering knuckle and front lower arm nut**  
 30 Nm (3.0 m·kgf, 22 ft·lbf)

- d. Install the new cotter pins.
- e. Tighten the front upper and lower arm nuts "5" to specification.



**Front upper arm nut**  
 55 Nm (5.5 m·kgf, 40 ft·lbf)  
**Front lower arm nut**  
 55 Nm (5.5 m·kgf, 40 ft·lbf)

b. Tighten the bolt "b".



EBS30407

## INSTALLING THE FRONT ARM PROTECTORS

The following procedure applies to both of the front arm protectors.

- 1. Install:
  - Front arm protector "1"



**Front arm protector bolt**  
 7 Nm (0.7 m·kgf, 5.1 ft·lbf)  
**Rear arm protector nut**  
 7 Nm (0.7 m·kgf, 5.1 ft·lbf)

- a. Fit the holders "a" on the front arm protector onto the lower arm.

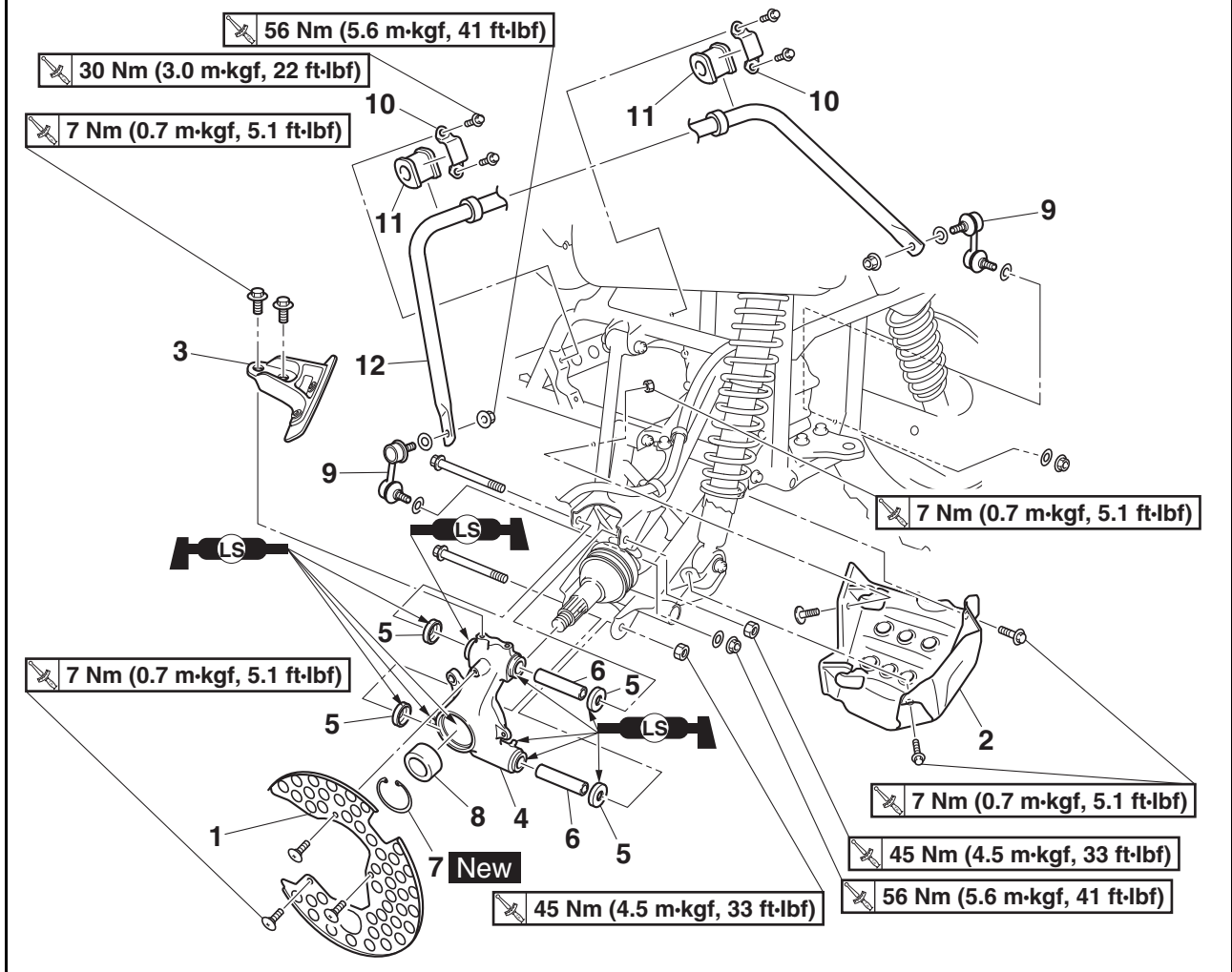


# REAR KNUCKLES AND STABILIZER

EBS20032

## REAR KNUCKLES AND STABILIZER

### Removing the rear knuckles and stabilizer



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear knuckles.
	Rear wheel hub		Refer to "REAR WHEELS" on page 4-23.
1	Brake disc guard	1	
2	Rear arm protector	1	
3	Rear brake disc cleaning plate	1	
4	Rear knuckle	1	
5	Spacer cover	4	
6	Spacer	2	
7	Circlip	1	
8	Wheel bearing	1	
9	Stabilizer joint	2	
10	Stabilizer holder	2	
11	Bushing	2	
12	Stabilizer	1	

# REAR KNUCKLES AND STABILIZER

EBS30119

## CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS

The following procedure applies to both of the rear knuckles and rear wheel bearings.

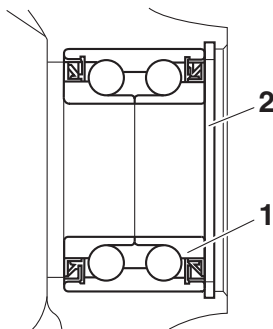
1. Check:
  - Rear knuckle  
Damage/pitting → Replace.
2. Check:
  - Rear wheel bearing "1"  
Rough movement/excessive free play → Replace.

- 
- a. Clean the surface of the rear knuckle.
  - b. Remove the circlip "2".
  - c. Drive out the bearing.

EWB03790

### **WARNING**

**Eye protection is recommended when using striking tools.**



- d. Apply lithium-soap-based grease to the bearing.
- e. Install the new bearing.

ECB02650

### **NOTICE**

**Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.**

- f. Install the new circlip.

EBS30120

## CHECKING THE STABILIZER

1. Check:
  - Stabilizer  
Bends/cracks/damage → Replace.

EBS30408

## INSTALLING THE REAR ARM PROTECTORS

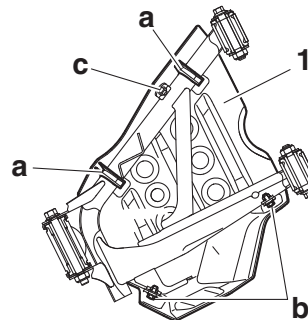
The following procedure applies to both of the rear arm protectors.

1. Install:
  - Rear arm protector "1"



**Rear arm protector bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)  
**Rear arm protector nut**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

- 
- a. Fit the holders "a" on the rear arm protector onto the lower arm.
  - b. Tighten the bolts "b"
  - c. Tighten the nut "c"

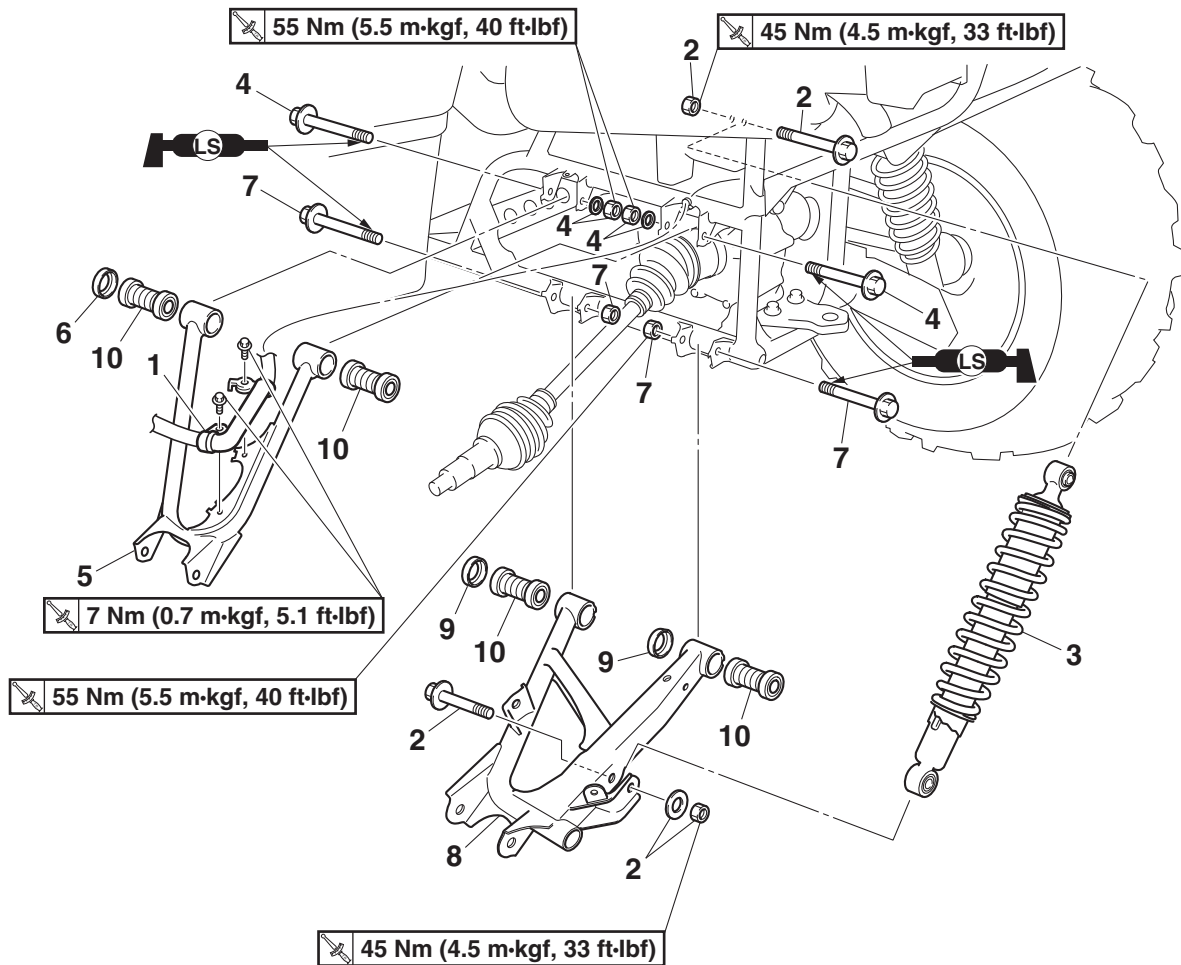


# REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

EBS20033

## REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

### Removing the rear arms and rear shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.
	Rear knuckle/Stabilizer		Refer to "REAR KNUCKLES AND STABILIZER" on page 4-70.
1	Rear brake hose guide	1	
2	Nut/Washer/Bolt	2/1/2	
3	Rear shock absorber assembly	1	
4	Nut/Washer/Bolt	2/2/2	
5	Rear upper arm	1	
6	Dust cover	1	
7	Nut/Bolt	2/2	
8	Rear lower arm	1	
9	Dust cover	2	
10	Bushing	4	

# REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

EBS30122

## CHECKING THE REAR ARMS

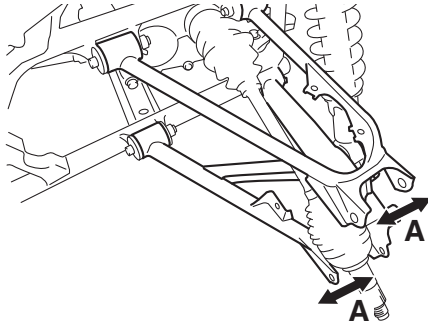
The following procedure applies to both of the rear upper arms and rear lower arms.

1. Check:

- Rear arm free play

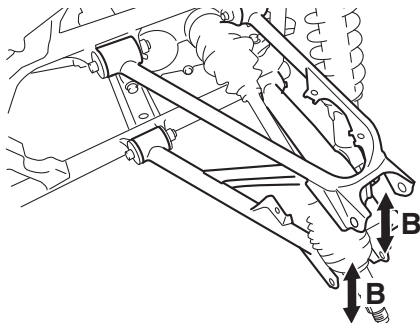
a. Check the rear arm side play “A” by moving it from side to side.

If side play is noticeable, check the bushings.



b. Check the rear arm vertical movement “B” by moving it up and down.

If the vertical movement is tight or rough, or if there is binding, check the bushings.



2. Check:

- Rear upper arm
  - Rear lower arm
- Bends/damage → Replace.

3. Check:

- Bushings
- Wear/damage → Replace.

EBS30125

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear shock absorber assemblies.

1. Check:

- Rear shock absorber assembly
- Oil leaks → Replace the rear shock absorber assembly.

- Rear shock absorber rod  
Bends/damage → Replace the rear shock absorber assembly.
- Spring  
Move the spring up and down.  
Fatigue → Replace the rear shock absorber assembly.

EBS30126

## INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.

1. Install:

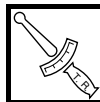
- Rear upper arm
- Rear lower arm
- Rear shock absorber assembly

a. Install the rear upper arm “1” and rear lower arm “2”.

**TIP**

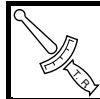
- Lubricate the rear upper and lower arm bolts “3” with lithium-soap-based grease.
- Be sure to position the rear upper and lower arm bolts “3” so that the bolt heads face outward.
- Installed the washers “4”.
- Temporarily tighten the rear upper and lower arm nuts “5”.

b. Install the rear shock absorber assembly “6”, bolts “7”, washer “8”, and nuts “9”.



**Rear shock absorber assembly nut**  
45 Nm (4.5 m·kgf, 33 ft·lbf)

c. Install the rear knuckle and nuts “10”.



**Rear knuckle nut**  
45 Nm (4.5 m·kgf, 33 ft·lbf)

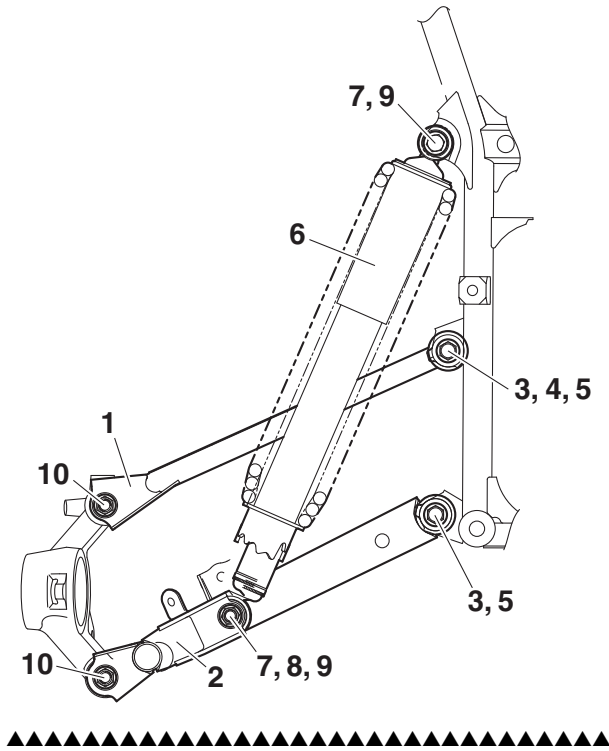
d. Tighten the rear upper and lower arm nuts “5” to specification.



**Rear upper arm nut**  
55 Nm (5.5 m·kgf, 40 ft·lbf)  
**Rear lower arm nut**  
55 Nm (5.5 m·kgf, 40 ft·lbf)

# REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

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# REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

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EBS20105

## ENGINE INSPECTION

EBS30135

### MEASURING THE COMPRESSION PRESSURE

**TIP** \_\_\_\_\_

Insufficient compression pressure will result in a loss of performance.

1. Measure:
  - Valve clearance  
Out of specification → Adjust.  
Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-5.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
  - Top cover
  - Side panel (right)
  - Storage compartment  
Refer to “GENERAL CHASSIS (2)” on page 4-6.
4. Disconnect:
  - Spark plug cap
5. Remove:
  - Spark plug

ECB01870

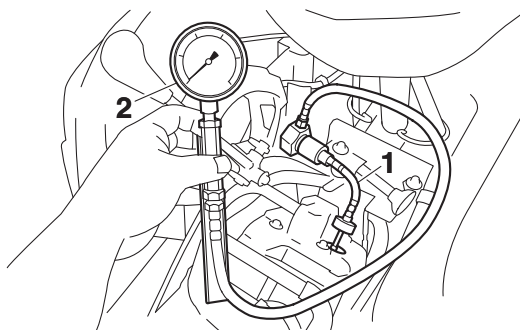
**NOTICE** \_\_\_\_\_

**Before removing the spark plug, use compressed air to blow away any dirt accumulated in the spark plug well to prevent it from falling into the cylinder.**

6. Install:
  - Extension “1”
  - Compression gauge “2”



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



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



**Standard compression pressure (at sea level)**  
650–1000 kPa (6.5–10.0 kgf/cm<sup>2</sup>, 92.4–142.2 psi)



- a. With the throttle wide open, crank the engine by pushing the start switch “⊗” until the reading on the compression gauge stabilizes.

EWB03200

**WARNING** \_\_\_\_\_

**To prevent sparking, ground the spark plug lead before cranking the engine.**

- b. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.  
Carbon deposits → Eliminate.
- c. 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 ring(s) possibly defective → Repair.



8. Install:
  - Spark plug



**Spark plug (reused)**  
Specified angle 30°–45°

**TIP** \_\_\_\_\_

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

9. Connect:
  - Spark plug cap
10. Install:
  - Storage compartment
  - Side panel (right)

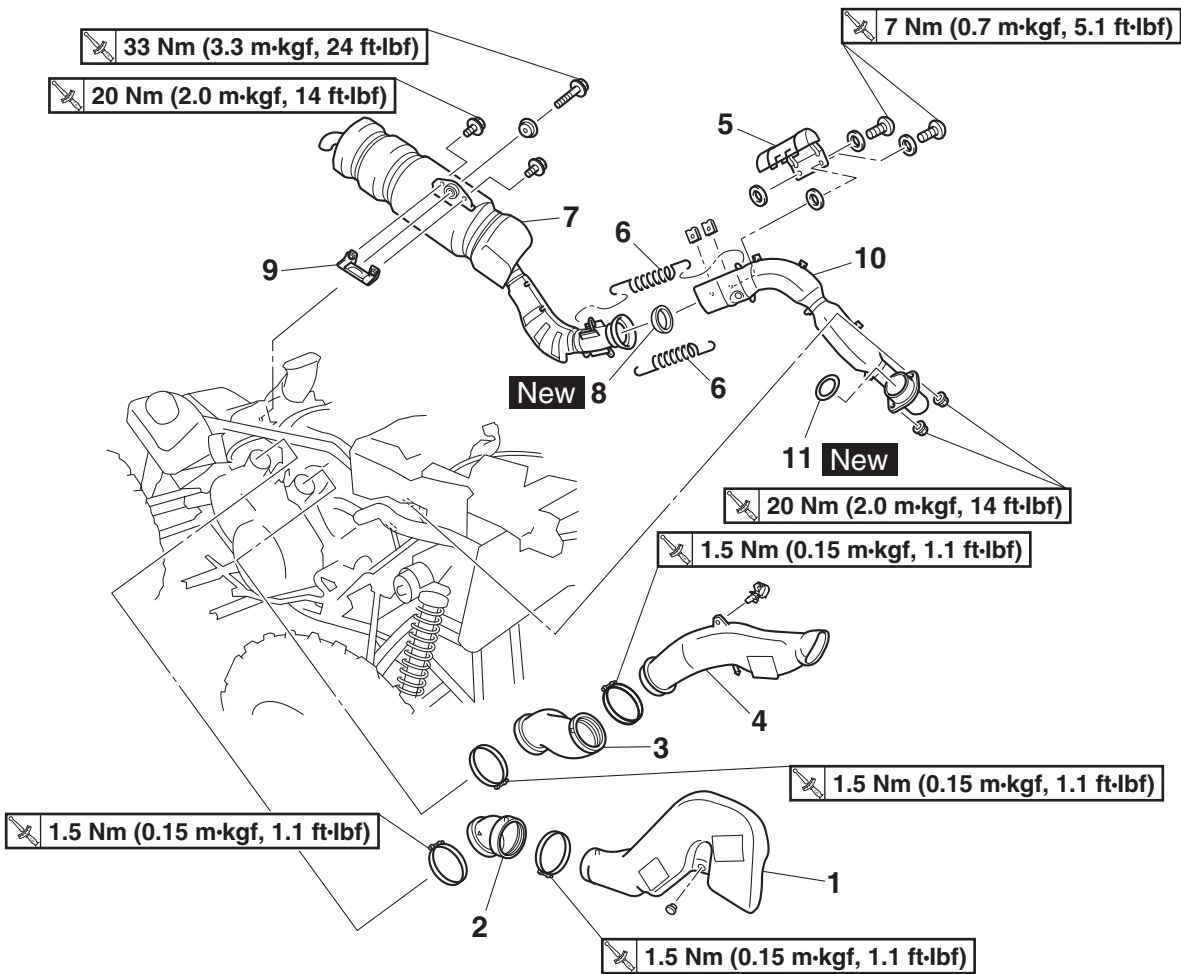
- Top cover  
Refer to "GENERAL CHASSIS (2)" on page 4-6.

# ENGINE REMOVAL (1)

EBS20034

## ENGINE REMOVAL (1)

Removing the V-belt cooling ducts, muffler and exhaust pipe



Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Rear fender		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Footrest board (left)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
1	V-belt cooling exhaust duct	1	
2	V-belt cooling exhaust duct joint	1	
3	V-belt cooling intake duct joint	1	
4	V-belt cooling intake duct	1	
5	Exhaust pipe protector	1	
6	Spring	2	
7	Muffler	1	
8	Gasket	1	
9	Muffler bracket	1	
10	Exhaust pipe	1	
11	Gasket	1	

# ENGINE REMOVAL (1)

EBS30127

## INSTALLING THE EXHAUST PIPE AND MUFFLER

1. Install:

- Gasket “1” **New**
- Exhaust pipe “2”
- Exhaust pipe nuts “3”



**Exhaust pipe nut**  
20 Nm (2.0 m·kgf, 14 ft·lbf)

2. Install:

- Muffler bracket “4”
- Muffler bracket bolts “5”



**Muffler bracket bolt**  
20 Nm (2.0 m·kgf, 14 ft·lbf)

3. Install:

- Gasket “6” **New**
- Muffler “7”
- Washer “8”
- Muffler bolt “9”

**TIP**

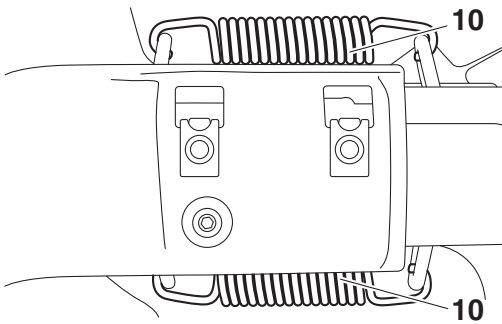
Do not fully tighten the muffler bolt.

4. Install:

- Springs “10”

**TIP**

Install the springs so that the spring ends are pointing inward as shown in the illustration.

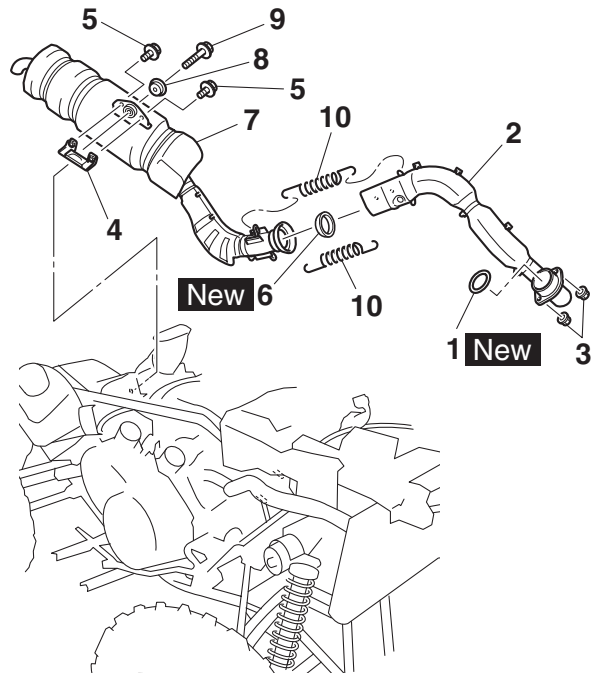


5. Tighten:

- Muffler bolt “9”



**Muffler bolt**  
33 Nm (3.3 m·kgf, 24 ft·lbf)



EBS30554

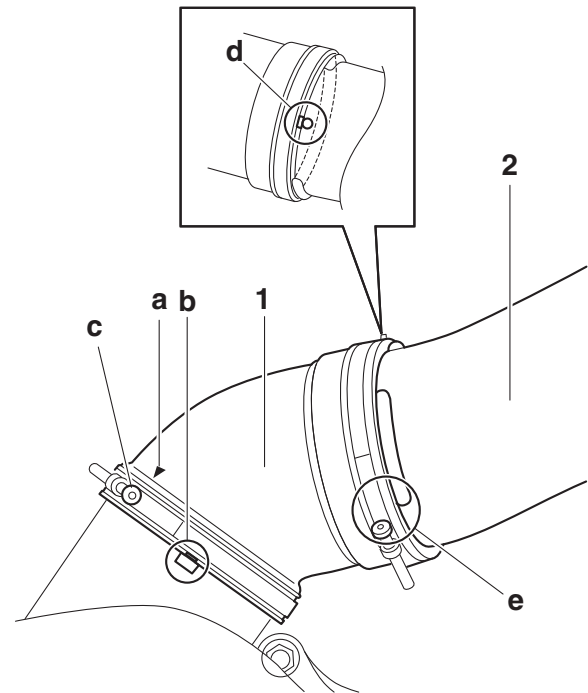
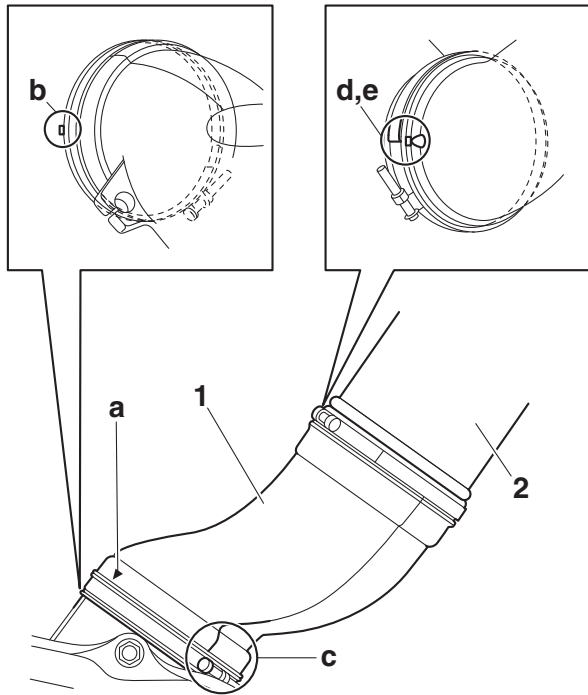
## INSTALLING THE V-BELT COOLING DUCTS

1. Install:

- V-belt cooling intake duct joint “1”
- V-belt cooling intake duct “2”

- Position the V-belt cooling intake duct joint with its arrow mark “a” pointing toward the engine.
- Align the projection on the V-belt cooling intake duct joint with the rib on the crankcase in the area “b” shown in the illustration.
- Align the screw head with the seam on the V-belt cooling intake duct joint in the area “c” shown in the illustration.
- Align the projection on the V-belt cooling intake duct with the projection on the V-belt cooling intake duct joint in the area “d” shown in the illustration.
- Align the bend in the screw clamp with the projection on the V-belt cooling intake duct joint in the area “e” shown in the illustration.

## ENGINE REMOVAL (1)



2. Install:

- V-belt cooling exhaust duct joint "1"
- V-belt cooling exhaust duct "2"

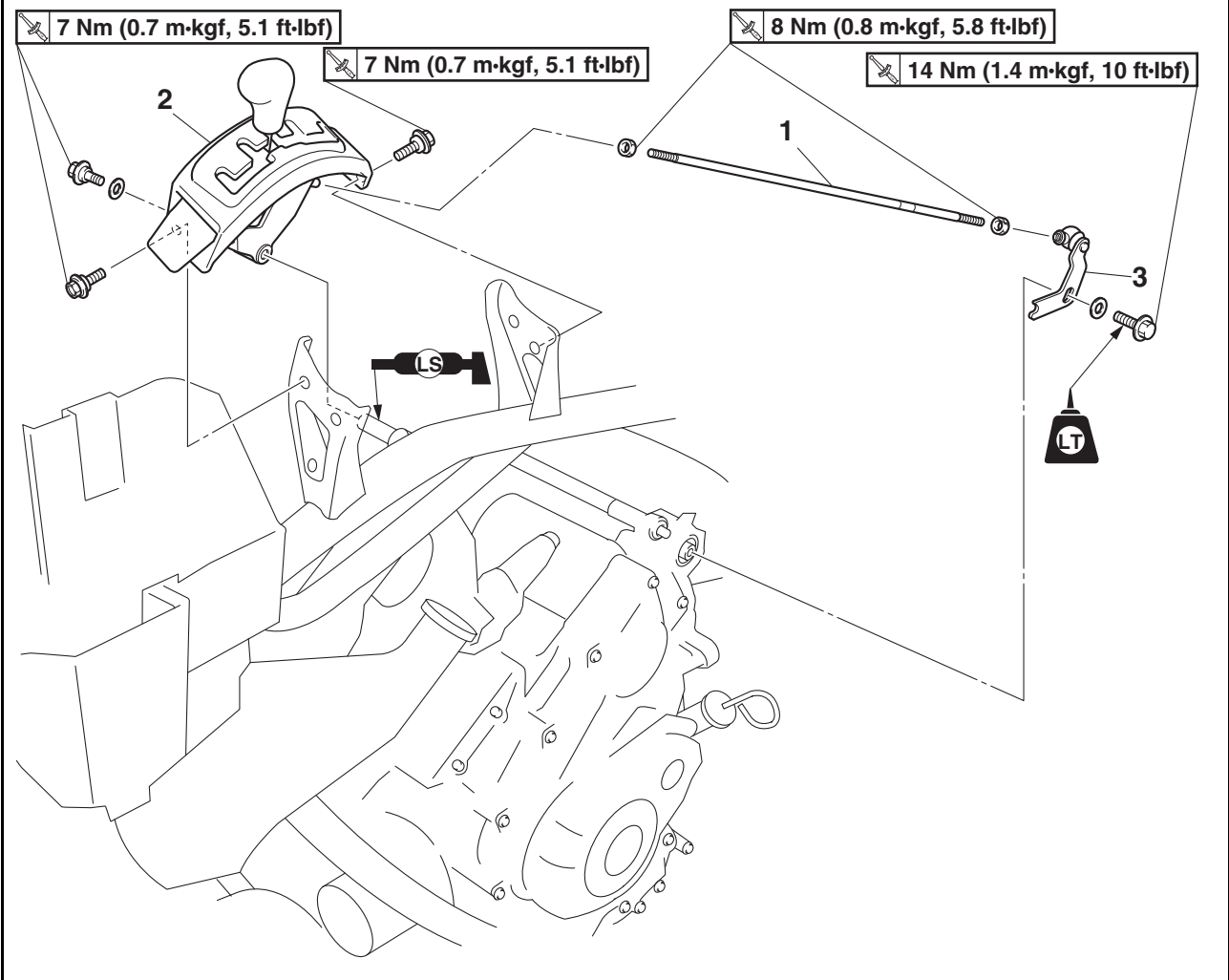
- Position the V-belt cooling exhaust duct joint with its arrow mark "a" pointing toward the engine.
- Align the projection on the V-belt cooling exhaust duct joint with the projection on the drive belt case in the area "b" shown in the illustration.
- Align the screw head with the arrow mark "a" on the V-belt cooling exhaust duct joint in the area "c" shown in the illustration.
- Align the projection on the V-belt cooling exhaust duct with the projection on the V-belt cooling exhaust duct joint in the area "d" shown in the illustration.
- Align the screw head with the rib on the V-belt cooling exhaust duct in the area "e" shown in the illustration.

# ENGINE REMOVAL (2)

EBS20093

## ENGINE REMOVAL (2)

### Removing the drive select lever unit



Order	Job/Parts to remove	Q'ty	Remarks
1	Drive select lever shift rod	1	
2	Drive select lever unit	1	
3	Shift arm	1	

EBS30553

## INSTALLING THE DRIVE SELECT LEVER UNIT

1. Install:

- Shift arm "1"
- Drive select lever unit "2"
- Drive select lever shift rod "3"



**Shift arm bolt**  
14 Nm (1.4 m·kgf, 10 ft·lbf)  
LOCTITE®

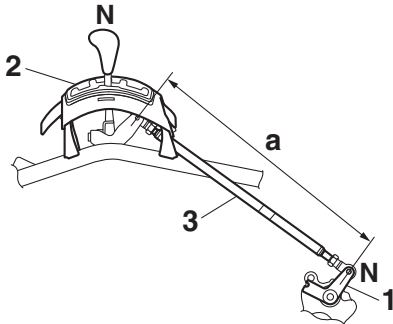
**Drive select lever unit bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**Drive select lever shift rod lock-nut (select lever unit side)**  
8 Nm (0.8 m·kgf, 5.8 ft·lbf)

**Drive select lever shift rod lock-nut (shift arm side)**  
8 Nm (0.8 m·kgf, 5.8 ft·lbf)

### TIP

- Make sure that the drive select lever and transmission are in "N" (neutral).
- The installed length "a" of the shift rod is 410 mm (16.1 in).



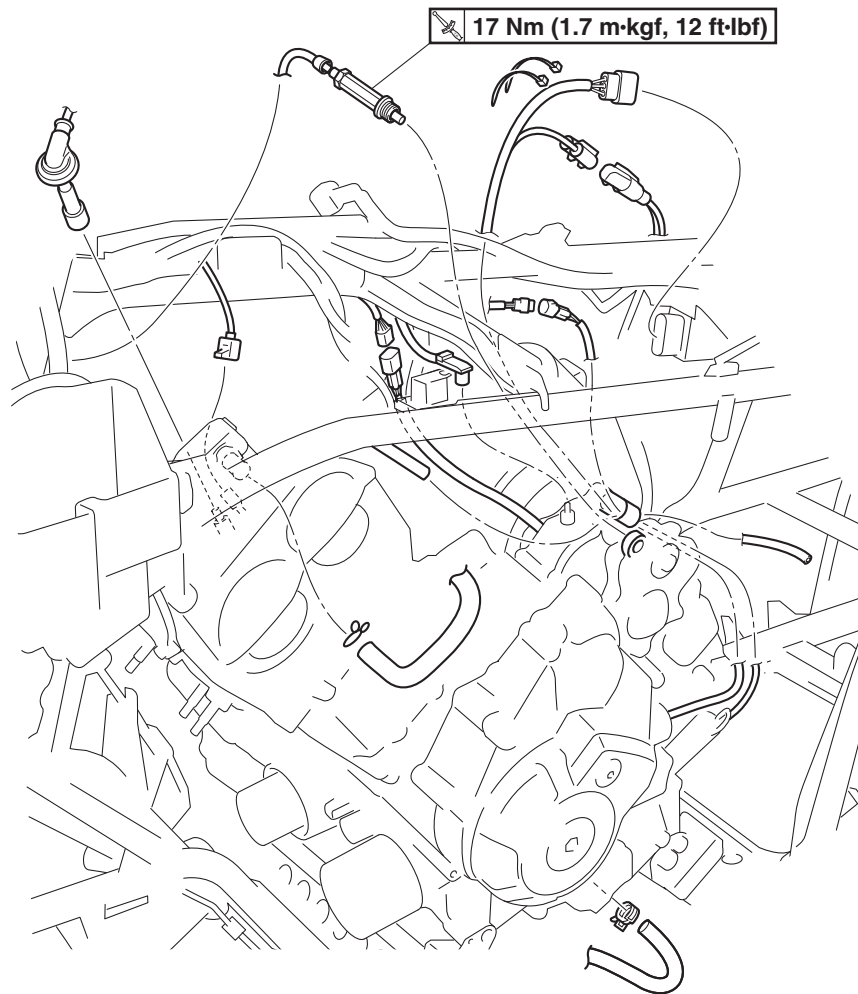


# ENGINE REMOVAL (3)

EBS20120

## ENGINE REMOVAL (3)

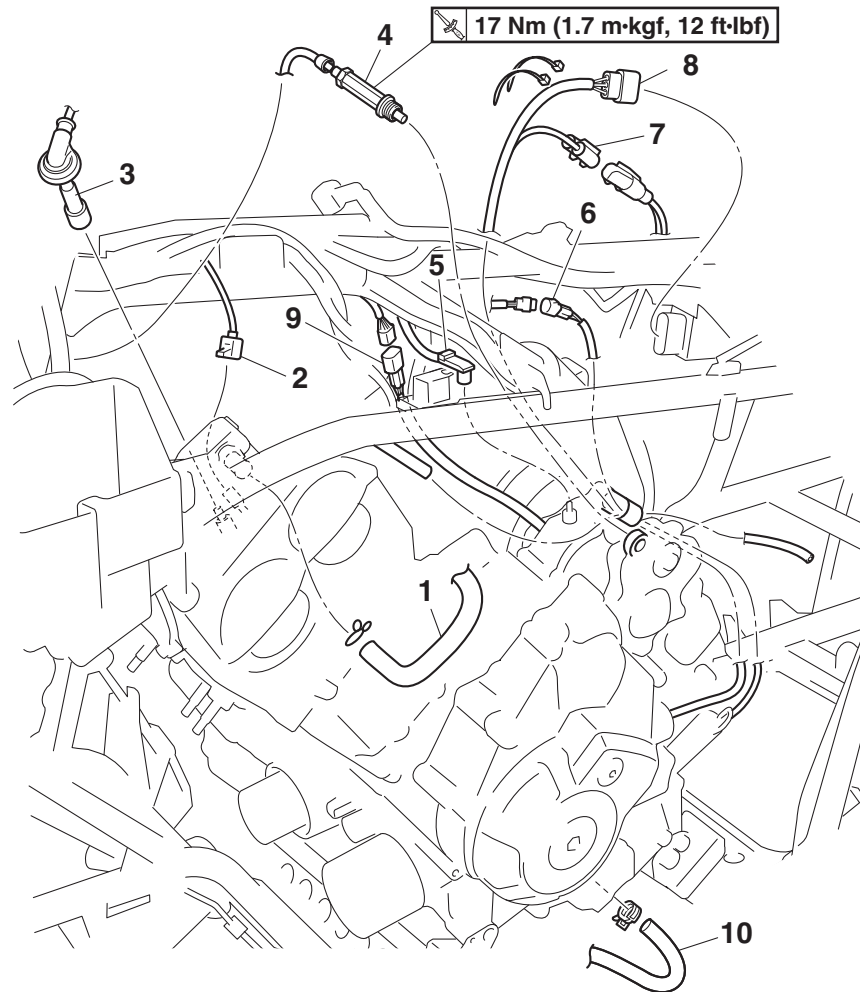
### Disconnecting the leads, cables and hoses



Order	Job/Parts to remove	Q'ty	Remarks
	Footrest board		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Air filter case		Refer to "GENERAL CHASSIS (5)" on page 4-17.
	Air cut-off valve assembly		Refer to "AIR INDUCTION SYSTEM" on page 7-9.
	Throttle body assembly		Refer to "THROTTLE BODY" on page 7-4.
	Coolant reservoir		Refer to "RADIATOR" on page 6-4.
	Thermostat		Refer to "THERMOSTAT" on page 6-7.
	Water pump assembly		Refer to "WATER PUMP" on page 6-10.
	Differential assembly		Refer to "FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT" on page 8-4.
	Final drive assembly		Refer to "REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT" on page 8-15.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-40.

## ENGINE REMOVAL (3)

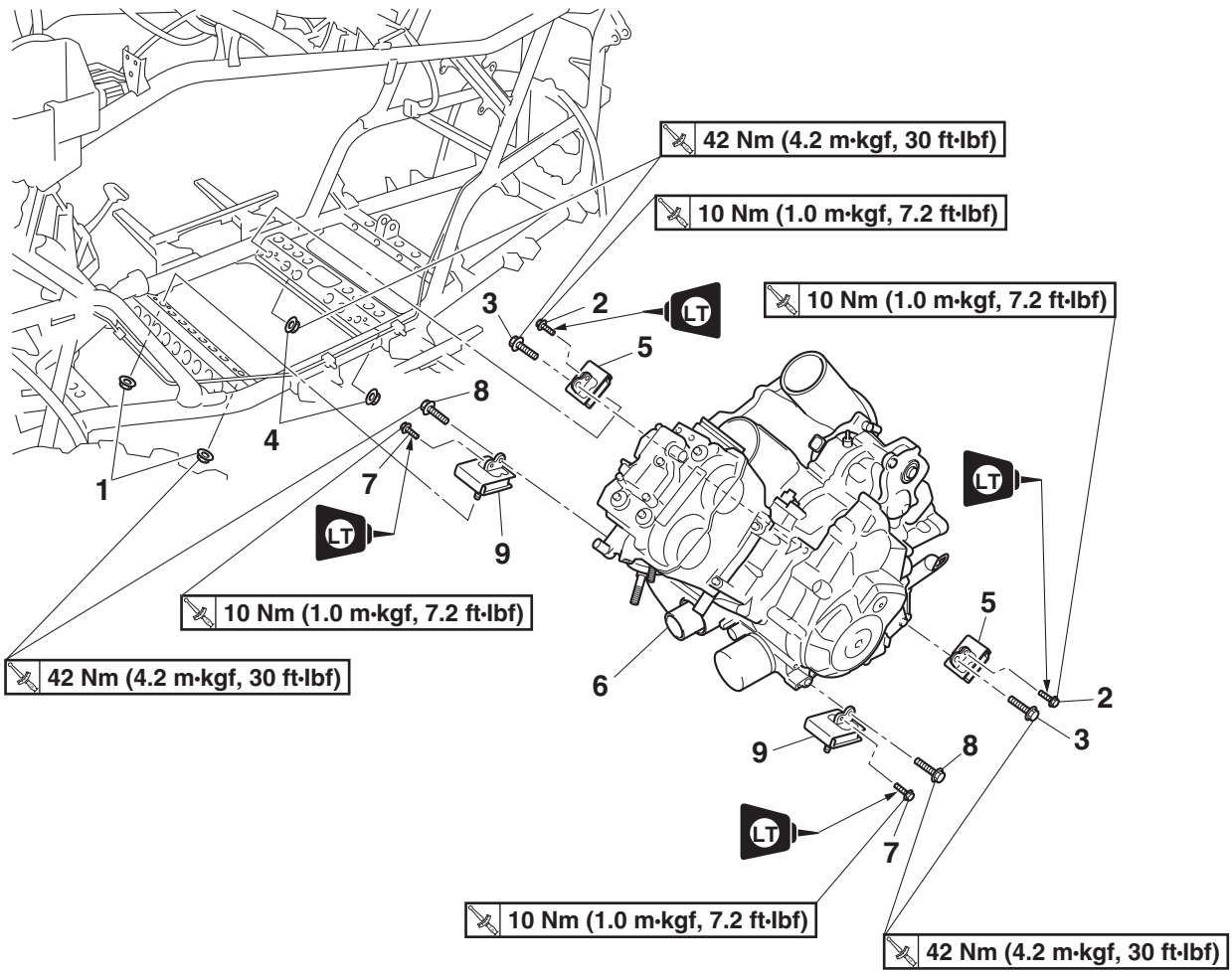
### Disconnecting the leads, cables and hoses



Order	Job/Parts to remove	Q'ty	Remarks
1	Cylinder head breather hose	1	
2	Coolant temperature sensor coupler	1	Disconnect.
3	Spark plug cap	1	
4	Shift control cable	1	Disconnect.
5	Reverse switch lead	1	Disconnect.
6	Speed sensor coupler	1	Disconnect.
7	Crankshaft position sensor coupler	1	Disconnect.
8	AC magneto lead coupler	1	Disconnect.
9	Gear position switch coupler	1	Disconnect.
10	Water pump drain hose	1	

# ENGINE REMOVAL (3)

## Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Rubber damper nut (front side)	2	
2	Engine mounting bolt (rear) (M6)	2	
3	Engine mounting bolt (rear) (M10)	2	
4	Rubber damper nut (rear side)	2	
5	Rubber damper (rear side)	2	
6	Engine	1	<b>TIP</b> _____ Remove the engine from the left side of the vehicle. _____
7	Engine mounting bolt (front) (M6)	2	
8	Engine mounting bolt (front) (M10)	2	
9	Rubber damper (front side)	2	

# ENGINE REMOVAL (3)

EBS30351

## INSTALLING THE ENGINE

### 1. Install:

- Rubber dampers (front side) "1"
- Engine mounting bolts (front) (M10) "2"
- Engine mounting bolts (front) (M6) "3"
- Engine "4"
- Rubber dampers (rear side) "5"
- Rubber damper nuts (rear side) "6"
- Engine mounting bolts (rear) (M10) "7"
- Engine mounting bolts (rear) (M6) "8"
- Rubber damper nuts (front side) "9"

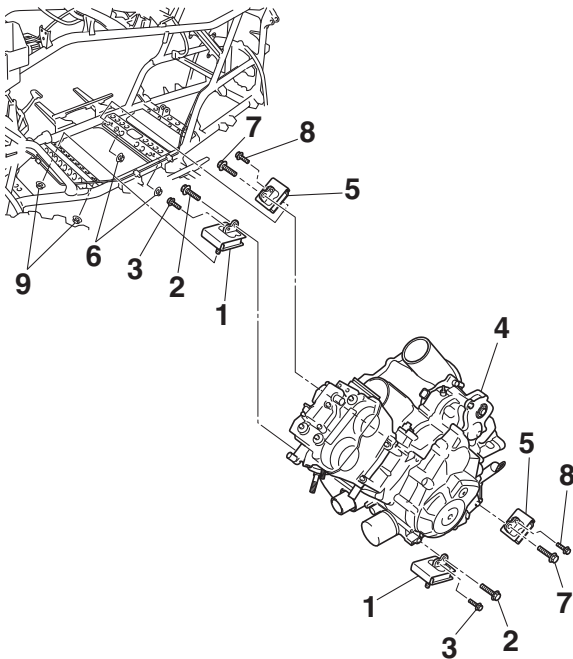
ECB01630

### NOTICE

Make sure that the engine does not strike the brake pipe when installing it.

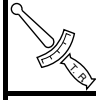
### TIP

Do not fully tighten the bolts and nuts.



### 2. Tighten:

- Engine mounting bolts (front) (M10) "2"
- Engine mounting bolts (front) (M6) "3"
- Engine mounting bolts (rear) (M10) "7"
- Engine mounting bolts (rear) (M6) "8"
- Rubber damper nuts (front side) "9"
- Rubber damper nuts (rear side) "6"



Engine mounting bolt (front) (M10)

42 Nm (4.2 m·kgf, 30 ft·lbf)

Engine mounting bolt (front) (M6)

10 Nm (1.0 m·kgf, 7.2 ft·lbf)

LOCTITE®

Engine mounting bolt (rear) (M10)

42 Nm (4.2 m·kgf, 30 ft·lbf)

Engine mounting bolt (rear) (M6)

10 Nm (1.0 m·kgf, 7.2 ft·lbf)

LOCTITE®

Rubber damper nut (front side)

42 Nm (4.2 m·kgf, 30 ft·lbf)

Rubber damper nut (rear side)

42 Nm (4.2 m·kgf, 30 ft·lbf)

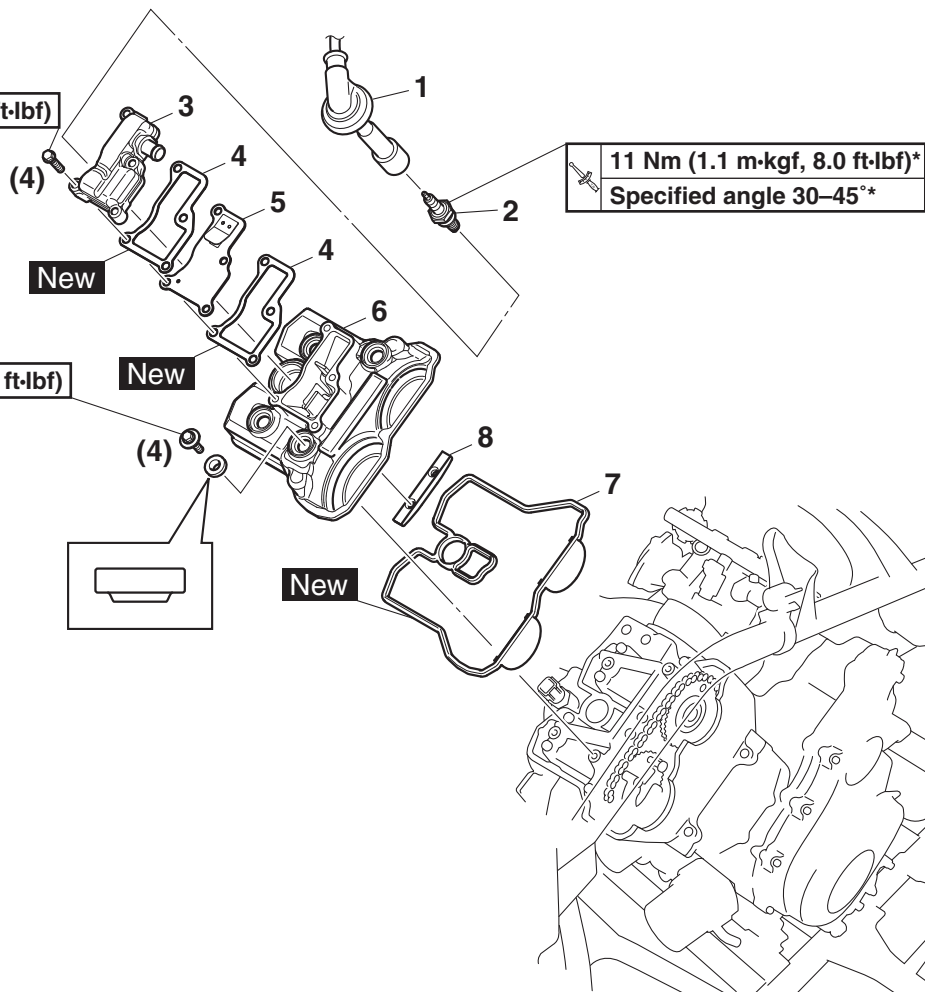
EBS20106

## CAMSHAFTS

### Removing the cylinder head cover



10 Nm (1.0 m·kgf, 7.2 ft·lbf)



11 Nm (1.1 m·kgf, 8.0 ft·lbf)\*  
Specified angle 30–45°\*

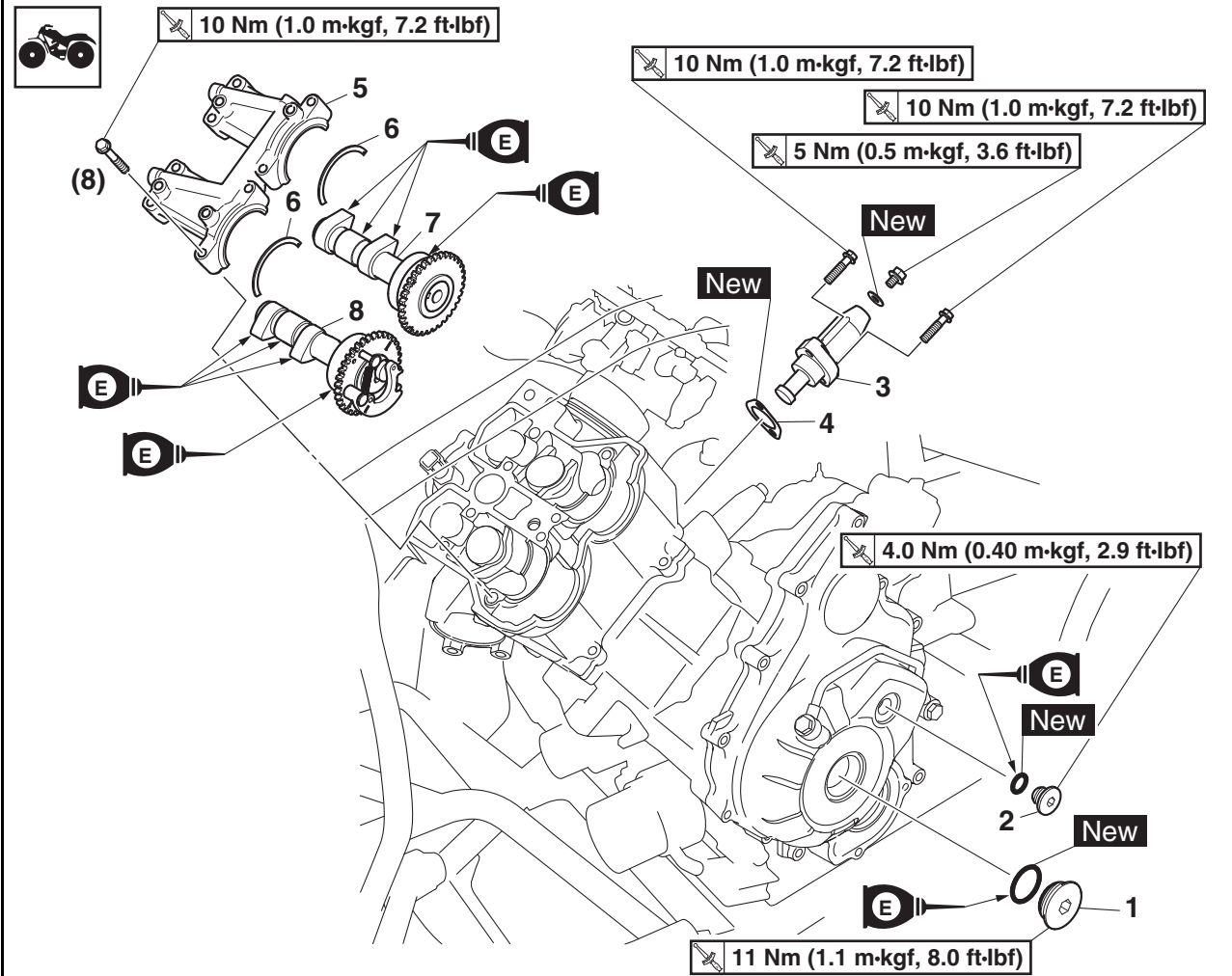
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

\* When installing a new spark plug, tighten the spark plug to 11 Nm (1.1 m·kgf, 8.0 ft·lbf).

\* When reusing a spark plug, tighten the spark plug to 30°–45°.

Order	Job/Parts to remove	Q'ty	Remarks
	Storage compartment		Refer to "GENERAL CHASSIS (5)" on page 4-17.
	Cylinder head breather hose		Refer to "ENGINE REMOVAL (3)" on page 5-8.
1	Spark plug cap	1	Disconnect.
2	Spark plug	1	
3	Breather plate cover	1	
4	Breather plate cover gasket	2	
5	Breather plate	1	
6	Cylinder head cover	1	
7	Cylinder head cover gasket	1	
8	Timing chain guide (upper side)	1	

## Removing the camshafts



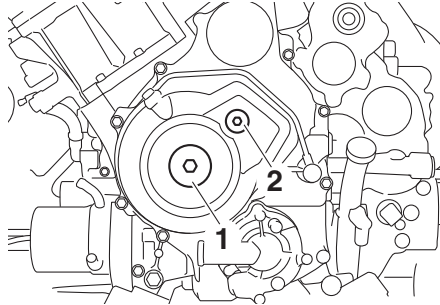
Order	Job/Parts to remove	Q'ty	Remarks
1	Crankshaft end accessing screw	1	
2	Timing mark accessing screw	1	
3	Timing chain tensioner	1	
4	Timing chain tensioner gasket	1	
5	Camshaft cap	1	
6	Bearing stopper	2	
7	Intake camshaft	1	
8	Exhaust camshaft	1	

EBS30432

## REMOVING THE CAMSHAFTS

### 1. Remove:

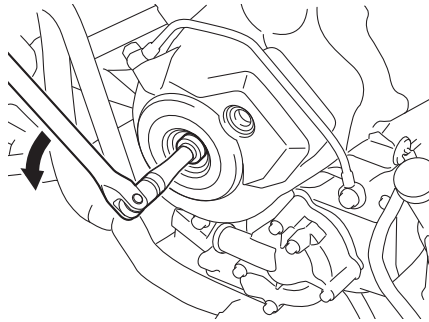
- Crankshaft end accessing screw "1"
- Timing mark accessing screw "2"



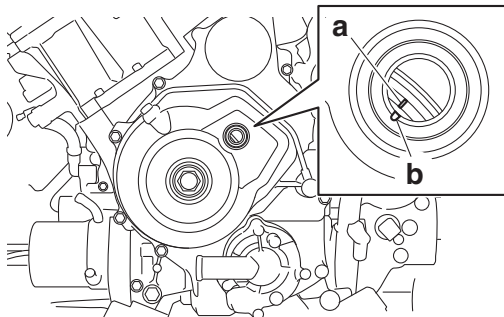
### 2. Align:

- Mark "a" on the AC magneto rotor (with the mark "b" in the AC magneto cover)

#### a. Turn the crankshaft counterclockwise.

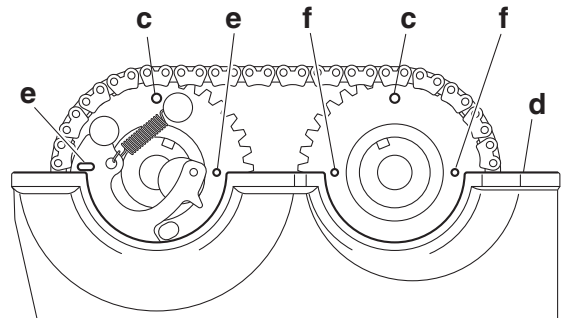


#### b. Position the mark "a" on the AC magneto rotor with the mark "b" in the AC magneto cover.



### TIP

When the holes "c" in the intake camshaft sprocket and exhaust camshaft sprocket are positioned above the cylinder head mating surface "d" as shown in the illustration, and the marks "e" and "f" on the sprockets are aligned with the cylinder head mating surface "d", the piston is at TDC.



### 3. Remove:

- Timing chain tensioner
- Timing chain tensioner gasket

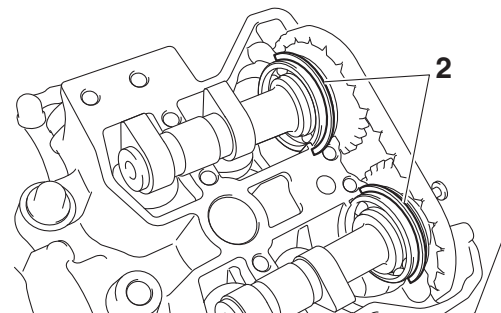
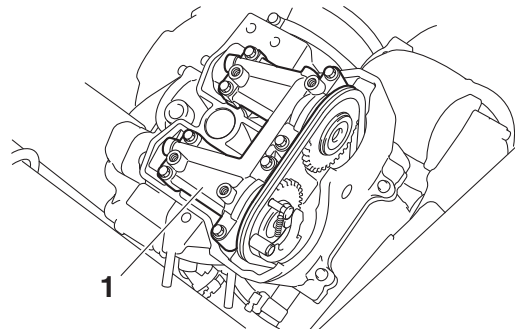
### 4. Remove:

- Camshaft cap "1"
- Bearing stoppers "2"

ECB02430

### NOTICE

- To prevent damage to the cylinder head, camshafts or camshaft cap, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.
- Be sure not to let the bearing stoppers fall into the crankcase when removing it.

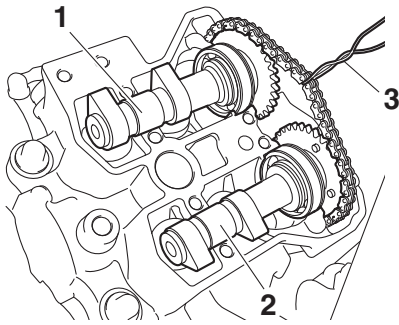


### 5. Remove:

- Intake camshaft "1"
- Exhaust camshaft "2"

### TIP

To prevent the timing chain from coming off the crankshaft sprocket, fasten it with a wire "3".



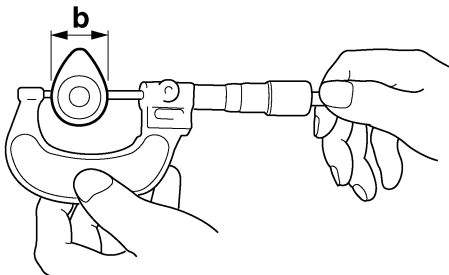
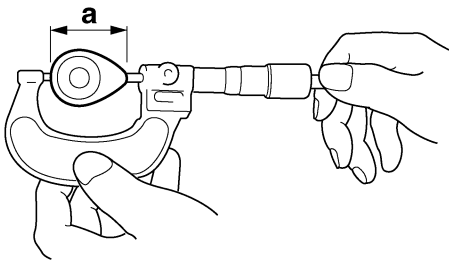
EBS30433

## CHECKING THE CAMSHAFTS

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



**Camshaft lobe dimensions**  
**Lobe height (Intake) limit**  
 33.800 mm (1.3307 in)  
**Base circle diameter (Intake) limit**  
 24.850 mm (0.9783 in)  
**Lobe height (Exhaust) limit**  
 30.750 mm (1.2106 in)  
**Base circle diameter (Exhaust) limit**  
 22.350 mm (0.8799 in)

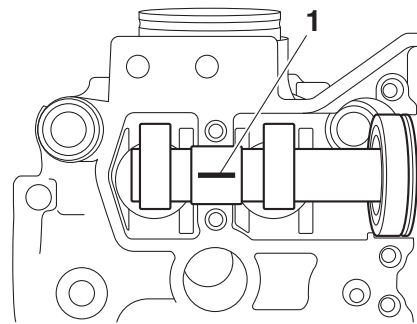


3. Measure:
  - Camshaft-journal-to-camshaft-cap clearance  
Out of specification → Measure the camshaft journal diameter.



**Camshaft-journal-to-camshaft-cap clearance**  
 0.037–0.075 mm (0.0015–0.0030 in)

- a. Install the camshafts into the cylinder head (without the camshaft cap).
- b. Position a strip of Plastigauge® “1” onto the camshaft journal as shown.



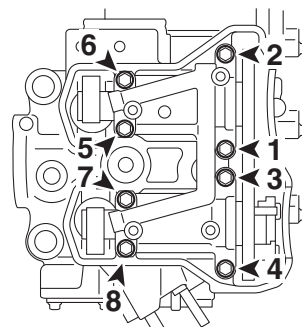
- c. Install the camshaft cap.

### TIP

- Tighten the camshaft cap bolts in the tightening sequence as shown.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

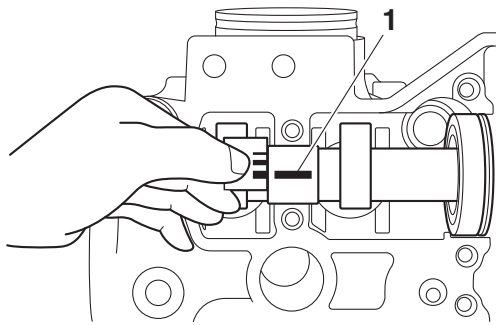


**Camshaft cap bolt**  
 10 Nm (1.0 m·kgf, 7.2 ft·lbf)



- d. Remove the camshaft cap, and then measure the width of the Plastigauge® “1”.



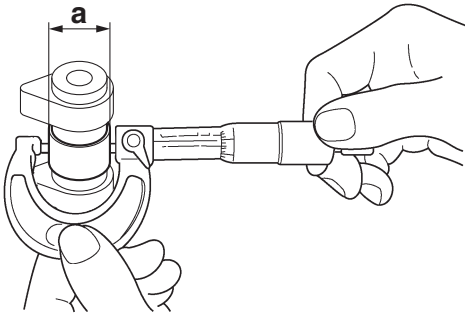


4. Measure:

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



**Camshaft journal diameter**  
21.946–21.963 mm (0.8640–0.8647 in)

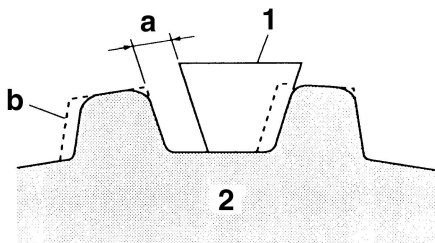


EBS30434

## CHECKING THE CAMSHAFT SPROCKETS

1. Check:

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



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

EBS30435

## CHECKING THE TIMING CHAIN TENSIONER

1. Check:

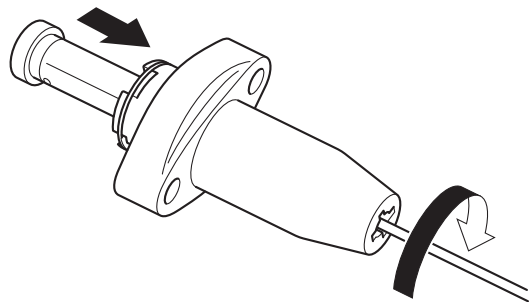
- Timing chain tensioner  
Cracks/damage/rough movement → Replace.



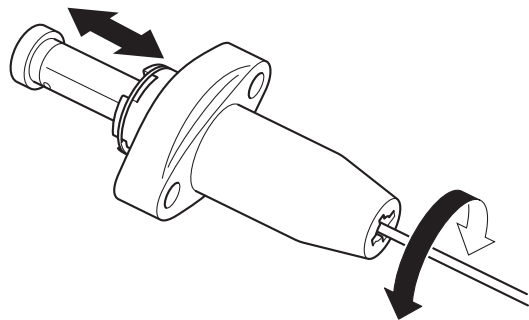
- a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

**TIP**

While pressing the timing chain tensioner rod, wind it clockwise with a flat-head screwdriver until it stops.



- b. Make sure that the timing chain tensioner rod moves in and out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.



EBS30436

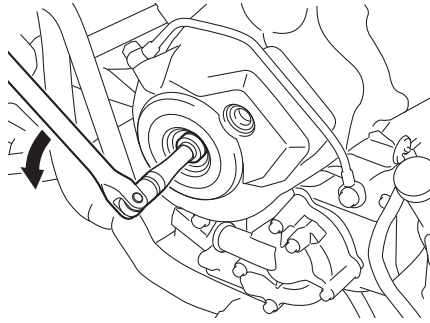
## INSTALLING THE CAMSHAFTS

1. Align:

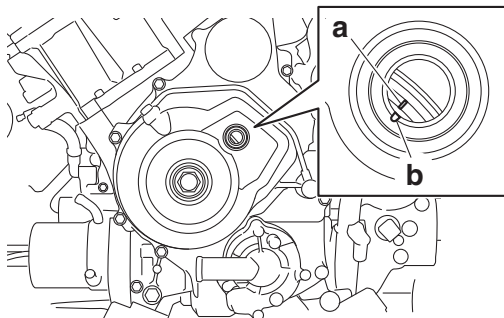
- Mark “a” on the AC magneto rotor  
(with the mark “b” in the AC magneto cover)



- a. Turn the crankshaft counterclockwise.



- b. Position the mark “a” on the AC magneto rotor with the mark “b” in the AC magneto cover.



2. Install:

- Timing chain “1”  
(onto the camshaft sprockets “2”)
- Exhaust camshaft
- Intake camshaft

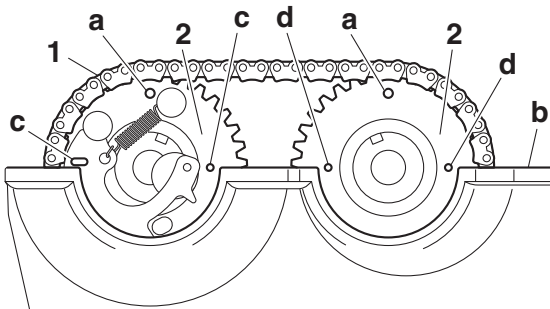
ECB02440

**NOTICE**

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

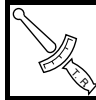
**TIP**

When installing the timing chain “1”, make sure that the holes “a” in the camshaft sprockets “2” are positioned above the cylinder head mating surface “b” as shown in the illustration, and the marks “c” and “d” on the sprockets are aligned with the cylinder head mating surface “b”.



3. Install:

- Bearing stoppers
- Camshaft cap “1”



**Camshaft cap bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

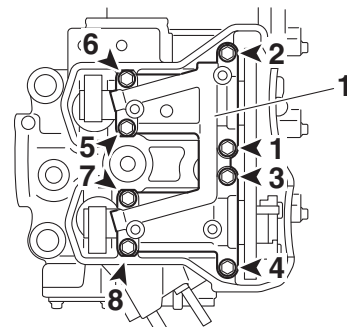
ECB02450

**NOTICE**

- The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft cap, and camshafts will result.
- Do not turn the crankshaft when installing the camshaft cap to avoid damage or improper valve timing.

**TIP**

Tighten the camshaft cap bolts in the tightening sequence as shown.



4. Install:

- Timing chain tensioner gasket **New**
- Timing chain tensioner

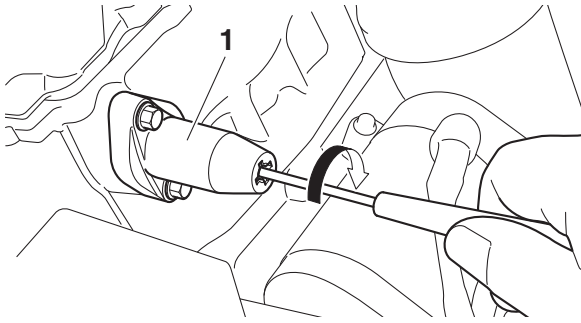
- a. Remove the timing chain tensioner cap bolt and gasket.  
b. Install a new gasket and the timing chain tensioner “1” onto the cylinder.



**Timing chain tensioner bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

**TIP**

Turn the timing chain tensioner rod fully clockwise with a flat-head screwdriver, and then, with the tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the timing chain tensioner “1” onto the cylinder.



c. Install a new gasket and the timing chain tensioner cap bolt.



**Timing chain tensioner cap bolt**  
**5 Nm (0.5 m·kgf, 3.6 ft·lbf)**



5. Turn:
  - Crankshaft  
(several turns counterclockwise)
6. Check:
  - Mark "a"

Make sure the mark "a" on the AC magneto rotor is aligned with the mark "b" in the AC magneto cover.

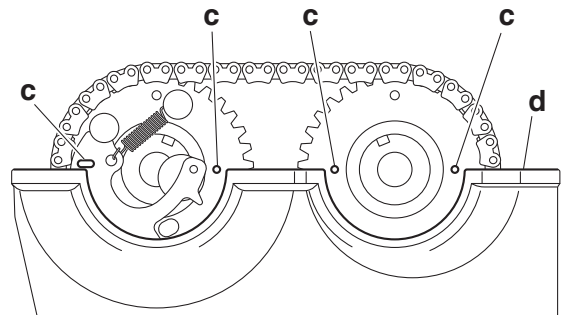
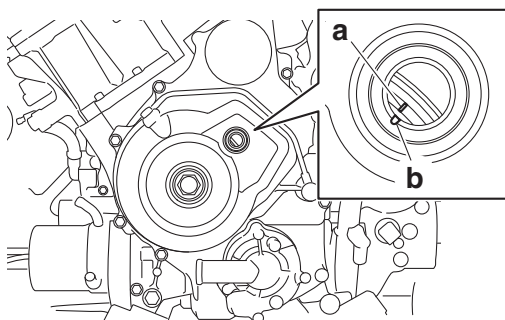
  - Camshaft sprocket mark "c"

Make sure the marks "c" on the camshaft sprockets are aligned with the cylinder head mating surface "d".

Out of alignment → Adjust.  
 Refer to the installation steps above.

  - Timing chain guide

Make sure that the timing chain guide and timing chain are positioned correctly.



7. Measure:
  - Valve clearance

Out of specification → Adjust.  
 Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-5.

EBS30437

## INSTALLING THE BREATHER PLATE

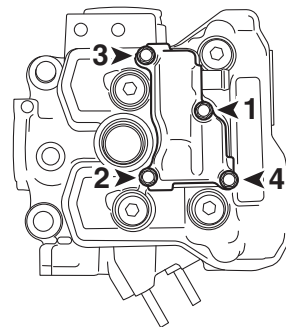
1. Install:
  - Breather plate cover gaskets **New**
  - Breather plate
  - Breather plate cover



**Breather plate cover bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

### TIP

Tighten the breather plate cover bolts in the proper tightening sequence as shown.

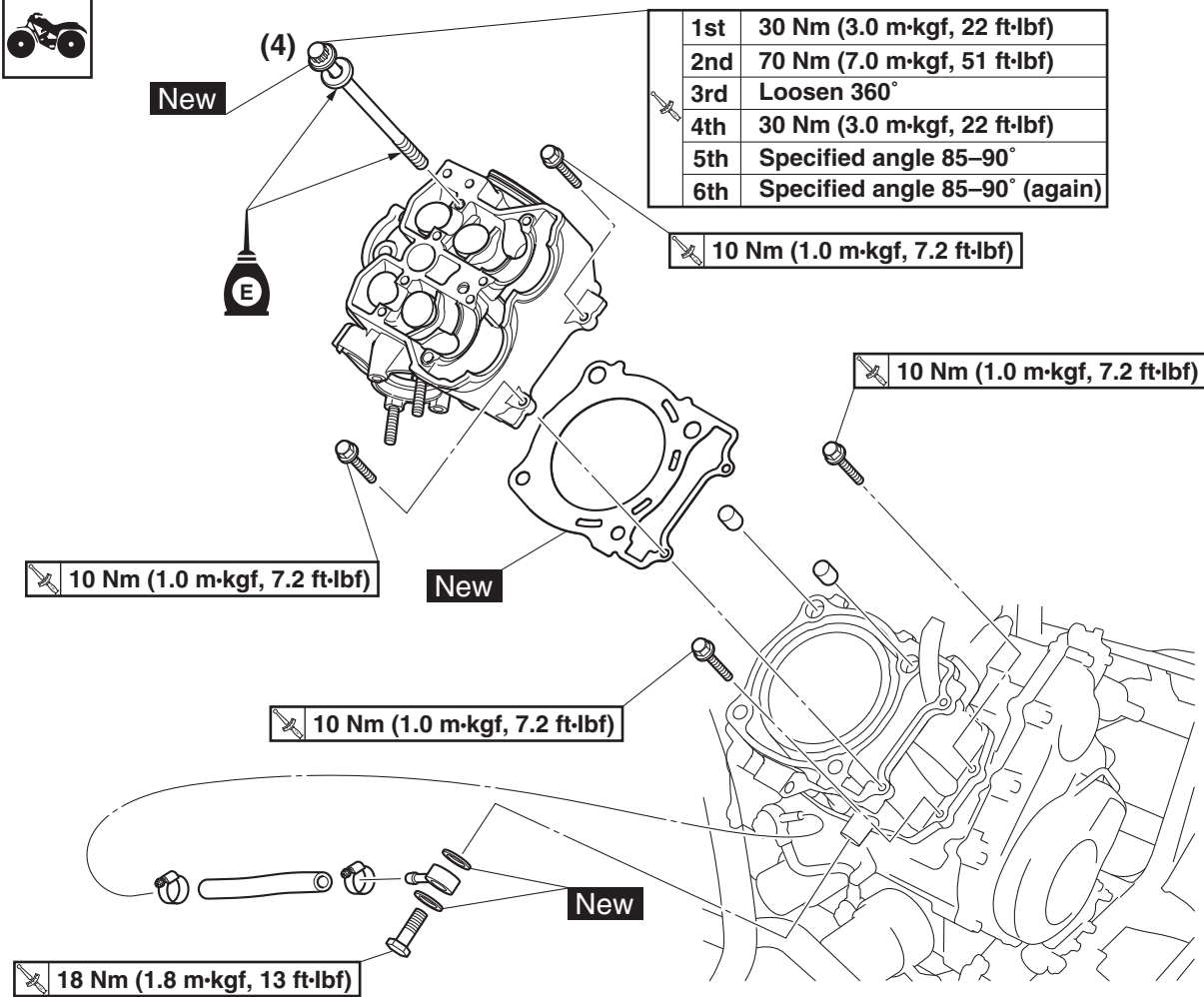


# CYLINDER HEAD, CYLINDER, AND PISTON

EBS20107

## CYLINDER HEAD, CYLINDER, AND PISTON

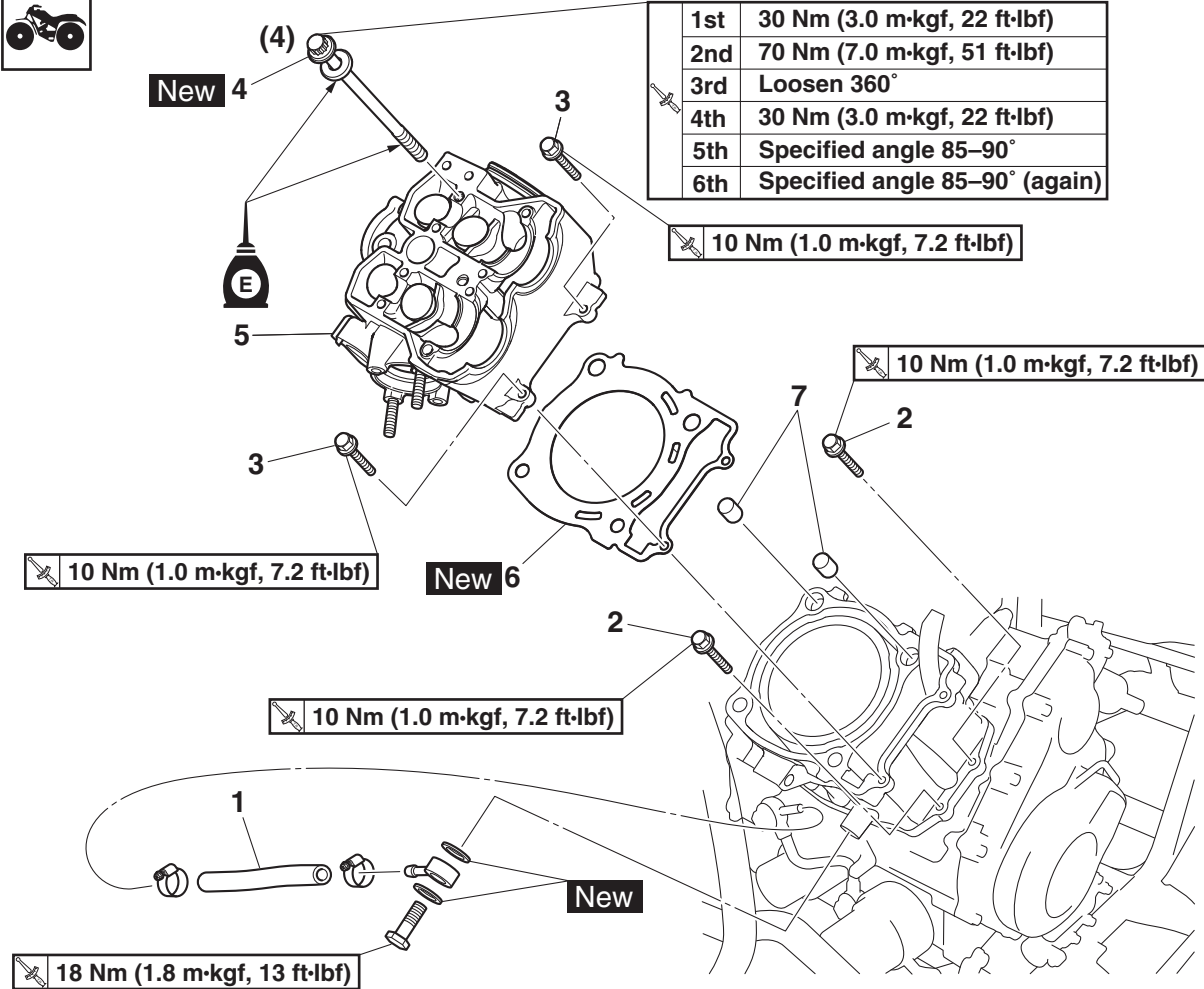
### Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
	Exhaust pipe		Refer to "ENGINE REMOVAL (1)" on page 5-3.
	Cylinder head cover/Intake camshaft/Exhaust camshaft		Refer to "CAMSHAFTS" on page 5-12.
	Thermostat/Coolant temperature sensor		Refer to "THERMOSTAT" on page 6-7.
	Water jacket joint		Refer to "WATER PUMP" on page 6-10.
	Throttle body assembly		Refer to "THROTTLE BODY" on page 7-4.
	Reed valve assembly		Refer to "AIR INDUCTION SYSTEM" on page 7-9.

# CYLINDER HEAD, CYLINDER, AND PISTON

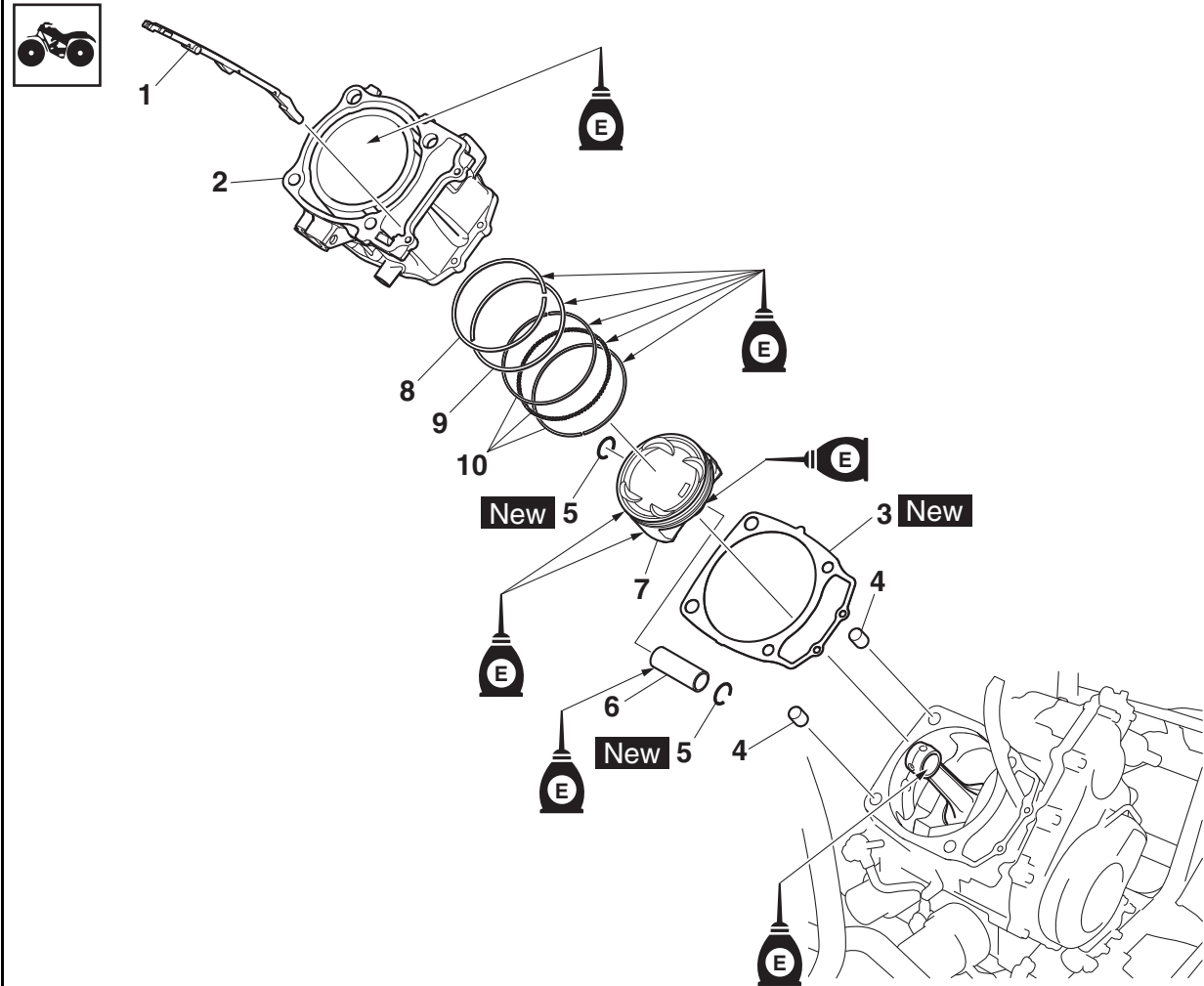
## Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil hose (crankcase to cylinder)	1	
2	Cylinder bolt	2	
3	Cylinder head bolt	2	M6
4	Cylinder head bolt	4	M11
5	Cylinder head	1	
6	Cylinder head gasket	1	
7	Dowel pin	2	

# CYLINDER HEAD, CYLINDER, AND PISTON

## Removing the cylinder and piston



Order	Job/Parts to remove	Q'ty	Remarks
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	
6	Piston pin	1	
7	Piston	1	
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	

# CYLINDER HEAD, CYLINDER, AND PISTON

EBS30438

## REMOVING THE CYLINDER HEAD

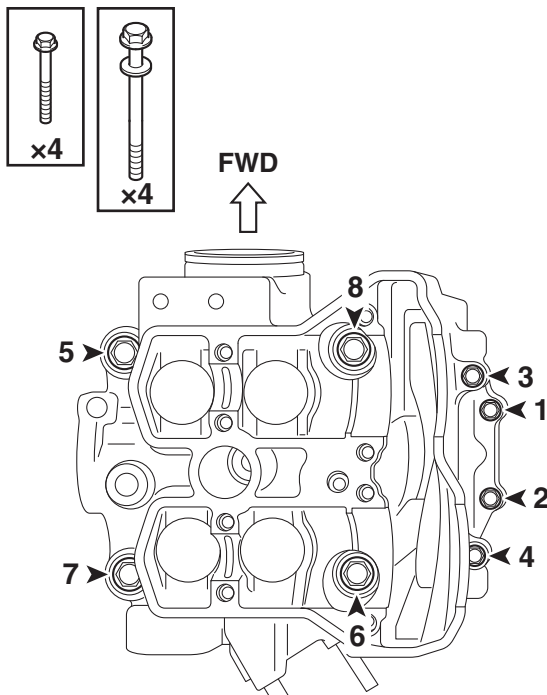
1. Remove:

- Cylinder bolt (M6) (×2)
- Cylinder head bolt (M6) (×2)
- Cylinder head bolt (M11) (×4)
- Cylinder head

### TIP

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

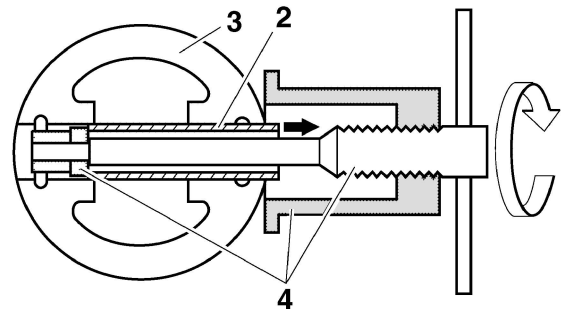
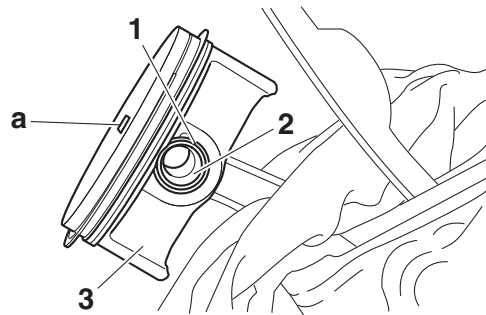
- M6 × 25 mm: “1”–“4”
- M11 × 208 mm: “5”–“8”



- Before removing the piston pin, deburr the piston pin clip grooves and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “4”.
- Remove the piston pin from the side of the piston that has the manufacturer’s mark “a”.



**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.

EBS30146

## REMOVING THE PISTON

1. Remove:

- Piston pin clips “1”
- Piston pin “2”
- Piston “3”

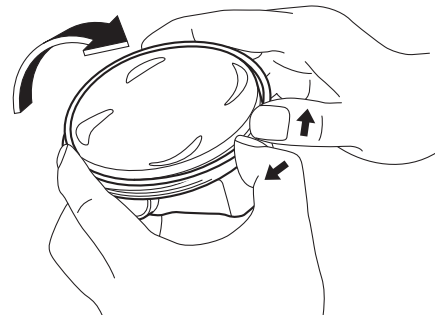
ECB01380

### NOTICE

**Do not use a hammer to drive the piston pin out.**

### TIP

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.



# CYLINDER HEAD, CYLINDER, AND PISTON

EBS30439

## CHECKING THE CYLINDER HEAD

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

ECB01851

### NOTICE

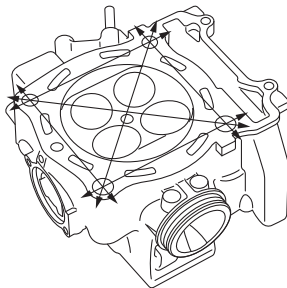
Do not use a sharp instrument; otherwise, the following may be damaged or scratched:

- Spark plug bore threads
- Valve seats

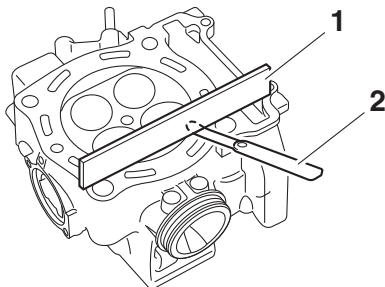
- Check:
  - Cylinder head  
Damage/scratches → Replace.
  - Cylinder head water jacket  
Mineral deposits/rust → Eliminate.
- Measure:
  - Cylinder head warpage  
Out of specification → Resurface the cylinder head.



**Warpage limit**  
**0.03 mm (0.0012 in)**



- Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



- Measure the warpage.
- If the limit is exceeded, resurface the cylinder head as follows.
- 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.



EBS30147

## CHECKING THE CYLINDER AND PISTON

- Check:
  - Piston wall
  - Cylinder wall  
Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.
- Measure:
  - Piston-to-cylinder clearance



- Measure the cylinder bore "C" with the cylinder bore gauge.

### TIP

Measure the cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder.



**Bore**  
**103.000–103.020 mm (4.0551–4.0559 in)**  
**Wear limit**  
**103.080 mm (4.0583 in)**  
**Taper limit**  
**0.050 mm (0.0020 in)**  
**Out of round limit**  
**0.050 mm (0.0020 in)**

"C" = maximum of  $D_1, D_2, D_3, D_4, D_5, D_6$

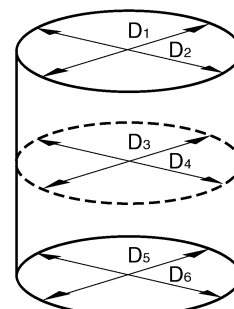
Taper (front-to-back) = maximum difference between  $D_1, D_3, D_5$

Taper (side-to-side) = maximum difference between  $D_2, D_4, D_6$

Out of round (top) = difference between  $D_1, D_2$

Out of round (middle) = difference between  $D_3, D_4$


Out of round (bottom) = difference between  $D_5, D_6$



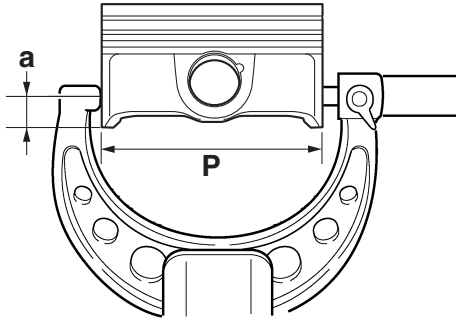


# CYLINDER HEAD, CYLINDER, AND PISTON

- b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.
- c. Measure piston skirt diameter "P" with a micrometer.




**Diameter**  
**102.960–102.975 mm (4.0535–4.0541 in)**



- a. 11.0 mm (0.43 in) from the bottom edge of the piston

- d. If out of specification, replace the piston and piston rings as a set.
- e. Calculate the piston-to-cylinder clearance with the following formula.

- $\text{Piston-to-cylinder clearance} = \text{Cylinder bore "C"} - \text{Piston skirt diameter "P"}$



**Piston-to-cylinder clearance**  
**0.040–0.075 mm (0.0016–0.0030 in)**

- f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.




EBS30148

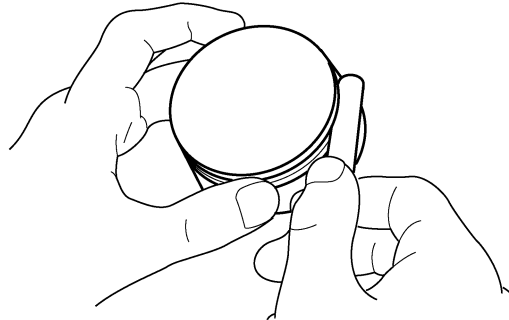
## CHECKING THE PISTON RINGS

1. Measure:
  - Piston ring side clearance  
 Out of specification → Replace the piston and piston rings as a set.

**TIP** \_\_\_\_\_  
 Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

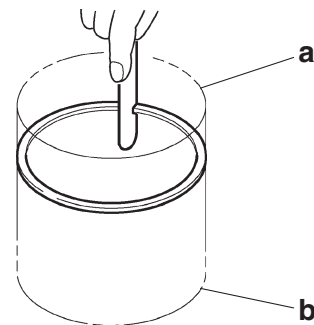


**Top ring**  
**Ring side clearance limit**  
**0.12 mm (0.0047 in)**  
**2nd ring**  
**Ring side clearance limit**  
**0.12 mm (0.0047 in)**



2. Install:
  - Piston ring  
 (into the cylinder)

**TIP** \_\_\_\_\_  
 Use the piston crown to level the piston ring near bottom of cylinder "a", where cylinder wear is lowest.



- b. Upper of cylinder

3. Measure:
  - Piston ring end gap  
 Out of specification → Replace the piston ring.

**TIP** \_\_\_\_\_  
 The oil ring expander end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.

# CYLINDER HEAD, CYLINDER, AND PISTON



**Top ring**  
End gap (installed) limit  
0.50 mm (0.0197 in)

**2nd ring**  
End gap (installed) limit  
0.70 mm (0.0276 in)

**Oil ring**  
End gap (installed) limit  
1.0 mm (0.04 in)

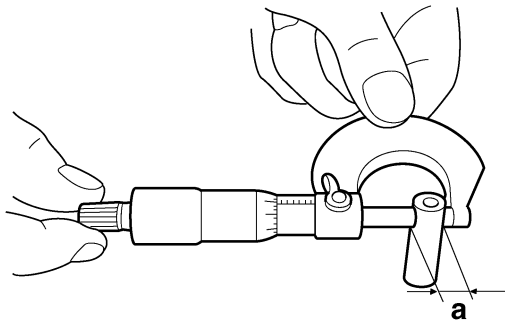
EBS30149

## CHECKING THE PISTON PIN

- Check:
  - Piston pin  
Blue discoloration/grooves → Replace the piston pin, and then check the lubrication system.
- Measure:
  - Piston pin outside diameter “a”  
Out of specification → Replace the piston pin.



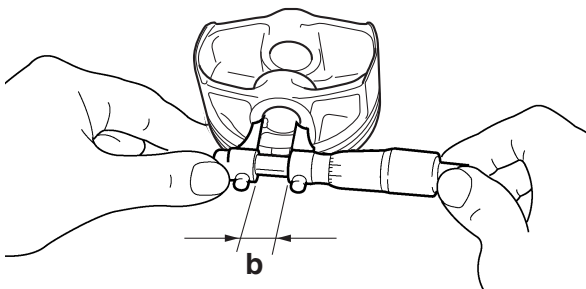
**Piston pin outside diameter limit**  
22.974 mm (0.9045 in)



- Measure:
  - Piston pin bore diameter “b”  
Out of specification → Replace the piston.



**Piston pin bore inside diameter limit**  
23.035 mm (0.9069 in)



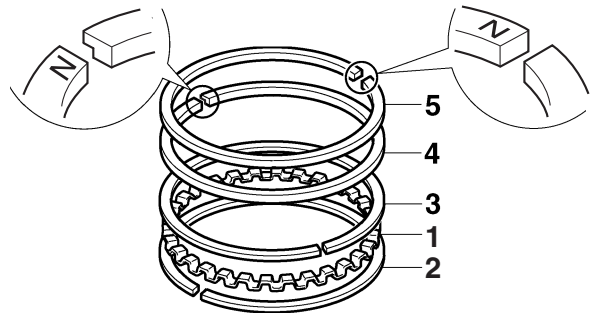
EBS30150

## INSTALLING THE PISTON AND CYLINDER

- Install:
  - Oil ring expander “1”
  - Lower oil ring rail “2”
  - Upper oil ring rail “3”
  - 2nd ring “4”
  - Top ring “5”

### TIP

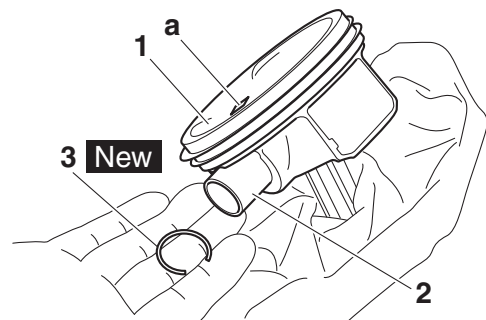
Be sure to install the piston rings so that the manufacturer’s marks or numbers face up.



- Install:
  - Piston “1”
  - Piston pin “2”
  - Piston pin clips “3” **New**

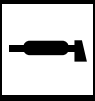
### TIP

- Apply engine oil to the piston pin.
- Make sure the manufacturer’s mark “a” on the piston points towards the AC magneto side.
- Install the piston pin from the side of the piston that has the manufacturer’s mark “a”.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.



- Install:
  - Cylinder gasket **New**
  - Dowel pins
- Lubricate:
  - Piston
  - Piston rings
  - Cylinder  
(with the recommended lubricant)

# CYLINDER HEAD, CYLINDER, AND PISTON



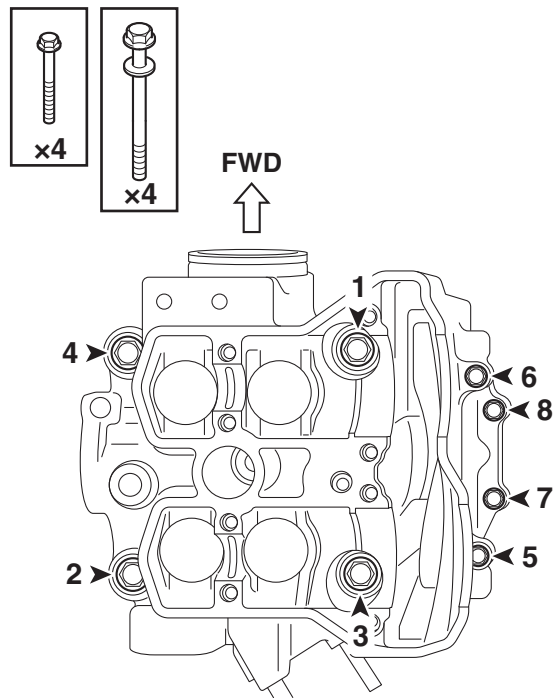
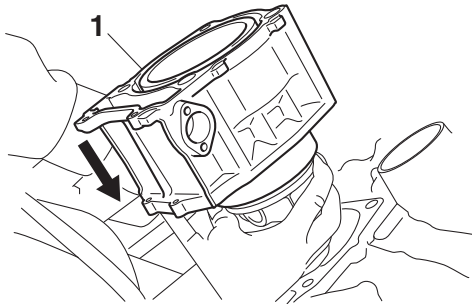
Recommended lubricant  
Engine oil

5. Install:

- Cylinder "1"
- Timing chain guide (exhaust side)

**TIP**

- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.



EBS30440

## INSTALLING THE CYLINDER HEAD

1. Install:

- Cylinder head
- Cylinder head bolt (M11) (x4) **New**
- Cylinder head bolt (M6) (x2)
- Cylinder bolt (M6) (x2)

**TIP**

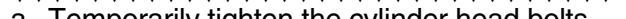
- Pass the timing chain through the timing chain cavity.
- Lubricate the cylinder head bolt (M11) threads and mating surface with engine oil.

2. Tighten:

- Cylinder head bolts (M11) "1"–"4"
- Cylinder head bolts (M6) "5", "6"
- Cylinder bolts (M6) "7", "8"



**Cylinder head bolt (M11)**  
**1st: 30 Nm (3.0 m·kgf, 22 ft·lbf)**  
**2nd: 70 Nm (7.0 m·kgf, 51 ft·lbf)**  
**3rd: Loosen 360°**  
**4th: 30 Nm (3.0 m·kgf, 22 ft·lbf)**  
**5th: Specified angle 85–90°**  
**6th: Specified angle 85–90°**  
**(again)**  
**Cylinder head bolt (M6)**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**  
**Cylinder bolt (M6)**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**



- Temporarily tighten the cylinder head bolts (M6) and cylinder bolts (M6).
- Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
- Tighten the cylinder head bolts (M11) to 70 Nm (7.0 m·kgf, 51 ft·lbf) in the proper tightening sequence.
- Loosen the cylinder head bolts (M11) 360°.
- Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
- Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence.
- Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence again.
- Tighten the cylinder head bolts (M6) and cylinder bolts (M6) to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.



3. Install:
- Oil hose (crankcase to cylinder) "1"
  - Clamps "2"
  - Oil hose joint "3"
  - Gaskets **New**
  - Oil hose union bolt (crankcase to cylinder) "4"

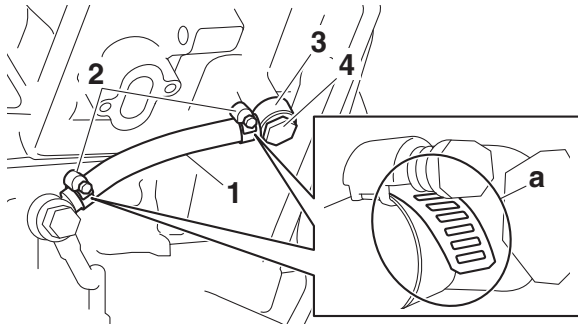
# CYLINDER HEAD, CYLINDER, AND PISTON



**Oil hose union bolt (crankcase to cylinder)**  
**18 Nm (1.8 m·kgf, 13 ft·lbf)**

## TIP

Tighten the clamp screw of each clamp “2” until 6 slots are visible in the area “a” of the clamp as shown in the illustration.

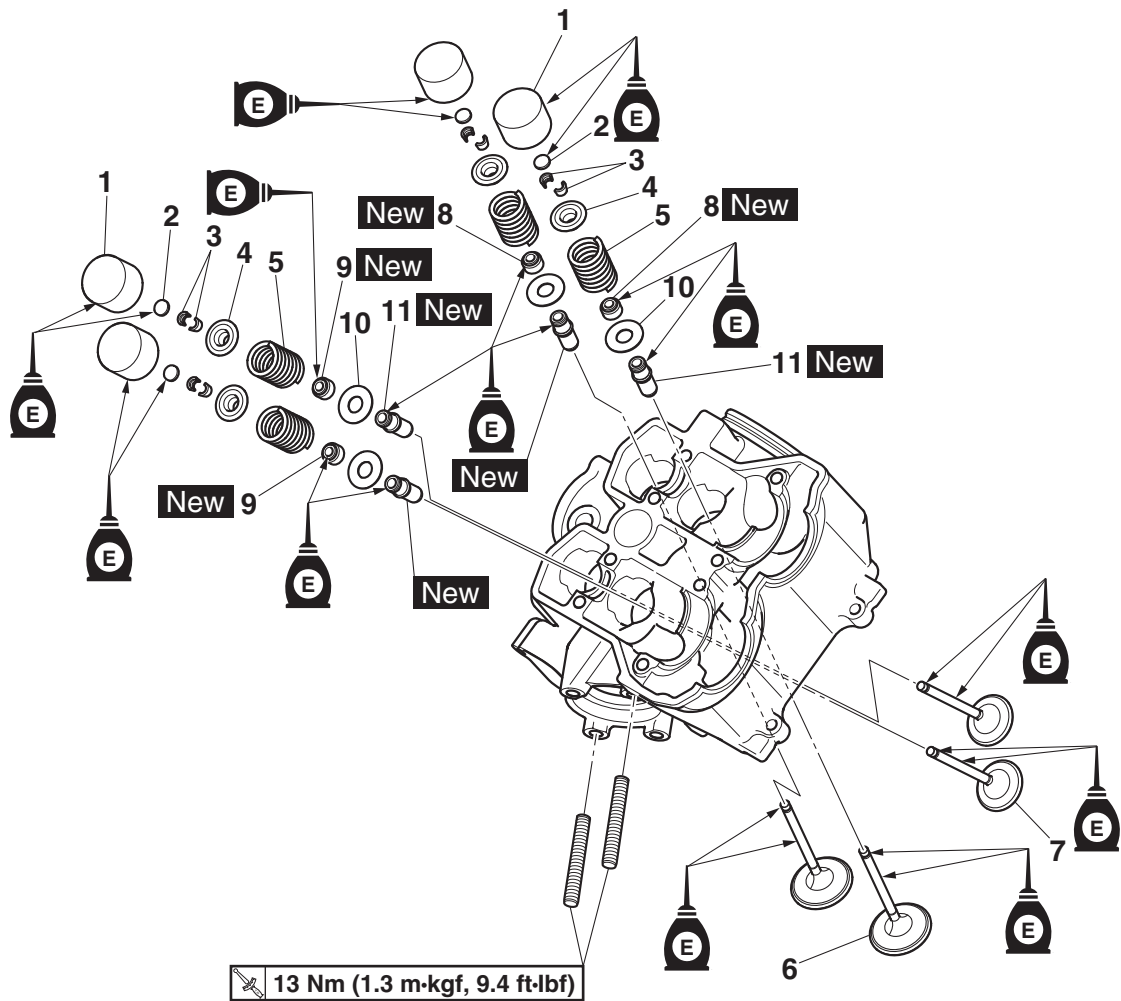


# VALVES AND VALVE SPRINGS

EBS20037

## VALVES AND VALVE SPRINGS

### Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD, CYLINDER, AND PISTON" on page 5-19.
1	Valve lifter	4	
2	Valve pad	4	
3	Valve cotter	8	
4	Valve spring retainer	4	
5	Valve spring	4	
6	Intake valve	2	
7	Exhaust valve	2	
8	Valve stem seal (intake)	2	Gray
9	Valve stem seal (exhaust)	2	Light green
10	Valve spring seat	4	
11	Valve guide	4	

# VALVES AND VALVE SPRINGS

EBS30141

## REMOVING THE VALVES

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

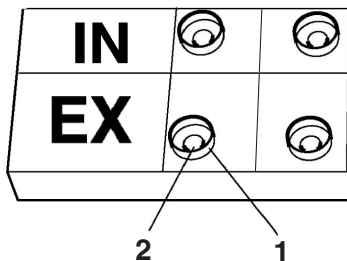
### TIP

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

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

### TIP

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

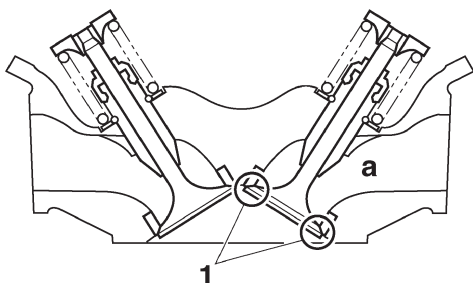


2. Check:
  - Valve sealing  
Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS" on page 5-31.

- 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".



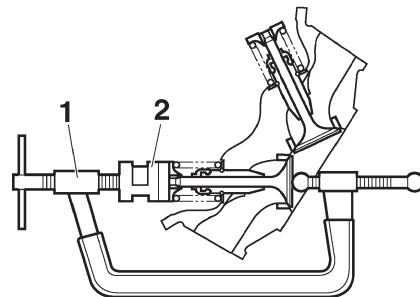
3. Remove:
  - Valve cotters

### TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



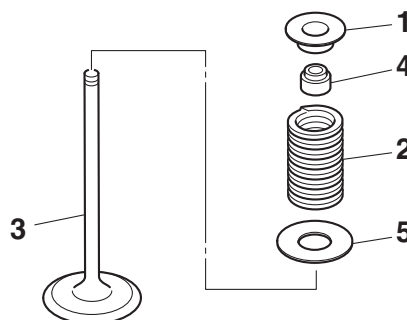
Valve spring compressor  
90890-04019  
Valve spring compressor  
YM-04019  
Valve spring compressor attach-  
ment  
90890-01243  
Valve spring compressor adapt-  
er (26 mm)  
YM-01253-1



4. Remove:
  - Valve spring retainer "1"
  - Valve spring "2"
  - Valve "3"
  - Valve stem seal "4"
  - Valve spring seat "5"

### TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



EBS30142

## CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.





**Valve guide remover & installer set (ø5.5)**  
90890-04016  
**Valve guide remover (5.5 mm)**  
YM-01122  
**Valve guide remover & installer set (ø5.5)**  
90890-04016  
**Valve guide installer (5.5 mm)**  
YM-04015  
**Valve guide remover & installer set (ø5.5)**  
90890-04016  
**Valve guide reamer (5.5 mm)**  
YM-01196

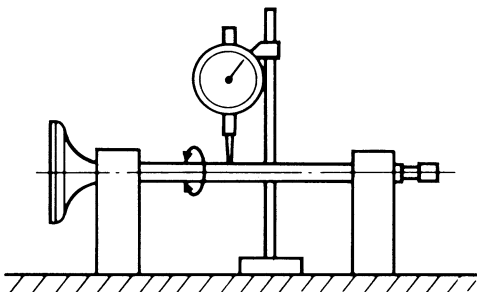
3. Eliminate:
- Carbon deposits (from the valve face and valve seat)
4. Check:
- Valve face  
Pitting/wear → Grind the valve face.
  - Valve stem end  
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
- Valve stem runout  
Out of specification → Replace the valve.

#### TIP

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.



**Valve stem runout**  
0.040 mm (0.0016 in)



EBS30143

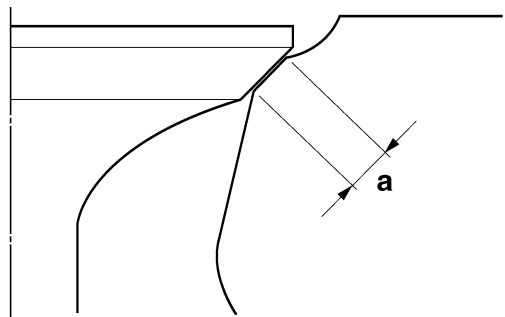
## CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

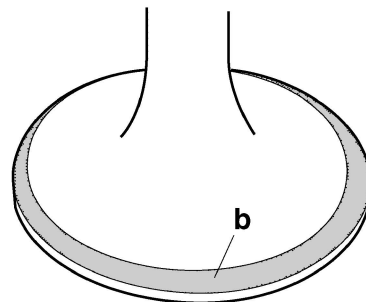
1. Eliminate:
  - Carbon deposits (from the valve face and valve seat)
2. Check:
  - Valve seat  
Pitting/wear → Replace the cylinder head.
3. Measure:
  - Valve seat width “a”  
Out of specification → Replace the cylinder head.



**Valve seat contact width (intake)**  
1.34–1.48 mm (0.0528–0.0583 in)  
**Valve seat contact width (exhaust)**  
1.34–1.48 mm (0.0528–0.0583 in)



a. Apply blue layout fluid “b” onto the valve face.



- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width.

#### TIP

Where the valve seat and valve face contacted one another, the blueing will have been removed.

4. Lap:
  - Valve face
  - Valve seat





# VALVES AND VALVE SPRINGS

EBS30441

## 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.

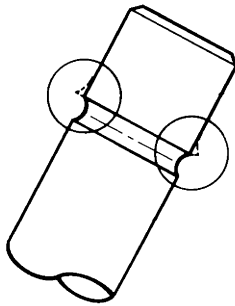
EBS30145

## INSTALLING THE VALVES

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

### 1. Deburr:

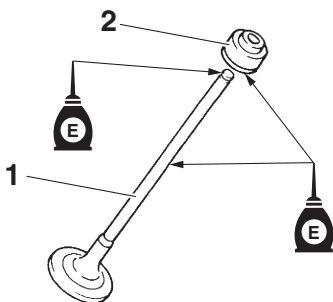
- Valve stem end  
(with an oil stone)



### 2. Lubricate:

- Valve stem "1"
- Valve stem end
- Valve stem seal "2"

(with the recommended lubricant)

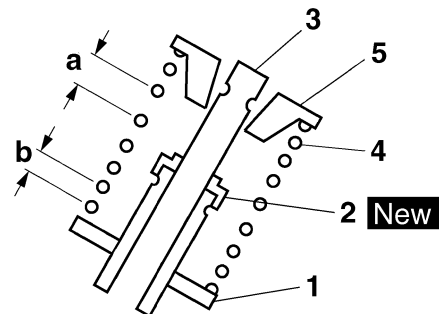
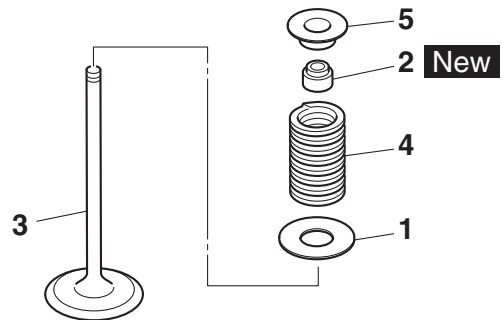


### 3. Install:

- Valve spring seat "1"  
(into the cylinder head)
- Valve stem seal "2" **New**
- Valve "3"
- Valve spring "4"
- Valve spring retainer "5"

### TIP

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.



b. Smaller pitch

### 4. Install:

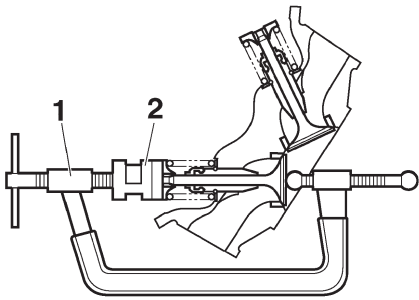
- Valve cotter pins

### TIP

Install the valve cotter pins by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



Valve spring compressor  
90890-04019  
Valve spring compressor  
YM-04019  
Valve spring compressor attachment  
90890-01243  
Valve spring compressor adapter (26 mm)  
YM-01253-1



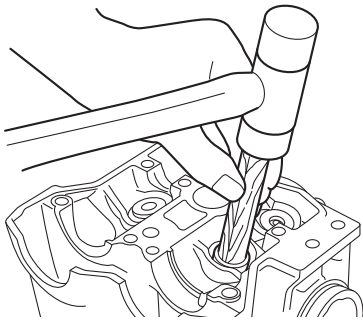
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECB01370

**NOTICE**

**Hitting the valve tip with excessive force could damage the valve.**

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6. Lubricate:
- Valve pad
  - Valve lifter
- (with the recommended lubricant)



7. Install:
- Valve pad
  - Valve lifter

**TIP**

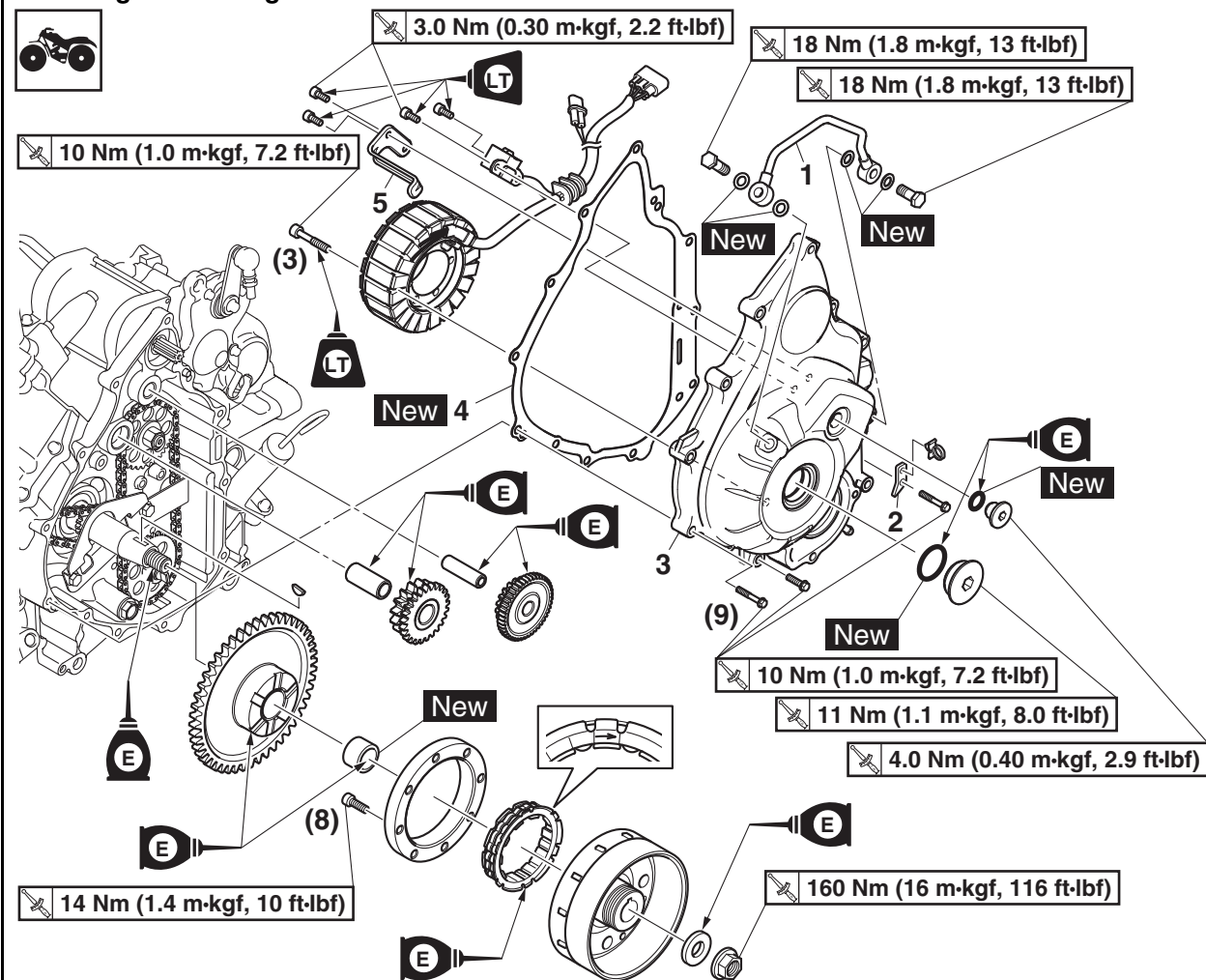
- The valve lifter must move smoothly when rotated with a finger.
  - Each valve lifter and valve pad must be reinstalled in their original position.
-

# AC MAGNETO AND STARTER CLUTCH

EBS20039

## AC MAGNETO AND STARTER CLUTCH

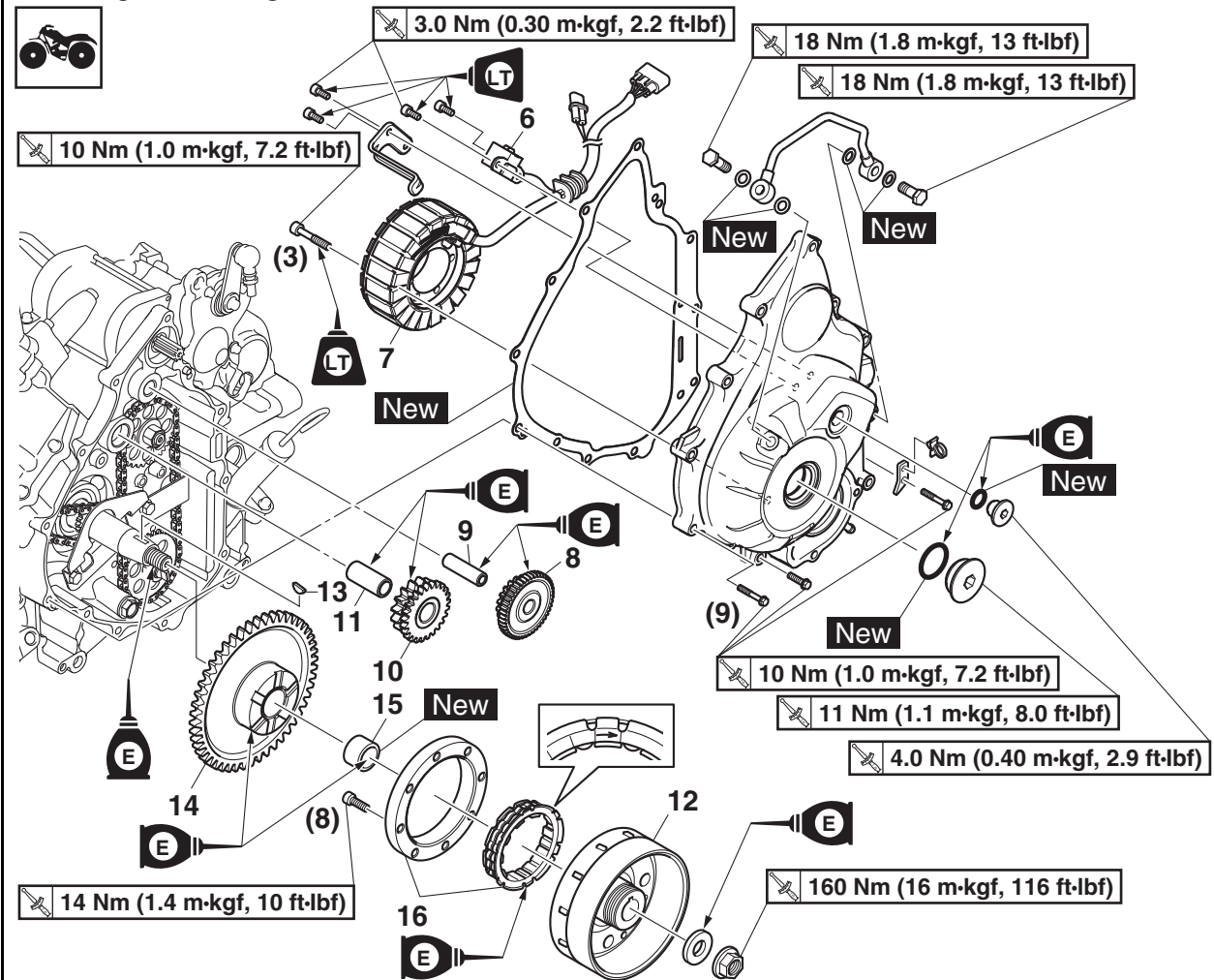
### Removing the AC magneto and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
	Footrest board (left)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Drive select lever unit		Refer to "ENGINE REMOVAL (2)" on page 5-6.
	Water pump housing		Refer to "WATER PUMP" on page 6-10.
1	Oil pipe (AC magneto cover)	1	
2	Lead holder bracket	1	
3	AC magneto cover	1	
4	AC magneto cover gasket	1	
5	AC magneto/curlyshaft position sensor lead holder	1	

# AC MAGNETO AND STARTER CLUTCH

## Removing the AC magneto and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
6	Crankshaft position sensor	1	
7	Stator coil	1	
8	Starter idle gear 1	1	
9	Starter idle gear shaft 1	1	
10	Starter idle gear 2	1	
11	Starter idle gear shaft 2	1	
12	AC magneto rotor	1	
13	Woodruff key	1	
14	Starter wheel gear	1	
15	Bushing	1	
16	Starter clutch	1	

# AC MAGNETO AND STARTER CLUTCH

EBS30151

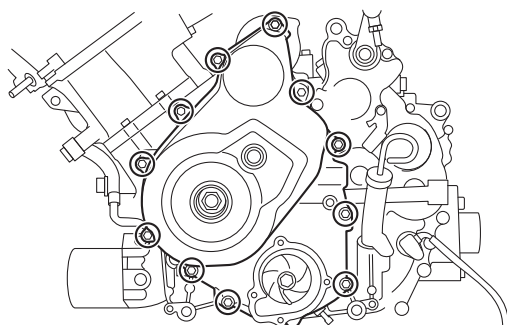
## REMOVING THE AC MAGNETO ROTOR

1. Remove:

- AC magneto 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:

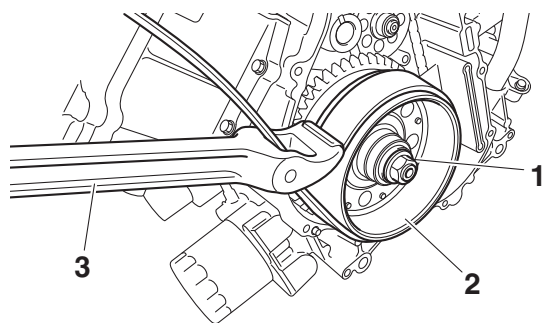
- AC magneto rotor nut "1"
- Washer

### TIP

Hold the AC magneto rotor "2" with the rotor holding tool "3" while loosening the AC magneto rotor nut.



**Rotor holding tool**  
90890-04166  
YM-04166



3. Remove:

- AC magneto rotor "1"  
(with the starter clutch)
- Woodruff key

ECB01390

### NOTICE

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

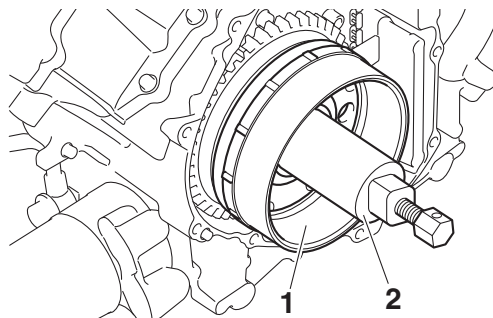
### TIP

- Use the flywheel puller "2".

- Make sure the flywheel puller is centered over the AC magneto rotor.



**Flywheel puller (M38 X P1.5)**  
90890-04178  
**Flywheel puller (M38 X P1.5)**  
YM-04178



EBS30152

## REMOVING THE STARTER CLUTCH

1. Remove:

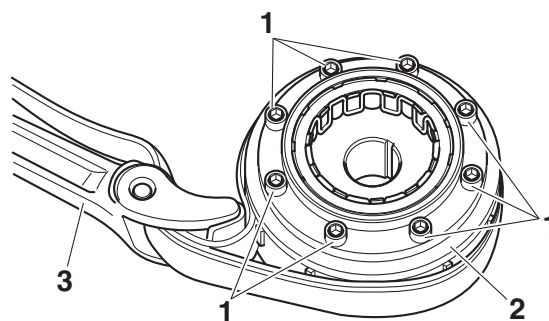
- Starter clutch bolts "1"

### TIP

Hold the AC magneto rotor "2" with the rotor holding tool "3" while removing the starter clutch bolts.



**Rotor holding tool**  
90890-04166  
YM-04166



EBS30153

## CHECKING THE STARTER CLUTCH

1. Check:

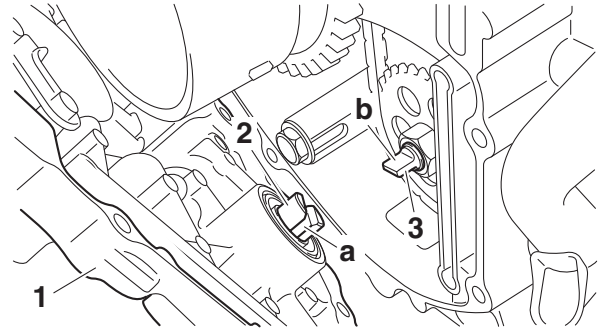
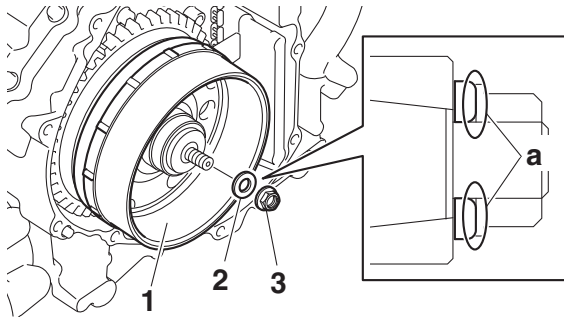
- Starter clutch rollers  
Damage/wear → Replace.

2. Check:

- Starter idle gear
- Starter wheel gear  
Burrs/chips/roughness/wear → Replace the defective part(s).

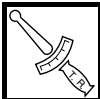


# AC MAGNETO AND STARTER CLUTCH



## 2. Tighten:

- AC magneto rotor nut "1"



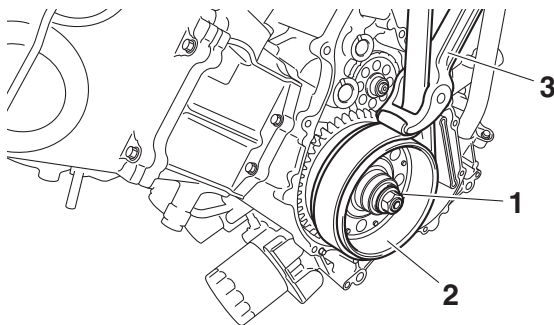
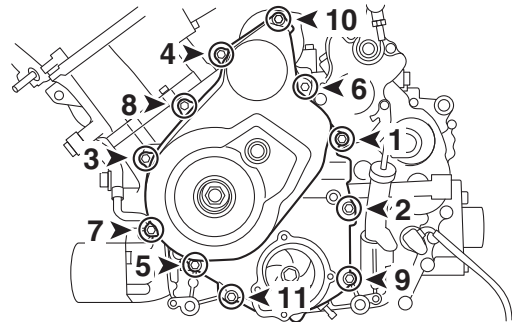
**AC magneto rotor nut**  
160 Nm (16 m·kgf, 116 ft·lbf)

## TIP

Hold the AC magneto rotor "2" with the rotor holding tool "3" while tightening the AC magneto rotor nut.



**Rotor holding tool**  
90890-04166  
YM-04166



## 3. Install:

- AC magneto cover "1"



**AC magneto cover bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

## TIP

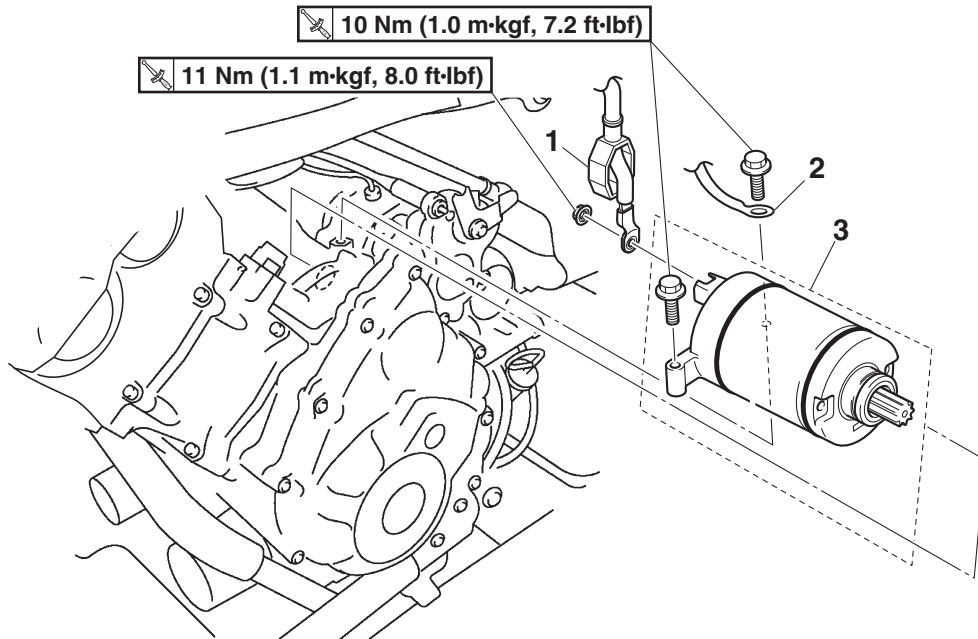
- Align the slot "a" in the impeller shaft "2" with the projection "b" on the oil pump shaft "3".
- Tighten the AC magneto cover bolts in the proper tightening sequence as shown.



EBS20040

## ELECTRIC STARTER

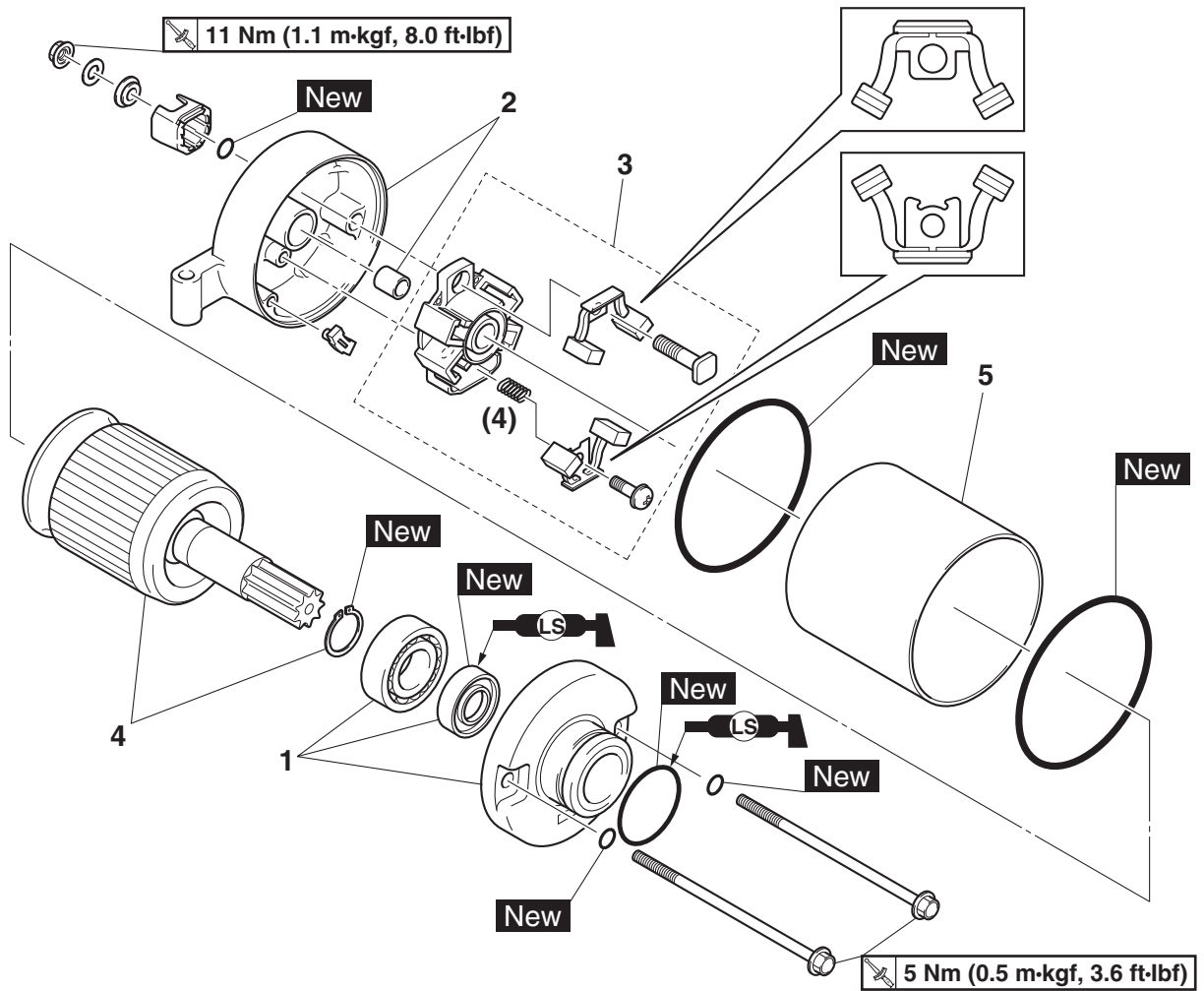
### Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Muffler		Refer to "ENGINE REMOVAL (1)" on page 5-3.
1	Starter motor lead	1	Disconnect.
2	Engine ground lead	1	Disconnect.
3	Starter motor	1	

# ELECTRIC STARTER

## Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Starter motor front cover	1	
2	Starter motor rear cover	1	
3	Brush set	1	
4	Armature assembly	1	
5	Starter motor yoke	1	

# ELECTRIC STARTER

EBS30157

## CHECKING THE STARTER MOTOR

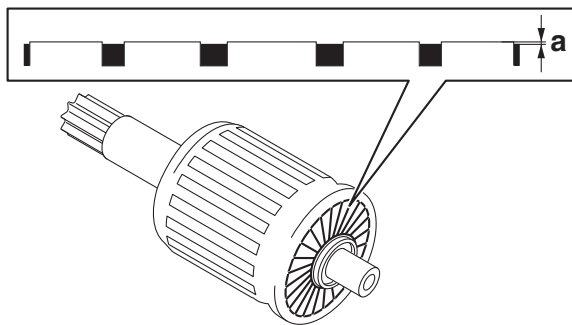
1. Check:
  - Commutator  
Dirt → Clean with 600-grit sandpaper.
2. Measure:
  - Mica undercut "a"  
Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



**Mica undercut (depth)**  
**0.70 mm (0.03 in)**

### TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.

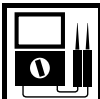


3. Measure:
  - Armature assembly resistances (commutator and insulation)  
Out of specification → Replace the starter motor.

- a. Measure the armature assembly resistances with the digital circuit tester.

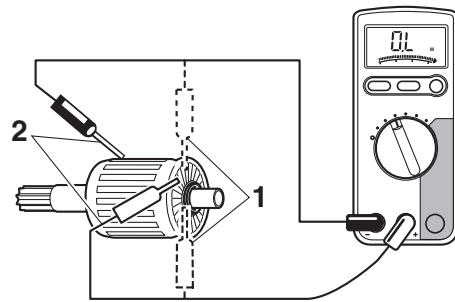


**Digital circuit tester**  
**90890-03174**  
**Model 88 Multimeter with tachometer**  
**YU-A1927**



**Armature coil**  
**Commutator resistance "1"**  
**0.0050–0.0150 Ω at 20 °C (68 °F)**  
**Insulation resistance "2"**  
**Above 1 MΩ at 20 °C (68 °F)**

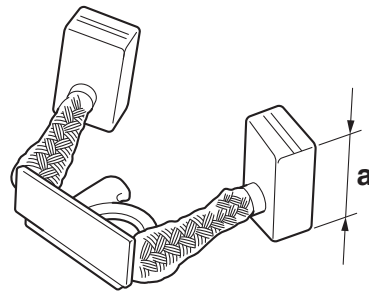
- b. If any resistance is out of specification, replace the starter motor.



4. Measure:
  - Brush length "a"  
Out of specification → Replace the brush set.



**Brush overall length limit**  
**6.50 mm (0.26 in)**

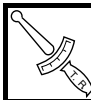


5. Check:
  - Gear teeth  
Damage/wear → Replace the gear.
6. Check:
  - Bearing
  - Oil seal  
Damage/wear → Replace the defective part(s).

EBS30158

## ASSEMBLING THE STARTER MOTOR

1. Install:
  - Starter motor yoke "1"
  - Starter motor front cover "2"
  - Starter motor rear cover "3"



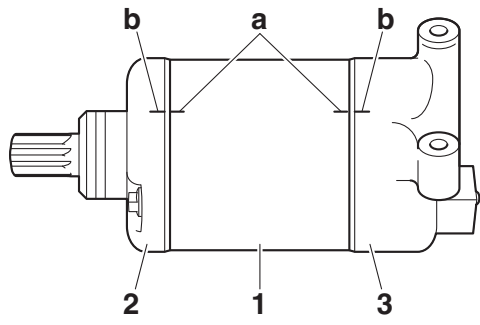
**Starter motor cover bolt**  
**5 Nm (0.5 m·kgf, 3.6 ft·lbf)**

### TIP

Align the match marks "a" on the starter motor yoke with the match marks "b" on the starter motor front and rear covers.

# ELECTRIC STARTER

---

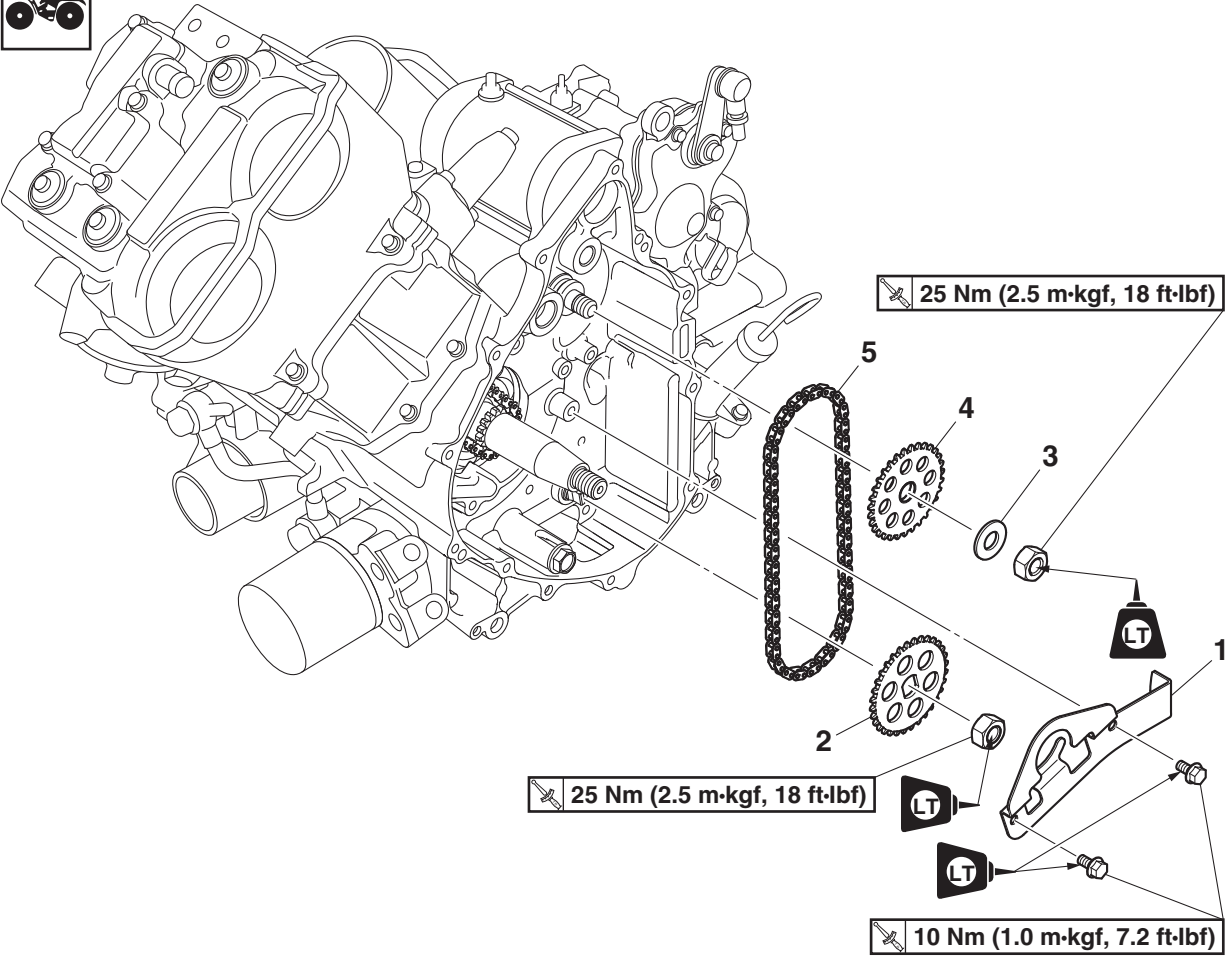


# OIL PUMP SPROCKETS

EBS20114

## OIL PUMP SPROCKETS

### Removing the oil pump sprockets



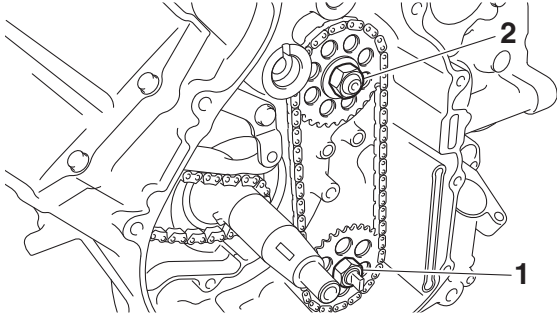
Order	Job/Parts to remove	Q'ty	Remarks
	AC magneto rotor		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-35.
1	Timing chain stopper guide (lower)	1	
2	Oil pump driven sprocket	1	
3	Washer	1	
4	Oil pump drive sprocket	1	
5	Chain	1	

# OIL PUMP SPROCKETS

EBS30524

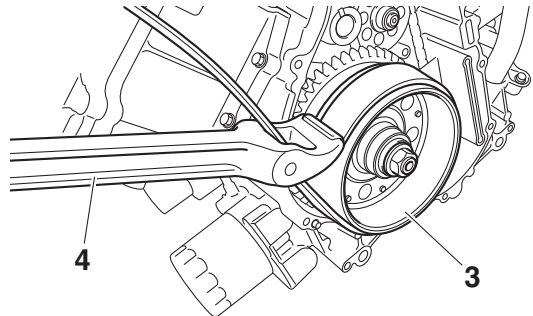
## REMOVING THE OIL PUMP DRIVE SPROCKET AND OIL PUMP DRIVEN SPROCKET

- Loosen:
  - Oil pump driven sprocket nut "1"
  - Oil pump drive sprocket nut "2"



- Temporarily install the AC magneto rotor. Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-35.
- Hold the AC magneto rotor "3" with the rotor holding tool "4" while loosening the oil pump driven sprocket nut and oil pump drive sprocket nut.

	<p><b>Rotor holding tool</b>  <b>90890-04166</b>  <b>YM-04166</b></p>
---	---



EBS30525

## CHECKING THE OIL PUMP SPROCKETS

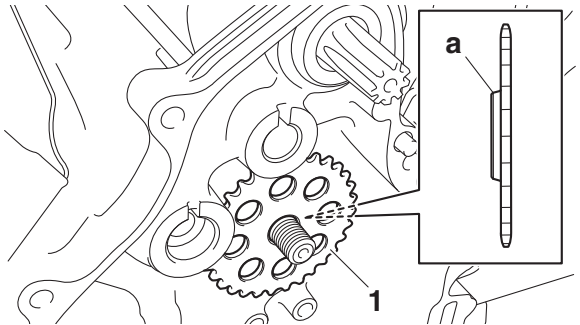
- Check:
  - Oil pump drive sprocket
  - Oil pump driven sprocket
 Cracks/wear/damage → Replace.

EBS30526

## INSTALLING THE OIL PUMP DRIVE SPROCKET AND OIL PUMP DRIVEN SPROCKET

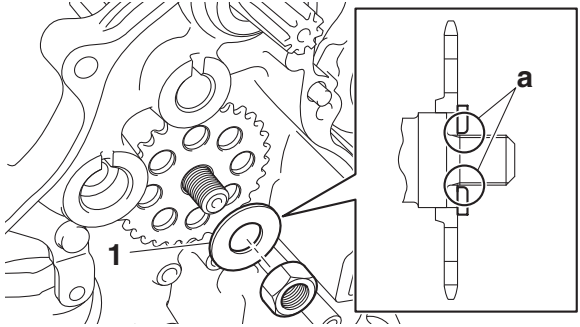
- Install:
  - Oil pump drive sprocket "1"

**TIP**  
 Install the oil pump drive sprocket so that the protruding portion "a" of the sprocket is facing toward the crankcase.



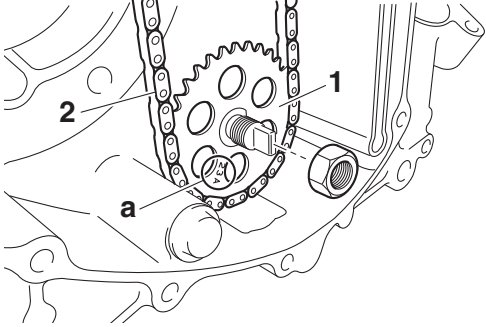
- Install:
  - Washer "1"
  - Oil pump drive sprocket nut

**TIP**  
 Install the washer with its rounded side "a" facing away from the crankcase.



- Install:
  - Oil pump driven sprocket "1"
  - Chain "2"
  - Oil pump driven sprocket nut

**TIP**  
 Install the oil pump driven sprocket with the "23A" mark "a" facing out.



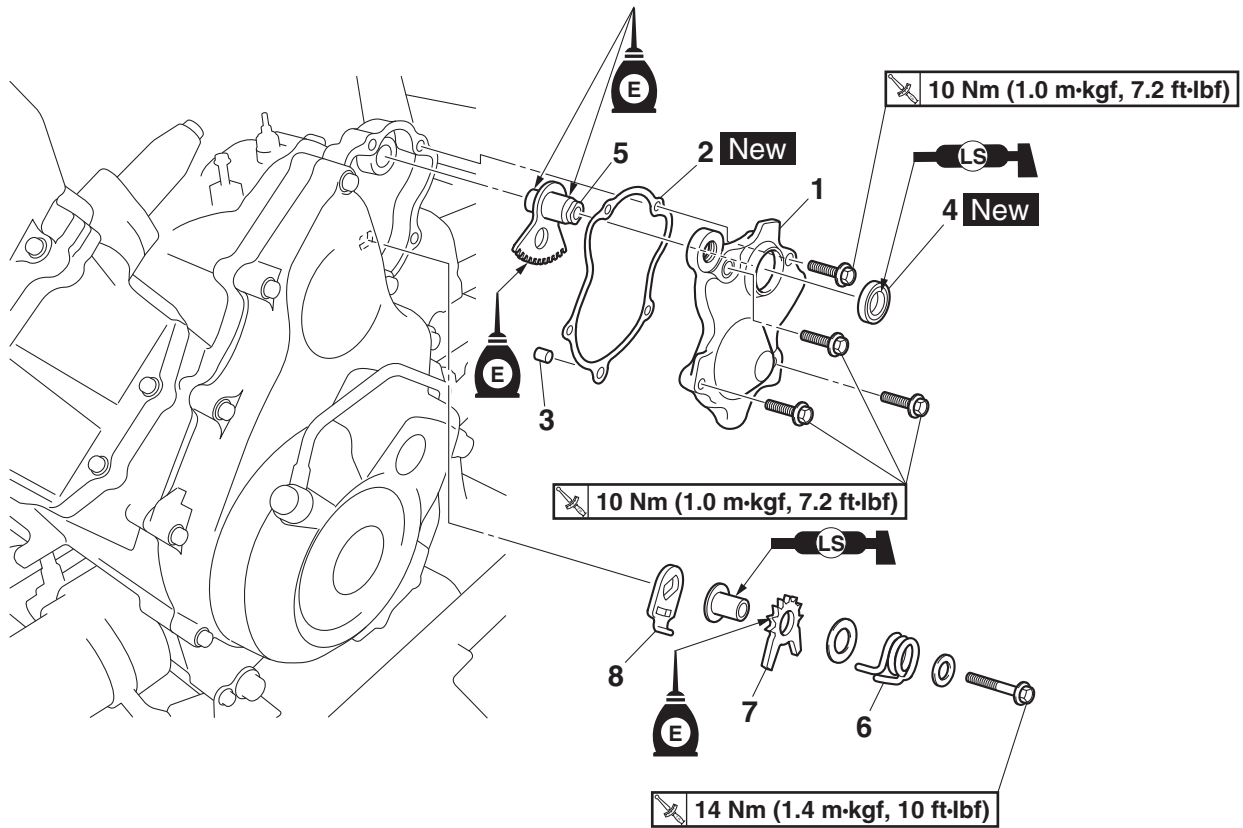
- Tighten:
  - Oil pump drive sprocket nut "1"
  - Oil pump driven sprocket nut "2"



EBS20042

## SHIFT LEVER

### Removing the shift levers and stopper lever



Order	Job/Parts to remove	Q'ty	Remarks
	Drive select lever unit/shift arm		Refer to "ENGINE REMOVAL (2)" on page 5-6.
1	Shift lever cover	1	
2	Shift lever cover gasket	1	
3	Dowel pin	1	
4	Oil seal	1	
5	Shift lever 1	1	
6	Stopper lever spring	1	
7	Shift lever 2	1	
8	Stopper lever	1	



EBS30163

## CHECKING THE STOPPER LEVER

- Check:
  - Stopper lever  
Damage/wear → Replace.
  - Stopper lever spring  
Damage/wear → Replace.

EBS30164

## CHECKING THE SHIFT LEVERS

- Check:
  - Shift lever 1
  - Shift lever 2  
Damage/wear → Replace.

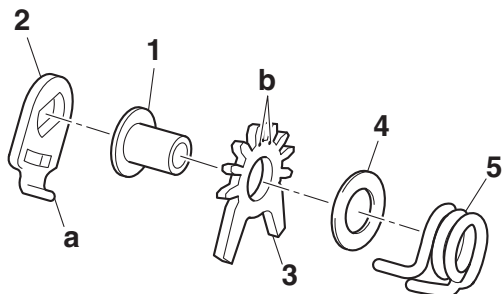
EBS30165

## INSTALLING THE SHIFT LEVERS

- Install:
  - Collar "1" (onto the stopper lever "2")
  - Shift lever 2 "3"
  - Washer "4"
  - Stopper spring "5"

### TIP

- Make sure the projection "a" on the stopper lever "2" facing toward the collar.
- Install the shift lever 2 "3" with the marks "b" facing the stopper spring.



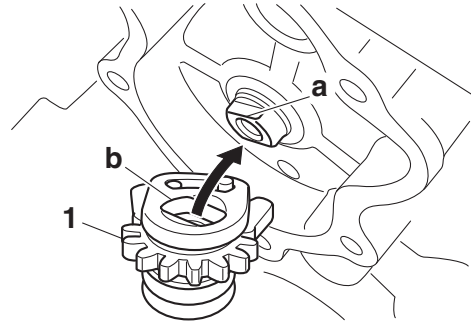
- Install:
  - Shift lever 2 assembly "1"



**Shift lever 2 bolt**  
**14 Nm (1.4 m·kgf, 10 ft·lbf)**

### TIP

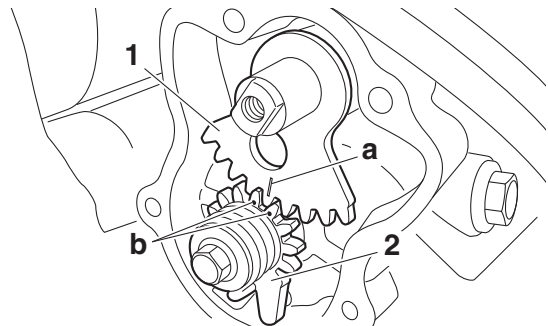
Align the projection "a" on the shift drum with the slit "b" in the stopper lever.



- Install:
  - Shift lever 1 "1"

### TIP

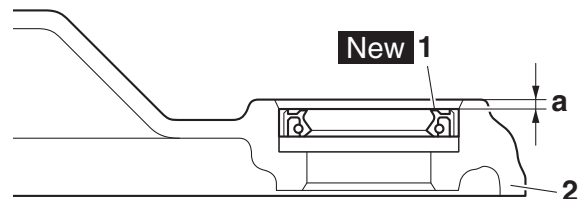
When installing shift lever 1, align the alignment mark "a" on shift lever 1 with the punch marks "b" on shift lever 2 "2".



- Install:
  - Oil seal "1" **New**  
(into the shift lever cover "2")



**Installed depth "a"**  
**1.0–1.5 mm (0.04–0.06 in)**

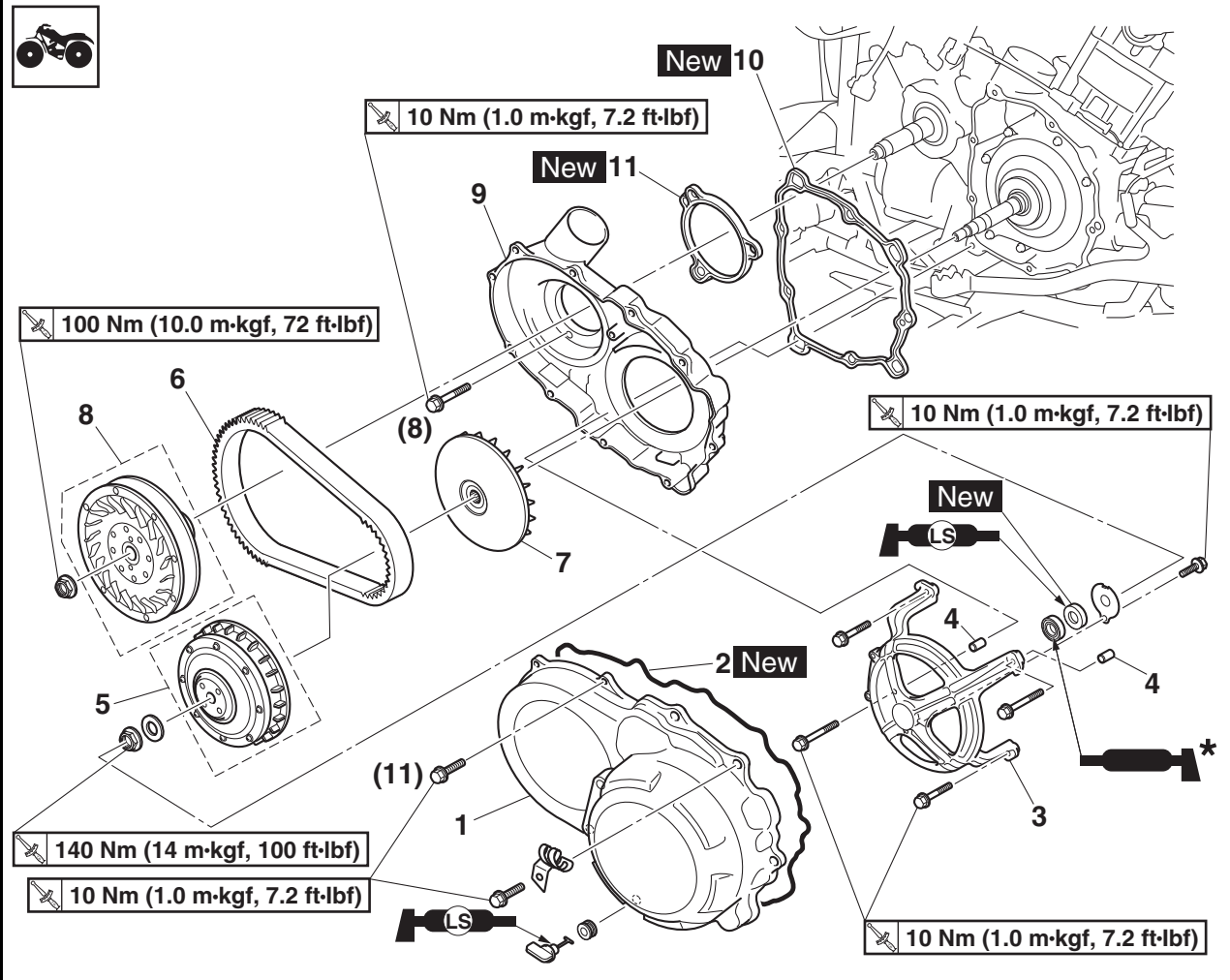


# PRIMARY AND SECONDARY SHEAVES

EBS20043

## PRIMARY AND SECONDARY SHEAVES

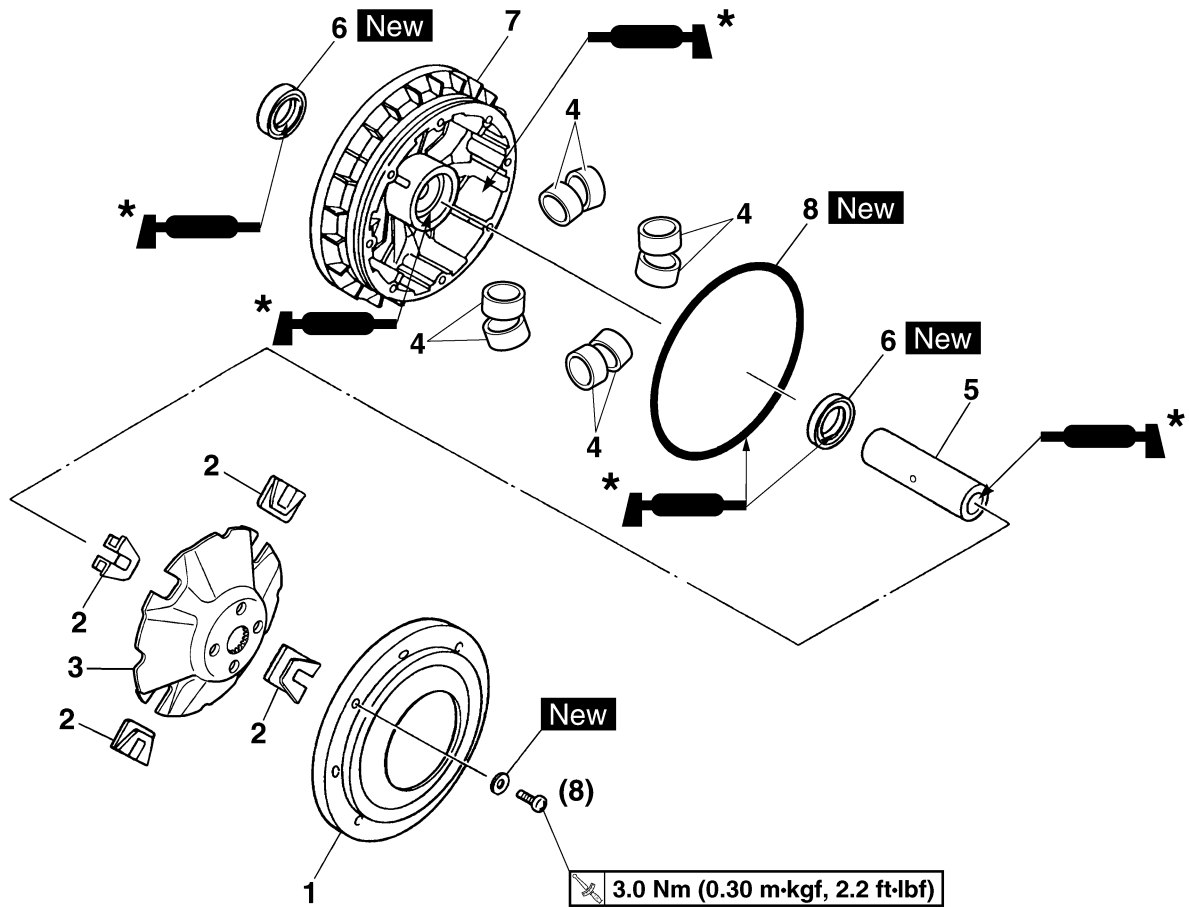
### Removing the primary and secondary sheaves



Order	Job/Parts to remove	Q'ty	Remarks
	Footrest board (right)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	V-belt cooling ducts		Refer to "ENGINE REMOVAL (1)" on page 5-3.
1	Drive belt cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	
5	Primary sheave assembly	1	
6	V-belt	1	
7	Primary fixed sheave	1	
8	Secondary sheave assembly	1	
9	Drive belt case	1	
10	Rubber gasket	1	
11	Rubber gasket	1	

# PRIMARY AND SECONDARY SHEAVES

## Disassembling the primary sheave

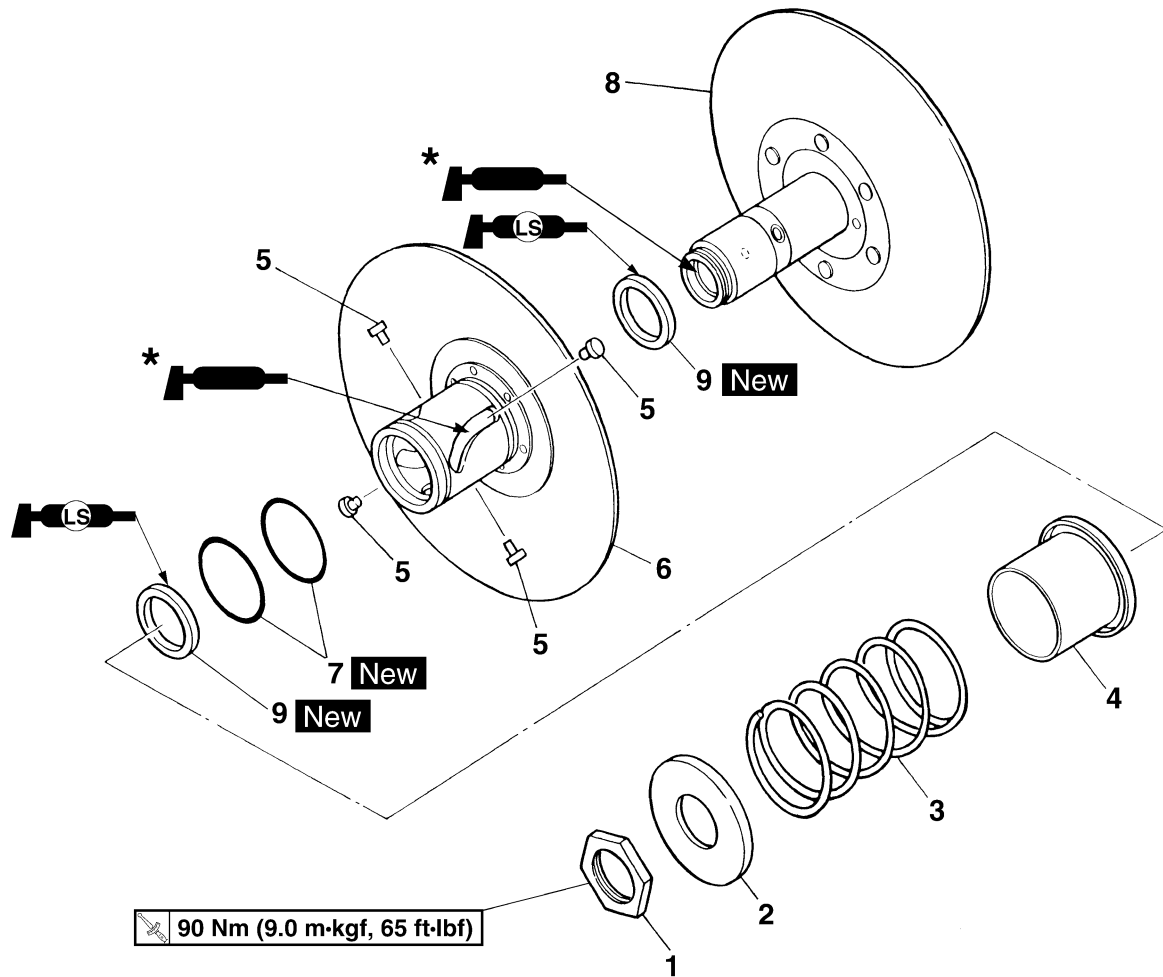


\* Apply Yamaha Grizzly grease or Yamaha grease F.

Order	Job/Parts to remove	Q'ty	Remarks
1	Primary sheave cap	1	
2	Primary sheave slider	4	
3	Primary sheave cam	1	
4	Primary sheave weight	8	
5	Spacer	1	
6	Oil seal	2	
7	Primary sliding sheave	1	
8	O-ring	1	

# PRIMARY AND SECONDARY SHEAVES

## Disassembling the secondary sheave



\* Apply Yamaha grease H or POLYREX EM®

Order	Job/Parts to remove	Q'ty	Remarks
1	Secondary sheave spring retaining nut	1	
2	Upper spring seat	1	
3	Compression spring	1	
4	Lower spring seat	1	
5	Guide pin	4	
6	Secondary sliding sheave	1	
7	O-ring	2	
8	Secondary fixed sheave	1	
9	Oil seal	2	

# PRIMARY AND SECONDARY SHEAVES

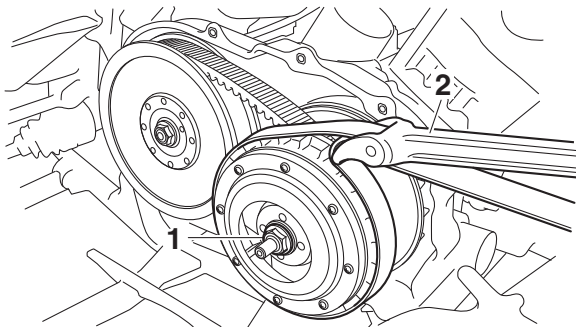
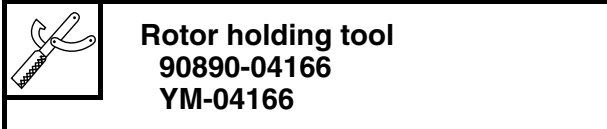
EBS30167

## REMOVING THE PRIMARY AND SECONDARY SHEAVES

- Loosen:
  - Primary sheave assembly nut "1"

### TIP

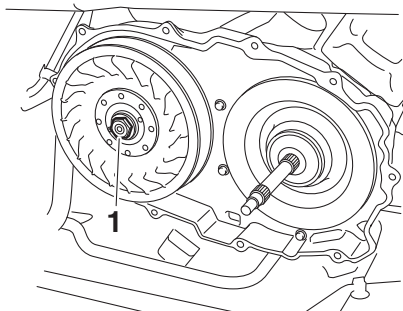
Use the rotor holding tool "2" to hold the primary sheave.



- Loosen:
  - Secondary sheave assembly nut "1"

### TIP

Shift the transmission into "R" (reverse), set the parking brake, and then loosen the secondary sheave assembly nut.



EBS30168

## DISASSEMBLING THE SECONDARY SHEAVE

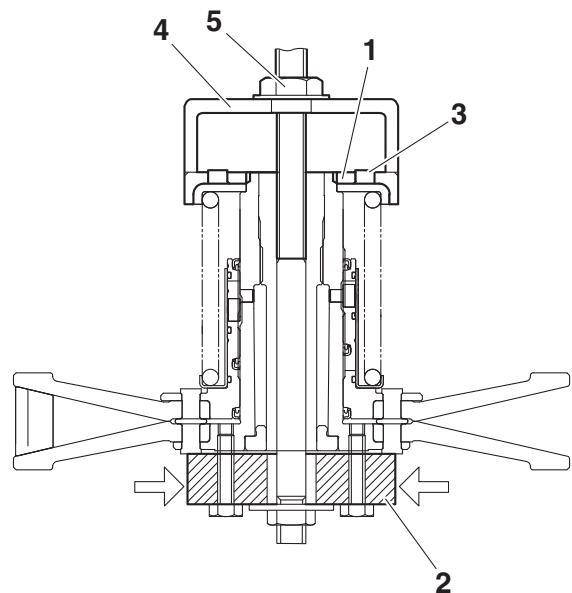
- Remove:
  - Secondary sheave spring retaining nut "1"

- Attach the sheave fixed block "2", locknut wrench "3" and sheave spring compressor "4" to the secondary sheave assembly.

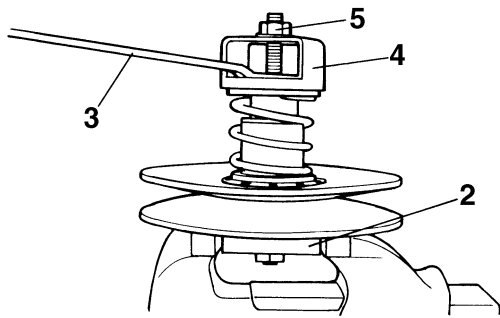


- Sheave fixed block  
90890-04135
- Sheave fixed bracket  
YM-04135
- Locknut wrench  
90890-01348
- Locknut wrench  
YM-01348
- Sheave spring compressor  
90890-04134
- Sheave spring compressor  
YM-04134

- Place the sheave fixed block in a vise and secure it.
- Tighten the sheave spring compressor nut "5" and compress the spring.
- Loosen the secondary sheave spring retaining nut "1" with the locknut wrench "3".
- Remove the secondary sheave spring retaining nut "1".
- Remove the sheave spring compressor and locknut wrench.



# PRIMARY AND SECONDARY SHEAVES



2. Check:
  - Primary sliding sheave
  - Primary fixed sheave
 Cracks/damage → Replace.

EBS30171

## 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 “a”
 Out of specification → Replace.

EBS30169

## CHECKING THE V-BELT

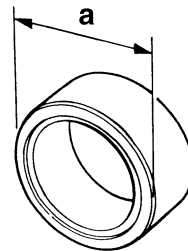
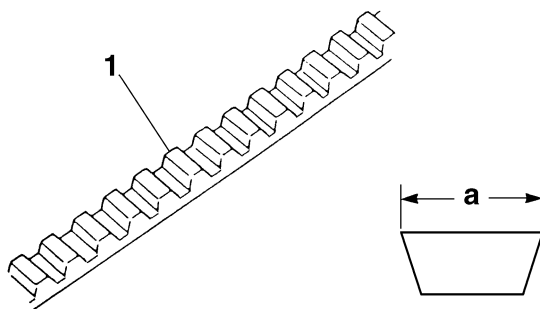
1. Check:
  - V-belt “1”
 Cracks/damage/wear → Replace.  
 Grease/oil → Clean the primary and secondary sheaves.
2. Measure:
  - V-belt width “a”
 Out of specification → Replace.



**V-belt width limit**  
**31.3 mm (1.23 in)**



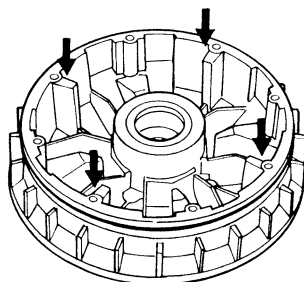
**Primary sheave weight outside diameter**  
**30 mm (1.18 in)**  
**Limit**  
**29.5 mm (1.16 in)**



EBS30170

## CHECKING THE PRIMARY SHEAVE

1. Check:
  - Primary sliding sheave splines
 Wear/cracks/damage → Replace.
- Primary sheave cam

 Cracks/damage → Replace.
 


EBS30172

## CHECKING THE PRIMARY SHEAVE SLIDERS

The following procedure applies to all of the primary sheave sliders.

1. Check:
  - Primary sheave slider
 Cracks/damage/wear → Replace.

EBS30173

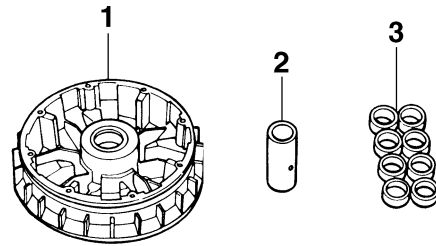
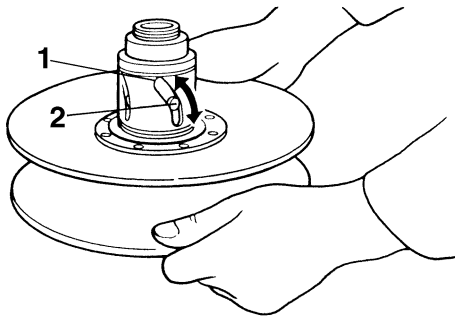
## CHECKING THE SECONDARY SHEAVE

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 grooves “1”
 Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

# PRIMARY AND SECONDARY SHEAVES

## 3. Check:

- Guide pins "2"
- Damage/wear → Replace the secondary fixed and sliding sheaves as a set.



## 4. Check:

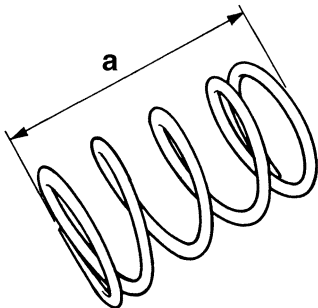
- Secondary sheave spring
- Damage → Replace.

## 5. Measure:

- Secondary sheave spring free length "a"
- Out of specification → Replace the secondary sheave spring.



**Free length**  
130.6 mm (5.14 in)  
**Limit**  
128.0 mm (5.04 in)



EBS30174

## ASSEMBLING THE PRIMARY SHEAVE

### 1. Clean:

- Primary sliding sheave "1"
- Spacer "2"
- Primary sheave weights "3"
- Primary sheave cam

### TIP

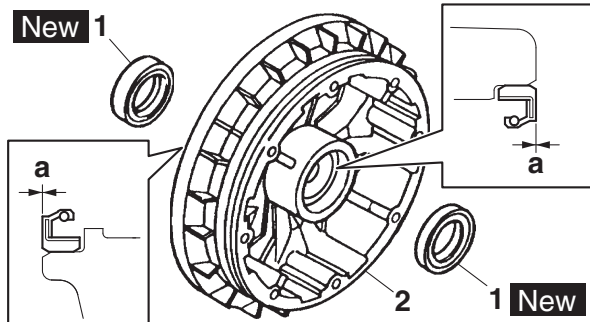
Remove any excess grease.

## 2. Install:

- Oil seals "1" **New**  
(into the primary sliding sheave "2")



**Installed depth "a"**  
0 mm (0 in)



## 3. Lubricate:

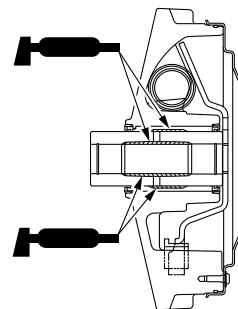
- Spacer inner surface
- Primary sliding sheave inner surface



**Recommended lubricant**  
Yamaha Grizzly grease or  
Yamaha grease F

### TIP

- Apply Yamaha Grizzly grease or Yamaha grease F (2.5 g) to the inner surface of the spacer.
- Apply Yamaha Grizzly grease or Yamaha grease F (2.5 g) to the inner surface of the primary sliding sheave.



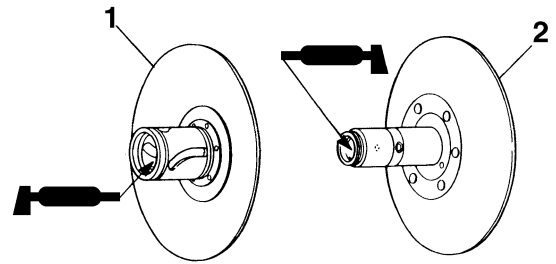
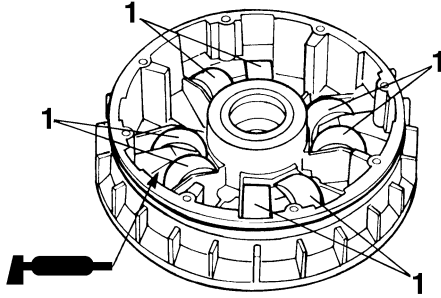
# PRIMARY AND SECONDARY SHEAVES

4. Install:

- Primary sheave weights "1"

**TIP**

Apply Yamaha Grizzly grease or Yamaha grease F (90 g) to the whole outer surface of the weights and install.

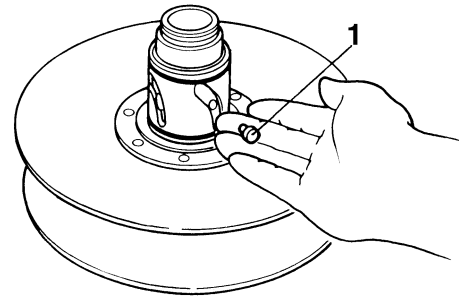


3. Install:

- Secondary sliding sheave

4. Install:

- Guide pins "1"



EBS30175

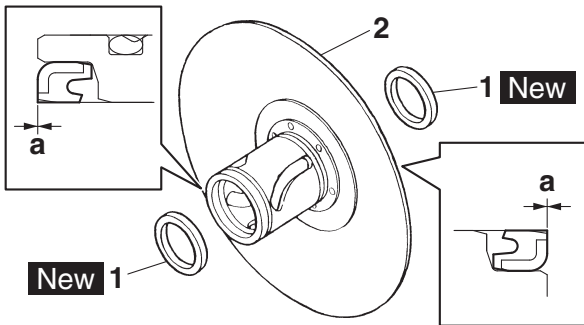
## ASSEMBLING THE SECONDARY SHEAVE

1. Install:

- Oil seals "1" **New**  
(into the secondary sliding sheave "2")



Installed depth "a"  
0 mm (0 in)



5. Lubricate:

- Guide pin grooves "1"  
(with the recommended lubricant)



Recommended lubricant  
Yamaha grease H or POLYREX  
EM®

**TIP**

Apply Yamaha grease H or POLYREX EM® (5.0 g) to the guide pin grooves.

2. Lubricate:

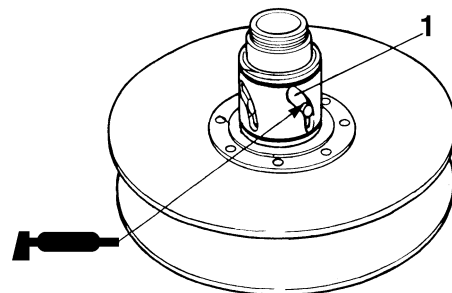
- Secondary sliding sheave "1"
- Secondary fixed sheave "2"  
(with the recommended lubricant)



Recommended lubricant  
Yamaha grease H or POLYREX  
EM®

**TIP**

Apply Yamaha grease H or POLYREX EM® (15 g) to the inner surfaces of the secondary sheaves.




6. Install:

- Lower spring seat "1"
- Compression spring "2"
- Upper spring seat "3"
- Secondary sheave spring retaining nut "4"




# PRIMARY AND SECONDARY SHEAVES

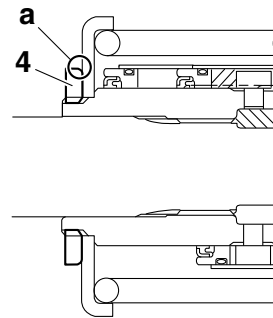
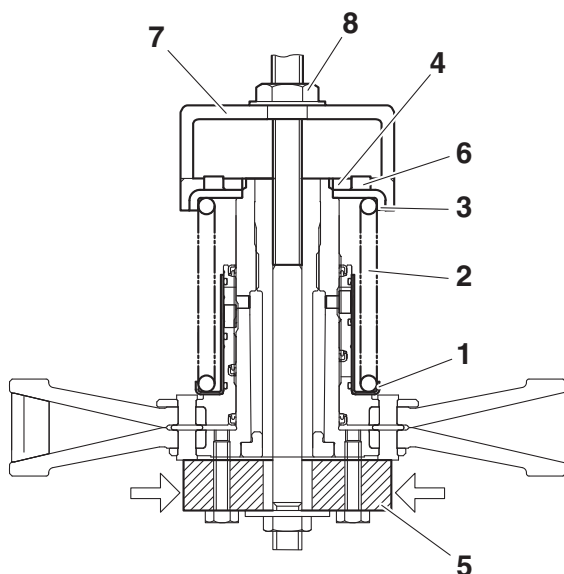
- a. Attach the sheave fixed block "5", locknut wrench "6" and sheave spring compressor "7" to the secondary sheave.

	<b>Sheave fixed block</b> <b>90890-04135</b> <b>Sheave fixed bracket</b> <b>YM-04135</b> <b>Locknut wrench</b> <b>90890-01348</b> <b>Locknut wrench</b> <b>YM-01348</b> <b>Sheave spring compressor</b> <b>90890-04134</b> <b>Sheave spring compressor</b> <b>YM-04134</b>
---	---

- b. Place the sheave fixed block in a vise and secure it.  
 c. Tighten the sheave spring compressor nut "8" and compress the spring.  
 d. Install the secondary sheave spring retaining nut "4" and tighten it to specification using the locknut wrench.

	<b>Secondary sheave spring retaining nut</b> <b>90 Nm (9.0 m.kgf, 65 ft.lbf)</b>
---	---

**TIP** \_\_\_\_\_  
 Install the secondary sheave spring retaining nut "4" with its tapered side "a" facing the secondary sheaves.

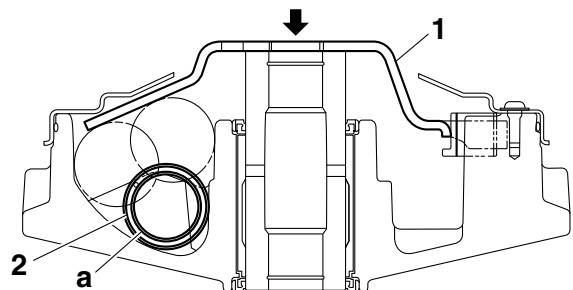


- e. Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

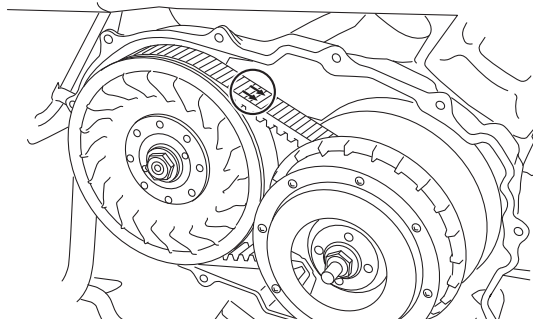
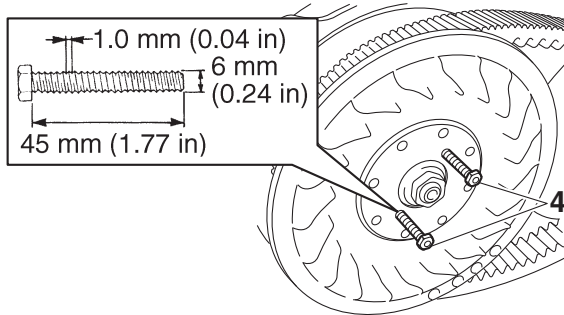
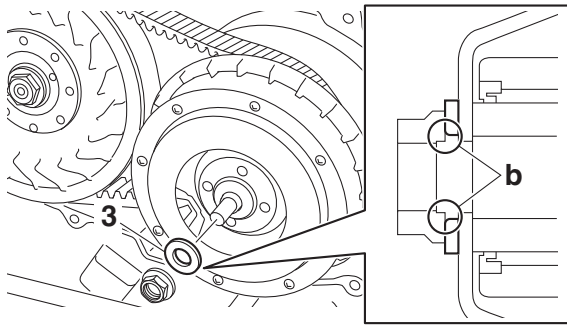
EBS30176  
**INSTALLING THE PRIMARY AND SECONDARY SHEAVES**

1. Install:
- Secondary sheave
  - V-belt
  - Primary fixed sheave
  - Primary sheave
  - Washer
  - Nuts

- TIP** \_\_\_\_\_
- Be sure to push in the primary sheave cam "1" when installing the primary sheave so that the primary sheave weights "2" will be properly positioned "a".
  - Install the washer "3" with its rounded side "b" facing away from the primary sheave assembly.
  - Tightening the bolts "4" (90101-06016) will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.
  - Install the V-belt so that its arrow points in the direction of rotation as shown in the illustration.



# PRIMARY AND SECONDARY SHEAVES

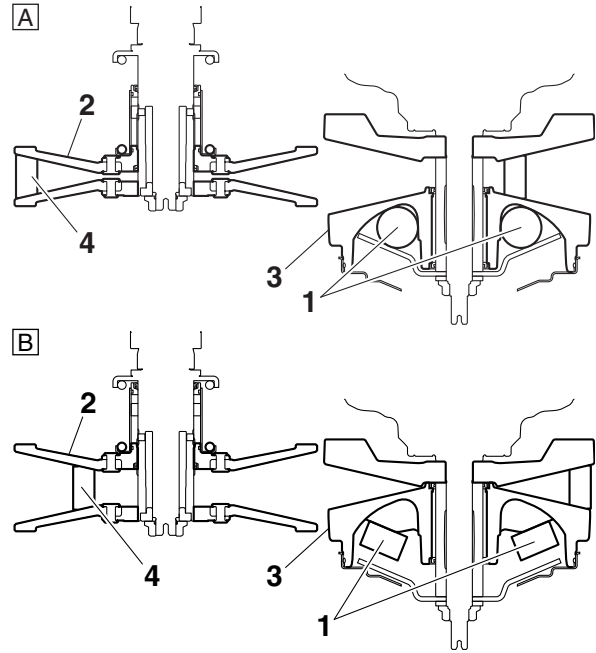


2. Check:

- Primary sheave weights position  
Out of specification → Repeat step (1).

**TIP**

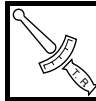
To check that the primary sheave weights “1” are installed correctly, make sure that the secondary sheave “2”, primary sheave “3”, and V-belt “4” are positioned as shown in the illustration.



- A. Correct position  
B. Incorrect position

3. Tighten:

- Primary sheave assembly nut “1”



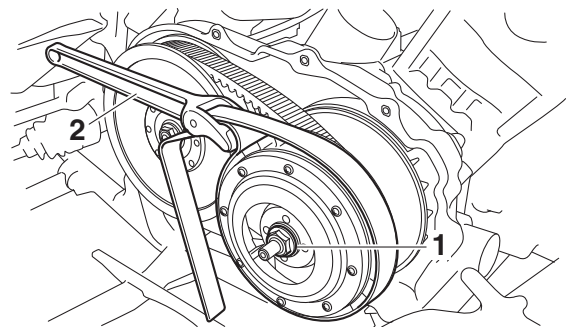
**Primary sheave assembly nut**  
**140 Nm (14 m·kgf, 100 ft·lbf)**

**TIP**

Use the rotor holding tool “2” to hold the primary sheave.

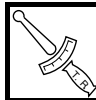


**Rotor holding tool**  
**90890-04166**  
**YM-04166**



4. Tighten:

- Secondary sheave assembly nut “1”



**Secondary sheave assembly nut**  
**100 Nm (10 m·kgf, 72 ft·lbf)**

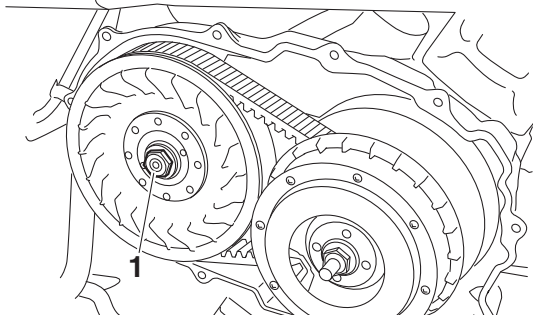
# PRIMARY AND SECONDARY SHEAVES

---

## TIP

Shift the transmission into “L” (low) or “H” (high), set the parking brake, and then tighten the secondary sheave assembly nut.

---



## 5. Lubricate:

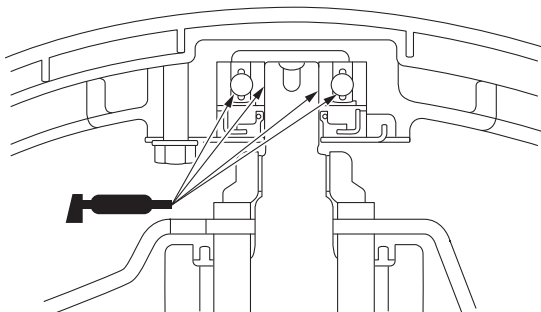
- Bearing housing bearing inner surface and ball  
(with the recommended lubricant)



## TIP

Apply 2.3 g or more of Shell Sunlight Grease 3® to the bearing inner surface and ball as shown in the illustration.

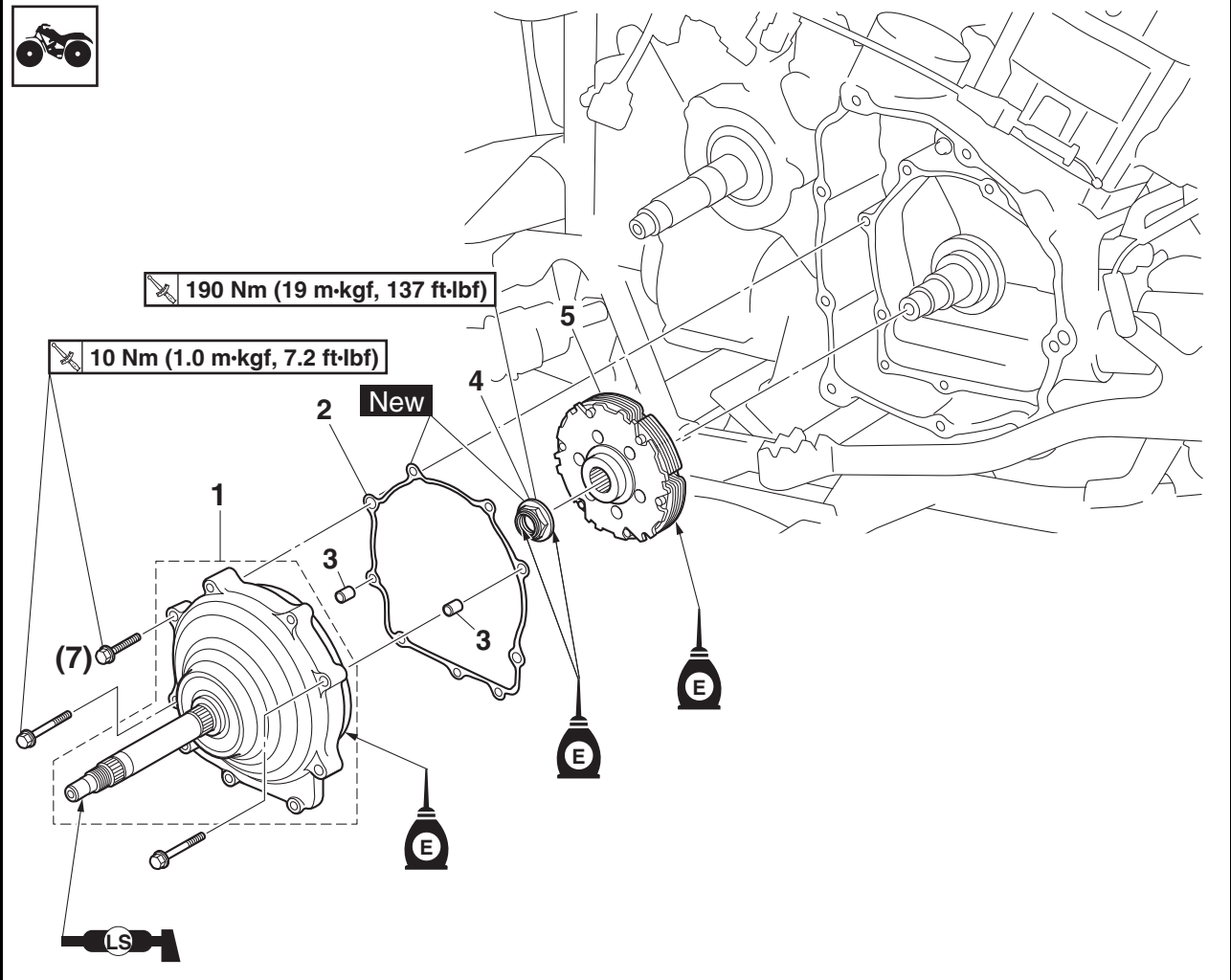
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EBS20044

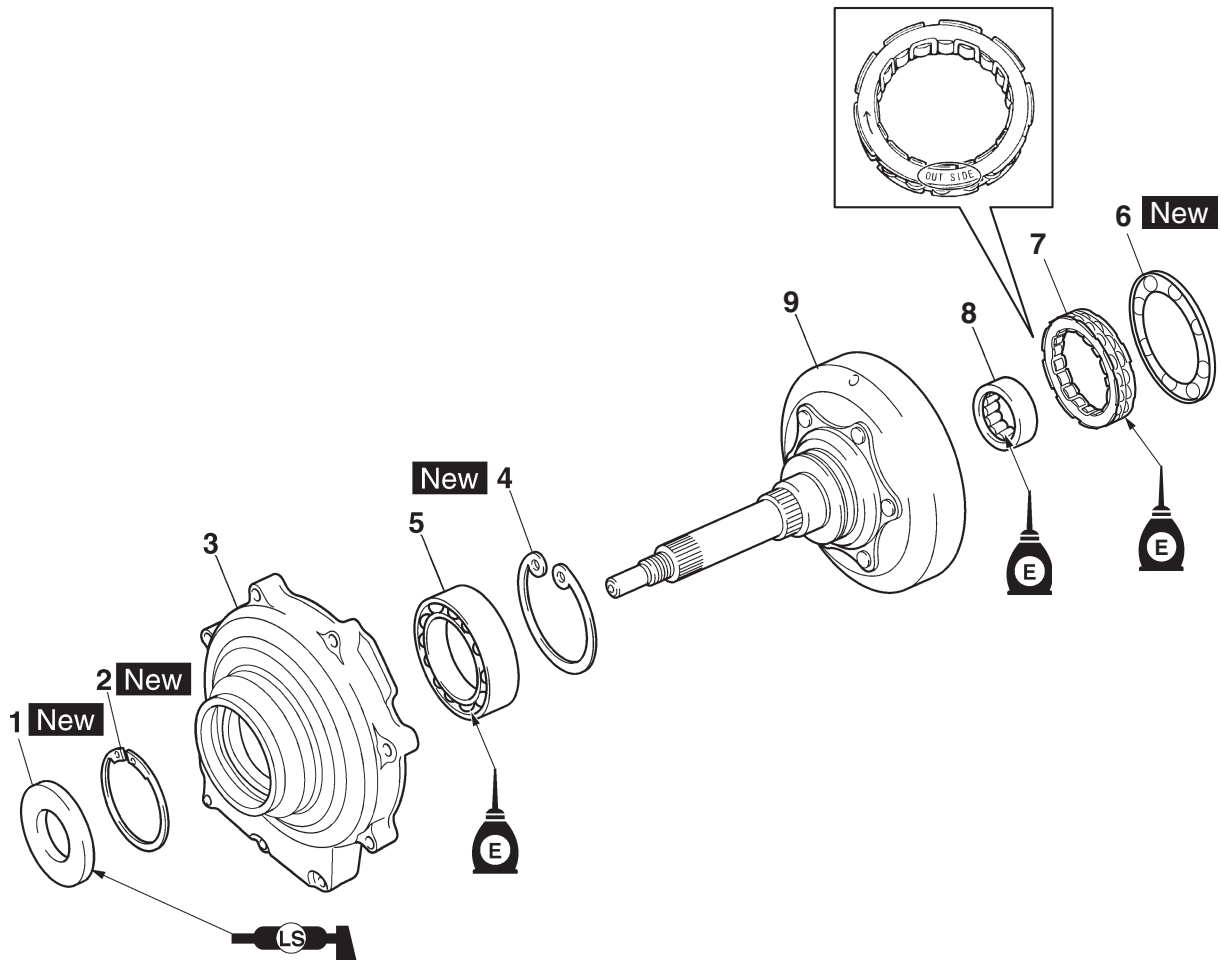
## CLUTCH

### Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Drive belt case		Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-49.
1	Clutch housing assembly	1	
2	Clutch housing assembly gasket	1	
3	Dowel pin	2	
4	Clutch carrier assembly nut	1	Left-hand thread
5	Clutch carrier assembly	1	

## Disassembling the clutch housing assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	1	
2	Circlip	1	
3	Bearing housing	1	
4	Circlip	1	
5	Bearing	1	
6	Seal ring	1	
7	One-way clutch bearing	1	
8	Bearing	1	
9	Clutch housing	1	

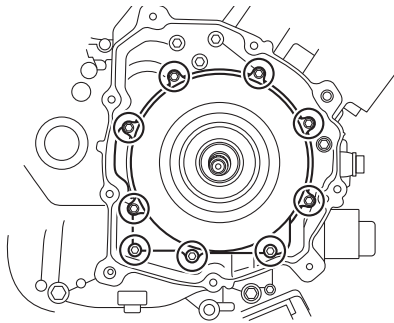
EBS30177

## REMOVING THE CLUTCH

- Remove:
  - Clutch housing assembly

### TIP

Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.



- Straighten:
  - Punched portion “a” of the clutch carrier assembly nut “1”
- Remove:
  - Clutch carrier assembly nut “1”

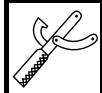
ECB01710

### NOTICE

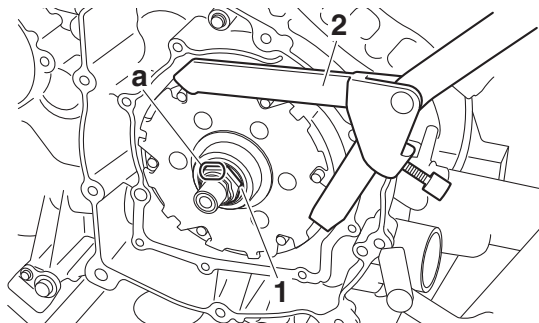
The clutch carrier assembly nut has left-hand threads. To loosen the clutch carrier assembly nut, turn it clockwise.

### TIP

Use a universal clutch holder “2” to hold the clutch carrier assembly.



Universal clutch holder  
90890-04086  
Universal clutch holder  
YM-91042



EBS30178

## CHECKING THE CLUTCH

- Check:
  - Clutch housing  
Damage/wear → Replace.

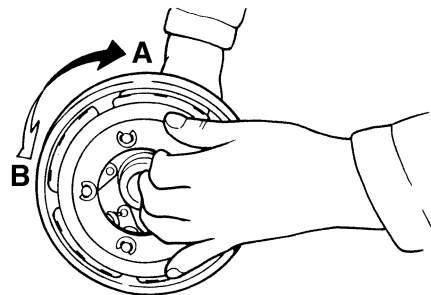
- One-way clutch bearing  
Chafing/wear/damage → Replace.

### TIP

- Replace the one-way clutch bearing and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing inward.

- Check:
  - One-way clutch operation

- Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
- When turning the clutch housing clockwise “A”, it should turn freely; otherwise, the one-way clutch assembly is faulty and must be replaced.
- When turning the clutch housing counter-clockwise “B”, the clutch housing and crankshaft should engage; otherwise, the one-way clutch assembly is faulty and must be replaced.



EBS30179

## CHECKING THE CLUTCH SHOE

- Check:
  - Clutch shoe  
Damage/wear → Replace.
  - Glazed areas → Sand with coarse sandpaper.

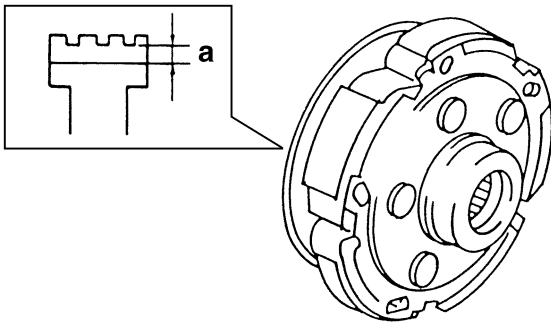
### TIP

After sanding the glazed areas, clean the clutch with a cloth.

- Measure:
  - Clutch shoe thickness  
Out of specification → Replace.



Clutch shoe thickness limit  
1.0 mm (0.04 in)



a. Clutch shoe wear limit

EBS30180

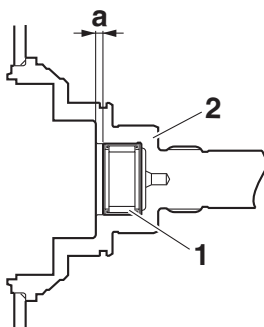
## ASSEMBLING THE CLUTCH HOUSING

1. Install:

- Bearing "1"  
(into the clutch housing "2")



Installed depth "a"  
2.5–2.7 mm (0.10–0.11 in)

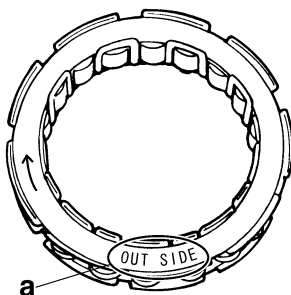


2. Install:

- One-way clutch bearing

### TIP

The one-way clutch bearing should be installed in the clutch housing with the "OUT SIDE" mark "a" facing the clutch housing.

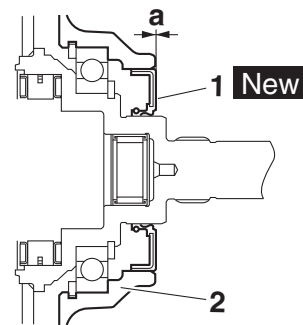


3. Install:

- Oil seal "1" **New**  
(into the bearing housing "2")



Installed depth "a"  
0 mm (0 in)



EBS30181

## INSTALLING THE CLUTCH

1. Install:

- Clutch carrier assembly
- Clutch carrier assembly nut "1" **New**



Clutch carrier assembly nut  
190 Nm (19 m·kgf, 137 ft·lbf)

ECB01720

### NOTICE

The clutch carrier assembly nut has left-hand threads. To tighten the clutch carrier assembly nut, turn it counterclockwise.

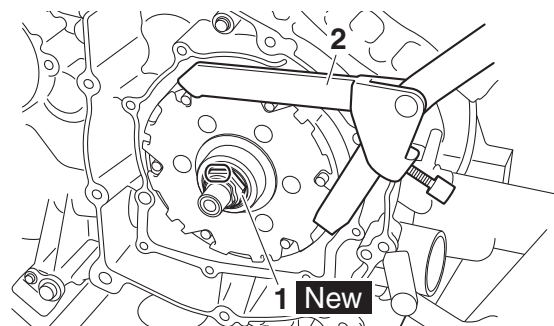
### TIP

- Lubricate the threads of the clutch carrier assembly nut with engine oil.
- Use a universal clutch holder "2" to hold the clutch carrier assembly.



Universal clutch holder  
90890-04086  
Universal clutch holder  
YM-91042

2. Lock the threads with a drift punch.



3. Install:

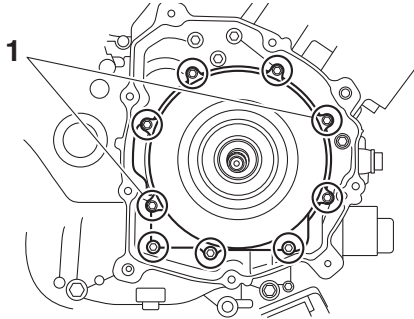
- Dowel pins "1"
- Gasket **New**
- Clutch housing assembly



Clutch housing assembly bolt  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

## TIP

- Tighten the bolts in stages, using a crisscross pattern.
  - After tightening the bolts, check that the clutch housing assembly rotates smoothly.
- 

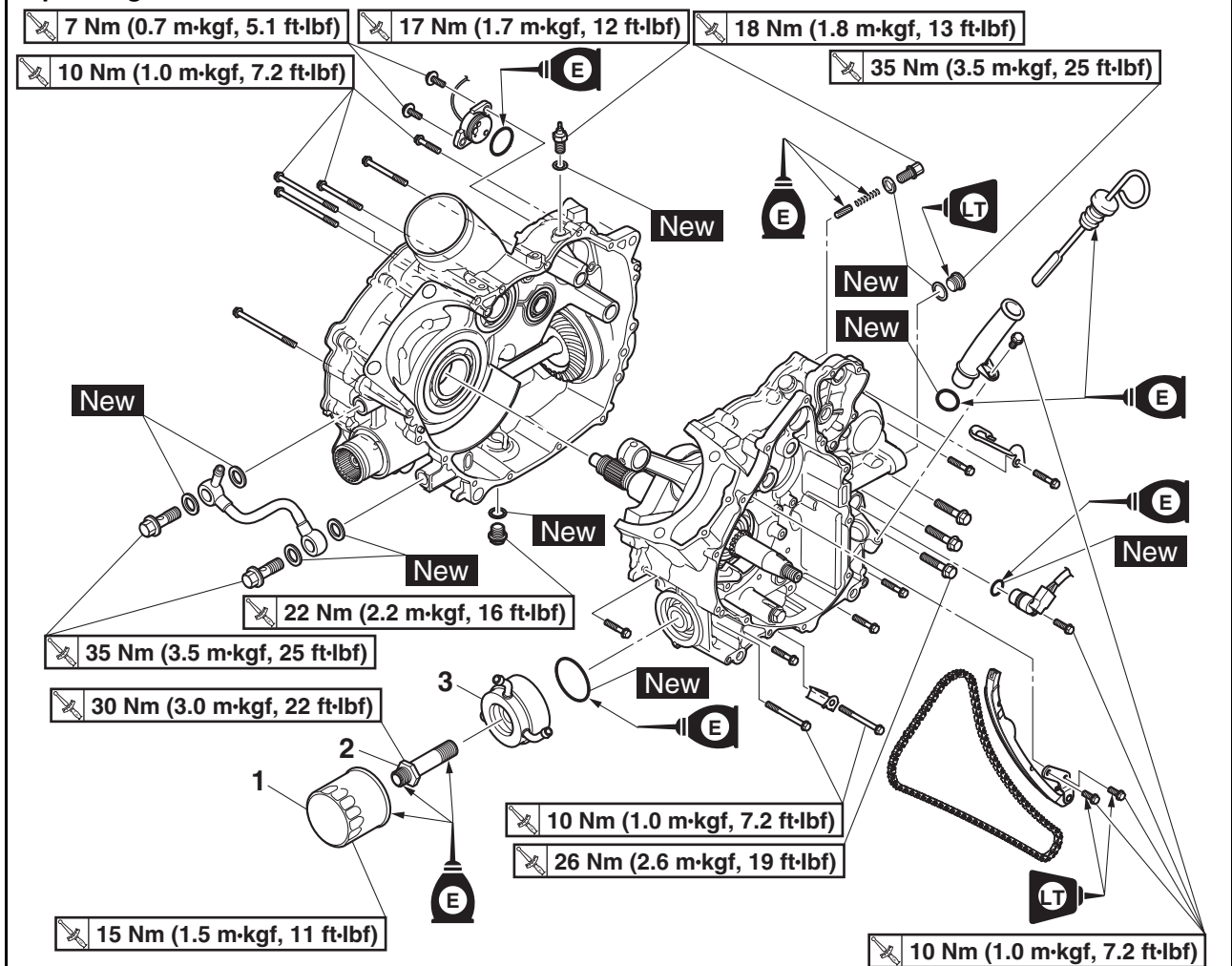




EBS20045

## CRANKCASE

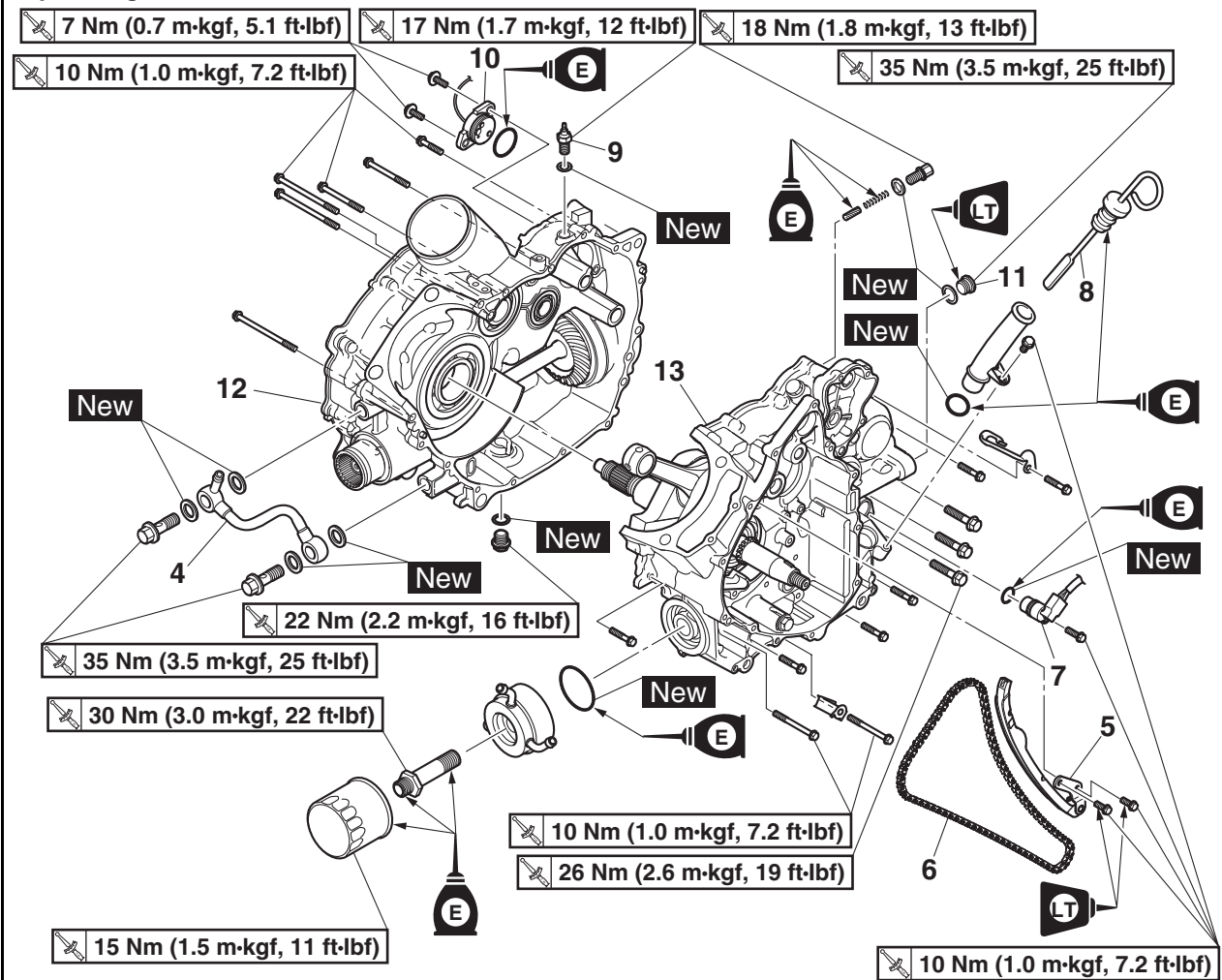
### Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL (3)" on page 5-8.
	Cylinder head/Piston		Refer to "CYLINDER HEAD, CYLINDER, AND PISTON" on page 5-19.
	AC magneto rotor		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-35.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-40.
	Oil pump sprockets		Refer to "OIL PUMP SPROCKETS" on page 5-44.
	Shift levers		Refer to "SHIFT LEVER" on page 5-47.
	Clutch carrier assembly		Refer to "CLUTCH" on page 5-59.
1	Oil filter cartridge	1	
2	Oil filter cartridge union bolt	1	
3	Adapter	1	

# CRANKCASE

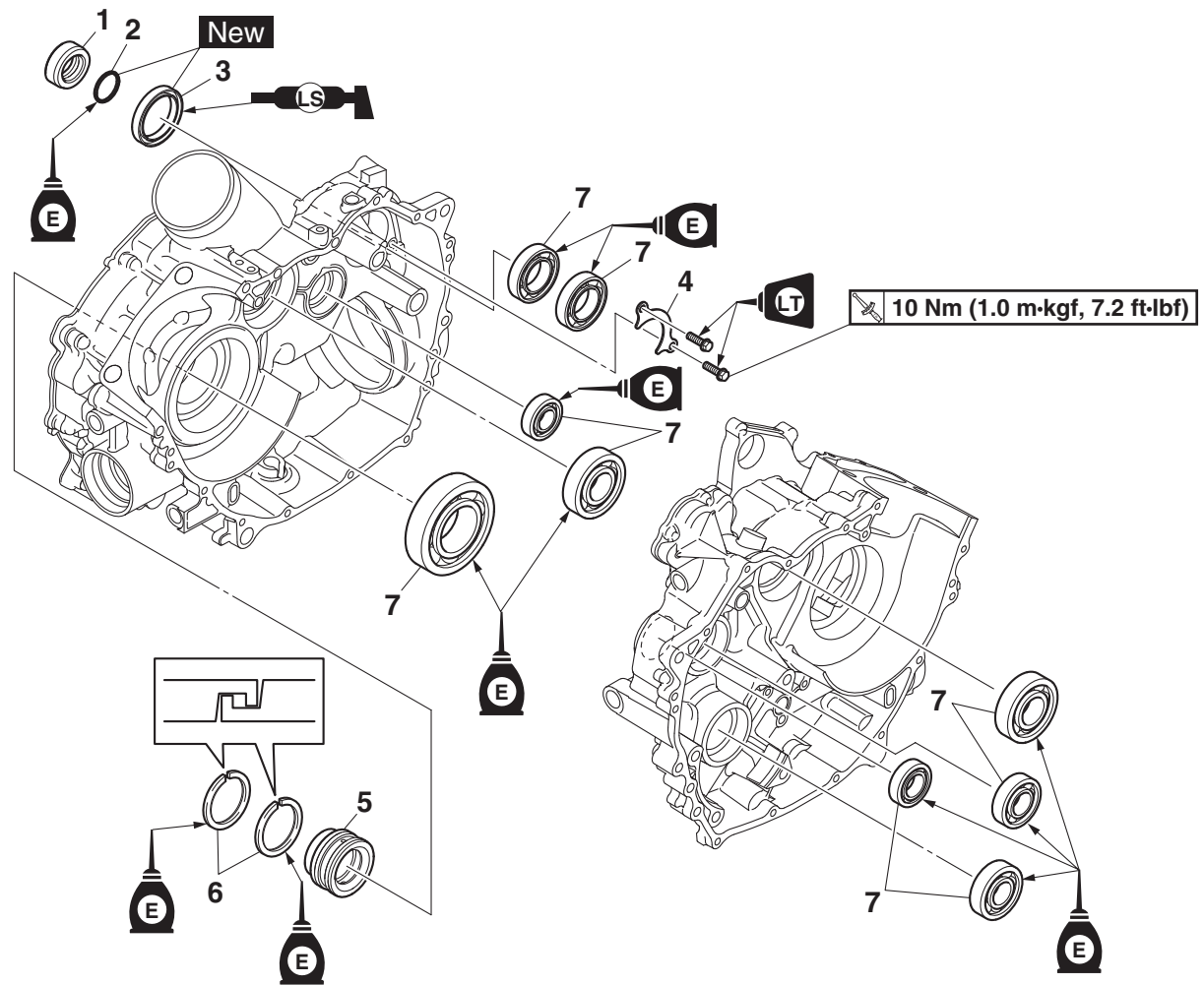
## Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
4	Oil pipe (crankcase)	1	
5	Timing chain guide (intake side)	1	
6	Timing chain	1	
7	Speed sensor	1	
8	Dipstick	1	
9	Reverse switch	1	
10	Gear position switch	1	
11	Main gallery bolt	1	
12	Crankcase (right)	1	
13	Crankcase (left)	1	

# CRANKCASE

## Removing the crankcase bearings



Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft/Oil pump		Refer to "CRANKSHAFT AND OIL PUMP" on page 5-70.
	Middle drive shaft/Middle driven shaft		Refer to "MIDDLE GEAR" on page 5-81.
	Transmission		Refer to "TRANSMISSION" on page 5-75.
1	Collar	1	
2	O-ring	1	
3	Oil seal	1	
4	Bearing retainer	1	
5	Spacer	1	
6	Crankshaft seal	2	
7	Bearing	9	

EBS30182

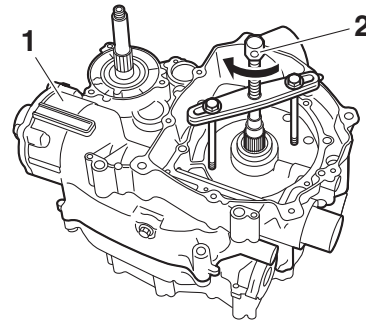
## SEPARATING THE CRANKCASE

1. Remove:

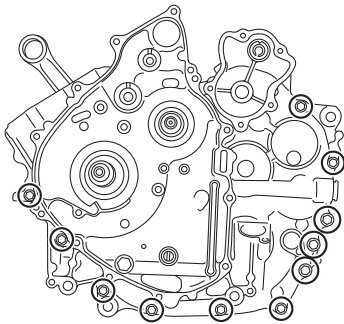
- Crankcase bolts

### TIP

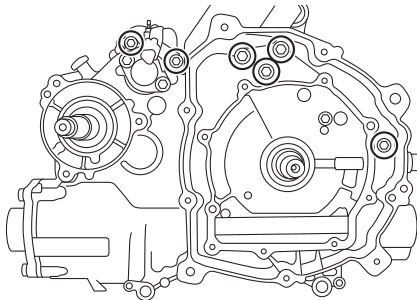
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



A



B



- A. Crankcase (left)  
B. Crankcase (right)

2. Remove:

- Crankcase (right) "1"

### TIP

- Remove the crankcase (right) with the crankcase separating tool "2".
- Make sure the crankcase separating tool is centered over the crankshaft.

ECB01880

### NOTICE

- To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
- Do not tap on the crankshaft.



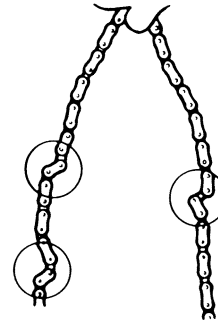
**Crankcase separating tool**  
**90890-01135**  
**Crankcase separator**  
**YU-01135-B**

EBS30183

## CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE

1. Check:

- Timing chain  
Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.



2. Check:

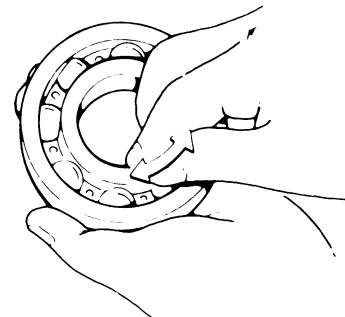
- Timing chain guide (intake side)  
Damage/wear → Replace.

EBS30185

## CHECKING THE BEARINGS

1. Check:

- Bearings  
Clean and lubricate, then rotate the inner race with a finger.  
Roughness → Replace.



# CRANKCASE

EBS30186

## 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.

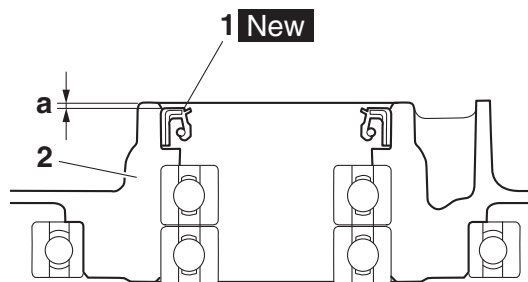
EBS30187

## ASSEMBLING THE CRANKCASE

1. Install:
  - Oil seal "1" **New**  
(into the right crankcase "2")



Installed depth "a"  
0.5–1.0 mm (0.02–0.04 in)



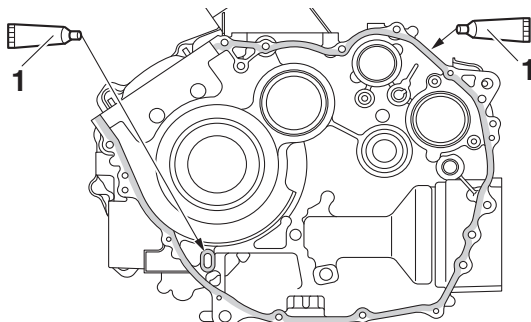
2. Thoroughly clean the crankcase mating surfaces.
3. Apply:
  - Sealant "1"  
(onto the crankcase mating surfaces)



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

### TIP

Do not allow any sealant to come into contact with the oil gallery.



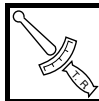
4. Fit the right crankcase onto the left crankcase. Tap lightly on the crankcase with a soft-face hammer.

ECB01730

### NOTICE

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

5. Install:
  - Crankcase bolts
6. Tighten:
  - Crankcase bolts



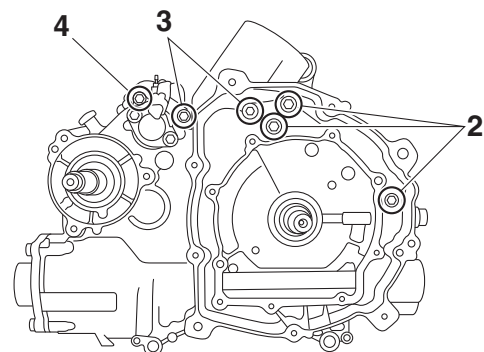
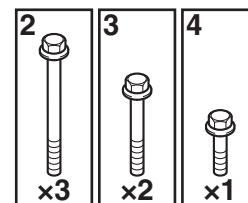
Crankcase bolt (M8)  
26 Nm (2.6 m·kgf, 19 ft·lbf)  
Crankcase bolt (M6)  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

M8 × 40 mm "1"  
M6 × 90 mm "2"  
M6 × 60 mm "3"  
M6 × 30 mm "4"

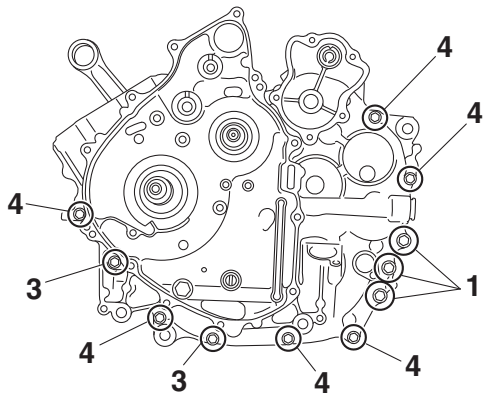
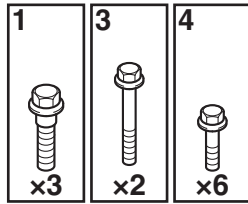
### TIP

Tighten the bolts in stages, using a crisscross pattern.

A



B



- A. Crankcase (right)
- B. Crankcase (left)

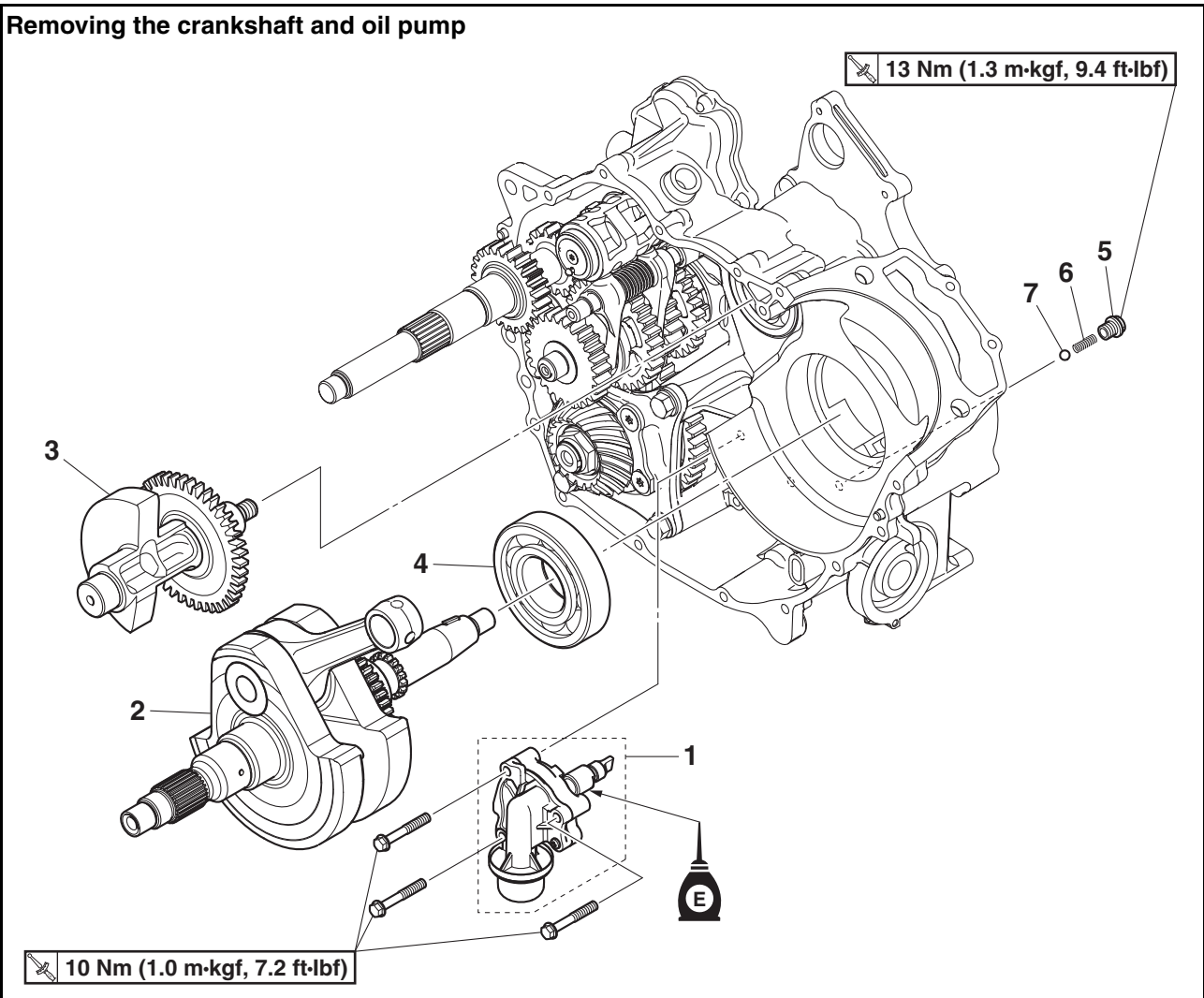
7. Apply:
  - 4-stroke engine oil  
(onto the crankshaft pin, bearings and oil delivery hole)
8. Check:
  - Crankshaft and transmission operation  
Rough operation → Repair.
9. Install:
  - Gasket **New**
  - Oil cooler
  - Oil filter cartridge union bolt  
Refer to “INSTALLING THE OIL COOLER”  
on page 6-3.

# CRANKSHAFT AND OIL PUMP

EBS20046

## CRANKSHAFT AND OIL PUMP

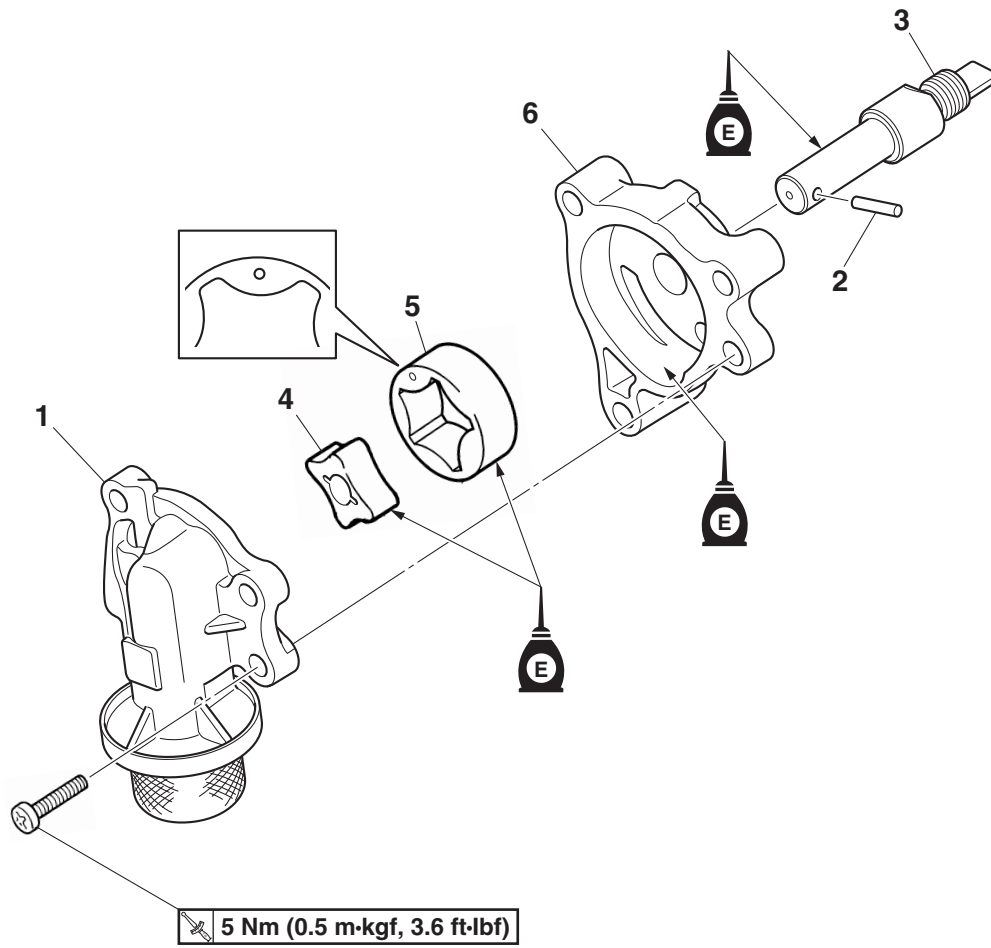
Removing the crankshaft and oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-64.
1	Oil pump	1	
2	Crankshaft	1	
3	Balancer	1	
4	Bearing	1	
5	Plug	1	
6	Spring	1	
7	Steel ball	1	

# CRANKSHAFT AND OIL PUMP

## Disassembling the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing cover	1	
2	Pin	1	
3	Oil pump shaft	1	
4	Oil pump inner rotor	1	
5	Oil pump outer rotor	1	
6	Oil pump housing	1	



# CRANKSHAFT AND OIL PUMP

EBS30188

## REMOVING THE CRANKSHAFT

- Remove:
  - Crankshaft "1"
  - Balancer "2"

### TIP

- Remove the crankshaft with the crankcase separating tool "3".
- Make sure the crankcase separating tool is centered over the crankshaft.
- Remove the crankshaft "1" and balancer "2" at the same time.

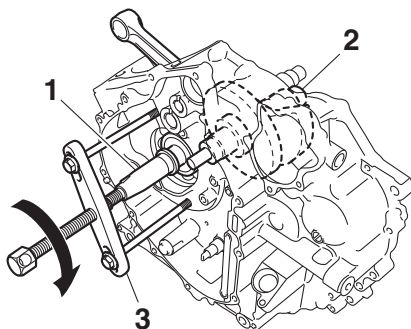
ECB01880

### NOTICE

- To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
- Do not tap on the crankshaft.



**Crankcase separating tool**  
90890-01135  
**Crankcase separator**  
YU-01135-B



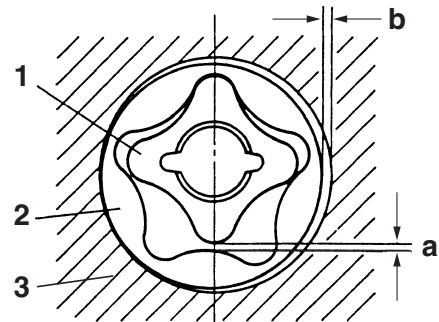
EBS30189

## CHECKING THE OIL PUMP

- Check:
  - Oil pump
  - Cracks/damage/wear → Replace the oil pump.
- Measure:
  - Inner-rotor-to-outer-rotor-tip clearance "a"
  - Outer-rotor-to-oil-pump-housing clearance "b"



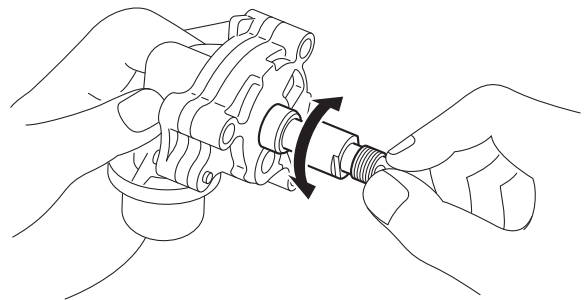
**Inner-rotor-to-outer-rotor-tip**  
**clearance limit**  
0.20 mm (0.0079 in)  
**Outer-rotor-to-oil-pump-housing**  
**clearance limit**  
0.240 mm (0.0094 in)



- Inner rotor
- Outer rotor
- Oil pump housing

### 3. Check:

- Oil pump operation
- Rough movement → Replace the oil pump.



EBS30190

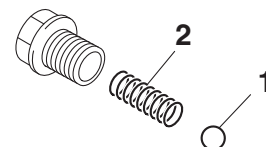
## CHECKING THE OIL STRAINER

- Check:
  - Oil strainer
  - Damage → Replace the oil pump.
  - Contaminants → Clean with solvent.

EBS30184

## CHECKING THE RELIEF VALVE

- Check:
  - Steel ball "1"
  - Spring "2"
  - Damage/wear → Replace the defective part(s).



# CRANKSHAFT AND OIL PUMP

EBS30191

## CHECKING THE CRANKSHAFT

- Measure:
  - Crankshaft width "a"
    - Out of specification → Replace the crankshaft.



**Crank assembly width**  
65.68–65.76 mm (2.586–2.589 in)

- Measure:
  - Crankshaft runout "b"
    - Out of specification → Replace the crankshaft.

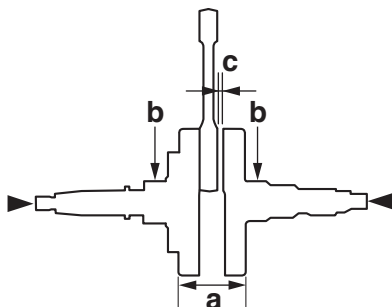


**Runout limit**  
0.030 mm (0.0012 in)

- Measure:
  - Big end side clearance "c"
    - Out of specification → Replace the crankshaft.



**Big end side clearance**  
0.090–0.500 mm (0.0035–0.0197 in)



- Check:
  - Crankshaft sprocket
    - Damage/wear → Replace the crankshaft.
  - Bearing
    - Cracks/damage/wear → Replace.
- Check:
  - Crankshaft journal
    - Scratches/wear → Replace the crankshaft.
  - Crankshaft journal oil passage
    - Obstruction → Blow out with compressed air.

EBS30192

## ASSEMBLING THE OIL PUMP

- Lubricate:
  - Inner rotor
  - Outer rotor
  - Oil pump shaft
    - (with the recommended lubricant)

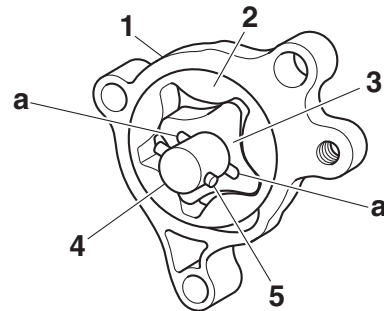


**Recommended lubricant**  
Engine oil

- Install:
  - Oil pump housing "1"
  - Oil pump outer rotor "2"
  - Oil pump inner rotor "3"
  - Oil pump shaft "4"
  - Pin "5"

### TIP

To install the oil pump shaft "4", align the pin "5" with the groove "a" in the inner rotor "3".



- Check:
  - Oil pump operation
    - Refer to "CHECKING THE OIL PUMP" on page 5-72.

EBS30193

## INSTALLING THE CRANKSHAFT

- Install:
  - Balancer "1"
  - Crankshaft "2"

ECB01890

### NOTICE

**Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.**

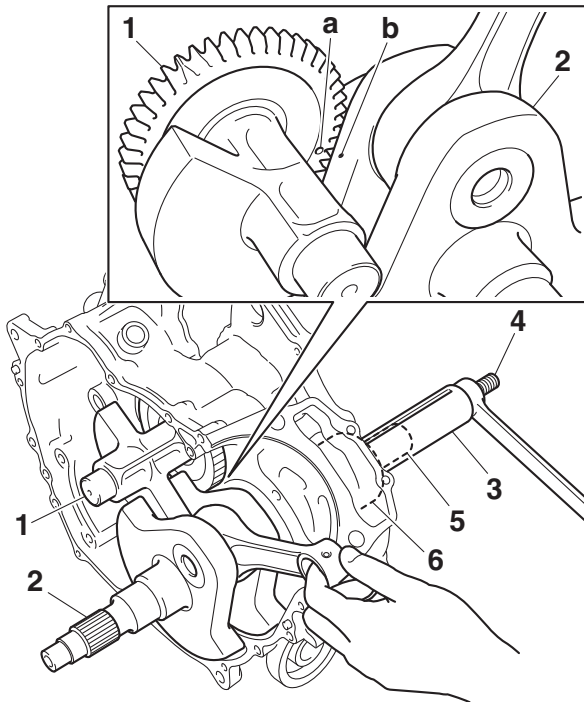
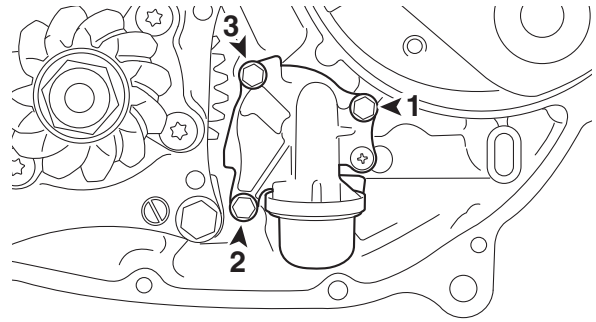
### TIP

- Install the balancer "1" and crankshaft "2" at the same time.
- Align the hole "a" in the balancer with the punch mark "b" on the crankshaft.
- Install the crankshaft with the crankshaft installer pot "3", crankshaft installer bolt "4", adapter (M16) "5", and spacer (crankshaft installer) "6".
- Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.

# CRANKSHAFT AND OIL PUMP



**Crankshaft installer pot**  
90890-01274  
**Installing pot**  
YU-90058  
**Crankshaft installer bolt**  
90890-01275  
**Bolt**  
YU-90060  
**Adapter (M16)**  
90890-04130  
**Adapter #13**  
YM-04059  
**Spacer (crankshaft installer)**  
90890-04081  
**Pot spacer**  
YM-91044



EBS30445

## INSTALLING THE OIL PUMP

1. Install:

- Oil pump



**Oil pump bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

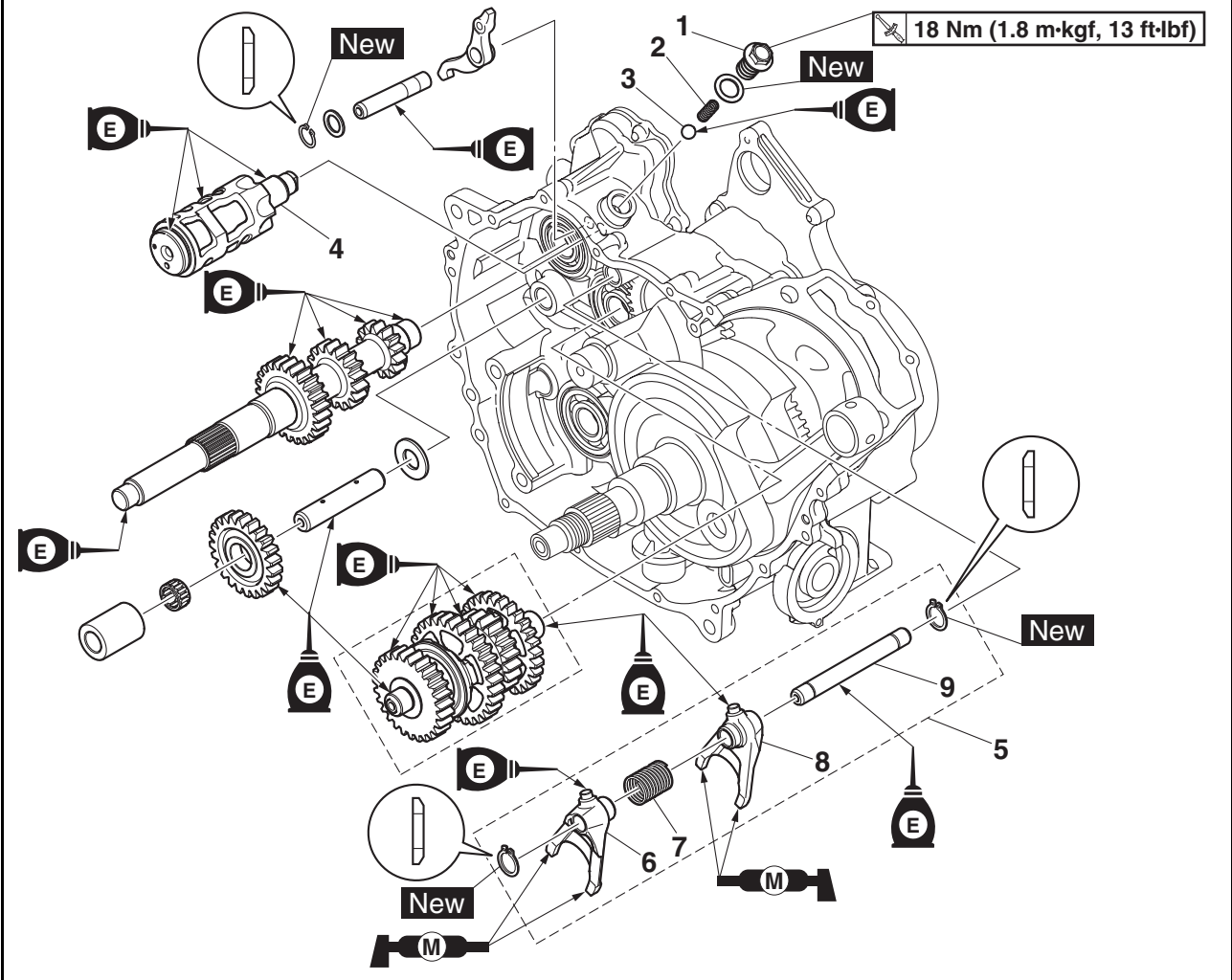
### TIP

Tighten the bolts to specification in the proper tightening sequence as shown.

EBS20047

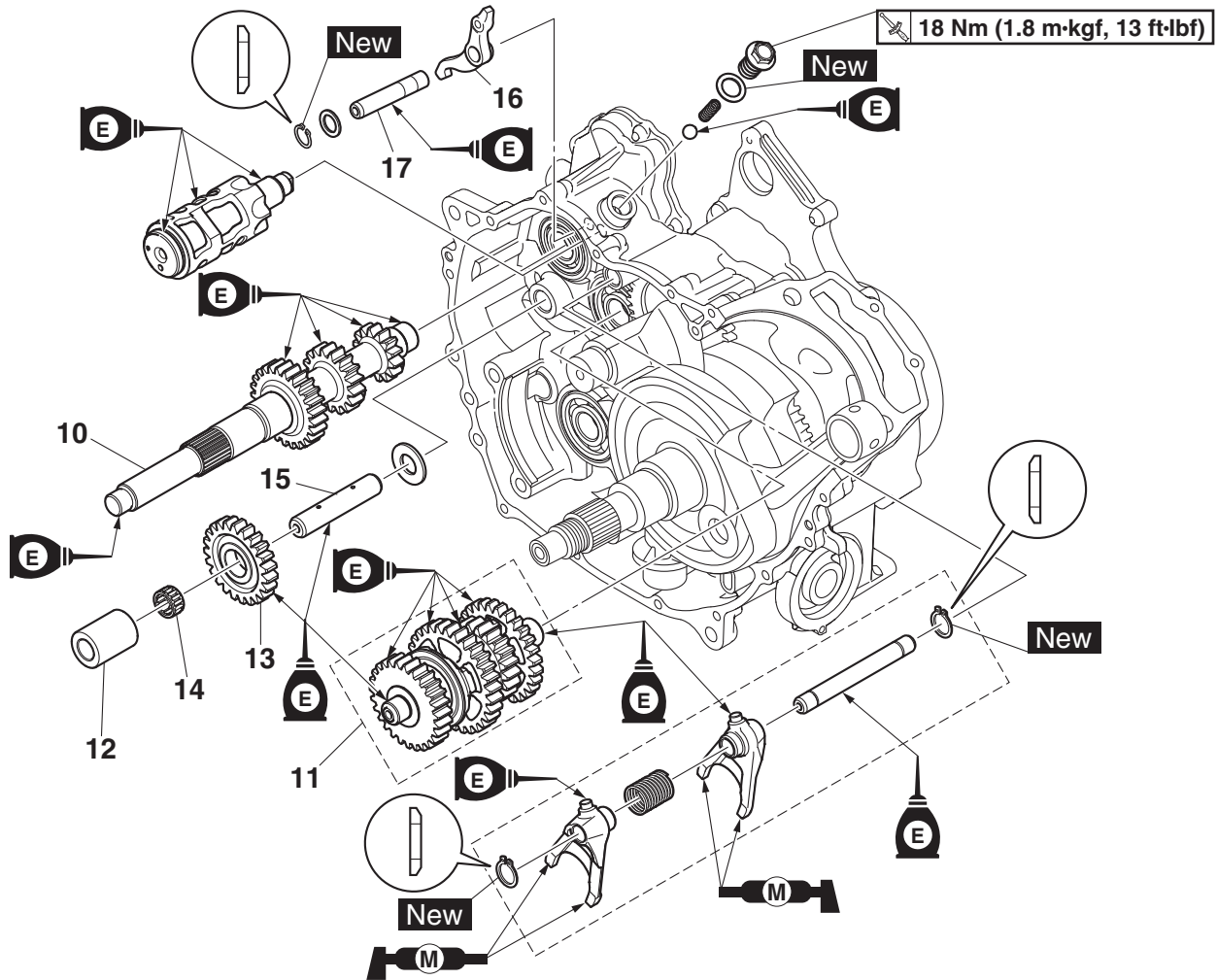
## TRANSMISSION

### Removing the transmission, shift drum and shift forks



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-64.
	Middle driven gear		Refer to "MIDDLE GEAR" on page 5-81.
1	Shift drum stopper bolt	1	
2	Spring	1	
3	Ball	1	
4	Shift drum	1	
5	Shift fork assembly	1	
6	Shift fork "R"	1	
7	Spring	1	
8	Shift fork "L"	1	
9	Shift fork guide bar	1	

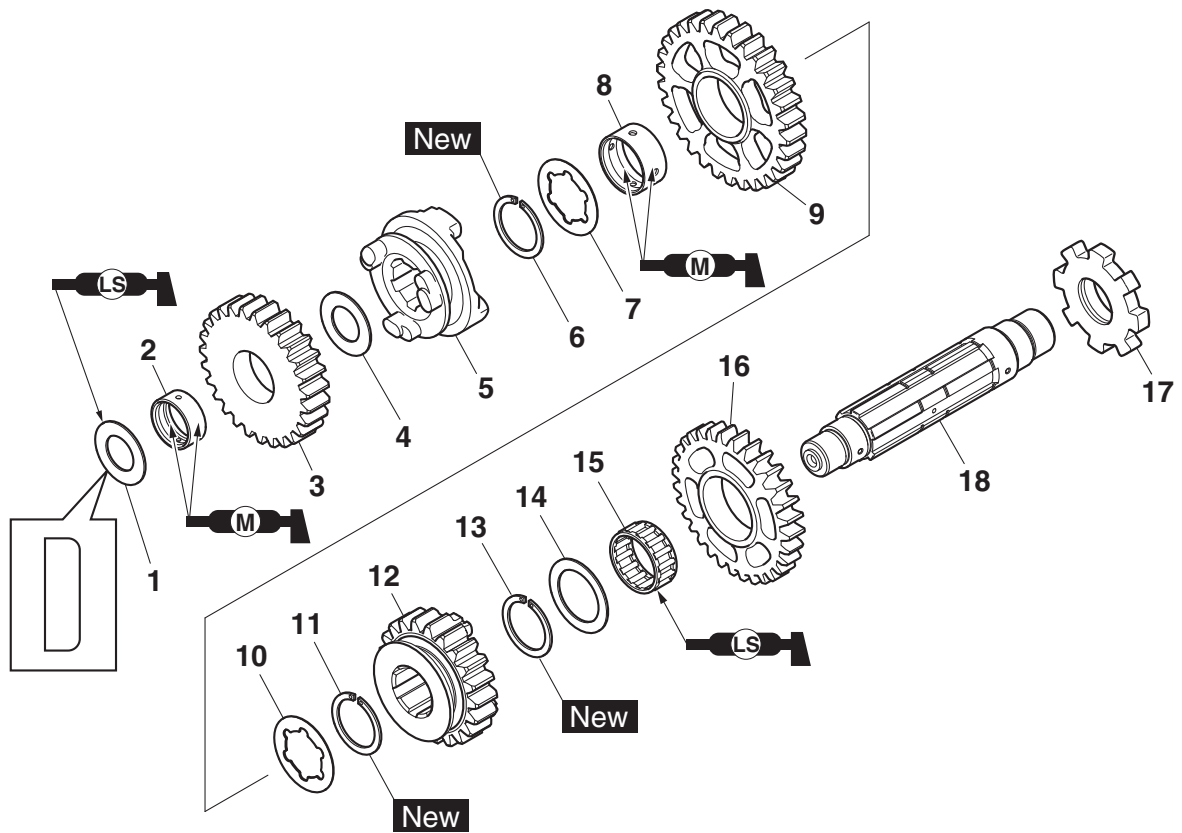
## Removing the transmission, shift drum and shift forks



Order	Job/Parts to remove	Q'ty	Remarks
10	Secondary shaft	1	
11	Drive axle assembly	1	
12	Collar	1	
13	Reverse idle gear	1	
14	Bearing	1	
15	Reverse idle gear shaft	1	
16	Stopper lever	1	
17	Stopper lever shaft	1	

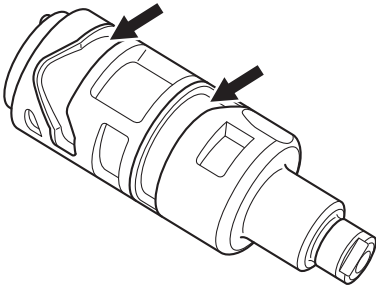
# TRANSMISSION

## Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Washer	1	
2	Collar	1	
3	High wheel gear	1	
4	Washer	1	
5	Clutch dog	1	
6	Circlip	1	
7	Washer	1	
8	Collar	1	
9	Low wheel gear	1	
10	Washer	1	
11	Circlip	1	
12	Middle drive gear	1	
13	Circlip	1	
14	Washer	1	
15	Bearing	1	
16	Reverse wheel gear	1	
17	Stopper wheel	1	
18	Drive axle	1	





EBS30198

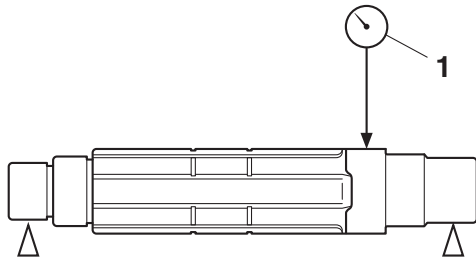
## CHECKING THE TRANSMISSION

### 1. Measure:

- Drive axle runout  
(with a centering device and dial gauge "1")  
Out of specification → Replace the drive axle.

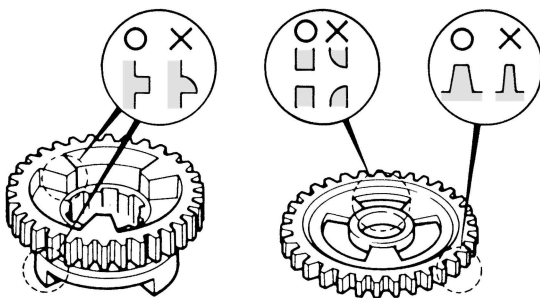


**Drive axle runout limit**  
**0.06 mm (0.0024 in)**



### 2. Check:

- Transmission gears  
Blue discoloration/pitting/wear → Replace the defective gear(s).
- Transmission gear dogs  
Cracks/damage/rounded edges → Replace the defective gear(s).



### 3. Check:

- Transmission gear engagement  
(each pinion gear to its respective wheel gear)  
Incorrect → Reassemble the transmission axle assemblies.

### 4. Check:

- Transmission gear movement  
Rough movement → Replace the defective part(s).

EBS30199

## CHECKING THE SECONDARY SHAFT

### 1. Check:

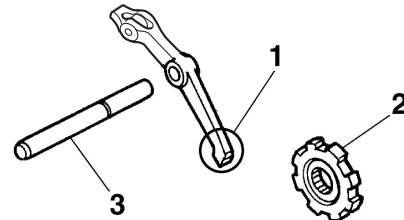
- Gear teeth  
Blue discoloration/pitting/wear → Replace.

EBS30555

## CHECKING THE STOPPER LEVER AND STOPPER WHEEL

### 1. Check:

- Stopper lever pawl "1"  
Bends/damage/wear → Replace the stopper lever and stopper wheel as a set.
- Stopper wheel "2"  
Damage/wear → Replace the stopper wheel and stopper lever as a set.
- Stopper lever shaft "3"  
Bends/damage/wear → Replace.



EBS30200

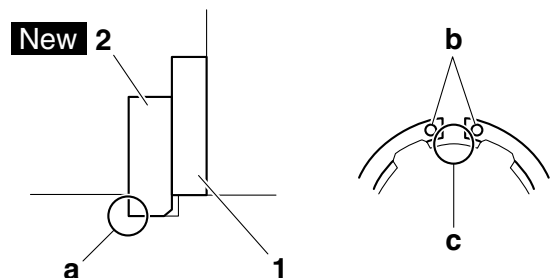
## ASSEMBLING THE DRIVE AXLE

### 1. Install:

- Washer "1"
- Circlip "2" **New**

### TIP

- Be sure the circlip sharp-edged corner "a" is positioned opposite side to the washer and gear.
- Be sure the circlip ends "b" are positioned at axle spline groove "c".



EBS30201

## ASSEMBLING THE SHIFT FORK

### 1. Install:

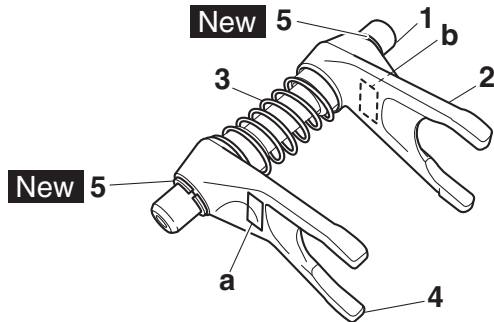
- Shift fork guide bar "1"



- Shift fork “L” “2”
- Spring “3”
- Shift fork “R” “4”
- Circlips “5” **New**

## TIP

Install the shift forks with the “R” mark “a” and “L” mark “b” facing away from each other.

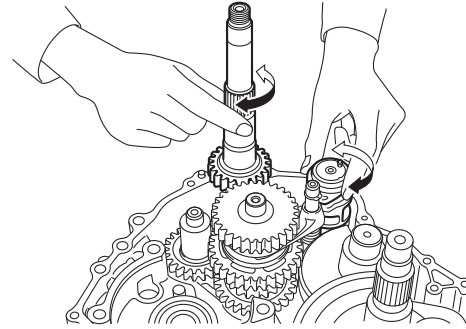


## 2. Check:

- Shift operation
- Rough operation → Repair.

## TIP

- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, make sure that the transmission is in neutral and that the gears turn freely.



EBS30202

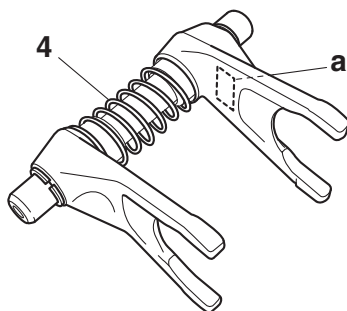
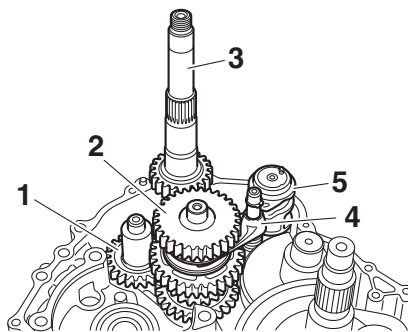
## INSTALLING THE SHIFT FORKS AND SHIFT DRUM

### 1. Install:

- Reverse idle gear “1”
- Drive axle assembly “2”
- Secondary shaft “3”
- Shift fork assembly “4”
- Shift drum “5”

## TIP

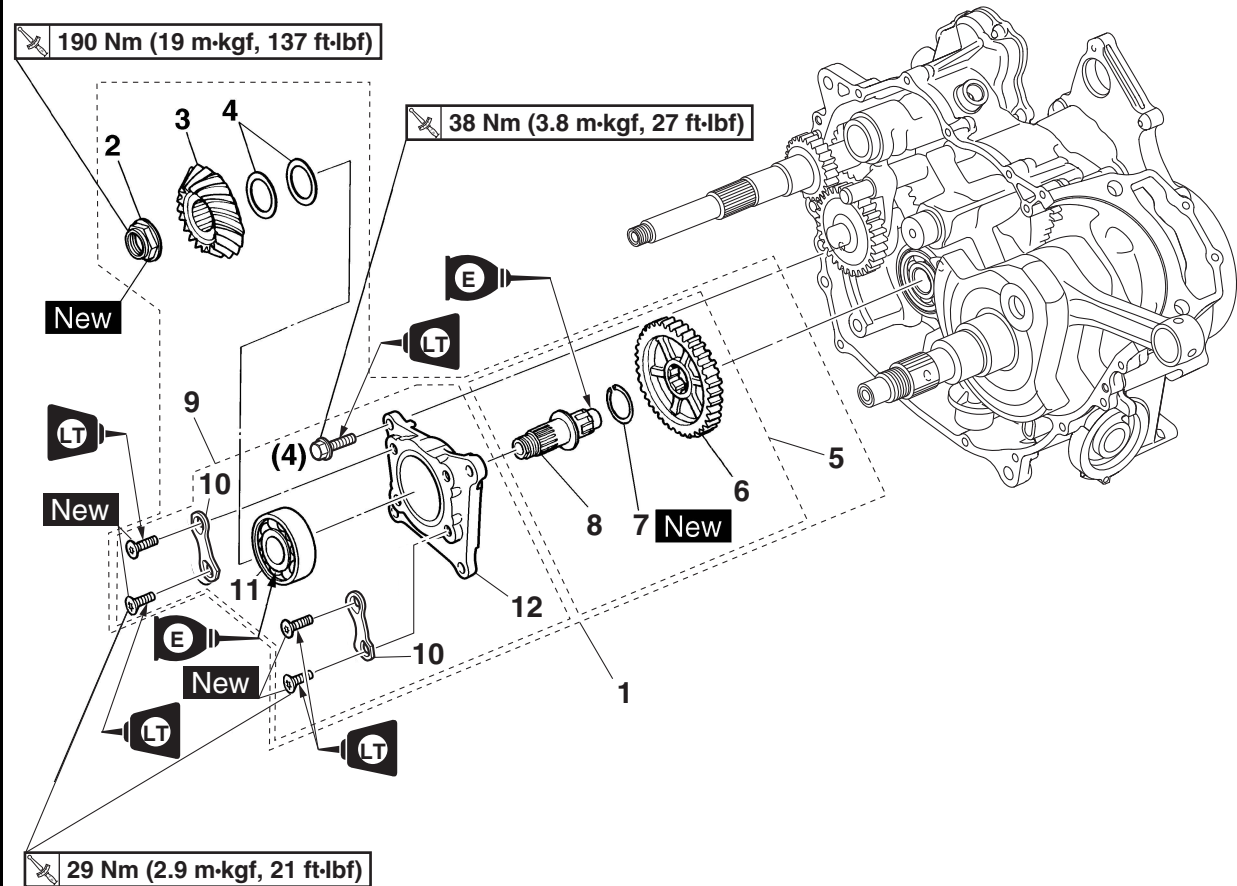
Install the shift fork assembly “4” with the “L” mark “a” facing the left crankcase.



EBS20048

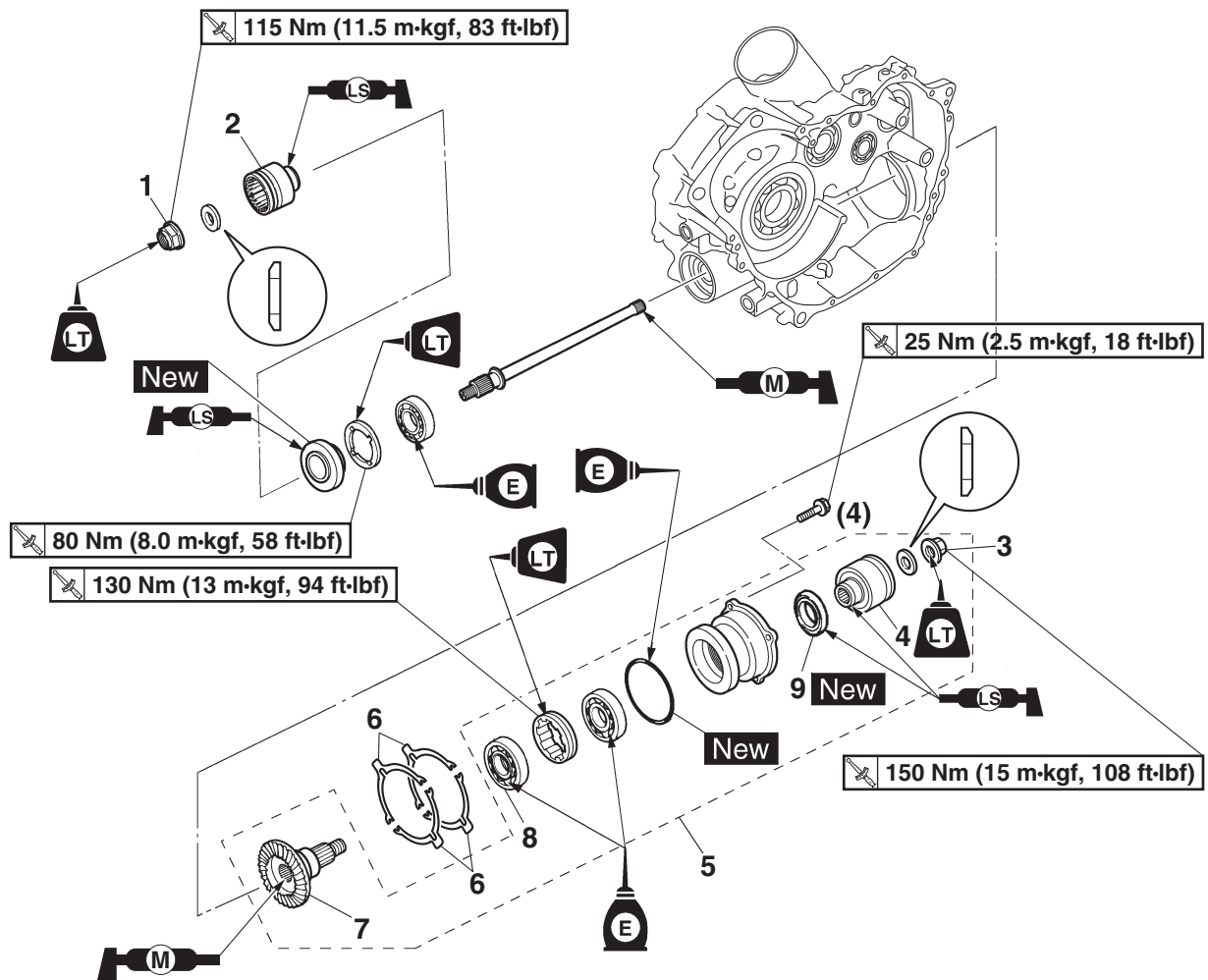
## MIDDLE GEAR

### Removing the middle drive shaft



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-64.
1	Middle drive shaft/Bearing housing assembly	1	
2	Middle drive pinion gear nut	1	
3	Middle drive pinion gear	1	
4	Middle drive pinion gear shim		Refer to "ALIGNING THE MIDDLE GEAR" on page 5-89.
5	Middle drive shaft assembly	1	
6	Middle driven gear	1	
7	Circlip	1	
8	Middle drive shaft	1	
9	Middle drive shaft bearing housing assembly	1	
10	Bearing retainer	2	
11	Bearing	1	
12	Bearing housing	1	

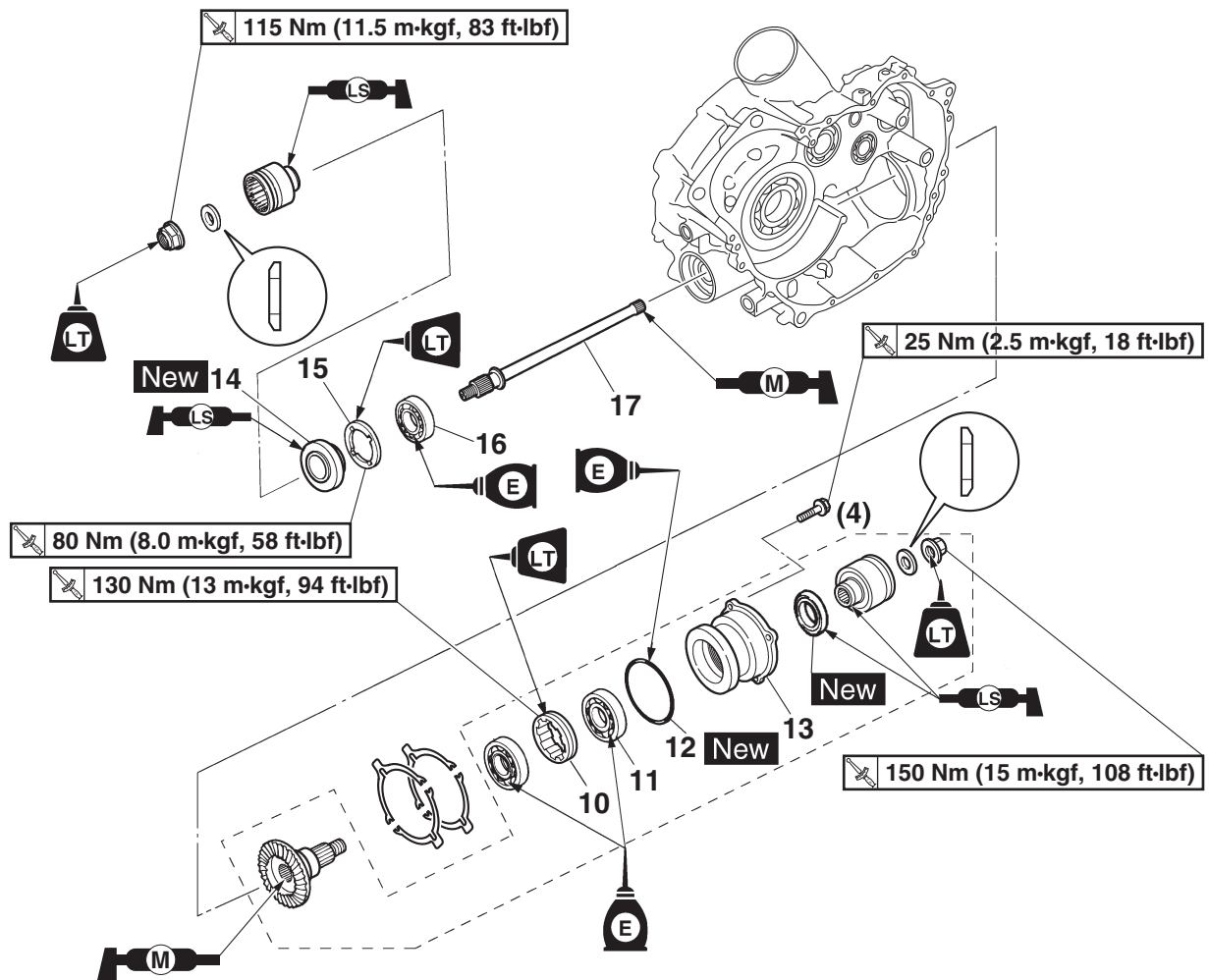
## Removing the middle driven shaft



Order	Job/Parts to remove	Q'ty	Remarks
1	Front drive shaft coupling gear nut (middle gear side)	1	
2	Front drive shaft coupling gear (middle gear side)	1	
3	Rear drive shaft coupling gear nut (middle gear side)	1	
4	Rear drive shaft coupling gear (middle gear side)	1	
5	Middle driven pinion gear assembly	1	
6	Middle driven pinion gear shim		Refer to "ALIGNING THE MIDDLE GEAR" on page 5-89.
7	Middle driven pinion gear	1	
8	Bearing	1	
9	Oil seal	1	

# MIDDLE GEAR

## Removing the middle driven shaft



Order	Job/Parts to remove	Q'ty	Remarks
10	Middle driven pinion gear bearing retainer	1	Left-hand thread
11	Bearing	1	
12	O-ring	1	
13	Bearing housing	1	
14	Oil seal	1	
15	Middle driven shaft bearing retainer	1	Left-hand thread
16	Bearing	1	
17	Middle driven shaft	1	

# MIDDLE GEAR

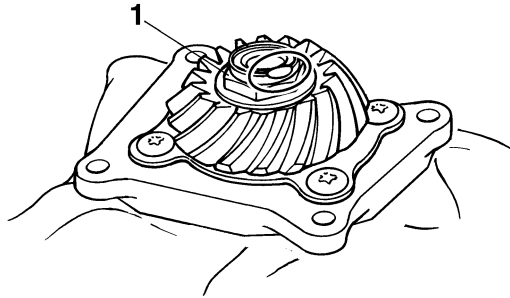
EBS30203

## REMOVING THE MIDDLE DRIVE SHAFT

1. Straighten:
  - Punched portion of the middle drive pinion gear nut
2. Loosen:
  - Middle drive pinion gear nut "1"

### TIP

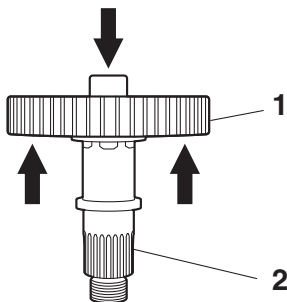
Wrap the middle drive shaft in a folded rag, and then secure it in a vise.



3. Remove:
  - Middle drive pinion gear nut
  - Middle drive pinion gear
  - Shim(s)
4. Remove:
  - Middle driven gear "1"
  - Circlip
  - Middle drive shaft "2"

### TIP

Press the middle drive shaft end and remove the middle driven gear.



EBS30204

## REMOVING THE MIDDLE DRIVEN SHAFT

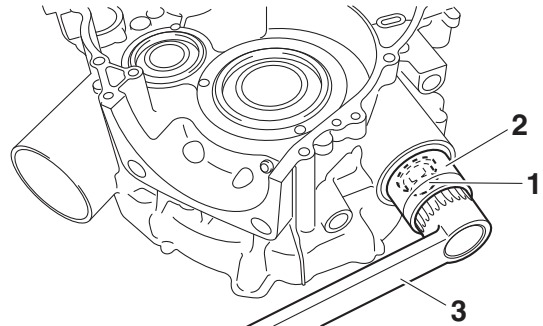
1. Remove:
  - Front drive shaft coupling gear nut "1"
  - Washer
  - Front drive shaft coupling gear "2"

### TIP

Use the coupling gear/middle shaft tool "3" to hold the front drive shaft coupling gear.



**Coupling gear/middle shaft tool**  
90890-01229  
**Gear holder**  
YM-01229



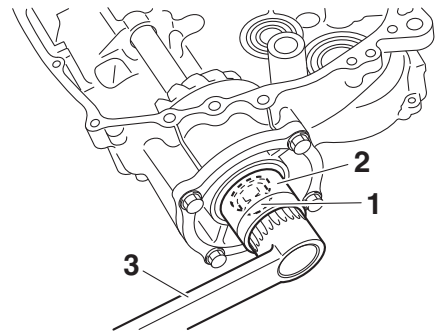
2. Remove:
  - Rear drive shaft coupling gear nut "1"
  - Washer
  - Rear drive shaft coupling gear "2"

### TIP

Use the coupling gear/middle shaft tool "3" to hold the rear drive shaft coupling gear.



**Coupling gear/middle shaft tool**  
90890-01229  
**Gear holder**  
YM-01229



3. Remove:
  - Bearing housing assembly "1"

- a. Clean the surface of the bearing housing assembly.
- b. Place the bearing housing assembly onto a hydraulic press.

ECB01900

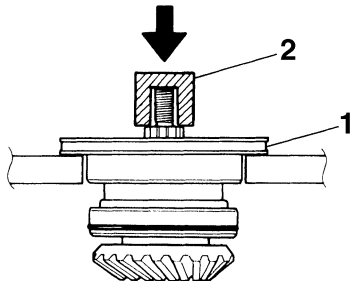
### NOTICE

- **Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.**

# MIDDLE GEAR

- Install a suitable socket “2” on the middle driven pinion gear end to protect the thread from damage.


- c. Press the middle driven pinion gear end and remove the bearing housing.



4. Remove:
- Middle driven pinion gear bearing retainer
  - Bearing



- a. Wrap the bearing housing in a folded rag “1”, and then secure the bearing housing edge in a vise.
- b. Attach the bearing retainer wrench “2”.

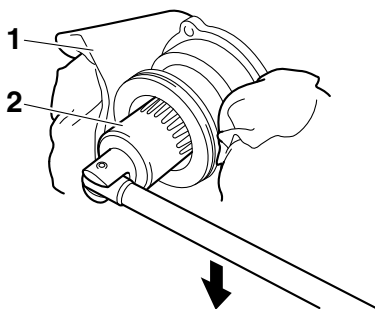


**Bearing retainer wrench**  
90890-04128  
**Middle gear bearing retainer**  
YM-04128

ECB01740

**NOTICE**

The middle driven pinion gear bearing retainer has left-hand threads. To loosen the retainer, turn it clockwise.



- c. Remove the bearing retainer and bearing.



5. Remove:
- Oil seal “1”
  - Middle driven shaft bearing retainer “2”

**TIP**

Attach the ring nut wrench “3”.

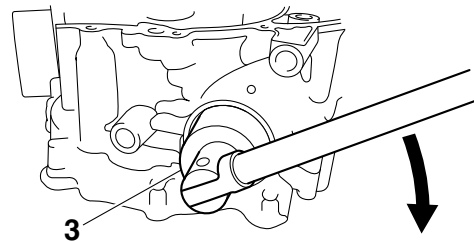
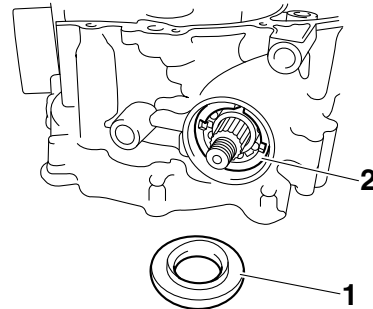


**Ring nut wrench**  
90890-01430  
**Ring nut wrench**  
YM-38404

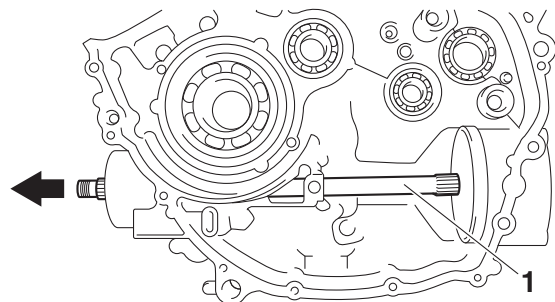
ECB01750

**NOTICE**

The middle driven shaft bearing retainer has left-hand threads. To loosen the retainer turn it clockwise.



6. Remove:
- Middle driven shaft “1” (with bearing)



EBS30205

**CHECKING THE PINION GEARS**

1. Check:
  - Drive pinion gear teeth
  - Driven pinion gear teeth
  - Pitting/galling/wear → Replace.
2. Check:
  - Bearings
  - Pitting/damage → Replace.

# MIDDLE GEAR

EBS30206

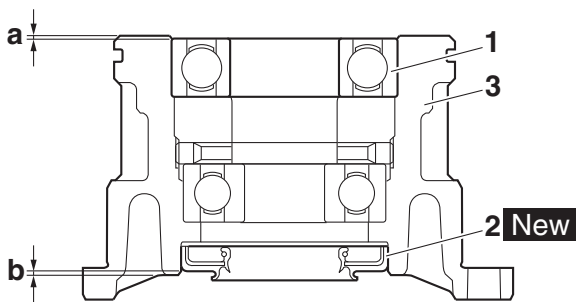
## INSTALLING THE BEARING AND OIL SEALS

1. Install:

- Bearing "1"
- Oil seal "2" **New**  
(into the bearing housing "3")



Installed depth "a" of bearing  
0.9–1.4 mm (0.035–0.055 in)  
Installed depth "b" of oil seal  
1.0–1.5 mm (0.039–0.059 in)

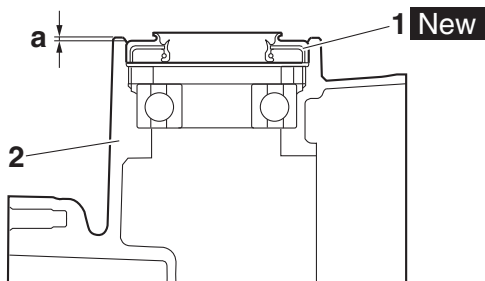


2. Install:

- Oil seal "1" **New**  
(into the crankcase "2")



Installed depth "a" of oil seal  
1.0–1.5 mm (0.039–0.059 in)

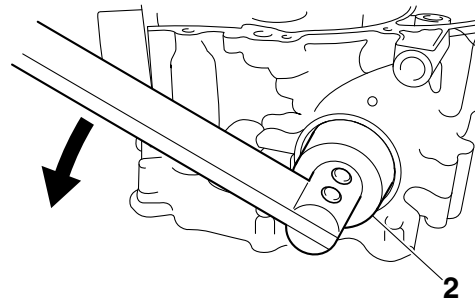
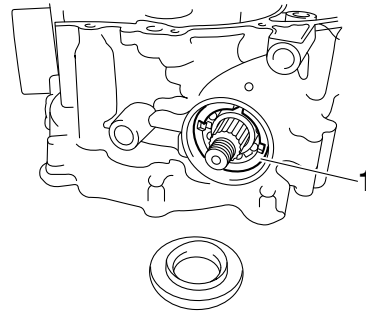


Ring nut wrench  
90890-01430  
Ring nut wrench  
YM-38404

ECB01760

### NOTICE

The middle driven shaft bearing retainer has left-hand threads. To tighten the retainer turn it counterclockwise.



2. Install:

- Middle driven pinion gear bearing retainer "1"

- Wrap the bearing housing in a folded rag, and then secure the bearing housing edge in a vise.
- Attach the bearing retainer wrench "2".



Bearing retainer wrench  
90890-04128  
Middle gear bearing retainer  
YM-04128

- Tighten the bearing retainer.



Middle driven pinion gear bearing retainer  
130 Nm (13 m·kgf, 94 ft·lbf)  
LOCTITE®

EBS30207

## INSTALLING THE MIDDLE DRIVEN SHAFT

1. Install:

- Middle driven shaft bearing retainer "1"



Middle driven shaft bearing re-  
tainer  
80 Nm (8.0 m·kgf, 58 ft·lbf)  
LOCTITE®

TIP

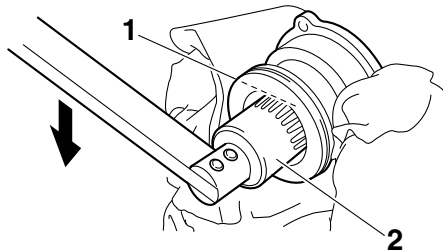
Attach the ring nut wrench "2".

# MIDDLE GEAR

ECB01770

## NOTICE

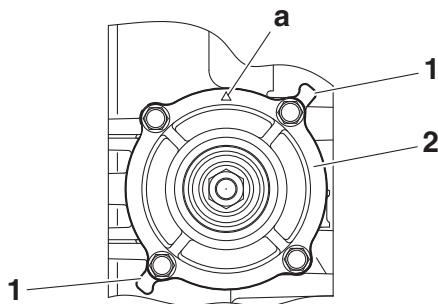
The middle driven pinion gear bearing retainer has left-hand threads. To tighten the retainer turn it counterclockwise.



3. Install:
- Middle driven pinion gear shim(s) "1"
  - Bearing housing "2"

### TIP

- Install the shim(s) so that the tabs are positioned as shown in the illustration.
- Make sure that the arrow "a" on the bearing housing points upward.



4. Install:
- Rear drive shaft yoke "1"
  - Washer
  - Rear drive shaft yoke nut "2"



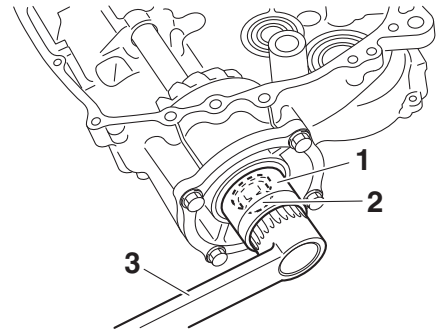
**Rear drive shaft coupling gear nut (middle gear side)**  
150 Nm (15 m·kgf, 108 ft·lbf)  
LOCTITE®

### TIP

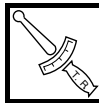
Use the coupling gear/middle shaft tool "3" to hold the rear drive shaft coupling gear.



**Coupling gear/middle shaft tool**  
90890-01229  
Gear holder  
YM-01229



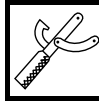
5. Install:
- Front drive shaft coupling gear "1"
  - Washer
  - Front drive shaft coupling gear nut "2"



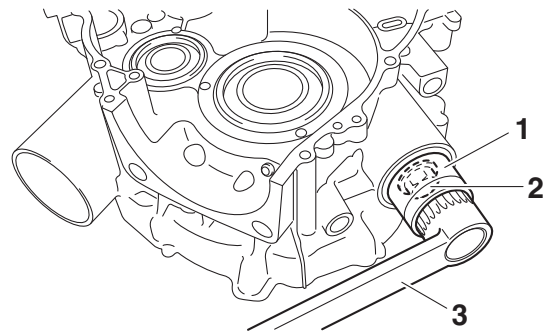
**Front drive shaft coupling gear nut (middle gear side)**  
115 Nm (11.5 m·kgf, 83 ft·lbf)  
LOCTITE®

### TIP

Use the coupling gear/middle shaft tool "3" to hold the front drive shaft coupling gear.



**Coupling gear/middle shaft tool**  
90890-01229  
Gear holder  
YM-01229



EBS30208

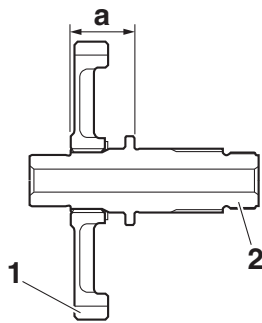
## INSTALLING THE MIDDLE DRIVE SHAFT

1. Install:
- Circlip
  - Middle driven gear "1"  
(onto the middle drive shaft "2")




**Installed depth "a" of middle driven gear**  
24.7–24.9 mm (0.972–0.980 in)





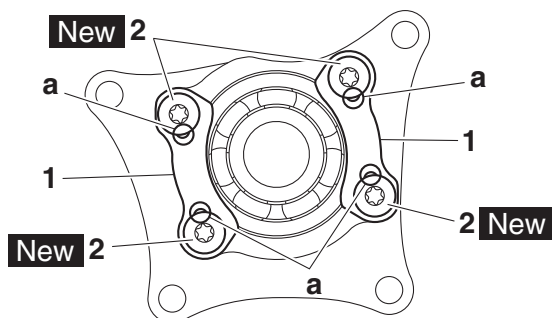
2. Install:

- Bearing
- Bearing retainers "1"
- Bearing retainer bolts "2" **New**

	<p><b>Middle drive shaft bearing retainer bolt</b>  <b>29 Nm (2.9 m.kgf, 21 ft.lbf)</b>  <b>LOCTITE®</b></p>
---	--


**TIP**

Stake the bearing retainer bolts at the cutouts "a" in the bearing retainers "1".



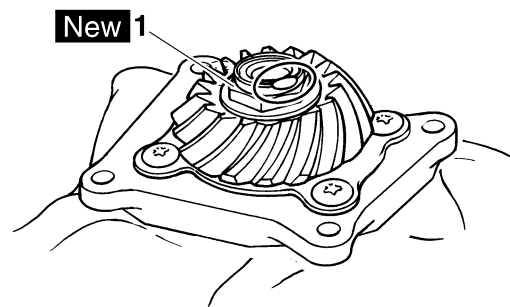
3. Tighten:

- Middle drive pinion gear nut "1" **New**

	<p><b>Middle drive pinion gear nut</b>  <b>190 Nm (19 m.kgf, 137 ft.lbf)</b></p>
---	--

**TIP**

- Wrap the middle drive shaft in a folded rag, and then secure it in a vise.
- Lock the threads with a drift punch.



EBS30209

## MEASURING THE MIDDLE GEAR BACKLASH

1. Measure:

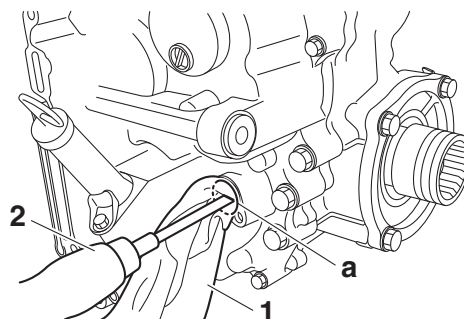
- Middle gear backlash

Out of specification → Adjust.


Refer to "ALIGNING THE MIDDLE GEAR" on page 5-89.

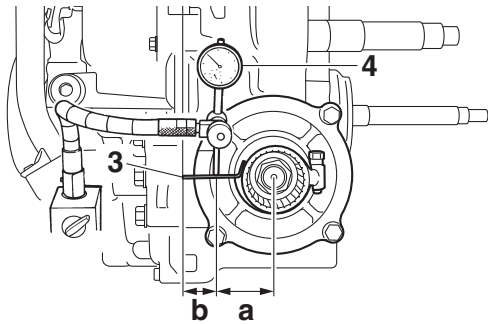
	<p><b>Middle gear backlash</b>  <b>0.10–0.30 mm (0.004–0.012 in)</b></p>
---	--

- Temporarily install the left crankcase.
- Wrap a rag "1" around a screwdriver "2", and then insert it into the installation hole "a" of the left crankcase speed sensor to hold the middle driven gear.



- Attach the final gear backlash band "3" and dial gauge "4".

	<p><b>Final gear backlash band</b>  <b>90890-01511</b>  <b>Middle drive gear lash tool</b>  <b>YM-01230</b></p>
---	---



- a. 44.9 mm (1.77 in)
- b. 19.7 mm (0.78 in)

d. Measure the gear lash while rotating the middle driven shaft back and forth.

**TIP** \_\_\_\_\_  
 Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.

e. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shim(s).



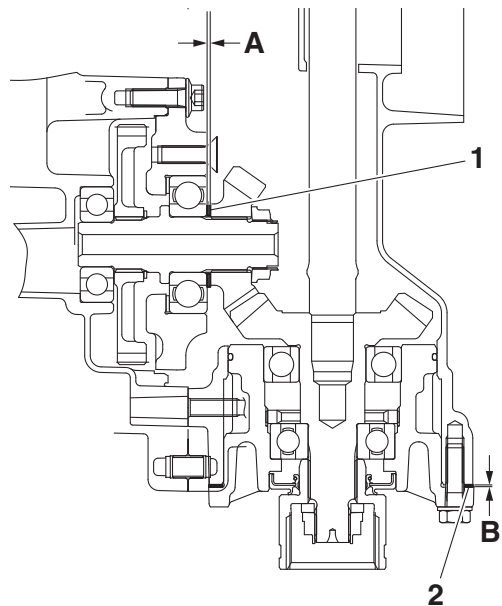
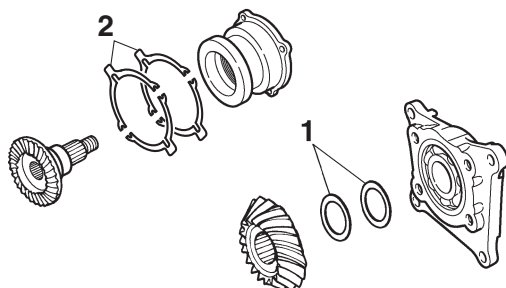
EBS30210

## ALIGNING THE MIDDLE GEAR

**TIP** \_\_\_\_\_  
 Aligning the middle gear is necessary when any of the following parts are replaced:

- Crankcase
- Middle drive pinion gear
- Middle driven pinion gear
- Middle driven shaft bearing housing
- Middle drive shaft bearing housing

1. Select:
- Middle drive pinion gear shim(s) "1"
  - Middle driven pinion gear shim(s) "2"



- A. Middle drive pinion gear shim thickness
- B. Middle driven pinion gear shim thickness



- a. Position the middle gears with the appropriate shim(s) that has had its respective thickness calculated from information marked on the crankcase, bearing housings, and pinion gears.
- b. To find middle drive pinion gear shim thickness "A", use the following formula.

Middle drive pinion gear shim thickness  
 $A = e + d - b - c - a$

"a" = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from "0.6"

"b" = 17.0

"c" = 55.0

"d" = a numeral (usually a decimal number) on the crankcase (right) specifies a thickness of "65.0"

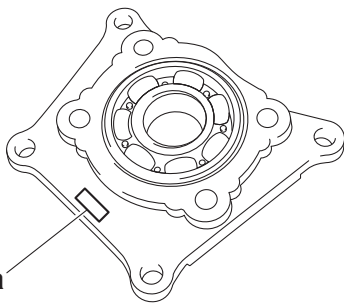
"e" = a numeral (usually a decimal number) on the crankcase (left) specifies a thickness of "9.0"

Example:

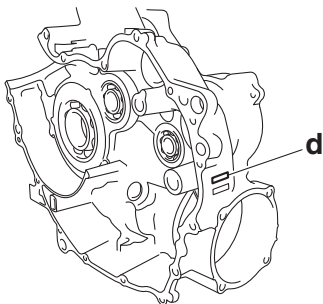
If the bearing housing is marked "-02",

"a" is 0.58

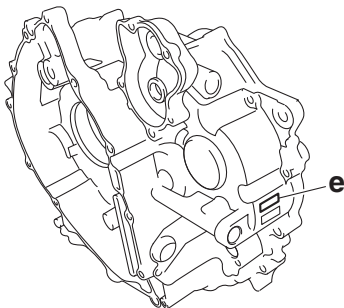
# MIDDLE GEAR



“b” is 17.0  
 “c” is 55.0  
 If the crankcase (right) is marked “64.96”,  
 “d” is 64.96



If the crankcase (left) is marked “9.01”,  
 “e” is 9.01



Therefore, “A” is 1.39.  
 $A = 9.01 + 64.96 - 17.0 - 55.0 - 0.58$   
 $= 1.39$   
 Round off hundredths digit and select appropriate shim(s).  
 In the above example, the calculated shim thickness is 1.39 mm. The following chart instructs you, however, to round off 9 to 10.

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

Shims are supplied in the following thicknesses.



## Middle drive pinion gear shim Thickness (mm)

0.50 0.55 0.60 0.70 0.80 0.90 1.00

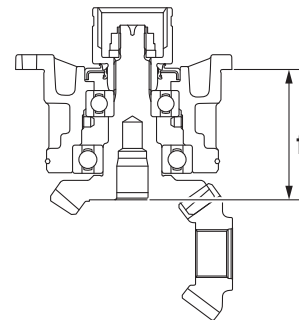
c. To find middle driven pinion gear shim thickness “B”, use the following formula.

Middle driven pinion gear shim thickness  
 $B = f - g + h - i - j$

“f” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “77.5”

### TIP

After replacing any part in the middle driven pinion gear assembly, the overall length of the assembly will change. Therefore, be sure to measure distance “f” to select the correct middle driven pinion gear shim thickness.



“g” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “49.0”

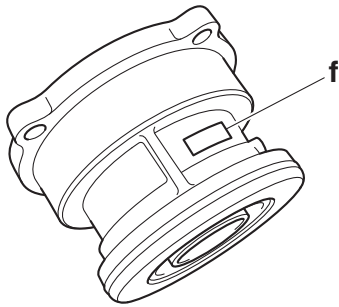
“h” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “80.5”

“i” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “99.98”

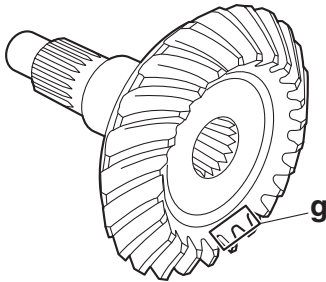
“j” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “8.12”

Example:

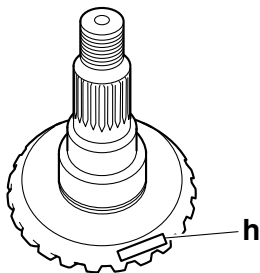
If the bearing housing is marked “+03”,  
 “f” is 77.53



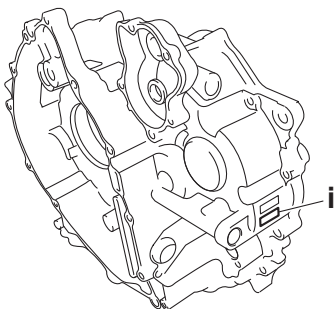
If the driven pinion gear is marked "+02",  
"g" is 49.02



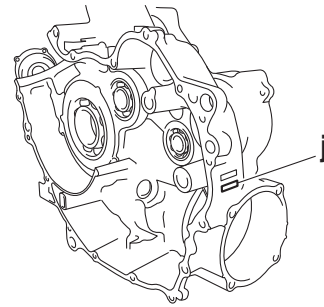
If the driven pinion gear is marked "-10",  
"h" is 80.40



If the left crankcase is marked "99.98",  
"i" is 99.98



If the right crankcase is marked "8.12",  
"j" is 8.12



Therefore, "B" is 0.81.


$$"B" = 77.53 - 49.02 + 80.40 - 99.98 - 8.12 = 0.81$$

Round off hundredth digit and select appropriate shim(s).

In the above example, the calculated shim thickness is 0.81 mm. The chart instructs you, however, to round off 1 to 0.

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

Shims are supplied in the following thicknesses.

	<b>Middle driven pinion gear shim</b>
	<b>Thickness (mm)</b> 0.10 0.15 0.20 0.30 0.40 0.50 0.60

**TIP**

- If the specified middle gear backlash cannot be obtained with a calculated shim thickness, increase or decrease the shim thickness.
- If the shim thickness is increased, the actual middle gear backlash will increase and, if the shim thickness is decreased, the actual middle gear backlash will decrease.



---

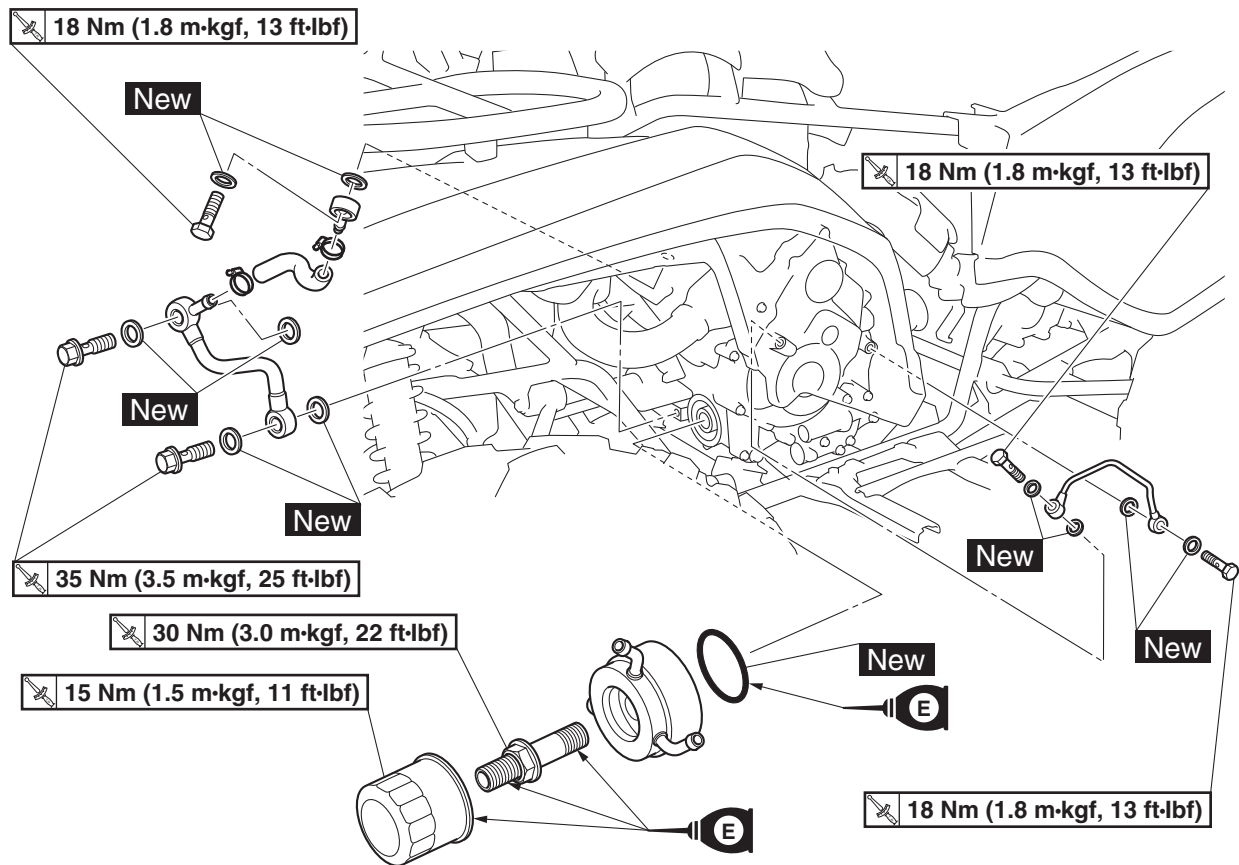
## COOLING SYSTEM

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INSTALLING THE WATER PUMP HOUSING .....	6-13
INSTALLING THE WATER JACKET JOINT .....	6-13

EBS20050

## OIL COOLER

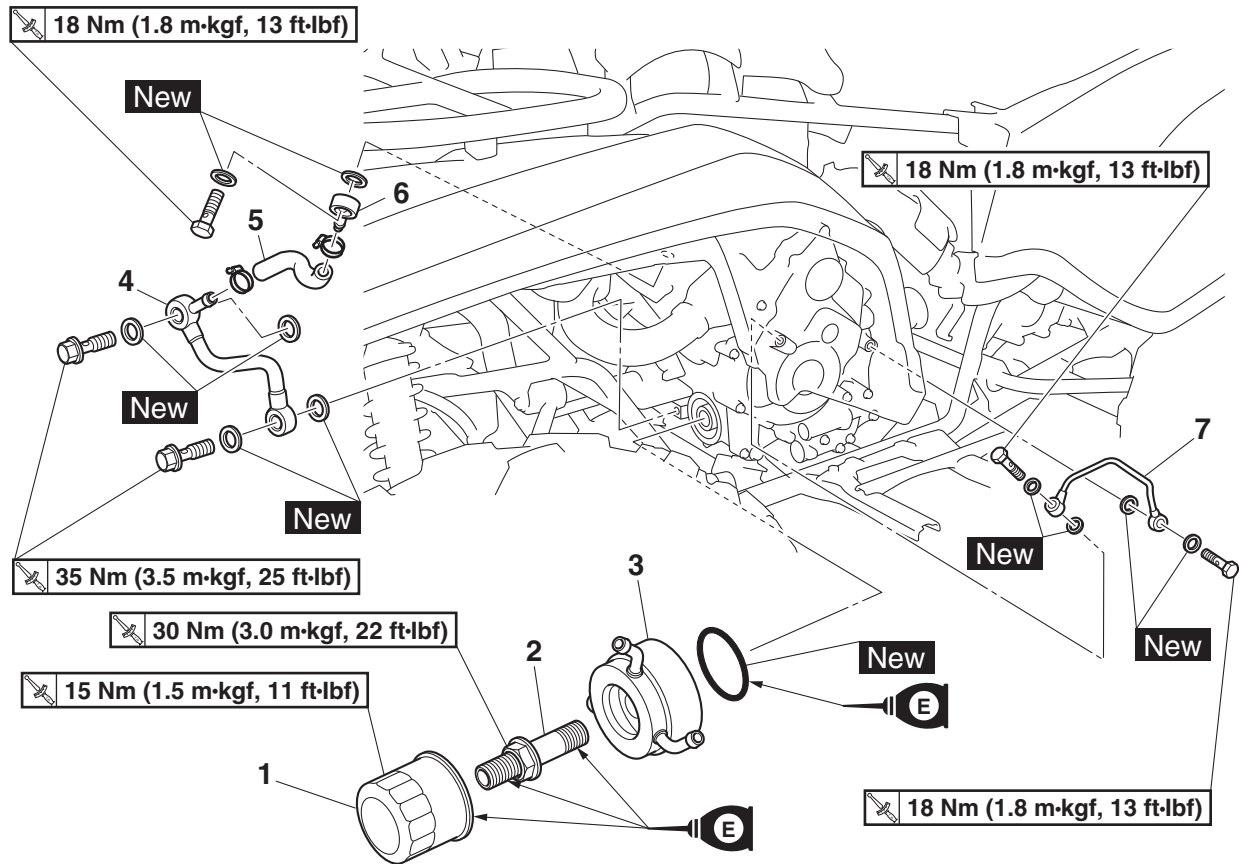
### Removing the oil cooler



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Center skid plate/Top cover/Side panel (left)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front fender inner panel (left)		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Footrest board (left)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-24.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29.
	Oil cooler outlet hose/Oil cooler inlet hose		Refer to "WATER PUMP" on page 6-10.

# OIL COOLER

## Removing the oil cooler



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil filter cartridge	1	
2	Oil filter cartridge union bolt	1	
3	Oil cooler	1	
4	Oil pipe (crankcase)	1	
5	Oil hose (crankcase to cylinder head)	1	
6	Oil hose joint	1	
7	Oil pipe (AC magneto cover)	1	

EBS30211

## CHECKING THE OIL COOLER

1. Check:
  - Oil cooler  
Cracks/damage → Replace.
2. Check:
  - Oil hose joint
  - Oil pipe (crankcase)
  - Oil pipe (AC magneto cover)  
Cracks/damage/wear → Replace.
3. Check:
  - Oil hose (crankcase to cylinder head)  
Cracks/damage → Replace.

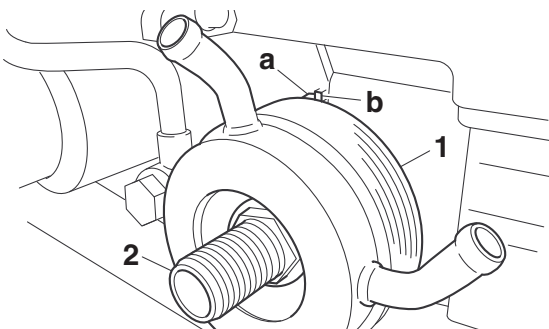
EBS30212

## INSTALLING THE OIL COOLER

1. Install:
  - Oil hose (crankcase to cylinder)
  - Clamps
  - Oil hose joint
  - Gaskets **New**
  - Oil hose bolt (crankcase to cylinder)  
Refer to “INSTALLING THE CYLINDER HEAD” on page 5-26.
2. Clean:
  - Mating surfaces of the oil cooler and the crankcase  
(with a cloth dampened with lacquer thinner)
3. Install:
  - Gasket **New**
  - Oil cooler “1”
  - Oil filter cartridge union bolt “2”

### TIP

Make sure the projection “a” on the oil cooler touches the projection “b” on the crankcase.



**Oil filter cartridge union bolt**  
**30 Nm (3.0 m-kgf, 22 ft-lbf)**

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

Refer to “CHANGING THE COOLANT” on page 3-29.

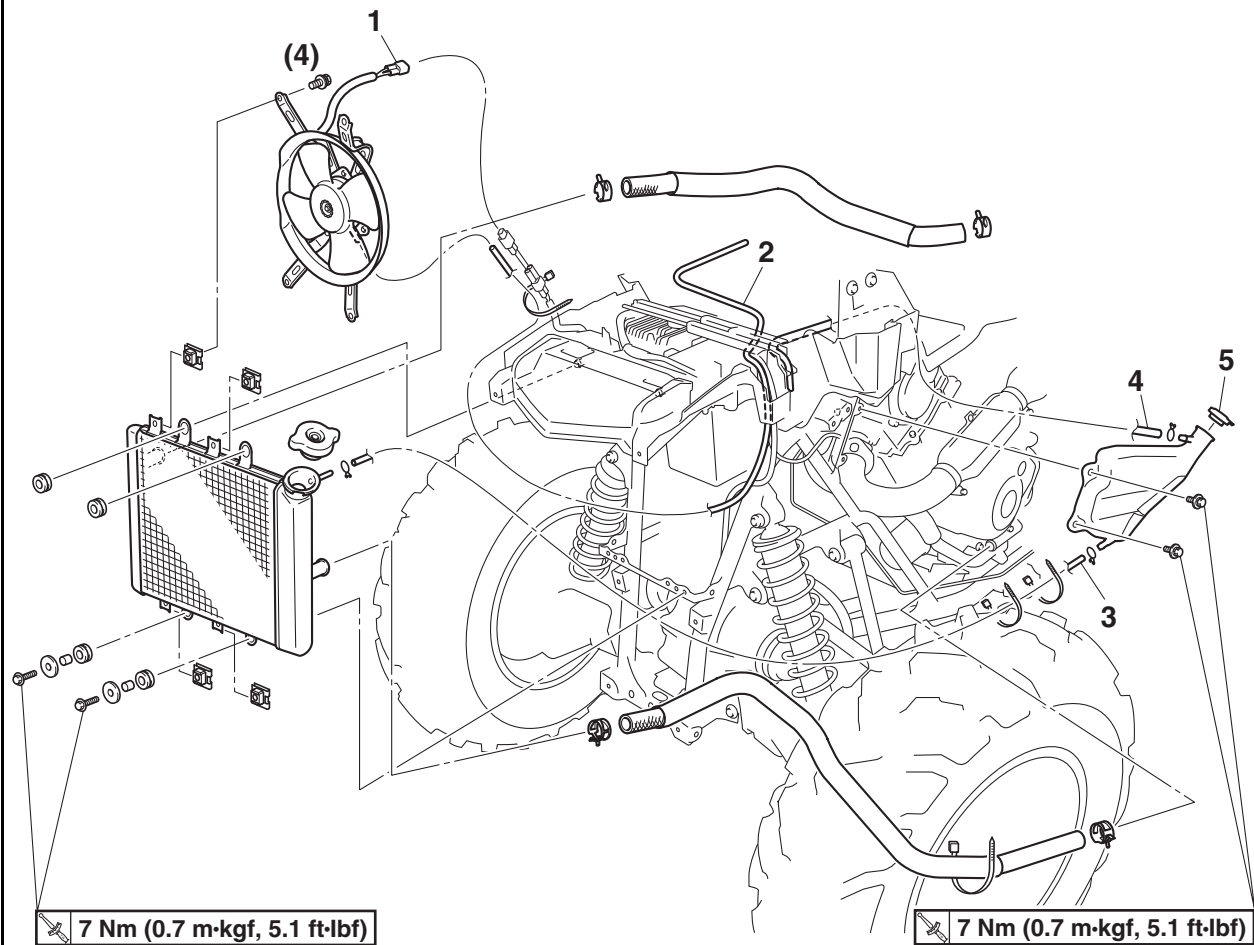
- Crankcase  
(with the specified amount of the recommended engine oil)  
Refer to “CHANGING THE ENGINE OIL” on page 3-24.
5. Check:
    - Cooling system  
Leaks → Repair or replace any faulty part.
  6. Measure:
    - Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.  
Refer to “CHECKING THE RADIATOR” on page 6-6.



EBS20051

## RADIATOR

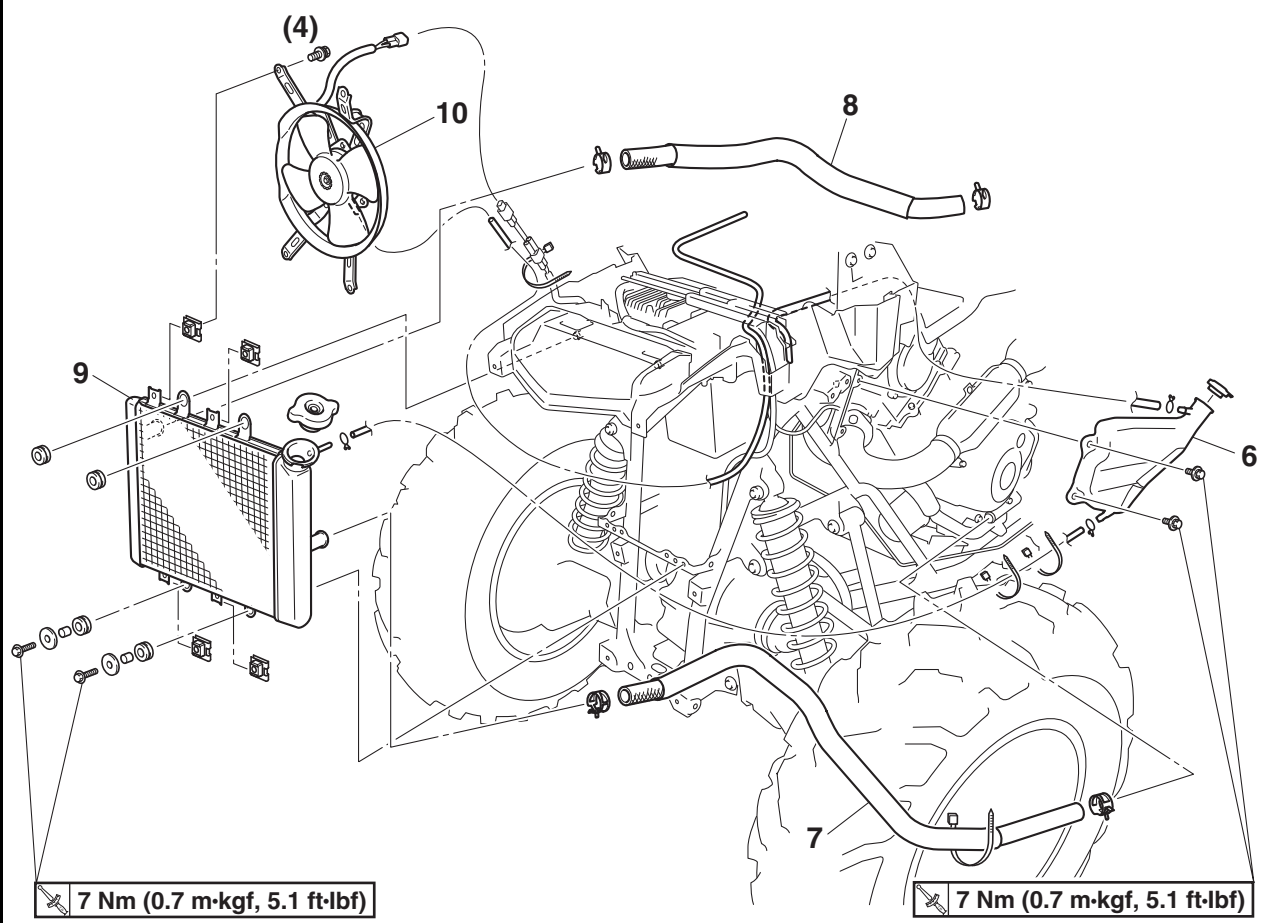
### Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Center skid plate/Top cover/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front guard		Refer to "GENERAL CHASSIS (2)" on page 4-6.
	Front fenders		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Footrest board (left)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29.
1	Radiator fan motor coupler	1	Disconnect.
2	Radiator fan motor breather hose	1	
3	Coolant reservoir hose	1	
4	Coolant reservoir breather hose	1	
5	Coolant reservoir cap	1	

# RADIATOR

## Removing the radiator



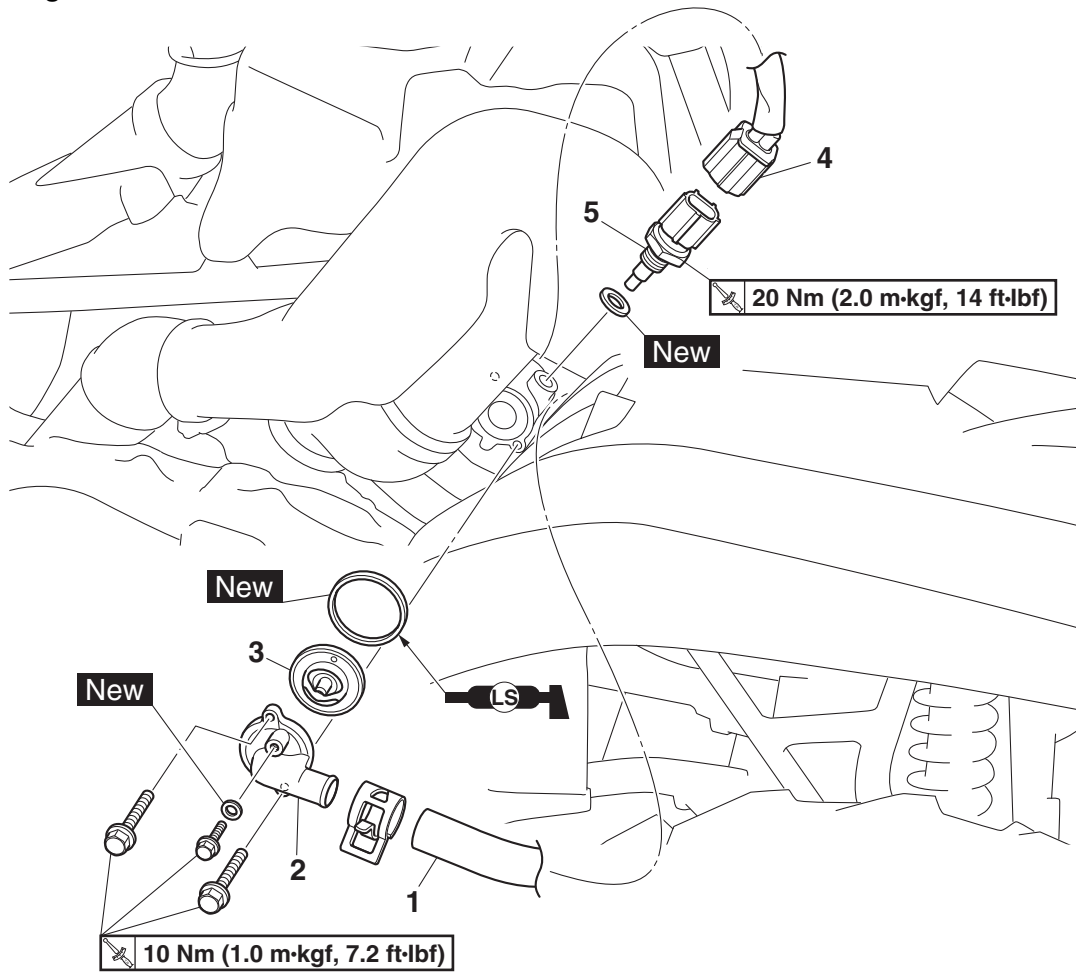
Order	Job/Parts to remove	Q'ty	Remarks
6	Coolant reservoir	1	
7	Radiator outlet hose	1	
8	Radiator inlet hose	1	
9	Radiator	1	
10	Radiator fan	1	



EBS20052

## THERMOSTAT

### Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Top cover/Side panel (right)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29".
1	Radiator inlet hose	1	Disconnect.
2	Thermostat cover	1	
3	Thermostat	1	
4	Coolant temperature sensor coupler	1	Disconnect.
5	Coolant temperature sensor	1	



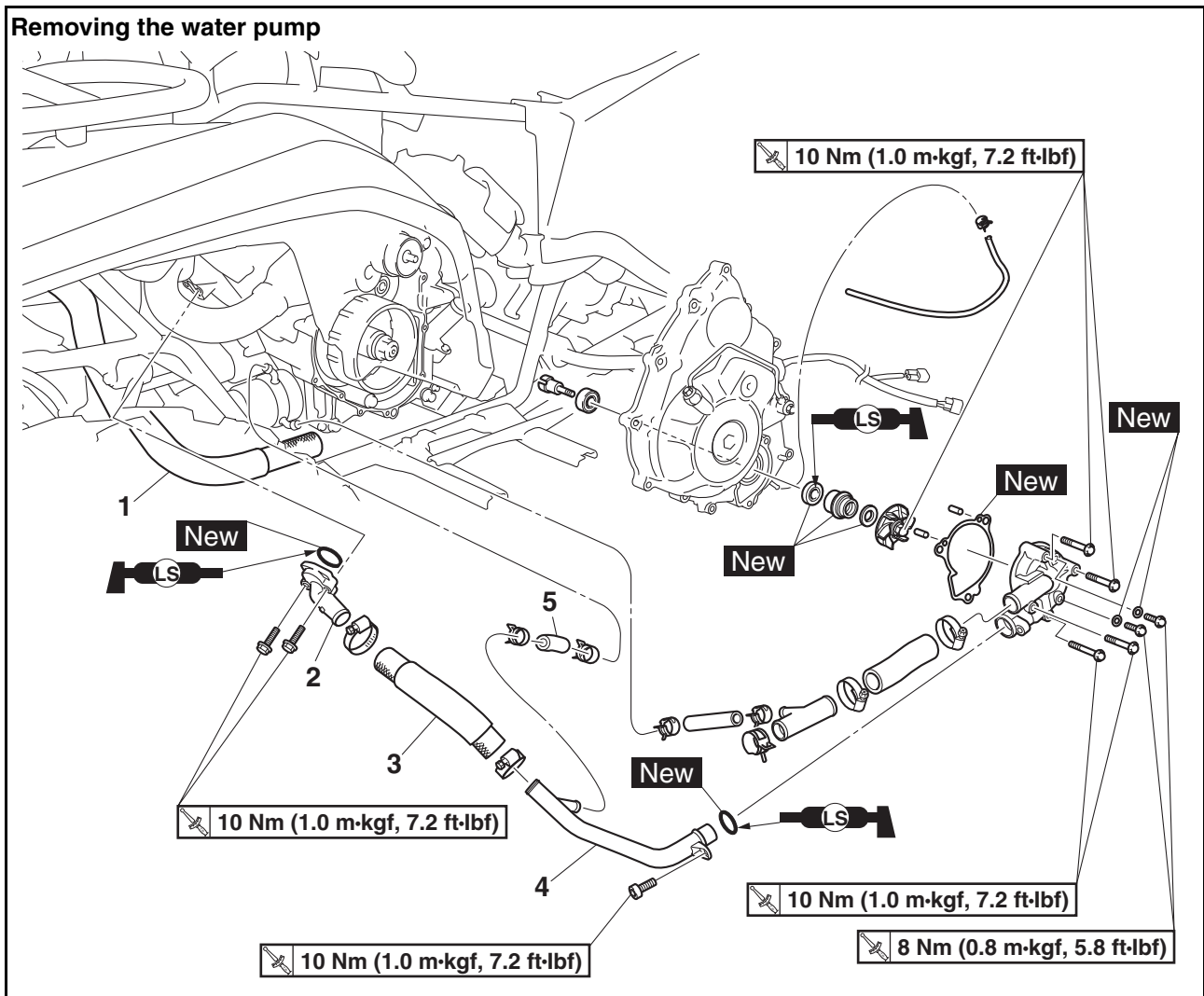
5. Measure:

- Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.  
Refer to “CHECKING THE RADIATOR” on page 6-6.

EBS20053

## WATER PUMP

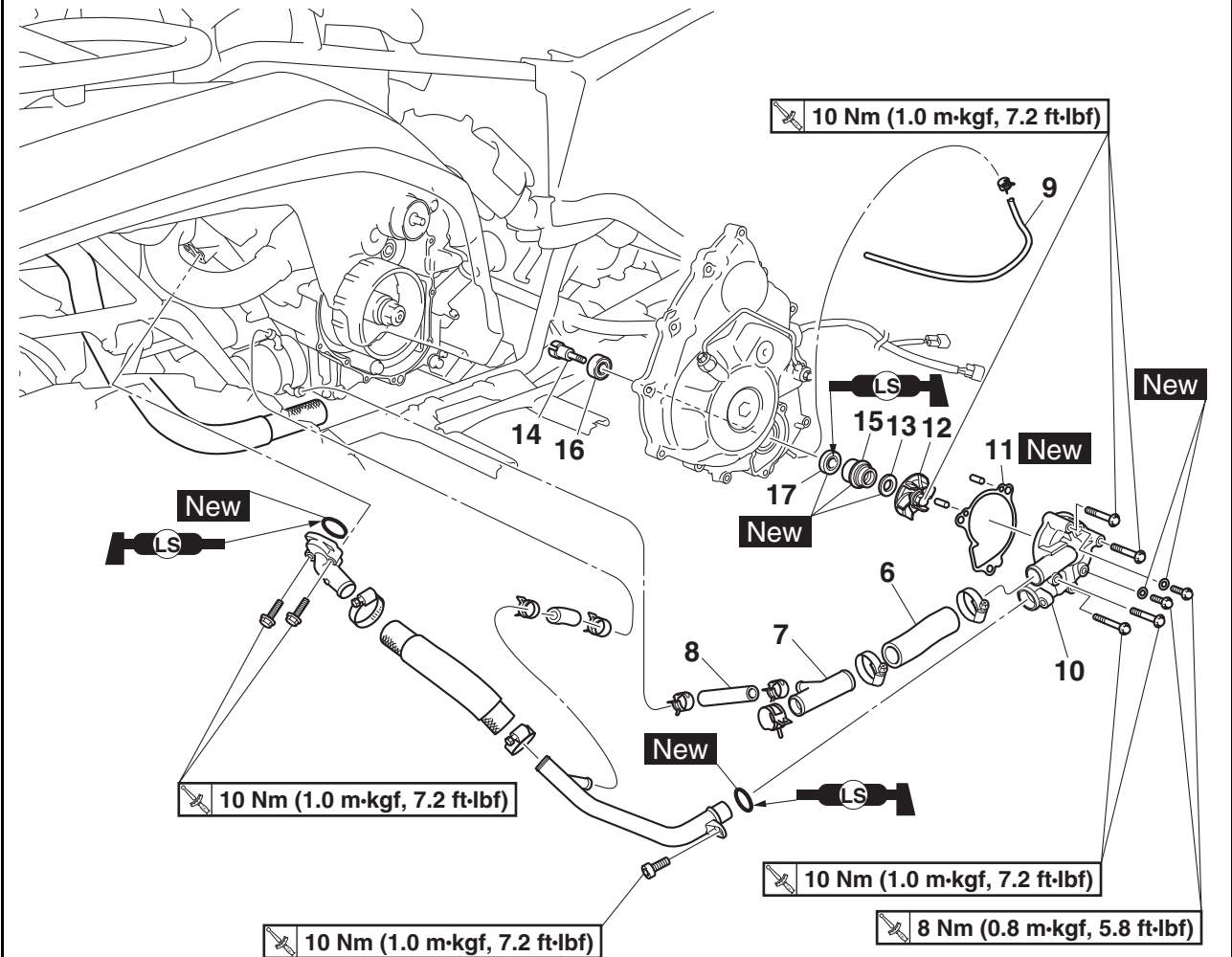
### Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate/Center skid plate/Top cover/Side panel (left)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front fender inner panel (left)		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Footrest board (left)		Refer to "GENERAL CHASSIS (4)" on page 4-11.
	AC magneto cover		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-35.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-29.
1	Radiator outlet hose	1	Disconnect.
2	Water jacket joint	1	
3	Water pump outlet hose	1	
4	Water pump outlet pipe	1	
5	Oil cooler outlet hose	1	

# WATER PUMP

## Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
6	Water pump inlet hose	1	
7	Cooling water hose joint	1	
8	Oil cooler inlet hose	1	
9	Water pump breather hose	1	
10	Water pump housing	1	
11	Gasket	1	
12	Impeller	1	Left-hand thread
13	Washer	1	
14	Impeller shaft	1	
15	Water pump seal	1	
16	Bearing	1	
17	Oil seal	1	



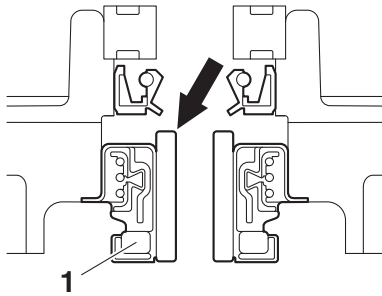
EBS30217

## DISASSEMBLING THE WATER PUMP

1. Remove:
  - Mechanical seal "1"

### TIP

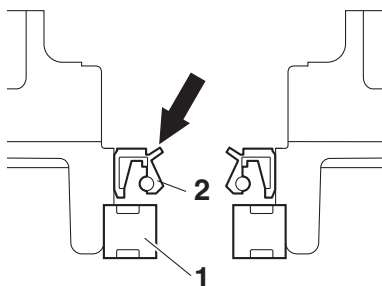
Remove the mechanical seal from the inside of the AC magneto cover.



2. Remove:
  - Bearing "1"
  - Oil seal "2"

### TIP

Remove the bearing and oil seal from the inside of the AC magneto cover.



EBS30218

## CHECKING THE WATER PUMP

1. Check:
  - Water pump housing cover
  - AC magneto cover
  - Impeller
  - Impeller shaft
  - Water pump outlet pipe
  - Water pump outlet hose
 Cracks/damage/wear → Replace.
2. Check:
  - Bearing
 Rough movement → Replace.

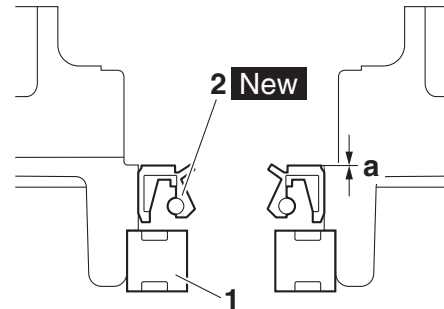
EBS30219

## ASSEMBLING THE WATER PUMP

1. Install:
  - Bearing "1"
  - Oil seal "2" **New**  
(into the AC magneto cover)

### TIP

Install the oil seal with a socket that matches its outside diameter.



2. Install:
  - Mechanical seal "1" **New**

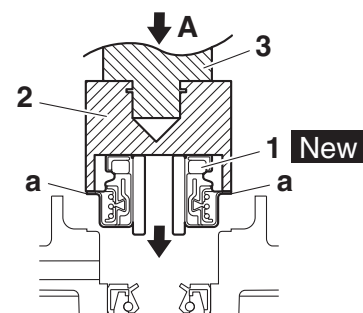
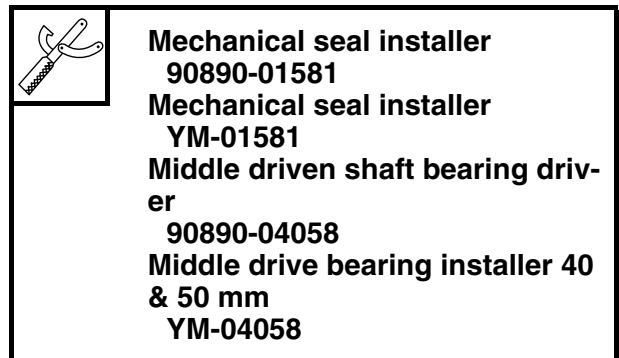
ECB02410

### NOTICE

Never lubricate the mechanical seal surface with oil or grease.


### TIP

Use the special tools and a press to press the mechanical seal straight in until its flange "a" touches the AC magneto cover.



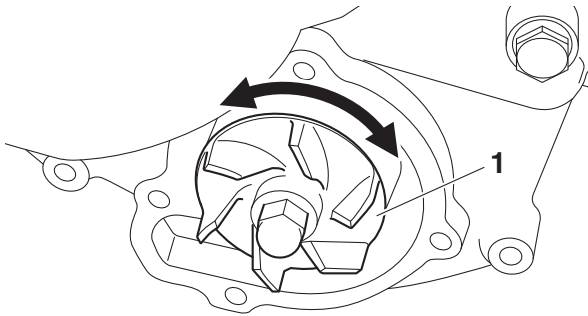
- Push down
- Mechanical seal installer
- Middle driven shaft bearing driver

3. Install:
- Impeller "1"

	<b>Impeller</b> 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	--

**TIP**

After installation, check that the impeller shaft rotates smoothly.



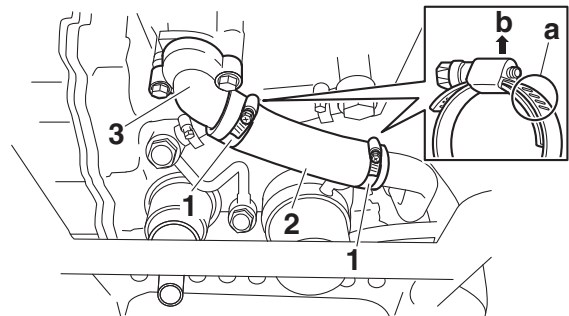
4. Install:
- AC magneto cover
- Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-35.

- Water pump outlet hose "2" (onto the water jacket joint)
- Water jacket joint "3"

**TIP**

Tighten the clamp screw of each clamp "1" until 4 slots remain in the area "a" of the clamp as shown in the illustration.

	<b>Water jacket joint bolt</b> 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	---



b. Upward

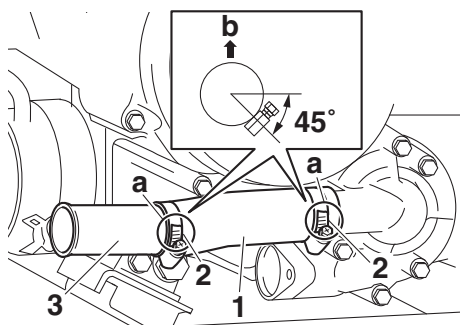
EBS30569

## INSTALLING THE WATER PUMP HOUSING

1. Install:
- Water pump inlet hose "1"
  - Clamps "2"
  - Cooling water hose joint "3"

**TIP**

Tighten the clamp screw of each clamp "2" until 9 slots are visible in the area "a" of the clamp as shown in the illustration. Position the screw head of each clamp within the range shown in the illustration.



b. Upward

EBS30471

## INSTALLING THE WATER JACKET JOINT

1. Install:
- Clamps "1" (onto the water pump outlet hose)

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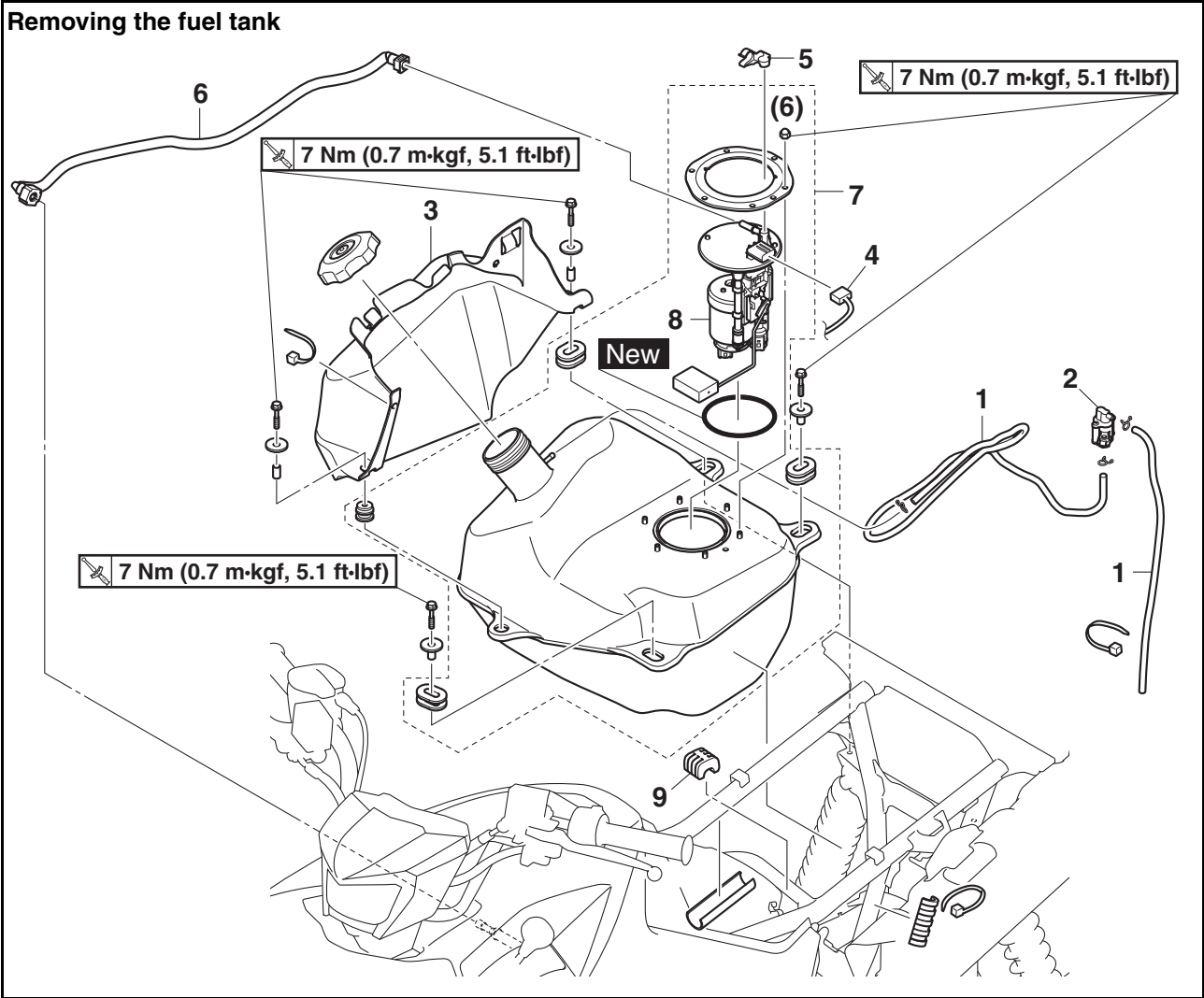
## FUEL SYSTEM

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CHECKING THE FUEL TANK BREATHER HOSE JOINT.....	7-2
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INSTALLING THE FUEL TANK.....	7-3
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CHECKING THE INJECTOR.....	7-6
CHECKING THE THROTTLE BODY.....	7-6
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CHECKING THE FUEL PRESSURE.....	7-7
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EBS20054

## FUEL TANK

### Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS (3)" on page 4-8.
1	Fuel tank breather hose	2	
2	Fuel tank breather hose joint	1	
3	Fuel tank shield	1	
4	Fuel pump coupler	1	Disconnect.
5	Fuel hose connector holder	1	
6	Fuel hose	1	
7	Fuel tank	1	
8	Fuel pump assembly	1	
9	Damper	1	

EBS30221

## REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
  - Fuel hose connector holder
  - Fuel hose

EWB03050

### WARNING

Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

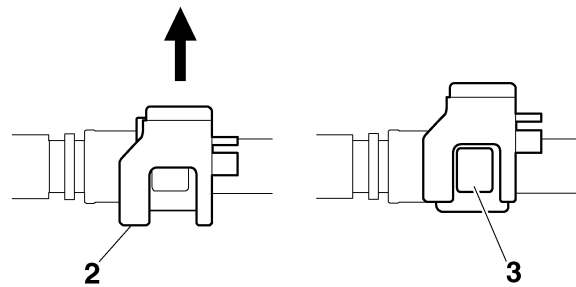
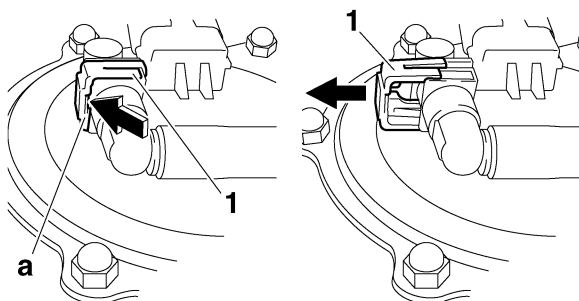
ECB01700

### 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.

### TIP

- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part "a" of the fuel hose connector cover "1", then slide it in the direction of the arrow, and remove the fuel hose.
- To remove the fuel hose from the throttle body, slide the fuel hose connector cover "2" on the end of the hose in direction of the arrow shown, press the two buttons "3" on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



3. Remove:
  - Fuel tank

### TIP

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank in an upright position.

EBS30222

## REMOVING THE FUEL PUMP

1. Remove:
  - Fuel pump bracket
  - Fuel pump
  - Fuel pump gasket

ECB01450

### NOTICE

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

EBS30223

## CHECKING THE FUEL PUMP BODY

1. Check:
  - Fuel pump body
    - Obstruction → Clean.
    - Cracks/damage → Replace the fuel pump assembly.

EBS30224

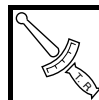
## CHECKING THE FUEL TANK BREATHER HOSE JOINT

1. Check:
  - Fuel tank breather hose joint
    - Damage/faulty → Replace.

EBS30225

## INSTALLING THE FUEL PUMP

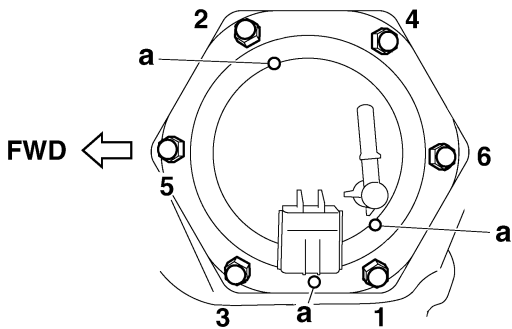
1. Install:
  - Fuel pump gasket **New**
  - Fuel pump
  - Fuel pump bracket



Fuel pump nut  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**TIP**

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump in the direction shown in the illustration.
- Install the fuel pump bracket by aligning the projections “a” on the fuel pump with the projections on the fuel tank.
- Tighten the fuel pump nuts in the proper tightening sequence as shown.



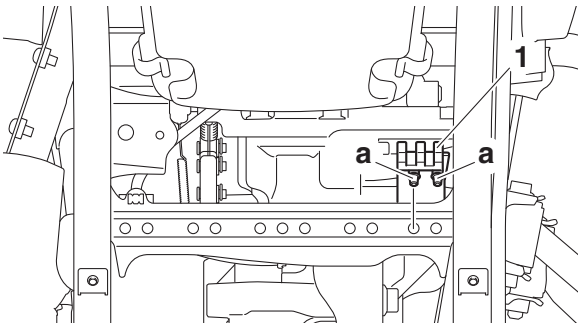
EBS30226

**INSTALLING THE FUEL TANK**

1. Install:
  - Damper “1”

**TIP**

- Fit the projections “a” on the damper into the 1st and 2nd holes on the right side of the frame.
- Make sure that the shorter end of the damper is facing outward as shown in the illustration.



2. Install:
  - Fuel hose
  - Fuel hose connector holder “1”
  - Fuel pump coupler

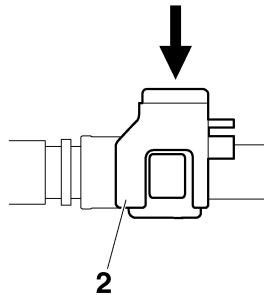
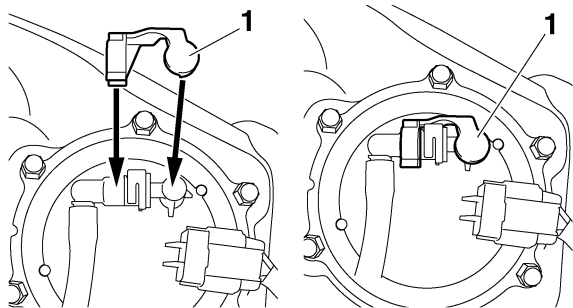
ECB02010

**NOTICE**

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

**TIP**

- Install the fuel hose connector holder “1” securely onto the fuel pump until a distinct “click” is heard, and then make sure that it does not come loose.
- To install the fuel hose onto the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown.

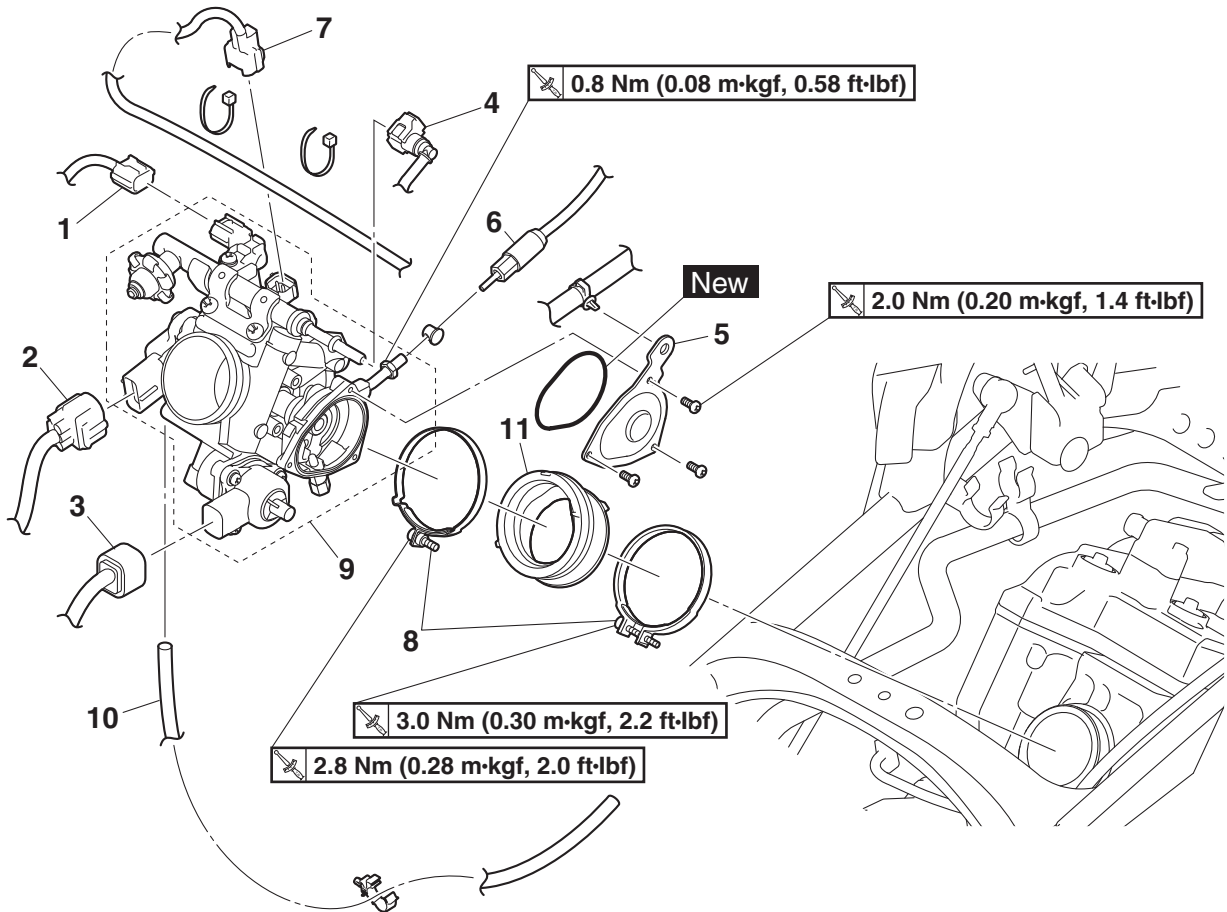


# THROTTLE BODY

EBS20056

## THROTTLE BODY

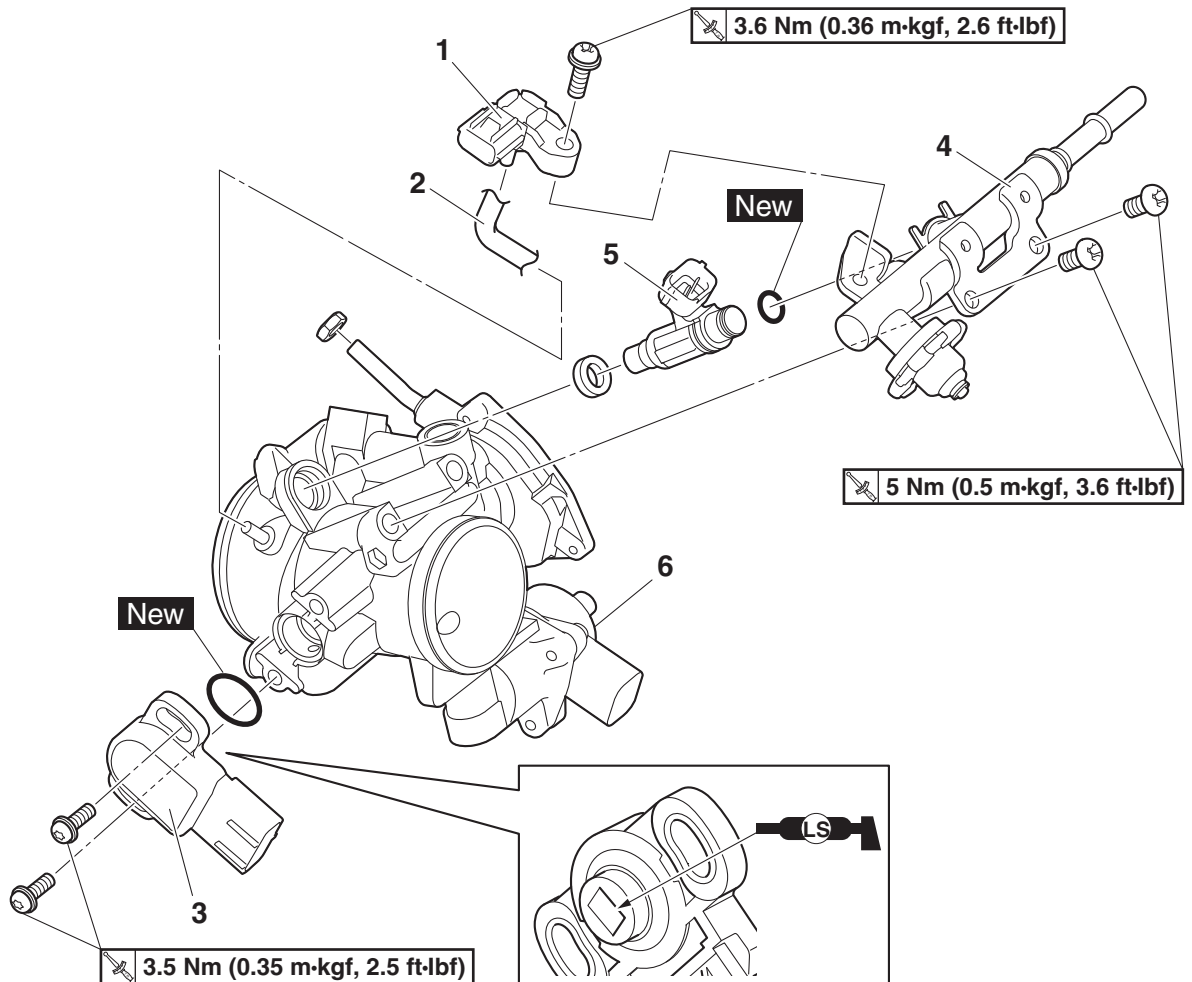
### Removing the throttle body



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Storage compartment/Air filter case/Air filter case joint		Refer to "GENERAL CHASSIS (5)" on page 4-17.
1	Intake air pressure sensor coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	ISC (Idle Speed Control) unit coupler	1	Disconnect.
4	Fuel hose	1	Disconnect.
5	Throttle cable housing cover	1	
6	Throttle cable	1	Disconnect.
7	Fuel injector coupler	1	Disconnect.
8	Throttle body joint clamp screw	2	Loosen.
9	Throttle body assembly	1	
10	Throttle body breather hose	1	
11	Throttle body joint	1	

# THROTTLE BODY

## Disassembling the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Intake air pressure sensor	1	
2	Intake air pressure sensor hose	1	
3	Throttle position sensor	1	
4	Fuel rail	1	
5	Fuel injector	1	
6	Throttle body	1	



# THROTTLE BODY

EBS30229

## REMOVING THE THROTTLE BODY ASSEMBLY

1. Disconnect:
  - Fuel hose

EWB03050

**⚠ WARNING**

Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

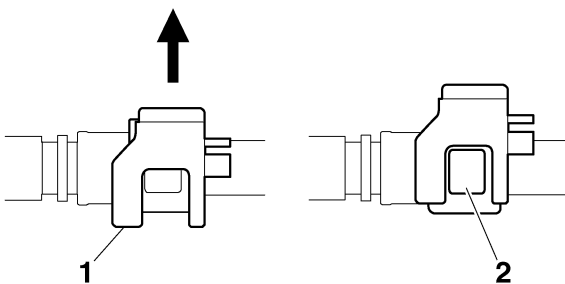
ECB02360

**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 disconnecting the fuel hose, since there may be fuel remaining in it.

**TIP**

- To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.



EBS30230

## CHECKING THE INJECTOR

1. Check:
  - Injector
  - Damage → Replace.

EBS30231

## CHECKING THE THROTTLE BODY

1. Check:
  - Throttle body
  - Cracks/damage → Replace the throttle body.

2. Check:
  - Fuel passages
  - Obstructions → Clean.

- 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.

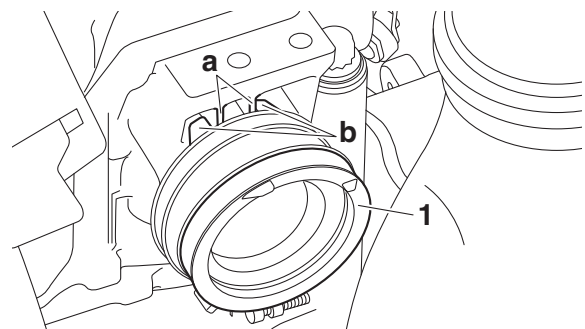
EBS30233

## INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
  - Throttle body joint “1”

**TIP**

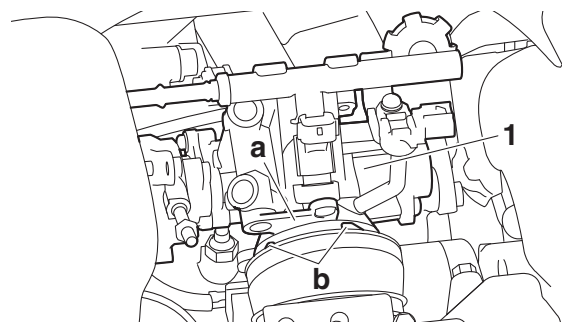
Fit the ribs “a” on the throttle body joint between the projections “b” on the cylinder head.



2. Install:
  - Throttle body assembly “1”

**TIP**

Fit the rib “a” on the throttle body assembly with the projections “b” on the throttle body joint.



3. Connect:
  - Fuel hose

# THROTTLE BODY

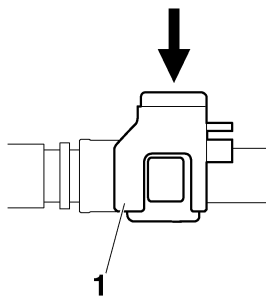
ECB02370

## NOTICE

When connecting 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 connected.

## TIP

To connect the fuel hose onto the throttle body, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown.



EBS30409

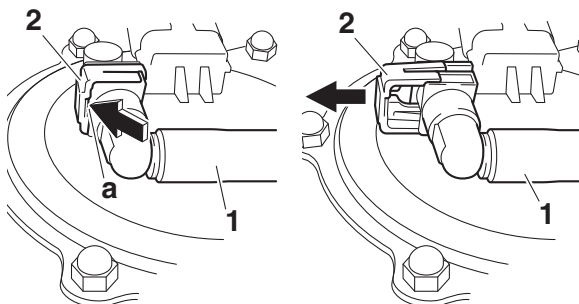
## CHECKING THE FUEL PRESSURE

1. Check:
  - Fuel pressure

- a. Remove the rear fender. Refer to "GENERAL CHASSIS (3)" on page 4-8.
- b. Remove the fuel hose connector holder.
- c. Disconnect the fuel hose "1" from the fuel pump.

## TIP

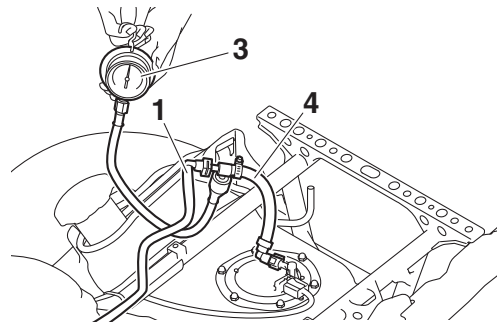
- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part "a" of the fuel hose connector cover "2", then slide it in the direction of the arrow, and remove the fuel hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



- d. Connect the pressure gauge "3" and adapter "4" to the fuel pump and fuel hose.



Pressure gauge  
90890-03153  
Pressure gauge  
YU-03153  
Fuel pressure adapter  
90890-03176  
Fuel pressure adapter  
YM-03176



- e. Start the engine.
- f. Measure the fuel pressure.  
Out of specification → Replace the fuel pump.



Fuel pressure  
324 kPa (3.24 kgf/cm<sup>2</sup>, 46.1 psi)

EBS30234

## ADJUSTING THE THROTTLE POSITION SENSOR

EWB03070

### WARNING


- Handle the throttle position sensor with special care.
- Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.

1. Check:
    - Throttle position sensor  
Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 9-96.
  2. Adjust:
    - Throttle position sensor angle
- a. Connect the test harness- TPS (3P) "1" to the throttle position sensor and wire harness as shown.
  - b. Connect the digital circuit tester to the test harness- TPS (3P).

- Positive tester probe  
yellow (wire harness color)
- Negative tester probe  
black/blue (wire harness color)



**Test harness– TPS (3P)  
90890-03204**  
**Test harness– TPS (3P)  
YU-03204**  
**Digital circuit tester  
90890-03174**  
**Model 88 Multimeter with ta-  
chometer  
YU-A1927**

- c. Turn the main switch to “” (on).
- d. Measure the throttle position sensor voltage.
- e. Adjust the throttle position sensor angle so that the voltage is within the specified range.

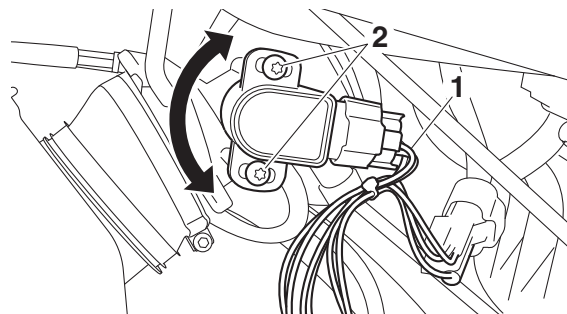


**Throttle position sensor output  
voltage  
0.63–0.73 V (yellow–black/blue)**

- f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “2” to specification.

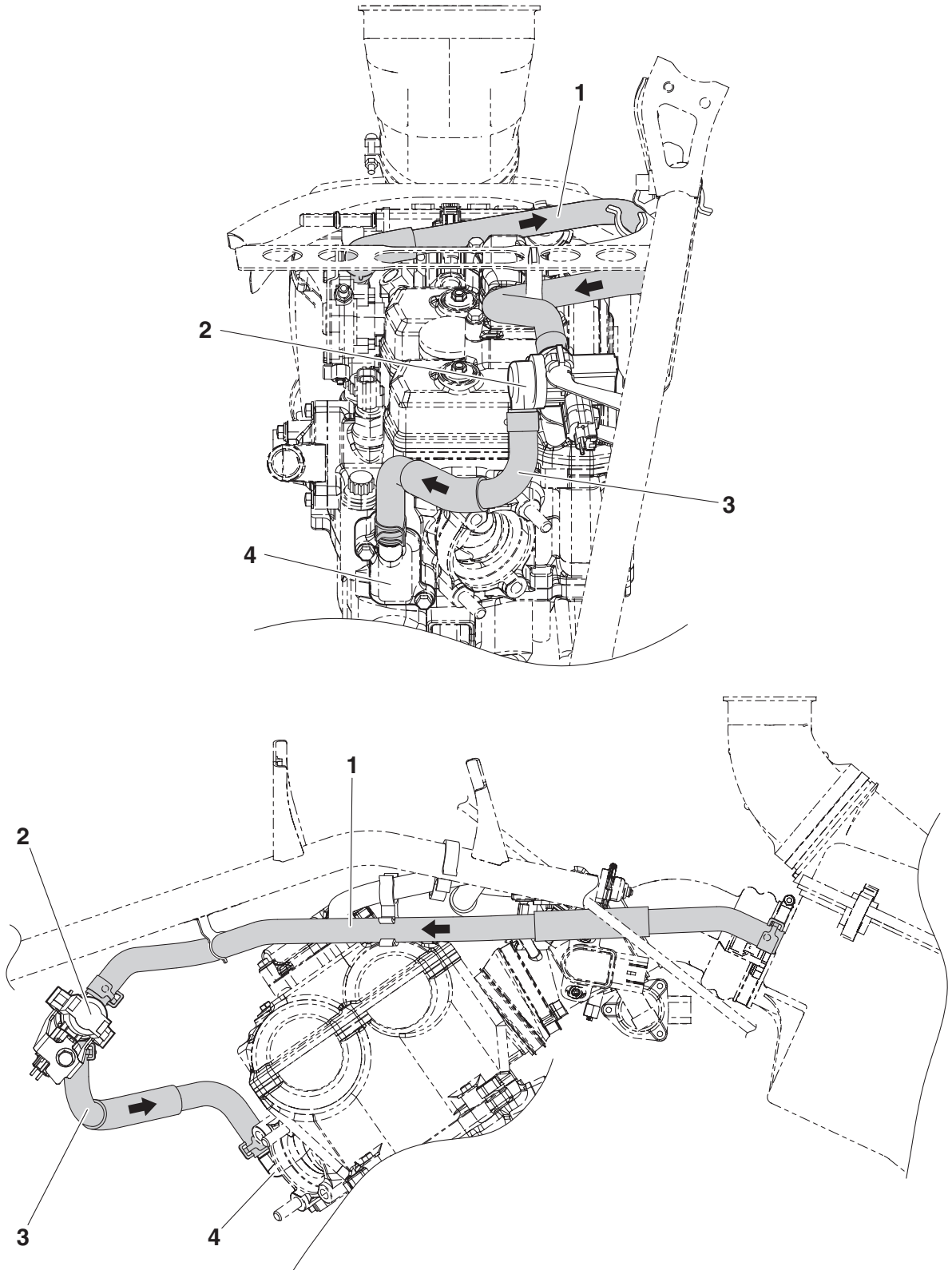


**Throttle position sensor screw  
3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)**



EBS20057

## AIR INDUCTION SYSTEM



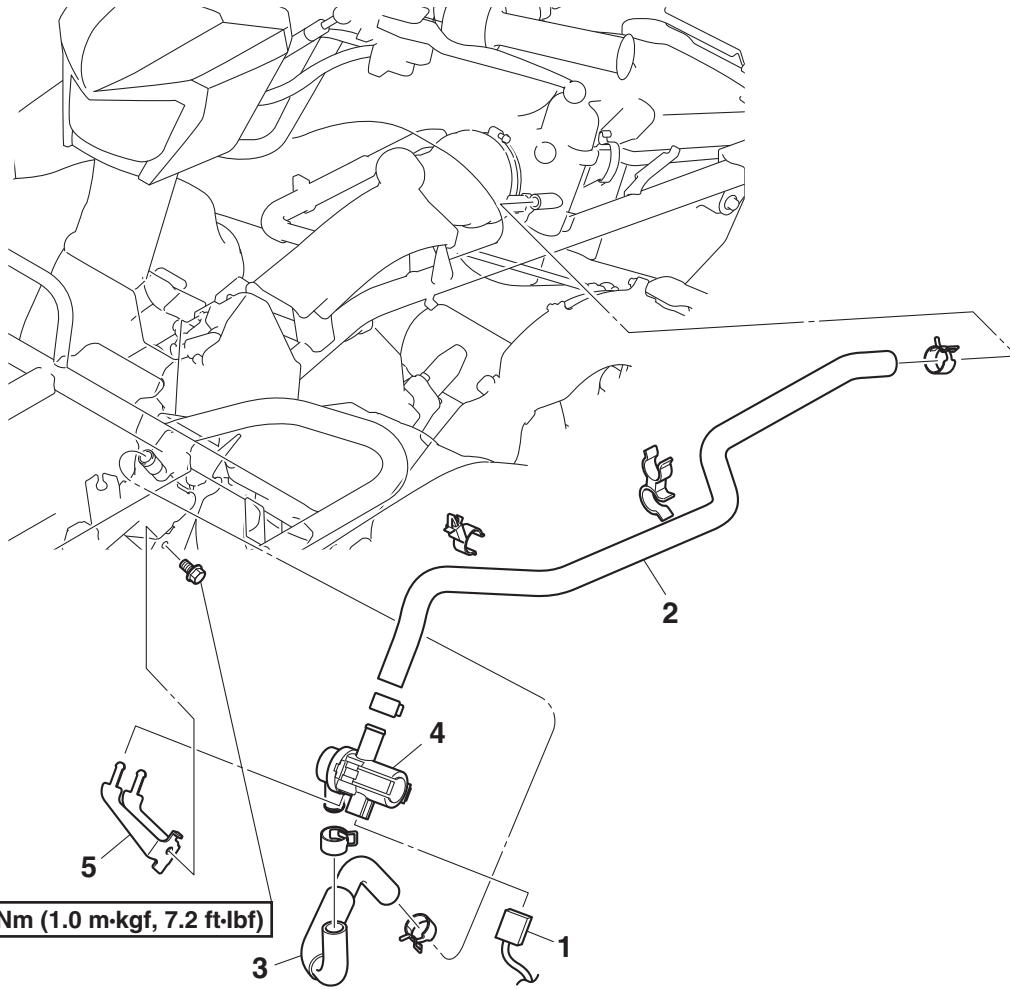
## AIR INDUCTION SYSTEM

---

1. Air induction system hose (air filter case to air cut-off valve)
2. Air cut-off valve
3. Air induction system hose (air cut-off valve to reed valve assembly)
4. Reed valve assembly

# AIR INDUCTION SYSTEM

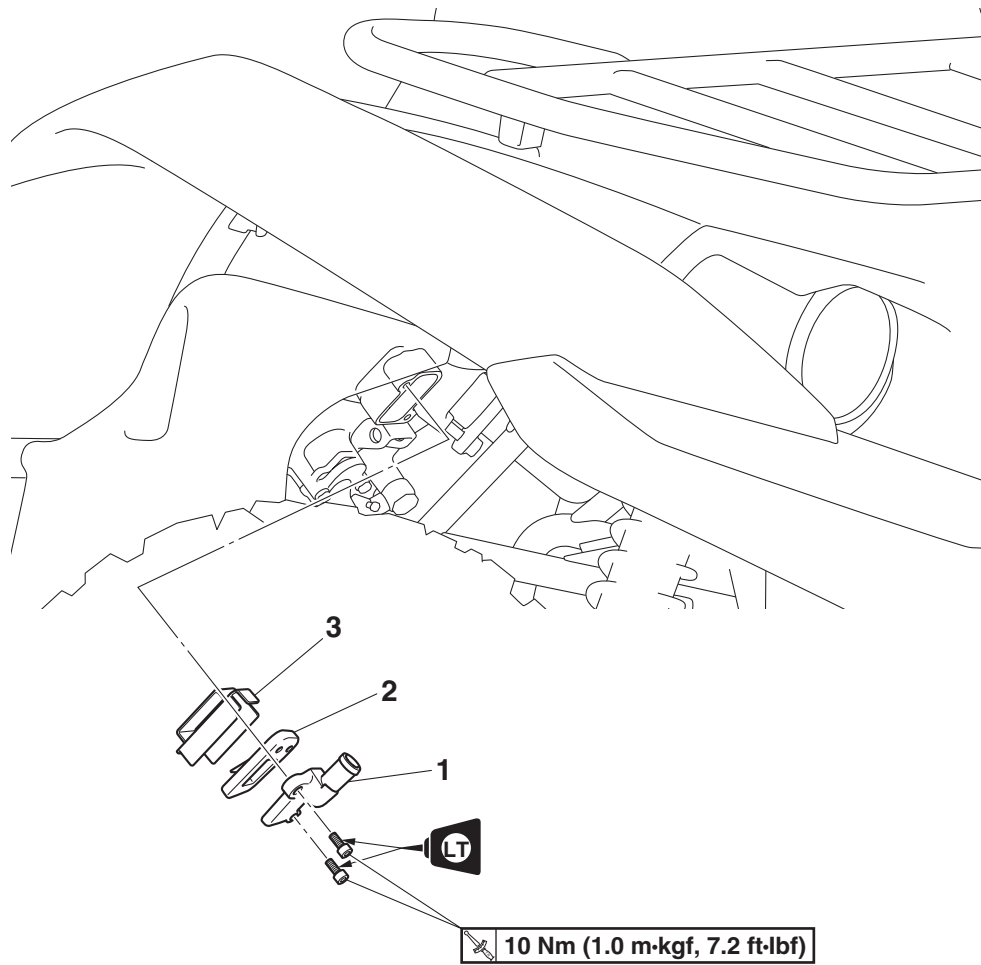
## Removing the air cut-off valve



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "GENERAL CHASSIS (1)" on page 4-1.
1	Air cut-off valve coupler	1	Disconnect.
2	Air induction system hose (air filter case to air cut-off valve)	1	
3	Air induction system hose (air cut-off valve to reed valve assembly)	1	
4	Air cut-off valve	1	
5	Air cut-off valve bracket	1	

# AIR INDUCTION SYSTEM

## Removing the reed valve



Order	Job/Parts to remove	Q'ty	Remarks
1	Reed valve cover	1	
2	Reed valve assembly	1	
3	Reed valve plate	1	

EBS30235

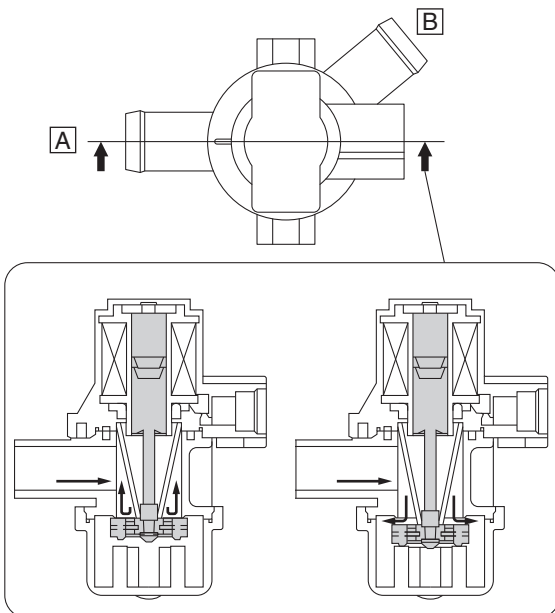
## CHECKING THE AIR INDUCTION SYSTEM

### Air injection

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C (1112 to 1292 °F).

### Air cut-off valve

The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the vehicle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.



- A. From the air filter case
- B. To the reed valve

### 1. Check:

- Hoses  
Loose connections → Connect properly.  
Cracks/damage → Replace.

### 2. Check:

- Reed valve
- Reed valve stopper
- Reed valve seat  
Cracks/damage → Replace the reed valve assembly.

### 3. Check:

- Air cut-off valve  
Cracks/damage → Replace.

### 4. Check:

- Air induction system solenoid  
Refer to "CHECKING THE AIR INDUCTION SYSTEM SOLENOID" on page 9-96.

EBS30236

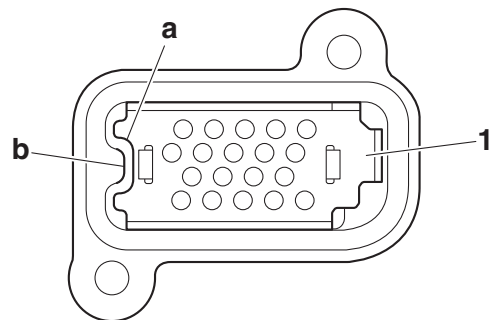
## INSTALLING THE AIR INDUCTION SYSTEM

### 1. Install:

- Reed valve plate "1"

### TIP

Align the notch "a" in the reed valve plate with the projection "b" of the reed valve seat on the cylinder head.





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## DRIVE TRAIN

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EBS20058

## TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
<ol style="list-style-type: none"><li>1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)</li><li>2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area.</li><li>3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheels.</li></ol>	<ol style="list-style-type: none"><li>A. Bearing damage.</li><li>B. Improper gear backlash.</li><li>C. Gear tooth damage.</li><li>D. Broken drive shaft.</li><li>E. Broken gear teeth.</li><li>F. Seizure due to lack of lubrication.</li><li>G. Small foreign objects lodged between the moving parts.</li></ol>

### TIP

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.



# TROUBLESHOOTING

EBS30238

## TROUBLESHOOTING CHART

When basic conditions (a) and (b) exist, check the following points:

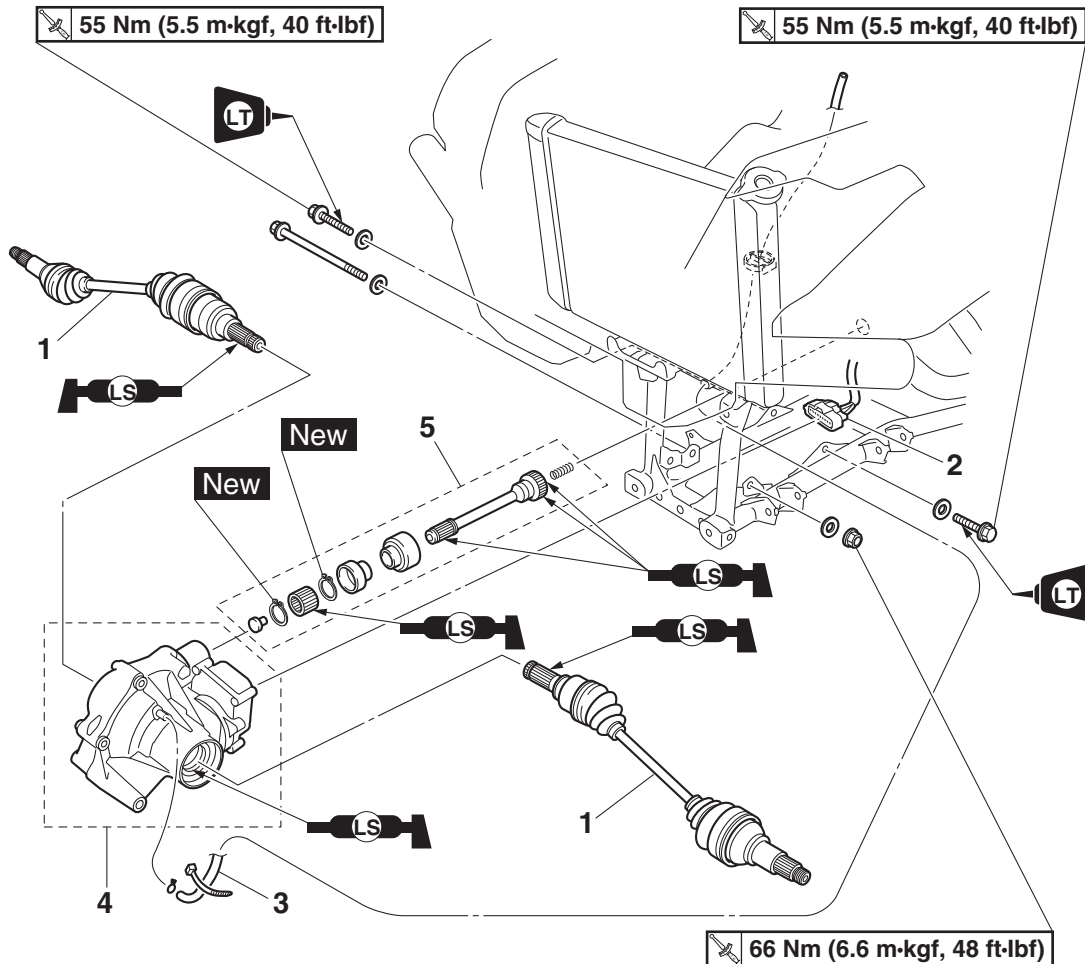
1. Elevate and spin both wheels. Feel for wheel bearing damage.	YES →	Replace the wheel bearing. (Refer to “TIE-RODS AND STEERING KNUCKLES” on page 4-61 and “REAR KNUCKLES AND STABILIZER” on page 4-70.)
NO ↓		
2. Check the wheel nuts and axle nuts for tightness.	NO →	Torque to specification. (Refer to “FRONT WHEELS” on page 4-20 and “REAR WHEELS” on page 4-23.)
YES ↓		
3. Check the front constant velocity shaft assemblies. Feel for bearing damage.	NO →	Constant velocity shaft bearings and differential bearings are probably not damaged. Repeat the test or remove the individual components.
YES ↓		
4. Check the rear brake adjustment.	NO →	Adjust per instructions. (Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.)
YES ↓		
5. Check the rear constant velocity shaft assemblies. Feel for bearing damage.	NO →	Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.
YES ↓		
Remove the shaft drive components.		

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

EBS20059

## FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

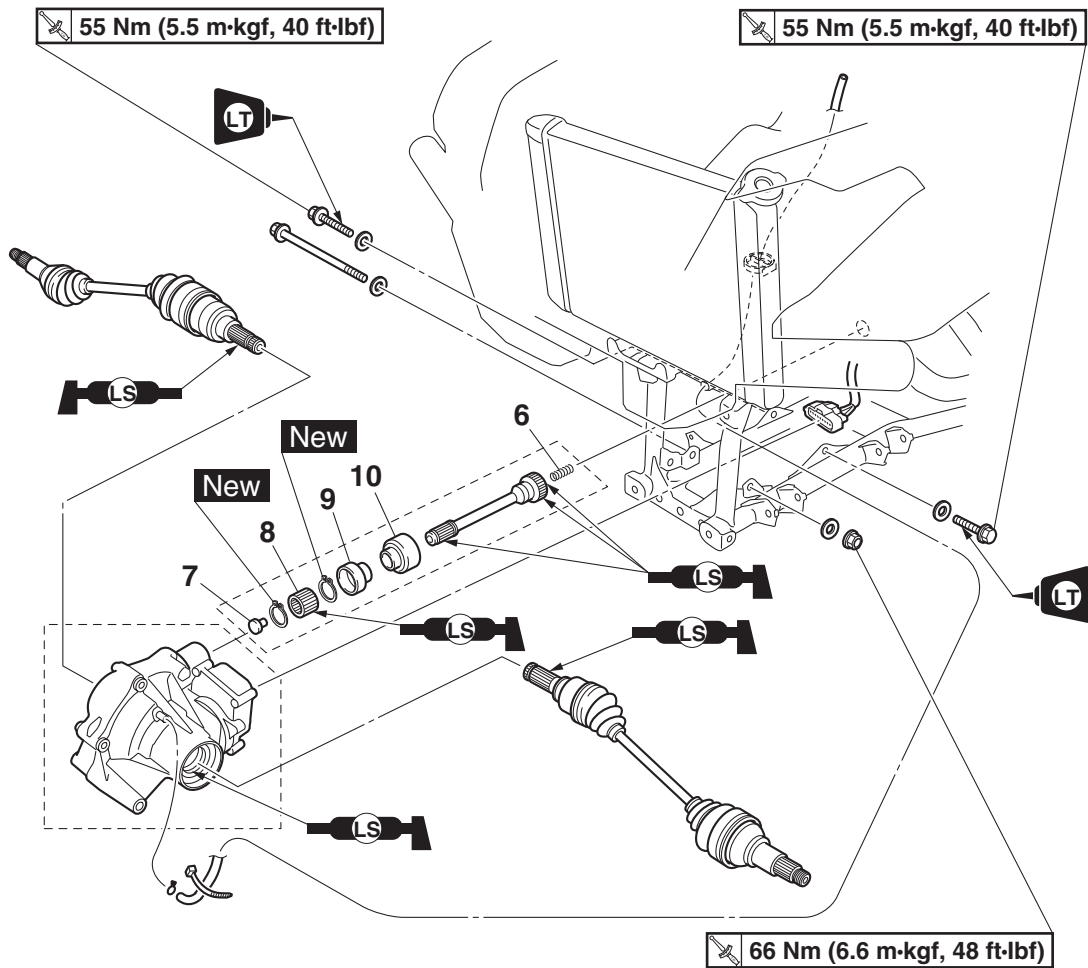
Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft



Order	Job/Parts to remove	Q'ty	Remarks
	Front skid plate		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Steering knuckles		Refer to "TIE-RODS AND STEERING KNUCKLES" on page 4-61.
	Front arms		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-65.
	Differential gear oil		Drain. Refer to "CHANGING THE DIFFERENTIAL GEAR OIL" on page 3-26.
1	Front constant velocity shaft assembly	2	
2	Differential motor coupler	1	Disconnect.
3	Differential case breather hose	1	Disconnect.
4	Differential assembly	1	
5	Front drive shaft	1	

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

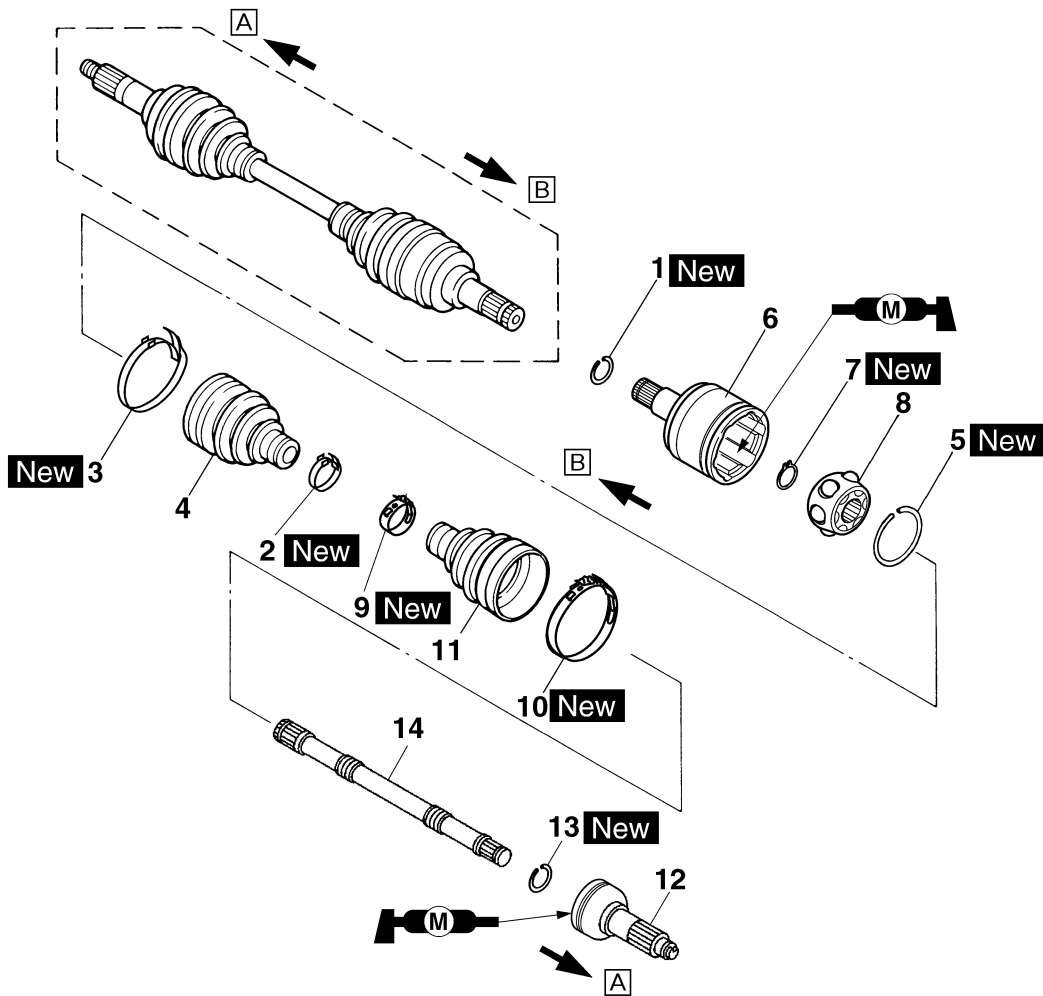
Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft



Order	Job/Parts to remove	Q'ty	Remarks
6	Spring	1	
7	Damper	1	
8	Front drive shaft coupling sleeve	1	
9	Dust seal	1	
10	Dust seal	1	

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

## Disassembling the front constant velocity shaft assemblies

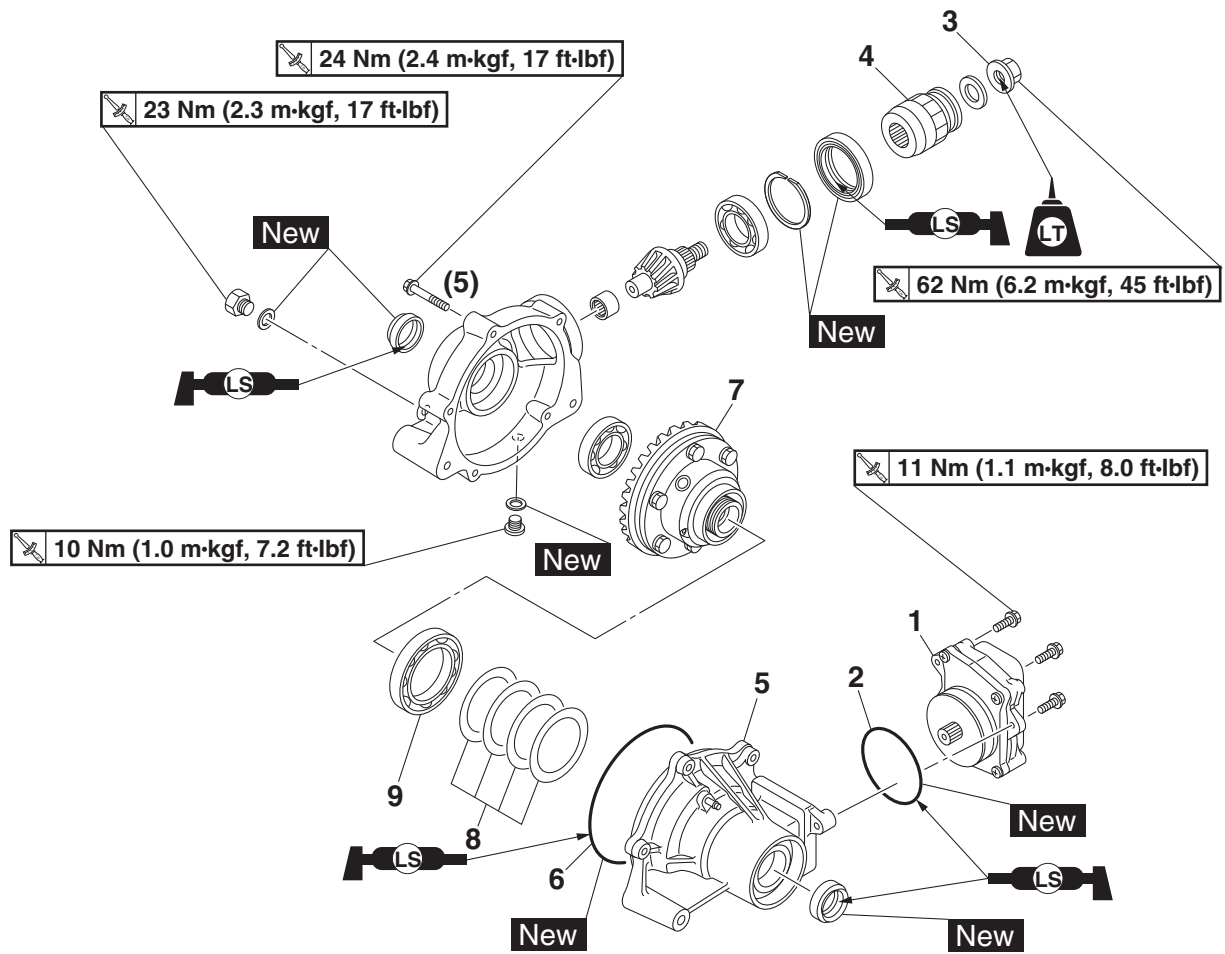


A: Wheel side  
B: Differential side

Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front constant velocity shaft assemblies.
1	Clip	1	
2	Boot band	1	
3	Boot band	1	
4	Dust boot	1	
5	Clip	1	
6	Double offset joint	1	
7	Circlip	1	
8	Ball bearing	1	
9	Boot band	1	
10	Boot band	1	
11	Dust boot	1	
12	Constant velocity joint	1	
13	Clip	1	
14	Constant velocity shaft	1	

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

## Disassembling the differential assembly

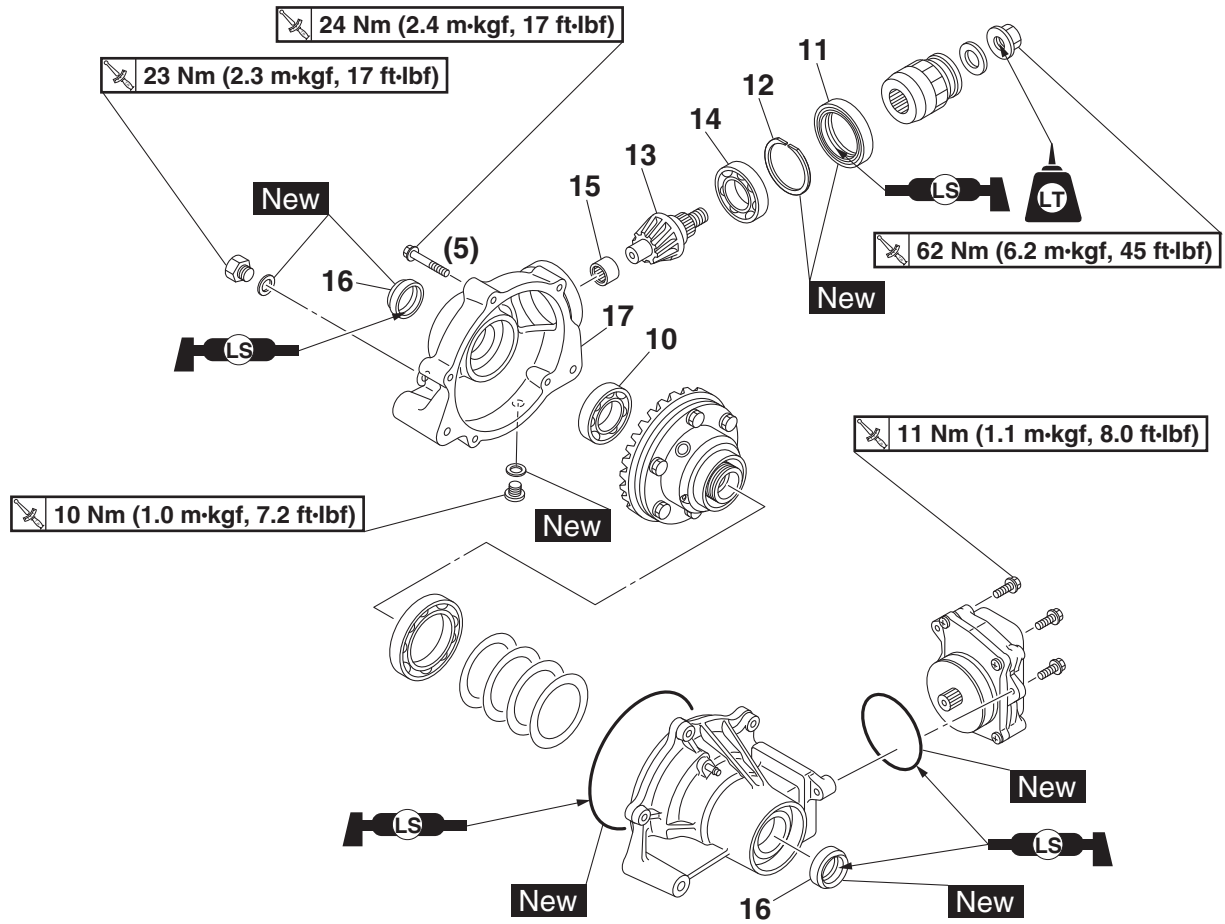


Order	Job/Parts to remove	Q'ty	Remarks
			<b>TIP</b> _____ Do not disassemble the differential motor or remove the differential motor pinion gear.
1	Differential motor	1	
2	O-ring	1	
3	Front drive shaft yoke nut (differential case side)	1	
4	Front drive shaft yoke (differential case side)	1	
5	Differential case cover	1	
6	O-ring	1	
7	Differential gear assembly	1	
8	Differential gear assembly shim	—	Refer to "ADJUSTING THE DIFFERENTIAL GEAR BACKLASH" on page 8-13.
9	Bearing	1	



# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

## Disassembling the differential assembly



Order	Job/Parts to remove	Q'ty	Remarks
10	Bearing	1	
11	Oil seal	1	
12	Clip	1	
13	Differential pinion gear	1	
14	Bearing	1	
15	Bearing	1	
16	Oil seal	2	
17	Differential case	1	

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

EBS30240

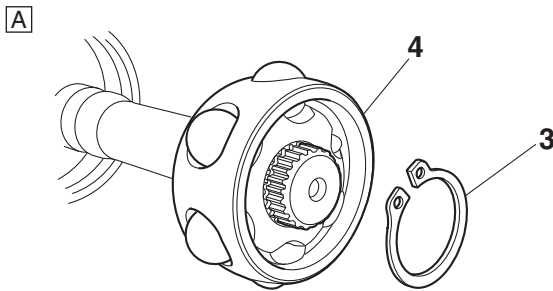
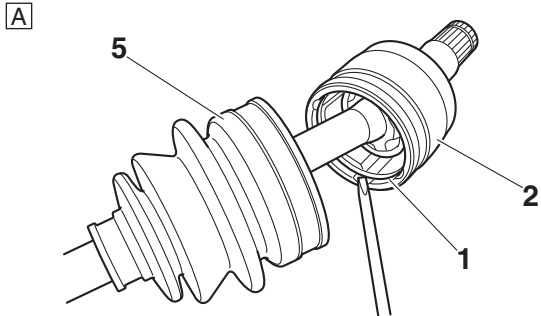
## DISASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

- Remove:
  - Boot bands
  - Clip "1"
  - Double offset joint "2"
  - Circlip "3"
  - Ball bearing "4"
  - Dust boot "5"

### TIP

Before removing the clip, slide the dust boot away from the double offset joint.



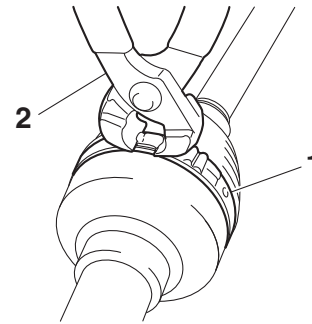
A. Differential side

- Remove:
  - Boot band "1"
 Use the boot band installation tool "2".



**Boots band installation tool  
90890-01526**  
**Boots band installation tool  
YM-01526**

### B



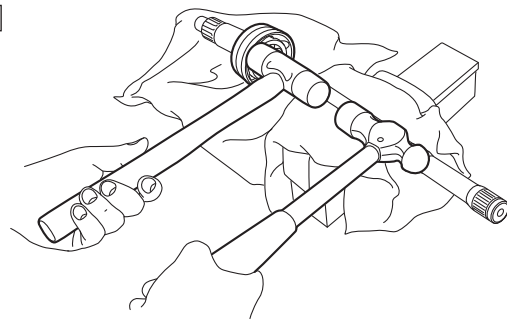
B. Wheel side

- Remove:
  - Dust boot
  - Constant velocity joint
  - Clip

### TIP

Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.

### B



B. Wheel side

EBS30241

## CHECKING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

- Check:
  - Double offset joint splines
  - Constant velocity joint splines
  - Constant velocity shaft splines
 Wear/damage → Replace.
- Check:
  - Dust boots
 Cracks/damage → Replace.

ECB01590

### NOTICE

**Always use a new boot band.**

- Check:
  - Balls and ball races
  - Inner surface of double offset joint
 Pitting/wear/damage → Replace.

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

EBS30242

## ASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Install:

- Clip "1" **New**
- Constant velocity joint "2"
- Constant velocity shaft "3"
- Dust boot



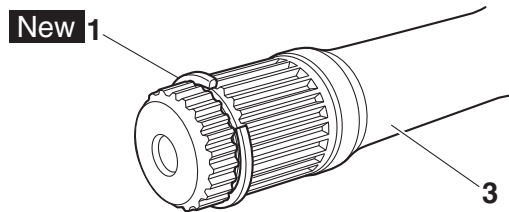
a. Install the clip.

b. Install the constant velocity joint.

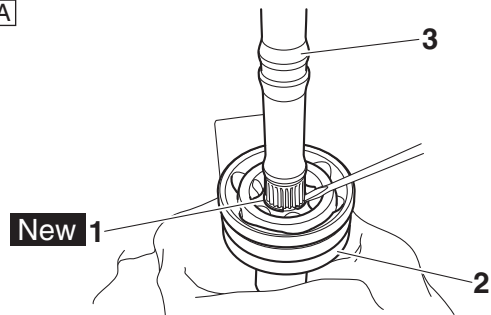
### TIP

- Install the clip into the groove in the constant velocity shaft as shown.
- Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

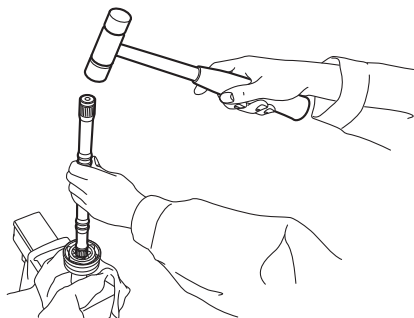
A



A



A



A. Wheel side



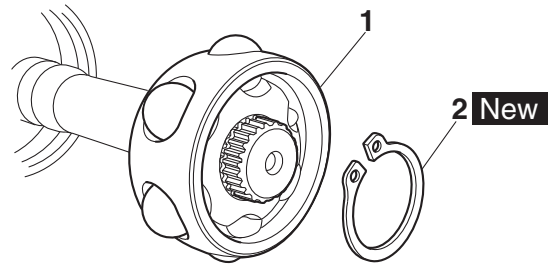
2. Install:

- Dust boot
- Ball bearing "1"
- Circlip "2" **New**
- Double offset joint "3"
- Clip "4" **New**

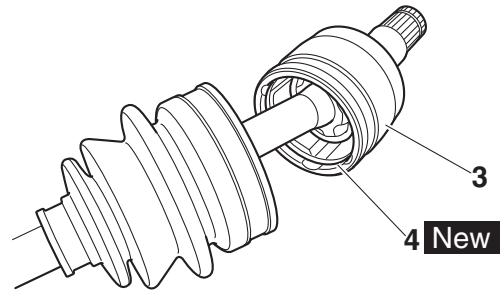
### TIP

- Securely install the circlip into the groove in the constant velocity shaft.
- Securely install the clip into the groove in the double offset joint.

B



B



B. Differential side

3. Apply:

- Molybdenum disulfide grease (into the double offset joint, constant velocity joint, and dust boots)

	<p><b>Molybdenum disulfide grease</b>  <b>70 g (2.5 oz) per dust boot (wheel side)</b>  <b>55 g (1.9 oz) per dust boot (differential side)</b></p>
--	--

### TIP

Molybdenum disulfide grease is included in the repair kit.

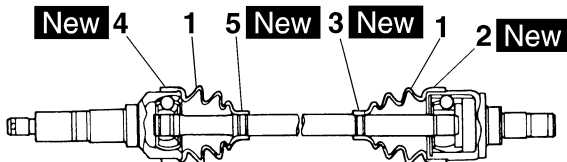
4. Install:

- Dust boots "1"
- Boot bands "2", "3", "4", "5" **New**

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

## TIP

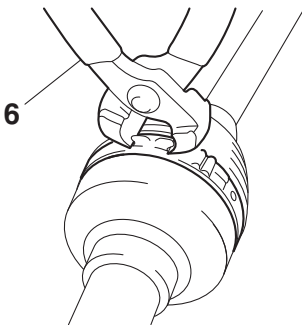
- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands "3" and "5" at the grooves in the constant velocity shaft.



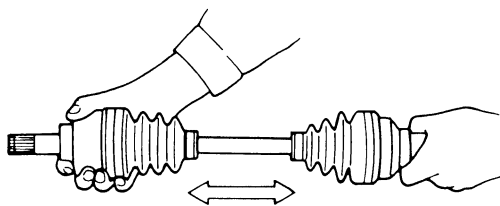
- Install the dust boots.
- Install the dust boot bands "4" and "5".  
Use the boot band installation tool "6".



**Boots band installation tool  
90890-01526**  
**Boots band installation tool  
YM-01526**



- Check:
  - Thrust movement free play  
Excessive play → Replace the constant velocity shaft assembly.



EBS30244

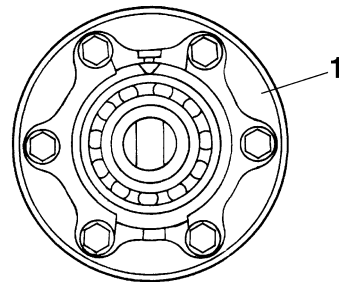
## REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

- Remove:
  - Differential gear assembly "1"

ECB01570

## NOTICE

The ring gear and differential gear are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.



EBS30246

## CHECKING THE DIFFERENTIAL ASSEMBLY

- Check:
  - Gear teeth  
Pitting/galling/wear → Replace differential pinion gear and differential gear assembly as a set.
  - Bearings  
Pitting/damage → Replace.
  - Oil seals
  - O-rings  
Damage → Replace.
- Check:
  - Drive shaft splines
  - Pinion gear splines  
Wear/damage → Replace.
  - Spring  
Fatigue → Replace.
- Check:
  - Front drive shaft  
Bends → Replace.

EWB03040

## WARNING

Do not attempt to straighten a bent shaft; this may dangerously weaken it.

EBS30247

## CHECKING THE DIFFERENTIAL MOTOR OPERATION

- Check:
  - Differential motor  
Does not operate → Replace.

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

ECB01930

## NOTICE

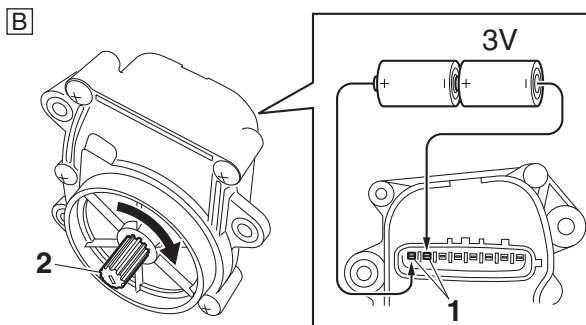
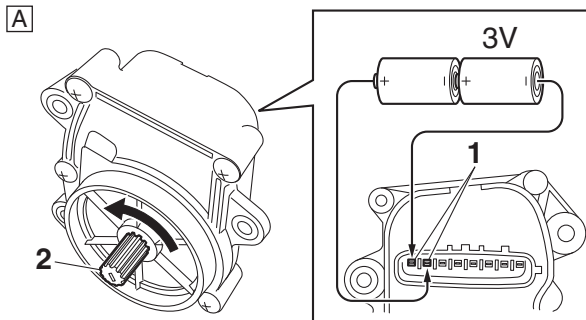
Do not disassemble the differential motor or remove the differential motor pinion gear.

- a. Connect two C-size batteries to the differential motor terminals "1" (as shown in the illustrations).

ECB01940

## NOTICE

- Do not use a 12 V battery to operate the differential motor pinion gear.
- Do not connect the batteries to the differential motor when it is installed in the differential case. The differential motor should be checked when it is removed from the differential case.



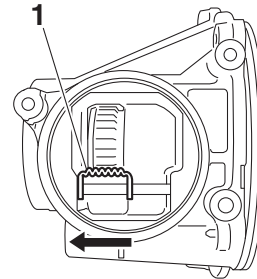
- A. Check that the differential motor pinion gear "2" turns counterclockwise.
- B. Check that the differential motor pinion gear "2" turns clockwise.

EBS30249

## ASSEMBLING THE DIFFERENTIAL ASSEMBLY

1. Measure:
  - Gear backlash  
Refer to "MEASURING THE DIFFERENTIAL GEAR BACKLASH" on page 8-13.
2. Install:
  - Differential motor

- a. Slide the shift fork sliding gear "1", which is installed to the differential case cover, to the left as shown in the illustration to put it into the 2WD mode.

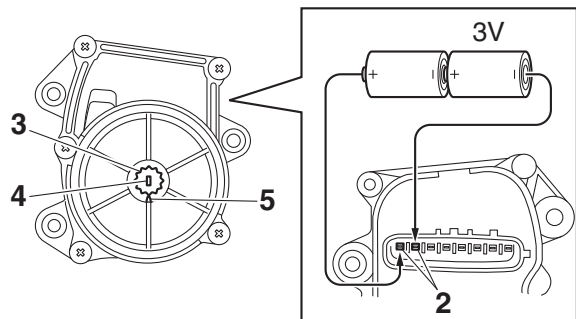


- b. Connect two C-size batteries to the differential motor terminal "2" to operate the differential motor pinion gear "3". Operate the differential motor pinion gear until the mark "4" on the differential motor pinion gear is aligned with the mark "5" on the differential motor case.

ECB01650

## NOTICE

Do not use a 12 V battery to operate the differential motor pinion gear.



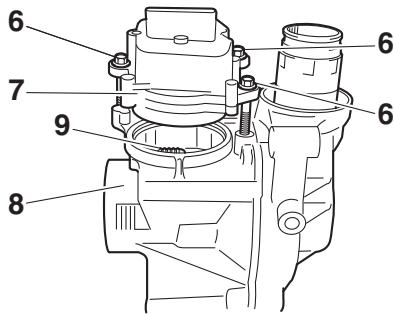
- c. Insert 6 mm bolts "6" into the differential motor "7" and use them as a guide to set the motor on the differential case cover "8" so that the shift fork sliding gear "9" does not move.

ECB01950


## NOTICE

If the position of the shift fork sliding gear is moved, the position of the differential gear assembly and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.

# FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

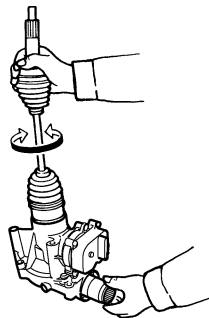


d. Remove the 6 mm bolts, and then install the motor with the differential motor bolts.

	<b>Differential motor bolt</b> <b>11 Nm (1.1 m·kgf, 8.0 ft·lbf)</b>
---	--

3. Check:

- Differential assembly operation  
Unsmooth operation → Replace the differential assembly.
- Insert the double offset joint into the differential assembly, and turn the gears back and forth.



EBS30251

## MEASURING THE DIFFERENTIAL GEAR BACKLASH

- Secure the differential case in a vise or another supporting device.
- Remove:
  - Drain plug
  - Gasket
- Install:
  - Ring gear fix bolt (M10) "1"  
(into the drain plug hole)

	<b>Ring gear fix bolt (M10)</b> <b>90890-01527</b> <b>Ring gear fix bolt (M10)</b> <b>YM-01527</b>
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ECB01250

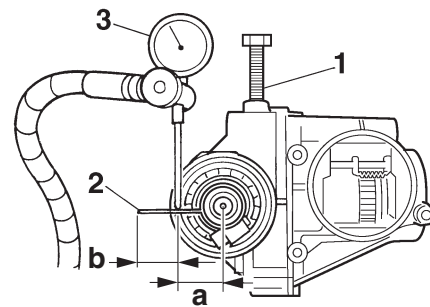
### NOTICE

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:

- Gear lash measurement tool "2"
- Dial gauge "3"

	<b>Gear lash measurement tool</b> <b>90890-01475</b> <b>Middle drive gear lash tool</b> <b>YM-01475</b>
---	--



- Measuring point is 22.5 mm (0.86 in)
- Measuring point is 28 mm (1.10 in)

5. Measure:

- Gear backlash  
Gently rotate the differential pinion gear from engagement to engagement.

	<b>Differential gear backlash</b> <b>0.05–0.25 mm (0.002–0.010 in)</b>
---	---

### TIP

Measure the gear backlash at four positions. Rotate the differential pinion gear 90° each time.

EBS30252

## ADJUSTING THE DIFFERENTIAL GEAR BACKLASH

1. Remove:

- Differential gear assembly shim(s) "1"
- Differential gear assembly "2"

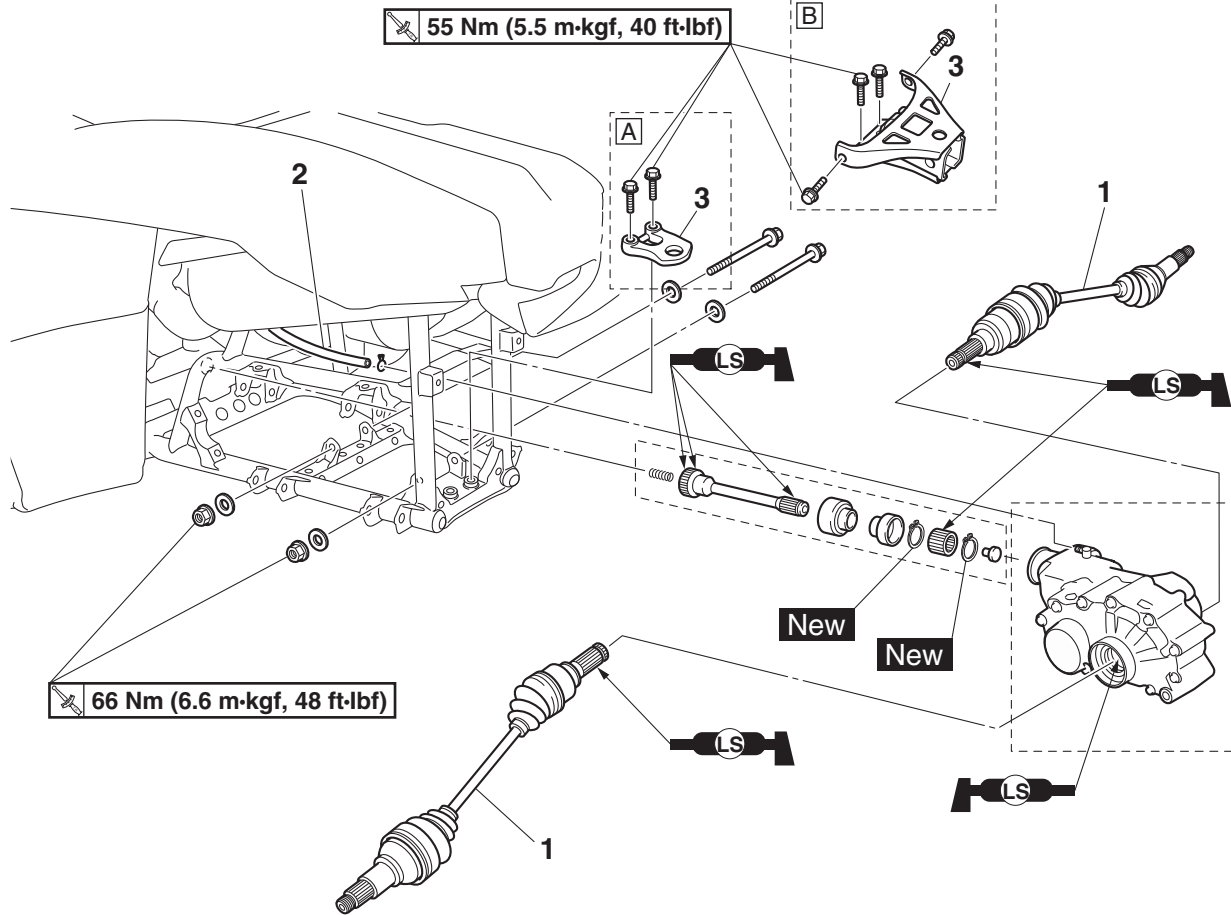


# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

EBS20060

## REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft



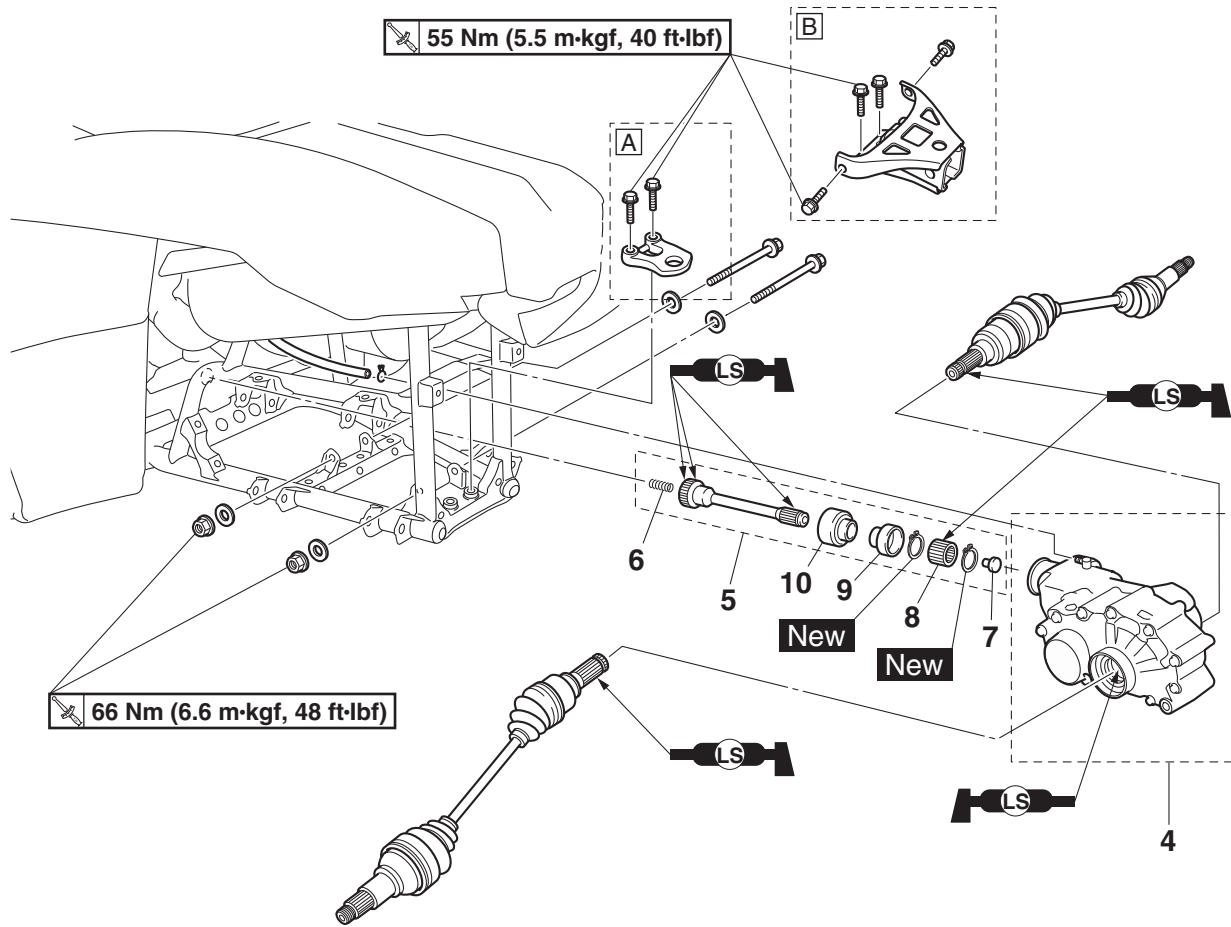
A: For panel wheel models  
B: For cast wheel models

Order	Job/Parts to remove	Q'ty	Remarks
	Rear skid plate		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS (3)" on page 4-8.
	Rear arms		Refer to "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" on page 4-72.
	Final gear oil		Drain. Refer to "CHANGING THE FINAL GEAR OIL" on page 3-27.
1	Rear constant velocity shaft assembly	2	
2	Final drive case breather hose	1	Disconnect.
3	Trailer hitch	1	



# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft

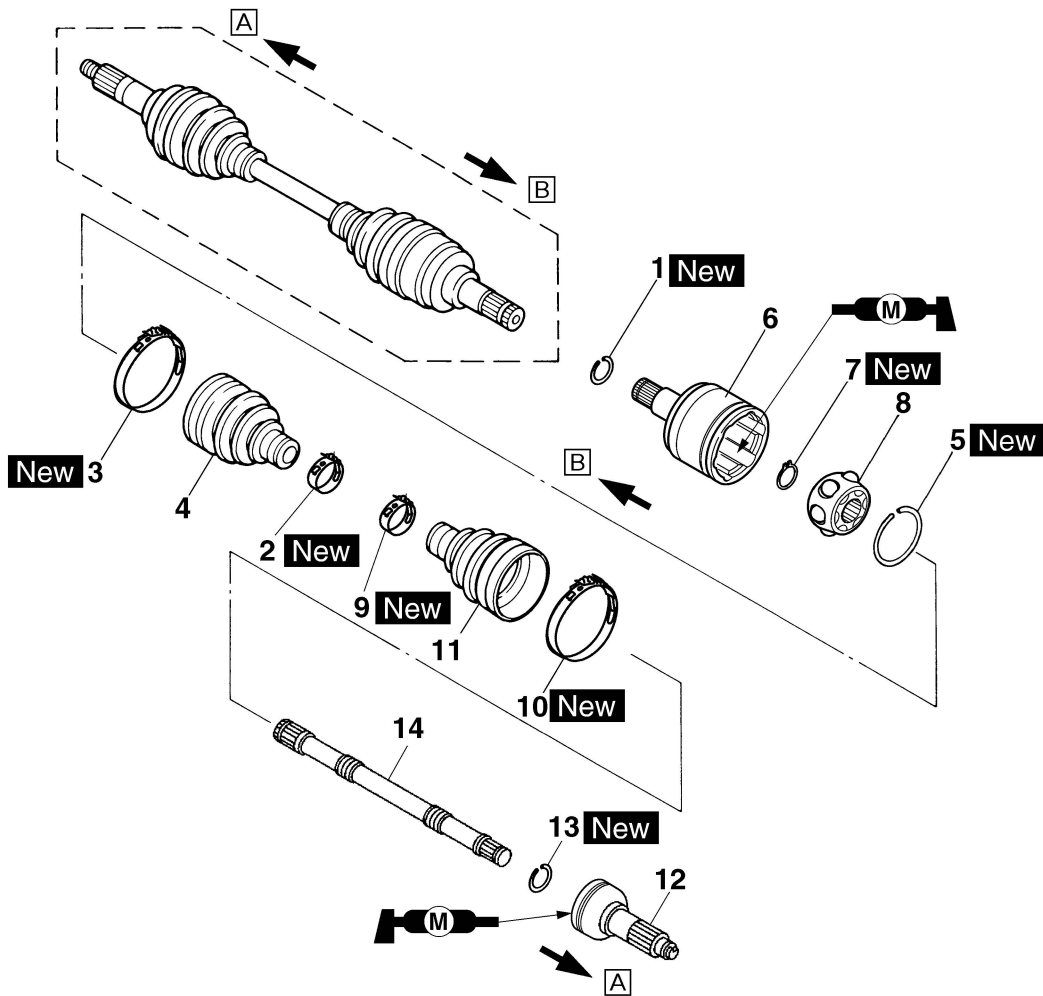


A: For panel wheel models  
B: For cast wheel models

Order	Job/Parts to remove	Q'ty	Remarks
4	Final drive assembly	1	
5	Rear drive shaft	1	
6	Spring	1	
7	Damper	1	
8	Rear drive shaft coupling sleeve	1	
9	Dust seal	1	
10	Dust seal	1	

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

## Disassembling the rear constant velocity shaft assemblies

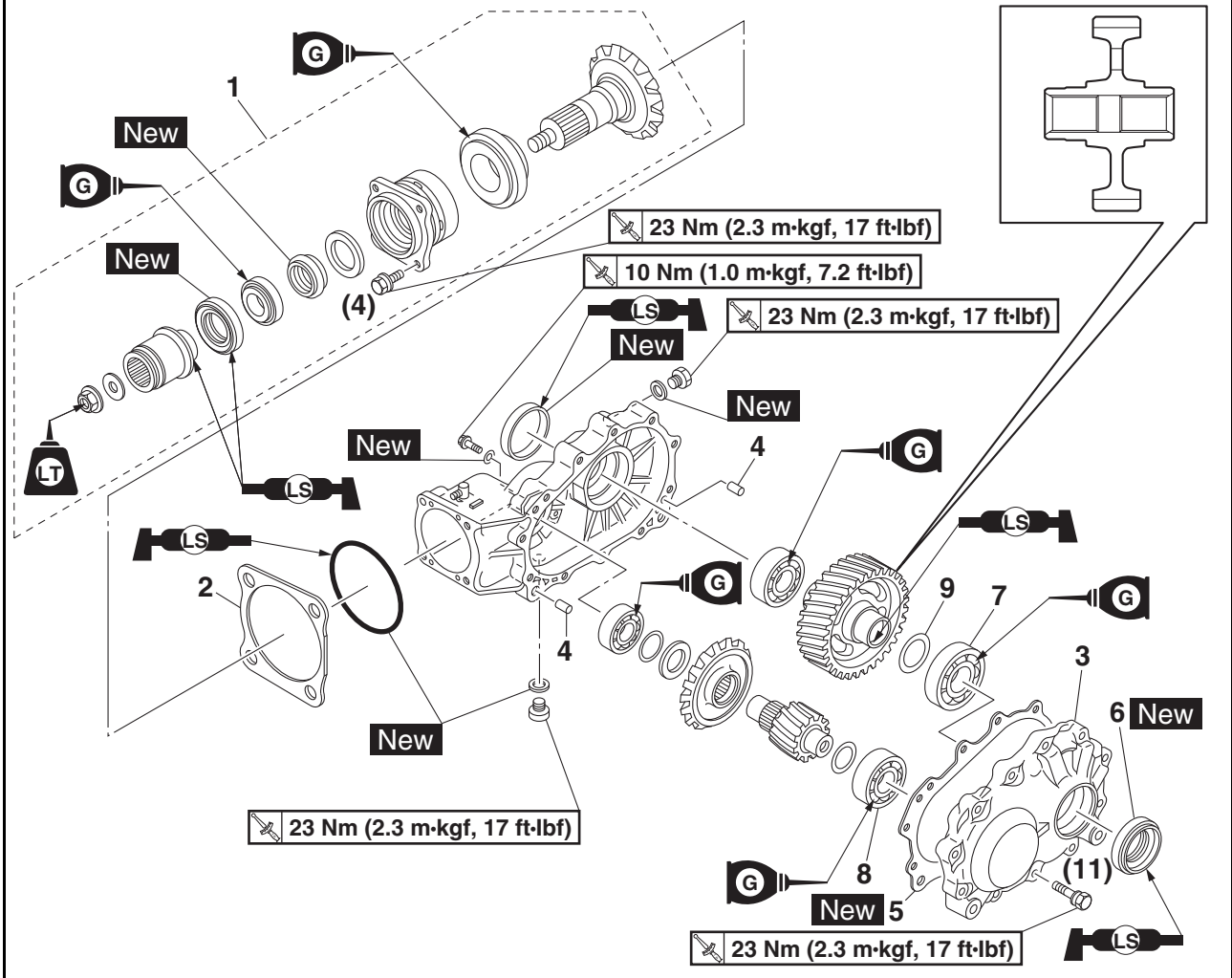


A: Wheel side  
B: Final drive side

Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear constant velocity shaft assemblies.
1	Clip	1	
2	Boot band	1	
3	Boot band	1	
4	Dust boot	1	
5	Clip	1	
6	Double offset joint	1	
7	Circlip	1	
8	Ball bearing	1	
9	Boot band	1	
10	Boot band	1	
11	Dust boot	1	
12	Constant velocity joint	1	
13	Clip	1	
14	Constant velocity shaft	1	

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

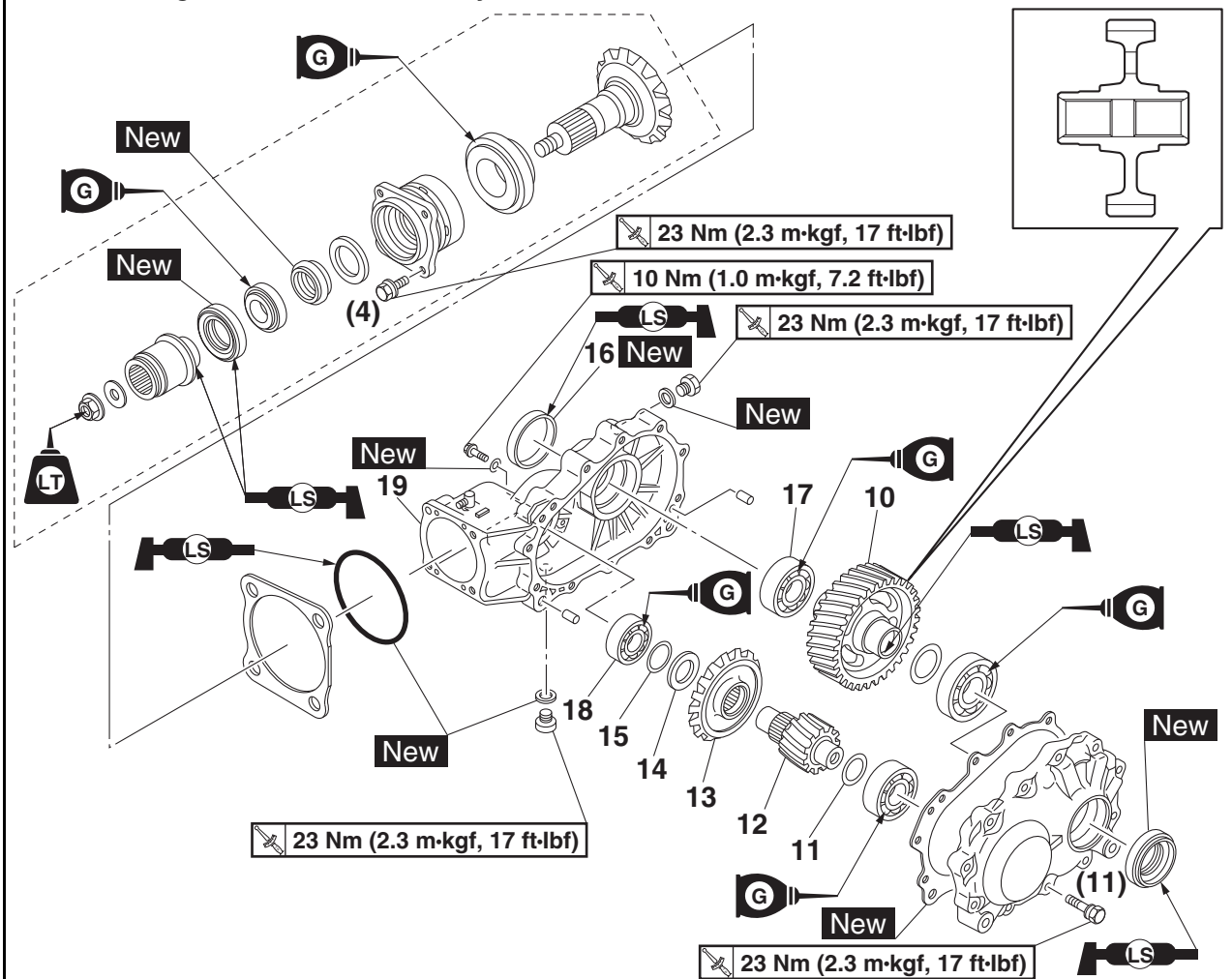
## Disassembling the final drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Final drive pinion gear assembly	1	
2	Final drive pinion gear shim	—	Refer to "SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)" on page 8-25.
3	Final drive case cover	1	<b>TIP</b> Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
4	Dowel pin	2	
5	Gasket	1	
6	Oil seal	1	
7	Bearing	1	
8	Bearing	1	
9	Wheel gear shim	—	Refer to "SELECTING THE WHEEL GEAR SHIM(S)" on page 8-28.

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

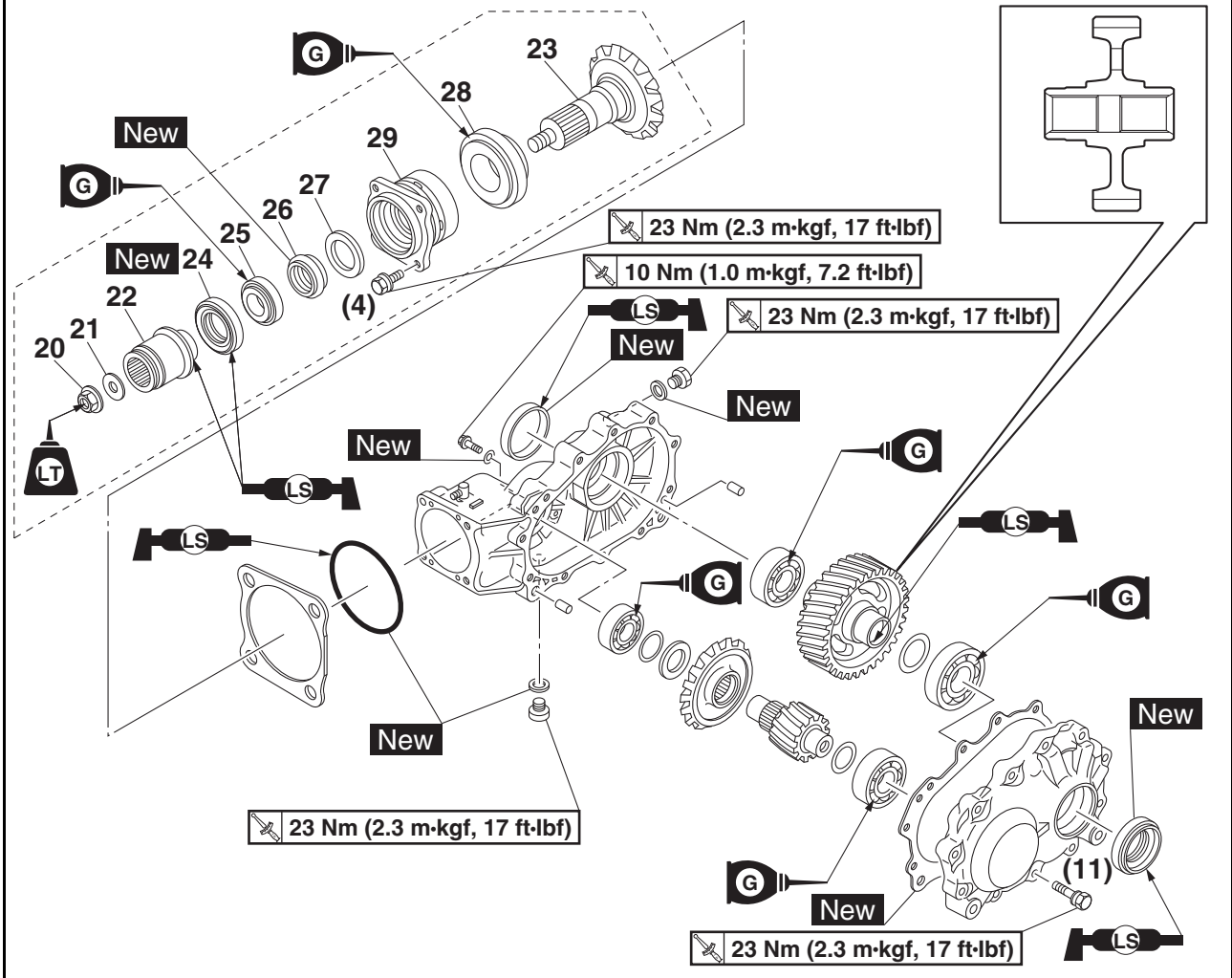
## Disassembling the final drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
10	Wheel gear	1	
11	Final driven pinion gear shim (final drive case cover side)	—	Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)" on page 8-27.
12	Pinion gear	1	
13	Final driven pinion gear	1	
14	Thrust washer	—	Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER" on page 8-26.
15	Final driven pinion gear shim (final drive case side)	—	Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER" on page 8-26.
16	Oil seal	1	
17	Bearing	1	
18	Bearing	1	
19	Final drive case	1	

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

## Disassembling the final drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
20	Rear drive shaft yoke nut	1	
21	Washer	1	
22	Rear drive shaft yoke (final drive case side)	1	
23	Final drive pinion gear	1	
24	Oil seal	1	
25	Bearing	1	
26	Expander	1	
27	Washer	1	
28	Bearing	1	
29	Final drive pinion gear bearing housing	1	

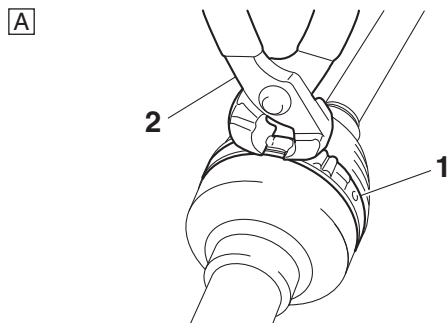
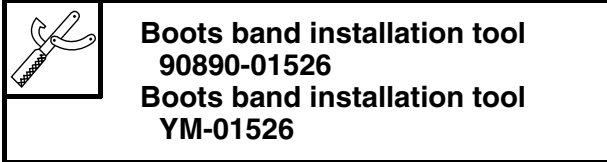
# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

EBS30253

## DISASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

- Remove:
  - Boot band "1"
 Use the boot band installation tool "2".

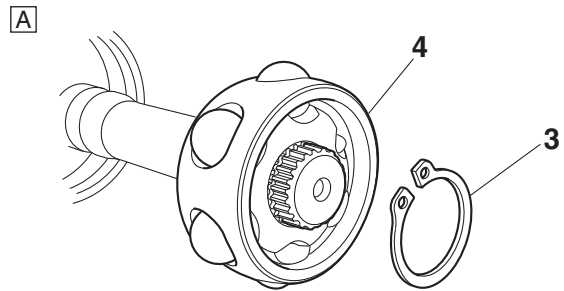
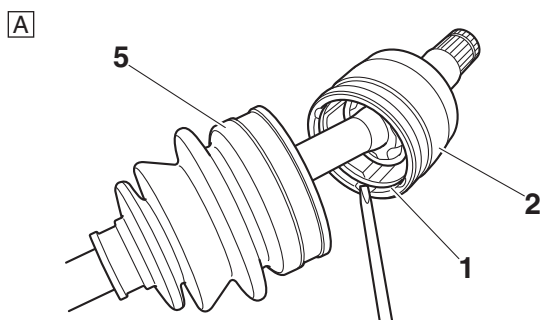


A. Final drive side

- Remove:
  - Clip "1"
  - Double offset joint "2"
  - Circlip "3"
  - Ball bearing "4"
  - Dust boot "5"

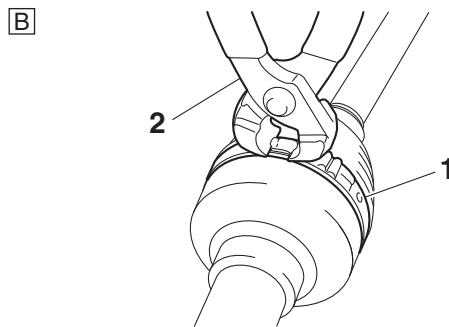
### TIP

Before removing the clip, slide the dust boot away from the double offset joint.



A. Final drive side

- Remove:
  - Boot band "1"
 Use the boot band installation tool "2".

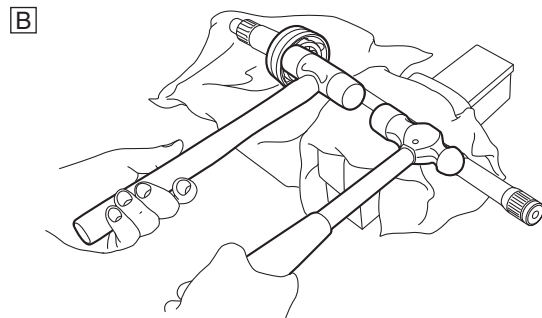


B. Wheel side

- Remove:
  - Dust boot
  - Constant velocity joint
  - Clip

### TIP

Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.



B. Wheel side

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

EBS30254

## CHECKING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Check:
  - Double offset joint splines
  - Constant velocity joint splines
  - Constant velocity shaft splines
  - Wear/damage → Replace.
2. Check:
  - Dust boots
  - Cracks/damage → Replace.

ECB01590

### NOTICE

**Always use a new boot band.**

3. Check:
  - Balls and ball races
  - Inner surface of double offset joint
  - Pitting/wear/damage → Replace.

EBS30255

## ASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Install:
  - Clip "1" **New**
  - Constant velocity joint "2"
  - Constant velocity shaft "3"
  - Dust boot

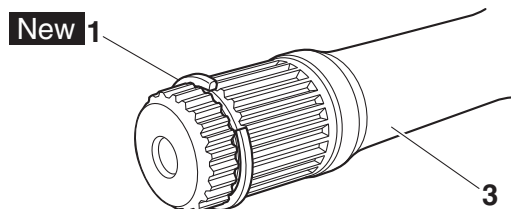


- a. Install the clip.
- b. Install the constant velocity joint.

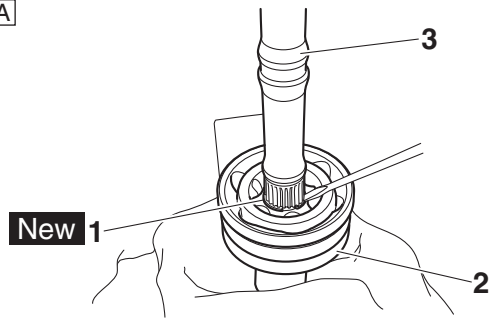
### TIP

- Install the clip into the groove in the constant velocity shaft as shown.
- Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

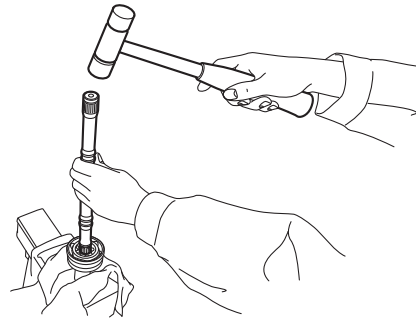
A



A



A



A. Wheel side

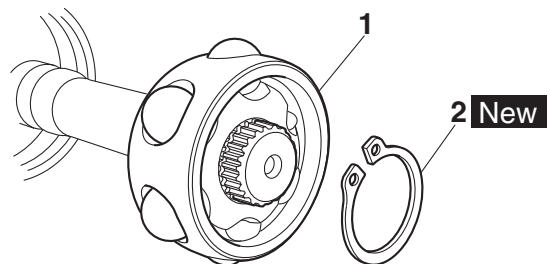


2. Install:
  - Dust boot
  - Ball bearing "1"
  - Circlip "2" **New**
  - Double offset joint "3"
  - Clip "4" **New**

### TIP

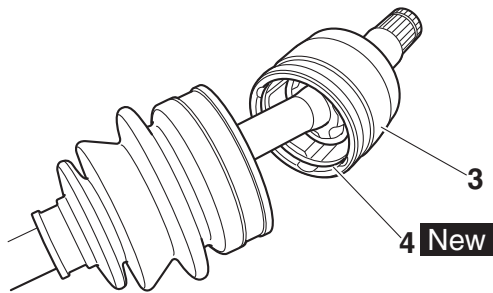
- Securely install the circlip into the groove in the constant velocity shaft.
- Securely install the clip into the groove in the double offset joint.

B



# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

B



B. Final drive side

3. Apply:

- Molybdenum disulfide grease  
(into the double offset joint, constant velocity joint, and dust boots)

	<p><b>Molybdenum disulfide grease</b>  <b>60 g (2.1 oz) per dust boot (wheel side)</b>  <b>70 g (2.5 oz) per dust boot (final drive side)</b></p>
--	---

**TIP**

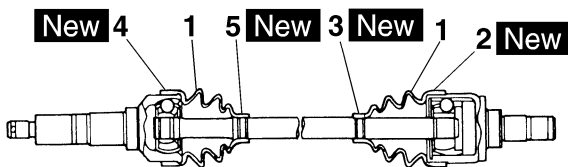
Molybdenum disulfide grease is included in the repair kit.

4. Install:

- Dust boots "1"
- Boot bands "2", "3", "4", "5" **New**

**TIP**

- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands "3" and "5" at the grooves in the constant velocity shaft.



a. Install the dust boots.

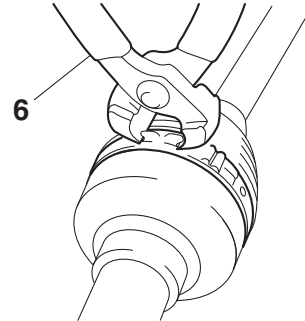
b. Install the dust boot bands.

Use the boot band installation tool "6".



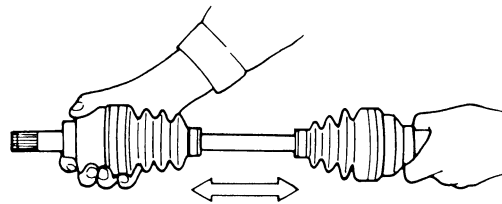
**Boots band installation tool**  
**90890-01526**

**Boots band installation tool**  
**YM-01526**



5. Check:

- Thrust movement free play  
Excessive play → Replace the constant velocity shaft assembly.



EBS30256

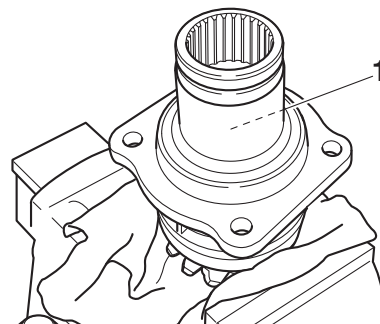
## DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

1. Remove:

- Rear drive shaft yoke nut "1"

a. Place a folded rag as shown.

b. Secure the final drive pinion gear in the vise.



c. Remove the rear drive shaft yoke nut.



# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

EBS30257

## CHECKING THE REAR DRIVE SHAFT

- Check:
  - Drive shaft splines
  - Coupling sleeve splines
 Wear/damage → Replace.

EBS30258

## CHECKING THE FINAL DRIVE ASSEMBLY

- Check:
  - Final drive case
  - Final drive case cover
 Cracks/damage → Replace.

### TIP

When the final drive case and/or the final drive case cover are replaced, be sure to adjust the shim of the final drive pinion gear and/or final driven pinion gear.

- Check:
  - Gear teeth
 Pitting/galling/wear → Replace the final drive pinion gear and final driven pinion gear as a set.

### TIP

When the final drive pinion gear, final driven pinion gear and/or wheel gear are replaced, be sure to adjust the shim of the final drive pinion gear, final driven pinion gear and/or wheel gear.

- Oil seals
  - O-ring
- Damage → Replace.
- Check:
    - Bearings
 Damage → Replace.

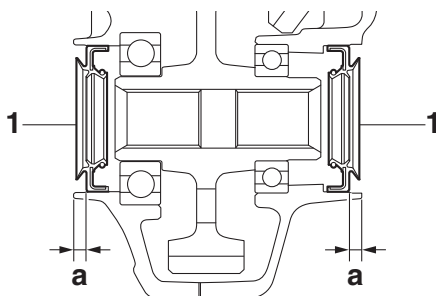
EBS30410

## ASSEMBLING THE FINAL DRIVE CASE

- Install:
  - Oil seals “1”



Installed depth of oil seal “a”  
5.5 mm (0.22 in)

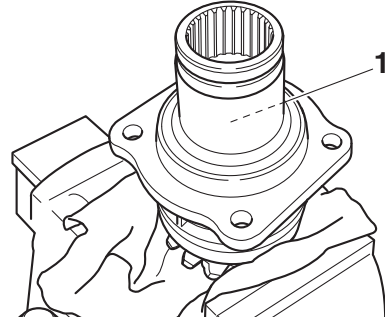


EBS30262

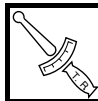
## ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

- Install:
  - Rear drive shaft yoke nut “1”

- Place a folded rag as shown.
- Secure the final drive pinion gear in the vise.

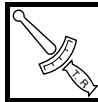


- Tighten the rear drive shaft yoke nut. (temporarily)



**Rear drive shaft yoke nut (temporarily)**  
82 Nm (8.2 m·kgf, 59 ft·lbf)  
LOCTITE®

- Secure the final drive pinion gear bearing housing in a vise, and then turn the nut with a torque wrench to check the starting torque.



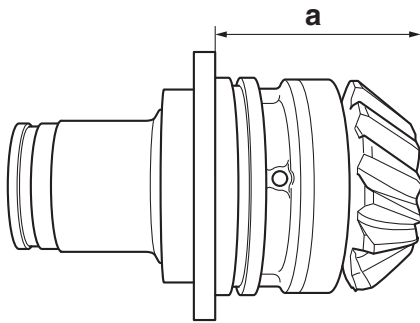
**Final drive pinion gear starting torque (final drive pinion gear preload)**  
0.8–1.3 Nm (0.08–0.13 m·kgf, 0.58–0.94 ft·lbf)

- Out of specification → Tighten the nut further.
- Repeat steps (d) and (e) until the starting torque is within specification.

### TIP

- Be careful not to exceed the specified starting torque.
- If the specified starting torque is exceeded, replace the expander with a new one and reassemble the final drive pinion gear assembly.
- Make sure that the distance “a” is 67.5–68.1 mm (2.66–2.68 in) as shown.

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT



2. Check:
- Final drive assembly operation  
Unsmooth operation → Replace the final drive assembly.  
Insert the double offset joint into the final drive assembly, and turn the gears back and forth.

EBS30413

## SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)

1. Select:
- Final drive pinion gear shim(s) "1"

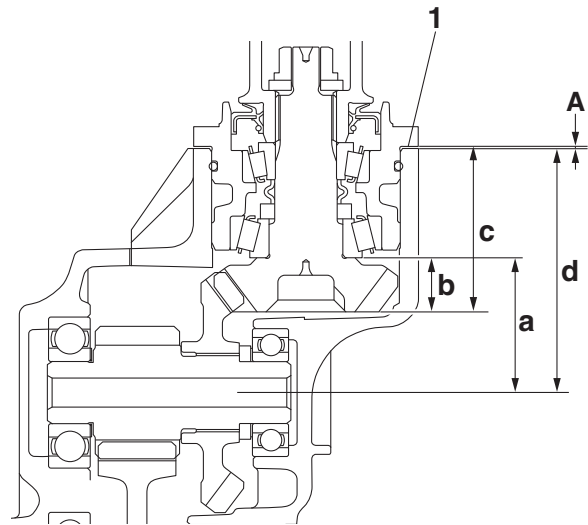


- a. To find the final drive pinion gear shim thickness "A", use the following formula.

Final drive pinion gear shim thickness  

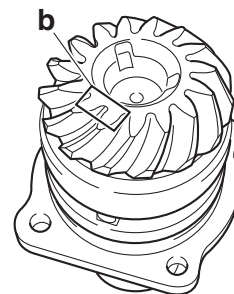
$$"A" = "a" + ("c" - "b") - "d"$$

- "a" = 55 mm
- "b" = a numeral (usually a decimal number) on the final drive pinion gear either added to or subtracted from "22.2"
- "c" = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from "67.8"
- "d" = a numeral (usually a decimal number) on the final drive case either added to or subtracted from "100"

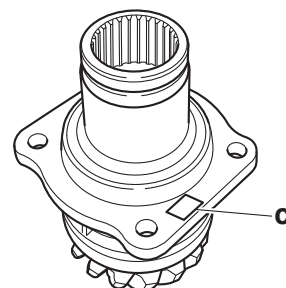


Example:

"a" = 55  
 If "-02" is stamped on the final drive pinion gear,  
 "b" = 22.2 - 0.02  
 = 22.18

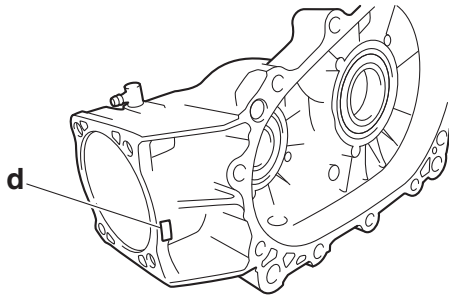


If "-05" is stamped on the final drive pinion gear bearing housing,  
 "c" = 67.8 - 0.05  
 = 67.75



# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

If "-01" is stamped on the final drive case,  
 "d" = 100 - 0.01  
 = 99.99



Therefore, "A" is 0.58.  
 "A" = 55 + (67.75 - 22.18) - 99.99  
 = 0.58

Round off the hundredth digit and select the appropriate shim(s).  
 In the example above, the calculated number is 0.58. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 0.60 mm (0.024 in).

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

Shims are supplied in the following thicknesses.

	<b>Final drive pinion gear shims</b>
	<b>Thickness (mm)</b> 0.25 0.30 0.35 0.40 0.45 0.50

EBS30412

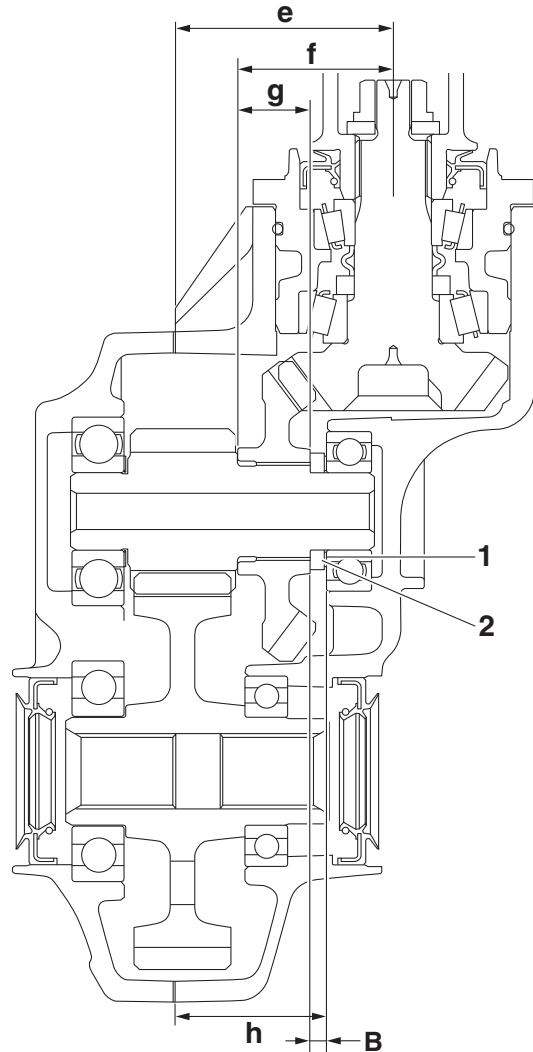
## SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER

- Select:
  - Final driven pinion gear shim (final drive case side) "1"
  - Thrust washer "2"

- To find the final driven pinion gear shim (final drive case side) and thrust washer thickness "B", use the following formula.

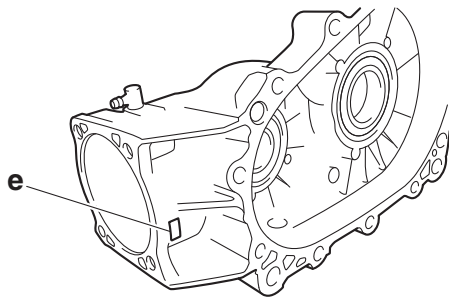
Final driven pinion gear shim (final drive case side) and thrust washer thickness  
 "B" = "h" - ("e" - "f" + "g")

"e" = a numeral (usually a decimal number) on the final drive case either added to or subtracted from "71.6"  
 "f" = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from "51.0"  
 "g" = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from "24.0"  
 "h" = 49.8

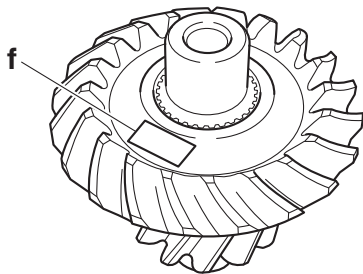


Example:  
 If "-03" is stamped on the final drive case,  
 "e" = 71.6 - 0.03  
 = 71.57

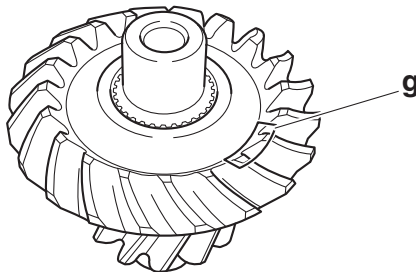
# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT



If “-12” is stamped on the outside of the final driven pinion gear,  
 “f” = 51.0 - 0.12  
 = 50.88



If “-05” is stamped on the outside of the final driven pinion gear,  
 “g” = 24.0 - 0.05  
 = 23.95



“h” = 49.8  
 Therefore, shim and thrust washer thickness “B” is 5.16.  
 “B” = 49.8 - (71.57 - 50.88 + 23.95)  
 = 5.16  
 Round off the hundredth digit and select the appropriate shim(s).  
 In the example above, the calculated number is 5.16. The chart instructs you to round off 6 to 5 at the hundredth place.  
 Thus, the shim and thrust washer thickness is 5.15 mm.

Hundredth	Rounded value
0, 1, 2	0

Hundredth	Rounded value
3, 4, 5, 6, 7	5
8, 9	10

Shim and thrust washer are supplied in the following thicknesses.



**Final driven pinion gear shims (final drive case side) “1”**  
**Thickness (mm)**  
 0.25 0.30 0.35 0.40 0.45 0.50



**Thrust washer “2”**  
**Thickness (mm)**  
 4.50 4.80 5.10 5.40

## TIP

Be sure to use one of each of the final driven pinion gear shim (final drive case side) “1” and thrust washer “2” to obtain the shim and thrust washer thickness.

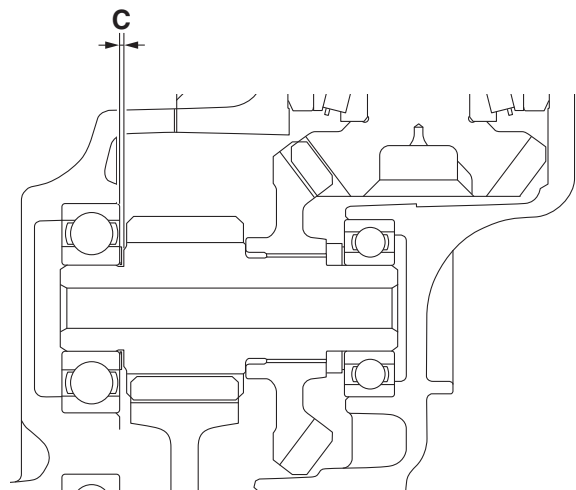


EBS30411

## SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)

1. Measure:

- Final driven pinion gear thrust clearance “C”

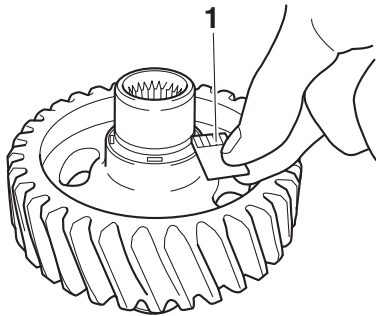




# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT



**Wheel gear thrust clearance**  
0.03–0.07 mm (0.0012–0.0028 in)



e. If out of specification, remove the originally fitted shim(s), and then select the correct shim(s).



2. Select:

- Wheel gear shim(s)



a. Select suitable wheel gear shims using the following chart.



**Wheel gear shims**  
**Thickness (mm)**  
0.25 0.30 0.35 0.40 0.45 0.50

## TIP

Measure the thickness of the originally fitted shim(s), and then calculate the required new shim thickness to bring the wheel gear thrust clearance within the specified limits.

b. Repeat the measurement steps until the wheel gear thrust clearance is within the specified limits.



EBS30260

## MEASURING THE FINAL GEAR BACKLASH

1. Secure the final drive case in a vise or another supporting device.
2. Remove:
  - Drain plug
  - Gasket
3. Install:
  - Ring gear fix bolt (M14) "1"  
(into the drain plug hole)



**Ring gear fix bolt (M14)**  
90890-01524  
**Ring gear fix bolt (M14)**  
YM-01524

ECB01250

## NOTICE

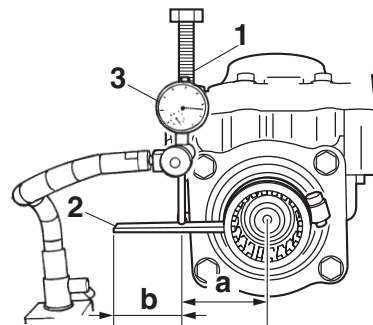
Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:

- Final gear backlash band "2"
- Dial gauge "3"



**Final gear backlash band**  
90890-01511  
**Middle drive gear lash tool**  
YM-01230



- a. Measuring point is 31.5 mm (1.24 in)
- b. Measuring point is 32.1 mm (1.26 in)

5. Measure:

- Gear backlash

Gently rotate the final drive pinion gear from engagement to engagement.



**Final gear backlash**  
0.10–0.20 mm (0.004–0.008 in)

## TIP

- When measuring the gear backlash, be sure the right side (gear oil level check bolt side) of the final drive case assembly is facing downward.
- Measure the gear backlash at four positions. Rotate the final drive pinion gear 90° each time.

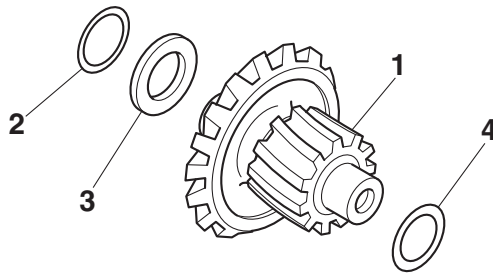
EBS30261


## ADJUSTING THE FINAL GEAR BACKLASH

1. Remove:

- Final driven pinion gear assembly "1"
- Final driven pinion gear shim (final drive case side) "2"
- Thrust washer "3"
- Final driven pinion gear shim (final drive case cover side) "4"

# REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT



	<b>Final driven pinion gear shims (final drive case cover side) "4"</b> <b>Thickness (mm)</b> 0.25 0.30 0.35 0.40 0.45 0.50
---	---




2. Adjust:
- Gear backlash




- a. Select a suitable shim(s) and thrust washer(s) using the following chart.

Thinner shim	Final gear backlash is increased.
Thicker shim	Final gear backlash is decreased.

- b. If increased by more than 0.2 mm (0.008 in):  
Reduce the final driven pinion gear shim (final drive case cover side) "4" thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) "2" and thrust washer "3" are increased.
- c. If reduced by more than 0.2 mm (0.008 in):  
Increase the final driven pinion gear shim (final drive case cover side) "4" thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) "2" and thrust washer "3" are decreased.

	<b>Final driven pinion gear shims (final drive case side) "2"</b> <b>Thickness (mm)</b> 0.25 0.30 0.35 0.40 0.45 0.50
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	<b>Thrust washers "3"</b> <b>Thickness (mm)</b> 4.50 4.80 5.10 5.40
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**TIP** \_\_\_\_\_

Be sure to use one of each of the final driven pinion gear shim (final drive case side) "2" and thrust washer "3" to obtain the shim and thrust washer thickness.

**REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL  
DRIVE ASSEMBLY AND REAR DRIVE SHAFT**

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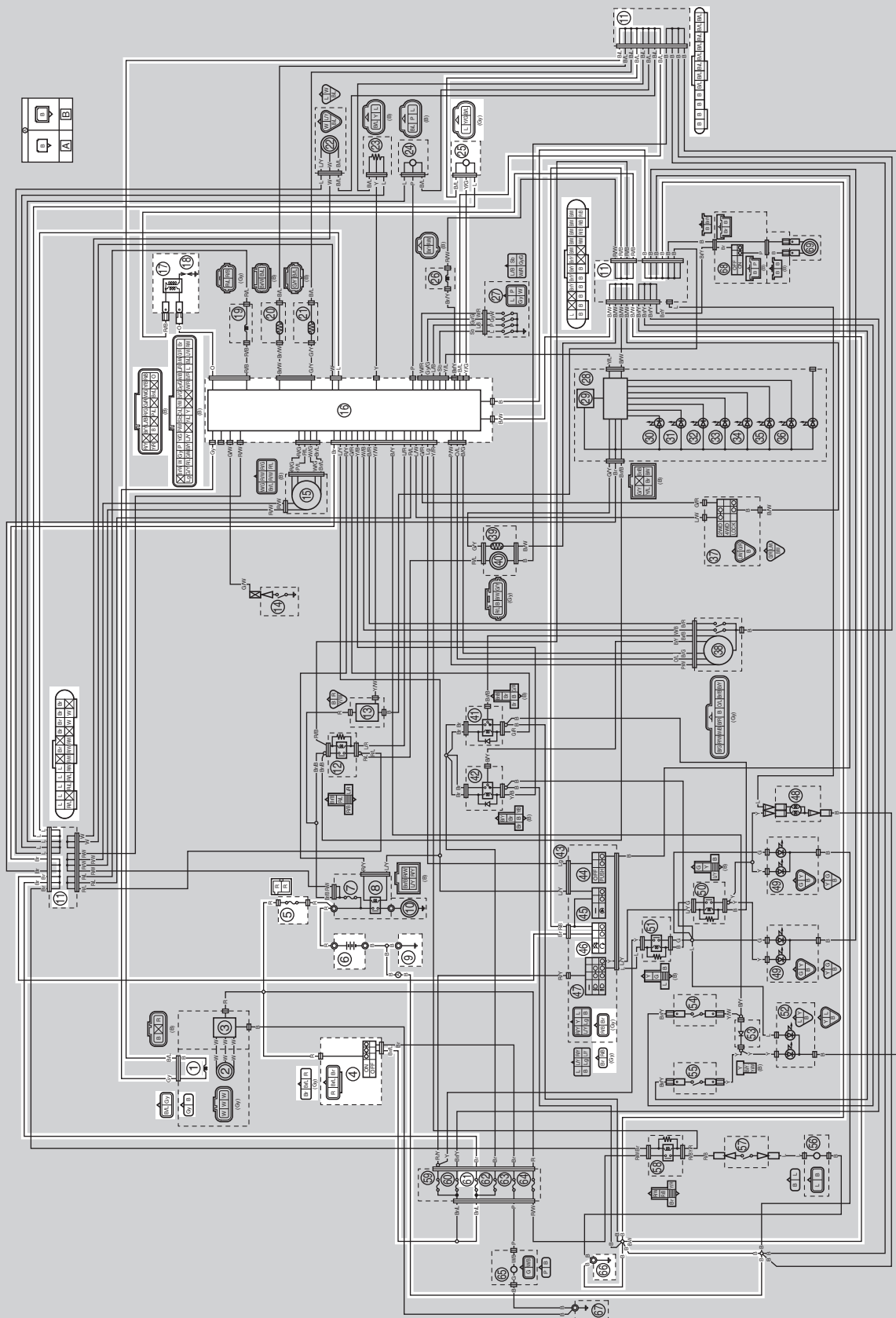
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EBS20074

## IGNITION SYSTEM

EBS30264

## CIRCUIT DIAGRAM



# IGNITION SYSTEM

---

- 1. Crankshaft position sensor
- 4. Main switch
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 11. Joint coupler
- 16. ECU (Engine Control Unit)
- 17. Ignition coil
- 18. Spark plug
- 25. Lean angle sensor
- 46. Engine stop switch
- 61. Ignition fuse
- 66. Frame ground 1
  - A. Wire harness
  - B. Negative battery sub-wire harness

EBS30265

## TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Top cover
4. Side panels (left and right)
5. Storage compartment
6. V-belt cooling exhaust duct

<p>1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 9-84.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
OK ↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	<p>NG →</p>	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK ↓		
<p>3. Check the spark plug. Refer to "CHECKING THE SPARK PLUG" on page 3-4.</p>	<p>NG →</p>	<p>Re-gap, clean, or replace the spark plug.</p>
OK ↓		
<p>4. Check the spark plug cap. Refer to "CHECKING THE SPARK PLUG CAP" on page 9-90.</p>	<p>NG →</p>	<p>Replace the spark plug cap.</p>
OK ↓		
<p>5. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 9-91.</p>	<p>NG →</p>	<p>Replace the ignition coil.</p>
OK ↓		
<p>6. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 9-91.</p>	<p>NG →</p>	<p>The crankshaft position sensor is faulty. Replace the crankshaft position sensor/stator assembly.</p>
OK ↓		
<p>7. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
OK ↓		

## IGNITION SYSTEM

8. Check the engine stop switch.  
Refer to "CHECKING THE SWITCHES" on page 9-81.

NG →

The engine stop switch is faulty. Replace the handlebar switch (left).

OK ↓

9. Check the lean angle sensor.  
Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 9-92.

NG →

Replace the lean angle sensor.

OK ↓

10. Check the entire ignition system wiring.  
Refer to "CIRCUIT DIAGRAM" on page 9-1.

NG →

Properly connect or repair the ignition system wiring.

OK ↓

Replace the ECU.

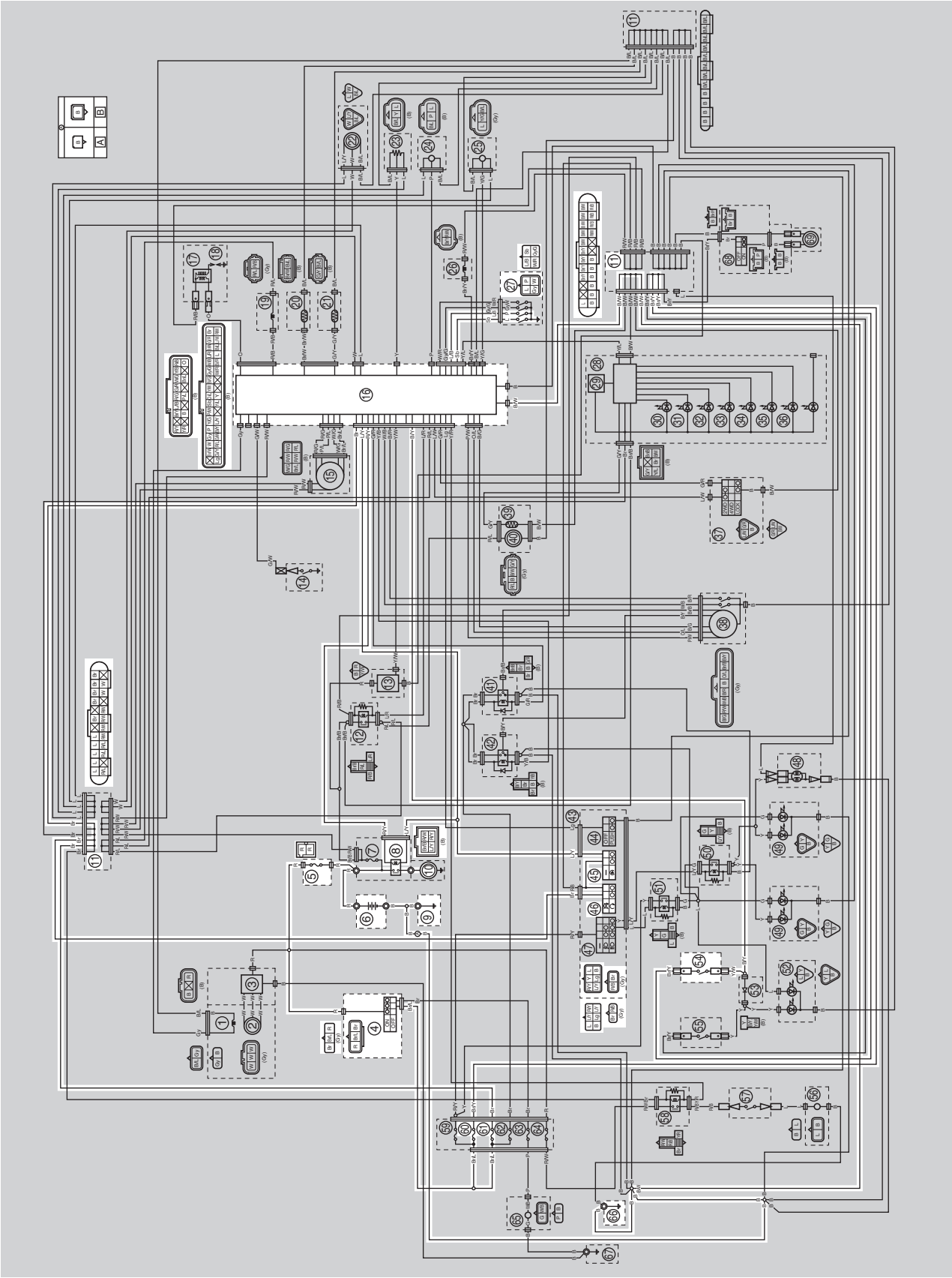
# ELECTRIC STARTING SYSTEM

EBS20075

## ELECTRIC STARTING SYSTEM

EBS30266

### CIRCUIT DIAGRAM





# ELECTRIC STARTING SYSTEM

---

- 4. Main switch
- 5. Main fuse
- 6. Battery
- 8. Starter relay
- 9. Engine ground
- 10. Starter motor
- 11. Joint coupler
- 16. ECU (Engine Control Unit)
- 27. Gear position switch
- 45. Start switch
- 46. Engine stop switch
- 54. Rear brake light switch
- 60. Signaling system fuse
- 61. Ignition fuse
- 66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

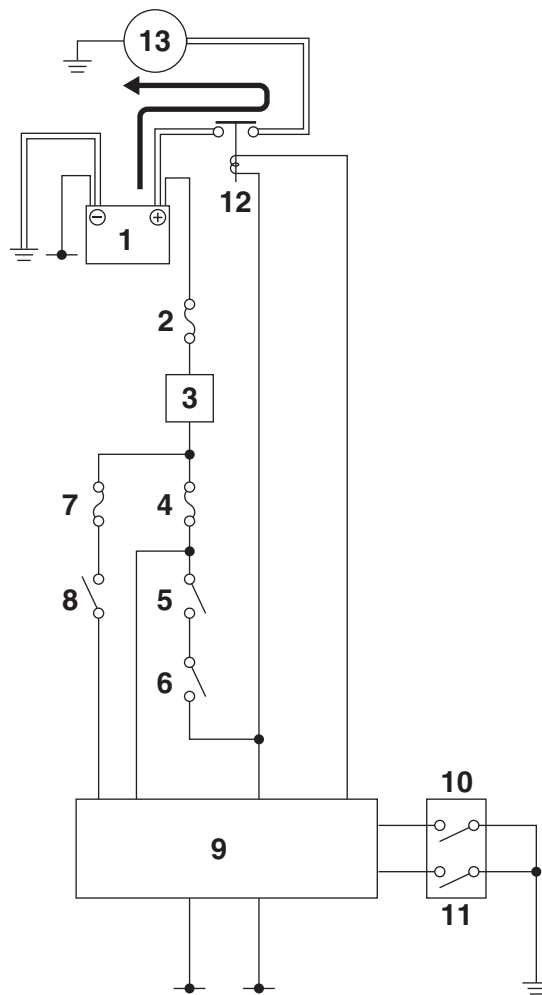
# ELECTRIC STARTING SYSTEM

EBS30267

## STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is set to “⏻” (on) (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).
- The transmission is in park (the park switch circuit of the gear position switch is closed).
- The rear brake lever is pulled to the handlebar or the brake pedal is pushed down (the rear brake light switch circuit is closed).



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Start switch
7. Signaling system fuse
8. Rear brake light switch
9. ECU (Engine Control Unit)
10. Park switch (gear position switch)
11. Neutral switch (gear position switch)
12. Starter relay
13. Starter motor

# ELECTRIC STARTING SYSTEM

EBS30268

## TROUBLESHOOTING

The starter motor fails to turn.

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Top cover
4. Side panels (left and right)
5. V-belt cooling exhaust duct

1. Check the fuses. (Main, ignition and signaling system) Refer to "CHECKING THE FUSES" on page 9-84.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.	NG →	<ul style="list-style-type: none"><li>• Clean the battery terminals.</li><li>• Recharge or replace the battery.</li></ul>
OK ↓		
3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 9-92.	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 5-42.	NG →	Repair or replace the starter motor.
OK ↓		
5. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 9-88.	NG →	Replace the starter relay.
OK ↓		
6. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the main switch.
OK ↓		
7. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	The engine stop switch is faulty. Replace the handlebar switch (left).
OK ↓		

## ELECTRIC STARTING SYSTEM

8. Check the start switch.  
Refer to "CHECKING THE SWITCHES" on page 9-81.

NG →

The start switch is faulty. Replace the handlebar switch (left).

OK ↓

9. Check the rear brake light switch.  
Refer to "CHECKING THE SWITCHES" on page 9-81.

NG →

Replace the rear brake light switch.

OK ↓

10. Check the gear position switch.  
Refer to "CHECKING THE SWITCHES" on page 9-81.

NG →

Replace the gear position switch.

OK ↓

11. Check the entire starting system wiring.  
Refer to "CIRCUIT DIAGRAM" on page 9-5.

NG →

Properly connect or repair the starting system wiring.

OK ↓

Replace the ECU.

# ELECTRIC STARTING SYSTEM

---



# CHARGING SYSTEM

---

- 2. AC magneto
- 3. Rectifier/regulator
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 66. Frame ground 1
- 67. Frame ground 2
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30270

## TROUBLESHOOTING

The battery is not being charged.

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Top cover
4. Side panel (right)
5. V-belt cooling exhaust duct

<p>1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 9-84.</p>	<p>NG →</p>	<p>Replace the fuse.</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	<p>NG →</p>	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
<p>OK ↓</p>		
<p>3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 9-93.</p>	<p>NG →</p>	<p>The stator coil is faulty. Replace the crankshaft position sensor/stator assembly.</p>
<p>OK ↓</p>		
<p>4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 9-93.</p>	<p>NG →</p>	<p>Replace the rectifier/regulator.</p>
<p>OK ↓</p>		
<p>5. Check the entire charging system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-11.</p>	<p>NG →</p>	<p>Properly connect or repair the charging system wiring.</p>
<p>OK ↓</p>		
<p>The charging system circuit is OK.</p>		



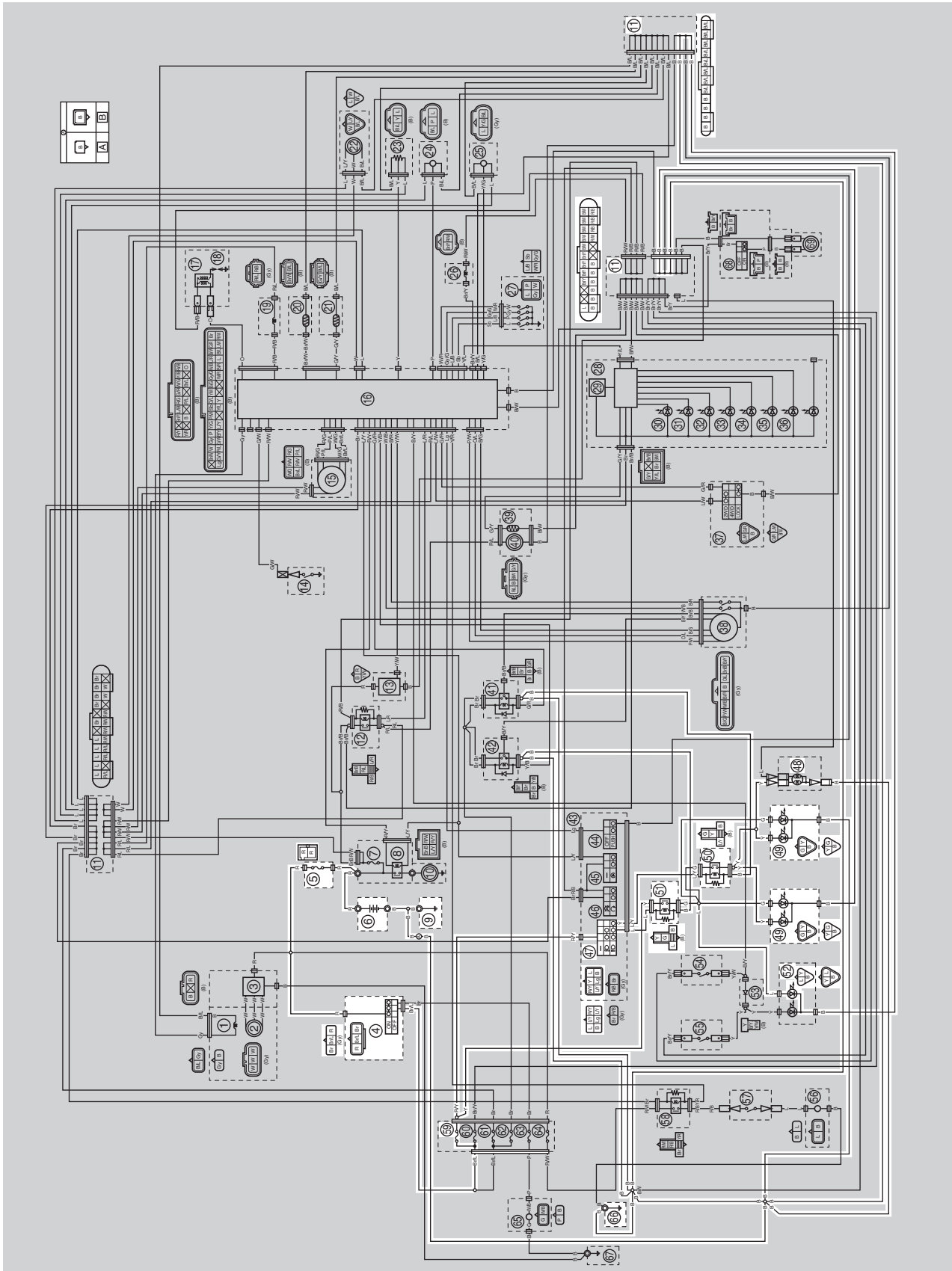


EBS20077

## LIGHTING SYSTEM

EBS30271

## CIRCUIT DIAGRAM



# LIGHTING SYSTEM

---

- 4. Main switch
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 11. Joint coupler
- 47. Light switch
- 48. Handle mounted light
- 49. Headlight
- 50. Headlight relay 2
- 51. Headlight relay 1
- 52. Tail/brake light
- 59. Headlight fuse
- 66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30272

## TROUBLESHOOTING

Any of the following fail to light: Handle mounted light, headlight or taillight.

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Handle mounted light cover

<p>1. Check the condition of handle mounted light bulb and bulb socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 9-83.</p>	<p>NG →</p>	<p>Replace the bulb and bulb socket.</p>
<p>OK ↓</p>		
<p>2. Check the fuses. (Main and headlight) Refer to "CHECKING THE FUSES" on page 9-84.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	<p>NG →</p>	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
<p>OK ↓</p>		
<p>4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
<p>OK ↓</p>		
<p>5. Check the light switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>The light switch is faulty. Replace the handlebar switch (left).</p>
<p>OK ↓</p>		
<p>6. Check the headlight relay 1. Refer to "CHECKING THE RELAYS" on page 9-88.</p>	<p>NG →</p>	<p>Replace the headlight relay 1.</p>
<p>OK ↓</p>		
<p>7. Check the headlight relay 2. Refer to "CHECKING THE RELAYS" on page 9-88.</p>	<p>NG →</p>	<p>Replace the headlight relay 2.</p>
<p>OK ↓</p>		

## LIGHTING SYSTEM

8. Check the entire lighting system wiring.  
Refer to "CIRCUIT DIAGRAM" on page 9-15.

NG →

Properly connect or repair the lighting system wiring.

OK ↓

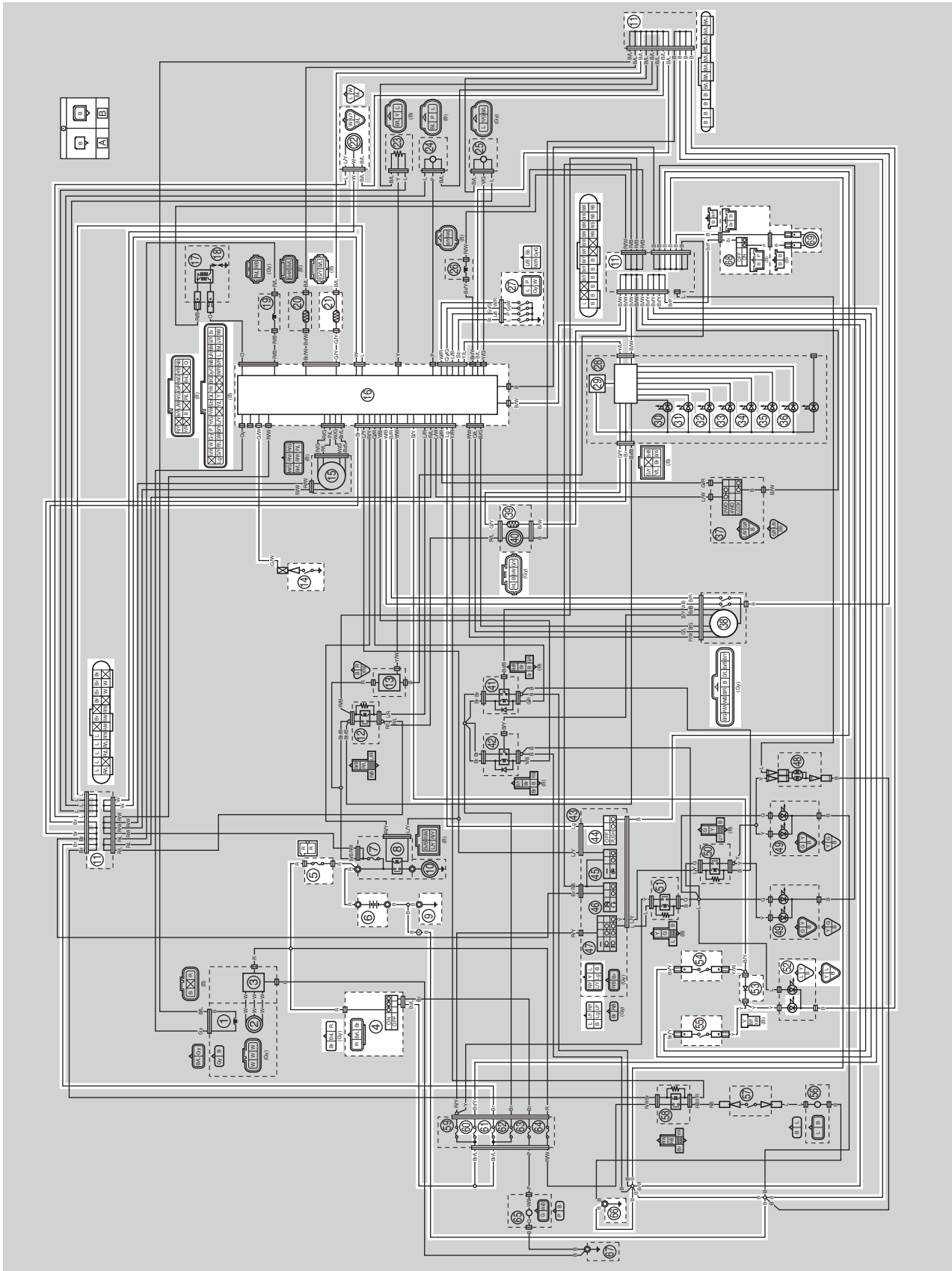
Replace the headlight unit or tail/brake light unit.

EBS20078

## SIGNALING SYSTEM

EBS30352

## CIRCUIT DIAGRAM



- 4. Main switch
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 11. Joint coupler
- 14. Reverse switch
- 16. ECU (Engine Control Unit)
- 21. Coolant temperature sensor
- 22. Speed sensor
- 27. Gear position switch
- 29. Multi-function meter
- 31. Coolant temperature warning light
- 32. Park indicator light
- 33. Reverse indicator light
- 34. Neutral indicator light
- 35. High-range indicator light
- 36. Low-range indicator light
- 38. Differential motor
- 39. Fuel sender
- 44. Override switch
- 52. Tail/brake light
- 53. Diode
- 54. Rear brake light switch
- 55. Front brake light switch
- 60. Signaling system fuse
- 61. Ignition fuse
- 66. Frame ground 1
- 68. Horn switch (except for CDN)
- 69. Horn (except for CDN)
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30274

## TROUBLESHOOTING

- Any of the following fail to light: warning light, brake light or an indicator light.
- The fuel meter fails to come on.
- The speedometer fails to operate.
- The horn fails to sound. (except for CDN)

### TIP

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. V-belt cooling exhaust duct
  6. Rear fender

<p>1. Check the fuses. (Main, ignition and signaling system) Refer to "CHECKING THE FUSES" on page 9-84.</p>	<p>NG →</p>	<p>Replace the fuse(s).</p>
<p>OK ↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	<p>NG →</p>	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
<p>OK ↓</p>		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>Replace the main switch.</p>
<p>OK ↓</p>		
<p>4. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.</p>	<p>NG →</p>	<p>Properly connect or repair the signaling system wiring.</p>
<p>OK ↓</p>		
<p>Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system".</p>		

### Checking the signaling system

The tail/brake light fails to come on.

<p>1. Check the front brake light switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>Replace the front brake light switch.</p>
<p>OK ↓</p>		



# SIGNALING SYSTEM

2. Check the rear brake light switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the rear brake light switch.
OK ↓		
3. Check the diode. Refer to "CHECKING THE DIODE" on page 9-90.	NG →	Replace the diode.
OK ↓		
4. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the tail/brake light unit or ECU.		

The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Check the gear position switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the gear position switch.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly or ECU.		

The reverse indicator light fails to come on.

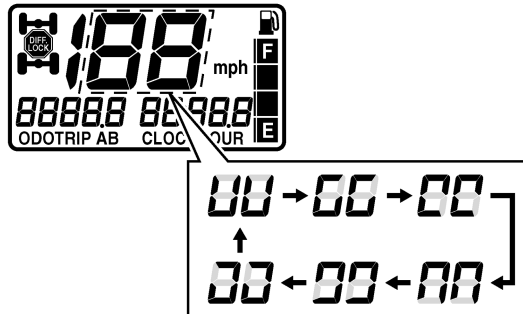
1. Check the reverse switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the reverse switch.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly or ECU.		

# SIGNALING SYSTEM

The differential gear lock indicator light and /or four-wheel-drive indicator light fails to come on.

<p>1. Check the four-wheel-drive motor switch (differential motor). Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>Replace the differential motor.</p>
<p>OK ↓</p>		
<p>2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.</p>	<p>NG →</p>	<p>Properly connect or repair the signaling system wiring.</p>
<p>OK ↓</p>		
<p>Replace the meter assembly or ECU.</p>		

While the override switch is pushed, the segments of the speedometer digits will not appear as shown in the illustration.



<p>1. Check the override switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	<p>NG →</p>	<p>The override switch is faulty. Replace the handlebar switch (left).</p>
<p>OK ↓</p>		
<p>2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.</p>	<p>NG →</p>	<p>Properly connect or repair the signaling system wiring.</p>
<p>OK ↓</p>		
<p>Replace the meter assembly or ECU.</p>		

The coolant temperature warning light fails to come on.

<p>1. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 9-95.</p>	<p>NG →</p>	<p>Replace the coolant temperature sensor.</p>
<p>OK ↓</p>		

# SIGNALING SYSTEM

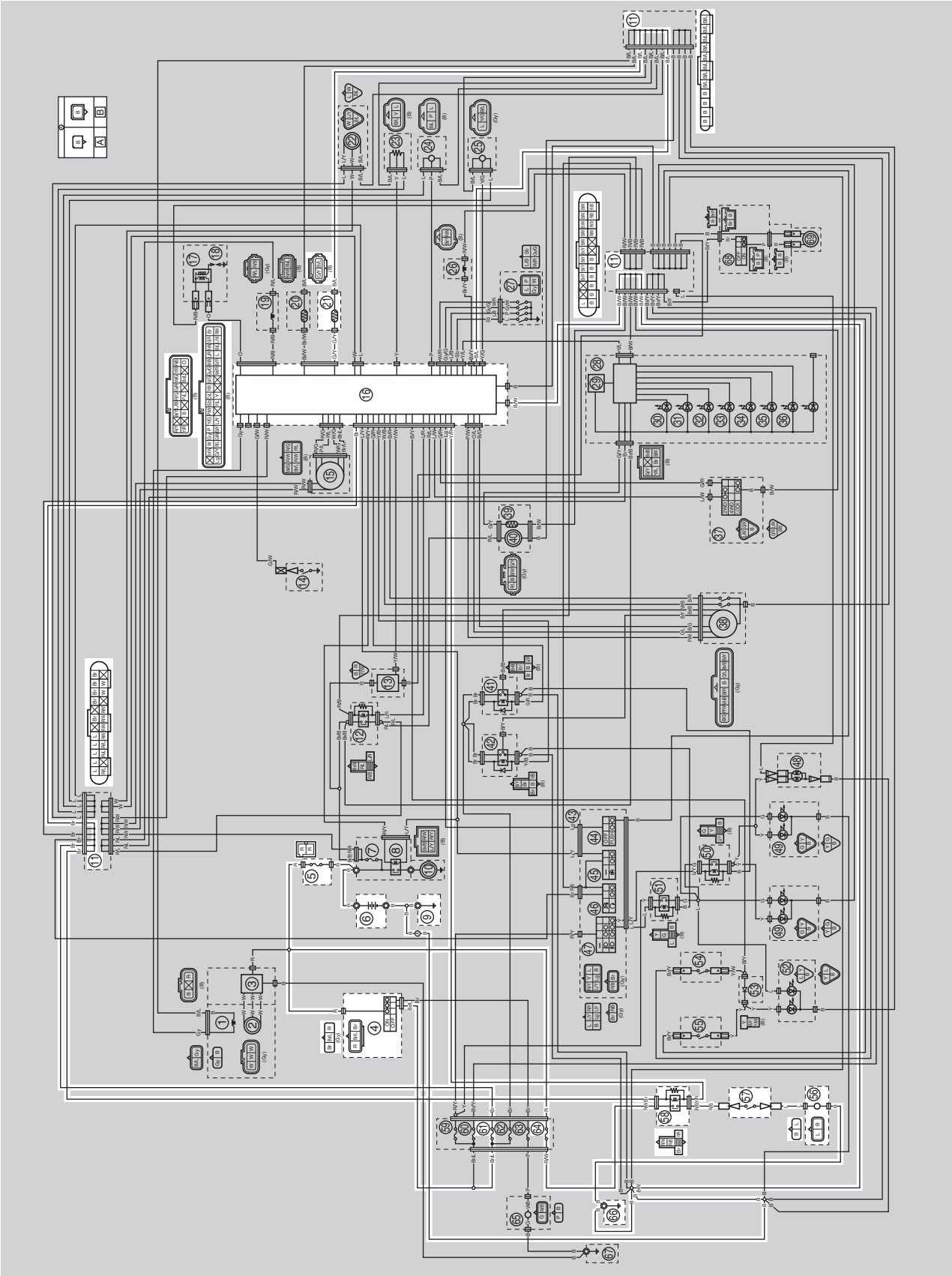
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly or ECU.		
<u>The fuel level indicator fails to come on.</u>		
1. Check the fuel sender. Refer to "CHECKING THE FUEL SENDER" on page 9-93.	NG →	Replace the fuel pump assembly.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly.		
<u>The speedometer fails to operate.</u>		
1. Check the speed sensor. Refer to "CHECKING THE SPEED SENSOR" on page 9-94.	NG →	Replace the speed sensor.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly or ECU.		
<u>The horn fails to sound (except for CDN).</u>		
1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the horn switch.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or replace the wire harness.
OK ↓		
Replace the horn.		

EBS20079

COOLING SYSTEM

EBS30275

CIRCUIT DIAGRAM



## COOLING SYSTEM

---

- 4. Main switch
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 11. Joint coupler
- 16. ECU (Engine Control Unit)
- 21. Coolant temperature sensor
- 56. Radiator fan motor
- 57. Radiator fan motor circuit breaker
- 58. Radiator fan motor relay
- 61. Ignition fuse
- 64. Radiator fan motor fuse
- 66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30276

## TROUBLESHOOTING

The radiator fan motor fails to turn.

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Top cover
4. Side panels (left and right)
5. Front fenders

<p>1. Check the fuses. (Main, ignition and radiator fan motor) Refer to "CHECKING THE FUSES" on page 9-84.</p>	NG →	<p>Replace the fuse(s).</p>
OK ↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	NG →	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK ↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	NG →	<p>Replace the main switch.</p>
OK ↓		
<p>4. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 9-94.</p>	NG →	<p>The radiator fan motor is faulty and must be replaced.</p>
OK ↓		
<p>5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 9-88.</p>	NG →	<p>Replace the radiator fan motor relay.</p>
OK ↓		
<p>6. Check the radiator fan motor circuit breaker. Refer to "CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER" on page 9-95.</p>	NG →	<p>Replace the radiator fan motor circuit breaker.</p>
OK ↓		
<p>7. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 9-95.</p>	NG →	<p>Replace the coolant temperature sensor.</p>
OK ↓		

## COOLING SYSTEM

8. Check the entire cooling system wiring.  
Refer to "CIRCUIT DIAGRAM" on page 9-25.

NG →

Properly connect or repair the cooling system wiring.

OK ↓

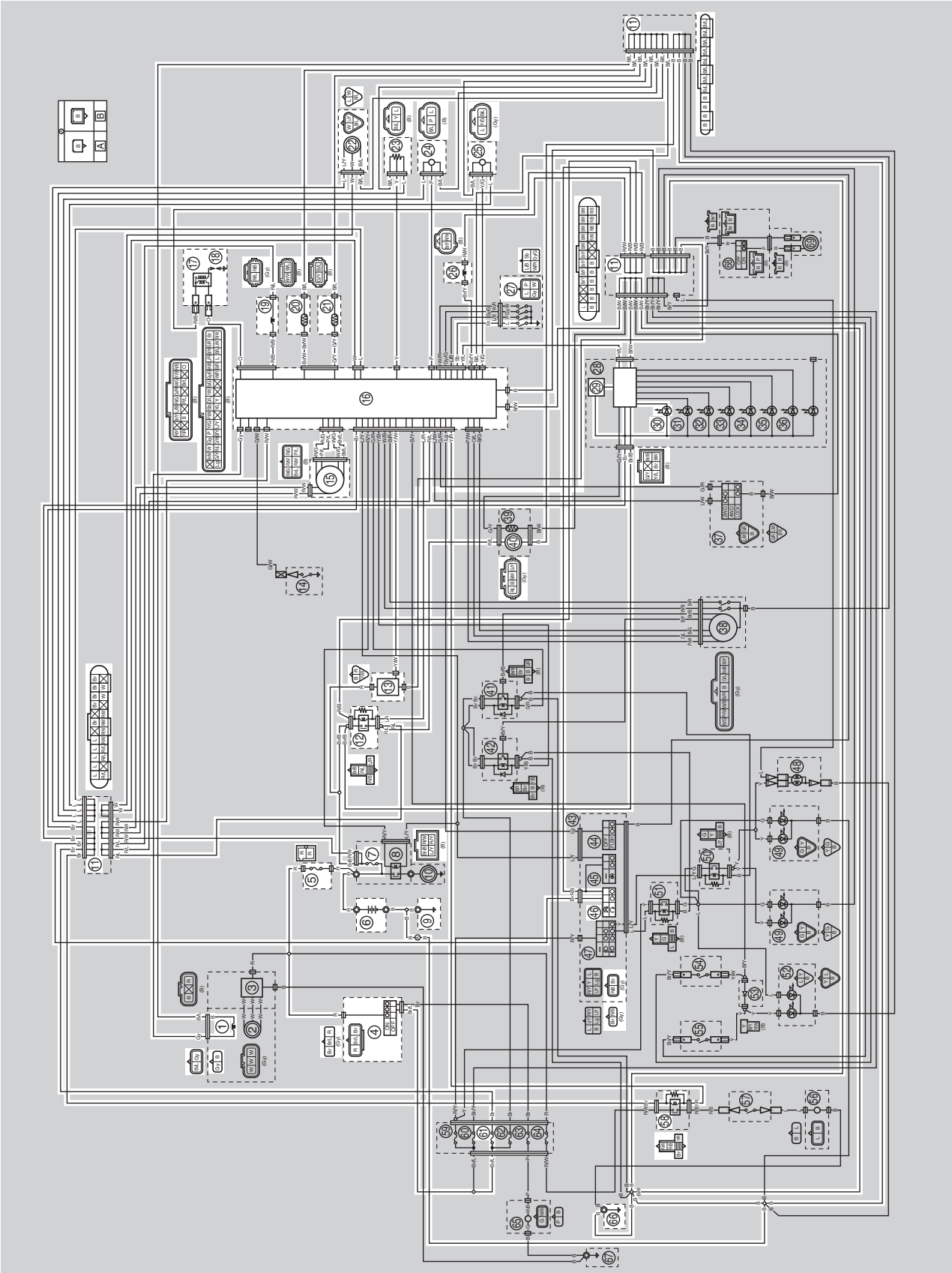
Replace the ECU.

EBS20080

## FUEL INJECTION SYSTEM

EBS30353

### CIRCUIT DIAGRAM





# FUEL INJECTION SYSTEM

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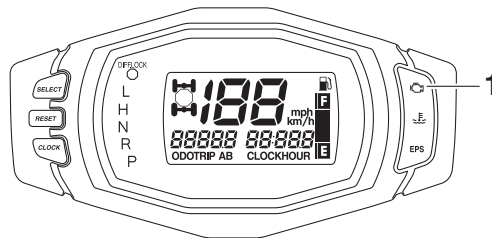
1. Crankshaft position sensor
4. Main switch
5. Main fuse
6. Battery
7. Fuel injection system fuse
9. Engine ground
11. Joint coupler
12. Fuel injection system relay
13. Yamaha diagnostic tool coupler
15. ISC (Idle Speed Control) unit
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
19. Fuel injector
20. Intake air temperature sensor
21. Coolant temperature sensor
22. Speed sensor
23. TPS (throttle position sensor)
24. Intake air pressure sensor
25. Lean angle sensor
26. Air induction system solenoid
27. Gear position switch
29. Multi-function meter
30. Engine trouble warning light
40. Fuel pump
46. Engine stop switch
58. Radiator fan motor relay
61. Ignition fuse
66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30278

## ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.


- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light comes on or flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the multi-function meter display. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.



1. Engine trouble warning light


## Engine trouble warning light indication and fuel injection system operation

Warning light indication	ECU 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            | 39: Fuel injector (open or short-circuit)        |
| 30: Lean angle sensor (latch up detected) | 41: Lean angle sensor (open or short-circuit)    |
| 33: Faulty ignition                       | 50: ECU internal malfunction (faulty ECU memory) |

## Checking for a defective engine trouble warning light bulb

The engine trouble warning light comes on for around 2 seconds after the main switch has been turned to “” (on). If the warning light does not come on under these conditions, the warning light (LED) may be defective.

## ECU detects an abnormal signal from a sensor

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.



# FUEL INJECTION SYSTEM

For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



## Features of the Yamaha diagnostic tool

You can use the Yamaha diagnostic tool to identify malfunctions quicker than with conventional methods.

By connecting the adapter interface, which is connected to the USB port of a computer, to a vehicle's ECU using the communication cable, you can display information that is necessary for identifying malfunctions and for maintenance to display on the computer. The displayed information includes the sensor output data and information recorded in the ECU.

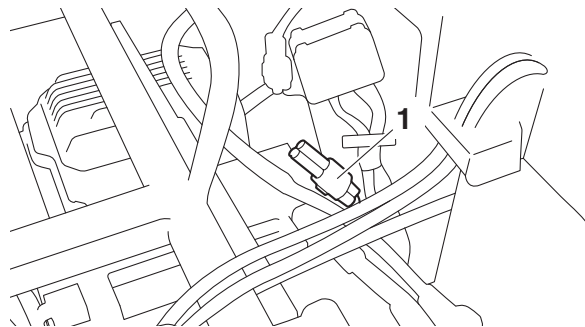
## Functions of the Yamaha diagnostic tool

Fault diagnosis mode:	Fault codes recorded on the ECU are read, and the contents are displayed.
Function diagnostic mode:	Check the operation of the output value of each sensor and actuator.
Inspection mode:	Determine whether each sensor or actuator is functioning properly.
Monitoring mode:	Displays a graph of sensor output values for actual operating conditions.
Logging mode:	Records and saves the sensor output value in actual driving conditions.
View log:	Displays the logging data.
ECU rewrite:	If necessary, the ECU is rewritten using ECU rewrite data provided by Yamaha. Ignition timing adjustment, etc. cannot be changed from the vehicle's original state.

However, the diagnostic tool cannot be used to freely change the basic vehicle functions, such as adjusting the ignition timing.

## Connecting the Yamaha diagnostic tool

Remove the protective cap, and then connect the Yamaha diagnostic tool to the coupler "1".



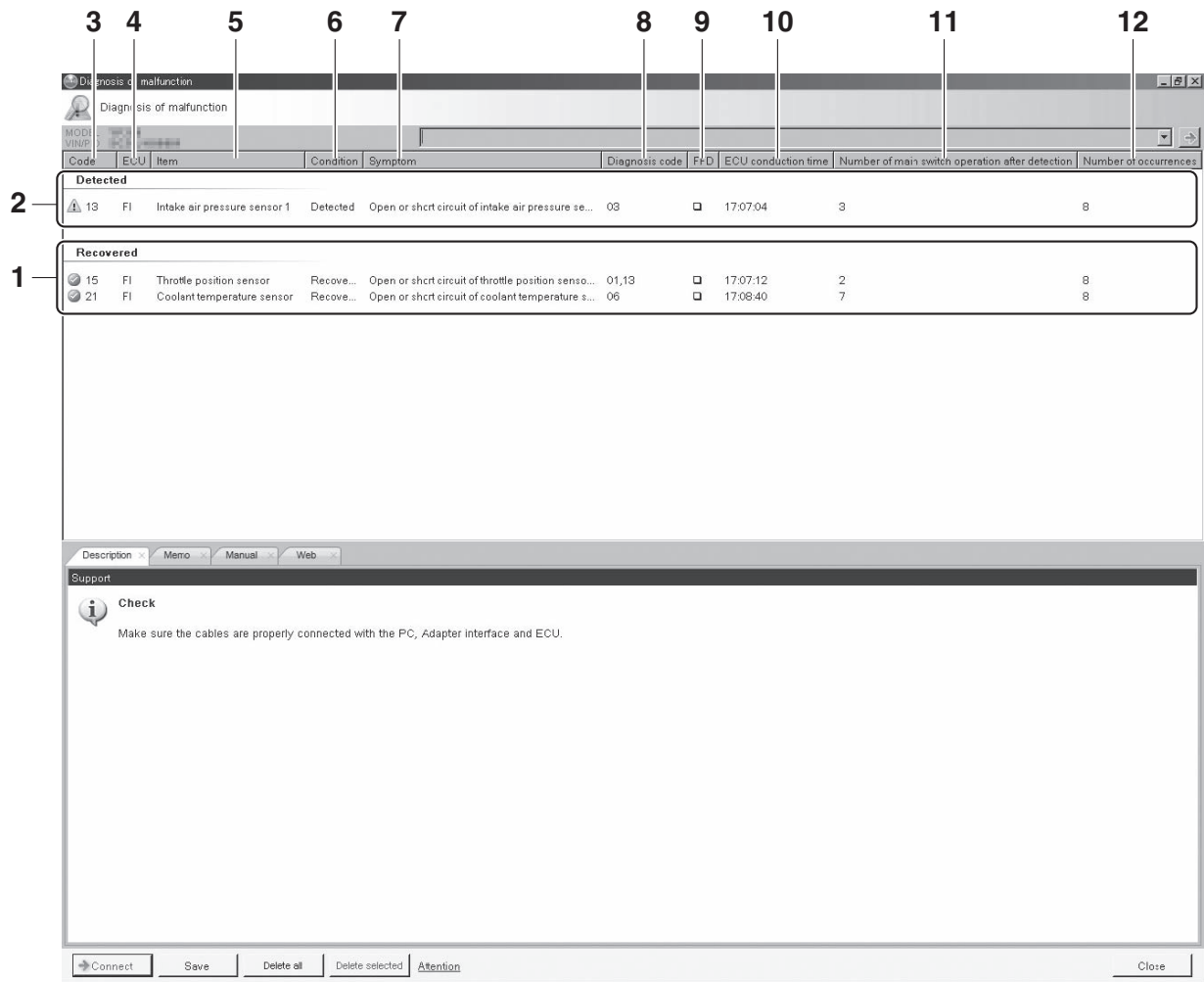
## **TIP**

When the Yamaha diagnostic tool is connected to the vehicle, the operation of the multi-function meter and indicators will be different from the normal operation.

# FUEL INJECTION SYSTEM

## Operation of the Yamaha diagnostic tool (Malfunction mode)

Malfunction results are displayed in the top part of the window area.



### 1. Recovered

The item list of the malfunction detected in the past (already recovered) are displayed.

### 2. Detected

The item list of the malfunction currently occurred are displayed.

### 3. Code

The following icons and the fault code numbers for the detected malfunctions are displayed.

A



B




A. Detected malfunction

B. Recovered malfunction

### 4. ECU

The types of the control units are displayed.

5. Item  
The item names of the detected malfunction are displayed.
6. Condition  
The current conditions are displayed. (Detected/Recovered)
7. Symptom  
The symptoms of the detected malfunction are displayed.
8. Diagnosis code  
The diagnosis codes related to the detected malfunction are displayed.
9. FFD (only for models that can display freeze frame data)  
The mark “” is displayed when the freeze frame data is available.
10. ECU conduction time (hour: minute: second)  
The total ECU conduction time (total hours the vehicle’s main switch was ON) when the malfunction was detected is displayed.
11. Number of main switch operation after detection  
The number of times the main switch was turned on between the malfunction detection and code reading is displayed.
12. Number of occurrences  
The number of malfunction occurrences between the malfunction detection and code reading is displayed.

EBS30281

## TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)

This section describes the measures per fault code number displayed on the Yamaha diagnostic tool or multi-function meter display. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the Yamaha diagnostic tool or multi-function meter display according to the “Confirmation of service completion”.

Fault code No.:

Fault code number displayed on the Yamaha diagnostic tool or multi-function meter when the engine failed to work normally.

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated.

Refer to “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-7.

### Fault code No. 12

<b>Fault code No.</b>	<b>12</b>		
<b>Item</b>	<b>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</b>		
<b>Fail-safe system</b>	Unable to start engine		
	Unable to drive vehicle		
<b>Diagnostic code No.</b>	—		
<b>Indicated</b>	—		
<b>Procedure</b>	—		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>12</b>		
<b>Item</b>	<b>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</b>		
1	Connection of crankshaft position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between crankshaft position sensor coupler and ECU coupler. gray-gray Between crankshaft position sensor coupler and joint coupler. black/blue-black/blue Between joint coupler and ECU coupler. black/blue-black/blue	Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of crankshaft position sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or replace the sensor.	Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Defective crankshaft position sensor.	Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 9-91. Replace if defective.	Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Replace the ECU.	

## Fault code No. 13

### TIP

If fault code numbers "13" and "14" are both indicated, take the actions specified for fault code number "13" first.

<b>Fault code No.</b>	<b>13</b>	
<b>Item</b>	<b>Intake air pressure sensor: open or short circuit detected.</b>	
<b>Fail-safe system</b>	Able to start engine	
	Able to drive vehicle	
<b>Diagnostic code No.</b>	03	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>13</b>		
<b>Item</b>	<b>Intake air pressure sensor: open or short circuit detected.</b>		
<b>Indicated</b>	Displays the intake air pressure.		
<b>Procedure</b>	Set the engine stop switch to “○”, and then operate the throttle while pushing the start switch “⊗”. (If the display value changes, the performance is OK.)		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of intake air pressure sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “⏻” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “⏻” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between intake air pressure sensor coupler and ECU coupler. pink–pink Between intake air pressure sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue	Turn the main switch to “⏻” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of intake air pressure sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “⏻” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.



# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>13</b>	
<b>Item</b>		<b>Intake air pressure sensor: open or short circuit detected.</b>	
5	Defective intake air pressure sensor.	<p>Execute the diagnostic mode. (Code No. 03)</p> <p>When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated.</p> <p>At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg)</p> <p>When engine is cranking: Make sure that the indication value changes.</p> <p>The value does not change when engine is cranking. → Check the intake air pressure sensor.</p> <p>Replace if defective.</p> <p>Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 9-97.</p>	<p>Turn the main switch to " I " (on).</p> <p>Fault code number is not displayed → Service is finished.</p> <p>Fault code number is displayed → Go to item 6.</p>
6	Malfunction in ECU.	Replace the ECU.	

## Fault code No. 14

### TIP

If fault code numbers "13" and "14" are both indicated, take the actions specified for fault code number "13" first.

<b>Fault code No.</b>		<b>14</b>	
<b>Item</b>		<b>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		03	
<b>Indicated</b>		Displays the intake air pressure.	
<b>Procedure</b>		Set the engine stop switch to " O ", and then operate the throttle while pushing the start switch " S ". (If the display value changes, the performance is OK.)	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>14</b>		
<b>Item</b>	<b>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</b>		
1	Condition of intake air pressure sensor hose. Check the intake air pressure sensor hose condition.	Clogged or detached hose → Repair or replace the sensor hose.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Defective intake air pressure sensor.	Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Check the intake air pressure sensor. Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 9-97.	







## Fault code No. 15

### TIP

If fault code numbers "15" and "16" are both indicated, take the actions specified for fault code number "15" first.

<b>Fault code No.</b>	<b>15</b>		
<b>Item</b>	<b>Throttle position sensor: open or short circuit detected.</b>		
<b>Fail-safe system</b>	Able to start engine		
	Able to drive vehicle		
<b>Diagnostic code No.</b>	01		
<b>Indicated</b>	Throttle position sensor signal • 14–20 (fully closed position)		
<b>Procedure</b>	Check with throttle valve fully closed.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

## FUEL INJECTION SYSTEM



Fault code No.		15	
Item		Throttle position sensor: open or short circuit detected.	
1	Connection of throttle position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between throttle position sensor coupler and ECU coupler. yellow–yellow Between throttle position sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of throttle position sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Throttle position sensor resistance.	Measure the throttle position sensor resistance. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Defective throttle position sensor.	Check throttle position sensor signal. Execute the diagnostic mode. (Code No. 01) When the throttle valve is fully closed: A value of 14–20 is indicated. An indicated value is out of the specified range → Replace the throttle position sensor.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 7.
7	Malfunction in ECU.	Replace the ECU.	

# FUEL INJECTION SYSTEM

## Fault code No. 16

### TIP

- If fault code numbers “15” and “16” are both indicated, take the actions specified for fault code number “15” first.
- If fault code numbers “16” and “37” are both indicated, take the actions specified for fault code number “16” first.

<b>Fault code No.</b>	<b>16</b>		
<b>Item</b>	<b>Throttle position sensor: stuck throttle position sensor is detected.</b>		
<b>Fail-safe system</b>	Able to start engine		
	Able to drive vehicle		
<b>Diagnostic code No.</b>	01		
<b>Indicated</b>	Throttle position sensor signal • 14–20 (fully closed position)		
<b>Procedure</b>	Check with throttle valve fully closed.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Installed condition of throttle position sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.	Turn the main switch to “  ” (on), then push the throttle lever. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Defective throttle position sensor.	Check throttle position sensor signal. Execute the diagnostic mode. (Code No. 01) When the throttle valve is fully closed: A value of 14–20 is indicated. An indicated value is out of the specified range → Replace the throttle position sensor.	Turn the main switch to “  ” (on), then operate the throttle. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Malfunction in ECU.	Replace the ECU.	






## Fault code No. 21

### TIP

If fault code numbers “21” and “37” are both indicated, take the actions specified for fault code number “21” first.

<b>Fault code No.</b>	<b>21</b>		
<b>Item</b>	<b>Coolant temperature sensor: open or short circuit detected.</b>		
<b>Fail-safe system</b>	Able to start engine		
	Able to drive vehicle		
<b>Diagnostic code No.</b>	06		
<b>Indicated</b>	Displays the coolant temperature.		
<b>Procedure</b>	Compare the actually measured coolant temperature with the indicated value.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

# FUEL INJECTION SYSTEM

Fault code No.		21	
Item		Coolant temperature sensor: open or short circuit detected.	
1	Connection of coolant temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between coolant temperature sensor coupler and ECU coupler. green/yellow–green/yellow Between coolant temperature sensor coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of coolant temperature sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Defective coolant temperature sensor.	Execute the diagnostic mode. (Code No. 06) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature → Check the coolant temperature sensor. Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Replace the ECU.	

## Fault code No. 22


### TIP

If fault code numbers “22” and “37” are both indicated, take the actions specified for fault code number “22” first.










# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>22</b>		
<b>Item</b>	<b>Intake air temperature sensor: open or short circuit detected.</b>		
<b>Fail-safe system</b>	Able to start engine		
	Able to drive vehicle		
<b>Diagnostic code No.</b>	05		
<b>Indicated</b>	Displays the intake air temperature.		
<b>Procedure</b>	Compare the actually measured intake air temperature with the indicated value.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of intake air temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between intake air temperature sensor coupler and ECU coupler. brown/white–brown/white Between intake air temperature sensor coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of intake air temperature sensor. Check for looseness or pinching.	Improperly installed sensor → Reinstall or replace the sensor.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>22</b>	
<b>Item</b>		<b>Intake air temperature sensor: open or short circuit detected.</b>	
5	Defective intake air temperature sensor.	Execute the diagnostic mode. (Code No. 05) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature. → Check the intake air temperature sensor. Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 9-97.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Replace the ECU.	

## Fault code No. 30

<b>Fault code No.</b>		<b>30</b>	
<b>Item</b>		<b>Latch up detected.</b>	
<b>Fail-safe system</b>		Unable to start engine	
		Unable to drive vehicle	
<b>Diagnostic code No.</b>		08	
<b>Indicated</b>		Lean angle sensor output voltage • 3.6–4.4 (upright) • 0.7–1.3 (overturned)	
<b>Procedure</b>		Remove the lean angle sensor and incline it more than 65 degrees.	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	The vehicle has overturned.	Raise the vehicle upright.	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Installed condition of lean angle sensor.	Check the installed direction and condition of the sensor.	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Defective lean angle sensor.	Execute the diagnostic mode. (Code No. 08) An indicated value is out of the specified range → Check the lean angle sensor. Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.	Turn the main switch to “  ” (on) then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Malfunction in ECU.	Replace the ECU.	

# FUEL INJECTION SYSTEM

## Fault code No. 33

<b>Fault code No.</b>	<b>33</b>		
<b>Item</b>	<b>Ignition coil: open or short circuit detected in the primary lead of the ignition coil.</b>		
<b>Fail-safe system</b>	Unable to start engine		
	Unable to drive vehicle		
<b>Diagnostic code No.</b>	30		
<b>Actuation</b>	Actuates the ignition coil five times at one-second intervals. The "CHECK" indicator and "ꠘ" on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.		
<b>Procedure</b>	Check that a spark is generated five times. • Connect an ignition checker.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of ignition coil connector. Check the locking condition of the connector. Disconnect the connector and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the connector securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between ignition coil connector and ECU coupler. orange–orange	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Installed condition of ignition coil. Check for looseness or pinching.	Improperly installed ignition coil → Reinstall or replace the ignition coil.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Defective ignition coil.	Measure the primary coil resistance of the ignition coil. Replace if out of specification. Refer to "CHECKING THE IGNITION COIL" on page 9-91.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Execute the diagnostic mode. (Code No. 30) No spark → Replace the ECU.	




# FUEL INJECTION SYSTEM

## Fault code No. 37

### TIP

- If fault code numbers “16” and “37” are both indicated, take the actions specified for fault code number “16” first.
- If fault code numbers “21” and “37” are both indicated, take the actions specified for fault code number “21” first.
- If fault code numbers “22” and “37” are both indicated, take the actions specified for fault code number “22” first.
- If fault code numbers “37” and “46” are both indicated, take the actions specified for fault code number “46” first.
- If fault code numbers “37” and “42” are both indicated, take the actions specified for fault code number “42” first.

<b>Fault code No.</b>	<b>37</b>		
<b>Item</b>	<b>A</b>	<b>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</b>	
	<b>B</b>	<b>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</b>	
<b>Fail-safe system</b>	Able to start engine		
	Able to drive vehicle		
<b>Diagnostic code No.</b>	54		
<b>Actuation</b>	Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds. The “CHECK” indicator and “  ” on the Yamaha diagnostic tool screen come on during the operation.		
<b>Procedure</b>	The operating sound can be heard when ISC valve operates.		
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
A-1	Locate the malfunction.	Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (Idle Speed Control) valve, and then fully opens the valve.	ISC operating sound is heard → Go to item A-2. ISC operating sound is not heard → Go to item B-2 for the defective ISC (Idle Speed Control) unit.
A-2	Incorrect speed sensor signal.	Check the speed sensor. Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value does not increase → Go to fault code No. 42.	Start the engine and let it idle for approximately 10 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item A-3.
A-3	Throttle valve does not fully close.	Check the throttle body. Refer to “THROTTLE BODY” on page 7-4. Check the throttle cable. Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-33.	Start the engine and let it idle for approximately 10 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item A-4.

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>37</b>	
<b>Item</b>	<b>A</b>	<b>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</b>	
	<b>B</b>	<b>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</b>	
A-4	ISC valve is not moving correctly.	Replace the throttle body assembly.	Start the engine and let it idle for approximately 10 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item A-5.
A-5	Malfunction in ECU.	Replace the ECU.	


<b>Fault code No.</b>		<b>37</b>	
<b>Item</b>	<b>A</b>	<b>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</b>	
	<b>B</b>	<b>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		54	
<b>Actuation</b>		Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds. The "CHECK" indicator and "ISC" on the Yamaha diagnostic tool screen come on during the operation.	
<b>Procedure</b>		The operating sound can be heard when ISC valve operates.	

<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
B-1	Locate the malfunction.	Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (Idle Speed Control) valve, and then fully opens the valve.	ISC operating sound is heard → Go to item A-2 for the component other than ISC (Idle Speed Control) unit is defective. ISC operating sound is not heard → Go to item B-2.
B-2	Connection of ISC (Idle Speed Control) unit coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-3.
B-3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-4.

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>37</b>	
<b>Item</b>	<b>A</b>	<b>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</b>	
	<b>B</b>	<b>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</b>	
B-4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between ISC (Idle Speed Control) unit coupler and ECU coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue Between ISC (Idle Speed Control) unit coupler and joint coupler. red/white–red/white red/white–red/white	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-5.
B-5	Installed condition of ISC (Idle Speed Control) unit. Check for looseness or pinching.	Improperly installed ISC (Idle Speed Control) unit → Reinstall the ISC (Idle Speed Control) unit.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.
B-6	ISC valve is not moving correctly.	Replace the throttle body assembly.	Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-7.
B-7	Malfunction in ECU.	Replace the ECU.	
B-8	Delete the fault code.		Start the engine and let it idle for approximately 10 seconds. Check that the fault code number is not displayed.

## Fault code No. 39

<b>Fault code No.</b>		<b>39</b>	
<b>Item</b>		<b>Fuel injector: open or short circuit detected.</b>	
<b>Fail-safe system</b>		Unable to start engine	
		Unable to drive vehicle	
<b>Diagnostic code No.</b>		36	
<b>Actuation</b>		Actuates fuel injector five times at one-second intervals. The “CHECK” indicator and “  ” on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.	
<b>Procedure</b>		Disconnect the fuel pump coupler, and then check that fuel injector is actuated five times by listening for the operating sound.	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>













# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>39</b>	
<b>Item</b>		<b>Fuel injector: open or short circuit detected.</b>	
1	Connection of fuel injector coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 2.
2	Defective fuel injector.	Measure the fuel injector resistance. Replace if out of specification. Refer to "CHECKING THE FUEL INJECTOR" on page 9-96.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 3.
3	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 4.
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between fuel injector coupler and ECU coupler. red/black–red/black Between fuel injector coupler and joint coupler. red/blue–red/blue	Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	
6	Delete the fault code.		Start the engine and let it idle for approximately 5 seconds. Check that the fault code number is not displayed.

## Fault code No. 41

<b>Fault code No.</b>		<b>41</b>	
<b>Item</b>		<b>Lean angle sensor: open or short circuit detected.</b>	
<b>Fail-safe system</b>		Unable to start engine Unable to drive vehicle	
<b>Diagnostic code No.</b>		08	
<b>Indicated</b>		Lean angle sensor output voltage • 3.6–4.4 (upright) • 0.7–1.3 (overturned)	
<b>Procedure</b>		Remove the lean angle sensor and incline it more than 65 degrees.	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>41</b>	
<b>Item</b>		<b>Lean angle sensor: open or short circuit detected.</b>	
1	Connection of lean angle sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between lean angle sensor coupler and ECU coupler. yellow/green–yellow/green Between lean angle sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective lean angle sensor.	Execute the diagnostic mode. (Code No. 08) An indicated value is out of the specified range → Check the lean angle sensor. Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.	Turn the main switch to “  ” (on), then to “  ” (off), and then back to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	





## Fault code No. 42

### TIP

If fault code numbers “37” and “42” are both indicated, take the actions specified for fault code number “42” first.





<b>Fault code No.</b>	<b>42</b>
<b>Item</b>	<b>Speed sensor: no normal signals are received from the speed sensor.</b>
<b>Fail-safe system</b>	Able to start engine
	Able to drive vehicle
<b>Diagnostic code No.</b>	07
<b>Indicated</b>	Vehicle speed pulse 0–999

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		42	
<b>Item</b>		<b>Speed sensor: no normal signals are received from the speed sensor.</b>	
<b>Procedure</b>		Check that the number increases when the rear wheels are rotated. The number is cumulative and does not reset each time the wheel is stopped.	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of speed sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between speed sensor coupler and joint coupler. white–white Between joint coupler and ECU coupler. white–white Between speed sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue	Turn the main switch to “  ” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 4.
4	Defective speed sensor.	Execute the diagnostic mode. (Code No. 07) While the rear wheels and stopped, check that the indicated value does not change. Rotate the rear wheel by hand and check that the indicated value increases. Malfunction → Replace the speed sensor.	Turn the main switch to “  ” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	
6	Delete the fault code.		Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Check that the fault code number is not displayed.

# FUEL INJECTION SYSTEM

## Fault code No. 43

<b>Fault code No.</b>		<b>43</b>	
<b>Item</b>		<b>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		09, 50	
09	<b>Indicated</b>	Fuel system voltage (battery voltage) Approximately 12.0	
	<b>Procedure</b>	Turn the main switch to “  ” (on), and then compare the actually measured battery voltage with the display value. (If the actually measured battery voltage is low, recharge the battery.)	
50	<b>Actuation</b>	Actuates the fuel injection system relay five times at one-second intervals. The “CHECK” indicator and “  ” on the Yamaha diagnostic tool screen come on each time the relay is actuated. (When the relay is on, the “CHECK” indicator and “  ” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “  ” on the Yamaha diagnostic tool screen come on.)	
	<b>Procedure</b>	Check that the fuel injection system relay is actuated five times by listening for the operating sound.	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of fuel injection system relay coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>43</b>	
<b>Item</b>		<b>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</b>	
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between fuel injection system relay coupler and ECU coupler. blue/red–blue/red Between fuel injection system relay coupler and joint coupler. red/blue–red/blue Between joint coupler and ECU coupler. red/blue–red/blue Between fuel injection system relay coupler and starter relay coupler. brown/black–brown/black Between fuel injection system relay coupler and joint coupler. red/black–red/black Between joint coupler and handlebar switch (left). red/black–red/black	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective fuel injection system relay.	Execute the diagnostic mode. (Code No. 50) No operating sound → Replace the fuel injection system relay.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Defective fuel injection system relay.	Execute the diagnostic mode. (Code No. 09) Fuel system voltage is below 3 V → Replace the fuel injection system relay.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Replace the ECU.	

## Fault code No. 44

<b>Fault code No.</b>		<b>44</b>	
<b>Item</b>		<b>EEPROM fault code number: an error is detected while reading or writing on EEPROM.</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		60	
<b>Indicated</b>		The fault code No. 44 detected EEPROM errors are indicated. 00 indication: Normal status	
<b>Procedure</b>		—	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Locate the malfunction.	Execute the diagnostic mode. (Code No. 60)	—
2	Malfunction in ECU.	Replace the ECU.	



# FUEL INJECTION SYSTEM

## Fault code No. 46

### TIP

If fault code numbers "37" and "46" are both indicated, take the actions specified for fault code number "46" first.

<b>Fault code No.</b>		46	
<b>Item</b>		Charging voltage is abnormal.	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		—	
<b>Indicated</b>		—	
<b>Procedure</b>		—	
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Malfunction in charging system.	Check the charging system. Refer to "CHARGING SYSTEM" on page 9-11. Defective rectifier/regulator or AC magneto → Replace. Defective connection in the charging system circuit → Properly connect or replace the wire harness.	Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Repeat the maintenance job.





## Fault code No. 50

<b>Fault code No.</b>		50	
<b>Item</b>		Faulty ECU (Engine Control Unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear.)	
<b>Fail-safe system</b>		Unable to start engine	
		Unable to drive vehicle	
<b>Diagnostic code No.</b>		—	
<b>Indicated</b>		—	
<b>Procedure</b>		—	
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Malfunction in ECU.	Replace the ECU.	Turn the main switch to " <input type="checkbox"/> " (on). Check that the fault code number is not displayed.

## Fault code No. Er-1

<b>Fault code No.</b>		Er-1	
<b>Item</b>		ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.	
<b>Fail-safe system</b>		Able to start engine (unable when ECU is malfunctioning)	
		Able to drive vehicle (unable when ECU is malfunctioning)	
<b>Diagnostic code No.</b>		—	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>Er-1</b>	
<b>Item</b>		<b>ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.</b>	
<b>Indicated</b>		—	
<b>Procedure</b>		—	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective meter assembly.	Replace the meter assembly.	Turn the main switch to “  ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	

## Fault code No. Er-2

<b>Fault code No.</b>		<b>Er-2</b>	
<b>Item</b>		<b>ECU (Engine Control Unit) internal malfunction (output signal error): no signals are received from the ECU within the specified duration.</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		—	
<b>Indicated</b>		—	
<b>Procedure</b>		—	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>

# FUEL INJECTION SYSTEM

Fault code No.		Er-2	
Item		ECU (Engine Control Unit) internal malfunction (output signal error): no signals are received from the ECU within the specified duration.	
1	Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective meter assembly.	Replace the meter assembly.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	

## Fault code No. Er-3

Fault code No.		Er-3	
Item		ECU (Engine Control Unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		—	
Indicated		—	
Procedure		—	
Item	Probable cause of malfunction and check	Maintenance job	Confirmation of service completion
1	Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>		<b>Er-3</b>	
<b>Item</b>		<b>ECU (Engine Control Unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.</b>	
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective meter assembly.	Replace the meter assembly.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	

## Fault code No. Er-4

<b>Fault code No.</b>		<b>Er-4</b>	
<b>Item</b>		<b>ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.</b>	
<b>Fail-safe system</b>		Able to start engine	
		Able to drive vehicle	
<b>Diagnostic code No.</b>		—	
<b>Indicated</b>		—	
<b>Procedure</b>		—	
<b>Item</b>	<b>Probable cause of malfunction and check</b>	<b>Maintenance job</b>	<b>Confirmation of service completion</b>
1	Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.
2	Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).	Improperly connected → Connect the coupler securely or replace the wire harness.	Turn the main switch to “ <input type="checkbox"/> ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.

## FUEL INJECTION SYSTEM

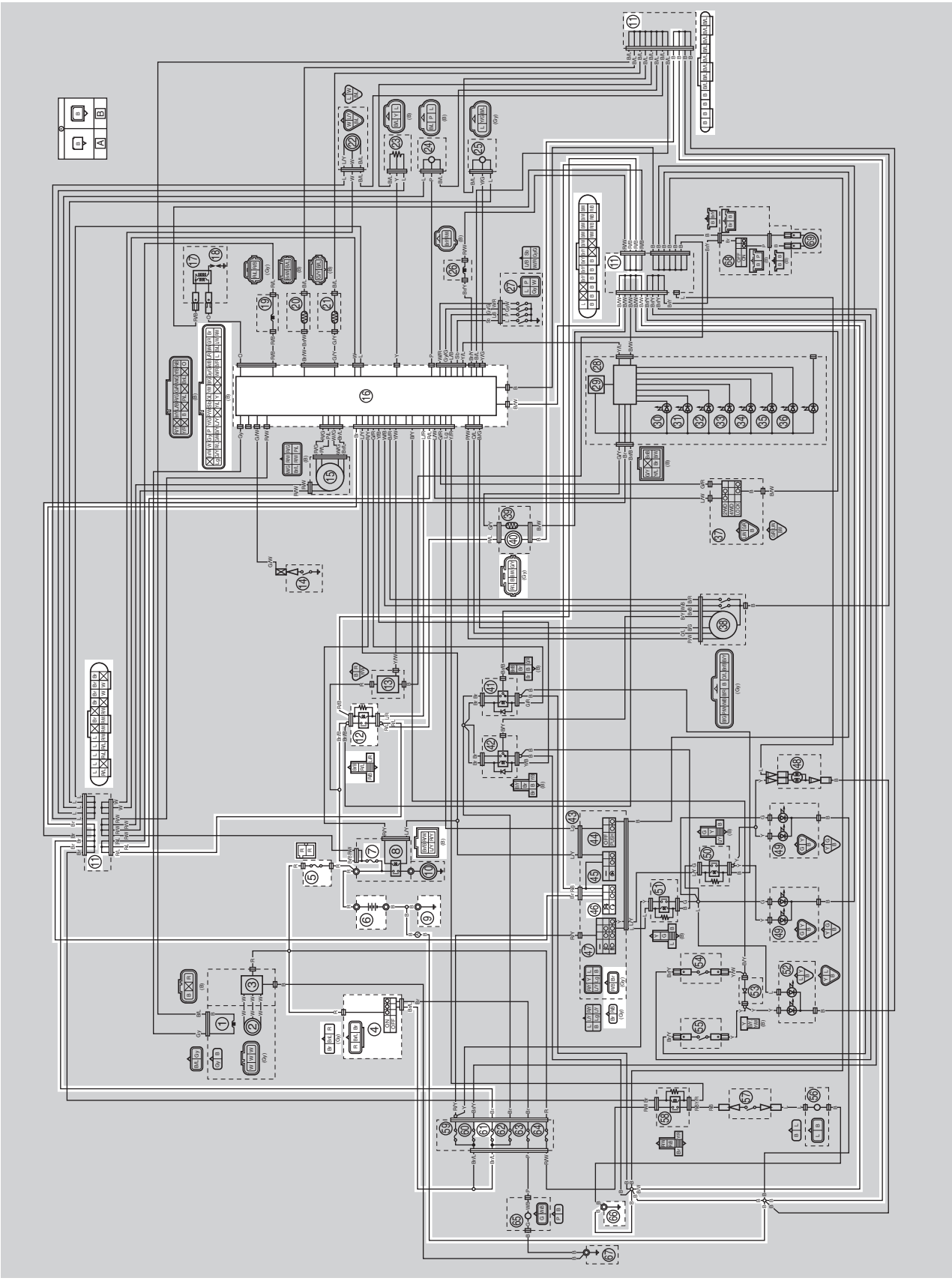
Fault code No.		Er-4	
Item		ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.	
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue	Turn the main switch to “ I ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.
4	Defective meter assembly.	Replace the meter assembly.	Turn the main switch to “ I ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.
5	Malfunction in ECU.	Replace the ECU.	

EBS20081

FUEL PUMP SYSTEM

EBS30282

CIRCUIT DIAGRAM



# FUEL PUMP SYSTEM

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- 4. Main switch
- 5. Main fuse
- 6. Battery
- 7. Fuel injection system fuse
- 9. Engine ground
- 11. Joint coupler
- 12. Fuel injection system relay
- 16. ECU (Engine Control Unit)
- 40. Fuel pump
- 46. Engine stop switch
- 61. Ignition fuse
- 66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

EBS30283

## TROUBLESHOOTING

If the fuel pump fails to operate.

### TIP

• Before troubleshooting, remove the following part(s):

1. Seat
2. Battery cover
3. Top cover
4. Side panels (left and right)
5. Rear fender

<p>1. Check the fuses. (Main, ignition and fuel injection system) Refer to "CHECKING THE FUSES" on page 9-84.</p>	NG →	<p>Replace the fuse(s).</p>
OK ↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.</p>	NG →	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK ↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	NG →	<p>Replace the main switch.</p>
OK ↓		
<p>4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 9-81.</p>	NG →	<p>The engine stop switch is faulty. Replace the handlebar switch (left).</p>
OK ↓		
<p>5. Check the fuel injection system relay. Refer to "CHECKING THE RELAYS" on page 9-88.</p>	NG →	<p>Replace the fuel injection system relay.</p>
OK ↓		
<p>6. Check the fuel pump. Refer to "CHECKING THE FUEL PUMP BODY" on page 7-2.</p>	NG →	<p>Replace the fuel pump.</p>
OK ↓		
<p>7. Check the entire fuel pump system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-59.</p>	NG →	<p>Properly connect or repair the fuel pump system wiring.</p>
OK ↓		
<p>Replace the ECU.</p>		





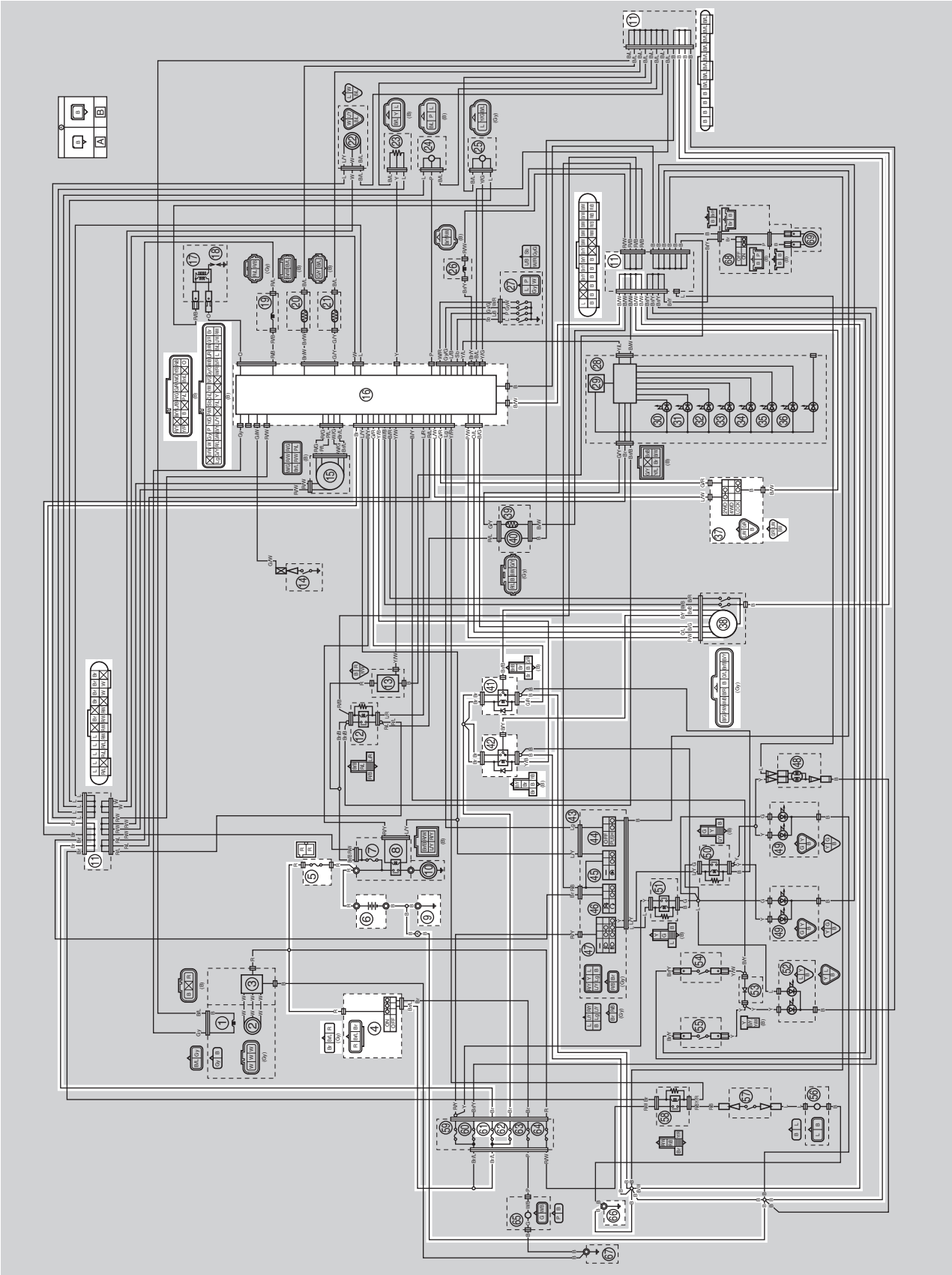
# 2WD/4WD SELECTING SYSTEM

EBS20082

## 2WD/4WD SELECTING SYSTEM

EBS30448

### CIRCUIT DIAGRAM



## 2WD/4WD SELECTING SYSTEM

---

- 4. Main switch
- 5. Main fuse
- 6. Battery
- 9. Engine ground
- 11. Joint coupler
- 16. ECU (Engine Control Unit)
- 37. On-Command four-wheel-drive motor switch  
and differential lock switch
- 38. Differential motor
- 41. Four-wheel-drive motor relay 1
- 42. Four-wheel-drive motor relay 2
- 61. Ignition fuse
- 62. Four-wheel-drive motor fuse
- 66. Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness

## 2WD/4WD SELECTING SYSTEM

EBS30285

### TROUBLESHOOTING

The four-wheel-drive motor indicator light fails to come on.

#### TIP

- Before troubleshooting, remove the following part(s):

1. Battery cover

1. Check the fuses. (Main, Ignition and four-wheel-drive motor) Refer to "CHECKING THE FUSES" on page 9-84.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.	NG →	<ul style="list-style-type: none"><li>• Clean the battery terminals.</li><li>• Recharge or replace the battery.</li></ul>
OK ↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the main switch.
OK ↓		
4. Check the On-Command four-wheel-drive motor switch and differential lock switch. Refer to "CHECKING THE SWITCHES" on page 9-81.	NG →	Replace the On-Command four-wheel-drive motor switch and differential lock switch.
OK ↓		
5. Check the four-wheel-drive motor relay 1. Refer to "CHECKING THE RELAYS" on page 9-88.	NG →	Replace the four-wheel-drive motor relay 1.
OK ↓		
6. Check the four-wheel-drive motor relay 2. Refer to "CHECKING THE RELAYS" on page 9-88.	NG →	Replace the four-wheel-drive motor relay 2.
OK ↓		
7. Check the differential motor. Refer to "CHECKING THE DIFFERENTIAL MOTOR OPERATION" on page 8-11.	NG →	Replace the differential motor.
OK ↓		

## 2WD/4WD SELECTING SYSTEM

8. Check the entire 2WD/4WD selecting system wiring.  
Refer to "CIRCUIT DIAGRAM" on page 9-63.

NG →

Properly connect or repair the 2WD/4WD selecting system wiring.

OK ↓

Replace the ECU.



# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

---



- 4. Main switch
- 5. EPS fuse
- 6. Main fuse
- 7. Battery
- 10.Engine ground
- 12.Joint coupler
- 13.EPS torque sensor
- 14.EPS motor
- 15.EPS (electric power steering) control unit
- 16.EPS self-diagnosis signal connector
- 21.ECU (Engine Control Unit)
- 27.Speed sensor
- 42.EPS warning light
- 67.Ignition fuse
- 72.Frame ground 1
- A. Wire harness
- B. Negative battery sub-wire harness
- C. EPS (electric power steering) control unit

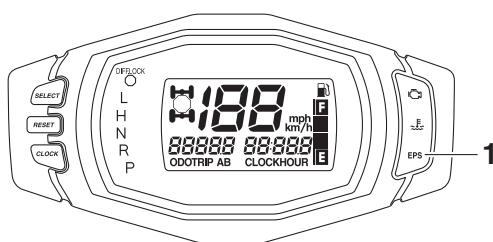
# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

EBS30287

## EPS CONTROL UNIT'S SELF-DIAGNOSTIC FUNCTION


The EPS control unit is equipped with a self-diagnostic function. If this function detects a malfunction in the EPS system, it lights the EPS warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the EPS control unit memory in the form of a fault code.

- The EPS warning light comes on when the main switch is turned to “” (on), and then goes off once the engine is started. If the warning light remains on or comes on after the engine is started, the EPS system may be defective.
- The electrical circuit of the warning light can be checked by turning the main switch to “” (on). If the warning light does not come on, the electrical circuit may be defective.




1. EPS warning light

### TIP

- If the engine is stopped using the engine stop switch and the main switch is in the “” (on) position, the EPS warning light comes on to indicate that the power assistance for the steering is not functioning.
- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.

EBS30288

## EPS WARNING LIGHT DURING NORMAL OPERATION

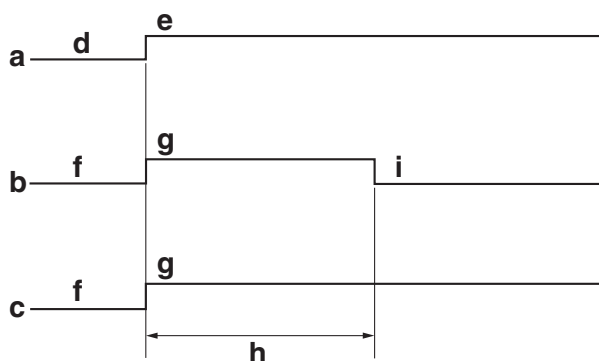
The EPS warning light comes on initially for 2 seconds after the main switch is turned to “” (on). However, the warning light remains on until the engine is started.

In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on.

Furthermore, the warning light comes on whenever a malfunction has occurred.

### TIP

The EPS system does not operate while the EPS warning light is on.




- |  |  |
|--|--|
| a. Main switch                                 | c. EPS warning light (malfunction detected)  |
| b. EPS warning light (no malfunction detected) | d. “  ” (off) |



# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)


---

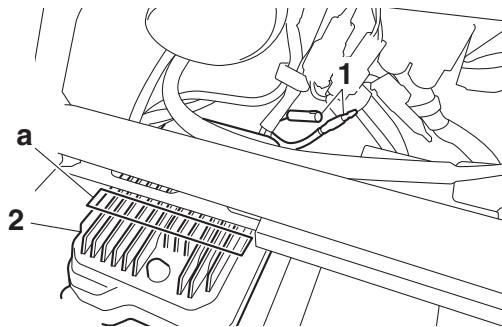
- e. “” (on)
- f. Off
- g. Comes on.
- h. Initial lighting: 2 seconds
- i. Goes off.

EBS30289

## DIAGNOSTIC MODE


### Setting the diagnostic mode (present and past malfunctions)

1. Disconnect the EPS self-diagnosis signal connector “1”.
2. Set the main switch to “” (on).
3. Select the signaling mode by grounding the EPS self-diagnosis signal connector (male side) to the EPS control unit “2” or disconnecting it from the unit as follows.




- Present malfunction signaling mode  
Ground the connector “1” quickly\* to the EPS control unit “2” over 2 times.  
\* Quickly = from 20 to 76 ms interval

### TIP

- Because the “quickly” intervals are approximately the same as the intervals when sliding the connector “1” across the area “a” of the EPS control unit “2”, this method can also be used to set the diagnostic mode.
- To set the diagnostic mode, this step should be started within 5 seconds and completed within 10 seconds after the main switch is turned to “” (on).

The EPS warning light starts to show present fault codes.

- Past malfunction signaling mode  
While the present malfunction mode is activated, briefly disconnect the connector “1”, ground it again, and leave it grounded. The signaling mode is activated after 5 seconds.  
The EPS warning light starts to show past fault codes.

4. Turn the main switch to “” (off) to cancel the diagnostic mode.

### TIP

- The diagnostic mode can also be canceled by riding the vehicle at speeds above 2 km/h (1.2 mi/h).
- When the diagnostic mode is selected and during the initial lighting of the EPS warning light, the EPS control unit does not receive input from the EPS self-diagnosis signal connector.

5. Connect the EPS self-diagnosis signal connector.

### Identifying fault codes

When the diagnostic mode is activated, the fault codes determined by the fail-safe specifications are signaled by the EPS warning light as follows.

- Present malfunction signaling mode: Currently detected fault codes are signaled.
- Past malfunction signaling mode: Both previously detected fault codes and currently detected fault codes are signaled.

### Signaling method





# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

Fault code No.	Item	Symptom	Probable cause of malfunction
53	EPS control unit	Battery voltage has dropped.	<ul style="list-style-type: none"> <li>Faulty battery.</li> <li>Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 9-11.</li> <li>Malfunction in EPS control unit.</li> </ul>
54	EPS control unit	Relay contacts in the EPS control unit are welded together.	Malfunction in EPS control unit.
55	EPS control unit	Battery voltage has increased. Abnormality exists between the EPS and the ECU.	<ul style="list-style-type: none"> <li>Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 9-11.</li> <li>Malfunction in EPS control unit.</li> </ul>

EBS30291

## TROUBLESHOOTING DETAILS (EPS SYSTEM)

### TIP



The malfunction history is stored even if the main switch is turned to "○" (off), therefore, be sure to erase the history (present and past malfunction signaling modes) after repairing the cause of the EPS system malfunction. The malfunction history must be erased in the diagnostic mode. Refer to "DIAGNOSTIC MODE" on page 9-70.

### Fault code No. 11, 13, 15, 16


Fault code No.	11, 13, 15, 16	Symptom	EPS torque sensor: no normal signals are received from the EPS torque sensor.	
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connections <ul style="list-style-type: none"> <li>EPS torque sensor coupler</li> </ul>	<ul style="list-style-type: none"> <li>Check the locking condition of the coupler.</li> <li>Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</li> <li>If there is a malfunction, connect the coupler securely or replace the wire harness.</li> </ul>	Turning the main switch to "○" (off).	
2	Open or short circuit in EPS torque sensor lead.	<ul style="list-style-type: none"> <li>Replace if there is an open or short circuit.</li> <li>Between EPS torque sensor coupler and EPS control unit coupler. <ul style="list-style-type: none"> <li>white–white</li> <li>red–red</li> <li>green–green</li> <li>black–black</li> </ul> </li> </ul>		
3	Defective EPS torque sensor.	<ul style="list-style-type: none"> <li>Replace if defective. Refer to "CHECKING THE EPS TORQUE SENSOR (for EPS models)" on page 9-98.</li> </ul>		
4	Malfunction in EPS control unit.	Replace the EPS control unit.		

# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

## Fault code No. 21


Fault code No.	21	Symptom	Speed sensor: no normal signals are received from the speed sensor.	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> <li>• Speed sensor coupler</li> <li>• EPS control unit coupler at the wire harness</li> </ul>		<ul style="list-style-type: none"> <li>• Check the locking condition of the coupler.</li> <li>• Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</li> <li>• If there is a malfunction, connect the coupler securely or replace the wire harness.</li> </ul>	Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h (3 mi/h), or turning the main switch to “  ” (off), then to “  ” (on), and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” on page 9-70.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Replace if there is an open or short circuit.</li> <li>• Between speed sensor coupler and joint coupler. white–white</li> <li>• Between joint coupler and EPS control unit coupler. white–white</li> </ul>	
3	Defective speed sensor.		<ul style="list-style-type: none"> <li>• Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94.</li> </ul>	
4	Malfunction in EPS control unit.		Replace the EPS control unit.	


## Fault code No. 22


Fault code No.	22	Symptom	No normal signals are received from the ECU.	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connections <ul style="list-style-type: none"> <li>• EPS control unit coupler at the wire harness</li> <li>• ECU coupler at the wire harness</li> </ul>		<ul style="list-style-type: none"> <li>• Check the locking condition of the coupler.</li> <li>• Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</li> <li>• If there is a malfunction, connect the coupler securely or replace the wire harness.</li> </ul>	Turning the main switch to “  ” (off).
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Replace if there is an open or short circuit.</li> <li>• Between ECU coupler and EPS control unit coupler. orange/white–orange/white</li> </ul>	
3	Malfunction in ECU.		Replace the ECU.	
4	Malfunction in EPS control unit.		Replace the EPS control unit.	

# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

## Fault code No. 41, 42, 43, 45

Fault code No.	41, 42, 43, 45	Symptom	EPS motor: no normal signals are received from the EPS motor.	
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connections • EPS motor coupler	<ul style="list-style-type: none"> <li>• Check the locking condition of the coupler.</li> <li>• Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</li> <li>• If there is a malfunction, connect the coupler securely or replace the wire harness.</li> </ul>	Turning the main switch to “  <h2>Fault code No. 52</h2>	

Fault code No.	52	Symptom	Relay contacts in the EPS control unit are welded together.	
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Malfunction in EPS control unit.	Replace the EPS control unit.	Turning the main switch to “  <h2>Fault code No. 53</h2>	

Fault code No.	53	Symptom	Battery voltage has dropped.	
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Faulty battery.	Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.	Turning the main switch to “  <p>9-75</p>	

## EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

### Fault code No. 54

Fault code No.	54	Symptom	Relay contacts in the EPS control unit are welded together.	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in EPS control unit.		Replace the EPS control unit.	Turning the main switch to “○” (off).

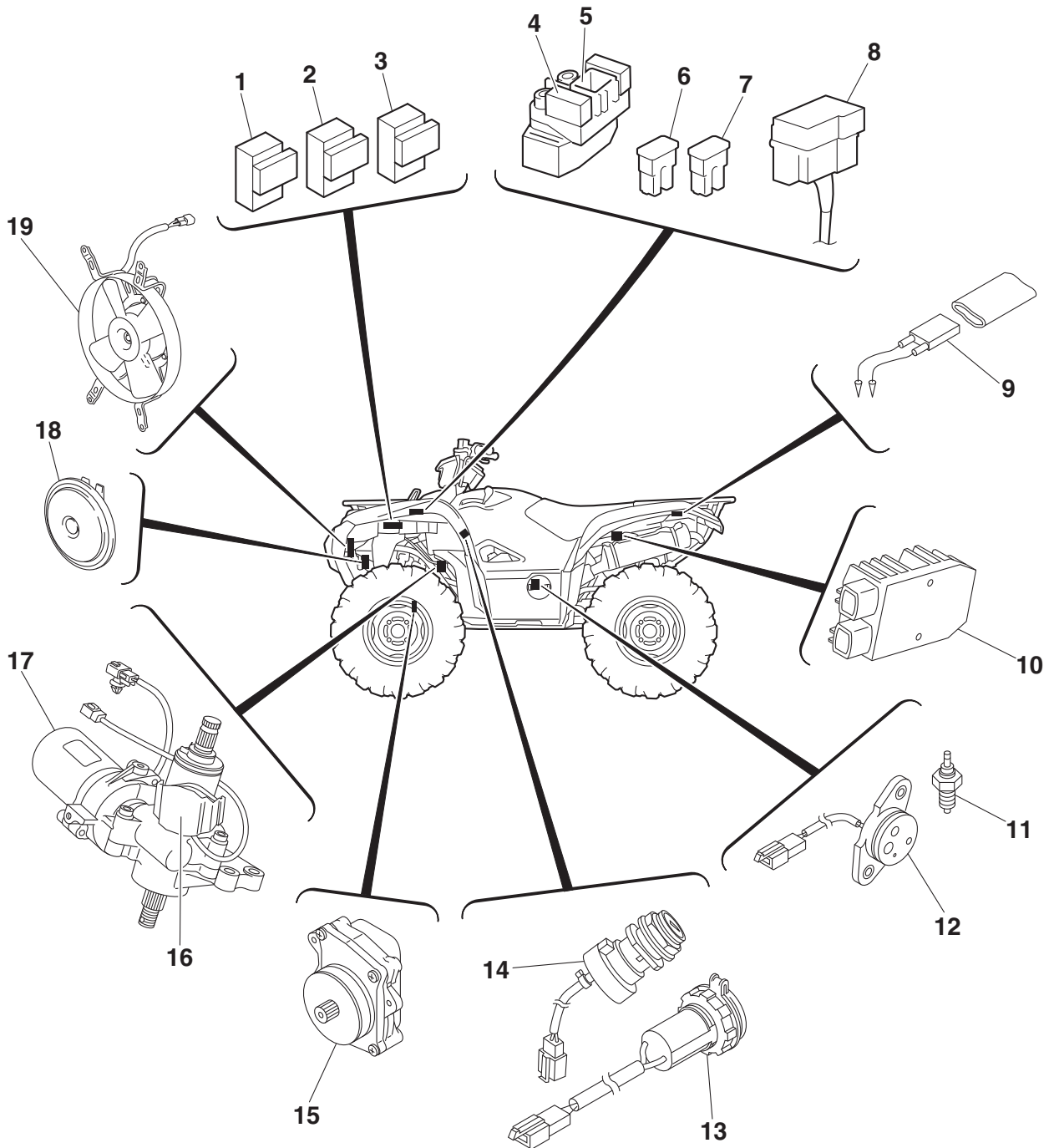
### Fault code No. 55

Fault code No.	55	Symptom	Battery voltage has increased. Abnormality exists between the EPS and the ECU.	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Faulty battery.		Replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.	Turning the main switch to “○” (off).
2	Malfunction in rectifier/regulator.		Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.	
3	Malfunction in EPS control unit.		Replace the EPS control unit.	

# ELECTRICAL COMPONENTS

EBS20084

## ELECTRICAL COMPONENTS



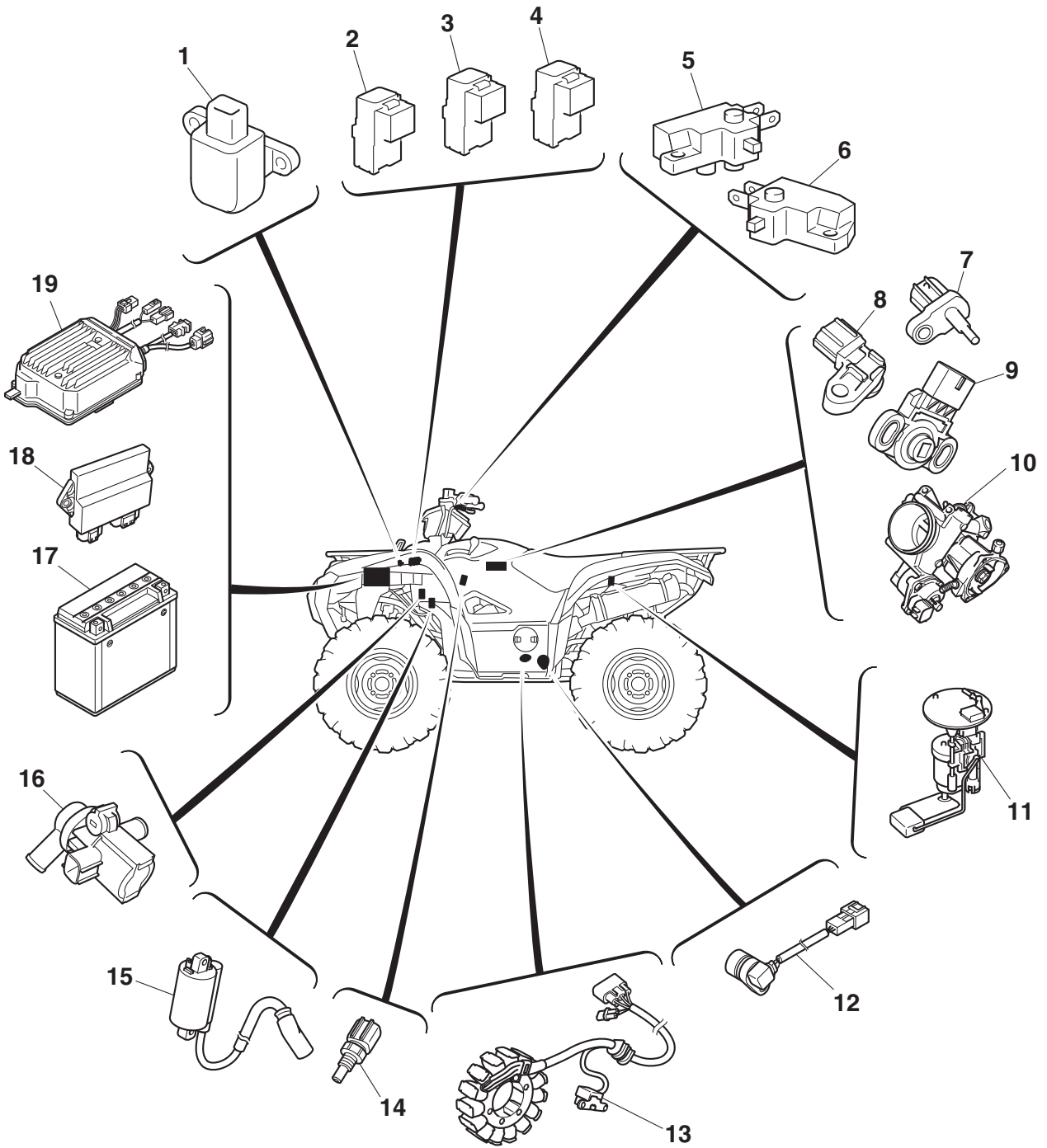


# ELECTRICAL COMPONENTS

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1. Four-wheel-drive motor relay 1
2. Four-wheel-drive motor relay 2
3. Headlight relay 1
4. Fuel injection system fuse
5. Starter relay
6. EPS fuse (for EPS models)
7. Main fuse
8. Fuse box (ignition, headlights, four-wheel-drive motor, radiator fan motor, signaling system, auxiliary DC jack)
9. Radiator fan motor circuit breaker
10. Rectifier/regulator
11. Reverse switch
12. Gear position switch
13. Auxiliary DC jack
14. Main switch
15. Differential motor
16. EPS torque sensor (for EPS models)
17. EPS motor (for EPS models)
18. Horn (except for CDN)
19. Radiator fan motor

# ELECTRICAL COMPONENTS



# ELECTRICAL COMPONENTS

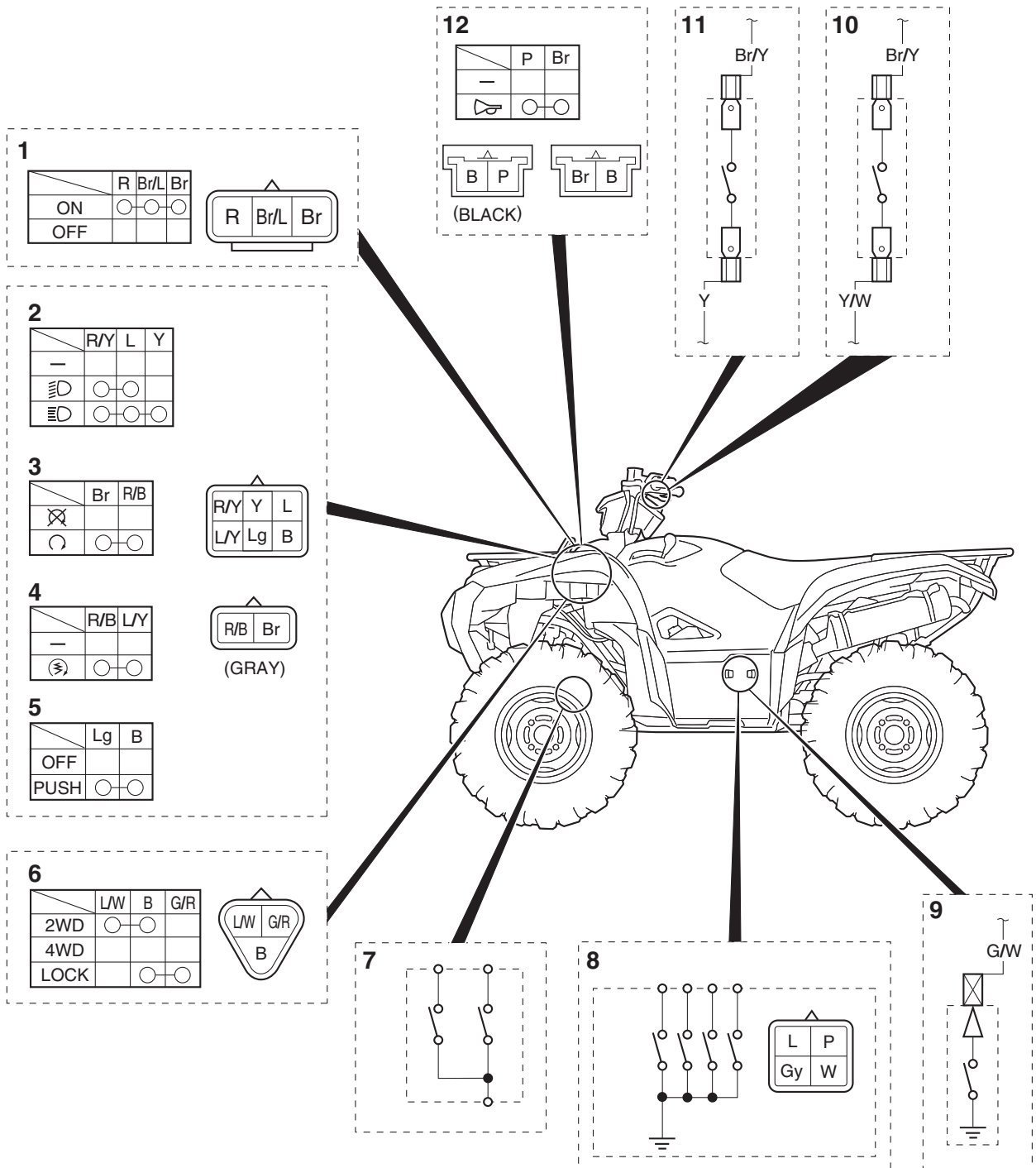
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1. Lean angle sensor
2. Radiator fan motor relay
3. Fuel injection system relay
4. Headlight relay 2
5. Front brake light switch
6. Rear brake light switch
7. Intake air temperature sensor
8. Intake air pressure sensor
9. TPS (throttle position sensor)
10. ISC (Idle Speed Control) unit
11. Fuel pump
12. Speed sensor
13. Crankshaft position sensor
14. Coolant temperature sensor
15. Ignition coil
16. Air induction system solenoid
17. Battery
18. ECU (Engine Control Unit)
19. EPS control unit (for EPS models)

# ELECTRICAL COMPONENTS

EBS30292

## CHECKING THE SWITCHES



1. Main switch
2. Light switch
3. Engine stop switch
4. Start switch
5. Override switch
6. On-Command four-wheel-drive motor switch and differential gear lock switch
7. Four-wheel-drive motor switch (differential motor)
8. Gear position switch
9. Reverse switch
10. Rear brake light switch
11. Front brake light switch
12. Horn switch (except for CDN)

# ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECB02380

## NOTICE

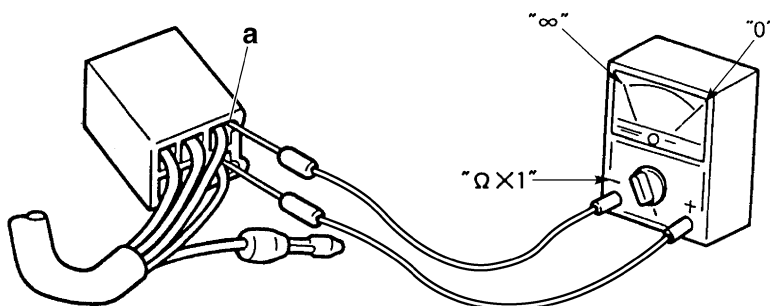
Never insert the tester probes into the coupler terminal slots "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



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

## TIP

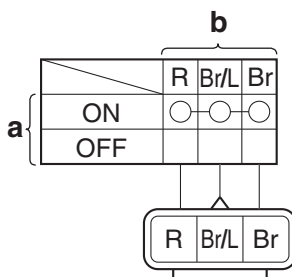
- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.

The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "○—○". There is continuity between red, brown/blue, and brown when the switch is set to "ON".



EBS30293

## 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.

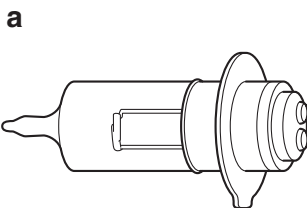
Improperly connected → Properly connect.

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.

- Bulb “a” is used for the handle mounted light 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 sockets by turning them counterclockwise.



### Checking the condition of the bulbs

The following procedure applies to all of the bulbs.

1. Remove:

- Bulb

EWB03950



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

ECB03000

### NOTICE

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.

- Avoid touching the glass part of a handle mounted light 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 handle mounted light 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.

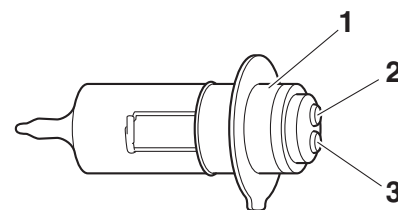


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

### TIP

Before checking for continuity, set the pocket tester to “0” and to the “ $\Omega \times 1$ ” range.

- 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.



### 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.

# ELECTRICAL COMPONENTS



**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.

- Install a good bulb into the bulb socket.
- Connect the pocket tester probes to the respective leads of the bulb socket.
- Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

EBS30296

## CHECKING THE FUSES

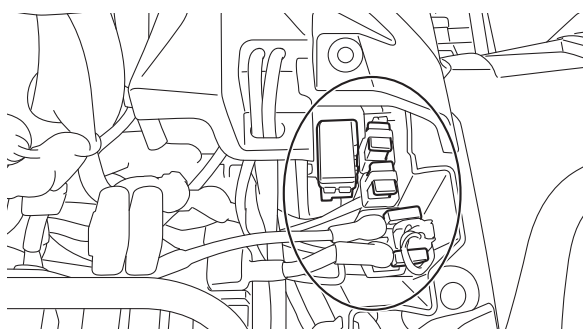
The following procedure applies to all of the fuses.

ECB02590

### NOTICE

**To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.**

- Remove:
  - Battery cover  
Refer to “GENERAL CHASSIS (1)” on page 4-1.
- Check:
  - Fuse



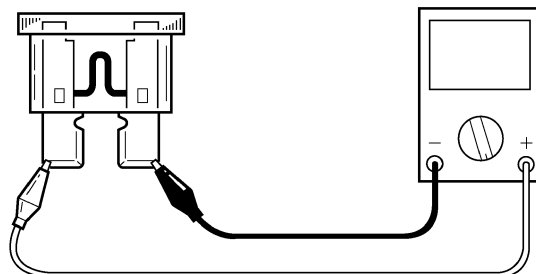
- Connect the pocket tester to the fuse and check the continuity.

## TIP

Set the pocket tester selector to “ $\Omega \times 1$ ”.



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



- If the pocket tester indicates “ $\infty$ ”, replace the fuse.

- Replace:
  - Blown fuse

- Set the main switch to “ $\odot$ ” (off).
- Install a new fuse of the correct amperage rating.
- Set the switch(es) to on to verify if the electrical circuit is operational.
- If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	40 A	1
EPS (for EPS models)	40 A	1
Radiator fan motor	20 A	1
Headlight	10 A	1
Ignition	10 A	1
Fuel injection system	15 A	1
Four-wheel-drive motor	10 A	1
Auxiliary DC jack	10 A	1
Signaling system	10 A	1
Spare	20 A	1
Spare	15 A	1
Spare	10 A	1

EWB03660

### 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 electri-**

cal system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.



4. Install:

- Battery cover  
Refer to “GENERAL CHASSIS (1)” on page 4-1.

EBS30297

## CHECKING AND CHARGING THE BATTERY

EWB03640

### 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.

ECB02390

### 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 as explained in the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

### TIP

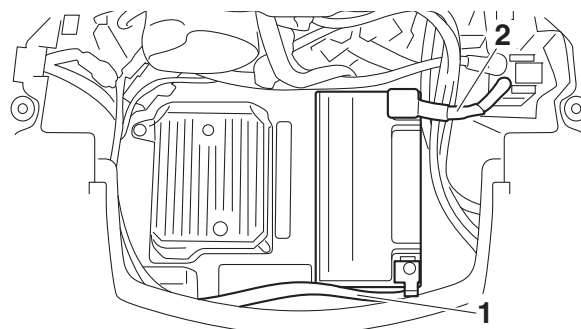
Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
  - Battery cover  
Refer to “GENERAL CHASSIS (1)” on page 4-1.
  - Front carrier
  - Battery holding bracket  
Refer to “GENERAL CHASSIS (2)” on page 4-6.
2. Disconnect:
  - Battery leads  
(from the battery terminals)

ECB02570

### NOTICE

First, disconnect the negative battery lead “1”, and then positive battery lead “2”.



3. Remove:
  - Battery
4. Check:
  - Battery charge

- 
- a. Connect a pocket tester to the battery terminals.

- Positive tester probe → positive battery terminal
- Negative tester probe → negative battery terminal



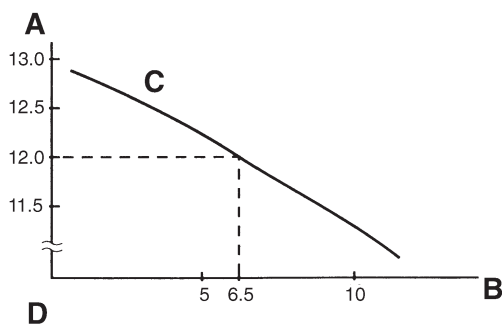
# ELECTRICAL COMPONENTS

## TIP

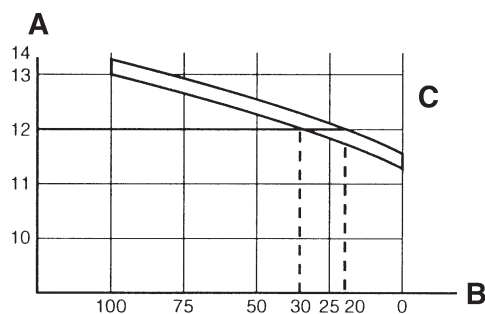
- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

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)

5. Charge:  
 • Battery  
 (refer to the appropriate charging method)

EWB03650



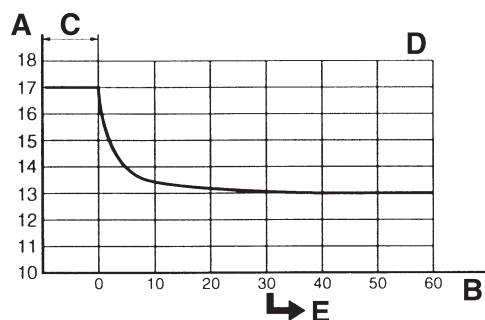
**WARNING**

**Do not quick charge a battery.**

ECB02580

**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)



# ELECTRICAL COMPONENTS

8. Check:
  - Battery terminals  
Dirt → Clean with a wire brush.  
Loose connection → Connect properly.
9. Lubricate:
  - Battery terminals


	<b>Recommended lubricant</b> <b>Dielectric grease</b>
---	--

10. Install:
  - Battery holding bracket
  - Front carrier  
Refer to "GENERAL CHASSIS (2)" on page 4-6.
  - Battery cover  
Refer to "GENERAL CHASSIS (1)" on page 4-1.

EBS30298

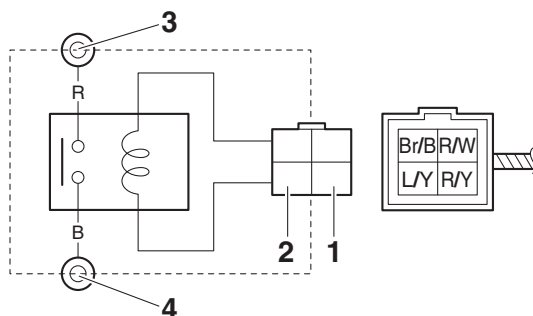
## CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

	<b>Pocket tester</b> <b>90890-03112</b> <b>Analog pocket tester</b> <b>YU-03112-C</b>
---	--

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminal as shown. Check the relay operation.  
Out of specification → Replace.

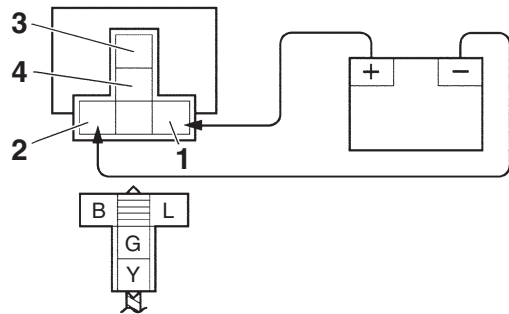
### Starter relay




1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

	<b>Result</b> <b>Continuity</b> <b>(between "3" and "4")</b>
---	--

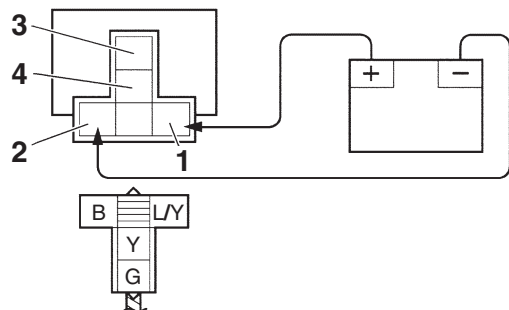
### Headlight relay 1




1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

	<b>Result</b> <b>Continuity</b> <b>(between "3" and "4")</b>
--	--

### Headlight relay 2

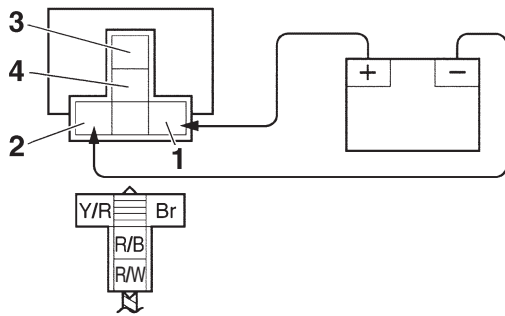


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe


	<b>Result</b> <b>Continuity</b> <b>(between "3" and "4")</b>
---	--

# ELECTRICAL COMPONENTS

## Radiator fan motor relay



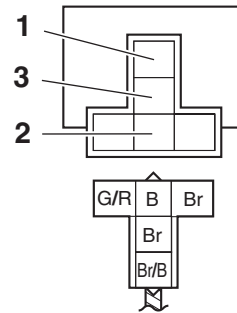
1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe




**Result**  
Continuity  
(between "3" and "4")

## Four-wheel-drive motor relay 1

First step:

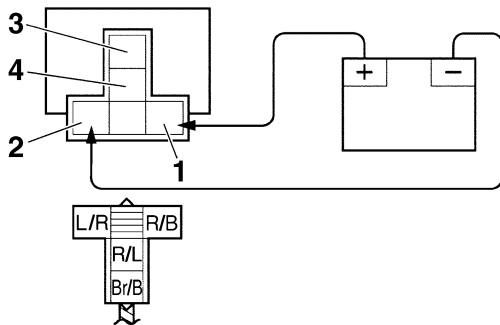


1. Positive tester probe
2. Negative tester probe
3. Negative tester probe




**Result**  
Continuity  
(between "1" and "2")  
No continuity  
(between "1" and "3")

## Fuel injection system relay

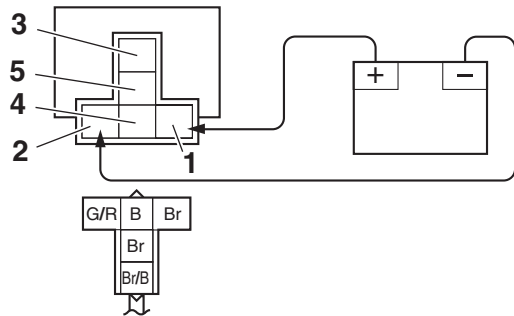


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe




**Result**  
Continuity  
(between "3" and "4")

Second step:



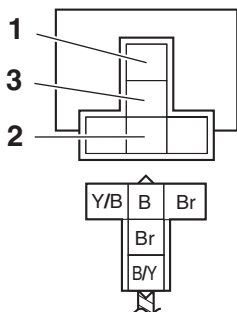
1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe



**Result**  
No continuity  
(between "3" and "4")  
Continuity  
(between "3" and "5")

## Four-wheel-drive motor relay 2

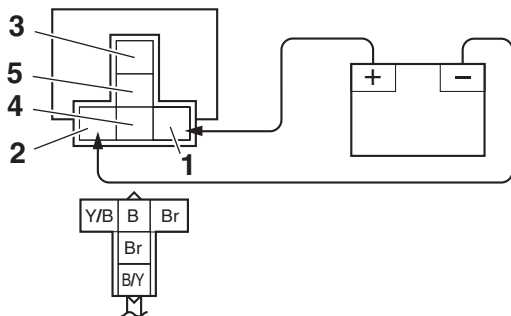
First step:



1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

	<b>Result</b> Continuity (between "1" and "2") No continuity (between "1" and "3")
--	--

Second step:



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

	<b>Result</b> No continuity (between "3" and "4") Continuity (between "3" and "5")
--	--

EBS30416

## CHECKING THE DIODE

1. Check:
  - Diode  
Out of specification → Replace.



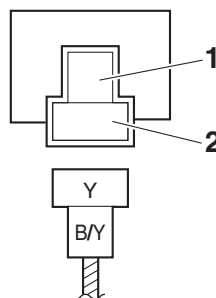
**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

**TIP**

The pocket tester or the analog pocket tester readings are shown in the following table.



**No continuity**  
Positive tester probe → black/yellow "1"  
Negative tester probe → yellow "2"  
**Continuity**  
Positive tester probe → yellow "2"  
Negative tester probe → black/yellow "1"



- Disconnect the diode from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the diode coupler as shown.
- Check the diode for continuity.
- Check the diode for no continuity.

EBS30299

## CHECKING THE SPARK PLUG CAP

1. Check:
  - Spark plug cap resistance  
Out of specification → Replace.



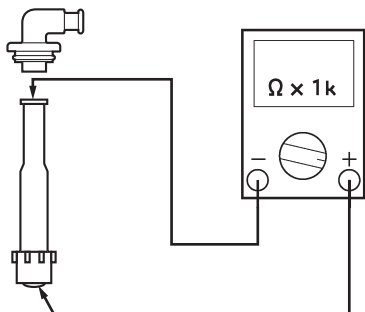
**Resistance**  
**10.0 k $\Omega$**

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the spark plug cap as shown.

# ELECTRICAL COMPONENTS



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



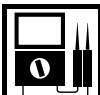
c. Measure the spark plug cap resistance.

EBS30300

## CHECKING THE IGNITION COIL

1. Check:

- Primary coil resistance  
Out of specification → Replace.



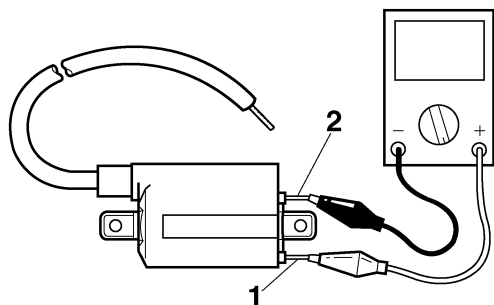
**Primary coil resistance  
2.16–2.64 Ω**

- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ( $\Omega \times 1$ ) to the ignition coil as shown.



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

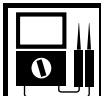
- Positive tester probe  
orange "1"
- Negative tester probe  
red/black "2"



c. Measure the primary coil resistance.

2. Check:

- Secondary coil resistance  
Out of specification → Replace.



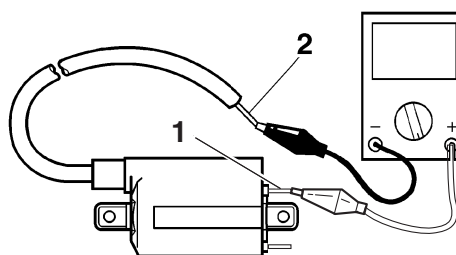
**Secondary coil resistance  
8.64–12.96 kΩ**

- Disconnect the spark plug cap from the ignition coil.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the ignition coil as shown.



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

- Positive tester probe  
red/black "1"
- Negative tester probe  
Spark plug lead "2"



c. Measure the secondary coil resistance.

EBS30302

## 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.



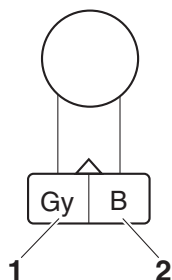
**Crankshaft position sensor resistance  
152–228 Ω**

- Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.



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

- Positive tester probe  
gray "1"
- Negative tester probe  
black "2"

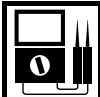


- b. Measure the crankshaft position sensor resistance.

EBS30303

### CHECKING THE LEAN ANGLE SENSOR

1. Remove:
  - Lean angle sensor
2. Check:
  - Lean angle sensor output voltage  
Out of specification → Replace.



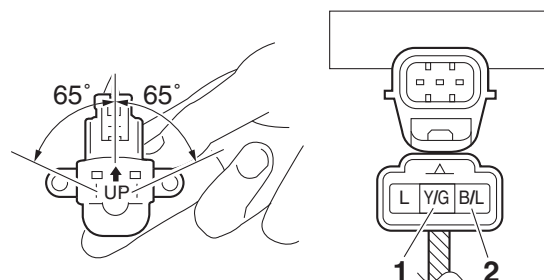
**Lean angle sensor output voltage**  
**Less than 65°: 3.55–4.45 V**  
**More than 65°: 0.65–1.35 V**

- a. Connect the lean angle sensor coupler to the wire harness.
- b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.



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

- Positive tester probe  
yellow/green "1"
- Negative tester probe  
black/blue "2"



- c. Set the main switch to "I" (on).
- d. Tilt the lean angle sensor to 65°.
- e. Measure the lean angle sensor output voltage.

EBS30304

### 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 10-1.

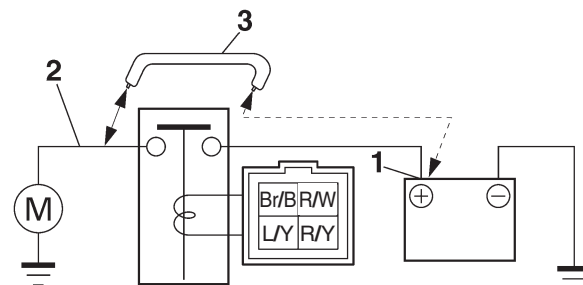
- a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

EWB03700



**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.



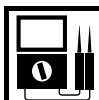
- b. Check the starter motor operation.

# ELECTRICAL COMPONENTS

EBS30305

## CHECKING THE STATOR COIL

- Disconnect:
  - AC magneto coupler (from the wire harness)
- Check:
  - Stator coil resistance  
Out of specification → Replace the crankshaft position sensor/stator assembly.



**Stator coil resistance**  
0.15–0.22 Ω

- Connect the pocket tester ( $\Omega \times 1$ ) to the AC magneto coupler as shown.

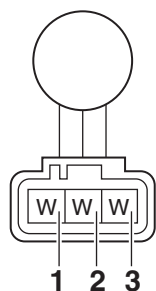


**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

- 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"

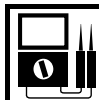


- Measure the stator coil resistance.

EBS30306

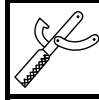
## CHECKING THE RECTIFIER/REGULATOR

- Check:
  - Charging voltage  
Out of specification → Replace the rectifier/regulator.



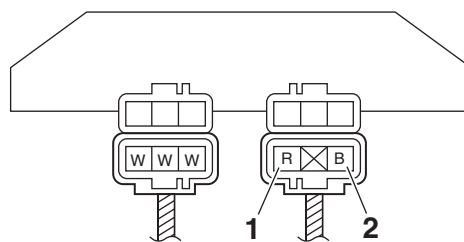
**Charging voltage**  
above 14 V at 5000 r/min

- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.



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

- Positive tester probe red "1"
- Negative tester probe black "2"



- Start the engine and let it run at approximately 5000 r/min.
- Measure the charging voltage.

EBS30307

## CHECKING THE FUEL SENDER

- Disconnect:
  - Fuel pump coupler (from the wire harness)
- Remove:
  - Fuel pump assembly (from the fuel tank)
- Check:
  - Fuel sender resistance  
Out of specification → Replace the fuel pump assembly.



**Sender unit resistance (full)**  
19.00–21.00 Ω  
**Sender unit resistance (empty)**  
138.50–141.50 Ω

- Connect the pocket tester ( $\Omega \times 10$ ) to the fuel sender terminal as shown.

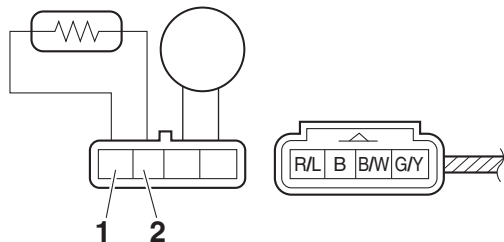


# ELECTRICAL COMPONENTS

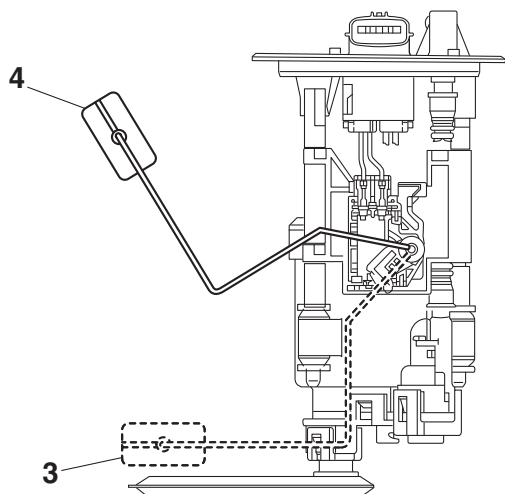


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

- Positive tester probe green/yellow "1"
- Negative tester probe black/white "2"



- b. Move the fuel sender float to the minimum "3" and maximum "4" level positions.



- c. Measure the fuel sender resistance.

## CHECKING THE SPEED SENSOR

1. Check:
- Speed sensor output voltage  
Out of specification → Replace.



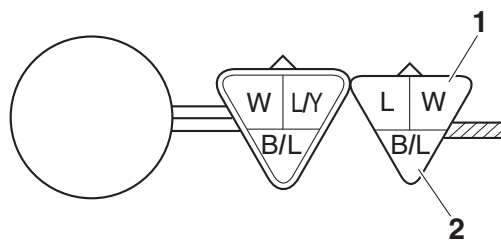
**Output voltage reading cycle**  
**0.6 V–4.8 V–0.6 V–4.8 V–0.6 V**

- a. Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.



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

- Positive tester probe white "1"
- Negative tester probe black/blue "2"



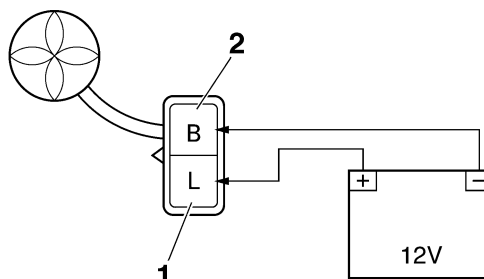
- b. Set the main switch to "I" (on).  
 c. Elevate the rear wheels and slowly rotate them.  
 d. Measure the voltage (DC 20 V) of white and black/blue. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.

## CHECKING THE RADIATOR FAN MOTOR

1. Check:
- Radiator fan motor  
Faulty/rough movement → Replace.

- a. Disconnect the radiator fan motor coupler from the wire harness.  
 b. Connect the battery (DC 12 V) as shown.

- Positive battery terminal blue "1"
- Negative battery terminal black "2"



c. Measure the radiator fan motor movement.



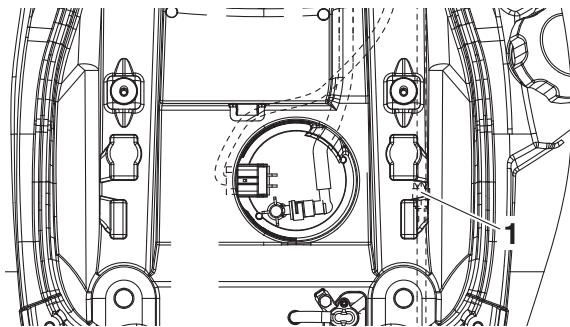
EBS30311

## CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER

- Remove:
  - Radiator fan motor circuit breaker (from the wire harness)

### TIP

The radiator fan motor circuit breaker "1" is attached to the wire harness with black tape as shown in the illustration.



- Check:
  - Radiator fan motor circuit breaker resistance  
Out of specification → Replace the radiator fan motor circuit breaker.

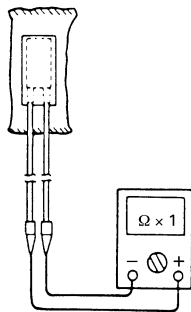


**Radiator fan motor circuit breaker resistance**  
Zero  $\Omega$  at 20 °C (68 °F)

- Connect the pocket tester ( $\Omega \times 1$ ) to the radiator fan motor circuit breaker as shown.



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



- Measure the radiator fan motor circuit breaker resistance.



EBS30312

## CHECKING THE COOLANT TEMPERATURE SENSOR

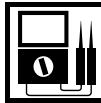
- Remove:
  - Coolant temperature sensor

EWB03710

### 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.

- Check:
  - Coolant temperature sensor resistance  
Out of specification → Replace.

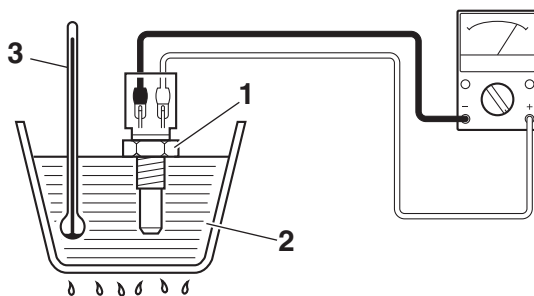


**Coolant temperature sensor resistance**  
2.32–2.59 k $\Omega$  at 20 °C (68 °F)  
310–326  $\Omega$  at 80 °C (176 °F)

- Connect the pocket tester ( $\Omega \times 100$ ) to the coolant temperature sensor terminals as shown.



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



- 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.


- Place a thermometer "3" in the coolant.
- Slowly heat the coolant, and then let it cool down to the specified temperature.
- Measure the coolant temperature sensor resistance.




EBS30313

## CHECKING THE THROTTLE POSITION SENSOR

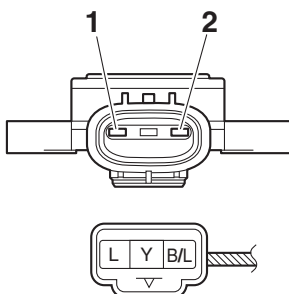
- Remove:
  - Throttle position sensor (from the throttle body)
- Check:
  - Throttle position sensor maximum resistance Out of specification → Replace the throttle position sensor.

	<b>Resistance</b> 2.64–6.16 kΩ
---	-----------------------------------

- Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor terminal as shown.

	<b>Pocket tester</b> 90890-03112 <b>Analog pocket tester</b> YU-03112-C
---	--

- Positive tester probe blue “1”
- Negative tester probe black/blue “2”



- Measure the throttle position sensor resistance.

- Install:
  - Throttle position sensor

### TIP

When installing the throttle position sensor, adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.


EBS30316

## CHECKING THE FUEL INJECTOR

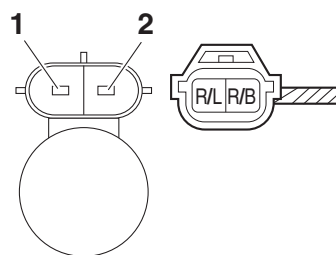
- Check:
  - Fuel injector resistance Out of specification → Replace the fuel injector.

	<b>Resistance</b> 12.0 Ω
---	-----------------------------

- Disconnect the fuel injector coupler from wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuel injector terminals as shown.

	<b>Pocket tester</b> 90890-03112 <b>Analog pocket tester</b> YU-03112-C
---	--

- Positive tester probe Fuel injector terminal “1”
- Negative tester probe Fuel injector terminal “2”




- Measure the fuel injector resistance.


EBS30317

## CHECKING THE AIR INDUCTION SYSTEM SOLENOID

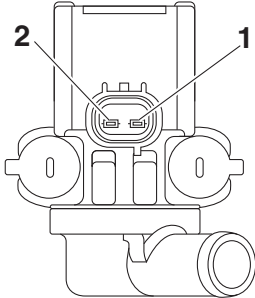
- Check:
  - Air induction system solenoid resistance Out of specification → Replace.

	<b>Solenoid resistance</b> 18–22 Ω
---	---------------------------------------

- Disconnect the air induction system solenoid coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the air induction system solenoid terminals as shown.

	<b>Pocket tester</b> 90890-03112 <b>Analog pocket tester</b> YU-03112-C
---	--


- Positive tester probe → Air induction system solenoid terminal “1”
- Negative tester probe → Air induction system solenoid terminal “2”



c. Measure the air induction system solenoid resistance.


EBS30314  
**CHECKING THE INTAKE AIR PRESSURE SENSOR**

1. Check:
- Intake air pressure sensor output voltage  
Out of specification → Replace.



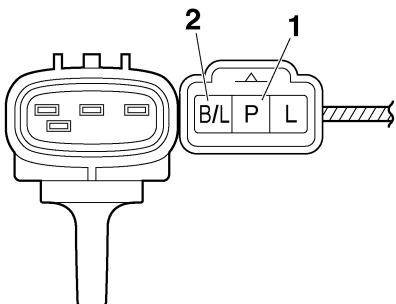
**Intake air pressure sensor output voltage**  
3.75–4.25 V

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 pink “1”
- Negative tester probe black/blue “2”



b. Set the main switch to “ $\text{I}$ ” (on).

c. Measure the intake air pressure sensor output voltage.


EBS30315  
**CHECKING THE INTAKE AIR TEMPERATURE SENSOR**

1. Remove:
- Intake air temperature sensor (from the air filter case.)

EWB03820  
**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.

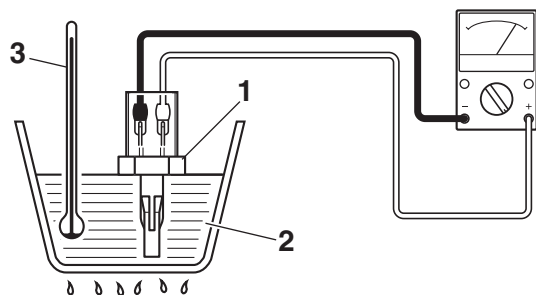


**Intake air temperature sensor resistance**  
5.40–6.60 k $\Omega$  at 0 °C (32 °F)  
290–390  $\Omega$  at 80 °C (176 °F)

a. Connect the pocket tester ( $\Omega \times 100$ ) to the intake air temperature sensor terminal as shown.



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



b. Immerse the intake air temperature sensor “1” in a container filled with water “2”.

**TIP**  
Make sure that the air temperature sensor terminals do not get wet.

- c. Place a thermometer “3” in the water.  
d. Slowly heat the water, then let it cool down to the specified temperature.

e. Measure the intake air temperature sensor resistance.



EBS30319

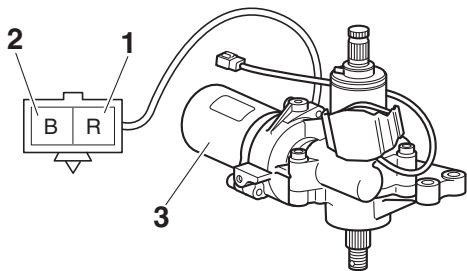
## CHECKING THE EPS MOTOR (for EPS models)

1. Remove:
    - EPS unit
  2. Check:
    - EPS motor
- Out of specification → Replace the EPS unit.

### TIP

The pocket tester and the analog pocket tester readings are shown in the following table.

	<b>Continuity</b>
	Positive tester probe → red “1”
	Negative tester probe → black “2”
	<b>No continuity</b>
	Positive tester probe → red “1”
	Negative tester probe → EPS motor body “3”
<b>No continuity</b>	
Positive tester probe → black “2”	
Negative tester probe → EPS motor body “3”	



EBS30320

## CHECKING THE EPS TORQUE SENSOR (for EPS models)

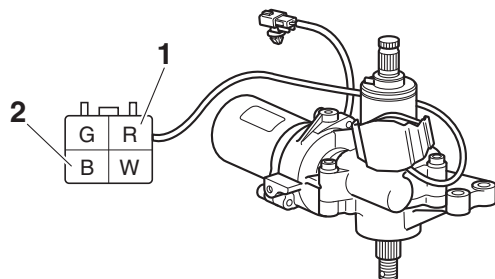
1. Remove:
    - EPS unit
  2. Check:
    - EPS torque sensor resistance
- Out of specification → Replace the EPS unit.

	<b>Coil resistance</b>
	1.00–1.50 kΩ (YF70GPG,
	YF70GPLG, YF70GPSG,
	YFM700FWAD, YFM70GPHG,
	YFM70GPLG, YFM70GPSG,
	YFM70GPXG)

- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the EPS torque sensor coupler terminal as shown.

	<b>Pocket tester</b>
	90890-03112
	<b>Analog pocket tester</b>
	YU-03112-C

- Positive tester probe → red “1”
- Negative tester probe → black “2”



- b. Measure the EPS torque sensor resistance.

- a. Connect the pocket tester ( $\Omega \times 1$ ) to the EPS motor coupler terminal and EPS motor body.

	<b>Pocket tester</b>
	90890-03112
	<b>Analog pocket tester</b>
	YU-03112-C

- b. Check the EPS motor for continuity.
- c. Check the EPS motor for no continuity.





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## TROUBLESHOOTING

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EBS20085

## TROUBLESHOOTING

EBS30321

### 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.

EBS30322

### STARTING FAILURES

#### Engine

1. Cylinder 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 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 drain hose
  - Clogged rollover valve
  - Clogged rollover valve hose
  - Deteriorated or contaminated fuel
2. Fuel pump
  - Faulty fuel pump
  - Faulty fuel injection system relay
  - Clogged or damaged fuel 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
  - 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
  - Faulty crankshaft position sensor
  - Broken AC magneto rotor woodruff key
6. Switches and wiring
  - Faulty main switch
  - Faulty engine stop switch
  - Broken or shorted wiring
  - Faulty gear position switch
  - Faulty start switch
  - Faulty brake light switch
  - Improperly grounded circuit
  - Loose connections
7. Starting system
  - Faulty starter motor
  - Faulty starter relay
  - Faulty starter clutch

EBS30323

### INCORRECT ENGINE IDLING SPEED

#### Engine

1. Cylinder 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
  - Improper throttle cable free play
  - Flooded throttle body



## Electrical system

1. Battery
  - Discharged battery
  - Faulty battery
2. Spark plug
  - 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
  - Broken or shorted primary or secondary coils
  - Faulty spark plug lead
  - Cracked or broken ignition coil
4. Ignition system
  - Faulty ECU
  - Faulty crankshaft position sensor
  - Broken AC magneto rotor woodruff key
5. Valve train
  - Improperly adjusted valve clearance
  - Improperly adjusted valve timing

EBS30324

## **POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE**

Refer to “STARTING FAILURES” on page 10-1.

## Engine

1. Air filter
  - Clogged air filter element

## Fuel system

1. Fuel pump
  - Faulty fuel pump

EBS30325

## FAULTY DRIVE TRAIN

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
<ol style="list-style-type: none"><li>1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)</li><li>2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area.</li><li>3. A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.</li></ol>	<ol style="list-style-type: none"><li>A. Bearing damage.</li><li>B. Improper gear backlash.</li><li>C. Gear tooth damage.</li><li>D. Broken drive shaft.</li><li>E. Broken gear teeth.</li><li>F. Seizure due to lack of lubrication.</li><li>G. Small foreign objects lodged between the moving parts.</li></ol>

### TIP

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EBS30326

## FAULTY GEAR SHIFTING

### Shifting is difficult

Refer to “FAULTY CLUTCH” on page 10-4.

EBS30327

## SHIFT LEVER DOES NOT MOVE

### Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

### Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

EBS30328

## JUMPS OUT OF GEAR

### Shift forks

- Worn shift fork

### Shift drum

- Incorrect axial play
- Worn shift drum groove

### Transmission

- Worn gear dog

EBS30329

## FAULTY CLUTCH

### Engine operates but vehicle will not move

1. V-belt
  - 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 spring
  - Damaged, loose or worn clutch spring
2. Clutch shoe
  - Damaged or worn clutch shoe
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
  - 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

EBS30330

## OVERHEATING

### Engine

1. Clogged coolant passages
2. Cylinder head and piston
  - Heavy carbon buildup
3. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity
  - Inferior oil quality

### Cooling system

1. Coolant
  - Low coolant level
2. Radiator
  - Damaged or leaking radiator
  - Faulty radiator cap
  - Bent or damaged radiator fin
3. Water pump
  - Damaged or faulty water pump
4. Thermostat
  - Thermostat stays closed
5. Hose(s) and pipe(s)
  - Damaged hose
  - Improperly connected hose
  - Damaged pipe
  - Improperly connected pipe

## Fuel system

1. Throttle body
  - Damaged or loose throttle body joint
2. Air filter
  - Clogged air filter element

## Chassis

1. Brake(s)
  - Dragging brake

## Electrical system

1. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
2. Ignition system
  - Faulty ECU

EBS30331

## OVERCOOLING

### Cooling system

1. Thermostat
  - Thermostat stays open

EBS30332

## POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper piston 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
- 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

EBS30333

## FAULTY SHOCK ABSORBER ASSEMBLY

### Leaking oil

- Bent, damaged or rusty damper rod
- Cracked or damaged shock absorber
- Damaged oil seal lip

### Malfunction

- Fatigued or damaged shock absorber spring
- Bent or damaged damper rod

EBS30334

## UNSTABLE HANDLING

1. Handlebar
  - Bent or improperly installed handlebar
2. Steering
  - Incorrect toe-in
  - Bent steering stem
  - Improperly installed steering stem
  - Damaged bearing or bearing race
  - Bent tie-rods
  - Deformed steering knuckles
3. Shock absorber
  - Faulty shock absorber spring
  - Leaking oil
4. Tire(s)
  - Uneven tire pressures (left and right)
  - Incorrect tire pressure
  - Uneven tire wear
5. Wheel(s)
  - Incorrect wheel balance
  - Deformed wheel
  - Damaged or loose wheel bearing
  - Bent or loose wheel axle
  - Excessive wheel runout
6. Frame
  - Bent frame
  - Damaged frame

EBS30335

## FAULTY LIGHTING OR SIGNALING SYSTEM

### Headlight or handle mounted light does not come on

- Wrong handle mounted light bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out handle mounted light bulb
- Faulty headlight or handle mounted light assembly

### Handle mounted light bulb burnt out

- Wrong handle mounted light bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Handle mounted light bulb life expired

### Tail/brake light does not come on

- Faulty brake light switch

## TROUBLESHOOTING

---

- Too many electrical accessories
- Incorrect connection
- Faulty tail/brake light assembly

# SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

EBS20086

## SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

EBS30336

### SELF-DIAGNOSTIC FUNCTION TABLE

Fault code No.	Item
12	Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.
13	Intake air pressure sensor: open or short circuit detected.
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose).
15	Throttle position sensor: open or short circuit detected.
16	Throttle position sensor: stuck throttle position sensor is detected.
21	Coolant temperature sensor: open or short circuit detected.
22	Intake air temperature sensor: open or short circuit detected.
30	Latch up detected.
33	Ignition coil: open or short circuit detected in the primary lead of the ignition coil.
37	Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).
	Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).
39	Fuel injector: open or short circuit detected.
41	Lean angle sensor: open or short circuit detected.
42	Speed sensor: no normal signals are received from the speed sensor.
43	Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.
44	EEPROM fault code number: an error is detected while reading or writing on EEPROM.
46	Charging voltage is abnormal.
50	Faulty ECU (Engine Control Unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear.)

EBS30337

### COMMUNICATION ERROR WITH THE METER

Fault code No.	Item
Er-1	ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.
Er-2	ECU (Engine Control Unit) internal malfunction (output signal error): no signals are received from the ECU within the specified duration.
Er-3	ECU (Engine Control Unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.
Er-4	ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.

EBS30338

### DIAGNOSTIC CODE: SENSOR OPERATION TABLE

#### TIP

The diagnostic code numbers cannot be displayed on the multi-function meter. To display the diagnostic code numbers, use the Yamaha diagnostic tool.

# SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

Diagnostic code No.	Item	Display	Procedure
01	Throttle angle • Fully closed position	14–20	Check with throttle valve fully closed.
03	Pressure difference (atmospheric pressure and intake air pressure)	Displays the intake air pressure.	Set the engine stop switch to “○”, and then operate the throttle while pushing 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 indicated value.
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the indicated value.
07	Vehicle speed pulse	0–999	Check that the number increases when the rear wheels are rotated. The number is cumulative and does not reset each time the wheel is stopped.
08	Lean angle sensor output voltage • Upright • Overturned	3.6–4.4 0.7–1.3	Remove the lean angle sensor and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0	Turn the main switch to “⏻” (on), and then compare the actually measured battery voltage with the display value. (If the actually measured battery voltage is low, recharge the battery.)
21	Neutral switch • Neutral • In gear	ON OFF	Shift the transmission.
60	EEPROM fault code display	The fault code No. 44 detected EEPROM errors are indicated. 00 indication: Normal status	—
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.)	— —

# SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

Diagnostic code No.	Item	Display	Procedure
62	Malfunction history code erasure <ul style="list-style-type: none"> <li>• No history</li> <li>• History exists</li> </ul>	0 Displays the total number of malfunctions, including the current malfunction, that have occurred since the history was last erased. (For example, if there have been three malfunctions, "03" is displayed.)	— Save the malfunction history to the computer, and then delete the fault codes.
70	Control number	0–254 [-]	—

EBS30339

## DIAGNOSTIC CODE: ACTUATOR OPERATION TABLE

Diagnostic code No.	Item	Actuation	Procedure
30	Ignition coil	Actuates the ignition coil five times at one-second intervals. The "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.	Check that a spark is generated five times. <ul style="list-style-type: none"> <li>• Connect an ignition checker.</li> </ul>
36	Fuel injector	Actuates the fuel injector five times at one-second intervals. The "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.	Disconnect the fuel pump coupler, and then check that fuel injector is actuated five times by listening for the operating sound.
48	Air induction system solenoid	Actuates the air induction system solenoid five times at one-second intervals. The "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen come on each time the air induction system solenoid is actuated.	Check that the air induction system solenoid is actuated five times by listening for the operating sound.
50	Fuel injection system relay	Actuates the fuel injection system relay five times at one-second intervals. The "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen come on each time the relay is actuated. (When the relay is on, the "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen go off. When the relay is off, the "CHECK" indicator and "⚡" on the Yamaha diagnostic tool screen come on.)	Check that the fuel injection system relay is actuated five times by listening for the operating sound.



## SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

Diagnostic code No.	Item	Actuation	Procedure
51	Radiator fan motor relay	<p>Actuates the radiator fan motor relay five times at five-second intervals. (2 seconds on, 3 seconds off)</p> <p>The "CHECK" indicator and "⚠" on the Yamaha diagnostic tool screen come on each time the relay is actuated.</p> <p>(When the relay is on, the "CHECK" indicator and "⚠" on the Yamaha diagnostic tool screen go off. When the relay is off, the "CHECK" indicator and "⚠" on the Yamaha diagnostic tool screen come on.)</p>	<p>Check that the radiator fan motor relay is actuated five times by listening for the operating sound.</p>
54	ISC valve	<p>Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds.</p> <p>The "CHECK" indicator and "⚠" on the Yamaha diagnostic tool screen come on during the operation.</p>	<p>The operating sound can be heard when ISC valve operates.</p>

**WIRING DIAGRAM****YF70GG/YFM70GDGXG/YFM70G  
DHG 2016**

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Main fuse
6. Battery
7. Fuel injection system fuse
8. Starter relay
9. Engine ground
10. Starter motor
11. Joint coupler
12. Fuel injection system relay
13. Yamaha diagnostic tool coupler
14. Reverse switch
15. ISC (Idle Speed Control) unit
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
19. Fuel injector
20. Intake air temperature sensor
21. Coolant temperature sensor
22. Speed sensor
23. TPS (throttle position sensor)
24. Intake air pressure sensor
25. Lean angle sensor
26. Air induction system solenoid
27. Gear position switch
28. Meter assembly
29. Multi-function meter
30. Engine trouble warning light
31. Coolant temperature warning light
32. Park indicator light
33. Reverse indicator light
34. Neutral indicator light
35. High-range indicator light
36. Low-range indicator light
37. On-Command four-wheel-drive motor switch and differential lock switch
38. Differential motor
39. Fuel sender
40. Fuel pump
41. Four-wheel-drive motor relay 1
42. Four-wheel-drive motor relay 2
43. Handlebar switch (left)
44. Override switch
45. Start switch
46. Engine stop switch
47. Light switch
48. Handle mounted light
49. Headlight
50. Headlight relay 2
51. Headlight relay 1
52. Tail/brake light
53. Diode

54. Rear brake light switch
55. Front brake light switch
56. Radiator fan motor
57. Radiator fan motor circuit breaker
58. Radiator fan motor relay
59. Headlight fuse
60. Signaling system fuse
61. Ignition fuse
62. Four-wheel-drive motor fuse
63. Auxiliary DC jack fuse
64. Radiator fan motor fuse
65. Auxiliary DC jack
66. Frame ground 1
67. Frame ground 2
68. Horn switch (except for CDN)
69. Horn (except for CDN)
  - A. Wire harness
  - B. Negative battery sub-wire harness

**YF70GPG/YF70GPSG/YF70GPL  
G/YFM70GPXG/YFM70GPHG/YF  
M70GPSG/YFM70GPLG/YFM70  
0FWAD 2016**

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. EPS fuse
6. Main fuse
7. Battery
8. Fuel injection system fuse
9. Starter relay
10. Engine ground
11. Starter motor
12. Joint coupler
13. EPS torque sensor
14. EPS motor
15. EPS (electric power steering) control unit
16. EPS self-diagnosis signal connector
17. Fuel injection system relay
18. Yamaha diagnostic tool coupler
19. Reverse switch
20. ISC (Idle Speed Control) unit
21. ECU (Engine Control Unit)
22. Ignition coil
23. Spark plug
24. Fuel injector
25. Intake air temperature sensor
26. Coolant temperature sensor
27. Speed sensor
28. TPS (throttle position sensor)
29. Intake air pressure sensor
30. Lean angle sensor
31. Air induction system solenoid
32. Gear position switch
33. Meter assembly
34. Multi-function meter
35. Engine trouble warning light
36. Coolant temperature warning light
37. Park indicator light
38. Reverse indicator light
39. Neutral indicator light
40. High-range indicator light
41. Low-range indicator light
42. EPS warning light
43. On-Command four-wheel-drive motor switch and differential lock switch
44. Differential motor
45. Fuel sender
46. Fuel pump
47. Four-wheel-drive motor relay 1
48. Four-wheel-drive motor relay 2
49. Handlebar switch (left)
50. Override switch
51. Start switch

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- 52. Engine stop switch
  - 53. Light switch
  - 54. Handle mounted light
  - 55. Headlight
  - 56. Headlight relay 2
  - 57. Headlight relay 1
  - 58. Tail/brake light
  - 59. Diode
  - 60. Rear brake light switch
  - 61. Front brake light switch
  - 62. Radiator fan motor
  - 63. Radiator fan motor circuit breaker
  - 64. Radiator fan motor relay
  - 65. Headlight fuse
  - 66. Signaling system fuse
  - 67. Ignition fuse
  - 68. Four-wheel-drive motor fuse
  - 69. Auxiliary DC jack fuse
  - 70. Radiator fan motor fuse
  - 71. Auxiliary DC jack
  - 72. Frame ground 1
  - 73. Frame ground 2
  - 74. Horn switch (except for CDN)
  - 75. Horn (except for CDN)
  - A. Wire harness
  - B. Negative battery sub-wire harness
  - C. EPS (electric power steering) control unit

EBS30002

**COLOR CODE**

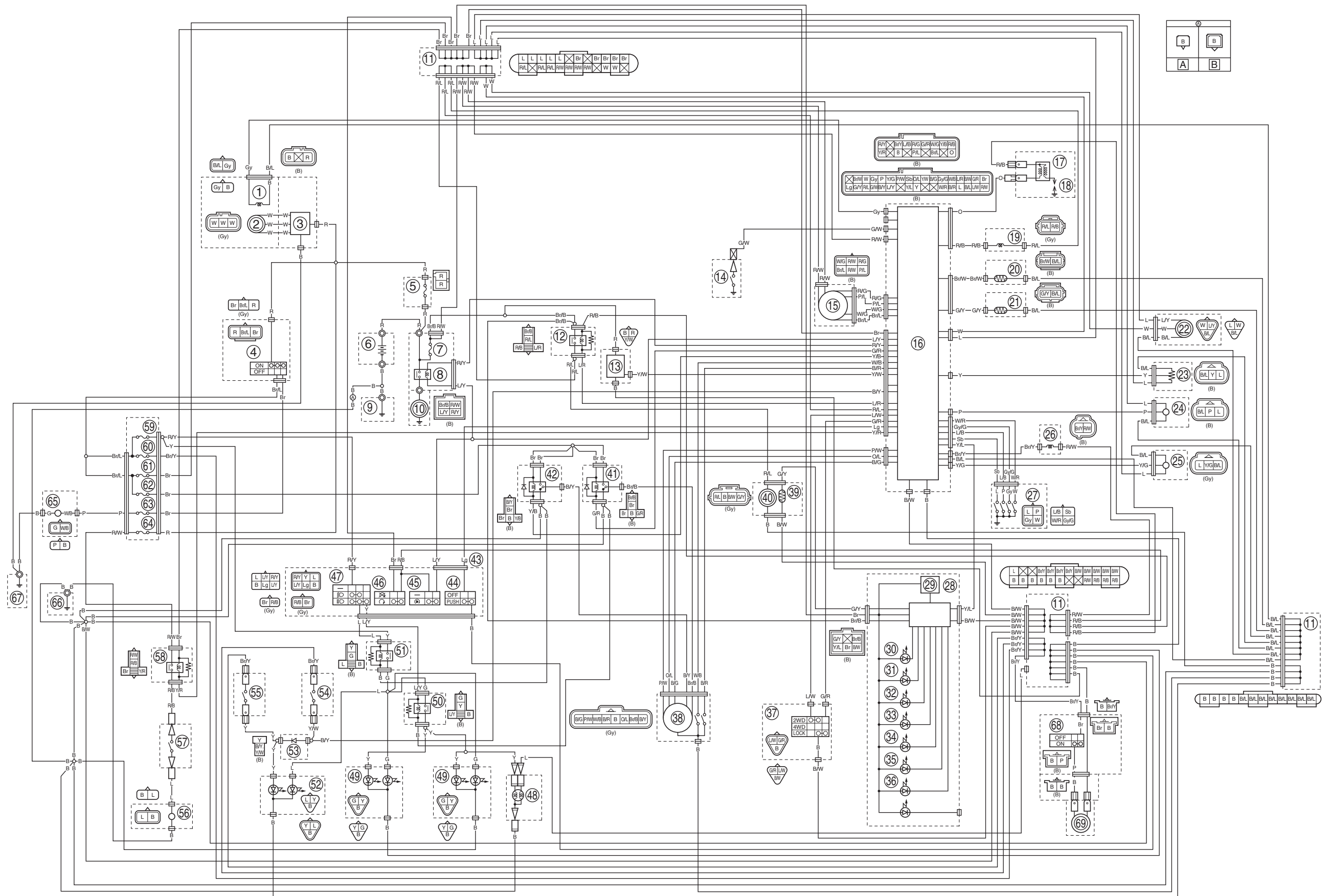
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Br	Brown
G	Green
Gy	Gray
L	Blue
Lg	Light green
O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow
B/G	Black/Green
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/B	Brown/Black
Br/L	Brown/Blue
Br/W	Brown/White
Br/Y	Brown/Yellow
G/L	Green/Blue
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
L/B	Blue/Black
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
O/L	Orange/Blue
O/R	Orange/Red
O/W	Orange/White
P/L	Pink/Blue
P/W	Pink/White
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
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W/L	White/Blue
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Y/L	Yellow/Blue
Y/R	Yellow/Red
Y/W	Yellow/White

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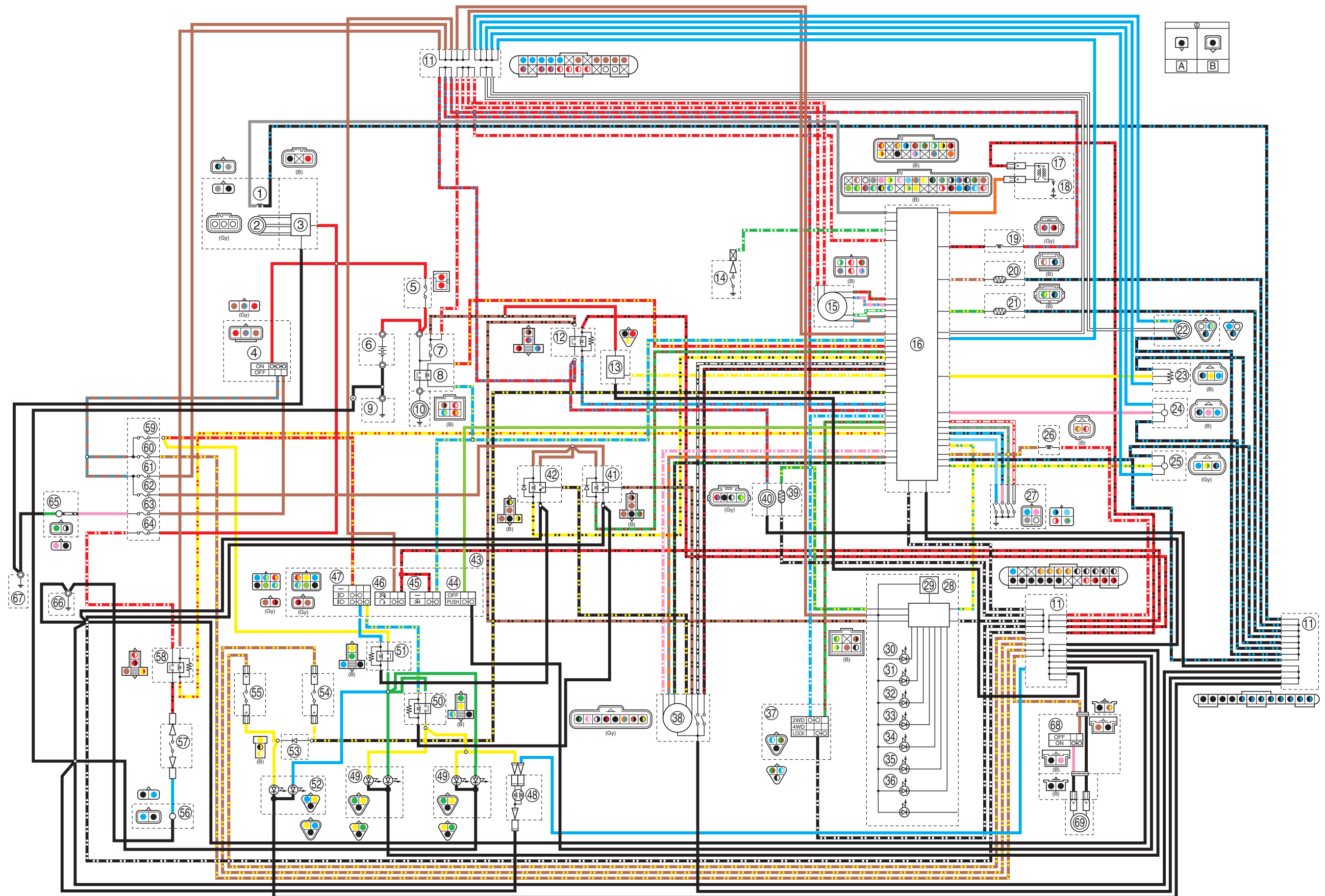




YF70GG/YFM70GDXG/YFM70GDHG 2016 WIRING DIAGRAM

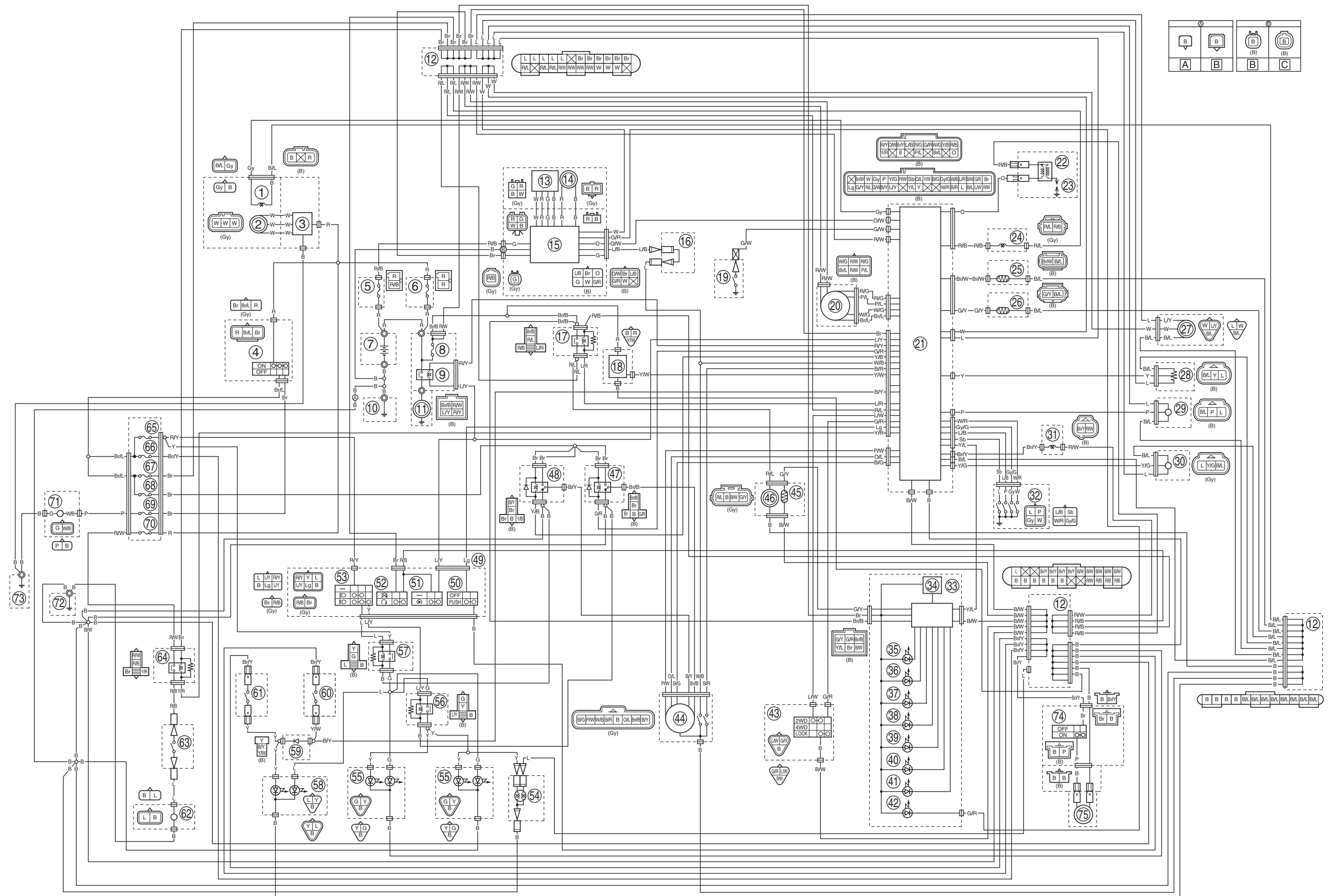


YF70GG/YFM70GDXG/YFM70GDHG 2016 WIRING DIAGRAM





YF70GPG/YF70GPSG/YF70GPLG/YFM70GPXG/YFM70GPHG/YFM70GPSG/YFM70GPLG/YFM700FWAD 2016 WIRING DIAGRAM



YF70GPG/YF70GPSG/YF70GPLG/YFM70GPXG/YFM70GPHG/YFM70GPSG/YFM70GPLG/YFM700FWAD 2016 WIRING DIAGRAM

