YAMAHA

YFM7FGPW

SERVICE MANUAL

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EBS00001

YFM7FGPW
SERVICE MANUAL

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LIT-11616-20-11

EBS00002

NOTICE

This manual was produced by the Yamaha Motor Company 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, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha vehicle has a basic understanding of the mechanical ideas and the procedures of vehicle repair. Repairs attempted by anyone without this knowledge are likely to render the vehicle unsafe and unfit for use.

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

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

NOTE:

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

EBS00003

IMPORTANT INFORMATION

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

⚠ 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 vehicle operator, a bystander or a person checking or repairing the vehicle.

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

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

EBS00004

HOW TO USE THIS MANUAL

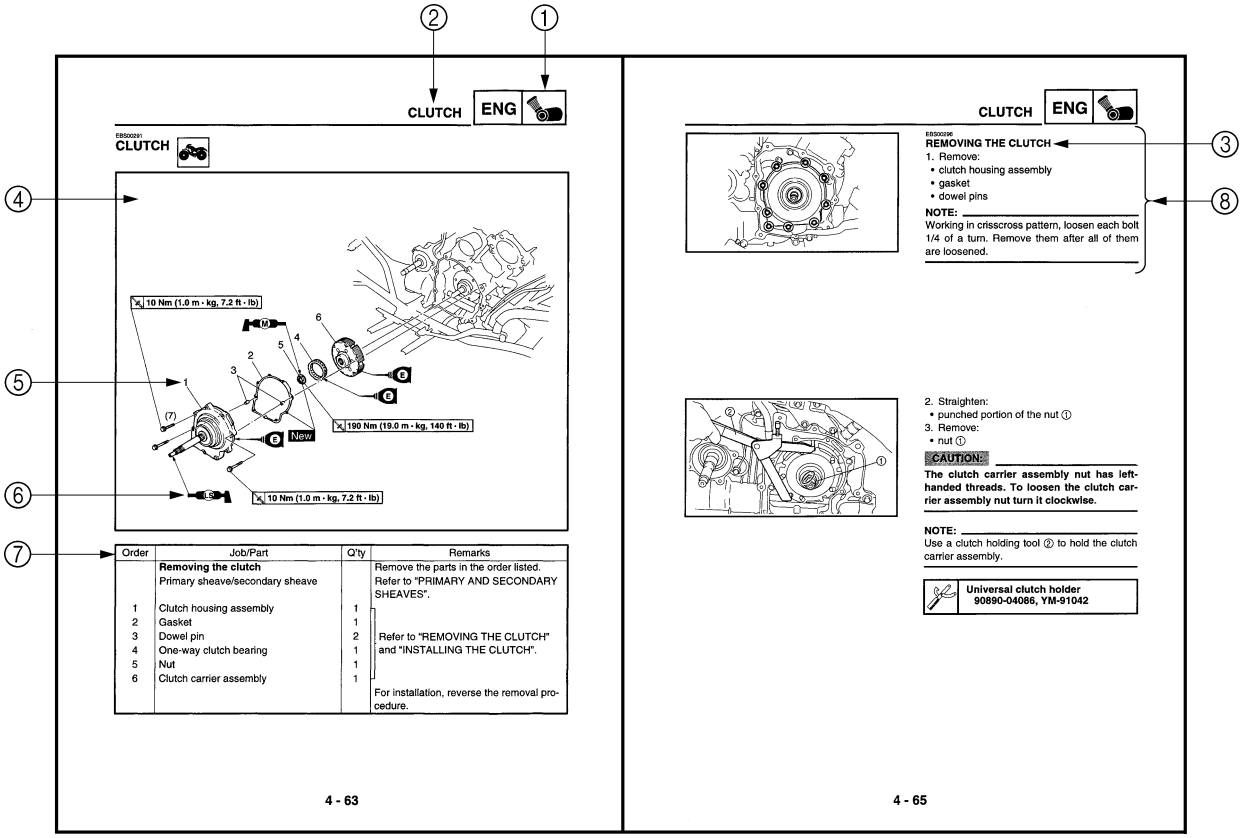
MANUAL ORGANIZATION

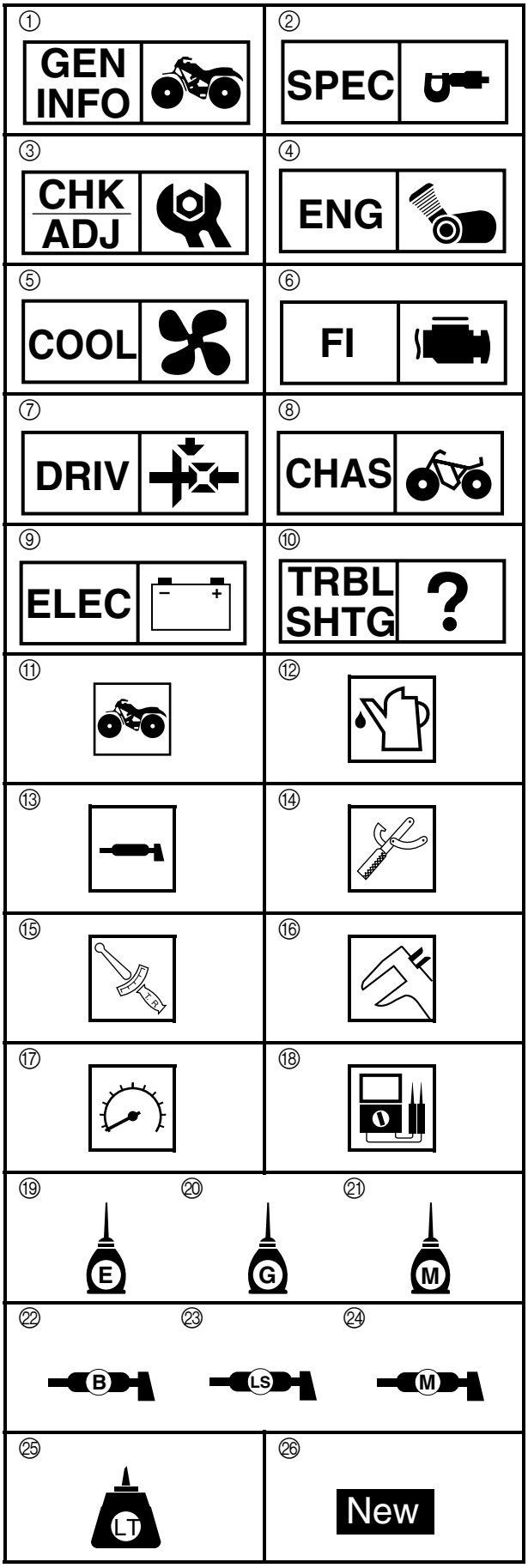
This manual consists of chapters for the main categories of subjects. (See “symbols”)
1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.
2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.
2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.
4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
5. For jobs requiring more information, the step-by-step format supplements ⑧ are given in addition to the exploded diagram and the job instruction chart.





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SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑩ indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Cooling system
⑥ Fuel injection system
⑦ Drive train
⑧ Chassis
⑨ Electrical
⑩ Troubleshooting

Symbols ⑪ to ⑱ indicate the following

⑪ Can be serviced with engine mounted
⑫ Filling fluid
⑬ Lubricant
⑭ Special tool
⑮ Torque
⑯ Wear limit, clearance
⑰ Engine speed
⑱ Electrical data (Ω, V, A)

Symbols ⑲ to ㉔ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑲ Apply engine oil
⑳ Apply gear oil
㉑ Apply molybdenum disulfide oil
㉒ Apply wheel bearing grease
㉓ Apply lithium-soap-based grease
㉔ Apply molybdenum disulfide grease

Symbols ㉕ to ㉖ in the exploded diagrams indicate where to apply a locking agent ㉕ and when to install a new part ㉖.

㉕ Apply the locking agent (LOCTITE®)
㉖ Replace

EBS00008

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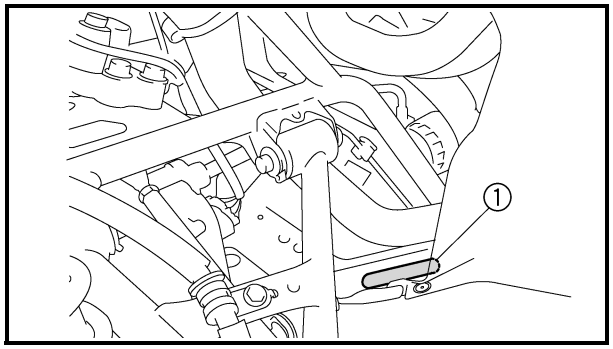
CHAPTER 7
DRIVE TRAIN

CHAPTER 8
CHASSIS

CHAPTER 9
ELECTRICAL

CHAPTER 10
TROUBLESHOOTING



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GENERAL INFORMATION

VEHICLE IDENTIFICATION

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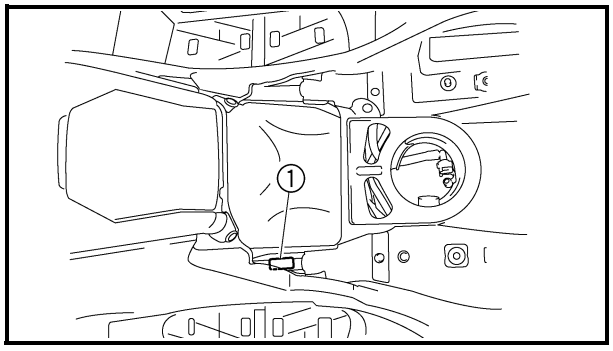
VEHICLE IDENTIFICATION NUMBER

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



EBS00011

MODEL LABEL

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

EAS20170
FEATURES

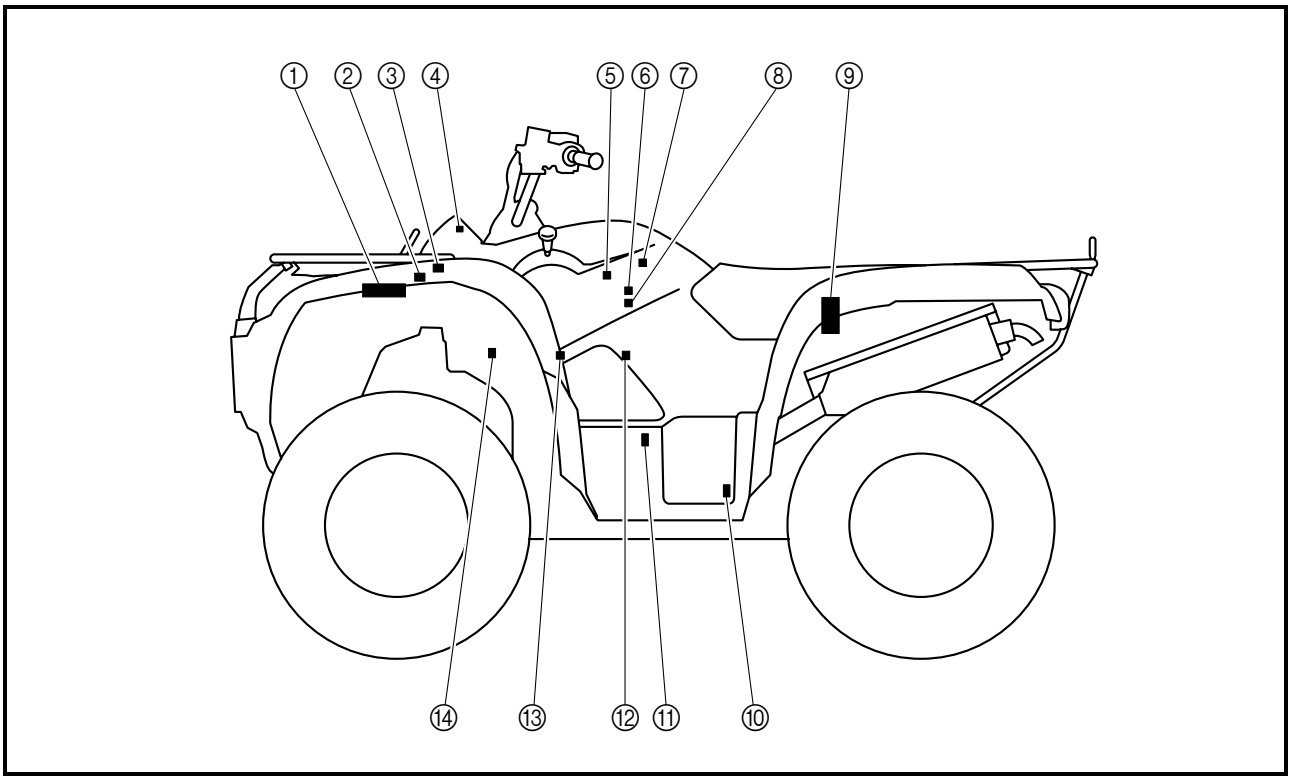
OUTLINE OF THE FI SYSTEM

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

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

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

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



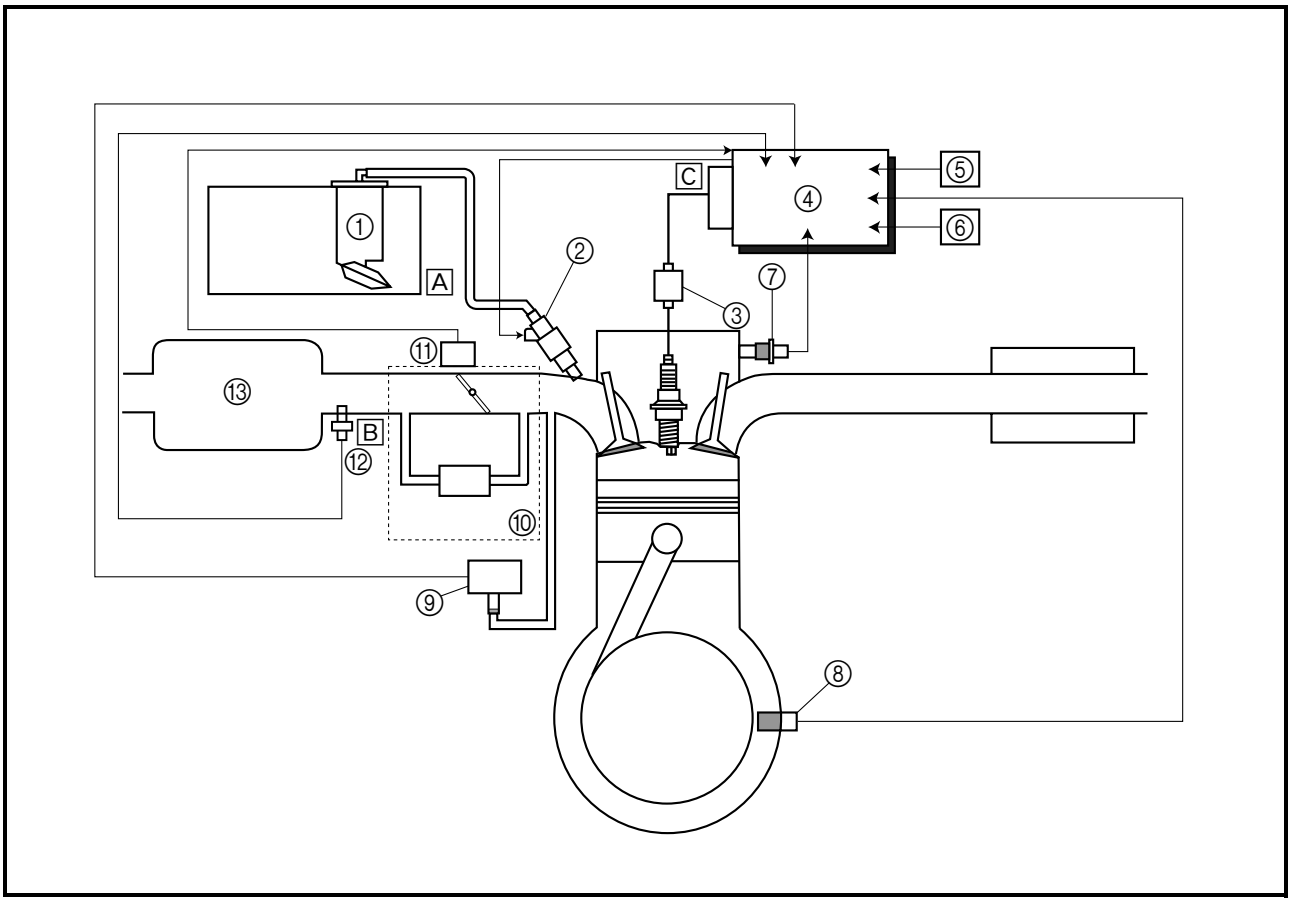
① ECU (engine control unit)
② Lean angle sensor
③ Fuel injection system relay
④ Engine trouble warning light
⑤ Intake air pressure sensor
⑥ TPS (throttle position sensor)
⑦ Intake air temperature sensor
⑧ Fuel injector
⑨ Fuel pump
⑩ Speed sensor
⑪ Crankshaft position sensor
⑫ Coolant temperature sensor
⑬ Spark plug
⑭ Ignition coil

FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kg/cm^2, 46.1 psi). Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

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

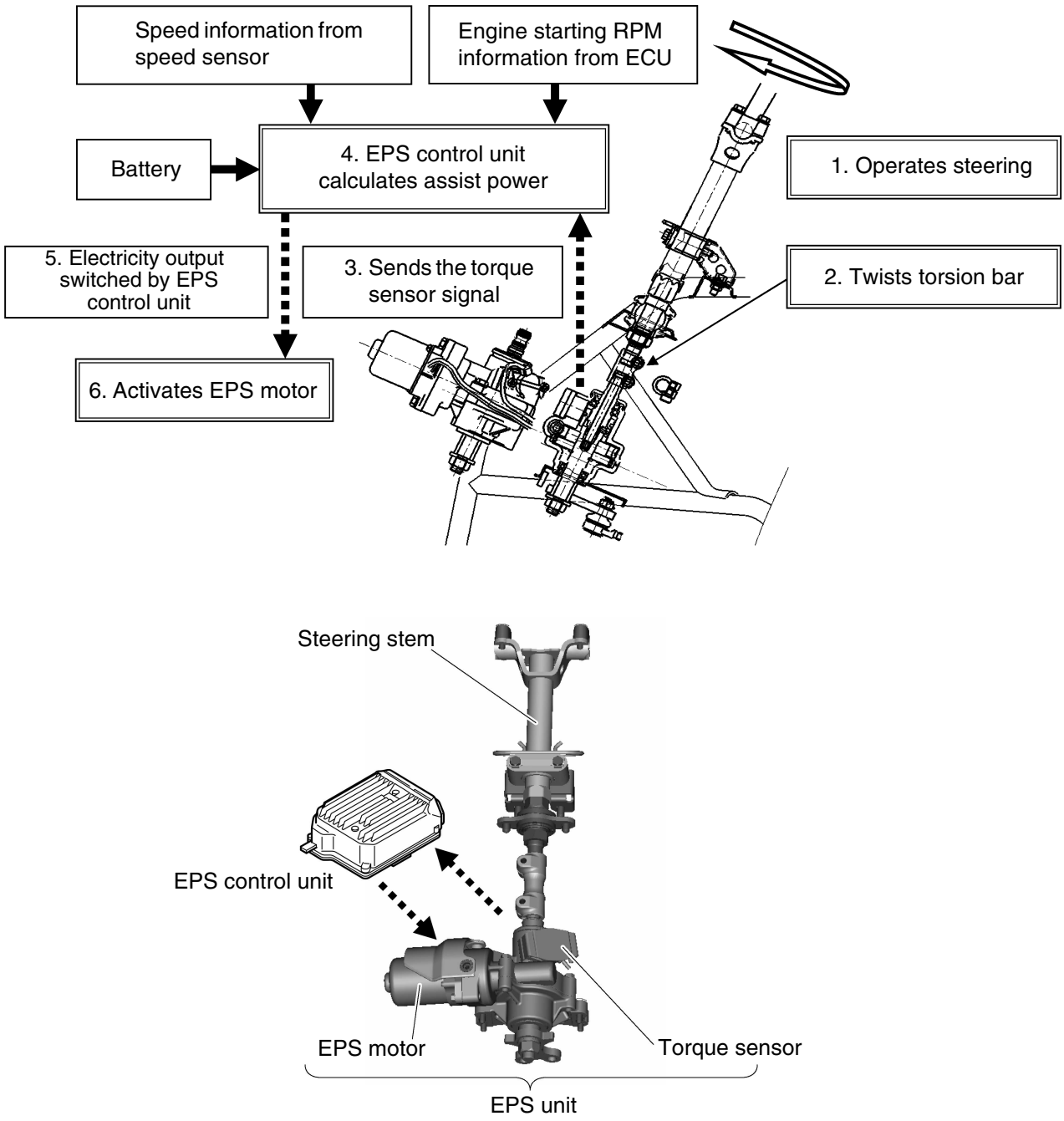
Illustration is for reference only.



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

A Fuel system
B Air system
C Control system

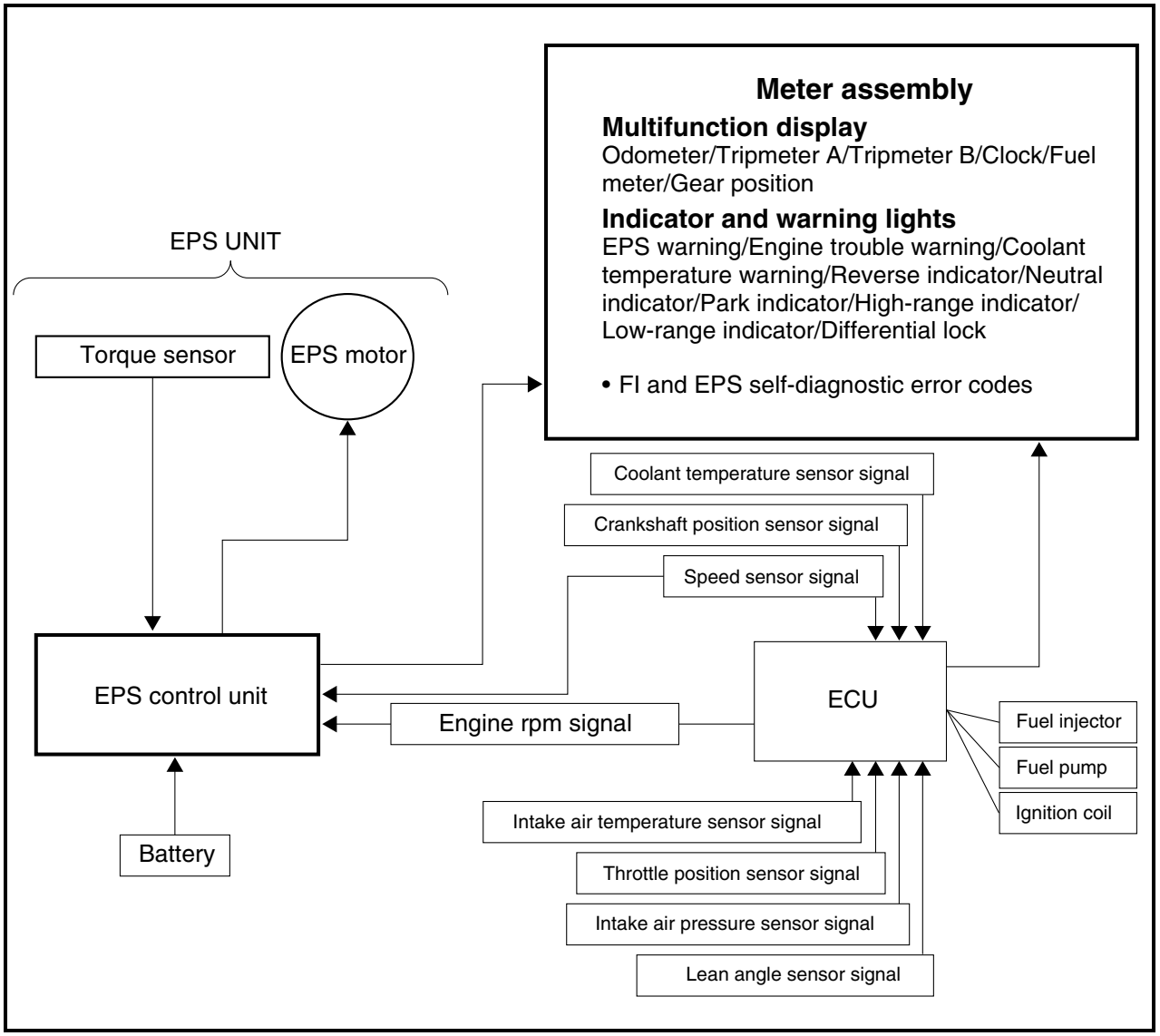
OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM

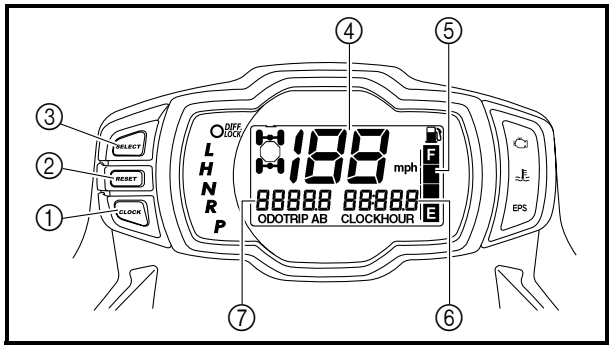


CAUTION:

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

EPS (ELECTRIC POWER STEERING) SYSTEM BLOCK DIAGRAM





INSTRUMENT FUNCTIONS

EBU27291

Multifunction display

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

The multifunction display is equipped with the following:

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

Odometer and tripmeter modes

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

ODO → TRIP A → TRIP B → ODO

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

NOTE:

Holding in the "SELECT" button and then turning the key to "ON" switches the display between "mph" and "km/h".

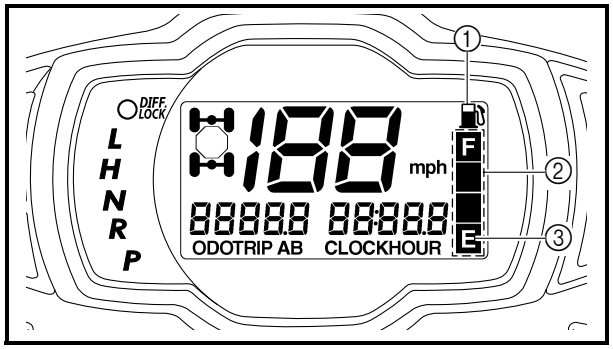
Clock mode

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

CLOCK → HOUR → CLOCK

To set the clock

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



Fuel meter

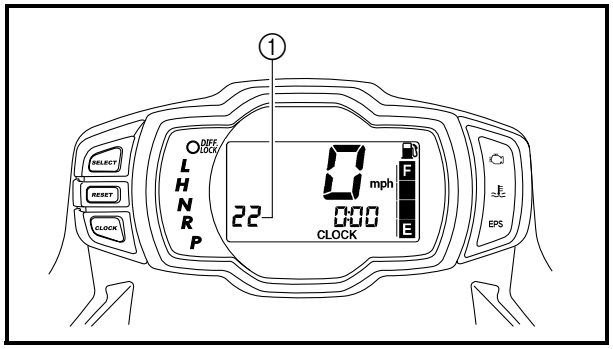
The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear from “F” (full) towards “E” (empty) as the fuel level decreases. When the “E” segment disappears and the fuel level warning indicator flashes, refuel as soon as possible.

NOTE:

This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, all the display segments and fuel level warning indicator will start flashing. If this occurs, check the electrical circuit.

Refer to “SIGNALING SYSTEM” in chapter 9.

① Fuel level warning indicator
② Fuel meter
③ “E” segment



Self-diagnosis device

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

If any of those circuits are defective, the multi-function display will indicate a two-digit error code. If the multifunction display indicates such an error code, note the code number, and check the vehicle.

ECB00810

CAUTION:

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

① Error code display

EBS00013

IMPORTANT INFORMATION

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”.
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.

EBS00014

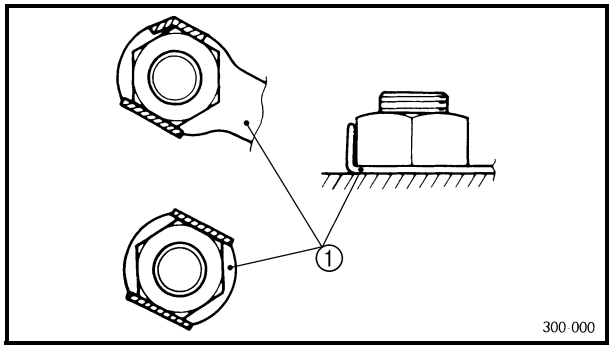
REPLACEMENT PARTS

1. 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.

EBS00015

GASKETS, OIL SEALS AND O-RINGS

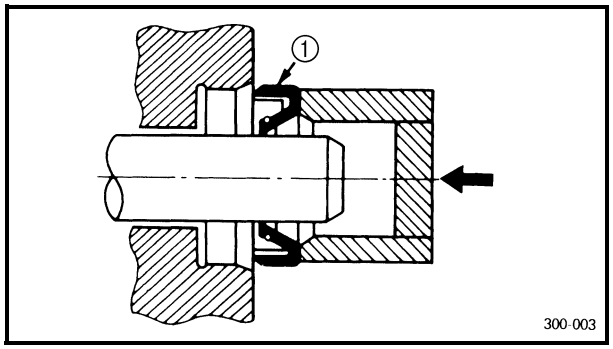
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly properly oil all mating parts and bearings, and lubricate the oil seal lips with grease.



EBS00016

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.



EBS00017

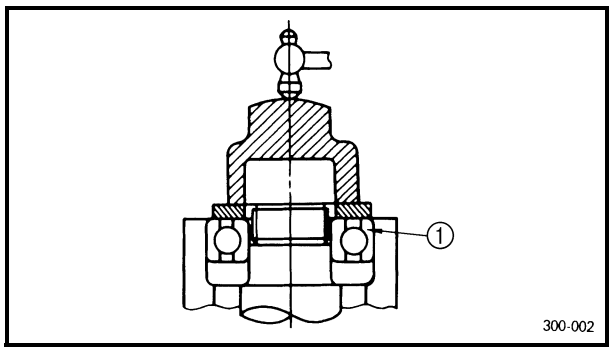
BEARINGS AND OIL SEALS

Install bearings and oil seals 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.

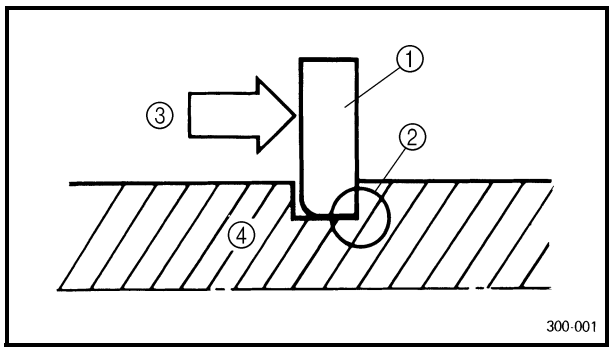
① Oil seal

CAUTION:

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



① Bearing

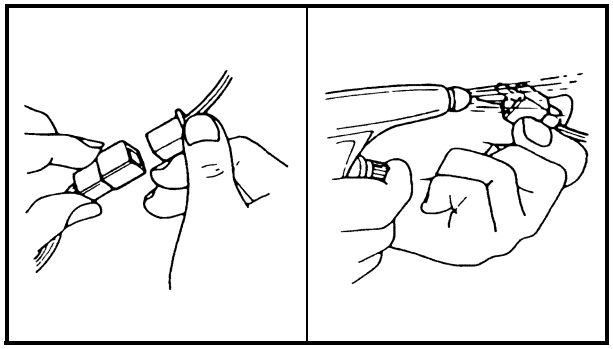


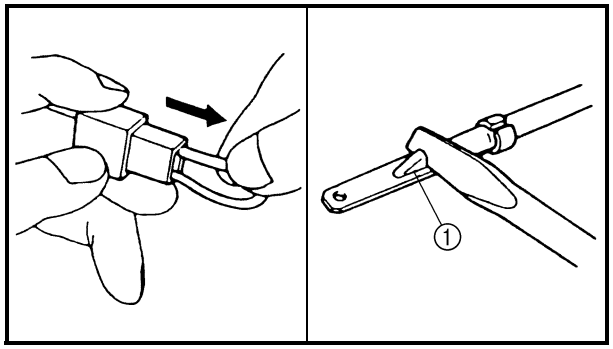
EBS00018

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.

④ Shaft



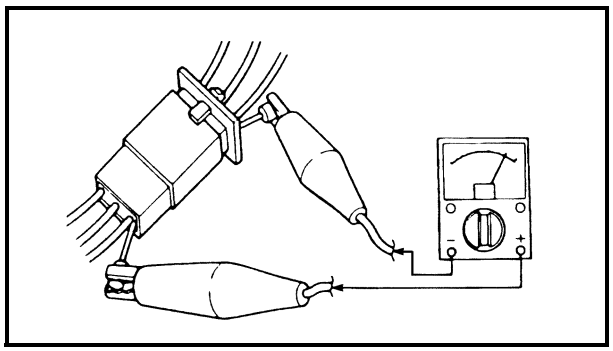


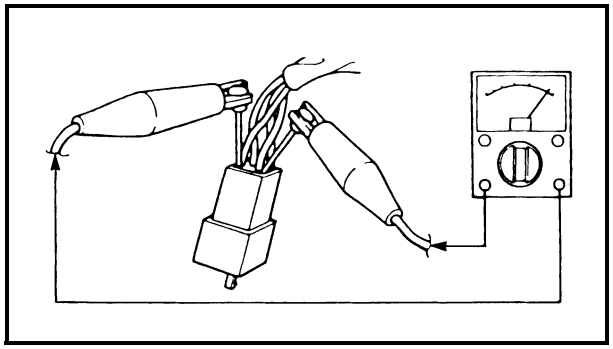
EBS00019
CHECKING THE CONNECTIONS
Check the leads, couplers, and connectors for stains, rust, moisture, etc.
1. Disconnect:
   - lead
   - coupler
   - connector
2. Check:
   - lead
   - coupler
   - connector
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.
3. Check:
   - all connections
   Loose connection → Connect properly.

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

4. Connect:
   - lead
   - coupler
   - connector

NOTE:
Make sure all connections are tight.





5. Check:
   - continuity (with the pocket tester)

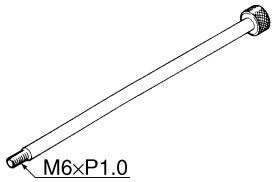
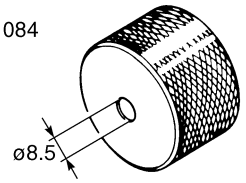
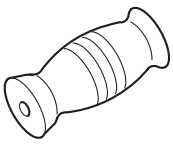
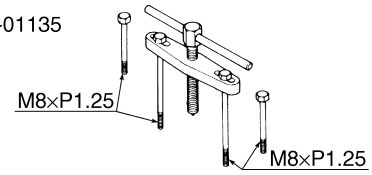
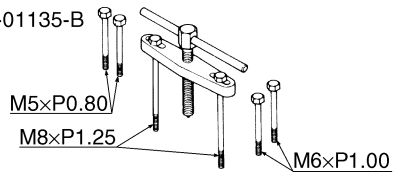
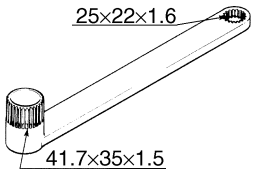
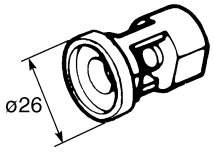
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

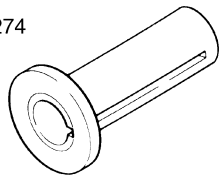
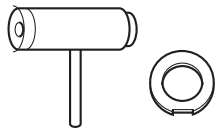
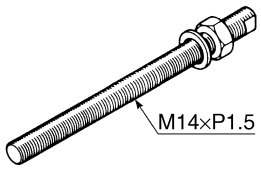
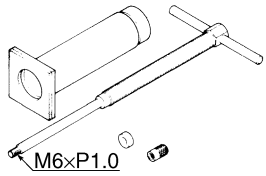
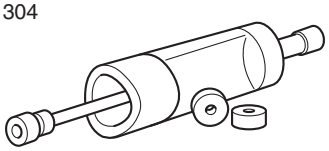
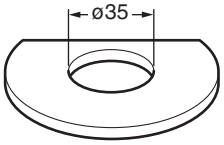
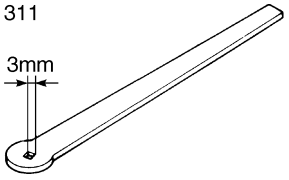
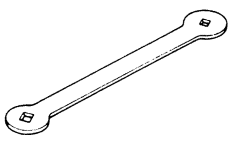
NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

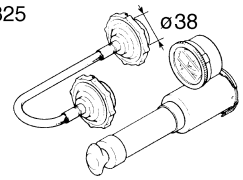
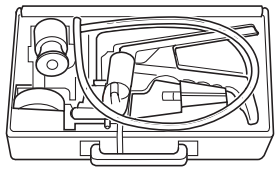
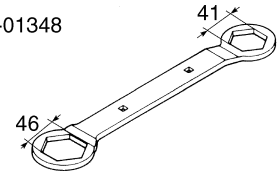
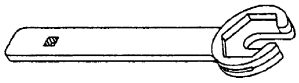
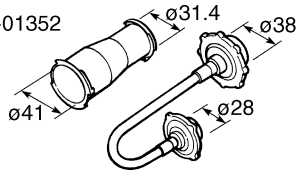
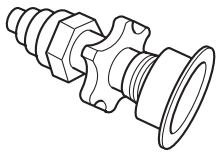
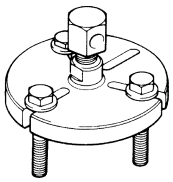
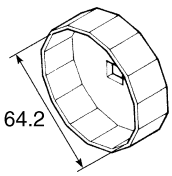
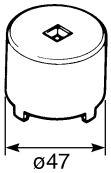
EBS00021

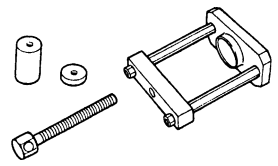
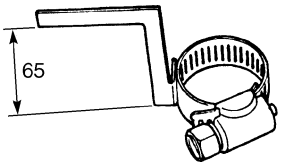
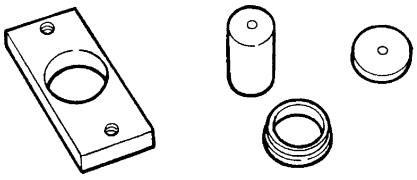
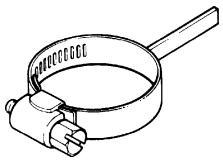
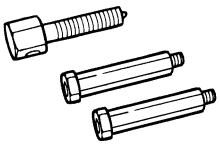
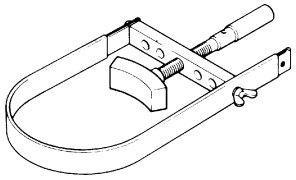
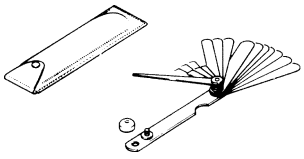
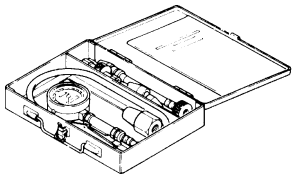
SPECIAL TOOLS

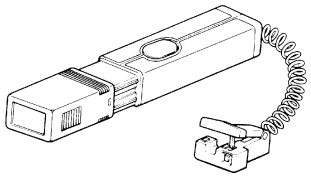
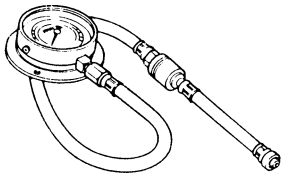
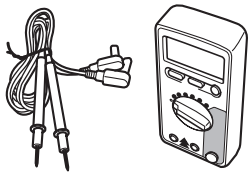
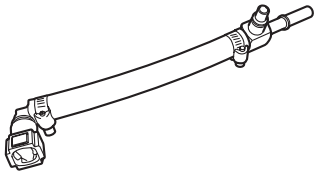
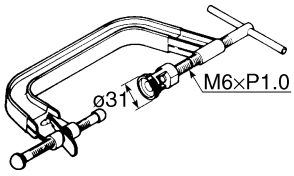
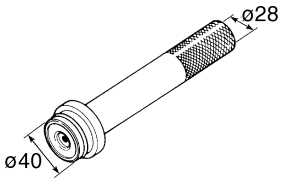
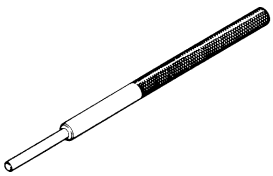
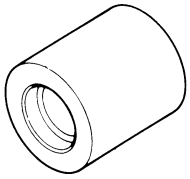
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.
When placing an order, refer to the list provided below to avoid any mistakes.
For US and CDN
P/N. YM-, YU-, YS-, YK-, ACC-
Except for US and CDN
P/N. 90890-

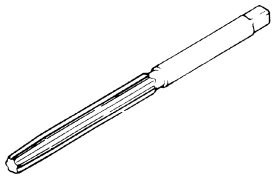
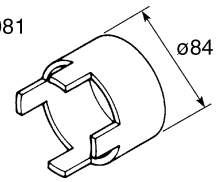
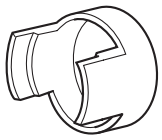
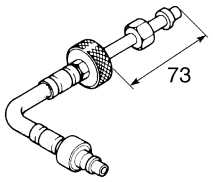
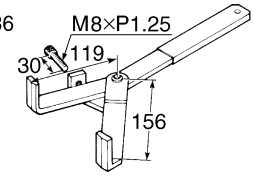
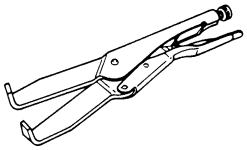
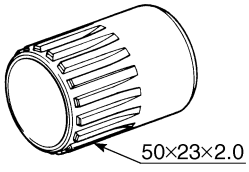
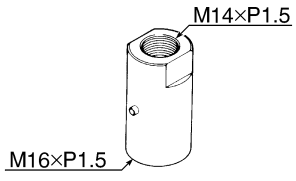
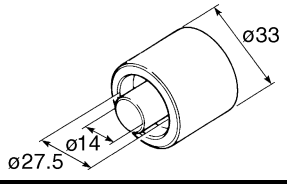
Tool No.	Tool name/How to use	Illustration
90890-01083 YU-01083-1	Slide hammer bolt Slide hammer bolt 6 mm This tool is used to remove the rocker arm shaft.	
90890-01084 YU-01083-3	Weight This tool is used to remove the rocker arm shaft.	90890-01084  YU-01083-3 
90890-01135 YU-01135-B	Crankcase separating tool Crankcase separator This tool is used to separate the crankcase.	90890-01135  YU-01135-B 
90890-01229 YM-01229	Coupling gear/middle shaft tool Gear holder This tool is needed when removing or installing the coupling gear nut.	
90890-01243 YM-01253-1	Valve spring compressor attachment Valve spring compressor adapter (26 mm) This tool is needed to remove and install the valve assemblies.	

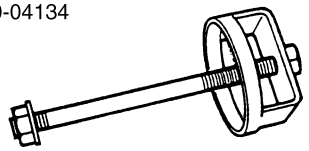
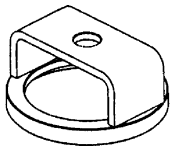
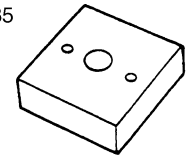
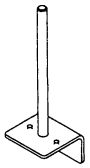
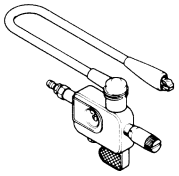
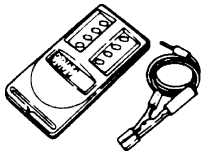
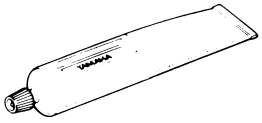
Tool No.	Tool name/How to use	Illustration
90890-01274 YU-90058 YU-90059	Crankshaft installer pot Installing pot Pot installer This tool is used to install the crankshaft.	90890-01274  YU-90058/YU-90059 
90890-01275 YU-90060	Crankshaft installer bolt Bolt This tool is used to install the crankshaft.	
90890-01304 YU-01304	Piston pin puller set Piston pin puller This tool is used to remove the piston pin.	90890-01304  YU-01304 
90890-01309 YU-90059	Spacer Pot spacer This tool is used to install the crankshaft.	
90890-01311 YM-08035-A	Tappet adjusting tool Valve adjuster 3 mm & 4 mm This tool is necessary for adjusting the valve clearance.	90890-01311  YM-08035-A 

Tool No.	Tool name/How to use	Illustration
90890-01325 YU-24460-01	Radiator cap tester Radiator pressure tester This tool is used to check the cooling system.	90890-01325  YU-24460-01 
90890-01348 YM-01348	Locknut wrench This tool is needed when removing or installing the secondary sheave spring.	90890-01348  YM-01348 
90890-01352 YU-33984	Radiator cap tester adapter Radiator pressure tester adapter This tool is used to check the cooling system.	90890-01352  YU-33984 
90890-01362 YU-33270-B	Flywheel puller Heavy duty puller This tool is used to remove the AC magneto rotor.	
90890-01426 YU-38411	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	
90890-01430 YM-38404	Ring nut wrench This tool is needed to removing and installing the middle driven shaft bearing retainer.	

Tool No.	Tool name/How to use	Illustration
90890-01474 YM-01474	Ball joint remover These tools are used to removing or installing the ball joints.	
90890-01475 YM-01475	Gear lash measurement tool Middle drive gear lash tool This tool is used to measure the gear lash.	
90890-01480 YM-01480	Ball joint remover attachment set Ball joint adapter set These tools are used to removing or installing the ball joints.	
90890-01511 YM-01230	Final gear backlash band Middle drive gear lash tool This tool is needed when measuring the final gear backlash.	
90890-01514 YM-01514	Ball joint remover short shaft set These tools are used to removing or installing the ball joints.	
90890-01701 YS-01880-A	Sheave holder Primary clutch holder This tool is needed to hold the primary sheave when removing or installing the sheave nuts.	
90890-03079 YM-34483	Thickness gauge Narrow gauge set This tool is used to measure the valve clearance.	
90890-03081 YU-33223	Compression gauge Engine compression tester This tool is needed to measure engine compression.	
90890-03112 YU-03112-C	Pocket tester Analog pocket tester This instrument is needed for checking the electrical systems.	

Tool No.	Tool name/How to use	Illustration
90890-03141 YU-03141	Timing light Inductive clamp timing light This tool is necessary for checking ignition timing.	
90890-03153 YU-03153	Pressure gauge This tool is used to measure fuel pressure.	
90890-03170 YM-03170	Belt tension gauge Rear drive belt tension gauge This tool is used to measure the steering tension.	
90890-03174 YU-A1927	Digital circuit tester Model 88 Multimeter with tachometer This tool is used to check the electrical systems.	
90890-03176 YM-03176	Fuel pressure adapter This tool is used to measure fuel pressure.	
90890-04019 YM-04019	Valve spring compressor This tool is used to remove or install the valve assemblies.	
90890-04058 YM-04058	Middle driven shaft bearing driver Bearing driver 40 mm This tool is used to install the water pump seal.	
90890-04064 YM-04064-A	Valve guide remover (ø6) Valve guide remover (6.0 mm) This tool is needed to remove and install the valve guides.	
90890-04065 YM-04065-A	Valve guide installer (ø6) Valve guide installer (6.0 mm) This tool is needed to install the valve guides.	

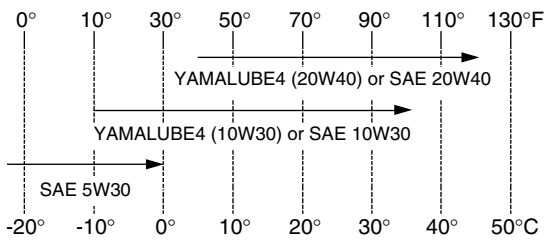
Tool No.	Tool name/How to use	Illustration
90890-04066 YM-04066	Valve guide reamer (ø6) Valve guide reamer (6.0 mm) This tool is needed to rebore the new valve guides.	
90890-04081 YM-91044	Spacer (crankshaft installer) Pot spacer This tool is used to install the crankshaft.	90890-04081  YM-91044 
90890-04082	Extension This tool is used to measure engine compression.	
90890-04086 YM-91042	Universal clutch holder This tool is needed to hold the clutch carrier when removing or installing the carrier nut.	90890-04086  YM-91042 
90890-04128 YM-04128	Bearing retainer wrench Middle gear bearing retainer This tool is needed when removing or installing the bearing retainers.	
90890-04130 YM-04059	Adapter (M16) Adapter #13 This tool is used to install the crankshaft.	
90890-04132 YM-33221-A	Mechanical seal installer Water pump seal installer This tool is used to install the water pump seal.	

Tool No.	Tool name/How to use	Illustration
90890-04134 YM-04134	Sheave spring compressor This tool is needed when removing or installing the secondary sheave spring.	90890-04134  YM-04134 
90890-04135 YM-04135	Sheave fixed block Sheave fixed bracket This tool is needed when removing or installing the secondary sheave spring.	90890-04135  YM-04135 
90890-06754 YM-34487	Ignition checker Opama pet-4000 spark checker This instrument is necessary for checking the ignition system components.	
90890-06760 YU-39951-B	Digital tachometer This tool is needed for checking engine rpm.	
90890-85505	Yamaha bond No. 1215 (Three bond No.1215®) This bond is used on crankcase mating surfaces, etc.	

EBS01001

SPECIFICATIONS

GENERAL SPECIFICATIONS

Item	Standard
Model code	3B41 3B45 3B48
Dimensions	
Overall length	2,065 mm (81.3 in)
Overall width	1,180 mm (46.5 in)
Overall height	1,240 mm (48.8 in)
Seat height	905 mm (35.6 in)
Wheelbase	1,250 mm (49.2 in)
Minimum ground clearance	275 mm (10.8 in)
Minimum turning radius	3,200 mm (126.0 in)
Basic weight	
With oil and fuel	294.0 kg (648 lb)
Engine	
Engine type	Liquid-cooled 4-stroke, SOHC
Cylinder arrangement	Forward-inclined single cylinder
Displacement	686.0 cm^3 (41.86 cu. in)
Bore × stroke	102.0 × 84.0 mm (4.02 × 3.31 in)
Compression ratio	9.20 : 1
Standard compression pressure (at sea level)	450 kPa (4.50 kg/cm^2, 64.0 psi)
Starting system	Electric starter
Lubrication system	Wet sump
Oil type or grade	
Engine oil	 API service SE, SF, SG type or higher JASO standard MA
Final gear oil	SAE 80 API GL-4 Hypoid gear oil
Differential gear oil	SAE 80 API GL-4 Hypoid gear oil

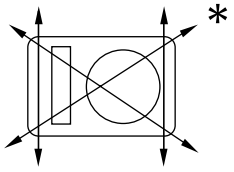
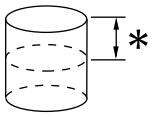
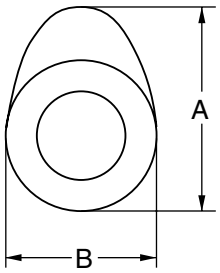
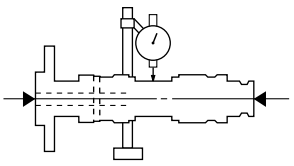
Item		Standard
Oil quantity		
Engine oil		
Periodic oil change		2.00 L (1.76 Imp qt, 2.11 US qt)
With oil filter replacement		2.10 L (1.85 Imp qt, 2.22 US qt)
Total amount		2.40 L (2.11 Imp qt, 2.54 US qt)
Final gear oil		
Periodic oil change		0.20 L (0.18 Imp qt, 0.21 US qt)
Total amount		0.25 L (0.22 Imp qt, 0.26 US qt)
Differential gear case oil		
Periodic oil change		0.215 L (0.19 Imp qt, 0.23 US qt)
Total amount		0.23 L (0.20 Imp qt, 0.24 US qt)
Radiator capacity (including all routes)		1.99 L (1.75 Imp qt, 2.10 US qt)
Air filter		Wet type element
Fuel		
Type		Unleaded gasoline only
Fuel tank capacity		20.0 L (4.40 Imp gal, 5.28 US gal)
Fuel reserve amount		4.5 L (0.99 Imp gal, 1.19 US gal)
Fuel injector		
Type/quantity		297500-1010/1
Manufacturer		DENSO
Spark plug		
Type/manufacturer		CPR7EA-9/NGK
Spark plug gap		0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Clutch type		Wet, centrifugal automatic
Transmission		
Primary reduction system		V-belt
Secondary reduction system		Shaft drive
Secondary reduction ratio		41/21 × 24/18 × 33/9 (9.544)
Transmission type		V-belt automatic
Operation		Left hand operation
Single speed automatic		2.380 ~ 0.700 : 1
Sub transmission ratio	low	31/16 (1.938)
	high	29/25 (1.160)
Reverse gear		23/14 × 28/23 (2.000)
Chassis		
Frame type		Steel tube frame
Caster angle		5.0°
Camber angle		0°
Kingpin angle		11.0°
Kingpin offset		0 mm (0 in)
Trail		26.0 mm (1.02 in)
Tread front (STD)		940.0 mm (37.01 in)
Tread rear (STD)		915.0 mm (37.01 in)
Toe-in (with tires touching the ground)		0 ~ 10.0 mm (0 ~ 0.39 in)

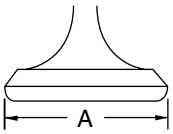
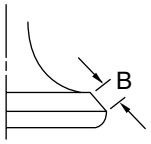
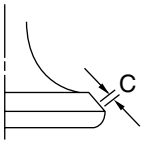
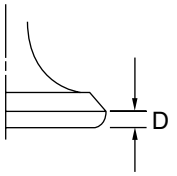
Item		Standard
Tire		
Type	front	Tubeless
	rear	Tubeless
Size	front	AT25 × 8-12
	rear	AT25 × 10-12
Manufacturer/model	front	DUNLOP/KT421
	rear	DUNLOP/KT425
Tire pressure (cold tire)		
Maximum load*		220.0 kg (485 lb)
Off-road riding	front	32 ~ 38 kPa (0.32 ~ 0.38 kg/cm^2, 4.6 ~ 5.5 psi)
	rear	27 ~ 33 kPa (0.27 ~ 0.33 kg/cm^2, 3.9 ~ 4.8 psi)
*Load is total weight of cargo, rider, accessories, and tongue		
Brake		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Dual disc brake
	operation	Left hand and right foot operation
Suspension		
Front suspension		Double wishbone
Rear suspension		Double wishbone
Shock absorber		
Front shock absorber		Coil spring/oil damper
Rear shock absorber		Coil spring/oil damper
Wheel travel		
Front wheel travel		180 mm (7.1 in)
Rear wheel travel		230 mm (9.1 in)
Electrical system		
Ignition system		Transistorized coil ignition (digital)
Generator system		AC magneto
Battery type		YTX20L-BS
Battery capacity		12 V 18.0 Ah
Bulb type		Halogen bulb

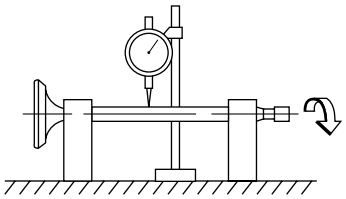
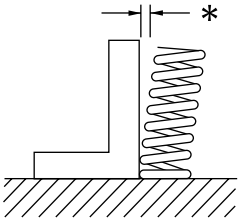
Item	Standard
Bulb voltage/wattage × quantity	
Headlight	12 V 35.0 W/35.0 W × 2
Tail/brake light	12 V 21.0/5.0 W × 1
Indicator light	
Neutral indicator light	LED
Reverse indicator light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED
EPS warning light	LED
Park indicator light	LED
On-command four-wheel drive/differential gear lock indicator	LCD
High-range indicator light	LED
Low-range indicator light	LED
Differential gear lock indicator light	LED

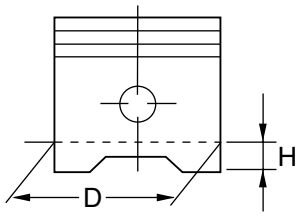
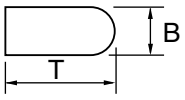
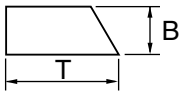
EBS01002

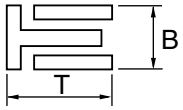
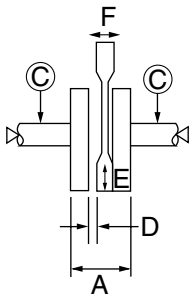
ENGINE SPECIFICATIONS

Item	Standard	Limit
Cylinder head		
Maximum warpage ∗ 	----	0.03 mm (0.0012 in)
Cylinder		
Bore	102.000 ~ 102.010 mm (4.0157 ~ 4.0161 in)	102.080 mm (4.0189 in)
Measuring point ∗ 	50.0 mm (1.97 in)	----
Maximum taper		0.05 mm (0.002 in)
Out of round		0.05 mm (0.002 in)
Camshaft		
Drive system	Chain drive (left)	----
Camshaft lobe dimensions 		
Intake measurement “A”	43.488 ~ 43.588 mm (1.7121 ~ 1.7161 in)	43.388 mm (1.7082 in)
“B”	36.959 ~ 37.059 mm (1.4551 ~ 1.4590 in)	36.859 mm (1.4511 in)
Exhaust measurement “A”	43.129 ~ 43.229 mm (1.6980 ~ 1.7019 in)	43.029 mm (1.6941 in)
“B”	37.007 ~ 37.107 mm (1.4570 ~ 1.4609 in)	36.907 mm (1.4530 in)
Maximum camshaft runout 	----	0.015 mm (0.0006 in)

Item	Standard	Limit
Timing chain		
Model/number of links	98XRH2010/126	----
Tensioning system	Automatic	----
Rocker arm/rocker arm shaft		
Rocker arm inside diameter	12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in)	----
Shaft outside diameter	11.981 ~ 11.991 mm (0.4717 ~ 0.4721 in)	----
Arm-to-shaft clearance	0.009 ~ 0.037 mm (0.0004 ~ 0.0015 in)	----
Rocker-arm-to-rocker-arm-shaft clearance	0.009 ~ 0.037 mm (0.0004 ~ 0.0015 in)	----
Valve, valve seat, valve guide		
Valve clearance–intake (cold)	0.09 ~ 0.13 mm (0.0035 ~ 0.0051 in)	----
Valve clearance–exhaust (cold)	0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in)	----
Valve dimensions		
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
Valve head diameter “A”		
Intake	37.90 ~ 38.10 mm (1.4921 ~ 1.5000 in)	----
Exhaust	31.90 ~ 32.10 mm (1.2559 ~ 1.2638 in)	----
Valve face width “B”		
Intake	2.26 mm (0.0890 in)	----
Exhaust	2.26 mm (0.0890 in)	----
Valve seat width “C”		
Intake	1.00 ~ 1.20 mm (0.0394 ~ 0.0472 in)	1.60 mm (0.0630 in)
Exhaust	1.00 ~ 1.20 mm (0.0394 ~ 0.0472 in)	1.60 mm (0.0630 in)
Valve margin thickness “D”		
Intake	0.80 ~ 1.20 mm (0.0315 ~ 0.0472 in)	----
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)	5.945 mm (0.2341 in)
Exhaust	5.960 ~ 5.975 mm (0.2346 ~ 0.2352 in)	5.930 mm (0.2335 in)
Valve guide inside diameter		
Intake	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.050 mm (0.2382 in)
Exhaust	6.000 ~ 6.012 mm (0.2362 ~ 0.2367 in)	6.050 mm (0.2382 in)

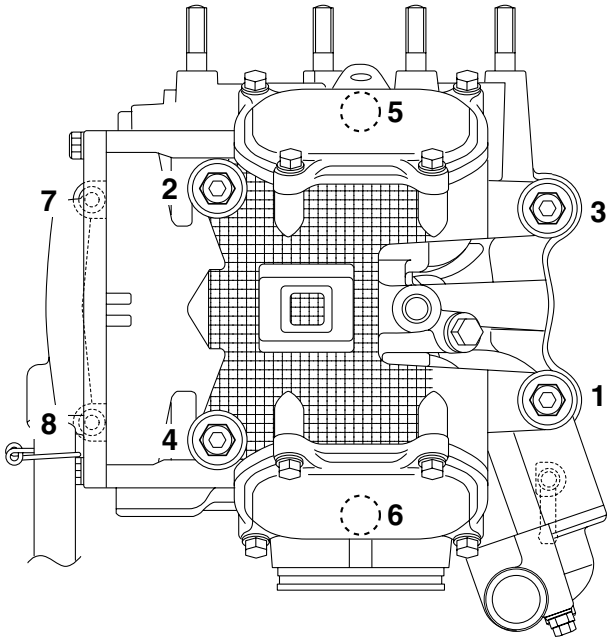
Item	Standard	Limit
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.080 mm (0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.100 mm (0.0039 in)
Valve stem runout	----	0.040 mm (0.0016 in)
		
Valve seat width		
Intake	1.00 ~ 1.20 mm (0.0394 ~ 0.0472 in)	1.60 mm (0.0630 in)
Exhaust	1.00 ~ 1.20 mm (0.0394 ~ 0.0472 in)	1.60 mm (0.0630 in)
Valve spring		
Free length		
Intake	38.79 mm (1.53 in)	36.85 mm (1.45 in)
Exhaust	38.79 mm (1.53 in)	36.85 mm (1.45 in)
Installed length (valve closed)		
Intake	35.00 mm (1.38 in)	----
Exhaust	35.00 mm (1.38 in)	----
Compressed spring force (installed)		
Intake	169 ~ 199 N (17.23 ~ 20.29 kgf, 37.99 ~ 44.73 lb)	----
Exhaust	169 ~ 199 N (17.23 ~ 20.29 kgf, 37.99 ~ 44.73 lb)	----
Spring tilt *		
		
Intake	----	2.5°/1.70 mm (2.5°/0.067 in)
Exhaust	----	2.5°/1.70 mm (2.5°/0.067 in)
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise	----

Item	Standard	Limit
Piston		
Piston-to-cylinder clearance	0.030 ~ 0.055 mm (0.0012 ~ 0.0022 in)	0.13 mm (0.0051 in)
Diameter "D" 	101.955 ~ 101.970 mm (4.0140 ~ 4.0146 in)	----
Height "H"	10.0 mm (0.39 in)	----
Offset	0.50 mm (0.0197 in)	----
Offset direction	Intake side	----
Piston pin bore inside diameter	23.004 ~ 23.015 mm (0.9057 ~ 0.9061 in)	23.045 mm (0.9073 in)
Piston pin outside diameter	22.991 ~ 23.000 mm (0.9052 ~ 0.9055 in)	22.971 mm (0.9044 in)
Piston-pin-to-piston-pin-bore clearance	0.004 ~ 0.024 mm (0.0002 ~ 0.0009 in)	0.074 mm (0.0029 in)
Piston rings		
Top ring 		
Ring type	Barrel	----
Dimensions (B × T)	1.20 × 3.80 mm (0.05 × 0.15 in)	----
End gap (installed)	0.20 ~ 0.35 mm (0.008 ~ 0.014 in)	0.60 mm (0.024 in)
Ring side clearance	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in)	0.12 mm (0.0047 in)
2nd ring 		
Ring type	Taper	----
Dimensions (B × T)	1.20 × 4.00 mm (0.05 × 0.16 in)	----
End gap (installed)	0.75 ~ 0.90 mm (0.030 ~ 0.035 in)	1.25 mm (0.049 in)
Ring side clearance	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in)	0.13 mm (0.0051 in)

Item	Standard	Limit
Oil ring  		
Dimensions (B × T)	2.50 × 2.80 mm (0.10 × 0.11 in)	----
End gap (installed)	0.20 ~ 0.70 mm (0.008 ~ 0.028 in)	----
Ring side clearance	0.060 ~ 0.150 mm (0.0024 ~ 0.0059 in)	----
Crankshaft  		
Crank width “A”	74.95 ~ 75.00 mm (2.951 ~ 2.953 in)	----
Maximum runout “C”	----	0.030 mm (0.0012 in)
Big end side clearance “D”	0.350 ~ 0.650 mm (0.0138 ~ 0.0256 in)	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 mm (0.0063 ~ 0.0157 in)	----
Balancer		
Balancer drive method	Gear	----
Automatic centrifugal clutch		
Clutch shoe thickness	1.5 mm (0.06 in)	1.0 mm (0.04 in)
Clutch-in revolution	1,850 ~ 2,250 r/min	----
Clutch-stall revolution	3,500 ~ 4,100 r/min	----
Transmission		
Maximum main axle runout	----	0.06 mm (0.0024 in)
Maximum drive axle runout	----	0.06 mm (0.0024 in)
Shifting mechanism		
Shift mechanism type	Shift drum and guide bar	----
Decompression device		
Device type	Auto decomp	----
Air filter oil grade	Foam air filter oil or equivalent oil	----
Throttle body		
Model/manufacturer × quantity	44EIS/MIKUNI × 1	----
Engine idle speed	1,550 ~ 1,650 r/min	----
Intake vacuum	35.0 kPa (263 mmHg, 10.3 inHg)	----

Item	Standard	Limit
Fuel pump		
Pump type	Electrical	----
Model/manufacturer	3B4/DENSO	----
Oil filter type	Cartridge (paper)	----
Oil pump		
Oil pump type	Trochoid	----
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.12 mm (0.0047 in)	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.090 ~ 0.170 mm (0.0035 ~ 0.0067 in)	0.24 mm (0.0094 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)	0.17 mm (0.0067 in)
Oil pressure (hot)	50.0 kPa at 1,600 r/min (0.50 kg/cm^2 at 1,600 r/min, 7.1 psi at 1,600 r/min)	----
Pressure check location	Cylinder head	----
Cooling system		
Radiator core		
Width	340.0 mm (13.39 in)	----
Height	248.2 mm (9.77 in)	----
Depth	22.0 mm (0.87 in)	----
Radiator cap opening pressure	93.3 ~ 122.7 kPa (0.933 ~ 1.227 kg/cm^2, 13.27 ~ 17.45 psi)	----
Coolant reservoir capacity		
Up to the maximum level mark	0.17 L (0.15 Imp qt, 0.18 US qt)	----
From low to full level	0.14 L (0.12 Imp qt, 0.15 US qt)	----
Water pump		
Water pump type	Single-suction centrifugal pump	----
Reduction ratio	32/31 (1.032)	----
Shaft drive		
Middle gear backlash	0.10 ~ 0.30 mm (0.004 ~ 0.012 in)	----
Final gear backlash	0.10 ~ 0.20 mm (0.0039 ~ 0.0079 in)	----
Differential gear backlash	0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in)	----

Cylinder head tightening sequence



EBS01003

CHASSIS SPECIFICATIONS

Item	Standard	Limit
Steering system		
Steering bearing type	Ball and race bearing	----
Steering tension	50 N (5.0 kgf)	----
Front suspension		
Shock absorber travel	90.7 mm (3.57 in)	----
Spring free length	292.0 mm (11.50 in)	----
Installed length	237.0 mm (9.33 in)	----
Spring rate (K1)	23.00 N/mm (2.35 kg/mm, 131.33 lb/in)	----
Spring stroke (K1)	0 ~ 90.7 mm (0 ~ 3.57 in)	----
Optional spring available	No	----
Rear suspension		
Shock absorber travel	109.2 mm (4.30 in)	----
Spring free length	314.5 mm (12.38 in)	----
Installed length	271.0 mm (10.67 in)	----
Spring rate (K1)	33.50 N/mm (3.42 kg/mm, 191.28 lb/in)	----
Spring rate (K2)	36.00 N/mm (3.67 kg/mm, 205.56 lb/in)	----
Spring stroke (K1)	0 ~ 46.5 mm (0 ~ 1.83 in)	----
Spring stroke (K2)	46.5 ~ 109.2 mm (1.83 ~ 4.30 in)	----
Optional spring available	No	----
Front wheel		
Type	Panel wheel	----
Rim size	12 × 6.0 AT	----
Rim material	Aluminum	----
Maximum radial wheel runout	----	2.0 mm (0.08 in)
Maximum lateral wheel runout	----	2.0 mm (0.08 in)
Rear wheel		
Type	Panel wheel	----
Rim size	12 × 7.5 AT	----
Rim material	Aluminum	----
Maximum radial wheel runout	----	2.0 mm (0.08 in)
Maximum lateral wheel runout	----	2.0 mm (0.08 in)

Item	Standard	Limit
Front disc brake		
Type	Dual	----
Disc outside diameter × thickness	220.0 × 3.5 mm (8.66 × 0.14 in)	----
Brake disc minimum thickness	3.0 mm (0.12 in)	----
Brake disc maximum deflection	0.1 mm (0.004 in)	----
Pad thickness inner	4.4 mm (0.17 in)	1.0 mm (0.04 in)
Pad thickness outer	4.4 mm (0.17 in)	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)	----
Caliper cylinder inside diameter	33.96 mm (1.34 in)	----
Brake fluid type	DOT 4	----
Rear disc brake		
Type	Dual	----
Disc outside diameter × thickness	205.0 × 3.5 mm (8.07 × 0.14 in)	----
Brake disc minimum thickness	3.0 mm (0.12 in)	----
Brake disc maximum deflection	0.1 mm (0.004 in)	----
Pad thickness inner	5.8 mm (0.23 in)	1.0 mm (0.04 in)
Pad thickness outer	5.8 mm (0.23 in)	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)	----
Caliper cylinder inside diameter	33.96 mm (1.34 in)	----
Brake fluid type	DOT 4	----
Brake lever and brake pedal		
Brake pedal position	56.7 mm (2.23 in)	----
Brake pedal free play	0 ~ 5.0 mm (0 ~ 0.20 in)	----
Throttle lever free play	3.0 ~ 5.0 mm (0.12 ~ 0.20 in)	----

EBS01004

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	----
Ignition system		
Ignition timing (B.T.D.C.)	12°/1,400 r/min	----
Advancer type	Digital	----
Transistorized coil ignition		
Crankshaft position sensor resistance/color	459 ~ 561 Ω at 20 °C (68 °F)/ black-green/yellow	----
ECU		
Model/manufacturer	3B4/MITSUBISHI	----
Ignition coil		
Model/manufacturer	JO226/DENSO	----
Minimum ignition spark gap	6.0 mm (0.24 in)	----
Primary coil resistance	3.4 ~ 4.6 Ω at 20 °C (68 °F)	----
Secondary coil resistance	10.4 ~ 15.6 kΩ at 20 °C (68 °F)	----
Spark plug cap		
Material	Resin	----
Resistance	10.0 kΩ	----
AC magneto		
Model/manufacturer	F4T393/MITSUBISHI	----
Standard output	14.0 V 35.0 A at 5,000 r/min	----
Stator coil resistance/color	0.108 ~ 0.132 Ω at 20 °C (68 °F)/ white-white	----
Rectifier/regulator		
Type	Semiconductor-short-circuit	----
Model/manufacturer	FH012AA/SHINDENGEN	----
No load regulated voltage (DC)	14.2 ~ 14.8 V	----
Rectifier capacity	50.0 A	----
Withstand voltage	40.0 V	----
Electric starting system		
Type	Constant mesh	----
Starter motor		
Model/manufacturer	SM-13/MITSUBA	----
Power output	0.80 kW	----
Armature coil resistance	0.0250 ~ 0.0350 Ω at 20 °C (68 °F)	----
Brush overall length	12.5 mm (0.49 in)	5.00 mm (0.20 in)
Spring force	7.65 ~ 10.01 N (780 ~ 1,021 gf, 27.54 ~ 36.03 oz)	----
Commutator diameter	28.0 mm (1.10 in)	27.0 mm (1.06 in)
Mica undercut	0.70 mm (0.03 in)	----

Item	Standard	Limit
Starter relay		
Model/manufacturer	2768113-A/JIDECO	----
Amperage rating	180.0 A	----
Coil winding resistance	4.18 ~ 4.62 Ω at 20 °C (68 °F)	----
Fuel gauge		
Sender unit resistance (full)	19.00 ~ 21.00 Ω	----
Sender unit resistance (empty)	139.00 ~ 141.00 Ω	----
Starting circuit cut-off relay		
Model/manufacturer	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Radiator fan motor relay		
Model/manufacturer	ACM33211/MATSUSHITA	----
Coil resistance	96.0 Ω	----
Circuit breaker		
Circuit breaker type	Fuse	----
Fuses		
Main fuse	40.0 A	----
Headlight fuse	15.0 A	----
Signaling system fuse	5.0 A	----
Ignition fuse	10.0 A	----
Auxiliary DC jack fuse	15.0 A	----
Fuel injection system fuse	15.0 A	----
Four-wheel-drive motor fuse	10.0 A	----
EPS fuse	40.0 A	----
Radiator fan motor fuse	15.0 A	----
Spare fuse	40.0 A	----
	15.0 A	----
	10.0 A	----
	5.0 A	----

EBS01005

TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES

Item	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Cylinder head (exhaust pipe)	Stud bolt	M8	4	15	1.5	11	
Cylinder head	Bolt	M9	4	35	3.5	25	M
Cylinder head	Bolt	M9	2	38	3.8	27	E
Cylinder head	Bolt	M6	2	10	1.0	7.2	
Spark plug	—	M10	1	13	1.3	9.4	
Oil gallery bolt	Union bolt	M8	1	10	1.0	7.2	
Cylinder	Bolt	M10	4	50	5.0	36	See NOTE. E
AC magneto rotor	Nut	M16	1	70	7.0	50	
Balancer driven gear	Nut	M18	1	80	8.0	58	Use a lock washer.
Thermostat cover	Bolt	M6	2	10	1.0	7.2	
Cylinder head air bleed bolt	Bolt	M6	1	10	1.0	7.2	
Valve adjusting screw	Nut	M6	4	14	1.4	10	
Decompression assembly	Bolt	M7	2	20	2.0	14	
Timing chain guide (intake side)	Bolt	M6	2	10	1.0	7.2	L
Timing chain tensioner cap	Bolt	M16	1	20	2.0	14	
Timing chain tensioner	Bolt	M6	2	10	1.0	7.2	
Bearing retainer (camshaft)	Bolt	M6	2	10	1.0	7.2	L
Camshaft sprocket cover	Bolt	M6	2	10	1.0	7.2	
Tappet cover	Bolt	M6	8	10	1.0	7.2	
Camshaft sprocket	Bolt	M7	2	20	2.0	14	
Crankcase	Bolt	M8	2	26	2.6	19	
	Bolt	M6	4	10	1.0	7.2	
	Bolt	M6	8	10	1.0	7.2	
Engine oil drain bolt	Bolt	M14	1	30	3.0	22	
Oil filter cartridge	—	M20	1	17	1.7	12	
Oil filter cartridge union bolt	Union bolt	M20	1	68	6.8	49	E
Oil delivery pipe	Union bolt	M14	2	35	3.5	25	
Oil delivery pipe	Union bolt	M10	1	20	2.0	14	
Oil pump	Bolt	M6	3	10	1.0	7.2	
Oil pump driven gear	Nut	M10	1	22	2.2	16	Use a lock washer.
Bearing retainer (crankcase)	Bolt	M6	2	10	1.0	7.2	L
Exhaust pipe protector	Bolt	M6	2	7	0.7	5.1	
Muffler and frame	Bolt	M8	1	20	2.0	14	
Muffler and muffler bracket	Bolt	M8	2	20	2.0	14	
Exhaust pipe	Nut	M8	4	20	2.0	14	
Water pump housing	Bolt	M6	2	10	1.0	7.2	
Coolant drain bolt	Bolt	M6	1	10	1.0	7.2	
Water pump air bleed bolt	Bolt	M6	1	10	1.0	7.2	

Item	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Water pump outlet pipe	Bolt	M6	1	10	1.0	7.2	
Water jacket joint	Bolt	M6	2	10	1.0	7.2	
Timing chain guide	Bolt	M6	2	10	1.0	7.2	
Crankshaft end accessing screw	—	M36	1	10	1.0	7.2	
Timing mark accessing screw	—	M14	1	6	0.6	4.3	
Drive belt cover	Bolt	M6	12	10	1.0	7.2	
Bearing housing (primary sheave assembly)	Bolt	M6	4	10	1.0	7.2	
AC magneto/crankshaft position sensor lead holder	Bolt	M5	2	7	0.7	5.1	
Starter one-way clutch	Screw	M8	3	30	3.0	22	
Clutch housing assembly	Bolt	M6	9	10	1.0	7.2	
Clutch carrier assembly	Nut	M22	1	190	19.0	140	Left-hand thread Stake. (M)
Middle drive pinion gear nut	Nut	M22	1	180	18.0	130	Stake.
Middle driven shaft bearing housing	Bolt	M8	4	32	3.2	23	
Middle drive shaft bearing retainer	Bolt	M6	4	29	2.9	21	
Front drive shaft coupling gear nut (middle gear side)	Nut	M16	1	115	11.5	85	
Middle driven shaft bearing retainer	Nut	M55	1	80	8.0	58	Left-hand thread
Middle driven pinion gear bearing retainer	Nut	M60	1	130	13.0	94	Left-hand thread
Rear drive shaft coupling gear nut (middle gear side)	Nut	M16	1	150	15.0	110	
Middle driven pinion gear bearing housing	Bolt	M8	4	25	2.5	18	
Primary sheave assembly	Nut	M16	1	140	14.0	100	
Secondary sheave spring retainer	Nut	M36	1	90	9.0	65	
Secondary sheave assembly	Nut	M16	1	100	10.0	72	
Shift lever 2 assembly	Bolt	M6	1	14	1.4	10	
Shift drum stopper	Bolt	M14	1	18	1.8	13	
Stopper lever stopper	Bolt	M14	1	18	1.8	13	
Stator coil assembly	Bolt	M6	3	7	0.7	5.1	
Crankshaft position sensor	Bolt	M5	2	7	0.7	5.1	
Coolant temperature sensor	—	M12	1	18	1.8	13	
Gear position switch	Bolt	M6	2	7	0.7	5.1	
Reverse switch	—	M10	1	17	1.7	12	
Speed sensor	Bolt	M6	1	10	1.0	7.2	

NOTE:

Temporarily tighten the cylinder bolts to 15 Nm (1.5 m · kg, 11 ft · lb) and then tighten them to 50 Nm (5.0 m · kg, 36 ft · lb).

EBS01006

CHASSIS TIGHTENING TORQUES

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Engine and front rubber damper	M10	42	4.2	30	
Engine and front rubber damper	M6	10	1.0	7.2	
Engine and rear rubber damper	M10	42	4.2	30	
Engine and rear rubber damper	M6	10	1.0	7.2	
Rubber damper and frame	M10	42	4.2	30	
Differential gear case and frame	M10	55	5.5	40	
Differential gear case and frame	M10	55	5.5	40	
Final gear case and frame	M10	55	5.5	40	
Radiator and frame	M6	7	0.7	5.1	
Coolant reservoir and frame	M6	7	0.7	5.1	
Shift arm	M6	14	1.4	10	
Select lever shift rod locknut	M8	15	1.5	11	
Select lever unit and frame	M6	7	0.7	5.1	
Select lever guide and frame	M6	7	0.7	5.1	
Front grill and front grill bracket	M6	7	0.7	5.1	
Front grill bracket and frame	M6	7	0.7	5.1	
Front fender and frame	M6	7	0.7	5.1	
Rear fender and frame	M6	7	0.7	5.1	
Radiator bracket and frame	M6	7	0.7	5.1	
Rear upper arm and frame	M10	45	4.5	32	LS
Rear lower arm and frame	M10	45	4.5	32	LS
Rear shock absorber and frame	M10	45	4.5	32	
Rear shock absorber and rear lower arm	M10	45	4.5	32	
Rear knuckle and rear upper arm	M10	45	4.5	32	
Rear knuckle and rear lower arm	M10	45	4.5	32	
Rear brake hose guide and rear lower arm	M6	7	0.7	5.1	
Stabilizer joint and stabilizer	M10	50	5.0	36	
Stabilizer joint and rear lower arm	M10	50	5.0	36	
Stabilizer holder and frame	M8	30	3.0	22	
Rear arm protector and rear lower arm	M6	7	0.7	5.1	
Front upper arm and frame	M10	45	4.5	32	LS
Front lower arm and frame	M10	45	4.5	32	LS
Front shock absorber and frame	M10	45	4.5	32	
Front shock absorber and front lower arm	M10	45	4.5	32	
Front brake hose holder and front upper arm	M6	7	0.7	5.1	
Select lever shift rod end	M10	15	1.5	11	Left-hand thread
Steering stem bushing and steering stem bracket	M8	23	2.3	17	
Steering stem joint bolt	M8	30	3.0	22	
EPS unit and frame	M8	30	3.0	22	
Steering stem bracket and frame	M10	50	5.0	36	
Steering stem bearing and frame	M10	50	5.0	36	

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Pitman arm nut	M16	210	21.0	150	
EPS motor cover	M6	7	0.7	5.1	
Pitman arm and tie-rod	M10	25	2.5	18	
Steering knuckle and tie-rod	M10	25	2.5	18	
Steering knuckle and front lower arm	M12	30	3.0	22	
Front arm protector and front lower arm	M6	7	0.7	5.1	
Fuel tank and fuel pump	M6	7	0.7	5.1	
Fuel tank and frame	M6	7	0.7	5.1	
Fuel tank side cover and frame	M6	7	0.7	5.1	
Front wheel and front wheel hub	M10	55	5.5	40	
Front wheel axle nut	M20	260	26.0	190	Stake.
Front brake caliper and steering knuckle	M8	30	3.0	22	
Front brake caliper bleed screw	M8	5	0.5	3.6	
Front brake disc and front wheel hub	M8	30	3.0	22	
Rear brake disc and rear wheel hub	M8	30	3.0	22	
Rear wheel and rear wheel hub	M10	55	5.5	40	
Rear wheel axle nut	M20	260	26.0	190	Stake.
Rear brake caliper and rear knuckle	M8	30	3.0	22	
Rear brake caliper bleed screw	M8	5	0.5	3.6	
Brake pad holding bolt	M6	17	1.7	12	
Rear knuckle and brake disc guard	M6	7	0.7	5.1	
Steering knuckle and brake disc guard	M6	7	0.7	5.1	
Brake master cylinder and brake master cylinder holder	M6	7	0.7	5.1	
Brake lever pivot	M6	6	0.6	4.3	Silicone grease
Handlebar holder and steering shaft	M8	20	2.0	14	
Brake hose joint and frame	M6	10	1.0	7.2	
Brake hose joint and brake hose	M10	19	1.9	13	
Brake hose union bolt	M10	27	2.7	19	
Rear knuckle and brake hose protector	M6	7	0.7	5.1	
Footrest bracket and frame	M10	53	5.3	38	
Footrest board and footrest bracket	M6	7	0.7	5.1	
Footrest and footrest board	M6	7	0.7	5.1	
Brake pedal adjusting nut	M6	7	0.7	5.1	
Shift control cable and shift lever cover	M14	17	1.7	12	
Front guard and frame	M8	26	2.6	19	
Front carrier and front guard	M8	26	2.6	19	
Front carrier and front carrier bracket	M8	26	2.6	19	
Front carrier bracket and frame	M8	26	2.6	19	
Front carrier and front fender	M6	7	0.7	5.1	
Rear carrier and rear carrier bracket	M8	34	3.4	24	
Rear carrier bracket and frame	M10	48	4.8	35	

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Rear carrier and rear fender	M6	7	0.7	5.1	
Engine skid plates	M6	7	0.7	5.1	
Trailer hitch and frame	M10	55	5.5	40	
Battery holding bracket	M6	7	0.7	5.1	
Battery bracket and fitting screw	M6	7	0.7	5.1	
Fitting screw and frame	M6	7	0.7	5.1	
Electrical components tray and frame	M6	7	0.7	5.1	
Differential gear case filler bolt	M14	23	2.3	17	
Differential gear case drain bolt	M10	10	1.0	7.2	
Differential gear case cover and differential gear case	M8	24	2.4	17	
Differential gear motor and differential gear case cover	M6	11	1.1	8.0	
Front drive shaft coupling gear and differential drive pinion gear	M14	62	6.2	45	
Final gear case filler plug	M14	23	2.3	17	
Final gear case drain bolt	M14	23	2.3	17	
Final gear oil level check bolt	M8	10	1.0	7.2	
Final gear case and final gear case cover	M8	23	2.3	17	
Final drive pinion gear bearing housing and final gear case	M8	23	2.3	17	

EBS00022

HOW TO USE THE CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS.
Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMPERIAL
** mm	×	0.03937	=	** in
2 mm	×	0.03937	=	0.08 in

CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Torque	m · kg m · kg cm · kg cm · kg	7.233 86.794 0.0723 0.8679	ft · lb in · lb ft · lb in · lb
Weight	kg g	2.205 0.03527	lb oz
Speed	km/hr	0.6214	mph
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu · in qt (IMP liq.) gal (IMP liq.)
Misc.	kg/mm kg/cm^2 Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in^2) Fahrenheit (°F)

EBS00023

GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

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

EBS00024

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
Bearings	E
O-ring	LS
Cylinder head bolts	M
Crankshaft pin	E
Connecting rod big end thrust surface	E
Crankshaft sprocket	M
Inner race (crankshaft)	E
Buffer boss (crankshaft)	E
Crankshaft seal	E
Piston pin	E
Piston and ring groove	E
Valve stems (intake and exhaust)	M
Valve stem ends (intake and exhaust)	M
Rocker arm shafts	E
Camshaft lobes	M
Decompressor lever pin	E
Decompressor lever spring	E
Rocker arms (intake and exhaust)	M
Oil pump shaft	E
O-ring (oil filter cartridge)	LS
Water pump impeller shaft	M
Dipstick mating surface	E
Starter idler gear inner surface	E
Starter idler gear shaft	E
Starter wheel gear	E
Torque limiter	E
Clutch housing shaft end	LS
Clutch carrier assembly	E
One-way clutch bearing	E
Clutch dog and middle drive gear	M
Reverse idle gear shaft	E
Middle driven shaft splines	M
Shift drum	E
Shift forks and shift fork guide bar	E
Ball (shift drum stopper)	E
Stopper lever and stopper lever shaft	E

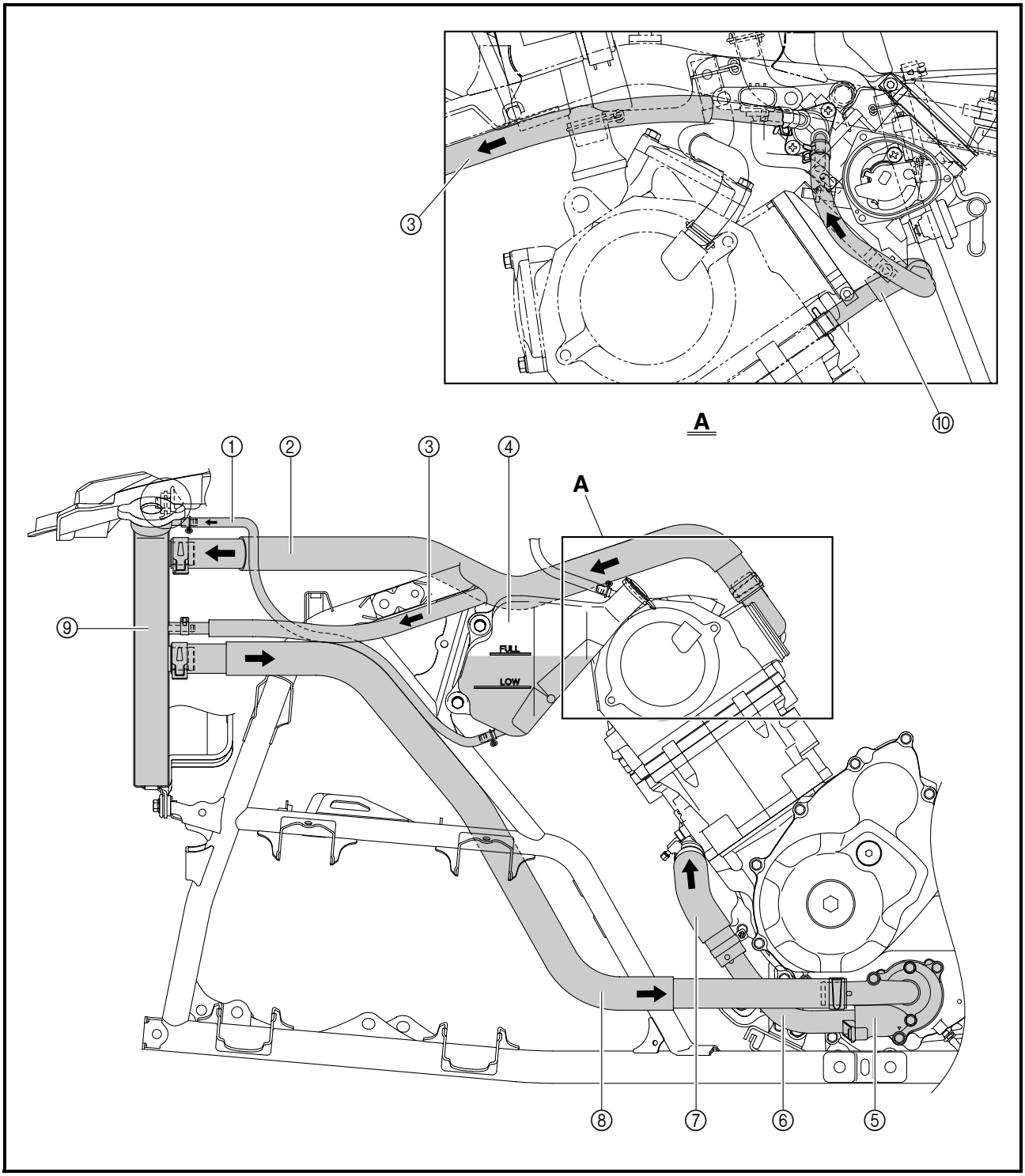
LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Shift lever 2 inner surface	LS
Shift lever 1	E
Shift lever 1 gear teeth and shift lever 2 gear teeth	E
Stopper lever stopper	E
Bearing (final drive pinion gear assembly)	G
Bearing (final gear)	G
AC magneto lead grommet	Yamaha bond No.1215 (Three bond No.1215®)
Crankcase mating surface	Yamaha bond No.1215 (Three bond No.1215®)

EBS00025

COOLANT FLOW DIAGRAMS

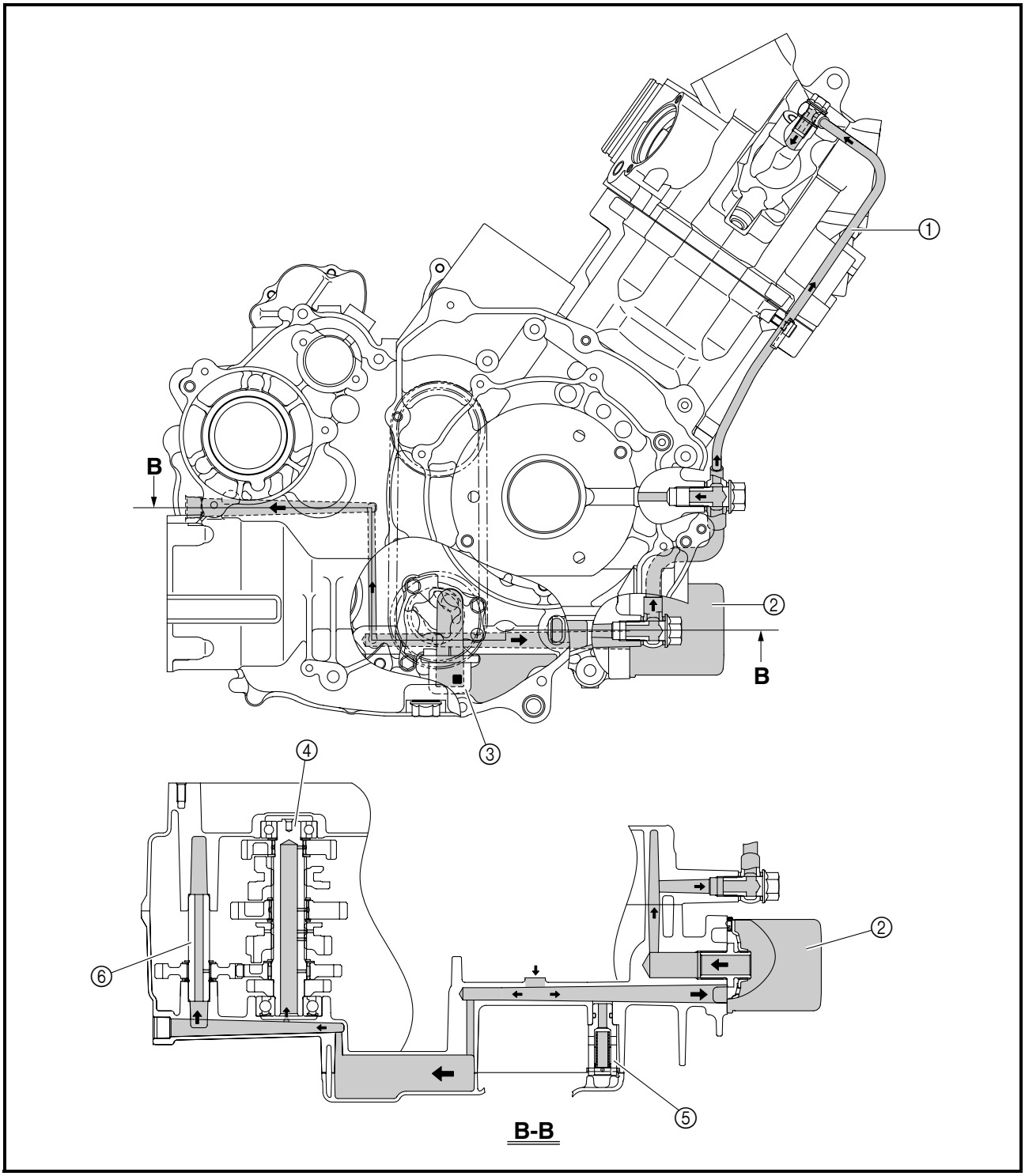
① Coolant reservoir hose
② Radiator inlet hose
③ Fast idle plunger outlet hose
④ Coolant reservoir
⑤ Water pump
⑥ Water pump outlet pipe
⑦ Water pump outlet hose
⑧ Radiator outlet hose
⑨ Radiator
⑩ Fast idle plunger inlet hose



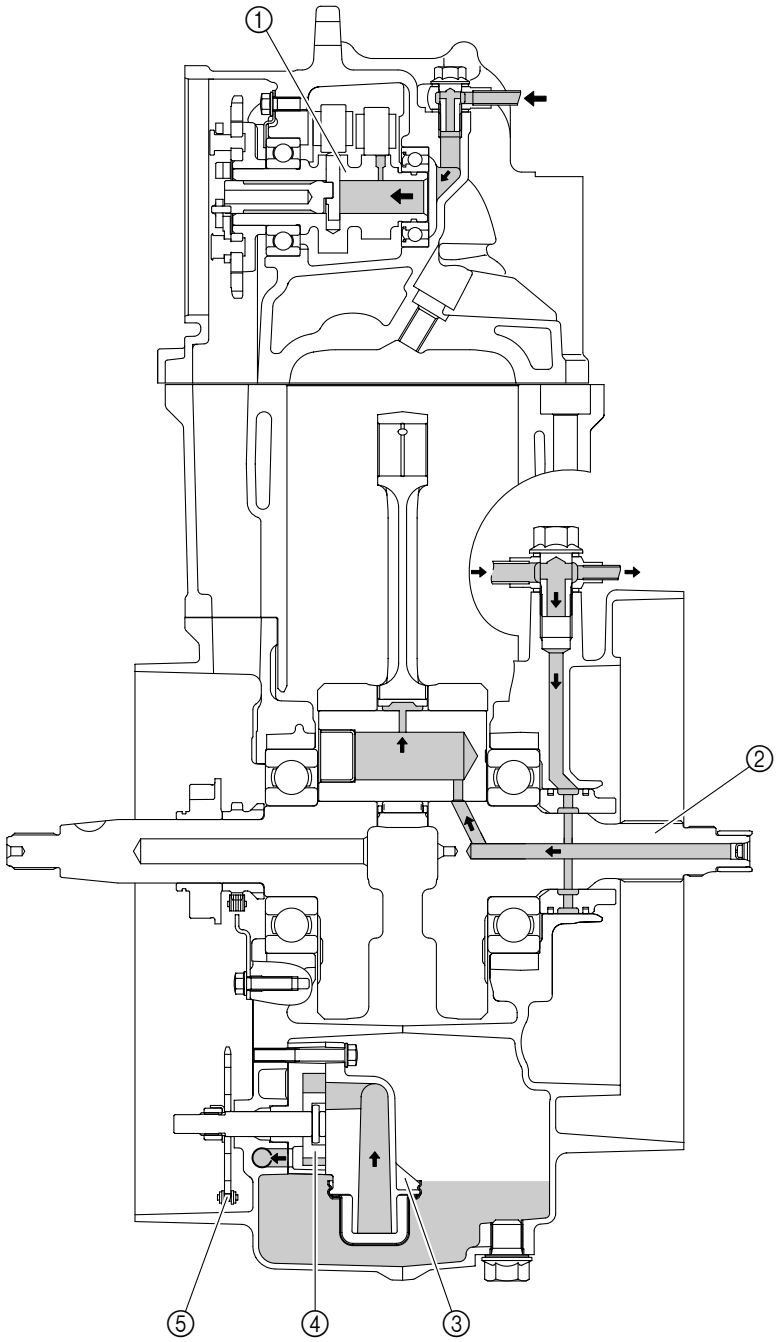
EBS00026

OIL FLOW DIAGRAMS

① Oil delivery pipe
② Oil filter cartridge
③ Oil strainer
④ Drive axle
⑤ Relief valve assembly
⑥ Reverse idle gear shaft



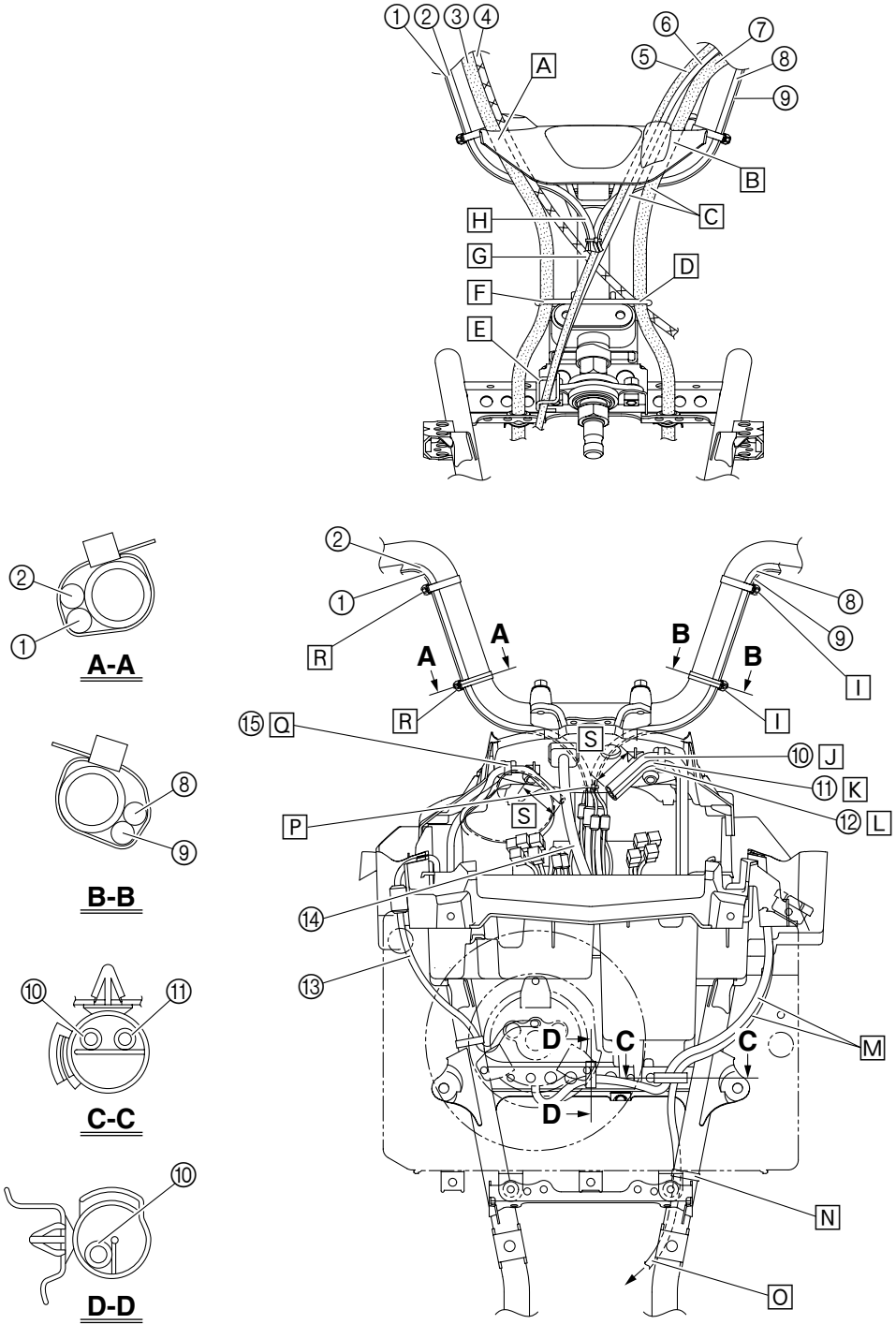
① Camshaft
② Crankshaft
③ Oil strainer
④ Oil pump rotor
⑤ Oil pump driven gear



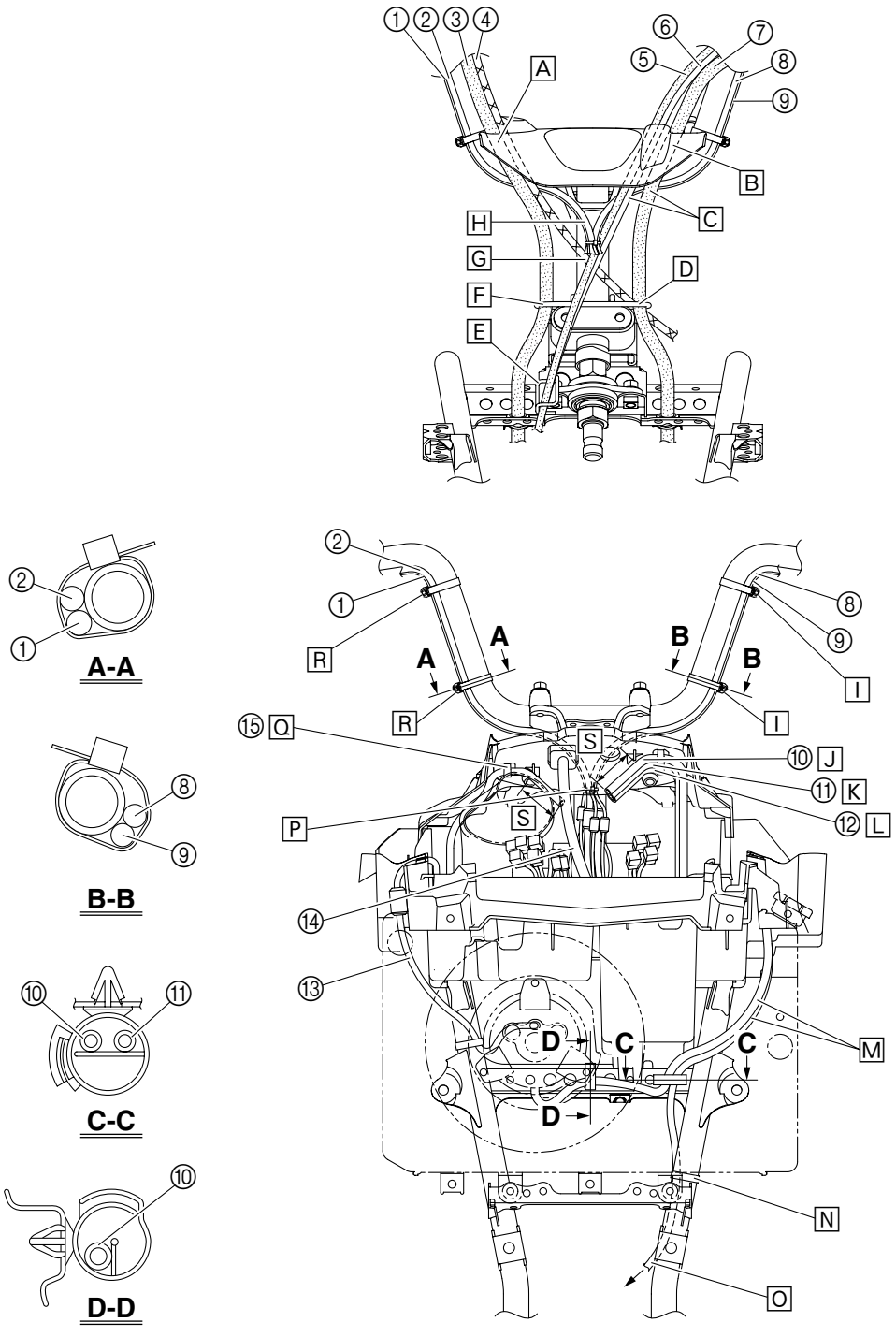
EBS00028

CABLE ROUTING

① Front brake light switch lead
② On-command four-wheel-drive motor switch and differential gear lock switch lead
③ Front brake hose
④ Throttle cable
⑤ Rear brake cable
⑥ Shift control cable
⑦ Rear brake hose
⑧ Left handlebar switch lead
⑨ Rear brake light switch lead
⑩ Radiator fan motor breather hose
⑪ Differential gear case breather hose
⑫ EPS motor breather hose
⑬ Radiator fan motor lead
⑭ Meter assembly lead
⑮ Final gear case breather hose



[A] Pass the front brake hose and throttle cable through the guide on the handlebar cover.
[B] Pass the rear brake cable, shift control cable, and rear brake hose through the guide on the handlebar cover.
[C] Route the rear brake cable, shift control cable, and rear brake hose in front of the left handlebar switch lead and rear brake light switch lead.
[D] Pass the rear brake hose and throttle cable through the guide, making sure to route the cable behind the hose.
[E] Pass the rear brake cable and shift control cable through the guide.
[F] Pass the front brake hose through the guide.
[G] Route the throttle cable behind the rear brake cable and shift control cable.

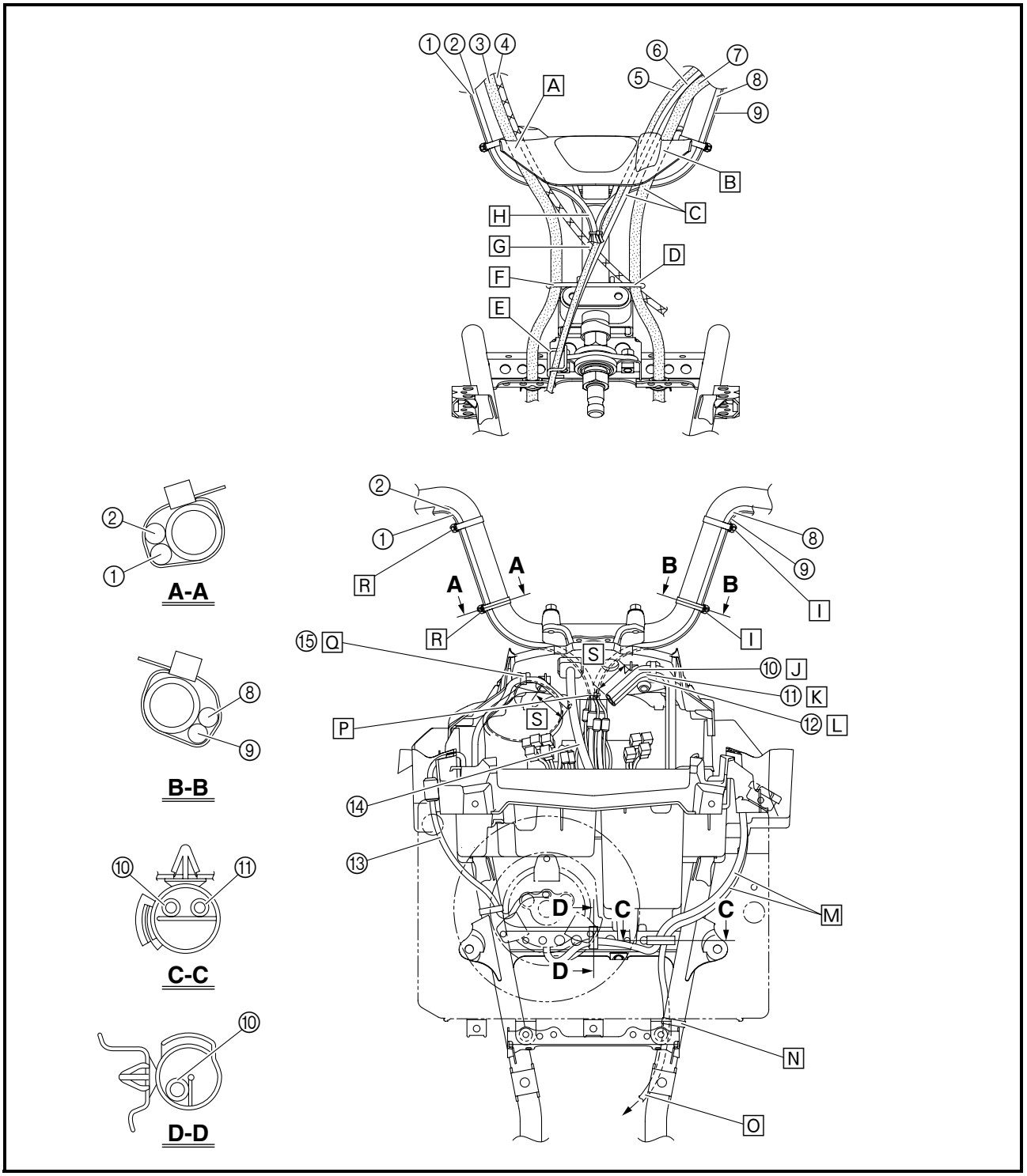


[H] Route the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead over the throttle cable, rear brake cable, and shift control cable, then to the front of where the cables cross.

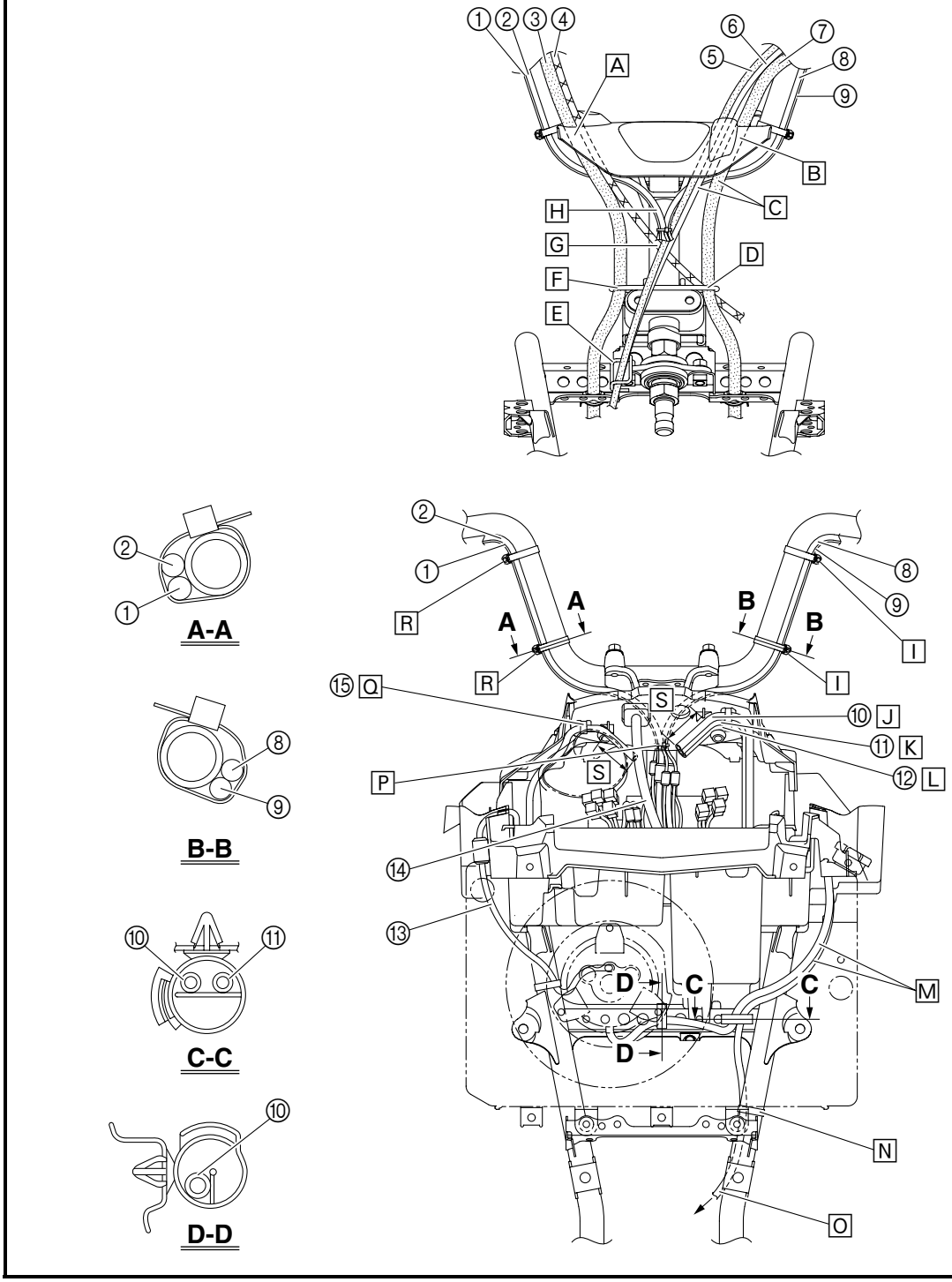
[I] Fasten the left handlebar switch lead and rear brake light switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.

[J] Pass the radiator fan motor breather hose through the guide on the meter bracket, making sure to face the end of the hose downward.

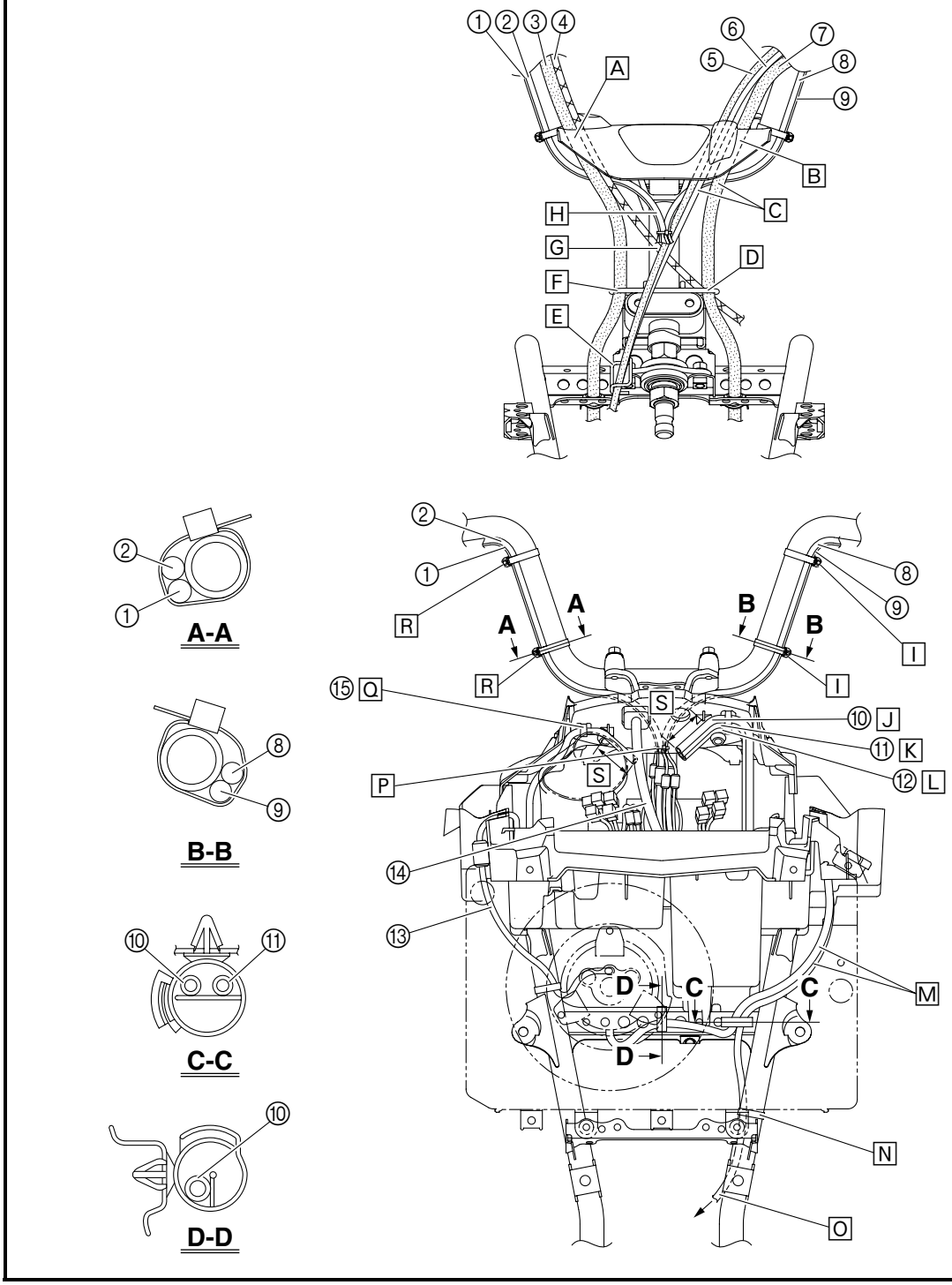
[K] Pass the differential gear case breather hose through the guide on the meter bracket, making sure to face the end of the hose downward.



[L] Pass the EPS motor breather hose through the guide on the meter bracket, making sure to face the end of the hose downward.
[M] Route the radiator fan motor breather hose and differential gear case breather hose in front of the frame.
[N] Fasten the differential gear case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
[O] Route the differential gear case breather hose to the inside of the frame.
[P] Fasten the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead with a plastic locking tie. Be sure to fasten the plastic locking tie above the couplers and fasten it around the protective sleeves of the leads, not the leads themselves.
[Q] Pass the final gear case breather hose through the guide on the meter bracket, making sure to face the end of the hose downward.

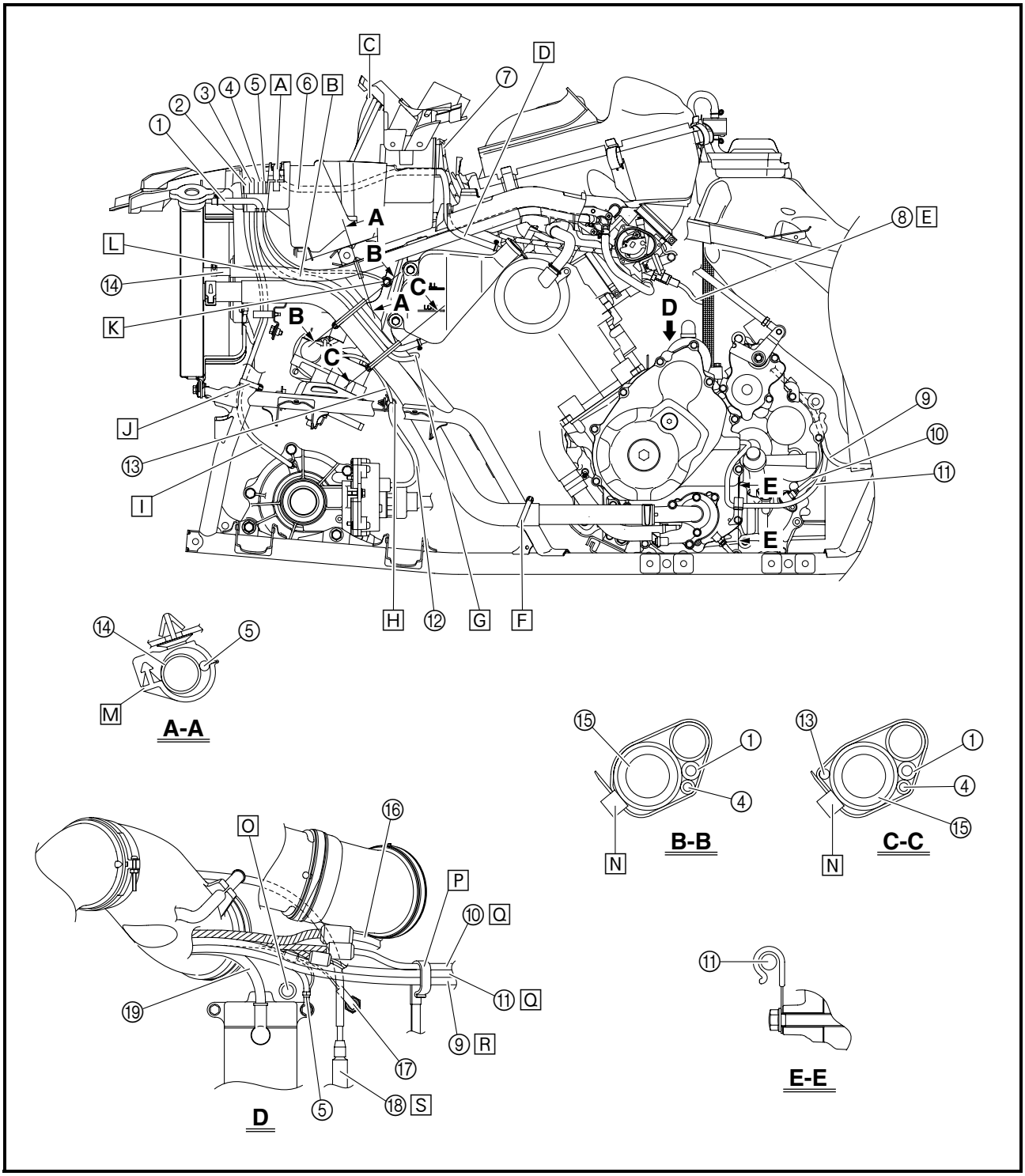


[R] Fasten the front brake light switch lead and on-command four-wheel-drive motor switch and differential gear lock switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.
[S] 20 ~ 50 mm (0.79 ~ 1.97 in)

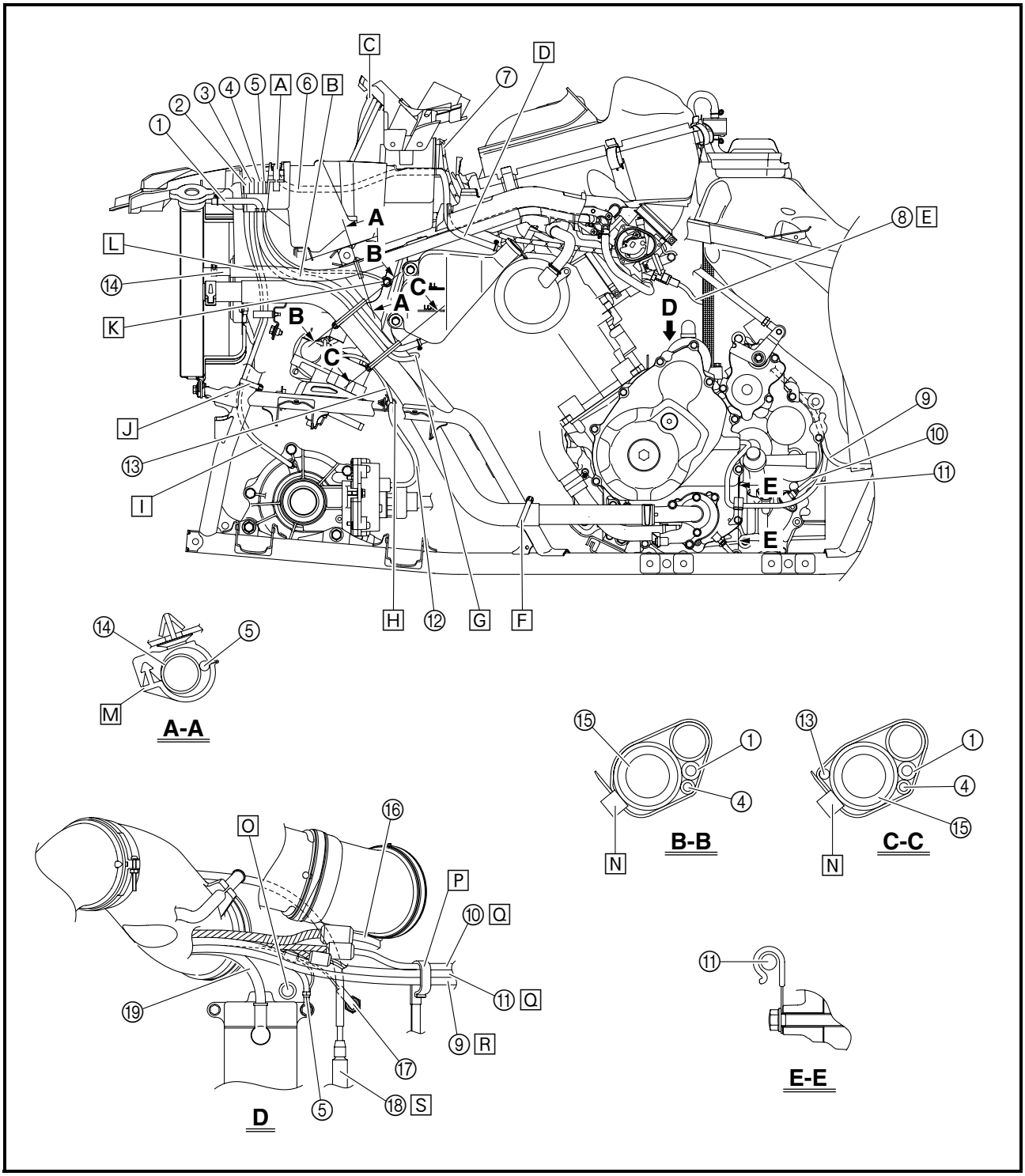


① Coolant reservoir hose
② Radiator fan motor breather hose
③ Differential gear case breather hose
④ EPS motor breather hose
⑤ Ground lead
⑥ Coolant reservoir breather hose
⑦ Throttle cable
⑧ Fuel injector lead
⑨ Final gear case breather hose
⑩ Speed sensor lead
⑪ Crankshaft position sensor lead
⑫ Differential gear motor lead
⑬ EPS torque sensor lead
⑭ Fast idle plunger outlet hose
⑮ Radiator outlet hose
⑯ Gear position switch lead
⑰ Reverse switch lead
⑱ Shift control cable
⑲ Starter motor lead

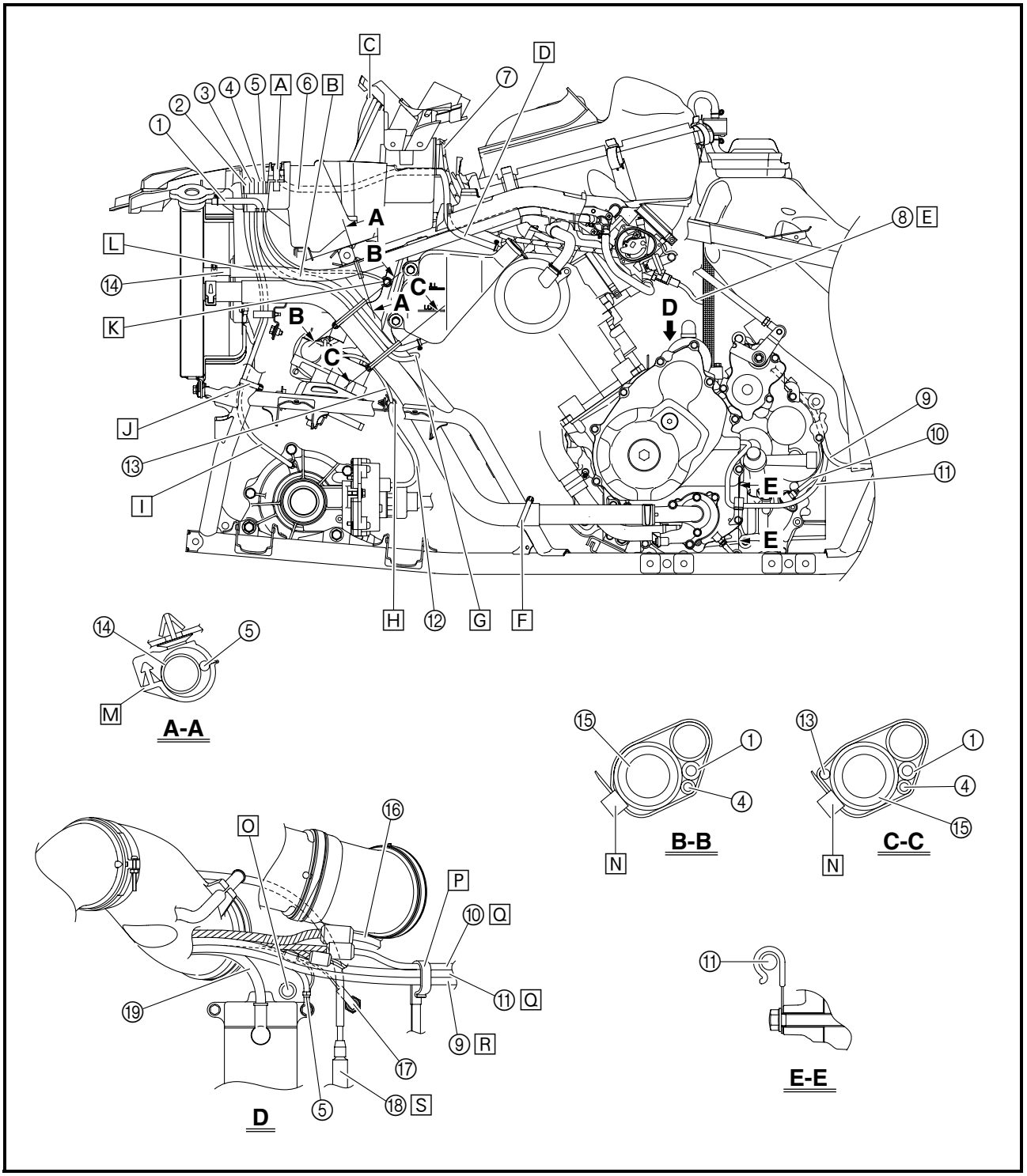
[A] Face the end of the coolant reservoir breather hose downward.



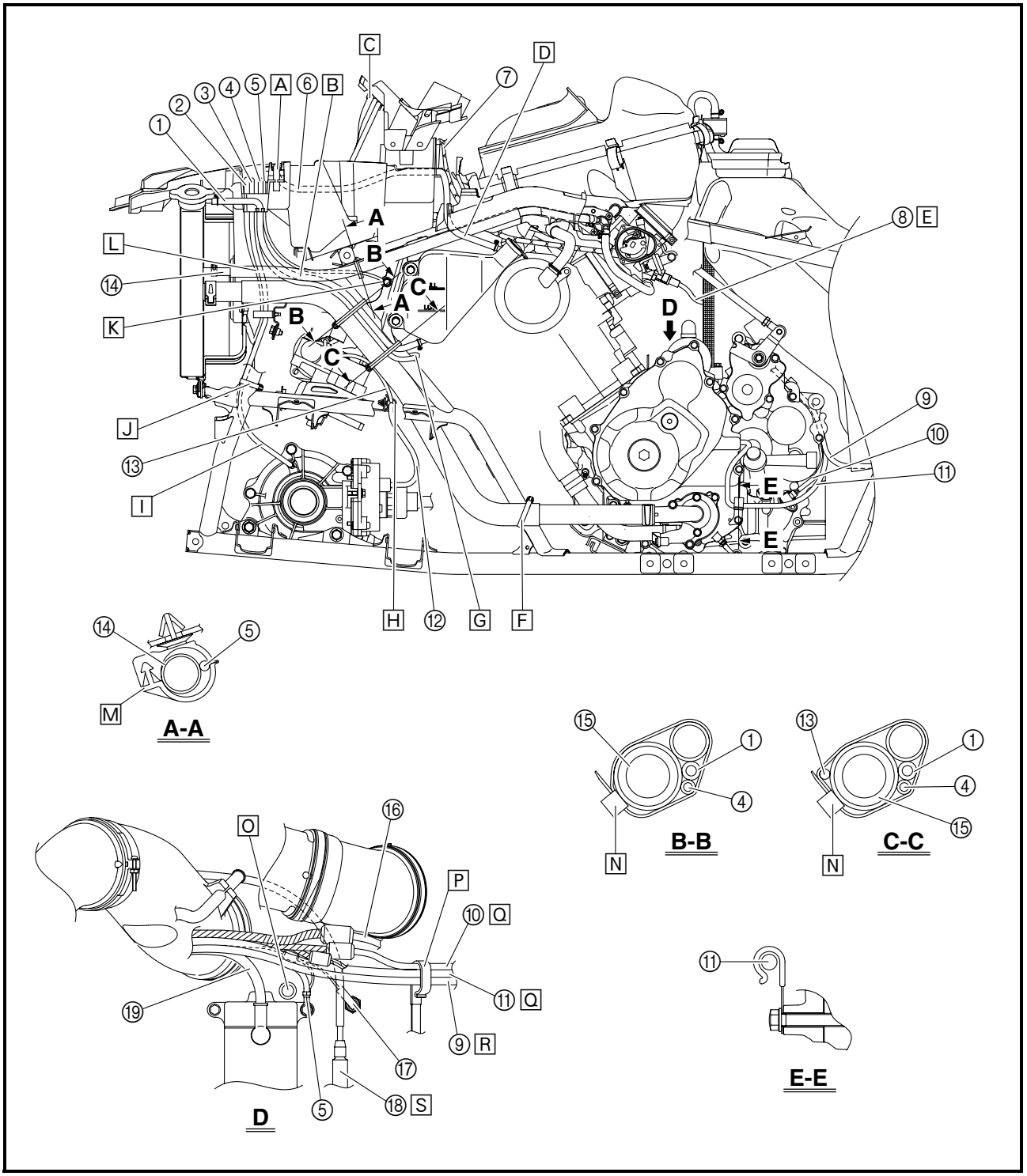
[B] Route the ground lead, radiator fan motor breather hose, differential gear case breather hose, and EPS motor breather hose to the inside of the fast idle plunger outlet hose.
[C] Pass the radiator fan motor breather hose through the larger diameter guide.
[D] Route the coolant reservoir breather hose to the outside of the fast idle plunger outlet hose.
[E] Route the fuel injector lead under the fuel hose.
[F] Fasten the radiator outlet hose to the frame with the plastic band, making sure to face the end of the band inward.
[G] Route the EPS motor breather hose under the coolant reservoir hose.
[H] Place the EPS torque sensor lead and differential gear motor lead in the holder, and then insert the ends of the holder into the hole in the stay on the frame.
[I] Route the differential gear case breather hose to the inside of the frame.



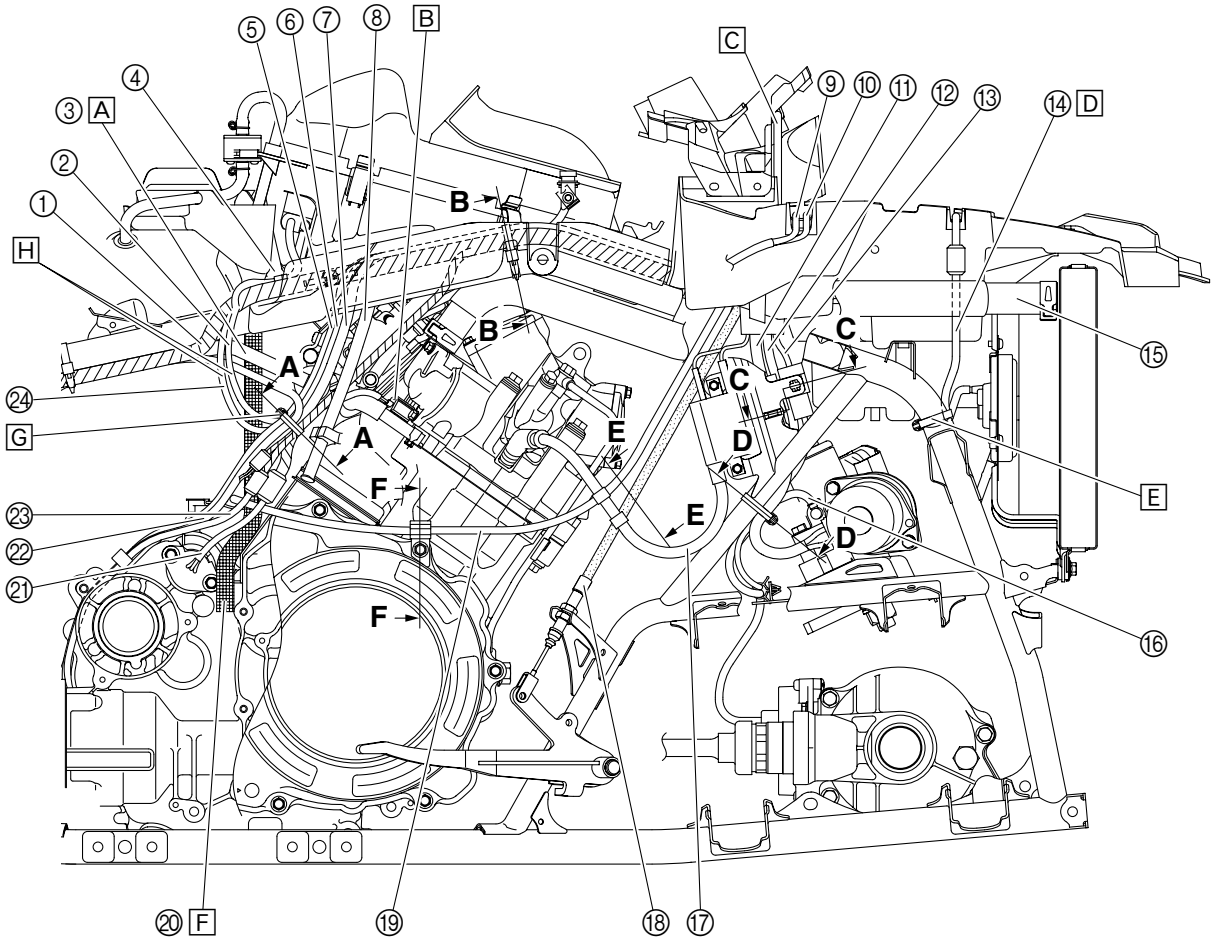
[J] Fasten the differential gear case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
[K] Attach the ground lead terminal to the frame using the bolt.
[L] Route the radiator fan motor breather hose and differential gear case breather hose to the inside of the fast idle plunger outlet hose and radiator outlet hose.
[M] Make sure that the catch of the holder is facing outward.
[N] Face the end of the plastic band inward.
[O] Route the fuel tank drain hose and position the end of the hose as shown in the illustration.
[P] Pass the speed sensor lead, AC magneto lead, and final gear case breather hose through the guide in the order listed.
[Q] Route the speed sensor lead, AC magneto lead, and final gear case breather hose to the right of the reverse switch.
[R] Route the final gear case breather hose above the reverse switch lead and ground leads.



[S] Route the shift control cable under the gear position switch lead, speed sensor lead, and crankshaft position sensor lead.

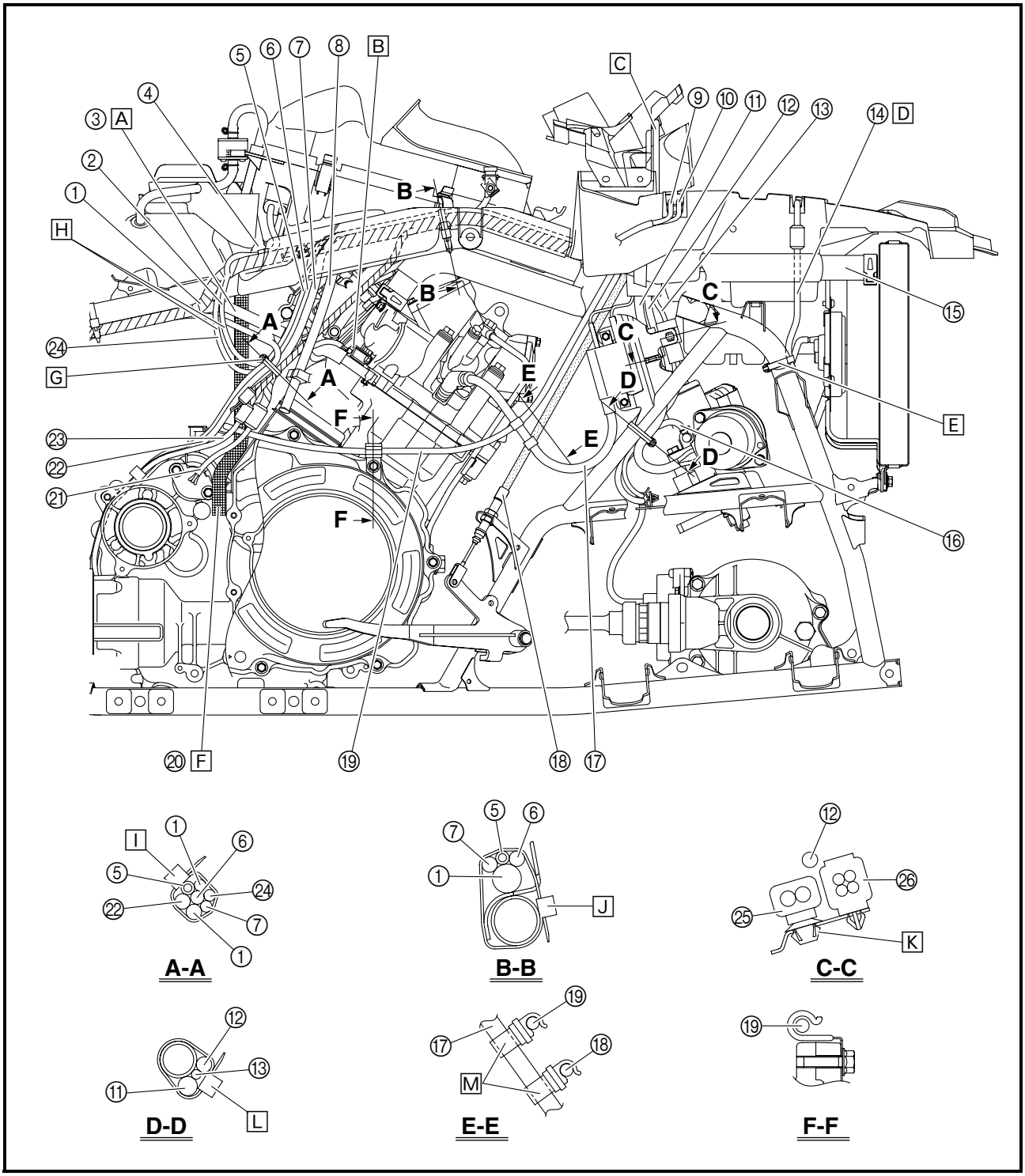


① Wire harness
② Fuel injector lead
③ Fuel hose
④ Intake air temperature sensor lead
⑤ Final gear case breather hose
⑥ Ground lead
⑦ Starter motor lead
⑧ Air filter case breather hose
⑨ Main switch lead
⑩ Auxiliary DC jack lead
⑪ EPS motor lead
⑫ Differential gear motor lead
⑬ EPS torque sensor lead
⑭ Radiator fan motor lead
⑮ Radiator inlet hose
⑯ EPS motor breather hose
⑰ Spark plug lead
⑱ Rear brake cable
⑲ Shift control cable
⑳ Fuel tank drain hose
㉑ Gear position switch lead
㉒ AC magneto lead

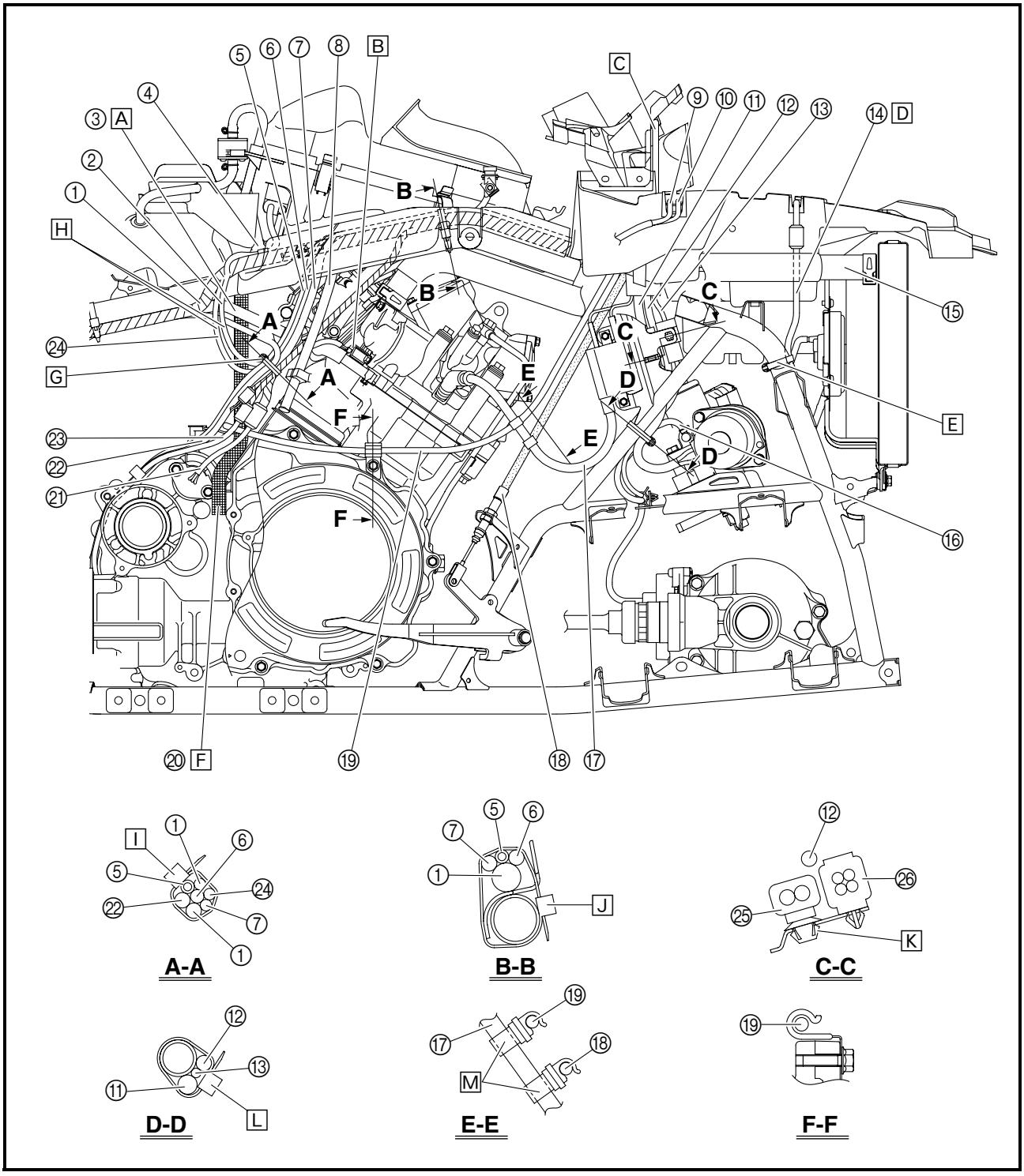


㉓ Speed sensor lead
㉔ Coolant temperature sensor lead
㉕ EPS motor lead coupler
㉖ EPS torque sensor lead coupler

[A] Route the fuel hose between the wire harness and the fuel tank drain hose.
[B] Route the coolant temperature sensor lead above the fast idle plunger inlet hose.
[C] Route the final gear case breather hose above the V-belt cooling duct 1.
[D] Route the radiator fan motor lead between the electrical components tray and the radiator inlet hose.
[E] Fasten the radiator fan motor lead to the frame with the plastic band, making sure to face the end of the band inward.
[F] Route the fuel tank drain hose to the inside of the leads and fuel hose, making sure to position the end of the drain hose as shown in the illustration.

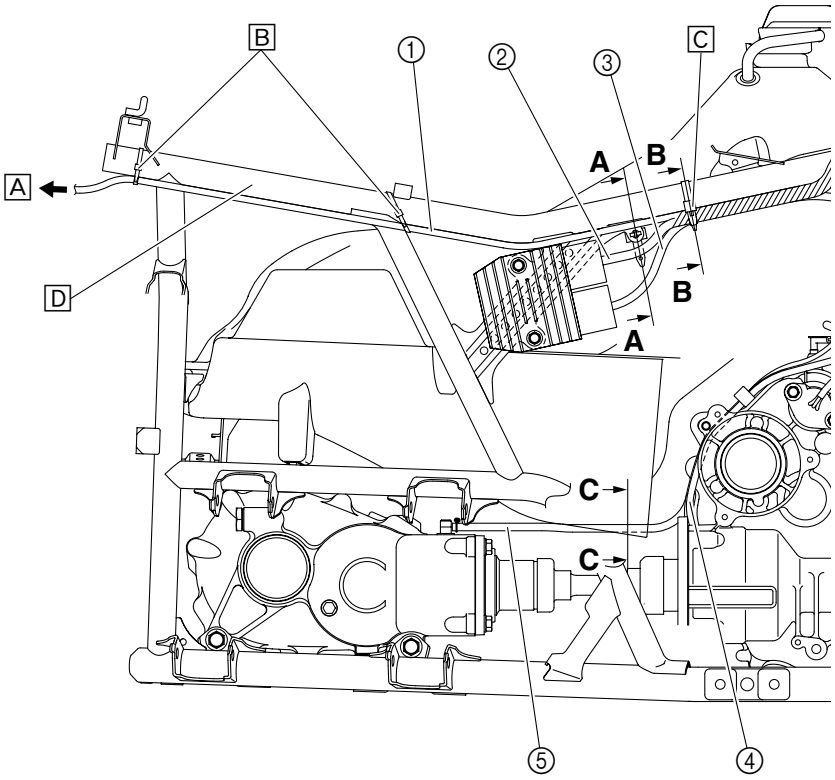


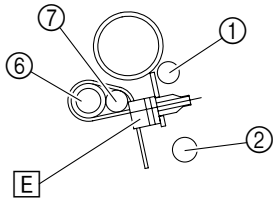
[G] Fasten the final gear case breather hose, ground lead, starter motor lead, fuel injector lead, coolant temperature sensor lead, AC magneto lead, and wire harness with the plastic band, making sure to position the band near the split in the wire harness.
[H] Route the fuel injector lead and coolant temperature sensor lead to the inside of the ground lead, starter motor lead, final drive gear case breather hose, and wire harness.
[I] Face the end of the plastic band inward.
[J] Pass the plastic band through the hole in the plastic cover, and then fasten the leads and hose with the band, making sure to face the end of the band downward.
[K] Insert the projection on the coupler into the hole in the frame from the inside of the frame.
[L] Face the end of the plastic band inward.
[M] Fasten the spark plug lead with the larger diameter section of each holder.



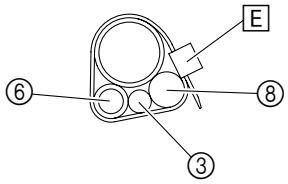
① Tail/brake light lead
② Rectifier/regulator lead
③ AC magneto lead
④ Speed sensor lead
⑤ Final gear case breather hose
⑥ Fuel hose
⑦ Fuel pump lead
⑧ Wire harness

A To tail/brake light
B Fasten the tail/brake light lead to the frame with a plastic locking tie, making sure to face the end of the tie downward.
C Install the plastic band near the split in the wire harness.
D Route the tail/brake light lead to the outside of the frame.
E Face the end of the plastic band downward.
F Pass the final gear case breather hose through the guide.

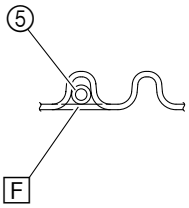




A-A ③

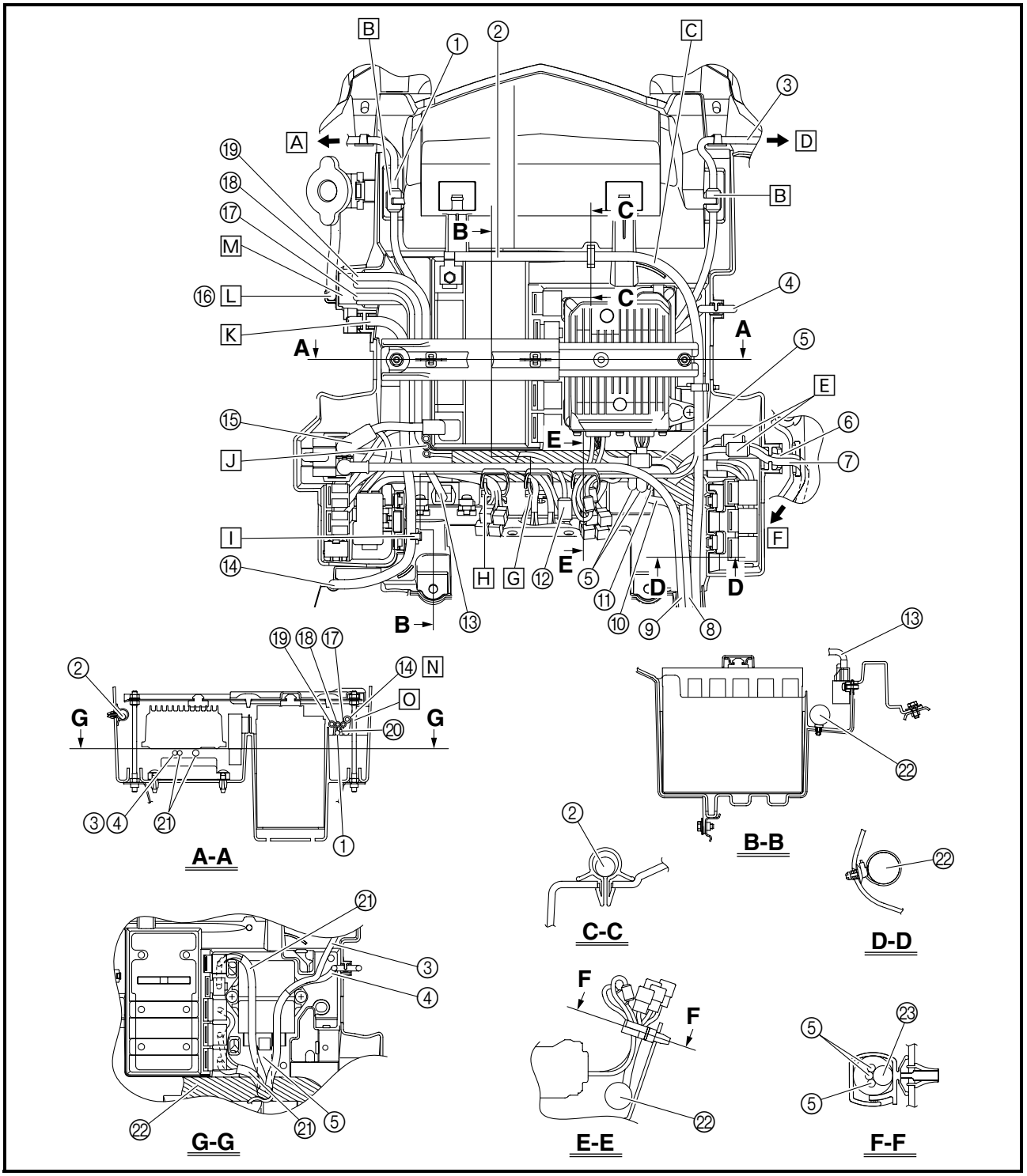


B-B



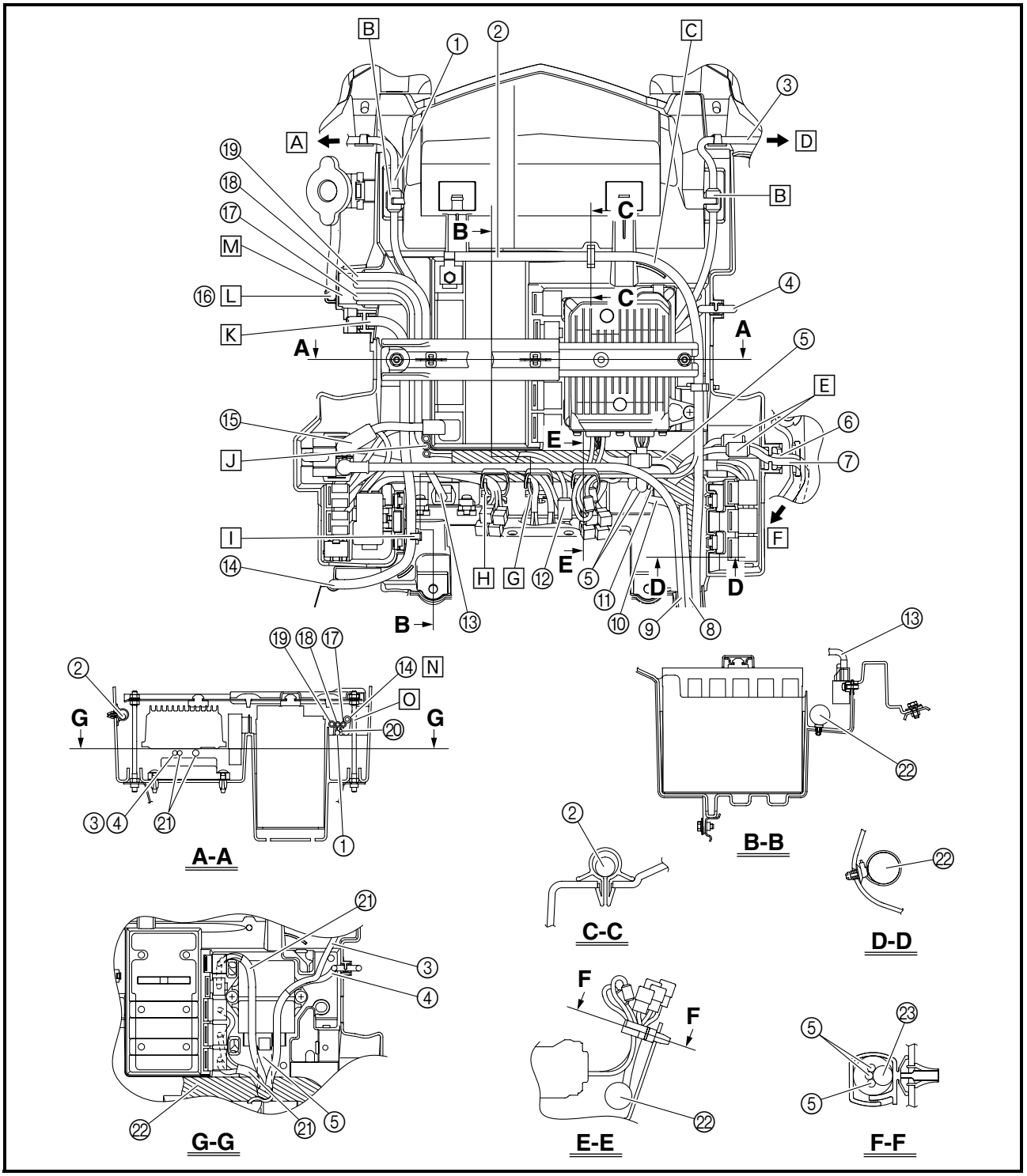
C-C

① Left headlight lead
② Negative battery lead
③ Right headlight lead
④ Radiator fan motor lead
⑤ EPS control unit lead
⑥ Auxiliary DC jack lead
⑦ Main switch lead
⑧ Final gear case breather hose
⑨ Starter motor lead
⑩ Differential gear motor lead
⑪ Ignition coil lead
⑫ Meter lead
⑬ Lean angle sensor lead
⑭ Coolant reservoir breather hose
⑮ Positive battery lead
⑯ Coolant reservoir hose
⑰ EPS motor breather hose
⑱ Differential gear case breather hose
⑲ Radiator fan motor breather hose
⑳ Ground lead
㉑ Relay lead
㉒ Wire harness

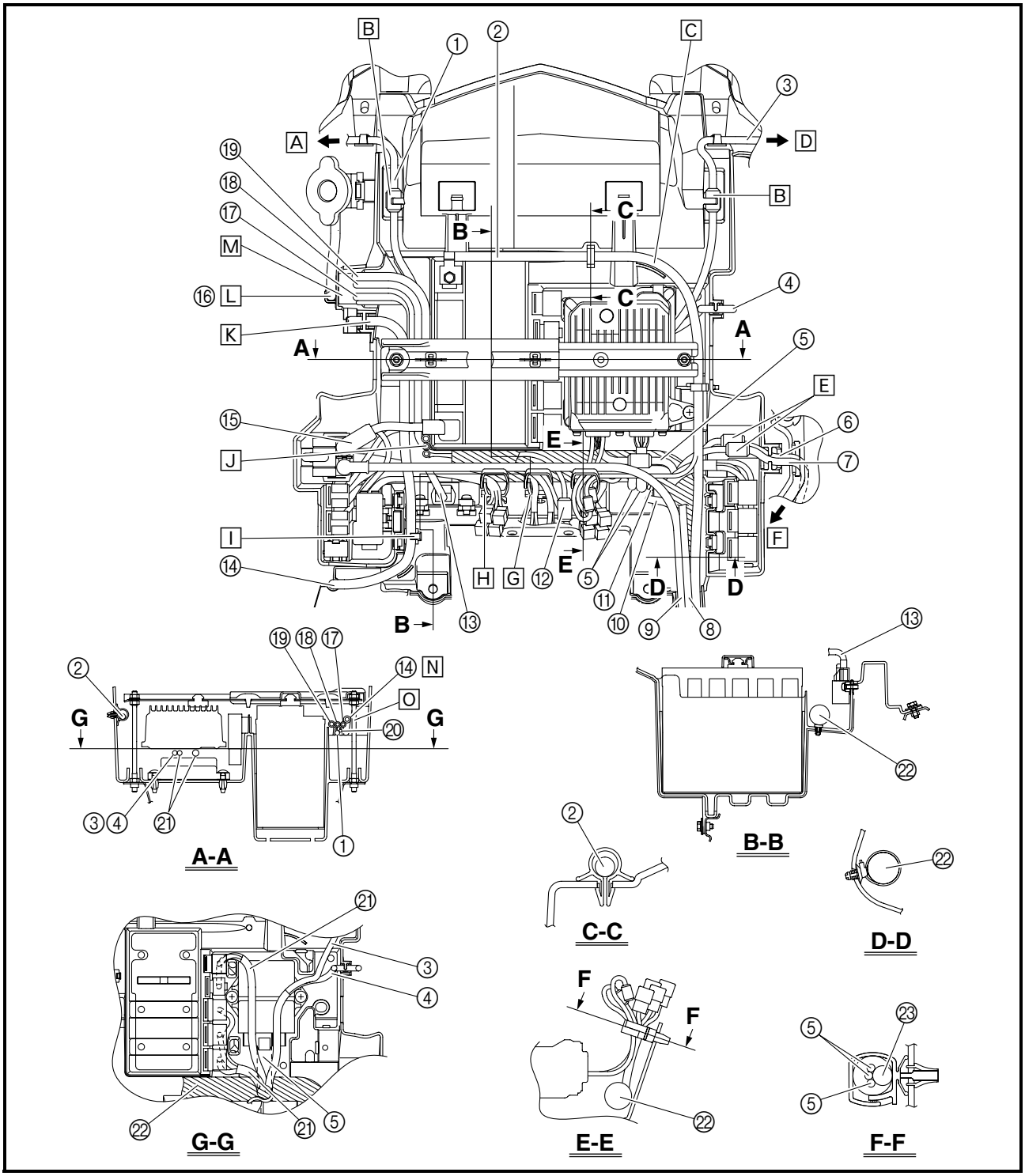


㉓ Joint coupler lead

A To left headlight
B Connect the headlight lead coupler, and then fasten the coupler with the holder on the electrical components tray.
C Route the negative battery lead along the guide on the electrical components tray.
D To right headlight
E Place the couplers on the inside of the electrical components tray.
F To main switch and auxiliary DC jack
G Fasten the left handlebar switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, front brake light switch lead, and rear brake light switch lead with the clamp.
H Fasten the joint coupler lead with the clamp.
I Pass the coolant reservoir breather hose through the guides on the plastic cover and electrical components tray and route it under the positive battery lead and starter motor lead.

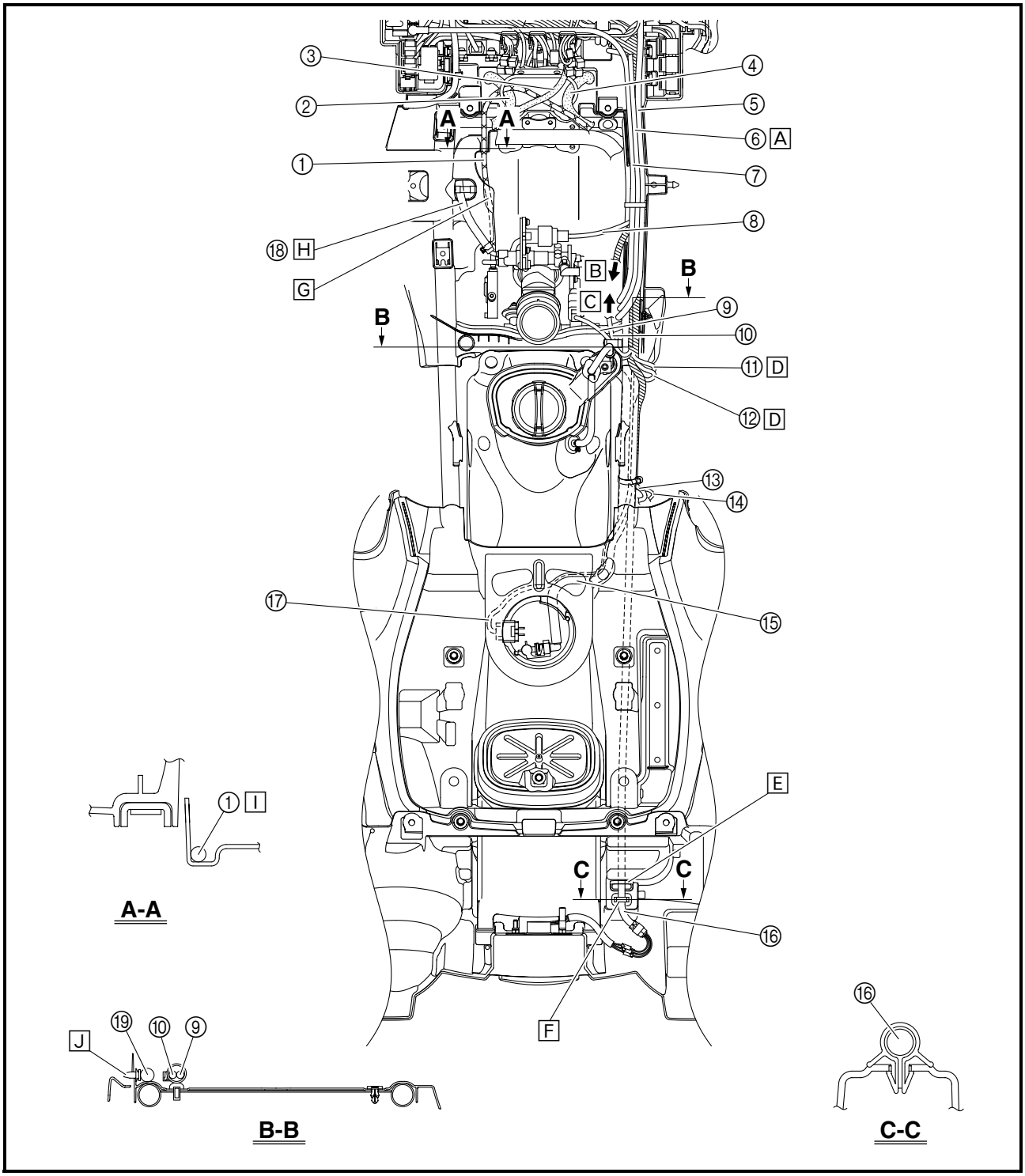


[J] Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose.
[K] Fasten the coolant reservoir breather hose with the holder on the electrical components tray.
[L] Fasten the coolant reservoir hose with the holder on the electrical components tray.
[M] Pass the hoses and ground lead through the opening in the electrical components tray.
[N] Route the coolant reservoir breather hose above the other hoses.
[O] Route the hoses to the inside of the bolt.

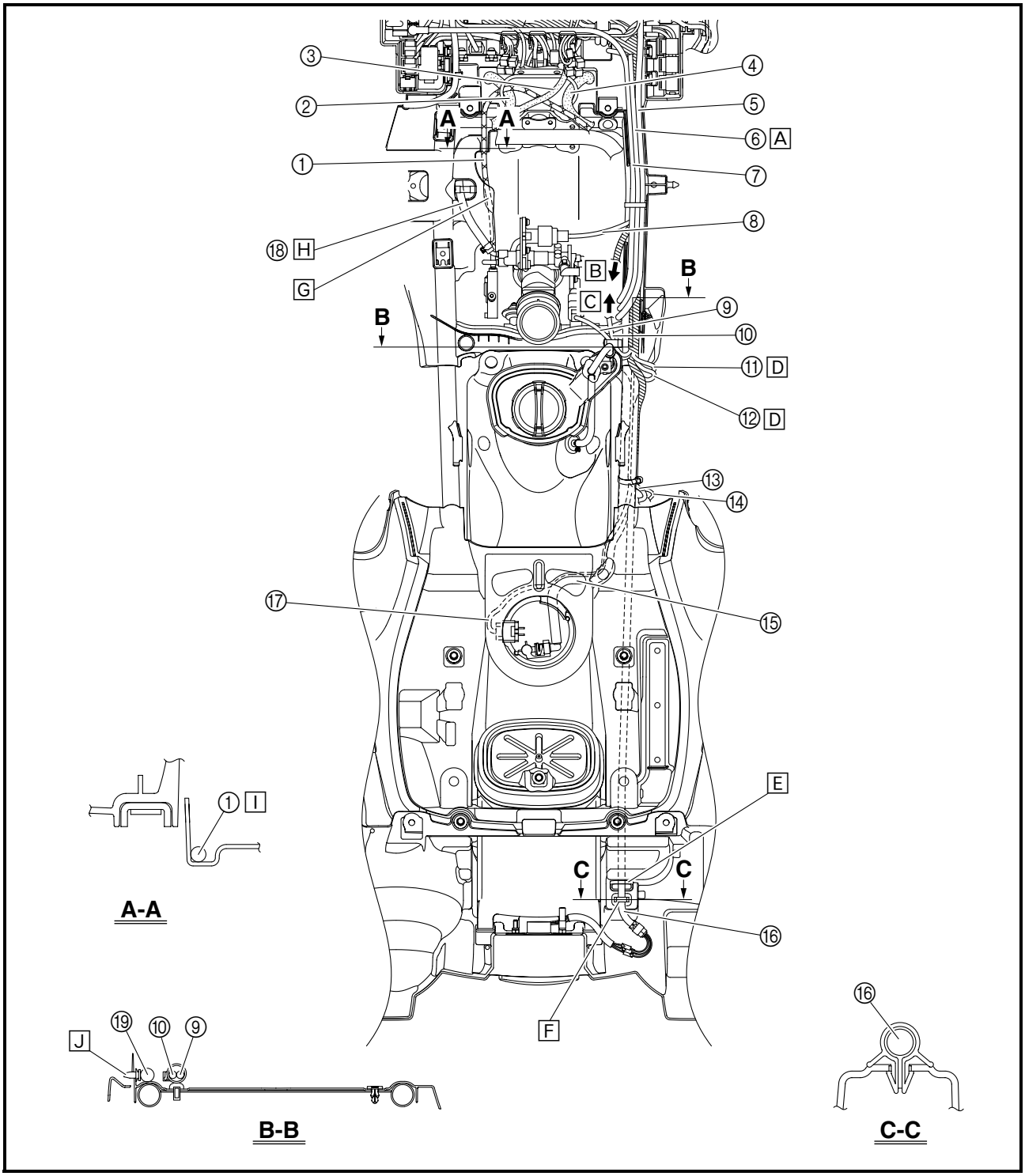


① Throttle cable
② Rear brake hose
③ Rear brake cable
④ Front brake hose
⑤ Negative battery lead
⑥ Final gear case breather hose
⑦ Starter motor lead
⑧ Intake air pressure sensor lead
⑨ TPS lead
⑩ Intake air temperature sensor lead
⑪ Fuel injector lead
⑫ Coolant temperature sensor lead
⑬ Rectifier/regulator lead
⑭ AC magneto lead
⑮ Fuel hose
⑯ Tail/brake light lead
⑰ Fuel pump lead
⑱ Fast idle plunger outlet hose
⑲ Wire harness

[A] Route the final gear case breather hose on top of the leads.



[B] To engine
[C] To air filter case
[D] Route the fuel injector lead and coolant temperature sensor lead to the outside of the frame.
[E] Pass the tail/brake light lead through the hole in the rear fender.
[F] Fasten the tail/brake light lead with the holder, making sure that the coupler is positioned to the rear of the holder.
[G] Route the throttle cable under the plastic cover.
[H] Route the fast idle plunger outlet hose above the plastic cover.
[I] Pass the throttle cable through the guide on the plastic cover.
[J] Insert the projection on the wire harness holder into the hole in the plastic cover.



EBS00029

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. 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.

EBU21742

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

NOTE:

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

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

EBU21863

GENERAL MAINTENANCE AND LUBRICATION CHART

NO.		ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇨		INITIAL			EVERY	
					month	1	3	6	6	12
					km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
					hours	20	80	160	160	320
1		Air filter element	• Clean and replace if necessary.			Every 20–40 hours (more often in wet or dusty areas)				
2	*	Front brake	• Check operation and correct if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary.			√	√	√	√	√
			• Replace brake pads.			Whenever worn to the limit				
3	*	Rear brake	• Check operation and correct if necessary. • Check brake pedal free play and adjust if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary.			√	√	√	√	√
			• Replace brake pads.			Whenever worn to the limit				
4	*	Brake hoses	• Check for cracks or other damage, and replace if necessary.				√	√	√	√
			• Replace.			Every 4 years				
5	*	Rear brake hose protectors	• Check for wear, cracks or other damage, and replace if necessary.			√	√	√	√	√
6	*	Wheels	• Check runout and for damage, and replace if necessary.			√		√	√	√
7	*	Tires	• Check tread depth and for damage, and replace if necessary. • Check air pressure and balance, and correct if necessary.			√		√	√	√
8	*	Wheel bearings	• Check for looseness or damage, and replace if necessary.			√		√	√	√
9	*	Upper and lower arm pivots	• Lubricate with lithium-soap-based grease.					√	√	√
10	*	V-belt	• Check for wear, cracks or other damage, and replace if necessary.			√		√	√	√
11	*	Drive shaft universal joint	• Lubricate with lithium-soap-based grease.					√	√	√
12	*	Chassis fasteners	• Make sure that all nuts, bolts, and screws are properly tightened.			√	√	√	√	√
13	*	Shock absorber assemblies	• Check operation and correct if necessary. • Check for oil leakage and replace if necessary.					√	√	√
14	*	Stabilizer bushes	• Check for cracks or other damage, and replace if necessary.					√	√	√
15	*	Knuckle pivots	• Lubricate with lithium-soap-based grease.					√	√	√
16	*	Knuckle shafts	• Lubricate with lithium-soap-based grease.					√	√	√
17	*	Steering shaft	• Lubricate with lithium-soap-based grease.					√	√	√
18	*	Steering system	• Check operation and repair or replace if damaged. • Check toe-in and adjust if necessary.			√	√	√	√	√
19	*	Engine mount	• Check for cracks or other damage, and replace if necessary.					√	√	√
20	*	Axle boots	• Check for cracks or other damage, and replace if necessary.			√	√	√	√	√
21		Engine oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√		√	√	√

GENERAL MAINTENANCE AND LUBRICATION CHART

CHK ADJ

NO.		ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇨		INITIAL			EVERY	
					month	1	3	6	6	12
					km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
					hours	20	80	160	160	320
22		Engine oil filter cartridge	• Replace.			√		√		√
23		Differential gear oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√				√
24		Final gear oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√				√
25		Cooling system	• Check coolant level and ATV for coolant leakage, and correct if necessary.			√	√	√	√	√
			• Replace coolant.			Every 2 years				
26	*	Moving parts and cables	• Lubricate.				√	√	√	√
27	*	Drive select lever safety system cable	• Check operation and adjust or replace if necessary.					√	√	√
28	*	Throttle lever housing and cable	• Check operation and correct if necessary. • Check throttle cable free play and adjust if necessary. • Lubricate throttle lever housing and cable.			√	√	√	√	√
29	*	Front and rear brake switches	• Check operation and correct if necessary.			√	√	√	√	√
30	*	Lights and switches	• Check operation and correct if necessary. • Adjust headlight beams.			√	√	√	√	√

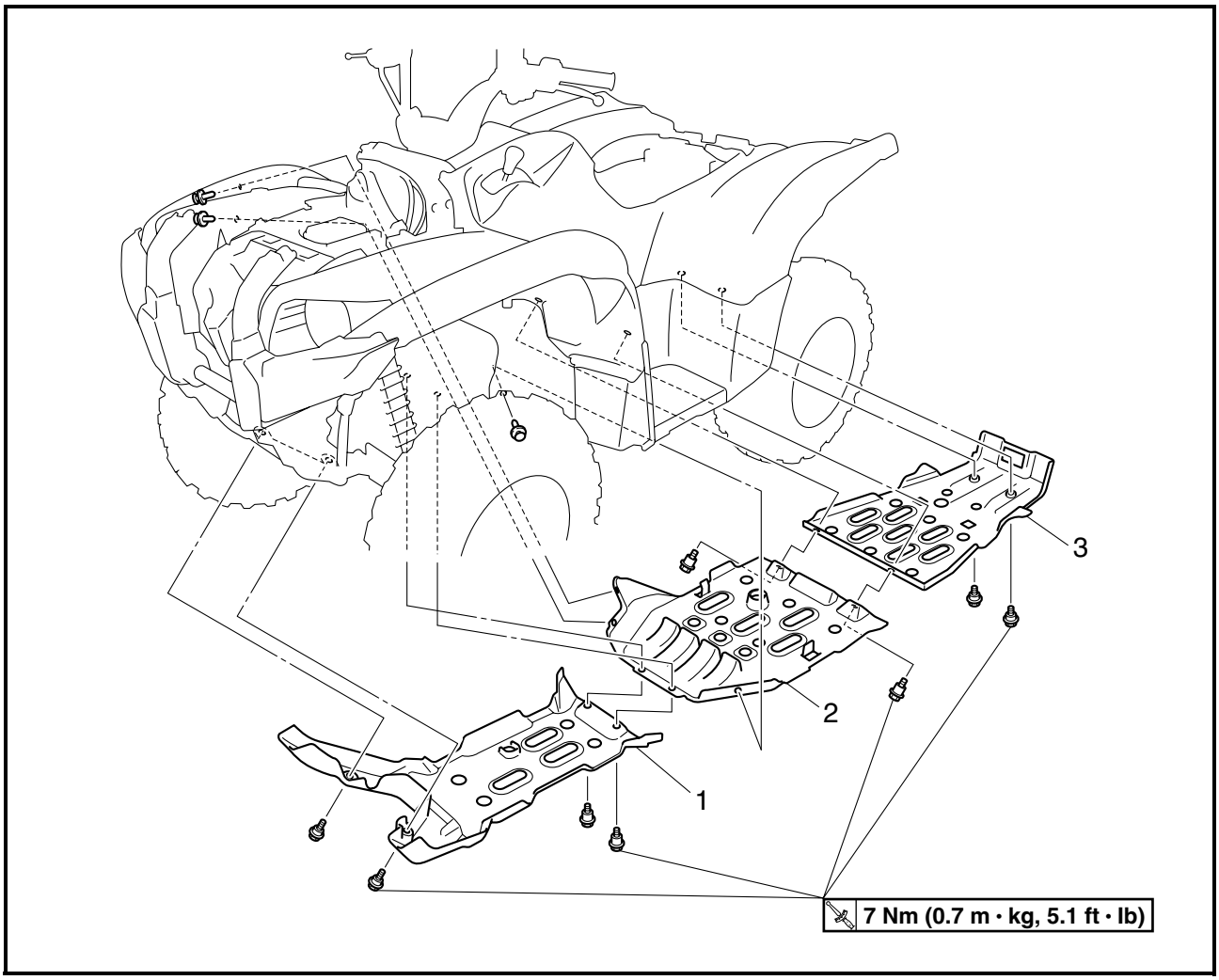
EBU23070

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.

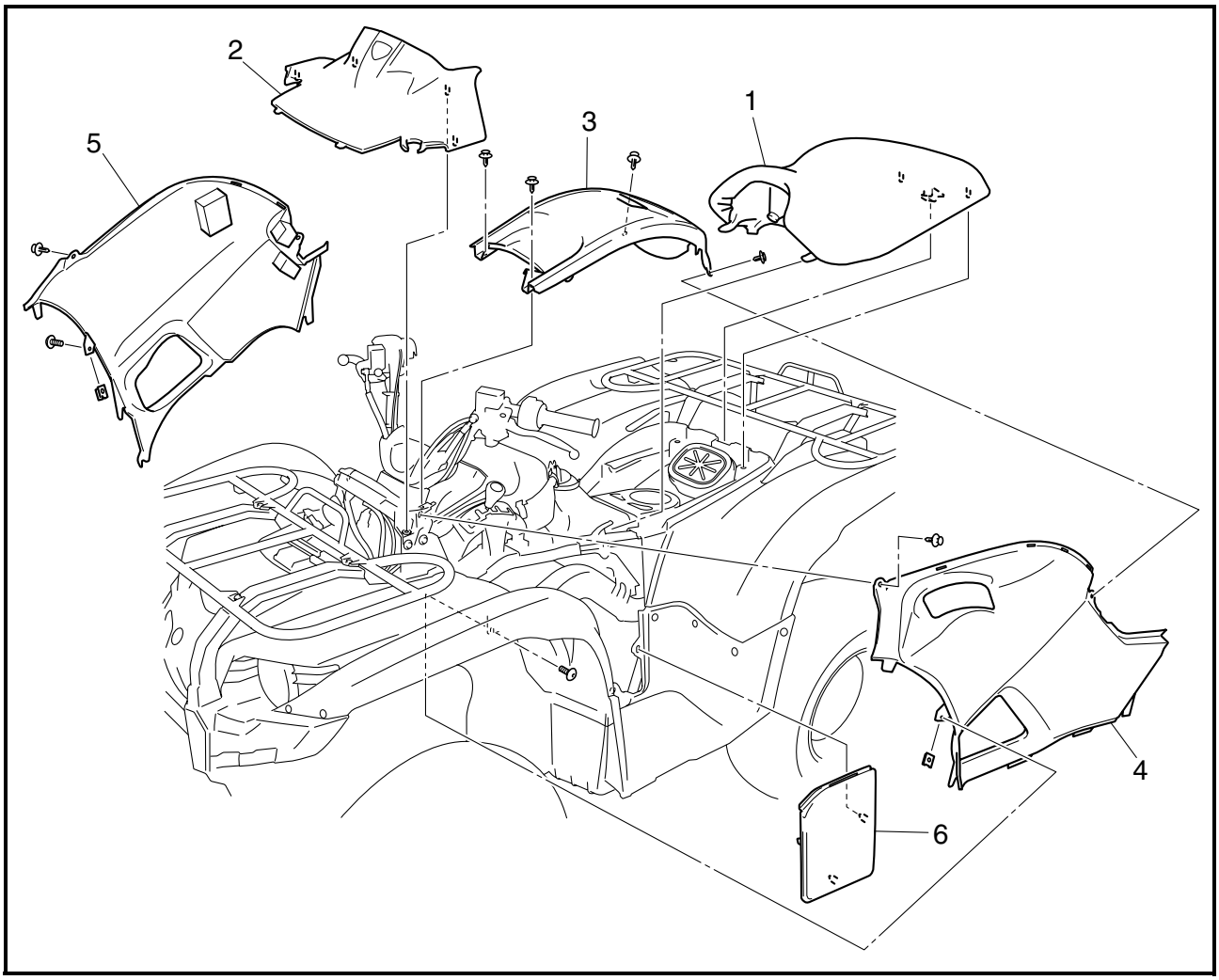
ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS

ENGINE SKID PLATES



Order	Job/Part	Q'ty	Remarks
	Removing the engine skid plates		Remove the parts in the order listed.
1	Front engine skid plate	1	
2	Center engine skid plate	1	
3	Rear engine skid plate	1	
			For installation, reverse the removal procedure.

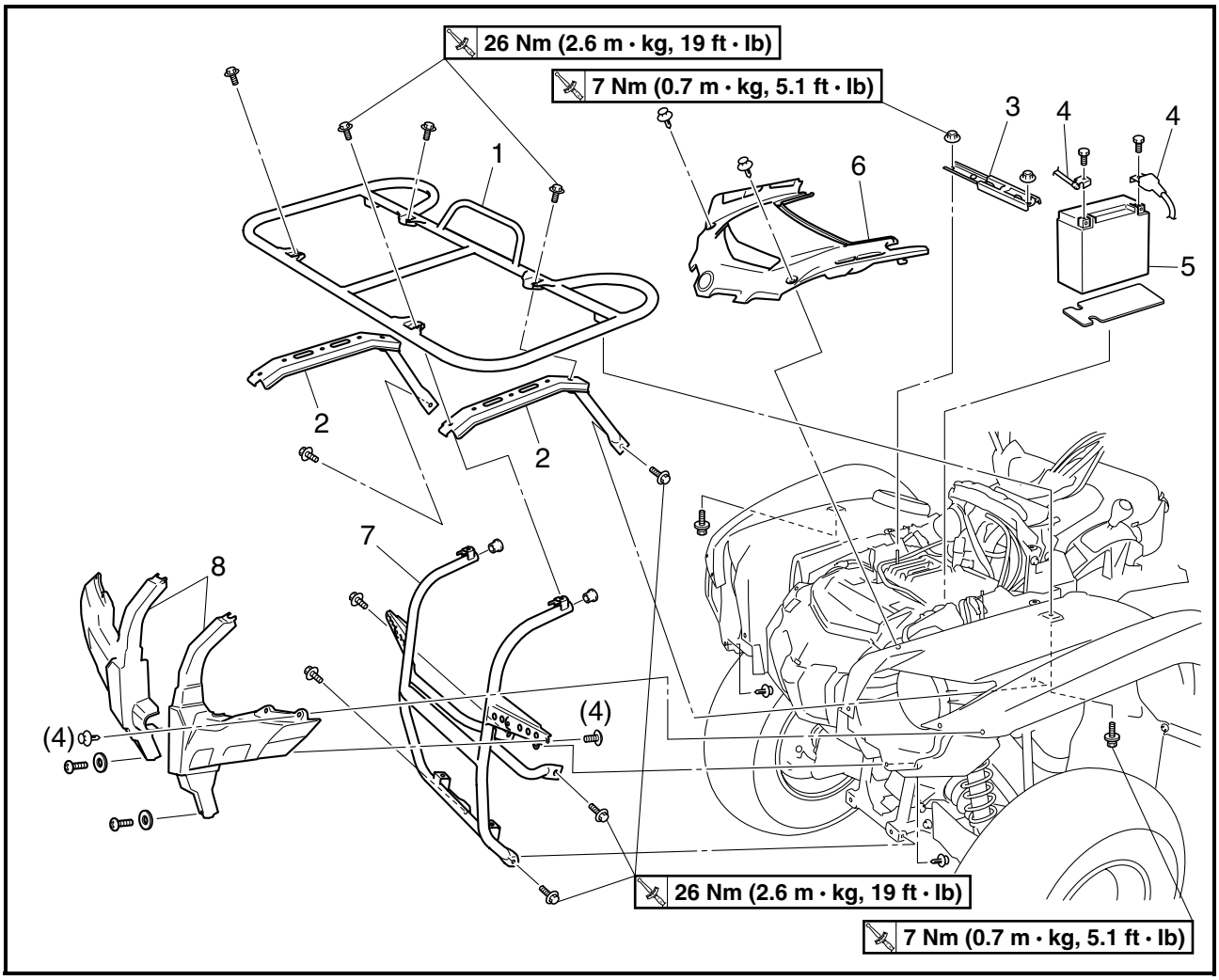
SEAT AND SIDE PANELS



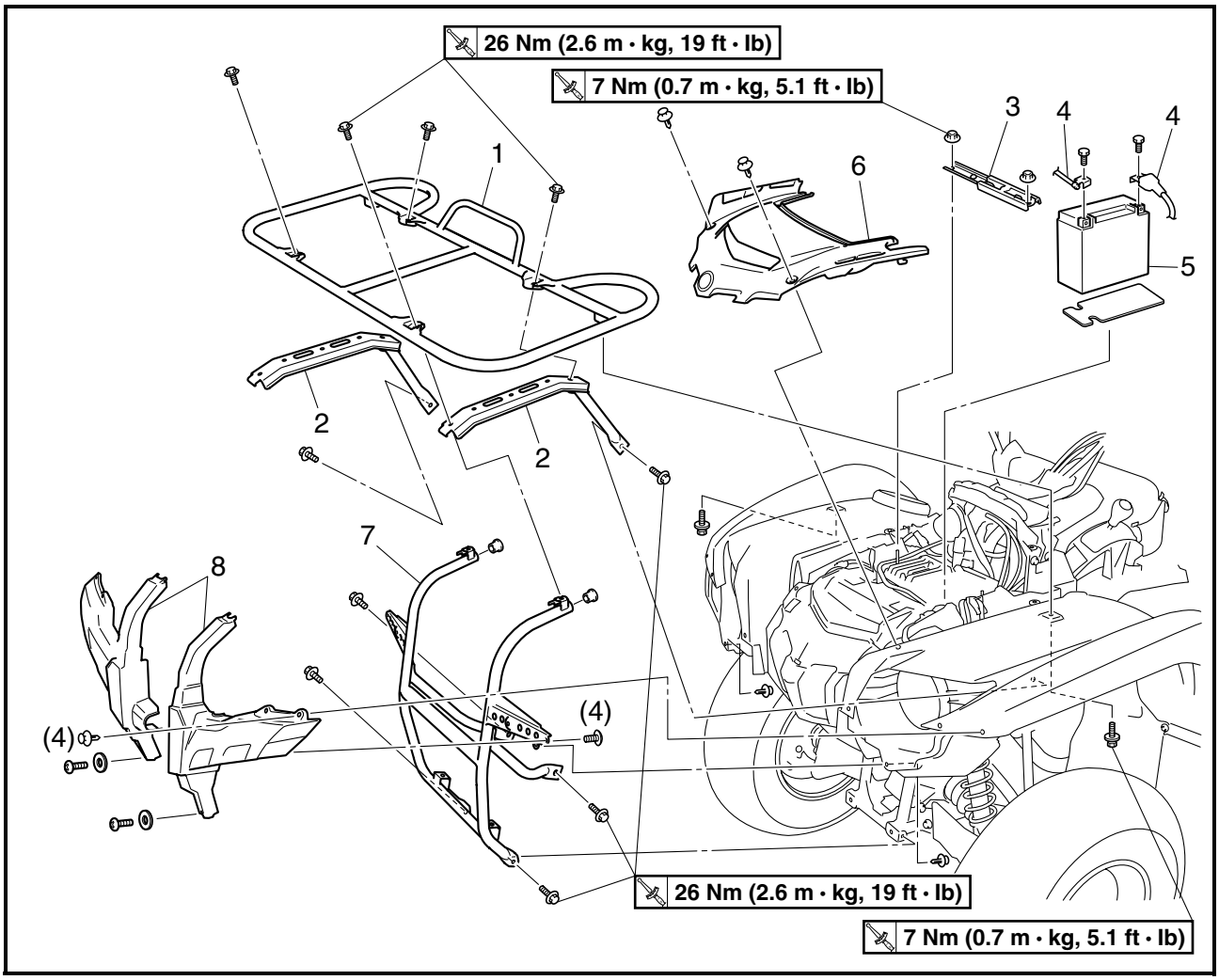
Order	Job/Part	Q'ty	Remarks
	Removing the seat and side panels		Remove the parts in the order listed.
1	Seat	1	**NOTE:** Pull up the seat lock lever, then pull up on the rear of the seat.
2	Battery cover	1	
3	Fuel tank cover	1	
4	Left side panel	1	
5	Right side panel	1	
6	Dipstick accessing panel	1	
			For installation, reverse the removal procedure.

EBS00037

FRONT CARRIER AND FRONT GUARD

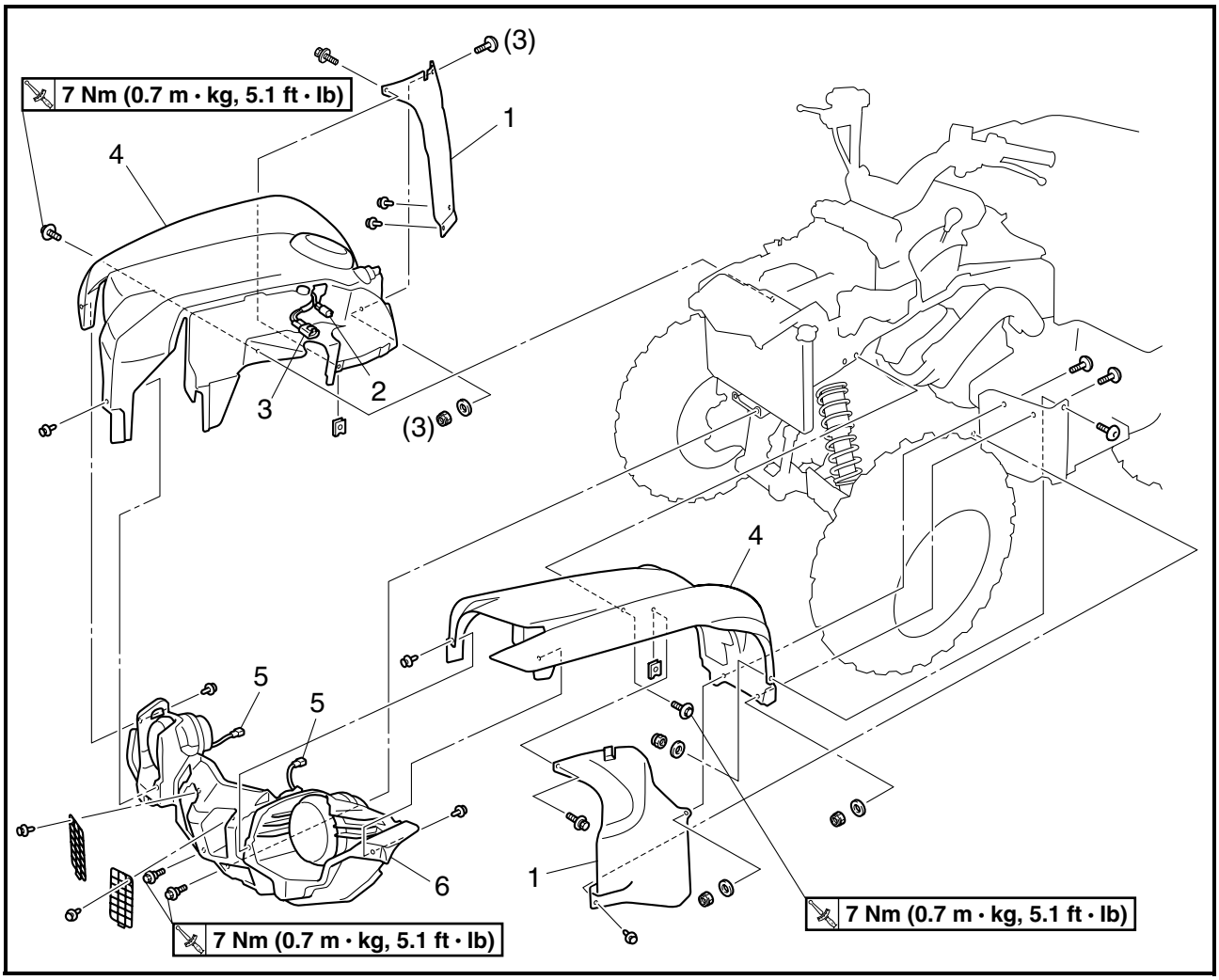


Order	Job/Part	Q'ty	Remarks
	Removing the front carrier and front guard		Remove the parts in the order listed.
	Front engine skid plate		Refer to "ENGINE SKID PLATES".
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
1	Front carrier	1	
2	Front carrier bracket	2	
3	Battery holding bracket	1	
4	Battery lead	2	Disconnect. **CAUTION:** **First disconnect the negative battery lead, then disconnect the positive lead.**
5	Battery	1	
6	Upper panel	1	



Order	Job/Part	Q'ty	Remarks
7	Front guard	1	
8	Front guard cover	2	
			For installation, reverse the removal procedure.

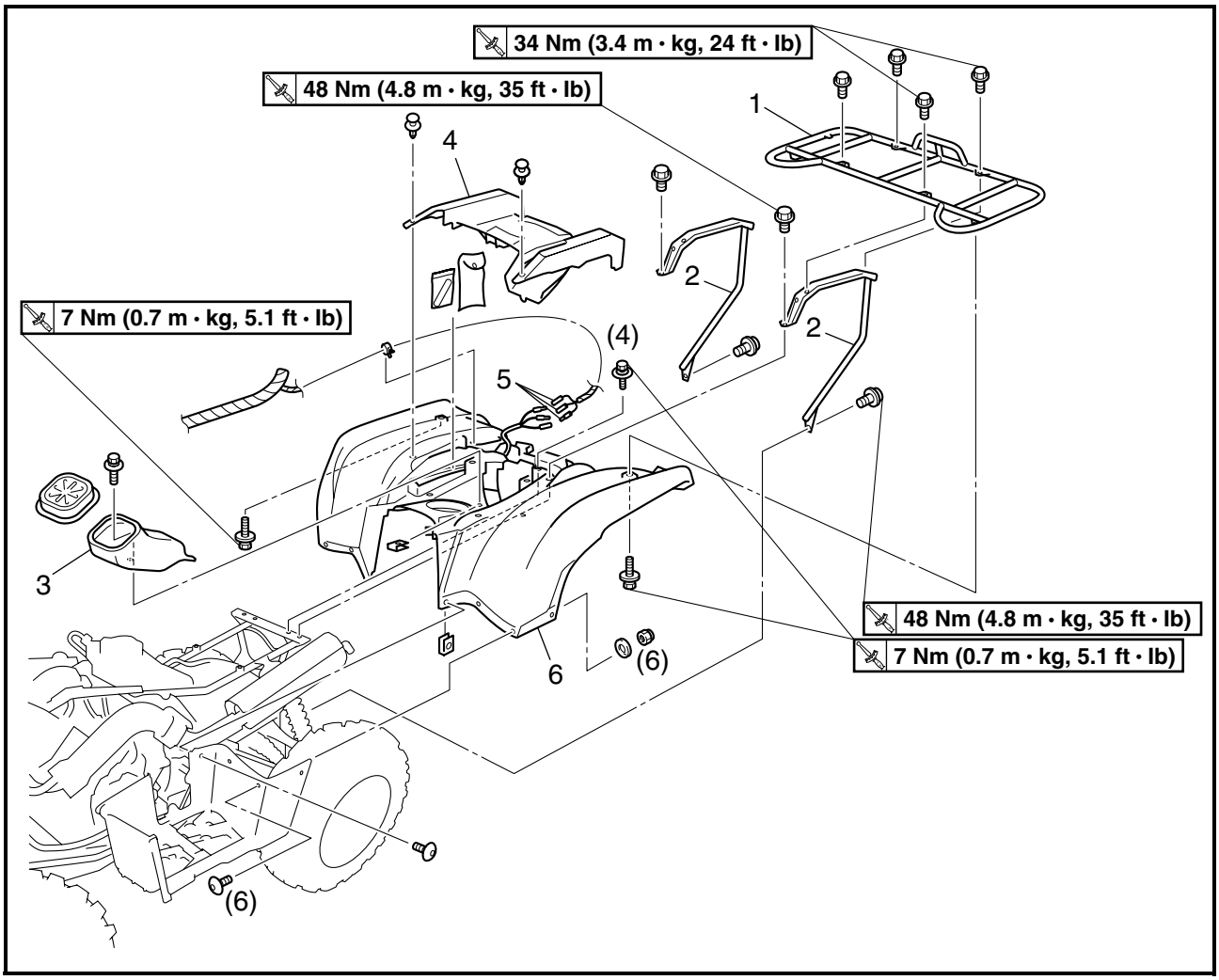
FRONT FENDERS AND FRONT GRILL



Order	Job/Part	Q'ty	Remarks
	Removing the front fenders and front grill		Remove the parts in the order listed.
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
	Front carrier/front guard		Refer to "FRONT CARRIER AND FRONT GUARD".
1	Front fender inner panel	2	
2	Auxiliary DC jack coupler	1	Disconnect.
3	Main switch coupler	1	Disconnect.
4	Front fender	2	
5	Headlight coupler	2	Disconnect.
6	Front grill	1	
			For installation, reverse the removal procedure.

EBS00040

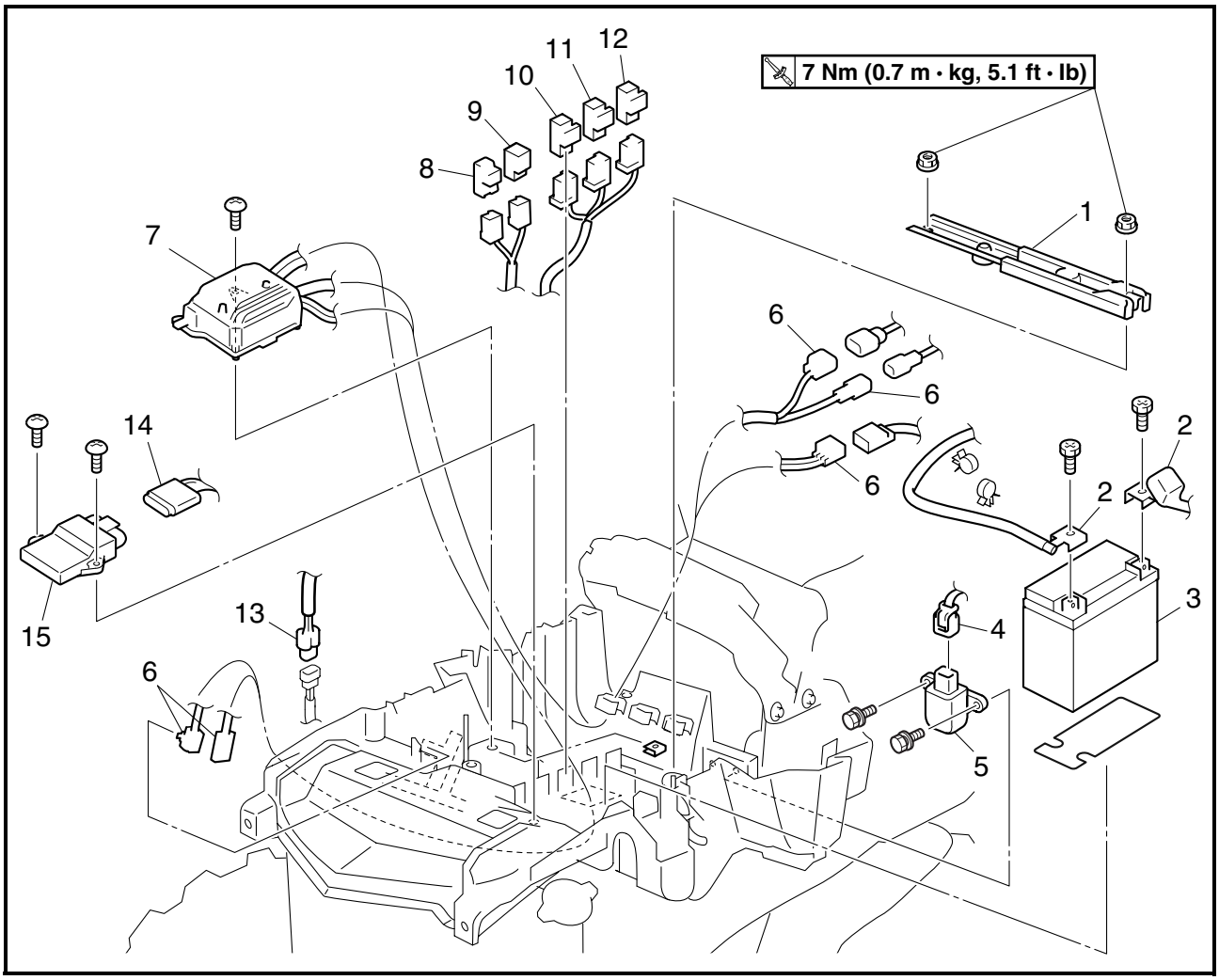
REAR CARRIER AND REAR FENDER



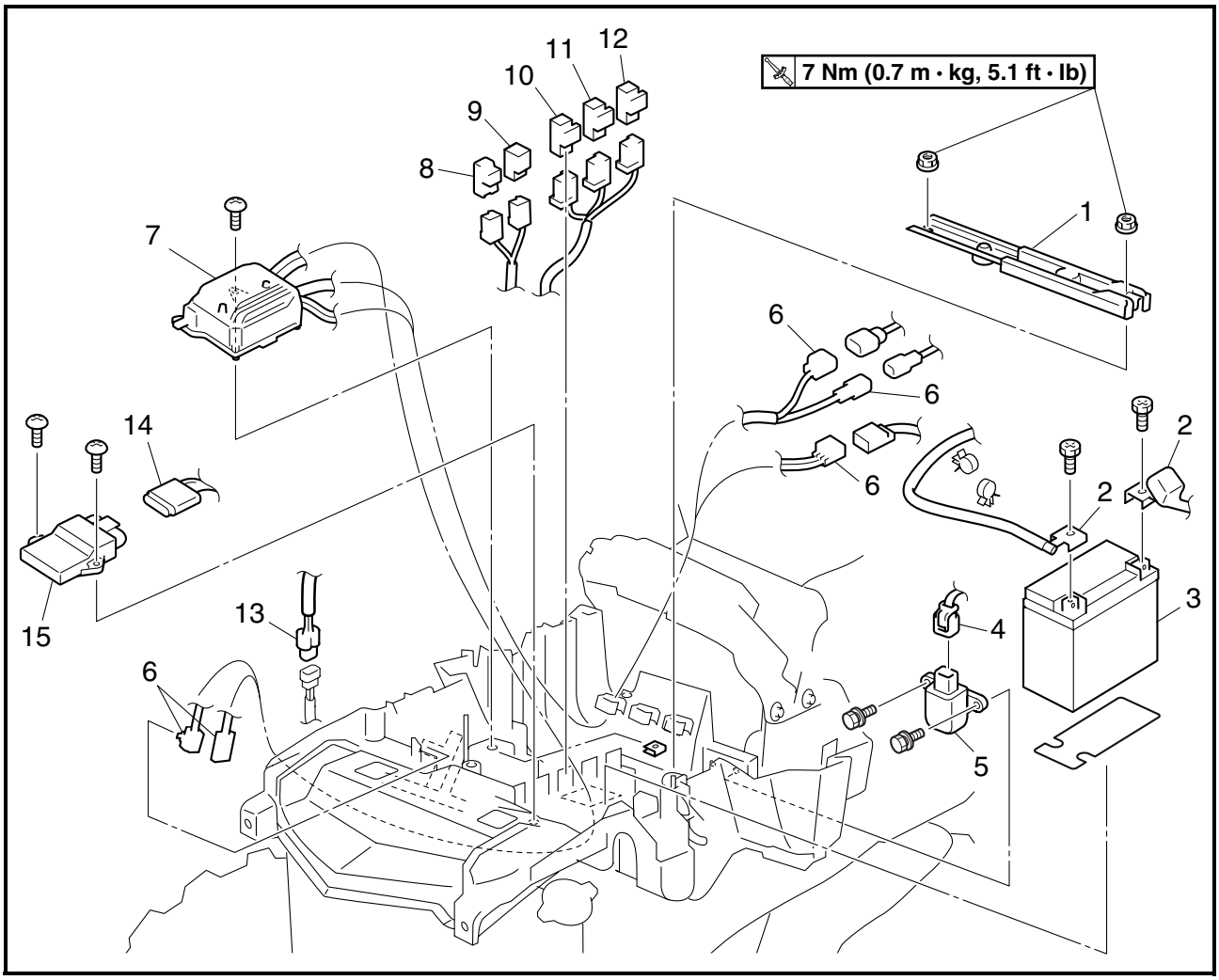
Order	Job/Part	Q'ty	Remarks
	Removing the rear carrier and rear fender		Remove the parts in the order listed.
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
1	Rear carrier	1	
2	Rear carrier bracket	2	
3	Storage compartment	1	
4	Tail/brake light cover	1	
5	Tail/brake light connector	3	Disconnect.
6	Rear fender	1	
			For installation, reverse the removal procedure.

ELECTRICAL COMPONENTS TRAY

ELECTRICAL COMPONENTS TRAY 1/2

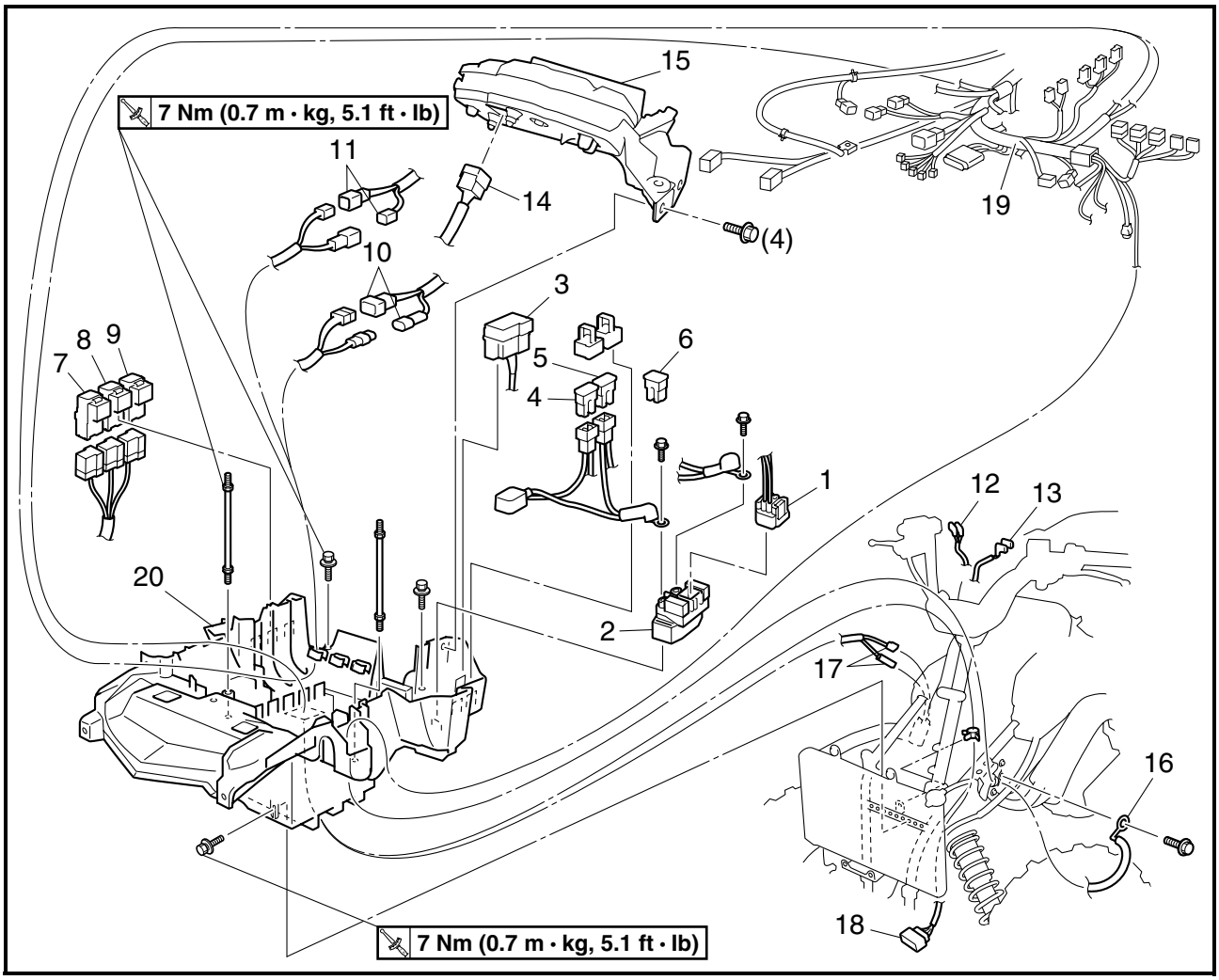


Order	Job/Part	Q'ty	Remarks
	Removing the electrical components tray		Remove the parts in the order listed.
	Front fender/front grill		Refer to "FRONT FENDERS AND FRONT GRILL".
1	Battery holding bracket	1	
2	Battery lead	2	Disconnect.
			CAUTION: **First disconnect the negative battery lead, then disconnect the positive lead.**
3	Battery	1	
4	Lean angle sensor coupler	1	Disconnect.
5	Lean angle sensor	1	
6	EPS control unit coupler	5	Disconnect.

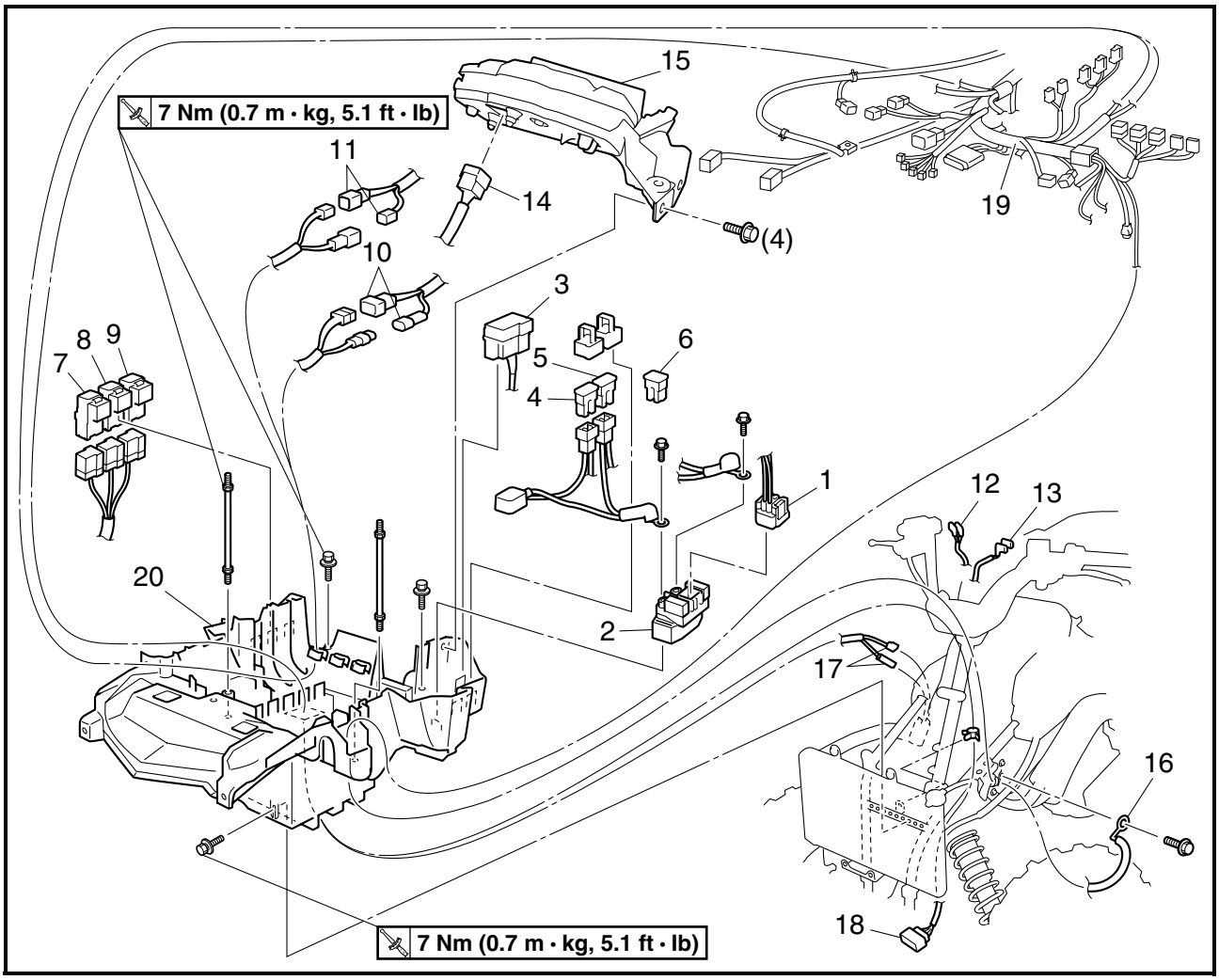


Order	Job/Part	Q'ty	Remarks
7	EPS (electric power steering) control unit	1	
8	Four-wheel-drive motor relay 3	1	
9	Rear brake relay	1	
10	Four-wheel-drive motor relay 2	1	
11	Four-wheel-drive motor relay 1	1	
12	Headlight relay	1	
13	Radiator fan motor coupler	1	Disconnect.
14	ECU coupler	1	Disconnect.
15	ECU (engine control unit)	1	For installation, reverse the removal procedure.

ELECTRICAL COMPONENTS TRAY 2/2

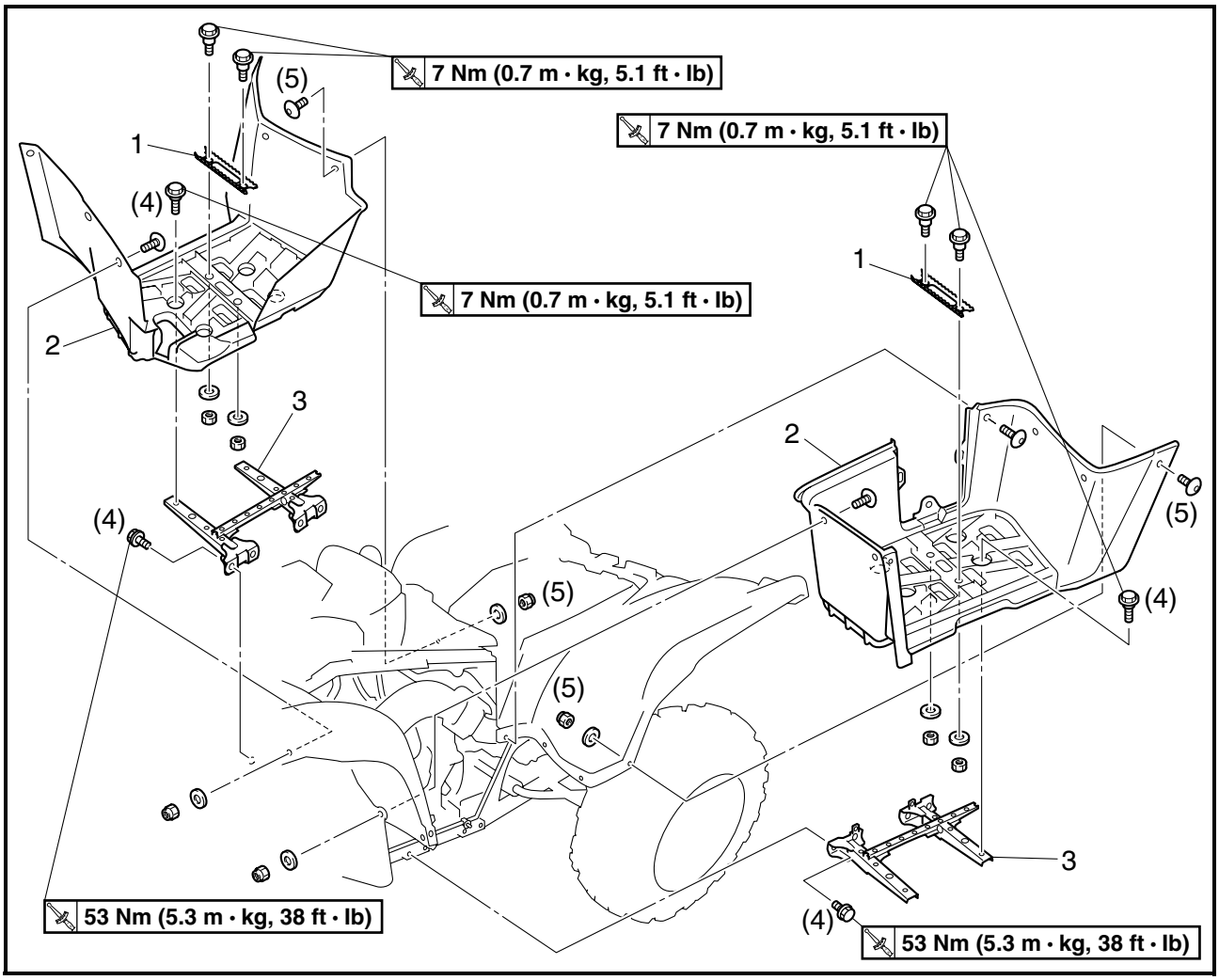


Order	Job/Part	Q'ty	Remarks
	Removing the electrical components tray		Remove the parts in the order listed.
1	Starter relay coupler	1	Disconnect.
2	Starter relay	1	
3	Fuse box	1	
4	EPS fuse	1	
5	Main fuse	1	
6	Spare fuse	1	
7	Radiator fan motor relay	1	
8	Fuel injection system relay	1	
9	Starting circuit cut-off relay	1	
10	Left handlebar switch coupler	2	Disconnect.
11	On-command four-wheel-drive motor switch and differential gear lock switch coupler	2	Disconnect.



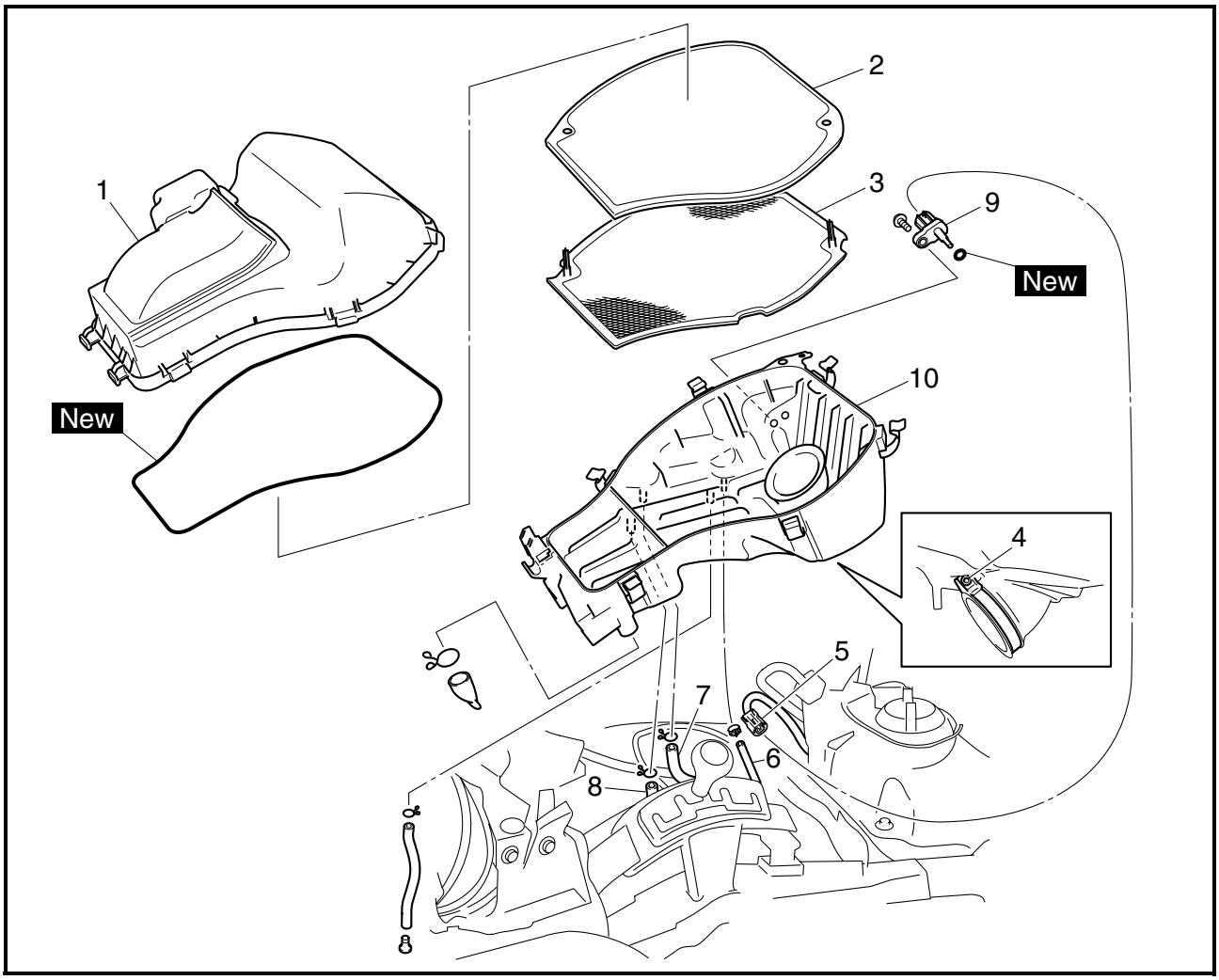
Order	Job/Part	Q'ty	Remarks
12	Front brake light switch connector	2	Disconnect.
13	Rear brake light switch connector	2	Disconnect.
14	Meter assembly coupler	1	Disconnect.
15	Meter assembly	1	
16	Frame ground terminal	1	
17	Ignition coil connector	2	Disconnect.
18	Differential gear motor coupler	1	Disconnect.
19	Wire harness	1	
20	Electrical components tray	1	
			For installation, reverse the removal procedure.

EBS00045
FOOTREST BOARDS



Order	Job/Part	Q'ty	Remarks
	Removing the footrest boards		Remove the parts in the order listed.
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
1	Footrest	2	
2	Footrest board	2	
3	Footrest bracket	2	
			For installation, reverse the removal procedure.

AIR FILTER CASE

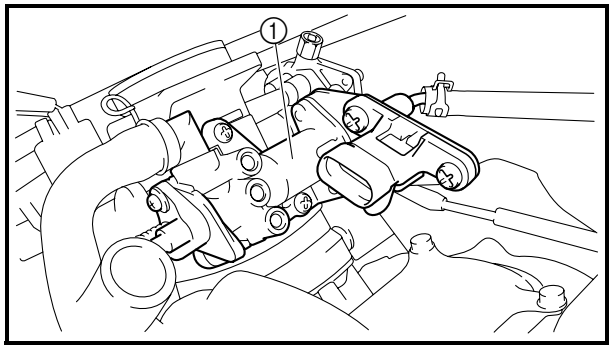


Order	Job/Part	Q'ty	Remarks
	Removing the air filter case		Remove the parts in the order listed.
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
1	Air filter case cover	1	
2	Air filter element	1	
3	Air filter element frame	1	
4	Air filter case joint clamp screw	1	Loosen.
5	Intake air temperature sensor coupler	1	Disconnect.
6	Breather hose (air filter case to throttle body)	1	Disconnect.
7	Breather hose (air filter case to fast idle plunger unit)	1	Disconnect.
8	Cylinder head breather hose	1	Disconnect.
9	Intake air temperature sensor	1	
10	Air filter case	1	
			For installation, reverse the removal procedure.

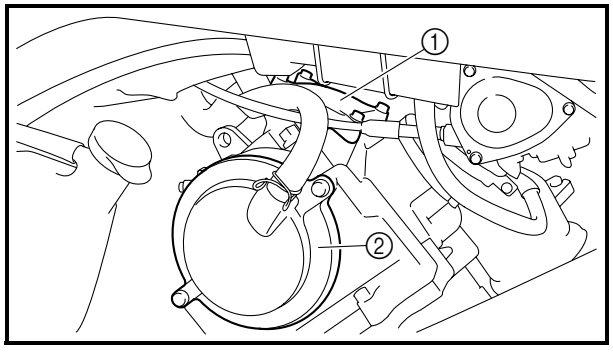
EAS00049
ENGINE
ADJUSTING THE VALVE CLEARANCE
The following procedure applies to all of the valves.

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.

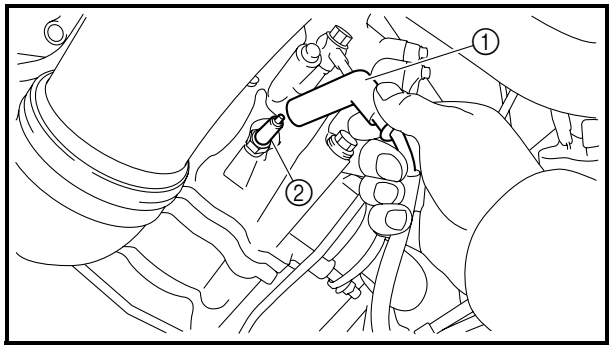
1. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
   - front fender
     Refer to “FRONT FENDERS AND FRONT GRILL”.
   - footrest board
     Refer to “FOOTREST BOARDS”.
   - air filter case
     Refer to “AIR FILTER CASE”.



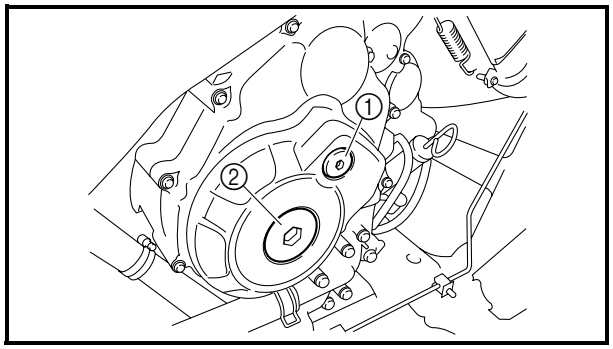
2. Remove:
   - fast idle plunger unit ①



3. Remove:
   - intake tappet cover ①
   - exhaust tappet cover
   - camshaft sprocket cover ②



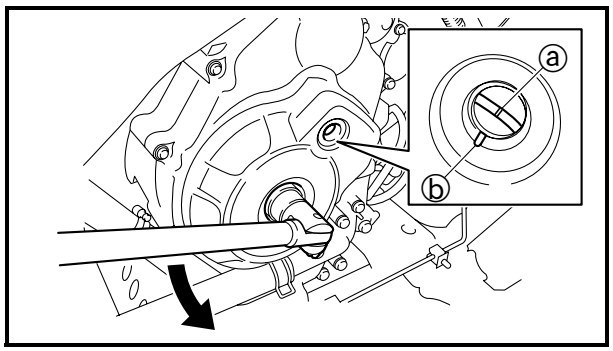
4. Disconnect:
   • spark plug cap ①
5. Remove:
   • spark plug ②



6. Remove:
   • timing mark accessing screw ①
   • crankshaft end accessing screw ②

7. Measure:
   • 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)



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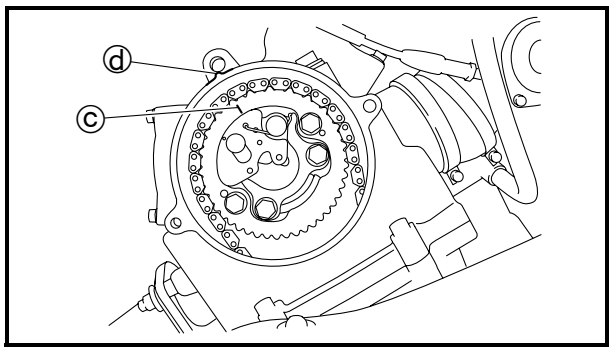
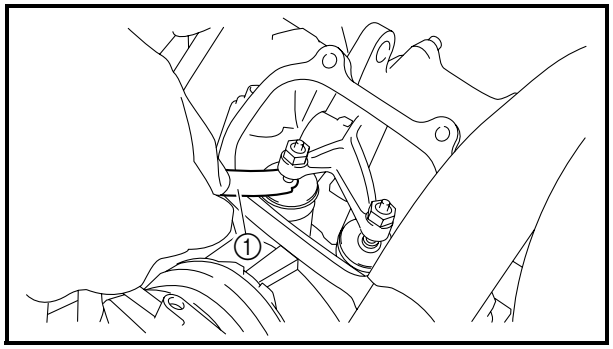
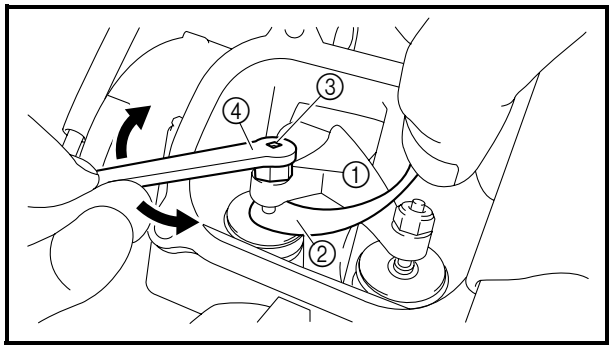
a. Turn the crankshaft counterclockwise.
b. When the piston is at the top dead center (TDC) on the compression stroke, align the "I" mark ⓐ on the AC magneto rotor with the stationary pointer ⓑ on the AC magneto cover.

NOTE:

To position the piston at top dead center (TDC) on the compression stroke, align the "I" mark ⓒ on the camshaft sprocket with the stationary pointer ⓓ on the cylinder head, as shown in the illustration.







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

	Thickness gauge **90890-03079** **Narrow gauge set** **YM-34483**

Out of specification → Adjust.

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8. Adjust:
   • valve clearance

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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 with the tappet adjusting tool ④ until the specified valve clearance is obtained.

	Tappet adjusting tool **90890-01311** **Valve adjuster 3 mm & 4 mm** **YM-08035-A**

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.

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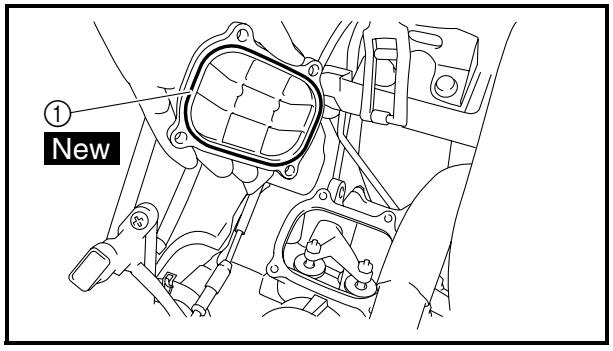
9. Install:
   • timing mark accessing screw — **6 Nm (0.6 m · kg, 4.3 ft · lb)**
   • crankshaft end accessing screw — **10 Nm (1.0 m · kg, 7.2 ft · lb)**
10. Install:
   • spark plug — **13 Nm (1.3 m · kg, 9.4 ft · lb)**
11. Connect:
   • spark plug cap



12.Install:
- O-ring New
- camshaft sprocket cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

- O-ring ① New
- intake tappet cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

- O-ring New
- exhaust tappet cover

10 Nm (1.0 m · kg, 7.2 ft · lb)

13.Install:
- fast idle plunger unit

14.Install:
- air filter case
  Refer to “AIR FILTER CASE”.
- footrest board
  Refer to “FOOTREST BOARDS”.
- front fender
  Refer to “FRONT FENDERS AND FRONT GRILL”.
- left side panel
  Refer to “SEAT AND SIDE PANELS”.

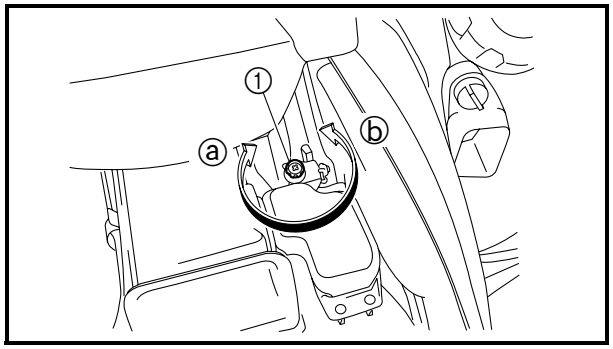
EBS00051
ADJUSTING THE ENGINE IDLING SPEED

1. Remove:
   - fuel tank cover
     Refer to “SEAT AND SIDE PANELS”.
2. Start the engine and let it warm up for several minutes.
3. Attach:
   - tachometer
     (to the spark plug lead)

Digital tachometer
90890-06760, YU-39951-B

4. Measure:
   - engine idling speed
     Out of specification → Adjust.

Engine idling speed
1,550 ~ 1,650 r/min



5. Adjust:
   • engine idling speed

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

Direction ⓐ	**Idling speed becomes higher.**
Direction ⓑ	**Idling speed becomes lower.**

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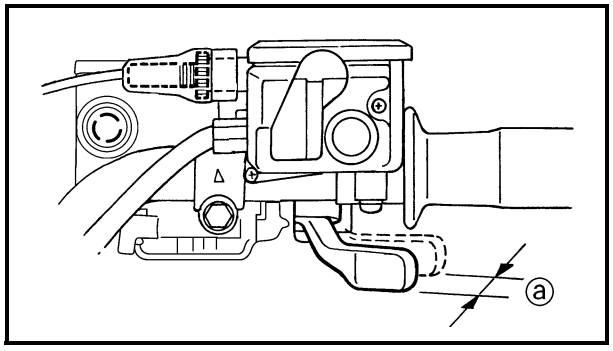
6. Detach:
   • tachometer
7. Adjust:
   • throttle lever free play
   Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY”.

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

8. Install:
   • fuel tank cover
   Refer to “SEAT AND SIDE PANELS”.



EBS00052

ADJUSTING THE THROTTLE LEVER FREE PLAY

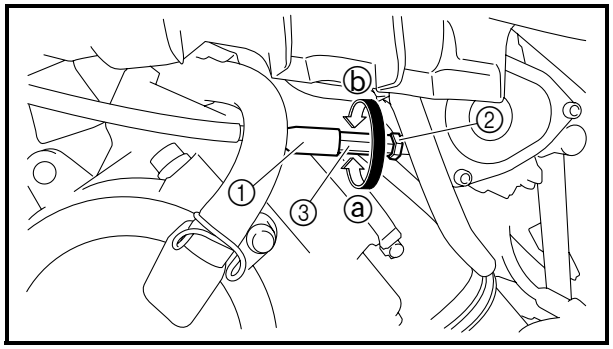
NOTE:

Engine idling speed should be adjusted properly before adjusting the throttle lever free play.

1. Measure:
   • throttle lever free play ⓐ
   Out of specification → Adjust.

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

2. Remove:
   • left side panel
   Refer to “SEAT AND SIDE PANELS”.



3. Adjust:
   • throttle lever free play

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First step:

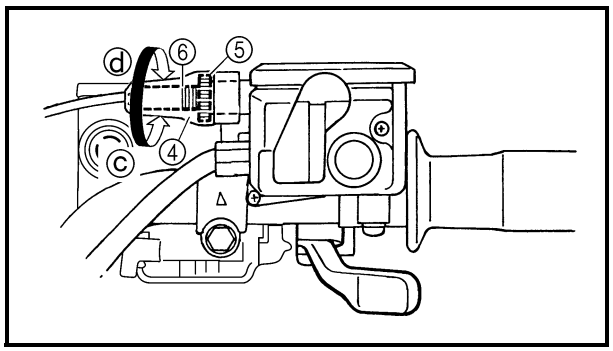
a. Slide back the rubber cover ①.
b. Loosen the locknut ② on the throttle body side.
c. Turn the adjusting nut ③ in direction ⓐ or ⓑ until the correct free play is obtained.

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

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

NOTE:

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



Second step:

f. Slide back the rubber cover ④.
g. Loosen the locknut ⑤.
h. Turn the adjusting bolt ⑥ in direction ⓒ or ⓓ until the correct free play is obtained.

Direction ⓒ	**Free play is increased.**
Direction ⓓ	**Free play is decreased.**

i. Tighten the locknut.
j. Slide the rubber cover to its original position.

⚠ WARNING

After adjusting the free play, turn the handlebar to the right and left to make sure that the engine idling speed does not increase.

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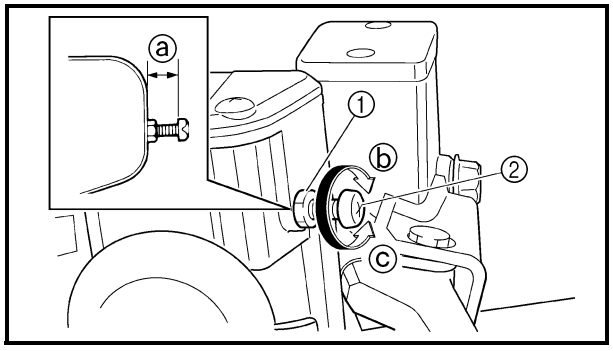
4. Install:
   • left side panel
   Refer to “SEAT AND SIDE PANELS”.



EBS00053

ADJUSTING THE SPEED LIMITER

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

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

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

2. Adjust:
   - speed limiter length

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

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

c. Tighten the locknut.

⚠ WARNING

- **Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as their riding technique improves. Never remove the speed limiter for a beginning rider.**
- **For proper throttle lever operation do not turn out the adjuster more than 12 mm (0.47 in). Also, always adjust the throttle lever free play to 3.0 ~ 5.0 mm (0.12 ~ 0.20 in).**

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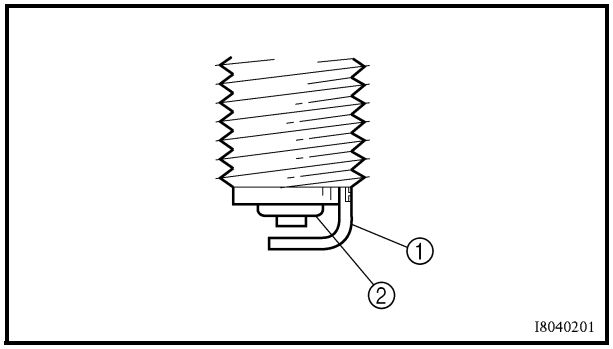
EBS00057

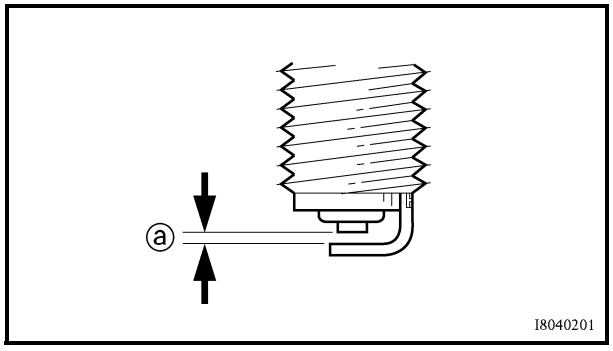
CHECKING THE SPARK PLUG

1. Remove:
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
2. Disconnect:
   - spark plug cap
3. Remove:
   - spark plug
4. Check:
   - spark plug type
     Incorrect → Change.

Standard spark plug
CPR7EA-9/NGK



5. Check:
   - electrode ①
     Wear/damage → Replace.
   - insulator ②
     Abnormal color → Replace.
     Normal color is a medium-to-light tan color.
6. Clean:
   - spark plug
     (with a spark plug cleaner or wire brush)



7. Measure:
   - spark plug gap ⓐ
     Use a wire gauge or thickness gauge.
     Out of specification → Regap.

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

8. Tighten:
   - spark plug — **13 Nm (1.3 m · kg, 9.4 ft · lb)**

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

9. Connect:
   - spark plug cap
10. Install:
    - right side panel
      Refer to “SEAT AND SIDE PANELS”.

EBS00058

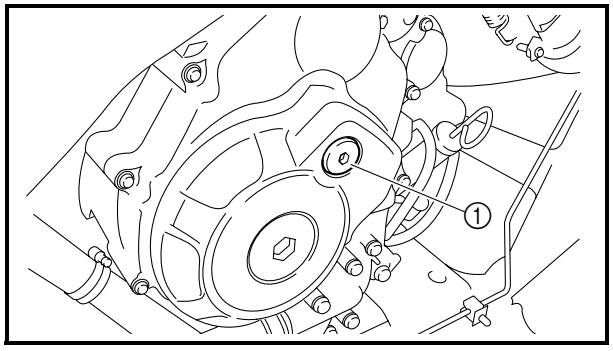
CHECKING THE IGNITION TIMING

NOTE:

Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:
   - left side panel
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - footrest board
     Refer to “FOOTREST BOARDS”.
2. Attach:
   - tachometer
   - timing light
     (to spark plug lead)

Digital tachometer
90890-06760, YU-39951-B
Timing light
90890-03141
Inductive clamp timing light
YU-03141



3. Check:
   - ignition timing

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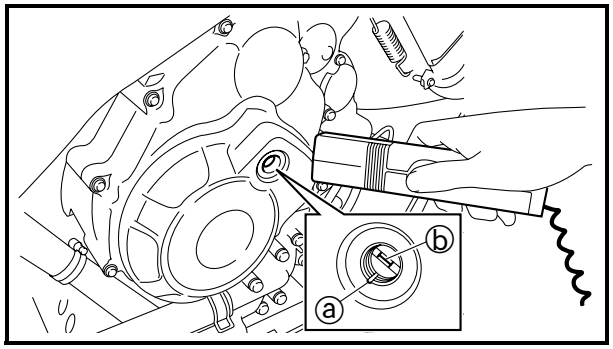
a. Warm up the engine and keep it at the specified speed.

Engine speed
1,550 ~ 1,650 r/min

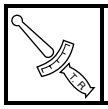
b. Remove the timing mark accessing screw ①.



c. Visually check the stationary pointer ⓐ to verify it is within the required firing range ⓑ indicated on the AC magneto rotor.
Incorrect firing range → Check the pulser coil assembly.

NOTE:
When checking the ignition timing, make sure that the timing light cord does not come in contact with the exhaust muffler.

d. Install the timing mark accessing screw.

	**Timing mark accessing screw 6 Nm (0.6 m · kg, 4.3 ft · lb)**

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4. Detach:
   - timing light
   - tachometer
5. Install:
   - footrest board
     Refer to “FOOTREST BOARDS”.
   - right side panel
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.

EBS00061
MEASURING THE COMPRESSION PRESSURE

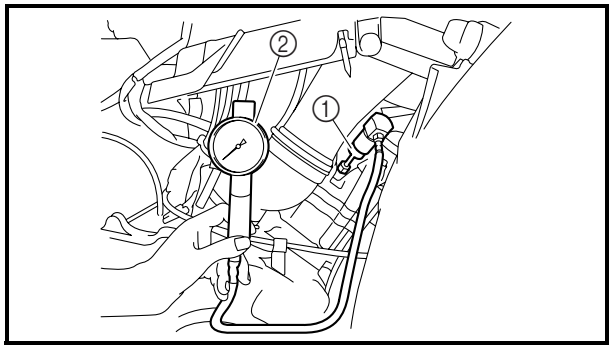
NOTE:
Insufficient compression pressure will result in a loss of performance.

1. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to “ADJUSTING THE VALVE CLEARANCE”.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.

4. Disconnect:
   • spark plug cap
5. Remove:
   • spark plug

CAUTION:

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



6. Attach:
   • extension ①
   • compression gauge ②

Compression gauge
90890-03081
Engine compression tester
YU-33223
Extension
90890-04082

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

Compression pressure (at sea level)
Minimum
392 kPa (3.92 kg/cm², 55.8 psi)
Standard
450 kPa (4.50 kg/cm², 64.0 psi)
Maximum
504 kPa
(5.04 kg/cm², 71.7 psi)

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a. Set the main switch to “ON”.

b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

⚠ WARNING

To prevent sparking, ground the spark plug lead before cranking the engine.

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

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

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8. Install:
   • spark plug — **13 Nm (1.3 m · kg, 9.4 ft · lb)**
9. Connect:
   • spark plug cap
10. Install:
   • V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
   • right side panel
     Refer to “SEAT AND SIDE PANELS”.

EBS00064

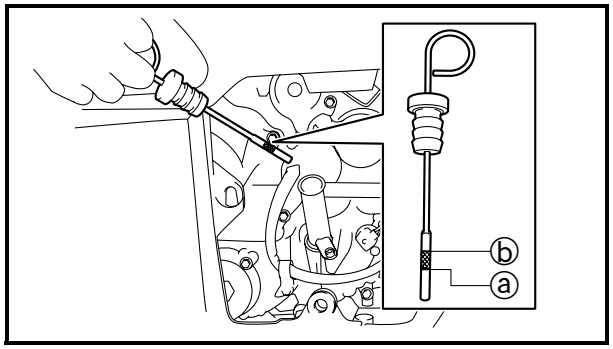
CHECKING THE ENGINE OIL LEVEL

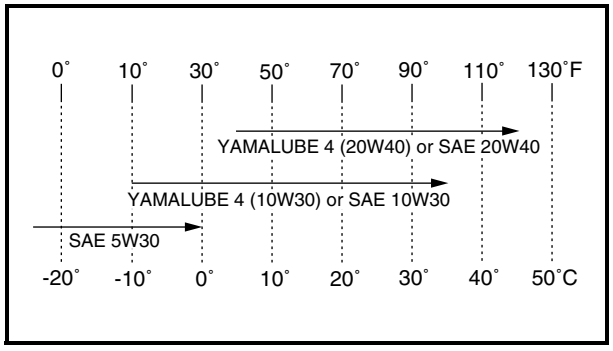
1. Place the vehicle on a level surface.
2. Check the engine oil level on a cold engine.

NOTE:

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

3. Remove:
   - dipstick accessing panel
     Refer to "SEAT AND SIDE PANELS".





4. Check:
   - engine oil level
     Oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
     Oil level low → Add oil to the proper level.

NOTE:

To obtain an accurate oil level reading, the dipstick must be inserted completely into the oil filter hole.

Recommended engine oil type
YAMALUBE 4, SAE5W30, SAE10W30 or SAE20W40
Recommended engine oil grade
API service SG type or higher, JASO standard MA

CAUTION:

Do not allow foreign material to enter the crankcase.

5. Check the engine oil level again.

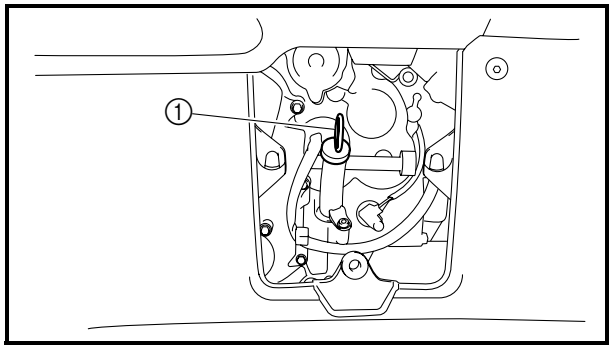
CAUTION:

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

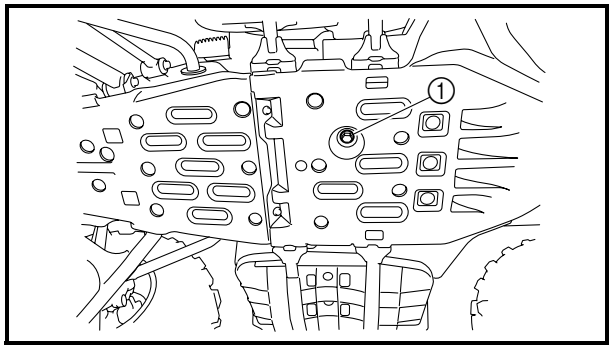
6. Install:
   • dipstick accessing panel
   Refer to “SEAT AND SIDE PANELS”.

EBS00069
CHANGING THE ENGINE OIL

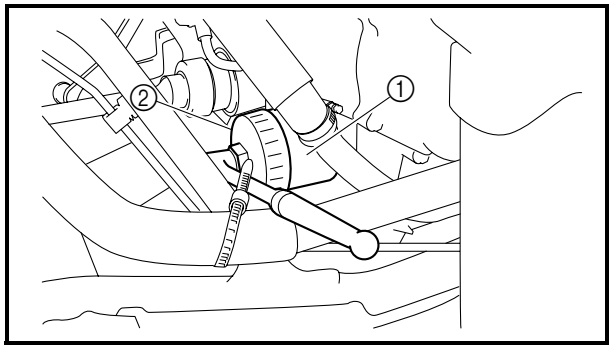
1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   • dipstick accessing panel
   Refer to “SEAT AND SIDE PANELS”.



4. Remove:
   • dipstick ①



5. Remove:
   • engine oil drain bolt ①
   (along with the gasket)
6. Drain:
   • engine oil
   (completely from the crankcase)



7. If the oil filter cartridge is also to be replaced, perform the following procedure.

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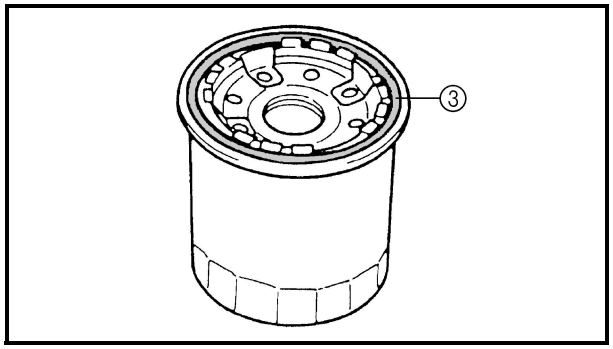
a. Remove the oil filter cartridge ① with an oil filter wrench ②.

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



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

CAUTION:

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

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

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

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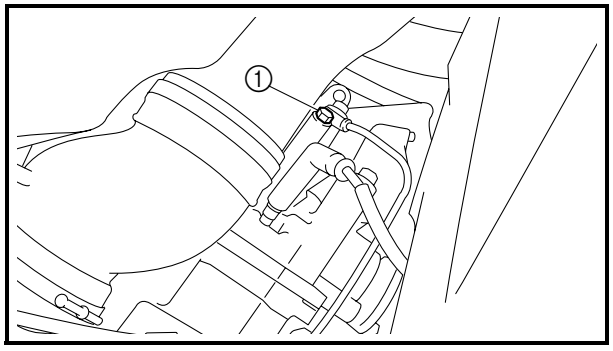
8. Check:
   - engine oil drain bolt gasket
     Damage → Replace.
9. Install:
   - engine oil drain bolt
     (along with the gasket)

30 Nm (3.0 m · kg, 22 ft · lb)

10. Fill:
    - crankcase
      (with the specified amount of the recommended engine oil)

Quantity
Total amount
2.40 L (2.11 Imp qt, 2.54 US qt)
Without oil filter cartridge replacement
2.00 L (1.76 Imp qt, 2.11 US qt)
With oil filter cartridge replacement
2.10 L (1.85 Imp qt, 2.22 US qt)

11. Install:
    - dipstick
12. Start the engine, warm it up for several minutes, and then turn it off.
13. Check:
    - engine
      (for engine oil leaks)
14. Check:
    - engine oil level
      Refer to “CHECKING THE ENGINE OIL LEVEL”.



15.Check:
- engine oil pressure

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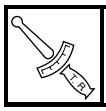
a. Slightly loosen the oil gallery bolt ①.
b. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to “CRANKSHAFT AND OIL PUMP” in chapter 4.
d. Start the engine after solving the problem(s) and check the engine oil pressure again.
e. Tighten the oil gallery bolt to specification.

	**Oil gallery bolt** **10 Nm (1.0 m · kg, 7.2 ft · lb)**

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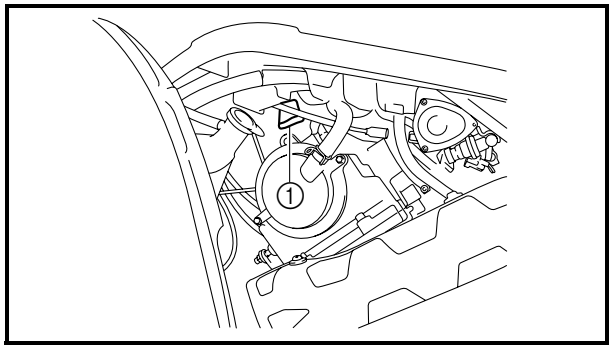
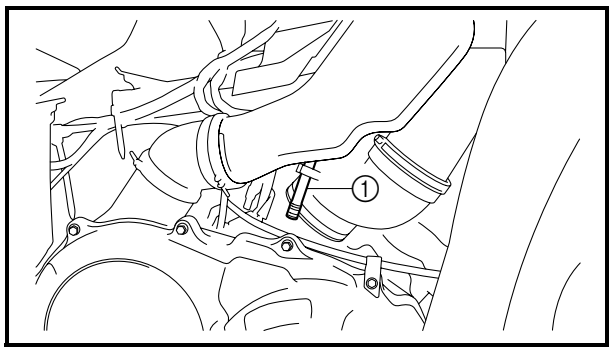




EBS00073

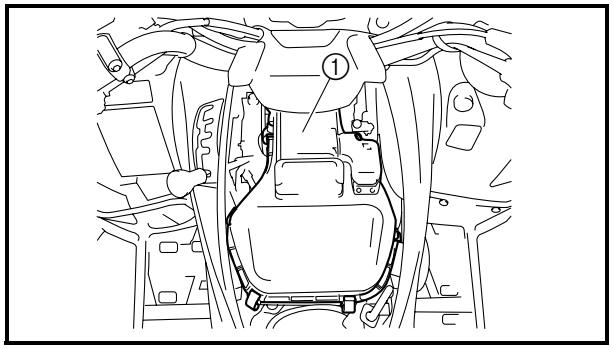
CLEANING THE AIR FILTER ELEMENT

1. Remove:
- fuel tank cover
- left side panel
- right side panel

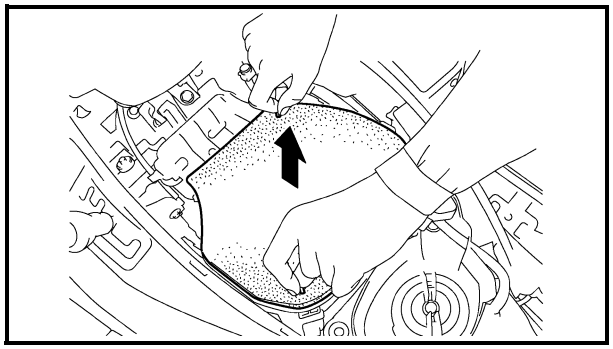
Refer to “SEAT AND SIDE PANELS”.

NOTE:

There are two check hoses ① at the bottom of the air filter case. If dust and/or water collects in them, clean the air filter element, air filter mesh and air filter case.



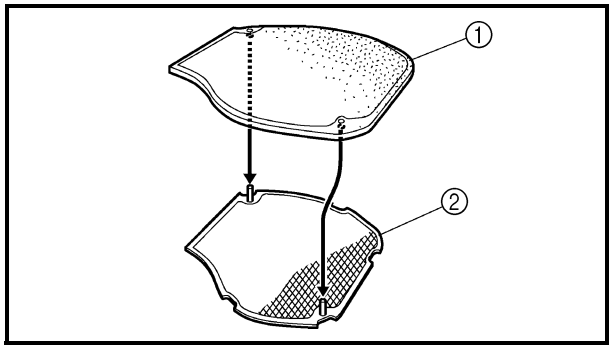
2. Remove:
   • air filter case cover ①



3. Remove:
   • air filter element ①
   • air filter element frame ②

CAUTION:

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



4. Check:
   • air filter element
   • air filter element frame
   Damage → Replace.
5. Clean:
   • air filter element
   Use compressed air to blow off dust from the inner surface of the element.

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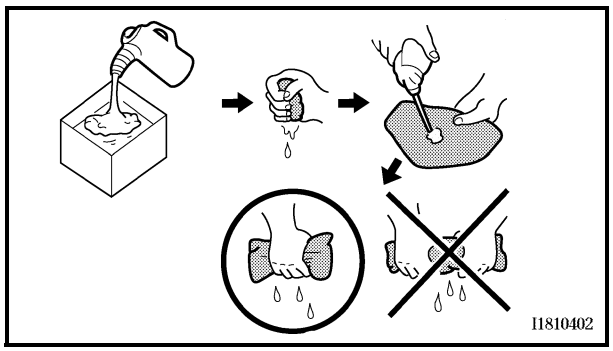
a. Wash the element gently, but thoroughly in solvent.



⚠ WARNING

Use a cleaning solvent which is designed to clean parts only. Never use gasoline or low flash point solvents as they may cause a fire or explosion.

b. Squeeze the excess solvent out of the element and let it dry.

CAUTION:

Do not twist or wring out the element. This could damage the foam material.

c. Apply Yamaha foam air filter oil or other quality foam air filter oil to the element.

d. Squeeze out the excess oil.

NOTE:
The element should be wet but not dripping.

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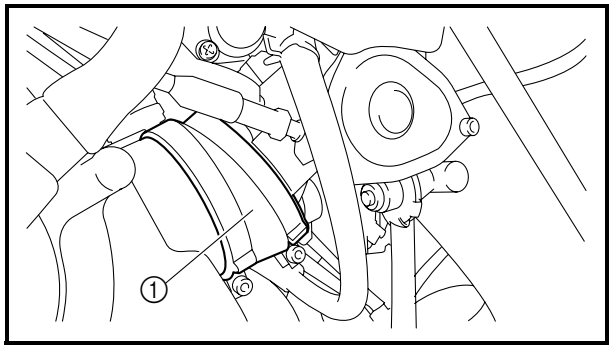
6. Install:
   - air filter element frame
   - air filter element

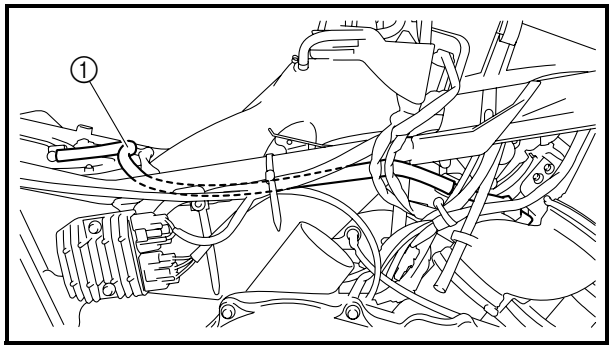
NOTE:
Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

7. Install:
   - air filter case cover
8. Install:
   - right side panel
   - left side panel
   - fuel tank cover
     Refer to “SEAT AND SIDE PANELS”.



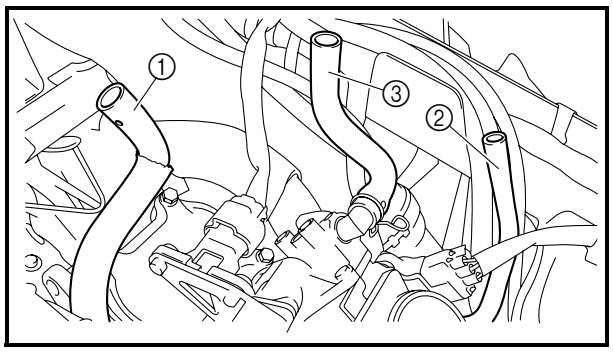
EAS00094
CHECKING THE THROTTLE BODY JOINT

1. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
2. Check:
   - throttle body joint ①
     Cracks/damage → Replace.
     Refer to “THROTTLE BODY” in chapter 6.
3. Install:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.



EAS00096
CHECKING THE FUEL HOSE

1. Remove:
   - seat
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - rear fender
     Refer to “REAR CARRIER AND REAR FENDER”.
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
2. Check:
   - fuel hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.
3. Install:
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
   - rear fender
     Refer to “REAR CARRIER AND REAR FENDER”.
   - right side panel
   - seat
     Refer to “SEAT AND SIDE PANELS”.

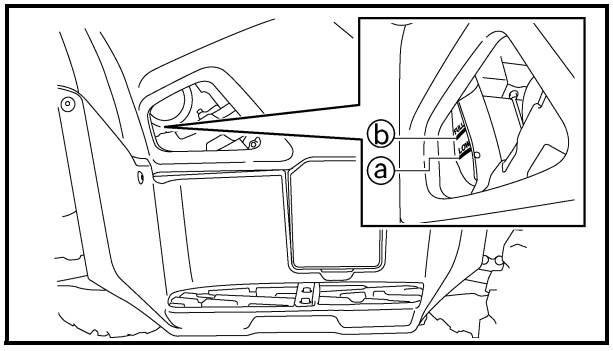


EAS00098
CHECKING THE BREATHER HOSES

1. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
   - air filter case
     Refer to “AIR FILTER CASE”.
2. Check:
   - cylinder head breather hose ①
   - breather hose (air filter case to throttle body) ②
   - breather hose (air filter case to fast idle plunger unit) ③
     Cracks/damage → Replace.
     Loose connection → Connect properly.

CAUTION:

Make sure the breather hoses are routed correctly.



EBS00076
CHECKING THE COOLANT LEVEL

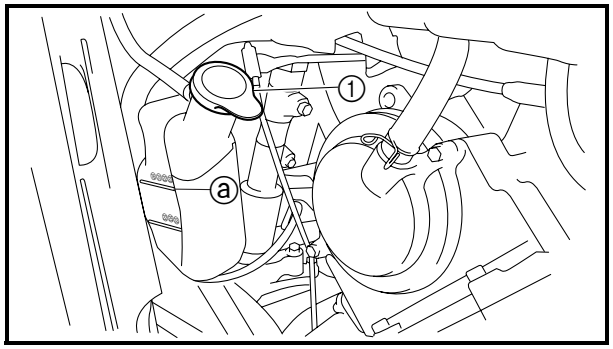
1. Place the vehicle on a level surface.

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

2. Check:
   - coolant level
     The coolant level should be between the minimum level mark ⓐ and maximum level mark ⓑ in the coolant reservoir.

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, soft water may be used if distilled water is not available.**

3. If the coolant is at or below the minimum level mark, remove the left side panel.
   Refer to “SEAT AND SIDE PANELS”.

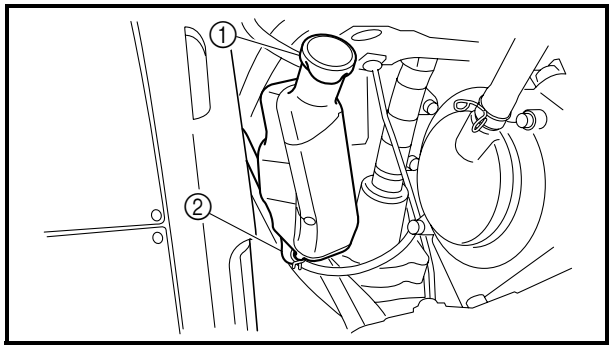


4. Remove the reservoir cap ①, add coolant or distilled water to the maximum level mark ⓐ, install the reservoir cap, and then install the panel.

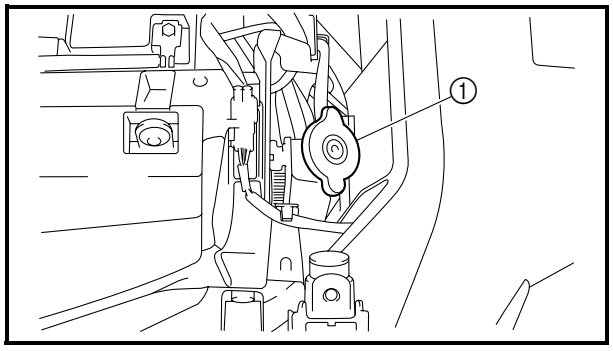
Coolant reservoir capacity (up to the maximum level mark):
0.17 L (0.15 Imp qt, 0.18 US qt)

EBS00075
CHANGING THE COOLANT

1. Remove:
   - right side panel
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
   - front carrier
   - upper panel
     Refer to “FRONT CARRIER AND FRONT GUARD”.



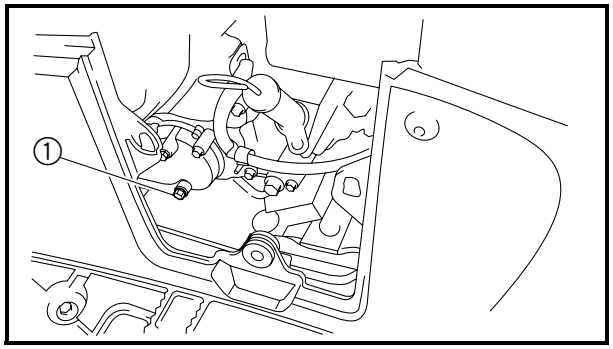
2. Remove:
   • coolant reservoir cap ①
3. Disconnect:
   • coolant reservoir hose ②
4. Drain:
   • coolant
   (from the coolant reservoir)
5. Connect:
   • coolant reservoir hose



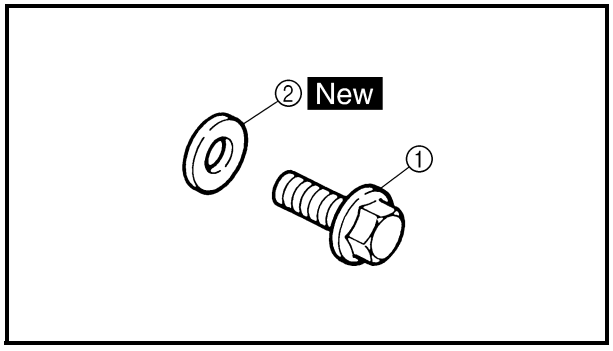
6. Remove:
   • radiator cap ①

⚠ WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

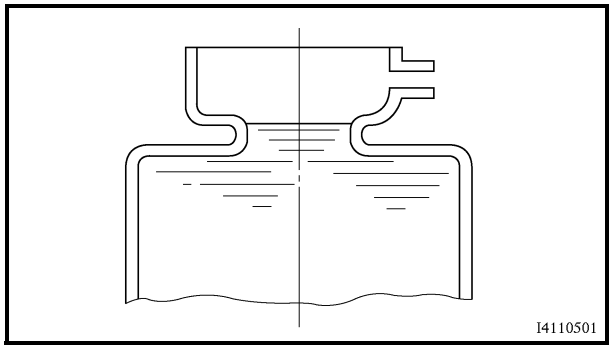


7. Remove:
   • coolant drain bolt ①
   (along with the copper washer)
8. Drain:
   • coolant
   (from the engine and radiator)



9. Check:
   • coolant drain bolt ①
   Damage → Replace.
10. Install:
   • copper washer ② New
   • coolant drain bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)



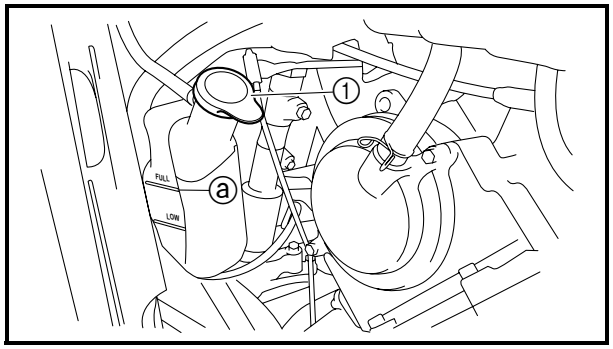
11.Fill:
- cooling system
  (with the specified amount of the recommended coolant)

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Quantity
Total amount
1.99 L
(1.75 Imp qt, 2.10 US qt)
Coolant reservoir capacity (up to the maximum level mark)
0.17 L
(0.15 Imp qt, 0.18 US qt)
From minimum to maximum level mark
0.14 L
(0.12 Imp qt, 0.15 US qt)

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

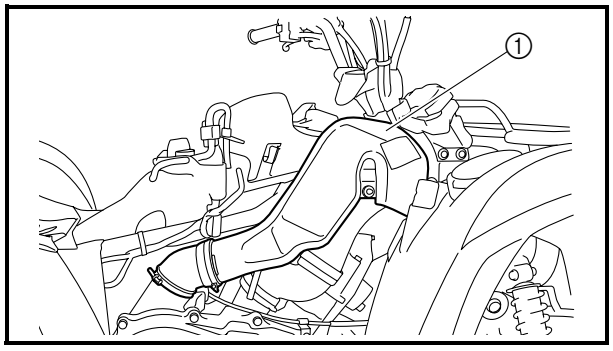
⚠ WARNING
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

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.**



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

13.Install:
- coolant reservoir cap ①



14.Bleed:
- coolant system

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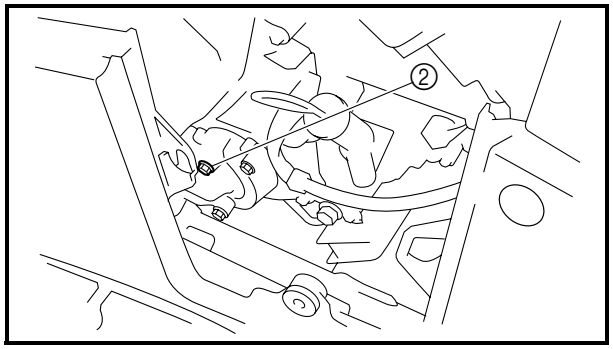
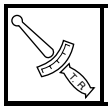
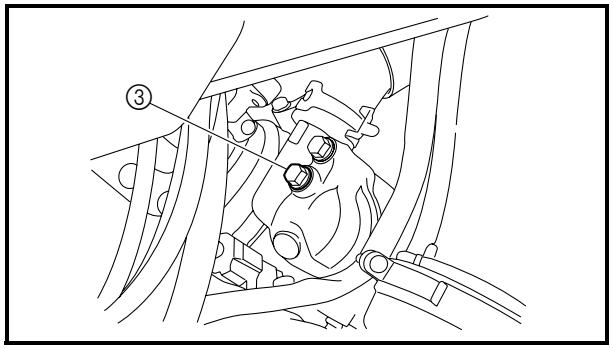
a. Remove the V-belt cooling duct 2 ①.
b. Loosen the water pump air bleed bolt ②, without removing it, to allow all of the air to escape from the air bleed bolt hole.
c. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.

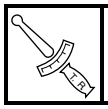




Water pump air bleed bolt
10 Nm (1.0 m · kg, 7.2 ft · lb)

d. Loosen the cylinder head air bleed bolt ③, without removing it, to allow all of the air to escape from the air bleed bolt hole.
e. When coolant begins to flow out of the bolt hole, tighten the cylinder head air bleed bolt to specification.





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

f. Install the V-belt cooling duct 2.

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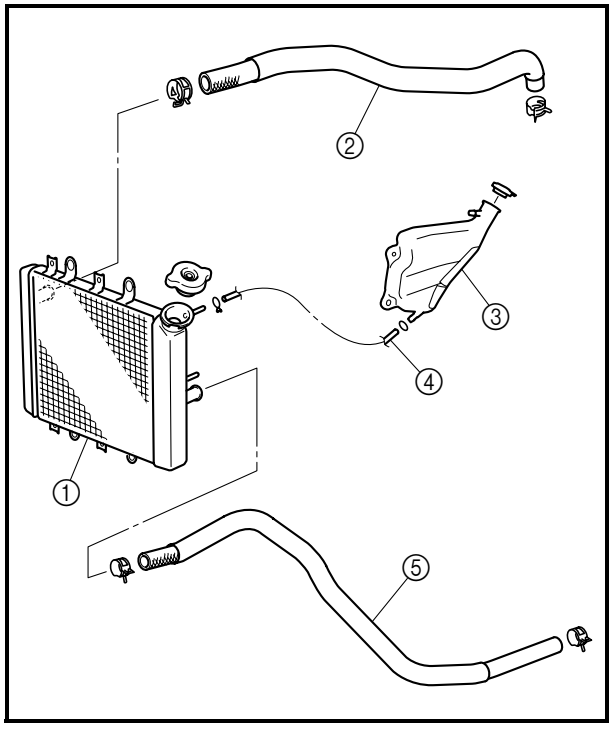
15.Start the engine, warm it up for ten minutes, and then rev the engine five times.
16.Pour the recommended coolant into the radiator until it is full.
17.Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.
18.Start the engine, and then check for coolant leakage.

19.Install:
- upper panel
- front carrier
  Refer to “FRONT CARRIER AND FRONT GUARD”.
- left side panel
- right side panel
  Refer to “SEAT AND SIDE PANELS”.

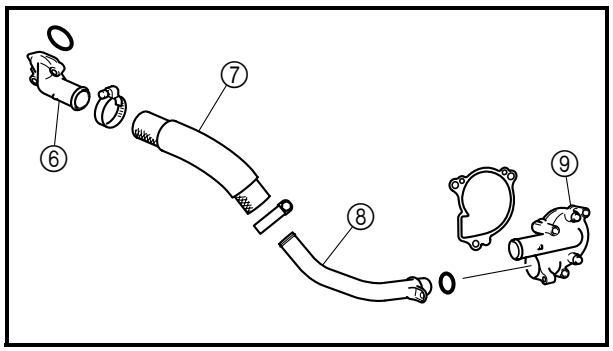
EAS00104
CHECKING THE COOLING SYSTEM

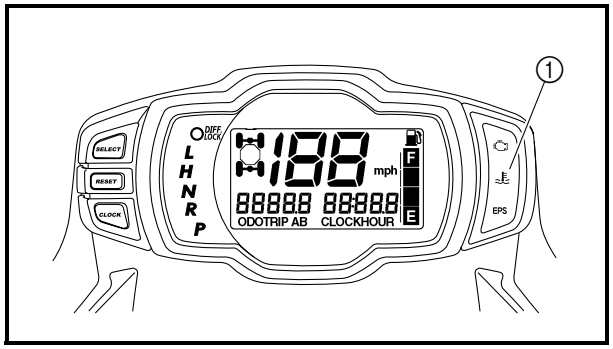
1. Remove:
- front fenders
  Refer to “FRONT FENDERS AND FRONT GRILL”.
- left footrest board
  Refer to “FOOTREST BOARDS”.



2. Check:
- radiator ①
- radiator inlet hose ②
- coolant reservoir ③
- coolant reservoir hose ④
- radiator outlet hose ⑤
- water jacket ⑥
- water pump outlet hose ⑦
- water pump outlet pipe ⑧
- water pump housing ⑨
  Cracks/damage → Replace.
  Refer to “COOLING SYSTEM” in chapter 5.

3. Install:
- left footrest board
  Refer to “FOOTREST BOARDS”.
- front fenders
  Refer to “FRONT FENDERS AND FRONT GRILL”.





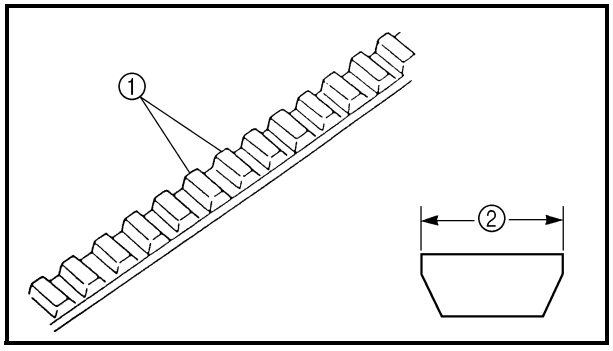
EBS00077

CHECKING THE COOLANT TEMPERATURE WARNING LIGHT

① Coolant temperature warning light

Coolant temperature warning light checking method

- Turn the main switch “ON” and the engine stop switch to “RUN”.
  - Coolant temperature warning light does not come on.
    - Push start switch with transmission in “neutral”.
      - Coolant temperature warning light comes on momentarily.
        - Coolant temperature and electrical circuit are OK. Go ahead with riding.
      - Coolant temperature warning light does not come on.
  - Coolant temperature warning light comes on.
    - Check the electrical circuit. Refer to “SIGNALING SYSTEM” in chapter 9.

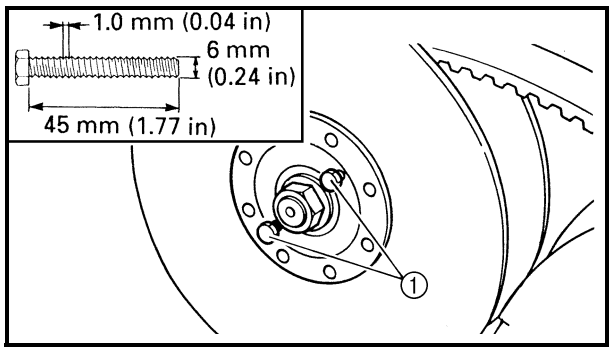


EBS00078

CHECKING THE V-BELT

1. Remove:
   - drive belt cover
     Refer to "PRIMARY AND SECONDARY SHEAVES" in chapter 4.
2. Check:
   - V-belt ①
     Cracks/wear/scaling/chipping → Replace.
     Oil/grease → Check primary sheave and secondary sheave.
3. Measure:
   - V-belt width ②
     Out of specification → Replace.

V-belt width
31.7 mm (1.25 in)
<Limit>: 31.3 mm (1.23 in)



4. Replace:
   - V-belt

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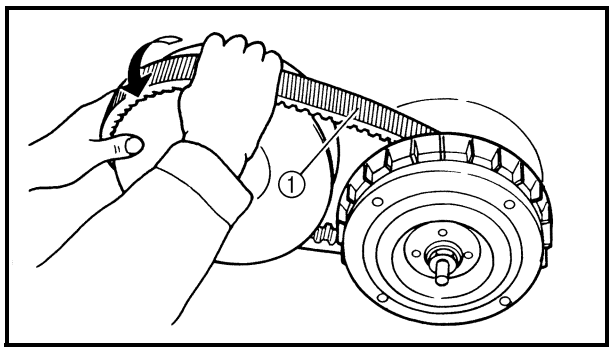
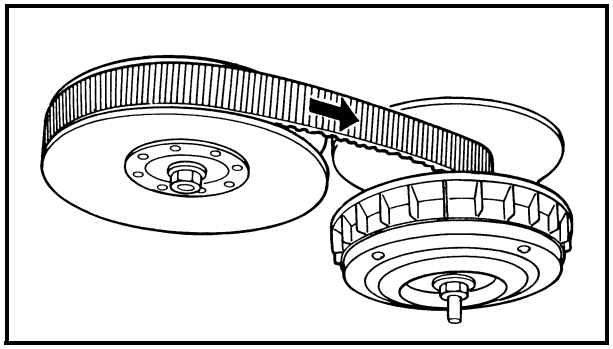
a. Install the bolts ① (90101-06016) into the secondary fixed sheave hold.

NOTE:

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



b. Remove the V-belt ① from the primary sheave and secondary sheave.



c. Install the V-belt.

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

d. Remove the bolts.

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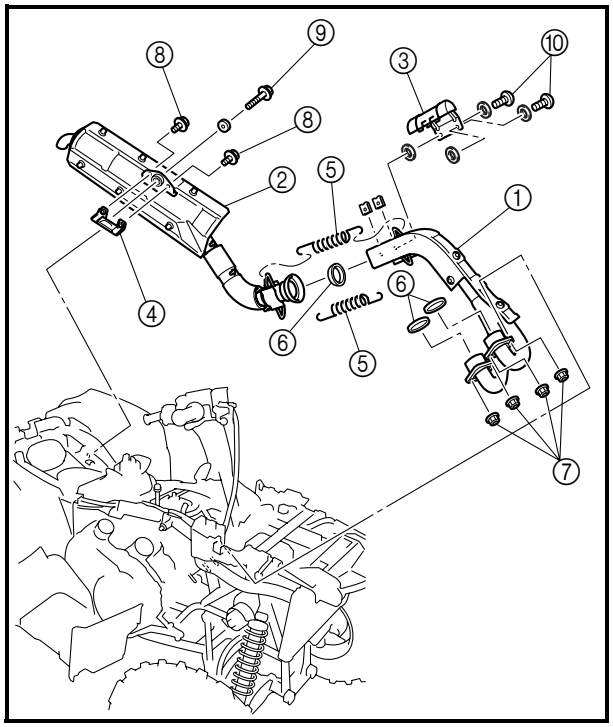
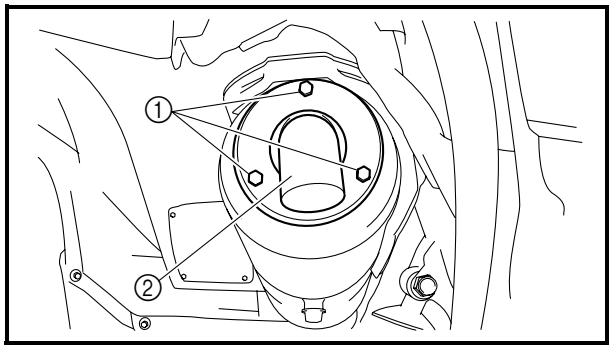


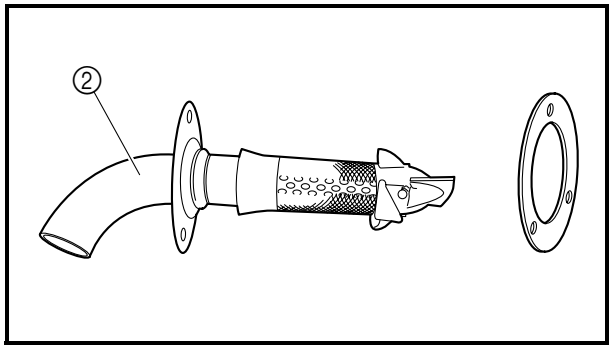
EAS00099
CHECKING THE EXHAUST SYSTEM

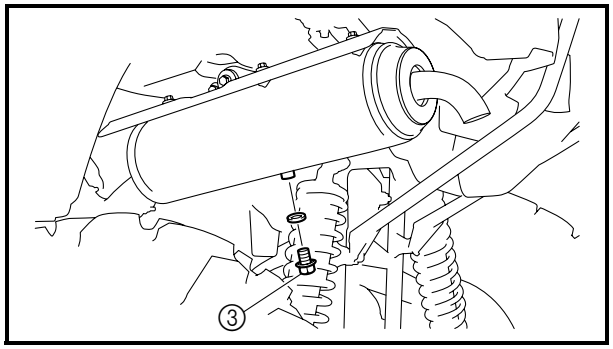
The following procedure applies to all of the exhaust pipe gaskets.

1. Check:
   - exhaust pipe ①
   - muffler ②
   - exhaust pipe protector ③
   - muffler bracket ④
   - springs ⑤
     Cracks/damage → Replace.
   - gaskets ⑥
     Exhaust gas leaks → Replace.
2. Check:
   - tightening torques

Exhaust pipe nut ⑦
20 Nm (2.0 m · kg, 14 ft · lb)
Muffler and muffler bracket bolt ⑧
20 Nm (2.0 m · kg, 14 ft · lb)
Muffler bolt ⑨
20 Nm (2.0 m · kg, 14 ft · lb)
Exhaust pipe protector bolt ⑩
7 Nm (0.7 m · kg, 5.1 ft · lb)







CLEANING THE SPARK ARRESTER

1. Clean:
   - spark arrester

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⚠ WARNING

- **Select a well-ventilated area free of combustible materials.**
- **Always let the exhaust system cool before performing this operation.**
- **Do not start the engine when removing the tailpipe from the muffler.**
- **Make sure that the transmission is in neutral.**

a. Remove the bolts ①.
b. Remove the tailpipe ② by pulling it out of the muffler and the gasket.
c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and inside of the tail pipe housing.
d. Install the gasket, and then insert the tailpipe into the muffler and align the bolt holes.
e. Insert the bolts ① and tighten them.

	Bolt **10 Nm (1.0 m · kg, 7.2 ft · lb)**

f. Remove the purging bolt ③.
g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
h. Stop the engine and allow the exhaust pipe to cool.
i. Install the purging bolt ③ and tighten it.

	Purging bolt **27 Nm (2.7 m · kg, 19 ft · lb)**

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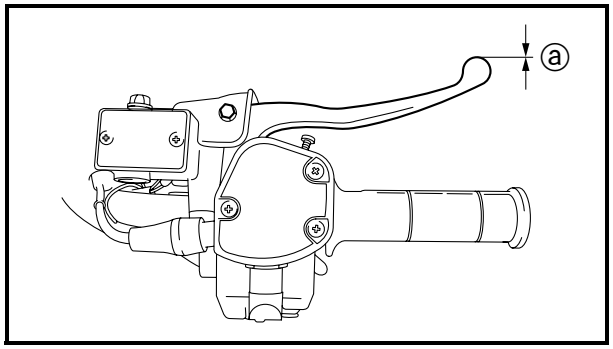


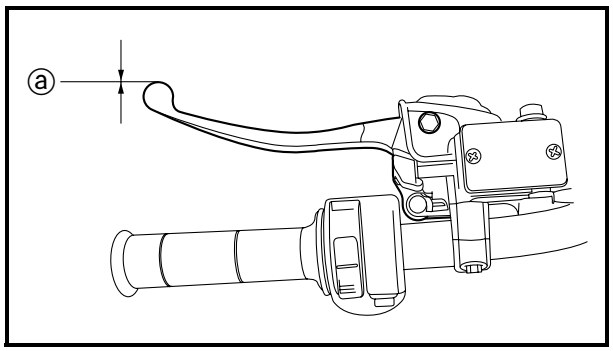
EBS00080

CHASSIS

ADJUSTING THE FRONT BRAKE

1. Measure:
   - front brake lever free play ⓐ
     Out of specification → Bleed the front brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM".

Front brake lever free play (at the end of the brake lever)
0 mm (0 in)



EBS00085

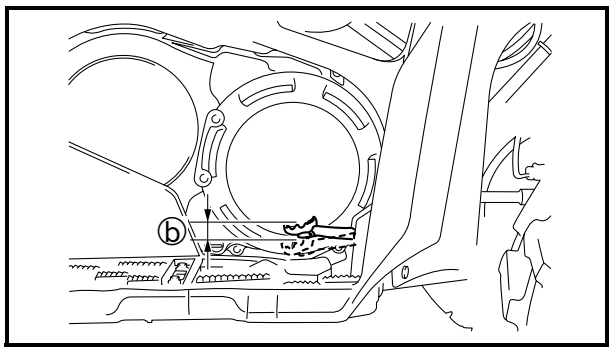
ADJUSTING THE REAR BRAKE

⚠ WARNING

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

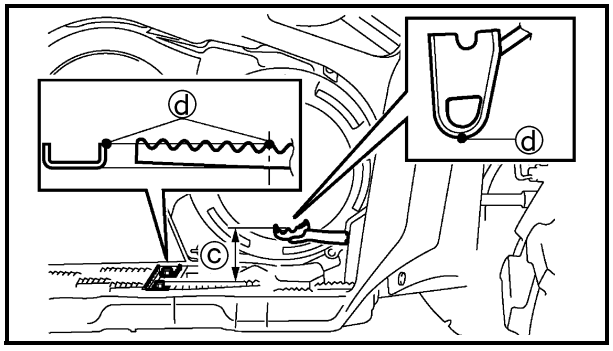
1. Measure:
   - rear brake lever free play ⓐ
     Out of specification → Bleed the rear brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM".

Rear brake lever free play (at the end of the brake lever)
0 mm (0 in)



2. Measure:
   - brake pedal free play ⓑ
     Out of specification → Adjust.

Brake pedal free play
0 ~ 5.0 mm (0 ~ 0.20 in)



3. Measure:
   • brake pedal height ⓒ
   Out of specification → Adjust.

	Brake pedal height **56.7 mm (2.23 in)**

ⓓ Measuring points

4. Adjust:
   • brake pedal free play
   • brake pedal height
5. Remove:
   • front fender inner panel
   Refer to “FRONT FENDERS AND FRONT GRILL”.

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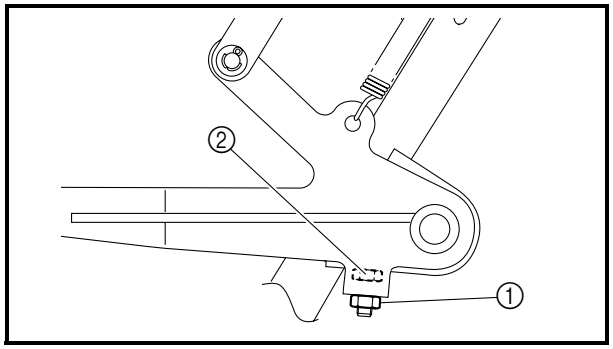
a. Loosen the locknut ①.
b. Turn the adjusting bolt ② until the brake pedal height is within the specified limits.

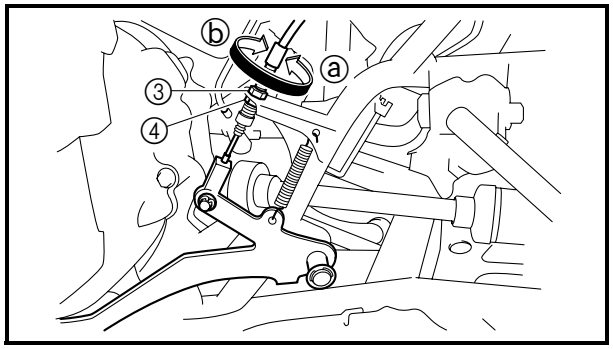


	Brake pedal height **56.7 mm (2.23 in)**

c. Tighten the locknut ①.

	Locknut **7 Nm (0.7 m · kg, 5.1 ft · lb)**

d. Loosen the locknut ③.
e. Turn the adjusting nut ④ in direction ⓐ or ⓑ until the specified brake pedal free play is obtained.



Direction ⓐ	**Brake pedal free play is increased.**
Direction ⓑ	**Brake pedal free play is decreased.**

f. Tighten the locknut ③.

	Locknut **7 Nm (0.7 m · kg, 5.1 ft · lb)**

g. Adjust the shift control cable.
Refer to "ADJUSTING THE SELECT LEVER CONTROL CABLE AND SHIFT ROD".

⚠ WARNING

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

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6. Install:
   - front fender inner panel
   Refer to "FRONT FENDERS AND FRONT GRILL".

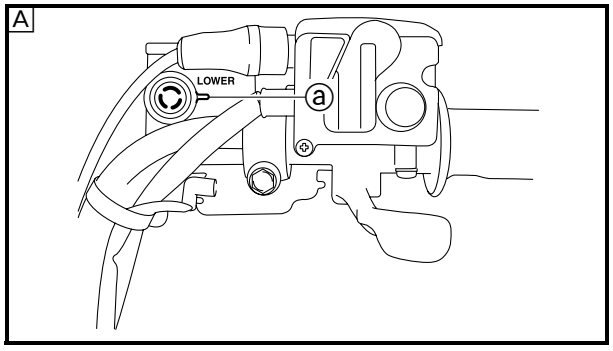
EBS00087

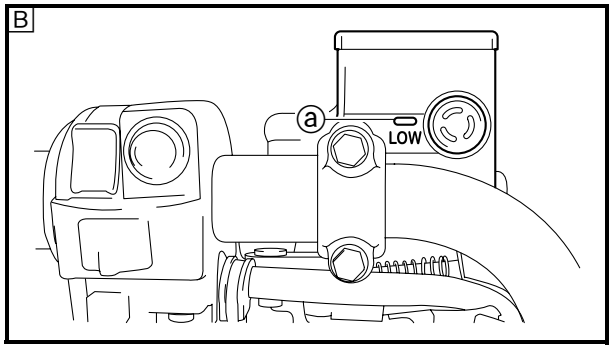
CHECKING THE BRAKE FLUID LEVEL

1. Place the vehicle on a level surface.

NOTE:

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





2. Check:
   - brake fluid level
   Below the minimum level mark ⓐ → 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 rubber seals to deteriorate, causing leakage and poor brake performance.**

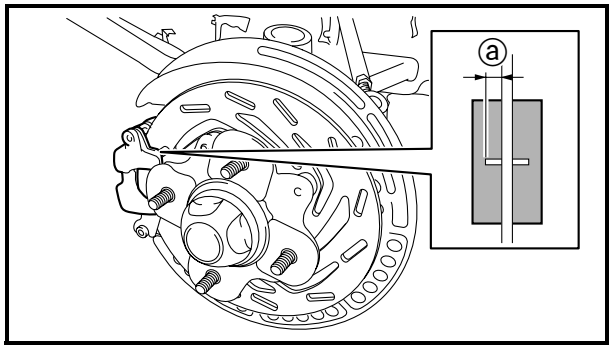
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling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

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 that the top of the brake master cylinder reservoir is horizontal.



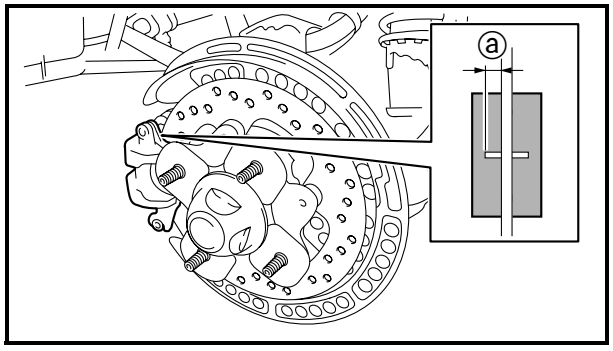
EBS00088

CHECKING THE FRONT BRAKE PADS

1. Remove:
   - front wheels
     Refer to "FRONT AND REAR WHEELS" in chapter 8.
2. Check:
   - brake pads
     Wear indicator groove ⓐ almost disappeared → Replace the brake pads as a set.
     Refer to "FRONT AND REAR BRAKES" in chapter 8.

Brake pad wear limit ⓐ
1.0 mm (0.04 in)

3. Operate the brake lever.
4. Install:
   - front wheels
     Refer to "FRONT AND REAR WHEELS" in chapter 8.



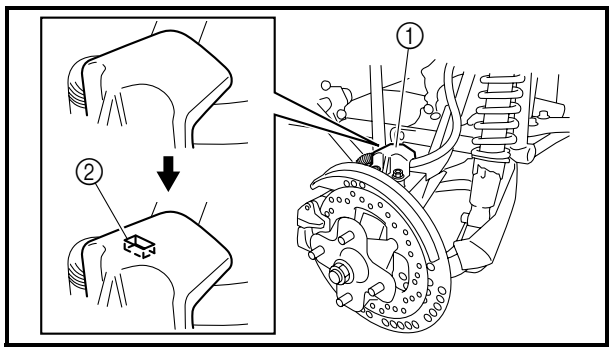
EBS00089

CHECKING THE REAR BRAKE PADS

1. Remove:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Check:
   - brake pads
     Wear indicator groove ⓐ almost disappeared → Replace the brake pads as a set.
     Refer to “FRONT AND REAR BRAKES” in chapter 8.

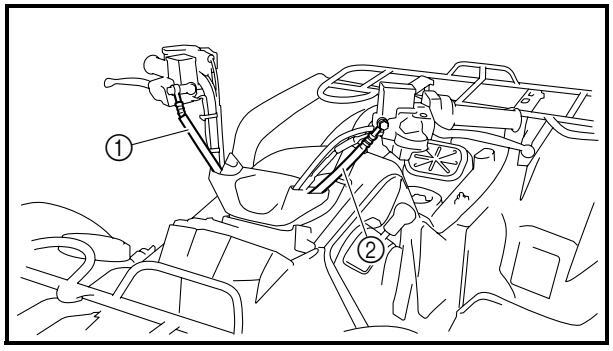
Brake pad wear limit ⓐ
1.0 mm (0.04 in)

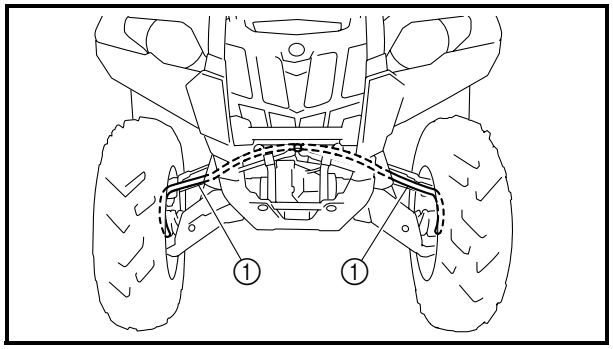
3. Operate the brake lever or brake pedal.
4. Install:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.

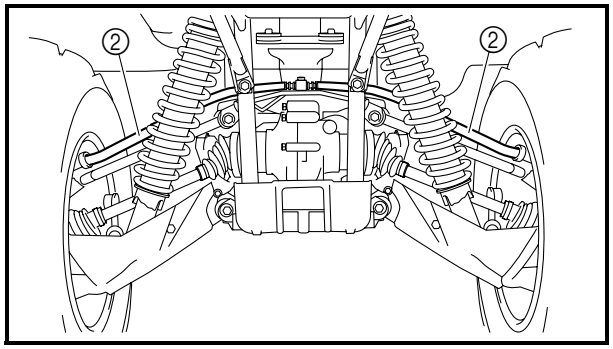


CHECKING THE REAR BRAKE HOSE PROTECTORS

1. Remove:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Check:
   - rear brake hose protectors ①
     Wear indicator ② becomes visible → Replace the rear brake hose protector.
     Refer to “REAR KNUCKLES AND STABILIZER” in chapter 8.
3. Install:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.







EBS00092

CHECKING THE BRAKE HOSES

1. Check:
   - front brake hoses ①
   - rear brake hoses ②
   Cracks/wear/damage → Replace.
2. Check:
   - brake hose holders
   Loosen → Tighten.
3. Hold the vehicle in an upright position and apply the front or rear brake.
4. Check:
   - brake hoses
   Apply the brake lever several times.
   Fluid leakage → Replace the hoses.
   Refer to "FRONT AND REAR BRAKES" in chapter 8.

EBS00094

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 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. Remove:
   - rear wheel
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Bleed:
   - hydraulic brake system

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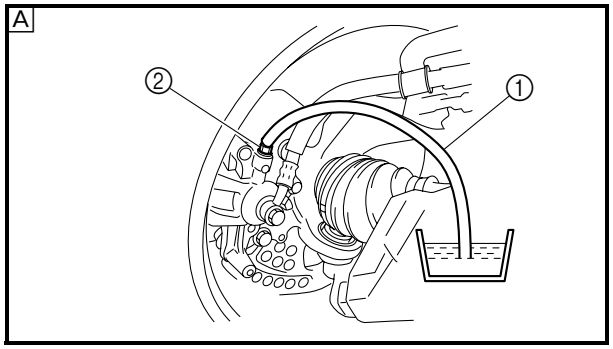
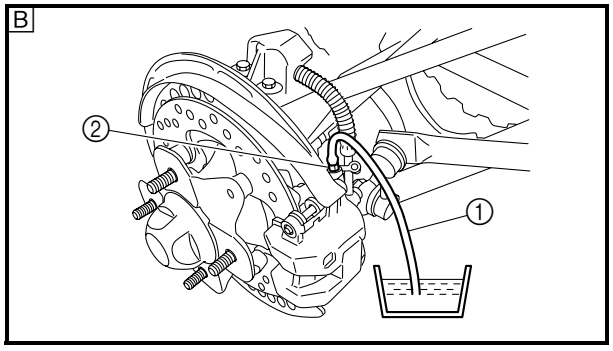
a. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
b. Install the diaphragm (brake master cylinder reservoir).
c. Connect a clear plastic hose ① tightly to the bleed screw ②.



A Front
B Rear



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

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

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

	**Bleed screw** **5 Nm (0.5 m · kg, 3.6 ft · lb)**

k. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
Refer to “CHECKING THE BRAKE FLUID LEVEL”.

⚠ WARNING

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

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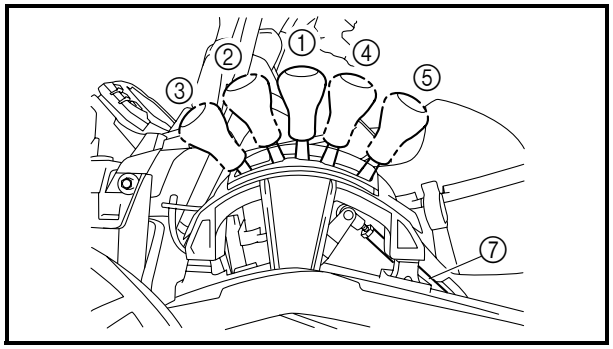
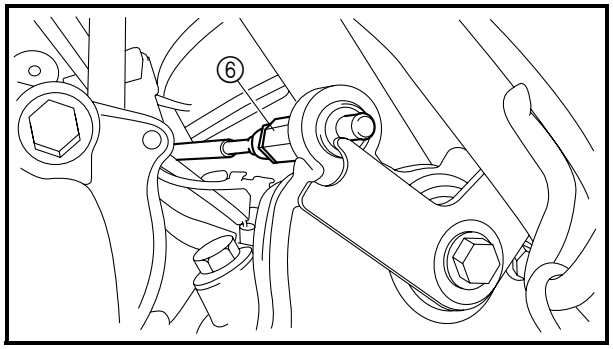
3. Install:
   - rear wheel
     Refer to “FRONT AND REAR WHEELS” in chapter 8.





EBS00100

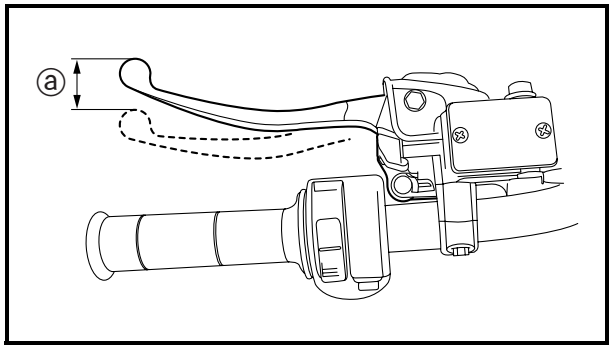
ADJUSTING THE SELECT LEVER CONTROL CABLE AND SHIFT ROD

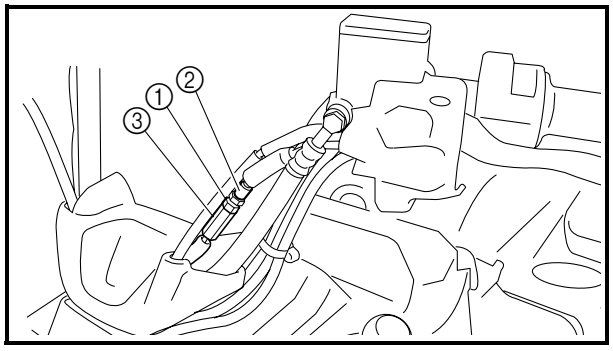
① NEUTRAL
② HIGH
③ LOW
④ REVERSE
⑤ PARK
⑥ Control cable
⑦ Select lever shift rod

⚠ WARNING

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

1. Adjust:
   - brake pedal free play
     Refer to “ADJUSTING THE REAR BRAKE”.
2. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.





3. Adjust:
   - shift control cable
   - shift rod

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Shift control cable:

a. Make sure that the select lever is in NEUTRAL.
b. Squeeze the brake lever 20 mm (0.79 in) ⓐ, loosen the locknut ①, and then adjust the shift control cable ② with the adjuster ③ so that the select lever can be shifted to REVERSE from NEUTRAL, and to PARK from REVERSE.
c. Release the brake lever so that ⓐ is 0 mm (0 in), and then verify that the select lever cannot be shifted to REVERSE from NEUTRAL, or to PARK from REVERSE.
d. If the operation of the select lever is incorrect, repeat steps (a) to (c).
e. Tighten the locknut.

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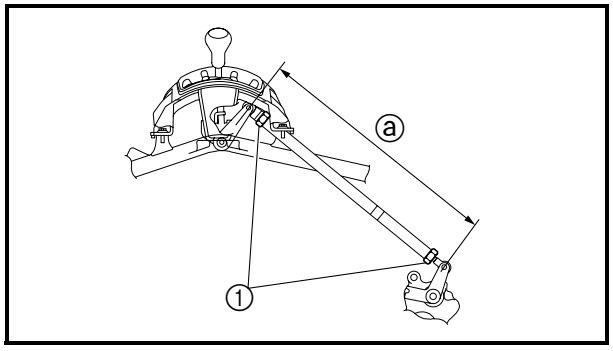

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Shift rod:

a. Make sure that the select lever and transmission are in HIGH.
b. Loosen both locknuts ①.
c. Adjust the length ⓐ of the shift rod to 413 mm (16.3 in).
d. Tighten the locknuts.

	**Locknut** **15 Nm (1.5 m · kg, 11 ft · lb)**

e. Start the engine, and then check that the select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.
f. Adjust the shift control cable again.

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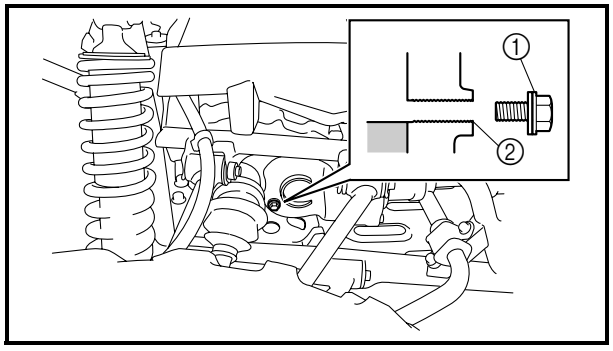


EBS00101
CHECKING THE FINAL GEAR OIL LEVEL

1. Place the vehicle on a level place.
2. Remove:
   - final gear oil level check bolt ①
3. Check:
   - oil level
     Oil level should be up to the bottom brim ② of the hole.
     Oil level low → Add oil to the proper level.

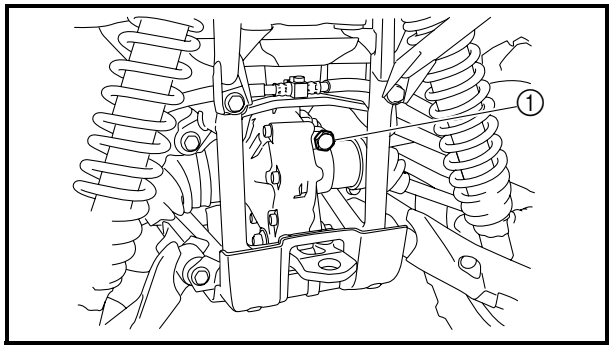
Recommended oil
SAE80 API GL-4 Hypoid gear oil

CAUTION:

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

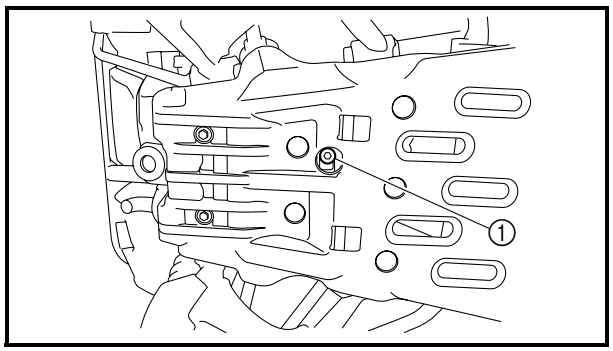
4. Install:
   - final gear oil level check bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)



EBS00102
CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Remove:
   - final gear oil filler bolt ①
3. Place a receptacle under the final gear case.



4. Remove:
   - final gear oil level check bolt
   - final gear oil drain bolt ①
5. Drain:
   - final gear oil

6. Install:
   • final gear oil drain bolt

23 Nm (2.3 m · kg, 17 ft · lb)

NOTE:
Check the gasket (drain bolt). If it is damaged, replace it with a new one.

7. Fill:
   • final gear case

Periodic oil change
0.20 L (0.18 Imp qt, 0.21 US qt)
Total amount
0.25 L (0.22 Imp qt, 0.26 US qt)
Recommended oil
SAE80 API GL-4 Hypoid gear oil

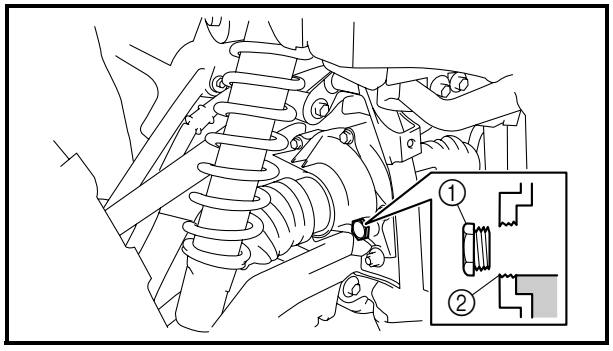
CAUTION:
Take care not to allow foreign material to enter the final gear case.

8. Check:
   • oil level
   Refer to "CHECKING THE FINAL GEAR OIL LEVEL".
9. Install:
   • final gear oil level check bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)

   • final gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)



EBS00103

CHECKING THE DIFFERENTIAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
   - differential gear oil filler bolt ①
3. Check:
   - oil level

   Oil level should be up to the brim ② of hole.
   Oil level low → Add oil to proper level.

Recommended oil
SAE80 API GL-4 Hypoid gear oil

CAUTION:

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

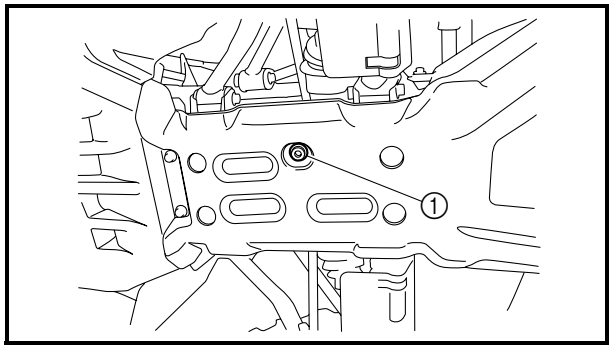
4. Install:
   - differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)

EBS00104

CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential gear case.



3. Remove:
   - differential gear oil filler bolt
   - differential gear oil drain bolt ①
4. Drain:
   - differential gear oil
5. Install:
   - differential gear oil drain bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)

6. Fill:
   • differential gear case

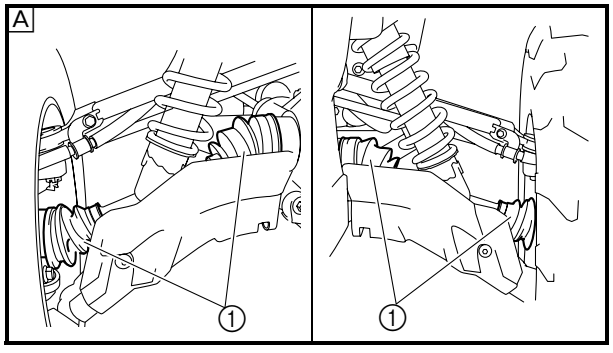
Periodic oil change
0.215 L (0.19 Imp qt, 0.23 US qt)
Total amount
0.23 L (0.20 Imp qt, 0.24 US qt)
Recommended oil
SAE80 API GL-4 Hypoid gear oil

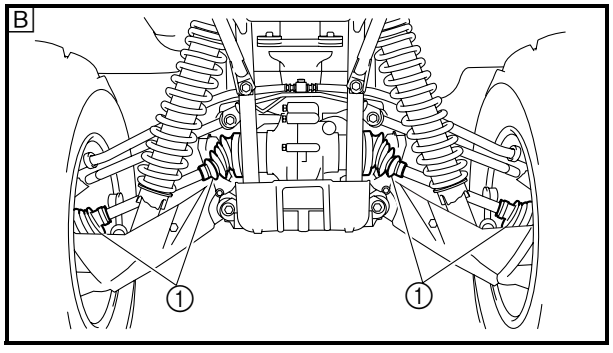
NOTE:
If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential gear case breather hose. Therefore, check the quantity of the oil, not its level.

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

7. Install:
   • differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)

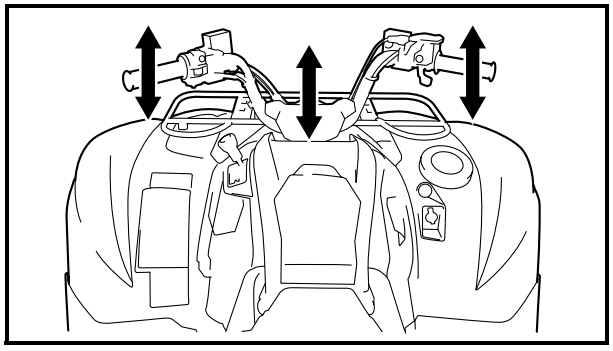


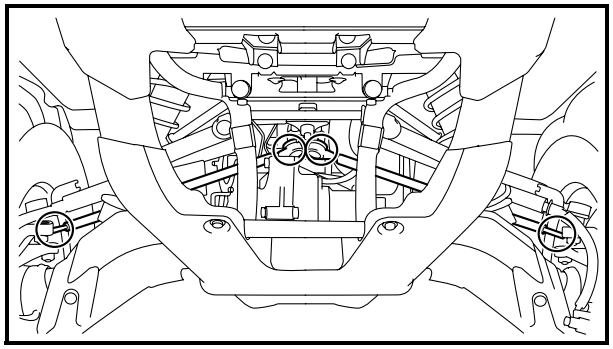


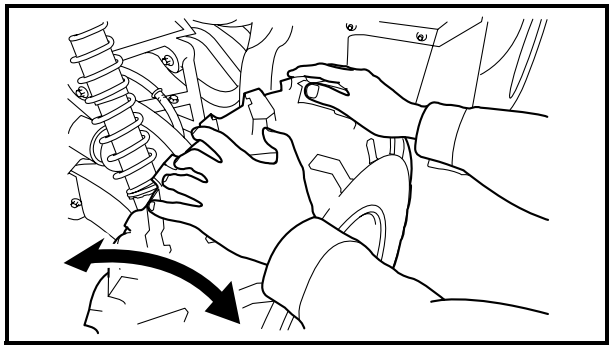
EBS00105
CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS

1. Check:
   • dust boots ①
   Damage → Replace.
   Refer to “FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR” and “REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR” in chapter 7.

A Front
B Rear







EBS00106

CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.
2. Check:
   - steering assembly bushings
     Move the handlebar up and down, and/or back and forth.
     Excessive play → Replace the steering stem bushings.
3. Check:
   - tie-rod ends
     Turn the handlebar to the left and/or right until it stops completely, then move the handlebar from the left to the right slightly.
     Tie-rod end has any vertical play → Replace the tie-rod end(s).
4. Raise the front end of the vehicle so that there is no weight on the front wheels.
5. Check:
   - ball joints and/or wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.

6. Measure:
   - steering tension
     Above specification → Adjust.

Steering tension
50 N (5.0 kgf)

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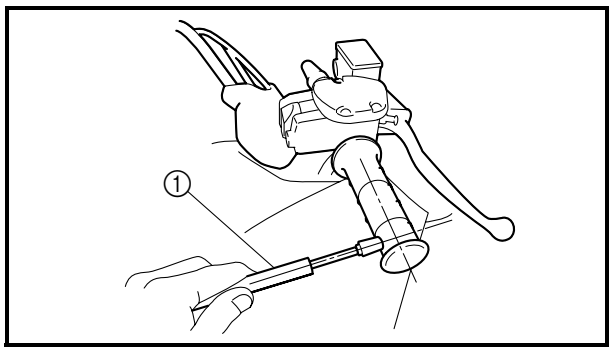
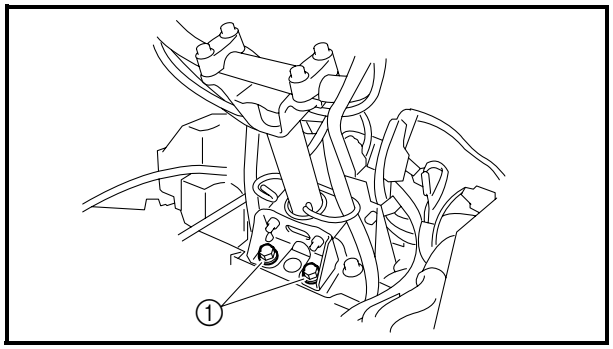
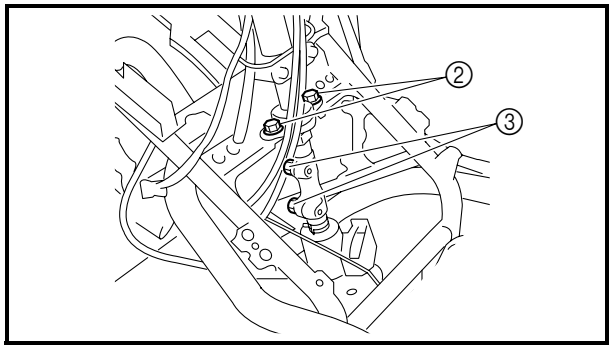
a. Turn the main switch to “OFF”.
b. Place the vehicle on a suitable stand so that the front wheels are elevated.
c. Point the front wheels straight ahead.
d. Hold the belt tension gauge ① at a 90° angle to the handlebar, push the gauge against the handlebar, and then record the measurement when the handlebar starts to turn.



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





7. Adjust:
   • steering tension

a. Remove the electrical components tray. Refer to "ELECTRICAL COMPONENTS TRAY".
b. Loosen the steering stem bracket bolts ①, steering stem bearing bolts ②, and steering stem joint bolts ③ completely.

NOTE:
After loosening the bolts, be sure to check that the steering stem joint moves smoothly on the serrations of the steering stem and shaft of the EPS unit.

c. Tighten the steering stem bearing bolts to specification.

Steering stem bearing bolt
50 Nm (5.0 m · kg, 36 ft · lb)
LOCTITE®

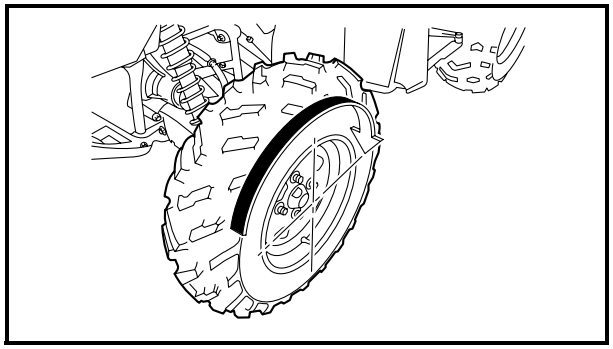
d. Tighten the steering stem bracket bolts to specification.

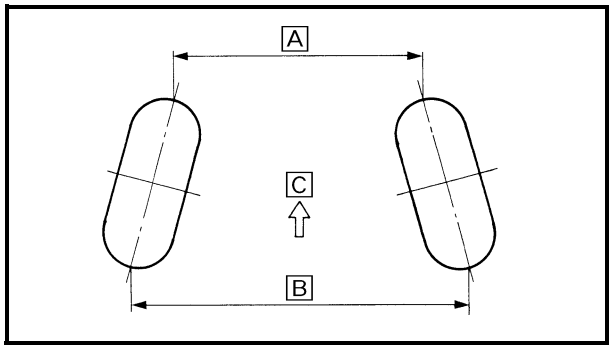
Steering stem bracket bolt
50 Nm (5.0 m · kg, 36 ft · lb)
LOCTITE®

e. Tighten the steering stem joint bolts to specification.

Steering stem joint bolt
30 Nm (3.0 m · kg, 22 ft · lb)
LOCTITE®

f. Measure the steering tension again.
g. Repeat the above procedure until the steering tension is below specification.





EBS00108

ADJUSTING THE TOE-IN

1. Place the vehicle on a level surface.
2. Measure:
   - toe-in

   Out of specification → Adjust.

Toe-in
0 ~ 10 mm (0 ~ 0.39 in)
(with tires touching the ground)

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NOTE:

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

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

Toe-in = [B] – [A]

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

[C] Forward

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3. Adjust:
   - toe-in

⚠ WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mishandling and an accident.**
- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**

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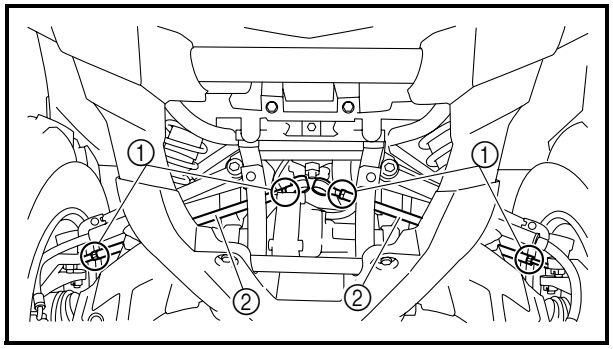
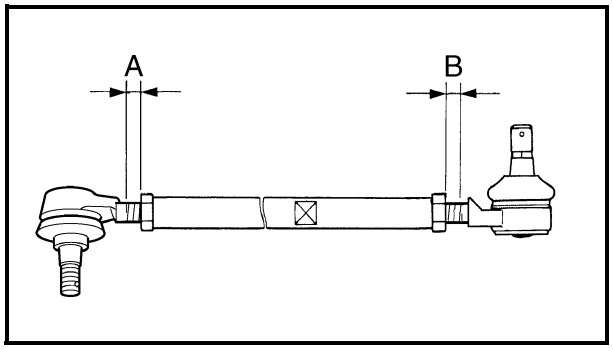
a. Mark both tie-rods ends.
   This reference point will be needed during adjustment.





b. Loosen the locknuts (tie-rod end) ① of both tie-rods.
c. The same number of turns should be given to both the right and left tie-rods ② until the specified toe-in is obtained. This is to keep the length of the rods the same.
d. Tighten the rod end locknuts of both tie rods.

	Locknut (rod end) **15 Nm (1.5 m · kg, 11 ft · lb)**

NOTE:
Adjust the rod ends so that A and B are equal.

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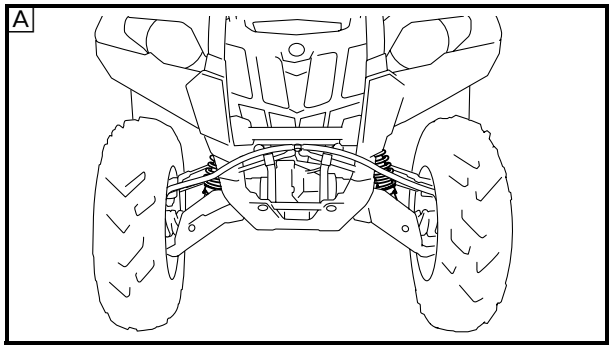
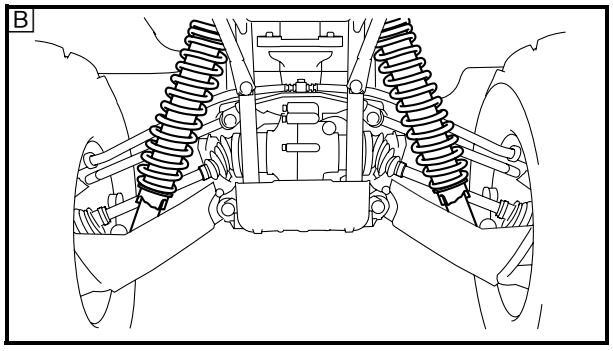
EBS00109

CHECKING THE FRONT AND REAR SHOCK ABSORBERS

1. Place the vehicle on a level place.
2. Check:
   - damper rod
     Bends/damage → Replace the front/rear shock absorber assembly.
     Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.
   - oil leakage
     Excessive oil leakage → Replace the front/rear shock absorber assembly.
     Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.
   - spring
     Fatigue → Replace the front/rear shock absorber assembly.
     Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.





3. Check:
   - operation
     Pump the shock absorbers up and down for several times.
     Unsmooth operation → Replace front/rear shock absorber.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.

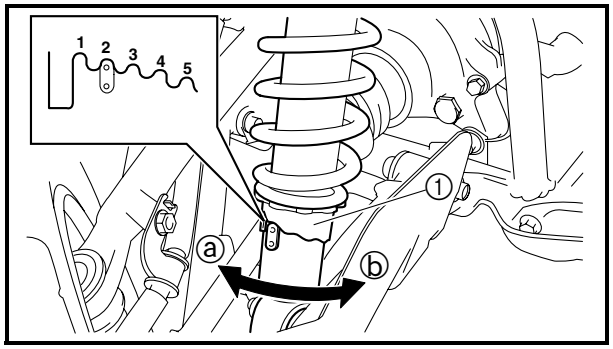
A Front shock absorber
B Rear shock absorber

EBS00110

ADJUSTING THE FRONT SHOCK ABSORBERS

⚠ WARNING

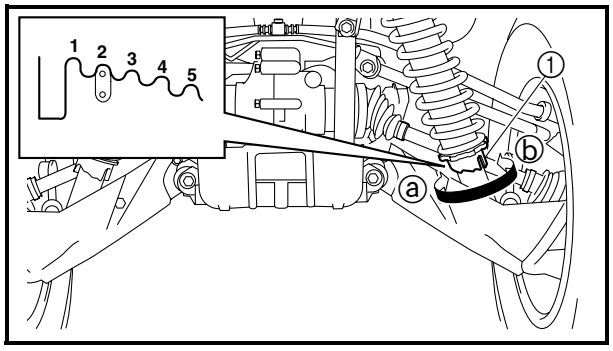
Always adjust the spring preload for both front shock absorber to the same setting. Uneven adjustment can cause poor handling and loss of stability.



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

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Standard position: 2
Minimum position: 1
Maximum position: 5



EBS00112
ADJUSTING THE REAR SHOCK ABSORBERS

⚠ WARNING

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

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

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Standard position: 2
Minimum position: 1
Maximum position: 5

EBS00115
CHECKING THE TIRES

⚠ WARNING

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

• TIRE CHARACTERISTICS

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

	Manufacturer	Size	Type
Front	DUNLOP	AT25× 8-12	KT421
Rear	DUNLOP	AT25× 10-12	KT425

• TIRE PRESSURE

1) Recommended tire pressure
Front 35 kPa (0.35 kg/cm², 5.0 psi)
Rear 30 kPa (0.30 kg/cm², 4.3 psi)

2) Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
The following are minimums:
Front 32 kPa (0.32 kg/cm², 4.6 psi)
Rear 27 kPa (0.27 kg/cm², 3.9 psi)

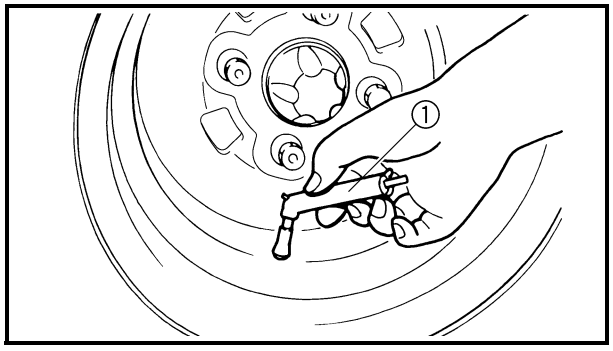
3) Use no more than
Front 250 kPa (2.5 kg/cm², 36 psi)
Rear 250 kPa (2.5 kg/cm², 36 psi)
when seating the tire beads. Higher pressures may cause the tire to burst.
Inflate the tires slowly and carefully.
Fast inflation could cause the tire to burst.

• MAXIMUM LOADING LIMIT

1) Vehicle load limits: 220 kg (485 lb)
***Total weight of the cargo, trailer hitch vertical load, rider, and accessories.**

2) Front carrier: 45.0 kg (99 lb)
3) Rear carrier: 85.0 kg (187 lb)
4) Front storage box: 0.5 kg (1 lb)
5) Rear storage box: 2.0 kg (4 lb)
6) Trailer hitch:

Pulling load (total weight of trailer and cargo): 5,390 N (550 kg, 1,212 lb)
Tongue weight (vertical weight on trailer hitch point): 147 N (15 kg, 33 lb)
Be extra careful of the vehicle balance and stability when towing a trailer.



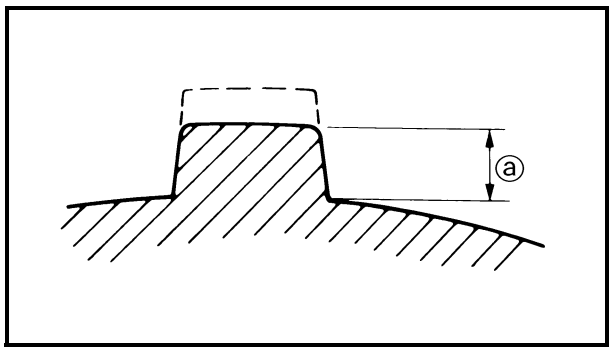
1. Measure:
   • tire pressure
   Out of specification → Adjust.

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

Cold tire pressure	Front	Rear
Standard	35 kPa (0.35 kg/cm², 5.0 psi)	30 kPa (0.30 kg/cm², 4.3 psi)
Minimum	32 kPa (0.32 kg/cm², 4.6 psi)	27 kPa (0.27 kg/cm², 3.9 psi)
Maximum	38 kPa (0.38 kg/cm², 5.5 psi)	33 kPa (0.33 kg/cm², 4.8 psi)

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.
- **Maintain proper tire pressures.**
- **Set tire pressures when the tires are cold.**
- **Tire pressures must be equal in both front tires and equal in both rear tires.**

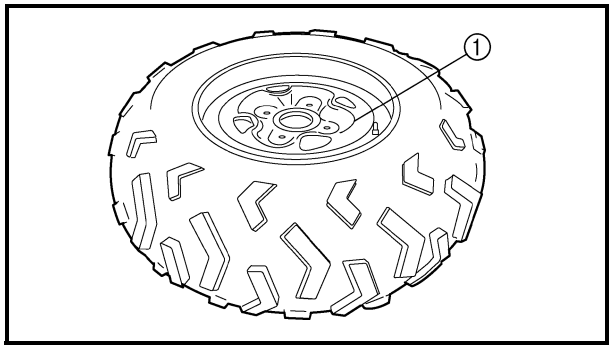


2. Check:
   • tire surfaces
   Wear/damage → Replace.

Tire wear limit ⓐ
Front and rear: 3 mm (0.12 in)

⚠ WARNING

It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.



EBS00116
CHECKING THE WHEELS

1. Check:
   - wheel ①
     Damage/bends → Replace.

NOTE:
Always balance the wheel when a tire or wheel has been changed or replaced.

⚠ WARNING

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

EBS00117
CHECKING AND LUBRICATING THE CABLES

⚠ WARNING

A damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result, so replace a damaged cable as soon as possible.

1. Check:
   - cable sheath
     Damage → Replace.
2. Check:
   - cable operation
     Unsmooth operation → Lubricate or replace.

Recommended lubricant
Yamaha chain and cable lube or engine oil

NOTE:
Hold the cable end up and apply several drops of lubricant to the cable.

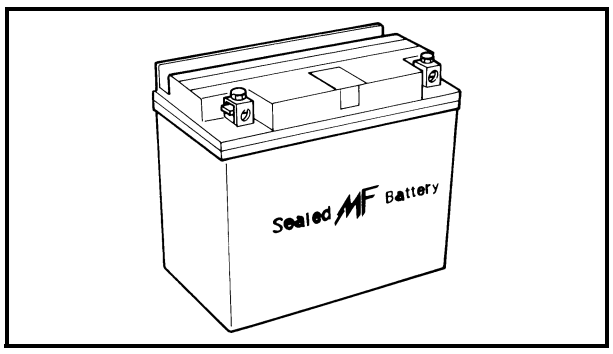
3. Apply:
   - lithium-soap-based grease
     (onto end of the cable)

EBS00118

LUBRICATING THE LEVERS AND PEDALS

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

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



EBS00120

ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL

- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL

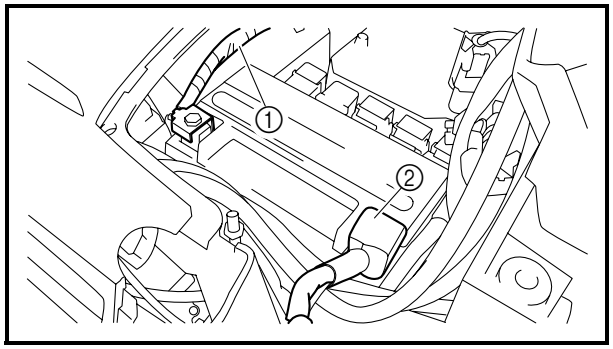
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:

- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

NOTE:
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

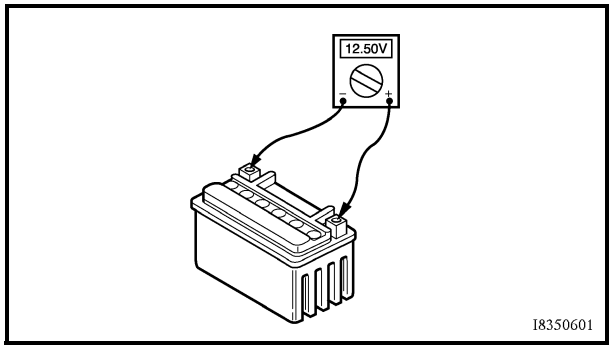
1. Remove:
   - battery cover
     Refer to "SEAT AND SIDE PANELS".
   - front carrier
   - battery holding bracket
     Refer to "FRONT CARRIER AND FRONT GUARD".



2. Disconnect:
   - battery leads
     (from the battery terminals)

CAUTION:
First, disconnect the negative battery lead ①, and then the positive battery lead ②.

3. Remove:
   - battery
4. Check:
   - battery charge



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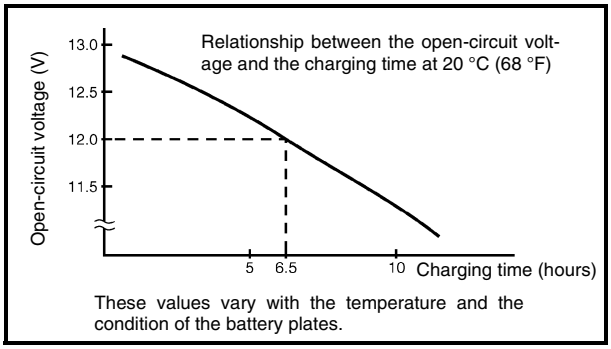
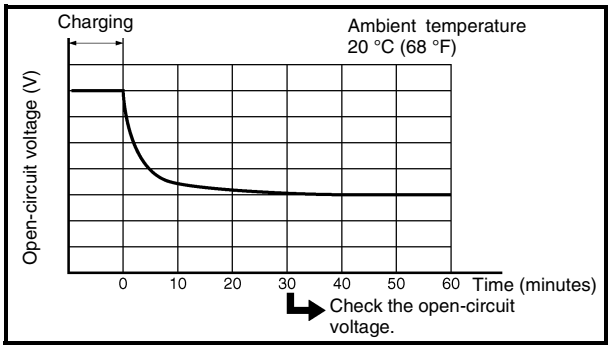
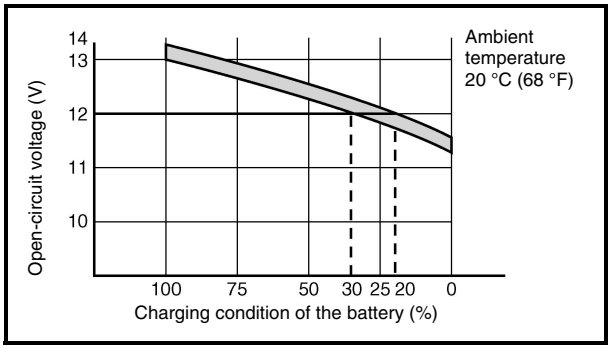
a. Connect a pocket tester to the battery terminals.

Positive tester probe →
positive battery terminal
Negative tester probe →
negative battery terminal

NOTE:
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive 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

c. Open-circuit voltage = 12.0 V

d. Charging time = 6.5 hours

e. Charge of the battery = 20 ~ 30%

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5. Charge:
   - battery

   (refer to the appropriate charging method illustration)

⚠ WARNING

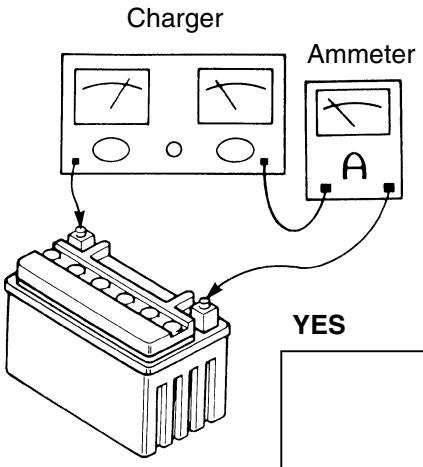
Do not quick charge a battery.

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



Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

NOTE:
Set the charging voltage to 16 ~ 17 V. (If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)

Is the amperage higher than the standard charging amperage written on the battery?

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes. Is the standard charging amperage exceeded?

YES

Adjust the voltage to obtain the standard charging amperage.

NO

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

Set the timer to the charging time determined by the open-circuit voltage.
Refer to "CHECKING AND CHARGING THE BATTERY".

If the required charging time exceeds 5 hours, it is advisable to check the charging amperage after 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging amperage.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → 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:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

Is the amperage higher than the standard charging amperage written on the battery?

YES

Charge the battery until the charging voltage reaches 15 V.

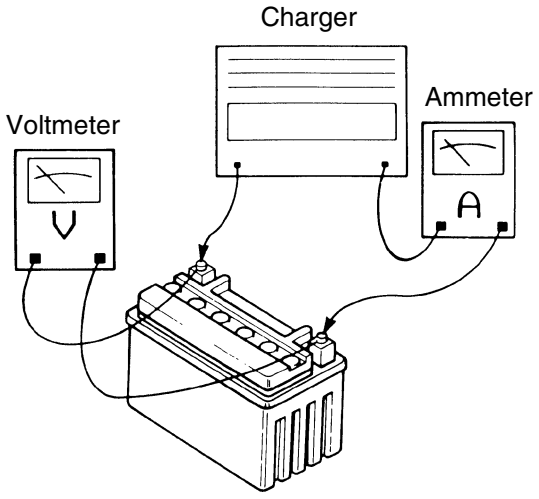
NOTE:
Set the charging time to a maximum of 20 hours.

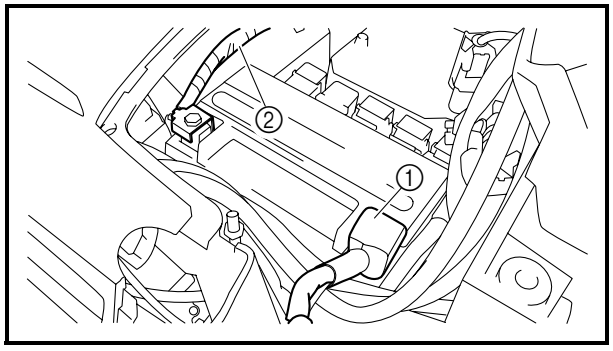
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

CAUTION:
Constant amperage chargers are not suitable for charging MF batteries.

NO

This type of battery charger cannot charge an MF battery. A variable-voltage charger is recommended.





6. Install:
   • battery
7. Connect:
   • battery leads
     (to the battery terminals)

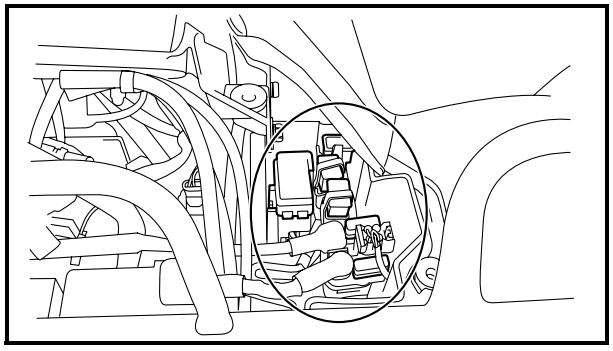
CAUTION:

First, connect the positive battery lead ①, and then the negative battery lead ②.

8. Check:
   • battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   • battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
    • battery holding bracket
    • front carrier
      Refer to “FRONT CARRIER AND FRONT GUARD”.
    • battery cover
      Refer to “SEAT AND SIDE PANELS”.



EBS00121

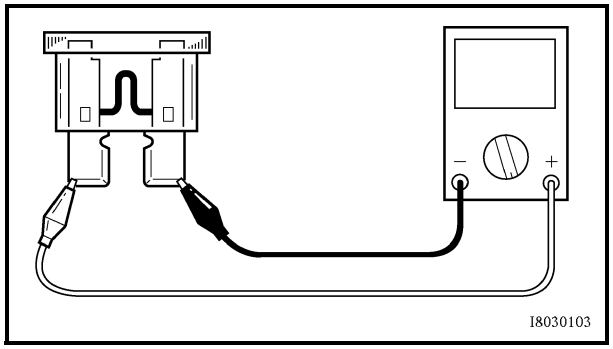
CHECKING THE FUSES

The following procedure applies to all of the fuses.

CAUTION:

To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
   • battery cover
     Refer to “SEAT AND SIDE PANELS”.



2. Check:
   • fuse

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a. Connect the pocket tester to the fuse and check the continuity.

NOTE:

Set the pocket tester selector to "Ω × 1".

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

b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
   • blown fuse

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a. Set the main switch to "OFF".
b. Install a new fuse of the correct amperage.
c. Set on the switches to verify if the electrical circuit is operational.

d. If the fuse immediately blows again, check the electrical circuit.

Items	Amperage rating	Q'ty
Main fuse	40 A	1
EPS fuse	40 A	1
Fuel injection system fuse	15 A	1
Ignition fuse	10 A	1
Headlight fuse	15 A	1
Four-wheel-drive motor fuse	10 A	1
Radiator fan motor fuse	15 A	1
Signaling system fuse	5 A	1
Auxiliary DC jack fuse	15 A	1
Spare fuse	40 A 15 A 10 A 5 A	1 2 1 1

⚠ WARNING

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

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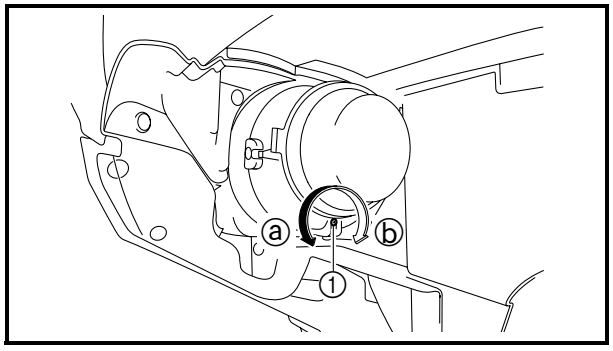
4. Install:
   - battery cover
     Refer to "SEAT AND SIDE PANELS".



EBS00122
ADJUSTING THE HEADLIGHT BEAMS

1. Adjust:
   • headlight beam (vertically)

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

Direction ⓐ	**Headlight beam is raised.**
Direction ⓑ	**Headlight beam is lowered.**

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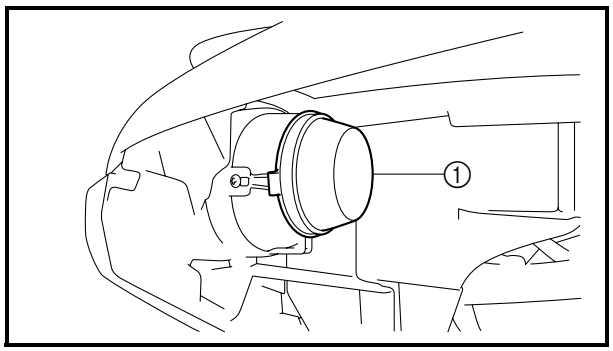
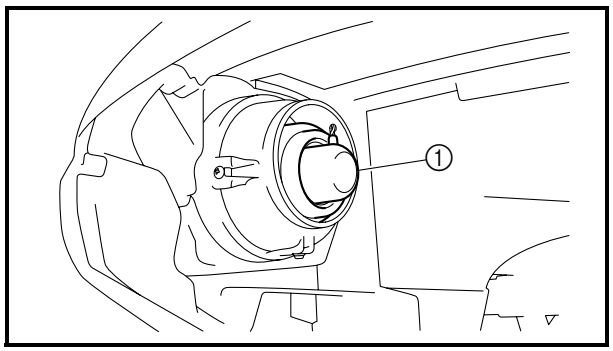
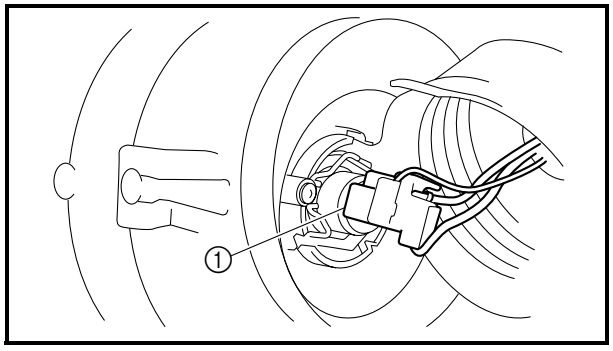


EBS00124
REPLACING THE HEADLIGHT BULBS

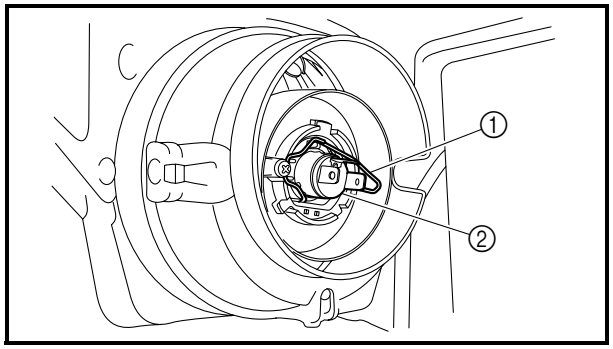
1. Remove:
   • cover at the rear of the headlight ①



2. Remove:
   • headlight bulb cover ①



3. Disconnect:
   • headlight coupler ①



4. Remove:
   - headlight bulb holder ①
   - headlight bulb ②

NOTE:
Unhook the headlight bulb holder, and then remove the defective bulb.

⚠ WARNING

Keep flammable products and your hands away from the bulb while it is on, as it will be hot. Do not touch the bulb until it cools down.

5. Install:
   - bulb New
     Secure the new bulb with the headlight unit.

CAUTION:

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

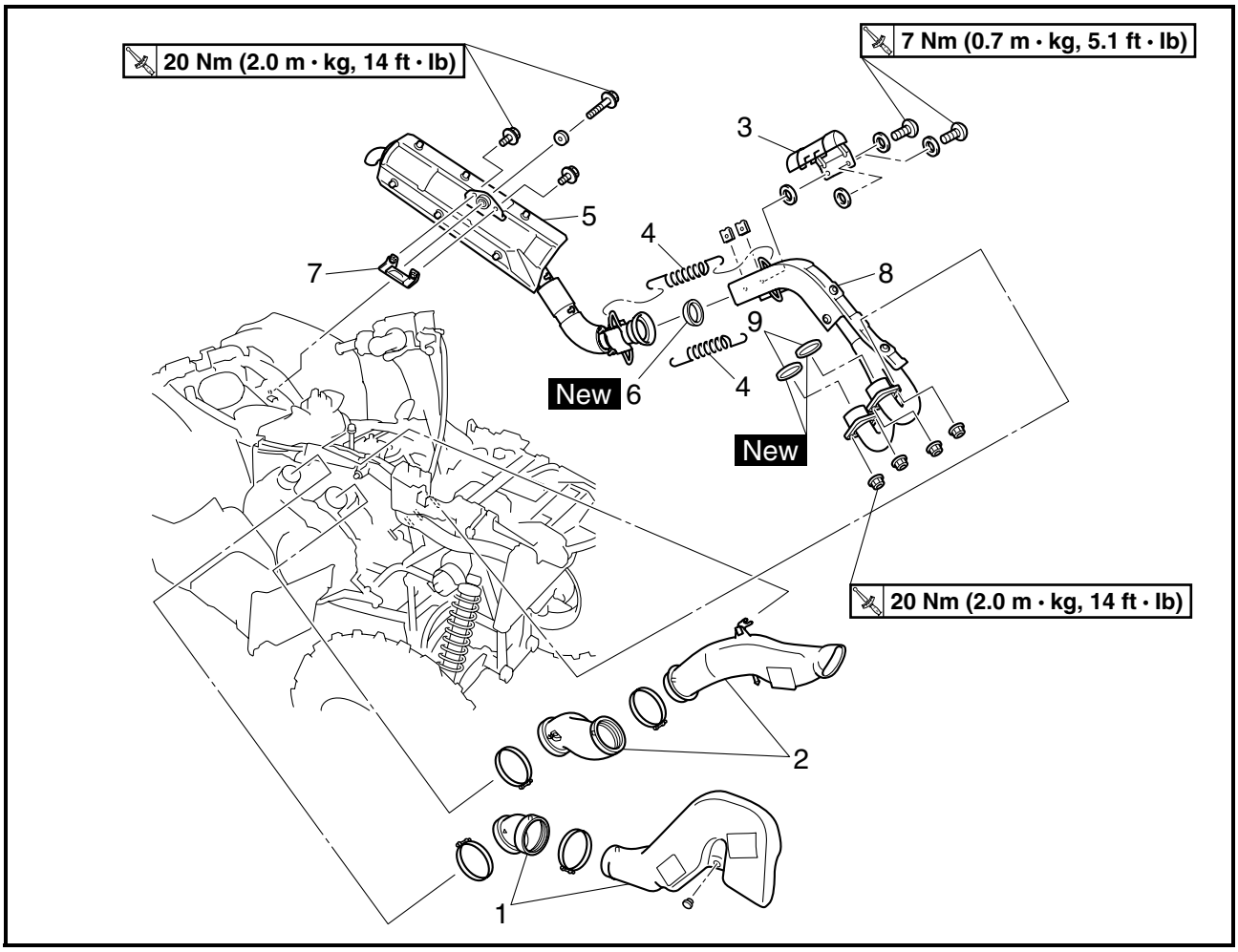
6. Install:
   - headlight bulb holder
7. Connect:
   - headlight coupler
8. Install:
   - headlight bulb cover
   - cover at the rear of the headlight

EBS00200

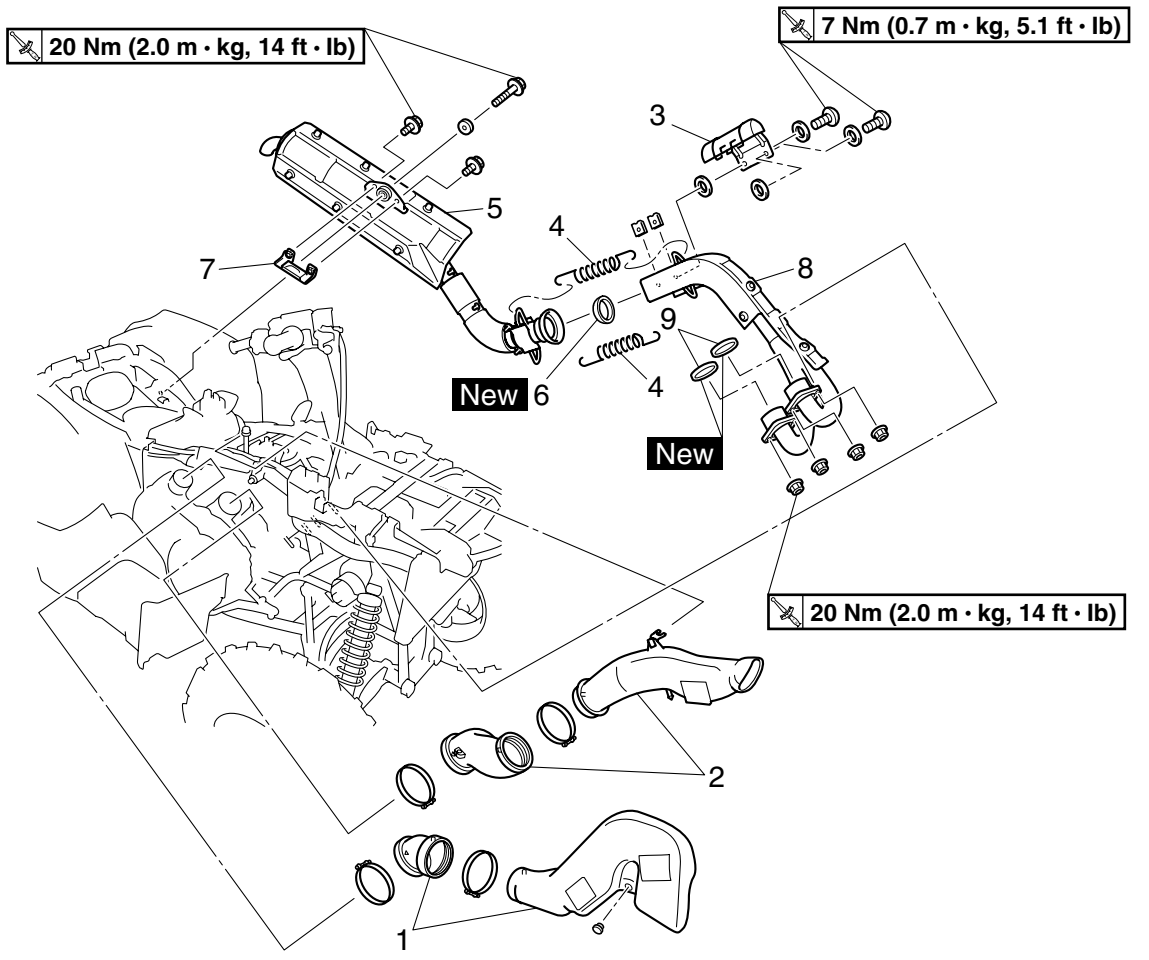
ENGINE

ENGINE REMOVAL

AIR DUCTS, MUFFLER AND EXHAUST PIPE



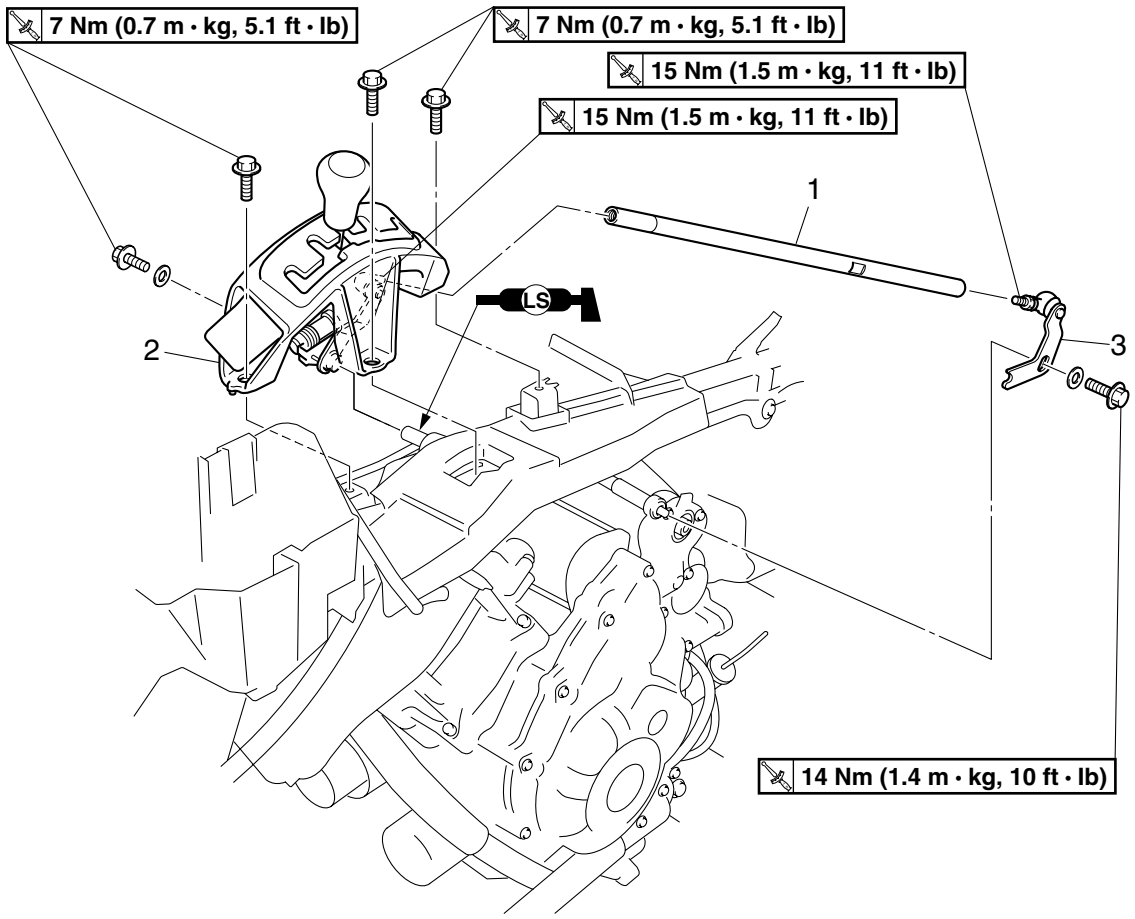
Order	Job/Part	Q'ty	Remarks
	Removing the air ducts, muffler and exhaust pipe		Remove the parts in the order listed.
	Front fender/rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Meter assembly		Refer to "ELECTRICAL COMPONENTS TRAY" in chapter 3.
1	V-belt cooling duct 2	1	
2	V-belt cooling duct 1	1	
3	Exhaust pipe protector	1	
4	Spring	2	
5	Muffler	1	



Order	Job/Part	Q'ty	Remarks
6	Gasket	1	
7	Muffler bracket	1	
8	Exhaust pipe	1	
9	Gasket	2	
			For installation, reverse the removal procedure.

EBS00202

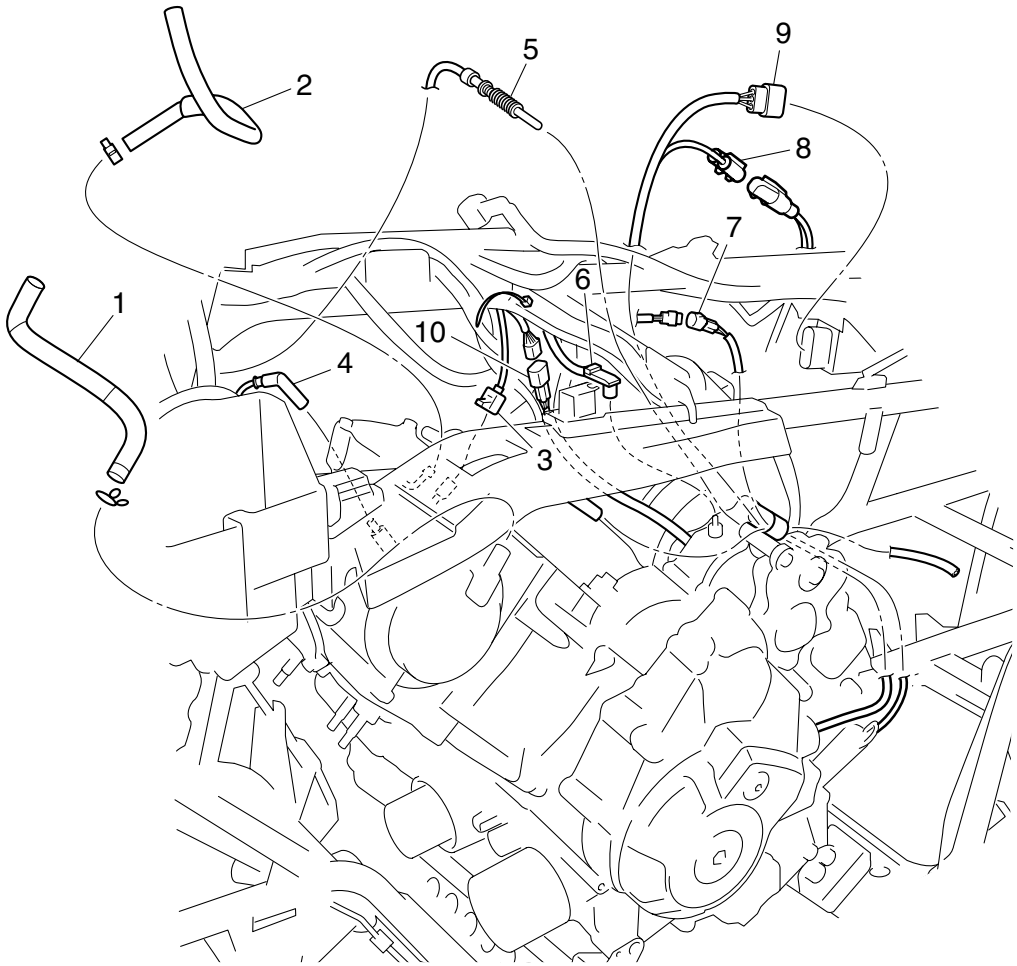
SELECT LEVER UNIT



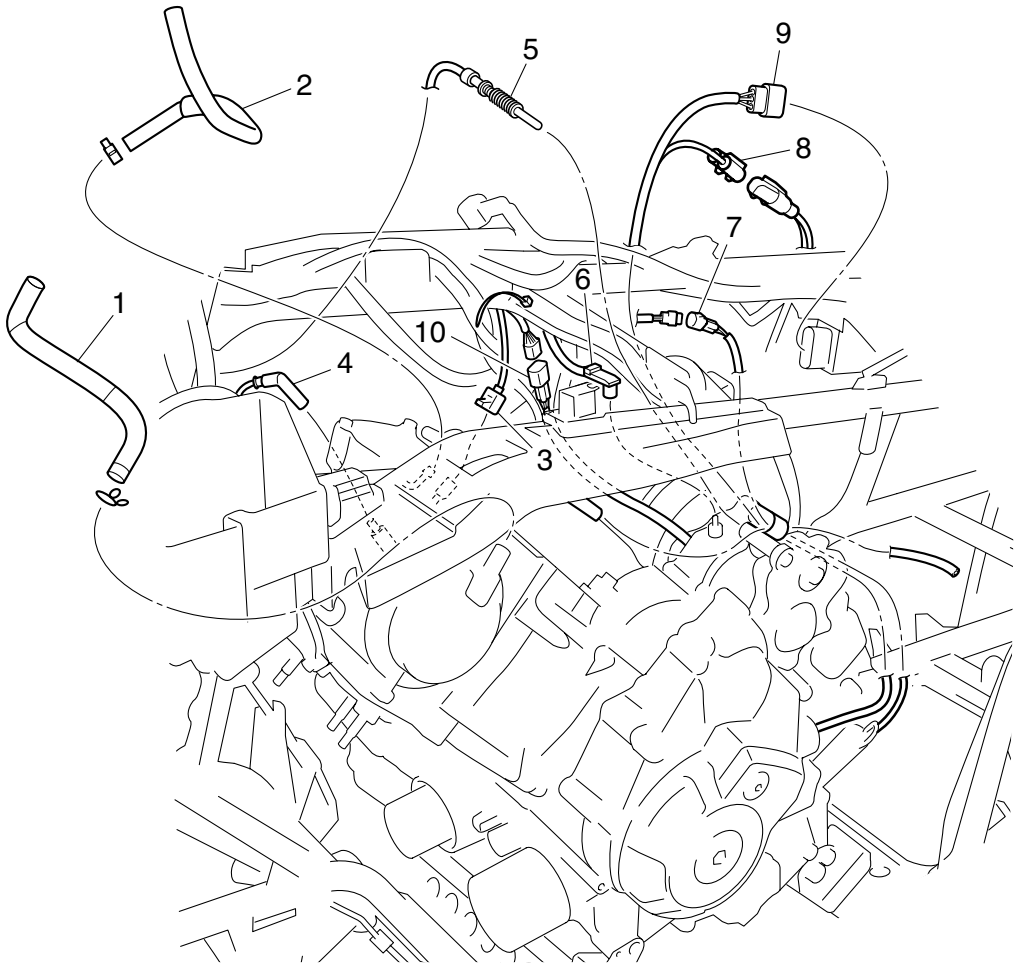
Order	Job/Part	Q'ty	Remarks
	Removing the select lever unit		Remove the parts in the order listed.
1	Select lever shift rod	1	Refer to "INSTALLING THE SELECT LEVER UNIT".
2	Select lever unit	1	
3	Shift arm	1	
			For installation, reverse the removal procedure.

EBS00204

LEADS, CABLES AND HOSES



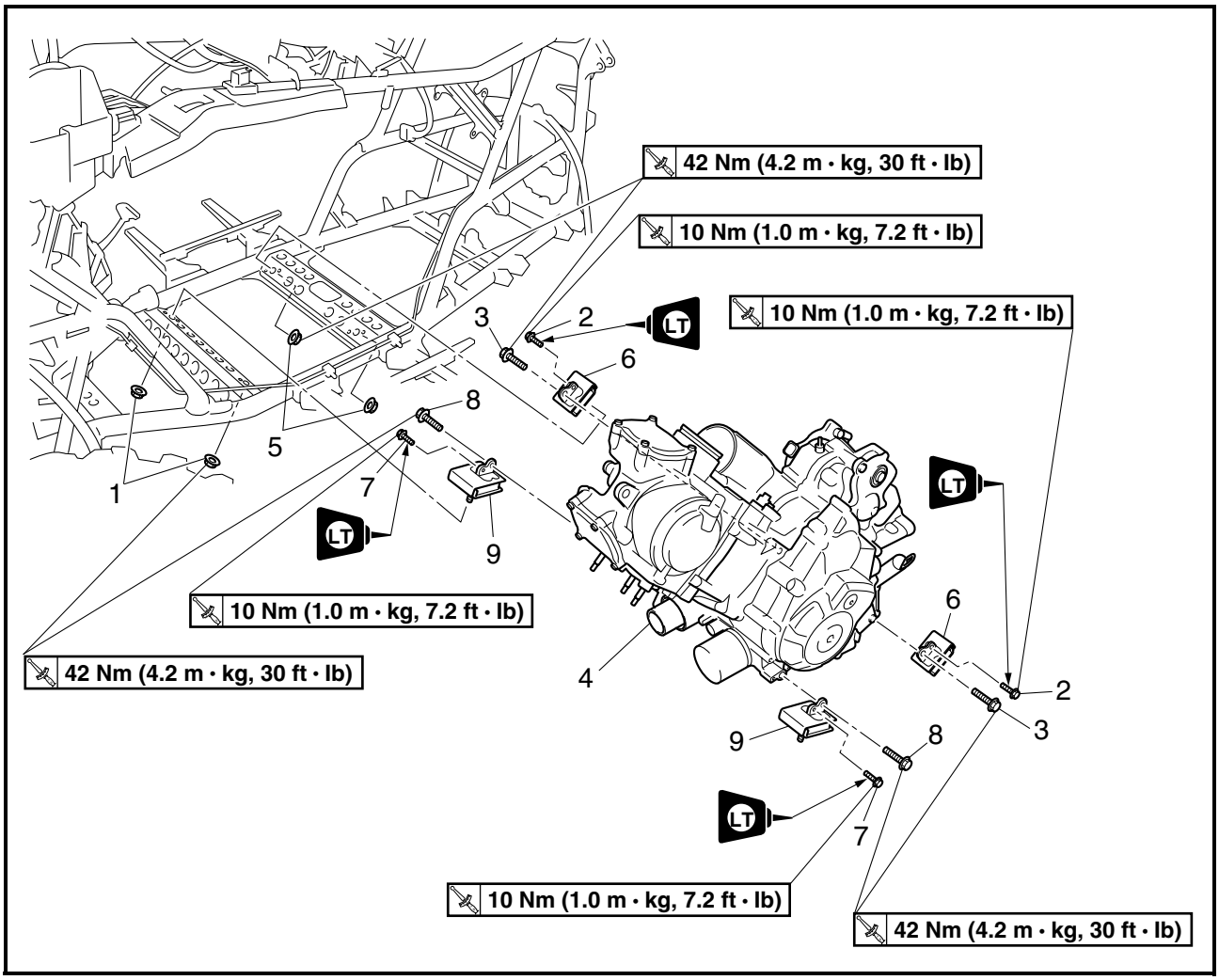
Order	Job/Part	Q'ty	Remarks
	Removing the leads, cables and hoses		Remove the parts in the order listed.
	Footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Fuel tank/fuel tank shield		Refer to "FUEL TANK" in chapter 6.
	Coolant reservoir		Refer to "RADIATOR" in chapter 5.
	Thermostat		Refer to "THERMOSTAT" in chapter 5.
	Water pump assembly		Refer to "WATER PUMP" in chapter 5.
	Oil delivery pipe		Refer to "CYLINDER HEAD".
	Final gear case assembly		Refer to "REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR" in chapter 7.



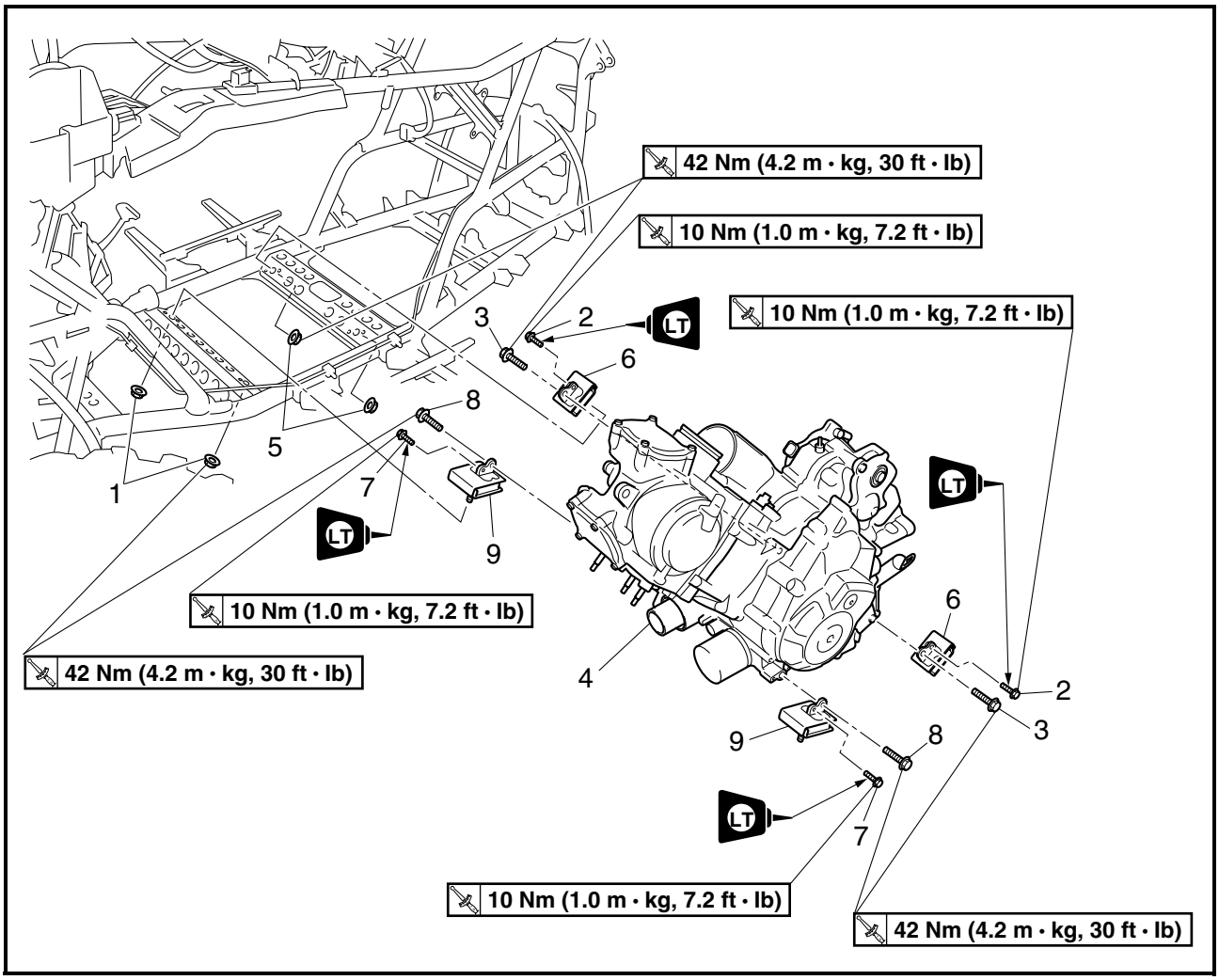
Order	Job/Part	Q'ty	Remarks
	Starter motor		Refer to "STARTER MOTOR" in chapter 9.
	Drive belt case		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Cylinder head breather hose	1	
2	Fast idle plunger inlet hose	1	
3	Coolant temperature sensor coupler	1	Disconnect.
4	Spark plug cap	1	
5	Shift control cable	1	Disconnect.
6	Reverse switch lead	1	Disconnect.
7	Speed sensor coupler	1	Disconnect.
8	Crankshaft position sensor coupler	1	Disconnect.
9	AC magneto coupler	1	Disconnect.
10	Gear position switch coupler	1	Disconnect.
			For installation, reverse the removal procedure.

EBS00205

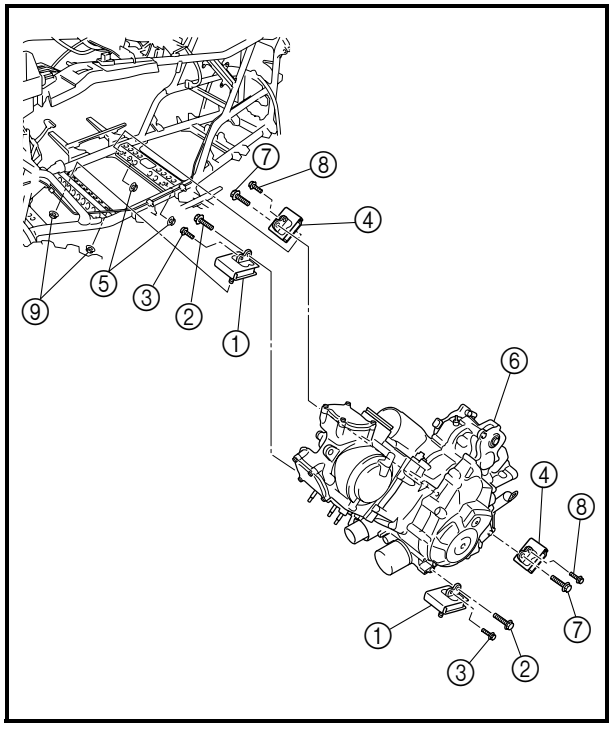
ENGINE MOUNTING BOLTS



Order	Job/Part	Q'ty	Remarks
	Removing the engine mounting bolts		Remove the parts in the order listed.
1	Rubber damper nut (front side)	2	
2	Engine mounting bolt (rear upper side)	2	Refer to "INSTALLING THE ENGINE".
3	Engine mounting bolt (rear lower side)	2	
4	Engine	1	**CAUTION:** **Make sure that the engine does not strike the brake pipe when removing it.** **NOTE:** Remove the engine from the left side of the vehicle.
5	Rubber damper nut (rear side)	2	



Order	Job/Part	Q'ty	Remarks
6	Rubber damper (rear side)	2	Refer to "INSTALLING THE ENGINE".
7	Engine mounting bolt (front upper side)	2	
8	Engine mounting bolt (front lower side)	2	
9	Rubber damper (front side)	2	
			For installation, reverse the removal procedure.



EBS00207

INSTALLING THE ENGINE

1. Install:
   - rubber dampers (front side) ①
   - engine mounting bolts (front lower side) ②
   - engine mounting bolts (front upper side) ③
   - rubber dampers (rear side) ④
   - rubber damper nuts (rear side) ⑤
   - engine ⑥
   - engine mounting bolts (rear lower side) ⑦
   - engine mounting bolts (rear upper side) ⑧
   - rubber damper nuts (front side) ⑨

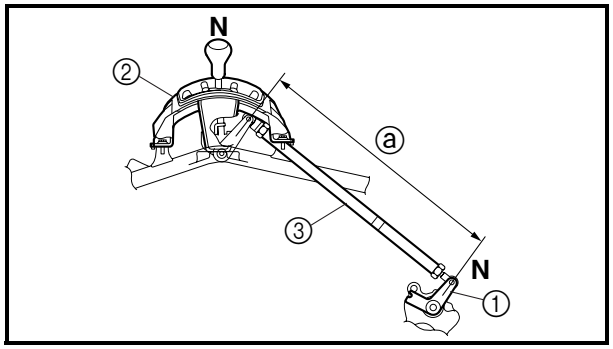
CAUTION:

Make sure that the engine does not strike the brake pipe when installing it.

NOTE:

Do not fully tighten the bolts and nuts.

2. Tighten:
   - engine mounting bolts (front lower side) ②
     42 Nm (4.2 m · kg, 30 ft · lb)
   - engine mounting bolts (front upper side) ③
     LT **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - engine mounting bolts (rear lower side) ⑦
     42 Nm (4.2 m · kg, 30 ft · lb)
   - engine mounting bolts (rear upper side) ⑧
     LT **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - rubber damper nuts (front side) ⑨
     42 Nm (4.2 m · kg, 30 ft · lb)
   - rubber damper nuts (rear side) ⑤
     42 Nm (4.2 m · kg, 30 ft · lb)



INSTALLING THE SELECT LEVER UNIT

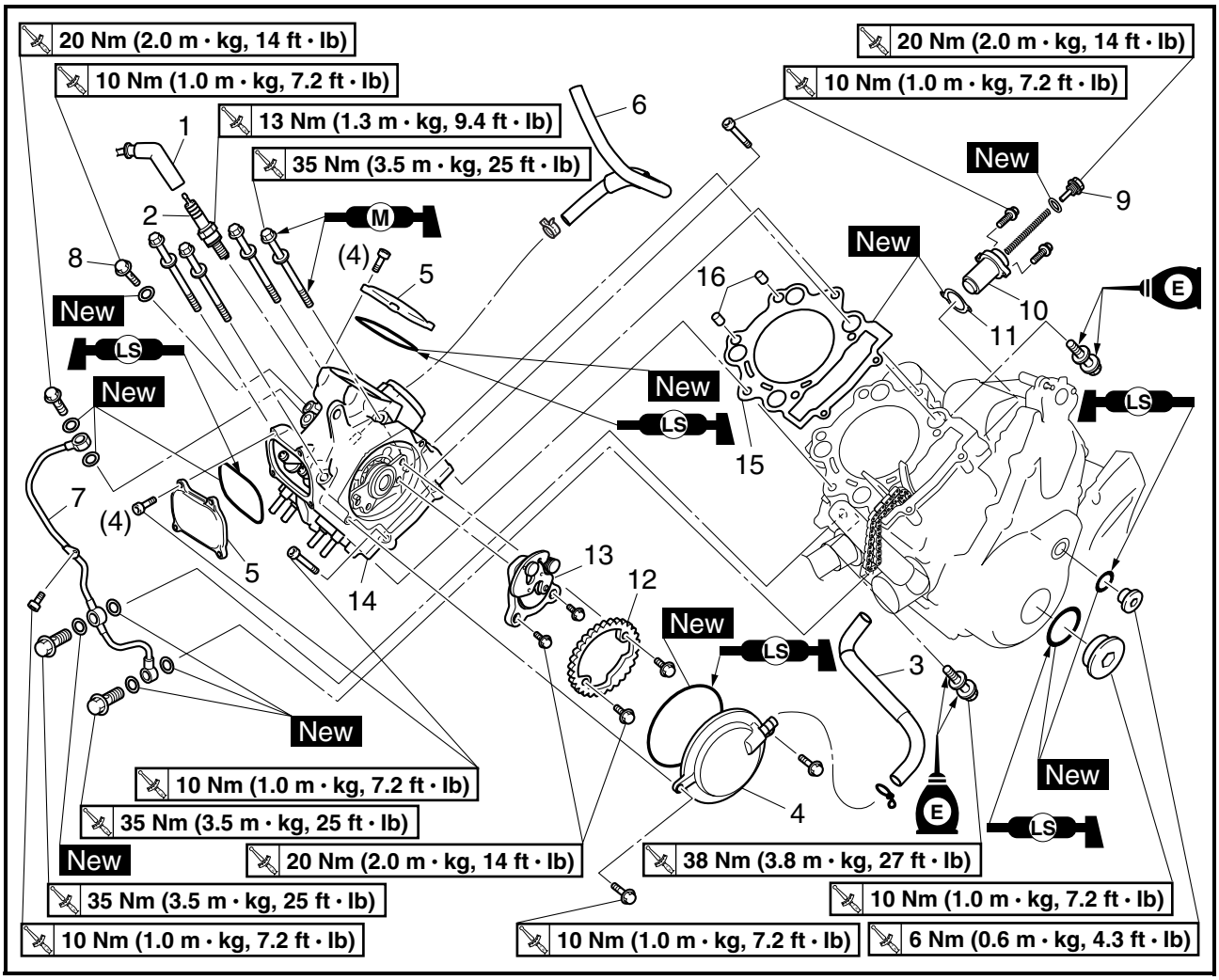
1. Install:
   - shift arm ① **14 Nm (1.4 m · kg, 10 ft · lb)**
   - select lever unit ② **7 Nm (0.7 m · kg, 5.1 ft · lb)**
   - select lever shift rod ③ **15 Nm (1.5 m · kg, 11 ft · lb)**

NOTE:

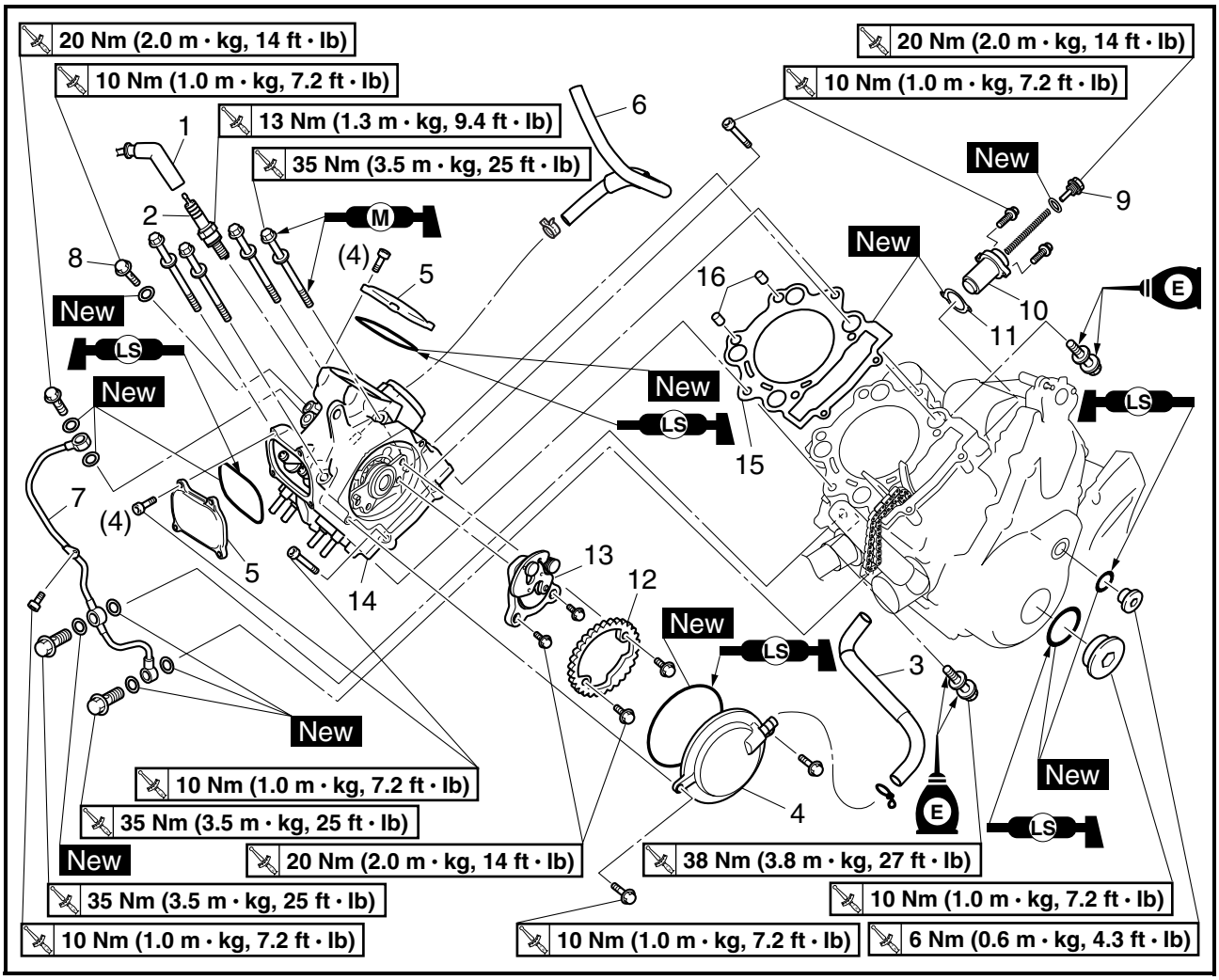
- Make sure that the select lever and transmission are in NEUTRAL.
- The installed length ⓐ of the shift rod is 413 mm (16.3 in).

EBS00218

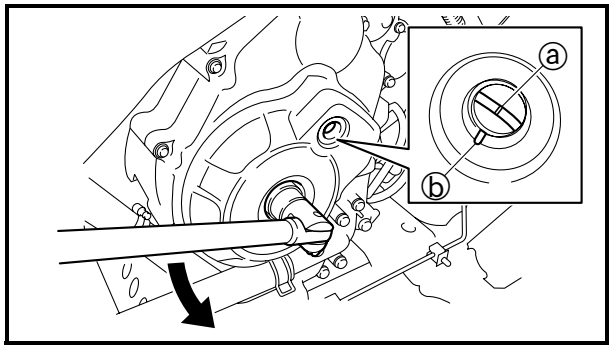
CYLINDER HEAD

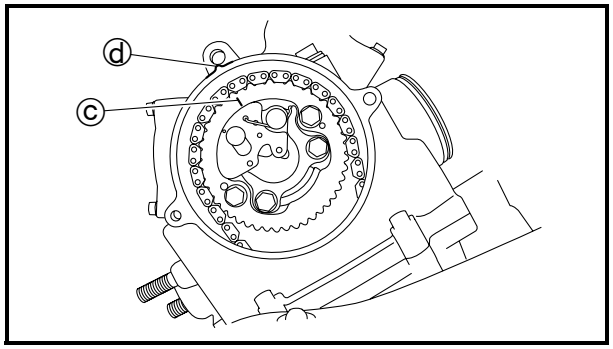


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Thermostat/coolant temperature sensor		Refer to "THERMOSTAT" in chapter 5.
	Air ducts/exhaust pipe		Refer to "ENGINE REMOVAL".
1	Spark plug cap	1	Disconnect.
2	Spark plug	1	
3	Cylinder head breather hose	1	
4	Camshaft sprocket cover	1	
5	Tappet cover	2	
6	Fast idle plunger inlet hose	1	
7	Oil delivery pipe	1	
8	Oil gallery bolt	1	



Order	Job/Part	Q'ty	Remarks
9	Timing chain tensioner cap bolt	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD".
10	Timing chain tensioner	1	
11	Gasket	1	
12	Camshaft sprocket	1	
13	Decompressor assembly	1	
14	Cylinder head	1	
15	Cylinder head gasket	1	
16	Dowel pin	2	
			For installation, reverse the removal procedure.





EBS00220

REMOVING THE CYLINDER HEAD

1. Align:
   - "I" mark on the AC magneto rotor (with the stationary pointer on the AC magneto cover)

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

NOTE:

To position the piston at top dead center (TDC) on the compression stroke, align the "I" mark ⓒ on the camshaft sprocket with the stationary pointer ⓓ on the cylinder head, as shown in the illustration.

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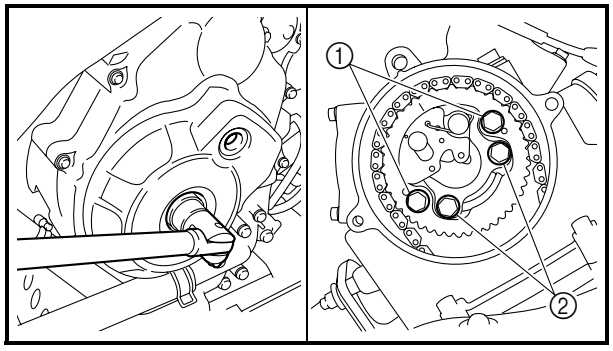


2. Loosen:
   - camshaft sprocket bolts ①
   - decompressor assembly bolts ②

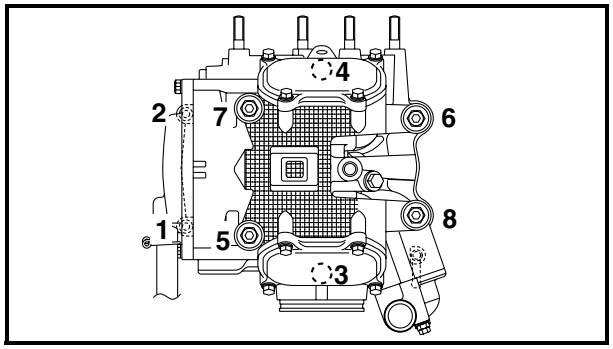
NOTE:

While holding the AC magneto rotor nut with a wrench, loosen the camshaft sprocket bolts and decompressor assembly bolts.

3. Loosen:
   - timing chain tensioner cap bolt
4. Remove:
   - timing chain tensioner (along with the gasket)
   - camshaft sprocket
   - timing chain

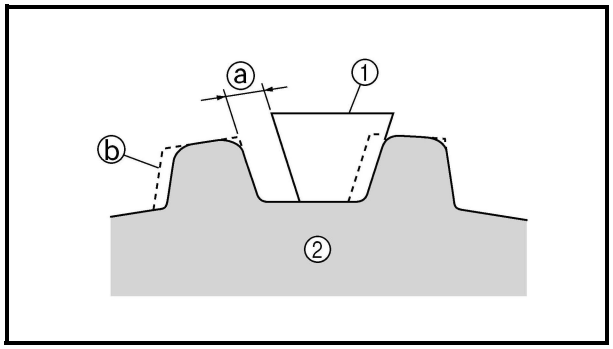
NOTE:

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.



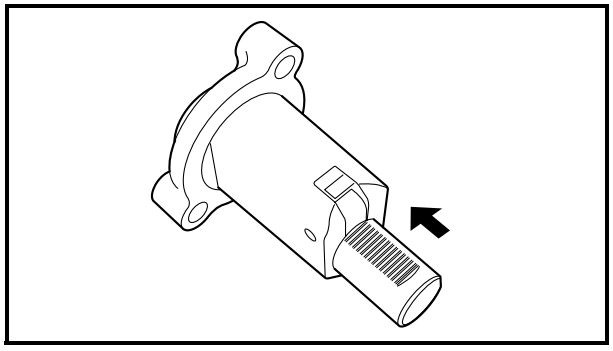
EBS00224
CHECKING THE CAMSHAFT SPROCKET

1. Check:
   • camshaft sprocket
   Wear/damage → Replace the camshaft sprocket and timing chain as a set.

ⓐ 1/4 of a tooth
ⓑ Correct
① Roller
② Sprocket

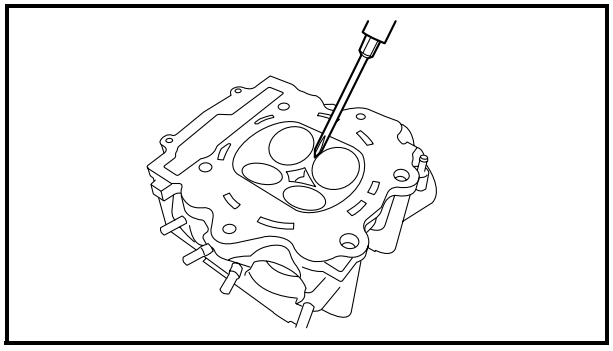
EBS00227
CHECKING THE TAPPET COVERS

1. Check:
   • tappet covers
   • camshaft sprocket cover
   Cracks/damage → Replace.



EBS00229
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.
3. Check:
   • timing chain tensioner cap bolt
   • spring
   • one-way cam
   • timing chain tensioner rod
   Damage/wear → Replace the defective part(s).

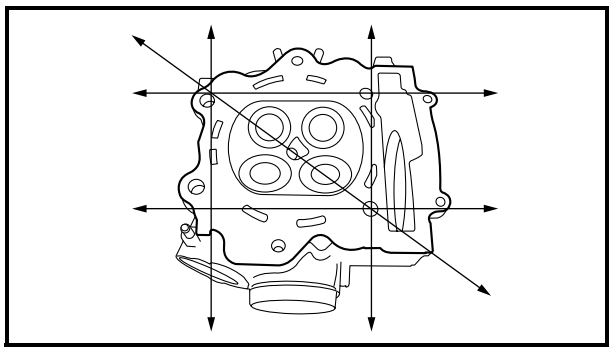


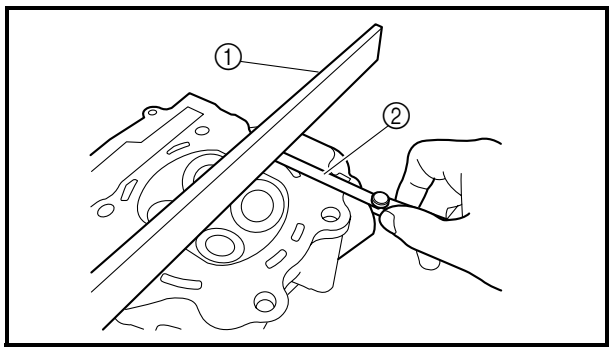
EBS00230
CHECKING THE CYLINDER HEAD

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)

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a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

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

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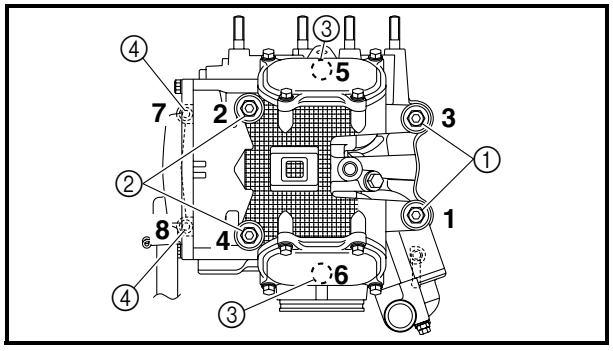
EBS00232
INSTALLING THE CYLINDER HEAD

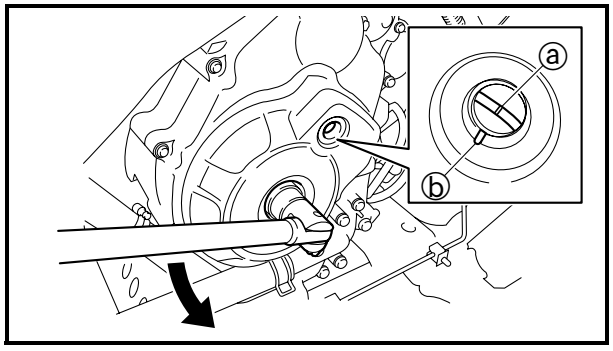
1. Install:
   - dowel pins
   - cylinder head gasket New
2. Install:
   - cylinder head
   - cylinder head bolts

NOTE:
- Lubricate the cylinder head bolt ① and ② threads and mating surface with molybdenum disulfide grease.
- Lubricate the cylinder head bolts ③ threads and mating surface with engine oil.



3. Tighten:
   - cylinder head bolts ①: ℓ = 135 mm (5.31 in)
     35 Nm (3.5 m · kg, 25 ft · lb)
   - cylinder head bolts ②: ℓ = 145 mm (5.71 in)
     35 Nm (3.5 m · kg, 25 ft · lb)
   - cylinder head bolts ③
     38 Nm (3.8 m · kg, 27 ft · lb)
   - cylinder head bolts ④
     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the cylinder head bolts in the proper tightening sequence as shown and torque them in two stages.



4. Install:
   - decompressor assembly
   - camshaft sprocket
     (onto the camshaft)

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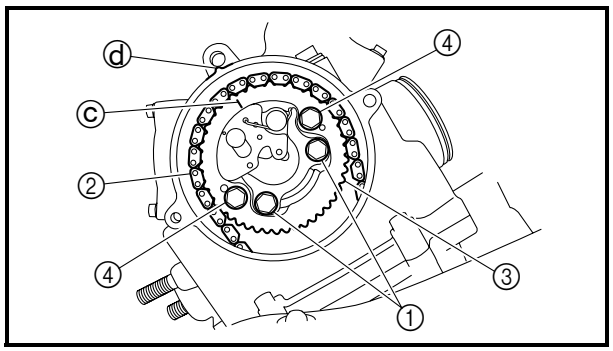
a. Install the decompressor assembly onto the camshaft, and then finger tighten the decompressor assembly bolts ①.
b. Turn the crankshaft counterclockwise.
c. Align the "I" mark ⓐ on the AC magneto rotor with the stationary pointer ⓑ on the AC magneto cover.
d. Install the timing chain ② onto the camshaft sprocket ③, then the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts ④.
e. Make sure the "I" mark ⓒ on the camshaft sprocket with the stationary pointer ⓓ on the cylinder head.



NOTE:
When installing the camshaft sprocket, keep the timing chain as tense as possible on the exhaust side.

CAUTION:
Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.

f. Remove the wire from the timing chain.

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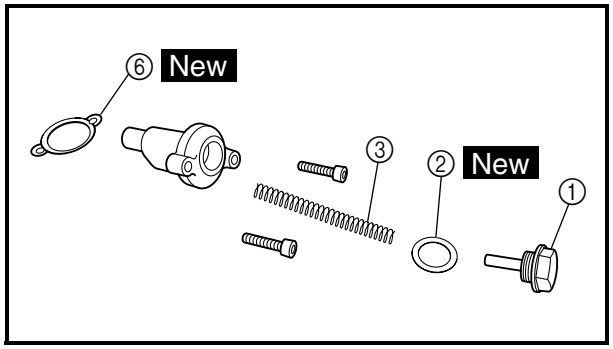

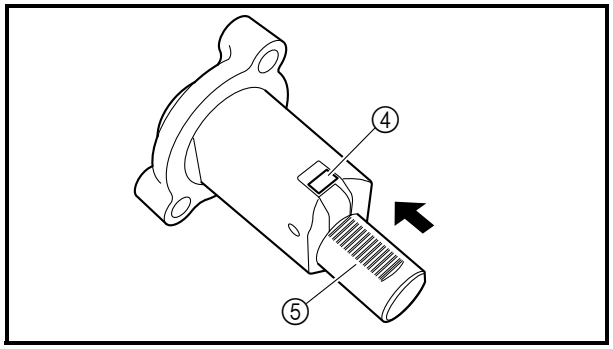

5. Install:
   • timing chain tensioner

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a. Remove the timing chain tensioner cap bolt ①, copper washer ② and spring ③.
b. 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.
c. 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)**

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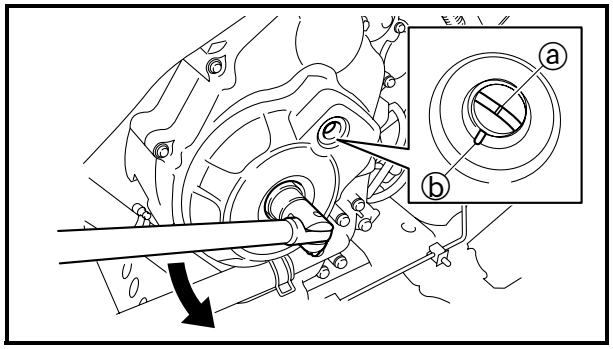
6. Turn:
   • crankshaft
   (several turns counterclockwise)

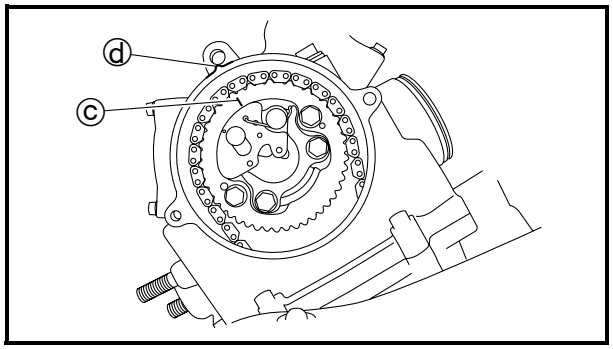


7. Check:
   • "I" mark ⓐ

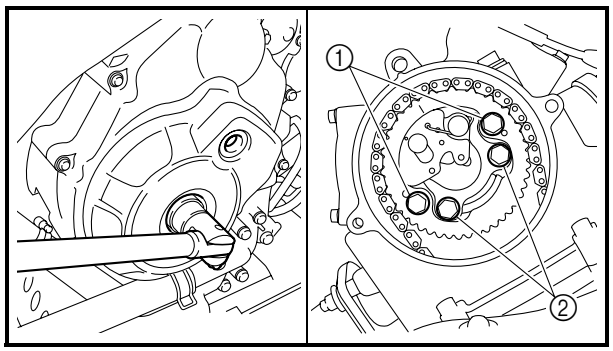
NOTE:
Check that the "I" mark on the AC magneto rotor is aligned with the stationary pointer ⓑ on the AC magneto cover.

   • "I" mark ⓒ

NOTE:
Check that the "I" mark on the camshaft sprocket is aligned with the stationary pointer ⓓ on the cylinder head.

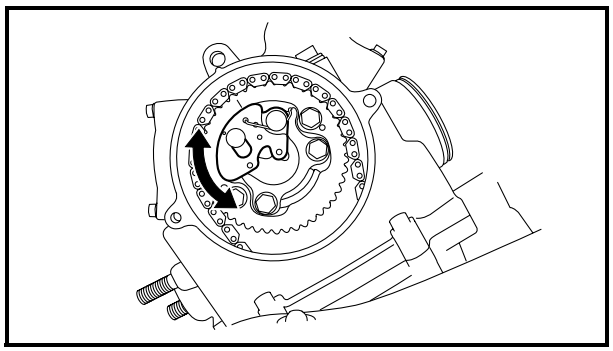


Out of alignment → Correct.
Repeat steps (4) to (7), if necessary.



8. Tighten:
   • camshaft sprocket bolts ①
     20 Nm (2.0 m · kg, 14 ft · lb)
   • decompressor assembly bolts ②
     20 Nm (2.0 m · kg, 14 ft · lb)

NOTE:
- While holding the AC magneto rotor nut with a wrench, tighten the camshaft sprocket bolts and decompressor assembly bolts.
- After tightening the decompressor assembly bolts, check that decompressor assembly moves smoothly.

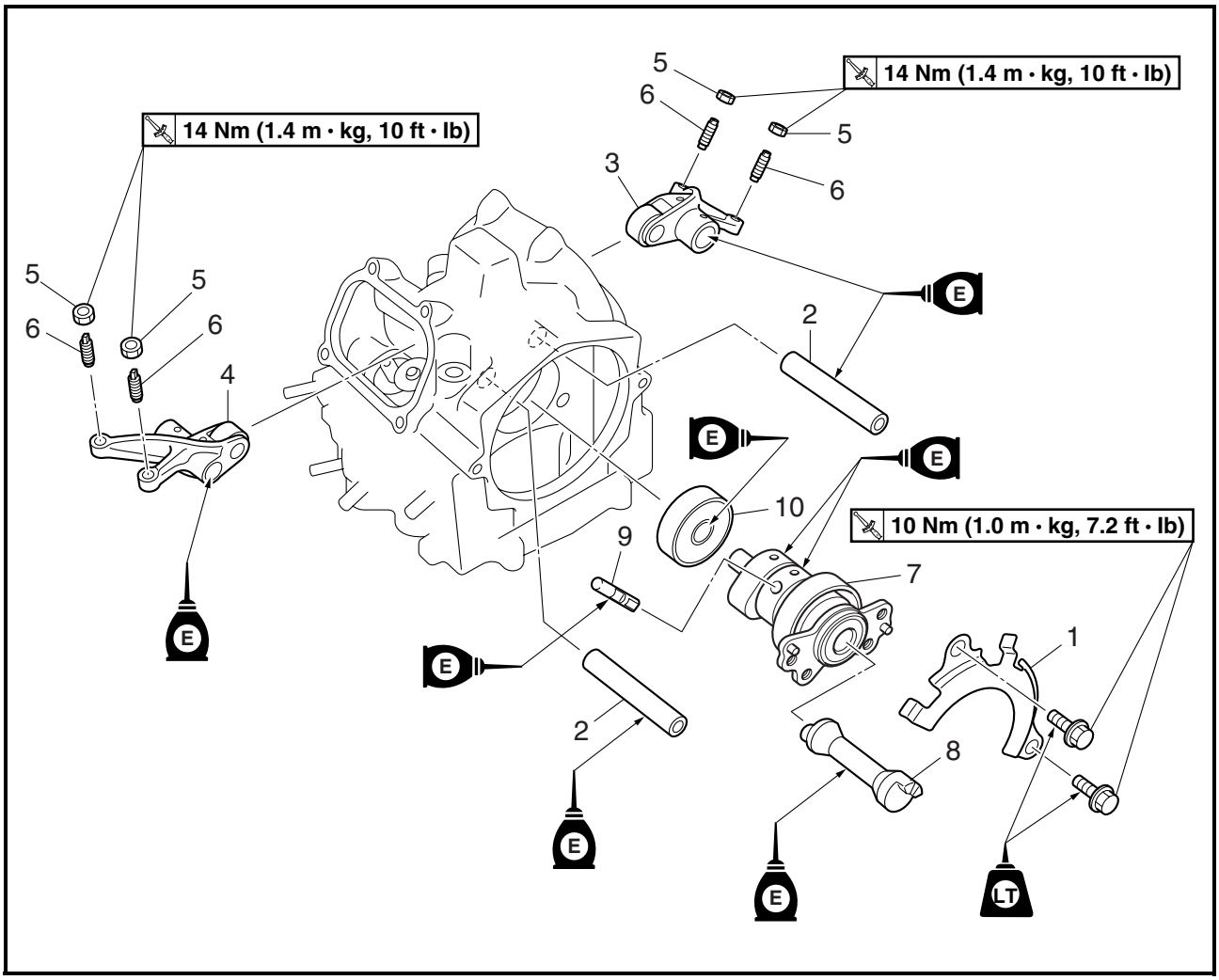


CAUTION:
Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

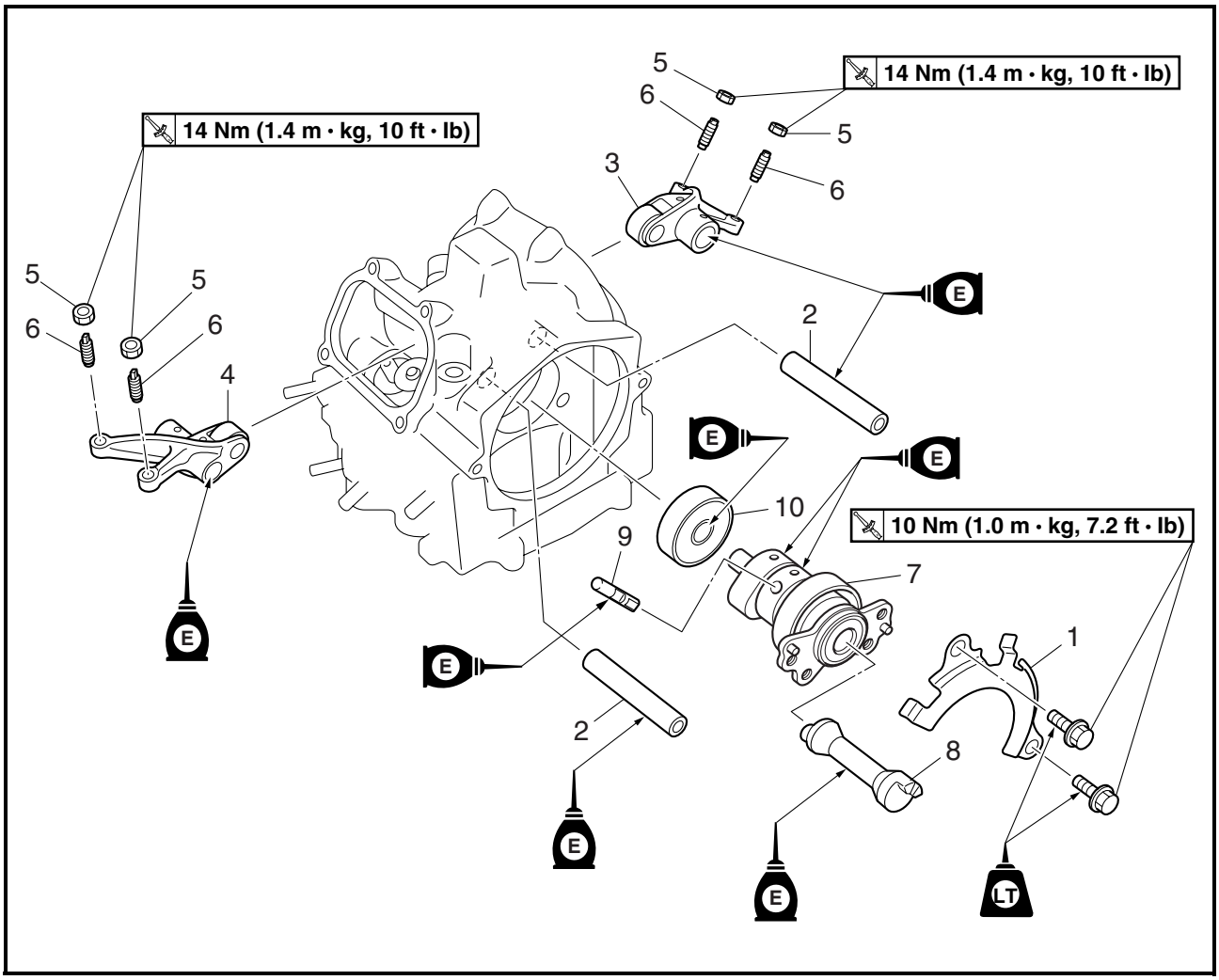
9. Measure:
   • valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

EBS00235

ROCKER ARMS AND CAMSHAFT



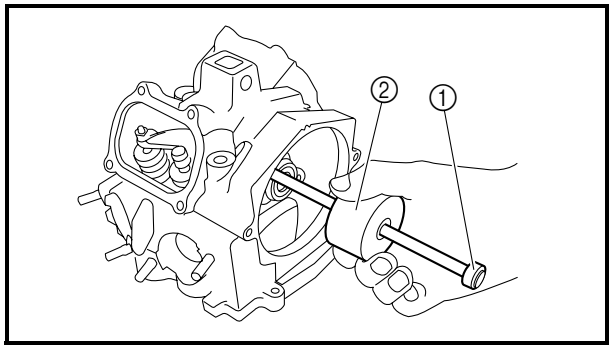
Order	Job/Part	Q'ty	Remarks
	Removing the rocker arms and camshaft		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Bearing retainer	1	
2	Rocker arm shaft	2	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS".
3	Intake rocker arm	1	
4	Exhaust rocker arm	1	
5	Locknut	4	
6	Valve adjusting screw	4	
7	Camshaft	1	**CAUTION:** **Do not disassemble the camshaft assembly.**
8	Decompressor lever	1	



Order	Job/Part	Q'ty	Remarks
9	Decompressor lever pin	1	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS". For installation, reverse the removal procedure.
10	Bearing	1	

EBS00237
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
   - locknuts
   - valve adjusting screws
2. Remove:
   - intake rocker arm shaft
   - exhaust rocker arm shaft
   - intake rocker arm
   - exhaust rocker arm



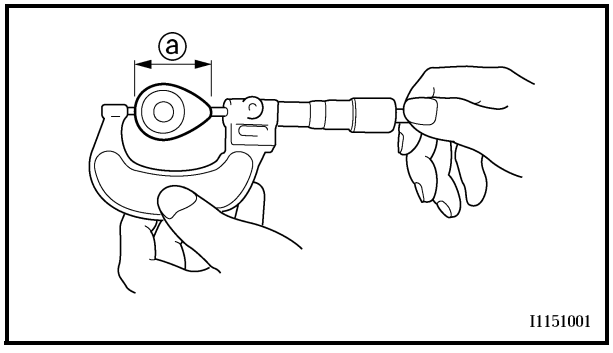
NOTE:

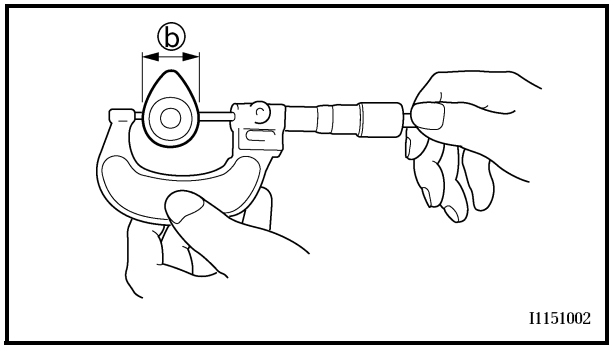
Remove the rocker arm shafts with the slide hammer bolt ① and weight ②.

Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1
Weight
90890-01084, YU-01083-3

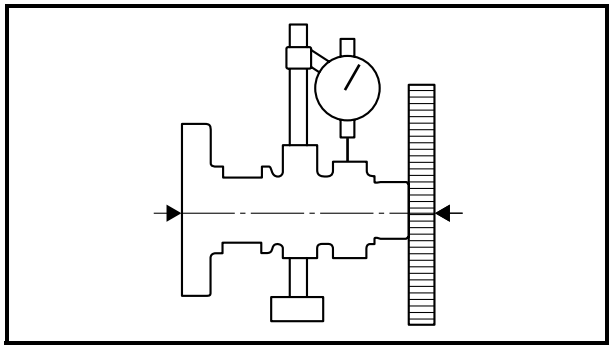
EBS00223
CHECKING THE CAMSHAFT

1. Check:
   - cam lobes
     Pitting/scratches/blue discoloration → Replace.
2. Measure:
   - cam lobe dimensions ⓐ and ⓑ
     Out of specification → Replace.



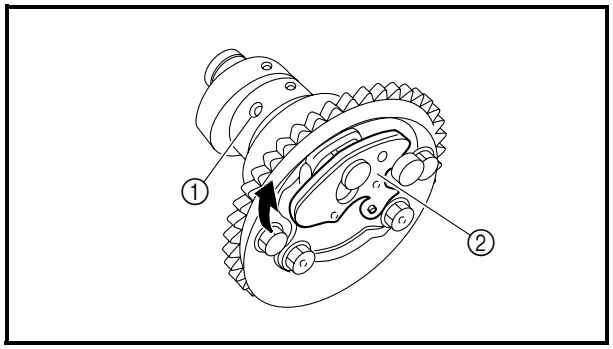


Camshaft lobe dimensions
Intake
ⓐ 43.488 ~ 43.588 mm (1.7121 ~ 1.7161 in)
<Limit>: 43.388 mm (1.7082 in)
ⓑ 36.959 ~ 37.059 mm (1.4551 ~ 1.4590 in)
<Limit>: 36.859 mm (1.4511 in)
Exhaust
ⓐ 43.129 ~ 43.229 mm (1.6980 ~ 1.7019 in)
<Limit>: 43.029 mm (1.6941 in)
ⓑ 37.007 ~ 37.107 mm (1.4570 ~ 1.4609 in)
<Limit>: 36.907 mm (1.4530 in)



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

Camshaft runout limit
0.015 mm (0.0006 in)



EBS00225
CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • decompression system

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a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and 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.

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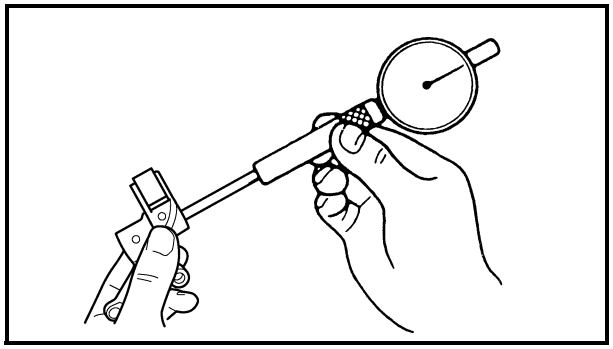
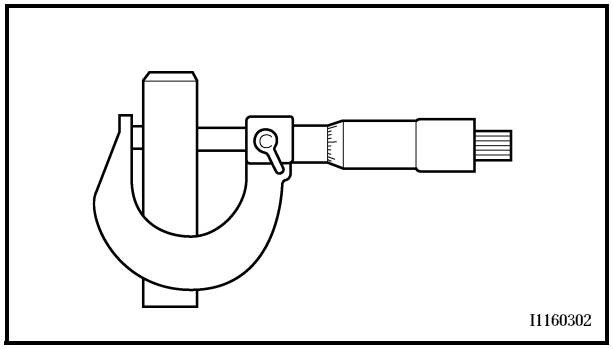
EBS00239
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

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.



Rocker arm inside diameter
12.000 ~ 12.018 mm
(0.4724 ~ 0.4731 in)



4. Measure:
   • rocker arm shaft outside diameter
   Out of specification → Replace.

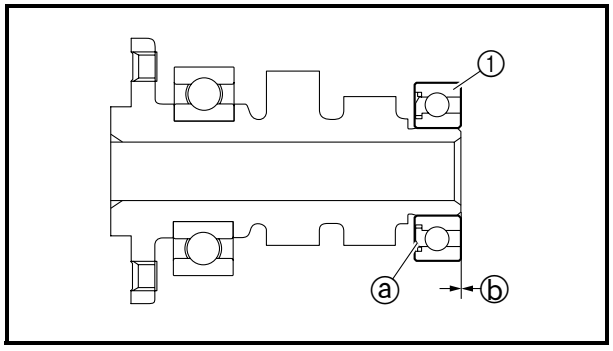
Rocker arm shaft outside diameter
11.981 ~ 11.991 mm
(0.4717 ~ 0.4721 in)

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.

Out of specification → Replace the defective part(s).

Rocker-arm-to-rocker-arm-shaft clearance
0.009 ~ 0.037 mm
(0.0004 ~ 0.0015 in)



EAS00243
INSTALLING THE CAMSHAFT AND ROCKER ARMS

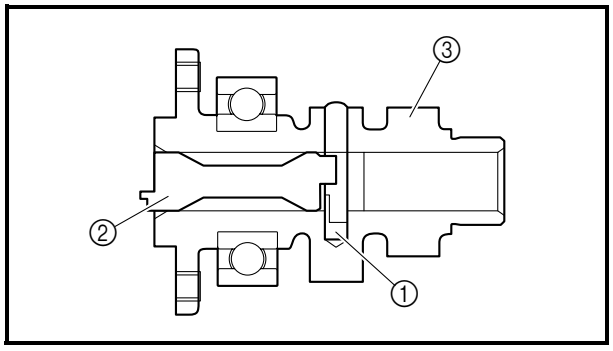
1. Install:
   • bearing ①
   (onto the cylinder head)

NOTE:
- Apply engine oil to the bearing.
- Install the bearing so that the seal is facing ⓐ the camshaft.

Installed depth ⓑ
0 mm (0 in)

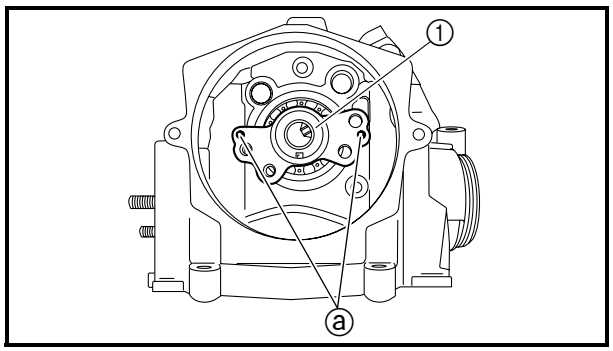
2. Lubricate:
   - camshaft
   - decompressor lever pin
   - decompressor lever

	Recommended lubricant **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.

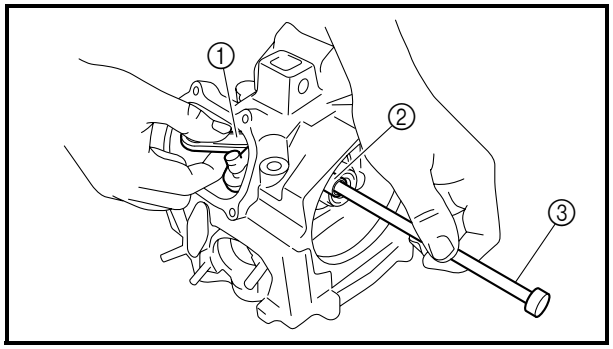


4. Install:
   - camshaft ①

NOTE:
Install the camshaft so that its projection ⓐ becomes horizontal.

5. Lubricate:
   - rocker arm shafts

	Recommended lubricant **Engine oil**



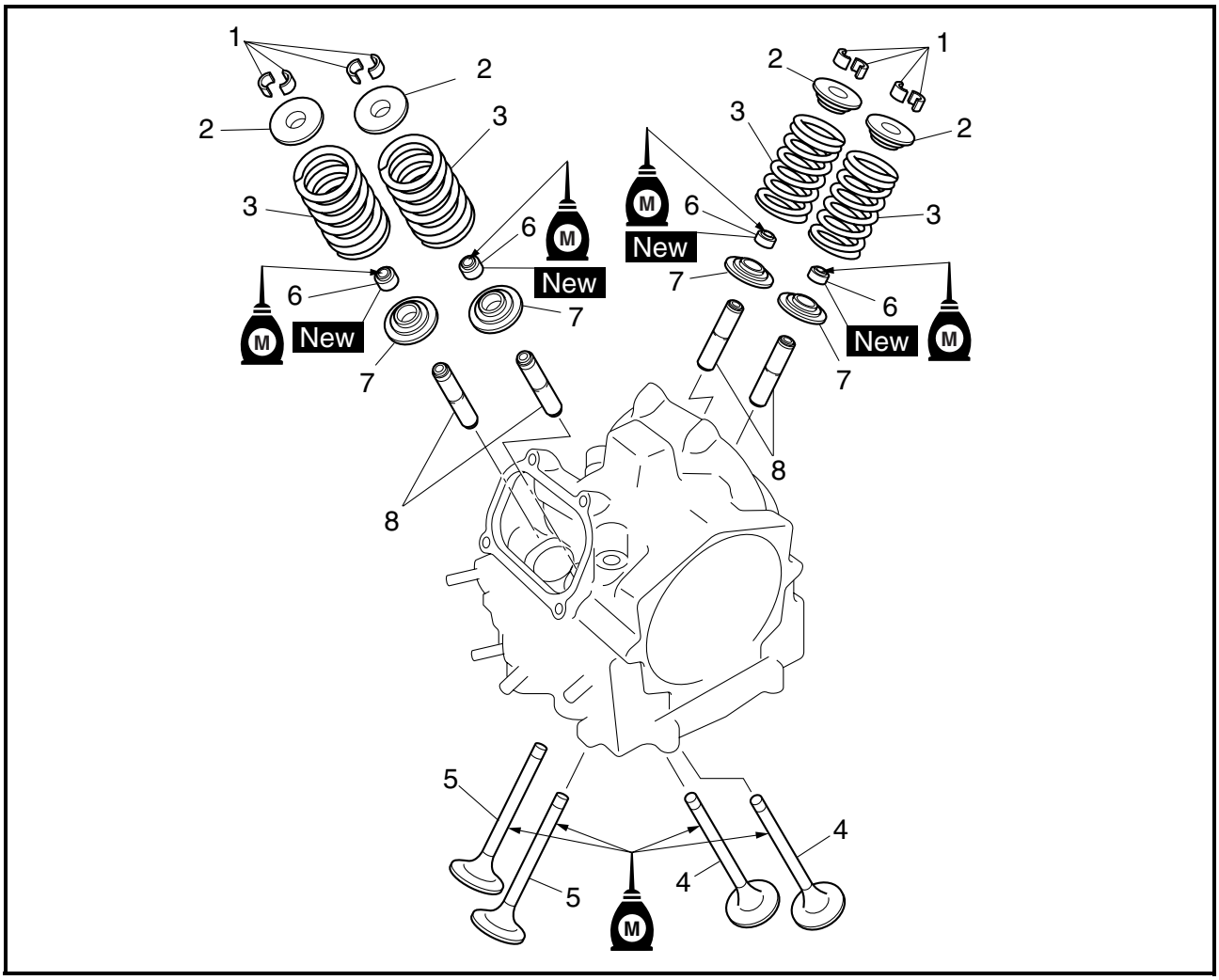
6. Install:
   - exhaust rocker arm ①
   - exhaust rocker arm shaft ②
   - intake rocker arm
   - intake rocker arm shaft

NOTE:

- Use a slide hammer bolt ③ to install the rocker arm shaft.
- Make sure the rocker arm shafts (intake and exhaust) are completely pushed into the cylinder head.

Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1

EBS00234
VALVES AND VALVE SPRINGS



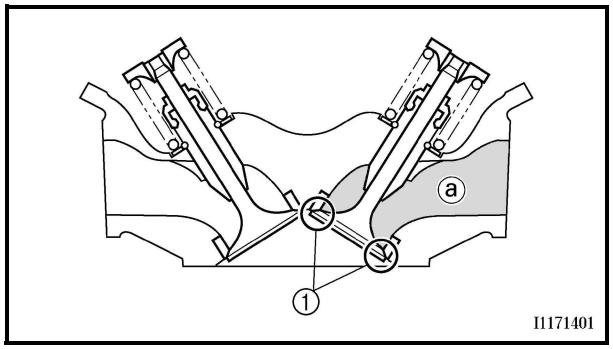
Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
	Rocker arms/rocker arm shafts/camshaft		Refer to "ROCKER ARMS AND CAMSHAFT".
1	Valve cotter	8	Refer to "REMOVING THE VALVES AND VALVE SPRINGS" and "INSTALLING THE VALVES AND VALVE SPRINGS".
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	
8	Valve guide	4	Refer to "CHECKING THE VALVES AND VALVE SPRINGS".
			For installation, reverse the removal procedure.

EBS00238
REMOVING THE VALVES AND VALVE SPRINGS

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 VALVES AND VALVE SPRINGS".

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a. Pour a clean solvent ⓐ into the intake and exhaust ports.
b. Check that the valve seals properly.
   There should be no leakage at the valve seat ①.

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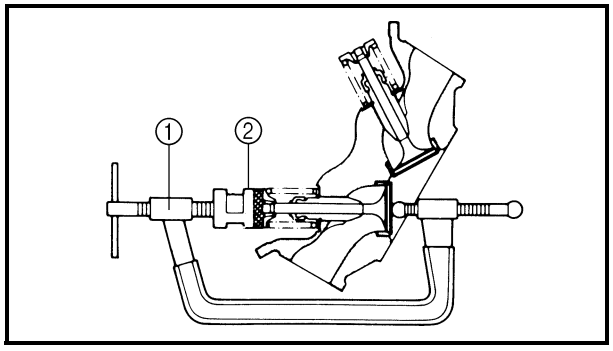
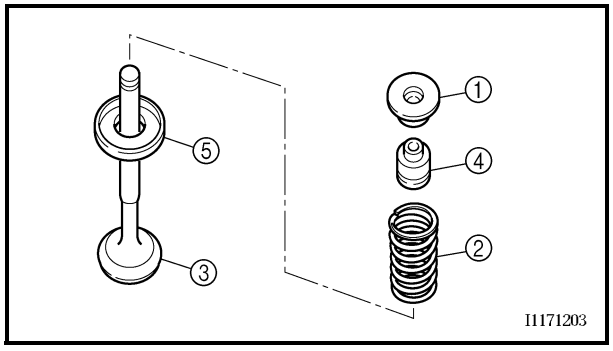


2. Remove:
   - valve cotters

NOTE:

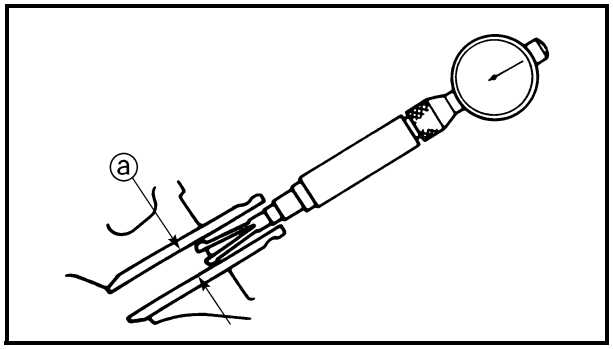
Attach a valve spring compressor ① and attachment ② between the valve spring retainer and the cylinder head to remove the valve cotters.

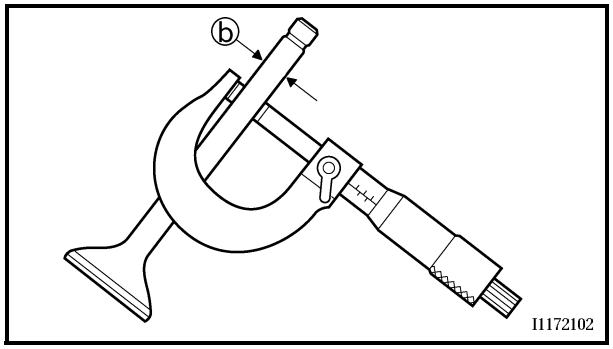
Valve spring compressor
90890-04019, YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1



3. Remove:
   - valve spring retainer ①
   - valve spring ②
   - valve ③
   - valve stem seal ④
   - valve spring seat ⑤

NOTE:
Identify the position of each part very carefully so that it can be reinstalled in its original place.





EBS00240

CHECKING THE VALVES AND VALVE SPRINGS

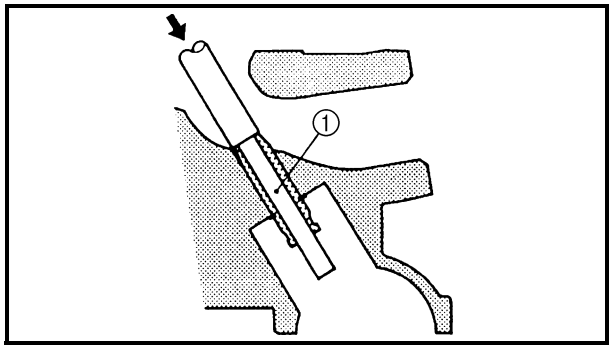
The following procedure applies to all of the valves and valve guides.

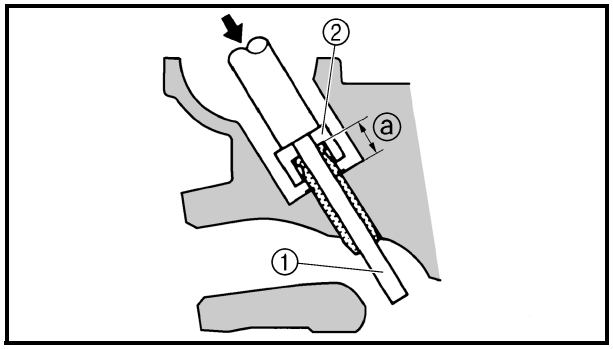
1. Measure:
   - valve-stem-to-valve-guide clearance

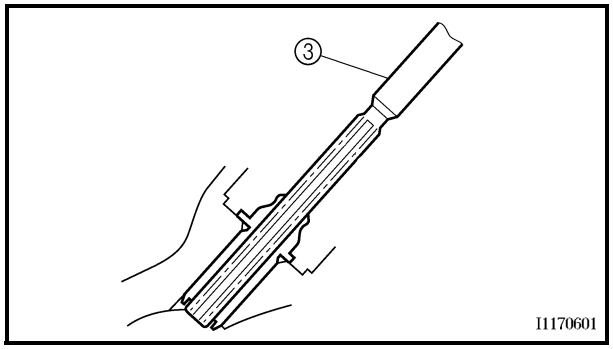
Stem-to-guide clearance =
valve guide inside diameter ⓐ -
valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Stem-to-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.

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a. Remove the valve guide using a valve guide remover ①.
b. Install the new valve guide using a valve guide remover ① and valve guide installer ②.

Valve guide position ⓐ
12.7 ~ 13.1 mm (0.50 ~ 0.52 in)

c. After installing the valve guide, bore the valve guide using a valve guide reamer ③ to obtain proper stem-to-guide clearance.

Valve guide remover (ø6)
90890-04064
Valve guide remover (6.0 mm)
YM-04064-A
Valve guide installer (ø6)
90890-04065
Valve guide installer (6.0 mm)
YM-04065-A
Valve guide reamer (ø6)
90890-04066
Valve guide reamer (6.0 mm)
YM-04066

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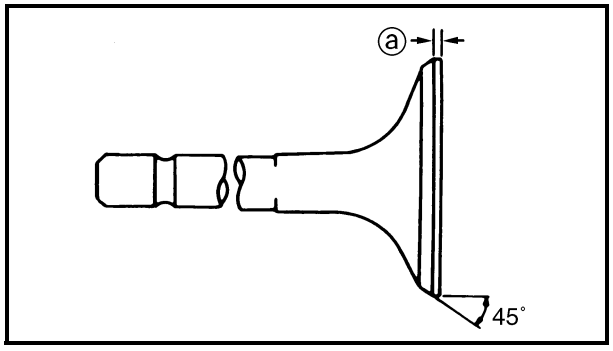
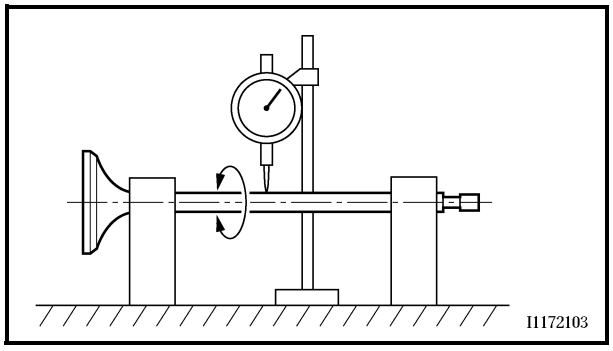
NOTE:
After replacing the valve guide, reface the valve seat.

3. Check:
   • valve face
     Pitting/wear → Grind the face.
   • valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace.



4. Measure:
   • margin thickness ⓐ
   Out of specification → Replace.

Margin thickness
0.80 ~ 1.20 mm
(0.0315 ~ 0.0472 in)

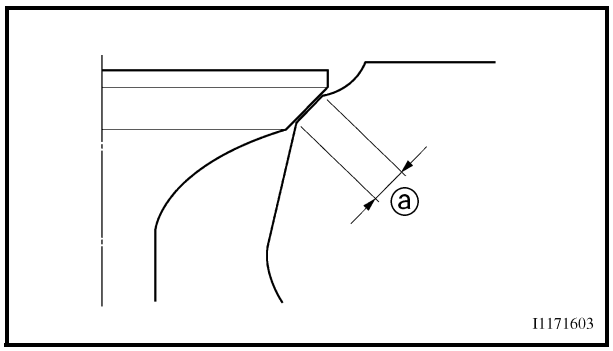


5. Measure:
   • valve stem runout
   Out of specification → Replace.

Runout limit
0.040 mm (0.0016 in)

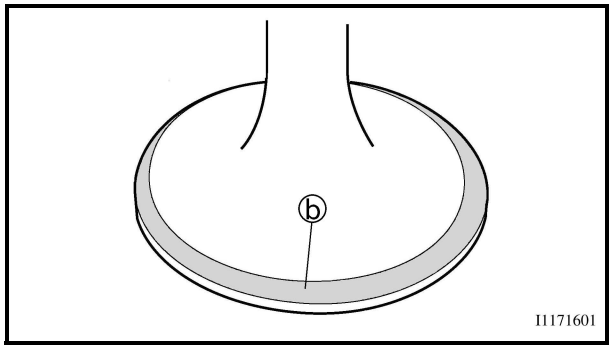
NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

6. Eliminate:
   • carbon deposits
   (from the valve face and valve seat)
7. Check:
   • valve seats
   Pitting/wear → Reface the valve seat.



8. Measure:
   • valve seat width ⓐ
   Out of specification → Reface the valve seat.

Valve seat width
1.00 ~ 1.20 mm
(0.0394 ~ 0.0472 in)
<Limit>: 1.60 mm (0.0630 in)



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a. Apply Mechanic's blueing dye (Dykem) ⓑ to 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 pattern.
d. Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.

e. If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

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9. Lap:
   - valve face
   - valve seat

NOTE:

After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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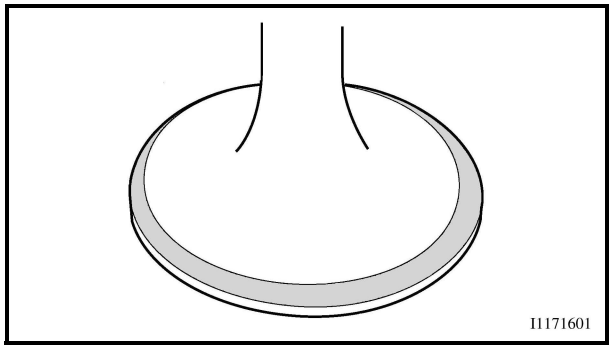
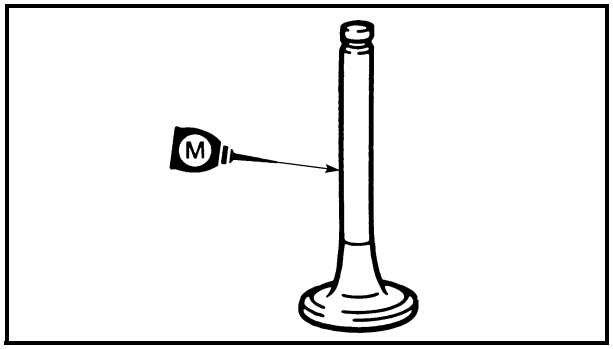


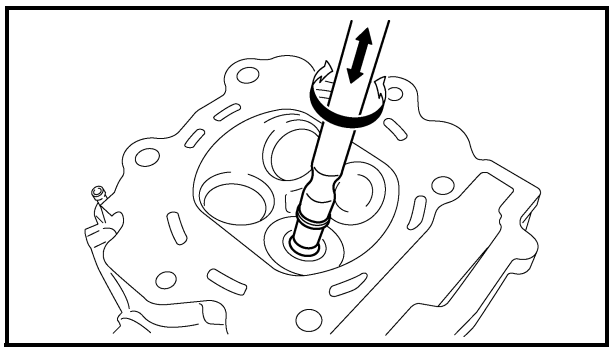
a. Apply a coarse lapping compound to the valve face.

CAUTION:

Do not let the compound enter the gap between the valve stem and the valve guide.



b. Apply molybdenum disulfide oil to 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 compound.

NOTE:

For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

e. Apply a fine lapping compound to the valve face and repeat the above steps.

NOTE:

After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.

f. Apply Mechanic's blueing dye (Dykem) to the valve face.
g. Install the valve into the cylinder head.

h. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
i. Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.

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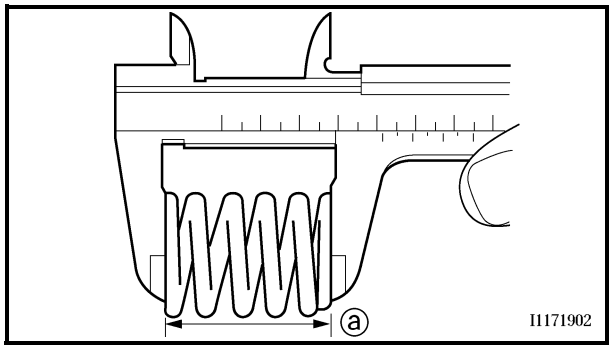
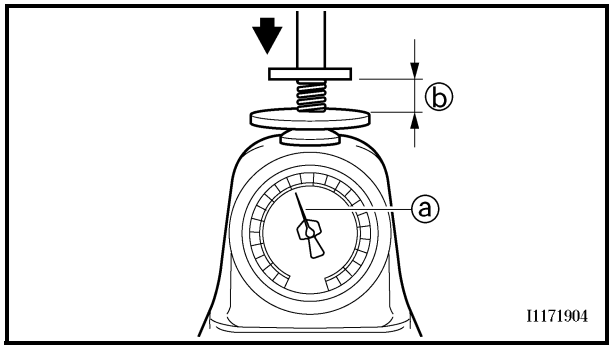


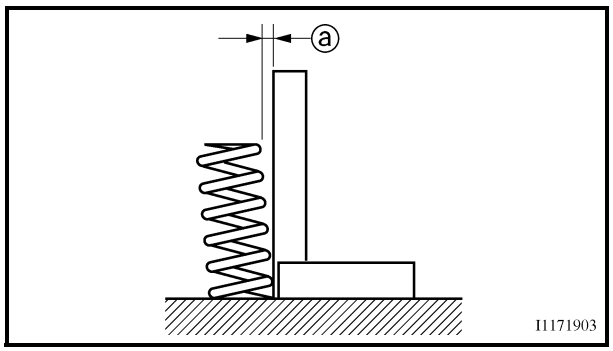
10.Measure:
• valve spring free length ⓐ
Out of specification → Replace.

Valve spring free length
38.79 mm (1.53 in)
<Limit>: 36.85 mm (1.45 in)



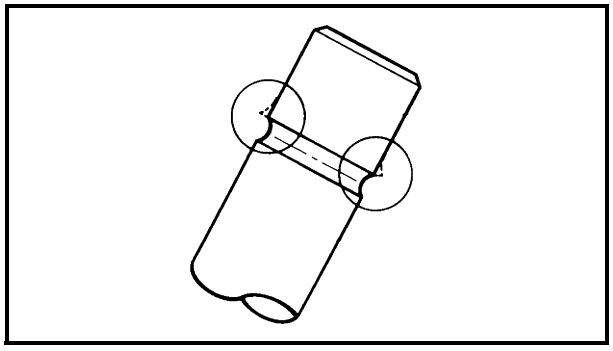
11.Measure:
• compressed spring force ⓐ
Out of specification → Replace.
ⓑ Installed length

Compressed spring force
169.0 ~ 199.0 N at 35.00 mm
(17.23 ~ 20.29 kg at 35.00 mm,
37.99 ~ 44.73 lb at 1.38 in)



12.Measure:
• spring tilt ⓐ
Out of specification → Replace.

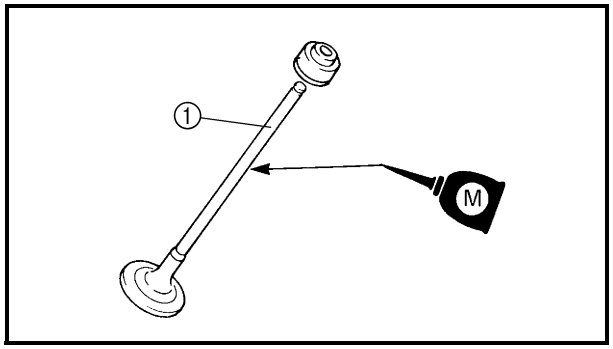
Spring tilt limit
2.5°/1.70 mm (0.067 in)



EBS00241
INSTALLING THE VALVES AND VALVE SPRINGS

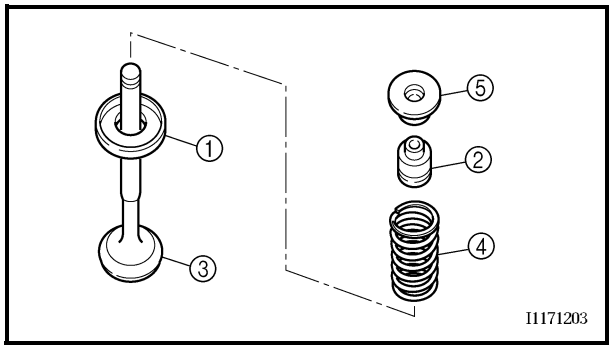
The following procedure applies to all of the valves and related components.

1. Deburr:
• valve stem end
(with an oil stone)



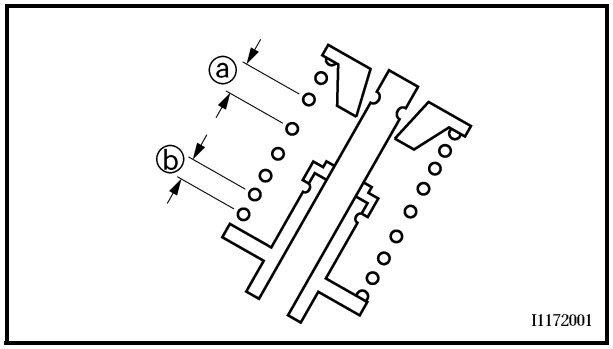
2. Lubricate:
   • valve stem ①
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

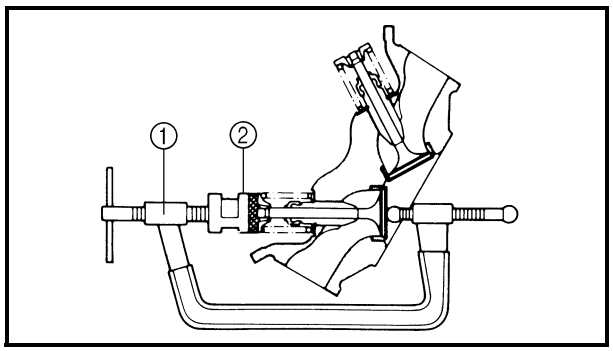


3. Install:
   • valve spring seats ①
   • valve stem seals ②
   • valves ③
   • valve springs ④
   • valve spring retainers ⑤

NOTE:
Install the valve springs with the larger pitch ⓐ facing upwards.



ⓑ Smaller pitch



4. Install:
   • valve cotters

NOTE:
Install the valve cotters while compressing the valve spring with the valve spring compressor ① and attachment ②.

	Valve spring compressor **90890-04019, YM-04019** **Valve spring compressor attachment** **90890-01243** **Valve spring compressor adapter (26 mm)** **YM-01253-1**

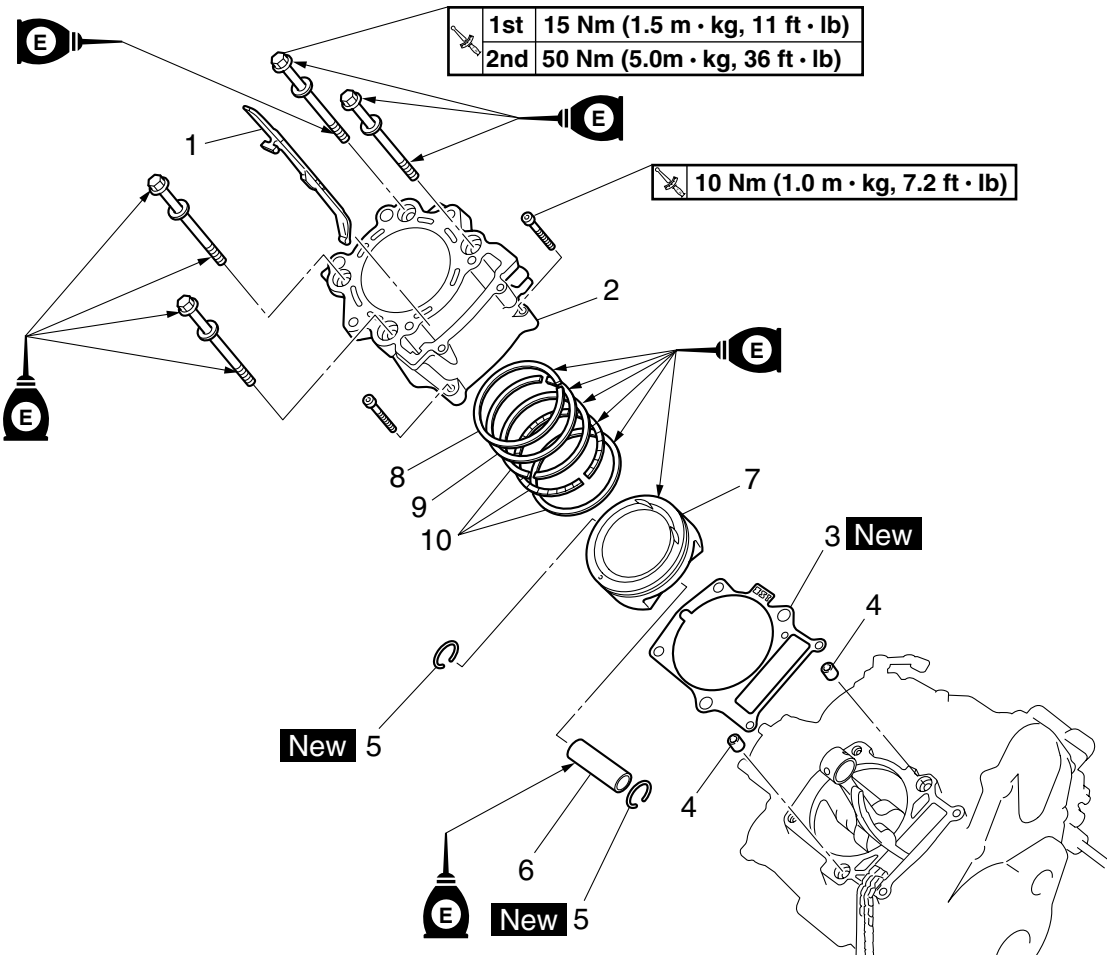
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a piece of wood.

CAUTION:

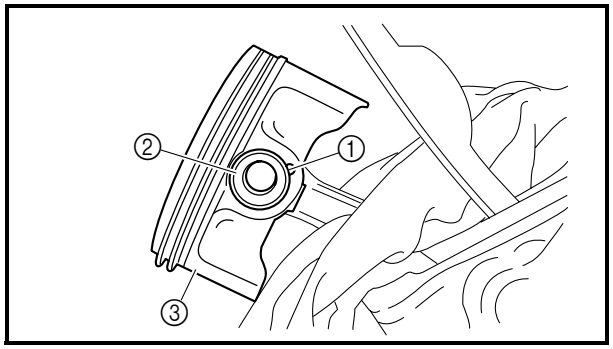
Hitting the valve tip with excessive force could damage the valve.

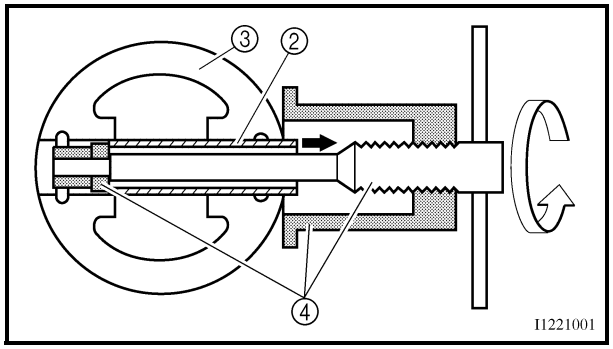
EBS00245

CYLINDER AND PISTON



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder and piston		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
	Water jacket joint		Refer to "WATER PUMP" in chapter 5.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	Refer to "INSTALLING THE PISTON AND CYLINDER".
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON AND CYLINDER".
6	Piston pin	1	
7	Piston	1	
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	
			For installation, reverse the removal procedure.





EBS00247

REMOVING THE PISTON

1. Remove:
   - piston pin clips ①
   - piston pin ②
   - piston ③

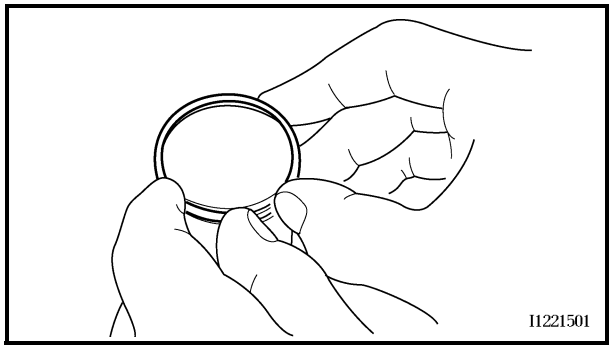
NOTE:

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip grooves and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set ④.

Piston pin puller set
90890-01304
Piston pin puller
YU-01304

CAUTION:

Do not use a hammer to drive the piston pin out.



2. Remove:
   - piston rings

NOTE:

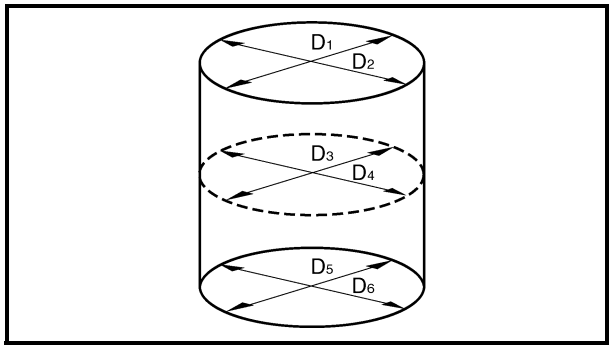
Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown, as shown in the illustration.

EBS00249

CHECKING THE CYLINDER AND PISTON

1. Check:
   - piston wall
   - cylinder wall

   Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.



2. Measure:
   • piston-to-cylinder clearance

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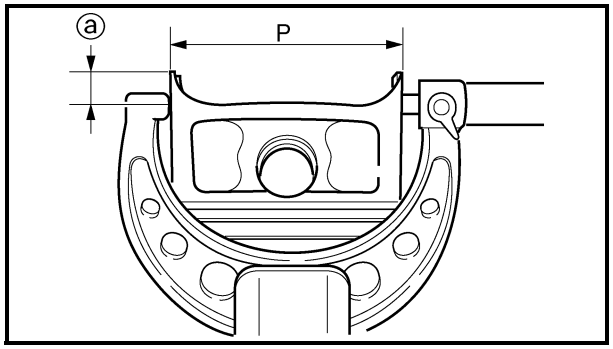
a. Measure the cylinder bore "C" with a cylinder bore gauge.

NOTE:

Measure the cylinder bore "C" in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

Cylinder bore "C"	**102.000 ~ 102.010 mm (4.0157 ~ 4.0161 in)**
Taper limit "T"	**0.05 mm (0.002 in)**
Out of round "R"	**0.05 mm (0.002 in)**
"C" = Maximum D	
"T" = (Maximum D_1 or D_2) – (Maximum D_5 or D_6)	
"R" = (Maximum D_1, D_3 or D_5) – (Minimum D_2, D_4 or D_6)	

b. If out of specification, replace the cylinder, and the piston and piston rings as a set.
c. Measure piston skirt diameter "P" with the micrometer.
ⓐ 10 mm (0.39 in) from the bottom edge of the piston



	Piston size "P"
Standard	**101.955 ~ 101.970 mm (4.0140 ~ 4.0146 in)**

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Piston-to-cylinder clearance
0.030 ~ 0.055 mm
(0.0012 ~ 0.0022 in)
<Limit>: 0.13 mm (0.051 in)

f. If out of specification, replace the cylinder, and the piston and piston rings as a set.

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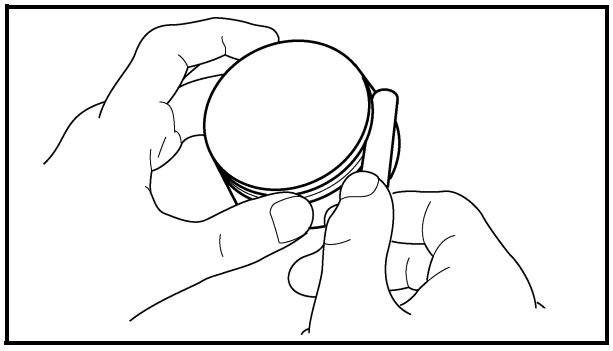


EBS00250

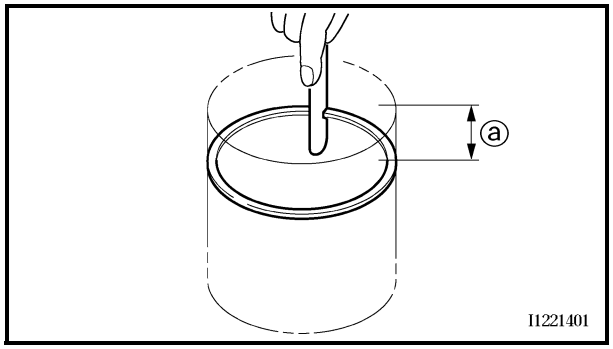
CHECKING THE PISTON RINGS

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.

Piston ring side clearance
Top ring
0.030 ~ 0.070 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.12 mm (0.0047 in)
2nd ring
0.030 ~ 0.070 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.13 mm (0.0051 in)



2. Install:
   - piston ring
     (into the cylinder)

NOTE:

Level the piston ring into the cylinder with the piston crown.

ⓐ 50 mm (1.97 in)

3. Measure:
   - piston ring end gap
     Out of specification → Replace the piston ring.

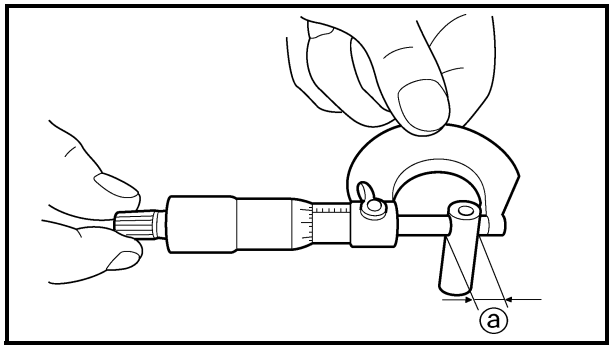
NOTE:

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
(0.008 ~ 0.014 in)
<Limit>: 0.60 mm (0.024 in)
2nd ring
0.75 ~ 0.90 mm
(0.030 ~ 0.035 in)
<Limit>: 1.25 mm (0.049 in)
Oil ring
0.20 ~ 0.70 mm
(0.008 ~ 0.028 in)

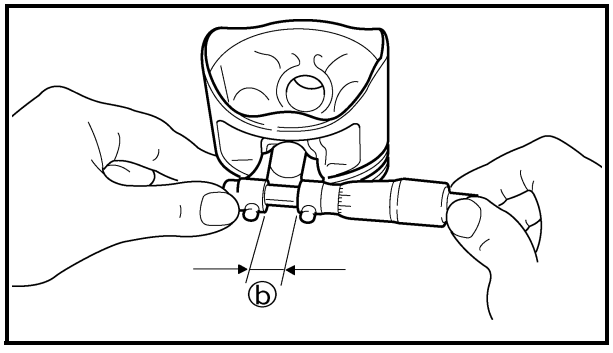
EBS00251
CHECKING THE PISTON PIN

1. Check:
   - piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.



2. Measure:
   - piston pin outside diameter ⓐ
     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)



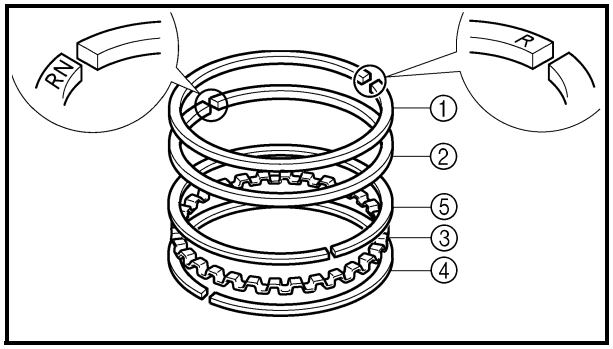
3. Measure:
   - piston pin bore inside diameter ⓑ
     Out of specification → Replace the piston.

Piston pin bore inside diameter
23.004 ~ 23.015 mm
(0.9057 ~ 0.9061 in)
<Limit>: 23.045 mm (0.9073 in)

4. Calculate:
   • piston-pin-to-piston-pin-bore clearance
   Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston-pin-bore clearance =
Piston pin bore diameter ⓑ –
Piston pin outside diameter ⓐ

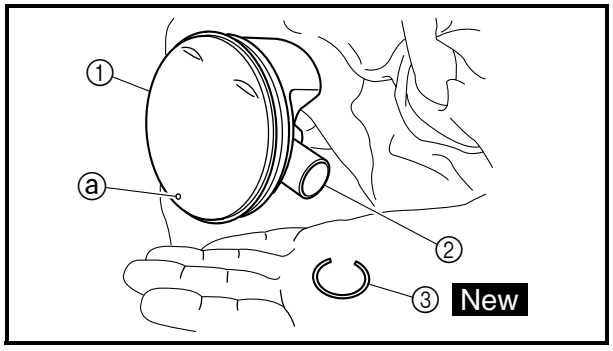
Piston-pin-to-piston clearance
0.004 ~ 0.024 mm
(0.0002 ~ 0.0009 in)
<Limit>: 0.074 mm (0.0029 in)



EBS00252
INSTALLING THE PISTON AND CYLINDER

1. Install:
   • top ring ①
   • 2nd ring ②
   • oil ring expander ③
   • lower oil ring rail ④
   • upper oil ring rail ⑤

NOTE:
Be sure to install the piston rings so that the manufacturer's marks or numbers face up.

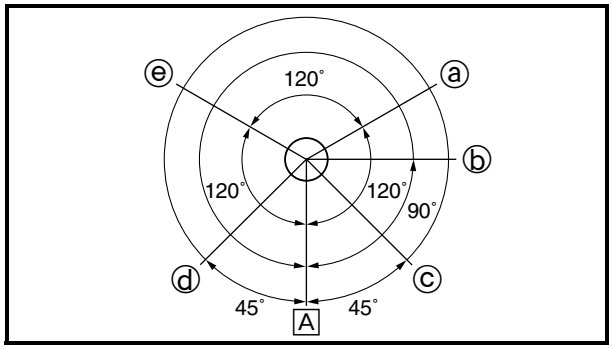


2. Install:
   - piston ①
   - piston pin ②
   - piston pin clips ③ New

NOTE:
- Apply engine oil to the piston pin.
- Make sure the punch mark ⓐ 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 clips from falling into the crankcase.

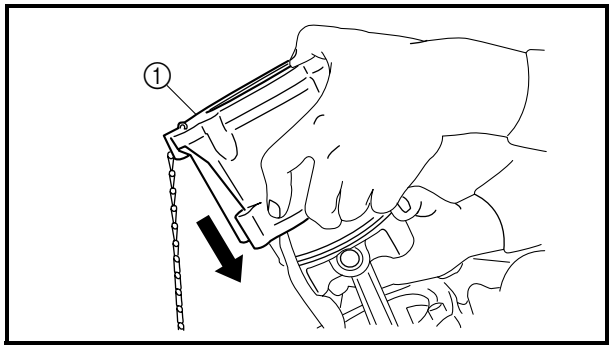
3. Install:
   - cylinder gasket New
   - dowel pins
4. Lubricate:
   - piston
   - piston rings
   - cylinder
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**



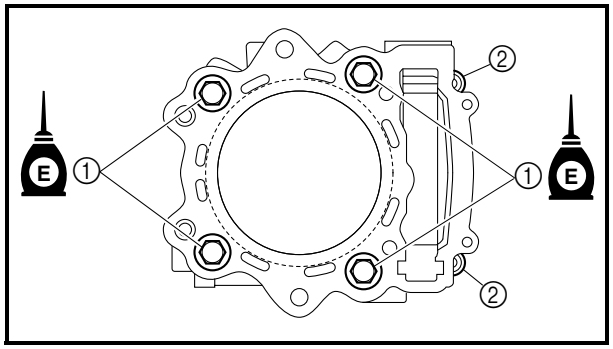
5. Offset:
   - piston ring end gaps

ⓐ Top ring
ⓑ Oil ring expander
ⓒ Upper oil ring rail
ⓓ Lower oil ring rail
ⓔ 2nd ring
A Exhaust side



6. Install:
   - cylinder ①
   - timing chain guide (exhaust side)

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.

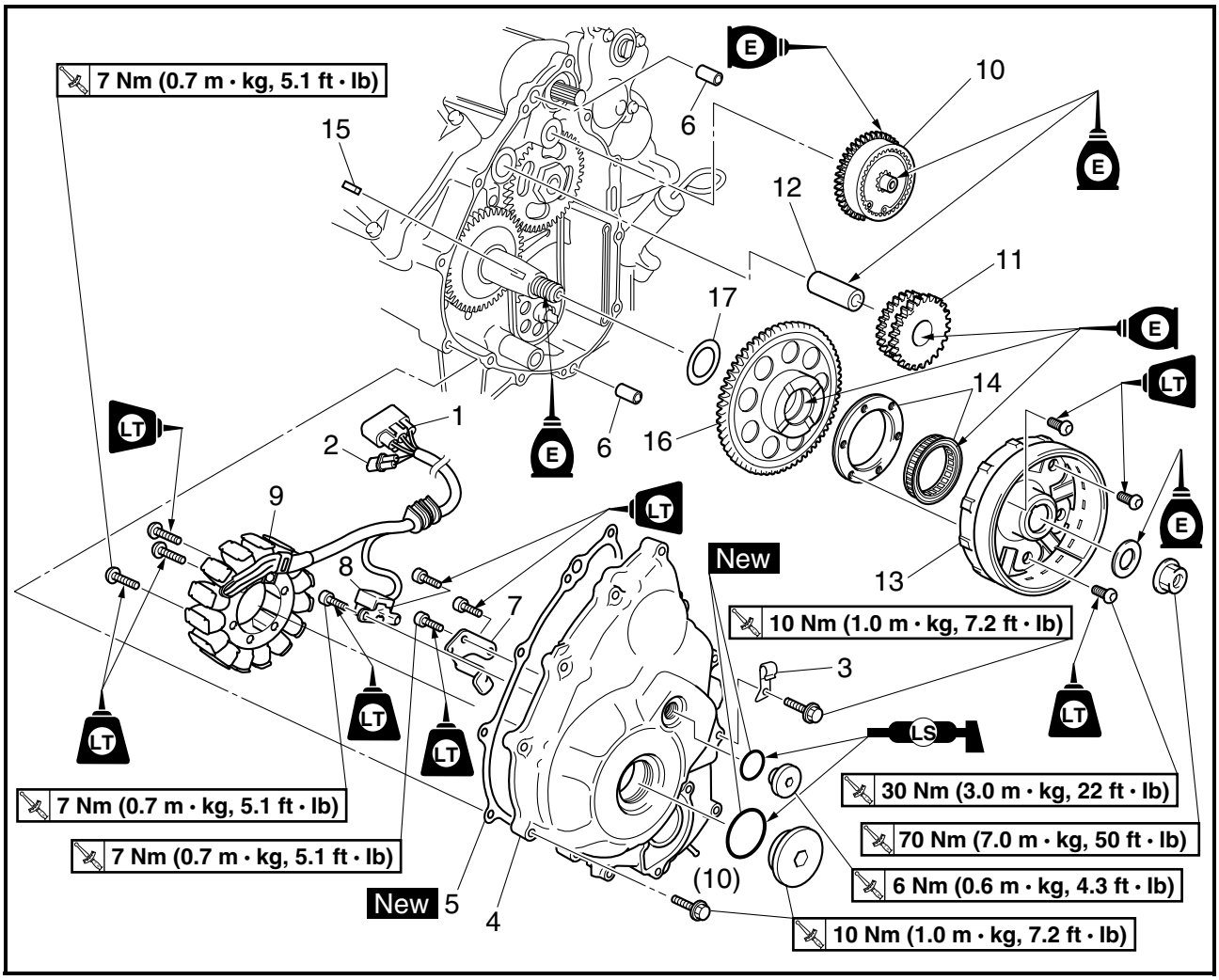


7. Install:
   • cylinder bolts

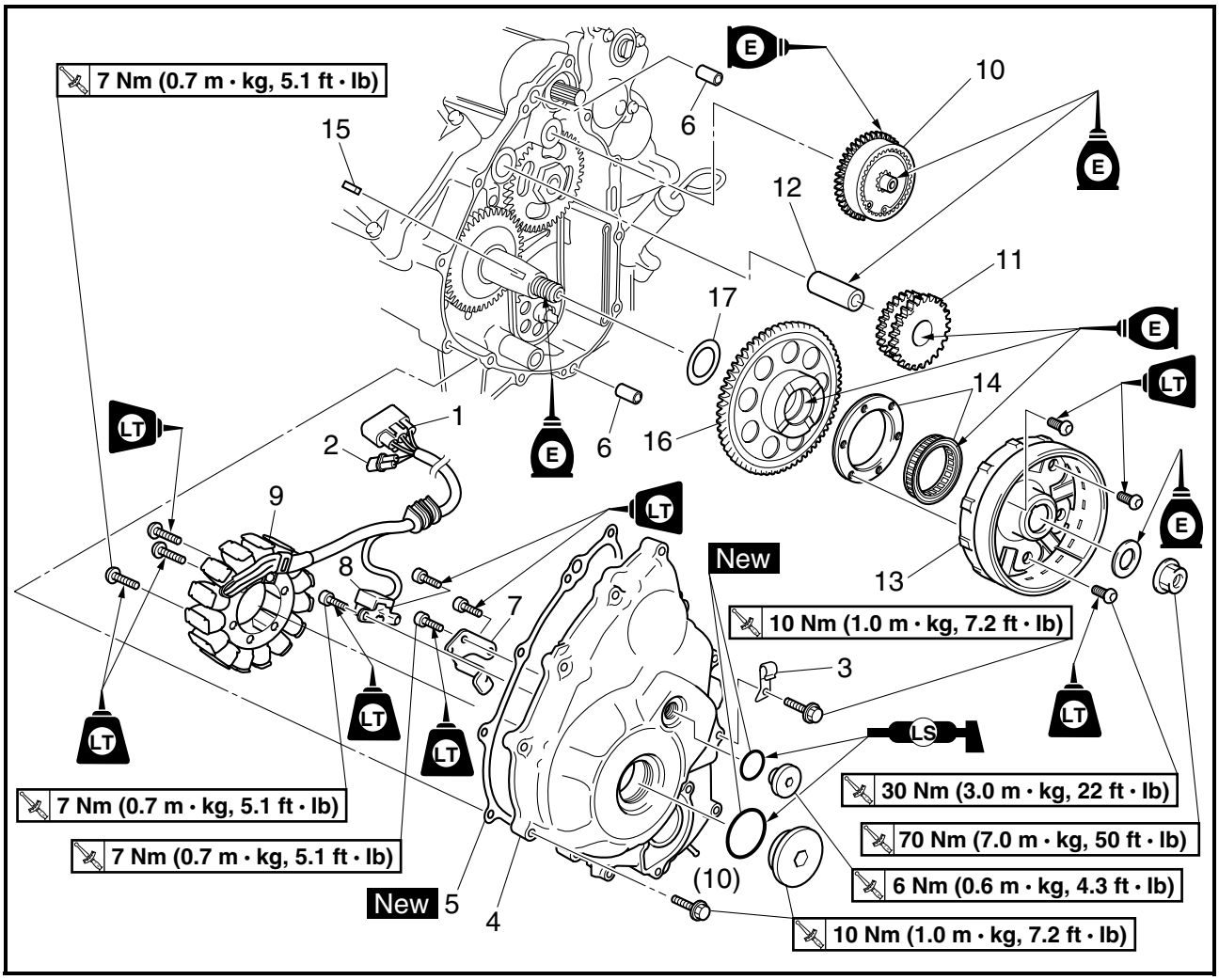
NOTE:
Lubricate the cylinder bolt ① threads and mating surface with engine oil.

8. Tighten:
   • cylinder bolts ① (1st)
     15 Nm (1.5 m · kg, 11 ft · lb)
   • cylinder bolts ① (2nd)
     50 Nm (5.0 m · kg, 36 ft · lb)
   • cylinder bolts (timing chain side) ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)

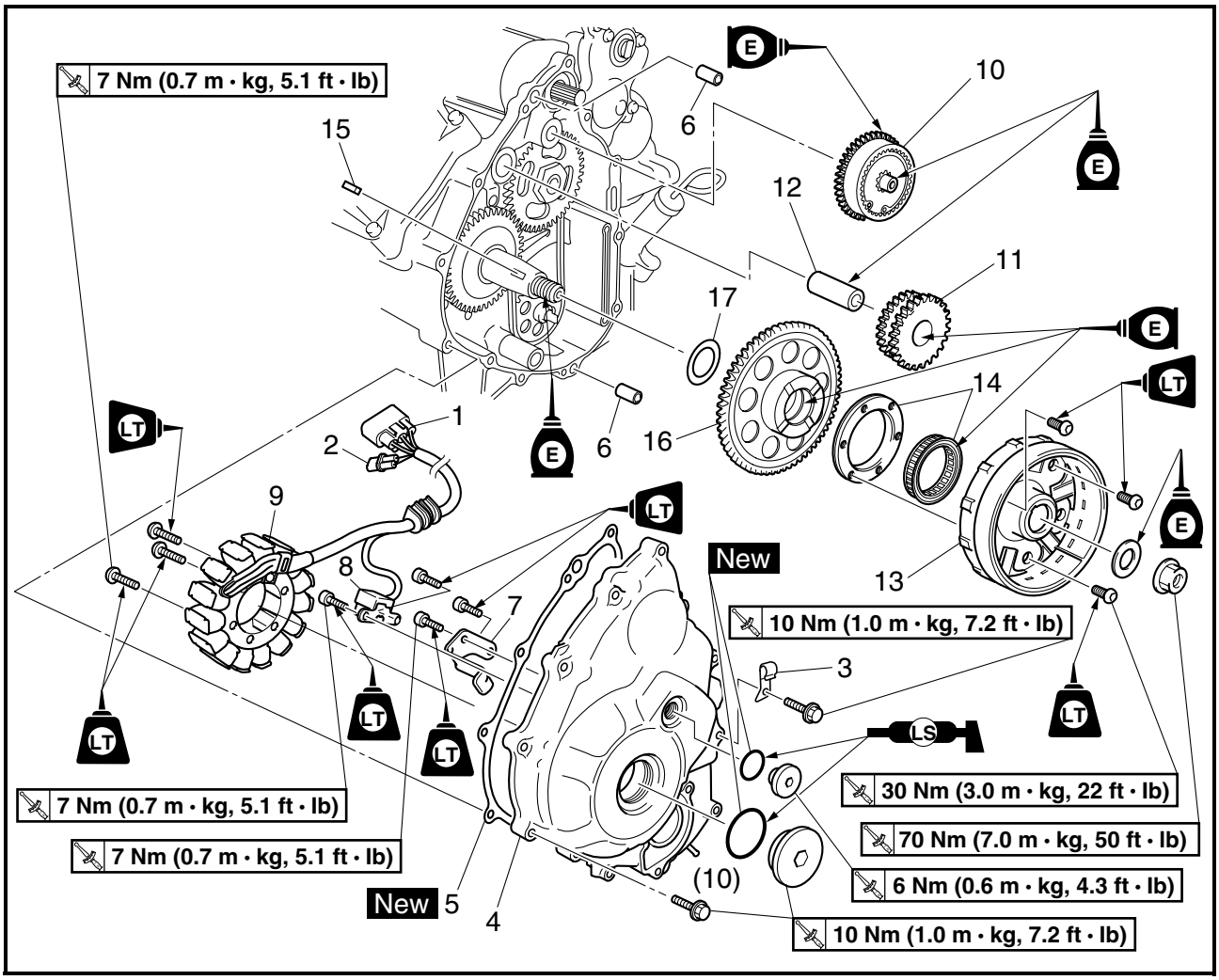
EBS00256
AC MAGNETO



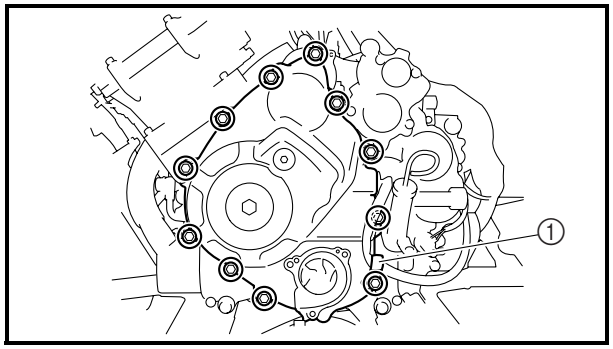
Order	Job/Part	Q'ty	Remarks
	Removing the AC magneto		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Select lever unit		Refer to "SELECT LEVER UNIT".
	Water pump		Refer to "WATER PUMP" in chapter 5.
1	AC magneto coupler	1	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Lead holder	1	Refer to "REMOVING THE AC MAGNETO ROTOR" and "INSTALLING THE AC MAGNETO ROTOR".
4	AC magneto cover	1	



Order	Job/Part	Q'ty	Remarks
5	AC magneto cover gasket	1	
6	Dowel pin	2	
7	Lead holder	1	
8	Crankshaft position sensor	1	
9	Stator coil	1	
10	Torque limiter	1	
11	Starter idle gear	1	
12	Starter idle gear shaft	1	
13	AC magneto rotor	1	Refer to "REMOVING THE AC MAGNETO ROTOR" and "INSTALLING THE AC MAGNETO ROTOR".
14	Starter clutch	1	
15	Woodruff key	1	
16	Starter wheel gear	1	



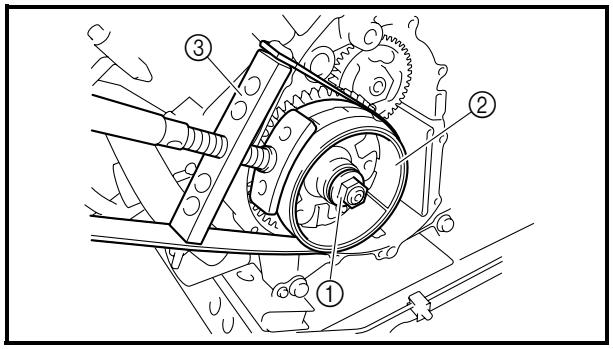
Order	Job/Part	Q'ty	Remarks
17	Washer	1	For installation, reverse the removal procedure.



EBS00259
REMOVING THE AC MAGNETO ROTOR

1. Remove:
   - lead holder ①
   - AC magneto cover

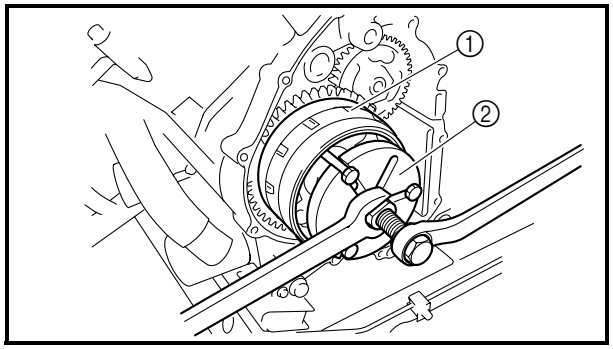
NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



2. Remove:
   - AC magneto rotor nut ①
   - washer

NOTE:
- While holding the AC magneto rotor ② with the sheave holder ③, loosen the AC magneto rotor nut.
- Do not allow the sheave holder to touch the projection on the rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

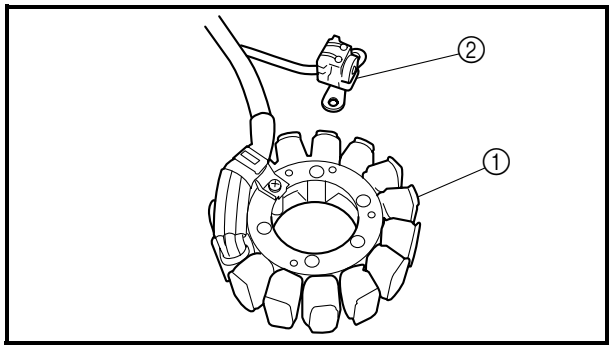


3. Remove:
   - AC magneto rotor ①
     (with the starter clutch)
   - woodruff key

CAUTION:
To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

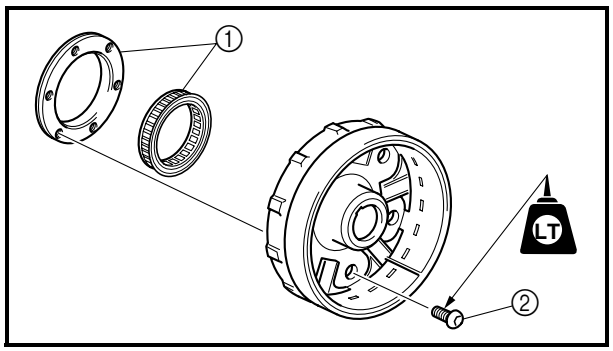
NOTE:
- Use the flywheel puller ②.
- Install the flywheel puller bolts to the threaded holes of the starter clutch.
- Make sure the flywheel puller is centered over the AC magneto rotor.

Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B



EBS00262
CHECKING THE STATOR COIL AND CRANKSHAFT POSITION SENSOR

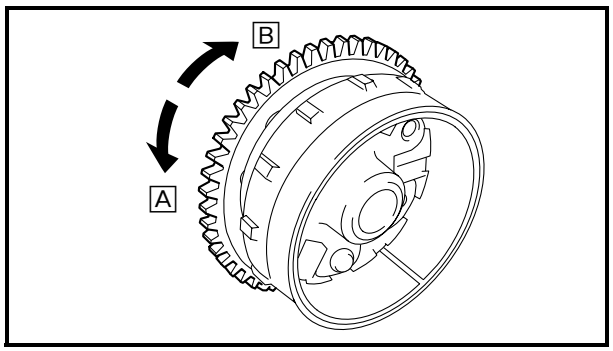
1. Check:
   - stator coil ①
   - crankshaft position sensor ②
     Damage → Replace the crankshaft position sensor/stator assembly.



EBS00263
CHECKING THE STARTER CLUTCH

1. Check:
   - starter one-way clutch ①
     Cracks/damage → Replace.
   - bolts ②
     Loose → Replace with a new one, and clinch the end of the bolt.

NOTE:
The arrow mark on the starter clutch must face inward, away from the AC magneto rotor.



Starter clutch bolt
30 Nm (3.0 m · kg, 22 ft · lb)
LOCTITE®

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a. Install the starter wheel gear to the starter clutch, and hold the starter clutch.
b. When turning the starter wheel gear counter clockwise [A], the starter clutch and the wheel gear should be engaged.
   If not, the starter clutch is faulty. Replace it.
c. When turning the starter wheel gear clockwise [B], the starter wheel gear should turn freely.
   If not, the starter clutch is faulty. Replace it.

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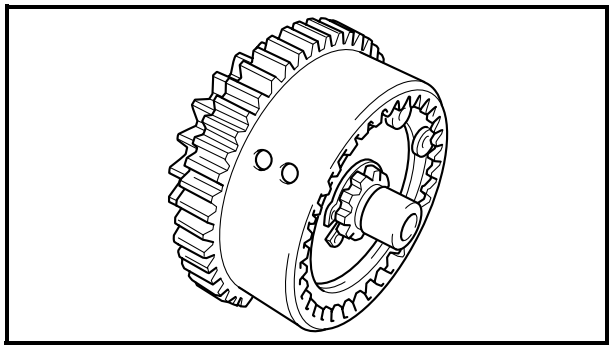
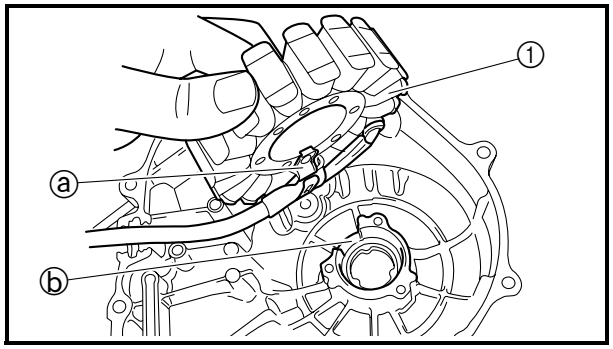
2. Check:
   - starter idle gear teeth
   - starter wheel gear teeth
   Burrs/clips/roughness/wear → Replace.
3. Check:
   - starter wheel gear
   (contacting surface)
   Damage/pitting/wear → Replace.



CHECKING THE TORQUE LIMITER
- torque limiter
  Damage/wear → Replace.

NOTE:
Do not disassemble the torque limiter.

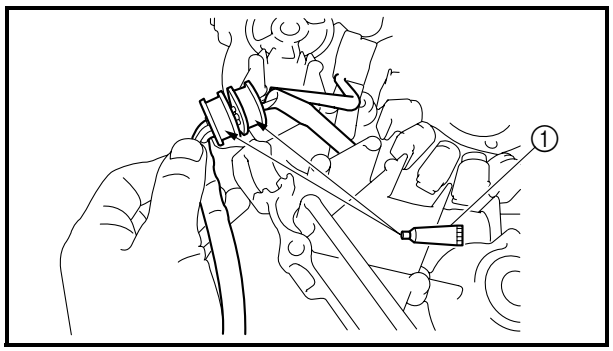


EBS00268
INSTALLING THE AC MAGNETO ROTOR
1. Install:
   - stator coil ①

LT | 7 Nm (0.7 m · kg, 5.1 ft · lb)

	Stator coil bolt **7 Nm (0.7 m · kg, 5.1 ft · lb)**

NOTE:
Align the projection ⓐ on the stator coil with the slot ⓑ in the AC magneto cover.

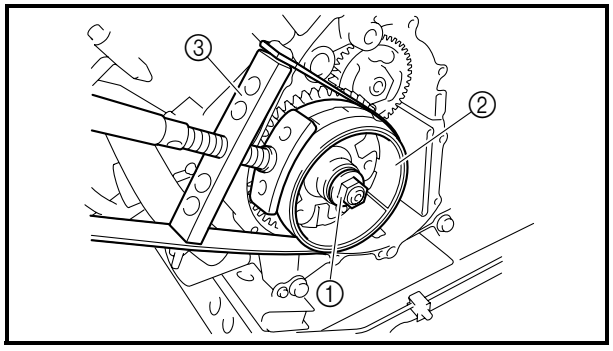


2. Apply:
   - Sealant ①
   (into the slit)

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

3. Install:
   - woodruff key
   - AC magneto rotor

NOTE:
- Before installing the rotor, clean the outside of the crankshaft and the inside of the rotor.
- After installing the rotor, check that the rotor rotates smoothly. If not, reinstall the key and rotor.

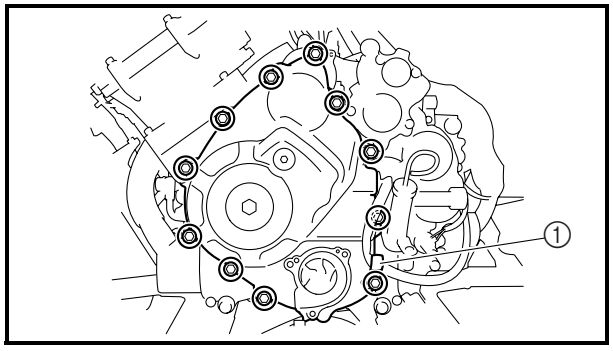


4. Tighten:
   - AC magneto rotor nut ①

70 Nm (7.0 m · kg, 50 ft · lb)

NOTE:
While holding the AC magneto rotor ② with the sheave holder ③, tighten the AC magneto rotor nut.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

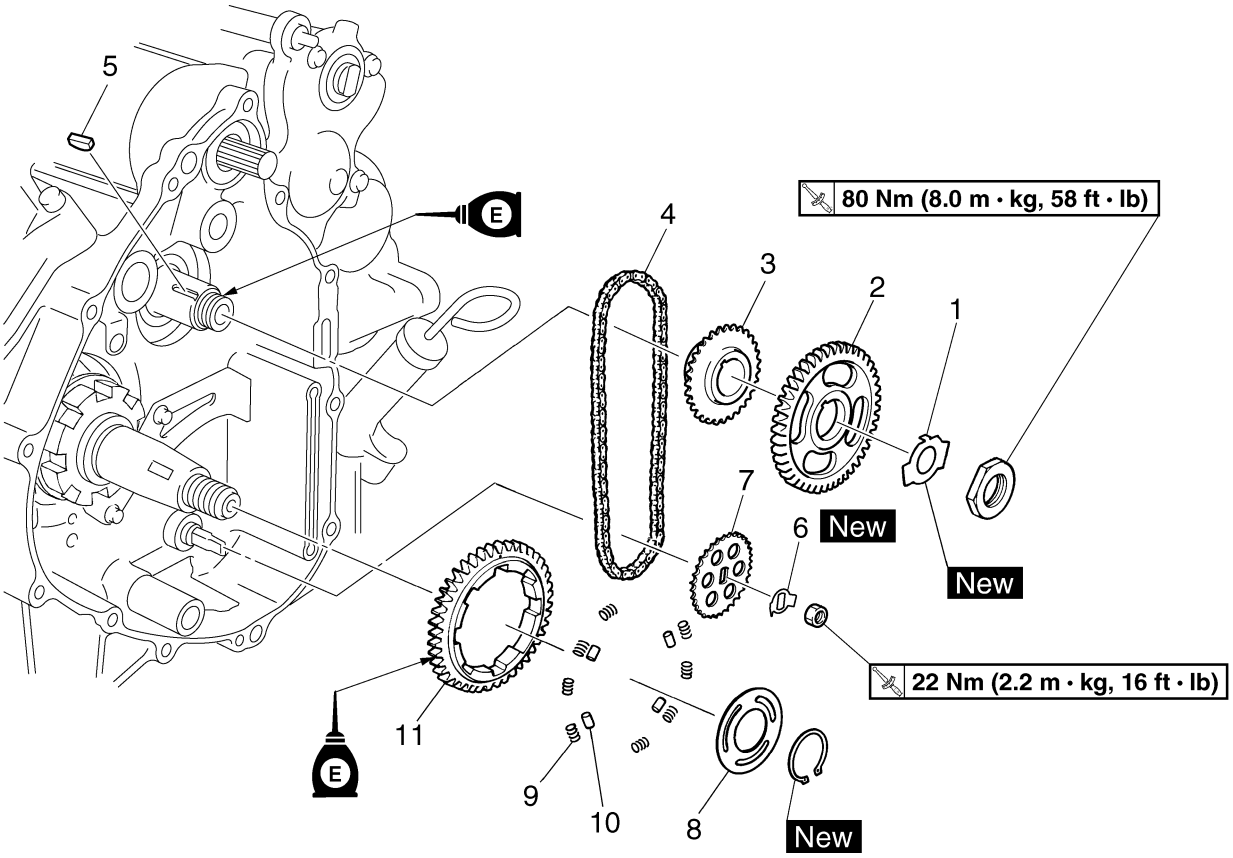


5. Install:
   - AC magneto cover
   - lead holder ①
   - AC magneto cover bolts

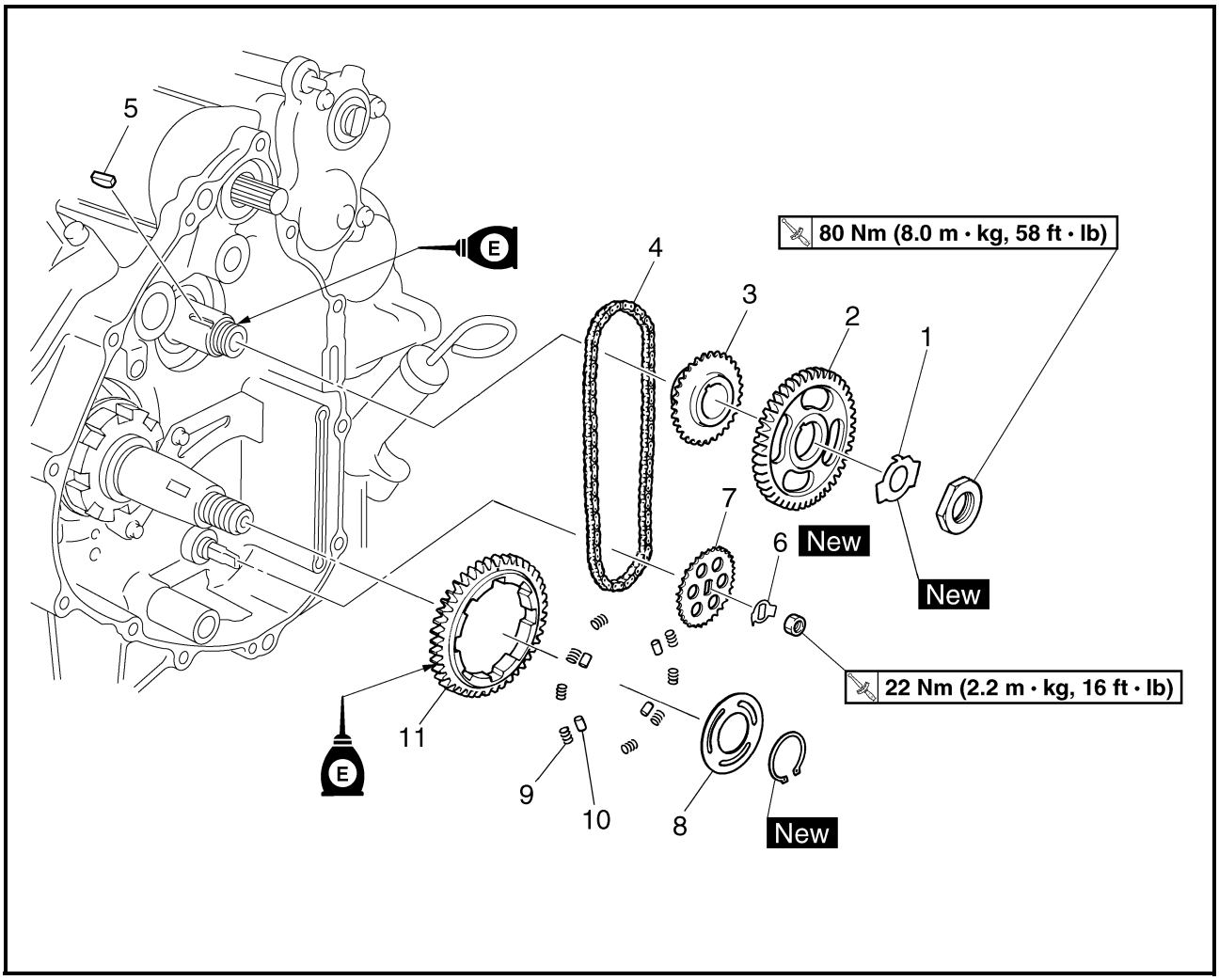
10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the AC magneto cover bolts in stages, using a crisscross pattern.

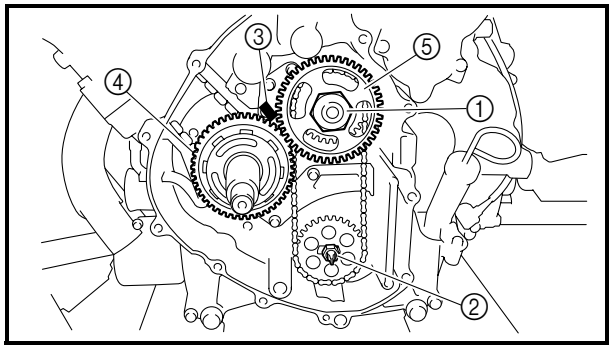
BALANCER GEARS AND OIL PUMP GEARS



Order	Job/Part	Q'ty	Remarks
	Removing the balancer gears and oil pump gears		Remove the parts in the order listed.
	Starter wheel gear		Refer to "AC MAGNETO".
1	Lock washer	1	Refer to "REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR" and "INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR".
2	Balancer driven gear	1	
3	Oil pump drive gear	1	
4	Chain	1	
5	Straight key	1	



Order	Job/Part	Q'ty	Remarks
6	Lock washer	1	Refer to "REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR" and "INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR".
7	Oil pump driven gear	1	
8	Plate	1	
9	Spring	8	Refer to "REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR" and "INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR".
10	Pin	4	
11	Balancer drive gear	1	
			For installation, reverse the removal procedure.



REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR

1. Straighten the lock washer tabs.
2. Loosen:
   - balancer driven gear nut ①
   - oil pump driven gear nut ②

NOTE:

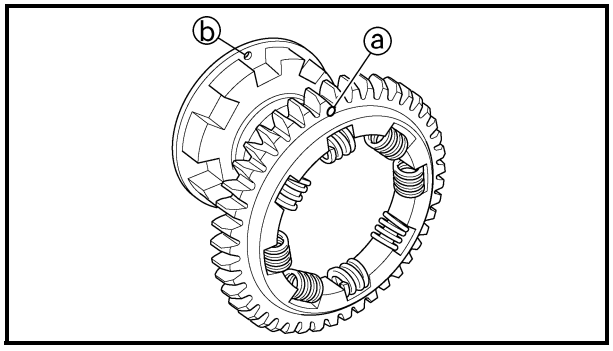
Place an aluminum plate ③ between the teeth of the balancer drive gear ④ and balancer driven gear ⑤, then loosen the nuts.

CHECKING THE OIL PUMP DRIVE

1. Check:
   - oil pump drive gear
   - oil pump driven gear
     Cracks/wear/damage → Replace.

CHECKING THE BALANCER DRIVE

1. Check:
   - balancer drive gear
   - balancer driven gear
     Damage/wear → Replace the balancer drive gear and balancer driven gear as a set.
     Excessive noise during operation → Replace the balancer drive gear and balancer driven gear as a set.

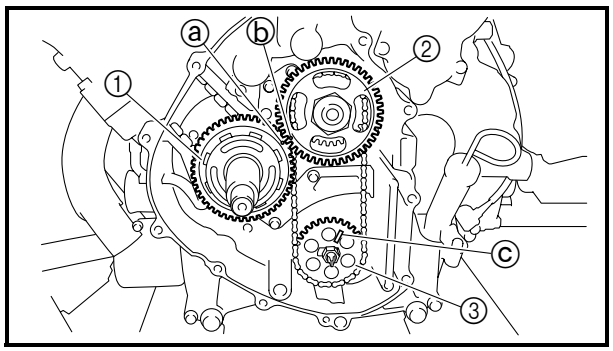


INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR

1. Install:
   - pin
   - spring
   - balancer drive gear (onto the buffer boss)

NOTE:

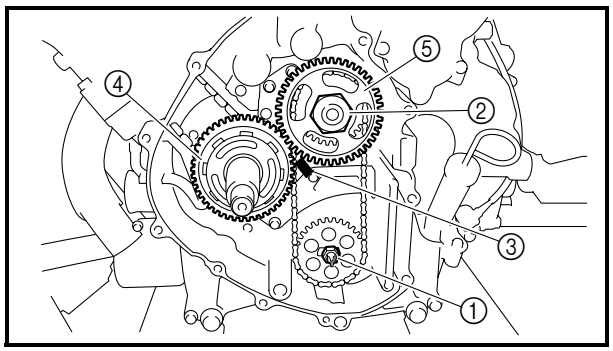
Align the punch mark ⓐ on the balancer drive gear with the hole ⓑ to the buffer boss.



2. Install:
   - balancer drive gear ①
   - balancer driven gear ②
   - oil pump driven gear ③

NOTE:

- Align the punch mark ⓐ on the balancer drive gear with the punch mark ⓑ on the balancer driven gear.
- Install the oil pump driven gear with the "3B4" mark ⓒ facing out.



3. Install:
   - lock washers New
   - oil pump driven gear nut ①

     22 Nm (2.2 m · kg, 16 ft · lb)
   - balancer driven gear nut ②

     80 Nm (8.0 m · kg, 58 ft · lb)

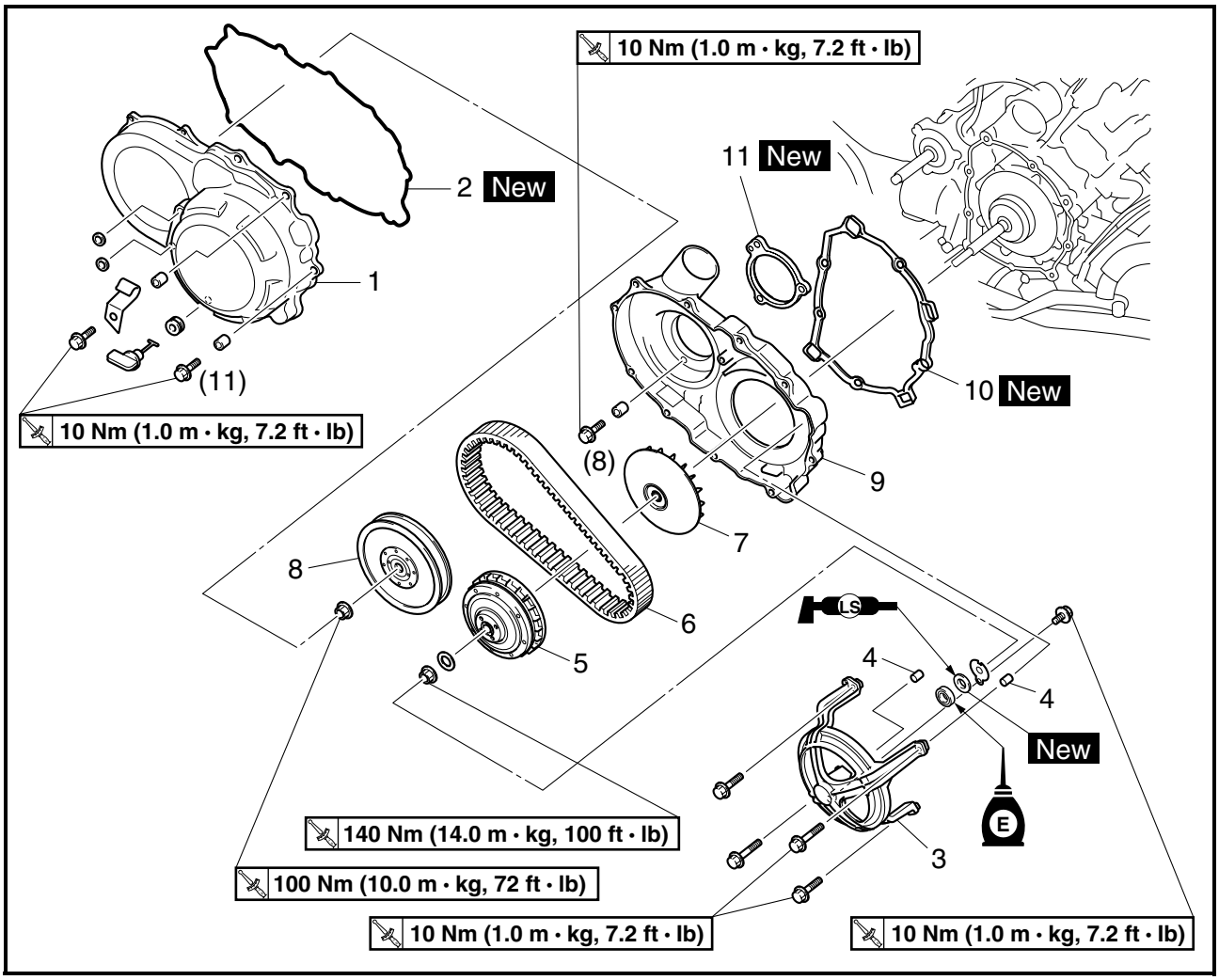
NOTE:

- Place an aluminum plate ③ between the teeth of the balancer drive gear ④ and balancer driven gear ⑤, then tighten the nuts.
- Apply the engine oil to the thread of axles and nuts.

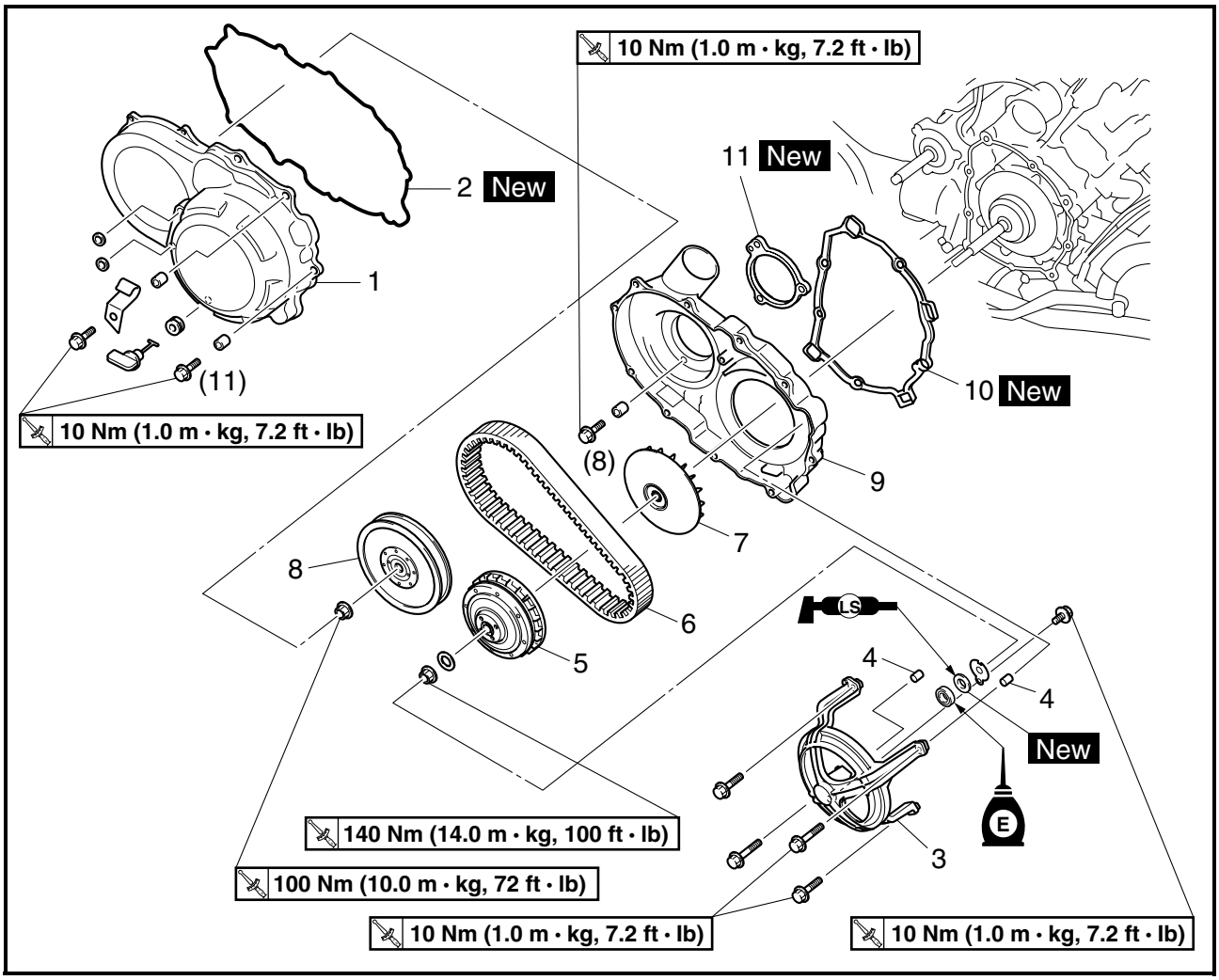
4. Bend the lock washer tabs along the balancer driven gear nut and oil pump driven gear nut.

EBS00269

PRIMARY AND SECONDARY SHEAVES



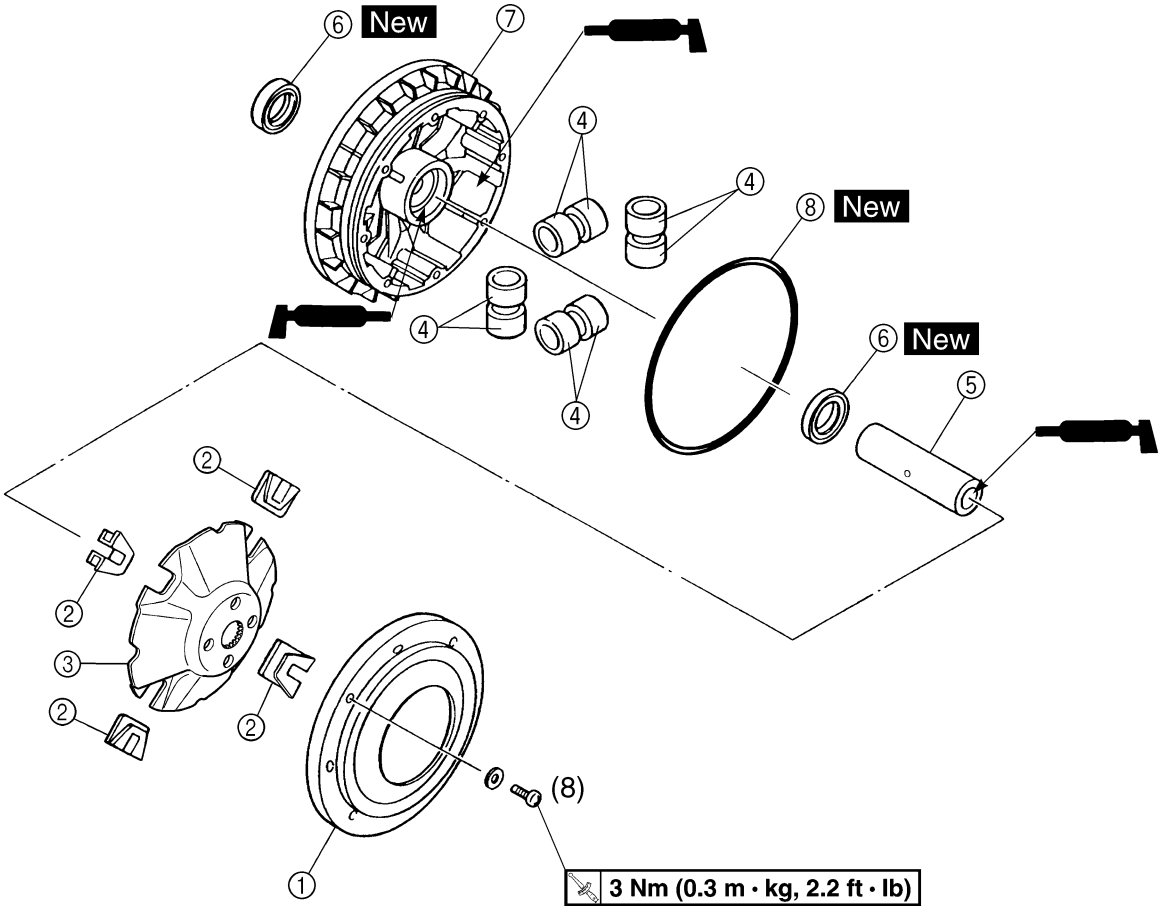
Order	Job/Part	Q'ty	Remarks
	Removing the primary and secondary sheaves		Remove the parts in the order listed.
	Front fender/rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Right footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air ducts		Refer to "ENGINE REMOVAL".
1	Drive belt cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	
5	Primary sheave assembly	1	Refer to "REMOVING THE PRIMARY AND SECONDARY SHEAVES" and "INSTALLING THE PRIMARY AND SECONDARY SHEAVES".
6	V-belt	1	
7	Primary fixed sheave	1	
8	Secondary sheave assembly	1	



Order	Job/Part	Q'ty	Remarks
9	Drive belt case	1	
10	Rubber gasket	1	
11	Rubber gasket	1	
			For installation, reverse the removal procedure.

EBS00270

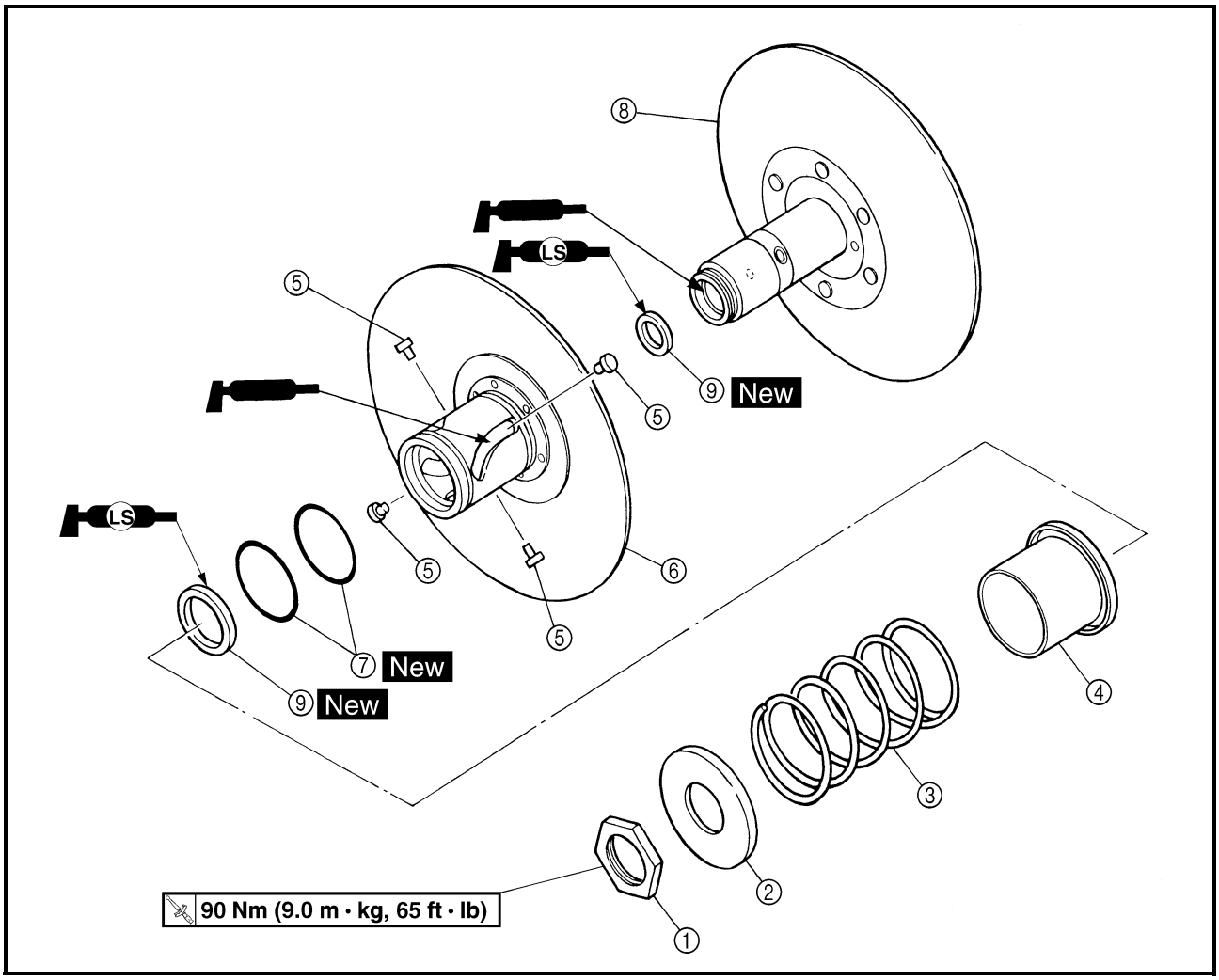
PRIMARY SHEAVE



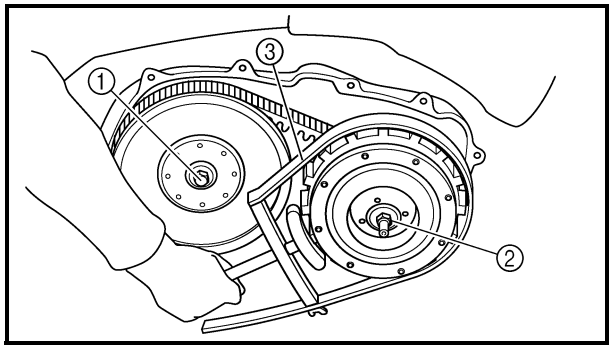
Order	Job/Part	Q'ty	Remarks
	Disassembling the primary sheave		Remove the parts in the order listed.
①	Primary pulley sheave cap	1	
②	Primary pulley slider	4	
③	Primary pulley cam	1	
④	Primary pulley weight	8	Refer to "ASSEMBLING THE PRIMARY SHEAVE".
⑤	Collar	1	
⑥	Oil seal	2	
⑦	Primary sliding sheave	1	
⑧	O-ring	1	
			For assembly, reverse the disassembly procedure.

EBS00271

SECONDARY SHEAVE



Order	Job/Part	Q'ty	Remarks
	Disassembling the secondary sheave		Remove the parts in the order listed.
①	Nut	1	Refer to "DISASSEMBLING THE SECONDARY SHEAVE" and "ASSEMBLING THE SECONDARY SHEAVE".
②	Spring seat	1	
③	Compression spring	1	
④	Spring seat	1	
⑤	Guide pin	4	
⑥	Secondary sliding sheave	1	
⑦	O-ring	2	
⑧	Secondary fixed sheave	1	
⑨	Oil seal	2	
			For assembly, reverse the disassembly procedure.



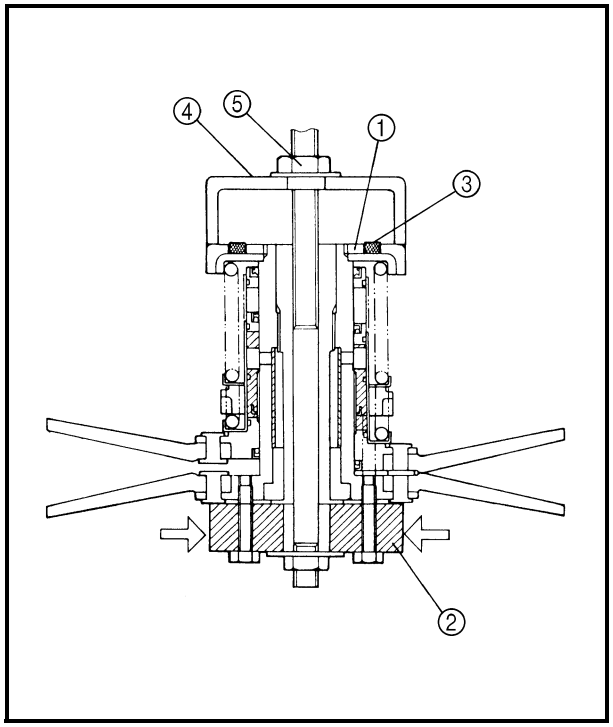
EBS00272
REMOVING THE PRIMARY AND SECONDARY SHEAVES

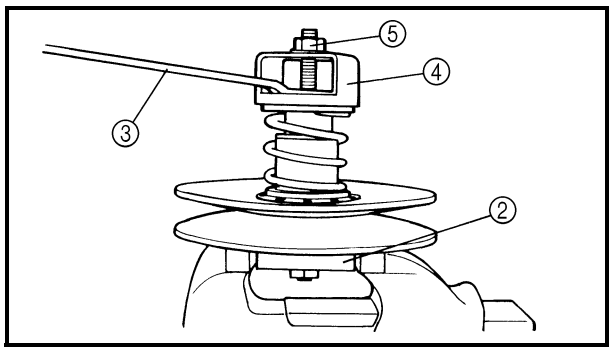
1. Loosen:
   - secondary sheave nut ①
   - primary sheave nut ②

NOTE:

- Use the sheave holder ③ to hold the primary sheave.
- First, loosen the secondary sheave nut ②, then loosen the primary sheave nut ①.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A





EBS00273
DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   - nut ①

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a. Attach the sheave fixed block ②, locknut wrench ③ and sheave spring compressor ④ to the secondary sheave assembly.

Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135
Locknut wrench
90890-01348, YM-01348
Sheave spring compressor
90890-04134, YM-04134

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut ⑤ and compress the spring.
d. Loosen the nut ① with the locknut wrench ③.
e. Remove the nut ①.
f. Remove the sheave spring compressor and locknut wrench.

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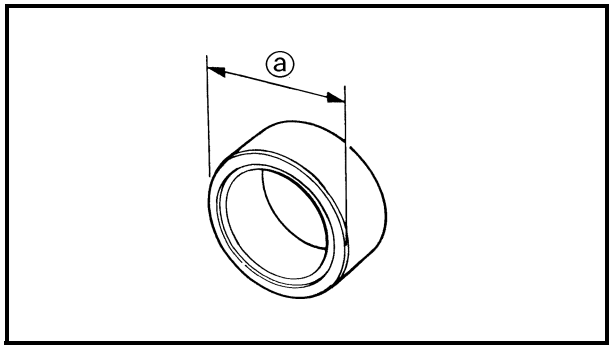
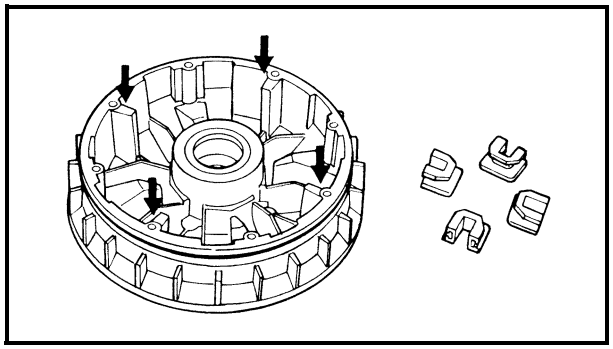


EBS00274
CHECKING THE PRIMARY SHEAVE

1. Check:
   - weight outside diameter ⓐ
     Out of specification → Replace the weight.

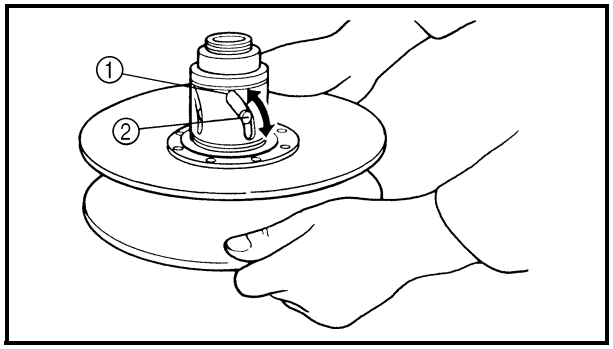
Weight outside diameter
30 mm (1.18 in)
<Limit>: 29.5 mm (1.16 in)



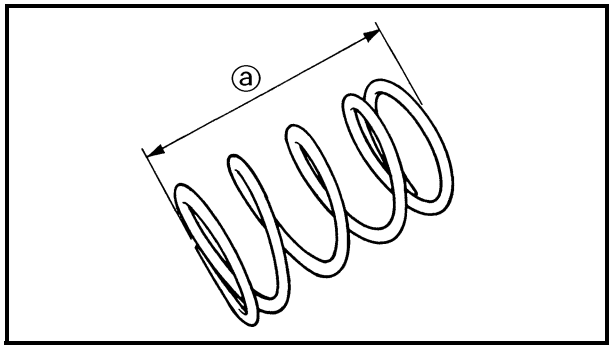
2. Check:
   - primary pulley slider
   - primary sliding sheave splines
     Wear/cracks/damage → Replace.
   - primary pulley cam
     Cracks/damage → Replace.
3. Check:
   - primary sliding sheave
   - primary fixed sheave
     Cracks/damage → Replace.

EBS00275
CHECKING THE SECONDARY SHEAVE

1. Check:
   - secondary fixed sheave smooth operation
   - secondary sliding sheave smooth operation
     Scratches/damage → Replace as a set.

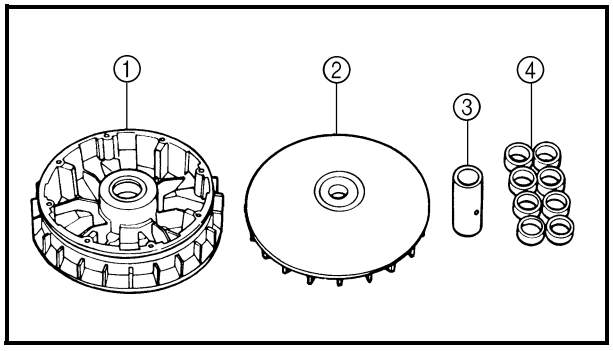


2. Check:
   - torque cam grooves ①
     Wear/damage → Replace.
3. Check:
   - guide pins ②
     Wear/damage → Replace.
4. Check:
   - secondary sheave spring
     Damage → Replace.



5. Measure:
   • secondary sheave spring free length ⓐ
   Out of specification → Replace the secondary sheave spring.

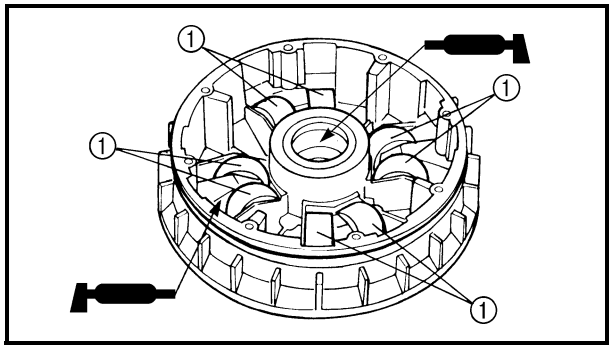
Free length
130.6 mm (5.14 in)
<Limit>: 128.0 mm (5.04 in)



EBS00276
ASSEMBLING THE PRIMARY SHEAVE

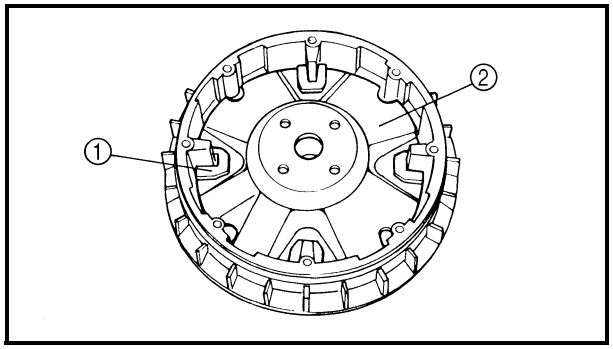
1. Clean:
   • primary sliding sheave face ①
   • primary fixed sheave face ②
   • collar ③
   • weights ④
   • primary sliding sheave cam face

NOTE:
Remove any excess grease.



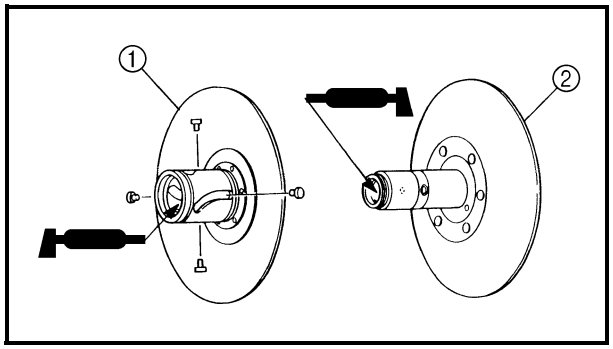
2. Install:
   • weights ①

NOTE:
- Apply Yamaha Grizzly grease (90 g) to the whole outer surface of the weights and install.
- Apply Yamaha Grizzly grease (2.5 g) to the inner surface of the collar.
- Apply Yamaha Grizzly grease (2.5 g) to the inner surface of the primary sliding sheave.



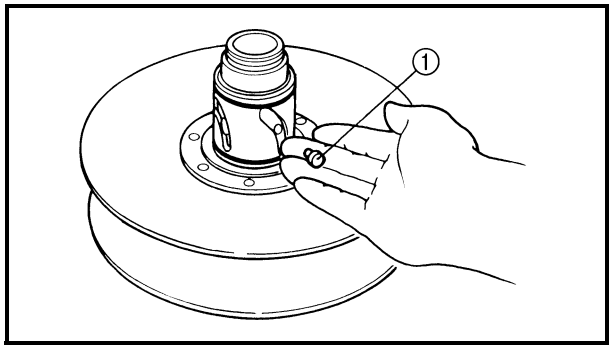
3. Install:
   - slider ①
   - cam ②
   - primary sliding sheave cap

	3 Nm (0.3 m · kg, 2.2 ft · lb)

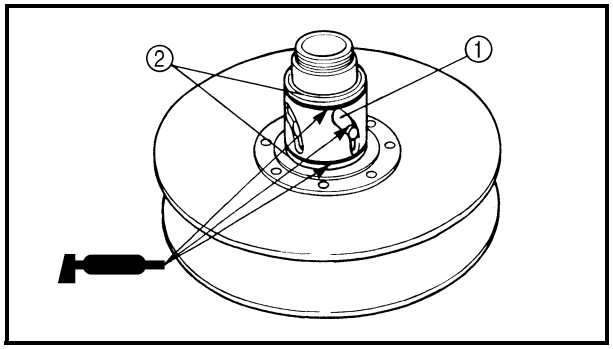


EBS00277
ASSEMBLING THE SECONDARY SHEAVE

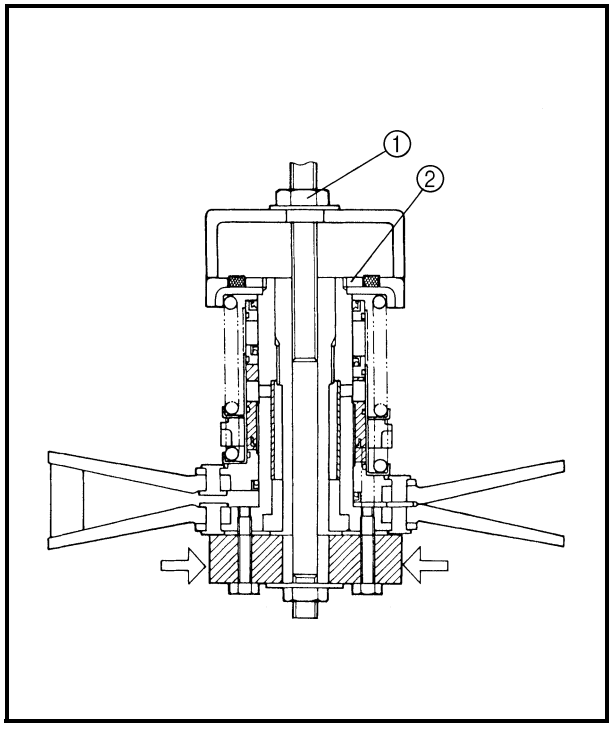
1. Apply:
   - BEL-RAY assembly lube®
     (to the secondary sliding sheave ① inner surface and oil seals)
   - BEL-RAY assembly lube®
     (to the bearings, oil seals and inner surface of the secondary fixed sheave ②)



2. Install:
   - guide pins ①



3. Apply:
   - BEL-RAY assembly lube®
     (to the guide pin sliding grooves ①, and oil seals ② New)



4. Install:
   - spring seat
   - compression spring
   - spring seat
   - nut

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a. Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave.

Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135
Locknut wrench
90890-01348, YM-01348
Sheave spring compressor
90890-04134, YM-04134

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut ① and compress the spring.
d. Install the nut ② and tighten it to the specified torque using the locknut wrench.

Nut
90 Nm (9.0 m · kg, 65 ft · lb)

e. Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

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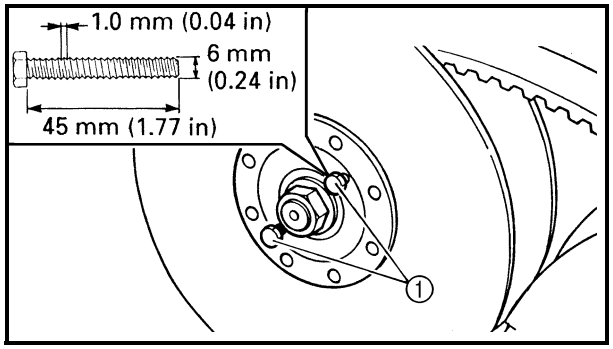
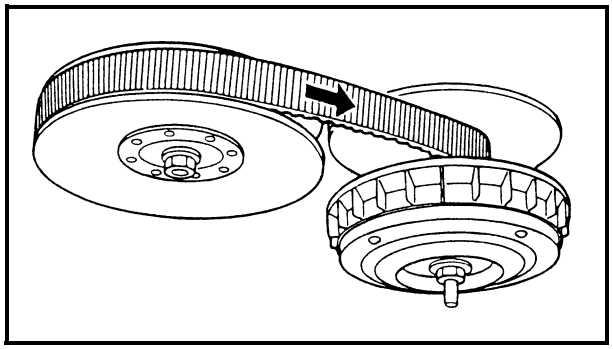
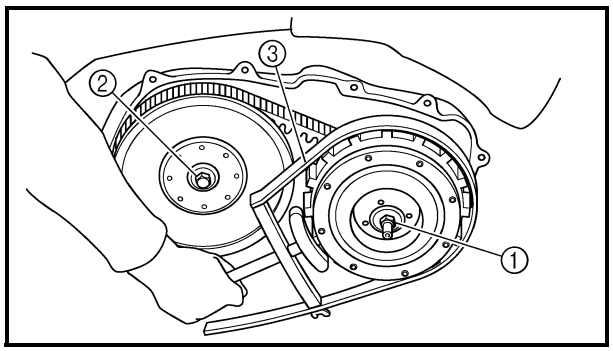






EBS00279

INSTALLING THE PRIMARY AND SECONDARY SHEAVES

1. Install:
   - secondary sheave
   - V-belt
   - primary sheave

NOTE:

- Tightening the bolts ① will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.
- Install the V-belt so that its arrow faces the direction shown in the illustration.

2. Tighten:
   - primary sheave nut ①

     140 Nm (14.0 m · kg, 100 ft · lb)
   - secondary sheave nut ②

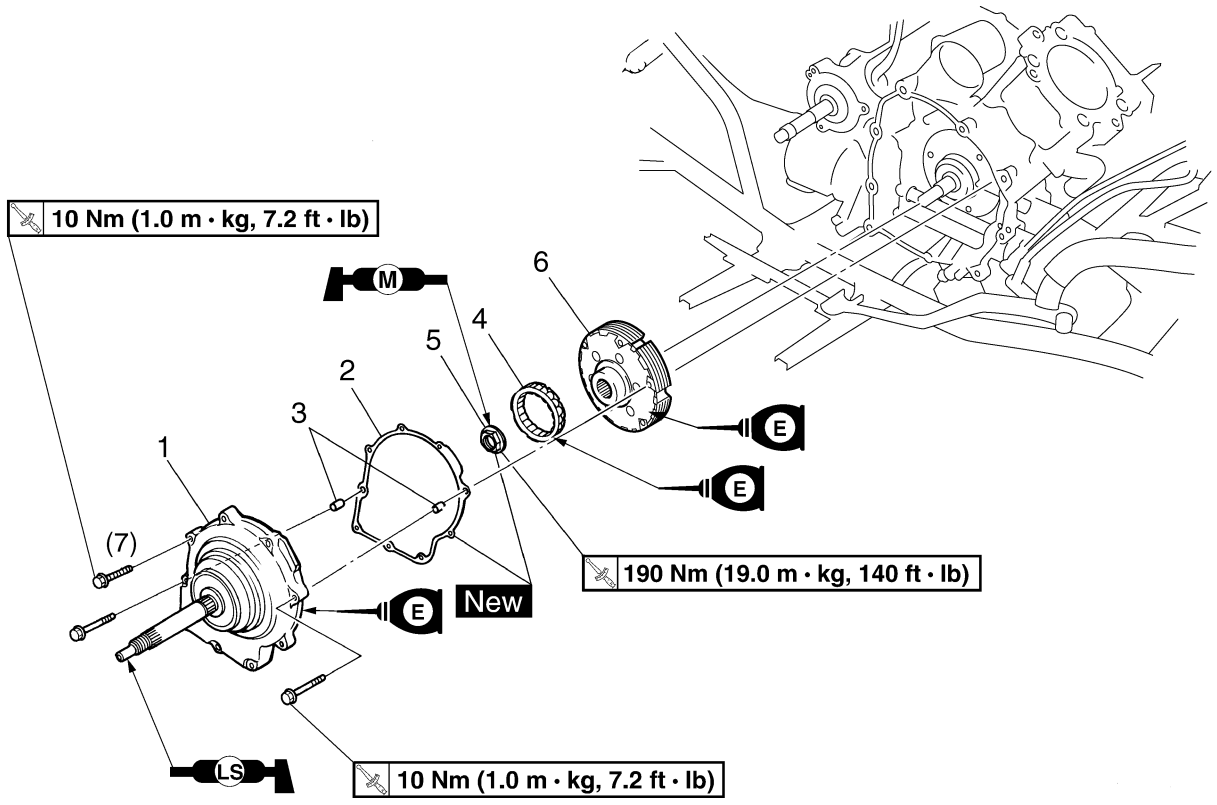
     100 Nm (10.0 m · kg, 72 ft · lb)

NOTE:

- Use the sheave holder ③ to hold the primary sheave.
- First, tighten the primary sheave nut ①, then tighten the secondary sheave nut ②.

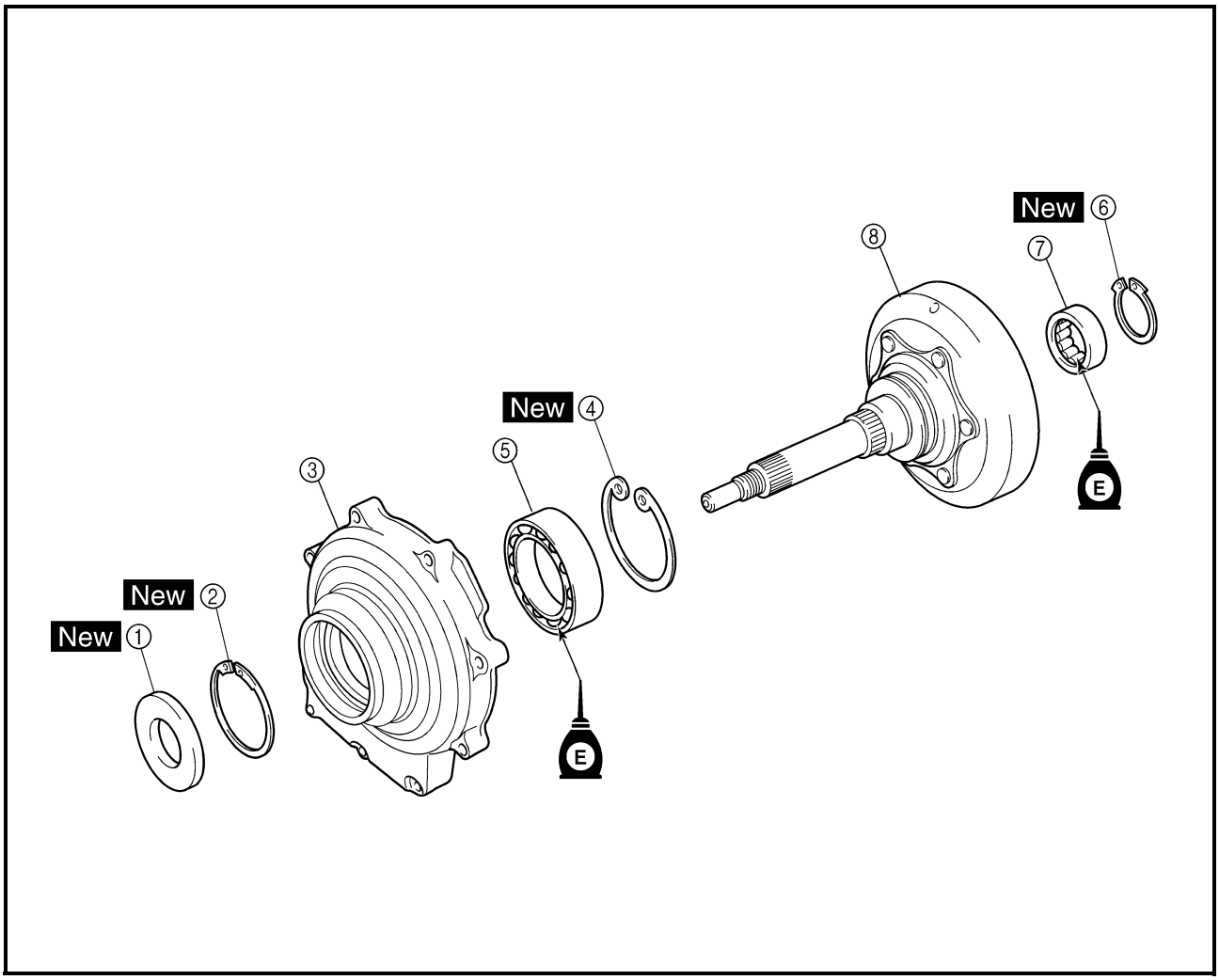
Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

EBS00291
CLUTCH

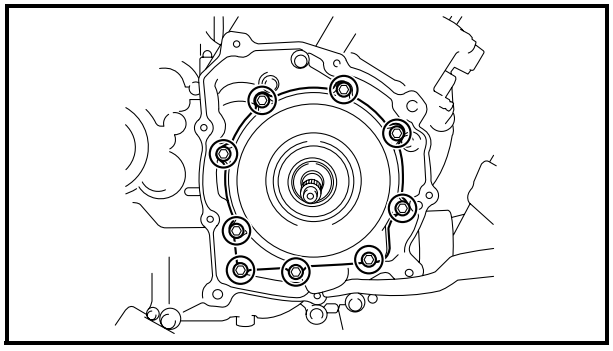


Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
	Primary sheave/secondary sheave		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Clutch housing assembly	1	Refer to "REMOVING THE CLUTCH" and "INSTALLING THE CLUTCH".
2	Gasket	1	
3	Dowel pin	2	
4	One-way clutch bearing	1	
5	Nut	1	
6	Clutch carrier assembly	1	
			For installation, reverse the removal procedure.

EBS00292



Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch housing assembly		Remove the parts in the order listed.
①	Oil seal	1	
②	Circlip	1	
③	Bearing housing	1	
④	Circlip	1	
⑤	Bearing	1	
⑥	Circlip	1	
⑦	Bearing	1	
⑧	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

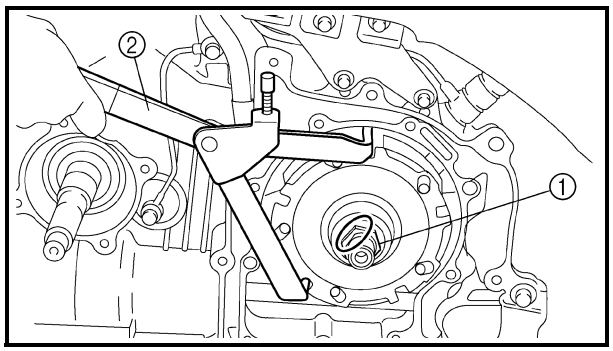


EBS00296
REMOVING THE CLUTCH

1. Remove:
   - clutch housing assembly
   - gasket
   - dowel pins

NOTE:

Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.



2. Straighten:
   - punched portion of the nut ①
3. Remove:
   - nut ①

CAUTION:

The clutch carrier assembly nut has left-handed threads. To loosen the clutch carrier assembly nut turn it clockwise.

NOTE:

Use a clutch holding tool ② to hold the clutch carrier assembly.

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

EBS00299
CHECKING THE CLUTCH

1. Check:
   - clutch housing
     Heat damage/wear/damage → Replace.
   - one-way clutch bearing
     Chafing/wear/damage → Replace.

NOTE:
- Replace the one-way clutch assembly and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing in.

2. Check:
   - one-way clutch operation

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a. Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
b. When turning the clutch housing clockwise [A], the clutch housing should turn freely.
   If not, the one-way clutch assembly is faulty.
   Replace it.
c. When turning the clutch housing counterclockwise [B], the clutch housing and crankshaft should be engaged.
   If not, the one-way clutch assembly is faulty.
   Replace it.

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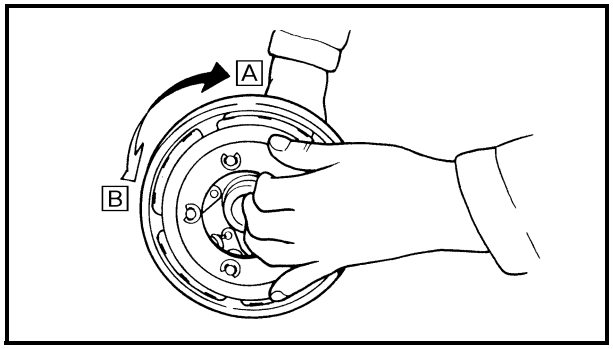
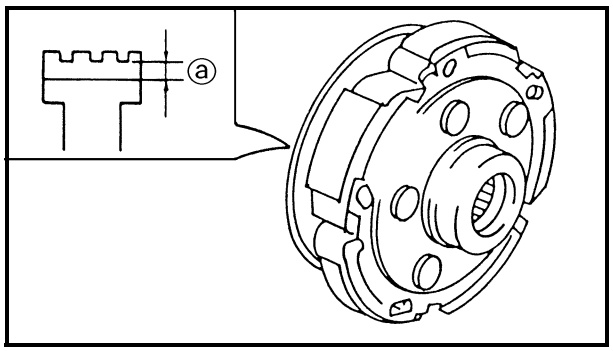
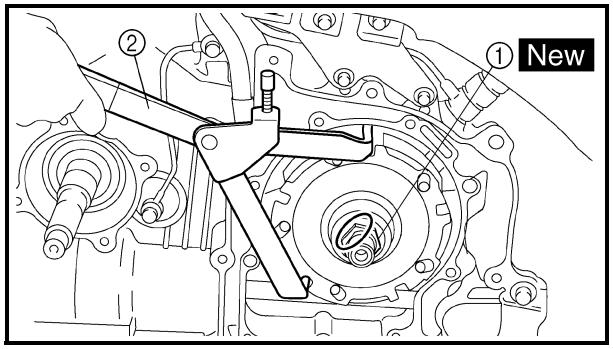


3. Check:
   - clutch shoe
     Heat damage → Replace.



4. Measure:
   - clutch shoe thickness
     Out of specification → Replace.

Clutch shoe thickness
1.5 mm (0.06 in)
Clutch shoe wear limit ⓐ
1.0 mm (0.04 in)



EBS00309
INSTALLING THE CLUTCH

1. Install:
   - clutch carrier assembly
   - nut ① New

190 Nm (19.0 m · kg, 140 ft · lb)

CAUTION:

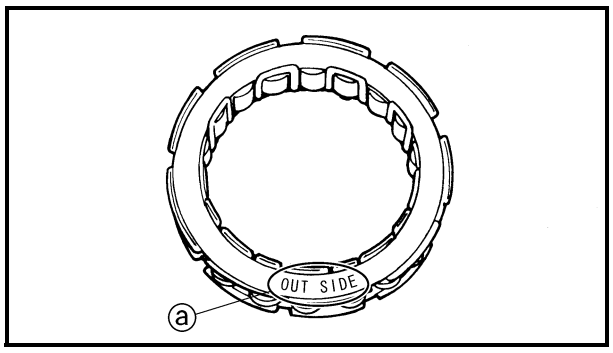
The clutch carrier assembly nut has left-handed threads. To tighten the clutch carrier assembly nut turn it counterclockwise.

NOTE:

Use a clutch holding tool ② to hold the clutch carrier assembly.

Universal clutch holder
90890-04086, YM-91042

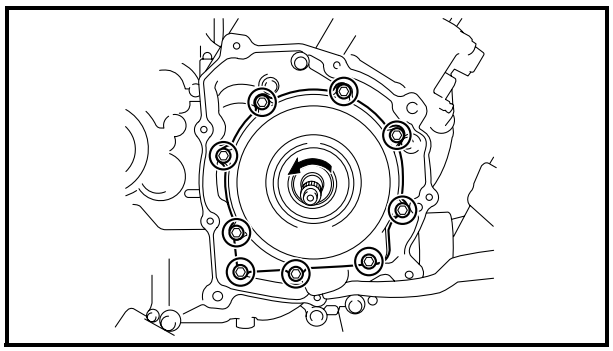
2. Lock the threads with a drift punch.



3. Install:
   - one-way clutch bearing

NOTE:

The one-way clutch bearing should be installed in the clutch carrier assembly with the "OUT SIDE" mark ⓐ facing toward the clutch housing.



4. Install:
   - dowel pins
   - gasket New
   - clutch housing assembly

10 Nm (1.0 m · kg, 7.2 ft · lb)

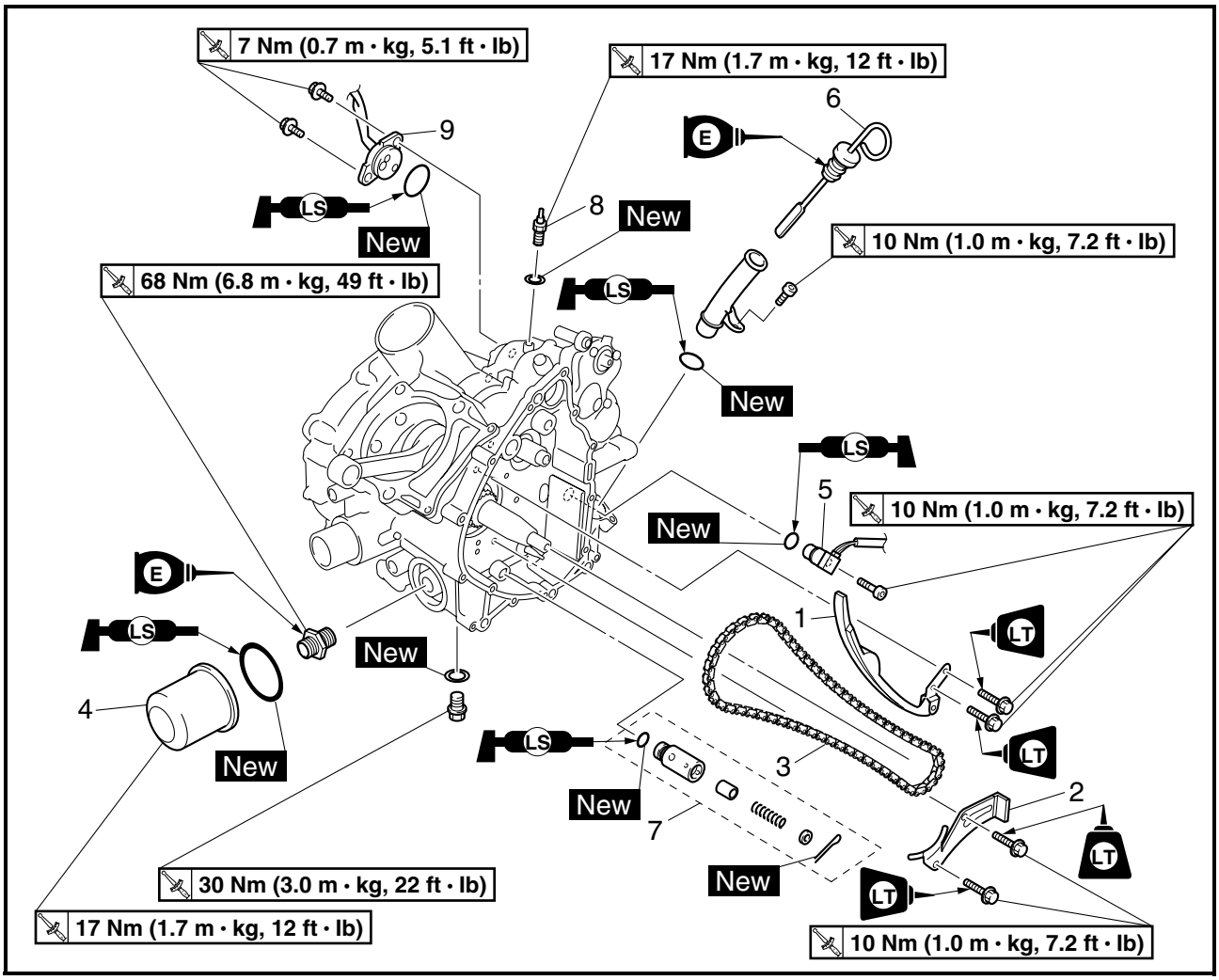
NOTE:

- Tighten the bolts in stages, using a criss-cross pattern.
- After tightening the bolts, check that the clutch housing assembly rotates smoothly.

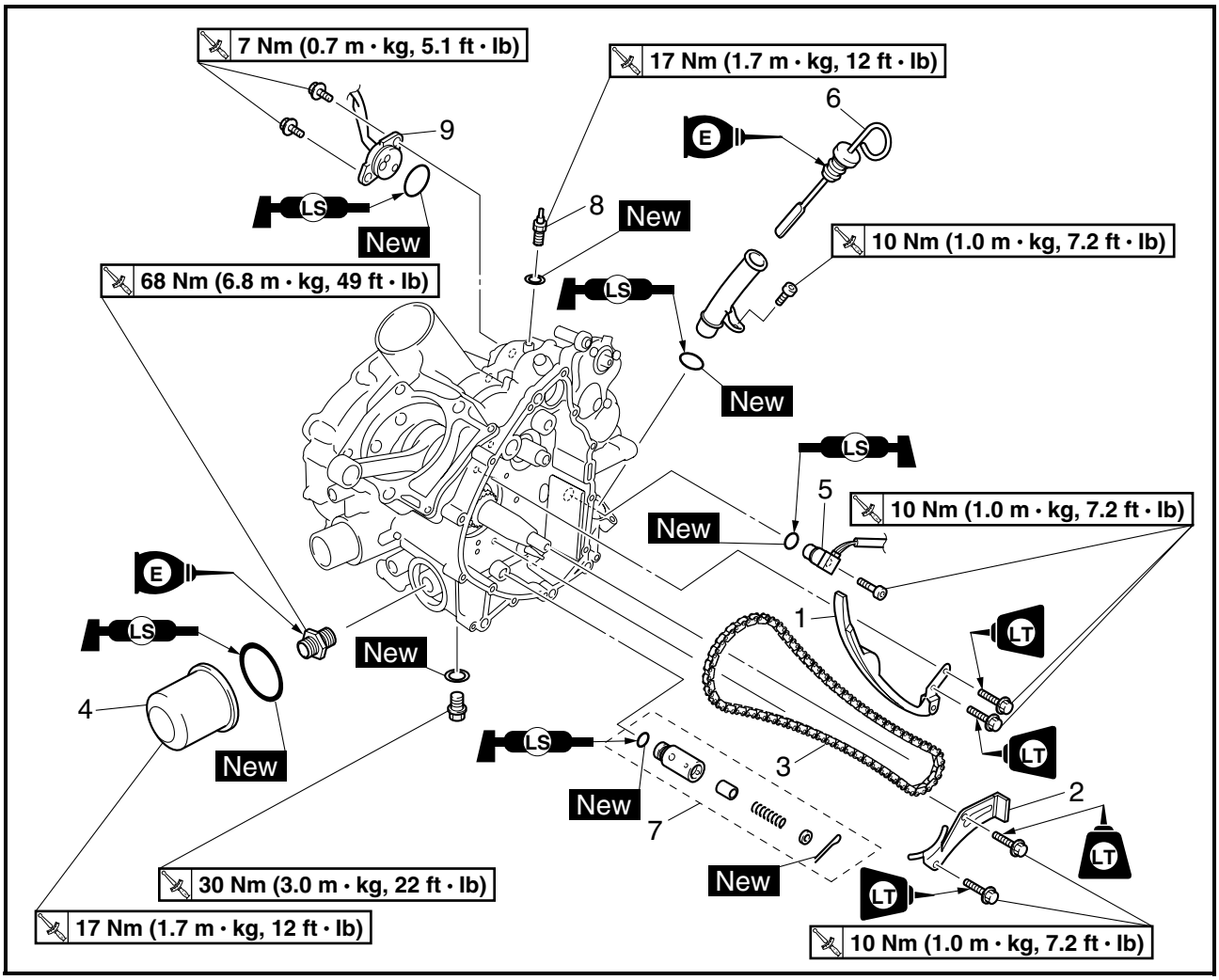
EBS00319

CRANKCASE

TIMING CHAIN AND OIL FILTER



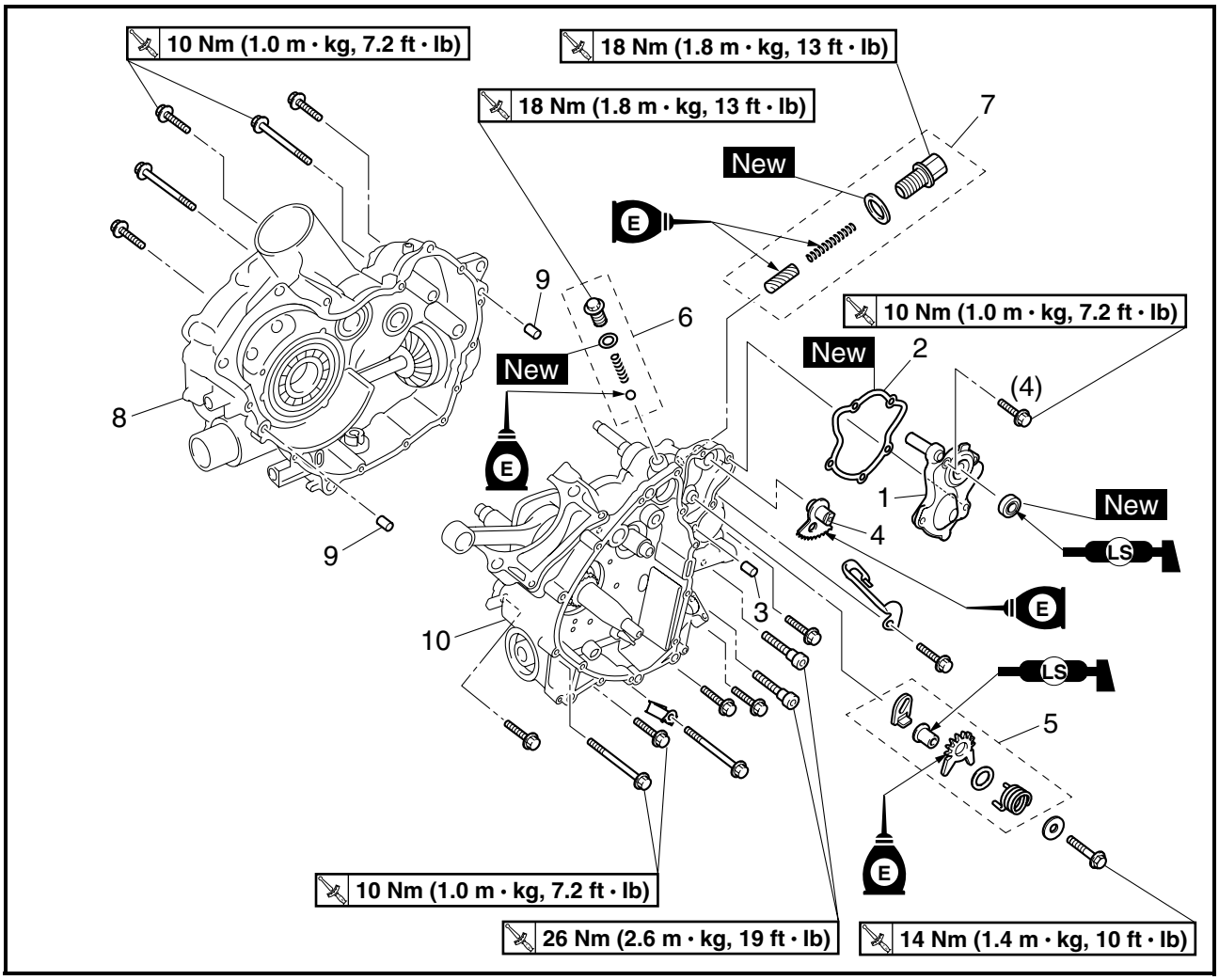
Order	Job/Part	Q'ty	Remarks
	Removing the timing chain and oil filter		Remove the parts in the order listed.
	Engine		Refer to "ENGINE REMOVAL".
	Cylinder head		Refer to "CYLINDER HEAD".
	Cylinder/piston		Refer to "CYLINDER AND PISTON".
	AC magneto rotor/starter wheel gear		Refer to "AC MAGNETO".
	Balancer driven gear/oil pump driven gear		Refer to "BALANCER GEARS AND OIL PUMP GEARS".
	Primary sheave assembly/secondary sheave assembly		Refer to "PRIMARY AND SECONDARY SHEAVES".
	Clutch carrier assembly		Refer to "CLUTCH".
1	Timing chain guide (intake side)	1	
2	Timing chain guide	1	
3	Timing chain	1	
4	Oil filter cartridge	1	



Order	Job/Part	Q'ty	Remarks
5	Speed sensor	1	
6	Dipstick	1	
7	Relief valve assembly	1	
8	Reverse switch	1	
9	Gear position switch	1	
			For installation, reverse the removal procedure.

EBS00320

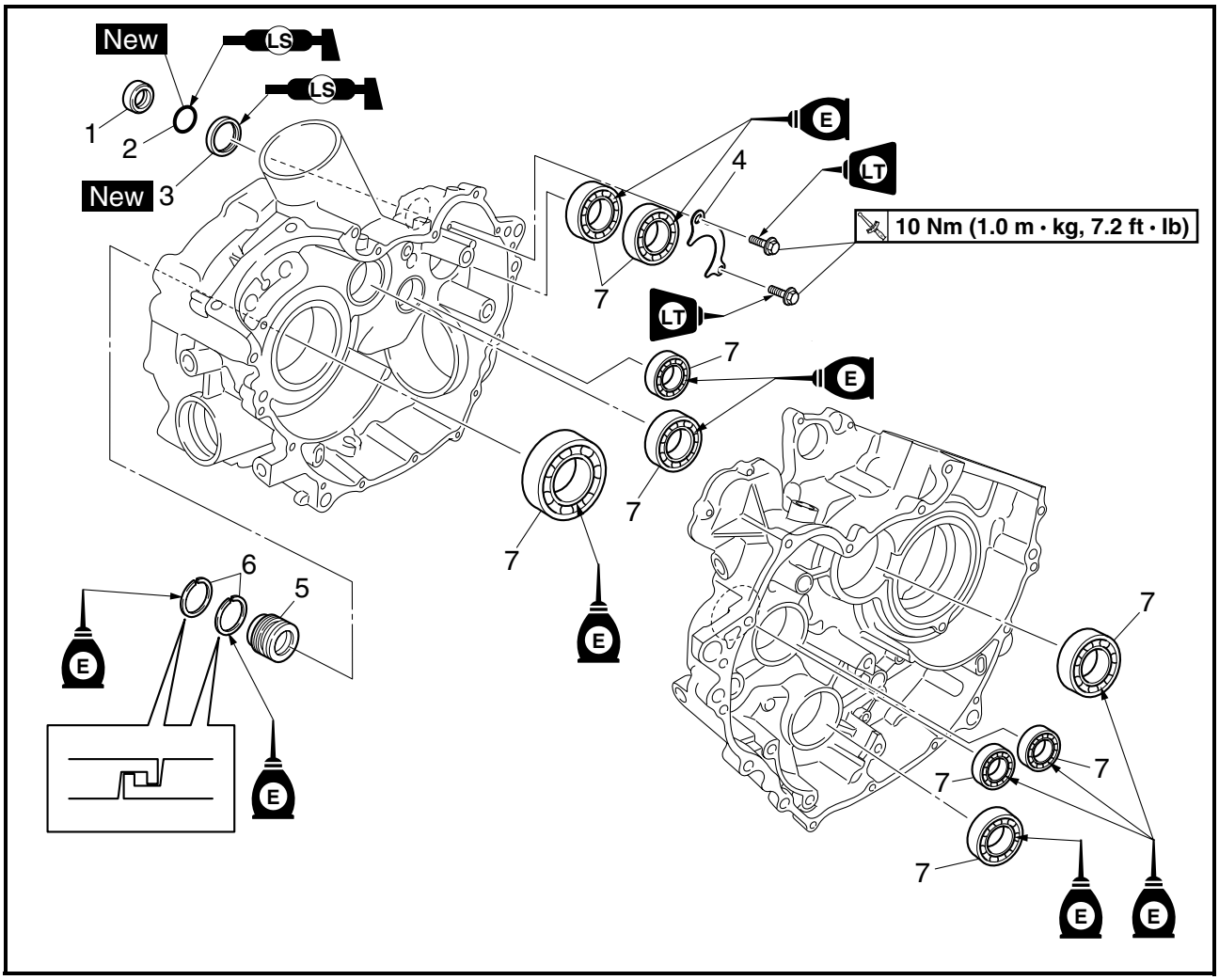
CRANKCASE



Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
1	Shift lever cover	1	
2	Gasket	1	Refer to "INSTALLING THE SHIFT LEVER".
3	Dowel pin	1	
4	Shift lever 1	1	
5	Shift lever 2 assembly	1	
6	Shift drum stopper	1	Spring identification color: red
7	Stopper lever stopper	1	Spring identification color: yellow
8	Right crankcase	1	Refer to "SEPARATING THE CRANKCASE" and "ASSEMBLING THE CRANKCASE".
9	Dowel pin	2	
10	Left crankcase	1	
			For installation, reverse the removal procedure.

EBS00321

CRANKCASE BEARINGS



Order	Job/Part	Q'ty	Remarks
	Removing the crankcase bearings		Remove the parts in the order listed.
	Crankshaft/oil pump		Refer to "CRANKSHAFT AND OIL PUMP".
	Transmission		Refer to "TRANSMISSION".
	Middle drive shaft/middle driven shaft		Refer to "MIDDLE GEAR".
1	Collar	1	
2	O-ring	1	
3	Oil seal	1	
4	Bearing retainer	1	
5	Spacer	1	
6	Crank seal	2	
7	Bearing	9	
			For installation, reverse the removal procedure.

EBS00332
SEPARATING THE CRANKCASE

1. Separate:
   - right crankcase
   - left crankcase

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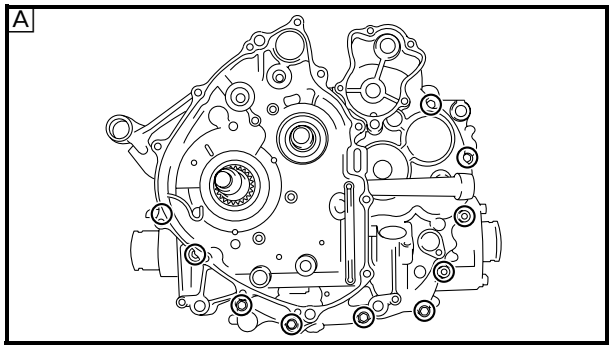
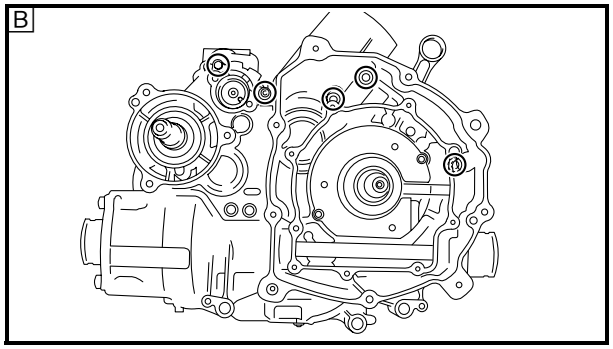
a. Remove the lead holders and crankcase bolts.

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 numerical order (see numbers on the illustration).



A Left crankcase
B Right crankcase



b. Remove the right crankcase.

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.

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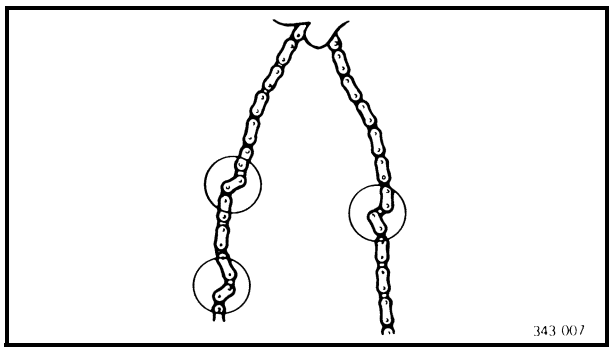
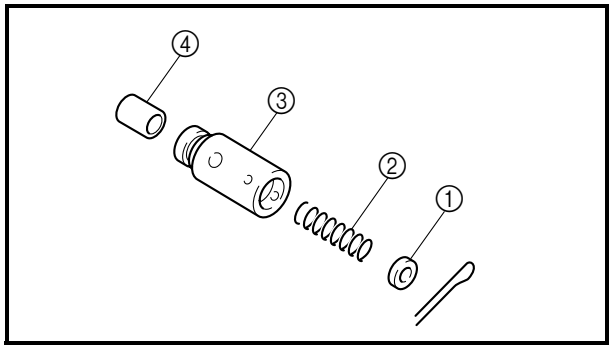
EBS00335
CHECKING THE TIMING CHAIN AND GUIDE

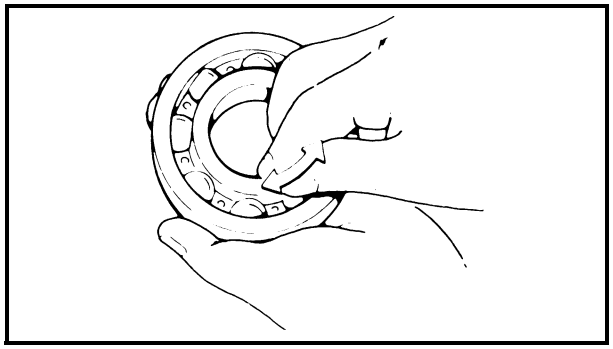
1. Check:
   - timing chain
     Cracks/stiff → Replace the timing chain and camshaft sprocket as a set.
2. Check:
   - intake side timing chain guide
     Wear/damage → Replace.



CHECKING THE RELIEF VALVE

1. Check:
   - spring seat ①
   - spring ②
   - relief valve body ③
   - relief valve ④
     Damage/wear → Replace the defective part(s).



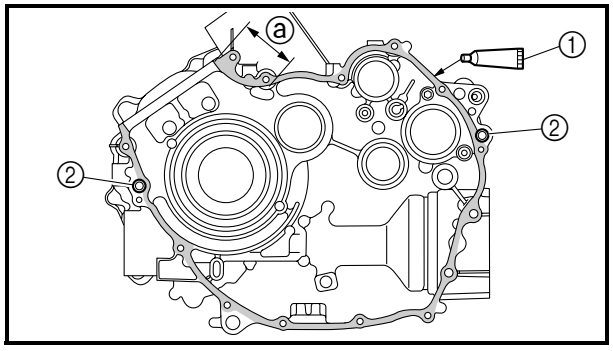


EBS00339
CHECKING THE BEARINGS

1. Check:
   - bearings
     Clean and lubricate, then rotate the inner race with a finger.
     Roughness → Replace.

EBS00338
CHECKING THE CRANKCASE

1. Thoroughly wash the case halves in a mild solvent.
2. Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
3. Check:
   - crankcase
     Cracks/damage → Replace.
   - oil delivery passages
     Clogged → Blow out with compressed air.



EBS00342
ASSEMBLING THE CRANKCASE

1. Apply:
   - sealant ①
     (to the mating surfaces of both case halves)

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

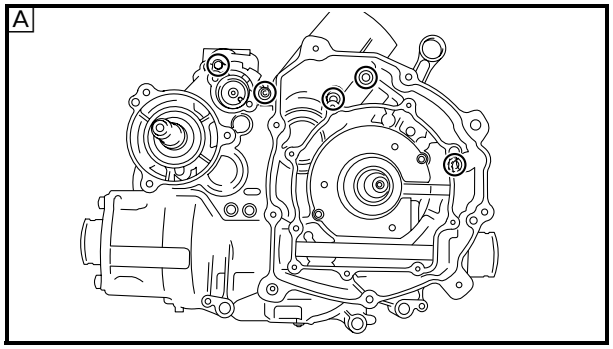
NOTE:
Apply two coats of sealant to the area ⓐ shown in the illustration.

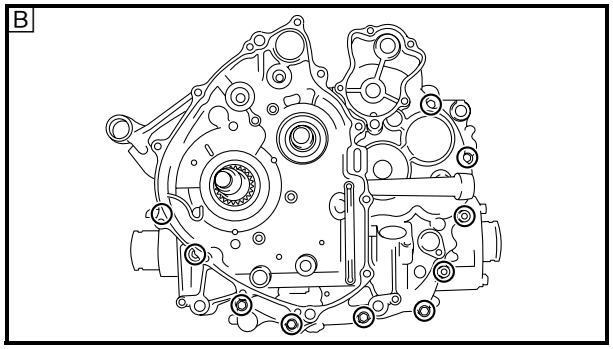
2. Install:
   - dowel pins ②

3. Fit the right crankcase onto the left crankcase. Tap lightly on the case with a soft hammer.

CAUTION:

Before installing and torquing the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.





4. Install:
   - lead holder
   - crankcase bolts
5. Tighten:
   - crankcase bolts
     (follow the proper tightening sequence)

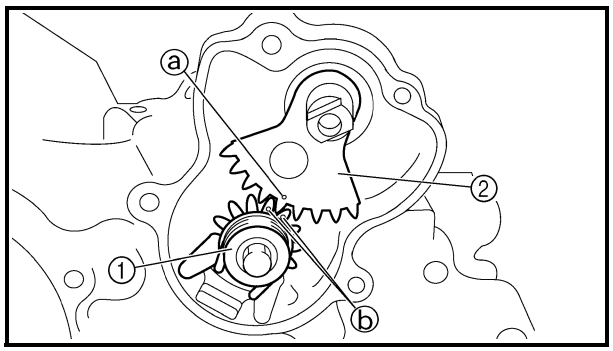
10 Nm (1.0 m · kg, 7.2 ft · lb)

A Right crankcase
B Left crankcase

NOTE:

Tighten the bolts in stages, using a crisscross pattern.

6. Apply:
   - 4-stroke engine oil
     (to the crankshaft pin, bearing and oil delivery hole)
7. Check:
   - crankshaft and transmission operation
     Unsmooth operation → Repair.



INSTALLING THE SHIFT LEVER

1. Install:
   - shift lever 2 assembly ①

14 Nm (1.4 m · kg, 10 ft · lb)

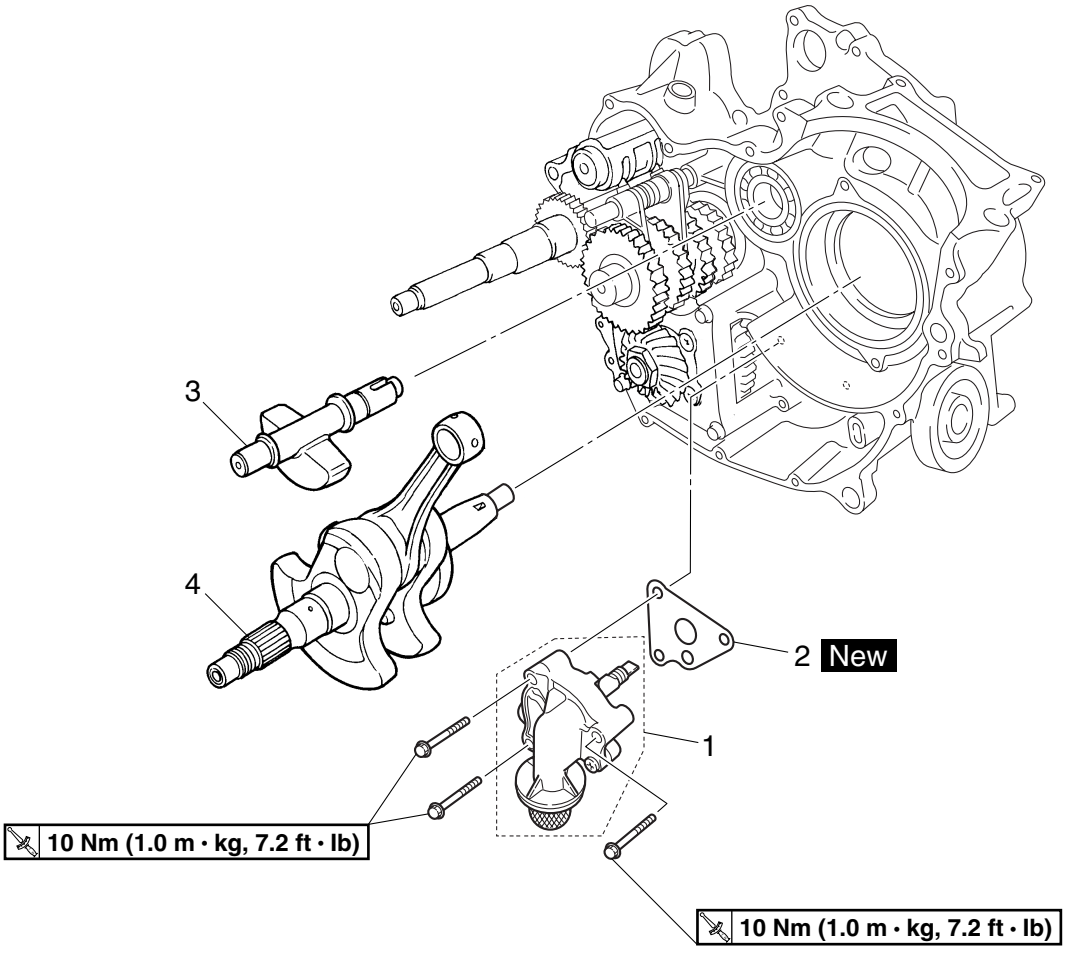
   - shift lever 1 ②

NOTE:

When installing the shift lever 1, align the punch mark ⓐ on the shift lever 1 with the punch marks ⓑ on the shift lever 2.

EBS00326

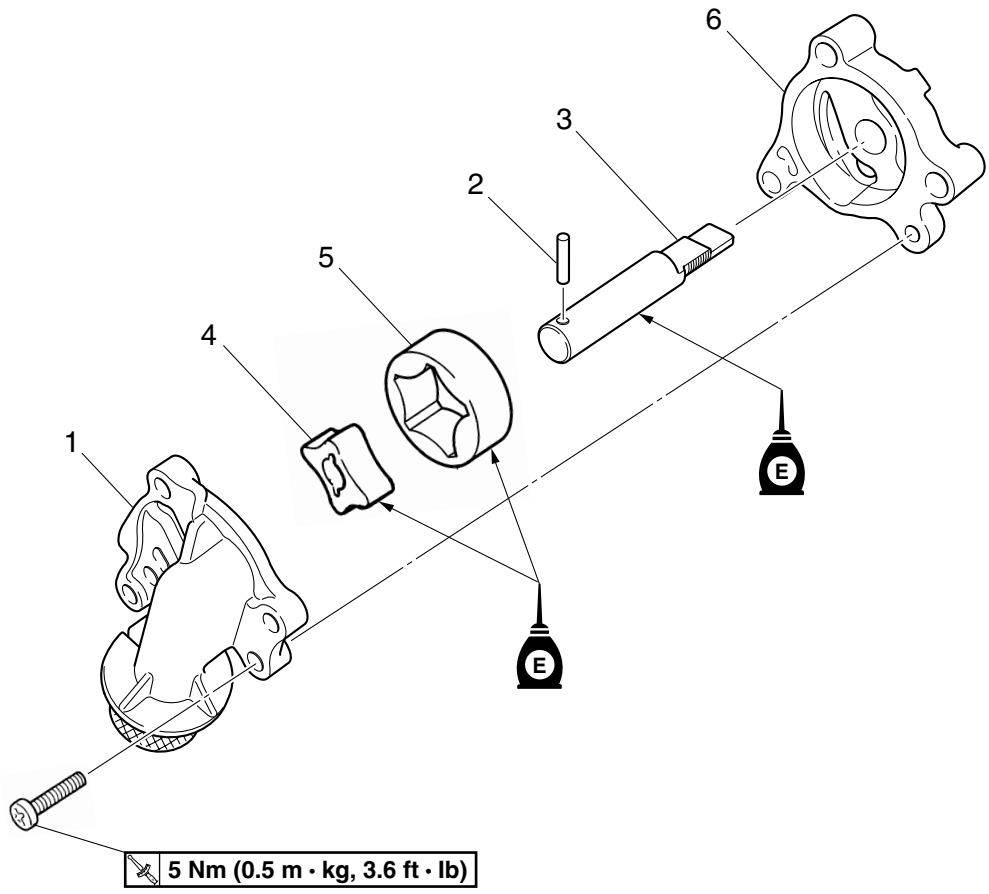
CRANKSHAFT AND OIL PUMP



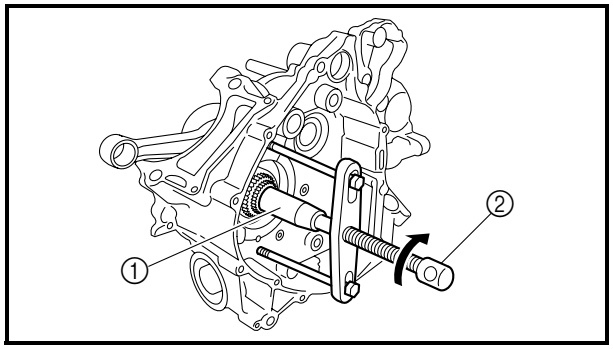
Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft and oil pump		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Oil pump	1	
2	Gasket	1	
3	Balancer	1	
4	Crankshaft	1	Refer to "REMOVING THE CRANKSHAFT" and "INSTALLING THE CRANKSHAFT". For installation, reverse the removal procedure.

EBS00327

OIL PUMP



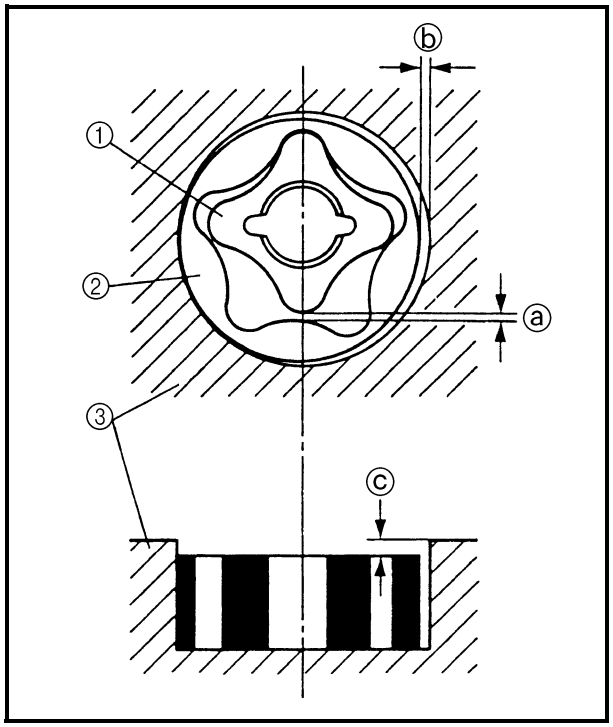
Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
1	Oil pump housing cover	1	
2	Pin	1	
3	Oil pump shaft	1	
4	Oil pump inner rotor	1	
5	Oil pump outer rotor	1	
6	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.



EBS00336
REMOVING THE CRANKSHAFT

1. Remove:
   • crankshaft ①
   Use a crankcase separating tool ②.

Crankcase separating tool
90890-01135
Crankcase separator
YU-01135-B

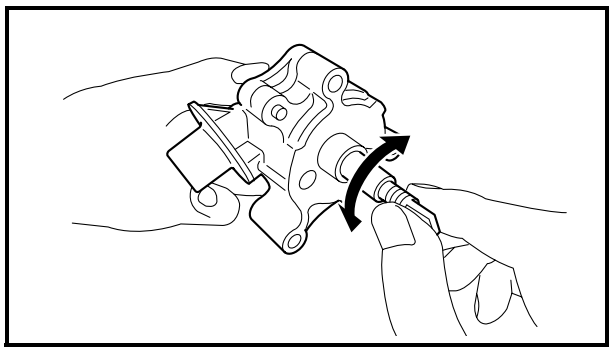


EBS00331
CHECKING THE OIL PUMP

1. Check:
   • oil pump housing
   • oil pump housing cover
   Cracks/wear/damage → Replace.
2. Measure:
   • inner-rotor-to-outer-rotor-tip clearance ⓐ
   • outer-rotor-to-oil-pump-housing clearance ⓑ
   • oil-pump-housing-to-inner-rotor-and-outer-rotor clearance ⓒ
   Out of specification → Replace the oil pump.

① Inner rotor
② Outer rotor
③ Oil pump housing

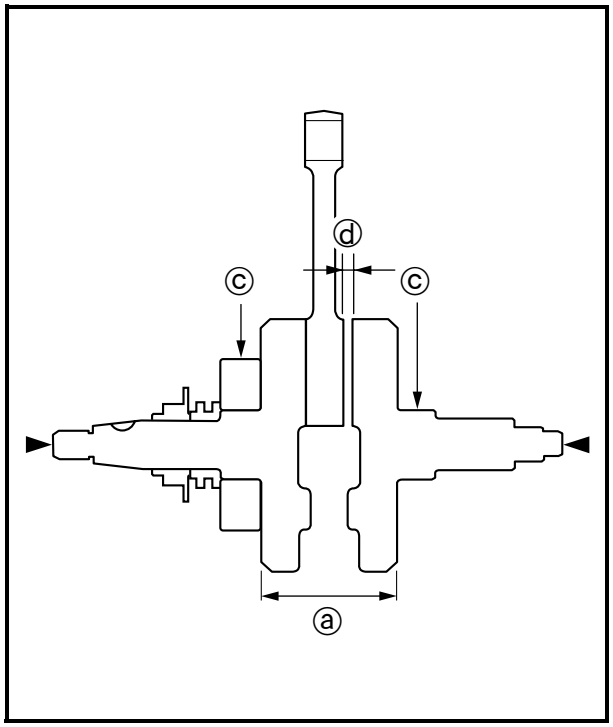
Inner-rotor-to-outer-rotor-tip clearance
Less than 0.12 mm (0.0047 in)
<Limit>: 0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance
0.090 ~ 0.170 mm
(0.0035 ~ 0.0067 in)
<Limit>: 0.24 mm (0.0094 in)
Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance
0.030 ~ 0.100 mm
(0.0012 ~ 0.0039 in)
<Limit>: 0.17 mm (0.0067 in)



3. Check:
   • oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

CHECKING THE OIL STRAINER

1. Check:
   - oil strainer
     Damage → Replace.
     Contaminants → Clean with engine oil.



EBS00360

CHECKING THE CRANKSHAFT

1. Measure:
   - crank width ⓐ
     Out of specification → Replace the crankshaft.

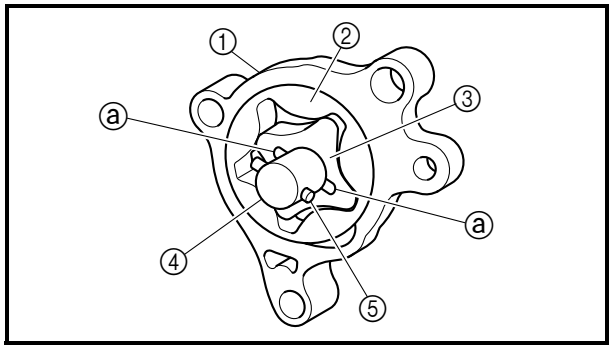
Crank width
74.95 ~ 75.00 mm
(2.951 ~ 2.953 in)

2. Measure:
   - side clearance ⓓ
     Out of specification → Replace the crankshaft.

Big end side clearance
0.350 ~ 0.650 mm
(0.0138 ~ 0.0256 in)
<Limit>: 1.0 mm (0.04 in)

3. Measure:
   - runout ⓒ
     Out of specification → Replace the crankshaft.

Runout limit
0.030 mm (0.0012 in)

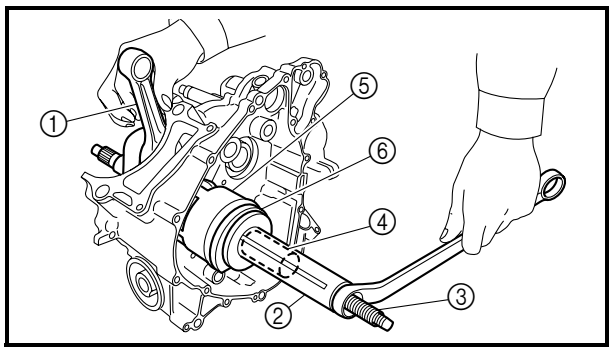


EBS00318
ASSEMBLING THE OIL PUMP

1. Install:
   - oil pump housing ①
   - oil pump outer rotor ②
   - oil pump inner rotor ③
   - oil pump shaft ④
   - pin ⑤

NOTE:

When installing the oil pump shaft ④ align the pin ⑤ with the groove ⓐ in the inner rotor ③.



EBS00362
INSTALLING THE CRANKSHAFT

1. Install:
   - crankshaft ①

Crankshaft installer pot ②
90890-01274
Installing pot
YU-90058
Pot installer
YU-90059
Crankshaft installer bolt ③
90890-01275
Bolt
YU-90060
Adapter (M16) ④
90890-04130
Adapter #13
YM-04059
Spacer (crankshaft installer) ⑤
90890-04081
Pot spacer
YM-91044
Spacer ⑥
90890-01309
Pot spacer
YU-90059

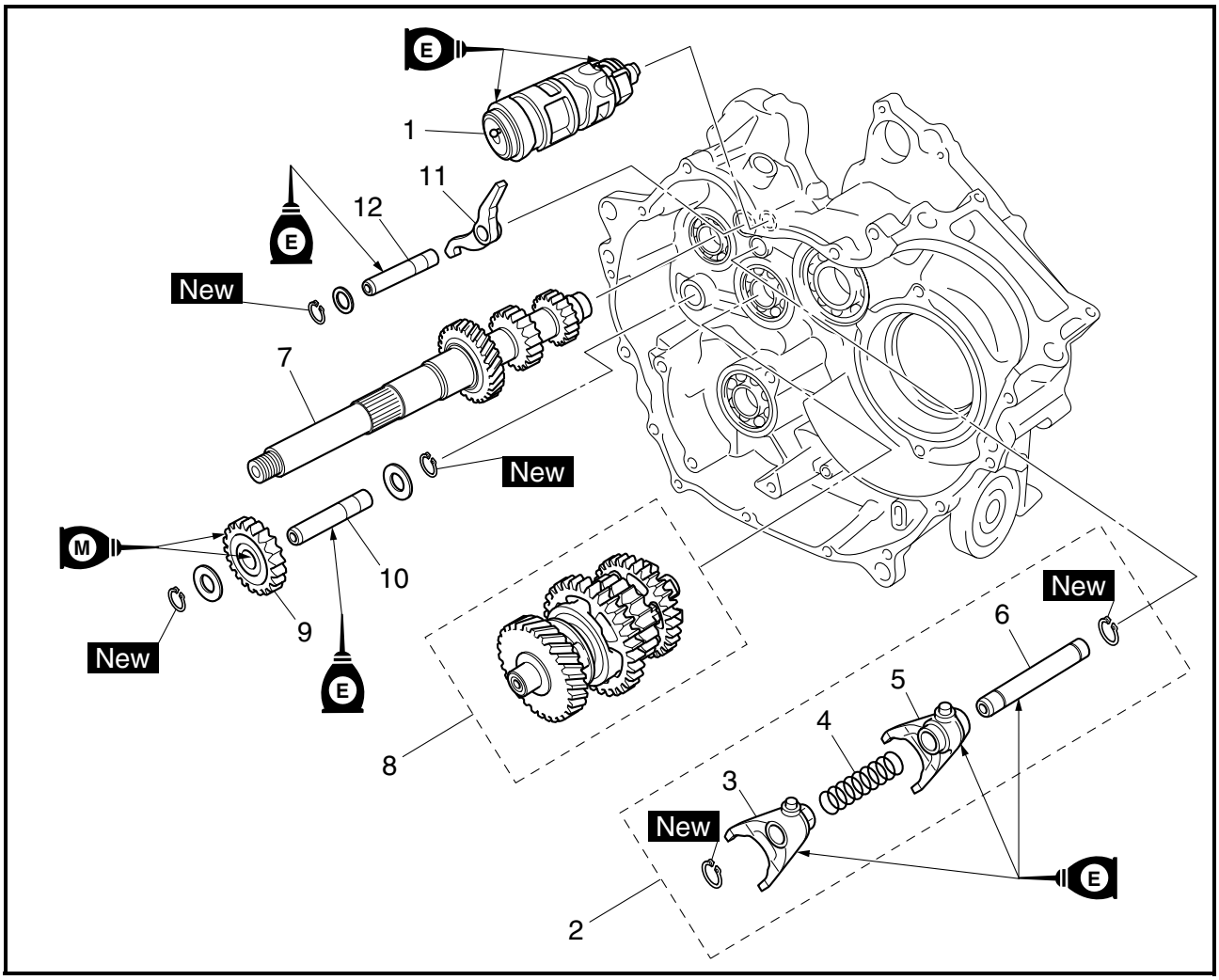
NOTE:

Hold the connecting rod at the Top Dead Center (TDC) with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.

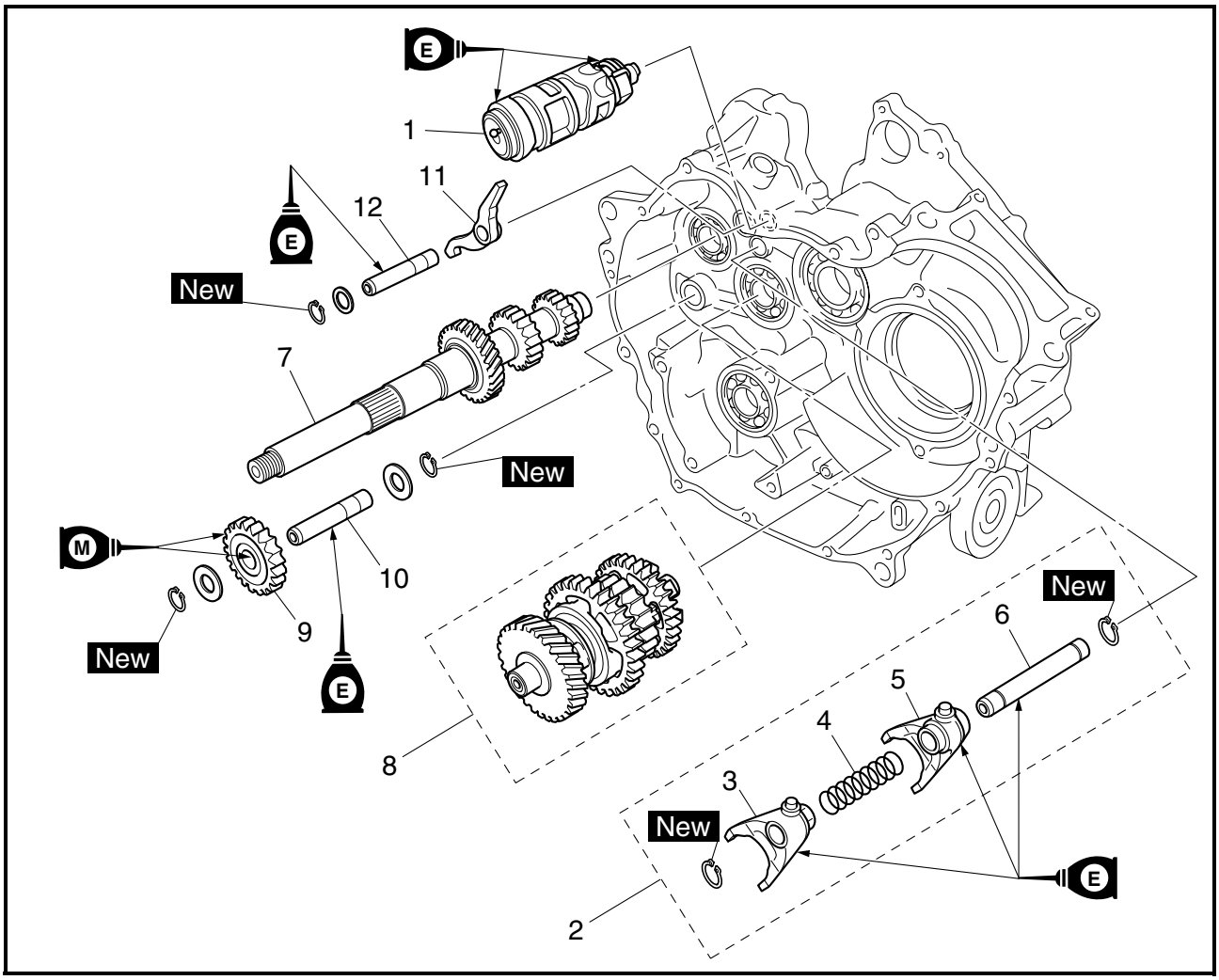
CAUTION:

Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

EBS00345
TRANSMISSION



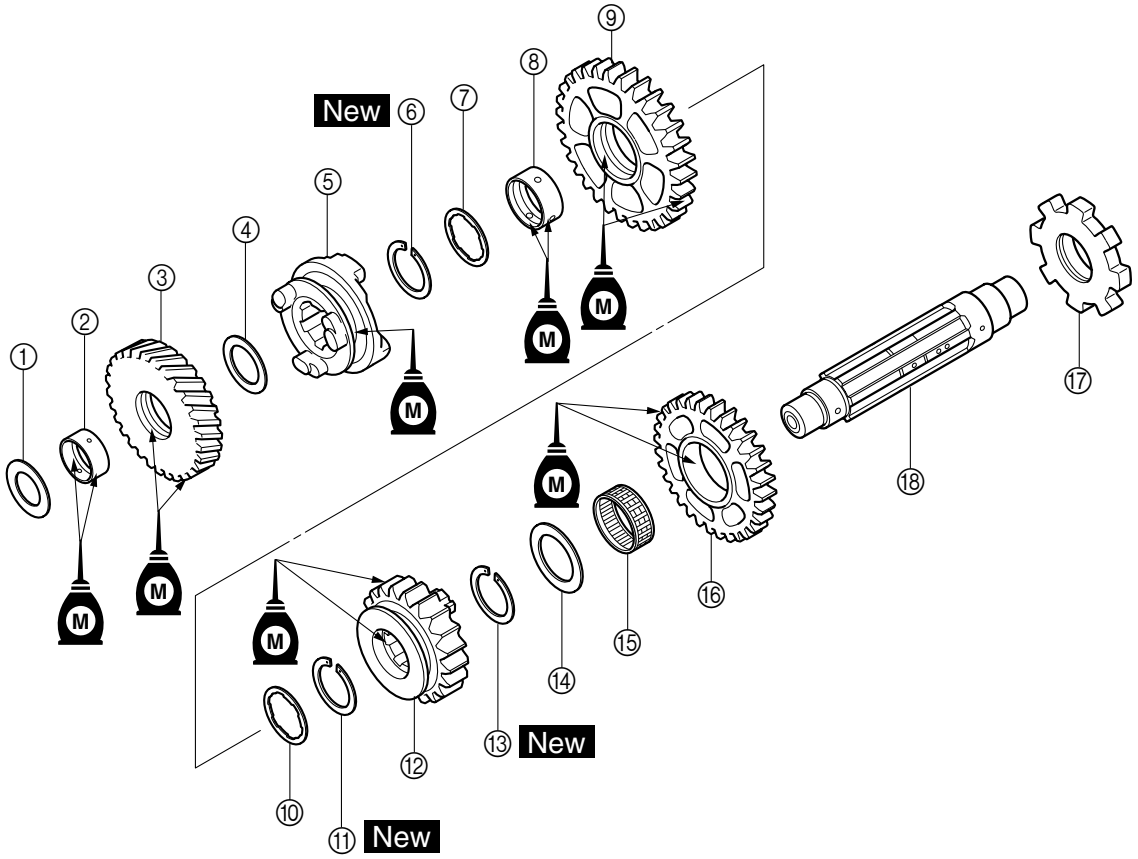
Order	Job/Part	Q'ty	Remarks
	Removing the transmission		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Middle driven gear		Refer to "MIDDLE GEAR".
1	Shift drum	1	Refer to "REMOVING THE TRANSMISSION" and "INSTALLING THE TRANSMISSION".
2	Shift fork assembly	1	
3	Shift fork "R"	1	
4	Spring	1	Refer to "ASSEMBLING THE SHIFT FORK ASSEMBLY".
5	Shift fork "L"	1	
6	Shift fork guide bar	1	
7	Secondary shaft	1	
8	Drive axle assembly	1	
9	Reverse idle gear	1	
10	Reverse idle gear shaft	1	



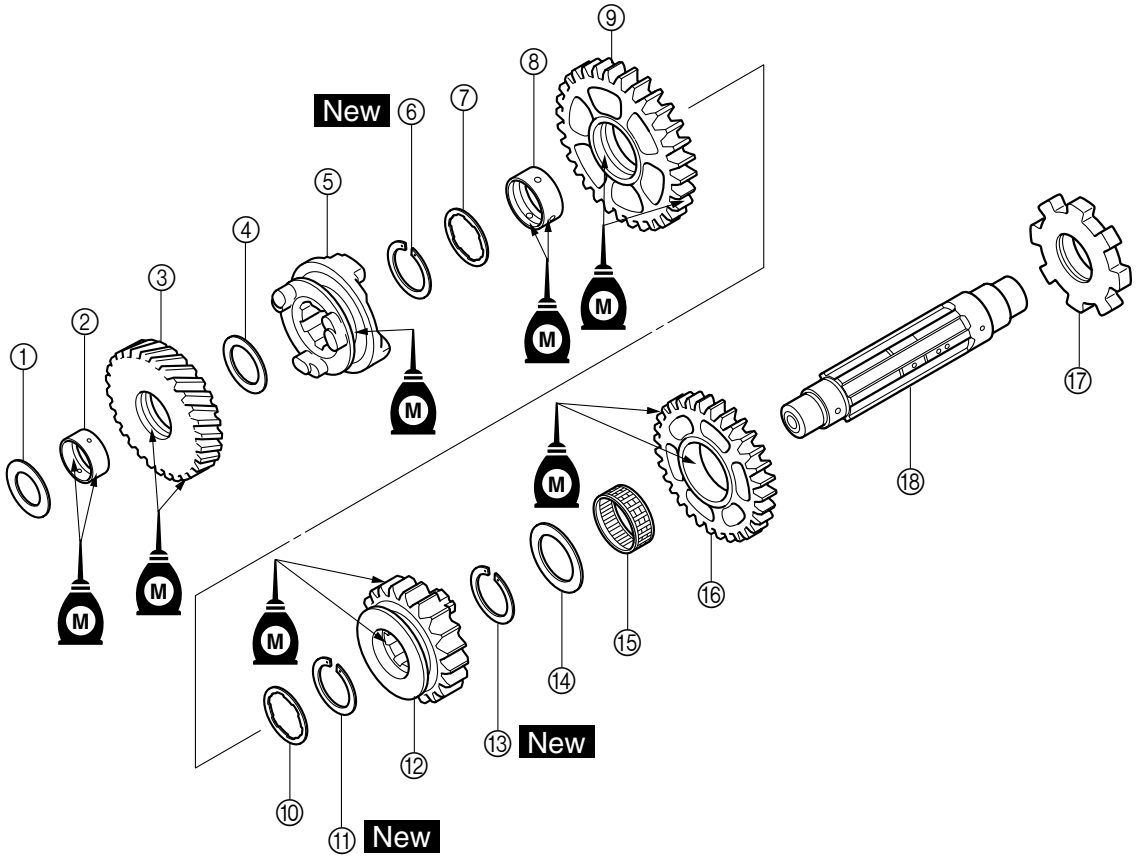
Order	Job/Part	Q'ty	Remarks
11	Stopper lever	1	Refer to "REMOVING THE TRANSMISSION" and "INSTALLING THE TRANSMISSION".
12	Stopper lever shaft	1	
			For installation, reverse the removal procedure.

EBS00348

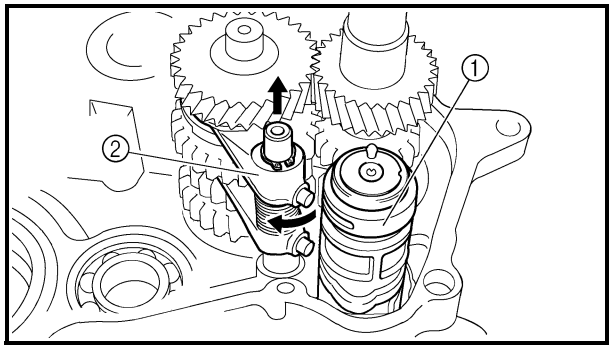
DRIVE AXLE



Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Remove the parts in the order listed.
①	Washer	1	
②	Collar	1	
③	High wheel gear	1	
④	Washer	1	
⑤	Clutch dog	1	
⑥	Circlip	1	
⑦	Washer	1	
⑧	Collar	1	
⑨	Low wheel gear	1	
⑩	Washer	1	
⑪	Circlip	1	
⑫	Middle drive gear	1	
⑬	Circlip	1	



Order	Job/Part	Q'ty	Remarks
⑭	Washer	1	
⑮	Bearing	1	
⑯	Reverse wheel gear	1	
⑰	Stopper wheel	1	
⑱	Drive axle	1	
			For assembly, reverse the disassembly procedure.



REMOVING THE TRANSMISSION

1. Remove:
   - shift drum ①
   - shift fork assembly ②

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a. Pull out the guide bar from the left crankcase.
b. Push down on the drive shaft, and then slide the shift fork assembly to remove the shift fork cam followers.
c. Remove the shift drum.
d. Remove the shift fork assembly.

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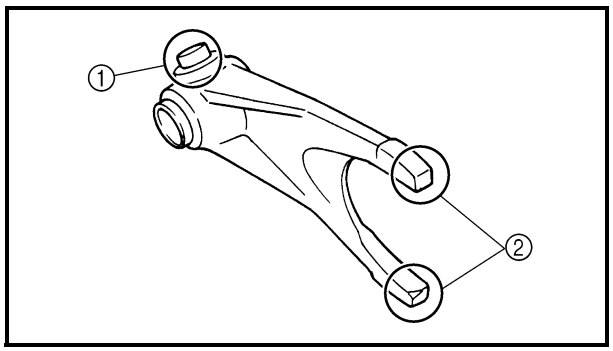
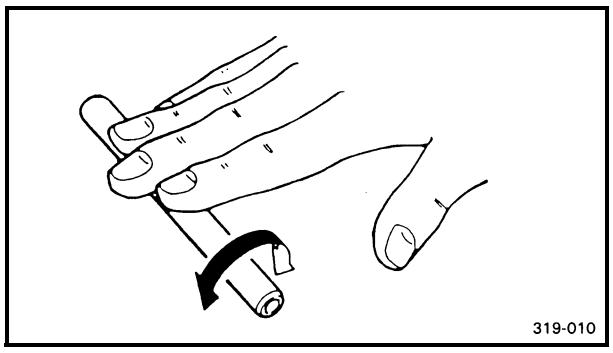


EBS00349

CHECKING THE SHIFT FORKS

1. Check:
   - shift fork cam follower ①
   - shift fork pawl ②

   Scoring/bends/wear/damage → Replace.

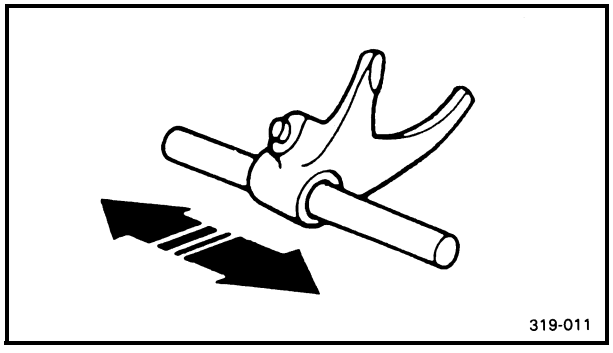


2. Check:
   - guide bar

   Roll the guide bar on a flat surface.
   Bends → Replace.

⚠ WARNING

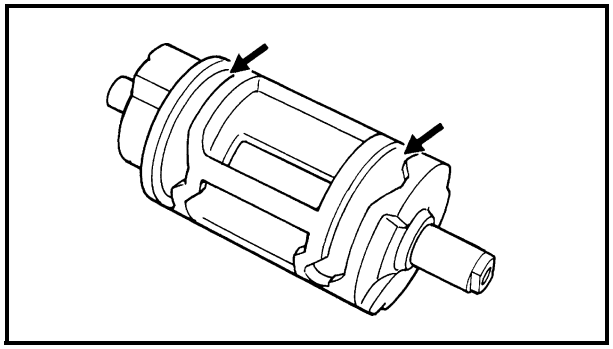
Do not attempt to straighten a bent guide bar.



3. Check:
   - shift fork movement

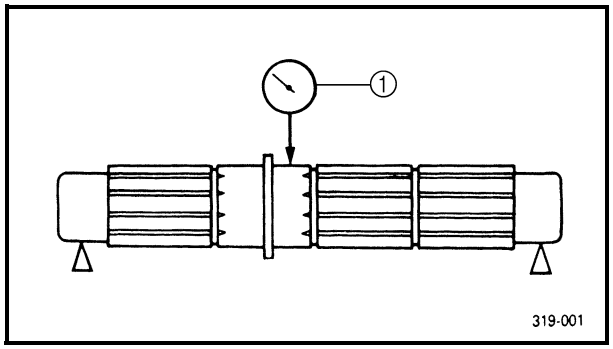
   (on the guide bar)
   Unsmooth operation → Replace the shift fork and the guide bar.
4. Check:
   - spring

   Cracks/damage → Replace.



EBS00351
CHECKING THE SHIFT DRUM

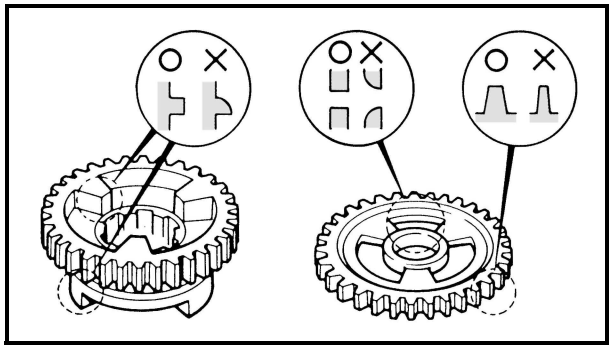
1. Check:
   - shift drum grooves
     Scratches/wear/damage → Replace.



EBS00354
CHECKING THE TRANSMISSION

1. Measure:
   - drive axle runout
     (with a centering device and dial gauge ①)
     Out of specification → Replace the drive axle.

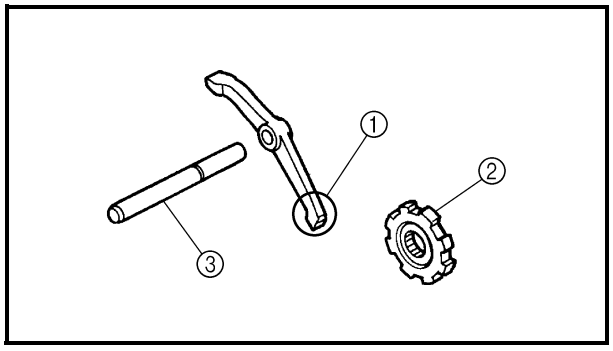
	Drive axle runout limit **0.06 mm (0.0024 in)**



2. Check:
   - transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(s).
   - transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(s).
3. Check:
   - transmission gear engagement
     (each pinion gear to its respective wheel gear)
     Incorrect → Reassemble the transmission axle assemblies.
4. Check:
   - transmission gear movement
     Rough movement → Replace the defective part(s).
5. Check:
   - circlips
     Bends/damage/looseness → Replace.

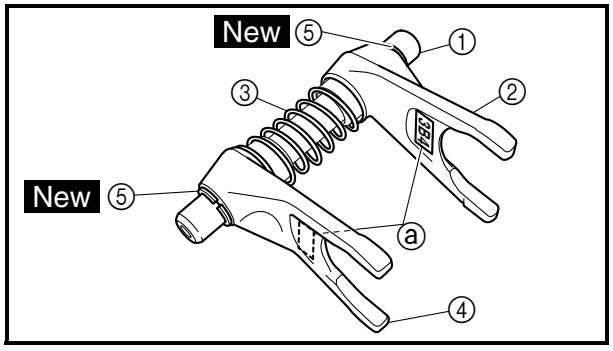
CHECKING THE SECONDARY SHAFT

1. Check:
   - gear teeth
     Blue discoloration/pitting/wear → Replace.



CHECKING THE STOPPER LEVER AND STOPPER WHEEL

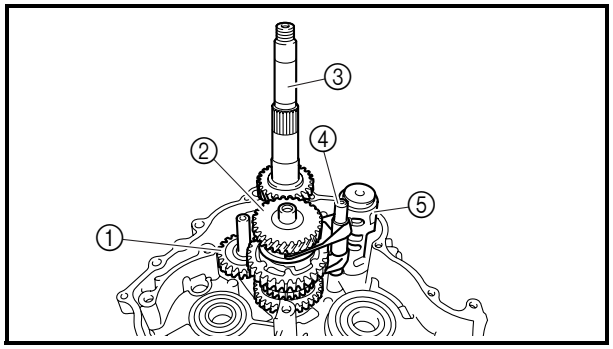
1. Check:
   - stopper lever pawl ①
     Bends/damage/wear → Replace the stopper lever and stopper wheel as a set.
   - stopper wheel ②
     Damage/wear → Replace the stopper wheel and stopper lever as a set.
   - stopper lever shaft ③
     Bends/damage/wear → Replace.

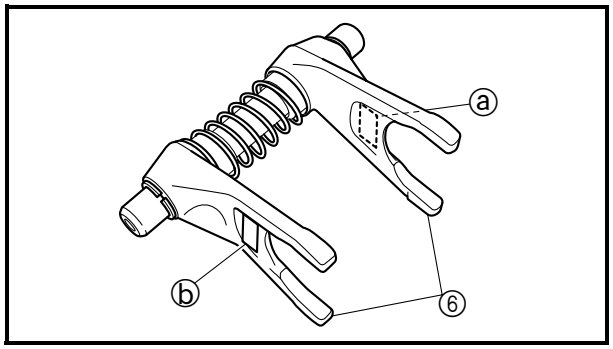


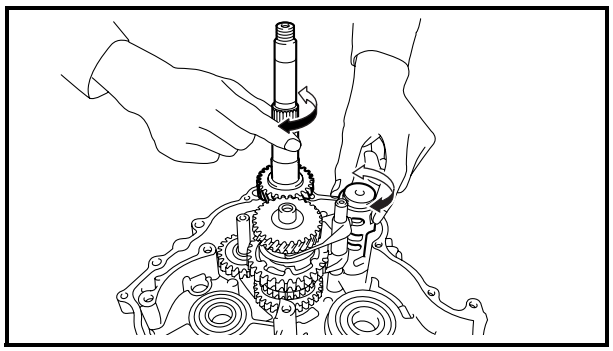
ASSEMBLING THE SHIFT FORK ASSEMBLY

1. Install:
   - shift fork guide bar ①
   - shift fork "L" ②
   - spring ③
   - shift fork "R" ④
   - circlips ⑤ New

NOTE:
Install the shift forks with their "3B4" marks ⓐ facing each other.







EBS00356

INSTALLING THE TRANSMISSION

1. Install:
   - stopper lever shaft
   - stopper lever
   - reverse idle gear ①
   - drive axle assembly ②
   - secondary shaft ③
   - shift fork assembly ④
   - shift drum ⑤

NOTE:

Install the shift forks ⑥ with the "L" mark ⓐ and "R" mark ⓑ facing towards the left and right sides of the crankcase respectively.

2. Check:
   - shift operation
     Unsmooth operation → Repair.

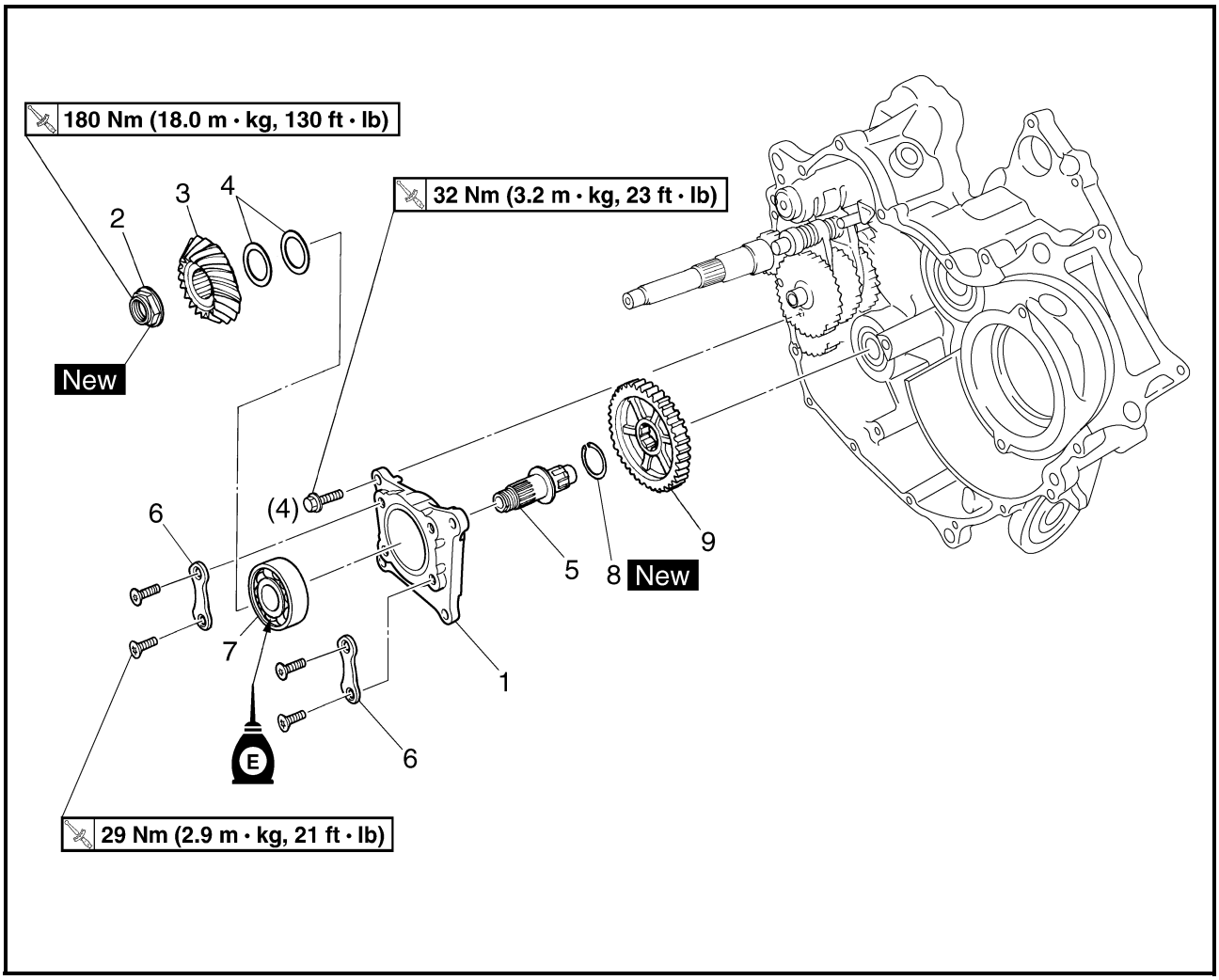
NOTE:

- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, make sure that the transmission is in neutral and that the gears turn freely.

EBS00363

MIDDLE GEAR

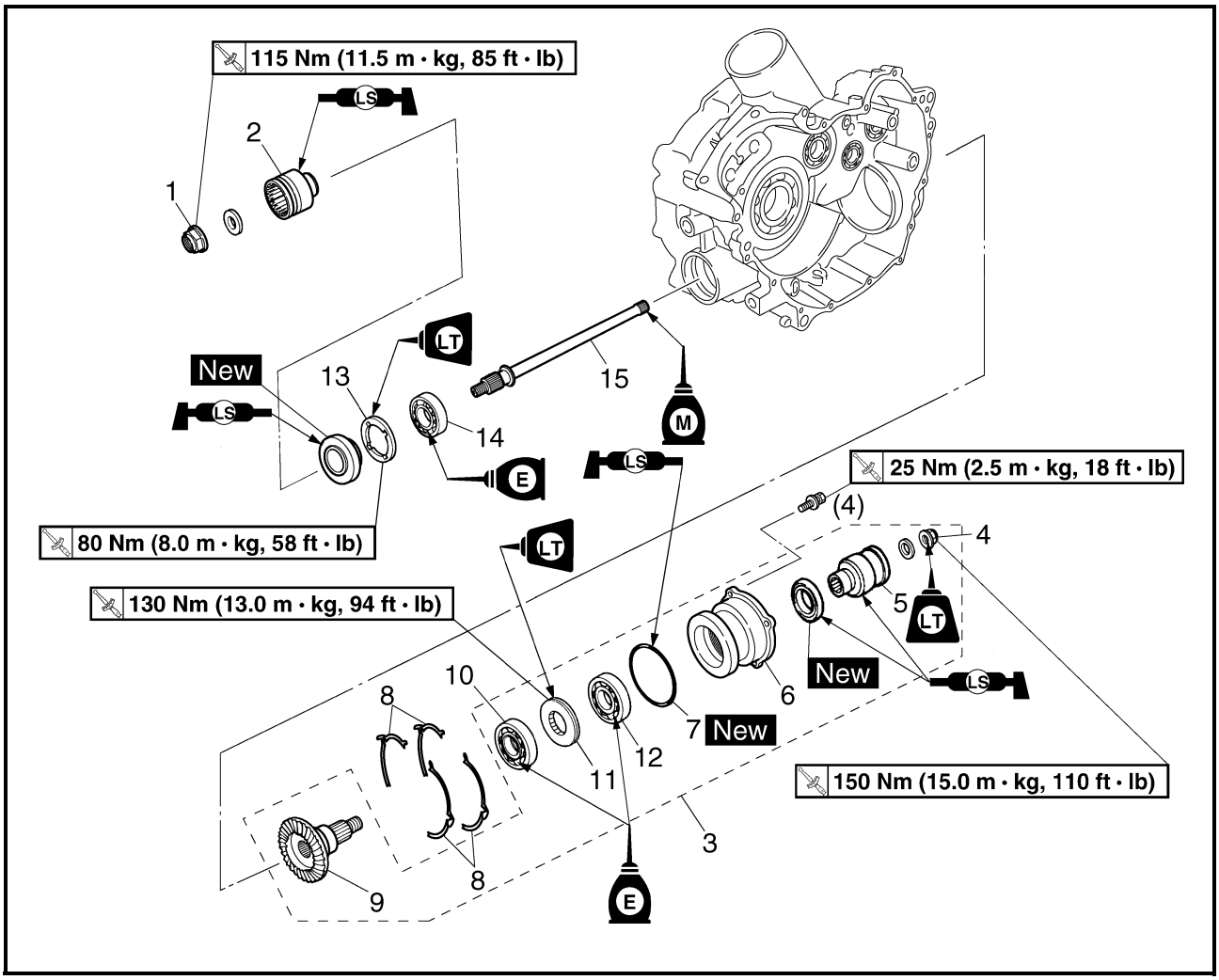
MIDDLE DRIVE SHAFT



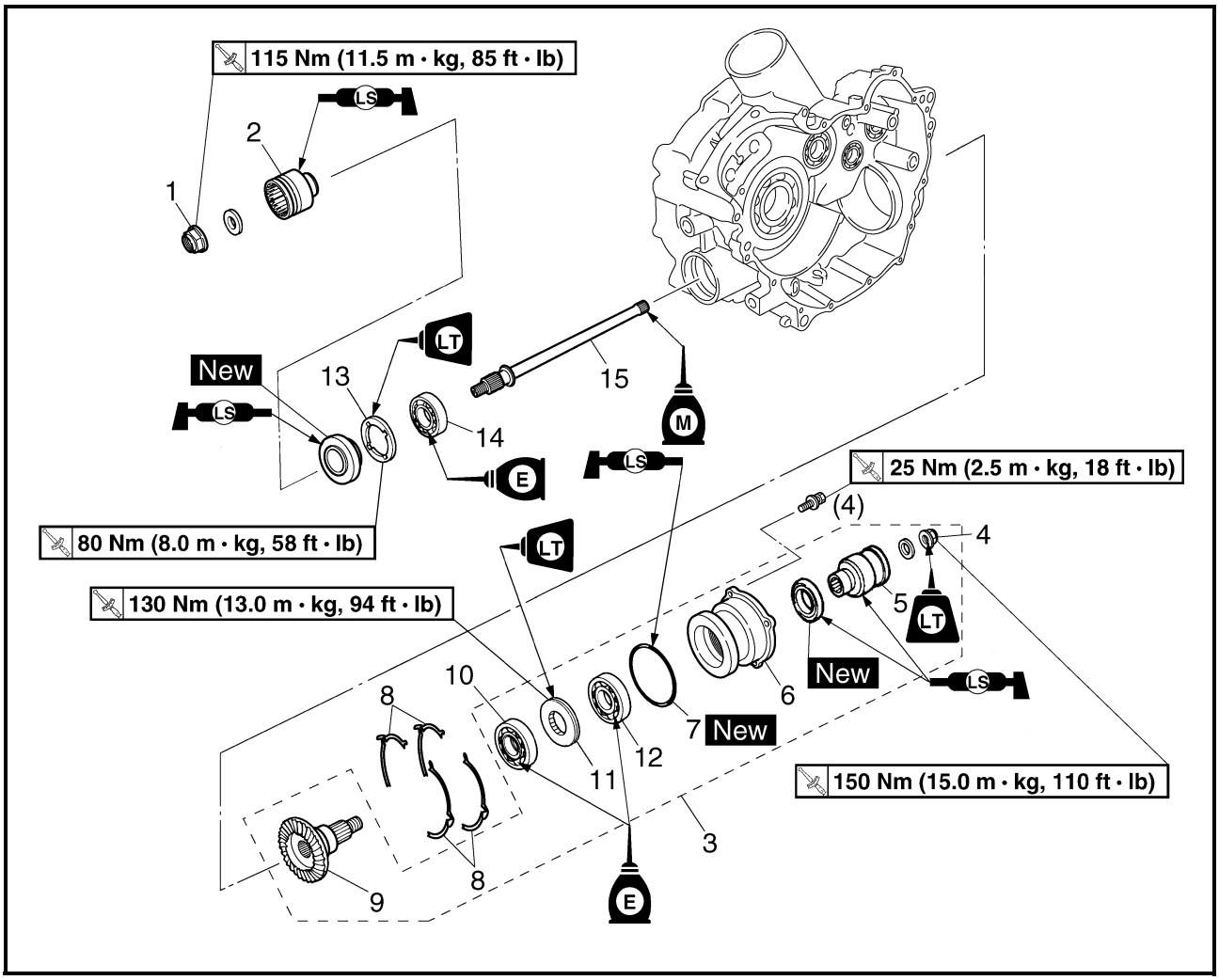
Order	Job/Part	Q'ty	Remarks
	Removing the middle drive shaft		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Bearing housing	1	
2	Middle drive pinion gear nut	1	Refer to "REMOVING THE MIDDLE DRIVE SHAFT" and "INSTALLING THE MIDDLE DRIVE SHAFT".
3	Middle drive pinion gear	1	
4	Middle drive gear shim	*	
5	Middle drive shaft	1	
6	Bearing retainer	2	
7	Bearing	1	
8	Circlip	1	
9	Middle driven gear	1	
			For installation, reverse the removal procedure.

EBS00364

MIDDLE DRIVEN SHAFT



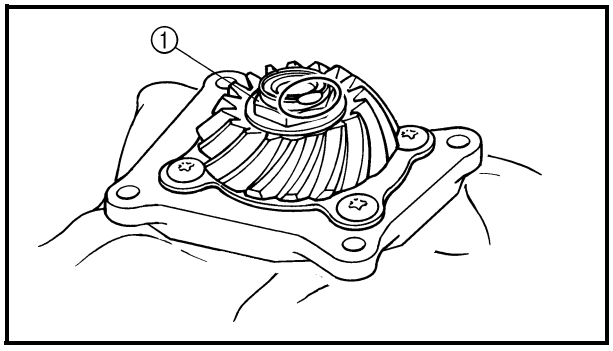
Order	Job/Part	Q'ty	Remarks
	Removing the middle driven shaft		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Front drive shaft coupling gear nut (middle gear side)	1	
2	Front drive shaft coupling gear (middle gear side)	1	
3	Middle driven pinion gear assembly	1	
4	Rear drive shaft coupling gear nut (middle gear side)	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT".
5	Rear drive shaft coupling gear (middle gear side)	1	
6	Bearing housing	1	
7	O-ring	1	
8	Middle driven gear shim	*	
9	Middle driven pinion gear	1	



Order	Job/Part	Q'ty	Remarks
10	Bearing	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT".
11	Middle driven pinion gear bearing retainer	1	
12	Bearing	1	
13	Middle driven shaft bearing retainer	1	
14	Bearing	1	
15	Middle driven shaft	1	
			For installation, reverse the removal procedure.

EBS00365
REMOVING THE MIDDLE DRIVE SHAFT

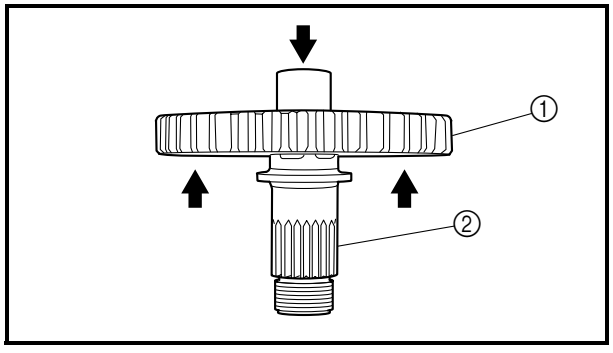
1. Straighten:
   - punched portion of the middle drive pinion gear nut



2. Loosen:
   - middle drive pinion gear nut ①

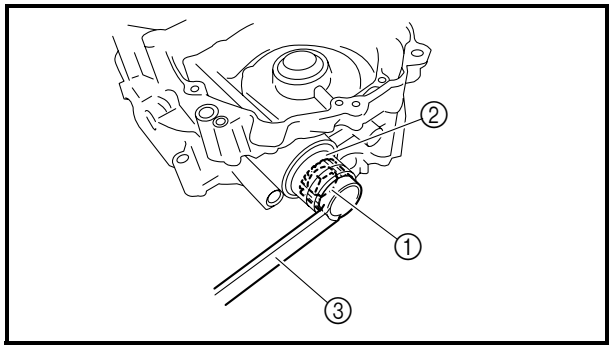
NOTE:
Secure the middle drive shaft in the vise with a clean rag.

3. Remove:
   - middle drive pinion gear nut
   - middle drive pinion gear
   - shim(s)



4. Remove:
   - middle driven gear ①
   - circlip
   - middle drive shaft ②

NOTE:
Press the middle drive shaft end and remove the middle driven gear.

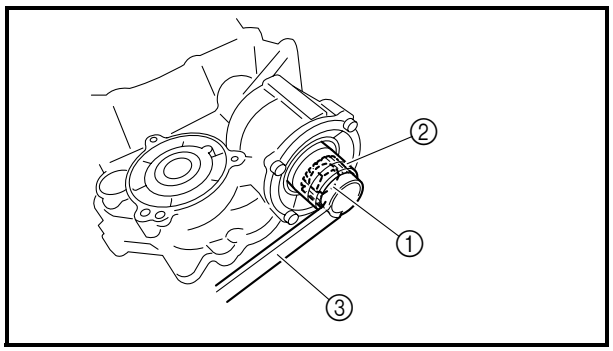


EBS01020
REMOVING THE MIDDLE DRIVEN SHAFT

1. Remove:
   - front drive shaft coupling gear nut (middle gear side) ①
   - washer
   - front drive shaft coupling gear (middle gear side) ②

NOTE:
Use the coupling gear/middle shaft tool ③ to hold the coupling gear.

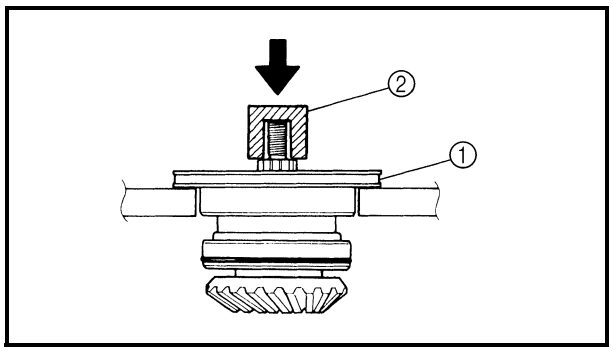
Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229



2. Remove:
   - rear drive shaft coupling gear nut (middle gear side) ①
   - washer
   - rear drive shaft coupling gear (middle gear side) ②

NOTE:
Use the coupling gear/middle shaft tool ③ to hold the coupling gear.

Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229



3. Remove:
   - bearing housing assembly ①

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a. Clean the outside of the bearing housing assembly.
b. Place the bearing housing assembly onto a hydraulic press.

CAUTION:

- **Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.**
- **Install a suitable socket ② on the middle driven pinion gear end to protect the thread from damage.**

c. Press the middle driven pinion gear end and remove the bearing housing.

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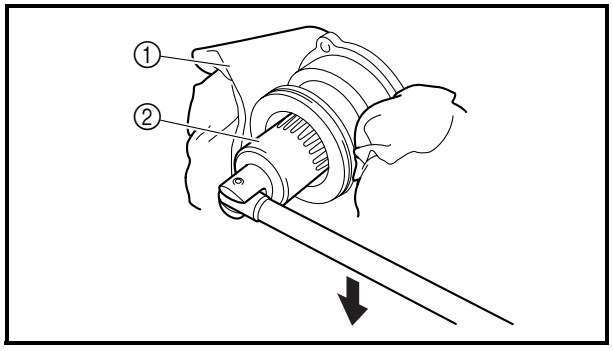

4. Remove:
   - middle driven pinion gear bearing retainer
   - bearing

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a. Attach the folded rag ①.
b. Secure the bearing housing edge in the vise.
c. Attach the bearing retainer wrench ②.

Bearing retainer wrench
90890-04128
Middle gear bearing retainer
YM-04128

CAUTION:

The middle driven pinion gear bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

d. Remove the bearing retainer and bearing.

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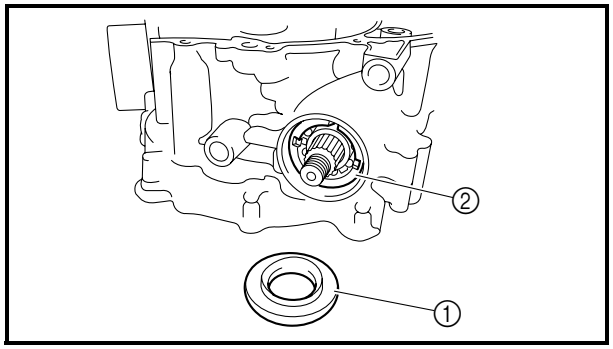
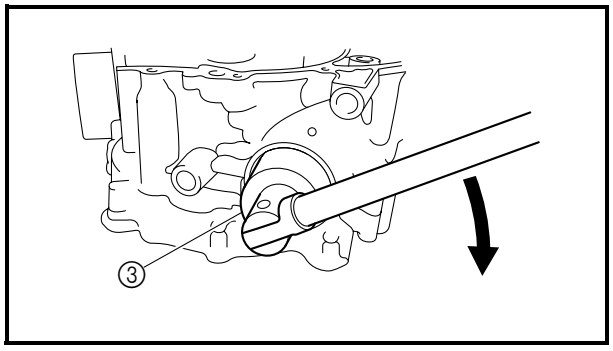


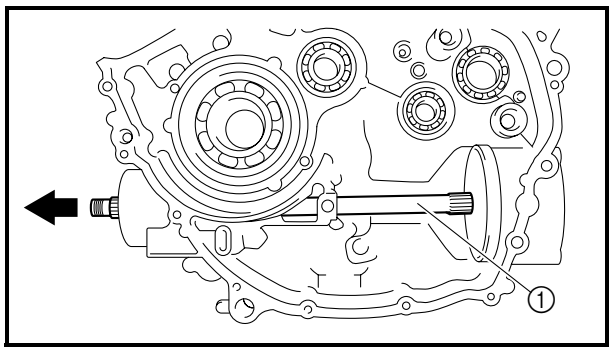
5. Remove:
   - oil seal ①
   - middle driven shaft bearing retainer ②

NOTE:
Attach the ring nut wrench ③.

	Ring nut wrench **90890-01430, YM-38404**

CAUTION:
The middle driven shaft bearing retainer has left-handed threads. To loosen the retainer turn it clockwise.

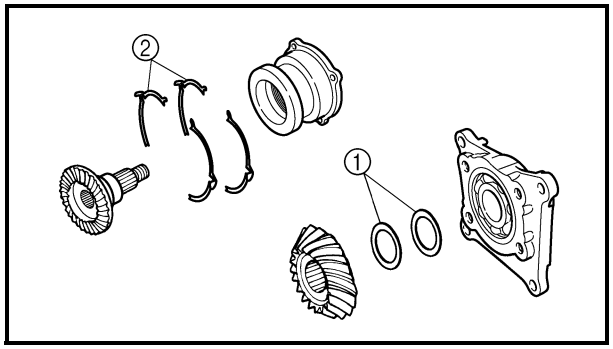




6. Remove:
   - middle driven shaft ①
     (with bearing)

EBS01021
CHECKING THE PINION GEARS

1. Check:
   - drive pinion gear teeth
   - driven pinion gear teeth
     Pitting/galling/wear → Replace.
2. Check:
   - O-ring
     Damage → Replace.
   - bearings
     Pitting/damage → Replace.

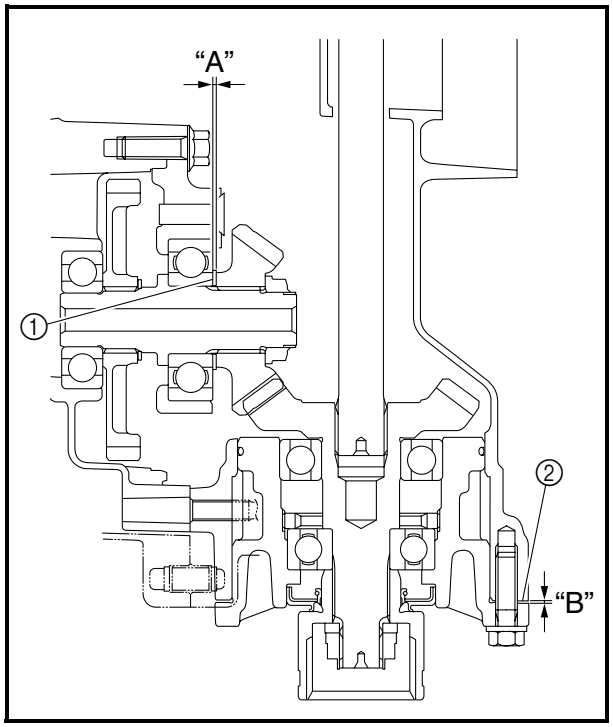


EBS00370

SELECTING MIDDLE DRIVE AND DRIVEN GEAR SHIMS

When the drive and driven gear, bearing housing assembly and/or crankcase replaced, be sure to adjust the gear shim ①, ②.

1. Select:
   - middle drive gear shim ①
   - middle driven gear shim ②



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a. Position middle drive and driven gear by using shims ① and ② with their respective thickness calculated from information marked on crankcase, bearing housing and drive gear end.

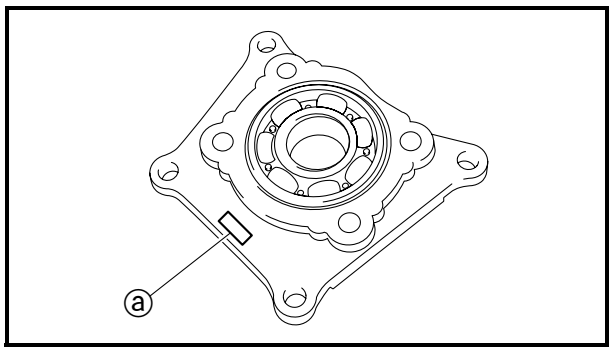
① Shim thickness "A"
② Shim thickness "B"

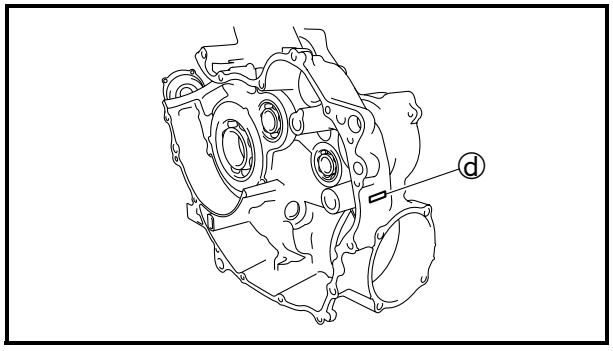
b. To find shim thickness "A" use following formula:

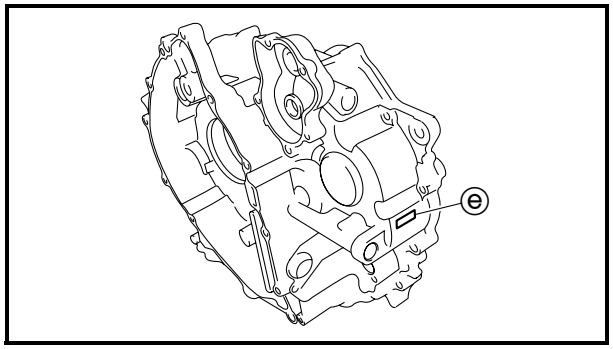
Middle drive pinion gear shim thickness "A" = ⓔ + ⓓ – ⓑ – ⓒ – ⓐ

Where:

ⓐ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from "0.6"
ⓑ = 17.0
ⓒ = 55.0
ⓓ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of "65.0"







ⓔ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of "9.0"

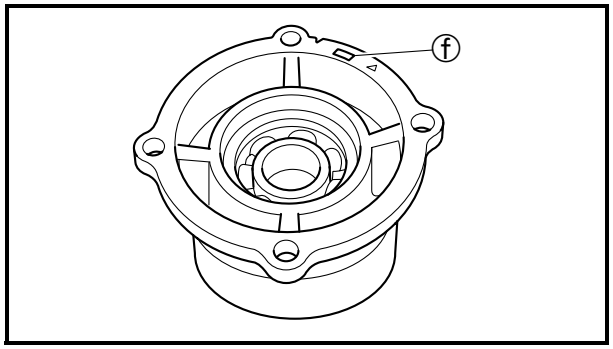
Example:

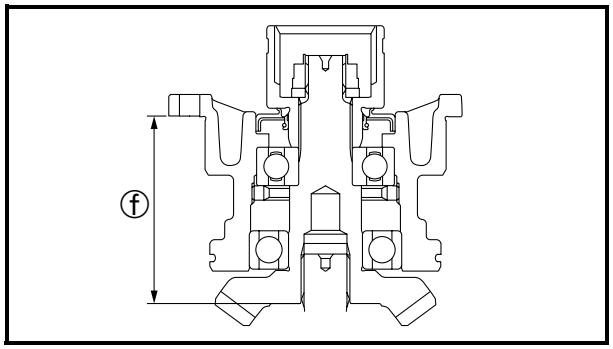
1) If the bearing housing is marked "–02", ... ⓐ is 0.58
2) ⓑ is 17.0
3) ⓒ is 55.0
4) If the right crankcase is marked "64.97", ... ⓓ is 64.97
5) If the left crankcase is marked "9.01", ... ⓔ is 9.01
6) Therefore, the shim thickness is 1.40 mm.
   "A" = 9.01 + 64.97 – 17.0 – 55.0 – 0.58
   = 1.40
7) Round off hundredths digit and select appropriate shim(s). In the example above, the calculated shim thickness is 1.40 mm. The chart instructs you, however, to round off 0 to 0.

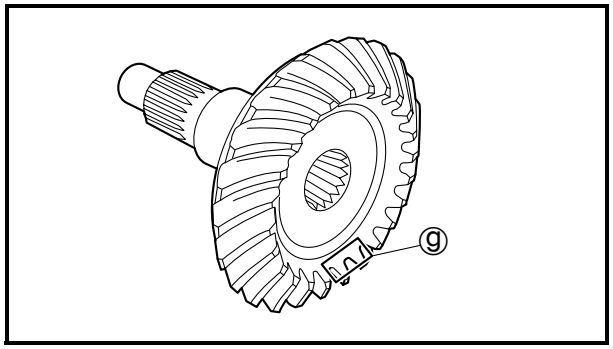
Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

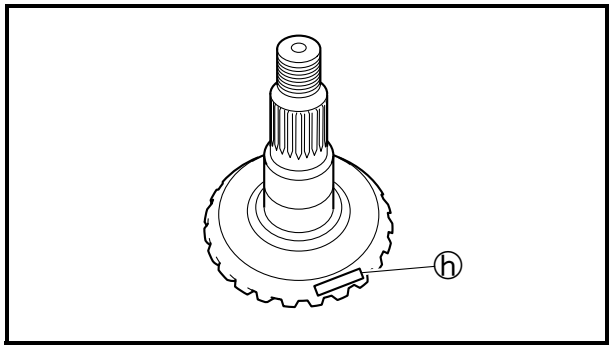
Shims are supplied in the following thickness.

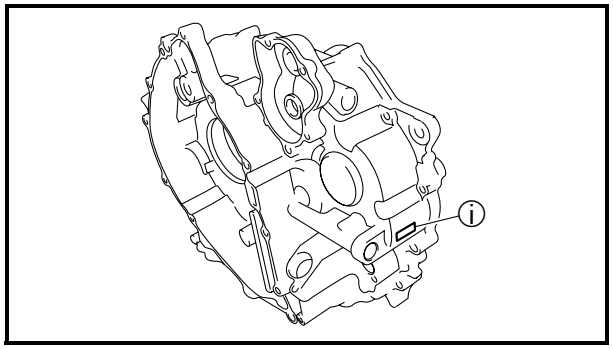
 Middle drive pinion gear shim	
Thickness (mm)	0.50 0.70 1.00 0.55 0.80 0.60 0.90











c. To find shim thickness "B" use the following formula:

Middle driven pinion gear shim thickness "B" = ⓕ – ⓖ + ⓗ – ⓘ – ⓙ – 0.05

Where:

ⓕ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from "77.5"

NOTE:

After replacing any part in the middle driven pinion gear assembly, the overall length of the assembly will change. Therefore, be sure to measure distance ⓕ to select the correct middle driven pinion gear shim thickness.

ⓖ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "49.0"

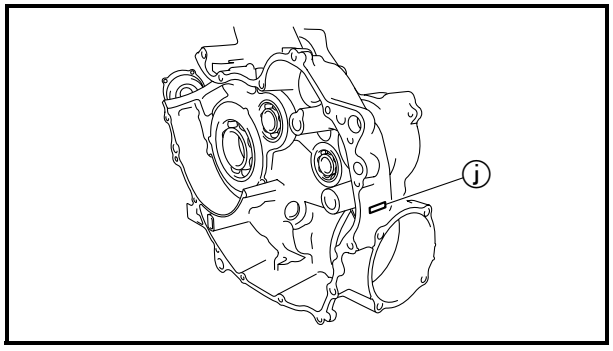
ⓗ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "80.5"

ⓘ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of "99.98"

ⓙ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of "8.12"

Example:

1) If the bearing housing is marked "+03", ... ⓕ is 77.53
2) If the driven pinion gear is marked "+0", ... ⓖ is 49.0
3) If the driven pinion gear is marked "–10", ... ⓗ is 80.40
4) If the left crankcase is marked "99.99", ... ⓘ is 99.99
5) If the right crankcase is marked "8.17", ... ⓙ is 8.17
6) Therefore, the shim thickness is 0.72 mm.
   "B" = 77.53 – 49.0 + 80.40 – 99.99 – 8.17 – 0.05
   = 0.72



7) Round off hundredth digit and select appropriate shim(s). In the example above, the calculated shim thickness is 0.72 mm. The chart instructs you, however, to round off 2 to 0.

Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thickness.

Middle drive pinion gear shim	
Thickness (mm)	0.10 0.40 0.15 0.50 0.20 0.60 0.30

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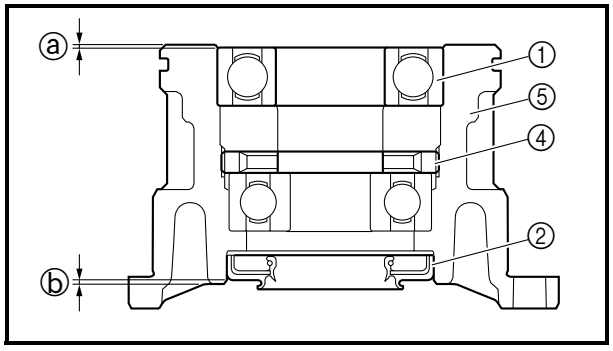
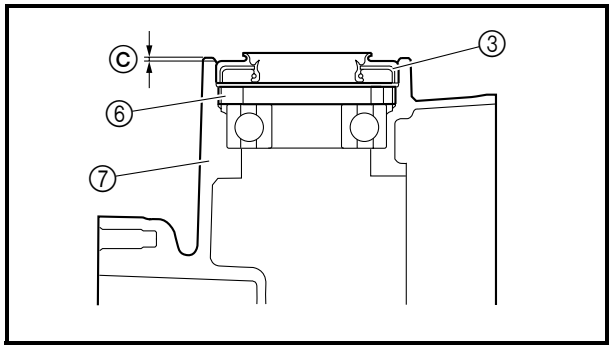


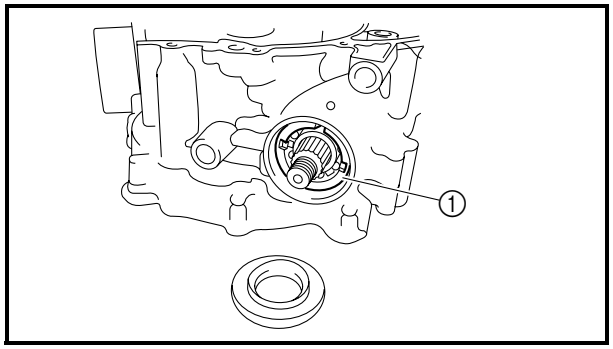


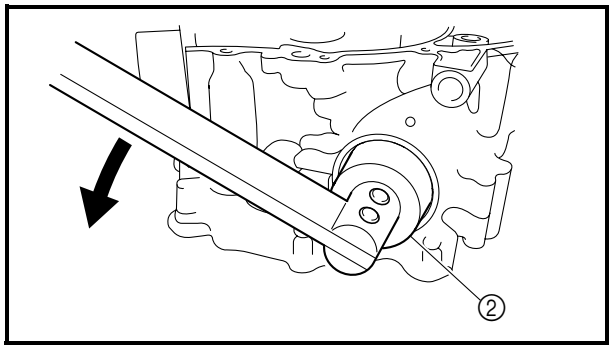
INSTALLING THE BEARING AND OIL SEALS

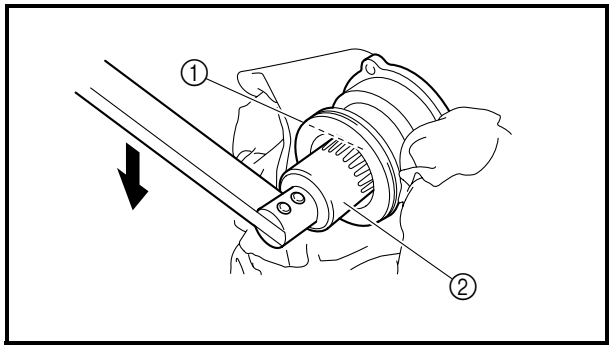
1. Install:
   - bearing ①
   - oil seal ②
   - oil seal ③

Installed depth of bearing ⓐ
0.9 ~ 1.4 mm (0.035 ~ 0.055 in)
Installed depth of oil seal ⓑ
1.0 ~ 1.5 mm (0.039 ~ 0.059 in)
Installed depth of oil seal ⓒ
1.0 ~ 1.5 mm (0.039 ~ 0.059 in)

④ Middle drive pinion gear bearing retainer
⑤ Bearing housing
⑥ Middle driven shaft bearing retainer
⑦ Crankcase







EBS00373

INSTALLING THE MIDDLE DRIVEN SHAFT

1. Install:
   - middle driven shaft bearing retainer ①

LT **80 Nm (8.0 m · kg, 58 ft · lb)**

NOTE:

Attach the ring nut wrench ②.

Ring nut wrench
90890-01430, YM-38404

CAUTION:

The middle driven shaft bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.

2. Install:
   - middle driven pinion gear bearing retainer ①

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a. Secure the bearing housing edge in the vise with a clean rag.
b. Attach the bearing retainer wrench ②.

Bearing retainer wrench
90890-04128
Middle gear bearing retainer
YM-04128

c. Tighten the bearing retainer.

CAUTION:

The middle driven pinion gear bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.

Bearing retainer
130 Nm (13.0 m · kg, 94 ft · lb)
LOCTITE®

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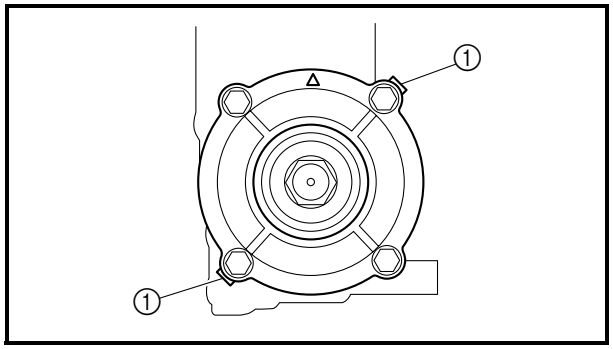
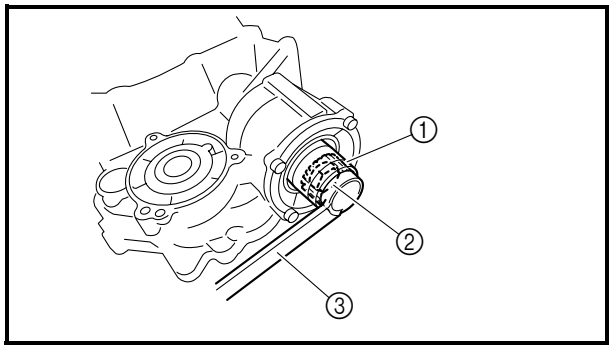


3. Install:
   - middle driven gear shim(s) ①
   - bearing housing

NOTE:
Install the shim(s) so that the tabs are positioned as shown in the illustration.

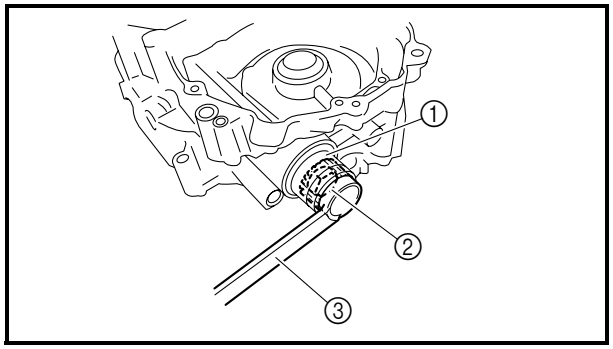


4. Install:
   - rear drive shaft coupling gear (middle gear side) ①
   - washer
   - rear drive shaft coupling gear nut (middle gear side) ②

150 Nm (15.0 m · kg, 110 ft · lb)

NOTE:
Use the coupling gear/middle shaft tool ③ to hold the coupling gear.

Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229

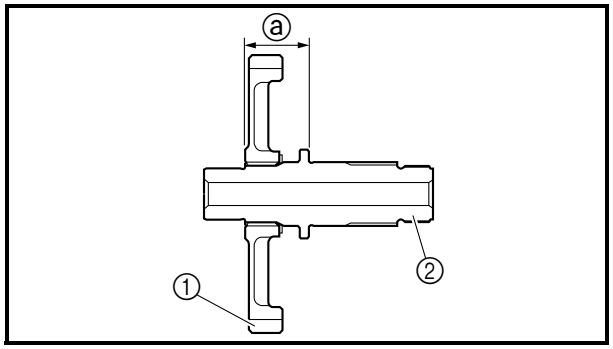


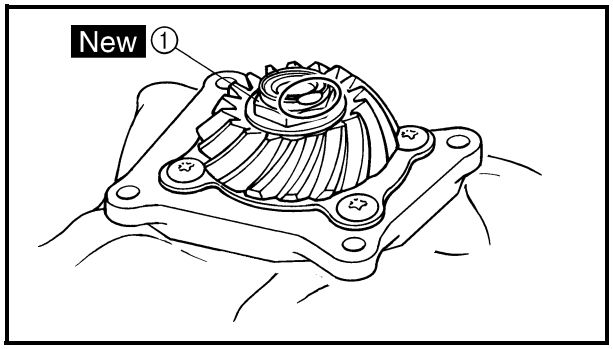
5. Install:
   - front drive shaft coupling gear (middle gear side) ①
   - washer
   - front drive shaft coupling gear nut (middle gear side) ②

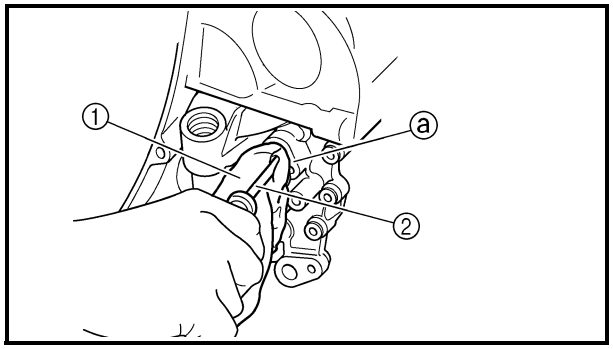
115 Nm (11.5 m · kg, 85 ft · lb)

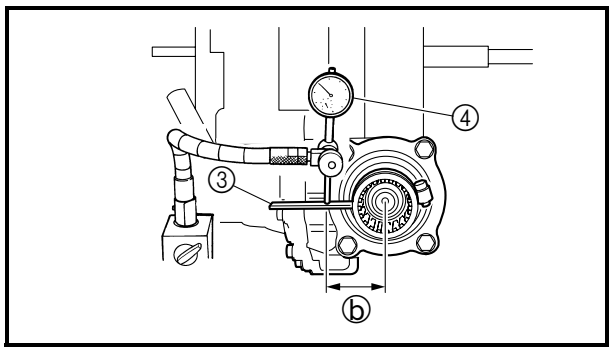
NOTE:
Use the coupling gear/middle shaft tool ③ to hold the coupling gear.

Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229









INSTALLING THE MIDDLE DRIVE SHAFT

1. Install:
   - circlip
   - middle driven gear ①
     (to the middle drive shaft ②)

Installed depth of middle driven gear ⓐ
24.7 ~ 24.9 mm (0.97 ~ 0.98 in)

2. Tighten:
   - middle drive pinion gear nut ① New

180 Nm (18.0 m · kg, 130 ft · lb)

NOTE:
Secure the middle drive shaft in the vise with a clean rag.

3. Lock the threads with a drift punch.

EBS01022

MEASURING THE MIDDLE GEAR BACKLASH

1. Measure:
   - gear lash

Middle gear lash
0.10 ~ 0.30 mm
(0.004 ~ 0.012 in)

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a. Temporarily install the left crankcase.
b. Wrap a rag ① around a screwdriver ②, and then insert it into the installation hole ⓐ of the left crankcase speed sensor to hold the middle driven gear.
c. Attach the final gear backlash band ③ and dial gauge ④.

Final gear backlash band
90890-01511
Middle drive gear lash tool
YM-01230

ⓑ 45 mm (1.8 in)

d. Measure the gear lash while rotating the middle driven shaft back and forth.

NOTE:
Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.

e. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shims and/or middle drive pinion gear shim(s).

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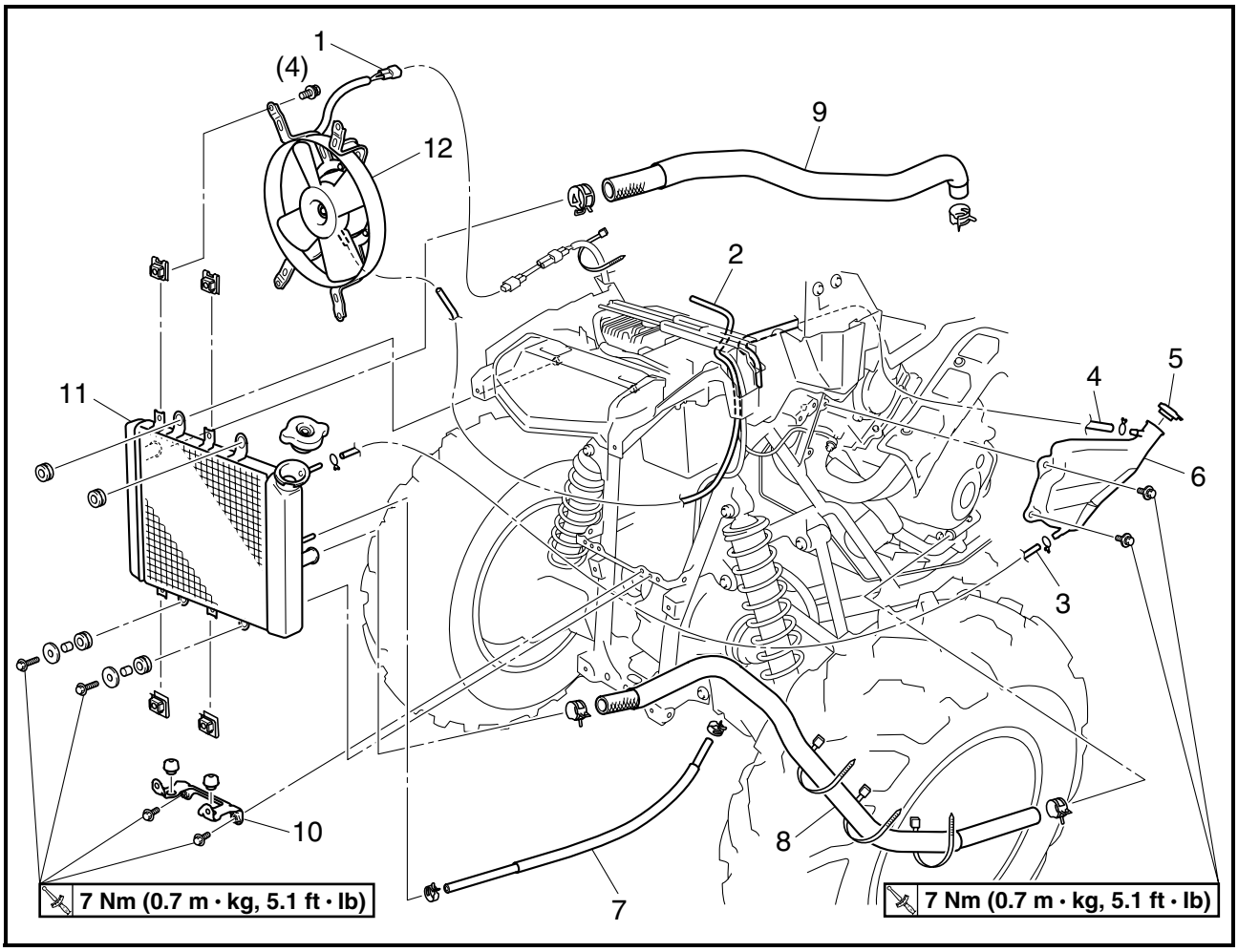
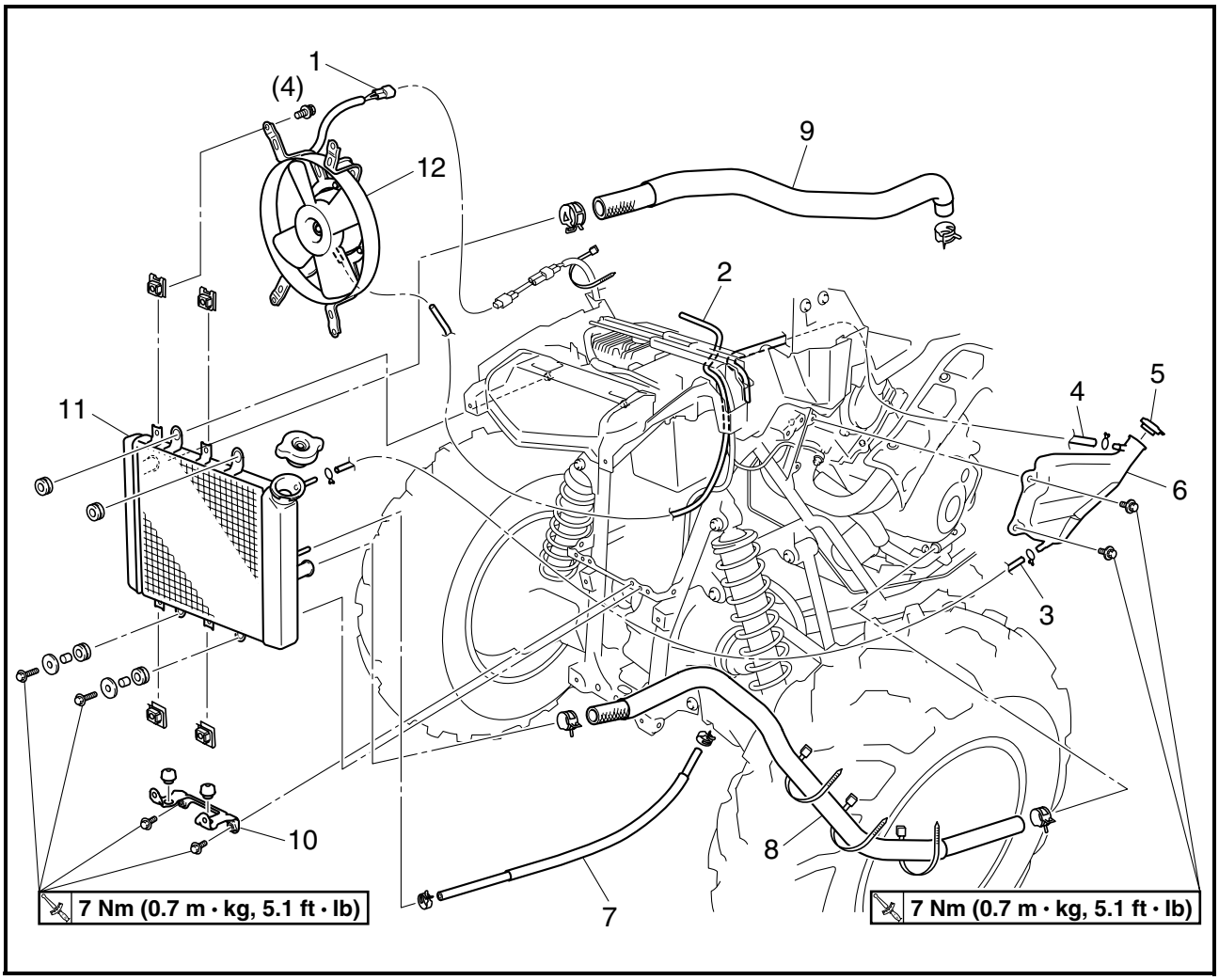
EBS00125

COOLING SYSTEM

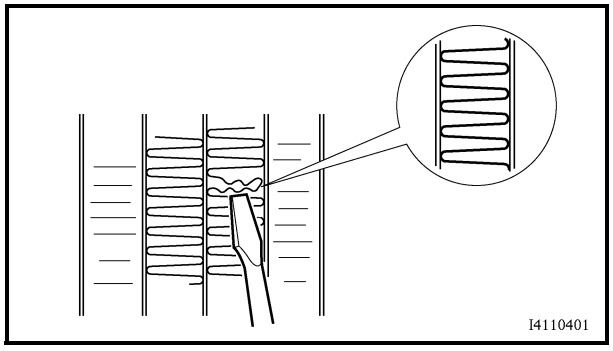
RADIATOR



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Front fenders		Refer to "FRONT FENDERS AND FRONT GRILL" in chapter 3.
	Front guard		Refer to "FRONT CARRIER AND FRONT GUARD" in chapter 3.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator fan motor coupler	1	Disconnect.
2	Radiator fan breather hose	1	
3	Coolant reservoir hose	1	
4	Coolant reservoir breather hose	1	



Order	Job/Part	Q'ty	Remarks
5	Coolant reservoir cap	1	
6	Coolant reservoir	1	
7	Fast idle plunger outlet hose	1	
8	Radiator outlet hose	1	
9	Radiator inlet hose	1	
10	Radiator bracket	1	
11	Radiator	1	
12	Radiator fan	1	
			For installation, reverse the removal procedure.

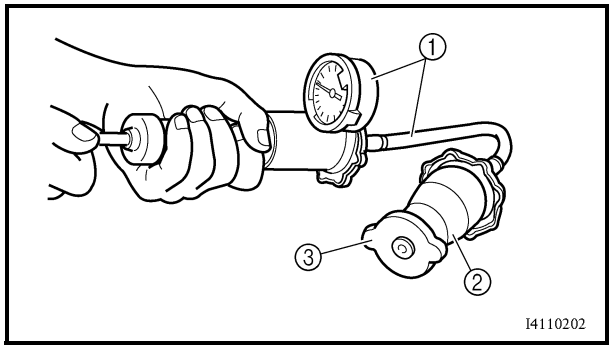


EBS00127
CHECKING THE RADIATOR

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
93.3 ~ 122.7 kPa
(0.933 ~ 1.227 kg/cm², 13.27 ~ 17.45 psi)

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a. Install the radiator cap tester ① and radiator cap tester adapter ② to the radiator cap ③.

Radiator cap tester
90890-01325
Radiator pressure tester
YU-24460-01
Radiator cap tester adapter
90890-01352
Radiator pressure tester adapter
YU-33984

b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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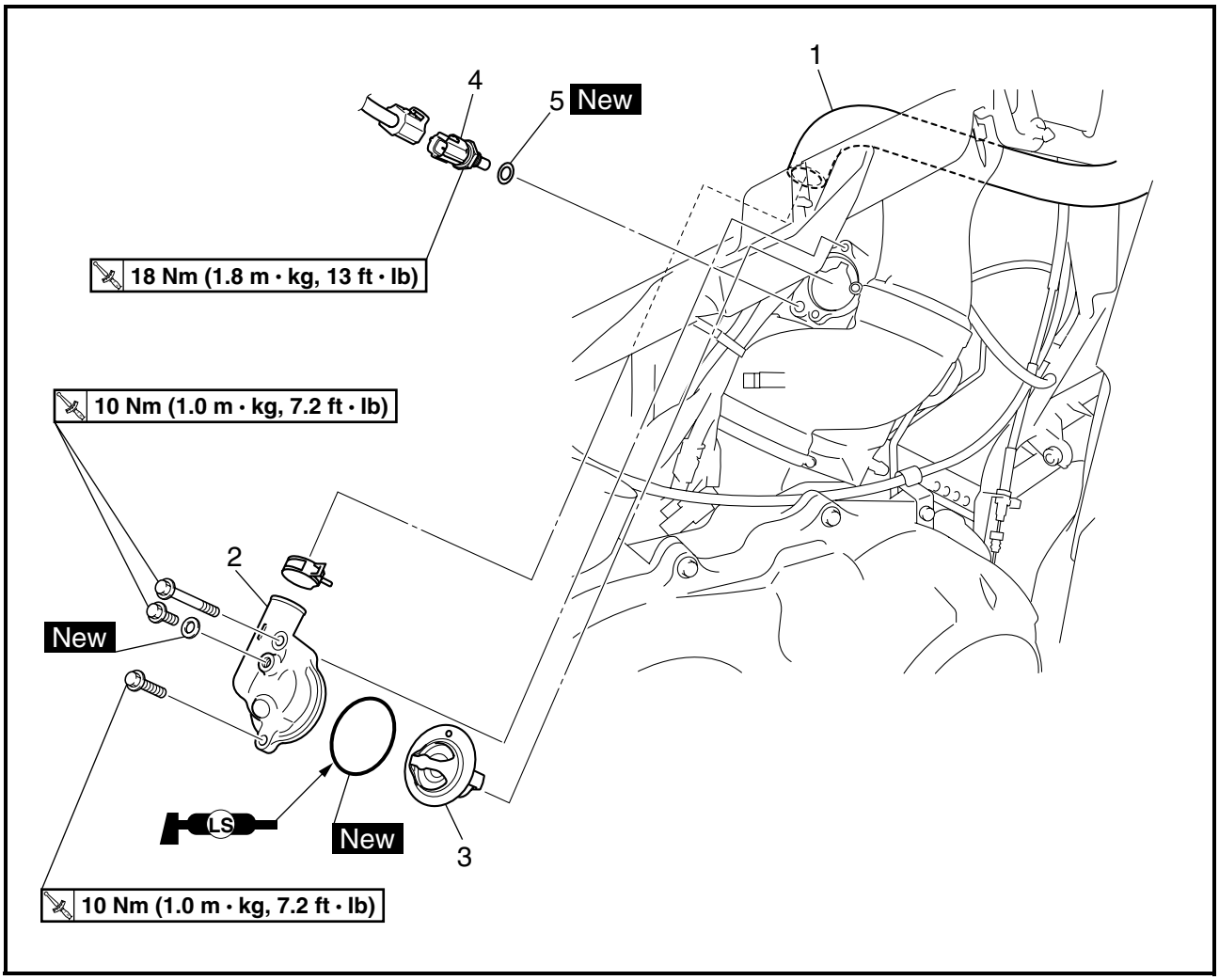
4. Check:
   - radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” in chapter 9.

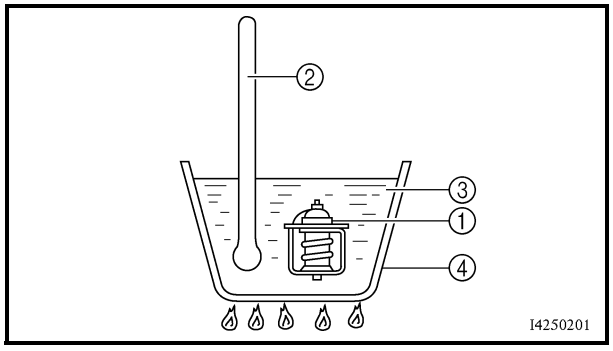
EBS00128
INSTALLING THE RADIATOR

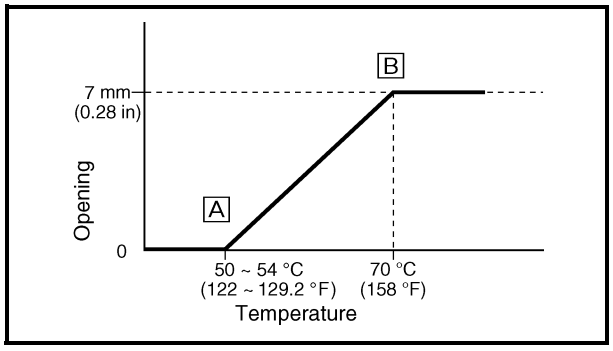
1. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” in chapter 3.
2. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
3. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR”.

EBS00129
THERMOSTAT



Order	Job/Part	Q'ty	Remarks
	Removing the thermostat		Remove the parts in the order listed.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator inlet hose	1	Disconnect.
2	Thermostat cover	1	
3	Thermostat	1	
4	Coolant temperature sensor	1	
5	Copper washer	1	
			For installation, reverse the removal procedure.





EBS00132
CHECKING THE THERMOSTAT

1. Check:
   - thermostat ①
     Does not open at 50 ~ 54 °C (122 ~ 129.2 °F) → Replace.

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a. Suspend the thermostat in a container filled with water.
b. Slowly heat the water.
c. Place a thermometer in the water.
d. While stirring the water, observe the thermostat and thermometer's indicated temperature.

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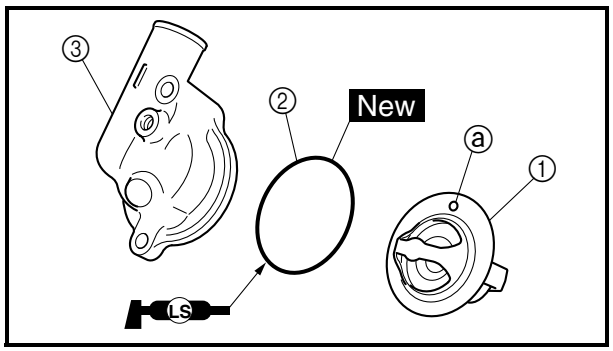
① Thermometer
② Water
③ Thermostat
④ Container
A Fully closed
B Fully open

NOTE:
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:
   - thermostat housing cover
   - thermostat housing (cylinder head)
     Cracks/damage → Replace.



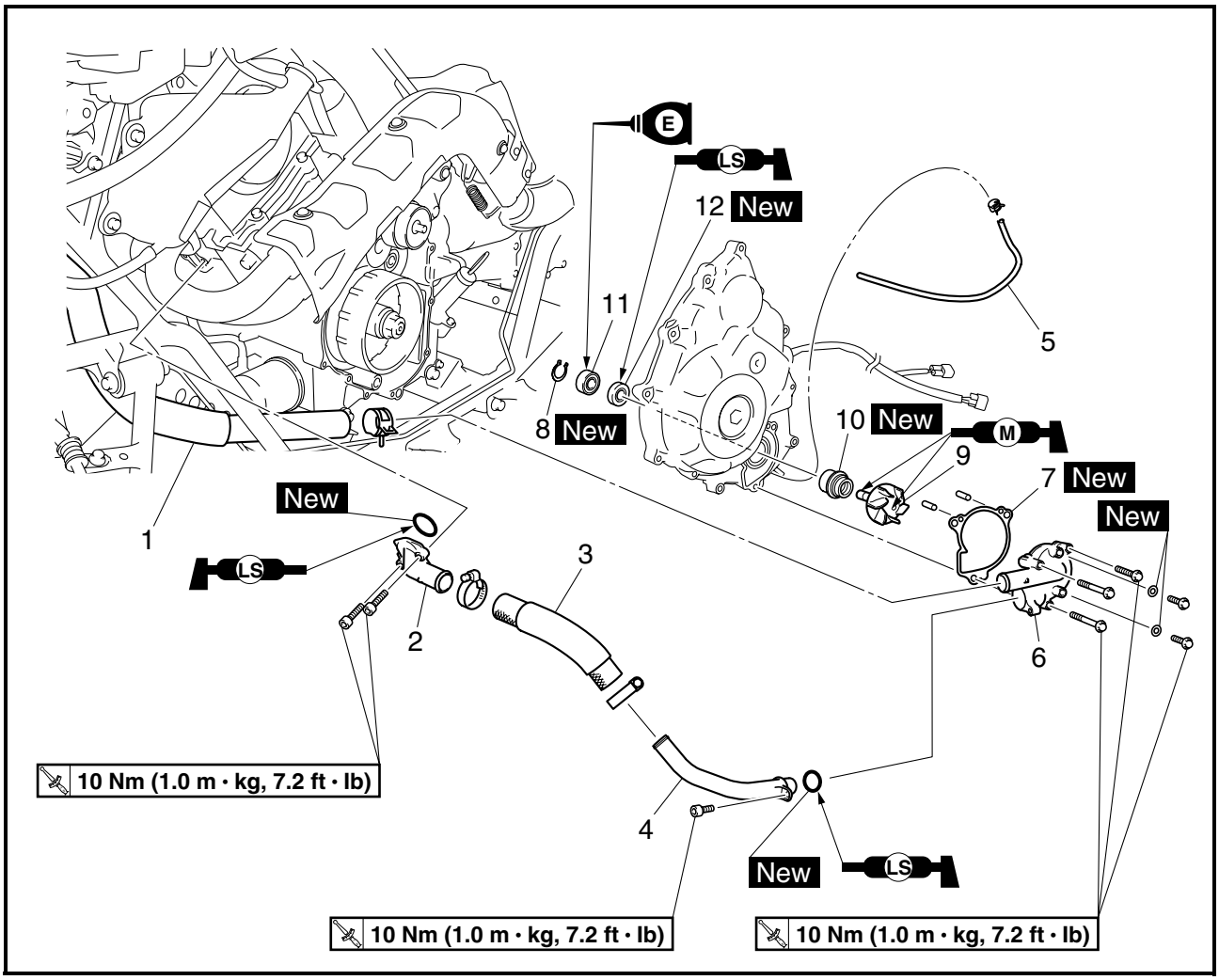
EBS00133
INSTALLING THE THERMOSTAT

1. Install:
   - thermostat ①
   - O-ring ② New
   - thermostat cover ③

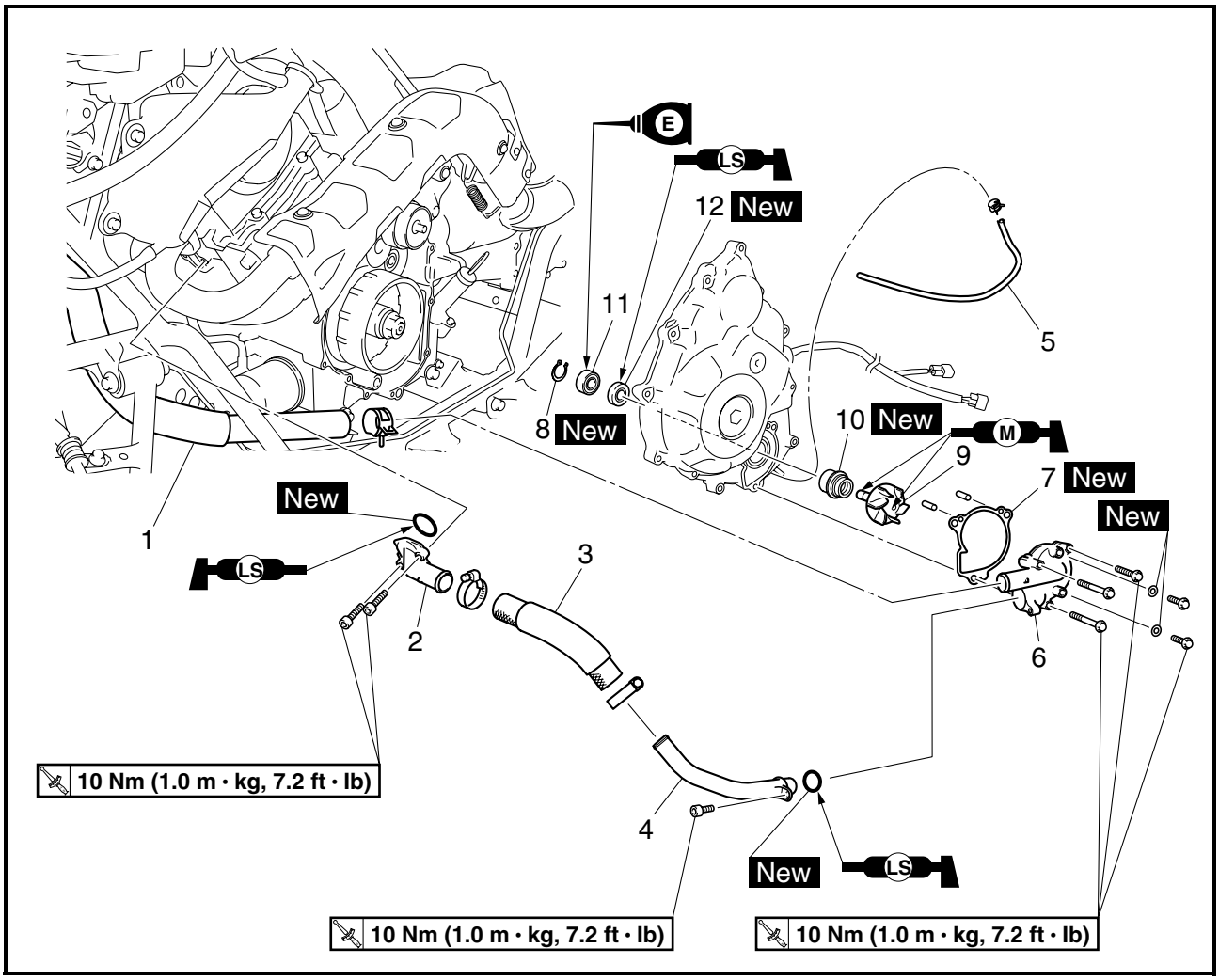
NOTE:
Install the thermostat with its breather hole ⓐ facing up.

2. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" in chapter 3.
3. Check:
   - cooling system
     Leak → Repair or replace any faulty part.

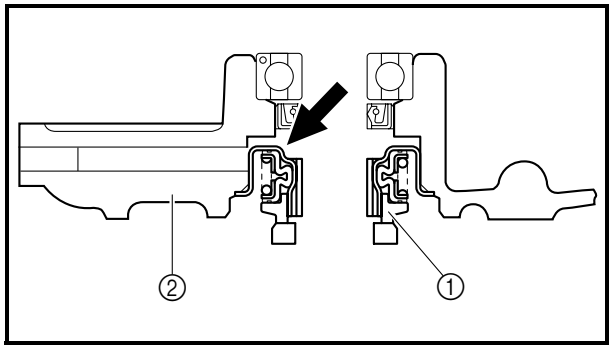
EBS00134
WATER PUMP



Order	Job/Part	Q'ty	Remarks
	Removing the water pump		Remove the parts in the order listed.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Left front fender		Refer to "FRONT FENDERS AND FRONT GRILL" in chapter 3.
	AC magneto cover		Refer to "AC MAGNETO" in chapter 4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Radiator outlet hose	1	Disconnect.
2	Water jacket joint	1	
3	Water pump outlet hose	1	
4	Water pump outlet pipe	1	
5	Water pump breather hose	1	
6	Water pump housing	1	



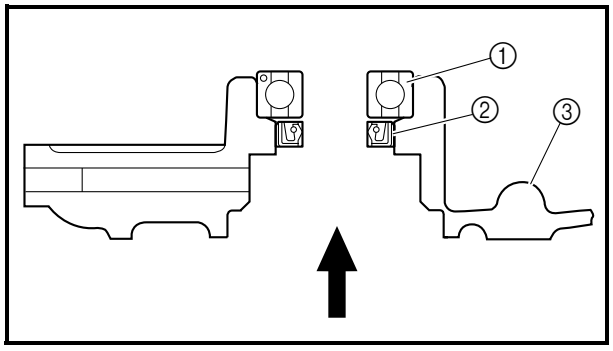
Order	Job/Part	Q'ty	Remarks
7	Gasket	1	
8	Circlip	1	
9	Impeller shaft	1	
10	Water pump seal	1	
11	Bearing	1	
12	Oil seal	1	
			For installation, reverse the removal procedure.



EBS00138
DISASSEMBLING THE WATER PUMP

1. Remove:
   • water pump seal ①

NOTE:
Tap out the water pump seal from the inside of the AC magneto cover ②.

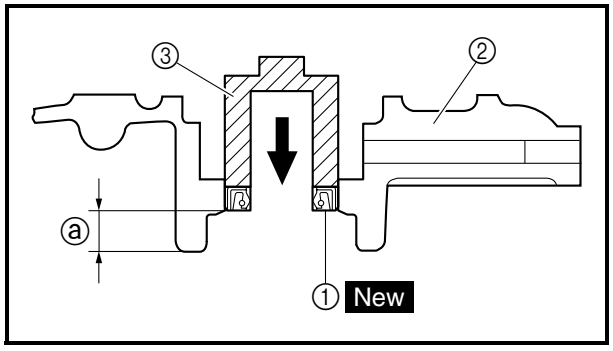


2. Remove:
   • bearing ①
   • oil seal ②

NOTE:
Tap out the bearing and oil seal from the outside of the AC magneto cover ③.

EBS00139
CHECKING THE WATER PUMP

1. Check:
   • water pump housing
   • impeller shaft
   Cracks/damage/wear → Replace.
2. Check:
   • water jacket
   • water jacket outlet hose
   • water jacket outlet pipe
   Cracks/damage/wear → Replace.
   • bearing
   Rough movement → Replace.



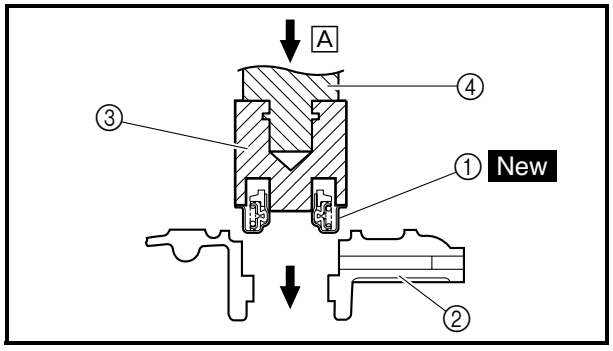
EBS00140
ASSEMBLING THE WATER PUMP

1. Install:
   - oil seal ① New
     (into the AC magneto cover ②)

NOTE:

- Before installing the oil seal, apply tap water or coolant onto its out surface.
- Install the oil seal with a socket ③ that matches its outside diameter.

Installed depth of oil seal ⓐ
8.1 ~ 8.7 mm (0.32 ~ 0.34 in)



2. Install:
   - water pump seal ① New
     (into the AC magneto cover ②)

CAUTION:

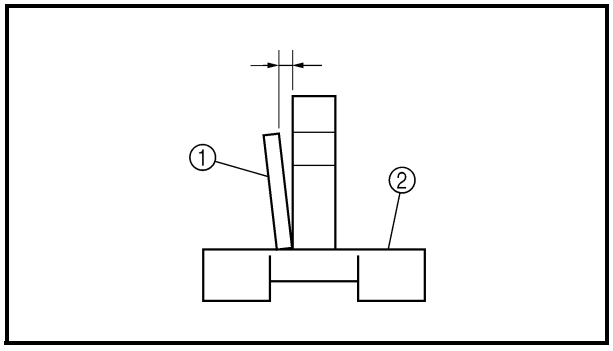
Never lubricate the water pump seal surface with oil or grease.

NOTE:

Install the water pump seal with the special tools.

Mechanical seal installer ③
90890-04132
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver ④
90890-04058
Bearing driver 40 mm
YM-04058

A Push down.



3. Measure:
   • impeller shaft tilt
   Out of specification → Replace.

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)

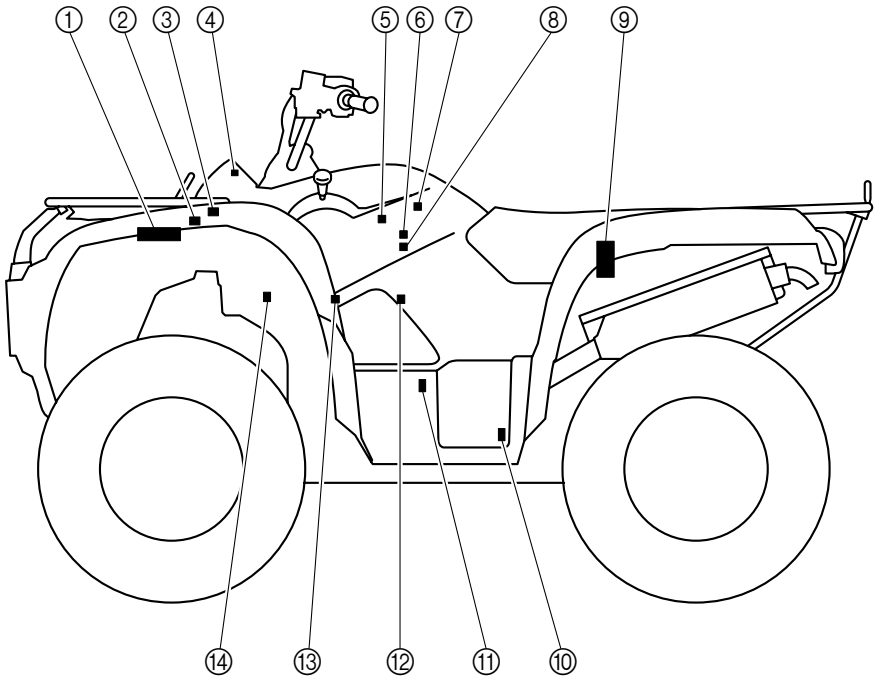
① Straightedge
② Impeller shaft

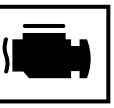
EAS00894

FUEL INJECTION SYSTEM

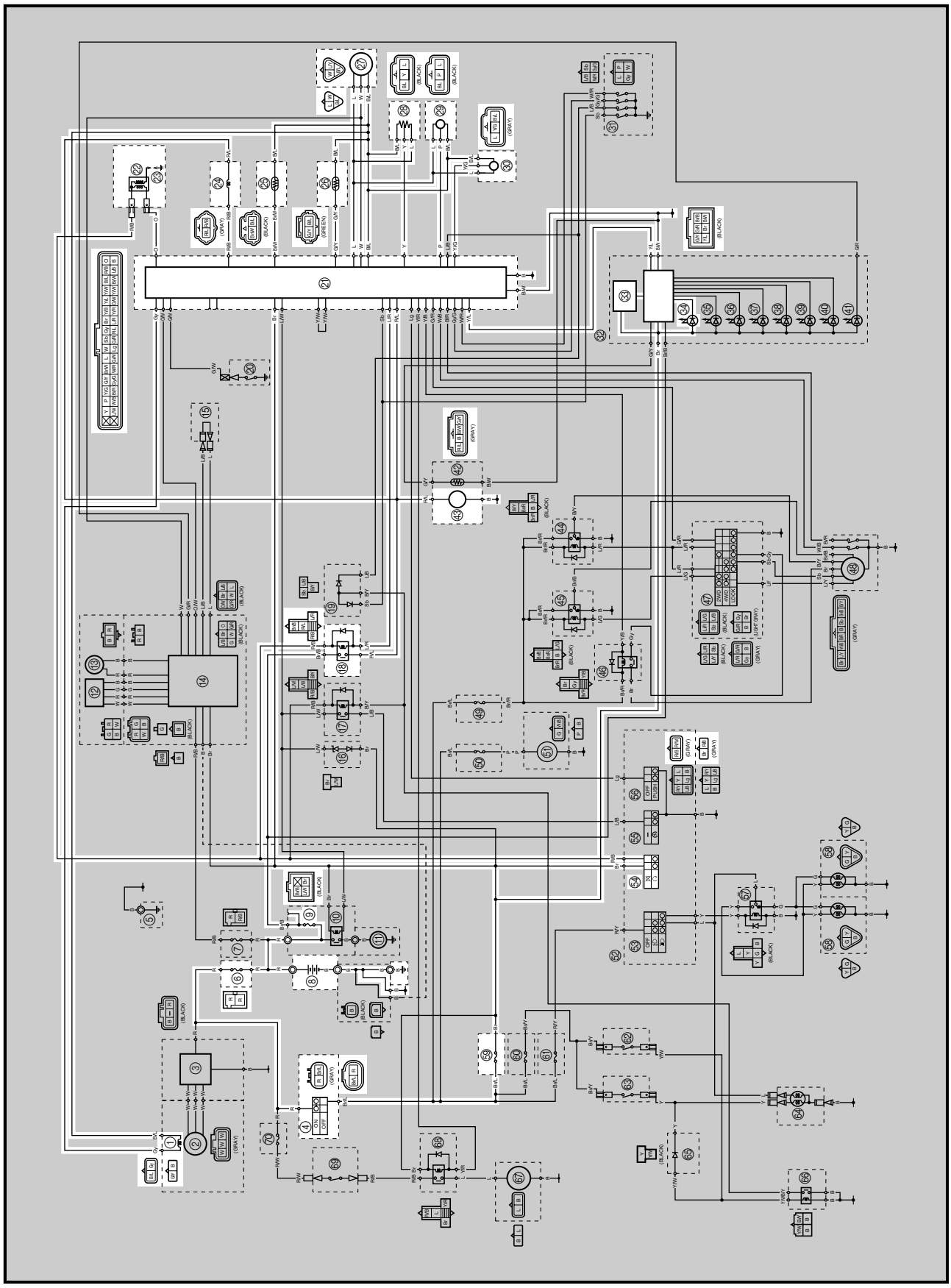
FUEL INJECTION SYSTEM

① ECU (engine control unit)
② Lean angle sensor
③ Fuel injection system relay
④ Engine trouble warning light
⑤ Intake air pressure sensor
⑥ TPS (throttle position sensor)
⑦ Intake air temperature sensor
⑧ Fuel injector
⑨ Fuel pump
⑩ Speed sensor
⑪ Crankshaft position sensor
⑫ Coolant temperature sensor
⑬ Spark plug
⑭ Ignition coil





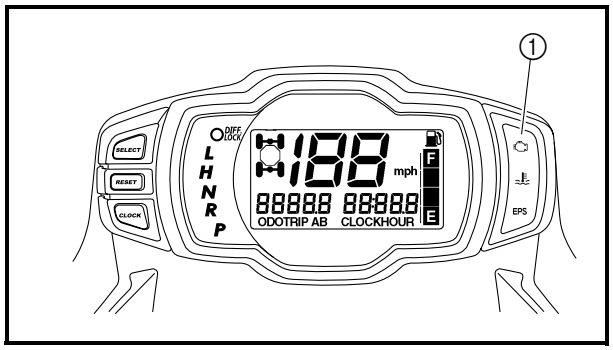
EAS27340
CIRCUIT DIAGRAM



① Crankshaft position sensor
④ Main switch
⑥ Main fuse
⑧ Battery
⑨ Fuel injection system fuse
⑱ Fuel injection system relay
㉑ ECU (engine control unit)
㉒ Ignition coil
㉓ Spark plug
㉔ Fuel injector
㉕ Intake air temperature sensor
㉖ Coolant temperature sensor
㉗ Speed sensor
㉘ TPS (throttle position sensor)
㉙ Intake air pressure sensor
㉚ Lean angle sensor
㉝ Multifunction meter
㉞ Engine trouble warning light
㊸ Fuel pump
㊹ Engine stop switch
㊾ Ignition fuse

ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.



① Engine trouble warning light

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the odometer/tripmeter LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

Engine trouble warning light indication and fuel injection system operation

Warning light indication	ECU operation	Fuel injection operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

*The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

12:	Crankshaft position sensor	41:	Lean angle sensor (open or short-circuit)
30:	Lean angle sensor (latch up detected)	50:	ECU internal malfunction (memory check error)

EAS27380
SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.
When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

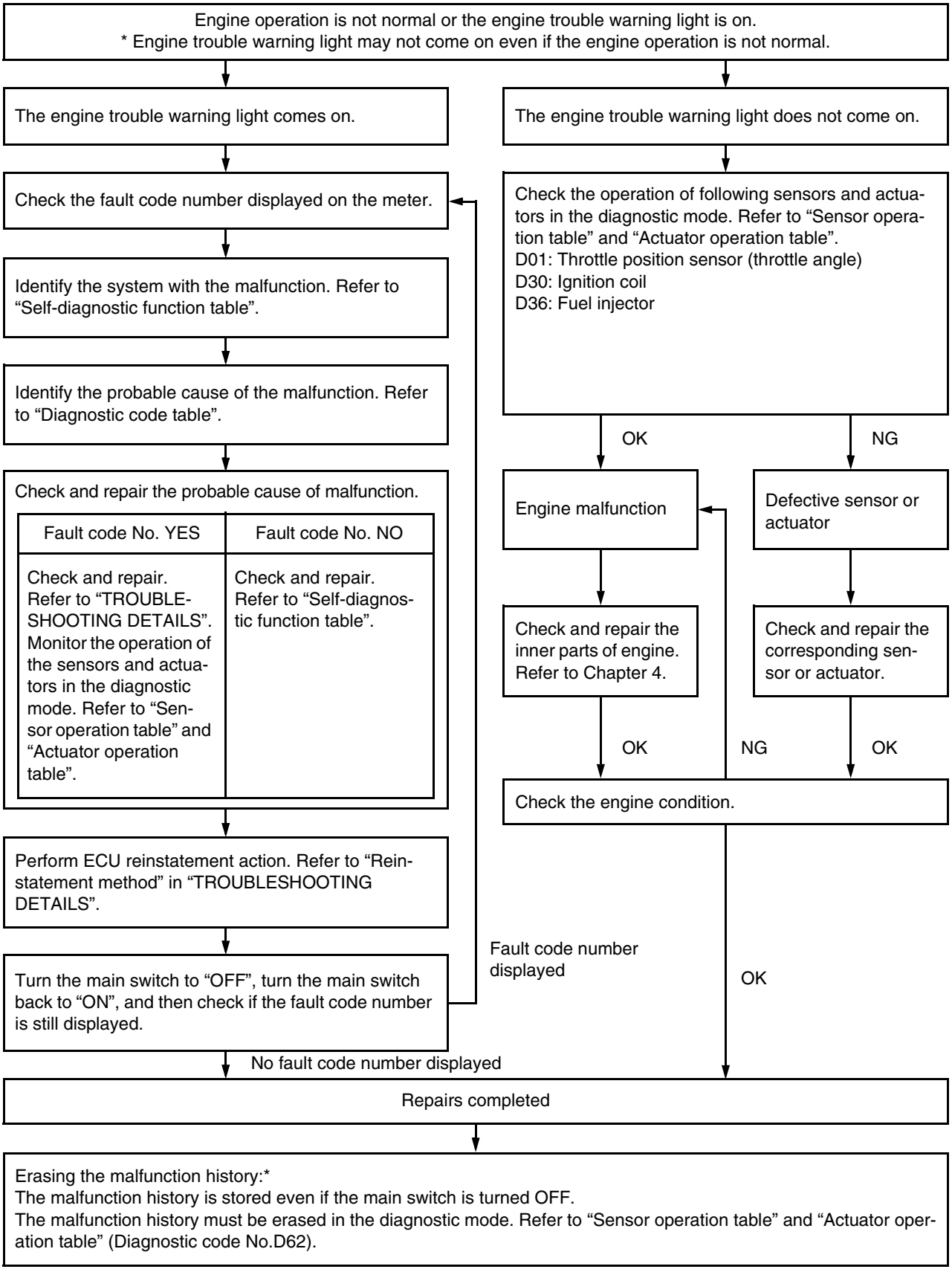
Self-diagnostic function table

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor: open or short circuit detected.	Able	Able
14	Intake air pressure sensor (hose line)	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor: open or short circuit detected.	Able	Able
16	Throttle position sensor	Stuck throttle position sensor detected.	Able	Able
21	Coolant temperature sensor	Coolant temperature sensor: open or short circuit detected.	Able	Able
22	Intake air temperature sensor (open or short circuit)	Intake air temperature sensor: open or short circuit detected.	Able	Able
30	Lean angle sensor (latch up detected)	The vehicle has overturned.	Unable	Unable
33	Ignition coil (faulty ignition)	Malfunction detected in the primary wire of ignition coil.	Unable	Unable
39	Injector (open circuit)	Injector: open circuit detected.	Unable	Unable
41	Lean angle sensor (open or short circuit)	Lean angle sensor: open or short circuit detected.	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.	Able	Able
43	Fuel system voltage (monitoring voltage)	The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	Error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (Monitoring voltage)	Power supply is not normal.	Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter).	Unable	Unable

Communication error with the meter

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
Er-1	ECU internal malfunction (output signal error)	No signals are received from the ECU.	Unable	Unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	Unable	Unable
Er-3	ECU internal malfunction (output signal error)	Data from the ECU cannot be received correctly.	Unable	Unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	Unable	Unable

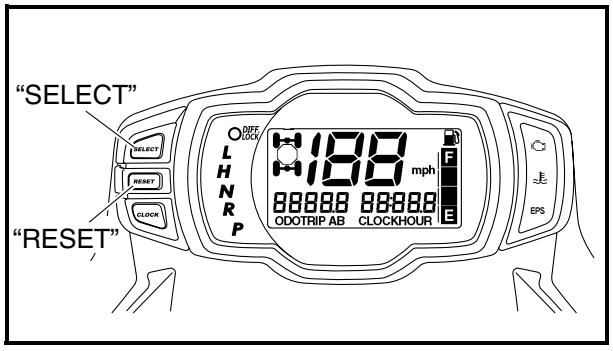
EAS00904
TROUBLESHOOTING CHART



* Operated when the engine trouble warning light is on.

EAS00905
DIAGNOSTIC MODE

It is possible to monitor the sensor output data or check the activation of actuators without connecting the measurement equipment by simply switching the meter indication from the normal mode to the diagnostic monitoring mode.



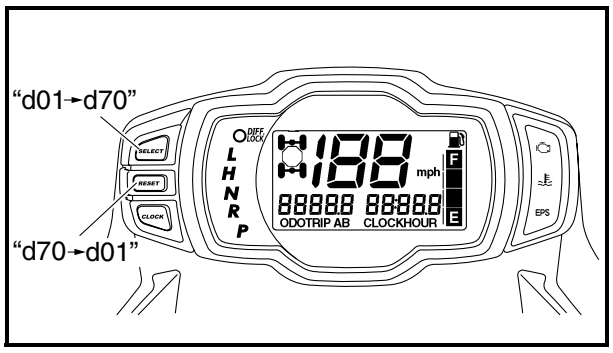
Setting the diagnostic mode

1. Turn the main switch to "OFF" and set the engine stop switch to "OFF".
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the "SELECT" and "RESET" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.

NOTE:

- All displays on the meter disappear.
- "dIAG" appears on the LCD meter.

4. Simultaneously press the "SELECT" and "RESET" buttons for 2 seconds or more to execute the selection.
5. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the "SELECT" and "RESET" buttons.



NOTE:

- The diagnostic code number appears on the LCD meter (01-70).
- To decrease the selected diagnostic code number, press the "RESET" button. Press the "RESET" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "SELECT" button. Press the "SELECT" button for 1 second or longer to automatically increase the diagnostic code numbers.

6. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating conditions of the sensor appears on the LCD meter.
   - Actuator operation
     Set the engine stop switch to “ON” to operate the actuator.
   * If the engine stop switch is set to “ON”, set it to “OFF”, and then set it to “ON” again.
7. Turn the main switch to “OFF” to cancel the diagnostic mode.

NOTE:
To perform a reliable diagnosis, make sure to turn off the power supply before every check and then start right from the beginning.

Diagnostic code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
12	No normal signals are received from the crankshaft position sensor.	• Open or short circuit in wire harness. • Defective crankshaft position sensor. • Malfunction in pickup rotor. • Malfunction in ECU. • Improperly installed sensor.	—
13	Intake air pressure sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake air pressure sensor. • Malfunction in ECU.	D03
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU.	D03
15	Throttle position sensor: open or short circuit detected.	• Open or short circuit in wire sub lead. • Open or short circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU. • Improperly installed throttle position sensor.	D01
16	Stuck throttle position sensor detected.	• Stuck throttle position sensor. • Malfunction in ECU.	D01
21	Coolant temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective coolant temperature sensor. • Malfunction in ECU. • Improperly installed coolant temperature sensor.	D06
22	Intake air temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake air temperature sensor. • Malfunction in ECU. • Improperly installed intake air temperature sensor.	D05
30	The vehicle has overturned.	• Overturned. • Malfunction in ECU.	D08
33	Malfunction detected in the primary lead of the ignition coil.	• Open or short circuit in wire harness. • Malfunction in ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cut-off circuit system.	D30 D32
39	Open circuit detected in a injector.	• Open or short circuit in wire harness. • Improperly installed injector. • Defective injector.	D36
41	Lean angle sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU.	D08
42	No normal signals are received from the speed sensor.	• Open circuit in wire harness. • Defective speed sensor. • Malfunction in vehicle speed sensor detected. • Malfunction in the engine side of the neutral switch. • Malfunction in ECU.	D07
43	Power supply to the injector and fuel pump is not normal.	• Open or short circuit in wire harness. • Malfunction in ECU.	D09
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	• 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 is not normal.	• Malfunction in the charging system. Refer to “CHARGING SYSTEM” in chapter 9.	—
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the LCD of the meter.)	• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)	—

Sensor operation table

Diagnostic code No.	Item	Meter display	Checking method
D01	Throttle angle • Fully closed position • Fully opened position	 15 ~ 20 95 ~ 100	 Check with throttle fully closed. Check with throttle fully open.
D03	Pressure difference (atmospheric pressure and intake air pressure)	Displays the intake air pressure.	Set the engine stop switch to “RUN”, then operate the throttle while pushing the start switch. (If the display value changes, the performance is OK.)
D05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured intake air temperature with the meter.
D06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter.
D07	Vehicle speed pulse	0 ~ 999	Check that the number increases when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.
D08	Lean angle sensor • Upright • Overturned	 3.7 ~ 4.4 0.4 ~ 1.4	Remove the lean angle sensor and incline it more than 65 degrees.
D09	Fuel system voltage (battery voltage)	Approximately 12.0	Set the engine stop switch to “RUN”, and then compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
D21	Neutral switch • Neutral • In gear	 ON OFF	Shift the transmission.
D60	EEPROM fault code display • No history • History exists	 00 01	—
D61	Malfunction history code display • No history • History exists	 00 Fault codes 12-50 • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
D62	Malfunction history code erasure • No history • History exists	 0 Up to 16 fault codes	 — To erase the history, set the engine stop switch to “OFF” and then to “RUN”.
D70	Control number	00 ~ 255	—

Actuator operation table

• Actuator operation

Set the engine stop switch to “OFF” and then to “RUN”.

Diagnostic code No.	Item	Actuation	Checking method
D30	Ignition coil	Actuates the ignition coil five times in one-second intervals. The engine trouble warning light also flashes five times.	Check the spark five times. • Connect an ignition checker.
D36	Injector	Actuates the injector five times in one-second intervals.	Check the operating sound of the injector five times.
D50	Fuel pump relay	Actuates the fuel pump relay five times in one-second intervals. The engine trouble warning light also flashes five times. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel pump relay five times.
D51	Radiator fan motor relay	Actuates the radiator fan motor relay and illuminates the engine trouble warning light five cycles (5 seconds per cycle–2 seconds ON, 3 seconds OFF). (ON 2 seconds, OFF 3 seconds)	Check the operating sound of the radiator fan motor relay five times.

EAS00908

TROUBLESHOOTING DETAILS

This section describes the countermeasures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the meter display according to the “Reinstatement method”.

Fault code No.:

Fault code number displayed on the meter 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.
Diagnostic code No.		—	—

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of crankshaft position sensor.	Check for looseness or pinching.	Cranking the engine.
2	Connections • Crankshaft position sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU coupler. (gray–gray) (black/blue–black/blue)	
4	Defective crankshaft position sensor.	• Replace if defective. Refer to “IGNITION SYSTEM” in chapter 9.	

Fault code No.	13	Symptom	Intake air pressure sensor: open or short circuit detected.	
Diagnostic code No.		D03	Intake air pressure sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Intake air pressure sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Turning the main switch to "ON".
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between intake air pressure sensor coupler and ECU coupler (black/blue–black/blue) (pink–pink) (blue–blue)	
3	Defective intake air pressure sensor.		• Execute the diagnostic mode. (Code No.D03) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR".	

Fault code No.	14	Symptom	Intake air pressure sensor: hose system malfunction (clogged or detached hose).
Diagnostic code No.		D03	Intake air pressure sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose	• Check the intake air pressure sensor hose condition. • Repair or replace the sensor hose.	Starting the engine and operating it at idle.
2	Intake air pressure sensor malfunction at intermediate electrical potential.	• Check and repair the connection. • Replace it if there is a malfunction.	
3	Connections • Intake air pressure sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
4	Defective intake air pressure sensor.	• Execute the diagnostic mode. (Code No.D03) • Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR”.	

Fault code No.	15	Symptom	Throttle position sensor: open or short circuit detected.	
Diagnostic code No.		D01	Throttle position sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Installed condition of throttle position sensor.		• Check for looseness or pinching. • Check that the sensor is installed in the specified position.	Turning the main switch to “ON”.
2	Connections • Throttle position sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between throttle position sensor coupler and ECU coupler (blue–blue) (yellow–yellow) (black/blue–black/blue)	
4	Throttle position sensor lead wire open circuit output voltage check.		• Check for open circuit and replace the throttle position sensor. (yellow–black/blue)	
5	Defective throttle position sensor.		• Execute the diagnostic mode. (Code No.D01) • Replace if defective. Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR”.	

Fault code No.	16	Symptom	Stuck throttle position sensor detected.	
Diagnostic code No.		D01	Throttle position sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Installed condition of throttle position sensor.		• Check the installed area for looseness or pinching. • Check that the throttle position sensor is installed in the specified position. Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR”.	Reinstated by starting the engine, operating it at idle, and then racing it.
2	Defective throttle position sensor.		• Execute the diagnostic monitoring mode. (Code No.D01) • Replace if defective. Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR”.	

Fault code No.	21	Symptom	Coolant temperature sensor: open or short circuit detected.	
Diagnostic code No.		D06	Coolant temperature sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Installed condition of coolant temperature sensor.		Check the installed area for looseness or pinching.	Turning the main switch to “ON”.
2	Connections • Coolant temperature sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between coolant temperature sensor coupler and ECU coupler. (black/blue–black/blue) (green/yellow–green/yellow)	
4	Defective coolant temperature sensor.		• Execute the diagnostic mode. (Code No.D06) • Replace if defective. Refer to “SIGNALING SYSTEM” in chapter 9.	

Fault code No.	22	Symptom	Intake air temperature sensor: open or short circuit detected.
Diagnostic code No.		D05	Intake air temperature sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of air temperature sensor.	Check for looseness or pinching.	Turning the main switch to "ON".
2	Connections • Intake air temperature sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between intake air temperature sensor coupler and ECU coupler (brown/white–brown/white) (black/blue–black/blue)	
4	Defective air temperature sensor.	• Execute the diagnostic mode. (Code No.D05) • Replace if defective. Refer to "CHECKING THE INTAKE AIR TEMPERATURE SENSOR".	

Fault code No.	30	Symptom	The vehicle has overturned.	
Diagnostic code No.		D08	Lean angle sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	The vehicle has overturned.		Raise the vehicle upright.	Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned “OFF”).
2	Installed condition of the lean angle sensor.		Check for looseness or pinching.	
3	Connections • Lean angle sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
4	Defective lean angle sensor.		• Execute the diagnostic mode. (Code No.D08) • Replace if defective. Refer to “IGNITION SYSTEM” in chapter 9.	

Fault code No.	33	Symptom	Malfunction detected in the primary lead of the ignition coil.
Diagnostic code No.		D30	Ignition coil

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Ignition coil connector (primary coil side) • Main wire harness-ECU coupler	• Check the connector and coupler for any pins that may be pulled out. • Check the locking condition of the connector and coupler. • If there is a malfunction, repair it and connect the coupler or connector securely.	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between ignition coil connector and ECU coupler. (orange–orange) • Between ignition coil connector and left handlebar switch coupler. (red/black–red/black)	
3	Defective ignition coil.	• Execute the diagnostic mode. (Code No.D30) • Test the primary and secondary coils for continuity. • Replace if defective. Refer to “IGNITION SYSTEM” in chapter 9.	

Fault code No.	39	Symptom	Open circuit detected in a injector.	
Diagnostic code No.		D36	Injector	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Injector coupler • Main wire harness-ECU coupler • Main wire harness fuel pump coupler		• Check the couplers for any pins that may be pulled out. • Check the locking condition of the couplers. • If there is a malfunction, repair it and connect the coupler securely.	Cranking the engine. (Connect the fuel injector coupler.)
2	Open or short circuit in wire harness and/or sub-wire harness 2.		• Repair or replace if there is an open or short circuit. • Between injector coupler and ECU coupler. (red/blue–red/blue) (red/black–red/black)	
3	Defective injector.		• Execute the diagnostic mode. (Code No.D36) • Replace if defective. Refer to “CHECKING THE FUEL INJECTOR”.	

Fault code No.	41	Symptom	Lean angle sensor: open or short circuit detected.	
Diagnostic code No.		D08	Lean angle sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Lean angle sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Turning the main switch to "ON".
2	Open or short circuit in lead wire.		• Repair or replace if there is an open or short circuit. • Between lean angle sensor coupler and ECU coupler. (blue–blue) (yellow/green–yellow/green) (black/blue–black/blue)	
3	Defective lean angle switch.		• Execute the diagnostic mode. (Code No.D08) • Replace if defective. Refer to "IGNITION SYSTEM" in chapter 9.	

Fault code No.	42	Symptom	No normal signals are received from the speed sensor.	
Diagnostic code No.		D07	Speed sensor	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Speed sensor coupler • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine, and activating the vehicle speed sensor by operating the vehicle at 20 to 30 km/h.
2	Open or short circuit in speed sensor lead.		• Repair or replace if there is an open or short circuit. • Between speed sensor coupler and ECU coupler. (blue–blue) (white–white) (black/blue–black/blue)	
3	Gear for detecting vehicle speed has broken.		• Replace if defective. Refer to “TRANSMISSION” in chapter 4.	
4	Defective speed sensor.		• Execute the diagnostic mode. (Code No.D07) • Replace if defective. Refer to “SIGNALING SYSTEM” in chapter 9.	

Fault code No.	43	Symptom	Power supply to the injector and fuel pump is not normal.
Diagnostic code No.		D09	Fuel system voltage

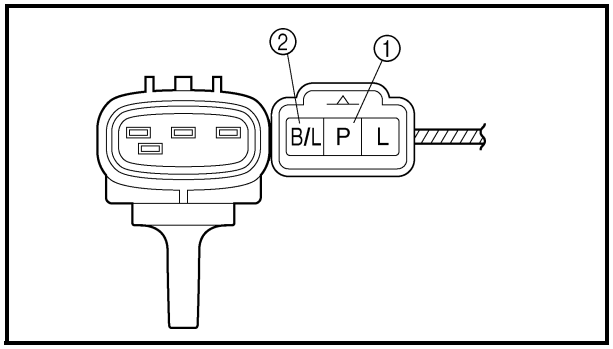
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Fuel injection system relay • Main wire harness-ECU coupler	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and operating it at idle.
2	Open or short circuit in the wire harness.	• Repair or replace if there is an open or short circuit. • Between fuel injection system relay coupler and ECU coupler. (blue/red–blue/red) (red/blue–red/blue) • Between fuel injection system relay coupler and starter relay coupler. (brown/black–brown/black) • Between fuel injection system relay coupler and left handlebar switch coupler. (red/black–red/black)	
3	Malfunction or open circuit in fuel pump relay.	• Execute the diagnostic mode. (Code No.D09) • Replace if defective. • If there is no malfunction with the relay unit, replace the ECU.	

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).
Diagnostic code No.		D60	EEPROM improper cylinder indication

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in ECU.	• Execute the diagnostic mode. (Code No.D60) 1. Check the faulty cylinder. • Replace ECU if defective.	Turning the main switch to “ON”.

Fault code No.	46	Symptom	Power supply is not normal.	
Diagnostic code No.		—	—	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Main wire harness-ECU coupler		• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and operating it at idle.
2	Faulty battery.		• Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.	
3	Malfunction in rectifier/regulator		• Replace if defective. Refer to “CHARGING SYSTEM” in chapter 9.	
4	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between battery lead and main switch coupler (red–red) • Between main switch coupler and ignition fuse (brown/blue–brown/blue) • Between ignition fuse and ECU coupler (brown–brown)	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	
Diagnostic code No.		—	—	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Malfunction in ECU.		Replace the ECU. **NOTE:** Do not perform this procedure with the main switch turned to “ON”.	Turning the main switch to “ON”.



EAS28410
CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
   • intake air pressure sensor output voltage
   Out of specification → Replace.

Intake air pressure sensor output voltage
3.00 ~ 4.00 V

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a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.

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

Positive tester probe → pink terminal ①
Negative tester probe → black/blue terminal ②

b. Turn the main switch to "ON".
c. Measure the intake air pressure sensor output voltage.

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CHECKING THE INTAKE AIR TEMPERATURE SENSOR

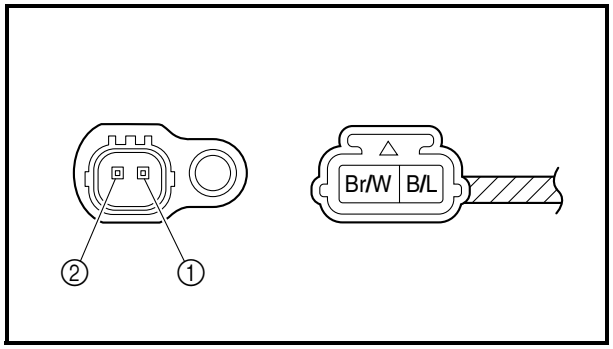
1. Remove:
   • intake air temperature sensor

⚠ 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
290 ~ 390 Ω at 80 °C (176 °F)



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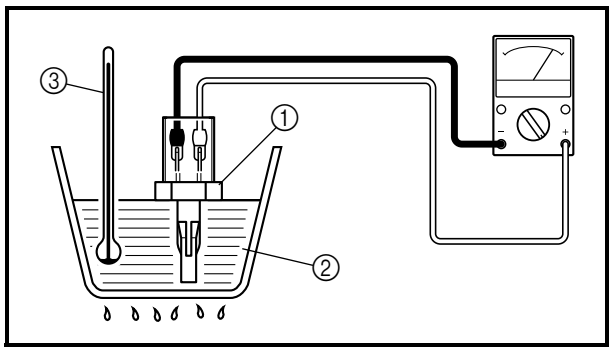
a. Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

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

Positive tester probe → brown/white ①
Negative tester probe → black/blue ②



b. Immerse the air temperature sensor ① in a container filled with water ②.

NOTE:
Make sure that the air temperature sensor terminals do not get wet.

c. Place a thermometer ③ in the water.
d. Slowly heat the water, then let it cool down to the specified temperature.
e. Measure the air temperature sensor resistance.

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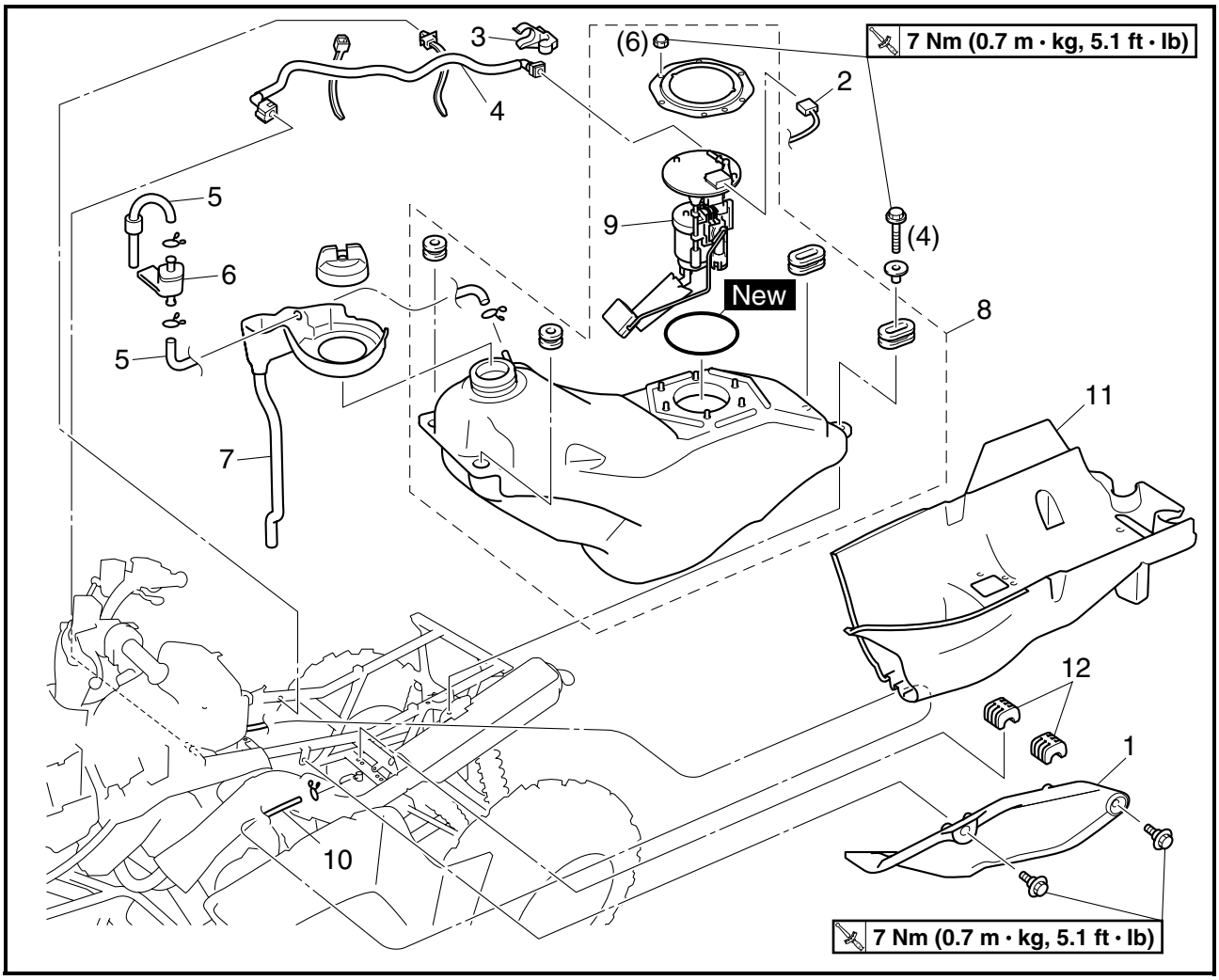
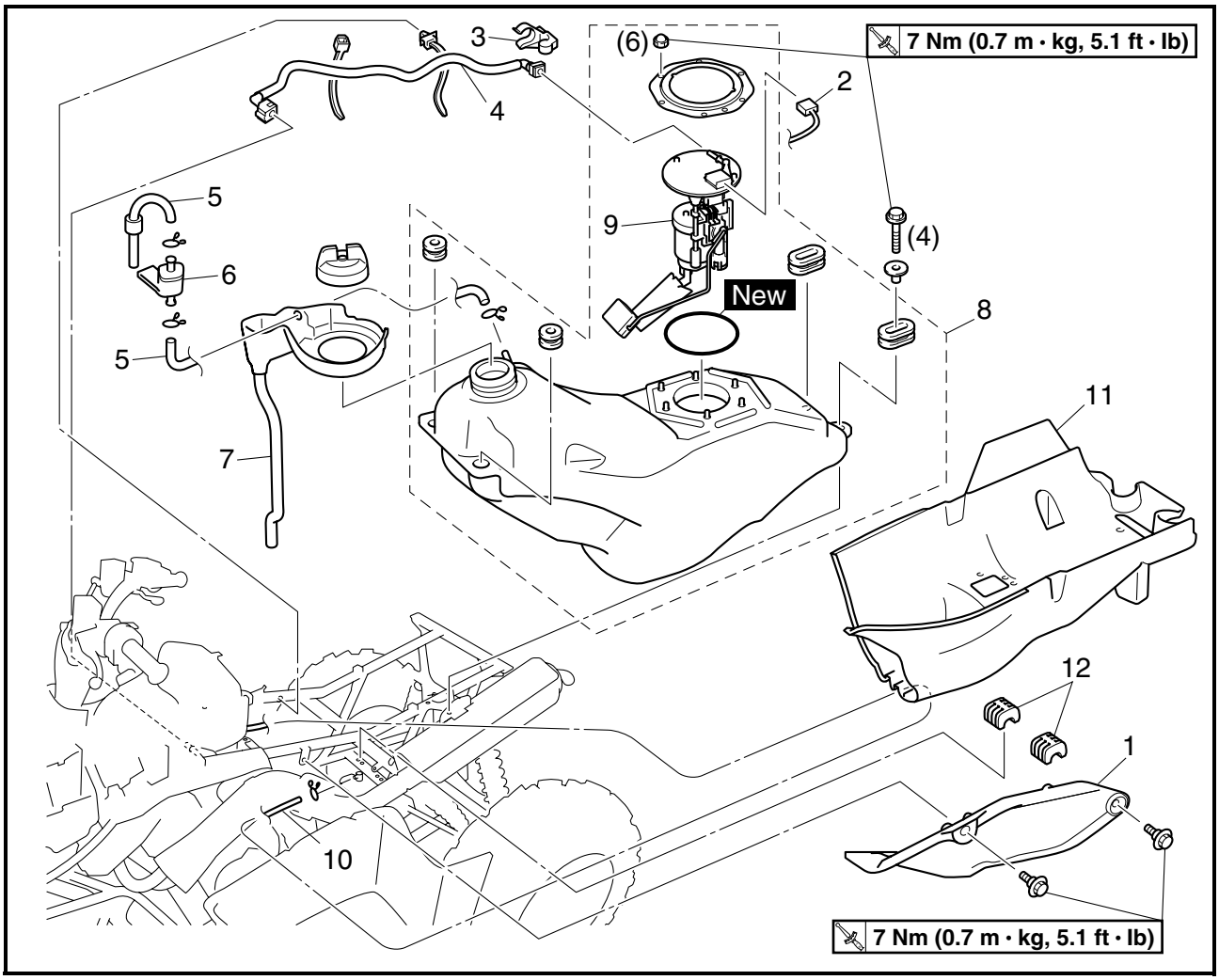
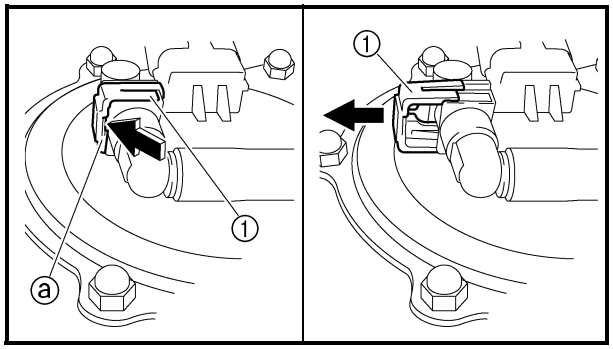
FUEL TANK

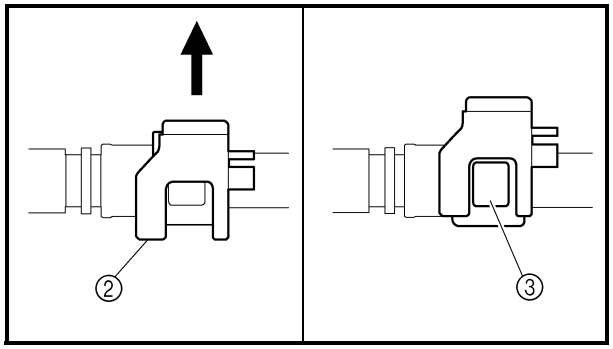


Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank		Remove the parts in the order listed.
	Rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
1	Fuel tank side cover	1	
2	Fuel pump coupler	1	Disconnect.
3	Fuel hose connector holder	1	Refer to "REMOVING THE FUEL TANK" and "INSTALLING THE FUEL HOSE".
4	Fuel hose	1	
5	Fuel tank breather hose	2	
6	Rollover valve	1	
7	Fuel tank overflow hose	1	
8	Fuel tank	1	
9	Fuel pump assembly	1	Refer to "REMOVING THE FUEL PUMP" and "INSTALLING THE FUEL PUMP".
10	Final drive case breather hose	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
11	Fuel tank shield	1	
12	Damper	2	
			For installation, reverse the removal procedure.





REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   - fuel hose connector holder
   - fuel hose

CAUTION:

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

NOTE:

- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part ⓐ of the fuel hose connector cover ①, then slide it in the direction of the arrow, and remove the fuel hose.
- To remove the fuel hose from the throttle body, slide the fuel hose connector cover ② on the end of the hose in direction of the arrow shown, press the two buttons ③ on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.

3. Remove:
   - fuel tank

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 like.

REMOVING THE FUEL PUMP

1. Remove:
   - fuel pump bracket
   - fuel pump
   - fuel pump gasket

CAUTION:

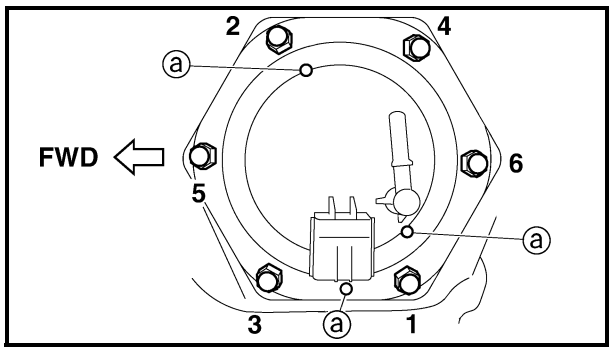
- **Do not drop the fuel pump or give it a strong shock.**
- **Do not touch the base section of the fuel sender.**

CHECKING THE FUEL PUMP BODY

1. Check:
   - fuel pump body
     Obstruction → Clean.
     Cracks/damage → Replace the fuel pump assembly.

CHECKING THE ROLLOVER VALVE

1. Check:
   - rollover valve
     Damage/faulty → Replace.



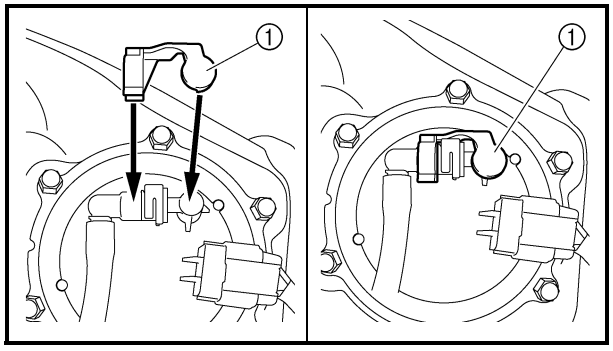
INSTALLING THE FUEL PUMP

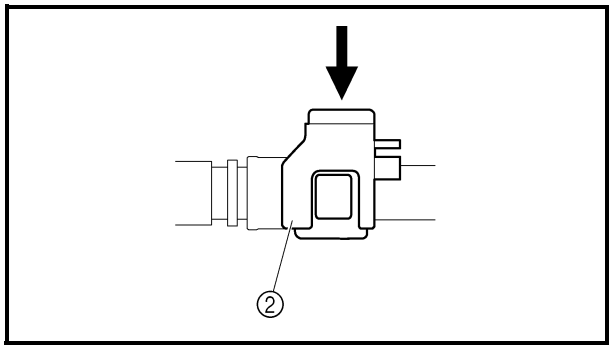
1. Install:
   - fuel pump gasket New
   - fuel pump
   - fuel pump bracket

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:

- Do not damage the installation surface of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump in the direction shown in the illustration.
- Install the fuel pump bracket by aligning the projection ⓐ on the fuel pump with the projection on the fuel tank.
- Tighten the nuts to the specified torque in the proper tightening sequence as shown.





INSTALLING THE FUEL HOSE

1. Install:
   - fuel hose
   - fuel hose connector holder ①
   - fuel pump coupler

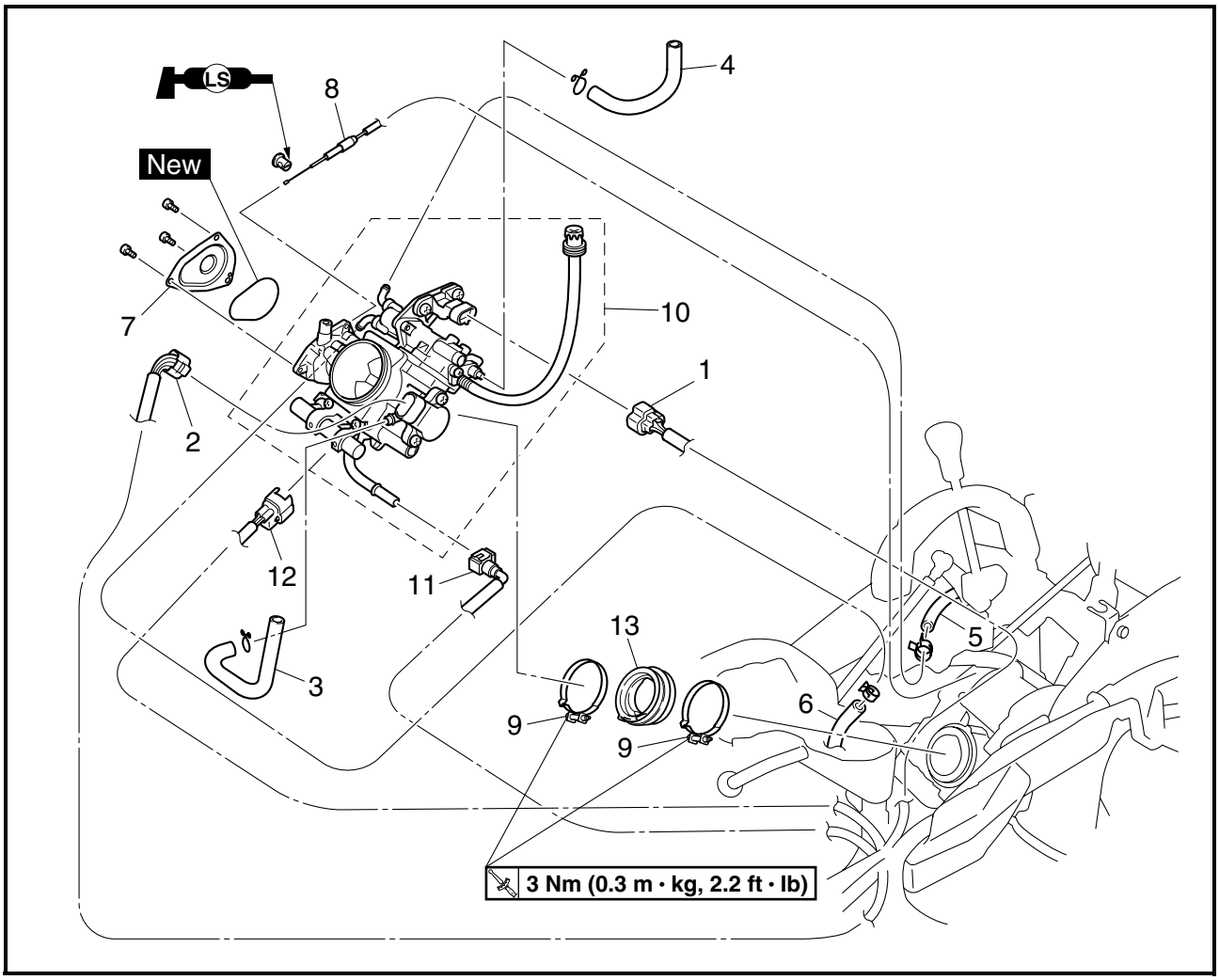
CAUTION:

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

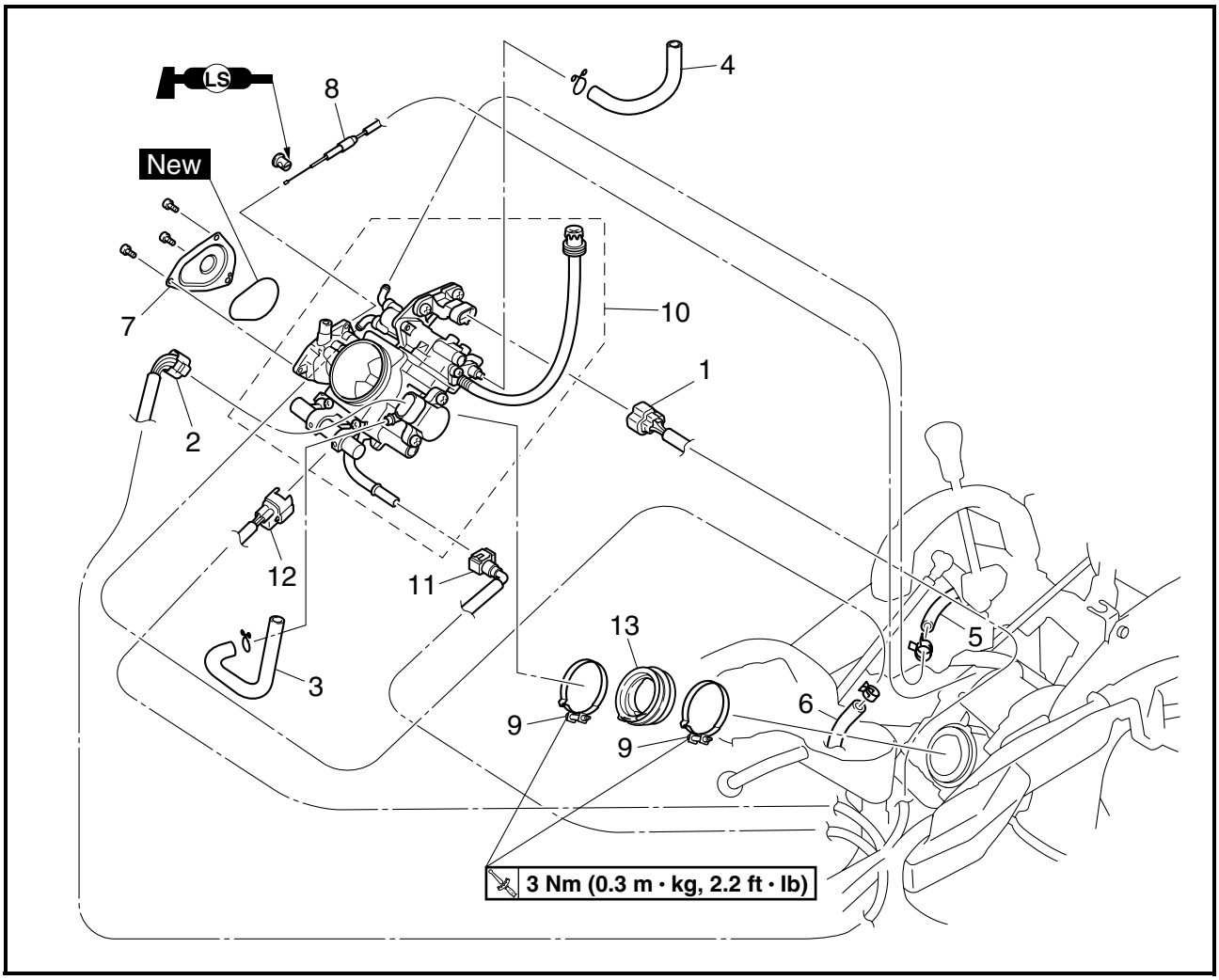
NOTE:

- Install the fuel hose connector holder ① securely onto the fuel pump until a distinct "click" is heard, and then make sure that it does not come loose.
- To install the fuel hose onto the throttle body, slide the fuel hose connector cover ② on the end of the hose in direction of the arrow shown.

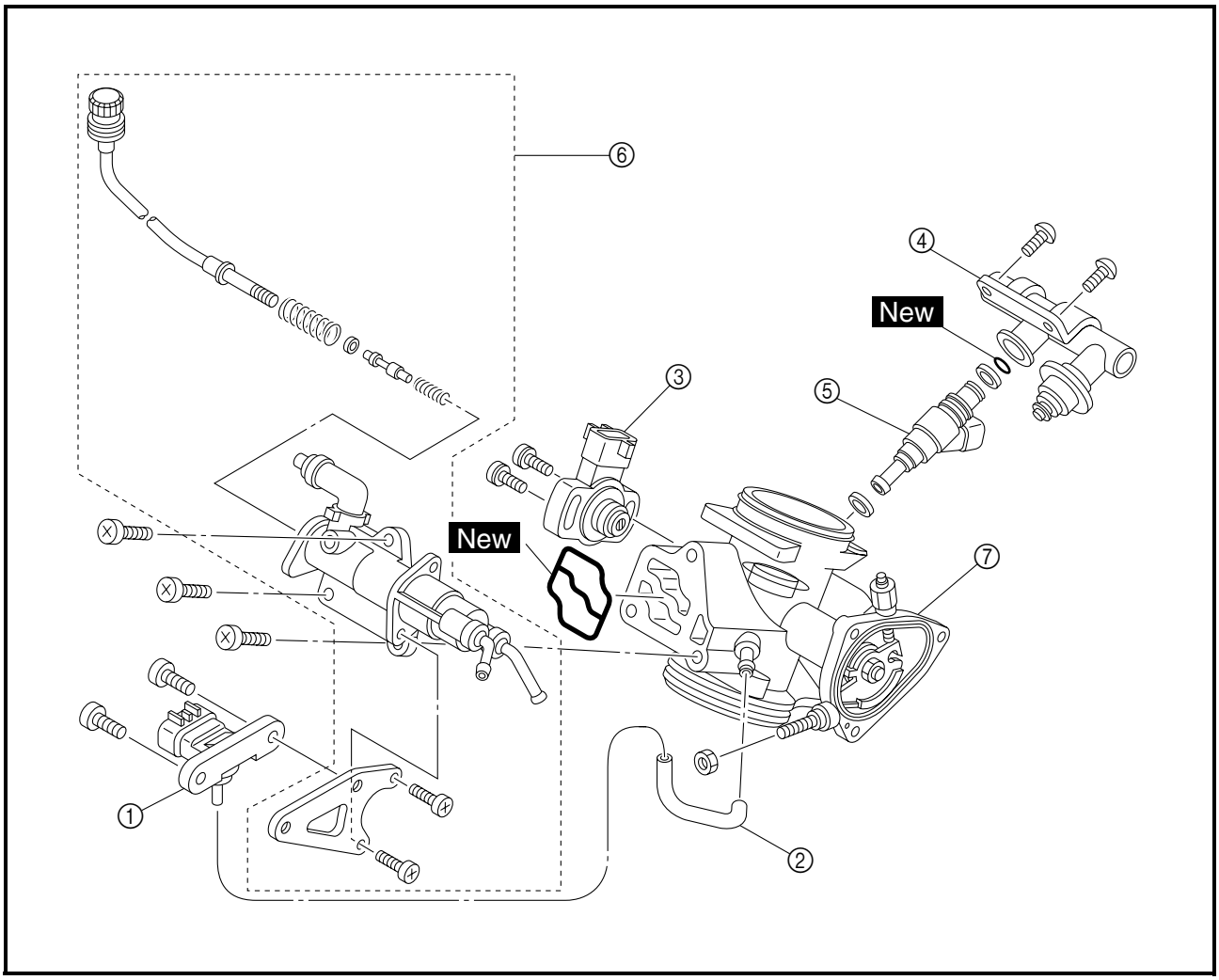
EAS00909
THROTTLE BODY



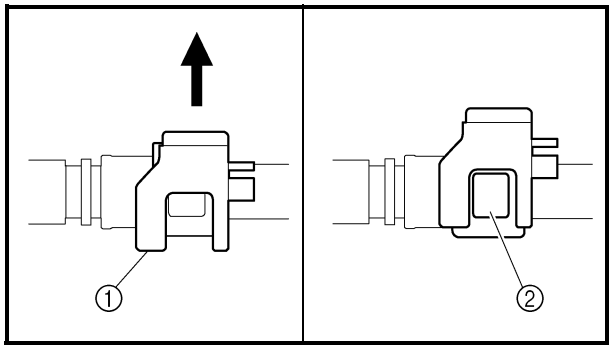
Order	Job/Part	Q'ty	Remarks
	Removing the throttle body		Remove the parts in the order listed.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Intake air pressure sensor coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	Breather hose (air filter case to throttle body)	1	
4	Breather hose (air filter case to fast idle plunger unit)	1	
5	Fast idle plunger outlet hose	1	Disconnect.
6	Fast idle plunger inlet hose	1	Disconnect.
7	Throttle cable housing cover	1	
8	Throttle cable	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
9	Throttle body joint clamp screw	2	Loosen. ┐ Refer to "INSTALLING THE
10	Throttle body assembly	1	┘ THROTTLE BODY ASSEMBLY".
11	Fuel hose	1	Disconnect. Refer to "REMOVING THE THROTTLE BODY ASSEMBLY" and "INSTALLING THE THROTTLE BODY ASSEMBLY".
12	Fuel injector coupler	1	Disconnect.
13	Throttle body joint	1	Refer to "INSTALLING THE THROTTLE BODY ASSEMBLY". For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the throttle body assembly		Remove the parts in the order listed.
①	Intake air pressure sensor	1	
②	Intake air pressure sensor hose	1	
③	Throttle position sensor	1	
④	Injector fuel rail	1	
⑤	Fuel injector	1	
⑥	Fast idle plunger unit	1	
⑦	Throttle body	1	**CAUTION:** **The throttle body should not be disassembled.** For assembly, reverse the disassembly procedure.



REMOVING THE THROTTLE BODY ASSEMBLY

1. Disconnect:
   - fuel hose

CAUTION:

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

NOTE:

- To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown, press the two buttons ② on the sides of the connector, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.

EAS00912

CHECKING THE FUEL INJECTOR

1. Check:
   - fuel injector
     Damage → Replace.

EAS00913

CHECKING THE THROTTLE BODY

1. Check:
   - throttle body
     Cracks/damage → Replace the throttle body.
2. Check:
   - fuel passages
     Obstructions → Clean.

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a. Wash the throttle body in a petroleum-based solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages with compressed air.

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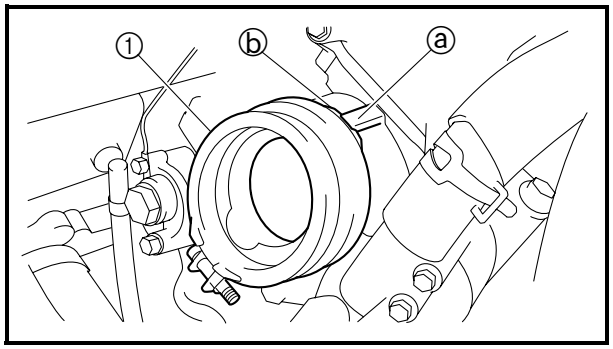
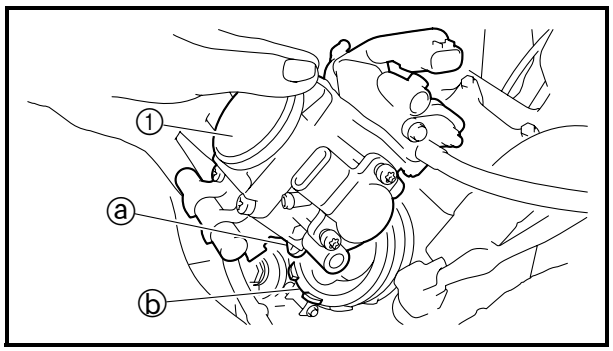


INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
   • throttle body joint ①

NOTE:

Align the projection ⓐ on the cylinder head with the slot ⓑ in the throttle body joint.



2. Install:
   • throttle body assembly ①

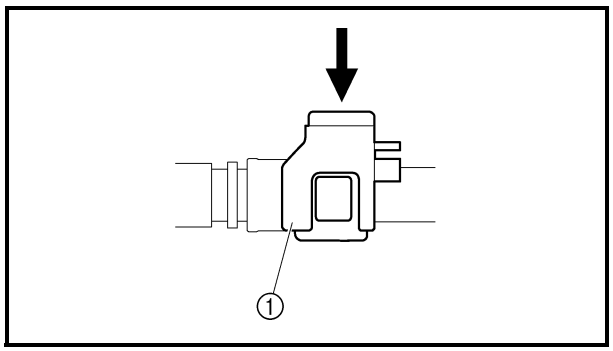
NOTE:

Align the projection ⓐ on the throttle body assembly with the slot ⓑ in the throttle body joint.

3. Connect:
   • fuel hose

CAUTION:

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



NOTE:

To connect the fuel hose onto the throttle body, slide the fuel hose connector cover ① on the end of the hose in direction of the arrow shown.

4. Install:
   • throttle cable
5. Check:
   • throttle position sensor
   Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR”.
6. Adjust:
   • throttle lever free play
   Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” in chapter 3.
7. Adjust:
   • engine idling speed
   Refer to “ADJUSTING THE ENGINE IDLING SPEED” in chapter 3.

EAS00915
CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:
   • pressure regulator operation

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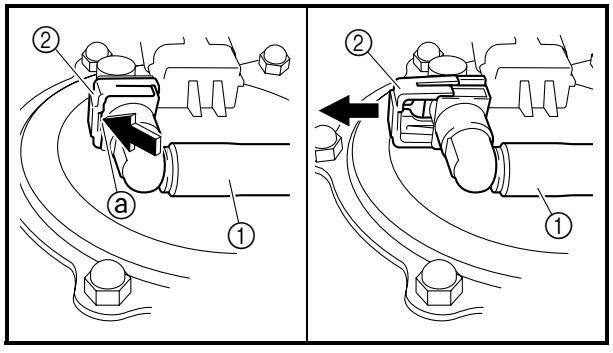
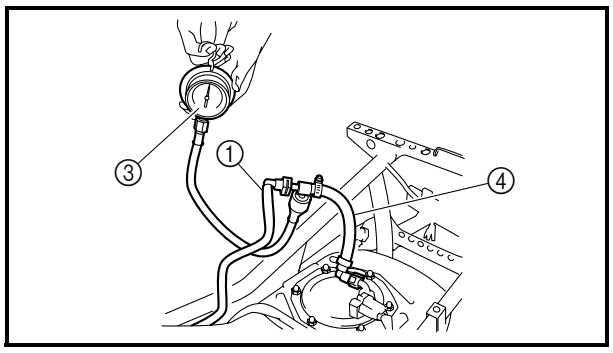
a. Remove the rear fender.
   Refer to “REAR CARRIER AND REAR FENDER” in chapter 3.
b. Remove the fuel hose connector holder.
c. Disconnect the fuel hose ① from the fuel pump.



NOTE:
- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screw driver etc. in the slot part ⓐ of the fuel hose connector cover ②, then slide it in the direction of the arrow, and remove the fuel hose.
- Before removing the hose, place a few rags in the area under where it will be removed.

d. Connect the pressure gauge ③ and adapter ④ to the fuel pump and fuel hose.



Pressure gauge
90890-03153, YU-03153
Fuel pressure adapter
90890-03176, YM-03176

e. Start the engine.
f. Measure the fuel pressure.

Fuel pressure
324 kPa (3.24 kg/cm², 46.1 psi)

Out of specification → Replace the fuel pump.

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EAS00916
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

1. Check:
   • throttle position sensor

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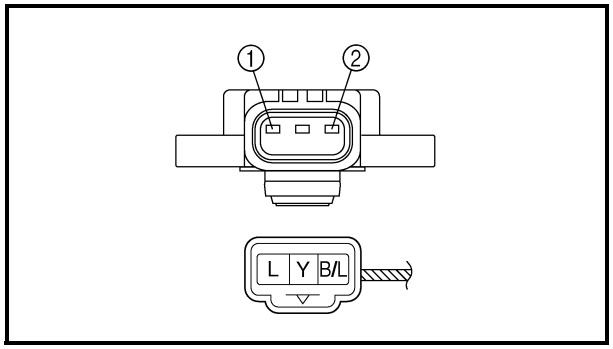
a. Disconnect the throttle position sensor coupler from the throttle position sensor.
b. Remove the throttle position sensor from the throttle body.
c. Connect the pocket tester (Ω × 1k) to the terminals of the throttle position sensor.



Positive tester probe → blue ①
Negative tester probe → black/blue ②

d. Measure the maximum throttle position sensor resistance.
   Out of specification → Replace the throttle position sensor.

Maximum throttle position sensor resistance
4.0 ~ 6.0 kΩ at 20 °C (68 °F)
(blue-black/blue)

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2. Adjust:
   • throttle position sensor angle

NOTE:
Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

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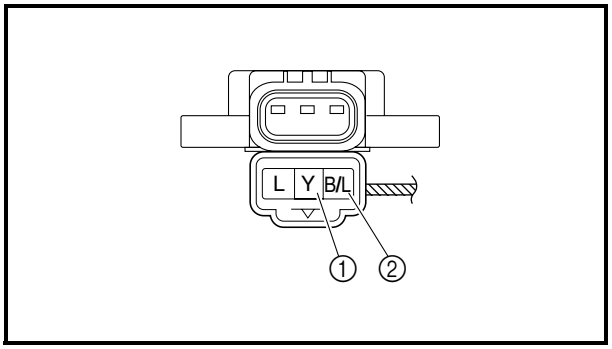
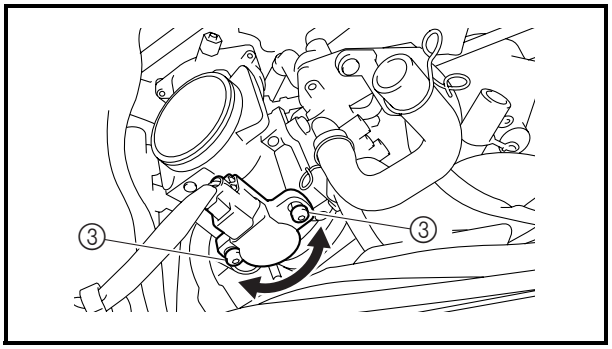
a. Connect the throttle position sensor coupler to the throttle position sensor.





b. Connect the digital circuit tester to the throttle position sensor coupler.

Positive digital circuit tester probe → yellow ①
Negative digital circuit tester probe → black/blue ②

Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927

c. Measure the throttle position sensor voltage.
d. Adjust the throttle position sensor angle so that the voltage is within the specified range.

Throttle position sensor voltage
0.63 ~ 0.73 V (yellow-black/blue)

e. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws ③.

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EBS00155

DRIVE TRAIN

TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. 3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheel.	A. Bearing damage. B. Improper gear lash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EBS00156

CHECKING NOISES

1. Investigate any unusual noises.

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a. A “rolling rumble” noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.
   Diagnosis: Possible wheel bearing damage.
b. A “whining” noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly, too-little gear lash.

CAUTION:

Too little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage.

c. A slight “thunk” evident at low speed operation. This noise must be distinguished from normal vehicle operation.
Diagnosis: Possible broken gear teeth.

⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing loss of control of the vehicle and possible injury to the rider.

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2. Check:
• drained oil
Drained oil shows large amounts of metal particles → Check the bearing for seizure.

NOTE:

A small amount of metal particles in the oil is normal.

3. Check:
• oil leakage

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a. Clean the entire vehicle thoroughly, then dry it.
b. Apply a leak-localizing compound or dry powder spray to the shaft drive.
c. Road test the vehicle for the distance necessary to locate the leak.
Leakage → Check the component housing, gasket, and/or seal for damage.
Damage → Replace the component.

NOTE:

• An apparent oil leak on a new or nearly new vehicle may be the result of a rust preventative coating or excessive seal lubrication.
• Always clean the vehicle and recheck the suspected location of an apparent leakage.

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EBS00157

TROUBLESHOOTING CHART

When basic condition “a” and “b” exist, check the following points:

Elevate and spin both wheels. Feel for wheel bearing damage.
- YES → Replace the wheel bearing. (Refer to “STEERING SYSTEM” and “REAR KNUCKLES AND STABILIZER” in chapter 8.)
- NO ↓

Check the wheel nuts and hub nuts for tightness.
- NO → Torque to specification. (Refer to “FRONT AND REAR WHEELS” in chapter 8.)
- YES ↓

Check the front constant velocity joints. Feel for bearing damage.
- NO → Constant velocity joint bearings and differential gear bearings are probably not damaged. Repeat the test or remove the individual components.
- YES ↓

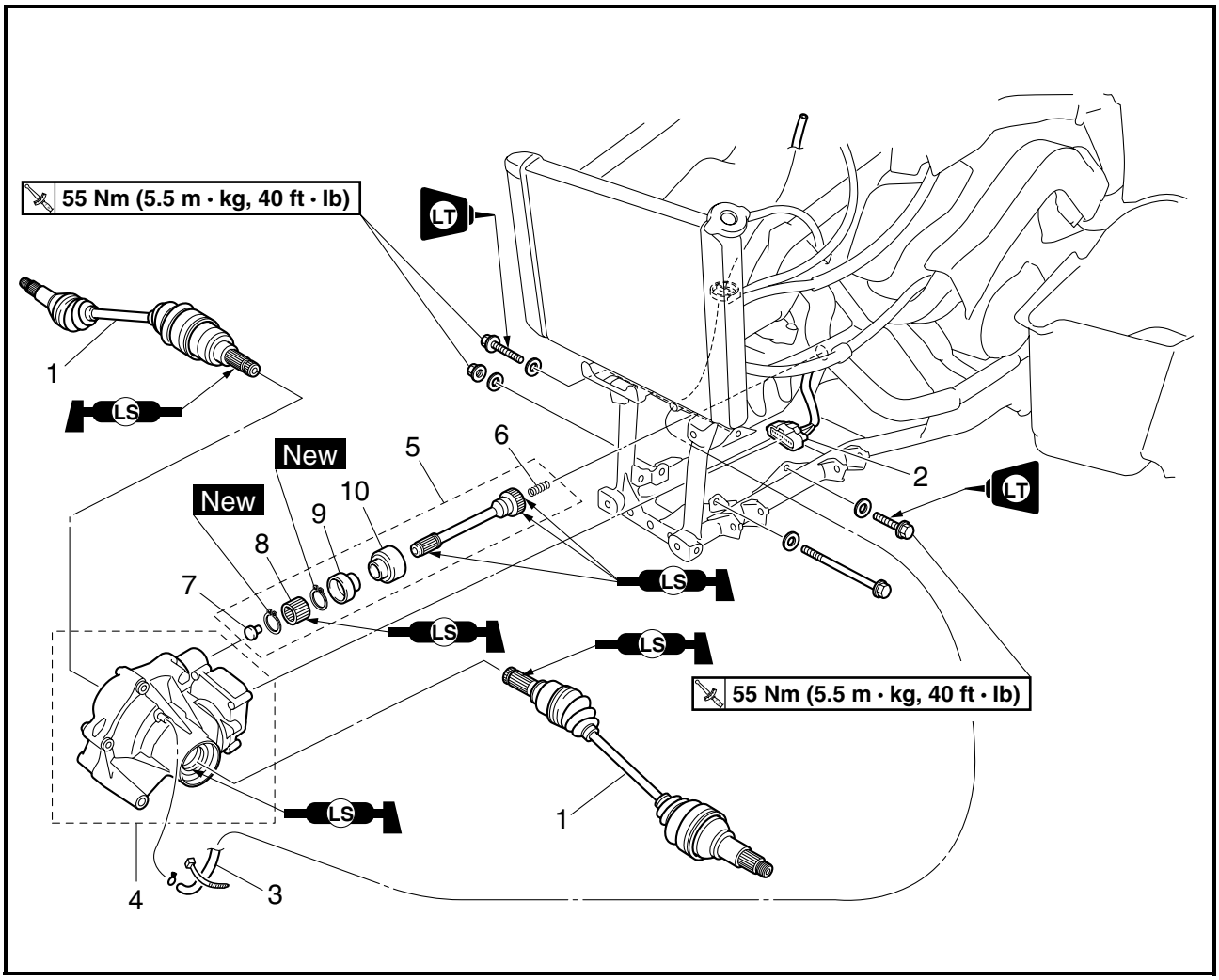
Check the rear brake adjustment.
- NO → Adjust per instructions. (Refer to “ADJUSTING THE REAR BRAKE” in chapter 3.)
- YES ↓

Check the rear constant velocity joints. Feel for bearing damage.
- NO → Constant velocity joint bearings and final drive gear bearings are probably not damaged. Repeat the test or remove the individual components.
- YES ↓

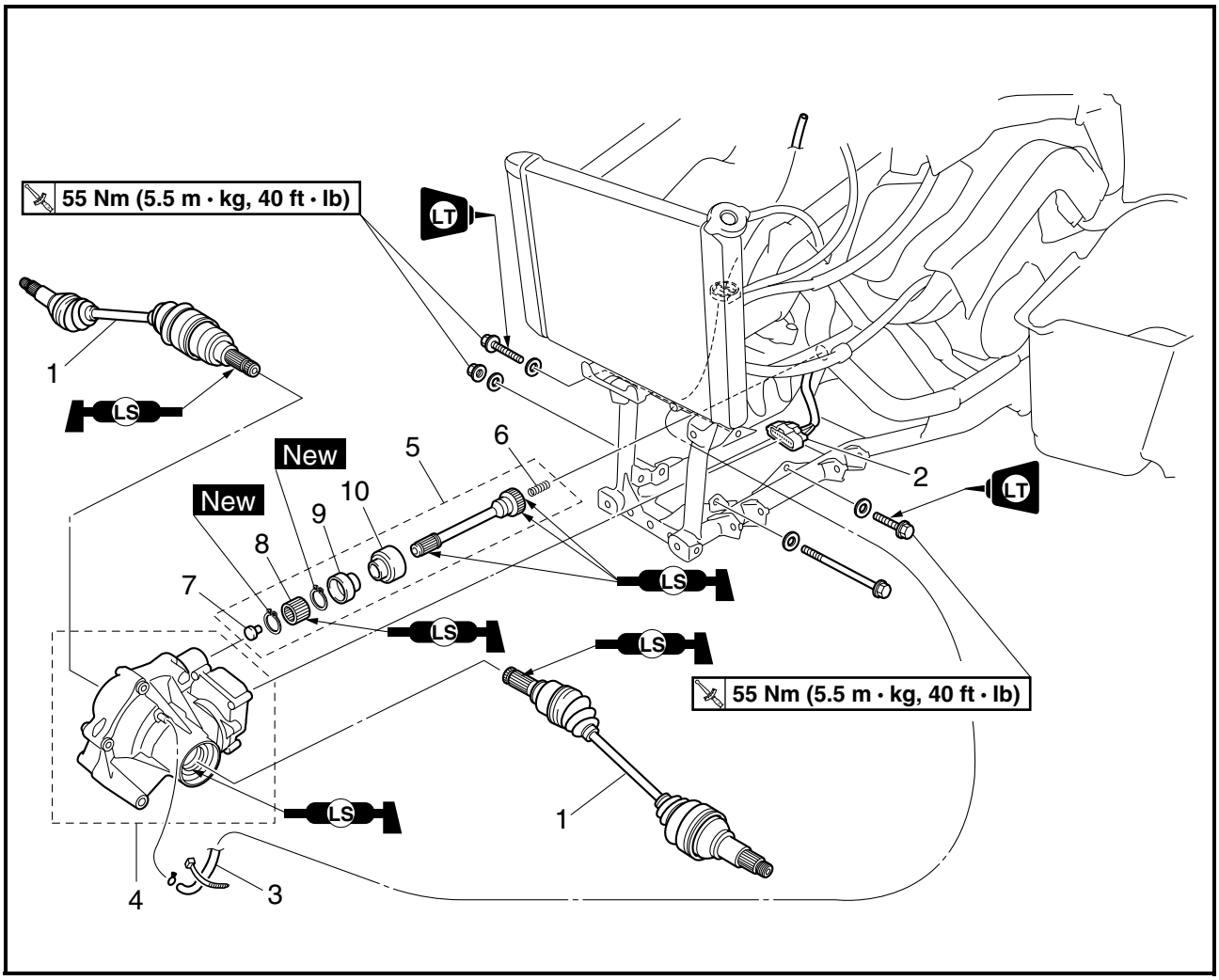
Remove the drive shaft components.

EBS00158

FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR

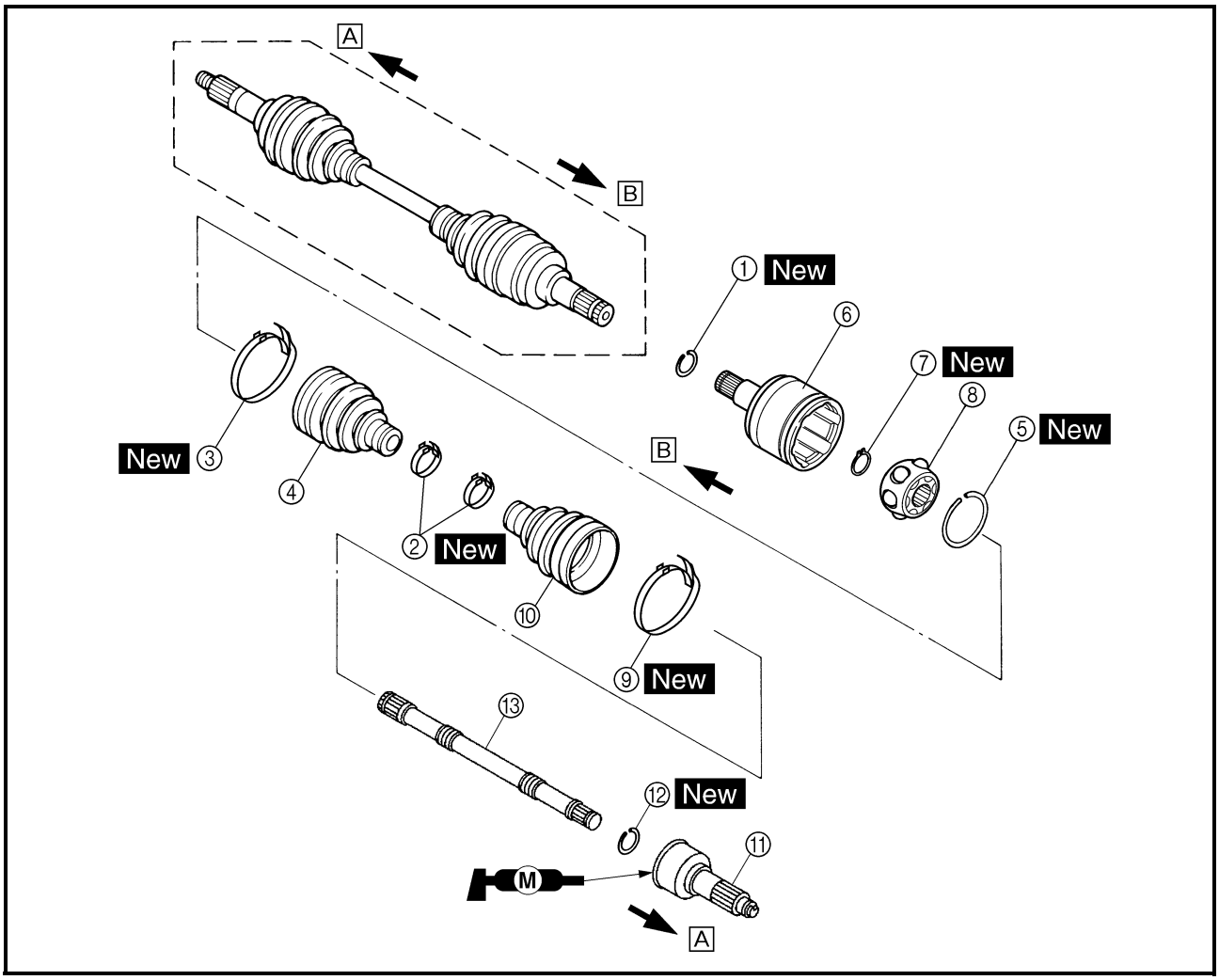


Order	Job/Part	Q'ty	Remarks
	Removing the front constant velocity joints and differential gear		Remove the parts in the order listed.
	Front engine skid plate/front fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Steering knuckles		Refer to "STEERING SYSTEM" in chapter 8.
	Front arms		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" in chapter 8.
	Differential gear oil		Drain. Refer to "CHANGING THE DIFFERENTIAL GEAR OIL" in chapter 3.
1	Front constant velocity joint	2	
2	Differential gear motor coupler	1	Disconnect.
3	Differential gear case breather hose	1	Disconnect.

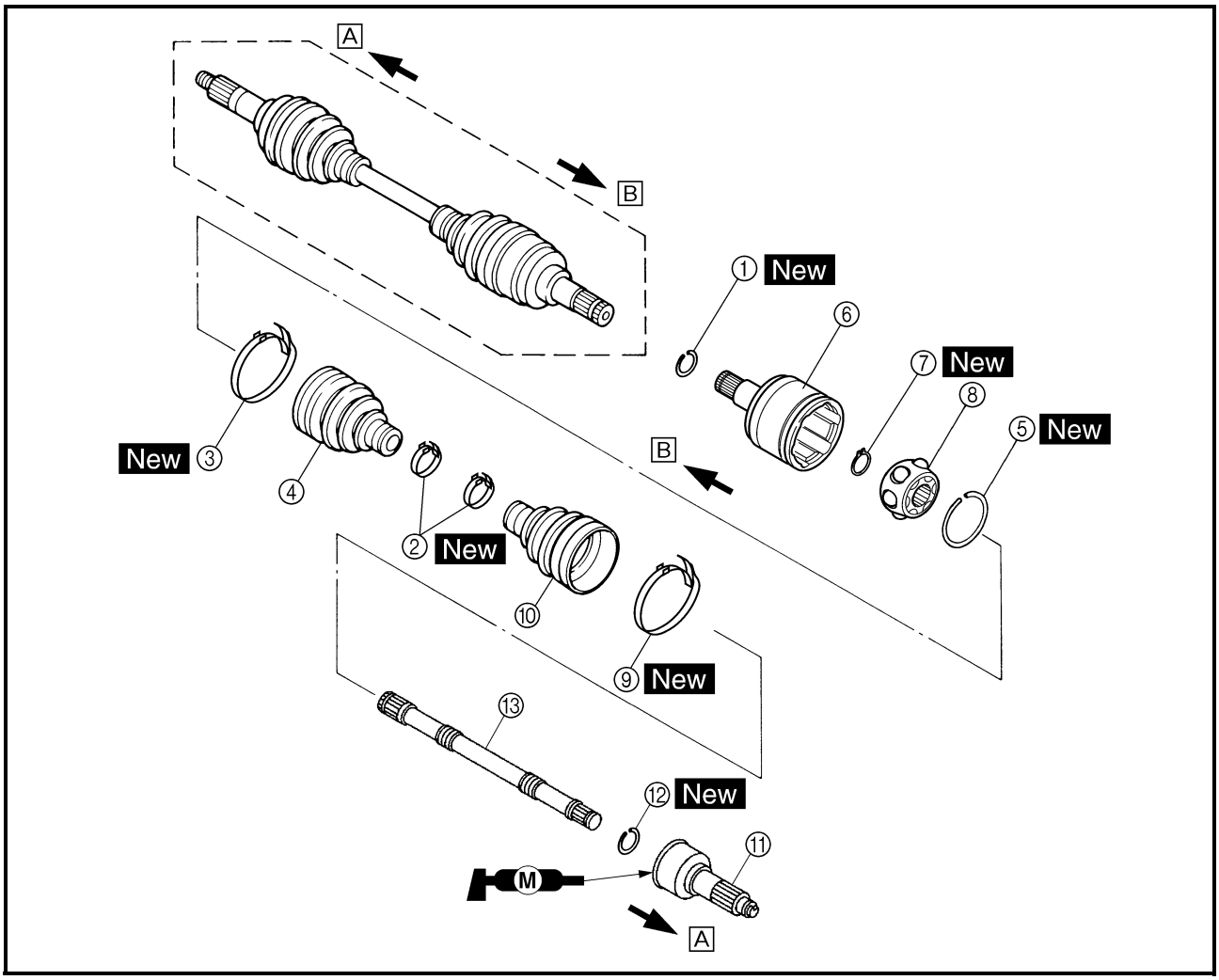


Order	Job/Part	Q'ty	Remarks
4	Differential gear case assembly	1	
5	Front drive shaft	1	
6	Spring	1	
7	Damper	1	
8	Coupling gear	1	
9	Dust seal	1	
10	Dust seal	1	
			For installation, reverse the removal procedure.

EBS00159



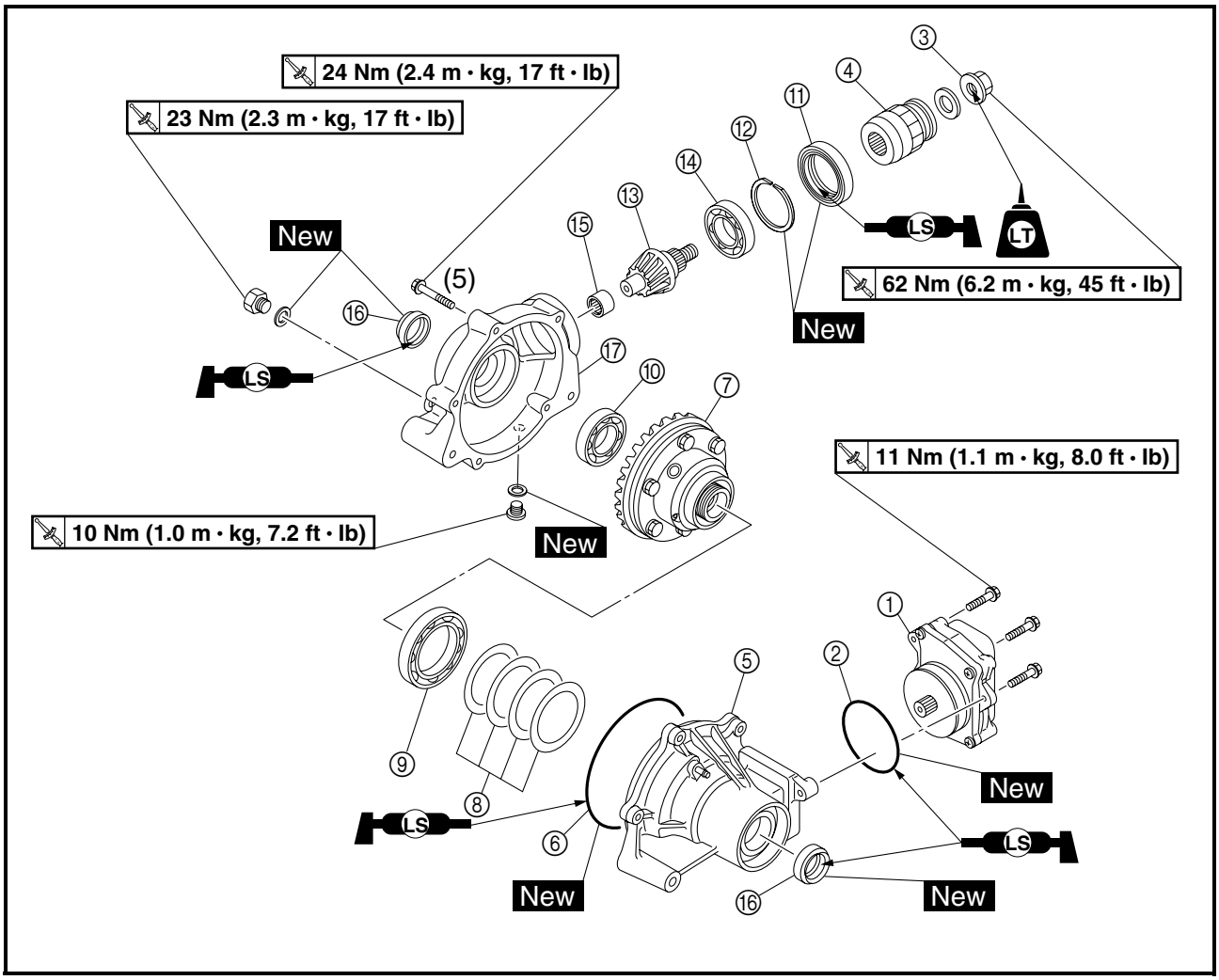
Order	Job/Part	Q'ty	Remarks
	Disassembling the front constant velocity joints		Remove the parts in the order listed. The following procedure applies to both of the front constant velocity joints.
①	Clip	1	
②	Boot band	2	Refer to "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS".
③	Boot band	1	
④	Dust boot	1	
⑤	Clip	1	
⑥	Double off-set joint	1	
⑦	Circlip	1	
⑧	Ball bearing	1	
⑨	Boot band	1	
⑩	Dust boot	1	
⑪	Off-set joint	1	



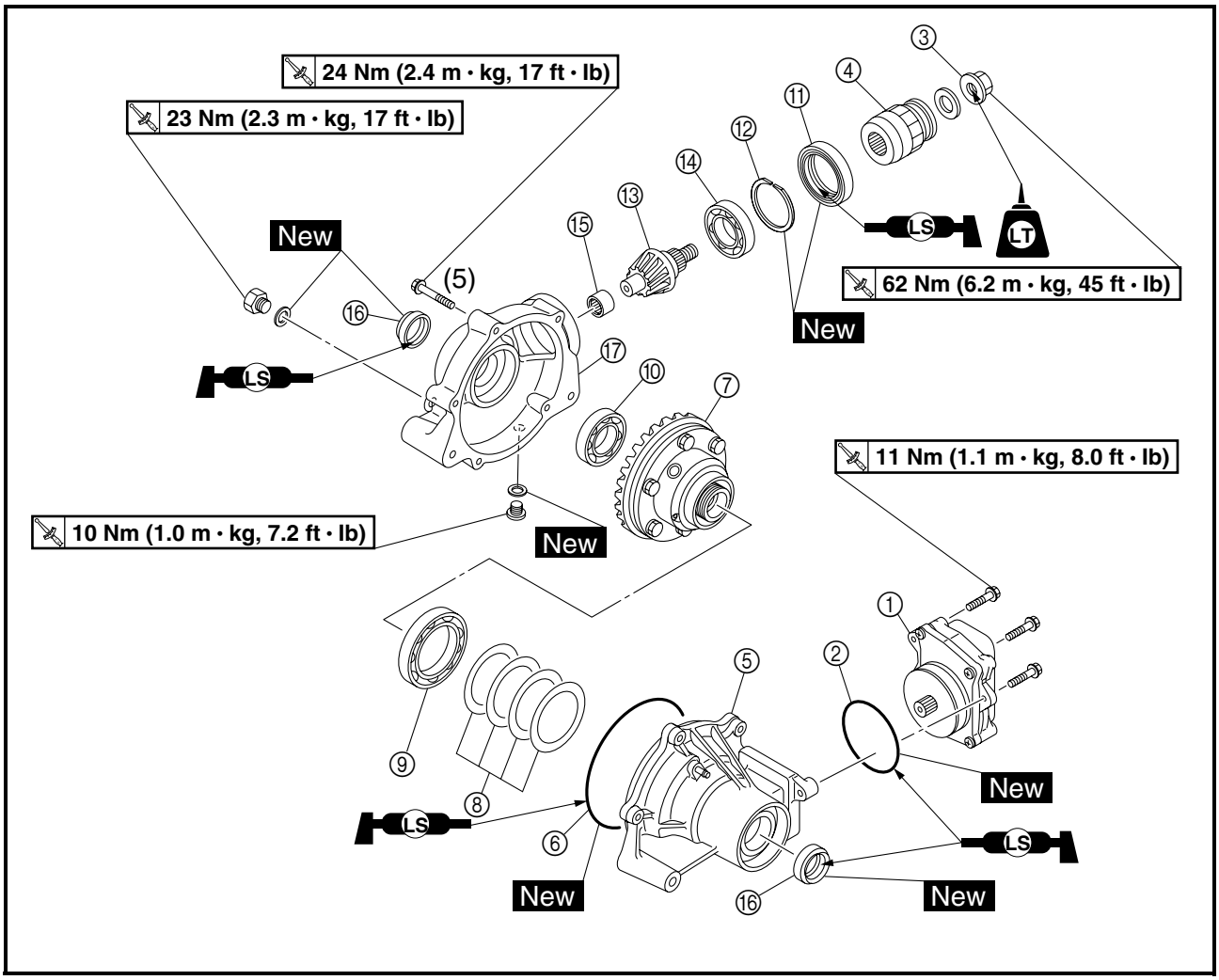
Order	Job/Part	Q'ty	Remarks
⑫	Clip	1	Refer to "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS".
⑬	Joint shaft	1	
			For assembly, reverse the disassembly procedure.

A Wheel side
B Gear case side

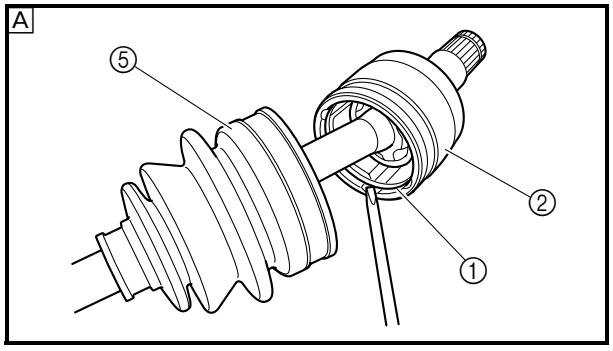
EBS00160

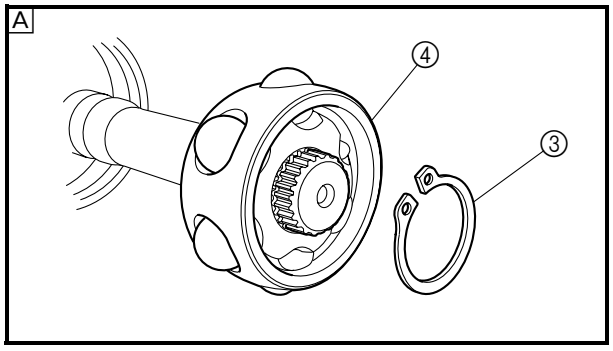


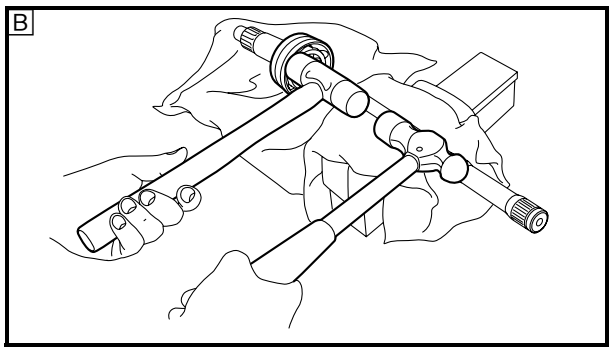
Order	Job/Part	Q'ty	Remarks
	Disassembling the differential gear case assembly		Remove the parts in the order listed.
①	Differential gear motor	1	Refer to "ASSEMBLING THE DIFFERENTIAL GEARS".
②	O-ring	1	
③	Front drive shaft coupling gear nut	1	
④	Front drive shaft coupling gear (differential gear case side)	1	
⑤	Differential gear case cover	1	
⑥	O-ring	1	
⑦	Differential gear assembly	1	
⑧	Differential drive pinion gear shim	*	
⑨	Bearing	1	
⑩	Bearing	1	
⑪	Oil seal	1	



Order	Job/Part	Q'ty	Remarks
⑫	Clip	1	
⑬	Differential drive pinion gear	1	
⑭	Bearing	1	
⑮	Bearing	1	
⑯	Oil seal	2	
⑰	Differential gear case	1	
			For assembly, reverse the disassembly procedure.







REMOVING THE FRONT CONSTANT VELOCITY JOINTS

1. Remove:
   - boot bands
   - clip ① New
   - double off-set joint ②
   - circlip ③ New
   - ball bearing ④
   - dust boot ⑤

NOTE:

Before removing the clip ①, slide the dust boot away from the double off-set joint.

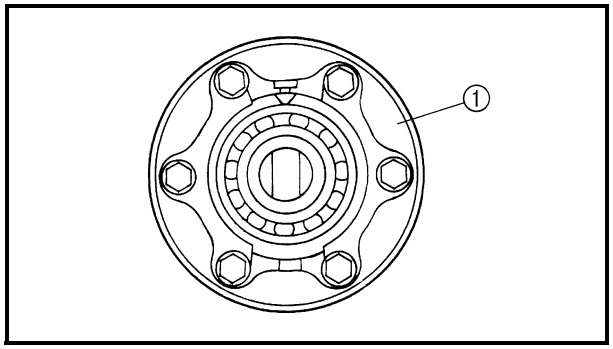
Ⓐ Gear case side

2. Remove:
   - boot bands
   - off-set joint
   - clip New
   - dust boots

NOTE:

Secure the joint shaft in a vise, and then remove the off-set joint using hammers.

Ⓑ Wheel side



EBS00163

REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

1. Remove:
   - differential gear assembly ①

NOTE:

The ring gear and the differential gear should be fastened together. Do not disassemble the differential gear.

CAUTION:

The differential gear are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.

EBS00165

CHECKING THE FRONT CONSTANT VELOCITY JOINTS

1. Check:
   - double off-set joint spline
   - ball joint spline
   - shaft spline

   Wear/damage → Replace.
2. Check:
   - dust boots

   Cracks/damage → Replace.

CAUTION:

Always use a new boot band.

3. Check:
   - balls and ball races
   - inner surface of double off-set joint

   Pitting/wear/damage → Replace.

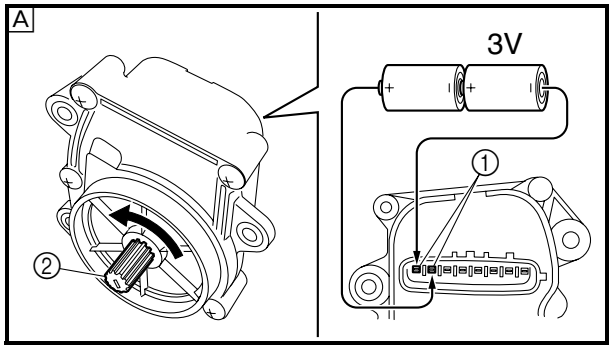
EBS00166

CHECKING THE DIFFERENTIAL GEARS

1. Check:
   - gear teeth
     Pitting/galling/wear → Replace.
   - bearing
     Pitting/damage → Replace.
   - oil seal
   - O-ring
     Damage → Replace.
2. Check:
   - front drive shaft splines
   - differential drive pinion gear splines
     Wear/damage → Replace.
   - spring
     Fatigue → Replace.
     Move the spring up and down.
3. Check:
   - front drive shaft
     Bends → Replace.

⚠ WARNING

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



CHECKING THE DIFFERENTIAL GEAR MOTOR

1. Check:
   - differential gear motor

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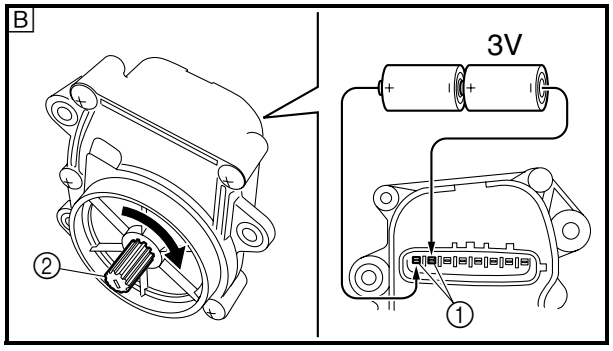
a. Connect two C size batteries to the gear motor terminals ① (as shown in illustration).

CAUTION:

- **Be sure to check the motor operation after removing it from the differential gear case assembly.**
- **Do not use a 12 V battery to operate the pinion gear.**

A Check that the pinion gear ② turns counterclockwise.



B Check that the pinion gear ② turns clockwise.

NOTE:

Be sure not to disassemble the gear motor and remove the pinion gear.

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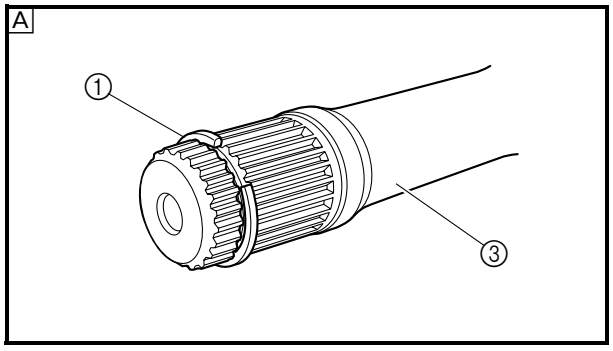

EBS00167

ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS

1. Install:
   - dust boot
   - clip ① New
   - off-set joint ②
   - joint shaft ③

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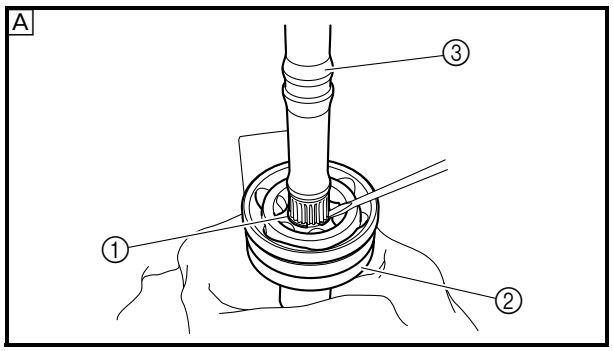

a. Install the clip ①.
b. Install the off-set joint ②.

NOTE:

- Install the clip ① into the groove in the joint shaft as shown.
- Secure the off-set joint in a vise, and then fit the joint shaft into the off-set joint using a hammer.

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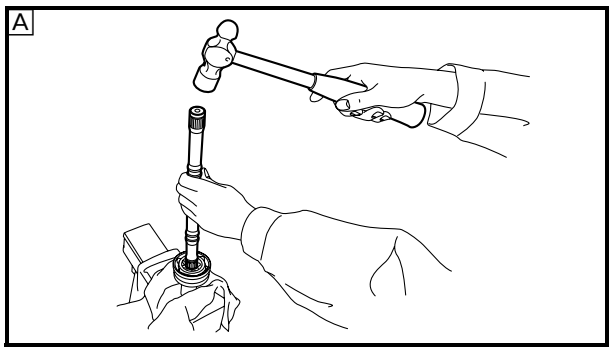
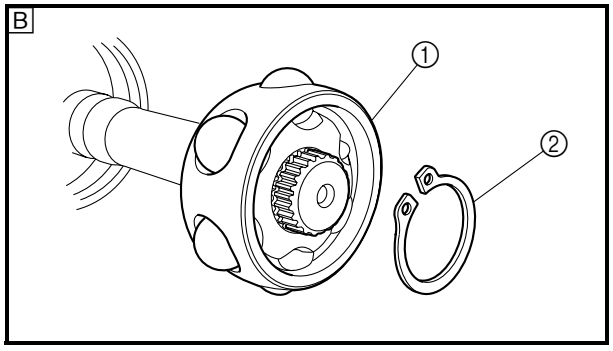
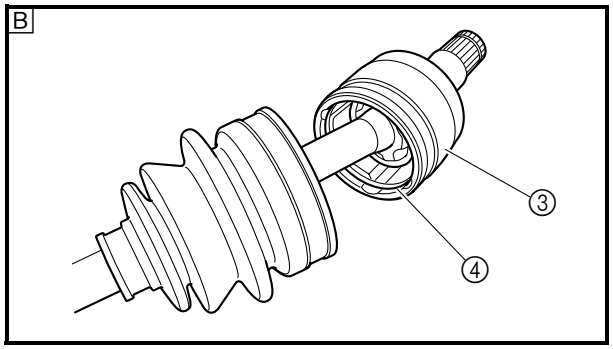
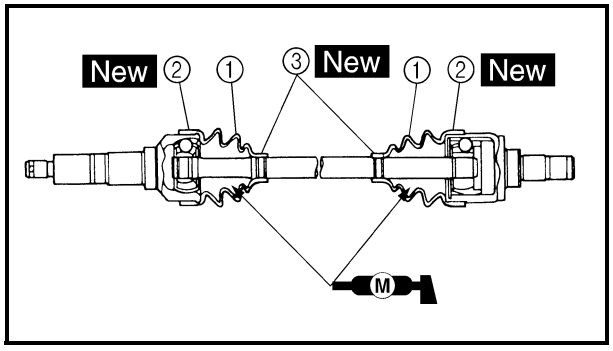


A Wheel side







2. Install:
   - dust boot
   - ball bearing ①
   - circlip ② New
   - double off-set joint ③
   - clip ④ New

NOTE:
- Securely install the circlip into the groove in the joint shaft.
- Securely install the clip into the groove in the double off-set joint.

B Gear case side

3. Apply:
   - molybdenum disulfide grease (into the ball joint assembly)

NOTE:
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - dust boots ①
   - boot bands ②, ③ New

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a. Apply molybdenum disulfide grease into the dust boots.

Molybdenum disulfide grease
40 g (1.4 oz) per dust boot (front wheel side)
55 g (1.9 oz) per dust boot (differential gear case side)

b. Install the dust boots ①.
c. Install the dust boot bands.

NOTE:
- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ at the grooves in the joint shaft.

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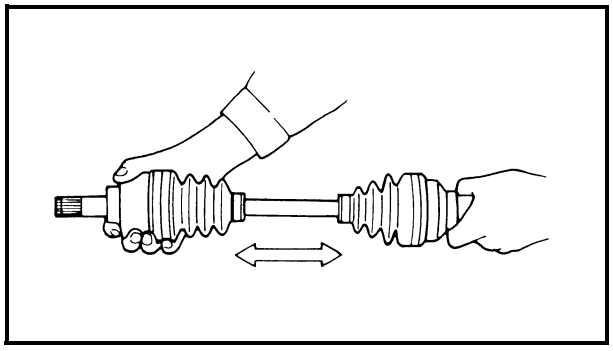
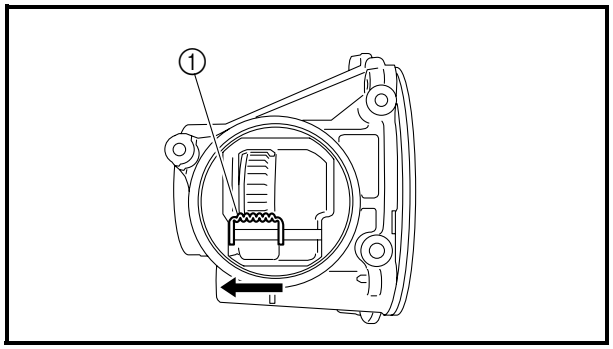


5. Check:
   - thrust movement free play
     Excessive play → Replace the joint assembly.

EBS01009
ASSEMBLING THE DIFFERENTIAL GEARS

1. Measure:
   • gear lash
   Refer to "MEASURING THE DIFFERENTIAL GEAR LASH".



2. Install:
   • differential gear motor

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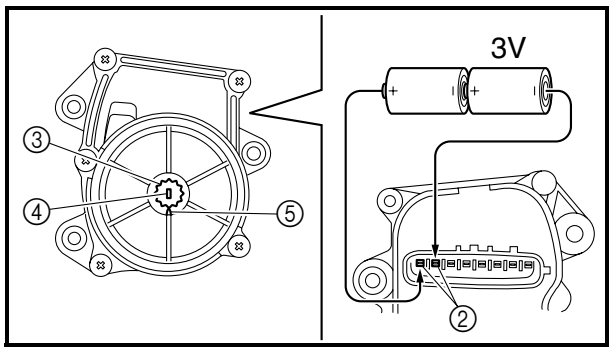
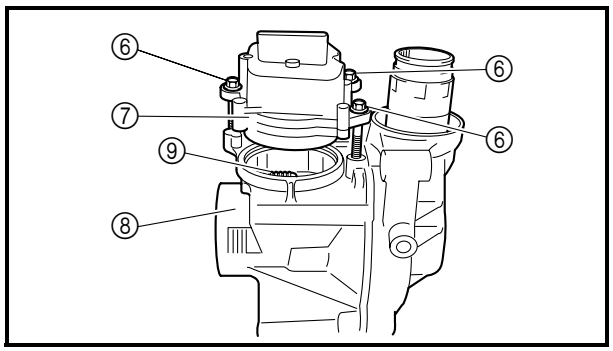
a. Slide the shift fork sliding gear ①, which is installed to the differential gear, to the left to put it into the 2WD mode.



b. Connect two C size batteries to the gear motor terminal ② to operate the pinion gear ③, and operate it until the mark ④ on the gear is aligned with the mark ⑤ on the gear motor case.

CAUTION:

Do not use a 12 V battery to operate the pinion gear.



c. Insert 6 mm bolts ⑥ into the gear motor ⑦ and use them as a guide to set the motor on the differential gear assembly ⑧ so that the shift fork sliding gear ⑨ does not move.

CAUTION:

If the position of the shift fork sliding gear is moved, the position of the differential gear and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.

d. Remove the 6 mm bolts, and then install the motor with the gear motor bolts.

	Differential gear motor bolt **11 Nm (1.1 m · kg, 8.0 ft · lb)**

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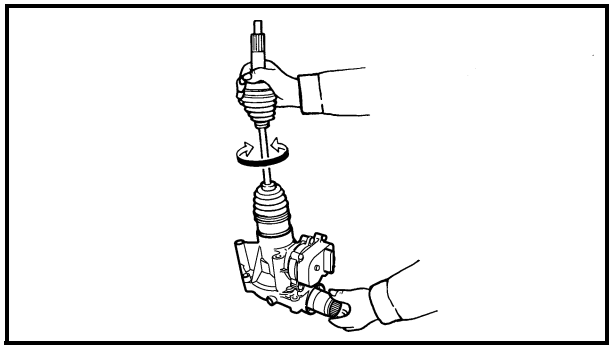
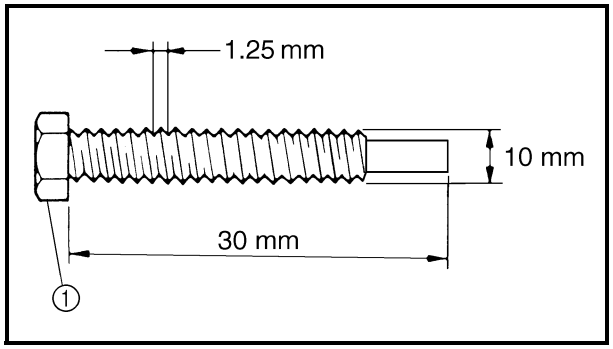


3. Check:
   - differential gear operation
     Unsmooth operation → Replace the differential gear assembly.
     Insert the double off-set joint into the differential gear, and turn the gear back and forth.

EBS00174
MEASURING THE DIFFERENTIAL GEAR LASH

1. Secure the gear case in a vise or another supporting device.
2. Remove:
   - drain plug
   - gasket

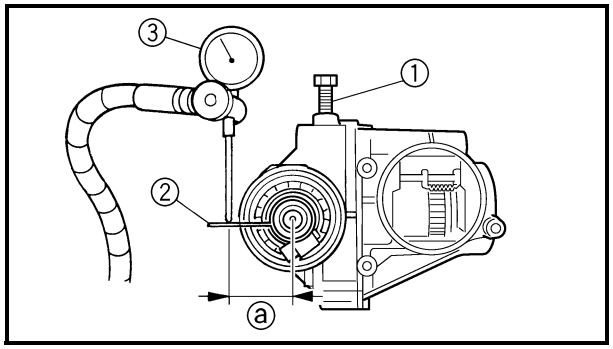


3. Install:
   - a bolt of the specified size ①
     (into the drain plug hole)

CAUTION:

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
   - gear lash measurement tool ②
   - dial gauge ③



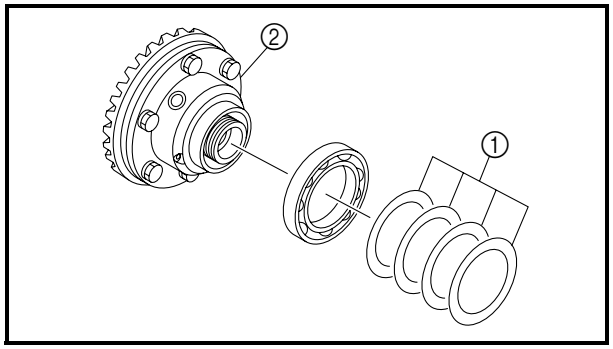
Gear lash measurement tool
90890-01475
Middle drive gear lash tool
YM-01475

ⓐ Measuring point is 22.5 mm (0.86 in)

5. Measure:
   • gear lash
   Gently rotate the coupling gear from engagement to engagement.

	Differential gear lash **0.05 ~ 0.25 mm** **(0.0020 ~ 0.0098 in)**

NOTE:
Measure the gear lash at four positions. Rotate the shaft 90° each time.



EBS00176
ADJUSTING THE DIFFERENTIAL GEAR LASH

1. Remove:
   • differential drive pinion gear shim(s) ①
   • differential gear assembly ②
2. Adjust:
   • gear lash

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a. Select the suitable shims using the following chart.

Too little gear lash	**Reduce shim thickness.**
Too large gear lash	**Increase shim thickness.**

	Ring gear shim
Thickness (mm)	**0.1** **0.2** **0.3** **0.4**

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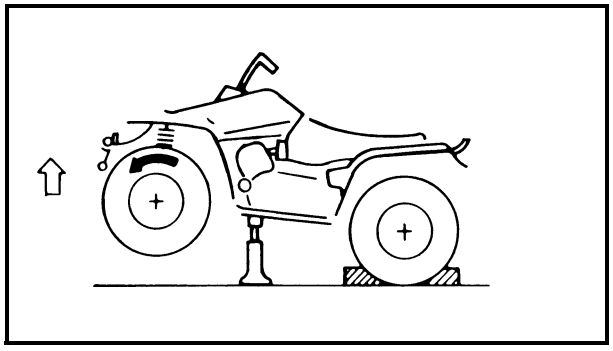


EBS00177

CHECKING THE DIFFERENTIAL GEAR OPERATION

1. Block the rear wheels, and elevate the front wheels by placing a suitable stand under the frame.
2. Remove the wheel cap from the axle nut (right or left).
3. Measure the starting torque of the front wheel (i.e., differential gear preload) with the torque wrench.

NOTE:

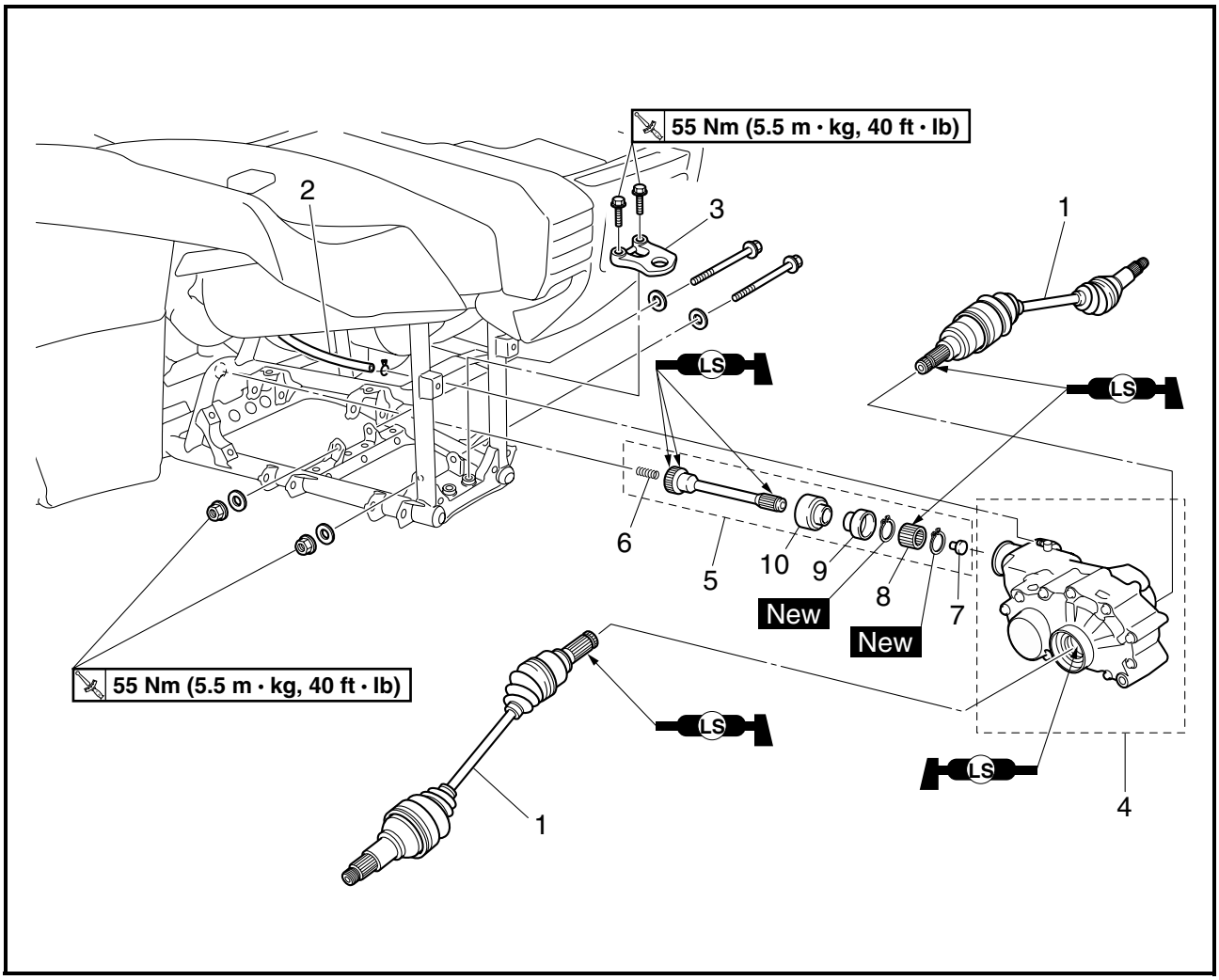
- Repeat this step several times to obtain an average figure.
- During this test, the other front wheel will turn in the opposite direction.

Front wheel starting torque (differential gear preload)
New unit
17 ~ 25 Nm
(1.7 ~ 2.5 m · kg, 12 ~ 18 ft · lb)
Minimum
10 Nm (1.0 m · kg, 7.2 ft · lb)

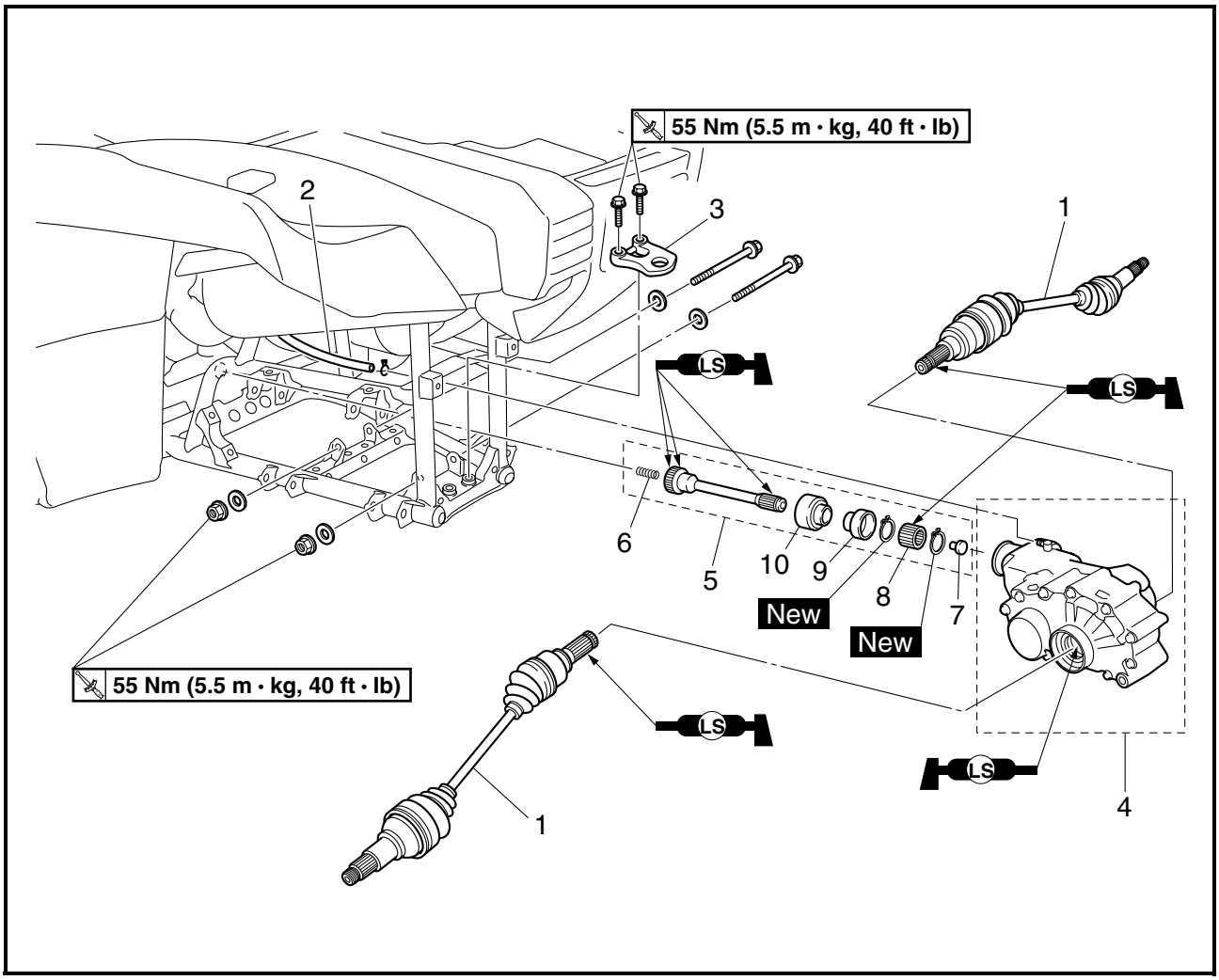
4. Out of specification → Replace the differential gear assembly.
5. Within specification → Install the new cotter pin and wheel cap.

EBS00178

REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR

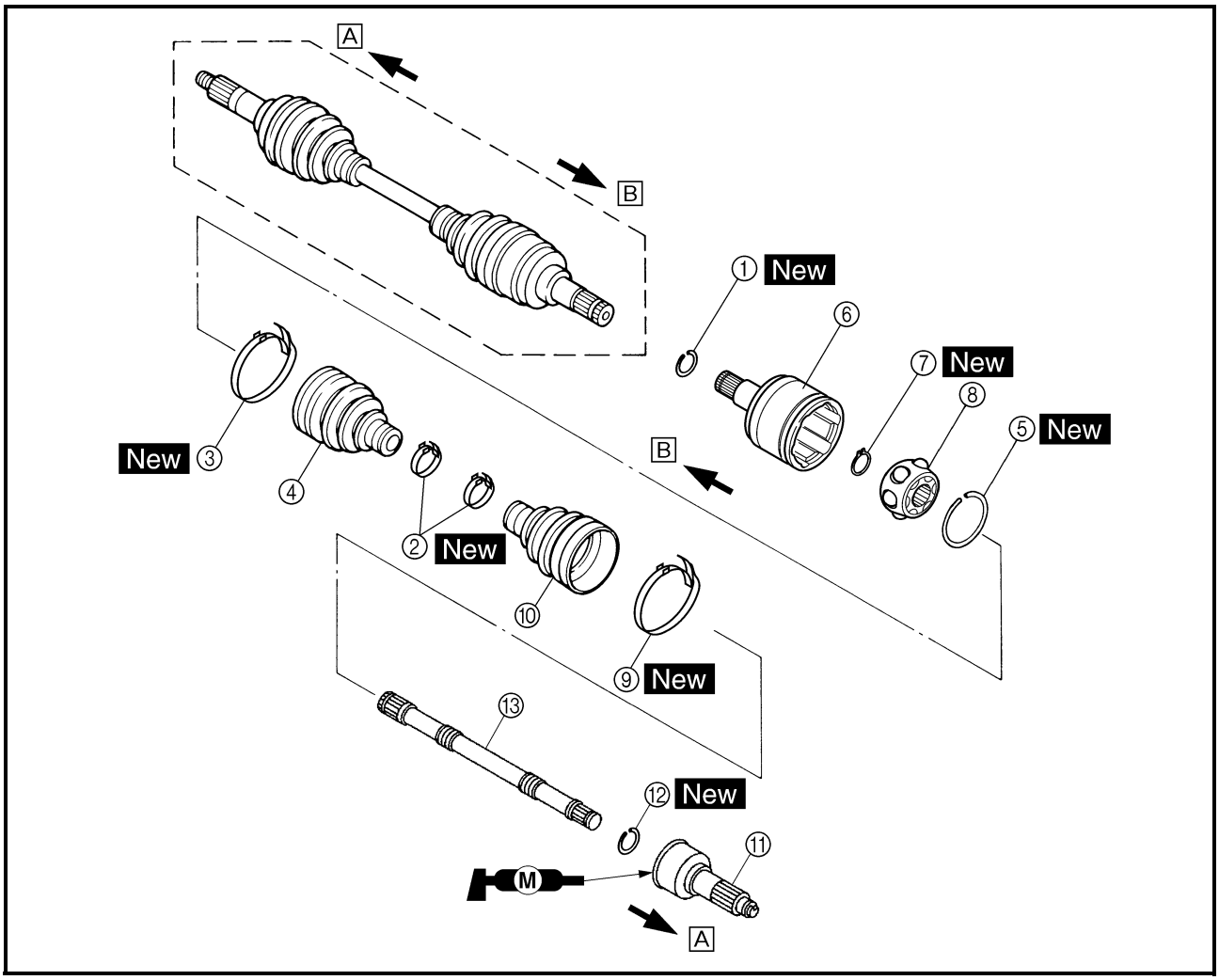


Order	Job/Part	Q'ty	Remarks
	Removing the rear constant velocity joints and final drive gear		Remove the parts in the order listed.
	Rear engine skid plate/rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Rear arms		Refer to "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.
	Final gear oil		Drain. Refer to "CHANGING THE FINAL GEAR OIL" in chapter 3.
1	Rear constant velocity joint	2	
2	Final gear case breather hose	1	Disconnect.
3	Trailer hitch	1	
4	Final gear case assembly	1	
5	Rear drive shaft	1	

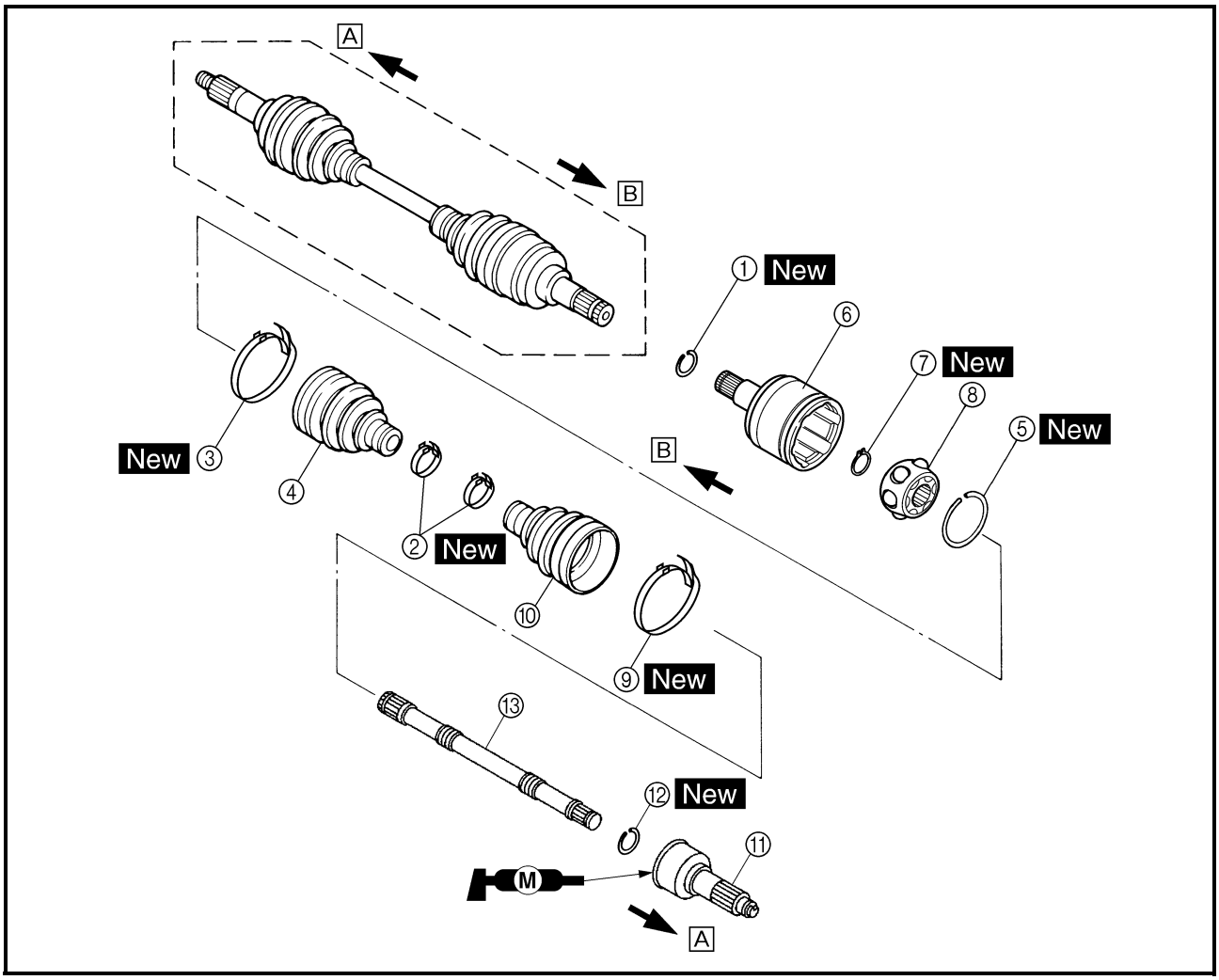


Order	Job/Part	Q'ty	Remarks
6	Spring	1	
7	Damper	1	
8	Coupling gear	1	
9	Dust seal	1	
10	Dust seal	1	
			For installation, reverse the removal procedure.

EBS01011



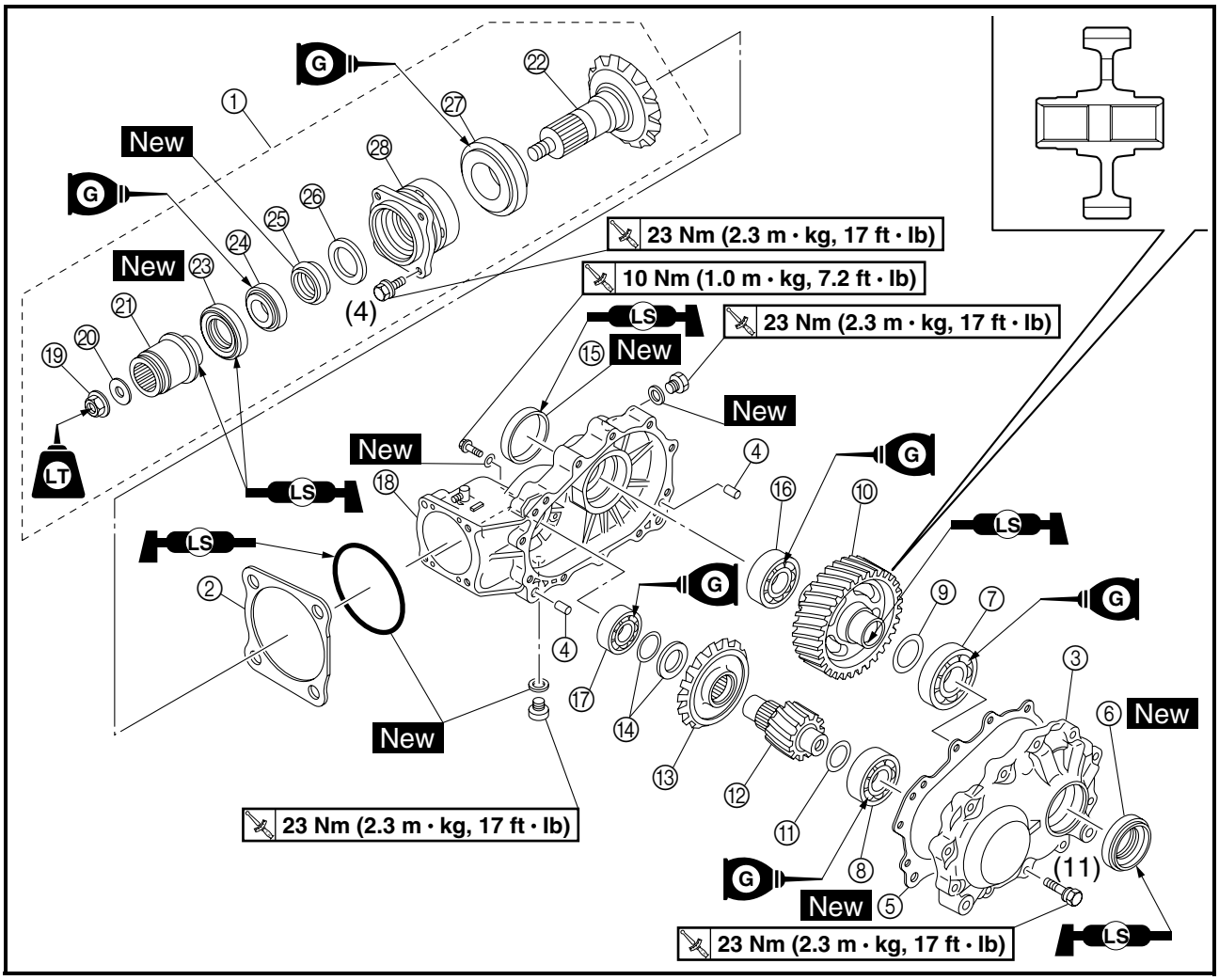
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear constant velocity joints		Remove the parts in the order listed. The following procedure applies to both of the rear constant velocity joints.
①	Clip	1	
②	Boot band	2	Refer to "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS".
③	Boot band	1	
④	Dust boot	1	
⑤	Clip	1	
⑥	Double off-set joint	1	
⑦	Circlip	1	
⑧	Ball bearing	1	
⑨	Boot band	1	
⑩	Dust boot	1	
⑪	Off-set joint	1	



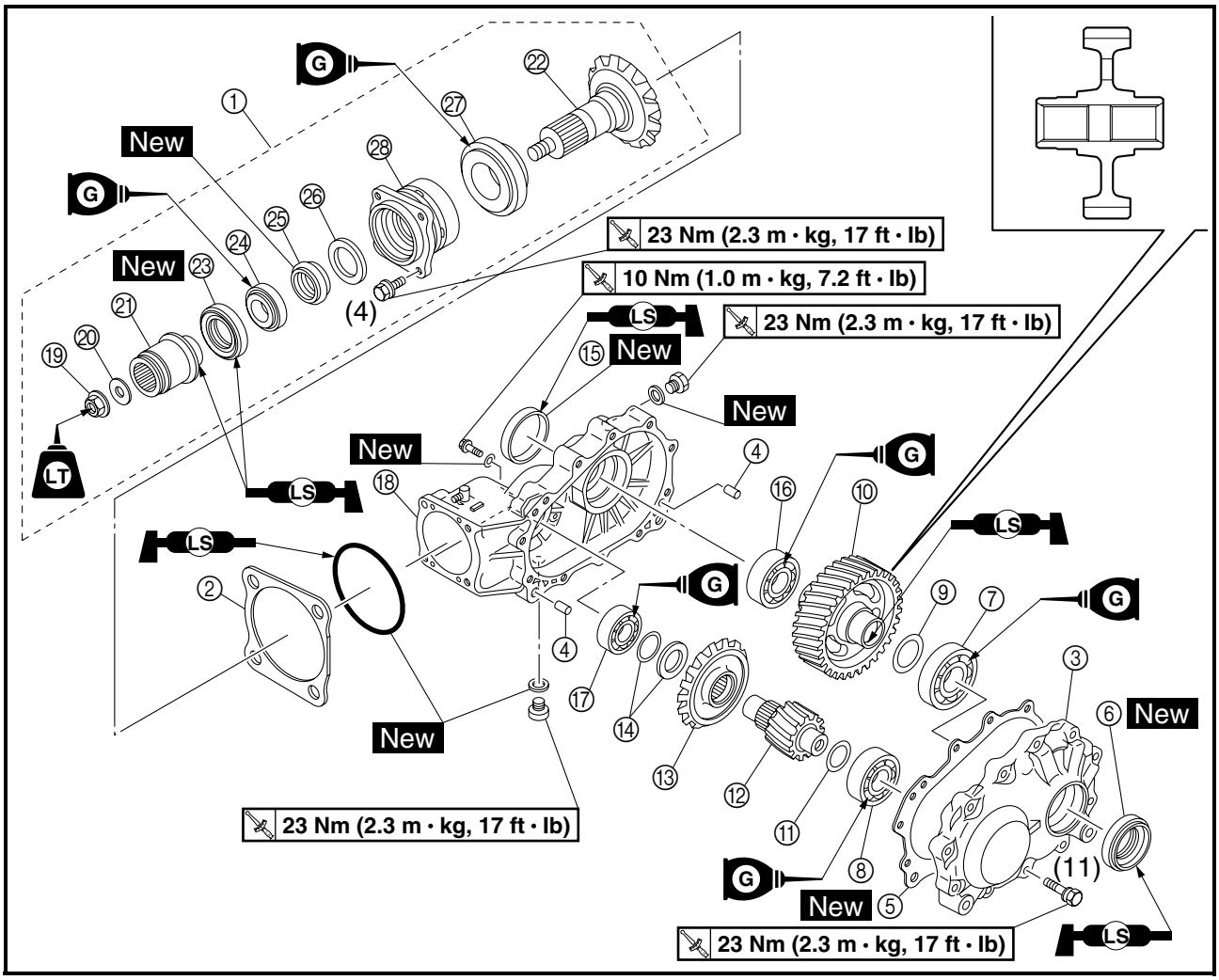
Order	Job/Part	Q'ty	Remarks
⑫	Clip	1	Refer to "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS".
⑬	Joint shaft	1	
			For assembly, reverse the disassembly procedure.

A Wheel side
B Gear case side

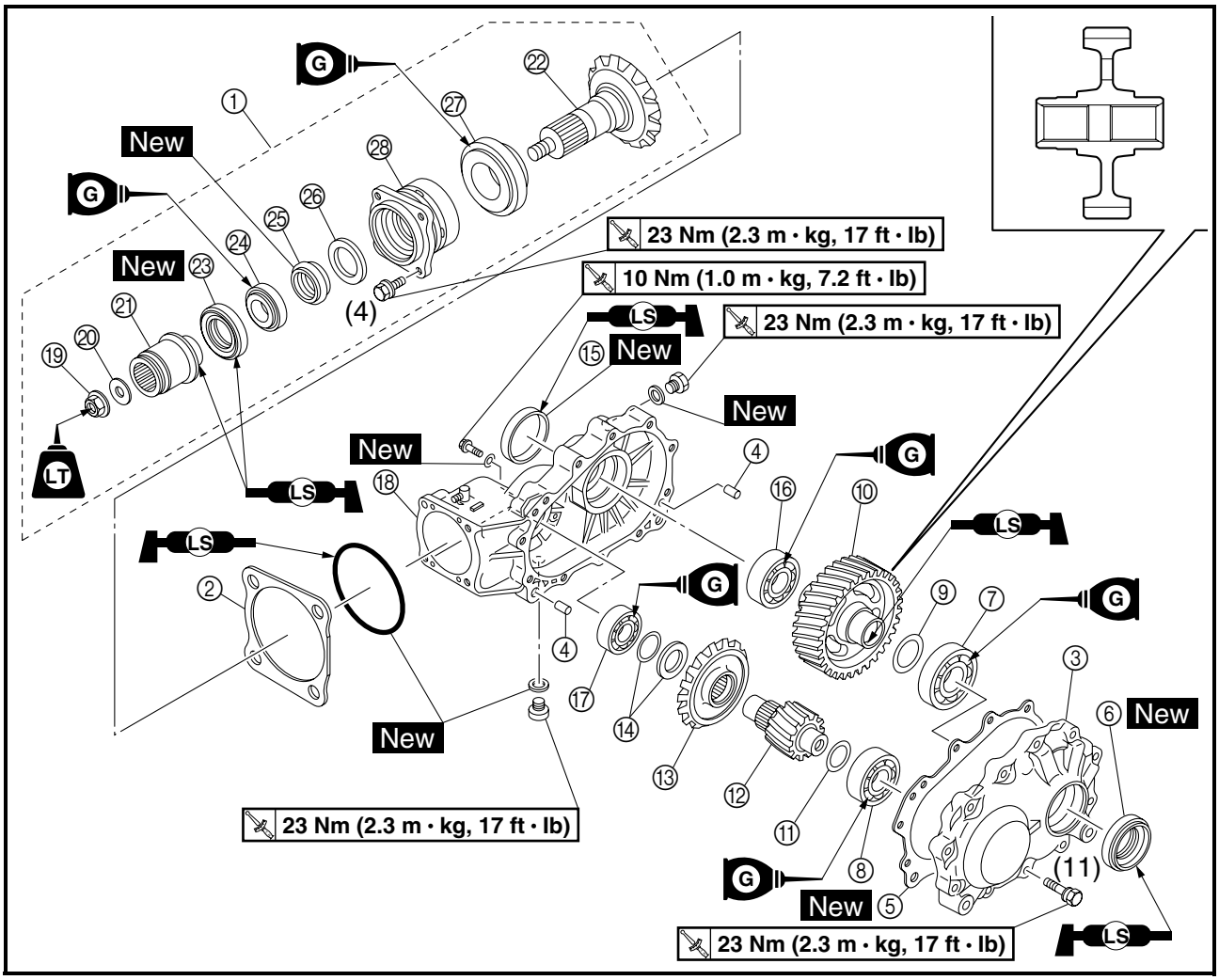
EBS00179



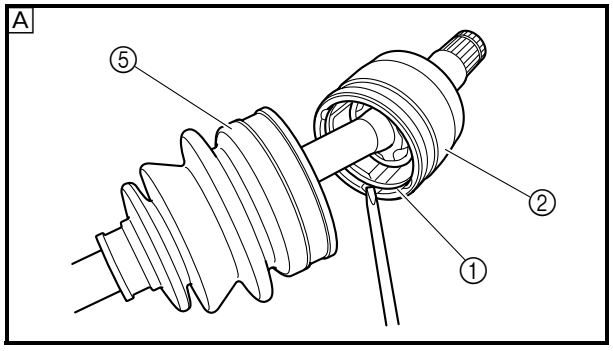
Order	Job/Part	Q'ty	Remarks
	Disassembling the final gear case assembly		Remove the parts in the order listed.
①	Final drive pinion gear assembly	1	
②	Final drive pinion gear shim	*	
③	Final gear case cover	1	**NOTE:** Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
④	Dowel pin	2	
⑤	Gasket	1	
⑥	Oil seal	1	
⑦	Bearing	1	
⑧	Bearing	1	
⑨	Wheel gear shim	*	
⑩	Wheel gear	1	

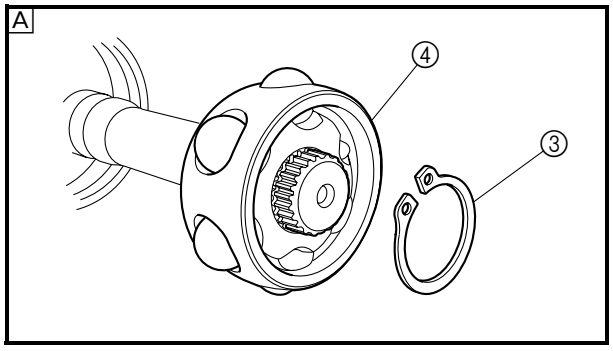


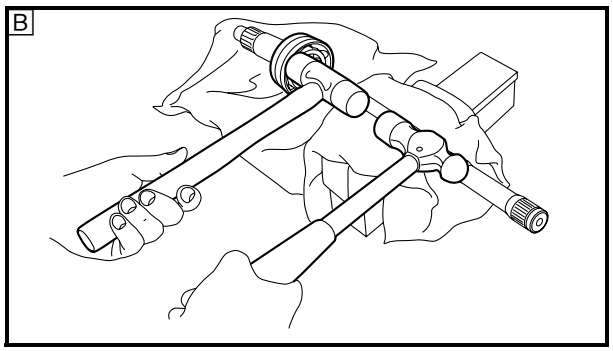
Order	Job/Part	Q'ty	Remarks
⑪	Thrust washer	*	
⑫	Pinion gear	1	
⑬	Final driven pinion gear	1	
⑭	Final driven pinion gear shim	*	
⑮	Oil seal	1	
⑯	Bearing	1	
⑰	Bearing	1	
⑱	Final gear case	1	
⑲	Rear drive shaft coupling gear nut	1	Refer to "DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY" and "ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY".
⑳	Washer	1	
㉑	Rear drive shaft coupling gear (final gear case side)	1	
㉒	Final drive pinion gear	1	
㉓	Oil seal	1	
㉔	Bearing	1	



Order	Job/Part	Q'ty	Remarks
㉕	Expander	1	Refer to "DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY" and "ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY".
㉖	Washer	1	
㉗	Bearing	1	
㉘	Final drive pinion gear bearing housing	1	
			For assembly, reverse the disassembly procedure.







REMOVING THE REAR CONSTANT VELOCITY JOINTS

1. Remove:
   - boot bands
   - clip ① New
   - double off-set joint ②
   - circlip ③ New
   - ball bearing ④
   - dust boot ⑤

NOTE:

Before removing the clip ①, slide the dust boot away from the double off-set joint.

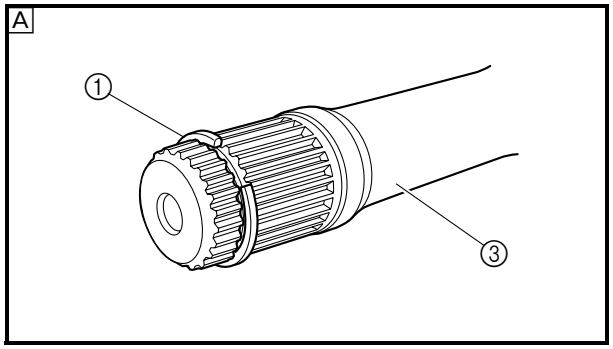
Ⓐ Gear case side

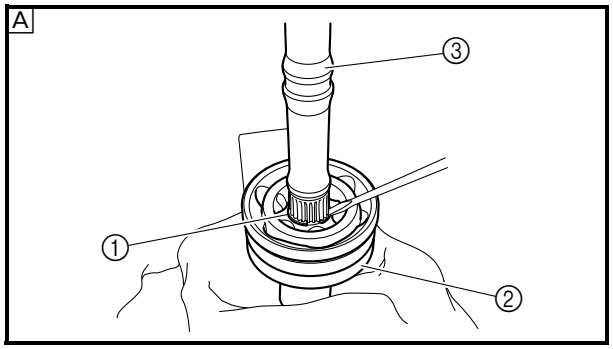
2. Remove:
   - boot bands
   - off-set joint
   - clip New
   - dust boots

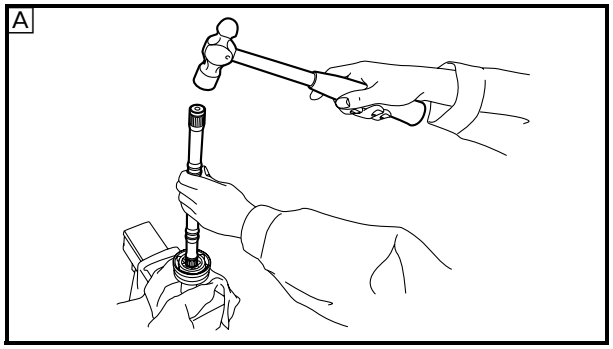
NOTE:

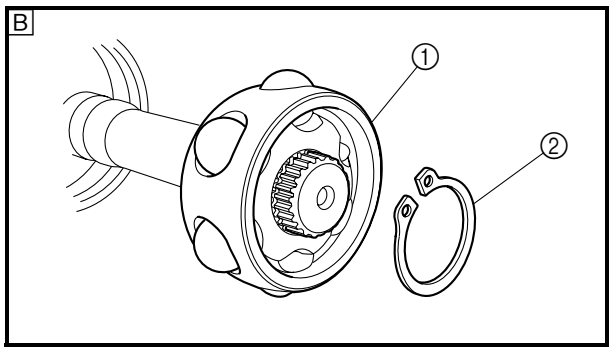
Secure the joint shaft in a vise, and then remove the off-set joint using hammers.

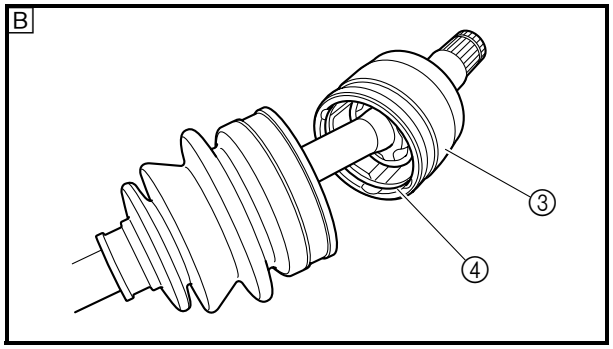
Ⓑ Wheel side











EBS00167

ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS

1. Install:
   - dust boot
   - clip ① New
   - off-set joint ②
   - joint shaft ③

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a. Install the clip ①.
b. Install the off-set joint ②.

NOTE:

- Install the clip ① into the groove in the joint shaft as shown.
- Secure the off-set joint in a vise, and then fit the joint shaft into the off-set joint using a hammer.

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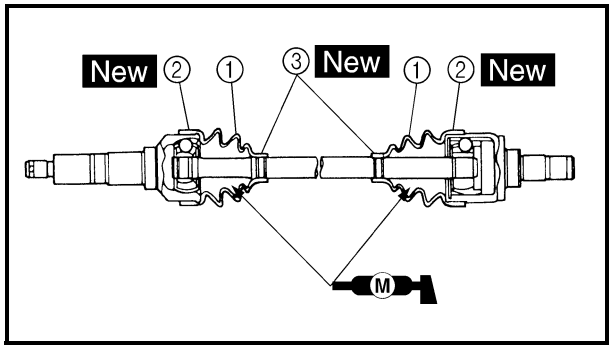
A Wheel side

2. Install:
   - dust boot
   - ball bearing ①
   - circlip ② New
   - double off-set joint ③
   - clip ④ New

NOTE:

- Securely install the circlip into the groove in the joint shaft.
- Securely install the clip into the groove in the double off-set joint.

B Gear case side



3. Apply:
   • molybdenum disulfide grease (into the ball joint assembly)

NOTE:
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • dust boots ①
   • boot bands ②, ③ New

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a. Apply molybdenum disulfide grease into the dust boots.

Molybdenum disulfide grease
40 g (1.4 oz) per dust boot (rear wheel side)
60 g (2.1 oz) per dust boot (final gear case side)

b. Install the dust boots ①.
c. Install the dust boot bands.

NOTE:
- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands ③ at the grooves in the joint shaft.

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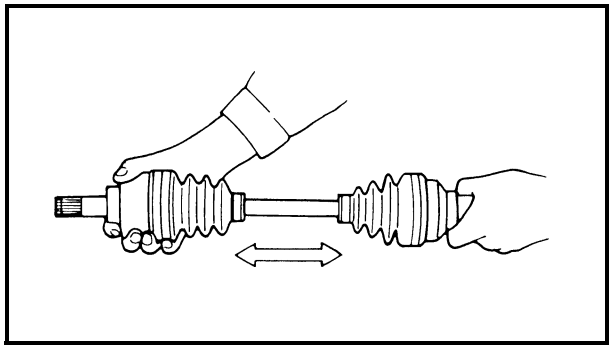
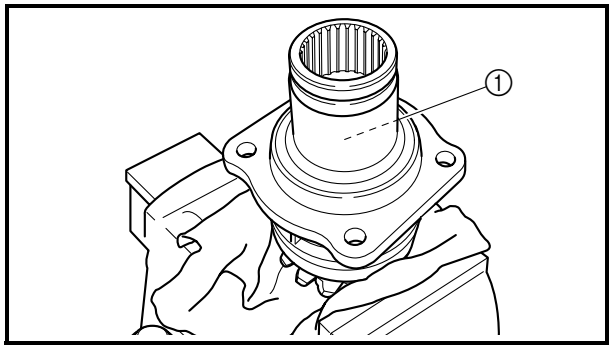


5. Check:
   • thrust movement free play
   Excessive play → Replace the joint assembly.



DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

1. Loosen:
   - rear drive shaft coupling gear (final gear side) nut ①

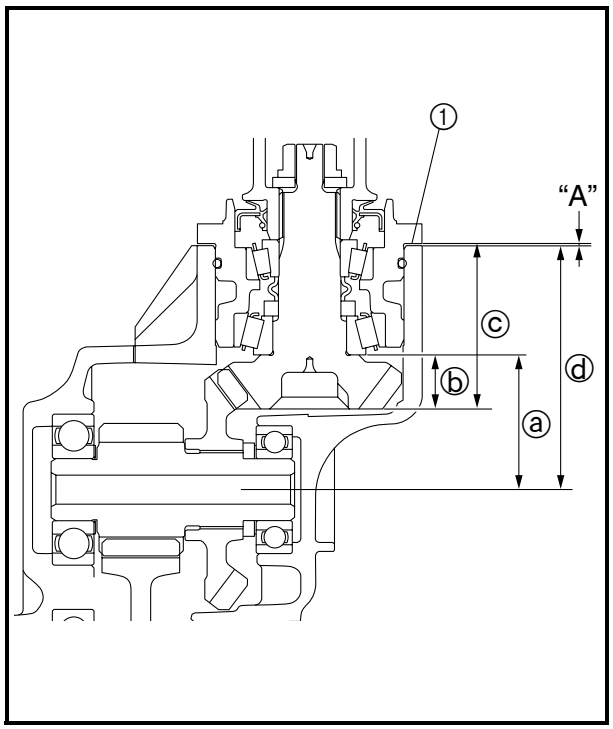
NOTE:

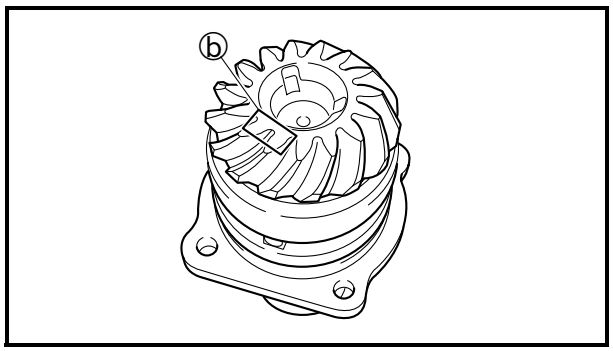
Secure the final drive pinion gear teeth in the vise with a clean rag.

EBS00184

POSITIONING THE FINAL DRIVE PINION GEAR AND RING GEAR

When the final drive pinion gear, wheel gear, final gear case and/or final driven pinion gear are replaced, be sure to adjust the positions of the final drive pinion gear, wheel gear and final driven pinion gear using the shim(s).





EBS00185

ADJUSTING THE FINAL DRIVE PINION GEAR BACKLASH

1. Select:
   - final drive pinion gear shim(s) ①

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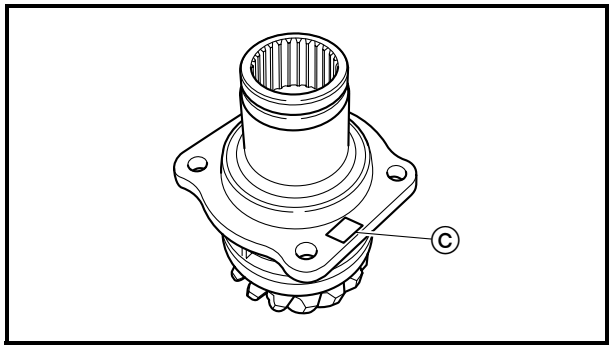
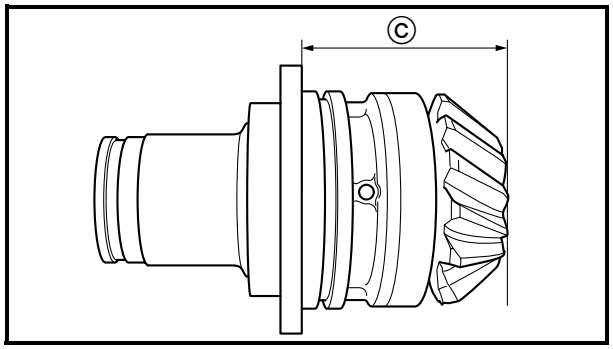
a. To find the final drive pinion gear shim thickness "A", use the following formula.

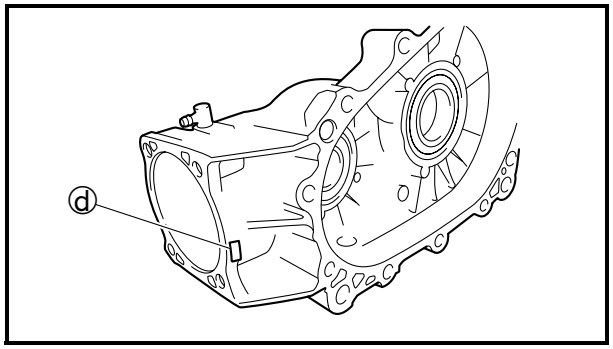
Final drive pinion gear shim thickness "A" = ⓐ + (ⓒ – ⓑ) – ⓓ

ⓐ = 55 mm (2.2 in).
ⓑ = a numeral (usually a decimal number) on the final drive pinion gear either added to or subtracted from "22.2".
ⓒ = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from "67.8".
ⓓ = a numeral (usually a decimal number) on the final gear case either added to or subtracted from "100".

Example:
1) ⓐ = 55
2) If "–02" is stamped on the final drive pinion gear,
   ⓑ = 22.2 – 0.02
   = 22.18







3) If "–05" is stamped on the final drive pinion gear bearing housing,
   ⓒ = 67.8 – 0.05
   = 67.75

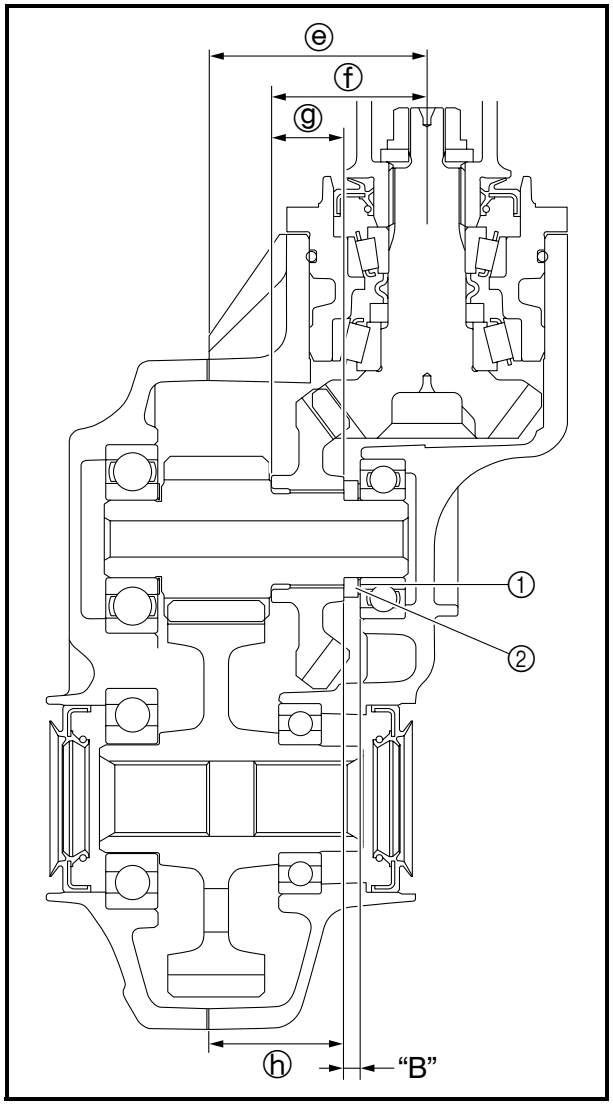
NOTE:
After replacing any part in the final drive pinion gear assembly, the overall length of the assembly will change. Therefore, be sure to measure distance ⓒ to select the correct final drive pinion gear shim thickness.

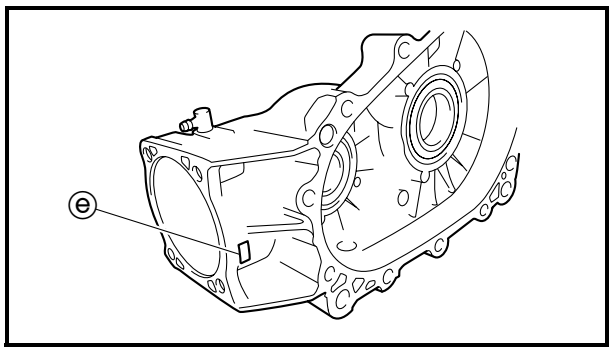
4) If "–01" is stamped on the final gear case,
   ⓓ = 100 – 0.01
   = 99.99
5) Therefore, "A" is 0.58
   "A" = 55 + (67.75 – 22.18) – 99.99
   = 0.58
6) Round off the hundredth digit and select the appropriate shim(s).
   In the example above, the calculated number is 0.58. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 0.60 mm (0.024 in).

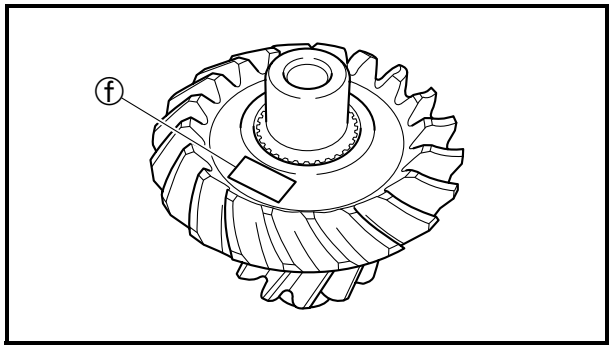
Hundredths	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

Final drive pinion gear shim	
Thickness (mm)	0.25 0.30 0.35 0.40 0.45 0.50







EBS00186

ADJUSTING THE FINAL DRIVEN PINION GEAR BACKLASH

1. Select:
   • final driven pinion gear shim(s) ①, ②

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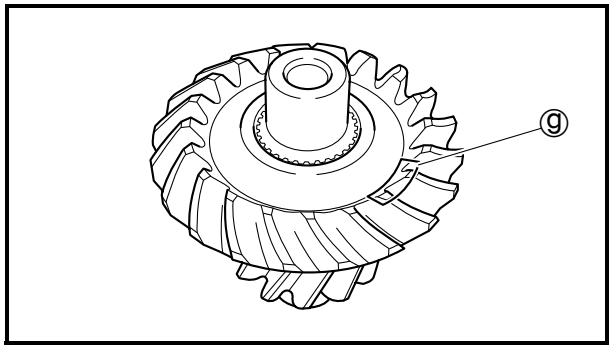
a. To find the final driven pinion gear shim thickness "B", use the following formula.

Final driven pinion gear shim thickness "B" = ⓗ – (ⓔ – ⓕ + ⓖ)

ⓔ = a numeral (usually a decimal number) on the final gear case either added to or subtracted from "71.6".
ⓕ = a numeral (usually a decimal number) on the outside of the final driven pinion gear either added to or subtracted from "51.0".
ⓖ = a numeral (usually a decimal number) on the outside of the final driven pinion gear either added to or subtracted from "24.0".
ⓗ = 49.8

Example:

1) If "–03" is stamped on the final gear case,
   ⓔ = 71.6 – 0.03
   = 71.57
2) If "–12" is stamped on the outside of the final driven pinion gear,
   ⓕ = 51.0 – 0.12
   = 50.88
3) If "–05" is stamped on the outside of the final driven pinion gear,
   ⓖ = 24.0 – 0.05
   = 23.95
4) ⓗ = 49.8
5) Therefore, shim thickness "B" is 5.16
   "B" = 49.8 – (71.57 – 50.88 + 23.95)
   = 5.16



6) Round off the hundredth digit and select the appropriate shim(s). In the example above, the calculated number is 5.16. The chart instructs you to round off 6 to 5 at the hundredth place.
Thus, the shim thickness is 5.15 mm.

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

Shims are supplied in the following thicknesses.

	Final driven pinion gear shim ①
Thickness (mm)	0.25 0.30 0.35 0.40 0.45 0.50

	Final driven pinion gear shim ②
Thickness (mm)	4.5 4.8 5.1 5.4

NOTE:
Be sure to use one of each of the final driven pinion gear shims ① and ② to obtain the shim thickness.

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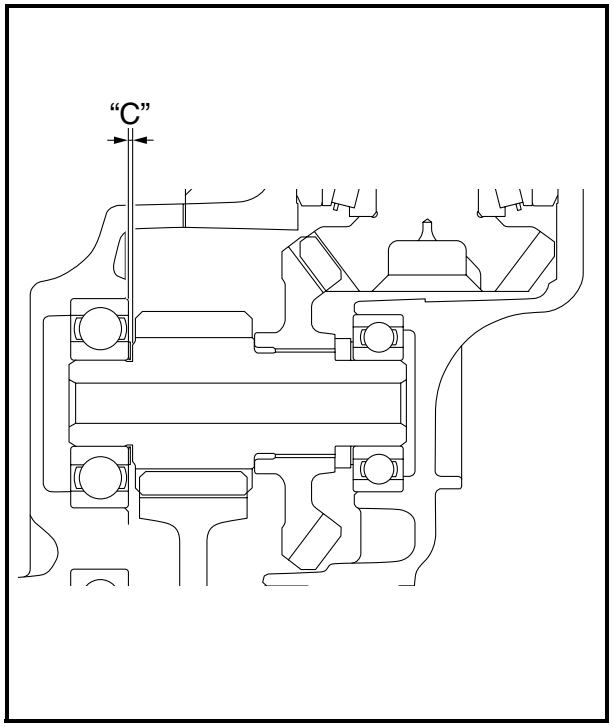

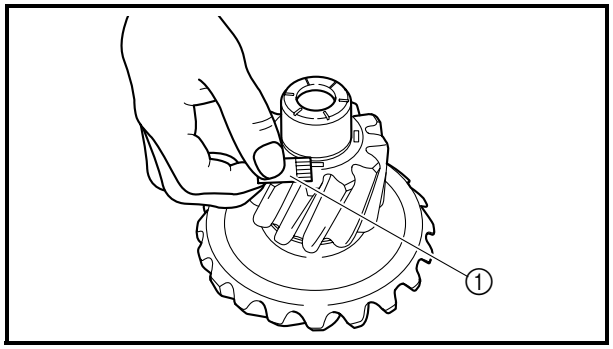

EBS00187

MEASURING THE FINAL DRIVEN PINION GEAR THRUST WASHER CLEARANCE

1. Measure:
   • final driven pinion gear thrust washer clearance "C"

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a. Place four pieces of Plastigauge® between the originally fitted thrust washer and the final driven pinion gear assembly.
b. Install the final driven pinion gear assembly and final driven pinion gear shim(s), and then tighten the bolts to specification.

	Final gear case cover bolt **23 Nm (2.3 m · kg, 17 ft · lb)**

NOTE:

Do not turn the drive pinion gear, wheel gear, and driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the final driven pinion gear assembly.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® ①.

	Final driven pinion gear thrust clearance **0.08 ~ 0.12 mm** **(0.0031 ~ 0.0047 in)**

e. If out of specification, select the correct washer.

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2. Select:
   • final driven pinion gear thrust washer

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a. Select a suitable thrust washer using the following chart.

	Thrust washer				
Thickness (mm)	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**

b. Repeat the measurement steps until the final driven pinion gear thrust clearance is within the specified limits.

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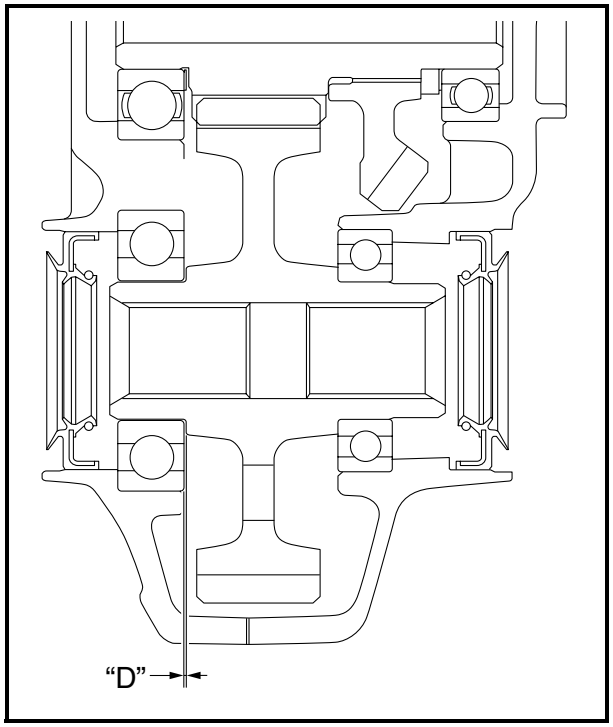

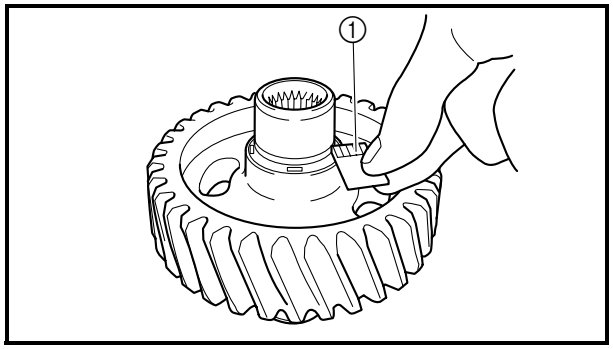

EBS00187

MEASURING THE WHEEL GEAR THRUST CLEARANCE

1. Measure:
   - wheel gear thrust clearance "D"

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a. Place four pieces of Plastigauge® between the originally fitted wheel gear shim(s) and the wheel gear.
b. Install the wheel gear and tighten the bolts to specification.

	Final gear case cover bolt **23 Nm (2.3 m · kg, 17 ft · lb)**

NOTE:

Do not turn the drive pinion gear, wheel gear, and driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the wheel gear.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® ①.

	Wheel gear thrust clearance **0.03 ~ 0.07 mm** **(0.0012 ~ 0.0028 in)**

e. If out of specification, select the correct shim(s).

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2. Select:
   - wheel gear thrust clearance "D"

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a. Select a suitable wheel gear shim(s) using the following chart.

	Wheel gear shim
Thickness (mm)	**0.25 0.30 0.35** **0.40 0.45 0.50**

b. Repeat the measurement steps until the wheel gear thrust clearance is within the specified limits.

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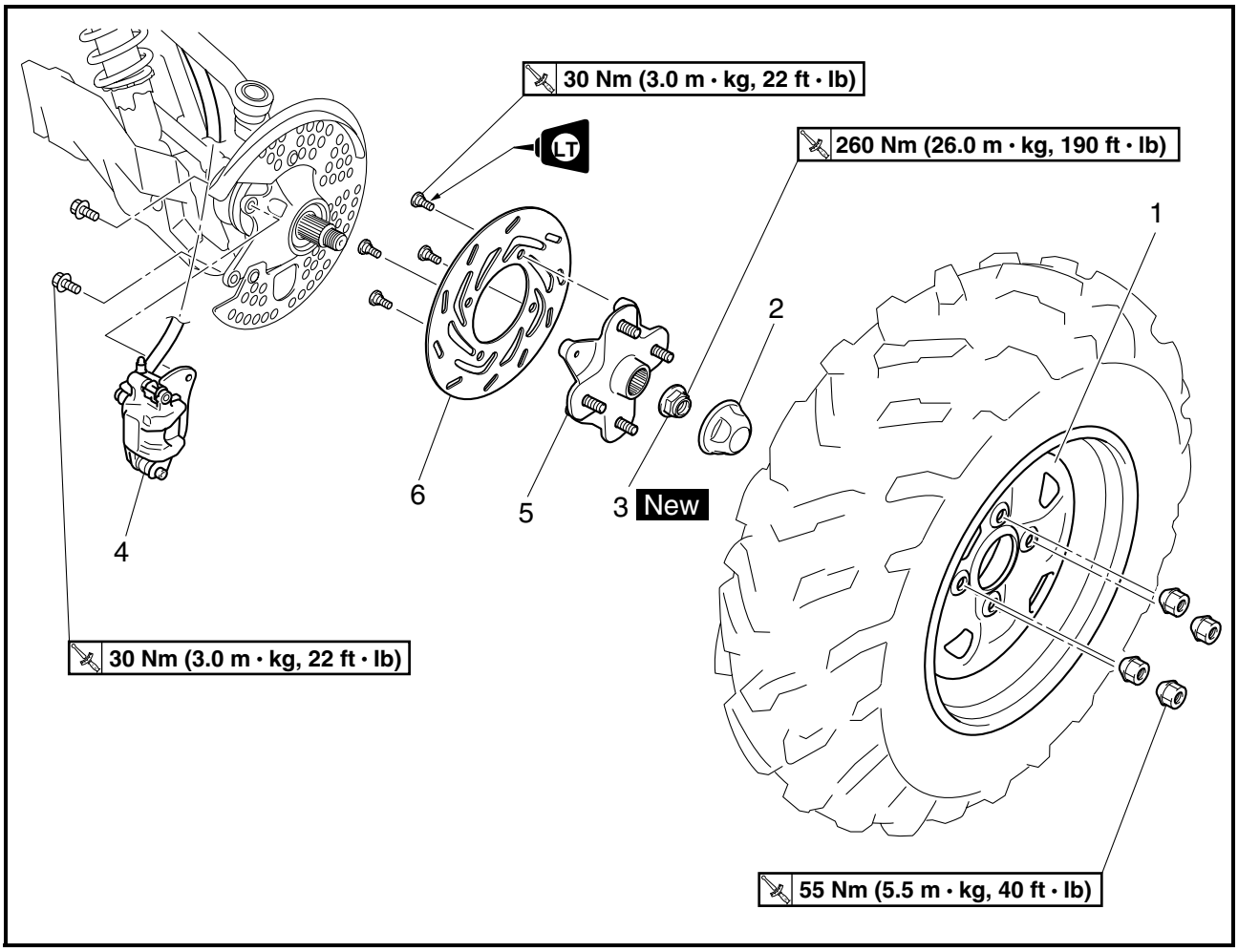
EBS00378

CHASSIS

FRONT AND REAR WHEELS

FRONT WHEELS



Order	Job/Part	Q'ty	Remarks
	Removing the front wheels		Remove the parts in the order listed. The following procedure applies to both of the front wheels. Place the vehicle on a level surface. **⚠ WARNING** **Securely support the vehicle so there is no danger of it falling over.**
1	Front wheel	1	Refer to "INSTALLING THE WHEELS".
2	Wheel cap	1	
3	Front wheel axle nut	1	Refer to "INSTALLING THE WHEEL HUBS".

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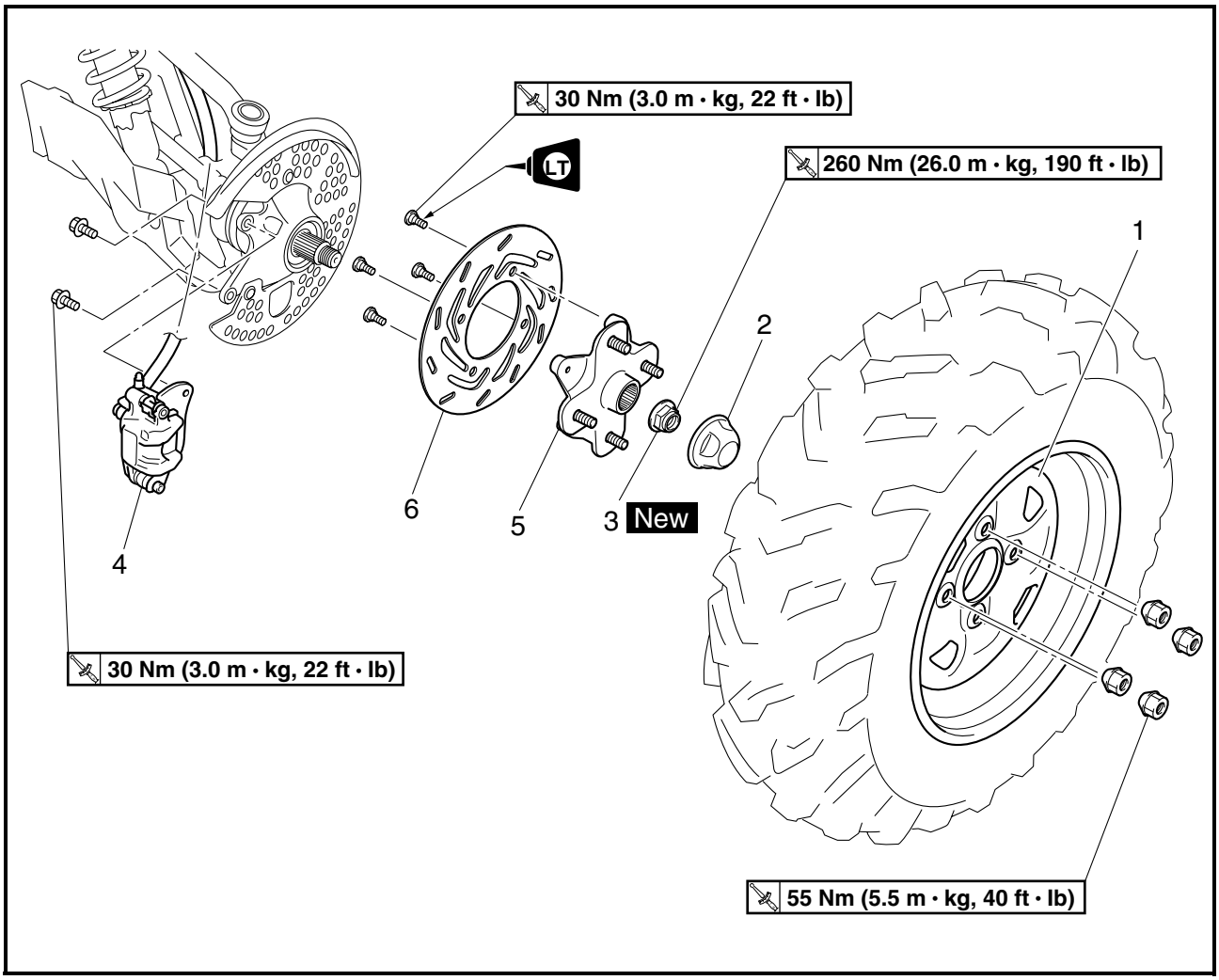
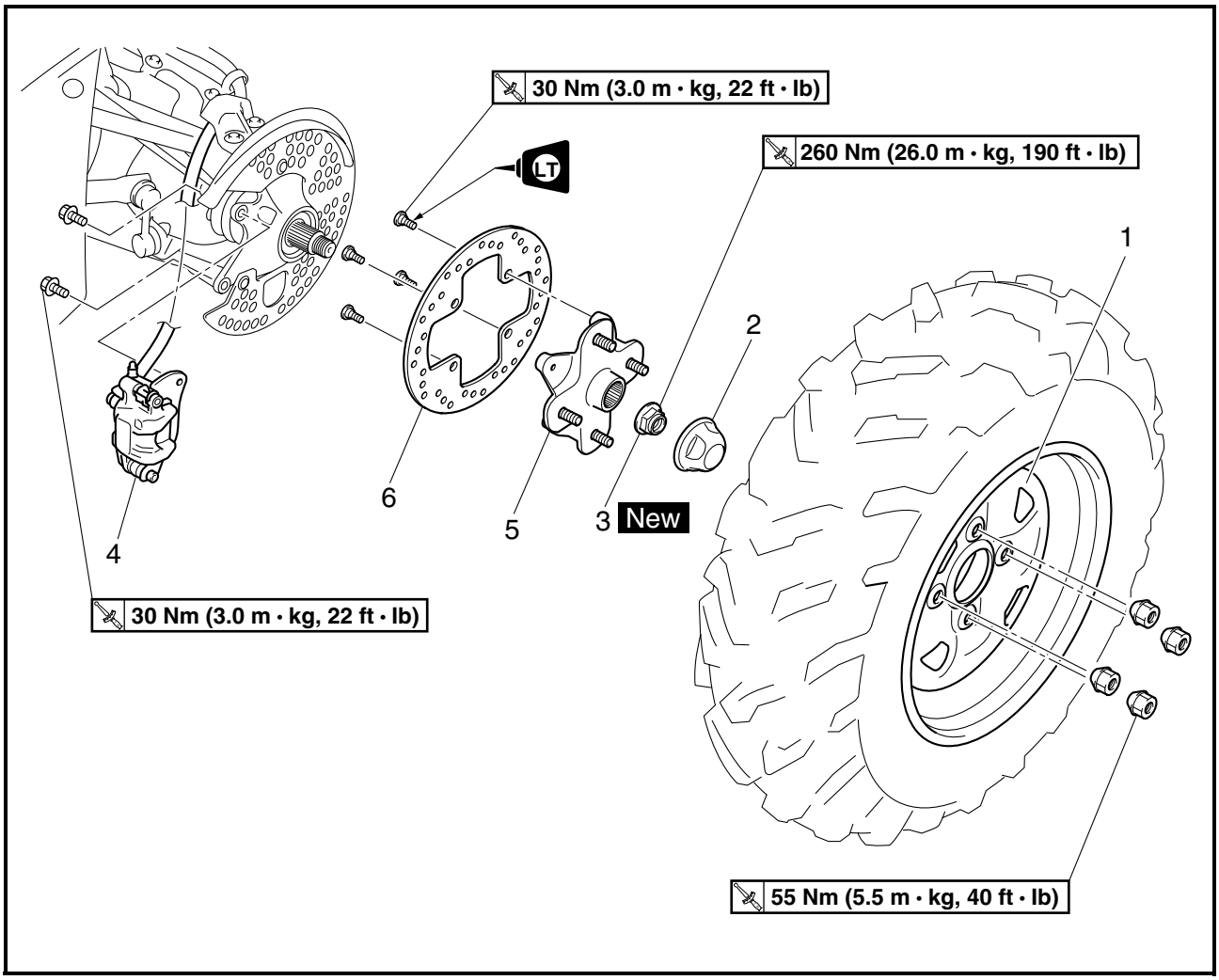


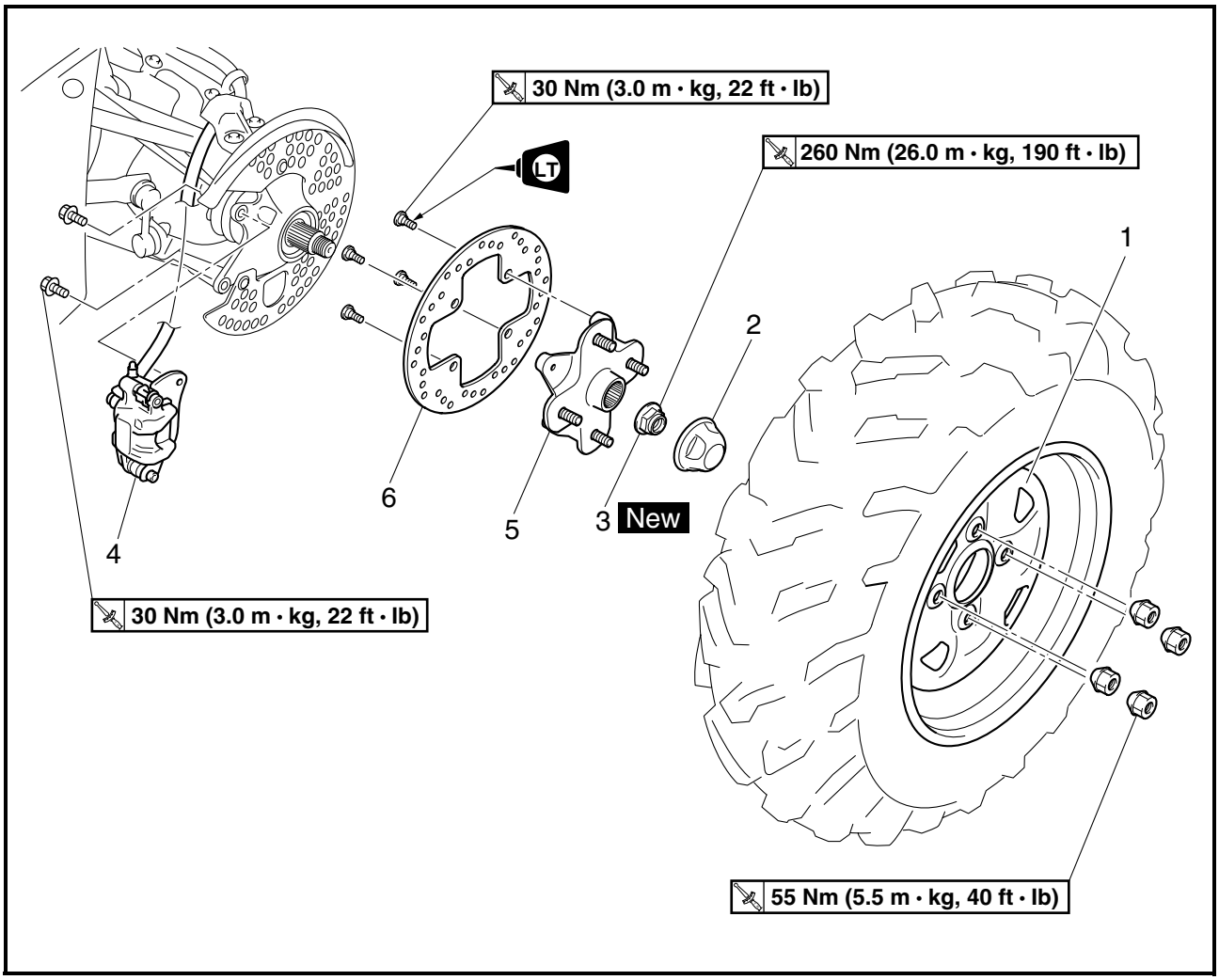
Order	Job/Part	Q'ty	Remarks
4	Front brake caliper assembly	1	**NOTE:** Do not squeeze the front brake lever when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Front brake disc	1	Refer to "INSTALLING THE BRAKE DISCS". For installation, reverse the removal procedure.

EBS00379

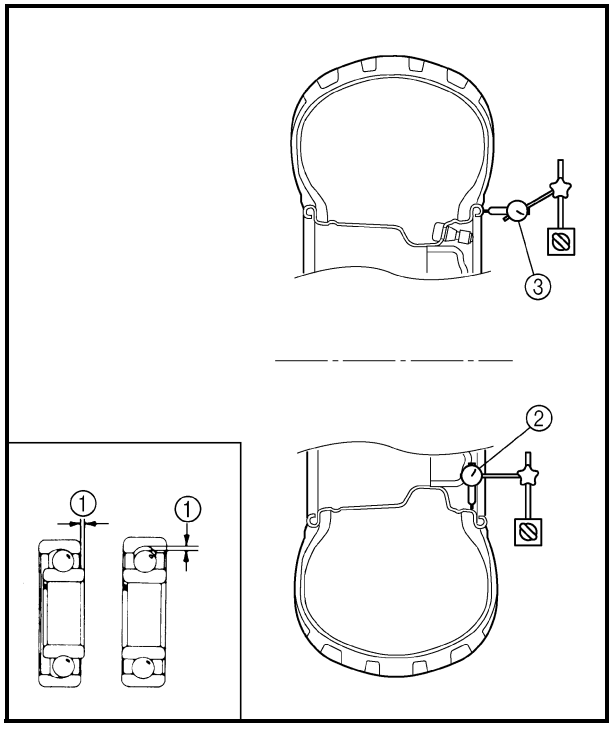
REAR WHEELS



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheels		Remove the parts in the order listed. The following procedure applies to both of the rear wheels. Place the vehicle on a level surface. **⚠ WARNING** **Securely support the vehicle so there is no danger of it falling over.**
1	Rear wheel	1	Refer to "INSTALLING THE WHEELS".
2	Wheel cap	1	
3	Rear wheel axle nut	1	Refer to "INSTALLING THE WHEEL HUBS".



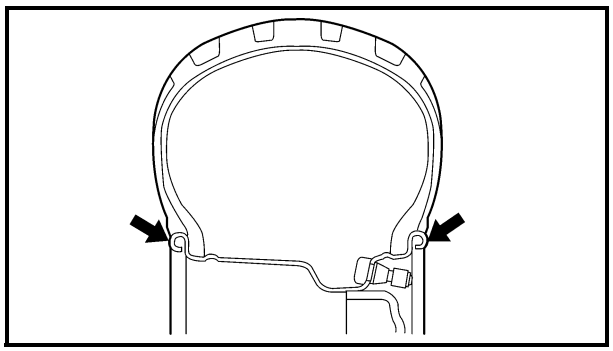
Order	Job/Part	Q'ty	Remarks
4	Rear brake caliper assembly	1	**NOTE:** Do not squeeze the rear brake lever and brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Rear wheel hub	1	
6	Rear brake disc	1	Refer to "INSTALLING THE BRAKE DISCS". For installation, reverse the removal procedure.



EBS00383
CHECKING THE WHEELS

1. Check:
   - wheels
2. Measure:
   - wheel runout
     Over the specified limit → Replace the wheel or check the wheel bearing play ①.

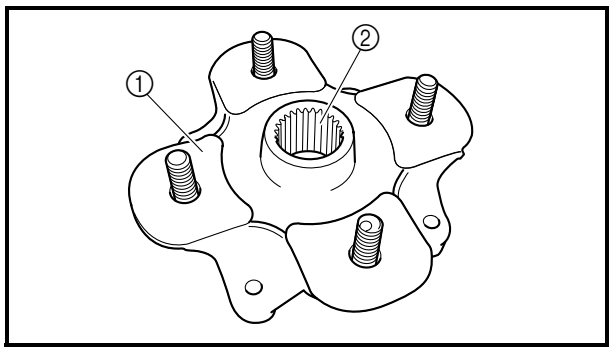
Wheel runout limit
Front
Radial ②: 2.0 mm (0.08 in)
Lateral ③: 2.0 mm (0.08 in)
Rear
Radial ②: 2.0 mm (0.08 in)
Lateral ③: 2.0 mm (0.08 in)



3. Check:
   - wheel balance
     Out of balance → Adjust.

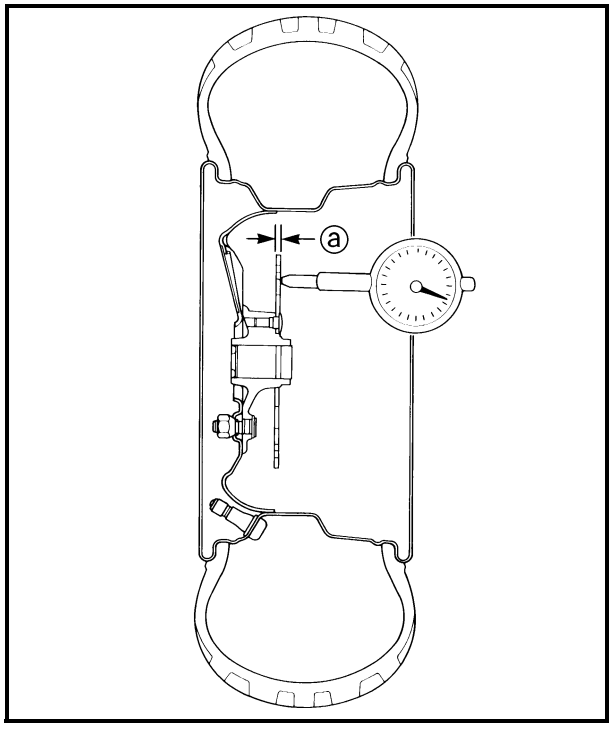
⚠ WARNING

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



EBS00385
CHECKING THE WHEEL HUBS

1. Check:
   - wheel hubs ①
     Cracks/damage → Replace.
   - splines (wheel hub) ②
     Wear/damage → Replace the wheel hub.



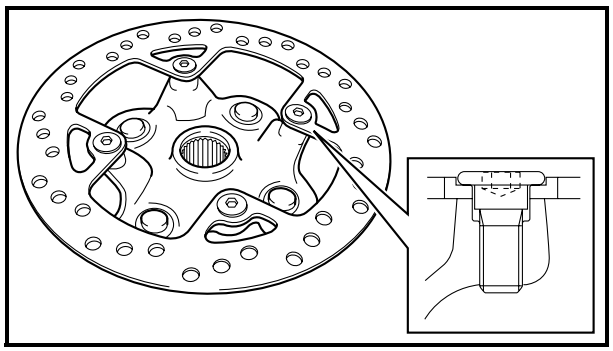
EBS00389
CHECKING THE BRAKE DISCS

1. Check:
   - brake discs
     Galling/damage → Replace.
2. Measure:
   - brake disc deflection
     Out of specification → Check the wheel runout.

Brake disc maximum deflection
Front: 0.1 mm (0.004 in)
Rear: 0.1 mm (0.004 in)

   - brake disc thickness ⓐ
     Out of specification → Replace.

Brake disc minimum thickness
Front: 3.0 mm (0.12 in)
Rear: 3.0 mm (0.12 in)

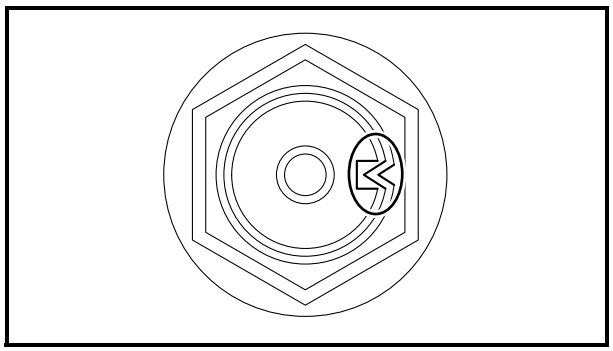


INSTALLING THE BRAKE DISCS

1. Install:
   - brake discs

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

NOTE:
Install the brake discs with their spot-faced side facing the bolt heads.

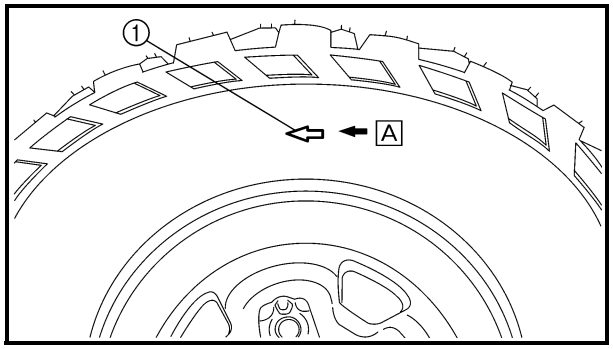


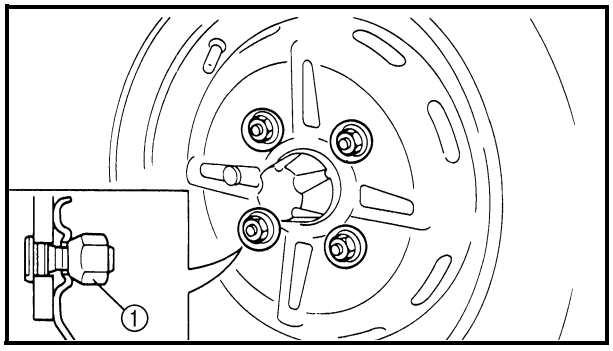
INSTALLING THE WHEEL HUBS

1. Install:
   - wheel axle nut New

260 Nm (26.0 m · kg, 190 ft · lb)

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





EBS00392
INSTALLING THE WHEELS

1. Install:
   - wheels

NOTE:
The arrow mark ① on the tire must point in the direction of rotation [A] of the wheel.

2. Tighten:
   - wheel nuts ①

55 Nm (5.5 m · kg, 40 ft · lb)

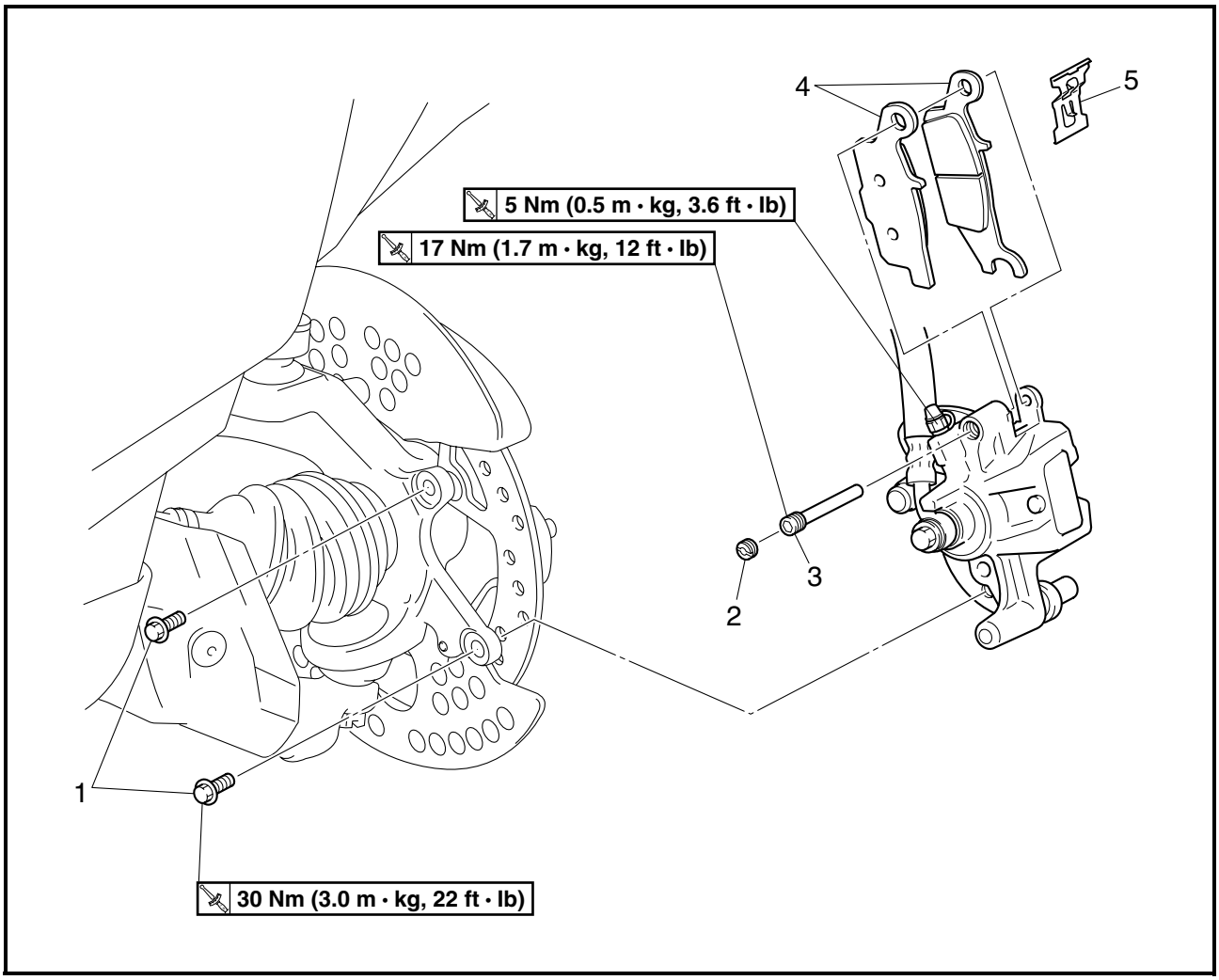
⚠ WARNING

Tapered wheel nuts ① are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.

EBS00400

FRONT AND REAR BRAKES

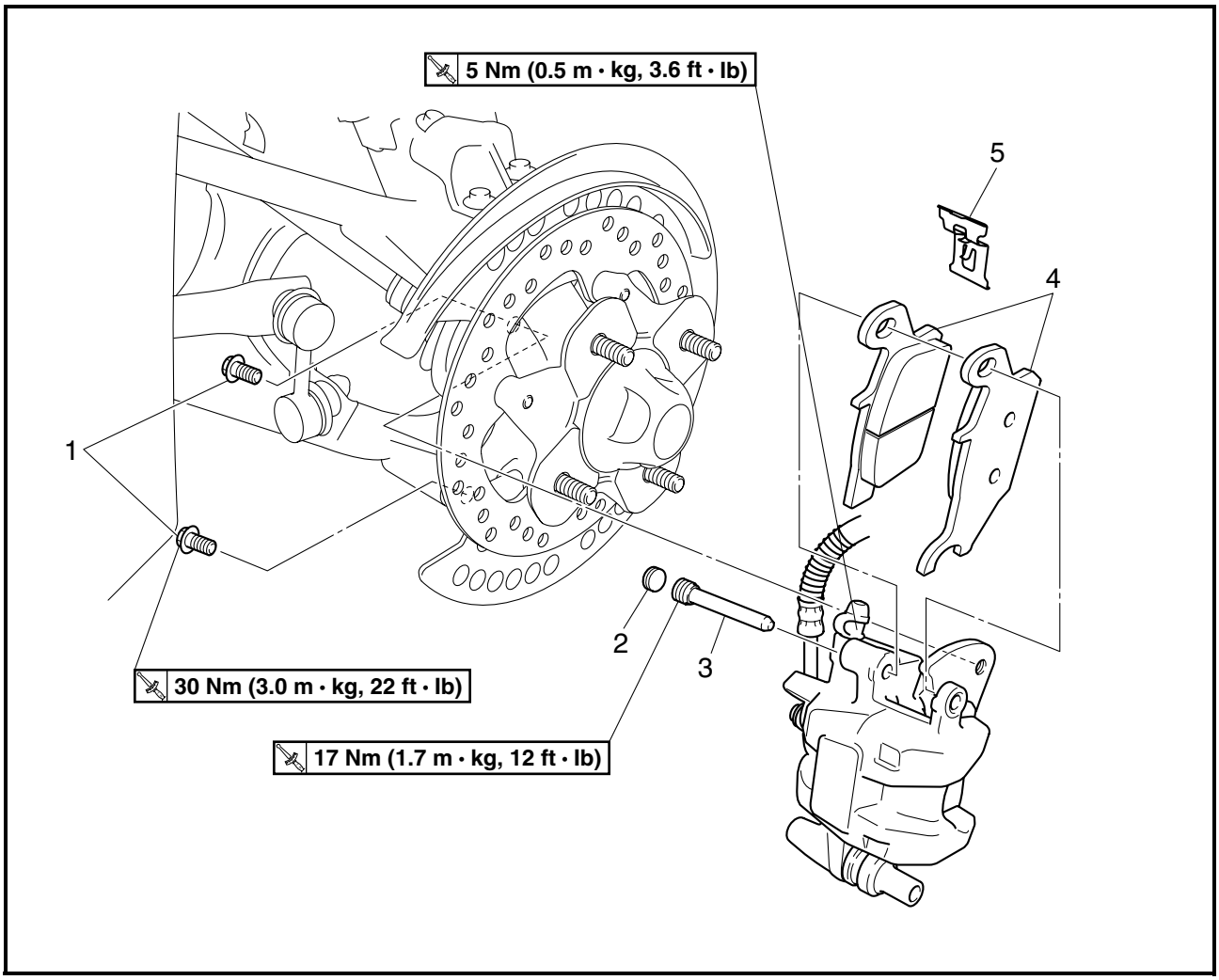
FRONT BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
	Front wheel		Refer to "FRONT AND REAR WHEELS".
1	Front brake caliper bolt	2	Refer to "REPLACING THE FRONT AND REAR BRAKE PADS".
2	Brake pad holding bolt plug	1	
3	Brake pad holding bolt	1	
4	Front brake pad	2	
5	Brake pad spring	1	
			For installation, reverse the removal procedure.

EBS00401

REAR BRAKE PADS

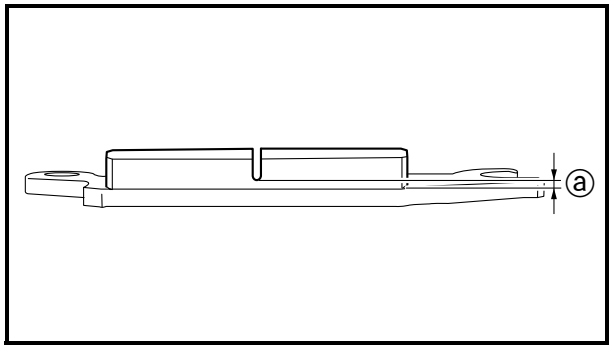


Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers.
	Rear wheel		Refer to "FRONT AND REAR WHEELS".
1	Rear brake caliper bolt	2	
2	Brake pad holding bolt plug	1	Refer to "REPLACING THE FRONT AND REAR BRAKE PADS".
3	Brake pad holding bolt	1	
4	Rear brake pad	2	
5	Brake pad spring	1	
			For installation, reverse the removal procedure.

EBS00402

CAUTION:

Disc brake components rarely require disassembly.
DO NOT:
- **disassemble components unless absolutely necessary;**
- **use solvents on internal brake components;**
- **use spent brake fluid for cleaning; (use only clean brake fluid)**
- **allow brake fluid to come in contact with the eyes, as this may cause eye injury;**
- **splash brake fluid onto painted surfaces or plastic parts, as this may cause damage;**
- **disconnect any hydraulic connection, as this would require the entire brake system to be disassembled, drained, cleaned, properly filled and bled after reassembly.**



EBS00404

REPLACING THE FRONT AND REAR BRAKE PADS

NOTE:

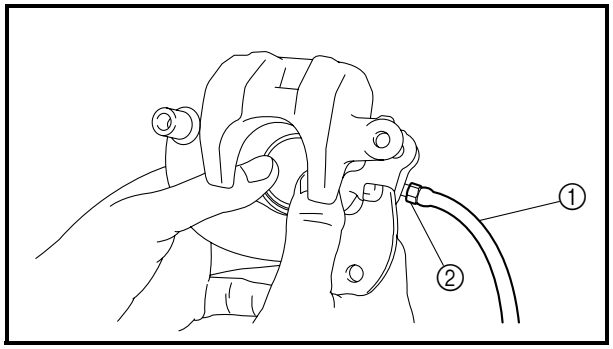
It is not necessary to disassemble the brake calipers and brake hoses to replace the brake pads.

1. Remove:
   - brake pads

Brake pad wear limit ⓐ
Front: 1.0 mm (0.04 in)
Rear: 1.0 mm (0.04 in)

NOTE:

Replace the brake pads as a set if either is found to be worn to the wear limit.



2. Install:
   • brake pad spring
   • brake pads

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

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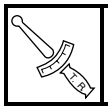
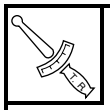
a. Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
b. Loosen the brake caliper bleed screw and, using a finger, push the caliper piston into the brake caliper.
c. Tighten the brake caliper bleed screw.

	**Brake caliper bleed screw** **5 Nm (0.5 m · kg, 3.6 ft · lb)**

d. Install new brake pads and a new brake pad spring.
e. Install the holding bolt, holding bolt plug and brake caliper.

	**Brake pad holding bolt** **17 Nm (1.7 m · kg, 12 ft · lb)** **Brake caliper bolt** **30 Nm (3.0 m · kg, 22 ft · lb)**

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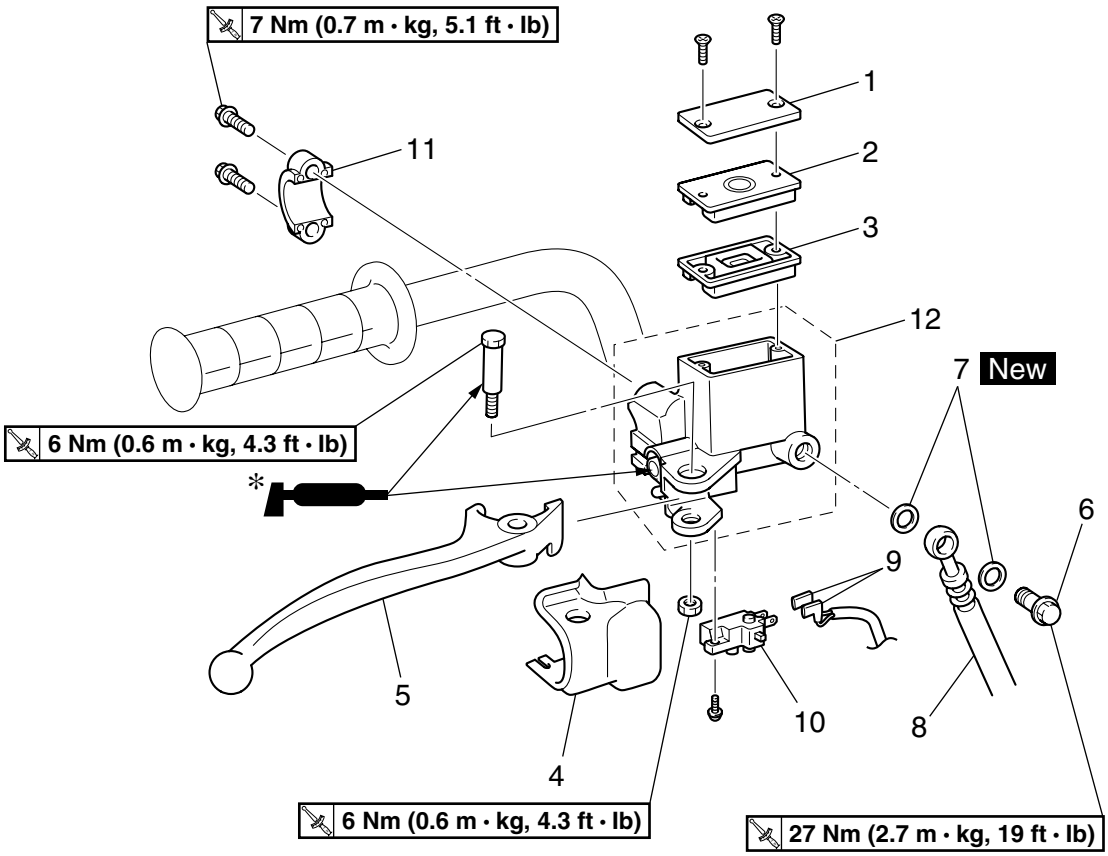
3. Check:
   • brake fluid level
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
4. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

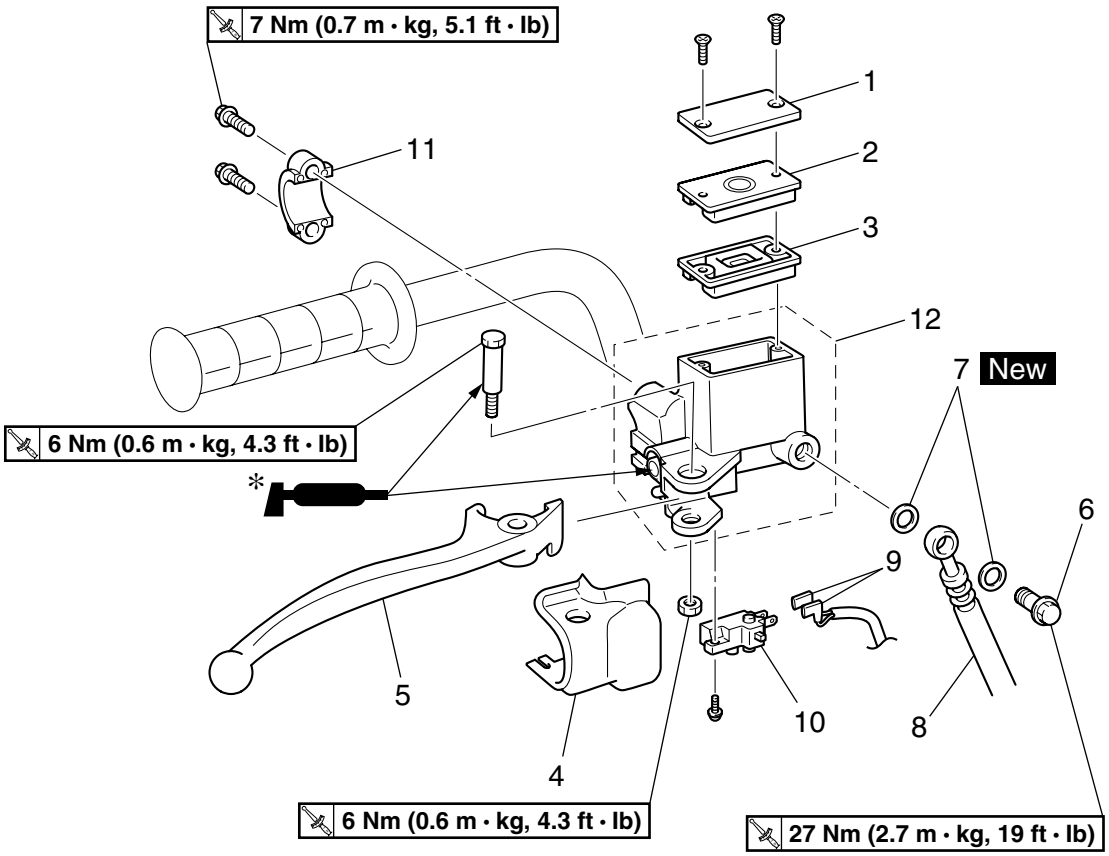
EBS00407

FRONT BRAKE MASTER CYLINDER



* Apply silicone grease.

Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain.
	On-command four-wheel-drive motor switch and differential gear lock switch		Refer to "HANDLEBAR".
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Front brake lever cover	1	
5	Brake lever	1	

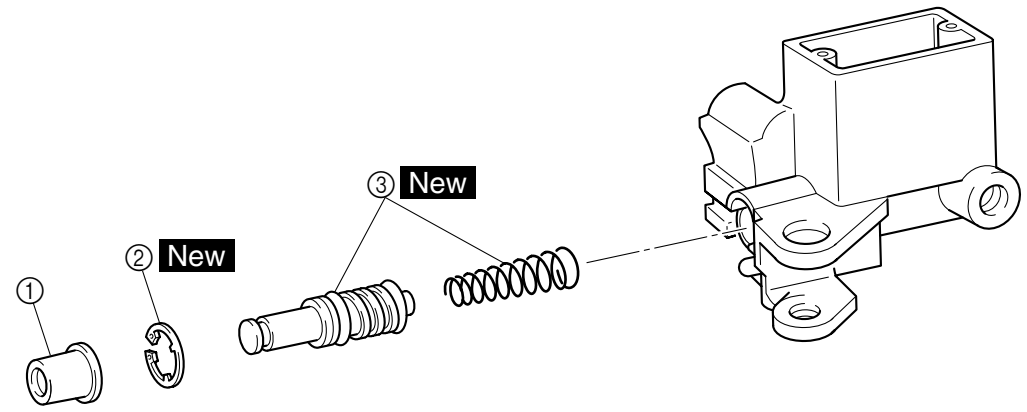


* Apply silicone grease.

Order	Job/Part	Q'ty	Remarks
6	Union bolt	1	
7	Copper washer	2	
8	Front brake hose	1	Disconnect.
9	Front brake light switch connector	2	Disconnect.
10	Front brake light switch	1	
11	Front brake master cylinder holder	1	
12	Front brake master cylinder	1	
			For installation, reverse the removal procedure.

Refer to "INSTALLING THE FRONT BRAKE MASTER CYLINDER".

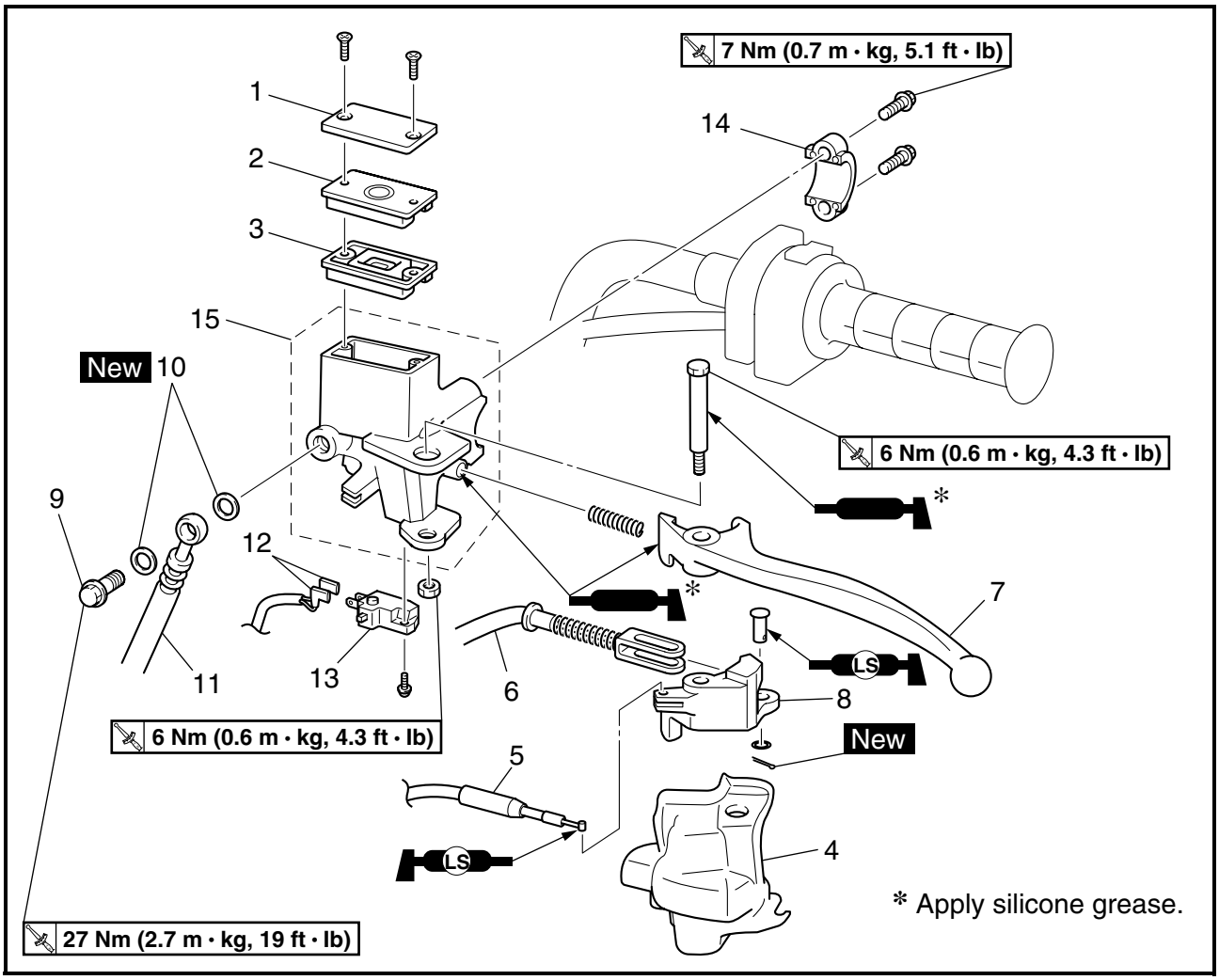
EBS00409



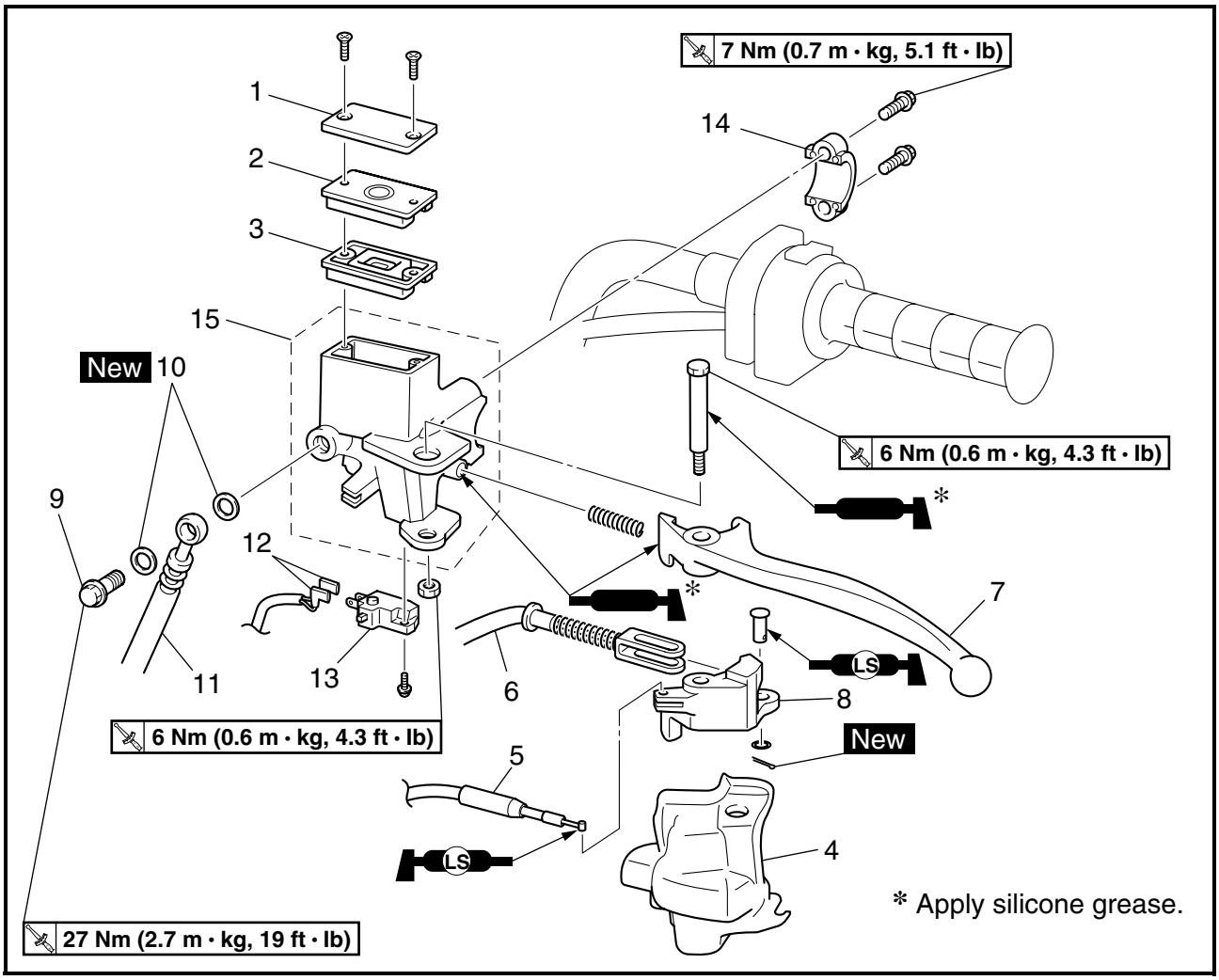
Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	Refer to "ASSEMBLING THE FRONT AND REAR BRAKE MASTER CYLINDERS".
②	Circlip	1	
③	Brake master cylinder kit	1	
			For assembly, reverse the disassembly procedure.

EBS00410

REAR BRAKE MASTER CYLINDER



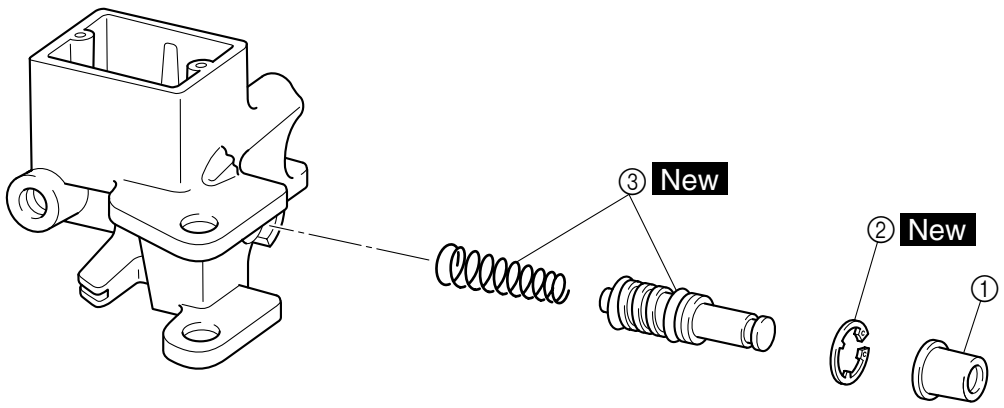
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Rear brake lever cover	1	
5	Shift control cable	1	Disconnect.
6	Rear brake cable	1	Disconnect.
7	Brake lever	1	
8	Brake lever bracket	1	



Order	Job/Part	Q'ty	Remarks
9	Union bolt	1	
10	Copper washer	2	
11	Rear brake hose	1	Disconnect.
12	Rear brake light switch connector	2	Disconnect.
13	Rear brake light switch	1	
14	Rear brake master cylinder holder	1	
15	Rear brake master cylinder	1	
			For installation, reverse the removal procedure.

Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".

EBS00411



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	Refer to "ASSEMBLING THE FRONT AND REAR BRAKE MASTER CYLINDERS".
②	Circlip	1	
③	Brake master cylinder kit	1	
			For assembly, reverse the disassembly procedure.

EBS00413
CHECKING THE MASTER CYLINDERS

1. Check:
   - brake master cylinder
     Wear/scratches → Replace the brake master cylinder assembly.
   - brake master cylinder body
     Cracks/damage → Replace.
   - brake fluid delivery passage
     (brake master cylinder body)
     Blockage → Blow out with compressed air.
2. Check:
   - brake master cylinder kit
     Scratches/wear/damage → Replace as a set.
3. Check:
   - brake master cylinder reservoir
   - brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.

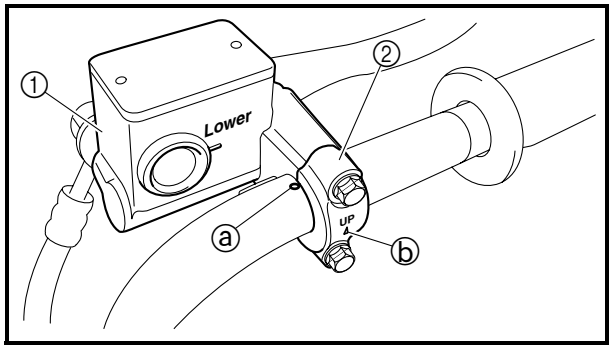
EBS00415
ASSEMBLING THE FRONT AND REAR BRAKE MASTER CYLINDERS

⚠ WARNING

- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

Recommended brake fluid
DOT 4

- **Whenever a master cylinder is disassembled, replace the piston seals and dust seals.**



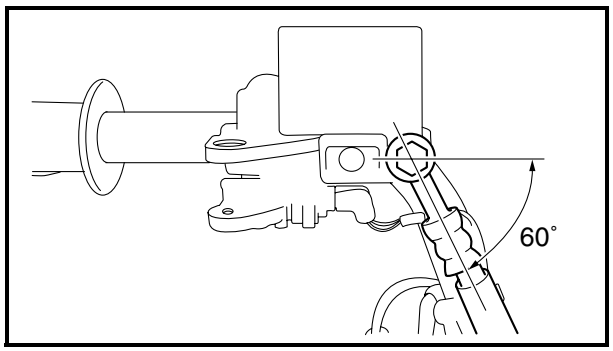
EBS00418
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - brake master cylinder ①
   - brake master cylinder holder ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:

- Align the end of the brake master cylinder holder with the punch mark ⓐ on the handlebar.
- The "UP" mark ⓑ on the brake master cylinder holder should face up.



2. Install:
   - brake hose
   - copper washers New
   - union bolt **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTE:

- Tighten the union bolt while holding the brake hose as shown.
- Turn the handlebar to the left and to the right to check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.). Correct if necessary.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

3. Fill:
   • brake fluid reservoir

Recommended brake fluid
DOT 4

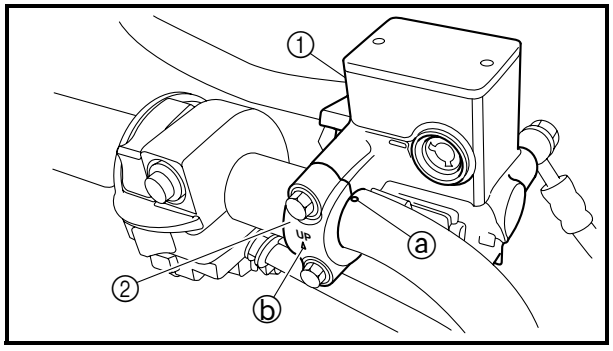
CAUTION:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful reaction and lead to poor brake performance.**
- **Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

4. Air bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
5. Check:
   • brake fluid level
   Brake fluid level is under the "LOWER" level line → Fill up.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.



EBS00418

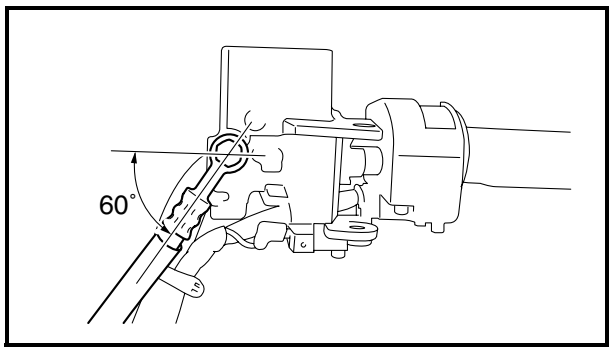
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   - brake master cylinder ①
   - brake master cylinder holder ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:

- Align the end of the brake master cylinder holder with the punch mark ⓐ on the handlebar.
- The "UP" mark ⓑ on the brake master cylinder holder should face up.



2. Install:
   - brake hose
   - copper washers New
   - union bolt **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTE:

- Tighten the union bolt while holding the brake hose as shown.
- Turn the handlebar to the left and to the right to check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.). Correct if necessary.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

3. Fill:
   • brake fluid reservoir

Recommended brake fluid
DOT 4

CAUTION:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

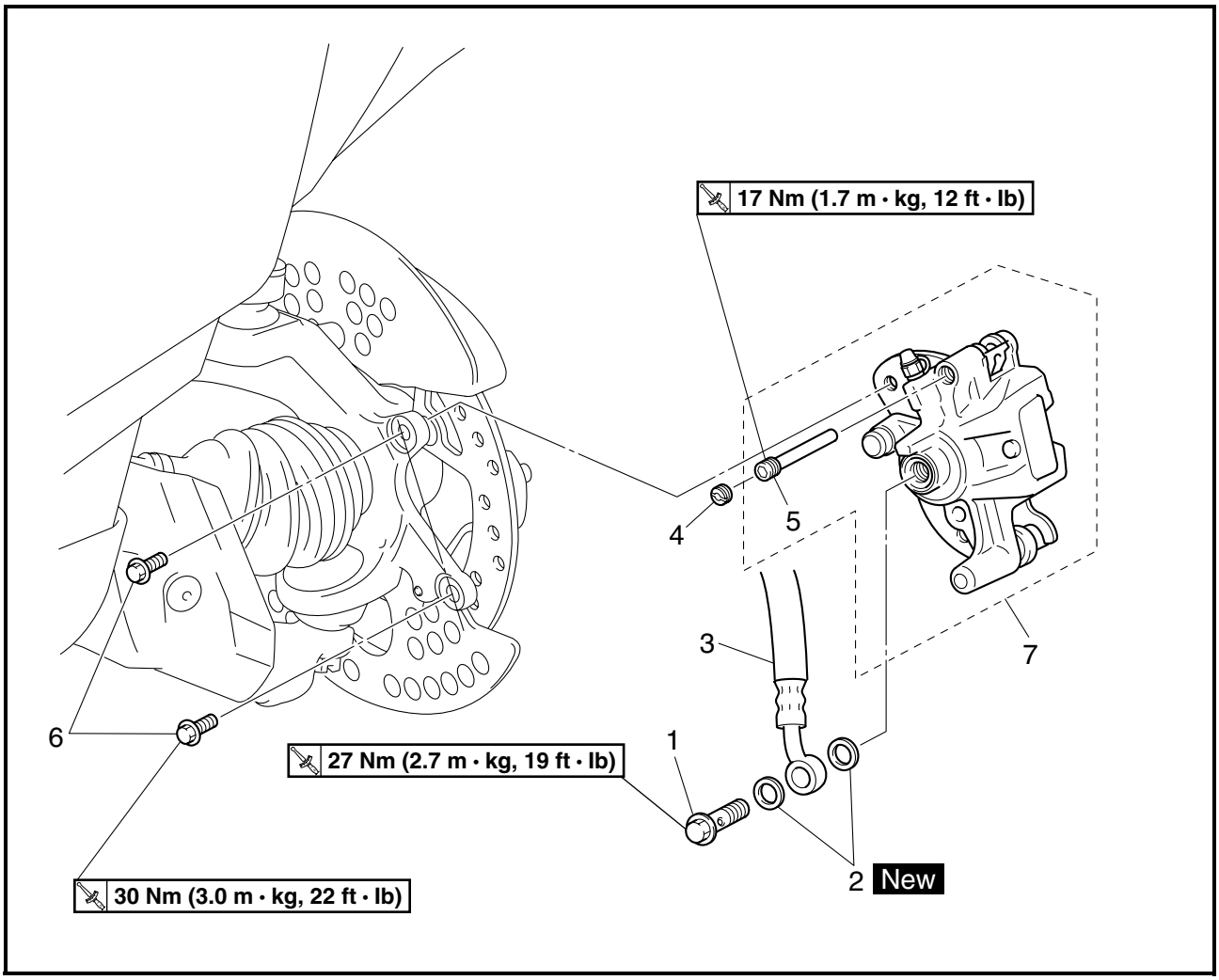
⚠ WARNING

- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

4. Air bleed:
   • brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
5. Check:
   • brake fluid level
   Brake fluid level is under the “LOWER” level line → Fill up.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
6. Check:
   • brake pedal free play
   Refer to “ADJUSTING THE REAR BRAKE” in chapter 3.
7. Check:
   • select lever movement
   Refer to “ADJUSTING THE SELECT LEVER CONTROL CABLE AND SHIFT ROD” in chapter 3.

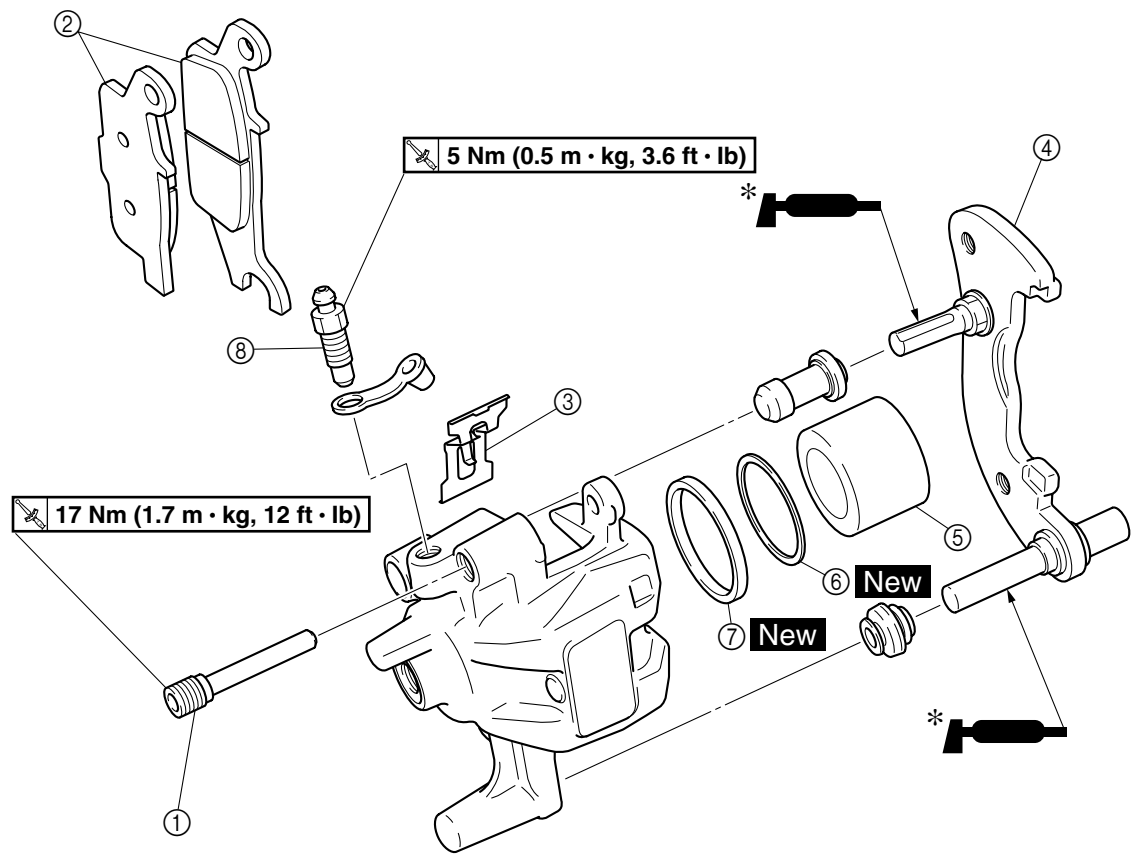
EBS00421

FRONT BRAKE CALIPERS



Order	Job/Part	Q'ty	Remarks
	Removing the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain.
	Front wheel		Refer to "FRONT AND REAR WHEELS".
1	Union bolt	1	Refer to "INSTALLING THE FRONT AND REAR BRAKE CALIPERS".
2	Copper washer	2	
3	Front brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Front brake caliper bolt	2	
7	Front brake caliper assembly	1	
			For installation, reverse the removal procedure.

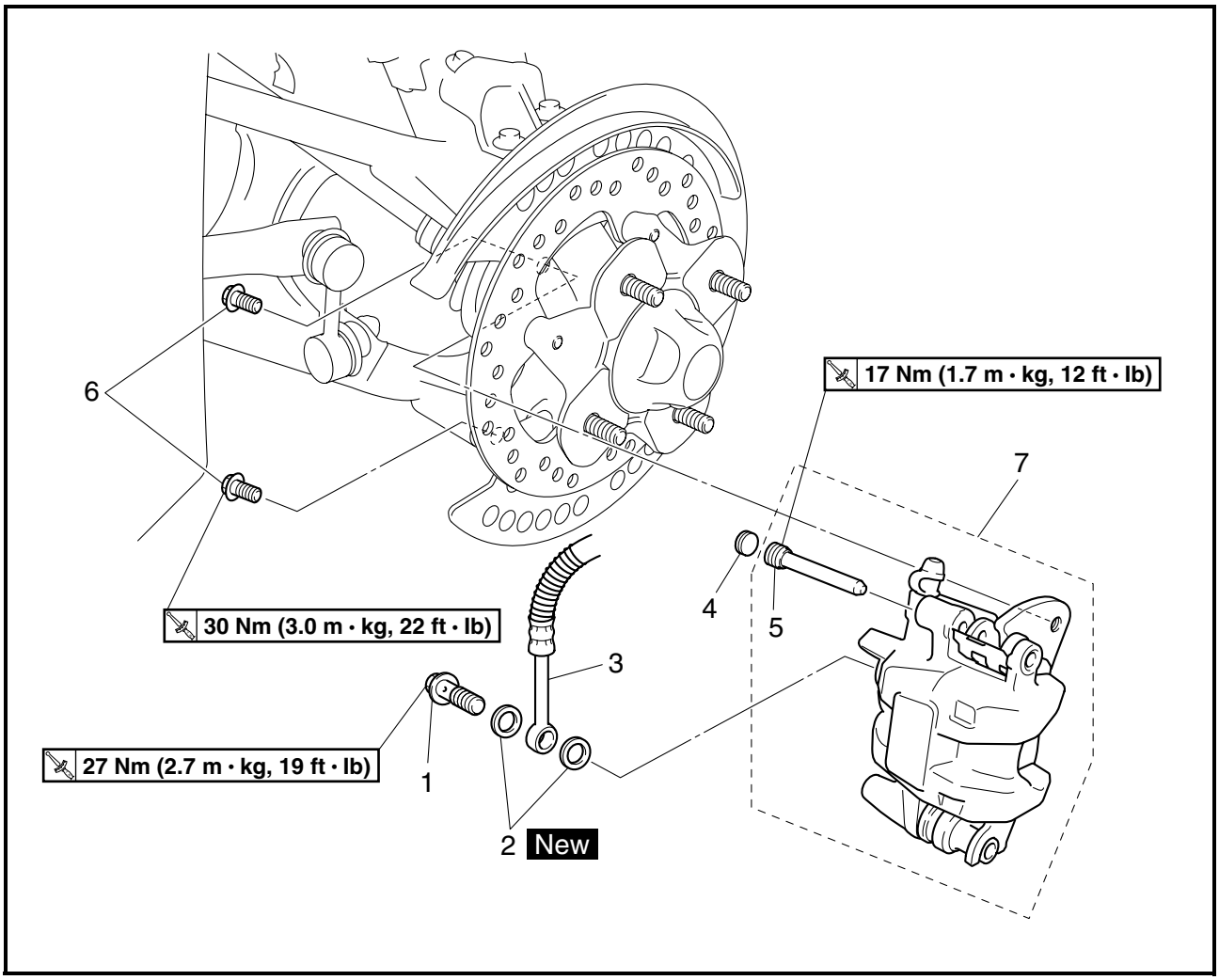
EBS00423



Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad holding bolt	1	
②	Front brake pad	2	
③	Brake pad spring	1	
④	Front brake caliper bracket	1	
⑤	Caliper piston	1	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS" and "ASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
⑥	Dust seal	1	
⑦	Caliper piston seal	1	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

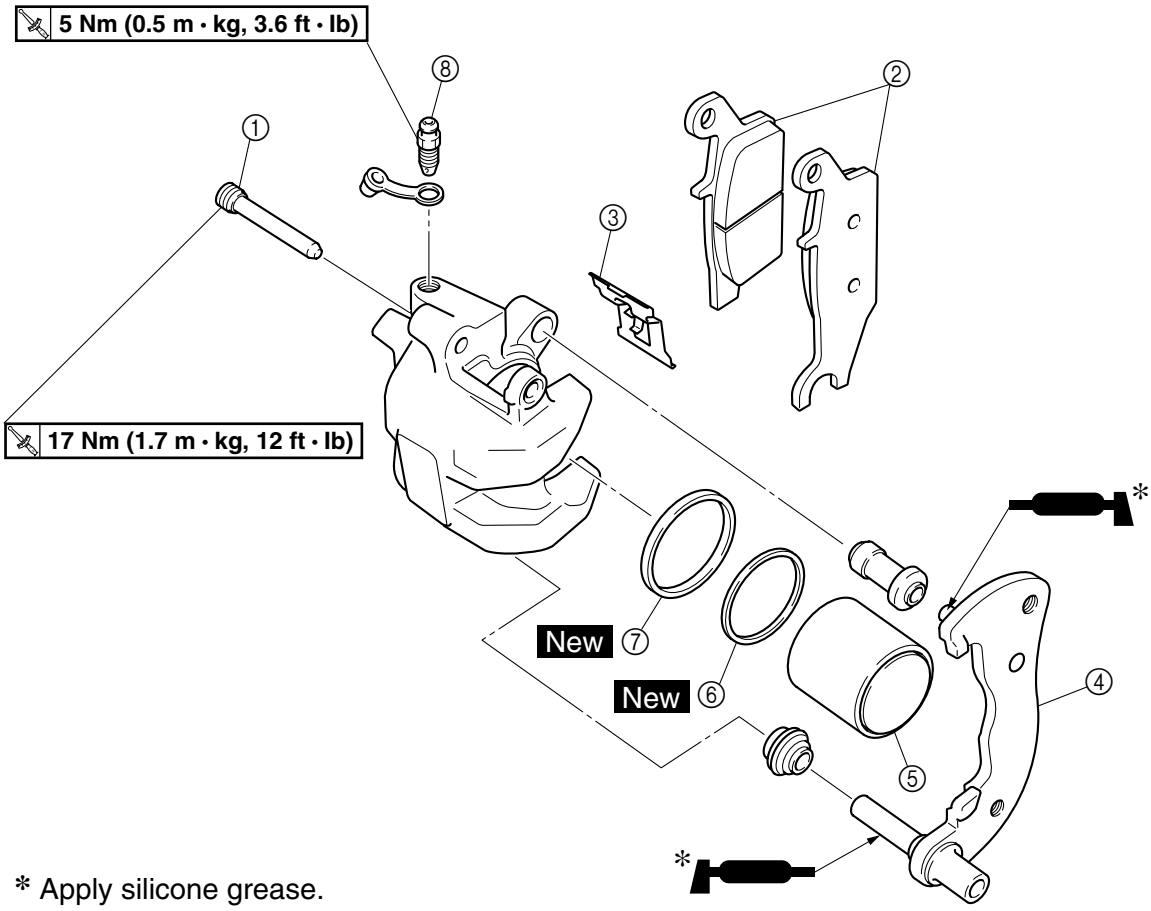
EBS00424

REAR BRAKE CALIPERS



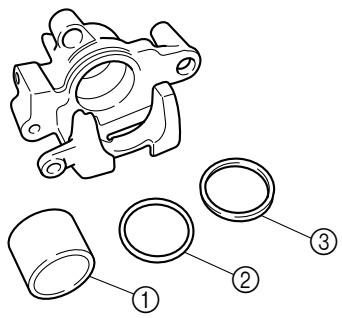
Order	Job/Part	Q'ty	Remarks
	Removing the rear brake calipers		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers.
	Brake fluid		Drain.
	Rear wheel		Refer to "FRONT AND REAR WHEELS".
1	Union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Rear brake caliper bolt	2	
7	Rear brake caliper assembly	1	
			For installation, reverse the removal procedure.

EBS00425

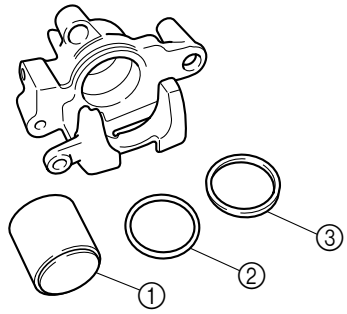


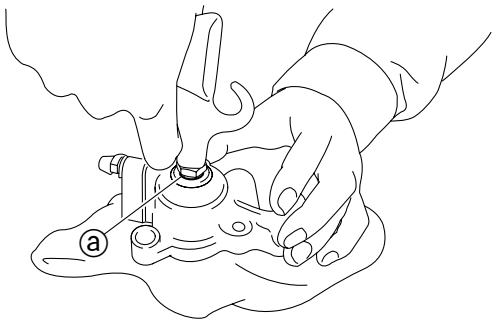
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake calipers		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers.
①	Brake pad holding bolt	1	
②	Rear brake pad	2	
③	Brake pad spring	1	
④	Rear brake caliper bracket	1	
⑤	Caliper piston	1	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS" and "ASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
⑥	Dust seal	1	
⑦	Caliper piston seal	1	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

A



B





EBS00427

DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS

1. Remove:
   - brake caliper piston ①
   - dust seal ②
   - caliper piston seal ③

A Front
B Rear

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

⚠ WARNING

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

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

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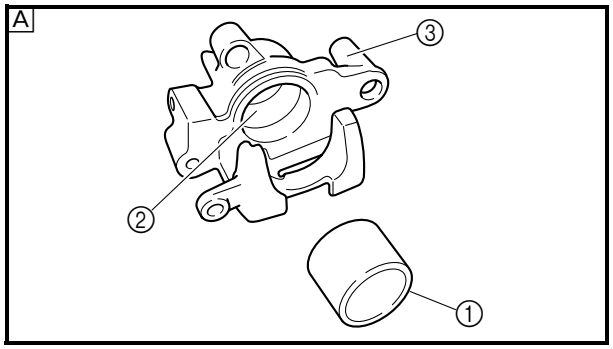
EBS00429

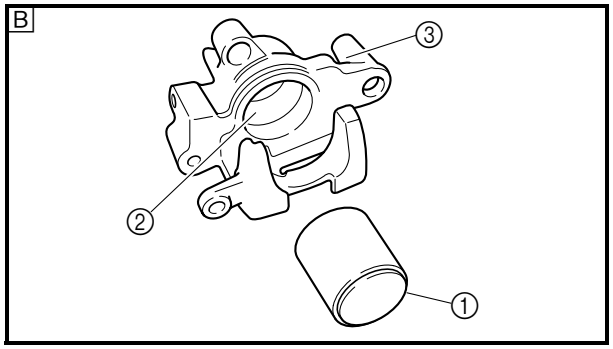
CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule:	
Brake pads	**As required**
Piston seals, dust seals	**Every two years**
Brake hoses	**Every four years**
Brake fluid	**Replace when brakes are disassembled.**

⚠ WARNING

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.





1. Check:
   - brake caliper piston ①
     Scratches/rust/wear → Replace the brake caliper assembly.
   - brake caliper cylinder ②
     Wear/scratches → Replace the brake caliper assembly.
   - brake caliper body ③
     Cracks/damage → Replace.
   - brake fluid delivery passage (brake caliper body)
     Blockage → Blow out with compressed air.

⚠ WARNING

Replace the caliper piston seal and dust seal whenever the brake caliper is disassembled.

A Front
B Rear

EBS00431

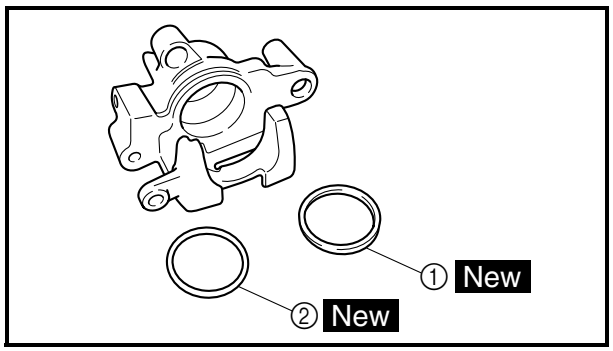
ASSEMBLING THE FRONT AND REAR BRAKE CALIPERS

⚠ WARNING

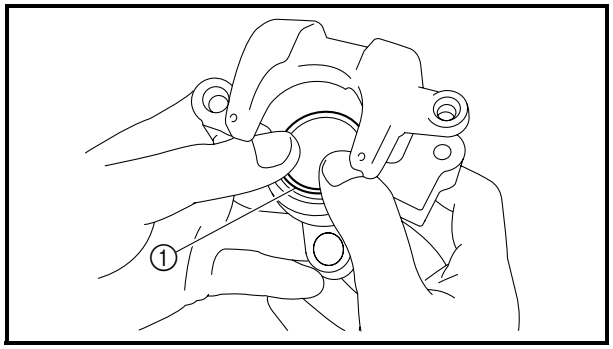
- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

Recommended brake fluid
DOT 4

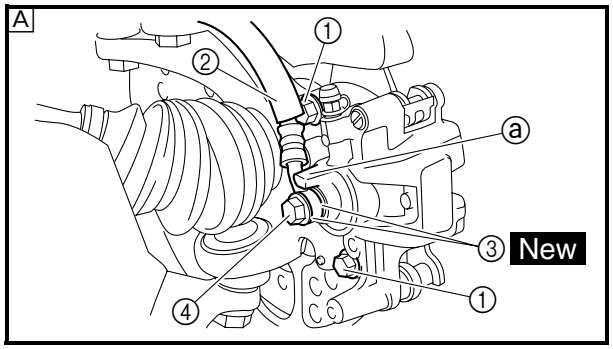
- **Replace the caliper piston seal whenever a brake caliper is disassembled.**

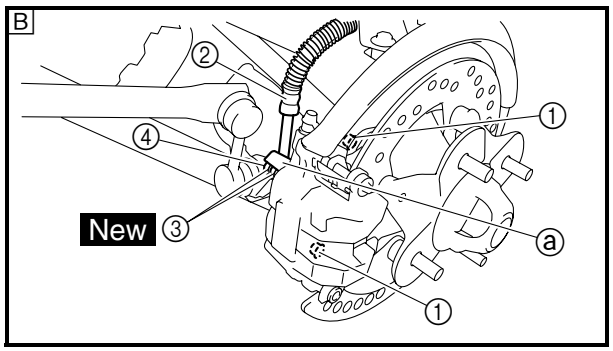


1. Install:
   - caliper piston seal ① New
   - dust seal ② New



2. Install:
   - brake caliper piston ①





EBS00434

INSTALLING THE FRONT AND REAR BRAKE CALIPERS

1. Install:
   - brake caliper assembly
   - brake caliper bolts ①

     30 Nm (3.0 m · kg, 22 ft · lb)
   - brake hose ②
   - copper washers ③ New
   - union bolt ④ **27 Nm (2.7 m · kg, 19 ft · lb)**

CAUTION:

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

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

A Front
B Rear

2. Fill:
   - brake master cylinder reservoir

Recommended brake fluid
DOT 4

CAUTION:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

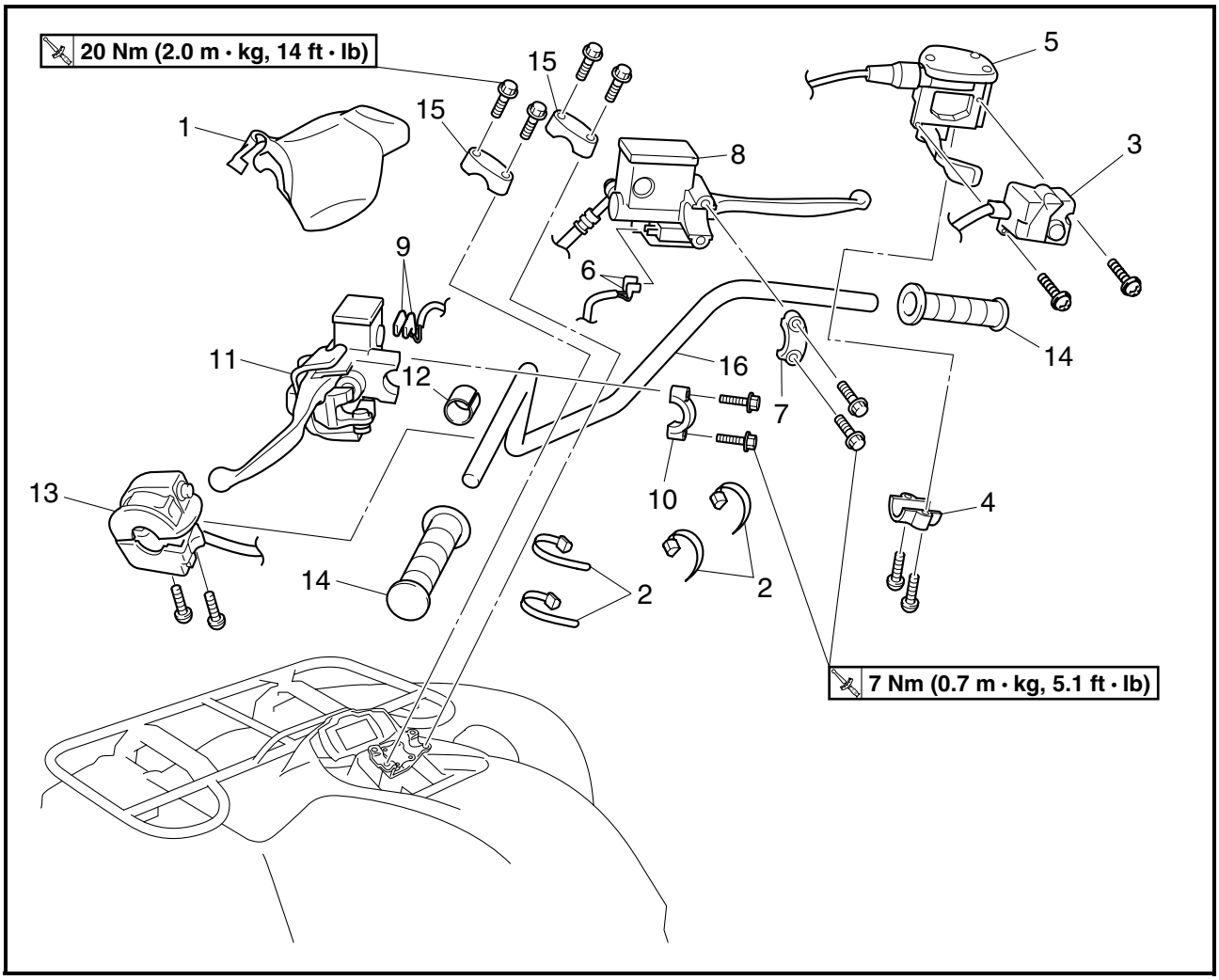
- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

3. Air bleed:
   - brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
4. Check:
   - brake fluid level
     Brake fluid level is below the "LOWER" level line → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

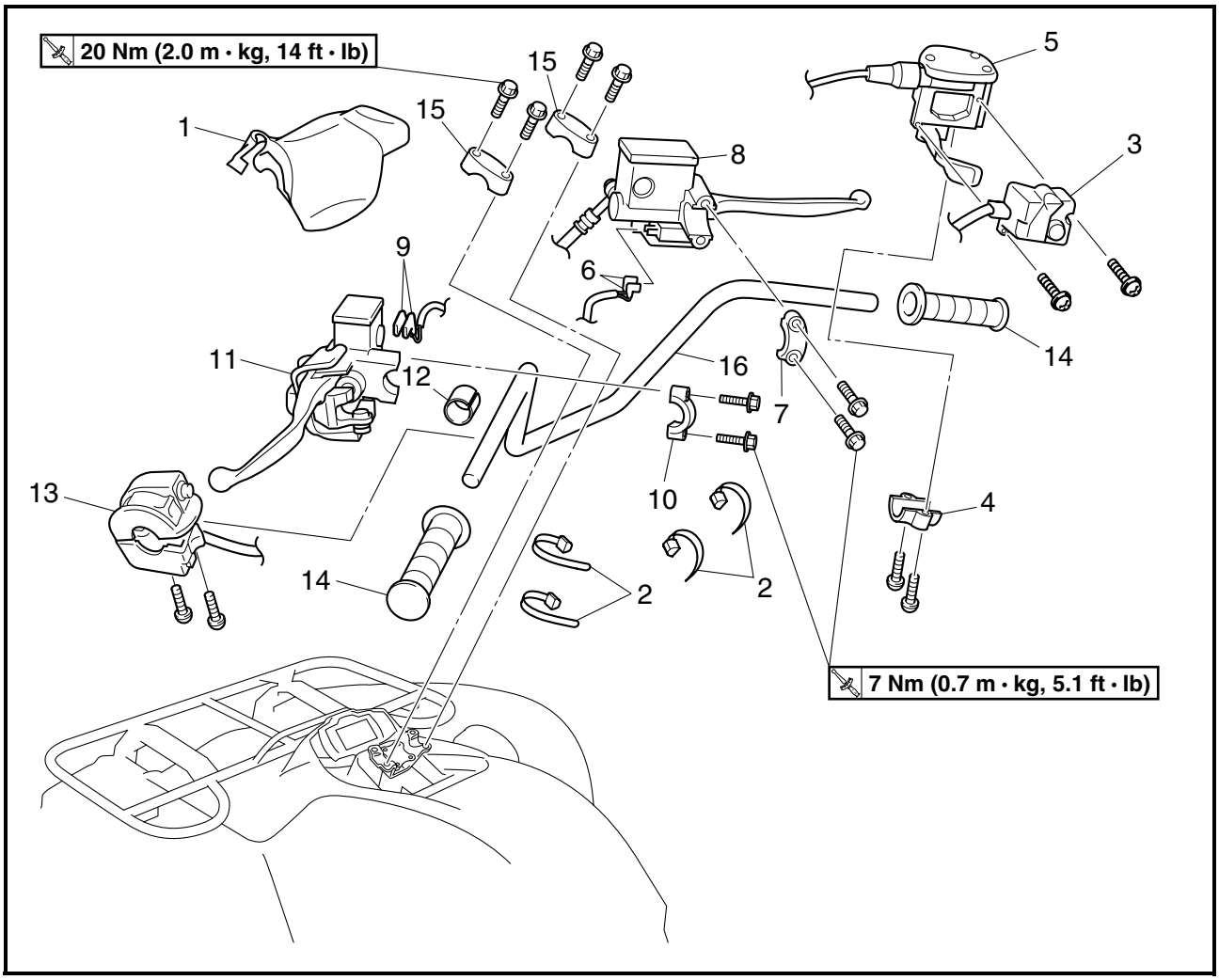
EBS00444

STEERING SYSTEM

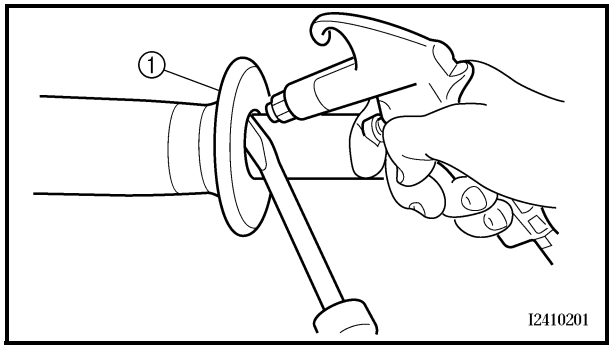
HANDLEBAR



Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed.
1	Handlebar cover	1	
2	Plastic band	4	
3	On-command four-wheel-drive motor switch and differential gear lock switch	1	
4	Throttle lever assembly holder	1	Refer to "INSTALLING THE THROTTLE LEVER ASSEMBLY".
5	Throttle lever assembly	1	
6	Front brake light switch connector	2	Disconnect.
7	Front brake master cylinder holder	1	Refer to "INSTALLING THE FRONT BRAKE MASTER CYLINDER".
8	Front brake master cylinder	1	
9	Rear brake light switch connector	2	Disconnect.



Order	Job/Part	Q'ty	Remarks
10	Rear brake master cylinder holder	1	
11	Rear brake master cylinder	1	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
12	Spacer	1	
13	Left handlebar switch	1	
14	Handlebar grip	2	Refer to "REMOVING THE HANDLEBAR GRIPS" and "INSTALLING THE HANDLEBAR GRIPS".
15	Handlebar holder	2	Refer to "INSTALLING THE HANDLEBAR".
16	Handlebar	1	
			For installation, reverse the removal procedure.



EBS00447
REMOVING THE HANDLEBAR GRIPS

1. Remove:
   • handlebar grips ①

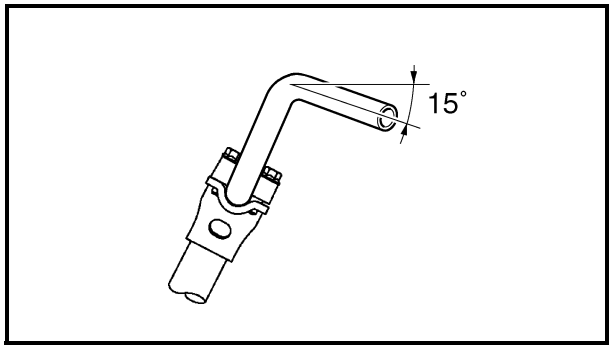
NOTE:
Blow compressed air between the handlebar and handlebar grip, and gradually push the grip off the handlebar.

EBS00448
CHECKING THE HANDLEBAR

1. Check:
   • handlebar
   Bends/cracks/damage → Replace.

⚠ WARNING

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

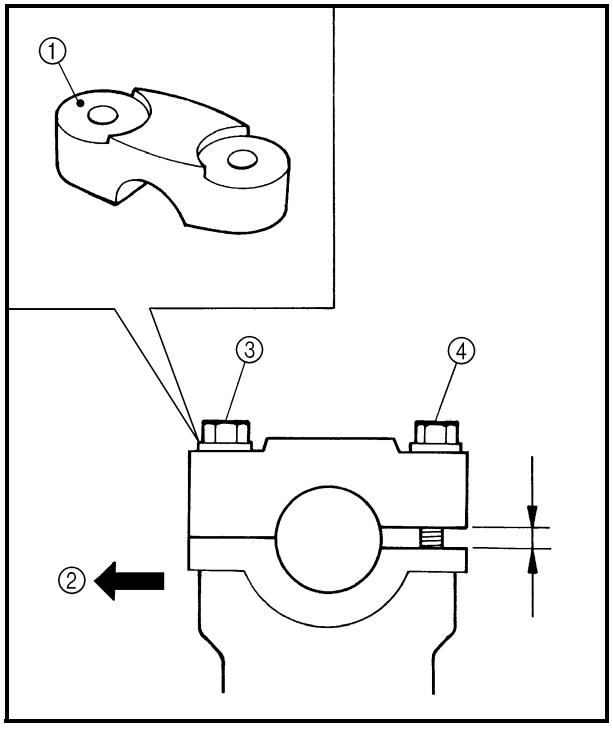


EBS00449
INSTALLING THE HANDLEBAR

1. Install:
   • handlebar
   • handlebar holders

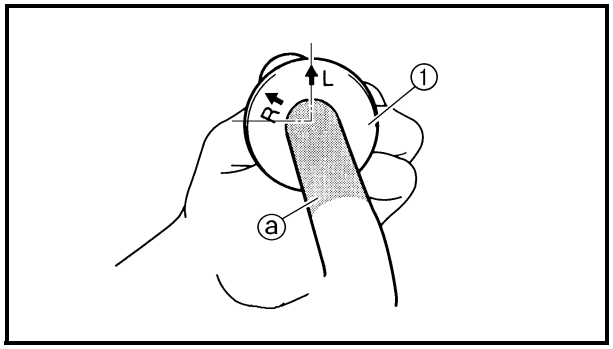
20 Nm (2.0 m · kg, 14 ft · lb)

NOTE:
- Install the handlebar within 15° from the horizontal line shown in the illustration.
- The upper handlebar holders should be installed with the punched mark ① forward ②.



CAUTION:

First tighten the bolts ③ on the front side of the handlebar holders, and then tighten the bolts ④ on the rear side.



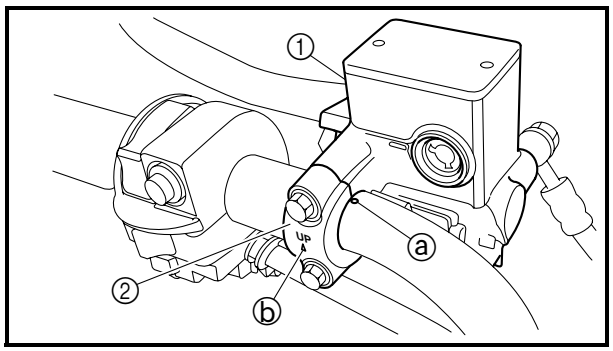
EBS00450

INSTALLING THE HANDLEBAR GRIPS

1. Install:
   - handlebar grip ①

NOTE:

- Before applying adhesive, wipe off grease or oil on the handlebar surface ⓐ with a lacquer thinner.
- Install the handlebar grips to the handlebar so that arrow mark L faces up on the left handlebar grip and the arrow mark R faces up on the right handlebar.



EBS00453

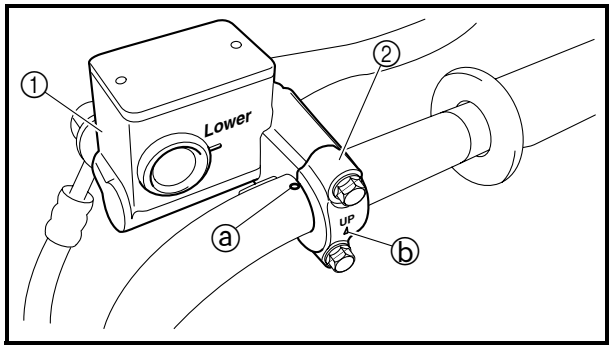
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   - left handlebar switch
   - spacer
   - rear brake master cylinder ①
   - rear brake master cylinder holder ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:

- Align the end of the brake master cylinder holder with the punch mark ⓐ on the handlebar.
- The “UP” mark ⓑ on the brake master cylinder holder should face up.



EBS00453

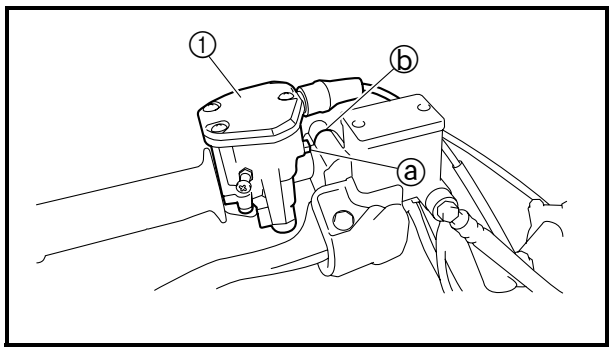
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - front brake master cylinder ①
   - front brake master cylinder holder ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

NOTE:

- Align the end of the brake master cylinder holder with the punch mark ⓐ on the handlebar.
- The "UP" mark ⓑ on the brake master cylinder holder should face up.



INSTALLING THE THROTTLE LEVER ASSEMBLY

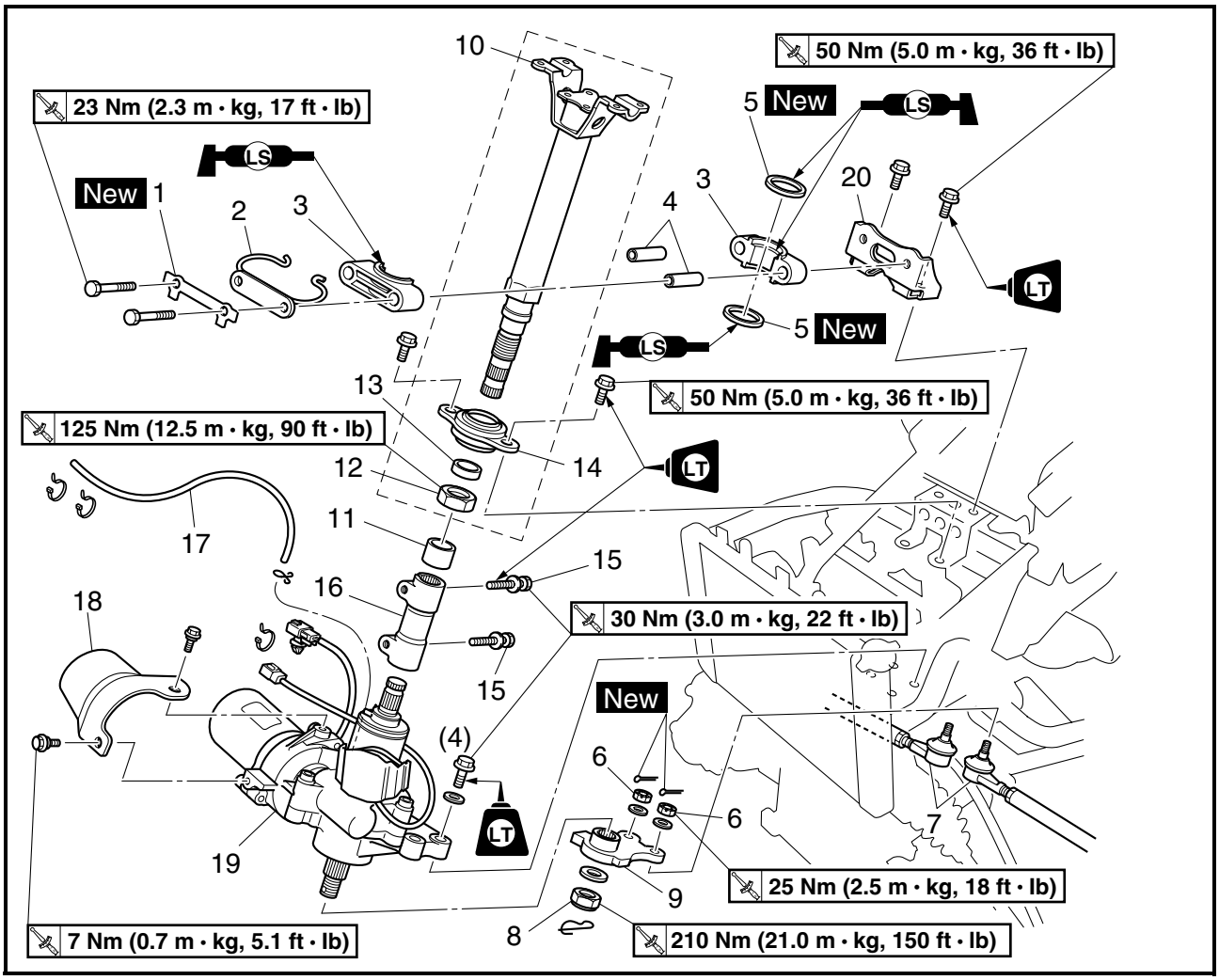
1. Install:
   - throttle lever assembly ①
   - throttle lever assembly holder

NOTE:

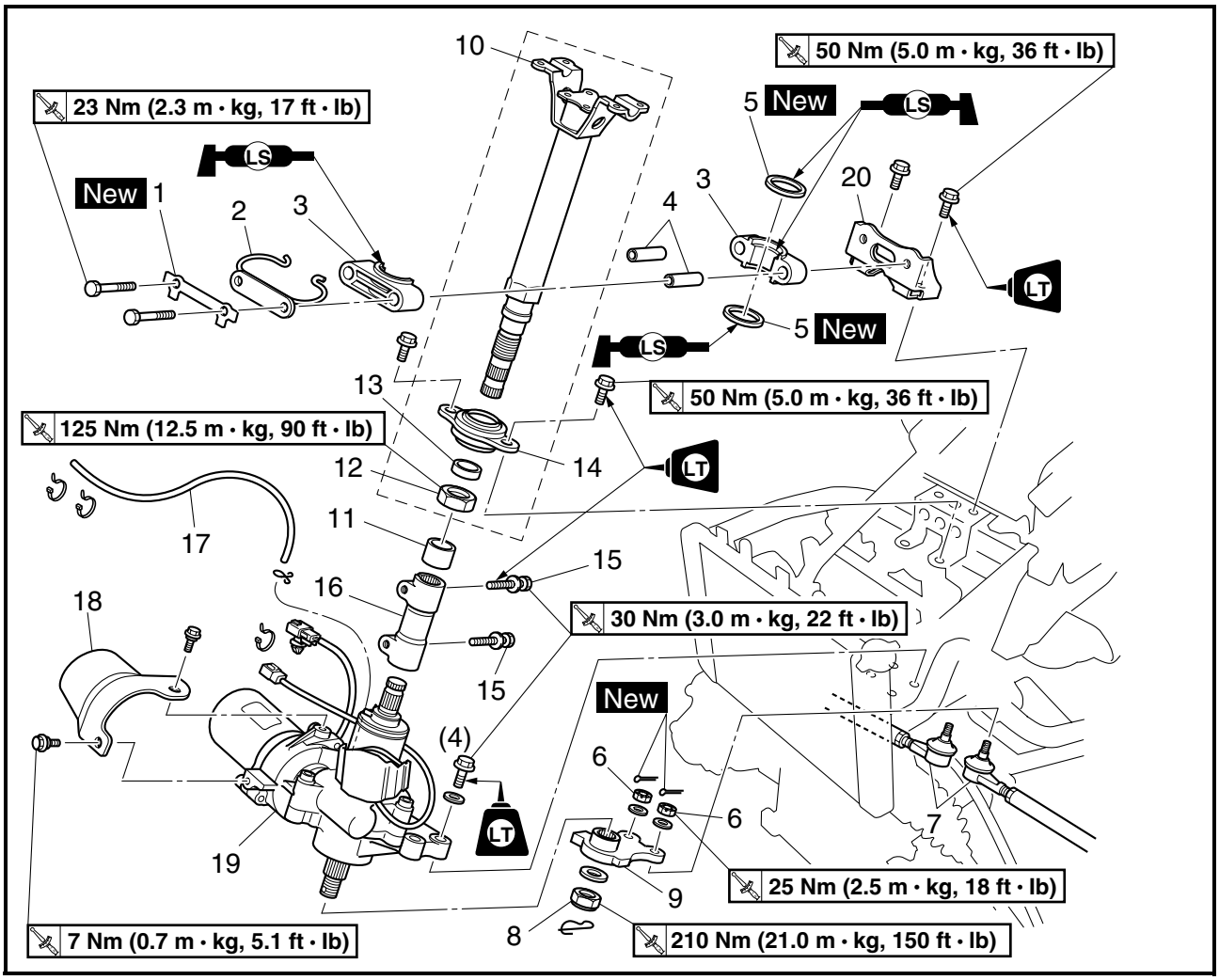
Align the projection ⓐ on the throttle lever assembly with the end of the brake master cylinder holder ⓑ.

EBS00454

STEERING STEM



Order	Job/Part	Q'ty	Remarks
	Removing the steering stem		Remove the parts in the order listed.
	Front fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Handlebar		Refer to "HANDLEBAR".
	Electrical components tray		Refer to "ELECTRICAL COMPONENTS TRAY" in chapter 3.
1	Lock washer	1	Refer to "INSTALLING THE STEERING STEM".
2	Cable guide	1	
3	Steering stem bushing	2	
4	Collar	2	
5	Oil seal	2	
6	Tie rod end nut	2	
7	Tie rod	2	Disconnect.



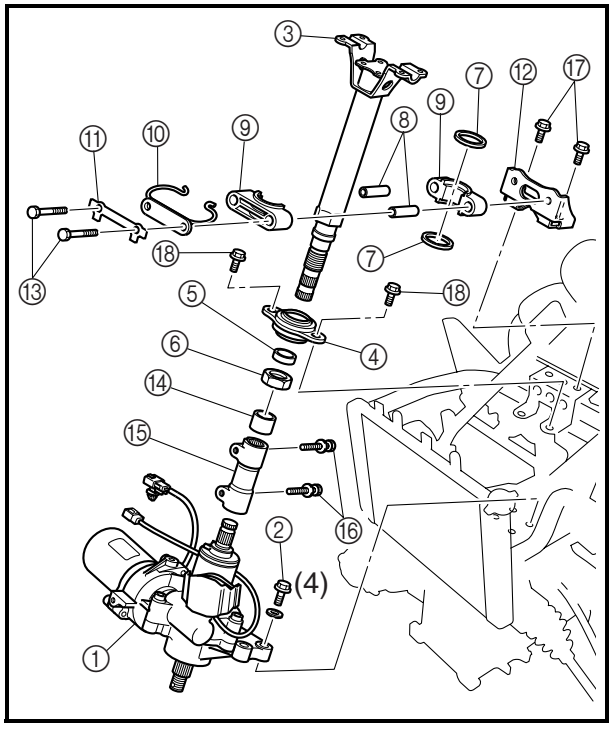
Order	Job/Part	Q'ty	Remarks
8	Pitman arm nut	1	Refer to "INSTALLING THE PITMAN ARM".
9	Pitman arm	1	
10	Steering stem	1	Refer to "INSTALLING THE STEERING STEM".
11	Collar	1	
12	Bearing nut	1	
13	Collar	1	
14	Steering stem bearing	1	
15	Steering stem joint bolt	2	
16	Steering stem joint	1	
17	EPS breather hose	1	
18	EPS motor cover	1	
19	EPS unit	1	Refer to "INSTALLING THE STEERING STEM".
20	Steering stem bracket	1	
			For installation, reverse the removal procedure.

EBS00456
CHECKING THE STEERING STEM
1. Check:
   - steering stem
     Bends → Replace.

⚠ WARNING

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

2. Check:
   - oil seals
   - steering stem bushings
     Wear/damage → Replace.
3. Check:
   - steering stem joint
     Cracks/damage → Replace.



INSTALLING THE STEERING STEM
1. Install:
   - EPS unit ①
   - washers
   - EPS unit bolts ②

	EPS unit bolt **30 Nm (3.0 m · kg, 22 ft · lb)** **LOCTITE®**

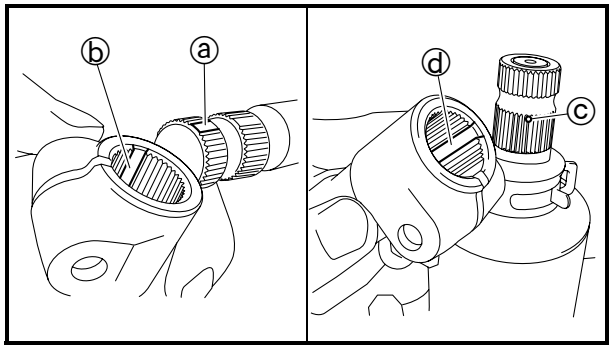
2. Install:
   - steering stem ③
   - steering stem bearing ④
   - collar ⑤
   - bearing nut ⑥

125 Nm (12.5 m · kg, 90 ft · lb)

3. Install:
   - oil seals ⑦ New
   - collars ⑧
   - steering stem bushings ⑨
   - cable guide ⑩
   - lock washer ⑪ New
   - steering stem bracket ⑫
   - steering stem bolts ⑬
     (temporarily tighten)

NOTE:

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



4. Install:
   - collar ⑭
   - steering stem joint ⑮
   - steering stem joint bolts ⑯ (temporarily tighten)

NOTE:
- Apply LOCTITE® to the steering stem joint bolts.
- Align the spline ⓐ on the steering stem with the groove ⓑ in the steering stem joint.
- Align the punch mark ⓒ on the EPS unit with the groove ⓓ in the steering stem joint.

5. Tighten:
   - steering stem bracket bolts ⑰

50 Nm (5.0 m · kg, 36 ft · lb)

NOTE:
Apply LOCTITE® to the steering stem bracket bolts.

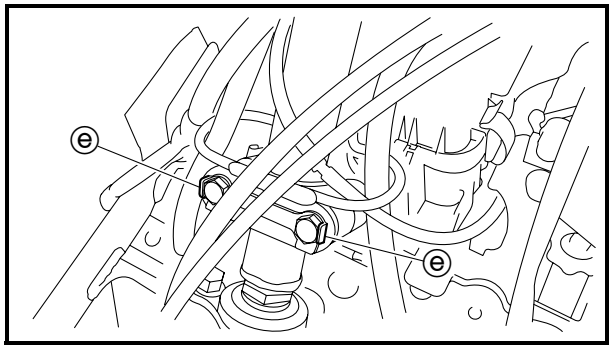
   - steering stem bearing bolts ⑱

50 Nm (5.0 m · kg, 36 ft · lb)

NOTE:
Apply LOCTITE® to the steering stem bearing bolts.

   - steering stem joint bolts ⑯

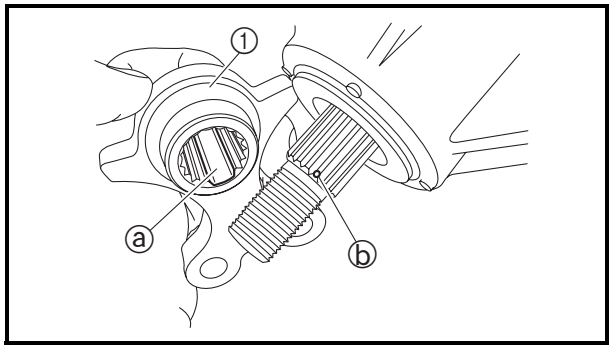
30 Nm (3.0 m · kg, 22 ft · lb)



6. Tighten:
   - steering stem bolts ⑬

23 Nm (2.3 m · kg, 17 ft · lb)

NOTE:
- Bend the lock washer tab ⓔ along a flat side of the bolt.
- Pass the cable and hoses through the cable guide. Refer to “CABLE ROUTING” in chapter 2.



INSTALLING THE PITMAN ARM

1. Install:
   - pitman arm ①
   - washer
   - pitman arm nut

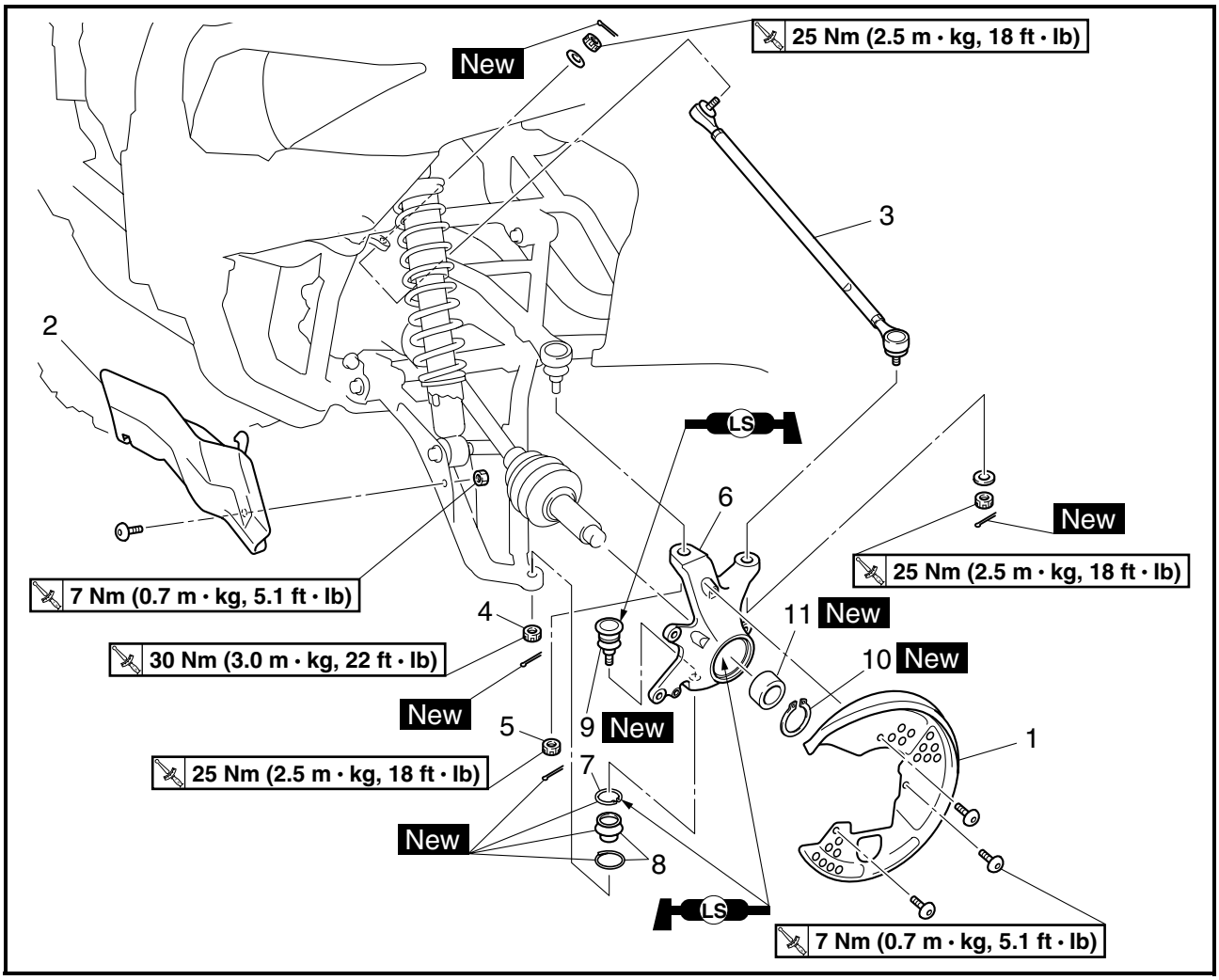
     210 Nm (21.0 m · kg, 150 ft · lb)
   - clip

NOTE:

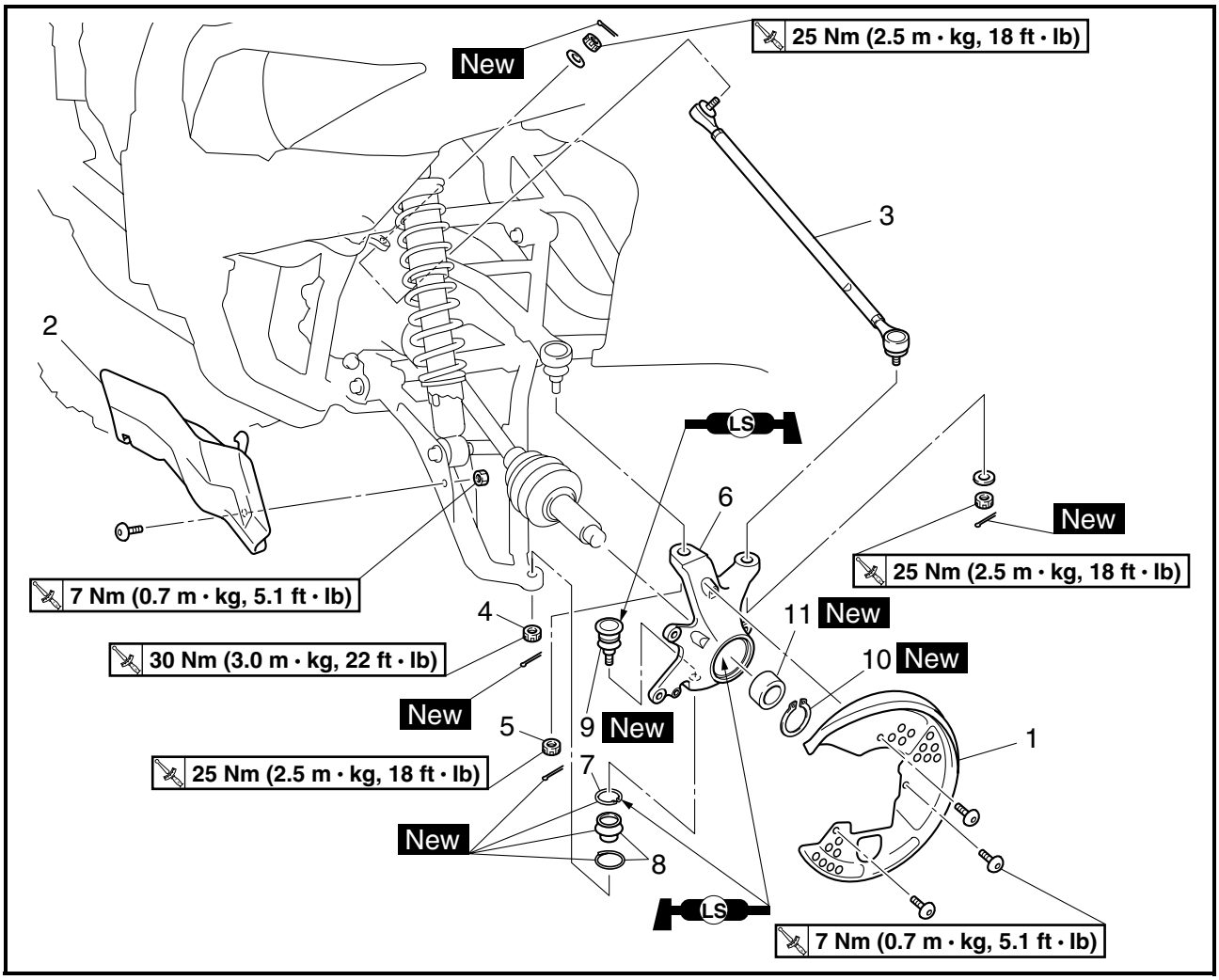
Align the punch mark ⓑ on the EPS unit with the groove ⓐ in the pitman arm.

EBS00460

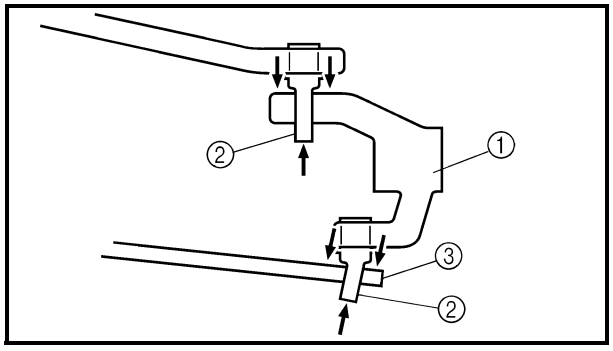
TIE-RODS AND STEERING KNUCKLES



Order	Job/Part	Q'ty	Remarks
	Removing the tie-rods and steering knuckles		Remove the parts in the order listed. The following procedure applies to both of the tie-rods and steering knuckles.
	Front wheel/brake disc		Refer to "FRONT WHEELS".
1	Brake disc guard	1	
2	Front arm protector	1	
3	Tie-rod	1	Refer to "INSTALLING THE TIE-RODS".
4	Nut	1	
5	Nut	1	
6	Steering knuckle	1	Refer to "REMOVING THE STEERING KNUCKLES".
7	Circlip	1	
8	Rubber boot	1	
9	Ball joint	1	



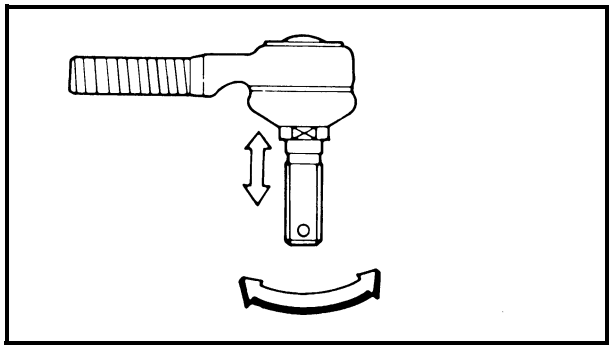
Order	Job/Part	Q'ty	Remarks
10	Circlip	1	
11	Bearing	1	
			For installation, reverse the removal procedure.



EBS00461
REMOVING THE STEERING KNUCKLES

1. Remove:
   • steering knuckle ①

NOTE:
Use a general puller to separate the ball joint ② from the steering knuckle ① or the front lower arm ③.

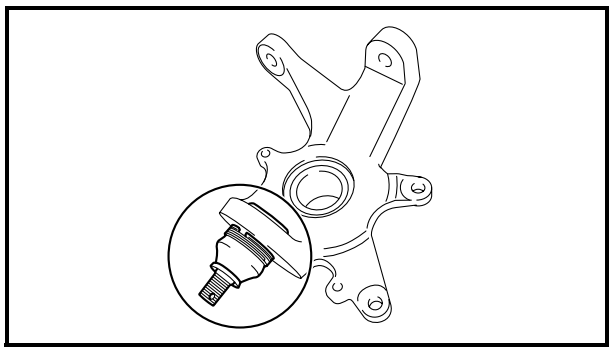


EBS00462
CHECKING THE TIE-RODS

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

EBS00463
CHECKING THE STEERING KNUCKLES

1. Check:
   • steering knuckle
     Damage/pitting → Replace.



2. Check:
   • ball joints
     Damage/pitting → Replace the ball joint.
     Free play → Replace the ball joint.
     Turns roughly → Replace the ball joint.

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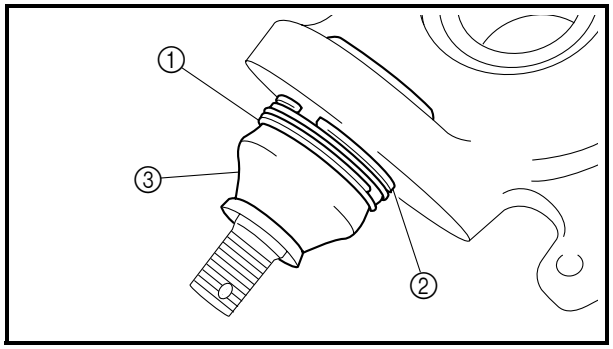
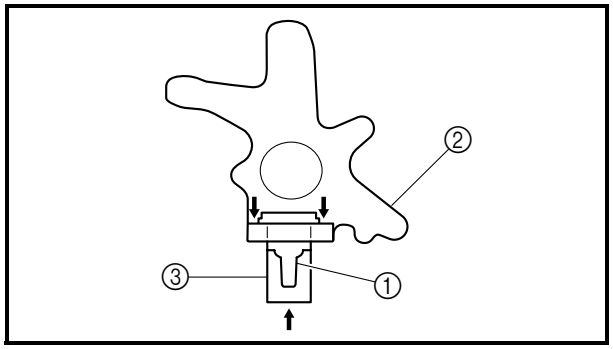
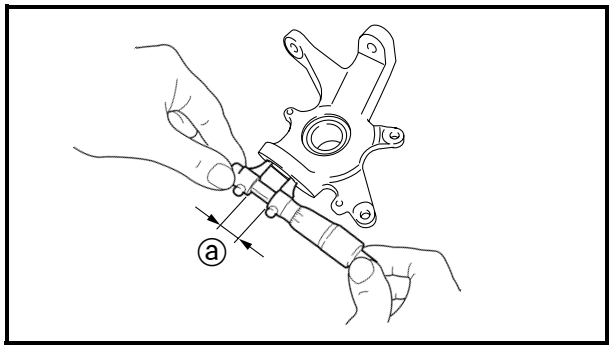
a. Clean the outside of the steering knuckle.
b. Remove the clip ①, circlip ② and rubber boot ③.





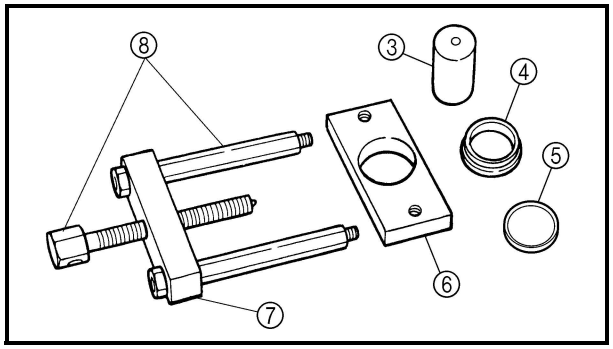
c. Remove the ball joint.

NOTE:
Use a remover attachment ③ to separate the ball joint ① from the steering knuckle ②.



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

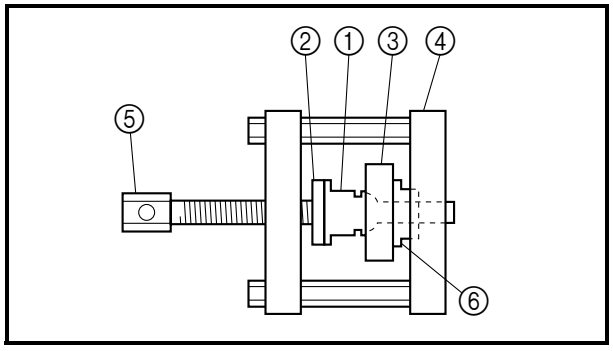
Ball joint bore inside diameter
32.00 ~ 32.05 mm
(1.260 ~ 1.280 in)



e. Install the new ball joint.
Use the ball joint remover/installer set.

Ball joint remover
90890-01474, YM-01474
Ball joint remover attachment set
90890-01480
Ball joint adapter set
YM-01480
Ball joint remover short shaft set
90890-01514

③	**Remover attachment**	**90890-01474 YM-01474**
④	**Installer spacer**	**90890-01480 YM-01480**
⑤	**Installer washer**	**90890-01474 YM-01474**
⑥	**Base**	**90890-01480 YM-01480**
⑦	**Body**	**90890-01480 YM-01480**
⑧	**Ball joint remover short shaft set**	**90890-01514 YM-01514**



f. Attach the ball joint remover/installer, new ball joint (with rubber boot and retaining ring) ①, installer spacer ⑥ and installer washer ② to the steering knuckle ③.

NOTE:
Do not tap or damage the top of the ball joint.

g. Hold the body ④ in place while turning in the bolt ⑤ to install the new ball joint ① into the steering knuckle ③.
h. Remove the ball joint remover/installer.
i. Install a new ball joint.

NOTE:
Always use a new ball joint set.

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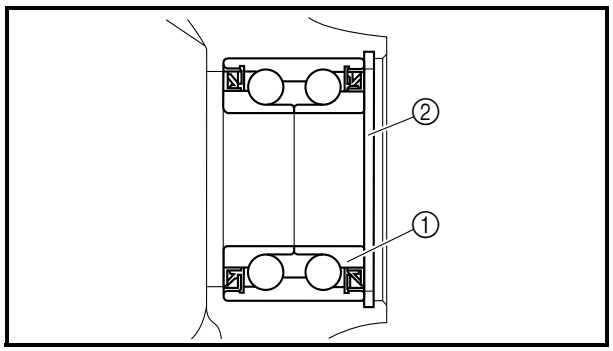

3. Check:
   • front wheel bearing ①
   Bearings allow play in the wheel hubs or the wheel turns roughly → Replace.

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a. Clean the outside of the steering knuckle.
b. Remove the circlip ②.
c. Drive out the bearing.

⚠ WARNING
Eye protection is recommended when using striking tools.

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

CAUTION:
Do not strike the center race or balls of the bearing. Should be made only with the outer race.

f. Install the new circlip.

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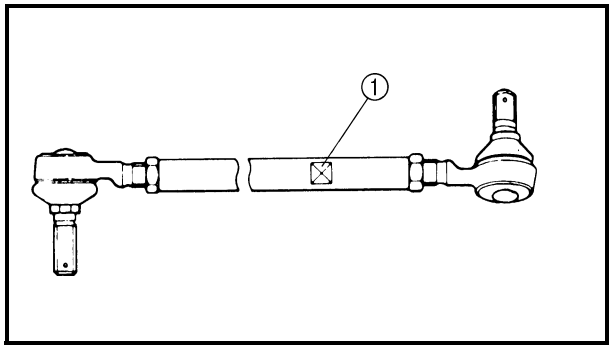


EBS00465

INSTALLING THE TIE-RODS

1. Install:
   • tie-rods (left and right)

25 Nm (2.5 m · kg, 18 ft · lb)

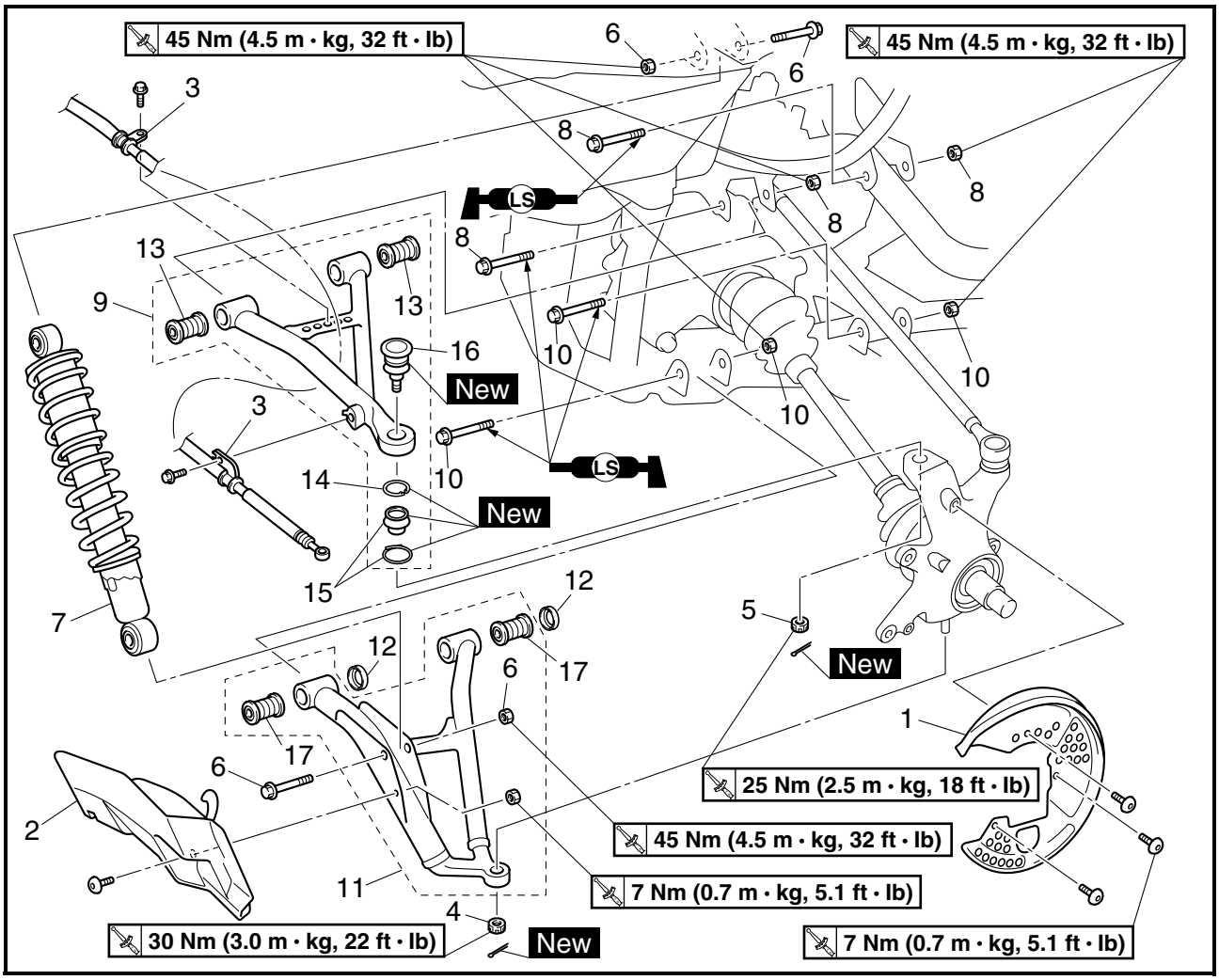
NOTE:

The tie-rod side which must be installed on the out side has grooves ①.

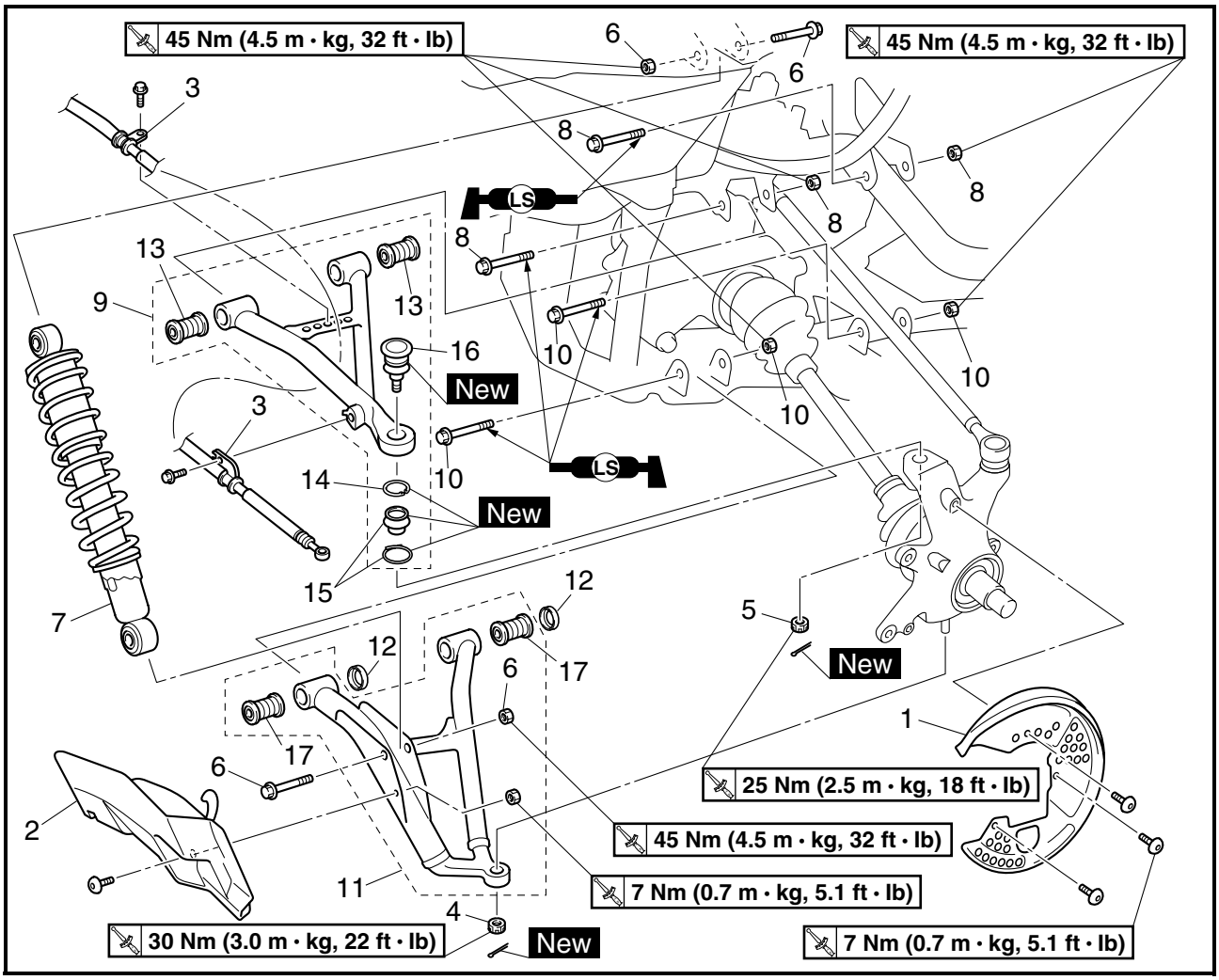
2. Adjust:
   • toe-in
   Refer to “ADJUSTING THE TOE-IN” in chapter 3.

EBS00468

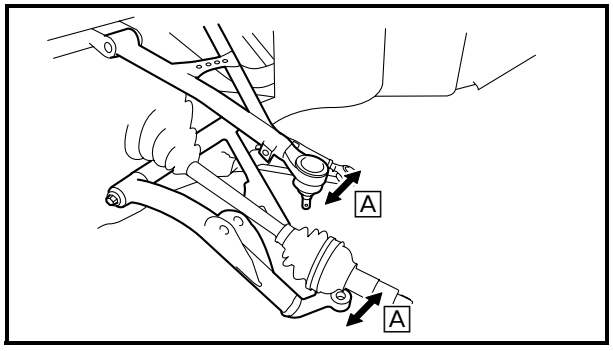
FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

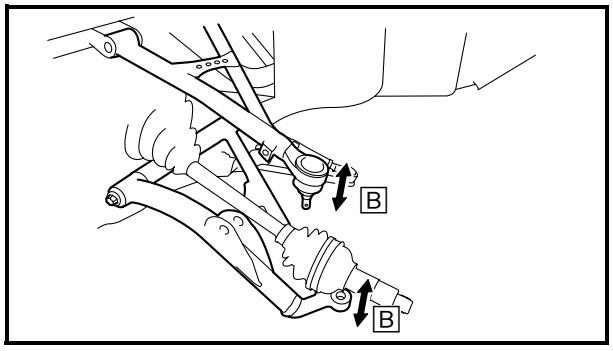


Order	Job/Part	Q'ty	Remarks
	Removing the front arms and front shock absorber assemblies		Remove the parts in the order listed. The following procedure applies to both of the front arms and front shock absorber assemblies.
	Front wheel/brake disc		Refer to "FRONT AND REAR WHEELS".
	Front brake caliper assembly		Refer to "FRONT AND REAR BRAKES".
1	Brake disc guard	1	
2	Front arm protector	1	
3	Front brake hose holder	2	
4	Nut	1	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBERS".
5	Nut	1	
6	Nut/bolt	2/2	
7	Front shock absorber assembly	1	
8	Nut/bolt	2/2	
9	Front upper arm	1	



Order	Job/Part	Q'ty	Remarks
10	Nut/bolt	2/2	
11	Front lower arm	1	
12	Dust cover	2	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBERS".
13	Bushing	2	
14	Circlip	1	
15	Rubber boot	1	
16	Ball joint	1	
17	Bushing	2	
			For installation, reverse the removal procedure.





EBS00469
REMOVING THE FRONT ARMS

1. Check:
   • front arm free play

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a. Check the front arm side play [A] by moving it from side to side.
   If side play is noticeable, check the bushings.
b. Check the front arm vertical movement [B] by moving it up and down.
   If the vertical movement is tight or rough, or if there is binding, check the bushings.

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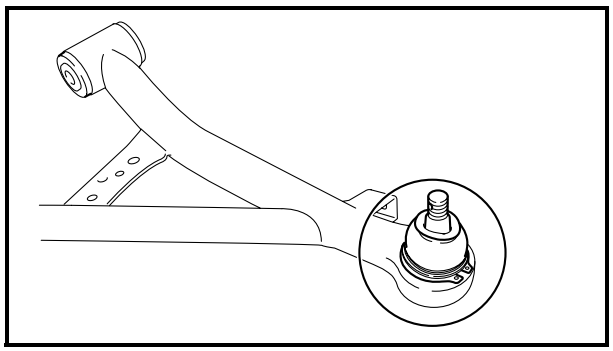
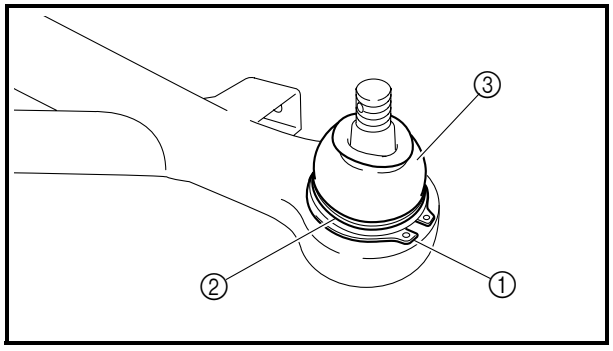
2. Remove:
   • front arms

EBS00470
CHECKING THE FRONT ARMS

1. Check:
   • front arms
   Bends/damage → Replace.
2. Check:
   • bushings
   Wear/damage → Replace.



3. Check:
   • ball joint
   Damage/pitting → Replace the ball joint.
   Free play → Replace the ball joint.
   Turns roughly → Replace the ball joint.



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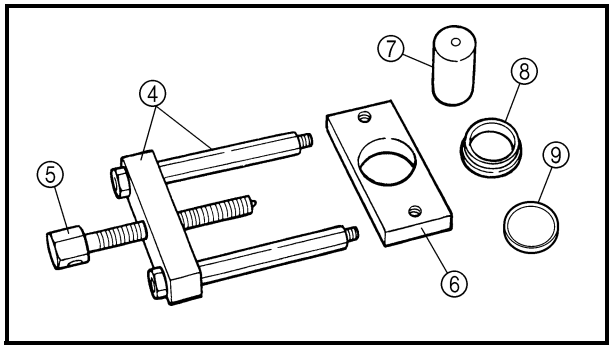
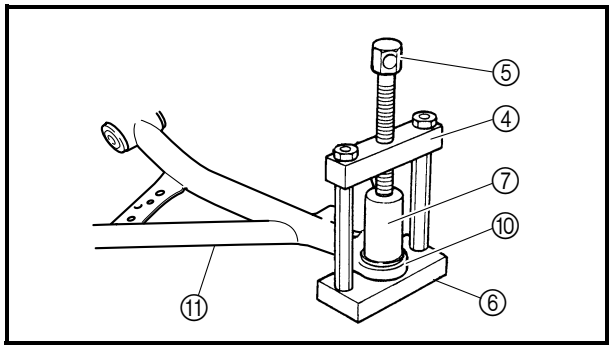
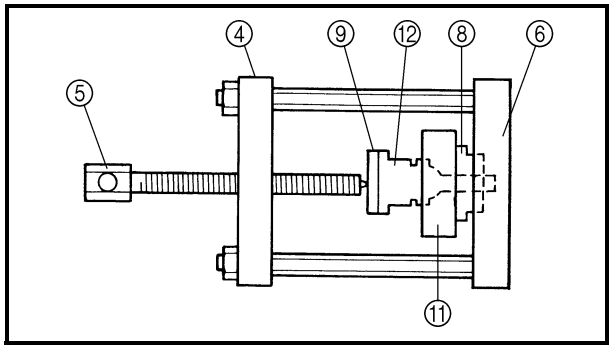
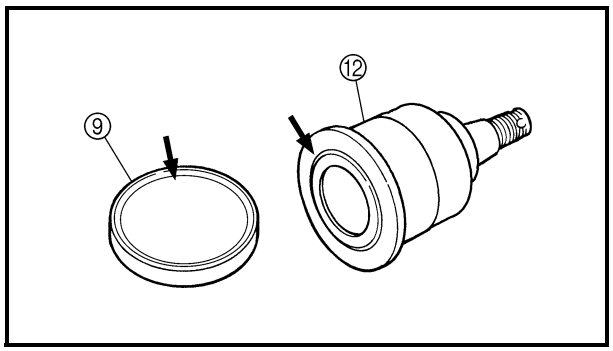
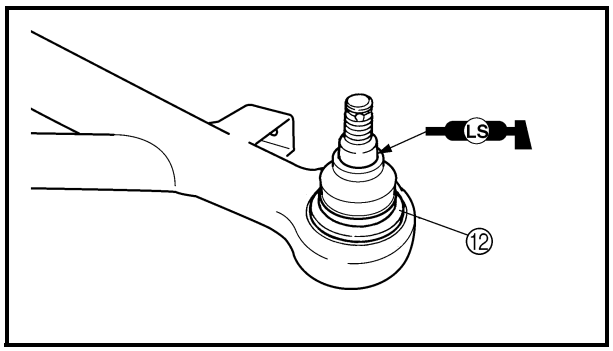
a. Clean the outside of the front upper arm.
b. Remove the circlip ①, boot retaining ring ② and rubber boot ③.
   Use the ball joint remover and installer set.











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

④	**Body**	**90890-01474 YM-01474**
⑤	**Long bolt**	
⑥	**Base**	**90890-01480 YM-01480**
⑦	**Remover attachment**	**90890-01474 YM-01474**
⑧	**Installer spacer**	**90890-01480 YM-01480**
⑨	**Installer washer**	**90890-01474 YM-01474**

c. Install the body ④, long bolt ⑤, base ⑥ and attachment ⑦ onto ball joint.
d. Hold the body ④ in place while turning in the long bolt ⑤ to remove the ball joint ⑩ from the front upper arm ⑪.
e. Remove the ball joint remover.
f. Attach the assembled ball joint remover/installer, new ball joint (with rubber boot and retaining ring) ⑫, installer spacer ⑧ and installer washer ⑨ to the front upper arm ⑪.

NOTE:
- Do not tap or damage the top of the ball joint.
- Installer washer ⑨ must be aligned with the projection on the head of the ball joint ⑫.

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

NOTE:
Always use a new ball joint set.

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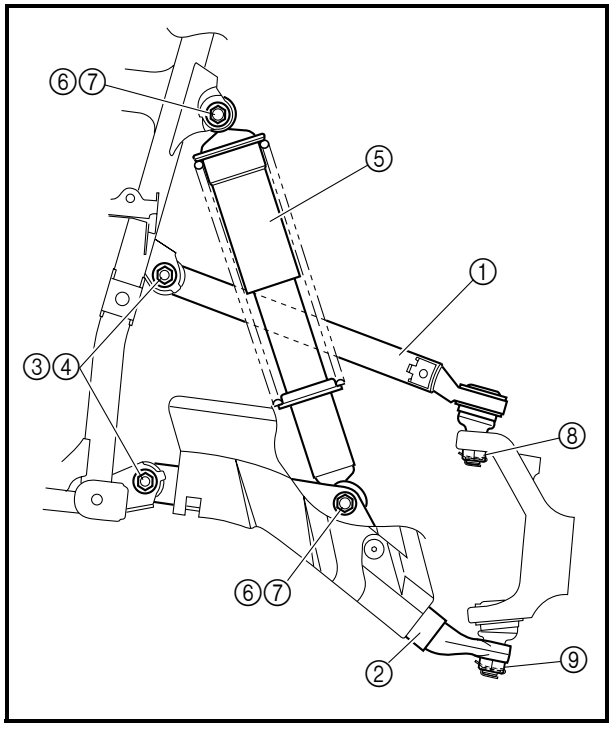
EBS00471
CHECKING THE FRONT SHOCK ABSORBERS

1. Check:
   - shock absorber assembly
     Oil leaks → Replace the shock absorber assembly.
   - spring
     Fatigue → Replace the shock absorber assembly.
     Move the spring up and down.

EBS00475
INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBERS

1. Install:
   - front arms
   - front shock absorber



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

NOTE:

- Lubricate the bolts ③ with lithium-soap-based grease.
- Be sure to position the bolts ③ so that the bolt head faces forward.
- Temporarily tighten the nuts ④.

b. Install the front shock absorber ⑤ and bolts ⑥.

Nut ⑦
45 Nm (4.5 m · kg, 32 ft · lb)

c. Install the steering knuckle.

Nut ⑧
25 Nm (2.5 m · kg, 18 ft · lb)
Nut ⑨
30 Nm (3.0 m · kg, 22 ft · lb)

d. Install the new cotter pins.
e. Tighten the nuts ④.

Nut ④
45 Nm (4.5 m · kg, 32 ft · lb)

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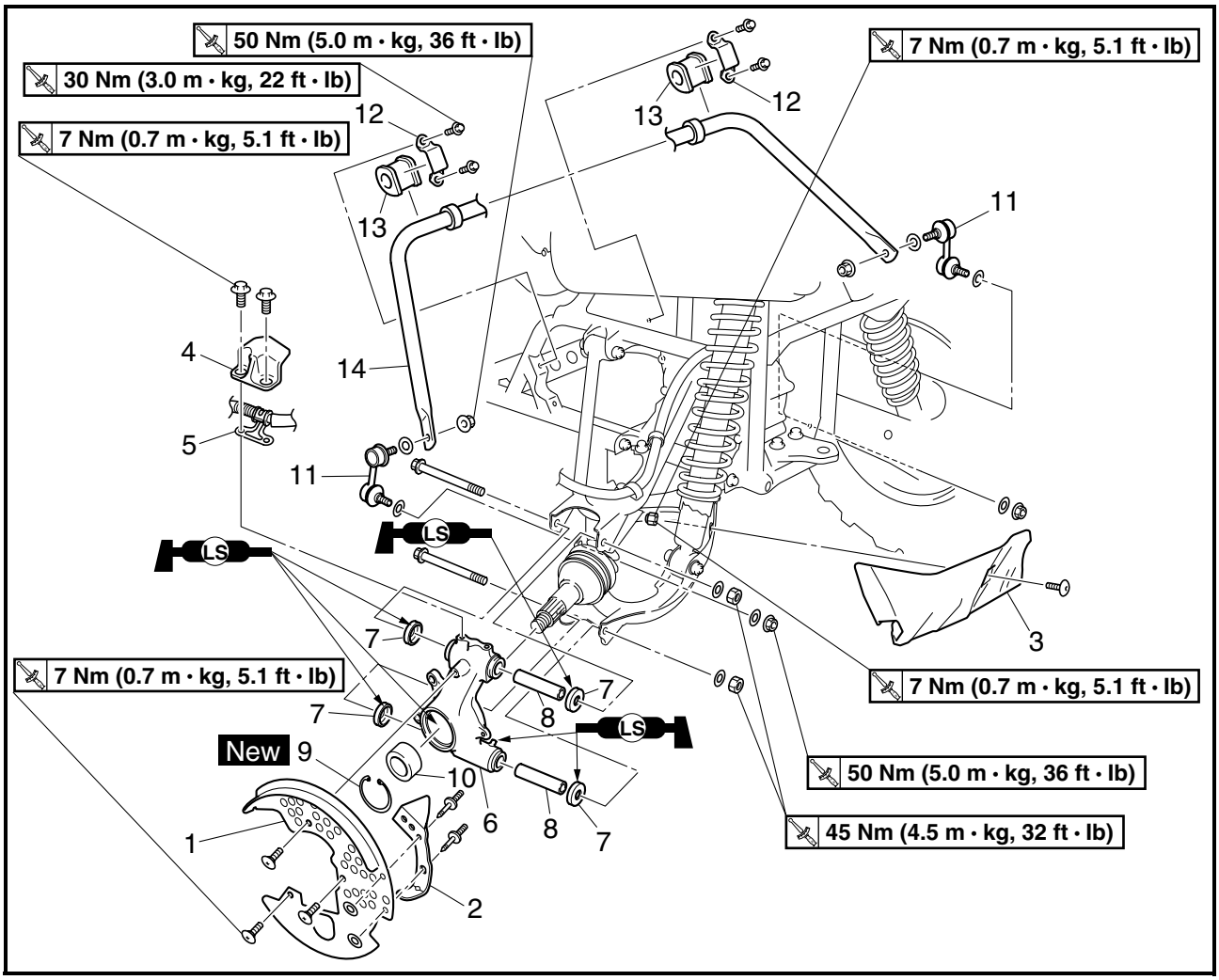
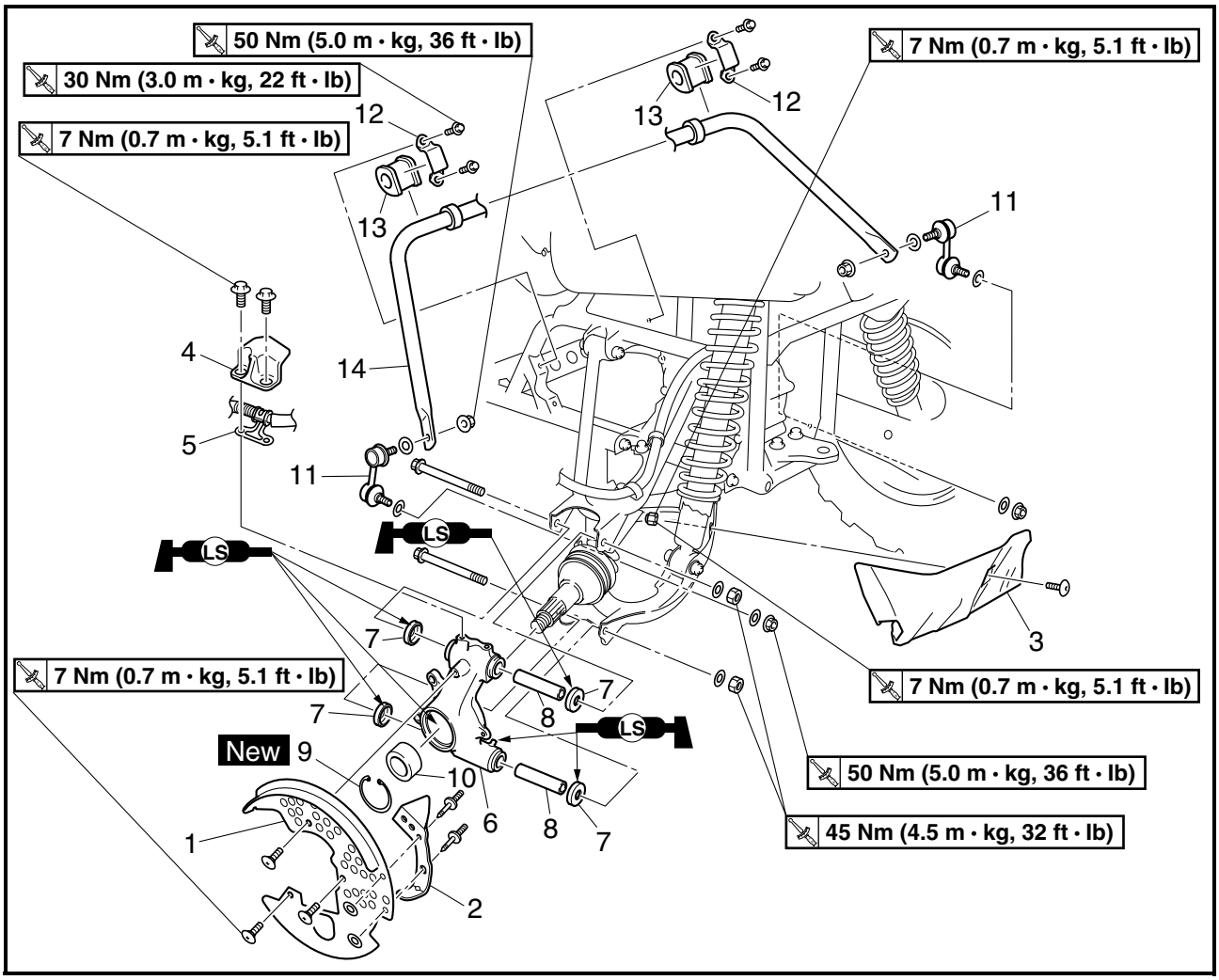
EBS01023

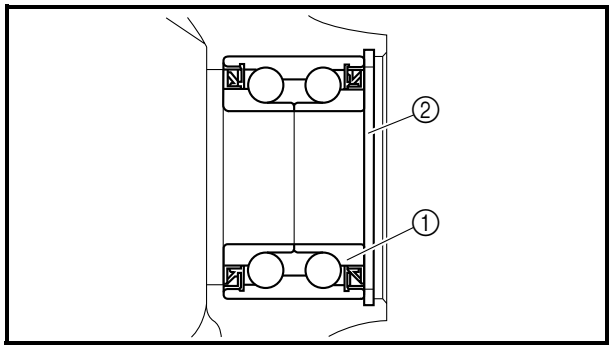
REAR KNUCKLES AND STABILIZER



Order	Job/Part	Q'ty	Remarks
	Removing the rear knuckles and stabilizer		Remove the parts in the order listed. The following procedure applies to both of the rear knuckles.
	Rear wheel hubs		Refer to "FRONT AND REAR WHEELS".
1	Brake disc guard	1	
2	Plate	1	
3	Rear arm protector	1	
4	Rear brake hose protector	1	
5	Rear brake hose holder	1	
6	Rear knuckle	1	
7	Spacer cover	4	
8	Spacer	2	
9	Circlip	1	
10	Bearing	1	
11	Stabilizer joint	2	



Order	Job/Part	Q'ty	Remarks
12	Stabilizer holder	2	
13	Bushing	2	
14	Stabilizer	1	
			For installation, reverse the removal procedure.



EBS01024
CHECKING THE REAR KNUCKLES

1. Check:
   - rear knuckle
     Damage/pitting → Replace.
2. Check:
   - rear wheel bearing ①
     Bearing allow play in the wheel hub or the wheel turns roughly → Replace.

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a. Clean the outside of the rear knuckle.
b. Remove the circlip ②.
c. Drive out the bearing.

⚠ WARNING

Eye protection is recommended when using striking tools.

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

CAUTION:

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

f. Install the new circlip.

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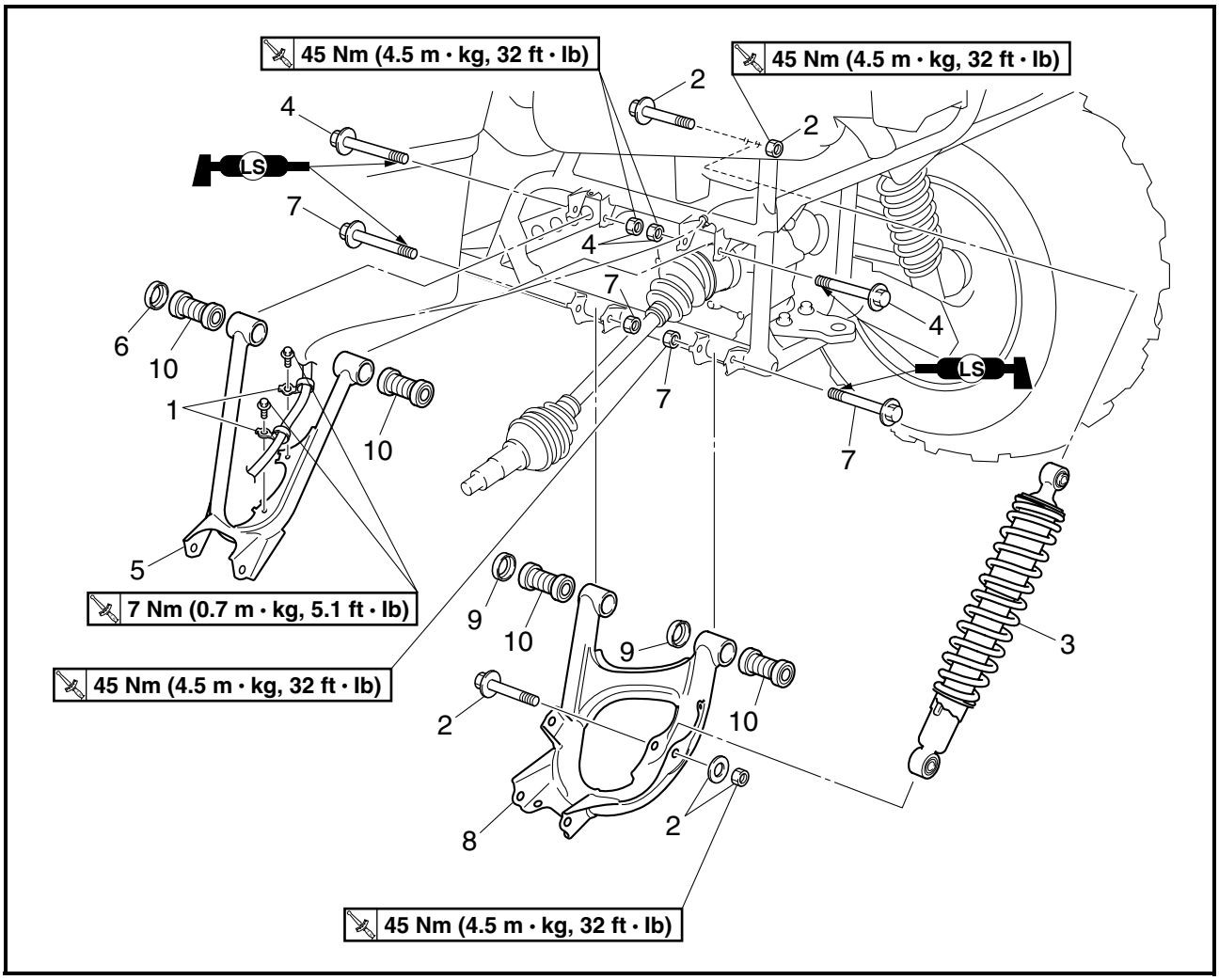
EBS01025
CHECKING THE STABILIZER

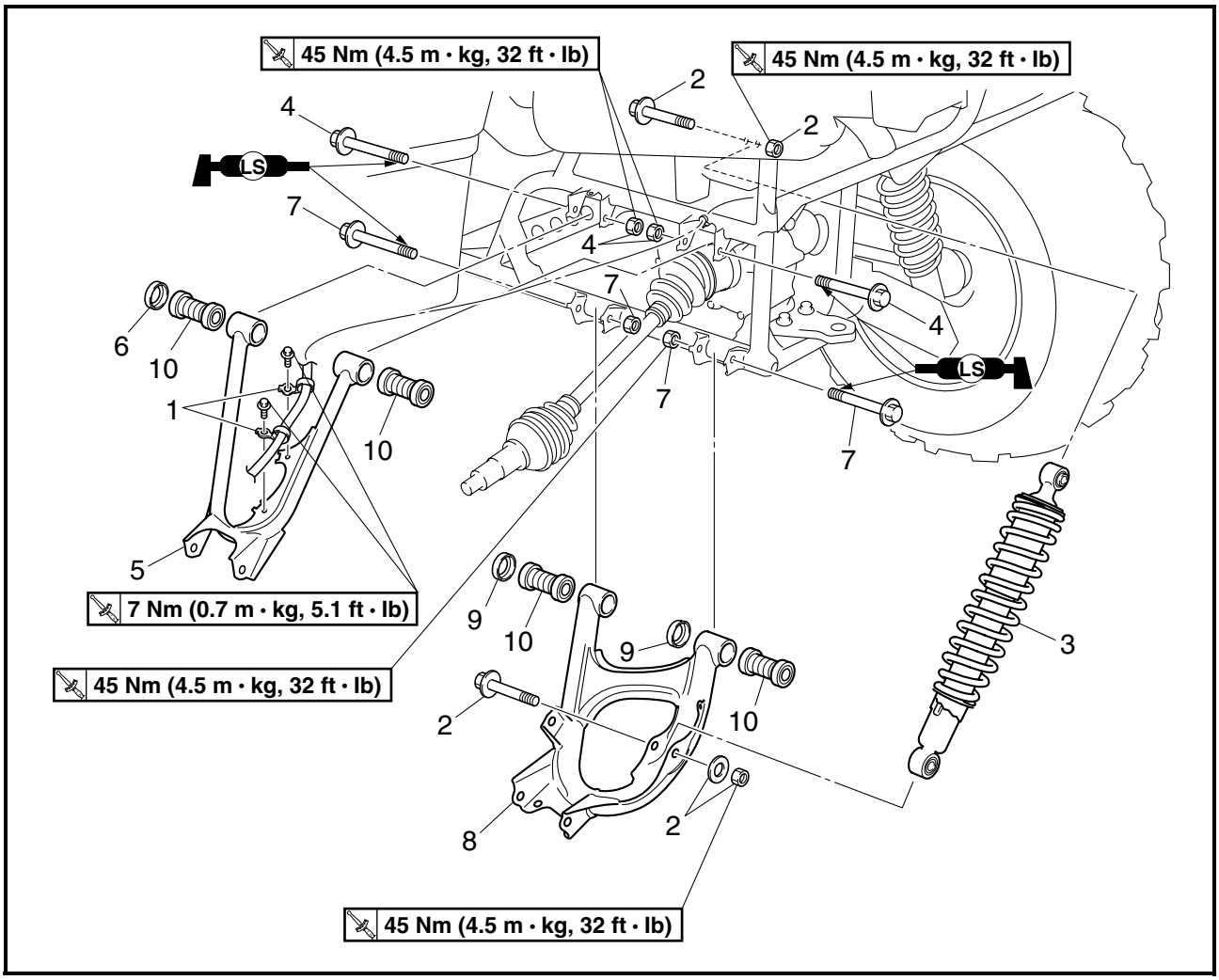
1. Check:
   - stabilizer
     Bends/cracks/damage → Replace.

EBS00476

REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES



Order	Job/Part	Q'ty	Remarks
	Removing the rear arms and rear shock absorber assemblies		Remove the parts in the order listed. The following procedure applies to both of the rear arms and rear shock absorber assemblies.
	Rear knuckle/stabilizer		Refer to "REAR KNUCKLES AND STABILIZER".
1	Rear brake hose guide	2	
2	Nut/washer/bolt	2/1/2	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES".
3	Rear shock absorber assembly	1	
4	Nut/bolt	2/2	
5	Rear upper arm	1	
6	Dust cover	1	
7	Nut/bolt	2/2	
8	Rear lower arm	1	
9	Dust cover	2	



Order	Job/Part	Q'ty	Remarks
10	Bushing	4	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES". For installation, reverse the removal procedure.

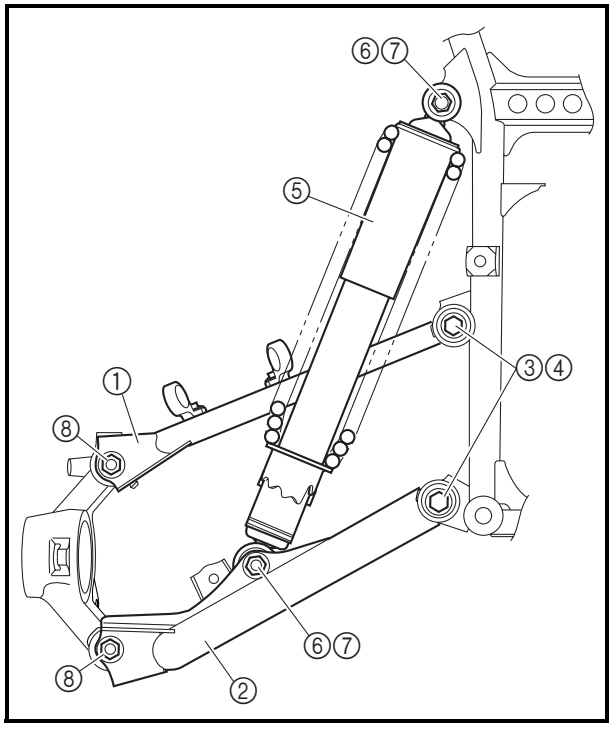
CHECKING THE REAR ARMS

1. Check:
   - rear arms
     Bends/damage → Replace.
2. Check:
   - bushings
     Wear/damage → Replace.

EBS00478

CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

1. Check:
   - shock absorber assemblies
     Oil leaks → Replace the shock absorber assembly.
   - spring
     Fatigue → Replace the shock absorber assemblies.
     Move the spring up and down.



EBS01027

INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

1. Install:
   - rear arms
   - rear shock absorber assemblies

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a. Install the rear upper arm ① and rear lower arm ②.

NOTE:

- Lubricate the bolts ③ with lithium-soap-based grease.
- Be sure to position the bolts ③ so that the bolt head faces outward.
- Temporarily tighten the nuts ④.

b. Install the rear shock absorber assembly ⑤ and bolts ⑥.

	**Nut ⑦** **45 Nm (4.5 m · kg, 32 ft · lb)**

c. Install the rear knuckle.

	**Nut ⑧** **45 Nm (4.5 m · kg, 32 ft · lb)**

d. Tighten the nuts ④.

	**Nut ④** **45 Nm (4.5 m · kg, 32 ft · lb)**

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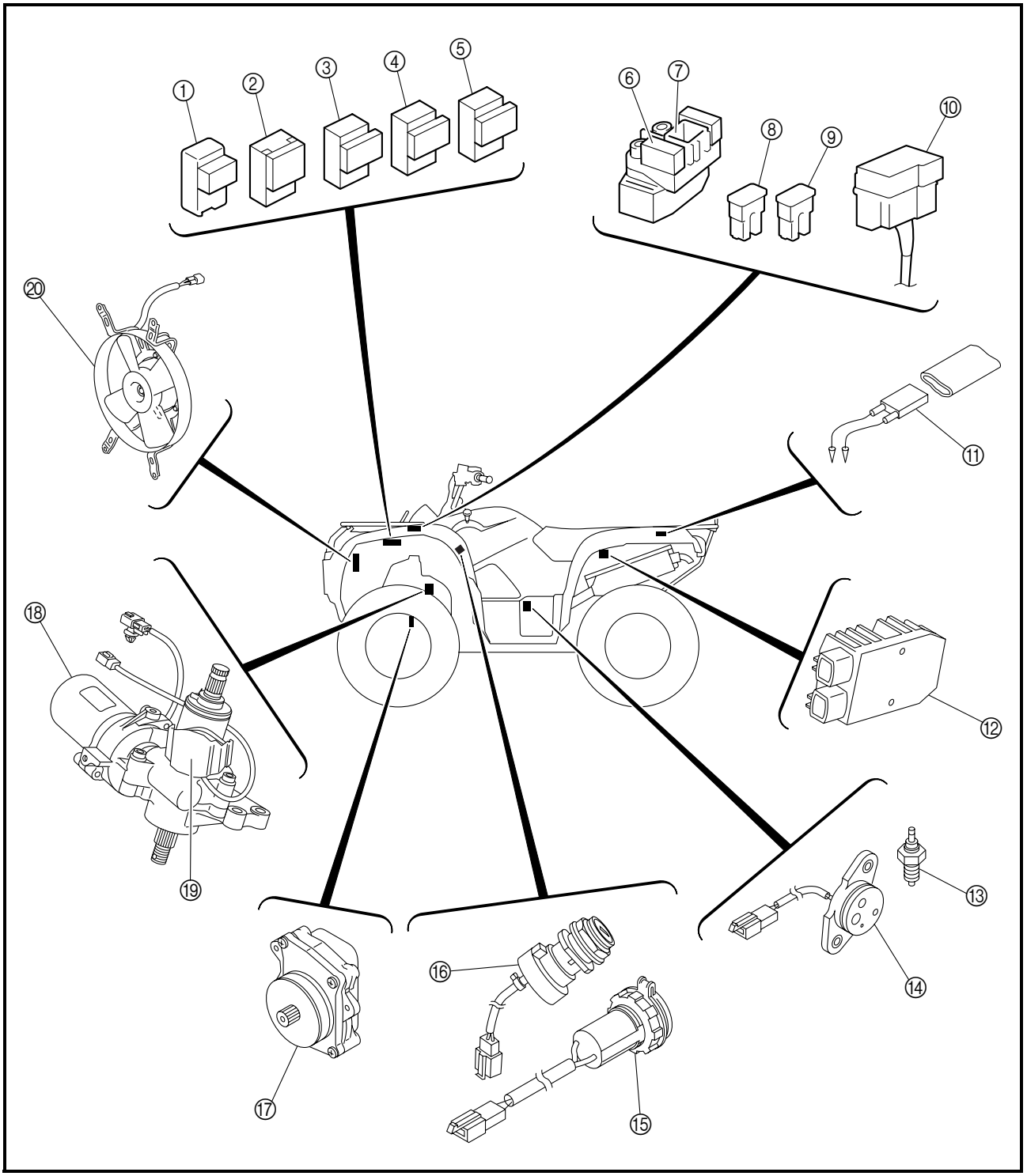
EBS00500

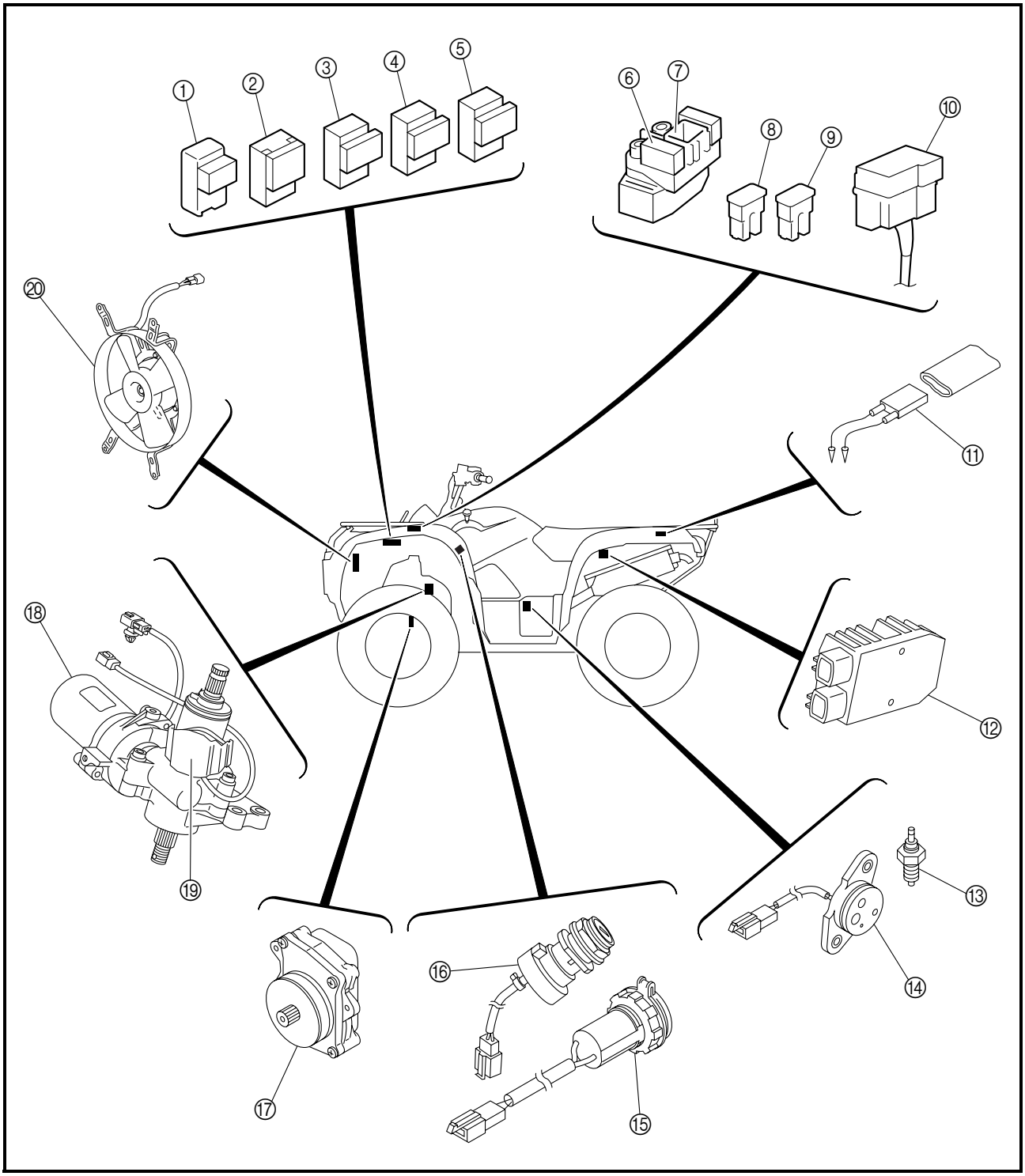
ELECTRICAL

ELECTRICAL COMPONENTS

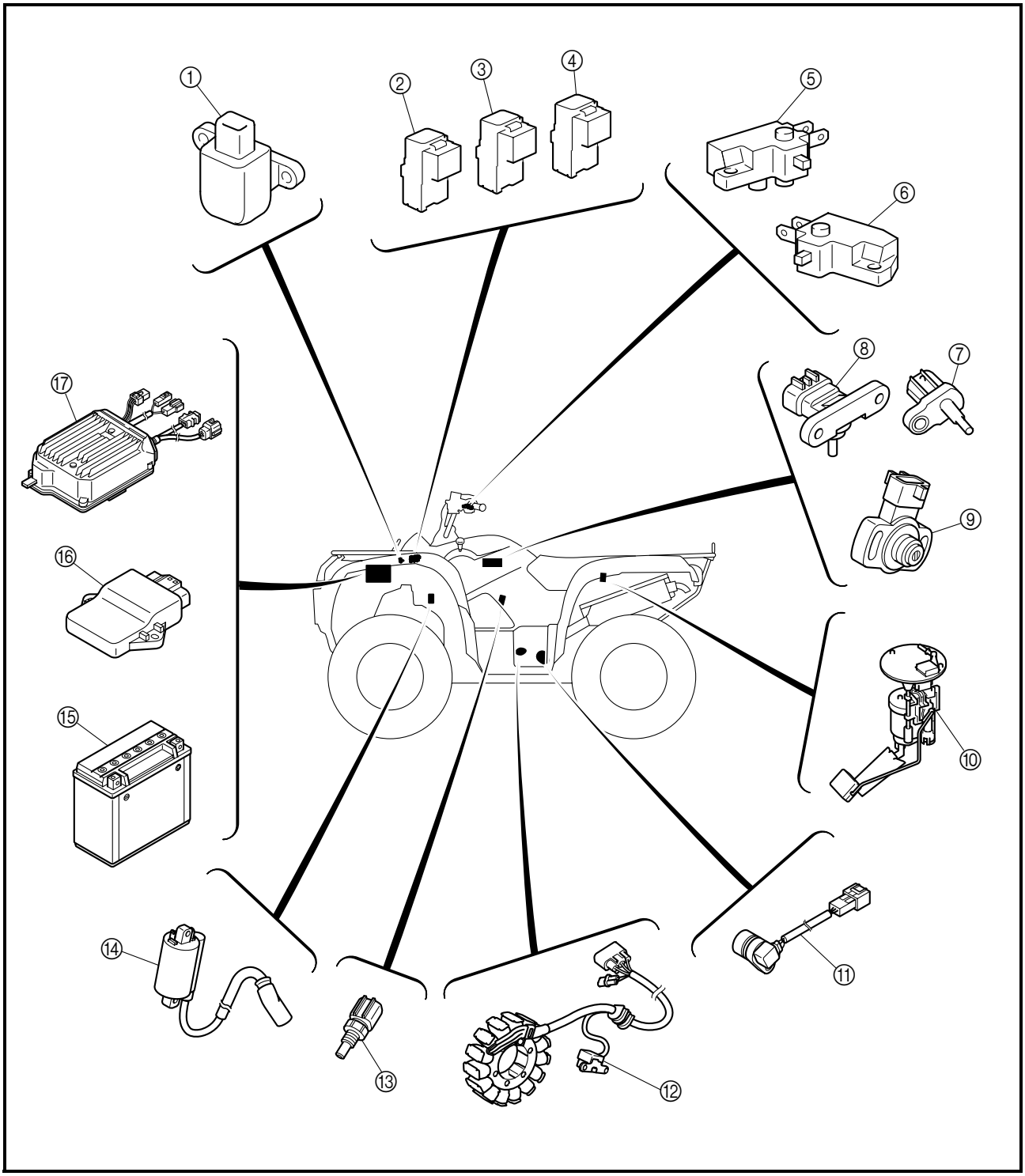
① Four-wheel-drive motor relay 3
② Rear brake relay
③ Four-wheel-drive motor relay 2
④ Four-wheel-drive motor relay 1
⑤ Headlight relay
⑥ Fuel injection system fuse
⑦ Starter relay
⑧ EPS fuse
⑨ Main fuse
⑩ Fuse box (ignition, headlights, four-wheel-drive motor, radiator fan motor, signaling system, auxiliary DC jack)
⑪ Radiator fan motor circuit breaker
⑫ Rectifier/regulator

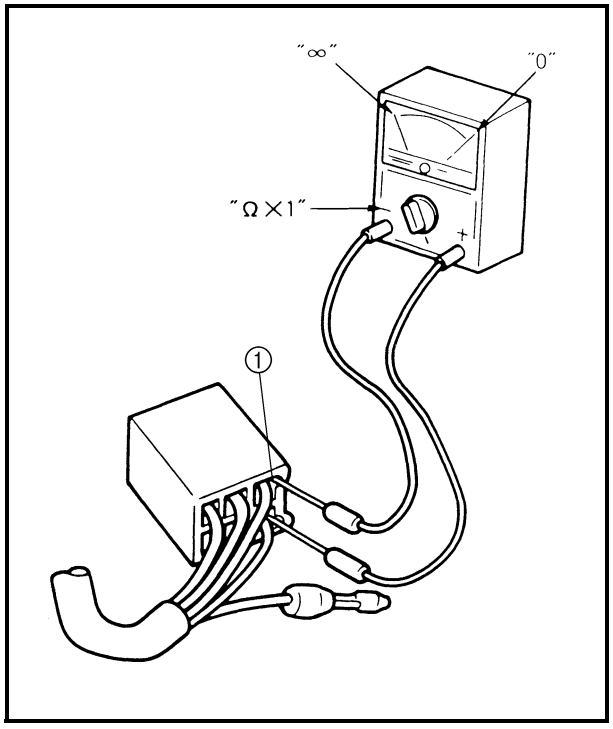


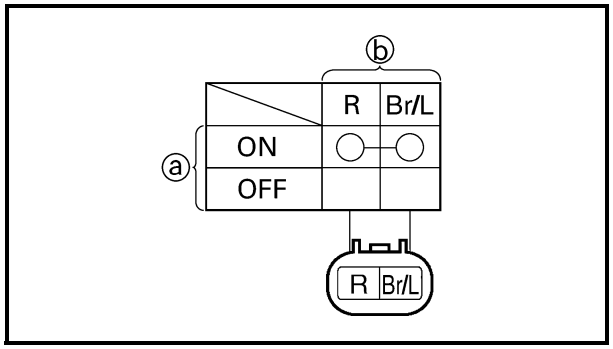
⑬ Reverse switch
⑭ Gear position switch
⑮ Auxiliary DC jack
⑯ Main switch
⑰ Differential gear motor
⑱ EPS motor
⑲ EPS torque sensor
⑳ Radiator fan motor



① Lean angle sensor
② Radiator fan motor relay
③ Fuel injection system relay
④ Starting circuit cut-off relay
⑤ Front brake light switch
⑥ Rear brake light switch
⑦ Intake air temperature sensor
⑧ Intake air pressure sensor
⑨ TPS (throttle position sensor)
⑩ Fuel pump
⑪ Speed sensor
⑫ Crankshaft position sensor
⑬ Coolant temperature sensor
⑭ Ignition coil
⑮ Battery
⑯ ECU (engine control unit)
⑰ EPS (electric power steering) control unit







EBS01028

CHECKING SWITCH CONTINUITY

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.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

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

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.
The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTE:

"○——○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between red and brown/blue when the switch is set to "ON".

EBS01029

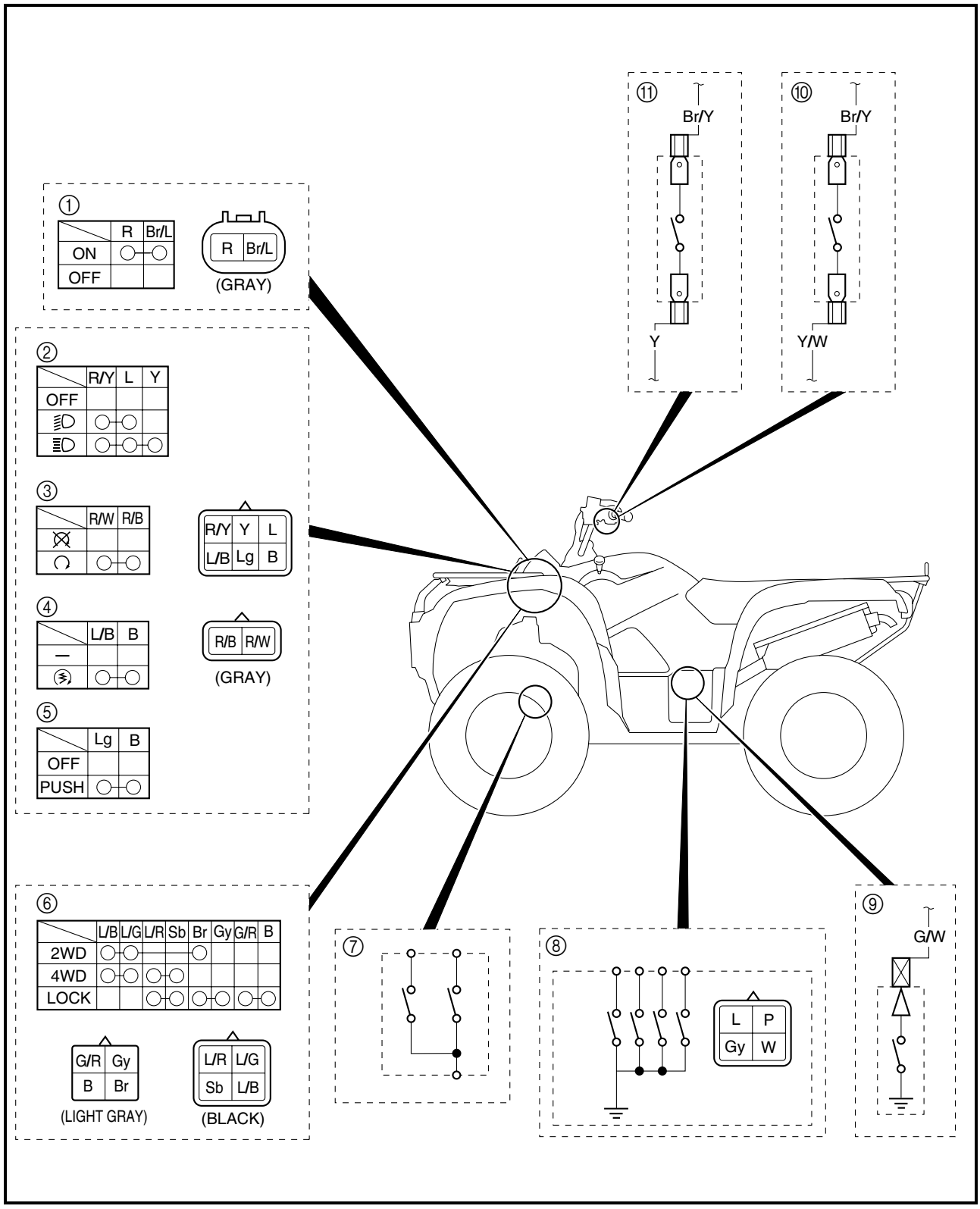
CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear → Repair or replace.

Improperly connected → Properly connect.

Incorrect continuity reading → Replace the switch.



① Main switch
② Light switch
③ Engine stop switch
④ Start switch
⑤ Override switch
⑥ On-command four-wheel-drive motor switch and differential gear lock switch
⑦ Four-wheel-drive motor switch
⑧ Gear position switch
⑨ Reverse switch
⑩ Rear brake light switch
⑪ Front brake light switch

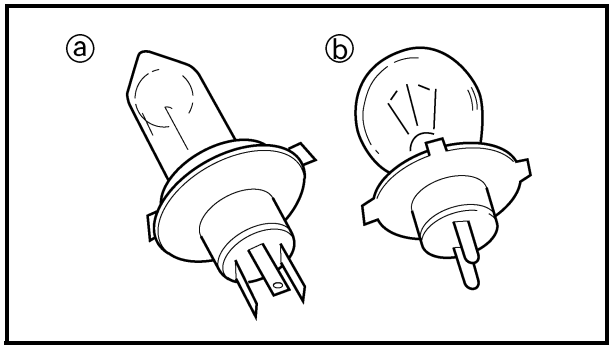
EBS01030
CHECKING THE BULBS AND BULB SOCKETS

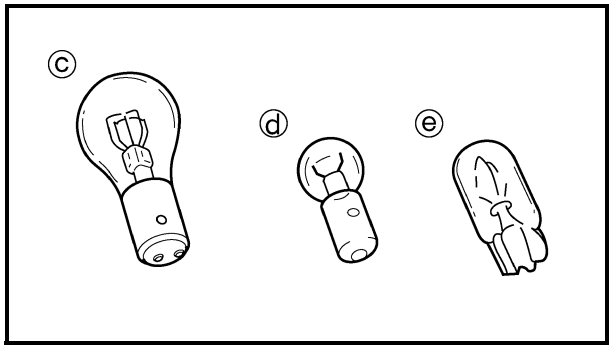
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.

Improperly connected → Properly connect.

No continuity → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs ⓐ and ⓑ are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs ⓓ and ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:
   - bulb

⚠ WARNING

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

CAUTION:

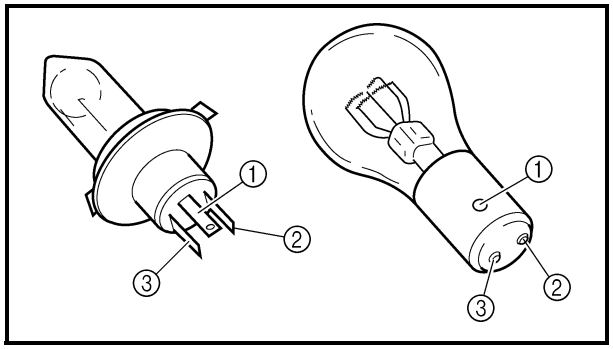
- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

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

NOTE:

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.



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a. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ②, and check the continuity.
b. Connect the positive tester probe to terminal ① and the negative tester probe to terminal ③, and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1. Check:
   - bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

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

NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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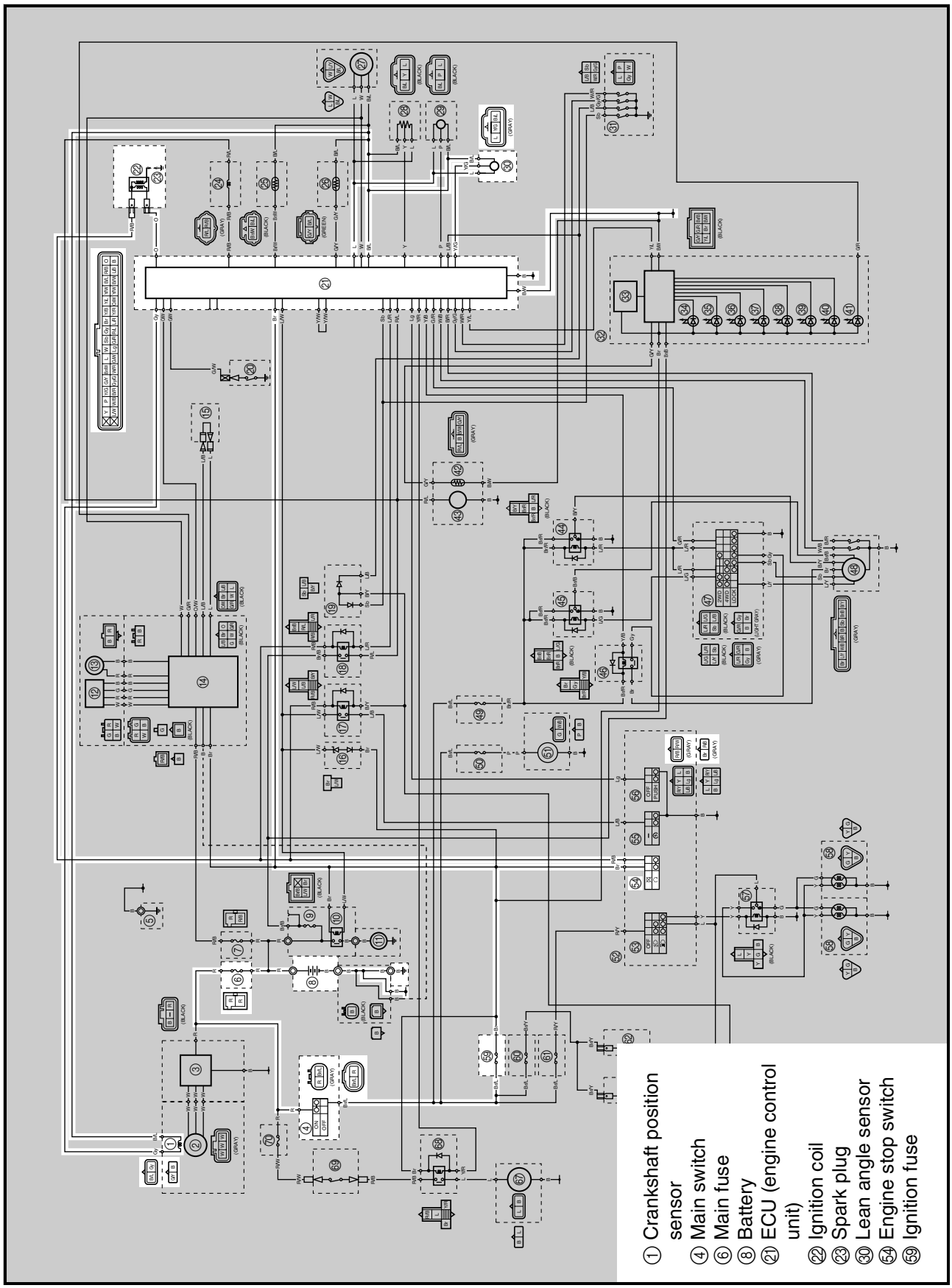
EBS00503

IGNITION SYSTEM

CIRCUIT DIAGRAM



EBS01045

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. main and ignition fuses
2. battery
3. spark plug
4. ignition spark gap
5. spark plug cap resistance
6. ignition coil resistance
7. main switch
8. engine stop switch
9. crankshaft position sensor resistance
10. lean angle sensor
11. wiring connections (of the entire ignition system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. right side panel
4. V-belt cooling duct 2

- Troubleshoot with the following special tool(s).

Ignition checker
90890-06754
Opama pet-4000 spark checker
YM-34487
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

EBS01043

1. Main and ignition fuses

- Check the main and ignition fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and ignition fuses OK?

YES

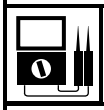
NO

Replace the fuse(s).

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES

NO

- Clean the battery terminals.
- Recharge or replace the battery.

EBS01032

3. Spark plug

- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
  Refer to "CHECKING THE SPARK PLUG" in chapter 3.

Standard spark plug
CR8E (NGK)
Spark plug gap
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

YES

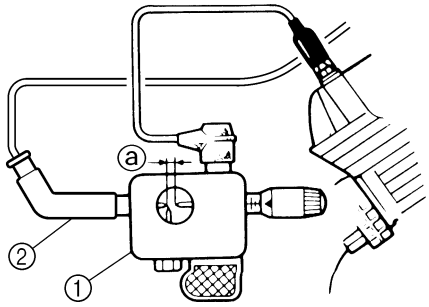
NO

Re-gap or replace the spark plug.

EBS01034

4. Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker ① as shown.
  ② Spark plug cap
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



Minimum ignition spark gap
6.0 mm (0.24 in)

- Is there a spark and is the spark gap within specification?

NO

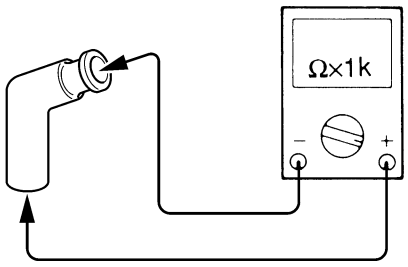
YES

The ignition system is OK.

EBS01036

5. Spark plug cap resistance

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance
10.0 kΩ at 20 °C (68 °F)

- Is the spark plug cap OK?

YES

NO

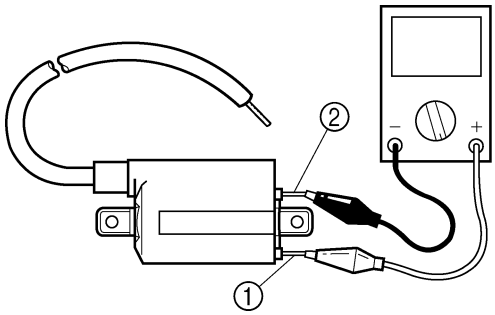
Replace the spark plug cap.

EBS01038

6. Ignition coil resistance

- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

Positive tester probe →
red/black lead terminal ①
Negative tester probe →
orange lead terminal ②

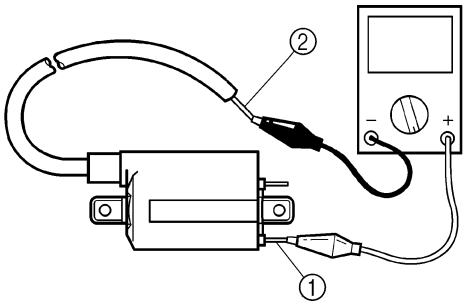


- Measure the primary coil resistance.

Primary coil resistance
3.4 ~ 4.6 Ω at 20 °C (68 °F)

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

Positive tester probe →
red/black lead terminal ①
Negative tester probe → spark plug lead ②



- Measure the secondary coil resistance.

Secondary coil resistance
10.4 ~ 15.6 kΩ at 20 °C (68 °F)

- Is the ignition coil OK?

YES

NO

Replace the ignition coil.

EBS01041

7. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES

NO

Replace the main switch.

EBS01042

8. Engine stop switch

- Check the engine stop switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES

NO

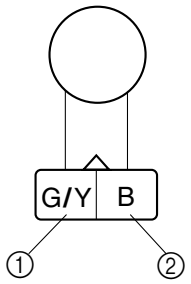
Replace the left handlebar switch.

EBS01040

9. Crankshaft position sensor resistance

- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 100$) to the crankshaft position sensor coupler as shown.

Positive tester probe → green/yellow ①
Negative tester probe → black ②



- Measure the crankshaft position sensor resistance.

Crankshaft position sensor resistance
459 ~ 561 Ω at 20 °C (68 °F)

- Is the crankshaft position sensor OK?

YES

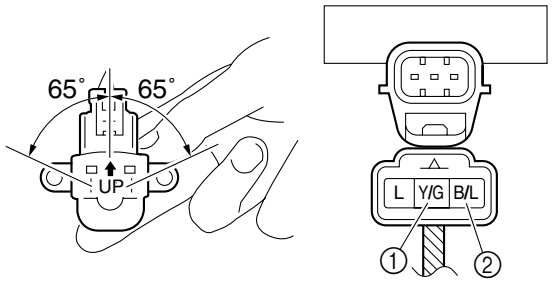
NO

Replace the crankshaft position sensor/stator assembly.

10.Lean angle sensor

- Remove the lean angle sensor.
- Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

Positive tester probe → yellow/green ①
Negative tester probe → black/blue ②



- Set the main switch to "ON".
- Turn the lean angle sensor to 65°.
- Measure the lean angle sensor output voltage.

Lean angle sensor voltage
Less than 65° ± 5° →
3.55 ~ 4.45 V
More than 65° ± 5° →
0.65 ~ 1.35 V

- Is the lean angle sensor OK?

YES

NO

Replace the lean angle sensor.

EBS01047

11.Wiring

- Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the ignition system's wiring properly connected and without defects?

YES

NO

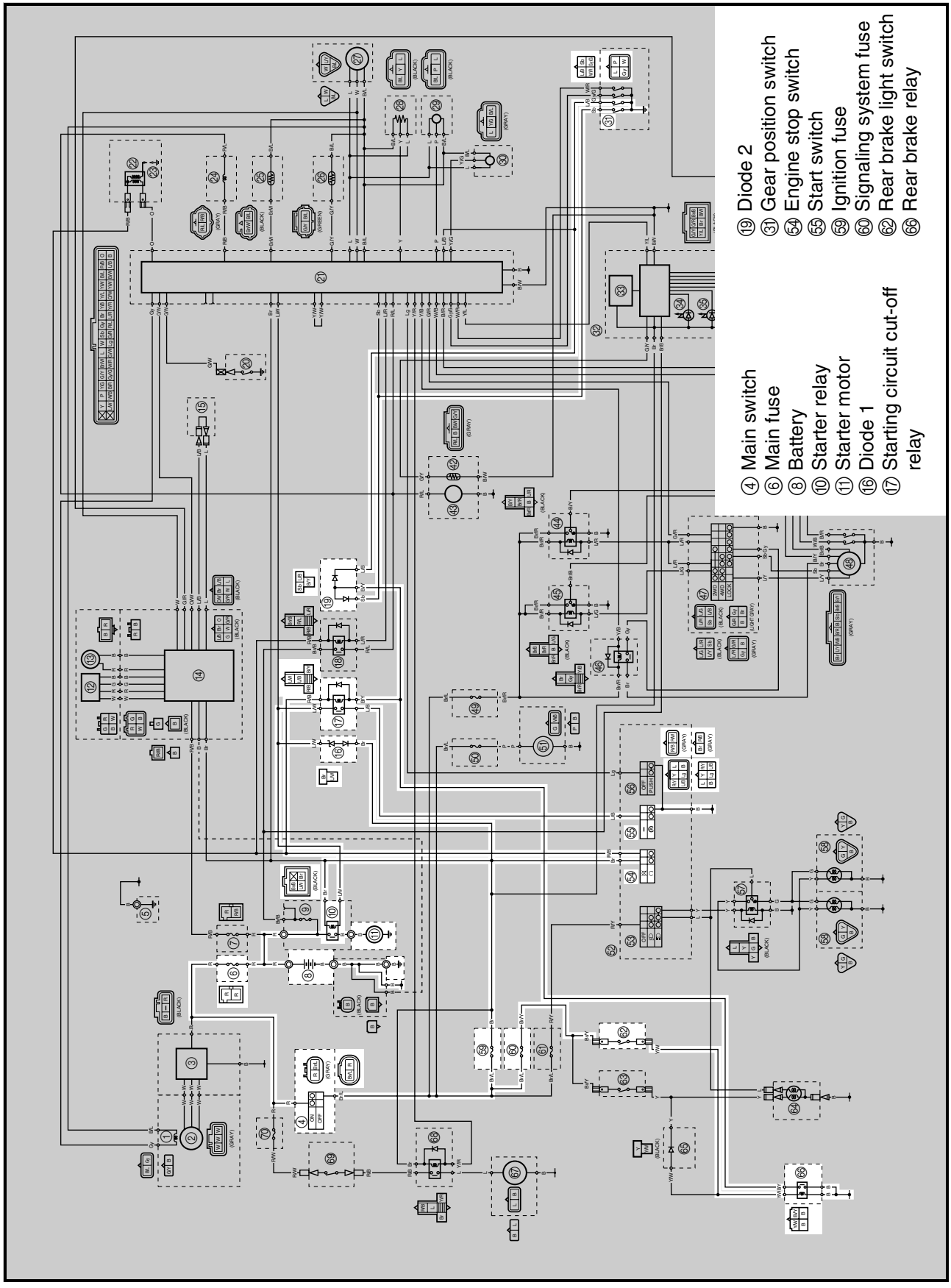
Replace the ECU.

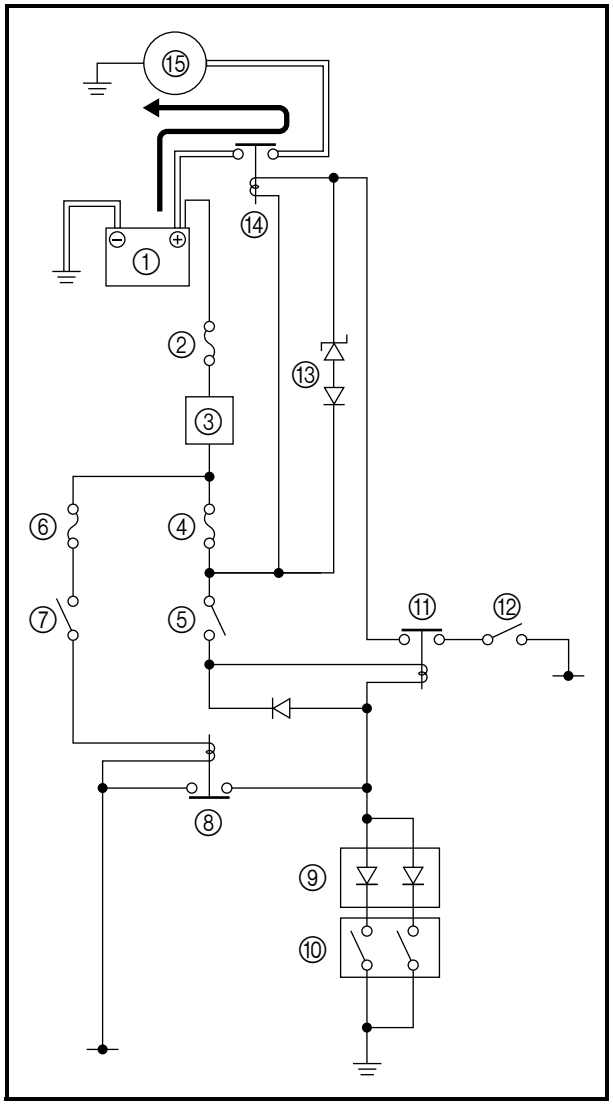
Properly connect or repair the ignition system's wiring.

EBS00506

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





EBS00507

STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, starting circuit cut-off relay, rear brake light switch, rear brake relay and gear position switch. If the main switch is on and the engine stop switch is in the RUN position, the starter motor can be operated only if:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).

or

- The transmission is in park (the park switch circuit of the gear position switch is closed).

or

- You pull in the rear brake lever or push down on the brake pedal (the rear brake light switch circuit is closed).

The starting circuit cut-off relay prevents the starter from operating when the select lever is in gear or in reverse and the rear brake lever and brake pedal is free. In this instance, the starting circuit cut-off relay is off so that current cannot reach the starter motor.

① Battery
② Main fuse
③ Main switch
④ Ignition fuse
⑤ Engine stop switch
⑥ Signaling system fuse
⑦ Rear brake light switch
⑧ Rear brake relay
⑨ Diode 2
⑩ Gear position switch
⑪ Starting circuit cut-off relay
⑫ Start switch
⑬ Diode 1
⑭ Starter relay
⑮ Starter motor

EBS01048
TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. main, ignition and signaling system fuses
2. battery
3. starter motor
4. starting circuit cut-off relay
5. starter relay
6. Rear brake relay
7. Diode 2
8. main switch
9. engine stop switch
10. start switch
11. rear brake light switch
12. gear position switch
13. wiring connections
    (of the entire starting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. side covers

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main, ignition and signaling system fuses

- Check the main, ignition and signaling system fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition and signaling system fuses OK?

YES

NO → Replace the fuse(s).

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

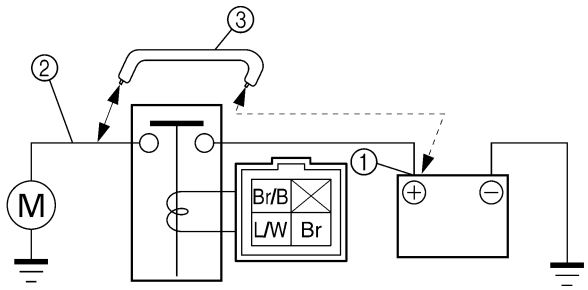
YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EBS01051

3. Starter motor

- 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.**

- Does the starter motor turn?

YES

NO → Repair or replace the starter motor.

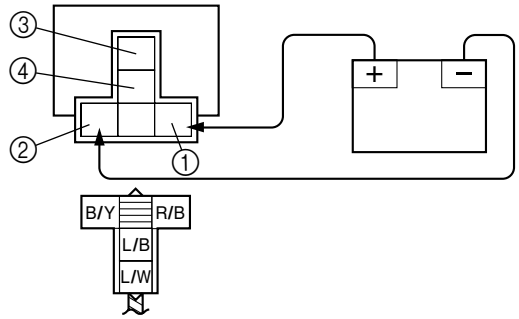
EBS01052

4. Starting circuit cut-off relay

- Remove the starting circuit cut-off relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starting circuit cut-off relay as shown.

Positive battery terminal → **red/black** ①
Negative battery terminal → **black/yellow** ②

Positive tester probe → **blue/white** ③
Negative tester probe → **blue/black** ④



- Does the starting circuit cut-off relay have continuity between blue/white and blue/black?

YES

NO

Replace the starting circuit cut-off relay.

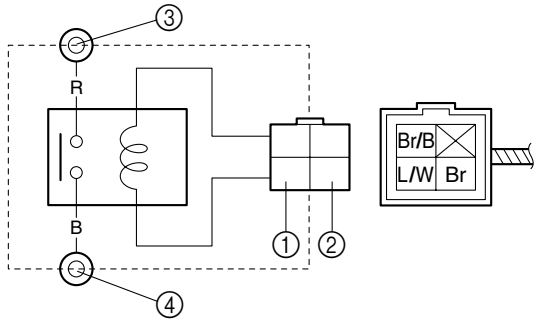
EBS01054

5. Starter relay

- Remove the starter relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starter relay as shown.

Positive battery terminal → **brown** ①
Negative battery terminal → **blue/white** ②

Positive tester probe → **red** ③
Negative tester probe → **black** ④



- Does the starter relay have continuity between red and black?

YES

NO

Replace the starter relay.

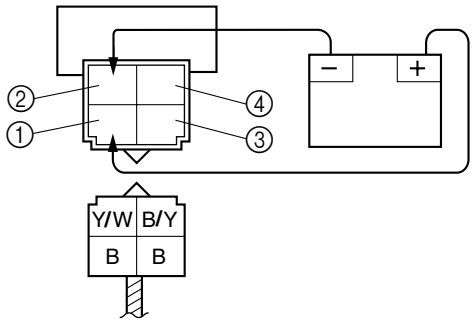
EBS01054

6. Rear brake relay

- Remove the rear brake relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the rear brake relay as shown.

Positive battery terminal →
yellow/white ①
Negative battery terminal → black ②

Positive tester probe → black/yellow ③
Negative tester probe → black ④



- Does the rear brake relay have continuity between black/yellow and black?

YES

NO

Replace the rear brake relay.

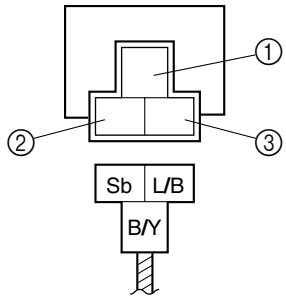
EBS01053

7. Diode 2

- Remove the diode 2 from the wire harness.
- Connect the pocket tester (Ω × 1) to the diode 2 as shown.
- Measure the diode 2 for continuity as follows.

NOTE:
The pocket tester 90890-03112 and the analog pocket tester YU-03112-C readings are shown in the following table.

Positive tester probe → **black/yellow** ① **Negative tester probe →** **sky blue** ②	**Continuity**
Positive tester probe → **black/yellow** ① **Negative tester probe →** **blue/black** ③	**Continuity**
Positive tester probe → **sky blue** ② **Negative tester probe →** **black/yellow** ①	**No continuity**
Positive tester probe → **blue/black** ③ **Negative tester probe →** **black/yellow** ①	**No continuity**



- Are the testing readings correct?

YES

NO

Replace the diode 2.

EBS01041

8. Main switch
- Check the main switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

YES ⇩

NO ⇩

Replace the main switch.

EBS01042

9. Engine stop switch
- Check the engine stop switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

YES ⇩

NO ⇩

Replace the left handlebar switch.

EBS01057

10.Start switch
- Check the start switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

YES ⇩

NO ⇩

Replace the left handlebar switch.

11.Rear brake light switch
- Check the rear brake light switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the rear brake light switch OK?

YES ⇩

NO ⇩

Replace the rear brake light switch.

EBS01058

12.Gear position switch
- Check the gear position switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the gear position switch OK?

YES ⇩

NO ⇩

Replace the gear position switch.

EBS01059

13.Wiring
- Check the entire starting system’s wiring.
  Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

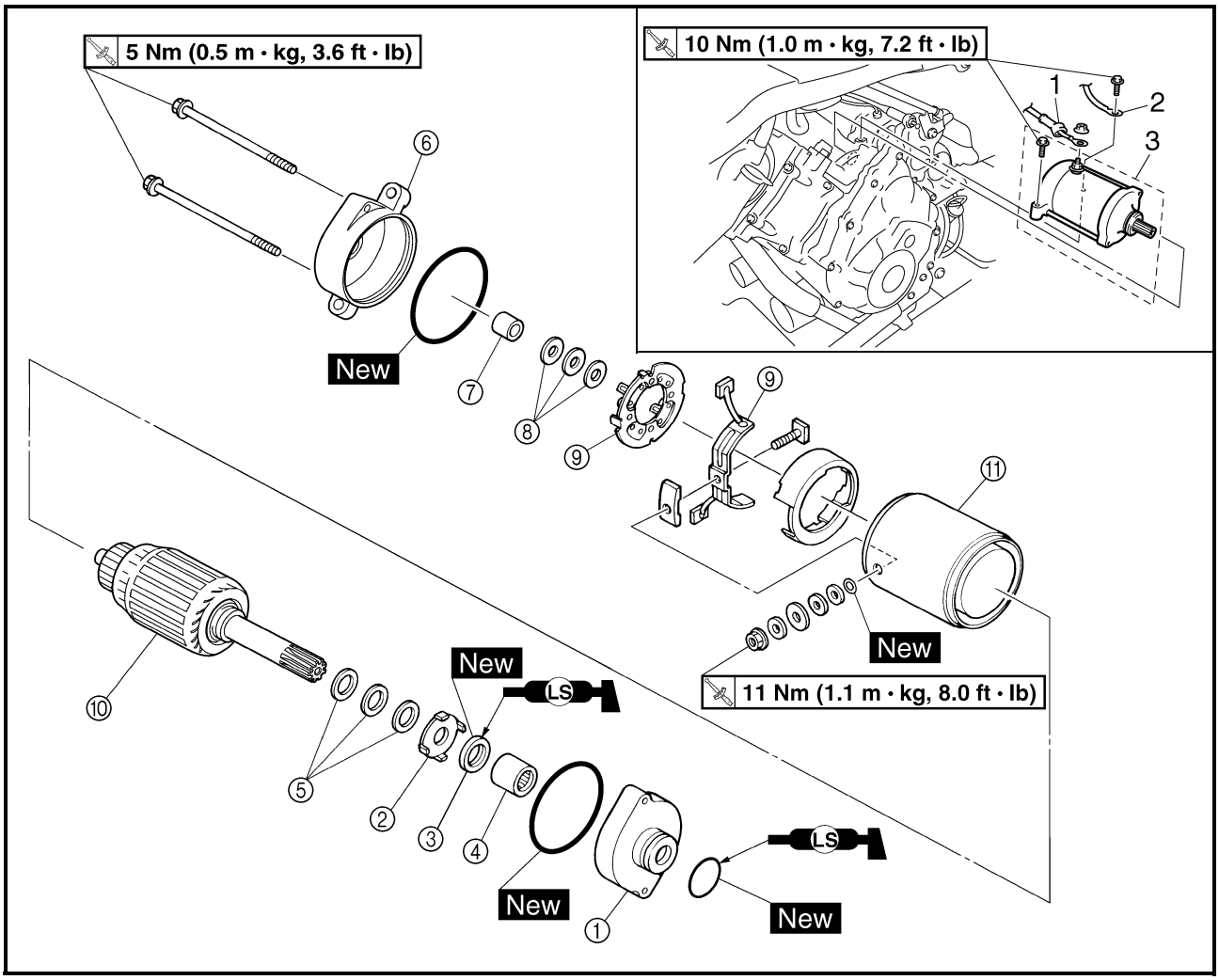
YES ⇩

NO ⇩

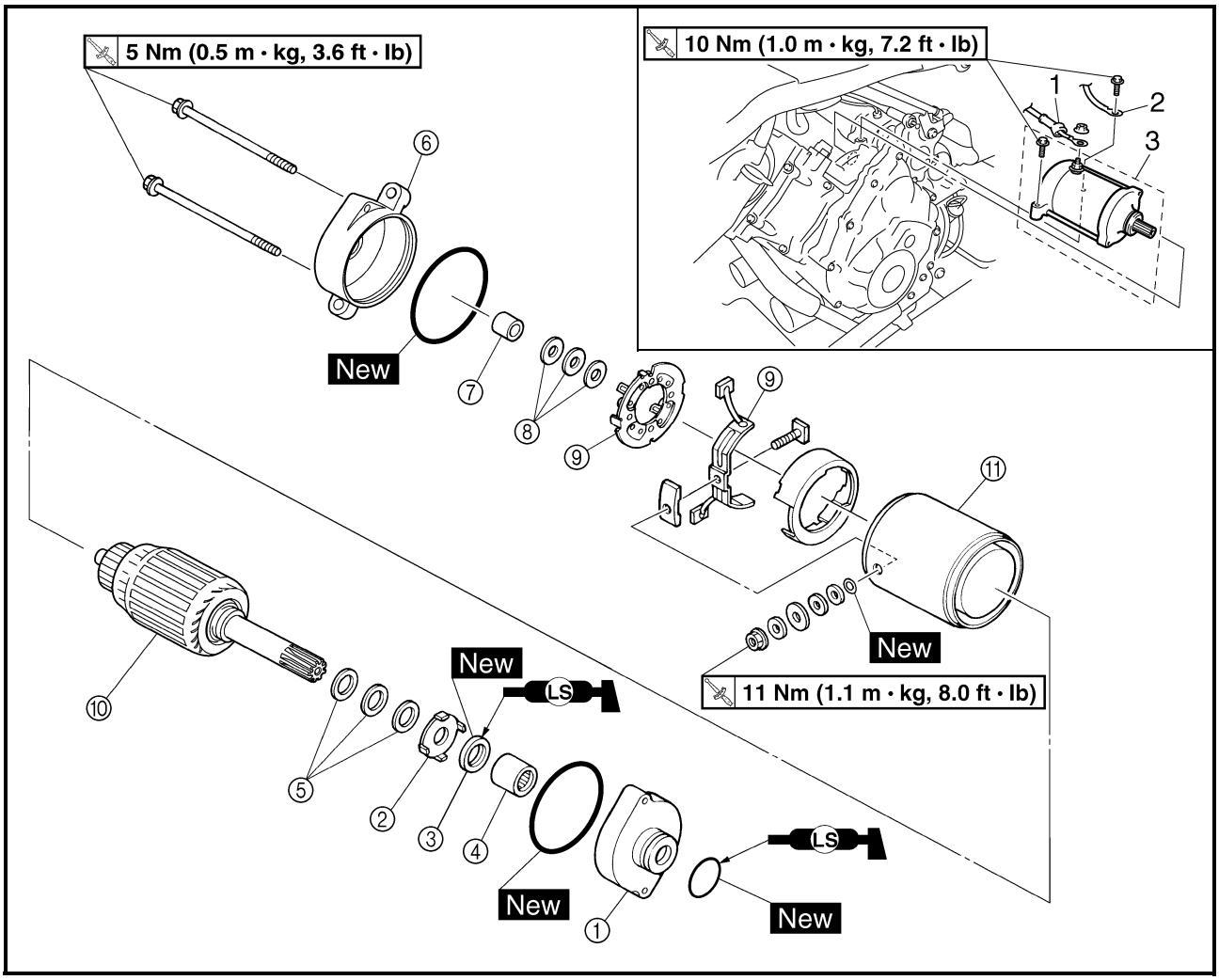
The starting system circuit is OK.

Properly connect or repair the starting system’s wiring.

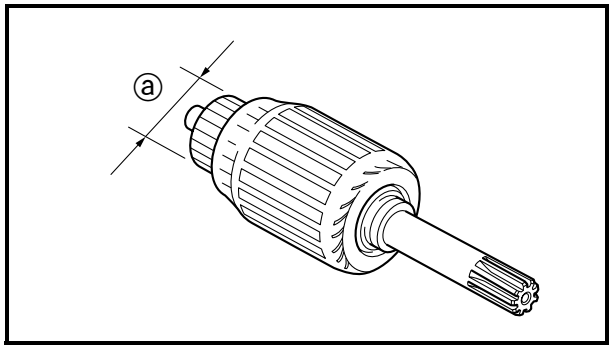
EBS01061
STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
	Muffler		Refer to "ENGINE REMOVAL" in chapter 4.
1	Starter motor lead	1	Disconnect.
2	Ground lead	1	Disconnect.
3	Starter motor	1	For installation, reverse the removal procedure.
	Disassembling the starter motor		Remove the parts in the order listed.
①	Starter motor front cover	1	Refer to "ASSEMBLING THE STARTER MOTOR".
②	Lock washer	1	
③	Oil seal	1	
④	Bearing	1	
⑤	Shim	*	
⑥	Starter motor rear cover	1	



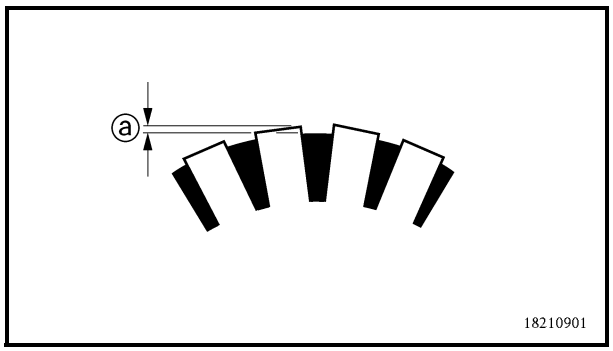
Order	Job/Part	Q'ty	Remarks
⑦	Bushing	1	Refer to "ASSEMBLING THE STARTER MOTOR".
⑧	Shim	*	
⑨	Brush holder set	1	
⑩	Armature assembly	1	
⑪	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.



EBS01064
CHECKING THE STARTER MOTOR

1. Check:
   - commutator
     Dirt → Clean with 600-grit sandpaper.
2. Measure:
   - commutator diameter ⓐ
     Out of specification → Replace the starter motor.

Commutator wear limit
27 mm (1.06 in)

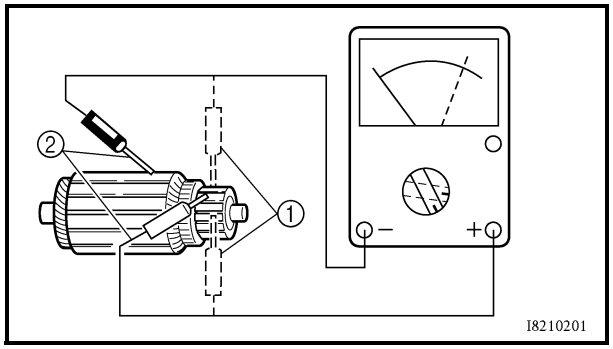


3. Measure:
   - mica undercut ⓐ
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut
0.70 mm (0.03 in)

NOTE:
The mica of the commutator must be undercut to ensure proper operation of the commutator.

4. Measure:
   - armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.



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a. Measure the armature assembly resistances with the pocket tester.

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

Armature coil
Commutator resistance ①
0.0250 ~ 0.0350 Ω at 20 °C (68 °F)
Insulation resistance ②
Above 1 MΩ at 20 °C (68 °F)

b. If any resistance is out of specification, replace the starter motor.

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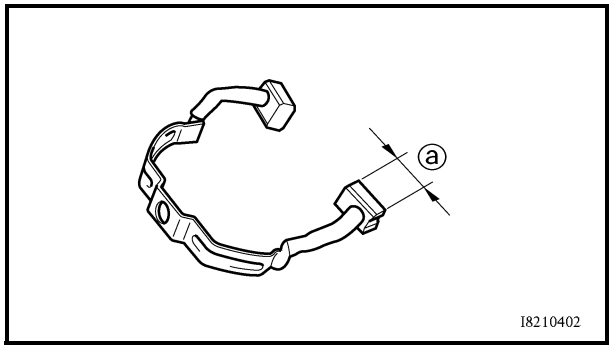
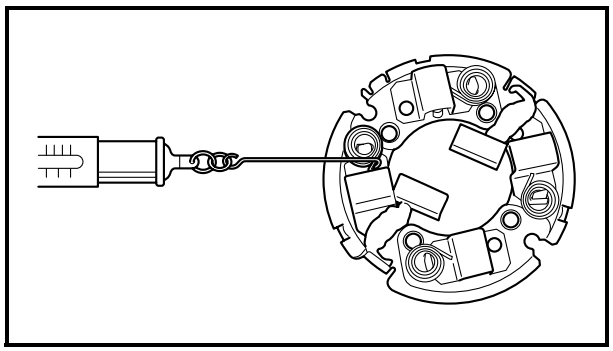


5. Measure:
• brush length ⓐ
Out of specification → Replace the brushes as a set.

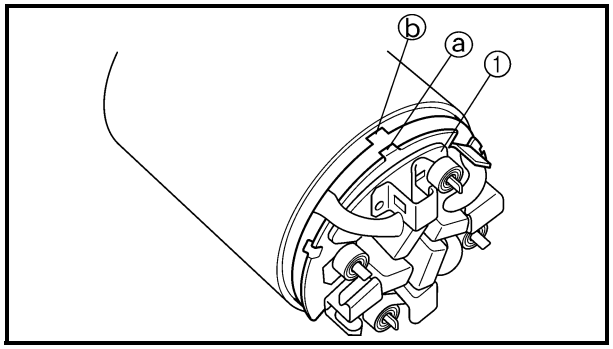
Brush length wear limit
5.00 mm (0.20 in)



6. Measure:
• brush spring force
Out of specification → Replace the brush springs as a set.

Brush spring force
7.65 ~ 10.01 N (780 ~ 1021 gf, 27.54 ~ 36.03 oz)

7. Check:
• gear teeth
Damage/wear → Replace the gear.
8. Check:
• bearing
• oil seal
Damage/wear → Replace the defective part(s).



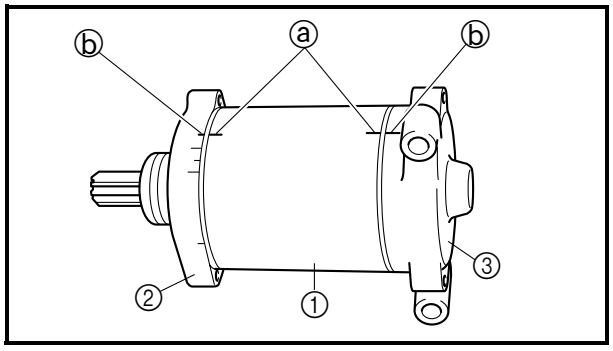
EBS00515

ASSEMBLING THE STARTER MOTOR

1. Install:
   - brush holder set ①

NOTE:

Align the projection ⓐ on the brush holder set with the slot ⓑ in the starter motor yoke.



2. Install:
   - starter motor yoke ①
   - starter motor front cover ②
   - starter motor rear cover ③

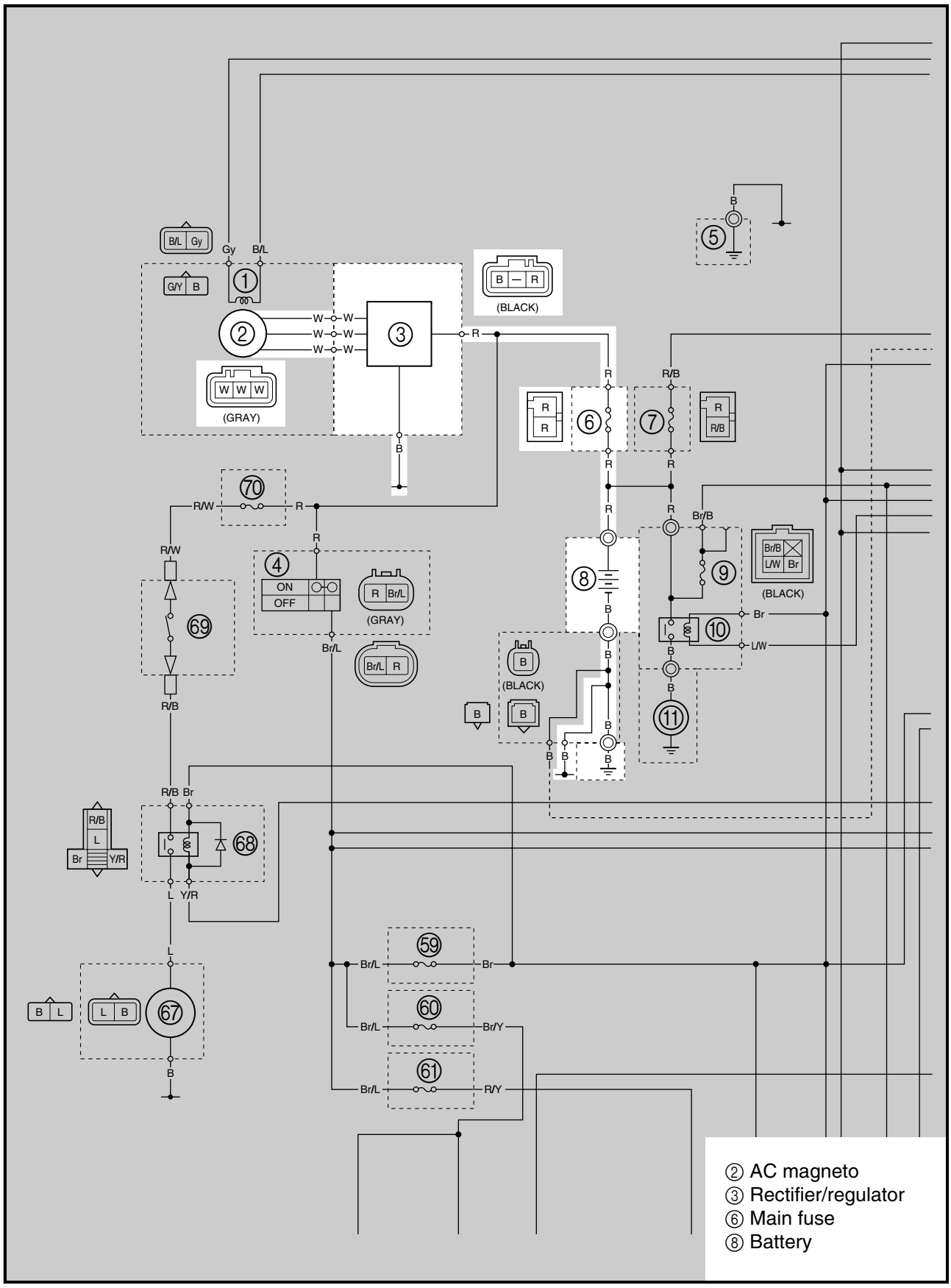
NOTE:

Align the match marks ⓐ on the starter motor yoke with the match marks ⓑ on the starter motor front and rear covers.

EBS00516

CHARGING SYSTEM

CIRCUIT DIAGRAM



EBS01065
TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4. stator coil resistance
5. wiring connections
   (of the entire charging system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. right side cover
4. V-belt cooling duct 2

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main fuse

- Check the main fuse for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Is the main fuse OK?

YES ⇩

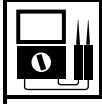
NO ⇩

Replace the main fuse.

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩

NO ⇩

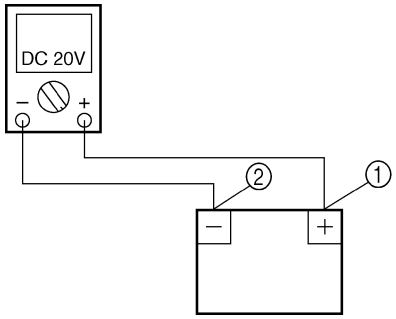
- Clean the battery terminals.
- Recharge or replace the battery.

EBS01066

3. Charging voltage

- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery as shown.

Positive tester probe →
positive battery terminal ①
Negative tester probe →
negative battery terminal ②



- Start the engine and let it run at approximately 1,000 r/min.
- Measure the charging voltage.

Charging voltage
14 V at 5,000 r/min

NOTE:
Make sure the battery is fully charged.

- Is the charging voltage within specification?

NO → The charging circuit is OK.

YES

EBS01100

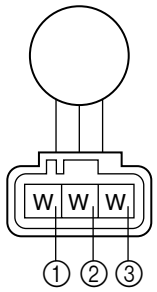
4. Stator coil resistance

- Disconnect the AC magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the stator coils.

Positive tester probe → white terminal ①
Negative tester probe → white terminal ②

Positive tester probe → white terminal ①
Negative tester probe → white terminal ③

Positive tester probe → white terminal ②
Negative tester probe → white terminal ③



- Measure the stator coil resistance.

Stator coil resistance
0.108 ~ 0.132 Ω at 20 °C (68 °F)

YES

NO → Replace the crankshaft position sensor/stator assembly.

5. Wiring

- Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the charging system's wiring properly connected and without defects?

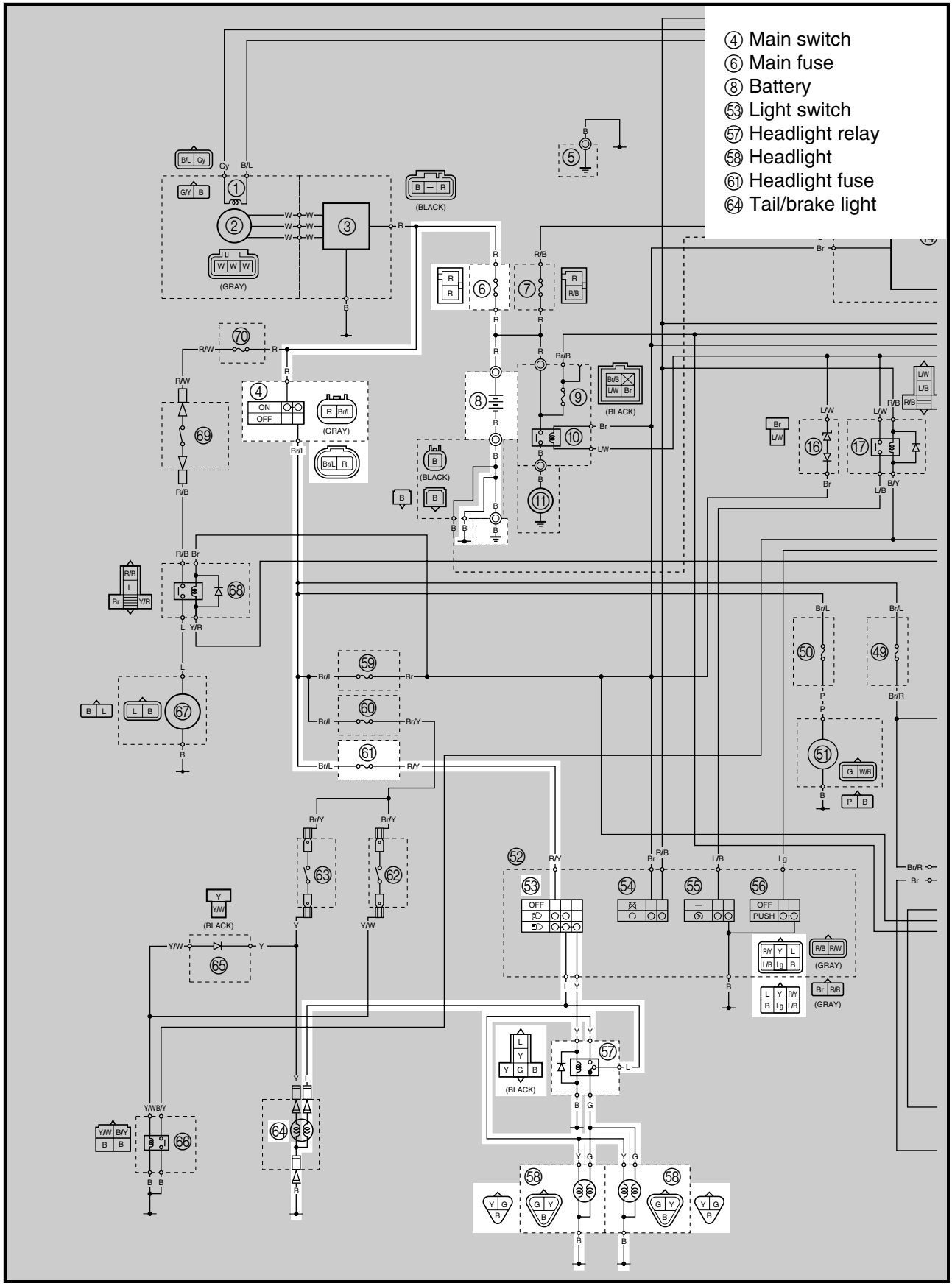
YES → Replace the rectifier/regulator.

NO → Properly connect or repair the charging system's wiring.

EBS00518

LIGHTING SYSTEM

CIRCUIT DIAGRAM



EBS01067
TROUBLESHOOTING

Any of the following fail to light: headlight, tail/brake light.

Check:
1. main and headlight fuses
2. battery
3. main switch
4. light switch
5. wiring connections
   (of the entire lighting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. tail/brake light cover

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main and headlight fuses
- Check the main and headlight fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and headlight fuses OK?

YES → (continue)
NO → Replace the fuse(s).

EBS01044

2. Battery
- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES → (continue)
NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EBS01041

3. Main switch
- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → (continue)
NO → Replace the main switch.

EBS01068

4. Light switch
- Check the light switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the light switch OK?

YES → (continue)
NO → Replace the left handlebar switch.

EBS01069

5. Wiring

- Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system wiring properly connected and without defects?

YES → Check the condition of each of the lighting system circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

NO → Properly connect or repair the lighting system's wiring.

EBS01070

CHECKING THE LIGHTING SYSTEM

1. The headlights fail to come on.

1. Headlight bulb and socket

- Check the headlight bulb and socket for continuity. Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the headlight bulb and socket OK?

YES

NO → Replace the headlight bulb, socket or both.

2. Headlight relay

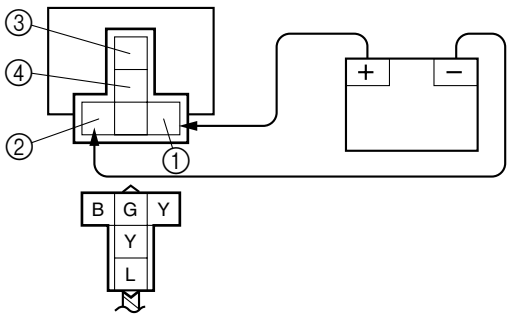
- Remove the headlight relay.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the headlight relay as shown.

A high beam
B low beam

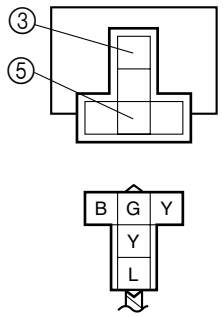
Positive battery terminal → yellow ①
Negative battery terminal → black ②

Positive tester probe → blue ③
Negative tester probe → yellow ④ or green ⑤

A



B



- Does the headlight relay have continuity between blue and yellow? A
- Does the headlight relay have continuity between blue and green? B

YES

NO → Replace the headlight relay.

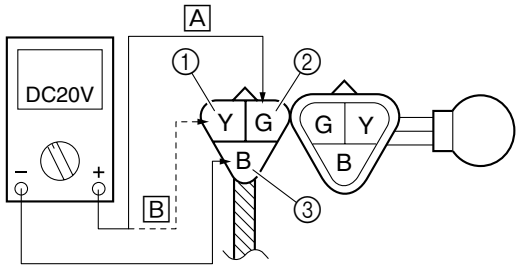
3. Voltage

- Connect the pocket tester (DC 20 V) to the headlight couplers as shown.

A When the light switch is set to "LO"
B When the light switch is set to "HI"

Headlight coupler (wire harness side)

Headlight
Positive tester probe →
yellow ① or green ②
Negative tester probe → black ③



- Set the main switch to "ON".
- Set the light switch to "LO" or "HI".
- Measure the voltage (DC 12 V) of yellow ① or green ② on the headlight coupler (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

2. The taillight fails to come on.

1. Taillight bulb and socket

- Check the taillight bulb and socket for continuity.
  Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Are the taillight bulb and socket OK?

YES

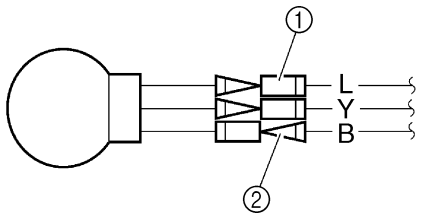
NO → Replace the taillight bulb, socket or both.

2. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light connectors as shown.

Tail/brake light connectors (wire harness side)

Positive tester probe → blue ①
Negative tester probe → black ②



- Set the main switch to "ON".
- Set the light switch to "LO" or "HI".
- Measure the voltage (DC 12 V) of blue ① on the tail/brake light connectors (wire harness side).
- Is the voltage within specification?

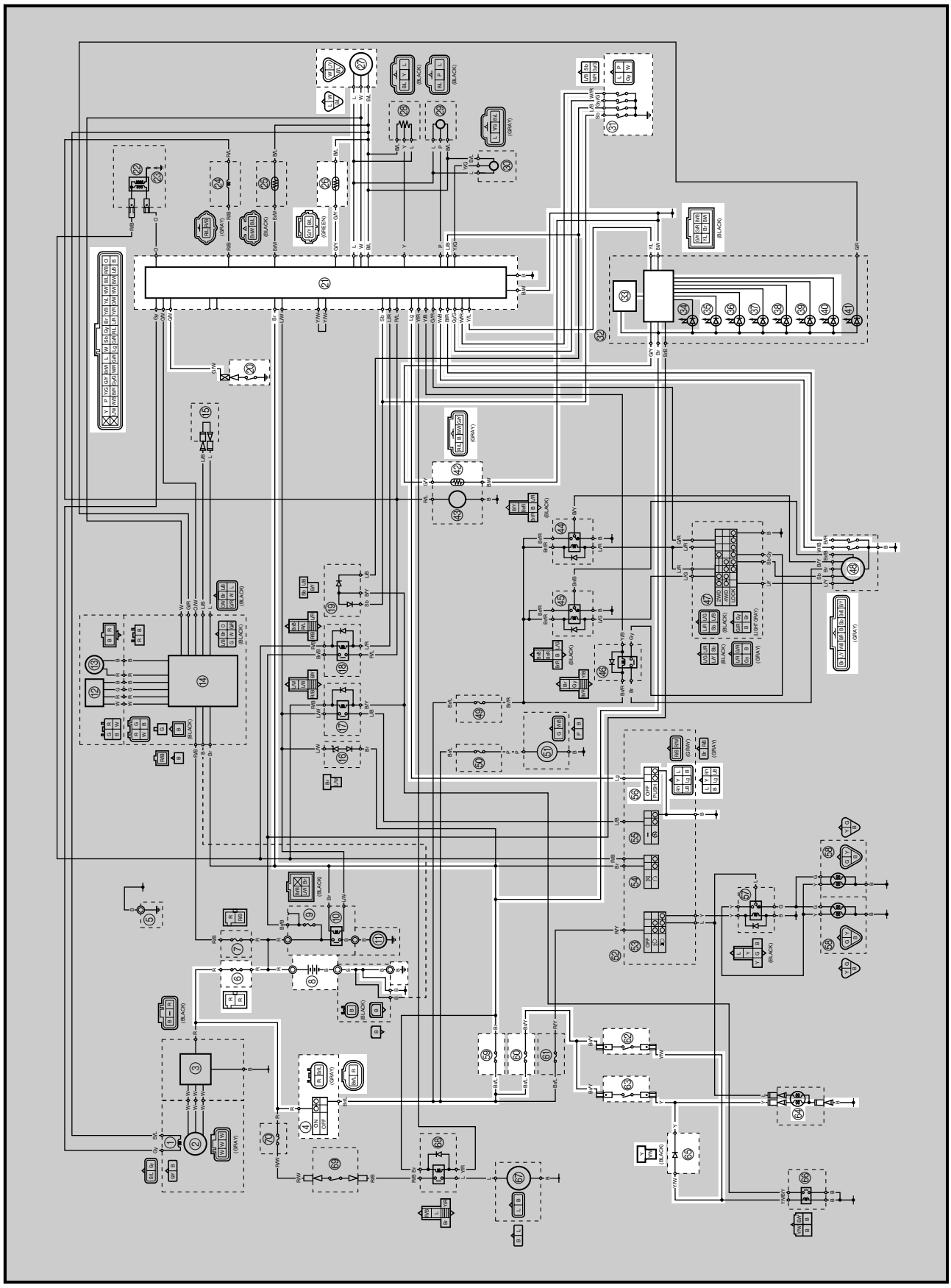
YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tail/brake light connectors are faulty and must be repaired.

EBS00521

SIGNALING SYSTEM

CIRCUIT DIAGRAM



④ Main switch
⑥ Main fuse
⑧ Battery
⑳ Reverse switch
㉑ ECU (engine control unit)
㉖ Coolant temperature sensor
㉗ Speed sensor
㉛ Gear position switch
㉝ Multifunction meter
㉟ Coolant temperature warning light
㊱ Park indicator light
㊲ Reverse indicator light
㊳ Neutral indicator light
㊴ High-range indicator light
㊵ Low-range indicator light
㊷ Fuel sender
㊽ Differential gear motor
㊻ Override switch
㊾ Ignition fuse
㊿ Signaling system fuse
(62) Rear brake light switch
(63) Front brake light switch
(64) Tail/brake light
(65) Diode 3

EBS01073
TROUBLESHOOTING

Any of the following fail to light: warning light, brake light or an indicator light.

Check:
1. main, signaling system and ignition fuses
2. battery
3. main switch
4. wiring connections
   (of the entire signaling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. side panels
4. V-belt cooling duct 2
5. rear fender

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main, signaling system and ignition fuses
   - Check the main, signaling system and ignition fuses for continuity.
     Refer to "CHECKING THE FUSES" in chapter 3.
   - Are the main, signaling system and ignition fuses OK?

YES → NO → Replace the fuse(s).

EBS01044

2. Battery
   - Check the condition of the battery.
     Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES → NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EBS01041

3. Main switch
   - Check the main switch for continuity.
     Refer to "CHECKING THE SWITCHES".
   - Is the main switch OK?

YES → NO → Replace the main switch.

EBS01074

4. Wiring
   - Check the entire signal system wiring.
     Refer to "CIRCUIT DIAGRAM".
   - Is the signaling system wiring properly connected and without defects?

YES → Check the condition of each of the signaling system circuits.
Refer to "CHECKING THE SIGNALING SYSTEM".

NO → Properly connect or repair the signaling system wiring.

EBS01075
CHECKING THE SIGNALING SYSTEM
EBS01076
1. The brake light fails to come on.

1. Brake light bulb and bulb socket
• Check the brake light bulb and bulb socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”. • Are the brake light bulb and bulb socket OK?

⇩ YES ⬇ NO

Replace the brake light bulb, bulb socket or both.

2. Brake light switches
• Check the brake light switches for continuity. Refer to “CHECKING THE SWITCHES”. • Is the brake light switch OK?

⇩ YES ⬇ NO

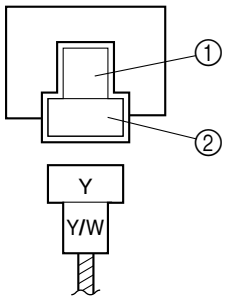
Replace the brake light switch.

EBS01053

3. Diode 3
• Remove the diode 3 from the wire harness. • Connect the pocket tester ($\Omega \times 1$) to the diode 3 as shown. • Measure the diode 3 for continuity as follows.

NOTE:
The pocket tester 90890-03112 and the analog pocket tester YU-03112-C readings are shown in the following table.

Positive tester probe → yellow/white ① Negative tester probe → yellow ②	**Continuity**
Positive tester probe → yellow ② Negative tester probe → yellow/white ①	**No continuity**



• Are the testing readings correct?

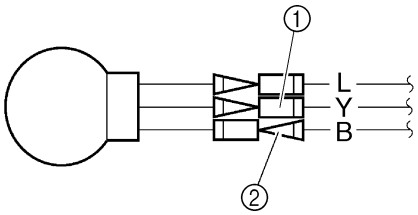
⇩ YES ⬇ NO

Replace the diode 3.

4. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light connectors (wire harness side) as shown.

Positive tester probe → yellow ①
Negative tester probe → black ②



- Set the main switch to "ON".
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (DC 12 V) of yellow ① on the tail/brake light connector (wire harness side).
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit from the main switch to the tail/brake light connector is faulty and must be repaired.

EBS01078

2. The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Gear position switch

- Check the gear position switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the gear position switch OK?

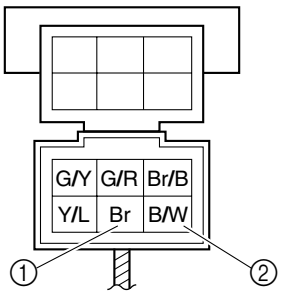
YES

NO → Replace the gear position switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES → Replace the meter assembly or ECU.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EBS01079
3. The reverse indicator light fails to come on.

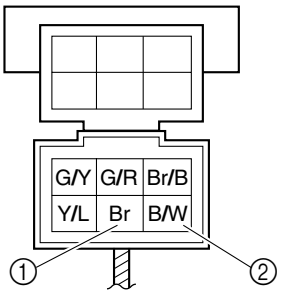
1. Reverse switch
- Check the reverse switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the reverse switch OK?

YES ⇩ NO ⇩

Replace the reverse switch.

2. Voltage
- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES ⇩ NO ⇩

Replace the meter assembly or ECU.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EBS01081
4. The differential gear lock indicator light and/or four-wheel-drive motor indicator light fails to come on.

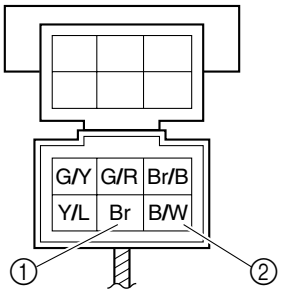
1. Four-wheel-drive motor switch (differential gear motor)
- Check the four-wheel-drive motor switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the four-wheel-drive motor switch OK?

YES ⇩ NO ⇩

Replace the differential gear motor.

2. Voltage
- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



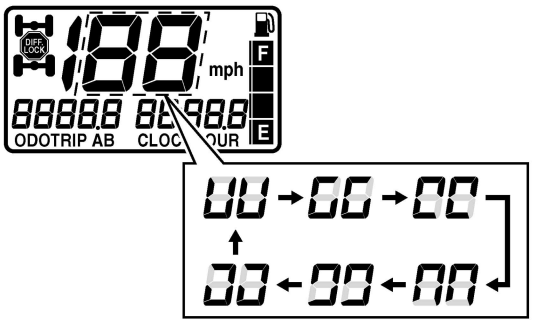
- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES ⇩ NO ⇩

Replace the meter assembly or ECU.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

5. While the override switch is pushed, the segments of the speedometer digits will not appear as shown in the illustration.



1. Override switch

- Check the override switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the override switch OK?

YES

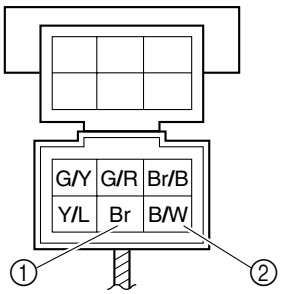
NO

Replace the left handlebar switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to “ON”.
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES

NO

Replace the meter assembly or ECU.

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EBS01083

6. The coolant temperature warning light does not come on when the main switch is set to "ON", or if the coolant temperature warning light does not come on when the temperature is high (more than 112 °C (233.6 °F)).

EBS00812

1. Coolant temperature sensor

- Remove the coolant temperature sensor from the cylinder head.
- Connect the pocket tester ($\Omega \times 100$) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:

Make sure the coolant temperature sensor terminals do not get wet.

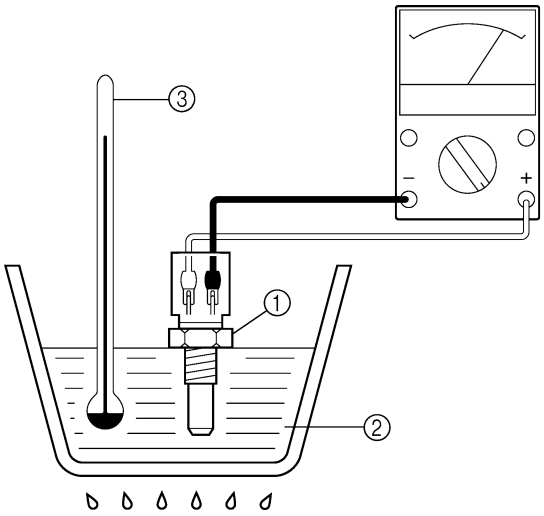
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.

Coolant temperature sensor resistance
290 ~ 354 Ω at 80 °C (176 °F)

⚠ 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.**

Coolant temperature sensor
18 Nm (1.8 m · kg, 13 ft · lb)



- Does the coolant temperature sensor operate properly?

YES

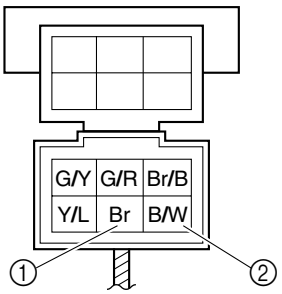
NO

Replace the coolant temperature sensor.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES

Replace the meter assembly or ECU.

NO

The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

7. The fuel level indicator light fails to come on.

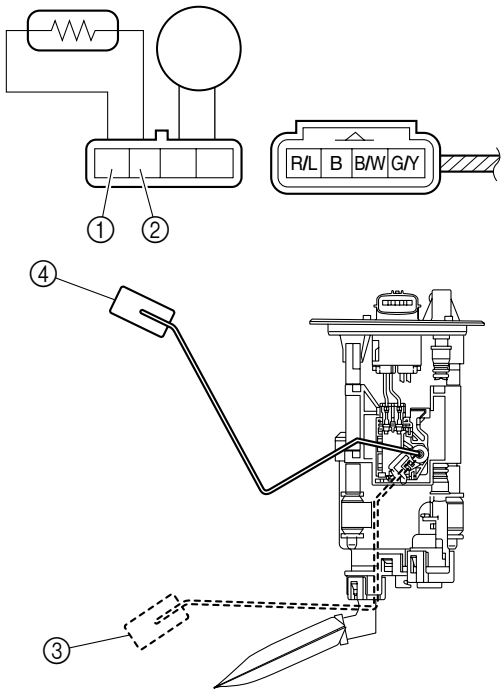
1. Fuel sender

- Drain the fuel from the fuel tank and then remove the fuel pump assembly (fuel sender) from the fuel tank.
- Connect the pocket tester (Ω × 10) to the fuel pump terminals as shown.

Positive tester probe → green/yellow ①
Negative tester probe → black/white ②

- Move the fuel sender float to the minimum ③ and maximum ④ level positions.
- Measure the fuel sender resistance.

Fuel sender resistance
Minimum ③: 139.0 ~ 141.0 Ω
Maximum ④: 19.0 ~ 21.0 Ω



- Is the fuel sender OK?

YES

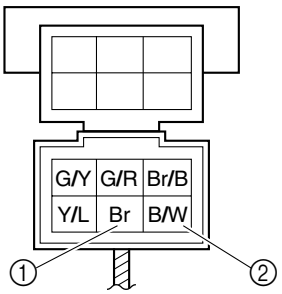
NO

Replace the fuel pump assembly.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

YES → Replace the meter assembly.

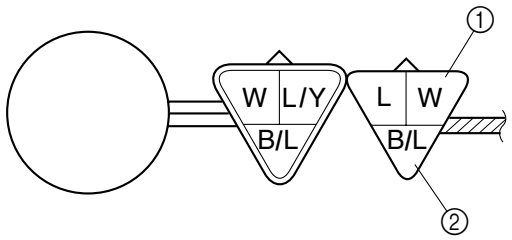
NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

8. The speedometer fails to come on.

1. Speed sensor

- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

Positive tester probe → white ①
Negative tester probe → black/blue ②



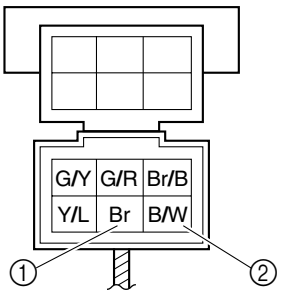
- Turn the main switch to "ON".
- Elevate the rear wheels and slowly rotate them.
- Measure the voltage of white and black/blue. With each full rotation of the rear wheels, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.
- Is the speed sensor OK?

YES → NO → Replace the speed sensor.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe → brown ①
Negative tester probe → black/white ②



- Set the main switch to "ON".
- Measure the voltage (12 V) of brown ① and black/white ② at the meter assembly coupler.
- Is the voltage within specification?

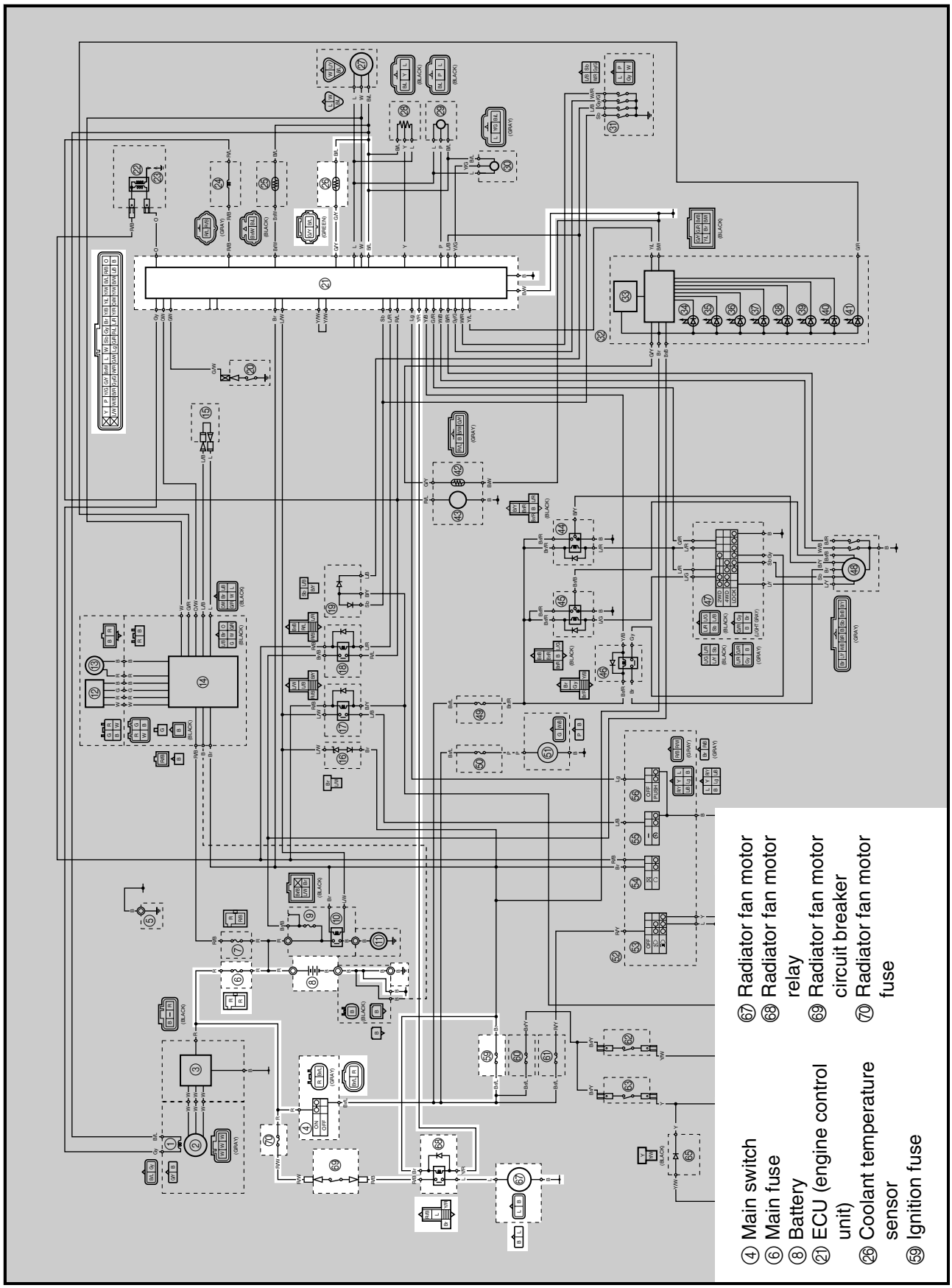
YES → Replace the meter assembly or ECU.

NO → The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.

EBS00532

COOLING SYSTEM

CIRCUIT DIAGRAM



EBS01085
TROUBLESHOOTING

The radiator fan motor fails to turn.

Check:
1. main, ignition, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. radiator fan motor relay
6. radiator fan motor circuit breaker
7. coolant temperature sensor
8. wiring connections
   (the entire cooling system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. side panels
4. front fenders

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main, ignition, and radiator fan motor fuses

- Check the main, ignition, and radiator fan motor fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition, and radiator fan motor fuses OK?

YES

NO → Replace the fuse(s).

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

EBS01041

3. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES

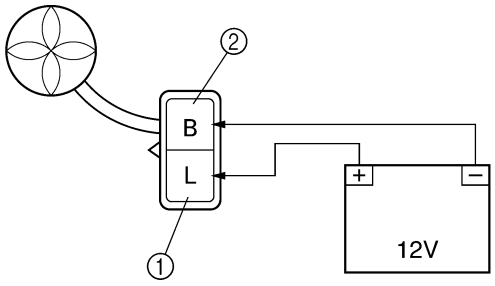
NO → Replace the main switch.

EBS01086

4. Radiator fan motor

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (12 V) as shown.

Positive battery lead → blue ①
Negative battery lead → black ②



- Does the radiator fan motor turn?

YES

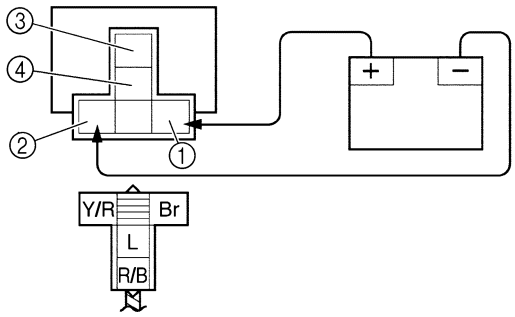
NO → The radiator fan motor is faulty and must be replaced.

5. Radiator fan motor relay

- Remove the radiator fan motor relay from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the radiator fan motor relay terminal as shown.
- Check the radiator fan motor relay of continuity.

Positive battery lead → brown ①
Negative battery lead → yellow/red ②

Positive tester probe → red/black ③
Negative tester probe → blue ④



- Does the radiator fan motor relay have continuity between red/black and blue?

YES

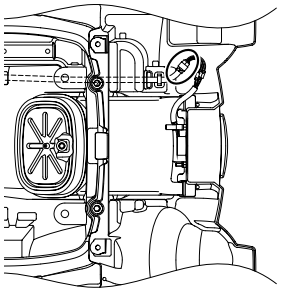
NO → The radiator fan motor relay is faulty and must be replaced.

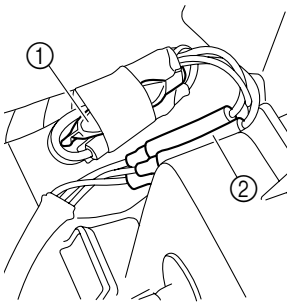
6. Radiator fan motor circuit breaker

- Remove the radiator fan motor circuit breaker from the wire harness.

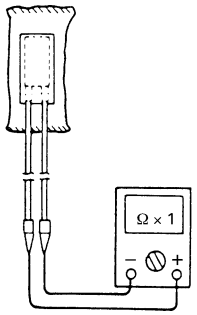
NOTE:

The radiator fan motor circuit breaker ① is attached to the wire harness with black tape near the tail/brake light connectors ②.





- Connect the pocket tester (Ω × 1) to the radiator fan motor circuit breaker.



Radiator fan motor circuit breaker resistance
Zero Ω at 20 °C (68 °F)

YES

NO

Replace the radiator fan motor circuit breaker.

EBS00812

7. Coolant temperature sensor

- Remove the coolant temperature sensor from the cylinder head.
- Connect the pocket tester ($\Omega \times 100$) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:
Make sure the coolant temperature sensor terminals do not get wet.

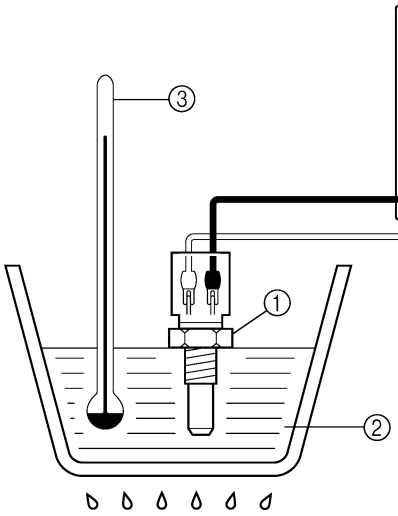
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.

Coolant temperature sensor resistance
290 ~ 354 Ω at 80 °C (176 °F)

⚠ 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.**

Coolant temperature sensor
18 Nm (1.8 m · kg, 13 ft · lb)



- Does the coolant temperature sensor operate properly?

YES → NO

Replace the coolant temperature sensor.

EBS01090

8. Wiring

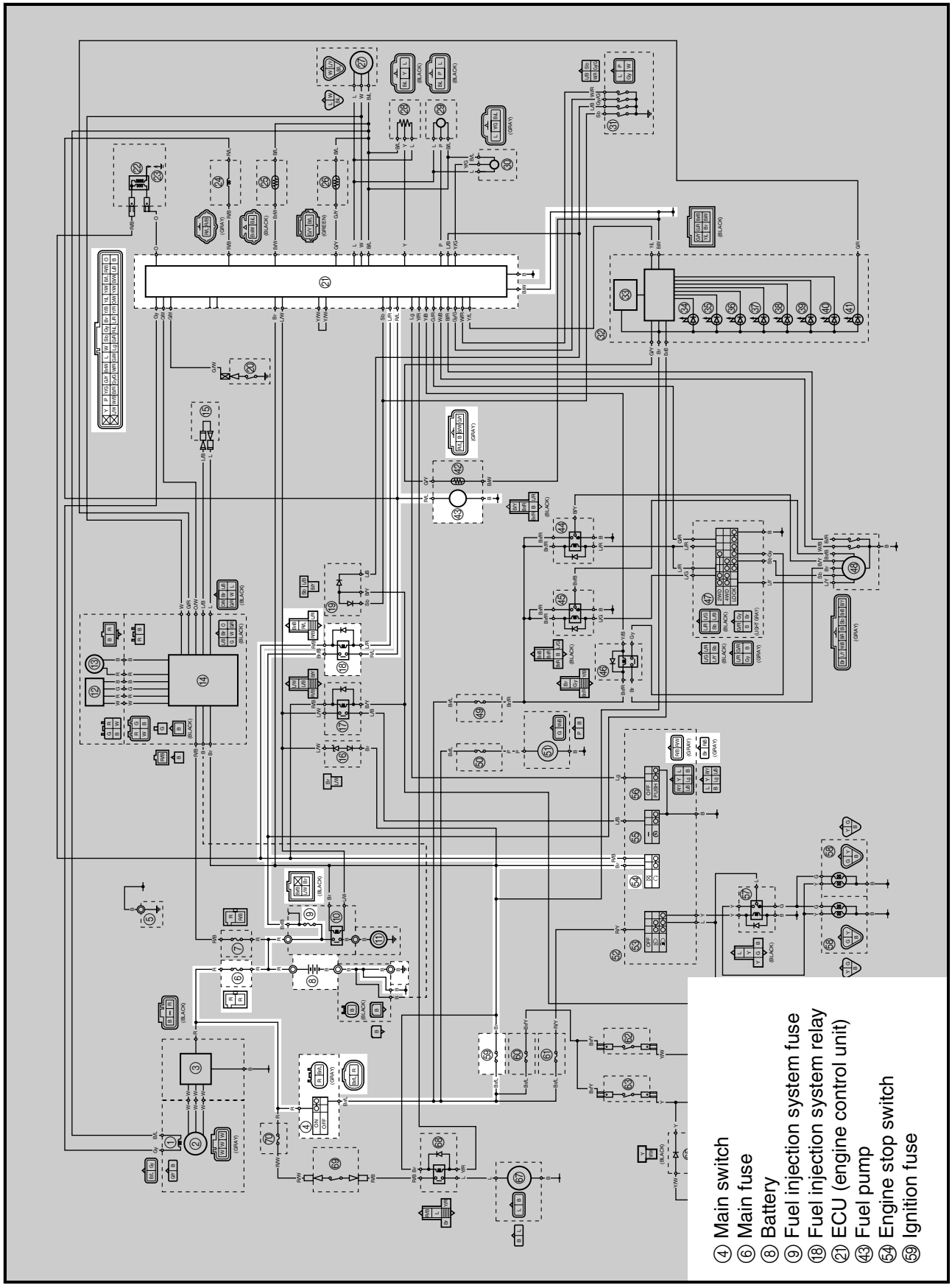
- Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the cooling system's wiring properly connected and without defects?

YES → Replace the ECU.

NO → Properly connect or repair the cooling system's wiring.

FUEL PUMP SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

The fuel pump fails to operate.

Check:
1. main, ignition, and fuel injection system fuses
2. battery
3. main switch
4. engine stop switch
5. fuel injection system relay
6. fuel pump
7. wiring connections (the entire fuel pump system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover
3. rear fender

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main, ignition, and fuel injection system fuses

- Check the main, ignition, and fuel injection system fuses for continuity.
  Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, ignition, and fuel injection system fuses OK?

YES → NO

Replace the fuse(s).

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES → NO

- Clean the battery terminals.
- Recharge or replace the battery.

EBS01041

3. Main switch

- Check the main switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

YES → NO

Replace the main switch.

4. Engine stop switch

- Check the engine stop switch for continuity.
  Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

YES → NO

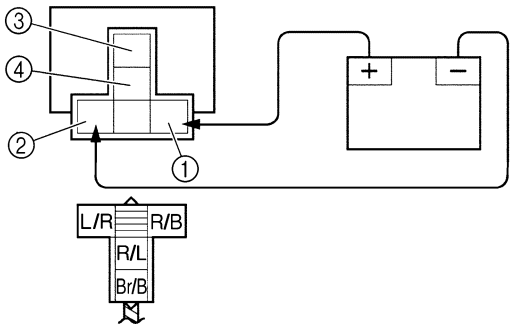
Replace the left handlebar switch.

5. Fuel injection system relay

- Remove the fuel injection system relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the fuel injection system relay terminal as shown.
- Check the fuel injection system relay of continuity.

Positive battery lead → **red/black** ①
Negative battery lead → **blue/red** ②

Positive tester probe → **brown/black** ③
Negative tester probe → **red/blue** ④



- Does the fuel injection system relay have continuity between brown/black and red/blue?

YES

NO → The fuel injection system relay is faulty and must be replaced.

6. Fuel pump

- Check the condition of the fuel pump. Refer to "CHECKING THE FUEL PUMP BODY" in chapter 6.

YES

NO → Replace the fuel pump assembly.

7. Wiring

- Check the entire fuel pump system wiring. Refer to "CIRCUIT DIAGRAM".
- Is the fuel pump system wiring properly connected and without defects?

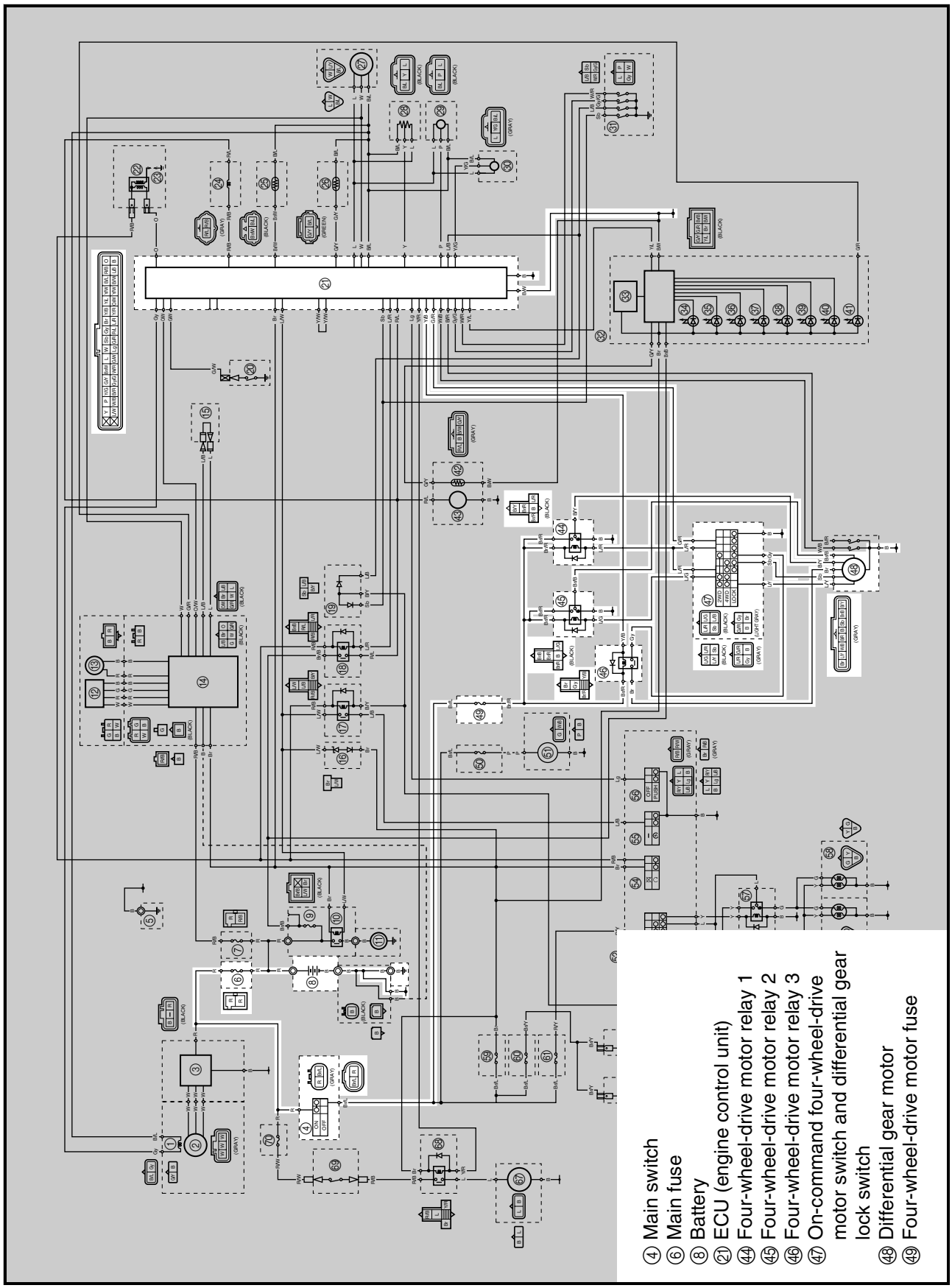
YES → Replace the ECU.

NO → Properly connect or repair the fuel pump system wiring.

EBS00535

2WD/4WD SELECTING SYSTEM

CIRCUIT DIAGRAM



EBS01095
TROUBLESHOOTING

The four-wheel-drive motor indicator light fails to come on.

Check:
1. main and four-wheel-drive motor fuses
2. battery
3. main switch
4. four-wheel-drive motor relay 1
5. four-wheel-drive motor relay 2
6. four-wheel-drive motor relay 3
7. on-command four-wheel-drive motor switch and differential gear lock switch
8. differential gear motor
9. wiring connection
   (the entire 2WD/4WD selecting system)

NOTE:
- Before troubleshooting, remove the following part(s):

1. seat
2. battery cover

- Troubleshoot with the following special tool(s).

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

EBS01043

1. Main and four-wheel-drive motor fuses

- Check the main and four-wheel-drive motor fuses for continuity.
  Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and four-wheel-drive motor fuses OK?

YES ⇩ NO ⇩

Replace the fuse(s).

EBS01044

2. Battery

- Check the condition of the battery.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

YES ⇩ NO ⇩

- Clean the battery terminals.
- Recharge or replace the battery.

EBS01041

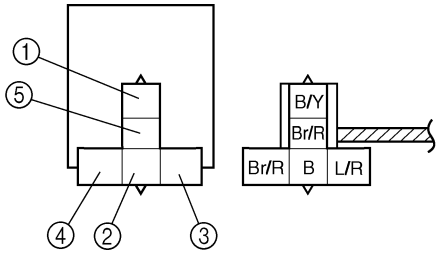
3. Main switch

- Check the main switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

YES ⇩ NO ⇩

Replace the main switch.

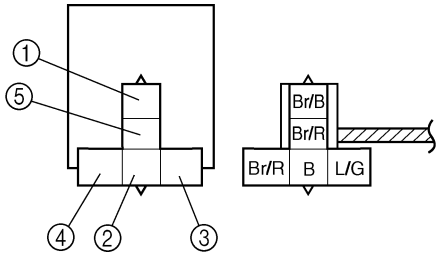
EBS01096

4. Four-wheel-drive motor relay 1
• Remove the four-wheel-drive motor relay 1 from the wire harness. • Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the four-wheel-drive motor relay 1 terminals.
Positive tester probe → **black/yellow** ① **Negative tester probe** → **black** ②
Positive battery terminal → **brown/red** ③ **Negative battery terminal** → **blue/red** ④
Positive tester probe → **black/yellow** ① **Negative tester probe** → **brown/red** ⑤

• Check the four-wheel-drive motor relay 1 for continuity.

YES → Replace the four-wheel-drive motor relay 1.

NO

EBS01097

5. Four-wheel-drive motor relay 2
• Remove the four-wheel-drive motor relay 2 from the wire harness. • Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the four-wheel-drive motor relay 2 terminals.
Positive tester probe → **brown/black** ① **Negative tester probe** → **black** ②
Positive battery terminal → **brown/red** ③ **Negative battery terminal** → **blue/green** ④
Positive tester probe → **brown/black** ① **Negative tester probe** → **brown/red** ⑤

• Check the four-wheel-drive motor relay 2 for continuity.

YES → Replace the four-wheel-drive motor relay 2.

NO

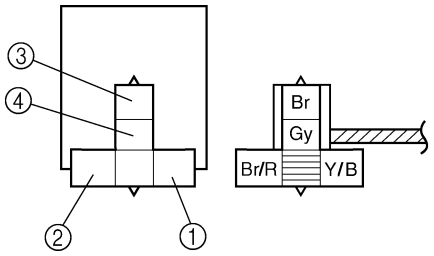
EBS01098

6. Four-wheel-drive motor relay 3

- Remove the four-wheel-drive motor relay 3 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel-drive motor relay 3 terminals.

Positive battery terminal → brown/red ①
Negative battery terminal →
yellow/black ②

Positive tester probe → brown ③
Negative tester probe → gray ④



- Check the four-wheel-drive motor relay 3 for continuity.

YES → Replace the four-wheel-drive motor relay 3.

NO

EBS01092

7. On-command four-wheel-drive motor switch and differential gear lock switch

- Check the on-command four-wheel-drive motor switch and differential gear lock switch for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Is the on-command four-wheel-drive motor switch and differential gear lock switch OK?

YES

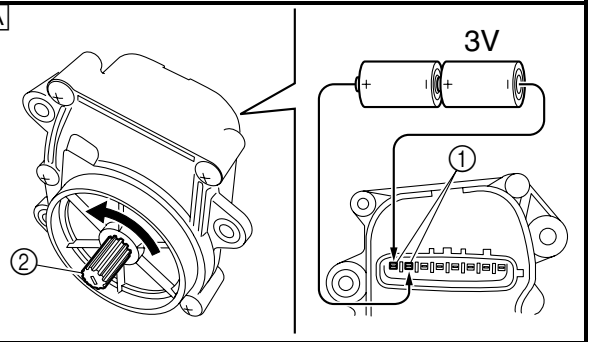
NO → Replace the on-command four-wheel-drive motor switch and differential gear lock switch.

8. Differential gear motor

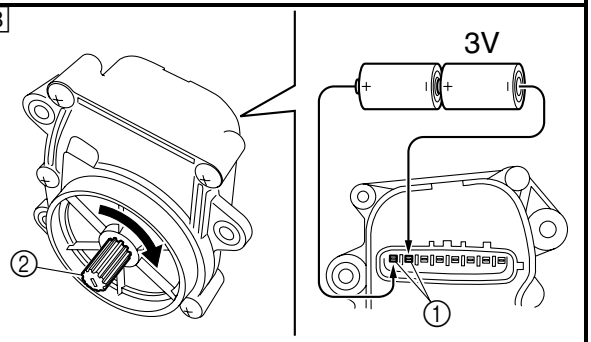
- Disconnect the differential gear motor coupler.
- Remove the differential gear motor from the differential gear case.
  Refer to “FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR” in chapter 7.
- Connect two C size batteries to the differential gear motor terminals ① (as shown illustrations).

A Check that the pinion gear ② turns counterclockwise.
B Check that the pinion gear ② turns clockwise.

A



B



- Make sure that the drive gear (shift fork sliding gear) operates correctly.

NOTE:
When installing the differential gear motor, refer to “FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR” in chapter 7.

YES

NO

Replace the differential gear motor.

EBS01094

9. Wiring connection

- Check the connections of the entire 2WD/4WD selecting system.
  Refer to “CIRCUIT DIAGRAM”.
- Is the 2WD/4WD system wiring properly connected and without defects?

YES

NO

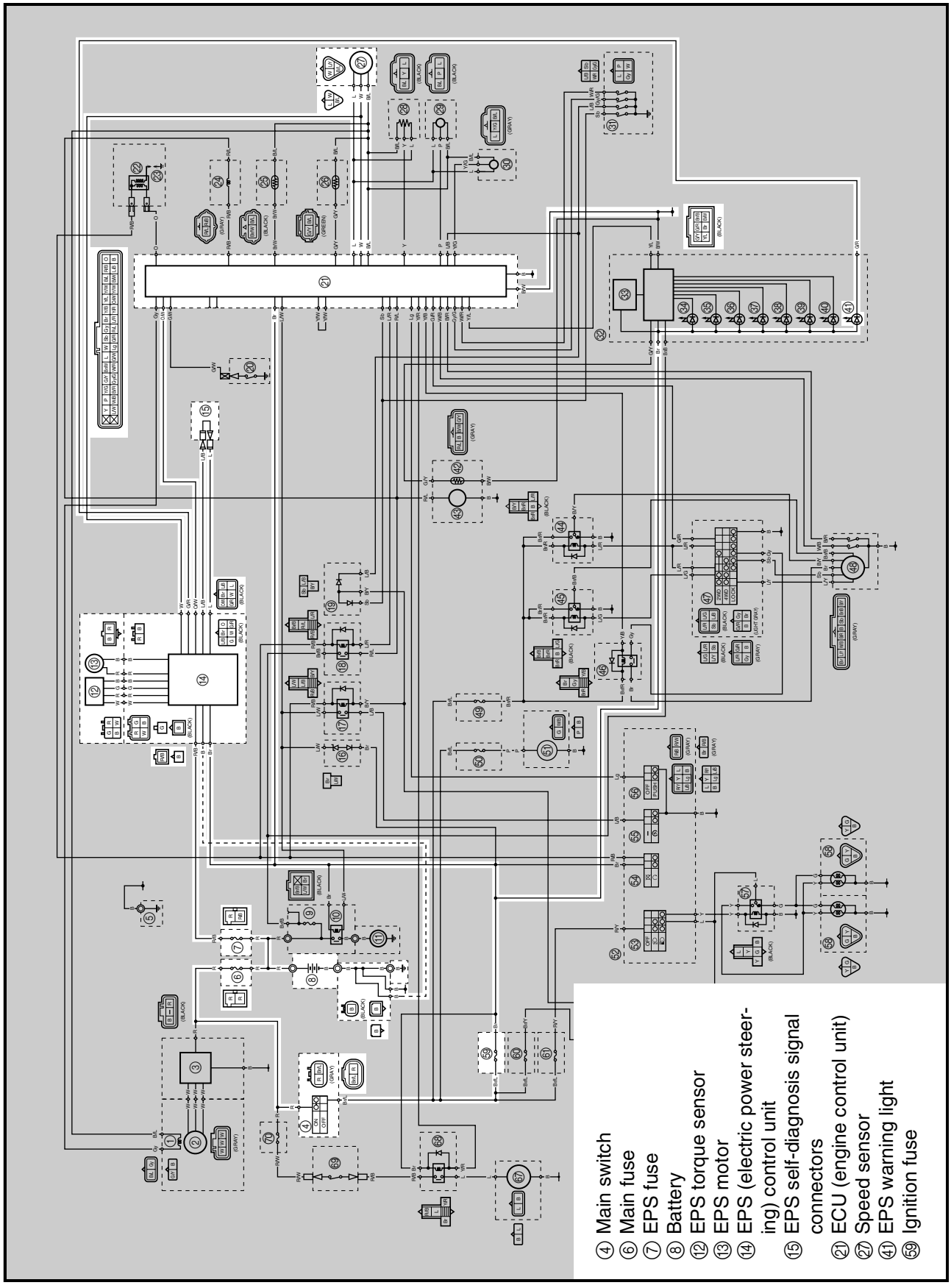
Replace the ECU.

Properly connect or repair the 2WD/4WD selecting system wiring.

EBS00532

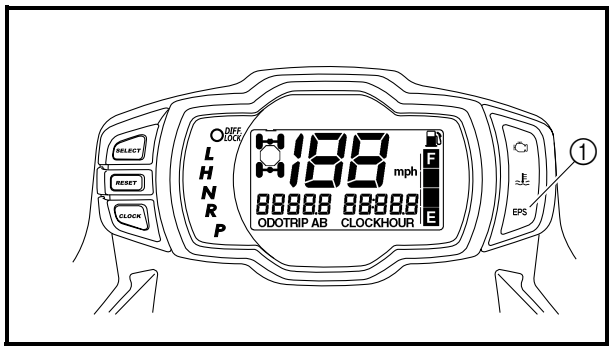
EPS (ELECTRIC POWER STEERING) SYSTEM

CIRCUIT DIAGRAM



EPS CONTROL UNIT'S SELF-DIAGNOSTIC FUNCTION

The EPS control unit is equipped with a self-diagnostic function. If this function detects a malfunction in the EPS system, it lights the EPS warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the EPS control unit memory in the form of a fault code.



① EPS warning light

- The EPS warning light comes on when the main switch is turned to "ON", and then goes off once the engine is started. If the warning light remains on or comes on after the engine is started, the EPS system may be defective.
- The electrical circuit of the warning light can be checked by turning the main switch to "ON". If the warning light does not come on, the electrical circuit may be defective.

NOTE:

- If the engine is stopped using the engine stop switch and the main switch is in the "ON" position, the EPS warning light comes on to indicate that the power assistance for the steering is not functioning.
- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.

EPS WARNING LIGHT DURING NORMAL OPERATION

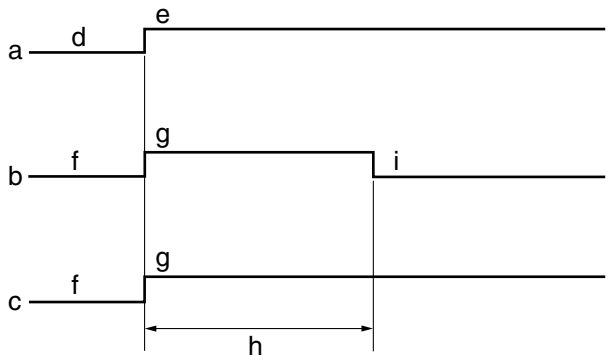
The EPS warning light comes on initially for 2 seconds after the main switch is turned to “ON”. However, the warning light remains on until the engine is started.

In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on.

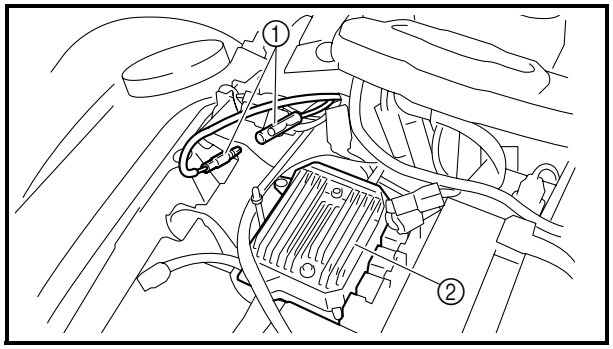
Furthermore, the warning light comes on whenever a malfunction has occurred.

NOTE:

The EPS system does not operate while the EPS warning light is on.



a. Main switch
b. EPS warning light (no malfunction detected)
c. EPS warning light (malfunction detected)
d. OFF
e. ON
f. Off
g. Comes on.
h. Initial lighting: 2 seconds
i. Goes off.



DIAGNOSTIC MODE

Setting the diagnostic mode (present and past malfunctions)

1. Turn the main switch to “ON”.
2. Disconnect the EPS self-diagnosis signal connector ①.

NOTE:

Do not disconnect the EPS self-diagnosis signal connector before turning the main switch to “ON”.

3. Select the signaling mode by grounding the EPS self-diagnosis signal connector (male side) to the EPS control unit ② or disconnecting it from the unit as follows.
   a) Present malfunction signaling mode
      Ground the EPS self-diagnosis signal connector within 5 seconds after turning the main switch to “ON”, and leave it grounded. The signaling mode is activated after 5 seconds.
   b) Past malfunction signaling mode
      While the present malfunction mode is activated, briefly disconnect the EPS self-diagnosis signal connector, ground it again, and leave it grounded. The signaling mode is activated after 5 seconds.
4. Turn the main switch to “OFF” to cancel the diagnostic mode.

NOTE:

- The diagnostic mode can also be canceled by riding the vehicle at speeds above 2 km/h.
- When the diagnostic mode is selected and during the initial lighting of the EPS warning light, the EPS control unit does not receive input from the EPS self-diagnosis signal connector.

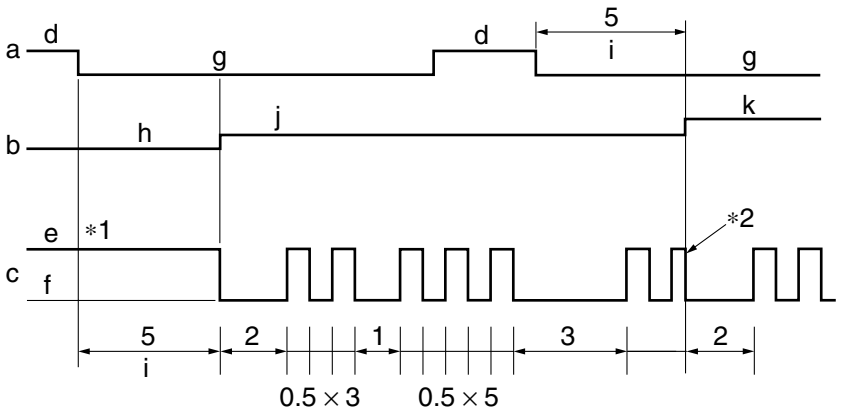
Identifying fault codes

When the diagnostic mode is activated, the fault codes determined by the fail-safe specifications are signaled by the EPS warning light as follows.

- Present malfunction signaling mode: Currently detected fault codes are signaled.
- Past malfunction signaling mode: Both previously detected fault codes and currently detected fault codes are signaled.

Signaling method

Example 1: Fault code No. 23

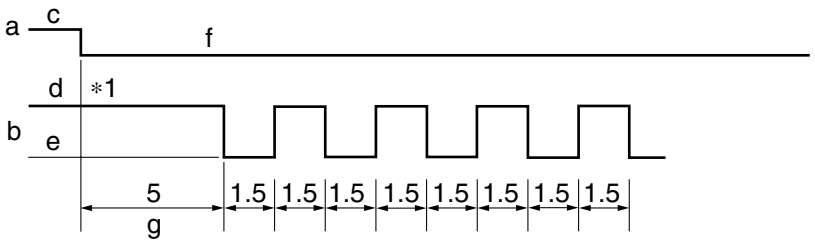


a. EPS self-diagnosis signal connector
b. Diagnostic mode
c. EPS warning light
d. Disconnected
e. On
f. Off
g. Grounded
h. Normal mode (diagnostic mode not activated)
i. Mode selection judgment
j. Present malfunction signaling mode
k. Past malfunction signaling mode

*1 The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.
*2 Display of the present malfunctions stops when the past malfunction display mode is selected.
After the mode selection judgment is completed (present or past malfunction mode), the current fault code signaling stops immediately, and then the first code of the mode is signaled 2 seconds later.

When a fault code is signaled, the EPS warning light goes off for 1 second between the units of 10 and the units of 1 for the code. After a fault code is signaled, the warning light goes off for 3 seconds, and then the next code is signaled.

Example 2: No malfunctions are detected

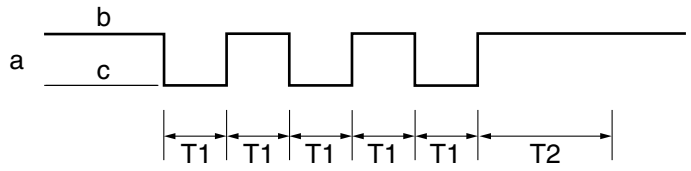


a. EPS self-diagnosis signal connector
b. EPS warning light
c. Disconnected
d. Comes on.
e. Goes off.
f. Grounded
g. Mode selection judgment

*1 The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.
After the mode selection judgment is completed (present display or past malfunction mode), the current fault code signaling stops immediately, and then the EPS warning light starts flashing at 1.5-second intervals.

Deleting fault codes

To delete fault codes, ground the EPS self-diagnosis signal connector 3 or more times within 5 seconds while the present or past malfunction mode is activated. The currently selected mode remains active after the fault codes of that mode are deleted.



a. EPS self-diagnosis signal connector
b. Disconnected
c. Grounded

T1: Connector grounded - - - - $0.1 \leq T1 \leq 1.6$ seconds
T2: Fault codes deleted - - - - - Maximum 1.5 seconds required

SELF-DIAGNOSTIC FUNCTION TABLE (EPS SYSTEM)

Fault code No.	Item	Symptom	Probable cause of malfunction
11 13 15 16	EPS torque sensor	No normal signals are received from the torque sensor.	• Open or short circuit in wire harness. • Malfunction in torque sensor. • Malfunction in EPS control unit.
21	Speed sensor	No normal signals are received from the speed sensor.	• Open or short circuit in wire harness. • Malfunction in speed sensor. • Malfunction in EPS control unit.
22	Engine speed signal	No normal signals are received from the ECU.	• Open or short circuit in wire harness. • Malfunction in ECU. • Malfunction in EPS control unit.
41 42 43 45	EPS motor	No normal signals are received from the EPS motor.	• Open or short circuit in wire harness. • Malfunction in EPS motor. • Malfunction in EPS control unit.
52	EPS control unit	Relay contacts in the EPS control unit are welded together.	Malfunction in EPS control unit.
53	EPS control unit	Battery voltage has dropped.	• Faulty battery. • Malfunction in the charging system. Refer to “CHARGING SYSTEM”. • Malfunction in EPS control unit.
54	EPS control unit	Relay contacts in the EPS control unit are welded together.	Malfunction in EPS control unit.
55	EPS control unit	Battery voltage has increased. Abnormality exists between the EPS and the ECU.	• Malfunction in the charging system. Refer to “CHARGING SYSTEM”. • Malfunction in EPS control unit.

TROUBLESHOOTING DETAILS (EPS SYSTEM)

NOTE:

The malfunction history is stored even if the main switch is turned to “OFF”, therefore, be sure to erase the history (present and past malfunction signaling modes) after repairing the cause of the EPS system malfunction. The malfunction history must be erased in the diagnostic mode. Refer to “DIAGNOSTIC MODE” and “Deleting fault codes”.

Fault code No.	**11, 13, 15, 16**	**Symptom**	**EPS torque sensor: open or short circuit detected.**

Order	**Item/components and probable cause**	**Check or maintenance job**	**Reinstatement method**
1	Connections • EPS torque sensor coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Turning the main switch to “OFF”.
2	Defective EPS torque sensor.	• Replace if defective. Refer to “CHECKING THE EPS TORQUE SENSOR”.	
3	Open or short circuit in EPS torque sensor lead.	• Repair or replace if there is an open or short circuit. • Between EPS torque sensor coupler and EPS control unit coupler. (white–white) (red–red) (green–green) (black–black)	

Fault code No.	21	Symptom	Speed sensor: open or short circuit detected.	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Speed sensor coupler • EPS control unit coupler at the wire harness		• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h, or turning the main switch to “OFF”, then to “ON”, and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” and “Deleting fault codes”.
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between speed sensor coupler and EPS control unit coupler. (white–white)	
3	Defective speed sensor.		• Execute the diagnostic mode. (Code No.21) • Replace if defective. Refer to “SIGNALING SYSTEM”.	

Fault code No.	22	Symptom	No normal signals are received from the ECU.	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • EPS control unit coupler at the wire harness • ECU coupler at the wire harness		• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Turning the main switch to “OFF”.
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ECU coupler and EPS control unit coupler. (orange/white–orange/white)	
3	Malfunction in ECU.		Replace the ECU.	

Fault code No.	41, 42, 43, 45	Symptom	EPS motor: open or short circuit detected.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • EPS motor coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Turning the main switch to "OFF".
2	Open or short circuit in EPS motor lead.	• Repair or replace if there is an open or short circuit. • Between EPS motor and EPS control unit coupler. (red–red) (black–black)	
3	Defective EPS motor.	Replace if defective. Refer to "CHECKING THE EPS MOTOR".	

Fault code No.	52	Symptom	Relay contacts in the EPS control unit are welded together.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in EPS control unit.	Replace the EPS control unit.	Turning the main switch to "OFF".

Fault code No.	53	Symptom	Power supply to the EPS control unit is not normal (low battery voltage).

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Faulty battery.	Replace or charge the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.	Turning the main switch to "OFF".
2	Malfunction in rectifier/regulator or charging system.	Replace if defective. Refer to "CHARGING SYSTEM".	
3	Malfunction in EPS control unit.	Replace the EPS control unit.	

Fault code No.	54	Symptom	Relay contacts in the EPS control unit are welded together.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in EPS control unit.	Replace the EPS control unit.	Turning the main switch to “OFF”.

Fault code No.	55	Symptom	Power supply to the EPS control unit is not normal (High battery voltage). Malfunction in control unit.

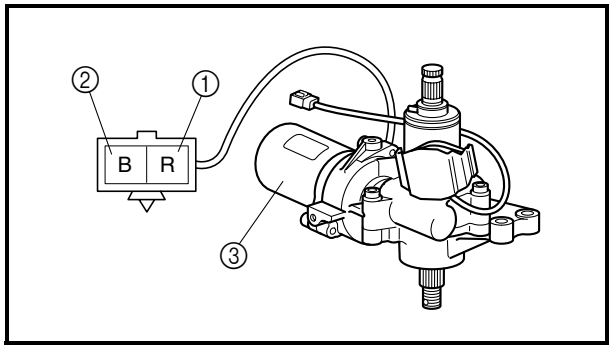
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Faulty battery.	Replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.	Turning the main switch to “OFF”.
2	Malfunction in rectifier/regulator.	Replace if defective. Refer to “CHARGING SYSTEM”.	
3	Malfunction in EPS control unit.	Replace the EPS control unit.	

CHECKING THE EPS MOTOR

1. Remove:
   - EPS unit
2. Check:
   - EPS motor
     Out of specification → Replace.

NOTE:

The pocket tester and the analog pocket tester readings are shown in the following table.



Continuity
Positive tester probe → red ①
Negative tester probe → black ②
No continuity
Positive tester probe → red ①
Negative tester probe → EPS motor body ③
No continuity
Positive tester probe → black ②
Negative tester probe → EPS motor body ③

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a. Connect the pocket tester (Ω × 1) to the EPS motor coupler terminal and EPS motor body.

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

b. Check the EPS motor for continuity.
c. Check the EPS motor for no continuity.

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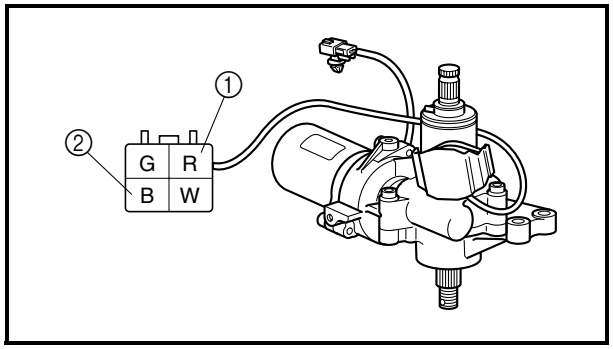
CHECKING THE EPS TORQUE SENSOR

1. Remove:
   - EPS unit
2. Check:
   - EPS torque sensor resistance
     Out of specification → Replace.

EPS torque sensor resistance
1.00 ~ 1.50 kΩ



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a. Connect the pocket tester (Ω × 1k) to the EPS torque sensor coupler terminal as shown.

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

Positive tester probe → red ①
Negative tester probe → black ②

b. Measure the EPS torque sensor resistance.

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EBS00537

TROUBLESHOOTING

NOTE:
The following troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for check, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel tank drain hose
- Deteriorated or contaminated fuel

Fuel pump
- Faulty fuel pump
- Faulty fuel injection system relay

Throttle body
- Deteriorated or contaminated fuel
- Sucked-in air

Air filter
- Clogged air filter element

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

Ignition system
- Faulty ECU
- Faulty crankshaft position sensor
- Broken AC magneto rotor woodruff key

Switches and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty gear position switch
- Faulty start switch
- Faulty brake light switch

Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starter circuit cut-off relay
- Faulty starter clutch

Battery
- Faulty battery

Fuse(s)
- Blown, damaged or incorrect fuse
- Improperly installed fuse

COMPRESSION SYSTEM

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Broken cylinder gasket
- Worn, damaged or seized cylinder

Valve, camshaft and crankshaft
- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring
- Seized camshaft
- Seized crankshaft

Piston and piston rings
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

Valve train
- Improperly adjusted valve clearance
- Improperly adjusted valve timing

EBS00538

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Throttle body
- Damaged or loose throttle body joint
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable play
- Flooded throttle body

Electrical system
- Faulty spark plug
- Faulty ECU
- Faulty crankshaft position sensor
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

EBS00539

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING” and “POOR IDLE SPEED PERFORMANCE”.

Fuel pump
- Faulty fuel pump

Air filter
- Clogged air filter element

EBS00540

FAULTY DRIVE TRAIN

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. 3. A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.	A. Bearing damage. B. Improper gear lash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EBS00542

FAULTY GEAR SHIFTING

HARD SHIFTING

Refer to “FAULTY CLUTCH PERFORMANCE”.

SHIFT LEVER DOES NOT MOVE

Shift drum, shift forks
- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

Shift guide
- Broken shift guide

JUMPS OUT OF GEAR

Shift forks
- Worn shift fork

Shift drum
- Improper thrust play
- Worn shift drum groove

Transmission
- Worn gear dog

EBS00543

FAULTY CLUTCH PERFORMANCE

ENGINE OPERATES BUT VEHICLE WILL NOT MOVE

V-belt
- Bent, damaged or worn V-belt
- V-belt slips

Primary pulley cam and primary pulley slider
- Damaged or worn primary pulley cam
- Damaged or worn primary pulley slider

Transmission
- Damaged transmission gears

CLUTCH SLIPPING

Clutch spring
- Damaged, loose or worn clutch shoe spring

Clutch shoe
- Damaged or worn clutch shoe

Primary sliding sheave
- Seized primary sliding sheave

POOR STARTING PERFORMANCE

V-belt
- V-belt slips
- Oil or grease on the V-belt

Primary sliding sheave
- Faulty operation
- Worn pin groove
- Worn pin

Clutch shoe
- Bent, damaged or worn clutch shoe

POOR SPEED PERFORMANCE

V-belt
- Oil or grease on the V-belt

Primary pulley weight
- Faulty operation
- Worn primary pulley weight

Primary fixed sheave
- Worn primary fixed sheave

Primary sliding sheave
- Worn primary sliding sheave

Secondary fixed sheave
- Worn secondary fixed sheave

Secondary sliding sheave
- Worn secondary sliding sheave

EBS00546

OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty ECU

Fuel system
- Faulty throttle body
- Damaged or loose throttle body joint
- Clogged air filter element

Compression system
- Heavy carbon build-up

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

Cooling system
- Low coolant level
- Clogged or damaged radiator
- Damaged or faulty water pump
- Faulty fan motor
- Faulty coolant temperature sensor

EBS00548

OVERCOOLING

COOLING SYSTEM

Thermostat
- Thermostat stays open

EBS00550

FAULTY BRAKE

POOR BRAKING EFFECT

Disc brake
- Worn brake pads
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty master cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose and pipe
- Oily or greasy disc/brake pads
- Improper brake fluid level

EBS00551

SHOCK ABSORBER MALFUNCTION

MALFUNCTION

- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring

EBS00552

UNSTABLE HANDLING

UNSTABLE HANDLING

Handlebar

- Improperly installed or bent

Steering

- Incorrect toe-in
- Bent steering stem
- Improperly installed steering stem
- Damaged bearing or bearing race
- Bent tie-rods
- Deformed steering knuckles

Tires

- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Wheels

- Deformed wheel
- Loose bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame

- Bent
- Damaged frame

EBS00553

LIGHTING SYSTEM

HEADLIGHT DOES NOT COME ON

- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil and/or faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or light switch)
- Bulb life expired

BULB BURNT OUT

- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or light switch
- Bulb life expired

YFM7FGPW 2007 WIRING DIAGRAM

① Crankshaft position sensor
② AC magneto
③ Rectifier/regulator
④ Main switch
⑤ Frame ground
⑥ Main fuse
⑦ EPS fuse
⑧ Battery
⑨ Fuel injection system fuse
⑩ Starter relay
⑪ Starter motor
⑫ EPS torque sensor
⑬ EPS motor
⑭ EPS (electric power steering) control unit
⑮ EPS self-diagnosis signal connectors
⑯ Diode 1
⑰ Starting circuit cut-off relay
⑱ Fuel injection system relay
⑲ Diode 2
⑳ Reverse switch
㉑ ECU (engine control unit)
㉒ Ignition coil
㉓ Spark plug
㉔ Fuel injector
㉕ Intake air temperature sensor
㉖ Coolant temperature sensor
㉗ Speed sensor
㉘ TPS (throttle position sensor)
㉙ Intake air pressure sensor
㉚ Lean angle sensor
㉛ Gear position switch
㉜ Meter assembly
㉝ Multifunction meter
㉞ Engine trouble warning light
㉟ Coolant temperature warning light
㊱ Park indicator light
㊲ Reverse indicator light
㊳ Neutral indicator light
㊴ High-range indicator light
㊵ Low-range indicator light
㊶ EPS warning light
㊷ Fuel sender
㊸ Fuel pump
㊹ Four-wheel-drive motor relay 1
㊺ Four-wheel-drive motor relay 2
㊻ Four-wheel-drive motor relay 3
㊼ On-command four-wheel-drive motor switch and differential gear lock switch
㊽ Differential gear motor
㊾ Four-wheel-drive motor fuse
㊿ Auxiliary DC jack fuse
(51) Auxiliary DC jack
(52) Left handlebar switch
(53) Light switch
(54) Engine stop switch
(55) Start switch
(56) Override switch
(57) Headlight relay
(58) Headlight
(59) Ignition fuse
(60) Signaling system fuse
(61) Headlight fuse
(62) Rear brake light switch
(63) Front brake light switch
(64) Tail/brake light
(65) Diode 3
(66) Rear brake relay
(67) Radiator fan motor
(68) Radiator fan motor relay
(69) Radiator fan motor circuit breaker
(70) Radiator fan motor fuse

COLOR CODE

B..... Black
Br ..... Brown
G ..... Green
Gy ..... Gray
L ..... Blue
Lg ..... Light green
O ..... Orange
P..... Pink
R ..... Red
Sb..... Sky blue
W..... White
Y..... Yellow
B/L..... Black/Blue
B/R ..... Black/Red
B/W ..... Black/White
B/Y ..... Black/Yellow
Br/B ..... Brown/Black
Br/L ..... Brown/Blue
Br/R..... Brown/Red
Br/W ..... Brown/White
Br/Y ..... Brown/Yellow
G/R..... Green/Red
G/W ..... Green/White
G/Y ..... Green/Yellow
Gy/G..... Gray/Green
L/B..... Blue/Black
L/G ..... Blue/Green
L/R ..... Blue/Red
L/W..... Blue/White
L/Y..... Blue/Yellow
O/G ..... Orange/Green
O/W..... Orange/White
R/B ..... Red/Black
R/L ..... Red/Blue
R/W ..... Red/White
R/Y ..... Red/Yellow
W/B ..... White/Black
W/L..... White/Blue
W/R ..... White/Red
Y/B ..... Yellow/Black
Y/G..... Yellow/Green
Y/L..... Yellow/Blue
Y/R ..... Yellow/Red
Y/W ..... Yellow/White

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