



**YAMAHA**

**2009**

# **SERVICE MANUAL**

# **YFZ450RY**

***YFZ450R***

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EAS20050

**YFZ450RY**  
**SERVICE MANUAL**  
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**P/N LIT-11616-22-75**

## IMPORTANT

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

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



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

### TIP

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

## 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>	<b>A TIP provides key information to make procedures easier or clearer.</b>

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

1  
↓  
**CLUTCH**

**EAS20091**  
**CLUTCH**

**Removing the clutch**

**4** → 1  
**5** → 2  
**3** → 3  
**6** → 6

Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain.
	Clutch cable		Refer to "ENGINE REMOVAL" on page 5-1.
1	Clutch cover	1	
2	Gasket	1	
3	Dowel pin	2	
4	Clutch spring	6	Yellow painting
5	Pressure plate	1	
6	Circlip	1	
7	Plain washer	1	
8	Bearing	1	
9	Push rod (pressure plate side)	1	
10	Ball	1	
11	Push rod (push lever side)	1	
12	Friction plate 1	2	
13	Clutch plate	7	
14	Friction plate 2	6	Purple painting
15	Clutch boss nut	1	
16	Lock washer	1	
17	Clutch boss	1	
18	Thrust washer	1	

5-44

**CLUTCH**

**EAS20070**  
**REMOVING THE CLUTCH**

1. Straighten the lock washer tab.
2. Loosen:
  - Clutch boss nut "1"

**TIP**  
While holding the clutch boss "2" with the universal clutch holder "3", loosen the clutch boss nut.

**Universal clutch holder**  
90890-04086  
YM-91042

3. Remove:
  - Thrust washer
  - Clutch housing

**EAS20070**  
**CHECKING THE FRICTION PLATES**  
The following procedure applies to all of the friction plates.

1. Check:
  - Friction plate 1
  - Friction plate 2

Damage/wear → Replace the friction plates as a set.
2. Measure:
  - Friction plate thickness

Out of specification → Replace the friction plates as a set.

**TIP**  
Measure the friction plate at four places.

**Friction plate 1 thickness**  
2.92~3.08 mm (0.11~0.12 in)  
**Limit**  
2.82 mm (0.11 in)  
**Friction plate 2 thickness**  
2.92~3.08 mm (0.11~0.12 in)  
**Limit**  
2.82 mm (0.11 in)

**EAS20110**  
**CHECKING THE CLUTCH PLATES**  
The following procedure applies to all of the clutch plates.

1. Check:
  - Clutch plate

Damage → Replace the clutch plates as a set.
2. Measure:
  - Clutch plate warpage (with a surface plate and thickness gauge "1")

Out of specification → Replace the clutch plates as a set.

**Clutch plate thickness**  
1.50~1.70 mm (0.06~0.07 in)  
**Warpage limit**  
0.20 mm (0.0079 in)

**EAS20140**  
**CHECKING THE CLUTCH SPRINGS**  
The following procedure applies to all of the clutch springs.

1. Check:
  - Clutch spring

Damage → Replace the clutch springs as a set.
2. Measure:
  - Clutch spring free length "a"

Out of specification → Replace the clutch springs as a set.

5-44

5-47





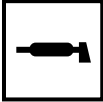















## SYMBOLS

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 (LOC-TITE®).
	Engine oil		Replace the part with a new one.

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## GENERAL INFORMATION

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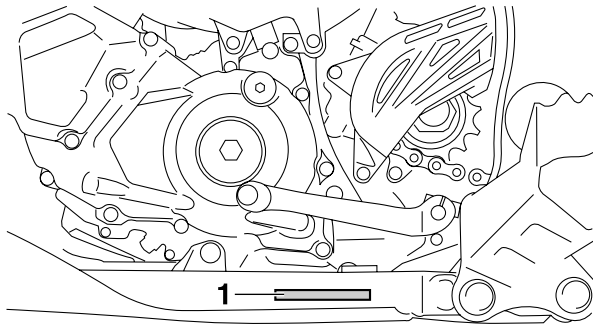
EAS20130

## IDENTIFICATION

EAS20140

### VEHICLE IDENTIFICATION NUMBER

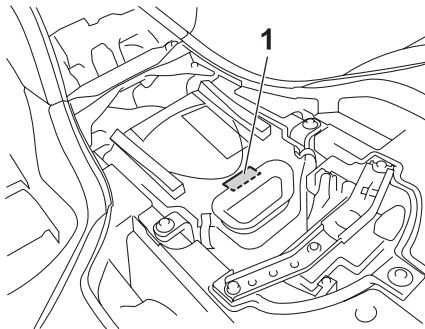
The vehicle identification number “1” is stamped into the left side of the frame.



EAS20150

### MODEL LABEL

The model label “1” is affixed to the air filter case cover. This information will be needed to order spare parts.



EAS20170

## FEATURES

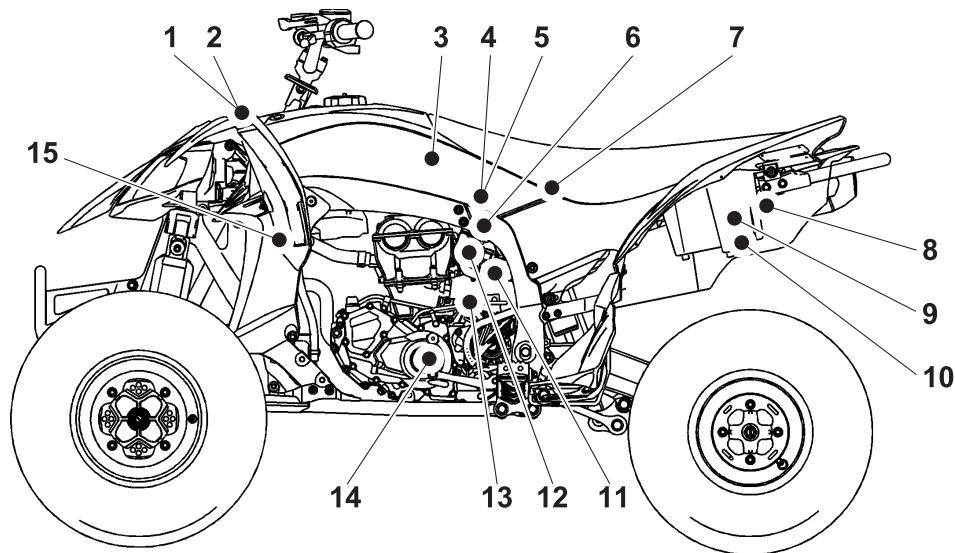
EAS30340

### OUTLINE OF THE FI SYSTEM

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

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

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



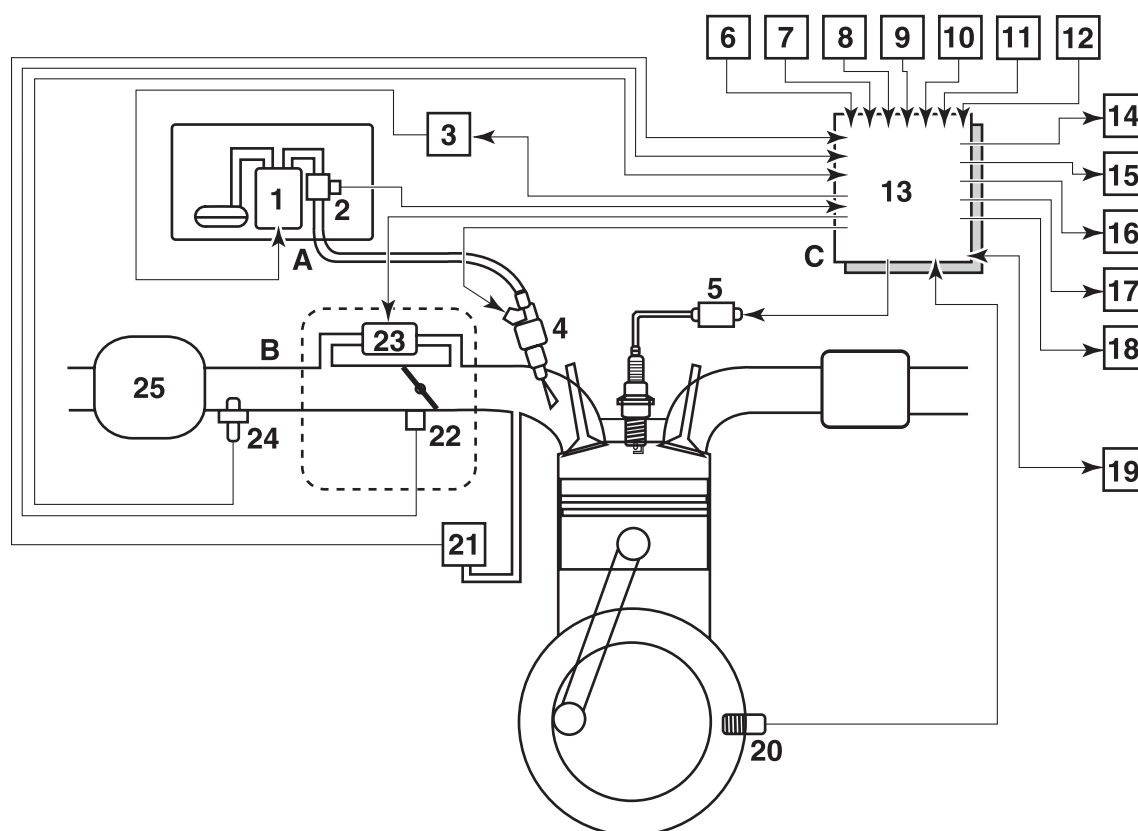
1. Engine trouble warning light
2. Fuel level warning light
3. Fuel pump
4. Ignition coil
5. Intake air pressure sensor
6. Injector
7. Intake air temperature sensor
8. ECU (engine control unit)
9. Battery
10. Lean angle sensor
11. ISC (idle speed control) valve
12. Throttle position sensor
13. Speed sensor
14. Crankshaft position sensor

15. Coolant temperature sensor

EAS18P1001

## FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kgf/cm<sup>2</sup>, 47.0 psi). Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied. The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake temperature sensor and coolant temperature sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



1. Fuel pump
2. Fuel sender
3. Main relay
4. Injector
5. Ignition coil
6. Lean angle sensor
7. Battery
8. Speed sensor
9. Neutral switch
10. Clutch switch
11. Start switch
12. Coolant temperature sensor
13. ECU (engine control unit)
14. Radiator fan motor relay

15. Coolant temperature warning light
  16. Fuel level warning light
  17. Engine trouble warning light
  18. Starter relay
  19. FI diagnostic tool
  20. Crankshaft position sensor
  21. Intake air pressure sensor
  22. Throttle position sensor
  23. ISC (idle speed control) valve
  24. Intake air temperature sensor
  25. Air filter case
- A. Fuel system  
B. Air system  
C. Control system



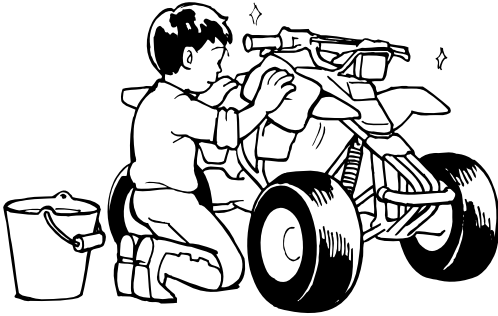
EAS20180

## IMPORTANT INFORMATION

EAS20190

### PREPARATION FOR REMOVAL AND DISASSEMBLY

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



2. Use only the proper tools and cleaning equipment.  
Refer to "SPECIAL TOOLS" on page 1-7.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.

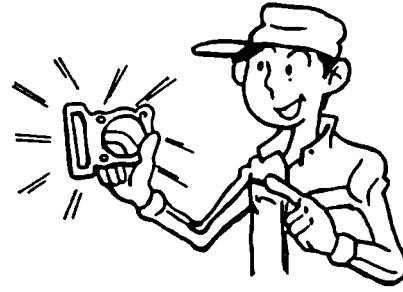


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200

### REPLACEMENT PARTS

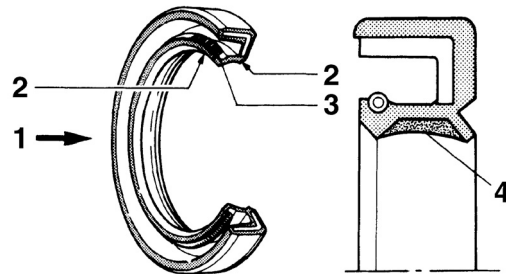
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

### GASKETS, OIL SEALS AND O-RINGS

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

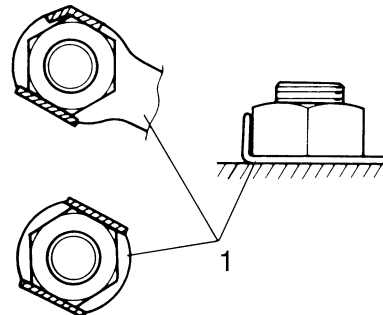


1. Oil
2. Lip
3. Spring
4. Grease

EAS20220

### LOCK WASHERS/PLATES AND COTTER PINS

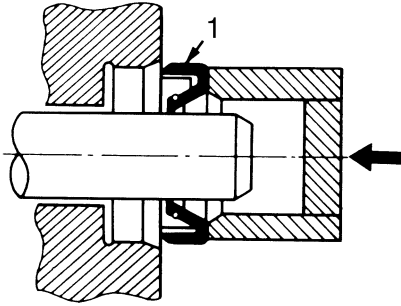
After removal, replace all lock washers/plates "1" and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



EAS20230

## BEARINGS AND OIL SEALS

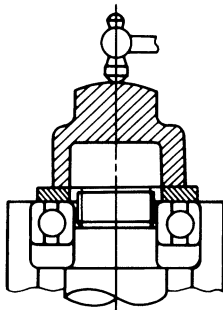
Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals "1", lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.



ECA13300

### NOTICE

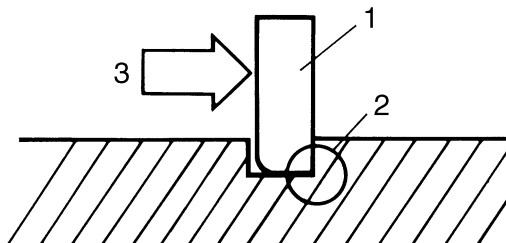
**Do not spin the bearing with compressed air because this will damage the bearing surfaces.**



EAS20240

## CIRCLIPS

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



EAS20250

## CHECKING THE CONNECTIONS

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

### 1. Disconnect:

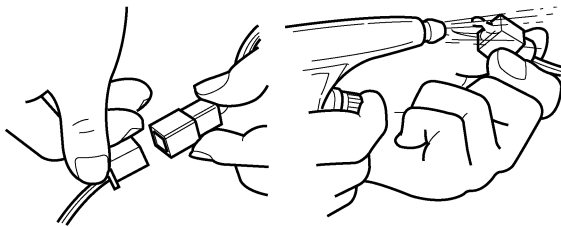
- Lead
- Coupler
- Connector

### 2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



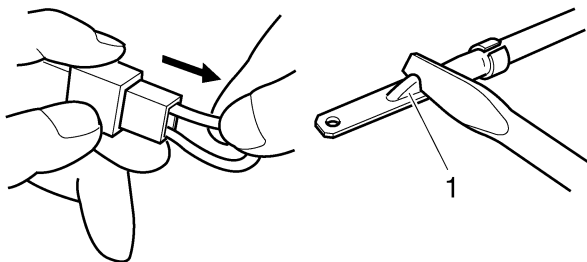
### 3. Check:

- All connections

Loose connection → Connect properly.

### TIP

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



### 4. Connect:

- Lead
- Coupler
- Connector

### TIP

Make sure all connections are tight.

### 5. Check:

- Continuity  
(with the pocket tester)



**Pocket tester**

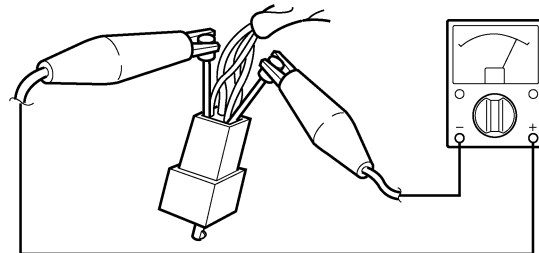
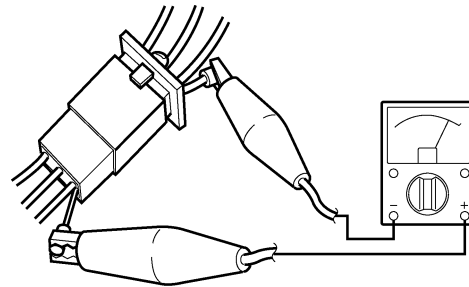
**90890-03112**

**Analog pocket tester**

**YU-03112-C**

### TIP

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



EAS20260

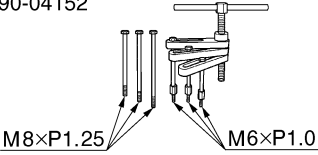
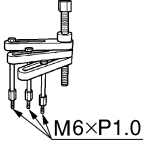
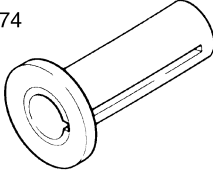
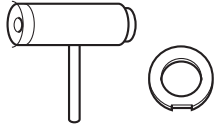
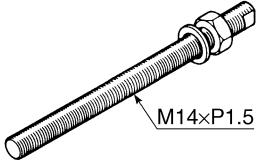
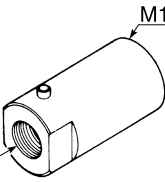
## SPECIAL TOOLS

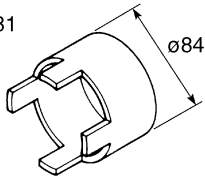
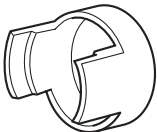
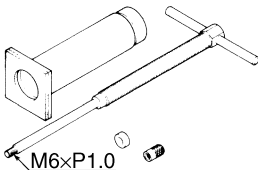
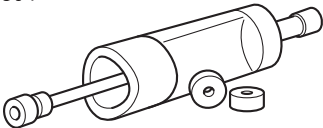
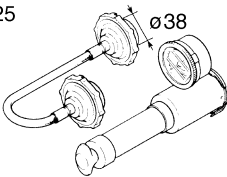
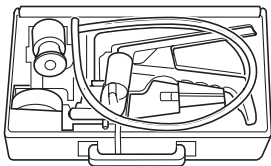
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.

When placing an order, refer to the list provided below to avoid any mistakes.

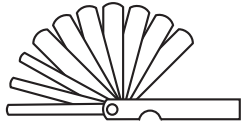
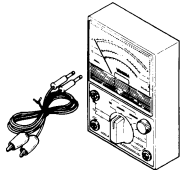
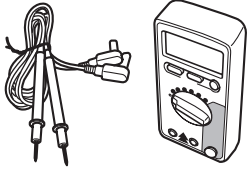
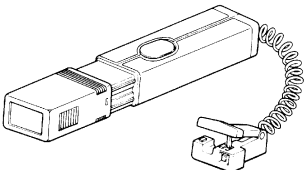
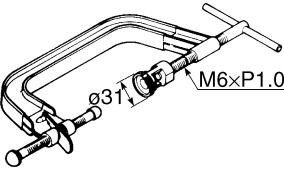
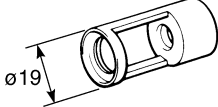
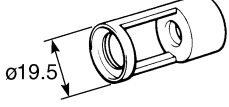
### TIP

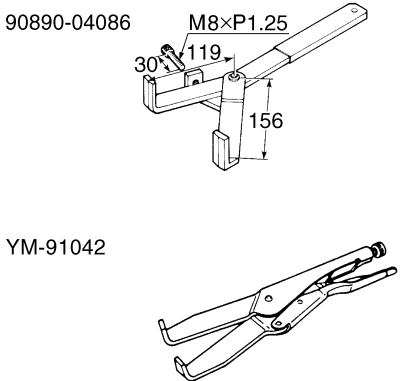
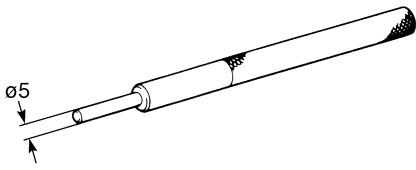
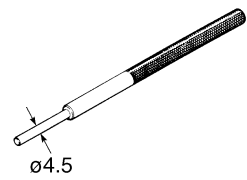
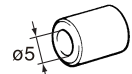
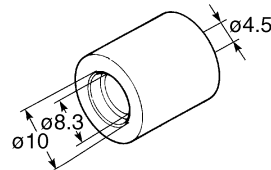
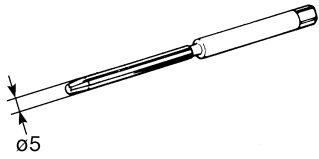
- For U.S.A. and Canada, use part number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part number starting with “90890-”.

Tool name/Tool No.	Illustration	Reference pages
Crankcase separating tool 90890-04152 YU-A9642	<p>90890-04152</p>  <p>M8xP1.25 M6xP1.0</p> <p>YU-A9642</p>  <p>M6xP1.0</p>	5-64
Crankshaft installer pot 90890-01274 Installing pot YU-90058	<p>90890-01274</p>  <p>YU-90058/YU-90059</p> 	5-65
Crankshaft installer bolt 90890-01275 Bolt YU-90060	 <p>M14xP1.5</p>	5-65
Adapter (M12) 90890-01278 Adapter #3 YU-90063	 <p>M12xP1.25</p> <p>M14xP1.5</p>	5-65

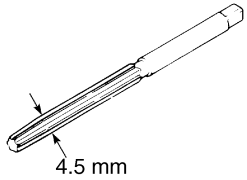

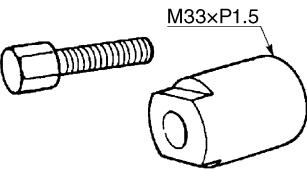
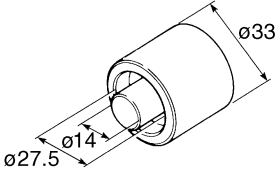
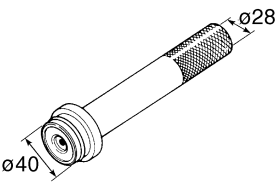
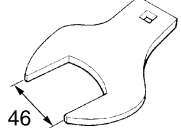
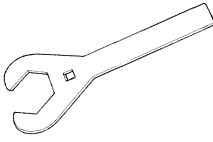
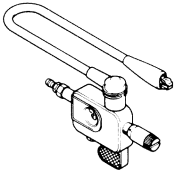
Tool name/Tool No.	Illustration	Reference pages
Spacer (crankshaft installer) 90890-04081 Pot spacer YM-91044	<div>90890-04081</div>  <div>YM-91044</div> 	5-65
Piston pin puller set 90890-01304 Piston pin puller YU-01304	<div>90890-01304</div>  <div>YU-01304</div> 	5-28
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01	<div>90890-01325</div>  <div>YU-24460-01</div> 	6-3


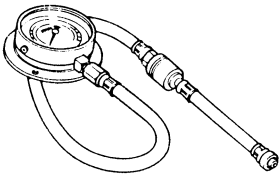
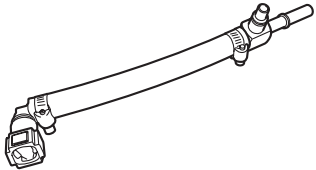
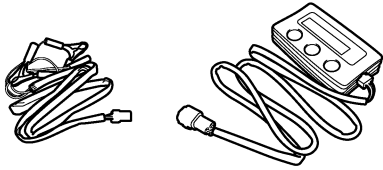
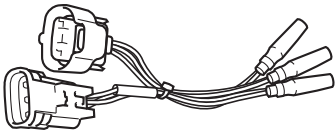
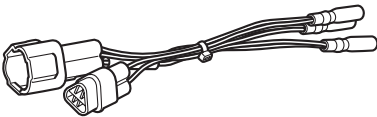
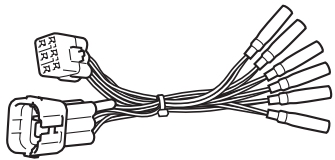
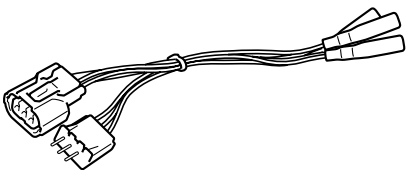
Tool name/Tool No.	Illustration	Reference pages
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984		6-3
Damper rod holder (30 mm) 90890-01327 YM-01327		4-56
Steering nut wrench 90890-01443 Spanner wrench YU-33975		3-30, 3-32
Ball joint remover 90890-01474 YM-01474		4-63
Ball joint remover attachment set 90890-01480 Ball joint adapter set YM-01480		4-63
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-35, 5-36

Tool name/Tool No.	Illustration	Reference pages
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-5
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-6, 8-65, 8-66, 8-67, 8-71, 8- 72, 8-73, 8-74, 8-75, 8-76, 8- 77, 8-79, 8-80
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		5-39, 7-9, 8-79
Timing light 90890-03141 Inductive clamp timing light YU-03141		3-9
Valve spring compressor 90890-04019 YM-04019		5-20, 5-26
Valve spring compressor attachment 90890-04114 Valve spring compressor adapter (19.5 mm) YM-04114	<p>90890-04114</p>  <p>YM-04114</p> 	5-20, 5-26

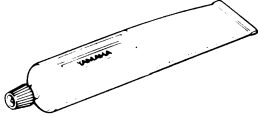
Tool name/Tool No.	Illustration	Reference pages
Universal clutch holder 90890-04086 YM-91042		5-48, 5-50
Valve guide remover (ø 5.0) 90890-04097 Valve guide remover (5.0 mm) YM-04097		5-22
Valve guide remover (ø 4.5) 90890-04116 Valve guide remover (4.5 mm) YM-04116		5-22
Valve guide installer (ø 5.0) 90890-04098 Valve guide installer (5.0 mm) YM-04098		5-22
Valve guide installer (ø 4.5) 90890-04117 Valve guide installer (4.5 mm) YM-04117		5-22
Valve guide reamer (ø 5.0) 90890-04099 Valve guide reamer (5.0 mm) YM-04099		5-22



Tool name/Tool No.	Illustration	Reference pages
Valve guide reamer (ø 4.5) 90890-04118 Valve guide reamer (4.5 mm) YM-04118		5-22
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-5
Rotor puller 90890-04142 YM-04142		5-35
Mechanical seal installer 90890-04132 Water pump seal installer YM-33221-A		6-8
Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058		6-8
Axle nut wrench (46 mm) 90890-01498 Rear axle nut wrench 46 mm YM-37134	<p>90890-01498</p>  <p>46</p> <p>YM-37134</p> 	4-18, 4-21
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		8-73

Tool name/Tool No.	Illustration	Reference pages
Digital tachometer 90890-06760 YU-39951-B		3-7, 3-9, 8-75, 8-76
Pressure gauge 90890-03153 YU-03153		7-9
Fuel pressure adapter 90890-03186 YU-03186		7-9
FI diagnostic tool 90890-03182 YU-03182		8-35
Test harness-TPS (3P) 90890-03204 YU-03204		7-9
Test harness-speed sensor (3P) 90890-03208 YU-03208		8-77
Test harness-lean angle sensor (6P) 90890-03209 YU-03209		8-74
Test harness S-presure sensor 5S7 (3P) 90890-03211 YU-03211		8-79

## SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Yamaha bond No. 1215 (Three bond No.1215®) 90890-85505		5-62, 6-8



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## SPECIFICATIONS

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# GENERAL SPECIFICATIONS

EAS29110

## GENERAL SPECIFICATIONS

### Model

Model	18P1 (USA)
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### Dimensions

Overall length	1795 mm (70.7 in)
Overall width	1240 mm (48.8 in)
Overall height	1065 mm (41.9 in)
Seat height	810 mm (31.9 in)
Wheelbase	1270 mm (50.0 in)
Ground clearance	235 mm (9.25 in)
Minimum turning radius	3600 mm (142 in)

### Weight

With oil and fuel	184 kg (406 lb)
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### Engine

Engine type	Liquid cooled 4-stroke, DOHC
Cylinder arrangement	Forward-inclined single cylinder
Displacement	449.0 cm <sup>3</sup>
Bore × stroke	95.0 × 63.4 mm (3.74 × 2.50 in)
Compression ratio	11.60 : 1
Starting system	Electric starter
Lubrication system	Dry sump

### Engine oil

Type	YAMALUBE 4-CW 5W-30 or YAMALUBE 4 10W-40 or YAMALUBE 4 20W-50, SAE 5W-30 or SAE 10W-40 or SAE 20W-50
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Without oil filter element replacement	1.40 L (1.48 US qt, 1.23 Imp.qt)
With oil filter element replacement	1.45 L (1.53 US qt, 1.28 Imp.qt)
Total amount	1.65 L (1.74 US qt, 1.45 Imp.qt)

### Oil filter

Oil filter type	Paper
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### Air filter

Air filter element	Wet element
Air filter oil grade	Foam air filter oil or equivalent oil

### Fuel

Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	10.0 L (2.64 US gal, 2.20 Imp.gal)
Fuel reserve amount	3.4 L (0.90 US gal, 0.75 Imp.gal)

### Fuel injector

Model/quantity	297500-1010/1
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### Spark plug

Manufacturer/model	NGK/CR8E
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)

# GENERAL SPECIFICATIONS

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## Clutch

Clutch type	Wet, multiple-disc
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## Transmission

Primary reduction system	Spur gear
Primary reduction ratio	61/23 (2.652)
Secondary reduction system	Chain drive
Secondary reduction ratio	38/14 (2.714)
Transmission type	Constant mesh 5-speed
Operation	Left foot operation
1st	35/14 (2.500)
2nd	30/15 (2.000)
3rd	31/19 (1.632)
4th	28/21 (1.333)
5th	23/21 (1.095)

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## Chassis

Frame type	Aluminum die-cast and steel tube frame
Caster angle	5.0°
Camber angle	-1.6°
Kingpin angle	15.3°
Kingpin offset	1.2 mm (0.05 in)
Trail	21.0 mm (0.83 in)
Tread rear (STD)	990.0 mm (38.98 in)
Tread front (STD)	1055.0 mm (41.54 in)
Toe-in (with tire touching the ground)	2.0–12.0 mm (0.08–0.47 in)

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## Front tire

Type	Tubeless
Size	AT21 × 7R10
Manufacturer/model	DUNLOP/KT351 Radial
Wear limit (front)	3.0 mm (0.12 in)

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## Rear tire

Type	Tubeless
Size	AT20 × 10R9
Manufacturer/model	DUNLOP/KT356 Radial
Wear limit (rear)	3.0 mm (0.12 in)

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## Tire air pressure (measured on cold tires)

Maximum loading limit	100.0 kg (220 lb)
Recommended	
Front	27.5 kPa (0.275 kgf/cm <sup>2</sup> , 4.0 psi)
Rear	30.0 kPa (0.300 kgf/cm <sup>2</sup> , 4.4 psi)
Minimum	
Front	24.5 kPa (0.245 kgf/cm <sup>2</sup> , 3.6 psi)
Rear	27.0 kPa (0.270 kgf/cm <sup>2</sup> , 3.9 psi)

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## Front brake

Type	Dual disc brake
Operation	Right hand operation

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## Rear brake

Type	Single disc brake
Operation	Right foot operation

# GENERAL SPECIFICATIONS

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## Front suspension

Type	Double wishbone
Spring/shock absorber type	Coil spring/gas-oil damper
Wheel travel	250 mm (9.9 in)

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## Rear suspension

Type	Swingarm (link suspension)
Spring/shock absorber type	Coil spring/gas-oil damper
Wheel travel	280 mm (11.0 in)

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## Electrical system

Ignition system	TCI (digital)
Charging system	AC magneto

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## Battery

Model	YTZ-7S
Voltage, capacity	12 V, 6.0 Ah
Manufacturer	GS YUASA
Ten hour rate amperage	6.0 A

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## Headlight

Bulb type	Krypton bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 30.0/30.0 W × 2
Tail/brake light	LED
Indicator light	
Neutral indicator light	LED
Fuel level warning light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED

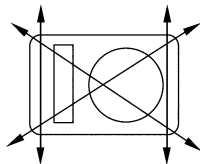


EAS29120

## ENGINE SPECIFICATIONS

### Cylinder head

Volume	22.42–23.22 cm <sup>3</sup> (1.37–1.42 cu.in)
Warpage limit	0.05 mm (0.0020 in)

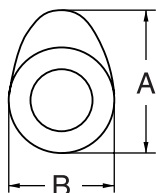


### Cylinder

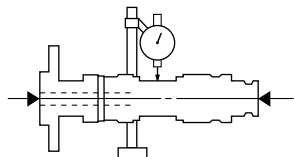
Bore	95.000–95.010 mm (3.7402–3.7405 in)
Taper limit	0.05 mm (0.0020 in)
Out of round	0.05 mm (0.0020 in)

### Camshaft

Drive system	Chain drive (left)
Camshaft cap inside diameter	22.000–22.021 mm (0.8661–0.8670 in)
Camshaft journal diameter	21.959–21.972 mm (0.8645–0.8650 in)
Camshaft-journal-to-camshaft-cap clearance	0.028–0.062 mm (0.0011–0.0024 in)
Limit	0.080 mm (0.0032 in)
Camshaft lobe dimensions	
Intake A	30.100–30.200 mm (1.1850–1.1890 in)
Limit	30.000 mm (1.1811 in)
Intake B	22.450–22.550 mm (0.8839–0.8878 in)
Limit	22.350 mm (0.8799 in)
Exhaust A	30.950–31.050 mm (1.2185–1.2224 in)
Limit	30.850 mm (1.2146 in)
Exhaust B	22.494–22.594 mm (0.8856–0.8895 in)
Limit	22.394 mm (0.8817 in)



Camshaft runout limit	0.030 mm (0.0012 in)
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### Timing chain

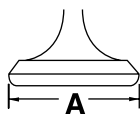
Tensioning system	Automatic
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### Valve, valve seat, valve guide

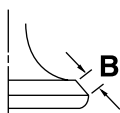
Valve clearance (cold)	
Intake	0.10–0.15 mm (0.0039–0.0059 in)
Exhaust	0.20–0.25 mm (0.0079–0.0098 in)

## Valve dimensions

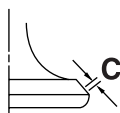
Valve head diameter A (intake)	26.90–27.10 mm (1.0591–1.0669 in)
Valve head diameter A (exhaust)	27.90–28.10 mm (1.0984–1.1063 in)



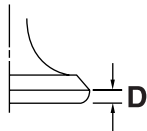
Valve face width B (intake)	2.26 mm (0.0890 in)
Valve face width B (exhaust)	2.26 mm (0.0890 in)



Valve seat width C (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.60 mm (0.06 in)
Valve seat width C (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.60 mm (0.06 in)



Valve margin thickness D (intake)	1.00 mm (0.0394 in)
Limit	0.85 mm (0.033 in)
Valve margin thickness D (exhaust)	1.00 mm (0.0394 in)
Limit	0.85 mm (0.033 in)



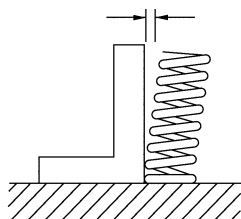
Valve stem diameter (intake)	4.475–4.490 mm (0.1762–0.1768 in)
Limit	4.445 mm (0.1750 in)
Valve stem diameter (exhaust)	4.965–4.980 mm (0.1955–0.1961 in)
Limit	4.935 mm (0.1943 in)
Valve guide inside diameter (intake)	4.500–4.512 mm (0.1772–0.1776 in)
Limit	4.550 mm (0.1791 in)
Valve guide inside diameter (exhaust)	5.000–5.012 mm (0.1969–0.1973 in)
Limit	5.050 mm (0.1988 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.020–0.047 mm (0.0008–0.0019 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)

## Valve spring

Free length (intake)	39.46 mm (1.55 in)
Limit	38.46 mm (1.51 in)
Free length (exhaust)	37.68 mm (1.48 in)
Limit	36.68 mm (1.44 in)
Installed length (intake)	27.87 mm (1.10 in)
Installed length (exhaust)	27.38 mm (1.08 in)
Spring rate K1 (intake)	12.08 N/mm (1.23 kgf/mm, 68.99 lbf/in)
Spring rate K2 (intake)	16.01 N/mm (1.63 kgf/mm, 91.44 lbf/in)

# ENGINE SPECIFICATIONS

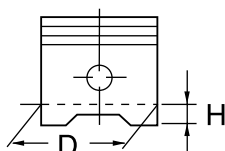
Spring rate K1 (exhaust)	13.29 N/mm (1.36 kgf/mm, 75.90 lbf/in)
Spring rate K2 (exhaust)	16.35 N/mm (1.67 kgf/mm, 93.38 lbf/in)
Installed compression spring force (intake)	130.20–149.80 N (13.28–15.28 kgf, 29.28–33.68 lbf)
Installed compression spring force (exhaust)	127.40–146.40 N (12.99–14.93 kgf, 28.64–32.91 lbf)
Spring tilt (intake)	2.5°/1.70 mm (0.067 in)
Spring tilt (exhaust)	2.5°/1.65 mm (0.065 in)



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

## Piston

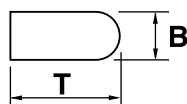
Piston-to-cylinder clearance	0.040–0.065 mm (0.0016–0.0026 in)
Limit	0.15 mm (0.0059 in)
Diameter D	94.945–94.960 mm (3.7380–3.7386 in)
Height H	10.0 mm (0.39 in)



Offset	1.00 mm (0.0394 in)
Offset direction	Intake side
Piston pin bore inside diameter	20.004–20.015 mm (0.7876–0.7880 in)
Limit	20.045 mm (0.7892 in)
Piston pin outside diameter	19.991–20.000 mm (0.7870–0.7874 in)
Limit	19.971 mm (0.7863 in)

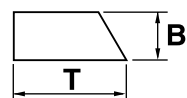
## Piston ring

Top ring	
Ring type	Barrel
Dimensions (B × T)	1.20 × 3.50 mm (0.05 × 0.14 in)



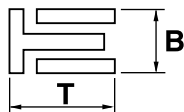
End gap (installed)	0.20–0.30 mm (0.008–0.012 in)
Limit	0.55 mm (0.0217 in)
Ring side clearance	0.030–0.070 mm (0.0012–0.0028 in)
Limit	0.12 mm (0.0047 in)

2nd ring	
Ring type	Taper
Dimensions (B × T)	1.00 × 3.35 mm (0.04 × 0.13 in)



# ENGINE SPECIFICATIONS

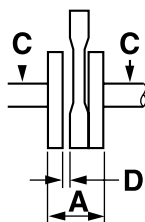
End gap (installed)	0.35–0.50 mm (0.014–0.020 in)
Limit	0.85 mm (0.0335 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.12 mm (0.0047 in)
Oil ring	
Dimensions (B × T)	2.00 × 2.90 mm (0.08 × 0.11 in)



End gap (installed)	0.20–0.50 mm (0.008–0.020 in)
Ring side clearance	0.040–0.140 mm (0.0016–0.0055 in)

## Crankshaft

Width A	63.95–64.00 mm (2.518–2.520 in)
Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.150–0.450 mm (0.0059–0.0177 in)



## Balancer

Balancer drive method	Gear
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## Clutch

Friction plate 2 thickness	2.92–3.08 mm (0.11–0.12 in)
Plate quantity	6 pcs
Wear limit	2.82 mm (0.11 in)
Friction plate 1 thickness	2.92–3.08 mm (0.11–0.12 in)
Plate quantity	2 pcs
Wear limit	2.82 mm (0.11 in)
Clutch plate thickness	1.50–1.70 mm (0.06–0.07 in)
Plate quantity	7 pcs
Warping limit	0.20 mm (0.0079 in)
Clutch spring free length	47.8 mm (1.88 in)
Spring quantity	6 pcs
Minimum length	46.0 mm (1.81 in)
Clutch housing thrust clearance	0.100–0.350 mm (0.0039–0.0138 in)
Clutch housing radial clearance	0.010–0.044 mm (0.0004–0.0017 in)
Clutch release method	Inner push, cam push

## Transmission

Main axle runout limit	0.08 mm (0.0031 in)
Drive axle runout limit	0.08 mm (0.0031 in)

## Shifting mechanism

Shift mechanism type	Shift drum and guide bar
Shift fork thickness	4.85 mm (0.1909 in)
Shift fork guide bar bending limit	0.05 mm (0.0020 in)

# ENGINE SPECIFICATIONS

## Decompression device

Device type	Auto decomp
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## Throttle body

Type/quantity	42EHS/1
ID mark	18P1 00

## Throttle position sensor

Output voltage	0.679–0.681 V
Maximum resistance	2.64–6.16 k $\Omega$

## Idling condition

Engine idling speed	1950–2050 r/min
Water temperature	90.0–100.0 °C (194.00–212.00 °F)
Oil temperature	55.0–65.0 °C (131.00–149.00 °F)

## Fuel injection sensor

Crankshaft position sensor resistance	248–372 $\Omega$ at 20 °C (68 °F)
Intake air pressure sensor output voltage	3.594–3.684 V at 101.32 kPa
Intake air temperature sensor resistance	5.4–6.6 k $\Omega$ at 0 °C (32 °F) 290–390 $\Omega$ at 80 °C (176 °F)
Coolant temperature sensor resistance	5.21–6.37 k $\Omega$ at 0 °C (32 °F) 2.45 k $\Omega$ at 20 °C (68 °F) 290–354 $\Omega$ at 80 °C (176 °F)

## Fuel pump

Pump type	Electrical
Fuel pressure	324.0 kPa (3.24 kgf/cm <sup>2</sup> , 47.0 psi)

## Oil pump

Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance (oil feed pump/scavenging pump)	0.00–0.12 mm (0.0000–0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance (oil feed pump/scavenging pump)	0.090–0.170 mm (0.0035–0.0067 in)
Limit	0.240 mm (0.0094 in)
Oil pump housing clearance (oil feed pump)	0.050–0.100 mm (0.0020–0.0039 in)
Limit	0.170 mm (0.0067 in)
Oil pump housing clearance (scavenging pump)	0.030–0.100 mm (0.0012–0.0039 in)
Limit	0.170 mm (0.0067 in)
Bypass valve opening pressure	40.0–80.0 kPa (0.40–0.80 kgf/cm <sup>2</sup> , 5.8–11.6 psi)

## Cooling system

Radiator core	
Width	183.0 mm (7.20 in)
Height	300.0 mm (11.8 in)
Depth	28.0 mm (1.10 in)
Radiator cap opening pressure	107.9–137.3 kPa (1.08–1.37 kgf/cm <sup>2</sup> , 15.6–19.9 psi)
Radiator capacity (including all routes)	1.25 L (1.32 US qt, 1.10 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.25 L (0.26 US qt, 0.22 Imp.qt)
From low to full level	0.15 L (0.16 US qt, 0.13 Imp.qt)
Water pump	
Impeller shaft tilt limit	0.15 mm (0.006 in)

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## CHASSIS SPECIFICATIONS

### Steering

Steering bearing type

Ball bearing

### Front suspension

Shock absorber travel	128.0 mm (5.04 in)
Spring free length	304.0 mm (11.97 in)
Installed length	289.8 mm (11.41 in)
Spring rate K1	10.00 N/mm (1.02 kgf/mm, 57.11 lbf/in)
Spring rate K2	30.00 N/mm (3.06 kgf/mm, 171.33 lbf/in)
Optional spring available	No
Spring preload adjusting positions	
Minimum	279.8 mm (11.02 in)
Standard	289.8 mm (11.41 in)
Maximum	299.8 mm (11.80 in)
Rebound damping adjusting positions	
Minimum	20
Standard	12
Maximum	1
Compression damping setting (for fast compression damping)	
Minimum	2
Standard	1
Maximum	Adjusting bolt fully turned in
Compression damping setting (for slow compression damping)	
Minimum	18
Standard	10
Maximum	1

### Rear suspension

Rear shock absorber assembly travel	132.5 mm (5.22 in)
Spring free length	275.0 mm (10.83 in)
Installed length	265.0 mm (10.43 in)
Spring rate K1	35.00 N/mm (3.57 kgf/mm, 199.89 lbf/in)
Optional spring available	No
Spring preload adjusting positions	
Minimum	253.5 mm (9.98 in)
Standard	265.0 mm (10.43 in)
Maximum	273.5 mm (10.77 in)
Rear damping adjustment	Compression and rebound
Rebound damping adjusting positions	
Minimum	20
Standard	11
Maximum	1
Compression damping setting (for fast compression damping)	
Minimum	2
Standard	1
Maximum	Adjusting bolt fully turned in
Compression damping setting (for slow compression damping)	
Minimum	18
Standard	8
Maximum	1

# CHASSIS SPECIFICATIONS

## Rear axle

Rear axle runout limit	1.5 mm (0.06 in)
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## Swingarm

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

## Front wheel

Wheel type	Panel wheel
Rim size	10 × 5.5 AT
Rim material	Steel
Radial wheel runout limit	2.0 mm (0.08 in)
Lateral wheel runout limit	2.0 mm (0.08 in)

## Rear wheel

Wheel type	Panel wheel
Rim size	9 × 8.5 AT
Rim material	Steel
Radial wheel runout limit	2.0 mm (0.08 in)
Lateral wheel runout limit	2.0 mm (0.08 in)

## Drive chain

Type/manufacture	520MXV/DAIDO
Link quantity	98
Drive chain slack	25.0–35.0 mm (0.98–1.38 in) at 20 N (2.0 kgf, 4.5 lbf)
15-link length limit	239.3 mm (9.42 in)

## Front brake

Type	Dual disc brake
Disc outside diameter × thickness	161.0 × 3.5 mm (6.34 × 0.14 in)
Brake disc thickness limit	3.0 mm (0.118 in)
Brake disc deflection limit	0.10 mm (0.0039 in)
Brake pad lining thickness (inner)	4.3 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	4.3 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	25.40 mm × 2 (1.00 in × 2)
Recommended fluid	DOT 4

## Rear brake

Type	Single disc brake
Disc outside diameter × thickness	200.0 × 4.0 mm (7.87 × 0.16 in)
Brake disc thickness limit	3.5 mm (0.138 in)
Brake disc deflection limit	0.10 mm (0.0039 in)
Brake pad lining thickness (inner)	5.4 mm (0.21 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	5.4 mm (0.21 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	25.40 mm × 2
Recommended fluid	DOT 4
Brake pedal position (from footrest)	11.7 mm (0.46 in)
Parking brake cable end length	47.0–51.0 mm (1.85–2.01 in)

# CHASSIS SPECIFICATIONS

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## Lever and pedal

Clutch lever free play (lever end)	8.0–13.0 mm (0.31–0.51 in)
Throttle lever free play	2.0–4.0 mm (0.08–0.16 in)
Speed limiter length	Less than 12 mm (0.47 in)
Shift pedal height	48.0 mm (1.89 in)



# ELECTRICAL SPECIFICATIONS

EAS29140

## ELECTRICAL SPECIFICATIONS

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### System voltage

System voltage	12 V
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### Ignition system

Ignition timing (B.T.D.C.)	7.5° at 2000 r/min
Advancer type	Digital

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### Ignition coil

Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	2.16–2.64 $\Omega$ at 20 °C (68 °F)
Secondary coil resistance	8.64–12.96 k $\Omega$ at 20 °C (68 °F)

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### Lean angle sensor

Output voltage	
Less than 65°	0.40–1.40 V
More than 65°	3.70–4.40 V

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### AC magneto

Standard output	14.0 V, 265 W at 5000 r/min
Stator coil resistance	0.32–0.48 $\Omega$ at 20 °C (68 °F)

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### Rectifier/regulator

Regulator type	Semi conductor-short circuit
Rectifier/regulator input voltage	Above 14 V at 5000 r/min
Rectifier/regulator output voltage	14.1–14.9 V
Rectifier capacity (DC)	18.0 A

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### Battery

Specific gravity	1.31
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### Electric starting system

System type	Electromagnetic shift
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### Starter motor

Power output	0.50 kW
Commutator resistance	0.0150–0.0250 $\Omega$ at 20 °C (68 °F)
Insulation resistance	Above 1 M $\Omega$ at 20 °C (68 °F)
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.02–6.51 N (614–664 gf, 21.65–23.41 ozf)
Mica undercut (depth)	0.70 mm (0.03 in)

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### Starter relay

Amperage	180.0 A
Coil resistance	4.18–4.62 $\Omega$

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### Headlight relay

Coil resistance	94.5–115.5 $\Omega$
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### Fuel gauge

Fuel sender resistance	
Full	10 $\Omega$
Empty	216 $\Omega$

# ELECTRICAL SPECIFICATIONS

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## Fuse

Main fuse	20.0 A
Spare fuse	20.0 A

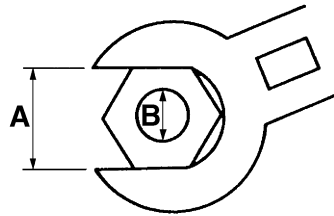
EAS20320

## TIGHTENING TORQUES

EAS20330

### GENERAL TIGHTENING TORQUE SPECIFICATIONS

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








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

A (nut)	B (bolt)	General tightening torques		
		Nm	m·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

EAS20340

## ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Camshaft cap bolt	M6	10	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	See TIP
Cylinder head blind plug	M12	1	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Spark plug	M10	1	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Exhaust pipe stud bolt	M8	2	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Exhaust pipe nut	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Cylinder head bolt	M10	4	See TIP	
Cylinder head cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil checking bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Balancer driven gear weight screw	M6	3	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Balancer driven gear nut	M14	1	50 Nm (5.0 m·kgf, 36 ft·lbf)	Use a lock washer.
Timing chain guide (intake side) bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner cap bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Coolant drain bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	With copper washer
Water pump housing cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	l=30 mm (1.18 in)
Water pump housing cover bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	l=80 mm (3.15 in)
Oil filter element cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil filter element drain bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Idle gear shaft screw	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil strainer bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil pump assembly bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Throttle body joint bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Throttle body joint clamp bolt	M4	1	3.3 Nm (0.33 m·kgf, 2.4 ft·lbf)	
Air filter joint clamp bolt (throttle body side)	M4	1	2.7 Nm (0.27 m·kgf, 2.0 ft·lbf)	
Intake air temperature sensor screw	M5	1	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Air filter element bolt	M6	1	2 Nm (0.2 m·kgf, 1.4 ft·lbf)	
Air filter joint clamp bolt (Air filter side)	M4	1	2.3 Nm (0.23 m·kgf, 1.7 ft·lbf)	
Air filter assembly bolt	M6	2	6.5 Nm (0.65 m·kgf, 4.7 ft·lbf)	
Throttle body case cover bolt	M4	3	2 Nm (0.2 m·kgf, 1.4 ft·lbf)	
Throttle cable and locknut (throttle body side)	M6	1	0.8 Nm (0.08 m·kgf, 0.6 ft·lbf)	
Breather assembly bolt	M6	1	6.5 Nm (0.65 m·kgf, 4.9 ft·lbf)	
Muffler joint bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Muffler bolt	M8	2	34 Nm (3.4 m·kgf, 24 ft·lbf)	

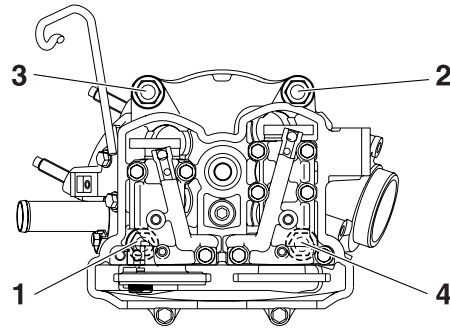
# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Crankcase bolt	M6	8	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	l=50 mm (1.97 in)
Crankcase bolt	M6	6	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	l=60 mm (2.36 in)
Crankcase bolt	M6	4	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	l=80 mm (3.15 in)
Generator rotor cover bolt	M6	9	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Right crankcase cover bolt	M6	10	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Clutch cover bolt	M6	7	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Crankshaft end accessing screw	M36	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing mark accessing screw	M14	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Engine oil drain bolt	M10	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Bearing retainer screw	M8	4	22 Nm (2.2 m·kgf, 16 ft·lbf)	Stake
Bearing retainer screw	M6	4	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Bearing retainer bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter clutch bolt	M6	6	16 Nm (1.6 m·kgf, 11 ft·lbf)	
Primary drive gear nut	M20	1	110 Nm (11 m·kgf, 80 ft·lbf)	
Clutch spring bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Clutch boss nut	M20	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	Use a lock washer.
Drive sprocket nut	M22	1	100 Nm (10 m·kgf, 72 ft·lbf)	Stake
Shift drum segment bolt	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Shift guide bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Stopper lever bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Stator coil bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Generator rotor nut	M12	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Neutral switch	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Crankshaft position sensor bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	

## TIP

### Cylinder head bolt

1. Remove old grease from a screw hole, washer and bolt.
2. Apply molybdenum disulfide grease on the bottom surface and screw part of the bolt and both sides of the washer well.
3. Tighten all the four bolts diagonally until they are lightly screwed in.
4. Tighten all the four bolts diagonally to 30 Nm (3.0 m·kgf, 22 ft·lbf) torque.
5. Loosen and remove all the bolts and washers, and then apply grease again as done in step "2".
6. Tighten all the four bolts diagonally until they are lightly screwed in as done in step "3".
7. Tighten all the four bolts diagonally to 20 Nm (2.0 m·kgf, 14 ft·lbf) torque.
8. Put a mark on the corner of the cylinder head bolt and the cylinder head.
9. After tightening all the four bolts, each in 90 degrees angle, diagonally, tighten again.
10. Further, retighten all the four bolts in 90 degrees angle diagonally (total of 180 degrees).

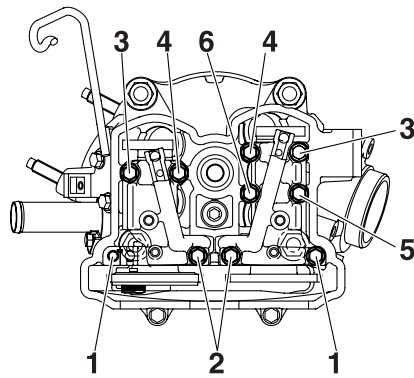


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**TIP****Camshaft cap bolt**

1–4 (exhaust) and 1–6 (intake) indicate tightening sequence of cam cap bolts.


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# TIGHTENING TORQUES

EAS20350

## CHASSIS TIGHTENING TORQUES


Item	Thread size	Q'ty	Tightening torque	Remarks
Engine stay bolt (rear upper side)	M8	2	33 Nm (3.3 m·kgf, 24 ft·lbf)	
Engine mounting bolt (rear upper side)	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Engine bracket bolt (front upper side)	M10	4	48 Nm (4.8 m·kgf, 35 ft·lbf)	
Engine mounting nut (front lower side)	M10	1	66 Nm (6.6 m·kgf, 48 ft·lbf)	
Engine mounting nut (front upper side)	M10	1	66 Nm (6.6 m·kgf, 48 ft·lbf)	
Front frame complete and rear frame complete screw	M10	4	54 Nm (5.4 m·kgf, 39 ft·lbf)	
Sub frame complete and main pipe nut (front side)	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Sub frame complete and main pipe screw (rear side)	M10	4	54 Nm (5.4 m·kgf, 39 ft·lbf)	
Tank rail and sub frame complete bolt/swingarm bracket bolt	M8	8	27 Nm (2.7 m·kgf, 19 ft·lbf)	
Swingarm bracket and main pipe screw	M10	2	54 Nm (5.4 m·kgf, 39 ft·lbf)	
Coolant reservoir tank bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear fender bracket and frame bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Pivot shaft nut	M16	1	100 Nm (10 m·kgf, 72 ft·lbf)	
Rear shock absorber nut	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Relay arm and swingarm nut	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Connecting arm and frame nut	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Rear shock absorber and relay arm bolt	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Relay arm and connecting arm nut	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Swingarm bolt	M12	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Rear axle pinch bolt	M8	4	21 Nm (2.1 m·kgf, 15 ft·lbf)	See TIP
Front upper arm nut	M10	2	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Front lower arm nut	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Front shock absorber and frame nut	M10	2	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Front shock absorber and front lower arm nut	M10	2	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Steering stem nut	M14	1	180 Nm (18 m·kgf, 130 ft·lbf)	
Frame and steering stem bushing bolt	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	Use a lock washer.
Steering stem and lower handlebar holder	M12	2	64 Nm (6.4 m·kgf, 46 ft·lbf)	

# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Upper handlebar holder and lower handlebar holder	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Locknut (tie-rod)	M10	4	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Steering knuckle and front upper arm nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Steering knuckle and front lower arm nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Steering knuckle and tie-rod ball joint nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Pitman arm and tie-rod ball joint nut	M10	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Frame and bearing retainer (external thread)	M42	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Fuel pump bolt	M6	6	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front wheel nut	M10	8	45 Nm (4.5 m·kgf, 32 ft·lbf)	
Front brake caliper bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Steering knuckle and front wheel hub nut	M14	2	70 Nm (7.0 m·kgf, 50 ft·lbf)	
Front brake disc bolt	M8	8	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Rear brake caliper bolt	M10	2	43 Nm (4.3 m·kgf, 31 ft·lbf)	
Rear wheel nut	M10	8	45 Nm (4.5 m·kgf, 32 ft·lbf)	
Rear axle and rear wheel hub nut	M16	2	200 Nm (20 m·kgf, 145 ft·lbf)	See TIP
Driven sprocket nut	M8	4	72 Nm (7.2 m·kgf, 52 ft·lbf)	
Front brake pipe flare nut and Joint	M10	1	19 Nm (1.9 m·kgf, 13 ft·lbf)	
Front brake pipe flare nut and brake hose	M10	1	19 Nm (1.9 m·kgf, 13 ft·lbf)	
Frame and joint bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Front upper arm and brake hose guide bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake caliper and brake hose bolt	M10	2	27 Nm (2.7 m·kgf, 19 ft·lbf)	
Front brake caliper and bleed screw	M8	2	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Rear axle and rear axle ring nut	M38	1	250 Nm (25 m·kgf, 181 ft·lbf)	
Rear axle ring nut and rear axle ring nut set bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake disc screw	M8	4	33 Nm (3.3 m·kgf, 24 ft·lbf)	
Front brake master cylinder bolt and handlebar	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake master cylinder and brake hose bolt	M10	1	27 Nm (2.7 m·kgf, 19 ft·lbf)	
Footrest bolt	M12	4	78 Nm (7.8 m·kgf, 56 ft·lbf)	
Rear brake caliper and brake hose bolt	M10	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	



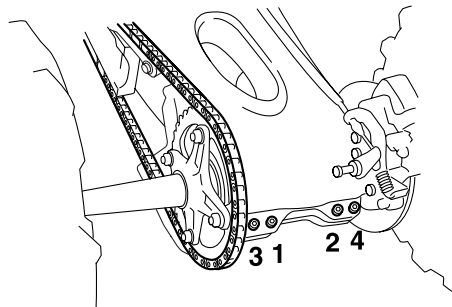
# TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Rear brake caliper and bleed screw	M8	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Rear brake master cylinder bolt	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Rear brake master cylinder and brake hose bolt	M10	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Adjusting bolt locknut (parking brake)	M8	1	16 Nm (1.6 m·kgf, 11 ft·lbf)	
Brake fluid reservoir and brake fluid reservoir bracket bolt	M6	1	4 Nm (0.4 m·kgf, 2.9 ft·lbf)	
Parking brake cable holder bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Brake hose holder and swing-arm bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Brake pedal bolt	M8	1	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Brake fluid reservoir hose cover and rear fender bracket bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Brake fluid reservoir hose bracket bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front bumper bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Rear carrier bar and frame bolt	M8	4	33 Nm (3.3 m·kgf, 24 ft·lbf)	
Lean angle sensor bolt	M4	2	2 Nm (0.2 m·kgf, 1.4 ft·lbf)	

## TIP

### Rear axle pinch bolt

Tightening the rear axle pinch bolts in the proper sequence as shown.



## TIP

### Rear axle and rear wheel hub nut

1. Apply rust preventive oil to the threads on both sides of the rear axle and to the wheel hub surfaces that contact the rear axle washers.
2. Tighten the rear axle nuts 200 Nm (20 m·kgf, 145 ft·lbf).
3. Loosen the rear axle nuts completely.
4. Retighten the rear axle nuts 200 Nm (20 m·kgf, 145 ft·lbf). Do not loosen the axle nut after tightening it. If an axle nut slot is not aligned with the cotter pin hole on either side of the axle, further tighten the axle nut until a slot is aligned with the hole.





































# LUBRICATION POINTS AND LUBRICANT TYPES

EAS20360

## LUBRICATION POINTS AND LUBRICANT TYPES

EAS20370

### ENGINE

Lubrication point	Lubricant
Oil seal lips	
Bearings	
O-rings	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Valve lifter outer surface (intake and exhaust)	
Camshaft lobes and journals (intake and exhaust)	
Valve lifter top surface (intake and exhaust)	
Valve pad	
Cylinder head bolts (thread part and bottom surface of bolts)	
Camshaft cap bolts (thread part)	
Piston surfaces and cylinder inside	
Piston pins	
Auto decompression	
Auto decompression lever	
Impeller shaft	
Oil pump drive gear	
Oil pump rotors (inner and outer) and oil pump housing	
Connecting rod big end thrust surface	
Oil strainer	
Oil jet nozzle	
Starter gear	
Idle gear thrust bearing	
Primary driven gear	
Push rod (pressure plate side)	
Ball	
Push rods end surface	
Push lever shaft	
Plain washer	
Transmission free movement gears (inside and end)	
Transmission sliding gears (inside)	
Transmission sliding gears (fork ditch)	
Shift fork guide bar	
Shift drum and Shift drum groove	
Shift shafts	
Shift ratchet device	
Cylinder head and cylinder head cover mating surfaces	Three bond No. 1541®

## LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Crankcase mating surfaces	Yamaha bond No. 1215 (Three bond No. 1215®)
Cylinder head cover mating surface (semicircular)	Yamaha bond No. 1215 (Three bond No. 1215®)
Cylinder head breather screw	Three bond No. 1322®
Generator cover (crankshaft position sensor lead grommet)	Yamaha bond No. 1215 (Three bond No. 1215®)

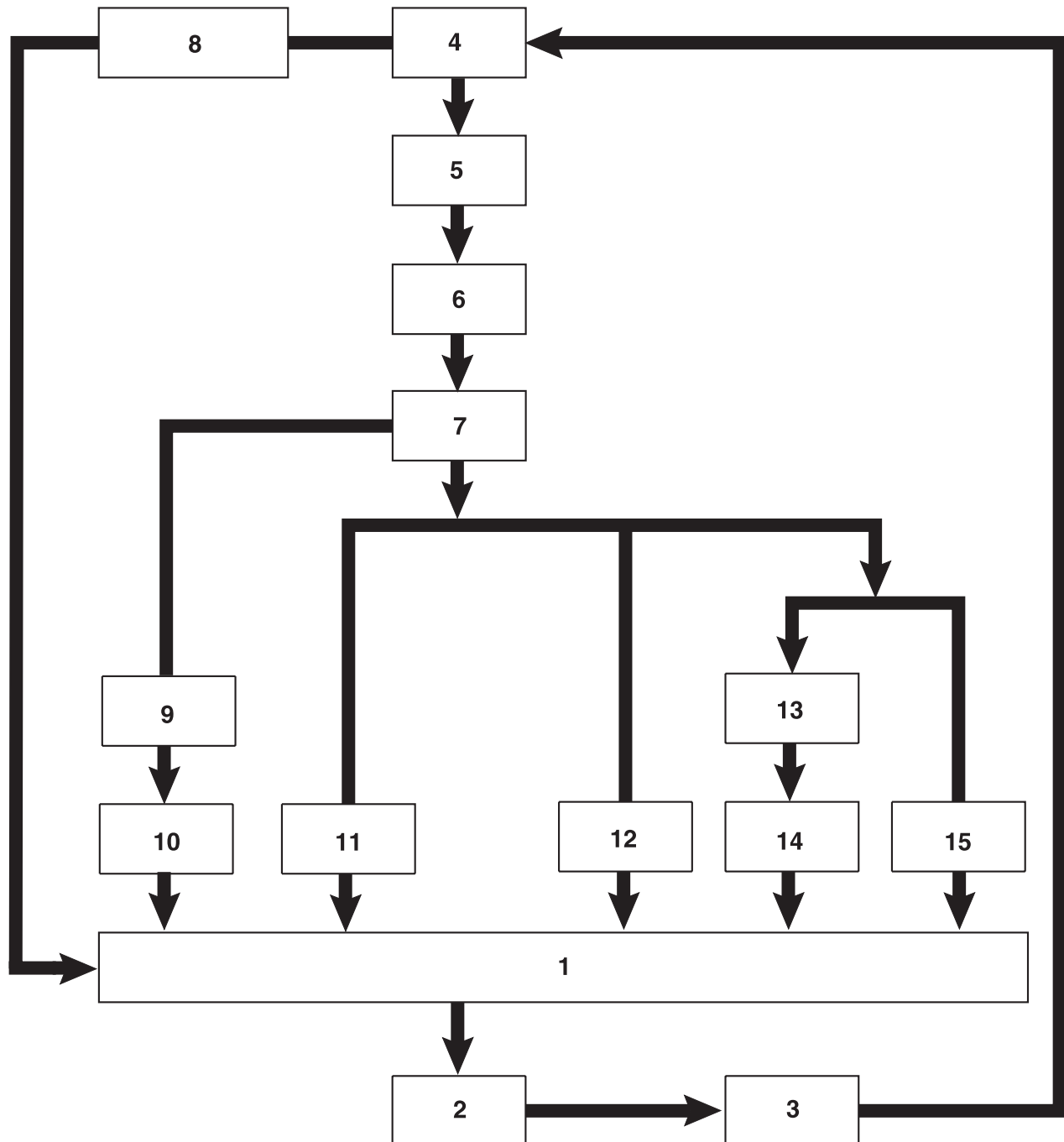
# LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20390

## LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20400

### ENGINE OIL LUBRICATION CHART



# LUBRICATION SYSTEM CHART AND DIAGRAMS

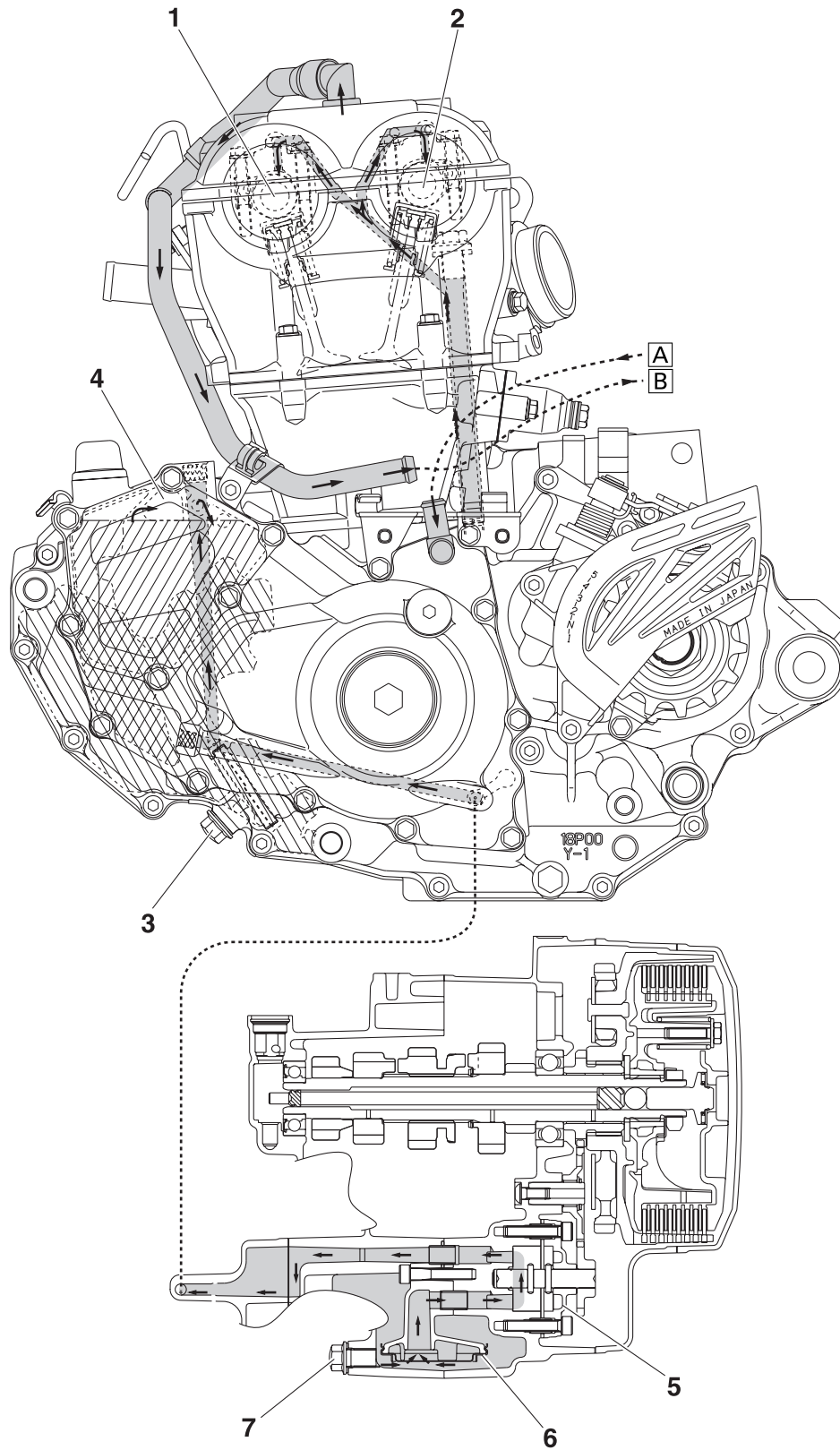
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1. Oil pan
2. Oil strainer
3. Scavenging pump
4. Oil tank
5. Oil pump
6. Check ball
7. Oil filter
8. Oil tank breather
9. Relief seal
10. Crankshaft
11. Oil jet nozzle
12. Camshafts
13. Main axle
14. Clutch
15. Drive axle

# LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410

## LUBRICATION DIAGRAMS



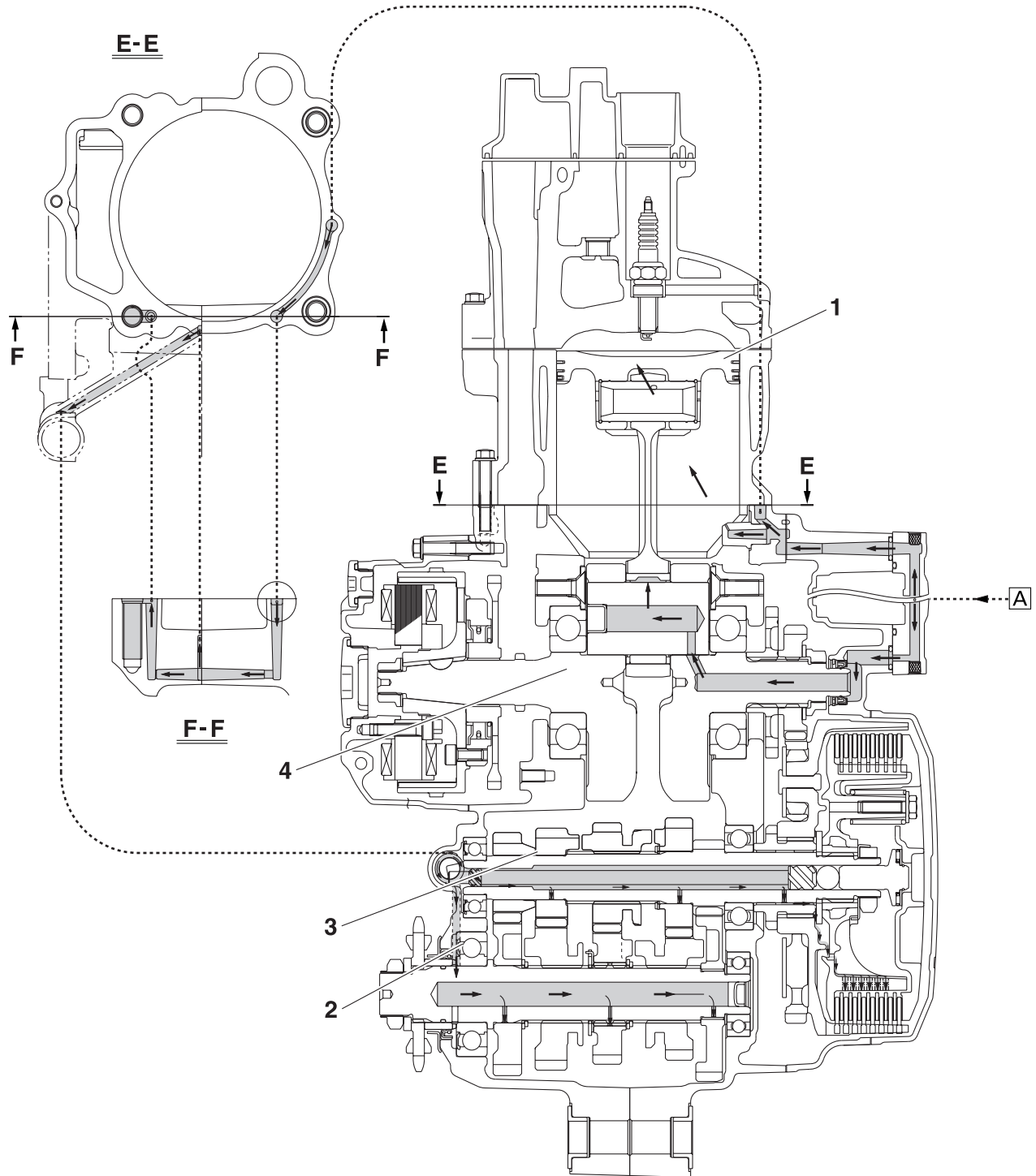
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Exhaust camshaft
2. Intake camshaft
3. Engine oil drain bolt (oil tank)
4. Oil tank breather
5. Oil pump
6. Oil strainer 1
7. Engine oil drain bolt (crankcase)

- A. From breather tank
- B. To breather tank

# LUBRICATION SYSTEM CHART AND DIAGRAMS





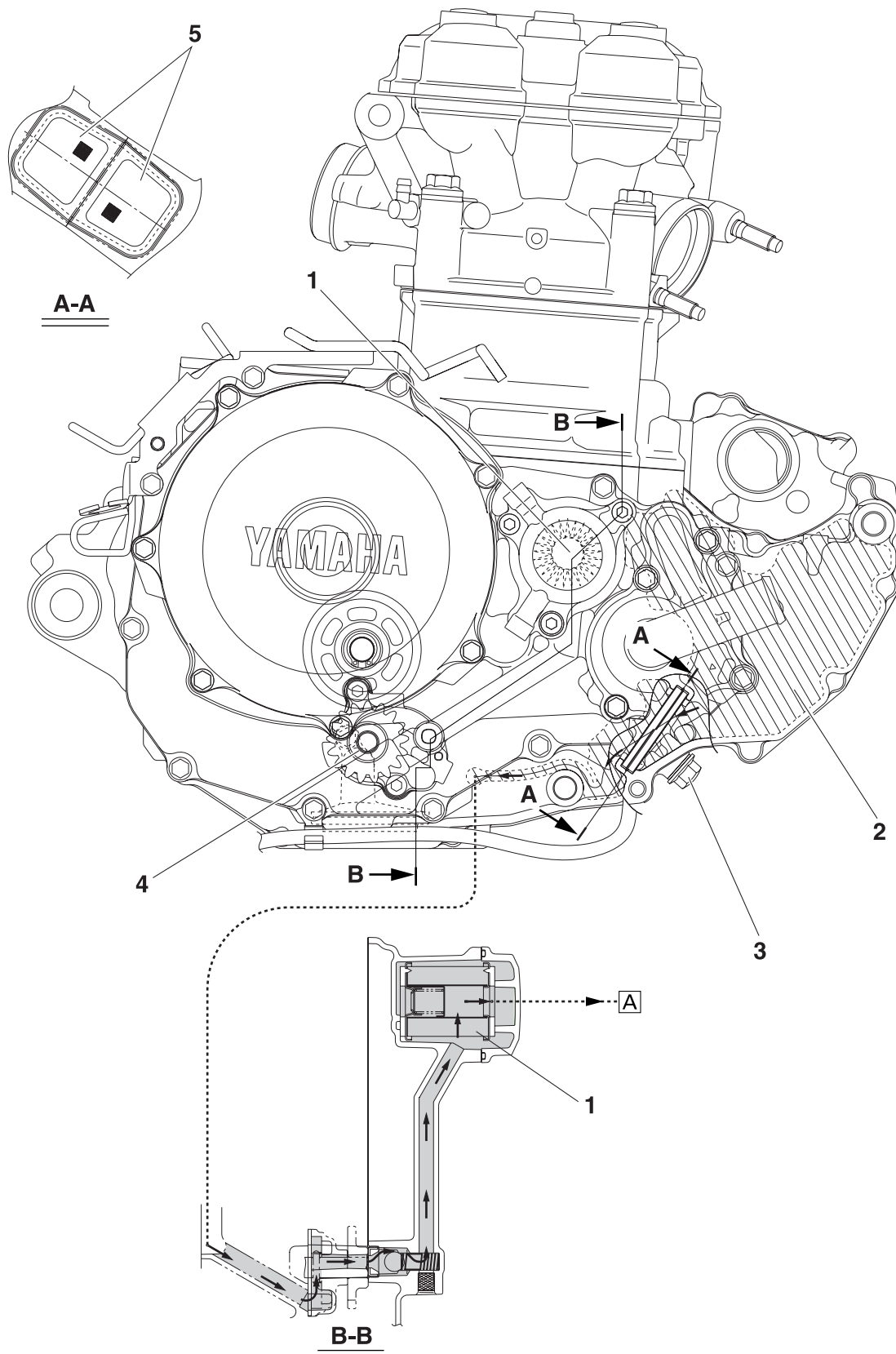
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Piston
2. Drive axle
3. Main axle
4. Crankshaft

A. From oil filter element

# LUBRICATION SYSTEM CHART AND DIAGRAMS



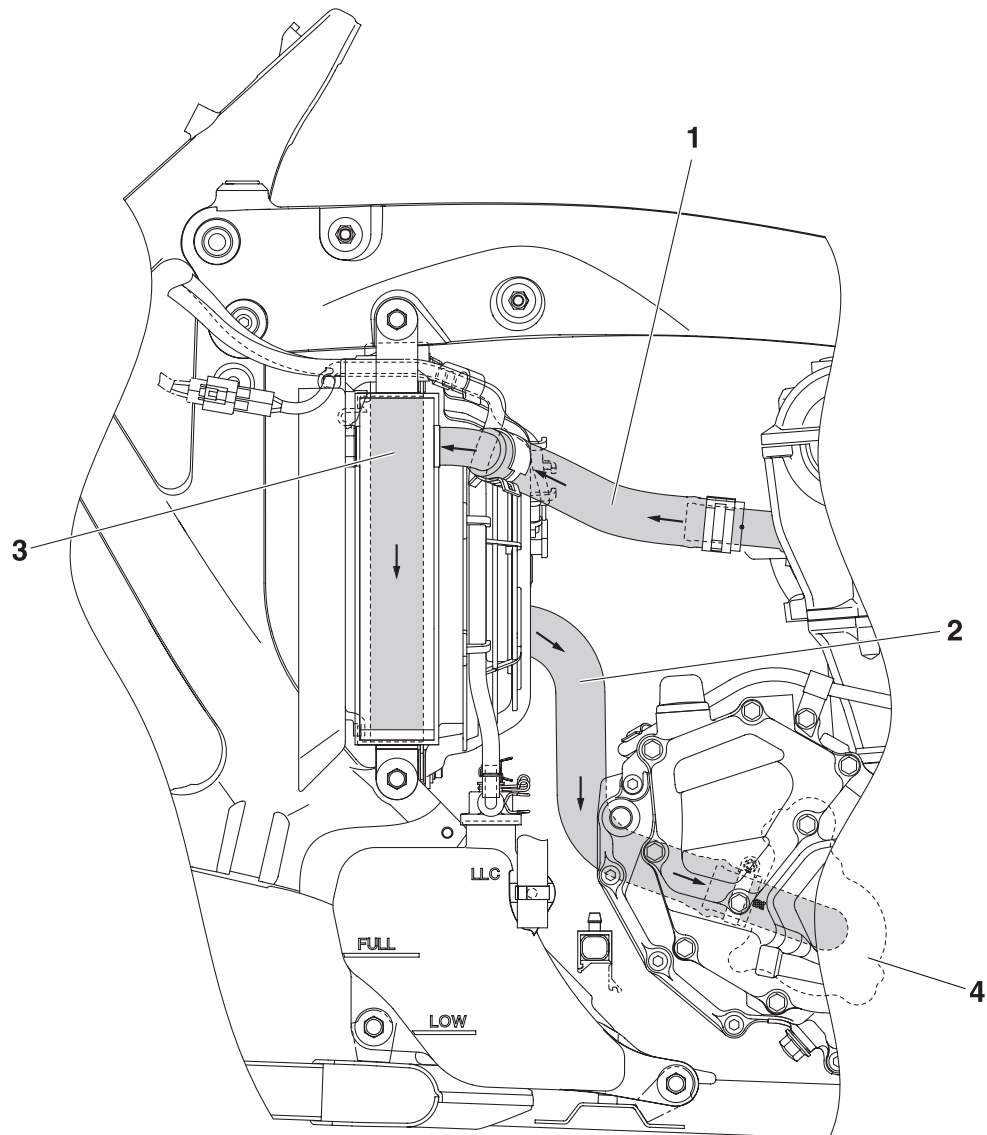
# LUBRICATION SYSTEM CHART AND DIAGRAMS

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1. Oil filter element
  2. Oil tank
  3. Engine oil drain bolt (oil tank)
  4. Oil pump
  5. Oil strainer 2
- A. To crankshaft and camshafts

EAS20420

## COOLING SYSTEM DIAGRAMS



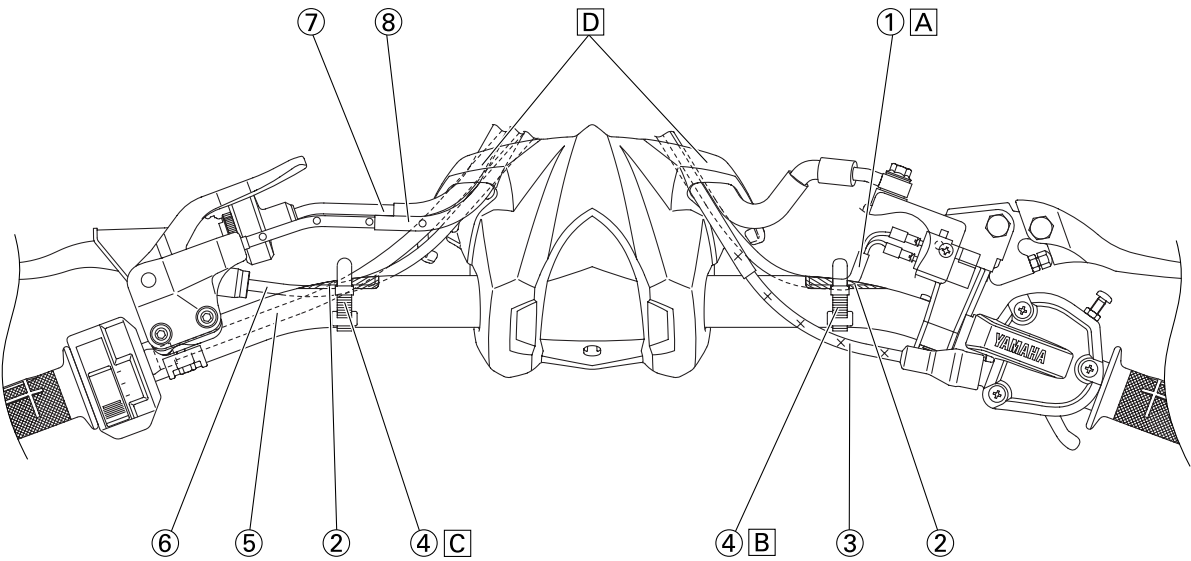
# COOLING SYSTEM DIAGRAMS

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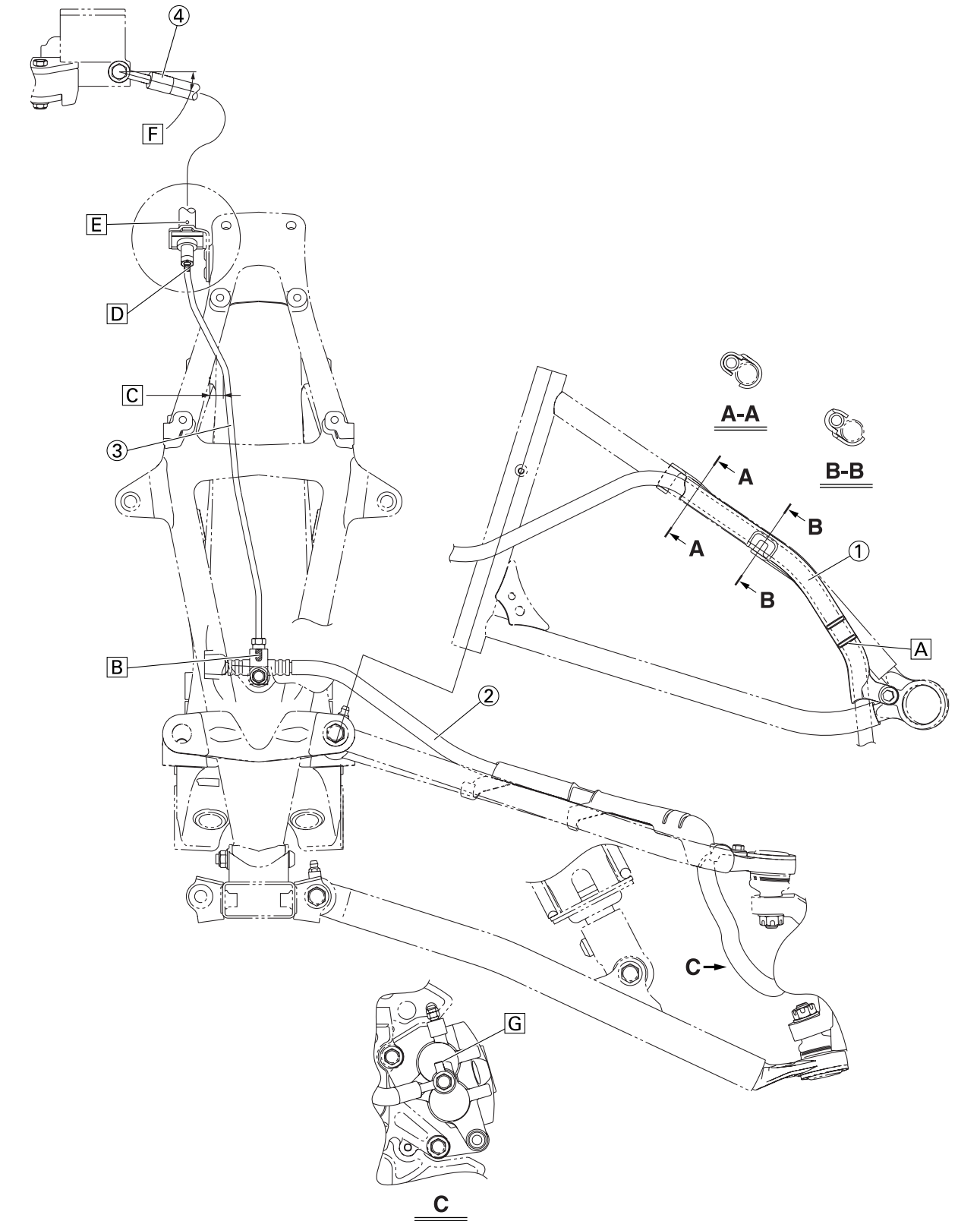
1. Radiator inlet hose
2. Radiator outlet hose
3. Radiator
4. Water pump

EAS20430

CABLE ROUTING

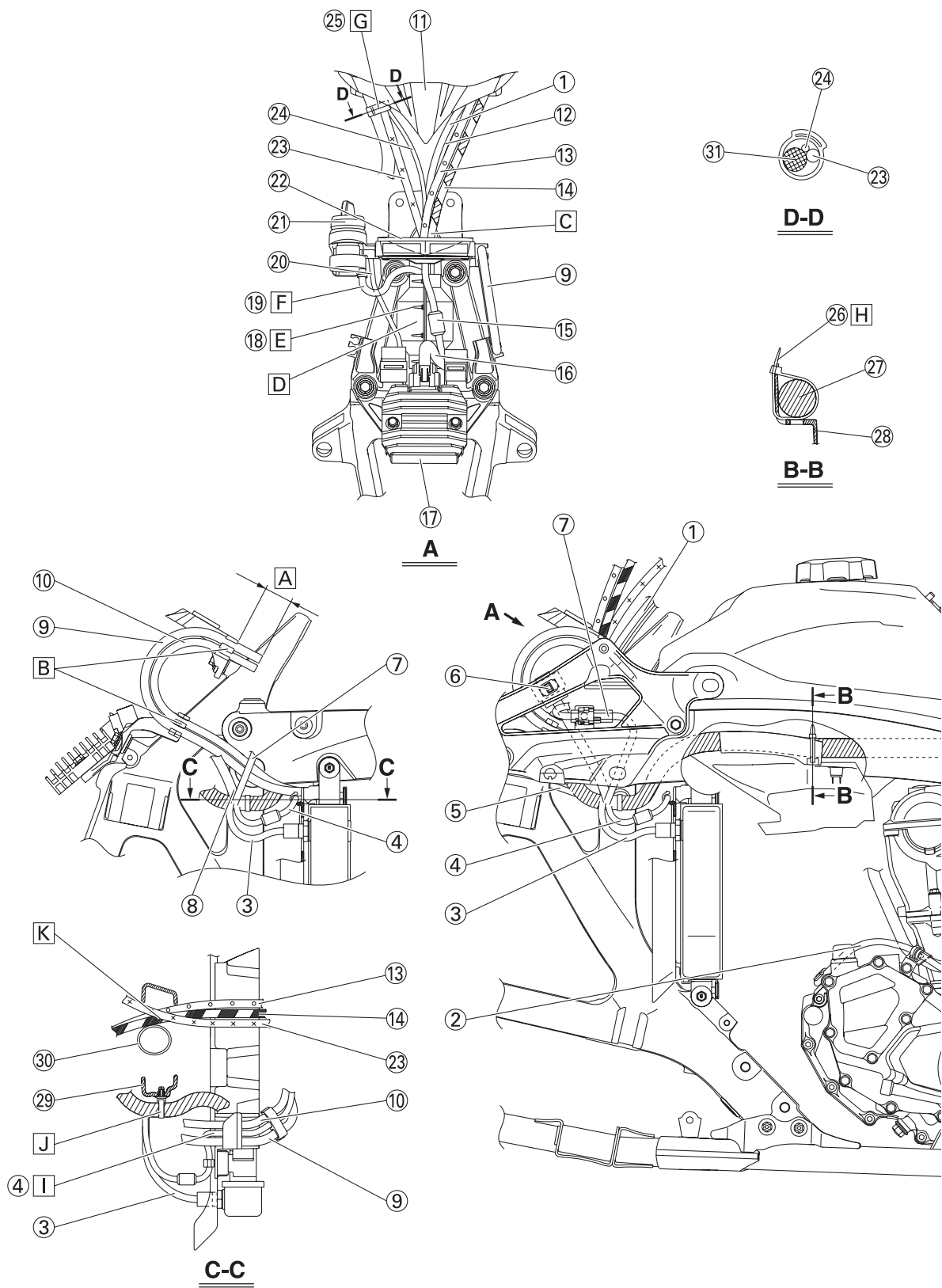


1. Front brake light switch lead
  2. Logo
  3. Throttle cable
  4. Plastic band
  5. Handlebar switch lead
  6. Clutch switch lead
  7. Clutch cable
  8. Parking brake cable
- 
- A. When routing the front brake light switch lead, make sure that it is not bent sharply at the root.
  - B. Fasten the front brake light switch lead with the plastic band at the logo center. Make sure that the end of the plastic band is facing forward.
  - C. Fasten the clutch switch lead and handlebar switch lead with the plastic band at the logo center. Make sure that the end of the plastic band is facing forward.
  - D. Pass the leads, hose and cables through the handlebar cover guide. Route in the order shown in the illustration.

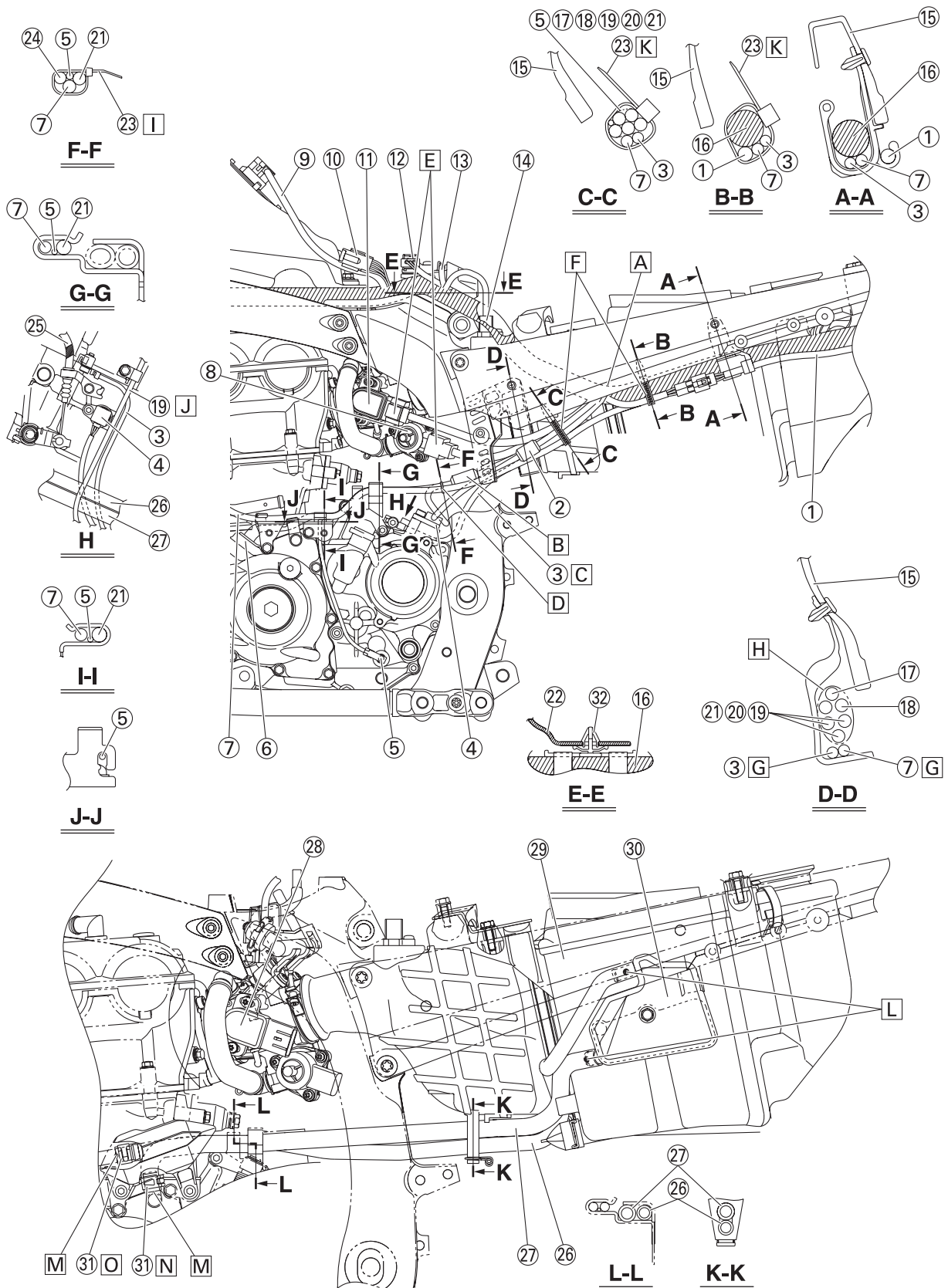




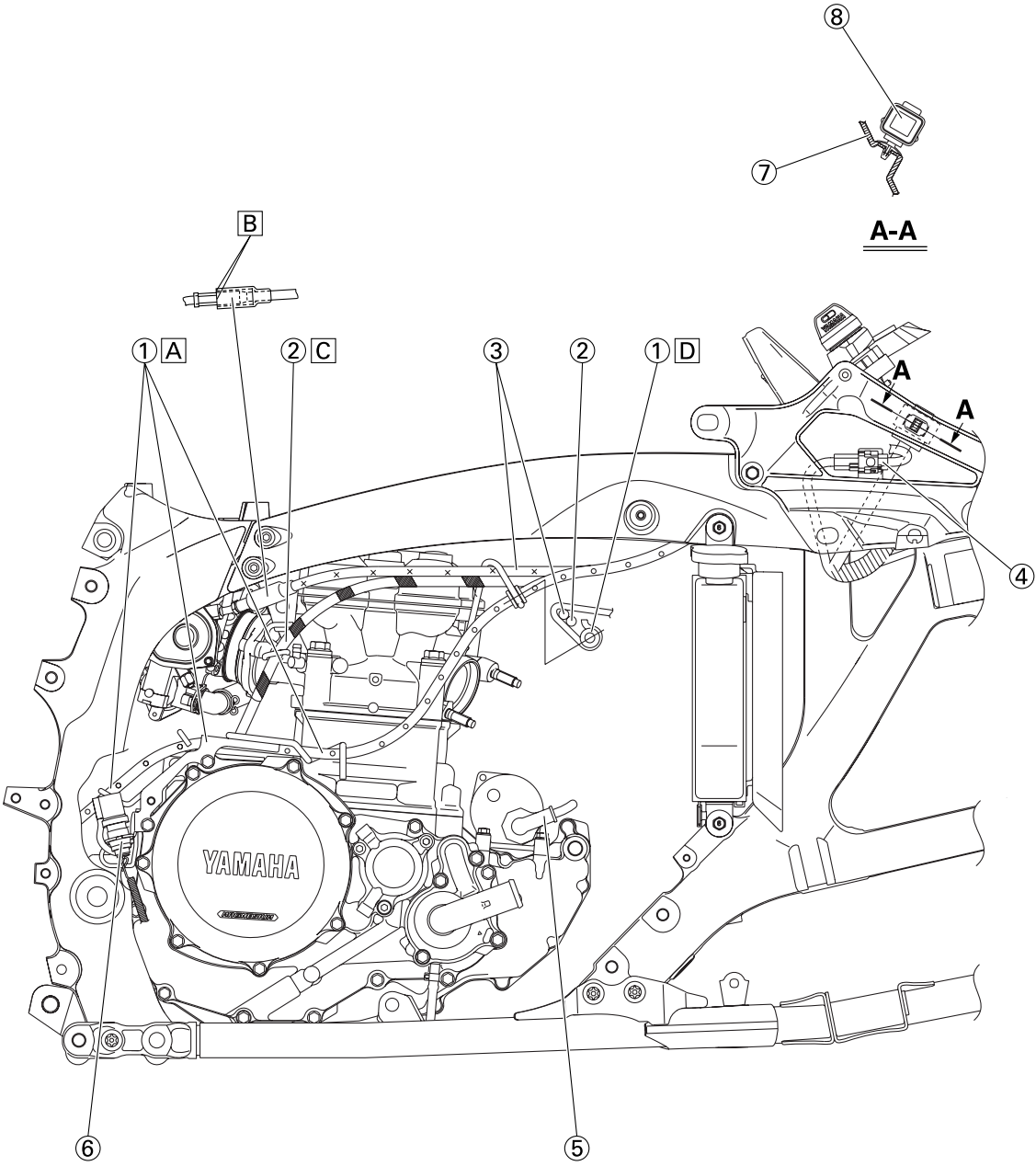
1. Brake hose guide
  2. Front brake hose 2
  3. Brake pipe
  4. Front brake hose 1
- 
- A. Make sure to install the brake hose grommet to the slit (silicon water can be applied).
  - B. Install the brake hose connecting metal with the paint mark facing forward.
  - C. When installing the brake pipe, make sure to have more than 10 mm (0.39 in) clearance from frame complete after tightening the flare nut.
  - D. Install the brake pipe with the paint mark facing upward.
  - E. Install the front brake hose 1 with the paint mark facing forward.
  - F. Make sure the front brake hose 1 positioned within 15° as shown in the illustration.
  - G. Make sure to put the brake pipe pin to the projection.



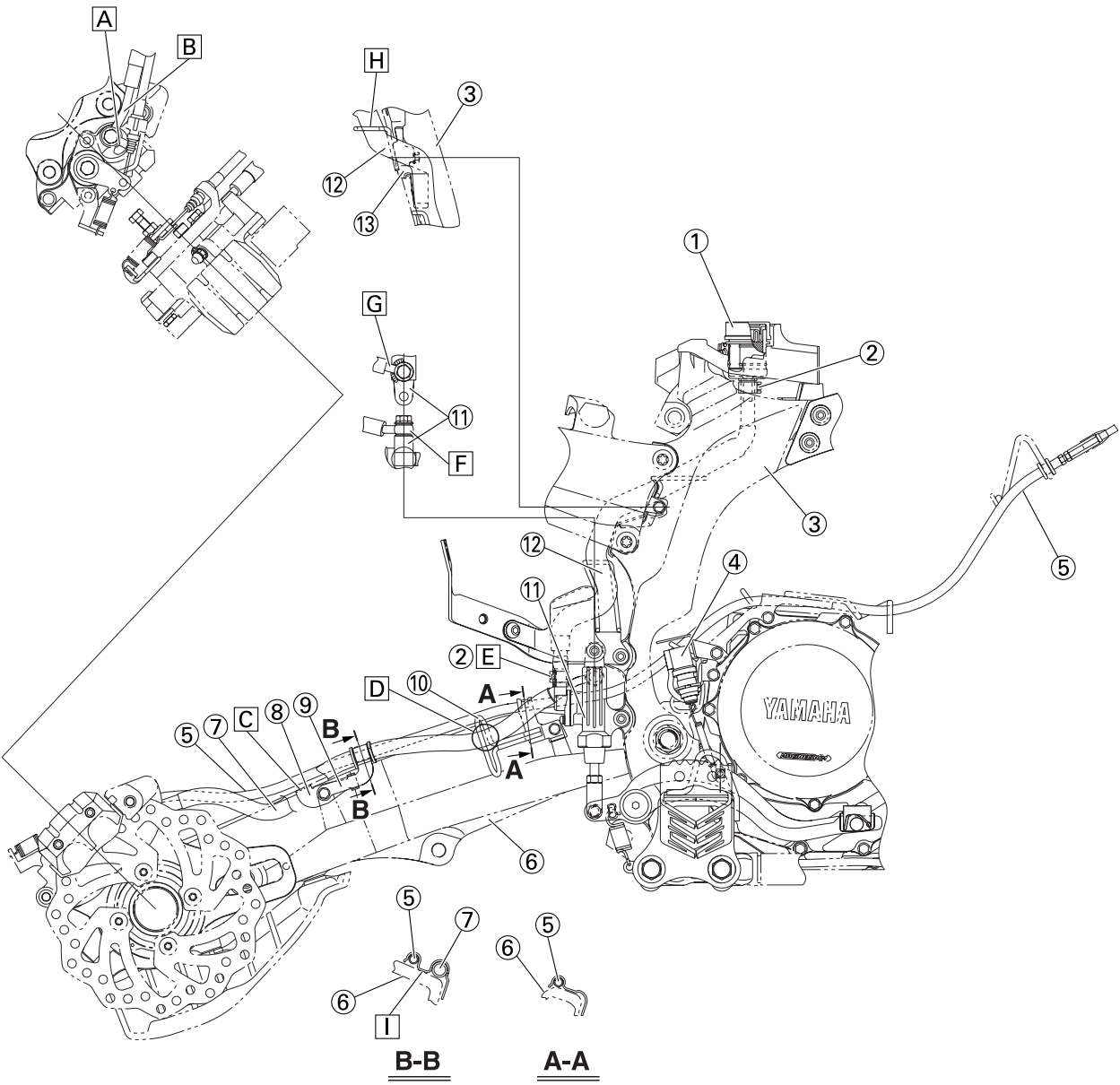
1. Handlebar switch lead
  2. Starter motor lead
  3. Coolant temperature lead
  4. Radiator fan motor lead
  5. Headlight relay lead
  6. Joint coupler
  7. Headlight lead
  8. Joint coupler lead
  9. Coolant reservoir breather hose
  10. Radiator fan breather hose
  11. Handlebar protector
  12. Clutch switch lead
  13. Parking brake cable
  14. Clutch cable
  15. Indicator light lead
  16. Rectifier/regulator lead
  17. Rectifier/regulator
  18. Cover
  19. Main switch lead
  20. Brake pipe
  21. Main switch
  22. Indicator light
  23. Throttle cable
  24. Front brake light switch lead
  25. Clamp
  26. Plastic band
  27. Main harness
  28. Damper plate
  29. Frame
  30. Steering stem
  31. Front brake hose 1
- A. 30 mm (1.18 in)
- B. Silicon water can be applied to where shown in the illustration.
- C. Route the clutch cable inner and left of the parking brake cable.
- D. After connecting the main switch lead, handlebar switch lead and clutch switch lead, wrap them with the cover including the front brake light switch lead and fit it in the frame (four couplers).
- E. Make sure to fasten the poor fit pins in four sections. Any direction is acceptable.
- F. Route the main switch lead in front of the brake pipe.
- G. Clamp the throttle cable, front brake light switch lead and brake hose below the handlebar protector.
- H. Face the end of the clamp upward.
- I. Route the radiator fan motor lead under the radiator fan breather hose.
- J. Make sure to insert the wire harness positioning clamp all the way in.
- K. Route throttle cable, clutch cable and brake cable from the top and through the right of the steering column.



1. Taillight lead
  2. Speed sensor coupler
  3. Battery negative lead
  4. Speed sensor
  5. Neutral switch lead
  6. AC magneto
  7. Starter motor lead
  8. ISC (idle speed control) valve
  9. Fuel pump lead
  10. Joint coupler
  11. TPS (throttle position sensor)
  12. Intake air pressure sensor
  13. Ignition coil lead
  14. Intake air temperature sensor
  15. Frame
  16. Main harness
  17. Throttle position sensor lead
  18. ISC (idle speed control) valve lead
  19. Rear brake light switch lead
  20. Speed sensor lead
  21. AC magneto lead
  22. Ignition coil bracket
  23. Plastic band
  24. Rear brake light switch lead
  25. Clutch cable
  26. Cylinder head breather hose
  27. Crankcase breather hose
  28. Throttle body assembly
  29. Air filter assembly
  30. Breather tank assembly
  31. Clip
  32. Wire harness positioning clamp
- 
- A. Make sure that the lead is not twisted from the branch point to positioning section at E-E.
  - B. Connect the 3 couplers (AC magneto lead, neutral switch lead, rear brake light switch lead) and 1 bullet terminal at the position shown in the illustration.
  - C. Route the battery negative lead below each lead.
  - D. Clamp the lead at where the AC magneto coupler is located. Do not clamp the bare wire.
  - E. Make sure to put the coupler covers on.
  - F. Clamp above the harness protector tube.
  - G. Route the battery negative lead and starter motor lead under the engine-related leads.
  - H. Within the engine-related leads, place the throttle position sensor and ISC (idle speed control) valve lead above and place the neutral switch lead inside.
  - I. Face the end of the clamp inside.
  - J. Route the rear brake light switch lead above the battery negative lead, cylinder head breather hose and crankcase breather hose.
  - K. Face the end of the clamp upward.
  - L. Install the breather hoses, making sure to face the white paint mark outward. Insert the breather hoses until they contact the projection.
  - M. Insert the breather hose until it contacts the projection.
  - N. Make sure that the end of the clip is facing rear side.
  - O. Make sure that the end of the clip is facing left side.

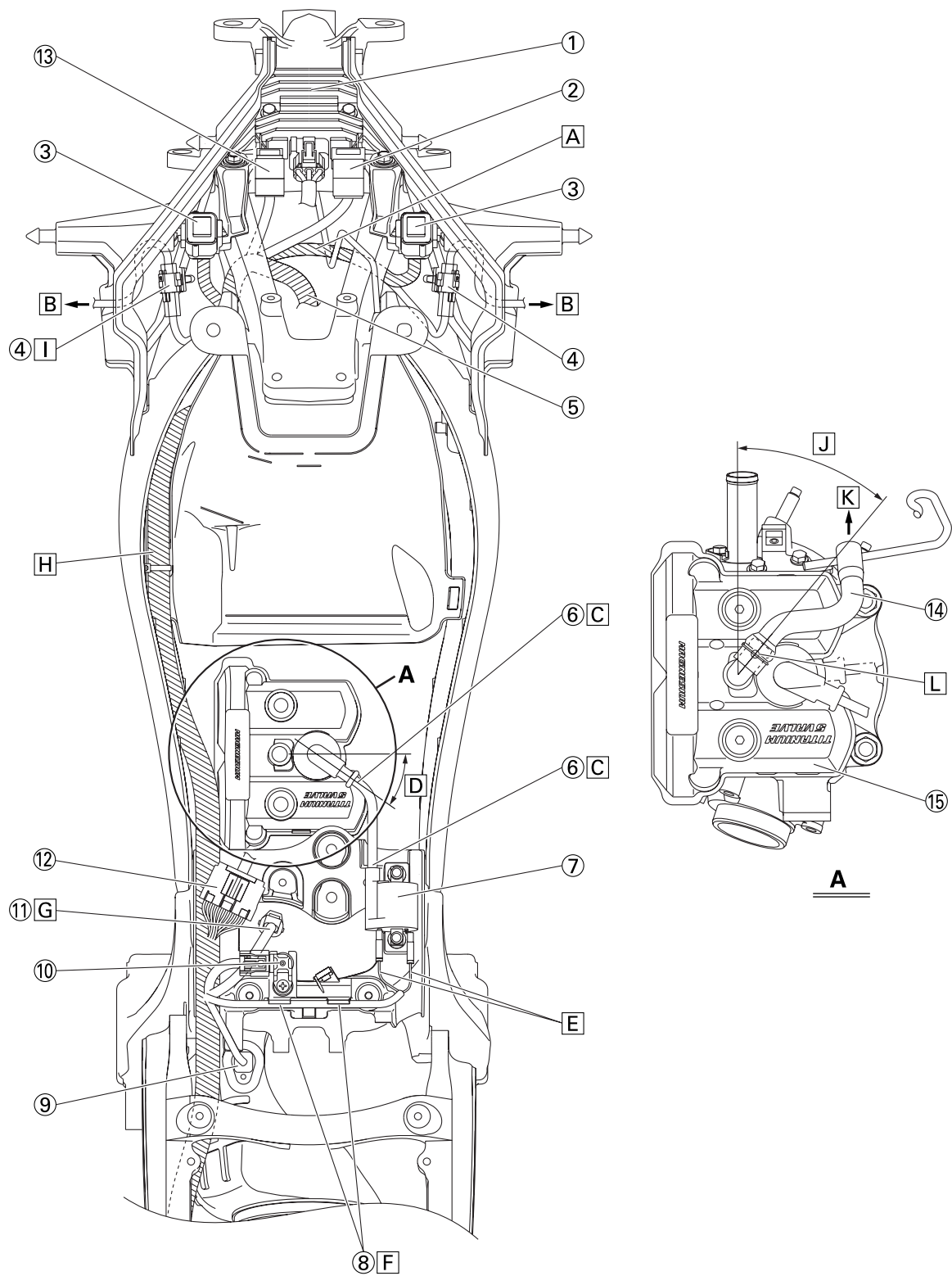


1. Parking brake cable
  2. Clutch cable
  3. Throttle cable
  4. Headlight lead
  5. Starter motor lead
  6. Rear brake light switch
  7. Fender stay
  8. Joint coupler
- 
- A. Pass the parking brake cable through the guide as shown in the illustration.
  - B. Adjust outside of the boots to inside of the rubber cover.
    - Disagreement between the throttle body: under 5 mm (0.20 in)
    - Disagreement between the front of the vehicle: under 10 mm (0.40 in)
  - C. Pass the clutch cable through the engine mount guide.
  - D. Clamp the grommet to the guide.

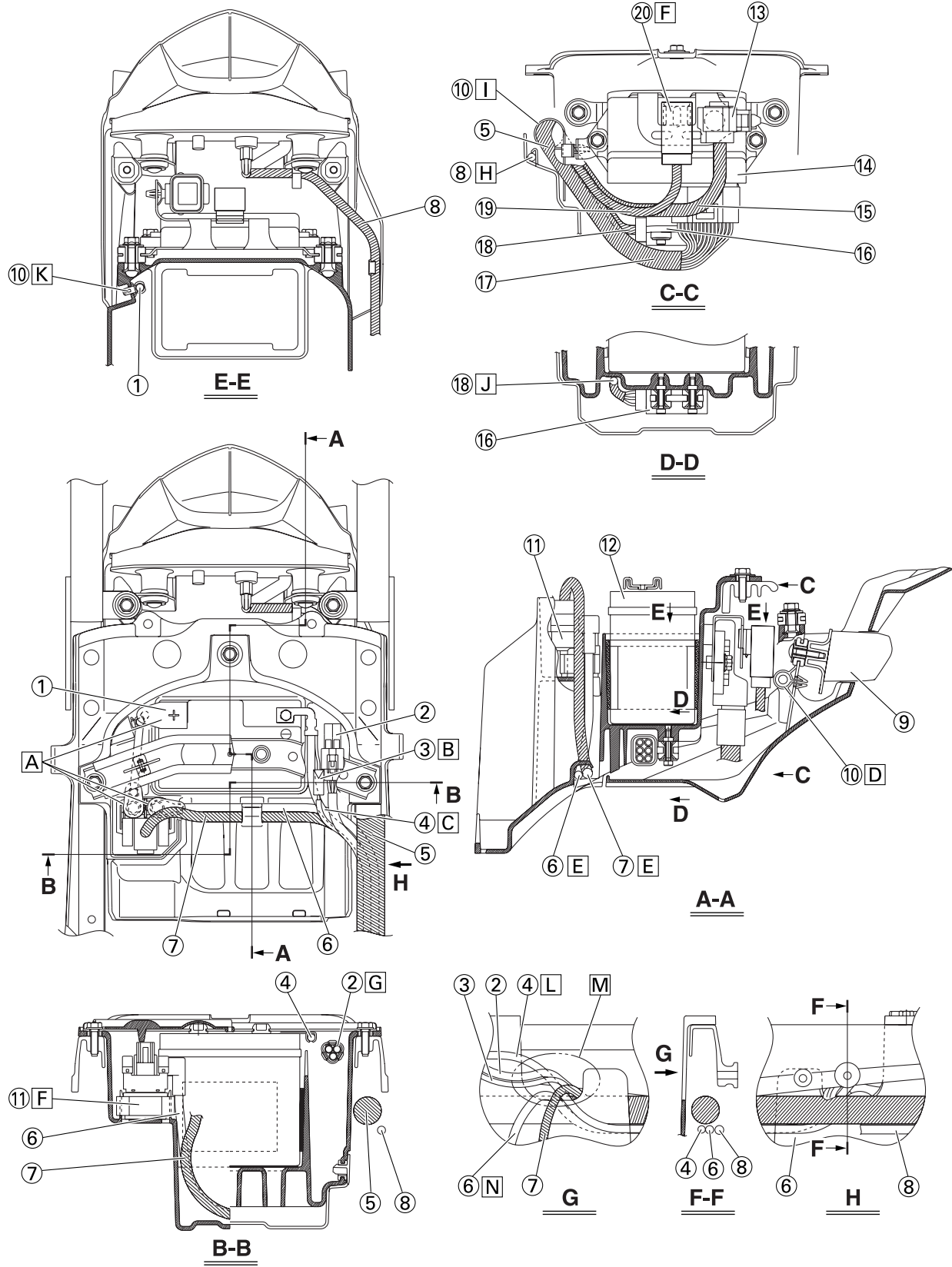




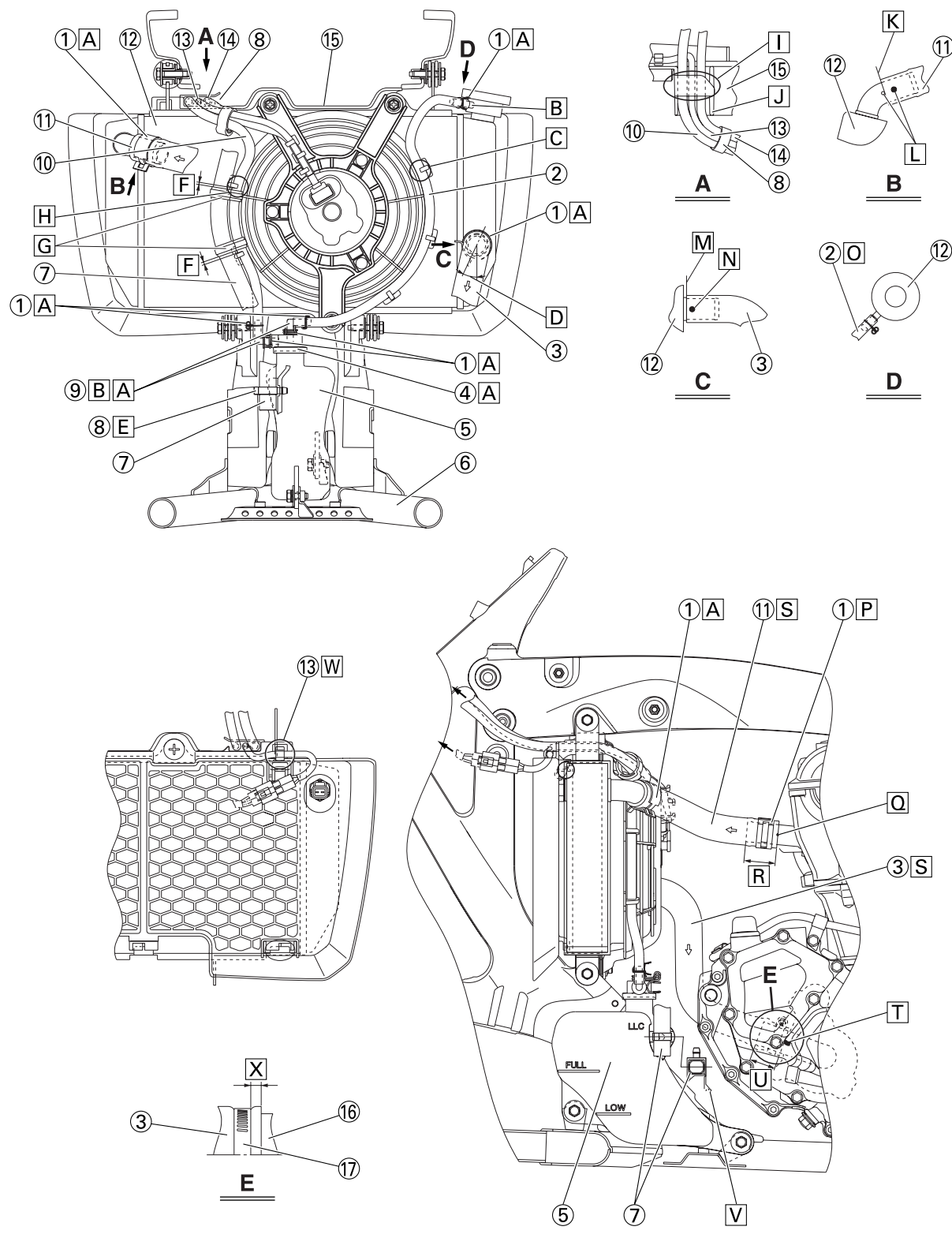
1. Brake fluid reservoir
  2. Clamp
  3. Frame
  4. Rear brake light switch
  5. Parking brake cable
  6. Swingarm
  7. Rear brake hose
  8. Stopper
  9. Brake hose holder
  10. Parking brake cable holder
  11. Rear brake master cylinder
  12. Brake fluid reservoir hose
  13. Brake fluid reservoir hose bracket
- 
- A. Insert the brake pipe projection until contacting the brake caliper projection.
  - B. Install the brake pipe toward the metal piece bending direction, downward.
  - C. Install this part of the stopper by pressing against the swingarm.
  - D. Pass the rear brake hose through the parking brake cable holder guide as shown in the illustration.
  - E. Do not install the end of the clamp facing outward.
  - F. Install the metal clip on the rear brake pipe toward the direction shown in the illustration.
  - G. Install the metal clip on the rear brake hose by fitting to the projection on the rear brake master cylinder.
  - H. Install the brake fluid reservoir hose to the bracket guide as shown in the illustration.
  - I. Fit the swingarm into the brake hose holder as shown in the illustration.



1. Rectifier/regulator
  2. Headlight relay
  3. Joint coupler
  4. Headlight lead
  5. Lead to the handle
  6. Spark plug lead
  7. Ignition coil
  8. Ignition coil lead
  9. Intake air temperature sensor
  10. Intake air pressure sensor
  11. Injector
  12. Fuel pump lead
  13. Radiator fan motor relay
  14. Cylinder head breather hose 1
  15. Cylinder head cover
- 
- A. Route the junction coupler lead in front of the brake pipe.
  - B. To the headlight
  - C. When routing, make sure that the spark plug lead is not bent sharply at the root.
  - D. Make sure the spark plug lead is positioned within 25° as shown in the illustration.
  - E. Outer lead: orange Inner lead: red
  - F. Pass the ignition coil lead through the guide.
  - G. Route the injector under the intake air pressure sensor.
  - H. Pass the main harness through the damper plate guide.
  - I. Insert the headlight relay coupler into the head light bracket (both left and right).
  - J. Make sure the cylinder head breather hose 1 is positioned 40° as shown in the illustration.
  - K. To the cylinder head breather pipe
  - L. Install the cylinder head breather hose 1, making sure to face the yellow paint mark upward.



1. Battery positive lead
  2. FI diagnostic tool coupler
  3. Battery negative lead (main harness)
  4. Battery negative lead
  5. Main harness
  6. Starter motor lead
  7. Starter relay lead
  8. Taillight lead
  9. Taillight assembly
  10. Clamp
  11. Starter relay
  12. Battery
  13. Joint coupler
  14. ECU (engine control unit)
  15. Joint coupler lead
  16. Lean angle sensor
  17. ECU (engine control unit) lead
  18. Lean angle sensor lead
  19. Main relay lead
  20. Main relay
- 
- A. After tightening, make sure to put the cover on.
  - B. Connect the battery negative lead (main harness) around this section.
  - C. Route the battery negative lead above the starter motor lead.
  - D. Clamp the taillight lead.
  - E. Pass the starter relay lead and starter motor lead through the guide as shown in the illustration.
  - F. Insert the starter relay all the way into the rib.
  - G. Place the FI diagnostic tool coupler where shown in the illustration.
  - H. Clamp the taillight lead on the taillight cover.
  - I. Clamp the branched section in the direction shown in the illustration.
  - J. Route the Lean angle sensor lead as shown in the illustration.
  - K. Clamp the protector on the battery positive lead.
  - L. Route the battery negative lead below where the wire harness branches.
  - M. Pass the leads through the battery box guide.
  - N. Route the starter motor lead below where the wire harness branches.



1. Clip
  2. Coolant reservoir hose
  3. Radiator outlet hose
  4. Coolant reservoir cap
  5. Coolant reservoir
  6. Frame
  7. Drain hose
  8. Clamp
  9. Hose joint
  10. Coolant reservoir breather hose
  11. Radiator inlet hose
  12. Radiator
  13. Radiator fan motor lead
  14. Radiator fan breather hose
  15. Radiator cover
  16. Water pump
  17. Clamp
- X. 3–5 mm (0.12–0.20 in)
- A. Install the clip in the direction shown in the illustration.
  - B. When installing the hose, LLC or silicon fluid can be applied.
  - C. Clamp the coolant reservoir hose in three sections.
  - D. 25°
  - E. Clamp the drain hose.
  - F. Less than 5 mm (0.20 in)
  - G. Clamp the coolant reservoir breather hose and drain hose.
  - H. Clamp the coolant reservoir breather hose in two sections.
  - I. Make sure that tab of the radiator cover is on top of all the leads.
  - J. Leads can cross over the rib.
  - K. Insert the radiator inlet hose until it contacts the projection.
  - L. Install the hose by aligning the mark on the radiator inlet hose to the projected part on the radiator pipe.
  - M. Insert the radiator outlet hose until contacting the base of the pipe.
  - N. Install with the radiator outlet hose mark facing inside.
  - O. Insert the coolant reservoir hose until it contacts the projection.
  - P. Install the tab in the direction facing outside.
  - Q. Insert the hose to the center of the paint mark.
  - R. 30 mm (1.18 in)
  - S. When installing the hose, LLC or silicon fluid can be applied to the other side.
  - T. Insert the hose until contacting the convex part of the water pump housing cover.
  - U. 25 mm (0.98 in)
  - V. Front of the clamp
  - W. Clamp the radiator fan motor lead.





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EAS20450

## PERIODIC MAINTENANCE

EAS20460

### INTRODUCTION

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

EAS18P1039

### PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

#### TIP

- For ATVs not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For ATVs equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the ATV 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	12
				km (mi)	320 (200)	1300 (800)	2500 (1600)	5000 (3200)
				hours	20	80	160	320
1	* Fuel line	<ul style="list-style-type: none"> <li>• Check fuel hoses for cracks or other damage, and replace if necessary.</li> <li>• Replace.</li> </ul>					✓	✓
					Every 5 years			
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	<ul style="list-style-type: none"> <li>• Check for leakage and replace gasket(s) if necessary.</li> <li>• Check for looseness and tighten all screw clamps and joints if necessary.</li> </ul>				✓	✓	✓
6	Spark arrester	• Clean.				✓	✓	✓

# PERIODIC MAINTENANCE

EAS18P1040

## GENERAL MAINTENANCE AND LUBRICATION CHART

NO.	ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ➡	INITIAL			EVERY	
				month	1	3	6	6
				km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)
				hours	20	80	160	160
1	Air filter element	• Clean and replace if necessary.			Every 20–40 hours (more often in wet or dusty areas)			
2	* Clutch	• Check operation and adjust if necessary.			✓		✓	✓
3	* Front brake	• Check operation and correct if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary. • Replace brake pads.			✓	✓	✓	✓
4	* Rear brake	• Check operation and correct if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary. • Replace brake pads.			✓	✓	✓	✓
5	* Brake hoses	• Check for cracks or other damage, and replace if necessary. • Replace.				✓	✓	✓
6	* Parking brake	• Check operation and adjust if necessary.			✓	✓	✓	✓
7	* Wheels	• Check runout and for damage, and replace if necessary.			✓		✓	✓
8	* Tires	• Check tread depth and for damage, and replace if necessary. • Check air pressure and balance, and correct if necessary.			✓		✓	✓
9	* Wheel hub bearings	• Check for looseness or damage, and replace if necessary.			✓		✓	✓
10	* Swingarm pivots	• Check operation and for excessive play, and replace bearings if necessary. • Lubricate with lithium-soap-based grease.					✓	✓
11	* Upper and lower arm pivots	• Lubricate with lithium-soap-based grease.					✓	✓
12	Drive chain	• Check chain slack and adjust if necessary. • Check rear wheel alignment and correct if necessary. • Clean and lubricate.			✓	✓	✓	✓
13	* Drive chain rollers	• Check for wear and replace if necessary.					✓	✓
14	* Chassis fasteners	• Make sure that all nuts, bolts, and screws are properly tightened.			✓	✓	✓	✓
15	* Shock absorber assemblies	• Check operation and correct if necessary. • Check for oil leakage and replace if necessary.					✓	✓
16	* Rear suspension relay arm and connecting arm pivoting points	• Check operation and correct if necessary. • Lubricate with lithium-soap-based grease.				✓	✓	✓
17	* Steering shaft	• Lubricate with lithium-soap-based grease.					✓	✓
18	* Steering system	• Check operation and repair or replace if damaged. • Check toe-in and adjust if necessary.			✓	✓	✓	✓
19	* Engine mount	• Check for cracks or other damage, and replace if necessary.					✓	✓
20	Engine oil	• Change. • Check ATV for oil leakage, and correct if necessary.			✓		✓	✓
21	Engine oil filter element	• Replace.			✓		✓	✓
22	Cooling system	• Check coolant level and ATV for coolant leakage, and correct if necessary. • Replace coolant.			✓	✓	✓	✓
23	* Moving parts and cables	• Lubricate.				✓	✓	✓

# PERIODIC MAINTENANCE

NO.	ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ➡	INITIAL			EVERY	
				month	1	3	6	6
				km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)
				hours	20	80	160	160
24	* Throttle lever housing and cable	<ul style="list-style-type: none"> <li>• Check operation and correct if necessary.</li> <li>• Check throttle cable free play and adjust if necessary.</li> <li>• Lubricate throttle lever housing and cable.</li> </ul>		✓	✓	✓	✓	✓
25	* Front and rear brake switches	<ul style="list-style-type: none"> <li>• Check operation and correct if necessary.</li> </ul>		✓	✓	✓	✓	✓
26	* 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.
- Replace the fuel hose every five years and if cracked or damaged.
- 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.

EAS20472

## ENGINE

EAS20510

### ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

#### TIP

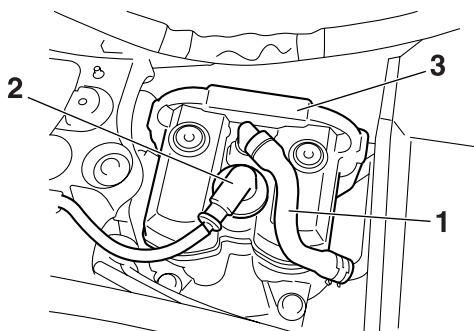
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

#### 1. Remove:

- Seat
- Fuel tank cover
- Side covers  
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank  
Refer to "FUEL TANK" on page 7-1.

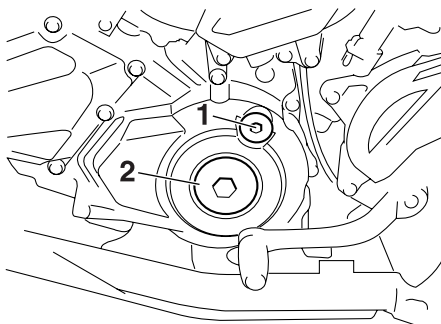
#### 2. Remove:

- Cylinder head breather hose "1"
- Spark plug cap "2"
- Cylinder head cover "3"



#### 3. Remove:

- Timing mark accessing screw "1"
- Crankshaft end accessing screw "2"



#### 4. Measure:

- Valve clearance  
Out of specification → Adjust.



#### Valve clearance (cold)

##### Intake

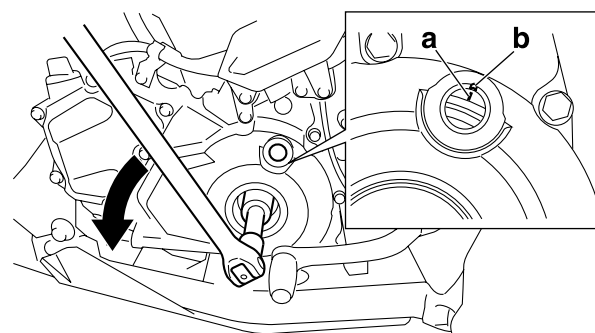
0.10–0.15 mm (0.0039–0.0059 in)

##### Exhaust

0.20–0.25 mm (0.0079–0.0098 in)

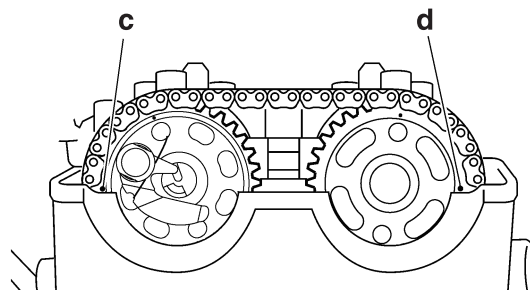


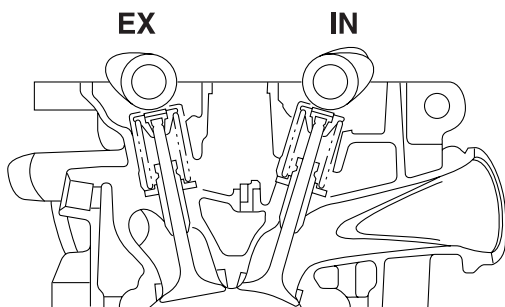
- Turn the crankshaft counterclockwise.
- When the piston is at TDC on the compression stroke, align the mark "a" on the generator rotor with the stationary pointer "b" on the generator cover.



#### TIP

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

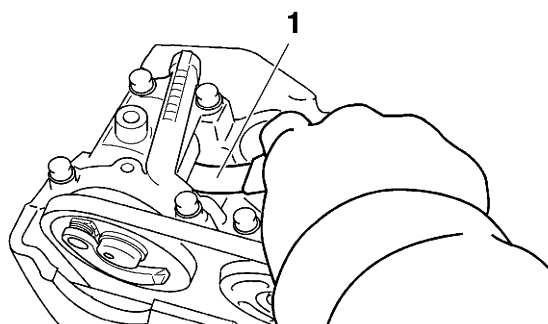




- c. Measure the valve clearance with a thickness gauge "1".



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



## TIP

If the valve clearance is incorrect, record the measured reading.



5. Remove:

- Intake camshaft
- Exhaust camshaft

## TIP

- Refer to "CAMSHAFTS" on page 5-7.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

6. Adjust:

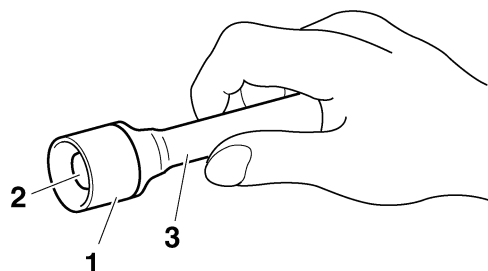
- Valve clearance



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

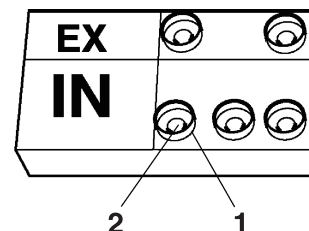


**Valve lapper**  
90890-04101  
**Valve lapping tool**  
YM-A8998



## TIP

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



- b. Calculate the difference between the specified valve clearance and the measured valve clearance.

Example:

Specified valve clearance = 0.11–0.20 mm  
(0.004–0.008 in)

Measured valve clearance = 0.23 mm  
(0.009 in)

$0.23 \text{ mm (0.009 in)} - 0.20 \text{ mm (0.008 in)} = 0.03 \text{ mm (0.001 in)}$

- c. Check the thickness of the current valve pad.

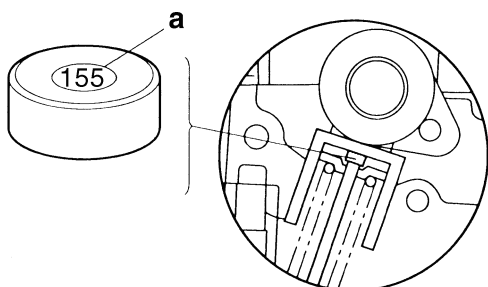
## TIP

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

Example:

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





- d. Calculate the sum of the values obtained in steps (b) and (c) to determine the required valve pad thickness and the valve pad number.

Example:

$$1.55 \text{ mm (0.061 in)} + 0.03 \text{ mm (0.001 in)} = 1.58 \text{ mm (0.062 in)}$$

The valve pad number is 158.

- e. Round off the valve pad number according to the following table, and then select the suitable valve pad.

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

#### TIP

Refer to the following table for the available valve pads.

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

Example:

Valve pad number = 158

Rounded value = 160

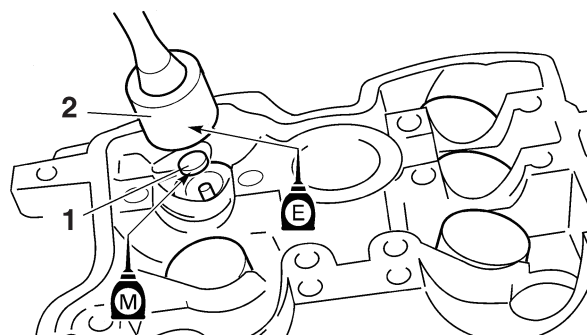
New valve pad number = 160

- f. Install the new valve pad “1” and the valve lifter “2”.

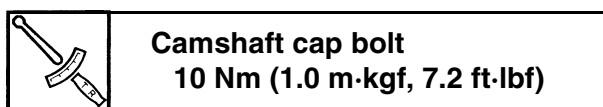
#### TIP

- Lubricate the valve pad with molybdenum disulfide oil.
- Lubricate the valve lifter with engine oil.
- Install the valve lifter and the valve pad in the correct place.

- The valve lifter must turn smoothly when rotated by hand.



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



**Camshaft cap bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

#### TIP

- Refer to “CAMSHAFTS” on page 5-7.
- Lubricate the camshaft bearings with engine oil.
- Lubricate the camshaft lobes and camshaft journals with molybdenum disulfide oil.
- First, install the exhaust camshaft.
- Align the camshaft sprocket marks with the edge of the cylinder head.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

- h. Measure the valve clearance again.

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



7. Install:

- All removed parts

#### TIP

For installation, reverse the removal procedure.

EAS29150

### CHECKING THE ENGINE IDLING SPEED

#### TIP

Prior to checking the engine idling speed, the air filter element should be clean, and the engine should have adequate compression.

1. Remove:
  - Seat
  - Fuel tank cover
  - Right side cover
 Refer to "GENERAL CHASSIS" on page 4-1.
2. Start the engine and let it warm up for several minutes.
3. Attach:
  - Digital tachometer  
(to the spark plug lead)



**Digital tachometer**  
90890-06760  
YU-39951-B

4. Measure:
  - Engine idling speed
 Out of specification → Check the throttle body.  
 Refer to "THROTTLE BODY" on page 7-4 and "FUEL INJECTION SYSTEM" on page 8-29.



**Engine idling speed**  
1950–2050 r/min

## TIP

The engine idling speed is not adjustable.

5. Install:
  - Right side cover
  - Fuel tank cover
  - Seat
 Refer to "GENERAL CHASSIS" on page 4-1.

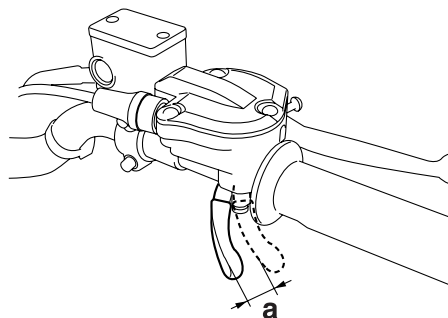
EAS20660

## ADJUSTING THE THROTTLE LEVER FREE PLAY

## TIP

Prior to adjusting the throttle lever free play, the engine idling speed should be adjusted.

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



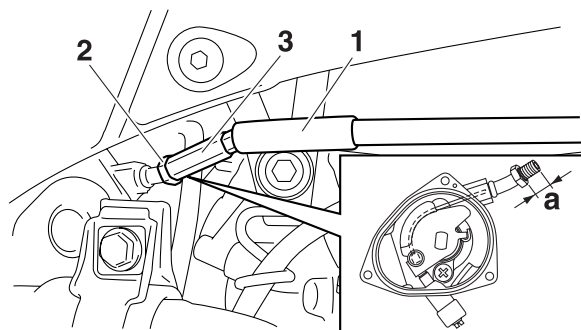
**Throttle lever free play**  
2.0–4.0 mm (0.08–0.16 in)

2. Adjust:
  - Throttle lever free play



## Throttle body side

- a. Slide back the rubber cover "1".
- b. Loosen the locknut "2" and adjusting nut "3".
- c. Set the distance "a", from the end of the cable holder to the locknut, to 7.9 mm (0.31 in) as shown in the illustration.
- d. Tighten the adjusting nut until touching the locknut.
- e. Tighten the locknut.
- f. Slide the rubber cover to its original position.



## Handlebar side

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

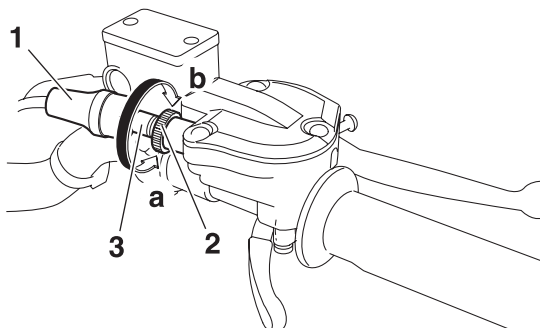
## Direction "a"

Throttle lever free play is increased.

## Direction "b"

Throttle lever free play is decreased.

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



EWA18P1002

## WARNING

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



EAS29170

## 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.

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



**Speed limiter length**  
Less than 12 mm (0.47 in)

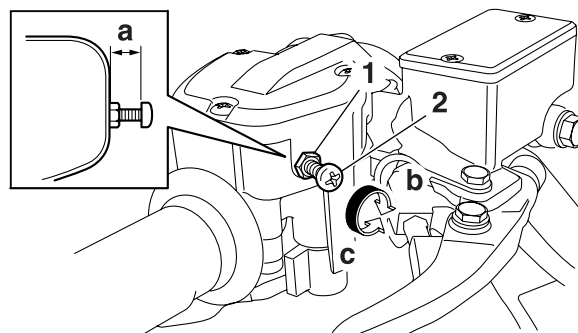
- Adjust:
  - Speed limiter length



- Loosen the locknut "1".
- Turn the adjusting screw "2" in or out until the specified speed limiter length is obtained.

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

- Tighten the locknut.



EWA18P1003

## 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 adjusting screw more than 12 mm (0.47 in). Also, always adjust the throttle lever free play to 2.0–4.0 mm (0.08–0.16 in).



EAS20690

## CHECKING THE SPARK PLUG

- Remove:
  - Seat
  - Fuel tank cover
  - Side covers
 Refer to "GENERAL CHASSIS" on page 4-1.
- Remove:
  - Fuel tank
 Refer to "FUEL TANK" on page 7-1.
- Disconnect:
  - Spark plug cap
- Remove:
  - Spark plug

ECA13330

## 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.

- Check:
  - Spark plug type
 Incorrect → Change.

Technical drawing of a threaded part with a U-bollet and a lock washer. The drawing shows a cross-section of the part with a U-bollet and a lock washer. The U-bollet is labeled with the number 1, and the lock washer is labeled with the number 2.

- 

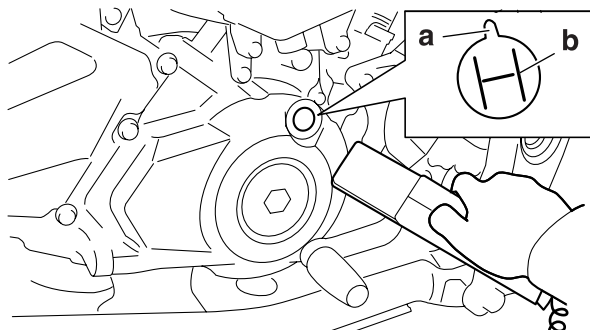
A diagram of a screw conveyor system. It features a vertical section at the top and a horizontal section below it. The horizontal section is labeled with the letter 'a' and has two thick black arrows pointing vertically towards it, one above and one below, indicating a specific point of interest or measurement.

- 

- c. Check that the stationary pointer “a” is within the firing range “b” on the generator rotor.  
Incorrect firing range → Check the ignition system.

## TIP

The ignition timing is not adjustable.



- d. Install the timing mark accessing screw.



4. Detach:
  - Timing light
  - Digital tachometer
5. Install:
  - Right side cover
  - Fuel tank cover
  - Seat

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

EAS28910

## CHECKING THE ENGINE OIL LEVEL

1. Place the vehicle on a level surface.
2. Start the engine, warm it up until the engine oil has reached a normal temperature of 40 °C (104 °F), let it continue to idle for ten seconds, and then turn the engine off.

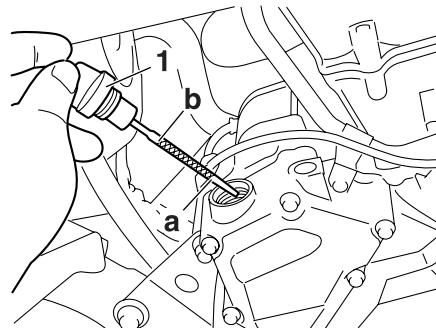
## TIP

To achieve the proper engine oil temperature for an accurate oil level reading, the engine must have first completely cooled down, and then warmed up again for several minutes to normal operating temperature.

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

## TIP

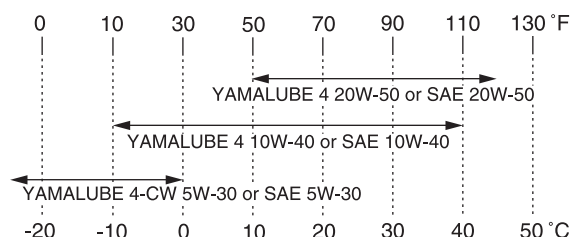
- Before checking the engine oil level, wait a few minutes until the oil has settled.
- Do not screw the dipstick “1” in when checking the oil level.



## Type

**YAMALUBE 4-CW 5W-30 or  
YAMALUBE 4 10W-40 or  
YAMALUBE 4 20W-50, SAE  
5W-30 or SAE 10W-40 or SAE  
20W-50**

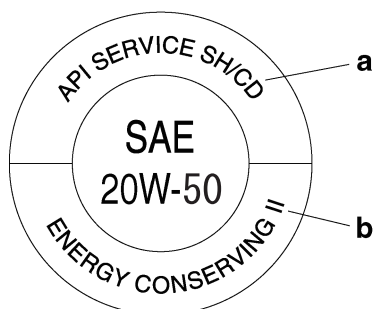
**Recommended engine oil grade  
API service SG type or higher,  
JASO standard MA**



ECA18P1016

## NOTICE

- In order to prevent clutch slippage (since the engine oil also lubricates the clutch), do not mix any chemical additives. Do not use oils with a diesel specification of “CD” “a” or oils of a higher quality than specified. In addition, do not use oils labeled “ENERGY CONSERVING II” “b” or higher.
- Make sure that no foreign material enters the crankcase.



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

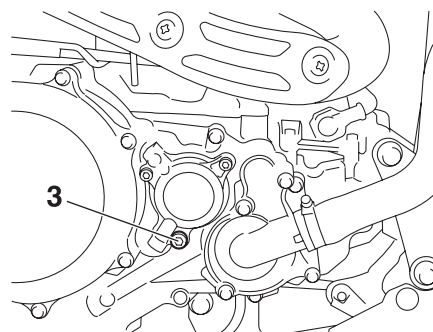
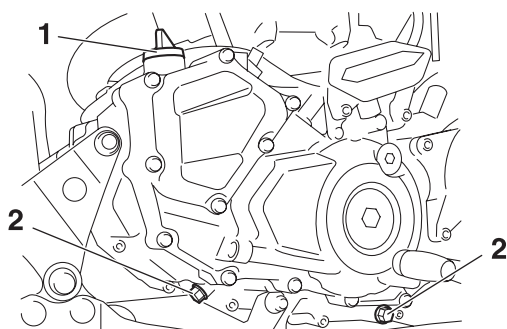
### TIP

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

EAS20810

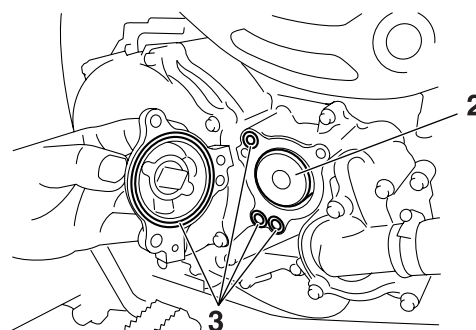
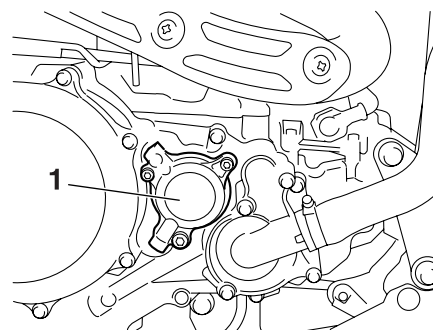
## CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Remove:
  - Engine skid plate  
Refer to "GENERAL CHASSIS" on page 4-1.
3. Place a container under the engine oil drain bolt.
4. Remove:
  - Dipstick "1"
  - Engine oil drain bolts "2"  
(along with the gasket)
  - Oil filter element drain bolt "3"

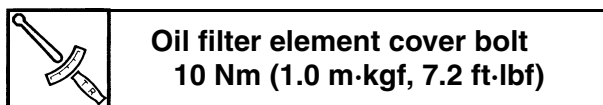


5. Drain:
  - Engine oil  
(completely from the oil tank and the crankcase)
6. If the oil filter element is also to be replaced, perform the following procedure.

- a. Remove the oil filter element cover "1" and oil filter element "2".
- b. Install new O-rings "3".



- c. Install the new oil filter element and the oil filter element cover.



7. Install:
  - Engine oil drain bolts  
(along with the new gasket)
  - Oil filter element drain bolt





**Engine oil drain bolt**  
**20 Nm (2.0 m·kgf, 14 ft·lbf)**  
**Oil filter element drain bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

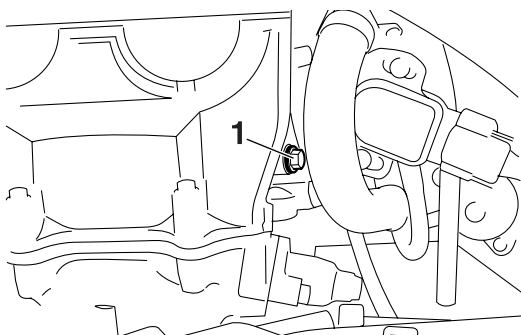
8. Fill:
- Crankcase  
(with the specified amount of the recommended engine oil)



**Engine oil quantity**  
**Without oil filter element replacement**  
**1.40 L (1.48 US qt, 1.23 Imp.qt)**  
**With oil filter element replacement**  
**1.45 L (1.53 US qt, 1.28 Imp.qt)**  
**Total amount**  
**1.65 L (1.74 US qt, 1.45 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 3-10.
13. Check:
- Engine oil pressure

- a. Slightly loosen the oil checking bolt "1".



- b. Start the engine and keep it idling until engine oil starts to seep from the oil checking bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.

- c. Check the engine oil passages, the oil filter element and the oil pump for damage or leakage. Refer to "OIL PUMP" on page 5-41.
- d. Start the engine after solving the problem(s) and check the engine oil pressure again.
- e. Tighten the oil checking bolt to specification.



**Oil checking bolt**  
**7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

14. Install:
- Engine skid plate  
Refer to "GENERAL CHASSIS" on page 4-1.

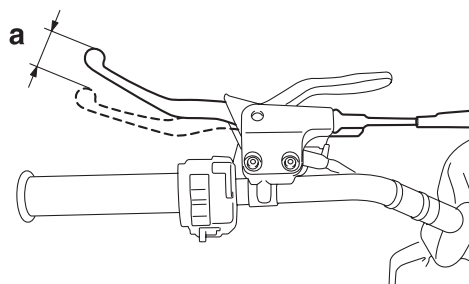
EAS20870

## ADJUSTING THE CLUTCH LEVER FREE PLAY

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



**Clutch lever free play (lever end)**  
**8.0–13.0 mm (0.31–0.51 in)**

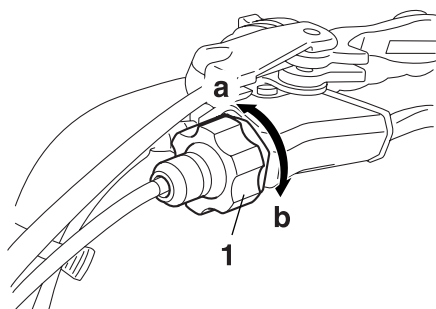


2. Adjust:
- Clutch lever free play

## Handlebar side

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

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



## TIP

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



## Engine side

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

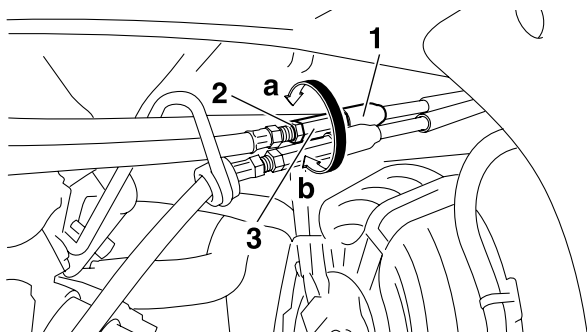
### Direction "a"

Clutch lever free play is increased.

### Direction "b"

Clutch lever free play is decreased.

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

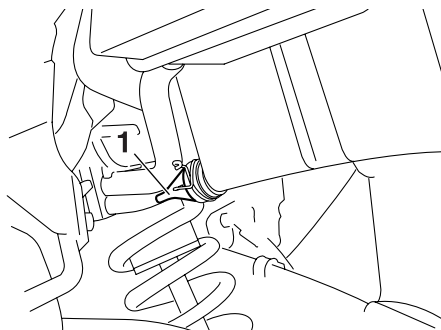


EAS20941

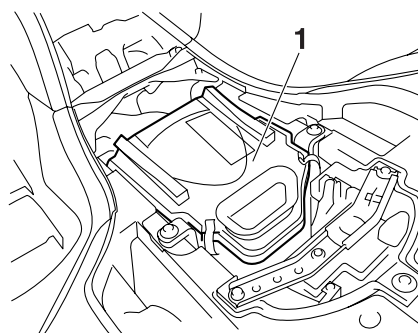
## CLEANING THE AIR FILTER ELEMENT

## TIP

On the bottom of the air filter case is a check hose "1". If dust or water or both collects in this hose, clean the air filter element and air filter case.



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

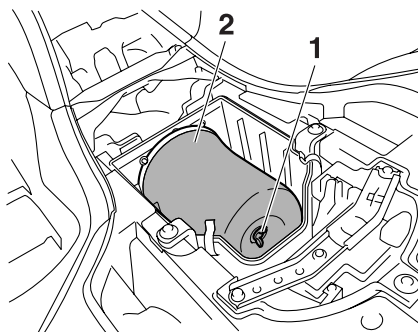


- Remove:
  - Wing bolt "1"
  - Air filter element "2"
  - Air filter element frame "3"

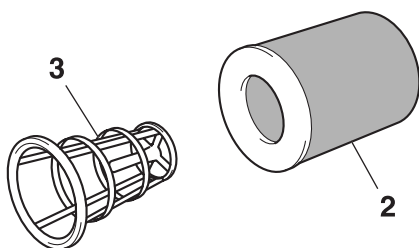
ECA18P1004

## NOTICE

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will lead to poor engine performance and possible overheating.







4. Clean:
  - Air filter element (with solvent)

EWA13020

## **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.**

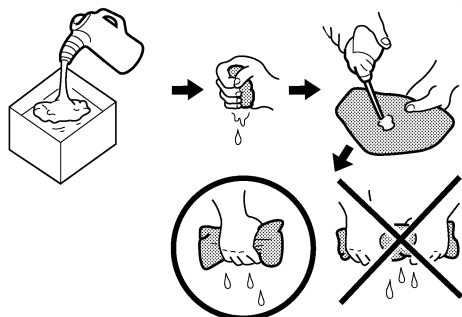
## **TIP**

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

ECA13430

## **NOTICE**

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



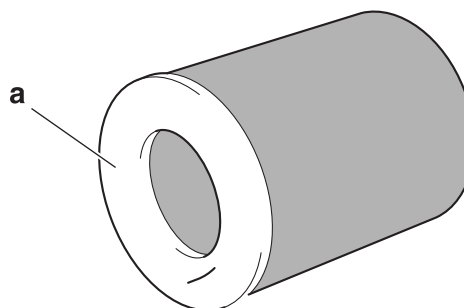
5. Check:
  - Air filter element
 Damage → Replace.
6. Apply the recommended oil to the entire surface of the air filter element and squeeze out the excess oil. The air filter element should be wet but not dripping.



**Air filter oil grade**  
**Foam air filter oil or equivalent oil**

7. Install:
  - Air filter element frame

8. Apply:
  - Lithium-soap-based grease
 On the matching surface “a” on air filter element.



9. Install:
  - Air filter element
  - Wing bolt

## **TIP**

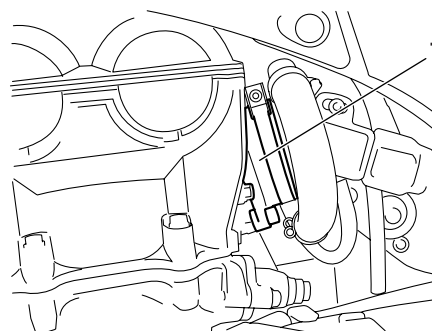
Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

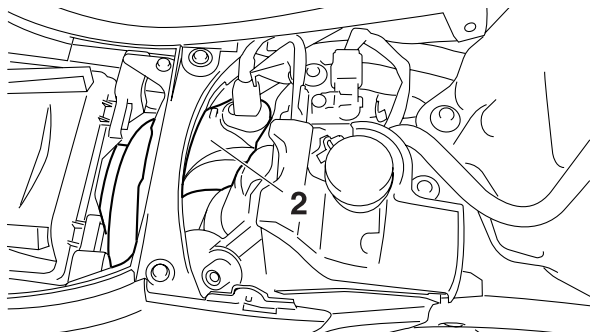
10. Install:
  - Air filter case cover
11. Install:
  - Seat
 Refer to “GENERAL CHASSIS” on page 4-1.

EAS21020

## **CHECKING THE THROTTLE BODY JOINT**

1. Remove:
  - Seat
 Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
  - Throttle body joint “1”
  - Air filter case joint “2”
 Cracks/damage → Replace.





3. Install:
  - Seat
 Refer to “GENERAL CHASSIS” on page 4-1.

EAS21030

## CHECKING THE FUEL LINE

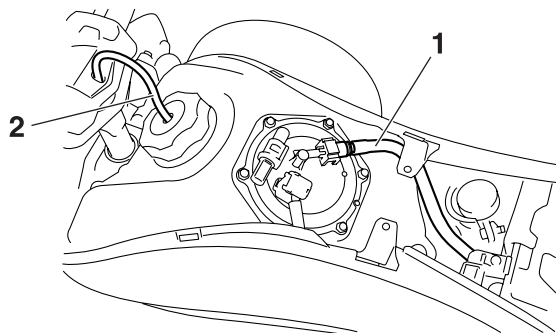
The following procedure applies to all of the fuel and breather hoses.

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

ECA14940

### NOTICE

**Make sure the fuel tank breather hose is routed correctly.**



3. Install:
  - Fuel tank cover
  - Seat
 Refer to “GENERAL CHASSIS” on page 4-1.

EAS21050

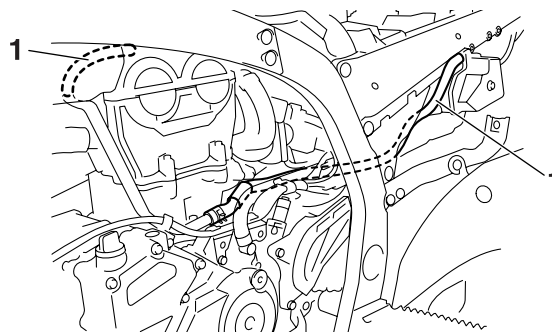
## CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Rear fender
 Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
  - Fuel tank
 Refer to “FUEL TANK” on page 7-1.
3. Check:
  - Cylinder head breather hoses “1”
 Cracks/damage → Replace.  
 Loose connection → Connect properly.

ECA14920

### NOTICE

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



4. Install:
  - All removed parts

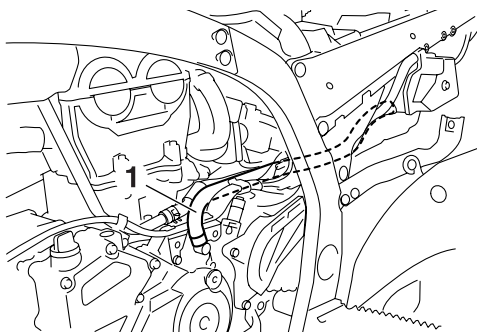
### TIP

For installation, reverse the removal procedure.

EAS21070

## CHECKING THE CRANKCASE BREATHER HOSE

1. Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Rear fender
 Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
  - Crankcase breather hose “1”
 Cracks/damage → Replace.  
 Loose connection → Connect properly.



ECA13450

## NOTICE

**Make sure the crankcase breather hose is routed correctly.**

### 3. Install:

- Rear fender
- Side covers
- Fuel tank cover
- Seat

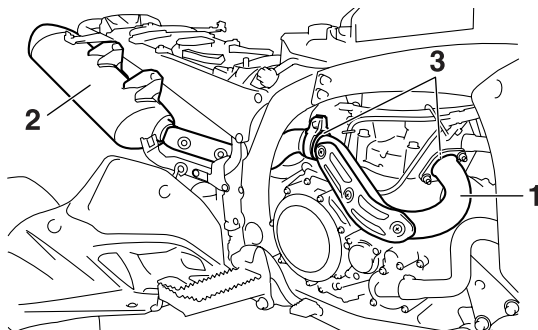
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21080

## CHECKING THE EXHAUST SYSTEM

### 1. Check:

- Exhaust pipe "1"
- Muffler "2"
- Cracks/damage → Replace.
- Gaskets "3"
- Exhaust gas leaks → Replace.



### 2. Check:

- Tightening torque



**Exhaust pipe nut**  
20 Nm (2.0 m·kgf, 14 ft·lbf)  
**Muffler bolt**  
34 Nm (3.4 m·kgf, 24 ft·lbf)  
**Muffler joint bolt**  
20 Nm (2.0 m·kgf, 14 ft·lbf)

EAS28970

## CLEANING THE SPARK ARRESTER

### 1. Clean:

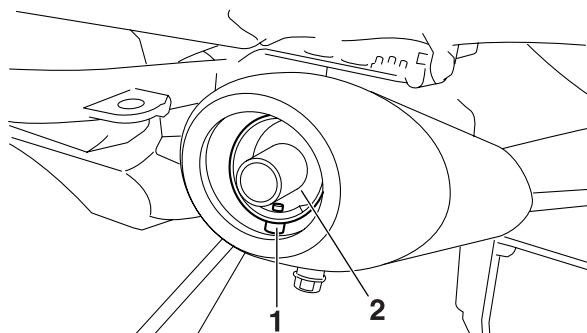
- Spark arrester

EWA14680

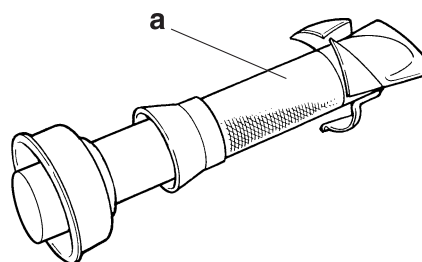
## WARNING

- 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 spark arrester bolt "1".
- b. Remove the tailpipe "2" by pulling it out of the muffler.



- 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 "a" of the tailpipe and the inner contact surfaces of the muffler.

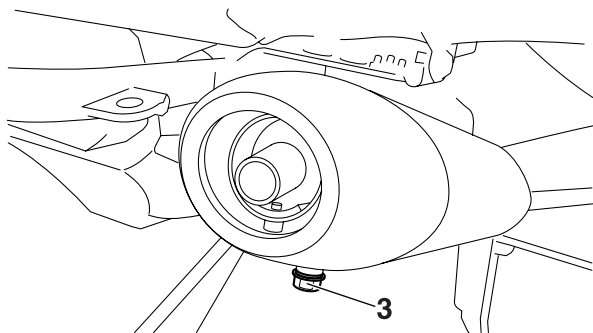


- d. Insert the tailpipe into the muffler and align the bolt holes.
- e. Insert the bolt and tighten it.



**Spark arrester bolt**  
8 Nm (0.8 m·kgf, 5.8 ft·lbf)

- f. Remove the purging bolt “3”.



- g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
- h. Stop the engine and allow the exhaust pipe to cool.
- i. Install the purging bolt and tighten it.



**Purging bolt**  
27 Nm (2.7 m·kgf, 19 ft·lbf)



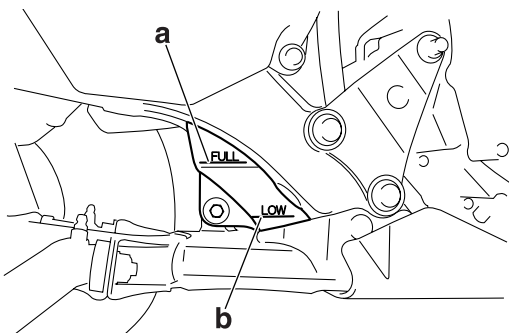
EAS21110

## CHECKING THE COOLANT LEVEL

- Place the vehicle on a level surface.
- Check:
  - Coolant level

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

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



ECA13470

### NOTICE

- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.

- Use only distilled water. However, if distilled water is not available, soft water may be used.

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

- Check:
  - Coolant level

### TIP

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

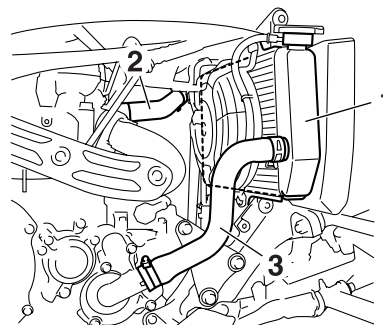
EAS21120

## CHECKING THE COOLING SYSTEM

- Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Front fender
  - Radiator side covers
- Check:
  - Radiator “1”
  - Radiator inlet hose “2”
  - Radiator outlet hose “3”

Cracks/damage → Replace.

Refer to “RADIATOR” on page 6-1.



- Install:
  - Radiator side covers
  - Front fender
  - Side covers
  - Fuel tank cover
  - Seat

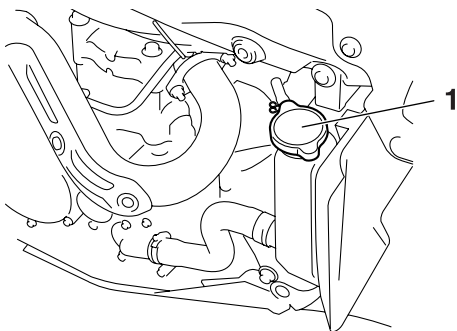
EAS21130

## CHANGING THE COOLANT

- Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Front fender
  - Radiator side covers

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

2. Remove:
  - Radiator cap “1”

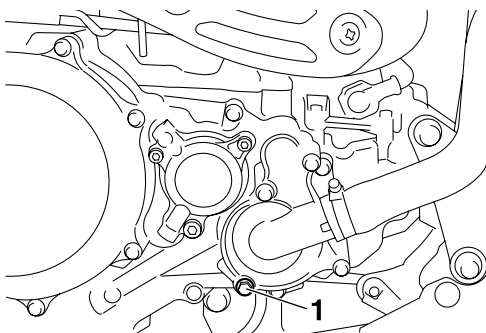


EWA13030

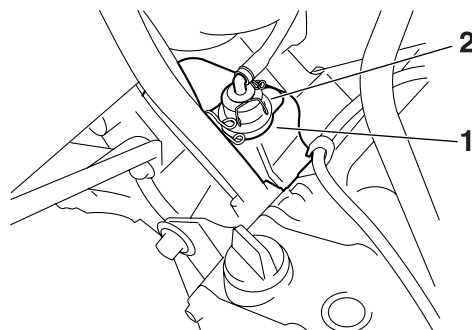
## **WARNING**

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

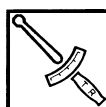
3. Remove:
  - Coolant drain bolt “1”  
(along with the copper washer)



4. Drain:
  - Coolant  
(from the engine and radiator)
5. Remove:
  - Radiator
  - Coolant reservoir “1”
  - Coolant reservoir cap “2”  
Refer to “RADIATOR” on page 6-1.



6. Drain:
  - Coolant  
(from the coolant reservoir)
7. Install:
  - Coolant reservoir
  - Radiator  
Refer to “RADIATOR” on page 6-1.
  - Coolant drain bolt



**Coolant drain bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

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



**Recommended antifreeze**  
**High-quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines**  
**Mixing ratio**  
**1:1 (antifreeze:water)**  
**Radiator capacity (including all routes)**  
**1.25 L (1.32 US qt, 1.10 Imp.qt)**  
**Coolant reservoir capacity (up to the maximum level mark)**  
**0.25 L (0.26 US qt, 0.22 Imp.qt)**

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

EWA13040

## **WARNING**

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

ECA13480

## NOTICE

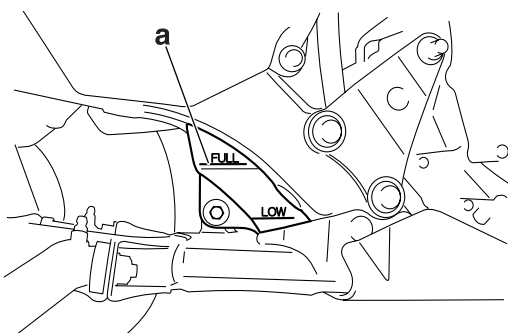
- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant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

9. Install:

- Radiator cap

10. Fill:

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



11. Install:

- Coolant reservoir cap

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

13. Check:

- Coolant level  
Refer to “CHECKING THE COOLANT LEVEL” on page 3-17.

## TIP

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

14. Install:

- Radiator side covers
- Front fender
- Side covers
- Fuel tank cover
- Seat  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS18P1048

## CHECKING THE ENGINE MOUNT

1. Check:

- Engine mount  
Refer to “ENGINE REMOVAL” on page 5-1.



EAS29360

**CHASSIS**

EAS21150

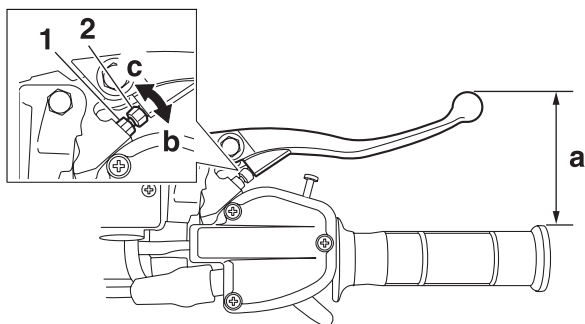
**ADJUSTING THE FRONT DISC BRAKE**

## 1. Adjust:

- Brake lever position  
(distance “a” from the handlebar grip to the brake lever)



- While pushing the brake lever forward, loosen the locknut “1”.
- While pushing the brake lever forward, turn the adjusting bolt “2” in direction “b” or “c” until the brake lever is in the desired position.

**Direction “b”****Brake lever distance is increased.****Direction “c”****Brake lever distance is decreased.**

- Tighten the locknut.

EWA13050



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

ECA13490

**NOTICE**

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

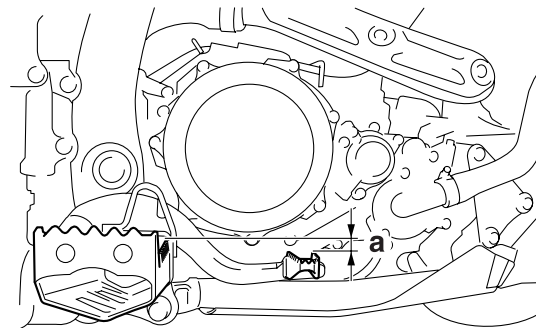


EAS29180

**ADJUSTING THE REAR DISC BRAKE**

## 1. Check:

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

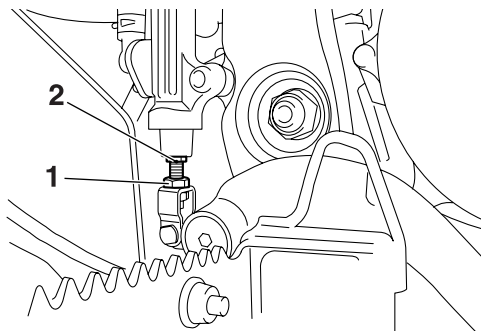
**Brake pedal position (from foot-rest)****11.7 mm (0.46 in)**

## 2. Adjust:

- Brake pedal height



- Loosen the locknut “1”.
- Turn the adjusting bolt “2” until the brake pedal height is within the specified limits.



- Tighten the locknut.

**Locknut (rear brake master cylinder)****17 Nm (1.7 m·kgf, 12 ft·lbf)**

EWA13050



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

ECA18P1017

**NOTICE**

**After adjusting the brake pedal height, make sure there is no brake drag.**



## 3. Adjust:

- Rear brake light operation timing  
Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-24.

EAS21240

### 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 master cylinder reservoir or brake fluid reservoir is horizontal.

2. Remove:

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

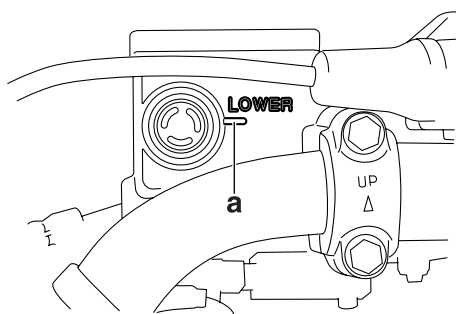
3. Check:

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

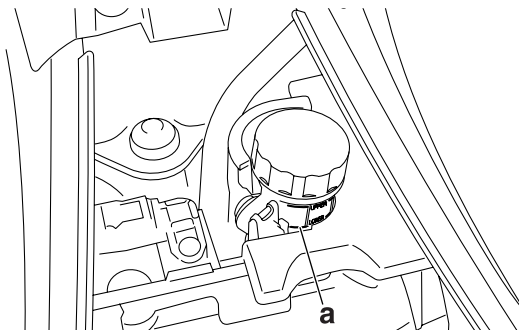


**Recommended brake fluid  
DOT 4**

A



B



A. Front brake

B. Rear brake

EWA13090

#### WARNING

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

ECA13540

#### NOTICE

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

#### TIP

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

4. Install:

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

EAS21250

### CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

1. Remove:

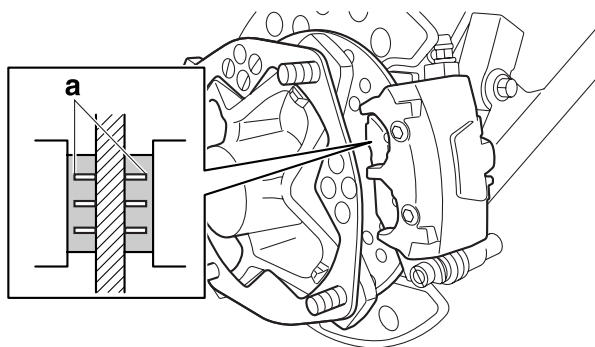
- Front wheels  
Refer to “FRONT WHEEL” on page 4-11.

2. Operate the brake.

3. Check:

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





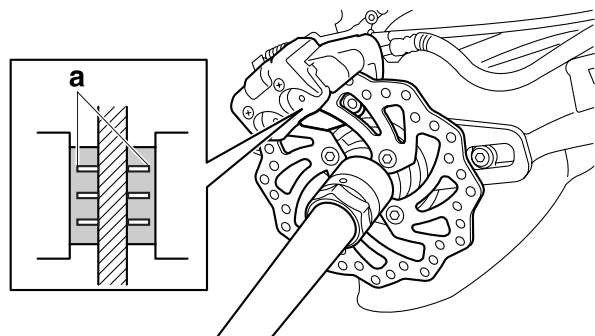
4. Install:
  - Front wheels
 Refer to "FRONT WHEEL" on page 4-11.

EAS21260

## CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
  - Rear brake pad
 Wear indicators "a" almost touch the brake disc → Replace the brake pads as a set.  
 Refer to "REAR BRAKE" on page 4-35.

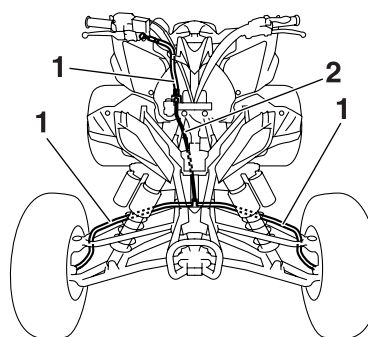


EAS21280

## CHECKING THE FRONT BRAKE HOSES

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

1. Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Front fender
 Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
  - Brake hoses "1"
  - Brake pipe "2"
 Cracks/damage/wear → Replace.



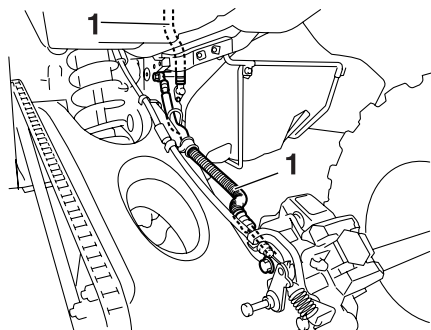
3. Check:
  - Brake hose clamp
 Loose → Tighten the clamp bolt.
4. Hold the vehicle upright and apply the front brake several times.
5. Check:
  - Brake hoses
  - Brake pipe
 Brake fluid leakage → Replace the damaged hose or pipe.  
 Refer to "FRONT BRAKE" on page 4-22.
6. Install:
  - Front fender
  - Side covers
  - Fuel tank cover
  - Seat
 Refer to "GENERAL CHASSIS" on page 4-1.

EAS21290

## CHECKING THE REAR BRAKE HOSES

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

1. Remove:
  - Seat
  - Fuel tank cover
  - Side covers
  - Rear fender
 Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
  - Brake hoses "1"
 Cracks/damage/wear → Replace.



3. Check:
  - Brake hose clamp  
Loose Connection → Tighten the clamp bolt.
4. Hold the vehicle upright and apply the rear brake several times.
5. Check:
  - Brake hoses  
Brake fluid leakage → Replace the damaged hose.  
Refer to "REAR BRAKE" on page 4-35.
6. Install:
  - Rear fender
  - Side covers
  - Fuel tank cover
  - Seat  
Refer to "GENERAL CHASSIS" on page 4-1.

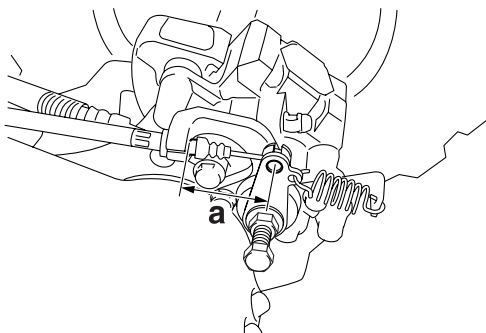
EAS29210

## ADJUSTING THE PARKING BRAKE

1. Check:
  - Parking brake cable end length "a"  
Out of specification → Adjust.



**Parking brake cable end length**  
**47.0–51.0 mm (1.85–2.01 in)**



2. Adjust:
  - Parking brake cable end length



- a. Loosen the adjusting bolt locknut (parking brake) "1" and adjusting bolt "2".
- b. Slide back the rubber cover "3".
- c. Loosen the locknut "4".
- d. Turn the adjusting nut "5" in direction "a" or "b" until the specified brake cable end length is obtained.

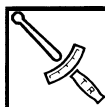
### Direction "a"

**Parking brake cable end length is increased.**

### Direction "b"

**Parking brake cable end length is decreased.**

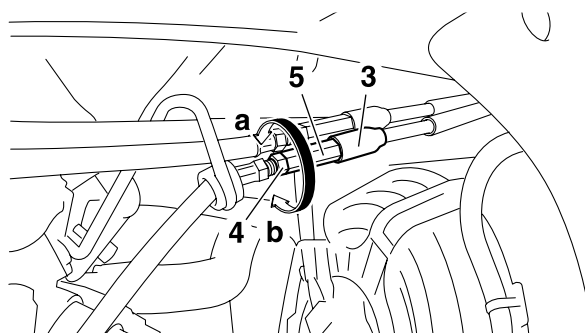
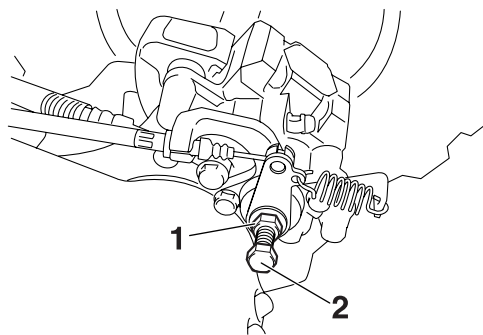
- e. Tighten the locknut.
- f. Slowly turn the adjusting bolt clockwise until resistance is felt.
- g. Turn it 1/8 counterclockwise.
- h. Tighten the adjusting bolt locknut (parking brake).



### Adjusting bolt locknut (parking brake)

**16 Nm (1.6 m·kgf, 11 ft·lbf)**

- i. Slide the rubber cover to its original position.



EWA18P1004



**After this adjustment is performed, lift the 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.**

EAS21330

## ADJUSTING THE REAR BRAKE LIGHT SWITCH

**TIP**

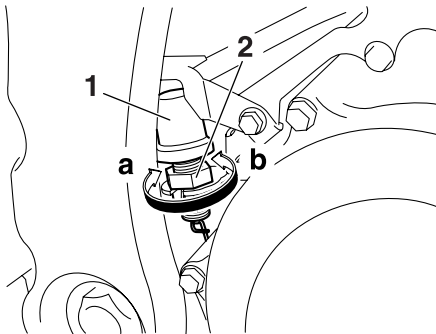
The rear brake light switch is operated by movement of the brake pedal. Set the brake light so that it lights up when pressing the brake pedal down for 5.5–14.5 mm (0.22–0.57 in).

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

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

**Direction “a”**  
Brake light comes on sooner.

**Direction “b”**  
Brake light comes on later.



EAS21350

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

EWA13100



**Bleed the hydraulic brake system whenever:**

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

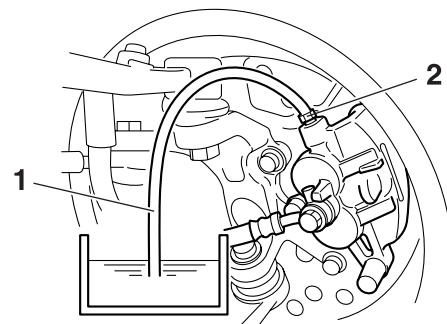
**TIP**

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

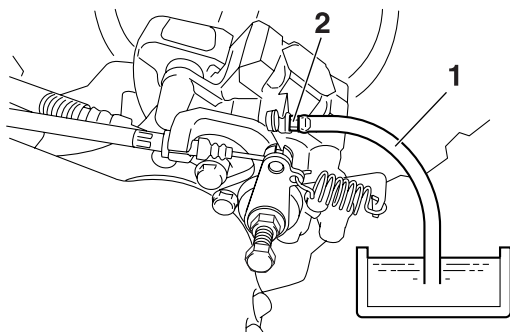
1. Bleed:
  - Hydraulic brake system

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

**A**



B



- A. Front  
B. Rear

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

**TIP**

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

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



**Bleed screw**  
**6 Nm (0.6 m·kgf, 4.3 ft·lbf)**

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

EWA13110

**WARNING**

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



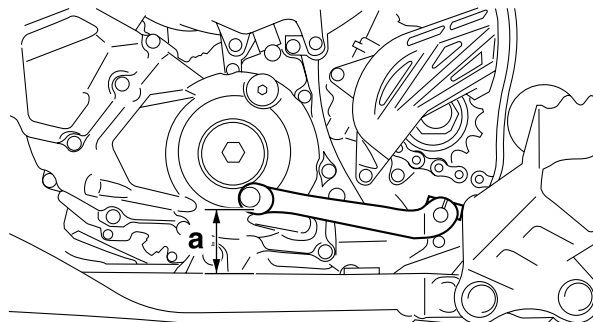
EAS21370

**ADJUSTING THE SHIFT PEDAL****1. Check:**

- Shift pedal height "a"  
Out of specification → Adjust.



**Shift pedal height**  
**48.0 mm (1.89 in)**

**2. Adjust:**

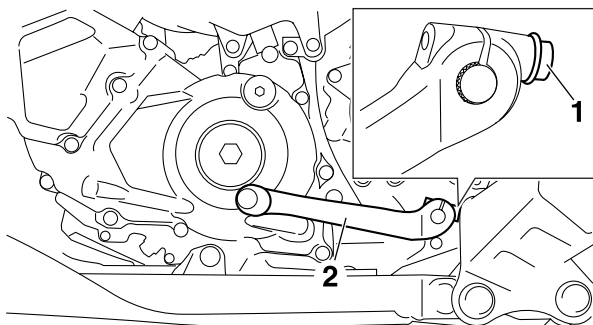
- Shift pedal position



- a. Remove the bolt "1".
- b. Remove the shift pedal "2".
- c. Install the shift pedal at the correct height.
- d. Tighten the bolt to specification.



**Shift pedal bolt**  
**12 Nm (1.2 m·kgf, 8.7 ft·lbf)**



EAS21390

**ADJUSTING THE DRIVE CHAIN SLACK****TIP**

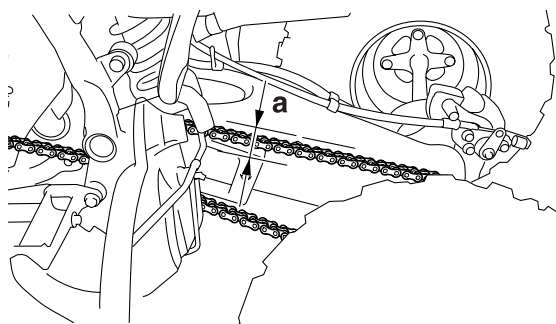
- When checking and adjusting the drive chain slack, there should be no weight on the vehicle and all tires must be touching the ground.
- Measure the drive chain slack halfway between the drive axle and the rear axle.

ECA13550

**NOTICE**

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

1. Place the vehicle on a level surface.
2. Check:
  - Drive chain slack "a"
 Out of specification → Adjust.



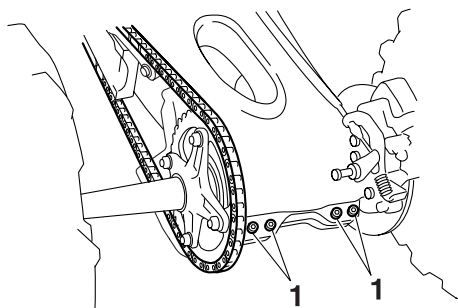
**Drive chain slack**  
25.0–35.0 mm (0.98–1.38 in) at  
20 N (2.0 kgf, 4.5 lbf)

3. Adjust:
  - Drive chain slack

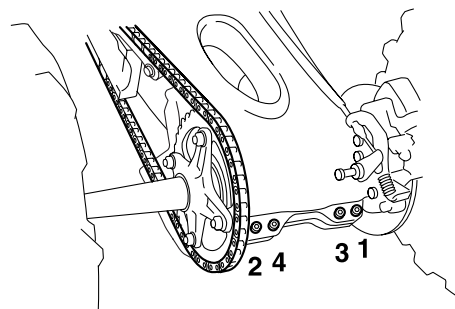
**TIP**

The drive chain slack is adjusted by the rotation of the rear axle hub.

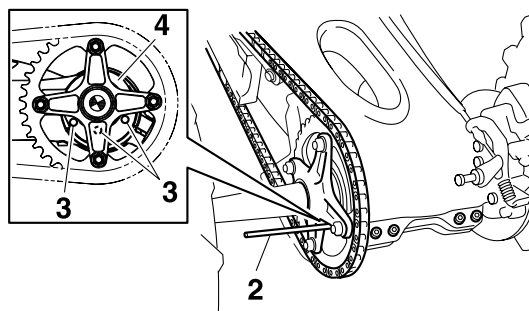
- a. Loosen the rear axle pinch bolts "1".

**TIP**

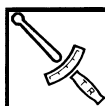
Loosen the rear axle pinch bolts in the proper sequence as shown.



- b. Insert a rod of diameter of 8 mm (0.31 in) and length of 100 mm (4 in) "2" in the hole "3" of rear axle hub "4".



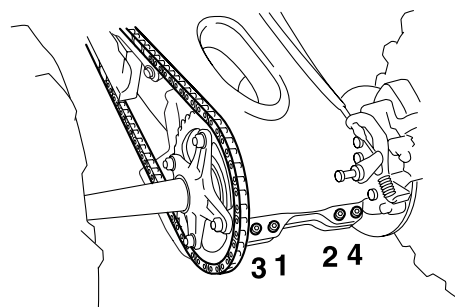
- c. Shift the transmission into the neutral position.
- d. To loosen the drive chain, push the vehicle forward and to tighten the drive chain, pull the vehicle backward.
- e. If the chain slack cannot be adjusted, replace the sprockets and drive chain as a set.
- f. Tighten the rear axle pinch bolts.



**Rear axle pinch bolt**  
21 Nm (2.1 m·kgf, 15 ft·lbf)

**TIP**

- Tighten the rear axle pinch bolts in the proper sequence as shown.
- The chain should be cleaned and lubricated after every use of the vehicle.

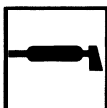


EAS21440

## LUBRICATING THE DRIVE CHAIN

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the vehicle is used in dusty areas.

This vehicle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.



**Recommended lubricant**  
Engine oil or chain lubricant  
suitable for O-ring chains

EAS18P1046

## CHECKING THE DRIVE CHAIN GUIDE

### 1. Check:

- Drive chain guide

Refer to "CHAIN DRIVE" on page 4-75.

EAS18P1042

## CHECKING THE SWINGARM PIVOT SHAFT

### 1. Check:

- Swingarm pivot shaft

Refer to "SWINGARM" on page 4-71.

EAS29280

## CHECKING THE STEERING SYSTEM

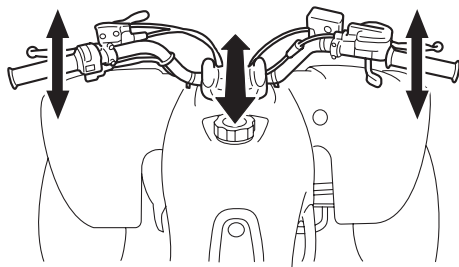
### 1. Place the vehicle on a level surface.

### 2. Check:

- Steering assembly bushings

Move the handlebar up and down, and back and forth.

Excessive play → Replace the steering stem bushings.



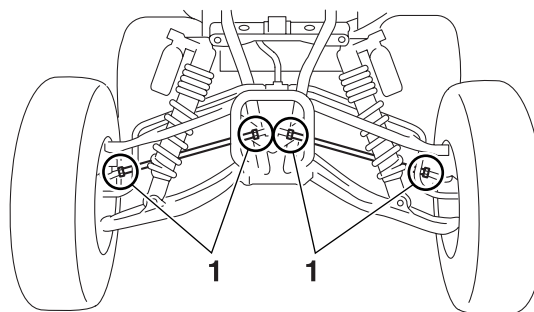
### 3. Check:

- Tie-rod ends "1"

Free play → Replace the tie-rod end.



- Turn the handlebar left until it stops.
- Move the handlebar slightly to the right and left.
- Check for play in the tie-rod ends.
- Turn the handlebar right until it stops.
- Move the handlebar slightly to the left and right.
- Check for play in the tie-rod ends.

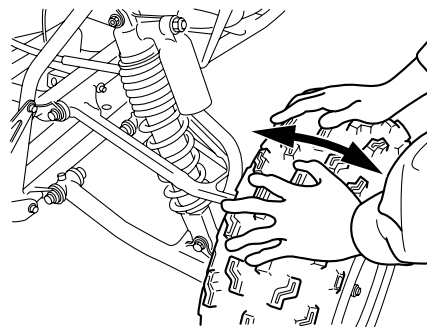


- Raise the front end of the vehicle so that there is no weight on the front wheels.

### 5. Check:

- Ball joints and wheel bearings

Move the wheels laterally back and forth. Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.



EAS18P1041

## CHECKING THE WHEEL HUB BEARINGS

The following procedure applies to all of the wheel hub bearings.

### 1. Check:

- Wheel hub bearing

Refer to "FRONT WHEEL" on page 4-11 and "REAR AXLE AND REAR AXLE HUB" on page 4-16.



EAS29290

**ADJUSTING THE TOE-IN**

1. Place the vehicle on a level surface.
2. Measure:
  - Toe-in
 Out of specification → Adjust.



**Toe-in (with tire touching the ground)**  
**2.0–12.0 mm (0.08–0.47 in)**

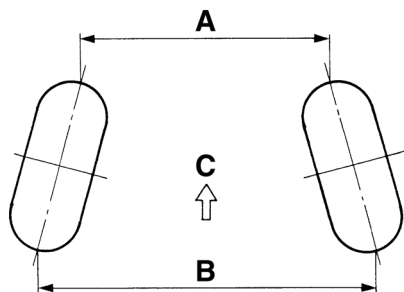
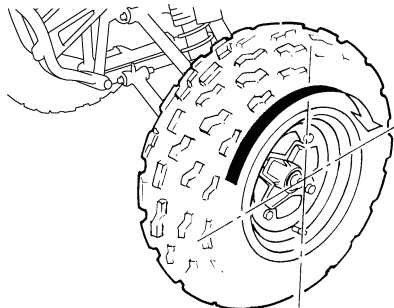
**TIP**

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.

$$\text{Toe-in} = \text{“B”} - \text{“A”}$$

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



C. Forward

3. Adjust:

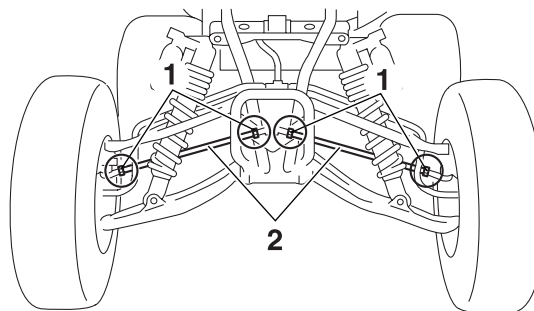
- Toe-in

EWA14910

**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 locknuts (tie-rod end) “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 rods the same.



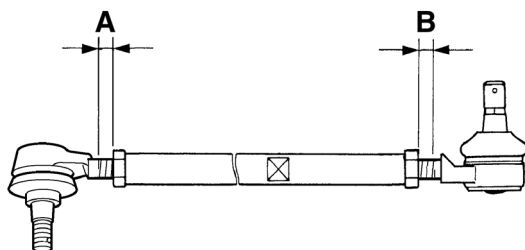
- d. Tighten the rod end locknuts of both tie-rods.



**Locknut (tie-rod)**  
**18 Nm (1.8 m·kgf, 13 ft·lbf)**

**TIP**

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



EAS29300

### 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 surface.
2. Check:
  - Damper rod
  - Oil leakage
  - Gas leakage
  - Spring

Refer to "CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-63.
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 4-60.

EAS29310

### ADJUSTING THE FRONT SHOCK ABSORBER ASSEMBLIES

EWA14920

**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.**

#### Spring preload

ECA18P1001

#### NOTICE

**Never attempt to turn the adjusting ring beyond the maximum or minimum setting.**

1. Adjust:
  - Spring preload



- a. Elevate the front wheels by placing a suitable stand under the frame.
- b. Loosen the locknut "1".
- c. Turn the adjusting ring "2" in direction "a" or "b".

#### Direction "a"

Spring preload is increased (suspension is harder).

#### Direction "b"

Spring preload is decreased (suspension is softer).



#### Spring preload adjusting length "c"

##### Minimum

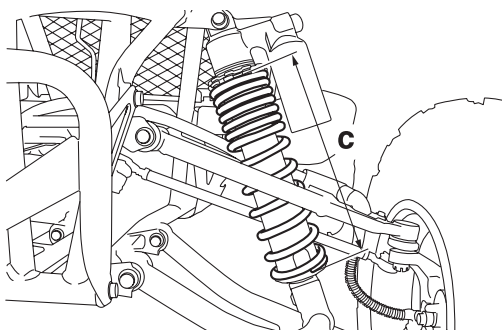
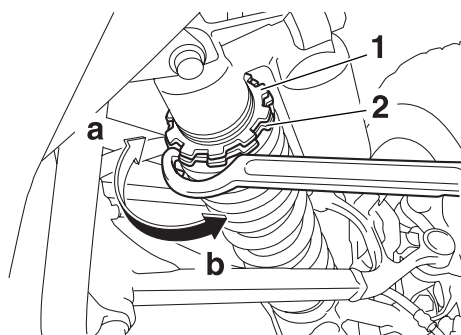
279.8 mm (11.02 in)

##### Standard

289.8 mm (11.41 in)

##### Maximum

299.8 mm (11.80 in)



#### TIP

Be sure to remove all dirt and mud from around the locknut and adjusting ring before adjustment.

- d. Tighten the locknut "1" with a steering nut wrench "3".



## TIP

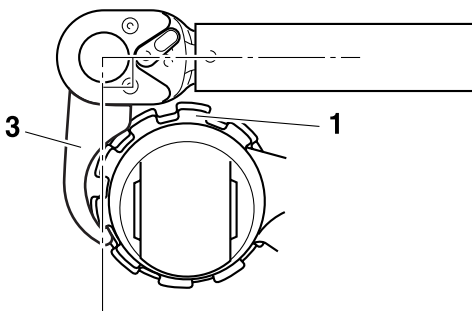
Set the torque wrench at a right angle to the steering nut wrench.



**Steering nut wrench**  
90890-01443  
**Spanner wrench**  
YU-33975



**Front shock absorber locknut**  
50 Nm (5.0 m·kgf, 36 ft·lbf)



## TIP

Always tighten the locknut against the adjusting ring, then torque it to specification.

## Rebound damping

ECA18P1002

### NOTICE

Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.

1. Adjust:
  - Rebound damping

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

<b>Direction "a" (turn in)</b>			
Rebound damping	is	increased	
(suspension is harder).			
<b>Direction "b" (turn out)</b>			
Rebound damping	is	decreased	
(suspension is softer).			



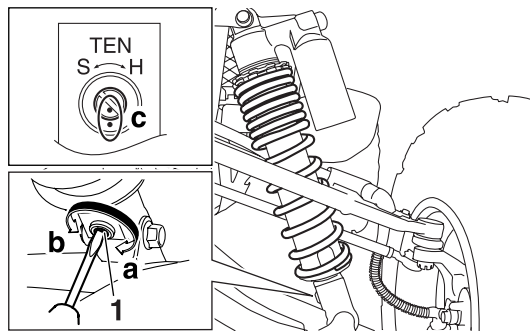
## Rebound damping adjusting positions

**Minimum**  
20 click(s) out\*  
**Standard**  
12 click(s) out\*  
**Maximum**  
1 click out\*

\* With the adjusting screw fully turned-in

## TIP

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.



## Compression damping (slow compression damping)

ECA18P1002

### NOTICE

Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.

1. Adjust:
  - Compression damping (slow compression damping)

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

<b>Direction "a" (turn in)</b>			
Compression damping	is	increased	
(suspension is harder).			
<b>Direction "b" (turn out)</b>			
Compression damping	is	decreased	
(suspension is softer).			



### Compression damping (slow compression damping) adjusting positions

Minimum  
18 click(s) out\*

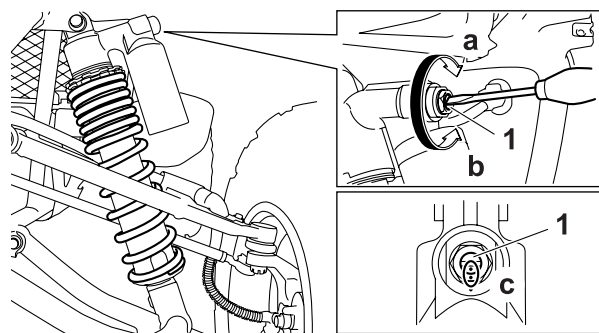
Standard  
10 click(s) out\*

Maximum  
1 click out\*

\* With the adjusting screw fully turned-in

#### TIP

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.



### Compression damping (fast compression damping)

ECA18P1002

#### NOTICE

**Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.**

1. Adjust:
  - Compression damping (fast compression damping)

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

**Direction "a" (turn in)**  
Compression damping is increased (suspension is harder).

**Direction "b" (turn out)**  
Compression damping is decreased (suspension is softer).



### Compression damping (fast compression damping) adjusting positions

Minimum  
2 turn(s) out\*

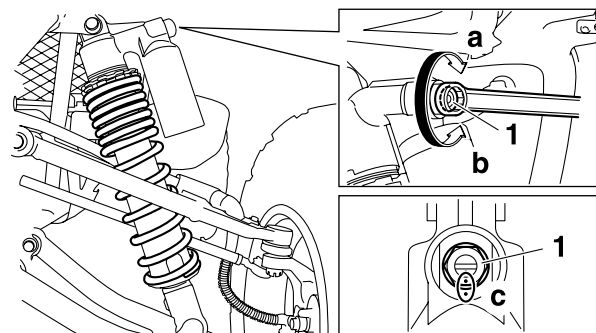
Standard  
1 turn out\*

Maximum  
Adjusting bolt fully turned-in

\* With the adjusting bolt fully turned-in

#### TIP

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.



EAS29320

### CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Place the vehicle on a level surface.
2. Check:

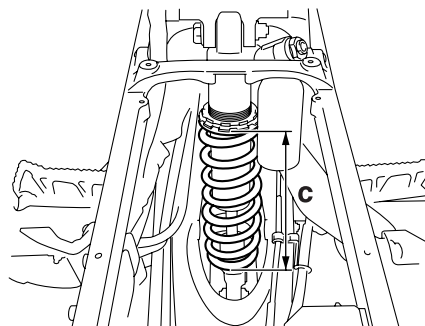
- Damper rod
- Oil leakage
- Gas leakage
- Spring

Refer to "CHECKING THE REAR SHOCK ABSORBER ASSEMBLY" on page 3-31.

3. Check:

- Operation  
Pump the rear shock absorber assembly up and down several times.  
Unsmooth operation → Replace rear shock absorber assembly.  
Refer to "REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM" on page 4-66.

## ECA18P1001



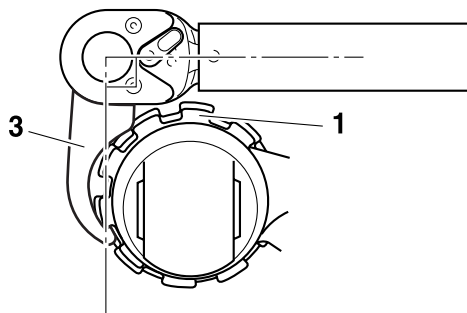
Set the torque wrench at a right angle to the steering nut wrench.



**YU-33975**



**44 Nm (4.4 m·kgf, 33 ft·lbf)**



Always tighten the locknut against the adjusting ring, then torque it to specification.



- Seat  
Refer to "GENERAL CHASSIS" on page 4-1.

**Rebound damping**

ECA18P1002

**NOTICE**

**Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.**

- Adjust:
  - Rebound damping



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

<b>Direction "a" (turn in)</b>			
Rebound damping	is	increased	
(suspension is harder).			
<b>Direction "b" (turn out)</b>			
Rebound damping	is	decreased	
(suspension is softer).			

**Rebound damping adjusting positions**

Minimum  
20 click(s) out\*

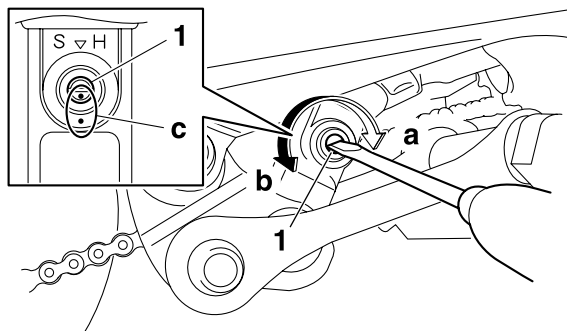
Standard  
11 click(s) out\*

Maximum  
1 click out\*

**\* With the adjusting screw fully turned-in**

**TIP**

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.

**Compression damping (slow compression damping)**

ECA18P1002

**NOTICE**

**Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.**

- Remove:
  - Seat
  - Fuel tank cover
  - Right side cover  
Refer to "GENERAL CHASSIS" on page 4-1.
- Adjust:
  - Compression damping (slow compression damping)



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

<b>Direction "a" (turn in)</b>	
Compression damping	is increased
(suspension is harder).	
<b>Direction "b" (turn out)</b>	
Compression damping	is decreased
(suspension is softer).	

**Compression damping (slow compression damping) adjusting positions**

Minimum  
18 click(s) out\*

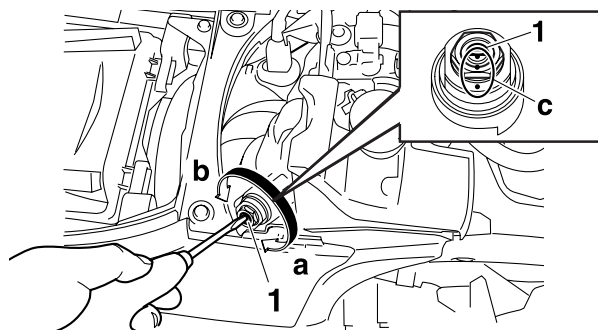
Standard  
8 click(s) out\*

Maximum  
1 click out\*

**\* With the adjusting screw fully turned-in**

**TIP**

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.



**Compression damping (fast compression damping) adjusting positions**

**Minimum**

**2 turn(s) out\***

**Standard**

**1 turn out\***

**Maximum**

**Adjusting bolt fully turned-in**

**\* With the adjusting bolt fully turned-in**

## TIP

Make sure that the position indicator marks "c" are aligned when the shock absorber is set to the standard setting.

## 3. Install:

- Right side cover
- Fuel tank cover
- Seat

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

## Compression damping (fast compression damping)

ECA18P1002

### NOTICE

**Do not force the adjusting mechanism past the minimum or maximum extent of adjustment. The adjusting mechanism may be damaged.**

## 1. Remove:

- Seat
- Fuel tank cover
- Right side cover

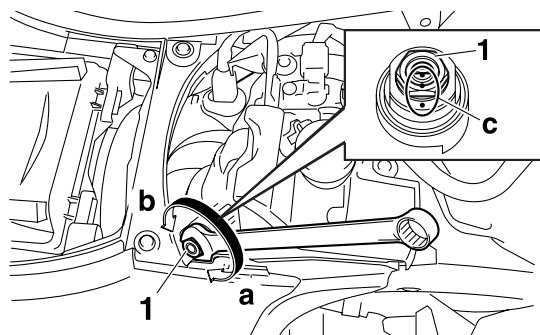
Refer to "GENERAL CHASSIS" on page 4-1.

## 2. Adjust:

- Compression damping (fast compression damping)

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

<b>Direction "a" (turn in)</b>		
<b>Compression</b>	<b>damping</b>	<b>is</b>
<b>increased(suspension is harder).</b>		
<b>Direction "b" (turn out)</b>		
<b>Compression</b>	<b>damping</b>	<b>is</b>
<b>decreased(suspension is softer).</b>		



## 3. Install:

- Right side cover
- Fuel tank cover
- Seat

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

EAS18P1047

## CHECKING THE RELAY ARM AND CONNECTING ARM

### 1. Check:

- Relay arm
- Connecting arm

Refer to "CHECKING THE RELAY ARM AND CONNECTING ARM" on page 4-68.

EAS29340

**CHECKING THE TIRES**

EWA14940

**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**

EWA14950

**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****Size****AT21 × 7R10****Manufacturer/model****DUNLOP/KT351 Radial****Rear tire****Size****AT20 × 10R9****Manufacturer/model****DUNLOP/KT356 Radial****Tire pressure**

EWA18P1005

**WARNING**

- Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions. The following are minimums:
- Front  
24.5 kPa (0.245 kgf/cm<sup>2</sup>, 3.6 psi)
- Rear  
27.0 kPa (0.270 kgf/cm<sup>2</sup>, 3.9 psi)
- 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.

**Maximum loading limit**

EWA14970

**WARNING**

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

**Maximum loading limit****100.0 kg (220 lb)**

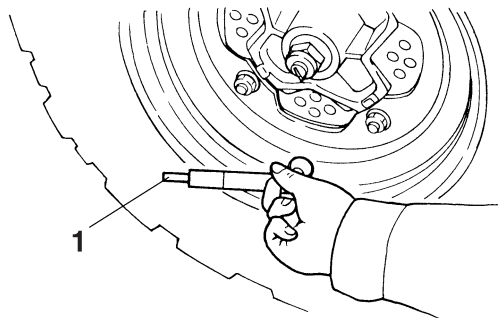
\* Total weight of the cargo, rider, and accessories.

**1. Measure:**

- Tire pressure  
Out of specification → Adjust.

**TIP**

- The low-pressure tire gauge "1" is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.

**Tire air pressure (measured on cold tires)****Recommended****Front**27.5 kPa (0.275 kgf/cm<sup>2</sup>, 4.0 psi)**Rear**30.0 kPa (0.300 kgf/cm<sup>2</sup>, 4.4 psi)**Minimum****Front**24.5 kPa (0.245 kgf/cm<sup>2</sup>, 3.6 psi)**Rear**27.0 kPa (0.270 kgf/cm<sup>2</sup>, 3.9 psi)

EWA14980

## **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.



#### **Tire wear limit**

##### **Front**

3.0 mm (0.12 in)

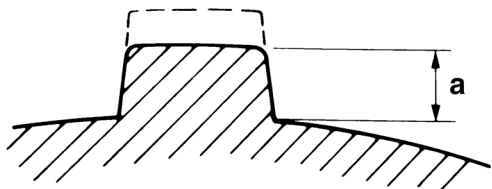
##### **Rear**

3.0 mm (0.12 in)

EWA13190

## **WARNING**

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



a. Tire wear limit

EAS29350

## **CHECKING THE WHEELS**

The following procedure applies to all of the wheels.

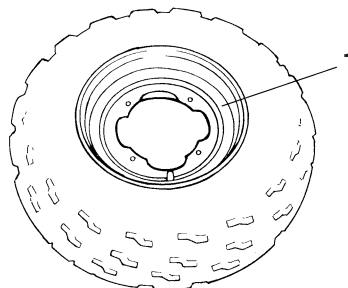
### 1. Check:

- Wheel "1"  
Damage/bends → Replace.

EWA14990

## **WARNING**

- Never attempt even small repairs to the wheel.
- Ride conservatively after installing a tire to allow it to seat itself properly on the rim.



EAS18P1049

## **CHECKING THE CHASSIS FASTENERS**

Make sure that all nuts, bolts, and screws are properly tightened.

Refer to "CHASSIS TIGHTENING TORQUES" on page 2-18.

EAS21690

## **CHECKING AND LUBRICATING THE CABLES**

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

EWA13270

## **WARNING**

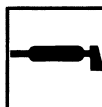
Damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.

### 1. Check:

- Outer cable  
Damage → Replace.

### 2. Check:

- Cable operation  
Rough movement → Lubricate or replace.



#### **Recommended lubricant**

Engine oil or a suitable cable lubricant

### **TIP**

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

EAS21700

**LUBRICATING THE LEVERS**

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

**Recommended lubricant****Brake lever****Silicone grease****Clutch lever****Lithium-soap-based grease**

EAS21710

**LUBRICATING THE PEDAL**

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

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

EAS18P1043

**LUBRICATING THE FRONT ARM PIVOTS**

Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-60.

EAS18P1044

**LUBRICATING THE STEERING SHAFT**

Refer to “STEERING STEM” on page 4-54.



EAS21750

## ELECTRICAL SYSTEM

EAS21760

### CHECKING AND CHARGING THE BATTERY

Refer to "ELECTRICAL COMPONENTS" on page 8-59.

EAS21770

### CHECKING THE FUSE

Refer to "ELECTRICAL COMPONENTS" on page 8-59.

EAS18P1045

### CHECKING THE SWITCHES

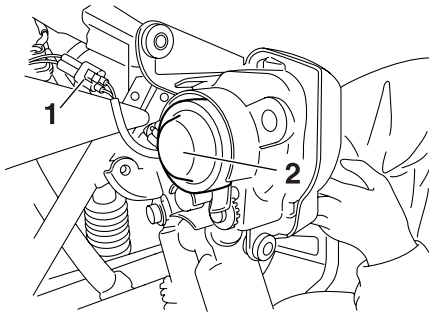
Refer to "ELECTRICAL COMPONENTS" on page 8-59.

EAS21790

### REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

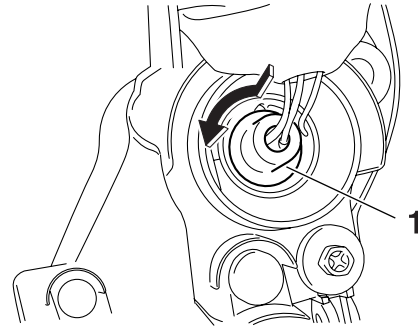
1. Remove:
  - Headlight  
Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
  - Headlight lead coupler "1"
3. Remove:
  - Headlight bulb holder cover "2"



4. Remove:
  - Headlight bulb holder "1"
  - Headlight bulb

#### TIP

Push the headlight bulb holder inward, turn it counterclockwise and remove the defective bulb.



EWA13320

#### WARNING

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

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

ECA13690

#### NOTICE

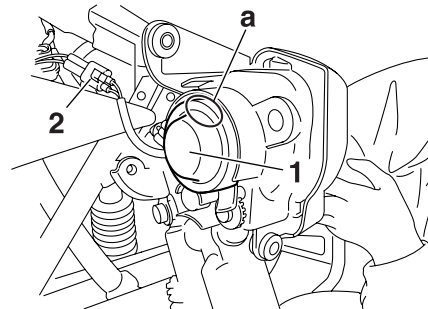
Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Install:
  - Headlight bulb holder
  - Headlight bulb holder cover "1"

#### TIP

After installing the headlight bulb holder cover, make sure that the "TOP" mark "a" is in the position shown.

7. Connect:
  - Headlight lead coupler "2"





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## CHASSIS

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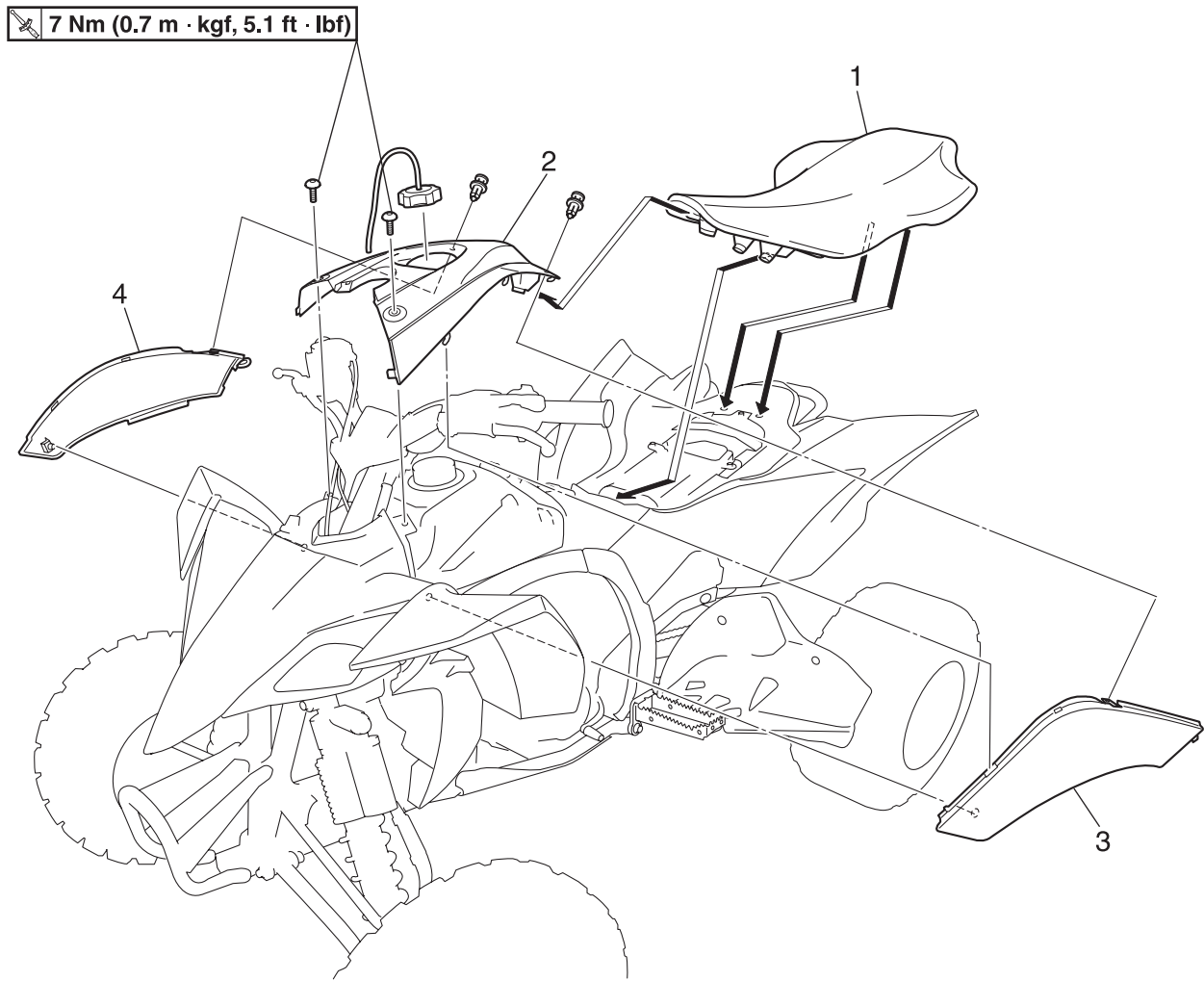
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EAS21830

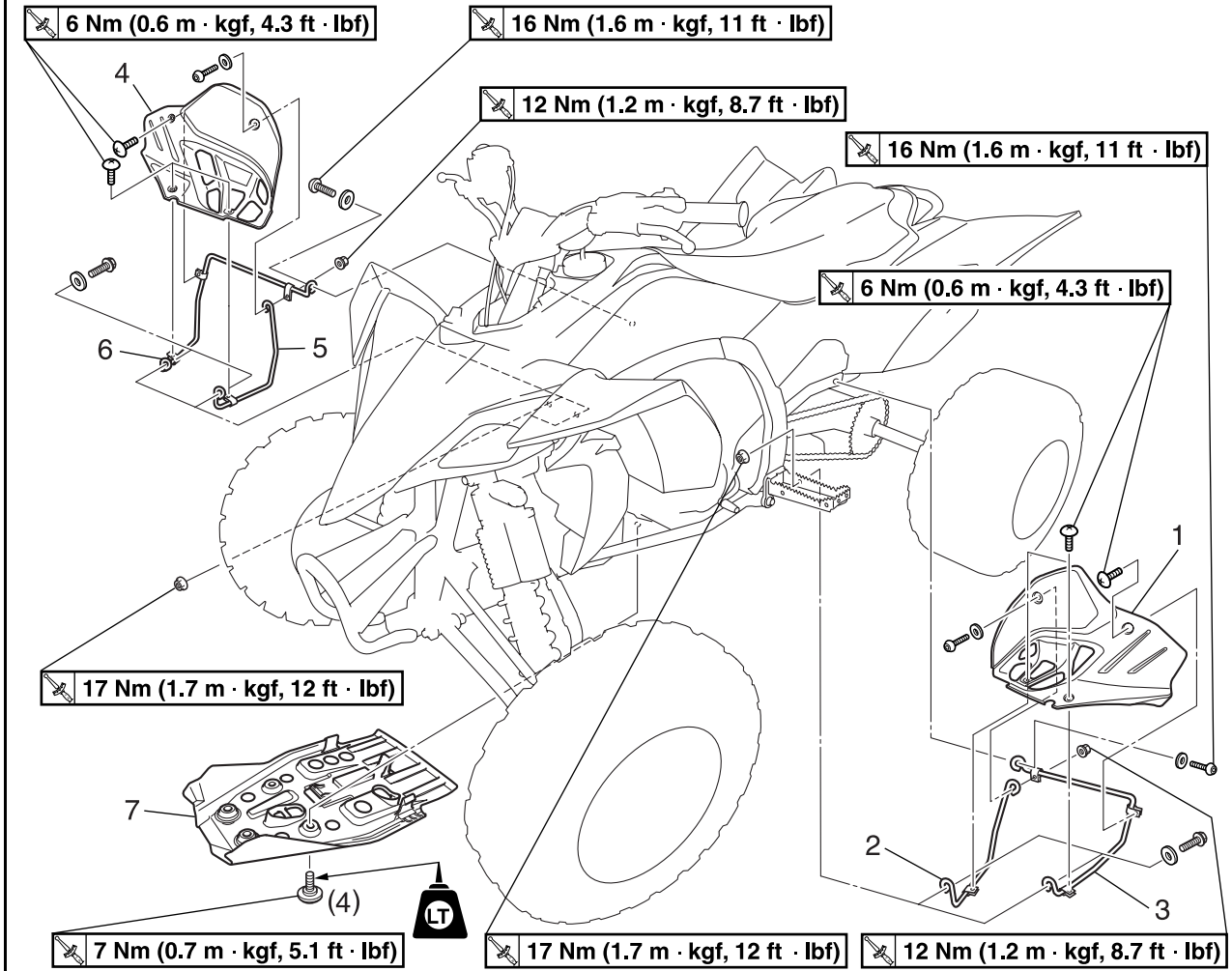
GENERAL CHASSIS

Removing the seat, fuel tank cover and side covers



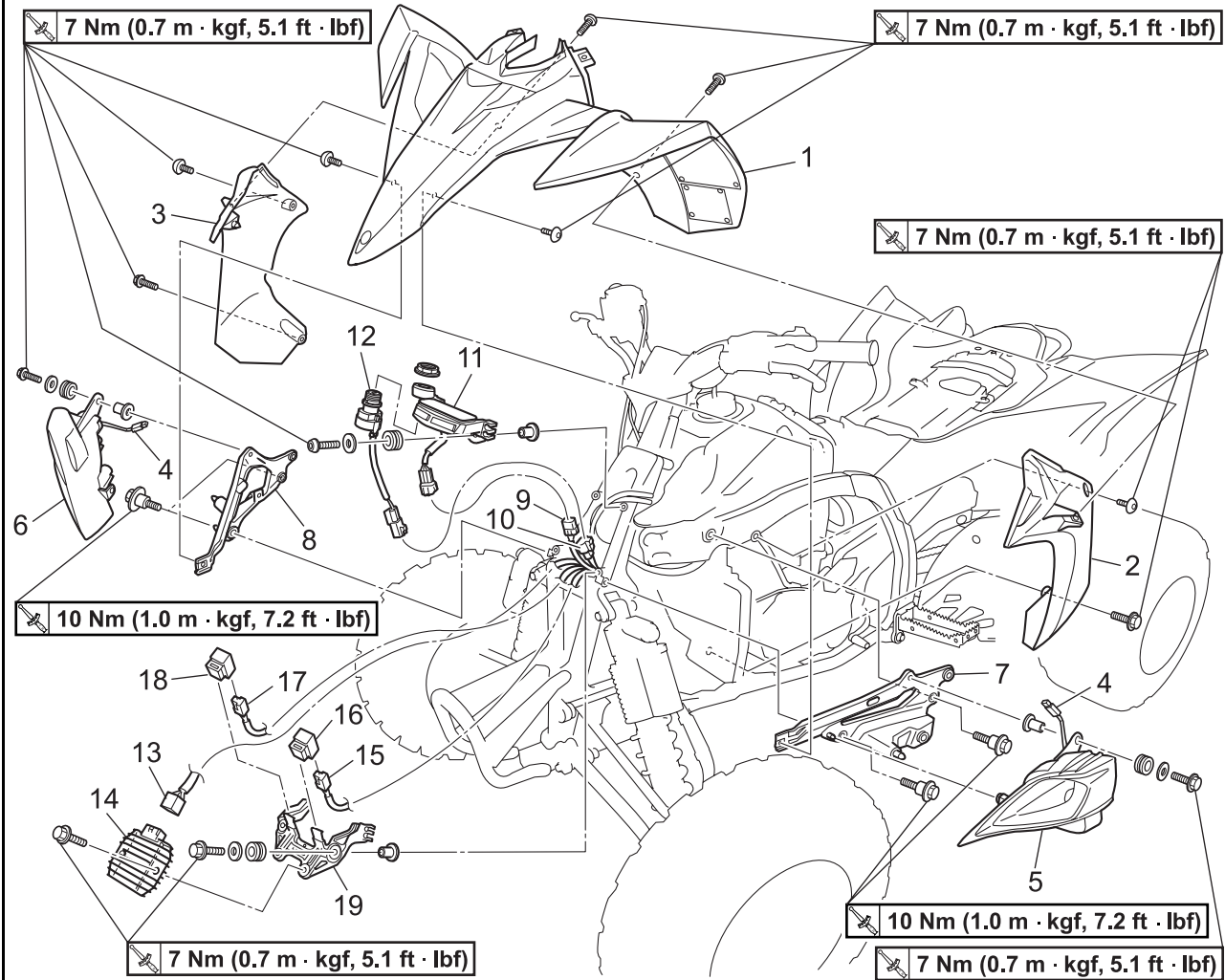
Order	Job/Parts to remove	Q'ty	Remarks
1	Seat	1	<b>TIP</b> Pull the seat lock lever upward and pull up the seat at the rear.
2	Fuel tank cover	1	
3	Left side cover	1	
4	Right side cover	1	
			For installation, reverse the removal procedure.

## Removing the foot protectors and engine skid plate



Order	Job/Parts to remove	Q'ty	Remarks
1	Left foot protector	1	
2	Left foot protector stay 1	1	
3	Left foot protector stay 2	1	
4	Right foot protector	1	
5	Right foot protector stay 1	1	
6	Right foot protector stay 2	1	
7	Engine skid plate	1	
			For installation, reverse the removal procedure.

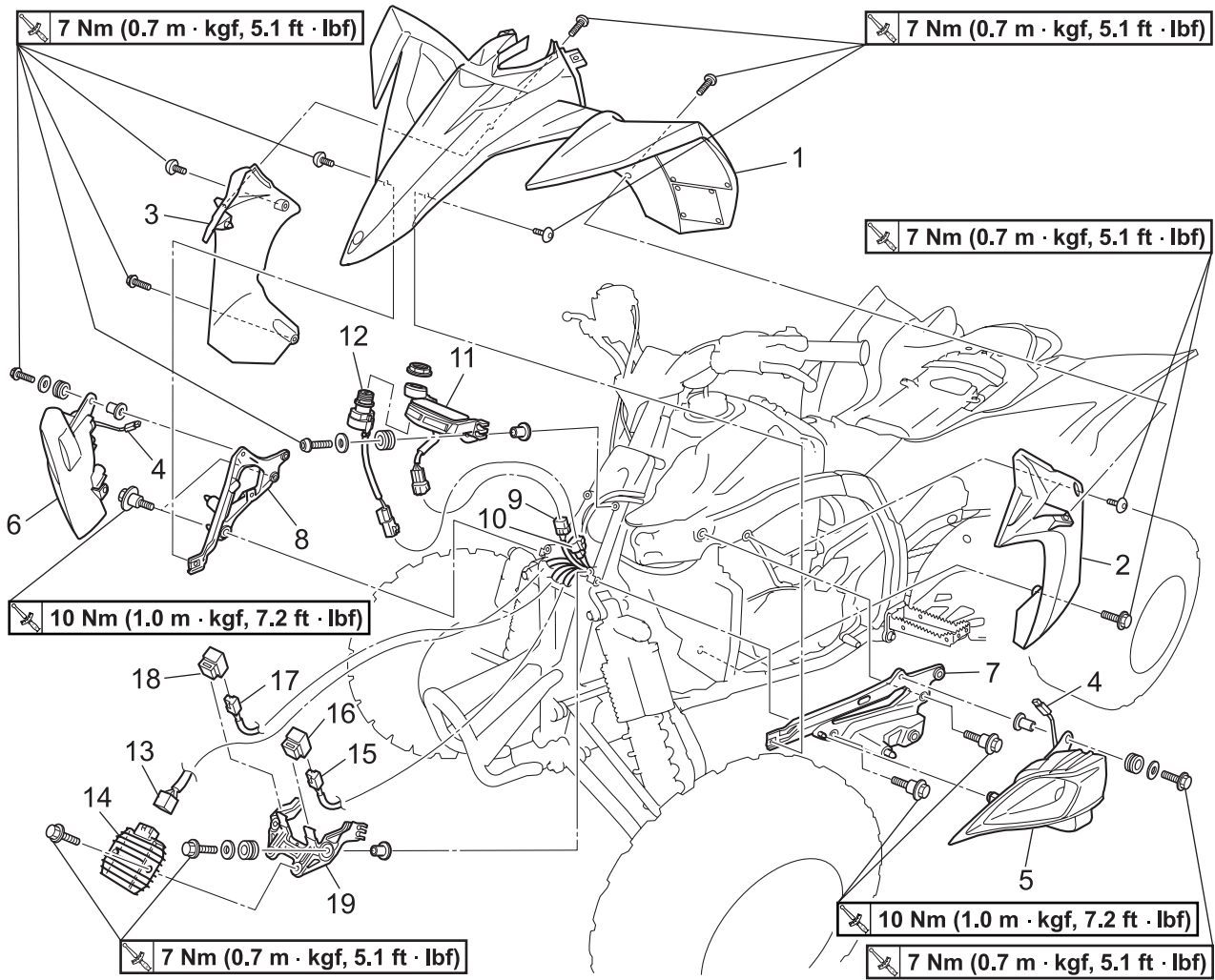
## Removing the front fender and headlights



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Front fender	1	
2	Left radiator side cover	1	
3	Right radiator side cover	1	
4	Headlight coupler	2	Disconnect.
5	Left headlight	1	
6	Right headlight	1	
7	Left headlight bracket	1	
8	Right headlight bracket	1	
9	Indicator light coupler	1	Disconnect.
10	Main switch coupler	1	Disconnect.
11	Indicator light assembly	1	
12	Main switch	1	
13	Rectifier/regulator coupler	1	Disconnect.
14	Rectifier/regulator	1	
15	Radiator fan motor relay coupler	1	Disconnect.
16	Radiator fan motor relay	1	

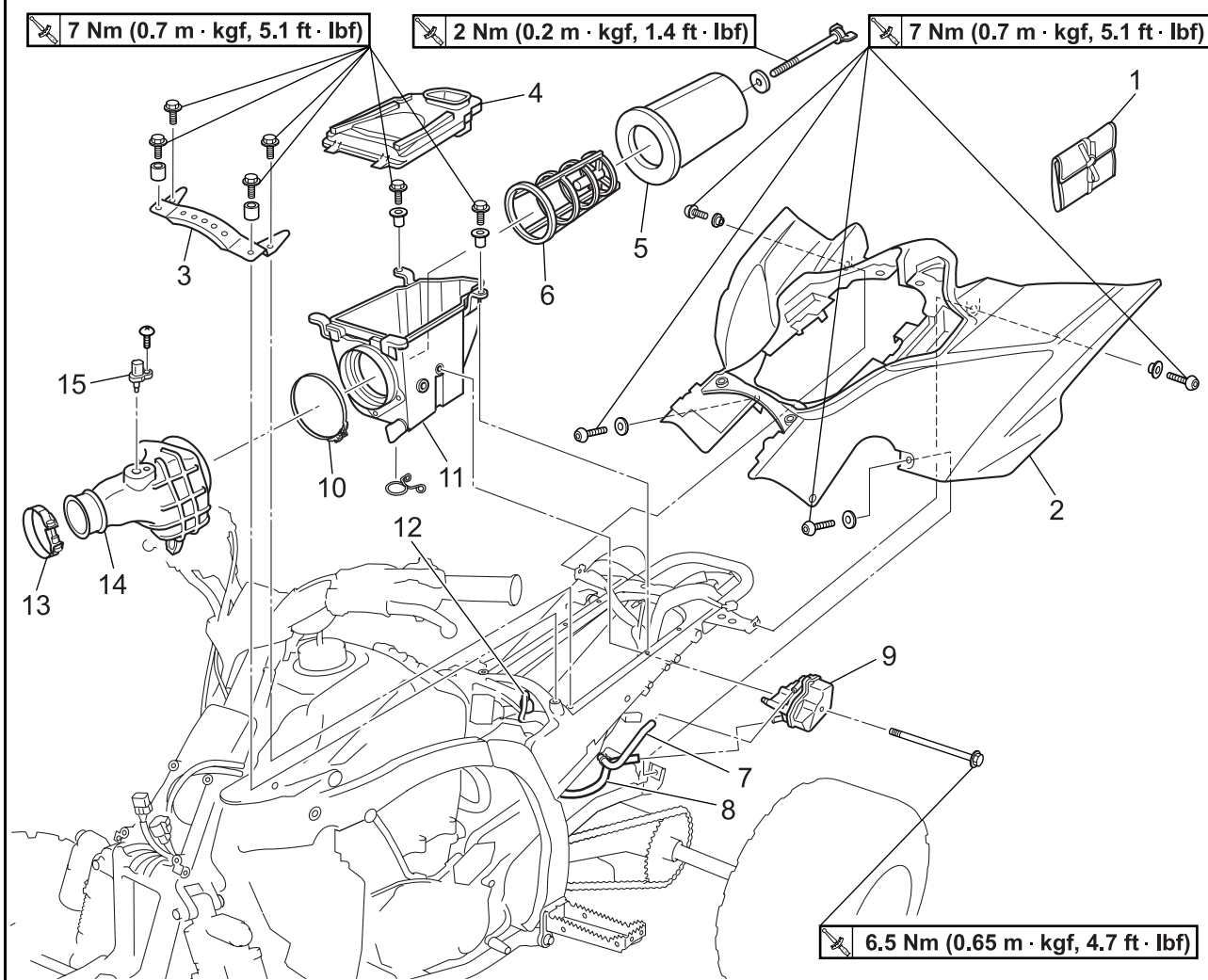


Removing the front fender and headlights



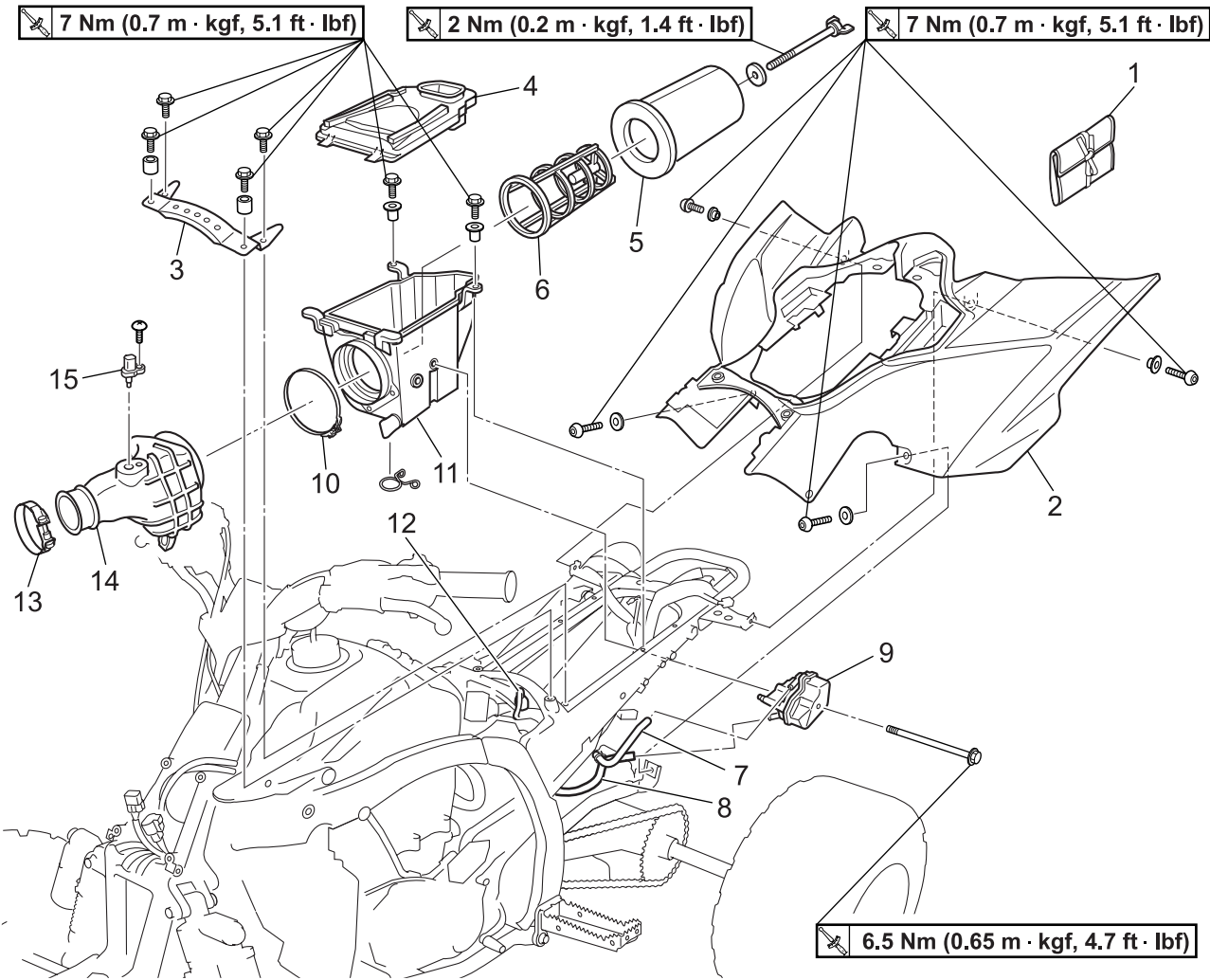
Order	Job/Parts to remove	Q'ty	Remarks
17	Headlight relay coupler	1	Disconnect.
18	Headlight relay	1	
19	Rectifier/regulator bracket	1	
			For installation, reverse the removal procedure.

## Removing the rear fender and air filter case



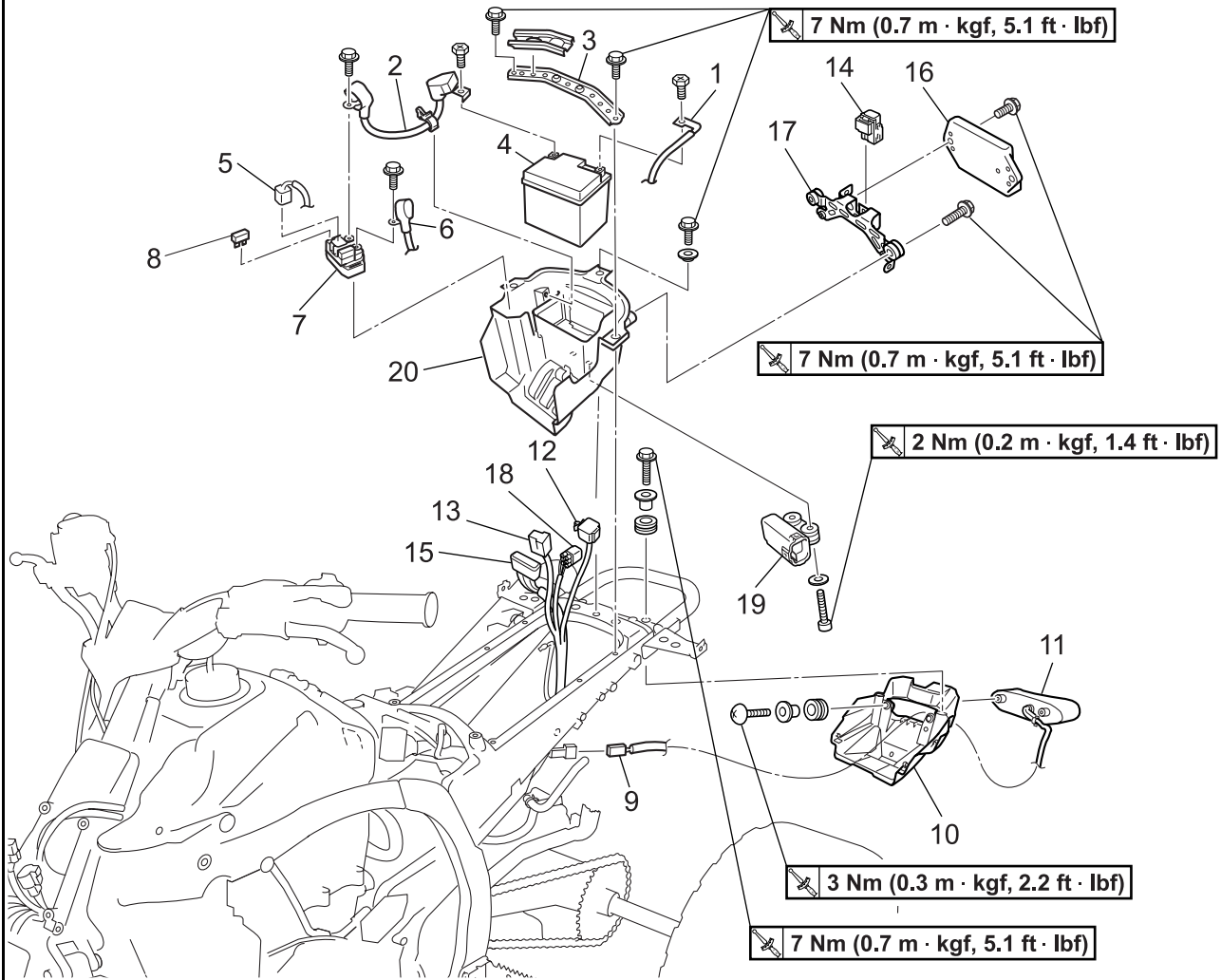
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Owner's tool kit	1	
2	Rear fender	1	
3	Air filter case bracket	1	
4	Air filter case cover	1	
5	Air filter element	1	
6	Air filter element frame	1	
7	Cylinder head breather hose	1	Disconnect.
8	Crankcase breather hose	1	Disconnect.
9	Breather tank assembly	1	
10	Clamp	1	Loosen.
11	Air filter case	1	
12	Intake air temperature sensor coupler	1	Disconnect.
13	Clamp	1	Loosen.
14	Air filter case joint	1	
15	Intake air temperature sensor	1	

Removing the rear fender and air filter case



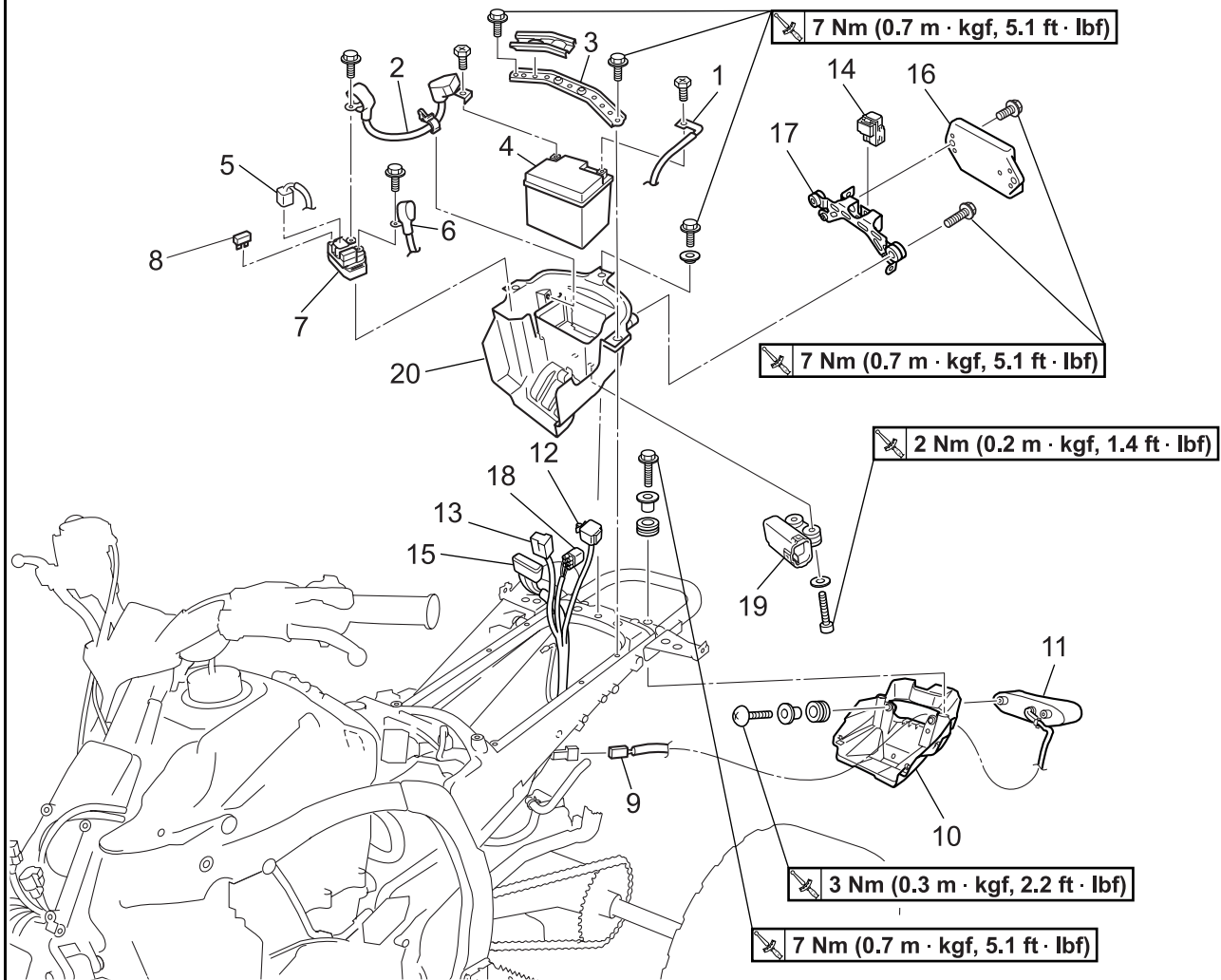
Order	Job/Parts to remove	Q'ty	Remarks
			For installation, reverse the removal procedure.

## Removing the battery and Tail/brake light



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
1	Negative battery lead	1	Disconnect.
2	Positive battery lead	1	Disconnect.
3	Battery bracket	1	
4	Battery	1	
5	Starter relay coupler	1	Disconnect.
6	Starter motor lead	1	Disconnect.
7	Starter relay	1	
8	Fuse	1	
9	Tail/brake light coupler	1	Disconnect.
10	Tail/brake light cover	1	
11	Tail/brake light	1	
12	Joint coupler	1	Disconnect.
13	Main relay coupler	1	Disconnect.
14	Main relay	1	

## Removing the battery and Tail/brake light



Order	Job/Parts to remove	Q'ty	Remarks
15	ECU coupler	1	Disconnect.
16	ECU (engine control unit)	1	
17	ECU bracket	1	
18	Lean angle sensor coupler	1	Disconnect.
19	Lean angle sensor	1	
20	Battery case	1	
			For installation, reverse the removal procedure.

EAS18P1030

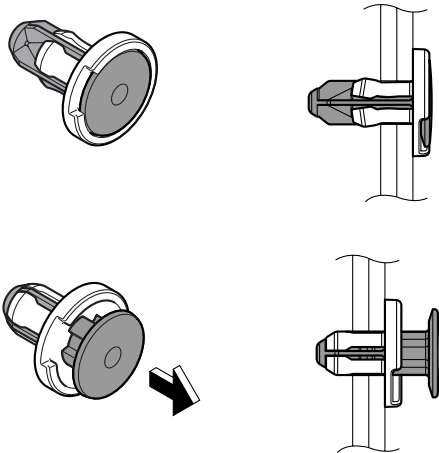
## REMOVING THE COVER

1. Remove:
  - Fuel tank cover

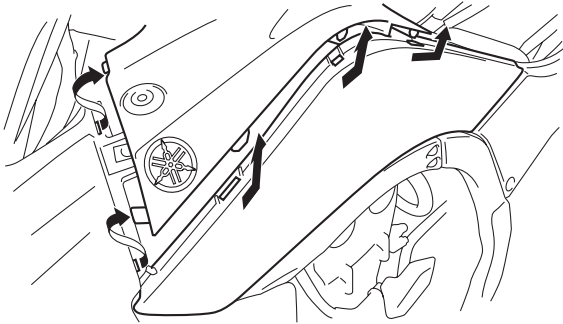
- a. Remove the bolts on the fuel tank cover.
- b. Remove the quick fastener on the fuel tank cover.

### TIP

To remove the quick fastener, pull the pin toward by using a flathead screwdriver, then pull the fastener out.

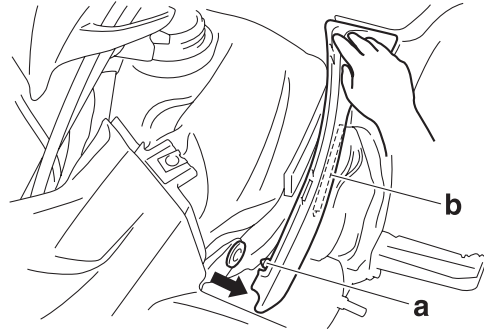


- c. Slide the fuel tank cover to the back and lift it up.

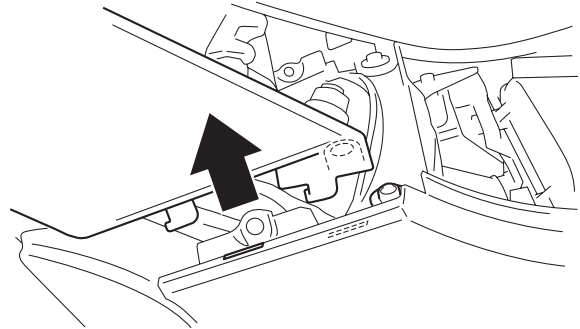


2. Remove:
  - Side covers

- a. Press the back of the side cover with one hand, pull the front toward outside, and then remove the projection "a" from the headlight bracket and brim "b" from the space between the frame and fuel tank.



- b. Pay attention to the tabs and lift up the side cover.

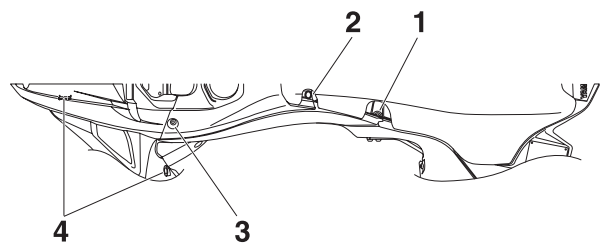


EAS18P1031

## INSTALLING THE COVER

### TIP

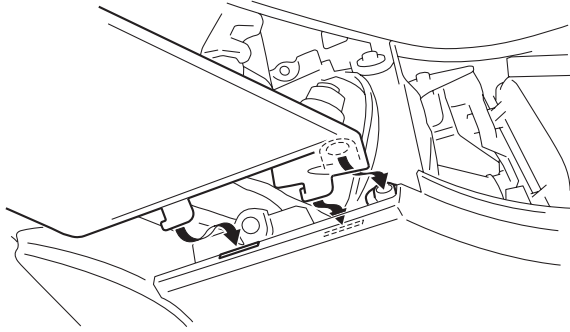
Tighten the bolts in the order shown in the illustration. Parts not specified can be in any order.



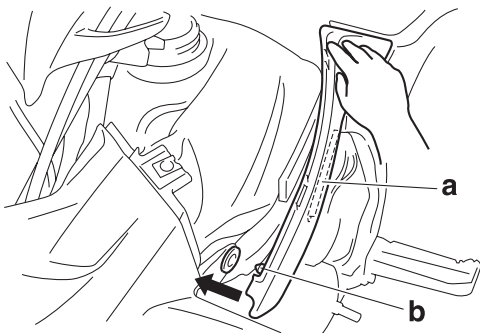
1. Bolt
2. Quick fastener
3. Fuel tank cover bolt
4. Front fender bolt

1. Install:
  - Side covers

- a. Install the back of the side cover with tabs aligned together.



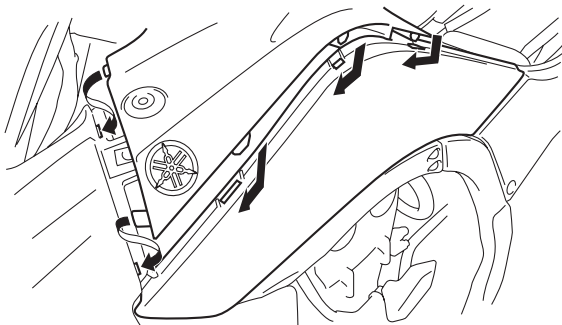
- b. While pressing the back of the side cover with one hand, fit the brim "a" into the space between the frame and fuel tank and projection "b" to the headlight bracket hole.



2. Install:

- Fuel tank cover

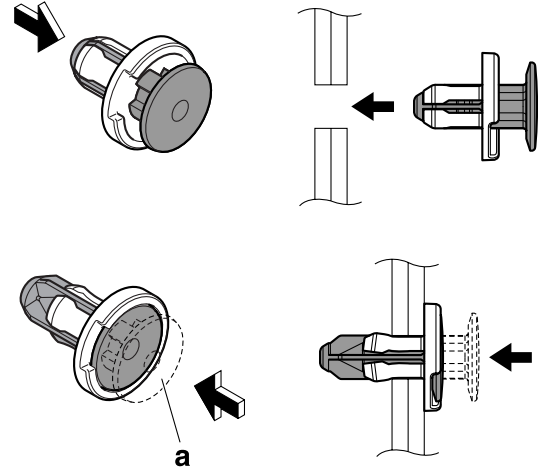
- a. Align the fuel tank cover tabs and press them forward.



- b. Install the quick fastener on the fuel tank cover.

## TIP

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



- c. Install the bolts on the fuel tank cover.

EAS18P1054

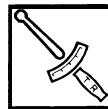
## INSTALLING THE ENGINE SKID PLATE

1. Install:

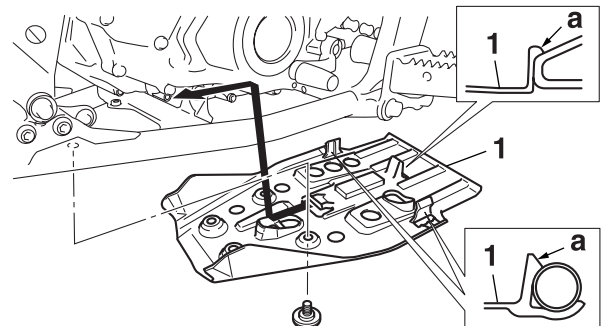
- Engine skid plate "1"

## TIP

Make sure to hook the engine skid plate's tabs "a" to the frame.



**Engine skid plate bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)  
**LOCTITE®**

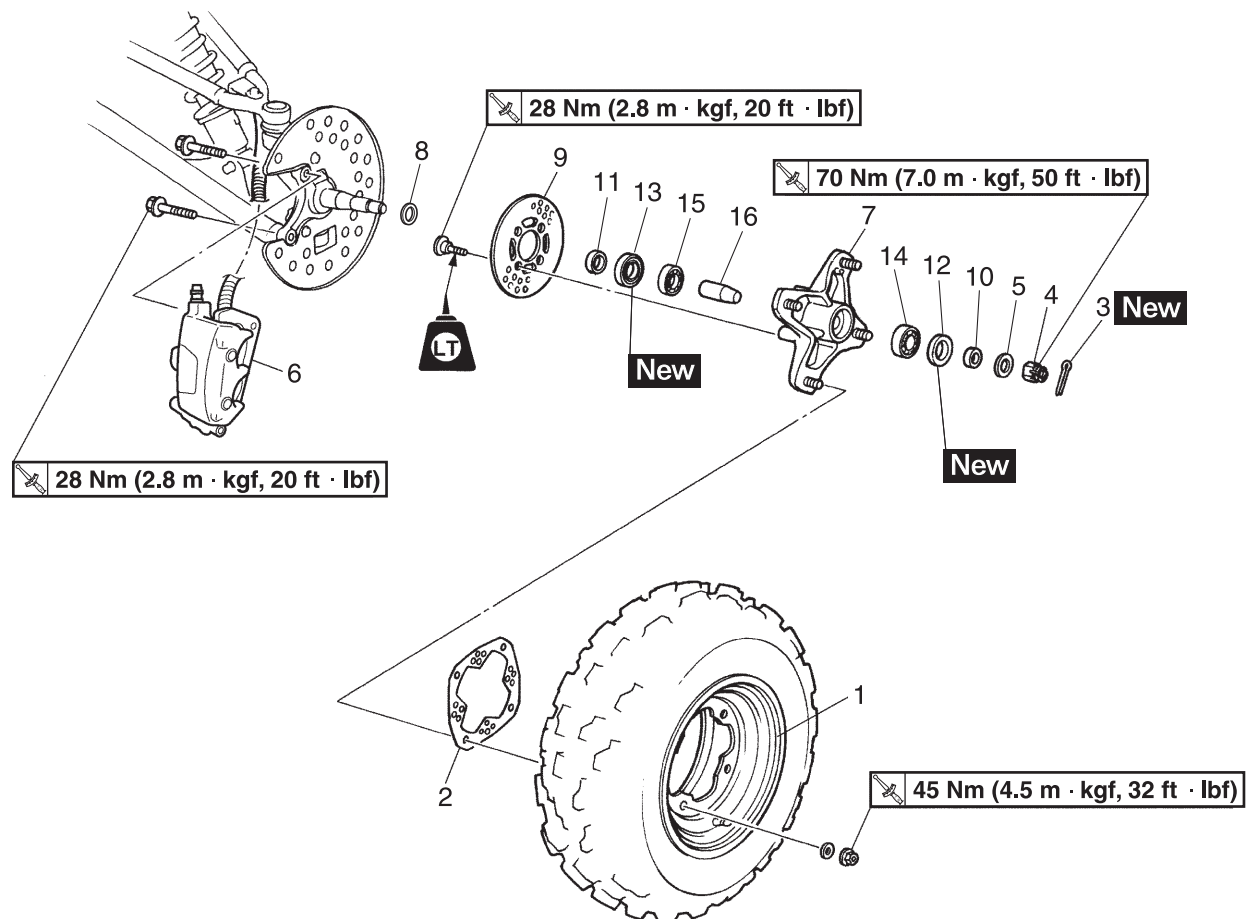




EAS21870

## FRONT WHEEL

### 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.
1	Front wheel	1	
2	Brake disc guard (outer)	1	
3	Cotter pin	1	
4	Axle nut	1	
5	Washer	1	
6	Brake caliper assembly	1	
7	Wheel hub	1	
8	Washer	1	
9	Brake disc	1	
10	Collar	1	
11	Collar	1	
12	Oil seal	1	
13	Oil seal	1	
14	Bearing	1	
15	Bearing	1	
16	Bearing spacer	1	
			For installation, reverse the removal procedure.



EAS21890

## REMOVING THE FRONT WHEELS

The following procedure applies to both of the front wheels.

1. Stand the vehicle on a level surface.

EWA13120

### **WARNING**

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

### **TIP**

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

2. Remove:
  - Front wheel

EAS29380

## CHECKING THE FRONT WHEELS

The following procedure applies to both of the front wheels.

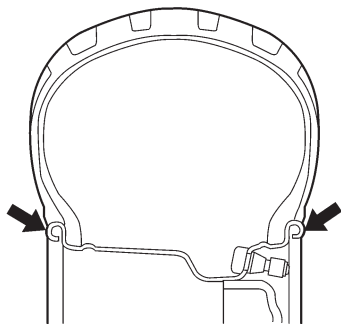
1. Check:
  - Tire
  - Wheel

Refer to “CHECKING THE TIRES” on page 3-35 and “CHECKING THE WHEELS” on page 3-36.

EWA15000

### **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.**

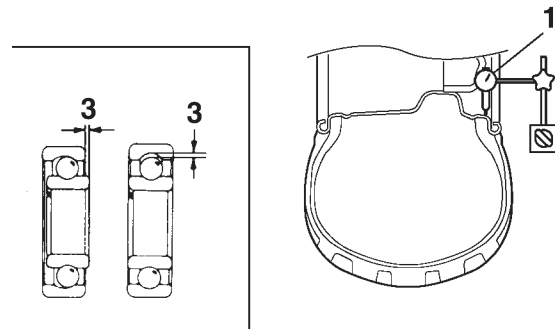
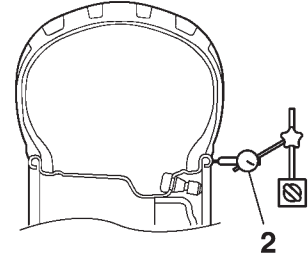


2. Measure:
  - Radial wheel runout “1”
  - Lateral wheel runout “2”

Over the specified limit → Replace the wheel or check the wheel bearing play “3”.



**Radial wheel runout limit**  
2.0 mm (0.08 in)  
**Lateral wheel runout limit**  
2.0 mm (0.08 in)



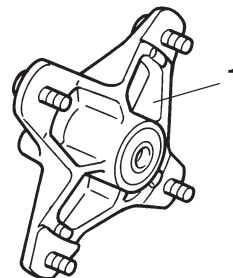
EAS29390

## CHECKING THE FRONT WHEEL HUBS

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

1. Check:
  - Wheel hubs “1”

Cracks/damage → Replace.



2. Check:
  - Wheel bearings

Wheel hub play/wheel turns roughly → Replace.



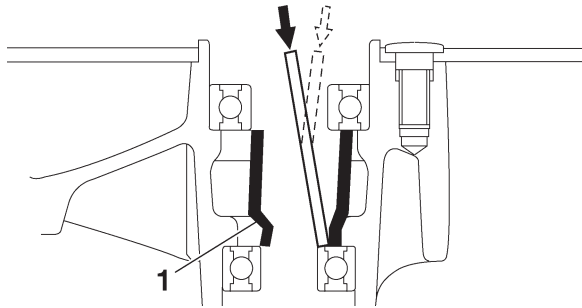
- a. Clean wheel hub exterior.
- b. Drive bearing out by pushing spacer aside and tapping around perimeter of bearing inner race. Use soft metal drift punch and

hammer. The spacer “1” “floats” between bearings. Remove both bearings as described.

EWA18P1007

## **WARNING**

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



- c. To install the wheel bearings “2”, reverse the above sequence. Use a socket that matches outside diameter of bearing outer race to drive in bearing.

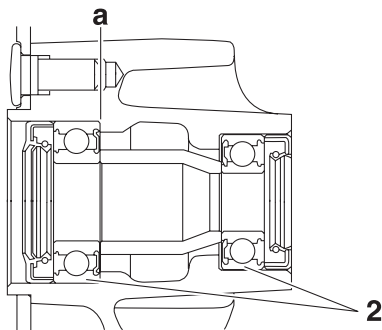
ECA18P1009

## **NOTICE**

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

## **TIP**

Face the oil seal side of the bearing inward.



a. Bearing press-in surface

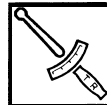


EAS29410

## **INSTALLING THE FRONT WHEEL HUBS**

The following procedure applies to both of the front hubs.

1. Install:
  - Washer
  - Front wheel hub
  - Washer
  - Front axle nut “1”

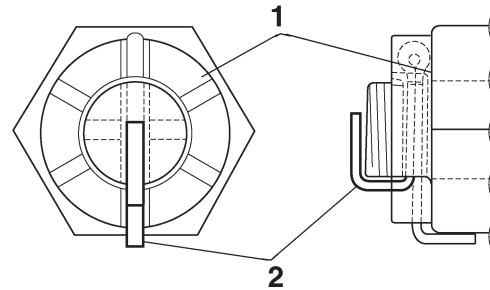


**Front axle nut**  
**70 Nm (7.0 m·kgf, 50 ft·lbf)**

- Cotter pins “2” **New**

## **TIP**

- Do not loosen the axle nut after torquing it. If the axle nut groove is not aligned with the cotter pin hole, align the groove with the hole by tightening the axle nut.
- Bend the longer cotter pin up.

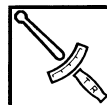


EAS29420

## **INSTALLING THE FRONT WHEELS**

The following procedure applies to both of the front wheels.

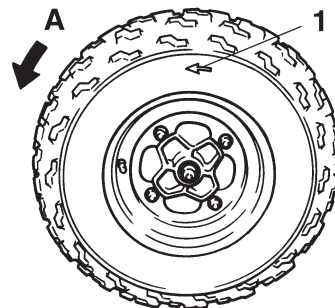
1. Install:
  - Brake disc guard (outer)
2. Install:
  - Front wheel



**Front wheel nut**  
**45 Nm (4.5 m·kgf, 32 ft·lbf)**

## **TIP**

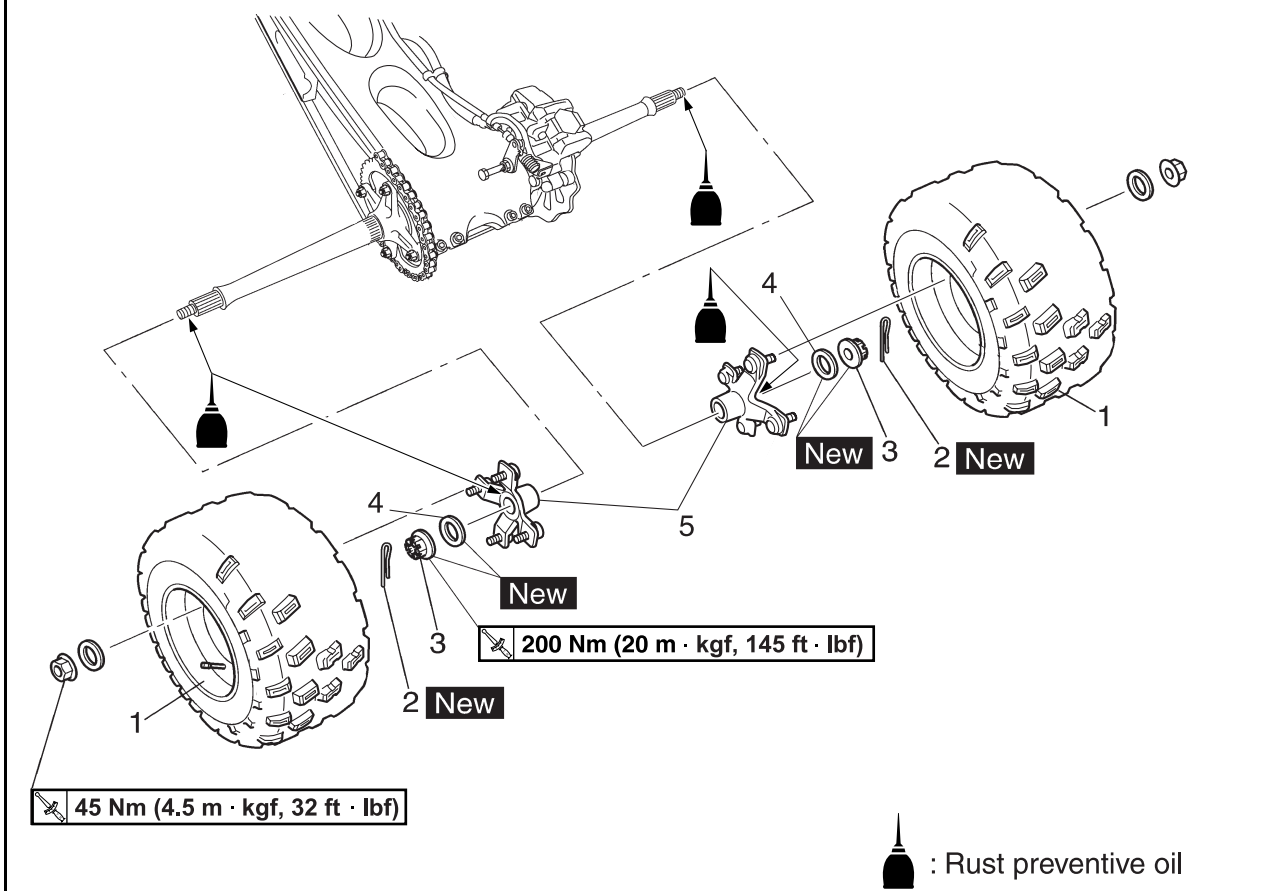
The arrow mark “1” on the must point in the direction of rotation “A” of the wheel.



EAS22020

## REAR WHEEL

### Removing the rear wheels



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear wheel	2	
2	Cotter pin	2	
3	Axle nut	2	
4	Washer	2	
5	Wheel hub	2	
			For installation, reverse the removal procedure.

EAS22040

## REMOVING THE REAR WHEELS

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

### TIP

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

2. Remove:
  - Rear wheels

EAS29430

## 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 3-35 and "CHECKING THE WHEELS" on page 3-36.
2. Measure:
  - Wheel runout

Refer to "CHECKING THE FRONT WHEELS" on page 4-12.

Over the specified limit → Replace.



**Radial wheel runout limit**  
2.0 mm (0.08 in)  
**Lateral wheel runout limit**  
2.0 mm (0.08 in)

EAS29440

## CHECKING THE REAR WHEEL HUBS

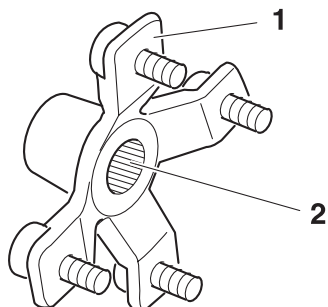
The following procedure applies to both of the rear wheel hubs.

1. Check:
  - Wheel hub "1"

Cracks/damage → Replace.

  - Splines (wheel hub) "2"

Wear/damage → Replace.

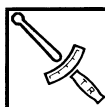


EAS29450

## INSTALLING THE REAR WHEEL HUBS

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

1. Install:
  - Rear wheel hub
  - Washer **New**
  - Rear axle nut **New**



### Rear axle nut

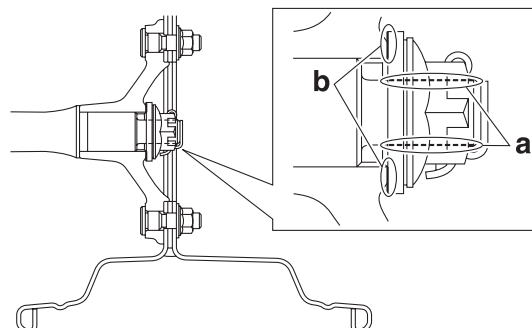
**1st: 200 Nm (20 m·kgf, 145 ft·lbf)**

**\*2nd: 200 Nm (20 m·kgf, 145 ft·lbf)**

\* Loosen the nut and then tighten to the specified torque.

### TIP

Apply rust preventive oil to the threads on both sides of the rear axle "a" and to the wheel hub surfaces "b" that contact the rear axle washers.



2. Install:
  - Cotter pin **New**

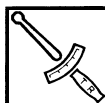
Refer to "INSTALLING THE FRONT WHEEL HUBS" on page 4-13.

EAS29460

## INSTALLING THE REAR WHEELS

The following procedure applies to both of the rear wheels.

1. Install:
  - Rear wheel



### Rear wheel nut

**45 Nm (4.5 m·kgf, 32 ft·lbf)**

## REAR AXLE AND REAR AXLE HUB

Diagram illustrating the assembly of a rear wheel hub, showing various components and their corresponding torque specifications:

- 43 Nm (4.3 m · kgf, 31 ft · lbf)** (Torque for the main hub nut)
- 21 Nm (2.1 m · kgf, 15 ft · lbf)** (Torque for the axle nut)
- 7 Nm (0.7 m · kgf, 5.1 ft · lbf)** (Torque for the brake disc pin)
- 33 Nm (3.3 m · kgf, 24 ft · lbf)** (Torque for the brake disc pin)
- 72 Nm (7.2 m · kgf, 52 ft · lbf)** (Torque for the axle nut)
- 250 Nm (25.0 m · kgf, 181 ft · lbf)** (Torque for the axle nut)

Key components and parts shown include:

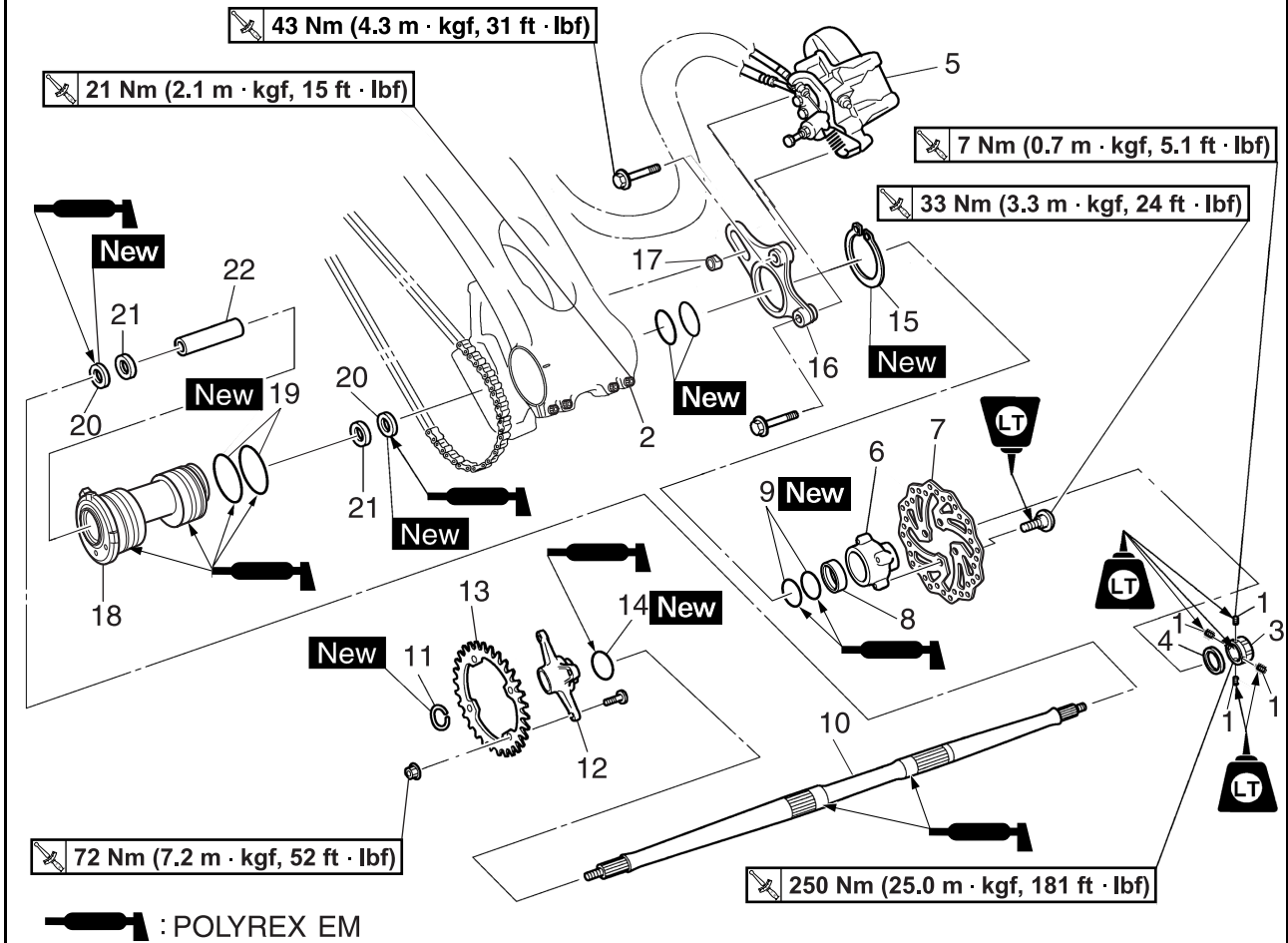
- Hub (1)
- Brake disc (2)
- Brake disc pin (3)
- Brake disc pin (4)
- Brake disc pin (5)
- Brake disc pin (6)
- Brake disc pin (7)
- Brake disc pin (8)
- Brake disc pin (9)
- Brake disc pin (10)
- Brake disc pin (11)
- Brake disc pin (12)
- Brake disc pin (13)
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- Brake disc pin (95)
- Brake disc pin (96)
- Brake disc pin (97)
- Brake disc pin (98)
- Brake disc pin (99)
- Brake disc pin (100)

Legend: **POLYREX EM** (Torque wrench symbol)

**4-16**

# REAR AXLE AND REAR AXLE HUB

## Removing the rear axle and rear axle hub



Order	Job/Parts to remove	Q'ty	Remarks
15	Circlip	1	
16	Brake caliper bracket	1	
17	Collar	1	
18	O-ring	2	
19	Rear axle hub	1	
20	O-ring	2	
21	Oil seal	2	
22	Bearing	2	
23	Spacer	1	
			For installation, reverse the removal procedure.

# REAR AXLE AND REAR AXLE HUB

EAS29490

## REMOVING THE REAR AXLE

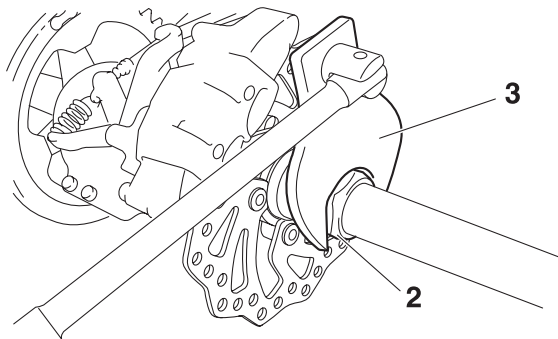
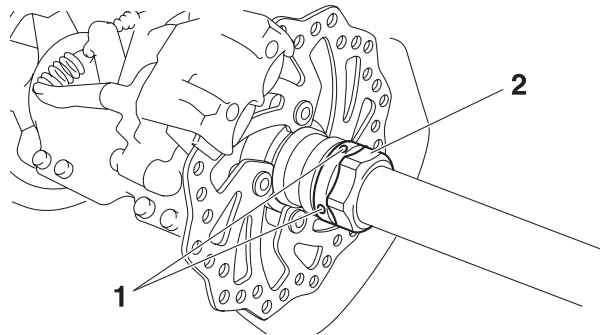
1. Place the vehicle on a level surface.
2. Remove:
  - Rear axle ring nut set bolts "1"
3. Loosen:
  - Rear axle ring nut "2"

### TIP

- Apply the brake pedal so that the rear axle does not turn when loosening the nut.
- Use the axle nut wrench "3".



Axle nut wrench (46 mm)  
90890-01498  
Rear axle nut wrench 46 mm  
YM-37134



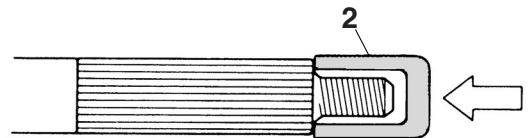
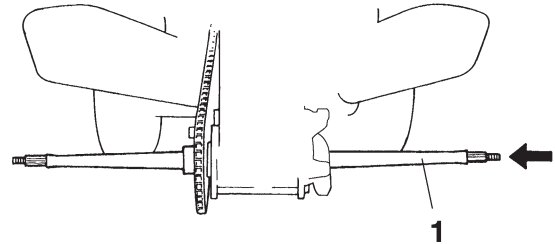
4. Loosen:
  - Drive chain  
Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 3-25.
5. Elevate the rear wheels by placing a suitable stand under the frame.
6. Remove:
  - Rear wheels
  - Wheel hubs
  - Rear axle ring nut
  - Conical spring washer

7. Remove:
  - Rear brake caliper
  - Rear brake disc  
Refer to "REMOVING THE REAR BRAKE CALIPER" on page 4-43.
8. Remove:
  - Collar
  - Rear axle "1"  
(with driven sprocket)

ECA16180

### NOTICE

- Never directly tap the axle end with a hammer, since this will result in damage to the axle thread and spline.
- Attach a suitable socket "2" on the axle end and tap it with a soft hammer, then pull out the rear axle to the left.



9. Remove:
  - Circlip
  - Driven sprocket bracket
10. Remove:
  - Rear axle hub

EAS29500

## CHECKING THE REAR AXLE

1. Check:
  - Rear axle runout "a"  
Out of specification → Replace.

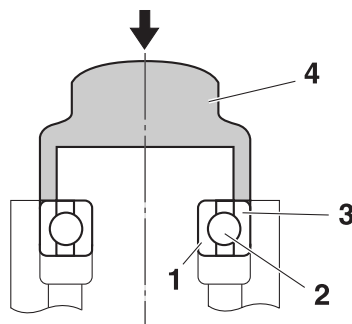
EWA15020



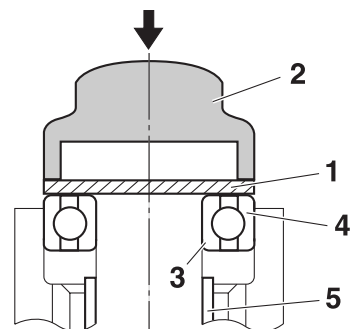
**Do not attempt to straighten a bent axle.**

A diagram of a horizontal beam supported by two triangular supports. Two downward-pointing arrows, each labeled 'a', represent point loads applied to the beam. The beam is shown with a slight upward curve between the supports and a slight downward curve at the ends.

Use a socket “4” that matches the diameter of the wheel bearing outer race.



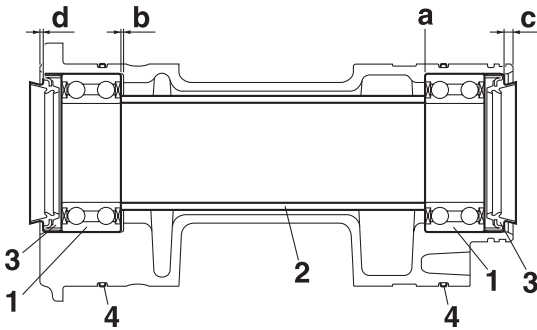
Place a suitable washer “1” between the socket “2” and the bearing so that both the inner race “3” and outer race “4” are pressed at the same time, and then press the bearing until the inner race makes contact with the spacer “5”



- Install the bearing with the character stamp turned outward.
- Insert the oil seal until it hits the bearing.
- Apply grease to rear axle hub processed surface, grease groove and O-ring.



# REAR AXLE AND REAR AXLE HUB



a. Bearing press-in surface

EAS18P1016

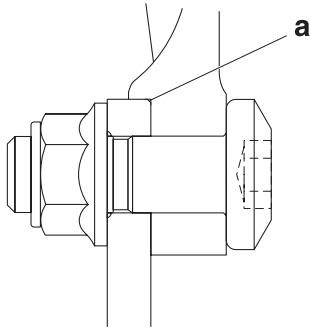
## INSTALLING THE DRIVEN SPROCKET

1. Install:

- Driven sprocket

### TIP

Install the driven sprocket with the punch mark "38" facing the bolt head and blunt-edged corner "a" facing the driven sprocket bracket.



EAS29530

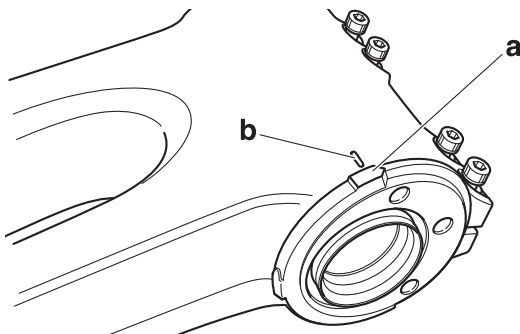
## INSTALLING THE REAR AXLE

1. Install

- Rear axle hub

### TIP

When installing the rear axle hub, make sure that the stationary pointer "b" on the swingarm is within the arrow "a" on the rear axle hub.

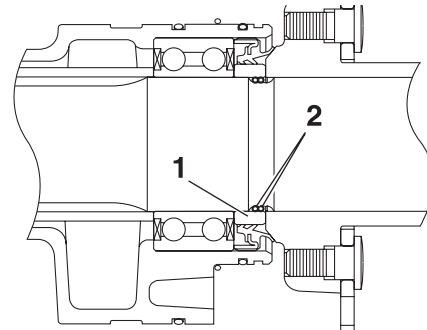


2. Install:

- Rear axle
- Collar "1"
- O-rings "2"

### TIP

Install the O-ring after installing the collar. Install inside the collar as shown in the illustration.

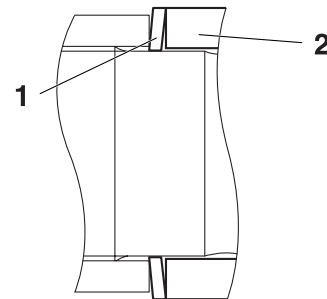


3. Install:

- Conical spring washer "1"
- Rear axle ring nut "2"

### TIP

Install the conical spring washer with the convex side of the washer facing brake disc bracket side.

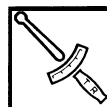


4. Install:

- Rear wheels
- Refer to "INSTALLING THE REAR WHEELS" on page 4-15.

5. Tighten:

- Rear axle ring nut "1"
- Rear axle ring nut set bolts "2"



**Rear axle ring nut**  
250 Nm (25 m·kgf, 181 ft·lbf)  
LOCTITE®

**Rear axle ring nut set bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)  
LOCTITE®

## TIP

- Apply the brake pedal so that the rear axle does not turn when tightening the nut.
- Use the axle nut wrench “3”.

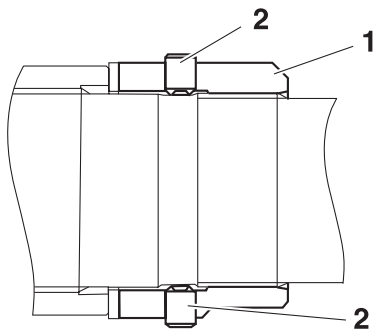
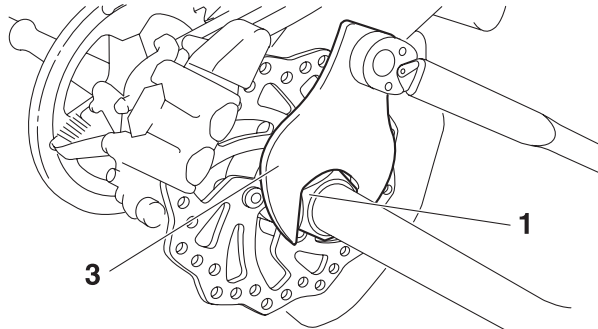


**Axle nut wrench (46 mm)**

**90890-01498**

**Rear axle nut wrench 46 mm**

**YM-37134**



## 6. Adjust:

- Drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-25.

EAS22210  
FRONT BRAKE

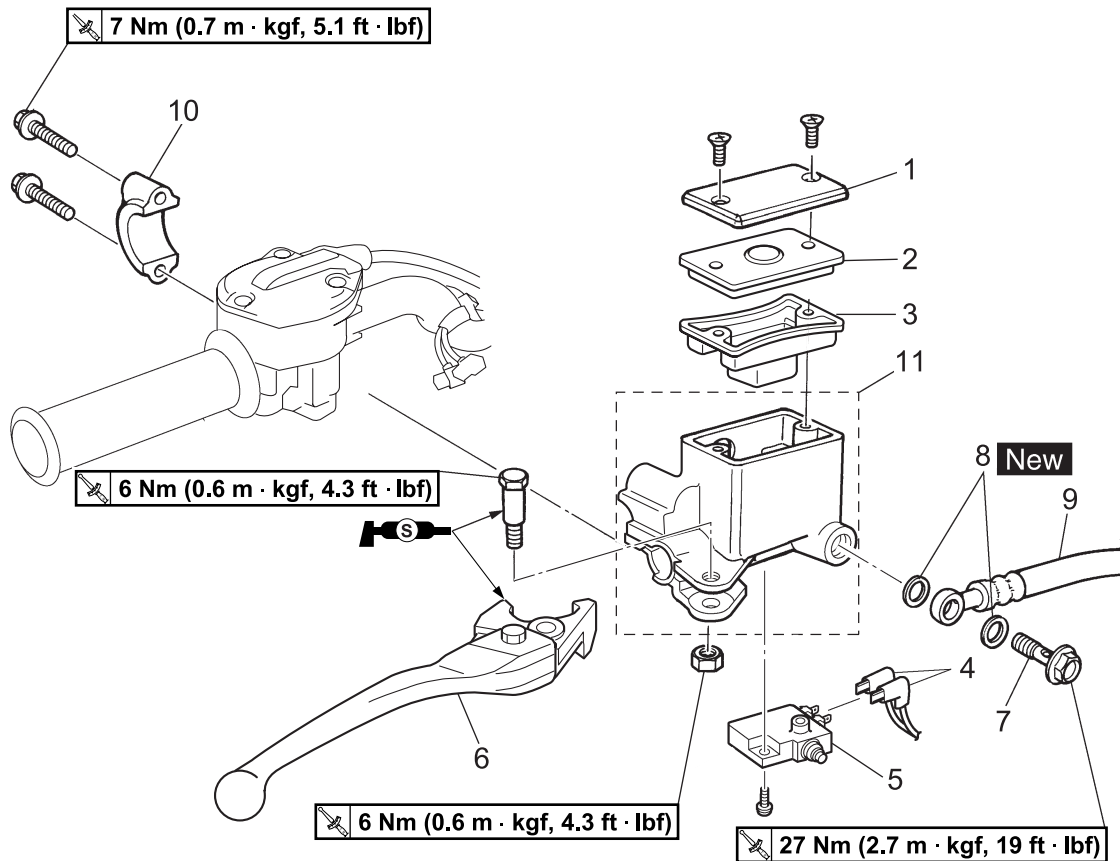
Removing the front brake pads

17 Nm (1.7 m · kgf, 12 ft · lbf)

28 Nm (2.8 m · kgf, 20 ft · lbf)

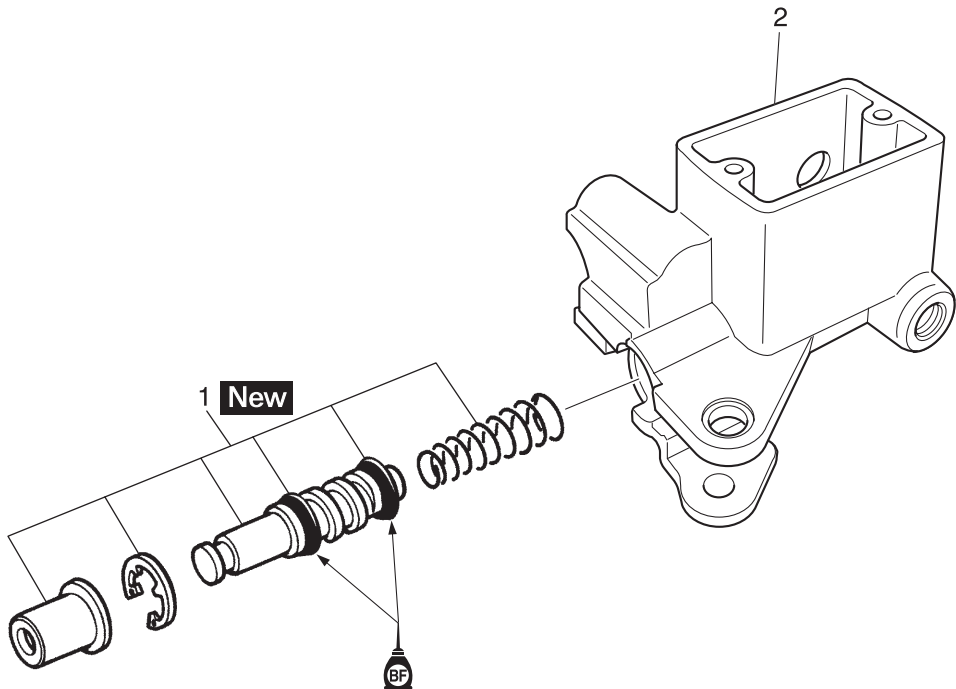
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Front wheel		Refer to "FRONT WHEEL" on page 4-11.
1	Brake pad retaining bolt	2	
2	Brake pad	2	
3	Brake pad shim	1	
4	Brake pad spring	1	
			For installation, reverse the removal procedure.

## Removing the front brake master cylinder



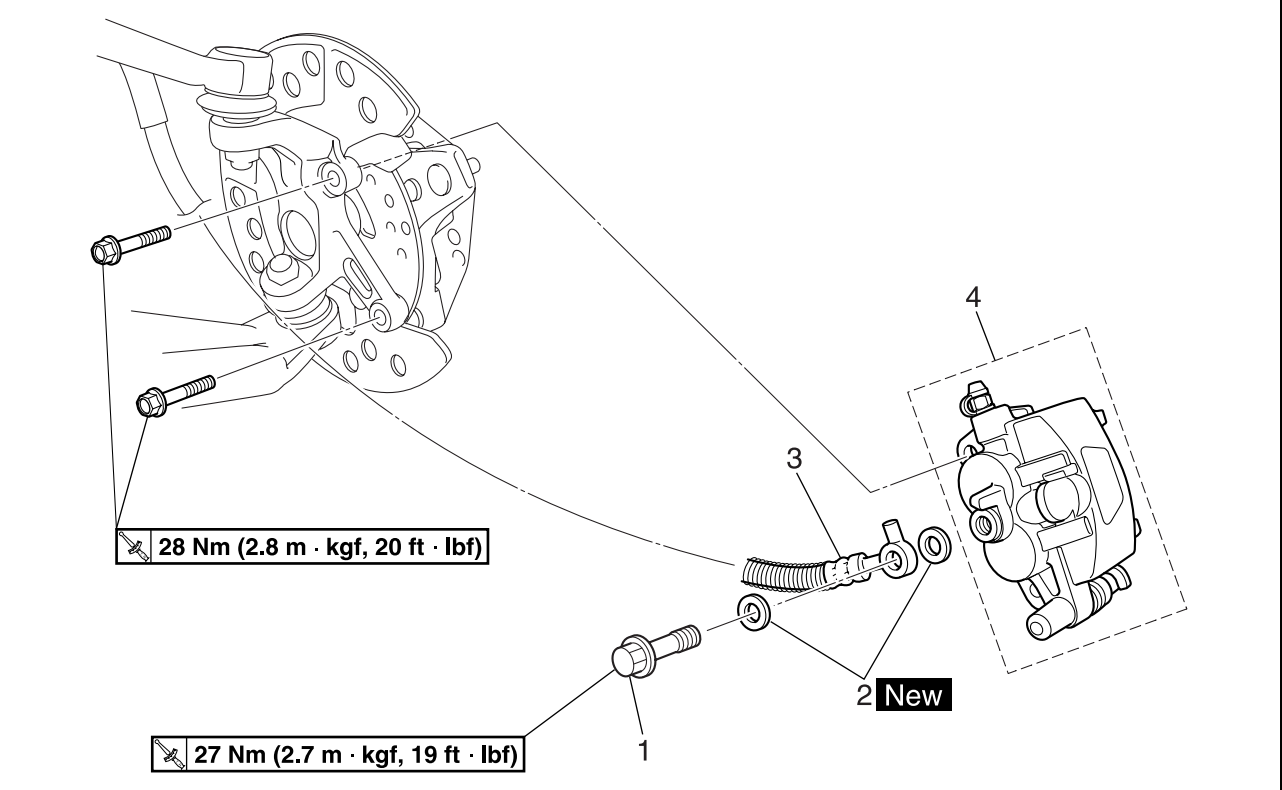
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-24.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Front brake light switch connector	2	Disconnect.
5	Front brake light switch	1	
6	Brake lever	1	
7	Union bolt	1	
8	Copper washer	2	
9	Brake hose	1	Disconnect.
10	Brake master cylinder bracket	1	
11	Brake master cylinder	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



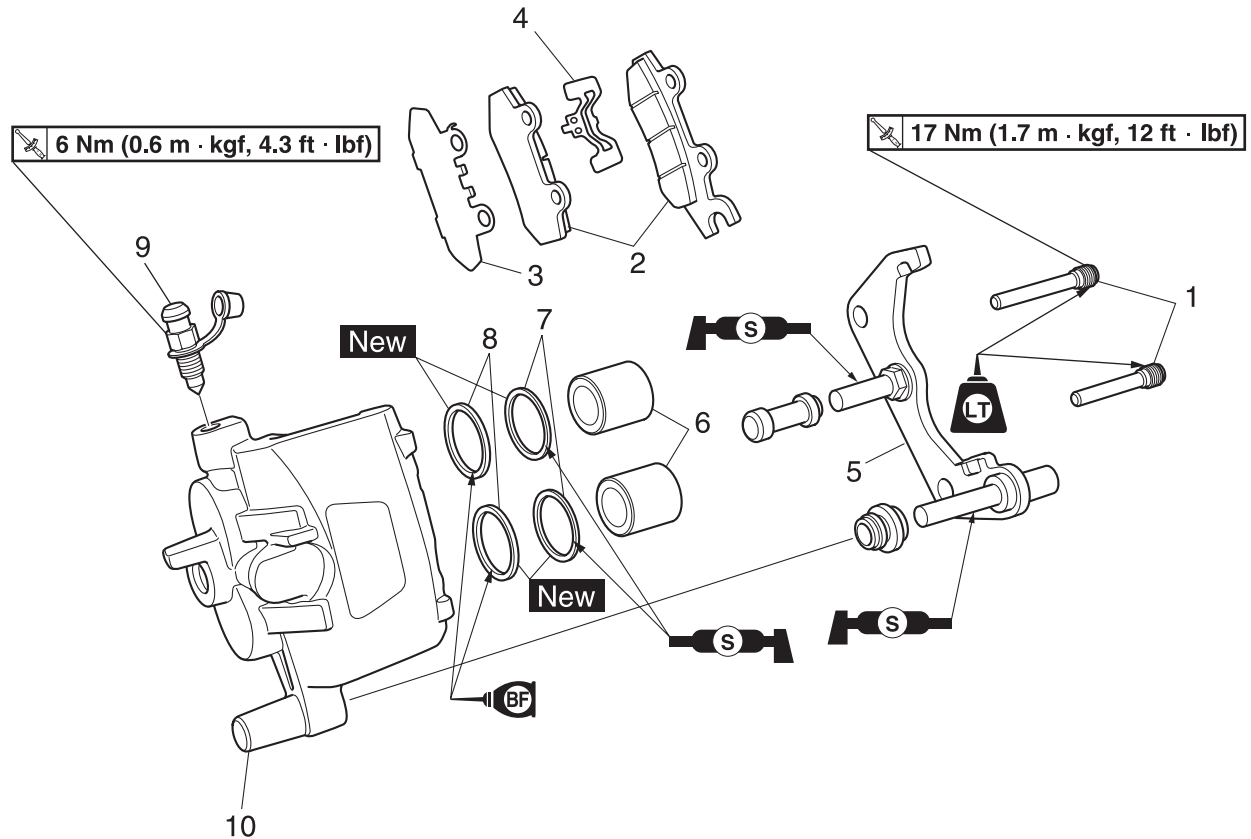
Order	Job/Parts to remove	Q'ty	Remarks
1	Brake master cylinder kit	1	
2	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-24.
	Front wheel		Refer to "FRONT WHEEL" on page 4-11.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	Disconnect.
4	Brake caliper assembly	1	
			For installation, reverse the removal procedure.

## Disassembling the front brake calipers



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

EAS22220

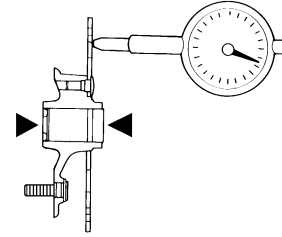
# INTRODUCTION

EWA14100

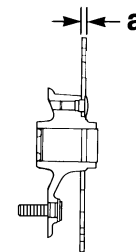


**Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:**

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

[illegible]

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 (0.118 in)**

- 5. Adjust:
  - Brake disc deflection

[illegible]

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

**TIP**

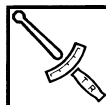
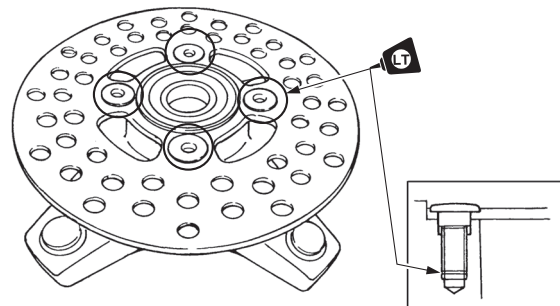
- Install the brake disc with its spot-faced side facing the bolt heads.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



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

[illegible]

- Remove the brake disc with wheel hub.
- Hold the dial gauge at a right angle against the brake disc surface.
- Measure the deflection 2.5 mm (0.10 in) below the edge of the brake disc.



**Brake disc bolt**  
28 Nm (2.8 m·kgf, 20 ft·lbf)  
**LOCTITE®**



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



6. Install:
  - Front wheel
 Refer to "INSTALLING THE FRONT WHEELS" on page 4-13.

EAS22250

## REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

### TIP

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

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

	<b>Brake pad lining thickness (inner)</b>
	4.3 mm (0.17 in)
	<b>Limit</b>
	1.0 mm (0.04 in)
	<b>Brake pad lining thickness (outer)</b>
	4.3 mm (0.17 in)
	<b>Limit</b>
	1.0 mm (0.04 in)



2. Install:
  - Brake pad shim (onto the brake pad)
  - Brake pads
  - Brake pad springs

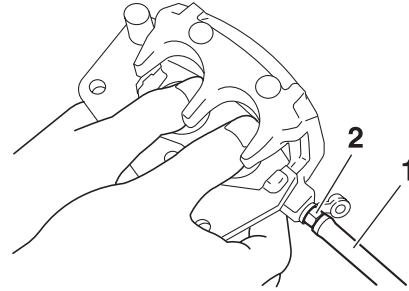
### TIP

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

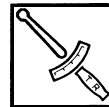


- a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.

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



- c. Tighten the bleed screw.

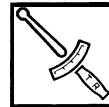


**Bleed screw**  
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

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

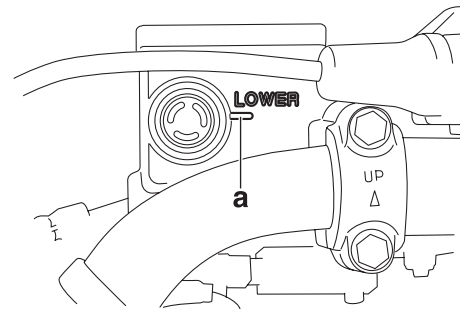


3. Install:
  - Brake pad retaining bolt
  - Brake caliper



**Brake pad retaining bolt**  
17 Nm (1.7 m·kgf, 12 ft·lbf)  
**LOCTITE®**  
**Brake caliper bolt**  
28 Nm (2.8 m·kgf, 20 ft·lbf)

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



## 5. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

EAS22300

## REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

### TIP

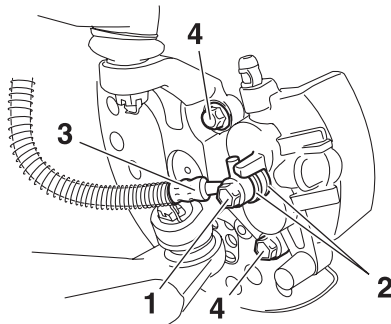
Before removing the brake caliper, drain the brake fluid from the entire brake system.

## 1. Remove:

- Union bolt “1”
- Copper washers “2”
- Brake hose “3”
- Brake caliper bolts “4”

### TIP

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



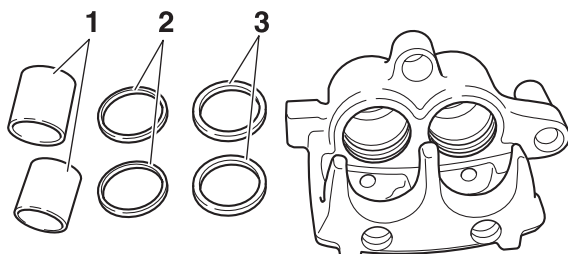
EAS22350

## DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

## 1. Remove:

- Brake caliper pistons “1”
- Brake caliper piston dust seals “2”
- Brake caliper piston seals “3”

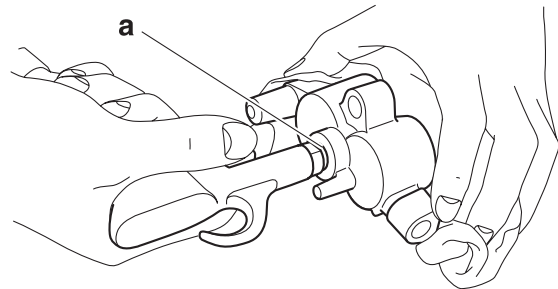


- Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA13550

### WARNING

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



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



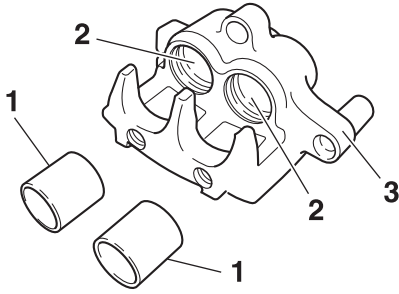
EAS22390

## CHECKING THE FRONT BRAKE CALIPERS

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

## 1. Check:

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



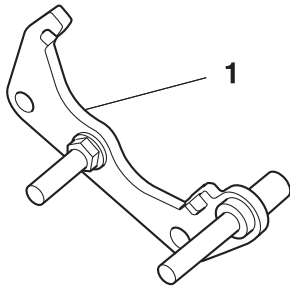
EWA18P1008

## **WARNING**

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

### 2. Check:

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



EAS22410

## **ASSEMBLING THE FRONT BRAKE CALI-PERS**

EWA18P1009

## **WARNING**

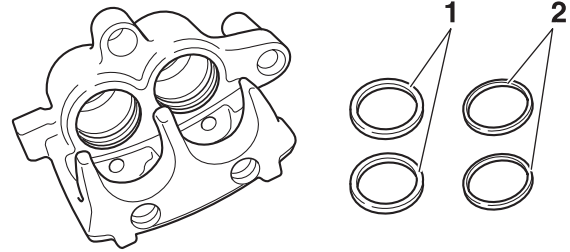
- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston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



**Recommended brake fluid  
DOT 4**

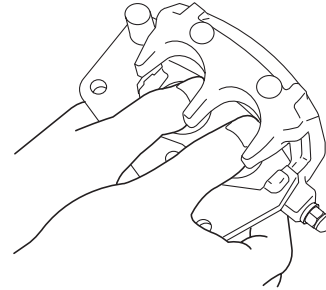
### 1. Install

- Brake caliper piston seals “1” **New**
- Brake caliper piston dust seals “2” **New**



### 2. Install

- Brake caliper pistons



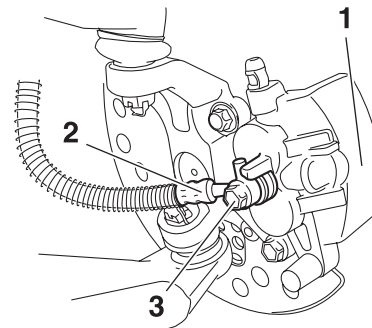
EAS22440

## **INSTALLING THE FRONT BRAKE CALI-PERS**

The following procedure applies to both of the brake calipers.

### 1. Install:

- Brake caliper “1”  
(temporarily)
- Copper washers **New**
- Brake hose “2”
- Union bolt “3”



**Brake hose union bolt  
27 Nm (2.7 m·kgf, 19 ft·lbf)**

EWA13530

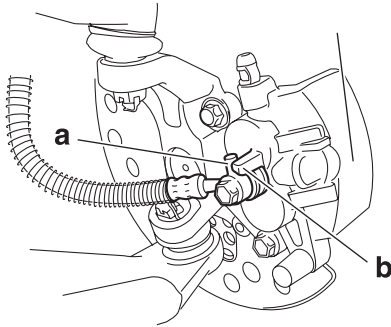
## **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-33.

ECA14170

## NOTICE

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



2. Remove:
  - Brake caliper
3. Install:
  - Brake pads
  - Brake pad spring
  - Brake pad retaining bolts
  - Brake caliper



**Brake pad retaining bolt**  
 17 Nm (1.7 m·kgf, 12 ft·lbf)  
**LOCTITE®**  
**Brake caliper bolt**  
 28 Nm (2.8 m·kgf, 20 ft·lbf)

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

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



**Recommended brake fluid**  
 DOT 4

EWA13090

## WARNING

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

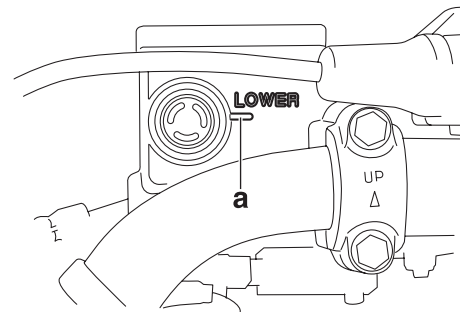
will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

## NOTICE

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

5. Bleed:
  - Brake system  
 Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.
6. Check:
  - Brake fluid level  
 Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
 Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.



7. Check:
  - Brake lever operation  
 Soft or spongy feeling → Bleed the brake system.  
 Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

EAS22490

## REMOVING THE FRONT BRAKE MASTER CYLINDER

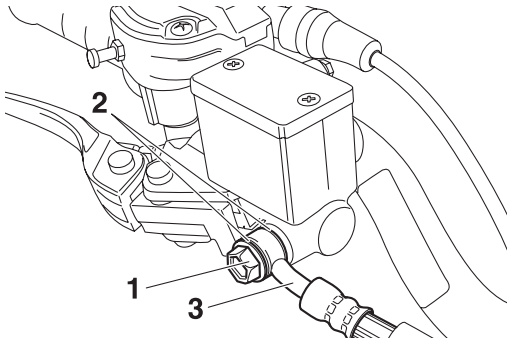
### TIP

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

1. Disconnect:
  - Front brake light switch connector (from the front brake light switch)
2. Remove:
  - Union bolt “1”
  - Copper washers “2”
  - Brake hose “3”

## TIP

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

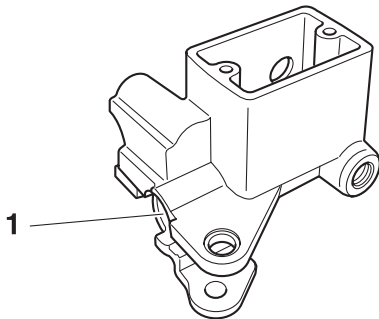


EAS22500

## CHECKING THE FRONT BRAKE MASTER CYLINDER

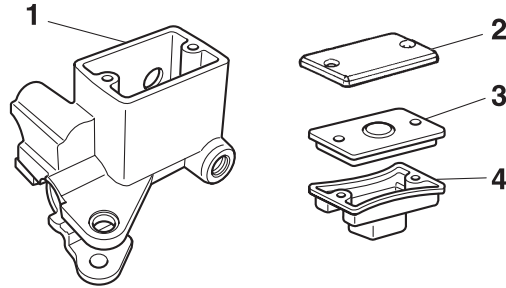
### 1. Check:

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



### 2. Check:

- Brake master cylinder reservoir “1”
- Brake master cylinder reservoir cap “2”  
Cracks/damage → Replace
- Brake master cylinder reservoir diaphragm holder “3”
- Brake master cylinder reservoir diaphragm “4”  
Damage/wear → Replace.



### 3. Check:

- Brake hoses  
Cracks/damage/wear → Replace.

EAS22520

## ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

### ⚠ WARNING

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



**Recommended brake fluid  
DOT 4**

EAS22530

## INSTALLING THE FRONT BRAKE MASTER CYLINDER

### 1. Install:

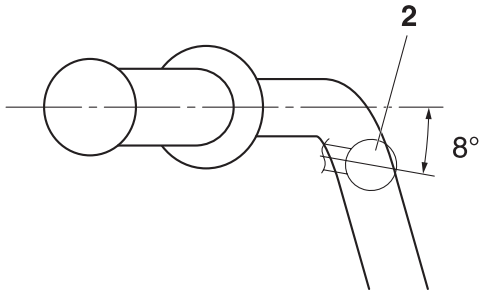
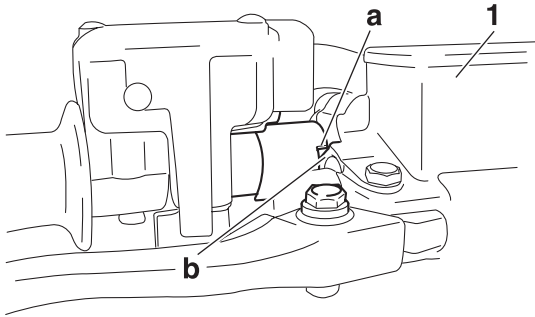
- Brake master cylinder “1”



**Brake master cylinder bracket  
bolt  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)**

## TIP

- Install the brake master cylinder bracket with the “UP” mark facing up.
- Engage the indentation “a” in the spacer with the lobe “b” on the brake master cylinder.
- Install the brake lever “2” at 8° angle as shown.
- Install the brake master cylinder so that the gaps between the brake master cylinder and the brake master cylinder bracket are equal.



## 2. Install:

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



**Brake hose union bolt**  
27 Nm (2.7 m·kgf, 19 ft·lbf)

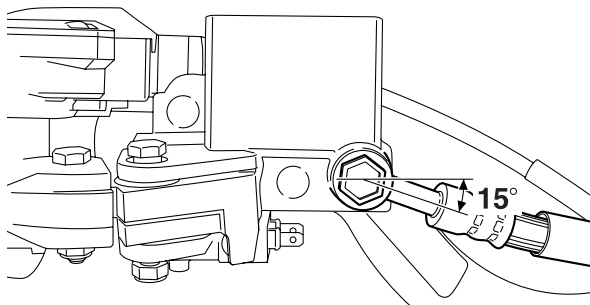
EWA13530

## **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 recommended brake fluid)



**Recommended brake fluid**  
**DOT 4**

EWA13540

## **WARNING**

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

ECA13540

## **NOTICE**

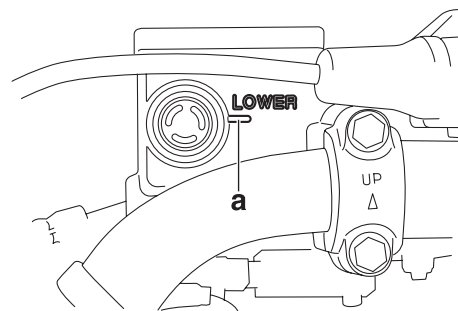
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**

## 4. Bleed:

- Brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

## 5. Check:

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



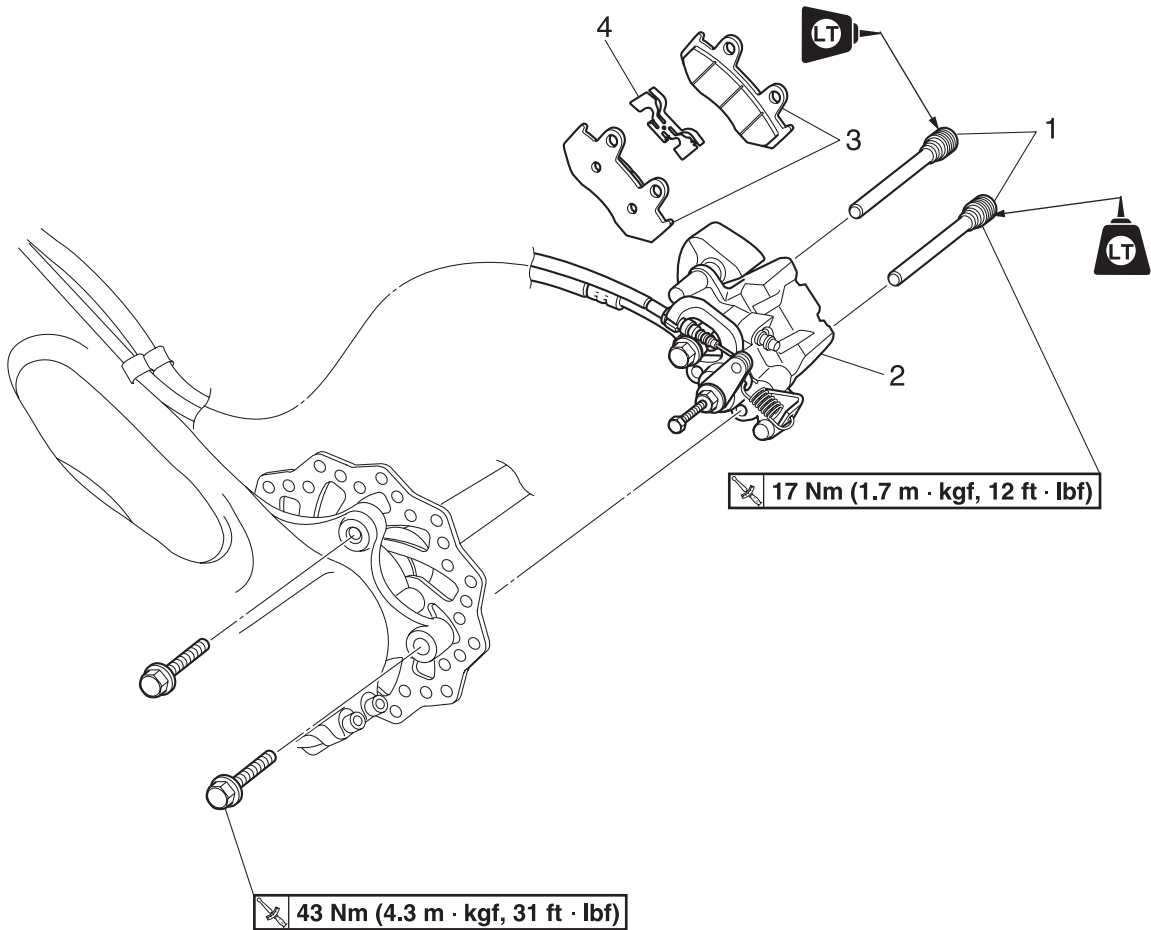
6. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

EAS22550

## REAR BRAKE

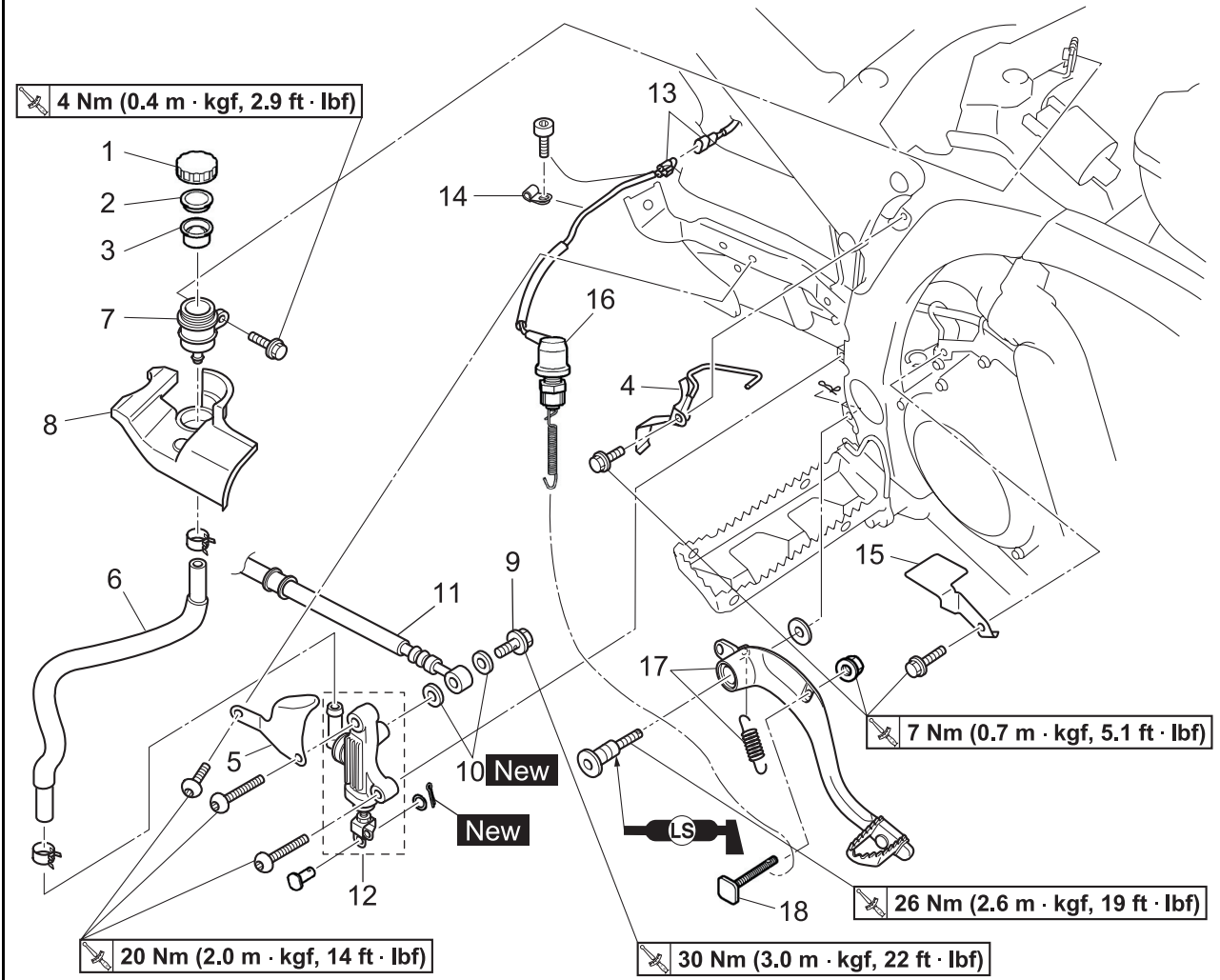
### Removing the rear brake pads



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



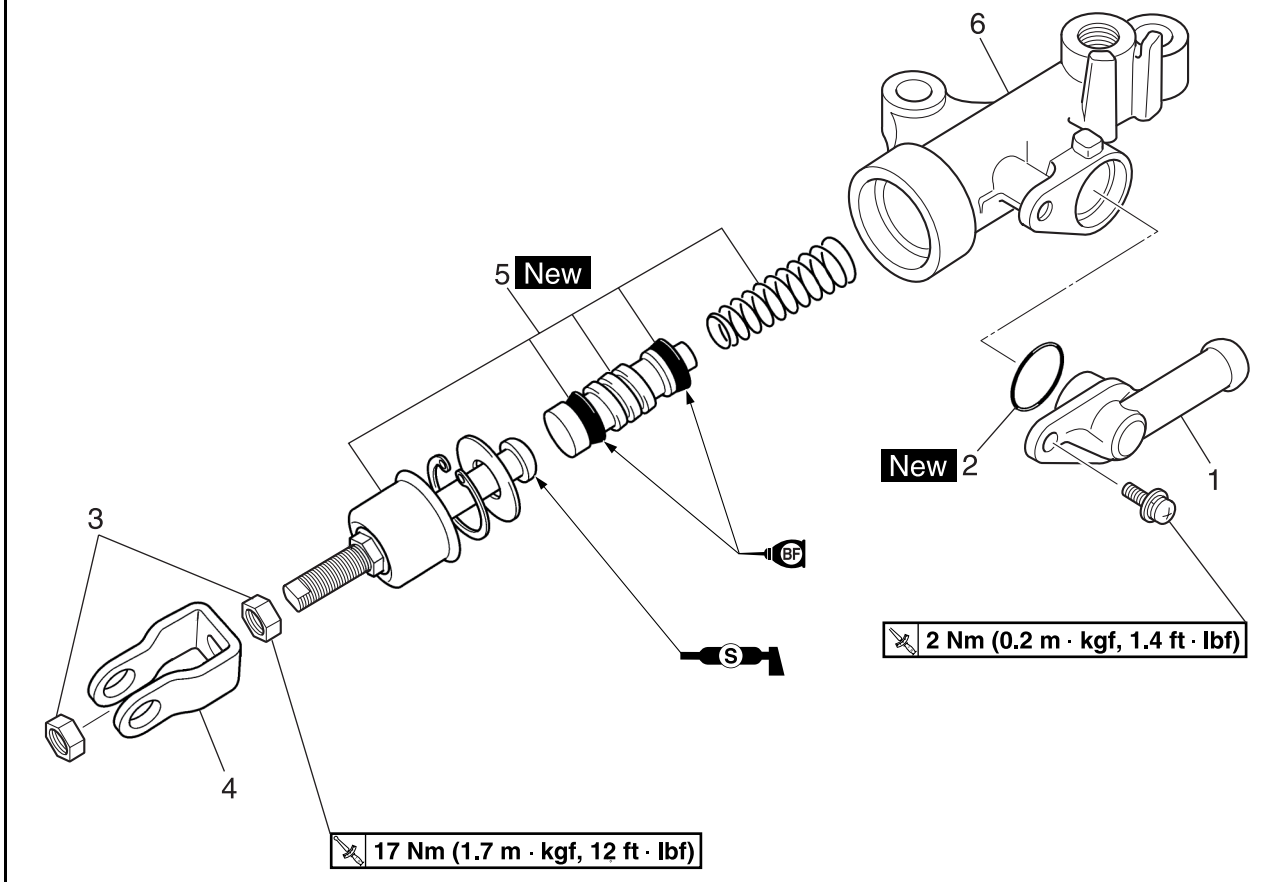
## Removing the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Air filter case joint		Refer to "GENERAL CHASSIS" on page 4-1.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir hose bracket	1	
5	Brake fluid reservoir hose cover	1	
6	Brake fluid reservoir hose	1	
7	Brake fluid reservoir	1	
8	Brake fluid reservoir damper	1	
9	Union bolt	1	
10	Copper washer	2	
11	Brake hose	1	Disconnect.
12	Brake master cylinder	1	
13	Rear brake light switch coupler	1	Disconnect.
14	Rear brake light switch lead holder	1	
15	Rear brake light switch cover	1	
16	Rear brake light switch	1	
17	Brake pedal	1	

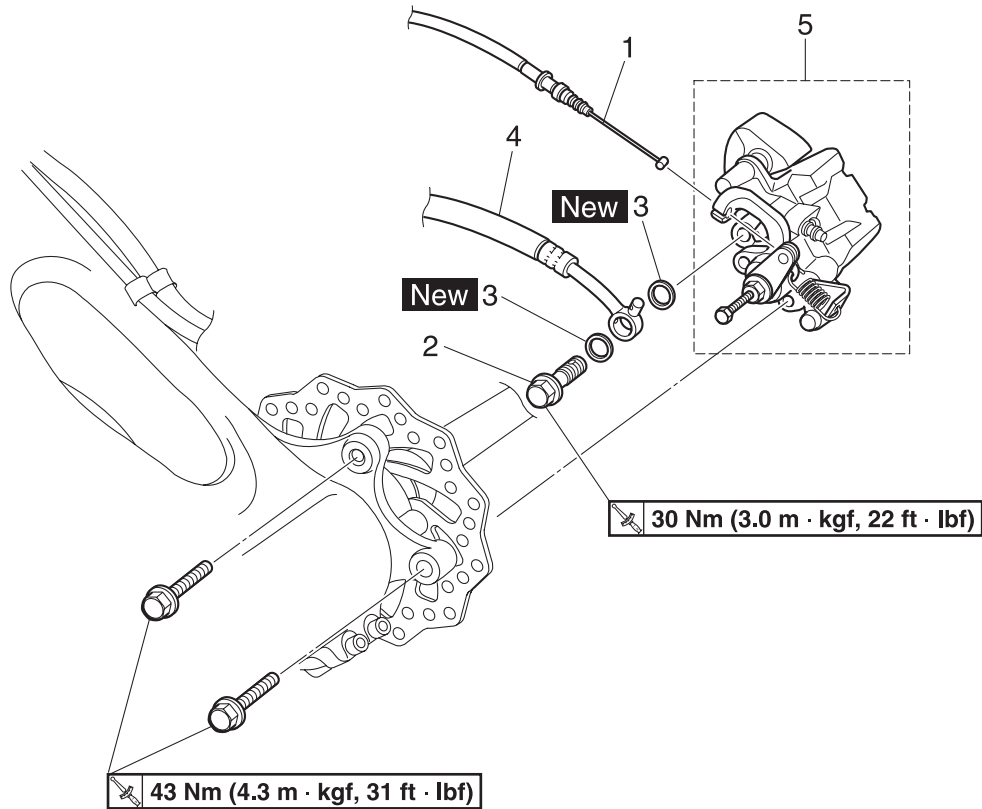


## Disassembling the rear brake master cylinder



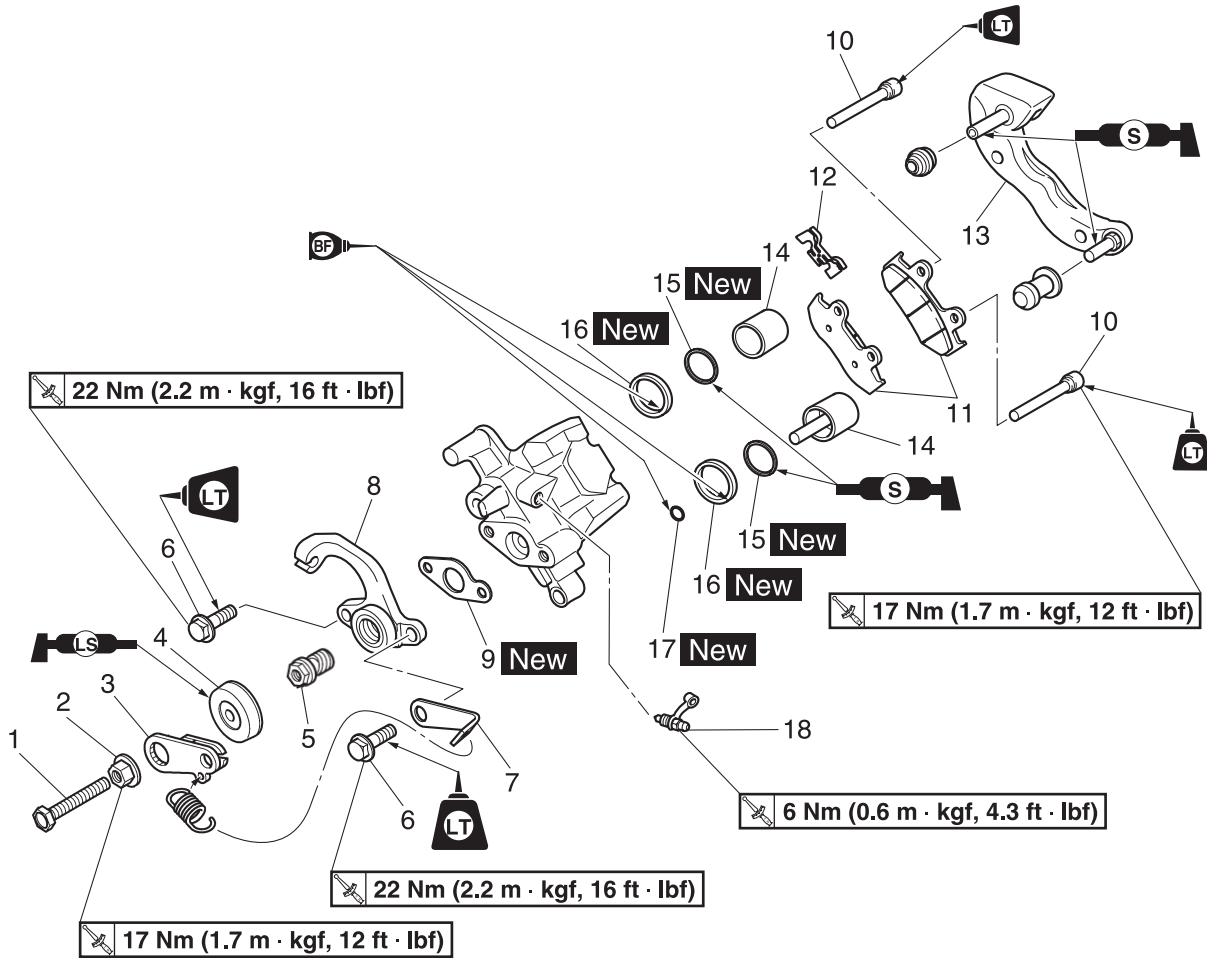
Order	Job/Parts to remove	Q'ty	Remarks
1	Hose joint	1	
2	O-ring	1	
3	Adjusting nut	2	
4	Brake master cylinder yoke	1	
5	Brake master cylinder kit	1	
6	Brake master cylinder body	1	
			For installation, reverse the removal procedure.

## Removing the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
	Parking brake cable (handlebar side)		Disconnect. Refer to "HANDLEBAR" on page 4-49.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-24.
1	Parking brake cable (caliper side)	1	Disconnect.
2	Union bolt	1	
3	Copper washer	2	
4	Brake hose	1	Disconnect.
5	Brake caliper assembly	1	
			For installation, reverse the removal procedure.

## Disassembling the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Adjusting bolt	1	
2	Locknut	1	
3	Parking brake arm	1	
4	Rubber boot	1	
5	Parking brake shaft	1	Left-hand thread.
6	Parking brake bracket bolt	2	
7	Parking brake case bracket	1	
8	Parking brake case	1	
9	Gasket	1	
10	Brake pad retaining bolt	2	
11	Brake pad	2	
12	Brake pad spring	1	
13	Brake caliper bracket	1	
14	Brake caliper piston	2	
15	Brake caliper piston dust seal	2	
16	Brake caliper piston seal	2	
17	O-ring	1	
18	Bleed screw	1	
			For installation, reverse the removal procedure.

EAS22560

## INTRODUCTION

EWA14100



### WARNING

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

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

EAS22570

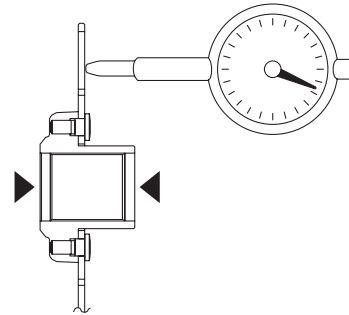
## CHECKING THE REAR BRAKE DISC

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

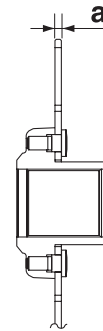


**Brake disc deflection limit**  
0.10 mm (0.0039 in)

- a. Remove the brake disc with bracket.  
Refer to "REAR AXLE AND REAR AXLE HUB" on page 4-16.
- b. Hold the dial gauge at a right angle against the brake disc surface.
- c. Measure the deflection 9.0 mm (0.35 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.

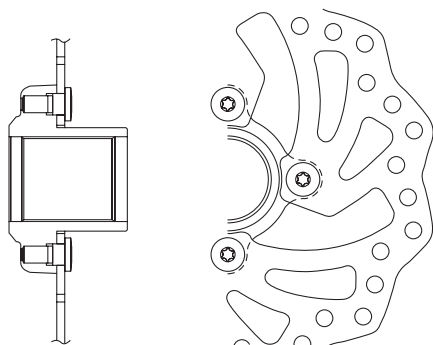


**Brake disc thickness limit**  
3.5 mm (0.138 in)

5. Adjust:
    - Brake disc deflection
- a. Remove the brake disc.
  - b. Rotate the brake disc by one bolt hole.
  - c. Install the brake disc.

### TIP

- Install the brake disc as shown in the illustration.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



**Brake disc bolt**  
**33 Nm (3.3 m·kgf, 24 ft·lbf)**  
**LOCTITE®**

- 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:
  - Rear wheel
 Refer to "INSTALLING THE REAR WHEELS" on page 4-15.

EAS22580

## REPLACING THE REAR BRAKE PADS

### TIP

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

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



**Brake pad lining thickness (inner)**  
**5.4 mm (0.21 in)**  
**Limit**  
**1.0 mm (0.04 in)**  
**Brake pad lining thickness (outer)**  
**5.4 mm (0.21 in)**  
**Limit**  
**1.0 mm (0.04 in)**



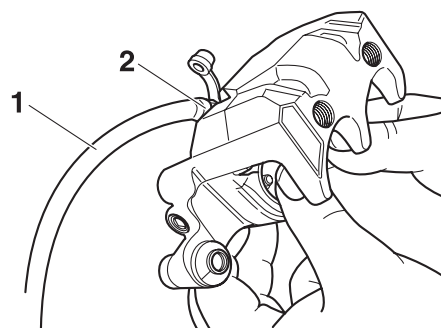
2. Install:
  - Brake pads
  - Brake pad spring

### TIP

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



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



- c. Tighten the bleed screw.

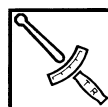


**Bleed screw**  
**6 Nm (0.6 m·kgf, 4.3 ft·lbf)**

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

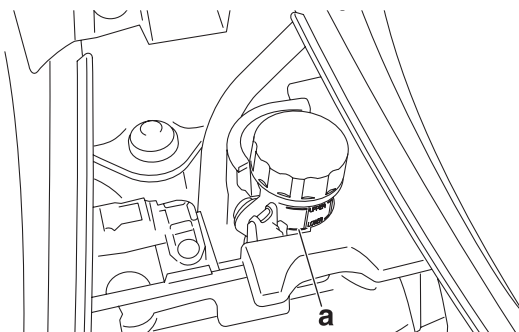


3. Install:
  - Brake pad retaining bolts
  - Brake caliper



**Brake pad retaining bolt**  
**17 Nm (1.7 m·kgf, 12 ft·lbf)**  
**LOCTITE®**  
**Brake caliper bolt**  
**43 Nm (4.3 m·kgf, 31 ft·lbf)**

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



5. Check:
  - Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

EAS22590

## REMOVING THE REAR BRAKE CALIPER

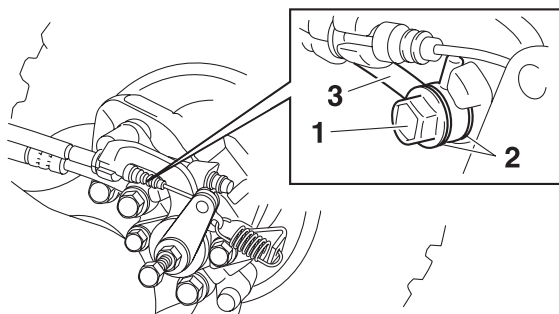
### TIP

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

1. Disconnect:
  - Parking brake cable (handlebar side)  
Refer to “HANDLEBAR” on page 4-49.
  - Parking brake cable (caliper side)
2. Remove:
  - Union bolt “1”
  - Copper washers “2”
  - Brake hose “3”

### TIP

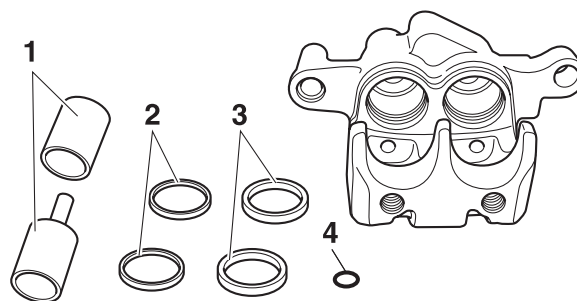
Put the end of the brake hose into a container and pump out the brake fluid carefully.



EAS22630

## DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
  - Brake caliper pistons “1”
  - Brake caliper piston dust seals “2”
  - Brake caliper piston seals “3”
  - O-ring “4”

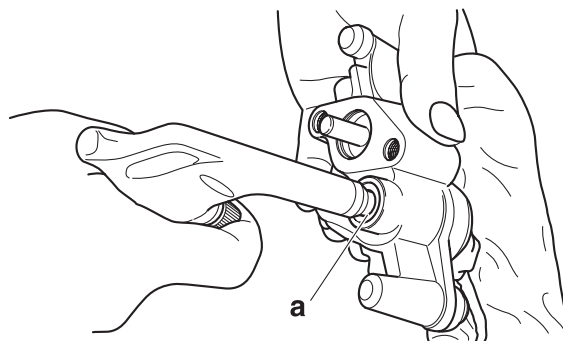


- a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA13550

### WARNING

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



- b. Remove the brake caliper piston dust seals, brake caliper piston seals and O-ring.



EAS22640

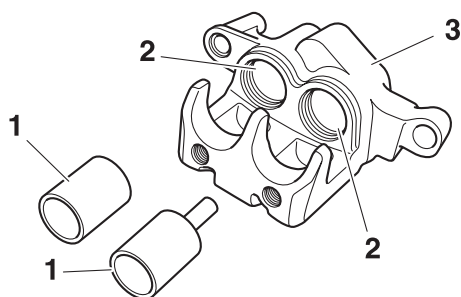
## CHECKING THE REAR BRAKE CALIPER

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



## 1. Check:

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



EWA18P1012

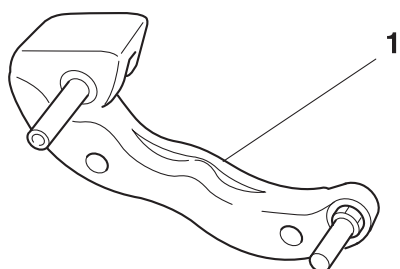


**WARNING**

**Whenever a brake caliper is disassembled, replace the brake caliper piston seals, brake caliper piston dust seals and O-ring.**

## 2. Check:

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



EAS22660

## ASSEMBLING THE REAR BRAKE CALIPER

EWA18P1013



**WARNING**

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

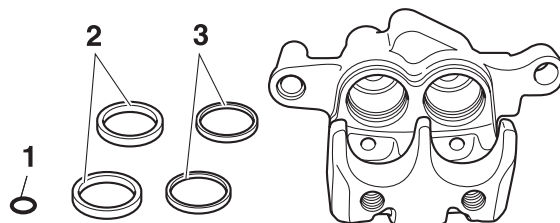
seals, brake caliper piston dust seals and O-ring.



**Recommended brake fluid  
DOT 4**

## 1. Install:

- O-ring “1” **New**
- Brake caliper piston seals “2” **New**
- Brake caliper piston dust seals “3” **New**



## 2. Install:

- Brake caliper pistons

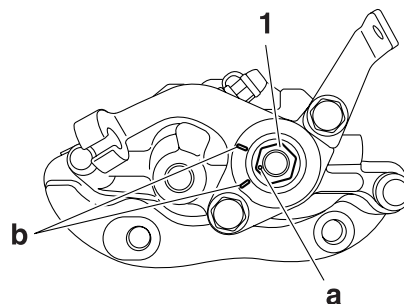


## 3. Install:

- Parking brake shaft “1”

## TIP

Screw the parking brake shaft all the way into the parking brake case, making sure that the punch mark “a” in the shaft is between the embossed marks “b” on the case.

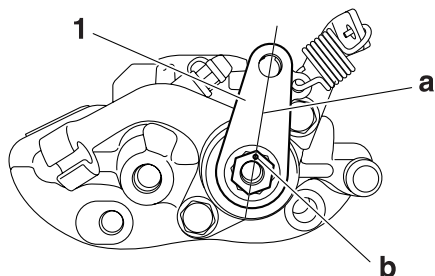


## 4. Install:

- Parking brake arm “1”

## TIP

Align the center “a” of the parking brake arm with the punch mark “b” in the parking brake shaft as shown.

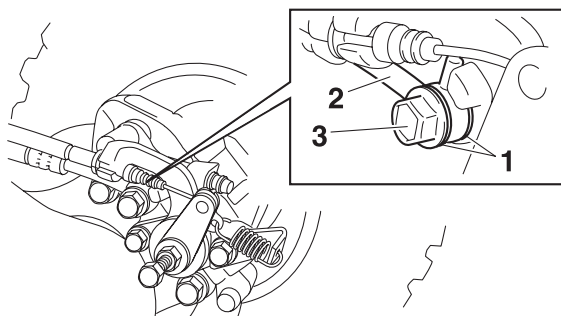


EAS22670

## INSTALLING THE REAR BRAKE CALIPER

### 1. Install:

- Brake caliper (temporarily)
- Copper washers “1” **New**
- Brake hose “2”
- Union bolt “3”



**Brake hose union bolt**  
30 Nm (3.0 m·kgf, 22 ft·lbf)

EWA13530

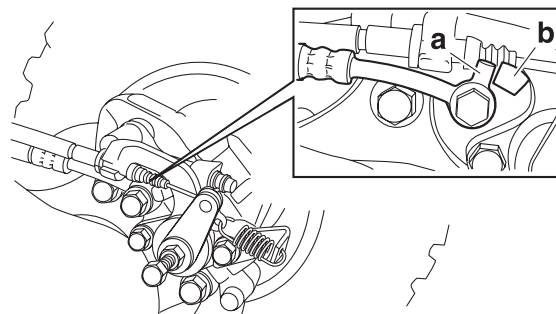


**WARNING**  
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-33.

ECA18P1010

## NOTICE

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



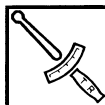
### 2. Remove:

- Brake caliper

### 3. Install:

- Brake pads
- Brake pad spring
- Brake pad retaining bolts
- Brake caliper

Refer to “REPLACING THE REAR BRAKE PADS” on page 4-42.



**Brake pad retaining bolt**  
17 Nm (1.7 m·kgf, 12 ft·lbf)  
**LOCTITE®**  
**Brake caliper bolt**  
43 Nm (4.3 m·kgf, 31 ft·lbf)

### 4. Fill:

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



**Recommended brake fluid**  
**DOT 4**

EWA13090



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

ECA13540

## NOTICE

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

### 5. Bleed:

- Brake system

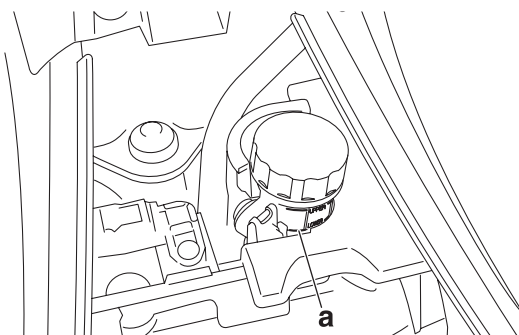
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

### 6. Check:

- Brake fluid level

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

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



### 7. Check:

- Brake pedal operation

Soft or spongy feeling → Bleed the brake system.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

### 8. Adjust:

- Parking brake cable end length

Refer to “ADJUSTING THE PARKING BRAKE” on page 3-23.

EAS22700

## REMOVING THE REAR BRAKE MASTER CYLINDER

### TIP

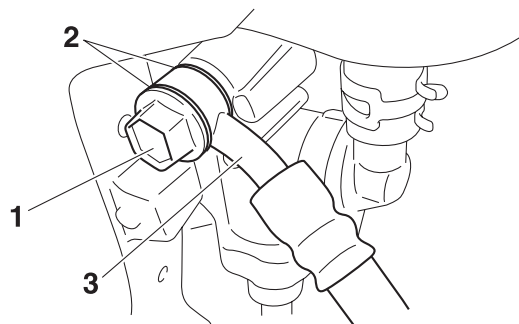
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

### 1. Remove:

- Union bolt “1”
- Copper washers “2”
- Brake hose “3”

### TIP

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

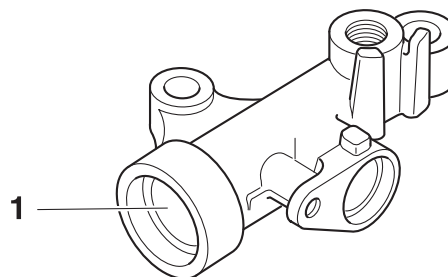


EAS22720

## CHECKING THE REAR BRAKE MASTER CYLINDER

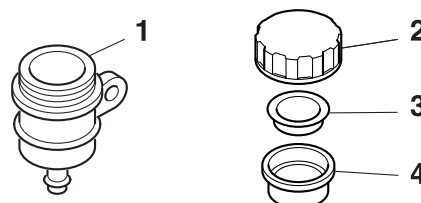
### 1. Check:

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



### 2. Check:

- Brake fluid reservoir “1”
- Brake fluid reservoir cap “2”  
Cracks/damage → Replace.
- Brake fluid reservoir diaphragm holder “3”
- Brake fluid reservoir diaphragm “4”  
Damage/wear → Replace.



### 3. Check:

- Brake hose  
Cracks/damage/wear → Replace.

EAS22730

## ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

### WARNING

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



Recommended brake fluid  
DOT 4

EAS22740

## INSTALLING THE REAR BRAKE MASTER CYLINDER

### 1. Install:

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



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

EWA13530

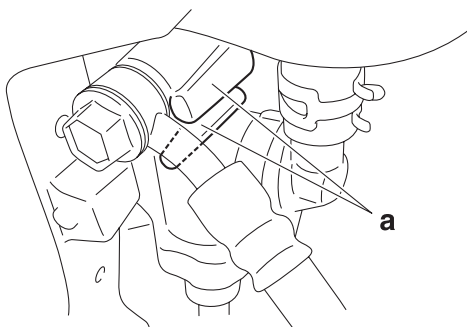
### WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-33.

ECA18P1011

### **NOTICE**

Install the brake pipe by fitting to the projection “a” on the rear brake master cylinder.



### 2. Fill:

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



Recommended brake fluid  
DOT 4

EWA13090

### WARNING

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

ECA13540

### **NOTICE**

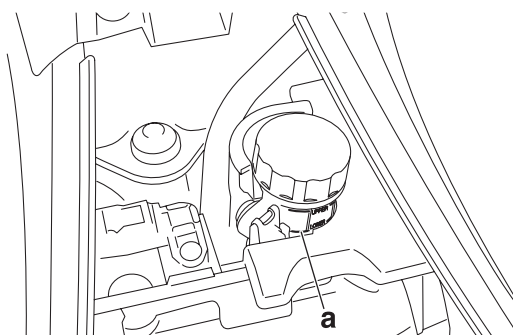
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

### 3. Bleed:

- Brake system  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

### 4. Check:

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



### 5. Check:

- Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-24.

### 6. Adjust:

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

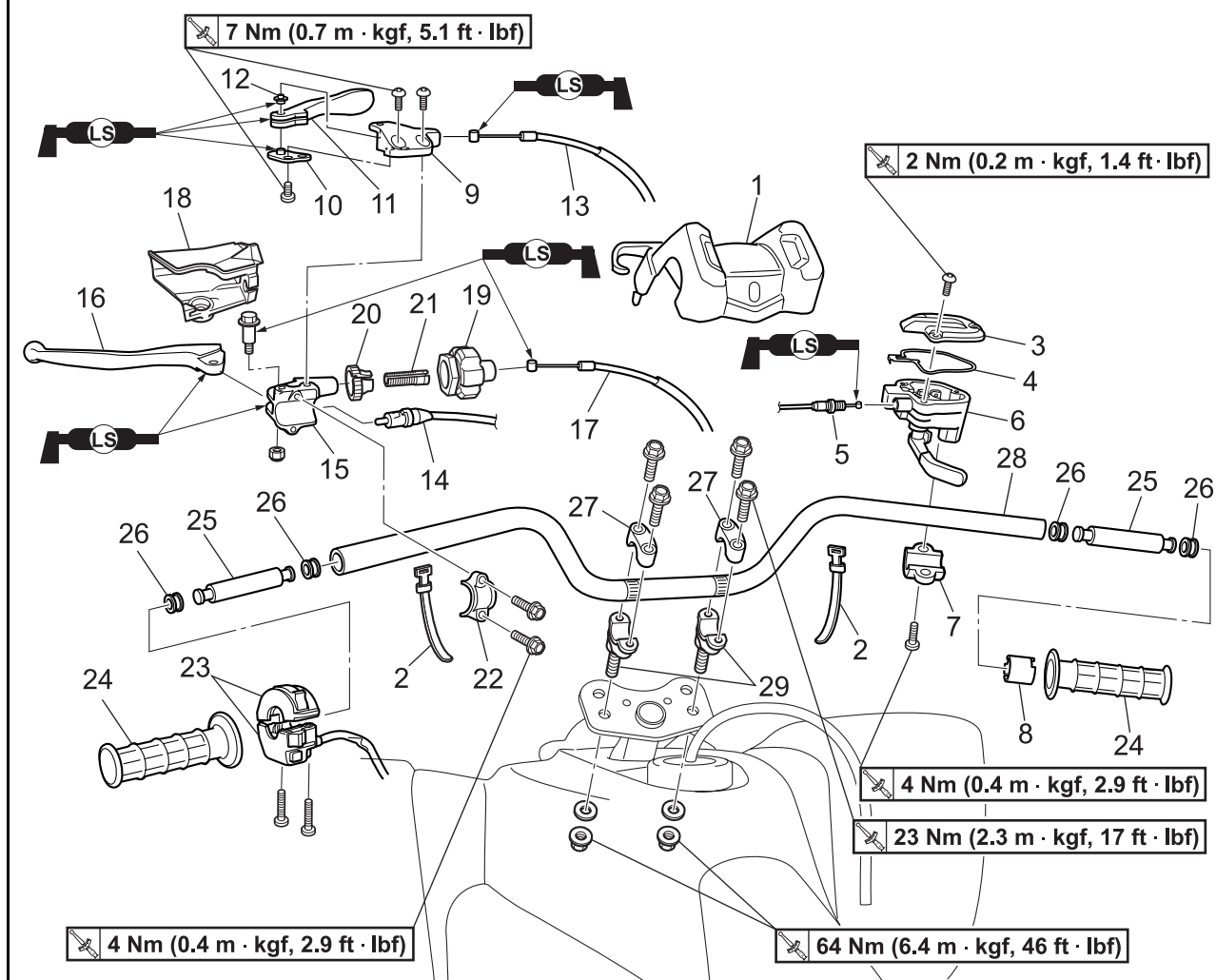


**Brake pedal position (from foot-rest)**  
**11.7 mm (0.46 in)**

7. Adjust:

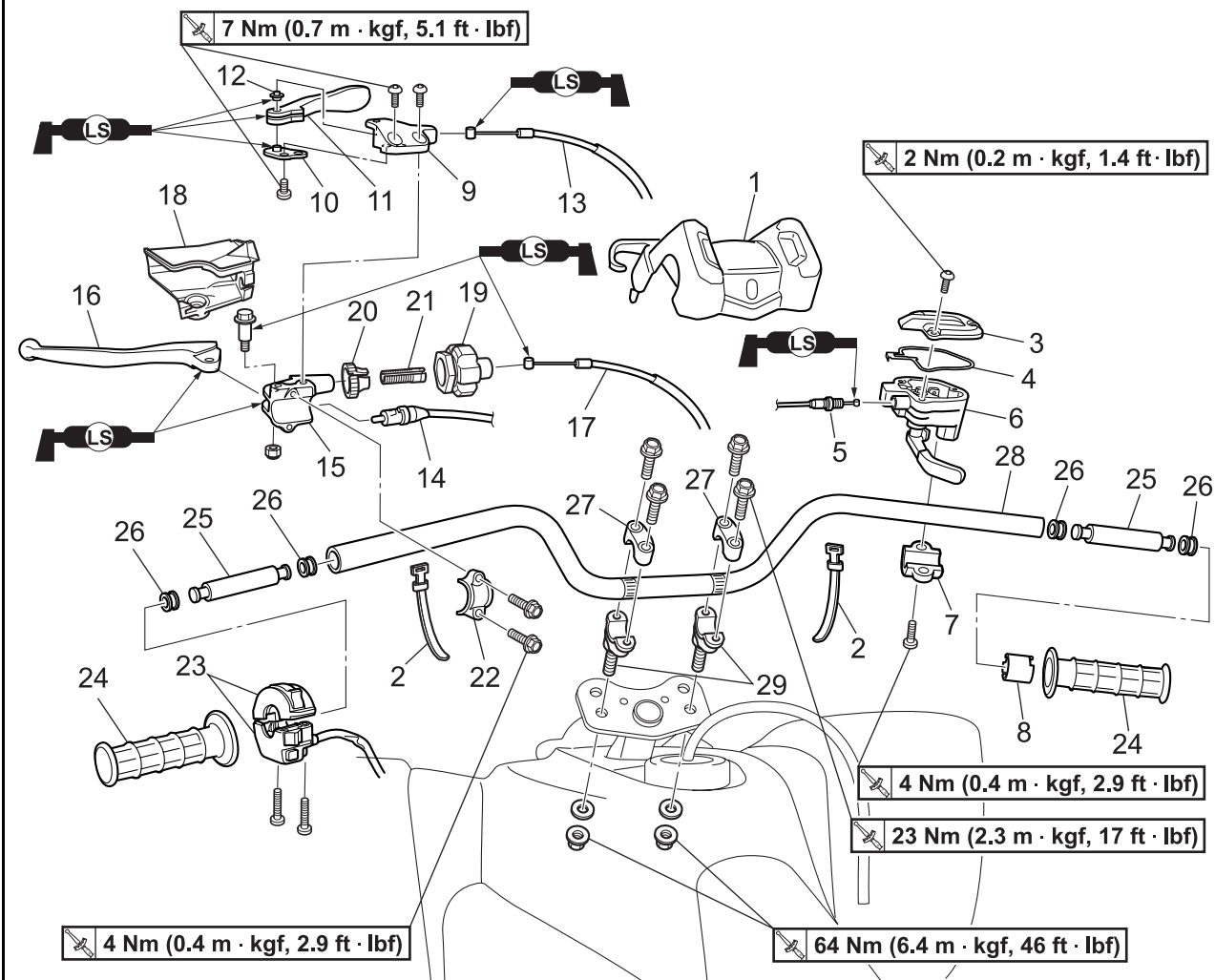
- Rear brake light operation timing  
Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-24.

EAS22840

**HANDLEBAR****Removing the handlebar**

Order	Job/Parts to remove	Q'ty	Remarks
	Front brake master cylinder assembly		Refer to "FRONT BRAKE" on page 4-22.
1	Handlebar protector	1	
2	Plastic band	2	
3	Throttle lever body cap	1	
4	Throttle lever body gasket	1	
5	Throttle cable	1	Disconnect.
6	Throttle lever body	1	
7	Throttle lever bracket	1	
8	Spacer	1	
9	Parking brake lever bracket	1	
10	Parking brake lever guide plate	1	
11	Parking brake lever	1	
12	Parking brake lever collar	1	
13	Parking brake cable	1	Disconnect.
14	Clutch switch	1	Disconnect.
15	Clutch lever holder	1	
16	Clutch lever	1	
17	Clutch cable	1	Disconnect.

## Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
18	Clutch lever cover	1	
19	Clutch lever adjusting dial cover	1	
20	Clutch lever adjusting dial	1	
21	Clutch lever adjusting bolt	1	
22	Clutch lever bracket	1	
23	Handlebar switch	1	
24	Handlebar grip	2	
25	Handlebar weight	2	
26	Handlebar weight grommet	4	
27	Upper handlebar holder	2	
28	Handlebar	1	
29	Lower handlebar holder	2	
			For installation, reverse the removal procedure.



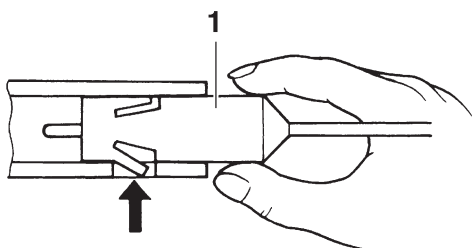
EAS22860

## REMOVING THE HANDLEBAR

1. Remove:
  - Clutch switch "1"

### TIP

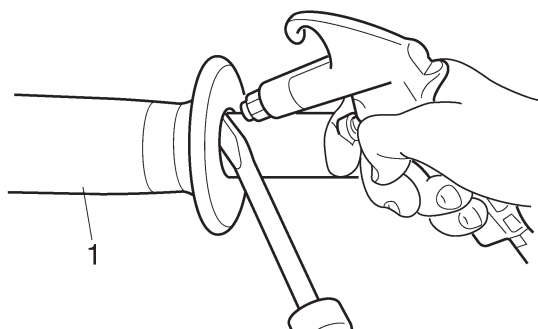
Push the fastener when removing the clutch switch out of the clutch lever holder.



2. Remove:
  - Handlebar grip "1"

### TIP

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



EAS22880

## CHECKING THE HANDLEBAR

1. Check:
  - Handlebar "1"

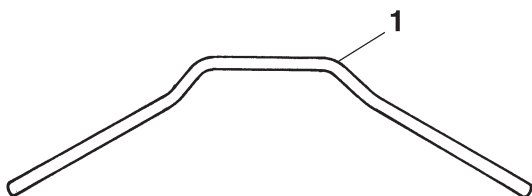
Bends/cracks/damage → Replace.

EWA13690



**WARNING**

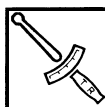
Do not attempt to straighten a bent handlebar as this may dangerously weaken it.



EAS22911

## INSTALLING THE HANDLEBAR

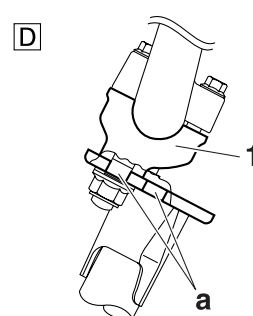
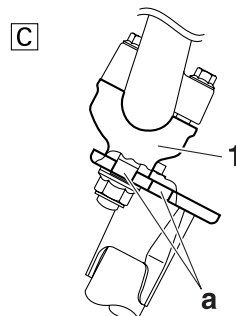
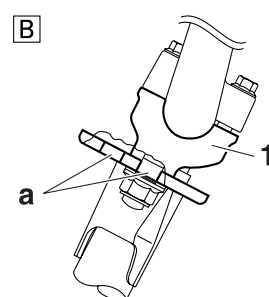
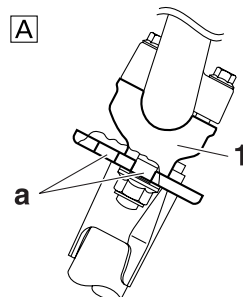
1. Install:
  - Lower handlebar holders "1"



**Lower handlebar holder nut**  
64 Nm (6.4 m·kgf, 46 ft·lbf)

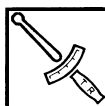
### TIP

The handlebar can be adjusted to the following 4 positions by turning the lower handlebar holder "1" front-back and changing the mounting hole positions "a".



- A. standard position
- B. 10 mm (0.39 in) backward position
- C. 20 mm (0.79 in) forward position
- D. 10 mm (0.39 in) forward position

2. Install:
  - Handlebar
  - Upper handlebar holders



**Upper handlebar holder bolt**  
23 Nm (2.3 m·kgf, 17 ft·lbf)

### TIP

- When installing the handlebar, make sure the projections "a" on the upper handlebar holder and handlebar indicators "b" are set symmetrical (in the axis direction).
- Install the upper handlebar holder with its projection "a" set at the center "c" of the handlebar indicator "b". Angle of installing the



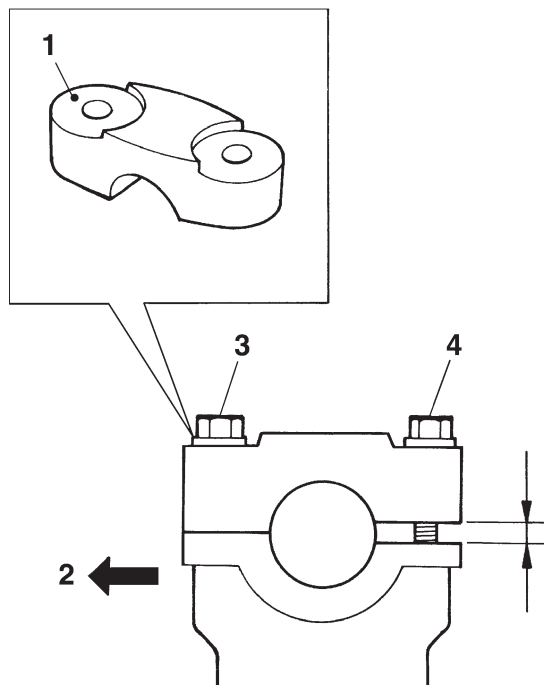
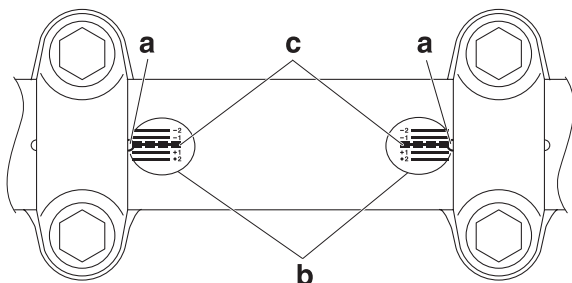
handlebar is adjustable within the indicator (in the rotating direction).

- The upper handlebar holders should be installed with the punched mark “1” forward “2”.

ECA18P1012

## NOTICE

**First, tighten the bolts “3” on the front side of the handlebar holder, and then the bolts “4” on the rear side.**



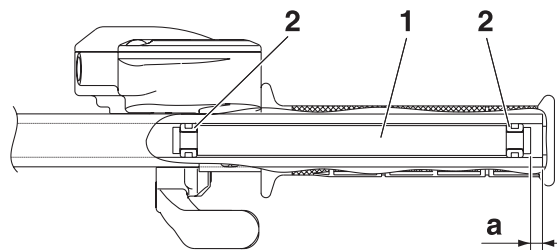
3. Install:
- Handlebar weight “1”
  - Handlebar weight grommet “2”



**Installed depth of weight “a”  
5.0–10.0 mm (0.20–0.39 in)**

## TIP

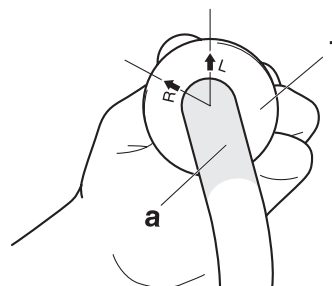
Apply adhesive to the handlebar weight grommet.



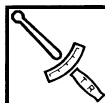
4. Install:
- Handlebar grips “1”

## TIP

- Before applying the adhesive, wipe off grease or oil on the handlebar surface “a” with a lacquer thinner.
- Install the handlebar grips so that the “L” arrow on the left grip and “R” arrow on the right grip are placed vertically.



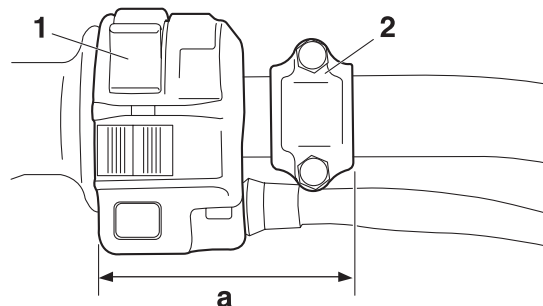
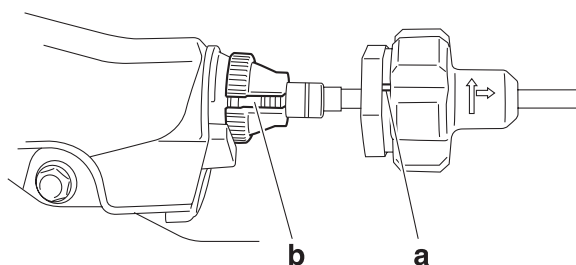
5. Install:
- Handlebar switch “1”
  - Clutch lever assembly
  - Clutch lever bracket “2”



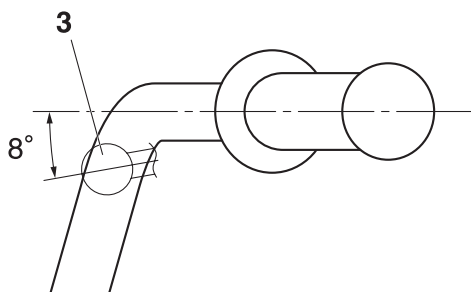
**Clutch lever bracket bolt  
4 Nm (0.4 m·kgf, 2.9 ft·lbf)**

## TIP

- When installing the clutch lever adjusting dial cover, align the mark “a” to the slit “b” of the clutch lever adjusting dial.
- Install the clutch lever bracket as shown.
- Install the clutch lever “3” at 8° angle as shown.



a. 68–69 mm (2.68–2.72 in)



6. Install:

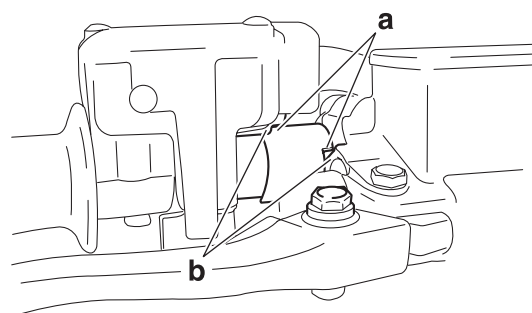
- Brake master cylinder  
Refer to “INSTALLING THE FRONT BRAKE MASTER CYLINDER” on page 4-32.
- Throttle lever assembly
- Spacer



**Brake master cylinder bracket bolt**  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**TIP**

Engage the indentations “a” in the spacer with the lobes “b” on the throttle lever assembly and brake master cylinder.



7. Install:

- Clutch switch
- Front brake light switch

8. Adjust:

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



**Clutch lever free play (lever end)**  
8.0–13.0 mm (0.31–0.51 in)

9. Adjust:

- Throttle lever free play  
Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-7.

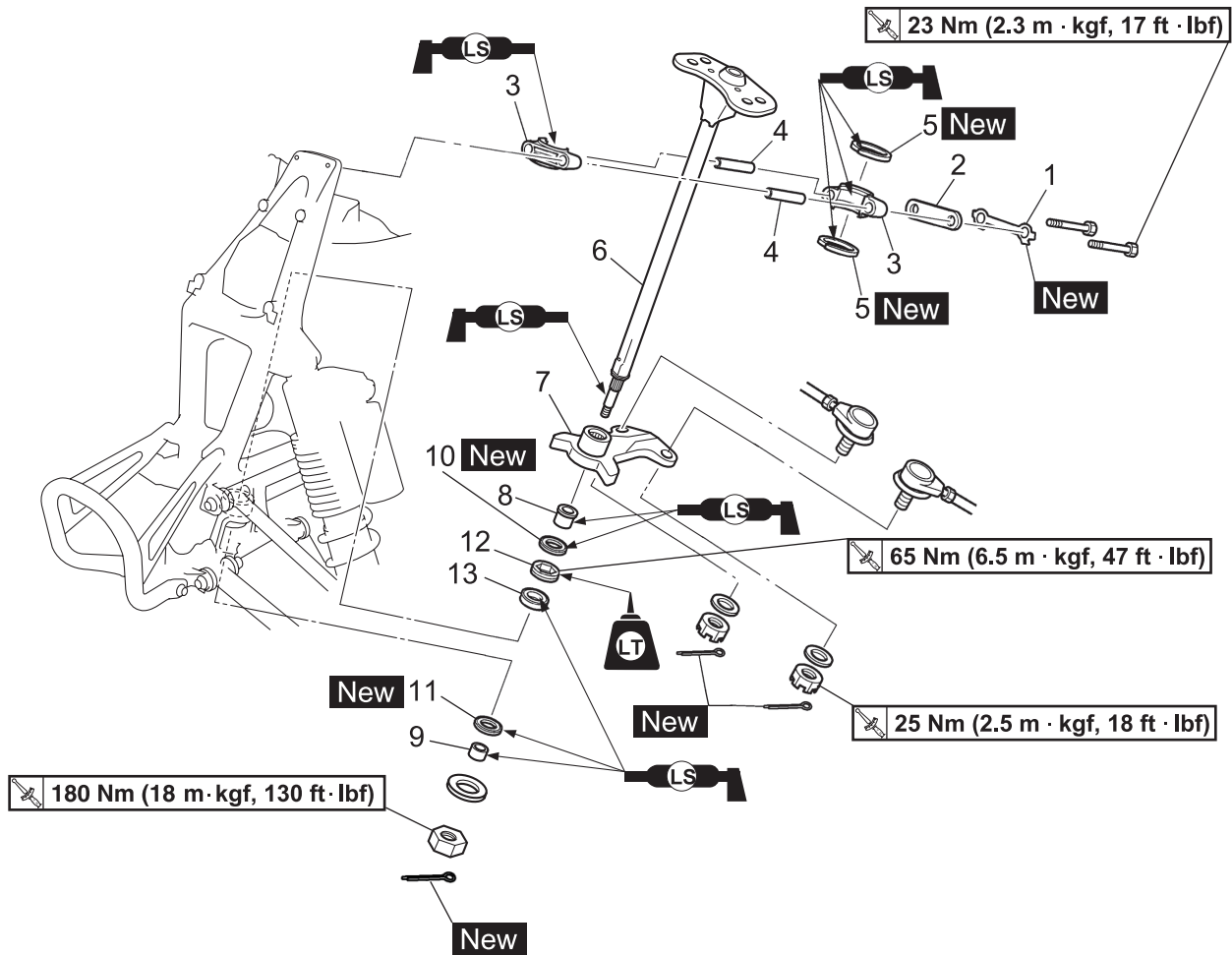


**Throttle lever free play**  
2.0–4.0 mm (0.08–0.16 in)

EAS29540

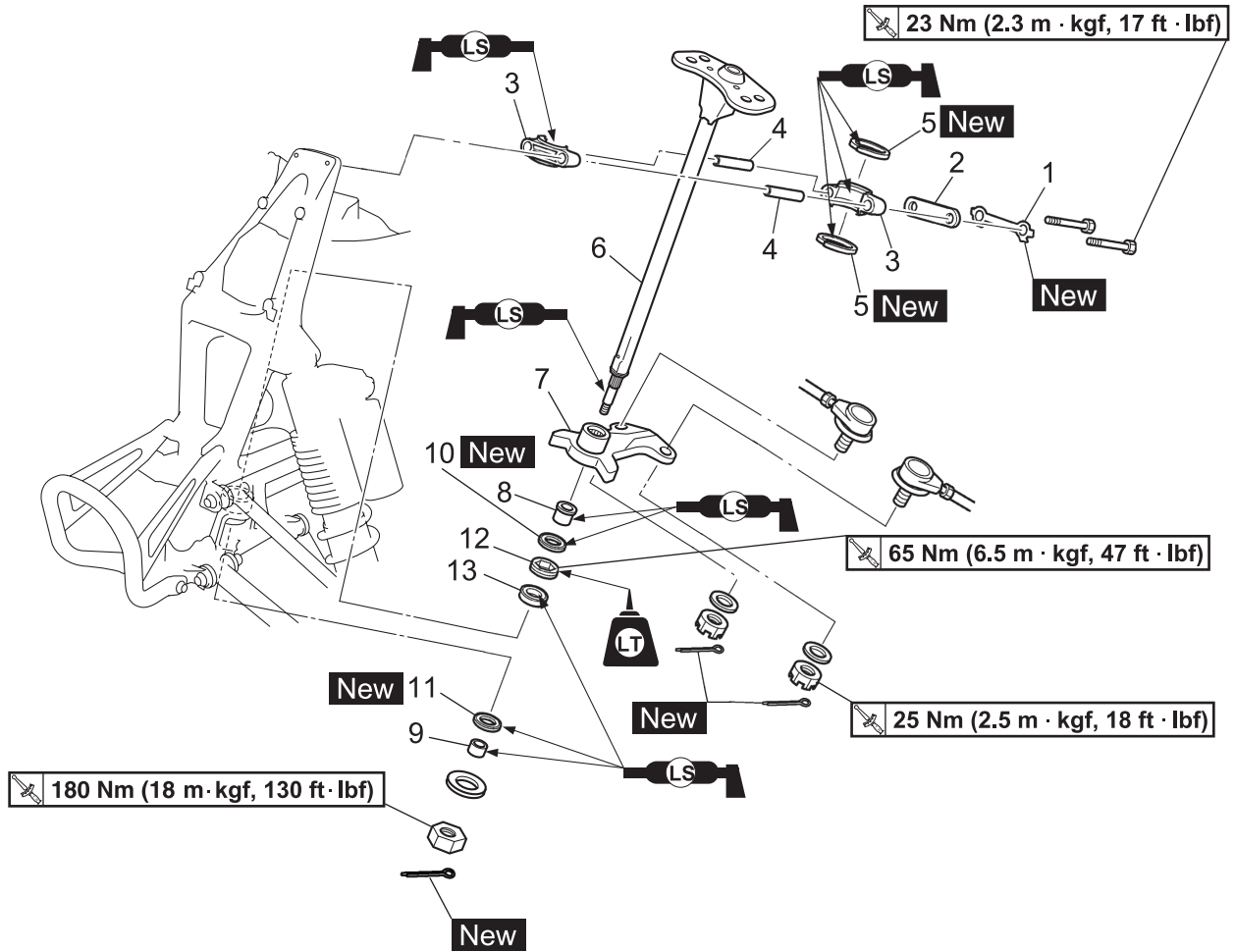
## STEERING STEM

### Removing the steering stem



Order	Job/Parts to remove	Q'ty	Remarks
	Front fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Handlebar		Refer to "HANDLEBAR" on page 4-49.
	Tie-rod (pitman arm side)		Disconnect. Refer to "TIE-RODS AND STEERING KNUCKLES" on page 4-57.
1	Lock washer	1	
2	Bracket	1	
3	Steering stem bushing	2	
4	Spacer	2	
5	Oil seal	2	
6	Steering stem	1	
7	Pitman arm	1	
8	Collar	1	
9	Collar	1	
10	Oil seal	1	
11	Oil seal	1	
12	Bearing retainer	1	
13	Bearing	1	

## Removing the steering stem



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

EAS29550

## REMOVING THE BEARING RETAINER

1. Remove:
  - Bearing retainer



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

EAS29560

## CHECKING THE STEERING STEM

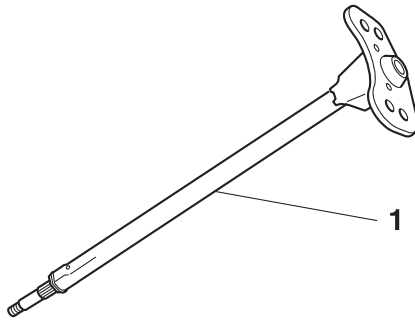
1. Check:
  - Steering stem "1"
 Bends → Replace.

EWA15030

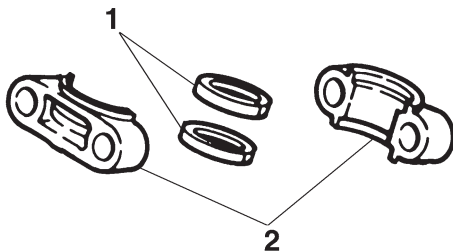


**WARNING**

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



2. Check:
  - Oil seals "1" **New**
  - Steering stem bushings "2"
 Wear/damage → Replace.



EAS29570

## INSTALLING THE BEARING RETAINER

1. Install:
  - Bearing retainer



**Bearing retainer**  
65 Nm (6.5 m·kgf, 47 ft·lbf)

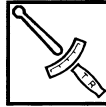


**Damper rod holder (30 mm)**  
90890-01327  
YM-01327

EAS18P1017

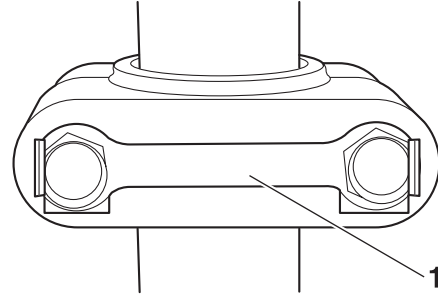
## INSTALLING THE STEERING STEM

1. Install:
  - Lock washer "1" **New**
  - Steering stem bushing bolts

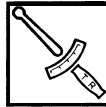


**Steering stem bushing bolt**  
23 Nm (2.3 m·kgf, 17 ft·lbf)

2. Bend the lock washer tabs along a flat side of the bolts.



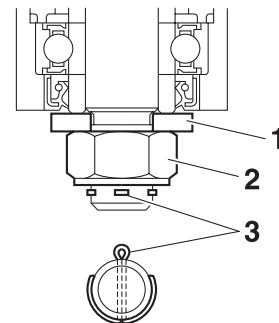
3. Install:
  - Washer "1"
  - Steering stem nut "2"
  - Cotter pin "3" **New**



**Steering stem nut**  
180 Nm (18 m·kgf, 130 ft·lbf)

### TIP

- Make sure that the threads of the steering stem, washers, nuts, and the installation surfaces of the pitman arm are free of grease and oil.
- Bend the cotter pin as shown in the illustration.



# TIE-RODS AND STEERING KNUCKLES

EAS29660

## TIE-RODS AND STEERING KNUCKLES

### Removing the tie-rods and steering knuckles

**25 Nm (2.5 m · kgf, 18 ft · lbf)**

**New**

**2**

**New**

**3**

**New**

**25 Nm (2.5 m · kgf, 18 ft · lbf)**

**1**

Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the tie-rods and steering knuckles.
	Front wheel		Refer to "FRONT WHEEL" on page 4-11.
	Front brake caliper		Refer to "FRONT BRAKE" on page 4-22.
	Brake disc		Refer to "FRONT BRAKE" on page 4-22.
1	Brake disc guard (inner)	1	
2	Tie-rod	1	
3	Steering knuckle	1	
			For installation, reverse the removal procedure.

EAS29670

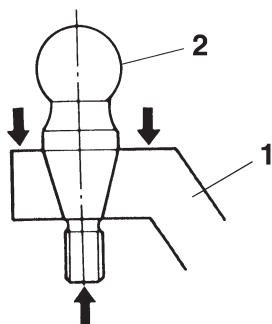
## REMOVING THE STEERING KNUCKLES

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.

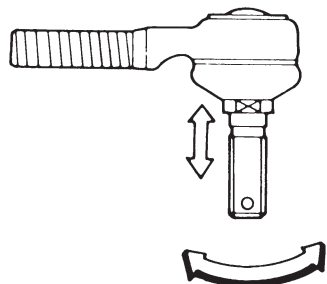


EAS29680

## CHECKING THE TIE-RODS

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

1. Check:
  - Tie-rod free play and movement  
Free play → Replace the tie-rod end.  
Turns roughly → Replace the tie-rod end.
2. Check:
  - Tie-rod  
Bends/damage → Replace.

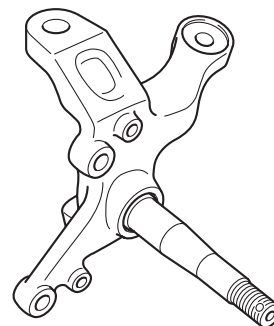


EAS29690

## CHECKING THE STEERING KNUCKLES

The following procedure applies to both of the steering knuckles.

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

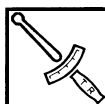


EAS18P1029

## INSTALLING THE STEERING KNUCKLES

The following procedure applies to both of the steering knuckles.

1. Install:
  - Steering knuckle



**Steering knuckle nut**  
**25 Nm (2.5 m·kgf, 18 ft·lbf)**

### TIP

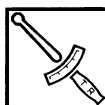
Do not loosen the steering knuckle nut after torquing it. If the steering knuckle nut groove is not aligned with the cotter pin hole, align the groove with the hole by tightening the steering knuckle nut.

EAS29700

## INSTALLING THE TIE-RODS

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

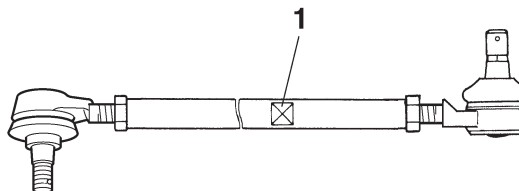
1. Install:
  - Tie-rod



**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.
- Do not loosen the tie-rod nut after torquing it. If the tie-rod nut groove is not aligned with the cotter pin hole, align the groove with the hole by tightening the tie-rod nut.
- Bend the longer cotter pin up.



2. Adjust:
  - Toe-in  
Refer to “ADJUSTING THE TOE-IN” on  
page 3-28.

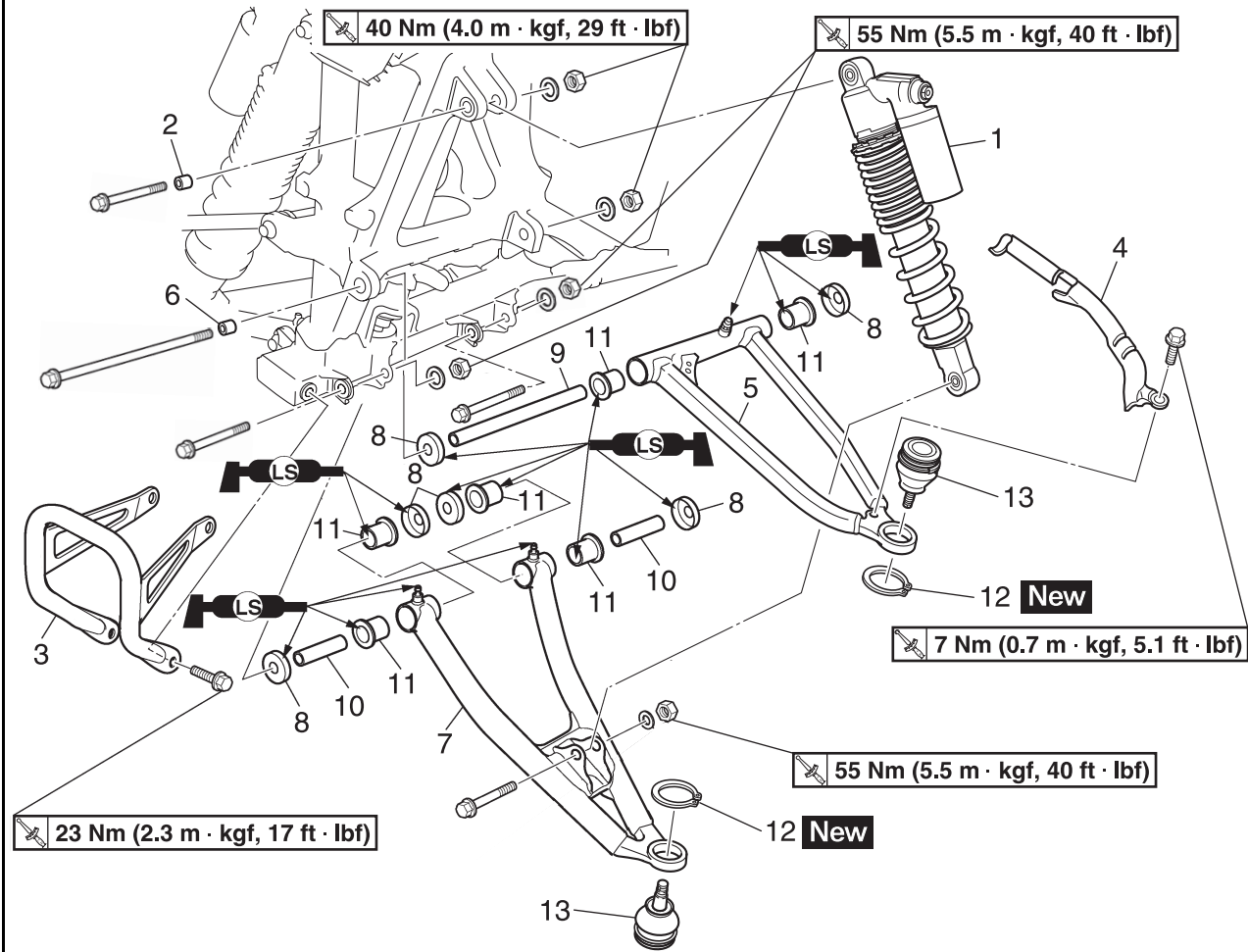


# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

EAS29710

## FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

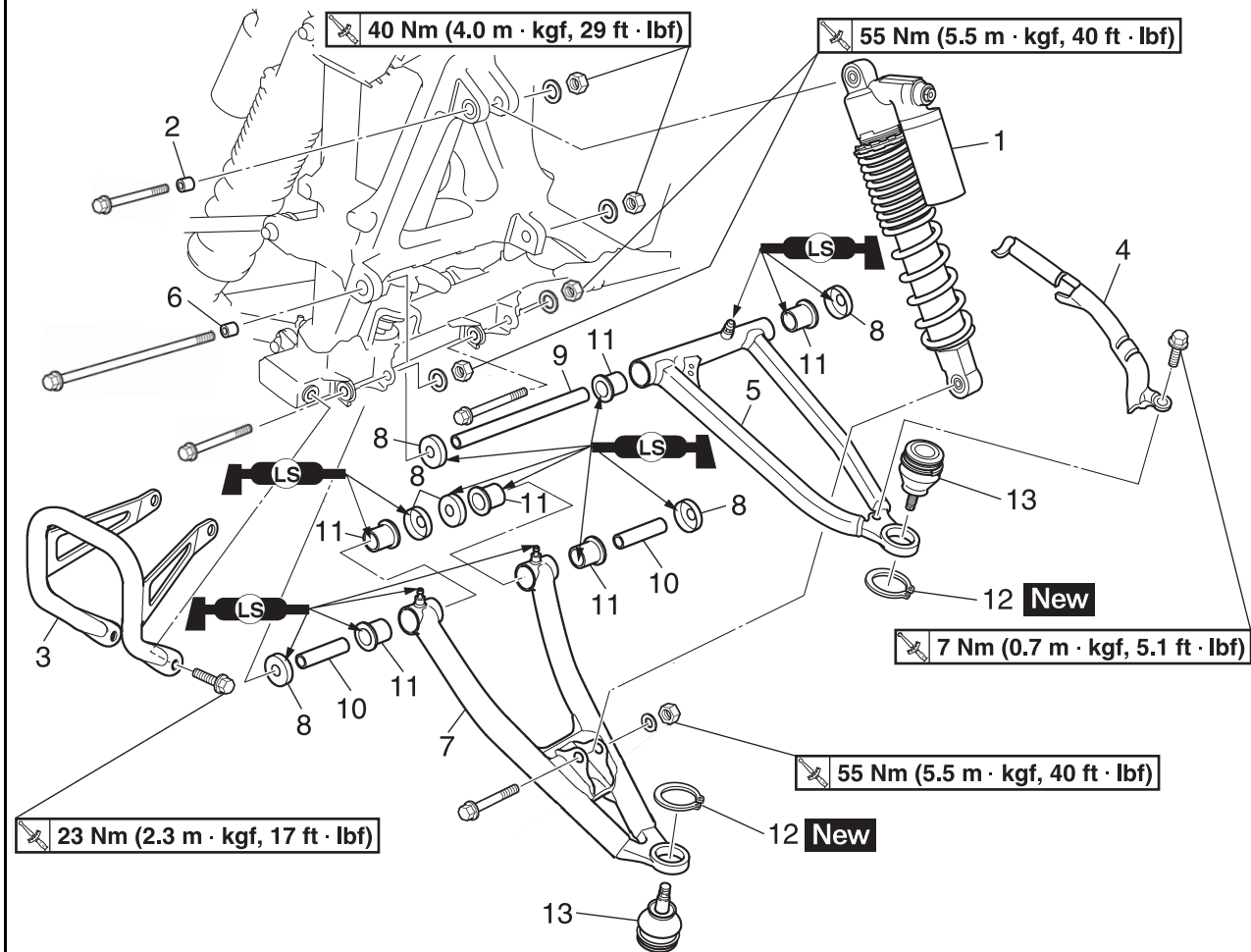
### Removing the front arms and front shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front arms and front shock absorber assemblies.
	Front fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Radiator side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Steering knuckle		Refer to "TIE-RODS AND STEERING KNUCKLES" on page 4-57.
1	Front shock absorber	1	
2	Spacer	1	
3	Front bumper	1	
4	Brake hose guide	1	
5	Front upper arm	1	
6	Spacer	1	
7	Front lower arm	1	
8	Dust cover	6	
9	Spacer	1	
10	Spacer	2	
11	Bushing	6	
12	Circlip	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
13	Front arm ball joint	2	
			For installation, reverse the removal procedure.

## FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

EAS29720

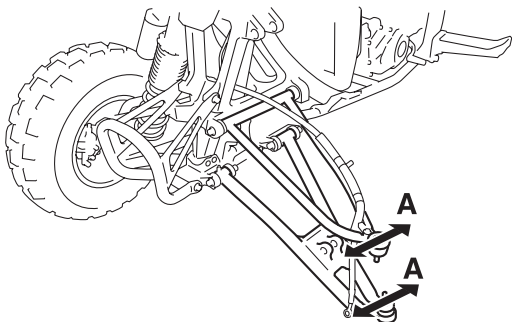
## REMOVING THE FRONT ARMS

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

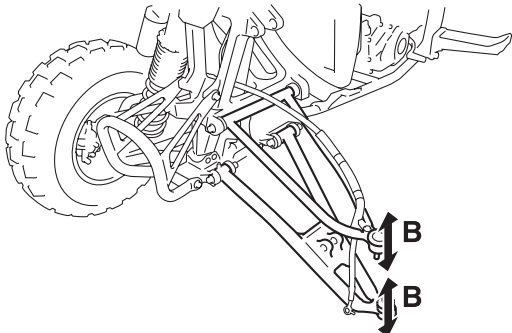
1. Check:
  - Front arm free play



- a. Check the front arm side play “A” by moving it from side to side.  
If side play is noticeable, check the bushings.



- b. Check the front 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.



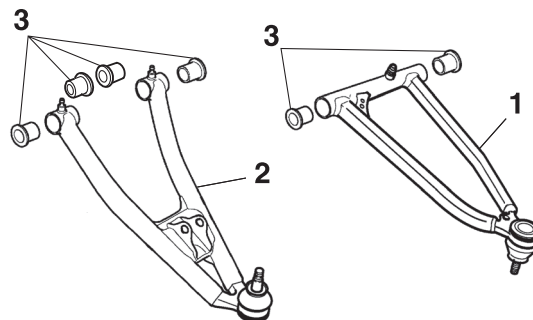
2. Remove:
  - Front arm

EAS29730

## CHECKING THE FRONT ARMS

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

1. Check:
  - Front upper arm “1”
  - Front lower arm “2”Bends/damage → Replace.
2. Check:
  - Bushings “3”Wear/damage → Replace.



EAS29740

## HANDLING THE FRONT SHOCK ABSORBER AND GAS CYLINDER

EWA18P1010



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

- Do not tamper or attempt to open the front shock absorber or gas cylinder.
- Do not subject the front shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the front shock absorber or gas cylinder in any way. If the front shock absorber, gas cylinder or both are damaged, damping performance will suffer.

EAS29750

## DISPOSING OF A FRONT SHOCK ABSORBER AND GAS CYLINDER

Gas pressure must be released before disposing of a front shock absorber.

To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the front shock absorber as shown.

EWA13760

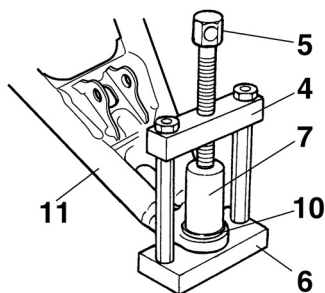


**Wear eye protection to prevent eye damage from released gas or metal chips.**



# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

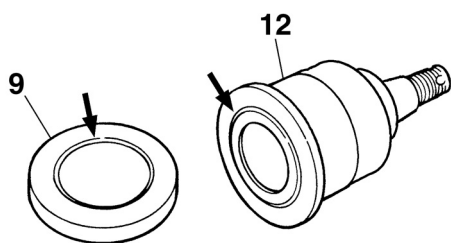
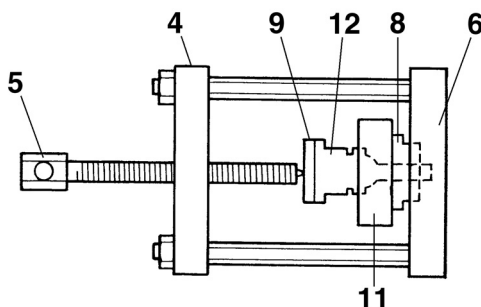
- d. Hold the body "4" in place while turning in the long bolt "5" to remove the ball joint "10" from the front arm "11".



- e. Remove the ball joint remover/installer.  
f. Attach the assembled ball joint remover/installer, new ball joint (with rubber boot and retaining ring) "12", installer spacer "8" and installer washer "9" to the front arm "11".

## TIP

- Do not tap or damage the top of the ball joint.
- Installer spacer "8" must be aligned with the projection on the head of the ball joint "12".



- g. Remove the ball joint remover/installer.  
h. Install a new circlip.

## TIP

Always use a new ball joint set.

EAS29790

## 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:

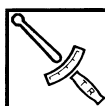
- Front upper arm
- Front lower arm
- Front shock absorber assembly

- a. Install the front upper arm and front lower arm.

## TIP

- Lubricate the front upper and lower arm dust cover and bushing inner surface with lithium-soap-based grease.
- Be sure to position the front upper and lower arm bolts so that the bolt heads face forward.
- Temporarily tighten the front upper and lower arm nuts.

- b. Install the front shock absorber assembly.



**Front shock absorber assembly upper nut**

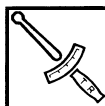
40 Nm (4.0 m·kgf, 29 ft·lbf)

**Front shock absorber assembly lower nut**

55 Nm (5.5 m·kgf, 40 ft·lbf)

- c. Install the steering knuckle.

Refer to "INSTALLING THE STEERING KNUCKLES" on page 4-58.



**Upper steering knuckle nut**

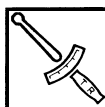
25 Nm (2.5 m·kgf, 18 ft·lbf)

**Lower steering knuckle nut**

25 Nm (2.5 m·kgf, 18 ft·lbf)

- d. Install the new cotter pins.

- e. Tighten the front upper and lower arm nuts to specification.



**Front upper arm nut**

40 Nm (4.0 m·kgf, 29 ft·lbf)

**Front lower arm nut**

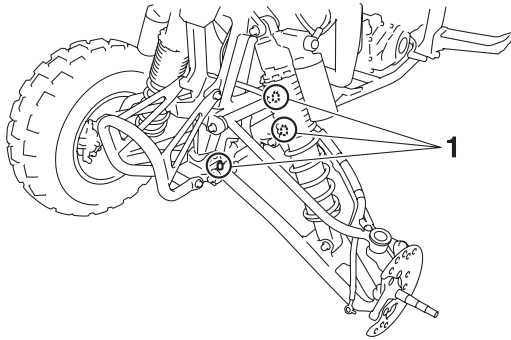
55 Nm (5.5 m·kgf, 40 ft·lbf)

## TIP

Apply lithium-soap-based grease to the grease nipple "1".

# FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

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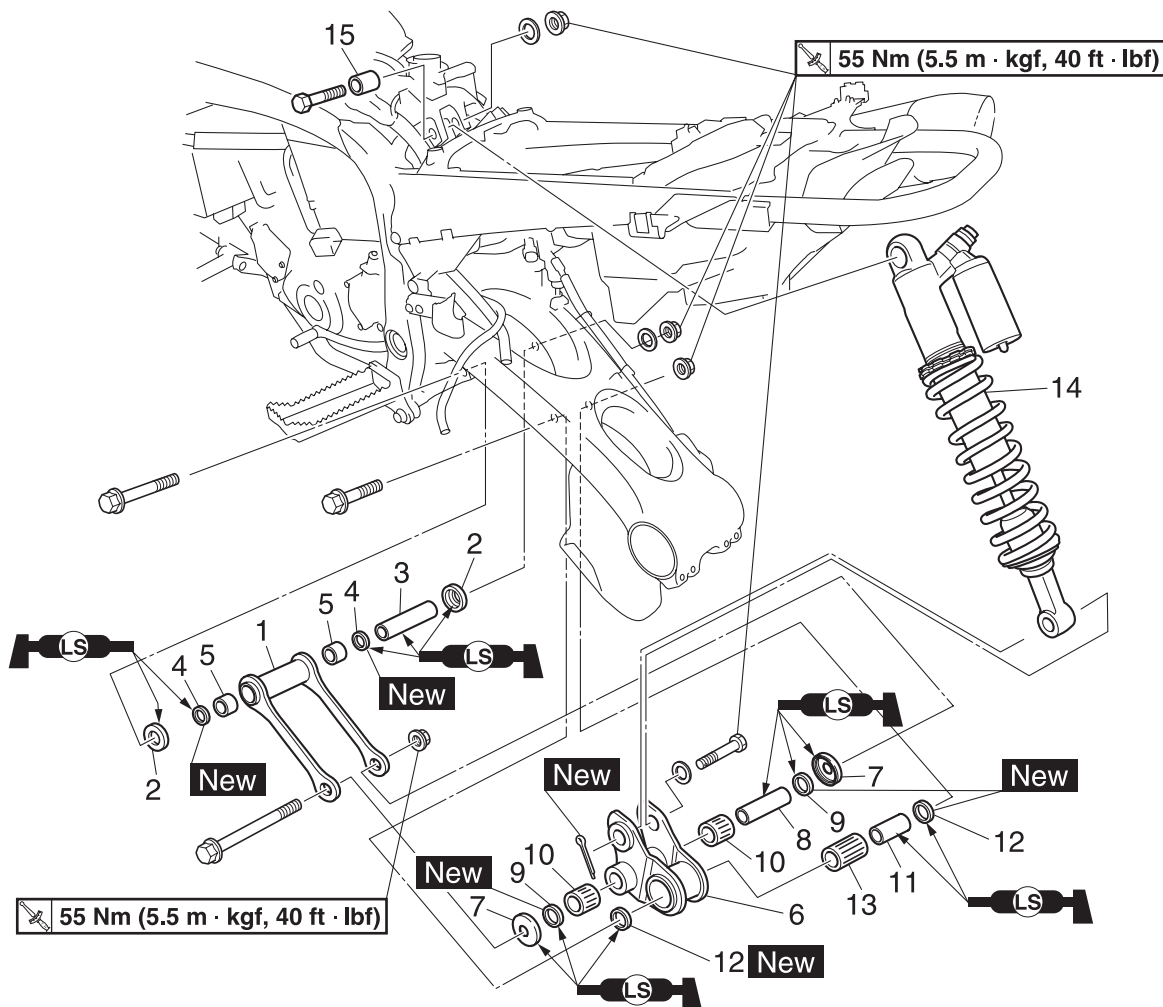


# REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

EAS18P1018

## REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

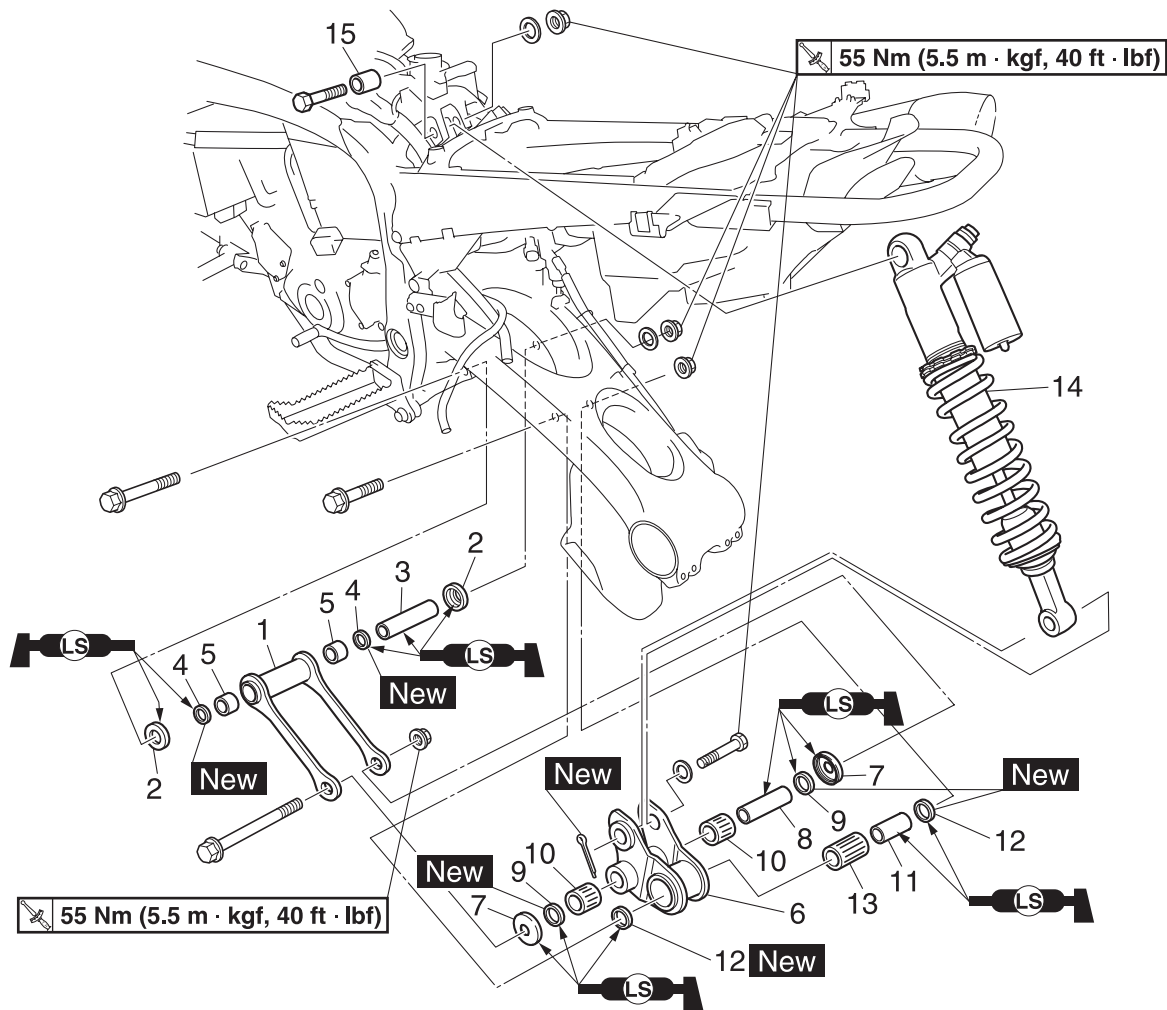
Removing the rear shock absorber assembly and relay arm



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Left foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Right foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Air filter case joint		Refer to "GENERAL CHASSIS" on page 4-1.
1	Connecting arm	1	
2	Dust cover	2	
3	Spacer	1	
4	Oil seal	2	
5	Bearing	2	
6	Relay arm	1	
7	Dust cover	2	
8	Spacer	1	
9	Oil seal	2	
10	Bearing	2	
11	Spacer	1	
12	Oil seal	2	
13	Bearing	1	
14	Rear shock absorber	1	

# REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

## Removing the rear shock absorber assembly and relay arm



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



# REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

EAS23170

## HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

EWA18P1011

### WARNING

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

- Do not tamper or attempt to open the rear shock absorber or gas cylinder.
- Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.

EAS23200

## DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

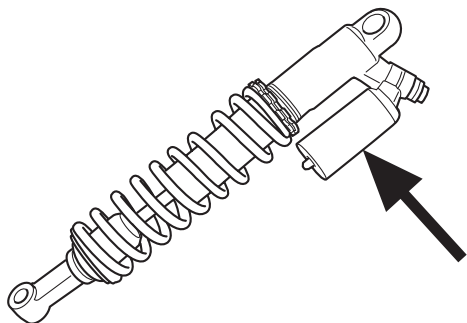
Gas pressure must be released before disposing of a rear shock absorber.

To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the rear shock absorber as shown.

EWA13760

### WARNING

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



EAS23210

## REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120

### WARNING

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

### TIP

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

2. Remove:

- Connecting arm
- Relay arm
- Rear shock absorber assembly

### TIP

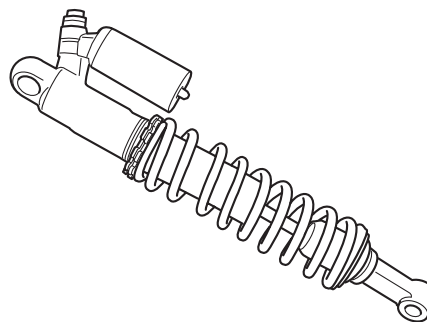
While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.

EAS23250

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:

- Rear shock absorber rod  
Bends/damage → Replace the rear shock absorber assembly.
- Rear shock absorber  
Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- Spring  
Move the spring up and down.  
Fatigue → Replace the rear shock absorber assembly.
- Gas cylinder  
Damage/gas leaks → Replace the rear shock absorber assembly.



EAS18P1033

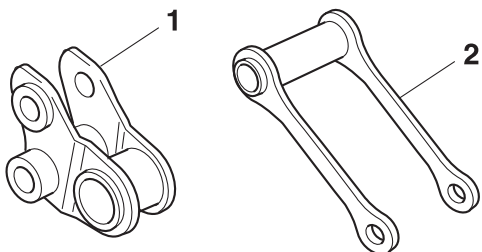
## CHECKING THE RELAY ARM AND CONNECTING ARM

1. Check:

- Relay arm “1”
- Connecting arm “2”  
Damage/wear → Replace.
- Bushings

# REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

- Spacers  
Damage/pitting/scratches → Replace.



EAS18P1034

## ASSEMBLING THE RELAY ARM AND CONNECTING ARM

### 1. Install:

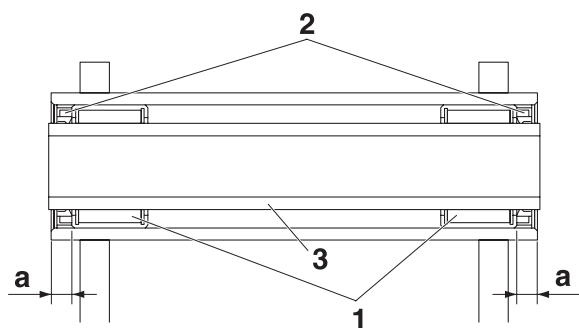
- Bearings “1”
- Oil seals **New** “2”
- Spacer “3”
- Dust covers  
(to connecting arm)



Installed depth of bearing “a”  
4.0 mm (0.16 in)

### TIP

- Install the bearing and oil seal with the character stamp turned outward.
- Insert the oil seal until it hits the bearing.
- Apply grease to the spacer and dust cover.



### 2. Install:

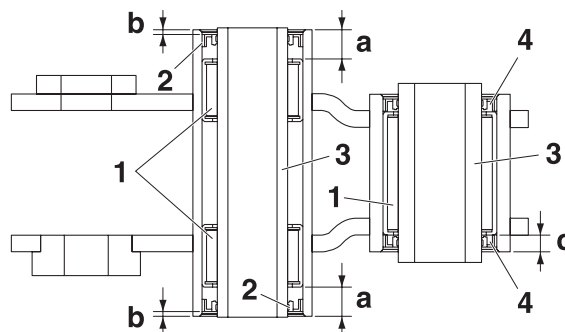
- Bearings “1”
- Oil seals **New** “2”, “4”
- Spacers “3”
- Dust covers  
(to relay arm)



Installed depth of bearing “a”  
7.0 mm (0.28 in)  
Installed depth of oil seal “b”  
1.0 mm (0.04 in)  
Installed depth of bearing “c”  
4.0 mm (0.16 in)

### TIP

- Press the bearing into the side with the character stamp using a press tool.
- Install the oil seal with the character stamp turned outward.
- Insert the oil seal “4” until it hits the bearing.
- Apply grease to the spacer and dust cover.



EAS18P1035

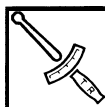
## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

### 1. Install:

- Rear shock absorber
- Relay arm
- Connecting arm

### TIP

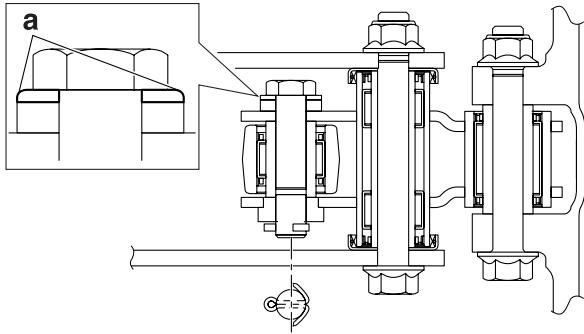
- When installing the rear shock absorber, lift up the swingarm.
- When installing the washer of the rear shock absorber lower bolt, set the blunt-edged corner “a” outside.
- Install the cotter pin and bend the ends as shown.



Rear shock absorber upper nut  
55 Nm (5.5 m·kgf, 40 ft·lbf)  
Rear shock absorber lower bolt  
55 Nm (5.5 m·kgf, 40 ft·lbf)  
Relay arm and swingarm nut  
55 Nm (5.5 m·kgf, 40 ft·lbf)  
Connecting arm and frame nut  
55 Nm (5.5 m·kgf, 40 ft·lbf)  
Relay arm and connecting arm  
nut  
55 Nm (5.5 m·kgf, 40 ft·lbf)

# REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM

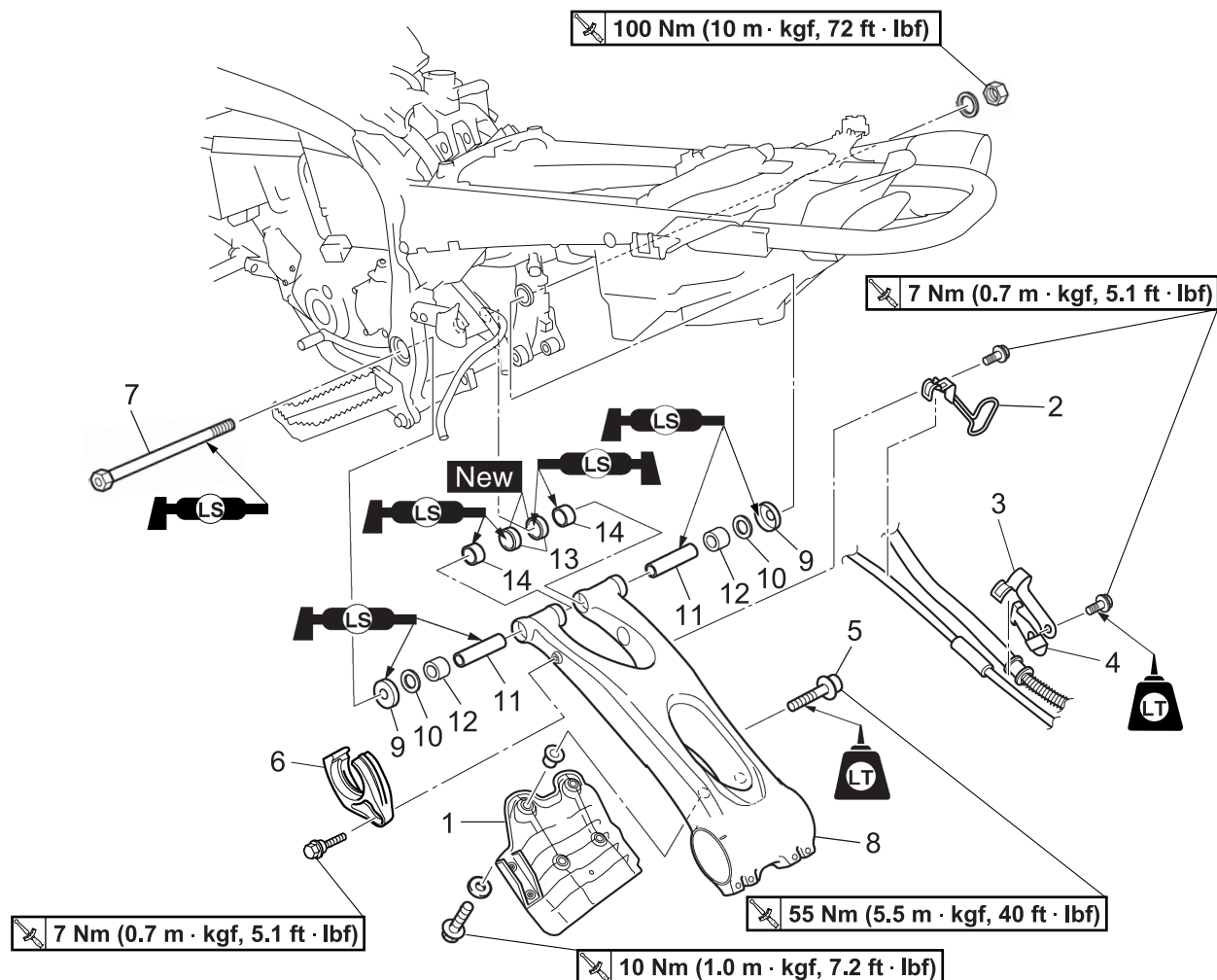
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EAS23330

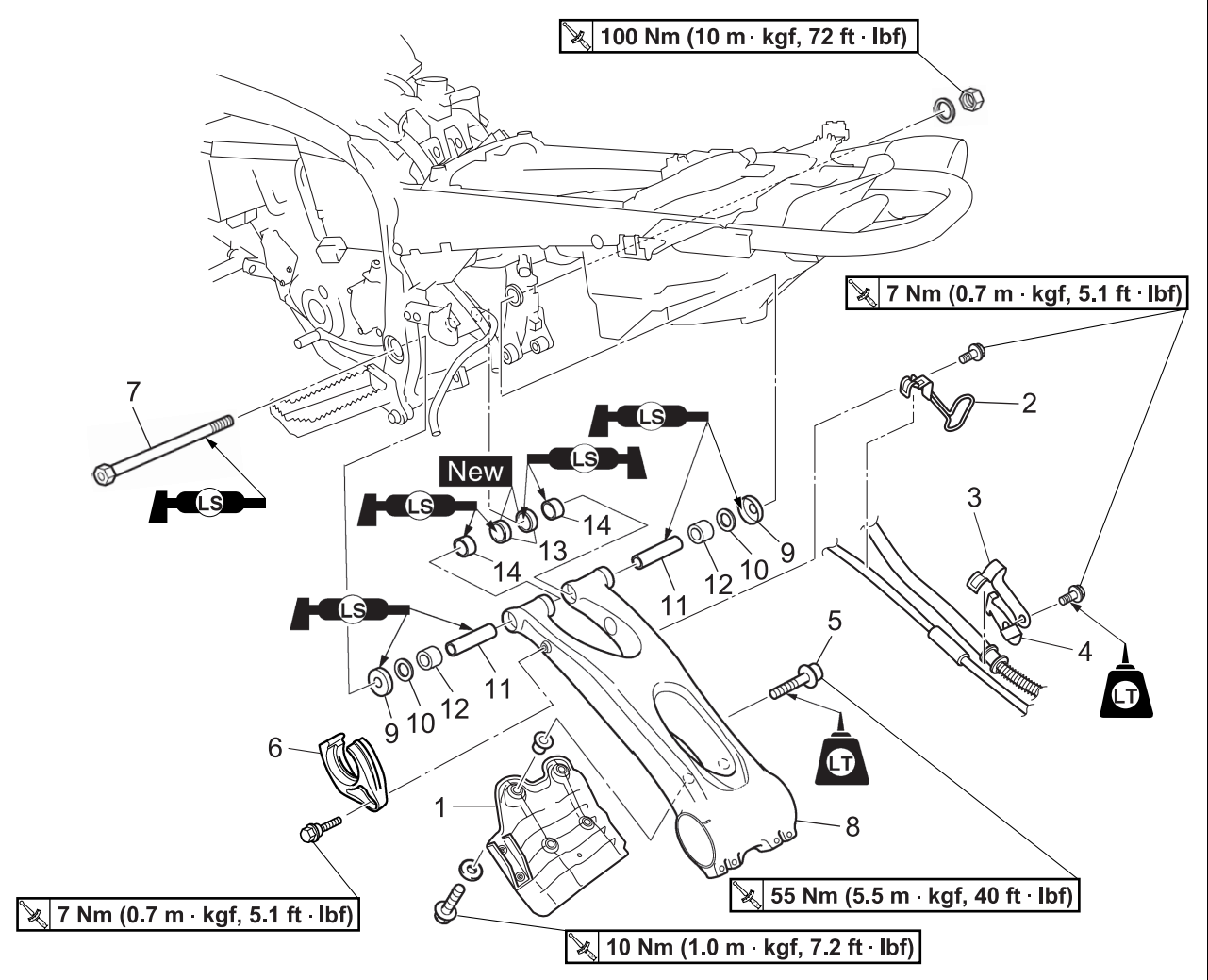
## SWINGARM

### Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Left foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Right foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear axle hub		Refer to "REAR AXLE AND REAR AXLE HUB" on page 4-16.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM" on page 4-66.
1	Swingarm skid plate	1	
2	Parking brake cable holder	1	
3	Brake hose holder	1	
4	Stopper	1	
5	Bolt	1	
6	Drive chain guide 2	1	
7	Pivot shaft	1	
8	Swingarm	1	
9	Dust cover	2	
10	Washer	2	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
11	Spacer	2	
12	Bearing	2	
13	Oil seal	2	
14	Bushing	2	
			For installation, reverse the removal procedure.

EAS23350

## REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

EWA13120



**WARNING**

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

### TIP

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

2. Remove:
  - Connecting arm
  - Relay arm
  - Rear shock absorber

### TIP

While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.

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

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



**Pivot shaft nut**  
**100 Nm (10 m·kgf, 72 ft·lbf)**

- b. Measure the swingarm side play "A" by moving the swingarm from side to side.
- c. If the swingarm side play is out of specification, check the spacers, bearings, washers, bushings and dust covers.

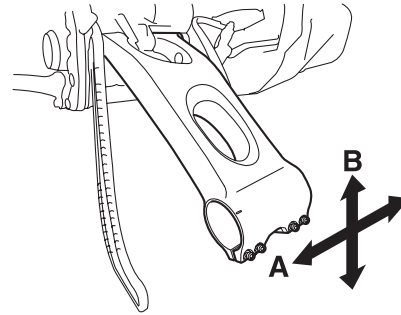


**Swingarm end free play limit (radial)**  
**1.0 mm (0.04 in)**

- d. Check the swingarm vertical movement "B" by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the spacers, bearings, washers, bushings and dust covers.



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

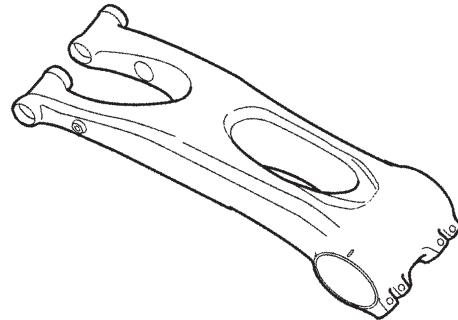


4. Remove:
  - Pivot shaft

EAS23360

## CHECKING THE SWINGARM

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



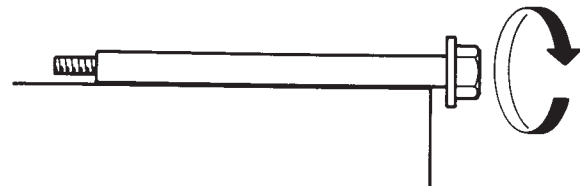
2. Check:
  - Pivot shaft  
Roll the pivot shaft on a flat surface.  
Bends → Replace.

EWA13770



**WARNING**

**Do not attempt to straighten a bent pivot shaft.**



3. Wash:
  - Pivot shaft
  - Dust covers
  - Spacers

- Washers
- Bearings
- Bushings



**Recommended cleaning solvent**  
**Kerosene**

#### 4. Check:

- Dust covers
- Spacers
- Washers
- Damage/wear → Replace.
- Bearings
- Bushings
- Damage/pitting → Replace.

EAS23380

### INSTALLING THE SWINGARM

#### 1. Lubricate:

- Bearings
- Bushings
- Spacers
- Oil seals
- Dust covers
- Pivot shaft



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

#### 2. Install:

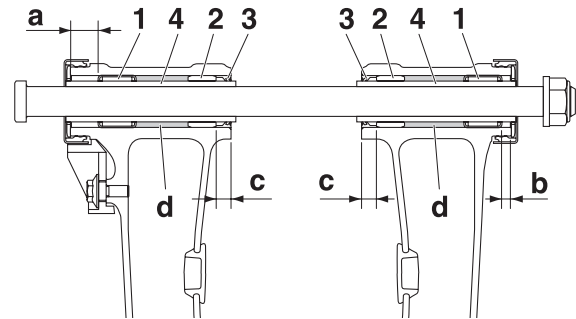
- Bearings “1”
- Bushings “2”
- Oil seals **New** “3”
- Spacers “4”
- Washers
- Dust covers  
(to swingarm)

#### TIP

- Install the bearing with the character stamp turned outward.
- Apply grease to outer pivot shaft, bush, dust cover and oil seal.
- Apply grease to “d” of the swingarm.

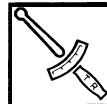


**Installed depth of bearing “a”**  
**15.0 mm (0.59 in)**  
**Installed depth of bearing “b”**  
**5.0 mm (0.20 in)**  
**Installed depth of bushing “c”**  
**8.0 mm (0.31 in)**



#### 3. Install:

- Pivot shaft



**Pivot shaft nut**  
**100 Nm (10 m·kgf, 72 ft·lbf)**

#### 4. Install:

- Rear shock absorber assembly
  - Rear axle hub
  - Rear wheel
- Refer to “REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM” on page 4-66 and “REAR AXLE AND REAR AXLE HUB” on page 4-16.

#### 5. Adjust:

- Drive chain slack
- Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-25.

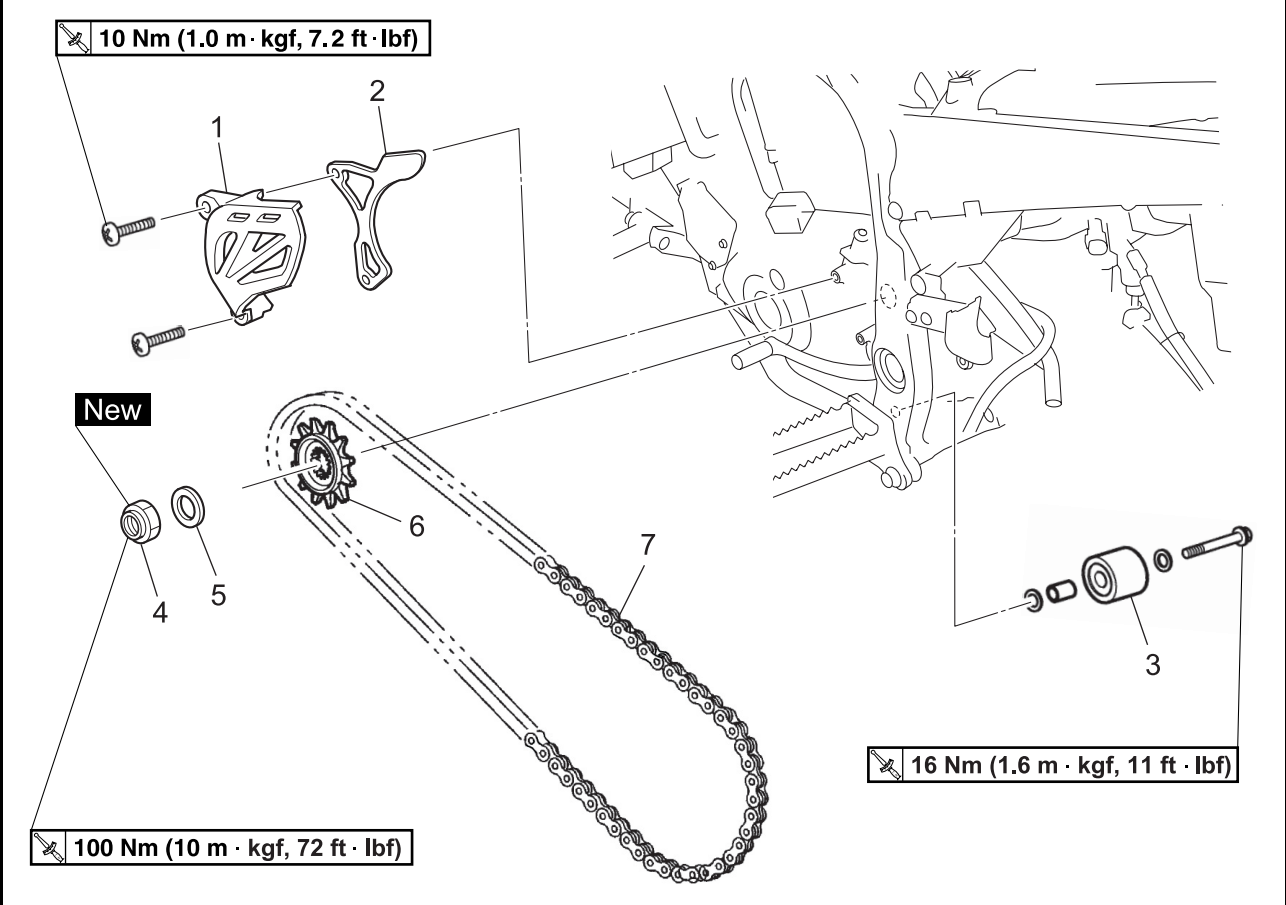


**Drive chain slack**  
**25.0–35.0 mm (0.98–1.38 in) at**  
**20 N (2.0 kgf, 4.5 lbf)**

EAS23400

CHAIN DRIVE

Removing the drive chain



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Left foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Right foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Rear axle hub		Refer to "REAR AXLE AND REAR AXLE HUB" on page 4-16.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM" on page 4-66.
	Swingarm		Refer to "SWINGARM" on page 4-71.
1	Drive sprocket cover	1	
2	Drive chain guide 1	1	
3	Drive chain guide 3	1	
4	Drive sprocket nut	1	
5	Washer	1	
6	Drive sprocket	1	
7	Drive chain	1	
			For installation, reverse the removal procedure.

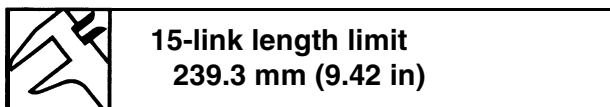


EAS23441

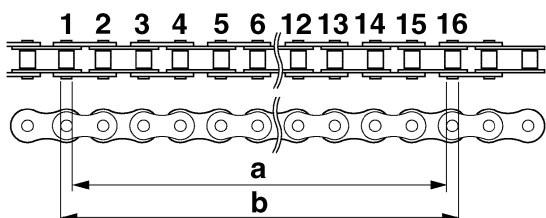
## CHECKING THE DRIVE CHAIN

### 1. Measure:

- 15-link section "a" of the drive chain  
Out of specification → Replace the drive chain.



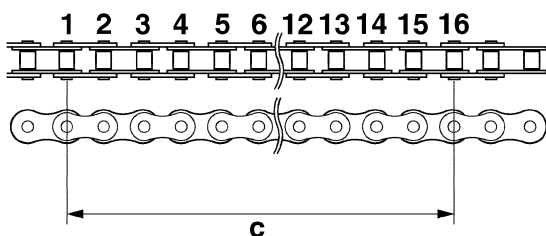
- a. Measure the length "a" between the inner sides of the pins and the length "b" between the outer sides of the pins on a 15-link section of the drive chain as shown in the illustration.



- b. Calculate the length "c" of the 15-link section of the drive chain using the following formula.  
Drive chain 15-link section length "c" =  
(length "a" between pin inner sides + length "b" between pin outer sides)/2

### TIP

- When measuring a 15-link section of the drive chain, make sure that the drive chain is taut.
- Perform this procedure 2–3 times, at a different location each time.



### 2. Clean:

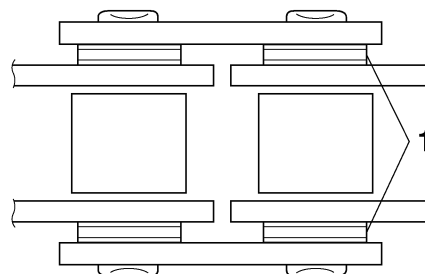
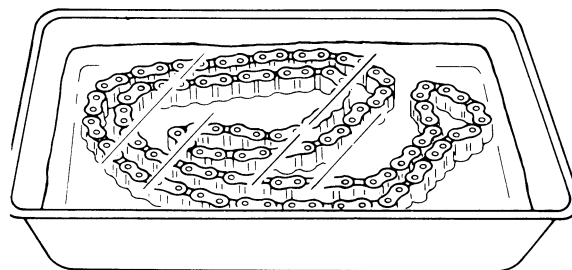
- Drive chain

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

ECA14290

### NOTICE

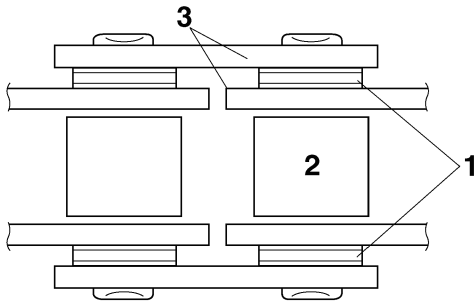
- This motorcycle has a drive chain with small rubber O-rings "1" between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosene to clean the drive chain.
- Do not soak the drive chain in kerosene for more than ten minutes, otherwise the O-rings can be damaged.



### 3. Check:

- O-rings "1"  
Damage → Replace the drive chain.
- Drive chain rollers "2"  
Damage/wear → Replace the drive chain.

- Drive chain side plates “3”  
Damage/wear → Replace the drive chain.  
Cracks → Replace the drive chain.



- Lubricate:
  - Drive chain

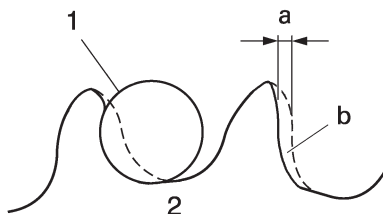


**Recommended lubricant**  
Engine oil or chain lubricant  
suitable for O-ring chains

EAS23460

## CHECKING THE DRIVE SPROCKET

- Check:
  - Drive sprocket  
More than 1/4 tooth “a” wear → Replace the drive chain sprockets as a set.  
Bent teeth → Replace the drive chain sprockets as a set.



b. Correct

- Drive chain roller
- Drive chain sprocket

EAS18P1024

## CHECKING THE DRIVEN SPROCKET

Refer to “CHECKING THE DRIVE SPROCKET” on page 4-77.

EAS18P1025

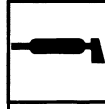
## CHECKING THE SPROCKET BRACKET

- Check:
  - Sprocket bracket  
Cracks/damage → Replace.

EAS28800

## INSTALLING THE DRIVE CHAIN

- Lubricate:
  - Drive chain

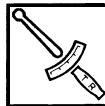


**Recommended lubricant**  
Engine oil or chain lubricant  
suitable for O-ring chains

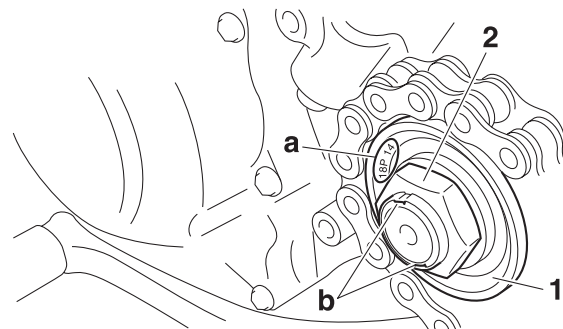
- Install:
  - Drive chain
  - Drive sprocket “1”
  - Washer
  - Drive sprocket nut “2” **New**
  - Drive chain guide

### TIP

- Install the drive sprocket with the “18P 14” “a” emboss facing outside.
- While applying the rear brake, tighten the drive sprocket nut.
- Stake the drive sprocket nut “2” at a cutout “b” in the drive axle.



**Drive sprocket nut**  
100 Nm (10 m·kgf, 72 ft·lbf)



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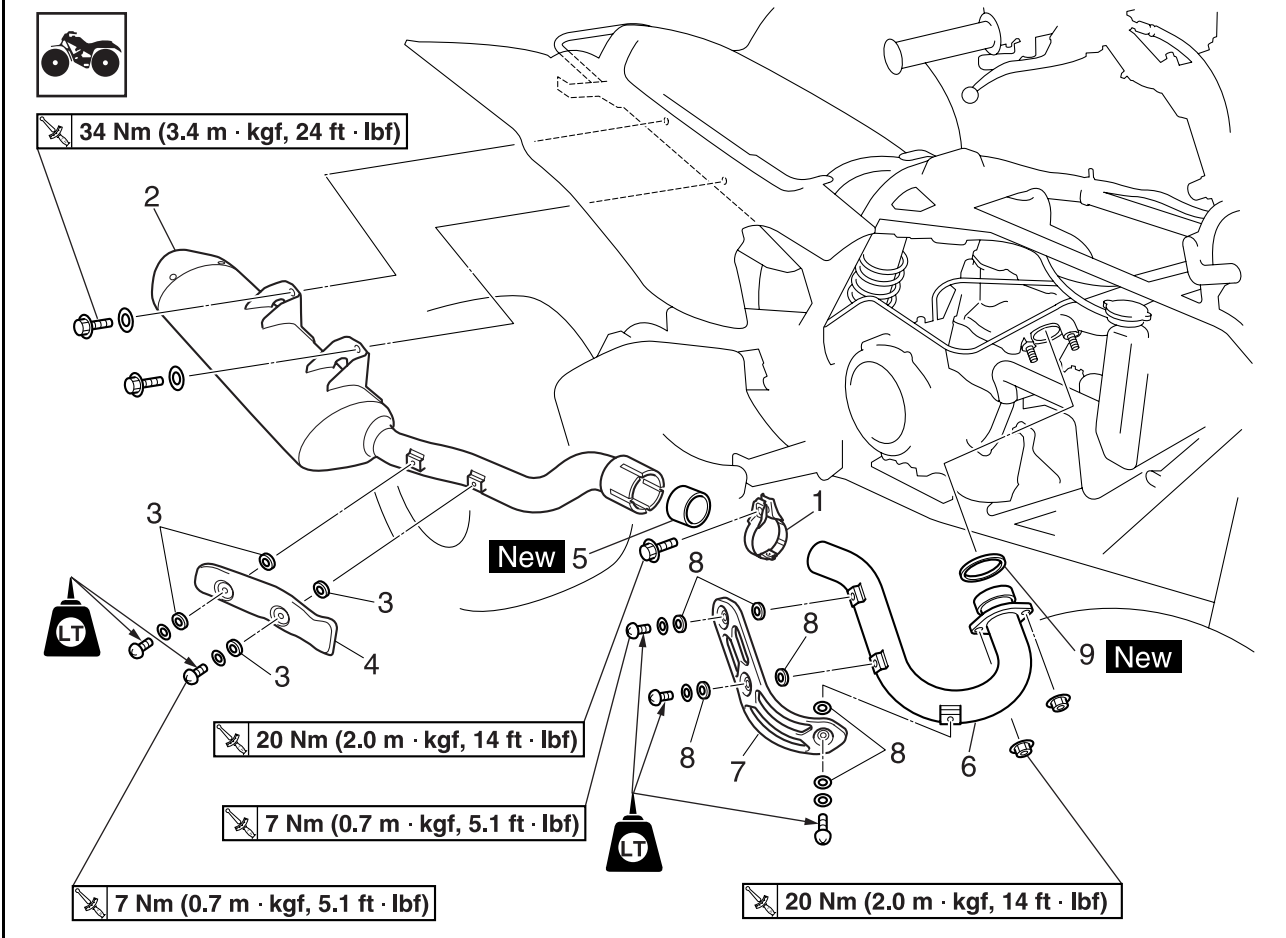
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EAS23711

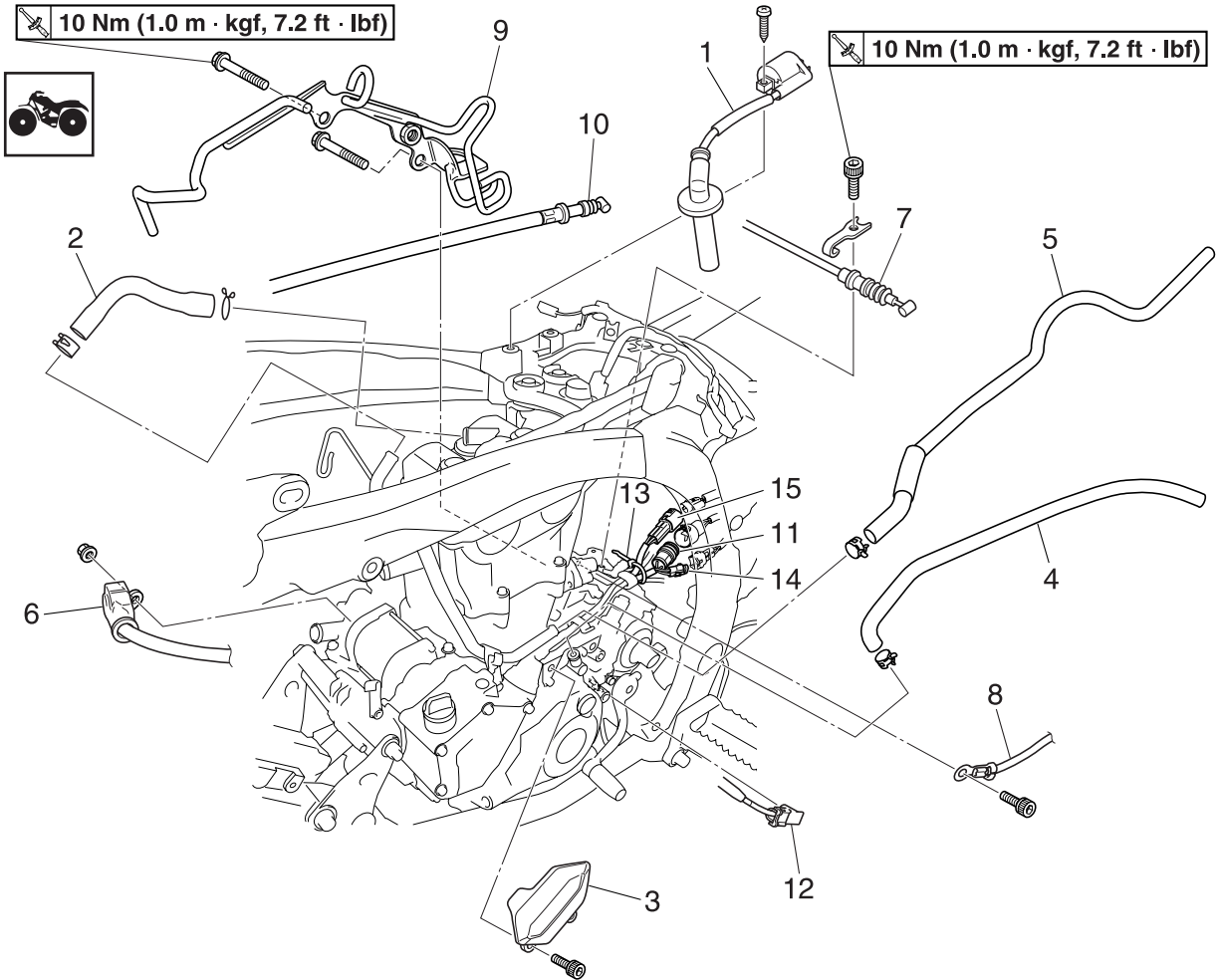
## ENGINE REMOVAL

### Removing the muffler and exhaust pipe



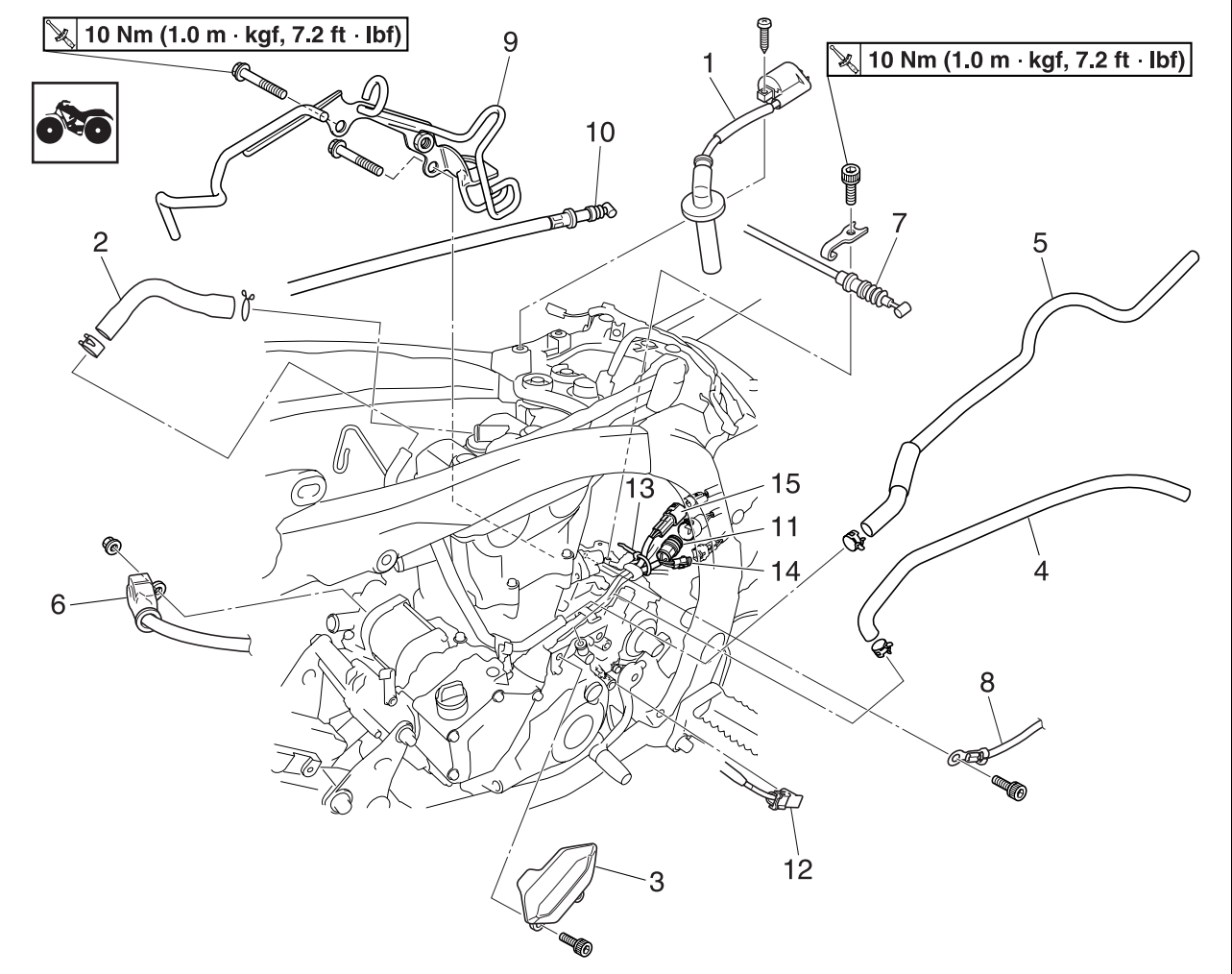
Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right foot protector		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine skid plate		Refer to "GENERAL CHASSIS" on page 4-1.
1	Clamp	1	Loosen.
2	Muffler	1	
3	Plain washer	4	
4	Muffler protector	1	
5	Gasket	1	
6	Exhaust pipe	1	
7	Exhaust pipe protector	1	
8	Plain washer	6	
9	Gasket	1	
			For installation, reverse the removal procedure.

## Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain.
	Coolant		Drain.
	Radiator inlet hose		Refer to "RADIATOR" on page 6-1.
	Radiator outlet hose		Refer to "RADIATOR" on page 6-1.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Throttle body		Refer to "THROTTLE BODY" on page 7-4.
	Drive sprocket		Refer to "CHAIN DRIVE" on page 4-75.
	Drive chain		Refer to "CHAIN DRIVE" on page 4-75.
1	Ignition coil	1	
2	Cylinder head breather hose 1	1	
3	Protector	1	
4	Crankcase breather hose	1	
5	Cylinder head breather hose 2	1	
6	Starter motor lead	1	Disconnect.
7	Clutch cable	1	
8	Battery negative lead	1	Disconnect.
9	Parking brake cable bracket	1	
10	Parking brake cable	1	
11	Generator coupler	1	Disconnect.
12	Crankshaft position sensor coupler	1	Disconnect.
13	Plastic band	1	

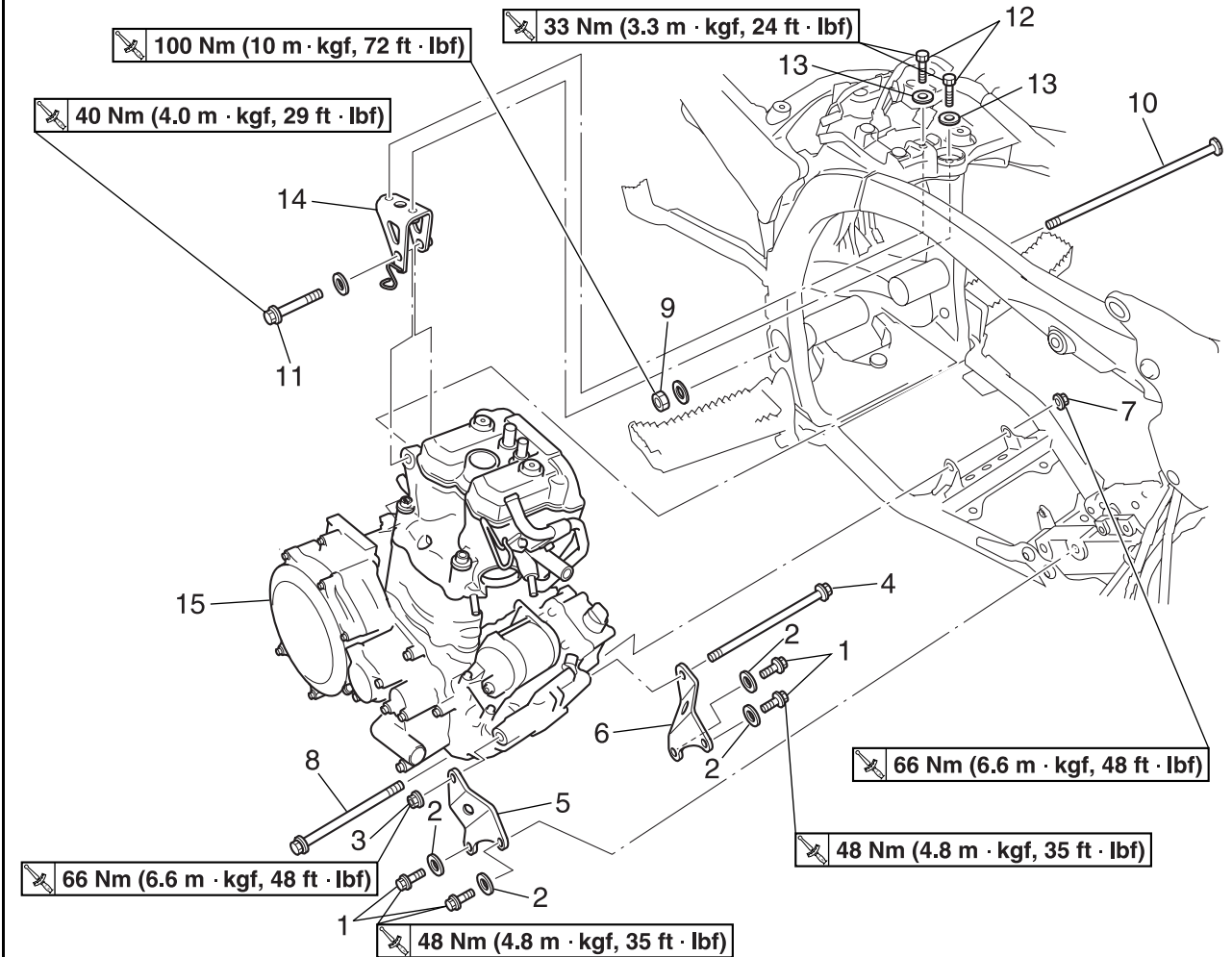
Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
14	Neutral switch lead	1	Disconnect.
15	Speed sensor coupler	1	Disconnect.
			For assembly, reverse the removal procedure.



## Removing the engine



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

EAS18P1051

## CHECKING THE ENGINE MOUNT

### 1. Check:

- Engine lower bracket (right side)
- Engine lower bracket (left side)
- Engine stay  
Cracks/damage → Replace.

EAS23720

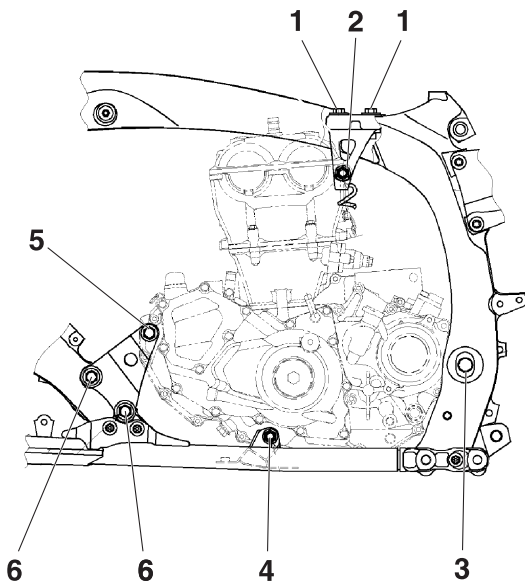
## INSTALLING THE ENGINE

### 1. Install:

- Engine stay bolts (rear upper side) “1”
- Engine mounting bolt (rear upper side) “2”
- Pivot shaft/washer/nut “3”
- Engine mounting bolt/nut (front lower side) “4”
- Engine mounting bolt/nut (front upper side) “5”
- Engine bracket bolts (front upper side) “6”

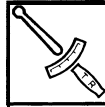
### TIP

Do not fully tighten the bolts and nuts.



### 2. Tighten:

- Engine stay bolt (rear upper side)
- Engine mounting bolt (rear upper side)
- Pivot shaft nut
- Engine mounting nut (front lower side)
- Engine mounting nut (front upper side)
- Engine bracket bolt (front upper side)



Engine stay bolt (rear upper side)

33 Nm (3.3 m·kgf, 24 ft·lbf)

Engine mounting bolt (rear upper side)

40 Nm (4.0 m·kgf, 29 ft·lbf)

Pivot shaft nut

100 Nm (10 m·kgf, 72 ft·lbf)

Engine mounting nut (front lower side)

66 Nm (6.6 m·kgf, 48 ft·lbf)

Engine mounting nut (front upper side)

66 Nm (6.6 m·kgf, 48 ft·lbf)

Engine bracket bolt (front upper side)

48 Nm (4.8 m·kgf, 35 ft·lbf)

EAS18P1007

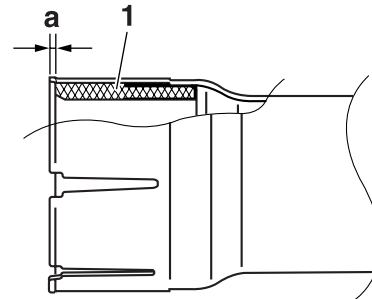
## INSTALLING THE MUFFLER AND EXHAUST PIPE

### 1. Install:

- Gasket “1” **New**  
(to muffler)



Installed depth of gasket “a”  
1.0–1.5 mm (0.04–0.06 in)

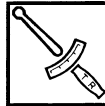


### 2. Install:

- Exhaust pipe protector

### 3. Tighten:

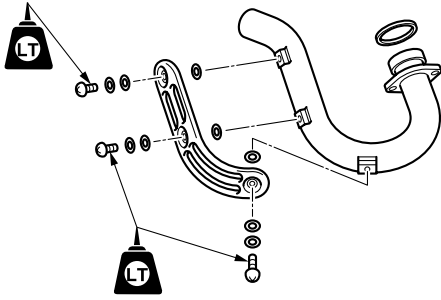
- Exhaust pipe protector screws



Screw

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

LOCTITE®



4. Install:

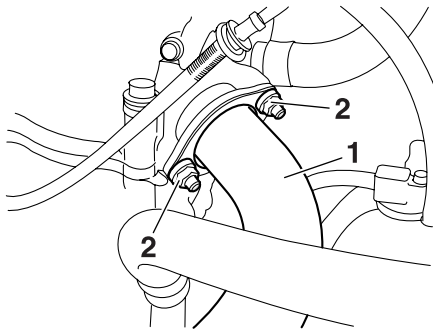
- Gasket **New**
- Exhaust pipe "1"

5. Tighten:

- Nuts (exhaust pipe) "2"



**Exhaust pipe nut**  
**20 Nm (2.0 m·kgf, 14 ft·lbf)**

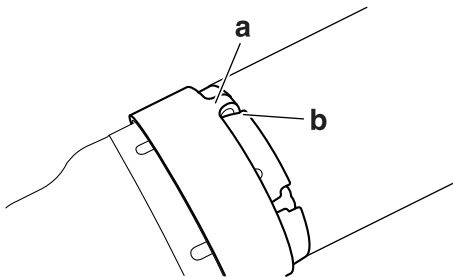


6. Install:

- Clamp

**TIP**

Slide the clamp onto the end of the muffler and insert the projection "a" of the clamp into a slot "b" in the muffler. Tighten the clamp after installing the muffler.





EAS23760

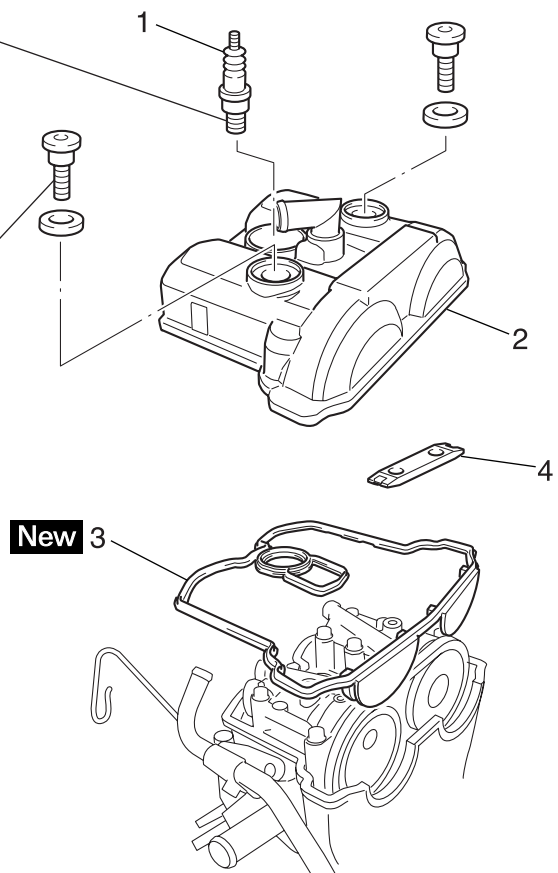
## CAMSHAFTS

## Removing the cylinder head cover



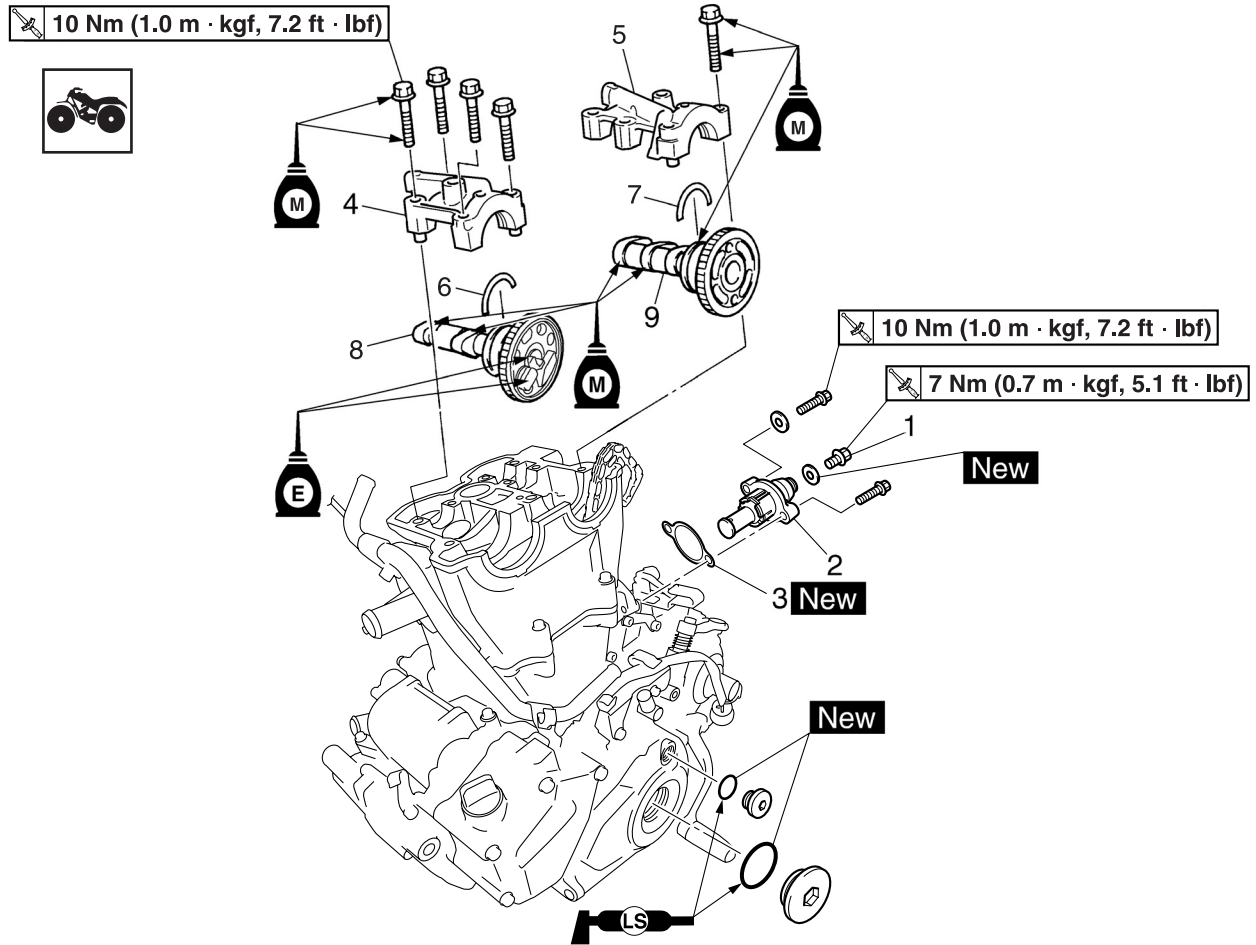
 13 Nm (1.3 m · kgf, 9.4 ft · lbf)

 10 Nm (1.0 m · kgf, 7.2 ft · lbf)



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Spark plug	1	
2	Cylinder head cover	1	
3	Cylinder head cover gasket	1	
4	Timing chain guide (top side)	1	
			For installation, reverse the removal procedure.

## Removing the camshafts



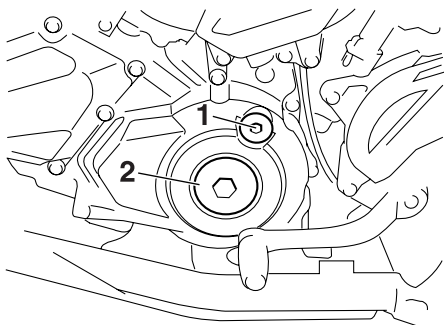
Order	Job/Parts to remove	Q'ty	Remarks
1	Tensioner cap bolt	1	
2	Timing chain tensioner	1	
3	Gasket	1	
4	Exhaust camshaft cap	1	
5	Intake camshaft cap	1	
6	Clip	1	
7	Clip	1	
8	Exhaust camshaft	1	
9	Intake camshaft	1	
			For installation, reverse the removal procedure.

EAS23810

## REMOVING THE CAMSHAFTS

### 1. Remove:

- Timing mark accessing screw "1"
- Crankshaft end accessing screw "2"



### 2. Align:

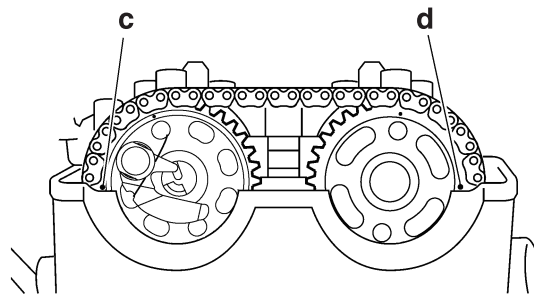
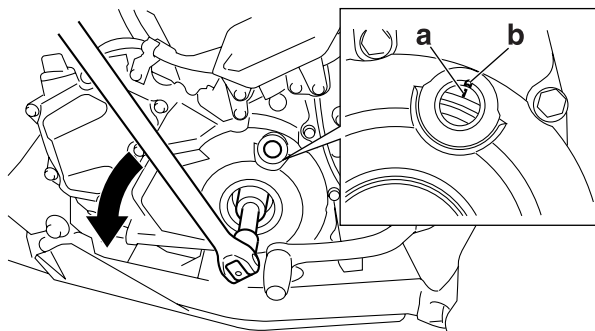
- "I" mark on the generator rotor (with the stationary pointer on the generator rotor cover)



- Turn the crankshaft counterclockwise.
- When piston is at TDC on the compression stroke, align the "I" mark "a" on the generator rotor with the stationary pointer "b" on the generator rotor cover.

### TIP

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

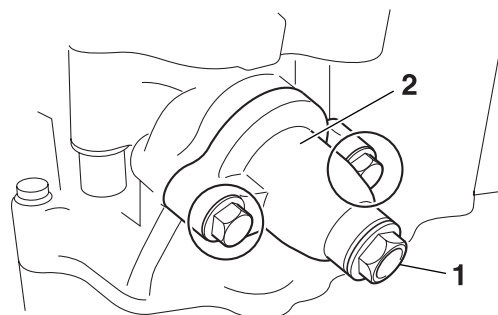


### 3. Loosen:

- Tensioner cap bolt "1"

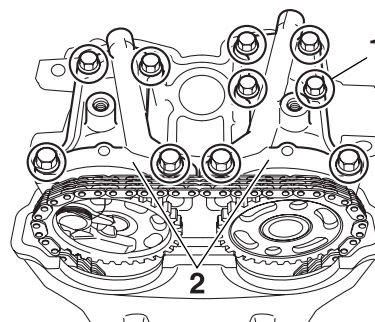
### 4. Remove:

- Timing chain tensioner "2"
- Timing chain tensioner gasket



### 5. Remove:

- Camshaft cap bolts "1"
- Camshaft caps "2"



ECA13720

### NOTICE

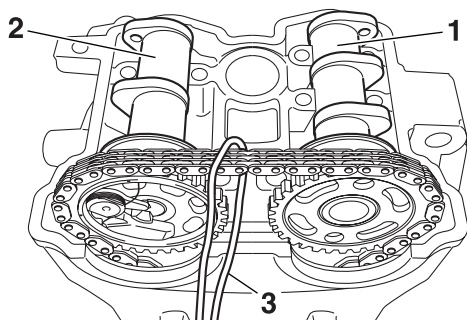
To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

### 6. Remove:

- Intake camshaft "1"
- Exhaust camshaft "2"

### TIP

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



EAS23850

## CHECKING THE CAMSHAFTS

### 1. Check:

- Camshaft lobes  
Blue discoloration/pitting/scratches → Replace the camshaft.

### 2. Measure:

- Camshaft lobe dimensions “a” and “b”  
Out of specification → Replace the camshaft.



### Camshaft lobe dimension limit

#### Intake “a”

30.100–30.200 mm (1.1850–1.1890 in)

#### Limit

30.000 mm (1.1811 in)

#### Intake “b”

22.450–22.550 mm (0.8839–0.8878 in)

#### Limit

22.350 mm (0.8799 in)

#### Exhaust “a”

30.950–31.050 mm (1.2185–1.2224 in)

#### Limit

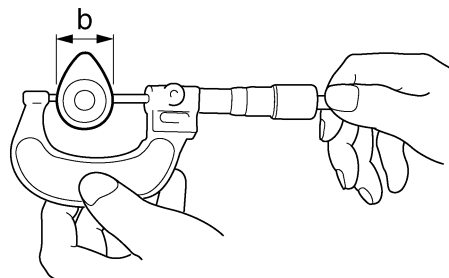
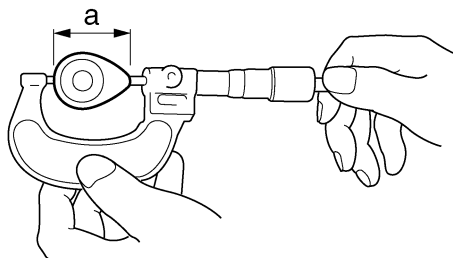
30.850 mm (1.2146 in)

#### Exhaust “b”

22.494–22.594 mm (0.8856–0.8895 in)

#### Limit

22.394 mm (0.8817 in)

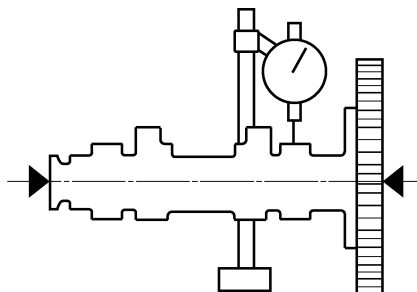


### 3. Measure:

- Camshaft runout  
Out of specification → Replace.



**Camshaft runout limit**  
**0.030 mm (0.0012 in)**



11151402

### 4. Measure:

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



**Camshaft-journal-to-camshaft-cap clearance**  
**0.028–0.062 mm (0.0011–0.0024 in)**  
**Limit**  
**0.080 mm (0.0032 in)**

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

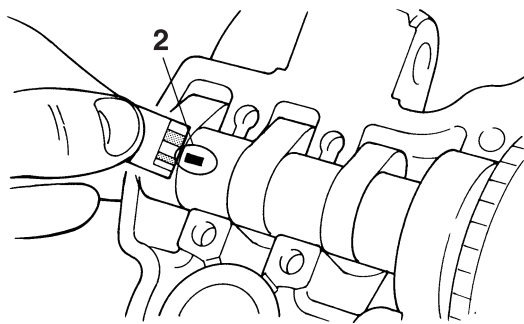
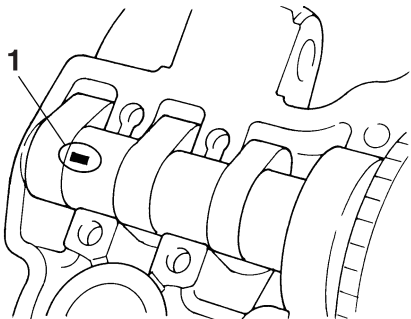
### TIP

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



**Camshaft cap bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

- d. Remove the camshaft caps and then measure the width of the Plastigauge® "2".

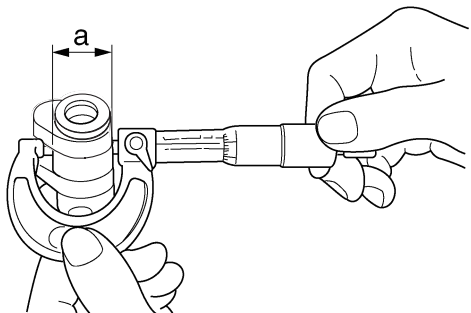


5. Measure:

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



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

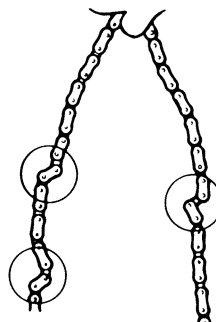


EAS23870

## CHECKING THE TIMING CHAIN AND CAMSHAFT SPROCKET

1. Check:

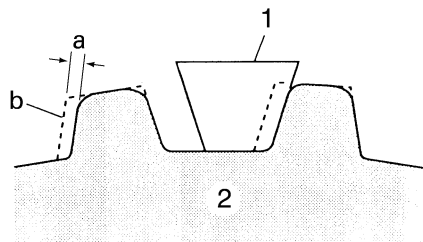
- Timing chain  
Damage/stiffness → Replace the timing chain and camshaft and camshaft sprocket as a set.



343 007

2. Check:

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



- a. 1/4 tooth  
b. Correct

1. Timing chain  
2. Camshaft sprocket

EAS18P1008

## CHECKING THE CHAIN GUIDE

1. Check:

- Timing chain guide (top side)  
Wear/damage → Replace.

EAS23970

## CHECKING THE TIMING CHAIN TENSIONER

1. Check:

- Timing chain tensioner  
Cracks/damage/rough movement → Replace.

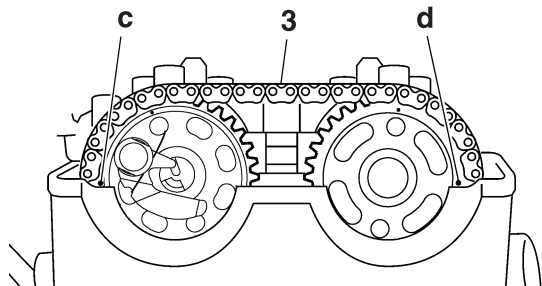




ECA18P1008

## NOTICE

**Do not turn the crankshaft during the camshaft installation. Damage or improper valve timing will result.**

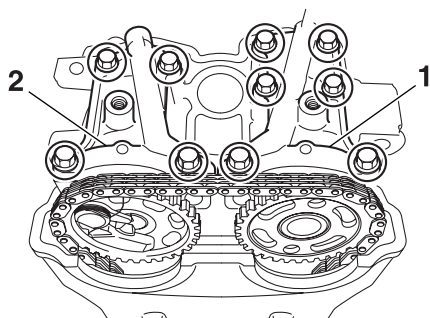


## 2. Install:

- Clips
- Intake camshaft cap "1"
- Exhaust camshaft cap "2"

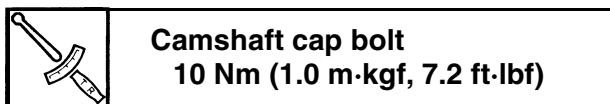
## TIP

Lubricate the camshaft cap bolt thread with molybdenum disulfide oil.



## 3. Install:

- Camshaft cap bolts



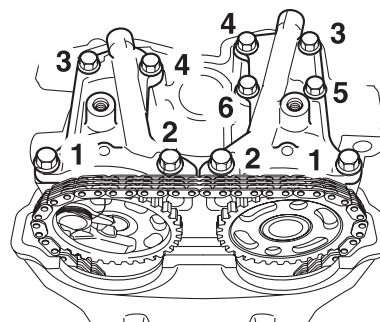
## TIP

Tighten the camshaft cap bolts in the illustration.

ECA13730

## NOTICE

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



## 4. Install:

- Timing chain tensioner
- Timing chain tensioner gasket **New**



- While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver "1".
- With the timing chain tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the gasket and the timing chain tensioner "2" onto the cylinder block.

## TIP

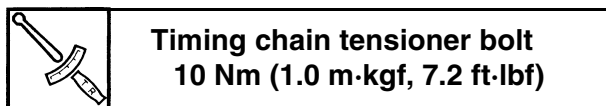
The "UP" mark "a" on the timing chain tensioner should face UP.

EWA18P1014

## WARNING

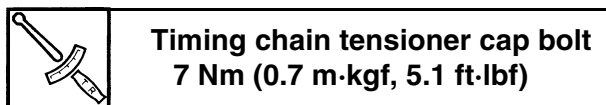
**Always use a new gasket.**

- Tighten the timing chain tensioner bolts "3" to the specified torque.

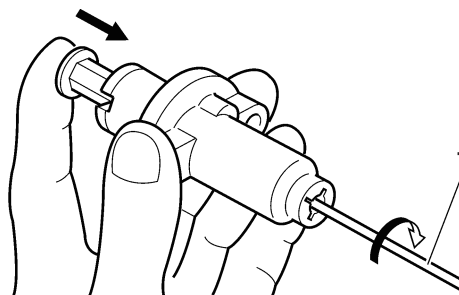


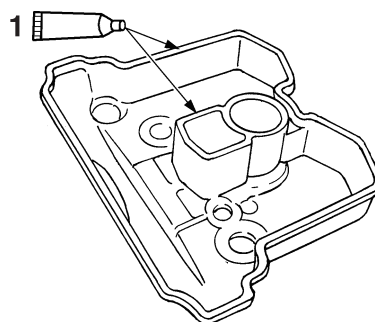
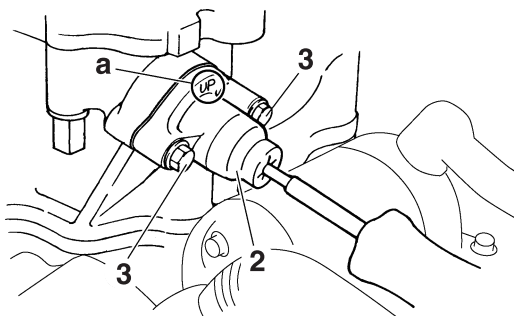
**Timing chain tensioner bolt  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

- Remove the screwdriver, make sure the timing chain tensioner rod releases, and then tighten the cap bolt to the specified torque.

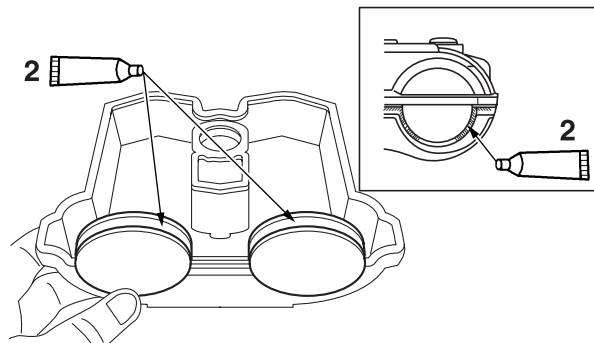


**Timing chain tensioner cap bolt  
7 Nm (0.7 m·kgf, 5.1 ft·lbf)**





5. Turn:
  - Crankshaft  
(several turns counterclockwise)
6. Check:
  - Generator rotor "I" mark  
Align with the generator rotor cover stationary pointer.
  - Camshaft sprocket punch marks  
Align with the cylinder head mating surface.  
Out of alignment → Adjust.  
Refer to "INSTALLING THE CAMSHAFTS" on page 5-12.
7. Measure:
  - Valve clearance  
Out of specification → Adjust.  
Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-4.
8. Install:
  - Timing chain guide (top side)
  - Cylinder head cover gasket **New**
  - Cylinder head cover



**Cylinder head cover bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

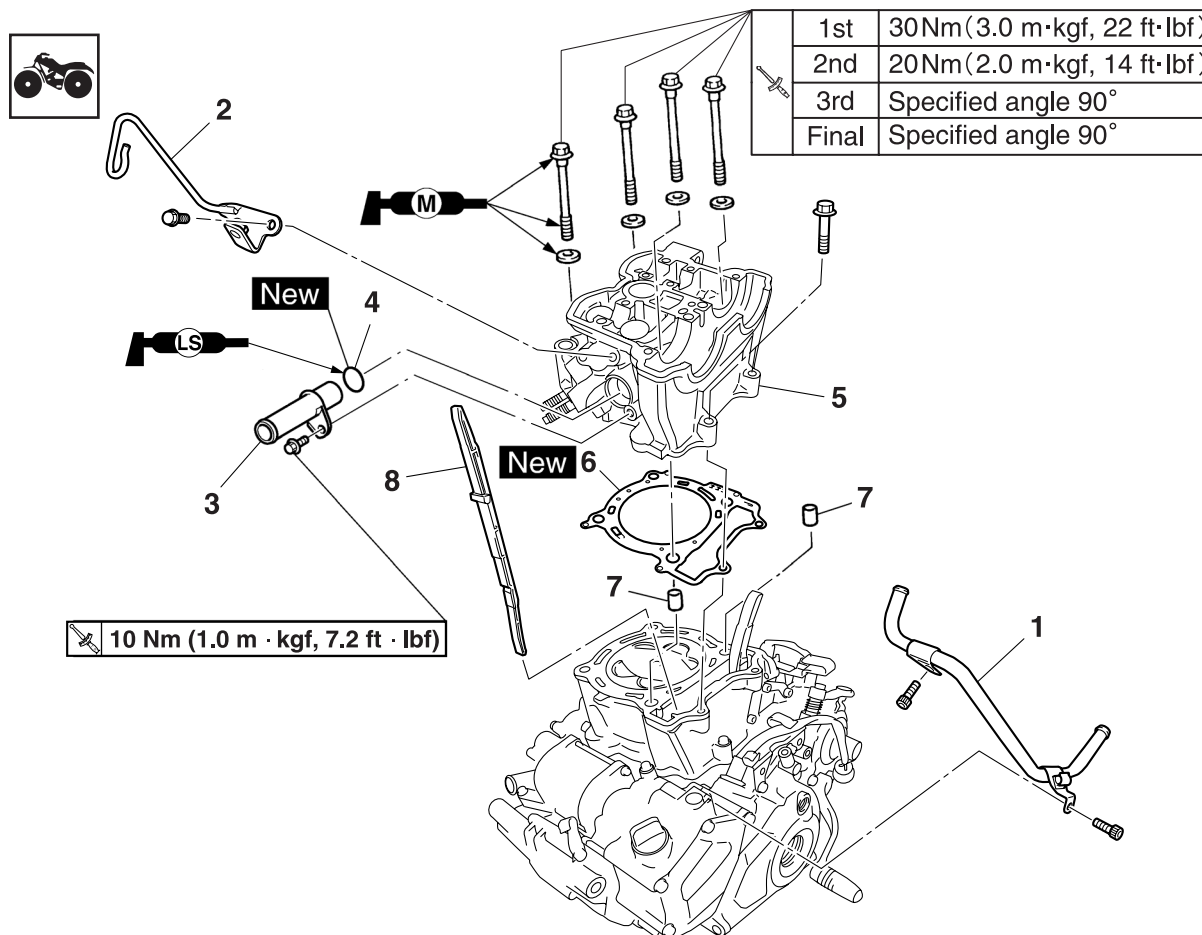
## TIP

- Apply Sealant Yamaha bond No. 1215 "1" onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply Sealant Yamaha bond No. 1215 "2" onto the mating surfaces of the cylinder head cover gasket and cylinder head.

EAS24100

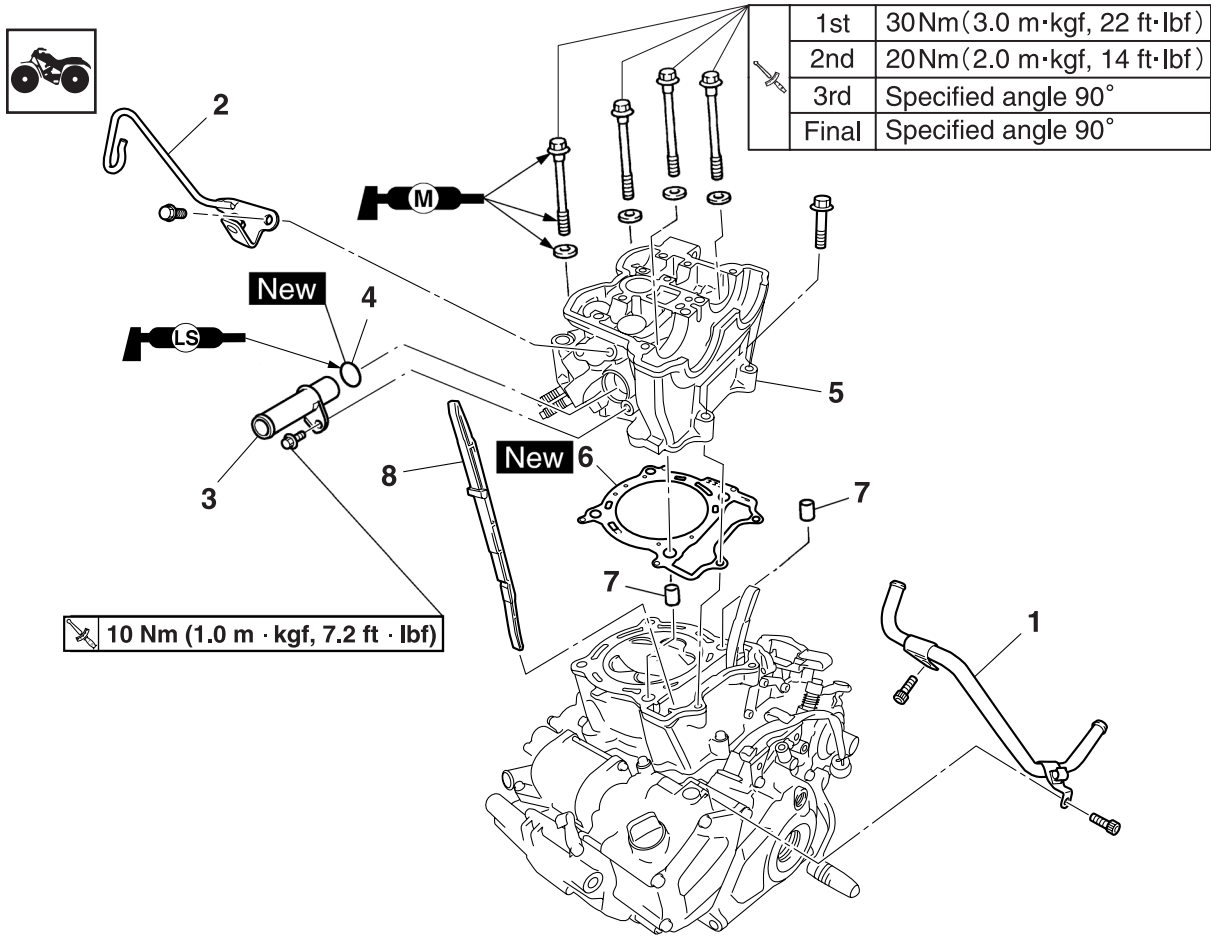
## CYLINDER HEAD

### Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
	Exhaust pipe		Refer to "ENGINE REMOVAL" on page 5-1.
	Radiator inlet hose		Refer to "RADIATOR" on page 6-1.
	Parking brake cable		Refer to "REAR BRAKE" on page 4-35 and "HANDLEBAR" on page 4-49.
	Throttle body		Refer to "THROTTLE BODY" on page 7-4.
	Camshafts		Refer to "CAMSHAFTS" on page 5-7.
1	Cylinder head breather pipe	1	
2	Cable holder	1	
3	Cylinder head water pipe	1	
4	O-ring	1	
5	Cylinder head	1	
6	Cylinder head gasket	1	
7	Dowel pin	2	
8	Timing chain guide (exhaust side)	1	

## Removing the cylinder head



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

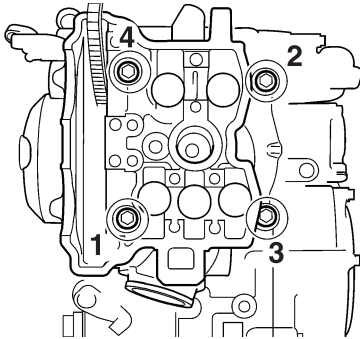
EAS24120

## REMOVING THE CYLINDER HEAD

1. Remove:
  - Cylinder head bolts

### TIP

- Loosen the bolts in the proper sequence as shown.
- Loosen each bolt 1/4 of a turn at a time. After all of the bolts are fully loosened, remove them.



EAS24160

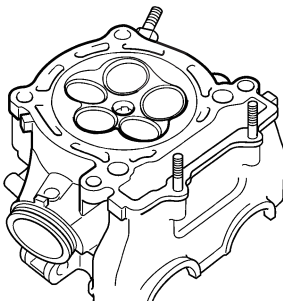
## CHECKING THE CYLINDER HEAD

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

### TIP

Do not use a sharp instrument to avoid damaging or scratching:

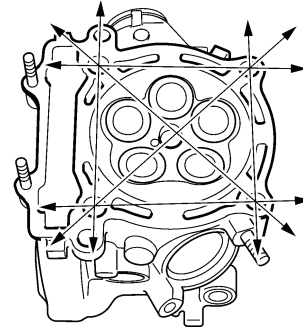
- Spark plug bore threads
- Valve seats



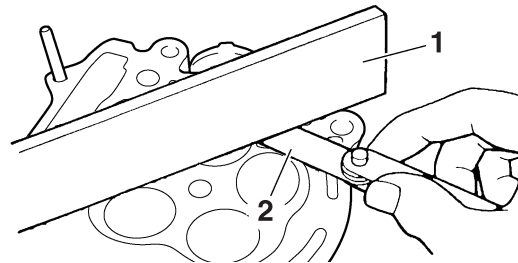
2. Check:
  - Cylinder head  
Damage/scratches → Replace.
  - Cylinder head water jacket  
Mineral deposits/rust → Eliminate.
3. Measure:
  - Cylinder head warpage  
Out of specification → Resurface the cylinder head.



Warpage limit  
0.05 mm (0.0020 in)



- a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



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

### TIP

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

EAS24180

## CHECKING THE TIMING CHAIN GUIDES

1. Check:
  - Timing chain guide (exhaust side)  
Damage/wear → Replace.



EAS24240

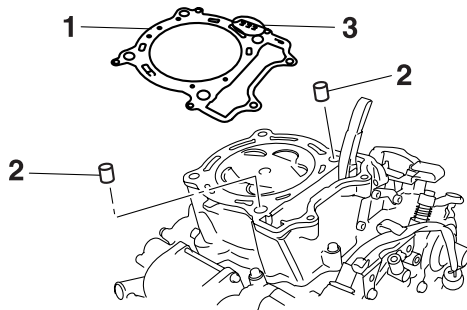
## INSTALLING THE CYLINDER HEAD

### 1. Install:

- Cylinder head gasket "1" **New**
- Dowel pins "2"

#### TIP

The model mark "3" on the cylinder head gasket must face up.



### 2. Install:

- Cylinder head

#### TIP

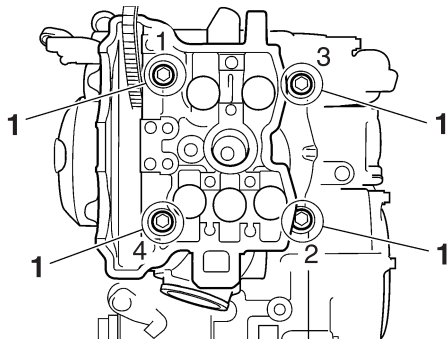
Pass the timing chain through the timing chain cavity.

### 3. Install:

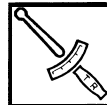
- Washers
- Bolts "1"

#### TIP

Tighten the bolts to the specified torque in two or three steps in the proper tightening sequence as shown.

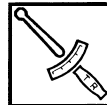


- Remove old grease from a screw hole, washer and bolt.
- Apply molybdenum disulfide oil on the bottom surface and screw part of the bolt and both sides of the washer well.
- Tighten all the four bolts diagonally until they are lightly screwed in.
- Tighten all the four bolts diagonally.



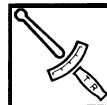
**Cylinder head bolt (1st)**  
**30 Nm (3.0 m·kgf, 22 ft·lbf)**

- Loosen and remove all the bolts and washers, and then apply grease again as done in "b".
- Tighten all the four bolts diagonally until they are lightly screwed in as done in "c".
- Tighten all the four bolts diagonally.



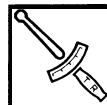
**Cylinder head bolt (2nd)**  
**20 Nm (2.0 m·kgf, 14 ft·lbf)**

- Put a mark on the corner "1" of the cylinder head bolt and the cylinder head "2" as shown.
- After tightening all the four bolts, each in 90 degrees angle, diagonally, tighten again.

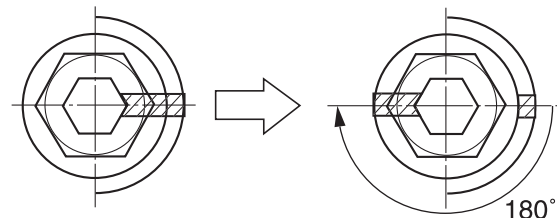
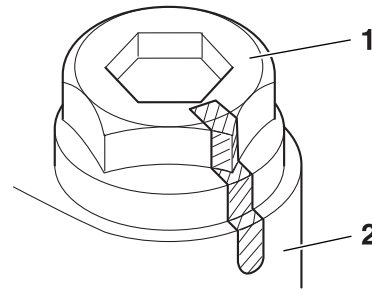


**Cylinder head bolts (3rd)**  
**Specified angle 90 degrees**

- Further, retighten all the four bolts in 90 degrees angle diagonally (total of 180 degrees).



**Cylinder head bolts (final)**  
**Specified angle 90 degrees**

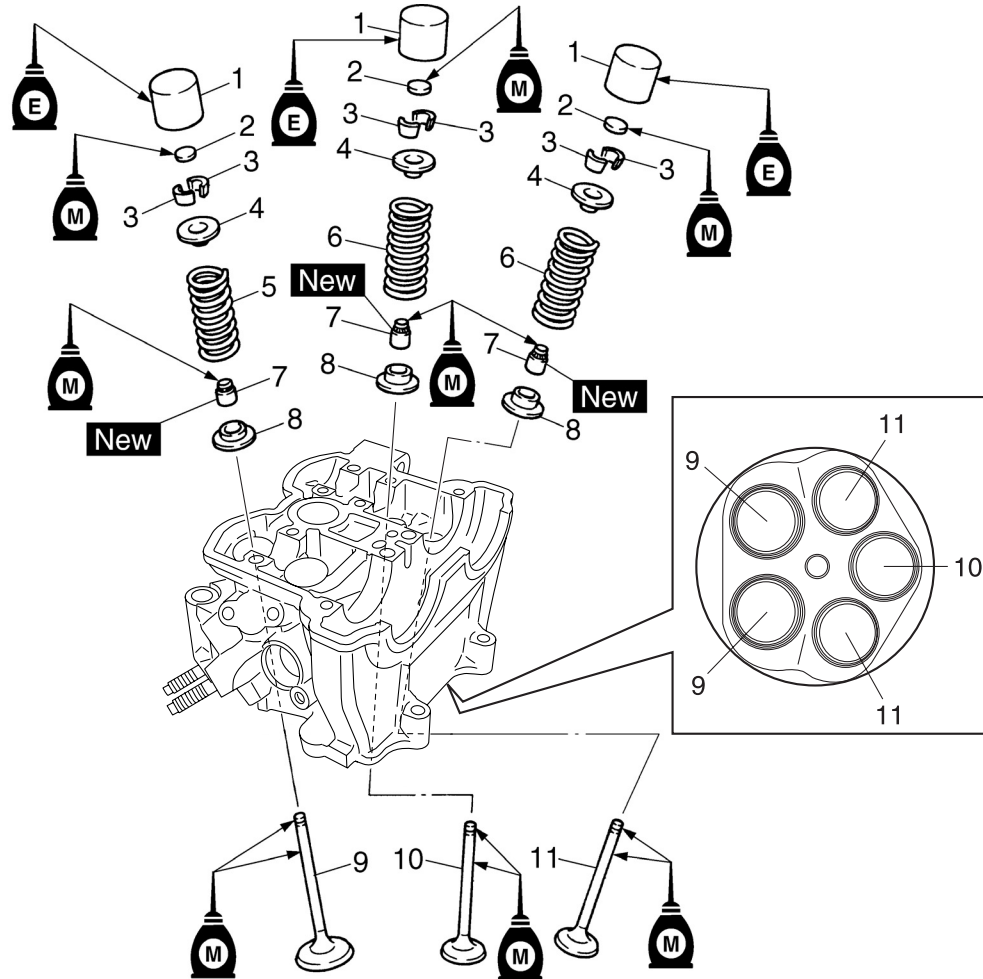




EAS24270

## VALVES AND VALVE SPRINGS

### Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
1	Valve lifter	5	
2	Valve pad	5	
3	Valve cotter	10	
4	Upper valve spring seat	5	
5	Exhaust valve spring	2	Red
6	Intake valve spring	3	Pink
7	Stem seal	5	
8	Lower valve spring seat	5	
9	Exhaust valve	2	L = 75.1 mm (2.96 in)
10	Intake valve 1	1	L = 76.3 mm (3.00 in)
11	Intake valve 2	2	L = 77.2 mm (3.04 in)
			For installation, reverse the removal procedure.



EAS24280

## REMOVING THE VALVES

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

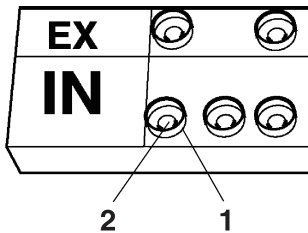
### TIP

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

1. Remove:
  - Valve lifter “1”
  - Valve pad “2”

### TIP

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



I1172202

2. Check:
  - Valve sealing

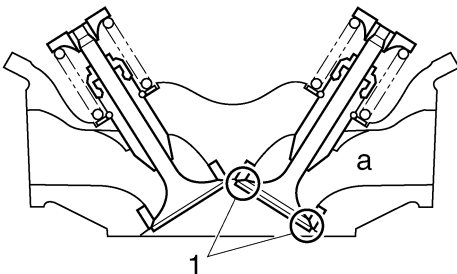
Leakage at the valve seat → Check the valve face, valve seat and valve seat width.

Refer to “CHECKING THE VALVE SEATS” on page 5-22.

- 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”.



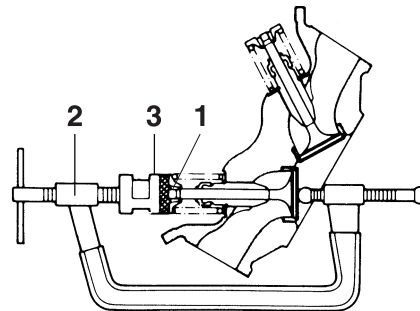
3. Remove:
  - Valve cotters “1”

### TIP

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



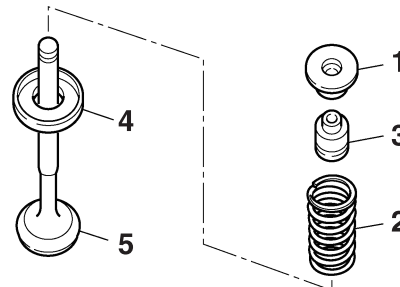
**Valve spring compressor**  
**90890-04019**  
**YM-04019**  
**Valve spring compressor**  
**attachment**  
**90890-04114**  
**Valve spring compressor**  
**adapter 19.5 mm**  
**YM-04114**



4. Remove:
  - Upper spring seat “1”
  - Valve spring “2”
  - Valve stem seal “3”
  - Lower spring seat “4”
  - Valve “5”

### TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



I1171203

EAS24290

## CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.

### 1. Measure:

- Valve-stem-to-valve-guide clearance  
Out of specification → Replace the valve guide.

• Valve-stem-to-valve-guide clearance = Valve guide inside diameter "a" - Valve stem diameter "b"
---



### Valve-stem-to-valve-guide clearance

#### Intake

0.010–0.037 mm (0.0004–0.0015 in)

#### Limit

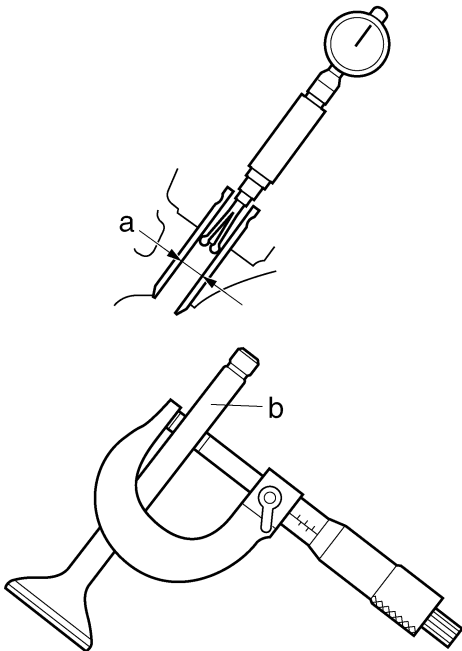
0.080 mm (0.0032 in)

#### Exhaust

0.020–0.047 mm (0.0008–0.0019 in)

#### Limit

0.100 mm (0.0039 in)



### 2. Replace:

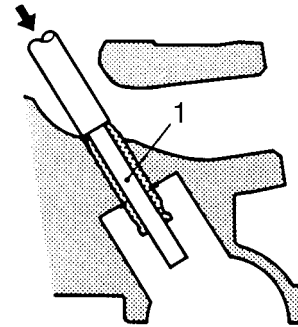
- Valve guide

### TIP

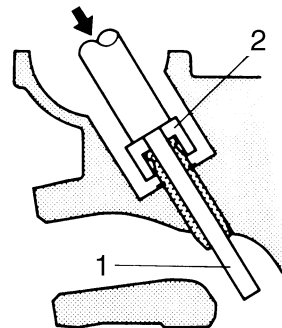
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.



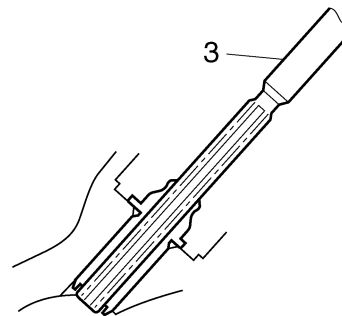
- Remove the valve guide with the valve guide remover "1".



- Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



- After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.



### TIP

After replacing the valve guide, reface the valve seat.



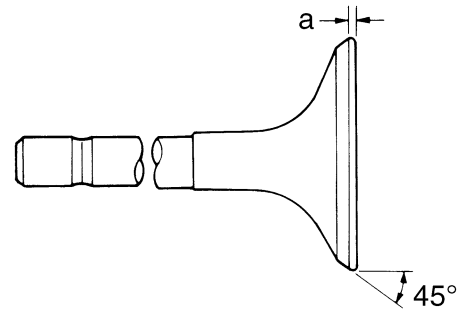
**Valve guide remover (ø4.5)**  
 90890-04116  
**Valve guide remover (4.5 mm)**  
 YM-04116  
**Valve guide remover (ø5)**  
 90890-04097  
**Valve guide remover (5.0 mm)**  
 YM-04097  
**Valve guide installer (ø4.5)**  
 90890-04117  
**Valve guide installer (4.5 mm)**  
 YM-04117  
**Valve guide installer (ø5)**  
 90890-04098  
**Valve guide installer (5.0 mm)**  
 YM-04098  
**Valve guide reamer (ø4.5)**  
 90890-04118  
**Valve guide reamer (4.5 mm)**  
 YM-04118  
**Valve guide reamer (ø5)**  
 90890-04099  
**Valve guide reamer (5.0 mm)**  
 YM-04099



3. Eliminate:
  - Carbon deposits  
(from the valve face and valve seat)
4. Check:
  - Valve face  
Pitting/wear → Grind the valve face.
  - Valve stem end  
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
  - Valve margin thickness “a”  
Out of specification → Replace the valve.



**Valve margin thickness**  
**Intake**  
 1.00 mm (0.0394 in)  
**Limit**  
 0.85 mm (0.033 in)  
**Exhaust**  
 1.00 mm (0.0394 in)  
**Limit**  
 0.85 mm (0.033 in)



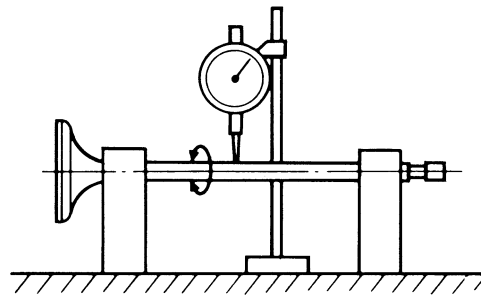
6. Measure:
  - Valve stem runout  
Out of specification → Replace the valve.

## TIP

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.



**Valve stem runout**  
 0.010 mm (0.0004 in)



EAS24300

## CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
  - Carbon deposits  
(from the valve face and valve seat)
2. Check:
  - Valve seat  
Pitting/wear → Replace the cylinder head.
3. Measure:
  - Valve seat width “a”  
Out of specification → Replace the cylinder head.



## Valve seat width

### Intake

0.90–1.10 mm (0.0354–0.0433 in)

### Limit

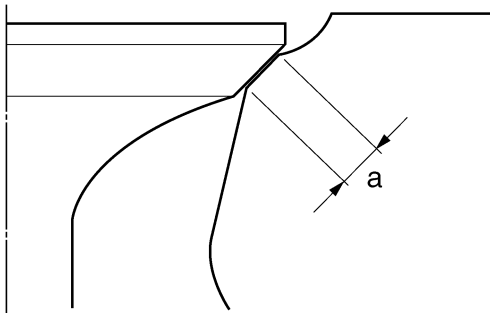
1.60 mm (0.06 in)

### Exhaust

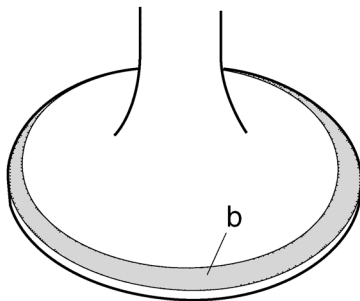
0.90–1.10 mm (0.0354–0.0433 in)

### Limit

1.60 mm (0.06 in)



- a. Apply Mechanic's blueing dye (Dykem) "b" onto the valve face.



- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear impression.
- 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

## TIP

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

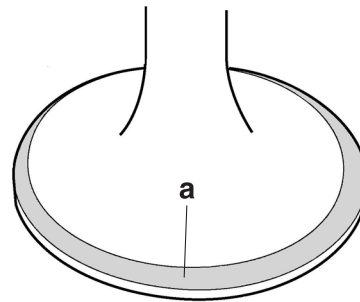


- a. Apply a coarse lapping compound "a" to the valve face.

ECA13790

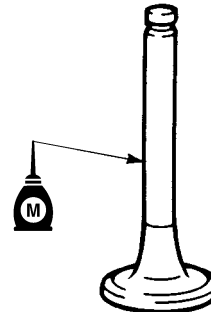
## NOTICE

Do not let the lapping compound enter the gap between the valve stem and the valve guide.



11171601

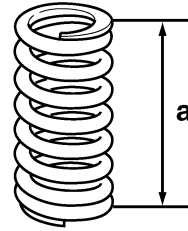
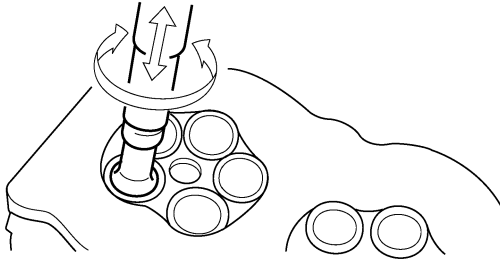
- b. Apply molybdenum disulfide oil onto the valve stem.



- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

## TIP

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic's blueing dye (Dykem) onto the valve face.
- h. Install the valve into the cylinder head.
- i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.



EAS24310

## CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:
  - Valve spring free length "a"
 Out of specification → Replace the valve spring.



### Valve spring free length

#### Intake

39.46 mm (1.55 in)

#### Limit

38.46 mm (1.51 in)

#### Exhaust

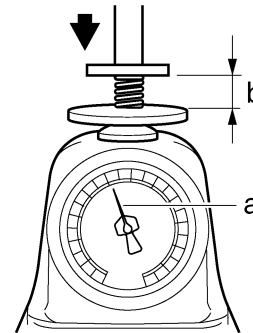
37.68 mm (1.48 in)

#### Limit

36.68 mm (1.44 in)

2. Measure:

- Compressed valve spring force "a"
- Out of specification → Replace the valve spring.



- b. Installed length



### Installed compression spring force (intake)

130.20–149.80 N (13.28–15.28 kgf, 29.28–33.68 lbf)

### Installed compression spring force (exhaust)

127.40–146.40 N (12.99–14.93 kgf, 28.64–32.91 lbf)

3. Measure:

- Valve spring tilt "a"
- Out of specification → Replace the valve spring.



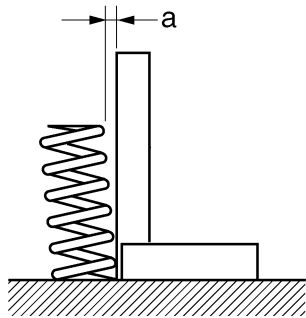
### Spring tilt limit

#### Spring tilt (intake)

2.5°/1.70 mm (0.067 in)

#### Spring tilt (exhaust)

2.5°/1.65 mm (0.065 in)



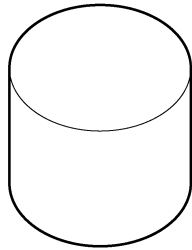
EAS24320

## CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

### 1. Check:

- Valve lifter  
Damage/scratches → Replace the valve lifters and cylinder head.



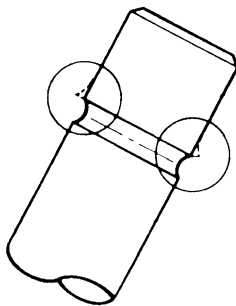
EAS24330

## INSTALLING THE VALVES

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

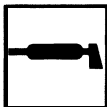
### 1. Deburr:

- Valve stem end  
(with an oil stone)

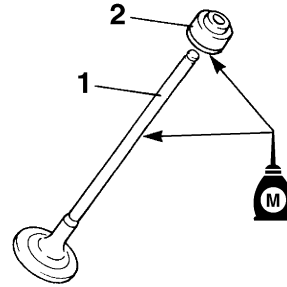


### 2. Lubricate:

- Valve stem "1"
- Valve stem seal "2"  
(with the recommended lubricant)

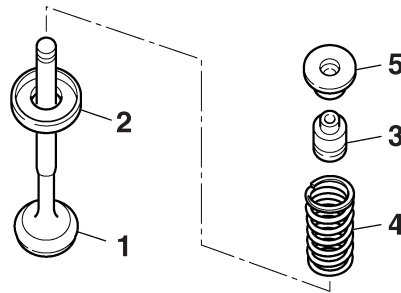


**Recommended lubricant**  
**Molybdenum disulfide oil**



### 3. Install:

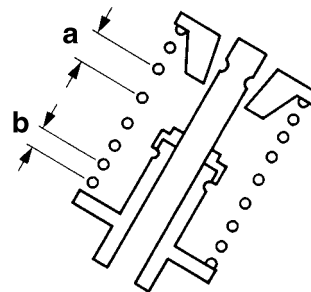
- Valves "1"
- Lower spring seats "2"
- Valve stem seals "3" **New**
- Valve springs "4"
- Upper spring seats "5"  
(into the cylinder head)



11171203

### TIP

Install the valve springs with the larger pitch "a" facing up.



b. Smaller pitch

### 4. Install:

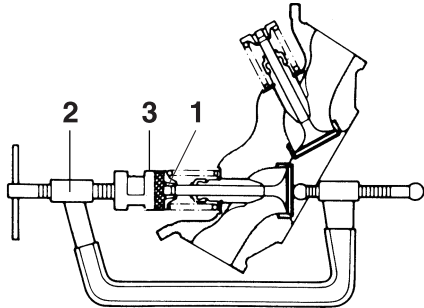
- Valve cotters "1"

### TIP

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



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

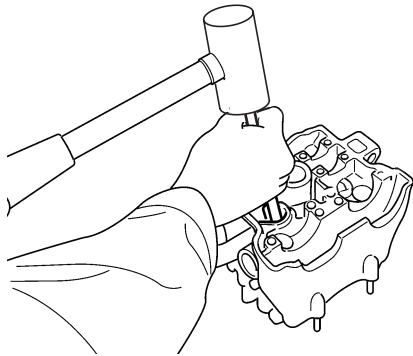


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

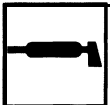
ECA13800

#### **NOTICE**

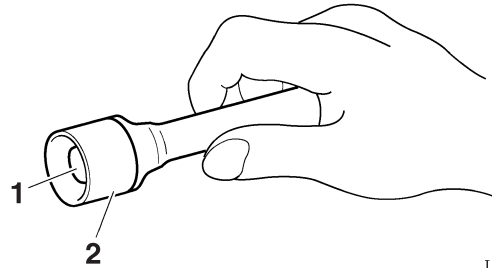
**Hitting the valve tip with excessive force could damage the valve.**



6. Lubricate:
- Valve pad "1"
  - Valve lifter "2"
- (with the recommended lubricant)



Recommended lubricant  
Valve pad  
Molybdenum disulfide oil  
Valve lifter  
Engine oil



11171102

7. Install:

- Valve pad
- Valve lifter

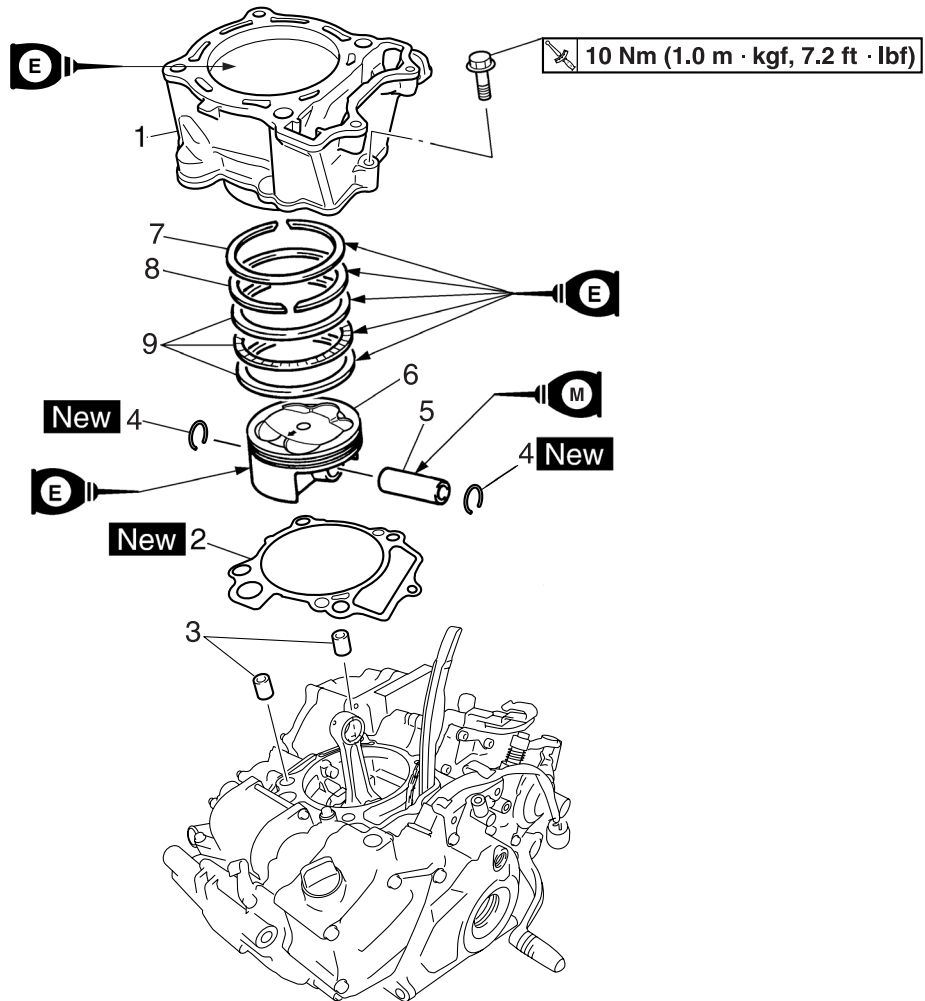
#### **TIP**

- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

EAS24350

## CYLINDER AND PISTON

### Removing the cylinder and piston

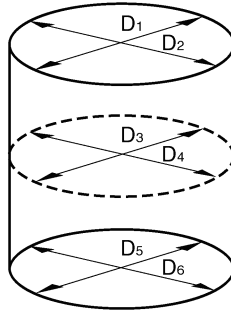


Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
1	Cylinder	1	
2	Cylinder gasket	1	
3	Dowel pin	2	
4	Piston pin clip	2	
5	Piston pin	1	
6	Piston	1	
7	Top ring	1	
8	2nd ring	1	
9	Oil ring	1	
			For installation, reverse the removal procedure.

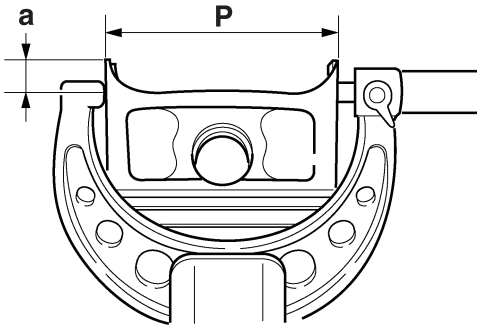




"C" = maximum of D <sub>1</sub> –D <sub>6</sub>
"T" = maximum of D <sub>1</sub> or D <sub>2</sub> - maximum of D <sub>5</sub> or D <sub>6</sub>
"R" = maximum of D <sub>1</sub> , D <sub>3</sub> or D <sub>5</sub> - minimum of D <sub>2</sub> , D <sub>4</sub> or D <sub>6</sub>



- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- Measure piston skirt diameter "P" with the micrometer.



- 10 mm (0.39 in) from the bottom edge of the piston

	<b>Piston size "P"</b>
	<b>Standard</b>
	<b>94.945–94.960 mm (3.7380–3.7386 in)</b>

- If out of specification, replace the piston and piston rings as a set.
- Calculate the piston-to-cylinder clearance with the following formula.

- Piston-to-cylinder clearance =  
Cylinder bore "C" -  
Piston skirt diameter "P"



## Piston-to-cylinder clearance

**0.040–0.065 mm (0.0016–0.0026 in)**

- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.



EAS24430

## CHECKING THE PISTON RINGS

- Measure:

- Piston ring side clearance  
Out of specification → Replace the piston and piston rings as a set.

### TIP

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



## Piston ring side clearance

### Top ring

**0.030–0.070 mm (0.0012–0.0028 in)**

### Limit

**0.12 mm (0.0047 in)**

### 2nd ring

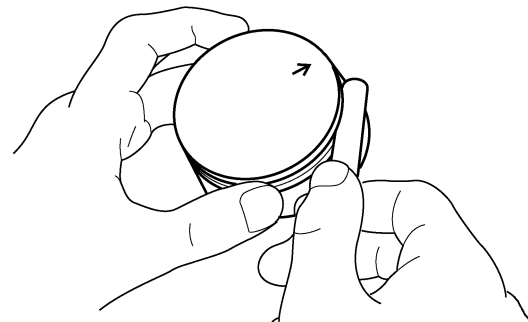
**0.020–0.055 mm (0.0008–0.0022 in)**

### Limit

**0.12 mm (0.0047 in)**

### Oil ring

**0.040–0.140 mm (0.0016–0.0055 in)**

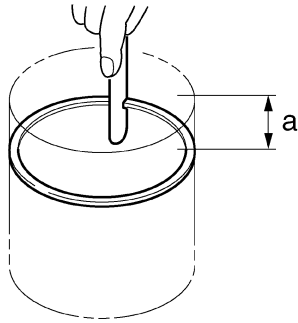


- Install:

- Piston ring  
(into the cylinder)

### TIP

Level the piston ring into the cylinder with the piston crown.



a. 10 mm (0.39 in)

### 3. Measure:

- Piston ring end gap  
Out of specification → Replace the piston ring.

#### TIP

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.



#### Piston ring end gap

##### Top ring

0.20–0.30 mm (0.008–0.012 in)

##### Limit

0.55 mm (0.0217 in)

##### 2nd ring

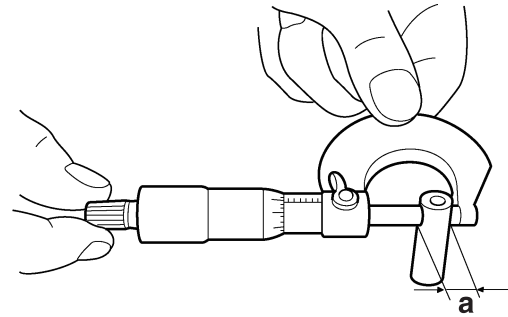
0.35–0.50 mm (0.014–0.020 in)

##### Limit

0.85 mm (0.0335 in)

##### Oil ring

0.20–0.50 mm (0.008–0.020 in)



### 3. Measure:

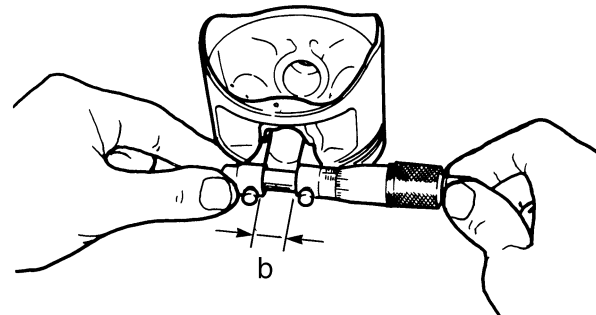
- Piston pin bore diameter "b"  
Out of specification → Replace the piston.



**Piston pin bore inside diameter**  
20.004–20.015 mm (0.7876–0.7880 in)

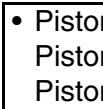
#### Limit

20.045 mm (0.7892 in)



### 4. Calculate:

- Piston-pin-to-piston-pin-bore clearance  
Out of specification → Replace the piston pin and piston as a set.



• Piston-pin-to-piston-pin-bore clearance =  
Piston pin bore diameter "b" -  
Piston pin outside diameter "a"



#### Piston-pin-to-piston clearance

0.004–0.024 mm (0.0002–0.0009 in)

#### Limit

0.074 mm (0.0029 in)



#### Piston pin outside diameter

19.991–20.000 mm (0.7870–0.7874 in)

#### Limit

19.971 mm (0.7863 in)

EAS24440

## CHECKING THE PISTON PIN

### 1. Check:

- Piston pin  
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

### 2. Measure:

- Piston pin outside diameter "a"  
Out of specification → Replace the piston pin.

EAS24450

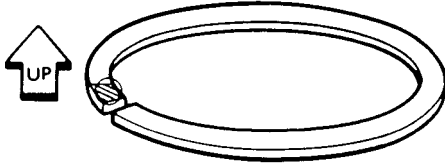
## INSTALLING THE PISTON AND CYLINDER

### 1. Install:

- Top ring
- 2nd ring
- Oil ring

## TIP

Be sure to install the piston rings so that the manufacturer's marks or numbers face up.

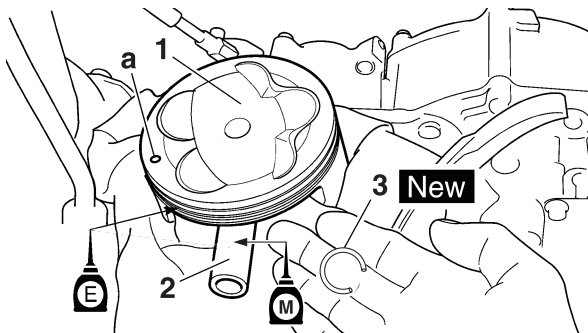


## 2. Install:

- Piston "1"
- Piston pin "2"
- Piston pin clip "3" **New**

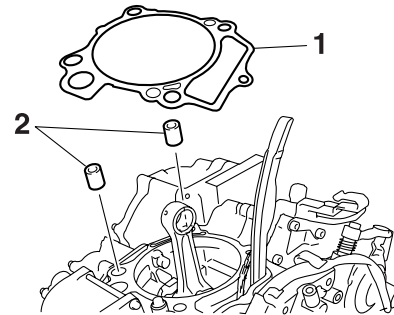
## TIP

- Apply molybdenum disulfide oil on to the piston pin.
- Apply engine oil on to piston rings and piston.
- Make sure the punch mark "a" on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.



## 3. Install:

- Cylinder gasket "1" **New**
- Dowel pins "2"



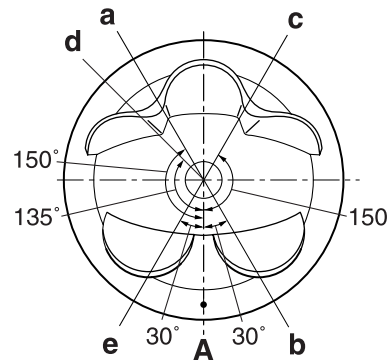
## 4. Lubricate:

- Piston
- Piston rings
- Cylinder (with the recommended lubricant)



## 5. Offset:

- Piston ring end gaps

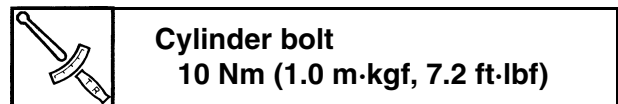


- a. Top ring
- b. 2nd ring
- c. Upper oil ring rail
- d. Oil ring expander
- e. Lower oil ring rail

- A. forward

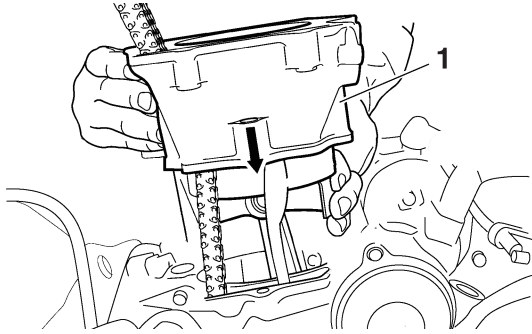
## 6. Install:

- Cylinder "1"



## TIP

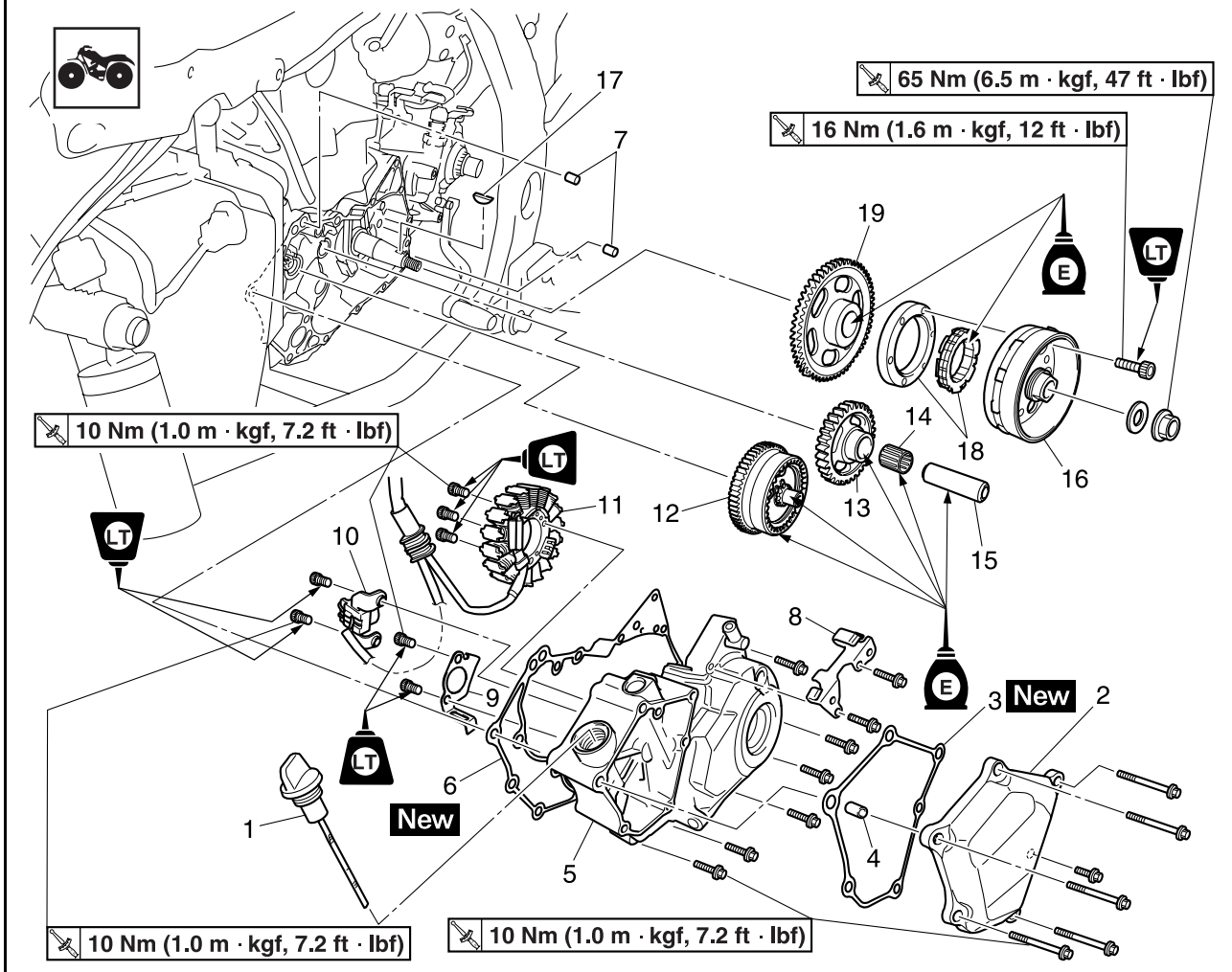
- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.



EAS24480

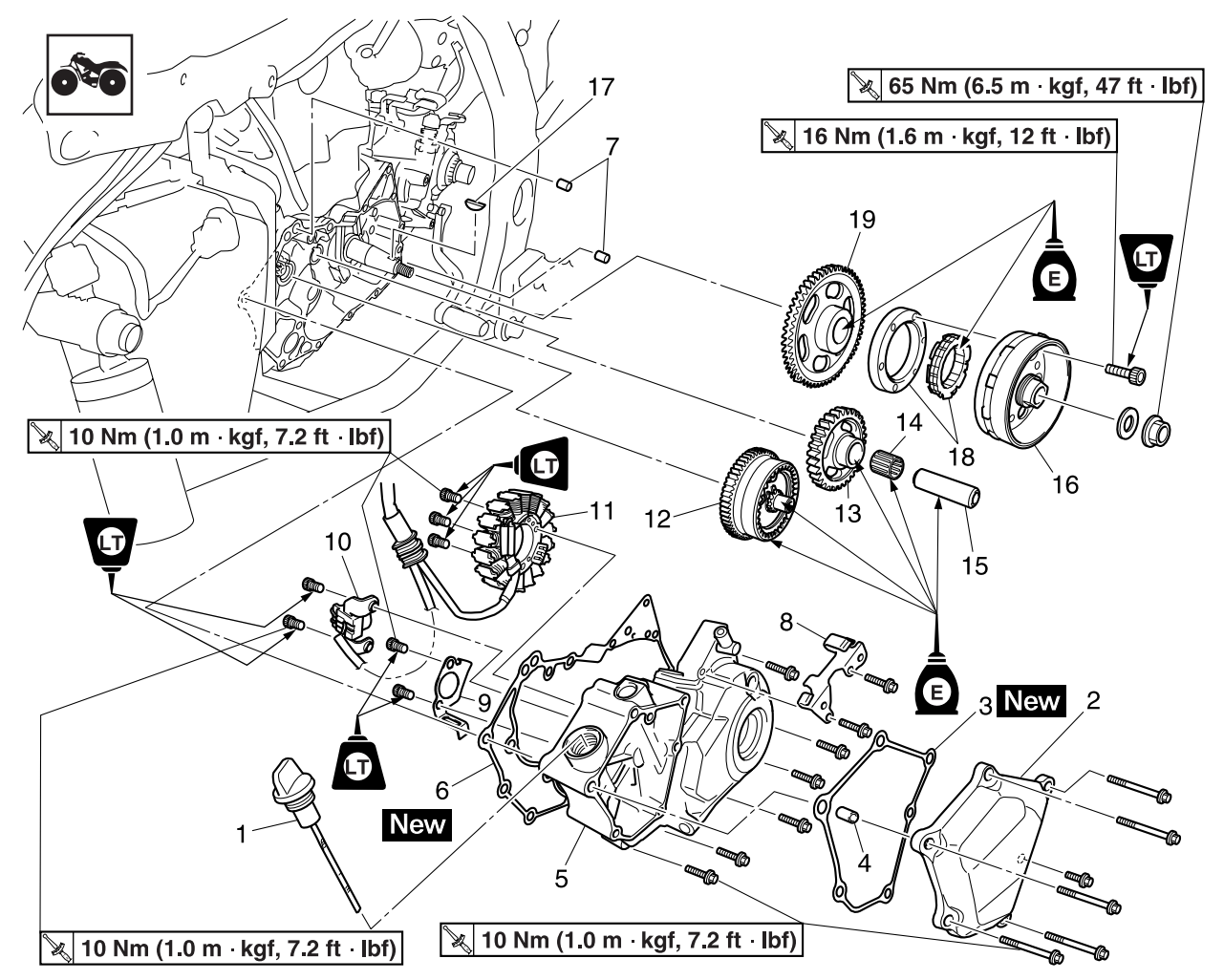
## GENERATOR

### Removing the generator



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain.
	Shift pedal		Refer to "SHIFT SHAFT" on page 5-55.
	Generator coupler		Refer to "ENGINE REMOVAL" on page 5-1.
	Crankcase breather hose		Refer to "ENGINE REMOVAL" on page 5-1.
1	Dipstick	1	
2	Oil tank cover	1	
3	Oil tank cover gasket	1	
4	Dowel pin	1	
5	Generator rotor cover	1	
6	Generator rotor cover gasket	1	
7	Dowel pin	2	
8	Lead holder 1	1	
9	Lead holder 2	1	
10	Crankshaft position sensor	1	
11	Stator coil	1	
12	Torque limiter	1	
13	Starter clutch idle gear	1	
14	Bearing	1	
15	Starter clutch idle gear shaft	1	

Removing the generator



Order	Job/Parts to remove	Q'ty	Remarks
16	Generator rotor	1	
17	Woodruff key	1	
18	Starter clutch	1	
19	Starter wheel gear	1	
			For installation, reverse the removal procedure.

EAS24490

## REMOVING THE GENERATOR

1. Remove:
  - Generator rotor cover

### TIP

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

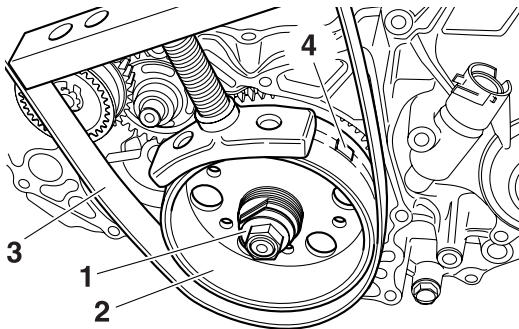
2. Remove:
  - Generator rotor nut "1"
  - Washer

### TIP

- While holding the generator rotor "2" with the sheave holder "3", loosen the generator rotor nut.
- Do not allow the sheave holder to touch the projection "4" on the generator rotor.



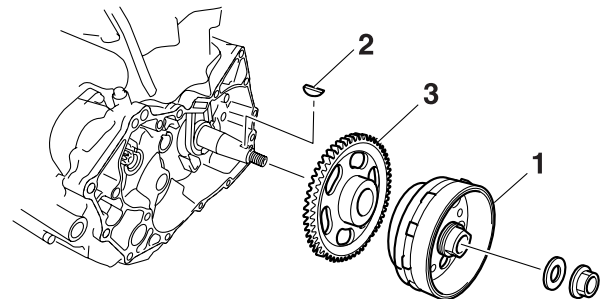
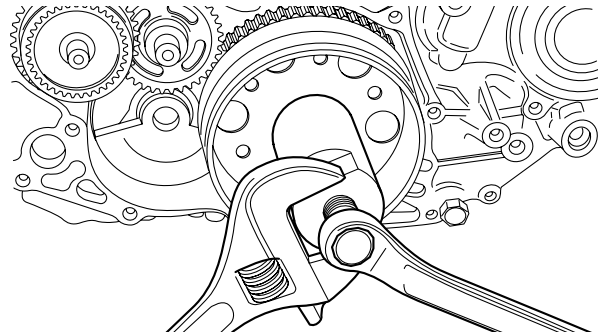
**Sheave holder**  
90890-01701  
**Primary clutch holder**  
YS-01880-A



3. Remove:
  - Generator rotor "1"
  - Woodruff key "2"
  - Starter wheel gear "3"



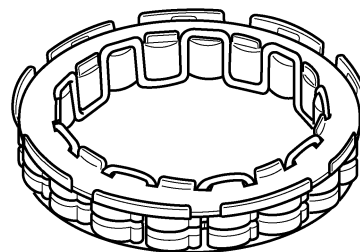
**Rotor puller**  
90890-04142  
YM-04142



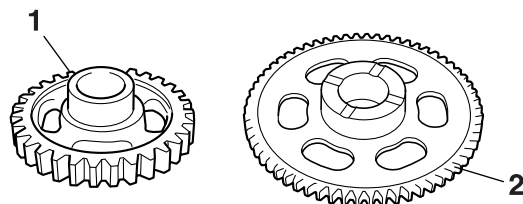
EAS24570

## CHECKING THE STARTER CLUTCH

1. Check:
  - Starter clutch rollers
  - Damage/wear → Replace.

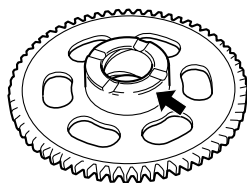


2. Check:
  - Starter clutch idle gear "1"
  - Starter wheel gear "2"
  - Burrs/chips/roughness/wear → Replace the defective part(s).



3. Check:
  - Starter wheel gear (Contacting surface)
  - Damage/pitting/wear → Replace.

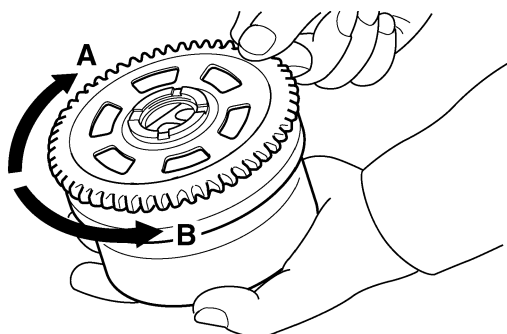




4. Check:
  - Starter clutch operation



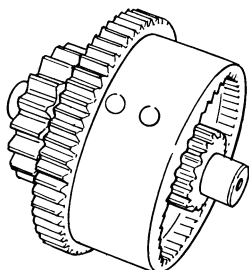
- a. Install the starter wheel gear onto the starter clutch and hold the starter clutch.
- b. When turning the starter wheel gear clockwise "A", the starter clutch and the starter wheel gear should engage, otherwise the starter clutch is faulty and must be replaced.
- c. When turning the starter wheel gear counterclockwise "B", it should turn freely, otherwise the starter clutch is faulty and must be replaced.



EAS18P1009

## CHECKING THE TORQUE LIMITER

1. Check:
  - Torque limiter
 Damage/wear → Replace.



EAS24500

## INSTALLING THE GENERATOR

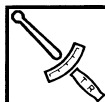
1. Install:
  - Woodruff key
  - Generator rotor
  - Washer
  - Generator rotor nut

### TIP

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly sealed in the keyway of the crankshaft.

2. Tighten:

- Generator rotor nut "1"



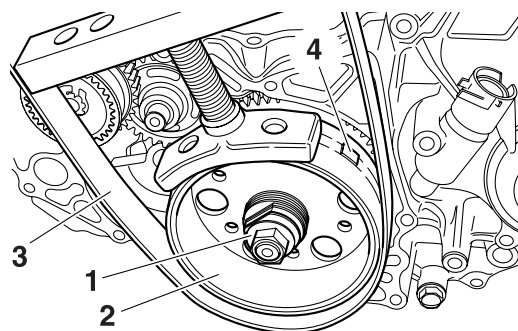
**Generator rotor nut**  
65 Nm (6.5 m·kgf, 47 ft·lbf)

### TIP

- While holding the generator rotor "2" with the sheave holder "3", tighten the generator rotor nut.
- Do not allow the sheave holder to touch the projection "4" on the generator rotor.



**Sheave holder**  
90890-01701  
**Primary clutch holder**  
YS-01880-A



3. Install:

- Pickup coil

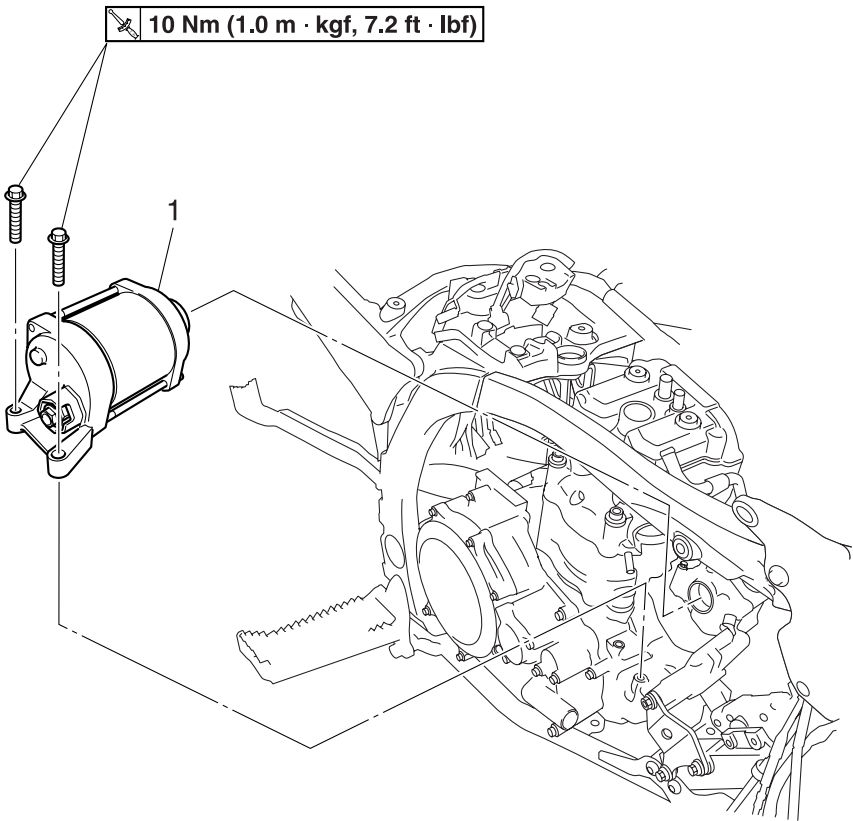


**Pickup coil bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)  
**LOCTITE®**

EAS24780

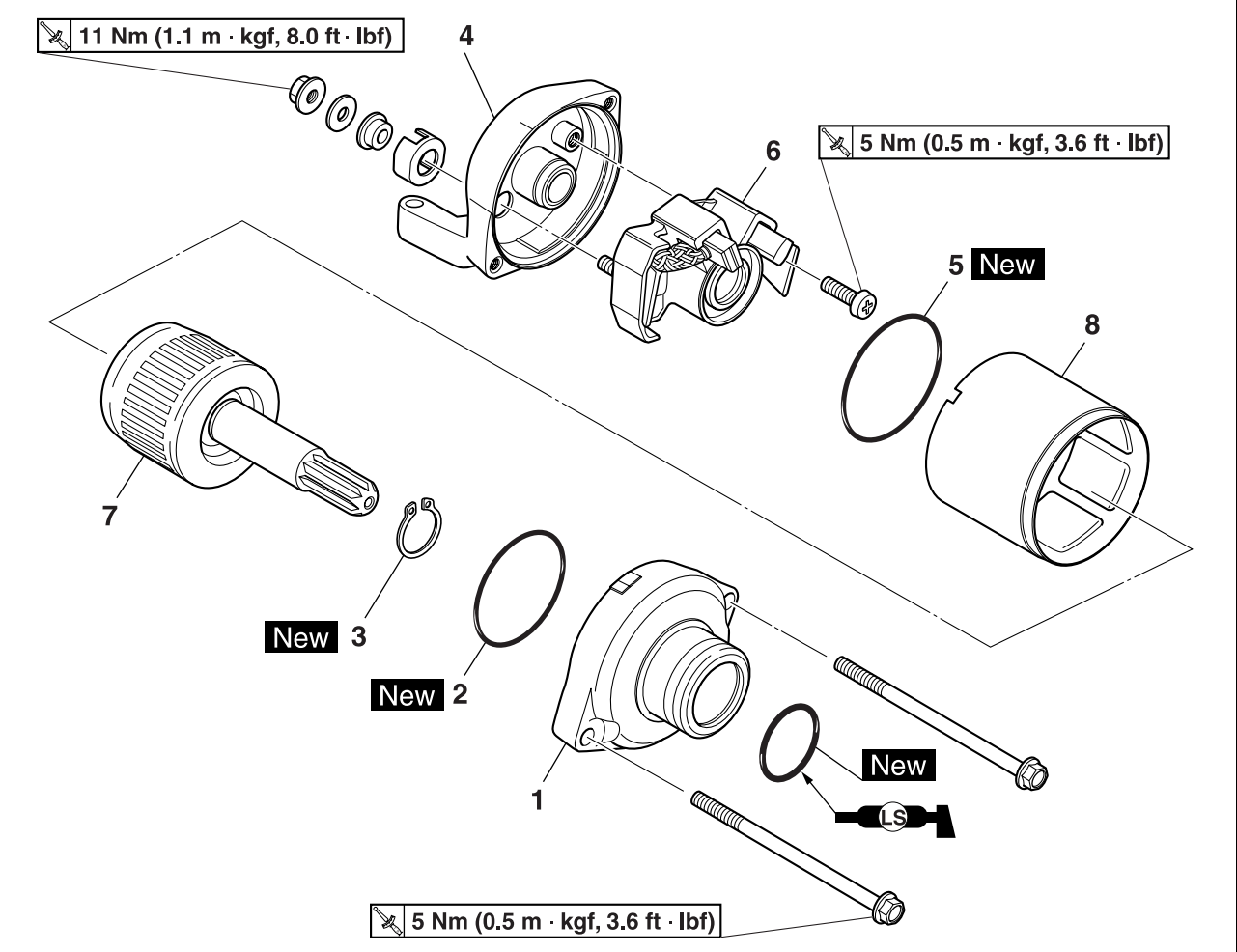
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Exhaust pipe		Refer to "ENGINE REMOVAL" on page 5-1.
1	Starter motor	1	
			For installation, reverse the removal procedure.

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Front bracket	1	
2	O-ring	1	
3	Circlip	1	
4	Rear bracket	1	
5	O-ring	1	
6	Brush holder assembly	1	
7	Armature assembly	1	
8	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.

EAS24790

## CHECKING THE STARTER MOTOR

### 1. Check:

- Commutator  
Dirt → Clean with 600 grit sandpaper.

### 2. Measure:

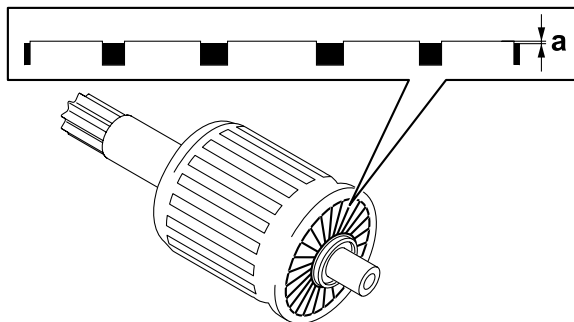
- Mica undercut "a"  
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



**Mica undercut (depth)**  
**0.70 mm (0.03 in)**

### TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.



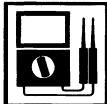
### 3. Measure:

- Armature assembly resistances (commutator "1" and insulation "2")  
Out of specification → Replace the starter motor.

- a. Measure the armature assembly resistances with the digital circuit tester.

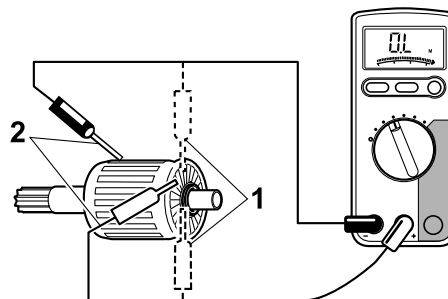


**Digital circuit tester**  
**90890-03174**  
**Model 88 Multimeter with tachometer**  
**YU-A1927**



**Armature coil**  
**Commutator resistance**  
**0.0150–0.0250  $\Omega$  at 20 °C (68 °F)**  
**Insulation resistance**  
**Above 1 M $\Omega$  at 20 °C (68 °F)**

- b. If any resistance is out of specification, replace the starter motor.

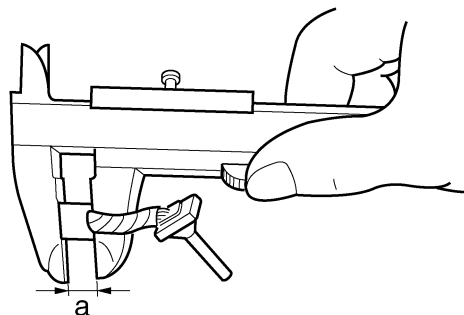


### 4. Measure:

- Brush length "a"  
Out of specification → Replace the brush holder assembly.



**Brush overall length**  
**12.0 mm (0.47 in)**  
**Limit**  
**6.50 mm (0.26 in)**

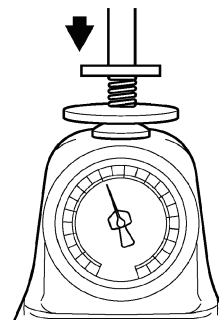


### 5. Measure:

- Brush spring force  
Out of specification → Replace the brush holder assembly.



**Brush spring force**  
**6.02–6.51 N (614–664 gf,**  
**21.65–23.41 ozf)**



### 6. Check:

- Gear teeth  
Damage/wear → Replace the gear.

7. Check:

- Bearing
- Oil seal

Damage/wear → Replace the defective part(s).

EAS24800

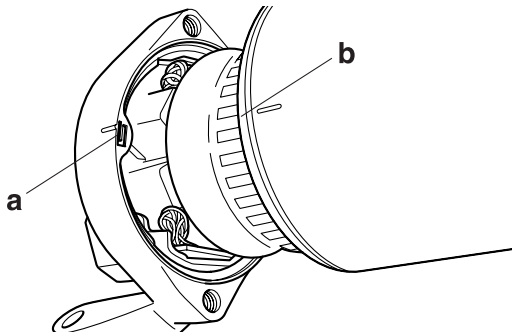
## ASSEMBLING THE STARTER MOTOR

1. Install:

- Starter motor yoke

**TIP**

Align the projection “a” on the rear bracket with the slot “b” in the starter motor yoke.

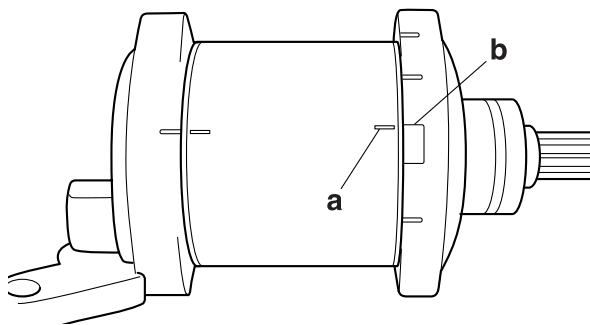


2. Install:

- Front bracket

**TIP**

Align the match marks “a” on the starter motor yoke with the match marks “b” on the front bracket.



EAS24810

## INSTALLING THE STARTER MOTOR

1. Install:

- Starter motor
- Starter motor bolts

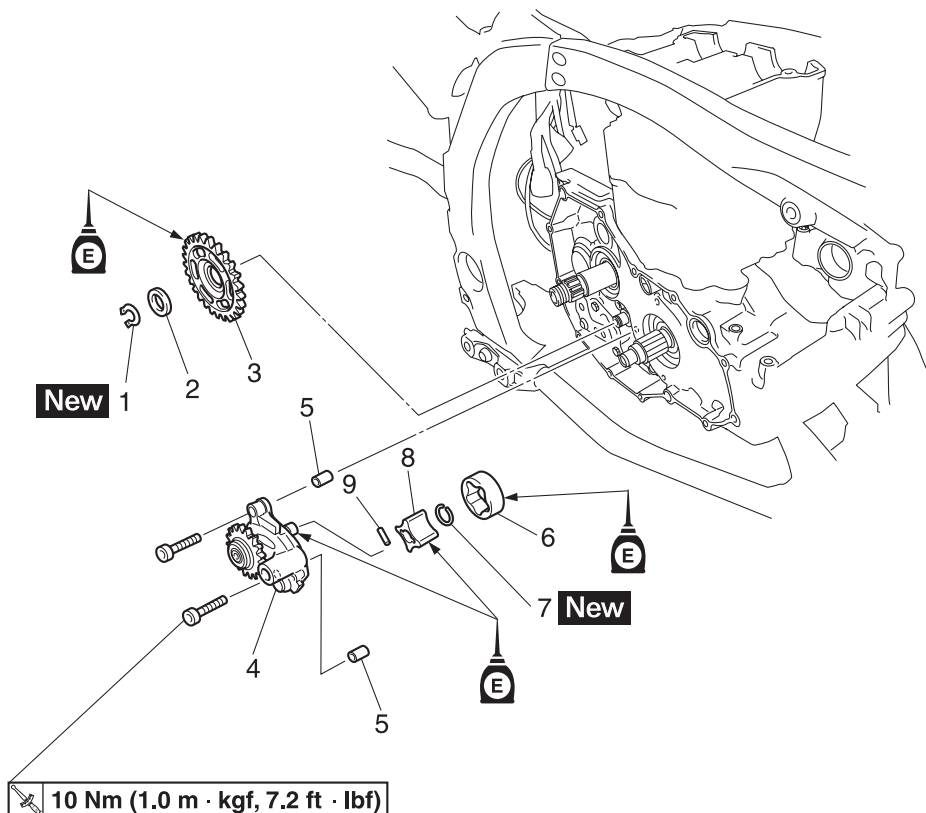


**Starter motor bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

2. Connect:

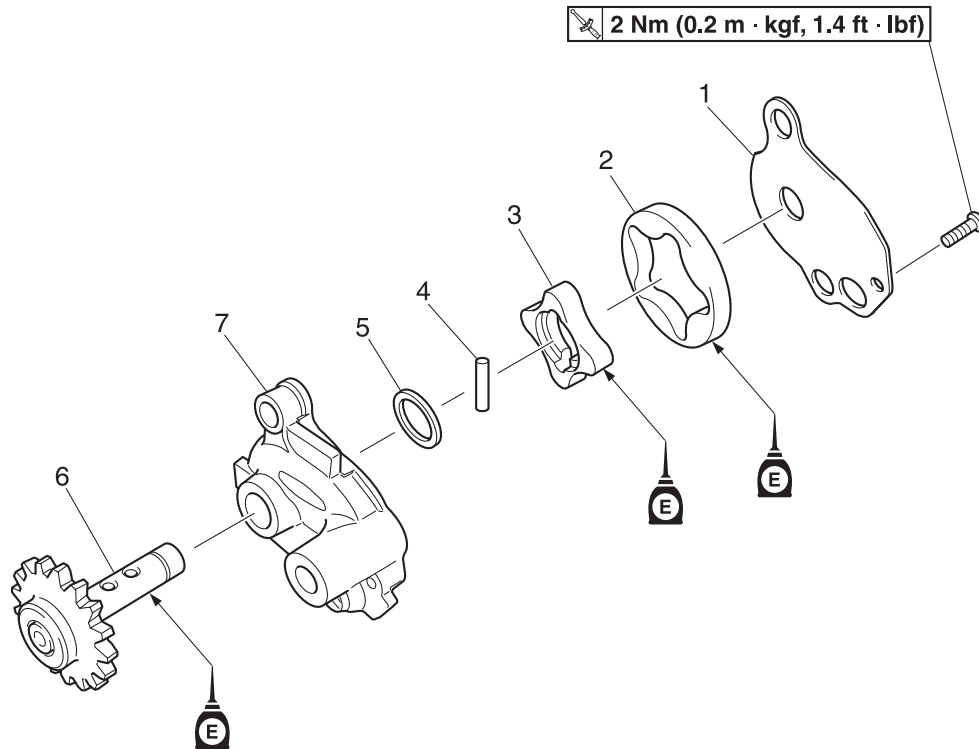
- Starter motor lead

EAS24911

**OIL PUMP****Removing the oil pump**

Order	Job/Parts to remove	Q'ty	Remarks
	Clutch housing		Refer to "CLUTCH" on page 5-45.
	Right crankcase cover		Refer to "CRANKCASE" on page 5-58.
1	Circlip	1	
2	Washer	1	
3	Oil pump drive gear	1	
4	Oil pump assembly	1	
5	Dowel pin	2	
6	Outer rotor (scavenging pump side)	1	
7	Circlip	1	
8	Inner rotor (scavenging pump side)	1	
9	Pin	1	
			For installation, reverse the removal procedure.

## Disassembling the oil pump



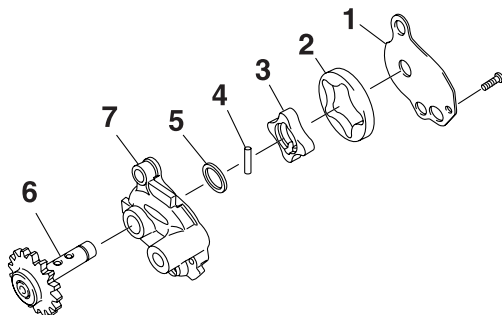
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing cover	1	
2	Outer rotor (oil feed pump side)	1	
3	Inner rotor (oil feed pump side)	1	
4	Pin	1	
5	Washer	1	
6	Oil pump driven gear	1	
7	Oil pump housing	1	
			For installation, reverse the removal procedure.

EAS24950

## DISASSEMBLING THE OIL PUMP (OIL FEED PUMP)

### 1. Remove:

- Oil pump housing cover "1"
- Outer rotor (oil feed pump side) "2"
- Inner rotor (oil feed pump side) "3"
- Pin "4"
- Washer "5"
- Oil pump driven gear "6"
- Oil pump housing "7"

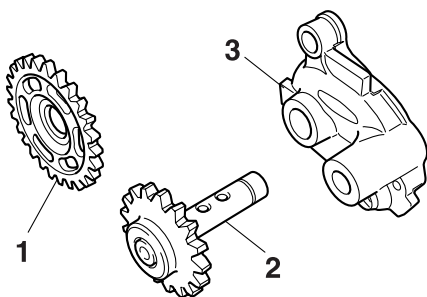


EAS24960

## CHECKING THE OIL PUMP

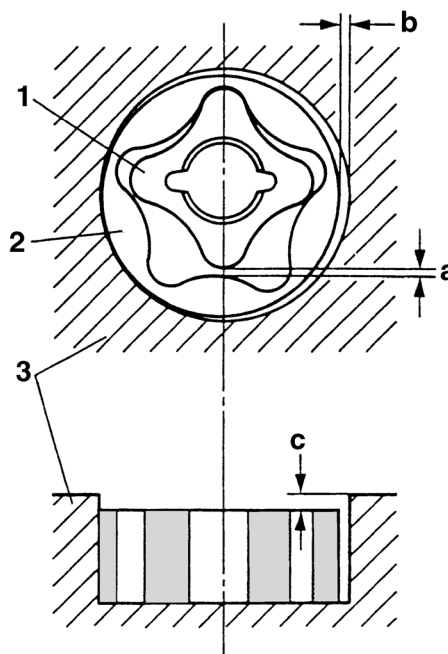
### 1. Check:

- Oil pump drive gear "1"
  - Oil pump driven gear "2"
  - Oil pump housing "3"
  - Oil pump housing cover
- Cracks/damage/wear → Replace the defective part(s).



### 2. Measure:

- Inner-rotor-to-outer-rotor-tip clearance "a"
  - Outer-rotor-to-oil-pump-housing clearance "b"
  - Oil pump housing clearance "C"
- Out of specification → Replace the oil pump.



1. Inner rotor
2. Outer rotor
3. Oil pump housing

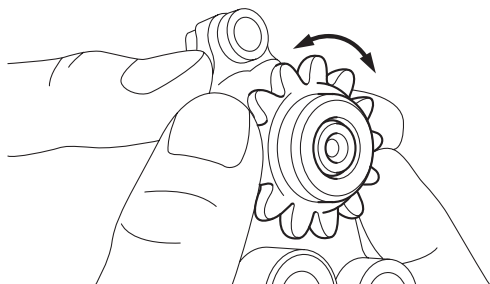


## 3. Check:

- Oil pump operation  
Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

## 3. Check:

- Oil pump operation  
Refer to “CHECKING THE OIL PUMP” on page 5-43.



EAS25000

## ASSEMBLING THE OIL PUMP (OIL FEED PUMP)

### 1. Lubricate:

- Inner rotor (oil feed pump side)
- Outer rotor (oil feed pump side)
- Oil pump shaft (oil pump driven gear)  
(with the recommended lubricant)



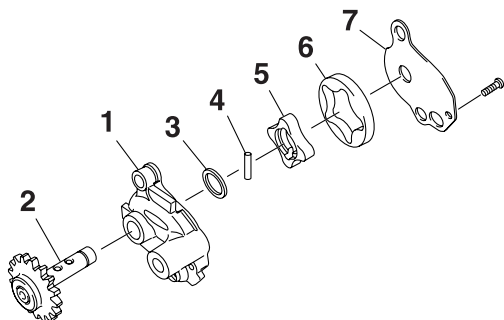
**Recommended lubricant**  
**Engine oil**

### 2. Install:

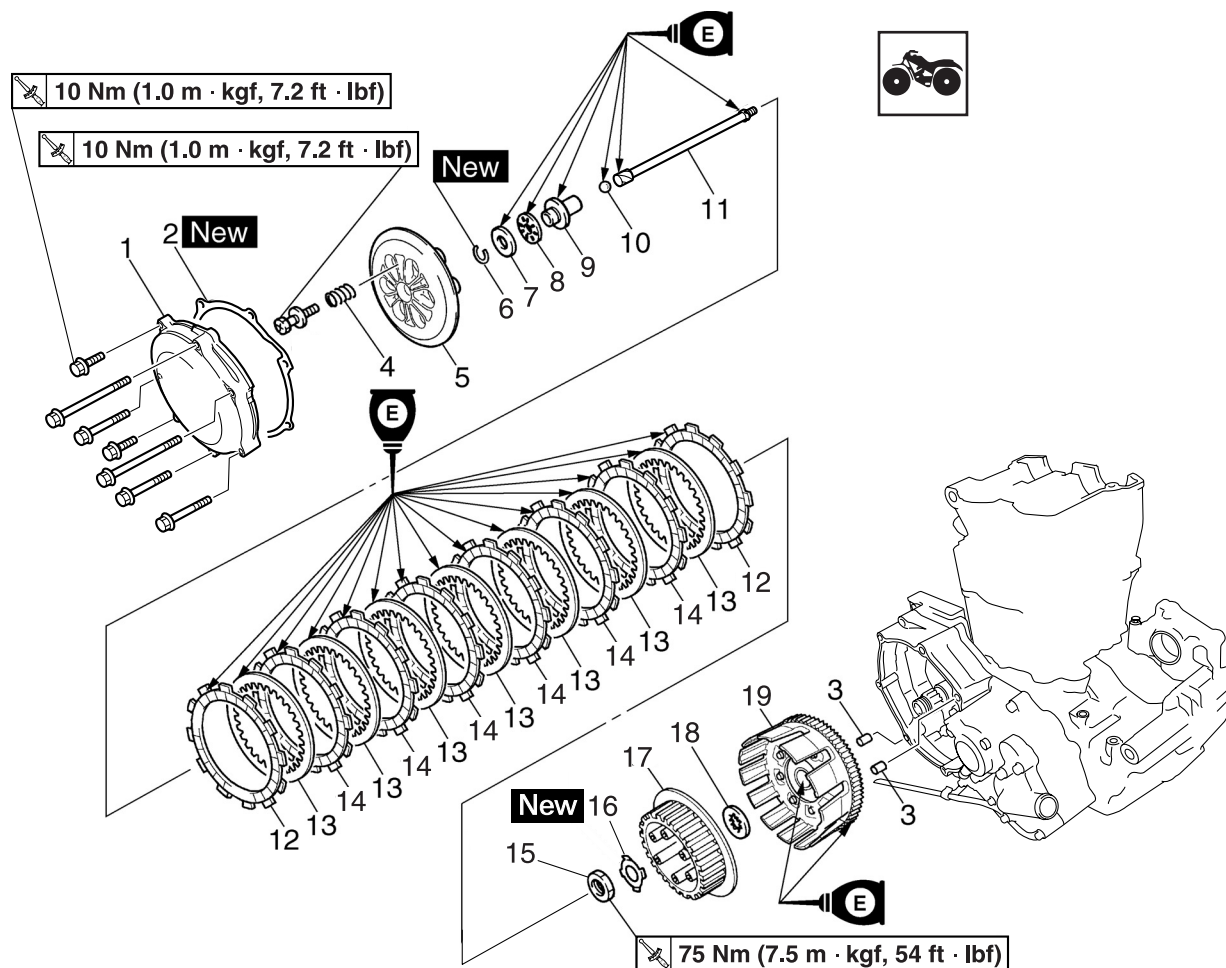
- Oil pump housing “1”
- Oil pump driven gear “2”
- Washer “3”
- Pin “4”
- Inner rotor (oil feed pump side) “5”
- Outer rotor (oil feed pump side) “6”
- Oil pump housing cover “7”

### TIP

When installing the inner rotor, align the pin in the oil pump shaft with the groove in the inner rotor.

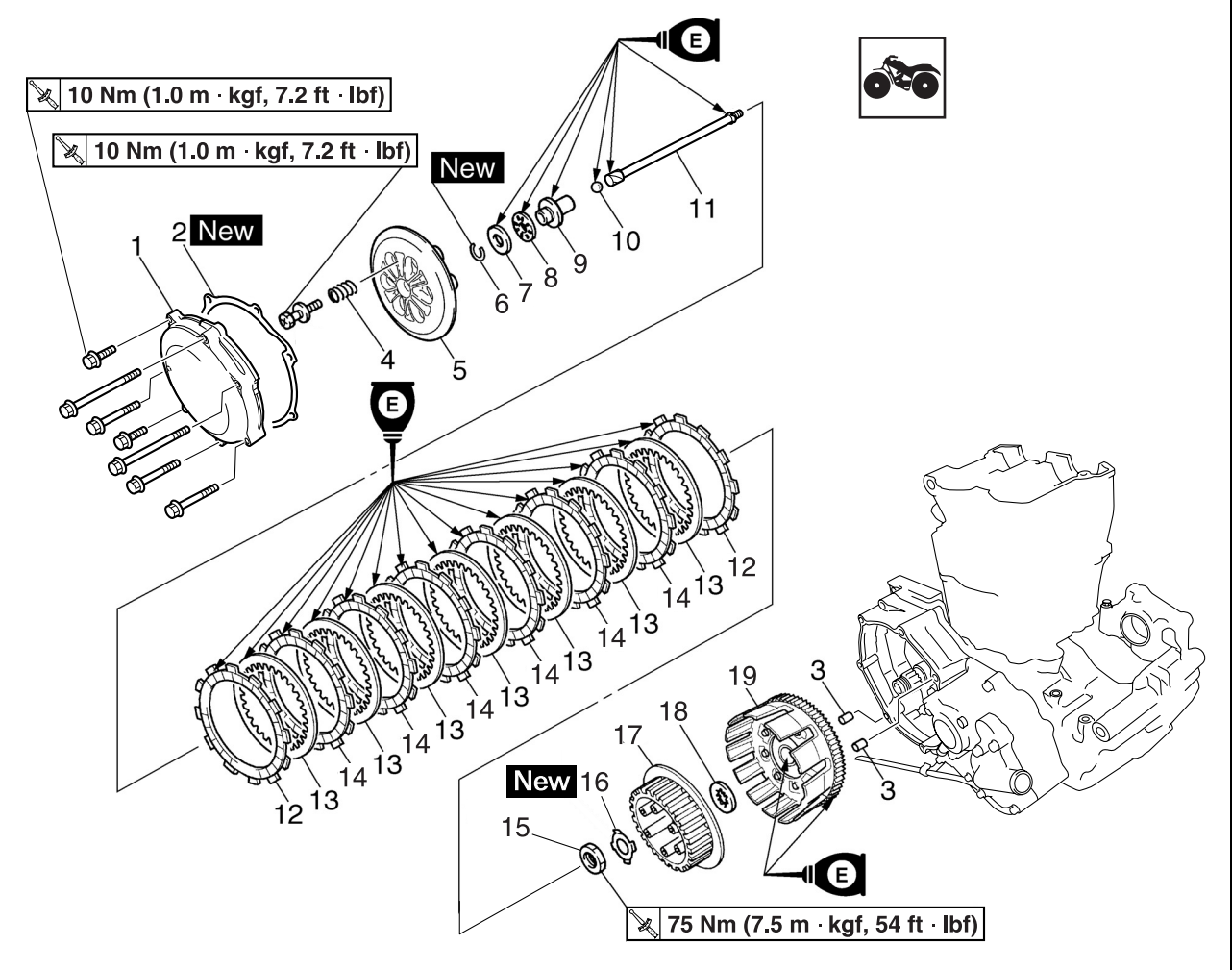


EAS25061

**CLUTCH****Removing the clutch**

Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain.
	Clutch cable		Refer to "ENGINE REMOVAL" on page 5-1.
1	Clutch cover	1	
2	Gasket	1	
3	Dowel pin	2	
4	Clutch spring	6	Yellow painting
5	Pressure plate	1	
6	Circlip	1	
7	Plain washer	1	
8	Bearing	1	
9	Push rod (pressure plate side)	1	
10	Ball	1	
11	Push rod (push lever side)	1	
12	Friction plate 1	2	
13	Clutch plate	7	
14	Friction plate 2	6	Purple painting
15	Clutch boss nut	1	
16	Lock washer	1	
17	Clutch boss	1	
18	Thrust washer	1	

Removing the clutch

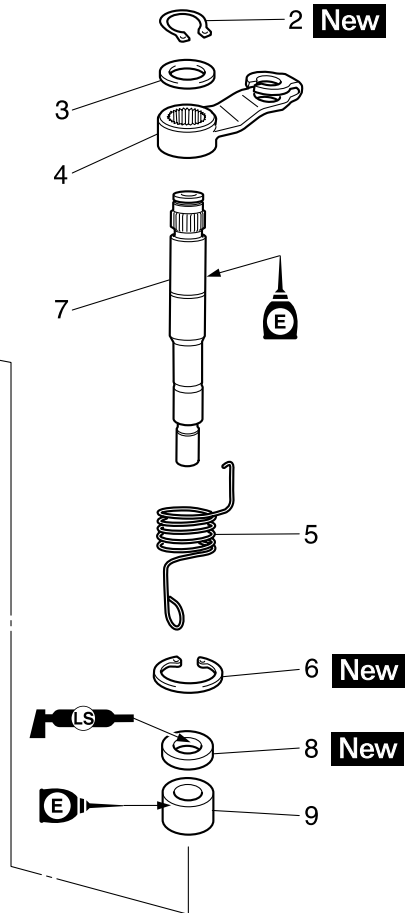
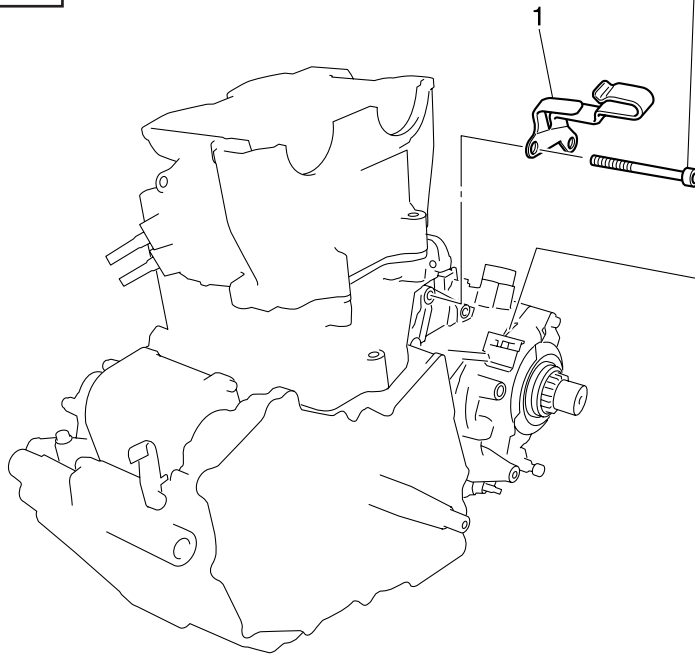


Order	Job/Parts to remove	Q'ty	Remarks
19	Clutch housing	1	
			For installation, reverse the removal procedure.

## Removing the push lever shaft



12 Nm (1.2 m · kgf, 8.7 ft · lbf)



Order	Job/Parts to remove	Q'ty	Remarks
1	Cable holder	1	
2	Circlip	1	
3	Plain washer	1	
4	Push lever	1	
5	Spring	1	
6	Circlip	1	
7	Push lever shaft	1	
8	Oil seal	1	
9	Bearing	1	
			For installation, reverse the removal procedure.

EAS25070

## REMOVING THE CLUTCH

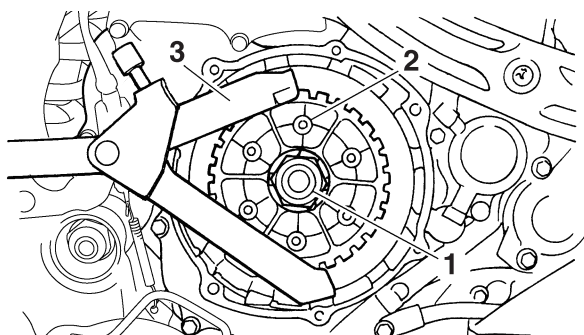
1. Straighten the lock washer tab.
2. Loosen:
  - Clutch boss nut "1"

### TIP

While holding the clutch boss "2" with the universal clutch holder "3", loosen the clutch boss nut.



**Universal clutch holder**  
90890-04086  
YM-91042



3. Remove:
  - Thrust washer
  - Clutch housing

EAS25100

## CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

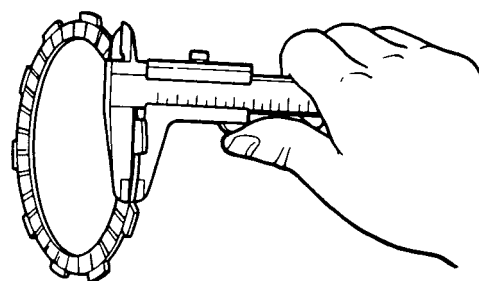
1. Check:
  - Friction plate 1
  - Friction plate 2
 Damage/wear → Replace the friction plates as a set.
2. Measure:
  - Friction plate thickness
 Out of specification → Replace the friction plates as a set.

### TIP

Measure the friction plate at four places.



**Friction plate 1 thickness**  
2.92–3.08 mm (0.11–0.12 in)  
**Limit**  
2.82 mm (0.11 in)  
**Friction plate 2 thickness**  
2.92–3.08 mm (0.11–0.12 in)  
**Limit**  
2.82 mm (0.11 in)



EAS25110

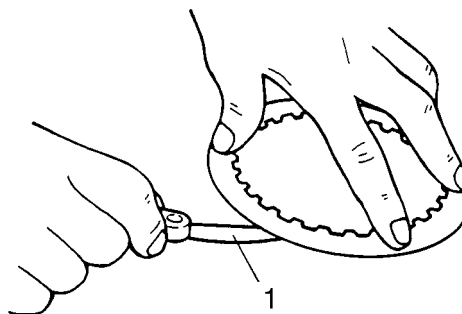
## CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

1. Check:
  - Clutch plate
 Damage → Replace the clutch plates as a set.
2. Measure:
  - Clutch plate warpage  
(with a surface plate and thickness gauge "1")
 Out of specification → Replace the clutch plates as a set.



**Clutch plate thickness**  
1.50–1.70 mm (0.06–0.07 in)  
**Warpage limit**  
0.20 mm (0.0079 in)



EAS25140

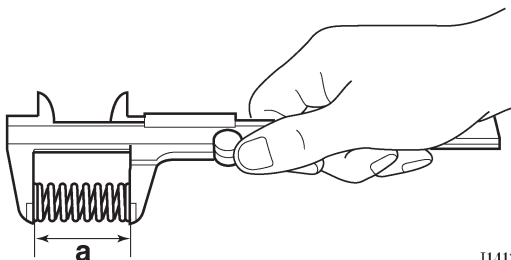
## CHECKING THE CLUTCH SPRINGS

The following procedure applies to all of the clutch springs.

1. Check:
  - Clutch spring
 Damage → Replace the clutch springs as a set.
2. Measure:
  - Clutch spring free length "a"
 Out of specification → Replace the clutch springs as a set.



**Clutch spring free length**  
47.8 mm (1.88 in)  
**Wear limit**  
45.4 mm (1.79 in)



11412901

EAS25150

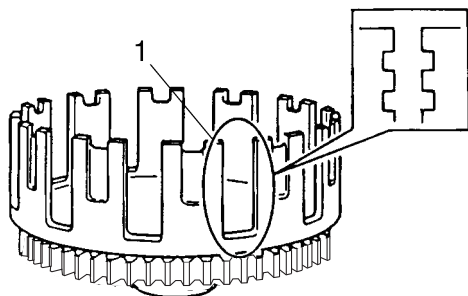
## CHECKING THE CLUTCH HOUSING

### 1. Check:

- Clutch housing dogs "1"  
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

#### TIP

Pitting on the clutch housing dogs will cause erratic clutch operation.



EAS25160

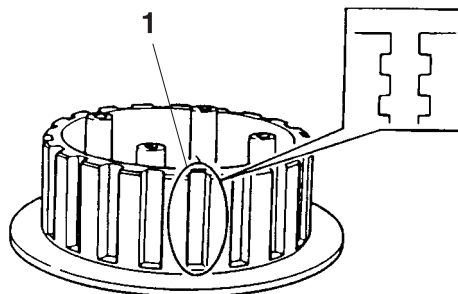
## CHECKING THE CLUTCH BOSS

### 1. Check:

- Clutch boss splines "1"  
Damage/pitting/wear → Replace the clutch boss.

#### TIP

Pitting on the clutch boss splines will cause erratic clutch operation.

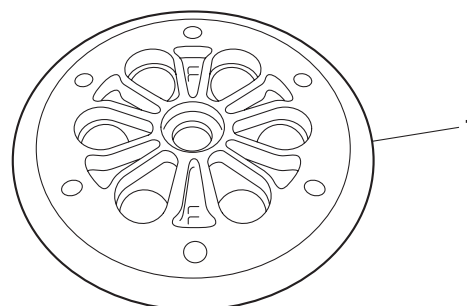


EAS25170

## CHECKING THE PRESSURE PLATE

### 1. Check:

- Pressure plate "1"  
Cracks/damage → Replace.

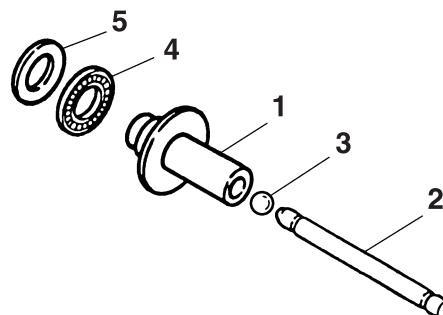


EAS25190

## CHECKING THE CLUTCH PUSH RODS

### 1. Check:

- Push rod (pressure plate side) "1"
- Push rod (push lever side) "2"
- Ball "3"
- Bearing "4"
- Plain washer "5"
- Cracks/damage/wear/bend → Replace the defective part(s).

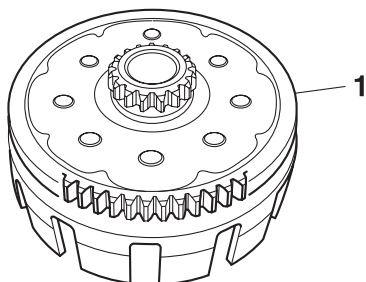


EAS18P1010

## CHECKING THE PRIMARY DRIVEN GEAR

### 1. Check:

- Primary driven gear “1”  
Damage/wear → Replace the primary drive gear and clutch housing as a set.  
Excessive noise during operation → Replace the primary drive gear and clutch housing as a set.



EAS25260

## INSTALLING THE CLUTCH

### 1. Install:

- Clutch housing “1”
- Thrust washer
- Clutch boss “2”
- Lock washer **New**
- Clutch boss nut “3”

### TIP

Make sure the teeth on the lock washer are correctly aligned with the grooves on the clutch boss.

### 2. Tighten:

- Clutch boss nut



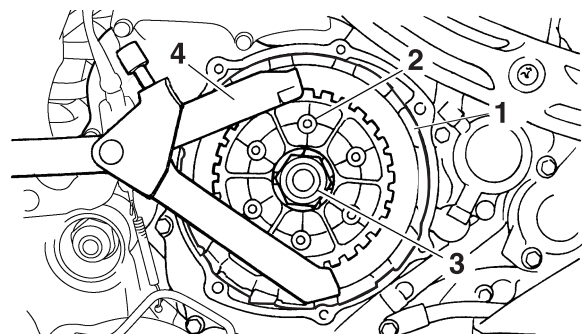
**Clutch boss nut**  
75 Nm (7.5 m·kgf, 54 ft·lbf)

### TIP

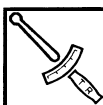
While holding the clutch boss with the universal clutch holder “4”, tighten the clutch boss nut.



**Universal clutch holder**  
90890-04086  
YM-91042



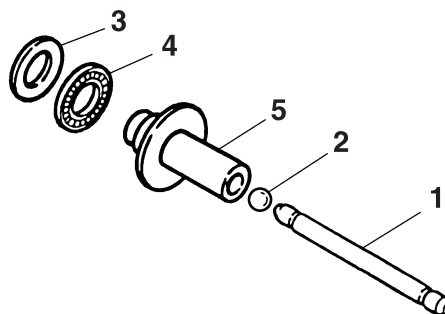
3. Bend the lock washer tab along a flat side of the nut.
4. Install:
  - Friction plate 1 (1 pc.)
5. Install:
  - Clutch plate (7 pcs.)
  - Friction plate 2 (6 pcs.)
6. Install:
  - Friction plate 1 (1 pc.)
7. Install:
  - Push rod (push lever side) “1”
  - Ball “2”
  - Plain washer “3”
  - Bearing “4”
  - Push rod (pressure plate side) “5”
  - Circlip
  - Pressure plate
  - Clutch springs
  - Clutch spring bolts



**Clutch spring bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

### TIP

Tighten the clutch spring bolts in stages and in a crisscross pattern.



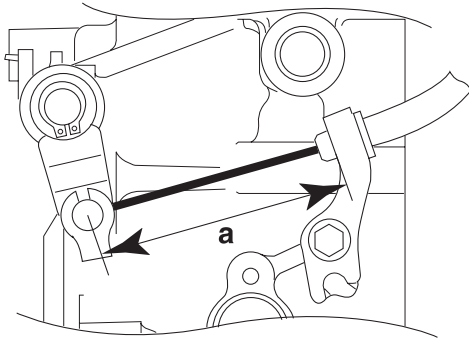
8. Check:
  - Clutch cable length “a”  
Out of specification → Adjust.

**TIP**

When installing, if “a” is out of the specified length, move the spline one section so that “a” is within the specified length.



**Clutch cable length**  
**66.5–73.6 mm (2.62–2.90 in)**



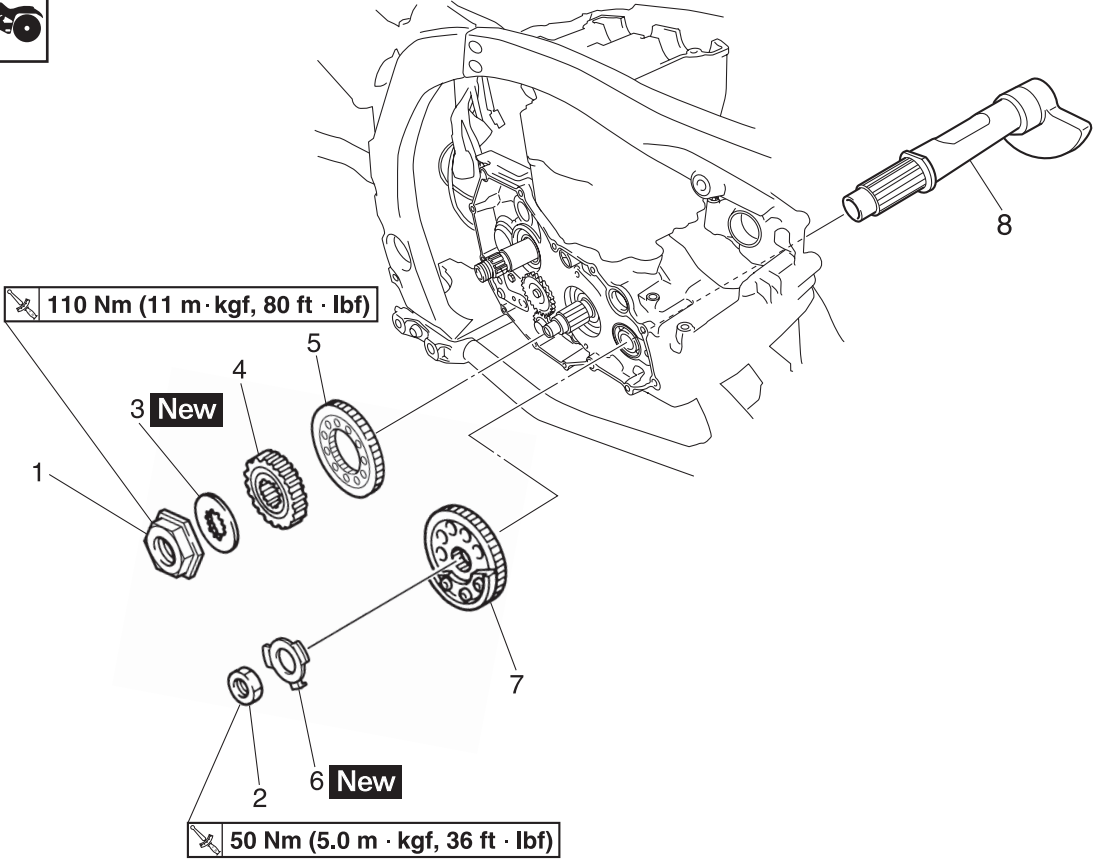

9. Adjust:

- Clutch lever free play

Refer to “ADJUSTING THE CLUTCH  
LEVER FREE PLAY” on page 3-12.



EAS18P1038  
**BALANCER**



Order	Job/Parts to remove	Q'ty	Remarks
	Clutch housing		Refer to "CLUTCH" on page 5-45.
	Right crankcase cover		Refer to "CRANKCASE" on page 5-58.
	Generator rotor		Refer to "GENERATOR" on page 5-33.
1	Primary drive gear nut	1	
2	Balancer driven gear nut	1	
3	Conical spring washer	1	
4	Primary drive gear	1	
5	Balancer drive gear	1	
6	Lock washer	1	
7	Balancer driven gear	1	
8	Balancer	1	
			For installation, reverse the removal procedure.

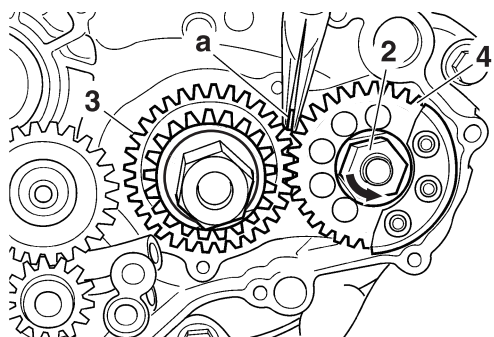
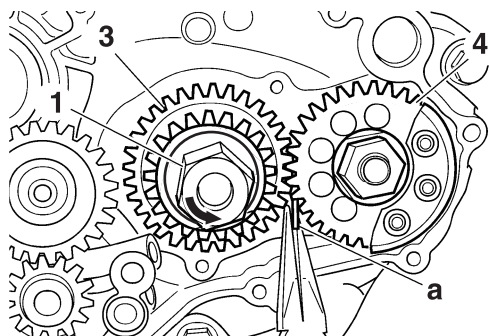
EAS18P1011

## REMOVING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1. Straighten the lock washer tab.
2. Loosen:
  - Primary drive gear nut “1”
  - Balancer driven gear nut “2”

### TIP

Place an aluminum plate “a” between the teeth of the balancer drive gear “3” and driven gear “4”

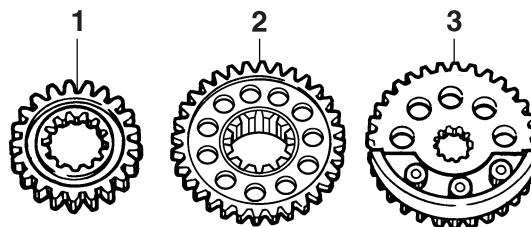


3. Remove:
  - Balancer drive gear
  - Balancer driven gear

EAS18P1012

## CHECKING THE PRIMARY DRIVE GEAR, BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

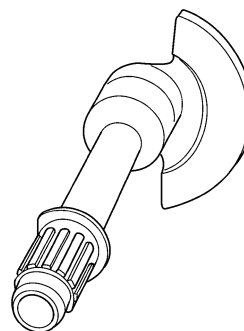
1. Check:
  - Primary drive gear “1”
  - Balancer drive gear “2”
  - Balancer driven gear “3”
 Wear/damage → Replace.



EAS18P1013

## CHECKING THE BALANCER

1. Check:
  - Balancer
 Cracks/damage → Replace.



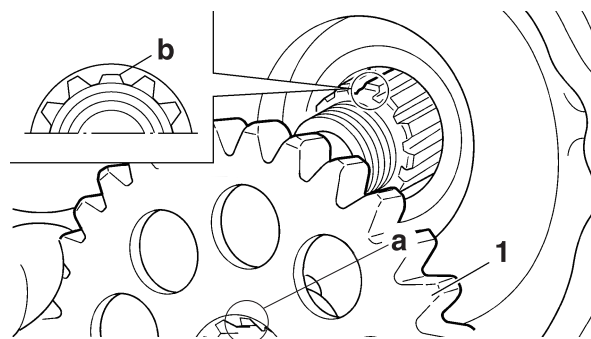
EAS18P1014

## INSTALLING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1. Install:
  - Balancer driven gear “1”

### TIP

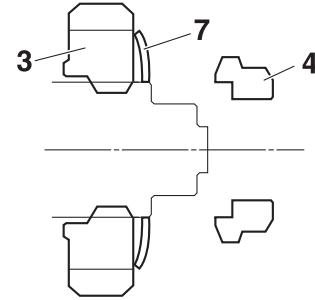
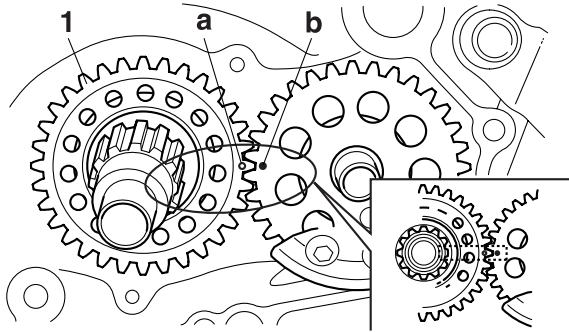
Install the balancer driven gear onto the balancer by adjusting the spline notch “b” on the balancer shaft and spline notch “a” on the balancer driven gear.



2. Install:
  - Balancer drive gear “1”

### TIP

Align the punch mark “a” on the balancer drive gear with the punch mark “b” on the balancer driven gear.



### 3. Install:

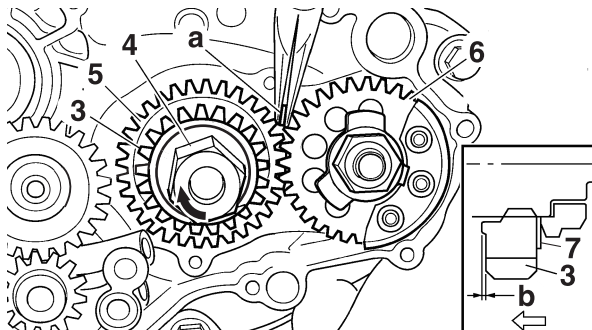
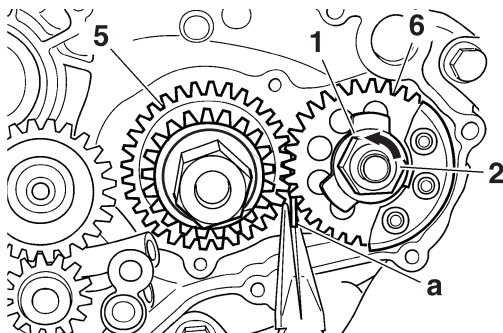
- Lock washer "1"
- Balancer driven gear nut "2"
- Primary drive gear "3"
- Primary drive gear nut "4"



**Balancer driven gear nut**  
**50 Nm (5.0 m·kgf, 36 ft·lbf)**  
**Primary drive gear nut**  
**110 Nm (11 m·kgf, 80 ft·lbf)**

### TIP

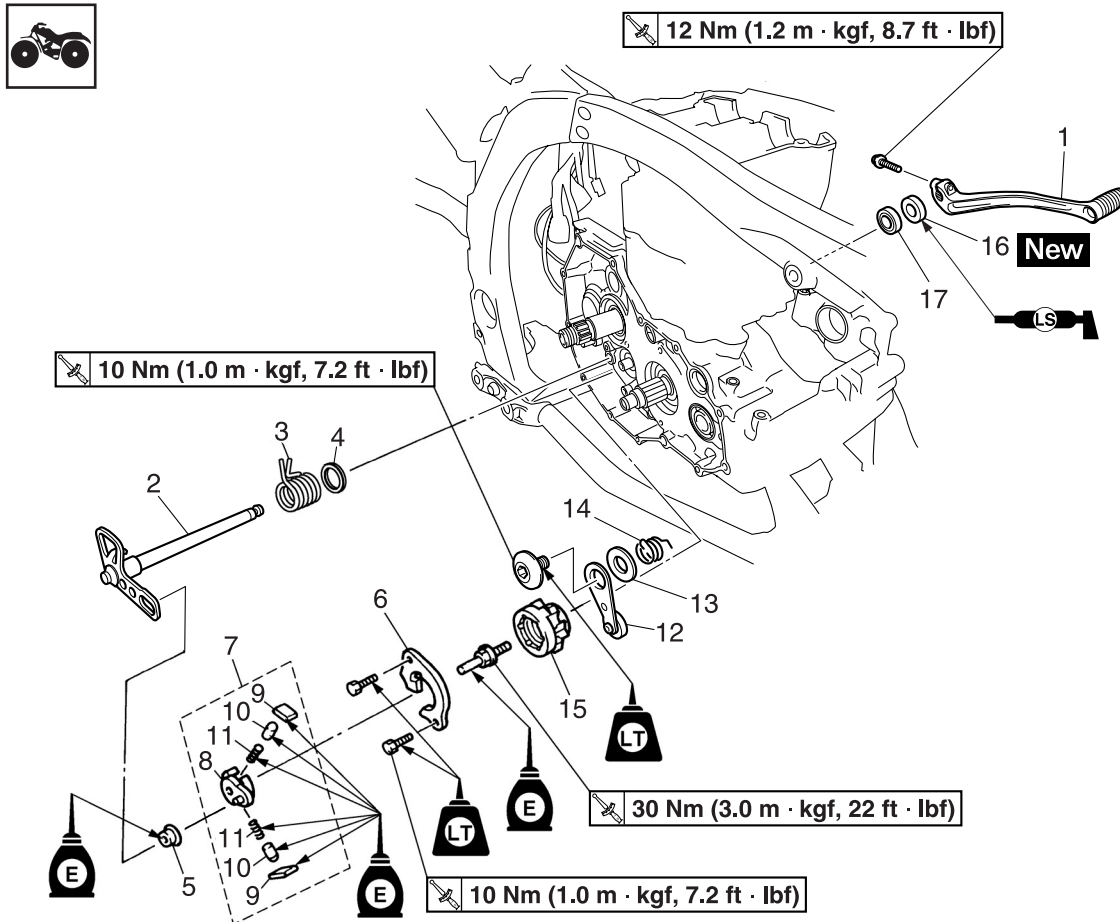
- Install the primary drive gear with its stepped side "b" facing the engine.
- Place an aluminum plate "a" between the teeth of the balancer drive gear "5" and driven gear "6".
- Install the convex of the conical spring washer "7" outside.



EAS25410

## SHIFT SHAFT

### Removing the shift shaft and stopper lever

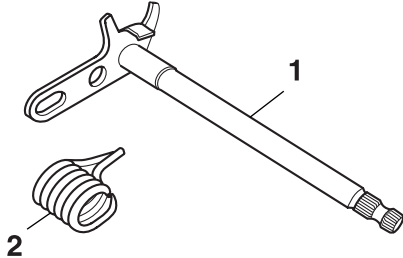


Order	Job/Parts to remove	Q'ty	Remarks
	Clutch		Refer to "CLUTCH" on page 5-45.
	Oil pump drive gear		Refer to "OIL PUMP" on page 5-41.
1	Shift pedal	1	
2	Shift shaft	1	
3	Shift shaft spring	1	
4	Washer	1	
5	Roller	1	
6	Shift guide	1	
7	Shift lever assembly	1	
8	Pawl holder	1	
9	Pawl	2	
10	Pawl pin	2	
11	Spring	2	
12	Stopper lever	1	
13	Washer	1	
14	Stopper lever spring	1	
15	Shift drum segment	1	
16	Oil seal	1	
17	Bearing	1	
			For installation, reverse the removal procedure.

EAS25420

## CHECKING THE SHIFT SHAFT

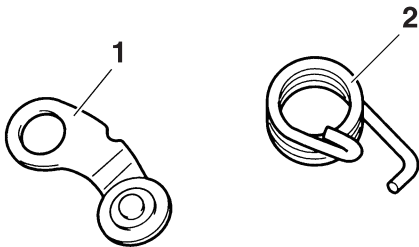
1. Check:
  - Shift shaft "1"
    - Bends/damage/wear → Replace.
  - Shift shaft spring "2"
    - Damage/wear → Replace.



EAS25430

## CHECKING THE STOPPER LEVER

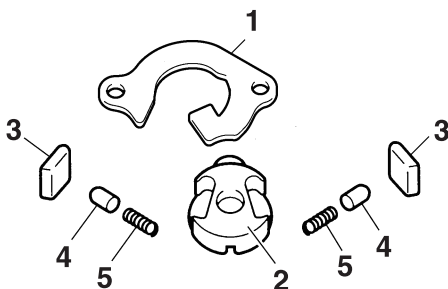
1. Check:
  - Stopper lever "1"
    - Bends/damage → Replace.
    - Roller turns roughly → Replace the stopper lever.
  - Stopper lever spring "2"
    - Damage/wear → Replace.



EAS18P1019

## CHECKING THE SHIFT GUIDE AND SHIFT LEVER

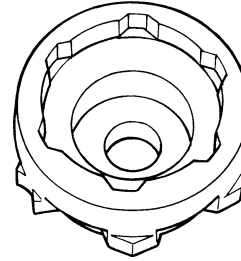
1. Check:
  - Shift guide "1"
  - Pawl holder "2"
  - Pawls "3"
  - Pawl pins "4"
  - Springs "5"
  - Wear/cracks/damage → Replace.



EAS18P1020

## CHECKING THE SHIFT DRUM SEGMENT

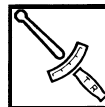
1. Check:
  - Shift drum segment
    - Damage/wear → Replace.



EAS18P1021

## INSTALLING THE SHIFT LEVER

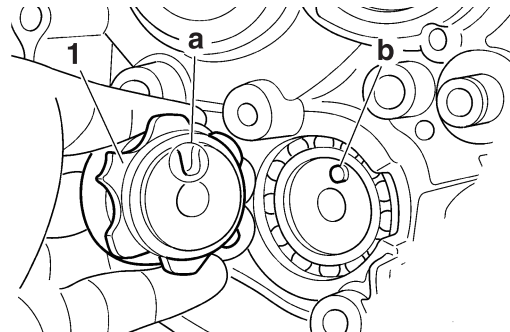
1. Check:
  - Shift drum segment "1"
  - Shift drum segment bolt



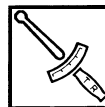
**Shift drum segment bolt**  
30 Nm (3.0 m·kgf, 22 ft·lbf)

### TIP

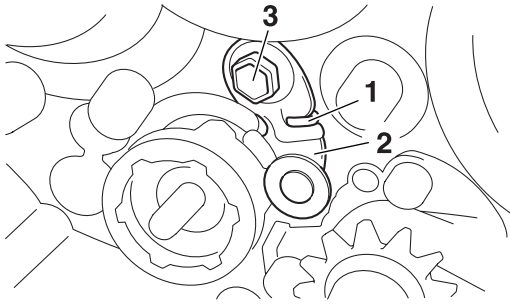
Align the notch "a" on the shift drum segment with the pin "b" on the shift drum.



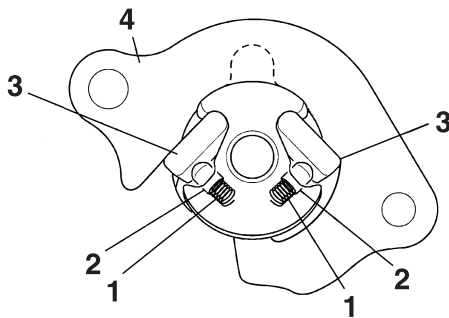
2. Install:
  - Stopper lever spring "1"
  - Stopper lever "2"
  - Stopper lever bolt "3"



**Stopper lever bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)  
LOCTITE®



3. Install:
- Springs "1"
  - Pawl pins "2"
  - Pawls "3"
  - Shift guide "4" (to the pawl holder)



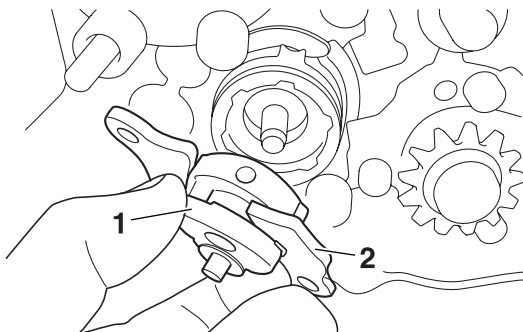
4. Install:
- Shift lever assembly "1"
  - Shift guide "2"
  - Shift guide bolt



**Shift guide bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)  
LOCTITE®

## TIP

The shift lever assembly is installed at the same time as the shift guide.



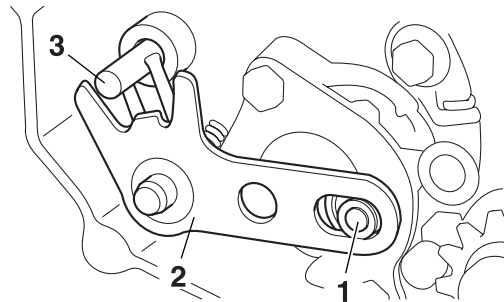
EAS25450

## INSTALLING THE SHIFT SHAFT

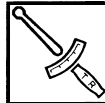
1. Install:
- Roller "1"
  - Shift shaft spring
  - Shift shaft "2"

## TIP

- Install the end of the shift shaft spring onto the shift shaft spring stopper "3".
- Install the end of the shift shaft lever onto the roller "1".



2. Install:
- Shift pedal
  - Shift pedal bolt

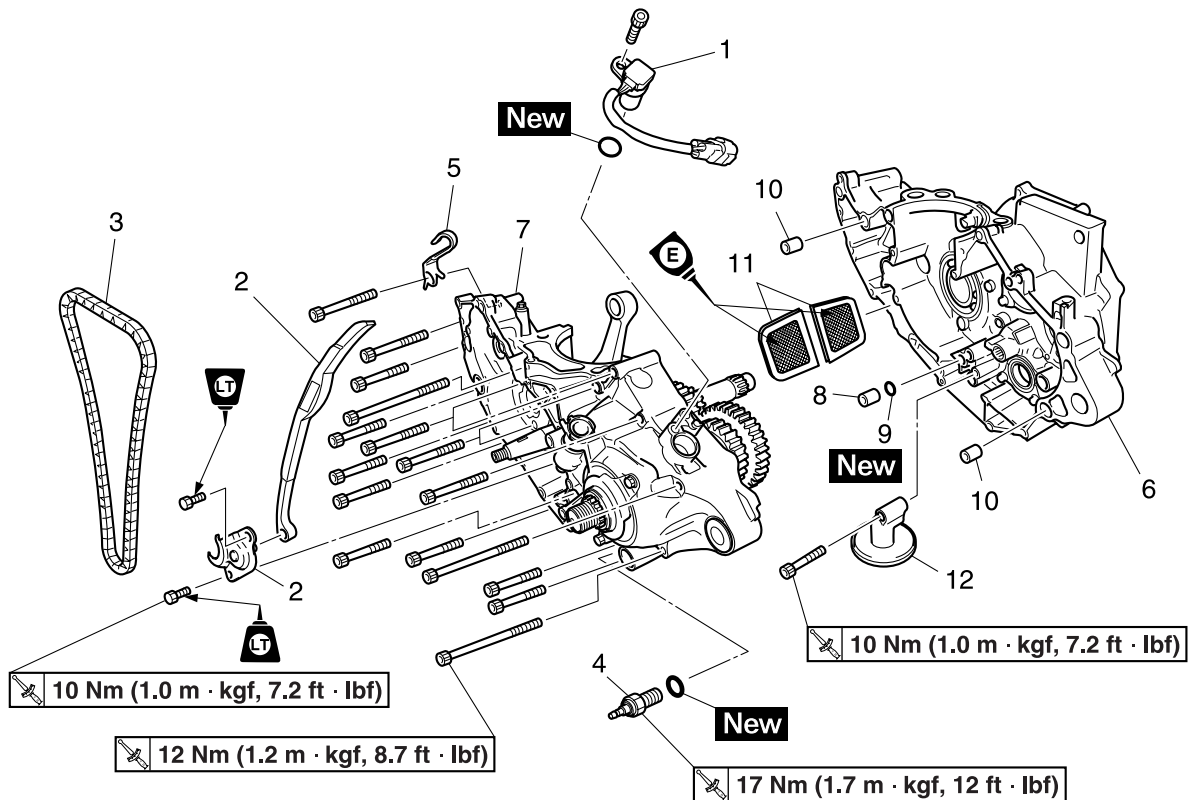


**Shift pedal bolt**  
12 Nm (1.2 m·kgf, 8.7 ft·lbf)

EAS25540

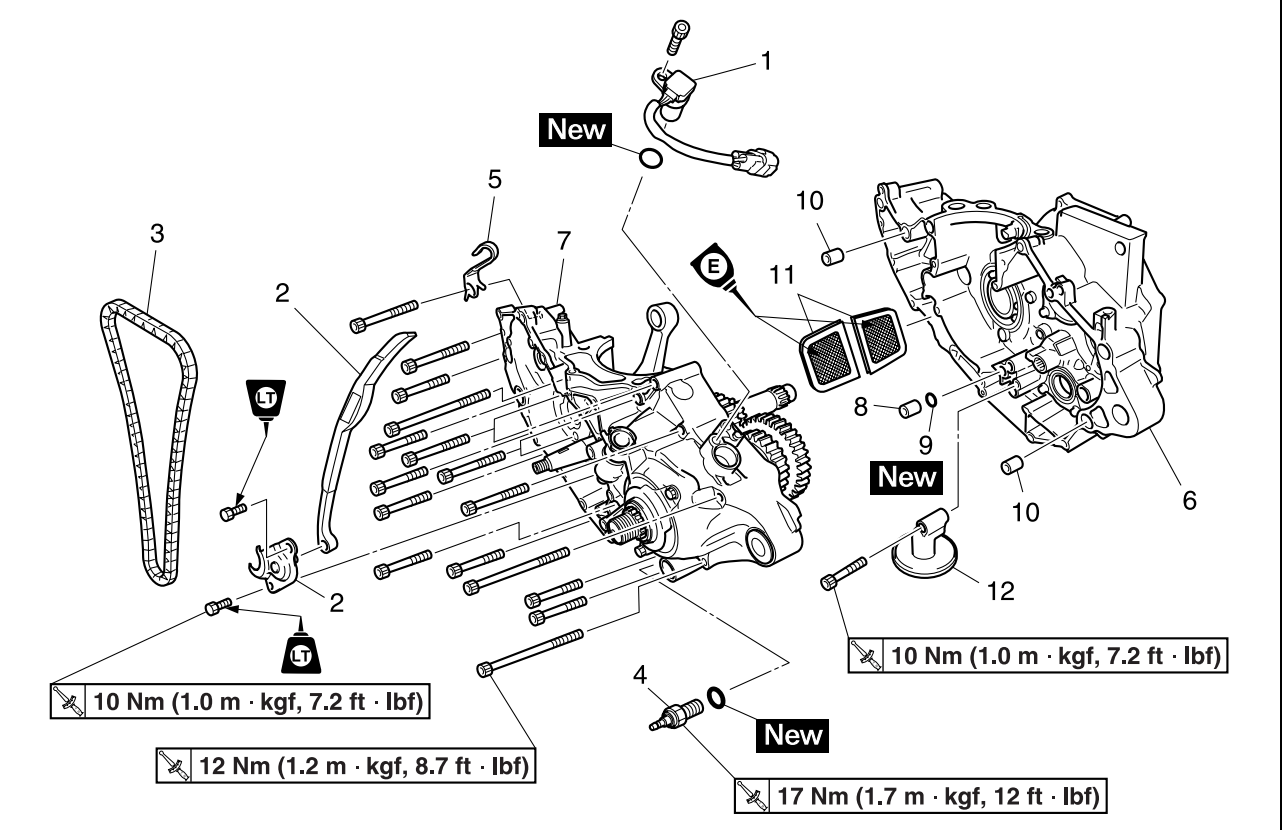
## CRANKCASE

### Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
	Engine assembly		Refer to "ENGINE REMOVAL" on page 5-1.
	Camshafts		Refer to "CAMSHAFTS" on page 5-7.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-15.
	Piston		Refer to "CYLINDER AND PISTON" on page 5-27.
	Generator		Refer to "GENERATOR" on page 5-33.
	Clutch		Refer to "CLUTCH" on page 5-45.
	Balancer		Refer to "BALANCER" on page 5-52.
	Oil pump		Refer to "OIL PUMP" on page 5-41.
	Shift drum segment		Refer to "SHIFT SHAFT" on page 5-55.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-37.
1	Speed sensor	1	
2	Timing chain guide (intake side)	2	
3	Timing chain	1	
4	Neutral switch	1	
5	Cable holder	1	
6	Right crankcase	1	
7	Left crankcase	1	
8	Dowel pin	1	
9	O-ring	1	
10	Dowel pin	2	
11	Strainer	2	
12	Oil strainer	1	

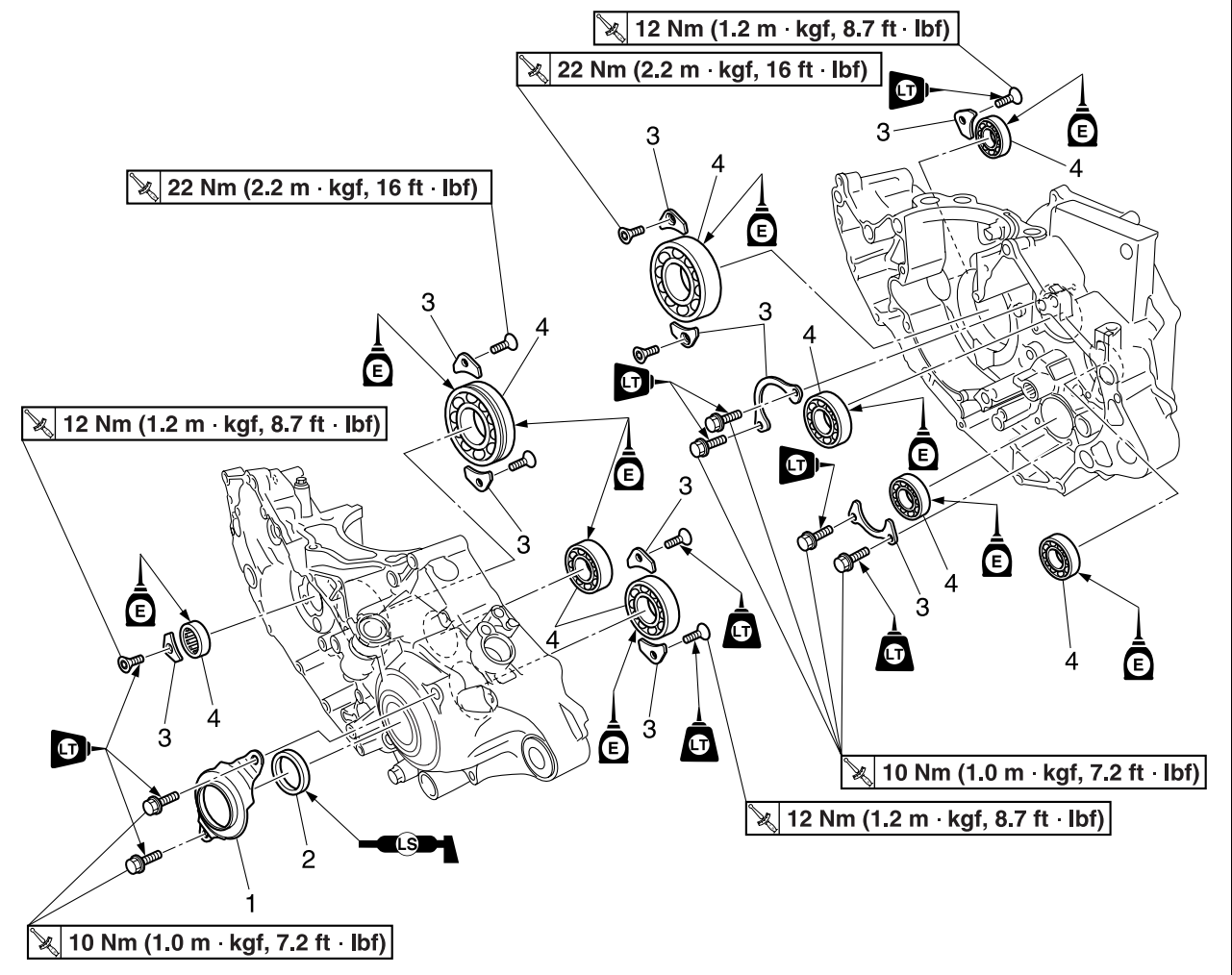
Separating the crankcase



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



Removing the crankcase bearings



Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft		Refer to "CRANKSHAFT" on page 5-63.
	Transmission		Refer to "TRANSMISSION" on page 5-66.
1	Oil seal holder	1	
2	Oil seal	1	
3	Bearing retainer	10	
4	Bearing	9	
			For installation, reverse the removal procedure.

EAS25560

## DISASSEMBLING THE CRANKCASE

1. Remove:
  - Crankcase bolts

### TIP

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

2. Remove:
  - Right crankcase

### TIP

Insert a screwdriver or pry bar into the pry points in the crankcase and then carefully pry apart the crankcase halves.

ECA13900

### NOTICE

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

EAS25580

## CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
  - Crankcase  
Cracks/damage → Replace.
  - Oil delivery passages  
Obstruction → Blow out with compressed air.

EAS25590

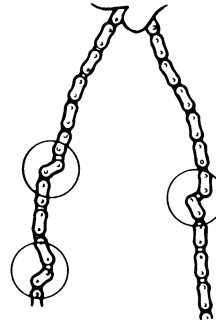
## CHECKING THE OIL STRAINER

1. Check:
  - Oil strainer  
Damage → Replace.  
Contaminants → Clean with engine oil.

EAS18P1026

## CHECKING THE TIMING CHAIN

1. Check:
  - Timing chain  
Cracks/stiffness → Replace the timing chain and camshafts as a set.

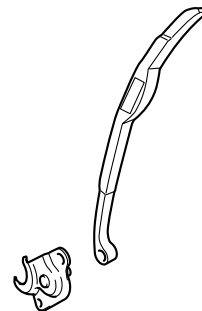


343 007

EAS18P1027

## CHECKING THE TIMING CHAIN GUIDE

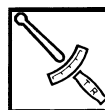
1. Check:
  - Timing chain guides (intake side)  
Wear/damage → Replace.



EAS18P1052

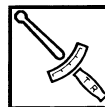
## INSTALLING THE BEARING AND BEARING RETAINER

1. Install:
  - Bearing **New**
  - Bearing retainer
  - Bearing retainer bolt "1"



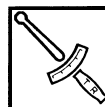
**Bearing retainer bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)  
LOCTITE®

- Bearing retainer screw (crankshaft) "2"



**Bearing retainer screw (crankshaft)**  
22 Nm (2.2 m·kgf, 16 ft·lbf)

- Bearing retainer screw (drive axle) "3"



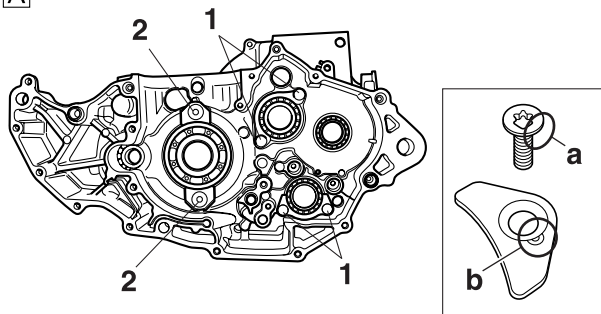
**Bearing retainer screw (drive axle)**  
12 Nm (1.2 m·kgf, 8.7 ft·lbf)  
LOCTITE®

### TIP

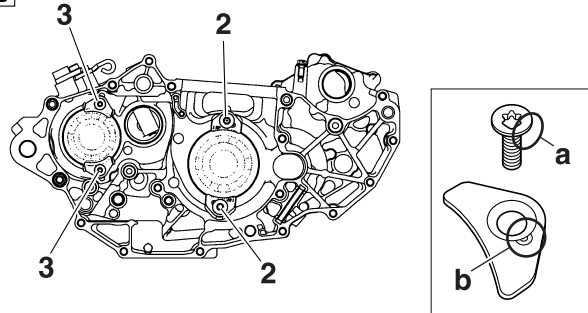
- Install the bearing by pressing its outer race evenly.

- To prevent the screws bearing retainer (crankshaft) from becoming loose, flatten the edge “a” of each screw into the depression “b” using a punch, etc. Be careful not to damage the hole for the screwdriver in the screw head.

A



B



A. Right crankcase

B. Left crankcase

EAS25690

## ASSEMBLING THE CRANKCASE

1. Apply:

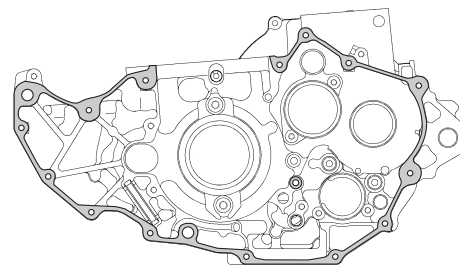
- Sealant  
(onto the crankcase mating surfaces)



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

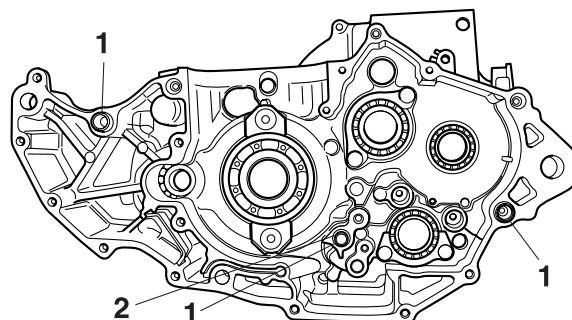
### TIP

Do not allow any sealant to come into contact with the oil gallery.



2. Install:

- Dowel pins “1”
- O-ring “2”



3. Install:

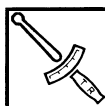
- Right crankcase  
(onto the left crankcase)

### TIP

Tap lightly on the right crankcase with a soft-face hammer.

4. Install:

- Crankcase bolts



**Crankcase bolt**  
**12 Nm (1.2 m·kgf, 8.7 ft·lbf)**

5. Apply:

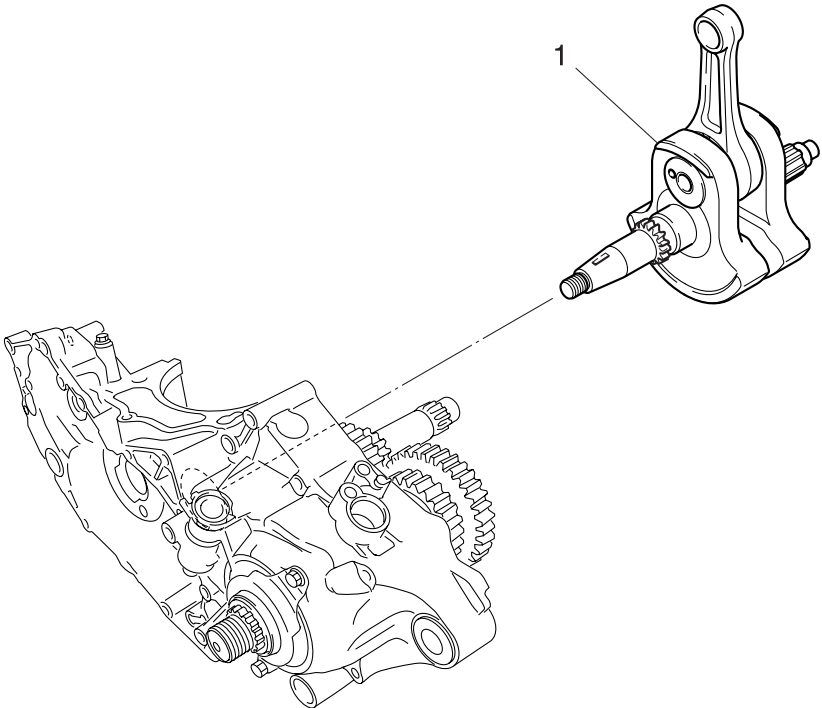
- Engine oil  
(onto the crankshaft pins bearings and oil delivery holes)

6. Check:

- Crankshaft and transmission operation  
Rough movement → Repair.

EAS25960  
CRANKSHAFT

Removing the crankshaft



Order	Job/Parts to remove	Q'ty	Remarks
			Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-58.
1	Crankshaft	1	
			For installation, reverse the removal procedure.

EAS25990

## REMOVING THE CRANKSHAFT ASSEMBLY

### 1. Remove:

- Crankshaft assembly "1"

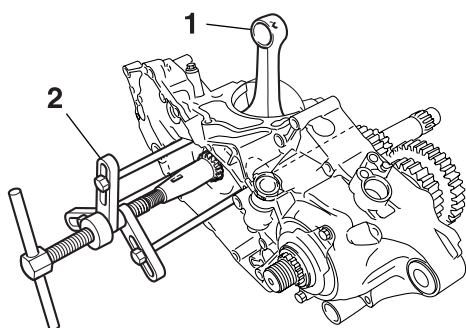
### TIP

- Remove the crankshaft assembly with the crankcase separating tool "2".
- Make sure the crankcase separating tool is centered over the crankshaft assembly.



**Crankcase separating tool**  
**90890-04152**

**Crankcase separator**  
**YU-A9642**



EAS26060

## CHECKING THE CRANKSHAFT AND CONNECTING ROD

### 1. Measure:

- Crankshaft runout

Out of specification → Replace the crankshaft, bearing or both.

### TIP

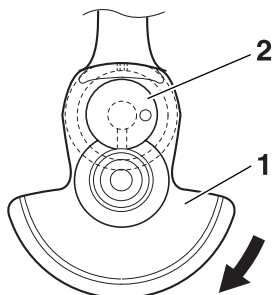
Turn the crankshaft slowly.



**Runout limit C**  
**0.030 mm (0.0012 in)**

### TIP

The crankshaft "1" and the crankshaft pin "2" oil passages must be properly interconnected with a tolerance of less than 1 mm (0.04 in).



### 2. Measure:

- Big end side clearance

Out of specification → Replace the big end bearing, crankshaft pin, or connecting rod.



**Big end side clearance D**  
**0.150–0.450 mm (0.0059–0.0177 in)**

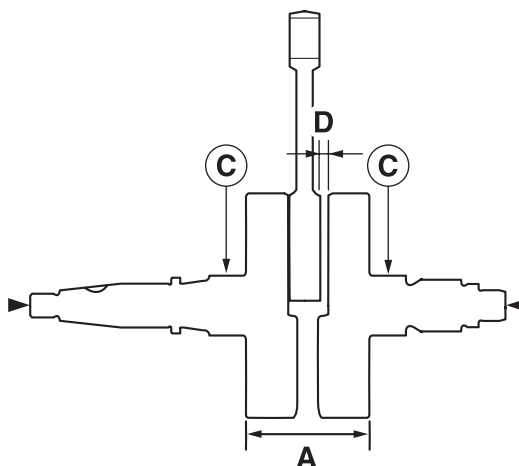
### 3. Measure:

- Crankshaft width

Out of specification → Replace the crankshaft.



**Width A**  
**63.95–64.00 mm (2.518–2.520 in)**



### 4. Check:

- Bearing

Cracks/damage/wear → Replace the crankshaft.

### 5. Check:

- Crankshaft journal

Scratches/wear → Replace the crankshaft.

- Crankshaft journal oil passage

Obstruction → Blow out with compressed air.

EAS26210

## INSTALLING THE CRANKSHAFT ASSEMBLY

### 1. Install:

- Crankshaft assembly

### TIP

Install the crankshaft assembly with the crankshaft installer pot, crankshaft installer bolt, adapter (M12) and spacer.



Crankshaft installer pot  
90890-01274  
Installing pot  
YU-90058  
Crankshaft installer bolt  
90890-01275  
Bolt  
YU-90060  
Adapter (M12)  
90890-01278  
Adapter #3  
YU-90063  
Spacer (crankshaft installer)  
90890-04081  
Pot spacer  
YM-91044

ECA13970

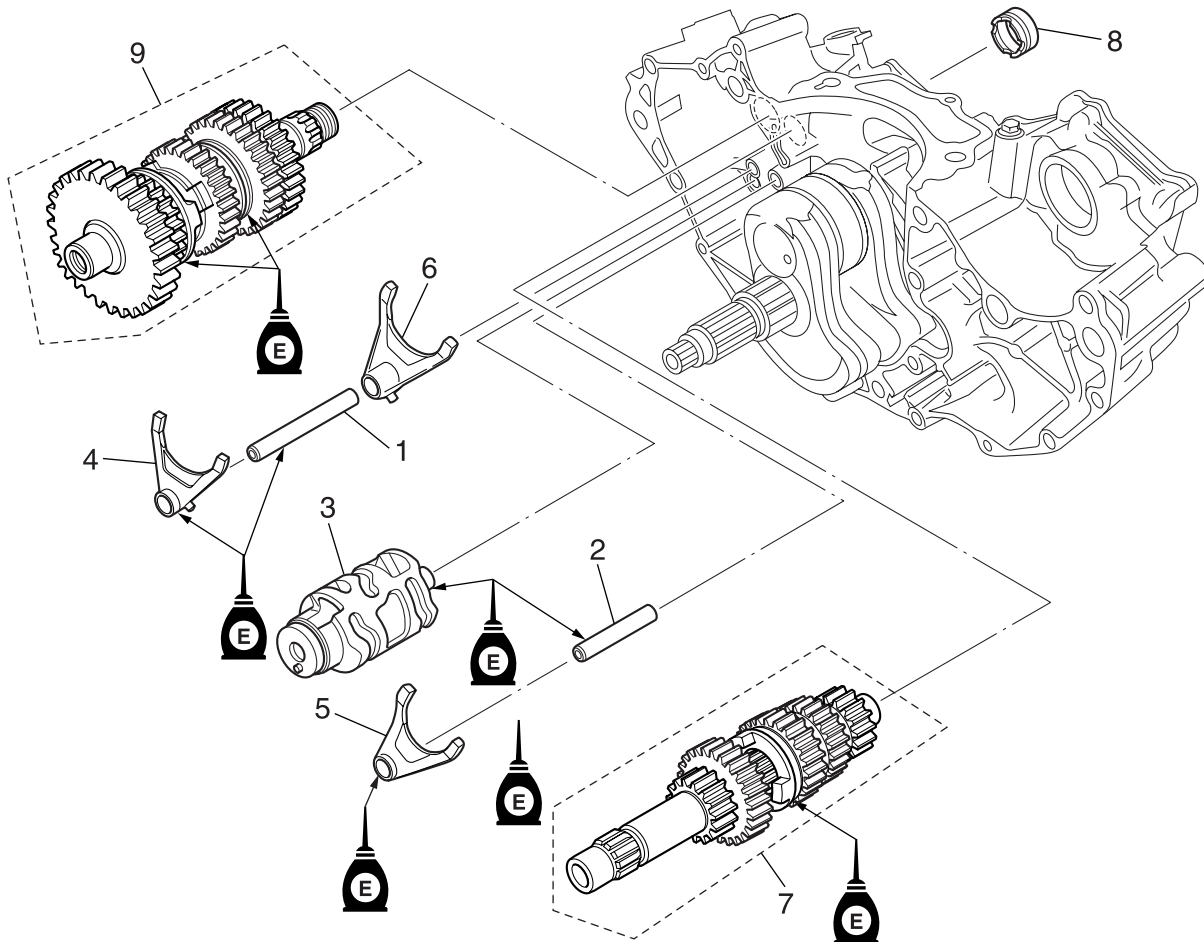
## **NOTICE**

**To avoid scratching the crankshaft and to ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease and each bearing with engine oil.**

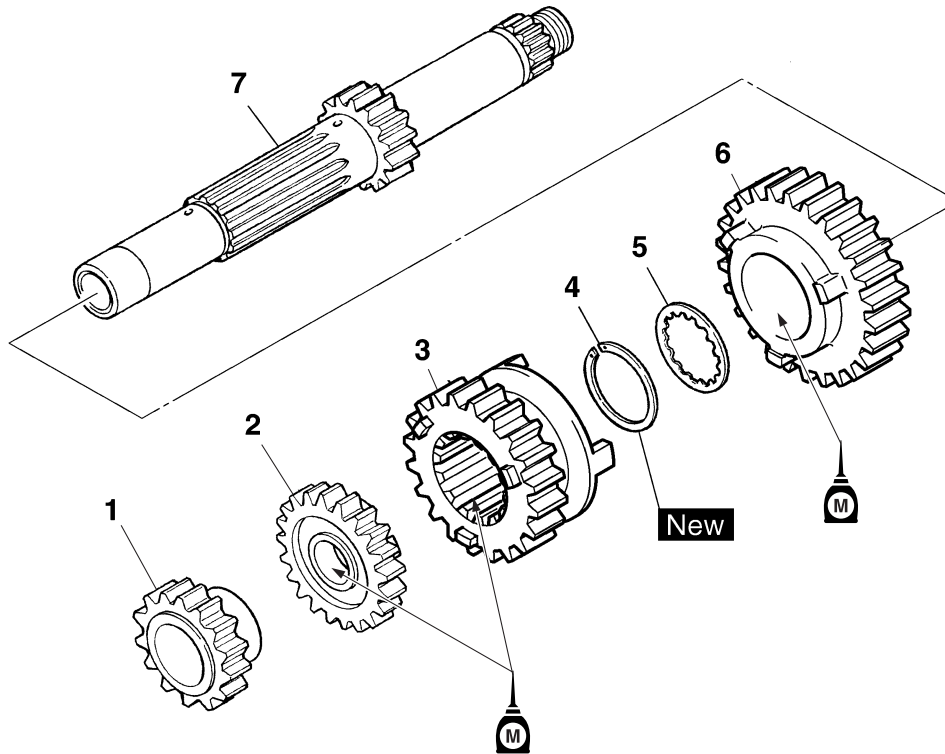
## **TIP**

Hold the connecting rod at 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.

EAS26241

**TRANSMISSION****Removing the transmission, shift drum assembly, and shift forks**

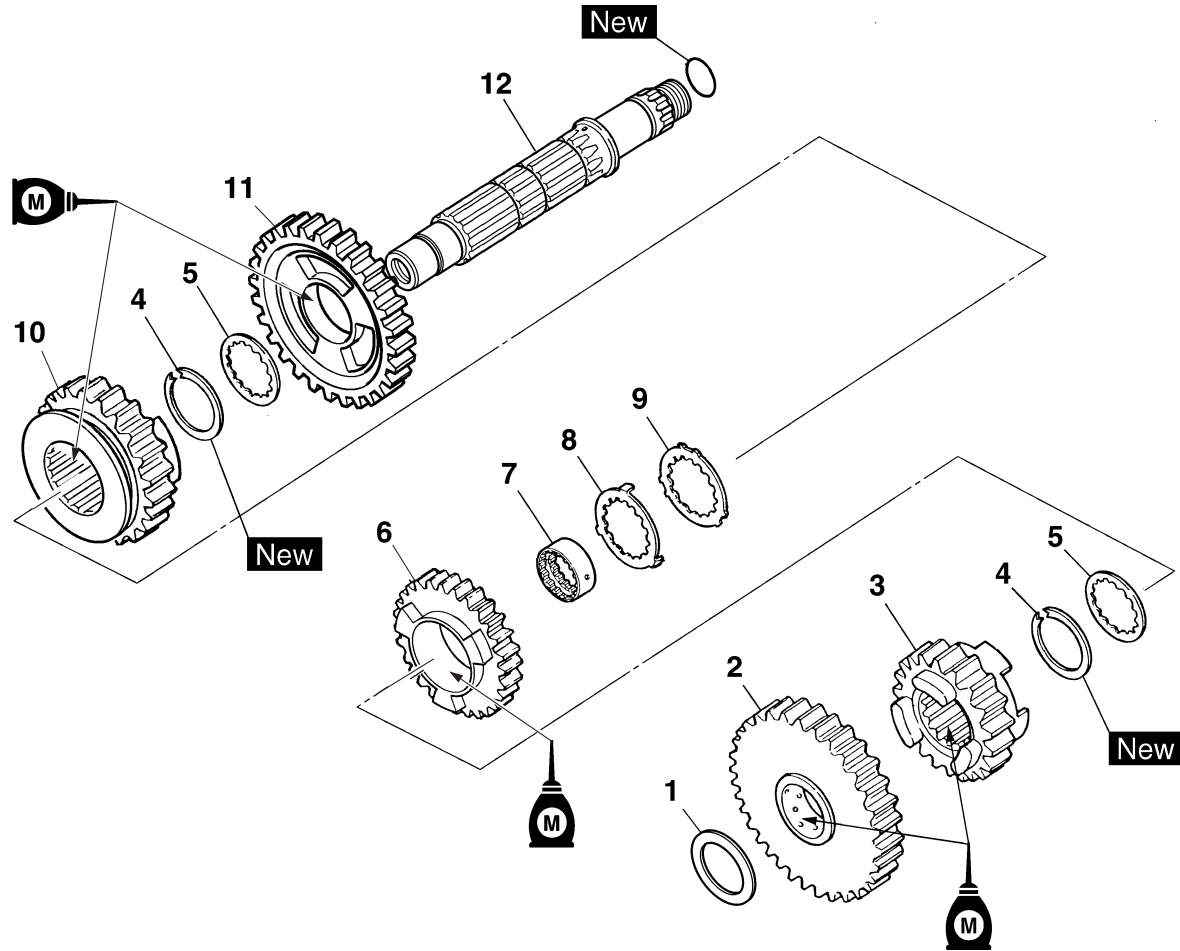
Order	Job/Parts to remove	Q'ty	Remarks
			Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-58.
1	Shift fork guide bar-L, R	1	
2	Shift fork guide bar-C	1	
3	Shift drum	1	
4	Shift fork-R	1	
5	Shift fork-C	1	
6	Shift fork-L	1	
7	Main axle assembly	1	
8	Spacer	1	
9	Drive axle assembly	1	
			For installation, reverse the removal procedure.

**Disassembling the main axle**

Order	Job/Parts to remove	Q'ty	Remarks
1	2nd pinion gear	1	
2	3rd pinion gear	1	
3	4th pinion gear	1	
4	Circlip	1	
5	Toothed washer	1	
6	5th pinion gear	1	
7	Main axle and 1st pinion gear	1	
			For installation, reverse the removal procedure.



## Disassembling the drive axle



Order	Job/Parts to remove	Q'ty	Remarks
1	Washer	1	
2	1st wheel gear	1	
3	5th wheel gear	1	
4	Circlip	2	
5	Toothed washer	2	
6	4th wheel gear	1	
7	Toothed spacer	1	
8	Toothed lock washer	1	
9	Toothed washer retainer	1	
10	3rd wheel gear	1	
11	2nd wheel gear	1	
12	Drive axle	1	
			For installation, reverse the removal procedure.

EAS26260

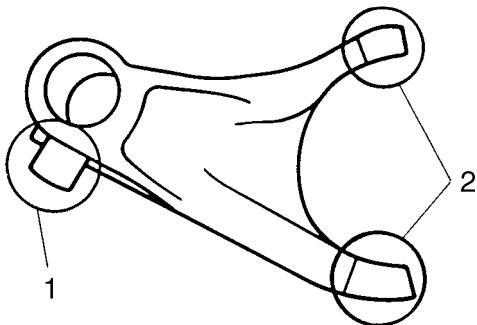
## CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

### 1. Check:

- Shift fork cam follower "1"
- Shift fork pawl "2"

Bends/damage/scoring/wear → Replace the shift fork.



### 2. Check:

- Shift fork guide bar

Roll the shift fork guide bar on a flat surface.

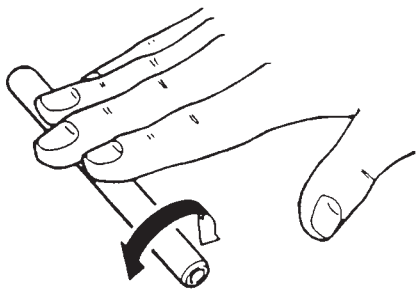
Bends → Replace.

EWA12840



**WARNING**

**Do not attempt to straighten a bent shift fork guide bar.**

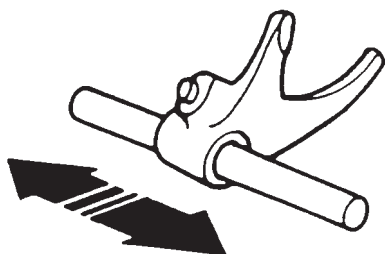


319-010

### 3. Check:

- Shift fork movement (along the shift fork guide bar)

Rough movement → Replace the shift forks and shift fork guide bar as a set.



319-011

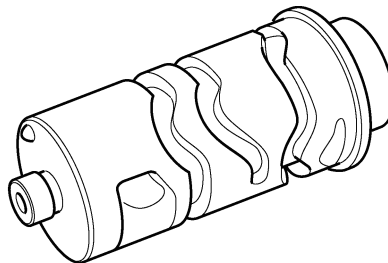
EAS26270

## CHECKING THE SHIFT DRUM ASSEMBLY

### 1. Check:

- Shift drum groove

Damage/scratches/wear → Replace the shift drum assembly.



11530104

EAS26300

## CHECKING THE TRANSMISSION

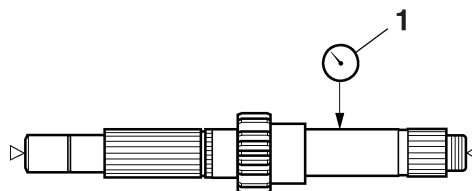
### 1. Measure:

- Main axle runout (with a centering device and dial gauge "1")

Out of specification → Replace the main axle.



**Main axle runout limit  
0.08 mm (0.0031 in)**



11650702

### 2. Measure:

- Drive axle runout (with a centering device and dial gauge)
- Out of specification → Replace the drive axle.

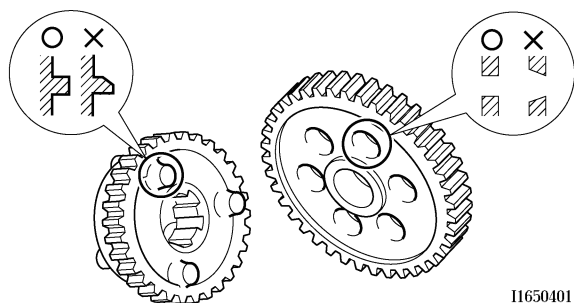


**Drive axle runout limit  
0.08 mm (0.0031 in)**

### 3. Check:

- Transmission gears
- Blue discoloration/pitting/wear → Replace the defective gear(s).

- Transmission gear dogs
- Cracks/damage/rounded edges → Replace the defective gear(s).



4. Check:
  - Transmission gear engagement (each pinion gear to its respective wheel gear)  
Incorrect → Reassemble the transmission axle assemblies.
5. Check:
  - Transmission gear movement  
Rough movement → Replace the defective part(s).
6. Check:
  - Circlips  
Bends/damage/looseness → Replace.

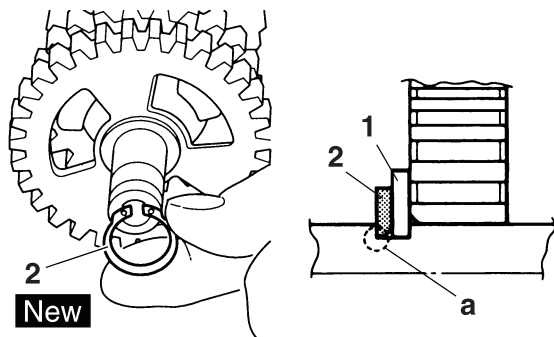
EAS29020

## ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

1. Install:
  - Toothed washer “1”
  - Circlip “2” **New**

### TIP

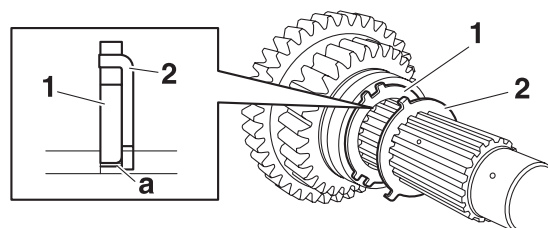
- Be sure the circlip sharp-edged corner “a” is positioned opposite side to the toothed washer and gear.
- Align the opening between the ends “b” of the circlip with a groove “c” in the axle.



2. Install:
  - Toothed lock washer retainer “1”
  - Toothed lock washer “2”

### TIP

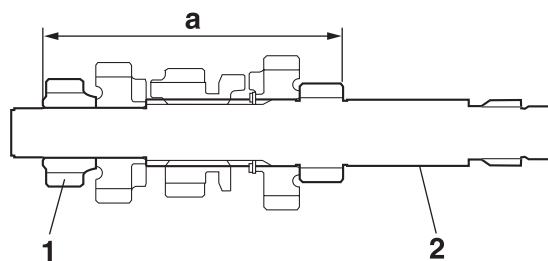
With the toothed lock washer retainer “1” in the groove “a” in the axle, align the projection on the retainer with an axle spline, and then install the toothed lock washer “2”.



3. Install:
  - 2nd pinion gear “1”

### TIP

Press the 2nd pinion gear into the main axle “2” as shown in the illustration.



a. 120.1–120.3 mm (4.73–4.74 in)

EAS26360

## INSTALLING THE TRANSMISSION

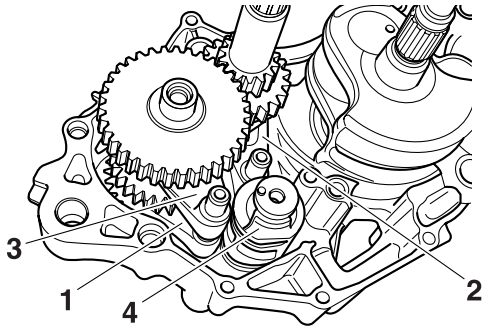
1. Install:
  - Shift fork-L “1”
  - Shift fork-C “2”
  - Shift fork-R “3”
  - Shift drum “4”
  - Transmission assembly

---

**TIP**

The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: “R”, “C”, “L”. Be sure that the shift fork cam follower is properly seated in the shift drum groove.

---



2. Check:

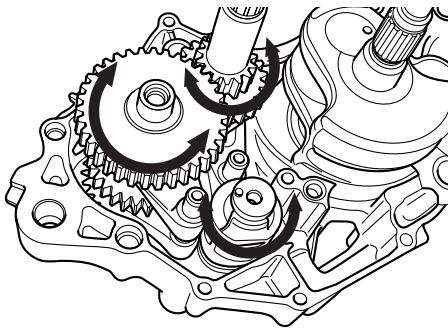
- Shift operation

Unsmooth operation → Repair.

---

**TIP**

- Oil each gear and bearing thoroughly.
  - Before assembling the crankcase, be sure that the transmission is in neutral and that the gears turn freely.
- 



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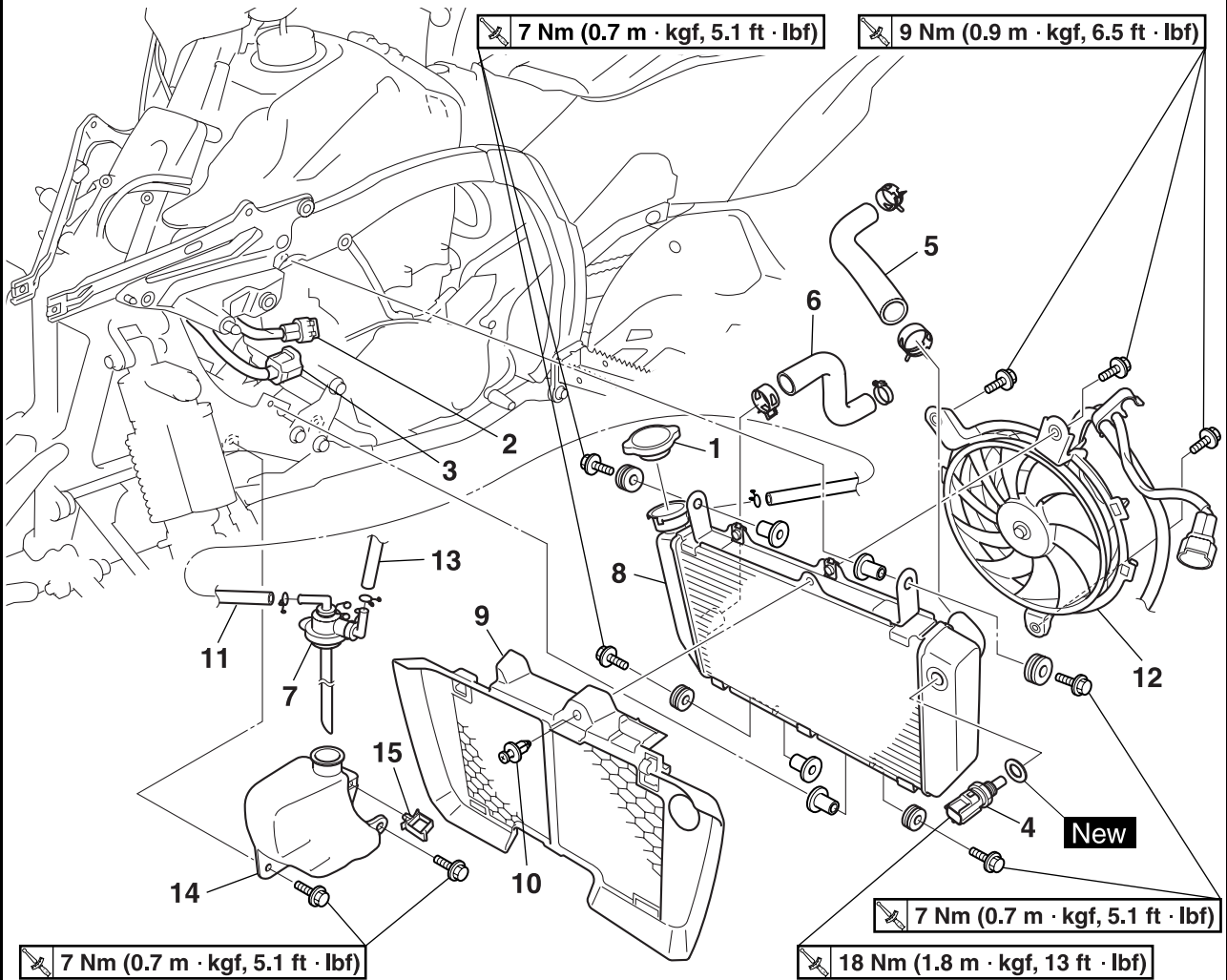
## COOLING SYSTEM

<b>RADIATOR</b> .....	6-1
CHECKING THE RADIATOR .....	6-3
INSTALLING THE RADIATOR .....	6-3
 <b>WATER PUMP</b> .....	6-5
REMOVING THE WATER PUMP .....	6-7
CHECKING THE WATER PUMP .....	6-7
INSTALLING THE WATER PUMP .....	6-7

EAS26380

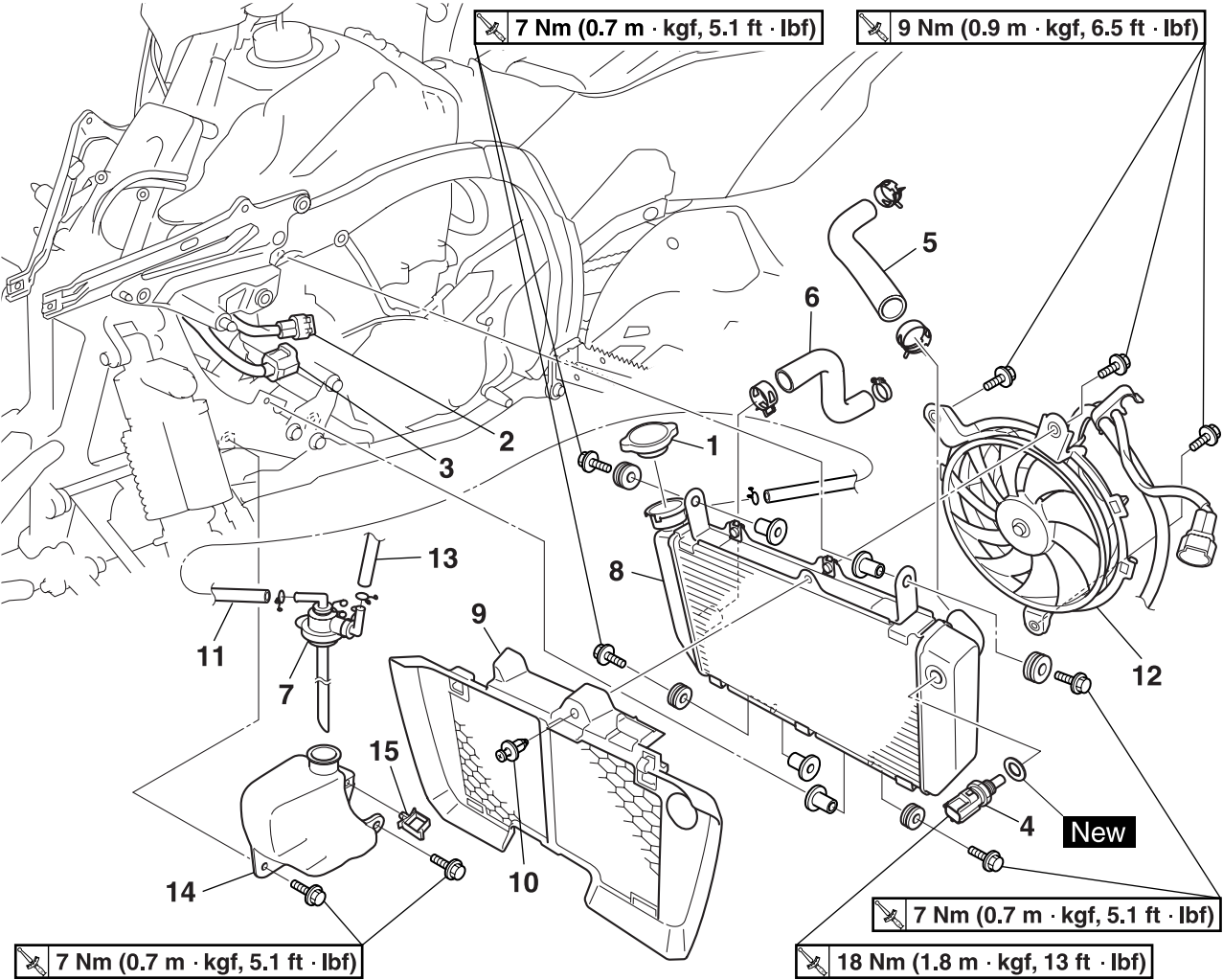
RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain.
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Side covers		Refer to "GENERAL CHASSIS" on page 4-1.
	Front fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Radiator side cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Radiator cap	1	
2	Radiator fan coupler	1	Disconnect.
3	Thermo switch coupler	1	Disconnect.
4	Coolant temperature sensor	1	
5	Radiator inlet hose	1	
6	Radiator outlet hose	1	
7	Coolant reservoir cap	1	
8	Radiator	1	
9	Radiator cover	1	
10	Clip	1	
11	Coolant reservoir hose	1	
12	Radiator fan	1	
13	Coolant reservoir breather hose	1	

Removing the radiator

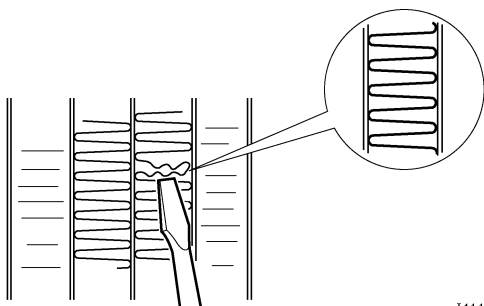


Order	Job/Parts to remove	Q'ty	Remarks
14	Coolant reservoir	1	
15	Clip	1	
			For installation, reverse the removal procedure.

1. Check:

- Radiator fins  
Obstruction → Clean.  
Apply compressed air to the rear of the radiator.  
Damage → Repair or replace.

Straighten any flattened fins with a thin, flat-head screwdriver.



I4110401

2. Check:
  - Radiator hoses  
Cracks/damage → Replace.
3. Measure:
  - Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.



**Radiator cap opening pressure**  
107.9–137.3 kPa (1.08–1.37  
kgf/cm<sup>2</sup>, 15.6–19.9 psi)

- a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.

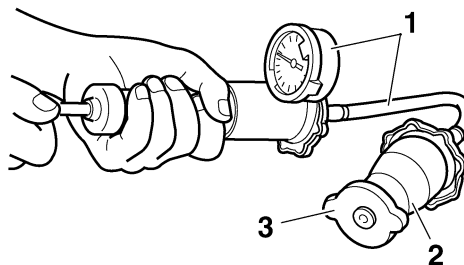


**Radiator cap tester**  
**90890-01325**

**Radiator pressure tester**  
**YU-24460-01**

**Radiator cap tester adapter**  
**90890-01352**

**Radiator pressure tester**  
**adapter**  
**YU-33984**



- b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.



4. Check:
- Radiator fan  
Damage → Replace.  
Malfunction → Check and repair.  
Refer to “COOLING SYSTEM” on page 8-25.

EAS26400

## INSTALLING THE RADIATOR

1. Fill:
  - Cooling system  
(with the specified amount of the recommended coolant)  
Refer to “CHANGING THE COOLANT” on page 3-17.
2. Check:
  - Cooling system  
Leaks → Repair or replace any faulty part.



- a. Attach the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator.



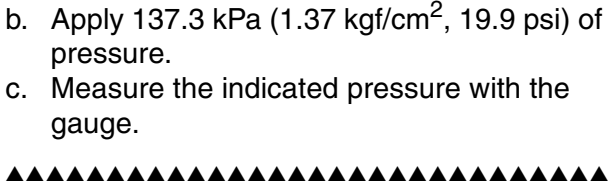
**Radiator cap tester**  
**90890-01325**

**Radiator pressure tester**  
**YU-24460-01**

**Radiator cap tester adapter**  
**90890-01352**

**Radiator pressure tester**  
**adapter**  
**YU-33984**

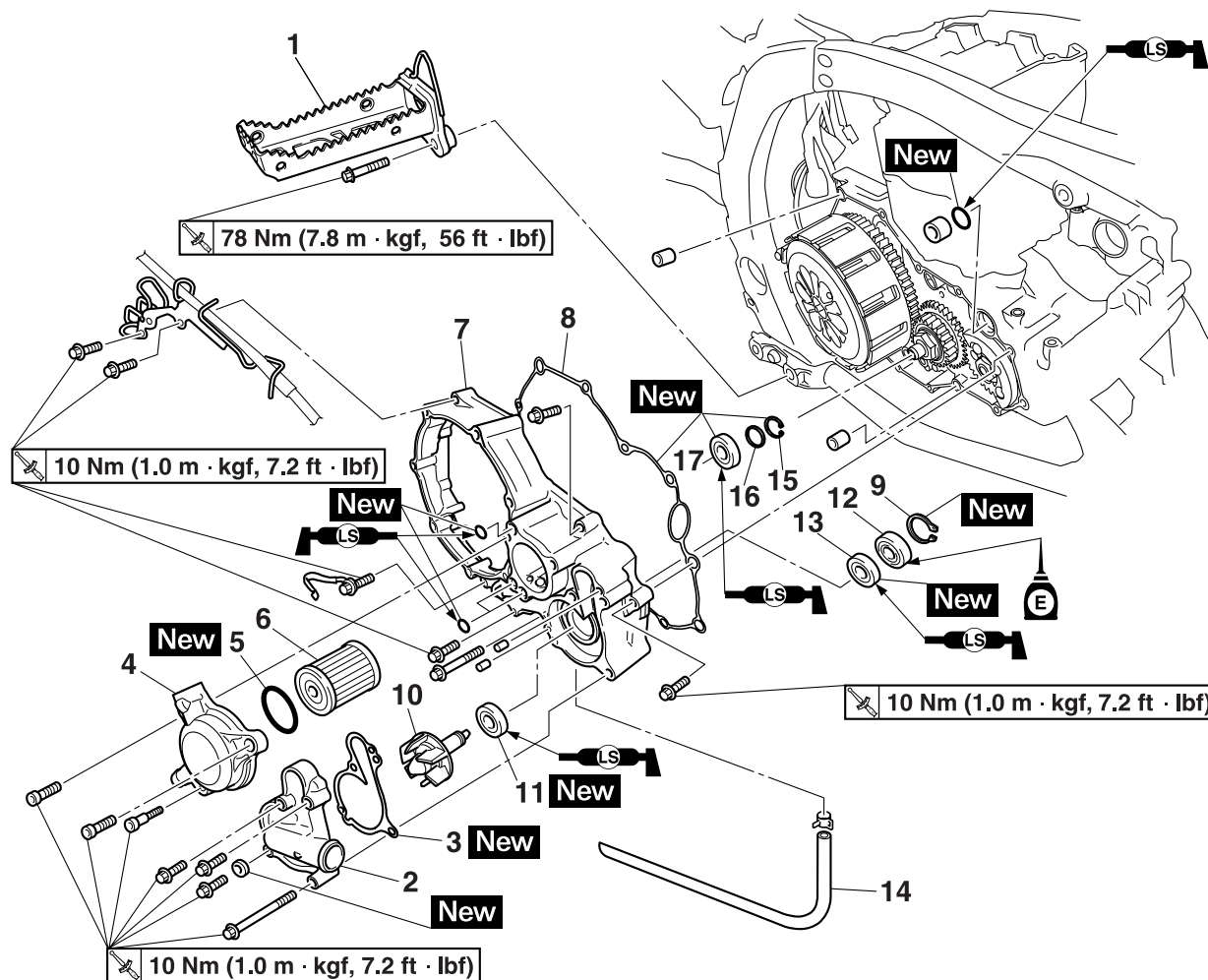




EAS26500

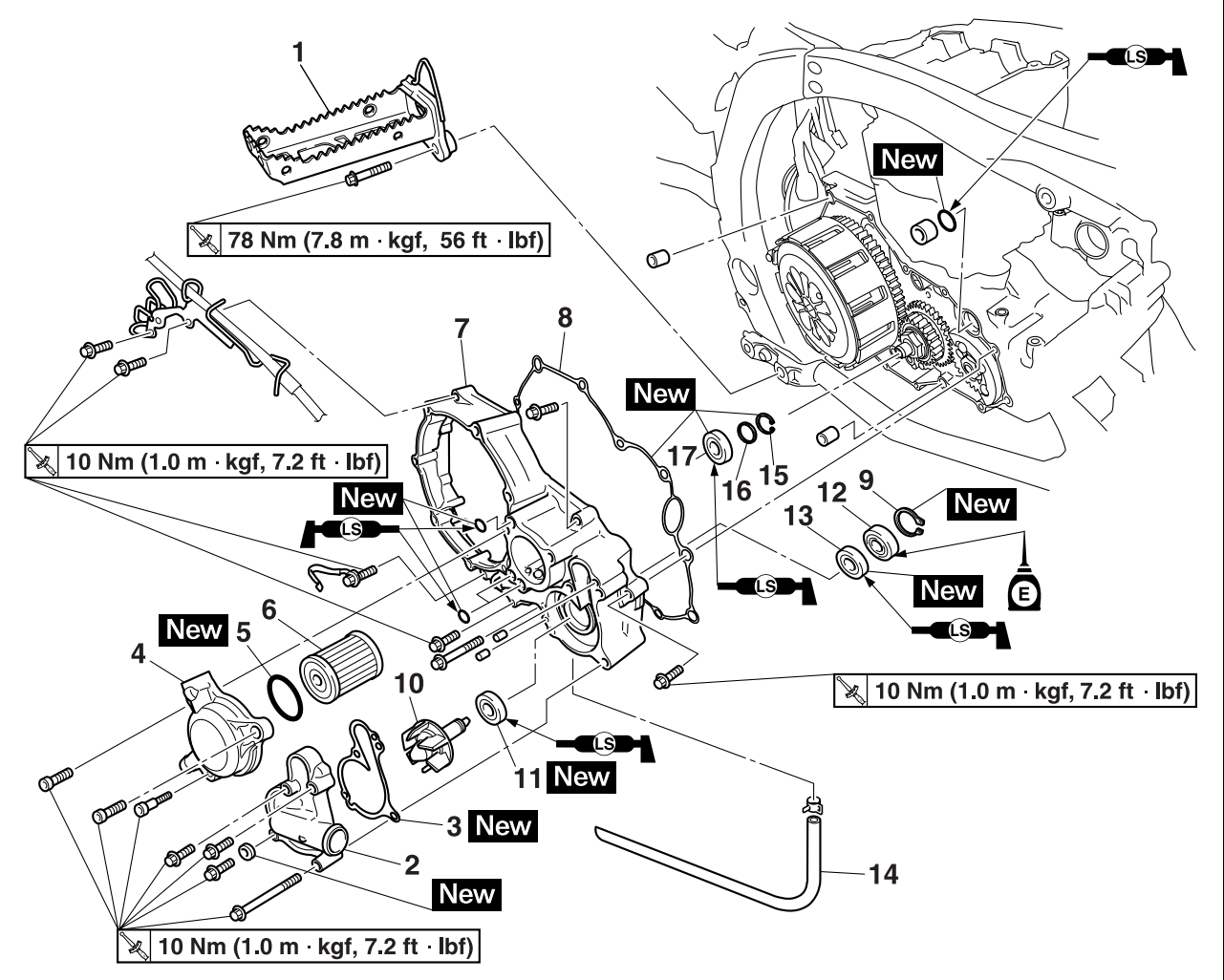
## WATER PUMP

### Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain.
	Coolant		Drain.
	Exhaust pipe		Refer to "ENGINE REMOVAL" on page 5-1.
	Rear brake light switch		Refer to "REAR BRAKE" on page 4-35.
	Parking brake cable bracket		Refer to "ENGINE REMOVAL" on page 5-1.
	Radiator outlet hose		Refer to "RADIATOR" on page 6-1.
	Clutch cover		Refer to "CLUTCH" on page 5-45.
1	Right footrest	1	
2	Water pump housing cover	1	
3	Water pump housing cover gasket	1	
4	Oil filter element cover	1	
5	O-ring	1	
6	Oil filter element	1	
7	Right crankcase cover	1	
8	Gasket	1	
9	Circlip	1	
10	Impeller shaft	1	
11	Water pump seal	1	
12	Bearing	1	

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
13	Oil seal	1	
14	Hose	1	
15	Circlip	1	
16	Washer	1	
17	Oil seal	1	
			For installation, reverse the removal procedure.

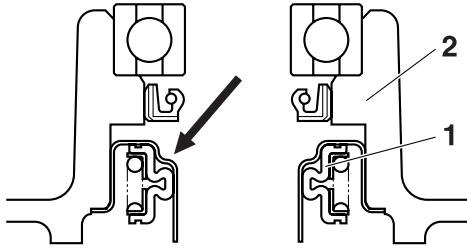
EAS18P1022

## REMOVING THE WATER PUMP

1. Remove:
  - Circlip
  - Impeller shaft
2. Remove:
  - Water pump seal "1"

### TIP

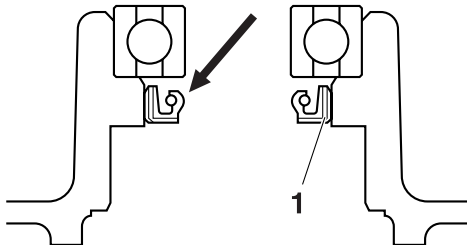
Remove the water pump seal from the outside of the Right crankcase cover.



2. Right crankcase cover
3. Remove:
  - Oil seal "1"
 (with a thin, flat-head screwdriver)

### TIP

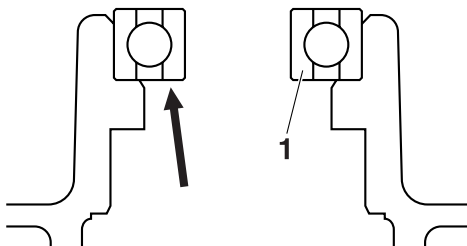
Remove the oil seal from the outside of the Right crankcase cover.



4. Remove:
  - Bearing "1"

### TIP

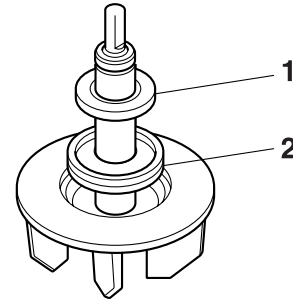
Remove the bearing from inside of the Right crankcase cover.



5. Remove:
  - Rubber damper holder "1"
  - Rubber damper "2"
 (from the impeller, with a thin, flat-head screwdriver)

### TIP

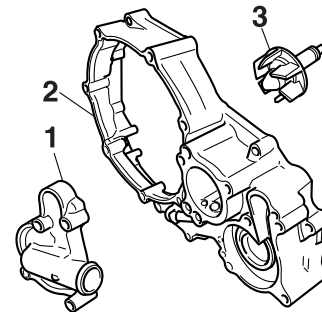
Do not scratch the impeller shaft.



EAS26540

## CHECKING THE WATER PUMP

1. Check:
  - Water pump housing cover "1"
  - Right crankcase cover "2"
  - Impeller shaft "3"
 Cracks/damage/wear → Replace.



2. Check:
  - Bearing
 Rough movement → Replace.

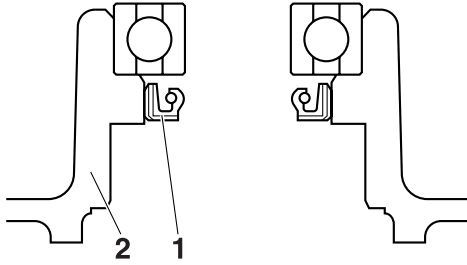
EAS18P1023

## INSTALLING THE WATER PUMP

1. Install:
  - Oil seal "1" **New**
 (into the Right crankcase cover "2")

### TIP

- Before installing the oil seal, apply tap water or coolant onto its out surface.
- Install the oil seal with a socket that matches its outside diameter.



2. Install:

- Water pump seal “1” **New**

ECA14080

## NOTICE

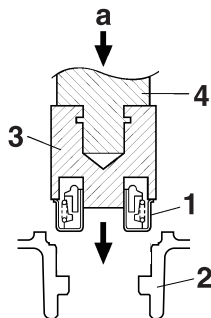
**Never lubricate the water pump seal surface with oil or grease.**

## TIP

Install the water pump seal with the special tools.



**Mechanical seal installer**  
90890-04132  
**Water pump seal installer**  
YM-33221-A  
**Middle driven shaft bearing driver**  
90890-04058  
**Bearing driver 40 mm**  
YM-04058  
**Yamaha bond No. 1215**  
90890-85505  
(Three bond No. 1215®)



a. Push down

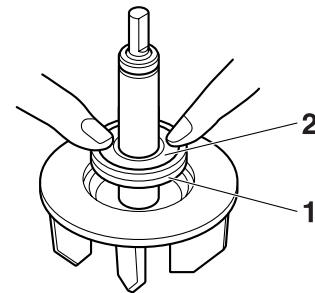
2. Right crankcase cover
3. Mechanical seal installer
4. Middle driven shaft bearing driver

3. Install:

- Rubber damper “1” **New**
- Rubber damper holder “2” **New**

## TIP

Before installing the rubber damper, apply coolant onto its outer surface.



4. Measure:

- Impeller shaft tilt  
Out of specification → Repeat steps (3) and (4).

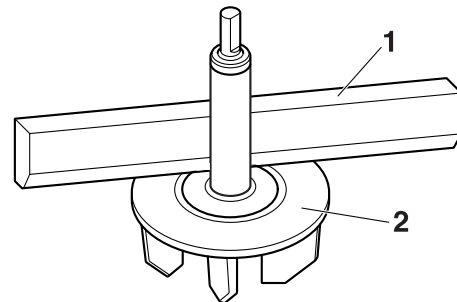
ECA14090

## NOTICE

**Make sure the rubber damper and rubber damper holder are flush with the impeller.**



**Impeller shaft tilt limit**  
0.15 mm (0.006 in)



1. Straightedge
2. Impeller

5. Install:

- Impeller
- Circlip **New**

## TIP

After installation, check that the impeller shaft rotates smoothly.

6. Install:

- Right crankcase cover
- Water pump housing cover



**Right crankcase cover bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

**Water pump housing cover bolt**  
**10 Nm (1.0 m·kgf, 7.2 ft·lbf)**

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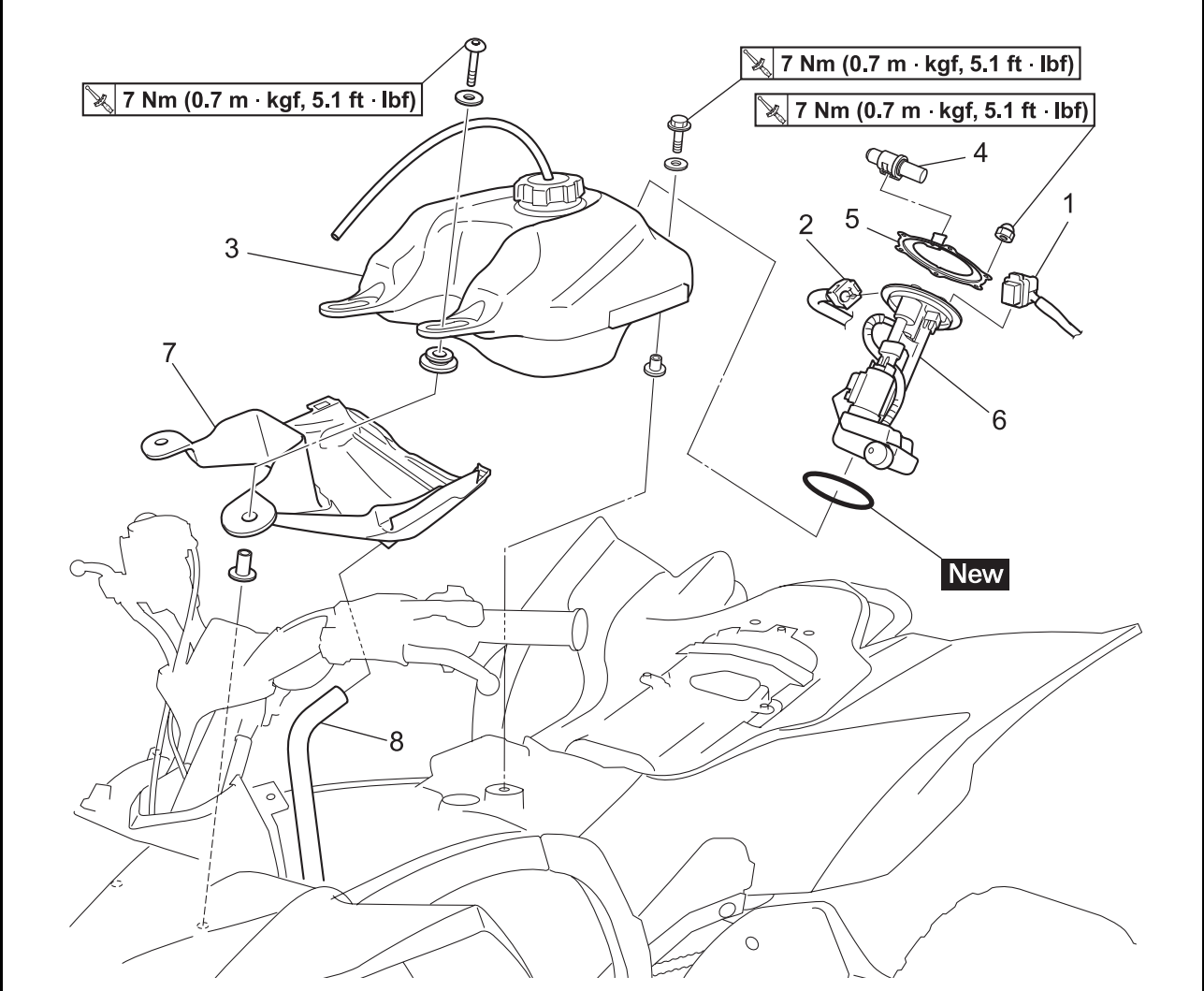
## FUEL SYSTEM

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REMOVING THE FUEL PUMP .....	7-2
CHECKING THE FUEL PUMP BODY .....	7-2
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EAS26620

FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Left side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Right side cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel pump coupler	1	Disconnect.
2	Fuel hose	1	Disconnect.
3	Fuel tank	1	
4	Fuel hose joint cover	1	
5	Fuel pump bracket	1	
6	Fuel pump assembly	1	
7	Fuel tank shield	1	
8	Drain hose	1	
			For installation, reverse the removal procedure.



EAS26630

## REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
  - Fuel pump coupler
  - Fuel hose

EWA18P1015

### **WARNING**

Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hoses.

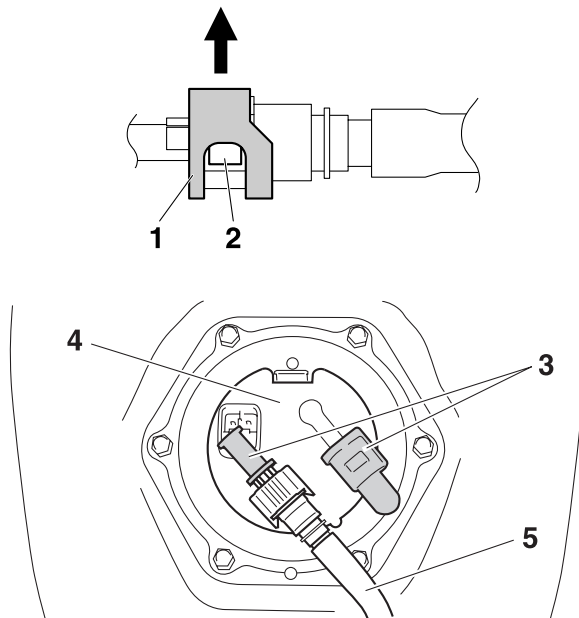
ECA18P1013

### **NOTICE**

Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.

### **TIP**

- To remove the fuel hose from the fuel pump, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then remove the hose.
- Install the fuel hose joint cover “3” so that dust does not enter to the fuel pump “4” and fuel hose “5”.



3. Remove:
  - Fuel tank

### **TIP**

Place the fuel tank on a level surface.

EAS26640

## REMOVING THE FUEL PUMP

1. Remove:
  - Fuel hose joint cover tool
  - Fuel pump bracket
  - Fuel pump
  - O-ring

ECA14720

### **NOTICE**

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

EAS26670

## CHECKING THE FUEL PUMP BODY

1. Check:
  - Fuel pump body  
Obstruction → Clean.  
Cracks/damage → Replace fuel pump assembly.

EAS26700

## INSTALLING THE FUEL PUMP

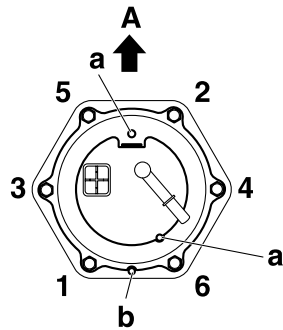
1. Install:
  - O-ring **New**
  - Fuel pump
  - Fuel pump bracket
  - Fuel hose joint cover tool



**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.
- Install the O-ring with the lip facing upward.
- Align the projection “a” on the fuel pump with the slot in the fuel pump bracket.
- Align the projection “b” on the fuel tank with the slot in the fuel pump bracket.
- Tighten the fuel pump nuts in the proper tightening sequence as shown.



A. Front

EAS18P1004

## INSTALLING THE FUEL TANK

1. Connect:

- Fuel hose
- Fuel pump coupler

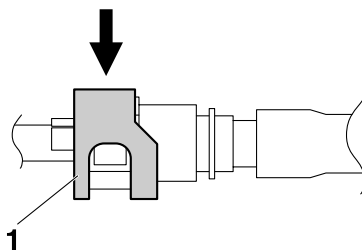
ECA18P1003

### **NOTICE**

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

### **TIP**

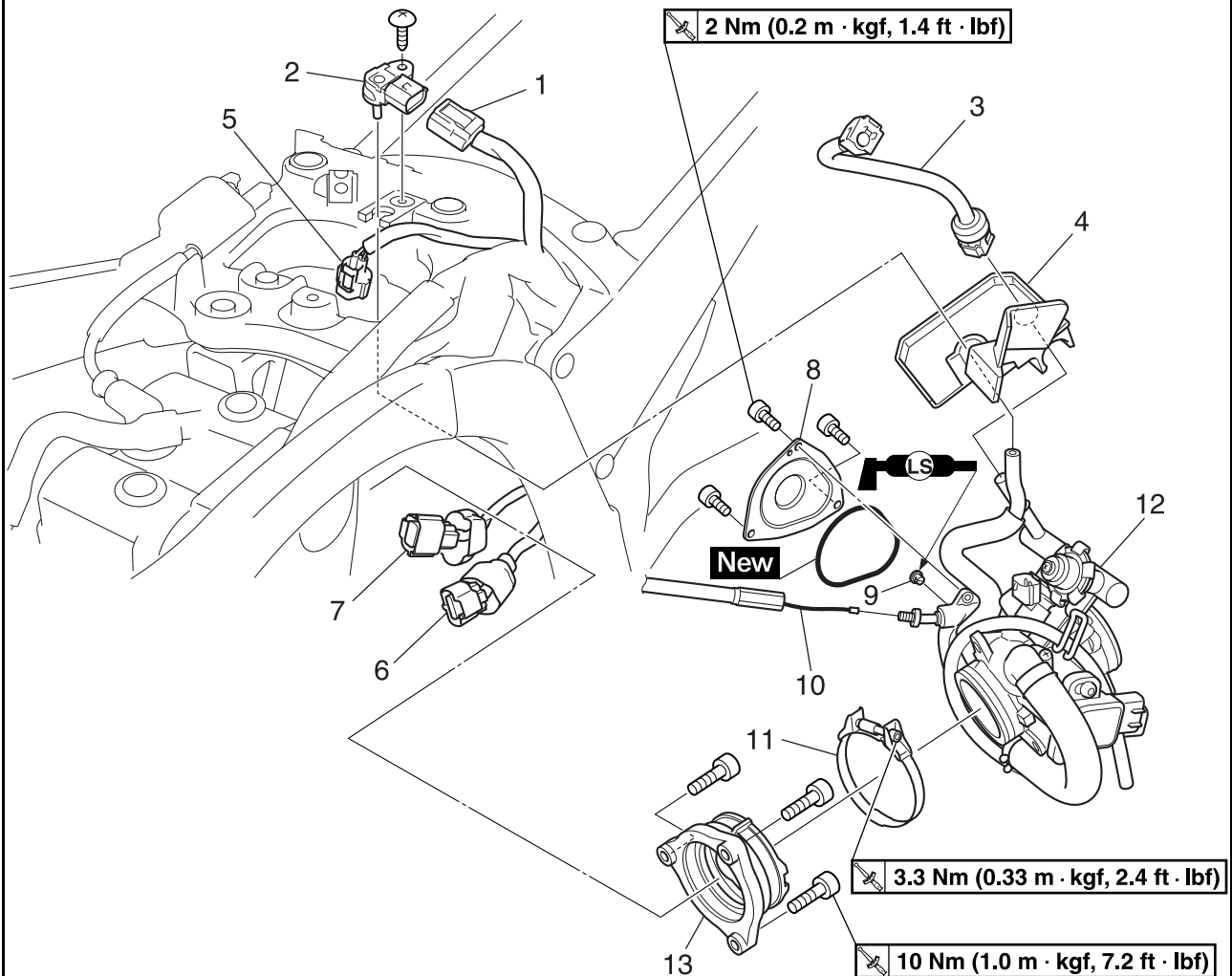
- Install the fuel hose securely onto the fuel pump until a distinct “click” is heard.
- To install the fuel hose onto the fuel pump, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown.



EAS26970

## THROTTLE BODY

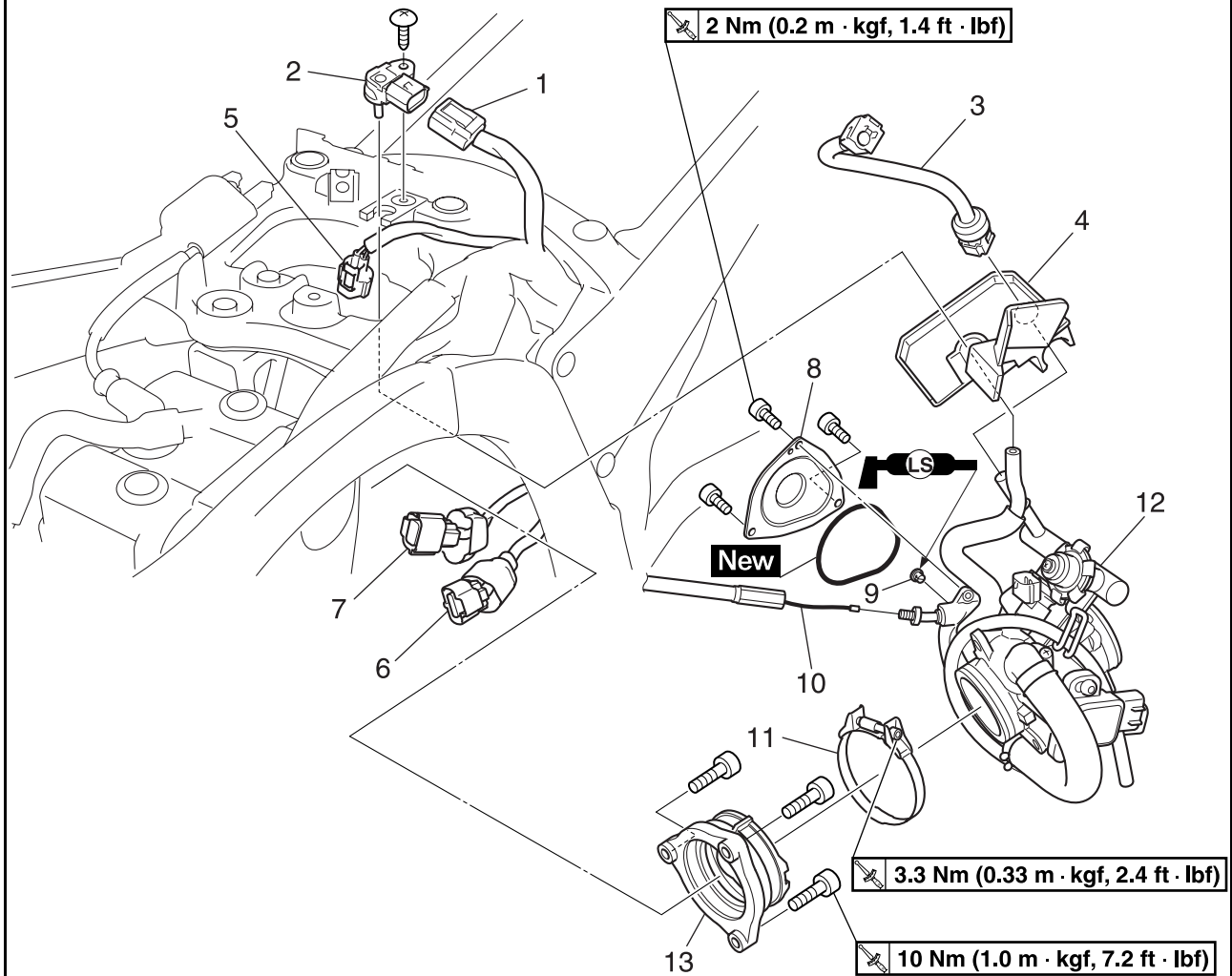
### Removing the throttle body



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid reservoir		Refer to "REAR BRAKE" on page 4-35.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY AND RELAY ARM" on page 4-66.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
	Throttle cable (handlebar side)		Disconnect. Refer to "HANDLEBAR" on page 4-49.
1	Intake air pressure sensor coupler	1	Disconnect.
2	Intake air pressure sensor	1	
3	Fuel hose	1	
4	Plate	1	
5	Injector coupler	1	Disconnect.
6	Throttle position sensor coupler	1	Disconnect.
7	ISC (idle speed control) valve coupler	1	Disconnect.
8	Throttle cable cover	1	
9	Throttle cable guide	1	
10	Throttle cable	1	Disconnect.

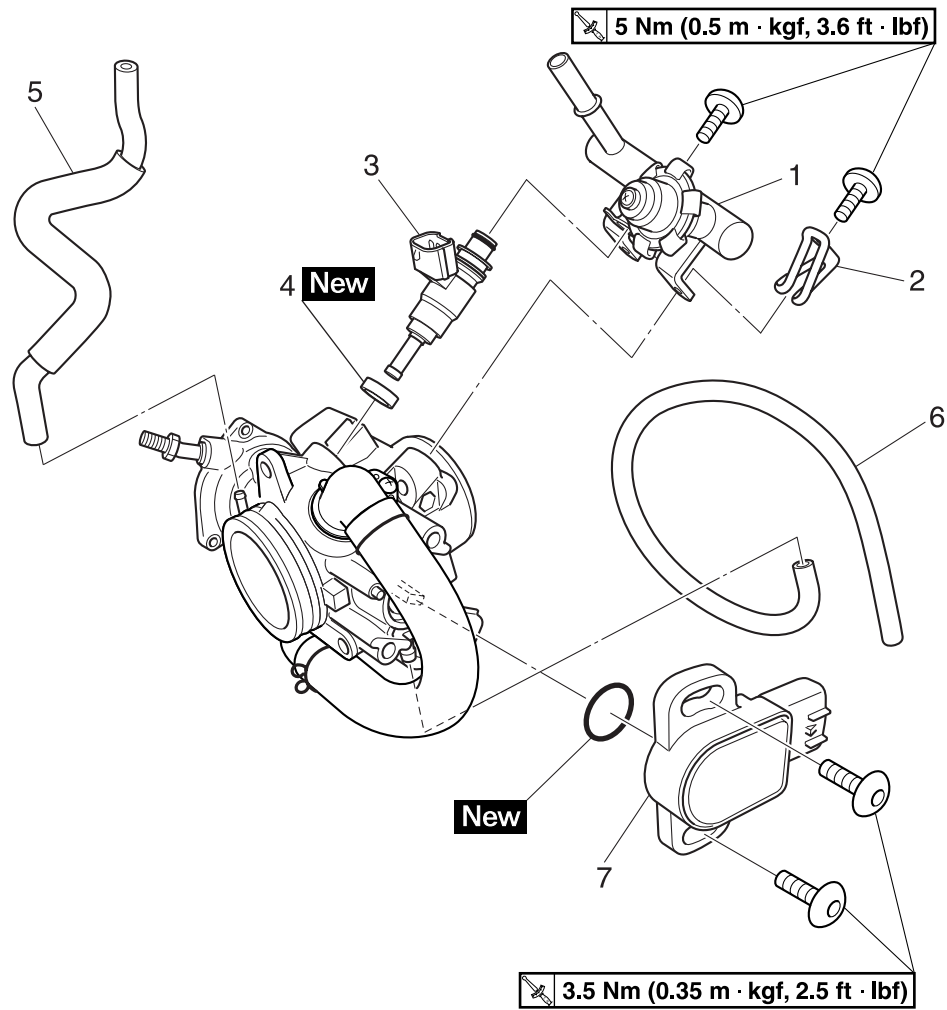
# THROTTLE BODY

## Removing the throttle body



Order	Job/Parts to remove	Q'ty	Remarks
11	Clamp	1	Loosen.
12	Throttle body assembly	1	
13	Throttle body joint	1	
			For installation, reverse the removal procedure.

## Removing the injector



Order	Job/Parts to remove	Q'ty	Remarks
1	Delivery pipe	1	
2	Clamp	1	
3	Injector	1	
4	Gasket	1	
5	Intake air pressure sensor hose	1	
6	Throttle position sensor drain hose	1	
7	Throttle position sensor	1	
			For installation, reverse the removal procedure.

EAS18P1005

## REMOVING THE THROTTLE BODY

1. Remove:
  - Throttle cable
  - Throttle position sensor coupler
  - ISC (idle speed control) valve coupler
  - Fuel hose

EWA18P1015

### **WARNING**

**Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hoses.**

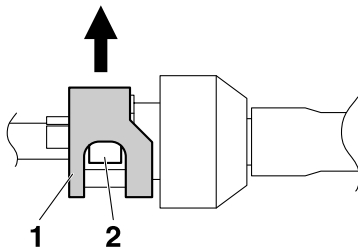
ECA18P1013

### **NOTICE**

**Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**

### **TIP**

- To remove the fuel hose from the fuel pump, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then remove the hose.
- Install the fuel hose joint cover so that dust does not enter to the fuel hose. Refer to “REMOVING THE FUEL TANK” on page 7-2.

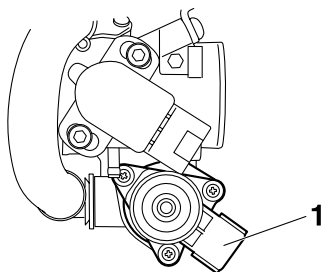


2. Remove:
  - Throttle body

ECA18P1014

### **NOTICE**

**Do not remove the ISC (idle speed control) valve “1” from the throttle body.**



EAS26980

## CHECKING THE INJECTOR

1. Check:
  - Injector
    - Damage → Replace.

EAS26990

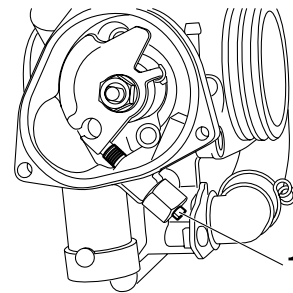
## CHECKING THE THROTTLE BODY

1. Check:
  - Throttle body
    - Cracks/damage → Replace the throttle body assembly.

ECA18P1015

### **NOTICE**

**Do not adjust the stop screw “1”.**



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.



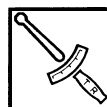
EAS18P1006

## INSTALLING THE THROTTLE BODY

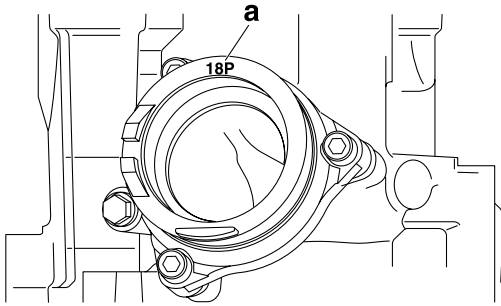
1. Install:
  - Throttle body joint

### **TIP**

Install the throttle body joint with 18P mark “a” facing up.



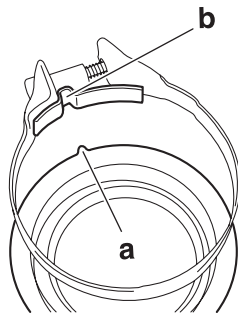
**Throttle body joint bolt**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)



2. Install:
- Throttle body joint clamp

## TIP

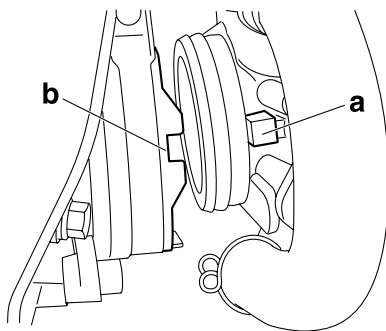
Align the projections “a” on the throttle body joint with the slot “b” in the throttle body joint clamp.



3. Install:
- Throttle body

## TIP

Align the projection “a” on the throttle body with the slot “b” in the throttle body joint.



4. Connect:
- Fuel hose

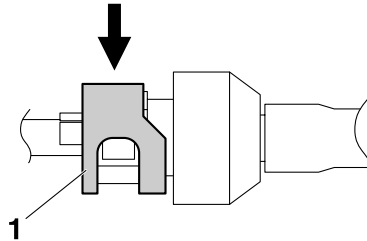
ECA18P1003

## NOTICE

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

## TIP

- Install the fuel hose securely onto the throttle body until a distinct “click” is heard.
- To install the fuel hose onto the throttle body, slide the fuel hose connector cover “1” on the end of the hose in the direction of the arrow shown.



5. Connect:
- ISC (idle speed control) valve coupler
  - Throttle position sensor coupler
  - Throttle cable
6. Adjust:
- Throttle cable free play
- Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-7.

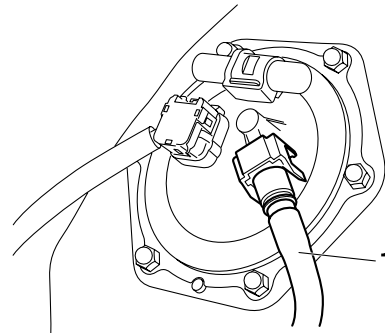
EAS18P1032

## CHECKING THE FUEL PRESSURE

1. Check:
- Fuel pressure



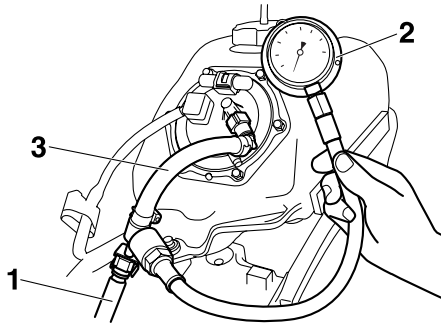
- a. Remove the fuel tank cover.  
Refer to “GENERAL CHASSIS” on page 4-1.
- b. Disconnect the fuel hose “1” from the fuel pump.  
Refer to “REMOVING THE FUEL TANK” on page 7-2.



- c. Connect the pressure gauge “2” and adapter “3” to the fuel hose “1”.



**Pressure gauge**  
90890-03153  
YU-03153  
**Fuel pressure adapter**  
90890-03186  
YU-03186



- d. Start the engine.
- e. Measure the fuel pressure.



**Fuel pressure**  
324.0 kPa (3.24 kgf/cm<sup>2</sup>, 47.0 psi)

Faulty → Replace the fuel pump assembly.



EAS27030

## ADJUSTING THE THROTTLE POSITION SENSOR

1. Check:
  - Throttle position sensor  
Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-78.
2. Adjust:
  - Throttle position sensor angle



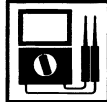
- a. Connect the test harness-TPS (3P) "1" to the throttle position sensor and wire harness as shown.
- b. Connect the digital circuit tester to the test harness-TPS (3P).

- Positive tester probe  
Yellow (wire harness color)
- Negative tester probe  
Black/blue (wire harness color)



**Digital circuit tester**  
90890-03174  
**Model 88 Multimeter with tachometer**  
YU-A1927  
**Test harness-TPS (3P)**  
90890-03204  
YU-03204

- c. Measure the throttle position sensor voltage.
- d. Adjust the throttle position sensor angle so that the voltage is within the specified range.

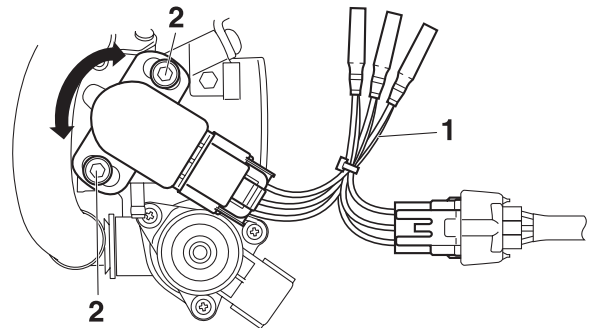


**Output voltage**  
0.679–0.681 V

- e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws "2".



**Throttle position sensor screw**  
3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)





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## ELECTRICAL SYSTEM

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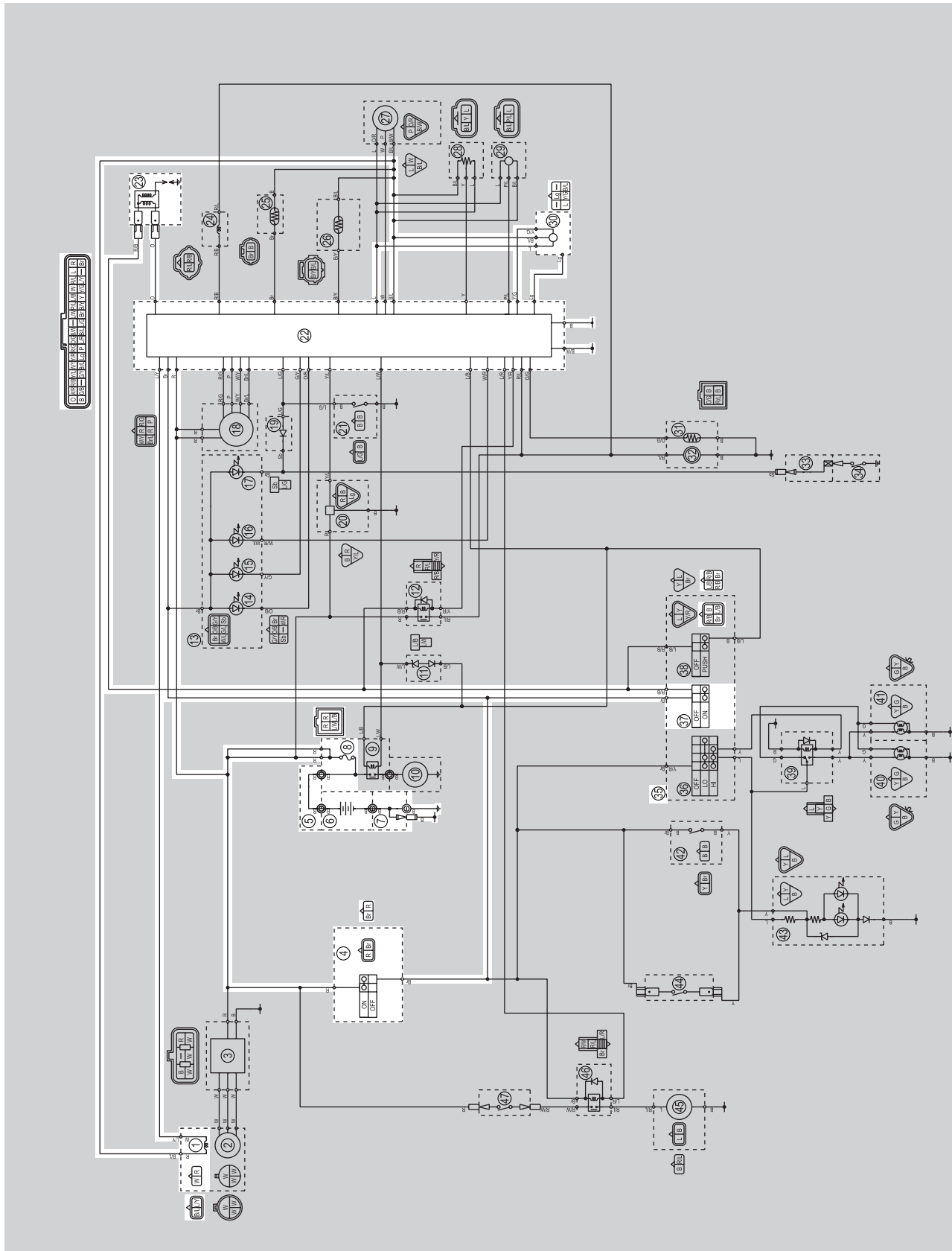
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EAS27090

## IGNITION SYSTEM

EAS27100

## CIRCUIT DIAGRAM



- 1. Crankshaft position sensor
- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 22. ECU (engine control unit)
- 23. Ignition coil
- 30. Lean angle sensor
- 35. Handlebar switch
- 37. Engine stop switch

EAS27130

## TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side cover (left and right)
4. Fuel tank
5. Front fender
6. Rear fender
7. Tail/brake light cover

1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	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 spark plug. Refer to "CHECKING THE SPARK PLUG" on page 3-8.	NG→	Re-gap or replace the spark plug.
OK↓		
4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION COIL" on page 8-72.	OK→	Ignition system is OK.
NG↓		
5. Check the spark plug cap. Refer to "CHECKING THE SPARK PLUG CAP" on page 8-72.	NG→	Replace the spark plug cap.
OK↓		
6. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 8-72.	NG→	Replace the ignition coil.
OK↓		
7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-73.	NG→	Replace the stator coil assembly.
OK↓		

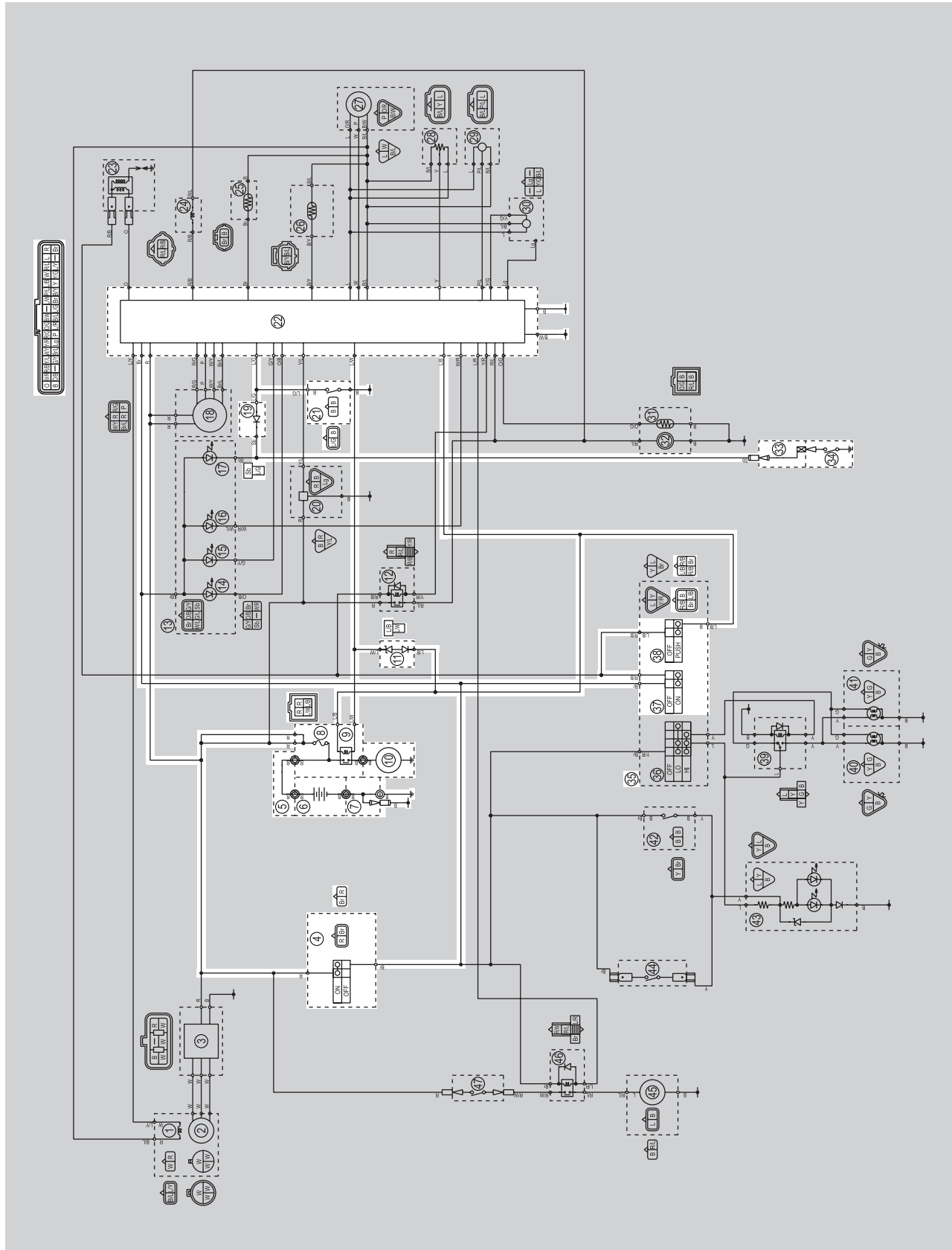
8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the main switch.
OK↓		
9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the handlebar switch.
OK↓		
10. Check the lean angle sensor. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-74.	NG→	Replace the lean angle sensor.
OK↓		
11. Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-1.	NG→	Properly connect or repair the ignition system's wiring
OK↓		
Replace the ECU (engine control unit).		

EAS27160

## ELECTRIC STARTING SYSTEM

EAS27170

## CIRCUIT DIAGRAM





- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 9. Starter relay
- 10. Starter motor
- 11. Diode 1
- 19. Diode 2
- 21. Clutch switch
- 22. ECU (engine control unit)
- 33. Wire lead
- 34. Neutral switch
- 35. Handlebar switch
- 37. Engine stop switch
- 38. Start switch

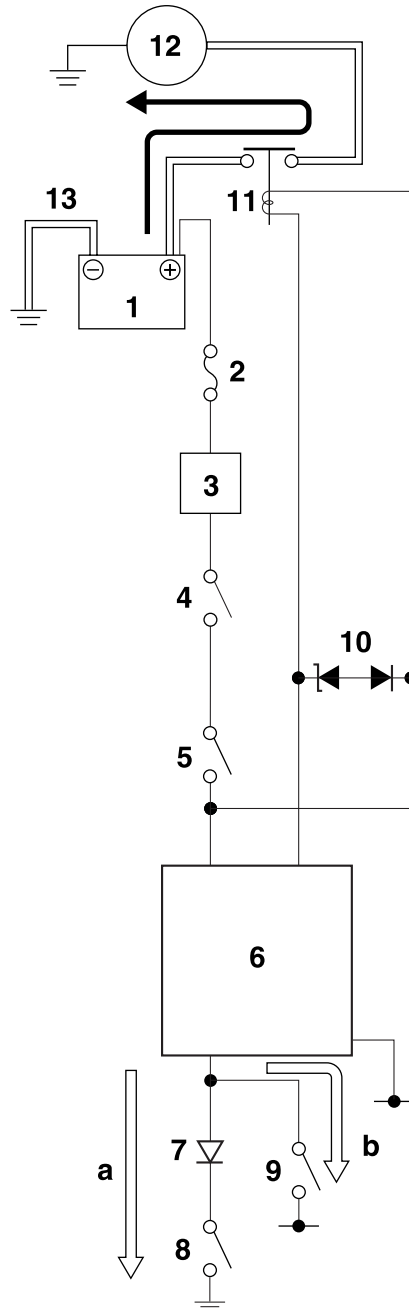
EAS27180

## STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed).

Starter motor operation is controlled by ECU (engine control unit).



- a. WHEN THE TRANSMISSION IS IN NEUTRAL
- b. WHEN THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

- 1. Battery
- 2. Main fuse
- 3. Main switch
- 4. Engine stop switch
- 5. Start switch
- 6. ECU (engine control unit)
- 7. Diode 2
- 8. Neutral switch
- 9. Clutch switch
- 10. Diode 1
- 11. Start relay
- 12. Starter motor
- 13. Battery negative lead

EAS27190

## TROUBLESHOOTING

The starter motor fails to turn.

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender
5. Rear fender
6. Tail/brake light cover

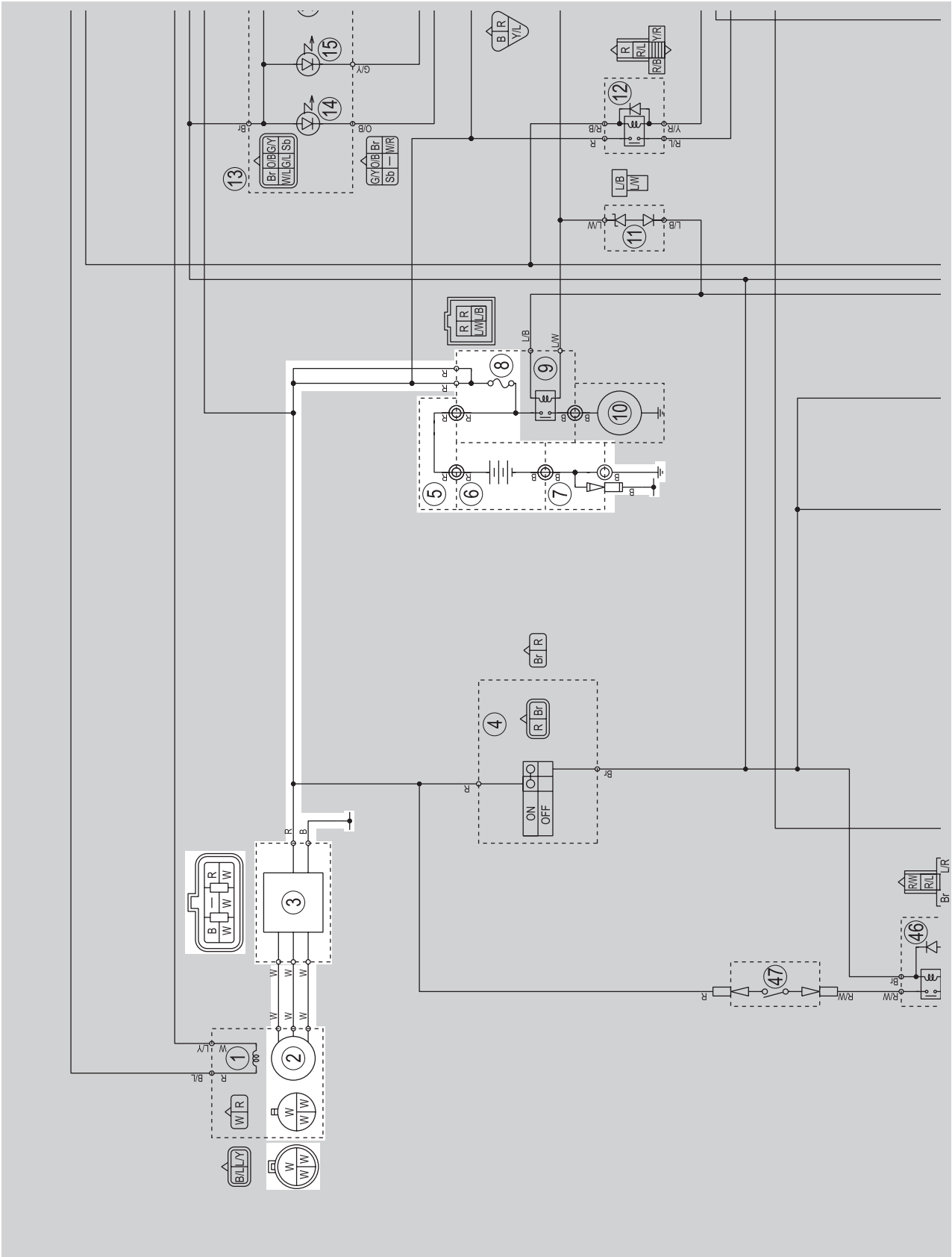
1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-74.	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 5-39.	NG→	Repair or replace the starter motor.
OK↓		
5. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-70.	NG→	Replace the starter relay.
OK↓		
6. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the main switch.
OK↓		
7. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the handlebar switch.
OK↓		

# ELECTRIC STARTING SYSTEM

8. Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the handlebar switch.
OK↓		
9. Check the diode 2. Refer to "CHECKING THE DIODE" on page 8-71.	NG→	Replace the wire harness.
OK↓		
10. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the neutral switch.
OK↓		
11. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the clutch switch.
OK↓		
12. Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-5.	NG→	Properly connect or repair the starting system's wiring.
OK↓		
Replace the ECU (engine control unit).		

EAS27200  
CHARGING SYSTEM

EAS27210  
CIRCUIT DIAGRAM



2. AC magneto
3. Rectifier/regulator
5. Battery positive lead
6. Battery
7. Battery negative lead
8. Main fuse

EAS27230

## TROUBLESHOOTING

The battery is not being charged.

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender

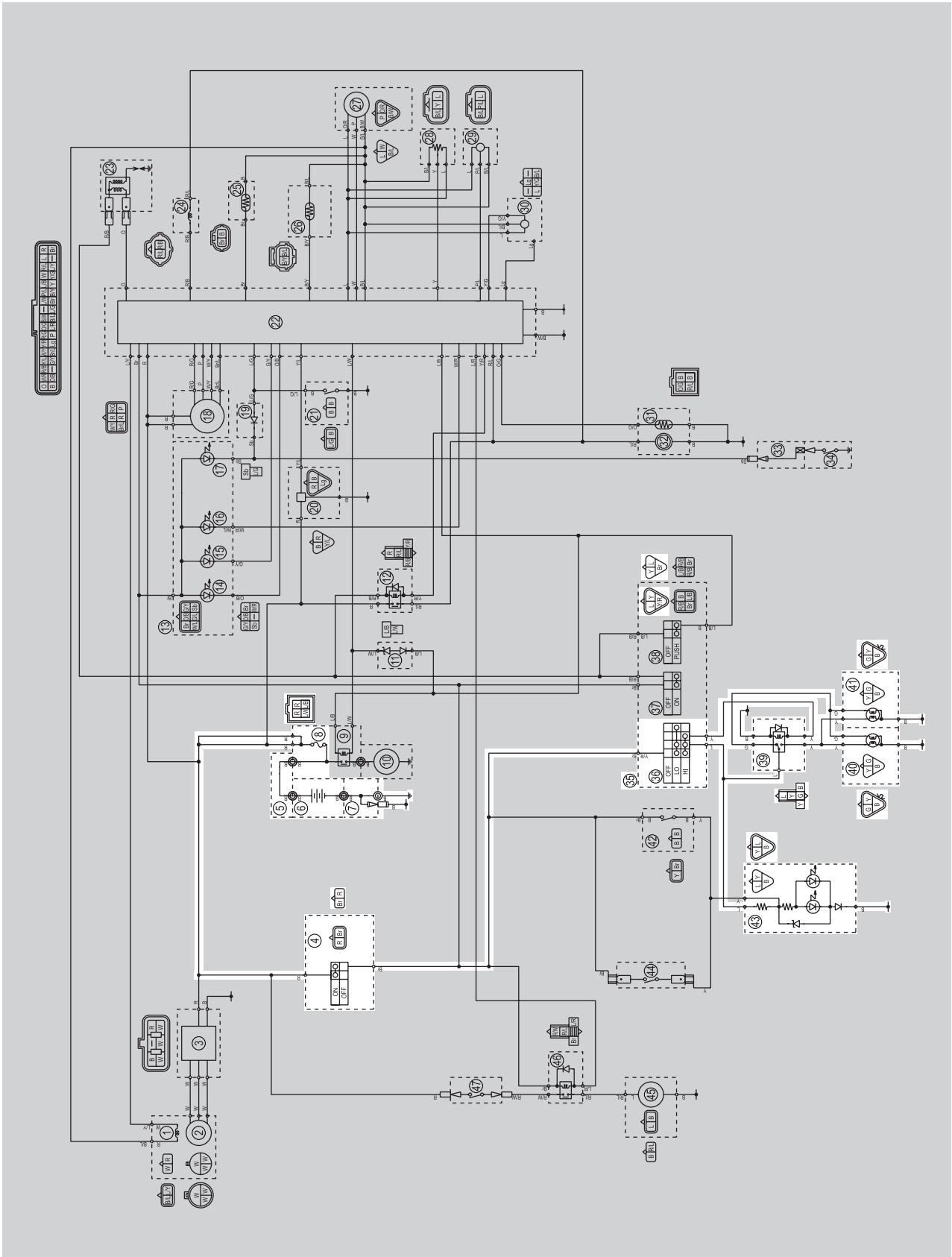
1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-75.	NG→	Replace the crankshaft position sensor/stator coil assembly.
OK↓		
4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-75.	NG→	Replace the rectifier/regulator.
OK↓		
5. Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-11.	NG→	Properly connect or repair the charging system's wiring.
OK↓		
The charging system circuit is OK.		





EAS27240  
LIGHTING SYSTEM

EAS27250  
CIRCUIT DIAGRAM



- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 35. Handlebar switch
- 36. Headlight switch
- 39. Headlight relay
- 40. Headlight (left)
- 41. Headlight (right)
- 43. Tail/brake light

EAS27260

## TROUBLESHOOTING

Any of the following fail to light: headlight or taillight.

### TIP

- Before troubleshooting, remove the following parts:

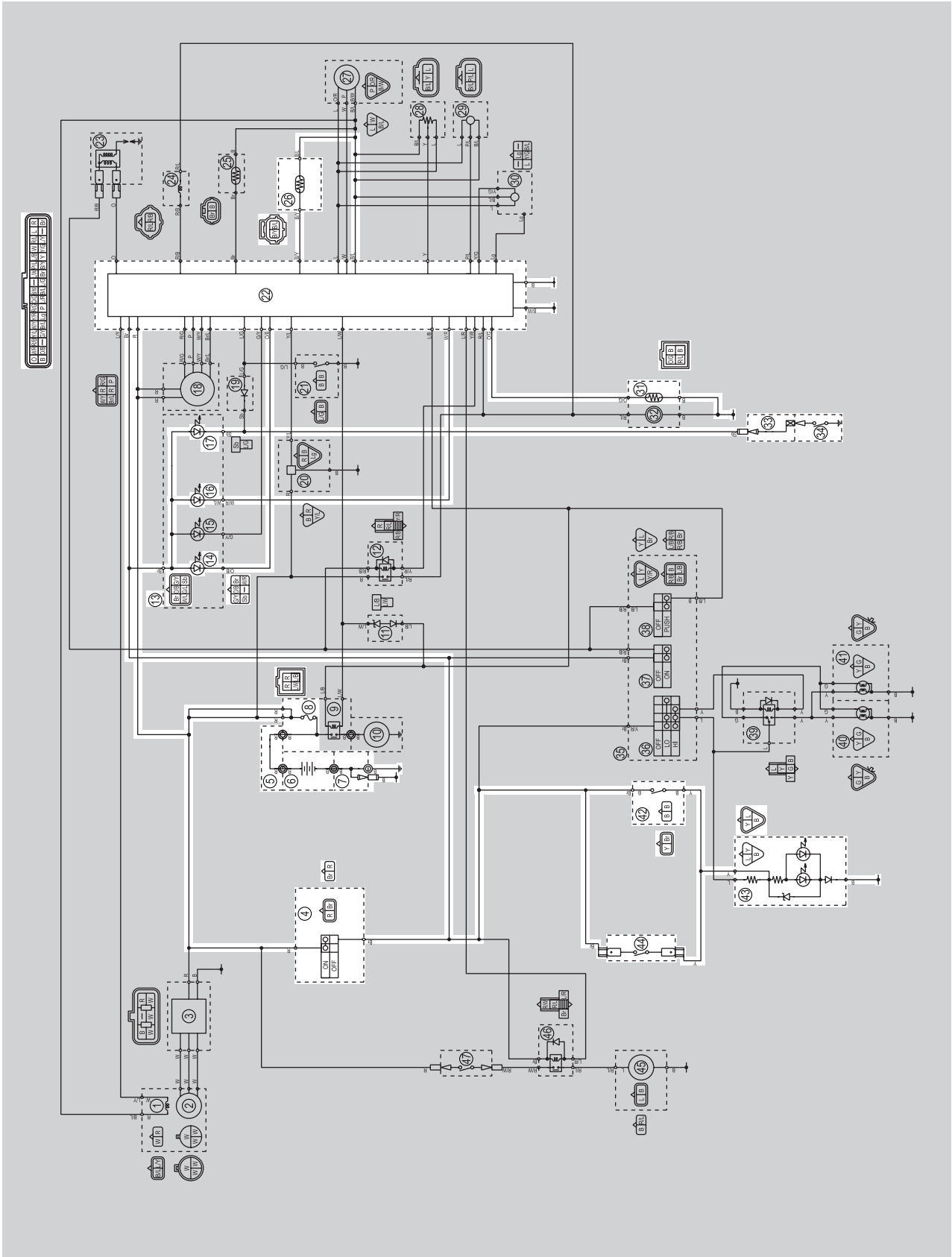
1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender

1. Check the each bulbs and bulb sockets condition. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-66.	NG→	Replace the bulbs and bulb sockets.
OK↓		
2. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	NG→	<ul style="list-style-type: none"> <li>• Clean the battery terminals.</li> <li>• Recharge or replace the battery.</li> </ul>
OK↓		
4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the main switch.
OK↓		
5. Check the headlight switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the handlebar switch.
OK↓		
6. Check the headlight relay. Refer to "CHECKING THE RELAYS" on page 8-70.	NG→	Replace the headlight relay.
OK↓		
7. Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-15.	NG→	Properly connect or repair the lighting system's wiring.
OK↓		
This circuit is OK.		



EAS27270  
SIGNALING SYSTEM

EAS27280  
CIRCUIT DIAGRAM



- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 13. Indicator light
- 14. Fuel level warning light
- 16. Coolant temperature warning light
- 17. Neutral indicator light
- 22. ECU (engine control unit)
- 26. Coolant temperature sensor
- 31. Fuel sender
- 33. Wire lead
- 34. Neutral switch
- 42. Rear brake light switch
- 43. Tail/brake light
- 44. Front brake light switch

EAS27290

## TROUBLESHOOTING

Any of the following fail to light: brake light or an indicator light.

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender
5. Rear fender
6. Tail/brake light cover

1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	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 8-63.	NG→	Replace the main switch.
OK↓		
4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
Check the condition of each of the signaling system's circuits. Refer to "Checking the signaling system".		

### Check the signaling system

The brake light fails to come on.

1. Check the brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the brake light switch.
OK↓		



2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
Replace the tail/brake light assembly.		
The neutral indicator light fails to come on.		
1. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the neutral switch.
OK↓		
2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
Replace the ECU (engine control unit) or indicator light assembly.		
The fuel level warning light fails to come on.		
1. Check the fuel sender. Refer to "CHECKING THE FUEL SENDER" on page 8-76.	NG→	Replace the fuel pump assembly.
OK↓		
2. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG→	Properly connect or repair the signaling system's wiring.
OK↓		
Replace the ECU (engine control unit) or indicator light assembly.		
The coolant temperature warning light fails to come on.		
1. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-77.	NG→	Replace the coolant temperature sensor.
OK↓		

2. Check the entire signaling system's wiring.  
Refer to "CIRCUIT DIAGRAM" on page 8-19.

NG→

Properly connect or repair the signaling system's wiring.

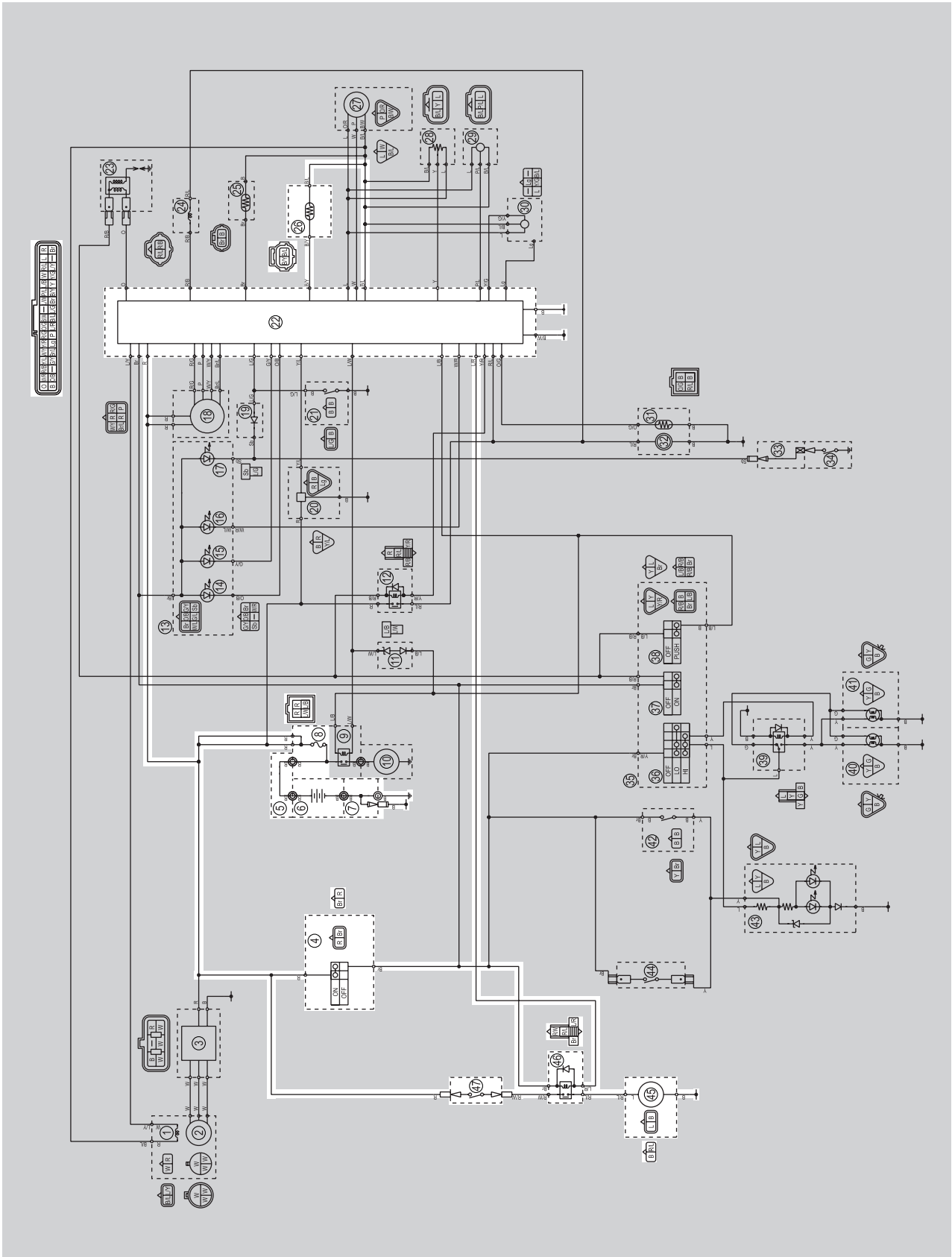
OK↓

Replace the ECU (engine control unit) or indicator light assembly.



EAS27300  
COOLING SYSTEM

EAS27310  
CIRCUIT DIAGRAM



- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 22.ECU (engine control unit)
- 26.Coolant temperature sensor
- 45.Radiator fan motor
- 46.Radiator fan motor relay
- 47.Thermo switch

EAS27320

## TROUBLESHOOTING

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender
5. Radiator side cover (left and right)
6. Rear fender
7. Tail/brake light cover

1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	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 8-63.	NG→	Replace the main switch.
OK↓		
4. Check the radiator fan motor. Refer to "RADIATOR" on page 6-1.	NG→	Replace the radiator fan motor.
OK↓		
5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-70.	NG→	Replace the radiator fan motor relay.
OK↓		
6. Check the thermo switch. Refer to "CHECKING THE THERMO SWITCH" on page 8-78.	NG→	Replace the wire harness.
OK↓		
7. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-77.	NG→	Replace the coolant temperature sensor.
OK↓		

8. Check the entire cooling system's wiring.  
Refer to "CIRCUIT DIAGRAM" on page 8-25.

NG→

Properly connect or repair the cooling system's wiring.

OK↓

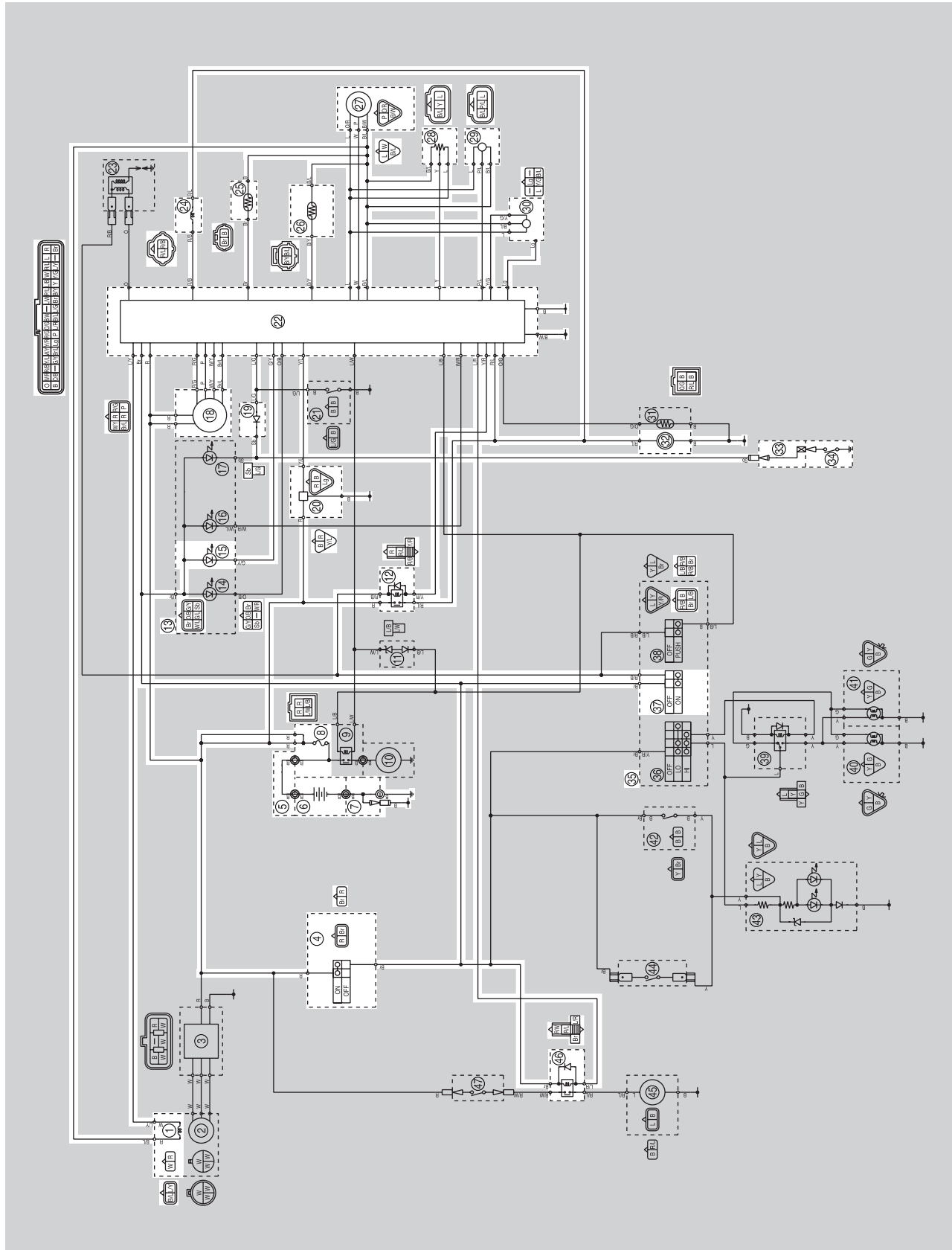
Replace the ECU (engine control unit).

EAS27330

## FUEL INJECTION SYSTEM

EAS27340

## CIRCUIT DIAGRAM





1. Crankshaft position sensor
4. Main switch
5. Battery positive lead
6. Battery
7. Battery negative lead
8. Main fuse
12. Main relay
13. Indicator light
15. Engine trouble warning light
18. ISC (idle speed control) valve
19. Diode 2
20. FI diagnostic tool coupler
22. ECU (engine control unit)
24. Injector
25. Intake air temperature sensor
26. Coolant temperature sensor
27. Speed sensor
28. Throttle position sensor
29. Intake air pressure sensor
30. Lean angle sensor
32. Fuel pump
33. Wire lead
34. Neutral switch
35. Handlebar switch
37. Engine stop switch
46. Radiator fan motor relay

EAS27350

## ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- If two or more malfunctions occur at one time, the system will display both fault codes repeatedly in cycles.

### Engine trouble warning light indication and FI 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            | 41: | Lean angle sensor (open or short-circuit)     |
| 30: | Lean angle sensor (latch up detected) | 50: | ECU internal malfunction (memory check error) |

### Checking for a defective engine trouble warning light

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light (LED) may be defective.



- Main switch "OFF"
- Main switch "ON"
- Engine trouble warning light off
- Engine trouble warning light on for 1.4 seconds

EAS27383

## FAIL-SAFE ACTIONS (SUBSTITUTE CHARACTERISTICS OPERATION CONTROL)

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

### Self-Diagnostic Function

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor: open or short circuit detected.	Able	Able
14	Intake air pressure sensor (pipe system)	Intake air pressure sensor: pipe system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor: open or short circuit detected.	Able/Unable	Able/Unable
16	Throttle position sensor (stuck)	The throttle position sensor is stuck.	Able	Able
21	Coolant temperature sensor	Coolant temperature sensor: open or short circuit detected.	Able	Able
22	Intake air temperature sensor	Intake air temperature sensor: open or short circuit detected.	Able	Able
30	Lean angle sensor (Latch up detected)	The vehicle has overturned.	Unable	Unable
33	Ignition coil (faulty ignition)	Malfunction detected in the primary wire of the ignition coil.	Unable	Unable
37	ISC valve (stuck fully open)	Engine speed is high when the engine is idling.	Able (stuck fully close unable)	Able
39	Injector (open circuit)	Injector: open or short circuit detected.	Unable	Unable
41	Lean angle sensor (open or short circuit)	Lean angle sensor: open or short circuit detected.	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.	Able	Able
43	Fuel system voltage (monitoring voltage)	The ECU is unable to monitor the battery voltage.	Able	Able

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>Item</b>	<b>Symptom</b>	<b>Able / unable to start</b>	<b>Able / unable to drive</b>
44	Error in writing the amount of CO adjustment on EEPROM	Error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (Monitoring voltage)	Power supply to the fuel injection system is not normal.	Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the FI diagnostic tool.)	Unable	Unable

## Communication error with the FI diagnostic tool

<b>Fault code No.</b>	<b>Item</b>	<b>Symptom</b>	<b>Able / unable to start</b>	<b>Able / unable to drive</b>
Waiting for connection.	ECU internal malfunction (output signal error)	No signals are received from the ECU.	Able*	Able*
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the FI diagnostic tool.	Able	Able

\* If malfunctions have been detected for the ECU, you may not be able to start or drive the vehicle.



EAS18P1055

## DIAGNOSTIC MODE

It is possible to monitor the sensor output data or check the activation of actuators with connecting the FI diagnostic tool to the normal mode or the diagnostic monitoring mode.



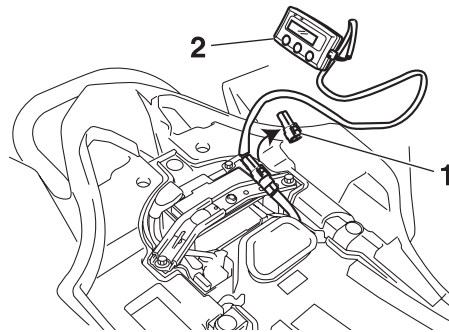
**FI diagnostic tool**  
**90890-03182**  
**YU-03182**

### Setting the normal mode

#### TIP

The engine speed, engine temperature, and fault code, if detected, can be displayed on the LCD of the FI diagnostic tool when the tool is connected to the vehicle and is set to the normal mode.

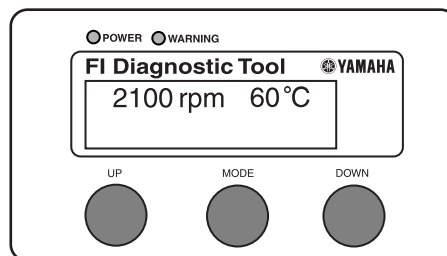
1. Turn the main switch to “OFF” and the engine stop switch to “ON”.
2. Disconnect the coupler cover “1”, and then connect the FI diagnostic tool “2” as shown.



3. Turn the main switch to “ON” and start the engine.

#### TIP

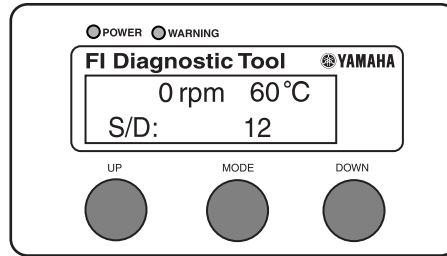
- Coolant temperature and engine revolution appear on the LCD of the FI diagnostic tool.
- “POWER” LED (Green) comes on.
- If a malfunction is detected in the system, “WARNING” LED (Orange) comes on. However the fault code does not appear on the LCD of FI diagnostic tool.



4. Stop the engine.

#### TIP

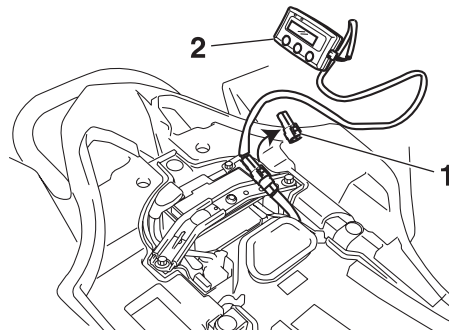
If a malfunction is detected in the system, the fault code appears on the LCD of the FI diagnostic tool. And also, “WARNING” LED (Orange) comes on.



5. Turn the main switch to “OFF” to cancel the normal mode.
6. Disconnect the FI diagnostic tool and connect the coupler cover.

### Setting the diagnostic monitoring mode

1. Turn the main switch to “OFF” and the engine stop switch to “ON”.
2. Disconnect the coupler cover “1”, and then connect the FI diagnostic tool “2” as shown.



3. While press the “MODE” button, turn the main switch to “ON”.

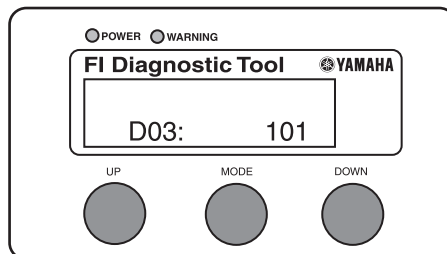
#### TIP

- “DIAG” appears on the LCD of the FI diagnostic tool.
- “POWER” LED (Green) comes on.

4. Press the “UP” button to select the CO adjustment mode “CO” or the diagnostic mode “DIAG”.
5. After selecting “DIAG”, press the “MODE” button.
6. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the “UP” and “DOWN” buttons.

#### TIP

- The diagnostic code number appears on the LCD (D01-D70).
- To decrease the selected diagnostic code number, press the “DOWN” button. Press the “DOWN” button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the “UP” button. Press the “UP” button for 1 second or longer to automatically increase the diagnostic code numbers.



7. Verify the operation of the sensor or actuator.
  - Sensor operation  
The data representing the operating conditions of the sensor appears on the LCD.
  - Actuator operation  
Press the “MODE” button to operate the actuator.
8. Turn the main switch to “OFF” to cancel the diagnostic mode.
9. Disconnect the FI diagnostic tool and connect the coupler cover.



**Diagnostic code table**

<b>Fault code No.</b>	<b>Symptom</b>	<b>Probable cause of malfunction</b>	<b>Diagnostic code No.</b>
12	No normal signals are received from the crankshaft position sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective crankshaft position sensor.</li> <li>• Malfunction in pickup rotor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed sensor.</li> </ul>	—
13	Intake air pressure sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective intake air pressure sensor.</li> <li>• Malfunction in ECU.</li> </ul>	D03
14	Intake air pressure sensor: pipe system malfunction (clogged or detached hose).	<ul style="list-style-type: none"> <li>• Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>• Clog in the opening of the intake air pressure sensor.</li> </ul>	D03
15	Throttle position sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective throttle position sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed throttle position sensor.</li> </ul>	D01
16	The throttle position sensor is stuck.	<ul style="list-style-type: none"> <li>• Stuck throttle position sensor.</li> <li>• Improperly installed throttle position sensor.</li> </ul>	D01
21	Coolant temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective coolant temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed coolant temperature sensor.</li> </ul>	D06
22	Intake air temperature sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective intake air temperature sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed intake air temperature sensor.</li> </ul>	D05
30	The vehicle has overturned.	<ul style="list-style-type: none"> <li>• The vehicle has overturned.</li> <li>• Defective lean angle sensor.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed lean angle sensor.</li> </ul>	D08
33	Malfunction detected in the primary wire of the ignition coil.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Malfunction in ignition coil.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed ignition coil.</li> </ul>	D30
37	Engine speed is high when the engine is idling.	<ul style="list-style-type: none"> <li>• Defective speed sensor.</li> <li>• Open or short circuit in wire harness.</li> <li>• Malfunction in throttle body.</li> <li>• Malfunction in throttle cable.</li> <li>• Defective ISC (idle speed control) valve.</li> <li>• ISC (idle speed control) valve is stuck fully open.</li> <li>• Hose coming off.</li> <li>• Air leak in intake path.</li> <li>• Malfunction in ECU.</li> </ul>	D54

# FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
39	Injector: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective injector.</li> <li>• Malfunction in ECU.</li> <li>• Improperly installed injector.</li> </ul>	D36
41	Lean angle sensor: open or short circuit detected.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective lean angle sensor.</li> <li>• Malfunction in ECU.</li> </ul>	D08
42	No normal signals are received from the speed sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Defective speed sensor.</li> <li>• Malfunction in ECU.</li> </ul>	D07
43	The ECU is unable to monitor the battery voltage	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness.</li> <li>• Malfunction in main relay.</li> <li>• Malfunction in ECU.</li> </ul>	D50
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory).</li> </ul>	D60
46	Power supply to the fuel injection system is not normal.	Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 8-11.	—
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the FI diagnostic tool.)	<ul style="list-style-type: none"> <li>• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)</li> </ul>	—
Waiting for connection.	No signals are received from the ECU.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in FI diagnostic tool.</li> <li>• Malfunction in ECU.</li> </ul>	—
Er-4	Non-registered data has been received from the FI diagnostic tool.	<ul style="list-style-type: none"> <li>• Open or short circuit in communication line.</li> <li>• Malfunction in FI diagnostic tool.</li> <li>• Malfunction in ECU.</li> </ul>	—

**Sensor operation table**

Diagnostic monitoring code No.	Item	FI diagnostic tool display	Checking method
D01	Throttle angle <ul style="list-style-type: none"> <li>Fully closed position</li> <li>Fully opened position</li> </ul>	12–22	Check with throttle fully closed. Check with throttle fully open.
D03	Pressure difference (intake air pressure)	Displays the intake air pressure.	Turn On the engine stop switch, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)
D05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured intake air temperature with the FI diagnostic tool display value. (*1)
D06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the FI diagnostic tool display value.
D07	Vehicle speed pulse	0–999	Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
D08	Lean angle sensor <ul style="list-style-type: none"> <li>Upright</li> <li>Overturned</li> </ul>	0.4–1.4 3.8–4.2	Remove the lean angle sensor and incline it more than 65 degrees.
D09	Fuel system voltage (battery voltage)	Approximately 12.0	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
D21	Neutral switch <ul style="list-style-type: none"> <li>Neutral</li> <li>In gear</li> </ul>	ON OFF	Perform the shift operation of transmission.

# FUEL INJECTION SYSTEM

Diagnostic monitoring code No.	Item	FI diagnostic tool display	Checking method
D60	EEPROM fault code display <ul style="list-style-type: none"> <li>No fault</li> <li>Fault detected</li> </ul>	00 01 (CO adjustment value is detected.) • (Displays malfunction of EEPROM data detected by fault code No 44. If there are multiple errors, the display would be in every two seconds.)	—
D61	Malfunction history code display <ul style="list-style-type: none"> <li>No history</li> <li>History exists</li> </ul>	00 12-50 (Fault detection code) • (If code numbers more than one are 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.)	—
D62	Malfunction history code erasure <ul style="list-style-type: none"> <li>No history</li> <li>History exists</li> </ul>	00 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.)	— To erase the history, press the "MODE" button of the FI diagnostic tool.
D70	Control number	00-254	—

\*1 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

**Actuator operation table**

<b>Diagnostic monitoring code No.</b>	<b>Item</b>	<b>Actuation</b>	<b>Checking method</b>
D30	Ignition coil	Actuates the ignition coil for five times at one-second intervals.	Check the spark five times. • Connect an ignition checker.
D36	Injector	Actuates the injector for five times at one-second intervals.	Check the operating sound of the injector five times.
D50	Main relay	Actuates the main relay for five times at one-second intervals.	Check the operating sound of the main relay five times.
D51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles every five-second. (ON 2 seconds, OFF 3 seconds)	Check the operating sound of the Radiator fan motor relay five times.
D54	ISC (idle speed control) unit	Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 3 seconds until it is completed.	The ISC unit vibrates when the ISC valve operates.

EAS27471

## TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the FI diagnostic tool. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the FI diagnostic tool display according to the reinstatement method.

Fault code No.:

Code number displayed on the FI diagnostic tool when the engine failed to work normally. Refer to "Self-Diagnostic Function table".

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-35.

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of crankshaft position sensor		Check the installed area for looseness or pinching.	Cranking the engine.
2	Connected state of connector <ul style="list-style-type: none"><li>• Crankshaft position sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between the crankshaft position sensor coupler and ECU coupler. (Blue/Yellow–Blue/Yellow) (Black/Blue–Black/Blue)</li></ul>	
4	Defective crankshaft position sensor.		<ul style="list-style-type: none"><li>• Replace if defective.</li></ul> Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-73.	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>13</b>	<b>Symptom</b>	<b>Intake air pressure sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>	<b>03</b>	<b>Intake air pressure sensor</b>		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connected state of connector <ul style="list-style-type: none"><li>• Intake air pressure sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Turning the main switch to “ON”.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between intake air pressure sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Pink/Blue–Pink/Blue) (Blue–Blue)</li></ul>	
3	Defective intake air pressure sensor		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.03)</li><li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-79.</li></ul>	

Fault code No.	14	Symptom	Intake air pressure sensor: pipe system malfunction (clogged or detached hose).	
Diagnostic code No.		03	Intake air pressure sensor	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose		<ul style="list-style-type: none"><li>• Check the Intake air pressure sensor hose condition.</li><li>• Repair or replace the sensor hose.</li></ul>	Starting the engine and operating it at idle.
2	Defective intake air pressure sensor		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.03)</li><li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-79.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	15	Symptom	Throttle position sensor: open or short circuit detected.		
Diagnostic code No.		01	Throttle position sensor		
Order	Item/components and probable cause		Check or maintenance job		Reinstatement method
1	Installed condition of throttle position sensor.		<ul style="list-style-type: none"><li>• Check the installed area for looseness or pinching.</li><li>• Check that is installed in the specified position.</li></ul>		Turning the main switch to “ON”.
2	Connected state of connector <ul style="list-style-type: none"><li>• Throttle position sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>		
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between throttle position sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Yellow–Yellow) (Blue–Blue)</li></ul>		
4	Throttle position sensor lead wire open circuit output voltage check.		<ul style="list-style-type: none"><li>• Check for open circuit and replace the throttle position sensor.</li></ul>		
			Open circuit item	Output voltage	
			Ground wire open circuit	5 V	
			Output wire open circuit	0 V	
			Power supply wire open circuit	0 V	
5	Defective throttle position sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.01)</li><li>• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-78.</li></ul>		



# FUEL INJECTION SYSTEM

Fault code No.	16	Symptom	The throttle position sensor is stuck.	
Diagnostic code No.	01	Throttle position sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.		<ul style="list-style-type: none"><li>• Check the installed area for looseness or pinching.</li><li>• Check that is installed in the specified position.</li></ul>	Reinstated by starting the engine, operating it at idle. And then racing it.
2	Defective throttle position sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.01)</li><li>• Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-78.</li></ul>	

<b>Fault code No.</b>	<b>21</b>	<b>Symptom</b>	<b>Coolant temperature sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>		<b>06</b>	<b>Coolant temperature sensor</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Installed condition of coolant temperature sensor		Check the installed area for looseness or pinching.	Turning the main switch to "ON".
2	Connected state of connector <ul style="list-style-type: none"><li>• Coolant temperature sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect it securely.</li></ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between coolant temperature sensor coupler and ECU coupler. (Black/Yellow–Black/Yellow) (Black/Blue–Black/Blue)</li></ul>	
4	Defective coolant temperature sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.06)</li><li>• Replace if defective. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-77.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	22	Symptom	Intake air temperature sensor: open or short circuit detected.	
Diagnostic code No.		05	Intake air temperature sensor	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of intake air temperature sensor		Check the installed area for looseness or pinching.	Turning the main switch to “ON”.
2	Connected state of connector <ul style="list-style-type: none"><li>• Intake air temperature sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between intake air temperature sensor coupler and ECU coupler. (Brown–Brown) (Black–Black/Blue)</li></ul>	
4	Defective intake air temperature sensor.		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.05)</li><li>• Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-79.</li></ul>	

Fault code No.		30	Symptom	The vehicle has overturned.		
Diagnostic code No.		08	Lean angle sensor			
Order	Item/components and probable cause			Check or maintenance job	Reinstatement method	
1	The vehicle has overturned.			Raise the vehicle upright.	Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned OFF).	
2	Installed state of the lean angle sensor.			Check the installed direction and condition of the sensor.		
3	Defective lean angle sensor.			<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.08)</li><li>• Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-74.</li></ul>		

# FUEL INJECTION SYSTEM

Fault code No.	33	Symptom	Malfunction detected in the primary wire of the ignition coil.	
Diagnostic code No.		30	Ignition coil	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connected state of connector <ul style="list-style-type: none"><li>• Ignition coil connector</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler and connector.</li><li>• If there is a malfunction, repair it and connect it securely.</li></ul>	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between ignition coil connector and ECU coupler. (Orange–Orange)</li></ul>	
3	Defective ignition coil		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.30)</li><li>• Test the primary and secondary coils for continuity.</li><li>• Replace if defective. Refer to “CHECKING THE IGNITION COIL” on page 8-72.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	37	Symptom	Engine speed is high when the engine is idling.	
Diagnostic code No.	54	ISC (Idle speed control) valve		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Incorrect speed sensor signal		<ul style="list-style-type: none"><li>• Check the speed sensor.</li><li>• Check the speed sensor leads.</li><li>• Check the speed sensor coupler.</li></ul>	Starting the engine and operating it at idle.
2	Throttle valve does not fully close		<ul style="list-style-type: none"><li>• Check the throttle body. Refer to “THROTTLE BODY” on page 7-4.</li><li>• Check the throttle cable. Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-7.</li></ul>	
3	ISC (idle speed control) valve stuck fully open		The ISC (idle speed control) valve is stuck fully open if it does not operate when the main switch is set to OFF. (Touch the ISC (idle speed control) valve unit with your hand and check if it is vibrating to confirm if the ISC (idle speed control) valve is operating.)	
4	ISC (idle speed control) valve not moving correctly		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.54)</li><li>• After the ISC (idle speed control) valve is fully closed, it opens until it is at the standby opening position when the engine is started. This operation takes approximately 3 seconds until it is completed.</li><li>• Start the engine. If the error recurs, replace the throttle body assembly.</li></ul>	

# FUEL INJECTION SYSTEM

Fault code No.	39	Symptom	Injector: open or short circuit detected.	
Diagnostic code No.	36	Injector		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connected state of connector. <ul style="list-style-type: none"><li>• Injector coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Replace if defective.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between the injector coupler and ECU coupler. (Red/Black–Red/Black) (Red/Blue–Red/Blue)</li></ul>	
3	Defective injector.		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.36)</li><li>• Replace if defective.</li></ul>	

<b>Fault code No.</b>	<b>41</b>	<b>Symptom</b>	<b>Lean angle sensor: open or short circuit detected.</b>	
<b>Diagnostic code No.</b>	<b>08</b>	<b>Lean angle sensor</b>		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connected state of connector <ul style="list-style-type: none"><li>• Lean angle sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Turning the main switch to “ON”.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between lean angle sensor coupler and ECU coupler. (Black/Blue–Black/Blue) (Yellow/Green–Yellow/Green) (Blue–Blue)</li></ul>	
3	Defective lean angle sensor		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.08)</li><li>• Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-74.</li></ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>42</b>	<b>Symptom</b>	<b>No normal signals are received from the speed sensor.</b>	
<b>Diagnostic code No.</b>	<b>07</b>	<b>Speed sensor</b>		
<b>Order</b>	<b>Item/components and probable cause</b>	<b>Check or maintenance job</b>	<b>Reinstatement method</b>	
1	Connected state of connector <ul style="list-style-type: none"><li>• Speed sensor coupler</li><li>• Main wire harness ECU coupler</li></ul>	<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect it securely.</li></ul>	Starting the engine, and activating the speed sensor by operating the vehicle.	
2	Open or short circuit in speed sensor lead.	<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between speed sensor coupler and ECU coupler. (Blue–Blue) (White–White) (Black/Blue–Black/Blue)</li></ul>		
3	Gear for detecting vehicle speed has broken.	<ul style="list-style-type: none"><li>• Replace if defective. Refer to “CHECKING THE TRANSMISSION” on page 5-69.</li></ul>		
4	Defective speed sensor	<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No.07)</li><li>• Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 8-76.</li></ul>		

# FUEL INJECTION SYSTEM

Fault code No.	43	Symptom	The ECU is unable to monitor the battery voltage.	
Diagnostic code No.	50	Main relay		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connected state of connector <ul style="list-style-type: none"><li>• Main relay coupler</li><li>• Main wire harness ECU coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Starting the engine and operating it at idle.
2	Defective main relay		Replace if defective.	
3	Open or short circuit in the wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between main relay coupler and ECU coupler. (Red/Blue–Red/Blue) (Yellow/Red–Yellow/Red)</li><li>• Between main relay coupler and starter relay coupler. (Red–Red)</li><li>• Between main relay coupler and handlebar switch coupler. (Red/Black–Red/Black)</li></ul>	
4	Malfunction in main relay		<ul style="list-style-type: none"><li>• Execute the diagnostic monitoring mode. (Code No. 50)</li><li>• Replace if defective.</li><li>• If there is no malfunction with the main relay, replace the ECU.</li></ul>	

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).		
Diagnostic code No.		60	EEPROM improper cylinder indication		
Order	Item/components and probable cause		Check or maintenance job		Reinstatement method
1	ECU is defective.		Execute the diagnostic monitoring mode. (Code No. 60)		Turning the main switch to “ON”.
			FI diagnostic tool display	Check or maintenance job	
			01	<ul style="list-style-type: none"><li>• Readjust the CO of the displayed cylinder. Replace ECU if defective.</li></ul>	

# FUEL INJECTION SYSTEM

<b>Fault code No.</b>	<b>46</b>	<b>Symptom</b>	<b>Power supply to the fuel injection system is not normal.</b>	
<b>Diagnostic code No.</b>	—	—		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connected state of connector. • Main wire harness ECU coupler		<ul style="list-style-type: none"> <li>• Check the coupler for any pins that may have pulled out.</li> <li>• Check the locking condition of the coupler.</li> <li>• If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Starting the engine and operating it at idle.
2	Faulty battery		<ul style="list-style-type: none"> <li>• Replace or change the battery Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-67.</li> </ul>	
3	The malfunction of the rectifier/regulator		<ul style="list-style-type: none"> <li>• Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 8-75.</li> </ul>	
4	Open or short circuit in wire harness.		<ul style="list-style-type: none"> <li>• Repair or replace if there is an open or short circuit.</li> <li>• Between battery and main switch (Red–Red)</li> <li>• Between main switch and ECU coupler. (Brown–Brown)</li> </ul>	

<b>Fault code No.</b>	<b>50</b>	<b>Symptom</b>	<b>Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the FI diagnostic tool.)</b>	
<b>Diagnostic code No.</b>	—	—		
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Malfunction in ECU		Replace the ECU.	Turning the main switch to “ON”.



# FUEL INJECTION SYSTEM

Fault code No.		Wait- ing for con- nec- tion.	Symptom	No signals are received from the ECU.	
Diagnostic code No.			—	—	
Order	Item/components and probable cause			Check or maintenance job	Reinstatement method
1	Connected state of connector <ul style="list-style-type: none"><li>• Main wire harness ECU coupler</li><li>• Main wire harness FI diagnostic tool coupler</li></ul>			<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically when it receives a normal signal.
2	Open or short circuit in wire harness.			<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between FI diagnostic tool coupler and ECU coupler (Yellow/Blue–Yellow/Blue)</li></ul>	
3	Malfunction in FI diagnostic tool			Replace the FI diagnostic tool.	
4	Malfunction in ECU			Replace the ECU.	

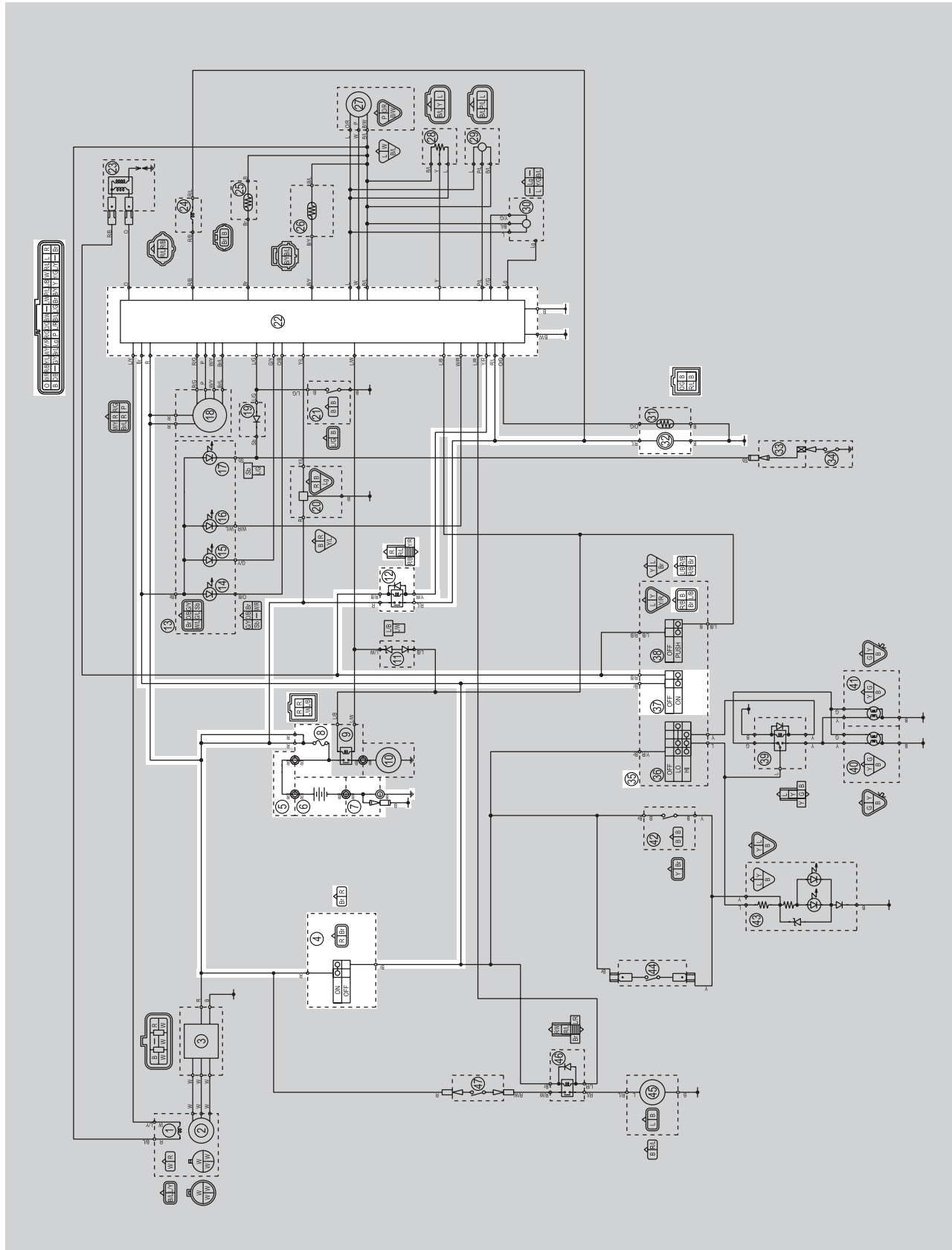
<b>Fault code No.</b>	<b>Er-4</b>	<b>Symptom</b>	<b>Non-registered data has been received from the FI diagnostic tool.</b>	
<b>Diagnostic code No.</b>		<b>—</b>	<b>—</b>	
<b>Order</b>	<b>Item/components and probable cause</b>		<b>Check or maintenance job</b>	<b>Reinstatement method</b>
1	Connected state of connector <ul style="list-style-type: none"><li>• Main wire harness ECU coupler</li><li>• Main wire harness FI diagnostic tool coupler</li></ul>		<ul style="list-style-type: none"><li>• Check the coupler for any pins that may have pulled out.</li><li>• Check the locking condition of the coupler.</li><li>• If there is a malfunction, repair it and connect the coupler securely.</li></ul>	Reinstated automatically when it receives a normal signal.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"><li>• Repair or replace if there is an open or short circuit.</li><li>• Between FI diagnostic tool coupler and ECU coupler (Yellow/Blue–Yellow/Blue)</li></ul>	
3	Malfunction in FI diagnostic tool		Replace the FI diagnostic tool.	
4	Malfunction in ECU		Replace the ECU.	

EAS27550

## FUEL PUMP SYSTEM

EAS27560

## CIRCUIT DIAGRAM



- 4. Main switch
- 5. Battery positive lead
- 6. Battery
- 7. Battery negative lead
- 8. Main fuse
- 12. Main relay
- 22. ECU (engine control unit)
- 32. Fuel pump
- 35. Handlebar switch
- 37. Engine stop switch

EAS27570

## TROUBLESHOOTING

If the fuel pump fails to operate.

### TIP

- Before troubleshooting, remove the following parts:

1. Seat
2. Fuel tank cover
3. Side covers (left and right)
4. Front fender
5. Rear fender
6. Tail/brake light cover

1. Check the fuse. Refer to "CHECKING THE FUSE" on page 8-67.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-67.	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 8-63.	NG→	Replace the main switch.
OK↓		
4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-63.	NG→	Replace the handlebar switch.
OK↓		
5. Check the main relay. Refer to "CHECKING THE RELAYS" on page 8-70.	NG→	Replace the main relay.
OK↓		
6. Check the fuel pump. Refer to "CHECKING THE FUEL PRESSURE" on page 7-8.	NG→	Replace the fuel pump.
OK↓		

7. Check the entire fuel pump system's wiring.  
Refer to "CIRCUIT DIAGRAM" on page 8-55.

NG→

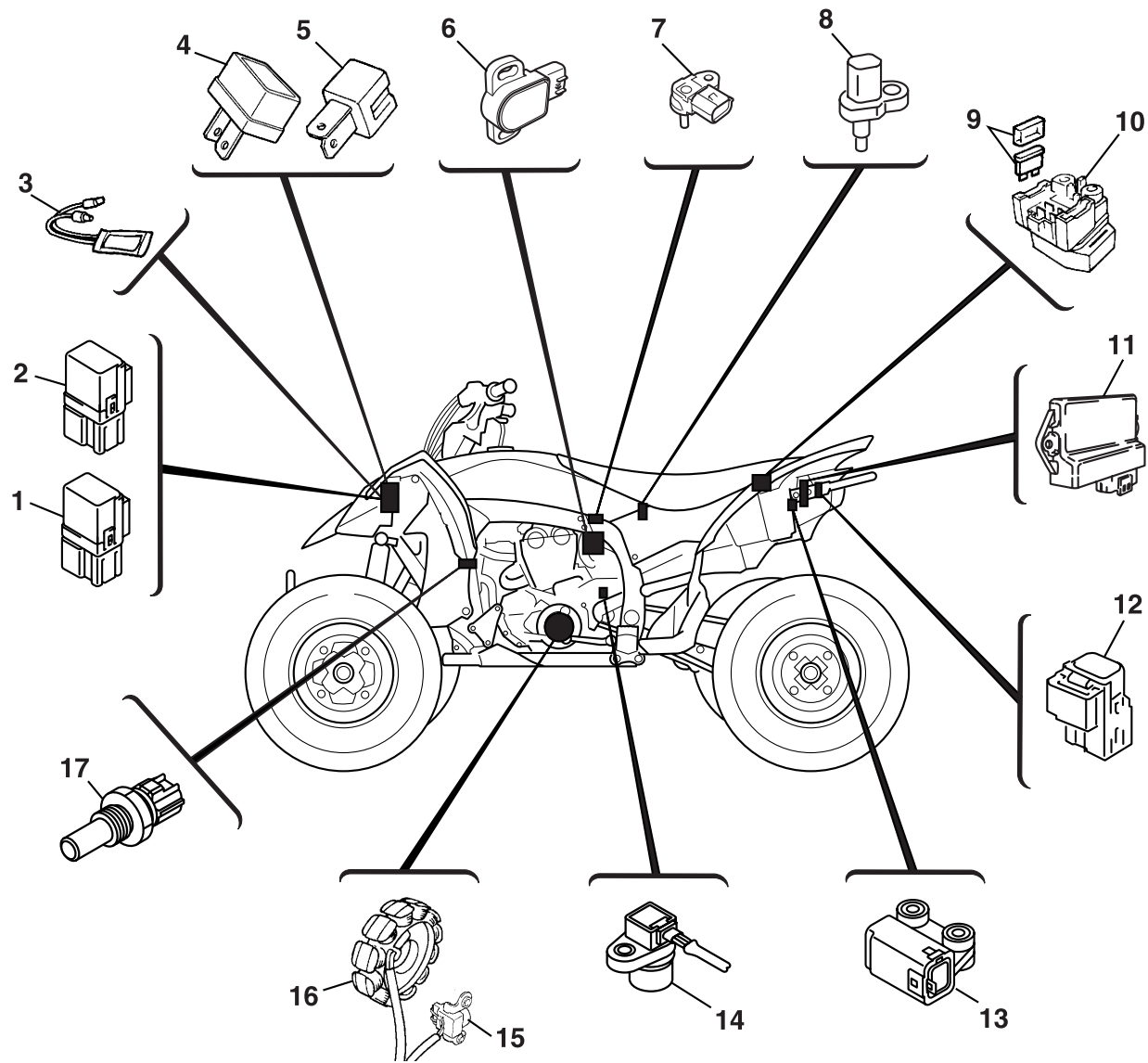
Properly connect or repair the fuel pump system's wiring.

OK↓

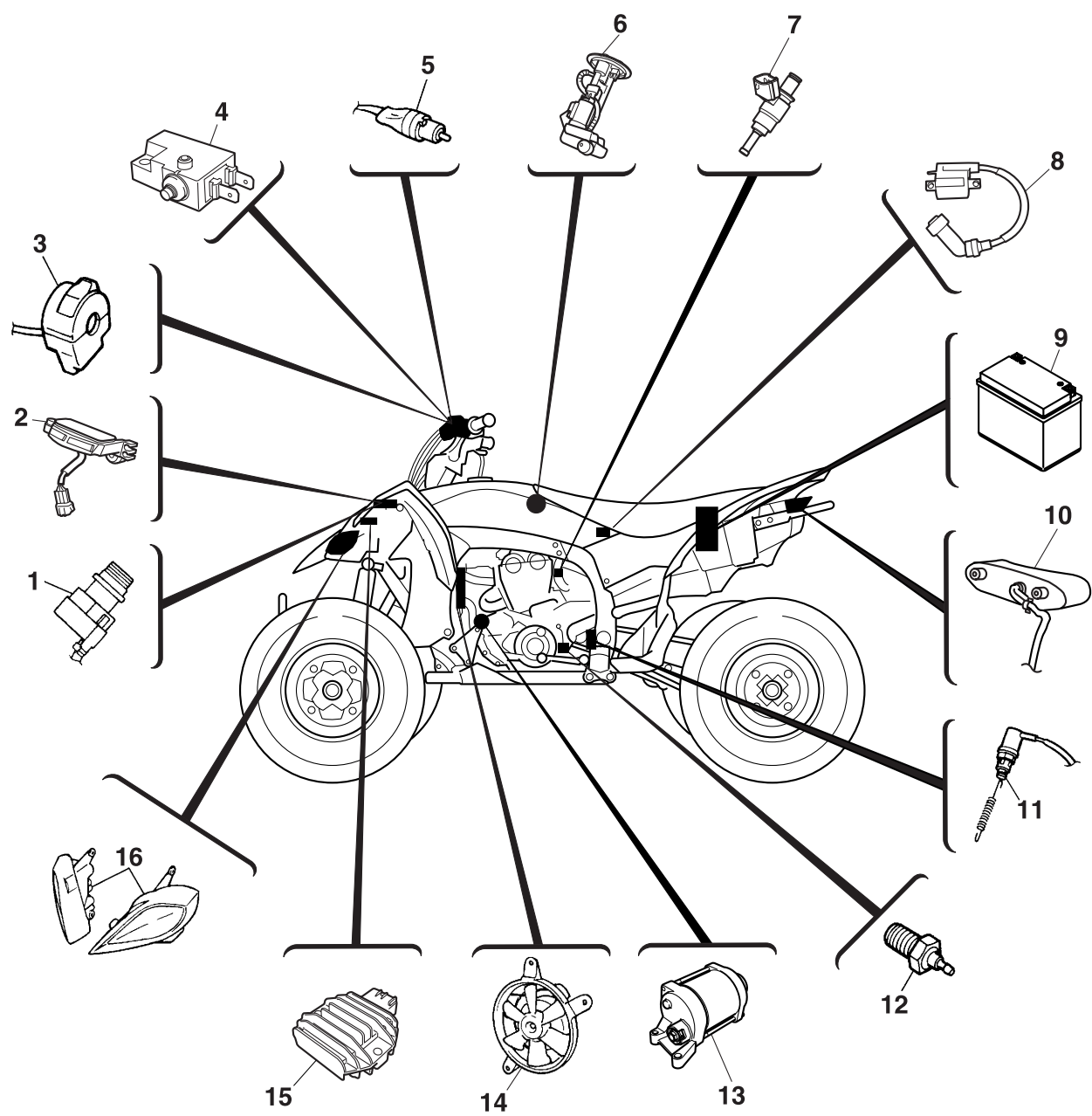
Replace the ECU (engine control unit).

EAS27972

ELECTRICAL COMPONENTS



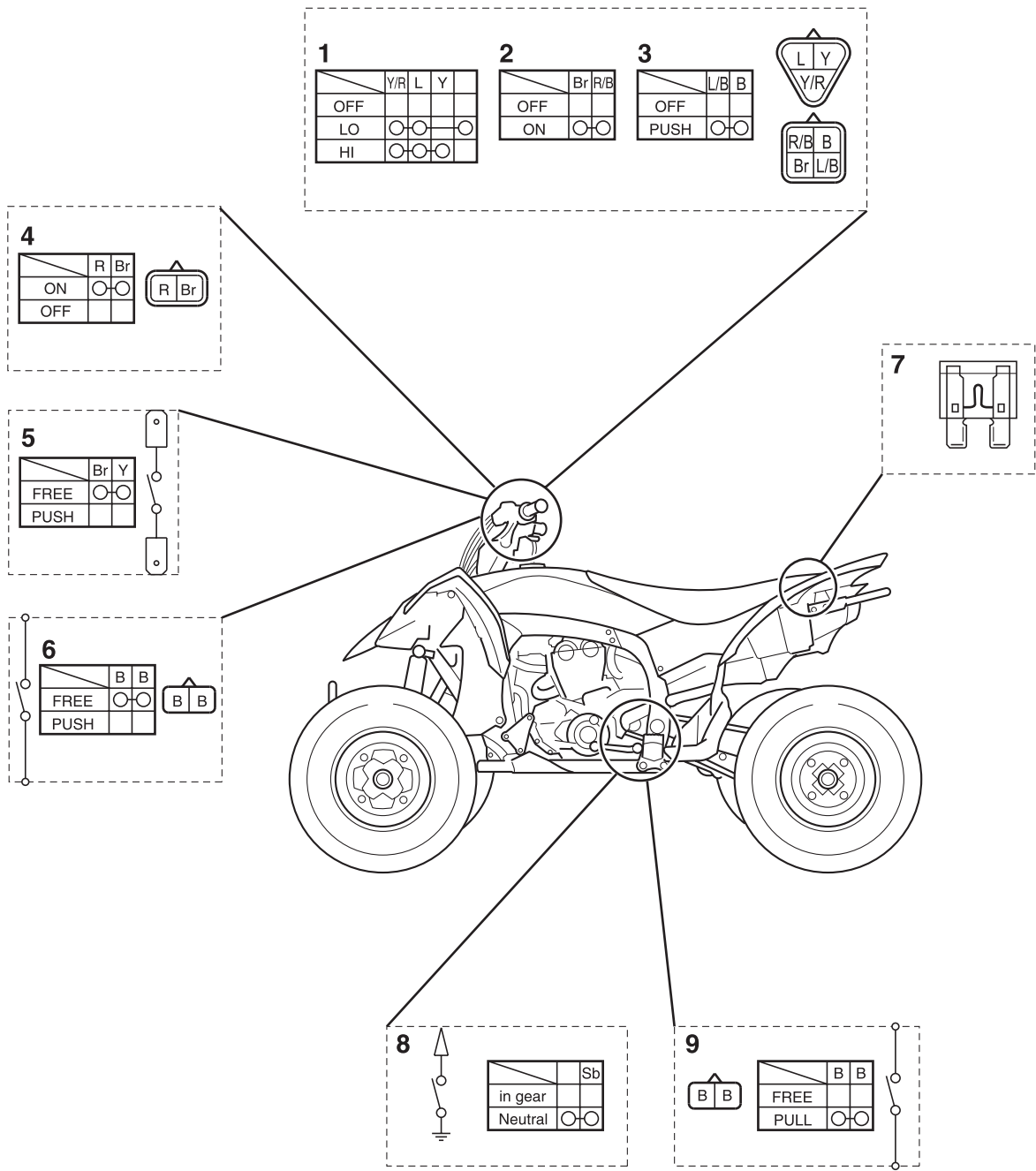
1. Radiator fan motor relay
2. Headlight relay
3. Thermo switch
4. Diode 1
5. Diode 2
6. Throttle position sensor
7. Intake air pressure sensor
8. Intake air temperature sensor
9. Main fuse
10. Starter relay
11. ECU (engine control unit)
12. Main relay
13. Lean angle sensor
14. Speed sensor
15. Crankshaft position sensor
16. Stator assembly
17. Coolant temperature sensor





1. Main switch
2. Indicator light
3. Handlebar switch
4. Front brake light switch
5. Clutch switch
6. Fuel pump and fuel sender
7. Injector
8. Ignition coil
9. Battery
10. Tail/brake light
11. Rear brake light switch
12. Neutral switch
13. Starter motor
14. Radiator fan motor
15. Rectifier/regulator
16. Headlight

EAS27980  
CHECKING THE SWITCHES



1. Headlight switch
2. Engine stop switch
3. Start switch
4. Main switch
5. Front brake light switch
6. Clutch switch
7. Main fuse
8. Neutral switch
9. Rear brake light switch

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

NOTICE

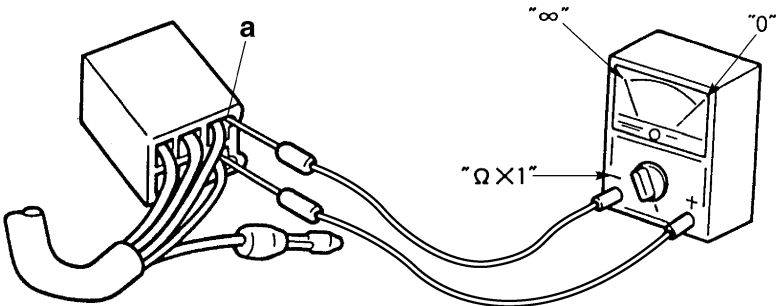
Never insert the tester probes into the coupler terminal slots “a”. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



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

TIP

- Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

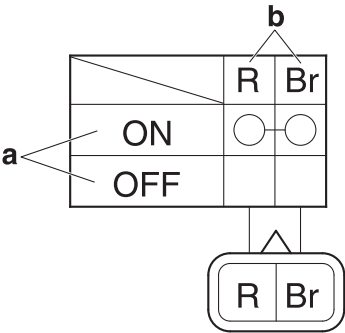


The switches and their terminal connections are illustrated as in the following example of the main switch.  
The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row in the switch illustration.

TIP

“○—○” indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:  
There is continuity between red and brown when the switch is set to “ON”.



EAS27990

**CHECKING THE BULBS AND BULB SOCKETS****TIP**

Do not check any of the lights that use LEDs.

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.

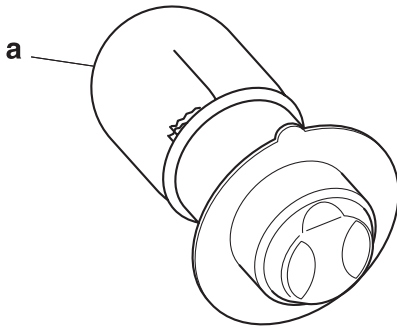
Improperly connected → Properly connect.

No continuity → Repair or replace the bulb, bulb socket or both.

**Types of bulbs**

The bulbs used on this vehicle are shown in the illustration.

- Bulb “a” is used for the headlights. It usually uses a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.

**Checking the condition of the bulbs**

The following procedure applies to all of the bulbs.

1. Remove:
  - Bulb

EWA13320

**WARNING**

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

ECA18P1006

**NOTICE**

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.

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

2. Check:

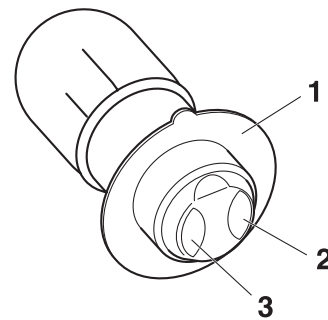
- Bulb (for continuity)  
(with the pocket tester)  
No continuity → Replace.

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

Before checking for continuity, set the pocket tester to “0” and to the “ $\Omega \times 1$ ” 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.

**8-67**

- Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

ECA18P1005

## NOTICE

- This is a sealed 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 an VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the instructions for the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

## TIP

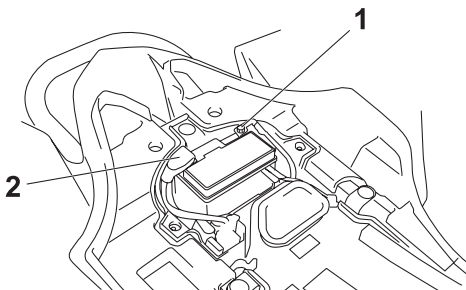
Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
  - Seat
  - Battery bracket
 Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
  - Battery leads
 (from the battery terminals)

ECA13640

## NOTICE

**First, disconnect the negative battery lead "1", and then positive battery lead "2".**



3. Remove:
  - Battery
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

## TIP

- The charge state of an 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.

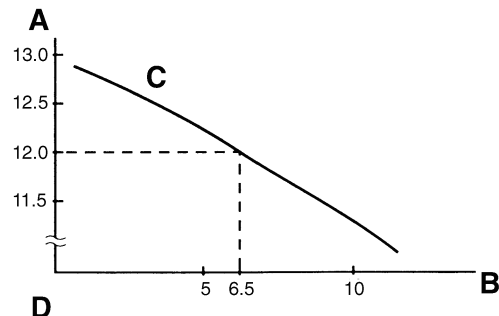
- b. Check the charge of the battery, as shown in the charts and the following example.

## 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.





monitor the amperage for 3–5 minutes to check the battery.

- Reach the standard charging current  
Battery is good.
- Does not reach the standard charging current  
Replace the battery.

- d. Adjust the voltage so that the current is at the standard charging level.
- e. Set the time according to the charging time suitable for the open-circuit voltage.
- f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
- g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.  
12.7 V or less --- Recharging is required.  
Under 12.0 V --- Replace the battery.



## Charging method using a constant voltage charger

- a. Measure the open-circuit voltage prior to charging.

### TIP

Voltage should be measured 30 minutes after the machine is stopped.

- b. Connect a charger and AMP meter to the battery and start charging.
- c. Make sure that the current is higher than the standard charging current written on the battery.

### TIP

If the current is lower than the standard charging current written on the battery, This type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

- d. Charge the battery until the battery's charging voltage is 15 V.

### TIP

Set the charging time at 20 hours (maximum).

- e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.  
12.7 V or less --- Recharging is required.  
Under 12.0 V --- Replace the battery.

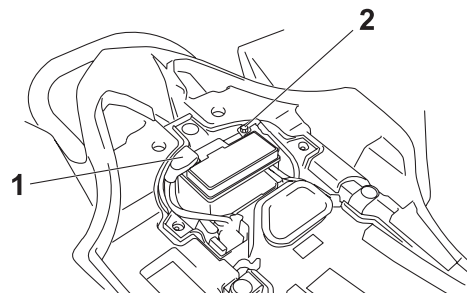


6. Install:
  - Battery
7. Connect:
  - Battery leads  
(to the battery terminals)

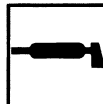
ECA13630

### NOTICE

**First, connect the positive battery lead “1”, and then the negative battery lead “2”.**



8. Check:
  - Battery terminals  
Dirt → Clean with a wire brush.  
Loose connection → Connect properly.
9. Lubricate:
  - Battery terminals



**Recommended lubricant  
Dielectric grease**

10. Install:
  - Battery bracket
  - Seat  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS28040

## CHECKING THE RELAYS

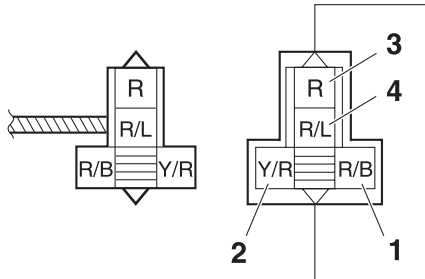
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.



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

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminal as shown. Check the relay operation.  
Out of specification → Replace.

## Main relay

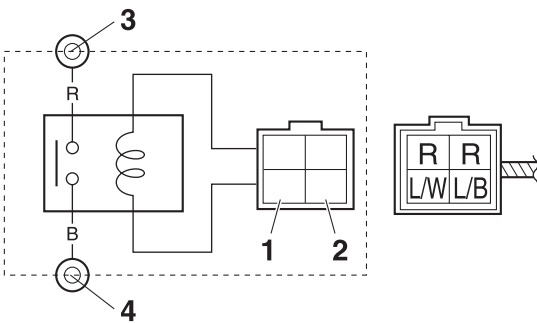


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

## Starter relay

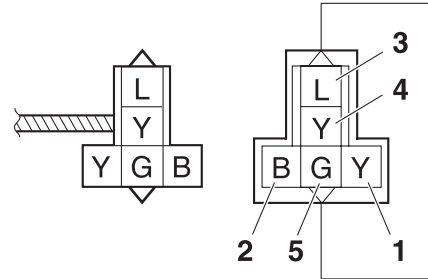


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

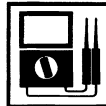


**Result**  
**Continuity**  
(between "3" and "4")

## Headlight relay

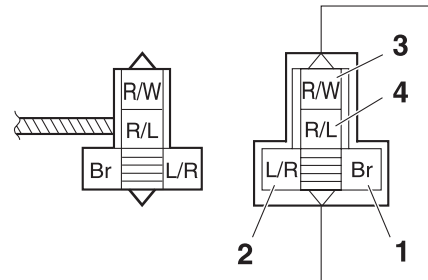


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

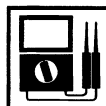


**Result**  
**Continuity**  
(between "3" and "4")  
(between "3" and "5")

## 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")

EAS28050

## CHECKING THE DIODE

1. Check:
  - Diode 2
 Out of specification → Replace.

- a. Disconnect the diode 2 from the wire harness.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the diode 2 terminals as shown.



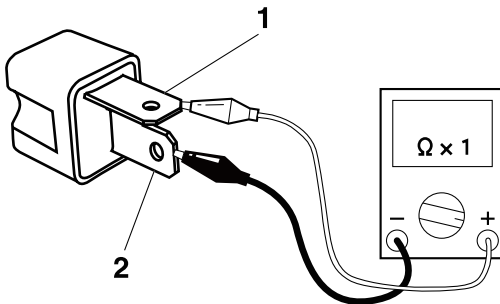
**Pocket tester**  
90890-03112  
**Analog pocket tester**  
YU-03112-C

## Continuity

- Positive tester probe  
Sky blue "1"
- Negative tester probe  
Blue/green "2"

## No continuity

- Positive tester probe  
Blue/green "2"
- Negative tester probe  
Sky blue "1"



- Check the diode 2 for continuity.
- Check the diode 2 for no continuity.

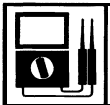
## TIP

When you switch the positive and negative tester probes, the readings in the above chart will be reversed.

EAS28060

## CHECKING THE SPARK PLUG CAP

- Check:
  - Spark plug cap resistance  
Out of specification → Replace.

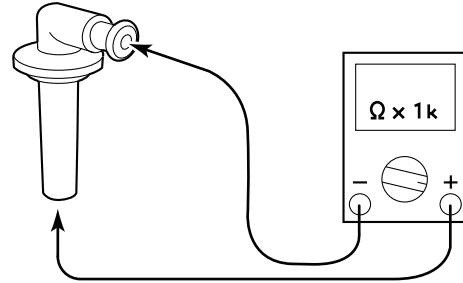


**Spark plug cap resistance**  
10 kΩ

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ( $\Omega \times 1k$ ) to the spark plug cap as shown.



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



- Measure the spark plug cap resistance.

EAS28090

## CHECKING THE IGNITION COIL

- Check:
  - Primary coil resistance  
Out of specification → Replace.



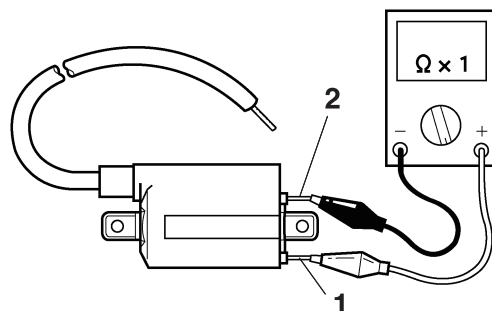
**Primary coil resistance**  
2.16–2.64  $\Omega$  at 20 °C (68 °F)

- 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  
Red/black "1"
- Negative tester probe  
Orange "2"

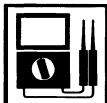


**90890-06754**

**Opama pet-4000 spark checker  
YM-34487**

- [illegible]

- Secondary coil resistance  
Out of specification → Replace.

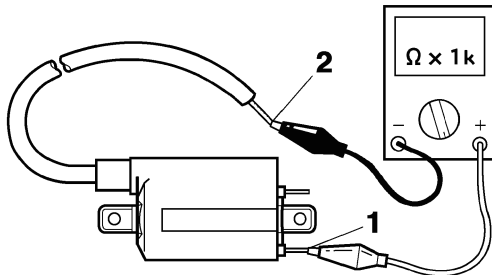


**Secondary coil resistance**  
8.64–12.96 k $\Omega$  at 20 °C (68 °F)

- 

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

- Positive tester probe  
Red/black "1"
- Negative tester probe  
Spark plug lead "2"



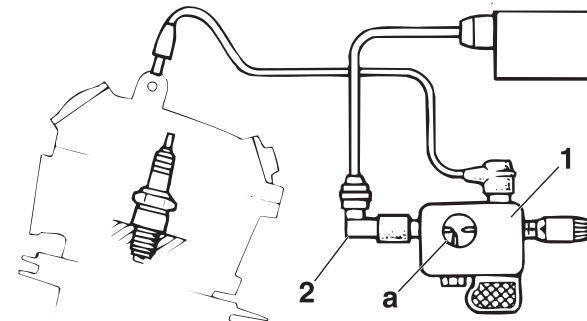
- 

- Ignition spark gap “a”  
Out of specification → Perform the ignition system troubleshooting, starting with step 5.  
Refer to “TROUBLESHOOTING” on page 8-3.



**Minimum ignition spark gap**  
**6.0 mm (0.24 in)**

- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker "1" as shown.



- ## 2. Spark plug cap

- c. Set the main switch to "ON".
- d. Measure the ignition spark gap.
- e. Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.

EAS28120

1. Disconnect:

- Crankshaft position sensor coupler (from the wire harness)
2. Check:
- Crankshaft position sensor resistance  
Out of specification → Replace the crankshaft position sensor/stator assembly.



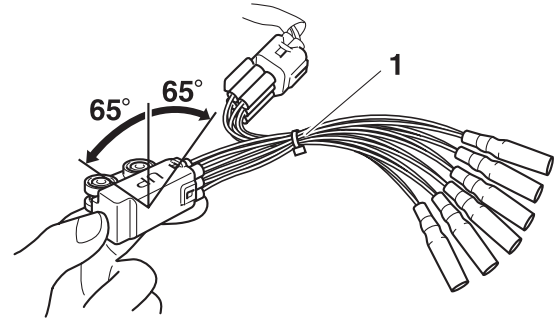
**Crankshaft position sensor resistance**  
**248–372  $\Omega$  at 20 °C (68 °F)**

- a. Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.



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

- Positive tester probe  
White "1"
- Negative tester probe  
Red "2"



- c. Set the main switch to “ON”.
- d. Turn the lean angle sensor to  $65^\circ$ .
- e. Measure the lean angle sensor output voltage.

## CHECKING THE LEAN ANGLE SENSOR

- ## CHECKING THE STARTER MOTOR OPERATION

- 

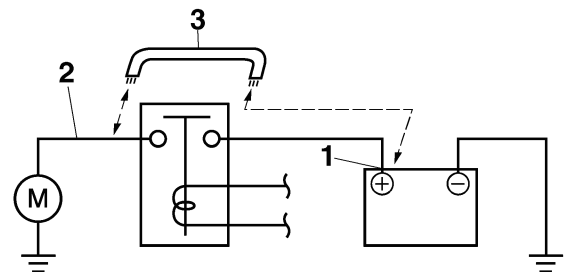
**3.70–4.40 V**

- 

**YU-03209**

- ⚠ WARNING**

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.**



- b. Check the starter motor operation.

EAS28150

## CHECKING THE STATOR COIL

1. Disconnect:
  - Stator coil coupler  
(from the wire harness)
2. Check:
  - Stator coil resistance  
Out of specification → Replace the crankshaft position sensor/stator coil assembly.



**Stator coil resistance**  
**0.32–0.48  $\Omega$  at 20 °C (68 °F)**



- a. Connect the pocket tester ( $\Omega \times 1$ ) to the stator coil coupler as shown.

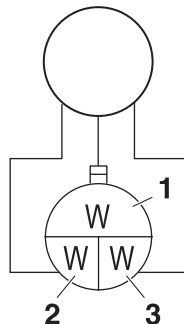


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**

- Positive tester probe  
White “1”
- Negative tester probe  
White “2”

- Positive tester probe  
White “1”
- Negative tester probe  
White “3”

- Positive tester probe  
White “2”
- Negative tester probe  
White “3”



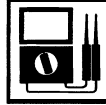
- b. Measure the stator coil resistance.



EAS28170

## CHECKING THE RECTIFIER/REGULATOR

1. Check:
  - Rectifier/regulator input voltage  
Out of specification → Correct the stator coil condition.  
Refer to “CHECKING THE STATOR COIL” on page 8-75.



**Rectifier/regulator input voltage**  
**Above 14 V at 5000 r/min**



- a. Set the digital tachometer to the spark plug lead.
- b. Connect the pocket tester (AC 20 V) to the rectifier/regulator coupler as shown.

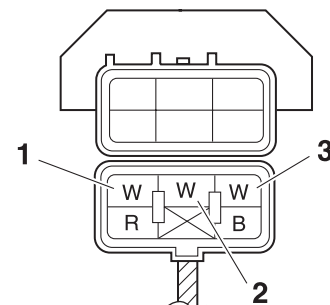


**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**  
**Digital tachometer**  
**90890-06760**  
**YU-39951-B**

- Positive tester probe  
White “1”
- Negative tester probe  
White “2”

- Positive tester probe  
White “1”
- Negative tester probe  
White “3”

- Positive tester probe  
White “2”
- Negative tester probe  
White “3”



- c. Start the engine and let it run at approximately 5000 r/min.

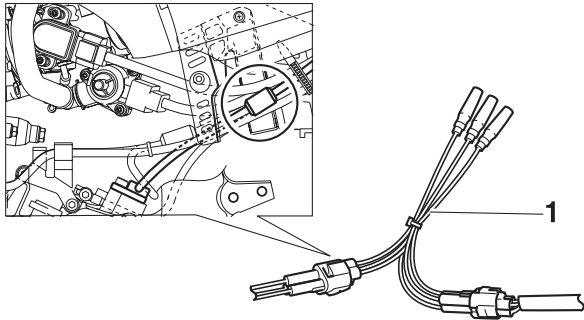






**Pocket tester**  
**90890-03112**  
**Analog pocket tester**  
**YU-03112-C**  
**Test harness-speed sensor (3P)**  
**90890-03208**  
**YU-03208**

- Positive tester probe  
White (wire harness color)
- Negative tester probe  
Black/blue (wire harness color)



- Set the main switch to "ON".
- Elevate the rear wheel and slowly rotate it.
- Measure the voltage. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.



EAS28250

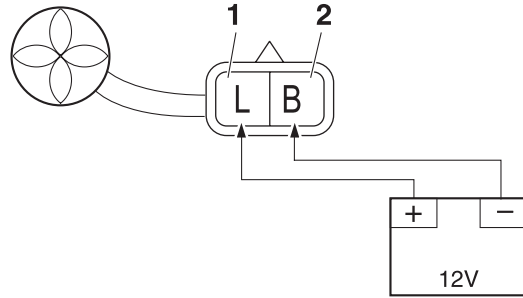
## CHECKING THE RADIATOR FAN MOTOR

- Check:
  - Radiator fan motor
 Faulty/rough movement → Replace.



- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (DC 12 V) as shown.

- Positive battery terminal  
Blue "1"
- Negative battery terminal  
Black "2"



- Measure the radiator fan motor movement.



EAS28260

## CHECKING THE COOLANT TEMPERATURE SENSOR

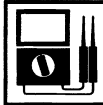
- Remove:
  - Coolant temperature sensor
 Refer to "RADIATOR" on page 6-1.

EWA14130

### ⚠ WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.

- Check:
  - Coolant temperature sensor resistance
 Out of specification → Replace.



### Coolant temperature sensor resistance

5.21–6.37 kΩ at 0 °C (32 °F)

2.45 kΩ at 20 °C (68 °F)

290–354 Ω at 80 °C (176 °F)



- Connect the pocket tester ( $\Omega \times 1k / \times 100$ ) to the coolant temperature sensor as shown.



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

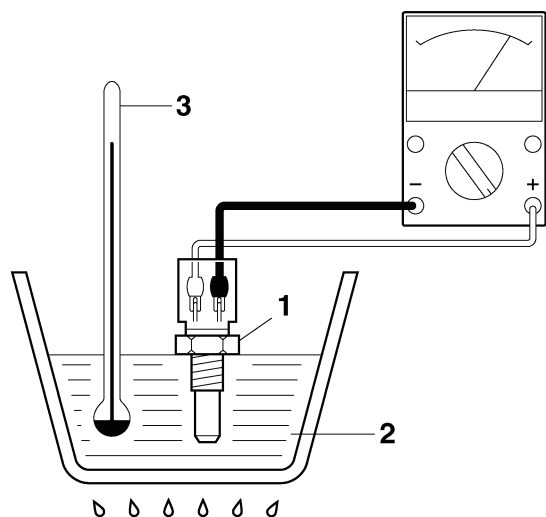
- Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

### 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.





e. Measure the coolant temperature sensor resistance.



3. Install:
- Coolant temperature sensor  
Refer to “RADIATOR” on page 6-1.

EAS28270  
**CHECKING THE THERMO SWITCH**

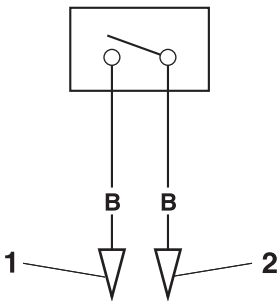
1. Remove:
- Thermo switch  
(from the wire harness)

EWA13830  
**⚠ WARNING**

- **Handle the thermo switch with special care.**
- **Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.**

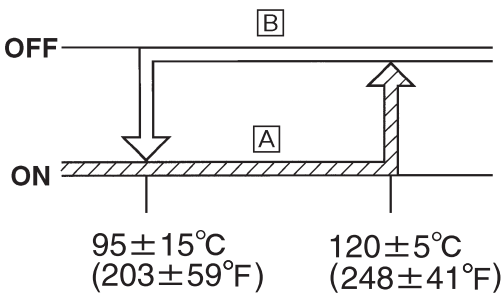
2. Check:
- Thermo switch continuity  
Out of specification → Replace the wire harness.

- Positive tester probe  
Black “1”
  - Negative tester probe  
Black “2”



Test step	Coolant temperature	Continuity
1	Less than 120±5 °C (248±41 °F)	YES
2	More than 120±5 °C (248±41 °F)	NO
3	More than 95±15 °C (203±59 °F)	NO
4	Less than 95±15 °C (203±59 °F)	YES

Step 1 and 2: Heating phase  
Step 3 and 4: Cooling phase



- A. Heating phase  
B. Cooling phase

3. Install:
- Thermo switch

EAS28300  
**CHECKING THE THROTTLE POSITION SENSOR**

1. Remove:
- Throttle position sensor  
(from the throttle body)
2. Check:
- Throttle position sensor maximum resistance  
Out of specification → Replace the throttle position sensor.



**Throttle position sensor maximum resistance**  
2.64–6.16 k $\Omega$

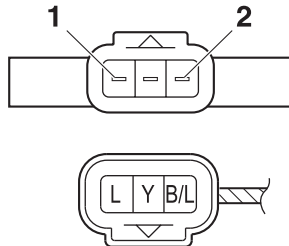


- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor as shown.



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

- Positive tester probe  
Blue “1”
- Negative tester probe  
Black/blue “2”



- b. Measure the throttle position sensor maximum resistance.



3. Install:
  - Throttle position sensor

## TIP

When installing the throttle position sensor, adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.

EAS28410

## CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
  - Intake air pressure sensor output voltage  
Out of specification → Replace.



**Intake air pressure sensor output voltage**  
3.594–3.684 V at 101.32 kPa



- a. Connect the test harness S-pressure sensor 5S7 (3P) “1” to the intake air pressure sensor and wire harness as shown.

ECA18P1020

## NOTICE

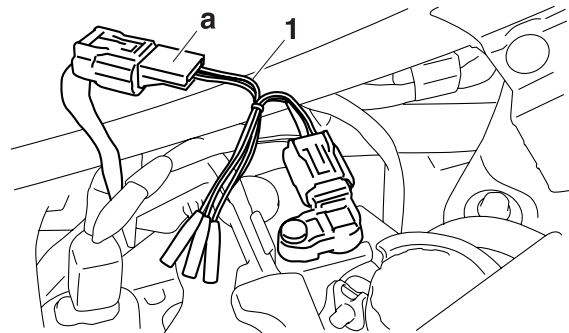
Pay attention to the installing direction of the test harness S-pressure sensor 5S7 (3P) coupler “a”.

- b. Connect the digital circuit tester (DCV) to the test harness S-pressure sensor 5S7 (3P).



**Digital circuit tester**  
90890-03174  
**Model 88 Multimeter with tachometer**  
YU-A1927  
**Test harness S-pressure sensor 5S7 (3P)**  
90890-03211  
YU-03211

- Positive tester probe  
Pink/blue (wire harness color)
- Negative tester probe  
Black/blue (wire harness color)



- c. Set the main switch to “ON”.
- d. Measure the intake air pressure sensor output voltage.



EAS28420

## CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
  - Intake air temperature sensor  
(from the air filter case joint.)

EWA14110

## WARNING

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.





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## TROUBLESHOOTING

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STARTING FAILURES .....	9-1
INCORRECT ENGINE IDLING SPEED .....	9-1
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE .....	9-2
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OVERHEATING .....	9-2
POOR BRAKING PERFORMANCE .....	9-3
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EAS28451

## TROUBLESHOOTING

EAS28460

### GENERAL INFORMATION

#### TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470

### 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 rings
  - Improperly installed piston ring
  - Damaged, worn or fatigued piston ring
  - Seized piston ring
  - Seized or damaged piston
3. Air filter
  - Improperly installed air filter
  - Clogged air filter element
4. Crankcase and crankshaft
  - Improperly assembled crankcase
  - Seized crankshaft

#### Fuel system

1. Fuel tank
  - Empty fuel tank
  - Clogged fuel filter
  - Clogged fuel tank breather hose
  - Clogged rollover valve
  - Deteriorated or contaminated fuel
2. Fuel pump
  - Faulty fuel pump
  - Faulty fuel pump relay
3. Throttle body
  - Deteriorated or contaminated fuel
  - Sucked-in air

#### Electrical system

1. Battery
  - Discharged battery
  - Faulty battery
2. Fuse
  - 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 crank shaft position sensor
  - Broken generator rotor woodruff key
6. Switches and wiring
  - Faulty main switch
  - Faulty engine stop switch
  - Broken or shorted wiring
  - Faulty neutral switch
  - Faulty start switch
  - Faulty clutch switch
  - Improperly grounded circuit
  - Loose connections
7. Starting system
  - Faulty starter motor
  - Faulty starter relay
  - Faulty starter clutch

EAS28490

### 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 crank shaft position sensor
  - Broken generator rotor woodruff key

EAS28520

## POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURES” on page 9-1 and “INCORRECT ENGINE IDLING SPEED” on page 9-1.

## Engine

1. Air filter
  - Clogged air filter element

## Fuel system

1. Fuel pump
  - Faulty fuel pump

EAS28530

## FAULTY GEAR SHIFTING

### Shifting is difficult

Refer to “Clutch drags”.

EAS28540

## SHIFT PEDAL DOES NOT MOVE

### Shift shaft

- Improperly adjusted shift rod
- Bent shift shaft

### Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

### Transmission

- Seized transmission gear

- Foreign object between transmission gears
- Improperly assembled transmission

EAS28550

## JUMPS OUT OF GEAR

### Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

### Shift forks

- Worn shift fork

### Shift drum

- Incorrect axial play
- Worn shift drum groove

### Transmission

- Worn gear dog

EAS28570

## FAULTY CLUTCH

### Clutch slips

1. Clutch
  - Improperly assembled clutch
  - Loose or fatigued clutch spring
  - Worn friction plate
  - Worn clutch plate
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (low)
  - Deteriorated oil

### Clutch drags

1. Clutch
  - Unevenly tensioned clutch springs
  - Warped pressure plate
  - Bent clutch plate
  - Swollen friction plate
  - Bent clutch push rod
  - Damaged clutch boss
  - Burnt primary driven gear bushing
  - Match marks not aligned
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (high)
  - Deteriorated oil

EAS28600

## OVERHEATING

### Engine

1. Cylinder head and piston
  - Clogged coolant passages
  - Heavy carbon buildup
2. Engine oil

- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

## Cooling system

1. Coolant
  - Low coolant level
2. Radiator
  - Damaged or leaking radiator
  - Faulty radiator cap
  - Bent or damaged radiator fin
3. Water pump
  - Damaged or faulty water pump
  - 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. Brakes
  - Dragging brake

## Electrical system

1. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
2. Ignition system
  - Faulty ECU
  - Faulty radiator fan motor
  - Faulty radiator fan motor relay
  - Faulty coolant temperature sensor
  - Faulty ECU

EAS28620

## POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS18P1003

## SHOCK ABSORBER MALFUNCTION

### MALFUNCTION

- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring
- Leaking oil or gas

EAS28670

## UNSTABLE HANDLING

1. Handlebar
  - Bent or improperly installed handlebar
2. Steering head components
  - Improperly installed upper holder
  - Improperly installed lower holder
  - Incorrect toe-in
  - Bent steering stem
  - Improperly installed steering stem
  - Damaged bearing or bearing race
  - Bent tie-rods
  - Deformed steering knuckles
3. Swingarm
  - Worn bearing or bushing
  - Bent or damaged swingarm
4. Tires
  - Uneven tire pressures (front and rear)
  - Incorrect tire pressure
  - Uneven tire wear
5. Wheels
  - Deformed wheel
  - Damaged wheel bearing
  - Bent or loose wheel axle
  - Excessive wheel runout
6. Frame
  - Bent frame
  - Improperly installed bearing race

EAS28710

## FAULTY LIGHTING OR SIGNALING SYSTEM

### Headlight does not come on

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

### Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator



- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

**Tail/brake light does not come on**

- Wrong tail/brake light LED
- Too many electrical accessories
- Hard charging (broken stator coil and/or faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out tail/brake light LED

**Tail/brake light LED burnt out**

- Wrong tail/brake light LED
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main and/or light switch
- Incorrectly adjusted rear brake light switch
- Tail/brake light LED life expired

EAS28740

## WIRING DIAGRAM

### 2009 YFZ450RY

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Battery positive lead
6. Battery
7. Battery negative lead
8. Main fuse
9. Starter relay
10. Starter motor
11. Diode 1
12. Main relay
13. Indicator light
14. Fuel level warning light
15. Engine trouble warning light
16. Coolant temperature warning light
17. Neutral indicator light
18. ISC (idle speed control) valve
19. Diode 2
20. FI diagnostic tool coupler
21. Clutch switch
22. ECU (engine control unit)
23. Ignition coil
24. Injector
25. Intake air temperature sensor
26. Coolant temperature sensor
27. Speed sensor
28. Throttle position sensor
29. Intake air pressure sensor
30. Lean angle sensor
31. Fuel sender
32. Fuel pump
33. Wire lead
34. Neutral switch
35. Handlebar switch
36. Headlight switch
37. Engine stop switch
38. Start switch
39. Headlight relay
40. Headlight (left)
41. Headlight (right)
42. Rear brake light switch
43. Tail/brake light
44. Front brake light switch
45. Radiator fan motor
46. Radiator fan motor relay
47. Thermo switch

O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow
B/L	Black/Blue
B/W	Black/White
B/Y	Black/Yellow
Br/L	Brown/Blue
G/L	Green/Blue
G/Y	Green/Yellow
L/B	Blue/Black
L/G	Blue/Green
L/R	Blue/Red
L/W	Blue/White
L/Y	Blue/Yellow
O/B	Orange/Black
O/G	Orange/Green
O/R	Orange/Red
P/L	Pink/Blue
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
W/L	White/Blue
W/R	White/Red
W/Y	White/Yellow
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red

EAS28750

### COLOR CODE

B	Black
Br	Brown
G	Green
L	Blue
Lg	Light green

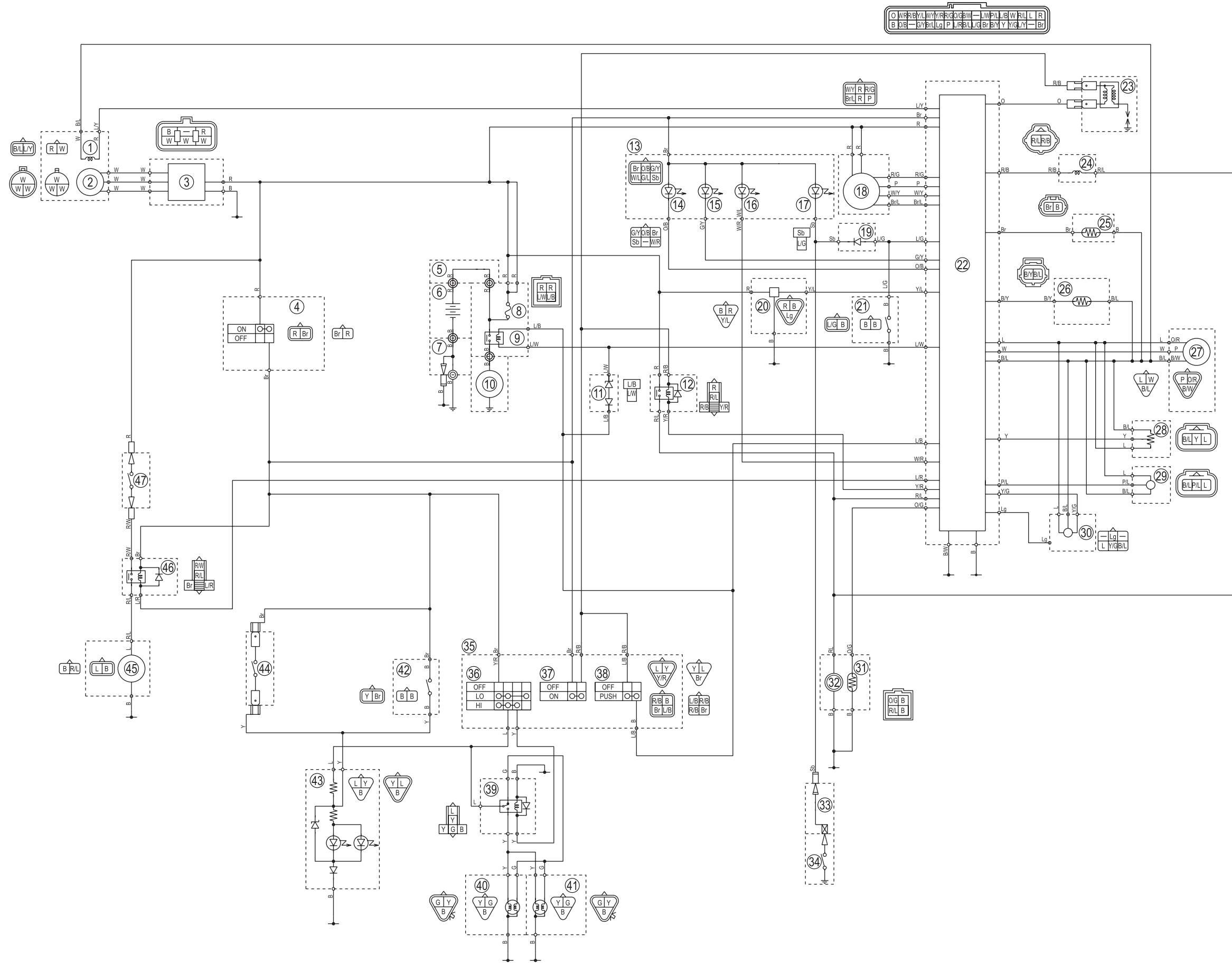




YAMAHA MOTOR CO., LTD.

2500 SHINGAI IWATA SHIZUOKA JAPAN

WIRING DIAGRAM  
2009 YFZ450RY



WIRING DIAGRAM  
2009 YFZ450RY

