



**YAMAHA**

**2006**

**MT-03**

**SERVICE MANUAL**

**5YK-F8197-E0**

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**MT-03 (2006)**  
**SERVICE MANUAL**  
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## NOTICE

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

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

### NOTE:

Designs and specifications are subject to change without notice.

## IMPORTANT MANUAL INFORMATION

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



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

### WARNING

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

### CAUTION:

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

### NOTE:

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

# HOW TO USE THIS MANUAL

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

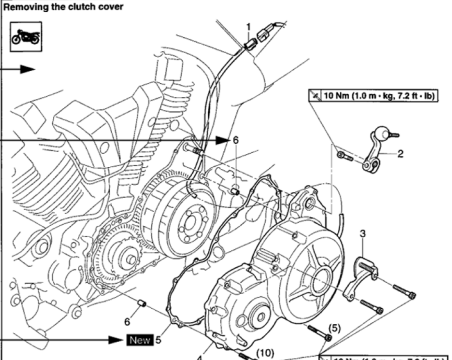
- The manual is divided into chapters and each chapter is divided into sections. The current section title “1” is shown at the top of each page.
- Sub-section titles “2” appear in smaller print than the section title.
- To help identify parts and clarify procedure steps, there are exploded diagrams “3”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

1

CLUTCH

CLUTCH

Removing the clutch cover



Order	Job/Parts to remove	Qty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-11.
	Battery box/Air duct		Refer to "GENERAL CHASSIS" on page 4-1.
	Oil tank/Shift rod		Refer to "ENGINE REMOVAL" on page 5-1.
1	Crankshaft position sensor coupler	1	Disconnect.
2	Shift arm	1	
3	Oil tank bracket	1	
4	Clutch cover	1	
5	Clutch cover gasket	1	
6	Dowel pin	2	

CLUTCH

REMOVING THE CLUTCH

1. Loosen:

• Clutch boss nut "1"

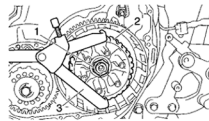
NOTE:

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

Universal clutch holder

90890-04086

YM-91042



2. Remove:

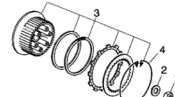
• Clutch boss nut "1"

• Washer "2"

• Clutch boss assembly "3"

NOTE:

There is a built-in damper between the clutch boss and the clutch plate. It is not necessary to remove the wire circlip "4" and disassemble the built-in damper unless there is serious clutch chattering.



REMOVING THE PRIMARY DRIVE GEAR

1. Remove:

• Primary drive gear bolt "1"

NOTE:

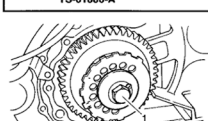
While holding the generator rotor "2" with the sheave holder "3", loosen the primary drive gear bolt.

Sheave holder

90890-01701

Primary clutch holder

YS-01880-A



CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:

• Friction plate

Damage/wear → Replace the friction plates as a set.

2. Measure:

• Friction plate thickness

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

NOTE:

Measure the friction plate at four places.

Friction plate thickness

2.92-3.08 mm (0.11-0.12 in)

Wear limit

2.82 mm (0.1110 in)

5-47

5-56



## SYMBOLS

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

### NOTE:

The following symbols are not relevant to every vehicle.

1



2



3



4



5



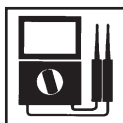
6



7



8



9



10



11



12



13



14



15



16

New

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

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# GENERAL INFORMATION

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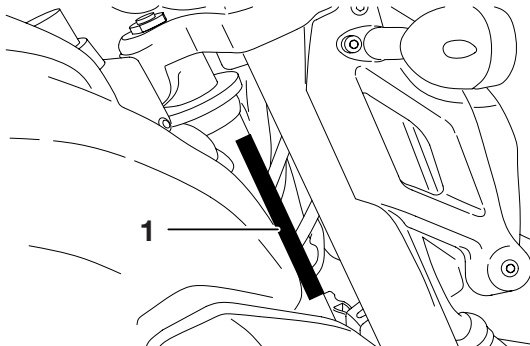
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## IDENTIFICATION

EAS00170

### VEHICLE IDENTIFICATION NUMBER

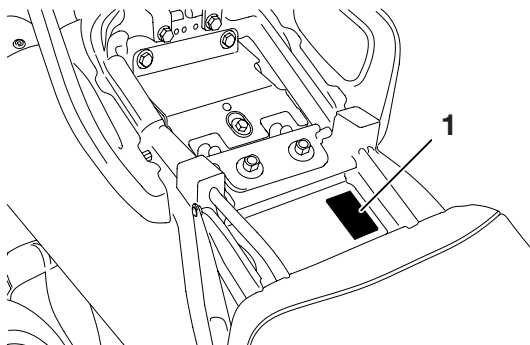
The vehicle identification number “1” is stamped into the right side of the steering head pipe.



EAS00180

### MODEL LABEL

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



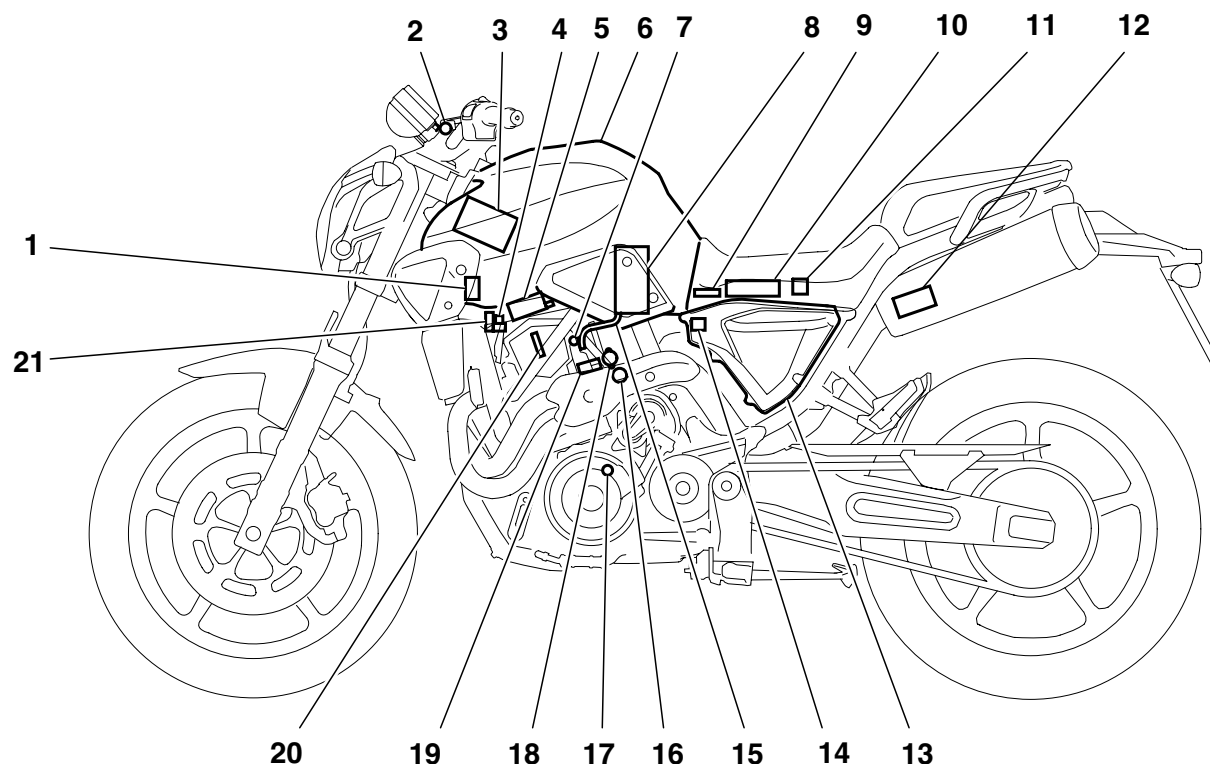
EAS00019

## FEATURES

EAS00896

### 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 a conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective chamber. Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operation under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine. As the requirements for engines to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system in place of a conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors. Adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions. Furthermore, the air induction system (AI system) has been placed under computer control together with the FI system in order to realize cleaner exhaust gases.



1. Fuel injection system relay
2. Engine trouble warning light
3. Battery
4. Air induction system solenoid
5. Ignition coil/Spark plug
6. Fuel tank
7. Idling adjustment screw
8. Fuel pump
9. Intake air pressure sensor
10. ECU
11. Lean angle cut-off switch

12. Catalytic converter
13. Air filter case
14. Intake air temperature sensor
15. Fuel hose
16. Coolant temperature sensor
17. Crankshaft position sensor
18. Throttle position sensor
19. Fuel injector
20. Spark plug
21. Air cut-off valve

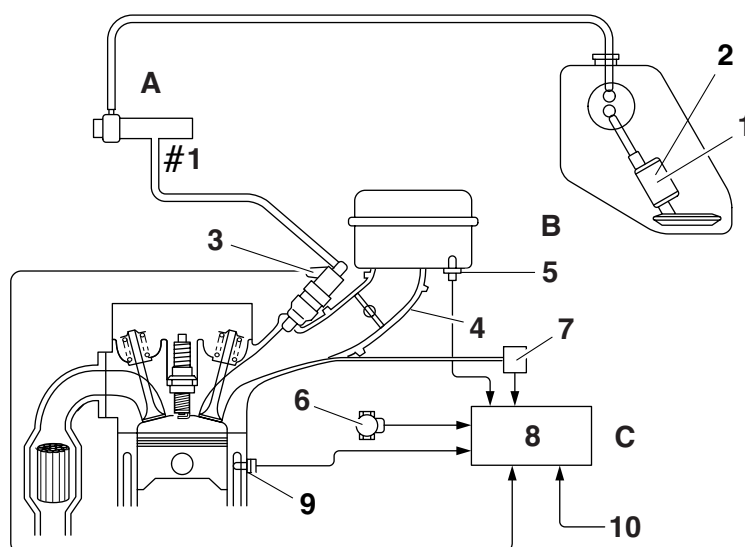
EAS00897

## FI SYSTEM

The fuel pump delivers fuel to the injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the injector at 324 kPa (3.24 kg/cm<sup>2</sup>, 46.1 psi) higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU energizes the 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 injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the 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 air temperature sensor, and coolant temperature sensor enable the ECU to determine the injection duration. The injection timing is determined through the signal from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.

**Illustration is for reference only.**



1. Fuel pump
2. Pressure regulator
3. Fuel injector
4. Throttle body
5. Intake air temperature sensor
6. Throttle position sensor
7. Intake air pressure sensor
8. ECU
9. Coolant temperature sensor
10. Crankshaft position sensor

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



## INSTRUMENT FUNCTIONS

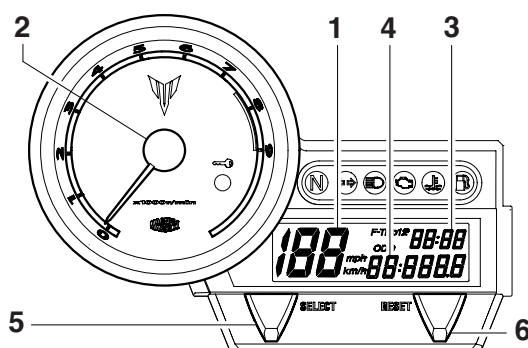
EAUB1392

### Multi-function meter unit

EWA12421

#### ⚠ WARNING

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



1. Speedometer
2. Tachometer
3. Clock
4. Odometer/Tripmeters/Fuel reserve tripmeter
5. "SELECT" button
6. "RESET" button

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

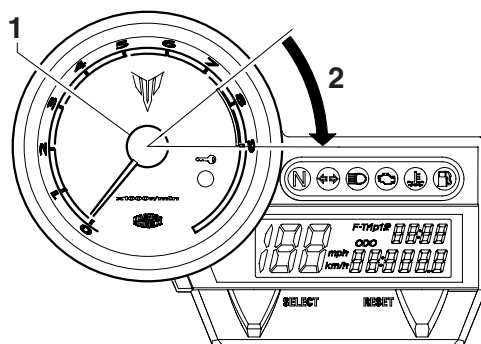
- a speedometer (which shows the riding speed)
- a tachometer (which shows engine speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled since the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

To switch the speedometer and odometer/tripmeter displays between kilometers and miles, push the "SELECT" and "RESET" buttons together and turn the key to "ON". When the digits start flashing on the display, push the "SELECT" button to choose kilometers or miles.

#### NOTE:

Be sure to turn the key to "ON" before using the "SELECT" and "RESET" buttons.

## Tachometer



1. Tachometer
2. Red zone

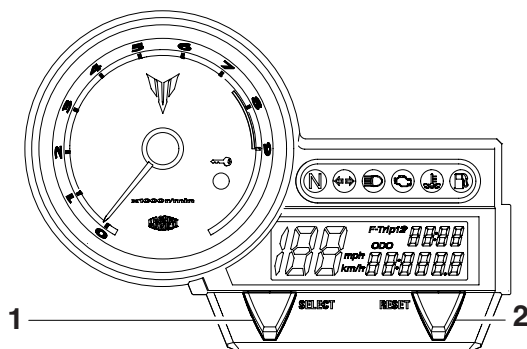
The electric tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

ECA10031

#### CAUTION:

Do not operate the engine in the tachometer red zone. Red zone: 7500 r/min and above.

## Odometer, tripmeter modes



1. "SELECT" button
2. "RESET" button

Pushing the "SELECT" button switches the display between the odometer mode "ODO" and the tripmeter modes "TRIP 1" and "TRIP 2" in the following order:

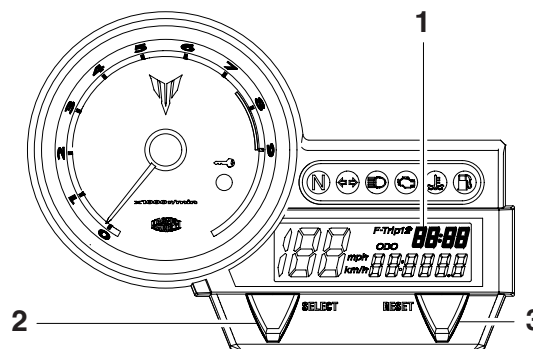
ODO → TRIP 1 → TRIP 2 → ODO

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

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

To reset a tripmeter, select it by pushing the "SELECT" button, and then push the "RESET" button for at least four seconds. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

## Clock mode



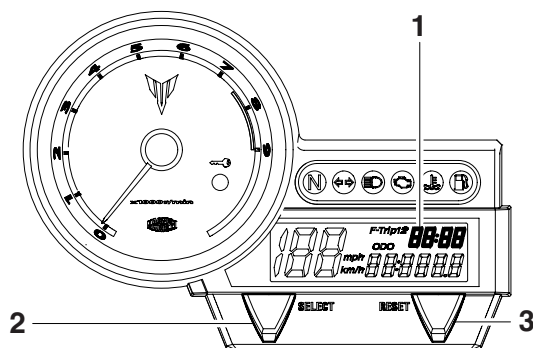
1. Clock
2. "SELECT" button
3. "RESET" button

Turn the key to "ON".

### To set the clock

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

## Self-diagnosis devices



1. Engine trouble warning light "⚡"
2. Immobilizer system indicator light "🔑"

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

If any of those circuits are defective, the engine trouble warning light will start flashing.

Refer to "FUEL INJECTION SYSTEM" on page 7-16. This model is also equipped with a self-diagnosis device for the immobilizer system.

Turn the key to "ON". If any of the immobilizer system circuits are defective, the immobilizer system indicator light will flash, and it will indicate an error code. Refer to "IMMOBILIZER SYSTEM" on page 8-29. However, if the indicator light slowly flashes five times, and then quickly flashes two times repeatedly, this error could be caused by signal interference. If this occurs, try the following.

1. Use the code re-registering key to start the engine.

### NOTE:

Make sure there are no other immobilizer keys close to the main switch, and do not keep more than one immobilizer key on the same key ring! Immobilizer system keys may cause signal interference, which may prevent the engine from starting.

2. If the engine starts, turn it off and try starting the engine with the standard keys.
3. If one or both of the standard keys do not start the engine, re-register the standard keys.

If the multifunction display indicates an error code, note the code number, and then check the vehicle. Refer to "IMMOBILIZER SYSTEM" on page 8-29.

ECA11590

### CAUTION:

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

### Indicator lights brightness control mode

- Indicator lights brightness:  
This function allows you to adjust the brightness of the indicator lights to suit the outside lighting conditions.

To adjust the brightness of the indicator lights

1. Turn the key to "ON".
2. Push the "SELECT" button to select ODO meter mode, and then push the "RESET" button for at least five seconds.
3. Release the "RESET" button, and then select the desired lighting brightness level by pushing the "RESET" button.

## IMPORTANT INFORMATION

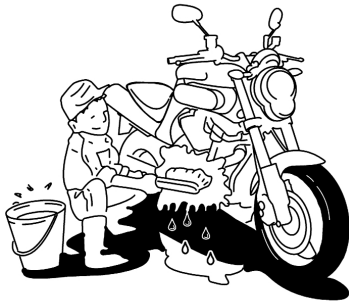
EAS20180

### IMPORTANT INFORMATION

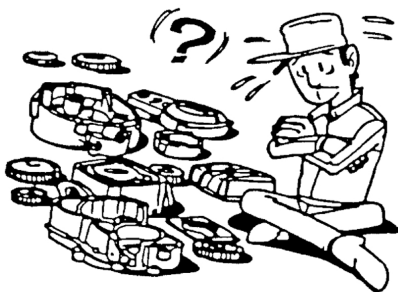
EAS20190

#### PREPARATION FOR REMOVAL AND DISASSEMBLY

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



2. Use only the proper tools and cleaning equipment.  
Refer to "SPECIAL TOOLS" on page 1-10.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.

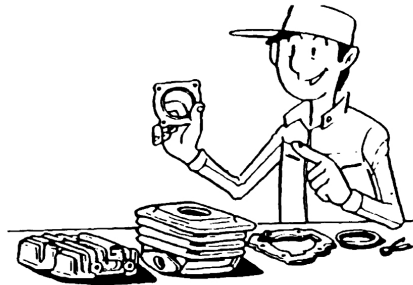


4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200

#### REPLACEMENT PARTS

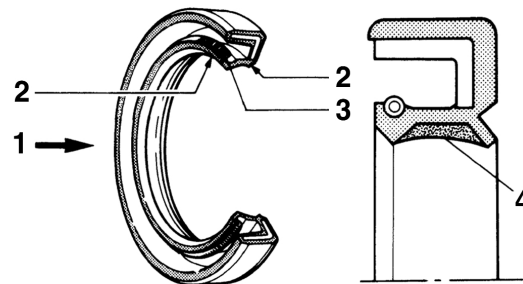
Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

#### GASKETS, OIL SEALS AND O-RINGS

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

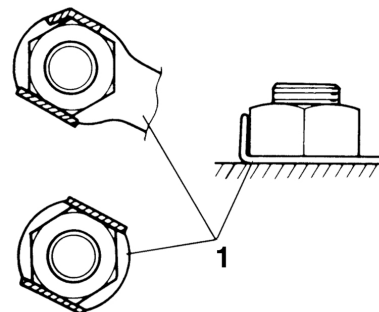


1. Oil
2. Lip
3. Spring
4. Grease

EAS20220

#### LOCK WASHERS/PLATES AND COTTER PINS

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



## IMPORTANT INFORMATION

EAS20230

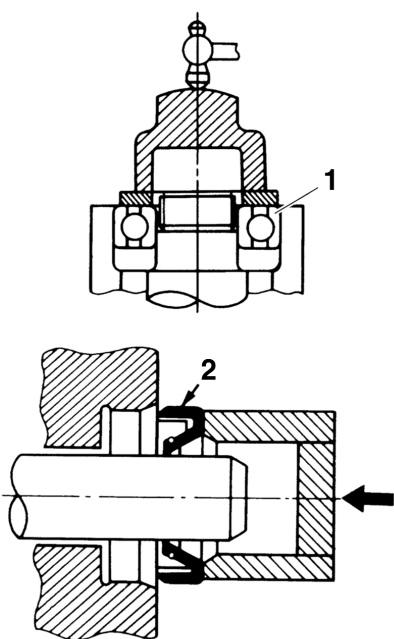
### BEARINGS AND OIL SEALS

Install bearings "1" and oil seals "2" so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

ECA13300

#### CAUTION:

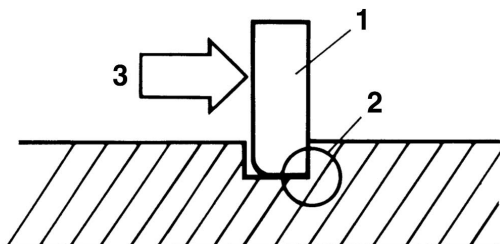
**Do not spin the bearing with compressed air because this will damage the bearing surfaces.**



EAS20240

### CIRCLIPS

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



# CHECKING THE CONNECTIONS

EAS20250

## CHECKING THE CONNECTIONS

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

1. Disconnect:

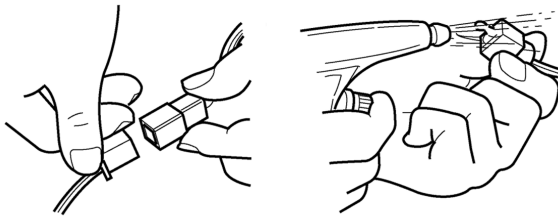
- Lead
- Coupler
- Connector

2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.



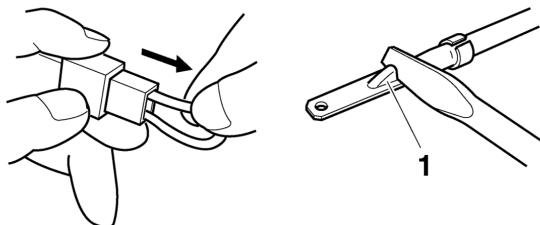
3. Check:

- All connections

Loose connection → Connect properly.

**NOTE:**

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



4. Connect:

- Lead
- Coupler
- Connector

**NOTE:**

Make sure all connections are tight.

5. Check:

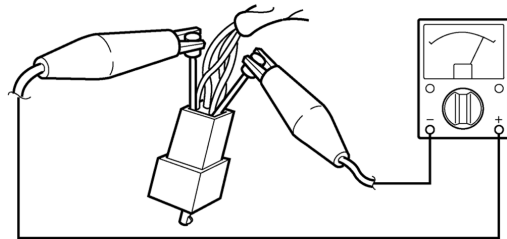
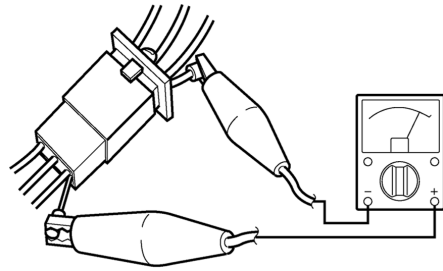
- Continuity  
(with the pocket tester)



**Pocket tester**  
**90890-03112**

**NOTE:**

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


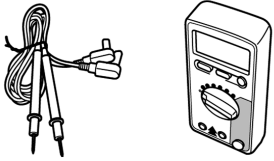
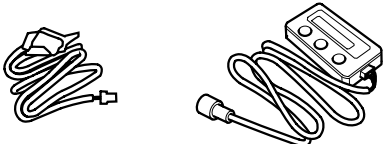
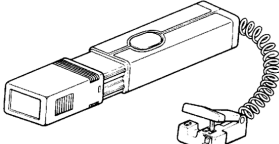
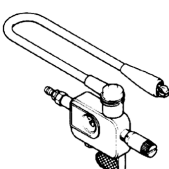
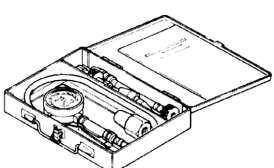
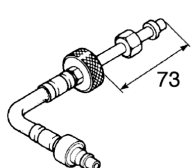


## SPECIAL TOOLS

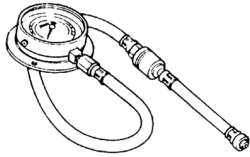
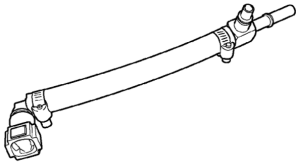
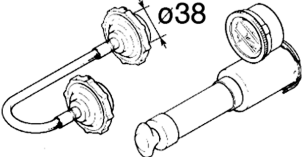
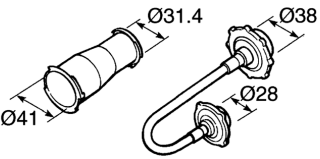
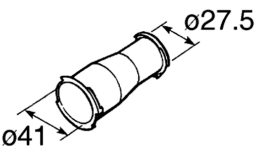
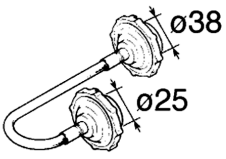
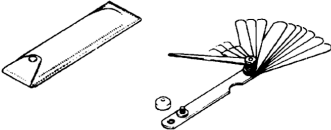
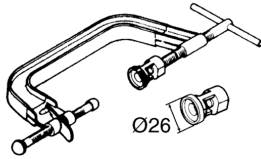
EAS00027

### 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.

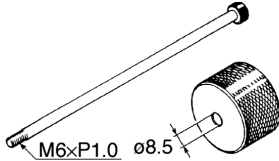
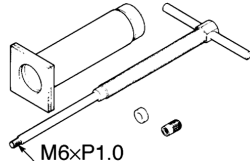
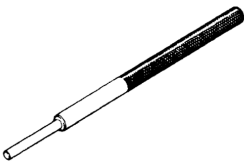
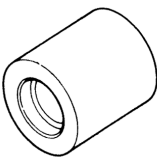
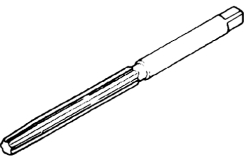

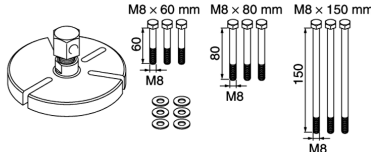
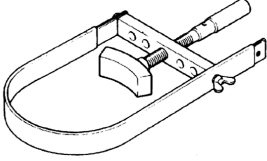
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112		5-59, 8-45, 8-46, 8-47, 8-48, 8-52, 8-53, 8-54, 8-55, 8-56, 8-57, 8-58, 8-59, 8-60
Digital circuit tester 90890-03174		7-10
Fuel injection system tester 90890-03182		7-23
Timing light 90890-03141		3-7
Ignition checker 90890-06754		8-55
Compression gauge 90890-03081		3-8
Adaptor (Compression gauge) 90890-04082		3-8

## SPECIAL TOOLS

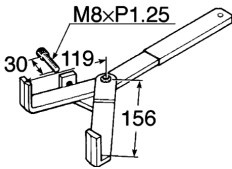
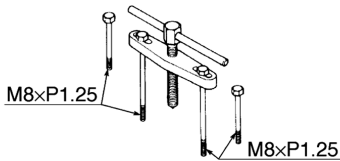
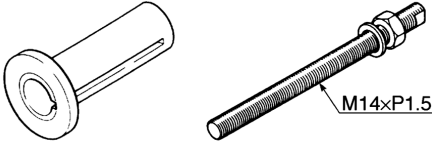
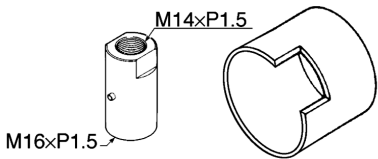
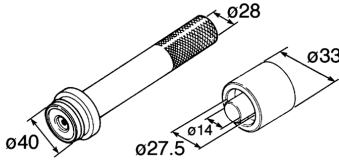
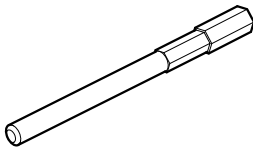
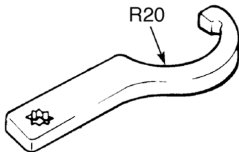
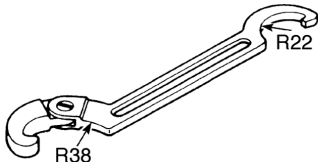
Tool name/Tool No.	Illustration	Reference pages
Pressure gauge 90890-03153		7-8
Fuel pressure adapter 90890-03176		7-8
Radiator cap tester 90890-01325		6-2, 6-3
Radiator cap tester adaptor 90890-01352		6-2
Radiator cap tester adapter 90890-01497		6-2
Radiator tester adapter 90890-01496		6-3
Thickness gauge 90890-03079		3-4
Valve spring compressor attachment 90890-01243 Valve spring compressor 90890-04019		5-21, 5-26



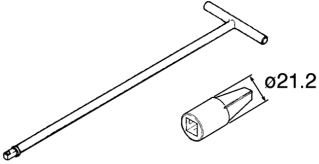
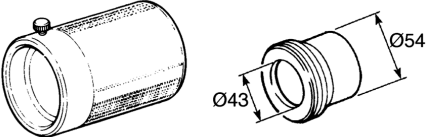
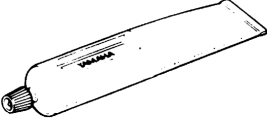
## SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Slide hammer bolt 90890-01083 Weight 90890-01084		5-16, 5-18
Piston pin puller set 90890-01304		5-28
Valve guide remover (ø 6) 90890-04064		5-22
Valve guide installer (ø 6) 90890-04065		5-22
Valve guide reamer (ø 6) 90890-04066		5-22
Valve lapper 90890-04101		5-22
Flywheel puller 90890-01362		5-54
Sheave holder 90890-01701		5-54, 5-56

## SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Universal clutch holder 90890-04086		5-36, 5-38
Crankcase separating tool 90890-01135		5-68
Crankshaft installer pot 90890-01274 Crankshaft installer bolt 90890-01275		5-69
Adapter 90890-04130 Spacer (crankshaft installer) 90890-04144		5-69
Middle driven shaft bearing driver 90890-04058 Mechanical seal installer 90890-04132		6-10
Engine alignment tool 90890-11097		5-7
Steering nut wrench 90890-01403		3-24, 4-57, 4-58
Ring nut wrench 90890-01268		4-57

## SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
T-handle 90890-01326 Damper rod holder 90890-01460		4-49, 4-51
Fork seal driver weight 90890-01367 Fork seal driver attachment (Ø 43) 90890-01374		4-51, 4-52
Yamaha bond No. 1215 90890-85505		5-56, 5-63, 5-65, 6-10

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## SPECIFICATIONS

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# GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS		
Model		
Model code		5YK1 (Europe) 5YK3 (MT-03 25KW)
Dimensions		
Overall length		2070 mm (81.49 in)
Overall width		860 mm (33.85 in)
Overall height		1115 mm (43.89 in)
Seat height		805 mm (31.69 in)
Wheelbase		1420 mm (55.90 in)
Minimum ground clearance		200 mm (7.87 in)
Minimum turning radius		2225 mm (87.59 in)
Weight		
With oil and fuel		192 kg (423 lb)
Maximum load		186 kg (410 lb)

## ENGINE SPECIFICATIONS

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### ENGINE SPECIFICATIONS

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#### Engine

Engine type	Liquid-cooled, 4-stroke, SOHC
Displacement	660 cm <sup>3</sup> (40.27 cu-in)
Cylinder arrangement	Forward-inclined single cylinder
Bore x stroke	100.0 x 84.0 mm (3.94 x 3.31 in)
Compression ratio	10.00 : 1
Standard compression pressure (at sea level)	650 kPa/800 r/min (92.4 psi/800 r/min) (6.5 kg/cm <sup>2</sup> /800 r/min)
Water temperature	80 °C (176 °F)
Oil temperature	55-60 °C (131-140 °F)
Engine idling speed	1,300-1,500 r/min
Starting system type	Electric starter

#### Fuel

Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	15.0 L (3.30 Imp gal, 3.96 US gal)
Reserve	4.25 L (0.93 Imp gal, 1.12 US gal)

#### Engine oil

Lubrication system	Dry sump
Oil type	SAE10W30 or SAE10W40 or SAE15W40 or SAE20W40 or SAE20W50
Recommended engine oil grade	API service SE, SF, SG type or higher
Engine oil quantity	
Total amount	3.40 L (2.99 Imp qt, 3.60 US qt)
Without oil filter element replacement	3.00 L (2.64 Imp qt, 3.17 US qt)
With oil filter replacement	3.10 L (2.72 Imp qt, 3.28 US qt)

#### Oil filter

Oil filter type	Paper
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#### Oil pump

Oil pump type	Trochoid
Inner-rotor to outer-rotor tip clearance	0.07-0.12 mm (0.0028-0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor to oil-pump housing clearance	0.03-0.08 mm (0.0012-0.0031 in)
Limit	0.15 mm (0.0059 in)
Oil-pump-housing to inner-rotor and outer-rotor clearance	0.03-0.08 mm (0.0012-0.0031 in)
Limit	0.150 mm (0.0059 in)
Bypass valve opening pressure	40.0-80.0 kPa (5.8-11.6 psi) (0.40-0.80 kg/cm <sup>2</sup> )
Pressure check location	Oil filter chamber

# ENGINE SPECIFICATIONS

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## Cooling system

Radiator capacity	1.00 L (1.06 US qt) (0.88 Imp.qt)
Radiator cap opening pressure	110.0-140.0 kPa (16.0-20.3 psi) (1.10-1.40 kg/cm <sup>2</sup> )
Radiator core	
Width	280.0 mm (11.02 in)
Height	158.0 mm (6.22 in)
Depth	23.0 mm (0.91 in)
Coolant reservoir	
Capacity	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	
Water pump type	Single-suction centrifugal pump
Reduction ratio	27/28 (0.964)
Maximum impeller shaft tilt	0.15 mm (0.006 in)

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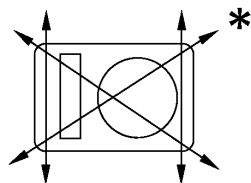
## Spark plug

Manufacturer/Model	NGK/CR7E
Spark plug gap	0.7-0.8 mm (0.028-0.031 in)

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## Cylinder head

Volume	59.10-60.50 cm <sup>3</sup> (3.61-3.69 cu·in)
Maximum warpage*	0.03 mm (0.0012 in)

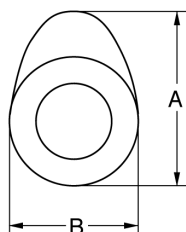




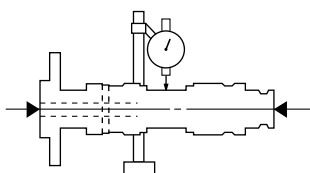
## ENGINE SPECIFICATIONS

### Camshaft

Drive system	Chain drive (left)
Intake camshaft lobe dimensions	
Measurement A	43.488-43.588 mm (1.7121-1.7161 in)
Limit	43.338 mm (1.7062 in)
Measurement B	36.959-37.059 mm (1.4551-1.4590 in)
Limit	36.859 mm (1.4511 in)
Exhaust camshaft lobe dimensions	
Measurement A	43.129-43.229 mm (1.6980-1.7019 in)
Limit	43.029 mm (1.694 in)
Measurement B	37.007-37.107 mm (1.4570-1.4609 in)
Limit	36.907 mm (1.4530 in)
Valve timing	
Intake - open (B.T.D.C.)	25°
Intake - closed (A.B.D.C.)	55°
Exhaust - open (B.B.D.C.)	60°
Exhaust - closed (A.T.D.C.)	20°
Overlap angle "A"	45°



Maximum camshaft runout	0.030 mm (0.0012 in)
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### Timing chain

Model/number of links	98 x RH2010/126
Tensioning system	Automatic

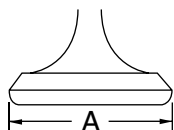
### Rocker arm/rocker arm shaft

Rocker arm inside diameter	12.000-12.018 mm (0.4724-0.4731 in)
Limit	12.036 mm (0.4739 in)
Shaft outside diameter	11.981-11.991 mm (0.4717-0.4721 in)
Limit	11.955 mm (0.4707 in)
Arm to shaft clearance	0.009-0.037 mm (0.0004-0.0015 in)
Limit	0.081 mm (0.0032 in)

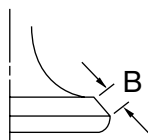
# ENGINE SPECIFICATIONS

## Valves, valve seats, valve guides

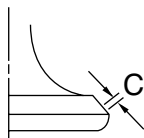
Valve clearance (cold)	
Intake	0.09-0.13 mm (0.0035-0.0051 in)
Exhaust	0.16-0.20 mm (0.0063-0.0079 in)
Valve dimensions	
Valve head diameter A (intake)	37.90-38.10 mm (1.4921-1.5000 in)
Valve head diameter A (exhaust)	31.90-32.10 mm (1.2559-1.2638 in)



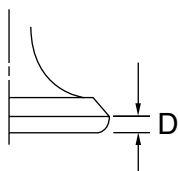
Valve face width B (intake)	1.910-2.620 mm (0.075-0.103 in)
Valve face width B (exhaust)	1.910-2.620 mm (0.075-0.103 in)



Valve seat width C (intake)	1.00-1.20 mm (0.0394-0.0472 in)
Limit	1.6 mm (0.06 in)
Valve seat width C (exhaust)	1.00-1.20 mm (0.0394-0.0472 in)
Limit	1.6 mm (0.06 in)



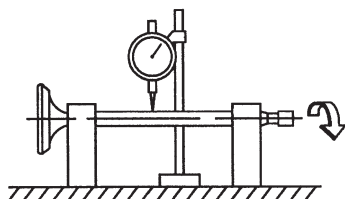
Valve margin thickness D (intake)	0.80-1.20 mm (0.0315-0.0472 in)
Valve margin thickness D (exhaust)	0.80-1.20 mm (0.0315-0.0472 in)



Valve stem diameter (intake)	5.975-5.990 mm (0.2352-0.2358 in)
Limit	5.945 mm (0.2341 in)
Valve stem diameter (exhaust)	5.960-5.975 mm (0.2346-0.2352 in)
Limit	5.930 mm (0.2335 in)
Valve guide inside diameter (intake)	6.000-6.012 mm (0.2362-0.2367 in)
Limit	6.05 mm (0.2382 in)
Valve guide inside diameter (exhaust)	6.000-6.012 mm (0.2362-0.2367 in)

## ENGINE SPECIFICATIONS

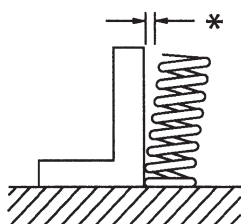
Limit	6.05 mm (0.2382 in)
Valve-stem to valve-guide clearance (intake)	0.010-0.037 mm (0.0004-0.0015 in)
Limit	0.08 mm (0.0031 in)
Valve-stem to valve-guide clearance (exhaust)	0.025-0.052 mm (0.0010-0.0020 in)
Limit	0.10 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)



Valve seat width (intake)	1.00-1.20 mm (0.0394-0.0472 in)
Limit	1.6 mm (0.06 in)
Valve seat width (exhaust)	1.00-1.20 mm (0.0394-0.0472 in)
Limit	1.6 mm (0.06 in)

### Valve springs

Free length (intake)	40.38 mm (1.59 in)
Limit	38.36 mm (1.51 in)
Free length (exhaust)	40.38 mm (1.59 in)
Limit	38.36 mm (1.51 in)
Installed length (valve closed) (intake)	35.00 mm (1.38 in)
Installed length (valve closed) (exhaust)	35.00 mm (1.38 in)
Compressed spring force (installed) (intake)	171.00-197.00 N (38.44-44.29 lb) (17.44-20.09 kg)
Compressed spring force (installed) (exhaust)	171.00-197.00 N (38.44-44.29 lb) (17.44-20.09 kg)
Spring tilt (intake)*	2.5°/1.8 mm
Spring tilt (exhaust)*	2.5°/1.8 mm



Winding direction (top view) (intake)	Clockwise
Winding direction (top view) (exhaust)	Clockwise

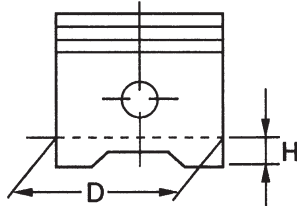
### Cylinder

Bore	100.000-100.010 (3.9370-3.9374 in)
Limit	100.080 mm (3.9402 in)
Maximum taper	0.050 mm (0.0020 in)
Maximum out-of-round	0.050 mm (0.0020 in)

## ENGINE SPECIFICATIONS

### Piston

Piston-to-cylinder clearance	0.030-0.055 mm (0.0012-0.0022 in)
Limit	0.13 mm (0.0051 in)
Diameter D	99.955-99.970 mm (3.9352-3.9358 in)
Height H	10.0 mm (0.39 in)



#### Piston pin bore (in the piston)

Diameter	23.004-23.015 mm (0.9057-0.9061 in)
Limit	23.045 mm (0.9073 in)
Offset	0.50 mm (0.0197 in)
Offset direction	Intake side

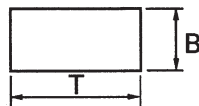
#### Piston pin

Outside diameter	22.991-23.000 (0.9052-0.9055 in)
Limit	22.971 mm (0.9044 in)
Piston-pin to piston-pin-bore clearance	0.004-0.024 mm (0.0002-0.0009 in)
Limit	0.074 mm (0.0029 in)

### Ring

#### Top ring

Ring type	Barrel
Dimensions (B x T)	1.20 x 3.80 mm (0.047 x 0.150 in)



End gap (installed)	0.20-0.35 mm (0.0079-0.0138 in)
Limit	0.60 mm (0.0236 in)
Ring side clearance	0.030-0.080 mm (0.0012-0.0031 in)
Limit	0.13 mm (0.0051 in)

#### 2<sup>nd</sup> ring

Ring type	Taper
Dimensions (B x T)	1.20 x 4.00 mm (0.047 x 0.157 in)



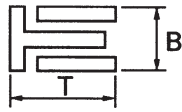
End gap (installed)	0.35-0.50 mm (0.0138-0.0197 in)
Limit	0.85 mm (0.0335 in)
Ring side clearance	0.030-0.070 mm (0.0012-0.0028 in)
Limit	0.115 mm (0.0045 in)

## ENGINE SPECIFICATIONS

### Oil ring

Dimensions (B x T)

2.50 x 3.40 mm (0.098 x 0.134 in)



End gap (installed)

0.20-0.70 mm (0.0079-0.0276 in)

Ring side clearance

0.060-0.150 mm (0.0024-0.0059 in)

### Crankshaft

Width A

74.95-75.00 mm (2.9508-2.9528 in)

Maximum runout C

0.040 mm (0.0016 in)

Big end side clearance D

0.350-0.650 mm (0.0138-0.0256 in)

Limit

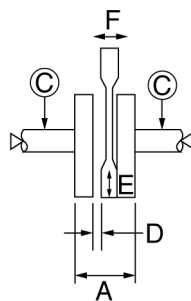
1.0 mm (0.04 in)

Big end radial clearance E

0.010-0.025 mm (0.0004-0.0010 in)

Small end free play F

0.16-0.40 (0.0063-0.0157 in)



### Balancer

Balancer drive method

Gear

### Clutch

Clutch type

Wet, multiple disc

Clutch release method

Outer pull, rack and pinion pull

Operation

Left-hand operation

Clutch cable free play  
(at the end of the clutch lever)

10.0-15.0 mm (0.39-0.59 in)

Friction plates 1 (inside dia.: 120 mm)

Thickness

2.90-3.10 mm (0.114-0.122 in)

Limit

2.80 mm (0.110 in)

Plate quantity

4

Friction Plates 2

Thickness

2.92-3.08 mm (0.115-0.121 in)

Limit

2.80 mm (0.110 in)

Plate quantity

2

Friction plates 3 (inside dia.: 128 mm)

Thickness

2.90-3.10 mm (0.114-0.122 in)

Limit

2.80 mm (0.110 in)

Plate quantity

1

## ENGINE SPECIFICATIONS

Clutch plates	
Thickness	1.50-1.70 mm (0.059-0.067 in)
Plate quantity	6
Maximum warpage	0.20 mm (0.0079 in)
Clutch spring	
Free length	55.60 mm (2.19 in)
Limit	52.82 mm (2.08 in)
Quantity	5
<b>Transmission</b>	
Transmission type	Constant mesh, 5-speed
Primary reduction system	Spur gear
Primary reduction ratio	75/36 (2.083)
Secondary reduction system	Chain drive
Secondary reduction ratio	47/15 (3.133)
Operation	Left-foot operation
Gear ratios	
1 <sup>st</sup> gear	30/12 (2.500)
2 <sup>nd</sup> gear	26/16 (1.625)
3 <sup>rd</sup> gear	23/20 (1.150)
4 <sup>th</sup> gear	20/22 (0.909)
5 <sup>th</sup> gear	20/26 (0.769)
Maximum main axle runout	0.08 mm (0.0031 in)
Maximum drive axle runout	0.08 mm (0.0031 in)
<b>Shifting mechanism</b>	
Shift mechanism type	Shift drum and guide bar
Shift fork thickness	5.76-5.89 mm (0.2267-0.23188 in)
<b>Decompression device</b>	
Device type	Auto decompression
<b>Air filter</b>	
Air filter type	Oil-coated paper element
<b>Fuel pump</b>	
Pump type	Electrical
Model/manufacturer	5VK/DENSO
Consumption amperage (maximum)	3.5 A
Output pressure	294 kPa (41.8 psi) (2.94 kg/cm <sup>2</sup> )
<b>Throttle body</b>	
Model/manufacturer x quantity	44EHS/5B/MIKUNI x 1
Intake vacuum pressure	37.6-40.2 kPa (11.1-11.9 inHg) (282-302 mmHg)
Throttle cable free play (at the flange of the throttle grip)	3.0-5.0 mm (0.12-0.20 in)
ID mark	5YK1 00
Throttle valve size	#50

## CHASSIS SPECIFICATIONS

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### CHASSIS SPECIFICATIONS

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#### Frame

Frame type	Truss diamond
Caster angle	26°
Trail	97.0 mm (3.81 in)

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#### Front wheel

Wheel type	Cast wheel
Rim size	17M/C x MT3.50
Material	Aluminum
Wheel travel	130 mm (5.12 in)
Maximum radial wheel runout	1.0 mm (0.04 in)
Maximum lateral wheel runout	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)

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#### Rear wheel

Wheel type	Cast wheel
Rim size	17M/C x MT5.00
Material	Aluminum
Wheel travel	120 mm (4.72 in)
Maximum radial wheel runout	1.0 mm (0.04 in)
Maximum lateral wheel runout	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)

---

#### Front tire

Tire type	Tubeless
Size	120/70-ZR17M/C (58W) 120/70-R17M/C (58H)
Manufacturer/model	DUNLOP D270F/ PIRELLI SCORPION SYNC
Minimum tire tread depth	1.6 mm (0.063 in)

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#### Rear tire

Tire type	Tubeless
Size	160/60-ZR17M/C (69W) 160/60-R17M/C (69H)
Manufacturer/model	DUNLOP D270/ PIRELLI SCORPION SYNC
Minimum tire tread depth	1.6 mm (0.063 in)

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

Loading condition	0-90 kg (0-198 lb)
Front	210 kPa (30 psi) (2.1 kgf/cm <sup>2</sup> ) (2.1 bar)
Rear	230 kPa (33 psi) (2.3 kgf/cm <sup>2</sup> ) (2.3 bar)
Loading condition	90 kg (198 lb)-186 kg (410 lb)
Front	230 kPa (33 psi) (2.3 kgf/cm <sup>2</sup> ) (2.3 bar)
Rear	250 kPa (36 psi) (2.5 kgf/cm <sup>2</sup> ) (2.5 bar)

## CHASSIS SPECIFICATIONS

High-speed riding	
Front	210 kPa (30 psi) (2.1 kgf/cm <sup>2</sup> ) (2.1 bar)
Rear	230 kPa (33 psi) (2.3 kgf/cm <sup>2</sup> ) (2.3 bar)
<b>Front brakes</b>	
Brake type	Dual-disc brake
Operation	Right-hand operation
Recommended fluid	DOT 4
Brake discs	
Diameter x thickness	298.0 x 5.0 mm (11.73 x 0.20 in)
Minimum thickness	4.5 mm (0.18 in)
Maximum deflection	0.10 mm (0.004 in)
Pad thickness inner	6.0 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Pad thickness outer	6.0 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	16.0 mm (0.63 in)
Caliper cylinder inside diameter	30.16 mm x 2 (1.18 in x 2) and 25.40 mm x 2 (1.10 in x 2)
<b>Rear brake</b>	
Brake type	Single-disc brake
Operation	Right-foot operation
Brake pedal position (below the top of the rider footrest)	14.5 mm (0.57 in)
Recommended fluid	DOT 4
Brake discs	
Diameter x thickness	245 x 5.0 mm (9.65 x 0.20 in)
Minimum thickness	4.5 mm (0.18 in)
Maximum deflection	0.15 mm (0.006 in)
Pad thickness inner	4.7 mm (0.18 in)
Limit	1.0 mm (0.04 in)
Pad thickness outer	4.7 mm (0.18 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	34.00 mm x 1 (1.34 in x 1)
<b>Steering</b>	
Steering bearing type	Angular bearing
Lock to lock angle (left)	35.0°
Lock to lock angle (right)	35.0°



## CHASSIS SPECIFICATIONS

### Front suspension

Suspension type	Telescopic fork
Front fork type	Coil spring/oil damper
Front fork travel	130.0 mm (5.12 in)
Spring	
Free length	376.0 mm (14.80 in)
Limit	368.0 mm (14.48 in)
Installed length	365.0 mm (14.37 in)
Spring rate (K1)	7.38 N/mm (42.13 lb/in) (0.75 kg/mm)
Spring stroke (K1)	0-77.0 mm (0-3.03 in)
Spring rate (K2)	11.82 N/mm (67.49 lb/in) (1.20 kg/mm)
Spring stroke (K2)	77.0-138.0 mm (3.03-5.43 in)
Optional spring available	No
Fork oil	
Recommended oil	Fork oil 10W or equivalent
Quantity (each front fork leg)	570.0 cm <sup>3</sup> (19.27 US oz) (20.06 Imp.oz)
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	95.0 mm (3.74 in)
Inner tube outer diameter	43.0 mm (1.69 in)
Inner tube bending limit	0.2 mm (0.0079 in)

### Rear suspension

Suspension type	Swingarm
Rear shock absorber assembly type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	51.0 mm (2.00 in)
Spring	
Free length	180.0 mm (7.08 in)
Limit	165.5 mm (6.51 in)
Installed length	170.0 mm (6.69 in)
Spring rate (K1)	120.00 N/mm (685.20 lb/in) (12.24 kg/mm)
Spring stroke (K1)	0-20.0 mm (0-0.78 in)
Spring rate (K2)	210.00 N/mm (1,199.10 lb/in) (21.42 kg/mm)
Spring stroke (K2)	20.0-51.0 mm (0.78-2.00 in)
Optional spring available	No
Standard spring preload gas/air pressure	1,215.9 kPa (172.9 psi) (12.0 kg/cm <sup>2</sup> )

### Swingarm

Free play (at the end of the swingarm)	
Radial	1.0 mm (0.04 in)
Axial	1.0 mm (0.04 in)

### Drive chain

Type/manufacturer	520 ZRA/REGINA CHAIN
Link quantity	112
Drive chain slack	40.0-50.0 mm (1.57-1.97 in)
Maximum 15-link section	240.5 mm (9.46 in)

## ELECTRICAL SPECIFICATIONS

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### ELECTRICAL SPECIFICATIONS

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#### Voltage

System voltage	12 V
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#### Ignition system

Ignition system type	Transistorized coil ignition (digital)
Ignition timing	9.0° BTDC at 1400 r/min
Advancer type	Electrical
Crankshaft position sensor resistance/color	192-288 $\Omega$ at 20 °C (68 °F)/blue/yellow-green/white
Transistorized coil ignition unit model/manufacturer	TBDF22/DENSO

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#### Ignition coil

Model/manufacturer	JO300/DENSO
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	3.4-4.6 $\Omega$ at 20 °C (68 °F)
Secondary coil resistance	10.4-15.6 k $\Omega$ at 20 °C (68 °F)

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#### Spark plug cap

Material	Rubber
Resistance	10.0 k $\Omega$ at 20 °C (68 °F)

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#### Charging system

System type	A.C. magneto
Model/manufacturer	LMX51/DENSO
Nominal output	14.0 V/20.8 A at 5000 r/min
Stator coil resistance/color	0.224-0.336 $\Omega$ at 20 °C (68 °F)/white-white

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#### Rectifier/regulator

Regulator type	Semiconductor, short circuit
Model/manufacturer	SH678-11/SHINDENGEN
No-load regulated voltage	14.1-14.9 V
Rectifier capacity	22.0 A
Withstand voltage	200.0 V

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#### Battery

Type/manufacturer	GT9B-4/GS
Voltage/capacity	12 V/8.0 Ah
Ten hour rate amperage	0.8 A

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#### Headlight

Headlight type	Halogen bulb
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## ELECTRICAL SPECIFICATIONS

### Bulbs (voltage/wattage x quantity)

Headlight	12 V 55.0 W/60.0 W x 1
Auxiliary light	12 V 3.0 W x 1
Tail/brake light	12 V 5.0 W/21.0 W x 1
Front turn signal light	12 V 10.0 W x 2
Rear turn signal light	12 V 10.0 W x 2
Meter lighting	LED (backlight)

### Indicator light (voltage/wattage x quantity)

Neutral indicator light	LED x 1
High beam indicator light	LED x 1
Fuel level warning light	LED x 1
Turn signal indicator light	LED x 1
Engine trouble warning light	LED x 1
Coolant temperature warning light	LED x 1
Immobilizer system indicator light	LED x 1

### Electric starting system

System type	Constant mesh
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### Starter motor

Model/manufacture	SM-13/MITSUBA
Power output	0.80 kW
Armature coil resistance	0.025-0.035 $\Omega$ at 20 °C (68 °F)
Brushes	
Overall length	12.5 mm (0.49 in)
Limit	5.00 mm (0.20 in)
Spring force	7.65-10.01 N (27.51-36.01 oz) (780-1,021 gf)
Commutator diameter	28.0 mm (1.10 in)
Limit	27 mm (1.06 in)
Mica undercut	0.70 mm (0.028 in)

### Starter relay

Model/manufacture	MS5F-421/JIDECO
Amperage	180.0 A
Coil resistance	4.18-4.62 $\Omega$ at 20 °C (68 °F)

### Horn

Type	Plane
Model/manufacture x quantity	YF-212/NIKKO x 1
Maximum amperage	3.0 A
Performance	105-120 dB/2 m (6.6 ft)
Coil resistance	1.15-1.25 $\Omega$ at 20 °C (68 °F)

### Turn signal/hazard relay

Relay type	Full-transistor
Model/manufacture	FE218BH/DENSO
Self-cancelling device built-in	No
Turn signal blinking frequency	75-95 cycles/min
Wattage	10 W x 2 +3.4 W

## ELECTRICAL SPECIFICATIONS

### Relay unit

Model/manufacture	G8R-30Y-V4/OMRON
Coil resistance	162-198 $\Omega$
Diode	Yes

### Throttle position sensor

Model/manufacture	5PS1/MIKUNI
Resistance	4.0-6.0 k $\Omega$

### Headlight relay

Model/manufacture	ACM33211 M04/MATSUSHITA
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### Radiator fan

Model/manufacture	VA31-A100-46A/SPAL
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### Fan motor relay

Model/manufacture	ACM33211 M04/MATSUSHITA
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### Intake air pressure sensor

Thermostat type/manufacture	5PS1/DENSO
Output voltage	3.4-3.8 V

### Intake air temperature sensor

Model/manufacture	5VU1/DENSO
Resistance	2.21-2.69 k $\Omega$ at 20 °C (68 °F) 0.290-0.354 k $\Omega$ at 80 °C (176 °F)

### Coolant temperature sensor

Model/manufacture	5PS1/DENSO
Resistance	2.28-2.63 k $\Omega$ at 20 °C (68 °F) 0.305-0.331 k $\Omega$ at 80 °C (176 °F) 0.138-0.145 k $\Omega$ at 110 °C (230 °F)

### Fuses (amperage)

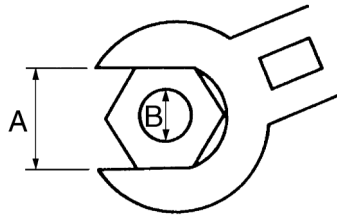
Main fuse	30 A
Signaling system fuse	10 A
Headlight fuse	20 A
Ignition fuse	10 A
Fuel injection system fuse	10 A
Radiator fan motor fuse	7.5 A
Parking lighting fuse	10 A
Backup fuse (for odometer, clock and immobilizer)	10 A
Reserve fuse	30 A
Reserve fuse	20 A
Reserve fuse	10 A
Reserve fuse	7.5 A

## TIGHTENING TORQUES

EAS00030

### 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 criss-cross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.











A: Distance between flats  
B: Outside thread diameter







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

## TIGHTENING TORQUES

### ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Cylinder head stud bolts (exhaust pipe)	M8	4	15 Nm (1.5 m·kg, 11 ft·lb)	
Cylinder head (left side) L=145 mm (5.71 in)	M9	2	50 Nm (5.0 m·kg, 36 ft·lb)	
Cylinder head (right side) L=135 mm (5.31 in)	M9	2	50 Nm (5.0 m·kg, 36 ft·lb)	
Cylinder head (center lower side)	M9	2	45 Nm (4.5 m·kg, 32 ft·lb)	
Cylinder head	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Spark plug	M10S	1	13 Nm (1.3 m·kg, 9.4 ft·lb)	
Cylinder (left side) L=116 mm (4.57 in)	M10	2	15 Nm (1.5 m·kg, 11 ft·lb)	
			50 Nm (5.0 m·kg, 36 ft·lb)	
Cylinder (right side) L=109 mm (4.29 in)	M10	2	15 Nm (1.5 m·kg, 11 ft·lb)	
			50 Nm (5.0 m·kg, 36 ft·lb)	
Cylinder	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Tappet cover (exhaust side)	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Tappet cover (intake side)	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Camshaft sprocket cover	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Camshaft sprocket	M7	2	20 Nm (2.0 m·kg, 14 ft·lb)	
Camshaft retainer	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Valve adjusting screw	M6	4	14 Nm (1.4 m·kg, 10 ft·lb)	
Balancer driven gear	M18	1	70 Nm (7.0 m·kg, 50 ft·lb)	Use a lock washer. 
Primary drive gear	M20	1	80 Nm (8.0 m·kg, 58 ft·lb)	Use the lock washer. 
Timing chain tensioner	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing chain tensioner cap	M16	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Timing chain guide (intake)	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Thermostat cover	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Water pump cover	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump assembly	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump outlet pipe	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	

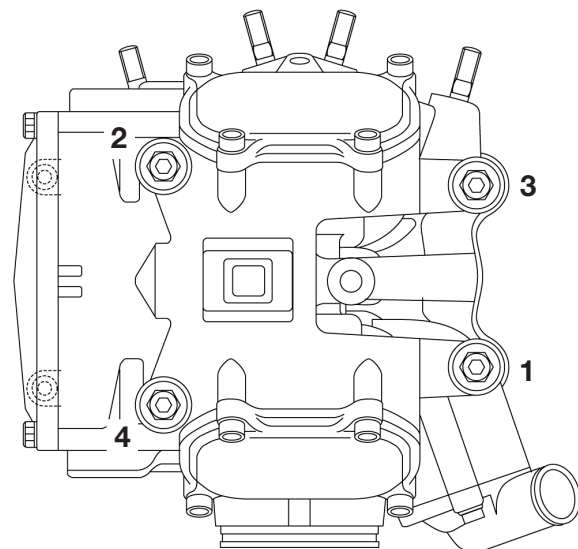
## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Water jacket joint	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase cover (right)	M6	9	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil strainer	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil pump	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil baffle plate 2	M5	2	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Oil pump assembly	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Engine oil drain bolt (crankcase)	M14	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Oil filter element cover	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil filter drain bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Engine oil drain bolt (oil tank)	M14	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Bleed bolt (oil filter element)	M5	1	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Oil delivery pipe 1	M10 M6	2 1	20 Nm (2.0 m·kg, 14 ft·lb) 10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil delivery pipe 2	M8	2	18 Nm (1.8 m·kg, 13 ft·lb)	
Oil delivery hose 1	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil delivery hose 2	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	Sealant
Throttle body joint clamp screw	M4	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Air filter case joint clamp screw	M5	1	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Air filter case	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Exhaust pipe joint	M8	2	18 Nm (1.8 m·kg, 13 ft·lb)	
Exhaust pipe and frame	M8	1	25 Nm (2.5 m·kg, 18 ft·lb)	
Exhaust pipe and muffler	M8	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Exhaust pipe (nut)	M8	4	20 Nm (2.0 m·kg, 14 ft·lb)	
Muffler stay and muffler	M8	2	22 Nm (2.2 m·kg, 16 ft·lb)	
Muffler stay and frame	M8	2	22 Nm (2.2 m·kg, 16 ft·lb)	
Air cut-off valve outlet pipe	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch cover	M6	7	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch cable holder	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch spring	M6	5	9 Nm (0.9 m·kg, 6.5 ft·lb)	
Clutch boss	M20	1	90 Nm (9.0 m·kg, 65 ft·lb)	
Shift shaft spring stopper	M8	1	22 Nm (2.2 m·kg, 16 ft·lb)	
Torque limiter cover	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
A.C.magneto cover	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
A.C.magneto rotor	M16	1	80 Nm (8.0 m·kg, 58 ft·lb)	→E
A.C.magneto lead holder	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	→LT
Crankcase (left side)	M6	6	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase (right side)	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Lead holder	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Bearing retainer	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	→LT
Starter clutch	M8	3	30 Nm (3.0 m·kg, 22 ft·lb)	→LT
Stator coil	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	→LT
Crankshaft position sensor	M5	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	→LT
Starter motor and crankcase	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter motor lead	M6	1	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Brush holder and starter motor yoke	M6	1	11 Nm (1.1 m·kg, 8 ft·lb)	
Starter motor assembly	M5	2	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Drive axle oil seal retainer	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	Sealant
Drive sprocket	M18	1	120 Nm (12.0 m·kg, 85 ft·lb)	Use the lock washer.
Neutral switch	M6	2	4 Nm (0.4 m·kg, 2.9 ft·lb)	→LT
Speed sensor	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Shift pedal	M6	1	20 Nm (2.0 m·kg, 14 ft·lb)	→LT 243
Intake air pressure sensor	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	




**Cylinder head tightening sequence:**






## TIGHTENING TORQUES





### CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
<b>Engine mounting:</b>				
Engine front and stay engine	M10	2	65 Nm (6.5 m·kg, 47 ft·lb)	
Stay engine (engine front) and frame	M10	2	65 Nm (6.5 m·kg, 47 ft·lb)	
Engine rear under and frame	M10	1	65 Nm (6.5 m·kg, 47 ft·lb)	
Stay engine (engine top) and frame	M10	2	65 Nm (6.5 m·kg, 47 ft·lb)	
Engine top and stay engine	M10	1	55 Nm (5.5 m·kg, 40 ft·lb)	
Adjusting nut (engine rear top) and frame	M25	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Tension pipe (L.H.) and frame	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Bar cross (rear) and frame	M12	1	155 Nm (15.5 m·kg, 112 ft·lb)	
<b>Oil tank:</b>				
Oil drain bolt and oil tank	M14	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Oil hose 1 and oil tank	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil tank assembly (L.H.) and frame	M8	1	25 Nm (2.5 m·kg, 18 ft·lb)	
Oil tank assembly (R.H.) and frame	M6	2	11 Nm (1.1 m·kg, 8 ft·lb)	
<b>Rear arm and side suspension:</b>				
Pivot shaft and frame	M16	1	92 Nm (9.2 m·kg, 66 ft·lb)	
Side suspension and rear arm	M10	1	50 Nm (5.0 m·kg, 36 ft·lb)	
Side suspension and frame	M12	1	155 Nm (15.5 m·kg, 112 ft·lb)	
Rear fender cover and rear arm	M6	4	9 Nm (0.9 m·kg, 6.5 ft·lb)	
Seal guard and rear arm	M5	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
<b>Front fork and cushion:</b>				
Handle crown and inner tube	M8	2	28 Nm (2.8 m·kg, 20 ft·lb)	
Handle crown and steering shaft	M22	1	110 Nm (11.0 m·kg, 79 ft·lb)	
Lower ring nut (steering shaft)	M25	1	See NOTE.	
Holder handle under and crown handle	M10	2	32 Nm (3.2 m·kg, 23 ft·lb)	
Holder handle under and upper	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Front master cylinder and cap	M4	2	2 Nm (0.2 m·kg, 1.4 ft·lb)	
Front master cylinder and handle	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Union bolt and front master cylinder	M10	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Front fork under bracket and inner tube	M10	2	28 Nm (2.8 m·kg, 20 ft·lb)	
Headlight stay 1, 2 (upper side) and handle crown	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Headlight stay 1, 2 and front fork under bracket	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Brake hose clamp and front fork	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Front fender and front fork	M6	4	6 Nm (0.6 m·kg, 4.3 ft·lb)	
<b>Tank/Seat/Scoop air/ Bracket license/Electrical:</b>				
Fuel tank (front) and frame	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Fuel tank (rear) and frame	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Fuel tank stay (front) and fuel tank	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel tank and fuel pump	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel tank and knee pad (external)	M6	4	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Fuel tank and knee pad (inside)	M5	2	1.3 Nm (0.13 m·kg, 0.94 ft·lb)	Max.
Fuel tank cap and fuel tank	M5	4	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Pipe breather joint and fuel tank	M6	2	2 Nm (0.2 m·kg, 1.4 ft·lb)	 572 or 222
Scoop air and stay (scoop air)	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Driver seat and frame	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Regulator and frame	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Horn and frame	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Ignition coil and frame	M5	2	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Sensor lean angle and frame	M4	2	2 Nm (0.2 m·kg, 1.4 ft·lb)	
Engine control unit and frame	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Bracket license (plastic resin) and frame	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Rear flasher and bracket license	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Tail lamp and rear fender	M4	3	1 Nm (0.1 m·kg, 0.7 ft·lb)	
License light and bracket license (plastic resin)	M5	2	2 Nm (0.2 m·kg, 1.4 ft·lb)	
Plate rear reflector and rear bracket (nut)	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Assist grip and frame	M8	4	24 Nm (2.4 m·kg, 17.5 ft·lb)	

## TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Starter relay and wire (+)/ Starting motor cord	M6	2	8 Nm (0.8 m·kg, 5.8 ft·lb)	
Pressure sensor and frame	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Lead wire (+/-) and battery	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
<b>Front and rear wheel:</b>				
Front wheel and disc brake	M6	10	18 Nm (1.8 m·kg, 13 ft·lb)	
Front wheel shaft and front fork	M16	1	72 Nm (7.2 m·kg, 52 ft·lb)	
Pinch bolt and front axle	M8	1	14 Nm (1.4 m·kg, 10 ft·lb)	
Front caliper and front fork	M10	4	40 Nm (4.0 m·kg, 29 ft·lb)	
Union bolt tightening (front caliper)	M10	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Bleeder tightening (front)	M7	2	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Hose brake clamp upper and headlight stay	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear wheel shaft and nut	M16	1	150 Nm (15.0 m·kg, 108 ft·lb)	
Clutch hub and sprocket	M10	6	70 Nm (7.0 m·kg, 51 ft·lb)	
Rear wheel and disc brake	M8	5	30 Nm (3.0 m·kg, 22 ft·lb)	
Union bolt tightening (rear caliper)	M10	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Idrostop and rear master cylinder	M10	1	24 Nm (2.4 m·kg, 17.5 ft·lb)	
Bleeder tightening (rear)	M10	1	14 Nm (1.4 m·kg, 10 ft·lb)	
Drive chain adjusting locknut	M8	2	16 Nm (1.6 m·kg, 11 ft·lb)	
<b>Footrest and pedal:</b>				
Side stand and frame	M10	2	63 Nm (6.3 m·kg, 46 ft·lb)	
Side stand mounting bolt and nut	M10	1	46 Nm (4.6 m·kg, 33 ft·lb)	
Side stand switch and side stand bracket	M5	2	4 Nm (0.4 m·kg, 2.9 ft·lb)	 243
Bracket rear footrest and frame	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Rear master cylinder and frame	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Rear brake reservoir and frame	M6	1	4 Nm (0.4 m·kg, 2.9 ft·lb)	
Front bracket footrest (L/R) and frame	M10	2	65 Nm (6.5 m·kg, 47 ft·lb)	 243
Holder brake hose and rear arm	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Pedal brake bolt mounting and nut	M10	1	48 Nm (4.8 m·kg, 35 ft·lb)	




































**NOTE:**

1. First, tighten the lower ring nut approximately 52 Nm (5.2 m·kg, 38 ft·lb) by using the torque wrench, then loosen the ring nut completely.
2. Retighten the lower ring nut 18 Nm (1.8 m·kg, 13 ft·lb) by using the torque wrench.


## LUBRICATION POINTS AND LUBRICANT TYPES

### LUBRICATION POINTS AND LUBRICANT TYPES

#### ENGINE




















Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearings	
Cylinder head tightening bolts	
Cylinder tightening bolts	
Crankshaft pin	
Timing chain sprocket inner surface	
Connecting rod big end thrust surface	
Piston pin	
Piston and ring groove	
Balancer weight tightening nut	
A.C. magnet rotor tightening nut inner surface	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Rocker arm shaft	
Camshaft lobes	
Decompressor lever pin	
Decompressor lever spring	
Water pump impeller shaft	
Oil pump rotors (inner and outer)	
Oil pump shaft	
Torque limiter	
Starter clutch idle gear thrust surface	
Starter clutch idle gear inner surface	
Starter clutch gear (inner and outer)	
Starter clutch assembly	
Primary drive gear tightening nut	
Primary driven gear	
Clutch boss tightening nut	
Push rod	
Transmission gears (wheel and pinion)	
Main and drive axle	
Shift forks	
Shift drum	
Shift shaft	

## LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Shift shaft spacer	
Crankcase mating surface	Yamaha bond No.1215
A.C. magnet lead grommet (A.C. magneto cover)	Yamaha bond No.1215
Oil seal holder tightening bolt	Yamaha bond No.1215
Oil delivery hose 2 tightening bolt	Yamaha bond No.1215

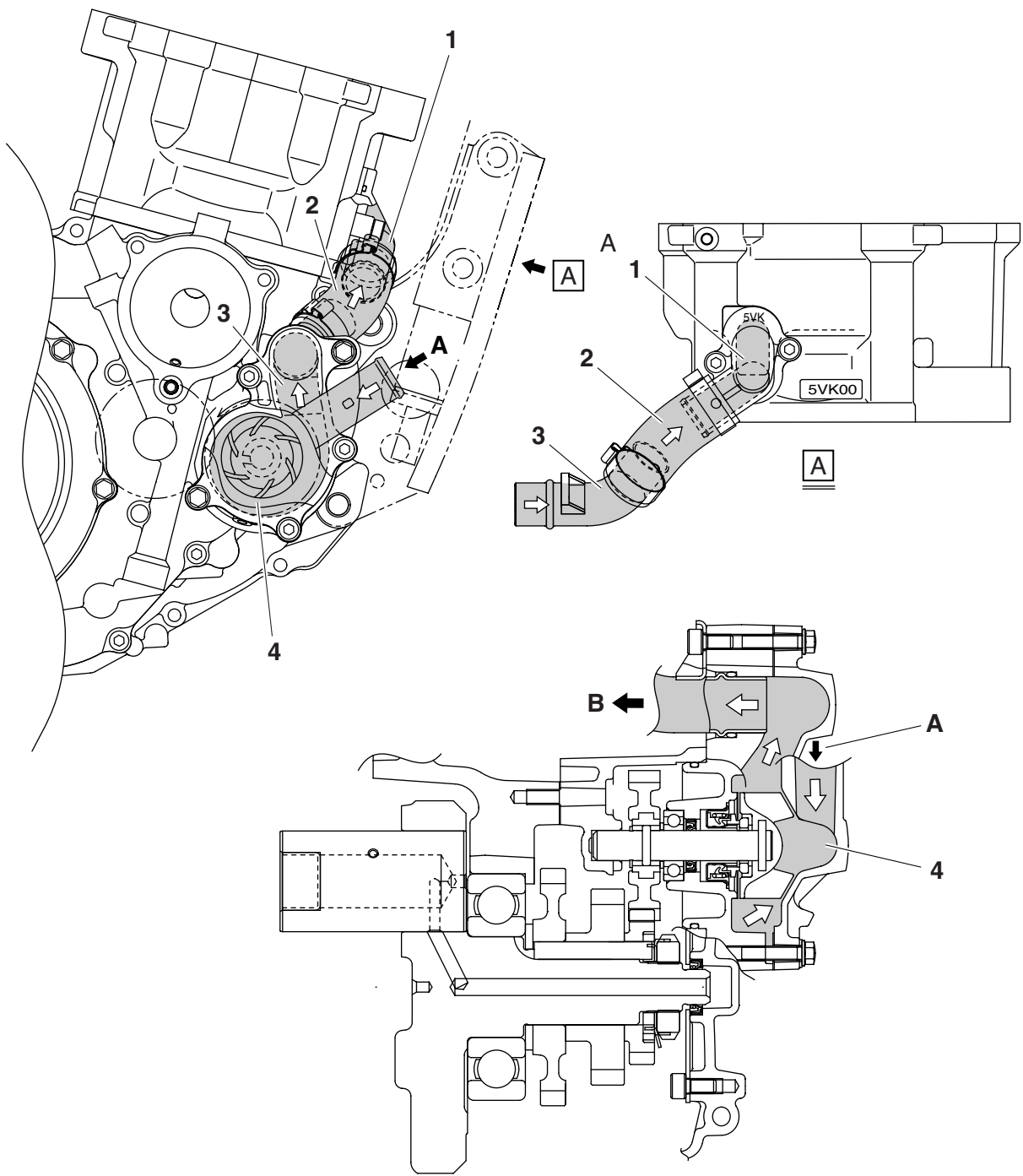
## LUBRICATION POINTS AND LUBRICANT TYPES

### CHASSIS

Lubrication point	Lubricant
Front wheel oil seal lips (left and right)	
Rear wheel oil seal lips (left and right)	
Rear wheel drive hub contact surface	
Rear arm pivot shaft outer surface and bush outer surface and oil seal lip	
Dust cover thrust surface	
Rear arm and rear shock absorber mounting bolt outer surface	
Rear arm and rear shock absorber oil seal lips	
Brake pedal outer surface	
Rear brake master cylinder pin outer surface	
Steering head pipe bearings (upper and lower)	
Steering head pipe bearing races (upper and lower)	
Tube guide (throttle grip)inner surface	
Clutch lever pivot bolt outer surface	
Sidestand sliding surface and collar outer surface	
Footrest pivoting point	
Footrest spring end	
Chain tensioner collar (upper and lower)outer surface	
Rear axle shaft outer surface	
Passenger footrest pivoting point	

EAS00033

COOLING SYSTEM DIAGRAMS



## COOLING SYSTEM DIAGRAMS

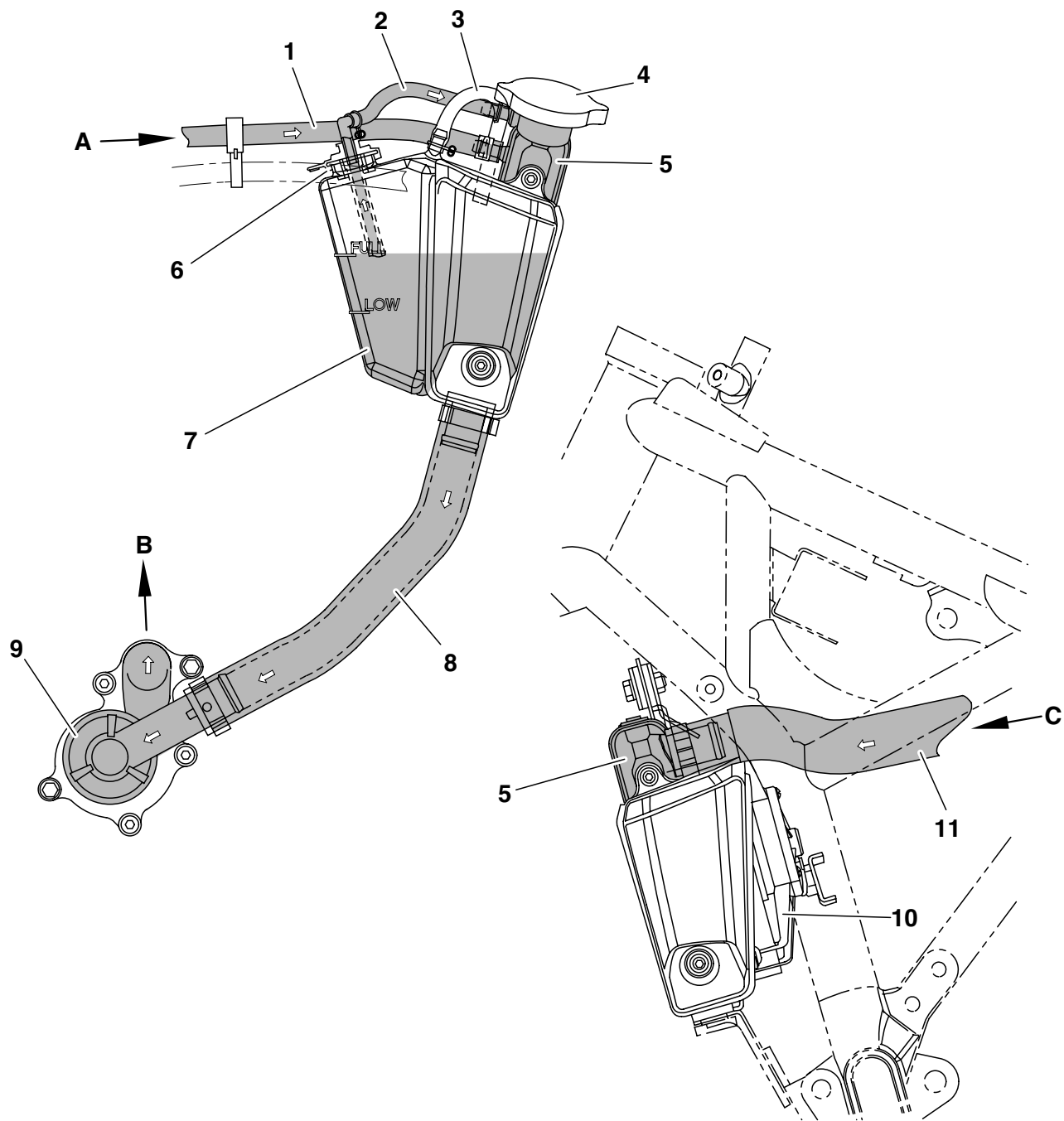
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1. Water jacket joint
  2. Water pump outlet hose
  3. Water pump outlet pipe
  4. Water pump
- A. From the radiator
  - B. To the cylinder



**COOLING SYSTEM DIAGRAMS**

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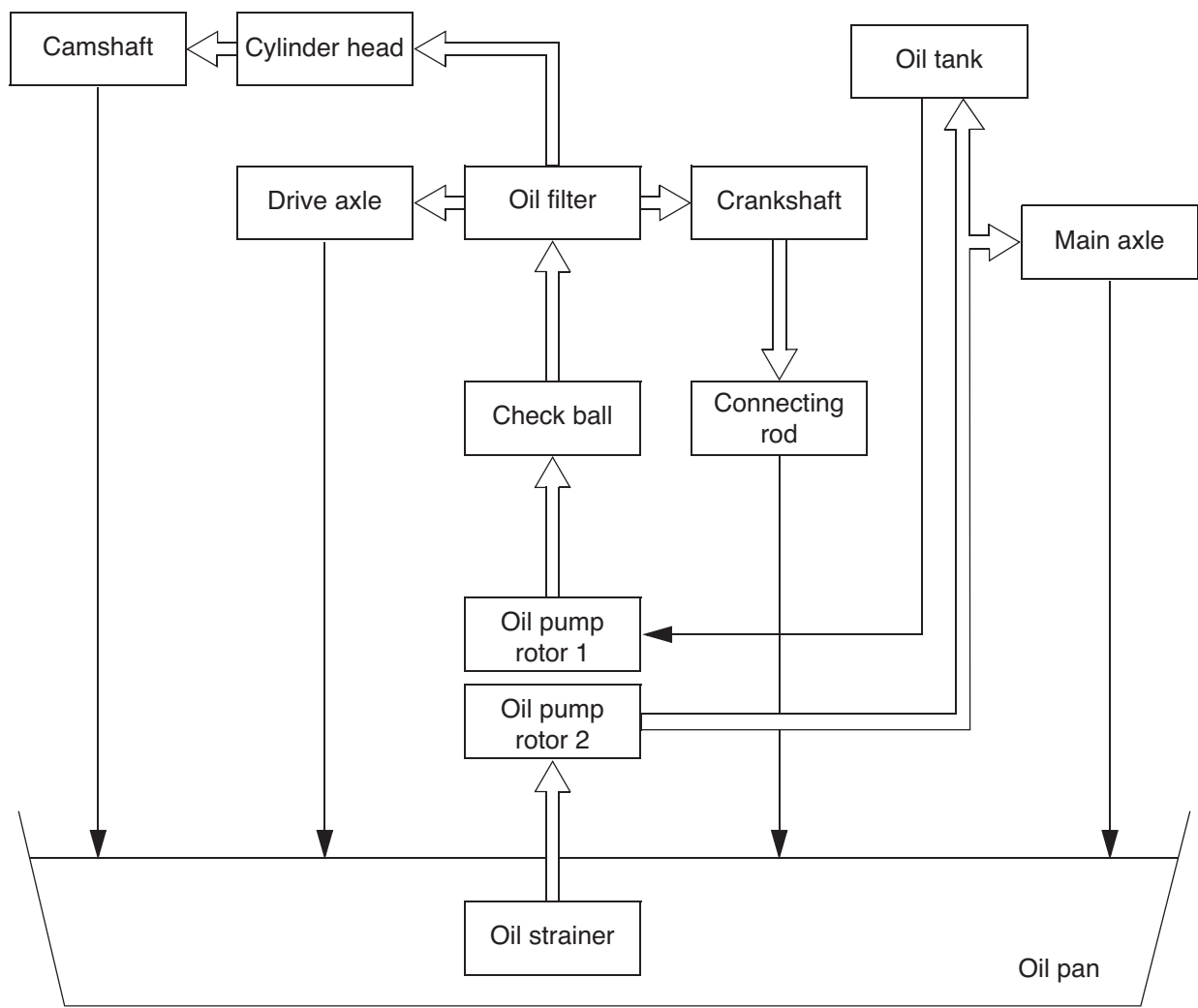
## COOLING SYSTEM DIAGRAMS

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1. Fast idle plunger outlet hose
2. Coolant reservoir hose
3. Coolant reservoir breather hose
4. Radiator cap
5. Radiator
6. Coolant reservoir cap
7. Coolant reservoir
8. Radiator outlet hose
9. Water pump
10. Radiator fan
11. Radiator inlet hose
  - A. From the fast idle plunger
  - B. To the cylinder
  - C. From the thermostat

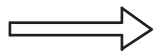

# LUBRICATION CHART

## LUBRICATION CHART



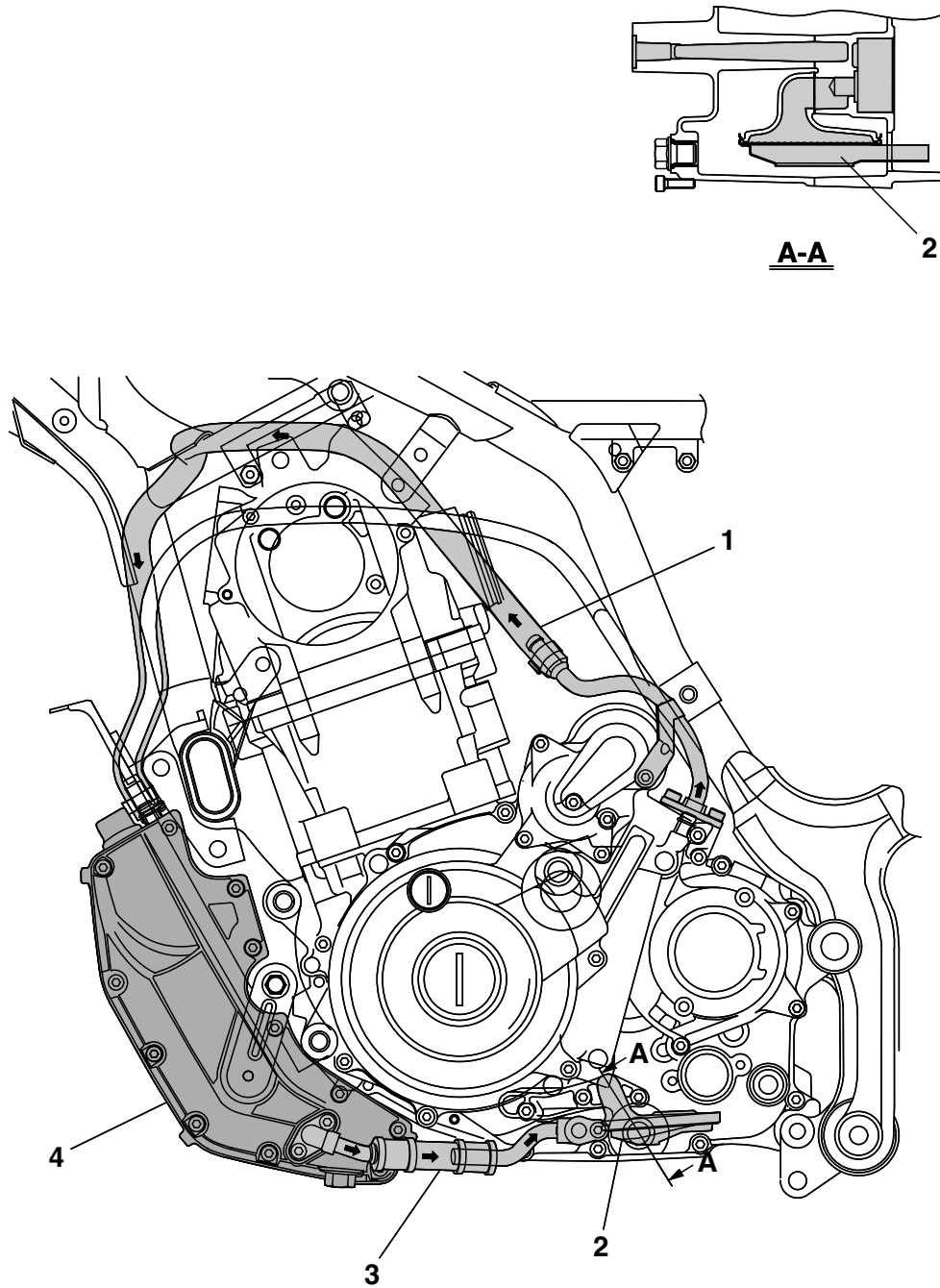
## LUBRICATION CHART

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 : Pressure feed  
 : Splashed scavenge

## LUBRICATION DIAGRAMS

### LUBRICATION DIAGRAMS



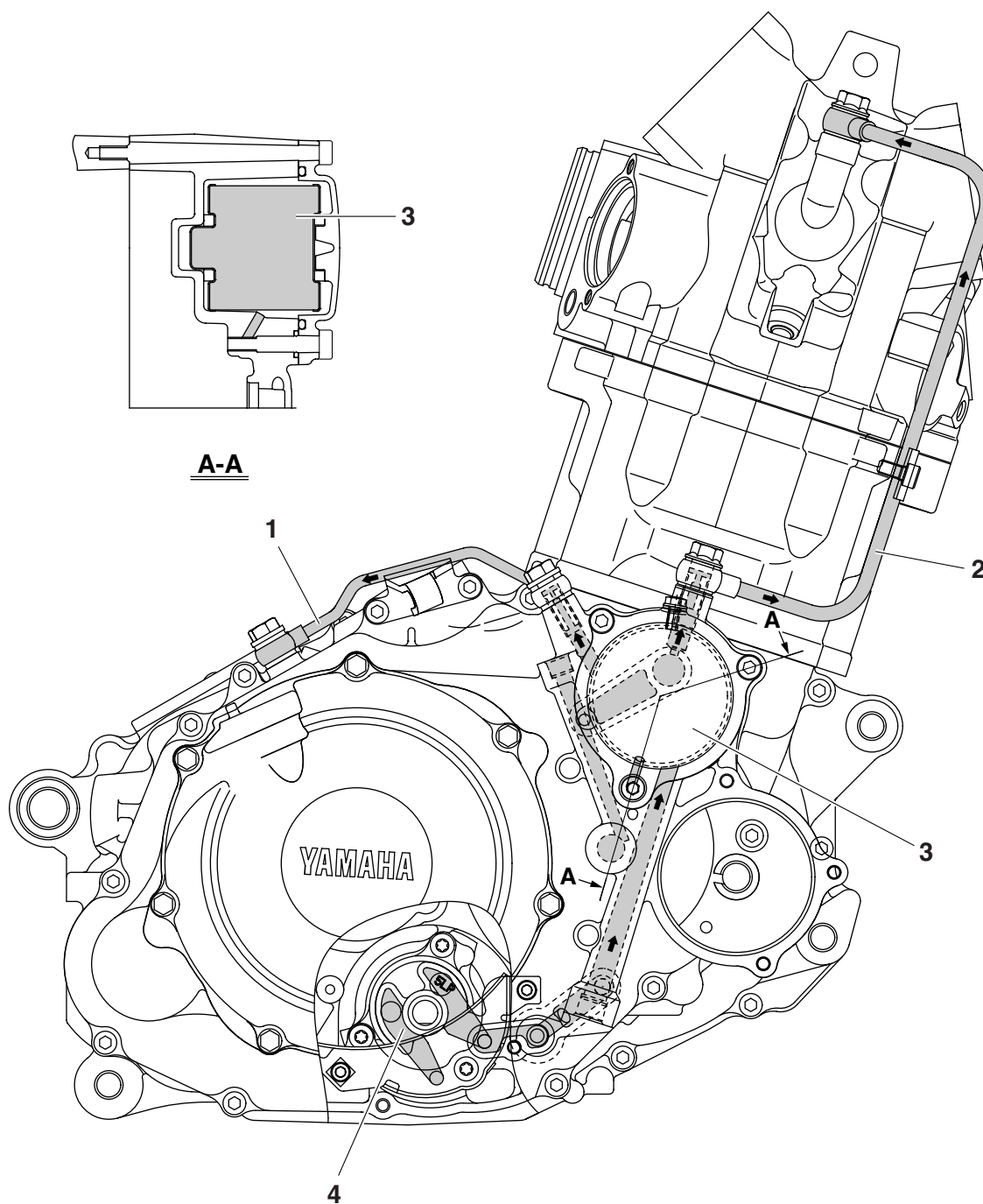
## LUBRICATION DIAGRAMS

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1. Oil delivery hose 2
2. Oil strainer
3. Oil delivery hose 1
4. Oil tank

## LUBRICATION DIAGRAMS

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## LUBRICATION DIAGRAMS

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1. Oil delivery pipe 2
2. Oil delivery pipe 1
3. Oil filter
4. Oil pump





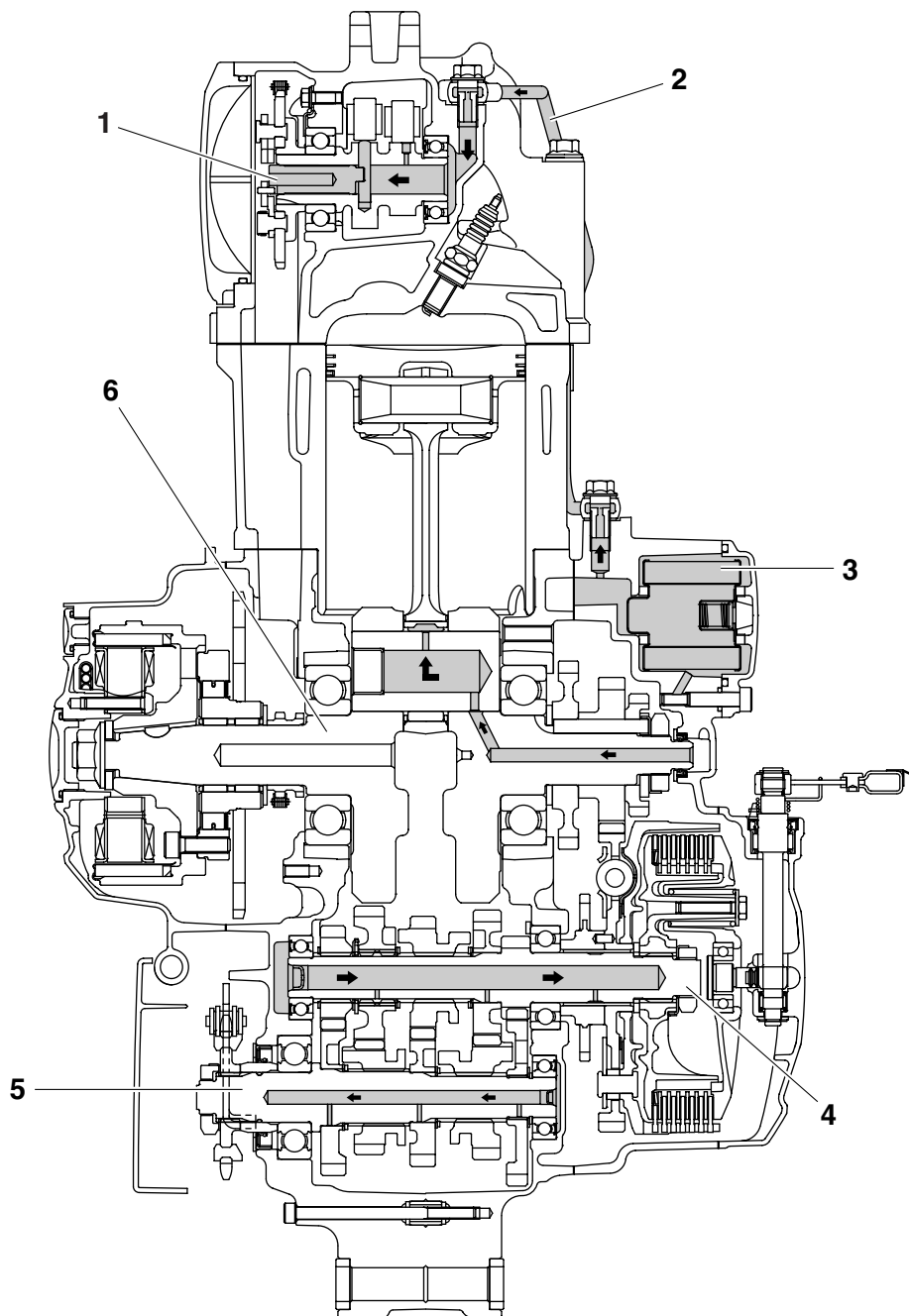
## LUBRICATION DIAGRAMS

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1. Oil delivery hose 2
2. Oil delivery pipe 2
3. Oil filter
4. Oil pump rotor 1
5. Oil pump rotor 2
6. Main axle
7. Oil delivery pipe 3
- A. To oil tank

## LUBRICATION DIAGRAMS

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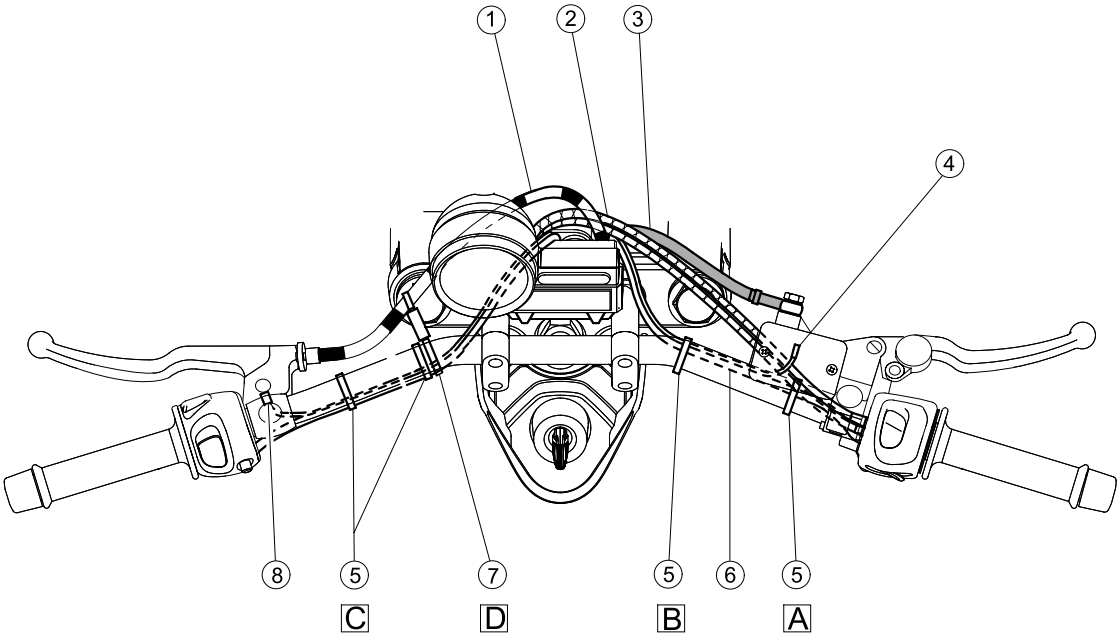


## LUBRICATION DIAGRAMS

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1. Camshaft
2. Oil delivery pipe 1
3. Oil filter
4. Main axle
5. Drive axle
6. Crankshaft

CABLE ROUTING



## CABLE ROUTING

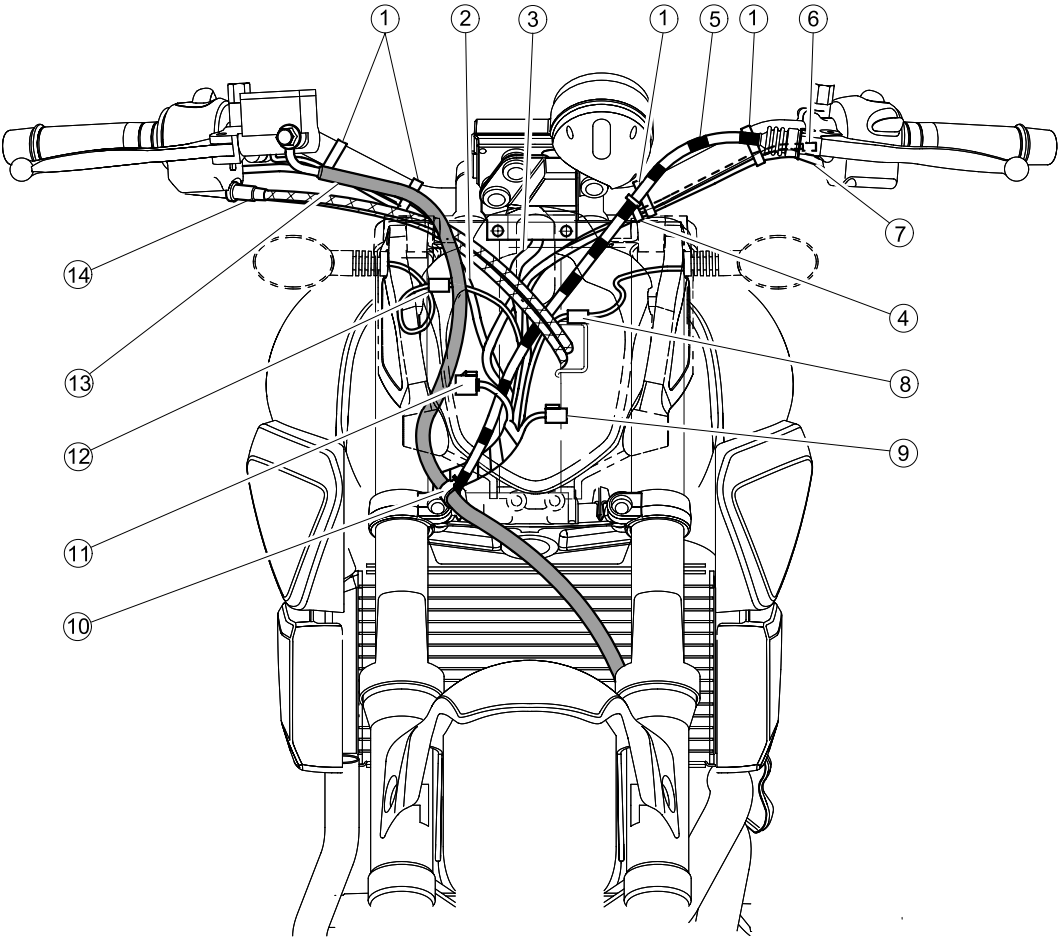
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### **WARNING**

**Proper cable and lead routing are essential to insure safe motorcycle operation.**

---

1. Clutch cable
2. Throttle cables
3. Front brake hose
4. Front brake light switch lead
5. Plastic band
6. Right handlebar switch lead
7. Piece connecting and plastic band
8. Clutch switch lead
- A. Fasten the right handlebar switch lead with a plastic band. Face the end of the plastic band forward.
- B. Fasten the right handlebar switch lead and front brake light switch lead with a plastic band. Face the end of the plastic band forward.
- C. Fasten the left handlebar switch lead and clutch switch lead with a plastic band. Face the end of the plastic band forward.
- D. Fasten the clutch cable with the piece connecting and plastic band. Face the end of the plastic band forward.

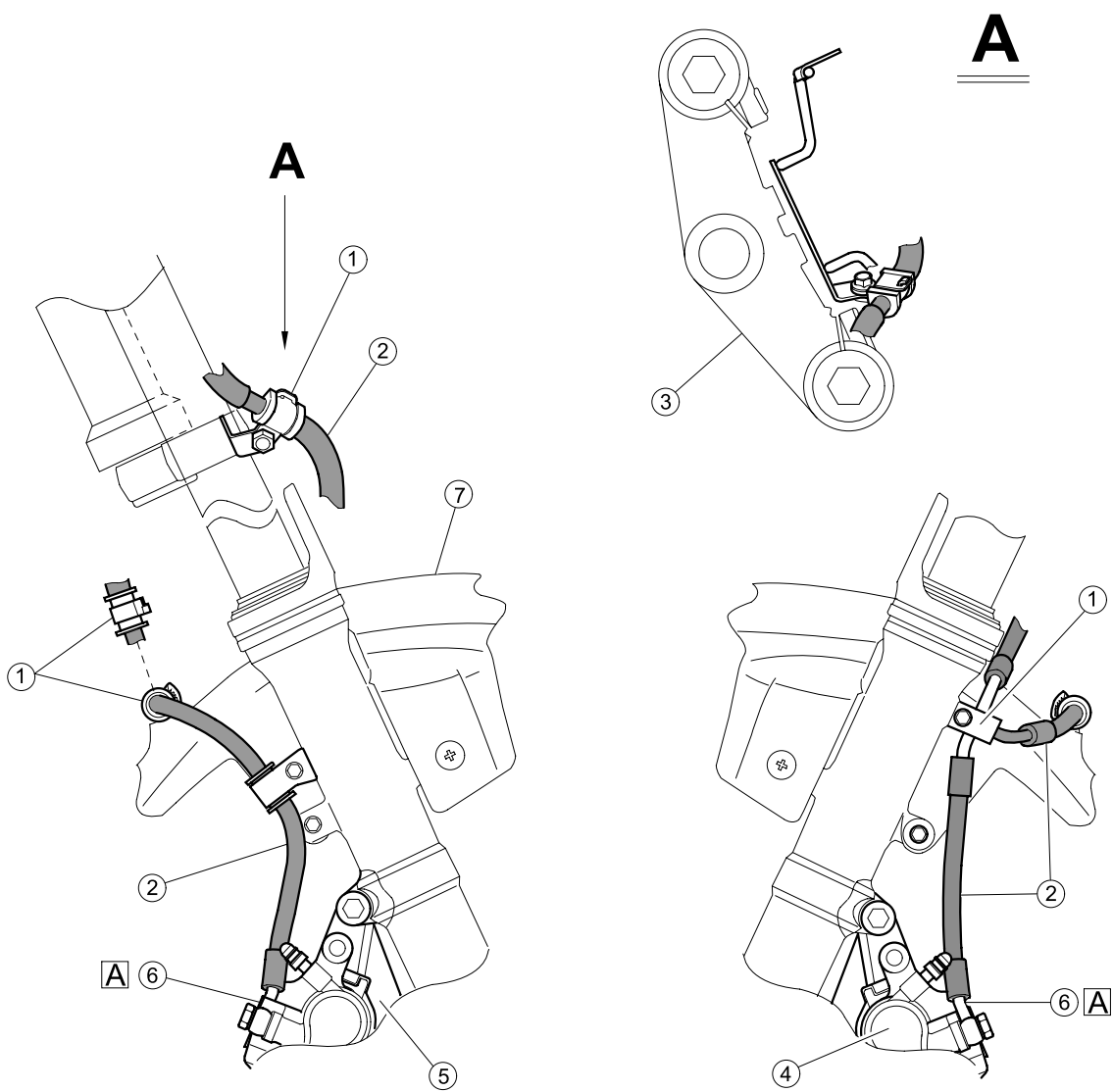


## CABLE ROUTING

---

1. Plastic band
2. Front brake light switch lead
3. Meter assembly lead
4. Piece connecting and plastic band
5. Clutch cable
6. Clutch switch lead
7. Left handlebar switch lead
8. Front turn signal light coupler (left)
9. Auxiliary light coupler
10. Front brake hose holder
11. Headlight coupler
12. Front turn signal light coupler (right)
13. Front brake hose
14. Throttle cables

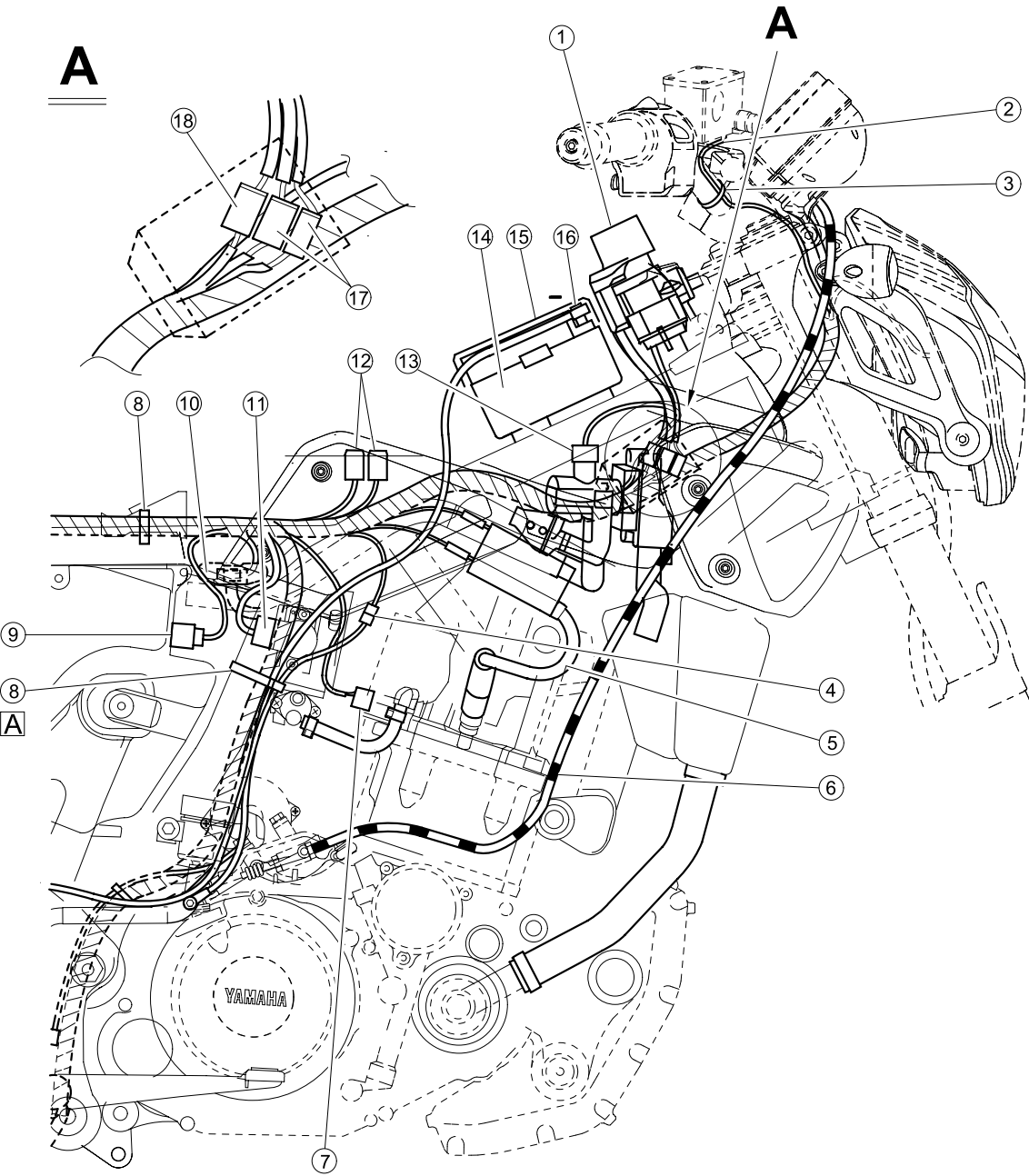




## CABLE ROUTING

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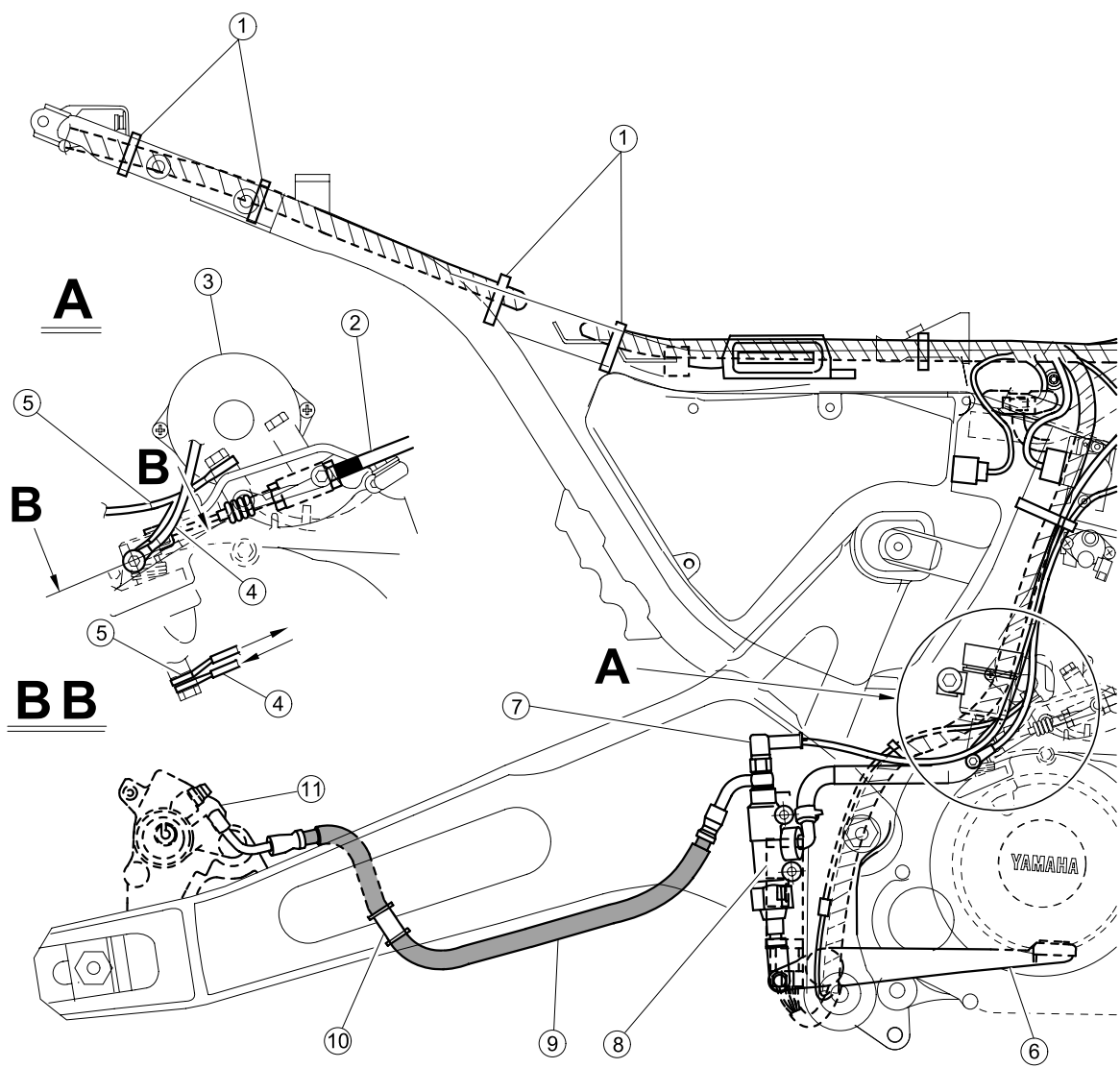
1. Front brake hose holder
  2. Front brake hose
  3. Front fork under bracket
  4. Front brake caliper (left)
  5. Front brake caliper (right)
  6. Brake caliper projection
  7. Front mud guard
- A. When installing the brake hose onto the brake caliper, make sure that the brake pipe touches the projection on the brake caliper.



## CABLE ROUTING

---

1. Main switch
2. Front brake light switch lead
3. Plastic band
4. Rear brake light switch coupler
5. Spark plug lead
6. Clutch cable
7. Coolant temperature sensor lead
8. Plastic band
9. Intake air temperature sensor lead
10. Intake air pressure sensor
11. Throttle position sensor lead
12. Fuel pump couplers
13. Air induction system lead
14. Battery
15. Battery cover
16. Negative battery lead
17. Main switch couplers
18. Immobilizer unit coupler
- A. Fasten the wire harness, negative battery lead and rear brake light switch lead to the frame with a plastic band.

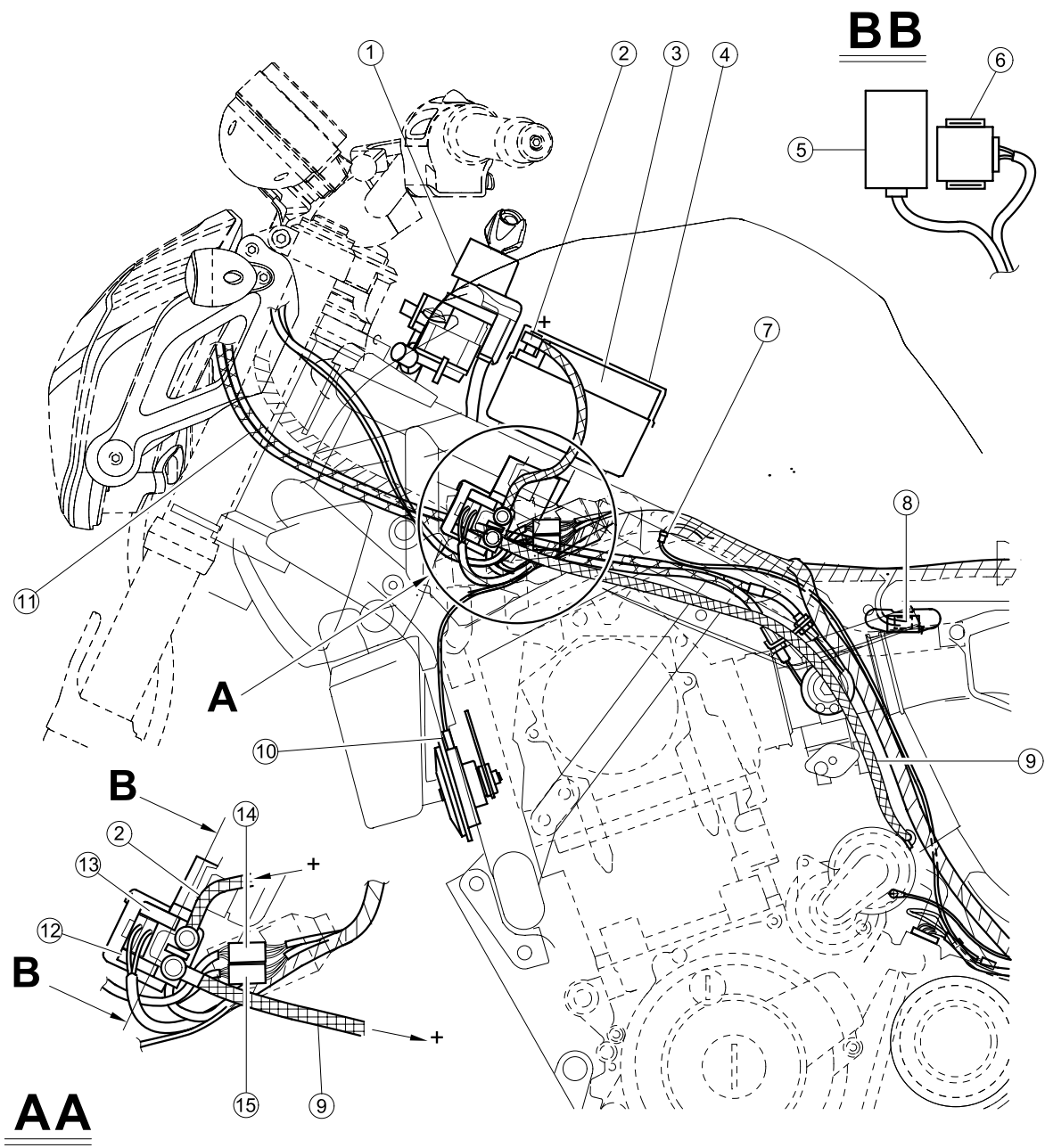


## CABLE ROUTING

---

1. Plastic band
2. Clutch cable
3. Starter motor
4. Negative battery lead
5. Starter negative lead
6. Rear brake pedal
7. Rear brake light switch
8. Rear brake master cylinder
9. Rear brake hose
10. Rear brake hose holder
11. Rear brake caliper

CABLE ROUTING

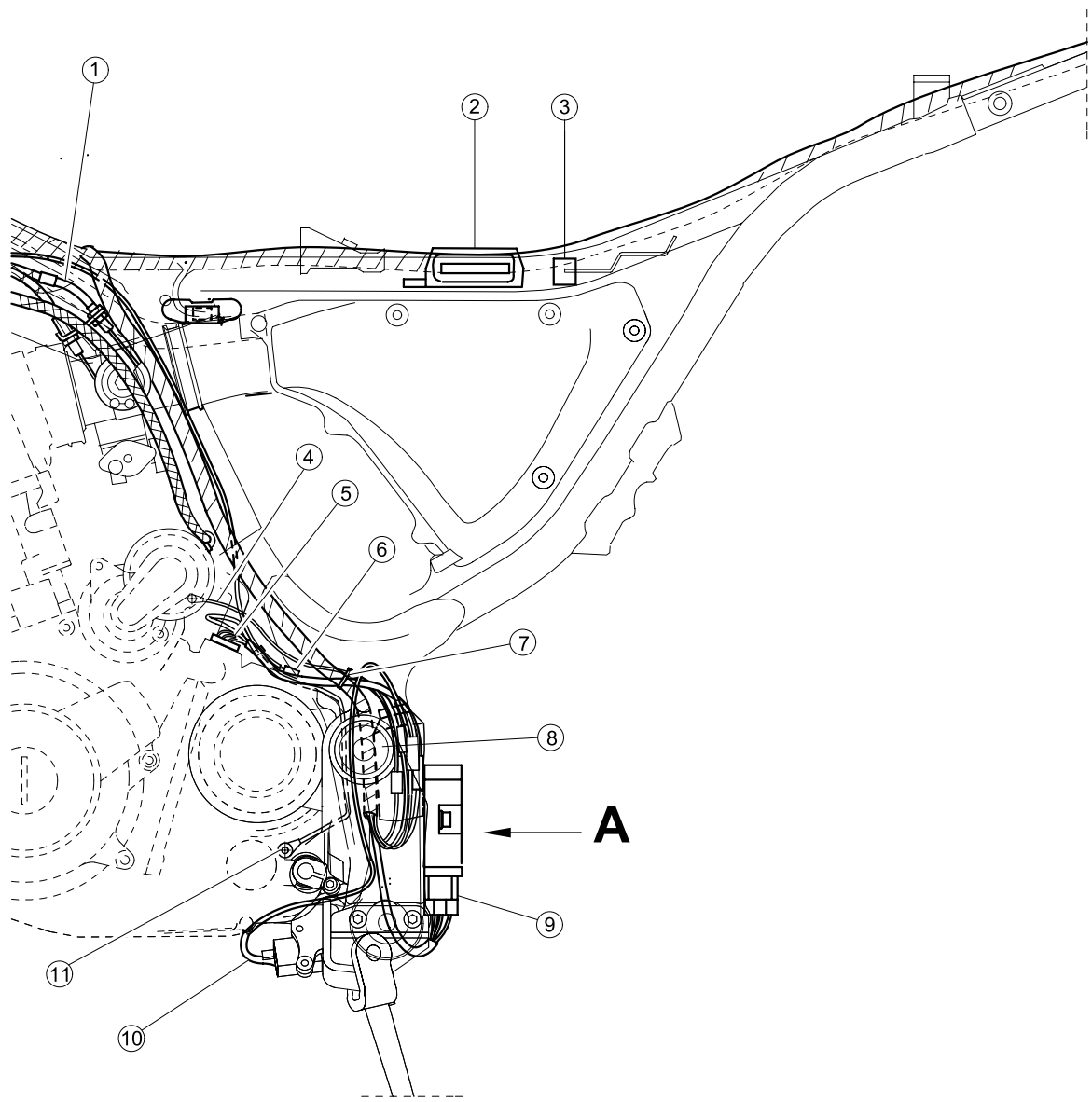


## CABLE ROUTING

---

1. Main switch
2. Positive battery lead
3. Battery
4. Battery cover
5. Relay unit
6. Starter relay
7. Speed sensor lead
8. Intake air pressure sensor
9. Positive starter lead
10. Horn lead
11. Throttle cables
12. Reserve fuse
13. Main fuse
14. Left handlebar switch lead
15. Right handlebar switch lead

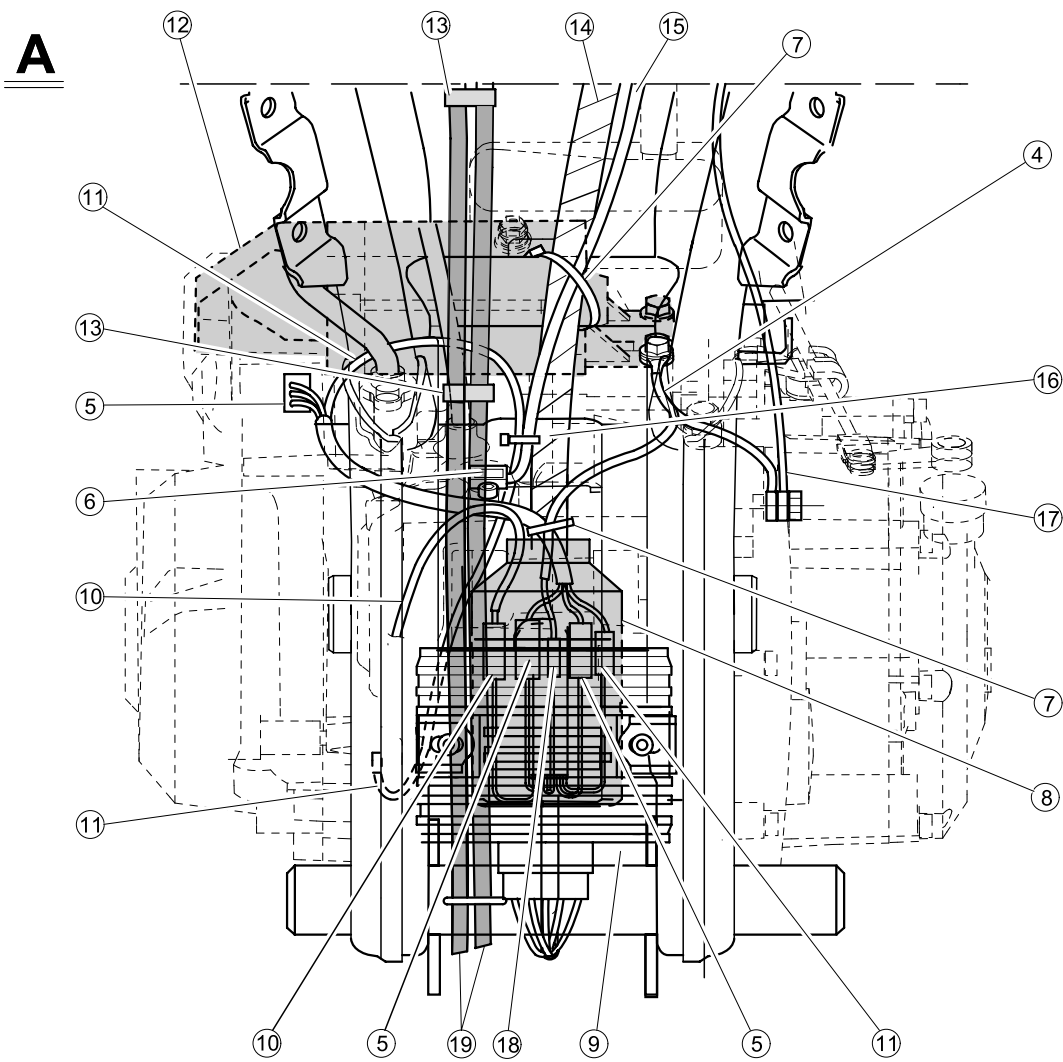




## CABLE ROUTING

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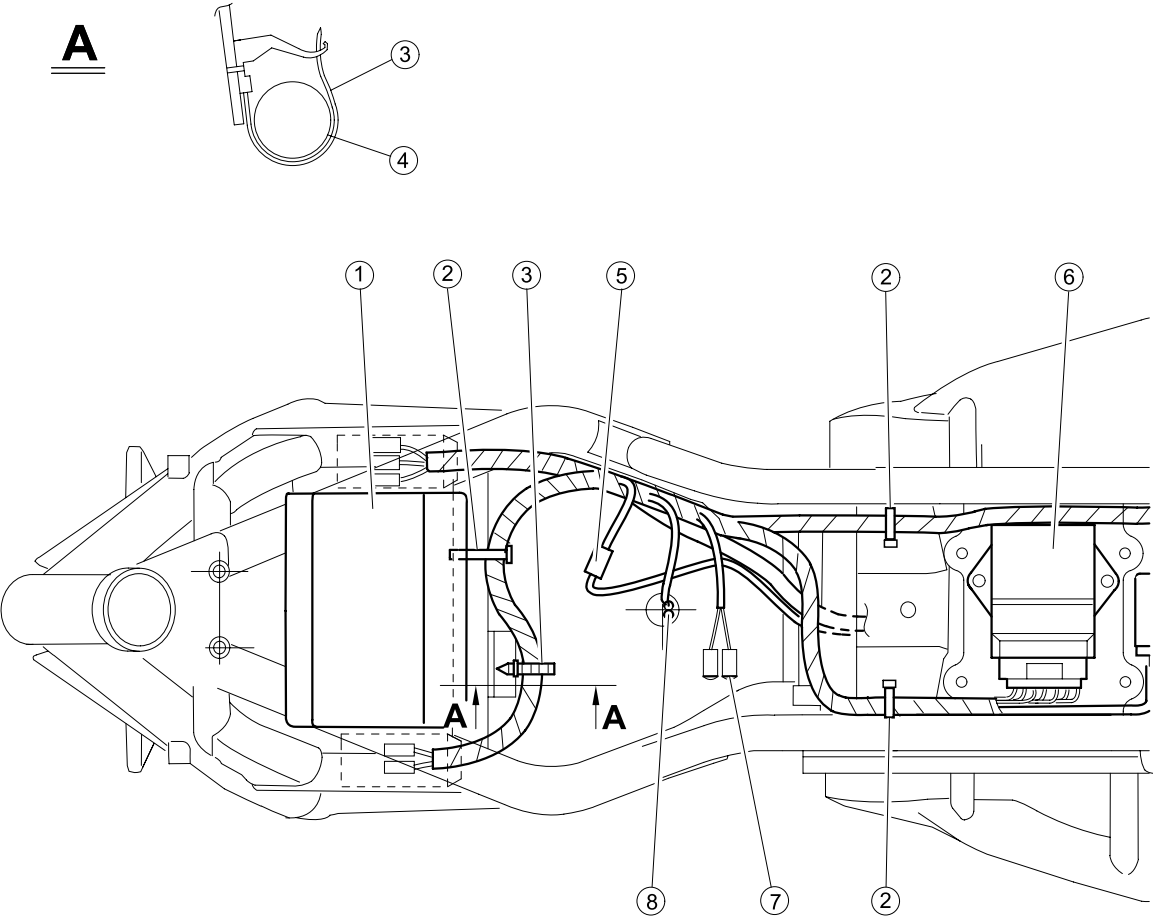
1. Throttle cables
2. ECU
3. Lean angle cut-off switch
4. Starter negative lead
5. A.C. magneto lead
6. Speed sensor
7. Plastic band
8. Rubber protection
9. Rectifier/regulator
10. Sidestand switch lead
11. Neutral switch lead
12. Starter motor
13. Hose holder
14. Main wire harness
15. Speed sensor lead
16. Wire holder
17. Negative battery lead
18. Negative coupler
19. Fuel tank breather/overflow hoses



## CABLE ROUTING

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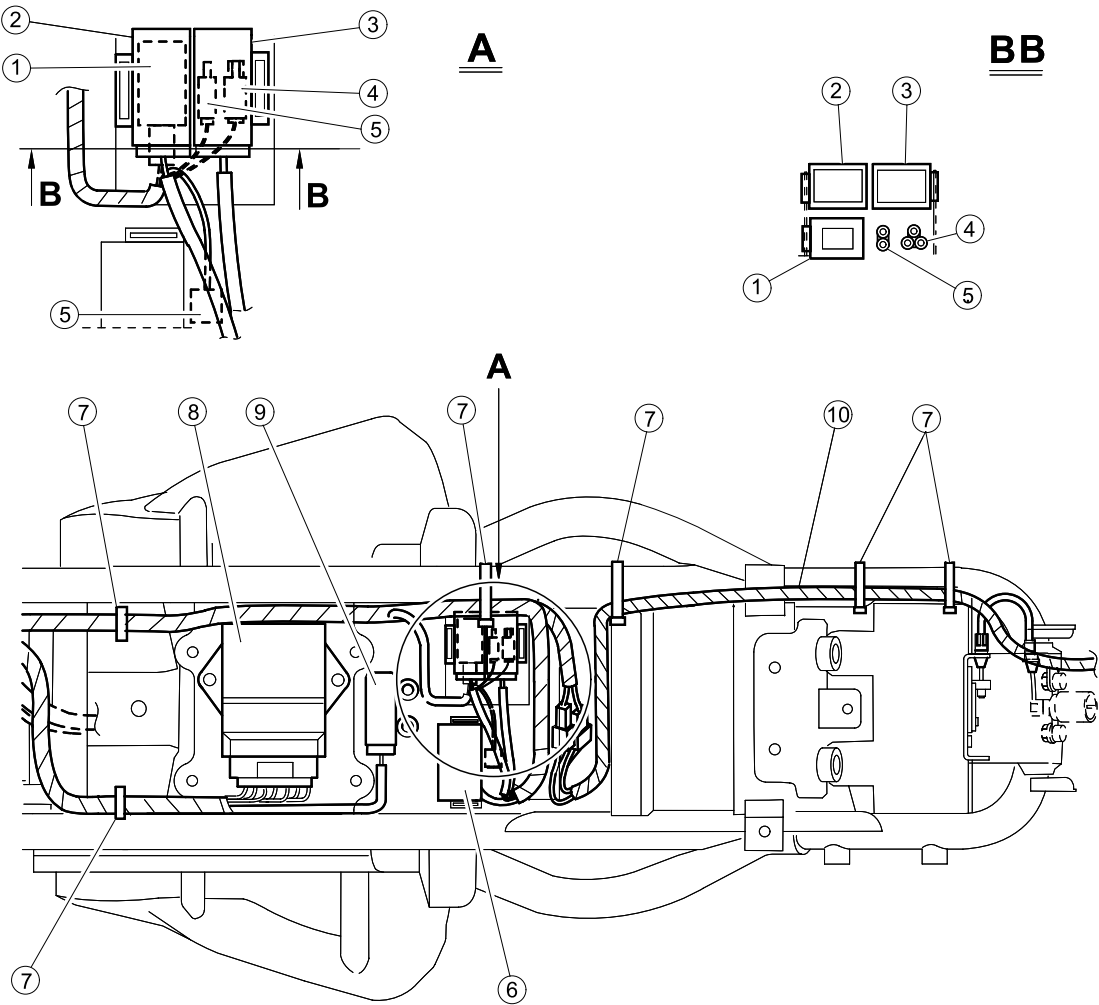
1. Throttle cables
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8. Rubber protection
9. Rectifier/regulator
10. Sidestand switch lead
11. Neutral switch lead
12. Starter motor
13. Hose holder
14. Main wire harness
15. Speed sensor lead
16. Wire holder
17. Negative battery lead
18. Negative coupler
19. Fuel tank breather/overflow hoses



## CABLE ROUTING

---

1. Battery cover
2. Plastic band
3. Plastic locking tie
4. Wire harness
5. Speed sensor coupler
6. ECU
7. Fuel pump couplers
8. Fuel injector lead



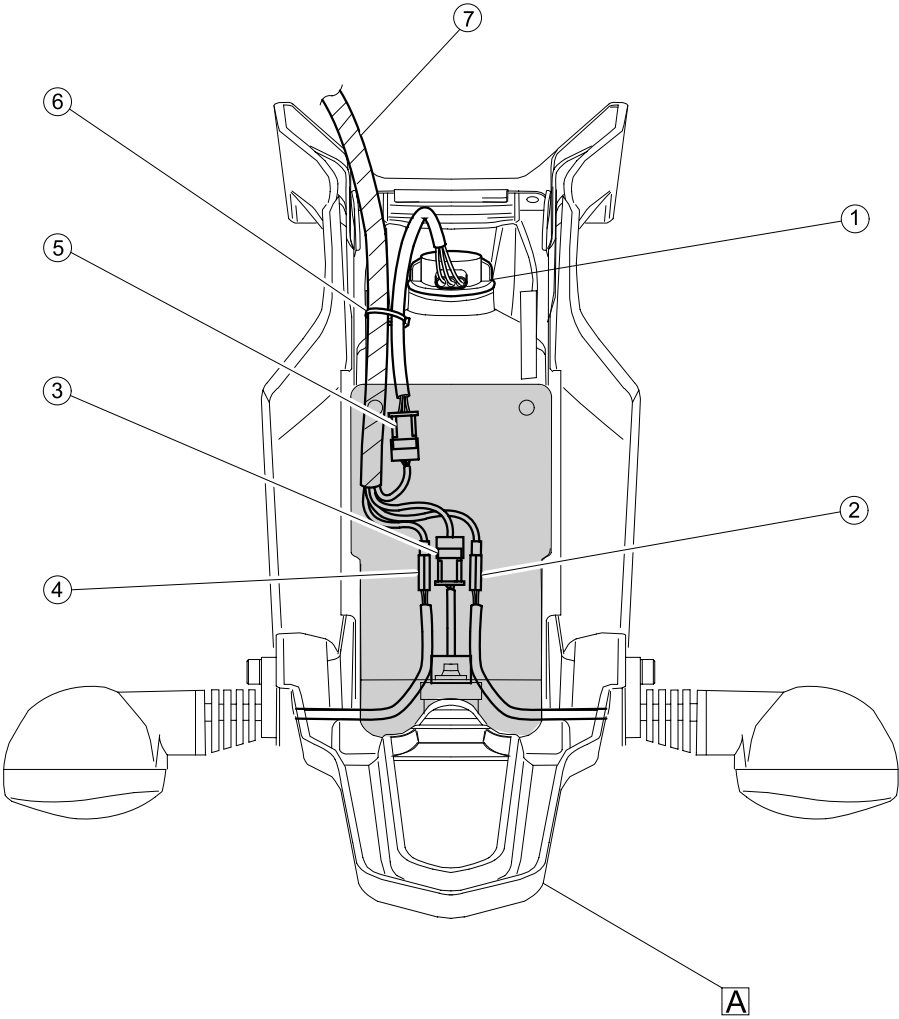
## CABLE ROUTING

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1. Turn signal/hazard relay
2. Headlight relay
3. Radiator fan motor relay
4. Fuel injection diagnostic tool coupler
5. Anti-theft alarm coupler
6. Fuse box
7. Plastic band
8. ECU
9. Lean angle cut-off switch
10. Extension wire harness



CABLE ROUTING



## CABLE ROUTING

---

1. Tail/brake light socket
2. Rear turn signal light coupler (left)
3. License plate light coupler
4. Rear turn signal light coupler (right)
5. Tail/brake light coupler
6. Plastic band
7. Extension wire harness
- A. Bottom view



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## PERIODIC CHECKS AND ADJUSTMENTS

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# PERIODIC MAINTENANCE

## PERIODIC MAINTENANCE

EAS00036

### 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.

EAS00037

### PERIODIC MAINTENANCE AND LUBRICATION CHART

#### NOTE:

- The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.
- From 50,000 km, repeat the maintenance intervals starting from 10,000 km.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (x 1,000 km)					ANNUAL CHECK
			1	10	20	30	40	
1	* Fuel line (See page 3-13)	• Check fuel hoses for cracks or damage.		✓	✓	✓	✓	✓
2	Spark plug (See page 3-6)	• Check condition. • Clean and regap.		✓		✓		
		• Replace.			✓		✓	
3	* Valves (See page 3-3)	• Check valve clearance. • Adjust.			✓		✓	
4	Air filter element (See page 3-12)	• Replace.			✓		✓	
5	Clutch (See page 3-11)	• Check operation. • Adjust.	✓	✓	✓	✓	✓	
6	* Front brake (See page 3-19, 3-20)	• Check operation, fluid level and vehicle for fluid leakage.	✓	✓	✓	✓	✓	✓
		• Replace brake pads.	Whenever worn to the limit					
7	* Rear brake (See page 3-19, 3-20)	• Check operation, fluid level and vehicle for fluid leakage.	✓	✓	✓	✓	✓	✓
		• Replace brake pads.	Whenever worn to the limit					
8	* Brake hoses (See page 3-20)	• Check for cracks or damage.		✓	✓	✓	✓	✓
		• Replace.	Every 4 years					
9	* Wheels (See page 3-27)	• Check runout and for damage.		✓	✓	✓	✓	
10	* Tires (See page 3-26)	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		✓	✓	✓	✓	✓
11	* Wheel bearings	• Check bearing for looseness or damage.		✓	✓	✓	✓	
12	* Swingarm (See page 3-28)	• Check operation and for excessive play.		✓	✓	✓	✓	
		• Lubricate with lithium-soap-based grease.	Every 50,000 km					
13	Drive chain (See page 3-22, 3-23)	• Check chain slack, alignment and condition • Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.	Every 800 km and after washing the motorcycle or riding in the rain					
14	* Steering bearings (See page 3-23)	• Check bearing play and steering for roughness.	✓	✓	✓	✓	✓	
		• Lubricate with lithium-soap-based grease.	Every 20,000 km					
15	* Chassis fasteners	• Make sure that all nuts, bolts and screws are properly tightened.		✓	✓	✓	✓	✓
16	Sidestand (See page 3-28)	• Check operation. • Lubricate.		✓	✓	✓	✓	✓

## PERIODIC MAINTENANCE

NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (x 1,000 km)					ANNUAL CHECK
			1	10	20	30	40	
17	* Sidestand switch	• Check operation.	✓	✓	✓	✓	✓	✓
18	* Front fork (See page 3-25)	• Check operation and for oil leakage.		✓	✓	✓	✓	
19	* Shock absorber assembly (See page 3-25)	• Check operation and shock absorber for oil leakage.		✓	✓	✓	✓	
20	* Side suspension relay arm and connecting arm pivoting points (See page 3-28)	• Check operation.		✓	✓	✓	✓	
		• Lubricate with lithium-soap-based grease.			✓		✓	
21	* Fuel injection (See page 3-5)	• Adjust engine idling speed.	✓	✓	✓	✓	✓	✓
22	Engine oil (See page 3-9)	• Change. • Check oil level and vehicle for oil leakage.	✓	✓	✓	✓	✓	✓
23	Engine oil filter element (See page 3-10)	• Replace	✓		✓		✓	
24	* Cooling system (See page 3-14, 3-16)	• Check coolant level and vehicle for coolant leakage.		✓	✓	✓	✓	✓
		• Change.	Every 3 years					
25	* Front and rear brake switches	• Check operation.	✓	✓	✓	✓	✓	✓
26	Moving parts and cables (See page 3-28)	• Lubricate.		✓	✓	✓	✓	✓
27	* Throttle grip housing and cable (See page 3-5)	• Check operation and free play. • Adjust the throttle cable free play if necessary. • Lubricate the throttle grip housing and cable.		✓	✓	✓	✓	✓
28	* Air induction system	• Check the air cut-off valve, reed valve, and hose for damage. • Check fuel hoses for cracks or damage.		✓	✓	✓	✓	✓
29	* Muffler and exhaust pipe (See page 3-14)	• Check the screw clamp for looseness.	✓	✓	✓	✓	✓	
30	* Lights, signals (See page 3-31)	• Check operation. • Adjust headlight beam.	✓	✓	✓	✓	✓	✓

### NOTE:

- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
  - Regularly check and, if necessary, correct the brake fluid level.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

## ENGINE

EAS00049

### ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

#### NOTE:

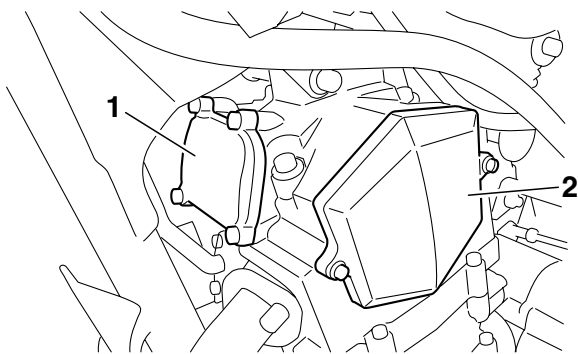
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

#### 1. Remove:

- Seats  
Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank  
Refer to "FUEL TANK" on page 7-1.
- Radiator  
Refer to "RADIATOR" on page 6-1.
- Air-filter-to-air-cut-off-valve hose  
Refer to "AIR INDUCTION SYSTEM" on page 7-11.

#### 2. Remove:

- Intake tappet cover
- Exhaust tappet cover "1"
- Camshaft sprocket cover "2"

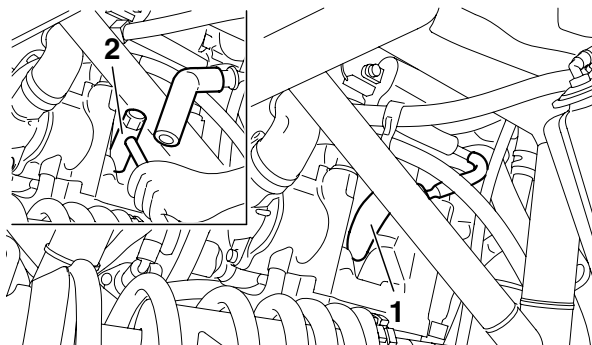


#### 3. Disconnect:

- Spark plug cap "1"

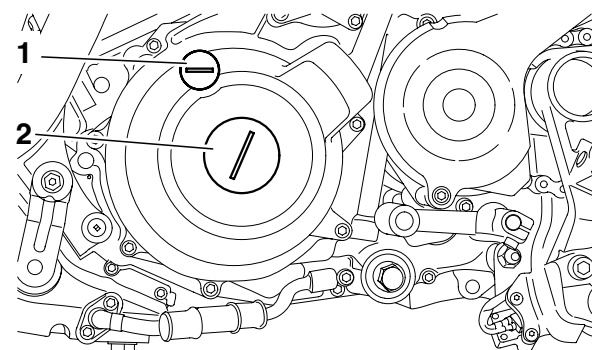
#### 4. Remove:

- Spark plug "2"



#### 5. Remove:

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



#### 6. Valve clearance

- Out of specification → Adjust.



#### Valve clearance (cold)

##### Intake valve

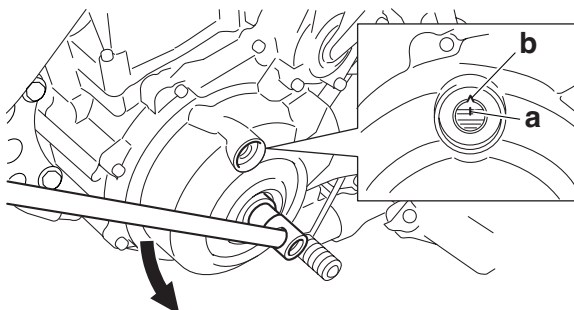
0.09-0.13 mm (0.0035-0.0051 in)

##### Exhaust valve

0.16-0.20 mm (0.0063-0.0079 in)

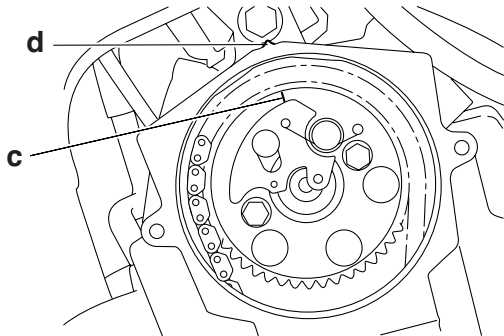


- Turn the crankshaft counterclockwise.
- When the piston is at the top dead center (TDC) on the compression stroke, align the "I" mark "a" on the A.C. magneto rotor with the stationary pointer "b" on the A.C. magneto cover.



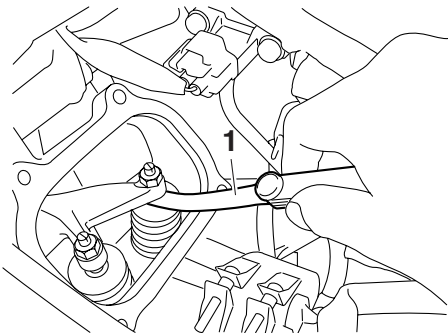


**NOTE:** To position the piston at top dead center (TDC) on the compression stroke, align the “1” mark “c” on the camshaft sprocket with the stationary pointer “d” on the cylinder head, as shown in the illustration.



- c. Measure the valve clearance with a thickness gauge “1”.  
Out of specification → Adjust.

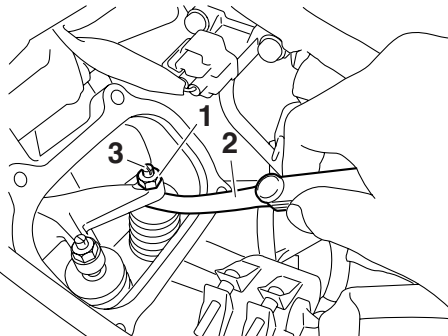
**Thickness gauge**  
90890-03079



7. Adjust:
- Valve clearance

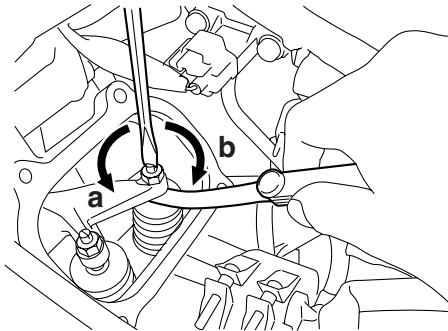


- a. Loosen the locknut “1”.  
b. Insert a thickness gauge “2” between the end of the adjusting screw and the valve tip.



- c. Turn the adjusting screw “3” in direction “a” or “b” until the specified valve clearance is obtained.

**Direction “a”**  
Valve clearance is increased.  
**Direction “b”**  
Valve clearance is decreased.



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

**Locknut**  
14 Nm (1.4 m·kg, 10 ft·lb)

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



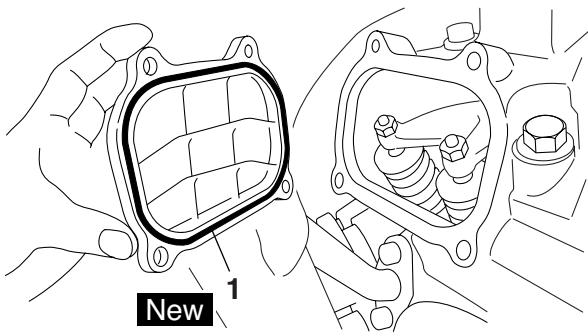
8. Install:
- Timing mark accessing screw
  - Crankshaft end accessing screw
9. Install:
- Spark plug

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

- 10.Connect:
- Spark plug cap
- 11.Install:
- Camshaft sprocket cover

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

- O-rings “1” **New**



- Intake tappet cover



**Intake tappet cover bolt**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**

- Exhaust tappet cover



**Exhaust tappet cover bolt**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**

12. Install:

- Air-filter-to-air-cut-off-valve hose  
Refer to “AIR INDUCTION SYSTEM” on page 7-11.
- Radiator  
Refer to “RADIATOR” on page 6-1.
- Fuel tank  
Refer to “FUEL TANK” on page 7-1.
- Seats  
Refer to “GENERAL CHASSIS” on page 4-1.

EAS00054

**ADJUSTING THE ENGINE IDLING SPEED**

**NOTE:** \_\_\_\_\_

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

1. Start the engine and let it warm up for several minutes.
2. Check:
  - Engine idling speed  
Out of specification → Adjust.



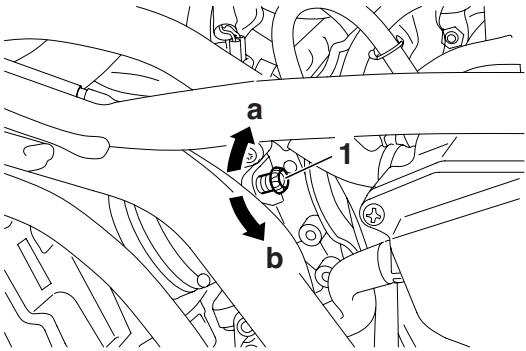
**Engine idling speed**  
**1300-1500 r/min**

3. Adjust:
  - Engine idling speed




- a. Turn the throttle stop screw “1” in direction “a” or “b” until the specified engine idling speed is obtained.

**Direction “a”**  
**Engine idling speed is increased.**  
**Direction “b”**  
**Engine idling speed is decreased.**



4. Adjust:
  - Throttle cable free play  
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-5.



**Throttle cable free play**  
**(at the flange of the throttle grip)**  
**3.0-5.0 mm (0.12-0.20 in)**


EAS00056

**ADJUSTING THE THROTTLE CABLE FREE PLAY**

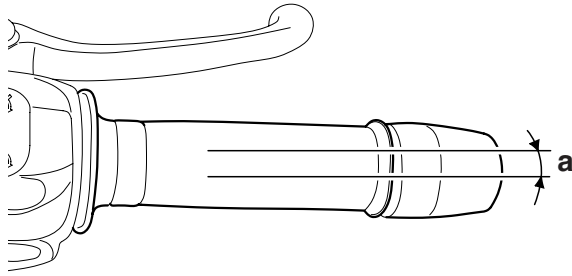
**NOTE:** \_\_\_\_\_

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

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



**Throttle cable free play**  
**(at the flange of the throttle grip)**  
**3.0-5.0 mm (0.12-0.20 in)**



2. Adjust:
- Throttle cable free play

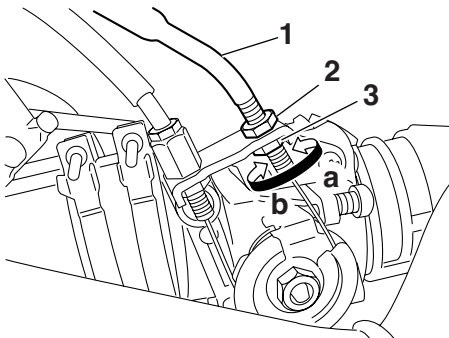
**NOTE:**

When the throttle is opened, the accelerator cable "1" is pulled.

**Throttle body end**

- Loosen the locknut "2" on the accelerator cable.
- Turn the adjusting nut "3" in direction "a" or "b" until the specified throttle cable free play is obtained.

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



- c. Tighten the locknut.

**NOTE:**

If the specified throttle cable free play cannot be obtained on the throttle body end of the cable, adjust the free play at the handlebar end of the cable using the adjusting nut.

**Handlebar end**

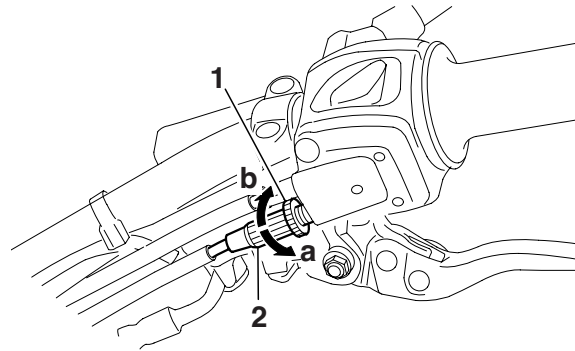
- Loosen the locknut "1".
- Turn the adjusting nut "2" in direction "a" or "b" until the specified throttle cable free play is obtained.

**Direction "a"**

Throttle cable free play is increased.

**Direction "b"**

Throttle cable free play is decreased.



- c. Tighten the locknut.

**⚠ WARNING**

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

EAS00060

**CHECKING THE SPARK PLUG**

- Disconnect:
  - Spark plug cap
- Remove:
  - Spark plug

**CAUTION:**

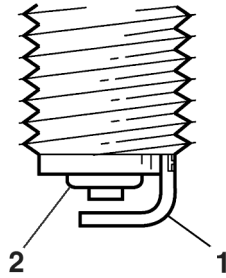
Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.

- Check:
  - Spark plug type
 Incorrect → Change.

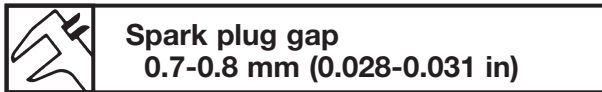


**Spark plug type (manufacturer)**  
**CR7E (NGK)**

- Check:
  - Electrode "1"
 Damage/wear → Replace the spark plug.
  - Insulator "2"
 Abnormal color → Replace the spark plug.  
Normal color is medium-to-light tan.



5. Clean:
  - Spark plug (with a spark plug cleaner or wire brush)
6. Measure:
  - Spark plug gap "a" (with a thickness gauge)
 Out of specification → Regap.



7. Install:
  - Spark plug



**NOTE:** Before installing the spark plug, clean the spark plug and gasket surface.

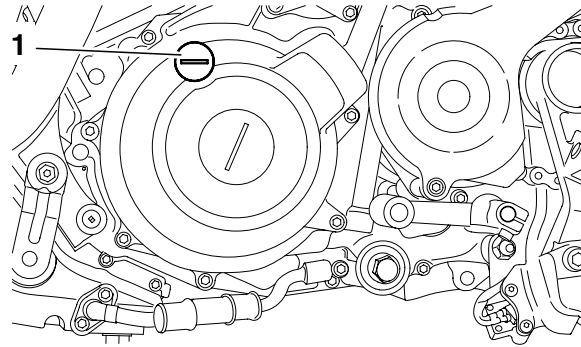
8. Connect:
  - Spark plug cap

EAS00064

## CHECKING THE IGNITION TIMING

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

1. Remove:
  - Timing mark accessing screw "1"



2. Connect:
  - Timing light (onto the spark plug lead)

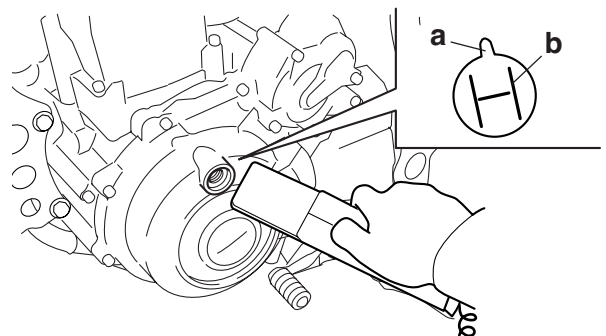


3. Check:
  - Ignition timing

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



- b. Check that the stationary pointer "a" is within the firing range "b" on the A.C. magneto rotor.
- Incorrect firing range → Check the ignition system.



**NOTE:** The ignition timing is not adjustable.

4. Detach:
  - Timing light
5. Install:
  - Timing mark accessing screw



EAS00069

CHECKING THE ENGINE OIL LEVEL

1. Place the vehicle on a level surface and hold it in an upright position.

NOTE:

Make sure that the vehicle is positioned straight up when checking the oil level. A slight tilt to the side can result in a false reading.

2. Start the engine, warm it up for 10-15 minutes, let it continue to idle for 20-30 seconds, and then turn it off.
3. Wait a few minutes until the oil settles, remove the engine oil tank dipstick "1", wipe the dipstick clean, insert it back into the oil filler hole (without screwing it in), and then remove it again to check the oil level.

EWAB0010

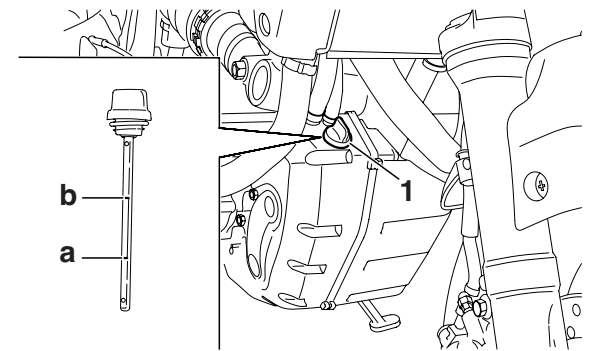
WARNING

The exhaust pipes are very hot during and following operation. To prevent burns when removing the oil filler cap, use extra care not to touch the exhaust pipes.

NOTE:

The engine oil tank is located in front of the frame.

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



ECA10010

CAUTION:

Do not operate the vehicle until you know that the engine oil level is sufficient.

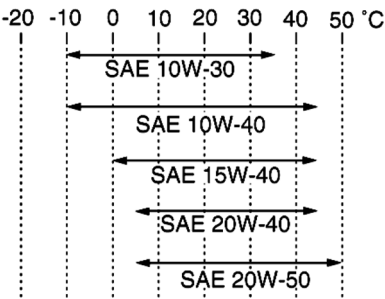
EWA10360

WARNING

Never remove the engine oil tank cap after high-speed operation, otherwise hot engine oil could spout out and cause damage or injury. Always let the engine oil cool down sufficiently before removing the oil tank cap.

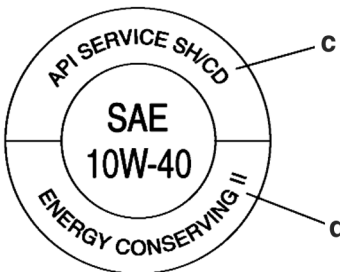


**Recommended oil**  
Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.  
API standard SE, SF, SG or higher grade.



CAUTION:

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





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

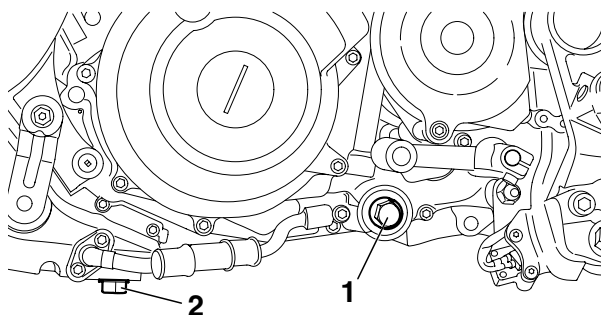
## NOTE:

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

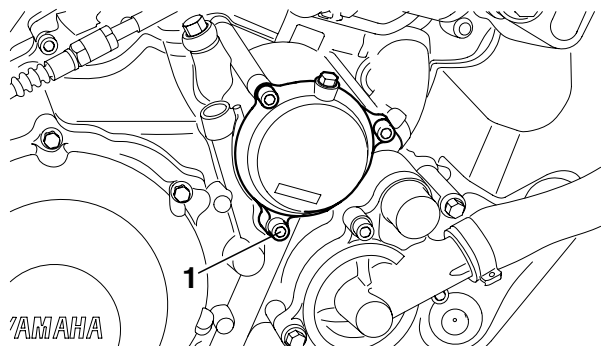
EAS00076

## CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place the motorcycle on its side stand, then place an oil pan under the oil tank and another under the engine to collect the used oil.
3. Remove:
  - Engine oil tank dipstick
  - Engine oil crankcase drain bolt "1"
  - Engine oil tank drain bolt "2"

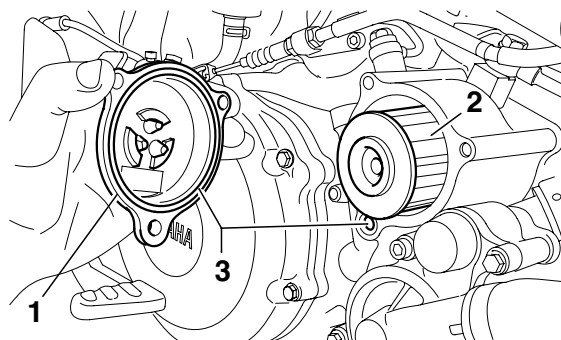


4. Remove:
  - Oil filter element drain bolt "1"



5. Drain:
  - Engine oil (completely from the crankcase and the oil tank)
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. Check the O-rings "3" and replace them if they are cracked or damaged.



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



**Oil filter element cover bolt**  
10 Nm (1.0 m·kg, 7.2 ft·lb)

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



**Engine oil drain bolt (crankcase)**  
30 Nm (3.0 m·kg, 22 ft·lb)

- Engine oil drain bolt (oil tank) (along with the gasket)



**Engine oil drain bolt (oil tank)**  
30 Nm (3.0 m·kg, 22 ft·lb)

- Oil filter element drain bolt



**Oil filter element drain bolt**  
10 Nm (1.0 m·kg, 7.2 ft·lb)

9. Fill:
  - Oil tank (with the specified amount of the recommended engine oil)

## CAUTION:

The engine oil tank must be filled with engine oil in two steps. First, fill the engine oil tank with 2.0 L (2.11 Imp qt, 1.75 US qt) of the recommended engine oil. Then, start the engine, race it five or six times, turn it off, and then add the remainder of the engine oil.



### Quantity

#### Total amount

3.40 L (2.99 Imp qt, 3.60 US qt)

Without oil filter element replacement

3.00 L (2.64 Imp qt, 3.17 US qt)

With oil filter element replacement

3.10 L (2.72 Imp qt, 3.28 US qt)

### 10. Install:

- Engine oil tank dipstick

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

### 12. Check:

- Engine (for engine oil leaks)

### 13. Check:

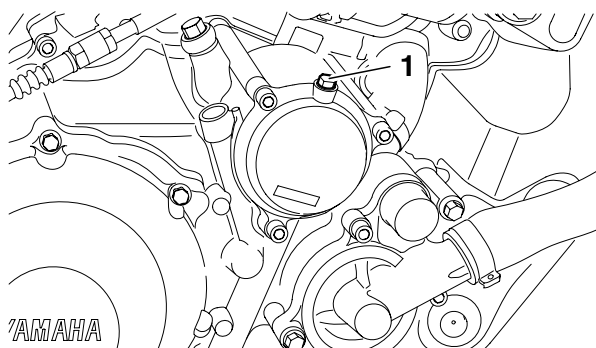
- Engine oil level

Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-9.

### 14. Check:

- Engine oil pressure

### a. Slightly loosen the bleed bolt "1"



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

- 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.
- Start the engine after correcting the problem(s) and check the engine oil pressure again.
- Tighten the bleed bolt to the specified torque.



### Bleed bolt

5 Nm (0.5 m·kg, 3.6 ft·lb)

EAS00078

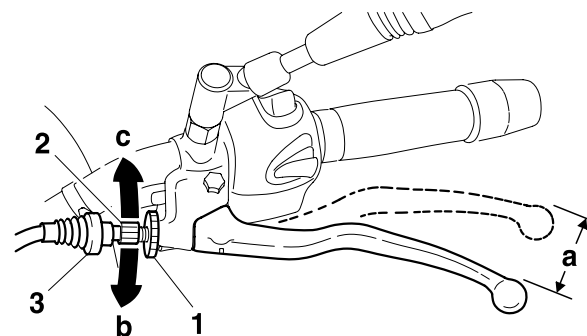
## ADJUSTING THE CLUTCH CABLE FREE PLAY

### 1. Check:

- Clutch cable free play "a"
- Out of specification → Adjust.



Clutch cable free play  
(at the end of the clutch lever)  
10.0-15.0 mm (0.39-0.59 in)



### 2. Adjust:

- Clutch cable free play

### Handlebar end

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

### Direction "b"

Clutch cable free play is increased.

### Direction "c"

Clutch cable free play is decreased.

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



## NOTE:

If the specified clutch cable free play cannot be obtained on the handlebar end of the cable, adjust the free play at the engine end of the cable using the adjusting nut.

## Engine end

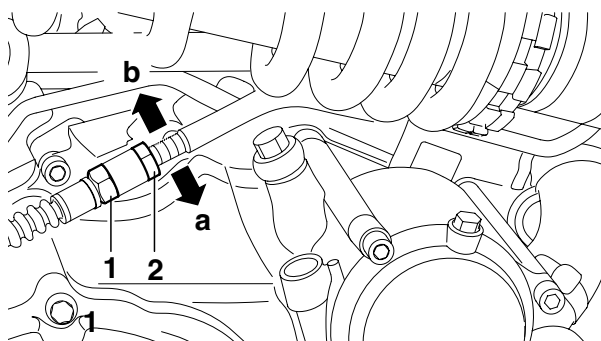
- Loosen the locknut "1".
- Turn the adjusting nut "2" in direction "a" or "b" until the specified clutch cable free play is obtained.

### Direction "a"

Clutch cable free play is increased.

### Direction "b"

Clutch cable free play is decreased.



- Tighten the locknuts.

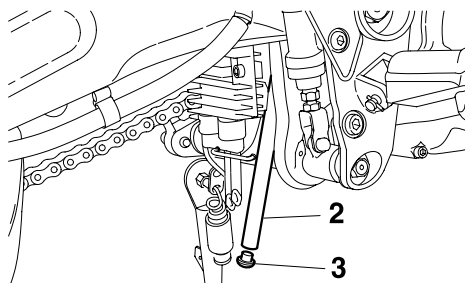
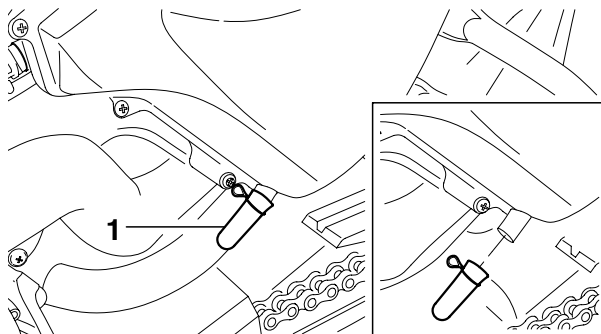


EAS00086

## CHECKING THE AIR FILTER ELEMENT

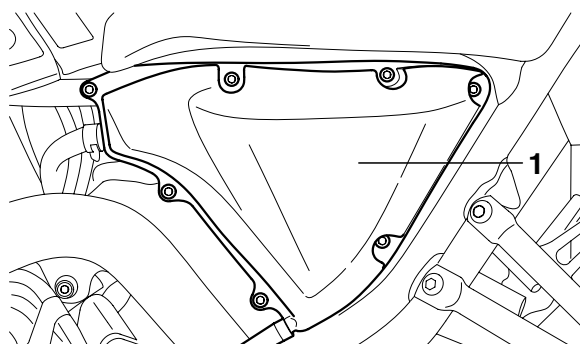
## NOTE:

There are two check hoses "1" and "2" at the bottom of the air filter case. Check the hose "1" for accumulated dirt, water or oil. If dirt, water or oil is visible remove the hose, clean it and then install it in its original position. Remove the plug "3" drain any dirt, water or oil and then install it in its original position. If dust and/or water collects in these hoses, clean the air filter element and air filter case.



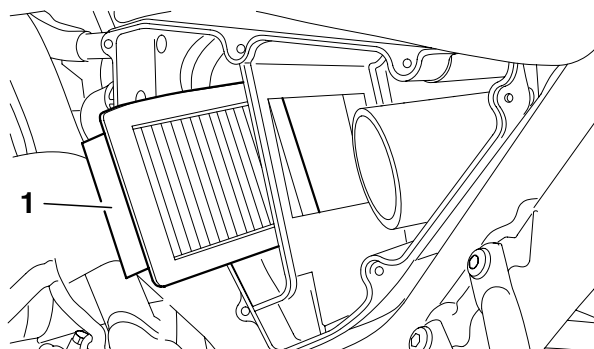
- Remove:

- Air filter case cover "1"



- Remove:

- Air filter element "1"



- Check:

- Air filter element
- Damage → Replace.

- Install:

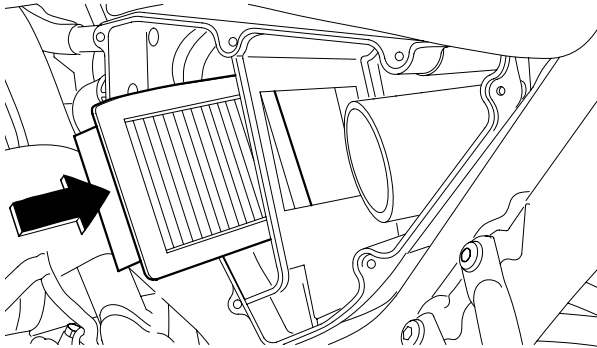
- Air filter element

## CAUTION:

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

## NOTE:

Insert the air filter element into the air filter case as shown.

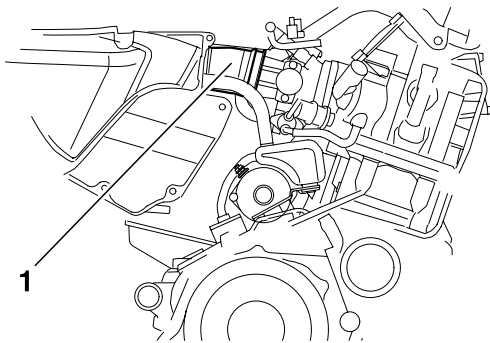


5. Install:
  - Air filter case cover

EAS00094

## CHECKING THE THROTTLE BODY JOINT

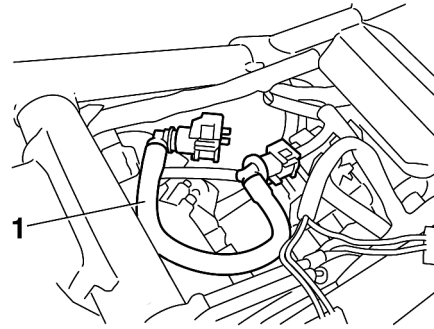
1. Check:
  - Throttle body joint "1"
 Cracks/damage → Replace.  
 Refer to "FUEL INJECTION SYSTEM" on page 7-4.



EAS00096

## CHECKING THE FUEL HOSE

1. Remove:
  - Seats  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
2. Check:
  - Fuel hose "1"
 Cracks/damage → Replace.  
 Loose connection → Connect properly.



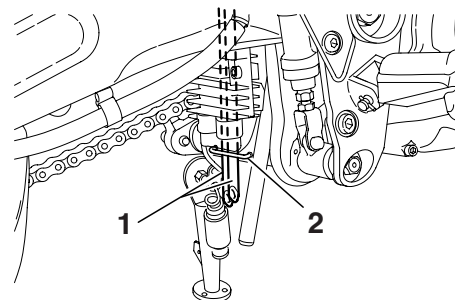
3. Install:
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
  - Seats  
Refer to "GENERAL CHASSIS" on page 4-1.

## CHECKING THE FUEL TANK BREATHER/OVERFLOW HOSES

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

## CAUTION:

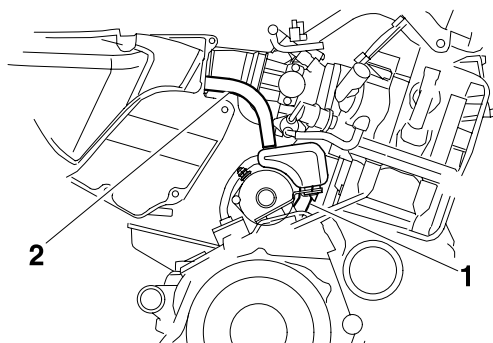
- Make sure that the end of the fuel tank breather/overflow hoses is not blocked, and clean it if necessary.
- Make sure that the end of the fuel tank breather/overflow hoses is positioned inside of the clamp "2".



EAS00098

## CHECKING THE CRANKCASE BREATHER HOSES

1. Check:
  - Crankcase-to-crankcase-breather-chamber hose "1"
  - Air-filter-to-crankcase-breather-chamber hose "2"
 Cracks/damage → Replace.  
 Loose connection → Connect properly.



## CAUTION:

Make sure the breather hoses are routed correctly.

EAS00099

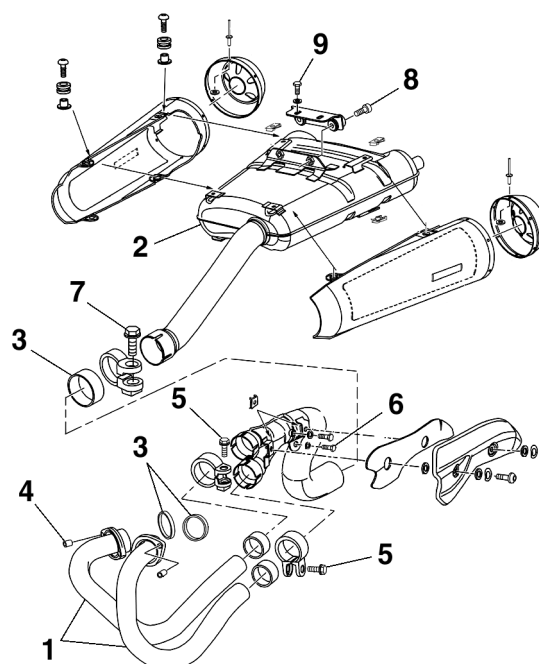
## CHECKING THE EXHAUST SYSTEM

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

1. Check:
  - Exhaust pipes “1”
  - Muffler “2”
  - Cracks/damage → Replace.
  - Gaskets “3”
  - Exhaust gas leaks → Replace.
2. Check:
  - Tightening torques



Exhaust pipe nut “4”  
20 Nm (2.0 m·kg, 14 ft·lb)  
Exhaust pipe joint bolt “5”  
18 Nm (1.8 m·kg, 13 ft·lb)  
Exhaust pipe and frame bolt “6”  
25 Nm (2.5 m·kg, 18 ft·lb)  
Exhaust pipe and muffler bolt “7”  
18 Nm (1.8 m·kg, 13 ft·lb)  
Muffler stay and muffler bolt “8”  
22 Nm (2.2 m·kg, 16 ft·lb)  
Muffler stay and frame bolt “9”  
22 Nm (2.2 m·kg, 16 ft·lb)



EAS00102

## CHECKING THE COOLANT LEVEL

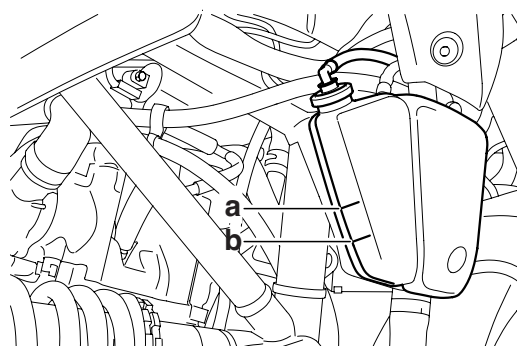
1. Stand the motorcycle on a level surface.

## NOTE:

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

2. Check:
  - Coolant level

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



## CAUTION:

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

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

## NOTE:

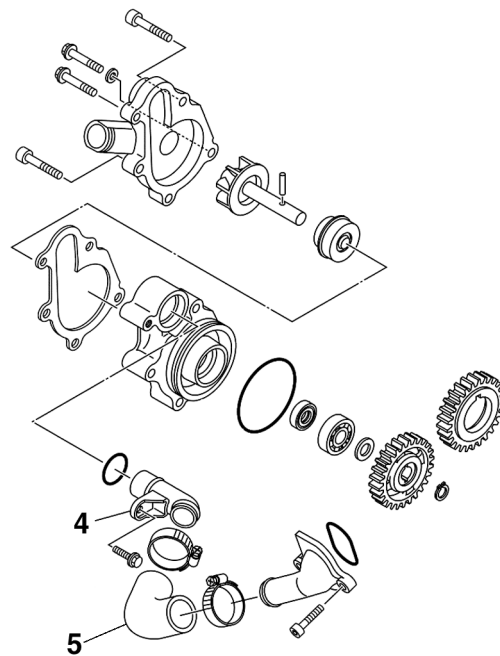
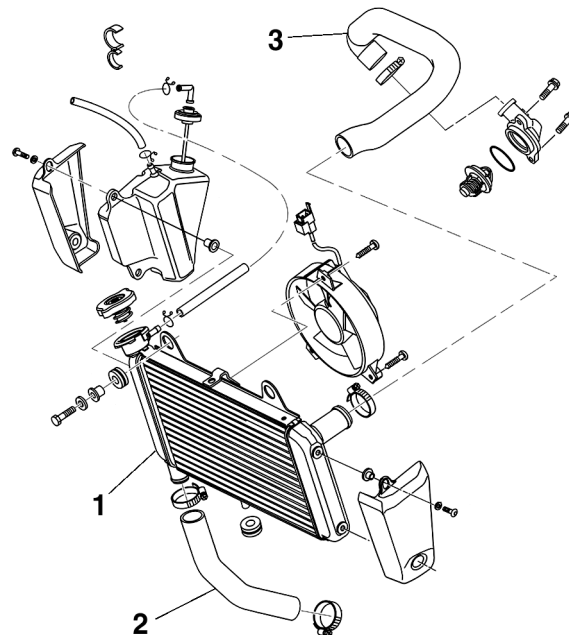
Before checking the coolant level, wait a few minutes until it settles.

EAS00104

## CHECKING THE COOLING SYSTEM

1. Remove:
  - Seats  
Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank  
Refer to "FUEL TANK" on page 7-1.
2. Check:
  - Radiator "1"
  - Radiator outlet hose "2"
  - Radiator inlet hose "3"
  - Water pump assembly
  - Water pump outlet pipe "4"
  - Water pump outlet hose "5"

Cracks/damage → Replace.  
Refer to "COOLING SYSTEM" on page 6-7.



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

EAS00105

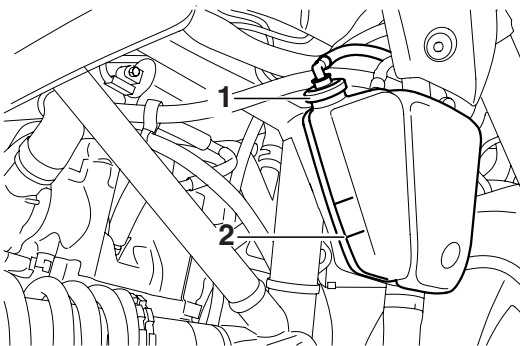
## CHANGING THE COOLANT

1. Remove:
  - Panel (right)  
Refer to "FUEL TANK" on page 7-1.
2. Remove:
  - Radiator cap

### **⚠ 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 reservoir cap "1"
  - Coolant reservoir "2"

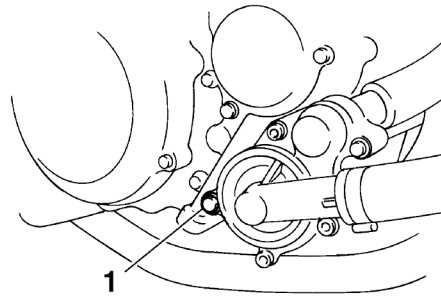


4. Drain:
  - Coolant (from the coolant reservoir)
5. Install:
  - Coolant reservoir

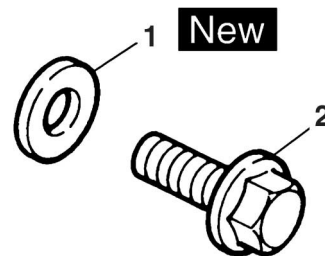


**Coolant reservoir bolt**  
5 Nm (0.5 m·kg, 3.6 ft·lb)

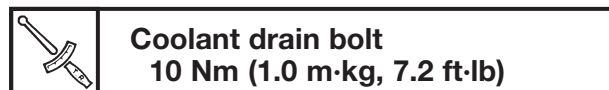
6. Remove:
  - Coolant drain bolt "1" (along with the copper washer)



7. Drain:
  - Coolant (from the engine and radiator)
8. Check:
  - Copper washer "1" **New**
  - Coolant drain bolt "2"
  - Damage → Replace.

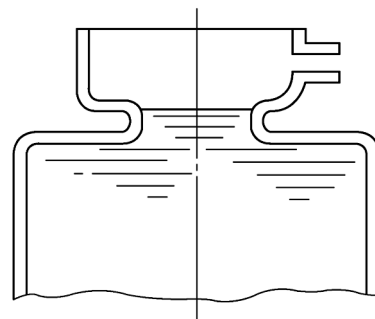


9. Install:
  - Coolant drain bolt



**Coolant drain bolt**  
10 Nm (1.0 m·kg, 7.2 ft·lb)

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





**Recommended antifreeze**  
**High-quality ethylene glycol**  
**antifreeze containing corrosion**  
**inhibitors for aluminum engines**  
**Mixing ratio**  
**1:1 (antifreeze:water)**  
**Quantity**  
**Total amount**  
**1.00 L**  
**(0.88 Imp qt, 1.06 US qt)**  
**Coolant reservoir capacity**  
**0.25 L**  
**(0.22 Imp qt, 0.26 US qt)**  
**From minimum to maximum**  
**level mark**  
**0.15 L**  
**(0.13 Imp qt, 0.16 US qt)**

## Handling notes for coolant

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

### **⚠ 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.

### **CAUTION:**

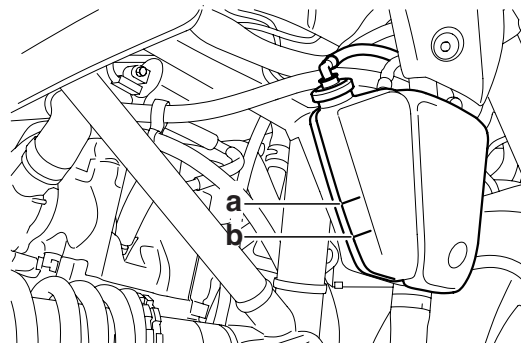
- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant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

11.Install:

- Radiator cap

12.Fill:

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



13.Install:

- Coolant reservoir cap

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

15.Check:

- Coolant level

Refer to "CHECKING THE COOLANT LEVEL" on page 3-14.

### **NOTE:**

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

16.Install:

- Panel (right)

Refer to "FUEL TANK" on page 7-1.



## CHASSIS

EAA00810

## ADJUSTING THE FRONT BRAKE

1. Adjust:
  - Brake lever position (distance "a" from the throttle grip to the brake lever)

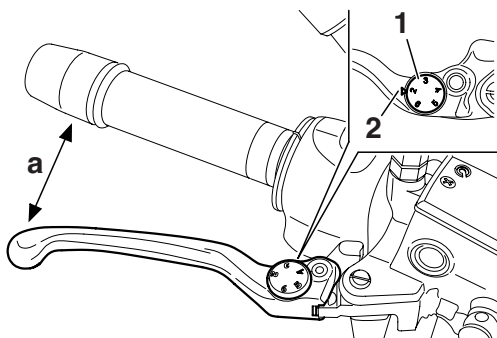


- a. While pushing the brake lever forward, turn the adjusting dial "1" until the brake lever is in the desired position.

**NOTE:**

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

**Position #1**  
Distance "a" is the largest.  
**Position #5**  
Distance "a" is the smallest.

**⚠ WARNING**

After adjusting the brake lever position, make sure that the pin on the brake lever holder is firmly inserted in the hole in the adjusting dial.

**CAUTION:**

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

**⚠ WARNING**

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check the brake system and bleed if necessary.



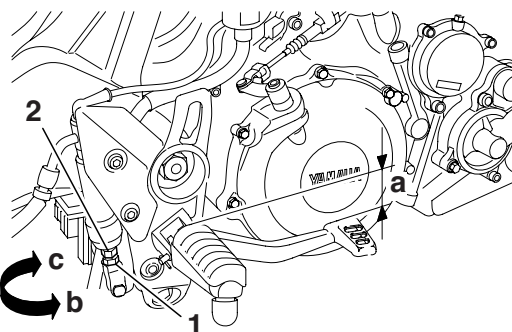
EAS00110

## ADJUSTING THE REAR BRAKE PEDAL

1. Check:
  - Brake pedal position (distance "a" from the top of the rider footrest to the top of the brake pedal)
 Out of specification → Adjust.



Brake pedal position (below the top of the rider footrest)  
14.5 mm (0.57 in)



2. Adjust:
  - Brake pedal position



- a. Loosen the locknut "1".
- b. Turn the adjusting bolt "2" in direction "b" or "c" until the specified brake pedal position is obtained.

**Direction "b"**  
Brake pedal is raised.  
**Direction "c"**  
Brake pedal is lowered.

- c. Tighten the locknut "1" to the specified torque.



**Locknut**  
**18 Nm (1.8 m·kg, 13 ft·lb)**

**⚠ WARNING**

**A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check and, if necessary, bleed the brake system.**

**CAUTION:**

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



EAS00115

## CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

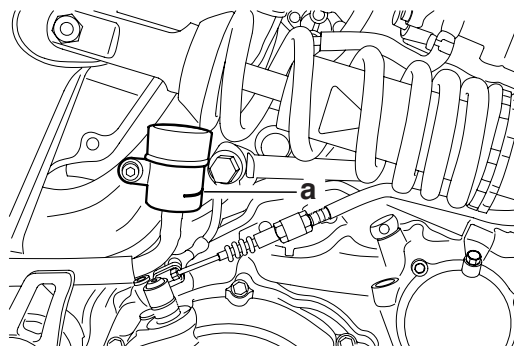
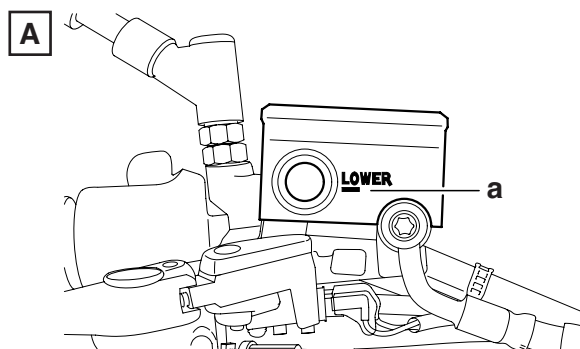
**NOTE:**

- Place the motorcycle on a suitable stand..
  - Make sure the motorcycle is upright.
- 
2. 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. Front brake  
B. Rear brake



**⚠ WARNING**

- **Use only the designated brake fluid. Other brake fluids may cause the piston 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.**

**CAUTION:**

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

**NOTE:**

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

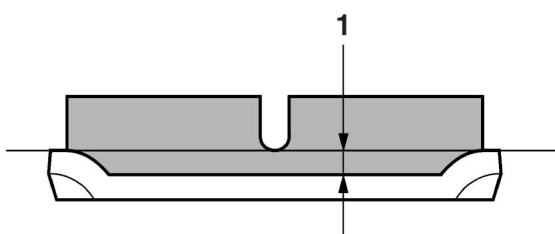


EAS00118

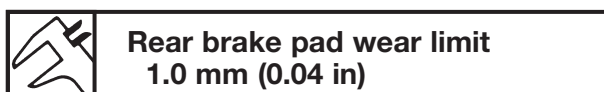
## CHECKING THE FRONT AND REAR BRAKE PADS AND BRAKE PAD PINS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
  - Front brake pads  
Wear indicator grooves "1" have almost disappeared → Replace the brake pads as a set.  
Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-24.



3. Measure:
  - Rear brake pads  
Wear limit "2" reached → Replace the brake pads as a set.  
Refer to "REPLACING THE REAR BRAKE PADS" on page 4-35.



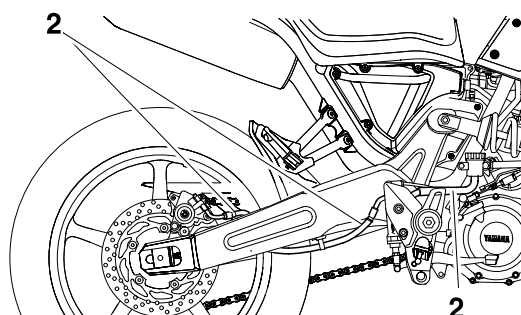
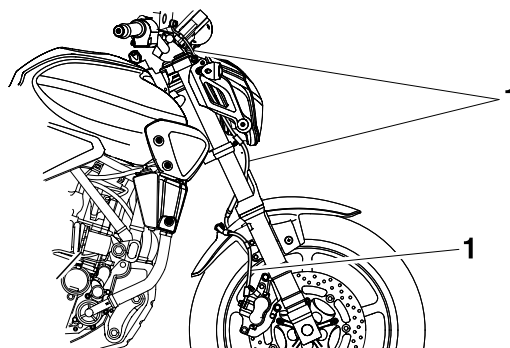
4. Check:
  - Brake pad pins  
Damage/wear → Replace.

EAS00131

## CHECKING THE FRONT AND REAR BRAKE HOSES

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

1. Check:
  - Front brake hoses "1"
  - Rear brake hoses "2"
 Cracks/damage/wear → Replace.



2. Check:
  - Brake hose clamp  
Loose → Tighten the clamp bolt.
3. Hold the motorcycle upright and apply the brake several times.
4. Check:
  - Brake hoses  
Brake fluid leakage → Replace the damaged hose.

EAS00134

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

### **⚠ WARNING**

Bleed the hydraulic brake system whenever:

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

### **NOTE:**

- 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:

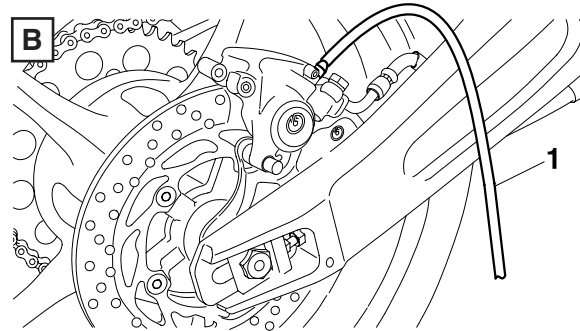
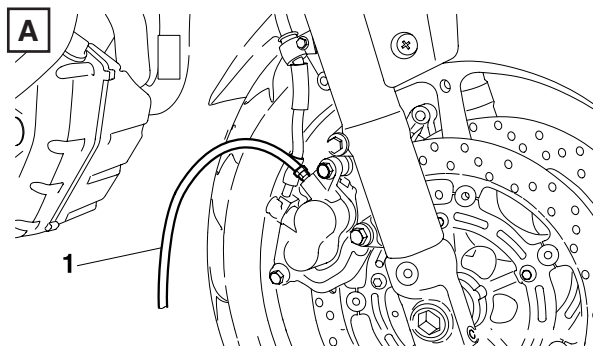
- Hydraulic brake system



- Fill the brake 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.

A. Front brakes

B. Rear brake



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

### **NOTE:**

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

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



#### **Bleed screw**

**6 Nm (0.6 m·kg, 4.3 ft·lb)**

**(front brake)**

**14 Nm (1.4 m·kg, 10 ft·lb)**

**(rear brake)**

- Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-19.

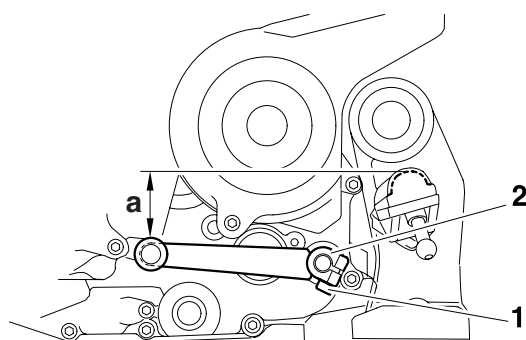
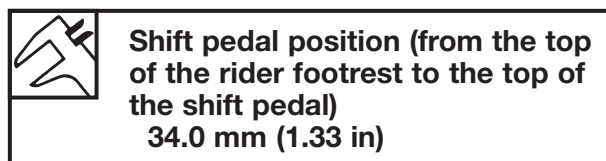
### **⚠ WARNING**

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



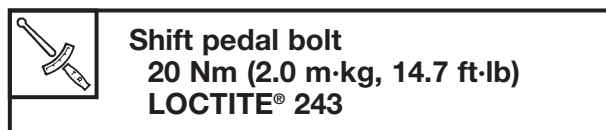
## ADJUSTING THE SHIFT PEDAL

1. Check:
  - Shift pedal position (distance “a” from the top of the rider footrest to the top of the shift pedal)
 Out of specification → Adjust.



2. Adjust:
  - Shift pedal position

- a. Remove the bolt “1”.
- b. Remove the shift pedal “2”.
- c. Install the shift pedal at the correct position.
- d. Install the bolt, and then tighten it to the specified torque.



EAA01140

## ADJUSTING THE DRIVE CHAIN SLACK

**NOTE:** The drive chain slack must be checked at the tightest point on the chain.

**CAUTION:**

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

1. Stand the motorcycle on a level surface.

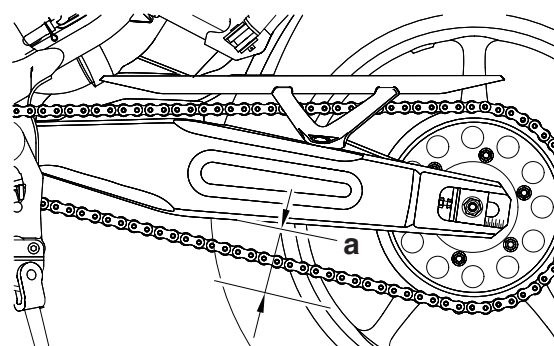
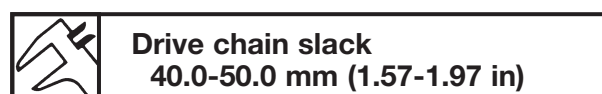
### ⚠ WARNING

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

### NOTE:

Both wheels should be on the ground without a rider on the motorcycle.

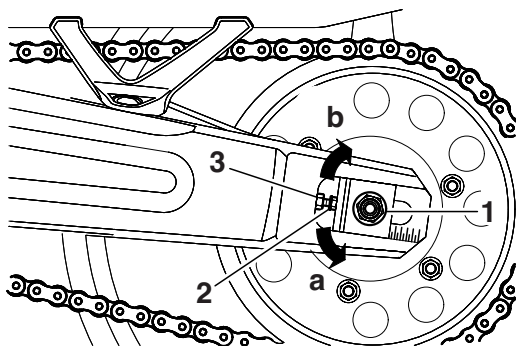
2. Rotate the rear wheel several times and check the drive chain to locate its tightest point.
3. Measure:
  - Drive chain slack “a”
 Out of specification → Adjust.



4. Loosen:
  - Wheel axle nut “1”
5. Adjust:
  - Drive chain slack

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

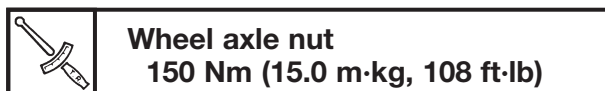
**Direction (a)**  
Drive chain is tightened.  
**Direction (b)**  
Drive chain is loosened.



## NOTE:

- To maintain the proper wheel alignment, adjust both sides evenly.
- Push the rear wheel forward to make sure that there is no clearance between the swingarm end plates and the ends of the swingarm.

c. Tighten the wheel axle nut to specification.



d. Tighten the locknuts to specification.

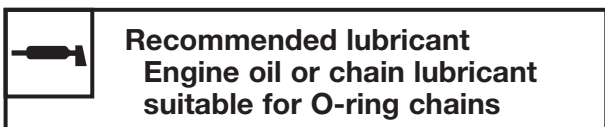


EAS00142

## 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 motorcycle is used in dusty areas.

This motorcycle 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.



EAS00146

## CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the motorcycle on a level surface.

### ⚠ WARNING

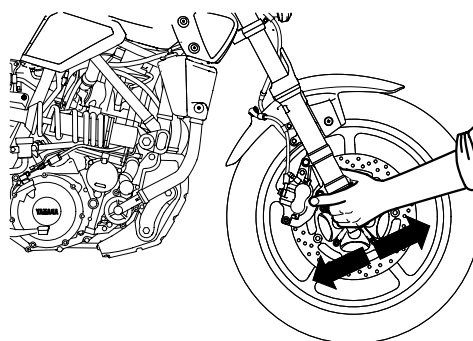
Securely support the motorcycle so that there is no danger of it falling over.

### NOTE:

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

2. Check:

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



3. Remove:

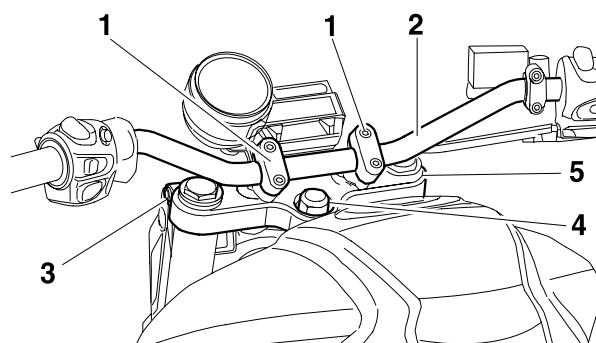
- Handlebar holder caps
- Upper handlebar holders "1"
- Handlebar "2"

4. Loosen:

- Upper bracket pinch bolts "3"

5. Remove:

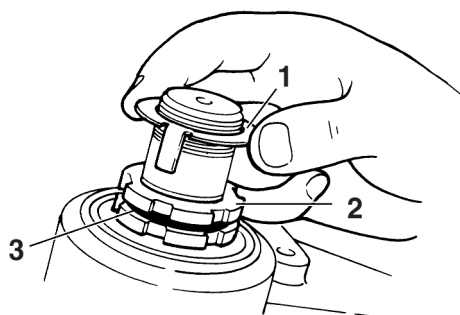
- Steering stem nut "4"
- Washer
- Upper bracket "5"



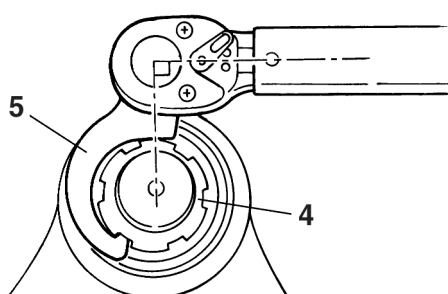
6. Adjust:

- Steering head

- a. Remove the lock washer “1”, the upper ring nut “2”, and the rubber washer “3”.

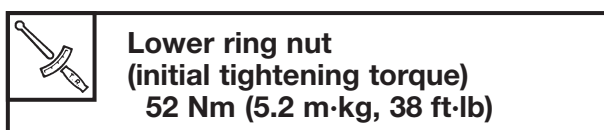


- b. Loosen the lower ring nut “4”, and then tighten it to the specified torque with a steering nut wrench “5”.



**NOTE:** \_\_\_\_\_

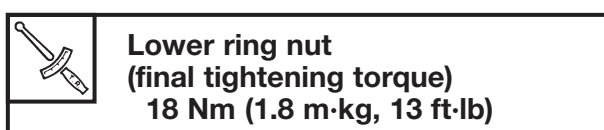
Set the torque wrench at a right angle to the steering nut wrench.



- c. Loosen the lower ring nut completely, and then tighten it to the specified torque.

**⚠ WARNING** \_\_\_\_\_

**Do not overtighten the lower ring nut.**



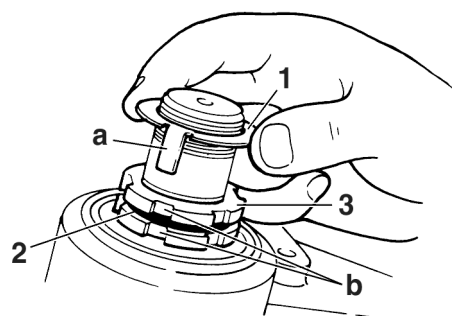
- d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to “STEERING HEAD” on page 4-55.

- e. Install the rubber washer “2”.  
f. Install the upper ring nut “3”.  
g. Finger tighten the upper ring nut “3”, and then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.  
h. Install the lock washer “1”.

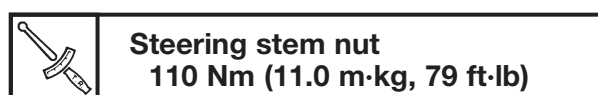
**NOTE:** \_\_\_\_\_

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



7. Install:

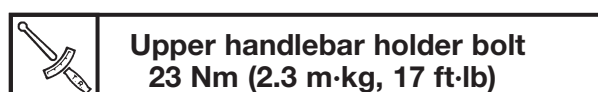
- Upper bracket
- Washer
- Steering stem



8. Tighten:
- Upper bracket pinch bolts



9. Install:
- Handlebar
  - Upper handlebar holders



- Handlebar holder caps  
Refer to "HANDLEBAR" on page 4-41.

EAS00149

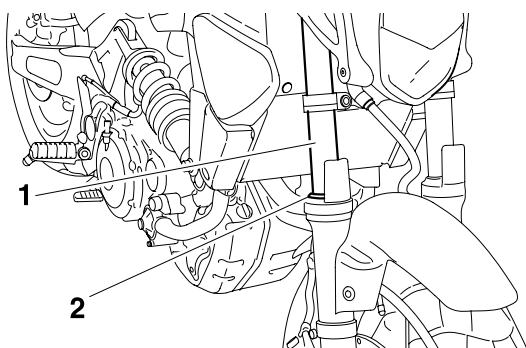
## CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

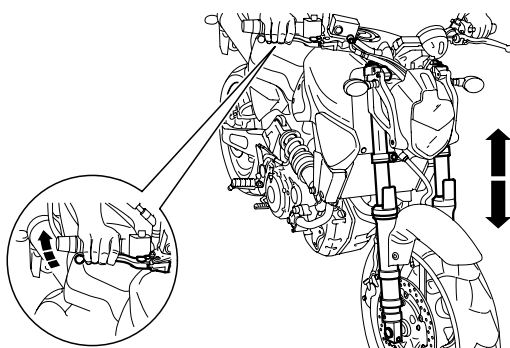
### **⚠ WARNING**

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

2. Check:
  - Inner tubes "1"
  - Damage/scratches → Replace.
  - Oil seals "2"
  - Oil leakage → Replace.



3. Hold the motorcycle upright and apply the front brake.
4. Check:
  - Front fork operation  
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.  
Rough movement → Repair.  
Refer to "FRONT FORK" on page 4-46.



EAA01030

## ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

### **⚠ WARNING**

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

### Spring preload

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
  - Spring preload

#### **NOTE:**

Adjust the spring preload with the special wrench and extension bar included in the owner's tool kit.



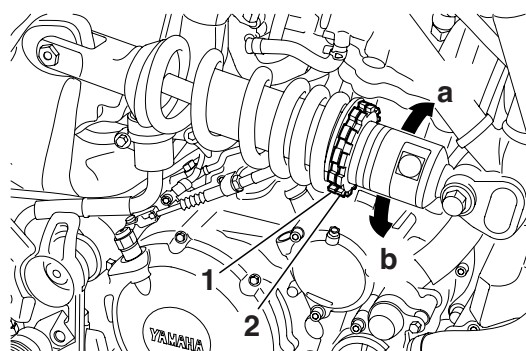
- a. Loosen the locknut "2".
- b. Turn the adjusting ring "1" in direction "a" or "b".

#### **Direction (a)**

Spring preload is increased  
(suspension is harder)

#### **Direction (b)**

Spring preload is decreased  
(suspension is softer)



#### **Adjusting positions**

Standard: 170 mm (6.69 in)

Minimum: 174.5 mm (6.87 in)

Maximum: 165.5 mm (6.49 in)



c. Tighten the locknut “2” to specification.



**Locknut**  
**45 Nm (4.5 m·kg, 32.5 ft·lb)**



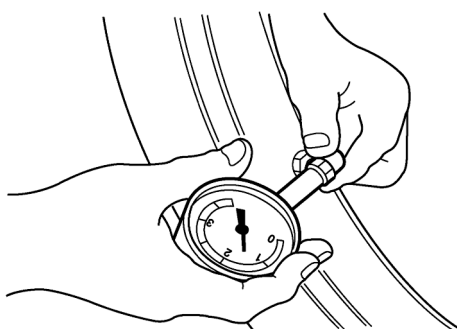
EAS00166

## CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Check:

- Tire pressure  
Out of specification → Regulate.



**⚠ WARNING**

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

**NEVER OVERLOAD THE MOTORCYCLE.**

Basic weight: With oil and full fuel tank	192 kg (423 lb)	
Maximum load*	186 kg (410 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg load*	210 kPa (2.1 kgf/cm <sup>2</sup> , 30 psi)	230 kPa (2.3 kgf/cm <sup>2</sup> , 33 psi)
90 kg ~ Maximum load*	230 kPa (2.3 kgf/cm <sup>2</sup> , 33 psi)	250 kPa (2.5 kgf/cm <sup>2</sup> , 36 psi)
High-speed riding	210 kPa (2.1 kgf/cm <sup>2</sup> , 30 psi)	230 kPa (2.3 kgf/cm <sup>2</sup> , 33 psi)

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

**⚠ WARNING**

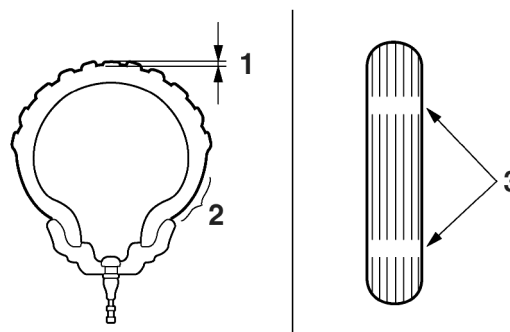
**It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.**

2. Check:

- Tire surfaces  
Damage/wear → Replace the tire.



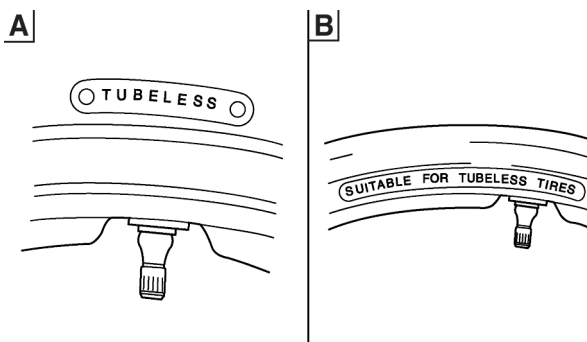
**Minimum tire tread depth**  
**1.6 mm (0.063 in)**



1. Tire tread depth
2. Sidewall
3. Wear indicator

## ⚠ WARNING

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



A. Tire  
B. Wheel

Tube wheel  
Tube tire only  
Tubeless wheel  
Tube or tubeless tire

## ⚠ WARNING

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



**Front tire**  
Tire type  
Tubeless  
Size  
120/70-ZR17M/C (58W)  
120/70-R17M/C (58H)  
Manufacturer/Model  
DUNLOP D270F/  
PIRELLI SCORPION SYNC



**Rear tire**  
Tire type  
Tubeless  
Size  
160/60-ZR17M/C (69W)  
160/60-R17M/C (69H)  
Manufacturer/Model  
DUNLOP D270/  
PIRELLI SCORPION SYNC

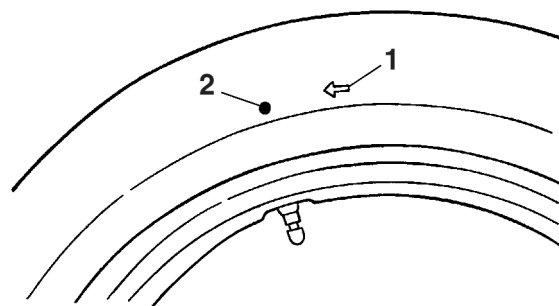
## ⚠ WARNING

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

## NOTE:

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

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



## CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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



EWA13260

## **⚠ WARNING**

**Never attempt to make any repairs to the wheel.**

## **NOTE:**

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

EAS00170

## **CHECKING AND LUBRICATING THE CABLES**

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

## **⚠ WARNING**

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

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



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

## **NOTE:**

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

EAS00172

## **LUBRICATING THE SIDESTAND**

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



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

## **LUBRICATING THE SIDE SUSPENSION**

The pivoting points of the side suspension must be lubricated at the intervals specified in the periodic maintenance and lubrication chart.



**Recommended lubricant**  
**Swingarm pivots**  
**Bearing grease**  
**Other pivoting points**  
**Lithium-soap-based grease**

EAS00171

## **LUBRICATING THE LEVERS AND BRAKE PEDAL**

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



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

## ELECTRICAL SYSTEM

EAS21760

### CHECKING AND CHARGING THE BATTERY

Refer to “ELECTRICAL COMPONENTS” on page 8-49.

EAS21770

### CHECKING THE FUSES

Refer to “ELECTRICAL COMPONENTS” on page 8-48.

### REPLACING THE HEADLIGHT BULB

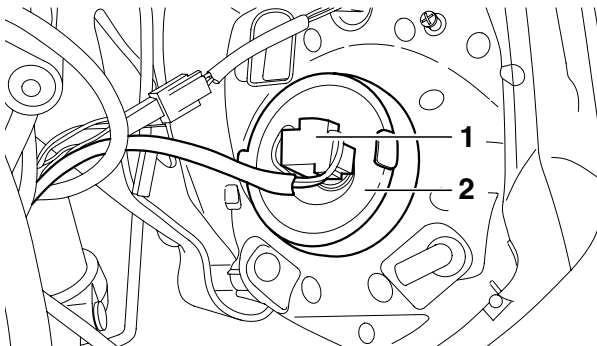
#### NOTE:

This model is equipped with a quartz bulb headlight.

1. Replace:
  - Headlight bulb



- a. Disconnect:
  - Headlight coupler “1”
- b. Remove:
  - Headlight bulb cover “2”

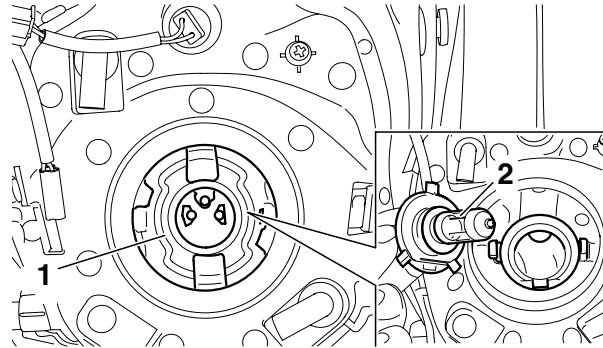


- c. Detach:
  - Headlight bulb holder “1”
- d. Remove:
  - Defective bulb “2”

EWA13320

#### **⚠ WARNING**

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



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

ECA10650

#### **CAUTION:**

Take care not to damage the following parts:

- Headlight bulb
  - Do not touch the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the luminosity of the bulb, and the bulb life will be adversely affected. Thoroughly clean off any dirt and fingerprints on the headlight bulb using a cloth moistened with alcohol or thinner.
- Headlight lens
  - Do not affix any type of tinted film or stickers to the headlight lens.
  - Do not use a headlight bulb of a wattage higher than specified.

- f. Install:
  - Headlight bulb cover
- g. Connect:
  - Headlight coupler

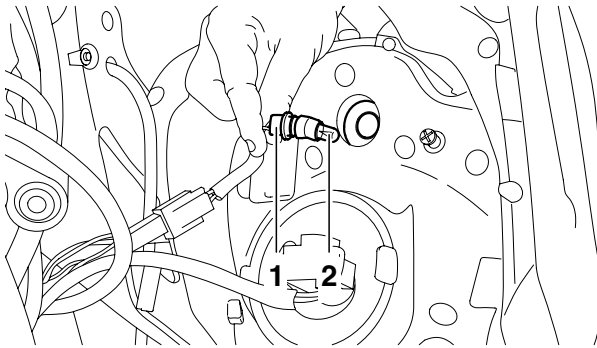


### REPLACING AN AUXILIARY LIGHT BULB

1. Replace:
  - Auxiliary light bulb



- a. Remove:
  - Headlight Auxiliary light socket “1” (together with the auxiliary light bulb)
- b. Remove:
  - Headlight Auxiliary light bulb “2” (by pulling it out)



- c. Install:
- Auxiliary light bulb into the socket (by pushing it in) **New**
  - Auxiliary light socket (together with the bulb) by pushing it in.

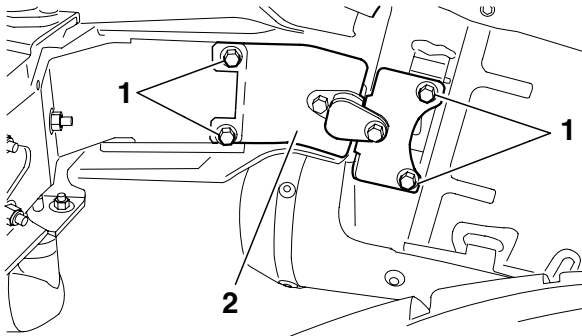


## REPLACING THE TAIL/BRAKE LIGHT BULB

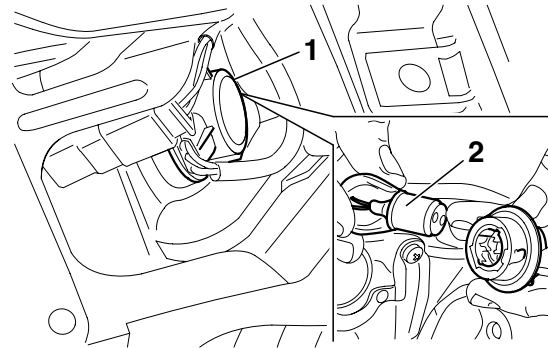
1. Replace:
- Tail/brake light bulb



- a. Remove:
- Tail/brake light bulb cover bolts "1"
  - Tail/brake light bulb cover "2"



- b. Remove:
- Tail/brake light socket "1" (together with the tail/brake light bulb)  
Turn the socket counterclockwise.
  - Tail/brake light bulb "2"  
Push in and turn the bulb counterclockwise.



- c. Install:
- Tail/brake light bulb into the socket (by pushing it in and then turning it clockwise until it stops) **New**
  - Tail/brake light socket (together with the bulb) by turning it clockwise.
  - Tail/brake light bulb cover
  - Tail/brake light bulb cover bolts
- d. Tighten:
- Tail/brake light bulb cover bolts

	<b>Tail/brake light bulb cover bolt</b> <b>10 Nm (1.0 m·kg, 7.2 ft·lb)</b>
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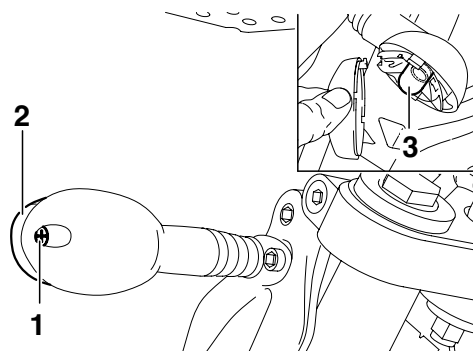


## REPLACING A TURN SIGNAL LIGHT BULB

1. Replace:
- Turn signal light bulb



- a. Remove:
- Turn signal light lens screw "1"
  - Turn signal light lens "2"
  - Turn signal light bulb "3"
- Push in and turn the bulb counterclockwise.



- b. Install:
- Turn signal light bulb into the socket (by pushing it in and then turning it clockwise until it stops) **New**
  - Turn signal light lens
  - Turn signal light lens screw

# ELECTRICAL SYSTEM

## CAUTION:

Do not overtighten the screw, otherwise the lens may break.

## REPLACING THE LICENSE PLATE LIGHT BULB

### 1. Replace:

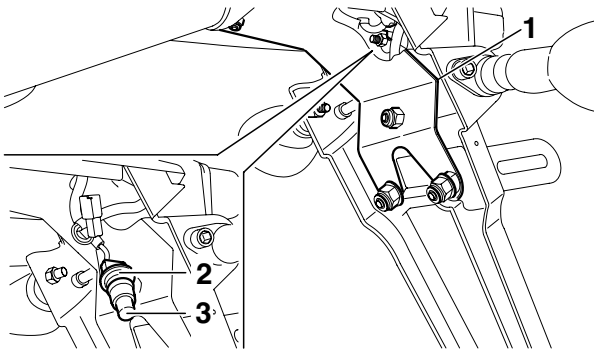
- License plate light bulb

### a. Remove:

- Reinforcement plate bolts and nuts
- Reinforcement plate "1"
- License plate light bulb socket "2" (by pulling it out)
- License plate light bulb "3" (by pulling it out)

## NOTE:

When removing the license plate light bulb socket, be careful not to pull too hard.



### b. Install:

- License plate light bulb into the socket (by pushing it in) **New**
- License plate light bulb socket (by pushing it in)
- Reinforcement plate
- Reinforcement plate bolts and nuts

### c. Tighten:

- Reinforcement plate bolts and nuts



Reinforcement plate nut  
7 Nm (0.7 m·kg, 5.1 ft·lb)  
Reinforcement plate bolt (centre)  
10 Nm (1.0 m·kg, 7.2 ft·lb)  
Reinforcement plate bolt (upper)  
10 Nm (1.0 m·kg, 7.2 ft·lb)

EAA01170

## ADJUSTING THE HEADLIGHT BEAM

### 1. Adjust:

- Headlight beam (vertically)

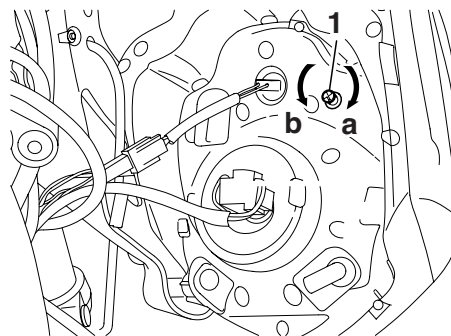
- a. Turn the adjusting screw "1" in direction "a" or "b"

### Direction (a)

Headlight beam is lowered

### Direction (b)

Headlight beam is raised





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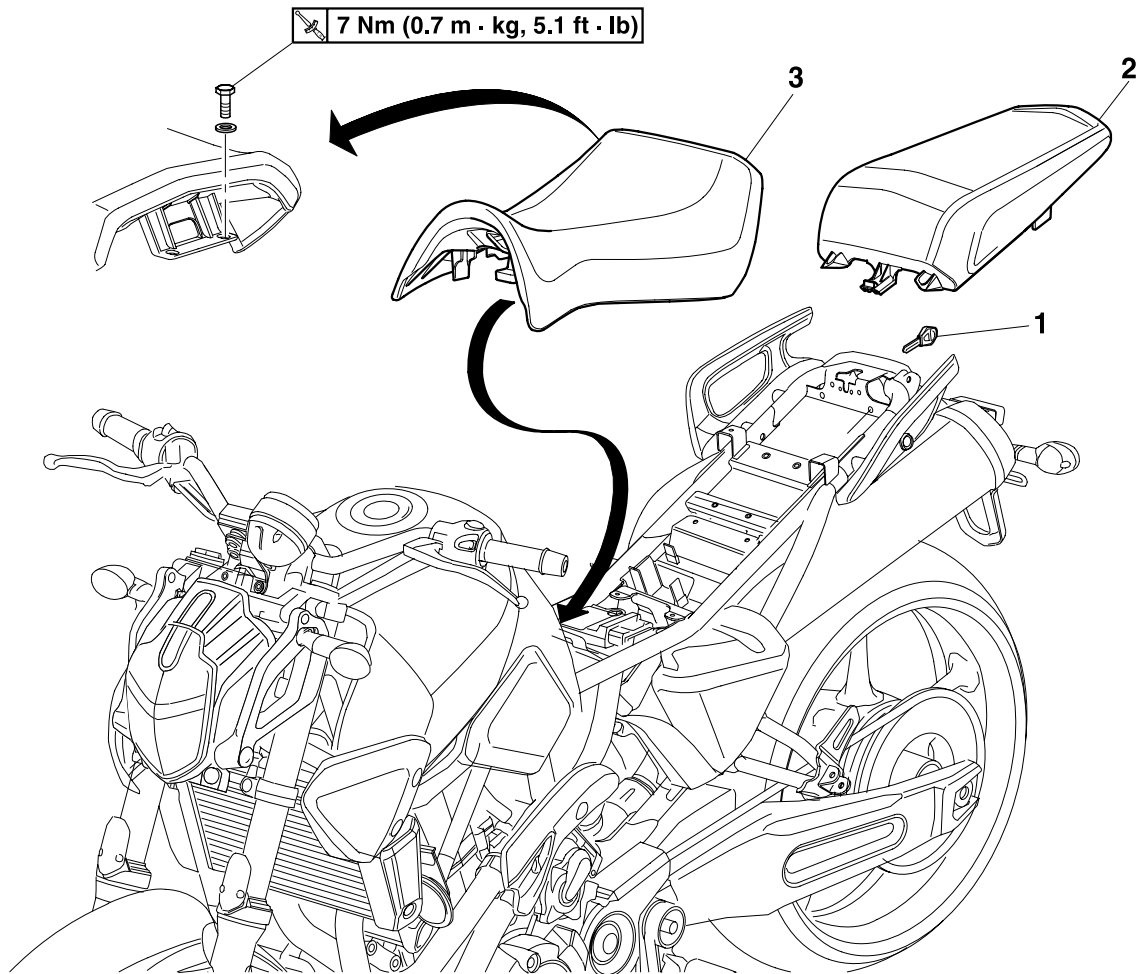
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## GENERAL CHASSIS

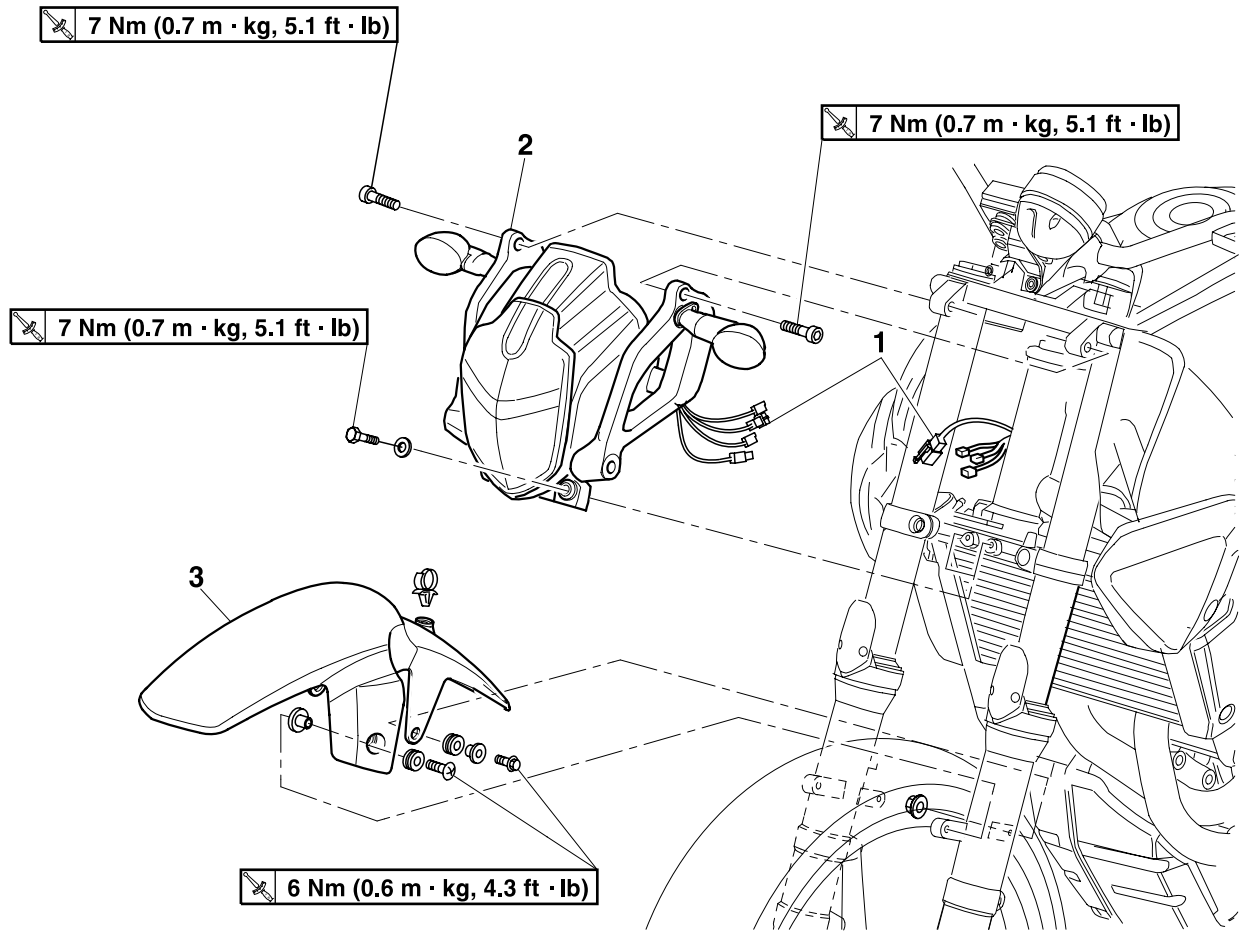
### Removing the seats



Order	Job/Parts to remove	Q'ty	Remarks
1	Key	1	Turn counterclockwise.
2	Passenger seat	1	
3	Driver seat	1	
			For installation, reverse the removal procedure.

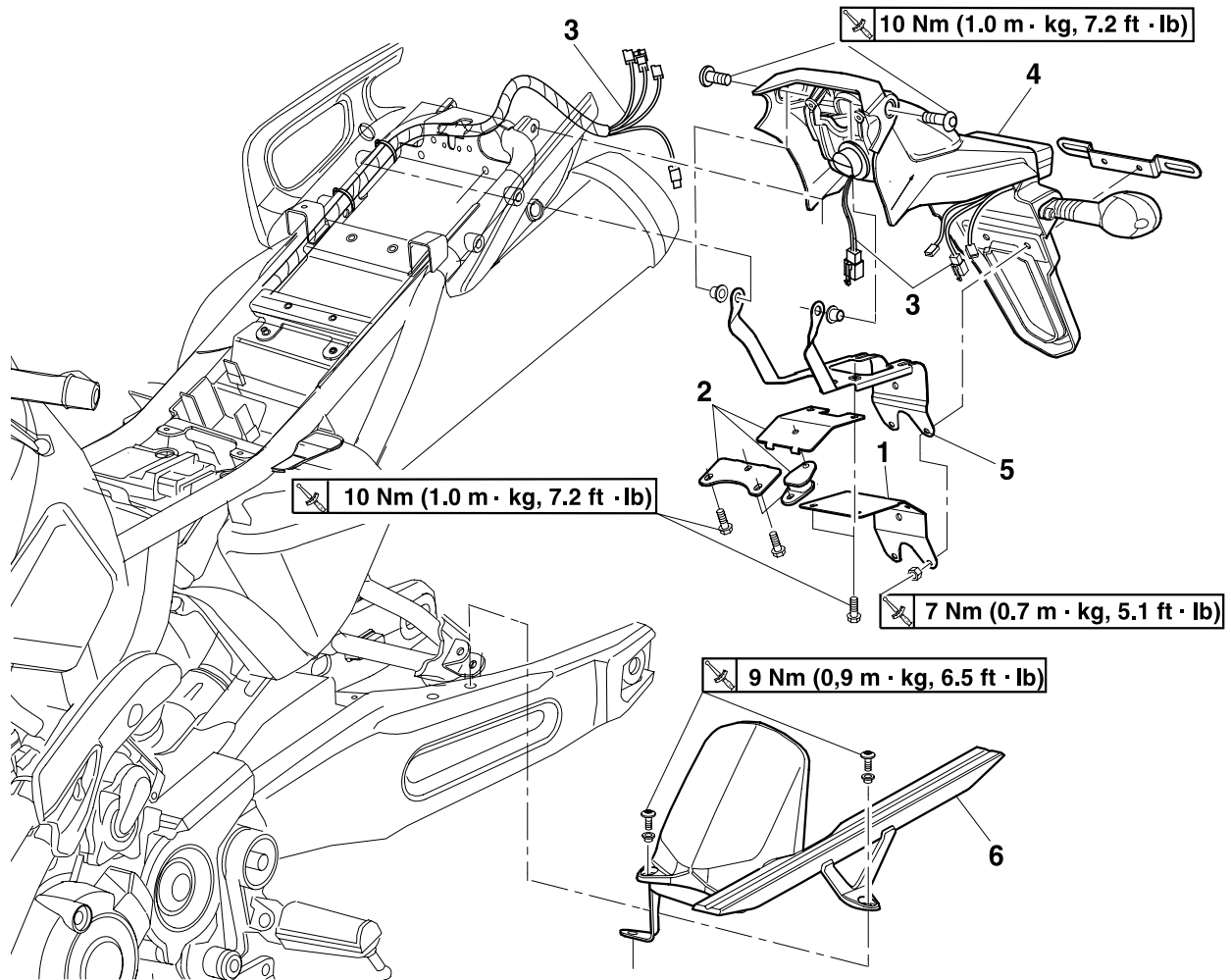


## Removing the cowling



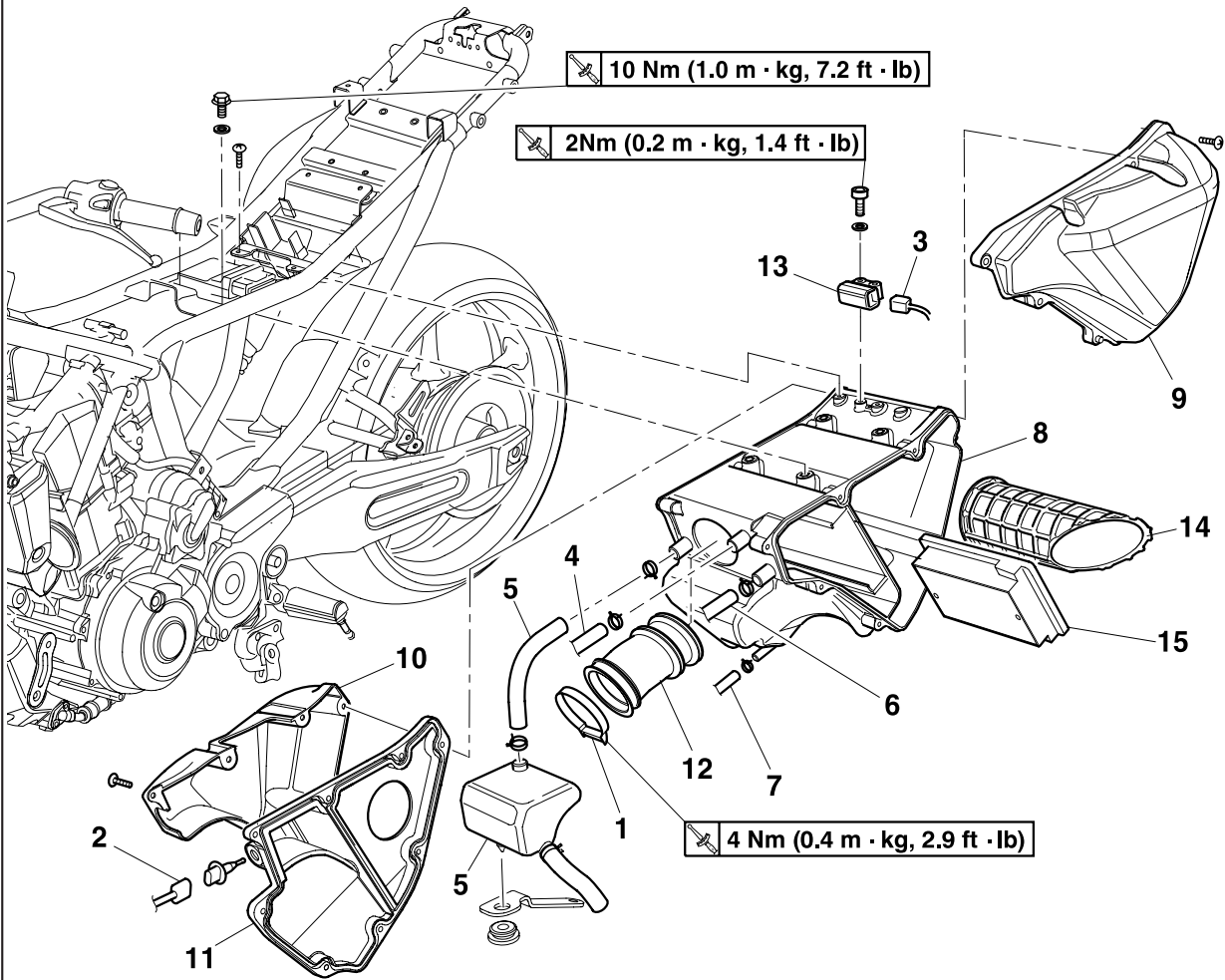
Order	Job/Parts to remove	Q'ty	Remarks
1	Headlight/Auxiliary light/Front turn signal light (left and right) couplers	1/1/1/1	Disconnect.
2	Headlight assembly	1	
3	Front fender	1	
			For installation, reverse the removal procedure.

## Removing the rear fender cover, license bracket and tail/brake light assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Plate	1	
2	Brackets/Muffler stay	2/1	
3	Tail/brake light/License light/Rear turn signal lights (left and right) couplers	1/1/1/1	Disconnect.
4	License bracket and tail/brake light assembly	1	
5	Bracket	1	
6	Rear fender cover	1	
			For installation, reverse the removal procedure.

## Removing the air filter case and crankcase breather chamber



Order	Job/Parts to remove	Q'ty	Remarks
	Seats		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Air filter case joint clamp screw	1	Loosen.
2	Intake air temperature sensor coupler	1	Disconnect.
3	Lean angle cut-off switch coupler	1	Disconnect.
4	Air filter case to air cut-off valve hose	1	Disconnect.
5	Crankcase breather chamber	1	
6	Pilot air hose	1	Disconnect.
7	Check hose	1	Disconnect.
8	Air filter case	1	
9	Air filter case cover (left)	1	
10	Air filter case cover (right)	1	
11	Cleaner case cover	1	
12	Air cleaner joint	1	
13	Lean angle cut-off switch	1	
14	Air cleaner duct	1	
15	Air cleaner element	1	
			For installation, reverse the removal procedure.

### INSTALLING THE AIR FILTER CASE JOINT CLAMP

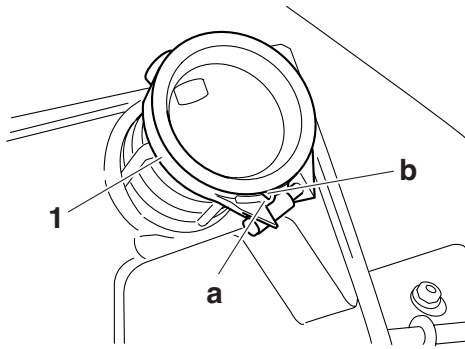
1. Install:

- Air filter case joint clamp “1”

**NOTE:**

To install the air filter case joint clamp, align slot “a” with the projection “b” on the air filter case.

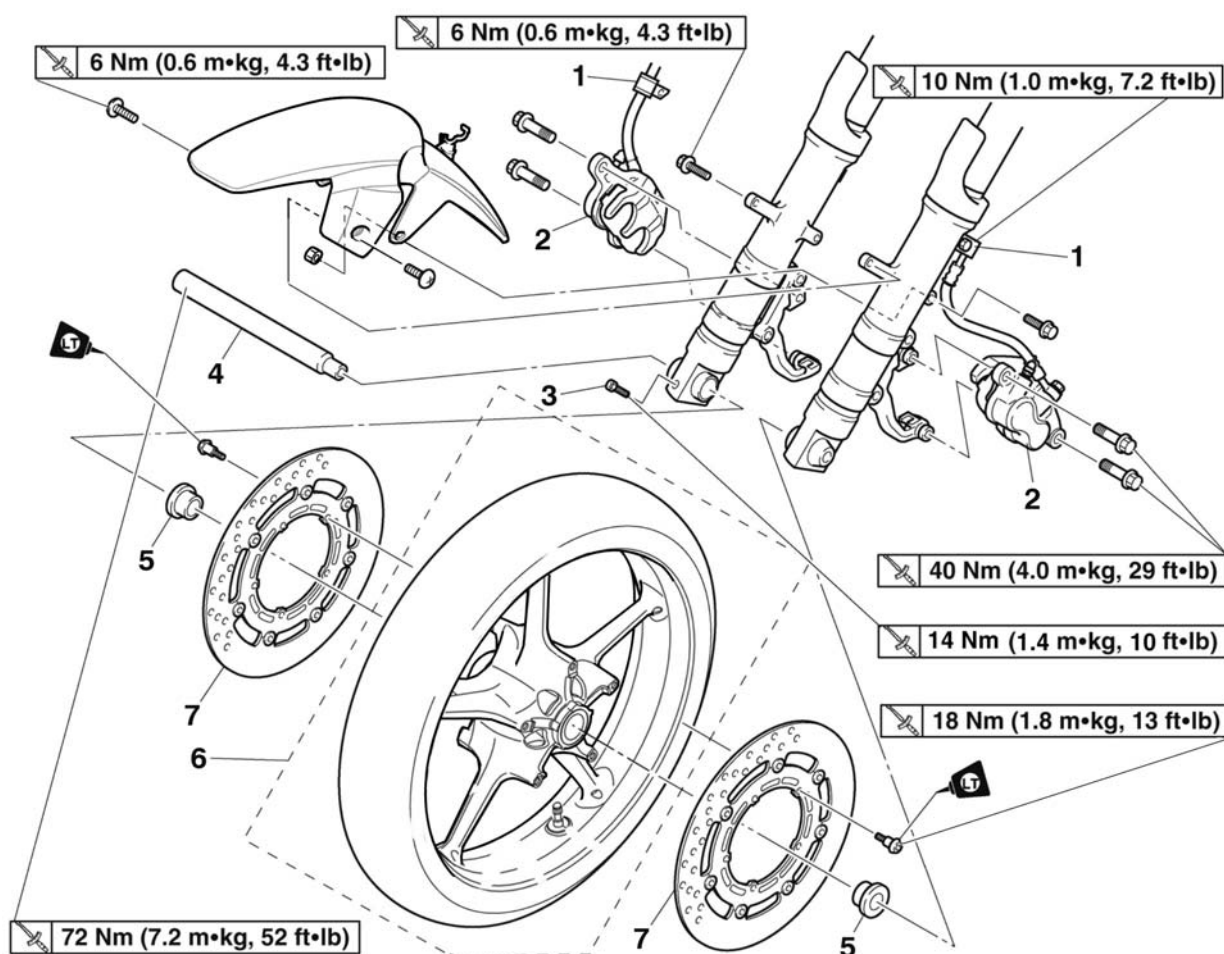
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EAS21870

## FRONT WHEEL

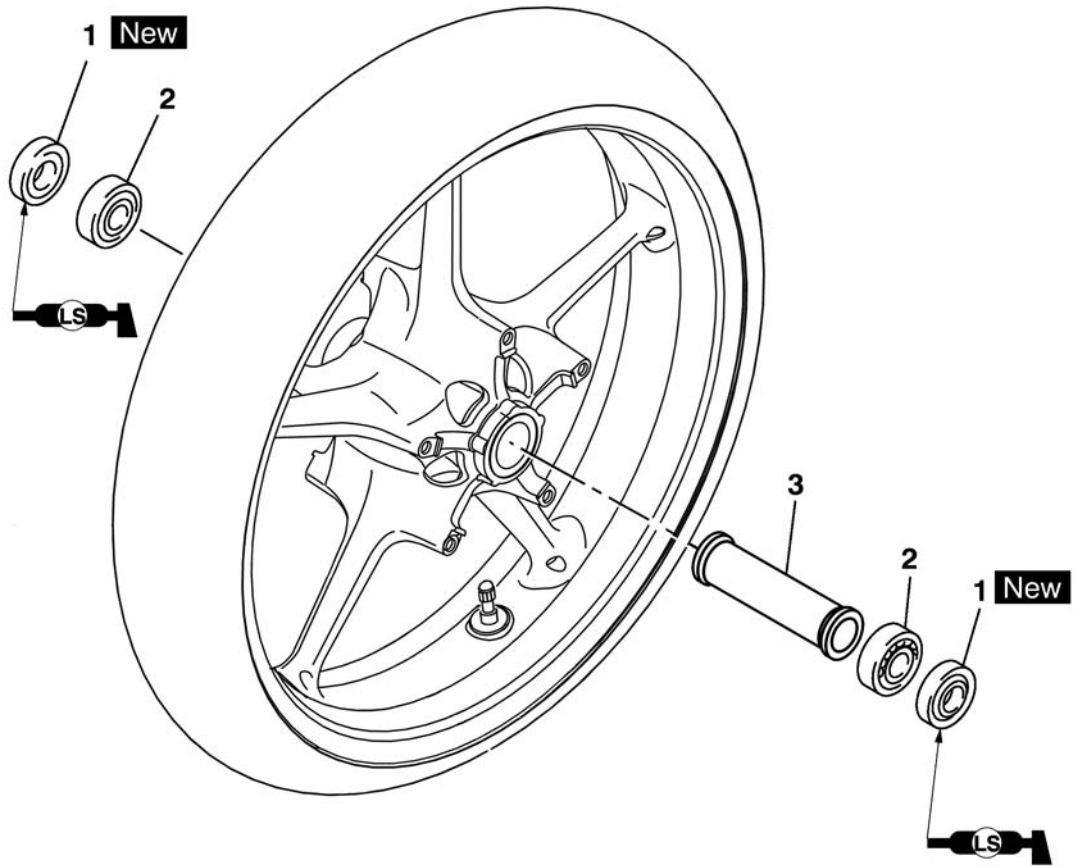
### Removing the front wheel and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			<b>NOTE:</b> Place the vehicle on a suitable stand so that the front wheel is elevated.
1	Front brake hose holder (left and right)	2	
2	Front brake caliper (left and right)	2	
3	Front wheel axle pinch bolt	1	Loosen.
4	Front wheel axle	1	
5	Collar (left and right)	2	
6	Front wheel	1	
7	Front brake disc (left and right)	2	
			For installation, reverse the removal procedure.

## FRONT WHEEL

### Disassembling the front wheel



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

EAS21900

## REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

EWA13120

### **⚠ WARNING**

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

### **NOTE:**

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

2. Remove:

- Front brake calipers

### **NOTE:**

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

EAS21910

## DISASSEMBLING THE FRONT WHEEL

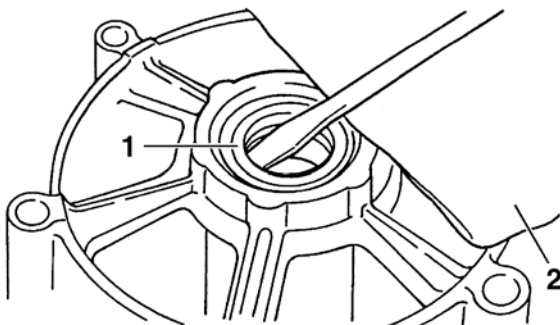
1. Remove:

- Oil seals
- Wheel bearings

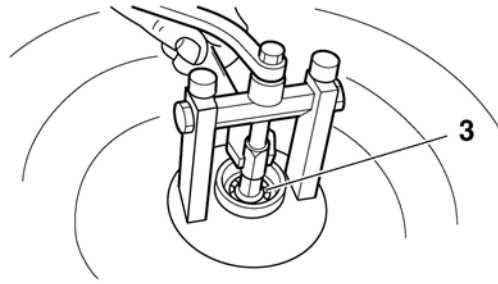
- a. Clean the outside of the front wheel hub.
- b. Remove the oil seals "1" with a flat-head screwdriver.

### **NOTE:**

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



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



EAS21920

## CHECKING THE FRONT WHEEL

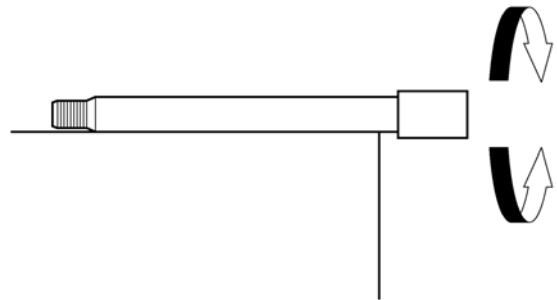
1. Check:

- Front wheel axle  
Roll the wheel axle on a flat surface.  
Bends → Replace.

EWA13460

### **⚠ WARNING**

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



2. Check:

- Tire
- Front wheel  
Damage/wear → Replace.  
Refer to "CHECKING THE TIRES" on page 3-26 and "CHECKING THE WHEELS" on page 3-27.

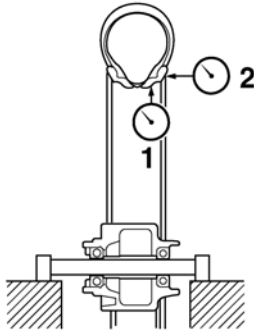
3. Measure:

- Radial wheel runout "1"
  - Lateral wheel runout "2"
- Over the specified limits → Replace.



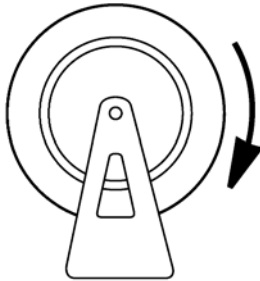
**Radial wheel runout limit**  
**1.0 mm (0.04 in)**  
**Lateral wheel runout limit**  
**0.5 mm (0.02 in)**





## 4. Check:

- Wheel bearings  
Front wheel turns roughly or is loose → Replace the wheel bearings.



- Oil seals  
Damage/wear → Replace.

EAS21960

## ASSEMBLING THE FRONT WHEEL

### 1. Install:

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

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

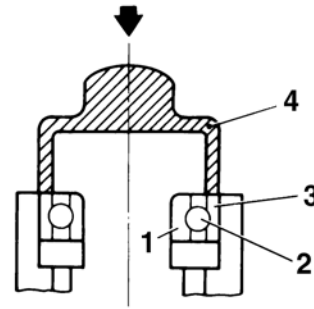
EC5YU1001

### CAUTION:

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

### NOTE:

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



EAS21970

## ADJUSTING THE FRONT WHEEL STATIC BALANCE

### NOTE:

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

### 1. Remove:

- Balancing weight(s)

### 2. Find:

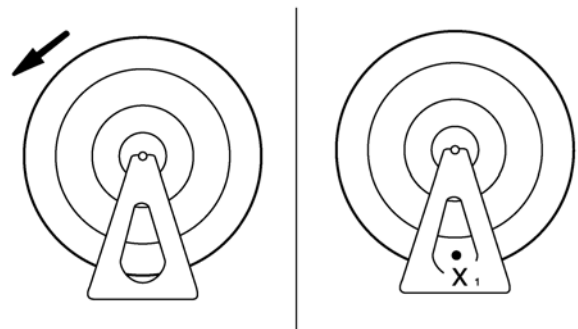
- Front wheel's heavy spot

### NOTE:

Place the front wheel on a suitable balancing stand.

### a. Spin the front wheel.

- When the front wheel stops, put an "X<sub>1</sub>" mark at the bottom of the wheel.



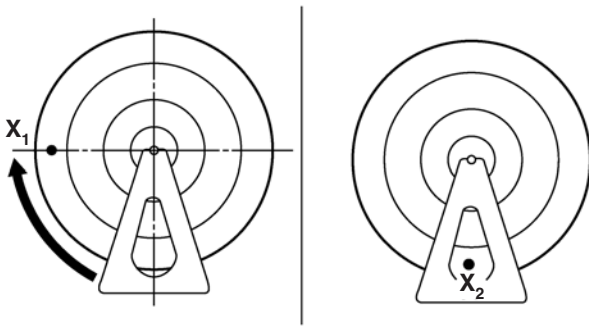
- Turn the front wheel 90° so that the "X<sub>1</sub>" mark is positioned as shown.

### d. Release the front wheel.

- When the wheel stops, put an "X<sub>2</sub>" mark at the bottom of the wheel.



# FRONT WHEEL



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



## 3. Adjust:

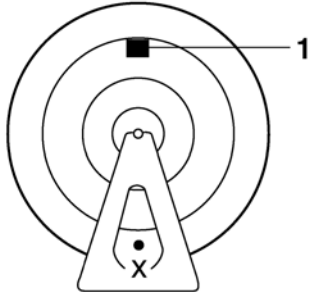
- Front wheel static balance



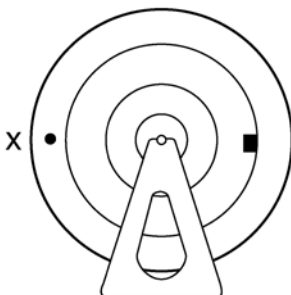
- a. Install a balancing weight "1" onto the rim exactly opposite the heavy spot "X".

## NOTE:

Start with the lightest weight.



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



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

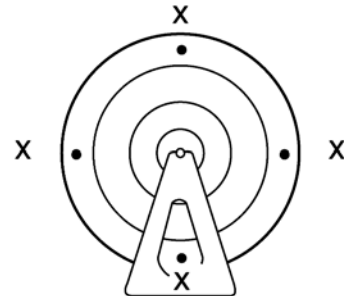


## 4. Check:

- Front wheel static balance



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



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



ET5YU1001

## CHECKING THE FRONT BRAKE DISCS

Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.

EAS22000

## INSTALLING THE FRONT WHEEL (FRONT BRAKE DISCS)

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

## 1. Install:

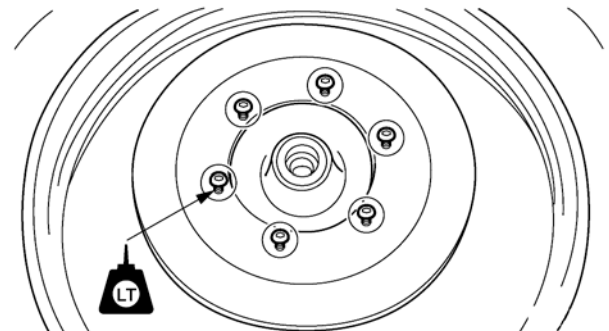
- Front brake disc



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

## NOTE:

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



## FRONT WHEEL

### 2. Check:

- Front brake discs  
Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-23.

### 3. Lubricate:

- Oil seal lips
- Collars

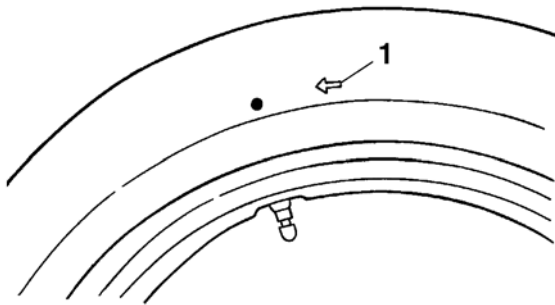


### 4. Install:

- Front wheel

#### NOTE:

Install the tire and wheel with the mark “1” pointing in the direction of wheel rotation.

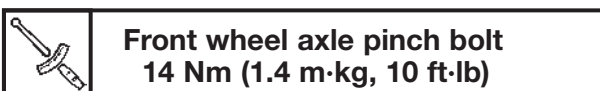


### 5. Tighten:

- Front wheel axle



- Front wheel axle pinch bolt



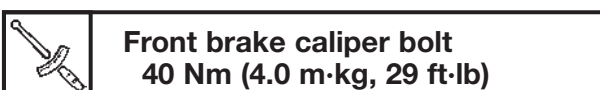
EC5YU1002

#### CAUTION:

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

### 6. Install:

- Front brake calipers



EWA13500

#### WARNING

Make sure the brake hose is routed properly.

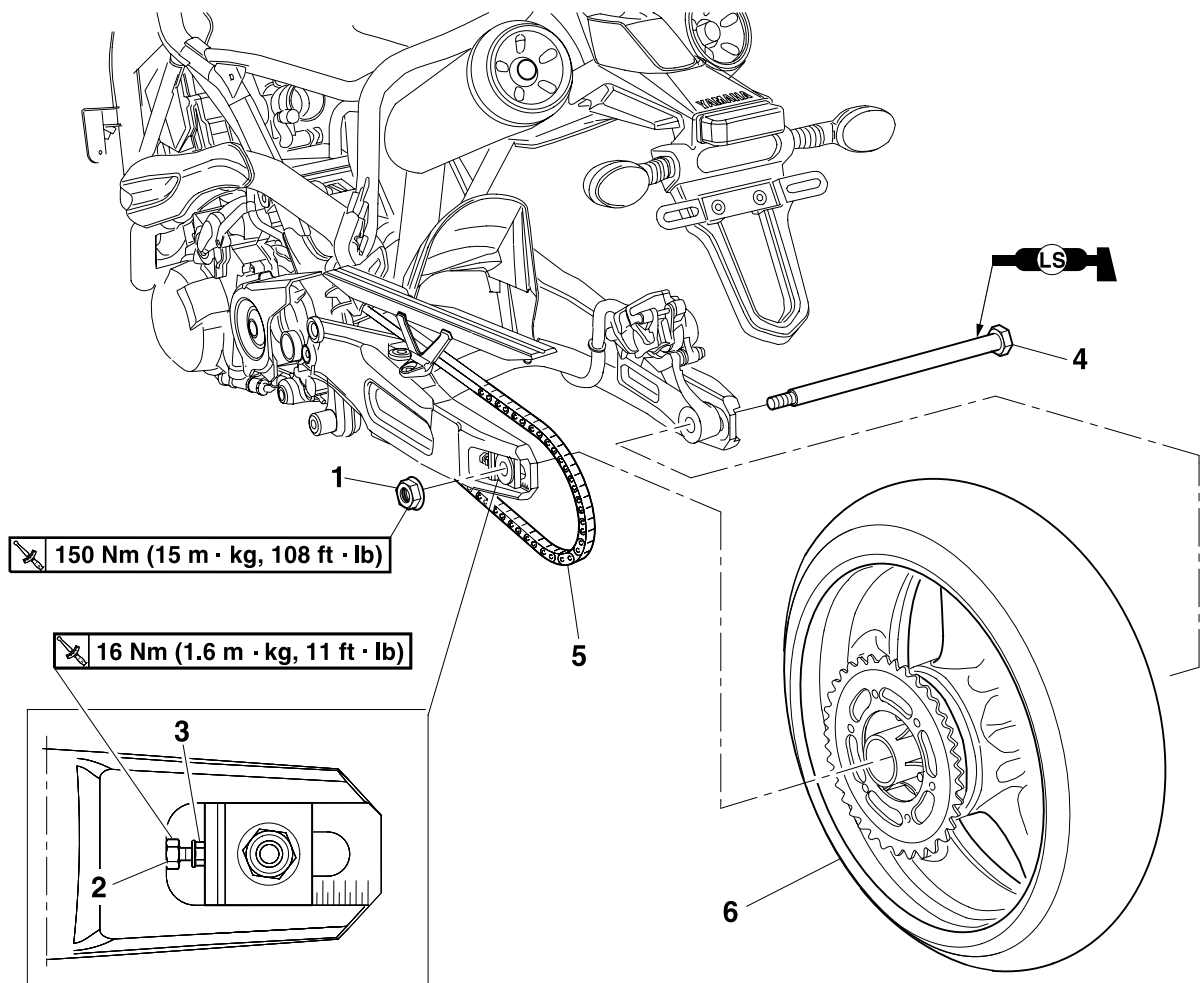
#### NOTE:

Make sure that there is enough space between the brake pads before installing the brake calipers onto the brake discs.

EAS22020

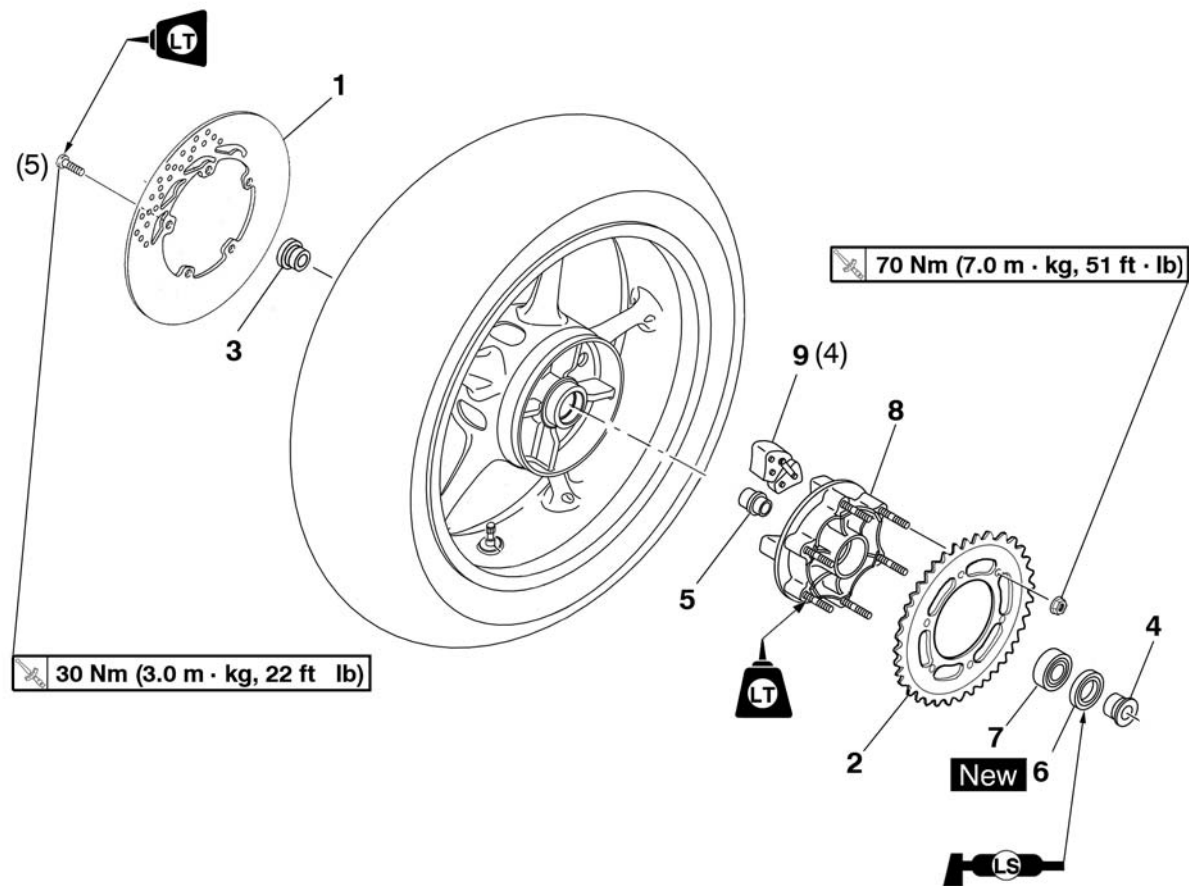
REAR WHEEL

Removing the rear wheel



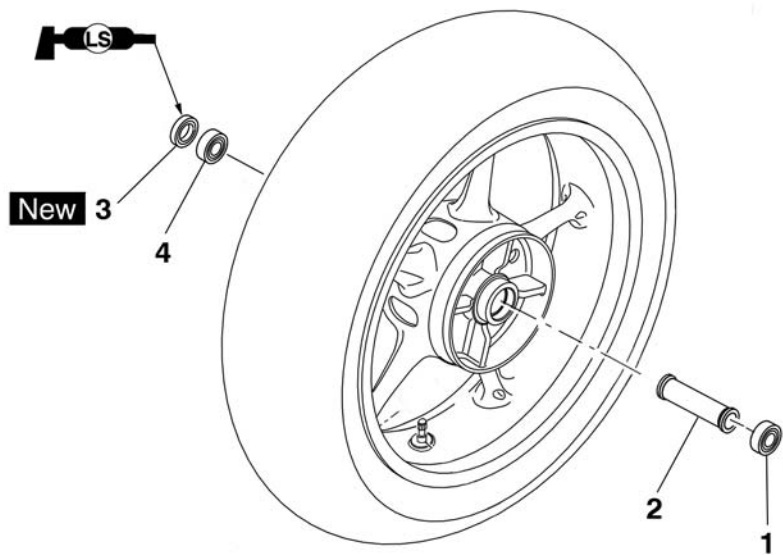
Order	Job/Parts to remove	Q'ty	Remarks
			<b>NOTE:</b> Place the vehicle on a suitable stand so that the front wheel is elevated.
1	Rear wheel axle nut	1	
2	Drive chain adjusting locknut (left and right)	2	Loosen.
3	Drive chain adjusting bolt (left and right)	2	Loosen.
4	Rear wheel axle	1	
5	Drive chain	1	Remove from the rear sprocket.
6	Rear wheel	1	
			For installation, reverse the removal procedure.

Removing the rear brake disc and rear wheel sprocket



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

Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Bearing	1	
2	Spacer	1	
3	Oil seal	1	
4	Bearing	1	
			For installation, reverse the removal procedure.

EAS22040

## REMOVING THE REAR WHEEL

1. Stand the vehicle on a level surface.

EWA13120

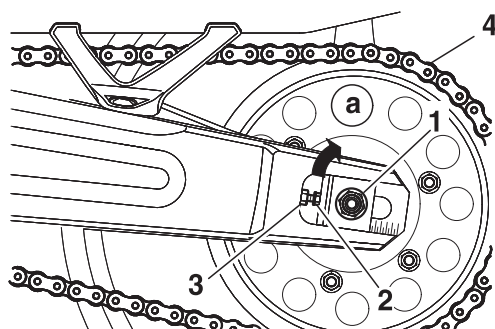
### **WARNING**

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

### **NOTE:**

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

2. Loosen:
  - Wheel axle nut "1"
  - Locknut "2" (on each side of the swingarm)
3. Turn:
  - Drive chain slack adjusting bolt "3" (fully in direction "a")
4. Push:
  - Wheel (forward)
5. Remove:
  - Drive chain "4" (from the rear sprocket)



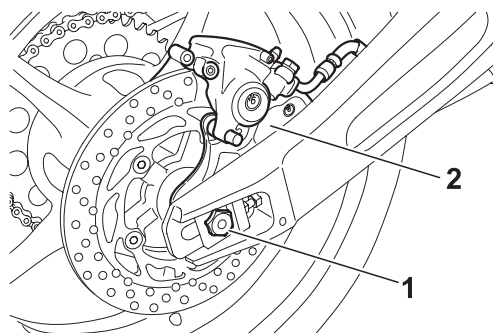
### **NOTE:**

- If the drive chain is difficult to remove, remove the wheel axle first, and then lift the wheel upward enough to remove the drive chain from the rear sprocket.
- The drive chain cannot be disassembled.

6. Remove:
  - Wheel axle "1"
  - Wheel

### **NOTE:**

Support the brake caliper bracket "2" while pulling the wheel axle out.



EAS22080

## DISASSEMBLING THE REAR WHEEL

1. Remove:
  - Oil seals
  - Wheel bearings
 Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-8.

EAS22090

## CHECKING THE REAR WHEEL

1. Check:
  - Rear wheel axle
  - Rear wheel
  - Wheel bearings
  - Oil seals
 Refer to "CHECKING THE FRONT WHEEL" on page 4-8.
2. Check:
  - Tire
  - Rear wheel
 Damage/wear → Replace.  
 Refer to "CHECKING THE TIRES" on page 3-26 and "CHECKING THE WHEELS" on page 3-27.
3. Measure:
  - Radial wheel runout
  - Lateral wheel runout
 Refer to "CHECKING THE FRONT WHEEL" on page 4-8.



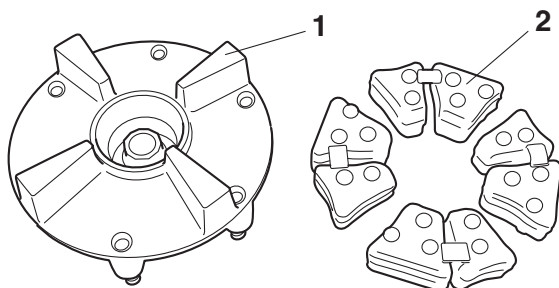
**Radial wheel runout limit**  
**1.0 mm (0.04 in)**  
**Lateral wheel runout limit**  
**0.5 mm (0.02 in)**

EAS22110

## CHECKING THE REAR WHEEL DRIVE HUB

### 1. Check:

- Rear wheel drive hub “1”  
Cracks/damage → Replace.
- Rear wheel drive hub dampers “2”  
Damage/wear → Replace.

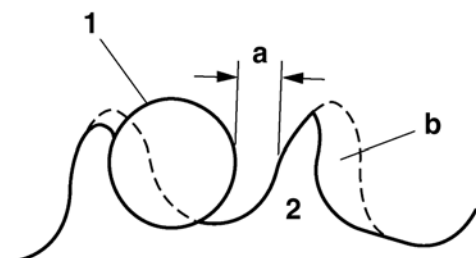


EAS22120

## CHECKING AND REPLACING THE REAR WHEEL SPROCKET

### 1. Check:

- Rear wheel sprocket  
More than 1/4 tooth “a” wear → Replace the rear wheel sprocket.  
Bent teeth → Replace the rear wheel sprocket.



b. Correct

1. Drive chain roller
2. Rear wheel sprocket

### 2. Replace:

- Rear wheel sprocket

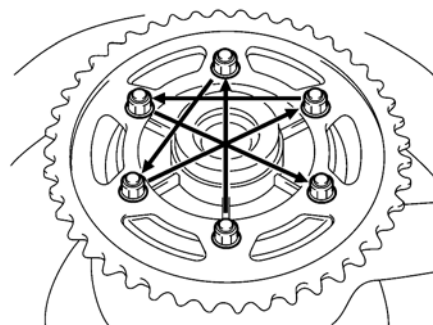
- Remove the self-locking nuts and the rear wheel sprocket.
- Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
- Install the new rear wheel sprocket.



**Rear wheel sprocket self-locking nut**  
**70 Nm (7.0 m·kg, 51 ft·lb)**

### NOTE:

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



EAS22140

## ASSEMBLING THE REAR WHEEL

### 1. Install:

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

Refer to “ASSEMBLING THE FRONT WHEEL” on page 4-9.

EAS22150

## ADJUSTING THE REAR WHEEL STATIC BALANCE

### NOTE:

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

### 1. Adjust:

- Rear wheel static balance  
Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-9.

ET5YU1026

## CHECKING THE REAR BRAKE DISC

Refer to “CHECKING THE REAR BRAKE DISC” on page 4-35.

EAS22160

## INSTALLING THE REAR WHEEL (REAR BRAKE DISC)

### 1. Install:

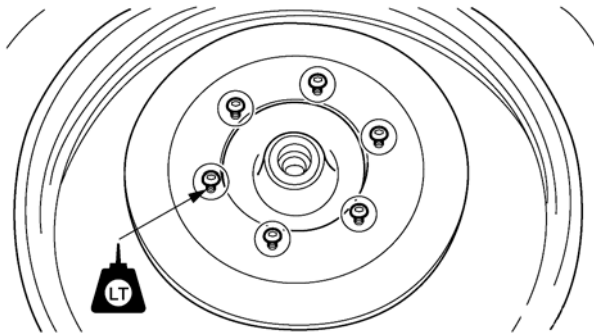
- Rear brake disc



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

**NOTE:**

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



2. Check:

- Rear brake disc  
Refer to “CHECKING THE REAR BRAKE DISC” on page 4-35.

3. Lubricate:

- Oil seal lips
- Collars



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

4. Install:

- Collar (wheel sprocket side)
- Collar (brake disc side)
- Rear brake caliper  
(on the swingarm)
- Rear wheel  
(on the swingarm)
- Drive chain  
(on the rear sprocket)
- Rear wheel axle
- Rear wheel axle nut

5. Adjust:

- Drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-22.



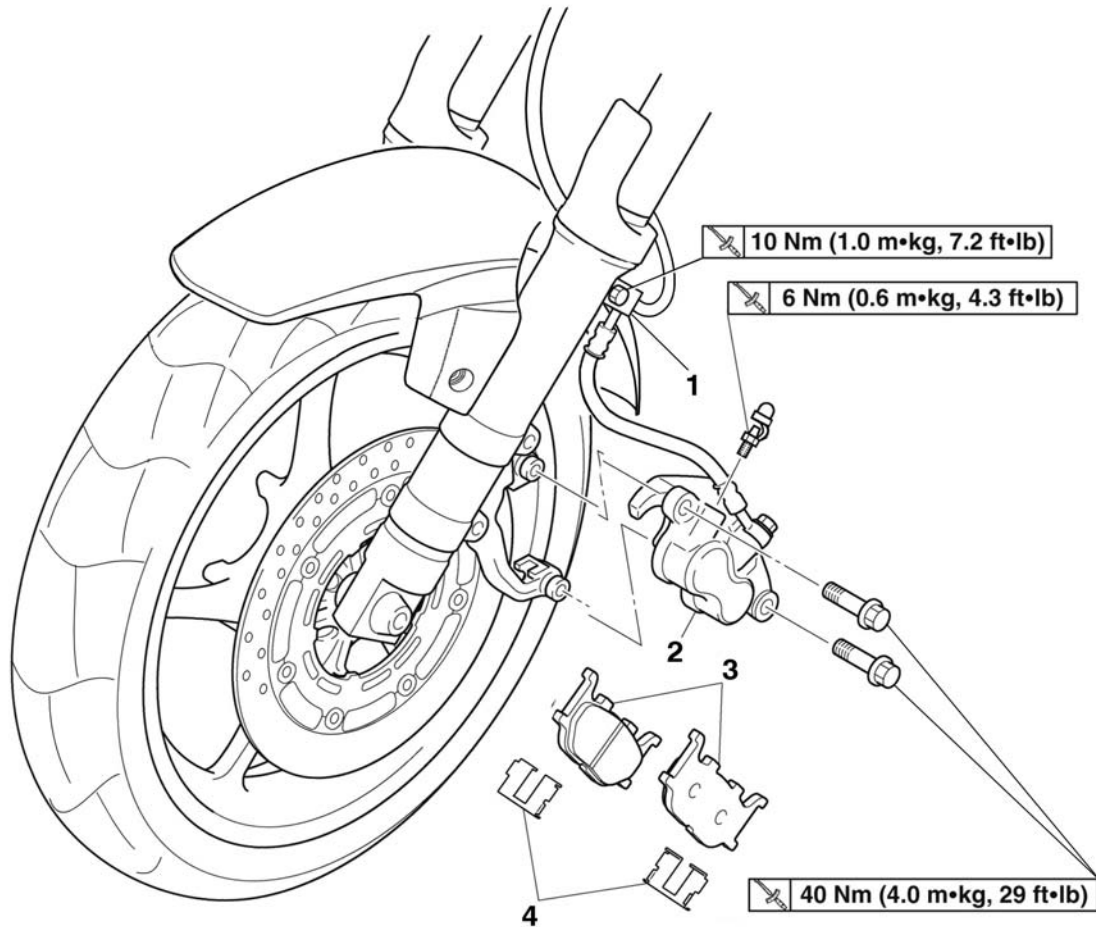
**Drive chain slack**  
**40.0–50.0 mm (1.57–1.97 in)**



EAS22210

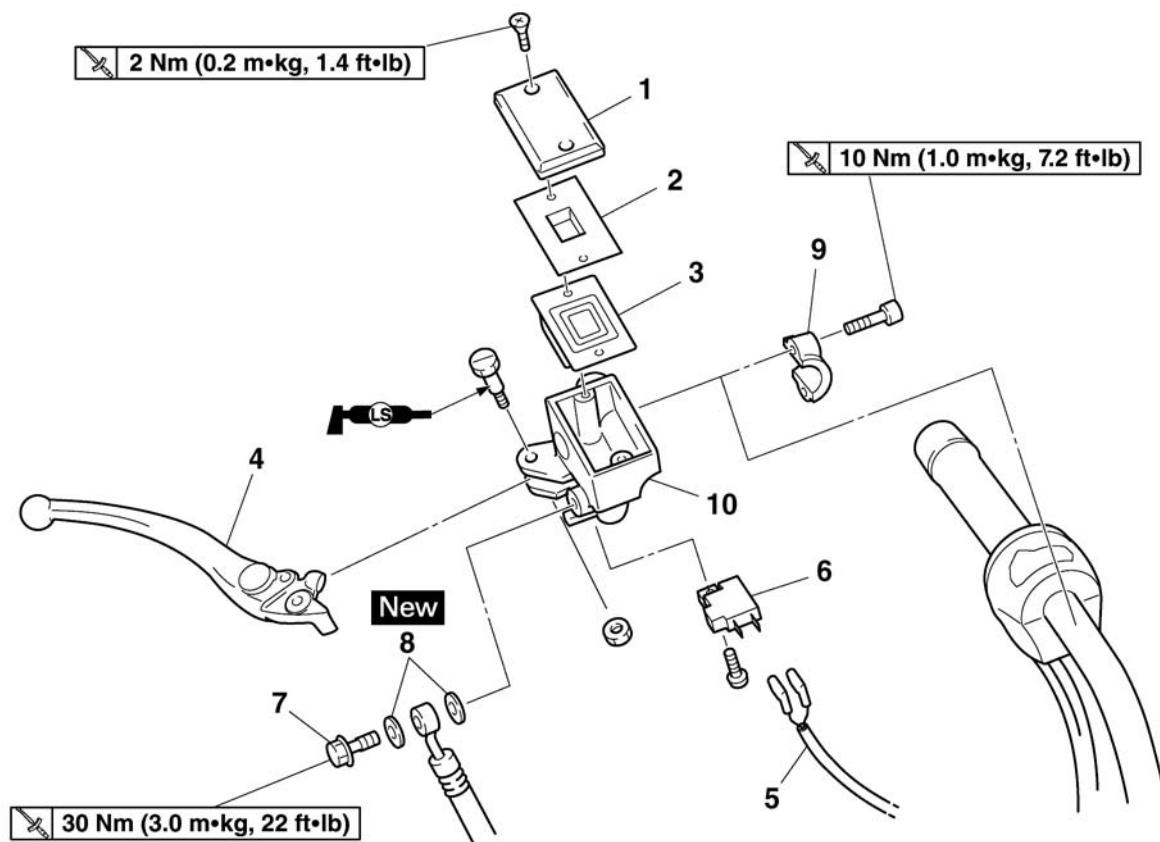
## FRONT BRAKE

### Removing the front brake pads



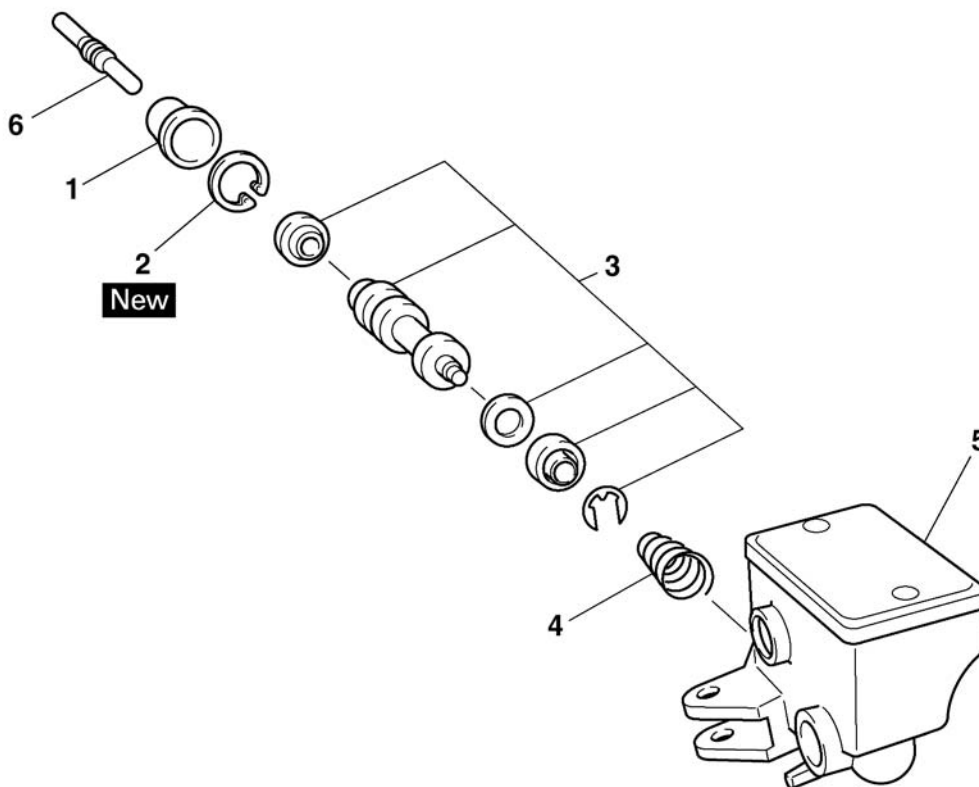
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Brake hose holder	1	
2	Front brake caliper	1	
3	Front brake pad	2	
4	Brake pad spring	2	
			For installation, reverse the removal procedure.

## Removing the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake lever	1	
5	Front brake light switch connector	2	Disconnect.
6	Front brake light switch	1	
7	Front brake hose union bolt	1	
8	Copper washer	2	
9	Front brake master cylinder holder	1	
10	Front brake master cylinder	1	

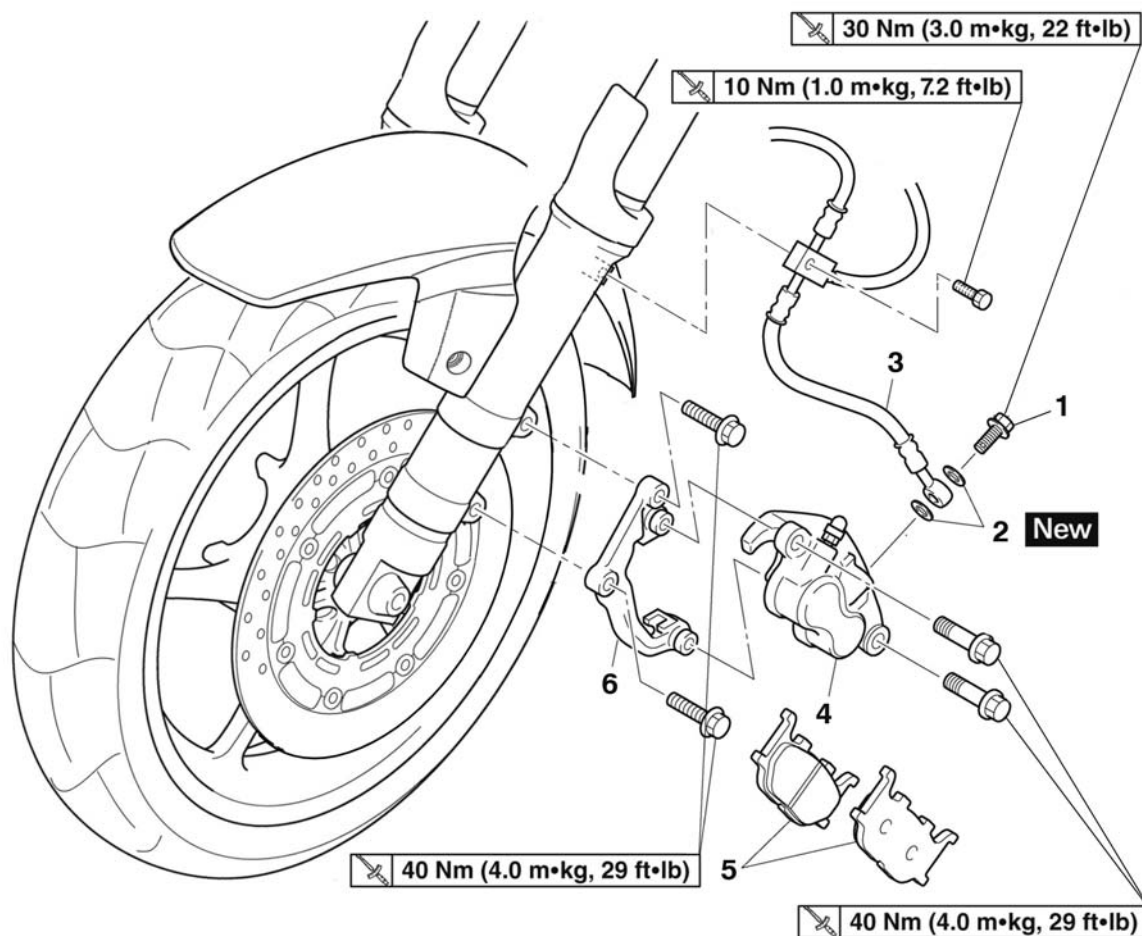
## Disassembling the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Master cylinder kit	1	
4	Spring	1	
5	Master cylinder	1	
6	Push rod	1	
			For assembly, reverse the disassembly procedure.

# FRONT BRAKE

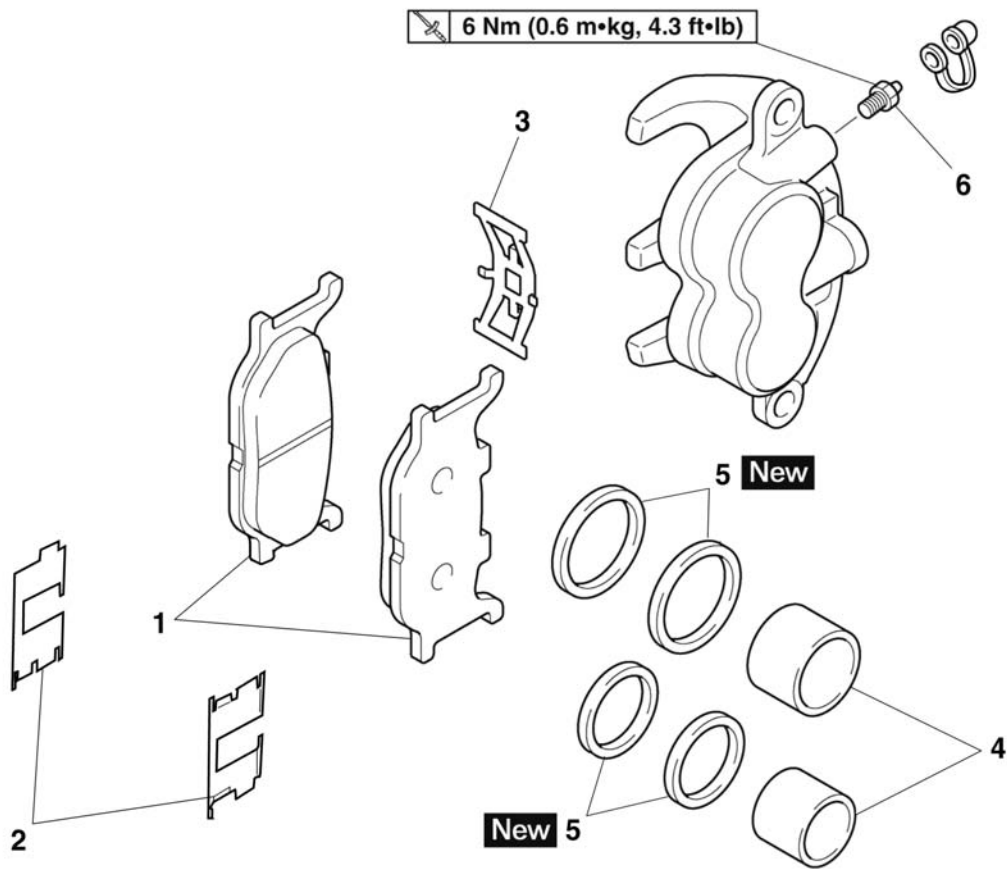
## Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.
1	Front brake hose union bolt	1	
2	Copper washer	2	
3	Front brake hose	1	
4	Front brake caliper	1	
5	Front brake pad	2	
6	Front brake caliper bracket	1	
			For installation, reverse the removal procedure.

# FRONT BRAKE

## Disassembling the front brake calipers



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

EAS22220

## 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 re-assembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.  
**FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.

EAS22240

## CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

1. Remove:
  - Front wheel  
Refer to "FRONT WHEEL" on page 4-6.
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.

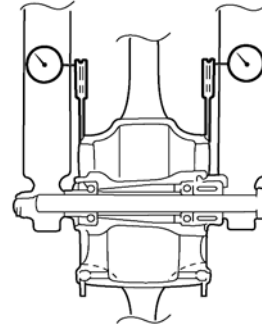


**Brake disc deflection limit**  
0.10 mm (0.0039 in)



- a. Place the vehicle on a suitable stand so that the front wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.

- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.



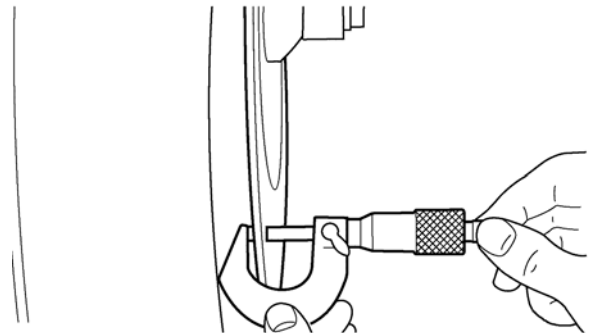
- e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.



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



**Brake disc thickness limit**  
4.5 mm (0.18 in)



5. Adjust:
  - Brake disc deflection



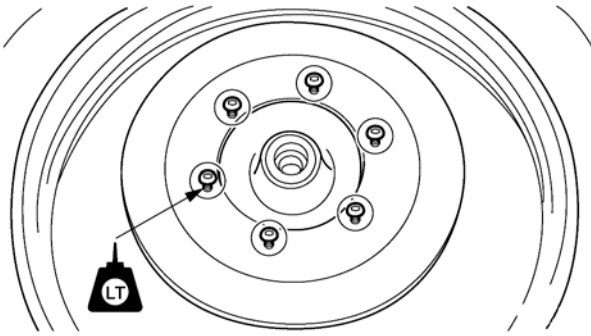
- a. Remove the brake disc.
- b. Rotate the brake disc by one bolt hole.
- c. Install the brake disc.



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

### NOTE:

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



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



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

EAS22270

## REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

### NOTE:

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

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



**Brake pad lining thickness (inner)**

6.0 mm (0.24 in)

**Limit**

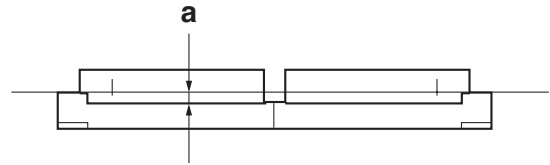
0.8 mm (0.03 in)

**Brake pad lining thickness (outer)**

6.0 mm (0.24 in)

**Limit**

0.8 mm (0.03 in)



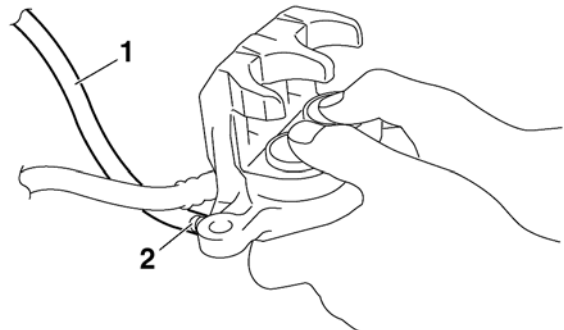
2. Install:
  - Brake pad supports
  - Brake pads
  - Brake pad spring

### NOTE:

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

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



3. Install:
  - Front brake caliper

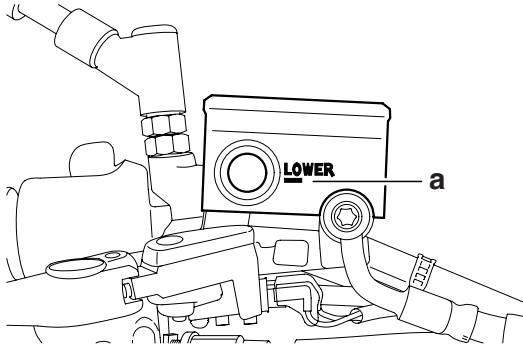


**Front brake caliper bolt**  
40 Nm (4.0 m·kg, 29 ft·lb)



## 4. Check:

- Brake fluid level  
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.  
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-19.



## 5. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-21.

EAS22300

## REMOVING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

### NOTE:

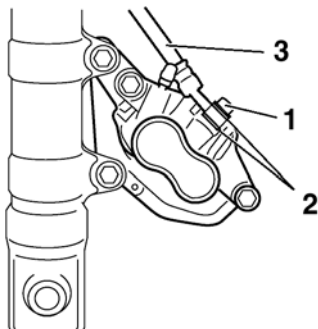
Before removing the brake caliper, drain the brake fluid from the entire brake system.

## 1. Remove:

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

### NOTE:

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



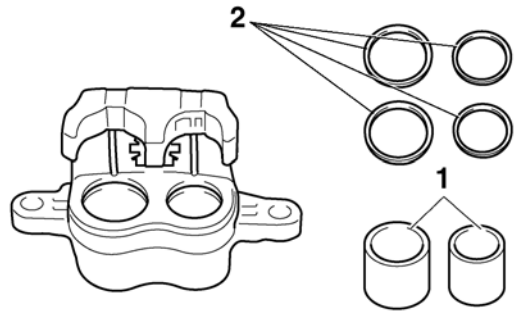
EAS22350

## DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

## 1. Remove:

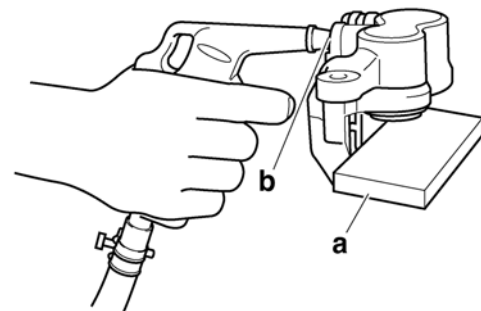
- Brake caliper pistons “1”
- Brake caliper piston seals “2”



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

### ⚠ WARNING

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



- Remove the brake caliper piston seals.



EAS22390

## CHECKING THE FRONT BRAKE CALIPERS

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

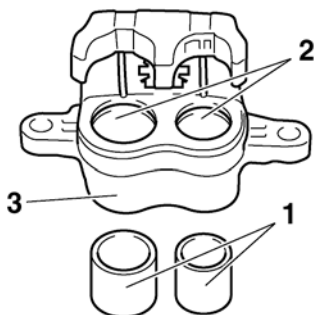
### 1. Check:

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

EWA13600

### **WARNING**

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



EAS22410

## ASSEMBLING THE FRONT BRAKE CALIPERS

EWA13620

### **WARNING**

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



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

EAS22450

## INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

### 1. Install:

- Brake caliper bracket “1”



**Brake caliper bracket bolt**  
**40 Nm (4.0 m·kg, 29 ft·lb)**

- Brake pads
- Brake caliper “2”

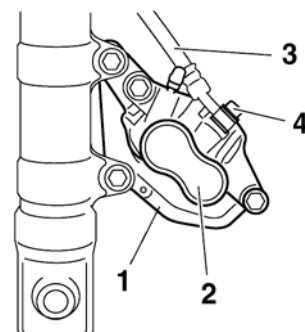


**Brake caliper bolt**  
**40 Nm (4.0 m·kg, 29 ft·lb)**

- Copper washers **New**
- Front brake hose “3”
- Front brake hose union bolt “4”



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



EWA13530

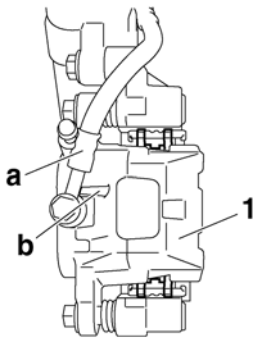
## **⚠ WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-40.

EWA13530

## **CAUTION:**

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



### 2. Fill:

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



Recommended fluid  
DOT 4

EWA13090

## **⚠ WARNING**

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

ECA13540

## **CAUTION:**

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

### 3. Bleed:

- Brake system

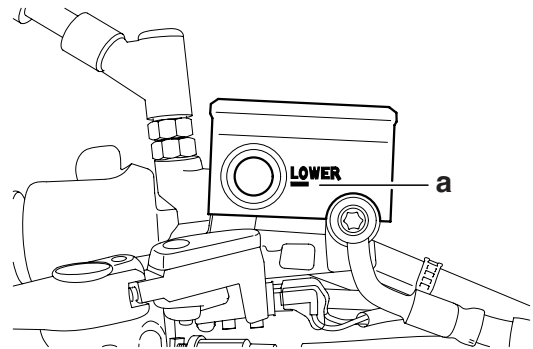
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-21.

### 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 3-19.



### 5. Check:

- Brake lever operation

Soft or spongy feeling → Bleed the brake system.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-21.

EAS22490

## **REMOVING THE FRONT BRAKE MASTER CYLINDER**

### **NOTE:**

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

### 1. Disconnect:

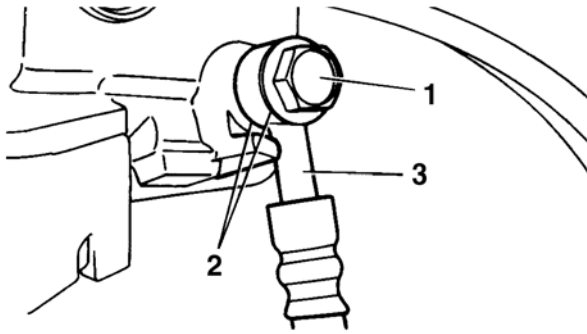
- Brake light switch coupler  
(from the brake light switch)

### 2. Remove:

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

### **NOTE:**

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

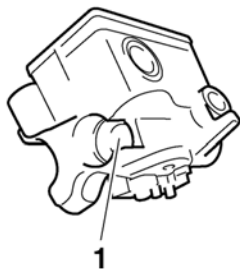


3. Remove:
  - Brake lever
  - Master cylinder bracket
  - Master cylinder assembly
4. Remove:
  - Circlip (from the master cylinder assembly)
  - Master cylinder kit

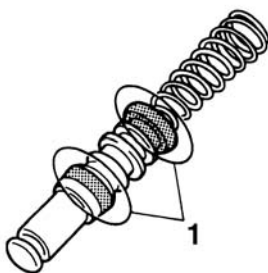
EAS22510

## CHECKING THE FRONT BRAKE MASTER CYLINDER

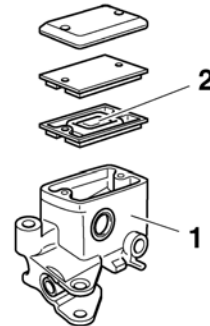
1. Check:
  - Brake master cylinder “1”  
Damage/scratches/wear → Replace.
  - Brake fluid delivery passages (brake master cylinder body)  
Obstruction → Blow out with compressed air.



2. Check:
  - Brake master cylinder kit “1”  
Damage/scratches/wear → Replace.



3. Check:
  - Brake fluid reservoir “1”  
Cracks/damage → Replace.
  - Brake fluid reservoir diaphragm “2”  
Cracks/damage → Replace.



4. Check:
  - Cracks/damage/wear → Replace.

EAS22520

## ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

### ⚠ WARNING

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



**Recommended fluid  
DOT 4**

EAS22540

## INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
  - Front brake master cylinder “1”
  - Front brake master cylinder holder “2”

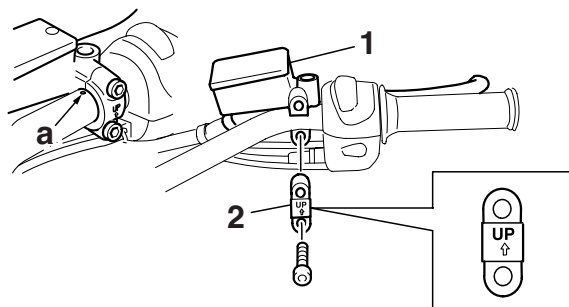


**Front brake master cylinder  
holder bolt  
10 Nm (1.0 m·kg, 7.2 ft·lb)**

### NOTE:

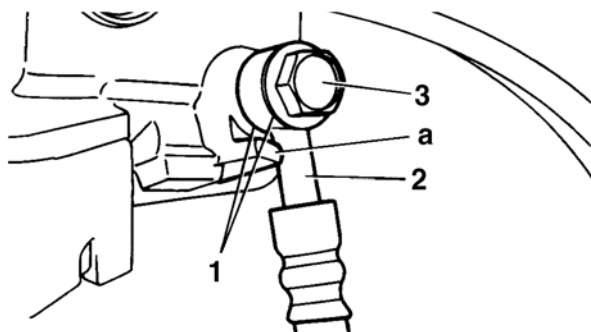
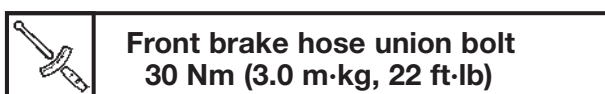
- Install the brake master cylinder holder with the “UP” mark facing up.
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.

# FRONT BRAKE



## 2. Install:

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



EWA13530

## **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “**CABLE ROUTING**” on page 2-40.

## **CAUTION:**

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

## **NOTE:**

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

## 3. Fill:

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



Recommended fluid  
DOT 4

EWA13090

## **WARNING**

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

ECA13540

## **CAUTION:**

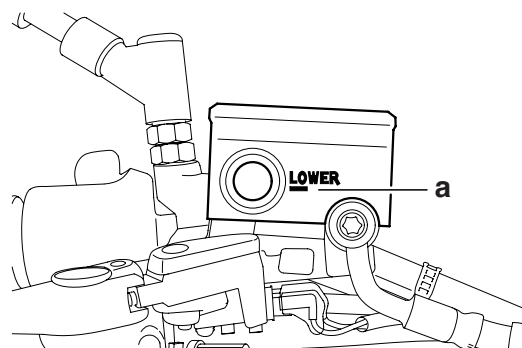
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

## 4. Bleed:

- Brake system  
Refer to “**BLEEDING THE HYDRAULIC BRAKE SYSTEM**” on page 3-21.

## 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 3-19.



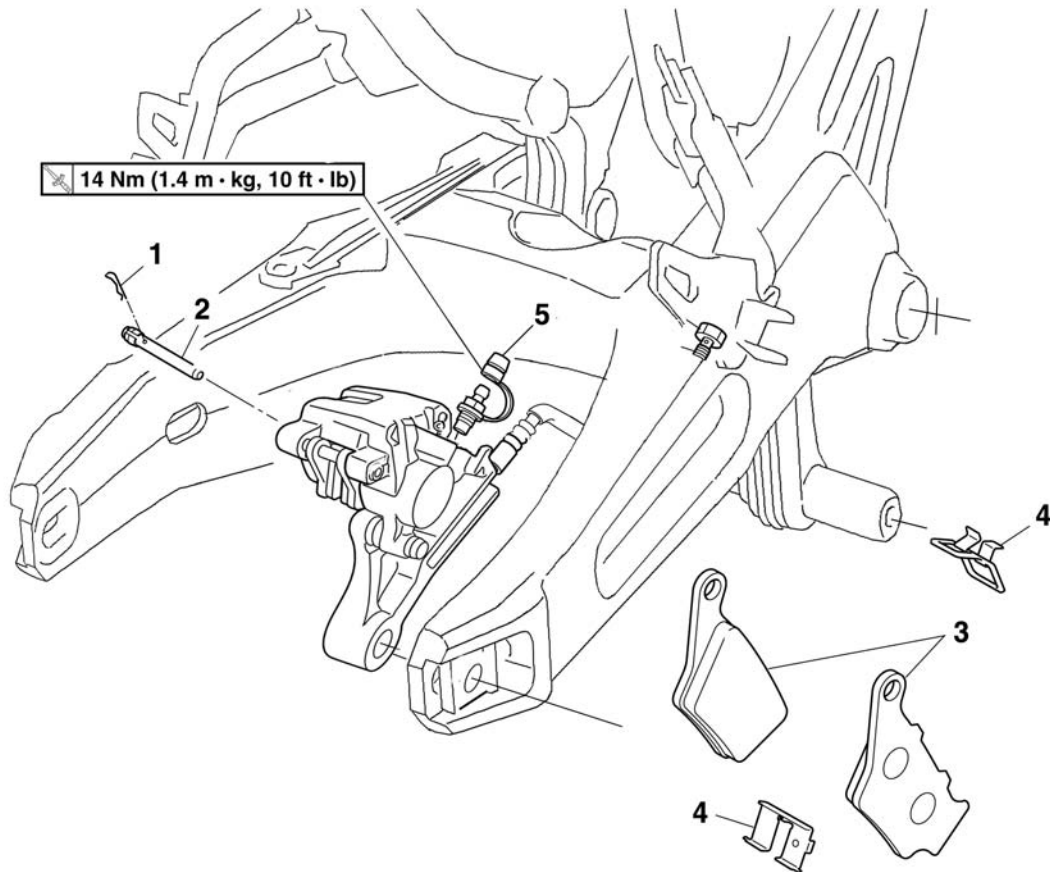
## 6. Check:

- Brake lever operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “**BLEEDING THE HYDRAULIC BRAKE SYSTEM**” on page 3-21.

EAS22550

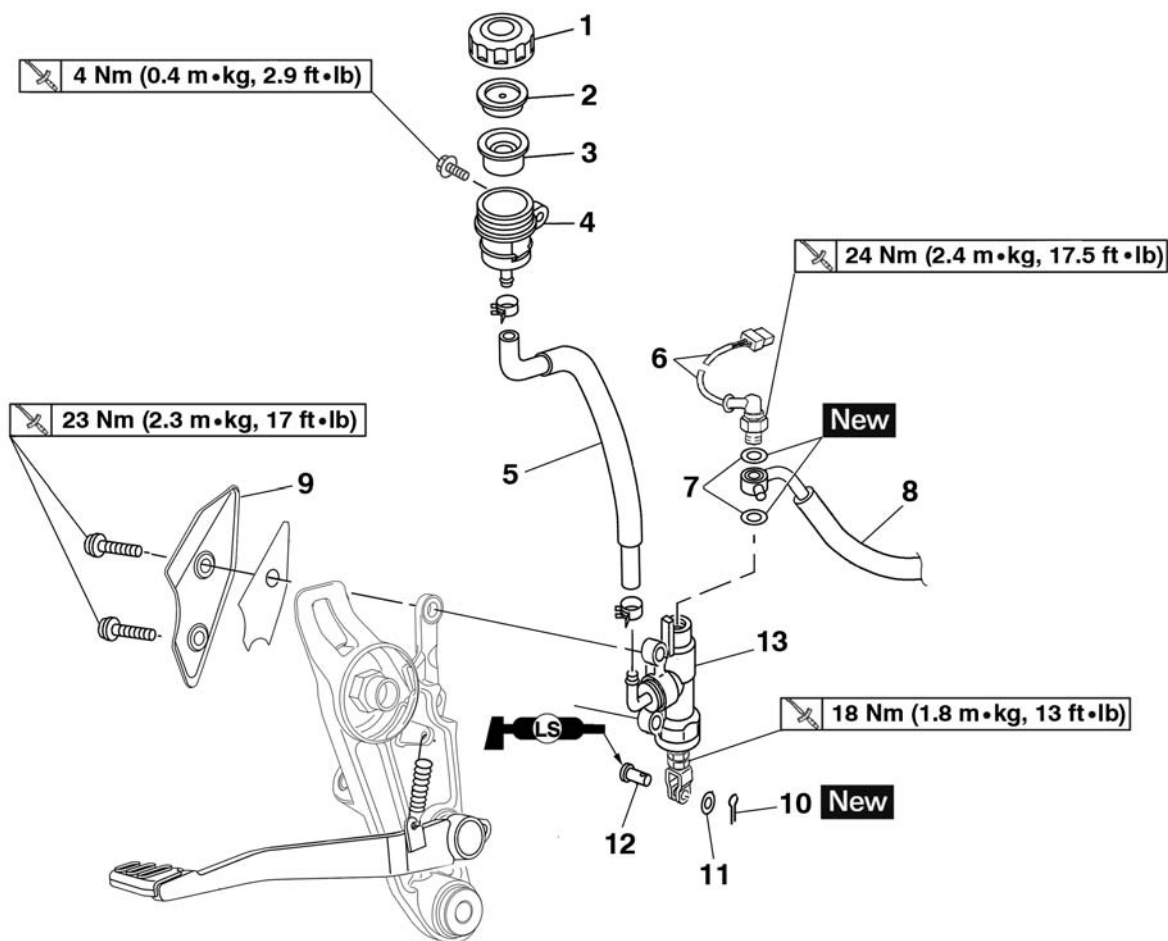
## REAR BRAKE

### Removing the rear brake pads



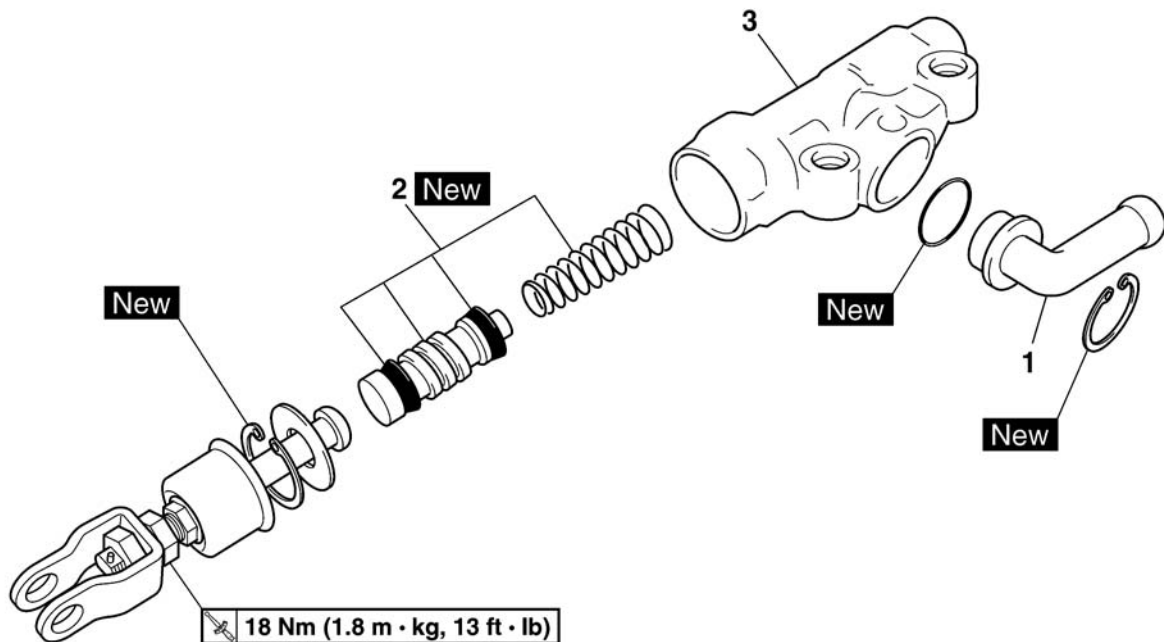
Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REMOVING THE REAR WHEEL" on page 4-15.
1	Brake pad clip	1	
2	Brake pad pin	1	
3	Rear brake pad	2	
4	Brake pad spring	2	
5	Blade screw	1	
			For installation, reverse the removal procedure.

## Removing the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Brake fluid reservoir hose	1	
6	Rear brake switch	1	
7	Copper washer	2	
8	Rear brake hose	1	Disconnect.
9	Right side plate	1	
10	Cotter pin	1	
11	Washer	1	
12	Pin	1	
13	Rear brake master cylinder	1	
			For installation, reverse the removal procedure.

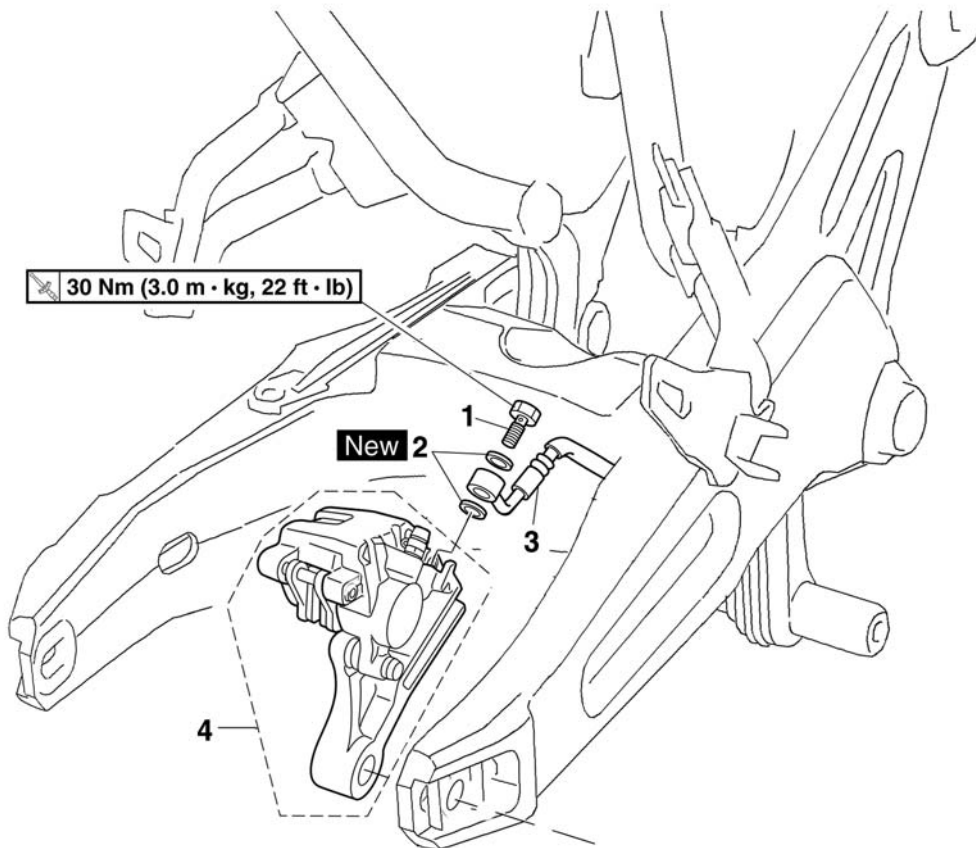
## Disassembling the rear brake master cylinder



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



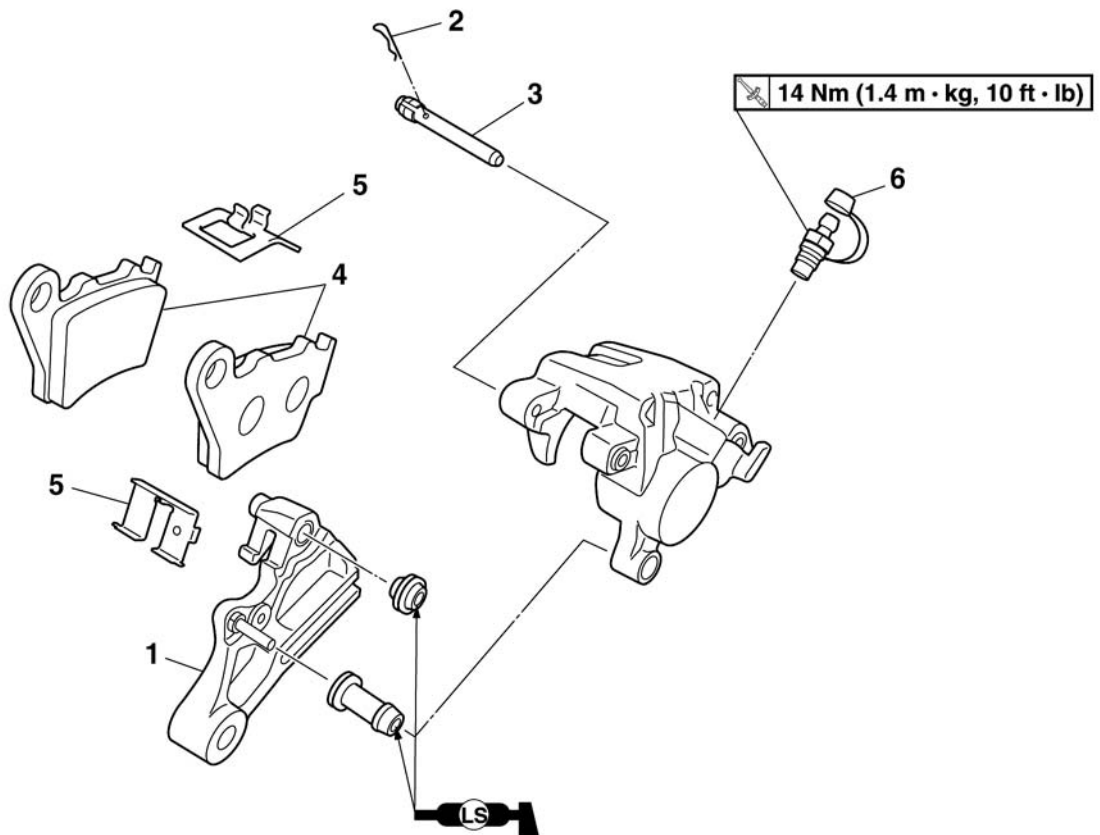
## Removing the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.
	Rear wheel		Refer to "REMOVING THE REAR WHEEL" on page 4-15.
1	Rear brake hose union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	
4	Rear brake caliper	1	
			For installation, reverse the removal procedure.



## Disassembling the rear brake caliper



Order	Job/Parts to remove	Q'ty	Remarks
1	Brake caliper bracket	1	
2	Brake pad clip	1	
3	Brake pad pin	1	
4	Brake pad	2	
5	Brake pad spring	2	
6	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 re-assembly.
- 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.

EAS22570

## CHECKING THE REAR BRAKE DISC

1. Remove:
  - Rear wheel  
Refer to "REAR WHEEL" on page 4-12.
2. Check:
  - Brake disc  
Damage/galling → Replace.
3. Measure:
  - Brake disc deflection  
Out of specification → Correct the brake disc deflection or replace the brake disc.  
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-23.



**Brake disc deflection limit**  
**0.15 mm (0.0059 in)**

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



**Brake disc thickness limit**  
**4.5 mm (0.18 in)**

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



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

6. Install:
  - Rear wheel  
Refer to "REAR WHEEL" on page 4-12.

EAS22580

## REPLACING THE REAR BRAKE PADS

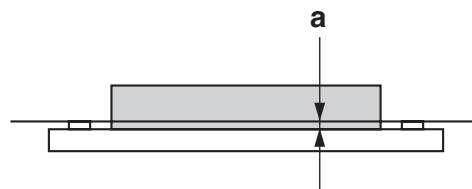
### NOTE:

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

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



**Brake pad lining thickness (inner)**  
**4.7 mm (0.18 in)**  
**Limit**  
**1.0 mm (0.04 in)**  
**Brake pad lining thickness (outer)**  
**4.7 mm (0.18 in)**  
**Limit**  
**1.0 mm (0.04 in)**



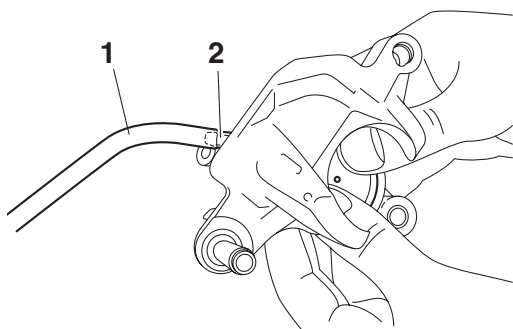
2. Install:
  - Brake pad springs
  - Brake pads

## NOTE:

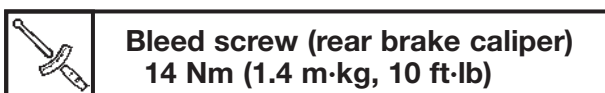
Always install new brake pads and brake pad springs as a set.



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



- Tighten the bleed screw.



- Install new brake pads and new brake pad springs.



## 3. Install:

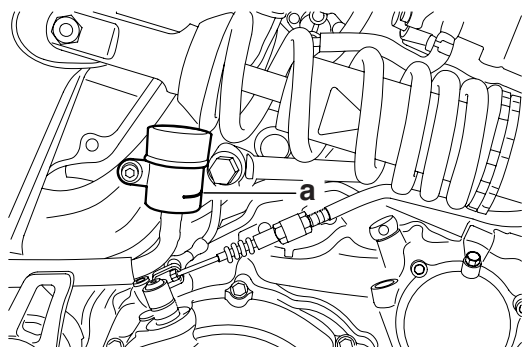
- Brake pad pin
- Brake pad clip
- Brake caliper
- Rear wheel

## 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 3-19.



## 5. Check:

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

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.

EAS22590

## REMOVING THE REAR BRAKE CALIPER

### NOTE:

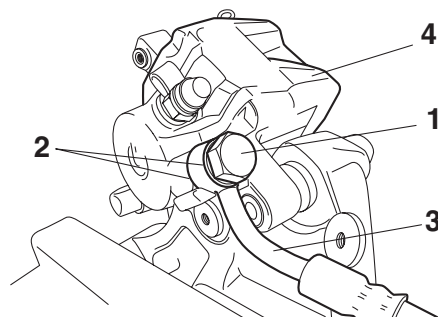
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

## 1. Remove:

- Rear wheel
- Rear brake hose union bolt "1"
- Copper washers "2"
- Rear brake hose "3"
- Rear brake caliper "4"

### NOTE:

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

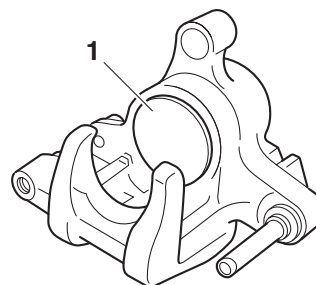


EAS22610

## DISASSEMBLING THE REAR BRAKE CALIPER

## 1. Remove:

- Brake caliper piston "1"

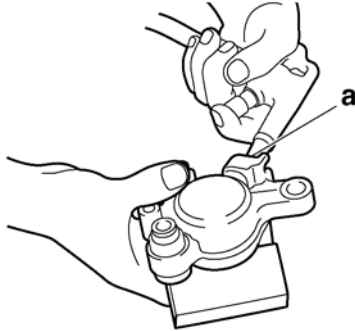


- Blow compressed air into the brake hose joint opening "a" to force out the pistons from the brake caliper.

EWA13550

## ⚠ WARNING

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



b. Remove the brake caliper piston seals.



EAS22640

## CHECKING THE REAR BRAKE CALIPER

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

1. Check:

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

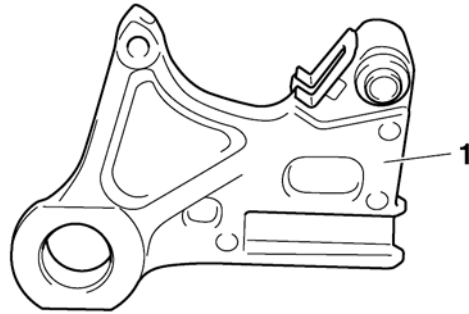
EWA13610

## ⚠ WARNING

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

2. Check:

- Brake caliper bracket "1"  
Cracks/damage → Replace.



EAS22650

## ASSEMBLING THE REAR BRAKE CALIPER

EWA13620

## ⚠ WARNING

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



**Recommended fluid  
DOT 4**

EAS22670

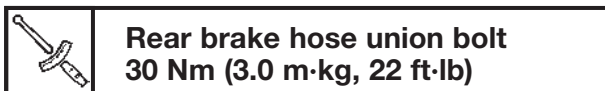
## INSTALLING THE REAR BRAKE CALIPER

1. Install:

- Brake caliper springs
- Brake pads
- Brake pad pin
- Brake pad clip  
Refer to "REAR BRAKE" on page 4-30.
- Brake caliper

## REAR BRAKE

- Rear wheel  
Refer to "REAR WHEEL" on page 4-12.
- Copper washers **New**
- Rear brake hose "1"
- Rear brake hose union bolt "2"



EWA13530

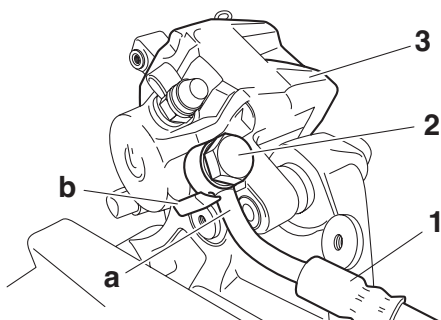
### **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-40.

ECA14170

### **CAUTION:**

When installing the brake hose onto the brake caliper "3", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



### 2. Fill:

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



EWA13090

### **WARNING**

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

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

ECA13540

### **CAUTION:**

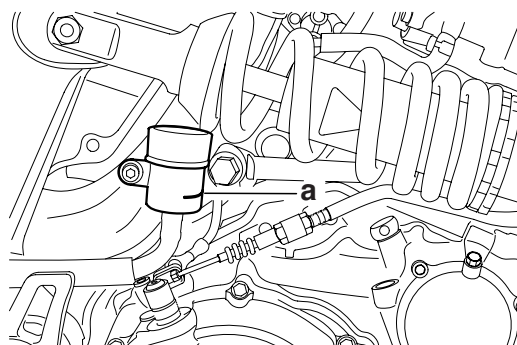
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

### 3. Bleed:

- Brake system  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-21.

### 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 3-19.



### 5. Check:

- Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-19.

EAS22700

## REMOVING THE REAR BRAKE MASTER CYLINDER

### **NOTE:**

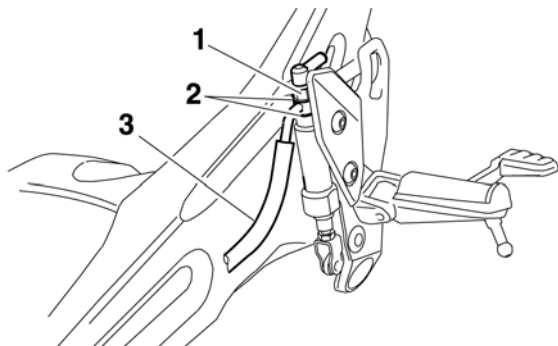
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

### 1. Remove:

- Rear brake switch "1"
- Copper washers "2"
- Rear brake hose "3"

## NOTE:

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



EAS22720

## CHECKING THE REAR BRAKE MASTER CYLINDER

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

EAS22730

## ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

### ⚠ WARNING

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components.
- Whenever a master cylinder is disassembled, replace the piston seals and dust seals.



## 1. Install:

- Brake master cylinder kit
- Joint “1”

## NOTE:

Turn the adjusting bolt “2” until the clearance “a” is within the specified limits when install the joint “1”.



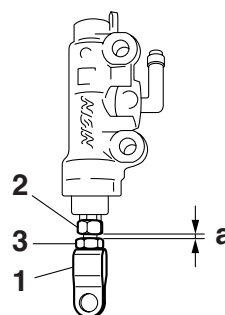
**Clearance**  
2.1 mm (0.08 in)

## 2. Tighten:

- Nut “3”



**Brake master cylinder adjusting nut**  
18 Nm (1.8 m·kg, 13 ft·lb)



EAS22740

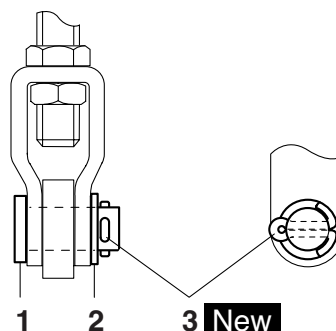
## INSTALLING THE REAR BRAKE MASTER CYLINDER

## 1. Install:

- Brake master cylinder
- Pin “1”
- Washer “2”
- Cotter pin “3” **New**

## NOTE:

Install the cotter pin and bend the ends as shown.





# REAR BRAKE

## 2. Install:

- Right side plate

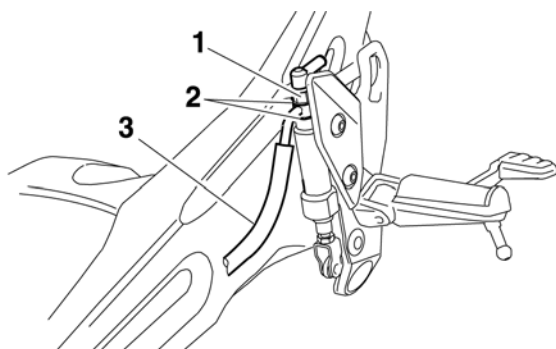


**Right side plate bolt**  
23 Nm (2.3 m·kg, 17 ft·lb)

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



**Rear brake switch**  
24 Nm (2.4 m·kg, 17.5 ft·lb)



EAS22740

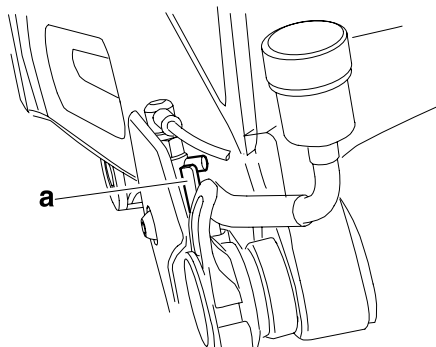
### **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “**CABLE ROUTING**” on page 2-40.

ECA14160

### **CAUTION:**

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



## 3. Fill:

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



**Recommended fluid**  
DOT 4

EWA13090

### **WARNING**

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

ECA13540

### **CAUTION:**

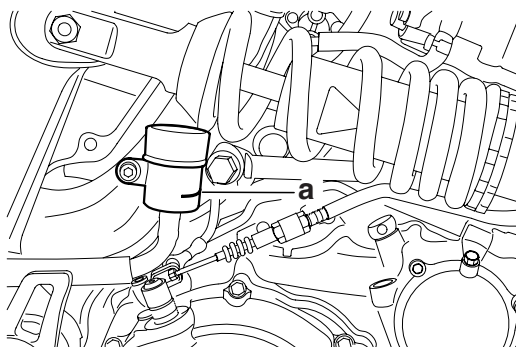
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

## 4. Bleed:

- Brake system  
Refer to “**BLEEDING THE HYDRAULIC BRAKE SYSTEM**” on page 3-21.

## 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 3-19.



## 6. Check:

- Brake pedal operation  
Soft or spongy feeling → Bleed the brake system.  
Refer to “**BLEEDING THE HYDRAULIC BRAKE SYSTEM**” on page 3-21.

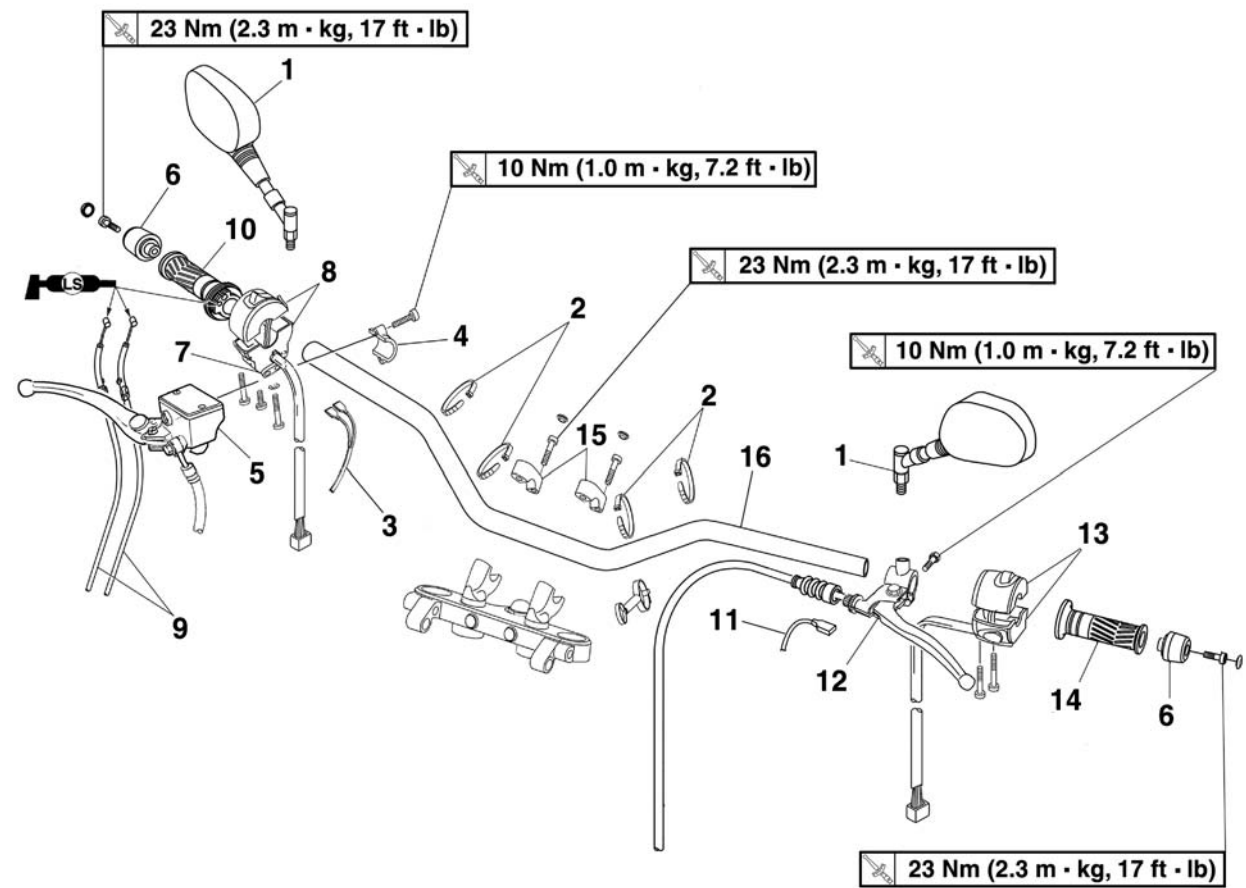
## 7. Adjust:

- Brake pedal position  
Refer to “**ADJUSTING THE REAR BRAKE PEDAL**” on page 3-18.

EAS22840

HANDLEBAR

Removing the handlebar

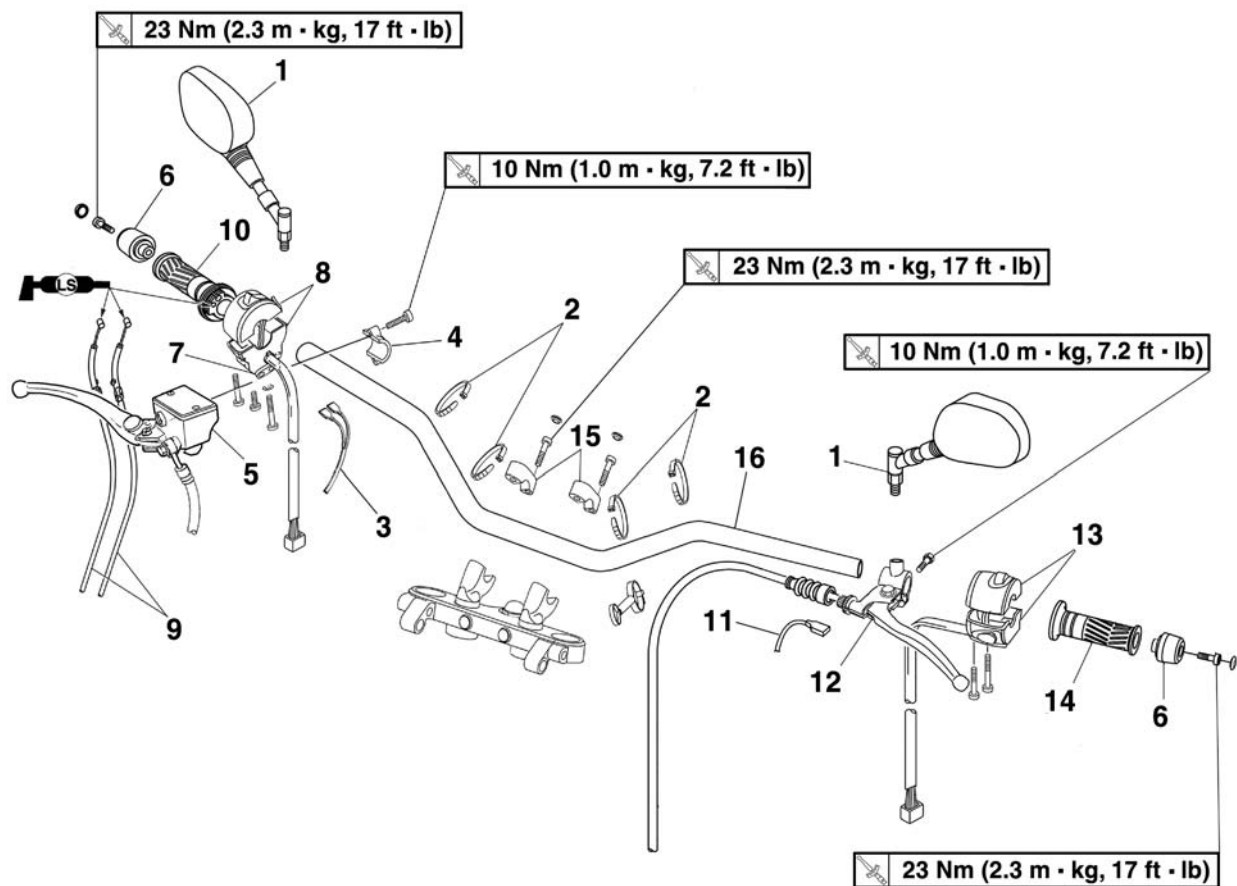


Order	Job/Parts to remove	Q'ty	Remarks
1	Rearview mirror (left and right)	2	
2	Plastic band	4	
3	Front brake light switch coupler	1	Disconnect.
4	Brake master cylinder holder	1	
5	Brake master cylinder	1	
6	Grip end	2	
7	Throttle cable holder	1	
8	Right handlebar switch	1	
9	Throttle cable	2	
10	Throttle grip	1	
11	Clutch switch coupler	1	Disconnect.
12	Clutch lever	1	
13	Left handlebar switch	1	
14	Handlebar grip	1	
15	Upper handlebar holder	2	



## HANDLEBAR

## Removing the handlebar



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

EAS22860

## REMOVING THE HANDLEBAR

1. Stand the vehicle on a level surface.

EWA13120

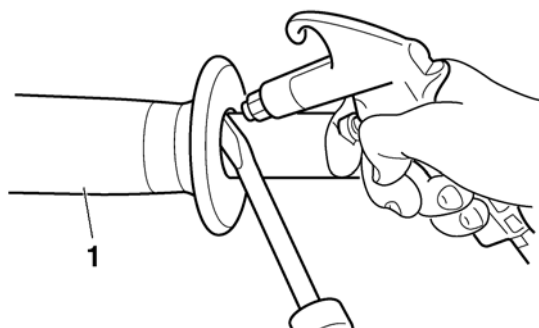
### **⚠ WARNING**

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

2. Remove:
  - Handlebar grip "1"

### NOTE:

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



EAS22880

## CHECKING THE HANDLEBAR

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

EWA13690

### **⚠ WARNING**

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

EAS22930

## INSTALLING THE HANDLEBAR

1. Stand the vehicle on a level surface.

EWA13120

### **⚠ WARNING**

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

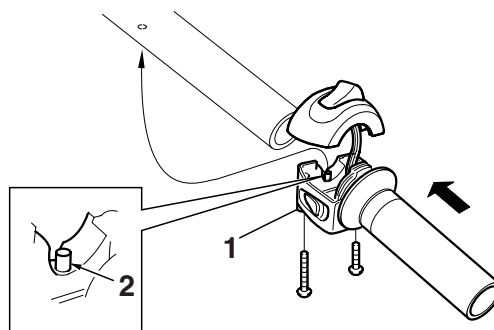
2. Install:
  - Throttle grip "1" (on the handlebar)

### NOTE:

Align the projection "2" on the handlebar switch with the hole in the handlebar.



**Handlebar switch bolt**  
2 Nm (0.2 m·kg, 1.4 ft·lb)



### NOTE:

Check the throttle grip for smooth action.

### **⚠ WARNING**

Proper cable routing is essential to assure safe motorcycle operation. Refer to "CABLE ROUTING" on page 2-40.

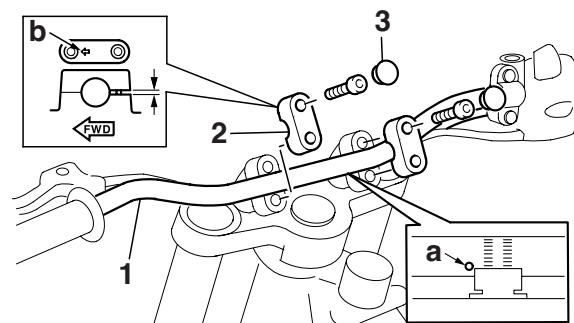
3. Install:
  - Handlebar "1"
  - Upper handlebar holders "2"
  - Bolt caps "3"

### NOTE:

- Align the punch mark "a" on the handlebar with the top of the lower handlebar holder.
- Install the handlebar holders with the arrow "b" mark facing forward.



**Upper handlebar holder bolt**  
23 Nm (2.3 m·kg, 17 ft·lb)



### CAUTION:

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

## 4. Install:

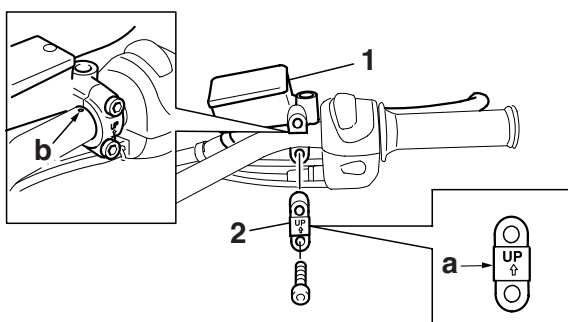
- Front brake master cylinder "1"
- Front brake master cylinder holder "2"

### NOTE:

- Make sure that the "UP" mark "a" with the bracket is pointed upward.
- Align the punch mark "b" on the handlebar with the gap of the master cylinder bracket.



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



### NOTE:

- Tighten the bolts in stages and maintain an equal gap on each side of the bracket to specification.
- Check the brake lever for smooth action.

### ⚠ WARNING

**Proper cable routing is essential to assure safe motorcycle operation. Refer to "CABLE ROUTING" on page 2-40.**

## 5. Install:

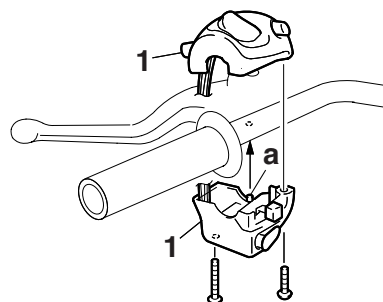
- Left handlebar switch "1"

### NOTE:

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



**Handlebar switch bolt**  
2 Nm (0.2 m·kg, 1.4 ft·lb)



### ⚠ WARNING

**Proper cable routing is essential to assure safe motorcycle operation. Refer to "CABLE ROUTING" on page 2-40.**

## 6. Install:

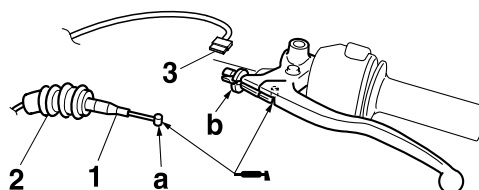
- Clutch cable "1"
- Cable boot "2"

### NOTE:

- Lubricate the pivoting part "a" of the clutch lever.
- Turn in the adjuster "b" on the lever holder until tight. Next, align the slit in the adjuster and cable socket with the slit in the lever holder.
- Insert the cable end into the lever hole. Next, while pulling the outer cable in the direction opposite to the lever, seat the outer cable into the cable socket.

## 7. Connect:

- Clutch lever switch "3"



### ⚠ WARNING

**Check the clutch lever for smooth action. Refer to "CABLE ROUTING" on page 2-40.**

## 8. Install:

- Handlebar grip “1”

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

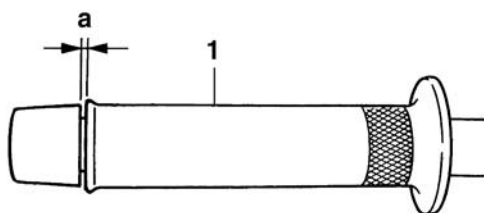
EWA13700

### **⚠ WARNING**

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

### NOTE:

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

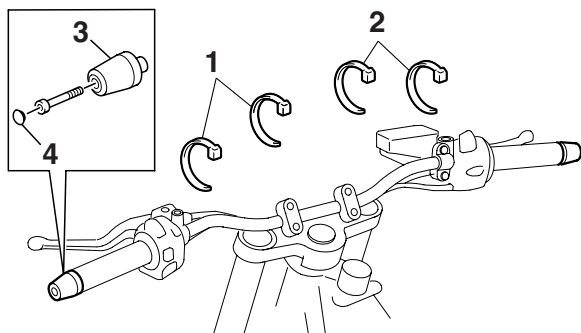


## 9. Install:

- Cable ties “1”  
(secure the left handlebar switch lead)
- Cable ties “2”  
(secure the right handlebar switch lead)
- Grip ends “3”
- Bolt caps “4”



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

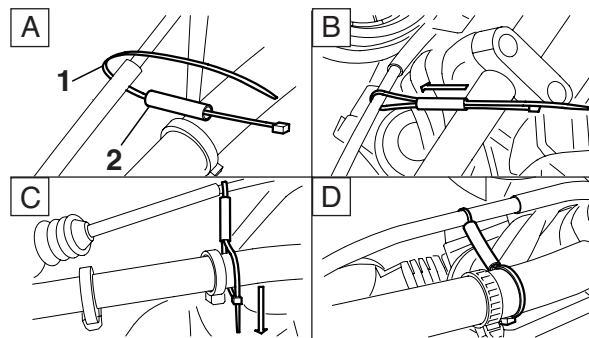


### NOTE:

Refer to “CABLE ROUTING” on page 2-40.

## 10. Install:

- Band “1”  
(secure the clutch cable)
- Piece connecting “2”

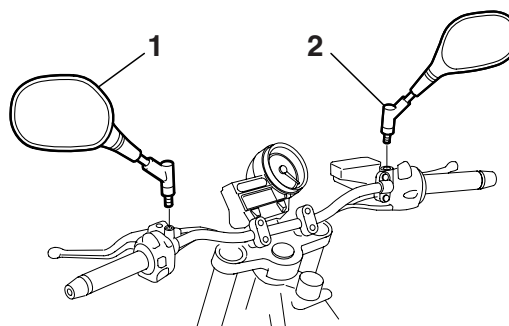


### NOTE:

Refer to “CABLE ROUTING” on page 2-40.

## 11. Install:

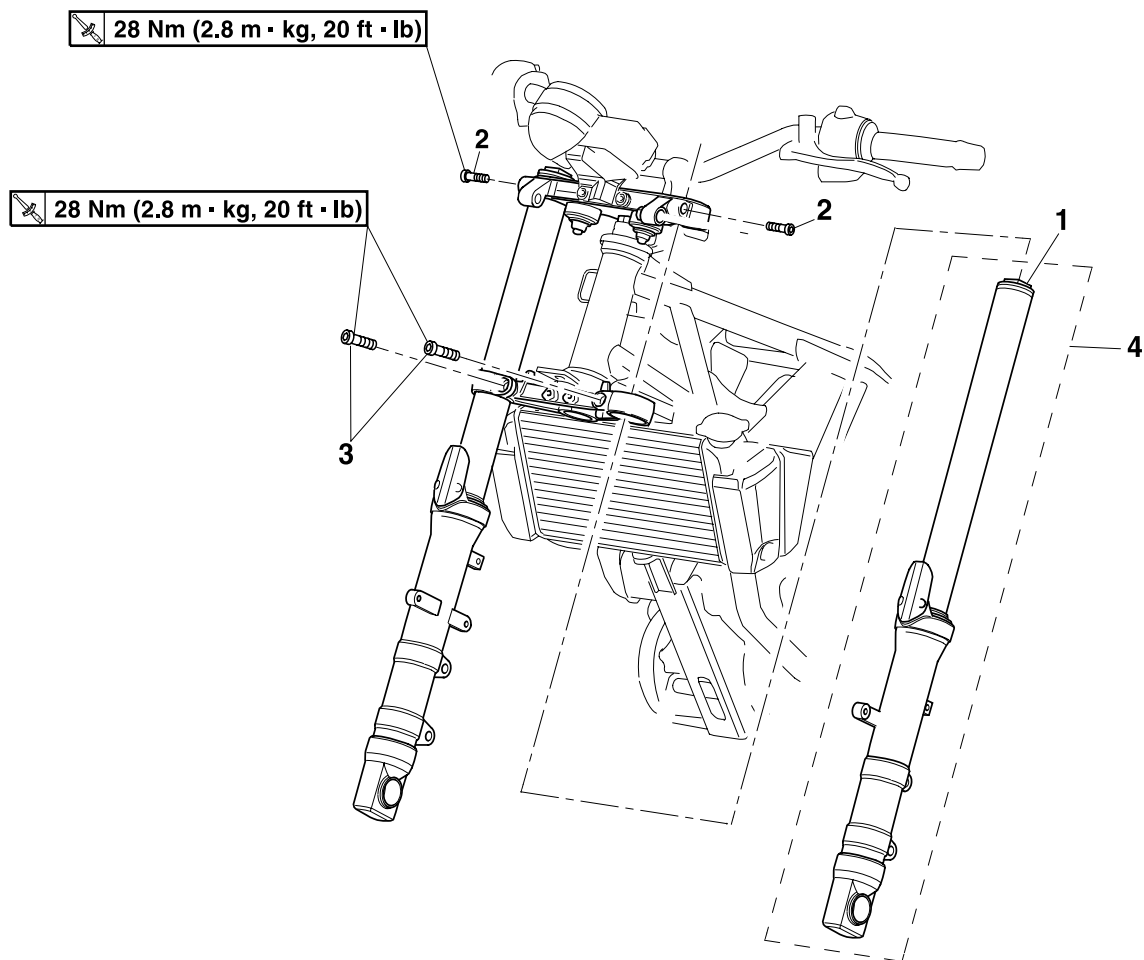
- Left rear view mirror “1”
- Right rear view mirror “2”



EAS22950

## FRONT FORK

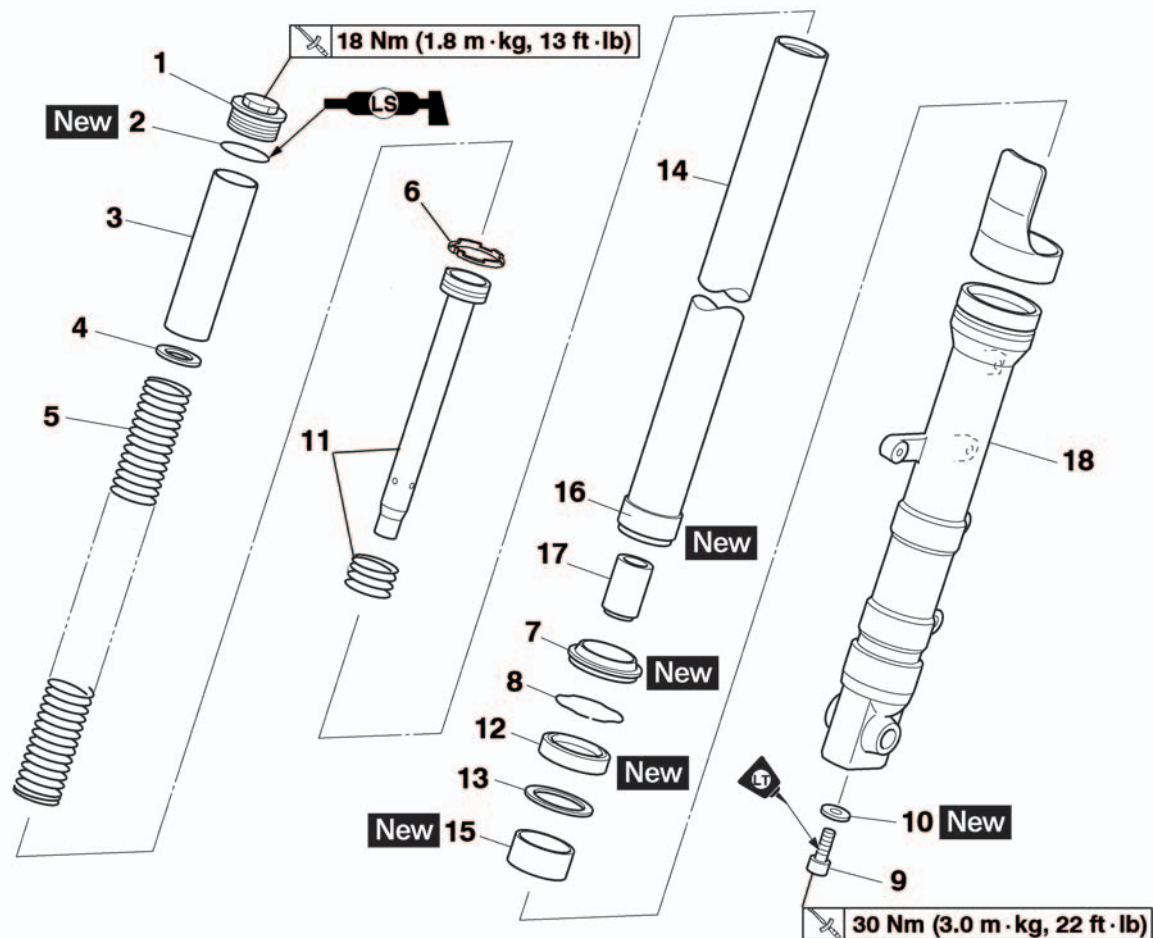
### Removing the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front fork legs.
	Front wheel		Refer to "FRONT WHEEL" on page 4-6.
	Front fender		Refer to "GENERAL CHASSIS" on page 4-1.
1	Cap bolt	1	Loosen.
2	Upper bracket pinch bolt	1	Loosen.
3	Lower bracket pinch bolt	1	Loosen.
4	Front fork leg	1	
			For installation, reverse the removal procedure.

# FRONT FORK

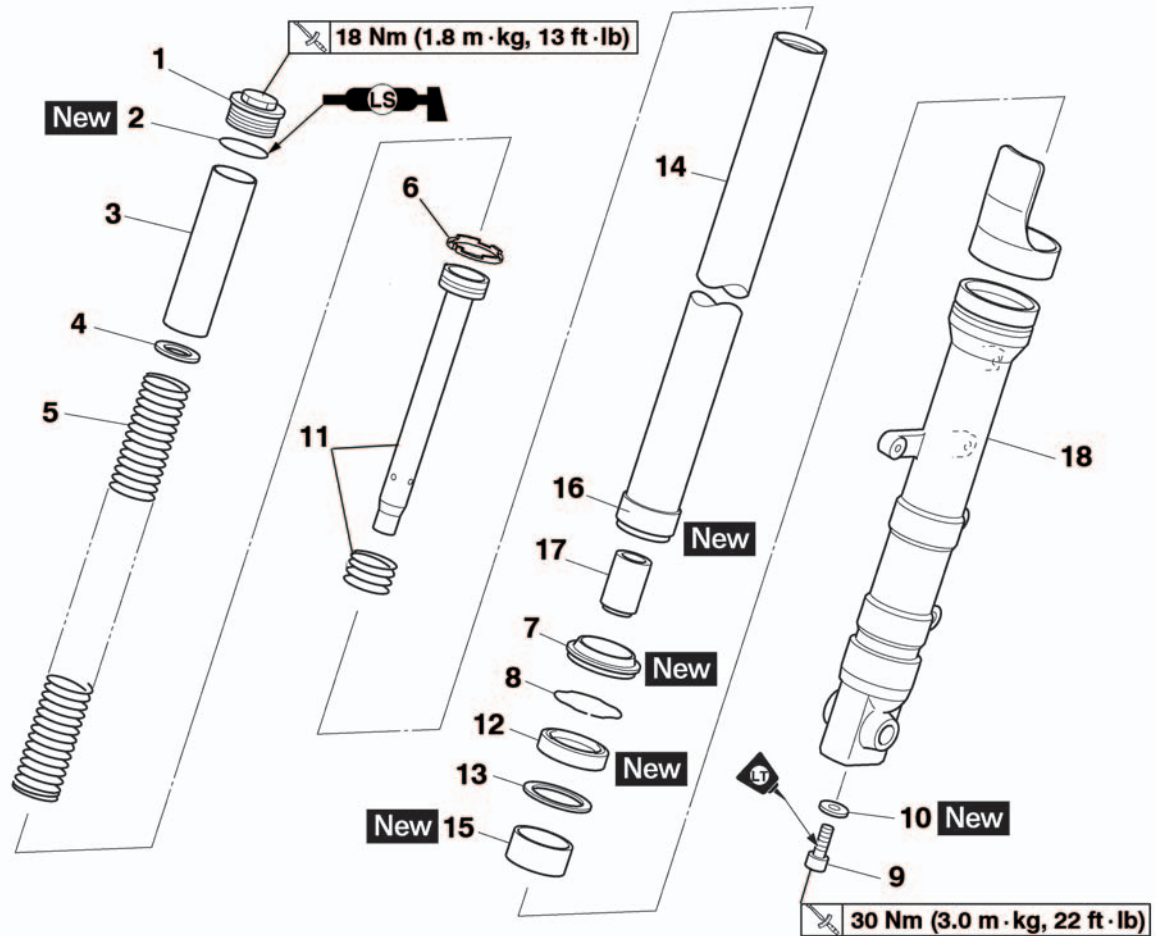
## Disassembling the front fork legs



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

# FRONT FORK

## Disassembling the front fork legs



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



EAS00649

## REMOVING THE FRONT FORK LEGS

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

1. Stand the motorcycle on a level surface.

### **⚠ WARNING**

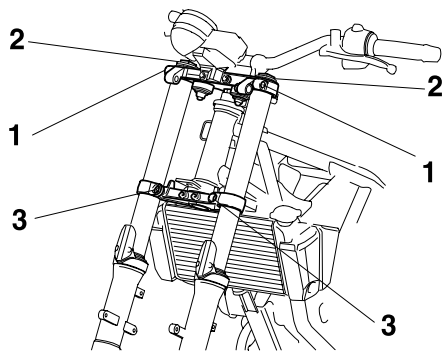
**Securely support the motorcycle so that there is no danger of it falling over.**

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

2. Loosen:
  - Upper bracket pinch bolt "1"
  - Cap bolt "2"
  - Under bracket pinch bolt "3"

### **⚠ WARNING**

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



3. Remove:
  - Front fork leg

EAS00652

## DISASSEMBLING THE FRONT FORK LEGS

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

1. Remove:
  - Cap bolt
  - Washer
  - Spacer
  - Fork spring

2. Drain:
  - Fork oil

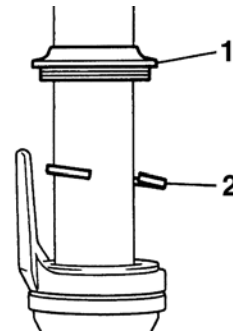
### **NOTE:**

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

3. Remove:
  - Dust seal "1"
  - Oil seal clip "2" (with a flat-head screwdriver)

### **CAUTION:**

**Do not scratch the inner tube.**



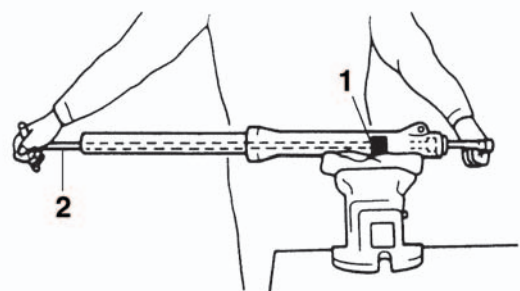
4. Remove:
  - Damper rod assembly bolt

### **NOTE:**

While holding the damper rod assembly with the damper rod holder "1" and T-handle "2", loosen the damper rod assembly bolt.



**Damper rod holder**  
90890-01460  
**T-handle**  
90890-01326

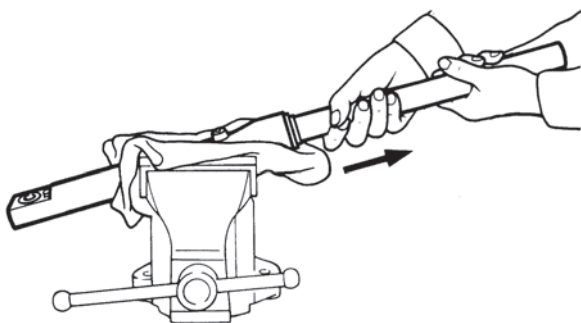


5. Remove:
  - Inner tube



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





## CAUTION:

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

EAS00657

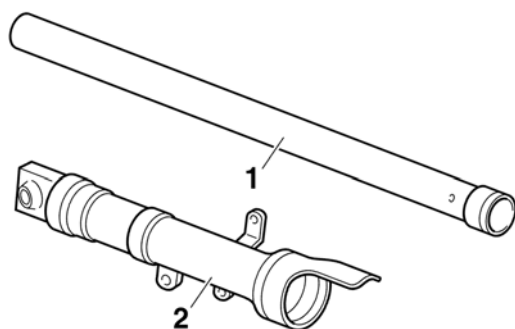
## CHECKING THE FRONT FORK LEGS

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

### 1. Check:

- Inner tube "1"
- Outer tube "2"

Bends/ damage/ scratches → Replace.



## ⚠ WARNING

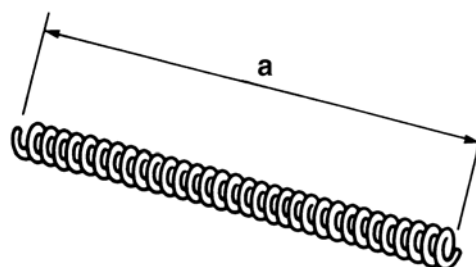
Do not attempt to straighten a bent inner tube as this may dangerously weaken it.

### 2. Measure:

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

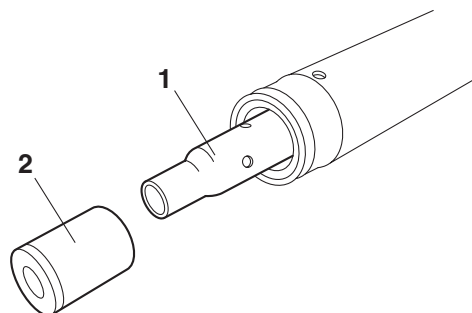


**Spring free length**  
376.0 mm (14.80 in)  
<Limit> : 368.0 mm (14.48 in)



### 3. Check:

- Damper rod "1"  
Damage/ wear → Replace.  
Obstruction → Blow out all of the oil passages with compressed air.
- Oil flow stopper "2"  
Damage → Replace.

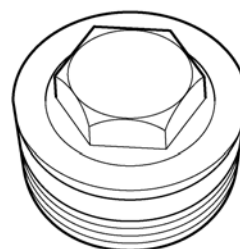


## CAUTION:

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

### 4. Check:

- Cap bolt O-ring  
Damage/wear → Replace.



# FRONT FORK

EAS00659

## ASSEMBLING THE FRONT FORK LEGS

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

### **⚠ WARNING**

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

### **NOTE:**

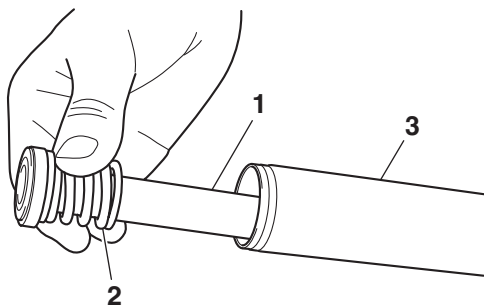
- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- before assembling the front fork leg, make sure all of the components are clean.

### 1. Install:

- Inner tube busing
- Outer tube busing
- Oil flow stopper
- Damper rod “1”
- Rebound spring “2”
- Copper washer **New**

### **⚠ WARNING**

Always use new copper washer.



### **CAUTION:**

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

### 2. Lubricate:

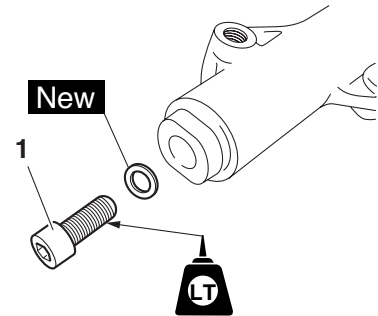
- Inner tube’s outer surface



**Recommended lubricant**  
Fork oil 10W or equivalent

### 3. Tighten:

- Damper rod assembly bolt “1”



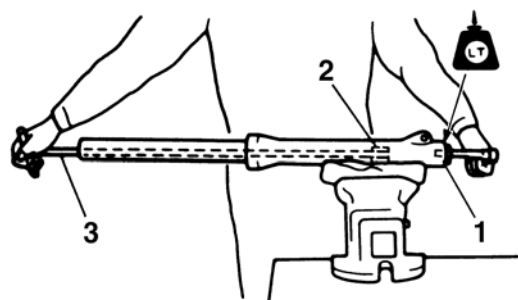
**Damper rod assembly bolt**  
30 Nm (3.0 m·kg, 22 ft·lb)  
**LOCTITE®**

### **NOTE:**

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



**Damper rod holder**  
90890-01460  
**T-handle**  
90890-01326



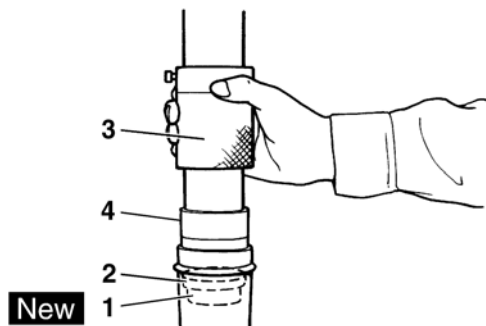
### 4. Install:

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



**Fork seal driver weight**  
90890-01367  
**Fork seal driver attachment**  
90890-01374

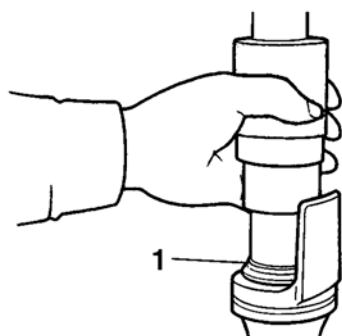
# FRONT FORK



5. Install:
- Oil seal “1”  
(with the fork seal driver weight and fork seal driver attachment)

## CAUTION:

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



## NOTE:

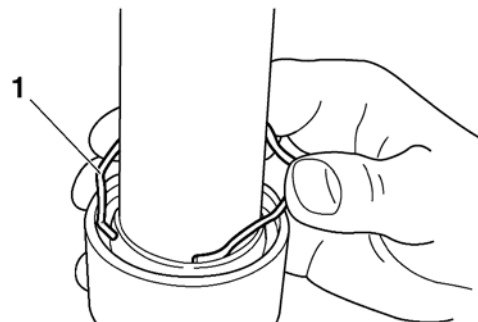
- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag “2” to protect the oil seal during installation.



6. Install:
- Oil seal clip “1”

## NOTE:

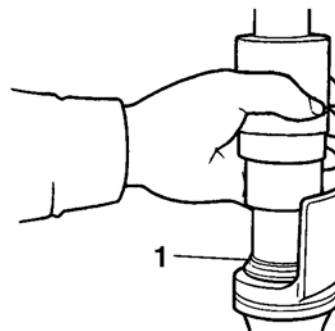
Adjust the oil seal clip so that it fits into the outer tube’s groove.



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



**Fork seal driver weight  
90890-01367**



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



**Quantity (each front fork leg)  
570.0 cm<sup>3</sup> (19.27 US oz)  
(20.06 Imp.oz)  
Recommended oil  
Fork oil 10W or equivalent**

## CAUTION:

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

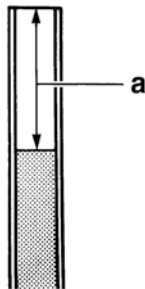
# FRONT FORK

## 9. Measure:

- Front fork leg oil level “a”  
Out of specification → Correct.

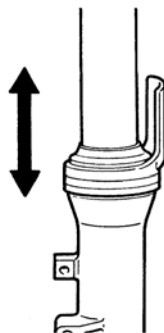


**Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed and without the fork spring)**  
95.0 mm (3.74 in)



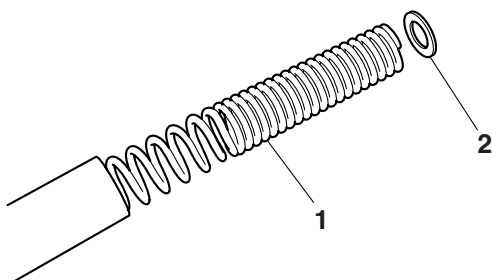
## NOTE:

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



## 10. Install:

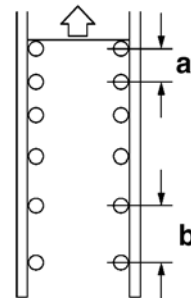
- Spring “1”
- Spring seat “2”
- O-ring **New**
- Cap bolt



## NOTE:

- Install the spring with the smaller pitch “a” facing up.
- Before installing the cap bolt, lubricate its O-ring with lithium-soap-based grease.
- Temporarily tighten the cap bolt.

## b. Larger pitch



EAS00662

## INSTALLING THE FRONT FORK LEGS

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

### 1. Install:

- Front fork leg  
Temporarily tighten the upper and under bracket pinch bolts.

## NOTE:

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

### 2. Tighten:

- Under bracket pinch bolt “3”



**Under bracket pinch bolt**  
28 Nm (2.8 m·kg, 20 ft·lb)

- Cap bolt “2”



**Cap bolt**  
18 Nm (1.8 m·kg, 13 ft·lb)

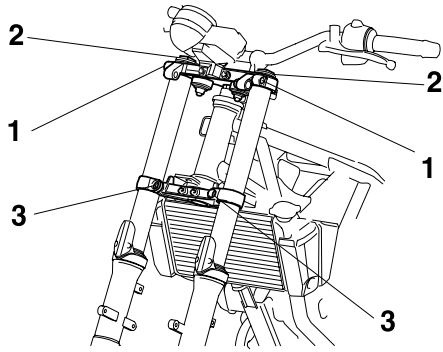
- Upper bracket pinch bolt “1”



**Upper bracket pinch bolt**  
28 Nm (2.8 m·kg, 20 ft·lb)

## FRONT FORK

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### **⚠ WARNING**

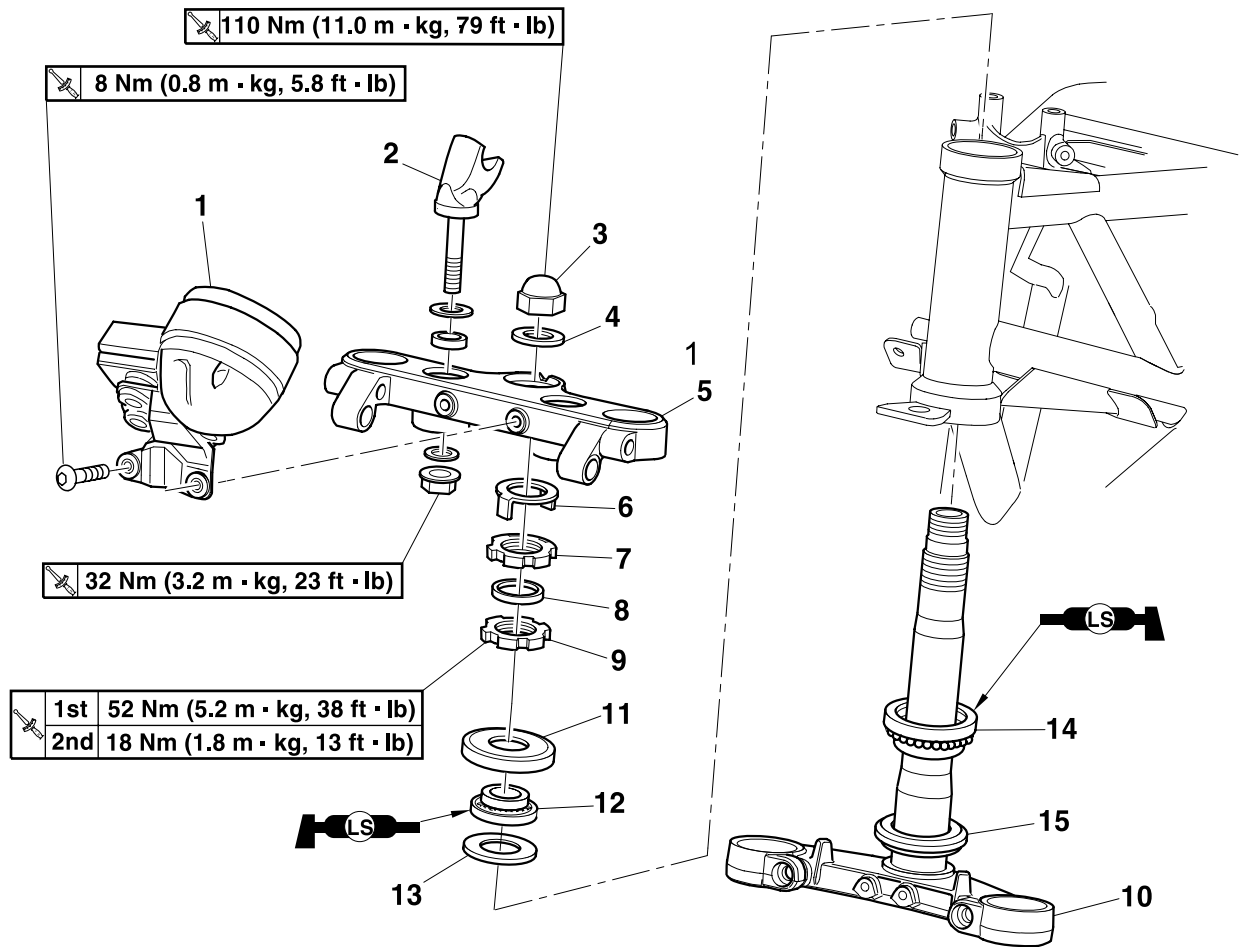
Make sure the brake hoses are routed properly.

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EAS23090

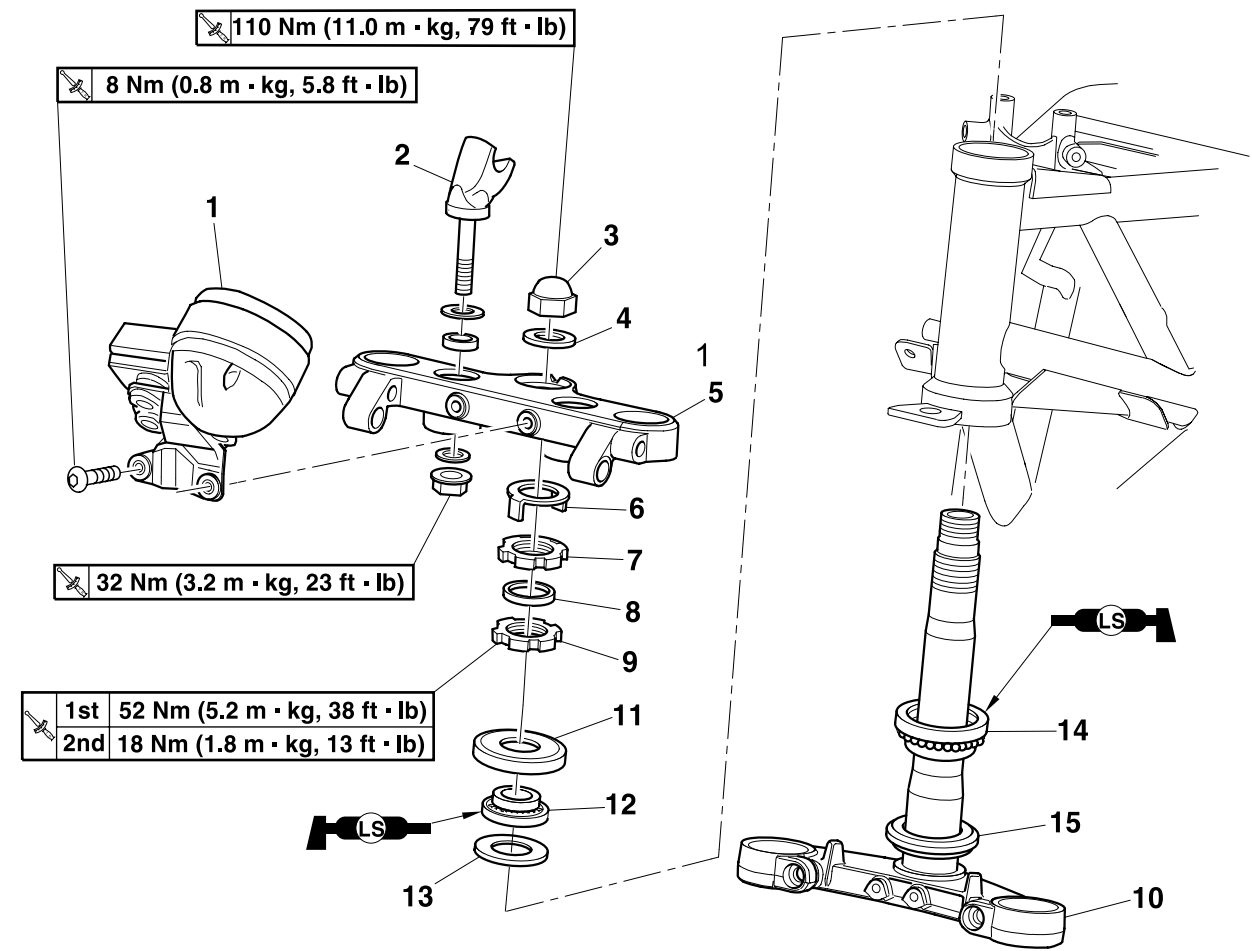
## STEERING HEAD

### Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-6.
	Front fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Front fork legs		Refer to "FRONT FORK" on page 4-46.
	Headlight assembly		Refer to "GENERAL CHASSIS" on page 4-1.
	Handlebar		Refer to "HANDLEBAR" on page 4-41.
1	Multi-function meter unit	1	
2	Lower handlebar holder	2	
3	Steering stem nut	1	
4	Washer	1	
5	Upper bracket	1	
6	Lock washer	1	
7	Upper ring nut	1	
8	Rubber washer	1	

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
9	Lower ring nut	1	
10	Lower bracket	1	
11	Bearing cover	1	
12	Bearing	1	
13	Plate washer	1	
14	Lower bearing	1	
15	Dust seal	1	
			For installation, reverse the removal procedure.





# STEERING HEAD

## NOTE:

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



## 4. Check:

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

EAS00683

## INSTALLING THE STEERING HEAD

### 1. Lubricate:

- Upper bearing
- Lower bearing
- Bearing races



### 2. Install:

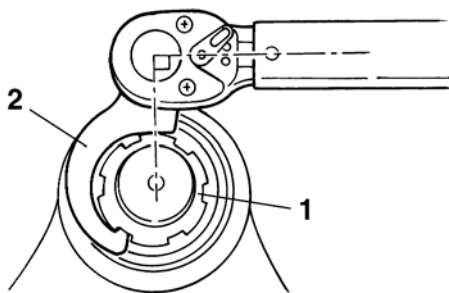
- Lower ring nut

### 3. Adjust:

- Steering head

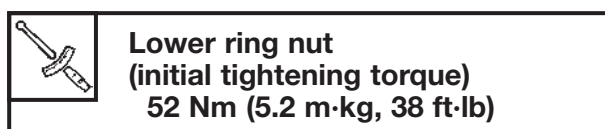


- a. Tighten the lower ring nut “1” to the specified torque with a steering nut wrench “2”.



## NOTE:

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



- b. Loosen the lower ring nut completely, and then tighten it to the specified torque.

## ⚠ WARNING

**Do not overtighten the lower ring nut.**



- c. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings. Refer to “CHECKING THE STEERING HEAD”.

- d. Install the rubber washer “2”.

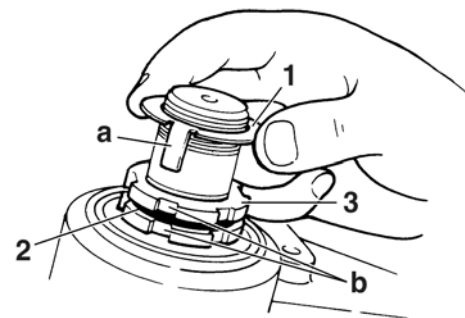
- e. Install the upper ring nut “3”.

- f. Finger tighten the upper ring nut “3”, and then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

- g. Install the lock washer “1”.

## NOTE:

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



### 4. Install:

- Upper bracket
- Washer
- Steering stem nut

### 5. Install:

- Front fork legs
- Refer to “INSTALLING THE FRONT FORK LEGS”.

## NOTE:

Temporarily tighten the lower bracket pinch bolts.

6. Tighten:

- Steering stem nut



**Steering stem nut**  
**110 Nm (11.0 m·kg, 79 ft·lb)**

7. Tighten:

- Upper bracket pinch bolts



**Upper bracket pinch bolt**  
**28 Nm (2.8 m·kg, 20 ft·lb)**

8. Install:

- Handlebar
- Upper handlebar holders



**Upper handlebar holder bolt**  
**23 Nm (2.3 m·kg, 17 ft·lb)**

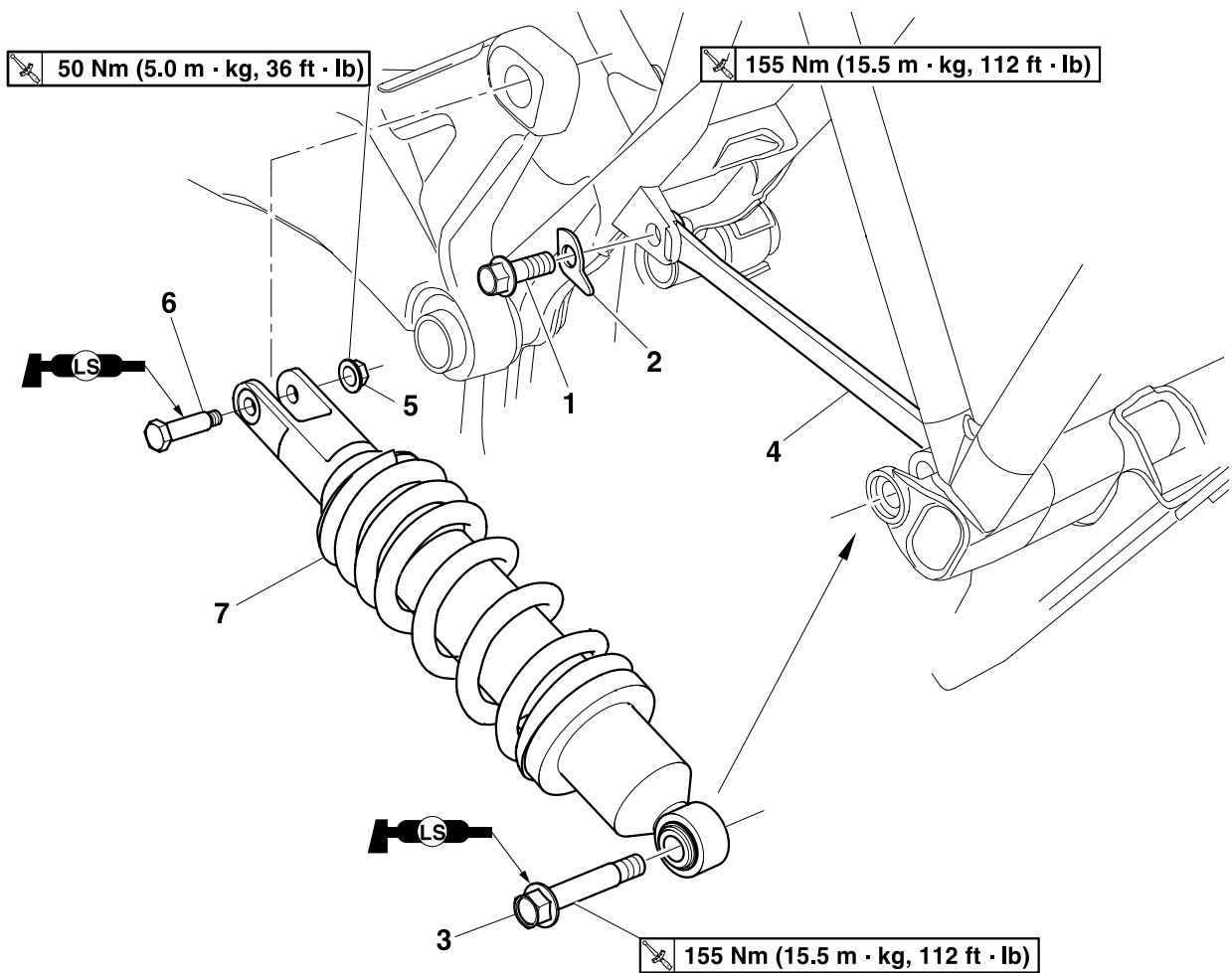
- Handlebar holder caps  
Refer to "HANDLEBAR" on page 4-41.

# REAR SHOCK ABSORBER ASSEMBLY

EAS23160

## REAR SHOCK ABSORBER ASSEMBLY

### Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Bolt	1	
2	Special washer	1	
3	Flange bolt	1	
4	Bar cross	1	
5	Flange nut	1	
6	Bolt	1	
7	Rear shock absorber assembly	1	
			For installation, reverse the removal procedure.

# REAR SHOCK ABSORBER ASSEMBLY

EAS23180

## HANDLING THE REAR SHOCK ABSORBER

EWA13740

### **⚠ WARNING**

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

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

EAS23190

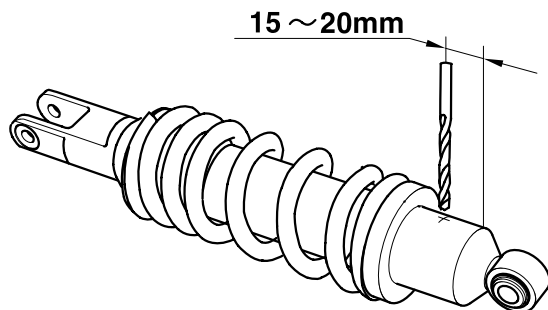
## DISPOSING OF A REAR SHOCK ABSORBER

1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2-3 mm (0.079-0.118 in) hole through the rear shock absorber at a point 15-20 mm (0.6-0.8 in) from its end as shown.

EWA13760

### **⚠ WARNING**

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



EAS23230

## REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

### **⚠ WARNING**

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

### **NOTE:**

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

EAS23240

## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:
  - Rear shock absorber rod  
Bends/damage → Replace the rear shock absorber assembly.
  - Rear shock absorber  
Gas leaks/oil leaks → Replace the rear shock absorber assembly.
  - Spring  
Damage/wear → Replace the rear shock absorber assembly.
  - Bolts  
Bends/damage/wear → Replace.

EAS23310

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
  - Flange bolt
  - Bolt



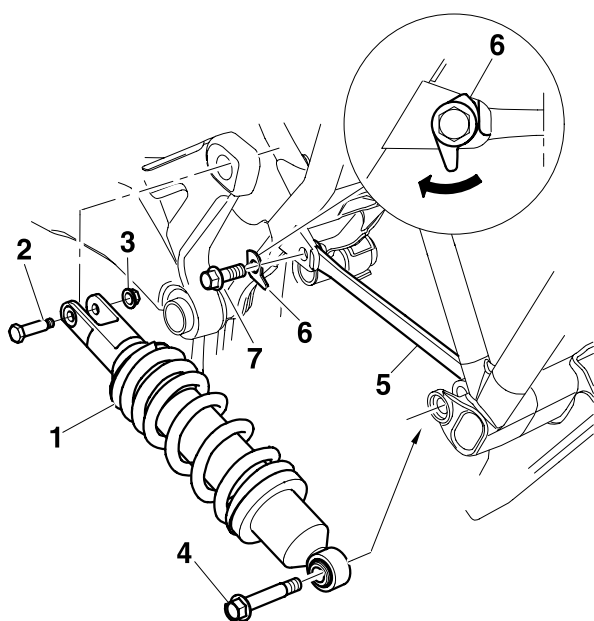
**Recommended lubricant**  
**Lithium-soap-based grease**

2. Install:
  - Rear shock absorber assembly "1"  
(onto the swingarm)
  - Bolt "2"
  - Flange nut "3"

### **NOTE:**

Tighten the flange nut until just touching. Do not fully tighten the nut.

## REAR SHOCK ABSORBER ASSEMBLY



6. Rotate:
  - Special washer “6”  
(clockwise until clearance with the abutment is completely recovered)
7. Tighten:
  - Bolt “7”  
(keep the special washer in its position with one finger)



**Bar cross rear bolt**  
**155 Nm (15.5 m·kg, 112 ft·lb)**

3. Install:
  - Rear shock absorber assembly “1”  
(into the frame support bracket)
  - Flange bolt “4”
  - Bar cross “5”

### NOTE:

Tighten the flange bolt into the bar cross until just touching. Do not fully tighten the bolt.

4. Install:
  - Special washer “6”  
(into the bolt “7”)

### NOTE:

Take care of placing the special washer in the correct side and tighten the bolt into the bar cross until just touching.

5. Tighten:
  - Flange nut “3”



**Rear shock absorber assembly  
nut (rear side)**  
**50 Nm (5.0 m·kg, 36 ft·lb)**

- Flange bolt “4”

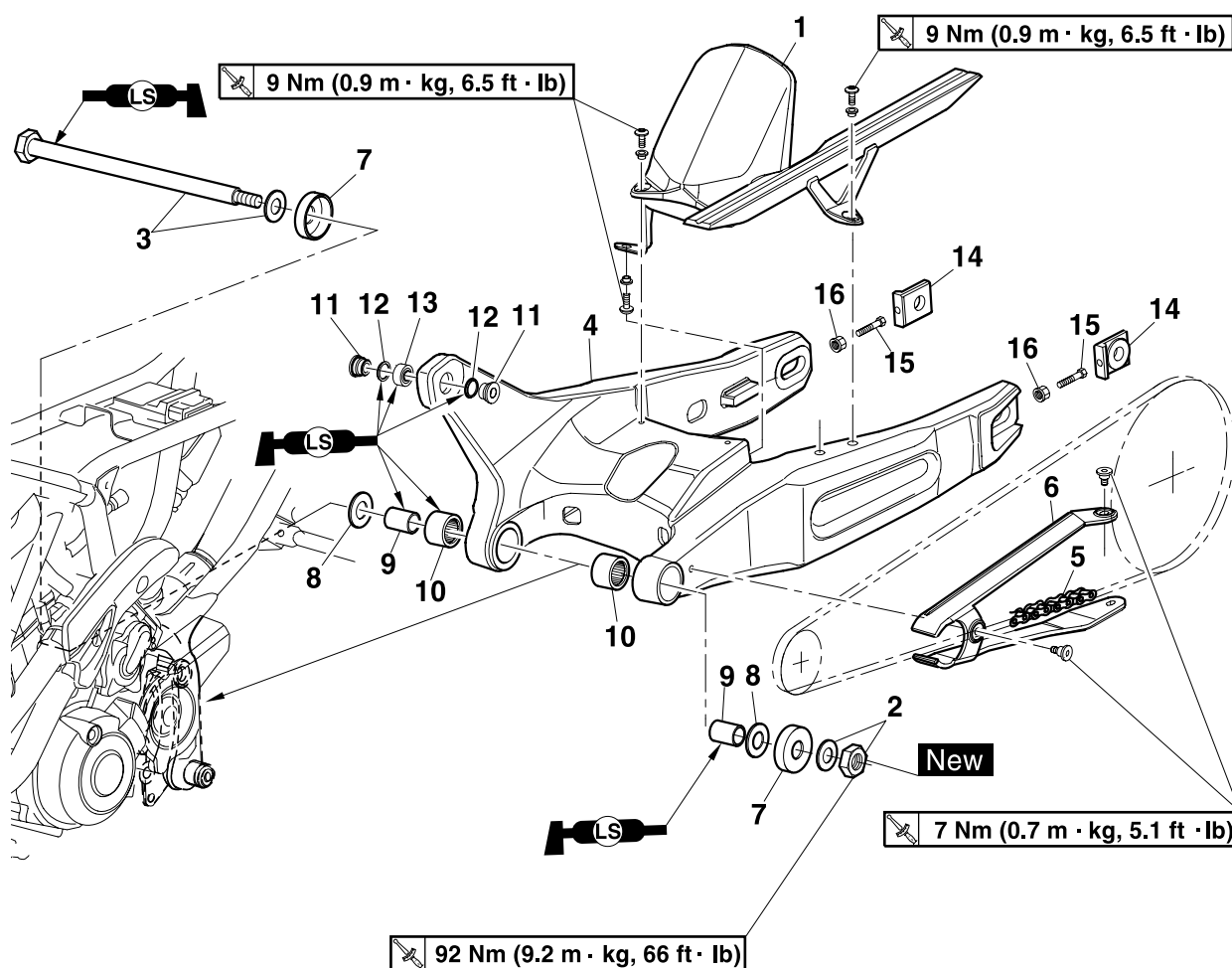


**Rear shock absorber assembly  
bolt (front side)**  
**155 Nm (15.5 m·kg, 112 ft·lb)**

EAS23330

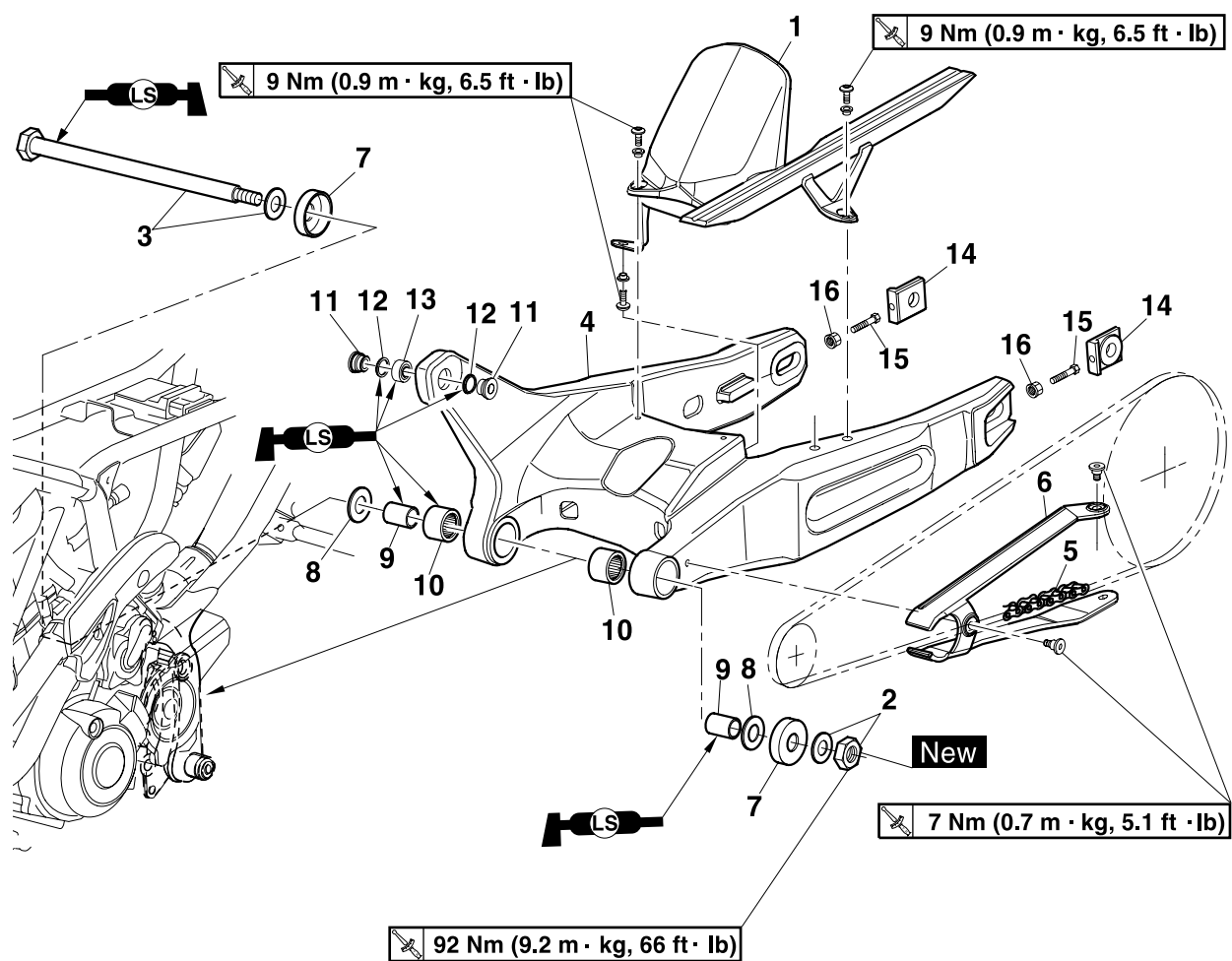
## SWINGARM

### Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REAR WHEEL" on page 4-12.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-60.
1	Rear fender cover	1	
2	Self-locking nut/Plate washer	1/1	
3	Pivot shaft/Plate washer	1/1	
4	Swingarm	1	
5	Drive chain	1	
6	Guard seal	1	
7	Thrust cover	2	
8	Plate washer	2	
9	Bush	2	
10	Bearing	2	
11	Collar	2	
12	Dust seal	2	

Removing the swingarm



Order	Job/Parts to remove	Q'ty	Remarks
13	Ball joint	1	
14	Chain puller	2	
15	Bolt	2	
16	Flange nut	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.**

### **NOTE:**

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

2. Remove:

- Rear wheel  
Refer to "REAR WHEEL" on page 4-12.
- Rear shock absorber assembly  
Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-60.

3. Measure:

- Swingarm side play
- Swingarm vertical movement

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



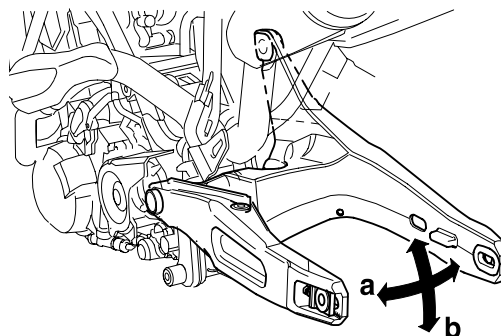
**Swingarm pivot shaft nut**  
**92 Nm (9.2 m·kg, 66 ft·lb)**

- b. Measure the swingarm side play "a" by moving the swingarm from side to side.
- c. If the swingarm side play is out of specification, check the spacers, bearings, washers, and dust covers.



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

- d. Check the swingarm vertical movement "b" by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the spacers, bearings, washers, and dust covers.



4. Remove:

- Swingarm shaft nut
- Pivot shaft
- Swingarm

EAS23360

## CHECKING THE SWINGARM

1. Check:

- Swingarm  
Bends/cracks/damage → Replace.

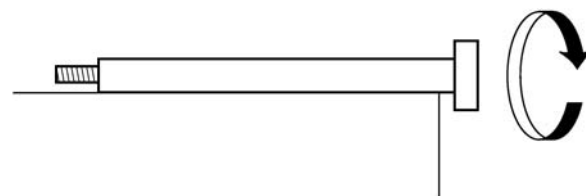
2. Check:

- 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 seal
- Thrust covers
- Spacer
- Washer
- Bearings
- Bush
- Ball joint
- Collars



**Recommended cleaning solvent**  
**Kerosene**



## 4. Check:

- Thrust covers
- Dust seal
- Oil seals
- Damage/wear → Replace.
- Ball joint
- Bearings
- Damage/pitting → Replace.
- Collars
- Spacers/Bush
- Damage/scratches → Replace.

EAS23380

## INSTALLING THE SWINGARM

### 1. Lubricate:

- Bearings
- Ball joint
- Spacers/Bush
- Pivot shaft



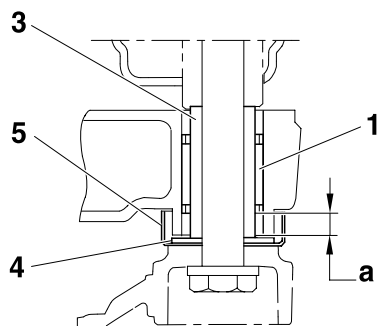
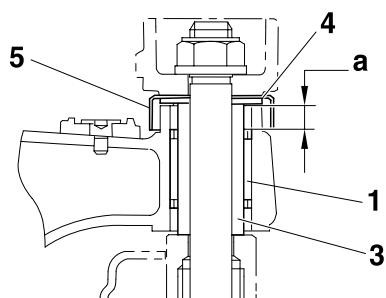
**Recommended lubricant**  
**Lithium-soap-based grease**

### 2. Press in their seats

- Bearings “1”



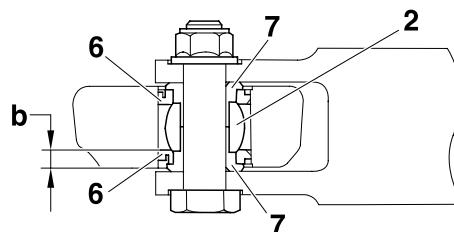
**Location “a” of bearings**  
**(right and left)**  
**9 mm (0.354 in)**



- Ball joint “2”



**Location “b” of ball joint**  
**5 ± 0.5 mm (0.196 ± 0.0196 in)**



### 3. Install:

- Bushes “3”
- Plate washers “4”
- Thrust covers “5”
- Dust seals “6”
- Collars “7”

### 4. Install:

- Swingarm  
(locate it in its position on frame)
- Plate washer
- Pivot shaft
- Self-locking nut **New**

### 5. Tighten:

- Self-locking nut



**Pivot shaft self-locking nut**  
**92 Nm (9.2 m·kg, 66 ft·lb)**

### 6. Install:

- Rear shock absorber assembly  
Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-60.
- Rear wheel  
Refer to “REAR WHEEL” on page 4-12

### 7. Adjust:

- Drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-22.

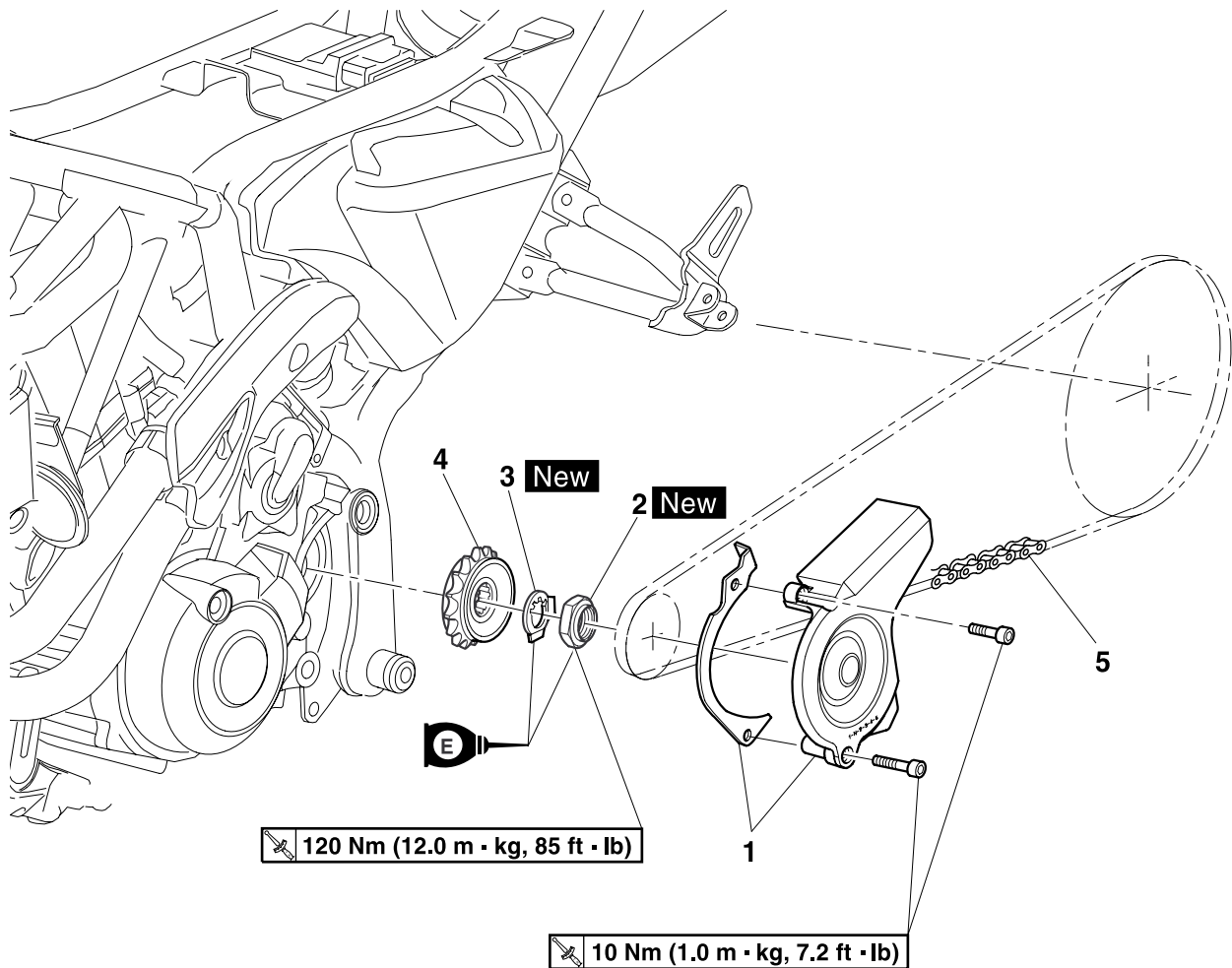


**Drive chain slack**  
**40.0–50.0 mm (1.57–1.97 in)**

EAS23400

## CHAIN DRIVE

### Removing the drive sprocket and drive chain



Order	Job/Parts to remove	Q'ty	Remarks
	Rear wheel		Refer to "REAR WHEEL" on page 4-12.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-60.
	Swingarm		Refer to "SWINGARM" on page 4-63.
	Shift pedal		Refer to "ADJUSTING THE SHIFT PEDAL" on page 3-22.
1	Drive sprocket cover/Drive chain guard	1/1	
2	Drive sprocket nut	1	
3	Lock washer	1	
4	Drive sprocket	1	
5	Drive chain	1	
			For installation, reverse the removal procedure.

EAS23410

## REMOVING THE DRIVE CHAIN

1. Stand the vehicle on a level surface.

EWA13120

### **WARNING**

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

### **NOTE:**

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

2. Remove:

- Swingarm
- Drive chain

EAS23440

## CHECKING THE DRIVE CHAIN

1. Measure:

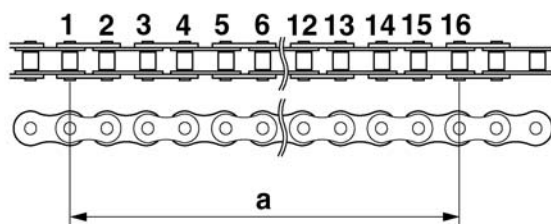
- 15-link section "a" of the drive chain  
Out of specification → Replace the drive chain.



**15-link length limit**  
**240.5 mm (9.46 in)**

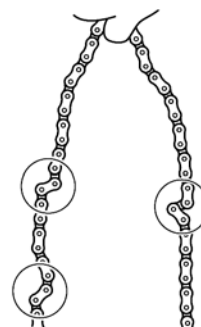
### **NOTE:**

- While measuring the 15-link section, push down on the drive chain to increase its tension.
- Measure the length between drive chain roller "1" and "16" as shown.
- Perform this measurement at two or three different places.



2. Check:

- Drive chain  
Stiffness → Clean and lubricate or replace.



3. Clean:

- Drive chain

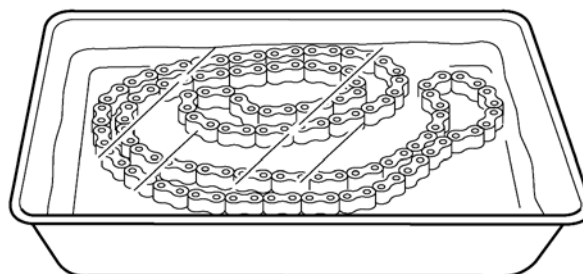


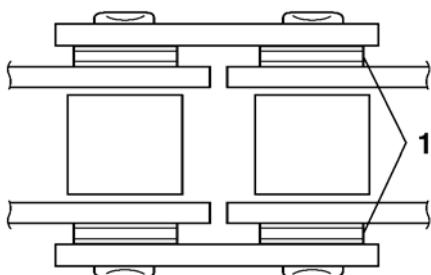
- a. Wipe the drive chain with a clean cloth.
- b. Put the drive chain in kerosene and remove any remaining dirt.
- c. Remove the drive chain from the kerosene and completely dry it.

EC5YU1022

### **CAUTION:**

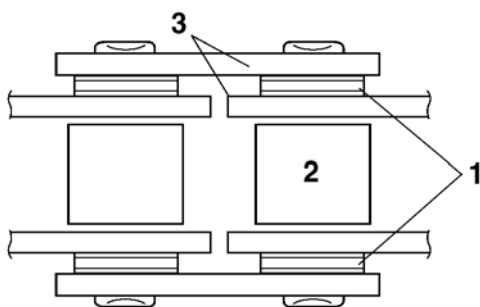
- This vehicle has a drive chain with small rubber O-rings "1" between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzene), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's 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.





## 4. Check:

- O-rings "1"  
Damage • Replace the drive chain.
- Drive chain rollers "2"  
Damage/wear → Replace the drive chain.
- Drive chain side plates "3"  
Damage/wear → Replace the drive chain.  
Cracks → Replace the drive chain and make sure the battery breather hose is properly routed away from the drive chain and below the swingarm.



## 5. Lubricate:

- Drive chain



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

## REMOVING THE DRIVE SPROCKET

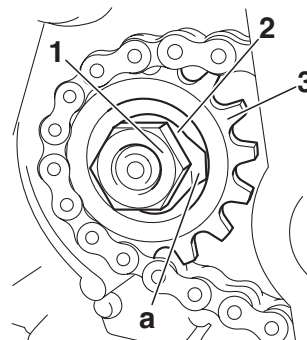
### NOTE:

Loosen the drive sprocket nut before removing the rear wheel.

1. Remove:
  - Drive sprocket cover
  - Drive chain guard
2. Straighten the lock washer tab "a"

## 3. Remove:

- Drive sprocket nut "1"
- Lock washer "2"
- Drive sprocket "3"

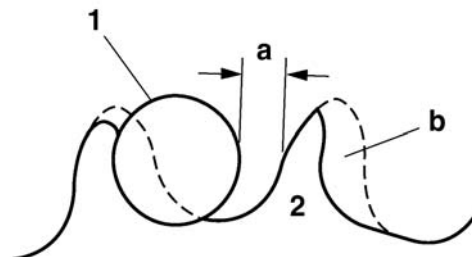


EAS23460

## CHECKING THE DRIVE SPROCKET

### 1. 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

1. Drive chain roller
2. Drive chain sprocket

EAS23470

## CHECKING THE REAR WHEEL SPROCKET

Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-16.

EAS23480

## CHECKING THE REAR WHEEL DRIVE HUB

Refer to "CHECKING THE REAR WHEEL DRIVE HUB" on page 4-15.

EAS28800

## INSTALLING THE DRIVE CHAIN

### 1. Lubricate:

- Drive chain



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

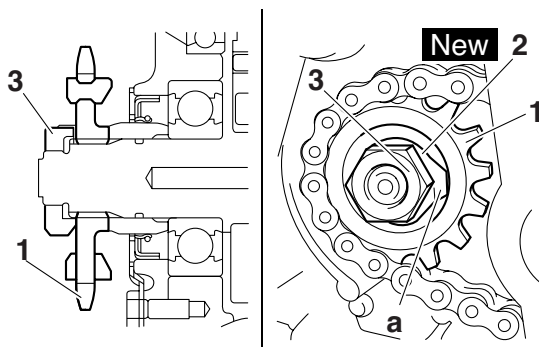
2. Install:

- Drive sprocket “1”
- Lock washer “2” **New**
- Drive sprocket nut “3”



**NOTE:**

- Install the drive sprocket “1” and drive sprocket nut “3” in the direction shown.
- While applying the rear brake, tighten the drive sprocket nut.



3. Bend the lock washer tab “a” along a flat side of the nut.

4. Install:

- Shift pedal  
Refer to “ADJUSTING THE SHIFT PEDAL” on page 3-22.

5. Adjust:

- Drive chain slack  
Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-22.



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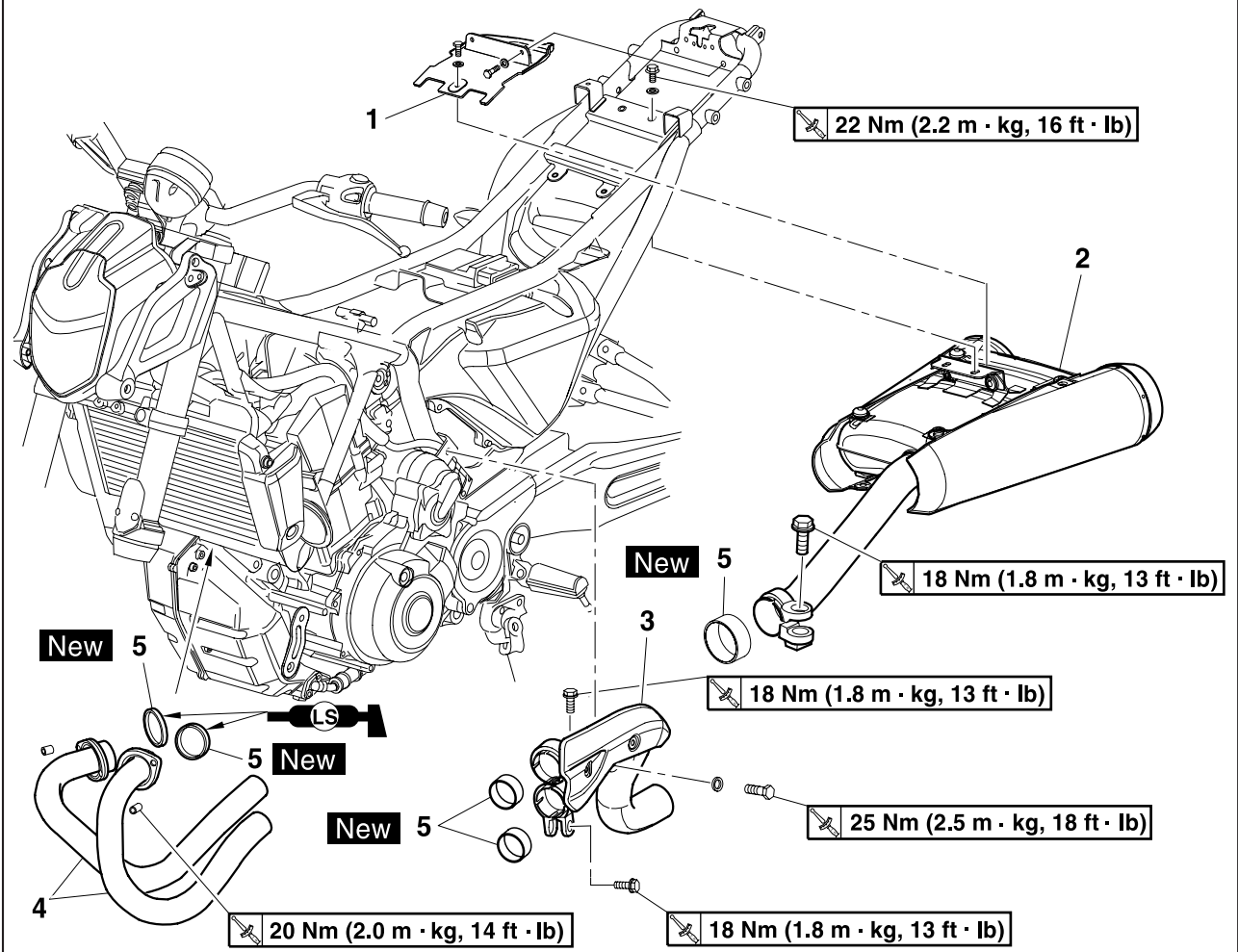
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EAS23710

ENGINE REMOVAL

Removing the exhaust pipes and muffler

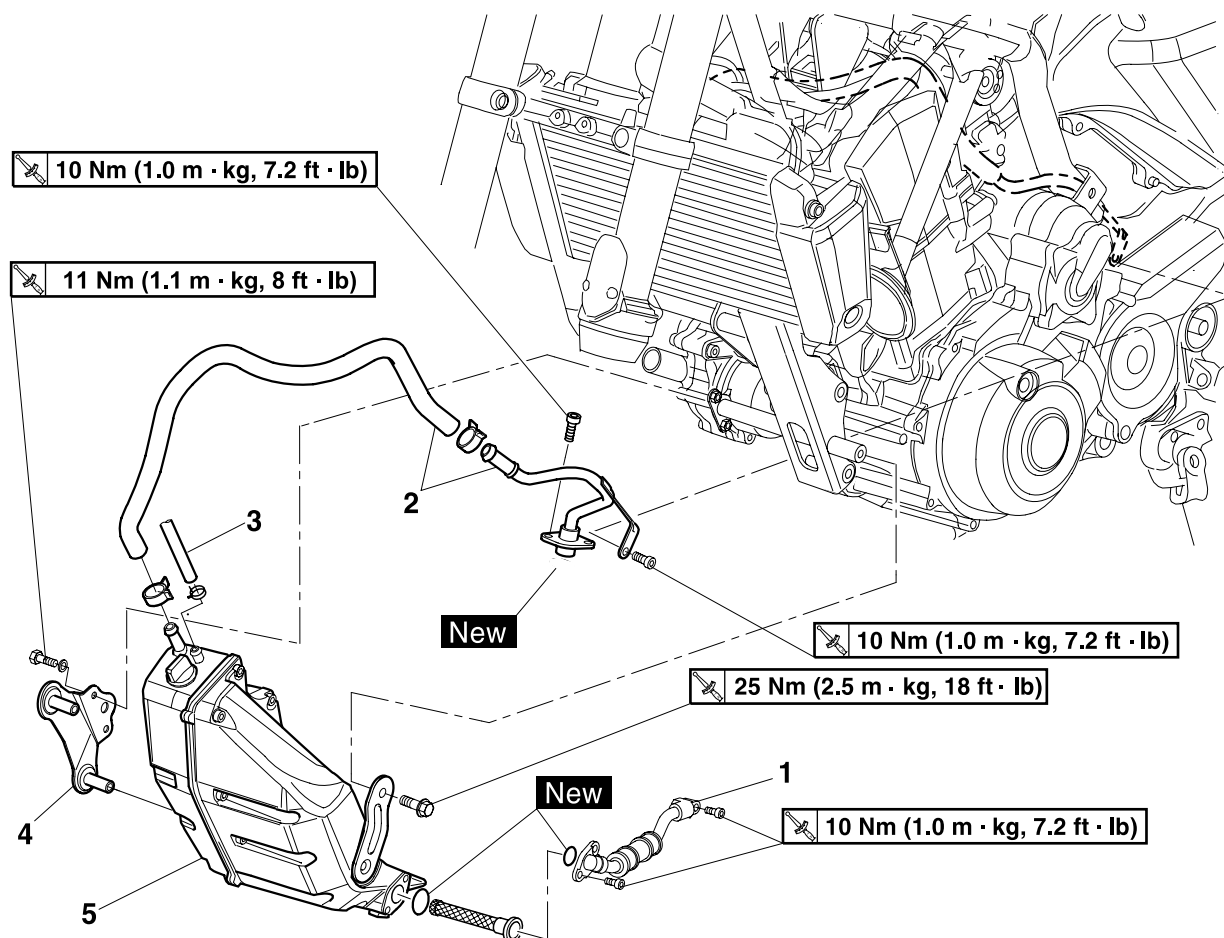


Order	Job/Parts to remove	Q'ty	Remarks
	Seats		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Rear mud guard and rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
1	Cover	1	
2	Muffler	1	
3	Exhaust pipe 3	1	
4	Exhaust pipe 1, 2	1/1	
5	Gasket	5	
			For installation, reverse the removal procedure.



# ENGINE REMOVAL

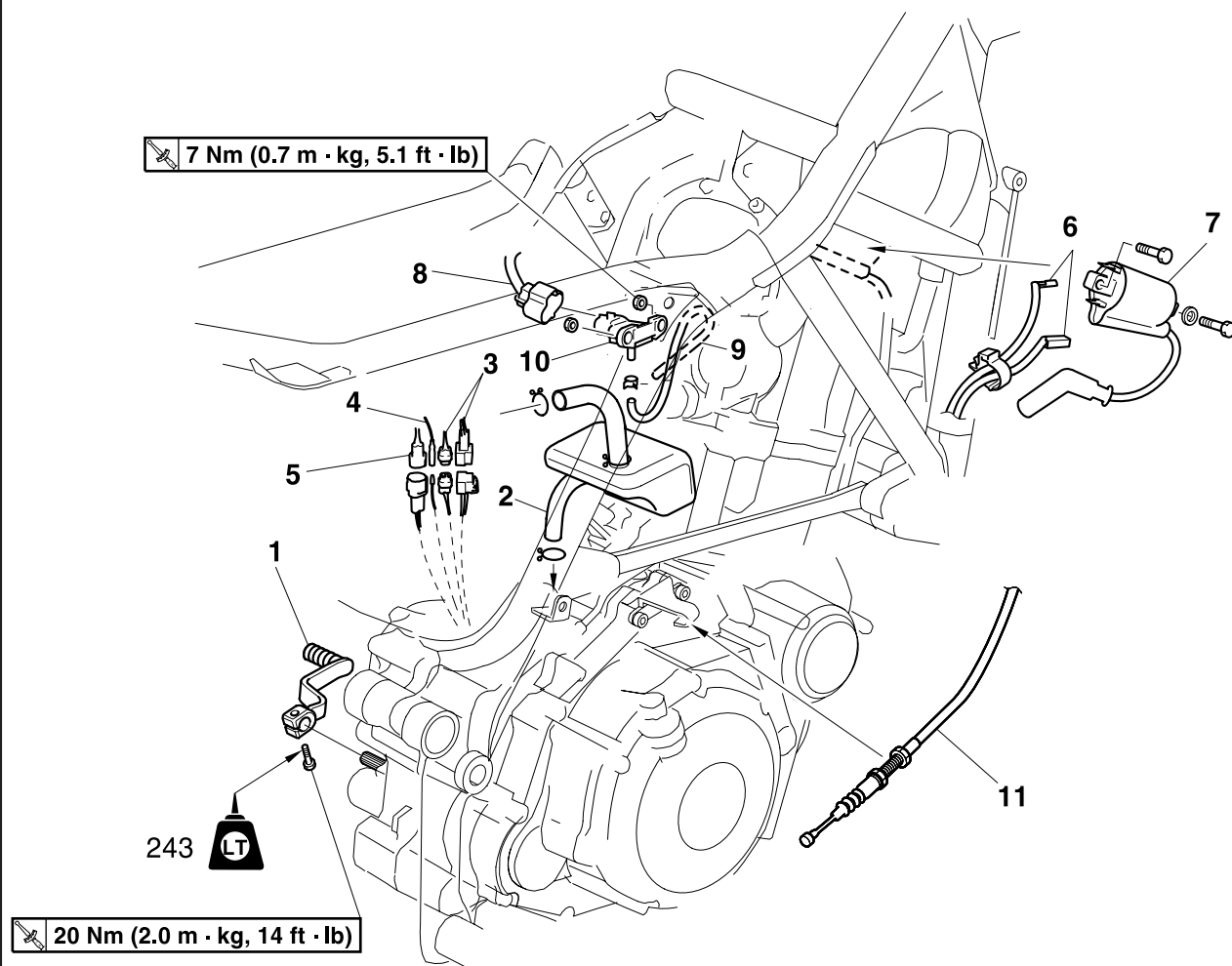
## Removing the oil tank



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-10.
1	Oil tank outlet pipe	1	
2	Oil tank inlet pipe	1	
3	Oil tank breather hose	1	Disconnect.
4	Side cover stay	1	
5	Oil tank	1	
			For installation, reverse the removal procedure.

# ENGINE REMOVAL

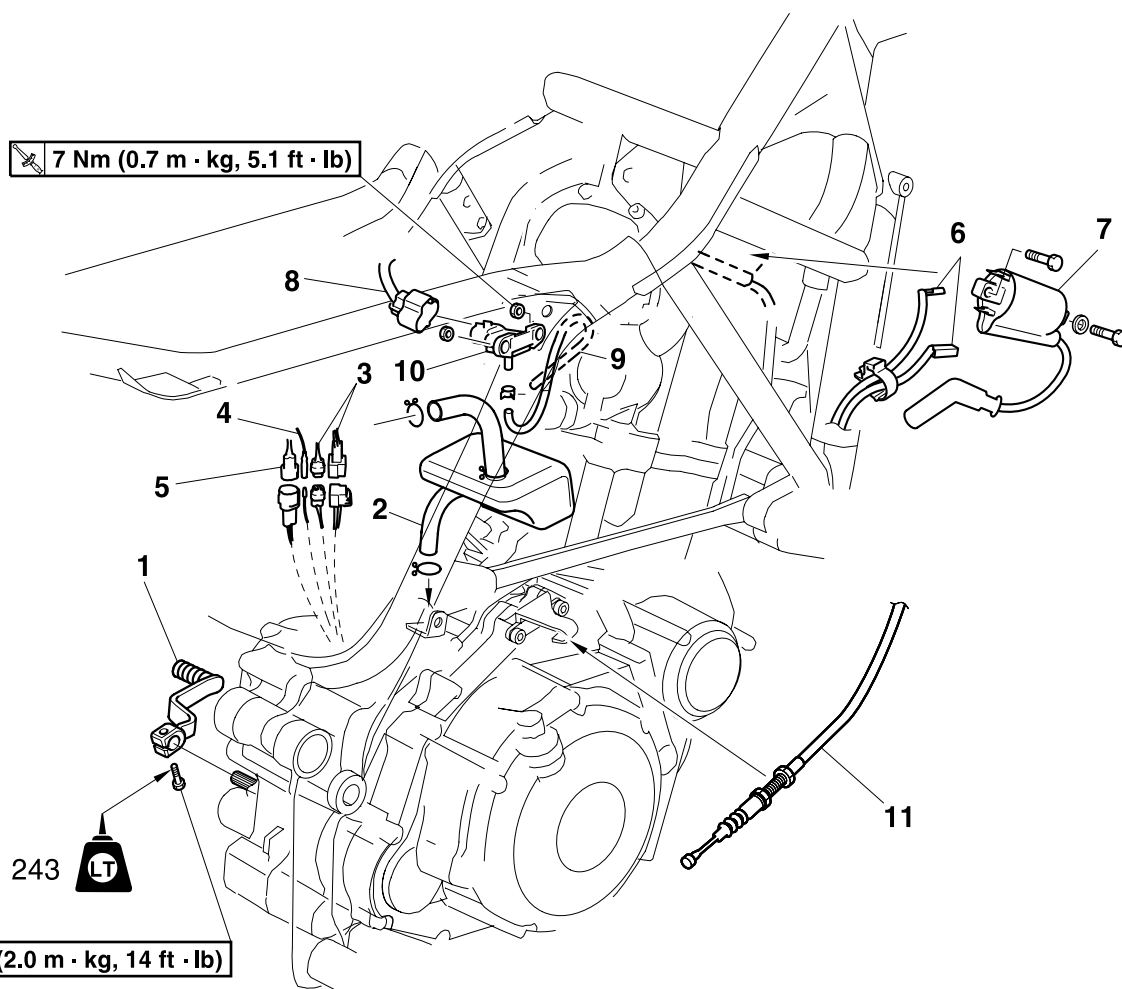
## Removing the leads, cables, hoses, and ignition coil



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
	Radiator		Refer to "RADIATOR" on page 6-1.
	Rear wheel		Refer to "REAR WHEEL" on page 4-12.
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-60.
	Swingarm/cross bar (R.H.)		Refer to "SWINGARM" on page 4-63.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-57.
	Air filter case		Refer to "AIR FILTER CASE" on page 4-4.
	Throttle body/fast idle plunger inlet hose		Refer to "THROTTLE BODY ASSEMBLY" on page 7-4.
	Thermostat/thermo sensor		Refer to "THERMOSTAT" on page 6-4.
	Water pump assembly/water pump outlet hose		Refer to "WATER PUMP" on page 6-7.
	Air cut-off valve assembly/air-filter-to-air-cut-off-valve hose		Refer to "AIR INDUCTION SYSTEM" on page 7-11.
1	Shift pedal	1	
2	Crankcase-to-breather-chamber hose	1	
3	A.C. magneto coupler	2	Disconnect.

# ENGINE REMOVAL

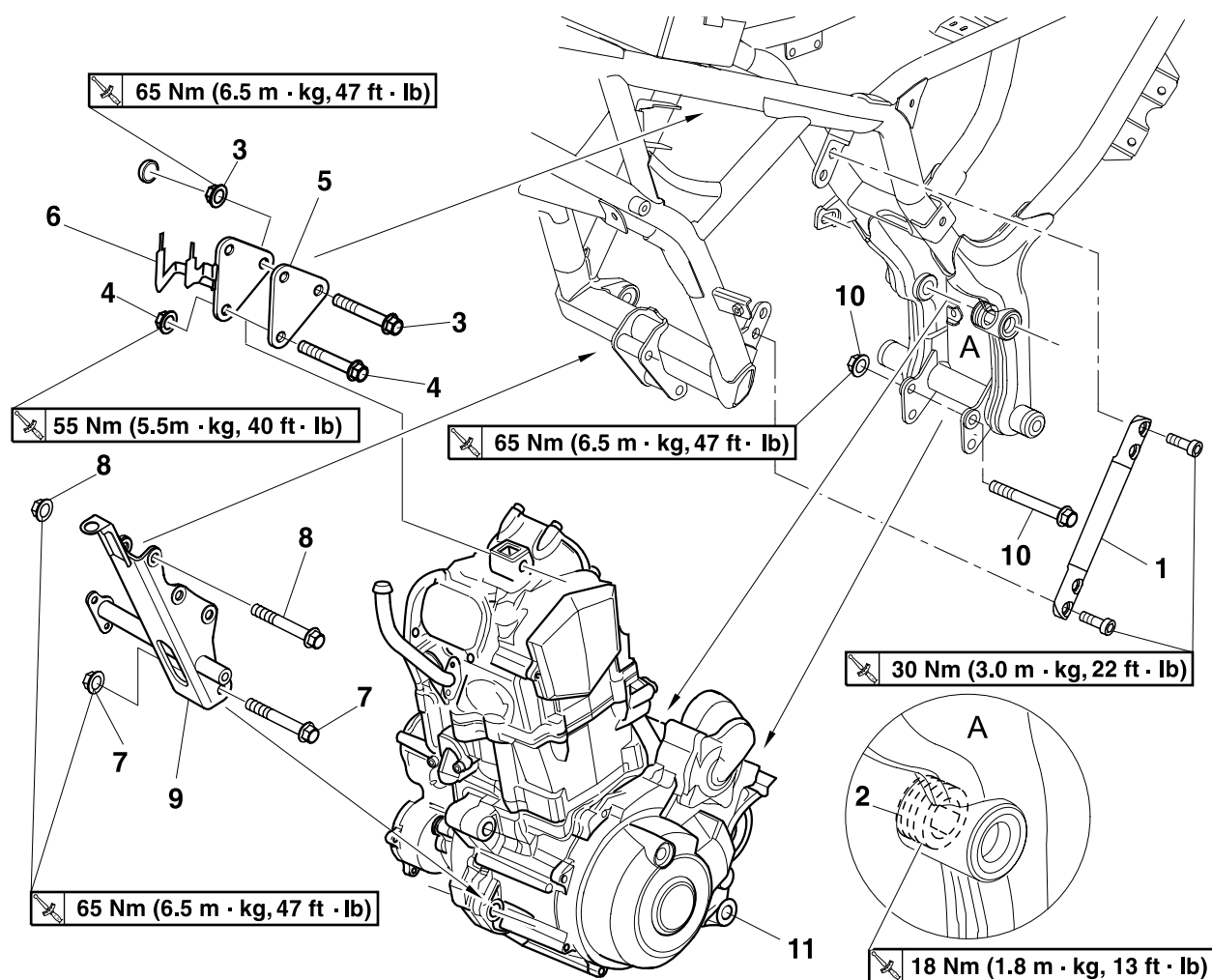
## Removing the leads, cables, hoses, and ignition coil



Order	Job/Parts to remove	Q'ty	Remarks
4	Neutral switch connector	1	Disconnect.
5	Speed sensor coupler	1	Disconnect.
6	Ignition coil lead	2	Disconnect.
7	Ignition coil	1	
8	Intake air pressure sensor coupler	1	Disconnect.
9	Vacuum hose	1	
10	Intake air pressure sensor	1	
11	Clutch cable	1	
			For installation, reverse the removal procedure.

# ENGINE REMOVAL

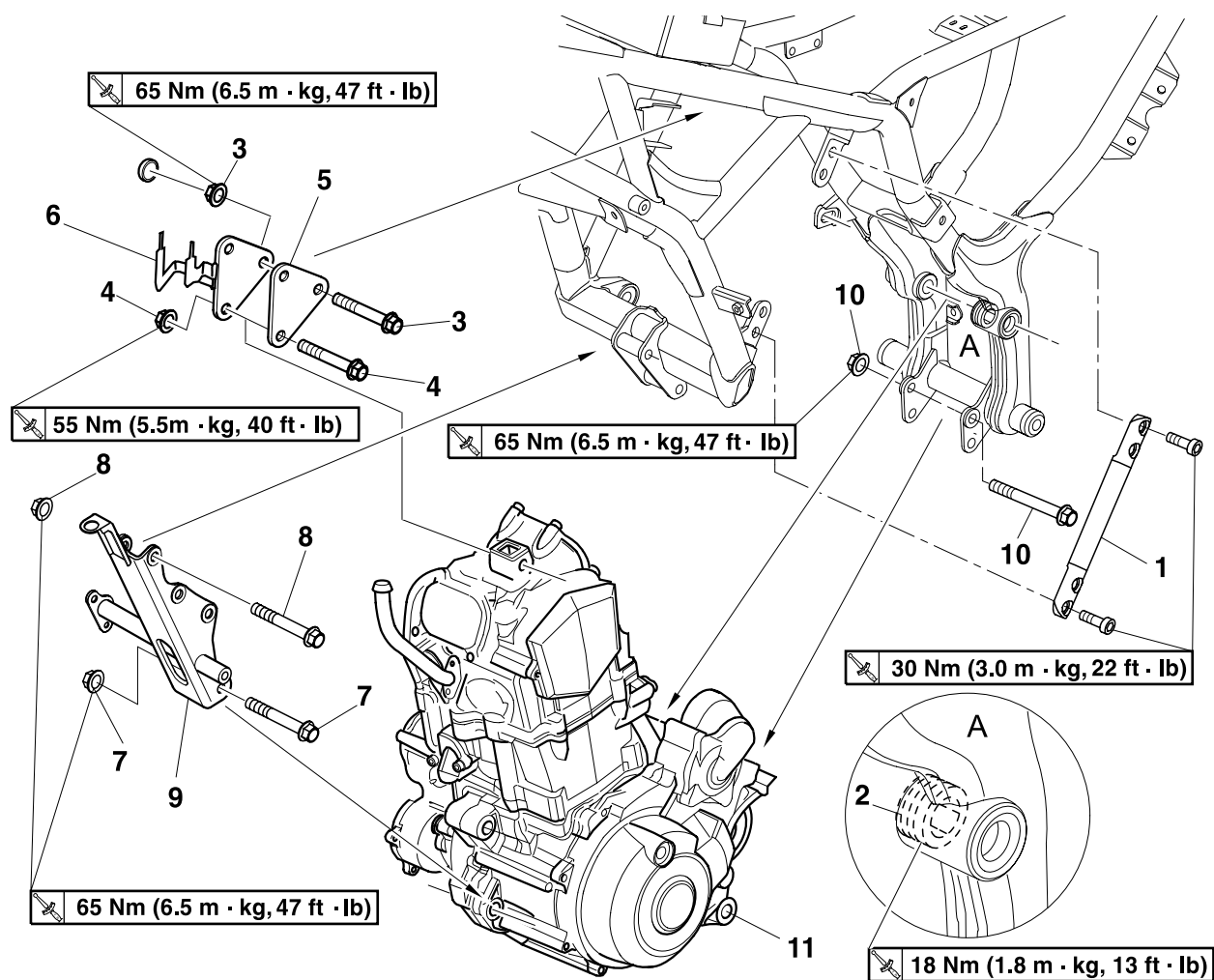
## Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
			<b>NOTE:</b> _____ Place a suitable stand under the frame and engine.
			<b>CAUTION:</b> _____ When remove the engine loosen first all of the nuts and bolts.
			<b>CAUTION:</b> _____ When install the engine install first all of the nuts and bolts, and then tighten them to specified torques. Refer to "INSTALLING THE ENGINE" on page 5-7.
1	Tension pipe (L.H.)	1	
2	Special nut	1	Loosen.
3	Engine upper bracket bolt/nut	2/2	
4	Engine upper mounting bolt/nut	1/1	
5	Engine upper bracket (left)	1	
6	Engine upper bracket (right)	1	

# ENGINE REMOVAL

## Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
7	Engine front mounting bracket bolt/nut	2/2	
8	Engine front bracket bolt/nut	2/2	
9	Engine front bracket	1	
10	Engine rear mounting bolt/nut	1/1	
11	Engine	1	
			For installation, reverse the removal procedure.

# ENGINE REMOVAL

EAS00192

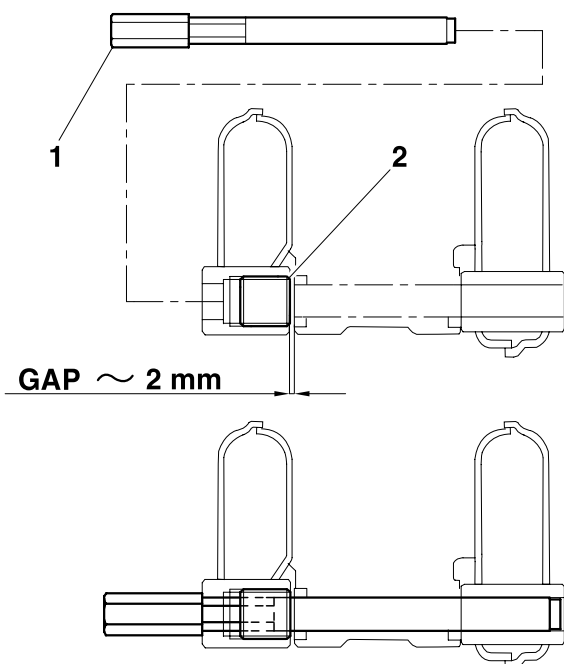
## INSTALLING THE ENGINE

### 1. Install:

- Engine (on the frame)
- Special tool "1"

### NOTE:

Insert the special tool "1" in its position until it is engaged to the special nut grooves "2".

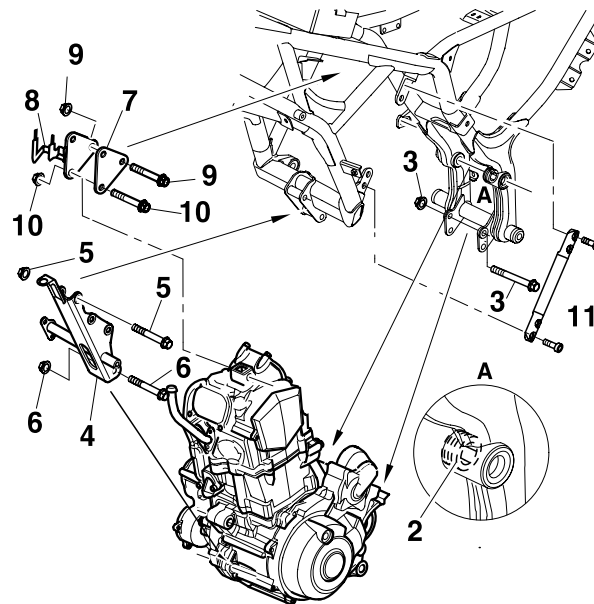


### 2. Install:

- Engine rear mounting bolt/nut "3" (tighten the nut until just touching the bracket)
- Engine front bracket "4"
- Engine front bracket bolts/nuts "5" (tighten the nuts until just touching the bracket)
- Engine front mounting bracket bolts/nuts "6" (tighten the nuts until just touching the bracket)
- Engine upper bracket (left) "7"
- Engine upper bracket (right) "8"
- Engine upper bracket bolts/nuts "9" (tighten the nuts until just touching the bracket)
- Engine upper mounting bolt/nut "10" (tighten the nut until just touching the bracket)

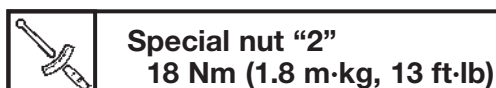
### NOTE:

Do not fully tighten the bolts.



### 3. Tighten:

- Special nut "2" (using the special tool "1")




### NOTE:


Leave the special tool in its position and start tightening all nuts to the indicated torque according to the sequence indicated.

### 4. Tighten:

- Engine rear mounting bolt/nut "3"
- Engine front bracket bolt/nut (upper) "5"
- Engine front bracket bolt/nut (lower) "5"
- Engine front mounting bracket bolt/nut (upper) "6"
- Engine front mounting bracket bolt/nut (lower) "6"
- Engine upper bracket bolt/nut (front) "9"
- Engine upper bracket bolt/nut (rear) "9"
- Engine upper mounting bolt/nut "10"

	<p><b>Engine rear mounting bolt/nut “3”</b> 65 Nm (6.5 m·kg, 47 ft·lb)</p> <p><b>Engine front bracket bolts/nuts “5”</b> 65 Nm (6.5 m·kg, 47 ft·lb)</p> <p><b>Engine front mounting bracket bolts/nuts “6”</b> 65 Nm (6.5 m·kg, 47 ft·lb)</p> <p><b>Engine upper bracket bolts/nuts “9”</b> 65 Nm (6.5 m·kg, 47 ft·lb)</p> <p><b>Engine upper mounting bolt/nut “10”</b> 55 Nm (5.5 m·kg, 40 ft·lb)</p>
---	---

5. Remove:
  - Special tool “1”
6. Install
  - Tension pipe (L.H.) “11”
7. Tighten:
  - Tension pipe bolts

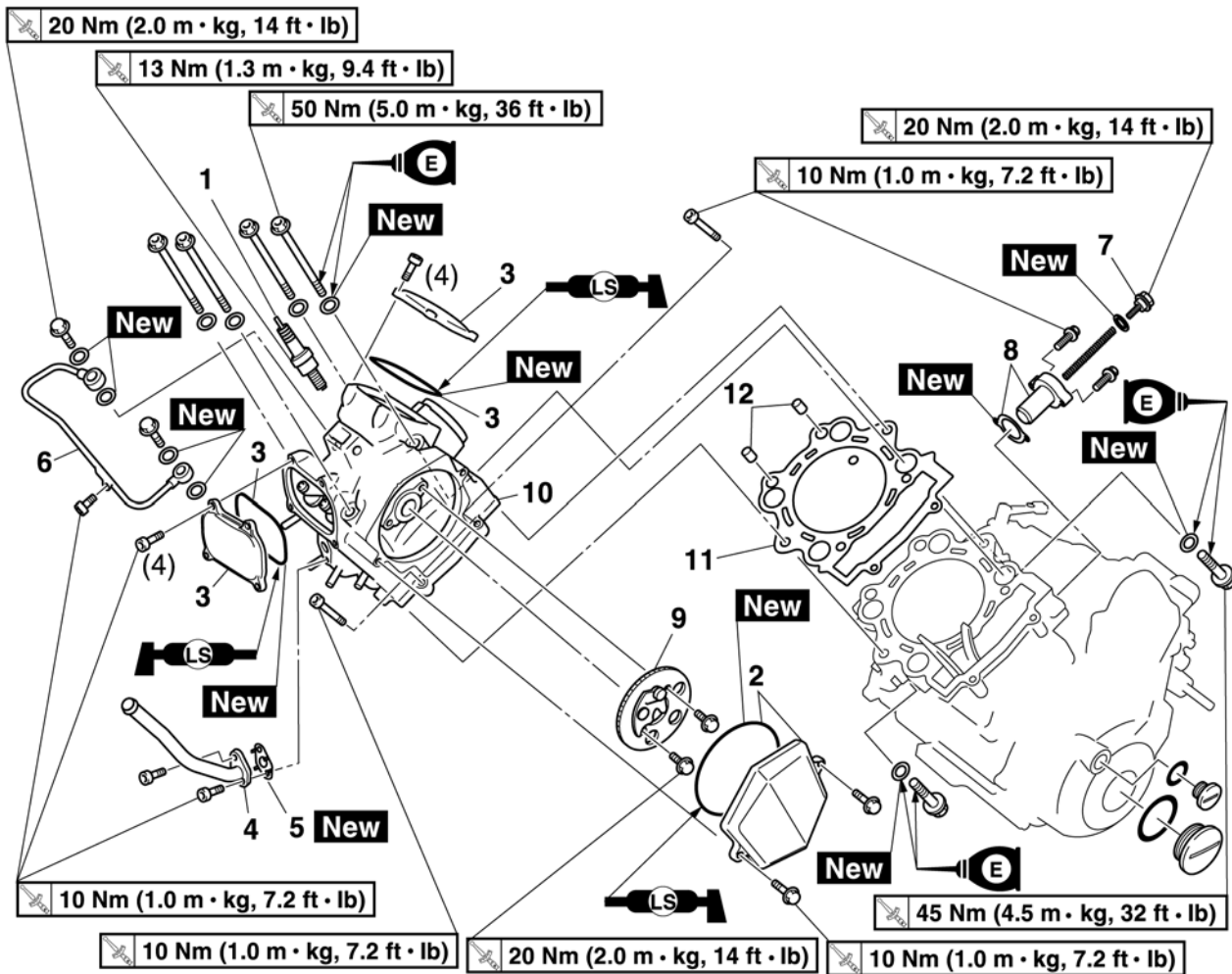
	<p><b>Tension pipe bolts</b> 30 Nm (3.0 m·kg, 22 ft·lb)</p>
--	---



EAS00221

## CYLINDER HEAD

### Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Timing mark accessing screw/crank-shaft end accessing screw		Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-3.
1	Spark plug	1	
2	Camshaft sprocket cover/O-ring	1/1	
3	Tappet cover/O-ring	2/2	
4	Air cut-off valve outlet pipe	1	
5	Gasket	1	
6	Oil delivery pipe	1	
7	Timing chain tensioner cap bolt	1	
8	Timing chain tensioner/gasket	1/1	
9	Camshaft sprocket	1	
10	Cylinder head	1	
11	Cylinder head gasket	1	
12	Dowel pin	2	
			For installation, reverse the removal procedure.

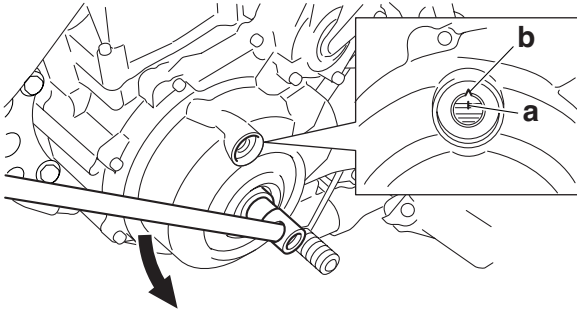


EAS00225

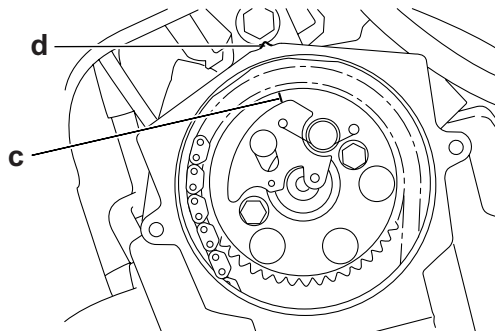
## REMOVING THE CYLINDER HEAD

### 1. Align:

- “I” mark “a” on the A.C. magneto rotor (with the stationary pointer “b” on the A.C. magneto cover)



- Turn the crankshaft counterclockwise.
- When the piston is at top dead center (TDC) on the compression stroke, align the “I” mark “c” on the camshaft sprocket with the stationary pointer “d” on the cylinder head.

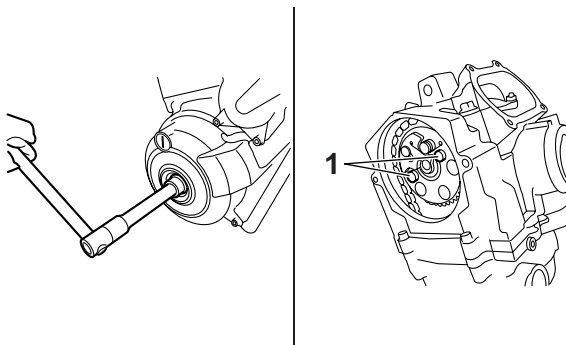


### 2. Loosen:

- Camshaft sprocket bolts “1”

### NOTE:

While holding the A.C. magneto rotor nut with a wrench, remove the bolt.



### 3. Loosen:

- Timing chain tensioner cap bolt

### 4. Remove:

- Timing chain tensioner (along with the gasket)
- Camshaft sprocket
- Timing chain

### NOTE:

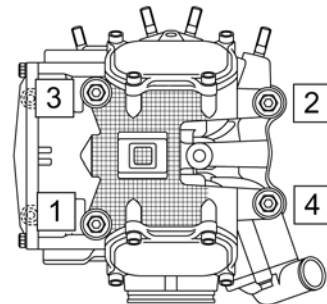
To prevent the timing chain from falling into the crankcase, fasten it with a wire.

### 5. Remove:

- Cylinder head

### NOTE:

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



EAS00229

## CHECKING THE CYLINDER HEAD

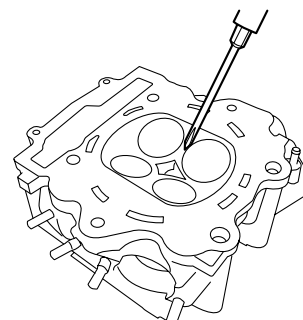
### 1. Eliminate:

- Combustion chamber carbon deposits (with a rounded scraper)

### NOTE:

Do not use a sharp instrument to avoid damaging or scratching:

- Spark plug bore threads
- Valve seats



## 2. Check:

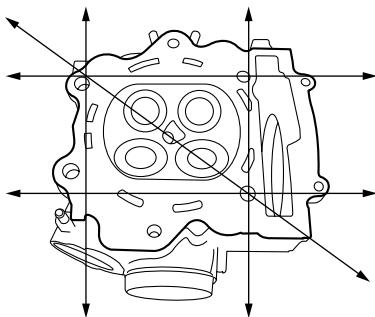
- Cylinder head  
Damage/scratches → Replace.
- Cylinder head water jacket  
Mineral deposits/rust → Eliminate.

## 3. Measure:

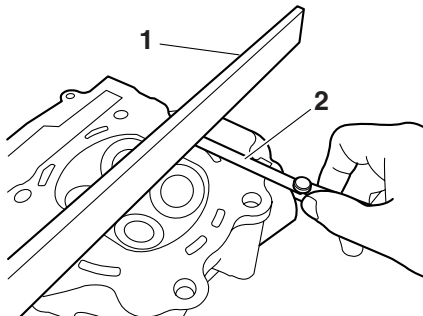
- Cylinder head warpage  
Out of specification → Resurface the cylinder head.



**Maximum cylinder head warpage  
0.03 mm (0.0012 in)**



- a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



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

### NOTE:

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

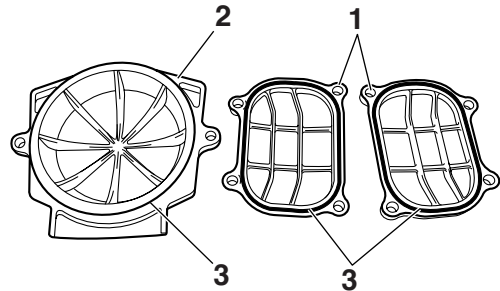


EAS00212

## CHECKING THE TAPPET COVERS AND CAMSHAFT SPROCKET COVER

### 1. Check:

- Tappet covers "1"
  - Camshaft sprocket cover "2"
  - O-rings "3"
- Damage/wear → Replace the defective part(s).

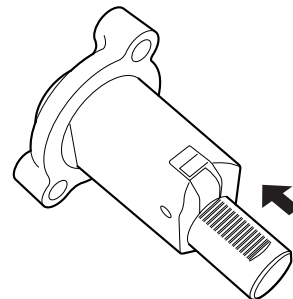


EAS00210

## CHECKING THE TIMING CHAIN TENSIONER

### 1. Check:

- Timing chain tensioner  
Cracks/damage → Replace.



### 2. Check:

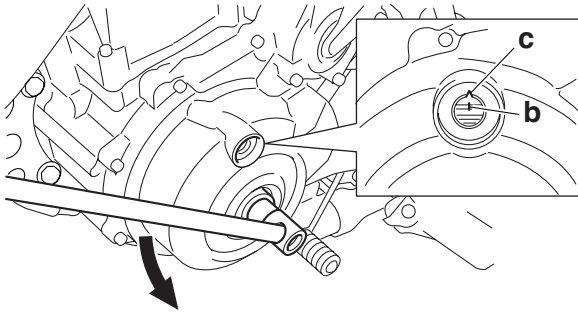
- One-way cam operation  
Rough movement → Replace the timing chain tensioner housing.

### 3. Check:

- Timing chain tensioner cap bolt
- Copper washer **New**
- Spring
- One-way cam
- Gasket **New**
- Timing chain tensioner rod  
Damage/wear → Replace the defective part(s).



# CYLINDER HEAD

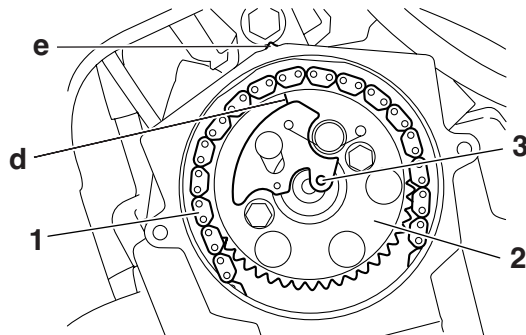


- c. Install the timing chain "1" onto the camshaft sprocket "2", then the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts.

## NOTE:

To install the camshaft sprocket, install the projection "3" on the camshaft sprocket into the slot "a" in the decompression lever.

- d. Make sure the "I" mark "d" on the camshaft sprocket with the stationary pointer "e" on the cylinder head.



## NOTE:

- When installing the camshaft sprocket, be sure to keep the timing chain as tight as possible at the exhaust end of the chain.
- Align the projection on the camshaft with the slot in the camshaft sprocket.

## CAUTION:

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

- e. Remove the wire from the timing chain.



5. Install:

- Timing chain tensioner



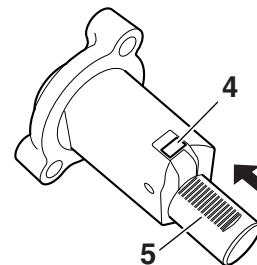
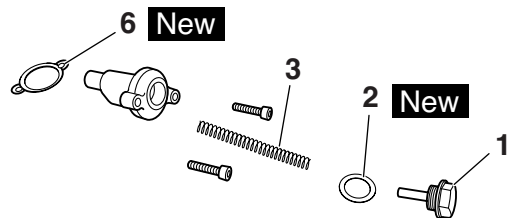
- Remove the timing chain tensioner cap bolt "1", copper washer "2" and spring "3".
- Release the timing chain tensioner one-way cam "4" and push the timing chain tensioner rod "5" all the way into the timing chain tensioner housing.
- Install the timing chain tensioner and gasket "6" onto the cylinder.



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

## NOTE:

Install the gasket with its beaded side facing the timing chain tensioner end.



- d. Install the spring and timing chain tensioner cap bolt.



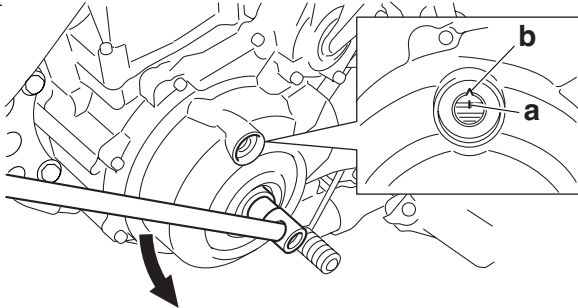
**Timing chain tensioner cap bolt**  
20 Nm (2.0 m·kg, 14 ft·lb)



- Turn:
  - Crankshaft (several turns counterclockwise)
- Check:
  - "I" mark "a"

**NOTE:**

Check that the “I” mark “a” on the A.C. magneto rotor is aligned with the stationary pointer “b” on the A.C. magneto cover.

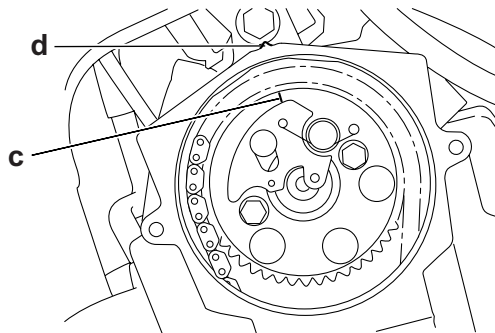


- “I” mark “c”

**NOTE:**

Check that the “I” mark “c” on the camshaft sprocket is aligned with the stationary pointer “d” on the cylinder head.

Out of alignment → Correct.  
Repeat steps 4-7, if necessary.

**8. Tighten:**

- Camshaft sprocket bolts

	<b>Camshaft sprocket bolts</b> 20 Nm (2.0 m·kg, 14 ft·lb)
---	--

**CAUTION:**

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

**9. Measure:**

- Valve clearance

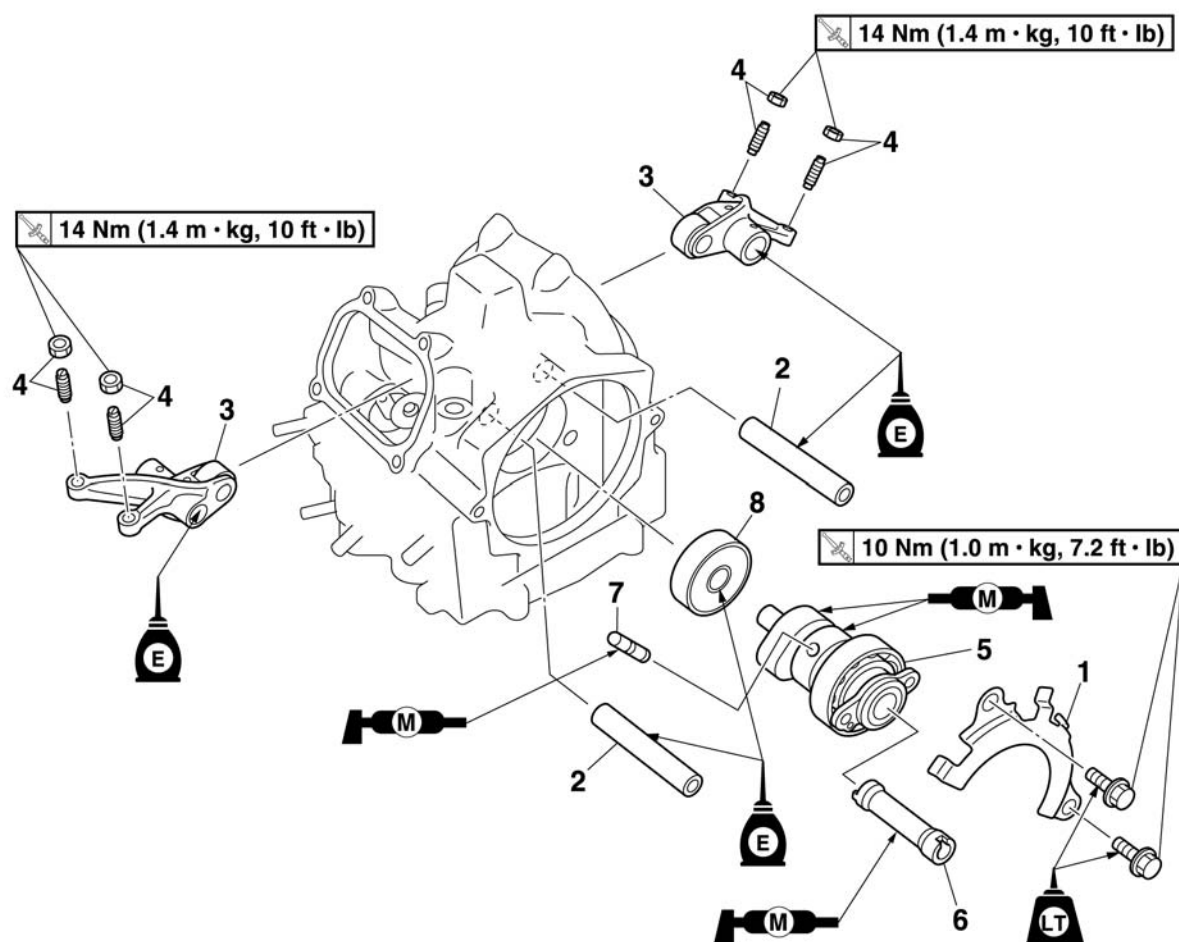
Out of specification → Adjust.

Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-3.

# ROCKER ARMS AND CAMSHAFT

## ROCKER ARMS AND CAMSHAFT

Removing the rocker arms and camshaft



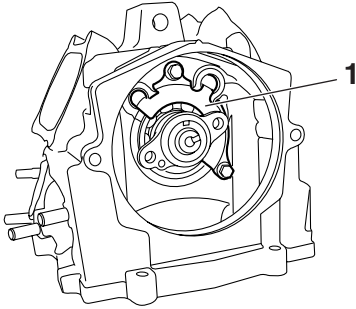
Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-9.
1	Bearing retainer	1	
2	Rocker arm shaft	2	
3	Rocker arm	2	
4	Locknut/valve adjuster	4/4	
5	Camshaft	1	<b>CAUTION:</b> Do not disassemble the camshaft assembly.
6	Decompressor lever	1	
7	Decompressor lever pin	1	
8	Bearing	1	
			For installation, reverse the removal procedure.

# ROCKER ARMS AND CAMSHAFT

EAS00202

## REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
  - Locknuts
  - Adjusting screws
2. Remove:
  - Camshaft retainer "1"



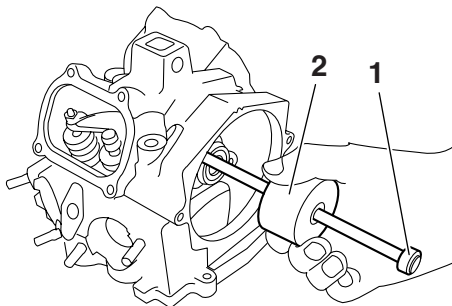
3. Remove:
  - Intake rocker arm shaft
  - Exhaust rocker arm shaft
  - Intake rocker arm
  - Exhaust rocker arm

### NOTE:

Remove the rocker arm shafts with the slide hammer bolt "1" and weight "2".



**Slide hammer bolt**  
**90890-01083**  
**Weight**  
**90890-01084**



4. Remove:
  - Camshaft

EAS00205

## CHECKING THE CAMSHAFT

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



### Camshaft lobe dimensions

#### Intake

"a" 43.488-43.588 mm  
(1.7121-1.7161 in)

#### <Limit>:

43.388 mm (1.7062 in)

"b" 36.959-37.059 mm  
(1.4551-1.4590 in)

#### <Limit>:

36.840 mm (1.4504 in)

#### Exhaust

"a" 43.129-43.229 mm  
(1.6980-1.7019 in)

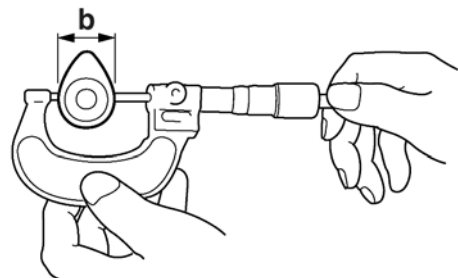
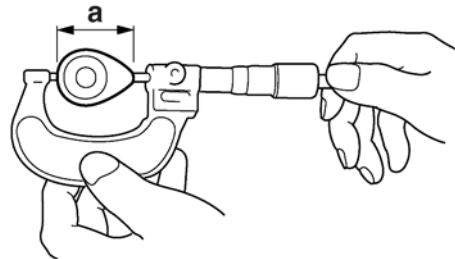
#### <Limit>:

42.983 mm (1.6922 in)

"b" 37.007-37.107 mm  
(1.4570-1.4609 in)

#### <Limit>:

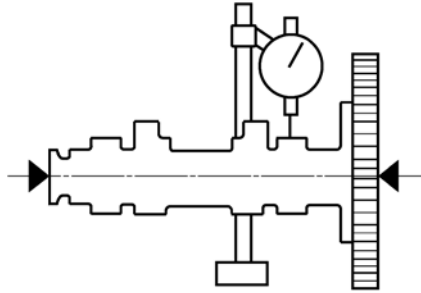
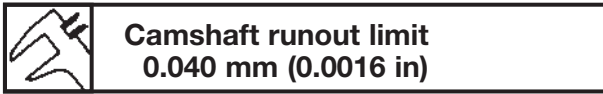
36.886 mm (1.4522 in)





# ROCKER ARMS AND CAMSHAFT

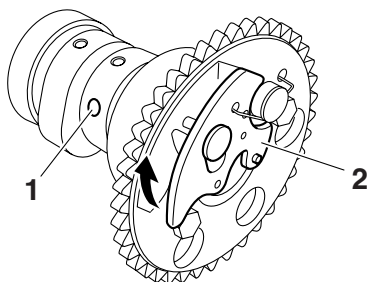
3. Measure:
  - Camshaft runout  
Out of specification → Replace.



## CHECKING THE DECOMPRESSION SYSTEM

1. Check:
  - Decompression system

- a. Check the decompression system with the camshaft sprocket installed on and the decompressor pin installed in the camshaft.
- b. Check that the decompressor lever pin “1” projects from the camshaft.
- c. Check that the decompressor cam “2” moves smoothly.



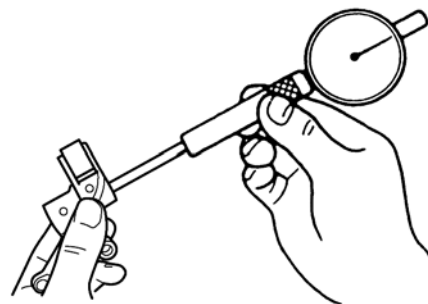
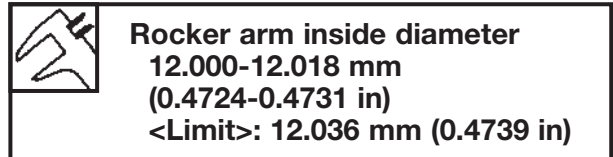
EAS00206

## CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

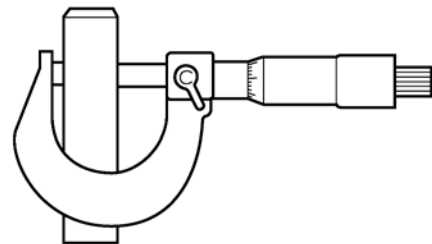
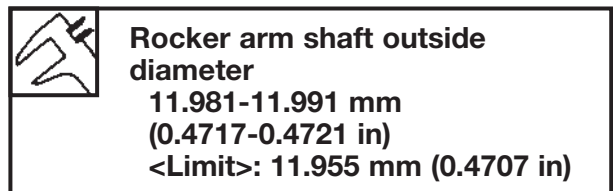
The following procedure applies to both of the rocker arms and rocker arm shafts.

1. Check:
  - Rocker arm  
Damage/wear → Replace.

2. Check:
  - Rocker arm shaft  
Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.
3. Measure:
  - Rocker arm inside diameter  
Out of specification → Replace.



4. Measure:
  - Rocker arm shaft outside diameter  
Out of specification → Replace.



5. Calculate:
  - Rocker-arm-to-rocker-arm-shaft clearance

### NOTE:

Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.



# ROCKER ARMS AND CAMSHAFT

Above 0.081 mm (0.0032 in) → Replace the defective part(s).



**Rocker-arm-to-rocker-arm-shaft clearance**  
0.009-0.037 mm  
(0.0004-0.0015 in)  
<Limit>: 0.081 mm (0.0032 in)

EAS00220

## INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Install:

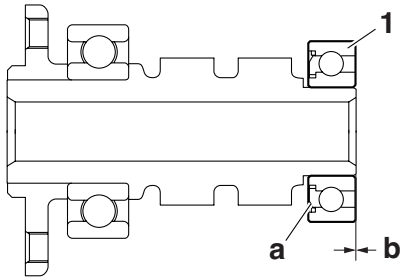
- Bearing "1"  
(onto the camshaft)

### NOTE:

- Apply engine oil to the bearing.
- Install the bearing so that the seal is facing "a" the camshaft.



**Installed depth "b"**  
0 mm (0 in)



2. Lubricate:

- Camshaft
- Decompressor lever pin
- Decompressor lever



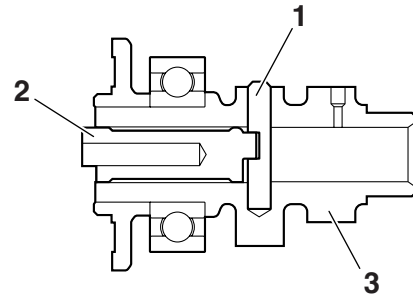
**Recommended lubricant**  
**Camshaft**  
Molybdenum disulfide oil  
**Camshaft bearing**  
Engine oil

3. Install:

- Decompressor lever pin "1"
- Decompressor lever "2"

### NOTE:

Install the decompressor lever pin "1" and decompressor lever "2" in the camshaft "3" as shown in the illustration.

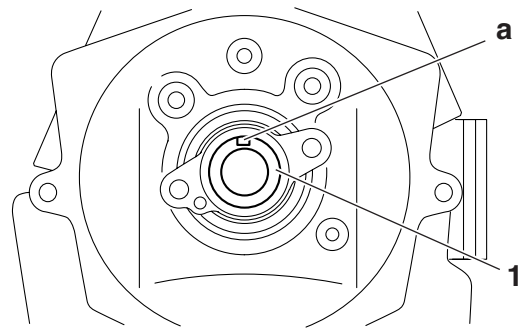


4. Install:

- Camshaft "1"

### NOTE:

Install the camshaft on the slot "a" facing up.



5. Lubricate:

- Rocker arm shafts



**Recommended lubricant**  
**Engine oil**

6. Install:

- Exhaust rocker arm "1"
- Exhaust rocker arm shaft "2"
- Intake rocker arm
- Intake rocker arm shaft

### NOTE:

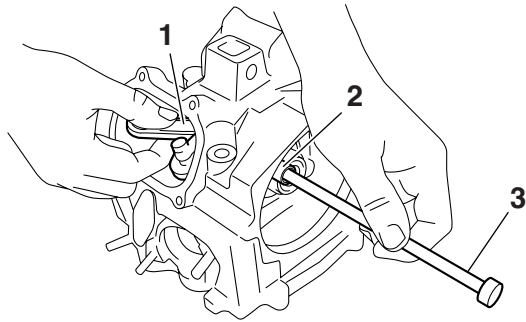
- Use a slide hammer bolt "3" to install the rocker arm shaft.
- Make sure the rocker arm shaft (intake and exhaust) is completely pushed into the cylinder head.



**Slide hammer bolt**  
**90890-01083**

## ROCKER ARMS AND CAMSHAFT

---



### 7. Install:

- Camshaft retainer
- Camshaft retainer bolts

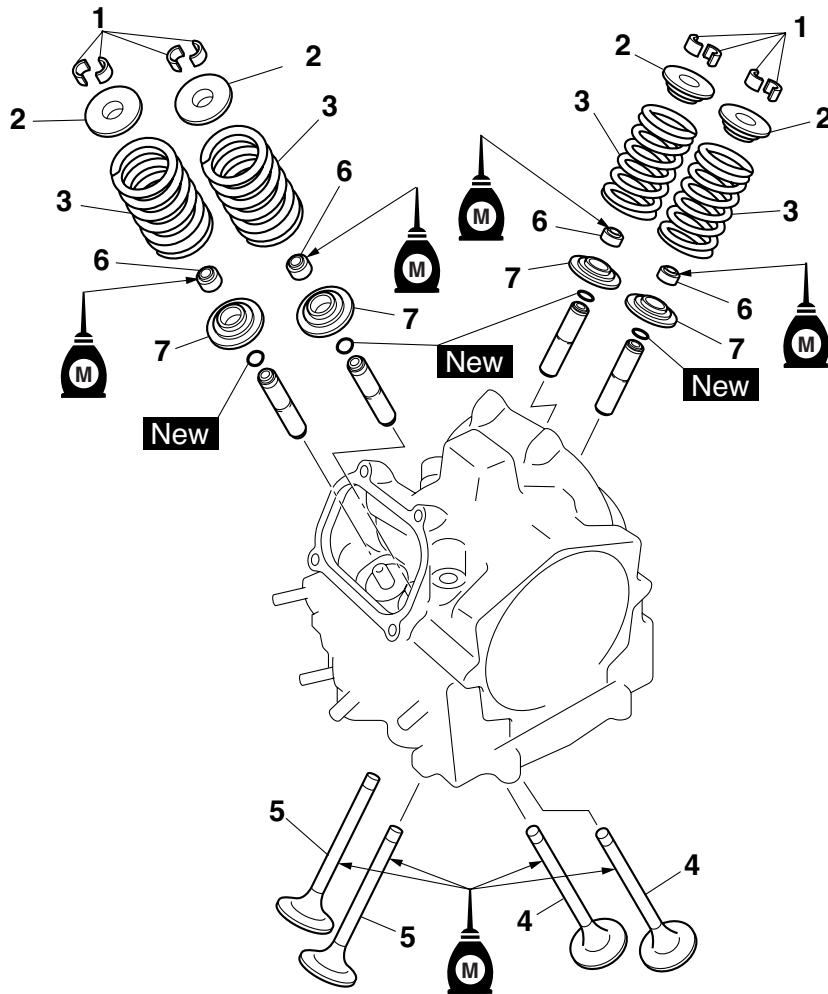


**Camshaft retainer bolts**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**  
**LOCTITE®**

EAS00236

## 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 5-9.
	Rocker arms/rocker arm shafts/camshaft		Refer to "ROCKER ARMS AND CAMSHAFT" on page 5-15.
1	Valve cotter	8	
2	Valve spring retainer	4	
3	Valve spring	4	
4	Exhaust valve	2	
5	Intake valve	2	
6	Valve stem seal	4	
7	Valve spring seat	4	
			For installation, reverse the removal procedure.

# VALVES AND VALVE SPRINGS

EAS00237

## REMOVING THE VALVES

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

### NOTE:

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

#### 1. Check:

- Valve sealing

Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS".

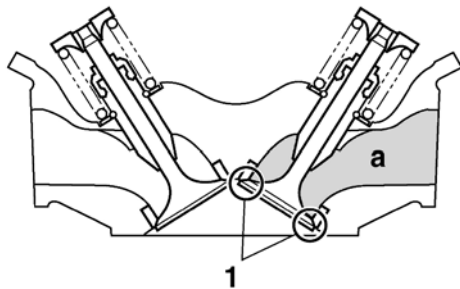


a. Pour a clean solvent "a" into the intake and exhaust ports.

b. Check that the valves properly seal.

### NOTE:

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



#### 2. Remove:

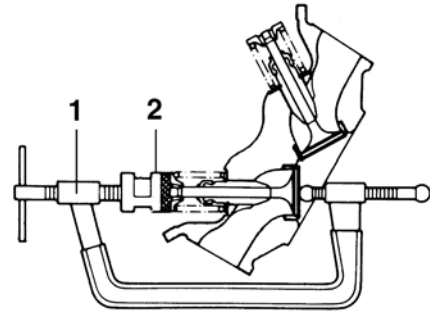
- Valve cotters

### NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".



**Valve spring compressor**  
90890-04019  
**Valve spring compressor attachment**  
90890-01243

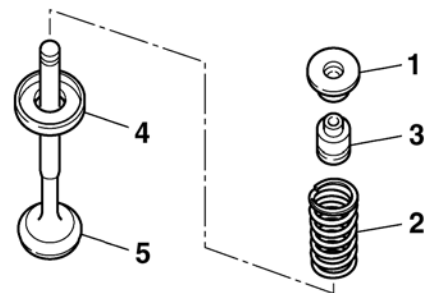


#### 3. Remove:

- Valve spring retainer "1"
- Valve spring "2"
- Valve stem seal "3"
- Valve spring seat "4"
- Valve "5"

### NOTE:

Identify the position of each part very carefully so that it can be reinstalled in its original place.



EAS00239

## CHECKING THE VALVES AND VALVE GUIDES

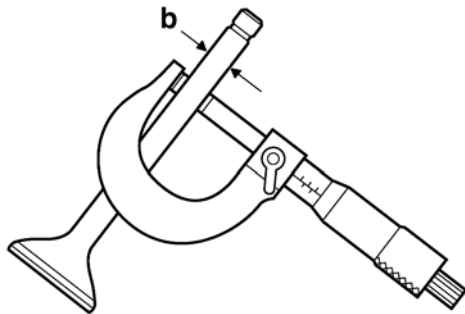
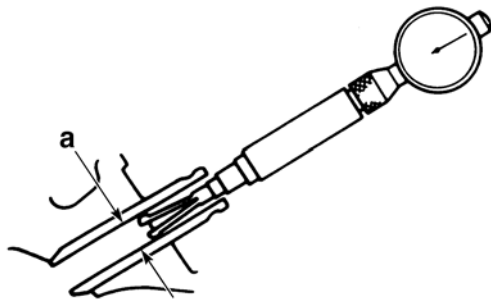
The following procedure applies to all of the valves and valve guides.

#### 1. Measure:

- Valve-stem-to-valve-guide clearance

**Valve-stem-to-valve-guide clearance =**  
**Valve guide inside diameter "a" –**  
**Valve stem diameter "b"**

Out of specification → Replace the valve guide.



## Valve-stem-to-valve-guide clearance

### Intake

0.010-0.037 mm

(0.0004-0.0015 in)

<Limit>: 0.08 mm (0.0031 in)

### Exhaust

0.025-0.052 mm

(0.0010-0.0020 in)

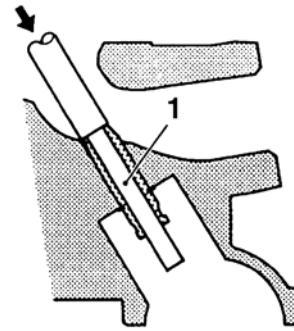
<Limit>: 0.10 mm (0.0039 in)

2. Replace:
- Valve guide

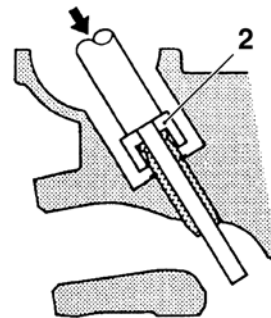
### NOTE:

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

- a. Remove the valve guide with the valve guide remover "1".



- b. Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



- c. After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.

### NOTE:

After replacing the valve guide, reface the valve seat.



Valve guide remover (ø6)

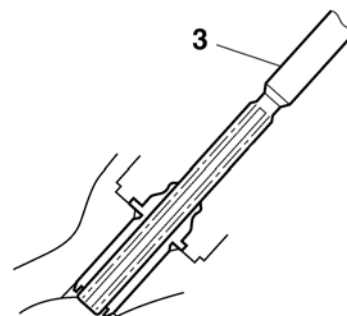
90890-04064

Valve guide installer (ø6)

90890-04065

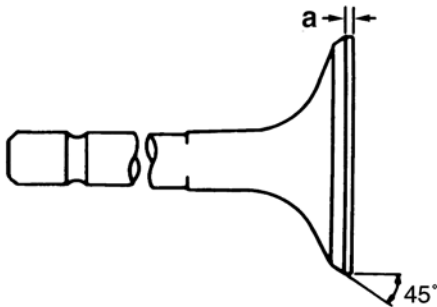
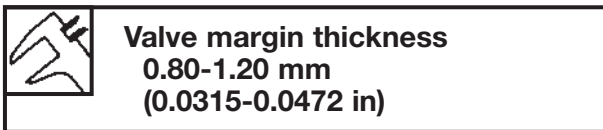
Valve guide reamer (ø6)

90890-04066



# VALVES AND VALVE SPRINGS

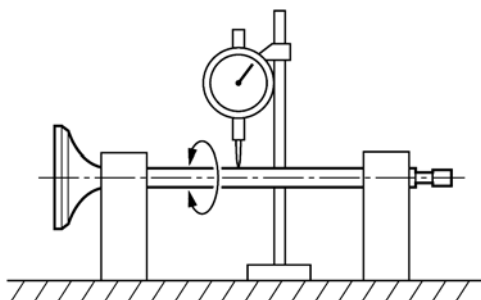
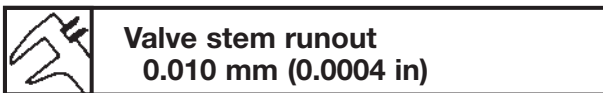
3. Eliminate:
  - Carbon deposits  
(from the valve face and valve seat)
4. Check:
  - Valve face  
Pitting/wear • Grind the valve face.
  - Valve stem end  
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
  - Valve margin thickness “a”  
Out of specification → Replace the valve.



6. Measure:
  - Valve stem runout  
Out of specification → Replace the valve.

## NOTE:

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

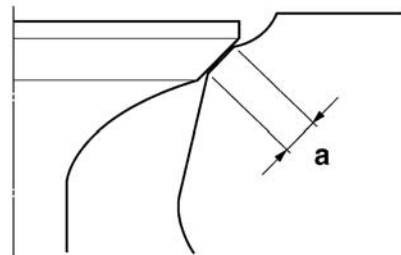
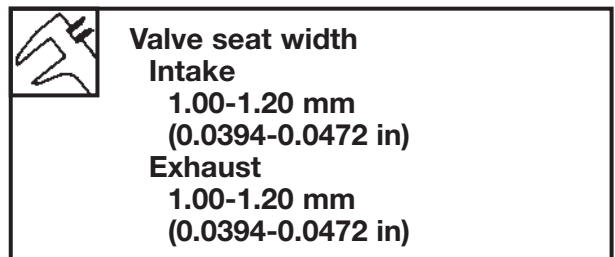


EAS00240

## 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.



- a. Apply Mechanic's blueing dye (Dykem) onto the valve face.
- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width.

## NOTE:

Where the valve seat and valve face contacted one another, the blueing will have been removed.

## VALVES AND VALVE SPRINGS

### 4. Lap:

- Valve face
- Valve seat

### NOTE:

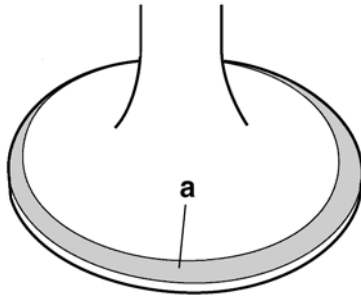
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.



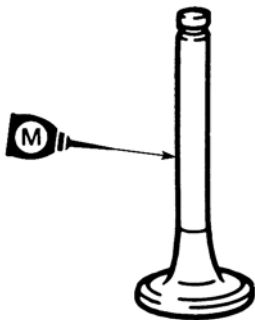
- a. Apply a coarse lapping compound “a” to the valve face.

### CAUTION:

**Do not let the lapping compound enter the gap between the valve stem and the valve guide.**



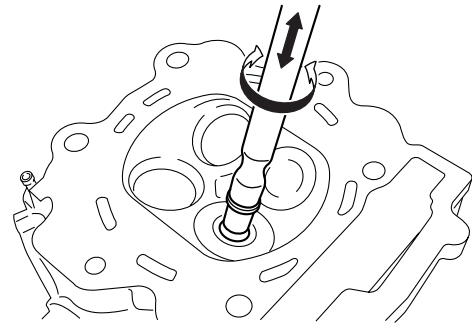
- b. Apply molybdenum disulfide oil onto the valve stem.



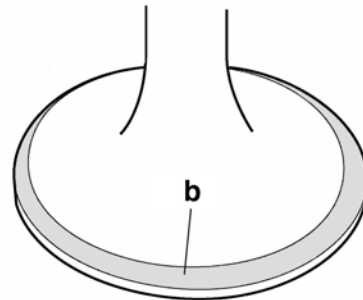
- c. Install the valve into the cylinder head.  
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

### NOTE:

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 steps above.  
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.  
g. Apply Mechanic’s blueing dye (Dykem) “b” onto the valve face.



- h. Install the valve into the cylinder head.  
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.  
j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.



EAS00241

### 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

40.38 mm (1.59 in)

<Limit>: 38.36 mm (1.51 in)

##### Exhaust

40.38 mm (1.59 in)

<Limit>: 38.36 mm (1.51 in)

# VALVES AND VALVE SPRINGS

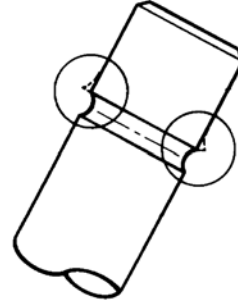
EAS00245

## 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. Measure:

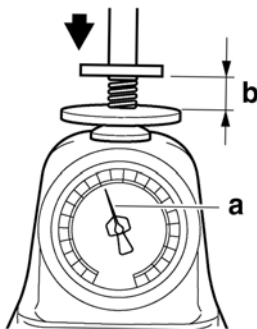
- Compressed valve spring force "a"  
Out of specification → Replace the valve spring.

### b. Installed length



#### Compressed valve spring force (installed)

171-197 N at 35.00 mm  
(17.44-20.09 kg at 35.00 mm,  
38.44-44.29 lb at 1.38 in)



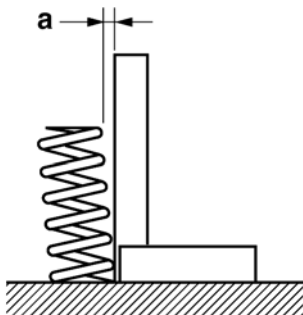
### 3. Measure:

- Valve spring tilt "a"  
Out of specification → Replace the valve spring.



#### Spring tilt limit

2.5°/1.8 mm (2.5°/0.071 in)

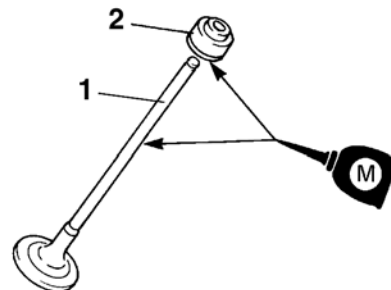


### 2. Lubricate:

- Valve stem "1"
- Valve stem seal "2"  
(with the recommended lubricant)

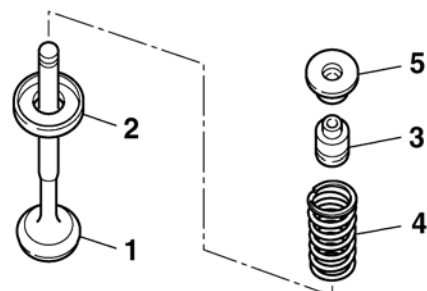


#### Recommended lubricant Molybdenum disulfide oil



### 3. Install:

- Valve "1"
- Valve spring seat "2"
- Valve stem seal "3"
- Valve spring "4"
- Valve spring retainer "5"  
(into the cylinder head)

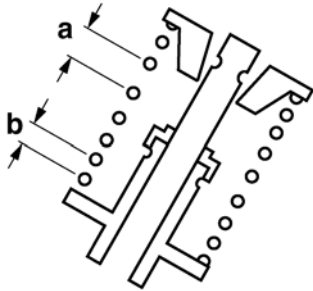




**NOTE:**

- Install the valve spring with the larger pitch “a” facing up.
- Install the valve spring with its painted end facing up.

b. Smaller pitch



4. Install:

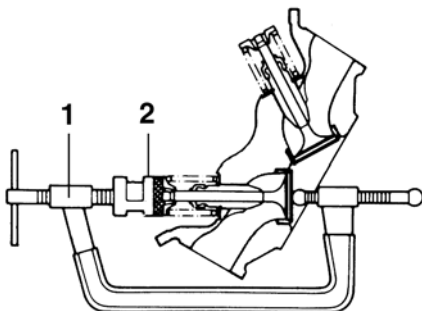
- Valve cotters

**NOTE:**

Install the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.



**Valve spring compressor**  
**98090-04019**  
**Valve spring compressor**  
**attachment**  
**90890-01243**



5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a softface hammer.

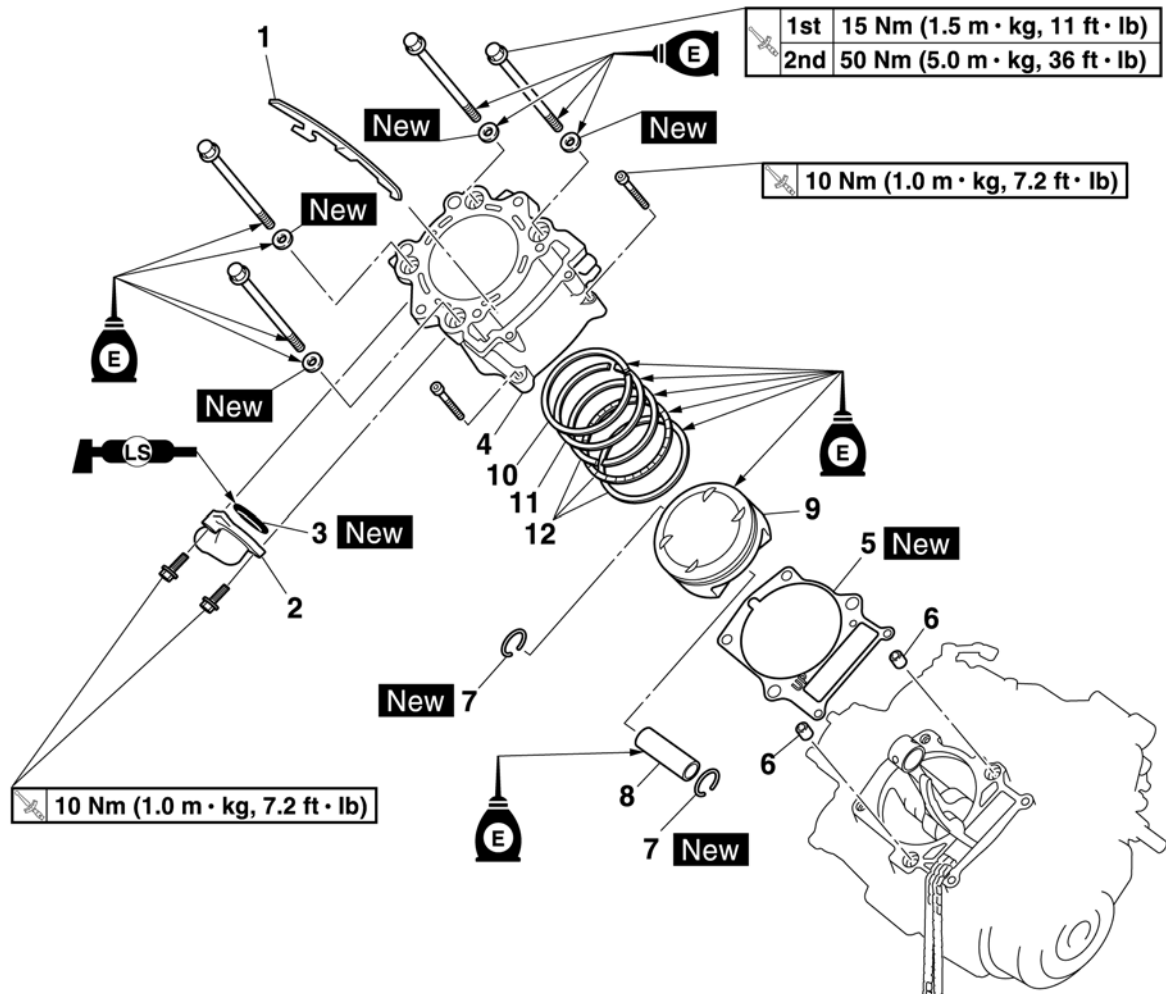
**CAUTION:**

Hitting the valve tip with excessive force can damage the valve.

EAS00251

## CYLINDER AND PISTON

### Removing the cylinder and piston



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-9.
1	Timing chain guide (exhaust)	1	
2	Water jacket joint	1	
3	O-ring	1	
4	Cylinder	1	
5	Cylinder gasket	1	
6	Dowel pin	2	
7	Piston pin clip	2	
8	Piston pin	1	
9	Piston	1	
10	Top ring	1	
11	2 <sup>nd</sup> ring	1	
12	Oil ring	1	
			For installation, reverse the removal procedure.

# CYLINDER AND PISTON

EAS00253

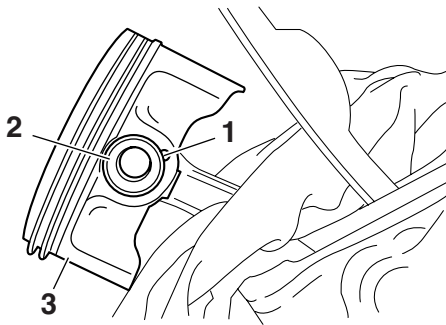
## REMOVING THE CYLINDER AND PISTON

### 1. Remove:

- Piston pin clips "1"
- Piston pin "2"
- Piston "3"

### CAUTION:

Do not use a hammer to drive the piston pin out.

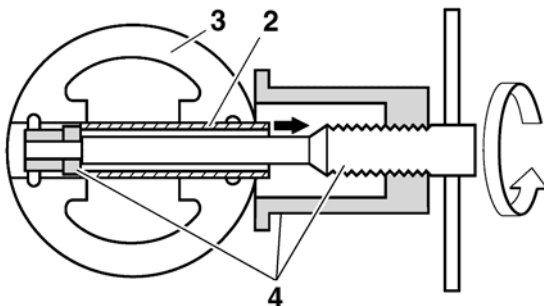


### NOTE:

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "4".



**Piston pin puller set**  
**90890-01304**



### 2. Remove:

- Top ring
- 2<sup>nd</sup> ring
- Oil ring

### NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS00255

## CHECKING THE CYLINDER AND PISTON

### 1. Check:

- Piston wall
- Cylinder wall

Vertical scratches → Replace the cylinder and the piston and piston rings as a set.

### 2. Measure:

- Piston-to-cylinder clearance



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

### NOTE:

Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

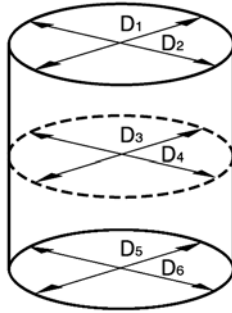
Cylinder bore "C"	100.000-100.010 mm (3.9370-3.9374 in)
Taper limit "T"	0.05 mm (0.002 in)
Out-of-round "R"	0.05 mm (0.002 in)

"C" = maximum of  $D_1 \sim D_2$

"T" = maximum of  $D_1$  or  $D_2$  – maximum of  $D_5$  or  $D_6$

"R" = maximum of  $D_1$ ,  $D_3$  or  $D_5$  – minimum of  $D_2$ ,  $D_4$  or  $D_6$

# CYLINDER AND PISTON



EAS00263

## CHECKING THE PISTON RINGS

### 1. Measure:

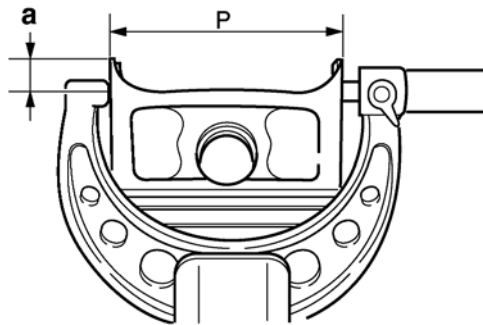
- Piston ring side clearance

Out of specification → Replace the piston and piston rings as a set.

### NOTE:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

- If out of specification, replace the cylinder and 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



- If out of specification, replace the piston and piston rings as a set.
- Calculate the piston-to-cylinder clearance with the following formula.

**Piston-to-cylinder clearance =**  
**Cylinder bore "C" -**  
**Piston skirt diameter "P"**



**Piston-to-cylinder clearance**  
**0.030-0.055 mm**  
**(0.0012-0.0022 in)**  
**<Limit>: 0.13 mm (0.0051 in)**

- If out of specification, replace the cylinder and the piston and piston rings as a set.



### Piston ring side clearance

#### Top ring

**0.030-0.080 mm**

**(0.0012-0.0031 in)**

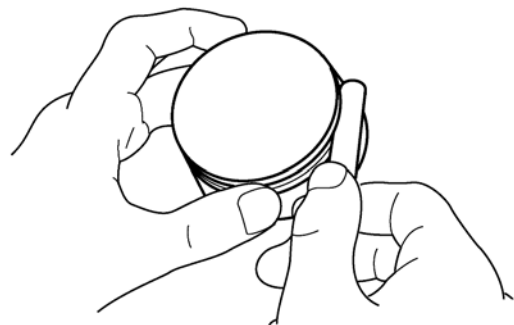
**<Limit>: 0.13 mm (0.0051 in)**

#### 2<sup>nd</sup> ring

**0.030-0.070 mm**

**(0.0012-0.0028 in)**

**<Limit>: 0.11 mm (0.0043 in)**



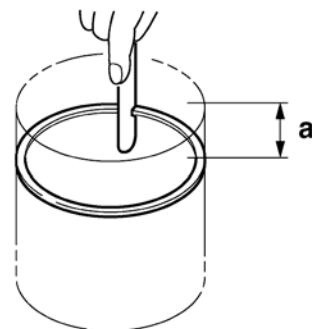
### 2. Install:

- Piston ring  
 (into the cylinder)

### NOTE:

Level the piston ring into the cylinder with the piston crown.

- 40 mm (1.57 in)



# CYLINDER AND PISTON

## 3. Measure:

- Piston ring end gap  
Out of specification → Replace the piston ring.

### NOTE:

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

0.20-0.35 mm  
(0.0079-0.0138 in)  
<Limit>: 0.60 mm (0.0236 in)

##### 2<sup>nd</sup> ring

0.35-0.50 mm  
(0.0138-0.0197 in)  
<Limit>: 0.85 mm (0.0335 in)

##### Oil ring

0.20-0.70 mm  
(0.0079-0.0276 in)

EAS00265

## CHECKING THE PISTON PIN

### 1. Check:

- Piston pin  
Blue discoloration/grooves → Replace the piston pin, and then check the lubrication system.

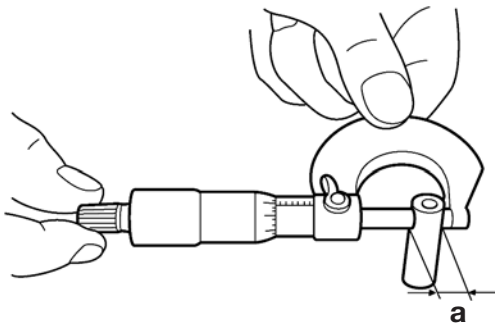
### 2. Measure:

- Piston pin outside diameter "a"  
Out of specification → Replace the piston pin.



#### Piston pin outside diameter

22.991-23.000 mm  
(0.9052-0.9055 in)  
<Limit>: 22.971 mm (0.9044 in)



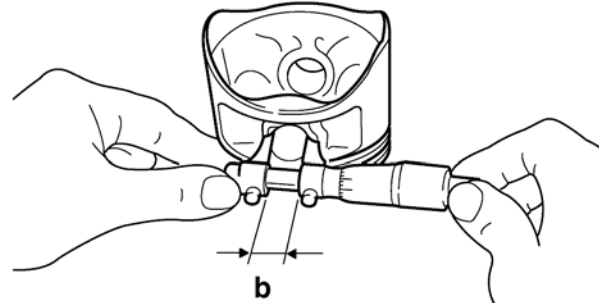
### 3. Measure:

- Piston pin bore inside diameter "b"  
Out of specification → Replace the piston.



#### Piston pin bore inside diameter

23.004-23.015 mm  
(0.9057-0.9061 in)  
<Limit>: 23.045 mm (0.9073 in)



### 4. Calculate:

- Piston-pin-to-piston-pin-bore clearance  
Out of specification → Replace the piston pin and piston as a set.

**Piston-pin-to-piston-pin-bore clearance =**  
**Piston pin bore inside 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)

EAS00267

## INSTALLING THE PISTON AND CYLINDER

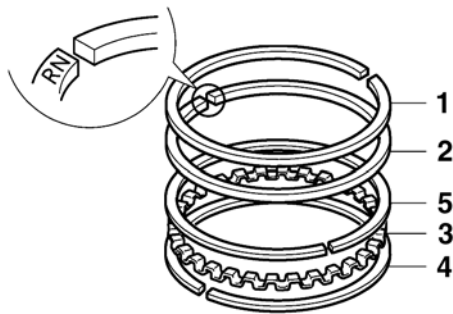
### 1. Install:

- Top ring "1"
- 2<sup>nd</sup> ring "2"
- Oil ring expander "3"
- Lower oil ring rail "4"
- Upper oil ring rail "5"

### NOTE:

Be sure to install the piston rings so that the manufacturer's marks or numbers face up.

# CYLINDER AND PISTON

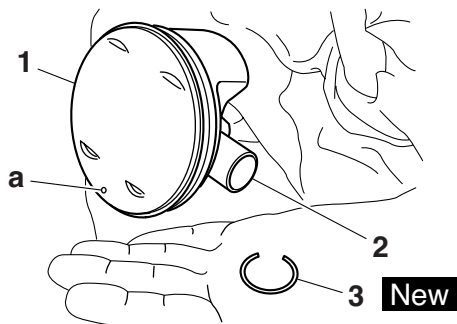


## 2. Install:

- Piston “1”
- Piston pin “2”
- Piston pin clips “3” **New**

## NOTE:

- Apply engine oil to the piston pin.
- Make sure the punch mark a on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.



## 3. Install:

- Cylinder gasket **New**
- Dowel pins

## 4. Lubricate:

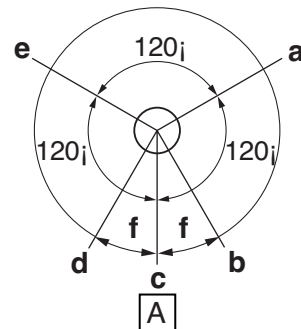
- Piston
- Piston rings
- Cylinder  
(with the recommended lubricant)



## 5. Offset:

- piston ring end gaps

- a. Top ring
- b. Upper oil ring rail
- c. Oil ring expander
- d. Lower oil ring rail
- e. 2<sup>nd</sup> ring
- f. 20 mm (0.79 in)
- A** Exhaust side

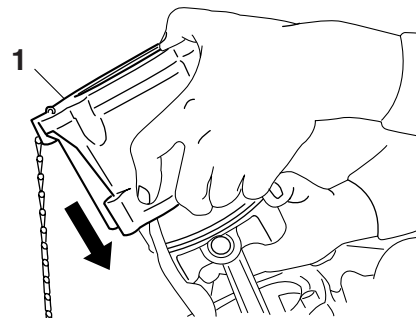


## 6. Install:

- Cylinder “1”
- Timing chain guide (exhaust)

## NOTE:

- 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.




## 7. Install:

- Washers **New**
- Cylinder bolts

## NOTE:

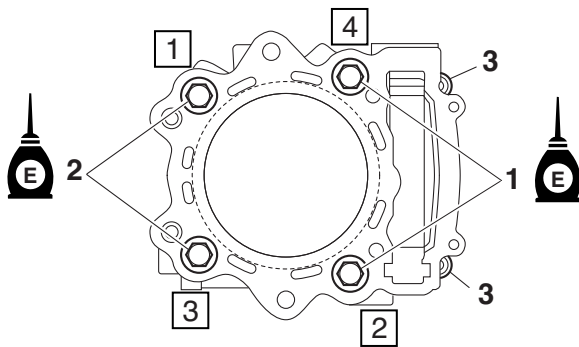
- Lubricate the cylinder bolt threads and muting surface with engine oil.
- Install the washers with their blunt surface facing up.

8. Tighten:
- Cylinder bolts

	<p><b>Cylinder bolts “1”</b> <b>L = 116 mm (4.57 in)</b> <b>1<sup>st</sup> 15 Nm (1.5 m·kg, 11 ft·lb)</b> <b>2<sup>nd</sup> 50 Nm (5.0 m·kg, 36 ft·lb)</b> <b>Cylinder bolts “2”</b> <b>L = 109 mm (4.29 in)</b> <b>1<sup>st</sup> 15 Nm (1.5 m·kg, 11 ft·lb)</b> <b>2<sup>nd</sup> 50 Nm (5.0 m·kg, 36 ft·lb)</b> <b>Cylinder bolts</b> <b>(timing chain side) “3”</b> <b>10 Nm (1.0 m·kg, 7.2 ft·lb)</b></p>
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**NOTE:** \_\_\_\_\_

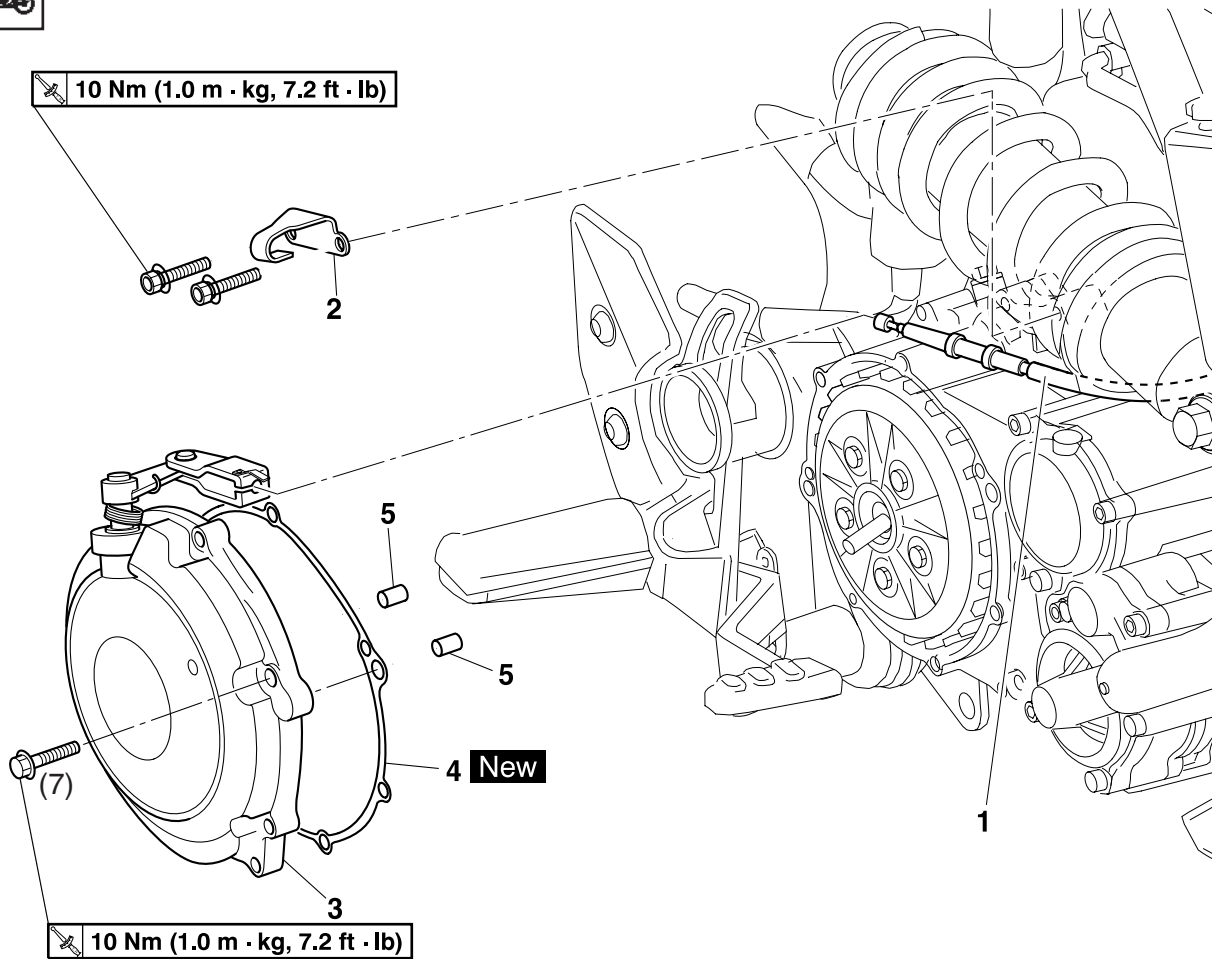
Tighten the cylinder bolts in the proper tightening sequence as shown and torque them in two stages.



EAS00273

CLUTCH

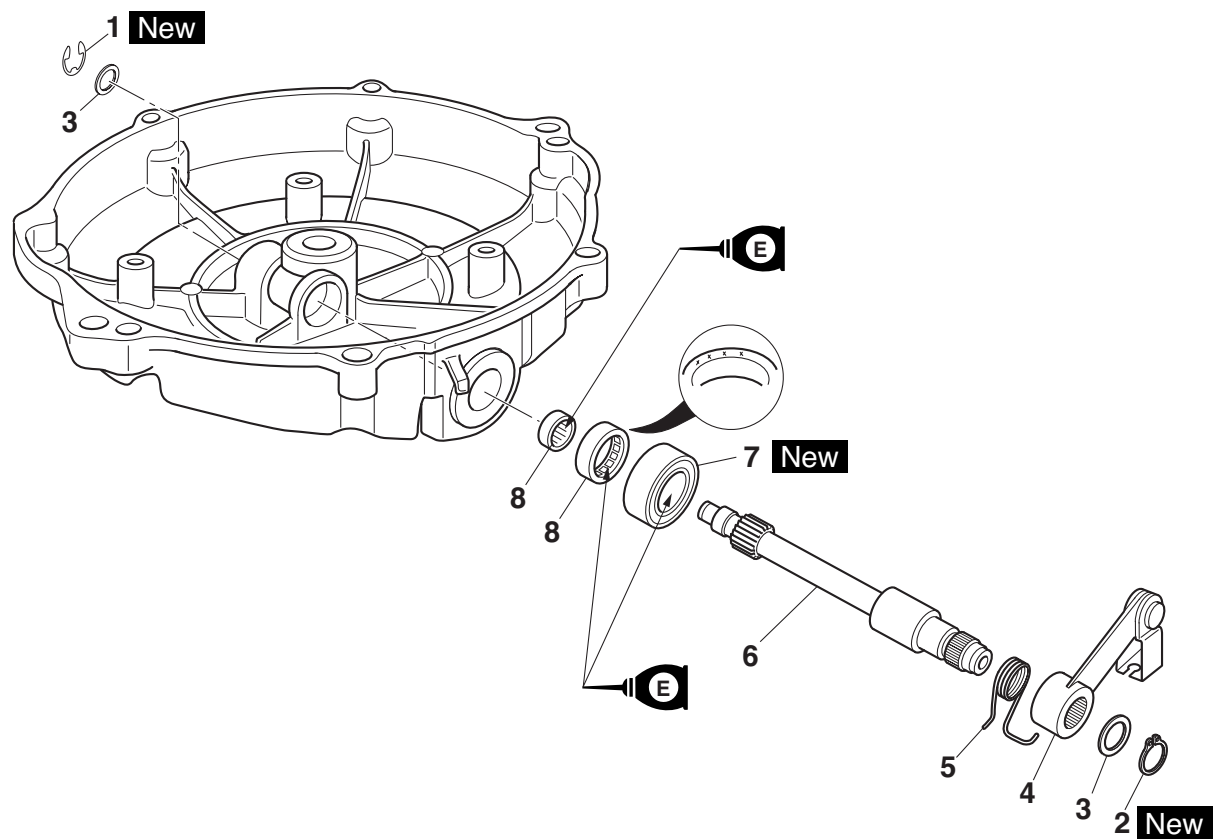
Removing the clutch cover



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-10.
1	Clutch cable	1	
2	Clutch cable holder	1	
3	Clutch cover	1	
4	Gasket	1	
5	Dowel pin	2	
			For installation, reverse the removal procedure.

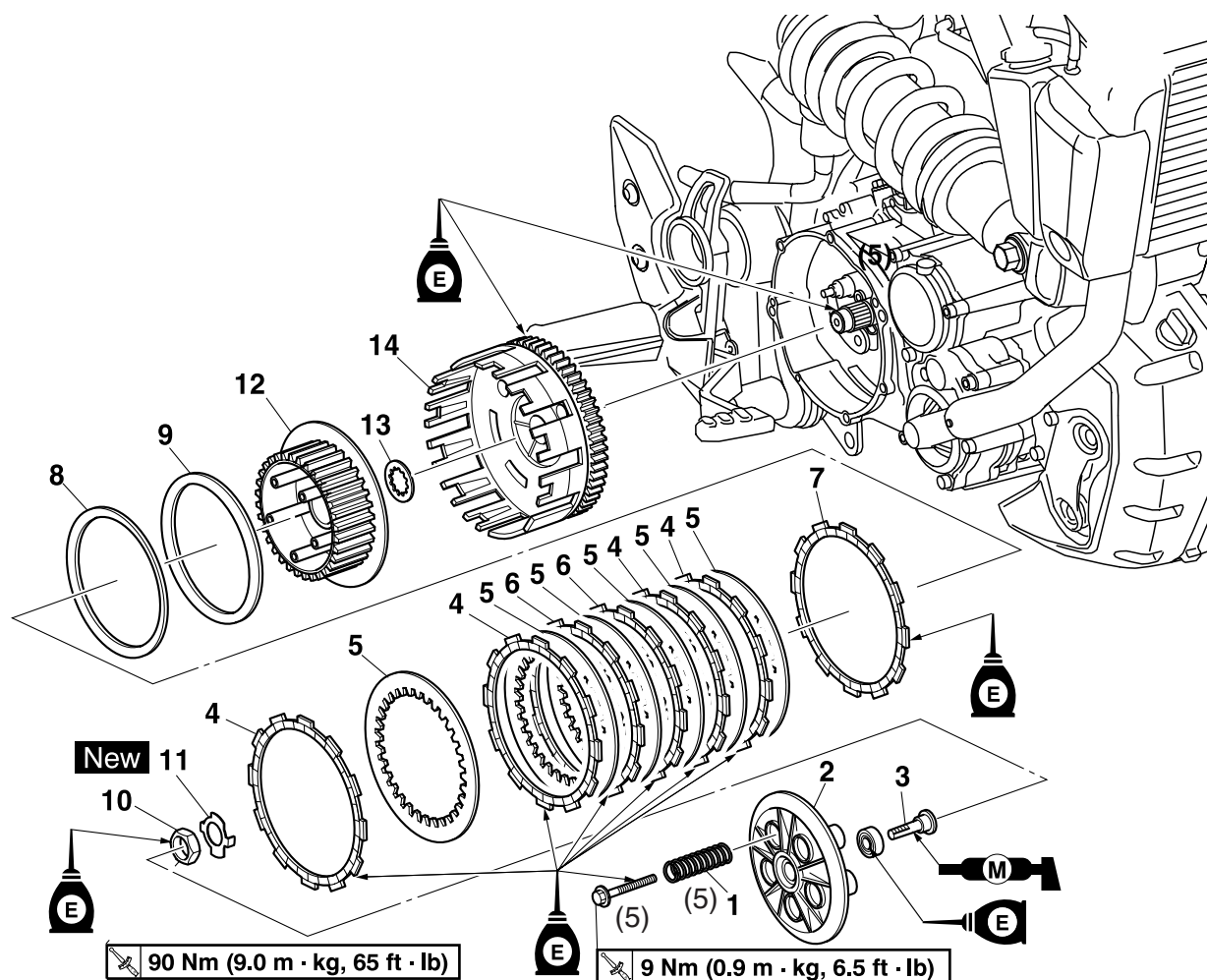


Removing the pull lever shaft



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Circlip	1	
3	Washer	2	
4	Pull lever	1	
5	Pull lever spring	1	
6	Pull lever shaft	1	
7	Oil seal	1	
8	Bearing	2	
			For installation, reverse the removal procedure.

## Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Clutch spring	5	
2	Pressure plate	1	
3	Pull rod	1	
4	Friction plate 1	4	Inside diameter (plate with notched tabs) = 119 mm (4.69 in)
5	Clutch plate	6	
6	Friction plate 2	2	Inside diameter (plate with no notched tabs) = 119 mm (4.69 in)
7	Friction plate 3	1	Inside diameter (plate with notched tabs) = 128 mm (5.04 in)
8	Clutch damper spring	1	
9	Clutch damper spring seat	1	
10	Clutch boss nut	1	
11	Lock washer	1	
12	Clutch boss	1	
13	Thrust washer	1	
14	Clutch housing	1	
			For installation, reverse the removal procedure.

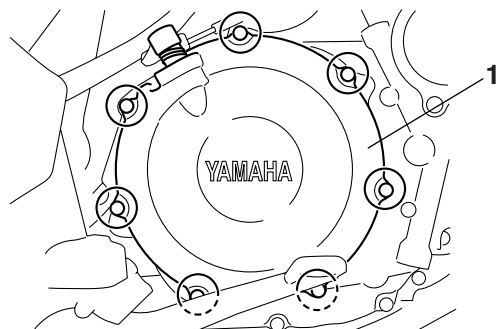
EAS00275

## REMOVING THE CLUTCH

1. Remove:
  - Clutch cover "1"

### NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



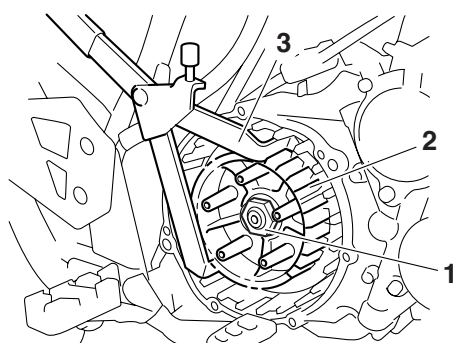
2. Straighten the lock washer tab.
3. Loosen:
  - Clutch boss nut "1"

### NOTE:

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



**Universal clutch holder**  
90890-04086



4. Remove:
  - Clutch boss nut
  - Lock washer
  - Clutch boss

EAS00280

## CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

### 1. Check:

- Friction plate "1"
- Friction plate "2"
- Friction plate "3"

Damage/wear → Replace the friction plates as a set.

### 2. Measure:

- Friction plate 1 thickness
- Friction plate 2 thickness
- Friction plate 3 thickness

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

### NOTE:

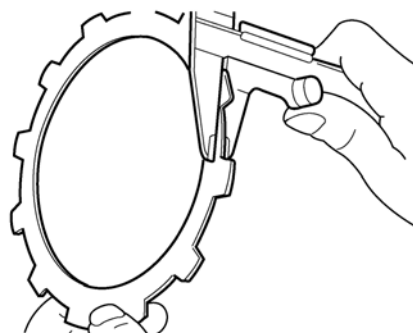
Measure the friction plate at four places.



**Friction plate 1 thickness**  
2.90-3.10 mm (0.114-0.122 in)  
<Limit>: 2.80 mm (0.110 in)

**Friction plate 2 thickness**  
2.92-3.08 mm  
(0.115-0.121 in)  
<Limit>: 2.80 mm (0.110 in)

**Friction plate 3 thickness**  
2.90-3.10 mm (0.114-0.122 in)  
<Limit>: 2.80 mm (0.110 in)



EAS00281

## CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

### 1. Check:

- Clutch plate

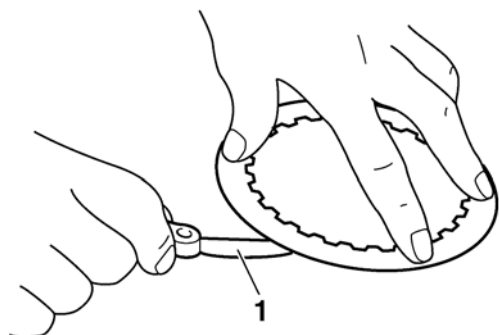
Damage → Replace the clutch plates as a set.

## 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 warpage limit**  
**0.20 mm (0.0079 in)**



EAS00282

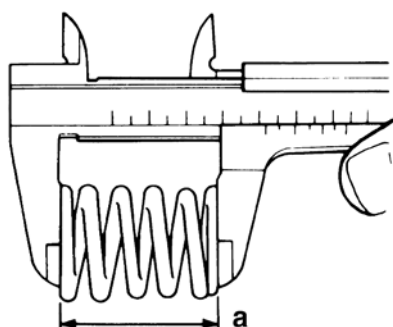
## CHECKING THE CLUTCH SPRINGS

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**  
**55.6 mm (2.19 in)**  
**<Limit>: 52.82 mm (2.08 in)**



EAS00284

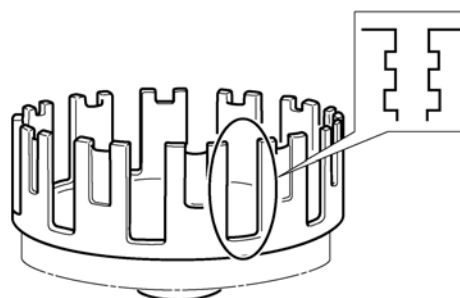
## CHECKING THE CLUTCH HOUSING

### 1. Check:

- Clutch housing dogs  
Damage/pitting/wear → Deburr the clutch  
housing dogs or replace the clutch housing.

### NOTE:

Pitting on the clutch housing dogs will cause er-  
ratic clutch operation.



EAS00285

## CHECKING THE CLUTCH BOSS

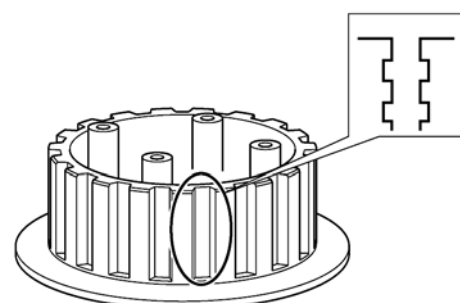
The following procedure applies to all of the clutch springs.

### 1. Check:

- Clutch boss splines  
Damage/pitting/wear → Replace the clutch  
boss.

### NOTE:

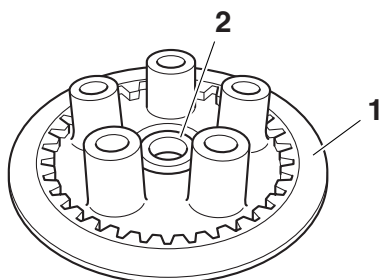
Pitting on the clutch boss splines will cause er-  
ratic clutch operation.



EAS00286

## CHECKING THE PRESSURE PLATE

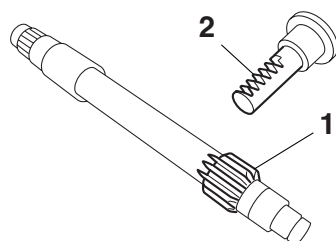
1. Check:
  - Pressure plate “1”  
Cracks/damage → Replace.
  - Bearing “2”  
Damage/wear → Replace.



EAS00287

## CHECKING THE PULL LEVER SHAFT AND PULL ROD

1. Check:
  - Pull lever shaft pinion gear teeth “1”
  - Pull rod teeth “2”
 Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.

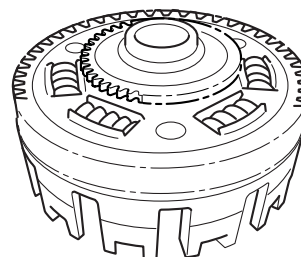


2. Check:
  - Pull rod bearing  
Damage/wear → Replace.

EAS00292

## CHECKING THE PRIMARY DRIVEN GEAR

1. Check:
  - Primary driven gear  
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.



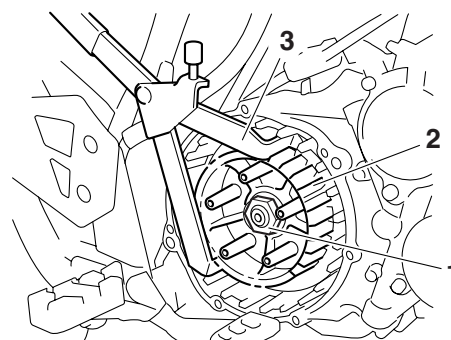
EAS00299

## INSTALLING THE CLUTCH

1. Install:
  - Clutch boss
  - Lock washer **New**
  - Clutch boss nut “1”

### NOTE:

Lubricate the crankshaft end threads with engine oil.



2. Tighten:
  - Clutch boss nut



**Clutch boss nut**  
90 Nm (9.0 m·kg, 65 ft·lb)

### NOTE:

While holding the clutch boss “2” with the universal clutch holder “3”, tighten the clutch boss nut.



**Universal clutch holder**  
90890-04086

3. Bend the lock washer tab along a flat side of the nut.

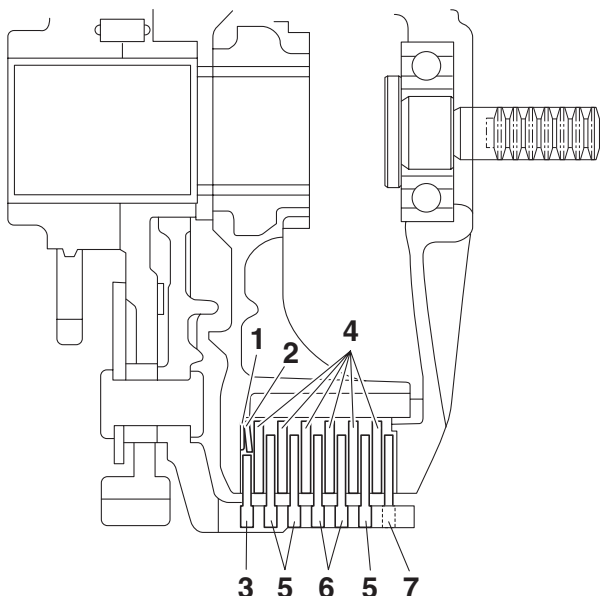
## 4. Lubricate:

- Friction plates
- Clutch plates  
(with the recommended lubricant)



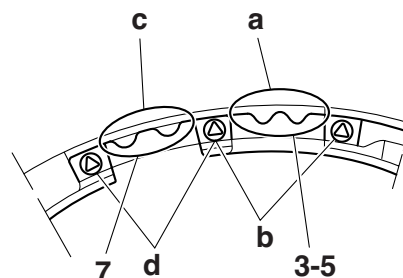
## 5. Install:

- Clutch damper spring seat "1"
- Clutch damper spring "2"
- Friction plate 3 "3"
- Clutch plates "4"
- Friction plates 1 "5", "7"
- Friction plates 2 "6"



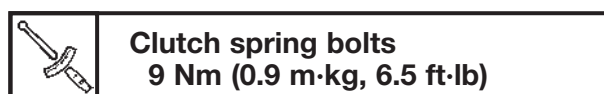
## NOTE:

- Install the clutch damper spring "2" with the "OUTSIDE" mark facing out.
- First, install a friction plate and then alternate between a clutch plate and a friction plate.
- Install friction plate 3 "3" and friction plate 1 "5" so that the tab with two notches "a" is between the two punch marks "b" on the clutch housing as shown.
- Install friction plate 1 "7" so that the tab with two notches "c" is between the two punch marks "d" on the clutch housing as shown.



## 6. Install:

- Clutch springs
- Clutch spring bolts



## NOTE:

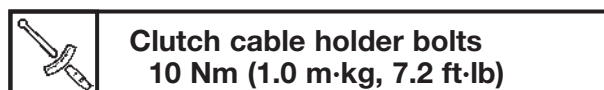
- Lubricate the clutch spring threads with engine oil.
- Tighten the clutch spring bolts in stages and in a crisscross pattern.

## 7. Install:

- Dowel pins
- Gasket
- Clutch cover



- Clutch cable holder



## NOTE:

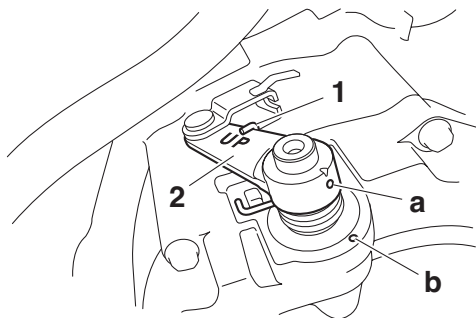
- To install the clutch cover, position the pull rod so that the teeth face towards that rear of the motorcycle.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

## 8. Install:

- Pull lever spring "1"
- Pull lever "2"
- Washer
- Circlip **New**

**NOTE:**

- Install the pull lever with the “UP” mark facing up.
- Align the punch mark “a” on the pull lever with the punch mark “b” on the clutch cover.
- Install the pull lever spring “1” as shown.



9. Install:

- Clutch cable “1”

10. Check:

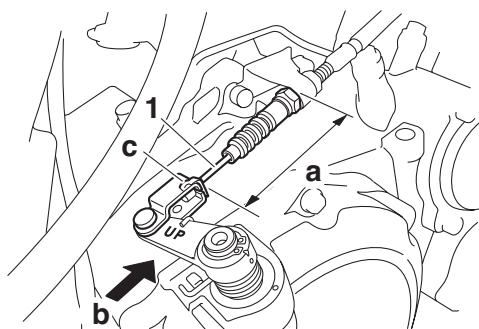
- Clutch cable length “a”
- Out of specification → Adjust.

**NOTE:**

- Push the pull lever in direction “b” and check the cable length “a”.
- Bend the tab “c” on the pull lever to secure the clutch cable.



**Clutch cable length**  
65.6-73.9 mm (2.58-2.91 in)



11. Adjust:

- Clutch cable length

**NOTE:**

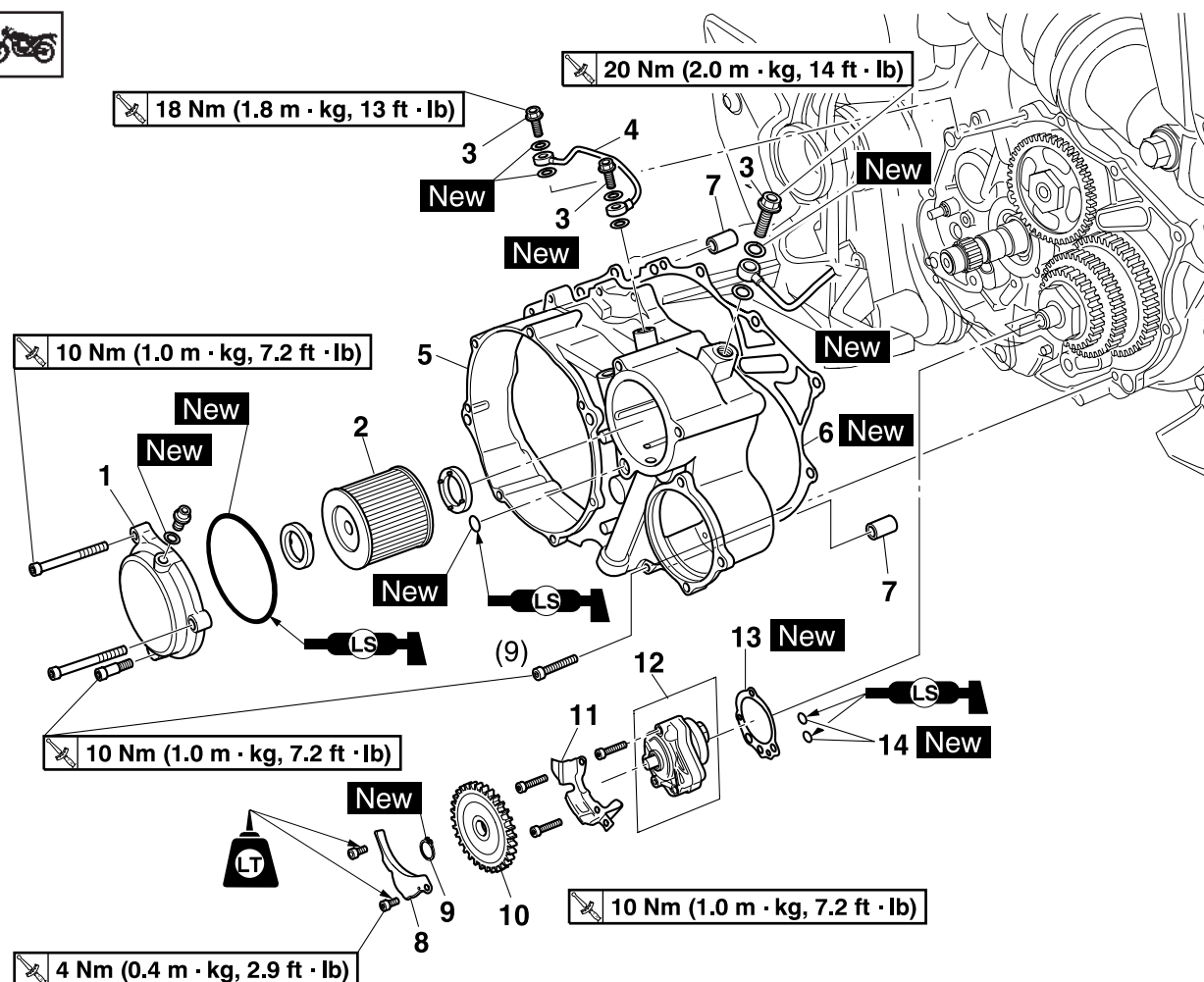
Move the pull lever a notch until the cable length is within specification.

12. Adjust:

- Clutch cable free play
- Refer to “ADJUSTING THE CLUTCH CABLE FREE PLAY” on page 3-11.

## OIL PUMP

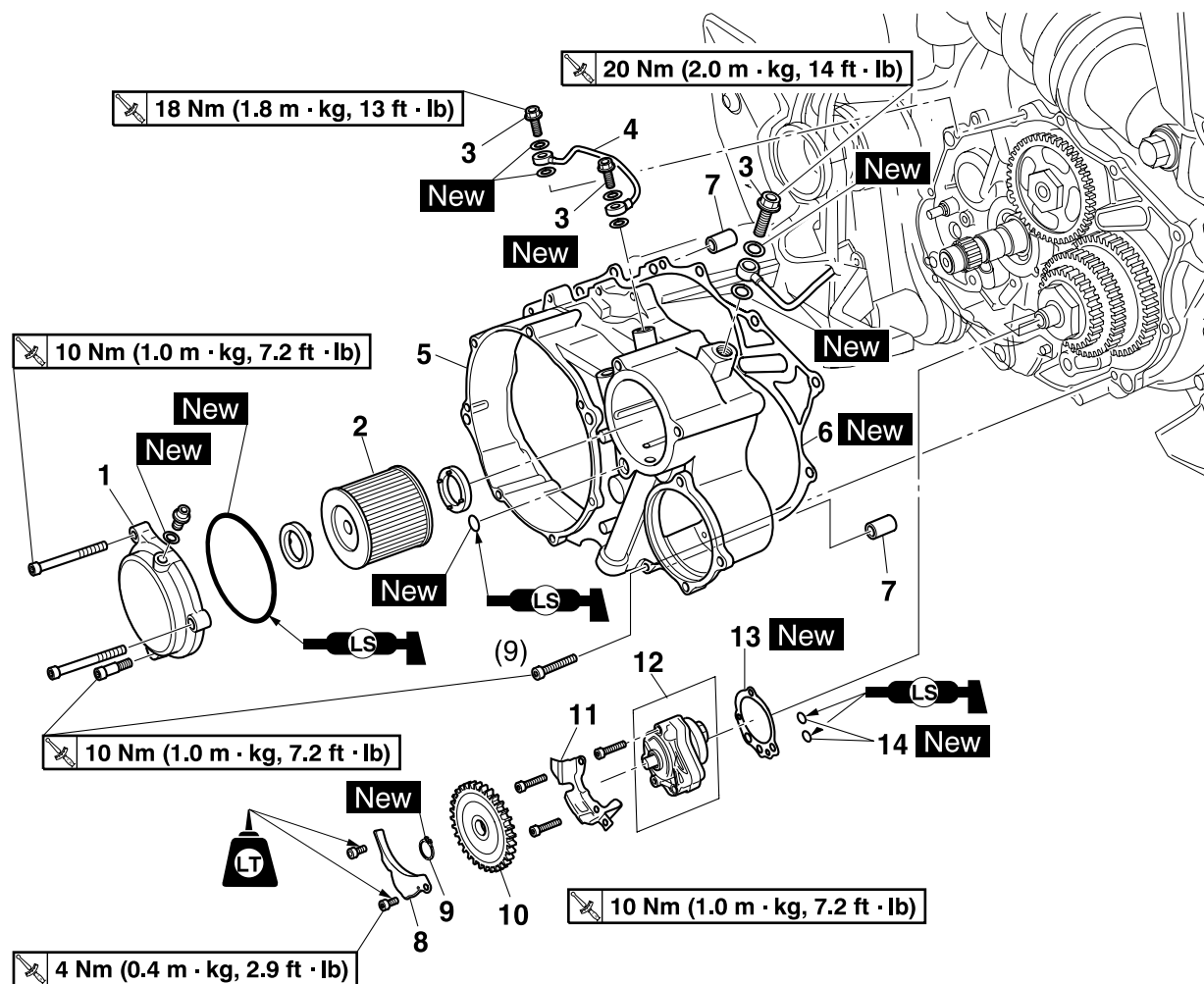
## Removing the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-10.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
	Water pump assembly		Refer to "WATER PUMP" on page 6-7.
	Clutch cable holder/clutch housing		Refer to "CLUTCH" on page 5-33.
	Right footrest/brake pedal assembly		
1	Oil filter element cover	1	
2	Oil filter element	1	
3	Union bolt	3	
4	Oil delivery pipe 2	1	
5	Crankcase cover (right)	1	
6	Gasket	1	
7	Dowel pin	2	

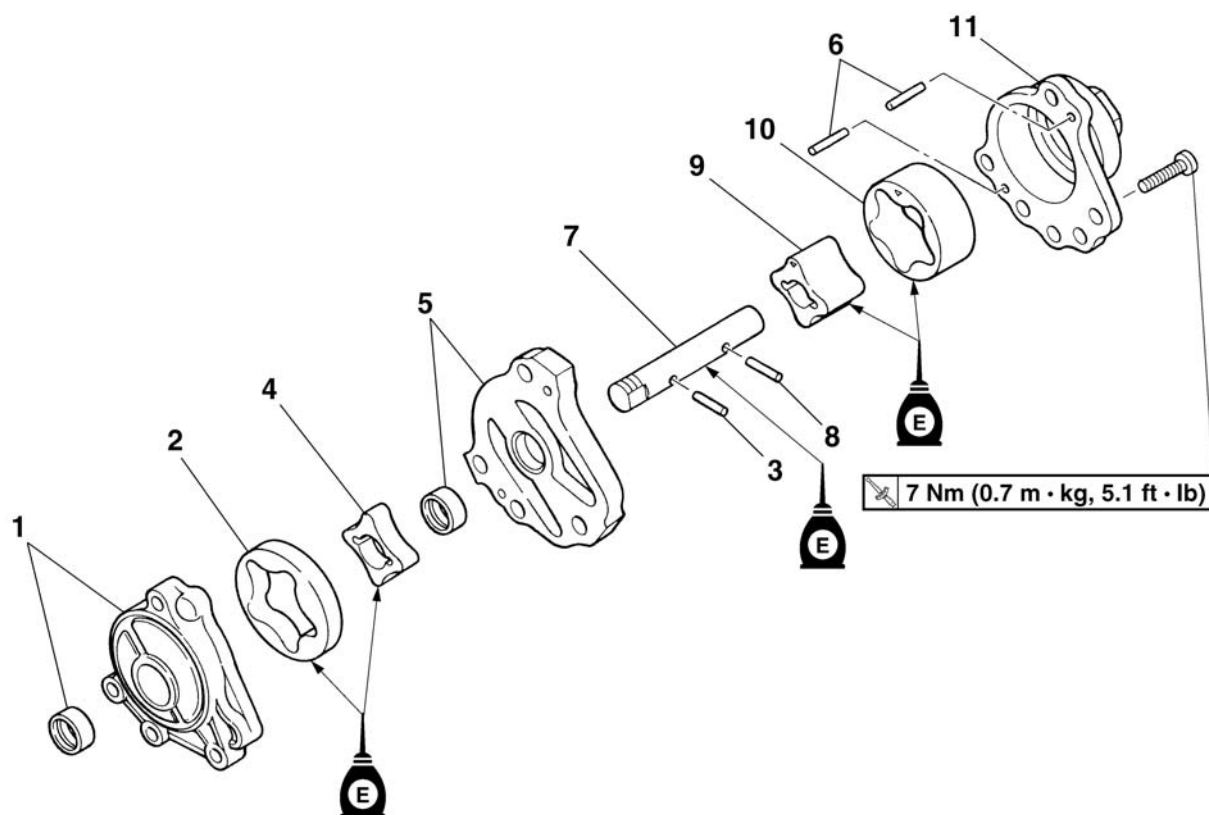


## Removing the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
8	Oil baffle plate 1	1	
9	Circlip	1	
10	Oil pump driven gear	1	
11	Oil baffle plate 2	1	
12	Oil pump	1	
13	Oil pump gasket	1	
14	O-ring	2	
			For installation, reverse the removal procedure.

## Disassembling the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing 1/oil seal	1/1	
2	Oil pump outer rotor 1	1	
3	Dowel pin	1	
4	Oil pump inner rotor 1	1	
5	Oil pump housing cover/oil seal	1/1	
6	Dowel pin	2	
7	Oil pump shaft	1	
8	Dowel pin	1	
9	Oil pump inner rotor 2	1	
10	Oil pump outer rotor 2	1	
11	Oil pump housing 2	1	
			For assembly, reverse the disassembly procedure.

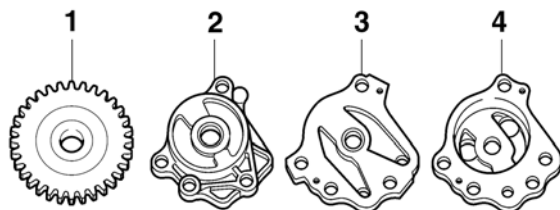
EAS00364

## CHECKING THE OIL PUMP

### 1. Check:

- Oil pump driven gear “1”
- Oil pump housing 1 “2”
- Oil pump housing cover “3”
- Oil pump housing 2 “4”

Cracks/damage/wear → Replace the defective part(s).



### 2. Measure:

- Inner-rotor-to-outer-rotor-tip clearance “a”
- Outer-rotor-to-oil-pump-housing clearance “b”
- Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”

Out of specification → Replace the oil pump.

### 1. Inner rotor

### 2. Outer rotor

### 3. Oil pump housing



#### Inner-rotor-to-outer-rotor-tip clearance

0.07-0.12 mm

(0.0028-0.0047 in)

<Limit>: 0.2 mm (0.008 in)

#### Outer-rotor-to-oil-pump-housing clearance

0.03-0.08 mm

(0.0012-0.0031 in)

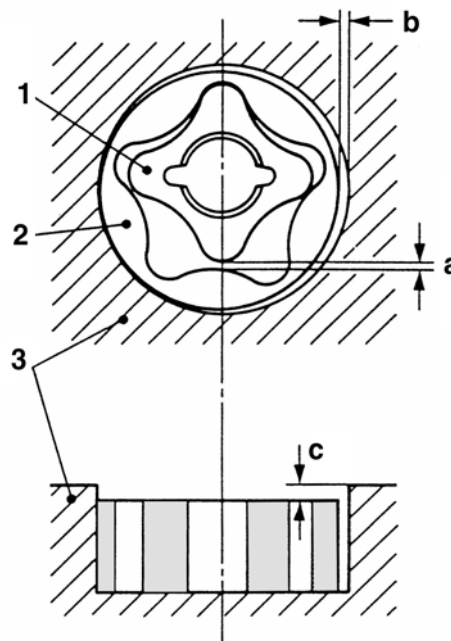
<Limit>: 0.15 mm (0.0059 in)

#### Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance

0.03-0.08 mm

(0.0012-0.0031 in)

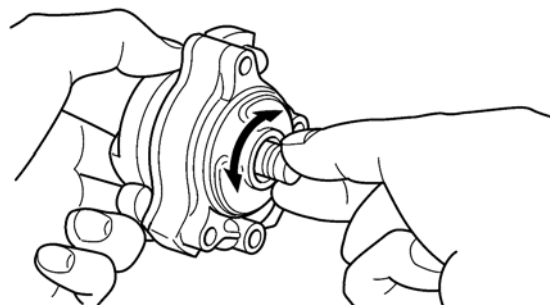
<Limit>: 0.15 mm (0.0059 in)



### 3. Check:

- Oil pump operation

Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS00367

## CHECKING THE OIL DELIVERY PIPES AND HOSES

The following procedure applies to all of the oil delivery pipes and hoses.

### 1. Check:

- Oil delivery pipe
- Oil delivery hose

Damage → Replace.

Obstruction → Wash and blow out with compressed air.

EAS00375

## ASSEMBLING THE OIL PUMP

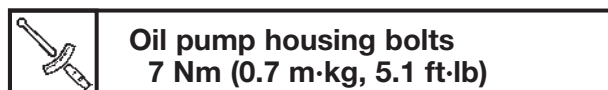
### 1. Lubricate:

- Oil pump inner rotor 1
- Oil pump inner rotor 2
- Oil pump outer rotor 1
- Oil pump outer rotor 2
- Oil pump shaft  
(with the recommended lubricant)



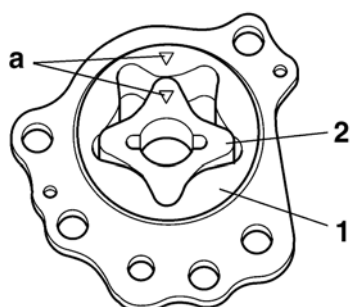
### 2. Install:

- Oil pump outer rotor 2 “1”
- Oil pump inner rotor 2 “2”  
(to the oil pump housing 2)
- Oil pump housing



### NOTE:

- Install oil pump inner rotor 2 and outer rotor 2 with the alignment marks “a” facing up.
- When installing the inner rotor, align the pin in the oil pump shaft with the groove in the inner rotor.



### 3. Check:

- Oil pump operation  
Refer to “CHECKING THE OIL PUMP”.

EAS00376

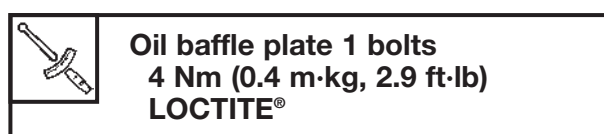
## INSTALLING THE OIL PUMP

### 1. Install:

- Oil pump gasket **New**
- Oil pump
- Oil baffle plate 2



- Oil pump driven gear “1”
- Oil pump driven gear circlip **New**
- Oil baffle plate 1

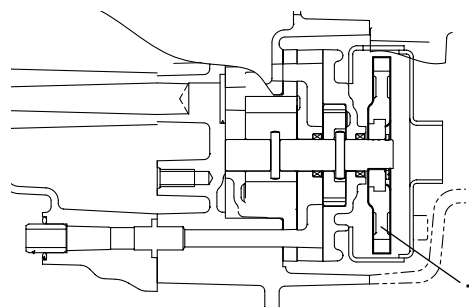


### CAUTION:

After tightening the bolts, make sure the oil pump turns smoothly.

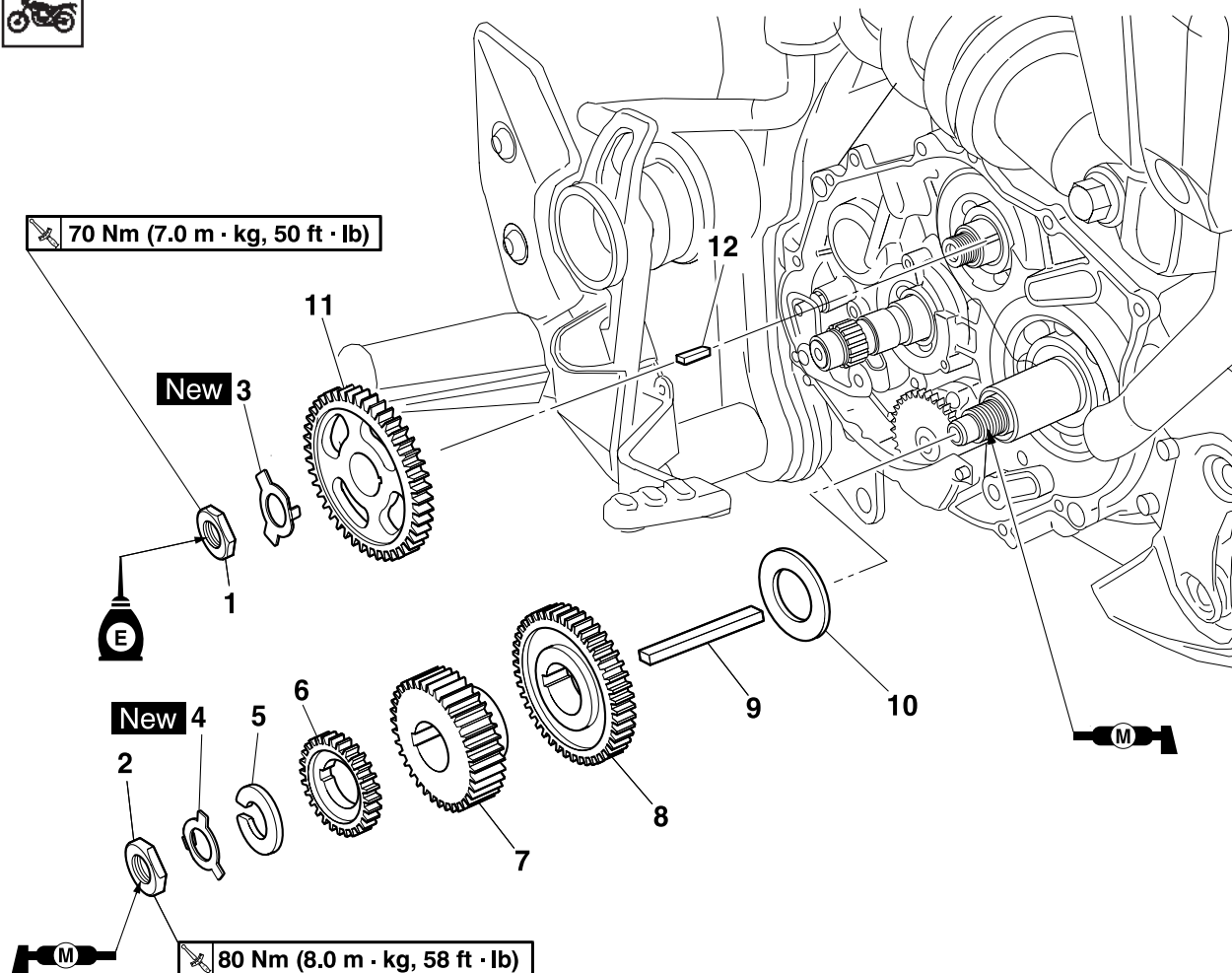
### NOTE:

- Install the oil pump driven gear “1” in the direction shown.
- Install the circlip with its blunt surface facing the engine.



## BALANCER DRIVEN GEAR

Removing the balancer driven gear



Order	Job/Parts to remove	Q'ty	Remarks
	Water pump assembly		Refer to "WATER PUMP" on page 6-7.
	Clutch housing		Refer to "CLUTCH" on page 5-33.
	Crankcase cover (right)		Refer to "OIL PUMP" on page 5-41.
1	Balancer driven gear nut	1	
2	Primary drive gear nut	1	
3	Lock washer	1	
4	Lock washer	1	
5	Washer	1	
6	Water pump drive gear	1	
7	Primary drive gear	1	
8	Balancer drive gear	1	
9	Straight key	1	
10	Washer	1	
11	Balancer driven gear	1	
12	Straight key	1	
			For installation, reverse the removal procedure.

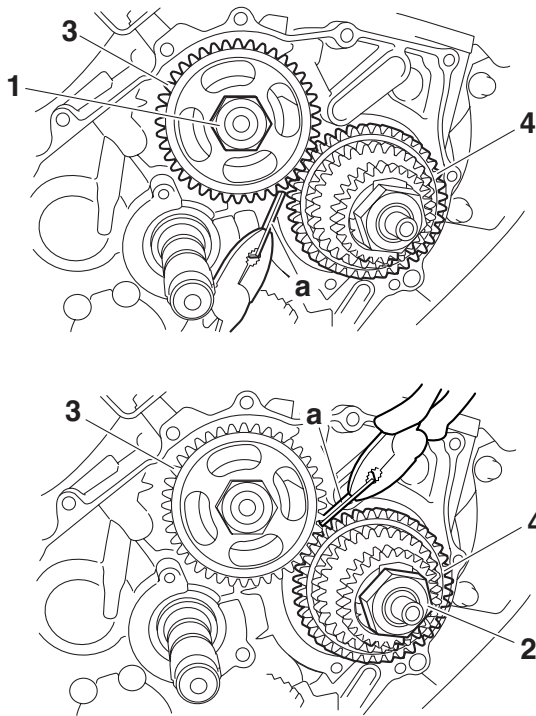
## BALANCER DRIVEN GEAR

### REMOVING THE BALANCER DRIVEN GEAR AND BALANCER DRIVE GEAR

1. Straighten the lock washer tab.
2. Loosen:
  - Balancer driven gear nut “1”
  - Primary drive gear nut “2”

#### NOTE:

Place an aluminum plate “a” between the teeth of the balancer driven gear “3” and balancer drive gear “4”.



3. Remove:
  - Balancer driven gear
  - Water pump drive gear
  - Primary drive gear
  - Balancer drive gear

### CHECKING THE BALANCER DRIVEN GEAR, WATER PUMP DRIVE GEAR, PRIMARY DRIVE GEAR, AND BALANCER DRIVE GEAR

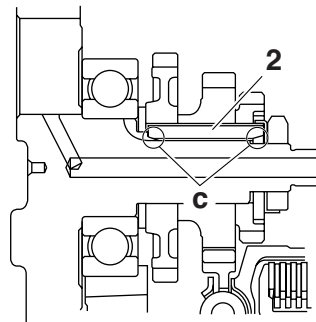
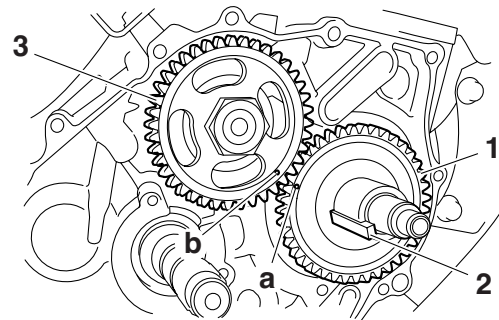
1. Check:
  - Balancer driven gear
  - Balancer drive gear
  - Water pump drive gear
  - Primary drive gearDamage/wear → Replace.

### INSTALLING THE BALANCER DRIVEN GEAR AND BALANCER DRIVE GEAR

1. Install:
  - Washer
  - Balancer drive gear “1”
  - Straight key “2”
  - Balancer driven gear “3”
  - Straight key
  - Primary drive gear
  - Water pump drive gear

#### NOTE:

- Align the punch mark “a” on the balancer drive gear with the punch mark “b” on the balancer driven gear.
- Install the key with its blunt surface facing “c” the crankshaft.



2. Install:
  - Lock washer “1” **New**
  - Primary drive gear nut “2”



**Primary drive gear nut**  
80 Nm (8.0 m·kg, 58 ft·lb)

- Lock washer “3” **New**
- Balancer driven gear nut “4”



**Balancer driven gear nut**  
70 Nm (7.0 m·kg, 50 ft·lb)

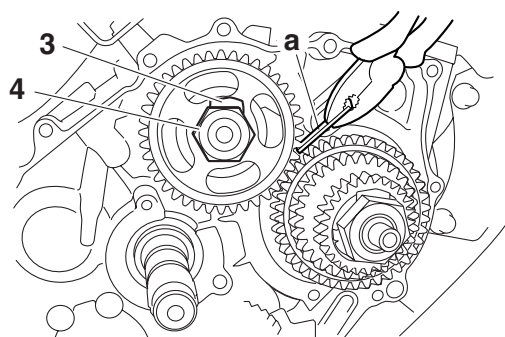
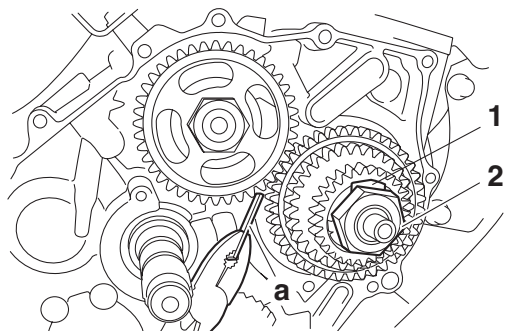
## BALANCER DRIVEN GEAR

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**NOTE:**

Place an aluminum plate “a” between the teeth of the balancer drive gear and balancer driven gear.

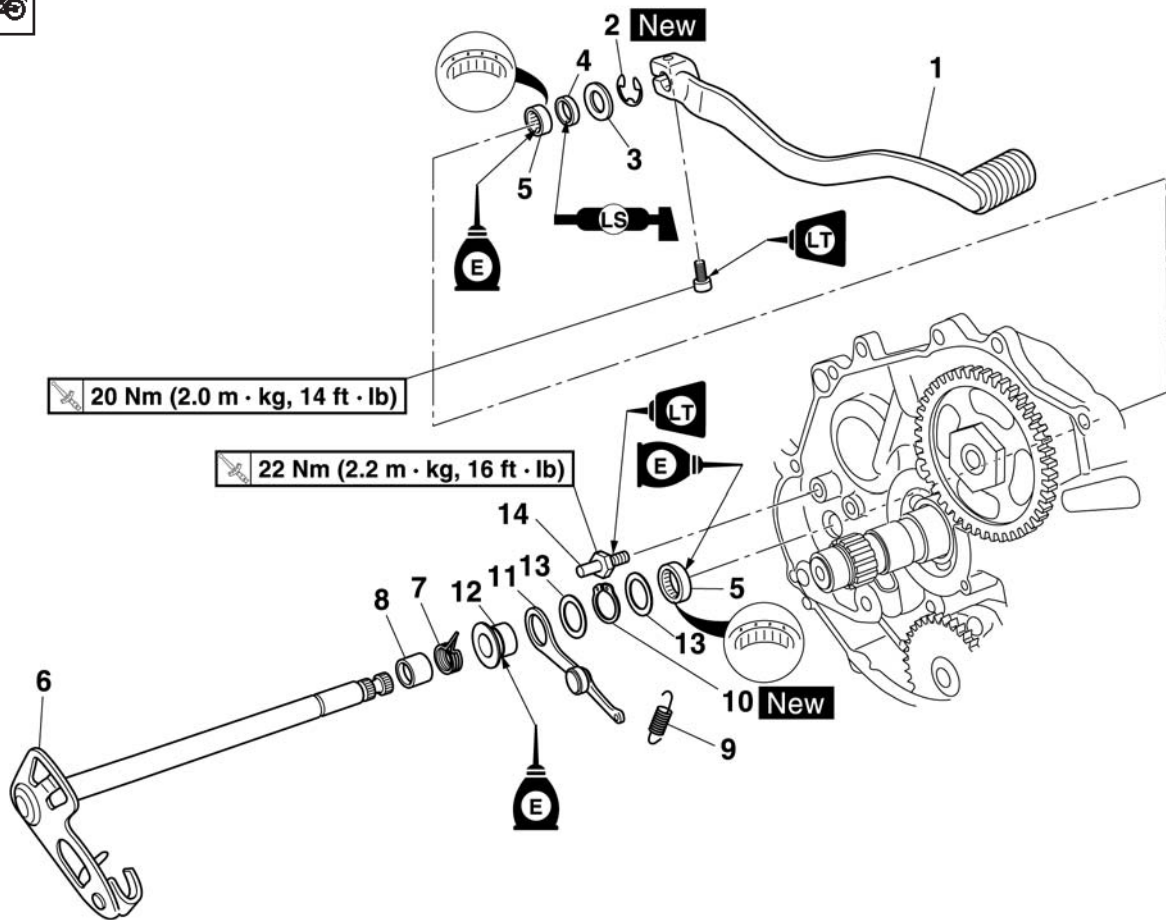
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3. Bend the lock washer tab.



## Removing the shift shaft and stopper lever

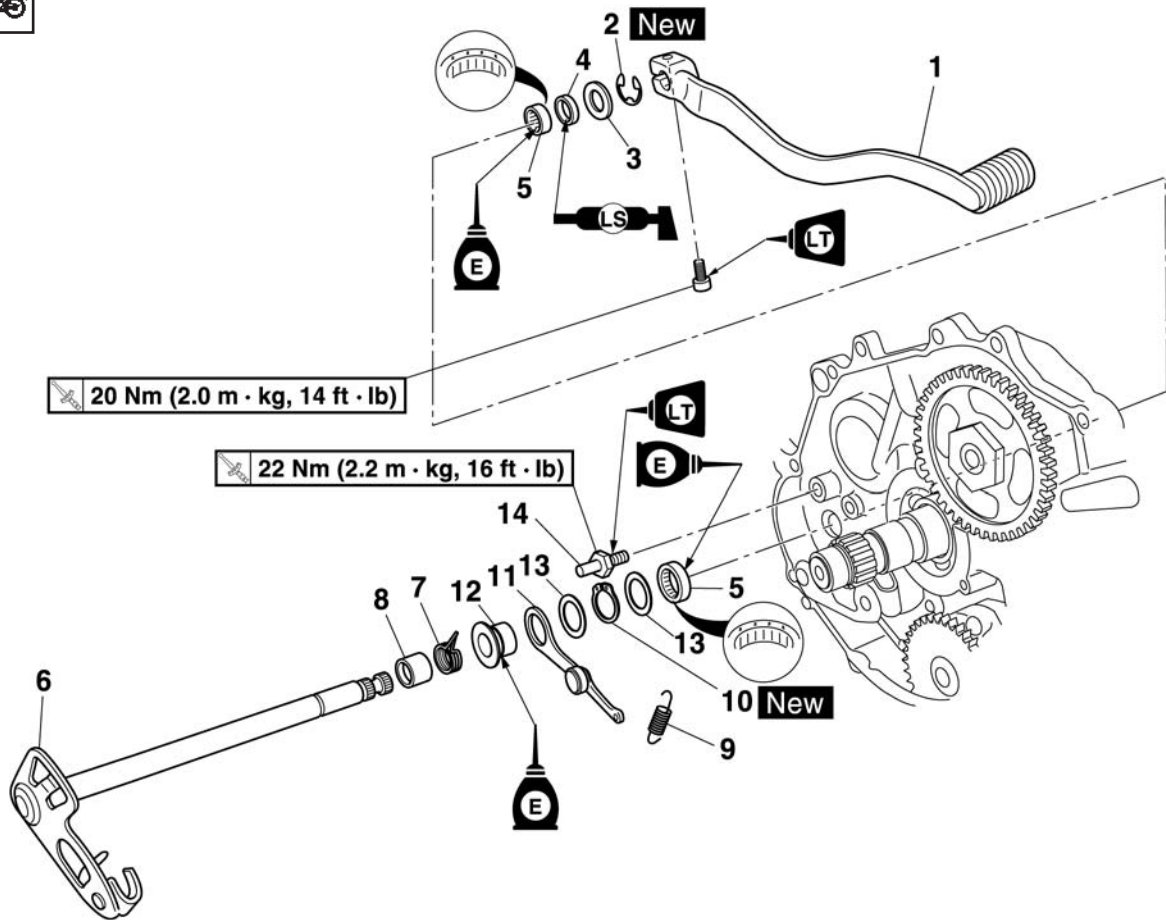


**5-49**



## SHIFT SHAFT

## Removing the shift shaft and stopper lever



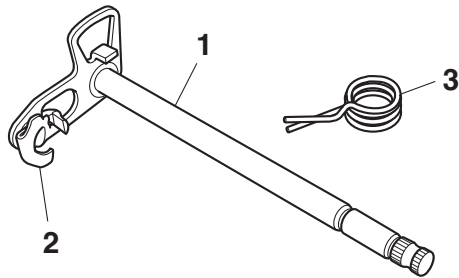
Order	Job/Parts to remove	Q'ty	Remarks
13	Washer	2	
14	Shift shaft spring stopper	1	
			For installation, reverse the removal procedure.

EAS00329

## CHECKING THE SHIFT SHAFT

### 1. Check:

- Shift shaft "1"
- Shift shaft pawl "2"
- Bends/damage/wear → Replace.
- Shift shaft spring "3"
- Damage/wear → Replace.

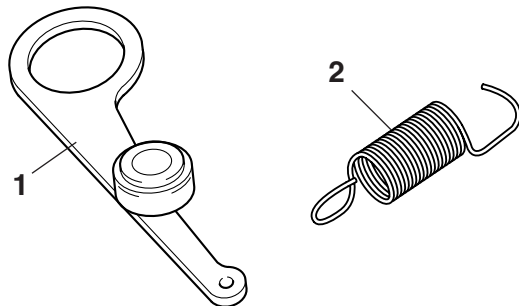


EAS00330

## 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.



EAS00331

## INSTALLING THE SHIFT SHAFT

### 1. Install:

- Shift shaft spring stopper

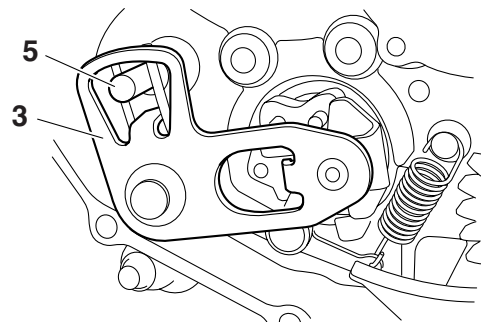
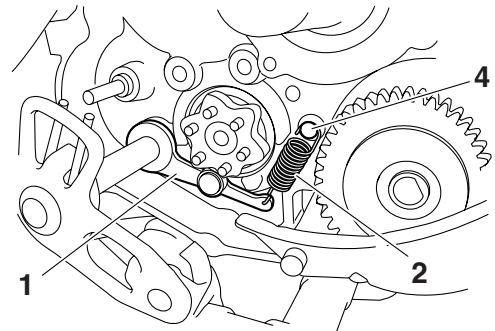


### 2. Install:

- Stopper lever "1"
- Stopper lever spring "2"
- Shift shaft "3"

## NOTE:

- Hook the ends of the stopper lever spring on to the stopper lever and the crankcase boss "4".
- Mesh the stopper lever with the shift drum segment assembly.
- Lubricate the oil seal lips with lithium-soap-based grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper "5".



### 3. Install:

- Shift pedal



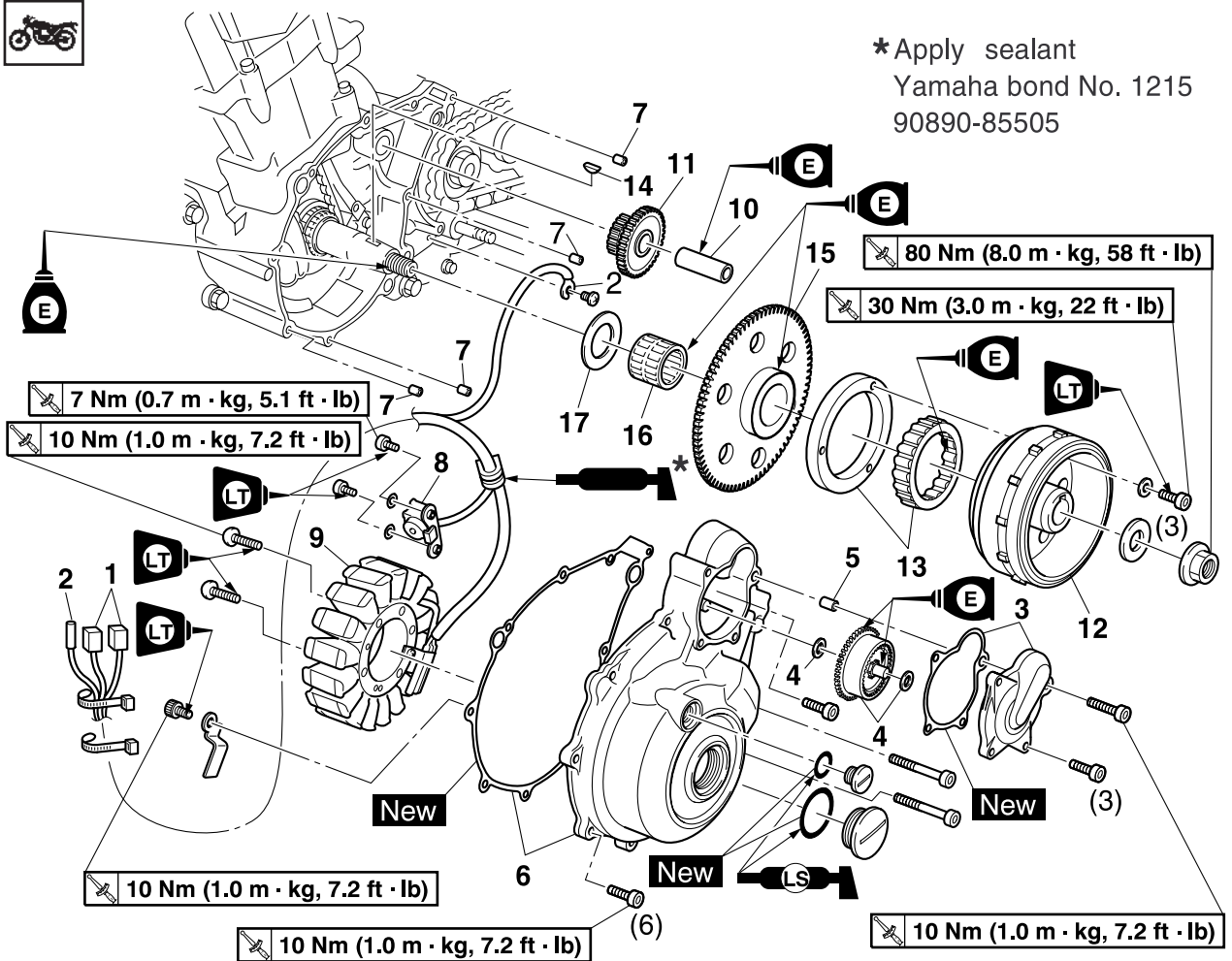
**Shift pedal bolt**  
**20 Nm (2.0 m·kg, 14 ft·lb)**  
**LOCTITE® 243**

# STARTER CLUTCH AND A.C. MAGNETO

EAS00341

## STARTER CLUTCH AND A.C. MAGNETO

### Removing the starter clutch and A.C. magneto



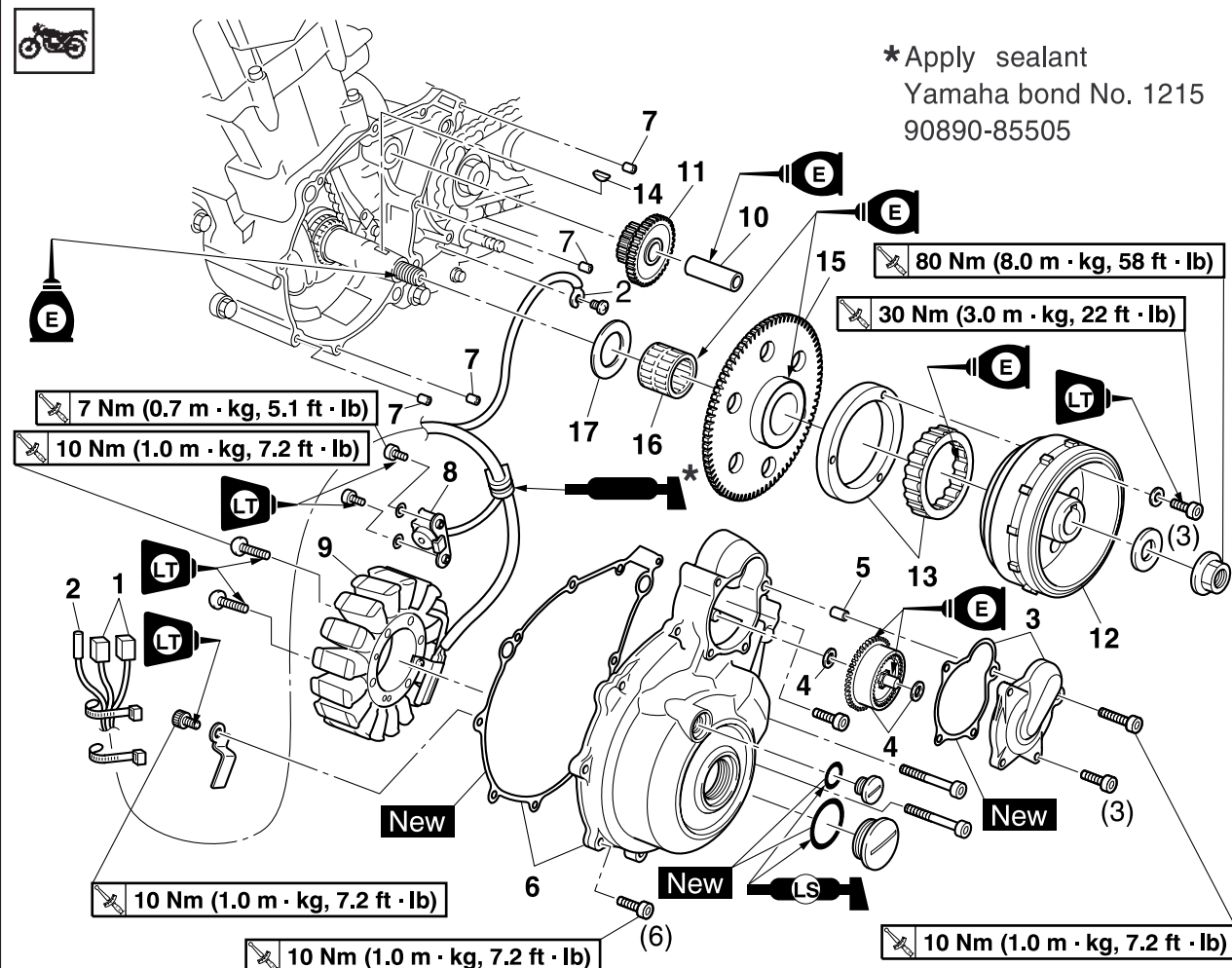
Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-10.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-57.
	Drive sprocket cover		Refer to "CHAIN DRIVE" on page 4-67.
	Shift pedal		
1	A.C. magneto coupler	2	Disconnect.
2	Neutral switch connector/lead	1/1	Disconnect.
3	Torque limiter cover/gasket	1/1	
4	Torque limiter/washer	1/2	
5	Dowel pin	1	
6	A.C. magneto cover/gasket	1/1	
7	Dowel pin	4	
8	Crankshaft position sensor	1	
9	Stator coil	1	
10	Starter clutch idle gear shaft	1	

# STARTER CLUTCH AND A.C. MAGNETO

## Removing the starter clutch and A.C. magneto



\*Apply sealant  
Yamaha bond No. 1215  
90890-85505



Order	Job/Parts to remove	Q'ty	Remarks
11	Starter clutch idle gear	1	
12	A.C. magneto rotor	1	
13	Starter clutch	1	
14	Woodruff key	1	
15	Starter clutch gear	1	
16	Bearing	1	
17	Washer	1	
			For installation, reverse the removal procedure.

# STARTER CLUTCH AND A.C. MAGNETO

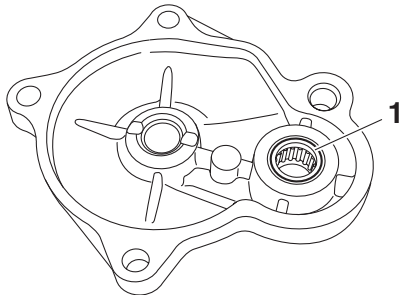
EAS00346

## REMOVING THE A.C. MAGNETO ROTOR

1. Remove:
  - Torque limiter cover

### CAUTION:

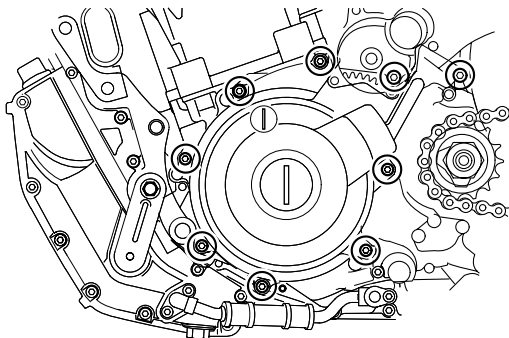
Do not remove the bearing "1".



2. Remove:
  - A.C. magneto cover

### NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



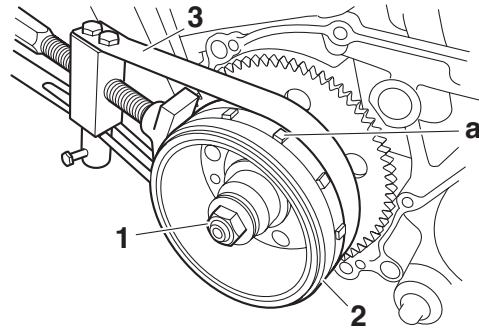
3. Remove:
  - A.C. magneto rotor nut "1"
  - Washer

### NOTE:

- While holding the A.C. magneto rotor "2" with the sheave holder "3", loosen the A.C. magneto rotor nut.
- Do not allow the sheave holder to touch the projection "a" on the A.C. magneto rotor.



**Sheave holder**  
90890-01701



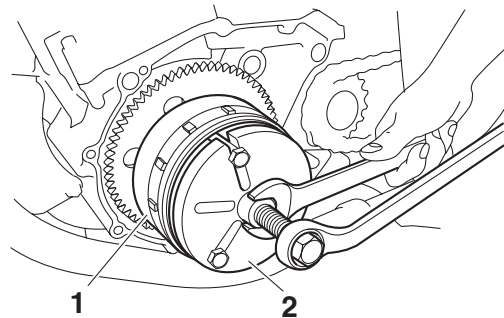
4. Remove:
  - A.C. magneto rotor "1"
  - (with the flywheel puller "2")
  - Woodruff key

### NOTE:

Use the rotor puller.

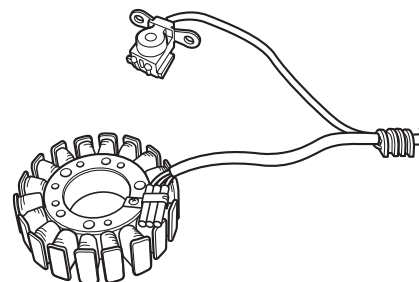


**Flywheel puller**  
90890-01362



## CHECKING THE STATOR COIL AND CRANKSHAFT POSITION SENSOR

1. Check:
  - Stator coil
  - Crankshaft position sensorDamage → Replace the crankshaft position sensor/stator assembly.







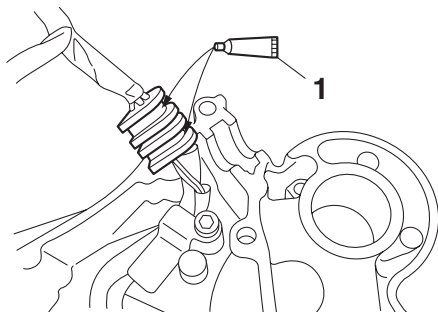
## STARTER CLUTCH AND A.C. MAGNETO

### 2. Apply:

- Yamaha bond No. 1215 “1” (into the slits)



**Yamaha bond No. 1215**  
**90890-85505**

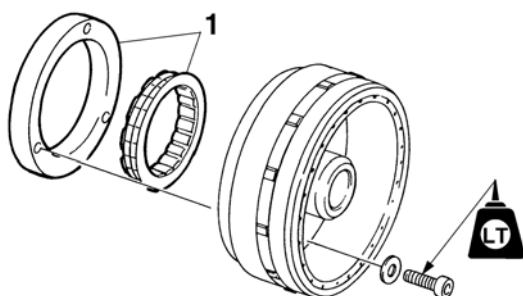


### 3. Install:

- Starter clutch “1” (to A.C. magneto rotor)
- Starter clutch bolts



**Starter clutch bolts**  
**30 Nm (3.0 m·kg, 22 ft·lb)**  
**LOCTITE®**



### 4. Install:

- Woodruff key
- A.C. magneto rotor
- Washer
- A.C. magneto rotor nut

### NOTE:

- Clean the tapered portion of the crankshaft and the A.C. magneto rotor hub.
- When installing the A.C. magneto rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.
- Lubricate crankshaft end threads with engine oil.

### 5. Tighten:

- A.C. magneto rotor nut “1”



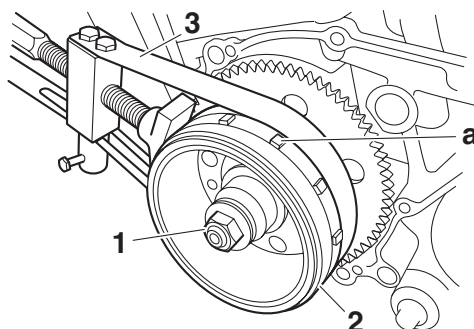
**A.C. magneto rotor nut**  
**80 Nm (8.0 m·kg, 58 ft·lb)**

### NOTE:

- While holding the A.C. magneto rotor “2” with the sheave holder “3”, tighten the A.C. magneto rotor nut.
- Do not allow the sheave holder to touch the projection “a” on the A.C. magneto rotor.



**Sheave holder**  
**90890-01701**



### 6. Install:

- Gasket
- A.C. magneto cover



**A.C. magneto cover bolts**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**  
**LOCTITE®**

### NOTE:

Tighten the A.C. magneto cover bolts in stages, using a crisscross pattern.

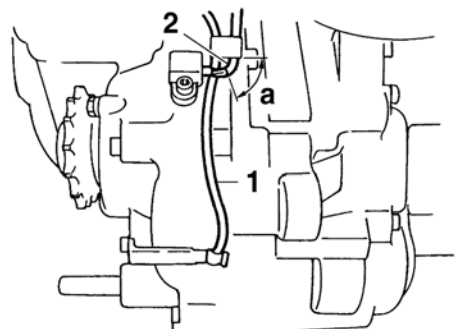
### 7. Install:

- Neutral switch lead “1”

### NOTE:

Route the neutral switch lead so that it is taut and route it under the speed sensor lead “2” as shown.

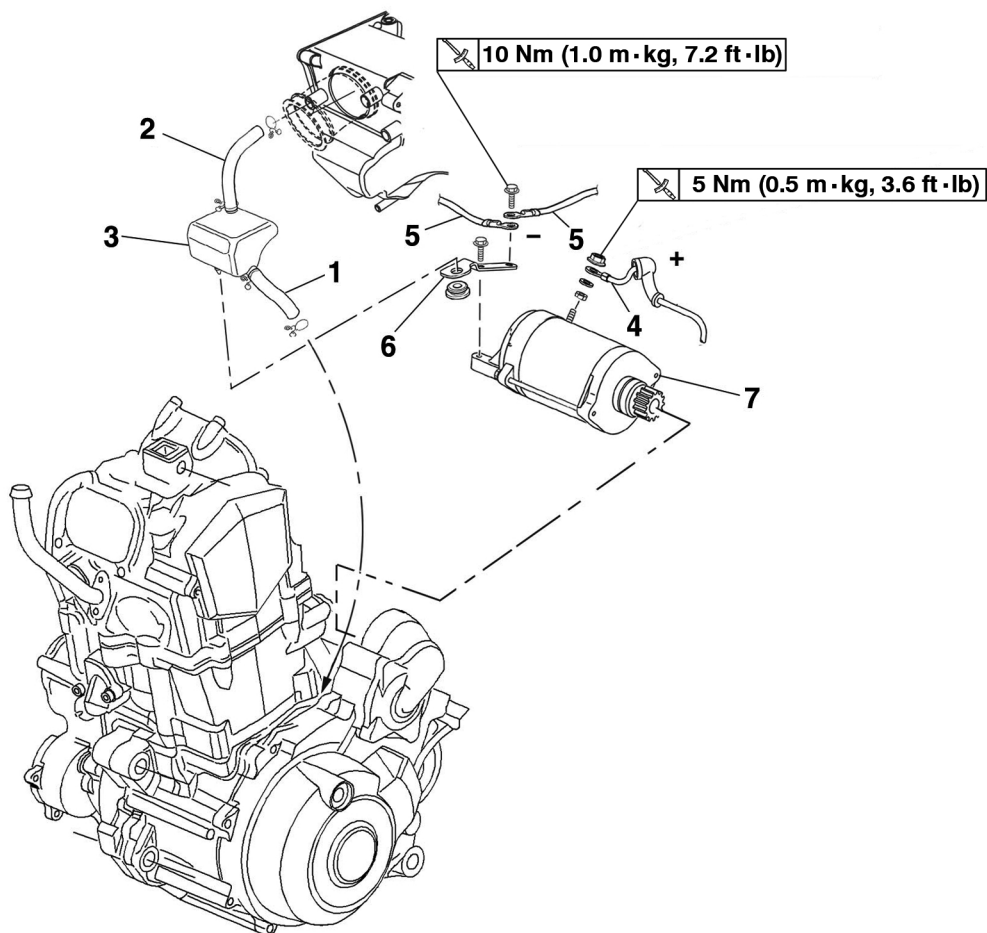
- a. 5 mm or more



EAS24780

ELECTRIC STARTER

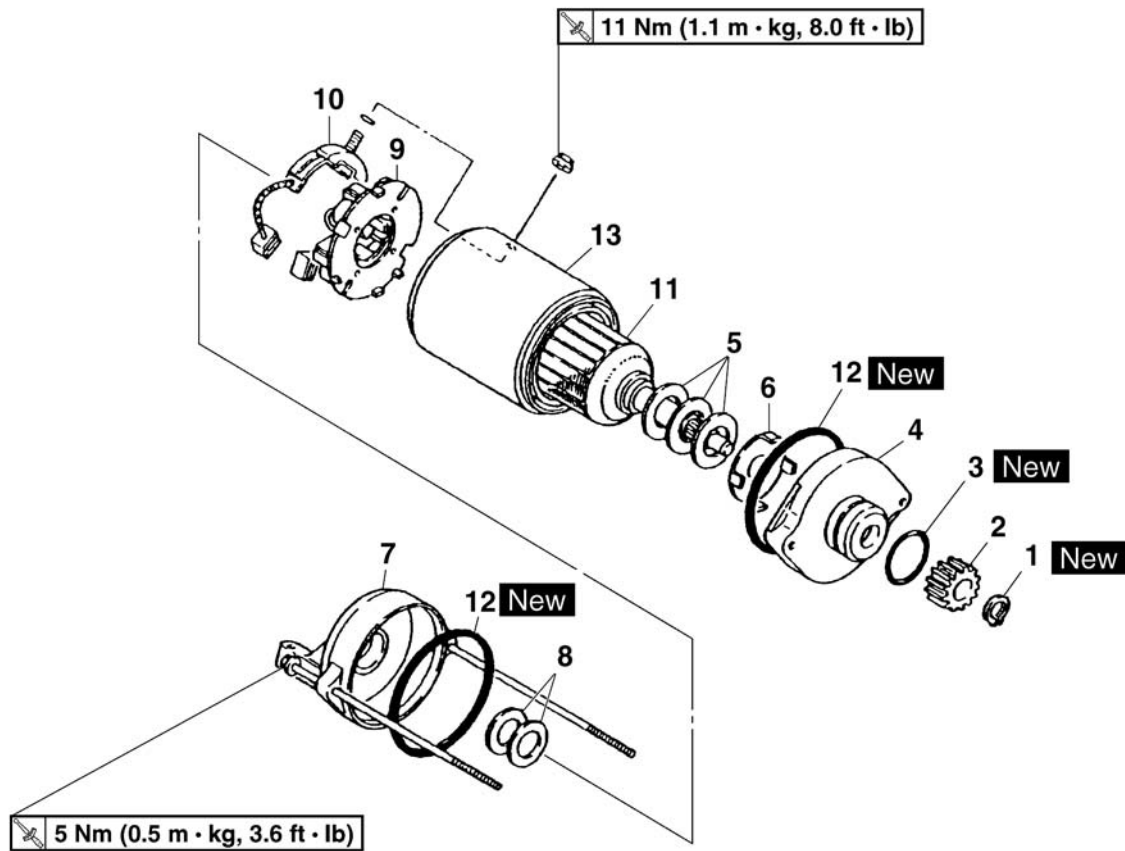
Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Crankcase-to-crankcase-breather-chamber hose	1	Disconnect.
2	Air-filter-to-crankcase-breather-chamber hose	1	Disconnect.
3	Crankcase breather chamber	1	
4	Starter motor lead	1	Disconnect.
5	Negative battery lead	1	Disconnect.
6	Crankcase breather chamber bracket	1	
7	Starter motor	1	
			For installation, reverse the removal procedure.



## Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	Disconnect.
2	Starter motor gear	1	Disconnect.
3	O-ring	1	
4	Front bracket	1	Disconnect.
5	Shims	1	Disconnect.
6	Lock washer	1	
7	Rear bracket	1	
8	Shims	1	
9	Brush holder assembly	1	
10	Brush	1	
11	Armature coil	1	
12	O-ring	2	
13	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.

# ELECTRIC STARTER

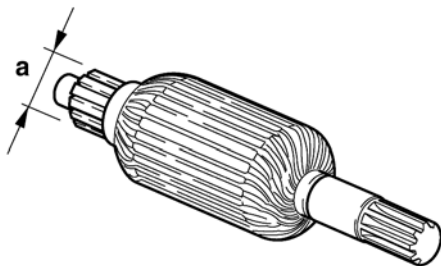
EAS24790

## CHECKING THE STARTER MOTOR

1. Check:
  - Commutator  
Dirt → Clean with 600 grit sandpaper.
2. Measure:
  - Commutator diameter "a"  
Out of specification → Replace the starter motor.



**Limit**  
**27.0 mm (1.06 in)**



3. Measure:
  - Mica undercut "a"  
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



**Mica undercut (depth)**  
**0.70 mm (0.028 in)**

### NOTE:

The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
  - Armature assembly resistances (commutator and insulation)  
Out of specification → Replace the starter motor.

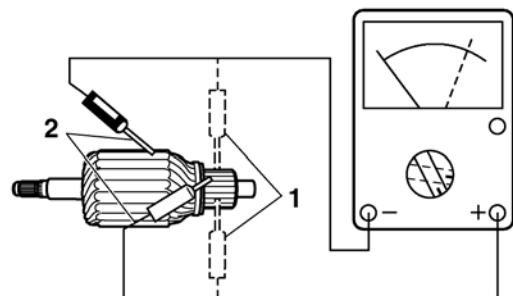
- a. Measure the armature assembly resistances with the pocket tester.



**Pocket tester**  
**90890-03112**



**Armature coil**  
**Commutator resistance "1"**  
**0.025–0.035  $\Omega$  at 20°C (68°F)**  
**Insulation resistance "2"**  
**Above 1 M at 20°C (68°F)**

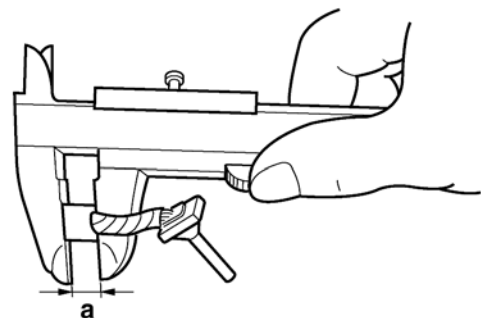


- b. If any resistance is out of specification, replace the starter motor.

5. Measure:
  - Brush length "a"  
Out of specification → Replace the brushes as a set.



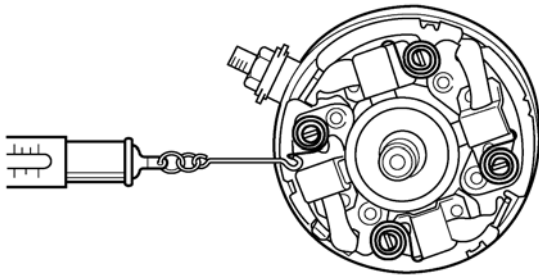
**Limit**  
**5.00 mm (0.20 in)**



6. Measure:
  - Brush spring force  
Out of specification → Replace the brush springs as a set.



**Brush spring force**  
**7.65–10.01 N (27.51–36.01 oz)**  
**(780–1,021 gf)**



7. Check:
  - Gear teeth  
Damage/wear → Replace the gear.
8. Check:
  - Bearing
  - Oil seal  
Damage/wear → Replace the defective part(s).

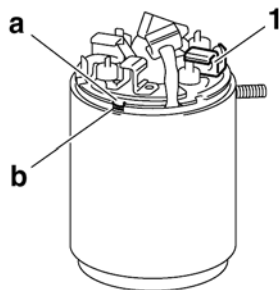
EAS00772

## ASSEMBLING THE STARTER MOTOR

1. Install:
  - Brush seat "1"

### NOTE:

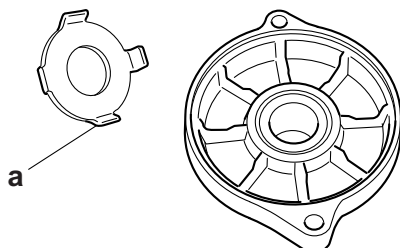
Align the tab "a" on the brush seat with the slot "b" in the starter motor yoke.



2. Install:
  - Lock washer

### NOTE:

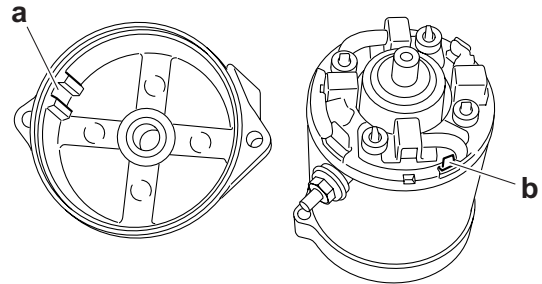
Align the tabs "a" on the lock washer with the grooves in the front bracket.



3. Install:
  - Rear bracket

### NOTE:

Align the slot "a" in the rear bracket with the tab "b" on the brush seat.



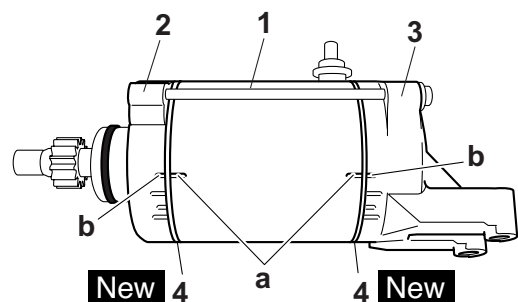
4. Install
  - Starter motor yoke "1"
  - Front bracket "2"
  - Rear bracket "3"
  - O-rings "4" **New**
  - Bolts



**Starter motor bracket bolts**  
**5 Nm (0.5 m·kg, 3.6 ft·lb)**

### NOTE:

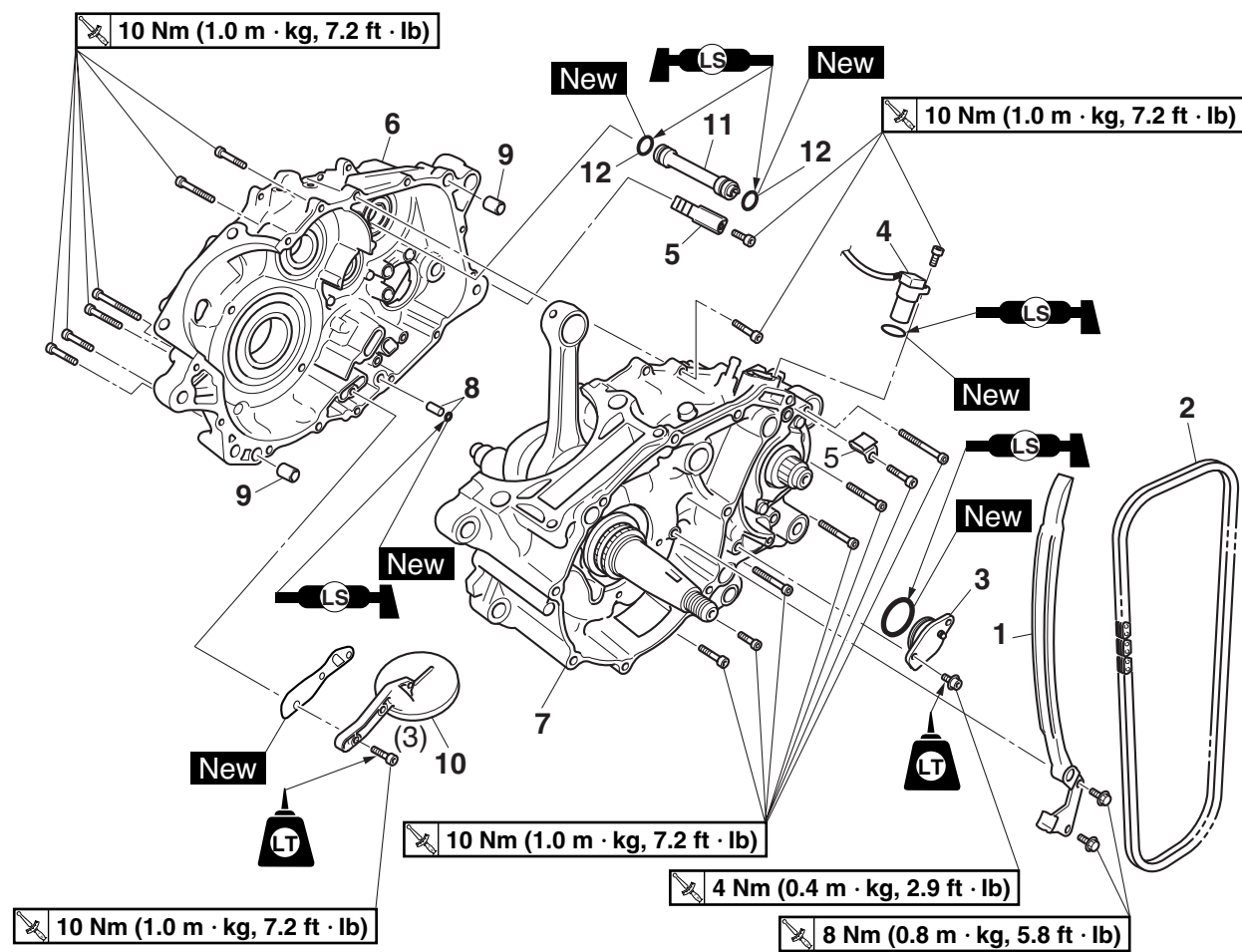
Align the alignment marks "a" on the starter motor yoke with the alignment marks "b" on the front and rear brackets.



5. Install:
  - Starter motor gear
  - Circlip

CRANKCASE

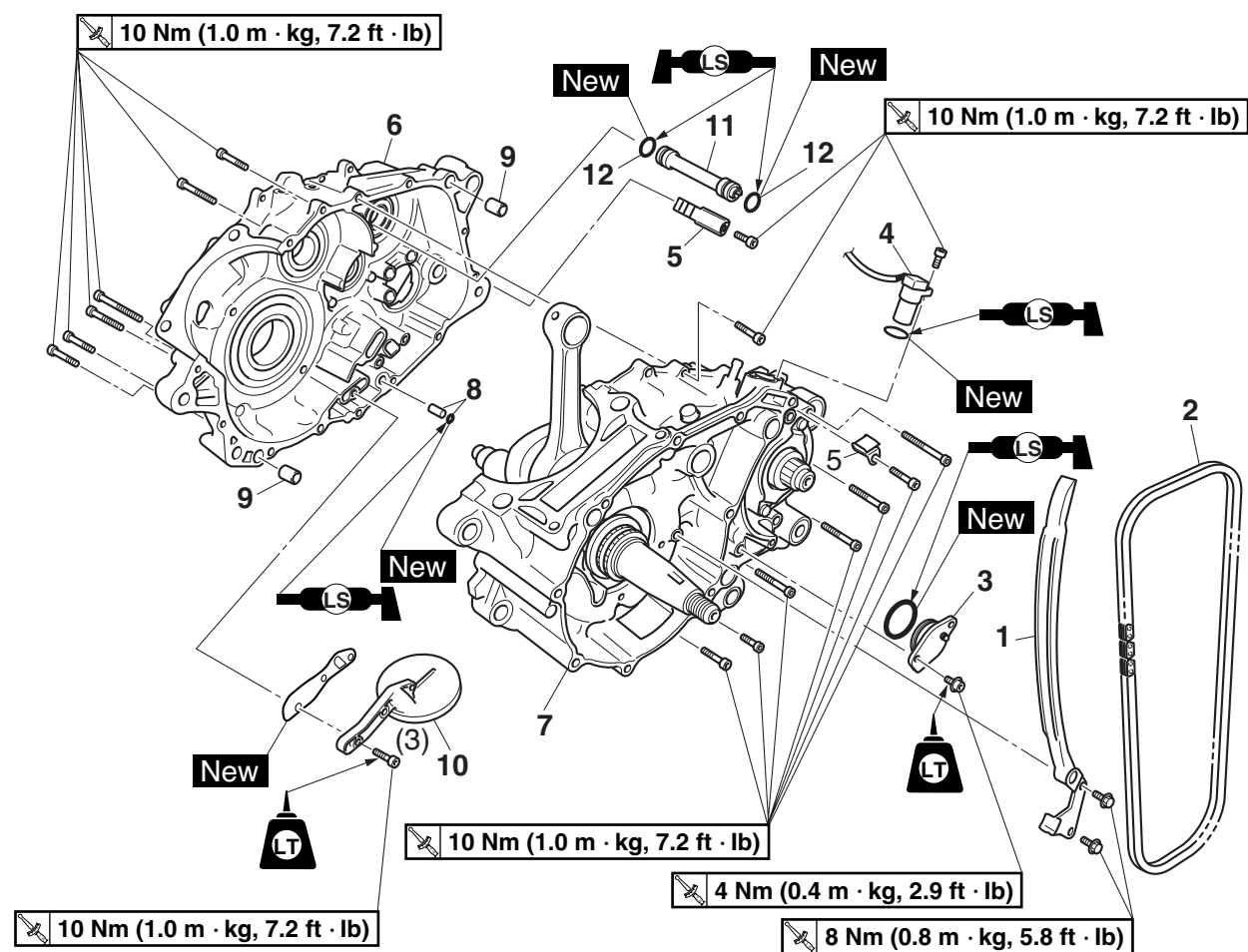
Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-9.
	Cylinder/piston		Refer to "CYLINDER AND PISTON" on page 5-27.
	A.C. magneto		Refer to "STARTER CLUTCH AND A.C. MAGNETO" on page 5-52.
	Clutch		Refer to "CLUTCH" on page 5-53.
	Balancer driven gear/balancer drive gear		Refer to "BALANCER DRIVEN GEAR" on page 5-46.
	Oil pump		Refer to "OIL PUMP" on page 5-41.
	Shift shaft		Refer to "SHIFT SHAFT" on page 5-49.
1	Timing chain guide (intake side)	1	
2	Timing chain	1	
3	Neutral switch	1	
4	Speed sensor	1	
5	Lead holder	2	
6	Crankcase (right)	1	

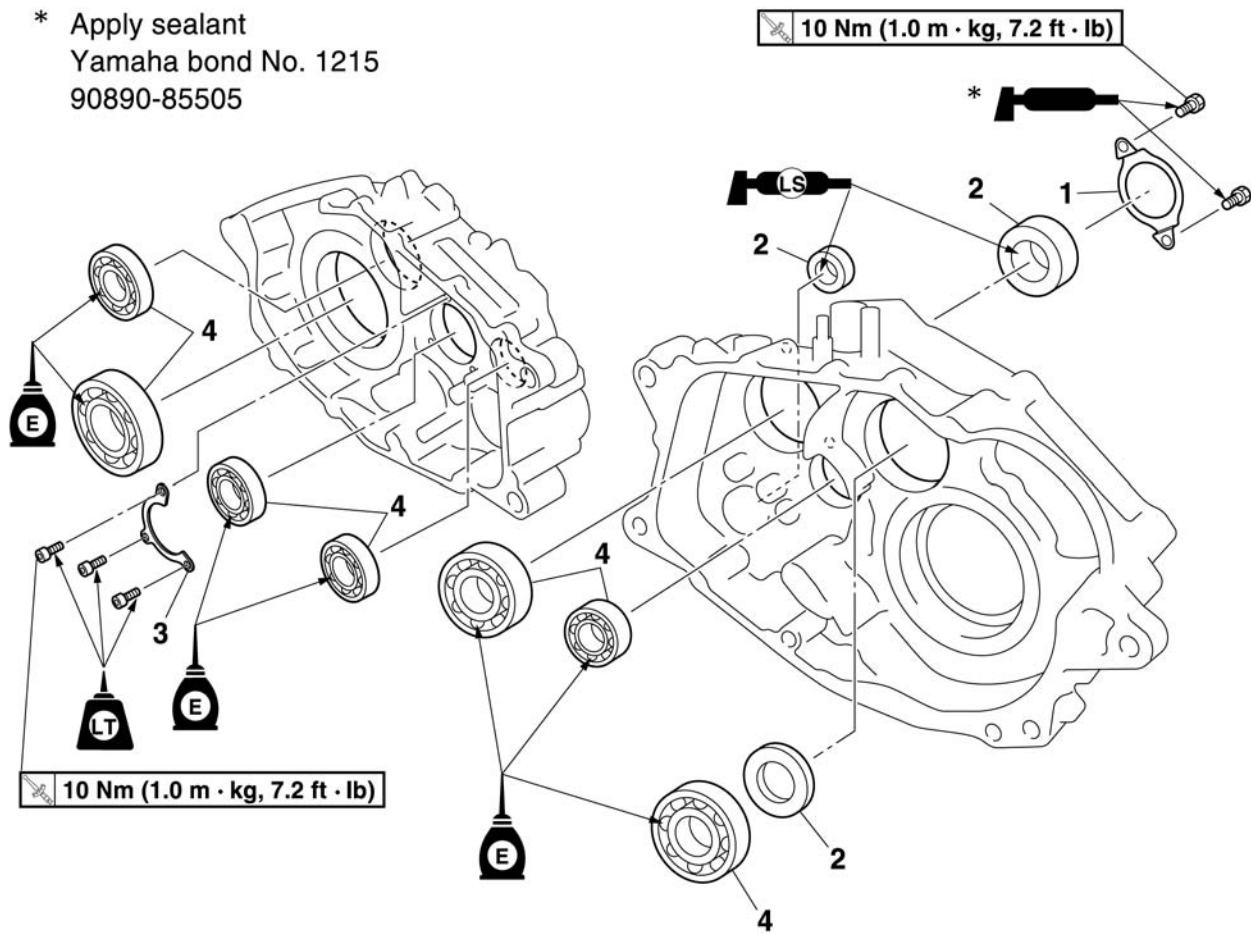
CRANKCASE

Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
7	Crankcase (left)	1	
8	Dowel pin/O-ring	1/1	
9	Dowel pin	2	
10	Oil strainer	1	
11	Oil delivery pipe 3	1	
12	O-ring	2	
			For installation, reverse the removal procedure.

Removing the crankcase bearings

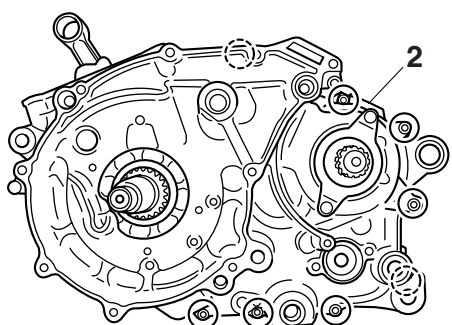
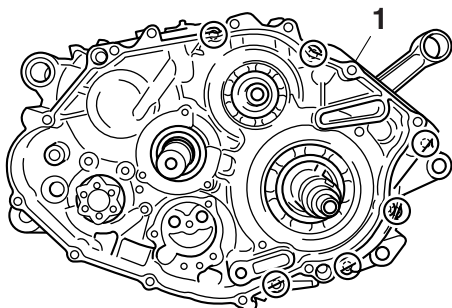


Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft/balancer		Refer to "CRANKSHAFT" on page 5-61.
	Transmission		Refer to "TRANSMISSION" on page 5-70.
1	Oil seal holder	1	
2	Oil seal	3	
3	Bearing retainer	1	
4	Bearing	7	
			For installation, reverse the removal procedure.



## SEPARATING THE CRANKCASE

1. Separate:
  - Right crankcase “1”
  - Left crankcase “2”



- a. Remove the crankcase bolts.

### NOTE:

- Loosen each bolt 1/4 of a turn at a time and after all the bolts are loosened, remove them.
- Loosen the bolts in stages, using a criss-cross pattern.

- b. Remove the right crankcase.

### NOTE:

Insert a screwdriver or pry bar into the pry points in the crankcase and then carefully pry apart the crankcase halves.

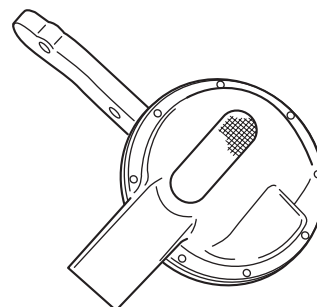
### CAUTION:

Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.

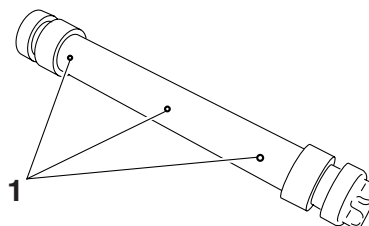
- c. Remove the dowel pins and O-ring.

## CHECKING THE OIL STRAINER AND OIL DELIVERY PIPE 3

1. Check:
  - Oil strainer  
Damage → Replace.  
Contaminants → Clean with engine oil.



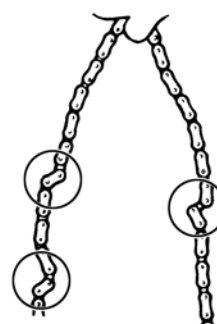
2. Check:
  - Oil delivery pipe 3  
Cracks/damage → Replace.
  - Oil delivery pipe holes “1”  
Clogged → Blow out with compressed air.



EAS00207

## CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDES

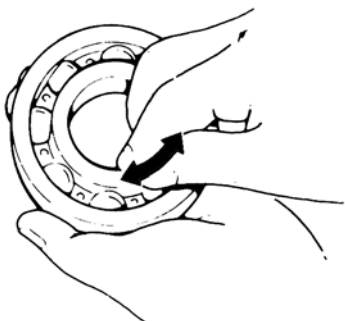
1. Check:
  - Timing chain  
Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.
2. Check:
  - Timing chain guide (intake side)  
Damage/wear → Replace.



EAS00401

## CHECKING THE BEARINGS AND OIL SEALS

1. Check:
  - Bearings  
Clean and lubricate the bearings, and then rotate the inner race with your finger.  
Rough movement → Replace.



2. Check:
  - Oil seals  
Damage/wear → Replace.

EAS00399

## 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.

EAS00418

## ASSEMBLING THE CRANKCASE

1. Lubricate:
  - Bearings
  - Oil seals

	<b>Recommended lubricant</b> Bearing Engine oil Oil seal Lithium-soap-based grease
--	--

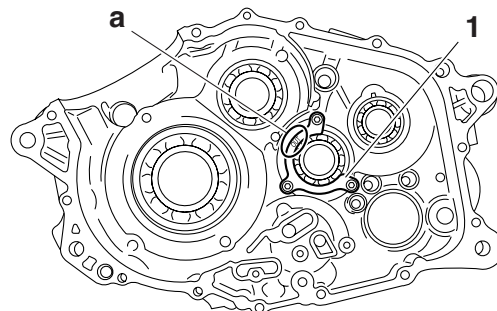
2. Install:
  - Bearings **New**
  - Bearing retainer “1”  
(to the right crankcase)
  - Bearing retainer bolts



**Bearing retainer bolts**  
10 Nm (1.0 m·kg, 7.2 ft·lb)

### NOTE:

Install the bearing retainer with the “OUT” mark “a” facing up.



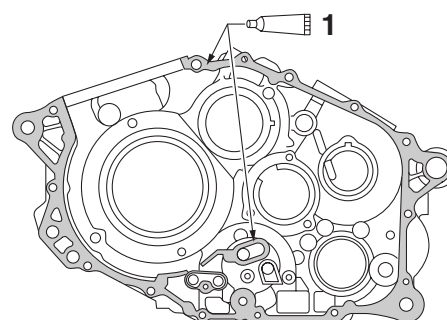
3. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
4. Apply:
  - Yamaha bond No. 1215 “1”  
(to the mating surfaces of both crankcase halves)



**Yamaha bond No. 1215**  
90890-85505

### NOTE:

Do not allow any sealant to come into contact with the oil gallery.



5. Install:
  - Dowel pins
  - O-rings **New**
6. Fit the right crankcase onto the left crankcase. Tap lightly on the case with a soft hammer.



## CAUTION:

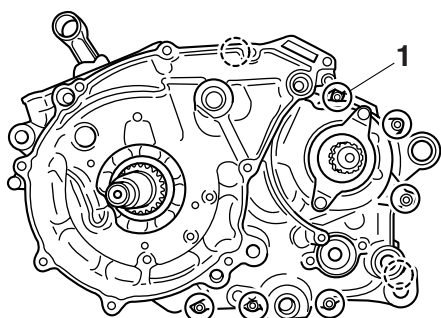
Before installing and torquing the crankcase bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.

### 7. Install:

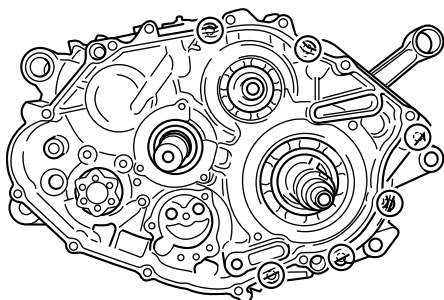
- Lead holder "1"
- Crankcase bolts

- A** Left crankcase  
**B** Right crankcase

**A**



**B**



### 8. Tighten:

- Crankcase bolts  
(follow the proper tightening sequence)



**Crankcase bolts**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**

## NOTE:

Tighten the bolts in stages, using a crisscross pattern.

### 9. Apply:

- 4-stroke engine oil  
(to the crankshaft pin, bearing, and oil delivery hole)

### 10. Check:

- Crankshaft and transmission operation  
Unsmooth operation → Repair.

### 11. Install:

- Speed sensor



**Speed sensor bolts**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**

- Neutral switch
- Neutral switch screw

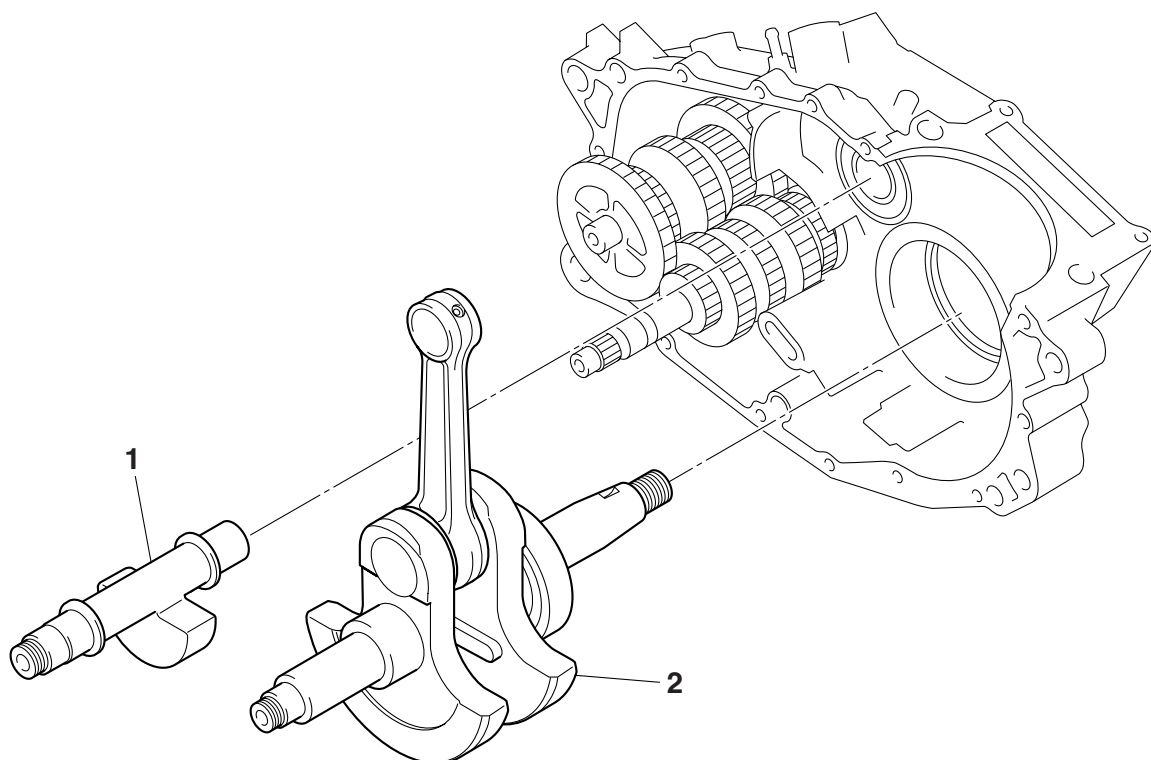


**Neutral switch screw**  
**4 Nm (0.4 m·kg, 2.9 ft·lb)**  
**LOCTITE®**

EAS00381

## CRANKSHAFT

### Removing the crankshaft and balancer



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61.
1	Balancer	1	
2	Crankshaft	1	
			For installation, reverse the removal procedure.

EAS00388

## REMOVING THE CRANKSHAFT ASSEMBLY

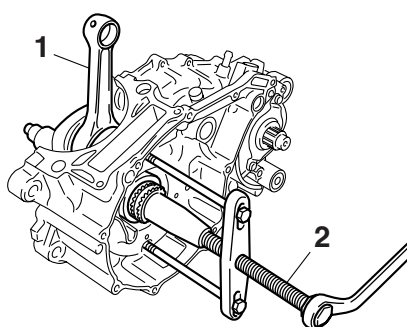
1. Remove:
  - Crankshaft "1"

### NOTE:

- Remove the crankshaft with the crankcase separating tool "2".
- Make sure the crankcase separating tool is centered over the crankshaft.



**Crankcase separating tool**  
90890-01135



EAS00394

## CHECKING THE CRANKSHAFT

1. Measure:
  - Big end side clearance "d"
 Out of specification → Replace the big end bearing, crankshaft pin, or connecting rod.



**Big end side clearance**  
0.350-0.650 mm  
(0.0138-0.0256 in)

2. Measure:
  - Crankshaft width "a"
 Out of specification → Replace the crankshaft.



**Crankshaft width**  
74.95-75.00 mm  
(2.9508-2.9528 in)

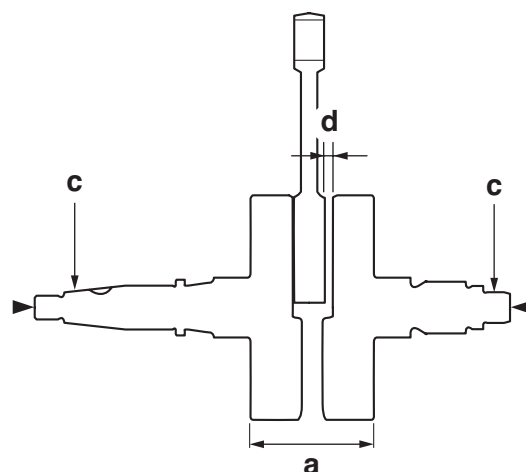
3. Measure:
  - Crankshaft runout "c"
 Out of specification → Replace the crankshaft, bearing or both.

### NOTE:

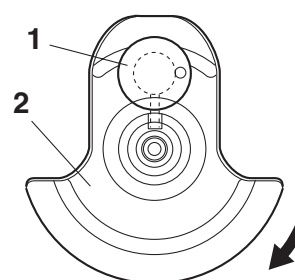
Turn the crankshaft slowly.



**Maximum crankshaft runout**  
0.04 mm (0.0016 in)



- a. 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).



4. Check:
  - Crankshaft sprocket  
Damage/wear → Replace the crankshaft.
  - 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.

EAS00408

## INSTALLING THE CRANKSHAFT

1. Install:

- Crankshaft “1”

### NOTE:

Install the crankshaft with the crankshaft installer pot, crankshaft installer bolt, adapter and spacer (crankshaft installer).



**Crankshaft installer pot “2”**

**90890-01274**

**Crankshaft installer bolt “3”**

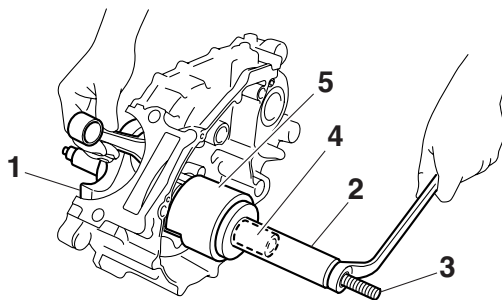
**90890-01275**

**Adapter “4”**

**90890-04130**

**Spacer (crankshaft installer) “5”**

**90890-04144**



### CAUTION:

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.

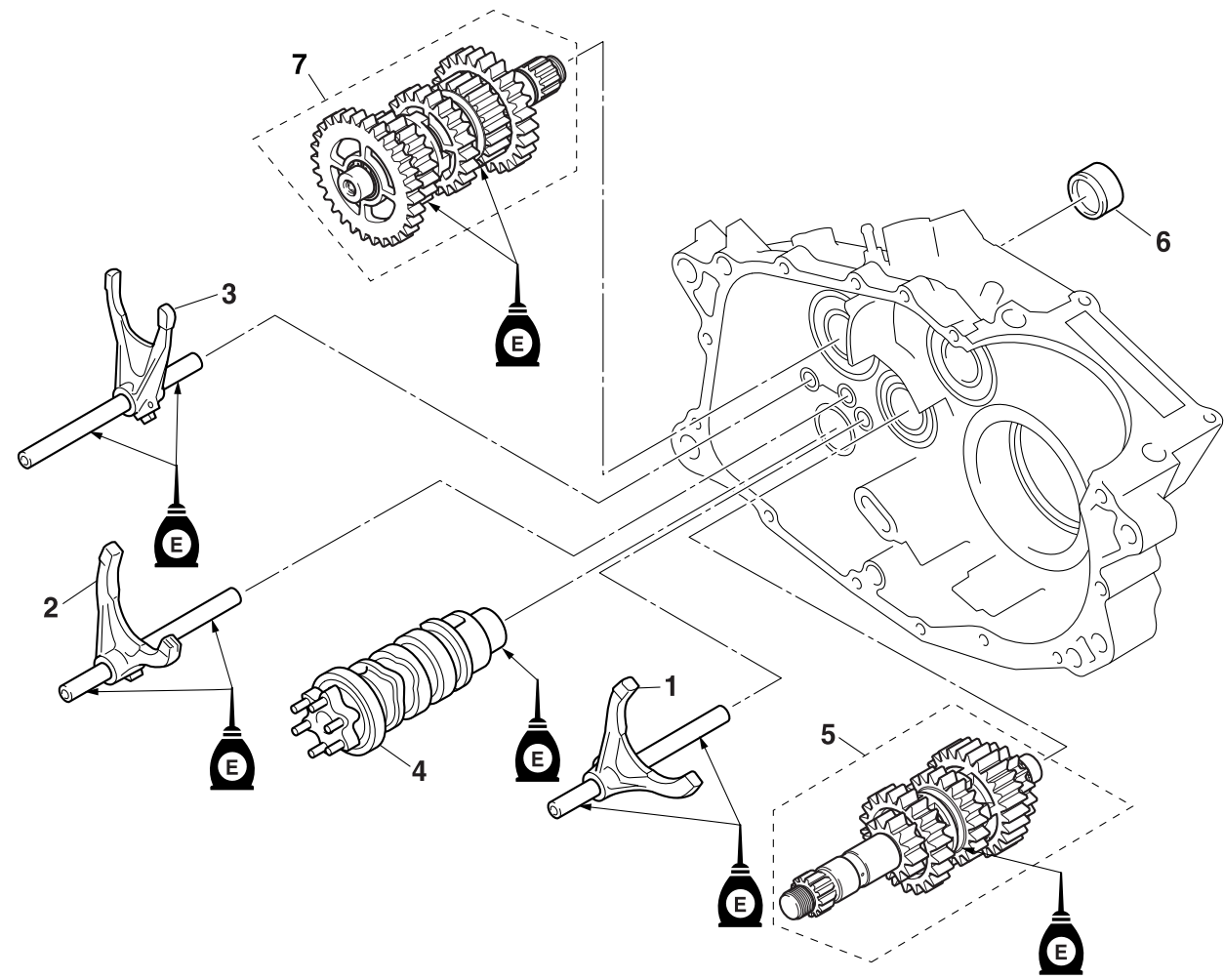
### NOTE:

Hold the connecting rod at the top dead center (TDC) on the compression stroke with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft bottoms against the bearing.

EAS00419

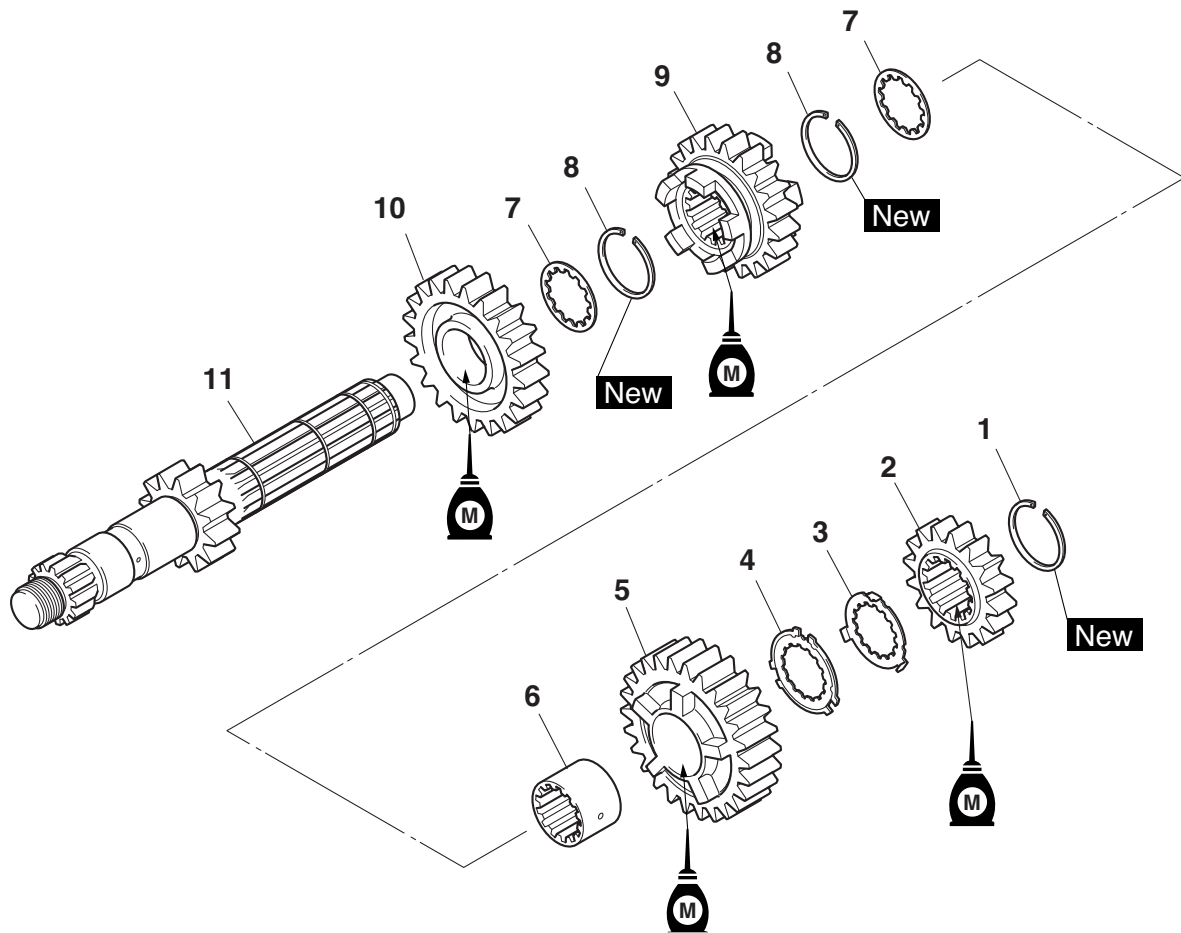
TRANSMISSION

Removing the transmission, shift drum, and shift forks



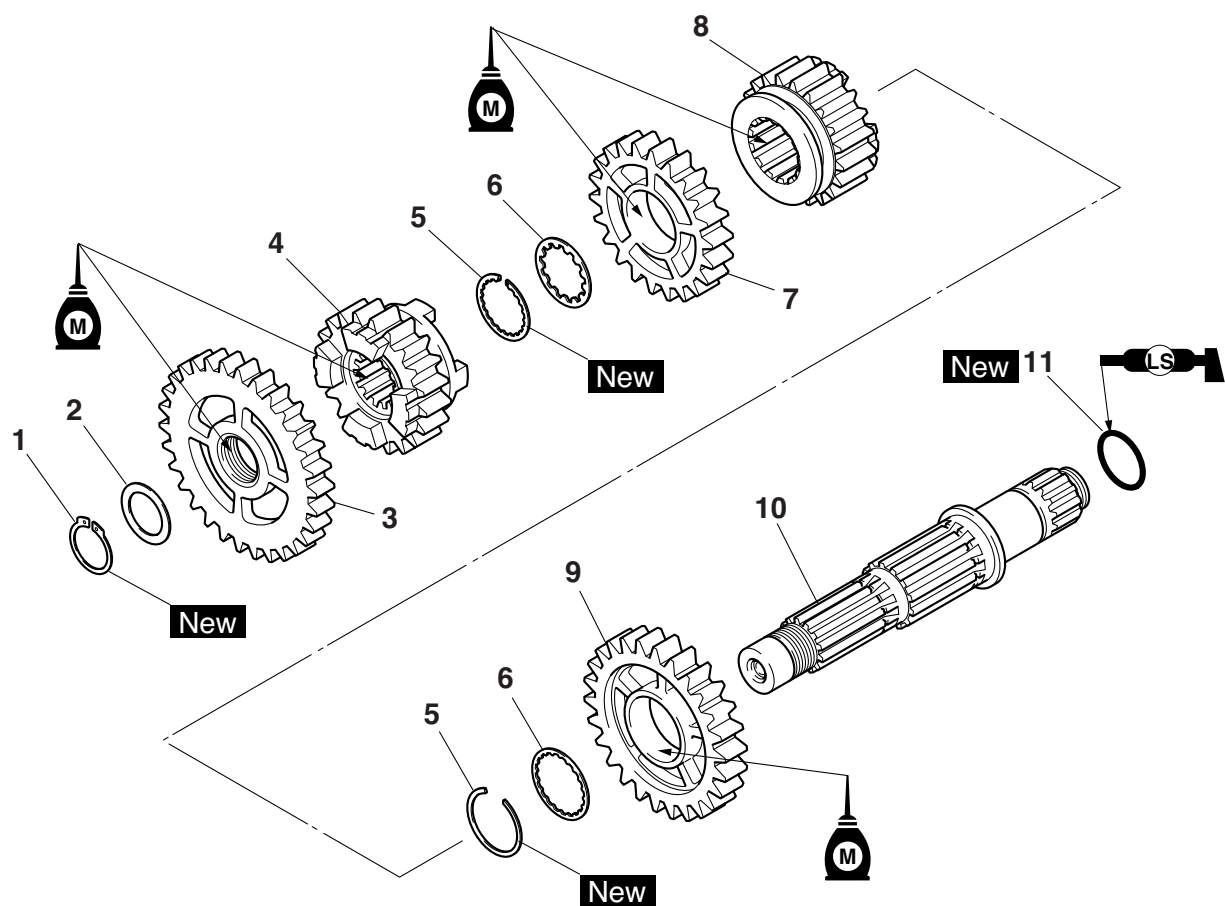
Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61.
1	Shift fork "C"	1	
2	Shift fork "R"	1	
3	Shift fork "L"	1	
4	Shift drum	1	
5	Main axle assembly	1	
6	Spacer	1	
7	Drive axle assembly	1	
			For installation, reverse the removal procedure.

## Disassembling the main axle



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	2 <sup>nd</sup> pinion gear	1	
3	Toothed lock washer	1	
4	Toothed washer retainer	1	
5	5 <sup>th</sup> pinion gear	1	
6	Toothed spacer	1	
7	Toothed washer	2	
8	Circlip	2	
9	3 <sup>rd</sup> pinion gear	1	
10	4 <sup>th</sup> pinion gear	1	
11	Main axle/1 <sup>st</sup> pinion gear	1	
			For assembly, reverse the disassembly procedure.

Disassembling the drive axle



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Washer	1	
3	1 <sup>st</sup> wheel gear	1	
4	4 <sup>th</sup> wheel gear	1	
5	Circlip	2	
6	Toothed washer	2	
7	3 <sup>rd</sup> wheel gear	1	
8	5 <sup>th</sup> wheel gear	1	
9	2 <sup>nd</sup> wheel gear	1	
10	Drive axle	1	
11	O-ring	1	
			For assembly, reverse the disassembly procedure.

EAS00421

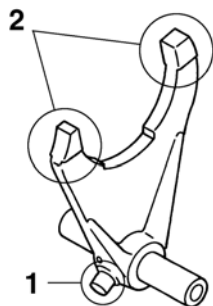
## CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

### 1. Check:

- Shift fork cam follower "1"
- Shift fork pawl "2"

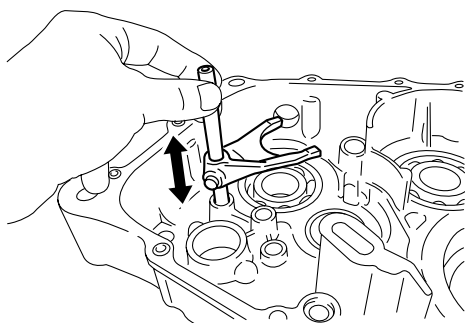
Bends/damage/scoring/wear → Replace the shift fork.



### 2. Check:

- Shift fork movement

Rough movement → Replace the shift forks.

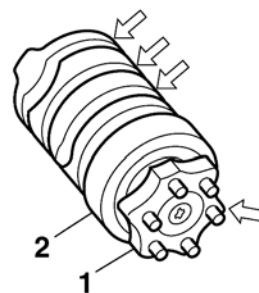


EAS00422

## CHECKING THE SHIFT DRUM ASSEMBLY

### 1. Check:

- Shift drum grooves  
Damage/scratches/wear → Replace the shift drum assembly.
- Shift drum segment "1"  
Damage/wear → Replace the shift drum assembly.
- Shift drum bearing "2"  
Damage/pitting → Replace the shift drum assembly.



EAS00425

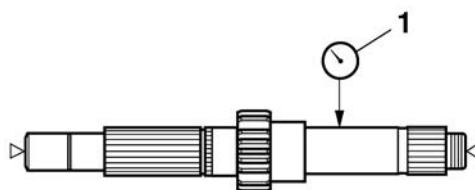
## CHECKING THE TRANSMISSION

### 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)**

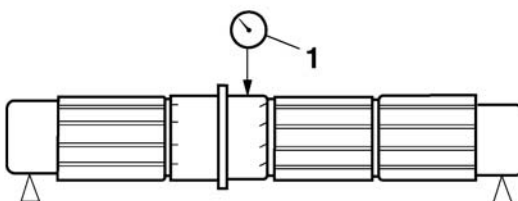


### 2. Measure:

- Drive axle runout  
(with a centering device and dial gauge "1")  
Out of specification → Replace the drive axle.



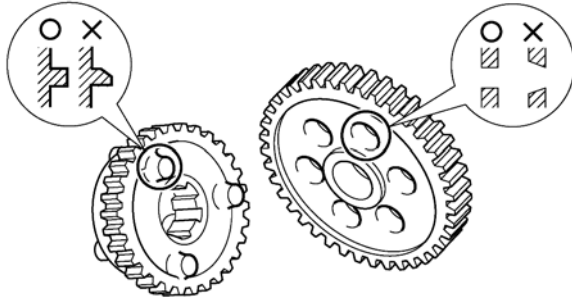
**Main axle runout limit**  
**0.08 mm (0.0031 in)**





## 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.

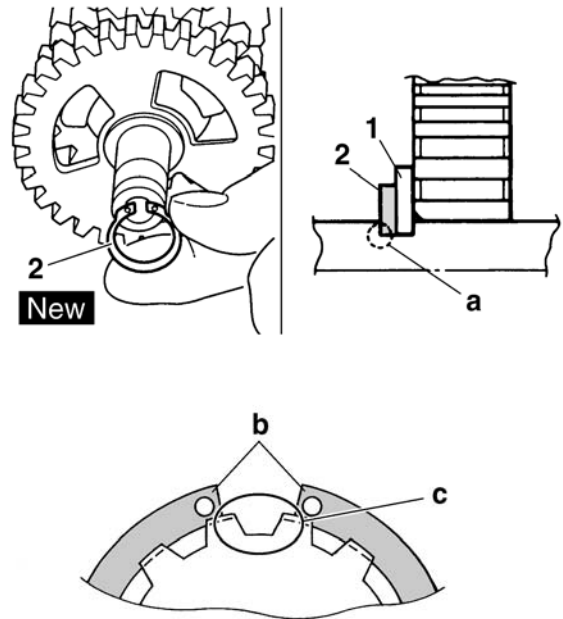
## ASSEMBLING THE MAIN AXLE AND DRIVE AXLE

### 1. Install:

- Toothed washer "1"
- Circlip "2" **New**

### NOTE:

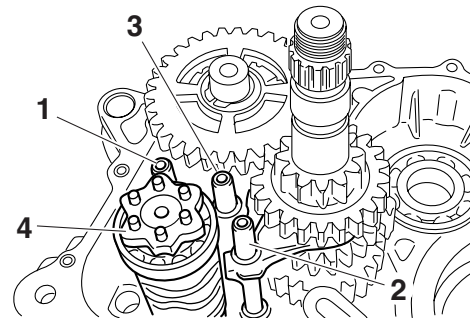
- Be sure the circlip shape-edged corner "a" is positioned opposite side to the toothed washer and gear.
- Install the circlip so that both ends "b" are positioned in the center of each axle spline "c".



## INSTALLING THE TRANSMISSION

### 1. Install:

- Shift fork "L" "1" (to drive axle)
- Shift fork "C" "2" (to main axle)
- Shift fork "R" "3" (to drive axle)
- Shift drum "4"
- Transmission assembly



### NOTE:

- The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence: "R", "C", and "L".
- Make sure that the shift fork cam follower is properly seated in the shift drum groove.

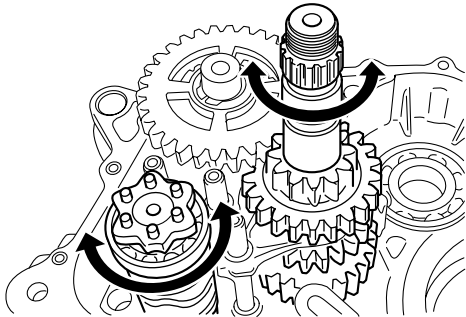
2. Check:

- Shift operation

Unsmooth operation → Repair.

**NOTE:**

- Apply engine oil to each gear and bearing thoroughly.
  - Before assembling the crankcase, make sure that the transmission is in neutral and that the gears turn freely.
- 





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## COOLING SYSTEM

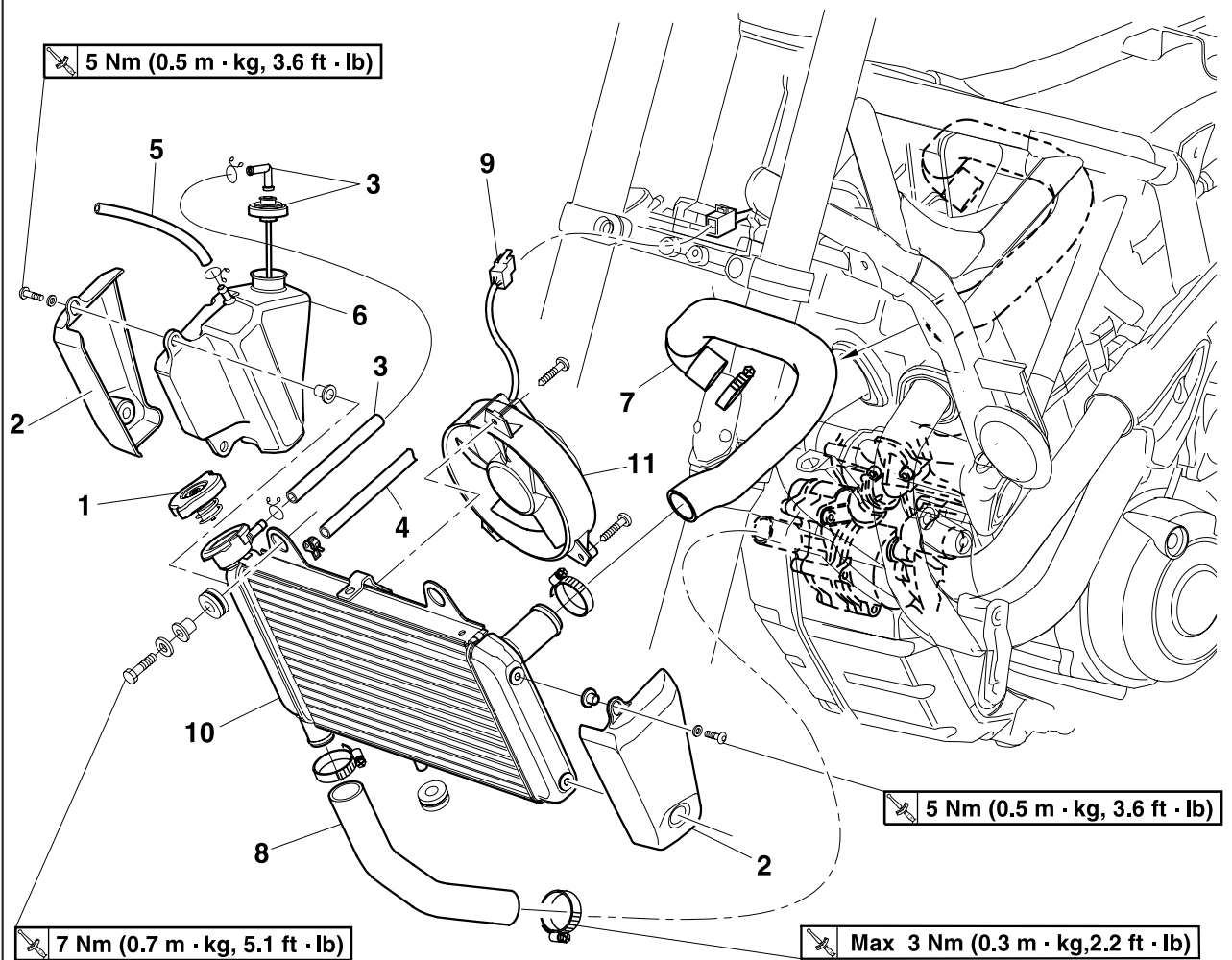
<b>RADIATOR .....</b>	<b>6-1</b>
CHECKING THE RADIATOR .....	6-2
INSTALLING THE RADIATOR .....	6-2
<b>THERMOSTAT.....</b>	<b>6-4</b>
CHECKING THE THERMOSTAT .....	6-5
INSTALLING THE THERMOSTAT .....	6-5
<b>WATER PUMP.....</b>	<b>6-7</b>
DISASSEMBLING THE WATER PUMP.....	6-9
CHECKING THE WATER PUMP .....	6-9
ASSEMBLING THE WATER PUMP.....	6-10
INSTALLING THE WATER PUMP .....	6-11

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EAS00454

RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
1	Radiator cap	1	
2	Radiator cover	2	
3	Coolant reservoir hose/cap	1/1	
4	Coolant throttle body hose	1	Disconnect.
5	Coolant reservoir breather hose	1	
6	Coolant reservoir	1	
7	Radiator inlet hose	1	
8	Radiator outlet hose	1	
9	Radiator fan motor coupler	1	Disconnect.
10	Radiator	1	
11	Radiator fan	1	
			For installation, reverse the removal procedure.

# RADIATOR

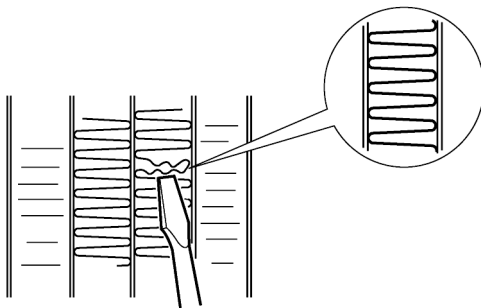
EAS00455

## CHECKING THE RADIATOR

1. Check:
  - Radiator fins  
Obstruction → Clean.  
Apply compressed air to the rear of the radiator.
  - Damage → Repair or replace.

### NOTE:

Straighten any flattened fins with a thin, flat-head screwdriver.



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**  
110.0-140.0 kPa  
(1.10-1.40 kg/cm<sup>2</sup>,  
16.0-20.3 psi)

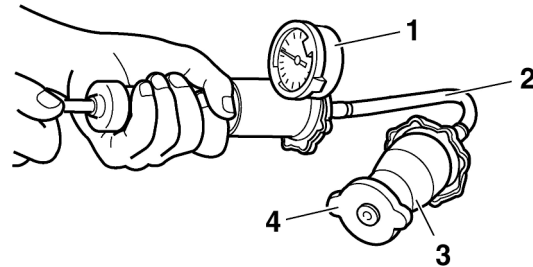


- a. Install the radiator cap tester "1" and radiator cap tester adaptor "2" and radiator cap tester adaptor "3" to the radiator cap "4".



**Radiator cap tester**  
90890-01325  
**Radiator cap tester adaptor**  
90890-01352  
**Radiator cap tester adaptor**  
90890-01497

- 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.

EAS00456

## INSTALLING THE RADIATOR

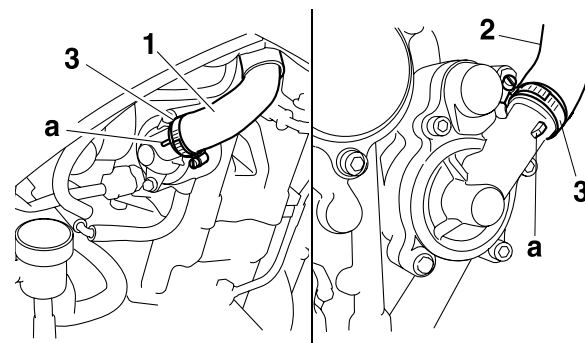
1. Install:
  - Radiator inlet hose "1"
  - Radiator outlet hose "2"
  - Hose clamps "3"



**Hose clamp**  
Max 3 Nm (0.3 m·kg, 2.2 ft·lb)

### NOTE:

Install the radiator inlet hose and radiator outlet hose so that each hose contacts the respective projection "a".



2. Fill:
  - Cooling system (with the specified amount of the recommended coolant)  
Refer to "CHANGING THE COOLANT" on page 3-16.



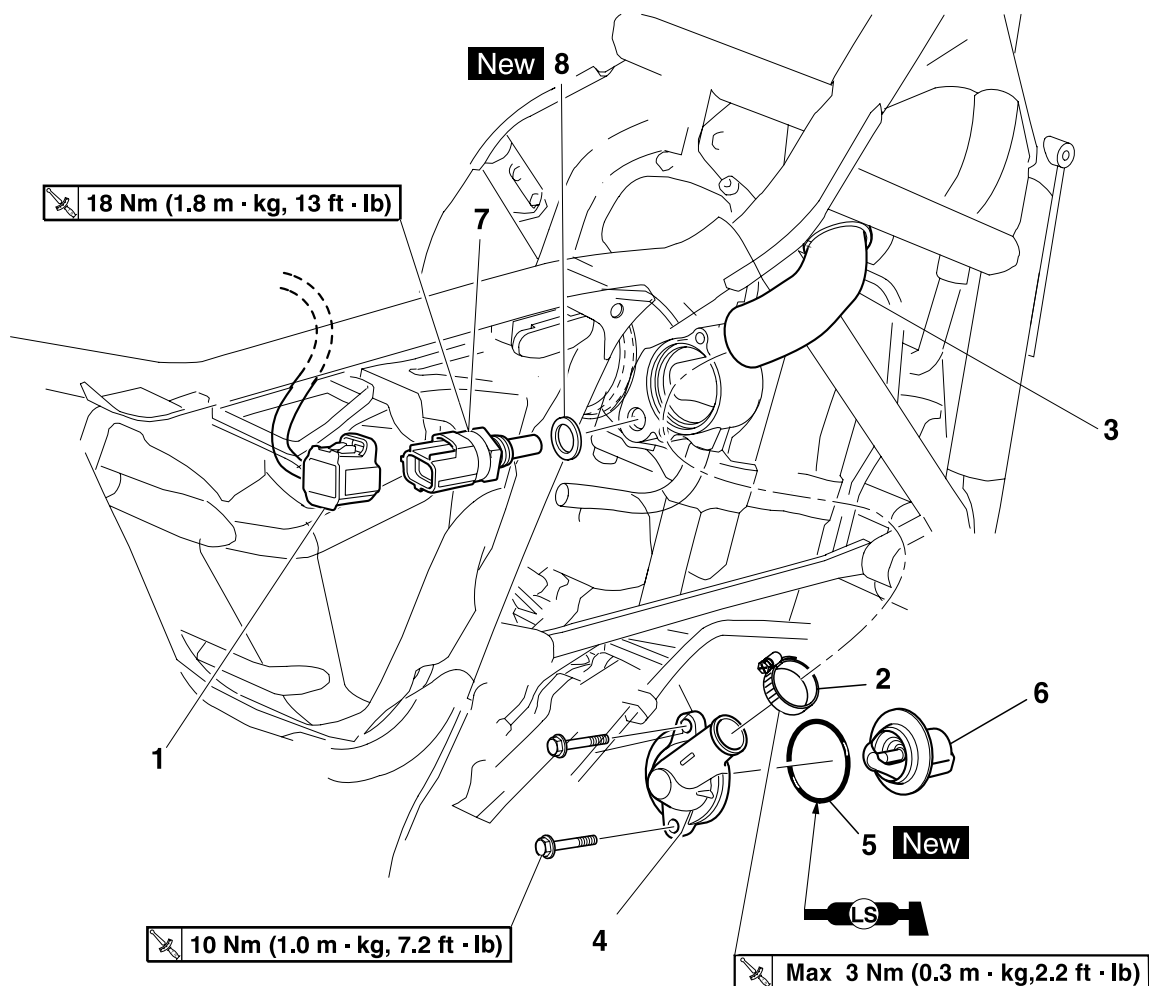


# THERMOSTAT

EAS00460

## THERMOSTAT

### Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
1	Coolant temperature sensor coupler	1	
2	Hose clamp	1	
3	Radiator inlet hose	1	Disconnect.
4	Thermostat cover	1	
5	O-ring	1	
6	Thermostat	1	
7	Coolant temperature sensor	1	
8	Copper washer	1	
			For installation, reverse the removal procedure.

# THERMOSTAT

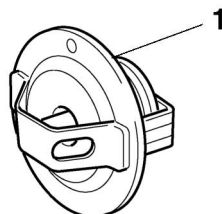
EAS00462

## CHECKING THE THERMOSTAT

### 1. Check:

- Thermostat "1"

Does not open at 71-85 °C (159.8-185 °F) → Replace.



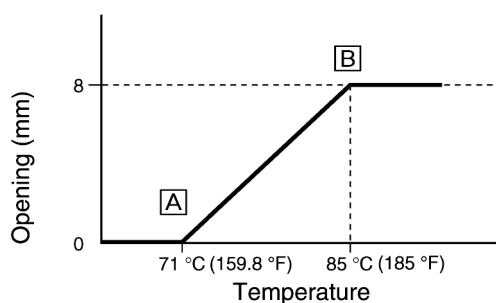
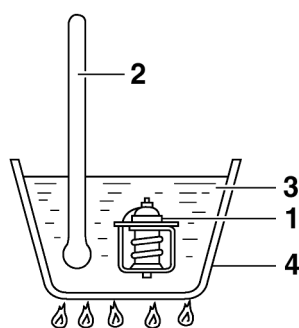
- Suspend the thermostat in a container filled with water.
- Slowly heat the water.
- Place a thermometer in the water.
- While stirring the water, observe the thermostat and thermometer's indicated temperature.



- Thermostat
  - Thermometer
  - Water
  - Container
- ☐ A Fully closed  
☐ B Fully open

### NOTE:

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.



### 2. Check:

- Thermostat cover
- Thermostat housing (cylinder head)  
Cracks/damage → Replace.

EAS00466

## INSTALLING THE THERMOSTAT

### 1. Install:

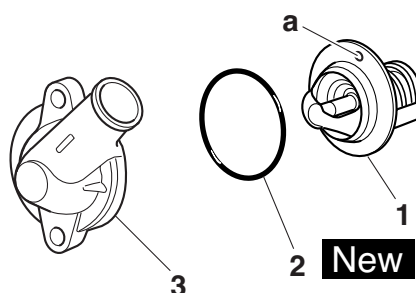
- Thermostat "1"
- O-ring "2" **New**
- Thermostat cover "3"



**Thermostat cover bolts**  
**10 Nm (1.0 m·kg, 7.2 ft·lb)**

### NOTE:

- Install the thermostat with its breather hole "a" facing up.
- Lubricate the O-ring with a thin coat of lithium-soap-based grease.



### 2. Install:

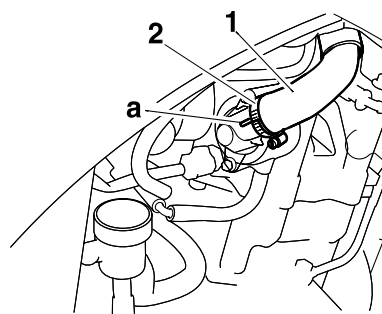
- Radiator inlet hose "1"
- Hose clamp "2"



**Hose clamp**  
**Max 3 Nm (0.3 m·kg, 2.2 ft·lb)**

### NOTE:

Install the radiator inlet hose "1" so that it contacts the projection on the thermostat cover "a".



3. Install:

- Copper washer **New**
- Coolant temperature sensor



**Coolant temperature sensor**  
**18 Nm (1.8 m·kg, 13 ft·lb)**

**CAUTION:**

**Use extreme care when handling the coolant temperature sensor. Replace the sensor if it is dropped or subjected to a strong impact.**

---

4. Fill:

- Cooling system (with the specified amount of the recommended coolant)  
Refer to “CHANGING THE COOLANT” on page 3-16.

5. Check:

- Cooling system  
Leaks → Repair or replace any faulty part.

6. Measure:

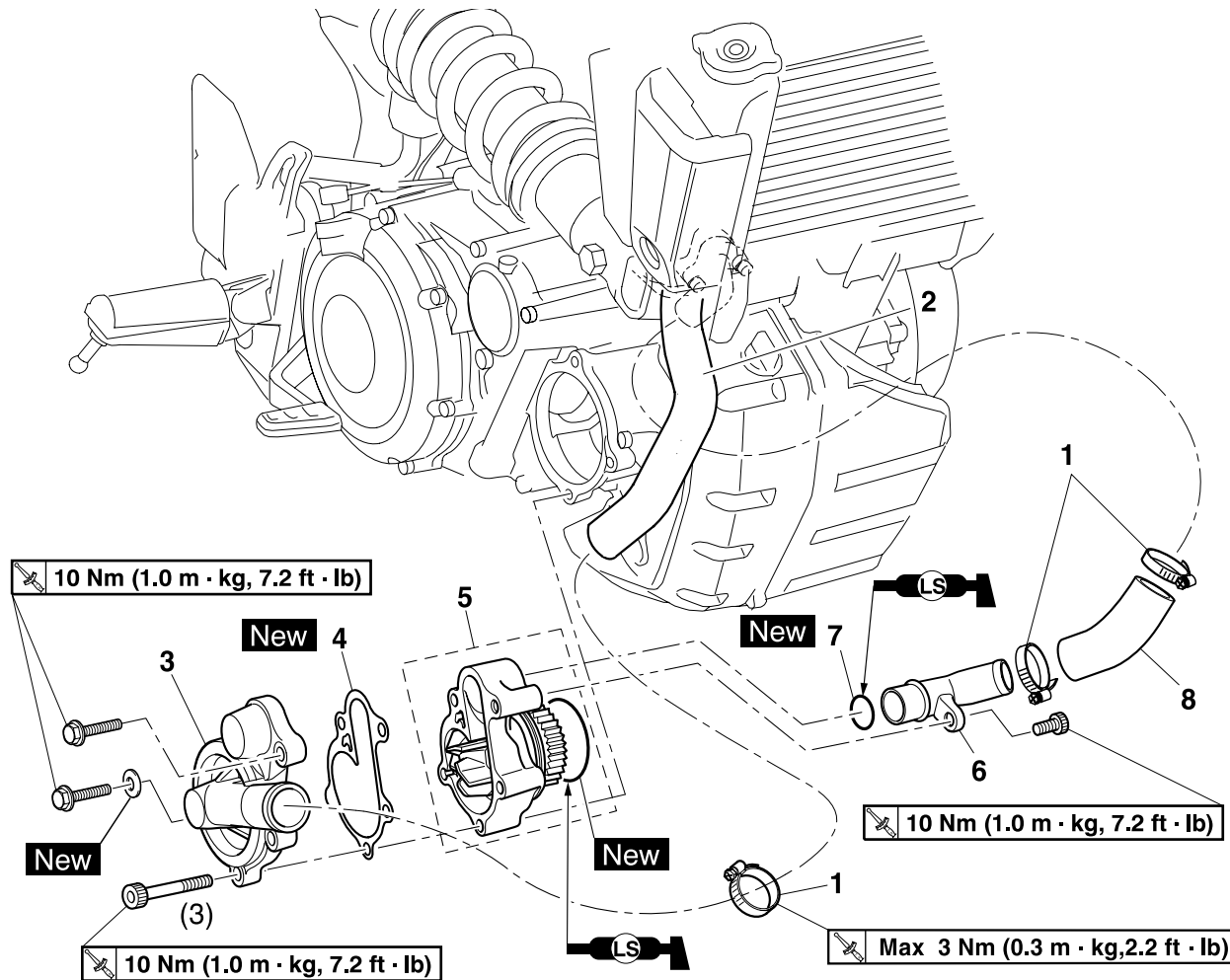
- Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.  
Refer to “CHECKING THE RADIATOR” on page 6-2.

# WATER PUMP

EAS00468

## WATER PUMP

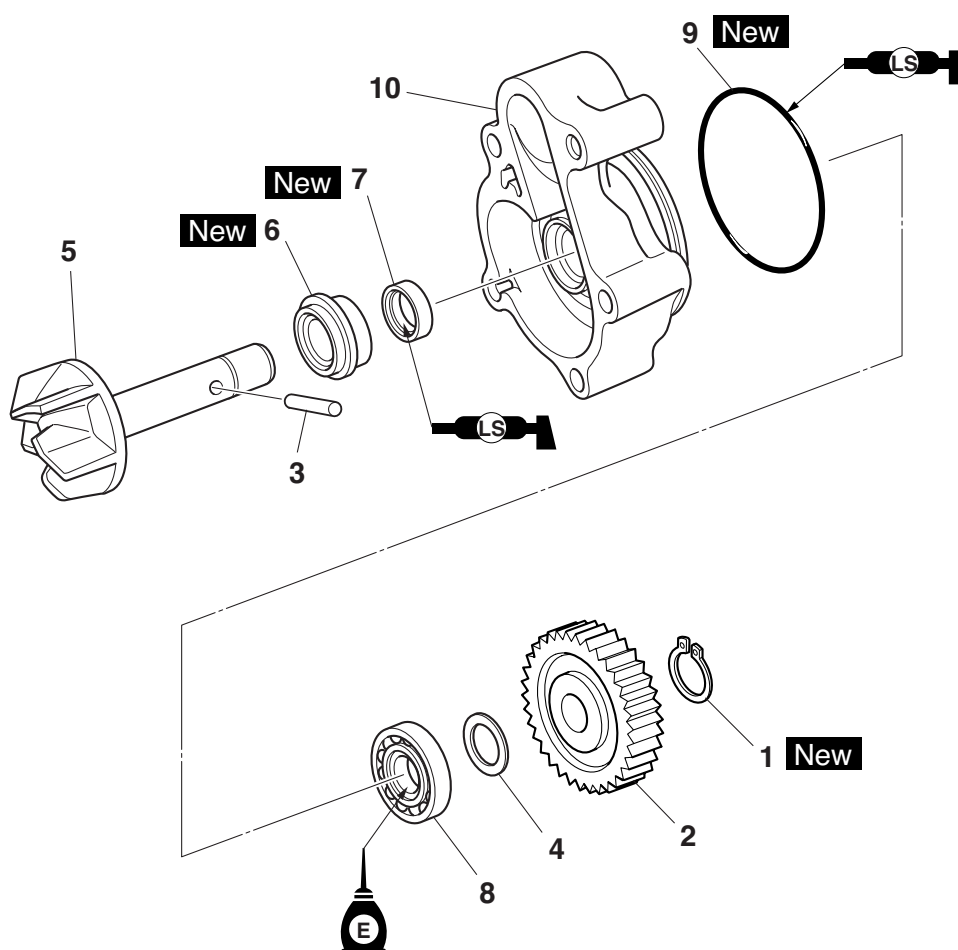
### Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
			<b>NOTE:</b> It is not necessary to remove the water pump unless the coolant level is extremely low or the coolant contains engine oil.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
1	Hose clamp	3	
2	Radiator outlet hose	1	Disconnect.
3	Water pump cover	1	
4	Gasket	1	
5	Water pump assembly	1	
6	Water pump outlet pipe	1	
7	O-ring	1	
8	Water pump outlet hose	1	
			For installation, reverse the removal procedure.

# WATER PUMP

## Disassembling the water pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Impeller shaft gear	1	
3	Pin	1	
4	Washer	1	
5	Impeller shaft assembly	1	
6	Water pump seal	1	
7	Oil seal	1	
8	Bearing	1	
9	O-ring	1	
10	Water pump housing	1	
			For assembly, reverse the disassembly procedure.

# WATER PUMP

EAS00470

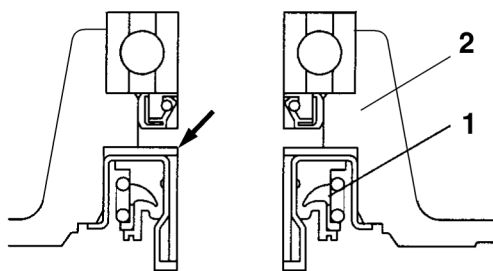
## DISASSEMBLING THE WATER PUMP

1. Remove:
  - Water pump seal "1"

### NOTE:

Tap out the water pump seal from water pump housing in the direction of the arrow shown.

2. Water pump housing

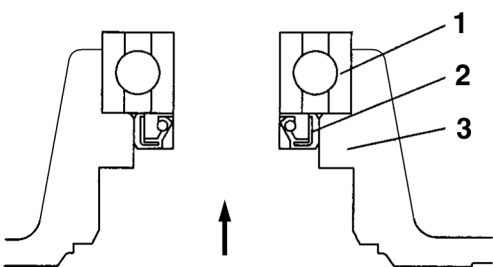


2. Remove:
  - Bearing "1"
  - Oil seal "2"

### NOTE:

Tap out the bearing and oil seal from water pump housing in the direction of the arrow shown.

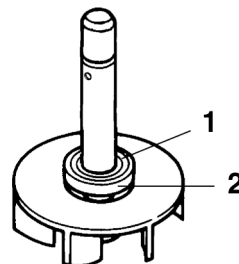
3. Water pump housing



3. Remove:
  - Rubber damper holder "1"
  - Rubber damper "2" (from the impeller, with a thin, flat-head screwdriver)

### NOTE:

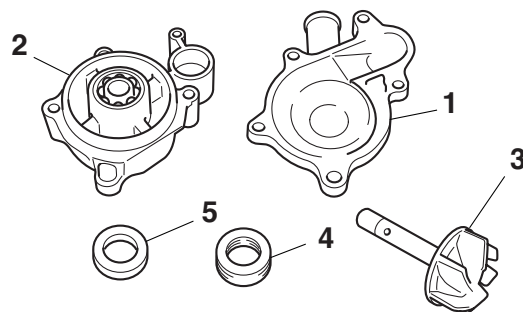
Do not scratch the impeller shaft.



EAS00474

## CHECKING THE WATER PUMP

1. Check:
  - Water pump housing cover "1"
  - Water pump housing "2"
  - Impeller "3"
  - Rubber damper "4"
  - Rubber damper holder "5"
 Cracks/damage/wear → Replace.



2. Check:
  - Water pump seal
  - Oil seal
 Cracks/damage/wear → Replace.
3. Check:
  - Bearing
 Rough movement → Replace.
4. Check:
  - Impeller shaft gear
 Pitting/wear → Replace.
5. Check:
  - Water pump outlet pipe
  - Radiator outlet hose
  - Water jacket inlet housing
 Cracks/damage/wear → Replace.

# WATER PUMP

EAS00475

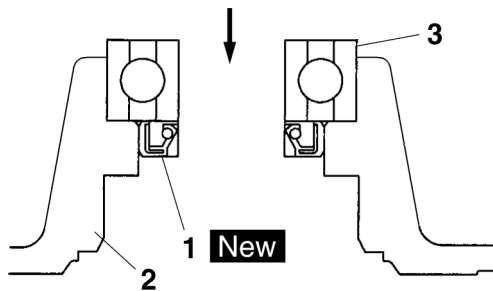
## ASSEMBLING THE WATER PUMP

### 1. Install:

- Oil seal "1" **New**  
(into the water pump housing "2")
- Bearing "3"

### NOTE:

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket that matches its outside diameter.



### 2. Install:

- Water pump seal "1" **New**

### CAUTION:

Never lubricate the water pump seal surface with oil or grease.

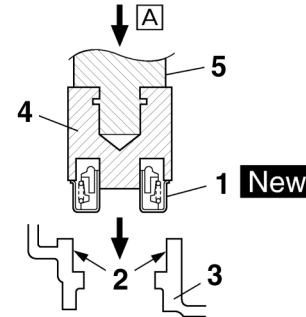
### NOTE:

- Install the water pump seal with the special tools.
- Before installing the water pump, apply Yamaha bond No.1215 "2" to the water pump housing "3".



**Mechanical seal installer "4"**  
90890-04132  
**Middle driven shaft bearing driver "5"**  
90890-04058  
**Yamaha bond No.1215**  
90890-85505

**A** Push down.

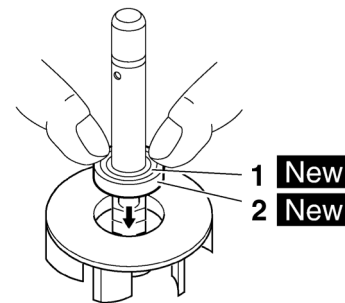


### 3. Install:

- Rubber damper "1" **New**
- Rubber damper holder "2" **New**

### NOTE:

Before installing the rubber damper, apply tap water or coolant onto its outer surface.



### 4. Measure:

- Impeller shaft tilt  
Out of specification → Repeat steps (3) and (4).

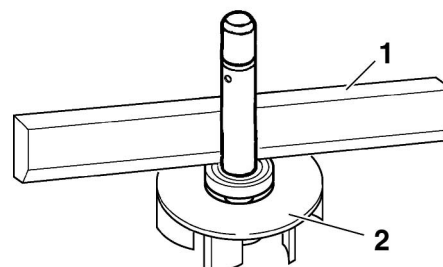
### CAUTION:

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

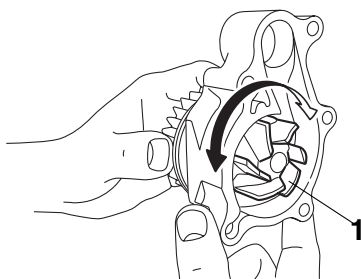


# WATER PUMP

5. Install:
- Impeller shaft assembly "1"
  - Washer
  - Pin
  - Impeller shaft gear
  - Circlip **New**

## NOTE:

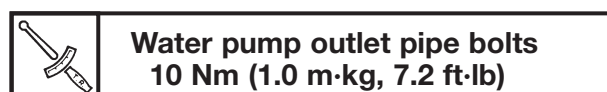
After installation, check that the impeller shaft rotates smoothly.



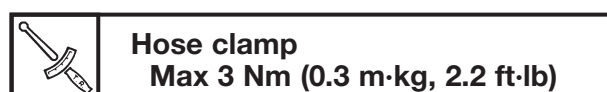
EAS00478

## INSTALLING THE WATER PUMP

1. Install:
- Water pump outlet hose "1"
  - O-rings **New**
  - Water pump outlet pipe (to the water pump assembly)

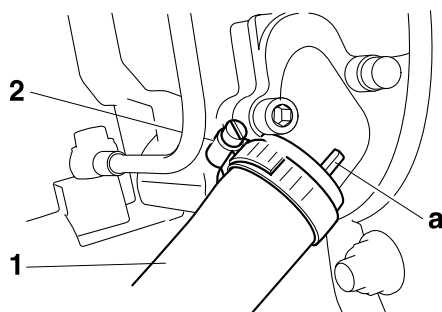


- Hose clamps "2"



## ⚠ WARNING

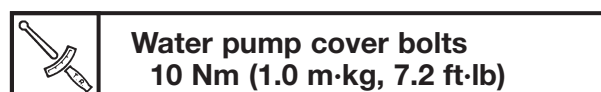
Always use new O-rings.



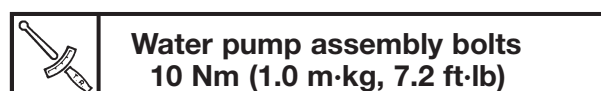
## NOTE:

- Install the water pump outlet hose so that it contacts the projection "a" on the water jacket joint.
- Before installing the water pump outlet pipe, lubricate the O-rings with a thin coat of lithium-soap-based grease.

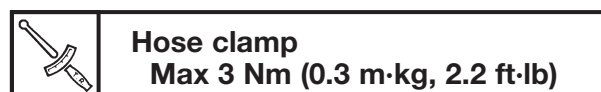
2. Install:
- Gasket **New**
  - Water pump assembly



- Water pump cover

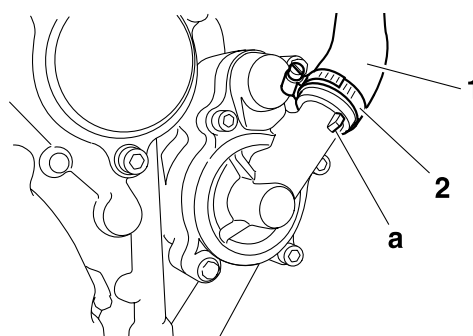


3. Install:
- Radiator outlet hose "1"
  - Hose clamp "2"



## NOTE:

Install the radiator outlet hose "1" so that it contacts the projection "a" on the water pump cover.



4. Fill:
- Cooling system (with the specified amount of the recommended coolant)  
Refer to "CHANGING THE COOLANT" on page 3-16.
5. Check:
- Cooling system  
Leaks → Repair or replace the faulty part.



6. Measure:

- Radiator cap opening pressure  
Below the specified pressure → Replace the radiator cap.  
Refer to “CHECKING THE RADIATOR” on page 6-2.

---

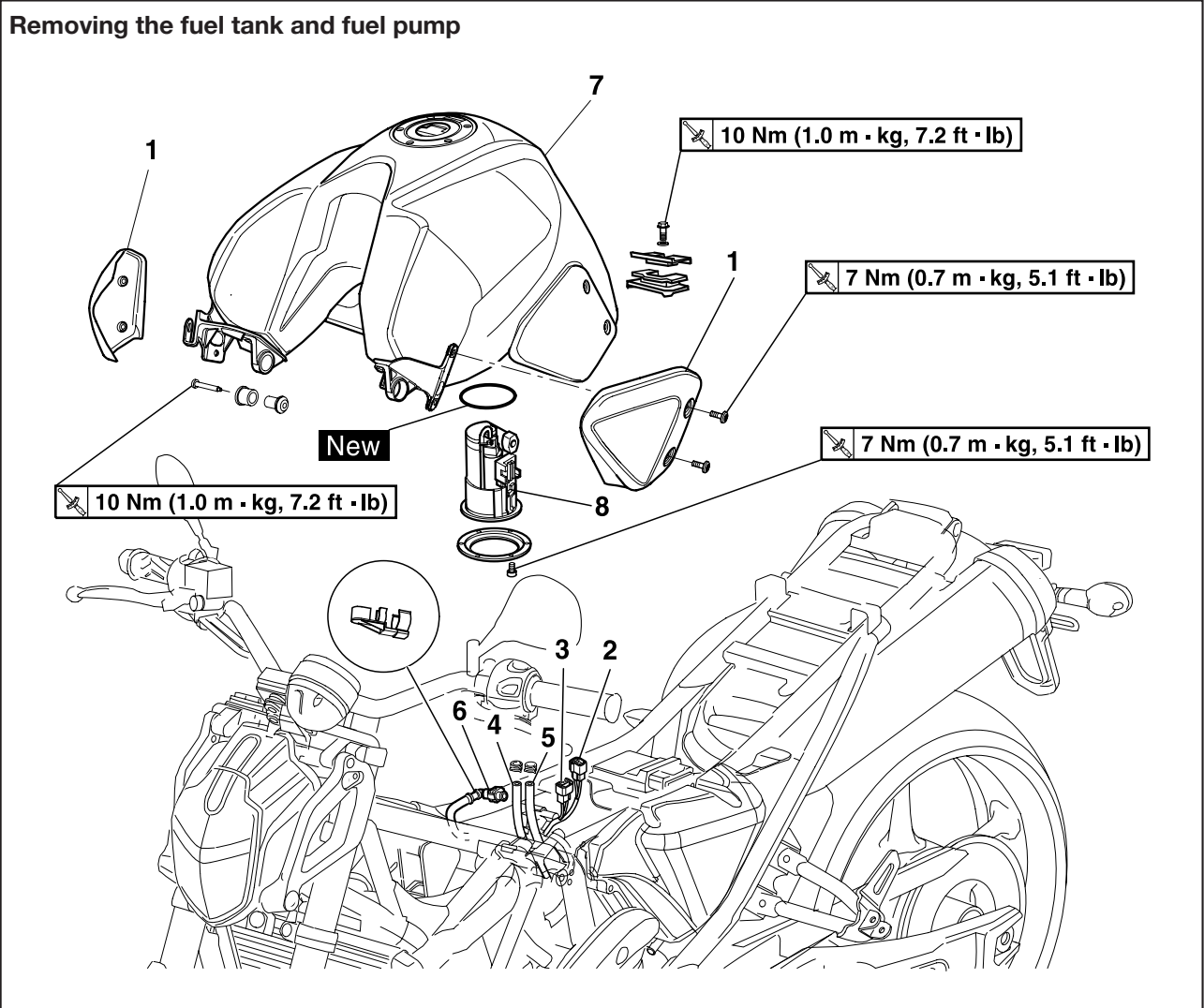
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FUEL TANK

Removing the fuel tank and fuel pump

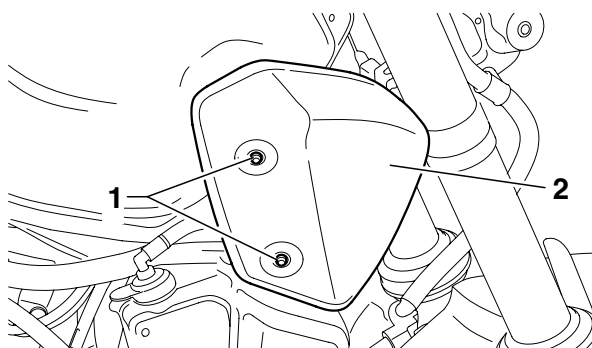


Order	Job/Parts to remove	Q'ty	Remarks
	Seats		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel tank panels (right and left)	2	
2	Fuel pump coupler	1	Disconnect.
3	Fuel sender coupler	1	Disconnect.
4	Fuel tank overflow hose	1	Disconnect.
5	Fuel tank breather hose	1	Disconnect.
6	Fuel hose	1	Disconnect.
7	Fuel tank	1	
8	Fuel pump	1	
			For installation, reverse the removal procedure.

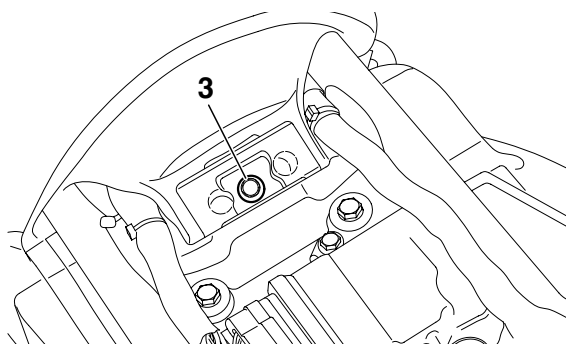
# FUEL TANK

## REMOVING THE FUEL TANK

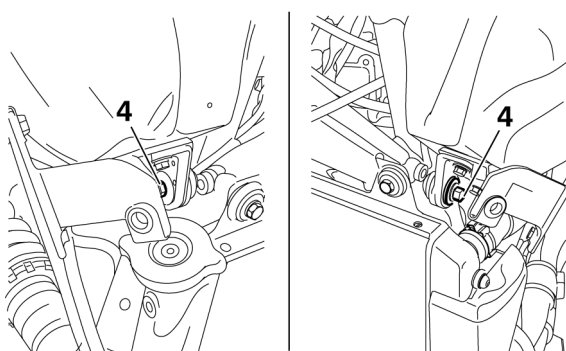
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
  - SeatsRefer to “GENERAL CHASSIS” on page 4-1.
  - Bolts “1”
  - Panels “2” (right and left)



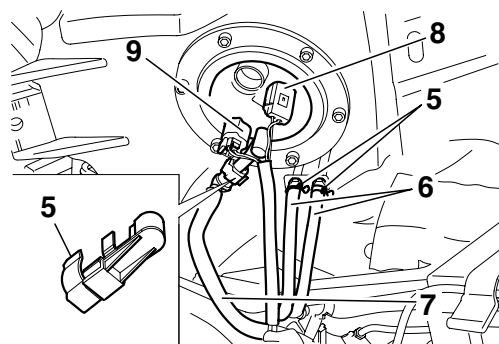
3. Remove:
  - Fuel tank rear bolt “3”



4. Remove:
  - Fuel tank front bolts “4”



5. Remove:
  - Fuel hose clamps “5”
6. Disconnect:
  - Overflow pipes “6”
  - Fuel hose “7”
  - Fuel pump coupler “8”
  - Fuel sender coupler “9”



EC5YU1029

### CAUTION:

Although the fuel has been removed from the fuel tank be careful when removing the fuel hoses, since there may be fuel remaining in them.

### NOTE:

- If Remove the fuel hose manually without using any tools.
- Before removing the hoses, place a few rags in the area under where they will be removed.

7. Remove:
  - Fuel tank

### NOTE:

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank against a wall or the like.

## REMOVING THE FUEL PUMP

1. Remove:
  - Fuel pump

### CAUTION:

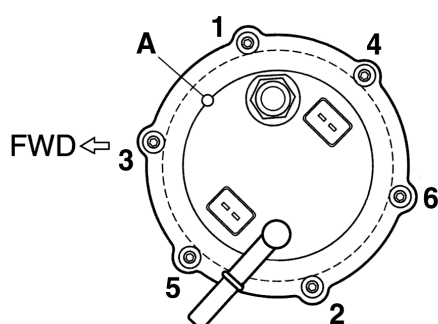
- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

## INSTALLING THE FUEL PUMP

1. Install:
  - Fuel pump

### NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Align the projection “A” on the fuel pump with the slot in the fuel pump bracket.
- Tighten the bolts to the specified torque in the proper tightening sequence as shown.
- Install the fuel pump in the direction shown in the illustration.



2. Tighten:
  - Fuel pump bolts



**Fuel pump bolt**  
7 Nm (0.7 m·kg, 5.1 ft·lb)

## INSTALLING THE FUEL HOSE

1. Install:
  - Fuel hose

### CAUTION:

**When installing the fuel hose, be sure to securely connect it.**

## CHECKING THE FUEL SENDER

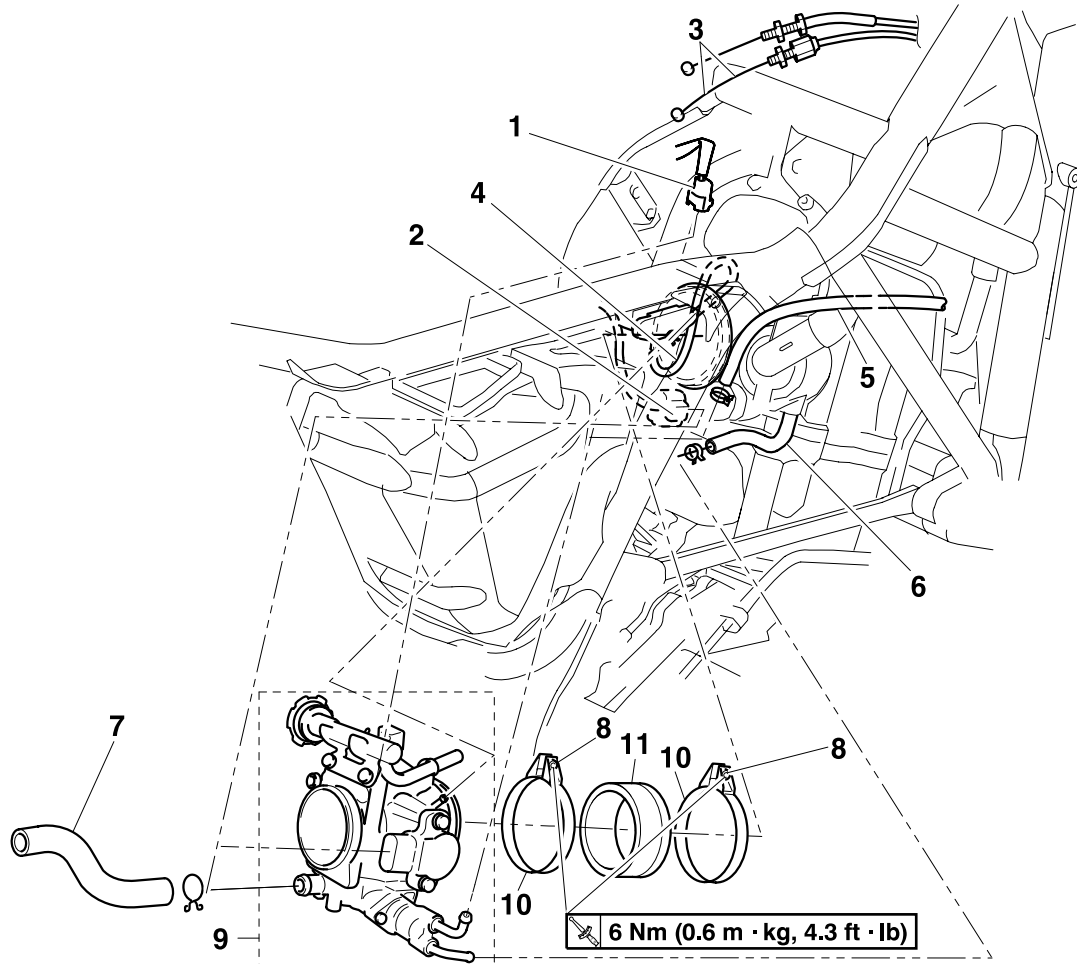
This model is equipped with a self-diagnosis device for the fuel sender circuit. If the fuel sender circuit is defective, the following cycle will be repeated until the malfunction is corrected.

- The fuel level warning light will flash four times and then go off for 3.0 seconds if the fuel sender circuit is in short circuit.
- The fuel level warning light will flash eight times and then go off for 3.0 seconds if the fuel sender circuit is interrupted or the coupler disconnected.

# THROTTLE BODY ASSEMBLY

## THROTTLE BODY ASSEMBLY

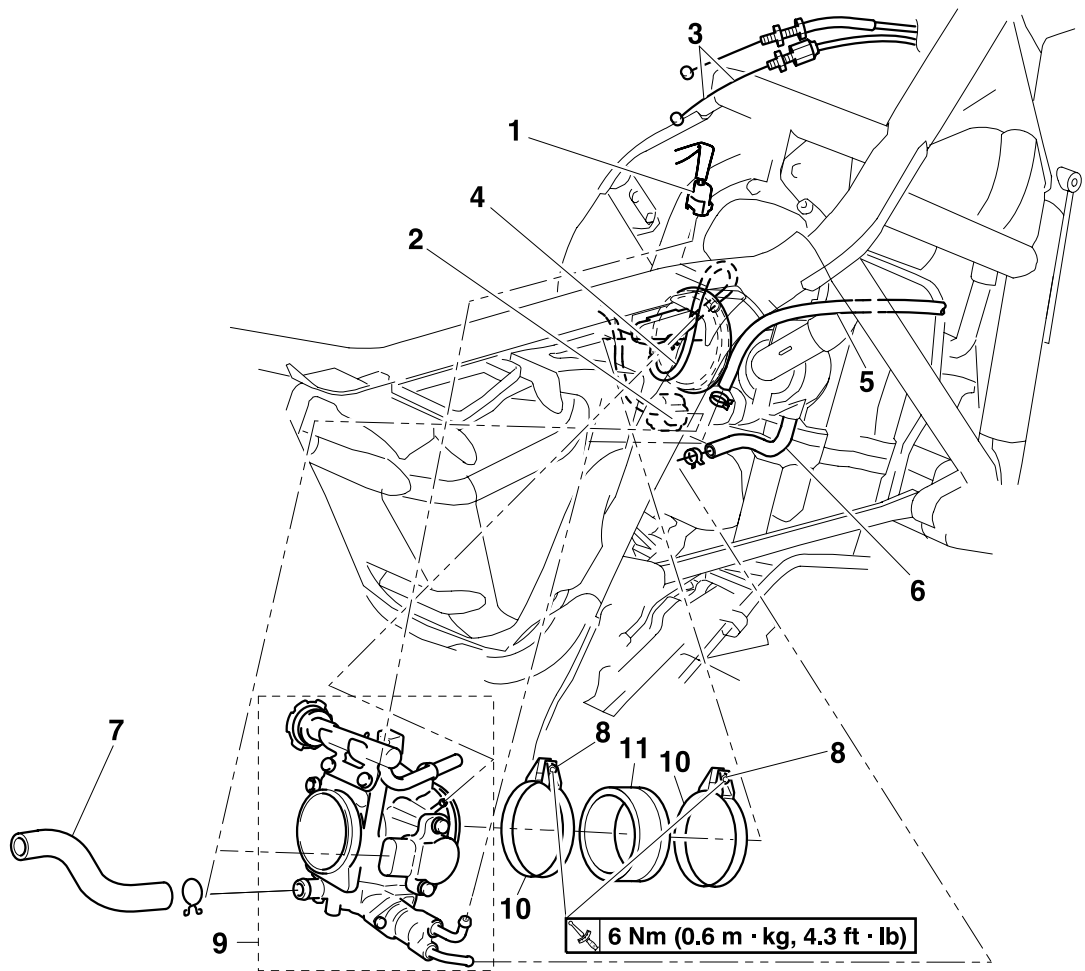
### Removing the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Seats		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 4-4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-16.
1	Fuel injector coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	Throttle cable	2	Disconnect. Refer to "INSTALLING THE THROTTLE BODY ASSEMBLY" on page 7-7.
4	Vacuum hose	1	Disconnect.
5	Fast idle plunger outlet hose	1	Disconnect.
6	Fast idle plunger inlet hose	1	
7	Pilot air hose	1	
8	Throttle body joint clamp screw	2	Loosen.

# THROTTLE BODY ASSEMBLY

## Removing the throttle body assembly

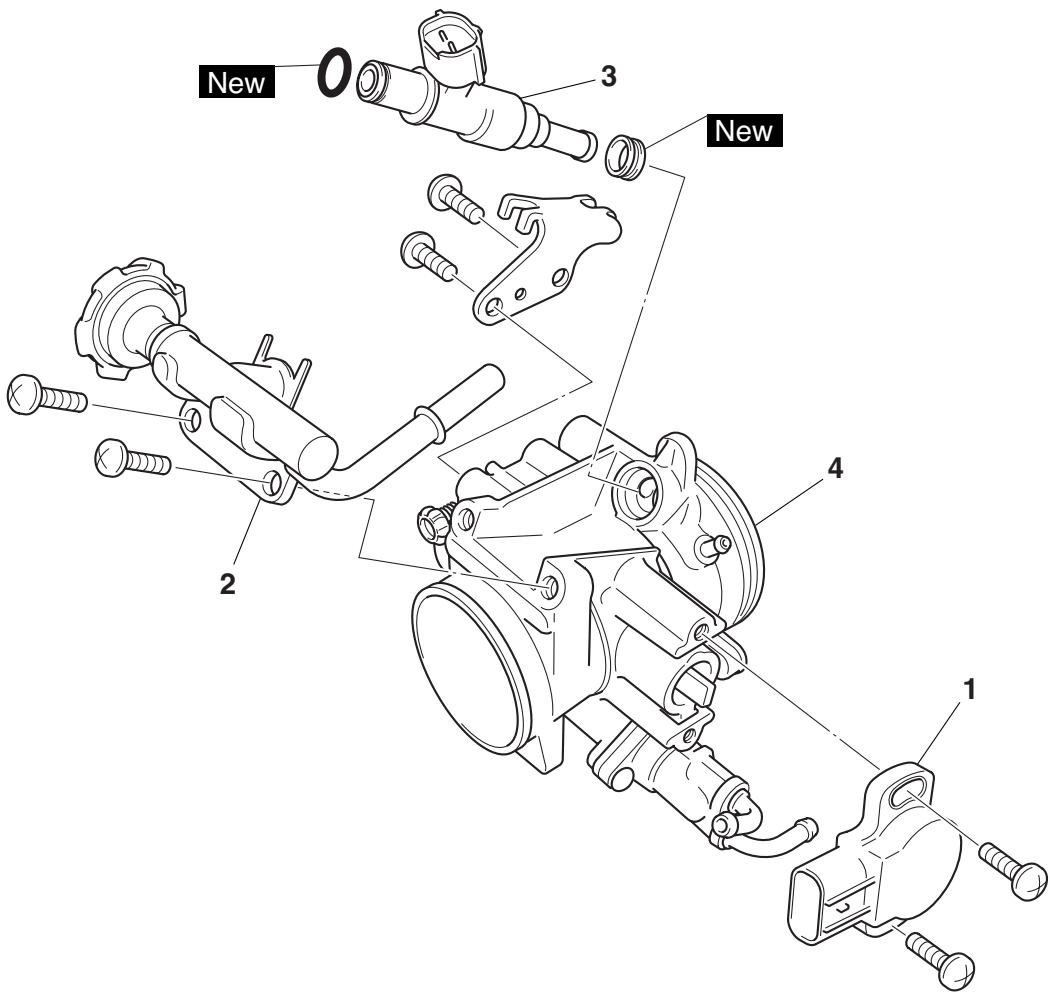


Order	Job/Parts to remove	Q'ty	Remarks
9	Throttle body assembly	1	Refer to "INSTALLING THE THROTTLE BODY ASSEMBLY" on page 7-7.
10	Throttle body joint clamp	2	
11	Throttle body joint	1	
			For installation, reverse the removal procedure.



# THROTTLE BODY ASSEMBLY

## Disassembling the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Throttle position sensor	1	
2	Fuel injection pipe	1	
3	Fuel injector	1	Refer to "AIR FILTER CASE" on page 4-4.
4	Throttle body	1	<b>CAUTION:</b> _____ <b>Do not disassemble the throttle body.</b>
			For assembly, reverse the disassembly procedure.

# THROTTLE BODY ASSEMBLY

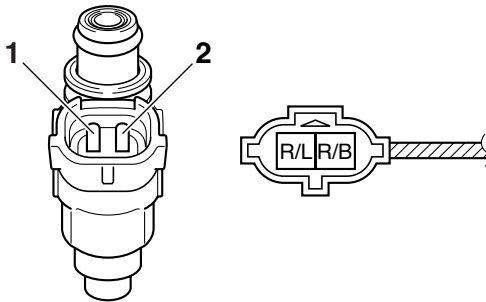
EAS00912

## CHECKING THE FUEL INJECTOR

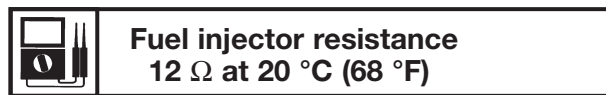
1. Check:
  - Fuel injector  
Damage → Replace.
2. Check:
  - Fuel injector resistance

- a. Disconnect the injection wire harness coupler from the fuel injector.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the fuel injector terminal as shown.

- Positive tester probe → Red/Black “1”
- Negative tester probe → Red/Blue “2”



- c. Measure the fuel injector resistance.  
Out of specification → Replace the fuel injector.



EAS00913

## CHECKING THE THROTTLE BODY

1. Check:
  - Throttle body  
Cracks/damage → Replace the throttle body.
2. Check:
  - Fuel passages  
Obstructions → Clean.

- a. Wash the throttle body in a petroleum-based solvent.

### CAUTION:

Do not use any caustic carburetor cleaning solution.

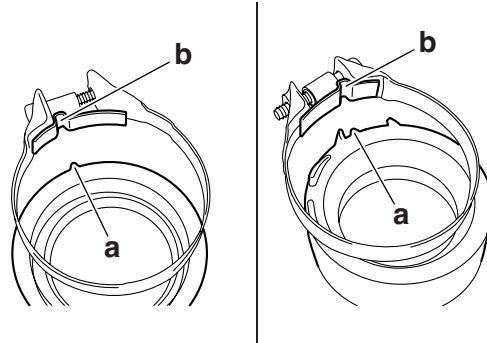
- b. Blow out all of the passages with compressed air.

## INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
  - Throttle body joint clamps

### NOTE:

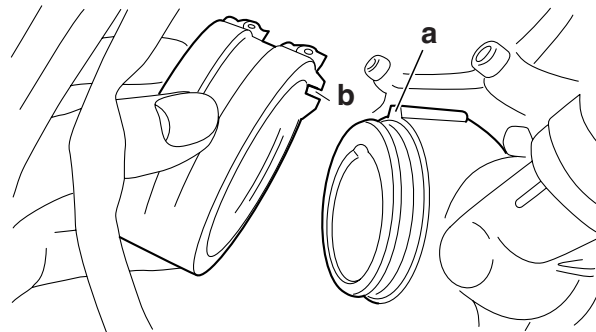
Align the projection “a” on the throttle body joint with the slot “b” in the throttle body joint clamp.



2. Install:
  - Throttle body joint

### NOTE:

Align the projection “a” on the cylinder head with the slot “b” in the throttle body joint.

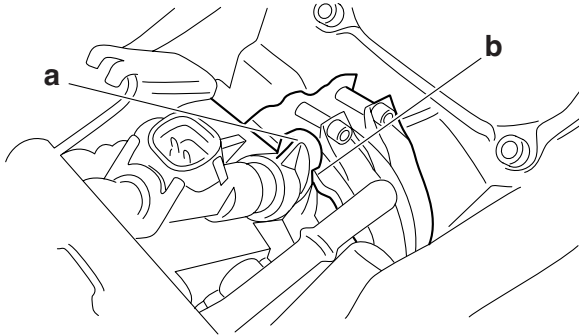


# THROTTLE BODY ASSEMBLY

3. Install:
  - Throttle body assembly

## NOTE:

Align the projection “a” on the throttle body assembly with the slot “b” throttle body joint.



4. Install:
  - Throttle cable
5. Adjust:
  - Throttle lever free play  
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-5.
6. Adjust:
  - Engine idling speed  
Refer to “ADJUSTING THE ENGINE IDLING SPEED” on page 3-5.
7. Check:
  - Throttle position sensor  
Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.

EAS00819

## CHECKING THE FUEL PUMP

### ⚠ WARNING

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:

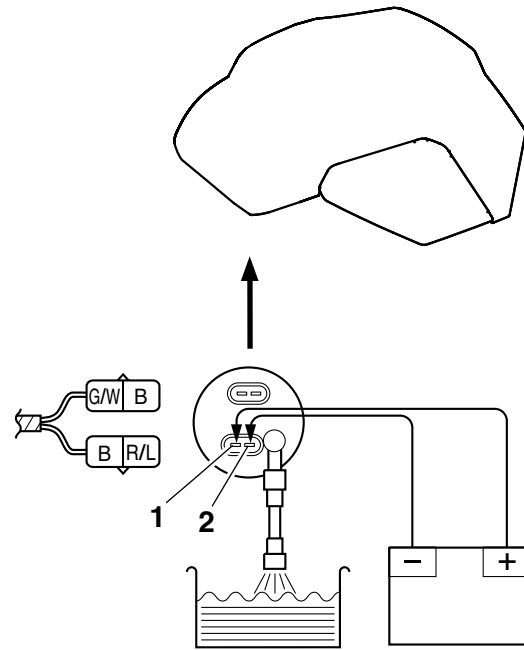
- Stop the engine before refueling.
- Do not smoke, and keep away from open flames, sparks, or any other source of fire.
- If you do accidentally spill gasoline, wipe it up immediately with dry rags.
- If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure the engine is completely cool before performing the following test.

1. Check:
  - Fuel pump operation



- a. Fill the fuel tank.
- b. Put the end of the fuel hose into an open container.
- c. Connect a battery (DC 12 V) to the fuel pump coupler as shown.

- Positive battery lead → Red/Blue “1”
- Negative battery lead → Black “2”



- d. If fuel flows out of the fuel hose, the fuel pump is OK. If fuel does not flow, replace the fuel pump.



2. Check:
  - Fuel pressure

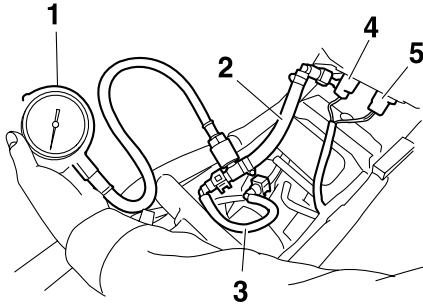


- a. Remove the fuel tank.  
Refer to “FUEL TANK” on page 7-1.
- b. Connect the pressure gauge “1” to the adapter “2”.
- c. Connect the fuel pressure adapter to the fuel pump and fuel hose “3”.

	<p><b>Pressure gauge</b> 90890-03153</p> <p><b>Fuel pressure adapter</b> 90890-03176</p>
--	--

# THROTTLE BODY ASSEMBLY

- d. Connect the fuel pump coupler “4” and fuel sender coupler “5” to the fuel pump.  
Refer to “FUEL TANK” on page 7-1.



- e. Set the main switch to “ON” and the engine stop switch to “O”.  
f. Start the engine.  
g. Measure the fuel pressure.

	<b>Fuel pressure</b> <b>324 kPa (3.24 kg/cm<sup>2</sup>, 46.1 psi)</b>
--	---

Out of specification → Replace the fuel pump.



EAS00502

## CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

### NOTE:

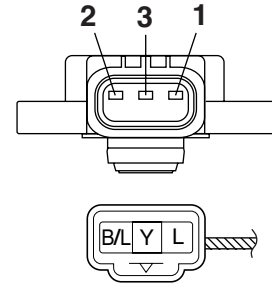
Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Check:
- Throttle position sensor (removed from the throttle body)



- a. Disconnect the throttle position sensor coupler from the throttle position sensor.  
b. Remove the throttle position sensor from the throttle body.  
c. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Positive tester probe → Terminal “1”</li> <li>• Negative tester probe → Blue Black/Blue terminal “2”</li> </ul> |
|--|



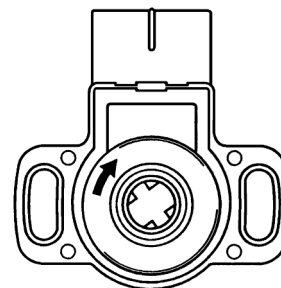
- d. Measure the maximum throttle position sensor resistance.  
Out of specification → Replace the throttle position sensor.

	<b>Maximum throttle position sensor resistance</b> <b>4.0-6.0 k<math>\Omega</math> at 20 °C (68 °F)</b> <b>(blue-black/blue)</b>
--	--

- e. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Positive tester probe → Yellow terminal “3”</li> <li>• Negative tester probe → Black/Blue terminal “2”</li> </ul> |
|--|

- f. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.  
The resistance does not change or it changes abruptly → Replace the throttle position sensor.  
The slot is worn or broken → Replace the throttle position sensor.



## THROTTLE BODY ASSEMBLY

### NOTE: \_\_\_\_\_

Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.



**Throttle position sensor  
resistance**  
0-5 ± 1.0 kΩ at 20 °C (68 °F)  
(yellow-black/blue)



### 2. Adjust:

- Throttle position sensor angle

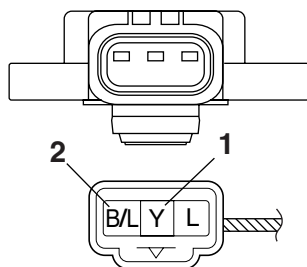


- Connecting the throttle position sensor coupler to the wire harness.
- Connect the digital circuit tester to the throttle position sensor.

- Positive tester probe → Yellow terminal "1"
- Negative tester probe → Black/Blue terminal "2"



**Digital circuit tester**  
90890-03174

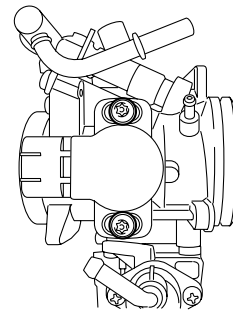


- Measure the throttle position sensor voltage.
- Adjust the throttle position sensor angle so the measured voltage is within the specified range.



**Throttle position sensor voltage**  
0.63-0.73 V  
(yellow-black/blue)

- After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.



# AIR INDUCTION SYSTEM

## AIR INDUCTION SYSTEM

EAS00507

### AIR INJECTION

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

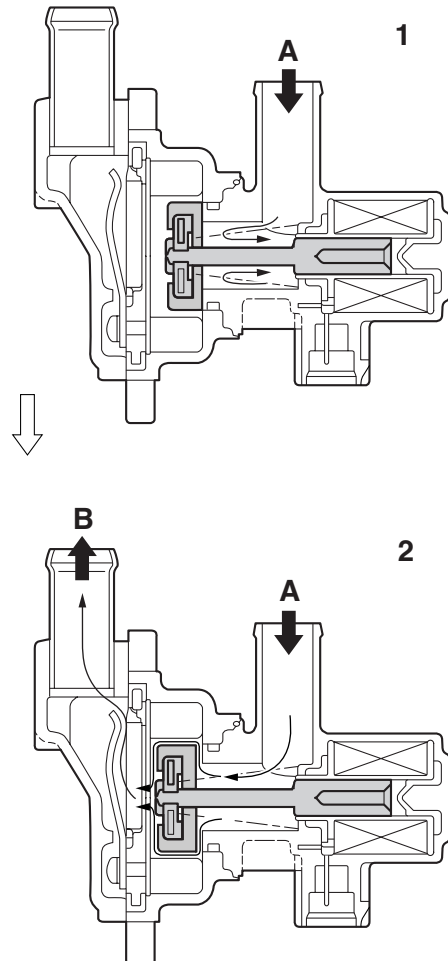
When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C (1,112 to 1,292 °F).

EAS00917

### AIR CUT-OFF VALVE

The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the vehicle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.

- A. From the air filter case
- B. To the cylinder head
- 1. The air cut-off valve is closed.
- 2. The air cut-off valve is open.

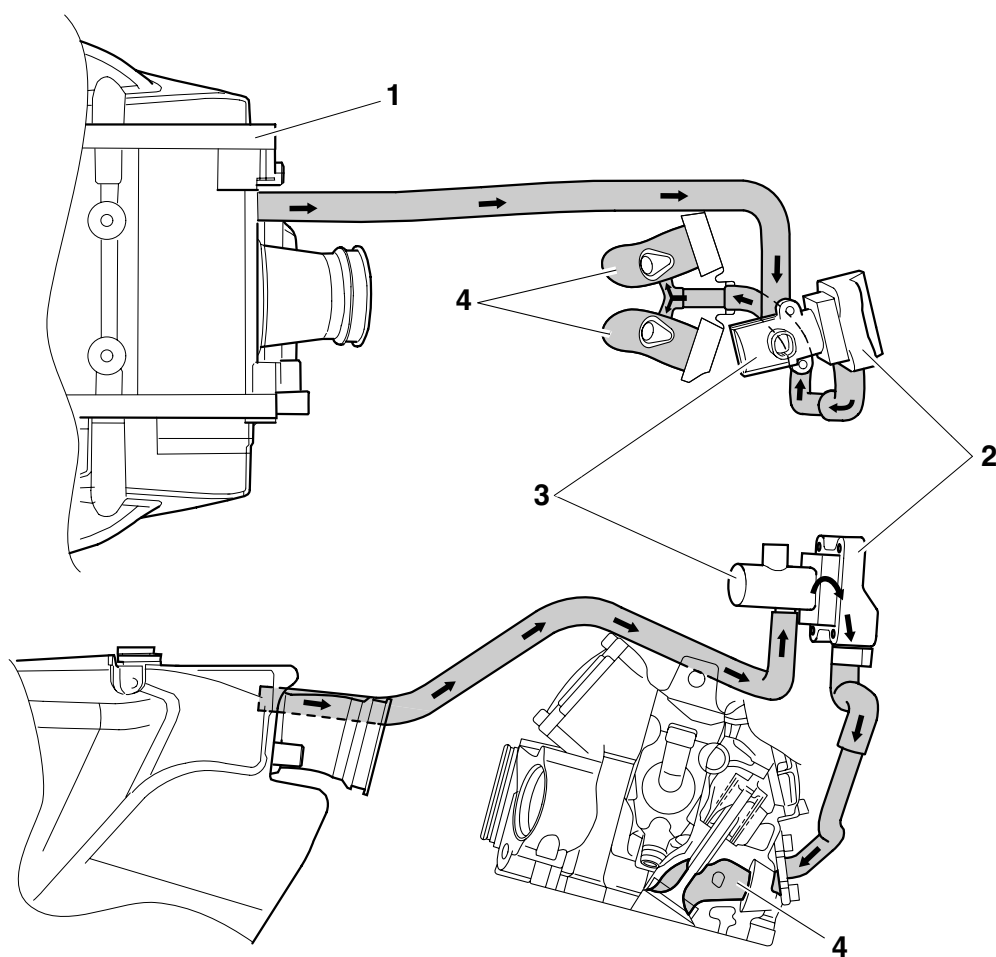


# AIR INDUCTION SYSTEM

EAS00509

## AIR INDUCTION SYSTEM DIAGRAMS

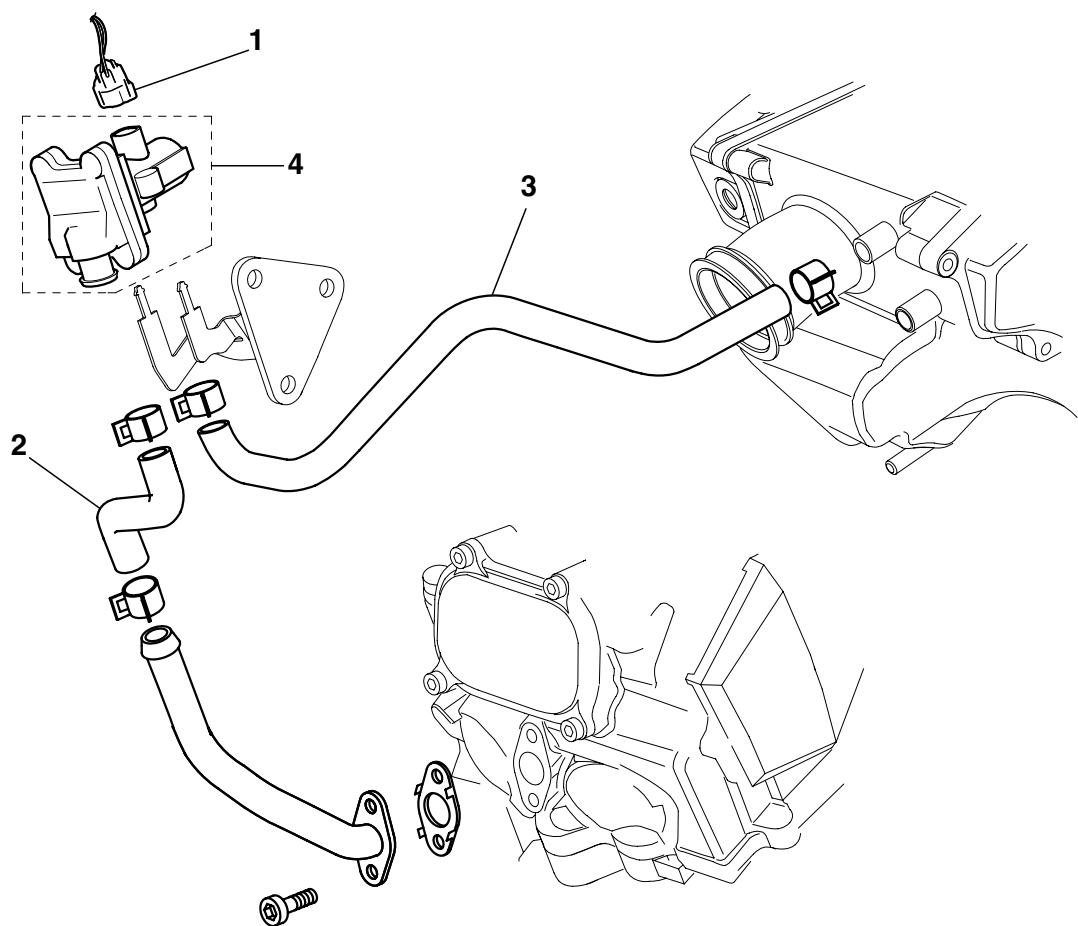
1. Air filter case
2. Reed valve
3. Air cut-off valve
4. Exhaust port



# AIR INDUCTION SYSTEM

## AIR CUT-OFF VALVE ASSEMBLY

Removing the air cut-off valve assembly

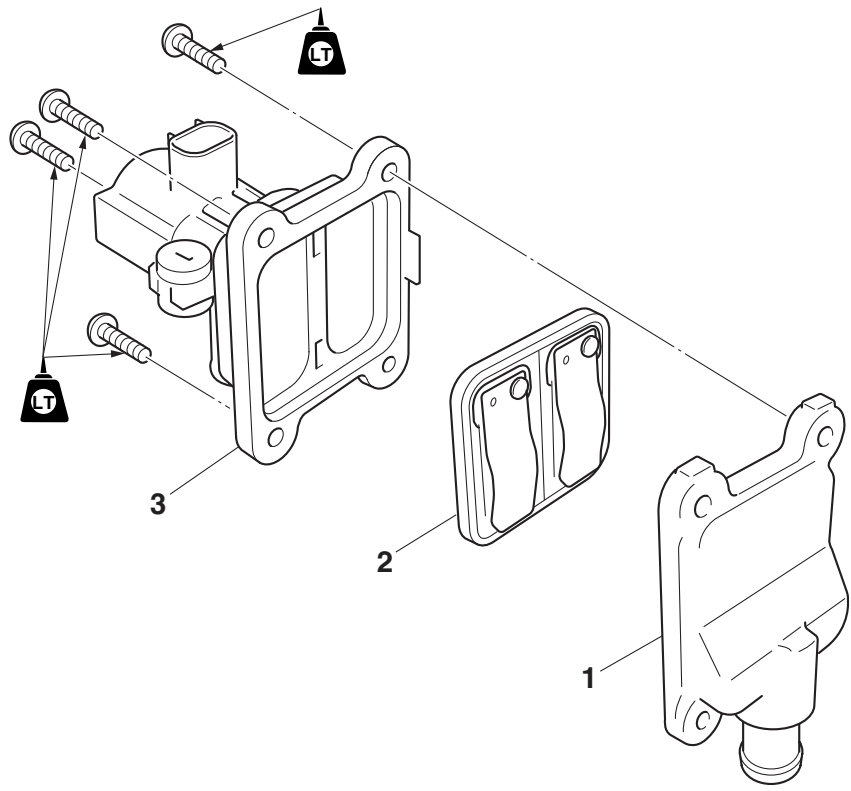


Order	Job/Parts to remove	Q'ty	Remarks
	Seats		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Air induction system solenoid coupler	1	Disconnect.
2	Air cut-off valve outlet hose	1	
3	Air-filter-to-air-cut-off-valve hose	1	
4	Air cut-off valve assembly	1	
			For installation, reverse the removal procedure.



# AIR INDUCTION SYSTEM

## Disassembling the air cut-off valve assembly

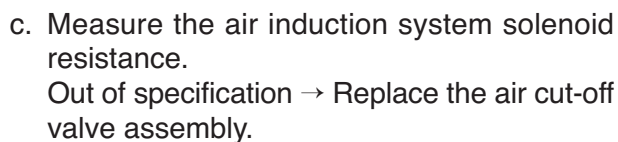


Order	Job/Parts to remove	Q'ty	Remarks
1	Air cut-off valve cover	1	
2	Reed valve assembly	1	
3	Air cut-off valve	1	
			For assembly, reverse the disassembly procedure.

1. Check:

- 

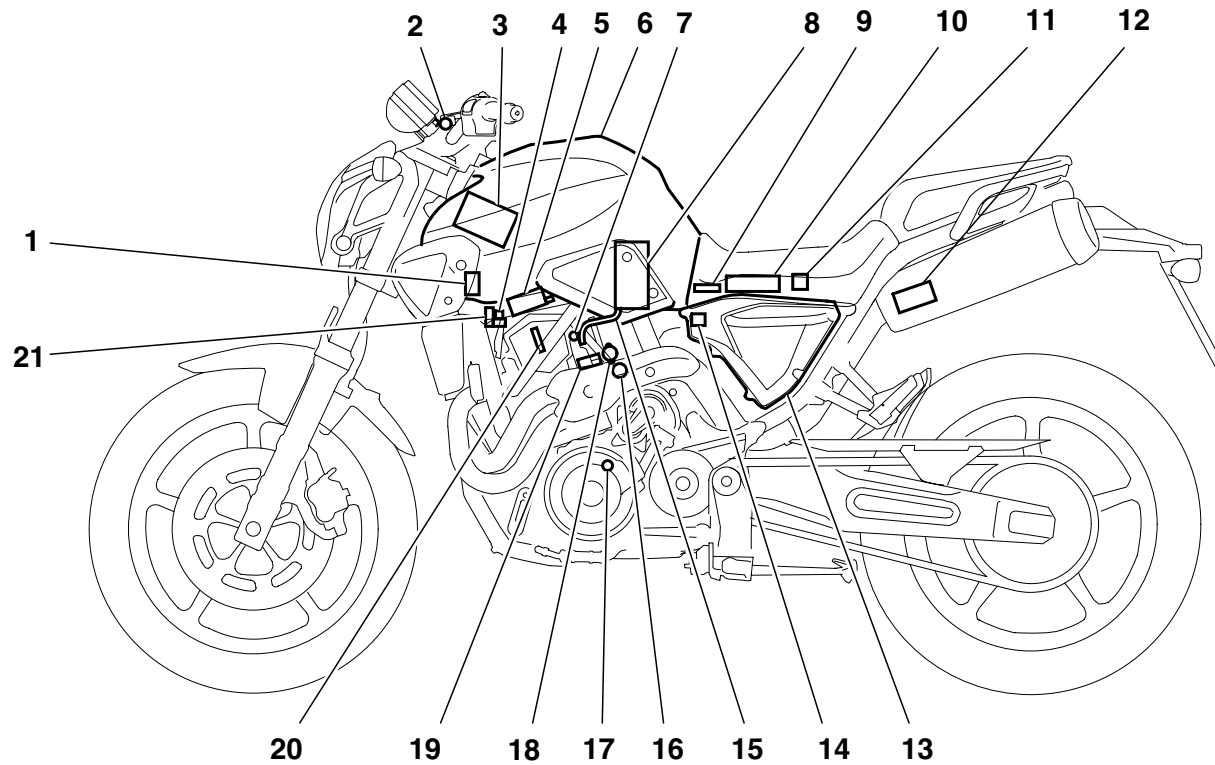
- Positive tester probe → Brown/Red “1”
- Negative tester probe → Red/White “2”



# FUEL INJECTION SYSTEM

EAS00895

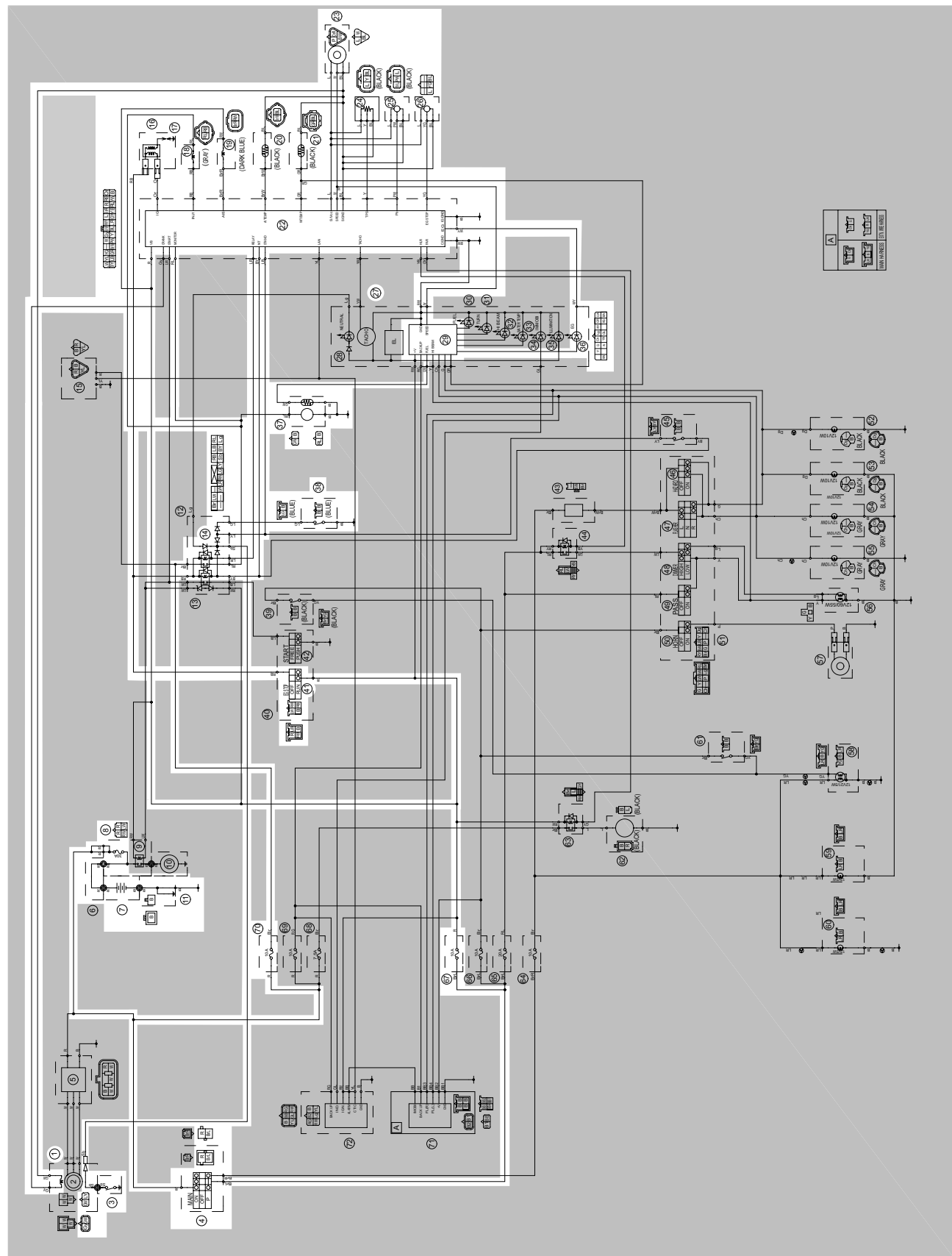
## FUEL INJECTION SYSTEM



- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1. Fuel injection system relay   | 12. Catalytic converter           |
| 2. Engine trouble warning light  | 13. Air filter case               |
| 3. Battery                       | 14. Intake air temperature sensor |
| 4. Air induction system solenoid | 15. Fuel hose                     |
| 5. Ignition coil/Spark plug      | 16. Coolant temperature sensor    |
| 6. Fuel tank                     | 17. Crankshaft position sensor    |
| 7. Idling adjustment screw       | 18. Throttle position sensor      |
| 8. Fuel pump                     | 19. Fuel injector                 |
| 9. Intake air pressure sensor    | 20. Spark plug                    |
| 10. ECU                          | 21. Air cut-off valve             |
| 11. Lean angle cut-off switch    |                                   |

# FUEL INJECTION SYSTEM

## WIRING DIAGRAM



## FUEL INJECTION SYSTEM

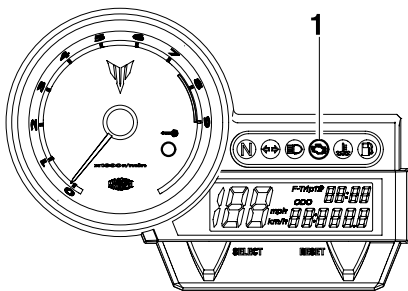
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1. Crankshaft position sensor
3. Neutral switch
4. Main switch
7. Battery
8. Main fuse
14. Fuel injection system relay
16. Ignition coil
17. Spark plug
18. Fuel injector
19. Air induction system solenoid
20. Intake air temperature sensor
21. Coolant temperature sensor
22. ECU
23. Speed sensor
24. Throttle position sensor
25. Intake air pressure sensor
26. Lean angle cut-off switch
27. Multi-function meter unit
36. Engine trouble warning light
37. Fuel pump
38. Sidestand switch
41. Engine stop switch
67. Ignition fuse
70. Fuel injection system fuse

# FUEL INJECTION SYSTEM

## ECU'S SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the engine control 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.



1. Engine trouble warning light

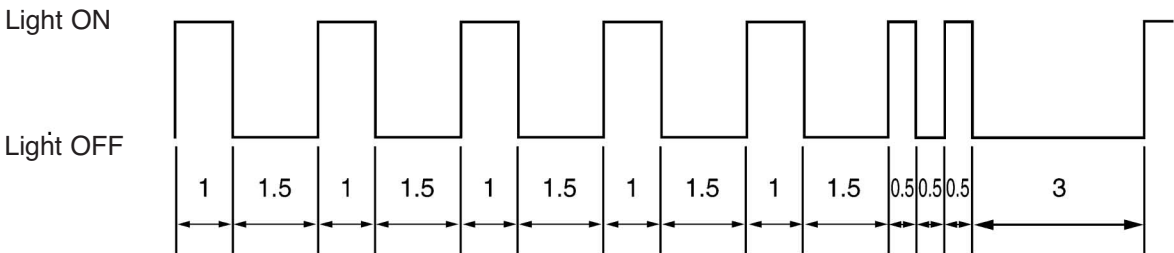
- To inform the rider that the fuel injection system is not functioning correctly, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, this mode provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number displays on the FI diagnostic tool. This fault code remains stored in the memory of the ECU until it is deleted.

## Engine trouble warning light fault code indication

Digit of 10: Cycles of 1 sec. ON and 1.5 sec. OFF.

Digit of 1: Cycles of 0.5 sec. ON and 0.5 sec. OFF.

<Example> 42



EAS00900

## Engine trouble warning light indication and FI system operating condition

Engine condition	Warning light indication	FI operation	Vehicle operation
Operates (cranking with electric starter)	Flashing	Operation stopped.	Unable
	Remains ON	Operated with substitute characteristics in accordance with the description of the malfunction.	Able
Stopped	Flashing (indicate the fault code)	—	—

# FUEL INJECTION SYSTEM

EAS27380

## SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

## FAIL-SAFE ACTION TABLE

### Self-diagnostic function

Fault code No.	Item	Symptom	Fail-safe action	Startability	Driveability
12	Crankshaft position sensor	No normal signals are received from the sensor.	—	No	No
13	Intake air pressure sensor (open or short circuit)	Open or short circuit is detected.	• Fixes the intake air pressure to 101 kPa (760 mmHg, 29.9 inHg).	Yes	Yes
14	Intake air pressure sensor	Intake air pressure sensor hose is clogged or disconnected, causing the constant application of atmospheric pressure to the sensor.	• Fixes the intake air pressure to 101 kPa (760 mmHg, 29.9 inHg).	Yes	Yes
15	Throttle position sensor (open or short circuit)	Open or short circuit is detected.	• Fixes the throttle position sensor to fully open.	Yes	Yes
16	Throttle position sensor (stuck)	The throttle position sensor is detected stuck.	• Fixes the throttle position sensor to fully open.	Yes	Yes
19	Broken or disconnected blue/black lead of the ECU	Open circuit in the input line (blue/black) of the ECU is detected.	—	No	No
21	Coolant temperature sensor	Open or short circuit is detected.	• Fixes the coolant temperature to 80 °C (176 °F).	Yes	Yes
22	Intake air temperature sensor	Open or short circuit is detected.	• Fixes the intake air temperature to 20 °C (68 °F).	Yes	Yes
30	Lean angle cut-off switch (latch up detected)	The motorcycle has overturned.	—	No	No
33	Faulty ignition	Open circuit is detected in the primary lead of the ignition coil.	—	No	No
41	Lean angle cut-off switch (open or short circuit)	Open or short circuit is detected.	—	No	No
42	Speed sensor, neutral switch	No normal signals are received from the speed sensor or an open or short circuit is detected in the neutral switch.	• Fixes the gear to the top gear.	Yes	Yes
43	Fuel system voltage (monitor voltage)	The ECU is unable to monitor the battery voltage (open circuit in the wire to the ECU).	• Fixes the battery voltage to 12 V.	Yes	Yes
44	Error in writing the amount of CO adjustment on EEPROM	An error is detected while reading or writing on EEPROM (CO adjustment value).	—	Yes	Yes

## FUEL INJECTION SYSTEM

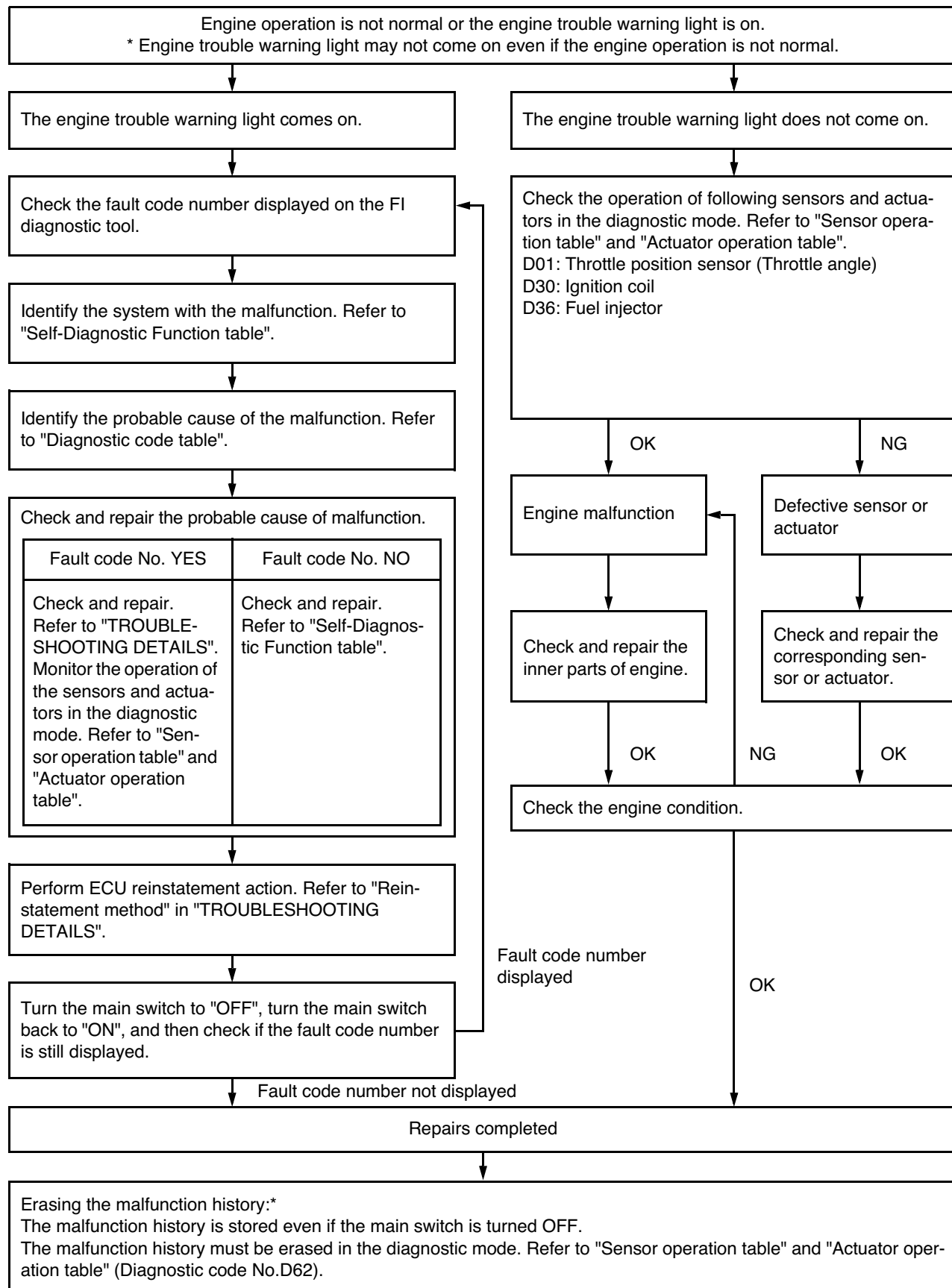
Fault code No.	Item	Symptom	Fail-safe action	Startability	Driveability
46	Vehicle system power supply (monitor voltage)	Power supply to the fuel injection system relay is not normal.	—	Yes	Yes
50	ECU internal malfunction (memory check error)	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	—	No	Yes
—	Start unable warning	Relay is not turned ON even if the crank signal is input while the start switch is turned ON. When the start switch is turned ON while an error is detected with the fault code of No. 12, 19, 33, 41 or 50.	• Engine trouble warning light flashes when the start switch is turned ON.	No	No



## FUEL INJECTION SYSTEM

EAS00904

## TROUBLESHOOTING CHART



\* Operated when the engine trouble warning light is on.

# FUEL INJECTION SYSTEM

EAS00905

## DIAGNOSTIC MODE

It is possible to monitor the sensor output data or check the activation of actuators with the FI diagnostic tool connected to the vehicle and set to the normal mode or the diagnostic monitoring mode.

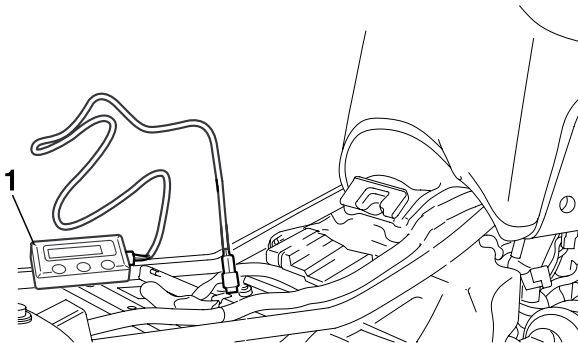


### Setting the normal mode

#### NOTE:

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.

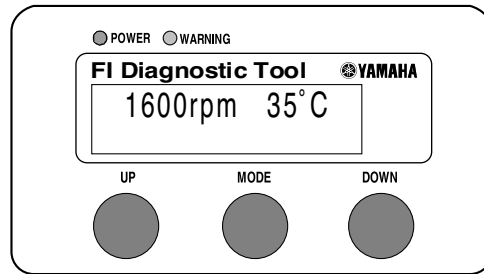
1. Turn the main switch to "OFF" and set the engine stop switch to "RUN".
2. Remove the self-diagnosis signal coupler cap, and then connect the FI diagnostic tool "1" as shown.



3. Turn the main switch to "ON" and start the engine.

#### NOTE:

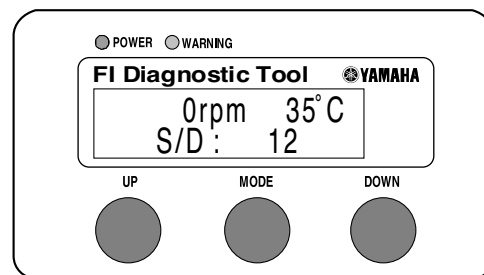
- Coolant temperature and engine revolution appear on the LCD of the FI diagnostic tool.
- "POWER" LED (Green) comes on.
- If a malfunction is detected in the system, "WARNING" LED (Orange) comes on.



4. Stop the engine.

#### NOTE:

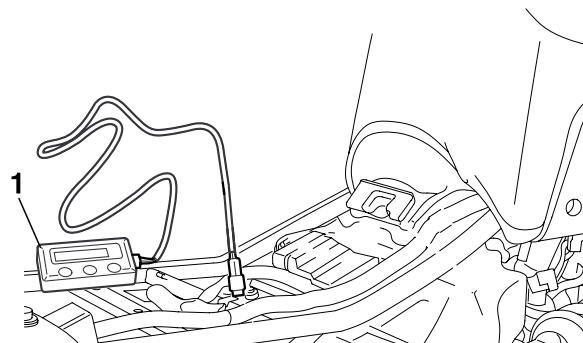
If a malfunction is detected in the system, the fault code appears on the LCD of the FI diagnostic tool. And also, "WARNING" LED (Orange) comes on.



5. Turn the main switch to "OFF" to cancel the normal mode.
6. Disconnect the FI diagnostic tool and connect the self-diagnosis signal connector.

### Setting the diagnostic mode

1. Turn the main switch to "OFF" and set the engine stop switch to "RUN".
2. Remove the self-diagnosis signal coupler cap, and then connect the FI diagnostic tool "1" as shown.



3. While press the "MODE" button, turn the main switch to "ON".

## FUEL INJECTION SYSTEM

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**NOTE:**

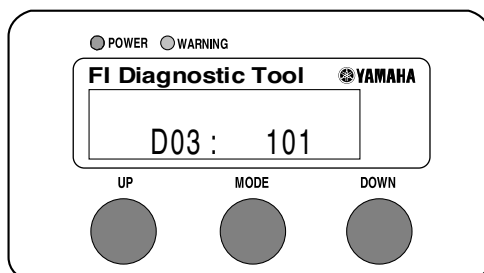
- “DIAG” appears on the LCD of the FI diagnostic tool.
  - “POWER” LED (Green) comes on.
- 

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 corresponding to the fault code number by pressing the “UP” and “DOWN” buttons.

---

**NOTE:**

- 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 appear on the LCD.
  - Actuator operation  
Set the engine stop switch to “OFF” and then to “RUN”.
8. Turn the main switch to “OFF” to cancel the diagnostic mode.
9. Disconnect the FI diagnostic tool and connect the self-diagnosis signal connector.

# FUEL INJECTION SYSTEM

EAS00906

## Diagnostic monitoring code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code
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>• Disconnected crankshaft position sensor coupler</li> <li>• Malfunction in A.C. magneto rotor</li> <li>• Malfunction in ECU</li> <li>• Improperly installed crankshaft position sensor</li> </ul>	—
13	Open or short circuit is detected in the intake air pressure sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective intake air pressure sensor</li> <li>• Disconnected intake air pressure sensor coupler</li> <li>• Malfunction in ECU</li> </ul>	D03
14	Faulty intake air pressure sensor hose system. <ul style="list-style-type: none"> <li>• detected hose</li> <li>• clogged hose</li> </ul>	<ul style="list-style-type: none"> <li>• Disconnected, clogged, kinked, or pinched intake air pressure sensor hose</li> <li>• Defective intake air pressure sensor</li> <li>• Malfunction in ECU</li> </ul>	D03
15	Open or short circuit is detected in the throttle position sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective throttle position sensor</li> <li>• Disconnected throttle position sensor coupler</li> <li>• Malfunction in ECU</li> <li>• Improperly installed throttle position sensor</li> </ul>	D01
16	Stuck throttle position sensor is detected.	<ul style="list-style-type: none"> <li>• Stuck throttle position sensor</li> <li>• Improperly installed throttle position sensor</li> <li>• Malfunction in ECU</li> </ul>	D01
19	Open circuit in the input line (blue/black lead) of ECU is detected when the start switch is pushed.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness (ECU coupler)</li> <li>• Malfunction in ECU</li> </ul>	D20
21	Open or short circuit is detected in the coolant temperature sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective coolant temperature sensor</li> <li>• Disconnected coolant temperature sensor coupler</li> <li>• Malfunction in ECU</li> <li>• Improperly installed coolant temperature sensor</li> </ul>	D06
22	Open or short circuit is detected in the intake air temperature sensor.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective intake air temperature sensor</li> <li>• Disconnected intake air temperature sensor coupler</li> <li>• Malfunction in ECU</li> <li>• Improperly installed intake air temperature sensor</li> </ul>	D05
30	The motorcycle has overturned.	<ul style="list-style-type: none"> <li>• Overturned motorcycle</li> <li>• Malfunction in ECU</li> </ul>	D08
33	Open circuit is detected in the primary lead of the ignition coil.	<ul style="list-style-type: none"> <li>• Open circuit in wire harness</li> <li>• Malfunction in ignition coil</li> <li>• Malfunction in ECU</li> <li>• Malfunction in a component of ignition cut-off circuit system</li> </ul>	D30
41	Open or short circuit is detected in the lean angle cut-off switch.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective lean angle cut-off switch</li> <li>• Disconnected lean angle cut-off switch coupler</li> <li>• Malfunction in ECU</li> </ul>	D08
42	No normal signals are received from the speed sensor or an open or short circuit is detected in the neutral switch.	<ul style="list-style-type: none"> <li>• Open or short circuit in wire harness</li> <li>• Defective speed sensor</li> <li>• Disconnected speed sensor coupler</li> <li>• Malfunction in vehicle speed sensor detected unit</li> <li>• Defective neutral switch</li> <li>• Disconnected neutral switch connector</li> <li>• Malfunction in the engine side of the neutral switch</li> <li>• Malfunction in ECU</li> </ul>	D07 D21
43	Power supply to the injector and fuel pump is not normal. (The ECU is unable to monitor the battery voltage.)	<ul style="list-style-type: none"> <li>• Open circuit in wire harness</li> <li>• Malfunction in ECU</li> <li>• Defective fuel injection system relay</li> </ul>	D09, D50

## FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code
44	An error is detected while reading or writing on EEPROM.	• Malfunction in ECU (The CO adjustment value is not properly written on or read from the internal memory.)	D60
46	Power supply to the fuel injection system relay is not normal.	• Open circuit in wire harness • Malfunction in rectifier/regulator • Malfunction in A.C. magneto rotor Refer to "CHARGING SYSTEM" on page 8-11.	D09
50	Faulty ECU memory. When this malfunction is detected, the code number might not appear on the meter.	• Malfunction in ECU (The program and data are not properly written on or read from the internal memory.)	—

EAS00907

### Diagnostic mode table

Switch the meter display from the regular mode to the diagnostic mode. To switch the display, refer to "DIAGNOSTIC MODE".

#### NOTE:

- Check the intake air temperature and coolant temperature as close as possible to the intake air temperature sensor and the coolant temperature sensor respectively.
- If it is not possible to check the intake air temperature, use the ambient temperature as reference.

Diagnostic code	Item	Action	Data displayed on the FI diagnostic tool (reference value)
D01	Throttle angle	Displays the throttle angle. • Check with throttle fully closed. • Check with throttle fully open.	0 ~ 125 degrees • Fully closed (15 ~ 17 degrees) • Fully open (97 ~ 100 degrees)
D03	Intake air pressure	Displays the intake air pressure. Set the engine stop switch to "○". • Generate the pressure difference by cranking the engine with the start switch, but do not start the engine.	When the engine is stopped: Atmospheric pressure 101.3 kPa (760 mmHg, 30 inHg) When cranking the engine with start switch: 1.3 ~ 26.6 kPa (10 ~ 200 mmHg, 0.4 ~ 7.9 inHg)
D05	Intake air temperature	Displays the intake air temperature. • Check the temperature in the air filter case.	Compare the temperature in the air filter case to the value displayed on the diagnostic tool.
D06	Coolant temperature	Displays the coolant temperature. • Check the coolant temperature.	Compare the coolant temperature to the value displayed on the diagnostic tool.
D07	Vehicle speed pulse	Displays the accumulation of the vehicle speed pulses that are generated when the tire is spun.	(0 ~ 199; resets to 0 after 199) OK if the numbers appear on the diagnostic tool.

# FUEL INJECTION SYSTEM

Diagnostic code	Item	Action	Data displayed on the FI diagnostic tool (reference value)
D08	Lean angle cut-off switch	Displays the lean angle cut-off switch values.	Upright: 0.4 ~ 1.4 V Overturned: 3.7 ~ 4.4 V
D09	Fuel system voltage (battery voltage)	Displays the fuel system voltage (battery voltage). Set the engine stop switch to "○".	Approximately 12.0 V
D20	Sidestand switch	Displays that the switch is on or off. (When the gear is in a position other than neutral.)	Stand retracted: On Stand extended: Off
D21	Neutral switch	Displays that the switch is on or off.	Neutral: On In gear: Off
D30	Ignition coil	The engine stop switch is set to "○", the ignition coil operates 5 times every second and the engine trouble warning light comes on. • Connect an ignition checker to the spark plug cap. • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that sparks are generated 5 times with the engine stop switch is set to "○".
D36	Fuel injector	The engine stop switch is set to "○", the fuel injector operates 5 times every second and the engine trouble warning light comes on. • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that the operating sound of the fuel injector is generated 5 times when the engine stop switch is set to "○".
D48	Air induction system	The engine stop switch is set to "○", the air induction system solenoid operates 5 times every second and the engine trouble warning light comes on. • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that the operating sound of the air induction system solenoid is generated 5 times when the engine stop switch is set to "○".
D50	Fuel injection system relay	The engine stop switch is set to "○", the fuel injection system relay operates 5 times every second and the engine trouble warning light comes on (on when relay is operating, off when relay is not operating). • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that the operating sound of the fuel injection system relay is generated 5 times when the engine stop switch is set to "○".
D51	Radiator fan motor relay	The engine stop switch is set to "○", the radiator fan motor relay operates 5 times, 5 seconds each time (2 seconds on, 3 seconds off), and the engine trouble warning light comes on. • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that the operating sound of the radiator fan motor relay is generated and that the radiator fan motor is operated 5 times when the engine stop switch is set to "○".
D52	Headlight relay 1	The engine stop switch is set to "○", the headlight relay operates 5 times, 5 seconds each time (2 seconds on, 3 seconds off), and the engine trouble warning light comes on. • If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	Check that the operating sound of the headlight relay is generated and that the headlight comes on 5 times when the engine stop switch is set to "○".
D60	E2PROM fault code display	• Transmits the abnormal portion of the data in the E2PROM that has been detected as fault code 44.	01 "00" is displayed when there is no malfunction.
D61	Malfunction history code display	• Displays the codes of the history of the self-diagnosis malfunctions (i.e., a code of a malfunction that occurred once and which has been corrected). • If multiple malfunctions have been detected, different codes are displayed at 2-second intervals, and this process is repeated.	12 ~ 61 "00" is displayed when there is no malfunction.
D62	Malfunction history code erasure	• Displays the total number of codes that are being detected through self diagnosis and the fault codes in the past history. • Erases only the history codes when the engine stop switch is set to "○". If the engine stop switch is set to "○", set it to "⊗", and then set it to "○" again.	00 ~ 17 "00" is displayed when there is no malfunction.
D70	Control number	• Displays the program control number.	00 ~ 255

# FUEL INJECTION SYSTEM

## TROUBLESHOOTING DETAILS

This section describes the countermeasures 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.:

Fault code number displayed on the FI diagnostic tool when the engine failed to work normally.

Refer to "Diagnostic code table".

Diagnostic code No.:

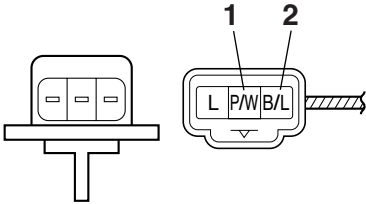

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE".

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.	
Used diagnostic code No. --				
Order	Item/components	Check or maintenance job	Restore method	
1	Crankshaft position sensor installation	Check the sensor for looseness or pinching.	Reinstated by cranking the engine.	
2	Coupler connections Crankshaft position sensor coupler ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.		
3	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Gray - Gray Green/White - Black/Blue		
4	Defective crankshaft position sensor	Replace the sensor if it is defective. Refer to "IGNITION SYSTEM" on page 8-1.		

## Communication error with the FI diagnostic tool

LCD Display	Symptom	Probable cause of malfunction
Waiting for connection....	No signals are received from the ECU.	<ul style="list-style-type: none"> <li>• Improper connection in connecting lead.</li> <li>• The main switch is OFF position.</li> <li>• Malfunction in FI diagnostic tool.</li> <li>• Malfunction in ECU.</li> </ul>
ERROR 4	Commands from the FI diagnostic tool are not accepted by the ECU.	<ul style="list-style-type: none"> <li>• Turn the main switch to "OFF" once, and then set the FI diagnostic tool to CO adjustment mode or diagnostic mode.</li> <li>• Vehicle battery is insufficiently charged.</li> <li>• Malfunction in FI diagnostic tool.</li> <li>• Malfunction in ECU.</li> </ul>

# FUEL INJECTION SYSTEM

Fault code No. 13    Symptom    Open or short circuit is detected from the intake air pressure sensor.			
Used diagnostic code No. 03 (intake air pressure sensor)			
Order	Item/components	Check or maintenance job	Restore method
1	Coupler connections Intake air pressure sensor coupler ECU coupler Sub-wire harness coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated by cranking the engine.
2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Black/Blue - Black/Blue Pink/White - Pink/White Blue - Blue	
3	Defective intake air pressure sensor	<p>Execute the diagnostic mode. (Code No. 03) Replace the sensor if it is defective.</p> <p>1. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler (wire harness end) as shown.</p> <div><ul style="list-style-type: none"><li>• Positive tester probe → Pink/White “1”</li><li>• Negative tester probe → Black/Blue “2”</li></ul></div> <div></div> <p>2. Set the main switch to “ON”.</p> <p>3. Measure the intake air pressure sensor output voltage.</p> <div><div><b>Intake air pressure sensor output voltage</b> 3.4 ~ 3.8 V</div></div> <p>4. Is the intake air pressure sensor OK?</p>	



# FUEL INJECTION SYSTEM

Fault code No. 14 Symptom Intake air pressure sensor hose is disconnected or clogged.			
Used diagnostic code No. 03 (intake air pressure sensor)			
Order	Item/components	Check or maintenance job	Restore method
1	Disconnected, clogged, kinked, or pinched intake air pressure sensor hose  Intake air pressure sensor malfunction at intermediate electrical potential	Repair or replace the hose.  Check and repair the connection.  Replace the sensor if there is a malfunction.	Reinstated by starting the engine and operating it at idle.
2	Coupler connections Intake air pressure sensor coupler ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	
3	Defective intake air pressure sensor	Execute the diagnostic mode. (Code No. 03) Replace the sensor if it is defective. Refer to "Fault code No. 13".	

Fault code No.		15	Symptom	Open or short circuit is detected from the throttle position sensor.	
Used diagnostic code No. 01 (throttle position sensor)					
Order	Item/components		Check or maintenance job		Restore method
1	Throttle position sensor installation		Check the sensor for looseness or pinching. Check that the sensor is installed in the specified position.		Reinstated by setting the main switch to "ON".
2	Coupler connections Throttle position sensor coupler ECU coupler		Check the connections of the couplers. Check that the couplers are securely locked. If necessary, repair the coupler or securely connect it.		
3	Open or short circuit in the wire harness		Repair or replace if there is an open or short circuit between the wire harnesses. Black/Blue - Black/Blue Yellow - Yellow Blue - Blue		
4	Check the throttle position sensor lead open circuit output voltage.		Check for an open circuit and replace the throttle position sensor, if necessary. Black/Blue - Yellow		
			Open circuit item	Output voltage	
			Ground wire open circuit	5 V	
			Output wire open circuit	0 V	
			Power supply wire open circuit	0 V	
5	Defective throttle position sensor		Execute the diagnostic mode. (Code No. 01) Replace the sensor if it is defective. Refer to "THROTTLE BODY ASSEMBLY".		

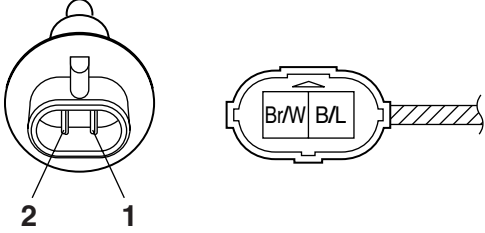

## FUEL INJECTION SYSTEM

Fault code No.	16	Symptom	The throttle position sensor is detected stuck.
Used diagnostic code No. 01 (throttle position sensor)			
Order	Item/components	Check or maintenance job	Restore method
1	Defective throttle position sensor	Replace the sensor if it is defective. Refer to "THROTTLE BODY ASSEMBLY".	Reinstated by starting the engine, operating it at idle, and then racing it.
2	Throttle position sensor installation	Execute the diagnostic mode. (Code No. 01) Check the sensor for looseness or pinching. Check that the sensor is installed in the specified position. Refer to "THROTTLE BODY ASSEMBLY".	

Fault code No.	19	Symptom	Open circuit is detected in the input wire from the sidestand switch to the ECU.
Used diagnostic code No. 20 (sidestand switch)			
Order	Item/components	Check or maintenance job	Restore method
1	Coupler connections ECU coupler Blue/Black connector	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	If the transmission is in gear, it is reinstated by retracting the sidestand. If the transmission is in neutral, it is reinstated by reconnecting the wiring.
2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the ECU and sidestand switch. Blue/Black	
3	Defective sidestand switch	Execute the diagnostic mode. (Code No. 20) Replace the switch if it is defective. Refer to "CHECKING THE SWITCHES" on page 8-43.	

Fault code No.	21	Symptom	Open or short circuit is detected from the coolant temperature sensor.
Used diagnostic code No. 06 (coolant temperature sensor)			
Order	Item/components	Check or maintenance job	Restore method
1	Coolant temperature sensor installation	Check the sensor for looseness or pinching.	Reinstated by setting the main switch to "ON".
2	Coupler connections Coolant temperature sensor coupler ECU coupler	Check the coupler for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	
3	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Black/Blue - Black/Blue Green/Red - Green/Red	
4	Defective coolant temperature sensor	Execute the diagnostic mode. (Code No. 06) Replace the sensor if it is defective. Refer to "COOLING SYSTEM" on page 8-25.	

# FUEL INJECTION SYSTEM

Fault code No. 22 Symptom Open or short circuit is detected from the intake air temperature sensor.			
Used diagnostic code No. 05 (intake air temperature sensor)			
Order	Item/components	Check or maintenance job	Restore method
1	Intake air temperature sensor installation	Check the sensor looseness or pinching.	Reinstated by setting the main switch to "ON".
2	Coupler connections Intake air temperature sensor coupler ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	
3	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Black/Blue - Black/Blue Brown/White - Brown/White	
4	Defective intake air temperature sensor	<p>Execute the diagnostic mode. (Code No. 05) Replace the sensor if it is defective.</p> <ol style="list-style-type: none"> <li>1. Remove the intake air temperature sensor from the air filter case.</li> <li>2. Connect the pocket tester (<math>\Omega \times 100</math>) to the intake air temperature sensor terminal as shown.</li> </ol> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <ul style="list-style-type: none"> <li>• Positive tester probe → Brown/White "1"</li> <li>• Negative tester probe → Black/Blue "2"</li> </ul> </div> <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> <li>3. Measure the intake air temperature sensor resistance.</li> </ol> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <p><b>Intake air temperature sensor resistance</b> 2.21 ~ 2.69 <math>\Omega</math> at 20 °C (68 °F)</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Handle the intake air temperature sensor with special care.</li> <li>• Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.</li> </ul> </div> <p>4. Is the intake air temperature sensor OK?</p>	

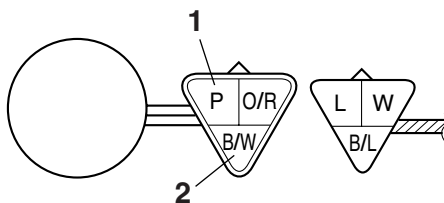

## FUEL INJECTION SYSTEM

Fault code No.	30	Symptom	The motorcycle has overturned.	
Used diagnostic code No. 08 (lean angle cut-off switch)				
Order	Item/components	Check or maintenance job	Restore method	
1	The motorcycle has overturned.	Raise the motorcycle upright.	Reinstated by setting the main switch to “ON” (the engine cannot be started unless the main switch is first set to “OFF”).	
2	Lean angle cut-off switch installation	Check the switch for looseness or pinching.		
3	Coupler connections Lean angle cut-off switch coupler ECU coupler	Check the coupler for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.		
4	Defective lean angle cut-off switch	Execute the diagnostic mode. (Code No. 08) Replace the switch if it is defective. Refer to “IGNITION SYSTEM” on page 8-1.		

Fault code No.	33	Symptom	Malfunction detected in the primary lead of the ignition coil.	
Used diagnostic code No. 30 (ignition coil)				
Order	Item/components	Check or maintenance job	Restore method	
1	Coupler and connector connections Ignition coil primary connector (Orange) ECU coupler	Check the coupler and connector for any pins that may have pulled out. Check the connector and coupler are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated by starting the engine and operating it at idle.	
2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Orange - Orange		
3	Defective ignition coil	Execute the diagnostic mode. (Code No. 30) Test the primary and secondary coils for continuity. Replace the coil if it is defective. Refer to “IGNITION SYSTEM” on page 8-1.		

Fault code No.	41	Symptom	Open or short circuit is detected in the lean angle cut-off switch.	
Used diagnostic code No. 08 (lean angle cut-off switch)				
Order	Item/components	Check or maintenance job	Restore method	
1	Coupler connections Lean angle cut-off switch coupler ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated immediately when it becomes normal.	
2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Black/Blue - Black/Blue Yellow/Green - Yellow/Green Blue - Blue		
3	Defective lean angle cut-off switch	Execute the diagnostic mode. (Code No. 08) Replace the switch if it is defective. Refer to “Fault code No. 30”.		

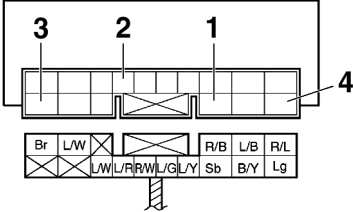
# FUEL INJECTION SYSTEM

Fault code No.	42	Symptom	A. No normal signals are received from the speed sensor. B. Open or short circuit is detected in the neutral switch.	
Used diagnostic code No. 07 (speed sensor) → A1 ~ A4 / No. 21 (neutral switch) → B1 ~ B4				
Order	Item/components	Check or maintenance job	Restore method	
A-1	Coupler connections Speed sensor coupler ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at 20 to 30 km/h (12.4 to 18.6 mi/h).	
A-2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. Blue - Blue White - White Black/Blue - Black/Blue		
A-3	Gear for detecting vehicle speed has broken.	Replace the gear if it is defective. Refer to “TRANSMISSION” on page 5-70.		
A-4	Defective speed sensor	<div>Execute the diagnostic mode. (Code No. 07) Replace the sensor if it is defective.</div> <div>1. Measure the speed sensor output voltage.</div> <div>2. Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.</div> <div><div>• Positive tester probe → Pink “1” • Negative tester probe → Black/White “2”</div><div></div><div>3. Set the main switch to “ON”.</div><div>4. Elevate the rear wheel and slowly rotate it.</div><div>5. Measure the speed sensor output voltage.</div><div><div><div><b>Speed sensor output voltage</b> When sensor is on DC 4.8 V or more When sensor is off DC 0.6 V or less</div></div></div><div>6. Is the speed sensor OK?</div></div>		

## FUEL INJECTION SYSTEM

Fault code No.	42	Symptom	A. No normal signals are received from the speed sensor. B. Open or short circuit is detected in the neutral switch.	
Used diagnostic code No. 07 (speed sensor) → A1 ~ A4 / No. 21 (neutral switch) → B1 ~ B4				
Order	Item/components	Check or maintenance job	Restore method	
B-1	Coupler connections Neutral switch connector Wiring harness ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated by starting the engine, and inputting the vehicle speed signals by operating the motorcycle at 20 to 30 km/h (12.4 to 18.6 mi/h).	
B-2	Open or short circuit in the wire harness	Repair or replace if there is an open or short circuit between the wire harnesses. between neutral switch and relay unit Sky blue - Sky blue between relay unit and ECU Blue/Yellow - Blue/Black		
B-3	Faulty shift drum (neutral detection area)	Replace if defective. Refer to “TRANSMISSION” on page 5-70.		
B-4	Defective neutral switch	Execute the diagnostic mode. (Code No. 21) Replace the switch if it is defective. Refer to “CHECKING THE SWITCHES” on page 8-43.		

# FUEL INJECTION SYSTEM

Fault code No.   43   Symptom   The ECU is unable to monitor the battery voltage.			
Used diagnostic code No. 09, 50 (fuel system voltage)			
Order	Item/components	Check or maintenance job	Restore method
1	Coupler connections Fuel injection system relay coupler Wiring harness ECU coupler	Check the couplers for any pins that may have pulled out. Check that the couplers are securely locked.  If necessary, repair the coupler or securely connect it.	Reinstated by starting the engine and operating it at idle.
2	Defective main relay	Replace the relay if it is defective.	
3	Open or short circuit in the wire harness	Execute the diagnostic mode. (Code No. 09) Repair or replace if there is an open or short circuit: between battery and fuel injection system fuse Red - Red between fuel injection system fuse and fuel injection system relay Brown - Brown between fuel injection system relay and ECU Red/Blue - Red/Blue between battery and main switch Red - Red between main switch and ignition fuse Brown/Blue - Brown/Blue between ignition fuse and engine stop switch Red - Red between engine stop switch and fuel injection system relay Red/Black - Red/Black between fuel injection system relay and ECU Blue/Red - Blue/Red	
4	Malfunction or open circuit in the fuel injection system relay	Execute the diagnostic mode. (Code No. 50) Replace if defective. 1. Remove the relay unit. 2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminals as shown.  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <ul style="list-style-type: none"> <li>• Positive battery terminal → Red/Black "1"</li> <li>• Negative battery terminal → Blue/Red "2"</li> </ul> <ul style="list-style-type: none"> <li>• Positive tester probe → Brown "3"</li> <li>• Negative tester probe → Red/Blue "4"</li> </ul> </div>  3. Does the diode have continuity between brown and red/blue? If there is no malfunction with the fuel injection system relay, replace the ECU.	

## FUEL INJECTION SYSTEM

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).
Used diagnostic code No. 60 (EEPROM improper cylinder indication)			
Order	Item/components	Check or maintenance job	Restore method
1	Malfunction in ECU	Execute the diagnostic mode. (Code No. 60) • Check the faulty cylinder. • Readjust the CO of the displayed cylinder. Replace the ECU if it is defective.	Reinstated by setting the main switch to "ON".

Fault code No.	46	Symptom	Power supply to the FI system relay is not normal.
Used diagnostic code No. 09			
Order	Item/components	Check or maintenance job	Restore method
1	Faulty battery	Replace or change the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 3-29.	Reinstated by starting the engine and operating it at idle.
2	Open or short circuit in the wire harness.	Excute the diagnostic mode. (Code No. 09) Repair or replace if there is an open or short circuit: between battery and fuel injection system fuse Red - Red between the fuel injection system fuse and fuel injection system relay Brown - Brown between the fuel injection system relay and ECU Red/Blue - Red/Blue	
3	Coupler connections ECU coupler	Check the coupler for any pins that may have pulled out. Check that the coupler is securely locked. If necessary, repair the coupler or securely connect it.	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)
Used diagnostic code No. --			
Order	Item/components	Check or maintenance job	Restore method
1	Malfunction in ECU	Replace the ECU.	Reinstated by setting the main switch to "ON".





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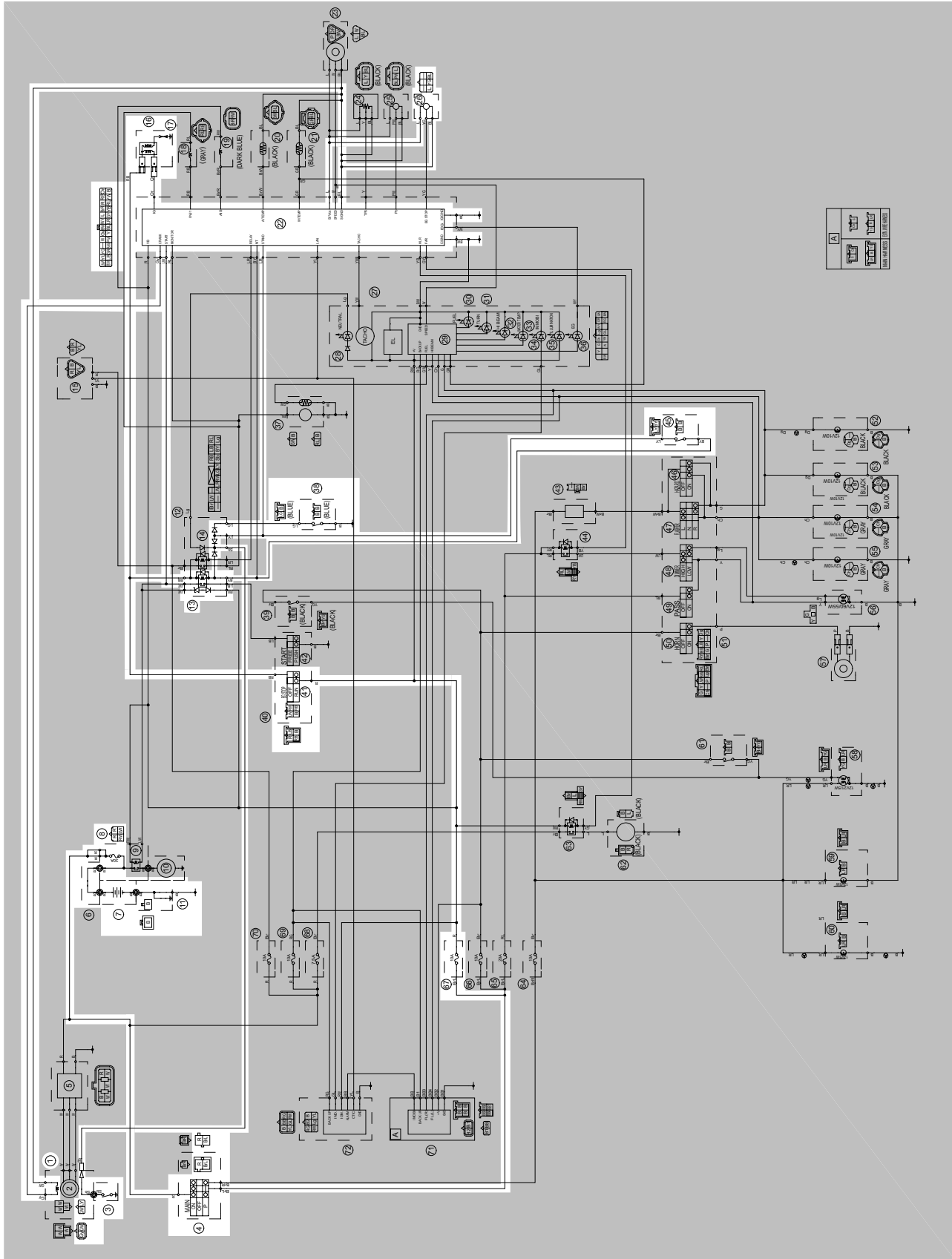
# IGNITION SYSTEM

EAS27090

## IGNITION SYSTEM

EAS27110

## CIRCUIT DIAGRAM



## IGNITION SYSTEM

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- 1. Crankshaft position sensor
- 3. Neutral switch
- 4. Main switch
- 7. Battery
- 8. Main fuse
- 13. Starting circuit cut-off relay
- 16. Ignition coil
- 17. Spark plug
- 22. ECU
- 26. Lean angle cut-off switch
- 38. Sidestand switch
- 41. Engine stop switch
- 45. Clutch switch
- 67. Ignition fuse

# IGNITION SYSTEM

EAS27150

## TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-49.	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 3-6.	NG →	Re-gap or replace the spark plug.
OK ↓		
4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-55.	OK →	Ignition system is OK.
NG ↓		
5. Check the spark plug cap. Refer to "CHECKING THE SPARK PLUG CAP" on page 8-54.	NG →	Replace the spark plug cap.
OK ↓		
6. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 8-54.	NG →	Replace the ignition coil.
OK ↓		
7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-55.	NG →	Replace the crankshaft position sensor.
OK ↓		

## IGNITION SYSTEM

8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		
9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the right handlebar switch.
OK ↓		
10. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the neutral switch.
OK ↓		
11. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the sidestand switch.
OK ↓		
12. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the clutch switch.
OK ↓		
13. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-51.	NG →	Replace the relay unit.
OK ↓		
14. Check the lean angle cut-off switch. Refer to "CHECKING THE LEAN ANGLE CUT-OFF SWITCH" on page 8-56.	NG →	Replace the lean angle cut-off switch.
OK ↓		
15. Check the entire ignition system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-1.	NG →	Properly connect or repair the ignition system wiring.
OK ↓		
Replace the ECU.		

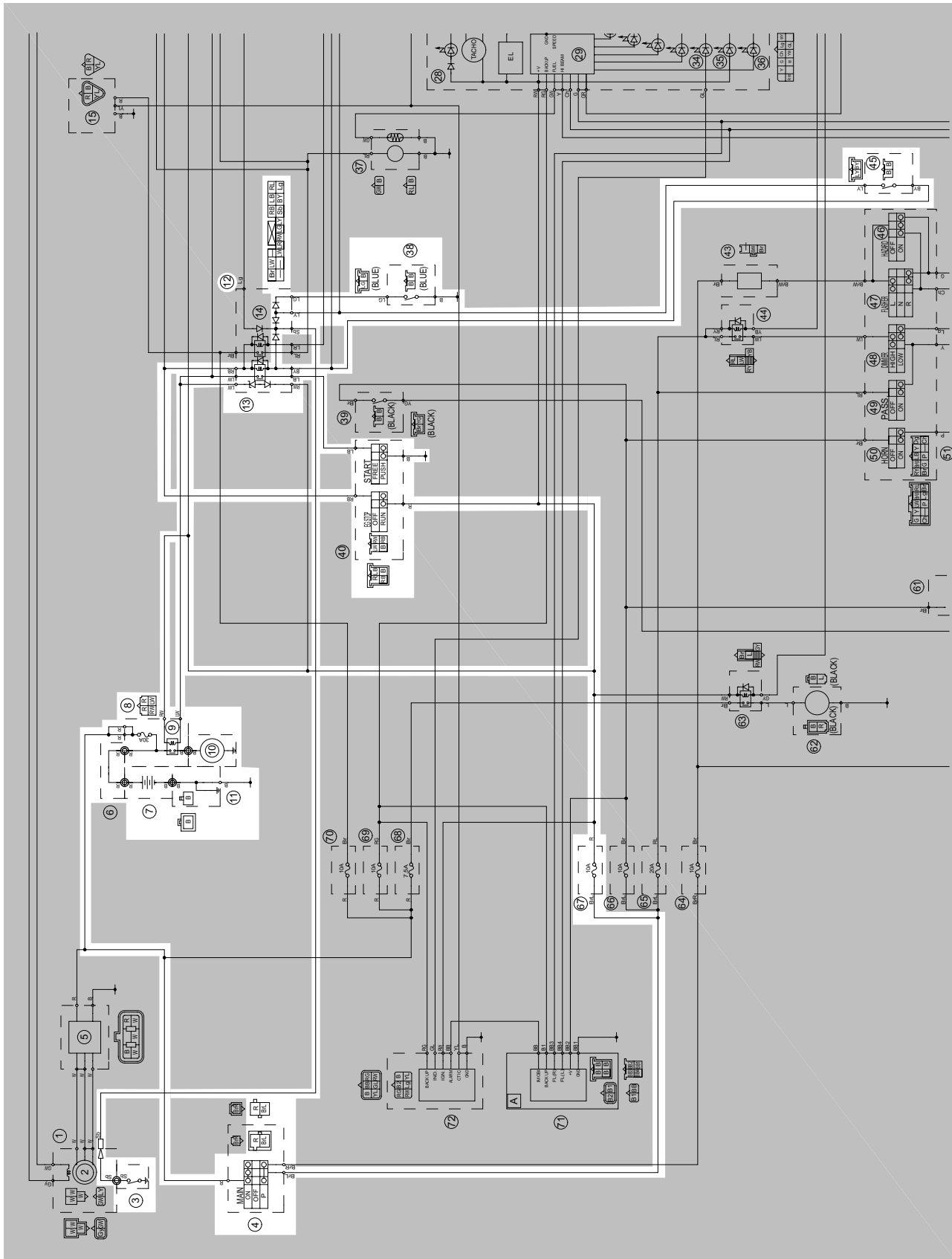
# ELECTRIC STARTING SYSTEM

EAS27160

## ELECTRIC STARTING SYSTEM

EAS27170

### CIRCUIT DIAGRAM





## ELECTRIC STARTING SYSTEM

---

- 3. Neutral switch
- 4. Main switch
- 7. Battery
- 8. Main fuse
- 9. Starter relay
- 10. Starter motor
- 12. Relay unit
- 13. Starting circuit cut-off relay
- 38. Sidestand switch
- 41. Engine stop switch
- 42. Start switch
- 45. Clutch switch
- 67. Ignition fuse

# ELECTRIC STARTING SYSTEM

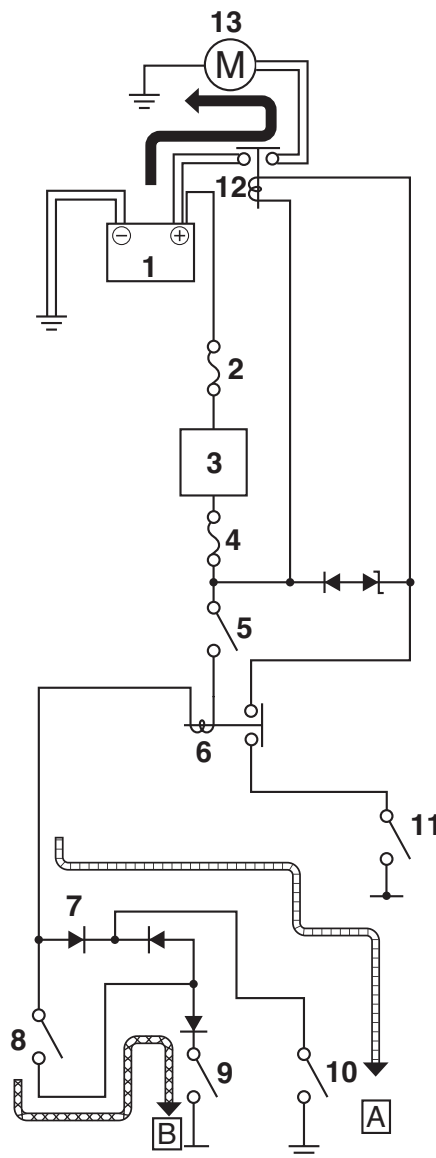
EAS27180

## STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “O” and the main switch is turned “ON” (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch circuit is closed).
- The clutch lever is pulled to the handlebar (the clutch switch circuit is closed) and the sidestand is up (the sidestand switch circuit is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay stays open so current cannot reach the starter motor. When at least one of the above conditions has been met, the starting circuit cut-off relay is closed and the engine can be started by pushing the start switch “O”.



## ELECTRIC STARTING SYSTEM

---

☐ WHEN THE TRANSMISSION IS IN NEUTRAL

☐ WHEN THE SIDESTAND IS UP AND THE  
CLUTCH LEVER IS PULLED TO THE  
HANDLEBAR

1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Relay unit (starting circuit cut-off relay)
7. Relay unit (diode)
8. Clutch switch
9. Sidestand switch
10. Neutral switch
11. Start switch
12. Starter relay
13. Starter motor

# ELECTRIC STARTING SYSTEM

EAS27190

## TROUBLESHOOTING

The starter motor fails to turn.

### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-49.	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. Refer to "CHECKING THE STARTER MOTOR" on page 8-61.	NG →	Repair or replace the starter motor.
OK ↓		
4. Check the relay unit (starting circuit cut-off relay). Refer to "CHECKING THE RELAYS" on page 8-51.	OK →	Replace the relay unit.
OK ↓		
5. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-53.	NG →	Replace the relay unit.
OK ↓		
6. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-51.	NG →	Replace the starter relay.
OK ↓		
7. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		

## ELECTRIC STARTING SYSTEM

8. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the right handlebar switch.
OK ↓		
9. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the neutral switch.
OK ↓		
10. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the sidestand switch.
OK ↓		
11. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the clutch switch.
OK ↓		
12. Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the right handlebar switch.
OK ↓		
13. Check the entire starting system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-5.	NG →	Properly connect or repair the starting system wiring.
OK ↓		
The starting system circuit is OK.		

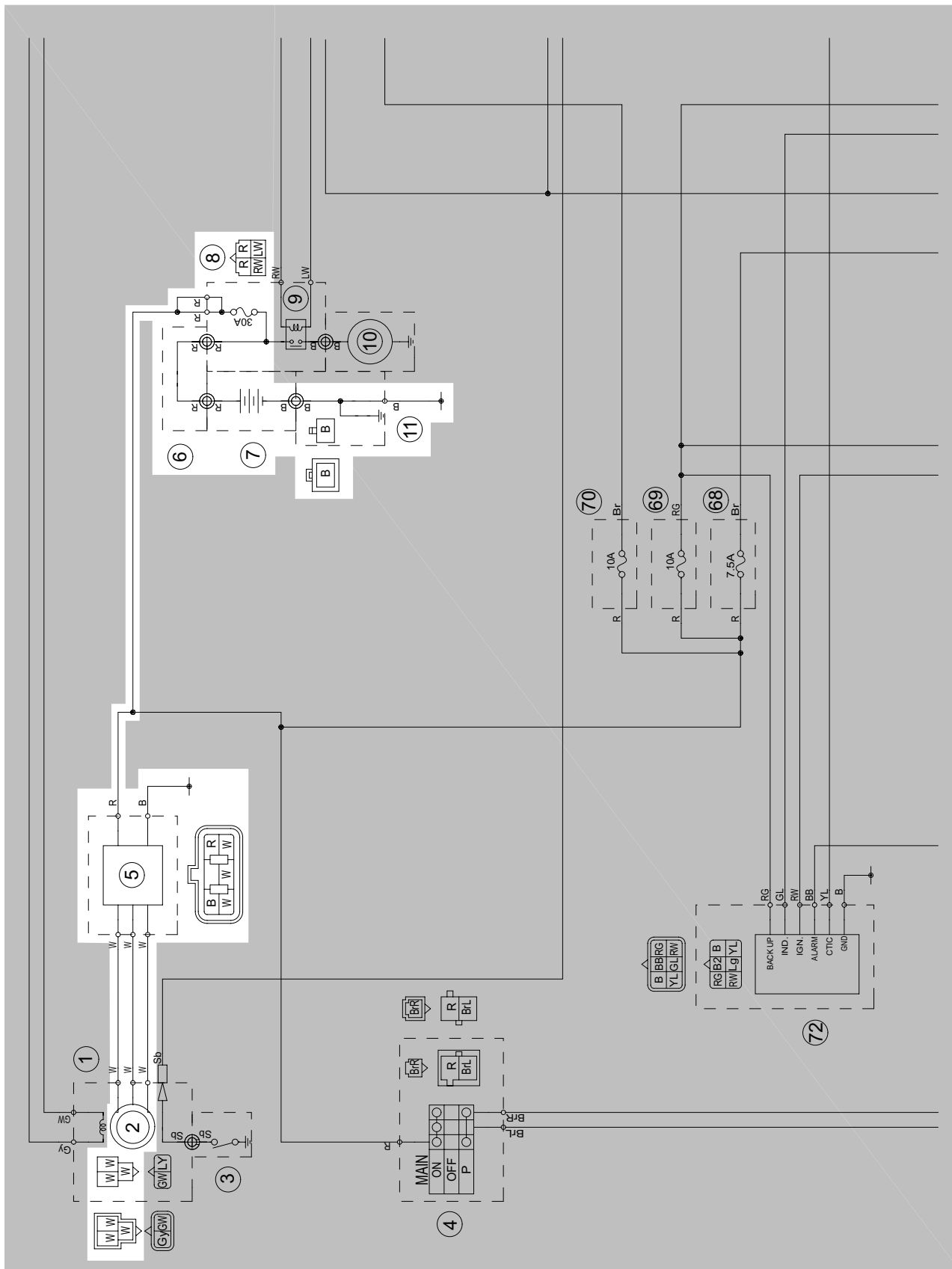
## CHARGING SYSTEM

EAS27200

## CHARGING SYSTEM

EAS27210

### CIRCUIT DIAGRAM



## CHARGING SYSTEM

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- 2. A.C. magneto
- 5. Rectifier/regulator
- 7. Battery
- 8. Main fuse

# CHARGING SYSTEM

EAS27220

## TROUBLESHOOTING

The battery is not being charged.

### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover

1. Check the fuses. (Main) Refer to "CHECKING THE FUSES" on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-49.	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 8-56.	NG →	Replace the stator assembly.
OK ↓		
4. Check the rectifier/regulator.	NG →	Replace the rectifier/regulator.
OK ↓		
5. Check the entire charging system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-11.	NG →	Properly connect or repair the charging system wiring.
OK ↓		
The circuit is OK.		

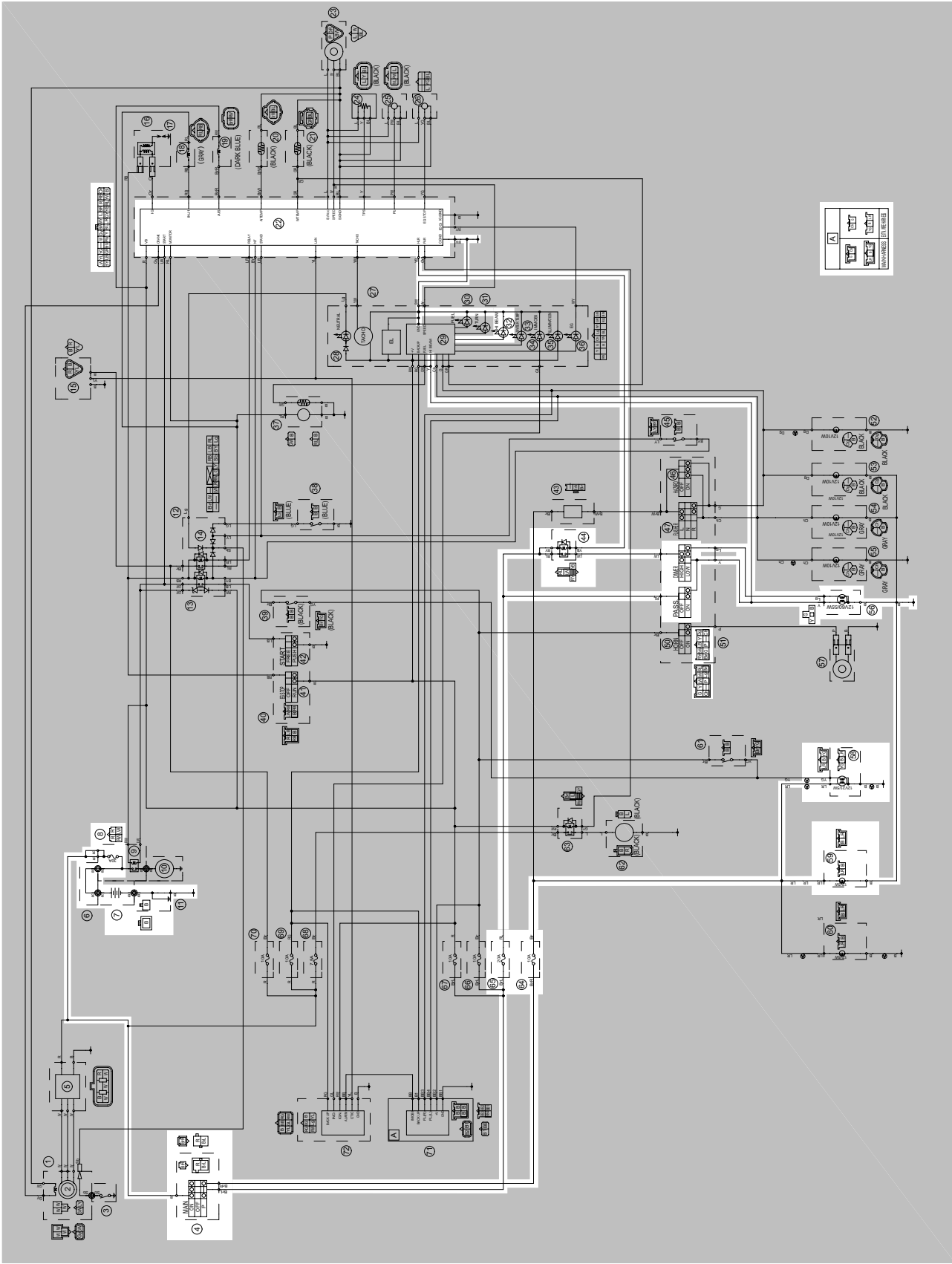


## CHARGING SYSTEM

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EAS27240  
LIGHTING SYSTEM

EAS27250  
CIRCUIT DIAGRAM



## LIGHTING SYSTEM

---

- 4. Main switch
- 7. Battery
- 8. Main fuse
- 22. ECU
- 32. High beam indicator light
- 44. Headlight relay
- 48. Dimmer switch
- 49. Pass switch
- 56. Headlight
- 58. Tail/brake light
- 59. Auxiliary light
- 64. Parking lighting fuse
- 65. Headlight fuse

# LIGHTING SYSTEM

EAS27260

## TROUBLESHOOTING

Any of the following fail to light: headlight (high beam), headlight (low beam), high beam indicator light, taillight, license plate light, auxiliary light or meter light.

### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover
5. Headlight assembly

1. Check the condition of each bulb and bulb socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-46.	NG →	Replace the bulb(s) and bulb socket(s).
OK ↓		
2. Check the fuses. (Main, headlight and parking lighting) Refer to "CHECKING THE FUSES" on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-49.	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 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		
5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the left handlebar switch.
OK		
6. Check the pass switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the left handlebar switch.
OK		
7. Check the headlight relay (on-off). Refer to "CHECKING THE RELAYS" on page 8-51.	NG →	Replace the headlight relay.

LIGHTING SYSTEM

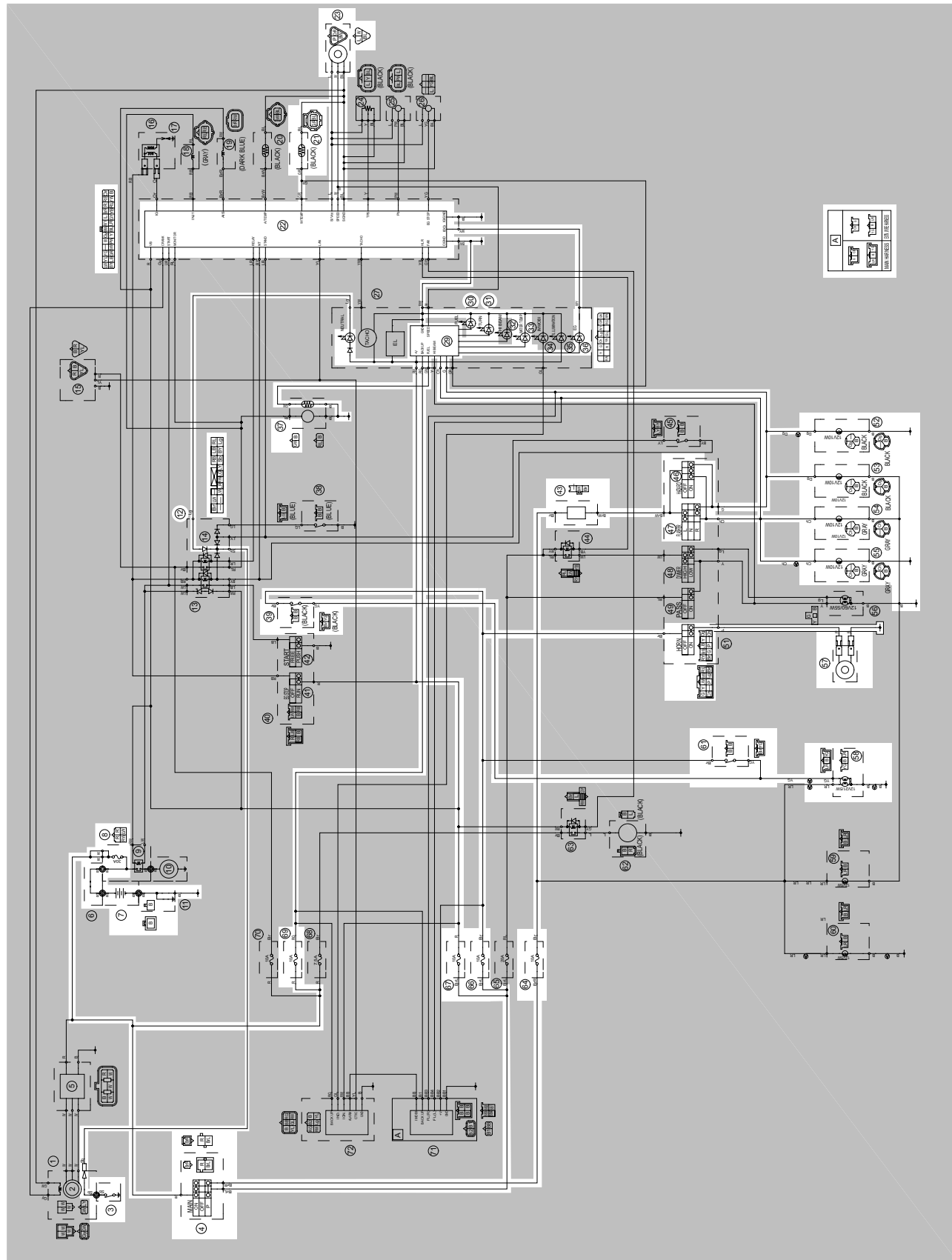
8. Check the high beam indicator light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK		
9. Check the meter light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK		
10. Check the entire lighting system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-15.	NG →	Properly connect or repair the lighting system wiring.
OK ↓		
This circuit is OK.		

EAS27270

SIGNALING SYSTEM

EAS27280

CIRCUIT DIAGRAM



## SIGNALING SYSTEM

---

- 3. Neutral switch
- 4. Main switch
- 7. Battery
- 8. Main fuse
- 12. Relay unit
- 21. Coolant temperature sensor
- 22. ECU
- 23. Speed sensor
- 28. Neutral indicator light
- 29. Multi-function meter
- 30. Fuel level warning light
- 31. Turn signal indicator light
- 33. Coolant temperature warning light
- 36. Engine trouble warning light
- 37. Fuel pump
- 39. Front brake light switch
- 43. Turn signal/hazard relay
- 46. Hazard switch
- 47. Turn signal switch
- 50. Horn switch
- 52. Rear turn signal light (right)
- 53. Front turn signal light (right)
- 54. Front turn signal light (left)
- 55. Rear turn signal light (left)
- 57. Horn
- 58. Tail/brake light
- 61. Rear brake light switch
- 64. Parking lighting fuse
- 66. Signaling system fuse
- 67. Ignition fuse
- 69. Backup fuse (immobilizer unit, multi-function meter unit)

# SIGNALING SYSTEM

EAS27290

## TROUBLESHOOTING

Any of the following fail to light: turn signal light, brake light or indicator light.

### NOTE:

- Before troubleshooting, remove the following part(s):
  1. Seats
  2. Side panels (left and right)
  3. Fuel tank
  4. Battery cover
  5. Headlight assembly

1. Check the fuses. (Main, ignition, signaling system, parking lighting, and backup fuse) Refer to “CHECKING THE FUSES” on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-49.	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 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		
4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	<ul style="list-style-type: none"><li>• Clean the battery terminals.</li><li>• Recharge or replace the battery.</li></ul>
OK ↓		
Check the condition of each of the signaling system’s circuits. Refer to “Checking the signaling system” on page 8-21.		

### Checking the signaling system

The horn fails to sound.

1. Check the horn switch. Refer to “CHECKING THE SWITCHES” on page 8-43.	NG →	Replace the left handlebar switch.
OK ↓		
2. Check the horn. Refer to “CHECKING THE HORN” on page 8-57.	NG →	Replace the horn.
OK ↓		



## SIGNALING SYSTEM

3. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The tail/brake light fails to come on.</u>		
1. Check the front brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the front brake light switch.
OK ↓		
2. Check the rear brake light switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the rear brake light switch.
OK ↓		
3. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The turn signal light, turn signal indicator light or both fail to blink.</u>		
1. Check the turn signal light bulbs and sockets. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-46.	NG →	Replace the turn signal light bulb, socket or both.
OK ↓		
2. Check the turn signal switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the left handlebar switch.
OK ↓		
3. Check the turn signal indicator light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK ↓		
4. Check the hazard switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the left handlebar switch.
OK ↓		

## SIGNALING SYSTEM

5. Check the turn signal/hazard relay. Refer to "CHECKING THE TURN SIGNAL/HAZARD RELAY" on page 8-53.	NG →	Replace the turn signal/hazard relay.
OK ↓		
6. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The neutral indicator light fails to come on.</u>		
1. Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-43.	NG →	Replace the neutral switch.
OK ↓		
2. Check the neutral indicator light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK ↓		
3. Check the relay unit (diode). Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-53.	NG →	Replace the relay unit.
OK ↓		
4. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The fuel level warning light fails to come on.</u>		
1. Check the fuel sender. Refer to "CHECKING THE FUEL SENDER" on page 8-58.	NG →	Replace the fuel pump assembly.
OK ↓		
2. Check the fuel level warning light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK ↓		

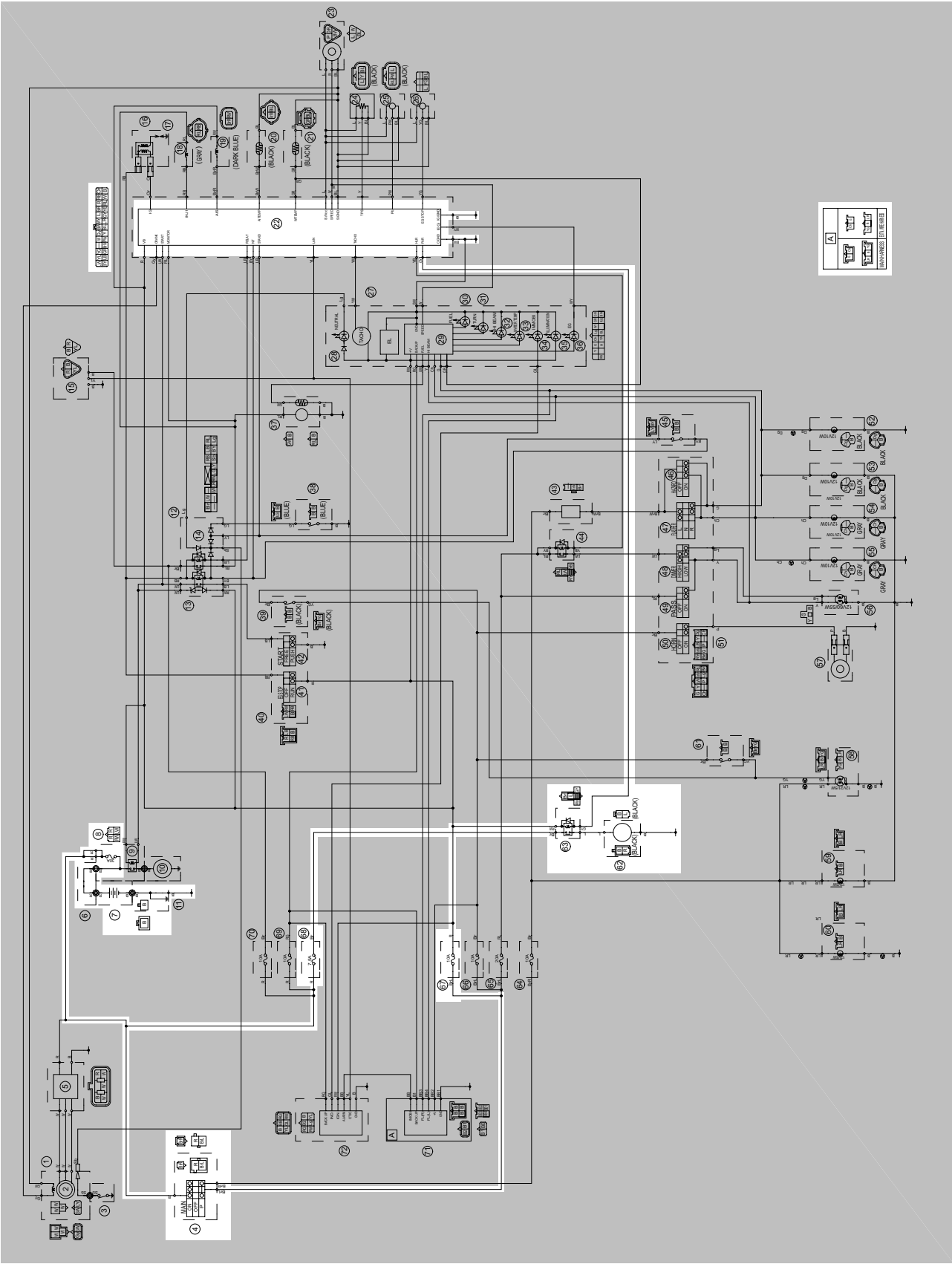
# SIGNALING SYSTEM

3. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The speedometer fails to operate.</u>		
1. Check the speed sensor. Refer to "CHECKING THE SPEED SENSOR" on page 8-58.	NG →	Replace the speed sensor.
OK ↓		
2. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
The circuit is OK.		
<u>The coolant temperature warning light fails to come on.</u>		
1. Check the coolant temperature warning light LED. Refer to "CHECKING THE LEDS" on page 8-47.	NG →	Replace the meter assembly.
OK ↓		
2. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-57.	NG →	Replace the coolant temperature sensor.
OK ↓		
3. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.	NG →	Properly connect or repair the cooling system wiring.

EAS00807

COOLING SYSTEM

CIRCUIT DIAGRAM



## COOLING SYSTEM

---

- 4. Main switch
- 7. Battery
- 8. Main fuse
- 22. ECU
- 62. Radiator fan motor
- 63. Radiator fan motor relay
- 67. Ignition fuse
- 68. Radiator fan motor fuse

## COOLING SYSTEM

EAS27570

### TROUBLESHOOTING

If the radiator fan motor fails to operate.

#### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover

1. Check the fuses. (Main, radiator fan motor and ignition). Refer to "CHECKING THE FUSES" on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-49.	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 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		
4. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 8-60.	NG →	Replace the radiator fan motor.
OK ↓		
5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-51.	NG →	Replace the radiator fan motor relay.
OK ↓		
6. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-57.	NG →	Replace the coolant temperature sensor.
OK ↓		
7. Check the entire cooling system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-25.	NG →	Properly connect or repair the cooling system wiring.
OK ↓		
Replace the ECU.		



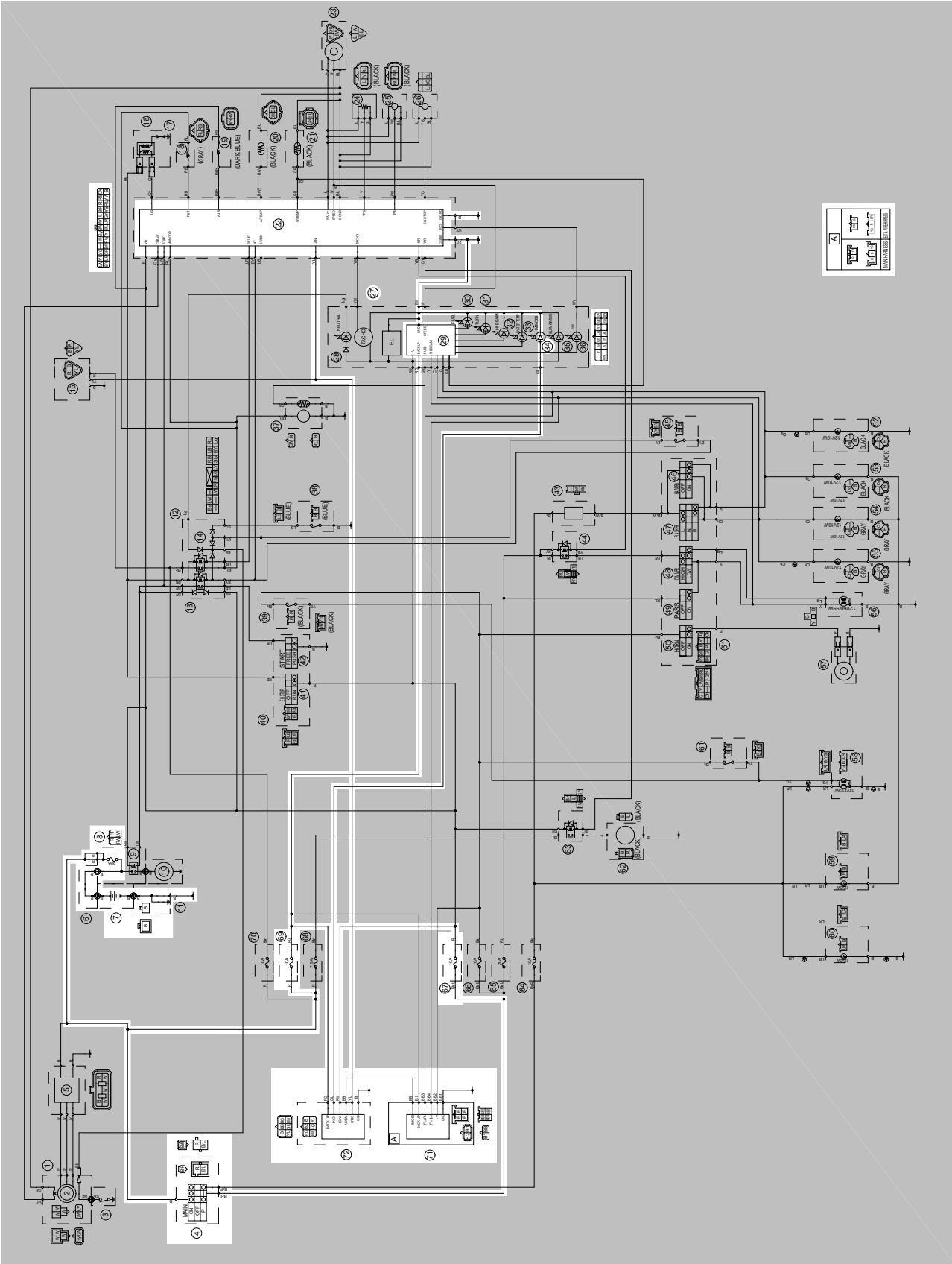
# IMMOBILIZER SYSTEM

ET5YU1002

## IMMOBILIZER SYSTEM

ET5YU1003

### CIRCUIT DIAGRAM





## IMMOBILIZER SYSTEM

---

- 4. Main switch
- 7. Battery
- 8. Main fuse
- 22. ECU
- 27. Multi-function meter unit
- 34. Immobilizer system indicator light
- 67. Ignition fuse
- 69. Backup fuse (immobilizer unit, multi-function meter unit)
- 71. Anti-theft alarm (optional)
- 72. Immobilizer unit

# IMMOBILIZER SYSTEM

EAS27670

## GENERAL INFORMATION

This vehicle is equipped with an immobilizer system to help prevent theft by re-registering codes in the standard keys. This system consists of the following:

- a code re-registering key (with a red bow)
- two standard keys (with a black bow) that can be re-registered with new codes
- a transponder (installed in the red key bow)
- an immobilizer unit
- the ECU
- an immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.

Therefore, always use a standard key for driving. (See caution below.)

### NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

EC5YU1026

### CAUTION:

- **DO NOT LOSE THE CODE RE-REGISTERING KEY!** If the code re-registering key is lost, registering new codes in the standard keys is impossible. The standard keys can still be used to start the vehicle. However, if code re-registering is required (e.g., if a new standard key is made or all keys are lost) the entire immobilizer system must be replaced. Therefore, it is highly recommended to use either standard key for driving, and to keep the code re-registering key in a safe place.
- Do not submerge the keys in water.
- Do not expose the keys to excessively high temperatures.
- Do not place the keys close to magnets (this includes, but is not limited to, products such as speakers, etc.).
- Do not place heavy items on the keys.
- Do not grind the keys or alter their shape.
- Do not disassemble the key bows.
- Do not put two keys of any immobilizer system on the same key ring.
- Keep the standard keys as well as other immobilizer system keys away from the code re-registering key.
- Keep other immobilizer system keys away from the main switch as they may cause signal interference.

EAS27690

## PART REPLACEMENT AND KEY CODE REGISTRATION REQUIREMENTS

In the course of use, you may encounter the following cases where replacement of parts and registration of code re-registering/standard keys are required.

### NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

## IMMOBILIZER SYSTEM

	Parts to be replaced					Key registration requirement
	Main switch/immo- bilizer unit		Standard key	ECU	Accesso- ry lock* and key	
	Main switch	Immobiliz- er unit				
Standard key is lost			√			New standard key
All keys have been lost (including code re-registering key)	√		√	√	√	Code re-registering key and standard keys
ECU is defective				√		Code re-registering key and standard keys
Immobilizer unit is defective		√				Code re-registering key and standard keys
Main switch is defective	√		√	√	√	Code re-registering key and standard keys
Accessory lock* is defective					√	Not required

\* Accessory locks mean the seat lock and fuel tank cap.

### Code re-registering key registration:

When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.

To register a code re-registering key:

1. Turn the main switch to “ON” with the code re-registering key.

### NOTE:

Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

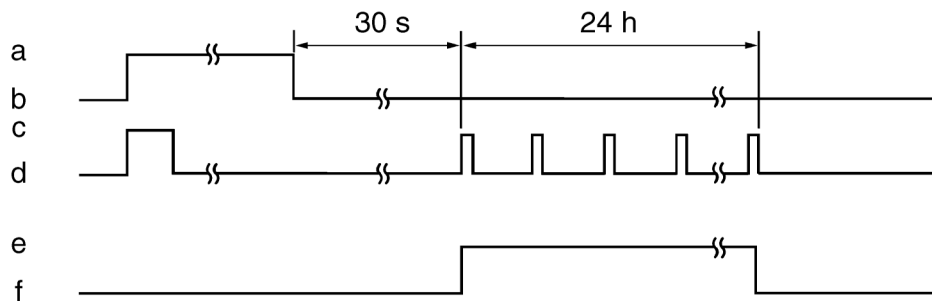
2. Check that the engine can be started.
3. Register the standard key, following the instructions in the section below.

### Standby mode:

To enable the immobilizer system, turn the ignition key to “OFF”. 30 seconds later, the indicator light will start flashing continuously in the standby flashing mode pattern for up to 24 hours. After that time, the indicator light will stop flashing, but the immobilizer system is still enabled.

# IMMOBILIZER SYSTEM

## Standby mode



a. Main switch "ON"  
b. Main switch "OFF"  
c. LED on

d. LED off  
e. Standby mode on  
f. Standby mode off

### Standard key registration:

Standard key registration is required when a standard key is lost and needs to be replaced, or when the code re-registering key is re-registered after the immobilizer unit or ECU are replaced.

#### NOTE:

Do not start the engine with a standard key that has not been registered. If the main switch is turned "ON" with a standard key that has not been registered, the immobilizer system indicator light flashes to indicate fault code "52". (Refer to "SELF-DIAGNOSIS FAULT CODE INDICATION" on page 8-36).

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, turn the main switch to "ON", then "OFF", and then remove the key within 5 seconds.
3. Insert the first standard key to be registered into the main switch, then turn the key to "ON" within 5 seconds to activate the key registration mode.

#### NOTE:

The existing standard key code is erased from the memory when the key registration mode is activated. When the key registration mode is activated, the immobilizer system indicator light flashes rapidly.

4. While the indicator light is flashing, turn the main switch to "OFF", remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.

#### NOTE:

If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.

5. Turn the main switch to "ON".

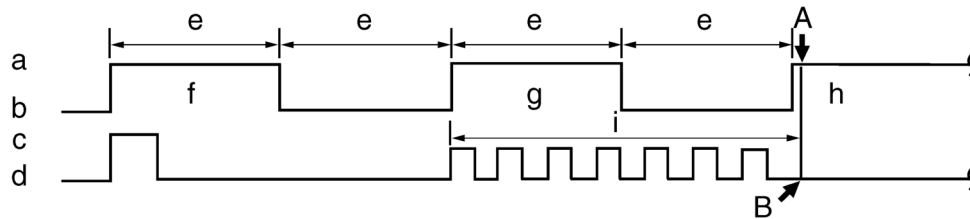
#### NOTE:

When the indicator light goes off, the registration is complete.

6. Check that the engine can be started with the two registered standard keys.

# IMMOBILIZER SYSTEM

## Standard key registration



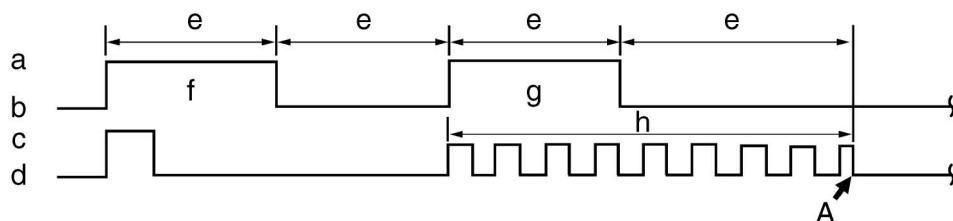
- a. Main switch "ON"
- b. Main switch "OFF"
- c. LED on
- d. LED off
- e. Less than 5.0 s
- f. Code re-registering key

- g. First standard key
- h. Second standard key
- i. Registration mode
- A. Registration of the second standard key is complete.
- B. Immobilizer system indicator light stops flashing when the registration of the second standard key is complete.

## Voiding the standard key code:

If a standard key has been lost, it is possible to disable its use by re-registering the remaining standard key. Standard key registration erases the stored standard key code from the memory, thus disabling the lost standard key. To re-register, refer to "Standard key registration".

## Standard key code voiding method



- a. Main switch "ON"
- b. Main switch "OFF"
- c. LED on
- d. LED off
- e. Less than 5.0 s

- f. Code re-registering key
- g. Remaining standard key
- h. Registration mode
- A. If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the second standard key cannot be registered.

# IMMOBILIZER SYSTEM

EAS27700

## TROUBLESHOOTING

When the main switch is turned to “ON”, the immobilizer system indicator light does not come on nor flashes.

### NOTE:

• Before troubleshooting, remove the following part(s):

1. Seats
2. Side panels (left and right)
3. Fuel tank
4. Battery cover

1. Check the fuses. (Main, ignition and backup). Refer to “CHECKING THE FUSES” on page 8-48.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-49.	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 8-43.	NG →	Replace the main switch/immobilizer unit.
OK ↓		
4. Check the immobilizer system indicator light LED. Refer to “CHECKING THE LEDS” on page 8-47.	NG →	Replace the meter assembly.
OK ↓		
5. Check the entire immobilizer system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-29.	NG →	Properly connect or repair the immobilizer system wiring.
OK ↓		
<ul style="list-style-type: none"><li>• Check the condition of the each immobilizer system circuits.</li><li>• Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 8-36.</li></ul>		

# IMMOBILIZER SYSTEM

EAS27720

## SELF-DIAGNOSIS FAULT CODE INDICATION

When a system malfunction occurs, the fault code number is signaled by the immobilizer system indicator light.

Fault code	Part	Symptom	Cause	Action
51	IMMOBILIZER UNIT	Code cannot be transmitted between the key and the immobilizer unit.	<ol style="list-style-type: none"> <li>1. Radio wave interference caused by objects around the keys and antenna.</li> <li>2. Immobilizer unit malfunction.</li> <li>3. Key malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas.</li> <li>2. Replace the main switch/ immobilizer unit.</li> <li>3. Replace the key.</li> </ol>
52	IMMOBILIZER UNIT	Codes between the key and immobilizer unit do not match.	<ol style="list-style-type: none"> <li>1. Signal received from other transponder (failed to recognize code after ten consecutive attempts).</li> <li>2. Signal received from unregistered standard key.</li> </ol>	<ol style="list-style-type: none"> <li>1. Place the immobilizer unit at least 50 mm away from the transponder of other vehicles.</li> <li>2. Register the standard key.</li> </ol>
53	IMMOBILIZER UNIT	Codes cannot be transmitted between the ECU and the immobilizer unit.	<p>Noise interference or disconnected lead/cable.</p> <ol style="list-style-type: none"> <li>1. Interference due to radio wave noise.</li> <li>2. Disconnected communication harness.</li> <li>3. Immobilizer unit malfunction.</li> <li>4. ECU malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the wire harness and connector.</li> <li>2. Replace the main switch/ immobilizer unit.</li> <li>3. Replace the ECU.</li> </ol>
54	IMMOBILIZER UNIT	Codes transmitted between the ECU and the immobilizer unit do not match.	<p>Noise interference or disconnected lead/cable.</p> <ol style="list-style-type: none"> <li>1. Interference due to radio wave noise.</li> <li>2. Disconnected communication harness.</li> <li>3. Immobilizer unit malfunction.</li> <li>4. ECU failure. (The ECU or immobilizer unit was replaced with a used unit from another vehicle.)</li> </ol>	<ol style="list-style-type: none"> <li>1. Register the code re-registering key.</li> <li>2. Check the wire harness and connector.</li> <li>3. Replace the main switch/ immobilizer unit.</li> <li>4. Replace the ECU.</li> </ol>

## IMMOBILIZER SYSTEM

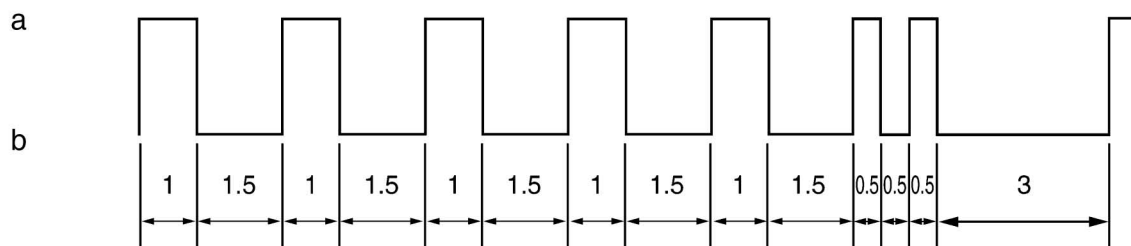
Fault code	Part	Symptom	Cause	Action
55	IMMOBILIZER UNIT	Key code registration malfunction.	Same standard key was attempted to be registered two consecutive times.	Register another standard key.
56	ECU	Unidentified code is received.	Noise interference or disconnected lead/cable. 1. Obstruction due to radio wave noise. 2. Error by disconnection of the communication harness.	1. Check the wire harness and connector. 2. Replace the main switch/ immobilizer unit. 3. Replace the ECU.

### Immobilizer system indicator light fault code indication

Units of 10: Cycles of on for 1 second and off for 1.5 seconds.

Units of 1: Cycles of on for 0.5 second and off for 0.5 second.

Example: fault code 52



a. Light on

b. Light off



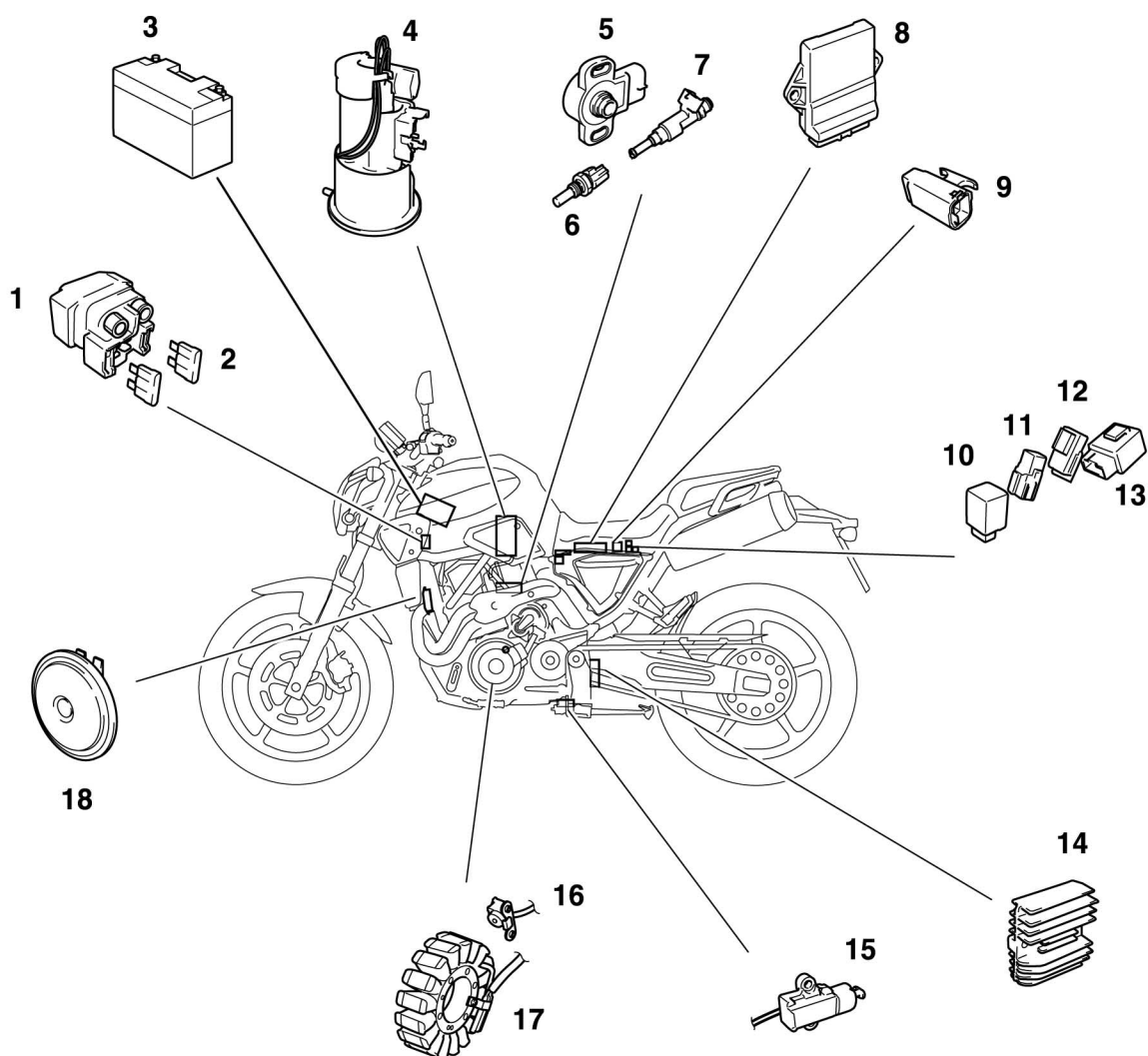
## IMMOBILIZER SYSTEM

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# ELECTRICAL COMPONENTS

EAS27970

## ELECTRICAL COMPONENTS



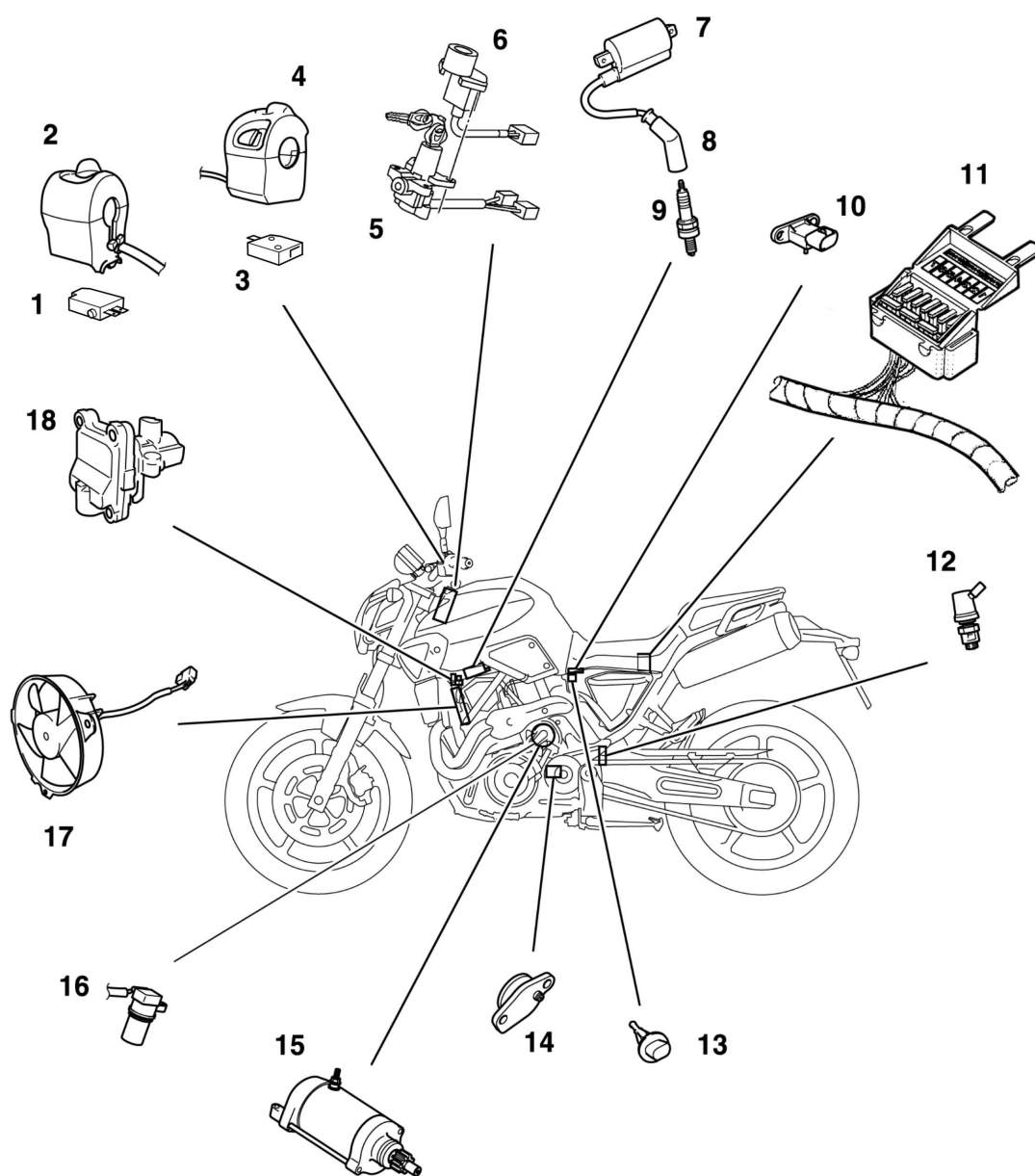
## ELECTRICAL COMPONENTS

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1. Starter relay
2. Main fuse
3. Battery
4. Fuel pump
5. Throttle position sensor
6. Coolant temperature sensor
7. Fuel injector
8. ECU (electronic control unit)
9. Lean angle cut-off switch
10. Turn signal/hazard relay
11. Headlight relay
12. Radiator fan motor relay
13. Relay unit
14. Rectifier/regulator
15. Sidestand switch
16. Crankshaft position sensor
17. Stator coil
18. Horn

## ELECTRICAL COMPONENTS

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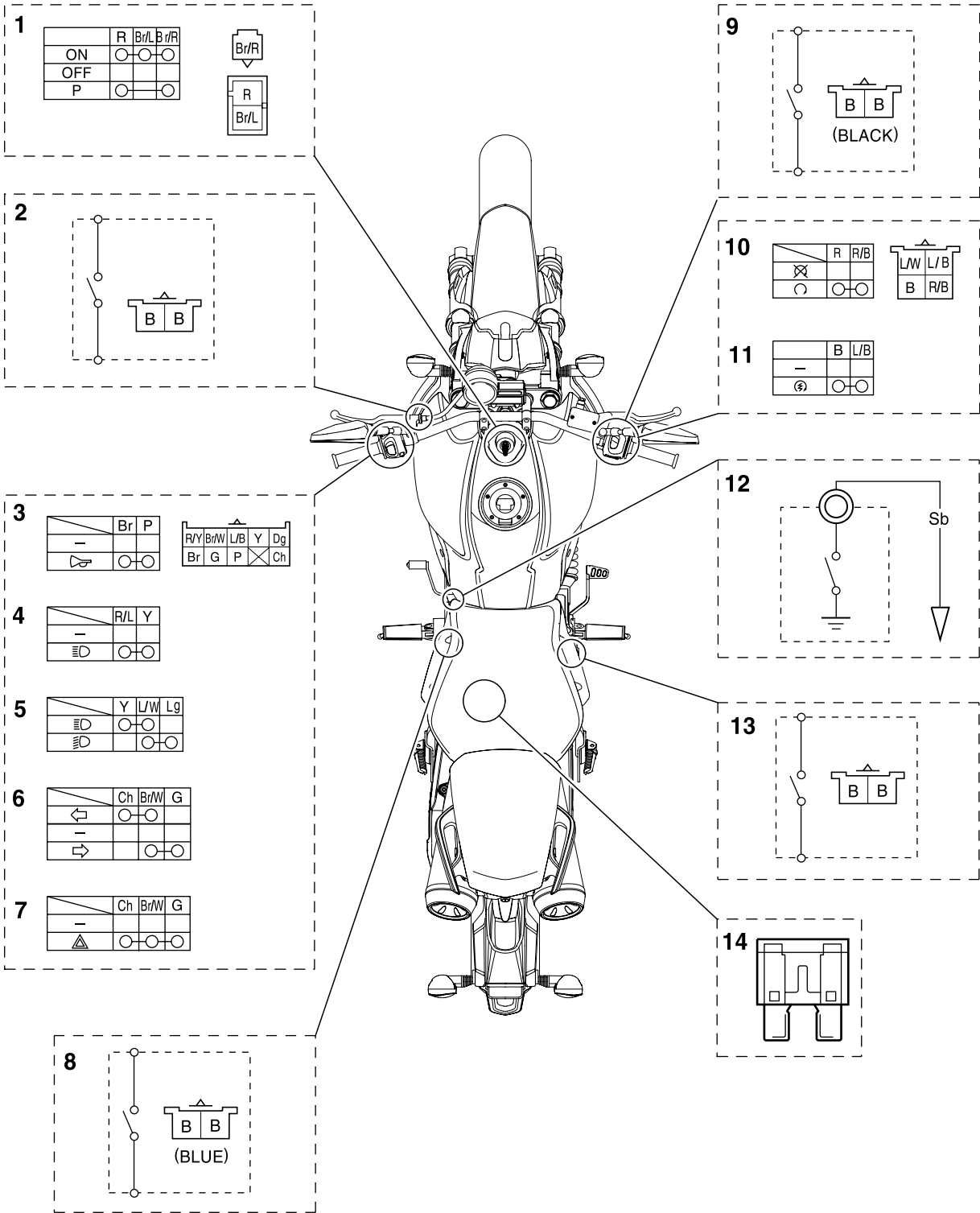
## ELECTRICAL COMPONENTS

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1. Front brake light switch
2. Right handlebar switch
3. Clutch switch
4. Left handlebar switch
5. Main switch
6. Immobilizer unit
7. Ignition coil
8. Plug cap
9. Spark plug
10. Intake air pressure sensor
11. Fuse box
12. Rear brake light switch
13. Intake air temperature sensor
14. Neutral switch
15. Starter motor
16. Speed sensor
17. Radiator fan motor
18. Air induction system solenoid

EAS27980

CHECKING THE SWITCHES



## ELECTRICAL COMPONENTS

---

1. Main switch
2. Clutch switch
3. Horn switch
4. Pass switch
5. Dimmer switch
6. Turn signal switch
7. Hazard switch
8. Sidestand switch
9. Front brake light switch
10. Engine stop switch
11. Start switch
12. Neutral switch
13. Rear brake light switch
14. Fuses

# ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

**CAUTION:**

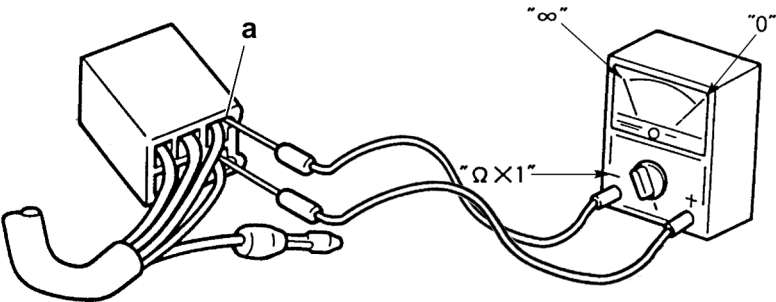
Never insert the tester probes into the coupler terminal slots “a”. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Pocket tester  
90890-03112

**NOTE:**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.

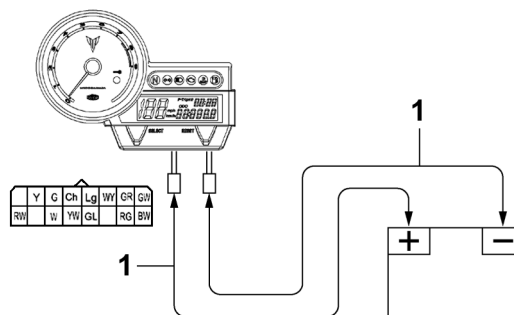
The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row.

The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indication by “○—○” There is continuity between red, brown/blue, and brown/red when the switch is set to “ON” and between red and brown/red when the switch is set to “P”.

		b		
		R	Br/L	Br/R
a	ON	○—○	○—○	○—○
	OFF			
	P	○—○		○—○
		<div>R Br/L</div>	<div>Br/R</div>	







1. Check:
  - Bulb socket (for continuity) (with the pocket tester)  
No continuity → Replace.



Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- 

1. Check:
  - LED (for proper operation)  
Improper operation → Replace.

- |                                     |   |
|-------------------------------------|---|
| Turn signal indicator light (left)  | Positive battery terminal → chocolate<br>Negative battery terminal → black/white              |
| Turn signal indicator light (right) | Positive battery terminal → green<br>Negative battery terminal → black/white                  |
| High beam indicator light           | Positive battery terminal → yellow<br>Negative battery terminal → black/white                 |
| Neutral indicator light             | Positive battery terminal → red/white<br>Negative battery terminal → light green              |
| Coolant temperature warning light   | Positive battery terminal → green/red<br>Negative battery terminal → black/white              |
| Fuel level warning light            | Positive battery terminal → green/white<br>Negative battery terminal → black/white            |
| Engine trouble warning light        | Positive battery terminal → red/white<br>Negative battery terminal → white/yellow             |
| Back light                          | Positive battery terminal → red/white or red/green<br>Negative battery terminal → black/white |

## ELECTRICAL COMPONENTS

Immobilizer system indicator LED

Connect the pocket tester ( $k\Omega \times 1$ ) to the meter coupler.

Positive tester probe → black/white Negative tester probe → green/blue	Continuity
Positive tester probe → green/blue Negative tester probe → black/white	No continuity

### ⚠ 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.

### CAUTION:

Do not connect the jumper lead (battery voltage) to the terminals (green/blue and black/white) for the immobilizer system indicator light (LED). The LED could be damaged.

- c. When the jumper leads are connected to the terminals, the respective LED should illuminate.  
Does not light → Replace the meter assembly.

EAS28000

### CHECKING THE FUSES

The following procedure applies to all of the fuses.

EC5YU1013

### CAUTION:

To avoid a short circuit, always turn the main switch to “OFF” when checking or replacing a fuse.

The main fuse is located under the fuel tank. The fuse box which contains the fuses for the individual circuits is located under the rider seat.

1. Remove:

- Seats
- Fuel tank

Refer to “FUEL INJECTION SYSTEM” on page 7-1.

2. Check:

- Fuse

- a. Connect the pocket tester to the fuse and check the continuity.

### NOTE:

Set the pocket tester selector to “ $\Omega \times 1$ ”.



**Pocket tester**  
**90890-03112**

- b. If the pocket tester indicates “ $\infty$ ”, replace the fuse.

3. Replace:

- Blown fuse

- a. Turn the main switch to “OFF”.  
b. Install a new fuse of the correct amperage rating.  
c. Set on the switches to verify if the electrical circuit is operational.  
d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	30 A	1
Ignition	10 A	1
Headlight	20 A	1
Fuel injection system	10 A	1
Radiator fan motor	7.5 A	1
Signaling system	10 A	1
Parking lighting	10 A	1
Backup (odometer, clock and immobilizer system)	10 A	1
Spare	30 A	1
Spare	20 A	1
Spare	10 A	1
Spare	7.5 A	1

## ECA13660

[illegible]

- EAS28030

## FWA13290

## ECA13640

A line drawing of a car's engine compartment showing the battery being secured. A bolt (1) is shown passing through the battery and the engine block. A bracket (2) is shown attached to the battery and the engine block.

3. Remove:
  - Battery band
  - 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

**NOTE:**

- The charge state of an MF 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%

5. Charge:  
• Battery  
(refer to the appropriate charging method)

EWA13300

**⚠ WARNING**

**Do not quick charge a battery.**

EWA13300

**CAUTION:**

- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)**

- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

### Charging method using a variable-current (voltage) charger

- a. Measure the open-circuit voltage prior to charging.

**NOTE:**

Voltage should be measured 30 minutes after the engine is stopped.

- b. Connect a charger and ammeter to the battery and start charging.

**NOTE:**

Set the charging voltage at 16–17 V.If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

- c. Make sure that the current is higher than the standard charging current written on the battery.

**NOTE:**

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

## ELECTRICAL COMPONENTS

- Standard charging current is reached  
Battery is good.
- Standard charging current is not reached  
Replace the battery.

- Adjust the voltage so that the current is at the standard charging level.
- Set the time according to the charging time suitable for the open-circuit voltage.  
Refer to "Battery condition checking steps".
- 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.
- 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

- Measure the open-circuit voltage prior to charging.

#### NOTE:

Voltage should be measured 30 minutes after the engine is stopped.

- Connect a charger and ammeter to the battery and start charging.
- Make sure that the current is higher than the standard charging current written on the battery.

#### NOTE:

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

- Charge the battery until the battery's charging voltage is 15 V.

#### NOTE:

Set the charging time at 20 hours (maximum).

- 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.

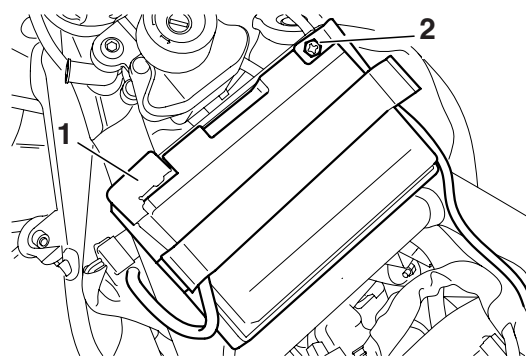


- Install:
  - Battery
  - Battery band
- Connect:
  - Battery leads  
(to the battery terminals)

ECA13630

#### CAUTION:

**First, connect the positive battery lead "1", and then the negative battery lead "2".**



- Check:
  - Battery terminals
  - Dirt → Clean with a wire brush.  
Loose connection → Connect properly.
- Lubricate:
  - Battery terminals



**Recommended lubricant**  
**Dielectric grease**

- Install:
  - Battery cover
  - Fuel tank  
Refer to "FUEL INJECTION SYSTEM" on page 7-1.
  - Seats

EAS28040

### CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.



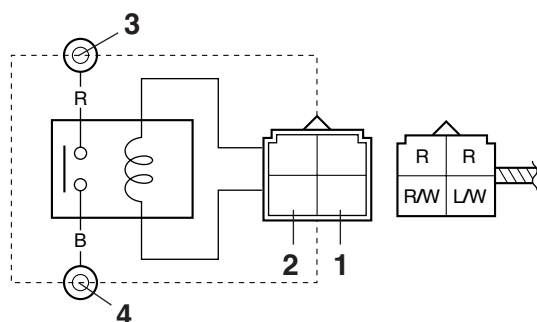
# ELECTRICAL COMPONENTS



**Pocket tester**  
90890-03112

1. Disconnect the relay from the wire harness.
  2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminal as shown.
- Check the relay operation.  
Out of specification → Replace.

## Starter relay

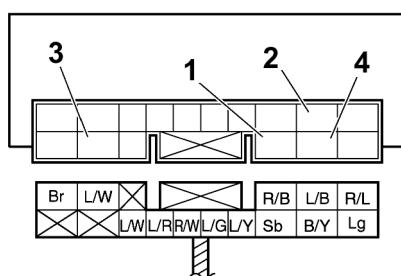


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

## Relay unit (starting circuit cut-off relay)

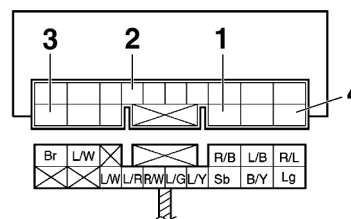


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

## Fuel injection system relay

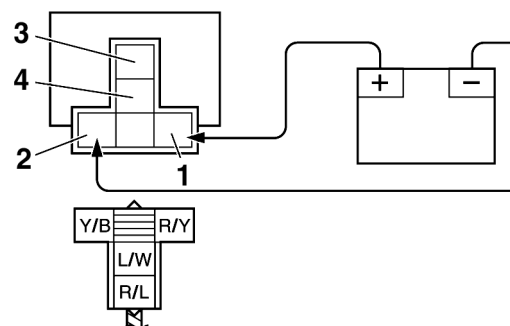


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

## Headlight relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



**Result**  
**Continuity**  
(between "3" and "4")

**8-53**



# ELECTRICAL COMPONENTS



## Continuity

Positive tester probe → sky blue "1"

Negative tester probe → black/yellow "2"

## No continuity

Positive tester probe → black/yellow "2"

Negative tester probe → sky blue "1"

## Continuity

Positive tester probe → sky blue "1"

Negative tester probe → blue/yellow "3"

## No continuity

Positive tester probe → blue/yellow "3"

Negative tester probe → sky blue "1"

## Continuity

Positive tester probe → sky blue "1"

Negative tester probe → light green "5"

## No continuity

Positive tester probe → light green "5"

Negative tester probe → sky blue "1"

## Continuity

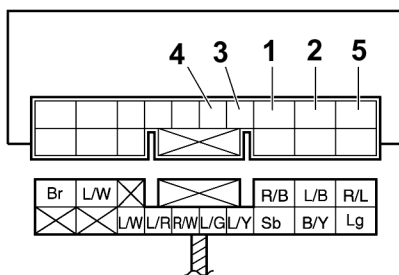
Positive tester probe → blue/green "4"

Negative tester probe → blue/yellow "3"

## No continuity

Positive tester probe → blue/yellow "3"

Negative tester probe → blue/green "4"



- Disconnect the relay unit coupler from the wire harness.
- Connect the pocket tester ( $\Omega \times 1$ ) to the relay unit terminal as shown.
- Check the relay unit (diode) for continuity.
- Check the relay unit (diode) for no continuity.

EAS28070

## CHECKING THE SPARK PLUG CAP

### 1. Check:

- Spark plug cap resistance
- Out of specification → Replace.



## Resistance

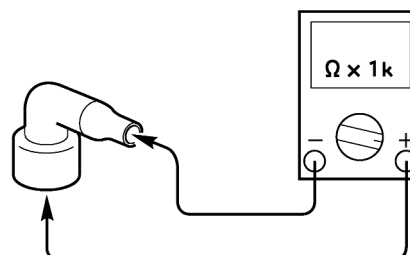
10.0 k $\Omega$  at 20 °C (68 °F)



- 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



- Measure the spark plug cap resistance.

EAS28100

## CHECKING THE IGNITION COIL

### 1. Check:

- Primary coil resistance
- Out of specification → Replace.



## Primary coil resistance

3.4-4.6  $\Omega$  at 20 °C (68 °F)



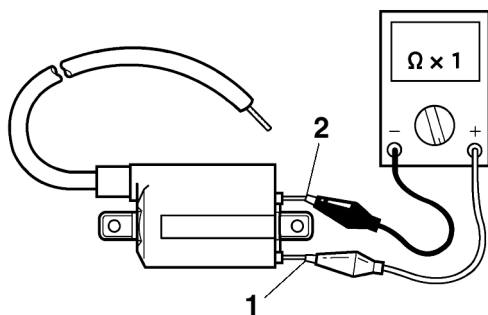
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ( $\Omega \times 1$ ) to the ignition coil as shown.



Pocket tester  
90890-03112

- Positive tester probe → red/black "1"
- Negative tester probe → orange "2"

## ELECTRICAL COMPONENTS



c. Measure the primary coil resistance.

2. Check:

- Secondary coil resistance
- Out of specification → Replace.



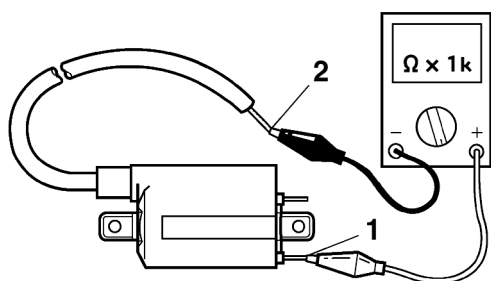
**Secondary coil resistance**  
10.4-15.6 kΩ at 20 °C (68 °F)

- Disconnect the spark plug cap from the ignition coil.
- Connect the pocket tester (Ω x 1k) to the ignition coil as shown.



**Pocket tester**  
90890-03112

- Positive tester probe → red/black “1”
- Negative tester probe → spark plug lead “2”



c. Measure the secondary coil resistance.

ET5YU1032

### CHECKING THE IGNITION SPARK GAP

1. Check:

- Ignition spark gap
- Out of specification → Perform the ignition system troubleshooting, starting with step 5. Refer to “TROUBLESHOOTING” on page 8-3.



**Minimum ignition spark gap**  
6.0 mm (0.24 in)

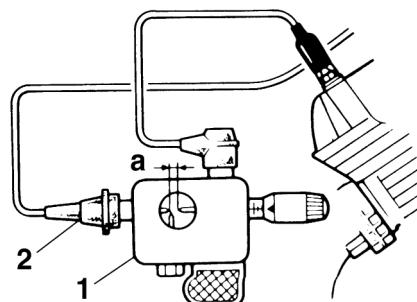
### NOTE:

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

- Disconnect the spark plug cap “2” from the spark plug.
- Connect the ignition checker “1” as shown.



**Ignition checker**  
90890-06754



2. Spark plug cap

- Turn the main switch to “ON” and engine stop switch to “O”.
- Measure the ignition spark gap “a”.
- Crank the engine by pushing the start switch “O” and gradually increase the spark gap until a misfire occurs.

EAS28120

### CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:

- Crankshaft position sensor coupler (from the wire harness)

2. Check:

- Crankshaft position sensor resistance
- Out of specification → Replace the crankshaft position sensor.



**Crankshaft position sensor resistance**  
192-288 Ω at 20 °C (68 °F)/  
blue/yellow-green/white

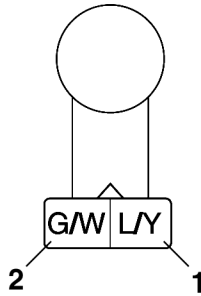
## ELECTRICAL COMPONENTS

- a. Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.



**Pocket tester**  
**90890-03112**

- Positive tester probe → blue/yellow “1”
- Negative tester probe → green/white “2”



- b. Measure the crankshaft position sensor resistance.

EAS28130

### CHECKING THE LEAN ANGLE CUT-OFF SWITCH

1. Remove:
  - Lean angle cut-off switch
2. Check:
  - Lean angle cut-off switch output voltage
 Out of specification → Replace.



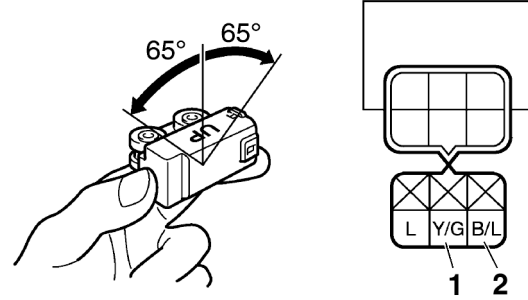
**Lean angle cut-off switch output voltage**  
**Less than 65°: 0.4–1.4 V**  
**More than 65°: 3.7–4.4 V**

- Connect the lean angle cut-off switch coupler to the lean angle cut-off switch.
- Connect the pocket tester (DC 20 V) to the lean angle cut-off switch coupler as shown.



**Pocket tester**  
**90890-03112**

- Positive tester probe → yellow/green “1”
- Negative tester probe → black/blue “2”



- Turn the lean angle cut-off switch to 65°.
- Measure the lean angle cut-off switch output voltage.

EAS28150

### CHECKING THE STATOR COIL

1. Disconnect:
  - Stator coil coupler (from the wire harness)
2. Check:
  - Stator coil resistance
 Out of specification → Replace the stator assembly.



**Stator coil resistance**  
**0.224–0.336  $\Omega$  at 20 °C (38 °F)**

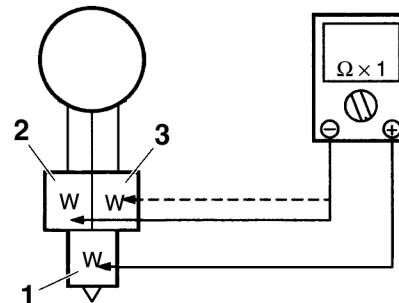
- Connect the pocket tester ( $\Omega \times 1$ ) to the stator coil coupler as shown.



**Pocket tester**  
**90890-03112**

- Positive tester probe → white “1”
- Negative tester probe → white “2”

- Positive tester probe → white “1”
- Negative tester probe → white “3”



- Measure the stator coil resistance.

EAS28180

## CHECKING THE HORN

1. Check:
  - Horn resistance
  - Out of specification → Replace.



**Coil resistance**  
1.15–1.25  $\Omega$  at 20 °C (68 °F)

- a. Disconnect the horn leads from the horn terminals.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the horn terminals.



**Pocket tester**  
90890-03112

- Positive tester probe → horn terminal
- Negative tester probe → horn terminal

- c. Measure the horn resistance.

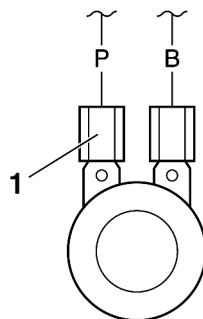
2. Check:
  - Voltage

- a. Disconnect the horn leads from the horn terminals.
- b. Connect the pocket tester (DC 20 V) to the horn leads.



**Pocket tester**  
90890-03112

- Positive tester probe → pink “1”
- Negative tester probe → ground



- c. Set the main switch to “ON”.
- d. Push the horn switch.
- e. Measure the voltage (DC 12 V) of pink at the horn terminal.

3. Check:
  - Horn sound
  - Faulty sound → Replace the horn.

- a. Disconnect the horn leads from the horn terminals.
- b. Connect a battery (12 V) to the horn terminals.

EAS28210

## CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
  - Coolant temperature sensor (from the engine)

### ⚠ WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.

2. Check:
  - Coolant temperature sensor resistance
  - Out of specification → Replace.

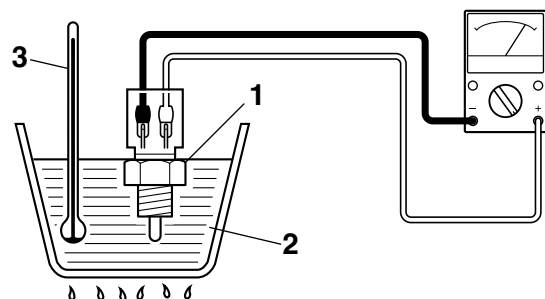


**Coolant temperature sensor resistance**  
2.28–2.63 k $\Omega$  at 20 °C (68 °F)  
0.305–0.331 k $\Omega$  at 80 °C (176 °F)  
0.138–0.145 k $\Omega$  at 110 °C (230 °F)

- a. Connect the pocket tester ( $\Omega \times 1k$ ) to the coolant temperature sensor terminal as shown.



**Pocket tester**  
90890-03112



- b. Immerse the coolant temperature sensor “1” in a container filled with water “2”.

## ELECTRICAL COMPONENTS

### NOTE:

Make sure that the coolant temperature sensor terminals do not get wet.

- Place a thermometer "3" in the water.
- Slowly heat the water, then let it cool down to the specified temperature.
- Measure the coolant temperature sensor resistance.



- Install:
  - Coolant temperature sensor



**Coolant temperature sensor**  
18 Nm (1.8 m·kg, 13 ft·lb)

EAS28230

### CHECKING THE FUEL SENDER

This model is equipped with a self-diagnosis device for the fuel sender circuit. If the fuel sender circuit is defective, the following cycle will be repeated until the malfunction is corrected.

- The fuel level warning light will flash four times and then go off for 3.0 seconds if the fuel sender circuit is in short circuit.
- The fuel level warning light will flash eight times and then go off for 3.0 seconds if the fuel sender circuit is interrupted or the coupler disconnected.

- Remove:
  - Fuel tank
- Disconnect:
  - Fuel pump coupler
  - Fuel sender coupler (from the wire harness)
- Remove:
  - Fuel pump (from the fuel tank)
- Check:
  - Fuel sender resistance  
Out of specification → Replace the fuel pump assembly.



**Fuel sender resistance**  
1.35–1.65 kΩ at 25 °C (77 °F)

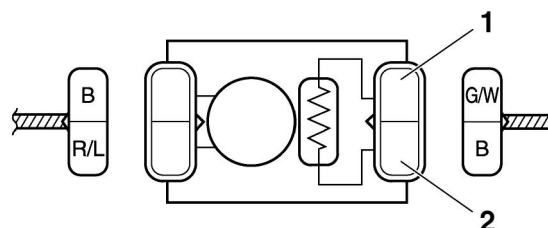


- Connect the pocket tester (Ω x 1k) to the fuel sender terminal as shown.



**Pocket tester**  
90890-03112

- Positive tester probe → green/white "1"
- Negative tester probe → black "2"



- Measure the fuel sender resistance.



EAS28240

### CHECKING THE SPEED SENSOR

- Check:
  - Speed sensor output voltage  
Out of specification → Replace.



**Output voltage reading cycle**  
0.6 V to 4.8 V to 0.6 V to 4.8 V

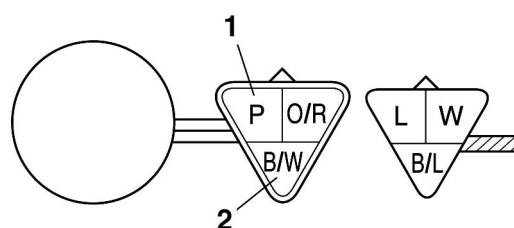


- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.



**Pocket tester**  
90890-03112

- Positive tester probe → pink "1"
- Negative tester probe → black/white "2"



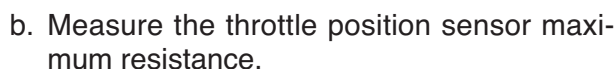
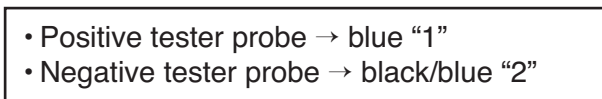
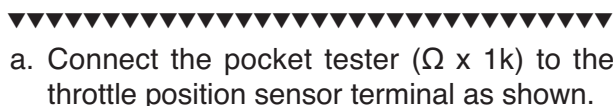
- Turn the main switch to "ON".
- Elevate the rear wheel and slowly rotate it.
- Measure the voltage (DC 5V) of pink and black/white. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.



- **Stop the engine before refueling.**
- **Do not smoke, and keep away from open flames, sparks, or any other source of fire.**
- **If you do accidentally spill gasoline, wipe it up immediately with dry rags.**
- **If gasoline touches the engine when it is hot, a fire may occur. Therefore, make sure the engine is completely cool before performing the following test.**

## 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.



- ### 3. Install:
- Throttle position sensor

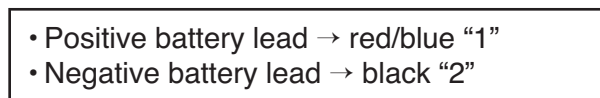
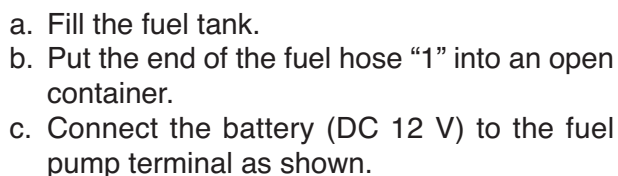
When installing the throttle position sensor, adjust its angle properly. Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.

## CHECKING THE FUEL PUMP

**⚠ WARNING**

**Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or fire. Be extremely careful and note the following points:**

1. Remove:
  - Fuel tank
2. Disconnect:
  - Fuel pump coupler
  - Fuel sender coupler (from the wire harness)
3. Check:
  - Fuel pump operation  
Faulty/rough movement → Replace.



## ELECTRICAL COMPONENTS

EAS28410

### CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
  - Intake air pressure sensor output voltage  
Out of specification → Replace.



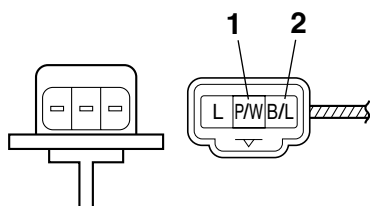
**Intake pressure sensor output voltage**  
**3.4-3.8 V**

- a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.



**Pocket tester**  
**90890-03112**

- Positive tester probe → pink/white “1”
- Negative tester probe → black/blue “2”



- b. Turn the main switch to “ON”.
- c. Measure the intake air pressure sensor output voltage.

EAS28410

### CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
  - Intake air temperature sensor (from the air filter case)

EW5YU1002

#### ⚠ WARNING

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. Check:
  - Intake air temperature sensor resistance  
Out of specification → Replace.



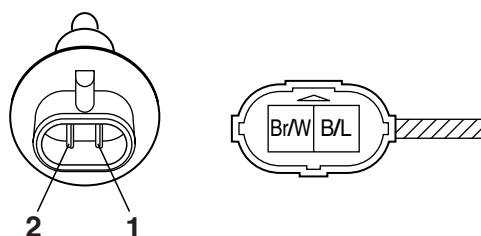
**Intake air temperature sensor resistance**  
**2.21-2.69  $\Omega$  at 20 °C (68 °F)**

- a. Connect the pocket tester ( $\Omega \times 100$ ) to the intake air temperature sensor terminal as shown.



**Pocket tester**  
**90890-03112**

- Positive tester probe → brown/white “1”
- Negative tester probe → black/blue “2”



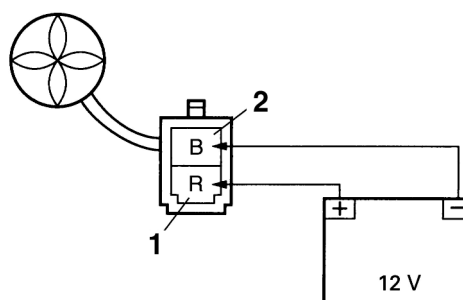
- b. Measure the intake air temperature sensor resistance.

### CHECKING THE RADIATOR FAN MOTOR

1. Check:
  - Radiator fan motor  
Faulty/rough movement → Replace.

- a. Disconnect the radiator fan motor coupler from the wire harness.
- b. Connect the battery (DC 12 V) as shown.

- Positive tester probe → red “1”
- Negative tester probe → black “2”

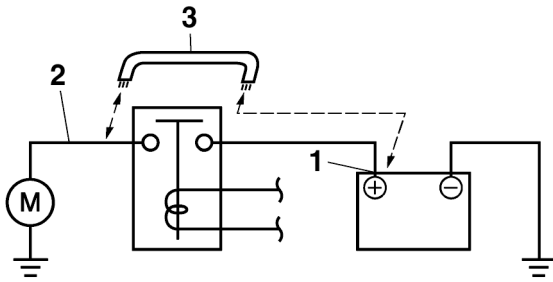


- c. Check the radiator fan motor movement.

## CHECKING THE STARTER MOTOR

1. Check:
  - Starter motor

- a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.



**⚠ WARNING**

- **A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.**

- b. Check the radiator fan motor movement.





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# TROUBLESHOOTING

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EAS28450

## TROUBLESHOOTING

EAS28460

### GENERAL INFORMATION

#### NOTE: \_\_\_\_\_

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470

### STARTING FAILURES

#### Engine

1. Cylinder and cylinder head
  - Loose spark plug
  - Loose cylinder head or cylinder
  - Damaged cylinder head gasket
  - Damaged cylinder gasket
  - Worn or damaged cylinder
  - Incorrect valve clearance
  - Improperly sealed valve
  - Incorrect valve-to-valve-seat contact
  - Incorrect valve timing
  - Faulty valve spring
  - Seized valve
2. Piston and piston ring(s)
  - Improperly installed piston ring
  - Damaged, worn or fatigued piston ring
  - Seized piston ring
  - Seized or damaged piston
3. Air filter
  - Improperly installed air filter
  - Clogged air filter element
4. Crankcase and crankshaft
  - Improperly assembled crankcase
  - Seized crankshaft

#### Fuel system

1. Fuel tank
  - Empty fuel tank
  - Clogged fuel tank drain hose
  - Deteriorated or contaminated fuel
2. Fuel pump
  - Faulty fuel pump
  - Faulty relay unit
3. Throttle body
  - Deteriorated or contaminated fuel
  - Sucked-in air

#### Electrical system

1. Battery
  - Discharged battery
  - Faulty battery
2. Fuse(s)
  - Blown, damaged or incorrect fuse
  - Improperly installed fuse
3. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
  - Worn or damaged insulator
  - Faulty spark plug cap
4. Ignition coil
  - Cracked or broken ignition coil body
  - Broken or shorted primary or secondary coils
  - Faulty spark plug lead
5. Ignition system
  - Faulty ECU
  - Faulty crankshaft position sensor
  - Broken A.C. magneto rotor woodruff key
6. Switches and wiring
  - Faulty main switch
  - Faulty engine stop switch
  - Broken or shorted wiring
  - Faulty neutral switch
  - Faulty start switch
  - Faulty sidestand switch
  - Faulty clutch switch
  - Improperly grounded circuit
  - Loose connections
7. Starting system
  - Faulty starter motor
  - Faulty starter relay
  - Faulty starting circuit cut-off 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
  - Improperly adjusted engine idling speed (throttle stop screw)
  - Improper throttle cable free play
  - Flooded throttle body
  - Faulty air induction system

## Electrical system

1. Battery
  - Discharged battery
  - Faulty battery
2. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
  - Worn or damaged insulator
  - Faulty spark plug cap
3. Ignition coil
  - Broken or shorted primary or secondary coils
  - Faulty spark plug lead
  - Cracked or broken ignition coil
4. Ignition system
  - Faulty ECU
  - Faulty crankshaft position sensor
  - Broken A.C. magneto rotor woodruff key

EAS28510

## POOR MEDIUM AND HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURES” on page 9-1.

### Engine

1. Air filter
  - Clogged air filter element

### Fuel system

1. Fuel pump
  - Faulty fuel pump

EAS28530

## FAULTY GEAR SHIFTING

### Shifting is difficult

Refer to “Clutch drags”.

EAS28540

## SHIFT PEDAL DOES NOT MOVE

### Shift shaft

- Improperly adjusted shift rod
- Bent shift shaft

### Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

### Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

EAS28550

## JUMPS OUT OF GEAR

### Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

### Shift forks

- Worn shift fork

### Shift drum

- Incorrect axial play
- Worn shift drum groove

### Transmission

- Worn gear dog

EAS28570

## FAULTY CLUTCH

### Clutch slips

1. Clutch
  - Improperly assembled clutch
  - Improperly adjusted clutch cable
  - Loose or fatigued clutch spring
  - Worn friction plate
  - Worn clutch plate
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (low)
  - Deteriorated oil

### Clutch drags

1. Clutch
  - Unevenly tensioned clutch springs
  - Warped pressure plate
  - Bent clutch plate
  - Swollen friction plate
  - Bent clutch push rod
  - Damaged clutch boss
  - Burnt primary driven gear bushing
  - Damaged clutch release cylinder
  - Match marks not aligned
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (high)
  - Deteriorated oil

EAS28590

## OVERHEATING

### Engine

1. Clogged coolant passages
2. Cylinder head and piston
  - Heavy carbon buildup
3. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity
  - Inferior oil quality

### Cooling system

1. Coolant
  - Low coolant level
2. Radiator
  - Damaged or leaking radiator
  - Faulty radiator cap
  - Bent or damaged radiator fin
3. Water pump
  - Damaged or faulty water pump
  - Thermostat
  - Thermostat stays closed
  - Damaged hose
  - Improperly connected hose
  - Damaged pipe
  - Improperly connected pipe

### Fuel system

1. Throttle body
  - Faulty throttle body
  - Damaged or loose throttle body joint
2. Air filter
  - Clogged air filter element

### Chassis

1. Brake(s)
  - Dragging brake

### Electrical system

1. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
2. Ignition system
  - Faulty ECU

EAS00856

## OVERCOOLING

### Cooling system

1. Thermostat
  - Thermostat stays open

EAS28620

## POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28660

## FAULTY FRONT FORK LEGS

### Leaking oil

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

### Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28670

## UNSTABLE HANDLING

1. Handlebar
  - Bent or improperly installed handlebar
2. Steering head components
  - Improperly installed upper bracket
  - Improperly installed lower bracket (improperly tightened ring nut)
  - Bent steering stem
  - Damaged ball bearing or bearing race
3. Front fork leg(s)
  - Uneven oil levels (both front fork legs)
  - Unevenly tensioned fork spring (both front fork legs)
  - Broken fork spring
  - Bent or damaged inner tube
  - Bent or damaged outer tube

## TROUBLESHOOTING

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4. Swingarm
  - Worn bearing or bushing
  - Bent or damaged swingarm
5. Rear shock absorber assembly
  - Faulty rear shock absorber spring
  - Leaking oil or gas
6. Tire(s)
  - Uneven tire pressures (front and rear)
  - Incorrect tire pressure
  - Uneven tire wear
7. Wheel(s)
  - Incorrect wheel balance
  - Deformed cast wheel
  - Damaged wheel bearing
  - Bent or loose wheel axle
  - Excessive wheel runout
8. Frame
  - Bent frame
  - Damaged steering head pipe
  - Improperly installed bearing race

EAS28710

### FAULTY LIGHTING OR SIGNALING SYSTEM

#### Headlight does not come on

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb
- Faulty headlight relay
- Faulty ECU

#### Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

#### Tail/brake light does not come on

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

#### Tail/brake light bulb burnt out

- Wrong tail/brake light bulb
- Faulty battery
- Tail/brake light bulb life expired

#### Turn signal does not come on

- Faulty turn signal switch
- Faulty turn signal/hazard relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

#### Turn signal flashes slowly

- Faulty turn signal/hazard relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

#### Turn signal remains lit

- Faulty turn signal/hazard relay
- Burnt-out turn signal bulb

#### Turn signal flashes quickly

- Incorrect turn signal bulb
- Faulty turn signal/hazard relay
- Burnt-out turn signal bulb

#### Horn does not sound

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

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## WIRING DIAGRAM

### MT-03 2006

1. Crankshaft position sensor
2. A.C. magneto
3. Neutral switch
4. Main switch
5. Rectifier/regulator
6. Wire plus lead
7. Battery
8. Main fuse
9. Starter relay
10. Starter motor
11. Wire minus lead
12. Relay unit
13. Starting circuit cut-off relay
14. Fuel injection system relay
15. Fuel injection diagnostic tool
16. Ignition coil
17. Spark plug
18. Fuel injector
19. Air induction system solenoid
20. Intake air temperature sensor
21. Coolant temperature sensor
22. ECU
23. Speed sensor
24. Throttle position sensor
25. Intake air pressure sensor
26. Lean angle cut-off switch
27. Multi-function meter unit
28. Neutral indicator light
29. Multi-function meter
30. Fuel level warning light
31. Turn signal indicator light
32. High beam indicator light
33. Coolant temperature warning light
34. Immobilizer system indicator light
35. Multi-function meter light
36. Engine trouble warning light
37. Fuel pump
38. Sidestand switch
39. Front brake light switch
40. Right handlebar switch
41. Engine stop switch
42. Start switch
43. Turn signal/hazard relay
44. Headlight relay
45. Clutch switch
46. Hazard switch
47. Turn signal switch
48. Dimmer switch
49. Pass switch
50. Horn switch
51. Left handlebar switch
52. Rear turn signal light (right)
53. Front turn signal light (right)
54. Front turn signal light (left)
55. Rear turn signal light (left)
56. Headlight
57. Horn
58. Tail/brake light
59. Auxiliary light
60. License light
61. Rear brake light switch
62. Radiator fan motor
63. Radiator fan motor relay
64. Parking lighting fuse
65. Headlight fuse
66. Signaling system fuse
67. Ignition fuse
68. Radiator fan motor fuse
69. Backup fuse (immobilizer unit, multi-function meter unit)
70. Fuel injection system fuse
71. Anti-theft alarm (optional)
72. Immobilizer unit



## COLOR CODE

	Black Noir Schwarz Nero Negro		Yellow Jaune Gelb Giallo Amarillo		Blue/Red Bleu/Rouge Blau/Rot Blu/Rosso Azul/Rojo
	Brown Brun Braun Marrone Marrón		Black/Blue Noir/Bleu Schwarz/Blau Nero/Blu Negro/Azul		Blue/White Bleu/Blanc Blau/Weiß Blu/Bianco Azul/Blanco
	Chocolate Chocolat Schokofarben Cioccolato Chocolate		Black/White Noir/Blanc Schwarz/Weiß Nero/Bianco Negro/Blanco		Blue/Yellow Bleu/Jaune Blau/Gelb Blu/Giallo Azul/Amarillo
	Dark green Vert foncé Dunkelgrün Verde scuro Verde oscuro		Black/Yellow Noir/Jaune Schwarz/Gelb Nero/Giallo Negro/Amarillo		Orange/Red Orange/Rouge Orange/Rot Aranjado/Rosso Naranja/Rojo
	Green Vert Grün Verde Verde		Brown/Blue Brun/Bleu Braun/Blau Marrone/Blu Marrón/Azu		Pink/White Rose/Blanc Rosa/Weiß Rosa/Bianco Rosa/Blanco
	Gray Gris Grau Grigio Gris		Brown/Red Brun/Rouge Braun/Rot Marrone/Rosso Marrón/Rojo		Red/Black Rouge/Noir Rot/Schwarz Rosso/Nero Rojo/Negro
	Blue Bleu Blau Blu Azul		Brown/White Brun/Blanc Braun/Weiß Marrone/Bianco Marrón/Blanco		Red/Green Rouge/Vert Rot/Grün Rosso/Verde Rojo/Verde
	Light green Vert clair Hellgrün Verde chiaro Verde claro		Green/Blue Vert/Bleu Grün/Blau Verde/Blu Verde/Azul		Red/Blue Rouge/Bleu Rot/Blau Rosso/Blu Rojo/Azul
	Orange Orange Orange Aranjado Naranja		Green/Red Vert/Rouge Grün/Rot Verde/Rosso Verde/Rojo		Red/White Rouge/Blanc Rot/Weiß Rosso/Bianco Rojo/Blanco
	Pink Rose Rosa Rosa Rosa		Green/White Vert/Blanc Grün/Weiß Verde/Bianco Verde/Blanco		Red/Yellow Rouge/Jaune Rot/Gelb Rosso/Giallo Rojo/Amarillo
	Red Rouge Rot Rosso Rojo		Green/Yellow Vert/Jaune Grün/Gelb Verde/Giallo Verde/Amarillo		Yellow/Black Jaune/Noir Gelb/Schwarz Giallo/Nero Amarillo/Negro
	Sky blue Bleu ciel Himmelblau Celeste Azul celeste		Blue/Black Bleu/Noir Blau/Schwarz Blu/Nero Azul/Negro		Yellow/Green Jaune/Vert Gelb/Grün Giallo/Verde Amarillo/Verde
	White Blanc Weiß Bianco Blanco		Blue/Green Bleu/Vert Blau/Grün Blu/Verde Azul/Verde		Yellow/Blue Jaune/Bleu Gelb/Blau Giallo/Blu Amarillo/Azul





MT-03 2006 WIRING DIAGRAM

